Cessna
A Textron Company

Maintenance Manual

MODEL 172 SERIES 1996 & ON

Member of GAMA

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CESSNA AIRCRAFT COMPANY
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LIST OF MANUFACTURERS' TECHNICAL PUBLICATIONS

1. List of Manufacturers' Technical Publications

A. Outlined below is a list of manufacturers' publications.

CHAPTER 22 - AUTOFLIGHT

Item	Cessna Part Number	Manufacturers' Part Number	Publication Part Number	Publication Title	Manufacturer
GFC -700 Autopilot			190-00352-00	G1000 Line Maintenance Manual	Garmin International, Inc. 1200 East 151st Street Olathe, KS 66062
Autopilot Servo		GSA 8X/GSM 85	190-00303-72	Installation Manual	Garmin International, Inc.
Autopilot		KAP140	006-00991-0002	KAP 140 Installation Manual	Allied Signal 101 N. Industrial Pkwy New Century, KS 66031

CHAPTER 23 - COMMUNICATIONS

Item	Cessna Part Number	Manufacturers' Part Number	Publication Part Number	Publication Title	Manufacturer
Nav-Com		KX155A	006-10542-0000	Nav/Com Installation Manual	Allied Signal
GIA 63 Integrated Avionics Unit				G1000 Line Maintenance Manual	Garmin International, Inc.

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CHAPTER 24 - ELECTRICAL POWER

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
24 Volt Battery Charger		TSC-01V		Teledyne Battery Products TSC-01V 24 Volt Battery Charger	Teledyne Continental Motors Battery Products 840 W. Brockton Avenue Redlands, CA 92374 Phone: 1-800-456-0070
Standby Battery		AVT-200413		Cyclon Selection Guide (Third Edition) (NOTE 1)	AVT Inc. DBA Electritek - AVT 400 East Mineral Avenue Littleton, CO 80122-2604 Hawker 617 North Ridgeview Drive Warrensburg, MO 64093-9301

NOTE 1: The power cells inside the Standby Battery are manufactured by Hawker and the manufacturer publication that is shown above is from Hawker. AVT is the supplier of the Standby Battery pack that is installed in the airplane. The data shown in the Hawker manual is informational only. Maintenance procedures for the Standby Battery given in Chapter 24, Standby Battery - Maintenance Practices must be followed.

CHAPTER 25 - EQUIPMENT FURNISHING

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Air Bag Assembly		7035-1-011-8105 (Co-Pilot's Seat) 7035-1-021-8105 (Pilot's Seat) 7035-2-011-8105 (LH Rear Seat) 7035-2-021-8105 (RH Rear Seat)	E508804	Supplemental Maintenance Manual	AmSafe Aviation 5456 E. McDowell Rd. Mesa, AZ 85215 www.amsafe.com

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CHAPTER 25 - EQUIPMENT FURNISHING

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Inflation Assembly		508792-401 (Co-Pilot's Seat) 508794-401 (Pilot's Seat)	E508804	Supplemental Maintenance Manual	AmSafe Aviation
Electron-ics Module Assembly		508358-409	E508804	Supplemental Maintenance Manual	AmSafe Aviation
Three-Point Air Bag Belt		7035-2030118105 (Co-Pilot's Seat) 7035-2040218105 (Pilot's Seat) 7035-2050218105 (LH Rear Seat) 7035-2060218105 (RH Rear Seat)	E508804	Supplemental Maintenance Manual	AmSafe Aviation
V23 System Diagnostic Tool		508668-201	E508804	Supplemental Maintenance Manual	AmSafe Aviation

CHAPTER 32 - LANDING GEAR

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Cleveland Wheels and Brakes		None		Component Maintenance Manual	Cleveland Wheels and Brakes/Parker Aerospace Parker Hannifin Corporation 1160 Center Road Avon, OH 44011

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CHAPTER 34 - NAVIGATION

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Blind Encoder		SSD120-20	M881000D	Altitude Encoder/ Digitizer Owner/ Installation Manual	Trans-Cal Industries, Inc. 16141 Cohasset St. Van Nuys, CA 91406
Automatic Direction Finder		KR87	006-00184-0005	Installation Manual	Allied Signal
Global Positioning System		KLN89/89B	006-10522-0001	Installation Manual	Allied Signal
Autopilot		KAP 140	006-00991-0000	Installation Manual	Allied Signal
Nav Indicators		KI208/209	006-0140-0003	Installation Manual	Allied Signal
Nav Indicators		KI209A	006-10543-0000	Installation Manual	Allied Signal
GDC 74 Air Data Unit				G1000 Line Maintenance Manual	Garmin International, Inc.
GIA 63 Integrated Avionics Unit				G1000 Line Maintenance Manual	Garmin International, Inc.
GMU 44 Magnetometer				G1000 Line Maintenance Manual	Garmin International, Inc.
GRS 77 AHRS				G1000 Line Maintenance Manual	Garmin International, Inc.
GTX 33 Transponder				G1000 Line Maintenance Manual	Garmin International, Inc.
GDU 1040 (PFD/ MFD)				G1000 Line Maintenance Manual	Garmin International, Inc.

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CHAPTER 71 - POWERPLANT

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Engine		IO360-L2A	60297-12	Operator's Manual Textron Lycoming Aircraft Engines	Textron Lycoming 652 Oliver Street Williamsport, PA 17701
Engine		IO360-L2A	PC-306-12	Parts Catalog	Textron Lycoming
Engine		IO360-L2A	60294-7	Direct Drive Engine Overhaul Manual	Textron Lycoming

CHAPTER 73 - ENGINE FUEL AND CONTROL

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Fuel Injection System		RSA-5	15-338D	RSA-5 & RSA-10 Fuel Injection Systems Operation & Service Manual	Precision Airmotive 3220 100th St S.W.#E Everett, WA 98204
Fuel Injection System		RSA-5	15-810B	Troubleshooting Techniques for the Precision Airmotive RSA Fuel Metering System	Precision Airmotive

CHAPTER 74 - IGNITION

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
Magneto		6351/6361	L-1363C	4300/6300 Series Magneto Maintenance and Overhaul Manual	Slick Aircraft Products 530 Blackhawk Park Ave. Rockford, IL 61104

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CHAPTER 77 - ENGINE INDICATING

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
GEA 71 Engine/ Airframe Unit				G1000 Line Maintenance Manual	Garmin International, Inc.

CHAPTER 79 - OIL

Item	Cessna Part Number	Manufacturers Part Number	Publication Part Number	Publication Title	Manufacturer
GDU 1040				G1000 Line Maintenance Manual	Garmin International, Inc.

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SERVICE BULLETIN LIST

1. Service Bulletins

Service Bulletin Number	Title	Service Bulletin Date	Manual Incorporation
SB97-11-01	Pilot's Operating Handbook and Checklist Revision	May 12/97	May 3/99
SB97-11-04	Aft Baggage Placard Inspection/Replacement	Nov 3/97	May 3/99
SB97-11-05	Altimeter Certification Logbook Entry Verification	Dec 15/97	May 3/99
SB97-22-01	Bendix/King Autopilot Flight Computer Modification	Oct 6/97	May 3/99
SB97-24-01	Electrical Wire Bundle Inspection	Dec 15/97	May 3/99
SB97-25-01	Aft Bench Seat Back Modification	Aug 11/97	May 3/99
SB97-26-01	Fire Extinguisher Mounting Bracket Inspection	Dec 22/97	May 3/99
SB97-27-01 R1	Inspection of Elevator and Elevator Trim Control Cable Pulleys	Dec 14/98	May 3/99
SB97-28-01	Inspection of Fuel Strainer Drain and Engine Muffler Tailpipe	Jun 6/97	May 3/99
SB97-33-01 R1	Light Dimming Module Resistor Installation Inspection	Dec 14/98	May 3/99
SB97-34-01	KLN 89B GPS Navigation System Approach Restrictions	Jul 2/97	May 3/99
SB97-34-02 R1	Alternate Static Source Valve Inspection	Dec 6/97	May 3/99
SB97-53-01	Inspection of Fuselage Station 205.812 Tailcone Bulkhead	Jul 1/97	May 3/99
SB97-53-02 R1	Lower Forward Doorpost Fastener Installation	Sep 15/97	May 3/99
SB97-71-01 R1	Alternate Air Door Hinge Assembly Replacement	Jul 27/98	May 3/99
SB97-71-02	Engine Induction Drain Line Inspection	Dec 22/97	May 3/99
SB98-11-01	Voltage Polarity Placard Installation	Mar 23/98	May 3/99
SB98-11-02	Pilot's Operating Handbook and Checklist Revisions	Mar 30/97	May 3/99
SB98-11-05	German Pilot's Operating Handbook and Checklist Revisions	Sep 21/98	May 3/99
SB98-11-06	Brazilian Pilot's Operating Handbook Revision	Oct 12/98	May 3/99
SB98-20-01 R1	Firewall Sealant Replacement	Dec 31/98	May 3/99
SB98-24-01	Alternator Replacement	Mar 30/98	Jan 15/01
SB98-25-01	Pilot and Copilot Seat Back Pivot Fitting Inspection	Jun 1/98	May 3/99
SB98-25-02	Pilot and Copilot Seat Roller Inspection	Sep 14/98	May 3/99
SB98-27-01	Flap Follow Up System Cable Clamp Inspection	Mar 30/98	May 3/99

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Service Bulletin Number	Title	Service Bulletin Date	Manual Incorporation
SB98-27-02 R1	Aileron Control Cable Routing Inspection	Dec 31/98	May 3/99
SB98-27-03	Aileron Primary Control Cable-to-Drum Lock Clamp Inspection	Jun 1/98	May 3/99
SB98-27-05 R2	Right Wing Aileron Control Cable Routing Inspection	Dec 31/98	May 3/99
SB98-27-06	Flight Control Cables and Travel Inspection	Jun 15/98	May 3/99
SB98-27-07	Control Yoke Attach Bushing Installation	Sep 21/98	May 3/99
SB98-28-01	Engine Fuel Pressure Transducer Inspection and Replacement	Mar 2/98	May 3/99
SB98-28-02 R1	Wing to Fuselage Fuel Hose Clamp Inspection	Feb 1/99	Aug 1/00
SB98-28-03	Fuel Shutoff Valve Cable Clamp Inspection	May 4/98	May 3/99
SB98-34-01 R1	KLN 89B GPS Navigation System IFR Non-Precision Approach Limitation	Aug 3/98	May 3/99
SB98-37-01 R1	Airborne Vacuum Pump Inspection	Nov 2/98	Aug 1/00
SB98-52-01	Baggage Door Seal Replacement	Feb 23/98	May 3/99
SB98-53-01 R1	Firewall Rivet Inspection	Dec 14/98	May 3/99
SB98-53-02 R2	Firewall Inspection and Cowl Mount Alignment	Dec 26/00	Aug 18/01
SB98-55-01	Elevator Stop Bolt Bracket Nutplate and Horizontal Stabilizer Installation Inspection	Jul 6/98	May 3/99
SB98-55-02	Horizontal Stabilizer Inboard Skin Rivet Inspection	Jul 27/98	May 3/99
SB98-57-01	Wing Strut Attach Bolts Nut Torque Inspection	Jun 1/98	May 3/99
SB98-71-01	Forward Engine Baffle and Heat Shroud Modification	Jul 27/98	May 3/99
SB98-71-02	Engine Air Filter Replacement	Jul 27/98	May 3/99
SB98-78-01	Engine Exhaust Muffler Inspection and Replacement	Jan 10/98	May 3/99
SB99-11-01	Pilot's Operating Handbook Revision	Sep 27/99	Jan 15/01
SB99-21-01	Fresh Air Vent Replacement	Mar 15/99	Jan 15/01
SB99-24-01	Electrical Power System Modification	Mar 15/99	Aug 1/00
SB99-24-02	Circuit Panel Assembly Cover Installation	Dec 27/99	Aug 1/00
SB99-25-01 R1	Emergency Locator Transmitter (ELT) Operational Test	Dec 27/99	Jan 15/01
SB99-27-01	Control Yoke Pivot Bolt Inspection/Replacement	Jul 12/99	Aug 1/00
SB99-28-01	Wing Fuel Tank Vent Check Valve Inspection	Apr 26/99	Aug 1/00
SB99-34-01 R1	KLN 89B GPS Navigation System Modification	Apr 24/00	Jan 15/01

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Service Bulletin Number	Title	Service Bulletin Date	Manual Incorporation
SB99-37-01	Vacuum Hose Modification	Dec 27/99	Aug 1/00
SB99-53-03	Elevator Control Yoke Roller Engagement Inspection/Modification	Dec 6/99	Aug 1/00
SB99-55-01	Vertical Fin Aft Spar Inspection	Mar 29/99	May 3/99
SB99-71-01 R2	Engine Piston Pin Plug Wear Inspection	Jul 12/99	Aug 1/00
SB99-71-02	Engine Oil Filler Tube to Engine Mount Clearance	Aug 12/99	Aug 1/00
SB99-71-05	Engine Valve Seat Inspection	Oct 25/99	Aug 1/00
SB99-73-01	Engine Fuel Manifold Spring Replacement	Jan 8/99	Aug 1/00
SB99-73-02	Engine Fuel Injector Unit Inspection	Feb 1/99	Aug 1/00
SB00-11-01	German Pilot's Operating Handbook Revision	Mar 13/00	Aug 1/00
SB00-11-03	Pilot's Operating Handbook and Pilot's Checklist Revisions	May 22/00	Jan 15/01
SB00-11-04	Pilot's Operating Handbook and Pilot's Checklist Revisions	Aug 14/00	No Effect
SB00-22-01	KAP-140 Autopilot Servo Inspection/Modification	Feb 14/00	Aug 1/00
SB00-24-01	Main Power Junction Box Circuit Breaker Retrofit Kit Installation	Mar 13/00	Aug 1/00
SB00-24-02	Electrical Panel Wiring Modifications	Jun 5/00	Jan 15/01
SB00-34-01	Pitot Tube Heater Assembly Insulation Installation	Apr 10/00	Jan 15/01
SB00-37-01	Vacuum System Air Filter Element Inspection/ Replacement	Aug 14/00	Jan 15/01
SB00-55-01	Rudder Attach Bolt Torque Inspection	Apr 10/00	Jan 15/01
SB00-57-01 R1	Flap Track and Wing Inboard Trailing Edge Inspection	Apr 28/03	No Effect
SB00-61-02	Propeller Hub Inspection	Aug 14/00	Jan 15/01
SB00-73-01 R2	Engine Fuel Injection Lines and Support Clamps Inspection	Dec 24/01	No Effect
SB00-79-01 R1	Engine Low Oil Pressure Switch Replacement	Feb 21/00	Jan 15/01
SB00-34-01	Pitot Tube Heater Insulation Installation	Apr 10/00	Feb 15/02
SB01-11-01	Pilot's Operating Handbook Revisions	Feb 5/01	No Effect
SB01-11-02	Pilot's Operating Handbook and Pilot's Checklist Revisions	Mar 5/01	No Effect
SB01-27-01 R1	Elevator Trim Tab Control Cable Stop Block Inspection	Feb 19/01	No Effect
SB01-28-03	Fuel Shutoff Valve Control Cable Inspection	Jul 23/01	Feb 15/02
SB01-71-01	Engine Fuel Flow Divider Installation Modification	Jan 22/01	No Effect

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Service Bulletin Number	Title	Service Bulletin Date	Manual Incorporation
SB01-74-01	Ignition Switch Center Ground Terminal Inspection	Jun 25/01	No Effect
SB01-53-01	Battery Box Support Inspection Modification	Feb 05/01	Apr 7/03
SB01-55-01	Elevator Balance Weight Attach Screw Inspection/Installation	Apr 2/01	No Effect
SB01-71-02	Engine Crankshaft Inspection	Apr 2/01	No Effect
SB01-27-02	Control Yoke Assembly Inspection	May 28/01	No Effect
SB01-28-02	Fuel Selector Shaft Assembly Inspection/ Replacement	May 28/01	Apr 7/03
SB01-73-01 R2	Engine Driven Fuel Pump Inspection	Oct 17/05	No Effect
SB02-22-01	Honeywell KAP 140 Autopilot System Modification	Nov 25/02	No Effect
SB02-52-01	Cabin Door Handle Replacement	Jan 21/002	No Effect
SB02-37-02	Dry Vacuum Pump and Coupling Replacement Requirements	Feb 18/02	No Effect
SB02-37-03	Vacuum System Reducer Fitting	Feb 18/02	Apr 7/03
SB02-25-01	Pilot and Copilot Shoulder Harness Removal	Apr 28/02	Apr 7/03
SB02-37-04	Airborne Air and Fuel Products Check Valve Manifold Inspection	Oct 28/02	Apr 7/03
SB02-53-02	Firewall Sealant Installation	Dec 16/02	No Effect
SB02-61-01	Propeller Spinner and Bulkhead Inspection	Jan 21/02	Feb 15/02
SB02-61-02	Propeller Blade Inspection	Dec 16/02	No Effect
SB03-11-02	Pilot's Operating Handbook and Pilot's Checklist Revisions	Apr 14/03	No Effect
SB03-11-04	Pilot's Operating Handbook and Pilot's Checklist Revision	Oct 27/03	No Effect
SB03-23-01	Honeywell KMA 26 Audio Panel Modification	Jul 28/03	No Effect
SB03-24-01	Alternator Replacement	Jul 28/03	No Effect
SB03-24-02	MC01-3A Main Electrical Power Junction Box Modification	Oct 13/03	No Effect
SB03-25-01	Armrest Shield Installation	Feb 3/03	No Effect
SB03-27-02	Flap Control Bracket Attach Bolts Replacement	Dec 22/03	No Effect
SB03-28-01	Fuel Cap Lanyard Removal	Oct 27/03	Jan 2/06
SB03-32-01	Nose Landing Gear Wheel Fairing Modification	Sep 29/03	No Effect
SB03-34-01	Honeywell KS270C, KS271C, and KS272C Servo Friction Inspection	Oct 27/03	No Effect
SB03-34-02 R1	Altimeter Inspection	Feb 16/04	No Effect
SB03-37-01	Vacuum Manifold Inspection/Replacement	Nov 10/03	Apr 7/03

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Service Bulletin Number	Title	Service Bulletin Date	Manual Incorporation
SB03-71-01	Engine Fuel Supply System Modification	May 26/03	----
SB03-71-02	Fuel Injection Servo Inspection	May 26/03	No Effect
SB03-73-01	Throttle Arm Retention Inspection	Nov 4/03	No Effect
SB04-11-02	Pilot's Operating Handbook Revision	Aug 30/04	No Effect
SB04-24-01	Alternator Control Unit Inspection/Replacement	Mar 1/04	No Effect
SB04-25-01 R4	Crew Seat Recline Modification	Dec 26/06	No Effect
SB04-25-02 R1	Crew Seat Back Cylinder Lock Inspection and Crank Arm Modification	Oct 17/05	No Effect
SB04-25-03	Passenger Bench Seat Bolt Installation	Jul 19/04	No Effect
SB04-25-04	Crew Seat Back Cylinder Lock Control Inspection/Adjustment	Oct 11/04	No Effect
SB04-27-02 R1	Elevator Trim Tab Control Cable Inspection	Oct 11/04	No Effect
SB04-28-01 R1	Fuel Hose Inspection	Mar 15/04	No Effect
SB04-28-03	Engine Fuel Return System Installation	Aug 30/04	No Effect
SB04-32-01	Landing Gear Shock Strut Metering Pin Replacement Nose	Feb 2/04	No Effect
SB04-52-01	Security Lock Installation	Jun 28/04	No Effect
SB04-55-01 R1	Horizontal Stabilizer Attach Bolt Holes Inspection	Jun 20/05	No Effect
SB04-71-02	Engine Starter Inspection/Replacement	Nov 8/04	No Effect
SB04-73-01	Engine Fuel Injection Lines and Support Clamps Inspection	Aug 30/04	Jan 2/06
SB04-73-02	Engine Fuel Manifold Spring Replacement	Oct 11/04	No Effect
SB05-11-02	Pilot's Operating Handbook Revisions	Jul 29/05	No Effect
SB05-11-03	Pilot's Operating Handbook Temporary Revision 2	Aug 29/05	No Effect
SB05-22-01	Trim Servo Cable Chain Inspection	Dec 5/05	No Effect
SB05-24-01	MC01-3A Main Electrical Power Junction Box Circuit Breakers Inspection	Jan 31/05	No Effect
SB05-25-01	Inflatable Seat Belt Restraint Installation Inspection	Mar 7/05	No Effect
SB05-25-02	Inflatable Seat Restraints Installation	Apr 25/05	No Effect
SB05-28-01	Fuel Strainer Gasket Inspection	Jan 17/05	No Effect
SB05-33-01	High Intensity Discharge (HID) Landing and Taxi Light Installation	May 9/05	Jul 1/05
SB05-34-07	Garmin G1000 Obstacle and Terrain Avoidance System Database Update	Sep 26/05	No Effect

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Service Bulletin Number	Title	Service Bulletin Date	Manual Incorporation
SB05-34-08	Garmin G1000 System Software Upgrade	Sep 26/2005	No Effect
SB05-34-09	Garmin G1000 GDL-69A Weather And Digital Audio Entertainment Interface Installation	Sep 26/05	No Effect
SB05-34-11	Garmin Gia 63 Integrated Avionics Unit Outside Cover Replacement	Nov 21/05	No Effect
SB05-34-12	Garmin G1000 Display Unit (GDU) 1040 Cover Glass Delamination	Dec 5/05	No Effect
SB05-37-01	Vacuum Pump Inspection/Replacement	Nov 7/05	No Effect
SB05-53-03	Floorboard Bulkhead Rivet Inspection	Dec 19/05	No Effect
SB05-57-01	Wing Trailing Edge Rib Inspection	Oct 10/05	No Effect
SB05-73-01	Engine Driven Fuel Pump Inspection	Mar 7/05	No Effect
SB06-11-01	Pilot's Operating Handbook Revisions	Mar 27/06	No Effect
SB06-11-02	Pilot's Operating Handbook Revisions	Nov 6/06	No Effect
SB06-11-03	Pilot's Operating Handbook and Pilot's Checklist Revisions	Dec 18/06	No Effect
SB06-22-01	Honeywell KS270C Pitch Servo and KS271C Roll Servo Tach Generator Modification	Apr 24/06	No Effect
SB06-24-01	Electrical Ground Strap Inspection	May 8/06	No Effect
SB06-24-02 R1	60 Ampere Alternator Rotor Replacement	Dec 26/06	No Effect
SB06-24-03	60 Ampere Alternator Brush Replacement	Dec 18/06	No Effect
SB06-24-04	Circuit Breaker Inspection	Dec 26/06	No Effect
SB06-24-05	Circuit Breaker Panel Assembly Inspection	Dec 26/06	No Effect
SB06-27-01	Flap Aft Roller Bearing Installation Modification	Apr 10/06	No Effect
SB06-32-01	Brake Master Cylinder Covers Inspection	Sep 25/06	No Effect
SB06-34-01	Honeywell KT 73 MODE S Transponder Installation	Feb 27/06	No Effect
SB06-34-02 R1	Garmin G1000 System Software Upgrade	Nov 6/06	No Effect
SB06-34-03	Enablement of Garmin G1000 Terrain Awareness Warning System CLASS-B (TAWS-B)	May 22/06	No Effect
SB06-34-04	Automatic Direction Finder (ADF) and Distance Measuring Equipment (DME) Installation	Oct 23/06	No Effect
SB06-52-01	Cabin Door Modification	Mar 27/06	No Effect
SB06-57-01	Upper Wing Skin Modification	Nov 6/06	No Effect
SB06-71-02	Engine Compartment Fuel Hoses Security Inspection	Jun 19/06	No Effect

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INTRODUCTION

1. General

WARNING: All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., recommended by Cessna are solely based on the use of new, remanufactured, or overhauled Cessna approved parts. If parts are designed, manufactured, remanufactured, overhauled, and/or approved by entities other than Cessna, then the data in Cessna's maintenance/service manuals and parts catalogs are no longer applicable and the purchaser is warned not to rely on such data for non-Cessna parts. All inspection intervals, replacement time limits, overhaul time limits, the method of inspection, life limits, cycle limits, etc., for such non-Cessna parts must be obtained from the manufacturer and/or seller of such non-Cessna parts.

A. The information in this publication is based on data available at the time of publication and is updated, supplemented, and automatically amended by all information issued in Service Newsletters, Service Bulletins, Supplier Service Notices, Publication Changes, Revisions, Reissues and Temporary Revisions. All such amendments become part of and are specifically incorporated within this publication. Users are urged to keep abreast of the latest amendments to this publication through information available at Cessna Authorized Service Stations or through the Cessna Propeller Aircraft Product Support subscription services. Cessna Service Stations have also been supplied with a group of supplier publications which provide disassembly, overhaul, and parts breakdowns for some of the various supplier equipment items. Suppliers publications are updated, supplemented, and specifically amended by supplier issued revisions and service information which may be reissued by Cessna thereby automatically amending this publication and are communicated to the field through Cessna's Authorized Service Stations and/or through Cessna's subscription services.

B. Inspection, maintenance and parts requirements for STC installations are not included in this manual. When an STC installation is incorporated on the airplane, those portions of the airplane affected by the installation must be inspected in accordance with the inspection program published by the owner of the STC. Since STC installations may change systems interface, operating characteristics and component loads or stresses on adjacent structures. Cessna provided inspection criteria may not be valid for airplanes with STC installations.

C. REVISIONS, REISSUES and TEMPORARY REVISIONS can be purchased from a Cessna Service Station or directly from Cessna Parts Distribution, Department 701, CPD 2, Cessna Aircraft Company, 5800 East Pawnee Road, Wichita, Kansas 67218-5590.

D. Information in this Maintenance Manual is applicable to all U.S. and Foreign-Certified Model 172 airplanes beginning at Serial 17280001 and On, and 172S8001 and On. Information unique to a particular country is identified in the chapter(s) affected.

E. All supplemental service information concerning this manual is supplied to all appropriate Cessna Service Stations so that they have the latest authoritative recommendations for servicing these Cessna airplanes. Therefore, it is recommended that Cessna owners utilize the knowledge and experience of the Cessna Service Organization.

2. Cross-Reference Listing of Popular Name Versus Model Numbers and Serials

A. All airplanes, regardless of manufacturer, are certified under model number designations. However, popular names are often used for marketing purposes. To provide a consistent method of referring to these airplanes, the model number will be used in this publication unless the popular name is necessary to differentiate between versions of the same basic model. The following table provides a listing of popular names, model numbers and serial numbers.

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NAME	MODEL	SERIALS BEGINNING
Skyhawk	172R	17280001
Skyhawk SP	172S	172S8001

3. Coverage and Format

A. The Cessna Model 172 1996 And On Maintenance Manual has been prepared to assist maintenance personnel in servicing and maintaining Model 172 airplanes (beginning at Serial 17280001 and 172S8001). This manual provides the necessary information required to enable the mechanic to service, inspect, troubleshoot, remove and replace components or repair systems.

NOTE: This manual is not intended to cover Model 172 airplanes produced prior to 1996. For manuals related to these airplanes, please refer to applicable listings in the Cessna Propeller Aircraft Care Customer Supplies and Publications Catalog.

B. This manual has been prepared in accordance with the Air Transport Association (ATA) Specification Number 100 for Manufacturer's Technical Data.

C. Information beyond the scope of this manual may be found in the applicable Model 172 Wiring Diagram Manual, Model 172 Illustrated Parts Catalog and the Single Engine Models 172, 182, T182, 206 and T206, 1996 And On, Structural Repair Manual.

D. Technical Publications are also available for the various components and systems which are not covered in this manual. These manuals must be utilized as required for maintenance of those components and systems, and may be purchased from the manufacturer.

4. Temporary Revisions

A. Additional information which becomes available may be provided by temporary revision. This service is used to provide, without delay, new information which will assist in maintaining safe flight/ground operations. Temporary revisions are numbered consecutively within the ATA chapter assignment. Page numbering utilizes the three-element number which matches the maintenance manual. Temporary revisions are normally incorporated into the maintenance manual at the next regularly scheduled revision.

5. Serialization

A. All Model 172 airplanes are issued a serial number. This number is assigned as construction begins and remains with the airplane throughout its service life. This serial number appears on the airplane ID plate, located below the horizontal stabilizer, and on a trim plate located on the pilot side doorpost. This serial number is used to identify changes within the text or within an illustration. The absence of a serial number in text or illustration indicates the material is applicable to all airplanes.

6. Material Presentation

A. This Maintenance Manual is available on paper, aerofiche or Compact Disc (CD/ROM). The CD/ROM contains the Maintenance Manual, Illustrated Parts Catalog Manual, Wiring Diagram Manual and Structural Repair Manual on a single disc.

7. Service Bulletins

A. Service Bulletins have special inspections and approved modifications to the airplane and/or systems. As service bulletins are issued, they will be included in subsequent scheduled manual revisions and recorded in the Service Bulletin List, which is before the Introduction of the manual. The list includes:
(1) Service Bulletin Number - This Service Bulletin number column identifies the bulletin by number. Service Bulletins are numbered to agree with ATA chapter assignment.
(2) Service Bulletin Date - The service bulletin date column gives the date the bulletin became active.
(3) Title - The title column gives the service bulletin by name. It is the same title shown on page one of the service bulletin.

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(4) Manual Incorporation - The manual incorporation column shows the date of incorporation of the service bulletin in the maintenance manual, if applicable. If incorporation of the service bulletin is not necessary, this column shows "No Effect" or dashed lines if the service bulletin has not been worked.

8. Using the Maintenance Manual

A. Division of Subject Matter.

(1) The Maintenance Manual is divided into four major sections. The major sections are in turn separated into chapters, with each chapter having its own effectivity page and table of contents. The manual divisions are as follows:

(a) Major Section 1 - Airplane General

Chapter	Title
5	Time Limits/Maintenance Checks
6	Dimensions and Areas
7	Lifting and Shoring
8	Leveling and Weighing
9	Towing and Taxiing
10	Parking, Mooring, Storage and Return to Service
11	Placards and Markings
12	Servicing

(b) Major Section 2 - Airframe Systems

Chapter	Title
20	Standard Practices - Airframe
21	Air Conditioning
22	Auto Flight
23	Communications
24	Electrical Power
25	Equipment/Furnishings
26	Fire Protection
27	Flight Controls
28	Fuel
31	Indicating/Recording Systems
32	Landing Gear
33	Lights
34	Navigation
37	Vacuum

(c) Major Section 3 - Structures

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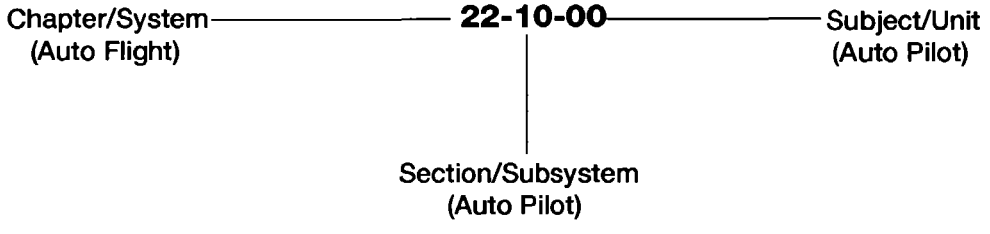
Chapter	Title
51	Standard Practices and Structures - General
52	Doors
55	Stabilizers
56	Windows
57	Wings

(d) Major Section 4 - Power Plant

Chapter	Title
61	Propeller
71	Power Plant
73	Engine Fuel and Control
74	Ignition
76	Engine Controls
77	Engine Indicating
78	Exhaust
79	Oil
80	Starting

B. Page Numbering System.

(1) The page numbering system used in the Maintenance Manual consists of three-element numbers separated by dashes. Refer to the example below for an illustration of typical numbering layout as used in the ATA format.



(2) When the chapter/system element number is followed with zeros in the section/subsystem and subject/unit element number (22-00-00), the information is applicable to the entire system.

(3) When the section/subsystem element number is followed with zeros in the subject/unit element number (22-10-00), the information is applicable to the subsystem within the system.

(4) The subject/unit element number is used to identify information applicable to units within the subsystems. The subject/unit element number progresses sequentially from the number -01 in accordance with the number of subsystem units requiring maintenance information.

(5) All system/subsystem/unit (chapter/section/subject) maintenance data is separated into specific types of information: description and operation, troubleshooting, maintenance practices. Blocks of sequential page numbers are used to identify the type of information:

Page 1 through 99 - Description and Operation

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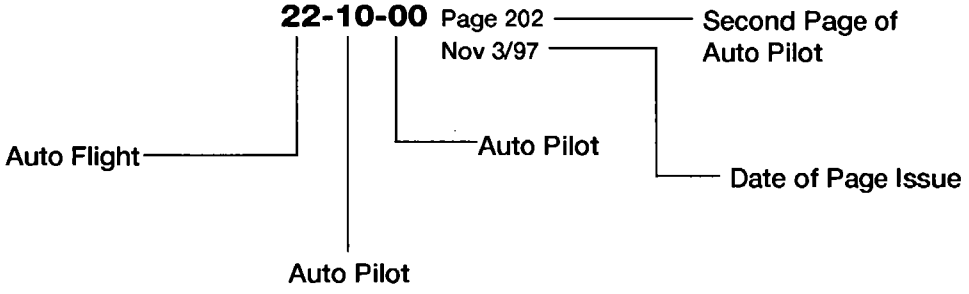
Page 101 through 199 - Troubleshooting
Page 201 through 299 - Maintenance Practices
Page 301 through 399 - Servicing
Page 401 through 499 - Removal/Installation
Page 501 through 599 - Adjustment/Test
Page 601 through 699 - Inspection/Check
Page 701 through 799 - Cleaning/Painting
Page 801 through 899 - Approved Repairs

NOTE: In most cases, the individual topics have been combined into a 200-series document (Maintenance Practices). When specific topics require lengthy explanation, they will utilize the page blocks mentioned above.

(6) A typical page number:



(7) Illustrations are also tied into the page block numbering system. For example, all illustrations within a Maintenance Practices section will begin with the number 2 (i.e. Figure 201, Figure 202, etc.). Conversely, all illustrations within an Approved Repair section will begin with the number 8 (i.e. Figure 801, Figure 802, etc.).

9. Effectivity Pages

A. A list of effective pages is provided at the beginning of each maintenance manual chapter. All pages in the specific chapter are listed in numerical sequence on the Effectivity Page(s) with the date of issue for each page.

10. Revision Filing Instructions

A. Regular Revision.
(1) Pages to be removed or inserted in the maintenance manual are determined by the effectivity page. Pages are listed in sequence by the three-element number (chapter/section/subject) and then by page number. When two pages display the same three-element number and page number, the page with the most recent Date of Page Issue shall be inserted in the maintenance manual. The date column on the corresponding chapter effectivity page shall verify the active page.

B. Temporary Revision.
(1) File temporary revisions in the applicable chapter in accordance with filing instructions appearing on the first page of the temporary revision.
(2) The rescission of a temporary revision is accomplished by incorporation into the maintenance manual or by a superseding temporary revision. A Record of Temporary Revisions is furnished in the Temporary Revision List located previous to the Introduction. A Manual Incorporation Date column on the Temporary Revision List page will indicate the date the temporary revision was incorporated, thus authorizing the rescission of the temporary revision.

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11. Identifying Revised Material

A. Additions or revisions to text in an existing section will be identified by a revision bar in the left margin of the page and adjacent to the change.

B. When technical changes cause unchanged text to appear on a different page(s), a revision bar will be placed in the left margin opposite the chapter/section/subject, page number and date of all affected pages, providing no other revision bar appears on the page. These pages will display the current revision date in the Date of Page Issue location.

C. Chapter 5 may contain revision bars to indicate revised text. Inspection items in section 5-10-01 are also noted as revised, added or deleted by the date of changed item code. A revision date is indicated below the page number.

D. When extensive technical changes are made to text in an existing section that requires extensive revision, revision bars will appear the full length of text.

E. Revised and new illustrations will be indicated by either a revision bar along the side of the page or a hand indicator directing attention to the area.

12. Warnings, Cautions and Notes

A. Throughout the text in this manual, warnings, cautions and notes pertaining to the procedures being accomplished are utilized. These adjuncts to the text are used to highlight or emphasize important points. Warnings and Cautions precede the text they pertain to, and Notes follow the text they pertain to.

(1) WARNING - Calls attention to use of materials, processes, methods, procedures or limits which must be followed precisely to avoid injury or death to persons.

(2) CAUTION - Calls attention to methods and procedures which must be followed to avoid damage to equipment.

(3) NOTE - Calls attention to methods which will make the job easier.

13. Propeller Aircraft Customer Care Supplies and Publications Catalog

A. A Cessna Propeller Aircraft Customer Care Supplies and Publications Catalog is available from a Cessna Service Station or directly from Cessna Propeller Product Support Dept.751, Cessna Aircraft Company, P.O. Box 7706, Wichita, Kansas 67277-7706. This catalog lists all publications and Customer Care Supplies available from Cessna for prior year models as well as new products. To maintain this catalog in a current status, it is revised yearly and issued in paper and aerofiche form.

14. Customer Comments on Manual

A. Cessna Aircraft Company has endeavored to furnish you with an accurate, useful and up-to-date manual. This manual can be improved with your help. Please use the return card, provided with your manual, to report any errors, discrepancies, and omissions in this manual as well as any general comments you wish to make.

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REVISION SUMMARY

1. General

A. This section shows a table that gives operators and maintenance personnel a list of the changes that were made to different documents in the manual as part of the current revision.

B. The table has three columns. The three columns are entitled: Chapter-Section-Subject, Document Title, and Action.

2. Definition

A. Columns
(1) Chapter-Section-Subject - This column gives the manual location for each document in the revision.
(2) Document Title - This column gives the name of the document as it is given at the top of the actual document and in the Table of Contents.
(3) Action - This column gives the step you must complete to include this revision in a paper copy of the manual. There are three different steps that can be given. The three steps are ADD, REPLACE, and REMOVE.

NOTE: This column does not apply to CD-ROM, DVD-ROM, or internet delivered publications.

B. Rows
(1) Each row gives all the necessary data for one document that is part of the current revision.

3. Procedure

A. Find the manual location for each document in the revision as given by the data in the Chapter-Section-Subject column.

NOTE: For data about document page numbers and how to put them in the manual, refer to Introduction, Page Number System. Also, pages 1 - 99 are used for both "General", and "Description And Operation" documents.

B. Make sure that the title of the document that you remove and/or the title of the document that you add agree with the data in the Document Title column of the table.

C. Complete the step given in the Action column as directed below:
(1) ADD - This step is for a new document that was not in the manual before. Put it in the applicable location.
(2) REPLACE - This step is for an existing document that was changed in the current revision. Remove the existing document and put the revised one in its place.
(3) REMOVE - This step is for an existing document that is no longer applicable. Remove it from the manual.

CHAPTER SECTION SUBJECT	DOCUMENT TITLE	ACTION
	REVISION SUMMARY	REPLACE
	PUBLICATION TITLE PAGE	REPLACE
Introduction	LIST OF EFFECTIVE PAGES	REPLACE
Introduction	TABLE OF CONTENTS	REPLACE
Introduction	LIST OF REVISIONS	REPLACE
Chapter 05	LIST OF EFFECTIVE PAGES	REPLACE

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CHAPTER SECTION SUBJECT	DOCUMENT TITLE	ACTION
Chapter 05	TABLE OF CONTENTS	REPLACE
Chapter 05	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 05	TABLE OF CONTENTS	REPLACE
05-00-00	TIME LIMITS/MAINTENANCE CHECKS	REPLACE
05-00-10	AIRWORTHINESS LIMITATIONS - FAA APPROVED DATA	REPLACE
05-10-00	INSPECTION TIME INTERVALS	REPLACE
05-10-01	INSPECTION TIME LIMITS	REPLACE
05-11-00	COMPONENT TIME LIMITS	REPLACE
05-12-00	PROGRESSIVE CARE PROGRAM	REPLACE
05-12-01	INSPECTION OPERATION 1	REPLACE
05-12-02	INSPECTION OPERATION 2	REPLACE
05-12-03	INSPECTION OPERATION 3	REPLACE
05-12-04	INSPECTION OPERATION 4	REPLACE
05-12-05	INSPECTION OPERATION 5	REPLACE
05-12-07	INSPECTION OPERATION 7	REPLACE
05-12-09	INSPECTION OPERATION 9	REPLACE
05-12-10	INSPECTION OPERATION 10	REPLACE
05-12-11	INSPECTION OPERATION 11	REPLACE
05-12-12	INSPECTION OPERATION 12	REPLACE
05-12-13	INSPECTION OPERATION 13	REPLACE
05-12-14	INSPECTION OPERATION 14	REPLACE
05-12-15	INSPECTION OPERATION 15	REPLACE
05-12-16	INSPECTION OPERATION 16	REPLACE
05-12-17	INSPECTION OPERATION 17	REPLACE
05-12-18	INSPECTION OPERATION 18	REPLACE
05-12-19	INSPECTION OPERATION 19	REPLACE
05-12-20	INSPECTION OPERATION 20	REPLACE
05-12-21	INSPECTION OPERATION 21	REPLACE
05-12-22	INSPECTION OPERATION 22	REPLACE
05-12-24	INSPECTION OPERATION 24	REPLACE
05-12-23	INSPECTION OPERATION 23	REPLACE
05-12-25	INSPECTION OPERATION 25	REPLACE
05-50-00	UNSCHEDULED MAINTENANCE CHECKS	REPLACE
Chapter 06	LIST OF EFFECTIVE PAGES	REPLACE

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CHAPTER SECTION SUBJECT	DOCUMENT TITLE	ACTION
Chapter 06	TABLE OF CONTENTS	REPLACE
06-10-00	AIRPLANE DIMENSIONS AND SPECIFICATIONS - DESCRIPTION AND OPERATION	REPLACE
Chapter 23	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 23	TABLE OF CONTENTS	REPLACE
23-10-00	NAV/COM - MAINTENANCE PRACTICES	REPLACE
Chapter 24	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 24	TABLE OF CONTENTS	REPLACE
24-60-00	12-VOLT CABIN POWER SYSTEM - TROUBLESHOOTING	REMOVE
24-60-02	12-VOLT CABIN POWER SYSTEM - MAINTENANCE PRACTICES	ADD
Chapter 25	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 25	TABLE OF CONTENTS	REPLACE
25-20-00	PASSENGER COMPARTMENT - MAINTENANCE PRACTICES	REPLACE
Chapter 28	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 28	TABLE OF CONTENTS	REPLACE
28-20-00	FUEL STORAGE AND DISTRIBUTION - MAINTENANCE PRACTICES	REPLACE
28-20-00	FUEL STORAGE AND DISTRIBUTION - ADJUSTMENT/TEST	REMOVE
28-21-00	FUEL BAY SEALING - MAINTENANCE PRACTICES	REPLACE
28-40-00	FUEL QUANTITY INDICATION SYSTEM - TROUBLESHOOTING	ADD
28-40-00	FUEL QUANTITY INDICATION SYSTEM - REMOVAL/INSTALLATION	ADD
28-40-00	FUEL QUANTITY INDICATION SYSTEM - ADJUSTMENT/TEST	ADD
Chapter 32	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 32	TABLE OF CONTENTS	REPLACE
32-42-00	BRAKE SYSTEM - MAINTENANCE PRACTICES	REPLACE
Chapter 73	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 73	TABLE OF CONTENTS	REPLACE
73-00-01	FUEL INJECTION SYSTEM - MAINTENANCE PRACTICES	REPLACE
Chapter 74	LIST OF EFFECTIVE PAGES	REPLACE
Chapter 74	TABLE OF CONTENTS	REPLACE
74-10-00	IGNITION SYSTEM - MAINTENANCE PRACTICES	REPLACE

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LIST OF REVISIONS

1. Revisions

A. This Maintenance Manual includes the original issue and the revisions listed in Table 1. To make sure information in this manual is current and the latest maintenance and inspections procedures are available, the revisions must be incorporated in the manual as they are issued.

Table 1. Basic Manual - Original Issue - 2 December 1996

Revision Number	Date	Revision Number	Date
1	16 May 1997	2	6 April 1998
3	3 May 1999	4	1 August 2000
5	15 January 2001	6	18 August 2001
7	15 February 2002	8	7 April 2003
9	7 June 2004	10	3 January 2005
11	1 July 2005	12	2 January 2006
13	3 July 2006	14	1 January 2007
15	1 July 2007	16	1 January 2008
17	1 March 2009		

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LIST OF CHAPTERS

CHAPTER		EFFECTIVE DATE*	FICHE/FRAME	
5	Time Limits/Maintenance Checks	Mar 1/2009	1	B2
6	Dimensions and Areas	Mar 1/2009	1	E6
7	Lifting and Shoring	Jan 3/2005	1	F5
8	Leveling and Weighing	Jan 3/2005	1	F13
9	Towing and Taxiing	Jan 3/2005	1	G2
10	Parking and Mooring	Jan 3/2005	1	G9
11	Placards and Markings	Jan 3/2005	1	H2
12	Servicing	Jan 1/2007	1	H8
20	Standard Practices - Airframe	Jan 1/2007	2	A2
21	Air Conditioning	Jan 2/2006	2	C12
22	Auto Flight	Jan 1/2008	2	D6
23	Communications	Mar 1/2009	2	E2
24	Electrical Power	Mar 1/2009	2	E21
25	Equipment/Furnishings	Mar 1/2009	2	G21
26	Fire Protection	Jan 3/2005	2	J13
27	Flight Controls	Jan 1/2008	2	J19
28	Fuel	Mar 1/2009	3	A2
31	Indicating/Recording Systems	Jan 2/2006	3	C9
32	Landing Gear	Mar 1/2009	3	D2
33	Lights	Jan 1/2008	3	F2
34	Navigation	Jan 1/2008	3	G12
37	Vacuum	Jan 2/2006	3	J13
51	Standard Practices -Structures	Jan 1/2008	3	K5
52	Doors	Jul 3/2006	3	K15
55	Stabilizers	Jan 3/2005	3	L10
56	Windows	Jan 2/2006	4	A2
57	Wings	Jan 3/2005	4	A16
61	Propellers	Jul 1/2007	4	B2
71	Powerplant	Jan 1/2007	4	B10
73	Engine Fuel and Control	Mar 1/2009	4	C16
74	Ignition	Mar 1/2009	4	D10
76	Engine Controls	Jan 2/2006	4	E2
77	Engine Indicating	Jan 1/2008	4	E13
78	Exhaust	Jan 3/2005	4	F5
79	Oil	Jan 2/2006	4	F13
80	Starting	Jul 1/2007	4	G5

NOTE 1: *Represents date of page one of each chapter's List of Effective Pages which is applicable to Manual revision date.

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CHAPTER

5

TIME LIMITS/ MAINTENANCE CHECKS

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
05-Title		
05-List of Effective Pages		
05-Record of Temporary Revisions		
05-Table of Contents		
5-00-00	Pages 1-2	Jul 1/2007
5-00-10	Page 1	Jan 3/2005
5-10-00	Pages 1-3	Mar 1/2009
5-10-01	Pages 1-15	Mar 1/2009
5-11-00	Pages 1-3	Mar 1/2009
5-12-00	Pages 1-2	Jul 1/2007
5-12-01	Pages 1-7	Mar 1/2009
5-12-02	Pages 1-5	Mar 1/2009
5-12-03	Pages 1-6	Mar 1/2009
5-12-04	Pages 1-5	Mar 1/2009
5-12-05	Page 1	Jul 3/2006
5-12-07	Page 1	Mar 1/2009
5-12-09	Page 1	Jul 3/2006
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5-12-12	Page 1	Jul 3/2006
5-12-13	Page 1	Jul 3/2006
5-12-14	Page 1	Jul 3/2006
5-12-15	Page 1	Jul 3/2006
5-12-16	Page 1	Jul 3/2006
5-12-17	Page 1	Jul 3/2006
5-12-18	Page 1	Jul 3/2006
5-12-19	Page 1	Jul 3/2006
5-12-20	Page 1	Mar 1/2009
5-12-21	Page 1	Jul 3/2006
5-12-22	Page 1	Jul 3/2006
5-12-23	Page 1	Jul 3/2006
5-12-24	Page 1	Jul 3/2006
5-12-25	Page 1	Jul 3/2006
5-50-00	Pages 1-5	Jan 2/2006

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

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Scope . . . . . 5-00-00 Page 1
Inspection Requirements . . . . . 5-00-00 Page 1
Inspection Program Selection . . . . . 5-00-00 Page 1
Description . . . . . 5-00-00 Page 1
General Inspection Terms and Guidelines . . . . . 5-00-00 Page 2

AIRWORTHINESS LIMITATIONS - FAA APPROVED DATA . . . . . 5-00-10 Page 1
Scope . . . . . 5-00-10 Page 1
Airworthiness Limitations . . . . . 5-00-10 Page 1

INSPECTION TIME INTERVALS . . . . . 5-10-00 Page 1
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Procedure . . . . . 5-10-00 Page 1
Inspection Terms and Guidelines . . . . . 5-10-00 Page 1
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TIME LIMITS/MAINTENANCE CHECKS

1. Scope

A. This chapter provides the time limits and maintenance checks for the Model 172 airplanes. It is divided into several sections, each with a specific purpose toward providing information necessary to establish inspection criteria.

2. Inspection Requirements

A. As required by U.S. Federal Aviation Regulations, all civil aircraft of U.S. registry must undergo a complete inspection (annual) each twelve calendar months. In addition to the required annual inspection, aircraft operated commercially (for hire) must have a complete inspection every 100 hours of operation.

B. Compliance with the regulations is accomplished using one of three methods:

(1) **Traditional (Annual/100 Hour) inspection program** which utilizes 14 CFR 43, Appendix D (scope and detail) to inspect the airplane. In addition, Cessna recommends certain components or items be inspected at 50 hour intervals. These inspection items are listed in Inspection Time Intervals, Section 5-10-01.

(2) **Progressive Care inspection program** which allows the work load to be divided into smaller operations that can be accomplished in a shorter time period. This method is detailed in Progressive Care Program, Section 5-12-00.

(3) **PhaseCard inspection program** which is geared toward high-utilization flight operations (approximately 600 or more flight hours per year). This system utilizes 50-hour intervals (Phase 1 and Phase 2) to inspect high-usage systems and components. At 12 months or 600 flight hours, whichever occurs first, the airplane undergoes a complete (Phase 3) inspection. PhaseCard Inspection programs can be ordered through Propeller Aircraft Product Support, P.O. Box 7706, Wichita, KS 67277-7706, Phone (316) 517-5800, Fax (316) 517-7271.

3. Inspection Program Selection

A. The selection of an inspection program (Annual, Progressive Care or PhaseCard) is primarily based on owner/operator preferences, whether an airplane is flown for hire, and numbers of hours flown during the year.

4. Description

A. Listed below is a brief description and intended purpose of each section of this chapter. For detailed information related to each particular inspection program, refer to the specific section within this chapter.

B. Section 5-00-00, Time Limits/Maintenance Checks - General. This section provides a general overview of inspection requirements.

C. Section 5-10-01, Inspection Time Intervals. The primary purpose of this section is to provide a central location for inspection time intervals. This section may also be utilized in conjunction with 14 CFR Part 43 to provide greater detail on inspection criteria when performing Annual/100-Hour inspections.

D. Section 5-11-00, Component Time Limits. This section provides a list of components which are life- or time-limited. Although these components are not listed in any of Cessna's inspection programs, they must be considered and included in whatever inspection program is used.

E. Section 5-12-00, Progressive Care Program. This section outlines the progressive inspection program. The program is divided into four primary operations which cover all inspection requirements up through the 200-hour interval inspection items. The remaining operations cover inspections which are at intervals other than what the four primary operations cover. Refer to the Progressive Care Program section for a more detailed description of the Progressive Care Program.

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5. General Inspection Terms and Guidelines

NOTE: When inspections criteria is required, this criteria is spelled out in the text. If more detailed instructions are required for an inspection, these instructions will be referenced out to appropriate locations (supplier publications and/or the maintenance manual).

A. Definitions of terms used through the inspection programs are as follows:
   (1) ON CONDITION is defined as the necessary inspections and/or checks to determine that a malfunction or failure of the component will not occur prior to the next scheduled inspection.
   (2) CONDITION is defined as inspection for (but not limited to) cleanliness, cracks, deformation, corrosion, wear, and loose or missing fasteners.
   (3) SECURITY: Inspect for looseness of fasteners and fastener securing devices such as safety wire, cotter pins and self-locking nuts.

B. During Inspections, use the following general guidelines:
   (1) MOVABLE PARTS: Inspect for lubrication, servicing, security of attachment, binding, excessive wear, safetying, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing, and tension.
   (2) FLUID LINES AND HOSES: Inspect for leaks, cracks, bulging, collapsed, twisted, dents, kinks, chafing, proper radius, security, discoloration, bleaching, deterioration, and proper routing; rubber hoses for hardness or flexibility and metal lines for corrosion.
   (3) METAL PARTS: Inspect for security of attachment, cracks, metal distortion, loose or broken terminals, heat deterioration, and corroded terminals.
   (4) WIRING: Inspect for security, chafing, burning, arcing, defective insulation, loose or broken terminals, heat deterioration, and corroded terminals.
   (5) STRUCTURAL FASTENERS: Inspect for correct torque in accordance with applicable torque values. Refer to Chapter 20, Torque Data - Maintenance Practices, during installation or when visual inspection indicates the need for a torque check.

   CAUTION: Torque values listed in this manual are not to be used for checking tightness of installed parts during service.

   (6) FILTERS, SCREENS, AND FLUIDS: Inspect for cleanliness and the need for replacement at specified intervals.
   (7) A system check (operation or function) that requires electrical power, must be performed using 28.5 Volts, +0.25 or -1.00 Volts, bus voltage. This will make sure that all components are operating at their operational voltage.

C. Airplane file.
   (1) Miscellaneous data, information, and licenses are a part of the airplane file. Check that the following documents are up-to-date and in accordance with current Federal Aviation Regulations. Most of the items listed are required by the Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of airplanes operated outside the United States should check with their own aviation officials to determine their individual requirements.
      (a) To be displayed in the airplane at all times:
         1 Standard Airworthiness Certificate (FAA Form 8100-2).
         2 Aircraft Registration Certificate (FAA Form 8050-3).
         3 Aircraft Radio Station License (Federal Communication Commission Form 556 if transmitter is installed).
      (b) To be carried in the airplane at all times:
         1 Weight and Balance Data Sheets and associated papers (all copies of the Repair and Alteration Form, FAA Form 337, are applicable).
         2 Equipment List.
         3 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
      (c) To be made available upon request:
         1 Airplane, Engine and Propeller Logbooks.

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AIRWORTHINESS LIMITATIONS - FAA APPROVED DATA

1. Scope

A. The Airworthiness Limitations section is FAA-approved and specifies maintenance required under Parts 43.16 and 91.403 of Title 14 of the Code of Federal Regulations unless an alternative program has been FAA-approved.

2. Airworthiness Limitations

A. There are no airworthiness limitations associated with this airplane.

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INSPECTION TIME INTERVALS

1. General

A. The primary function of this section is to give inspection time intervals. Section 5-10-01 is an index of the inspections that you can use with 14 CFR, Part 43 inspection scope and detail. It is not recommended, however, that you use Section 5-10-01 as the primary checklist for inspection of the airplane.

NOTE: The inspection information in this section is not made to be all-inclusive. No chart can replace the good judgment of certified Airframe and Powerplant mechanics. The owner or operator must make sure of the airplane's airworthiness and must use only qualified personnel to do maintenance on the airplane.

2. Procedure

A. A complete airplane inspection includes all inspection items as required by 14 CFR 43, Appendix D, Scope and Detail of annual/100 hour inspections. Use the chart in this section as an augmentation for the inspection.

B. Examine the Component Time Limits section (5-11-00) with this inspection to make sure the correct overhaul and replacement requirements are completed at the specified times.

C. The intervals shown are recommended intervals at which items are to be examined for normal use under average environmental conditions. Airplanes operated in extremely humid areas (tropics), or in unusually cold, damp climates, etc., can need more frequent inspections for wear, corrosion, and lubrication. Under these adverse conditions, complete periodic inspections related to this chart at more frequent intervals until operator field experience is used to set individual inspection intervals.

(1) The 14 CFR Part 91 operator's inspection intervals must obey the inspection time limits shown in this manual except as given below: (Refer to 14 CFR 91.409.)

(a) The airplane can operate only ten hours more than its inspection point, if the airplane is enroute to a facility to have the inspection completed.

(b) If any operation is scheduled after its inspection point, the next operation in sequence keeps the required date from the time that the late operation was originally scheduled (schedule again if late).

(c) If any scheduled operation is completed early, and is 10 hours or less ahead of schedule, the next scheduled phase can keep its original date.

(d) If any scheduled operation is obeyed early, and it is more than 10 hours ahead of schedule, the next phase must be rescheduled from the time the operation was completed.

3. Inspection Terms and Guidelines

A. For inspection terms and guidelines, refer to Time Limits/Maintenance Checks - General.

4. Chart Legend

A. Each page of the inspection given in Inspection Time Limits, Section 5-10-01, contains the five columns that follow:

(1) REVISION STATUS - This column supplies the date that a given item was added, deleted or revised. A blank entry in this column is an indication there have been no changes since the original issue of this manual.

(2) INSPECTION ITEM CODE NUMBER - This column gives a six-digit number permanently assigned to a scheduled maintenance item. A given inspection item code number will never change and will not be used again if the scheduled maintenance item is deleted.

(3) REQUIREMENTS - This column supplies a short description of the inspection and/or servicing procedures. Where more detailed procedure information is required, a reference will be made to either another section in the maintenance manual or a specific reference to a supplier publication.

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(4) TASK - This column gives a short description of the inspection and/or servicing procedures. Where a more detailed description of the procedure is necessary, a reference will be made to another selection found in the maintenance manual or a specific reference to a supplier publication. If a task does not refer to a specific model and/or system, then the inspection and/or servicing procedure applies to all equivalent models and/or systems in the airplane.

(5) INTERVAL - This column gives the frequency of the inspection in an alphabetic coded form. The legend for the alpha code is shown below.

(6) OPERATION - The Progressive Care inspection program lets the work load to be divided into smaller operations, that can be completed in a shorter time period. This program is supplied in section 5-12-00, which is the Progressive Care Program.

(7) ZONE - This column gives the locations for the components within a specific zone. For a breakdown of how the airplane is zoned, refer to Chapter 6, Airplane Zoning - Description and Operation.

INTERVAL LETTER	OPERATION	INTERVAL
A.	1, 2, 3, 4	Every 50 hours.
B.	1, 2, 3, 4	Every 100 hours.
C.	1, 2, 3, 4	Every 200 hours.
D.	5	Every 400 hours or 1 year, whichever occurs first.
E.		**(Not used. NOTE)** First 100 hours and each 500 hours thereafter.
F.	7	Every 600 hours or 1 year, whichever occurs first.
G.		**(Not used. NOTE)** Every 1000 hours or 3 years, whichever occurs first.
H.	9	Every 500 hours.
I.	10	Every 1000 hours.
J.	11	Every 2 years.
K.	12	Beginning five years from the date of the manufacture, you must make sure of the serviceability of the components every twelve months. Refer to Airborne Air and Fuel Products Service Letter Number 39A or latest revision.
L.	13	Every 50 hours or four months, whichever occurs first.
M.	14	Every 2 years, or anytime components are added or removed which have the potential to affect the magnetic accuracy and/or variation of the compass calibration, or anytime the accuracy of the compass is in question.
N.	15	Every 2000 hours.
O.	16	Every 1000 hours or 1 year, whichever occurs first.
P.	17	Every 12 calendar months.
Q.	18	Every 6 years.
R.	19	Every 12 years.
S.	20	Every 1 year.
T.	21	Every 6 years, or every 1000 hours, whichever occurs first.
U.	22	Every 100 hours or every one year, whichever occurs first.

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INTERVAL LETTER	OPERATION	INTERVAL
V.	23	Every 100 hours, every annual inspection, every overhaul, and any time fuel lines or clamps are serviced, removed or replaced.
W.	24	First 600 hours and as defined by the manufacturer thereafter.
X.	25	Every 1000 hours or 3 years, whichever occurs first.

NOTE: This interval is not currently used but is given to supply information only.

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INSPECTION TIME LIMITS

1. Inspection Items

REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
Revised Jul 3/06	110000	Interior Placards, Exterior Placards, Decals, Markings and Identification Plates - Examine for correct installation and legibility. Refer to Chapter 11 Placards and Markings - Inspection/ Check.	S	20	All
Deleted Jul 1/05	112101				
Deleted Jul 1/05	113101				
	212001	Ventilation System - Inspect clamps, hoses, and valves for condition and security.	D	5	211
Added Jul 1/05	212002	Primary Flight Display (PFD) Fan and Multi-Function Display (MFD) Fan, Deck Skin Fan, and Remote Avionics Cooling Fan - Operational Check. Refer to Chapter 21, Avionics Cooling - Maintenance Practices.	U	22	220, 225
	214001	Cold and Hot Air Hoses - Check condition, routing, and security.	B	2, 4	120
Revised May 16/97	214002	Heater Components, Inlets, and Outlets - Inspect all lines, ducts, clamps, seals, and gaskets for condition, restriction, and security.	B	1, 3	211
	214003	Cabin Heat and Ventilation Controls - Check freedom of movement through full travel. Check friction locks for proper operation.	C	1	211
	221001	Autopilot Rigging - Refer to Autopilot - Maintenance Practices.	F	7	610
Added May 3/99	221002	Autopilot Servo Capstan Assemblies. Check slip-clutch torque settings. Refer to Autopilot - Maintenance Practices.	O	16	610
Added May 3/99	221003	Autopilot Servo Actuators. Inspect for evidence of corrosion and or buildup of dirt or other particulate matter which may interfere with servo operation. Refer to Autopilot - Maintenance Practices.	O	16	610
	231001	Communication Antennas and Cables - Inspect for security of attachment, connection, and condition.	C	3	210

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	235001	Microphones, Headsets, and Jacks - Inspect for cleanliness, security, and evidence of damage.	C	1	211
Added Jun 7/04	235002	Microphone Push-To-Talk Switch - Clean the pilot's and copilot's microphone switches. Refer to Chapter 23, NAV/COM - Maintenance Practices.	B	1, 3	222, 223
	242001	Alternator, Mounting Bracket, and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment. Check belt tension.	A	1, 2, 3, 4	120
Revised Jul 1/05	243001	Main Battery - Examine the general condition and security. Complete a check of the level of electrolyte. Refer to Chapter 12, Battery - Servicing.	B	2, 4	120
Revised Jul 1/05	243002	Main Battery Box and Cables - Clean and remove any corrosion. Examine the cables for routing, support, and security of the connections.	B	2, 4	120
	243003	General Airplane and System Wiring - Inspect for proper routing, chafing, broken or loose terminals, general condition, broken or inadequate clamps, and sharp bends in wiring.	C	1	210
	243004	External Power Receptacle and Power Cables - Inspect for condition and security.	C	2	120
Revised Jul 1/05	243005	Standby Battery - Complete the Standby Battery Capacity Test. Refer to Chapter 24, Standby Battery - Maintenance Practices.	S	20	220
	246001	Switch and Circuit Breaker Panel, Terminal Blocks, and Junction Boxes - Inspect wiring and terminals for condition and security.	C	1	222
Revised Aug 1/00	246002	Power Junction Box - Check operation and condition. Check availability and condition of spare fuse (if applicable).	B	1, 3	222
Added Jul 3/06	246003	Alternator Control Unit - Complete the Over-voltage Protection Circuit Test. Refer to Chapter 24, Alternator Control Unit.	J	11	222

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
Revised Jul 1/05	246101	Essential and Crossfeed Bus Diodes - Complete a check for proper operation. Complete the Essential and Crossfeed Bus Diode Inspection. Refer to Chapter 24, Essential and Crossfeed Bus Diodes - Maintenance Practices.	S	20	224
Revised Jul 3/06	251001	Seats - Examine the seats to make sure they are serviceable and installed correctly. Make sure the seat stops and adjustment mechanism operate correctly. Examine the seat recline control and attaching hardware to make sure the hardware and lock are not damaged and are correctly installed. Lubricate the threads of the Seat Crank Handle Assembly with MIL-PRF-81322 general purpose grease.	B	1, 3	211
	251002	Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Inspect seat rails for cracks.	B	2, 4	230
	251101	Restraint System, front and rear - Check belts for thinning, fraying, cutting, broken stitches, or ultra-violet deterioration. Check system hardware for security of installation.	B	1, 3	211
Revised Mar 1/09	251102	AMSAFE Aviation Inflatable Restraint (AAIR) - Examine the restraint for dirt, frayed edges, unserviceable stitching, loose connections, and other wear. Refer to Chapter 25, Inflatable Restraint System - Maintenance Practices, and do the Inflatable Restraint System Inspection and the Inflatable Restraint System Adjustment/Test.	S	20	211
	252201	Upholstery, Headliner, Trim, and Carpeting - Check condition and security.	D	5	211
Revised Jan 2/06	256001	Emergency Locator Transmitter - Inspect for security of attachment and check operation by verifying transmitter output. Check cumulative time and useful life of batteries in accordance with 14 CFR Part 91.207.	B	1, 3	310

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	262001	Portable Hand Fire Extinguisher - Inspect for proper operating pressure, condition, security of installation, and servicing date.	B	1, 3	230
Added May 3/99	262002	Cockpit Mounted Halon Type Fire Extinguisher - Weigh bottle. Bottle must be reserviced by qualified individual if more than 2 ounces is lost.	P	17	211
Added May 3/99	262003	Cockpit Mounted Halon Type Fire Extinguishers - Perform hydrostatic test. The hydrostatic test shall be at twelve-year intervals based on initial servicing or date of last hydrostatic test.	R	19	211
Added May 3/99	262004	Cockpit Mounted Halon Type Fire Extinguishers - Empty, inspect for damage, and recharge.	Q	18	211
Revised May 3/99	271001	Aileron Controls - Check freedom of movement and proper operation through full travel.	B	1, 3	120, 520, 620
	271002	Ailerons and Cables - Check operation and security of stops. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety. Check travel if cable tension requires adjustment or if stops are damaged. Check fairleads and rub strips for condition.	C	3	120, 520, 620
	271003	Aileron Structure, Control Rods, Hinges, Balance Weights, Bellcranks, Linkage, Bolts, Pulleys, and Pulley Brackets - Check condition, operation, and security of attachment.	B	1, 3	520, 620
	271004	Ailerons and Hinges - Check condition, security, and operation.	B	1, 3	520, 620
	271005	Control Wheel Lock - Check general condition and operation.	C	1	222
Revised May 16/97	271006	Control Yoke - Inspect pulleys, cables, bearings, and turnbuckles for condition and security.	C	1	222, 223
	272001	Rudder - Check internal surfaces for corrosion, condition of fasteners, and balance weight attachment.	C	3	340

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
Revised Aug 1/00	272002	Rudder - Inspect the rudder skins for cracks and loose rivets, rudder hinges for condition, cracks and security; hinge bolts, nuts, hinge bearings, hinge attach fittings, and bonding jumper for evidence of damage and wear, failed fasteners, and security. Inspect balance weight for looseness and the supporting structure for damage.	B	1, 3	340
Revised Aug 1/00	272003	Rudder, Tips, Hinges, Stops, Clips and Cable Attachment - Check condition, security, and operation.	B	1, 3	340
	272004	Rudder Pedals and Linkage - Check for general condition, proper rigging, and operation. Check for security of attachment.	C	1	230
Added Aug 1/00	272005	Rudder Control - Check freedom of movement and proper operation through full travel. Check rudder stops for damage and security.	B	1, 3	340
Revised Aug 1/00	273001	Elevator Control - Check freedom of movement and proper operation through full travel.	B	1, 3	222, 223
Revised May 3/99	273002	Elevator Control System - Inspect pulleys, cables, sprockets, bearings, chains, and turnbuckles for condition, security, and operation. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety.	B	1, 3	222, 223
Revised Aug 1/00	273003	Elevator, Hinges, Stops, and Cable Attachment - Check condition, security, and operation.	B	1, 3	320, 330
	273101	Elevator Trim System - Check cables, push-pull rods, bellcranks, pulleys, turnbuckles, fairleads, rub strips, etc. for proper routing, condition, and security.	B	1, 3	224, 240, 310
Revised May 3/99	273102	Elevator Trim Control and Indicator - Check freedom of movement and proper operation through full travel. Check pulleys, cables, sprockets, bearings, chains, and turnbuckles for condition and security. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety.	C	1	224, 240, 310
	273103	Elevator Trim Tab and Hinges - Check condition, security, and operation.	B	1, 3	224

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
Revised Jul 3/06	273104	Elevator Trim Tab Actuator - Examine the free play limits. Refer to Chapter 27, Elevator Trim Control - Maintenance Practices, Trim Tab Free Play Inspection. If the free play is more than the permitted limits, lubricate the actuator and examine the free play limits again. If the free play is still more than the permitted limits, replace the actuator.	B	1, 3	320
Deleted Dec 1/98	273105				
	273106	Elevator Trim Tab Stop Blocks - Inspect for damage and security.	C	1	240
Added Jul 3/06	273107	Elevator Trim Tab Actuator - Remove, clean, examine, and lubricate the actuator. Refer to Chapter 27, Elevator Trim Control - Maintenance Practices.	X	25	320
Revised Aug 1/00	275001	Flaps - Check tracks, rollers, and control rods for security of attachment. Check rod end bearings for corrosion. Check operation.	B	1, 3	510, 610
	275002	Wing Flap Control - Check operation through full travel and observe Flap Position indicator for proper indication.	C	1	221
	275003	Flap Structure, Linkage, Bellcranks, Pulleys, and Pulley Brackets - Check for condition, operation and security.	C	3	510, 610
	275004	Flaps and Cables - Check cables for proper tension, routing, fraying, corrosion, and turnbuckle safety. Check travel if cable tension requires adjustment.	C	3	510, 610
Revised May 16/97	275005	Flap Motor, Actuator, and Limit Switches - Check wiring and terminals for condition and security. Check actuator for condition and security.	C	3	610
Revised Feb 15/02	275006	Flap Actuator Threads - Clean and lubricate. Refer to Chapter 12, Flight Controls - Servicing.	B	1, 3	610
	282001	Fuel System - Inspect plumbing and components for mounting and security.	B	1, 3	510, 610
Revised Aug 1/00	282002	Fuel Tank Vent Lines and Vent Valves - Check vents for obstruction and proper positioning. Check valves for operation.	B	1, 3	510, 610

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	282003	Fuel Selector Valve - Check controls for detent in each position, security of attachment, and for proper placarding.	B	1, 3	224
Revised Aug 1/00	282004	Integral Fuel Bays - Check for evidence of leakage and condition of fuel caps, adapters, and placards. Using quick drains, ensure no contamination exists. Check quick drains for proper shut off.	B	1, 3	510, 610
	282005	Fuel Reservoir - Using quick drain, ensure no contamination exists.	B	1, 3	510, 610
	282006	Fuel Selector - Using quick drain, ensure no contamination exists.	B	1, 3	224
	282007	Fuel Strainer, Drain Valve, and Controls - Check freedom of movement, security, and proper operation. Disassemble, flush, and clean screen and bowl.	B	1, 3	510, 610
Deleted Mar 1/09	282008				
Revised Jul 1/05	282009	Integral Fuel Bays - Drain the fuel (Refer to Chapter 12, Fuel - Servicing) and purge tanks (Refer to the Single Engine Structural Repair Manual, 1996 and On). Complete an inspection of the tank interior and outlet screens and remove any foreign object debris. Complete an inspection of the tank interior surfaces for sealant deterioration and corrosion (especially in the sump areas).	I	10	510, 610
Added Aug 1/00	282010	Auxiliary (Electric) Fuel Pump - Check pump and fittings for condition, operation, security.	B	2, 4	120
Added Mar 1/09	284001	Fuel Quantity Indication System Check (Airplanes without Garmin G1000) - Examine for damage and correct installation. Complete a Fuel Quantity Calibration and Check. Refer to Chapter 28, Fuel Quantity Indication System - Adjustment/Test.	F	7	220, 510, 610
Added Mar 1/09	284002	Fuel Quantity Indication System Check (Airplanes with Garmin G1000) - Examine for damage and correct installation. Complete a Fuel Quantity System Check. Refer to Chapter 28, Fuel Quantity Indication System - Adjustment/Test.	F	7	220, 510, 610
	311001	Instruments - Check general condition and markings for legibility.	B	1, 3	220

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
Deleted Jul 1/05	311002				
	311003	Instrument Lines, Fittings, Ducting, and Instrument Panel Wiring - Check for proper routing, support, and security of attachment.	C	1	220
Revised Mar 1/09	321001	Main Landing Gear Wheel Fairings, Strut Fairings, and Cuffs - Check for cracks, dents, condition of paint, and correct scraper clearance.	B	2, 4	721,722
Revised Jul 1/05	321002	Main Gear Spring Assemblies - Examine for cracks, dents, corrosion, condition of paint or other damage. Examine for chips, scratches, or other damage that lets corrosion get to the steel spring. Examine the axles for condition and security.	B	2, 4	721, 722
	321003	Main Landing Gear Attachment Structure - Check for damage, cracks, loose rivets, bolts and nuts and security of attachment.	B	2, 4	721, 722
	322001	Nose Gear - Inspect torque links, steering rods, and boots for condition and security of attachment. Check strut for evidence of leakage and proper extension. Check strut barrel for corrosion, pitting, and cleanliness. Check shimmy damper and/or bungees for operation, leakage, and attach points for wear and security.	B	2, 4	720
	322002	Nose Landing Gear Wheel Fairings - Check for cracks, dents, and condition of paint.	B	2, 4	720
	322003	Nose Gear Fork - Inspect for cracks, general condition, and security of attachment.	C	4	720
	322004	Nose Gear Attachment Structure - Inspect for cracks, corrosion, or other damage and security of attachment.	B	2, 4	720
	324001	Brakes - Test toe brakes and parking brake for proper operation.	B	2, 4	230
Revised Feb 15/02	324002	Brakes, Master Cylinders, and Parking Brake - Check master cylinders and parking brake mechanism for condition and security. Check fluid level and test operation of toe and parking brake. Refer to Chapter 12, Hydraulic Brakes - Servicing.	B	2, 4	224, 230

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	324003	Brake Lines, Wheel Cylinders, Hoses, Clamps, and Fittings - Check for leaks, condition, and security and hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.	D	5	721, 722
	324004	Tires - Check tread wear and general condition. Check for proper inflation.	B	2, 4	720, 721, 722
	324005	Wheels, Brake Discs, and Linings - Inspect for wear, cracks, warps, dents, or other damage. Check wheel through-bolts and nuts for looseness.	B	2, 4	721, 722
Revised May 16/97	324006	Wheel Bearings - Clean, inspect and lube.	B	4	720, 721, 722
	325001	Nose Gear Steering Mechanism - Check for wear, security, and proper rigging.	C	4	720
	331001	Instrument and Cabin Lights - Check operation, condition of lens, and security of attachment.	B	1, 3	220, 211, 221
	334001	Navigation, Beacon, Strobe, and Landing Lights - Check operation, condition of lens, and security of attachment.	B	1, 3	340, 520, 620
	341101	Static System - Inspect for security of installation, cleanliness, and evidence of damage.	C	3	210
Revised Jan 2/06	341102	Pitot and Static System - Inspect in accordance with 14 CFR Part 91.411.	J	11	220
Revised Mar 1/09	341103	Pitot Tube and Stall Warning System - Examine for condition and obstructions and make sure the anti-ice heat operates correctly. Apply vacuum to stall warning horn scoop assembly and make sure horn is audible.	A	1, 2, 3, 4	510
	342101	Magnetic Compass - Inspect for security of installation, cleanliness, and evidence of damage.	C	1	225
Revised May 16/97	342102	Magnetic Compass - Calibrate.	M	14	220
Revised Aug 1/00	345001	Instrument Panel Mounted Avionics Units (Including Audio Panel, VHF Nav/Com(s), ADF, GPS, Transponder, and Compass System) - Inspect for deterioration, cracks, and security of instrument panel mounts. Inspect for security of electrical connections, condition, and security of wire routing.	C	1	225

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	345002	Avionics Operating Controls - Inspect for security and proper operation of controls and switches and ensure that all digital segments will illuminate properly.	C	1	225
	345003	Navigation Indicators, Controls, and Components - Inspect for condition and security.	C	1	220, 225
	345004	Navigation Antennas and Cables - Inspect for security of attachment, connection, and condition.	C	1	310
	371001	Vacuum System - Inspect for condition and security.	B	2, 4	120
	371002	Vacuum Pumps - Check for condition and security. Check vacuum system breather line for obstructions, condition, and security.	B	2, 4	120
	371003	Vacuum System Hoses - Inspect for hardness, deterioration, looseness, or collapsed hoses.	B	2, 4	120
Revised May 16/97	371004	Gyro Filter - Inspect for damage, deterioration and contamination. Clean or replace if required.	B	2, 4	120
Deleted Apr 7/03	371005				
Revised Jul 1/05	371006	Vacuum Manifold Check Valve - Complete a check for proper operation. (Only airplanes with dual vacuum pumps and Airborne manifolds. Refer to the Airborne Air & Fuel Products Service Letter Number 39A or latest revision, and in accordance with SB02-37-04.) Refer to Chapter 37, Vacuum System - Maintenance Practices for the removal and installation of the check valve.	T	12	120
Added Jan 2/06	371007	Do an inspection of the wear indicator ports on the vacuum pump described in the Tempest Service Letter 004.	W	24	120
	521001	Doors - Inspect general condition. Check latches, hinges, and seals for condition, operation, and security of attachment.	B	1, 3	210
	531001	Fuselage Surface - Inspect for skin damage, loose rivets, condition of paint, and check pitot-static ports and drain holes for obstruction. Inspect covers and fairings for security.	B	1, 3	210

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	531002	Firewall Structure - Inspect for wrinkles, damage, cracks, sheared rivets, etc. Check cowl shock mounts for condition and security.	C	2	120
	531003	Internal Fuselage Structure - Inspect bulkheads, doorposts, stringers, doublers, and skins for corrosion, cracks, buckles, and loose rivets, bolts and nuts.	C	1	211
	551001	Horizontal Stabilizer and Tailcone structure - Inspect bulkheads, spars, ribs, and skins, for cracks, wrinkles, loose rivets, corrosion, or other damage. Inspect horizontal stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings, and tips.	B	1, 3	320, 330
	551002	Horizontal Stabilizer and Tips - Inspect externally for skin damage and condition of paint.	B	1, 3	320, 330
Revised Aug 1/00	553001	Vertical Stabilizer Fin - Inspect bulkheads, spars, ribs, and skins for cracks, wrinkles, loose rivets, corrosion, or other damage. Inspect vertical stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings, and tip.	B	1, 3	340
Revised Aug 1/00	553002	Vertical Stabilizer Fin and Tailcone - Inspect externally for skin damage and condition of paint.	B	1, 3	340
	561001	Windows and Windshield - Inspect general condition. Check latches, hinges, and seals for condition, operation, and security of attachment.	B	1, 3	210
	571001	Wing Surfaces and Tips - Inspect for skin damage, loose rivets, and condition of paint.	B	1, 3	510, 520, 610, 620
	571002	Wing Struts and Strut Fairings - Check for dents, cracks, loose screws and rivets, and condition of paint.	B	1, 3	510, 610
	571003	Wing Access Plates - Check for damage and security of installation.	C	3	510, 520, 610, 620
	571004	Wing Spar and Wing Strut Fittings - Check for evidence of wear. Check attach bolts for indications of looseness and retorque as required.	C	3	510, 520, 610, 620

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	571005	Wing Structure - Inspect spars, ribs, skins, and stringers for cracks, wrinkles, loose rivets, corrosion, or other damage.	C	3	510, 520, 610, 620
	611001	Spinner - Check general condition and attachment.	A	1, 2, 3, 4	110
	611002	Spinner and Spinner Bulkhead - Remove spinner, wash, and inspect for cracks and fractures.	B	2, 4	110
	611003	Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion, or other damage.	A	1, 2, 3, 4	110
	611004	Propeller Hub - Check general condition.	C	2	110
	611005	Propeller Mounting - Check for security of installation.	A	1, 2, 3, 4	110
	611006	Propeller Mounting Bolts - Inspect mounting bolts and safety wire for signs of looseness. Retorque mounting bolts as required.	C	2	110
Revised Jul 3/06	611007	1A170E/JHA7660 propellers installed on Model 172R airplanes incorporating SB02-61-02 and all Model 172S airplanes (for airplanes operated by pilot schools under Title 14 of the Code of Federal Regulations, Part 141, and airplanes with more than 2000 takeoff cycles for each 1000 flight hours) - Complete a liquid penetrant inspection. (Refer to the latest revision of McCauley Service Bulletin 240.)	T	21	110
Revised Aug 1/00	711001	Cowling and Cowl Flaps - Inspect for cracks, dents, other damage and security of cowl fasteners. Check cowl flaps for condition, security, and operation. Check cowl flap controls for freedom of movement through full travel.	A	1, 2, 3, 4	120
	712001	Engine Shock Mounts, Engine Mount Structure, and Ground Straps - Check condition, security, and alignment.	C	2	120
Added Jun 7/04	712002	Do a check of the engine mount and the oil filter tube for evidence of contact. Refer to SB99-71-02.	A	1, 2, 3, 4	120
	716001	Alternate Induction Air System - Check for obstructions, operation, and security.	A	1, 2, 3, 4	120

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	716002	Induction System - Check security of clamps, tubes, and ducting. Inspect for evidence of leakage.	A	1, 2, 3, 4	120
Revised Aug 1/00	716003	Induction Airbox, Valves, Doors, and Controls - Remove air filter and inspect hinges, doors, seals, and attaching parts for wear and security. Check operation.	A	1, 2, 3, 4	120
Revised May 3/99	716004	Induction Air Filter - Remove and clean. Inspect for damage and service.	A	1, 2, 3, 4	120
Added Jan 2/06	720000	Fuel line (Stainless steel tube assembly) and support clamp inspection and installation. Refer to Lycoming Service Bulletin Number 342E or later version.	V	23	120
	722001	Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.	A	1, 2, 3, 4	120
	722002	Crankcase, Oil Sump, and Accessory Section - Inspect for cracks and evidence of oil leakage. Check bolts and nuts for looseness and retorque as necessary. Check crankcase breather lines for obstructions, security, and general condition.	B	2, 4	120
	722003	Hoses, Metal Lines, and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.	A	1, 2, 3, 4	120
	723001	Engine Cylinders, Rocker Box Covers, and Pushrod Housings - Check for fin damage, cracks, oil leakage, security of attachment, and general condition.	B	2, 4	120
	723002	Engine Metal Lines, Hoses, Clamps, and Fittings - Check for leaks, condition, and security. Check for proper routing and support.	C	2	120
	723003	Engine Baffles and Seals - Check condition and security of attachment.	A	1, 2, 3, 4	120
Revised Jul 1/05	723004	Cylinder Compression - Complete a differential compression test. If there is weak cylinder compression, refer to Chapter 71, Engine - Troubleshooting, for further procedures.	B	2, 4	120
	730001	Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment, and general condition.	B	2, 4	120

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
	730002	Fuel Injection System - Check system for security and condition. Clean fuel inlet screen, check and clean injection nozzles and screens (if evidence of contamination is found), and lubricate air throttle shaft.	B	2, 4	120
Added Jun 1/01	730003	Idle and Mixture - Run the airplane engine to determine satisfactory performance. If required, adjust the idle rpm and fuel mixture. Refer to Chapter 73, Fuel Injection Systems - Maintenance Practices.	B	2, 4	120
Revised Mar 1/09	741001	Magnetos - Examine the external condition and for correct installation and condition of the electrical leads. Complete a check of the engine timing (external timing). Refer to Chapter 74, Ignition System - Maintenance Practices.	B	2, 4	120
Revised Jul 3/06	741002	Magnetos - Clean, examine, and adjust as necessary. Do the 500-hour inspection in accordance with the Slick 4300/6300 Series Magneto Maintenance and Overhaul Manual.	H	9	120
	742001	Ignition Harness and Insulators - Check for proper routing, deterioration, and condition of terminals.	B	2, 4	120
	742002	Spark Plugs - Remove, clean, analyze, test, gap, and rotate top plugs to bottom and bottom plugs to top.	B	2, 4	120
	743001	Ignition Switch and Electrical Harness - Inspect for damage, condition, and security.	B	2, 4	120
Revised Aug 1/00	743002	Inspect and lubricate ACS brand ignition switch. Refer to Chapter 74, Ignition System - Maintenance Practices.	N	15	224
Revised Jul 1/05	761001	Engine Controls and Linkage - Examine the general condition and freedom of movement through the full range. Complete a check for the proper travel, security of attachment, and for evidence of wear. Complete a check of the friction lock and vernier adjustment for proper operation. Complete a check to make sure the throttle, fuel mixture, and propeller governor arms operate through their full arc of travel. The maximum linear freeplay is 0.050 inch.	A	1, 2, 3, 4	120, 225

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REVISION STATUS	ITEM CODE NUMBER	TASK	INTERVAL	OPERATION	ZONE
Revised Aug 1/00	781001	Exhaust System - Inspect for cracks and security. Special check in area of heat exchanger. Refer to Chapter 78, Exhaust system - Maintenance Practices.	A	1, 2, 3, 4	120
Revised Apr 7/03	791001	Engine Oil - Drain oil sump and oil cooler. Check for metal particles or foreign material in filter, on sump drain plug, and on engine suction screen. Replace filter, and refill with recommended grade aviation oil.	L	13	120
	792001	Oil Cooler - Check for obstructions, leaks, and security of attachment.	A	1, 2, 3, 4	120
Revised May 3/99	801001	Starter and Electrical Connections - Check security and condition of starter, electrical connection, and cable.	B	2, 4	120
Added Feb 15/02	801002	Bendix Drive Starter Assembly - Clean and lubricate starter drive assembly.	A	1, 2, 3, 4	120

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COMPONENT TIME LIMITS

1. General

A. Most components given in Chapter 5 are examined as shown elsewhere in this chapter and repaired, overhauled, or replaced as necessary. Some components have a time or life limit and must be overhauled or replaced on or before the specified limit.

B. The terms overhaul and replacement as used in this section are defined as follows:
(1) Overhaul - Overhaul the item as given in 14 CFR 43.2 or replace it.
(2) Replacement - Replace the item with a new item or a serviceable item that is in its service life and time limits or has been rebuilt as given in 14 CFR 43.2.

C. This section (5-11-00) gives a list of items which must be overhauled or replaced at specific time limits. The Cessna-Supplied Replacement Time Limits section shows those items which Cessna has found necessary to overhaul or replace at specific time limits. The Supplier-Supplied Replacement Time Limits section shows component time limits which have been given by an outside supplier for their products. In addition to these time limits, the components shown in this section are also examined at regular time intervals given in the Inspection Time Intervals section. If necessary, based on service use and inspection results, these components can be overhauled or replaced before their time limit is reached.

2. Cessna-Supplied Replacement Time Limits

A. Equipment/Furnishings (Chapter 25).
(1) 504516-401-XXXX Restraint System, Pilot's Left Hand or Right Hand Auto Adjust - Replace every 10 years.
(2) 504851-401-XXXX Restraint System, Pilot's Left Hand or Right Hand Manual Adjust - Replace every 10 years.
(3) 504516-403-XXXX Restraint System, Aft Bench Left Hand or Right Hand Auto Adjust - Replace every 10 years.
(4) 504851-403-XXXX Restraint System, Aft Bench Left Hand or Right Hand Manual Adjust - Replace every 10 years.
(5) 2000031-09-201 Restraint Assembly, Pilot's Seat - Replace every 10 years.
(6) 2000031-10-201 Restraint Assembly, Copilot's Seat - Replace every 10 years.
(7) 2000031-11-201 Restraint Assembly, Right Rear Seat - Replace every 10 years.
(8) 2000031-12-201 Restraint Assembly, Left Rear Seat - Replace every 10 years.

B. Flight Controls (Chapter 27).
(1) 1260074-1 Trim Tab Actuator - Replace the trim tab actuators when the free play cannot be kept in limits by the adjustment or replacement of the rod ends, rod end bolts, screw assembly, and the lubrication of the trim tab actuator.

C. Lights (Chapter 33)
(1) Position Light Assembly (Part Number 01-0771011-04, and 01-0771015-07,-08) - Replace every 10,000 hours. Refer to Chapter 33, LED Navigation Lights Removal/Installation.

D. Vacuum (Chapter 37).
(1) C294502-0201 Gyro Filter - Replace at 600 hours.

E. Powerplant (Chapter 71).
(1) Engine Compartment Flexible Fluid-Carrying Teflon Hoses (Cessna-Installed), Except Drain Hoses - Replace every 10 years or at the engine overhaul, whichever occurs first.

NOTE: This life limit is intended not to let flexible, fluid-carrying Teflon hoses in a deteriorated or damaged condition stay in service. Replace the flexible, fluid-carrying Teflon hoses in the engine compartment (Cessna-installed only) every 10 years or at the engine overhaul, whichever occurs first. This does not include drain hoses. Serviceable hoses which are beyond these limits must be put on order immediately and replaced within 30 days after the new hose is received from Cessna.

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(2) Engine Compartment Drain Hoses - Replace on condition.
(3) Engine Flexible Hoses (Textron Lycoming Installed) - Refer to latest Textron Lycoming Engine Service Bulletins.
(4) P198281 Air Filter - Replace every 500 hours or if the condition of the part shows the need for replacement.
(5) CA3559 Air Filter - Replace every 100 hours or if the condition of the part shows the need for replacement.
(6) Mixture and Throttle Cables - Replace at every engine TBO or any time freeplay is more than 0.05 inch.
(7) 31B22207 Engine Starter - Replace at every engine TBO.

F. Chapter 79 (Oil).
(1) 83278 Oil Pressure Switch - Replace every 3000 hours.

NOTE: If the 83278 Oil Pressure Switch has more than 3000 hours and is in serviceable condition, you must submit an order for a new switch immediately and replace the switch within 60 days after you receive it from Cessna.

3. Supplier-Supplied Replacement Time Limits

A. Chapter 25 (Equipment/Furnishings).
(1) 2020-0 Pointer ELT Battery - Refer to 14 CFR 91.207 for battery replacement time limits.
(2) 508358-409 and 508358-421 AMSAFE Aviation Inflatable Restraint (AAIR) Forward and Aft Electronics Module Assemblies (EMA) - Remove and return the forward and aft EMA's to AMSAFE Aviation after seven years from the manufacture date. The expiration of the service life, that is the total sum of storage life and installation life, must not be more than seven years from the manufacture date. Only the manufacturer can renew the EMA's.
(3) 508792-401 and 508794-401 Pilot's, Copilot's, Left Passenger's, and Right Passenger's AMSAFE Aviation Inflatable Restraint (AAIR) Inflator Assemblies – Remove and replace the pilot's, copilot's, left passenger's, and right passenger's inflator assemblies after ten years from the date of manufacture. The total service life, that is the sum of the storage life and installation life, must not be more than ten years from the date of manufacture. The date of manufacture is found on the gas cylinder. If the cylinder has an expiration date as an alternative to a date of manufacture on it, calculate the date when the inflator assembly must be replaced. Add three years to the expiration date. This is the date the inflator assembly must be replaced. (For additional information refer to AMSAFE service letter SL 25-031.)
(4) 452-201-[X] CO Guardian Remote Mounted CO Detector - Replace 7 years.

B. Chapter 28 (Fuel).
(1) Electric Fuel Pump - Replace at 10 Years if not overhauled.

C. Chapter 37 (Vacuum).
(1) 1H5-25 Vacuum Manifold - Refer to the Airborne Air & Fuel Product Reference Memo No. 39 or the latest revision for replacement time limits.
(2) B3-5-1 or ARB3-5-1 Regulator Valve Filter - Replace at 100 hours.
(3) Dry Vacuum Pump - Replace the engine-driven vacuum pump, if it does not have a wear indicator, every 500 hours of operation, or replace the pump at the vacuum pump manufacturer's recommended inspection and replacement interval, whichever occurs first. For vacuum pumps with a wear indicator, replace the pump at the manufacturer's recommended inspection and replacement interval for that vacuum pump.
(4) Airborne 350 Vacuum Pump Coupling - Replace every 6 years.

D. Chapter 61 (Propeller).
(1) 1C235/LFA7570 or 1A170E/JHA7660 Propeller - Refer to the latest revision of McCauley Service Bulletin 137 for the overhaul time limits.

E. Chapter 71 (Powerplant).
(1) IO-360-L2A Engine - Refer to Textron/Lycoming Service Instruction S.I. 1009AJ or latest revision for time limits.

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(2) CH48110 Engine Oil Filter - Refer to Textron/Lycoming Service Instructions S.I. 1492B, S.I. 1267C, and Service Bulletin SB.480C, or latest revisions.

F. Chapter 74 (Ignition).
(1) 4371 Slick Magnetos - Refer to the Slick Service Bulletin SB2-80C, or latest revision, for time limits.

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PROGRESSIVE CARE PROGRAM

1. General

NOTE: The inspection charts contained within the Progressive Care Program are not intended to be all inclusive, for no such charts can replace the good judgment of a certified airframe and powerplant mechanic in performance of his duties. As the one primarily responsible for the airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

A. The program is divided into four primary operations (operations 1 through 4) which cover all 50-hour, 100-hour and 200-hour inspection requirements. The remaining operations include all of the inspection requirements due at other intervals.

B. The inspection program is divided into operations to enable the progressive inspection to be accomplished.

OPERATION NUMBER	INTERVAL
Operation 1	Consists of all 50-hour interval inspections items and those 100- or 200-hour interval inspections items contained in the fuselage area.
Operation 2	Consists of all 50-hour interval inspections items and those 100- or 200-hour interval inspections items contained in the engine compartment area.
Operation 3	Consists of all 50-hour interval inspections items and those 100- or 200-hour interval inspections items contained in the wing.
Operation 4	Consists of all 50-hour interval inspections items and those 100- or 200-hour interval inspections items contained in the landing gear.
Operation 5	Every 400 hours or 1 year, whichever occurs first.
Operation 6	**(Not used. NOTE)** First 100 hours and each 500 hours thereafter.
Operation 7	Every 600 hours or 1 year, whichever occurs first.
Operation 8	**(Not used. NOTE)** Every 1000 hours or 3 years, whichever occurs first.
Operation 9	Every 500 hours.
Operation 10	Every 1000 hours.
Operation 11	Every 2 years.
Operation 12	Beginning 5 years from the date of the manufacture, you must make sure of the serviceability of the components every twelve months. Refer to Airborne Air and Fuel Products Service Letter Number 39A or latest revision.
Operation 13	Every 50 hours or four months, whichever occurs first.
Operation 14	Every 2 years, or anytime components are added or removed which have the potential to affect the magnetic accuracy and/or variation of the compass calibration, or anytime the accuracy of the compass is in question.
Operation 15	Every 2000 hours.
Operation 16	Every 1000 hours or 1 year, whichever occurs first.
Operation 17	Every 12 calendar months.
Operation 18	Every 6 years.
Operation 19	Every 12 years.

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OPERATION NUMBER	INTERVAL
Operation 20	Every 1 year.
Operation 21	Every 6 years, or every 1000 hours, whichever occurs first.
Operation 22	Every 100 hours or every one year, whichever occurs first.
Operation 23	Every 100 hours, every annual inspection, every overhaul, and any time fuel lines or clamps are serviced, removed or replaced.
Operation 24	First 600 hours and as defined by the manufacturer thereafter.
Operation 25	Every 1000 hours or 3 years, whichever occurs first.

NOTE: This operation and interval is not currently used but is listed to provide information only.

2. Procedure

A. A COMPLETE AIRPLANE INSPECTION includes all 50-, 100- and 200-hour items plus those inspection items contained in other operations which are due at the specified time.

B. The Component Time Limits Section (5-11-00) should be checked at each inspection interval to ensure proper overhaul and replacement requirements are accomplished at the specified times.

C. The Inspection Operations have been developed based on normal usage under average environmental conditions. Airplanes operated in extremely humid areas (tropics), or in exceptionally cold, damp climates, etc., may need more frequent inspections for wear, corrosion, and lubrication. Under these adverse conditions, do the periodic inspections in compliance with the Inspection Operations at more frequent intervals until the operator can set his own inspection periods based on field experience. The operator's inspection intervals must not deviate from the inspection time limits shown in this manual except as given below:

(1) Each inspection interval can be exceeded by 10 hours (if time-controlled), or by 30 days (if date-controlled), or can be performed early at any time prior to the regular interval as provided below:

(a) In the event of late compliance of any operation scheduled, the next operation in sequence retains a due point from the time the late operation was originally scheduled.

(b) In the event of early compliance of any operation scheduled, that occurs 10 hours or less ahead of schedule, the next phase due point may remain where originally set.

(c) In the event of early compliance of any operation scheduled, that occurs more than 10 hours ahead of schedule, the next operation due point must be rescheduled to establish a new due point from the time of early accomplishment.

3. Inspection Terms and Guidelines

A. For inspection terms and guidelines, refer to Time Limits/Maintenance Checks - General.

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INSPECTION OPERATION 1

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 1 gives a list of item(s), which has all 50-hour interval inspection items and those 100- or 200-hour interval inspection items contained in the fuselage area. Items from other areas are included to meet their required time interval.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
611001	Spinner - Check general condition and attachment.	110		
611003	Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion, or other damage.	110		
611005	Propeller Mounting - Check for security of installation.	110		
242001	Alternator, Mounting Bracket, and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment. Check belt tension.	120		
711001	Cowling and Cowl Flaps - Inspect for cracks, dents, other damage and security of cowl fasteners. Check cowl flaps for condition, security, and operation. Check cowl flap controls for freedom of movement through full travel.	120		
712002	Do a check of the engine mount and the oil filter tube for evidence of contact. Refer to SB99-71-02.	120		

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
716001	Alternate Induction Air System - Check for obstructions, operation, and security.	120			
716002	Induction System - Check security of clamps, tubes, and ducting. Inspect for evidence of leakage.	120			
716003	Induction Airbox, Valves, Doors, and Controls - Remove air filter and inspect hinges, doors, seals, and attaching parts for wear and security. Check operation.	120			
716004	Induction Air Filter - Remove and clean. Inspect for damage and service.	120			
722001	Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.	120			
722003	Hoses, Metal Lines, and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.	120			
723003	Engine Baffles and Seals - Check condition and security of attachment.	120			
781001	Exhaust System - Inspect for cracks and security. Special check in area of heat exchanger. Refer to Chapter 78, Exhaust system - Maintenance Practices.	120			
792001	Oil Cooler - Check for obstructions, leaks, and security of attachment.	120			
801002	Bendix Drive Starter Assembly - Clean and lubricate starter drive assembly.	120			
761001	Engine Controls and Linkage - Examine the general condition and freedom of movement through the full range. Complete a check for the proper travel, security of attachment, and for evidence of wear. Complete a check of the friction lock and vernier adjustment for proper operation. Complete a check to make sure the throttle, fuel mixture, and propeller governor arms operate through their full arc of travel. The maximum linear freeplay is 0.050 inch.	120, 225			
271001	Aileron Controls - Check freedom of movement and proper operation through full travel.	120, 520, 620			
243003	General Airplane and System Wiring - Inspect for proper routing, chafing, broken or loose terminals, general condition, broken or inadequate clamps, and sharp bends in wiring.	210			
521001	Doors - Inspect general condition. Check latches, hinges, and seals for condition, operation, and security of attachment.	210			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
531001	Fuselage Surface - Inspect for skin damage, loose rivets, condition of paint, and check pitot-static ports and drain holes for obstruction. Inspect covers and fairings for security.	210			
561001	Windows and Windshield - Inspect general condition. Check latches, hinges, and seals for condition, operation, and security of attachment.	210			
214002	Heater Components, Inlets, and Outlets - Inspect all lines, ducts, clamps, seals, and gaskets for condition, restriction, and security.	211			
214003	Cabin Heat and Ventilation Controls - Check freedom of movement through full travel. Check friction locks for proper operation.	211			
235001	Microphones, Headsets, and Jacks - Inspect for cleanliness, security, and evidence of damage.	211			
251001	Seats - Examine the seats to make sure they are serviceable and installed correctly. Make sure the seat stops and adjustment mechanism operate correctly. Examine the seat recline control and attaching hardware to make sure the hardware and lock are not damaged and are correctly installed. Lubricate the threads of the Seat Crank Handle Assembly with MIL-PRF-81322 general purpose grease.	211			
251101	Restraint System, front and rear - Check belts for thinning, fraying, cutting, broken stitches, or ultra-violet deterioration. Check system hardware for security of installation.	211			
531003	Internal Fuselage Structure - Inspect bulkheads, doorposts, stringers, doublers, and skins for corrosion, cracks, buckles, and loose rivets, bolts and nuts.	211			
311001	Instruments - Check general condition and markings for legibility.	220			
311003	Instrument Lines, Fittings, Ducting, and Instrument Panel Wiring - Check for proper routing, support, and security of attachment.	220			
331001	Instrument and Cabin Lights - Check operation, condition of lens, and security of attachment.	220, 211, 221			
345003	Navigation Indicators, Controls, and Components - Inspect for condition and security.	220, 225			
275002	Wing Flap Control - Check operation through full travel and observe Flap Position indicator for proper indication.	221			
246001	Switch and Circuit Breaker Panel, Terminal Blocks, and Junction Boxes - Inspect wiring and terminals for condition and security.	222			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
246002	Power Junction Box - Check operation and condition. Check availability and condition of spare fuse (if applicable).	222			
271005	Control Wheel Lock - Check general condition and operation.	222			
235002	Microphone Push-To-Talk Switch - Clean the pilot's and copilot's microphone switches. Refer to Chapter 23, NAV/COM - Maintenance Practices.	222, 223			
271006	Control Yoke - Inspect pulleys, cables, bearings, and turnbuckles for condition and security.	222, 223			
273001	Elevator Control - Check freedom of movement and proper operation through full travel.	222, 223			
273002	Elevator Control System - Inspect pulleys, cables, sprockets, bearings, chains, and turnbuckles for condition, security, and operation. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety.	222, 223			
273103	Elevator Trim Tab and Hinges - Check condition, security, and operation.	224			
282003	Fuel Selector Valve - Check controls for detent in each position, security of attachment, and for proper placarding.	224			
282006	Fuel Selector - Using quick drain, ensure no contamination exists.	224			
273101	Elevator Trim System - Check cables, push-pull rods, bellcranks, pulleys, turnbuckles, fairleads, rub strips, etc. for proper routing, condition, and security.	224, 240, 310			
273102	Elevator Trim Control and Indicator - Check freedom of movement and proper operation through full travel. Check pulleys, cables, sprockets, bearings, chains, and turnbuckles for condition and security. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety.	224, 240, 310			
342101	Magnetic Compass - Inspect for security of installation, cleanliness, and evidence of damage.	225			
345001	Instrument Panel Mounted Avionics Units (Including Audio Panel, VHF Nav/Com(s), ADF, GPS, Transponder, and Compass System) - Inspect for deterioration, cracks, and security of instrument panel mounts. Inspect for security of electrical connections, condition, and security of wire routing.	225			
345002	Avionics Operating Controls - Inspect for security and proper operation of controls and switches and ensure that all digital segments will illuminate properly.	225			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
262001	Portable Hand Fire Extinguisher - Inspect for proper operating pressure, condition, security of installation, and servicing date.	230			
272004	Rudder Pedals and Linkage - Check for general condition, proper rigging, and operation. Check for security of attachment.	230			
273106	Elevator Trim Tab Stop Blocks - Inspect for damage and security.	240			
256001	Emergency Locator Transmitter - Inspect for security of attachment and check operation by verifying transmitter output. Check cumulative time and useful life of batteries in accordance with 14 CFR Part 91.207.	310			
345004	Navigation Antennas and Cables - Inspect for security of attachment, connection, and condition.	310			
273104	Elevator Trim Tab Actuator - Examine the free play limits. Refer to Chapter 27, Elevator Trim Control - Maintenance Practices, Trim Tab Free Play Inspection. If the free play is more than the permitted limits, lubricate the actuator and examine the free play limits again. If the free play is still more than the permitted limits, replace the actuator.	320			
273003	Elevator, Hinges, Stops, and Cable Attachment - Check condition, security, and operation.	320, 330			
551001	Horizontal Stabilizer and Tailcone structure - Inspect bulkheads, spars, ribs, and skins, for cracks, wrinkles, loose rivets, corrosion, or other damage. Inspect horizontal stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings, and tips.	320, 330			
551002	Horizontal Stabilizer and Tips - Inspect externally for skin damage and condition of paint.	320, 330			
272002	Rudder - Inspect the rudder skins for cracks and loose rivets, rudder hinges for condition, cracks and security; hinge bolts, nuts, hinge bearings, hinge attach fittings, and bonding jumper for evidence of damage and wear, failed fasteners, and security. Inspect balance weight for looseness and the supporting structure for damage.	340			
272003	Rudder, Tips, Hinges, Stops, Clips and Cable Attachment - Check condition, security, and operation.	340			
272005	Rudder Control - Check freedom of movement and proper operation through full travel. Check rudder stops for damage and security.	340			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
553001	Vertical Stabilizer Fin - Inspect bulkheads, spars, ribs, and skins for cracks, wrinkles, loose rivets, corrosion, or other damage. Inspect vertical stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings, and tip.	340			
553002	Vertical Stabilizer Fin and Tailcone - Inspect externally for skin damage and condition of paint.	340			
334001	Navigation, Beacon, Strobe, and Landing Lights - Check operation, condition of lens, and security of attachment.	340, 520, 620			
341103	Pitot Tube and Stall Warning System - Examine for condition and obstructions and make sure the anti-ice heat operates correctly. Apply vacuum to stall warning horn scoop assembly and make sure horn is audible.	510			
571001	Wing Surfaces and Tips - Inspect for skin damage, loose rivets, and condition of paint.	510, 520, 610, 620			
275001	Flaps - Check tracks, rollers, and control rods for security of attachment. Check rod end bearings for corrosion. Check operation.	510, 610			
282001	Fuel System - Inspect plumbing and components for mounting and security.	510, 610			
282002	Fuel Tank Vent Lines and Vent Valves - Check vents for obstruction and proper positioning. Check valves for operation.	510, 610			
282004	Integral Fuel Bays - Check for evidence of leakage and condition of fuel caps, adapters, and placards. Using quick drains, ensure no contamination exists. Check quick drains for proper shut off.	510, 610			
282005	Fuel Reservoir - Using quick drain, ensure no contamination exists.	510, 610			
282007	Fuel Strainer, Drain Valve, and Controls - Check freedom of movement, security, and proper operation. Disassemble, flush, and clean screen and bowl.	510, 610			
571002	Wing Struts and Strut Fairings - Check for dents, cracks, loose screws and rivets, and condition of paint.	510, 610			
271003	Aileron Structure, Control Rods, Hinges, Balance Weights, Bellcranks, Linkage, Bolts, Pulleys, and Pulley Brackets - Check condition, operation, and security of attachment.	520, 620			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
271004	Ailerons and Hinges - Check condition, security, and operation.	520, 620			
275006	Flap Actuator Threads - Clean and lubricate. Refer to Chapter 12, Flight Controls - Servicing.	610			
	*** End of Operation 1 Inspection Items ***				

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INSPECTION OPERATION 2

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 2 gives a list of item(s), which has all 50-hour interval inspection items and those 100- or 200-hour interval inspection items contained in the engine compartment. Items from other areas are included to meet their required time interval.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
611001	Spinner - Check general condition and attachment.	110		
611002	Spinner and Spinner Bulkhead - Remove spinner, wash, and inspect for cracks and fractures.	110		
611003	Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion, or other damage.	110		
611004	Propeller Hub - Check general condition.	110		
611005	Propeller Mounting - Check for security of installation.	110		
611006	Propeller Mounting Bolts - Inspect mounting bolts and safety wire for signs of looseness. Retorque mounting bolts as required.	110		
214001	Cold and Hot Air Hoses - Check condition, routing, and security.	120		

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
242001	Alternator, Mounting Bracket, and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment. Check belt tension.	120			
243001	Main Battery - Examine the general condition and security. Complete a check of the level of electrolyte. Refer to Chapter 12, Battery - Servicing.	120			
243002	Main Battery Box and Cables - Clean and remove any corrosion. Examine the cables for routing, support, and security of the connections.	120			
243004	External Power Receptacle and Power Cables - Inspect for condition and security.	120			
282010	Auxiliary (Electric) Fuel Pump - Check pump and fittings for condition, operation, security.	120			
371001	Vacuum System - Inspect for condition and security.	120			
371002	Vacuum Pumps - Check for condition and security. Check vacuum system breather line for obstructions, condition, and security.	120			
371003	Vacuum System Hoses - Inspect for hardness, deterioration, looseness, or collapsed hoses.	120			
371004	Gyro Filter - Inspect for damage, deterioration and contamination. Clean or replace if required.	120			
531002	Firewall Structure - Inspect for wrinkles, damage, cracks, sheared rivets, etc. Check cowl shock mounts for condition and security.	120			
711001	Cowling and Cowl Flaps - Inspect for cracks, dents, other damage and security of cowl fasteners. Check cowl flaps for condition, security, and operation. Check cowl flap controls for freedom of movement through full travel.	120			
712001	Engine Shock Mounts, Engine Mount Structure, and Ground Straps - Check condition, security, and alignment.	120			
712002	Do a check of the engine mount and the oil filter tube for evidence of contact. Refer to SB99-71-02.	120			
716001	Alternate Induction Air System - Check for obstructions, operation, and security.	120			
716002	Induction System - Check security of clamps, tubes, and ducting. Inspect for evidence of leakage.	120			
716003	Induction Airbox, Valves, Doors, and Controls - Remove air filter and inspect hinges, doors, seals, and attaching parts for wear and security. Check operation.	120			
716004	Induction Air Filter - Remove and clean. Inspect for damage and service.	120			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
722001	Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.	120			
722002	Crankcase, Oil Sump, and Accessory Section - Inspect for cracks and evidence of oil leakage. Check bolts and nuts for looseness and retorque as necessary. Check crankcase breather lines for obstructions, security, and general condition.	120			
722003	Hoses, Metal Lines, and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.	120			
723001	Engine Cylinders, Rocker Box Covers, and Pushrod Housings - Check for fin damage, cracks, oil leakage, security of attachment, and general condition.	120			
723002	Engine Metal Lines, Hoses, Clamps, and Fittings - Check for leaks, condition, and security. Check for proper routing and support.	120			
723003	Engine Baffles and Seals - Check condition and security of attachment.	120			
723004	Cylinder Compression - Complete a differential compression test. If there is weak cylinder compression, refer to Chapter 71, Engine - Troubleshooting, for further procedures.	120			
730001	Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment, and general condition.	120			
730002	Fuel Injection System - Check system for security and condition. Clean fuel inlet screen, check and clean injection nozzles and screens (if evidence of contamination is found), and lubricate air throttle shaft.	120			
730003	Idle and Mixture - Run the airplane engine to determine satisfactory performance. If required, adjust the idle rpm and fuel mixture. Refer to Chapter 73, Fuel Injection Systems - Maintenance Practices.	120			
741001	Magnetos - Examine the external condition and for correct installation and condition of the electrical leads. Complete a check of the engine timing (external timing). Refer to Chapter 74, Ignition System - Maintenance Practices.	120			
742001	Ignition Harness and Insulators - Check for proper routing, deterioration, and condition of terminals.	120			
742002	Spark Plugs - Remove, clean, analyze, test, gap, and rotate top plugs to bottom and bottom plugs to top.	120			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
743001	Ignition Switch and Electrical Harness - Inspect for damage, condition, and security.	120			
781001	Exhaust System - Inspect for cracks and security. Special check in area of heat exchanger. Refer to Chapter 78, Exhaust system - Maintenance Practices.	120			
792001	Oil Cooler - Check for obstructions, leaks, and security of attachment.	120			
801001	Starter and Electrical Connections - Check security and condition of starter, electrical connection, and cable.	120			
801002	Bendix Drive Starter Assembly - Clean and lubricate starter drive assembly.	120			
761001	Engine Controls and Linkage - Examine the general condition and freedom of movement through the full range. Complete a check for the proper travel, security of attachment, and for evidence of wear. Complete a check of the friction lock and vernier adjustment for proper operation. Complete a check to make sure the throttle, fuel mixture, and propeller governor arms operate through their full arc of travel. The maximum linear freeplay is 0.050 inch.	120, 225			
324002	Brakes, Master Cylinders, and Parking Brake - Check master cylinders and parking brake mechanism for condition and security. Check fluid level and test operation of toe and parking brake. Refer to Chapter 12, Hydraulic Brakes - Servicing.	224, 230			
251002	Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Inspect seat rails for cracks.	230			
324001	Brakes - Test toe brakes and parking brake for proper operation.	230			
341103	Pitot Tube and Stall Warning System - Examine for condition and obstructions and make sure the anti-ice heat operates correctly. Apply vacuum to stall warning horn scoop assembly and make sure horn is audible.	510			
322001	Nose Gear - Inspect torque links, steering rods, and boots for condition and security of attachment. Check strut for evidence of leakage and proper extension. Check strut barrel for corrosion, pitting, and cleanliness. Check shimmy damper and/or bungees for operation, leakage, and attach points for wear and security.	720			
322002	Nose Landing Gear Wheel Fairings - Check for cracks, dents, and condition of paint.	720			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
322004	Nose Gear Attachment Structure - Inspect for cracks, corrosion, or other damage and security of attachment.	720			
324004	Tires - Check tread wear and general condition. Check for proper inflation.	720, 721, 722			
321002	Main Gear Spring Assemblies - Examine for cracks, dents, corrosion, condition of paint or other damage. Examine for chips, scratches, or other damage that lets corrosion get to the steel spring. Examine the axles for condition and security.	721, 722			
321003	Main Landing Gear Attachment Structure - Check for damage, cracks, loose rivets, bolts and nuts and security of attachment.	721, 722			
324005	Wheels, Brake Discs, and Linings - Inspect for wear, cracks, warps, dents, or other damage. Check wheel through-bolts and nuts for looseness.	721, 722			
321001	Main Landing Gear Wheel Fairings, Strut Fairings, and Cuffs - Check for cracks, dents, condition of paint, and correct scraper clearance.	721,722			

*** End of Operation 2 Inspection Items ***

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INSPECTION OPERATION 3

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 3 gives a list of item(s), which has all 50-hour interval inspection items and those 100- or 200-hour interval inspection items contained in the wing. Items from other areas are included to meet their required time interval.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
611001	Spinner - Check general condition and attachment.	110		
611003	Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion, or other damage.	110		
611005	Propeller Mounting - Check for security of installation.	110		
242001	Alternator, Mounting Bracket, and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment. Check belt tension.	120		
711001	Cowling and Cowl Flaps - Inspect for cracks, dents, other damage and security of cowl fasteners. Check cowl flaps for condition, security, and operation. Check cowl flap controls for freedom of movement through full travel.	120		
712002	Do a check of the engine mount and the oil filter tube for evidence of contact. Refer to SB99-71-02.	120		

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
716001	Alternate Induction Air System - Check for obstructions, operation, and security.	120			
716002	Induction System - Check security of clamps, tubes, and ducting. Inspect for evidence of leakage.	120			
716003	Induction Airbox, Valves, Doors, and Controls - Remove air filter and inspect hinges, doors, seals, and attaching parts for wear and security. Check operation.	120			
716004	Induction Air Filter - Remove and clean. Inspect for damage and service.	120			
722001	Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.	120			
722003	Hoses, Metal Lines, and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.	120			
723003	Engine Baffles and Seals - Check condition and security of attachment.	120			
781001	Exhaust System - Inspect for cracks and security. Special check in area of heat exchanger. Refer to Chapter 78, Exhaust system - Maintenance Practices.	120			
792001	Oil Cooler - Check for obstructions, leaks, and security of attachment.	120			
801002	Bendix Drive Starter Assembly - Clean and lubricate starter drive assembly.	120			
761001	Engine Controls and Linkage - Examine the general condition and freedom of movement through the full range. Complete a check for the proper travel, security of attachment, and for evidence of wear. Complete a check of the friction lock and vernier adjustment for proper operation. Complete a check to make sure the throttle, fuel mixture, and propeller governor arms operate through their full arc of travel. The maximum linear freeplay is 0.050 inch.	120, 225			
271001	Aileron Controls - Check freedom of movement and proper operation through full travel.	120, 520, 620			
271002	Ailerons and Cables - Check operation and security of stops. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety. Check travel if cable tension requires adjustment or if stops are damaged. Check fairleads and rub strips for condition.	120, 520, 620			
231001	Communication Antennas and Cables - Inspect for security of attachment, connection, and condition.	210			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
341101	Static System - Inspect for security of installation, cleanliness, and evidence of damage.	210			
521001	Doors - Inspect general condition. Check latches, hinges, and seals for condition, operation, and security of attachment.	210			
531001	Fuselage Surface - Inspect for skin damage, loose rivets, condition of paint, and check pitot-static ports and drain holes for obstruction. Inspect covers and fairings for security.	210			
561001	Windows and Windshield - Inspect general condition. Check latches, hinges, and seals for condition, operation, and security of attachment.	210			
214002	Heater Components, Inlets, and Outlets - Inspect all lines, ducts, clamps, seals, and gaskets for condition, restriction, and security.	211			
251001	Seats - Examine the seats to make sure they are serviceable and installed correctly. Make sure the seat stops and adjustment mechanism operate correctly. Examine the seat recline control and attaching hardware to make sure the hardware and lock are not damaged and are correctly installed. Lubricate the threads of the Seat Crank Handle Assembly with MIL-PRF-81322 general purpose grease.	211			
251101	Restraint System, front and rear - Check belts for thinning, fraying, cutting, broken stitches, or ultra-violet deterioration. Check system hardware for security of installation.	211			
311001	Instruments - Check general condition and markings for legibility.	220			
331001	Instrument and Cabin Lights - Check operation, condition of lens, and security of attachment.	220, 211, 221			
246002	Power Junction Box - Check operation and condition. Check availability and condition of spare fuse (if applicable).	222			
235002	Microphone Push-To-Talk Switch - Clean the pilot's and copilot's microphone switches. Refer to Chapter 23, NAV/COM - Maintenance Practices.	222, 223			
273001	Elevator Control - Check freedom of movement and proper operation through full travel.	222, 223			
273002	Elevator Control System - Inspect pulleys, cables, sprockets, bearings, chains, and turnbuckles for condition, security, and operation. Check cables for tension, routing, fraying, corrosion, and turnbuckle safety.	222, 223			
273103	Elevator Trim Tab and Hinges - Check condition, security, and operation.	224			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
282003	Fuel Selector Valve - Check controls for detent in each position, security of attachment, and for proper placarding.	224			
282006	Fuel Selector - Using quick drain, ensure no contamination exists.	224			
273101	Elevator Trim System - Check cables, push-pull rods, bellcranks, pulleys, turnbuckles, fairleads, rub strips, etc. for proper routing, condition, and security.	224, 240, 310			
262001	Portable Hand Fire Extinguisher - Inspect for proper operating pressure, condition, security of installation, and servicing date.	230			
256001	Emergency Locator Transmitter - Inspect for security of attachment and check operation by verifying transmitter output. Check cumulative time and useful life of batteries in accordance with 14 CFR Part 91.207.	310			
273104	Elevator Trim Tab Actuator - Examine the free play limits. Refer to Chapter 27, Elevator Trim Control - Maintenance Practices, Trim Tab Free Play Inspection. If the free play is more than the permitted limits, lubricate the actuator and examine the free play limits again. If the free play is still more than the permitted limits, replace the actuator.	320			
273003	Elevator, Hinges, Stops, and Cable Attachment - Check condition, security, and operation.	320, 330			
551001	Horizontal Stabilizer and Tailcone structure - Inspect bulkheads, spars, ribs, and skins, for cracks, wrinkles, loose rivets, corrosion, or other damage. Inspect horizontal stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings, and tips.	320, 330			
551002	Horizontal Stabilizer and Tips - Inspect externally for skin damage and condition of paint.	320, 330			
272001	Rudder - Check internal surfaces for corrosion, condition of fasteners, and balance weight attachment.	340			
272002	Rudder - Inspect the rudder skins for cracks and loose rivets, rudder hinges for condition, cracks and security; hinge bolts, nuts, hinge bearings, hinge attach fittings, and bonding jumper for evidence of damage and wear, failed fasteners, and security. Inspect balance weight for looseness and the supporting structure for damage.	340			
272003	Rudder, Tips, Hinges, Stops, Clips and Cable Attachment - Check condition, security, and operation.	340			

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ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
272005	Rudder Control - Check freedom of movement and proper operation through full travel. Check rudder stops for damage and security.	340		
553001	Vertical Stabilizer Fin - Inspect bulkheads, spars, ribs, and skins for cracks, wrinkles, loose rivets, corrosion, or other damage. Inspect vertical stabilizer attach bolts for looseness. Retorque as necessary. Check security of inspection covers, fairings, and tip.	340		
553002	Vertical Stabilizer Fin and Tailcone - Inspect externally for skin damage and condition of paint.	340		
334001	Navigation, Beacon, Strobe, and Landing Lights - Check operation, condition of lens, and security of attachment.	340, 520, 620		
341103	Pitot Tube and Stall Warning System - Examine for condition and obstructions and make sure the anti-ice heat operates correctly. Apply vacuum to stall warning horn scoop assembly and make sure horn is audible.	510		
571001	Wing Surfaces and Tips - Inspect for skin damage, loose rivets, and condition of paint.	510, 520, 610, 620		
571003	Wing Access Plates - Check for damage and security of installation.	510, 520, 610, 620		
571004	Wing Spar and Wing Strut Fittings - Check for evidence of wear. Check attach bolts for indications of looseness and retorque as required.	510, 520, 610, 620		
571005	Wing Structure - Inspect spars, ribs, skins, and stringers for cracks, wrinkles, loose rivets, corrosion, or other damage.	510, 520, 610, 620		
275001	Flaps - Check tracks, rollers, and control rods for security of attachment. Check rod end bearings for corrosion. Check operation.	510, 610		
275003	Flap Structure, Linkage, Bellcranks, Pulleys, and Pulley Brackets - Check for condition, operation and security.	510, 610		
275004	Flaps and Cables - Check cables for proper tension, routing, fraying, corrosion, and turnbuckle safety. Check travel if cable tension requires adjustment.	510, 610		
282001	Fuel System - Inspect plumbing and components for mounting and security.	510, 610		
282002	Fuel Tank Vent Lines and Vent Valves - Check vents for obstruction and proper positioning. Check valves for operation.	510, 610		

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
282004	Integral Fuel Bays - Check for evidence of leakage and condition of fuel caps, adapters, and placards. Using quick drains, ensure no contamination exists. Check quick drains for proper shut off.	510, 610			
282005	Fuel Reservoir - Using quick drain, ensure no contamination exists.	510, 610			
282007	Fuel Strainer, Drain Valve, and Controls - Check freedom of movement, security, and proper operation. Disassemble, flush, and clean screen and bowl.	510, 610			
571002	Wing Struts and Strut Fairings - Check for dents, cracks, loose screws and rivets, and condition of paint.	510, 610			
271003	Aileron Structure, Control Rods, Hinges, Balance Weights, Bellcranks, Linkage, Bolts, Pulleys, and Pulley Brackets - Check condition, operation, and security of attachment.	520, 620			
271004	Ailerons and Hinges - Check condition, security, and operation.	520, 620			
275005	Flap Motor, Actuator, and Limit Switches - Check wiring and terminals for condition and security. Check actuator for condition and security.	610			
275006	Flap Actuator Threads - Clean and lubricate. Refer to Chapter 12, Flight Controls - Servicing.	610			
	*** End of Operation 3 Inspection Items ***				

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INSPECTION OPERATION 4

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 4 gives a list of item(s), which has all 50-hour interval inspection items and those 100- or 200-hour interval inspection items contained in the landing gear. Items from other areas are included to meet their required time interval.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
611001	Spinner - Check general condition and attachment.	110		
611002	Spinner and Spinner Bulkhead - Remove spinner, wash, and inspect for cracks and fractures.	110		
611003	Propeller Blades - Inspect for cracks, dents, nicks, scratches, erosion, corrosion, or other damage.	110		
611005	Propeller Mounting - Check for security of installation.	110		
214001	Cold and Hot Air Hoses - Check condition, routing, and security.	120		
242001	Alternator, Mounting Bracket, and Electrical Connections - Check condition and security. Check alternator belts for condition and proper adjustment. Check belt tension.	120		
243001	Main Battery - Examine the general condition and security. Complete a check of the level of electrolyte. Refer to Chapter 12, Battery - Servicing.	120		

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
243002	Main Battery Box and Cables - Clean and remove any corrosion. Examine the cables for routing, support, and security of the connections.	120			
282010	Auxiliary (Electric) Fuel Pump - Check pump and fittings for condition, operation, security.	120			
371001	Vacuum System - Inspect for condition and security.	120			
371002	Vacuum Pumps - Check for condition and security. Check vacuum system breather line for obstructions, condition, and security.	120			
371003	Vacuum System Hoses - Inspect for hardness, deterioration, looseness, or collapsed hoses.	120			
371004	Gyro Filter - Inspect for damage, deterioration and contamination. Clean or replace if required.	120			
711001	Cowling and Cowl Flaps - Inspect for cracks, dents, other damage and security of cowl fasteners. Check cowl flaps for condition, security, and operation. Check cowl flap controls for freedom of movement through full travel.	120			
712002	Do a check of the engine mount and the oil filter tube for evidence of contact. Refer to SB99-71-02.	120			
716001	Alternate Induction Air System - Check for obstructions, operation, and security.	120			
716002	Induction System - Check security of clamps, tubes, and ducting. Inspect for evidence of leakage.	120			
716003	Induction Airbox, Valves, Doors, and Controls - Remove air filter and inspect hinges, doors, seals, and attaching parts for wear and security. Check operation.	120			
716004	Induction Air Filter - Remove and clean. Inspect for damage and service.	120			
722001	Engine - Inspect for evidence of oil and fuel leaks. Wash engine and check for security of accessories.	120			
722002	Crankcase, Oil Sump, and Accessory Section - Inspect for cracks and evidence of oil leakage. Check bolts and nuts for looseness and retorque as necessary. Check crankcase breather lines for obstructions, security, and general condition.	120			
722003	Hoses, Metal Lines, and Fittings - Inspect for signs of oil and fuel leaks. Check for abrasions, chafing, security, proper routing and support and for evidence of deterioration.	120			
723001	Engine Cylinders, Rocker Box Covers, and Pushrod Housings - Check for fin damage, cracks, oil leakage, security of attachment, and general condition.	120			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
723003	Engine Baffles and Seals - Check condition and security of attachment.	120			
723004	Cylinder Compression - Complete a differential compression test. If there is weak cylinder compression, refer to Chapter 71, Engine - Troubleshooting, for further procedures.	120			
730001	Engine-Driven Fuel Pump - Check for evidence of leakage, security of attachment, and general condition.	120			
730002	Fuel Injection System - Check system for security and condition. Clean fuel inlet screen, check and clean injection nozzles and screens (if evidence of contamination is found), and lubricate air throttle shaft.	120			
730003	Idle and Mixture - Run the airplane engine to determine satisfactory performance. If required, adjust the idle rpm and fuel mixture. Refer to Chapter 73, Fuel Injection Systems - Maintenance Practices.	120			
741001	Magnetos - Examine the external condition and for correct installation and condition of the electrical leads. Complete a check of the engine timing (external timing). Refer to Chapter 74, Ignition System - Maintenance Practices.	120			
742001	Ignition Harness and Insulators - Check for proper routing, deterioration, and condition of terminals.	120			
742002	Spark Plugs - Remove, clean, analyze, test, gap, and rotate top plugs to bottom and bottom plugs to top.	120			
743001	Ignition Switch and Electrical Harness - Inspect for damage, condition, and security.	120			
781001	Exhaust System - Inspect for cracks and security. Special check in area of heat exchanger. Refer to Chapter 78, Exhaust system - Maintenance Practices.	120			
792001	Oil Cooler - Check for obstructions, leaks, and security of attachment.	120			
801001	Starter and Electrical Connections - Check security and condition of starter, electrical connection, and cable.	120			
801002	Bendix Drive Starter Assembly - Clean and lubricate starter drive assembly.	120			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
761001	Engine Controls and Linkage - Examine the general condition and freedom of movement through the full range. Complete a check for the proper travel, security of attachment, and for evidence of wear. Complete a check of the friction lock and vernier adjustment for proper operation. Complete a check to make sure the throttle, fuel mixture, and propeller governor arms operate through their full arc of travel. The maximum linear freeplay is 0.050 inch.	120, 225			
324002	Brakes, Master Cylinders, and Parking Brake - Check master cylinders and parking brake mechanism for condition and security. Check fluid level and test operation of toe and parking brake. Refer to Chapter 12, Hydraulic Brakes - Servicing.	224, 230			
251002	Seat Tracks and Stops - Inspect seat tracks for condition and security of installation. Check seat track stops for damage and correct location. Inspect seat rails for cracks.	230			
324001	Brakes - Test toe brakes and parking brake for proper operation.	230			
341103	Pitot Tube and Stall Warning System - Examine for condition and obstructions and make sure the anti-ice heat operates correctly. Apply vacuum to stall warning horn scoop assembly and make sure horn is audible.	510			
322001	Nose Gear - Inspect torque links, steering rods, and boots for condition and security of attachment. Check strut for evidence of leakage and proper extension. Check strut barrel for corrosion, pitting, and cleanliness. Check shimmy damper and/or bungees for operation, leakage, and attach points for wear and security.	720			
322002	Nose Landing Gear Wheel Fairings - Check for cracks, dents, and condition of paint.	720			
322003	Nose Gear Fork - Inspect for cracks, general condition, and security of attachment.	720			
322004	Nose Gear Attachment Structure - Inspect for cracks, corrosion, or other damage and security of attachment.	720			
325001	Nose Gear Steering Mechanism - Check for wear, security, and proper rigging.	720			
324004	Tires - Check tread wear and general condition. Check for proper inflation.	720, 721, 722			
324006	Wheel Bearings - Clean, inspect and lube.	720, 721, 722			

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ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
321002	Main Gear Spring Assemblies - Examine for cracks, dents, corrosion, condition of paint or other damage. Examine for chips, scratches, or other damage that lets corrosion get to the steel spring. Examine the axles for condition and security.	721, 722			
321003	Main Landing Gear Attachment Structure - Check for damage, cracks, loose rivets, bolts and nuts and security of attachment.	721, 722			
324005	Wheels, Brake Discs, and Linings - Inspect for wear, cracks, warps, dents, or other damage. Check wheel through-bolts and nuts for looseness.	721, 722			
321001	Main Landing Gear Wheel Fairings, Strut Fairings, and Cuffs - Check for cracks, dents, condition of paint, and correct scraper clearance.	721,722			
	*** End of Operation 4 Inspection Items ***				

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INSPECTION OPERATION 5

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 5 gives a list of item(s), which are completed every 400 hours or 1 year, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
212001	Ventilation System - Inspect clamps, hoses, and valves for condition and security.	211		
252201	Upholstery, Headliner, Trim, and Carpeting - Check condition and security.	211		
324003	Brake Lines, Wheel Cylinders, Hoses, Clamps, and Fittings - Check for leaks, condition, and security and hoses for bulges and deterioration. Check brake lines and hoses for proper routing and support.	721, 722		

*** End of Operation 5 Inspection Items ***

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INSPECTION OPERATION 7

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 7 gives a list of item(s), which are completed every 600 hours or 1 year, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
284001	Fuel Quantity Indication System Check (Airplanes without Garmin G1000) - Examine for damage and correct installation. Complete a Fuel Quantity Calibration and Check. Refer to Chapter 28, Fuel Quantity Indication System - Adjustment/Test.	220, 510, 610		
284002	Fuel Quantity Indication System Check (Airplanes with Garmin G1000) - Examine for damage and correct installation. Complete a Fuel Quantity System Check. Refer to Chapter 28, Fuel Quantity Indication System - Adjustment/Test.	220, 510, 610		
221001	Autopilot Rigging - Refer to Autopilot - Maintenance Practices.	610		
	*** End of Operation 7 Inspection Items ***			

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INSPECTION OPERATION 9

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 9 gives a list of item(s), which are completed every 500 hours.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
741002	Magnetos - Clean, examine, and adjust as necessary. Do the 500-hour inspection in accordance with the Slick 4300/6300 Series Magneto Maintenance and Overhaul Manual.	120		

*** End of Operation 9 Inspection Items ***

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INSPECTION OPERATION 10

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 10 gives a list of item(s), which are completed every 1000 hours.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
282009	Integral Fuel Bays - Drain the fuel (Refer to Chapter 12, Fuel - Servicing) and purge tanks (Refer to the Single Engine Structural Repair Manual, 1996 and On). Complete an inspection of the tank interior and outlet screens and remove any foreign object debris. Complete an inspection of the tank interior surfaces for sealant deterioration and corrosion (especially in the sump areas).	510, 610			

*** End of Operation 10 Inspection Items ***

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INSPECTION OPERATION 11

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 11 gives a list of item(s), which are completed every 2 years.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
341102	Pitot and Static System - Inspect in accordance with 14 CFR Part 91.411.	220		
246003	Alternator Control Unit - Complete the Over-voltage Protection Circuit Test. Refer to Chapter 24, Alternator Control Unit.	222		

*** End of Operation 11 Inspection Items ***

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INSPECTION OPERATION 12

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 12 gives a list of item(s), which are completed beginning five years from the date of the manufacture. You must make sure of the serviceability of the components every twelve months. Refer to Airborne Air and Fuel Products Service Letter Number 39A or latest revision.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
371006	Vacuum Manifold Check Valve - Complete a check for proper operation. (Only airplanes with dual vacuum pumps and Airborne manifolds. Refer to the Airborne Air & Fuel Products Service Letter Number 39A or latest revision, and in accordance with SB02-37-04.) Refer to Chapter 37, Vacuum System - Maintenance Practices for the removal and installation of the check valve.	120		

*** End of Operation 12 Inspection Items ***

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INSPECTION OPERATION 13

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 13 gives a list of item(s), which are completed every 50 hours or four months, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
791001	Engine Oil - Drain oil sump and oil cooler. Check for metal particles or foreign material in filter, on sump drain plug, and on engine suction screen. Replace filter, and refill with recommended grade aviation oil.	120		

*** End of Operation 13 Inspection Items ***

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INSPECTION OPERATION 14

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 14 gives a list of item(s), which are completed every 2 years, or anytime components are added or removed from the airplane which have the potential to affect the magnetic accuracy and/or variation of the compass calibration, or anytime the accuracy of the compass is in question.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
342102	Magnetic Compass - Calibrate.	220		

*** End of Operation 14 Inspection Items ***

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INSPECTION OPERATION 15

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 15 gives a list of item(s), which are completed every 2000 hours.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
743002	Inspect and lubricate ACS brand ignition switch. Refer to Chapter 74, Ignition System - Maintenance Practices.	224		

*** End of Operation 15 Inspection Items ***

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INSPECTION OPERATION 16

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 16 gives a list of item(s), which are completed every 1000 hours or 1 year, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
221002	Autopilot Servo Capstan Assemblies. Check slip-clutch torque settings. Refer to Autopilot - Maintenance Practices.	610		
221003	Autopilot Servo Actuators. Inspect for evidence of corrosion and or buildup of dirt or other particulate matter which may interfere with servo operation. Refer to Autopilot - Maintenance Practices.	610		

*** End of Operation 16 Inspection Items ***

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INSPECTION OPERATION 17

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 17 gives a list of item(s), which are completed every 12 calendar months.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
262002	Cockpit Mounted Halon Type Fire Extinguisher - Weigh bottle. Bottle must be reserviced by qualified individual if more than 2 ounces is lost.	211			

*** End of Operation 17 Inspection Items ***

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INSPECTION OPERATION 18

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 18 gives a list of item(s), which are completed every 6 years.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
262004	Cockpit Mounted Halon Type Fire Extinguishers - Empty, inspect for damage, and recharge.	211		

*** End of Operation 18 Inspection Items ***

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INSPECTION OPERATION 19

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 19 gives a list of item(s), which are completed every 12 years.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
262003	Cockpit Mounted Halon Type Fire Extinguishers - Perform hydrostatic test. The hydrostatic test shall be at twelve-year intervals based on initial servicing or date of last hydrostatic test.	211		

*** End of Operation 19 Inspection Items ***

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INSPECTION OPERATION 20

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 20 gives a list of item(s), which are completed every year.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
251102	AMSAFE Aviation Inflatable Restraint (AAIR) - Examine the restraint for dirt, frayed edges, unserviceable stitching, loose connections, and other wear. Refer to Chapter 25, Inflatable Restraint System - Maintenance Practices, and do the Inflatable Restraint System Inspection and the Inflatable Restraint System Adjustment/Test.	211		
243005	Standby Battery - Complete the Standby Battery Capacity Test. Refer to Chapter 24, Standby Battery - Maintenance Practices.	220		
246101	Essential and Crossfeed Bus Diodes - Complete a check for proper operation. Complete the Essential and Crossfeed Bus Diode Inspection. Refer to Chapter 24, Essential and Crossfeed Bus Diodes - Maintenance Practices.	224		
110000	Interior Placards, Exterior Placards, Decals, Markings and Identification Plates - Examine for correct installation and legibility. Refer to Chapter 11 Placards and Markings - Inspection/Check.	All		

*** End of Operation 20 Inspection Items ***

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INSPECTION OPERATION 21

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 21 gives a list of item(s), which are completed every 6 years, or every 1000 hours, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
611007	1A170E/JHA7660 propellers installed on Model 172R airplanes incorporating SB02-61-02 and all Model 172S airplanes (for airplanes operated by pilot schools under Title 14 of the Code of Federal Regulations, Part 141, and airplanes with more than 2000 takeoff cycles for each 1000 flight hours) - Complete a liquid penetrant inspection. (Refer to the latest revision of McCauley Service Bulletin 240.)	110		

*** End of Operation 21 Inspection Items ***

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INSPECTION OPERATION 22

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 22 consists of items to be inspected every 100 hours or every one year, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
212002	Primary Flight Display (PFD) Fan and Multi-Function Display (MFD) Fan, Deck Skin Fan, and Remote Avionics Cooling Fan - Operational Check. Refer to Chapter 21, Avionics Cooling - Maintenance Practices.	220, 225		

*** End of Operation 22 Inspection Items ***

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INSPECTION OPERATION 23

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 23 gives a list of item(s), which are completed every 100 hours, every annual inspection, every overhaul, and any time fuel lines or clamps are serviced, removed, or replaced.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
720000	Fuel line (Stainless steel tube assembly) and support clamp inspection and installation. Refer to Lycoming Service Bulletin Number 342E or later version.	120		

*** End of Operation 23 Inspection Items ***

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INSPECTION OPERATION 24

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 24 gives a list of item(s), which are completed the first 600 hours and as defined by the manufacturer thereafter.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH INSP	REMARKS
371007	Do an inspection of the wear indicator ports on the vacuum pump described in the Tempest Service Letter 004.	120		

*** End of Operation 24 Inspection Items ***

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INSPECTION OPERATION 25

Date: _____

Registration Number: _____

Serial Number: _____

Total Time: _____

1. Description

A. Operation 25 gives a list of item(s), which are completed every 1000 hours or 3 years, whichever occurs first.

B. Inspection items are given in the order of the zone in which the inspection is to be completed. A general description of the inspection required and the Item Code Number for cross-reference to section 5-10-01 are shown. Frequently, the tasks define more specifically the scope and extent of each required inspection. These tasks are printed in the individual chapters of this manual.

C. The right portion of each page gives space for the mechanic's and inspector's initials and remarks. A copy of these pages can be used as a checklist when these inspections are completed.

2. General Inspection Criteria

A. During each of the specified inspection tasks in this section, more general inspections of the adjacent areas must be done while access is available. These general inspections are used to find apparent conditions which can need more maintenance.

B. If a component or system is changed after a required task has been completed, then that specified task must be done again to make sure it is correct before the system or component is returned to service.

C. Do a preflight inspection after these inspections are completed to make sure all the required items are correctly serviced. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

ITEM CODE NUMBER	TASK	ZONE	MECH	INSP	REMARKS
273107	Elevator Trim Tab Actuator - Remove, clean, examine, and lubricate the actuator. Refer to Chapter 27, Elevator Trim Control - Maintenance Practices.	320			

*** End of Operation 25 Inspection Items ***

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UNSCHEDULED MAINTENANCE CHECKS

1. General

A. During operation, the airplane can go through:
(1) Hard landings.
(2) Overspeed.
(3) Extreme turbulence or extreme maneuvers.
(4) Towing with a large fuel unbalance or high drag/side loads due to ground handling.
(5) Lightning strikes.

B. When the flight crew gives a report of any of these conditions, complete a visual inspection of the airframe and specific inspections of components and areas involved.

C. Do the inspections to find and examine the damage in local areas of visible damage, and in the structure and components adjacent to the area of damage.

D. If foreign object damage (FOD) is found, complete a visual inspection of the airplane before the airplane is returned to service.

2. Unscheduled Maintenance Checks Defined and Areas of Inspection

A. Hard/Overweight Landings.
(1) A hard landing is any landing made when the sink rate is more than the permitted sink rate limit. An overweight landing is any landing made when the gross weight is more than the maximum gross landing weight given in the approved Pilot's Operating Handbook.

NOTE: If the hard/overweight landing also has high drag/side loads, more checks are necessary.

(2) Hard or overweight landing check.
(a) Landing gear.
1 Main gear struts - Examine for correct attachment and permanent set.
2 Main gear attachments and supporting structure - Examine for loose or unserviceable fasteners and signs of structural damage.
3 Nose gear trunnion supports and attaching structure - Examine for loose or unserviceable fasteners and signs of structural damage.
4 Nose gear attachments and supporting structure - Examine for loose or unserviceable fasteners and signs of structural damage.
(b) Wings.
1 Wing surface and lift strut - Examine the skin for buckles, loose or unserviceable fasteners, and fuel leaks. Examine the attach fittings for security.
2 Trailing edge - Examine for any deformation that stops the normal flap operation.

B. Overspeed.
(1) Overspeed occurs when one of the conditions that follow are met:
(a) The airplane was flown at a speed more than the speed limit of the flaps.
(b) The airplane was flown at a speed more than the maximum design speed.
(2) Overspeed (airspeed) check.
(a) Fuselage.
1 Windshield and Windows - Examine for buckling, dents, loose or unserviceable fasteners, and signs of structural damage.
2 All hinged doors - Examine the hinges, hinge attach points, latches and attachments, and skins for deformation and signs of structural damage.
(b) Cowling.
1 Skins - Examine for buckling, cracks, loose or unserviceable fasteners, and signs of structural damage.

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(c) Stabilizers.
1 Stabilizers - Examine the skins, hinges and attachments, movable surfaces, mass balance weights, and the structure for cracks, dents, buckling, loose or unserviceable fasteners, and signs of structural damage.
(d) Wings.
1 Flaps - Examine the skin for buckling, cracks, loose or unserviceable fasteners, attachments, and signs of structural damage.
2 Fillets and fairings - Examine for buckling, dents, cracks, and loose or unserviceable fasteners.

C. Extreme Turbulence or Extreme Maneuvers.
(1) Extreme turbulence is caused by atmospheric conditions that produce dangerous quantities of stress on the airplane. Extreme maneuvers are any maneuvers that do not stay within the limits given in the Pilot's Operating Handbook.
(2) Extreme turbulence and/or maneuvers checks.
(a) Stabilizers.
1 Horizontal stabilizer hinge fittings, actuator fittings, and stabilizer center section - Examine for loose or unserviceable fasteners and signs of structural damage.
2 Vertical stabilizer - Examine the vertical stabilizer for signs of structural damage, skin buckles, loose or unserviceable fasteners, and damage to the hinges and actuator fittings.
3 Elevator and rudder balance weight supporting structure - Examine for loose or unserviceable fasteners and signs of structural damage.
(b) Wing.
1 Wing to body strut fittings and supporting structure - Examine for loose or unserviceable fasteners and signs of structural damage.
2 Trailing Edge - Examine for any deformation that stops the normal operation of the flap and aileron.

D. Lightning Strike.
(1) If the airplane is flown through an electrically charged region of the atmosphere, it can be struck by an electrical discharge moving from cloud to cloud or from cloud to ground. During a lightning strike, the current goes into the airplane at one point and comes out of another, usually at opposite extremities. The wing tips, nose and tail sections are the areas where damage is most likely to occur. You can find burns and/or erosion of small surface areas of the skin and structure during inspection. In most cases, the damage is easily seen. In some cases, however, a lightning strike can cause damage that is not easily seen. The function of the lightning strike inspection is to find any damage to the airplane before it is returned to service.
(2) Lightning strike check. As the checks that follow are performed, complete the Lightning Strike/ Static Discharge Incident Reporting Form and return it to Cessna Propeller Aircraft Product Support Dept. 751, Cessna Aircraft Company, P.O. Box 7706, Wichita, KS. 67277-7706. If there are components listed on the form that are not applicable to your airplane, please write "Not Applicable" in the space provided.
(a) Communications.
1 Antennas - Examine all antennas for burns or erosion. If you find damage, complete the functional test of the communication system.
(b) Navigation.
1 Glideslope antenna - Examine for burning and pitting. If damage is found, complete a functional check of the glideslope system.
2 Compass - The compass is serviceable if the corrected heading is within plus or minus 10 degrees of the heading shown by the remote compass system. Remove, repair, or replace the compass if the indication is not within the tolerance limits.
(c) Fuselage.
1 Skin - Examine the surface of the fuselage skin for signs of damage.
2 Tailcone - Examine the tailcone and static dischargers for damage.
(d) Stabilizers.
1 Examine the surfaces of the stabilizers for signs of damage.
(e) Wings.
1 Skins - Examine the skin for burns and erosion.

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2 Wing tips - Examine the wing tips for burns and pits.
3 Flight surfaces and hinging mechanisms - Examine for burns and pits.

(f) Propeller.
1 Propeller - Remove the propeller and have it examined at an authorized repair station.

(g) Powerplant.
1 Engine - Refer to the engine manufacturer's overhaul manual for inspection procedures.

E. Foreign Object Damage.

(1) Foreign object damage (FOD) is damage to the airplane caused by a bird strike or by any other foreign object while operating the airplane on the ground or in normal flight. Tools, bolts, nuts, washers, rivets, rags or pieces of safety-wire left in the aircraft during maintenance operations can also cause damage. The function of the foreign object damage inspection is to find any damage before the airplane is repaired or returned to service.

(2) Use caution to prevent unwanted objects from hitting the airplane during towing and at all times when the airplane is not in service.

(3) The aerodynamic cleanliness level (degree of surface smoothness), has an effect on the performance of the airplane. It is important to keep a high level of cleanliness.

(4) Normal operation or careless maintenance operations can cause contour distortion of the aerodynamic surface. Careless maintenance operations can also cause distortion to the doors and access panels. Be careful when you work with these items.

(5) Foreign object damage check.

(a) Landing gear.
1 Fairings - Examine for dents, cracks, misalignment, and signs of structural damage.

(b) Fuselage.
1 Skin - Examine the forward and belly areas for dents, punctures, cracks, and signs of structural damage.

(c) Cowling.
1 Skins - Examine for dents, punctures, loose or unserviceable fasteners, cracks, and signs of structural damage.

(d) Stabilizers.
1 Leading edge skins - Examine for dents, cracks, scratches, and signs of structural damage.

(e) Windows.
1 Windshield - Examine for pits, scratches, and cracks.

(f) Wings.
1 Leading edge skins - Examine for dents, cracks, punctures, and signs of structural damage.

(g) Engine.
1 Propeller - Examine the propeller for nicks, bends, cracks, and worn areas on the blades.

F. High Drag/Side Loads Due To Ground Handling.

(1) A high drag/side load condition occurs when the airplane skids or overruns the prepared surface and goes onto an unprepared surface. It also includes landings that are short of the prepared surface, or landings which involve the damage of tires or skids on a runway to the extent that the safety of the airplane is in question. This includes takeoff and landings or unusual taxi conditions.

(2) High drag/side loads due to ground handling check.

(a) Landing gear.
1 Main gear and fairings - Examine for loose or unserviceable fasteners, buckling, cracks, and signs of structural damage.
2 Nose gear and fairing - Examine for loose or unserviceable fasteners, cracks, loose steering cable tension, buckling, and signs of structural damage.

(b) Wings.
1 Wing to fuselage attach fittings and attaching structure - Examine for loose or unserviceable fasteners and signs of structural damage.

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LIGHTNING STRIKE/STATIC DISCHARGE INCIDENT REPORTING FORM
Part 1

1. Flight Crew must complete Part 1.

NOTE: Entire report must be filled out following any lightning strike incident. If lightning strike is discovered after the fact, complete as much of report as possible. File form immediately following incident. Attach additional sheet(s) to provide complete description.

A. Flight Information:
Flight Number _____ Strike Date _____ Model _____ Unit/Serial Number _____
Altitude _____ ft Airspeed _____ knots Geographical Location _____

B. Airplane Orientation:
Takeoff _____ Climb _____ Cruise _____ Descent _____
Approach _____ Other _____

C. At time of Strike, aircraft was:
Above Clouds _____ Within Clouds _____ Below Ceiling _____

D. Precipitation at Strike:
Rain _____ Sleet _____ Hail _____ Snow _____ None _____

E. Lightning in Vicinity:
Before _____ After _____ None _____

F. Static in Comm/Nav
Before _____ After _____ None _____

G. Was St. Elmo's fire (bluish electrical discharge or corona) visible before strike?
Yes _____ No _____

H. Interference (**I**) or Outage (**O**) report. Check all the following which apply, and list affected systems, such as dimming of cabin lights, total system outage, etc.

Engines	I _____	O _____
Navigation	I _____	O _____
Communication	I _____	O _____
Flight Instruments	I _____	O _____
Flight Control	I _____	O _____
AC Power System	I _____	O _____
DC Power System	I _____	O _____

I. Additional comments and descriptions:

Part 1 completed by: _____ Date _____ Phone _____

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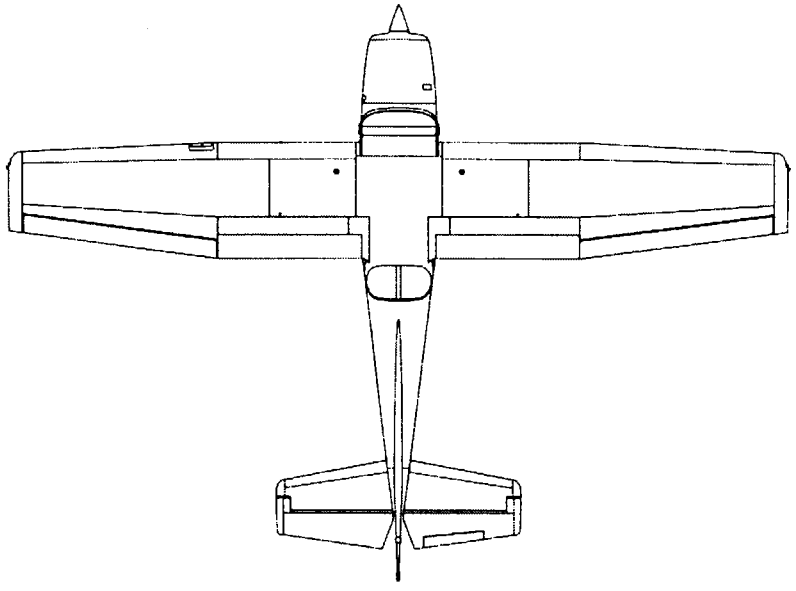
LIGHTNING STRIKE/STATIC DISCHARGE INCIDENT REPORTING FORM
Part 2

1. **Ground Crew must complete Part 2.**

   NOTE: Attach additional sheet(s) to provide complete description. Photos and sketches of damage are recommended and must be itemized and referenced in their description.

   NOTE: If damage is severe, please report the lightning strike as soon as possible. Inspection by Cessna Engineering Representative(s) may be required.

   A. List any sweeping points, such as burn marks, divots, etc., and skin penetrations on airplane skin believed to be the result of the lightning strike. Itemize and reference location(s) of damage on drawing provided. Indicate top, bottom, left or right.



   B. Describe damage to structure and external components caused by previously mentioned damage points. In the case of skin penetration(s), indicate hole diameter(s). List all damage to radome and any other composite structure, such as fairings, control surfaces, etc. If lightning diverter strips are damaged, include lightning diverter strip location(s) on radome. For damage to composite structure, paint thickness must be included in description.

   C. List any damage to avionics and electrical components believed to be the result of the lightning strike, including damaged wiring, disengaged circuit breakers, etc. Include manufacturer, model number and serial number of damaged units where applicable.

   D. Estimate cost of repair.

   E. Mention severity of damage (light, moderate, heavy).

   F. Additional comments and descriptions:

Part 2 completed by: _____ Date _____ Phone _____

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CHAPTER

6

DIMENSIONS AND AREAS

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
06-Title		
06-List of Effective Pages		
06-Record of Temporary Revisions		
06-Table of Contents		
6-00-00	Page 1	Apr 7/2003
6-10-00	Pages 1-4	Mar 1/2009
6-15-00	Pages 1-3	Apr 7/2003
6-20-00	Pages 1-4	Jul 1/2007
6-20-02	Pages 1-11	Jul 1/2007

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

CONTENTS

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Scope . . . . . 6-00-00 Page 1
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AIRPLANE DIMENSIONS AND SPECIFICATIONS - DESCRIPTION AND OPERATION 6-10-00 Page 1
General . . . . . 6-10-00 Page 1

AIRPLANE STATIONS - DESCRIPTION AND OPERATION . . . . . 6-15-00 Page 1
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General . . . . . 6-20-00 Page 1
Description . . . . . 6-20-00 Page 1

ACCESS/INSPECTION PLATES - DESCRIPTION AND OPERATION . . . . . 6-20-02 Page 1
General . . . . . 6-20-02 Page 1
Access/Inspection Panel Numbering . . . . . 6-20-02 Page 1
Description . . . . . 6-20-02 Page 1

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DIMENSIONS AND AREAS - GENERAL

1. Scope

A. This chapter includes illustrations and statistical information concerning the Model 172 airplane. Provided are the overall airplane dimensions, surface areas, station locations, zones and access plate locations.

B. Dimensions and measurements are presented to aid the operator and/or maintenance personnel in ground handling the airplane and locating components.

2. Definition

A. Airplane Dimensions and Areas.
(1) The section on airplane dimensions and areas provides airplane dimensions and identifies areas of the airplane.

B. Airplane Stations.
(1) The section on stations provides illustrations to identify reference points on the airplane along a three axis division.

C. Airplane Zoning.
(1) The section on zoning provides illustrations of all airplane zones.

D. Access Plates/Panels.
(1) The section on access plates/panels provides numbering of all plates and panels based on specific airplane zones.

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AIRPLANE DIMENSIONS AND SPECIFICATIONS - DESCRIPTION AND OPERATION

1. General

A. Airplane dimensions and specifications have been compiled to serve as a central reference point for airplane information. This information is presented in tabular and illustrative form below. Refer to Figure 1 for an illustration of airplane dimensions.

AIRPLANE OVERALL	
Length (Overall)	27’ - 2”
Height (Maximum)	8’ - 11”
Wing Span (Overall)	36’ - 0”
Tail Span	11’ - 4”
Landing Gear Track Width	8’ - 4 1/2”
FUSELAGE DIMENSIONS	
Cabin Width (Maximum Sidewall to Sidewall)	3’ - 3 1/2”
Cabin Height (Floorboard to Headliner)	4’ - 0”
MAXIMUM WEIGHT	
Ramp	
172R	2457 Pounds
172S (And 172R Airplanes Incorporating MK172-72-01)	2558 Pounds
Takeoff	
172R	2450 Pounds
172S (And 172R Airplanes Incorporating MK172-72-01)	2550 Pounds
Landing	
172R	2450 Pounds
172S (And 172R Airplanes Incorporating MK172-72-01)	2550 Pounds
FUEL CAPACITY	
Total	56.0 Gallons
Usable	53.0 Gallons
ENGINE DATA	
Type	Lycoming IO-360-L2A
Oil Capacity	8.0 Quarts
Oil Filter	CH48110
RPM (Maximum)	
172R	2400 RPM
172S (And 172R Airplanes Incorporating MK172-72-01)	2700 RPM

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Horsepower	
172R	160 HP
172S (And 172R Airplanes Incorporating MK172-72-01)	180 HP

PROPELLER

Type	
172R	McCauley 1C235/LFA7570
172S (And 172R Airplanes Incorporating MK172-72-01)	McCauley 1A170E/JHA7660
Diameter (Maximum to Minimum)	
172R	75” - 74”
172S (And 172R Airplanes Incorporating MK172-72-01)	76” - 75”

TIRE, STRUT AND WHEEL ALIGNMENT DATA

Main Tire Size	
172R	6.00 X 6, 4-Ply Rating
172S (And 172R Airplanes Incorporating MK172-72-01)	6.00 X 6, 6-Ply Rating
Main Tire Pressure	
172R	28.0 PSI
172S (And 172R Airplanes Incorporating MK172-72-01)	42.0 PSI
Nose Tire Size	
172R, 172S	5.00 X 5, 6-Ply Rating
Nose Tire Pressure	
172R	34.0 PSI
172S (And 172R Airplanes Incorporating MK172-72-01)	45.0 PSI
Nose Gear Strut Pressure (Strut Extended)	45.0 PSI
Camber (Measured With Airplane Empty)	2 to 4 Degrees
Toe-In (Measured With Airplane Empty)	0.00 to 0.18”

CONTROL SURFACE TRAVELS/CABLE TENSION SETTINGS

AILERONS

Aileron Up Travel	20 Degrees, ±1 Degree
Aileron Down Travel	15 Degrees, ±1 Degree
Aileron Cable Tension (Carry Through)	40 Pounds, ±10 Pounds

RUDDER

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Rudder Travel (Measured Parallel to Water Line)	
Right	16 Degrees 10 Min; ±1 Degree
Left	16 Degrees 10 Min; ±1 Degree
Rudder Travel (Measured Perpendicular to Hinge Line)	
Right	17 Degrees 44 Min; ±1 Degree
Left	17 Degrees 44 Min; ±1 Degree
ELEVATOR	
Up Travel (Relative to Stabilizer)	28 Degrees, +1 or -0 Degree
Down Travel (Relative to Stabilizer)	23 Degrees, +1 or -0 Degree
Elevator Cable Tension	30 Pounds, ±10 Pounds
ELEVATOR TRIM TAB	
Up Travel	22 Degrees, +1 or -0 Degree
Down Travel	19 Degrees, +1 or -0 Degree
Elevator Trim Cable Tension	20 Pounds, +0 or -5 Pounds
FLAPS	
Flap Setting:	
0 Degree (UP)	0 Degree
10 Degrees	10 Degrees, +0 or -2 Degrees
20 Degrees	20 Degrees, +0 or -2 Degrees
30 Degrees (FULL)	30 Degrees, +0 or -2 Degrees
Flap Cable Tension	30 Pounds, ±10 Pounds

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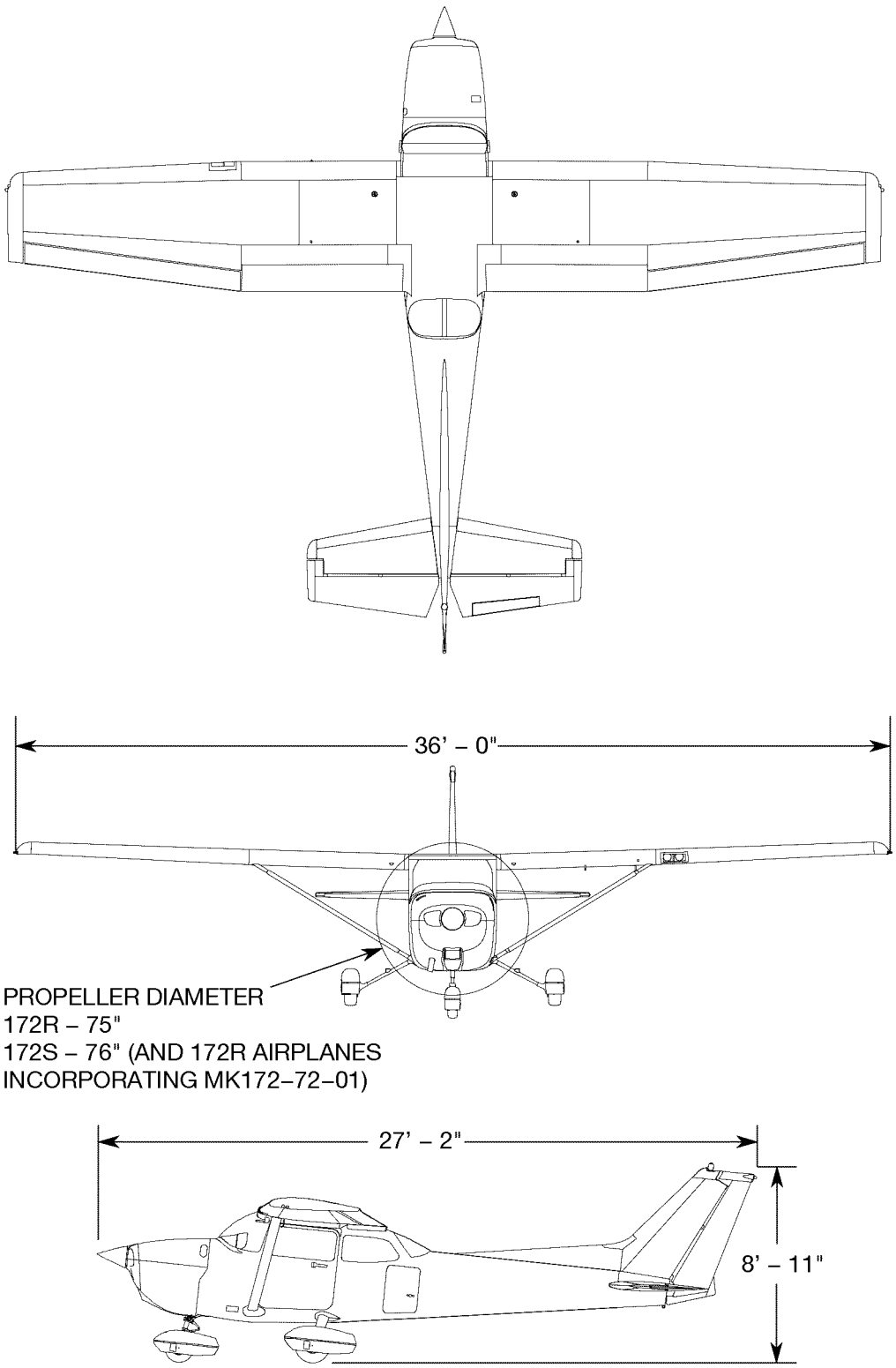

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0510T1005
0510T1005

Airplane Dimensions
Figure 1 (Sheet 1)

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AIRPLANE STATIONS - DESCRIPTION AND OPERATION

1. General

A. The airplane is laid out according to fuselage stations (FS) and wing stations (WS). These stations provide fixed reference points for all components located on or within the airplane. Fuselage Stations begin at the firewall (FS 0.00) and extend to the tailcone area (FS 230.18). Wing Stations begin at the root (WS 23.62) and extend to the tip (WS 208.00). Both Fuselage Stations and Wing Stations are measured in inches. For example, FS 185.50 is 185.50 inches aft of the firewall (FS 0.00).

B. For an illustration of Fuselage Stations, refer to Figure 1. For an illustration of Wing Stations, refer to Figure 2.

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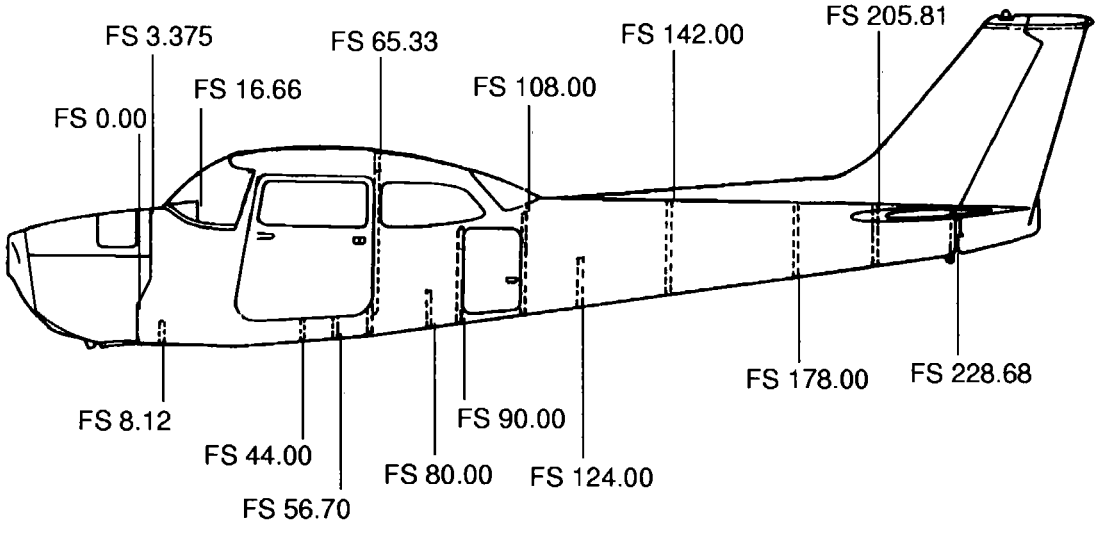

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Fuselage Stations
Figure 1 (Sheet 1)

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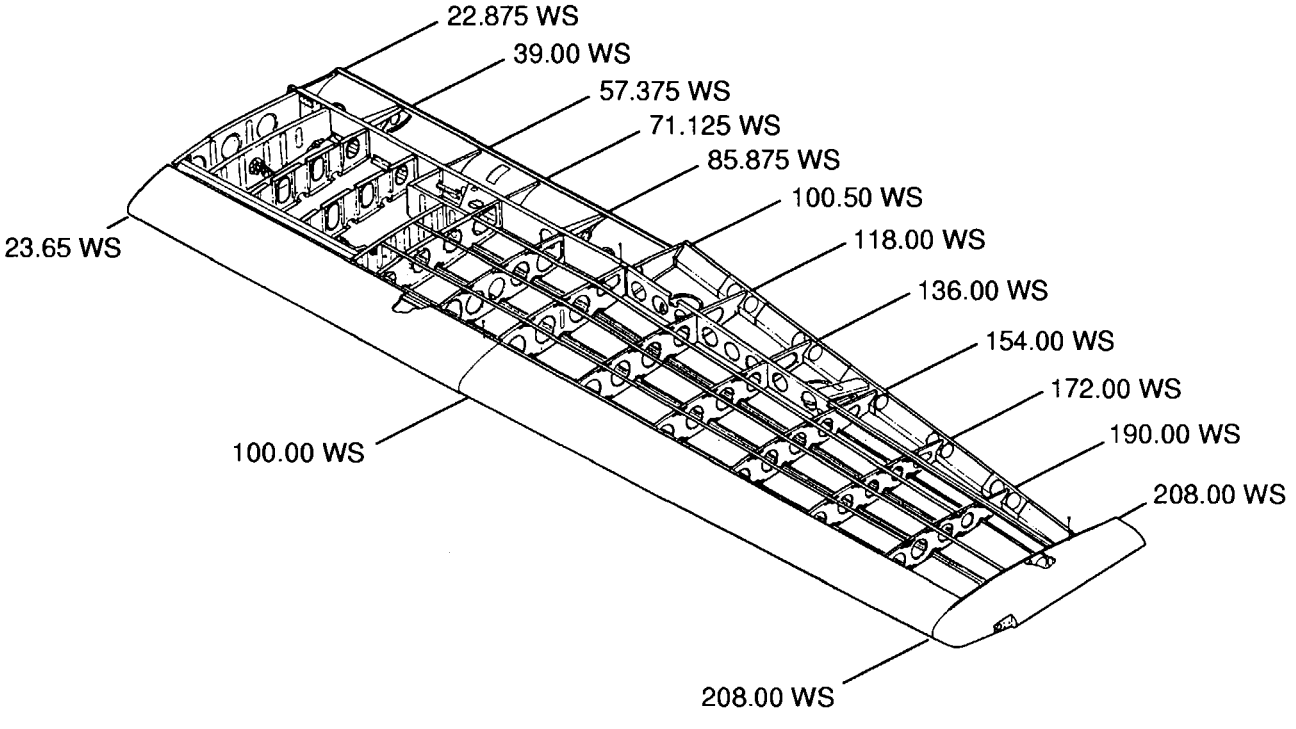

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Wing Stations
Figure 2 (Sheet 1)

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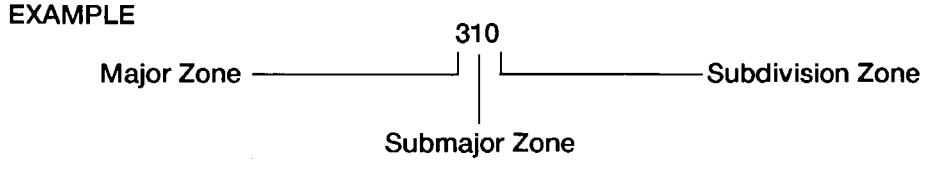
AIRPLANE ZONING - DESCRIPTION AND OPERATION

1. General

A. The Model 172 is divided into numbered zones to provide a method for locating components and/or placards throughout the airplane. The zones are identified by a three-digit number as shown in the example below. The first digit in the sequence denotes the major zone (300 series for aft of cabin, 500 series for left wing, etc.). The second digit in the sequence further divides the zone into submajor zone (Zone 510 for inboard portion of the left wing and Zone 520 for outboard portion of the left wing, etc..). The third digit further divides the submajor zones into subdivisions (if no subdivision is needed, this digit is typically assigned as 0 (zero).



B. Major Zones.
(1) 100 - Forward side of firewall and forward.
(2) 200 - Aft side of firewall.
(3) 300 - Aft of cabin to end of airplane.
(4) 500 - Left wing.
(5) 600 - Right wing.
(6) 700 - Landing gear.

2. Description

A. For a breakdown of the airplane zones, refer to Figure 1.

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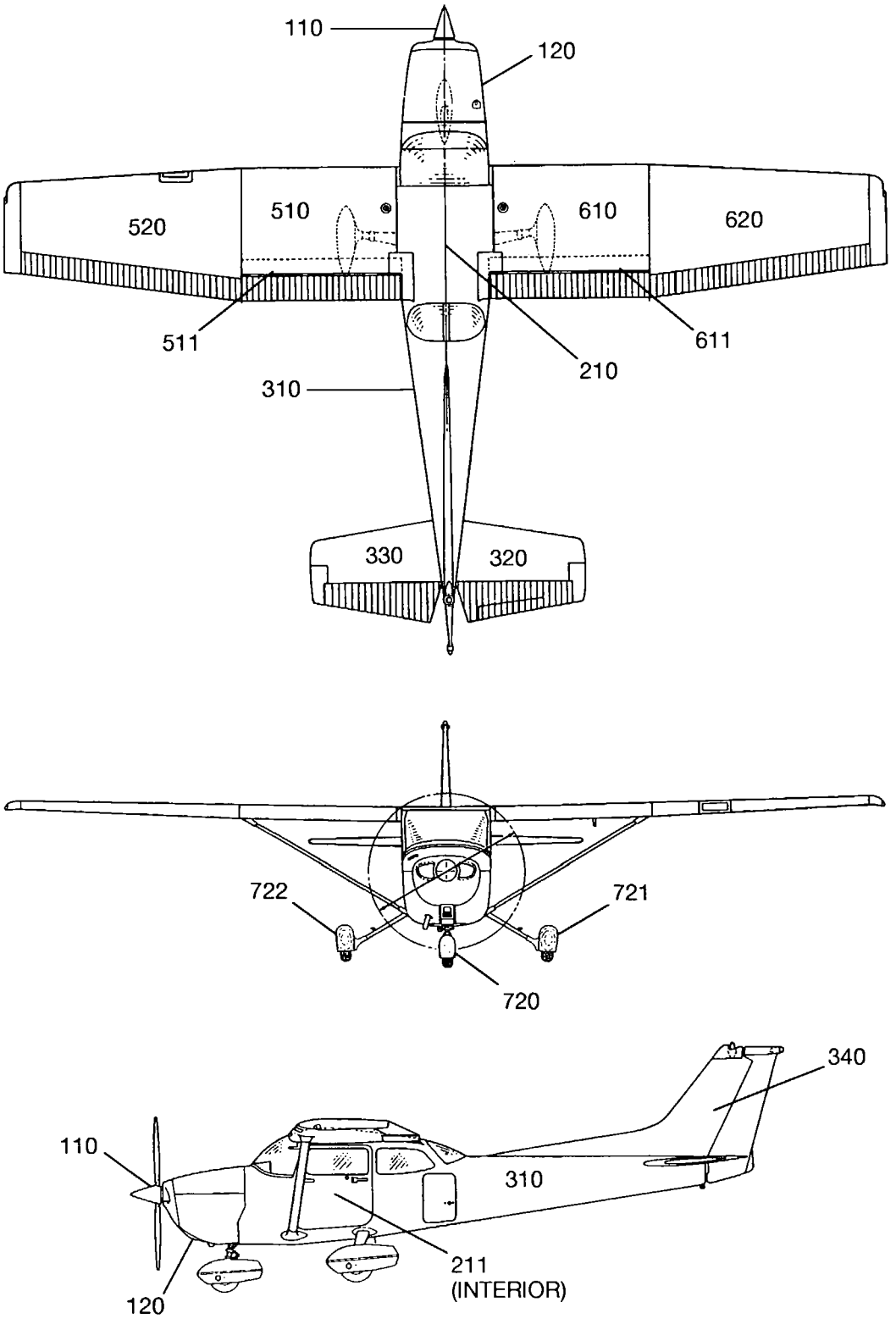

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0510T3001
0510T3001

Airplane Zones
Figure 1 (Sheet 1)

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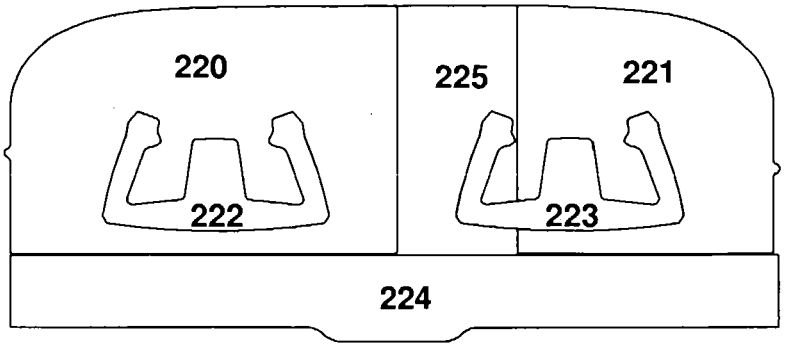
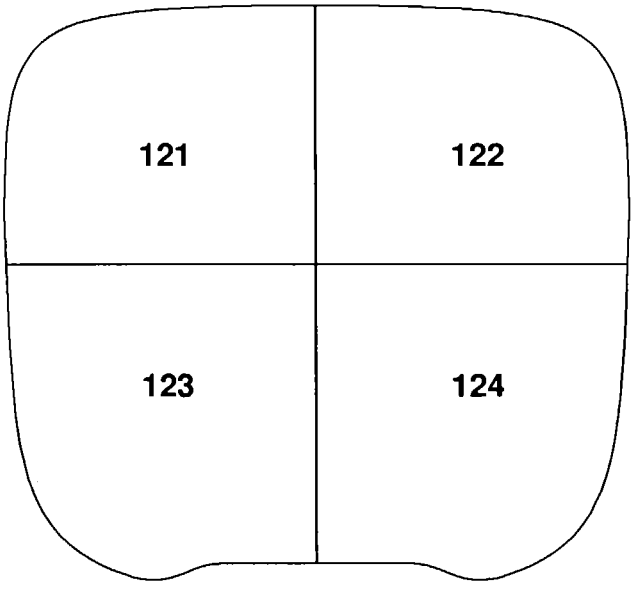


INSTRUMENT PANEL



FIREWALL LOOKING FORWARD

0513T1003
0511T1002

Airplane Zones
Figure 1 (Sheet 2)

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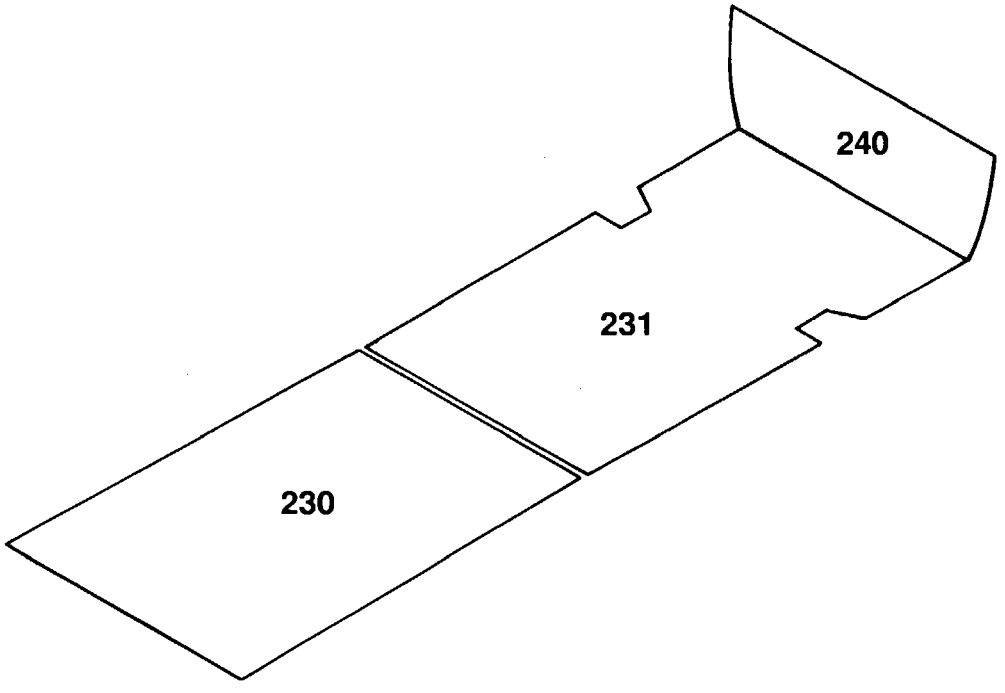

INTERIOR FLOOR

0511T1015

Airplane Zones
Figure 1 (Sheet 3)

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ACCESS/INSPECTION PLATES - DESCRIPTION AND OPERATION

1. General

A. There are access and inspection panels on the interior and exterior of the airplane. These panels give access to components and airframe areas.

NOTE: Panels that have hinges attached to them (like the oil door for example) are not referred to as panels and are not included in this section.

B. This section can be used in conjunction with inspection practices (Chapter 5) or standard maintenance practices to quickly find related components throughout the airplane.

2. Access/Inspection Panel Numbering

A. All access/inspection panels have a series of numbers and letters which identify their zone location, sequence, and orientation.
   (1) Zone Location - Zone location is identified by the first three numbers of any panels. This three-number sequence is specified in Airplane Zoning - Description and Operation.
   (2) Sequence - The sequence is identified by alphabetical letters follow the three-number sequence. The first panel is identified as "A," the second panel is identified as "B", and so on.
   (3) Orientation - The orientation for each panel is identified by one of four letters that come after the sequence letter. The orientation letters are "T" for top, "B" for bottom, "L" for left, and "R" for right.

B. With access panel 510AB as an example, the breakdown is as follows:
   (1) Zone Location = 510 (inboard portion of left wing)
   (2) Sequence = A (the first panel within the zone)
   (3) Orientation = B (located on the bottom of the zone).

3. Description

A. Access/Inspection Panels.

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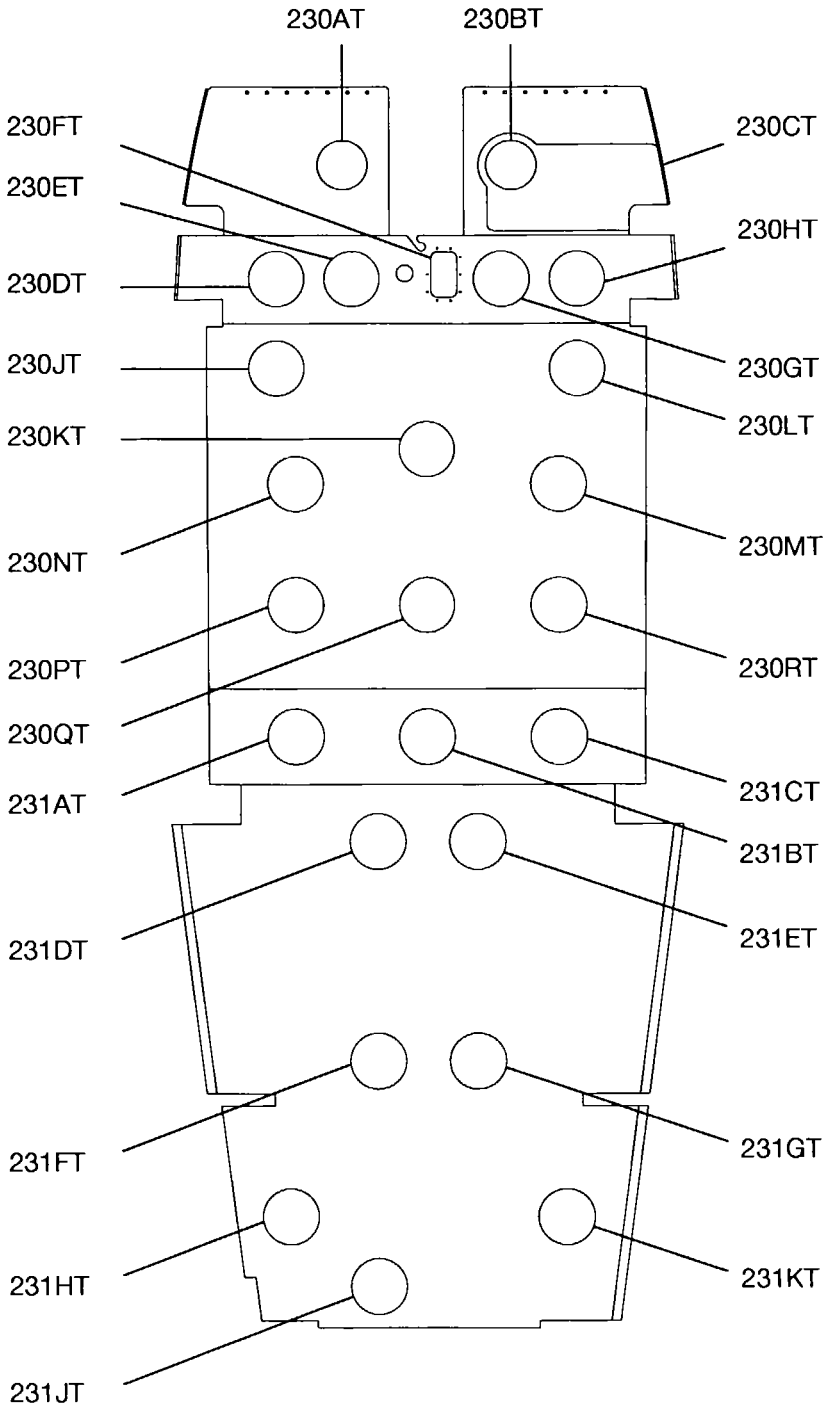

CABIN FLOORBOARD PANELS

0510T1011A

Cabin Floorboard Panels
Figure 1 (Sheet 1)

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Table 1. Cabin Floorboard Panels

Panel	Equipment Located In Area (Refer to Figure 1)
230AT	Brake Line
230BT	Fuel Pump and Reservoir
230CT	Fuel Pump and Reservoir
230DT	Fuel Lines, Wire Bundle
230ET	Elevator Bellcrank, Fuel Lines
230FT	Fuel Selector, Elevator Bellcrank
230GT	Fuel Line
230HT	Fuel Line
230JT	Fuel Lines, Wire Bundles
230KT	Elevator Trim Tab Pulley, ADF Antenna
230LT	Fuel Lines
230MT	Fuel Lines
230NT	Fuel Lines
230PT	Wire Bundle, Brake Line
230QT	Rudder Cables, Elevator Cables, Elevator Trim Cables
230RT	Brake Line
231AT	Main Landing Gear Bulkhead
231BT	Rudder Cables, Elevator Cables, Elevator Trim Cables
231CT	Main Landing Gear Bulkhead
231DT	Rudder Cables, Elevator Cables, Elevator Trim Cables
231ET	Rudder Cables, Elevator Cables, Elevator Trim Cables
231FT	Transponder Antenna
231GT	Rudder Cables, Elevator Cables, Elevator Trim Cables
231HT	Structure
231JT	Rudder Cables, Elevator Cables, Elevator Trim Cables
231KT	Structure

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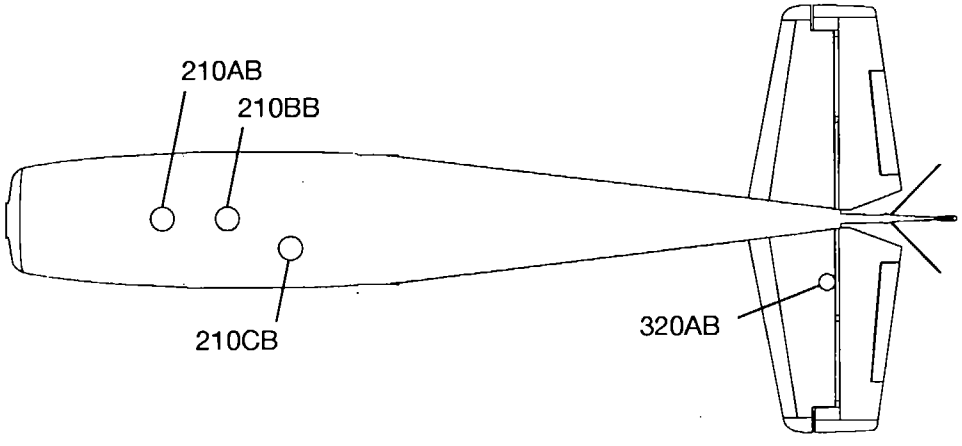
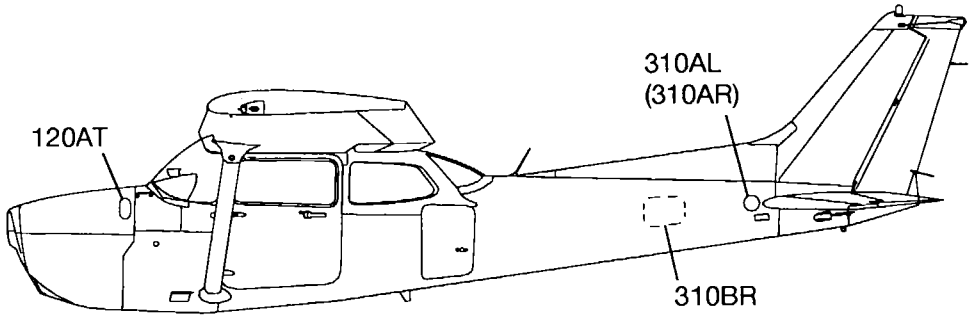


BOTTOM VIEW



LEFT VIEW

FUSELAGE PANELS

0522T1019
0510T1024

Fuselage Panels
Figure 2 (Sheet 1)

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Table 2. Fuselage Panels

Panel	Equipment Located In Area (Refer to Figure 2)
120AT	External Power
210AB	Control Yoke/Elevator Attach
210BB	Brake Line, Rudder Cables, Elevator Cables, Elevator Trim Cables, Wiring
210CB	Rudder Cables, Elevator Cables, Elevator Trim Cables
310AL	Elevator Pulleys, Elevator Trim Pulleys
310AR	Elevator Pulleys, Elevator Trim Pulleys
310BR	Rudder Cables, Elevator Cables, Elevator Trim Cables
320AB	Elevator Trim Actuator

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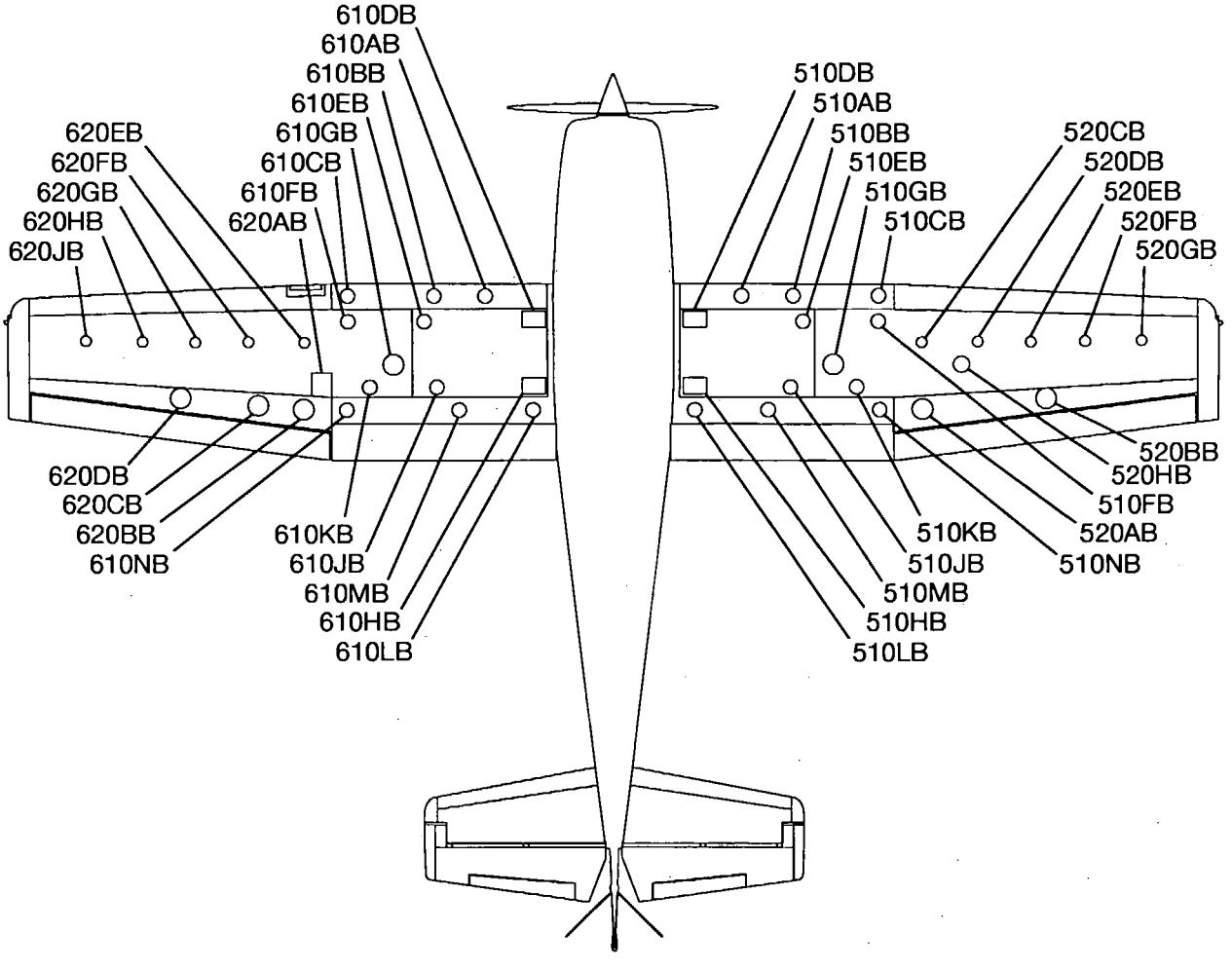

BOTTOM VIEW

WING ACCESS PANELS

0522T1019

Wing Access Panels
Figure 3 (Sheet 1)

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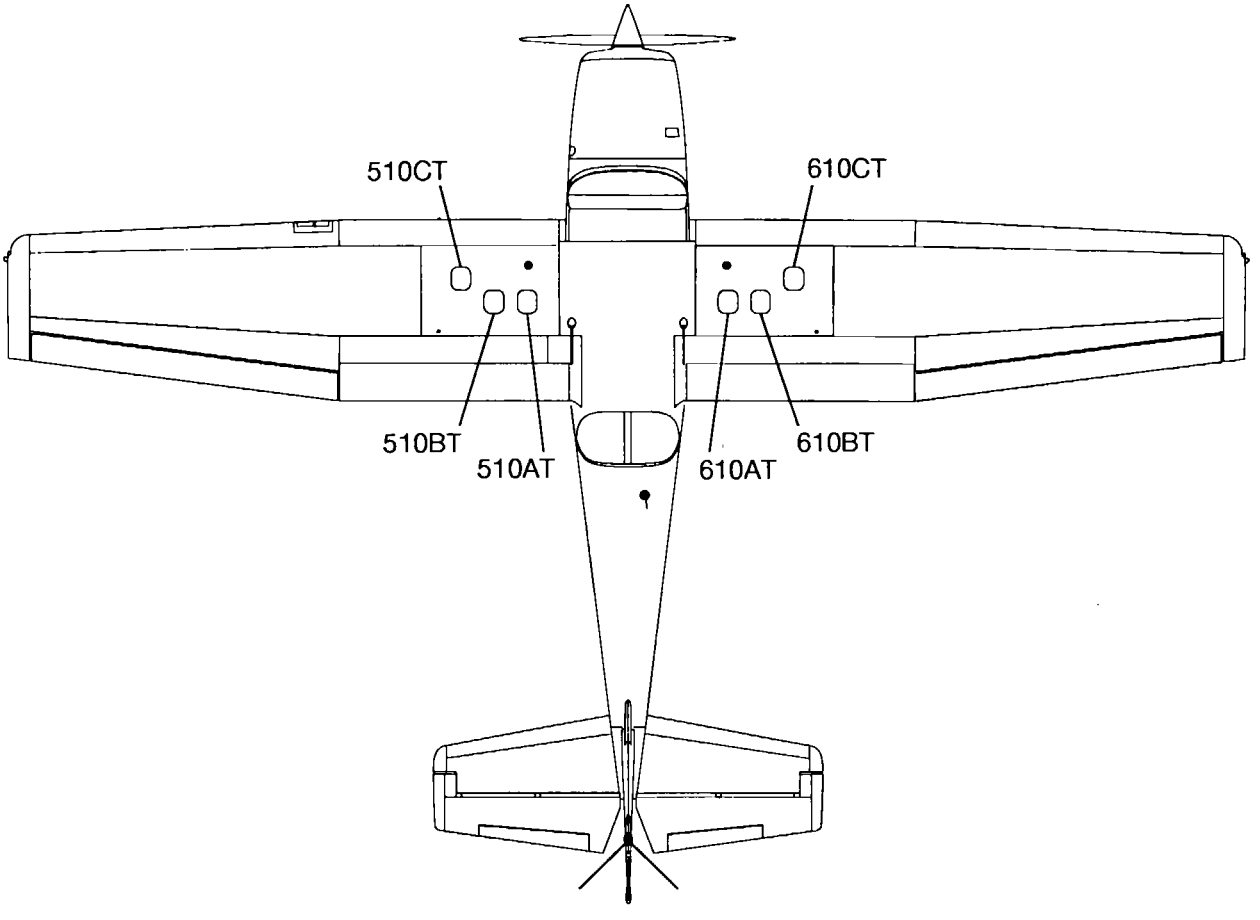

TOP VIEW

WING ACCESS PANELS

0510T1002

Wing Access Panels
Figure 3 (Sheet 2)

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Table 3. Wing Access Panels

Panel	Equipment Located In Area (Refer to Figure 3)
610AB	Wiring
610BB	Wiring
610CB	Strut Bolt
610DB	Fuel Lines, Fuel Transmitter
610EB	Flap Controls
610FB	Strut Bolt
610GB	Flap Actuator
610HB	Fuel Lines, Fuel Transmitter
610JB	Wing Structure
610KB	Wing Structure
610LB	Flap Cables, Aileron Cables
610MB	Flap Cables, Aileron Cables
610NB	Aileron Cables
620AB	Autopilot Roll Servo
620BB	Aileron Cables, Trim Cables
620CB	Aileron Cables
620DB	Aileron Bellcrank
620EB	Wing Structure
620FB	Wing Structure
620GB	Wing Structure
620HB	Wing Structure
620JB	Wing Structure
510AB	Wiring
510BB	Wiring, Pitot Tube
510CB	Strut Bolt
510DB	Fuel Lines, Fuel Transmitter
510EB	Flap Controls
510FB	Strut Bolt
510GB	Flap Actuator
510HB	Fuel Lines, Fuel Transmitter
510JB	Wing Structure, Courtesy Light
510KB	Wing Structure, Flap Bellcrank
510LB	Flap Cables, Aileron Cables

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Table 3. Wing Access Panels (continued)

Panel	Equipment Located In Area (Refer to Figure 3)
510MB	Flap Cables, Aileron Cables
510NB	Aileron Cables
520AB	Aileron Cables, Trim Cables
520BB	Aileron Cables, Aileron Bellcrank
520CB	Wing Structure
520DB	Wing Structure
520EB	Wing Structure
520FB	Wing Structure
520GB	Wing Structure
520HB	Magnetometer
610AT	Fuel Bay
610BT	Fuel Bay
610CT	Fuel Bay
510AT	Fuel Bay
510BT	Fuel Bay
510CT	Fuel Bay

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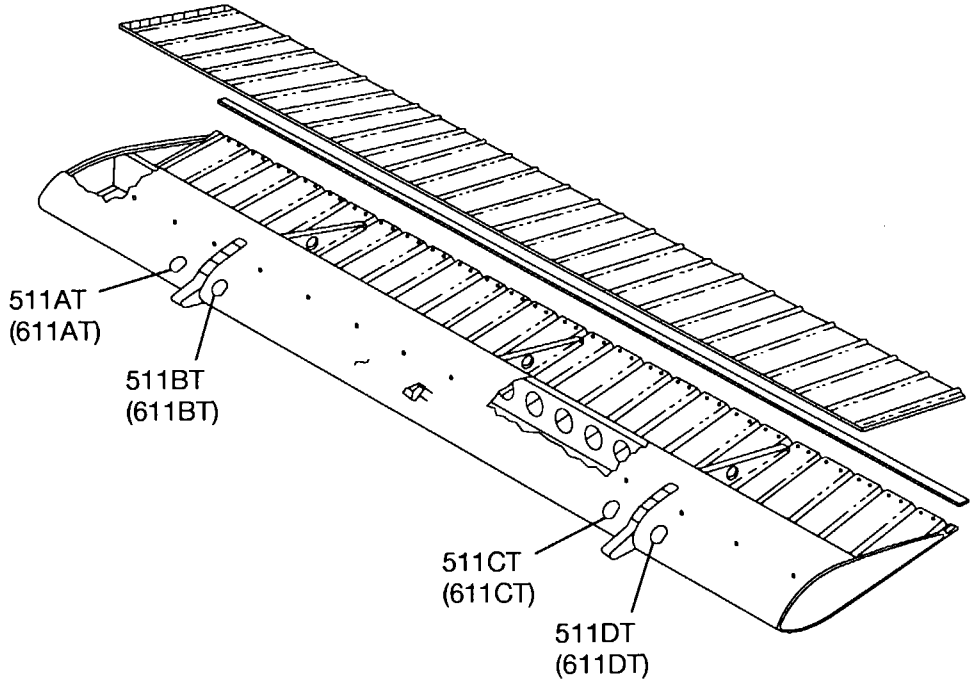

FLAP PANELS

0525T1002

Flap Panels
Figure 4 (Sheet 1)

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Table 4. Flap Panels

Panel	Equipment Located In Area (Refer to Figure 4)
511AT	Flap Access
511BT	Flap Access
511CT	Flap Access
511DT	Flap Access
611AT	Flap Access
611BT	Flap Access
611CT	Flap Access
611DT	Flap Access

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CHAPTER

7

LIFTING AND SHORING

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EMERGENCY LIFTING/HOISTING - MAINTENANCE PRACTICES ..... 7-11-00 Page 201
Lifting Procedure ..... 7-11-00 Page 201

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LIFTING AND SHORING - GENERAL

1. Scope

A. This chapter describes both standard and emergency procedures used to lift the airplane off the ground.

2. Tools, Equipment and Material

NOTE: Equivalent substitutes may be used for the following listed items:

NAME	NUMBER	MANUFACTURER	USE
Jack	2-170	Cessna Aircraft Company Cessna Parts Department P.O. Box 949 Wichita, KS 67201	To jack wing.
Leg Extension	2-109	Cessna Aircraft Company	To extend legs on jack.
Slide Tube Extension	2-70	Cessna Aircraft Company	To extend jack height.
Universal Tail Stand	2-168	Cessna Aircraft Company	To secure tail.
Padded Block		Fabricate locally	To provide cushion between wing jack and wing spar.

3. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:
   (1) The section on jacking provides normal procedures and techniques used to jack the airplane off the ground.
   (2) The section on emergency lifting provides procedures, techniques and fabrication information needed to lift the airplane by overhead means.

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JACKING - MAINTENANCE PRACTICES

1. General

CAUTION: JACKING BOTH WHEELS SIMULTANEOUSLY AT BUILT-IN JACK PADS IS NOT RECOMMENDED. WHEN USING BUILT-IN JACK PAD, FLEXIBILITY OF THE MAIN GEAR STRUT WILL CAUSE THE MAIN WHEEL TO SLIDE INBOARD AS THE WHEEL IS RAISED, TILTING THE JACK. IF THIS OCCURS, THE JACK MUST BE LOWERED FOR A SECOND OPERATION.

A. Normal jacking procedures involve lifting one main wheel at a time. This procedure is best accomplished using a floor jack in conjunction with the built-in jack pad (located directly below the step on each strut).

2. Tools, Equipment and Materials

A. For a list of required tools, equipment and materials, refer to Lifting and Shoring - General.

3. Jacking Procedure

NOTE: When the airplane needs to be raised off the ground at all points, the following procedure should be used.

A. Raise Airplane (Refer to Figure 201).

CAUTION: WHEN PLACED ON JACKS, THE AIRPLANE IS NOSE HEAVY. TAIL STANDS MUST WEIGH ENOUGH TO KEEP THE TAIL DOWN UNDER ALL CONDITIONS. ADDITIONALLY, THE TAIL STAND MUST BE STRONG ENOUGH TO SUPPORT ANY WEIGHT WHICH MIGHT BE TRANSFERRED TO THE TAILCONE AREA DURING MAINTENANCE, CREATING A TAIL HEAVY CONDITION.

(1) Carefully attach tail stand to tail tie-down ring.
(2) Place wing jacks and padded blocks under front spar, just outboard of wing strut (Wing Station 118.00). Ensure that padded block (1 inch X 4 inch X 4 inch with 0.25 inch rubber pad) is resting securely between spar and jack.
(3) Raise wing jacks evenly until desired height is reached.

B. Lower Airplane (Refer to Figure 201).
(1) Slowly lower wing jacks simultaneously until main tires are resting on ground.
(2) Remove wing jacks and pads from wing area.
(3) Detach tail stand from tie-down ring.

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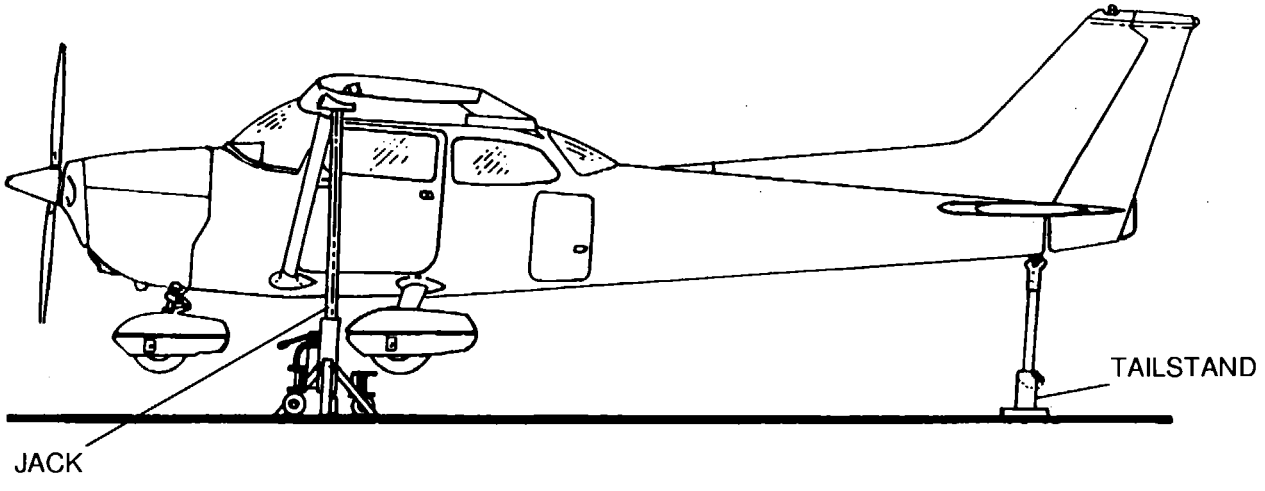

05801001

Airplane Jacking
Figure 201 (Sheet 1)

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EMERGENCY LIFTING/HOISTING - MAINTENANCE PRACTICES

1. Lifting Procedure

A. The airplane may be lifted with a hoist of two-ton capacity attached by rings, which are optional equipment installed by Service Kit, or by means of suitable slings. The front sling should be hooked to each upper engine mount, and the aft sling should be positioned around the fuselage at the first bulkhead forward of the leading edge of the stabilizer. If the optional hoisting rings are used, a minimum cable length of 60 inches for each cable is required to prevent bending of the eyebolt-type hoisting rings. If desired, a spreader jig may be fabricated to apply vertical force to the eyebolts.

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CHAPTER

8

LEVELING AND WEIGHING

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Tools, Equipment and Materials ..... 8-10-00 Page 201
Leveling Points ..... 8-10-00 Page 201

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LEVELING AND WEIGHING - GENERAL

1. Scope

A. This chapter provides information necessary to properly level the airplane.

B. For information on airplane weighing procedures, refer to the applicable Model 172 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

2. Tools, Equipment and Material

NAME	NUMBER	MANUFACTURER	USE
Spirit Level		Commercially available	Spirit level used to level airplane.

3. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:

(1) The section on leveling provides maintenance practices and instructions for longitudinal and lateral leveling of the airplane. This leveling is accomplished using a spirit level of at least 18 inches in length.

(2) For information on weighing the airplane, refer to the applicable Model 172 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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LEVELING - MAINTENANCE PRACTICES

1. General

A. This section gives reference points for leveling the airplane laterally and longitudinally.

2. Tools, Equipment and Materials

A. For a list of required tools, equipment and materials, refer to Leveling and Weighing - General.

3. Leveling Points

A. Lateral Leveling. (Refer to Figure 201).
   (1) Find two points that are the same on each upper door sill of the left and right cabin doors.
   (2) Put a level in position across these points.

   NOTE: Out-of-level tolerance for wing tips is three inches total.

   (3) Make a note of the airplane's lateral position.
   (4) If applicable, put jacks in position at the wings and tail jacking points. Refer to Jacking - Maintenance Practices.
      (a) Adjust the wing jacks as required to get the necessary lateral position.

B. Longitudinal Leveling. (Refer to Figure 201).
   (1) Find the two screws on the left side of the airplane tailcone that are in line with water line zero.
   (2) Remove the screws.
   (3) Install studs or long screws of applicable length (approximately two inches long).
   (4) Put the level in position on the studs or screws.
   (5) Make a note of the airplane's longitudinal position.
   (6) If applicable, put jacks in position at the wings and tail jacking points. Refer to Jacking - Maintenance Practices.
      (a) Adjust the tail jack as required to get the necessary longitudinal position.

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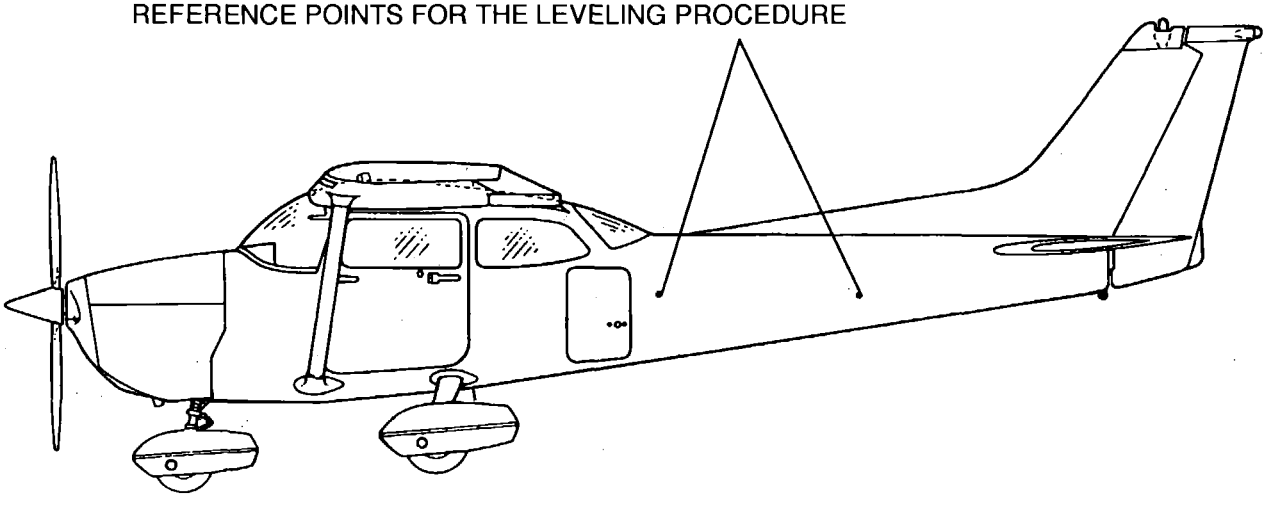
REFERENCE POINTS FOR THE LEVELING PROCEDURE



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Airplane Leveling
Figure 201 (Sheet 1)

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CHAPTER

9

TOWING AND TAXIING

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TOWING - MAINTENANCE PRACTICES ..... 9-10-00 Page 201
General ..... 9-10-00 Page 201

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TOWING AND TAXIING - GENERAL

1. Scope

A. This chapter describes towing procedures for movement of the airplane on the ground. For taxiing procedures, refer to the applicable Pilots's Operating Handbook and FAA Approved Airplane Flight Manual.

2. Definition

A. The section on towing describes towing procedures and cautions applicable to the Model 172.

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TOWING - MAINTENANCE PRACTICES

1. General

CAUTION: WHEN TOWING THE AIRPLANE, NEVER TURN THE NOSE WHEEL MORE THAN 30 DEGREES EITHER SIDE OF CENTER, OR THE GEAR WILL BE DAMAGED. DO NOT PUSH ON CONTROL SURFACES OR ANY PORTION OF THE HORIZONTAL STABILIZER. WHEN PUSHING ON THE TAILCONE, ALWAYS APPLY PRESSURE AT A BULKHEAD TO AVOID DAMAGING THE SKIN.

A. Towing.

(1) Moving the airplane by hand is accomplished by using the wing struts and landing gear struts as push points. A tow bar attached to the nose gear should be used for steering and maneuvering the airplane on the ground. When no tow bar is available, press down on the tailcone at a bulkhead to raise the nose wheel off the ground. With the nose wheel clear of the ground, the airplane can be turned by pivoting about the main wheels.

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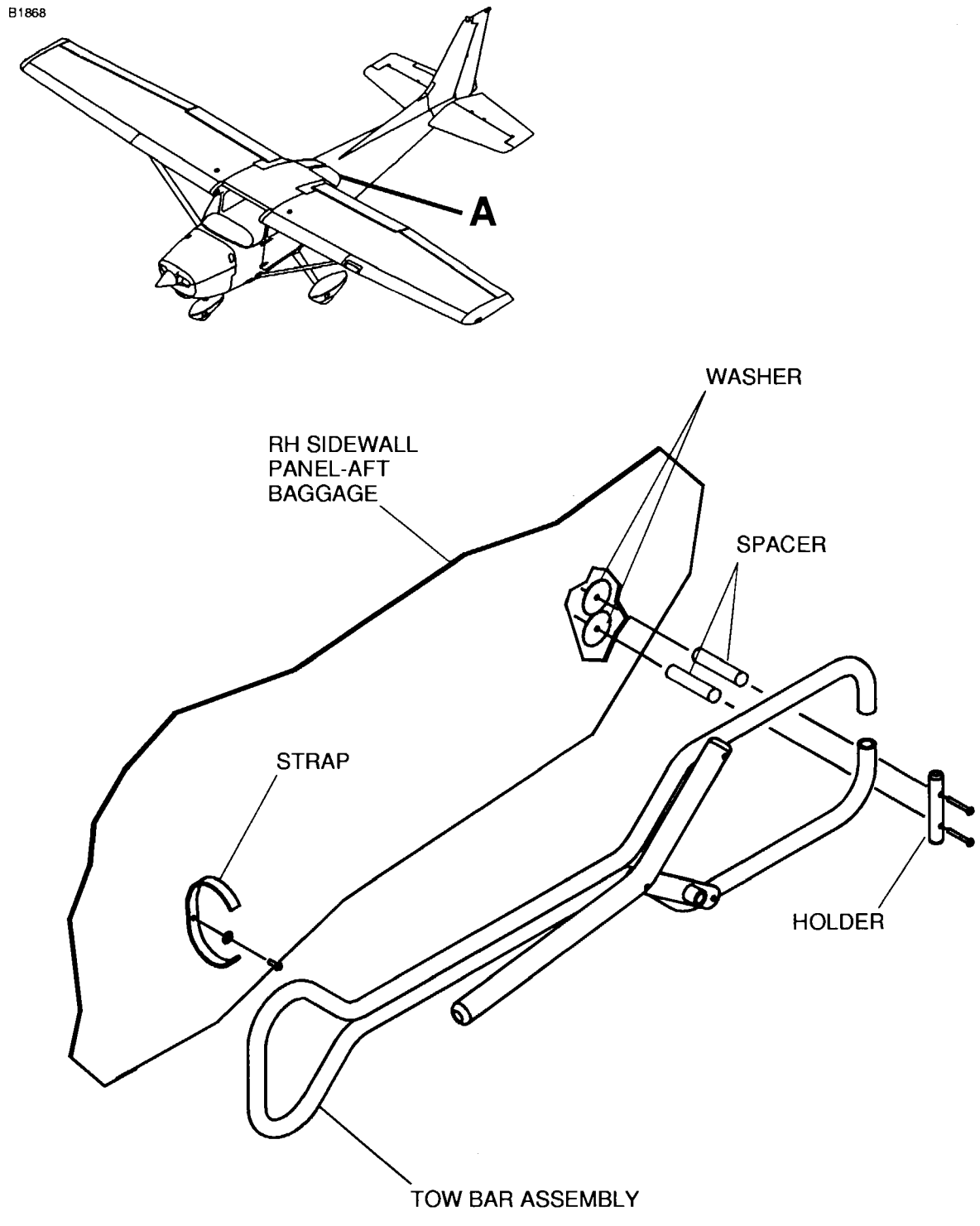

DETAIL A

0510T1007
A0714T1016

Tow Bar Installation
Figure 201 (Sheet 1)

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CHAPTER 10

PARKING AND MOORING

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PARKING, MOORING, STORAGE AND RETURN TO SERVICE - GENERAL

1. Scope

A. This chapter describes and provides maintenance instructions for parking, storing, mooring and returning the airplane to service.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
Wheel Chocks		Available Commercially	To chock landing wheels.
Engine Air Inlet Cover		Cessna Aircraft	To prevent entry of moisture and/or foreign particles through cowling.
Pitot Tube Cover		Cessna Aircraft	To prevent entry of moisture and/or foreign particles in pitot tubes.
Static Ground Cable		Available Commercially	To static ground airplane.
Rope (0.375 inch diameter minimum) or equivalent		Available Commercially	To tie down wing and tail.

3. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:
   (1) The section on parking describes methods, procedures and precautions used when parking the airplane.
   (2) The section on storage provides information on recommended storage procedures. Recommendations vary with the length of time the airplane is to be stored.
   (3) The section on mooring describes procedures and equipment used to moor the airplane.
   (4) The section on return to service describes procedures used when returning the airplane to service from storage.

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PARKING - MAINTENANCE PRACTICES

1. General

A. This maintenance practice covers procedures used to park the airplane.

B. The airplane should be moored if high winds are anticipated or anytime the airplane remains outside for extended periods of time. Refer to Mooring - Maintenance Practices for mooring procedures. Refer to Storage - Maintenance Practices for detailed instructions regarding storage.

2. Parking Instructions

A. Hard Surface and Sod.

CAUTION: ANY TIME THE AIRPLANE IS LOADED HEAVILY, THE FOOTPRINT PRESSURE (PRESSURE OF THE AIRPLANE WHEELS UPON THE CONTACT SURFACE OF THE PARKING AREA OR RUNWAY) WILL BE EXTREMELY HIGH, AND SURFACES SUCH AS HOT ASPHALT OR DAMP SOD MAY NOT ADEQUATELY SUPPORT THE WEIGHT OF THE AIRPLANE. PRECAUTIONS SHOULD BE TAKEN TO AVOID AIRPLANE PARKING OR MOVEMENT ON SUCH SURFACES.

(1) Position airplane headed into wind, on level surface.

CAUTION: DO NOT SET PARKING BRAKE DURING COLD WEATHER, WHEN ACCUMULATED MOISTURE MAY FREEZE BRAKES, OR WHEN BRAKES ARE HOT.

(2) Set parking brake or chock main gear wheels.
(3) Install control column lock.

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STORAGE - DESCRIPTION AND OPERATION

1. General

A. As a result of corrosion, it is possible that some piston engines will not complete the usual service life. Moisture from the air and material from combustion mix to cause corrosion on cylinder walls and bearing surfaces when the engine is not in operation. A thin layer of corrosion inhibitor is used to help prevent corrosion.

NOTE: The owner or operator of the airplane must make a decision if preservation is necessary as a result of environmental conditions and frequency of airplane use.

NOTE: The time periods given in this document are recommendations as given for normal conditions.

B. In areas of high humidity, corrosion can start in a short period of time. Corrosion is found on cylinder walls of new engines that have not operated for a period as short as two days.

C. In engines that have 50 hours or more time of service in a short period, the cylinder walls will have a varnish that will help protect from corrosion. These engines in good atmospheric conditions can stay inactive for many weeks without indication of corrosion.

2. Flyable Storage

A. The flyable storage is a maximum of 30 days storage with no engine operation and/or the first 25 hours of intermittent engine operation.

B. Engine temperature and length of operation time are very important in the control of corrosion. The desired flight time for air cooled engines is at least one continuous hour at oil temperatures of 165 degrees F (74 degrees C) to 200 degrees F (93 degrees C) at intervals not to exceed 30 days. The one hour does not include taxi, take-off and landing time.

C. The aircraft temperature gages must operate correctly.

D. The cooling air baffles must be in good condition and fitted properly.

E. The oil cooler system must be of the proper size for the engine and airframe installation. Oil coolers that are not the correct size can cause an engine overheat condition or below minimum temperatures. Low temperatures are as dangerous as high temperatures because of build-up of water and acids.

F. Pulling engines through by hand when the airplane is not operated for approximately a week is not recommended. Pulling the engine through by hand before you start the engine or to minimize corrosion can cause damage. The cylinder walls, pistons, rings, cam and cam follower receive minimum lubrication. When the prop is pulled through by hand, the rings remove oil from the cylinder walls. The cam load made by the valve train removes oil from the cam and followers. After two or three times of pulling the engine through by hand without engine starts, the cylinders, cam and followers are left without the correct quantity of oil film. Engine starts without the correct lubrication can cause the engine parts to score which can cause damage to the engine.

G. The pitot tube, static air vents, air vents, openings in the engine cowl, and other openings must have protective covers installed to prevent entry of foreign object debris.

3. Temporary Storage

A. Temporary airplane storage.

(1) Temporary storage is when the airplane does not operate in a maximum of 90 days. The airplane is made of corrosion resistant, epoxy primed aluminum, which will last a long time in normal conditions. But these alloys can have oxidation. The first indication of corrosion on surfaces without paint is white deposits or spots. Corrosion on surfaces with paint is discoloration or blistered paint. Storage in a dry hangar is very important for good preservation. Different conditions will change the measures of preservation, but for normal conditions in a dry hangar, and for storage periods not to exceed 90 days, the procedures that follow are recommended.

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WARNING: For procedures that require fuel, fire equipment must be available. Two ground wires from different points on the airplane connected to separate, approved ground stakes must be used in case of accidental disconnection of one ground wire. Make sure the fuel nozzle is grounded to the airplane

(a) Fill the fuel tanks with the correct grade of fuel.
(b) Use tie-down rings for ground points for the fuel procedure.
(c) Clean the airplane fully.
(d) Clean oil or grease from the tires.
(e) Put a thin layer of tire preservative on the tires.
(f) Put a cover on the tires to keep grease and oil from the tires.
(g) Keep the tires from deformation.
1 Put the fuselage on blocks to relieve pressure on the tires or rotate the wheels every 30 days to keep the tires from flat spots.
(h) Lubricate all airframe items.
(i) Put a cover on openings which let moisture and/or dust to enter.

B. Temporary engine storage.
(1) If it is known that an aircraft is to be out of operation for 30 or more days, the procedures that follow must be applied to the engine.
(a) Put a preservative in the engine by one of the methods that follow.
1 Drain the oil from the sump or system and replace with a preservative oil mixture. This preservation mixture is one part by volume of MIL-C-6529C Type I concentrated preservative compound added to three parts by volume of MIL-L-6082C (SAE J1966), Grade 1100, mineral aircraft engine oil or oil that agrees to MIL-C-6529C Type II. Carefully follow the manufacturer's instructions before use.
2 An alternative method is the use of Cortec VC1-326 preservative concentrate added to the original oil at a ratio of one part VC1-326 to ten parts of oil.
(b) Operate the engine to get the normal temperatures of operation.
1 Do not stop the engine until the oil temperature is 180 degrees F (82 degrees C). If weather conditions are below 32 degrees F (0 degrees C), oil temperature must be at least 165 degrees F (73 degrees C) before shutdown.
(c) Remove the engine cowl to get access to the top spark plugs.
(d) Remove the spark plugs.

NOTE: Oils of the type given are to be used in Lycoming aircraft engines for preservation only and not for lubrication.

(e) Through the spark plug hole, spray the interior of each cylinder with approximately two ounces of the preservative oil mixture with an airless spray gun (Spraying Systems Co., Gunjet Model 24A-8395 or equivalent). If an airless spray gun is not available, a moisture trap can be installed in the air line of a conventional spray gun.
(f) Install the spark plugs.
(g) Do not turn the crankshaft after the cylinders have been sprayed.
(h) If the aircraft is stored in a region of high humidity, or near a sea coast, it is better to use dehydrator plugs and not the spark plugs. Cylinder dehydrator plugs, MS-27215-2 or equivalent, can be used.
(i) Before the engine has cooled, install small bags of desiccant in the exhaust and intake ports and seal with a moisture impervious material and pressure sensitive tape.
(j) Firmly attach red cloth streamers to any desiccant bags installed in the intake and exhaust passages to make sure the material is removed when the engine is made ready for flight. Streamers must be visible from outside the aircraft. Thr propeller must have a label that says "Engine preserved - do not turn propeller".
(k) Seal all engine openings with plugs. Attach a red streamer at each point that a plug is installed.

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(l) If the airplane is to be stored outside, the pitot tube, static source vents, air vent openings in the engine cowl, and other openings must have protective covers installed to prevent entry of foreign object debris.

(m) Attach a warning placard to the propeller that says the propeller must not be moved while the engine is in storage.

(n) At 15-day maximum intervals, a periodic check must be made of the cylinder dehydrator plugs and desiccant. When the color of the desiccant has changed from blue to pink the preservation procedure must be repeated.

WARNING: To prevent serious bodily injury or death, before the propeller is moved, obey all precautions to prevent the engine start. Disconnect the spark plug leads. Make sure the magnetos are switched off and P-leads are grounded. Make sure the throttle is closed and the mixture is in idle cut-off. Do not stand within the arc of the blade. Even without spark, compression can cause the propeller to move with sufficient force to cause serious injury.

C. Return the airplane to service.

(1) To return the airplane to service, remove seals, tape, and desiccant bags. Use solvent to remove tape residue. Remove spark plugs or dehydrator plugs. With the magnetos off, turn the propeller by hand through sufficient rotation to remove excess preservative oil from the cylinders. Drain the remaining preservatives from the engine through the sump.

(2) Install spark plugs and reconnect all parts in accordance with manufacturer's instructions. Service the engine with approved lubrication oil.

4. Inspection During Storage

A. Do an inspection of the airplane.

(1) Do an inspection of the airframe for corrosion at least once a month and remove dust collection as frequently as possible. Clean the airplane as required.

(2) Do an inspection of the interior of at least one cylinder through the spark plug hole for corrosion at least once a month.

NOTE: Do not move crankshaft when the interior of the cylinders is examined for corrosion.

(3) If at the end of the 90 day period, the airplane is to be continued in storage, repeat the 90-day storage procedure.

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MOORING - MAINTENANCE PRACTICES

1. Mooring

A. When mooring the airplane in the open, head into the wind if possible. Tie down the airplane as follows:

(1) Secure control surfaces with the internal control lock and set brakes.

(2) Tie ropes, cables, or chains to the wing tie-down fittings, located at the upper end of each wing strut. Secure the opposite ends of ropes, cables, or chains to ground anchors.

(3) Secure rope (no chains or cables) to forward mooring ring and secure opposite end to ground anchor.

(4) Secure the middle of a rope to the tail tie-down ring. Pull each end of rope away at a 45 degree angle and secure to ground anchors at each side of tail.

(5) Secure control lock on pilot control column. If control lock is not available, tie pilot control wheel back with front seat belt.

(6) These airplanes are equipped with a spring-loaded steering system which affords protection against normal wind gusts. However, if extremely high wind gusts are anticipated, additional external locks may be installed.

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RETURN TO SERVICE - MAINTENANCE PRACTICES

1. Flyable Storage Return to Service

A. Flyable storage is defined as a maximum of 30 days nonoperational storage and/or the first 25 hours of intermittent engine operation. After flyable storage, returning the airplane to service is accomplished by performing a thorough preflight inspection. At the end of the first 25 hours of engine operation, drain engine oil and replace oil filter. Service engine with correct grade and quantity of engine oil.

2. Temporary Storage Return to Service

A. Temporary storage is defined as airplane in a nonoperational status for a maximum of 90 days. After temporary storage, use the following procedures to return the airplane to service:

(1) Remove airplane from blocks and check tires for proper inflation. Check for proper nose gear strut inflation.
(2) Check battery and install.
(3) Check that oil sump has proper grade and quantity of engine oil.
(4) Service induction air filter and remove warning placard from propeller.
(5) Remove materials used to cover openings.
(6) Remove spark plugs from engine.
(7) While spark plugs are removed, rotate propeller several revolutions to clear excess oil from cylinders.
(8) Clean, gap and install spark plugs. Torque spark plugs to the proper value and connect spark plug leads.
(9) Check fuel strainer. Remove and clean filter screen if necessary. Check fuel tanks and fuel lines for moisture and sediment. Drain enough fuel to eliminate any moisture and sediment.
(10) Perform a thorough preflight inspection, then start and warm up engine.

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CHAPTER 11

PLACARDS AND MARKINGS

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PLACARDS AND MARKINGS - GENERAL

1. General

A. Placards and markings on the exterior surfaces of the airplane are found in the Model 172 Illustrated Parts Catalog, Chapter 11.

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PLACARDS AND MARKINGS - INSPECTION/CHECK

1. Scope

A. This section has inspection data for the interior and exterior placards.

2. Interior and Exterior Placard and Decal Inspection

NOTE: This section gives an inspection procedure for all placards, decals, and markings on the airplane.

A. Do an inspection of the placards, decals, and markings.
   (1) Examine the interior of the airplane. Include the aft baggage areas for the installation of all required placards, decals, and markings.
      (a) For required placards, decals, and markings, refer to the Model 172R Illustrated Parts Catalog.
   (2) Examine the exterior of the airplane for the installation of all required placards, decals, and markings.
      (a) For required placards, decals, and markings, refer to the Model 172R Illustrated Parts Catalog.
   (3) Examine the airplane identification (ID) plate.
      (a) The ID plate is found on the left side of the stinger, Zone 310. Refer to the Model 172R Illustrated Parts Catalog and Chapter 6, Airplane Zoning - Description and Operation.

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CHAPTER 12

SERVICING

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SERVICING - GENERAL

1. Scope

A. This chapter provides instructions for the replenishment of fluids, scheduled and unscheduled servicing applicable to the entire airplane. Personnel shall observe safety precautions pertaining to the individual servicing application.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief description of each section follows.

(1) The section on replenishing is subdivided into categories to group servicing information such as systems requiring hydraulic fluid or compressed gas. A brief description of the subdivision subjects follows.

(a) Replenishing charts for the liquids most commonly used to service the airplane are grouped together to aid maintenance personnel in servicing.

(b) The subdivision of fuel and oil provides maintenance personnel with general servicing procedures. Safety precautions and servicing procedures required by federal and local regulations may supersede the procedures described.

(c) The subject on hydraulic fluid servicing provides servicing procedures for the airplane hydraulic brake system, nose gear shimmy damper and nose gear strut.

(d) The remaining subject subdivisions provide service information on either a system, an assembly or a component.

(2) The section on scheduled servicing includes lubrication information, external cleaning and internal cleaning. The section is subdivided to provide individual system, assembly or component service information.

(3) The section on unscheduled servicing provides information on deicing an airplane or portions of an airplane.

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REPLENISHING - DESCRIPTION AND OPERATION

1. General

A. This section provides maintenance personnel with servicing information for replenishing fuel and oil.

2. Description

A. For an illustration of service points located on the airplane, refer to Figure 1. This illustration may be used in conjunction with replenishing tables to aid maintenance technicians in servicing the airplane.

B. The following tables are provided to establish replenishment capacities of various systems:
(1) Fuel Capacity (Table 1)
(2) Approved Fuels (Table 2)
(3) Engine Oil Capacity (Table 3)

3. Fuel Capacity Table

A. The following table lists airplane fuel capacity.

WARNING: Only aviation grade fuels are approved for use.

Table 1. Fuel Capacity

	U.S.
Fuel Capacity	56.0 Gallons
Usable Fuel	53.0 Gallons

4. Approved Fuel Table

A. The following table lists approved fuels for use in the airplane.

Table 2. Approved Fuels

TYPE OF FUEL	SPECIFICATION	COLOR
100 LL	ASTM-D910	Blue
100	ASTM-D910	Green

For other fuels that can be used in Russia, refer to Lycoming Service Instruction No. 1070M (or subsequently approved Lycoming Service Instruction revision).

5. Engine Oil Capacity Table

A. The following table lists oil capacity for the airplane. For list of approved engine oil, refer to the Pilot's Operating Handbook and FAA Approved Flight Manual.

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WARNING: The U.S. Environmental Protection Agency advises mechanics and other workers who handle oil to minimize skin contact with used oil and to promptly remove used oil from skin. In a laboratory study, mice developed skin cancer after skin was exposed to used engine oil twice a week without being washed off. Substances found to cause cancer in laboratory animals may also cause cancer in humans.

Table 3. Engine Oil Capacity

	U.S. Quarts
Oil Capacity (total with filter, oil cooler and cooler hoses)	8.0 quarts

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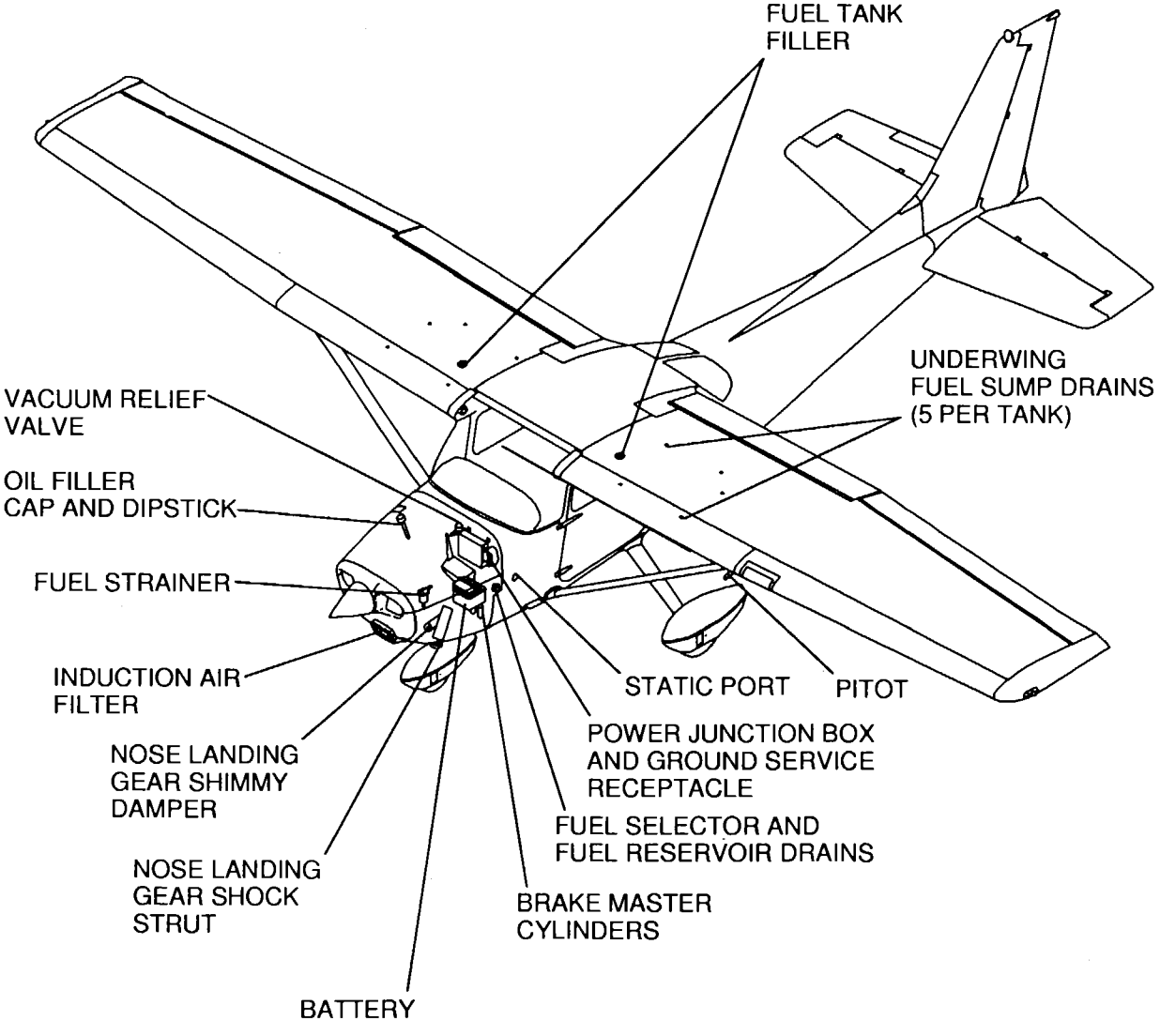

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Airplane Service Points
Figure 1 (Sheet 1)

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NOSE LANDING GEAR SHOCK STRUT - SERVICING

1. General

A. The nose gear shock strut requires a periodic check to make sure the strut is filled with hydraulic fluid and is inflated to the correct air pressure. The procedures give only replenishing and servicing instructions. For the disassembly and repair procedures, refer to Chapter 32, Nose Landing Gear - Maintenance Practices.

2. Shock Strut Servicing Procedures

A. The nose landing gear shock strut must be serviced every 100 hours.

B. To service the nose gear shock strut, proceed as follows:
(1) Raise airplane nose to remove pressure from shock strut.
(2) Remove valve cap and release all air.
(3) Remove valve housing assembly.
(4) Compress strut completely (stops in contact with outer barrel hub).
(5) Check and replenish oil level.

NOTE: Fluid used must comply with specification MIL-PRF-5606.

(a) Fill strut to bottom of valve installation hole.
(b) Maintain oil level at bottom of valve installation hole.
(6) Fully extend strut.
(7) Reinstall valve housing assembly.
(8) With strut fully extended and nose wheel clear of ground, inflate strut to 45 PSI.

NOTE: The nose landing gear shock strut will normally require only a minimum amount of service. Strut extension pressure must be maintained at 45 PSI. Machined surfaces must be wiped free of dirt and dust using a clean, lint-free cloth saturated with MIL-PRF-5606 or kerosene. All surfaces must be wiped free of excessive hydraulic fluid.

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NOSE LANDING GEAR SHIMMY DAMPER - SERVICING

1. General

A. This procedure gives servicing instructions for the shimmy damper. To disassemble the shimmy damper, refer to Chapter 32, Nose Gear - Maintenance Practices.

2. Shimmy Damper Servicing (On Airplanes that do not have the Lord Shimmy Damper)

A. Service the shimmy damper every 100 hours.

B. Service the shimmy damper as follows:
(1) Remove the shimmy damper from the airplane. Refer to Chapter 32, Nose Landing Gear - Maintenance Practices.
(2) While you hold the damper in a vertical position with the fitting end pointed down, pull the fitting end of the damper shaft to its limit of travel.
(3) While you hold the damper in this position, fill the damper through the open end of the cylinder with hydraulic fluid.
(4) Push the shaft up slowly to seal off the filler hole.
(5) Clean the damper with solvent. Make sure that the shaft comes out through the filler hole until the damper is installed on the aircraft.
(6) Install the damper on the airplane. Refer to Chapter 32, Nose Landing Gear - Maintenance Practices.

C. Keep the shimmy damper clean.
(1) Clean the shimmy damper with a clean, lint-free cloth to prevent the collection of dust and grit.
(2) Make sure that the part of the damper piston shaft that you can see is always clean.
(3) Clean the machined surfaces of the shimmy damper.
(a) Use a clean, lint-free cloth soaked with hydraulic fluid to clean the machined surfaces.
(b) After the surfaces are clean, remove the remaining hydraulic fluid from them with a clean, lint-free cloth.

3. Shimmy Damper Servicing (On Airplanes with the Lord Shimmy Damper)

A. Lord Shimmy Dampers do not need special servicing. However, you must lubricate the nose wheel shimmy damper pivots with general purpose oil MIL-L-7870.

B. Keep the shimmy damper clean.
(1) Clean the shimmy damper with a clean, lint-free cloth to prevent the collection of dust and grit.
(2) Make sure that the part of the damper piston shaft that you can see is always clean.
(3) Clean the machined surfaces of the shimmy damper with a clean, lint-free cloth to prevent the collection of dust and dust.

C. If necessary, exercise a shimmy damper before installation.
(1) If a shimmy damper has been in storage for a long period, make sure that it moves freely before you install it.

CAUTION: Make sure that you do not push or pull on the shaft of the shimmy damper after it has reached its limit in either the up or the down position. If you continue to push a fully compressed, bottomed-out shaft, you can cause damage to the shimmy damper. If you continue to pull on a fully extended shaft, you can cause damage to the shimmy damper.

(2) If the shimmy damper does not move freely, push and pull the shaft through complete cycles until it does move freely. When the shimmy damper shaft has come to its limit of travel up and down as you push and pull, make sure that you do not continue to push or pull it beyond that limit of travel.

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HYDRAULIC BRAKES - SERVICING

1. General

A. The brake master cylinders must be serviced every 100 hours.

B. The brake master cylinders are on the pilot's rudder pedals and are filled with MIL-PRF-5606 hydraulic fluid.

NOTE: For bleeding procedures, refer to Chapter 32, Brakes - Maintenance Practices.

(1) Remove the filler plug on the top of each master cylinder to fill the brake master cylinders.
(2) Fill to the top of the internal reservoir with MIL-PRF-5606 hydraulic fluid.

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FUEL AND ENGINE OIL - DESCRIPTION AND OPERATION

1. General

A. This section provides servicing procedures for the fuel and engine oil system. It is subdivided as follows:
   (1) The fuel system section includes procedures for adding fuel, defueling the airplane and mixing anti-icing additives to the fuel.
   (2) The engine oil section includes procedures for checking, adding and changing engine oil.

2. Fuel Precautions

A. Safety Precautions.
   (1) The safety precautions on fueling and defueling may be superseded by local directives. However, following is a typical list of precautions.
      (a) Ground, by designated grounding cables, the fueling and/or defueling vehicle to the airplane. Also, a static ground device shall contact the fueling or defueling vehicle and ground.
      (b) Fire fighting equipment shall be immediately available.
      (c) Wear proper clothing.
         1 Do not wear clothing that has a tendency to generate static electricity such as nylon or synthetic fabrics.
         2 Do not wear metal taps on shoes when working in areas where fuel fumes may accumulate at ground level.
      (d) The airplane shall be in a designated fuel loading or unloading area.
      (e) High wattage, pulse transmitting avionics equipment shall not be operated in the immediate vicinity.

B. Maintenance Precautions.
   (1) Use designated equipment for fuel loading and unloading to prevent contamination.
   (2) Use proper procedures when adding fuel inhibitors.
   (3) Use specified type of fuel.

3. Oil Precautions

A. Maintenance Precautions.
   (1) Use proper servicing procedures; do not overfill, do not mix manufacturer's brands of oil.

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FUEL - SERVICING

1. General

A. Fuel Tanks.

(1) Each wing contains an integral fuel bay, located between the front and rear spars, extending from WS 31.38 to WS 65.125. Fuel bays should be filled immediately after each flight to lessen condensation in the tanks and lines. A fuel filler cap is located on top of each wing and provides a fueling/defueling point for each fuel bay.

B. Fuel Drains.

(1) Fuel drains are located at various places on the underside of each integral fuel bay and throughout the fuel system. These drains are utilized to collect fuel samples for analysis. This sampling is accomplished by placing the fuel sample cup up to the drain valve, and depressing the valve with rod protruding from the cup.

NOTE: For detailed description and maintenance practices related to the fuel system, refer to Chapter 28, Fuel - General.

2. Safety and Maintenance Precautions

A. Safety Precautions.

WARNING: During all fuel system servicing procedures, fire fighting equipment must be available. Two ground wires from tiedown rings on the airplane to approved ground stakes shall be used to prevent accidental disconnection of one ground wire. Make sure battery switch is turned off, unless otherwise specified.

(1) Establish ground as follows:
  (a) Ground airplane first.
  (b) Ground vehicle (or hose cart) to the same ground as the airplane.
  (c) Bond vehicle (or hose cart) to airplane.
  (d) Bond refuel nozzle to airplane.
(2) Ensure fire fighting equipment is positioned and immediately available.
(3) Do not wear clothing that has a tendency to generate static electricity such as nylon or synthetic fabrics.
(4) Do not wear metal taps on shoes.
(5) The airplane should be in a designated fuel loading/unloading area.
(6) High wattage, pulse transmitting avionics equipment shall not be operated in the vicinity of the fueling/defueling operation.

B. Maintenance Precautions.

(1) Use designated equipment for fuel loading/unloading to prevent contamination.
(2) Due to the chemical composition of anti-ice additive, improper blending of fuel and anti-icing additive may cause the deterioration of the integral fuel tanks interior finish, thus promoting corrosion. It is very important that the proper anti-ice additive blending procedures be followed.
(3) Use authorized type of fuel and anti-ice additive.
(4) During defueling, ensure anti-ice additive blended fuel and unblended fuel are not mixed.

3. Fueling and Defueling

A. Fueling Procedures.

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CAUTION: Make sure that the correct grade and type of fuel is used to service the airplane. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for a list of approved fuels.

(1) Ground airplane and vehicle as outlined above.
(2) Ensure battery switch is turned OFF.
(3) Place protective mat around fuel filler area and remove fuel filler caps.
(4) Fuel airplane. Ensure correct grade of aviation fuel is used.
(5) Replace filler caps. Wipe up excess fuel from wing area.
(6) Remove grounding equipment.

B. Defueling Procedures.
(1) Ground airplane and vehicle as outlined above.
(2) Ensure battery switch is turned OFF.
(3) Remove fuel filler caps.
(4) Insert defueling nozzle into fuel bay and begin defueling.
(5) Remove as much fuel as possible with defueling nozzle.
(6) Drain fuel from drains located on underside of fuselage.
(7) Remove drain valves from bottom of fuel tank and drain remaining fuel.
(8) Remove grounding equipment.

4. Aviation Fuel Additive

A. When servicing fuel with anti-icing additive containing diethylene glycol monomethyl ether (DiEGME), remember that it is harmful if inhaled, swallowed or absorbed through the skin, and will cause eye irritation. Also, it is combustible. Before using this material, refer to all safety information on the container.

B. In cases of acute exposure, DiEGME is an eye and mucous membrane irritant, a nephrotoxin and central nervous system depressant. It is toxic by skin absorption. Inhalation may cause irritation to mucous membranes, although, due to it's low volatility this is not an extreme hazard at room temperature or below. If DiEGME contacts the eye, it may cause pain and transient injury. It is absorbed through the skin in toxic amounts.

C. In the event DiEGME contact is experienced, the following emergency and first aid procedures should be used.
(1) If ingested (swallowed), drink large quantities of water. Then induce vomiting by placing a finger far back into the throat. Contact a physician immediately. If vomiting cannot be induced, take victim immediately to the hospital or a physician. If victim is unconscious or in convulsions, take victim immediately to the hospital or a physician. Do not induce vomiting or give anything by mouth to an unconscious person.
(2) If eye or skin contact is experienced, flush with plenty of water (use soap and water for skin) for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Thoroughly wash contaminated clothing and shoes before reuse.

5. Fuel Loading

CAUTION: Make sure that the correct grade and type of fuel is used to service the airplane. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for a list of approved fuels.

A. Approved fuel for the Model 172 airplane may or may not contain an anti-ice additive. The additive incorporates a biocidal chemical which inhibits growth of fungal and bacterial organisms in fuel storage reservoirs. Mixing anti-ice additive and fuel during refueling involves the utilization of an aerosol or proportioned dispenser.

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B. Mixing Icing Inhibitor Procedures.

NOTE: Equivalent procedures may be substituted.

(1) When using aerosol cans, utilize the following procedures.
(a) Insert the fueling nozzle and fuel additive nozzle into the fuel filler.

WARNING: Anti-icing additives containing DiEGME are harmful if inhaled, swallowed or absorbed through the skin and will cause eye irritation.

CAUTION: Ensure that additive is directed into flowing fuel stream and additive flow is started after fuel flow starts and is stopped before fuel flow stops. Do not allow concentrated additive to contact coated interior of fuel tank or airplane painted surface.

(b) Start refueling; then, direct the fuel additive into the fuel stream so as to blend the additive simultaneously with the fuel as it fills the tank. The additive concentration range shall be maintained in accordance with instructions in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

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ENGINE OIL - SERVICING

1. General

A. This section gives instructions to examine and replace the engine oil.

2. Oil Change Intervals

A. Oil Change Intervals.

NOTE: An inspection of the oil filter will help find unusual engine wear. Refer to the Lycoming Service Bulletin 480D or the latest revision.

(1) You must frequently do a check of the oil during the first 25 hours of engine operation and add oil as necessary. Use an aviation grade mineral oil of the required viscosity which agrees with SAE J1966. Refer to Engine Oil Check.
(2) After the first 25 hours, drain the engine oil and replace the oil filter. Fill the engine through the oil filler tube with aviation grade mineral oil of the required viscosity which agrees with SAE J1966. Refer to Engine Oil Change.
(3) Continue to use the aviation grade mineral oil until the airplane completes a total of 50 hours of engine operation or oil consumption is stabilized. You must then drain the engine oil, replace the oil filter and add ashless dispersant oil to the engine. Refer to Engine Oil Change.
(4) For more information on engine oil replacement intervals, refer to Chapter 5, Inspection Time Limits.

3. Engine Oil Level

A. Engine Oil Check (Refer to Figure 301).
(1) Make sure the airplane is in a level position for the best indication.
(2) Wait five to ten minutes after the engine has stopped, then examine the engine oil level on the dipstick.
(a) Open engine oil door on the top cowl.
(b) Remove the dipstick from the engine.
(c) Wipe the dipstick with a clean cloth.
(d) Fully insert the dip stick into the oil filler tube and remove the dipstick.
(e) Read oil level on dipstick.

CAUTION: THE AIRPLANE CAN OPERATE WITH SAE J1966 STRAIGHT MINERAL OIL DURING THE INITIAL BREAK-IN PERIOD OR AFTER AN OVERHAUL. AFTER THE BREAK-IN PERIOD, USE AN ASHLESS DISPERSANT OIL THAT AGREES WITH SAE J1899. MAKE SURE YOU USE THE CORRECT OIL TYPE WHEN YOU SERVICE THE ENGINE.

(3) If the oil is low, add the correct quantity and viscosity of aviation grade engine oil. Refer to Replenishing - Description and Operation.
(4) Insert the dipstick into the oil filler tube.
(5) Do a check for the correct fit of the dipstick to make sure it is not loose.
(6) Close engine oil door.

4. Engine Oil Change

A. Change the Engine Oil (Refer to Figure 301).
(1) Operate engine until oil temperature is at a normal operating temperature.

NOTE: Normal temperature operation is within the green arc of the oil temperature gage. The engine oil must drain while the engine is still warm.

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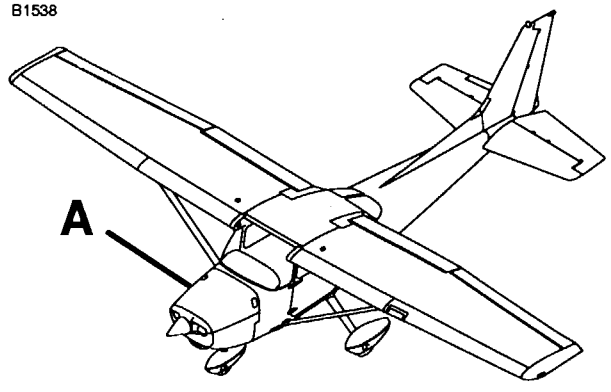

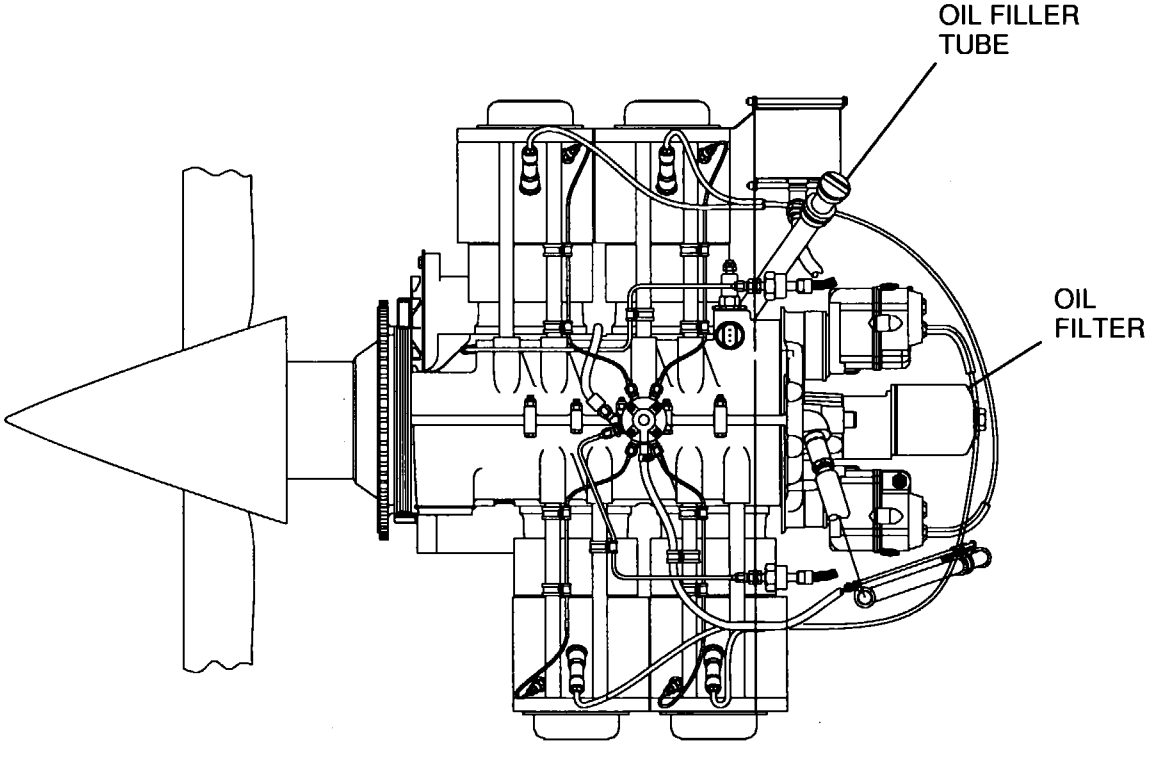

DETAIL A

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A0556T1008

Engine Oil Service
Figure 301 (Sheet 1)

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WARNING: AVOID SKIN CONTACT WITH ENGINE OIL. ENGINE OIL THAT GETS ON THE SKIN MUST BE IMMEDIATELY REMOVED.

(2) Shut off the engine.
(3) The front of the airplane must be raised slightly to drain sludge that can collect in the engine oil sump.
(4) Remove the top cowl to get access to the oil drain plug and external oil filter. Refer to Chapter 71, Cowl - Maintenance Practices.
(5) Put a cover such as a plastic bag over the lower vacuum pump when you replace the oil or oil filter to prevent contamination of the vacuum pump.
(6) Remove and discard the safety-wire from the drain plug.

WARNING: YOU MUST PREVENT SKIN CONTACT WITH ENGINE OIL. ANY ENGINE OIL THAT GETS ON THE SKIN MUST BE REMOVED IMMEDIATELY.

(7) Remove the drain plug and let the oil drain into an applicable container.
(8) After the engine oil has drained, install the drain plug. Refer to the Lycoming SSP-1776 Table of Limits or latest revision, for the torque requirements.
(9) Attach safety-wire to the drain plug. Refer to Chapter 20, Safetying - Maintenance Practices.
(10) Remove suction screen from oil sump.
  (a) Complete an inspection for metal particles.
    1 If you see metal content, keep the material from the oil sump for identification. Additional investigation will be required to find the source of the metal and possible need for corrective maintenance. Refer to Lycoming SSP500 (or latest revision) and contact a Textron Lycoming representative.
  (b) Install the suction screen with a new gasket. Refer to the Lycoming SSP-1776 Table of Limits (or latest revision) for torque requirements.
  (c) Attach safety-wire to the suction screen. Refer to Chapter 20, Safetying - Maintenance Practices.
(11) Remove the external oil filter.
  (a) Open the filter can and examine the oil from the filter for metal particles.
  (b) Carefully remove and unfold the paper element. Do an inspection of the material in the filter.
    1 If metal content is shown, keep the material from the filter for identification. Additional investigation will be required to find the source of the metal and possible need for corrective maintenance. Refer to Lycoming SSP500 and contact a Textron Lycoming representative.
  (c) Install a new external oil filter.
  (d) Attach safety-wire to the oil filter. Refer to Chapter 20, Safetying - Maintenance Practices.
(12) Fill the engine oil sump through the filler tube. Make sure you use the correct grade and quantity of oil. Refer to Replenishing - Description and Operation. Refer to Figure 302 for oil grade versus temperature chart.
(13) Install the dipstick and make sure of the correct fit on the filler tube.
(14) Remove the bag from the lower vacuum pump.
(15) Operate the engine until the normal operating temperature shows on the oil temperature indicator.
(16) Shutdown the engine.
(17) Examine the engine for oil leaks.

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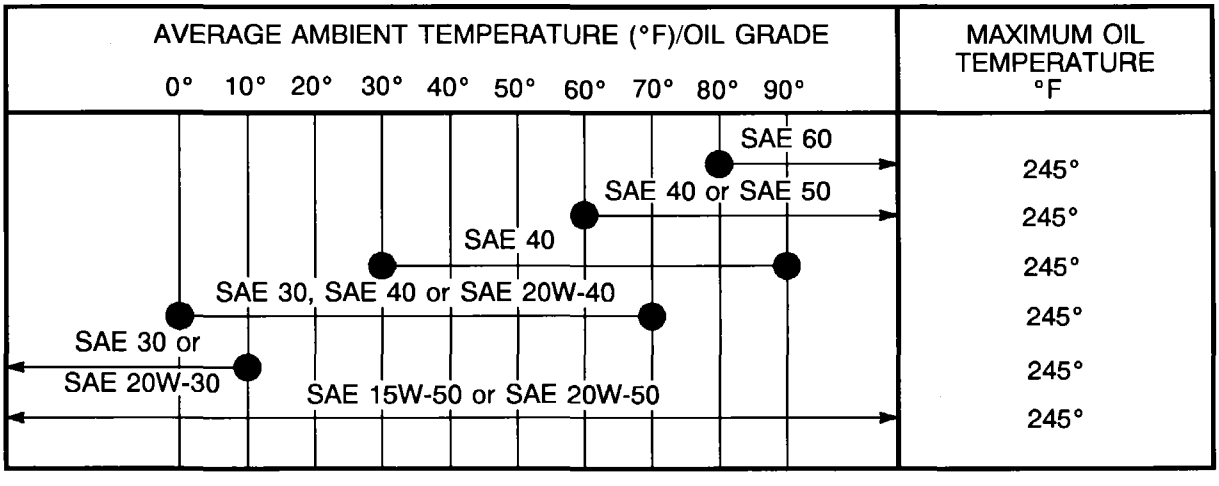
SPECIFIED AVIATION GRADE OIL:



0598T1001

Temperature Versus Oil Viscosity
Figure 302 (Sheet 1)

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INDUCTION AIR FILTER - SERVICING

1. General

A. The induction air filter helps make sure dust and dirt does not go into the induction system.

2. CA3559 Air Filter Service

A. CA3559 Air Filter (Refer to Figure 301).
   (1) The CA3559 Induction Air Filter must be serviced at 50 hours, is life limited and must be replaced at 100 hours. Refer to Chapter 5, Component Time Limits.

B. Clean the CA3559 Air Filter (Refer to Figure 301).
   (1) Remove the filter from the airplane.
   (2) Replace the filter if it is damaged or split.
   (3) If the filter is in serviceable condition, proceed with the steps that follow.

CAUTION: DO NOT USE MORE THAN 100 PSI COMPRESSED AIR TO CLEAN THE FILTER . USE CARE NOT TO CAUSE DAMAGE TO THE FILTER WHEN YOU CLEAN IT.

   (a) Clean the filter from the opposite direction of the normal air flow with oil-free compressed air that is less than 100 psi.
   (b) Make sure the air box is clean and free of debris before you install the filter.
   (c) Install the filter.

3. P198281 Air Filter Service

A. P198281 Air Filter (Refer to Figure 301).
   (1) The filter must be serviced at 50 hours, is life-limited and must be replaced at 500 hours. A new filter must be installed after using 500 hours of engine operating time or one year, whichever occurs first. Refer to Chapter 5, Component Time Limits.

B. Clean the P198281 Air Filter (Refer to Figure 301).

NOTE: The filter assembly can be cleaned with compressed air a maximum of 30 times or it can be washed a maximum of 20 times. Refer to the maintenance log book for a record of air filter service.

   (1) Remove the filter from the airplane.

CAUTION: DO NOT CLEAN THE FILTER WITH COMPRESSED AIR THAT IS MORE THAN 100 PSI OR THE FILTER CAN BE DAMAGED.

   (2) Clean the filter with oil-free compressed air that is less than 100 psi, from the opposite direction of the normal air flow.

NOTE: Arrows on the filter case show the direction of the normal air flow.

   (3) Examine the paper pleats bond to the face screen.
      (a) A new filter must be installed when the current filter is damaged. A damaged filter can have sharp or broken edges in the filtering panels, which will let unfiltered air to enter the induction system. Any filter that appears doubtful must have a new filter installed.
      (b) Replace the filter if the face screen is loose or pulled away from the filter pleats. The bond holds the paper pleats in place. If the bond is broken the pleats are free to move, which will decrease filtration.

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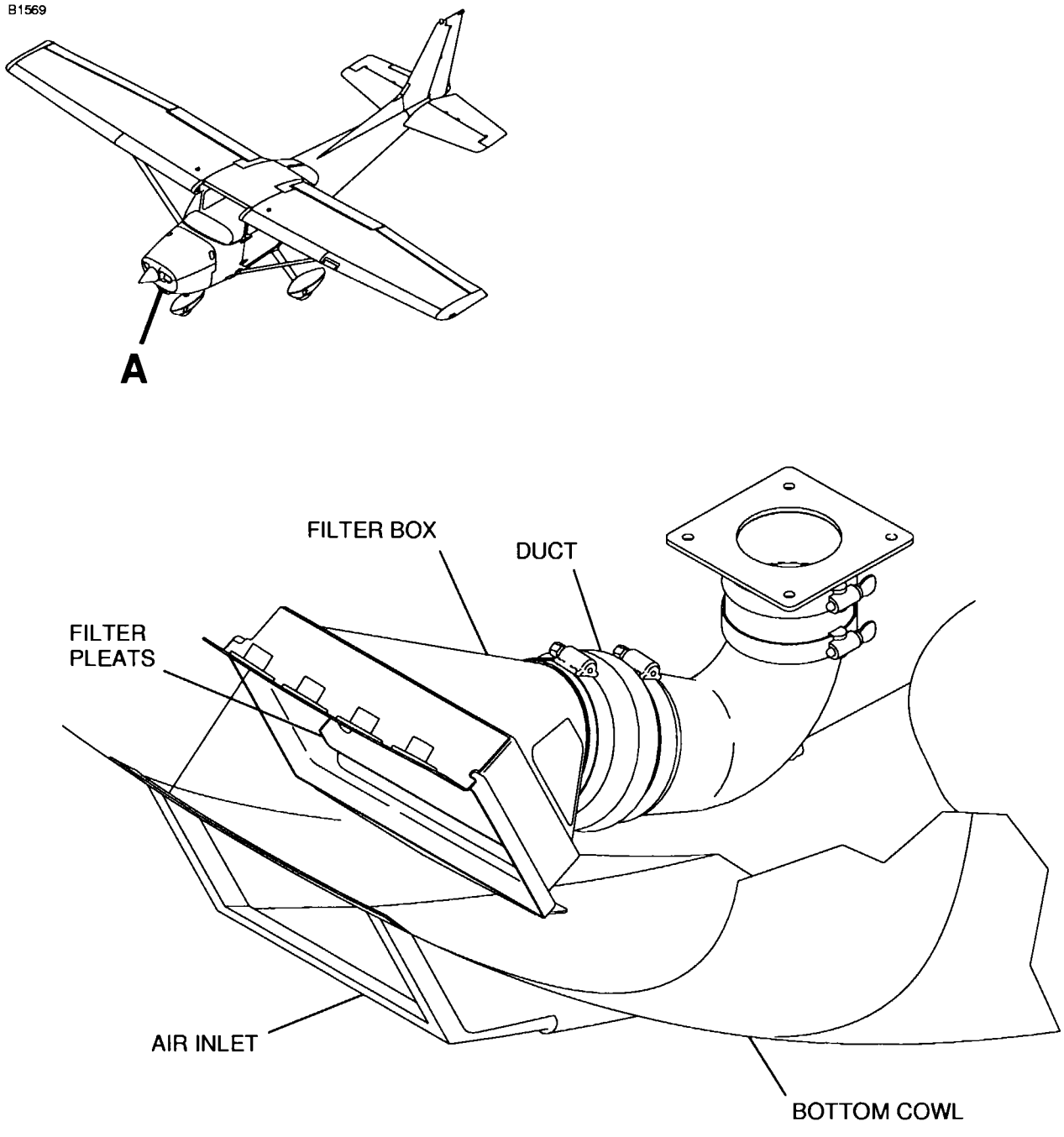

DETAIL A

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Air Filter Service
Figure 301 (Sheet 1)

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CAUTION: DO NOT USE SOLVENT OR CLEANING FLUIDS TO CLEAN THE FILTER. USE ONLY WATER AND HOUSEHOLD DETERGENT SOLUTION WHEN YOU WASH THE FILTER.

(4) After you clean the filter with air, the filter can be washed in a mixture of warm water and a mild household detergent. A cold water mixture is acceptable.
(5) After you wash the filter, rinse it with clean water until the rinse water that drains from the filter is clear.
(6) Let the water drain from the filter and dry with compressed air that is less than 100 psi.

NOTE: The filtering panels of the filter can twist when they are wet, but they will return to their original shape when they are dry.

(7) When the filter is dry, exam it to make sure the filter is not damaged. If it is damaged, anew filter must be installed.
(8) Make sure the air box is clean.
(9) Install the filter with the gasket on the aft face of the filter frame and with the flow arrows on the filter frame pointed in the correct (normal air flow) direction.
(10) Make sure you update the maintenance log book to show the number of times the air filter has been cleaned for future reference.

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VACUUM SYSTEM FILTERS - SERVICING

1. General

A. The vacuum system has two filters for which servicing is necessary. The gyro filter is forward of the instrument panel on the pilot's side. The regulator valve filter is forward of the instrument panel near the firewall centerline.

B. An inspection of the gyro filter and the regulator valve filter must be done every 100 hours. Both filters must be replaced at life limits set in Chapter 5, Component Time Limits.

2. Gyro Filter Servicing

A. Servicing Procedures (Refer to Figure 301).

CAUTION: Do not operate the vacuum system with the filter removed or with a vacuum line disconnected. Foreign object debris can go into the system and cause damage to the vacuum-operated instruments.

(1) Remove the bolt and washer that attach the filter to the cover.
(2) Do an inspection of the filter for deterioration or damage.
(3) Clean or, if applicable, replace the filter.
(4) Install the filter in the cover and attach with the bolt and washer.

3. Regulator Valve Filter Servicing

A. Servicing Procedure (Refer to Figure 301).

CAUTION: Do not operate the vacuum system with the filter removed or with a vacuum line disconnected. Foreign object debris can go into the system and cause damage to the vacuum operated instruments.

(1) Do an inspection of the filter for deterioration or damage.
(2) If the filter is dirty, carefully remove it from the regulator valve.
(3) Use shop air to clean the filter.
(4) Replace damaged filter, if applicable.
(5) Install the filter on the regulator valve.

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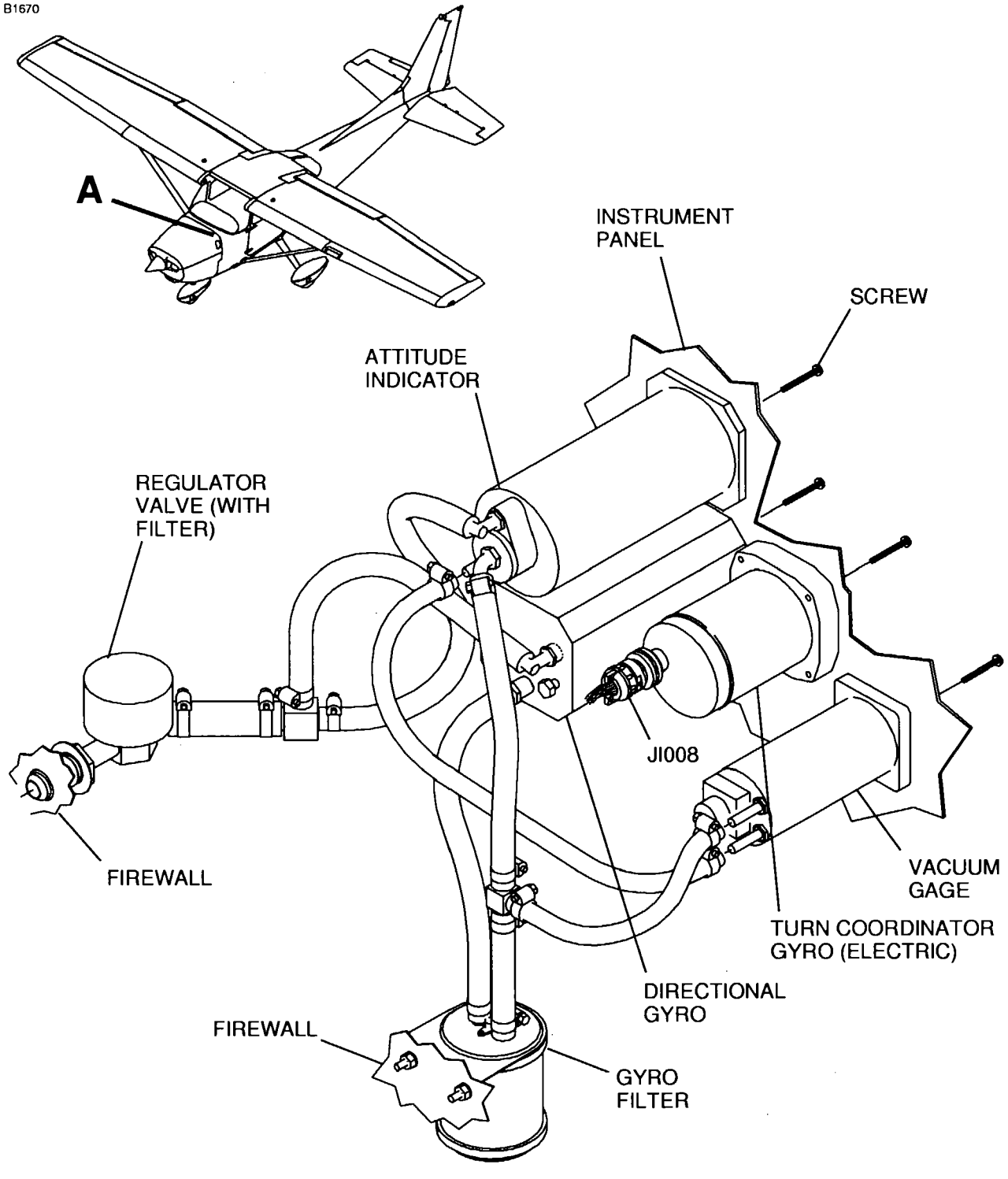

DETAIL A

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A0518T1052

Vacuum System Filters
Figure 301 (Sheet 1)

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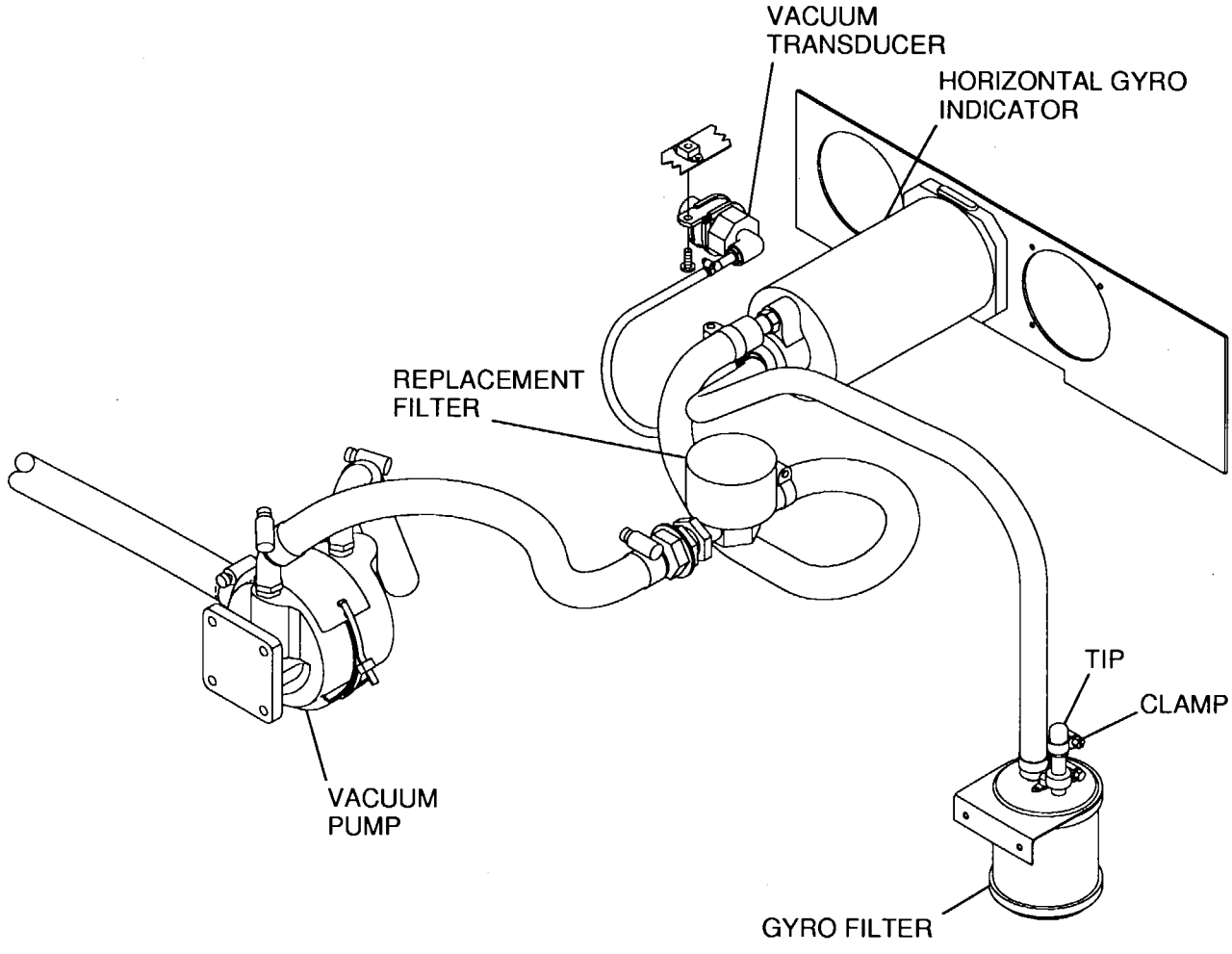

DETAIL B
AIRPLANES WITH GARMIN G1000

0510T1007
B0518T1105

Vacuum System Filters
Figure 301 (Sheet 2)

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BATTERY - SERVICING

1. General

A. This procedure provides instructions for adding water to the battery. For testing, charging and maintenance on the battery, refer to Chapter 24, Battery - Maintenance Practices.

2. Battery Servicing

A. The battery should be serviced every 100 hours.

B. Battery servicing involves adding distilled water to maintain the electrolyte even with the horizontal baffle plate at the bottom of the filler holes, checking the battery cable connections, and neutralizing and cleaning off any spilled electrolyte or corrosion. Use bicarbonate of soda (baking soda) and water to neutralize electrolyte or corrosion. Follow with a thorough flushing with a wire brush, then coat with petroleum jelly before connecting. The battery box should also be checked and cleaned if any corrosion is noted. Distilled water, not acid or "re-juvenators" should be used to maintain electrolyte level. Inspect the battery in accordance with time limits spelled out in Chapter 5, Inspection Time Limits.

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TIRES - SERVICING

1. General

A. Servicing the tires by maintaining correct inflation pressure is the most important job in any tire preventative maintenance program. Improper inflation pressure causes uneven tread wear.
   (1) Under inflation, indicated by excessive wear in the shoulder area, is particularly damaging. It increases the chance of bruising sidewalls and shoulders against rim flanges. In addition, it shortens tire life by permitting excessive heat buildup.
   (2) Over inflation is indicated by excessive wear in the center of the tire. This condition reduces traction, increases tire growth and makes treads more susceptible to cutting.

2. Safety Precautions and Notes

A. Safety Precautions.
   (1) Tire should be allowed to cool before attempting to service.

WARNING: Do not stand in front of the bead area. The tendency of a bursting tire is to rupture along the bead. Standing in any position in front of either bead area could cause injury if the tire should burst.

   (2) Personnel should stand at a 90-degree angle to the axle along the centerline of the tire during servicing.

CAUTION: Applying a tire sealant to the tire may cause wheel corrosion.

   (3) The use of tire sealant is not recommended.

B. Notes.
   (1) A tube-type tire that has been freshly mounted and installed should be closely monitored during the first week of operation, ideally before every takeoff. Air trapped between the tire and the tube at the time of mounting could seep out under the bead, through sidewall vents or around the valve stem, resulting in an under inflated assembly.
   (2) The initial stretch or growth of a tire results in a pressure drop after mounting. Consequently, tires should not be placed in service until the have been inflated a minimum of 12 hours, pressures rechecked, and tires reinflated if necessary.
   (3) Inaccurate tire pressure gages are a major cause of improper inflation pressures. Ensure gages used are accurate.

3. Tire Servicing

A. Check tire pressure regularly.
   (1) Tire pressure should be checked when tire is cold (at least 2 or 3 hours after flight) on a regular basis. Tire pressure should be checked prior to each flight when practical.
   (2) When checking tire pressure, examine tires for wear, cuts, and bruises. Remove oil, grease and mud from tires with soap and water.

B. Use recommended tire pressure. Consult the table below.

NOTE: Recommended tire pressures should be maintained, especially in cold weather. Any drop in temperature of the air inside a tire causes a corresponding drop in air pressure.

	MODEL 172R	MODEL 172S
Main Gear Tire Type	6.00 x 6, 4-ply rated tire	6.00 x 6, 6-ply rated tire
Pressure	29 PSI	42 PSI

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	MODEL 172R	MODEL 172S
Nose Gear Tire Type	5.00 x 5, 6-ply rated tire	5.00 x 5, 6-ply rated tire
Pressure	34 PSI	45 PSI

4. Cold Weather Servicing

A. Cold Weather Servicing.

(1) Check tires for excessive deflation.

NOTE: Tire air pressure will decrease somewhat as the temperature drops, but excessive deflation could indicate cold weather leakage at the air valve. Avoid unnecessary pressure checks.

(2) If it is necessary to pressure check tires in cold climates, always apply heat to air valves and surrounding areas before unseating valves.

(3) Continue application of heat during reinflation to ensure air valve seal flexibility when valve closes.

(4) Do not allow tires to stand in snow soaked with fuel, or on fuel covered ramp areas.

(5) If tires become frozen to parking ramp, use hot air or water to melt ice bond before attempting to move airplane.

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SCHEDULED SERVICING - DESCRIPTION AND OPERATION

1. General

A. This section provides instructions necessary to carry out scheduled servicing as well as internal/external cleaning. It also includes instructions for lubricating specific points identified in periodic inspection and/or preventive maintenance programs. This section does not include lubrication procedures required for the accomplishment of maintenance practices.

2. Description

A. This section is subdivided to provide maintenance personnel with charts, text and illustrations to prevent confusion. Also included in this section is a table containing a list of lubricants.
   (1) The subdivisions are separated according to airplane systems. This aids maintenance personnel in locating service information.

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LUBRICANTS - DESCRIPTION AND OPERATION

1. General

A. This section is designed to assist the operator in selecting recommended lubricants. For best results and continued trouble free service, use clean and approved lubricants.

B. For a list of recommended lubricants, refer to Recommended Lubricants Table.

2. Lubrication Service Notes

A. Lubricant Application.
(1) Cleanliness is essential to good lubrication. Lubricants and dispensing equipment must be kept clean. Use only one lubricant in a grease gun or oil can.
(2) Store lubricants in a protected area. Containers should be closed at all times when not in use.
(3) Wipe grease fittings and areas to be lubricated with clean, dry cloths before lubricating.
(4) When lubricating bearings which are vented, force grease into fitting until old grease is extruded.
(5) After any lubrication, clean excess lubricant from all but actual working parts.
(6) All sealed or prepacked antifriction bearings are lubricated with grease by the manufacturer and require no further lubrication.
(7) Friction bearings of the porous, sintered type are prelubricated. An occasional squirt can oiling of such bearings with general purpose oil (MIL-PRF-7870) extends its service life.
(8) Lubricate unsealed pulley bearings, rod ends, pivot end hinge points and any other friction point obviously needing lubrication, with general purpose oil (MIL-L- 7870).
(9) Paraffin wax rubbed on seat rails will ease sliding the seats fore and aft.
(10) Do not lubricate roller chains or cables except under sea coast conditions. Wipe with a clean, dry cloth.
(11) All piano hinges may be lubricated using (PG) powdered graphite (SS-G-659) when assembly is installed.
(12) Lubricate door latching mechanism with MIL-PRF-81322 general purpose grease, applied sparingly to friction points, if binding occurs. No lubrication is recommended on the rotary clutch.

3. Definition of "As Needed"

A. In the following sections, time requirements for lubrication are presented in one of two formats. When specific time intervals for lubrication exist, those intervals are defined in Chapter 5, Inspection Time Limits. When no time limit has been established, lubrication is on an "as needed" basis. This leaves much of the decision making process in the hands of the airframe and powerplant mechanic, who has been trained to make these types of decisions.

B. In an effort to standardize the decision making process, the following guidelines may be considered to determine if a component needs lubrication. Any one of the following conditions would indicate a need for lubrication, and may additionally indicate the need for inspection:
(1) A visual inspection which indicates dirt or wear residue near the movement contact area.
(2) An audible inspection which indicates squeaks, grinding or other abnormal sounds.
(3) A tactile (touch and feel) inspection which indicates jerky or restricted movement throughout portions of the travel range.

4. Recommended Lubricants Table

NOTE: Equivalent substitutes may be used for the following items:

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Table 1. Recommended Lubricants

SYMBOL	PROCUREMENT SPECIFICATION	LUBRICANT DESCRIPTION	PRODUCT PART NUMBER	SUPPLIER
GR	MIL-PRF-81322	Grease, wide temperature range.	Mobil-grease 28	Mobil Oil Corp. 150 E. 42nd Street New York, NY 10017
			Royco 22C	Royal Lubricants Co., Inc. River Road East Hanover, NJ 07936
			Aeroshell grease 22	Shell Oil Co. One Shell Plaza Houston, TX 77001
GH	MIL-PRF-23827	Grease, aircraft and instrument, gear and actuator screw.	Southwest Grease 16215	Southwest Petro- Chem, Inc. Division - Witco 1400 S. Harrison Olathe, KS 66061
			Aeroshell grease 7	Shell Oil Co.
			Royco 27A	Royal Lubricants Co., Inc.
			Supermil grease No. A72832	Amoco Oil Co. 200 East Randolph Dr. Chicago, IL 60601
			Braycote 6275	Burmah-Castrol, Inc. Bray Products Div. 16815 Von Karman Ave. Irving, CA 92714
			Cas-trolease A1	Burmah-Castrol, Inc.
			TG-11900 low temp grease EP	Southwest Petro-Chem,Inc.
			Brayco 885	Brumah-Castrol, Inc.
OG	MIL-PRF-7870	Oil, general purpose	Royco 363	Royal Lubricants Co., Inc.
OG (Cont.)	MIL-PRF-7870	Oil, general purpose	Petrotect 7870A	Penreco 106 South Main Street Butler, PA 16001
			Windsor lube L-1018	Anderson Oil & Chemical Co., Inc. Portland, CT 06480
			Octoil 70	Octagon Process, Inc. 596 River Road Edgewater, NJ 07020

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Table 1. Recommended Lubricants (continued)

SYMBOL	PROCUREMENT SPECIFICATION	LUBRICANT DESCRIPTION	PRODUCT PART NUMBER	SUPPLIER
PL	VV-P-236	Petrolatum technical		Available Commercially
PG	SS-G-659	Powdered Graphite		Available Commercially
GL	MIL-G-21164	High and Low Temperature Grease	Everlube 211-G Moly Grease	E/M Corporation Box 2200 Highway 52 N.W. West Lafayette, IN 47906
			Royco 64	Royal Lubricants Co., Inc.
GP	NONE	Number 10 weight, non-detergent oil		Available Commercially
OL	VV-L-800	Light Oil		Available Commercially
		Grease, general purpose	U000992	Cessna Aircraft Co. 1 Cessna Blvd. Wichita, Ks 67277-7704

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BATTERY TERMINALS - SERVICING

1. General

A. It is recommended the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Battery Terminal Lubrication

A. Battery terminals should be lubricated when cables are installed to terminals.

B. Refer to Figure 301 for lubrication requirements of the battery terminals.

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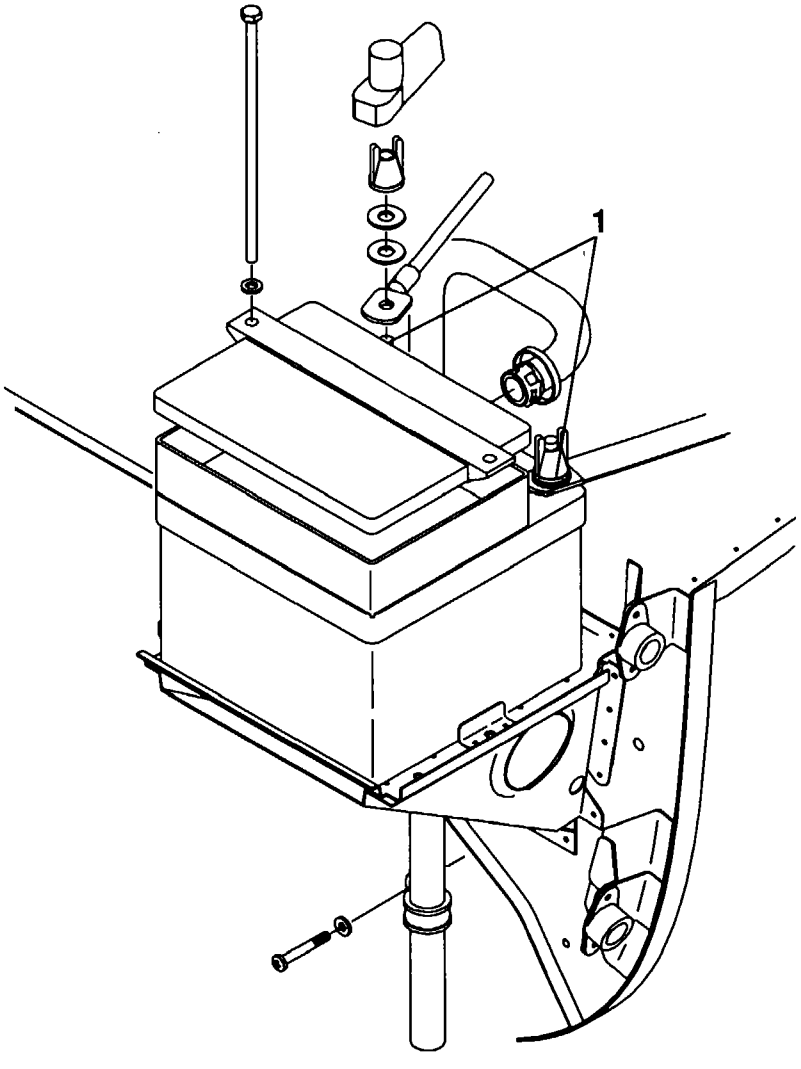

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	BATTERY TERMINALS	PL	HAND

PL - GREASE, PETROLATUM - VV - P-236

0518T1023

Battery Terminals Lubrication
Figure 301 (Sheet 1)

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LANDING GEAR AND PARKING BRAKE - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Wheel Bearing Lubrication

A. Wheel bearings should be lubricated every 100 hours.

WARNING: WHEN CLEANING WHEEL BEARINGS, USE LOW PRESSURE SHOP AIR TO DRY BEARINGS. DO NOT SPIN BEARING CONES WITH COMPRESSED AIR. DRY BEARINGS WITHOUT LUBRICATION MAY EXPLODE AT HIGH RPM.

B. Refer to Figure 301 for lubrication requirements of the wheel bearings.

3. Nose Gear Torque Link Lubrication

A. Nose gear torque links should be lubricated every 50 hours.

B. Refer to Figure 301 for lubrication requirements of the nose gear torque links.

4. Shimmy Dampener Pivots Lubrication

A. Shimmy dampener pivots should be lubricated on an "as needed" basis and when assembled or installed.

B. Refer to Figure 301 for lubrication requirements of the shimmy dampener pivots.

5. Steering System Needle Bearing Lubrication

A. Steering system needle bearings should be lubricated on an "as needed" basis and when assembled or installed.

B. Refer to Figure 301 for lubrication requirements of the steering system needle bearings.

6. Nose Gear Steering Pushrods Lubrication

A. Nose gear steering pushrods should be lubricated every 100 hours using OG lubricant applied with an oil can.

7. Parking Brake Handle Shaft Lubrication

A. The parking brake handle shaft should be lubricated on an "as needed" basis and when assembled or installed.

B. Refer to Figure 301 for lubrication requirements of the parking brake handle shaft.

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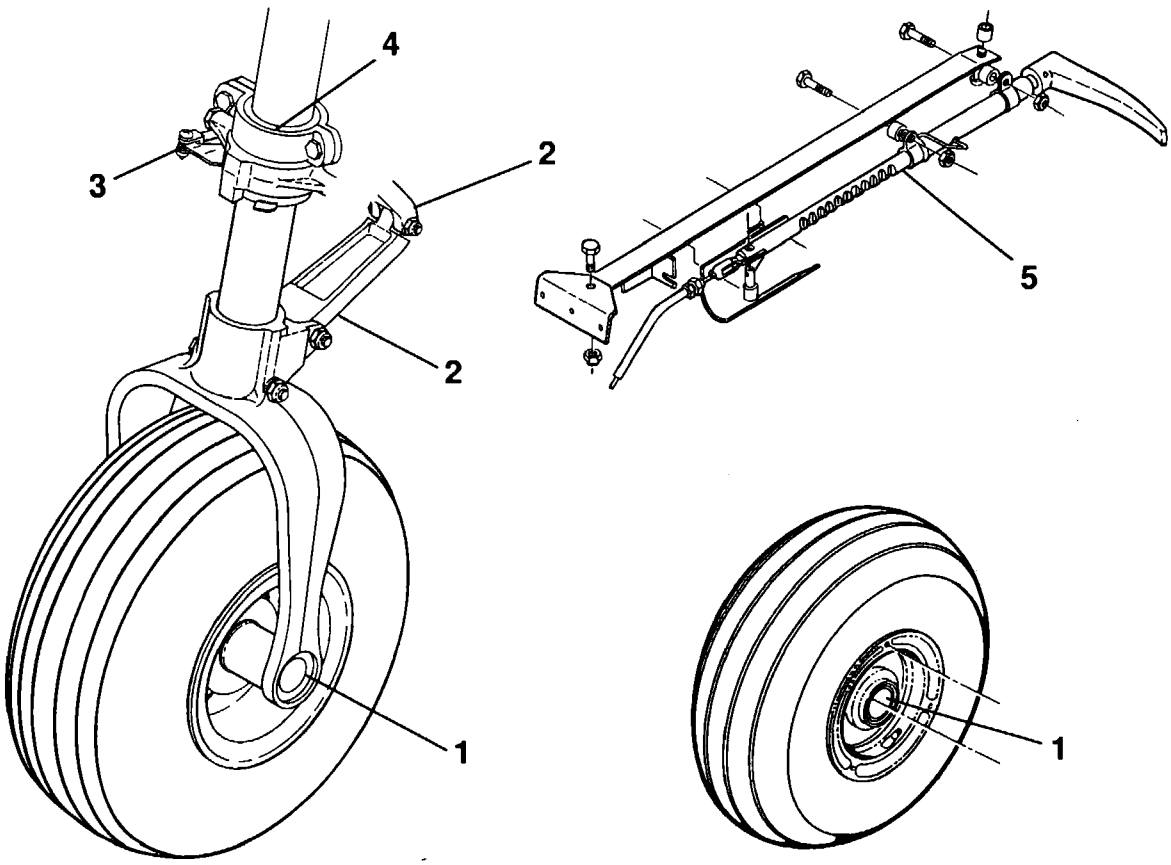

NOSE GEAR MAIN GEAR

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	WHEEL BEARINGS	GR	HAND
2	TORQUE LINKS	GR	GUN
3	SHIMMY DAMPER PIVOTS	OG	OIL CAN
4	NEEDLE BEARINGS	GR	HAND
5	PARKING BRAKE HANDLE SHAFT	OG	OIL CAN

GR - GREASE, GENERAL PURPOSE - (MIL-G-81322)
OG - OIL, GENERAL PURPOSE - (MIL-L-7870)

0542T2001
0514T3001
0541T3001

Landing Gear Lubrication
Figure 301 (Sheet 1)

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FLIGHT CONTROLS - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Aileron System Lubrication

A. Bearings in the control column should be lubricated on an "as needed" basis and when assembled or installed.

B. Piano hinges on the ailerons should be lubricated on an "as needed" basis and when assembled or installed.

C. Needle bearings on the aileron bellcrank should be lubricated every 1,000 hours.

D. Rod end bearings on the aileron bellcrank should be lubricated every 1,000 hours.

E. Refer to Figure 301 for lubrication requirements of the aileron system.

3. Flap System Lubrication

A. Flap motor screw jack threads should be lubricated every 100 hours. To lubricate the jack screw, operate flaps to full down position, clean screw threads with solvent rag, dry with compressed air and lubricate per Figure 302.

NOTE: It is not necessary to remove actuator from airplane to clean or lubricate threads.

B. Needle bearings should be lubricated on an "as needed" basis and when assembled or installed.

C. Refer to Figure 302 for lubrication requirements of the flap system.

4. Elevator System Lubrication

A. Bearings in the trim wheel controls should be lubricated on an "as needed" basis and when assembled or installed.

B. Trim tab piano hinges should be lubricated on an "as needed" basis and when assembled or installed.

C. The trim tab actuator should be lubricated on an "as needed" basis". If trim tab inspection reveals excessive free play, the first item of recourse should be to lubricate and remeasure. Lubrication is accomplished by unscrewing the jackscrew and applying lubricant to the internal portion of the actuator. This lubrication may bring free play back with limits. If not, actuator should be overhauled.

NOTE: Carefully count and record the number of turns required to remove jackscrew from actuator. Upon reassembly, the jackscrew should be threaded into the actuator using exactly the same number of turns as recorded during disassembly.

D. Refer to Figure 303 for lubrication requirements of the elevator system.

5. Rudder System Lubrication

A. The rudder bar bearings and linkage point pivots should be lubricated on an "as needed" basis and when assembled or installed.

B. Refer to Figure 304 for lubrication requirements of the rudder system.

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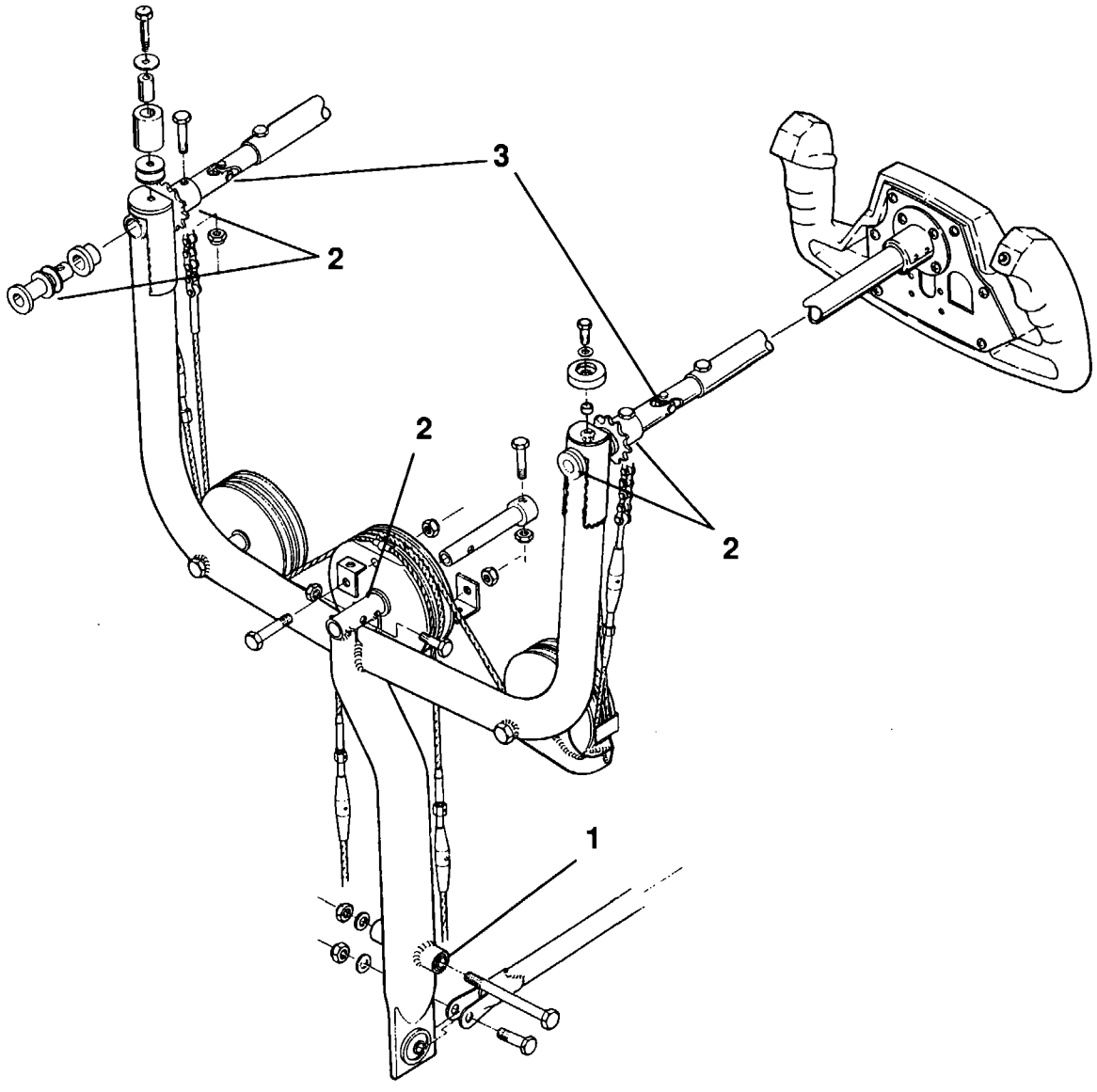

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	NEEDLE BEARINGS	GR	HAND
2	BUSHINGS AND OILITE BEARINGS	OG	OIL CAN
3	CONTROL TUBE UNIVERSAL JOINTS	OG	OIL CAN

0560T3001

Aileron System Lubrication
Figure 301 (Sheet 1)

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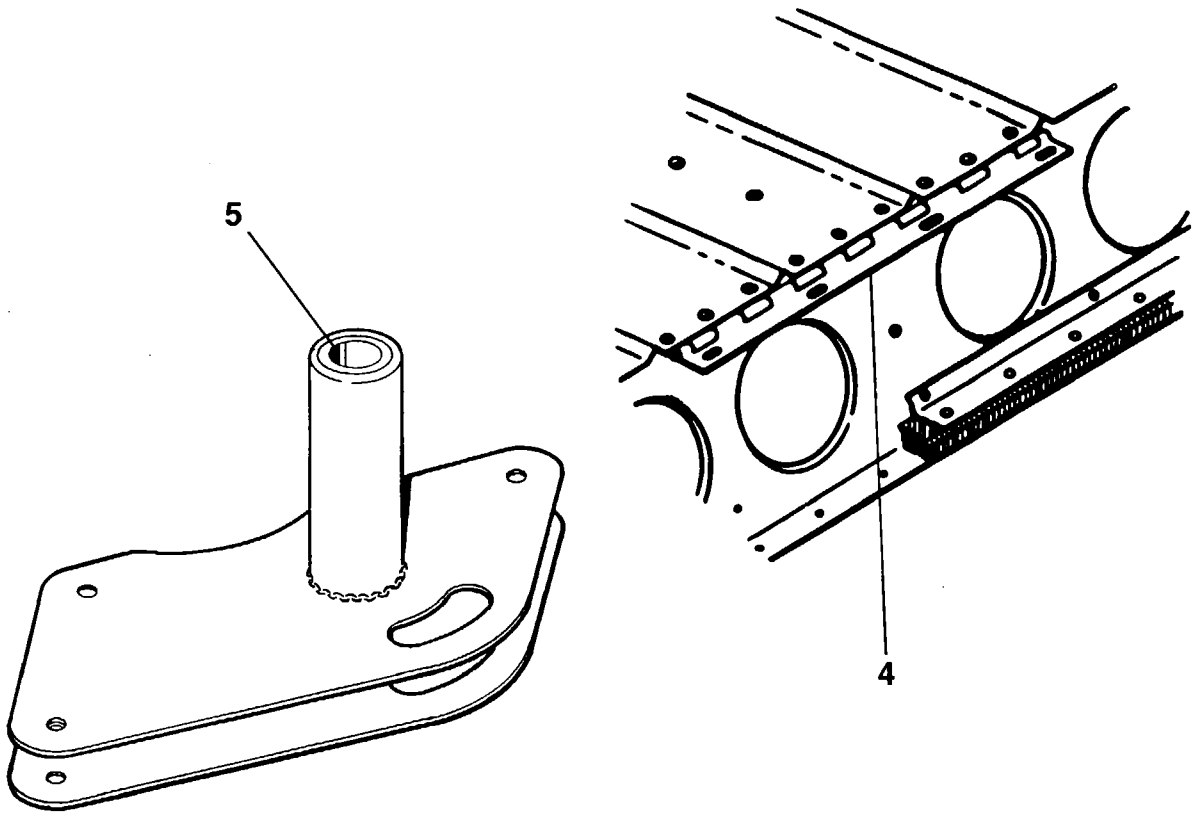

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
4	ALL PIANO HINGES	PG	SYRINGE
5	BELLCRANK NEEDLE BEARINGS	GR	HAND

GR - GREASE, GENERAL PURPOSE - (MIL-G-81322)
OG - OIL, GENERAL PURPOSE - (MIL-L-7870)
PG - POWDERED GRAPHITE - (SS-G-659)

0561T1002
0561T1001

Aileron System Lubrication
Figure 301 (Sheet 2)

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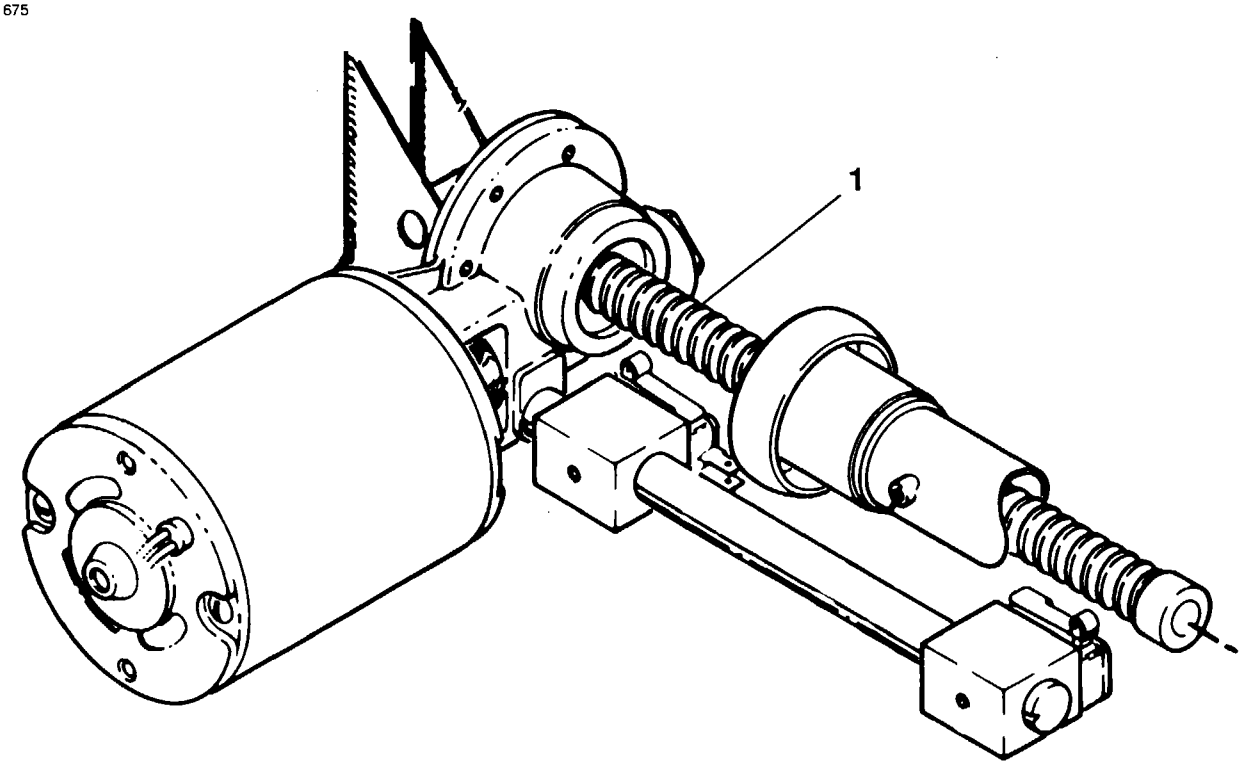

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	SCREW JACK THREADS	GP	OIL CAN

GP - OIL, NO. 10 WEIGHT, NONDETERGENT

0564T2003

Flap System Lubrication
Figure 302 (Sheet 1)

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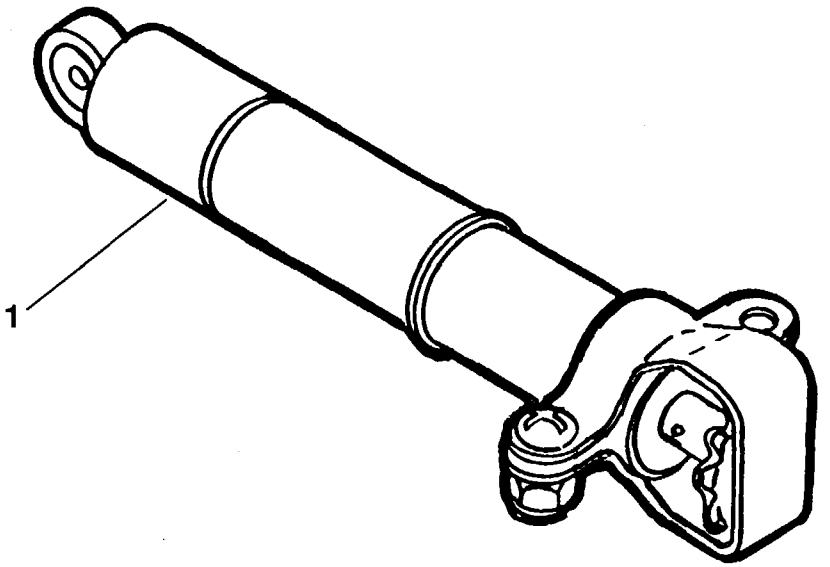

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICAITION
1	ELEVATOR TRIM TAB ACTUATOR	GL	HAND

GL - MOLYBDENUM DISLULFIDE GREASE - (MIL-G-21164)

0563T1004

Elevator Trim Lubrication
Figure 303 (Sheet 1)

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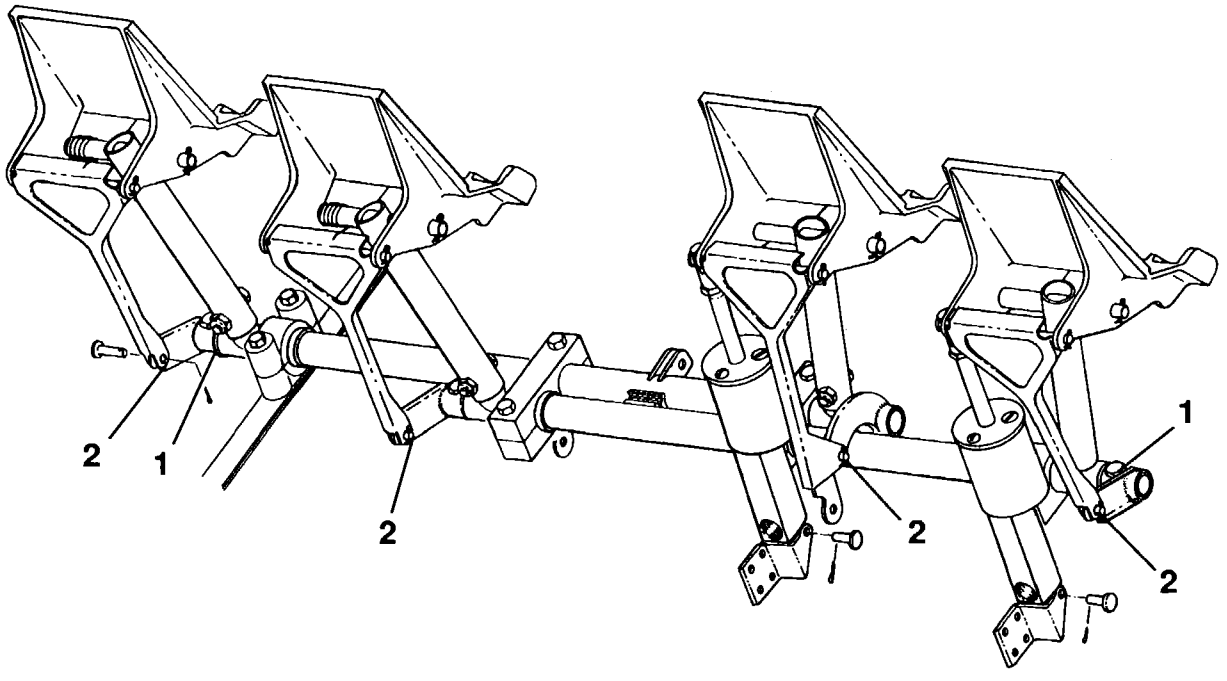
B1677



ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	OILITE BEARING (RUDDER BAR ENDS)	OG	OIL CAN
2	ALL LINKAGE PIVOT POINTS	OG	OIL CAN

OG - OIL, GENERAL PURPOSE - (MIL-L-7870)

0562T2002

Rudder Pedals Lubrication
Figure 304 (Sheet 1)

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ENGINE CONTROL CABLES - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Engine Control Cables Lubrication

A. All housed, pull-type, push-pull or vernier controls should have each outer housing lightly lubricated internally with VV-L-800 General Purpose Lube Oil.

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HEATING AND VENTILATION CONTROL CABLES - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Heating And Ventilation Control Cables Lubrication

A. All housed, pull-type, push-pull or vernier controls should have each outer housing lightly lubricated internally with VV-L-800 General Purpose Lube Oil.

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AIRPLANE EXTERIOR - CLEANING/PAINTING

1. General

A. The airplane should be washed frequently in order to maintain its appearance and minimize corrosion. The painted area of the airplane should be polished at periodic intervals to remove chalking paint and restore its gloss.

B. Water/detergent cleaning is the preferred method to clean the exterior surface of the airplane.

2. Precautions

A. Read and adhere to all manufacturers instructions, warnings and cautions on the cleaning/solvent compounds used.

B. Do not use silicone based wax to polish the airplane exterior. Silicone based wax, especially if buffed to produce a high shine, will contribute to the build up of P-static.

C. Do not park or store airplane where it might be subjected to direct contact with fluid or vapors from methanol, denatured alcohol, gasoline, benzene, xylene, methyl n-propyl ketone, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers or other types of solvents.

D. Do not leave sun visors up against windshield when not in use. The reflected heat from these items causes elevated temperatures on the windshield. If solar screens are installed on the inside of the airplane, ensure they are the silver appearing, reflective type.

3. Preventive Maintenance

A. Keep all surfaces of windshields and windows clean.

B. If desired, wax acrylic surfaces.

C. Carefully cover all surfaces during any painting, powerplant cleaning or other procedure that calls for use of any type of solvent or chemical. Table 701 lists approved coatings for use in protecting surfaces from solvent attack.

Table 701. Approved Protective Coatings

NAME	NUMBER	MANUFACTURER	USE
Spray	MIL-C-6799, Type 1, Class II	Available Commerically	Protect surfaces from solvents.
Masking Paper	WPL-3	Champion Intl. Corp. Forest Product Division 7785 Bay Meadows Way Jacksonville, FL 32256	Protect surfaces from solvents.
Poly-Spotstick	SXN	Champion Intl. Corp.	Protect surfaces from solvents.
Protex 40		Mask Off Company 345 Marie Avenue Monrovia, CA	Protect surfaces from solvents.

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4. Windshield and Window Cleaners

CAUTION: Do not use gasoline, alcohol, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, deicer fluid, lacquer thinner or glass window cleaning spray. These solvents will soften and craze the plastic.

NOTE: Equivalent substitutes may be used for the following items:

Table 702. Windshield and Window Cleaners/Polishers

NAME	NUMBER	MANUFACTURER	USE
Mild soap or detergent (hand dishwashing type without abrasives)		Commercially Available	Cleaning windshields and windows.
Aliphatic Naphtha Type II	Federal Specification TT-N-95	Commercially Available	Removing deposits which cannot be removed with mild soap solution on acrylic windshields and windows.
Turtle Wax (paste)		Commercially Available	Waxing acrylic windshields and windows.
Permatex Plastic Cleaner No. 403D	Federal Specification P-P-560	Permatex Company, Inc. Kansas City, KS 66115	Waxing acrylic windshields and windows.
Soft cloth (cotton flannel or cotton terry cloth)		Commercially Available	Applying and removing wax and polish.

5. Cleaning Windshield and Windows

CAUTION: Windshields and windows are easily damaged by improper handling and cleaning techniques.

CAUTION: Do not use any of the following for cleaning windshields and windows: methanol, denatured alcohol, gasoline, benzene, xylene, methyl n-propyl ketone, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays.

A. Refer to Table 702 for cleaning materials.

B. Windshield Cleaning Procedures.
   (1) Place airplane inside hanger or in shaded area and allow to cool from heat of sun's direct rays.
   (2) Using clean (preferably running) water, flood surface. Use bare hands with no jewelry to feel and dislodge any dirt or abrasive materials.
   (3) Using a mild soap or detergent (such as dish washing liquid) in water, wash surface. Again use only bare hands to provide rubbing force. (A clean cloth may be used to transfer soap solution to surface, but extreme care must be exercised to prevent scratching surface.)
   (4) On acrylic windshields and windows only, if soils that cannot be removed by a mild detergent remain, Type II aliphatic naphtha applied with a soft clean cloth may be used as a cleaning solvent. Be sure to frequently refold cloth to avoid redepositing soil and/or scratching windshield with any abrasive particles.

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(5) Rinse surface thoroughly with clean fresh water and dry with a clean cloth.

6. Waxing and Polishing Windshield and Windows

CAUTION: Do not use rain repellent on acrylic surfaces.

NOTE: Windshields and windows must be cleaned prior to application of wax. When applying and removing wax and polish, use a clean soft cloth.

A. Refer to Table 702 for polishing materials.

B. Hand polishing wax (or other polish meeting Federal Specification P-P-560) should be applied to acrylic surfaces. The wax has an index of refraction nearly the same as transparent acrylic and tends to mask any scratches on windshield surface.

7. Aluminum Surfaces

A. Aluminum surfaces require a minimum of care, but should never be neglected. The airplane may be washed with clean water to remove dirt and may be washed with non alkaline grease solvents to remove oil and/or grease. Household type detergent soap powders are effective cleaners, but should be used cautiously, since some of them are strongly alkaline. Many good aluminum cleaners, polishes and waxes are available from commercial suppliers of airplane products.

8. Painted External Surfaces

CAUTION: Do not let solvents come in contact with the external graphics. The external graphics can be easily damaged by contact with solvents. For care and cleaning of the external graphics, refer to Chapter 12, Exterior Graphics - Maintenance Practices.

A. Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which could cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

B. To seal any minor surface chips or scratches and protect against corrosion, the airplane should be waxed regularly with a good automotive wax applied in accordance with the manufacturer's instructions. If the airplane is operated in a seacoast area or other salt water environment, it must be washed and waxed more frequently to assure adequate protection. Special care should be taken to seal around rivet heads and skin laps, which are the areas susceptible to corrosion. A heavier coating of wax on the leading edges of the wings and tail and on the cowl nose cap and propeller spinner will help reduce the abrasion encountered in these areas. Reapplication of wax will generally be necessary after cleaning with soap solutions or after chemical deicing operations.

9. Engine and Engine Compartment Washing

A. Notes and Precautions.
(1) An engine and accessories wash down should be accomplished during each 100 hour inspection to remove oil, grease, salt corrosion or other residue that might conceal component defects during inspection. Also, periodic cleaning can be very effective In preventive maintenance.
(2) When working with cleaning agents, protective devices (rubber gloves, aprons, face shields, etc...) should be worn. Use the least toxic of available cleaning agents that will satisfactorily accomplish the work.
(3) All cleaning operations should be performed in a well ventilated work area.
(4) Adequate fire fighting and safety equipment should be available.

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WARNING: Do not smoke or expose a flame within 100 feet of the cleaning area.

(5) Compressed air, if used to apply solvent or to dry components, should be regulated to lowest practical pressure.
(6) Use of a stiff bristle brush (as opposed to a steel brush) is recommended if cleaning agents do not remove excess grease and grime during spraying.

B. Cleaning Procedures.
(1) Remove engine cowling.
(2) Carefully cover the coupling area between vacuum pumps and engine drive shafts so no cleaning solvent can reach coupling or seal.
(3) Cover open end of the vacuum discharge tubes.
(4) If engine is contaminated with salt or corrosive chemicals, first flush engine compartment with fresh water.

CAUTION: Do not use gasoline or other highly flammable substances for wash down.

CAUTION: Do not attempt to wash an engine which is still hot or running. Allow engine to cool before cleaning.

CAUTION: Care should be exercised to not direct cleaning agents or water streams at openings on the starter, magnetos, alternator or vacuum pump.

(5) Apply solvent or cleaning agent to engine compartment. The following solutions (or their equivalent) can be used to satisfactorily clean the engine compartment:
(a) Stoddard Solvent (Specification P-D-680, Type II).
(b) Water alkaline detergent cleaner (MIL-C-25769 mixed 1 part cleaner, with 2 to 3 parts water and 8 to 12 parts Stoddard Solvent).
(c) Solvent based emulsion cleaner (MIL-C-4361 mixed 1 part cleaner with 3 parts Stoddard Solvent).
(6) After applying solvent, thoroughly rinse with clean warm water.

NOTE: Cleaning agents should never be left on engine components for an extended period of time. Failure to remove them may cause damage to components such as neoprene seals and silicone fire sleeves, and could cause additional corrosion.

(7) Completely dry engine and accessories using clean, dry compressed air.
(8) Remove protective cover over coupling area.
(9) Remove protective cover from vacuum discharge tube.
(10) If desired, engine cowling may be washed with the same cleaning agents, then rinsed thoroughly and wiped dry. After cleaning engine, relubricate all control arms and moving parts as required.
(11) Reinstall engine cowling.

WARNING: Ensure magneto switches are off, throttle is closed, mixture control is in the idle cutoff position, and the airplane is secured before rotating propeller by hand. Do not stand within arc of the propeller blades while turning propeller.

(12) Before starting engine, rotate propeller by hand no less than four complete revolutions.

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10. Propeller

A. The propeller should be wiped occasionally with an oily cloth to remove grass and bug stains. In salt water areas, this will assist in corrosion proofing the propeller.

11. Tires and Wheels

A. Remove oil, grease, and mud from tires and wheels with soap and water.

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AIRPLANE INTERIOR - CLEANING/PAINTING

1. General

A. Airplane Interior - Cleaning/Painting gives procedures for different types of cleaning agents and cleaning procedures for the interior of the airplane.

2. Interior Cleaning Materials

NOTE: Equivalent alternatives can be used for the items that follow.

NAME	NUMBER	MANUFACTURER	USE
Son Of A Gun		Commercially available	To give protection for interior components (does not include fabric materials).
Fantastic		Commercially available	To general purpose clean interior components and recommended to clean Morbern vinyl.
Aliphatic Naphtha	TT-N-95	Commercially available	To remove tar, asphalt, etc., from interior.
Rug Shampoo		Commercially available	To clean carpet.
Perchloroethylene Cleaning Solvent		Commercially available	To spot clean carpet and seats.
Stoddard Solvent		Commercially available	To clean nylon safety belts.
Ivory Liquid (White or colorless)		Commercially available	To clean seat fabric.
Cheer		Commercially available	To clean seat fabric.
Mr. Clean		Commercially available	Recommended to clean Morbern vinyl.

3. To Clean Interior Panels

A. Interior panels are made of a heavy vinyl and can have a softer Morbern vinyl cover. You can clean the interior panels with a mild detergent solution or with pre-mixed commercial cleaners. You can remove contamination that is not easily removed with aliphatic naphtha. Make sure the cleaners will work on the interior without damge. If it is not sure that the cleaner will cause damage to the interior, apply a small quantity of cleaner to a not visible location and do a test to see if it will cause damage.

4. To Clean Carpet

A. The carpet is made of a polypropylene weave put together with a fire retardant backing. The polypropylene gives stain resistant qualities and normally only minimal maintenance is required.

B. If the carpet becomes contaminated, it can be cleaned with a commercially available carpet cleaning agent.

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5. To Clean Seats

A. Fabric seats of the 172R and some 172S are made of a flame retardant Trevira polyester fiber and have fire-retardant and stain-resistant properties. You must clean the seats regularly. Contamination and stains must be cleaned up immediately and the fabric cleaned before the stains set up in the fabric.

B. Table 701 (Procedures to Clean Trevira Fabric on Seats) and Table 702 (Procedures to Clean Morbern Vinyl on Cabin Panels) are given to help in stain removal. The tables have two columns; one with the stain and the other with the procedure to remove the stain. For example, coffee and tea stains are removed with processes 2, 4, 5 and 1. The first step is the application of process 2 (dishwashing liquid with warm water) to the stain. The second step is the application of process 4 (vinegar and water) to the stain. The third step is the application of process 5 (laundry powder and warm water followed by blotting) to the stain. The final step is the application of process 1 (dry cleaning solvent applied to the stain).

Table 701. Procedures to Clean Trevira Fabric on Seats

STAIN	PROCESS/SEQUENCE	STAIN	PROCESS/SEQUENCE
Antacid (Maalox)	1	Infant Formula	2,1
Betadine (Iodine)	2,3,4,6	Ink (ball point)	8
Blood	2,3,5	Motor Oil	1,2,3,4
Catsup	2,3,5	Mud	2,1
Chewing Gum	7,1,2	Petroleum Jelly	1,2
Chocolate Syrup	5,1	Pepto Bismol	6,1
Coffee/Tea	2,4,5,1	Urine	2,3,4
Cola	2,3,4	Suntan Lotion	1,2
Cough Syrup	2	Shoe Polish	1,2,3
Egg	2,3,5,1	Vomit	2,3,4,5
Grape Drink	2,3,4,5	Wax	7,1
Ice Cream	2,3,4,5,1		

1. Apply a small quantity of dry cleaning solvent to the stain. Do not smoke or use near an open flame. Use sufficient airflow.
2. Mix one teaspoon of white or colorless dishwashing liquid with a cup of lukewarm water.
3. Mix one tablespoon of household ammonia with half a cup of water.
4. Mix one part household vinegar with two parts water.
5. Mix a solution of laundry powder with water and leave on the stain according to the label directions. Flush with warm water and wipe dry.
6. Mix one part household bleach with nine parts water. Use a dropper to apply the solution to the stain. Flush with water and wipe dry.
7. Chill area with an ice cube wrapped in a plastic bag. Remove the gum or wax from the surface of the fabric.
8. Apply a small quantity of rubbing alcohol to the ink stain and blot to remove the ink. Continue until the ink is removed.

NOTE: All solutions must be cool when applied to the stain. Heat from the solutions will permanently set the stain.

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Table 702. Procedures to Clean Morbern Vinyl on Cabin Panels

STAIN	PROCESS/SEQUENCE	STAIN	PROCESS/SEQUENCE
Blood	4	Mud	3,6
Candy, Ice Cream	14,6	Mustard	3,12,8,6
Chewing Gum	11,6	Paint, Latex	9,6
Crayon	3,12,8,6	Paint, Oil base	2,3
Fruit Stains	14,6	Shoe Polish	13,6
Ink (ballpoint)	1	Soft Drinks	14,6
Ketchup	3,12,8,6	Surface Mildew	8,6
Lipstick, Eyeshadow	13,6	Tar, Asphalt	10,3
Liquor, Wine	14,6	Urine	7,6
Motor Oil, Grease	13,6	Vomit	5,6

1. Apply a small quantity of rubbing alcohol to the ink stain and blot to remove the ink. Continue until the ink is removed.
2. Turpentine in a well ventilated area will remove fresh paint. Dried paint must be moistened carefully with a semi-solid gel-type stripper so that the softened paint can be gently scraped away.

CAUTION: Direct contact with paint strippers will remove the print pattern from vinyl. Paint strippers are very corrosive. Be careful to avoid skin and eye contact. Wear safety equipment, if applicable.

3. Flush with mild soap and water.
4. Rub out any spots with a clean cloth soaked in cool water. If spots remain, use household ammonia and flush with a clean, wet cloth.
5. Sponge the stained area with soapy water that contains diluted bleach until the stain is removed.
6. Flush thoroughly with clean, cool water.
7. Sponge with soapy water that contains a small quantity of household ammonia.
8. Wash with diluted bleach and use a soft brush for difficult stains.
9. Fresh paint can be wiped off with a damp cloth. Hot, soapy water will normally remove dried latex.
10. Remove immediately, as prolonged contact will result in a permanent stain. Use a cloth lightly dampened with mineral spirits or kerosene and rub the stain gently. Work from the outer edge of the stain towards the center in order to prevent the spread of the stain.
11. Scrape off as much as possible with a dull knife. Rub with an ice cube to help make it easier to remove the gum. The remaining gum can then be removed in a well ventilated area with a cloth saturated with mineral spirits. Rub lightly.
12. Flush with a mild detergent and water.
13. Apply a small quantity of mineral spirits with a clean soft cloth. Rub gently. Be careful to not spread the stain. Remove shoe polish as soon as possible, as it contains a dye which will cause a permanent stain.
14. Flush thoroughly with clean, lukewarm water. Repeat as necessary. Scrape the area gently with a dull knife to remove any loose material. Any soiled area remaining after the area dries can be gently rubbed with a cloth spotted with a small quantity of alcohol.

NOTE: All solutions must be cool when applied to the stain. Heat from the solutions will permanently set the stain.

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6. To Clean the GDU 1040 Display Lens

NOTE: The Primary Flight Display (PFD) and Multi-Function Display (MFD) are the GDU 1040 displays in airplanes with Garmin G1000.

CAUTION: If possible, do not touch the lens. The GDU 1040 lens has a layer of anti-reflective material which is very sensitive to skin oils, waxes and abrasive cleaners.

CAUTION: Do not use cleaners that contain ammonia. Ammonia will cause damage to the anti-reflective material.

A. Clean the GDU 1040 Display Lens.
   (1) Use a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective material to clean the lens.

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EXTERIOR GRAPHICS - MAINTENANCE PRACTICES

1. General

A. This section gives general instructions for removal/installation and preservation for the exterior graphics (decals) on the airplane.

2. Tools and Equipment

NOTE: Equivalent alternatives can be used from the list of items that follows:

Table 201. Graphics Application Tools

NAME	NUMBER	MANUFACTURER	USE
Isopropyl Alcohol	None	Commercially Available	To prepare airplane surface for graphics application.
Sharpline Primer	None	Sharpline Converting Inc. 1520 S. Tyler Road Box 9608 Wichita, KS 67277	To give additional adhesion of graphics to the airplane around the rivet heads.
Desothane	CA 8000/ B900B	PRC-DeSoto International 5454 San Fernando Road Glendale, CA 91209 Phone: (818) 240-2060	To seal the edge of a graphic.
Primer Remover	Acti-Sol	Sharpline	To remove the primer.
Dense, closed cell foam block	1" X 2" X 2"	Fabricate Locally	To help apply graphics around rivets.
Needle	None	Commercially Available	To puncture air bubbles.
Artist's Paint Brush	None	Commercially Available	To apply the primer to the airplane.
Squeegee	None	Commercially Available	To help apply graphics to the flat surfaces.

NOTE: The table that follows gives a list of paint and related chemicals used on the airplane.

Table 202. Interior and Exterior Paint

NAME	NUMBER	MANUFACTURER	USE
Fuel Bay Primer	Conventional 454-4-1 Base	AKZO Nobel Aerospace Coatings East Water Street Waukegan, IL 60085	Epoxy primer for the inner surfaces of the wing fuel compartments.
Activator	CA109	AKZO Nobel Aerospace Coatings	Used with fuel tank epoxy primer (conventional).
Fuel Bay Primer	High Solids 10P30-5 Base	AKZO Nobel Aerospace Coatings	Epoxy primer for the inner surfaces of the wing fuel compartments.

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Table 202. Interior and Exterior Paint (continued)

NAME	NUMBER	MANUFACTURER	USE
Activator	EC275	AKZO Nobel Aerospace Coatings	Used with fuel tank epoxy primer (high solids).
Thinner	TR115	AKZO Nobel Aerospace Coatings	Used with fuel tank epoxy primer (high solids).
Overall Primer/Sealer (Note 1)	483-928	Sherwin Williams 16116 E. 13th St. Wichita, KS 67230	Applied to the airplane before topcoat.
Hardener	120-828	Sherwin Williams	Used with Sherwin Williams primer/sealer.
Overall Primer (Note 2)	G2HC 4175	Omega Coatings Corporation PO Box 1319 El Dorado, KS 67042	Applied to the airplane before topcoat.
Hardener	G2HE0175	Omega Coatings Corporation	Used with Omega primer/sealer.
Topcoat (Note 3)	830 Series High Solids Acry Glo Color Code AO-150 (Matterhorn White)	Sherwin Williams	Topcoat overall color.
Hardener	830-081	Sherwin Williams	Used as a catalyst for Acry Glo.
Accelerator	830-H18	Sherwin Williams	Decrease cure time of Acry Glo.
Topcoat (Note 4)	AF3102 Imron High Solids (Matterhorn White)	Du Pont Du Pont Performance Coatings Willmington, DE 19898	Topcoat overall color.
Activator	194S	Du Pont	Used as a catalyst for AF3102 Imron.
Reducer	2165S	Du Pont	Used as a reducer for AF3102 Imron.
Pot Life Extender	TP31124	Du Pont	Extends potlife for AF3102.
Wash Primer	728-014	Sherwin Williams	Treatment of surfaces before the application of primer.

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Table 202. Interior and Exterior Paint (continued)

NAME	NUMBER	MANUFACTURER	USE
Adduct	702-701		
Heat Resistant Enamel (Gray)	521-520	Sherwin Williams	Engine mount and engine mount hardware in engine compartment.
Cloth	Cheese cloth	Commercially available	Used with solvent to clean airplane exterior.

Note 1: This product is for airplanes manufactured before June 2002.

Note 2: This product is for airplanes manufactured after June 2002.

Note 3: This product is for airplanes manufactured before January 2004.

Note 4: This product is for airplanes manufactured after January 2004.

3. Graphics Removal/Installation

A. Remove the Graphics (Refer to Figure 201).

(1) If you install a new graphic, you must show reference marks on the airplane before you remove the old graphic. The reference marks will help to position the new graphic on the airplane.

CAUTION: Do not heat the airplane surface more than 250°F (121°C) or damage to the paint will result.

(2) Apply heat with a heat gun to the surface of the graphic.
(3) Carefully separate a corner of the graphic from the airplane.
(4) Apply primer remover between the graphic and airplane to loosen the adhesive-backed graphic. Refer to Table 201.

CAUTION: Do not pull the graphic out (perpendicular to surface) and away from the airframe. If you do not pull the graphic down (so it is parallel to the surface), you will remove paint from the airplane.

(5) Pull down on the graphic parallel to the surface with a firm, slow movement.
(6) Continue to apply primer remover to the glued side of the graphic as you remove the graphic from the airplane.
(7) Discard the old graphic.
(8) Use the primer remover to remove all adhesive from the airplane.
  (a) Make sure all adhesive is removed from areas around the rivet heads.

B. Install the Graphics (Refer to Figure 201).

CAUTION: Install graphics only after the exterior paint is cured. If the paint is not cured, solvents will be left in the film that can cause damage to the graphics.

NOTE: The center hinge method will help to correctly set in position the large graphics.

NOTE: The graphic has a protective backing (paper liner), the adhesive-backed graphic (decal), and a protective outer film.

(1) Use isopropyl alcohol and primer remover as necessary to clean the surface of the airplane. Refer to Table 201.
  (a) Make sure any amount of old adhesive is removed from the airplane surface.

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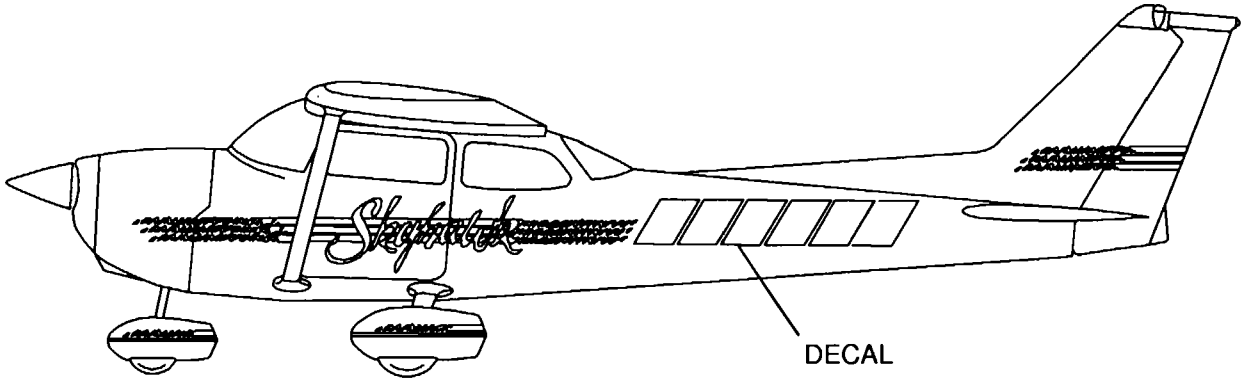

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Decal Application
Figure 201 (Sheet 1)

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(2) Apply Sharpline Primer on and around each rivet approximately 0.25 inch (6.35 mm) beyond the head with a small artist's paint brush. Let the primer dry for 15 minutes at 75°F (24°C).
(3) To help install large graphics, use reference marks from the old graphic and set the new graphic in position with a piece of masking tape installed vertically across the center of the graphic.

NOTE: The use of the masking tape set vertically across the center of the graphic is known as the center hinge method.

(4) Remove the paper liner from the back of the new graphic to show the adhesive. For large graphics that use the center hinge method, remove one half of the graphic paper liner.
(5) Apply the graphic to airplane.
  (a) Use the reference marks from the old graphic to position the new graphic on the airplane.
  (b) Use a squeegee to make sure that no wrinkles or bubbles show on the surfaces of the airplane. At the area where the graphic overlays on rivets, the graphic must be stretched over the rivet heads to prevent a wrinkle development.
  (c) The graphic must adhere to the top of the rivet and to the area around the airplane structure. Air that has been trapped around the base of the rivets will be removed in a later step.
(6) For large graphics that use the center hinge method, remove the second half of the graphic paper lining.
  (a) Use the reference marks from the old graphic to position the new graphic on the airplane.
  (b) Use a squeegee to make sure that no wrinkles or bubbles show on the surfaces of airplane. At the area where the graphic overlays on rivets, the graphic must be stretched over the rivet heads to prevent a wrinkle development.
  (c) The graphic must adhere to the top of the rivet and to the surrounding airplane structure. Air that has been trapped around the base of the rivets will be removed in a later step.
(7) Remove the premask (outer protective film) from the graphic when it has been fully applied to the airplane.
  (a) Use Desothane as an edge sealer to minimize graphic delamination and peel at the vinyl leading edges. Desothane must also be used to promote graphic adhesion where rivets are 0.25 inch (6.35 mm) from the vinyl edges.
(8) Remove any air bubbles from rivets in the steps that follow.
  (a) Puncture the air bubble 8 to 12 places around the rivet with a small needle.
  (b) Use a heat gun to warm the graphic and structure around each rivet to approximately 125°F (52°C).
  (c) Use a dense, closed cell foam block (Temperfoam or equivalent to work out all bubbles from around the rivet head).
(9) Use a needle to puncture any air bubbles from the flat areas of the graphic.
(10) Use a squeegee to smooth the graphic.
(11) When all bubbles have been removed, warm the full graphic for 10 minutes to 15 minutes at 125°F (52°C) to 130°F (54°C).
(12) Remove any primer with primer remover after the surface has cooled to room temperature.
(13) Trim the graphics to be flush with the areas of termination such as the doors and cowl.
(14) Adhesive cure time must be a minimum of 72 hours and recorded in the maintenance log.

4. Exterior Graphics Preservation

A. Clean the Exterior Graphics.

NOTE: The procedures that follow must be obeyed to make sure of the maximum service life for the graphic.

(1) Wash the graphic with soap and water.
(2) Rinse the graphic after you wash it.
(3) If you use a high pressure washer, keep the nozzle at least two feet from the edge of the graphic.
(4) Do not use acetone, methyl n-propyl ketone, toluene, paint thinner, lacquer thinner or other aromatic solvents to clean the graphic.
(5) Test other cleaning solutions on a small corner of the graphic before you use it.
(6) Do not overcoat the graphic with clear paint.

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(7) Do not let fuel spill on the graphics.
    (a) Wipe off and flush with water immediately if fuel spills on the graphics.
(8) Do not paint over the graphics.
(9) Do not apply wax over the graphics.

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UNSCHEDULED SERVICING - DESCRIPTION AND OPERATION

1. General

A. This section gives procedures and recommendations for normally unscheduled servicing.

B. Instructions are given in the Cold Soak procedures for operation of the airplane during very cold temperatures.

NOTE: During operation at outside air temperatures below International Standard Atmosphere (ISA) Standard, the engine can develop more than its rated power at normal-rated RPM. This occurs more at lower altitudes.

2. Extreme Weather Maintenance

A. Seacoast and Humid areas.
(1) In salt water areas, special care should be taken to keep engine, accessories, and airframe clean to help prevent oxidation.
(2) In humid areas, fuel and oil should be checked frequently and drained of condensation to prevent corrosion.

3. Cold Soak

A. If extended exposure to cold weather is expected, refer to this procedure to prepare the airplane for cold soak. If the airplane has cold soaked for more than two hours at temperatures colder than -10°C (14°F), refer to this procedure and the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual to prepare the airplane for flight.
(1) Cold temperatures have an effect on control cable tension. Refer to Chapter 27, Aileron Control System - Maintenance Practices, Elevator Control System - Maintenance Practices, Elevator Trim Control - Maintenance Practices, and Flap Control System - Maintenance Practices for flight control cable tensions.
(2) For information on lubrication and greasing of moving parts, refer to Chapter 12, Lubricants - Description and Operation.
(3) Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for the correct engine oil viscosity.
(4) Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for additional information on procedures for operation of the airplane in cold temperatures.

B. The engine must be preheated before an engine start when exposed to very cold temperatures. Preheat the engine as follows:
(1) Direct warm air into the engine cooling inlets behind the propeller.

CAUTION: Do not use air with a temperature of more than 120°C (248°F) when you preheat the engine. Air with a temperature of more than 120°C (248°F) can do damage to the exterior paint of the airplane.

(2) Make sure that the temperature of the warm air is no more than 120°C (248°F).

WARNING: Never bring open flames near the airplane. Use of a heater with an open flame to preheat the engine can cause damage to the airplane and injury to personnel.

(3) Do not use a heater with open flames to supply the warm air to preheat the engine.
(4) Preheat the engine before an engine start if the engine temperature is less than -6°C (20°F).

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(5) When the temperature is less than 0°C (32°F), preheat the engine to more than 0°C (32°F) before you start the engine again after an engine start and stop.

NOTE: When the temperature is less than 0°C (32°F), water from combustion can freeze to the engine spark plugs if the engine does not continue to operate after it is started. This will prevent the engine from starting again.

C. The Garmin GDU 1040 PFD/MFD requires warm-up time when exposed to very cold temperatures.
(1) A warm-up time of up to 30 minutes is necessary when the GDU is exposed to down to -40°C (-40°F) for an extended period.
(2) A warm-up time of up to 15 minutes is necessary when the GDU is exposed to down to -30°C (-22°F) for an extended period.

D. Before takeoff, preheat the airplane cabin to more than -30°C (-22°F) for correct operation of the standby altimeter.

NOTE: If there is no warning that an instrument is not operating correctly, all other instruments will operate continuously until at the minimum temperature of the airplane.

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CHAPTER

20

STANDARD PRACTICES - AIRFRAME

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STANDARD PRACTICES AIRFRAME - GENERAL

1. Scope

A. This Chapter describes standard maintenance practices and safety precautions applicable to all aspects of the airframe and related systems. Maintenance practices which are unique to a particular system or subject are described in the appropriate chapter and section in the maintenance manual.

B. For repairs beyond the scope of this manual, refer to the 1996 and On 100 Series Structural Repair Manual.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief definition of the subjects and sections incorporated in this chapter is as follows.

(1) The section on Material and Tool Cautions describes general cautions and warnings applicable to maintenance on or around the airplane.

(2) The section on Torque Data provides tables, formulas, requirements and torque limits for various type fasteners.

(3) The section on Safetying describes the proper methods and use of safety wire/lockwire, cotter pins and lock clip installations.

(4) The section on Solvents describes characteristics of solvents which are commonly used during maintenance, cleaning and inspection of various airframe and related components.

(5) The section on conversion data provides tables for converting english to metric measurements.

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MATERIAL AND TOOL CAUTIONS - DESCRIPTION AND OPERATION

1. Titanium

CAUTION: Do not use cadmium-plated tools on titanium parts. Cadmium particles can stay on such parts. The cadmium particles will cause an unwanted condition with the titanium when heated. The titanium part will become brittle in the area of the unwanted condition and make cracks.

CAUTION: Do not let cadmium-plated fasteners touch titanium parts.

2. Mercury

CAUTION: Do not use thermometers and other mercury-based test equipment on the airplane.

A. Corrosion Caused by Mercury.
   (1) There is no known procedure to stop corrosion when it has started.
   (2) Mercury can go into any crack in the finish, paint, or seal layer of a metal. An oxide layer on a dry metal surface will prevent corrosion. A bright surface, a polished surface, or a surface with scratches will increase the rate of corrosion.
   (3) Dirt, grease, or other contaminants that have no effect on the metal surfaces will help prevent corrosion.
   (4) The corrosion and the embrittlement caused by corrosion can be very fast in structural members.

3. Asbestos

WARNING: Do not let asbestos fibers make entry into the body of personnel. Asbestos fibers can cause injury or death.

A. Do not breathe the dust of asbestos fibers. To not breathe the dust of asbestos fibers, use either of the methods that follows.
   (1) Use engineering control, which includes work in a correctly filtered exhaust chamber. Use wet procedures to keep personnel exposure limits less than those recommended by the Occupational Safety Health Administration (OSHA).
   (2) Use breathing equipment with high quality filters. Other protection must include protective clothing, gloves and eye protection.

B. Refer to all local, state, and federal regulations to discard asbestos material.

4. Cadmium Plated Fasteners

CAUTION: Put a complete layer of fuel sealant on cadmium-plated fasteners that are used in fuel areas. Cadmium particles from cadmium-plated fasteners can cause damage to the engine.

5. Maintenance Precautions

WARNING: Obey the precautions during maintenance, repair, and service procedures of the airplane to prevent the risk of injury because of the different materials and environmental conditions.

A. Carefully read and follow all instructions.
   (1) Obey all cautions and warnings given by the manufacturer of the product that is used.
      (a) Use the applicable safety equipment such as goggles, face shields, breathing equipment, protective clothing and gloves.
   (2) Do not get dangerous chemicals in the eyes or on the skin.

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(3) Do not breathe the fumes of dangerous chemicals.
(4) Make sure the work area has good airflow and the applicable breathing equipment is used when composites or metals are sanded or work is done in an area where small particles can be made.

6. General Usage Solvents

A. Airplane maintenance procedures frequently use solvents. A solvent is a material, usually a liquid, that can break down another material. Solvents usually have no color, dry quickly, and give off fumes in high quantities. Examples of general use solvents are as follows:
- Methyl n-Propyl Ketone
- Toluene
- Isopropyl Alcohol
- Acetone
- Methylene Chloride
- 1,1,1 - Trichlorethane
- Naptha
- ASTM D4080

B. Solvents can cause injury or death. Solvents usually have no color, dry quickly, and give off fumes in high quantities. The fumes are usually heavier than air. The fumes can collect in low-level areas and push air out of the areas that are not ventilated. This can remove the supply of oxygen from the area.
(1) The solvent fumes are usually heavier than air.
(2) The solvent fumes can be breathed. Use applicable breathing equipment.
(3) Solvents can cause damage to the hands and the skin.
(a) Solvents dry out the skin and remove the natural oils. Damaged skin can cause other contamination to make the condition worse.
(b) The contamination has easier access to the lowest levels of the skin.
1 The human body can filter small amounts of solvents out of itself. This filtration function takes place in the liver. The liver receives blood which can be contaminated with solvents from both the lungs and the skin. If the quantities are low enough and not too frequent, the liver can filter out the contaminants. This is one of the scientific facts on which OSHA based its Permissible Exposure Limits. However, when exposures are constantly above these levels and extend for many years, the filter (liver) becomes clogged and the solvents can then have an unwanted effect on other parts/portions of the body.

C. Solvents are hazardous materials because of flammability. The rate of evaporation is related to flammability. The fumes are usually needed to ignite the liquid. Any ignition source can ignite solvent fumes. The low flash point of the solvent shows that the solvent can ignite easily. Usually the flash points of less than 100°F (37.8°C) are thought to be flammable. Examples of solvent flash points are as follows:

SOLVENT	FLASH POINT
Methyl n-Propyl Ketone	45°F (7.2°C)
Toluene	39°F (3.9°C)
Isopropyl Alcohol	53.6°F (12°C)
Acetone	1.4°F (-17°C)

D. Solvents can be explosive when mixed with chemicals that release oxygen (oxidizer). For this reason, it is very important for personnel to know which chemicals are in use in the work area to avoid accidental mixture of solvents and oxidizers.
(1) Know the container labels.
(a) Chemical manufacturers are required to put a label with a diamond-shaped symbol on each container.
1 The red symbol on the label shows that the contents are flammable.
2 The yellow symbol on the label shows that the contents are oxidizers.

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7. National Emissions Standards for Hazardous Air Pollutants

A. National Emissions Standards for Hazardous Air Pollutants (NESHAP).
(1) The NESHAP standards have put a limit on the use of certain chemicals and solvents.
(2) For complete details of the regulatory standards, see the Federal Register, 40 CFR Part 63, [Ad-FRL-5636-1], RIN 2060-AG65.

B. NESHAP Requirements.
(1) Hand-Wipe Cleaning.
(a) All hazardous air pollutants or organic compounds that release dangerous fumes that are used as hand wipe cleaning solvents must meet a composition requirement and have a vapor pressure less than or equal to 1.75 Hg at 69°(45 mm Hg at 2 0℃.)
(b) The requirements specified can be met by an alternative compliance plan used by the applicable authority and approved under Section 112(1) of the Clean Air Act.
(2) Primer Application.
(a) The organic hazardous air pollutant content is limited to 350 g/l (2.9 pounds-per-gallon), less water, as applied.
(b) The volatile organic compound limit is 350 g/l (2.9 pounds-per-gallon), less water, as applied.
(c) Use coatings below the content limit or use monthly volume-weighted averaging to get the content limits to meet content limits.
(3) Topcoat Application.
(a) The base coat organic hazardous air pollutant content must be less than 420 g/l (3.5 pounds-per-gallon), less water, as applied.
(b) The volatile organic compound limit is 420 g/l (3.5 pounds per gallon), less water, as applied.
(c) The topcoats must meet the requirements of MIL-PRF-85285D.
(d) Stripe paint requirements are the same as the base coat requirements. If the recommended supplier cannot be used, then use base coat materials to paint stripes.

NOTE: All paints and primers must have specific application techniques. If an alternative is supplied, use only the materials that are less than or equal in emissions, to less than the HVLP or electrostatic spray application techniques.

NOTE: Operate all application equipment according to the manufacturer's specifications, company procedures or locally specified operating procedures.

(4) Paint Removal
(a) Paint removal operations apply to the outer surface of the airplane and do not apply to parts or units normally removed. Fuselage, wings and stabilizers are covered. Parts that are normally removed are exempt from the requirements that follow:
1 No organic hazardous air pollutants are to come from chemical strippers or softeners.
2 Inorganic hazardous air pollutant fumes must be kept to a minimum during periods of non-chemical based equipment malfunctions.
3 The use of organic hazardous air pollutant material for spot stripping and decal removal is kept to a minimum of 190 pounds per airplane per year.
(b) Operating requirements for paint removal operations that give airborne inorganic hazardous air pollutants include control with particulate filters or water wash systems.
(c) Mechanical and hand sanding are exempt from these requirements.

8. Facilities and Equipment

A. Facilities
(1) A system must be supplied to collect processing waters to treat or remove chromium and pH.
(2) Facilities must have proper safety equipment.

B. Equipment
(1) Applied spray of cleaning solvents, paint removers or color chemical film treatment solutions is to be prevented unless all requirements of NESHAP are met.

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(2) Spraying equipment to wash the airplane with alkaline cleaner can be used. This equipment is sufficient to spray deoxidizer, chemical film solutions and rinse water.
(3) A high pressure washer is recommended, with or without hot water.
(4) Respirators and/or dust masks must be used.

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TORQUE DATA - MAINTENANCE PRACTICES

1. General

A. To ensure security of installation and prevent over stressing of components during installation, the torque values outlined in this section and other applicable chapters of this manual should be used during installation and repair of components.

B. The torque value tables, listed in this section, are standard torque values for the nut and bolt combinations shown. If a component requires special torque values, those values will be listed in the applicable maintenance practices section.

C. Torque is typically applied and measured using a torque wrench. Different adapters, used in conjunction with the torque wrench, may produce an actual torque to the nut or bolt which is different from the torque reading. Figure 201 is provided to help calculate actual torque in relation to specific adapters used with the torque wrench.

D. Free Running Torque Value.

(1) Free running torque value is the torque value required to rotate a nut on a threaded shaft, without tightening. Free running torque value does not represent the torque values listed in the tables of this section. Torque values listed in the tables represent the torque values above free running torque.

NOTE: EXAMPLE: If final torque required is to be 150 inch-pounds and the free running torque is 25 inch-pounds, then the free running torque must be added to the required torque to achieve final torque of 150 + 25 =175 inch-pounds.

(2) Breakaway torque value is the value of torque required to start a nut rotating on a thread shaft, and does not represent free running torque value. It should be noted that on some installations the breakaway torque value cannot be measured.

E. General Torquing Notes.

(1) These requirements do not apply to threaded parts used for adjustment, such as turnbuckles and rod ends.

(2) Torque values shown are for clean, non lubricated parts. Threads should be free of dust, metal filings, etc. Lubricants, other than that on the nut as purchased, should not be used on any bolt installation unless specified.

(3) Assembly of threaded fasteners, such as bolts, screws and nuts, should conform to torque values shown in Table 201.

(4) When necessary to tighten from the bolt head, increase maximum torque value by an amount equal to shank friction. Measure shank friction with a torque wrench.

(5) Sheet metal screws should be tightened firmly, but not to a specific torque value.

(6) Countersunk washers used with close tolerance bolts must be installed correctly to ensure proper torquing (refer to Figure 202).

(7) For Hi-Lok fasteners used with MS21042 self-locking nuts, fastener and nut should be lubricated prior to tightening.

(8) Tighten accessible nuts to torque values per Table 201. Screws attached to nutplates, or screws with threads not listed in Table 201 should be tightened firmly, but not to a specific torque value. Screws used with dimpled washers should not be drawn tight enough to eliminate the washer crown.

(9) Table 201 is not applicable to bolts, nuts and screws used in control systems or installations where the required torque would cause binding, or would interfere with proper operation of parts. On these installations, the assembly should be firm but not binding.

(10) Castellated Nuts.

(a) Self-locking and non self-locking castellated nuts, except MS17826, require cotter pins and should be tightened to the minimum torque value shown in Table 201. The torque may be increased to install the cotter pin, but this increase must not exceed the alternate torque values.

(b) MS17826 self-locking, castellated nuts shall be torqued per Table 201.

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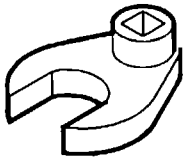
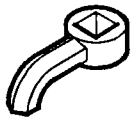
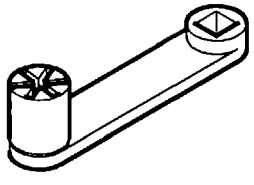


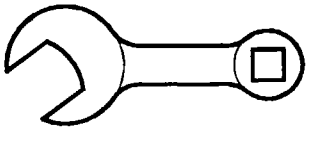
SHORT OPEN END ADAPTER



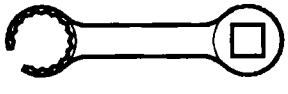
SETSCREW ADAPTER



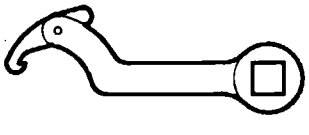
HOSE CLAMP ADAPTER



OPEN-END WRENCH ADAPTER

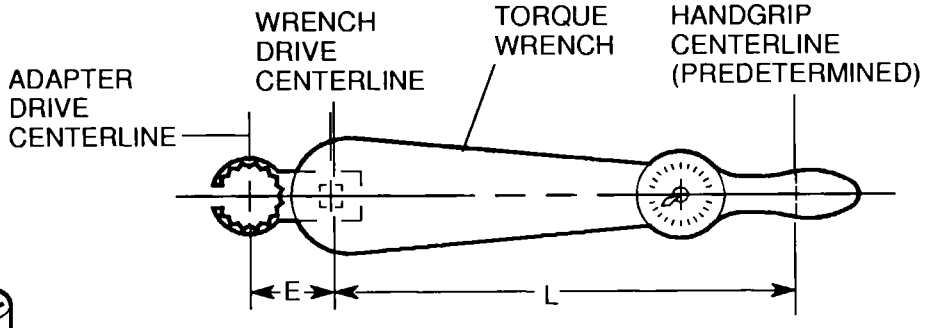


FLARE NUT WRENCH ADAPTER



SPANNER WRENCH ADAPTER

NOTE: WHEN USING A TORQUE WRENCH ADAPTER WHICH CHANGES THE DISTANCE FROM THE TORQUE WRENCH DRIVE TO THE ADAPTER DRIVE, APPLY THE FOLLOWING FORMULAS TO OBTAIN THE CORRECTED TORQUE READING.



FORMULA $\frac{T \times L}{L+E} = Y$

EXAMPLE (WITH "E" AS PLUS DIMENSION)

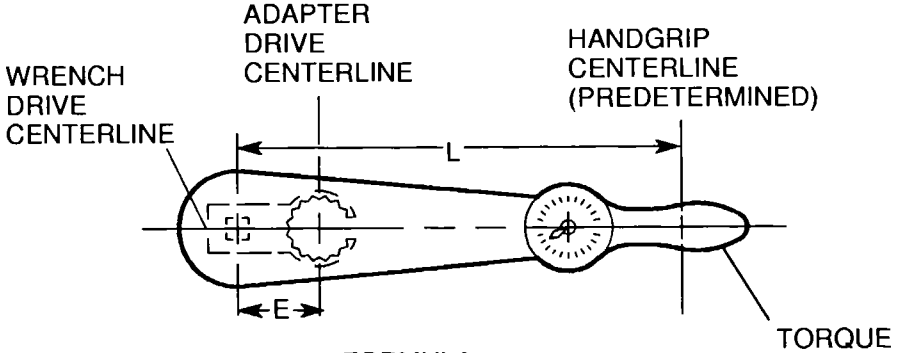
T = 135 IN-LB
Y = UNKNOWN
E = 1.5 IN
L = 10.0 IN

$Y = \frac{135 \times 10}{10 + 1.5} = 117.39$

Y = 117 IN-LB

LEGEND

T = ACTUAL (DESIRED) TORQUE
Y = APPARENT (INDICATED) TORQUE
L = EFFECTIVE LENGTH LEVER
E = EFFECTIVE LENGTH OF EXTENSION



FORMULA $\frac{T \times L}{L - E} = Y$

EXAMPLE (WITH "E" AS MINUS DIMENSION)

T = 135 IN-LB
Y = UNKNOWN
L = 10.0 IN
E = 1.5 IN

$Y = \frac{135 \times 10}{10 - 1.5} = \frac{1350}{8.5} = 158.82$

Y = 159 IN-LB

5598T2005

Torque Wrench and Adapter Formulas
Figure 201 (Sheet 1)

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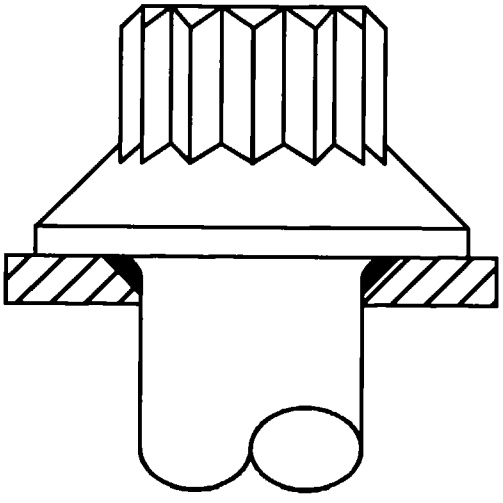
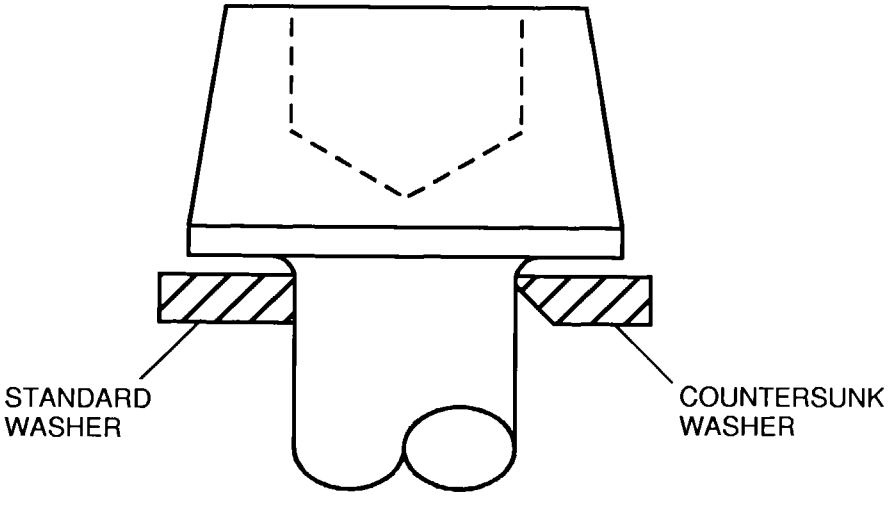
EXTERNAL WRENCHING HEAD



CORRECT INSTALLATION

INSTALL WASHER WITH COUNTERSUNK FACE NEXT TO BOLT HEAD RADIUS

INTERNAL WRENCHING HEAD



INCORRECT INSTALLATION

CAUTION: NEVER INSTALL STANDARD WASHER OR COUNTERSUNK WASHER IN REVERSE WHEN USING BOLTS WITH RADIUS UNDER THE HEAD

5598T1004
5598T1004A

Washer Installation Close Tolerance Bolts
Figure 202 (Sheet 1)

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(c) The end of the bolt or screw should extend through the nut at least two full threads including the chamfer.

(11) Joints containing wood, plastics, rubber or rubberlike materials should be torqued to values approximately 80 percent of the torque at which crushing is observed, or to the requirements of Table 201, whichever is lower, or as specified.

2. Torque Requirements for Bolts, Screws and Nuts

A. Use Table 201 to determine torque requirements for nuts, bolts and screws. Although the table makes reference to nuts (because nuts are typically torqued), torque values are also applicable when applying torque to bolts and screws.

Table 201. Torque Requirements For Steel Nuts, Bolts, and Screws (In Inch-Pounds)

SIZE	FINE THREADED SERIES (TENSION TYPE NUTS)		FINE THREADED SERIES (SHEAR TYPE NUTS EXCEPT MS17826)		MS17826 NUTS	
	Standard Torque	Alternate Torque	Standard Torque	Alternate Torque	Standard Torque	Alternate Torque
8-36	12 to 15	- -	7 to 9	- -	- -	- -
10-32	20 to 25	20 to 28	12 to 15	12 to 19	12 to 15	12 to 20
1/4-28	50 to 70	50 to 75	30 to 40	30 to 48	30 to 40	30 to 45
5/16-24	100 to 140	100 to 150	60 to 85	60 to 100	60 to 80	60 to 90
3/8-24	160 to 190	160 to 260	95 to 110	95 to 170	95 to 110	95 to 125
7/16-20	450 to 500	450 to 560	270 to 300	270 to 390	180 to 210	180 to 225
1/2-20	480 to 690	480 to 730	290 to 410	290 to 500	240 to 280	240 to 300
9/16-18	800 to 1000	800 to 1070	480 to 600	480 to 750	320 to 370	320 to 400
5/8-18	1100 to 1300	1100 to 1600	660 to 780	660 to 1060	480 to 550	480 to 600
3/4-16	2300 to 2500	2300 to 3350	1300 to 1500	1300 to 2200	880 to 1010	880 to 1100
7/8-14	2500 to 3000	2500 to 4650	1500 to 1800	1500 to 2900	1500 to 1750	1500 to 1900
1-14	3700 to 4500	3700 to 6650	2200 to 3300	2200 to 4400	2200 to 2700	2200 to 3000

NOTE 1: Fine Thread Tension application nuts include: AN310, AN315, AN345, MS17825, MS20365, NASM21044 through MS21048, MS21078, NAS679, NAS1291

NOTE 2: Fine Thread Shear application nuts include: AN316, AN320, MS21025, MS21042, MS21043, MS21083, MS21245, NAS1022, S1117

NOTE 3: Coarse Thread application nuts include: AN340, MS20341, MS20365, MS35649

3. Torque Requirements for Hi-Lok Fasteners

A. Use Table 202 to determine torque requirements for Hi-Lok fasteners.

NOTE: This table is used in conjunction with MS21042 self-locking nuts.

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Table 202. Torque Values For Hi-Lok Fasteners (Alloy Steel, 180 to 200 ksi)

NOMINAL FASTENER DIAMETER	TORQUE VALUE (INCH-POUNDS)
6-32	8 to 10
8-32	12 to 15
10-32	20 to 25
1/4-28	50 to 70
5/16-24	100 to 140
3/8-24	160 to 190
7/16-20	450 to 500
1/2-20	480 to 690

4. Torque Requirements for Electrical Current Carrying And Airframe Ground Fasteners

A. Use Table 203 to determine torque requirements for threaded electrical current carrying fasteners.
(1) Torque values shown are clean, non lubricated parts. Threads shall be free of dust and metal filings. Lubricants, other than on the nut as purchased, shall not be used on any bolt installations unless specified in the applicable chapters of this manual.
(2) All threaded electrical current carrying fasteners for relay terminals, shunt terminals, fuse limiter mount block terminals and bus bar attaching hardware shall be torqued per Table 203.

NOTE: There is no satisfactory method of determining the torque previously applied to a threaded fastener. When retorquing, always back off approximately 1/4 turn or more before reapplying torque.

B. Use Table 204 to determine torque requirements for threaded fasteners used as airframe electrical ground terminals.

Table 203. Torque Values For Electrical Current Carrying Fasteners

FASTENER DIAMETER	TORQUE VALUE (INCH-POUNDS)
6-32	8 to 12
8-32	13 to 17
10-32	20 to 30
3/16	20 to 30
1/4	40 to 60
5/16	80 to 100
3/8	105 to 125
1/2	130 to 150

Table 204. Torque Values For Airframe Electrical Ground Terminals

FASTENER DIAMETER	TORQUE VALUE (INCH-POUNDS)
5/16	130 to 150
3/8	160 to 190

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5. Torque Requirements for Rigid Tubing and Hoses

A. Use Table 205 to determine torque requirements for tubes and hoses.

Table 205. Tubing/Hose Torque Limits (Inch-Pounds)

Hose Size	Tubing O.D.	Flared or Flareless fitting with Aluminum or Annealed Stainless Steel Tubing, and Hose with Aluminum Inserts		Flared or Flareless fitting with Steel Tubing, and Hose with Steel Inserts	
		Min	Max	Min	Max
-2	1/8	20	30	75	85
-3	3/16	25	35	95	105
-4	1/4	50	65	135	150
-5	5/16	70	90	170	200
-6	3/8	110	130	270	300
-8	1/2	230	260	450	500
-10	5/8	330	360	650	700
-12	3/4	460	500	900	1000
-16	1	500	700	1200	1400
-20	1 1/4	800	900	1520	1680
-24	1 1/2	800	900	1900	2100

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SAFETYING - MAINTENANCE PRACTICES

1. General

A. Safety Wire.
(1) Inconel (Uncoated), Monel (Uncoated).
(a) Inconel and Monel wires is used for general safety wire purposes. Safety wiring is used to help prevent the movement of structural and other critical components. Monel safety wire must be used at temperatures up to 700°F (371°C). Inconel saf ety wire must be used at temperatures that get to 1500°F (815°C). The safety wire is i dentified by the color of the wire. Monel and inconel color is a grey color.
(2) Copper, Cadmium-Plated and Dyed Yellow in accordance with FED-STD 595.
(a) The wires must be used for shear and seal wire applications. A shear application is when it is necessary to break or shear the wire to let the emergency devices operate. A seal application is when the wire is used with a lead seal to prevent tampering or the use of a device without indication. The wires are identified by the color of the wire. Copper wire is dyed a yellow color.
(3) Inconel and monel wires can be replaced with the same diameter and length of carbon steel or corrosion resistant wire.
(4) Make sure you use the appropriate wire for the type of application.

NOTE: Wires are visually identifiable by their colors. Grey color for inconel and monel, yellow color for copper, and blue color for aluminum.

B. Cotter Pin.
(1) The selection of material must be in accordance with the temperature, atmosphere and service limitations. Refer to Table 202.

2. Safety Wire

A. Safety Wire Size.
(1) Refer to Table 201 for the required size of the safety wire.
(a) The 0.032 inch (0.80 mm) diameter safety wire is for general use. The 0.02 inch (0.51 mm) diameter safety wire is acceptable to use.
(b) 0.02 inch (0.51 mm) diameter copper wire must be used for shear and seal wire applications and can be used as follows:
1 For parts that have a nominal hole diameter of less than 0.045 inch (1.143 mm).
2 For parts that have a nominal hole diameter between 0.045 (1.143 mm) and 0.062 (1.574 mm) with space between the parts of less than 2.00 inches (51 mm).
3 For closely spaced screws and bolts of 0.25 inch (6.35 mm) diameter and smaller.
(c) The largest nominal size wire for the applicable material or part that the hole will accommodate must be used when you use the single-wire procedure.

Table 201. Safety Wire

	SIZE AND NUMBER (NASM20995-XXX)							
Inches -	**.015**	**.020**	**.032**	**.040**	**.041**	**.047**	**.051**	**.091**
Millimeters -	**0.30**	**0.51**	**0.80**	**1.00**	**1.04**	**1.19**	**1.30**	**2.31**
Material								
Ni-Cu Alloy (Monel)		NC20	NC32	NC40			NC51	NC91
Ni-Cr-Fe Alloy (Inconel)		N20	N32	N40			N51	N91
Carbon Steel		F20	F32		F41	F47		F91

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Table 201. Safety Wire (continued)

	SIZE AND NUMBER (NASM20995-XXX)							
Inches -	**.015**	**.020**	**.032**	**.040**	**.041**	**.047**	**.051**	**.091**
Millimeters -	**0.30**	**0.51**	**0.80**	**1.00**	**1.04**	**1.19**	**1.30**	**2.31**
Material								
Corrosion-Resistant Steel	C15	C20	C32		C41	C47		C91
Aluminum Alloy (Blue)		AB20	AB32		AB41	AB47		AB91
Copper (Yellow)	CY15	CY20						

3. Safety Wire Installation

A. Double-Twist and Single-Wire Procedures (Refer to Figure 201).

CAUTION: You must use the double-twist procedure of safety wiring with screws that are in closely spaced geometric patterns that attach hydraulic or air seals, hold hydraulic pressure, or are used in critical areas.

(1) Use the double-twist safety wiring procedure as the common procedure of safety wiring.
   (a) The double-twist procedure is one wire twisted on itself many times.

NOTE: The single-wire procedure of safety wiring can be used in a closely spaced, closed geometrical pattern (triangle, square, circle, etc.), on parts in electrical systems, and in places that would make the single-wire procedure more advisable. Closely spaced must be considered a maximum of two inches between centers.

(2) Safety wiring with the double-twist procedure must be done as follows:
   (a) One end of the safety wire must be installed through one set of safety wire holes in the bolt head.
   (b) The opposite end of the safety wire must be looped firmly around the head to the next set of safety wire holes in the same unit, and then inserted through the set of safety wire holes.
   (c) The other end of the safety wire can go over the head when the clearances around the head are obstructed by adjacent parts.
   (d) With the wires tight, they must be twisted until the twisted part of the wire is just short of the nearest safety wire hole in the next part. The twisted portion must be within 0.125 inch (3.175 mm) of the holes in each part. The twisting must keep the wire tight without it stressed, kinked or mutilated.

NOTE: The actual number of twists will depend upon the wire diameter, with smaller diameters being able to have more twists than larger diameters.

   (e) The wire must be twisted to form a pigtail of 3 to 5 twists after you safety wire the last part.
   (f) Cut off any extra material at the end of the wire.
   (g) Bend the pigtail towards the part to prevent it from becoming a snag.
   (h) Safety wiring multiple groups by the double twist double hole procedure must be the same as the previous double twist single hole procedure except the twist direction between subsequent fasteners may be clockwise or counterclockwise.

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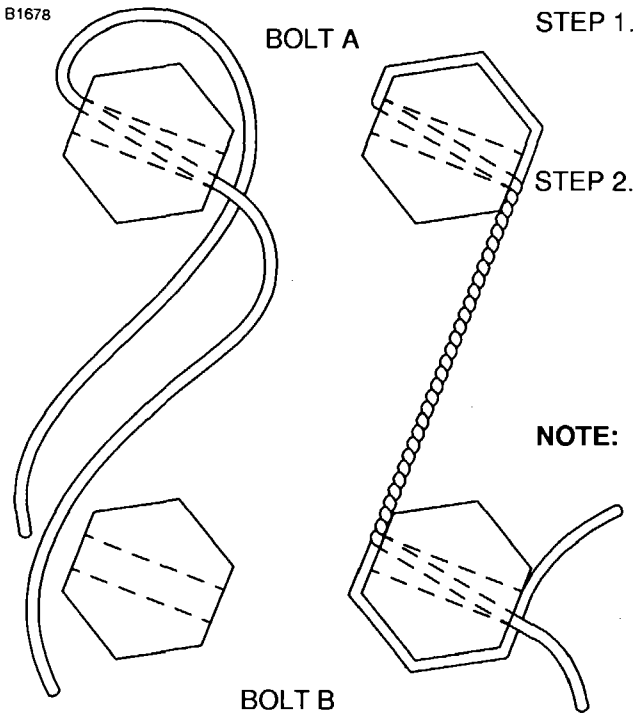
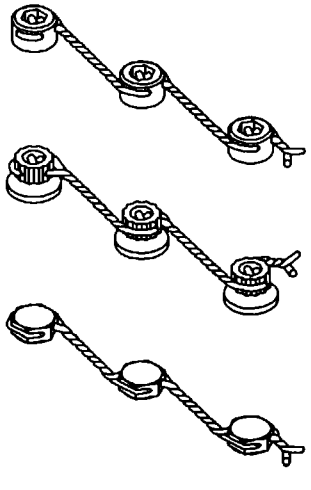


DOUBLE-WIRE SAFETYING

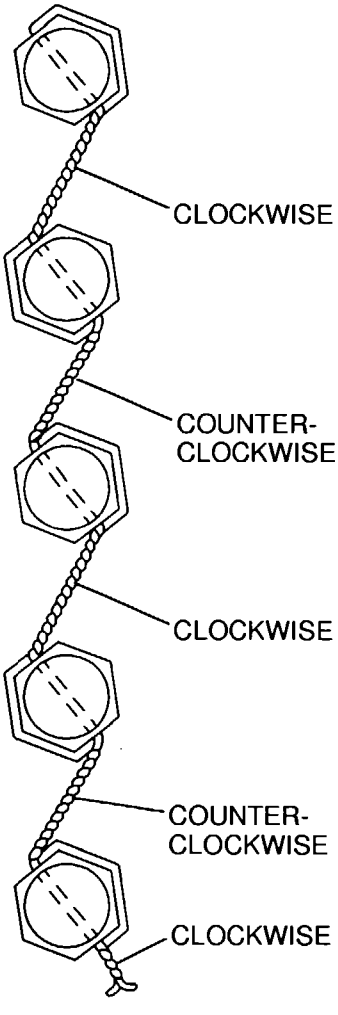
STEP 1. INSERT A WIRE THROUGH BOLT A AND BEND IT AROUND THE BOLT. IF NECESSARY, BEND THE WIRE ACROSS THE BOLT HEAD. TWIST THE WIRES CLOCKWISE UNTIL THEY REACH BOLT B.

STEP 2. INSERT ONE END OF THE WIRE THROUGH BOLT B. BEND THE OTHER END AROUND THE BOLT. IF NECESSARY, BEND THE WIRE ACROSS THE BOLT HEAD. TWIST THE WIRES COUNTERCLOCKWISE 0.50 INCH (12.70 mm) OR SIX TWISTS. CLIP THE ENDS OF THE WIRE AND BEND IT BACK AGAINST THE PART.

NOTE: RIGHT THREADED PARTS SHOWN. REVERSE DIRECTIONS FOR LEFT PARTS.



MULTIPLE FASTENER APPLICATION DOUBLE - TWIST



DOUBLE-TWIST SAFETYING

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Lockwire Safetying
Figure 201 (Sheet 1)

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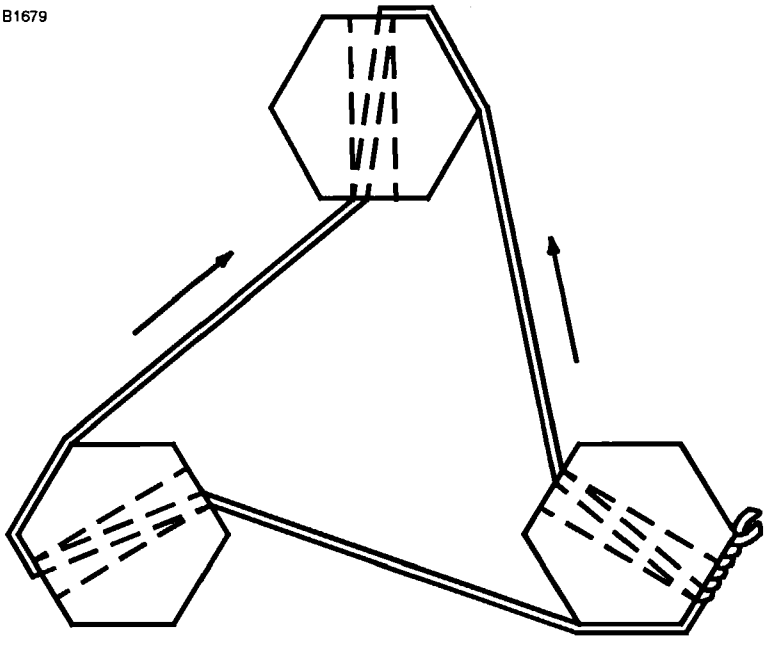
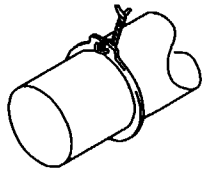
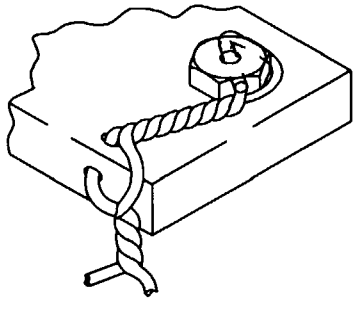


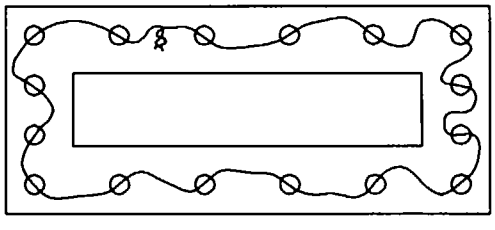
BOLTS IN CLOSELY SPACED, CLOSED GEOMETRICAL PATTERN, SINGLE WIRE METHOD



EXTERNAL SNAP RING
SINGLE-WIRE METHOD



SINGLE FASTENER APPLICATION
DOUBLE-TWIST METHOD



SMALL SCREWS IN CLOSELY SPACED, CLOSED GEOMETRICAL PATTERN, SINGLE WIRE METHOD

NOTE: RIGHT THREADED PARTS SHOWN. REVERSE DIRECTION FOR LEFT THREADS

5598T1003
5598T1024
5598T1024
5598T1024

Lockwire Safetying
Figure 201 (Sheet 2)

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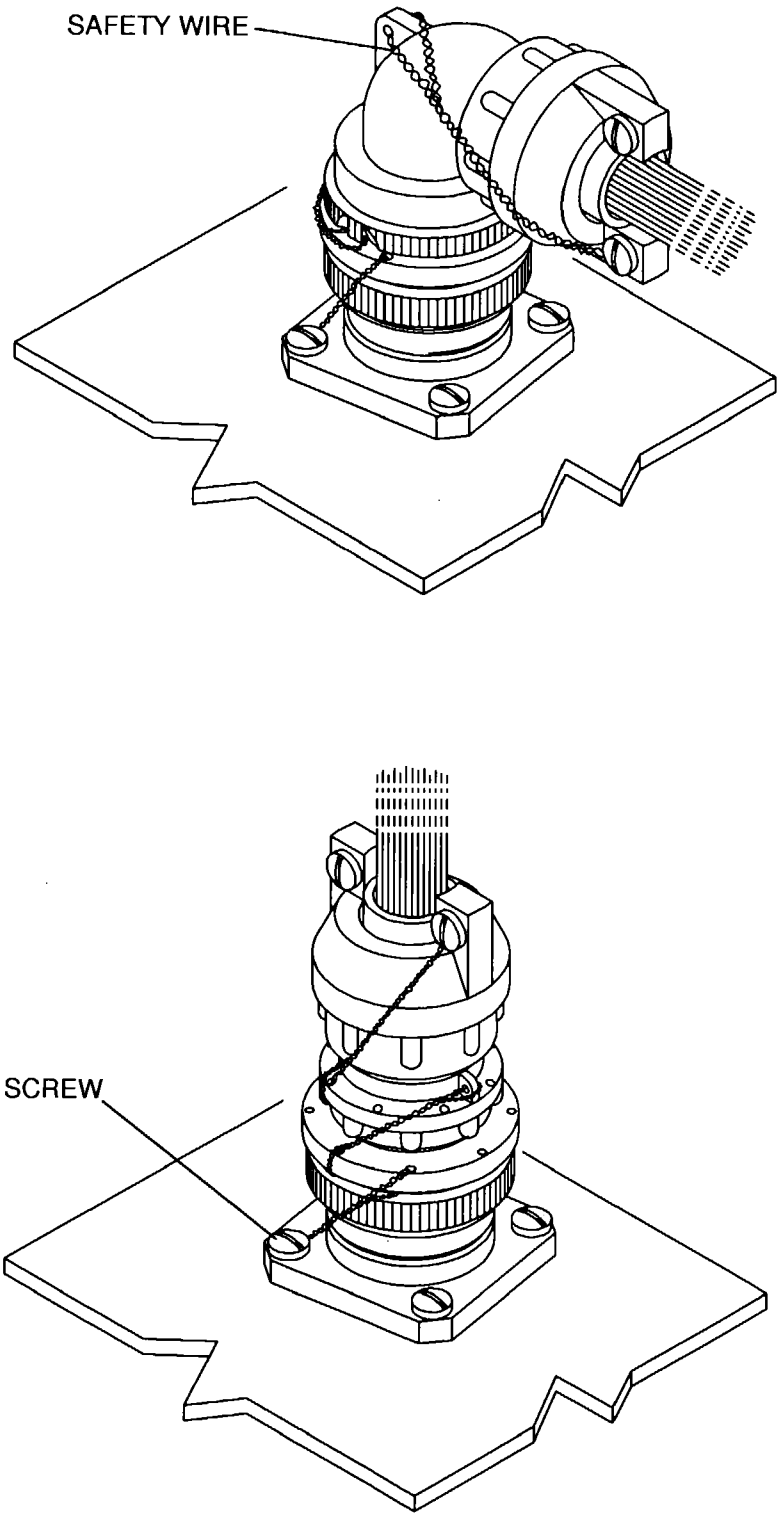

0560R1026

Lockwire Safetying
Figure 201 (Sheet 3)

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(3) The single-wire procedure of safety wiring must use the largest nominal size wire listed in Table 201 that will fit the hole.

NOTE: You can use the single-wire procedure in a closely spaced, closed geometrical pattern (triangle, square, circle, etc.), on parts in electrical systems, and in places that would make the single-wire procedure more applicable.

(a) Use the single-wire procedure for shear and seal wiring application.
(b) Make sure the wire is installed correctly so that it can be broken easily in an emergency situation.
(c) Use only copper wire to attach emergency devices where it is necessary to break the wire quickly.

B. Safety Wire Space.
(1) When you use safety wire for widely spaced multiple groups of parts by the double-twist procedure, three parts must be the maximum number in a series.
(2) When you use safety wire for close spaced multiple groups, the number of parts that can be safety wired by a 24.00 inch (610.00 mm) length of wire must be the maximum number in a series.
(3) Widely spaced multiple groups must mean those that the fastenings are from four to six inches apart. Safety wiring must not be used to attach fasteners or fittings that are spaced more than 6.00 inches (152 mm) apart, unless tie points are given on adjacent parts to shorten the span of the safety wire to less than 6.00 inches (152 mm).

C. Tension.
(1) Parts must be safety wired so that the safety wire must be put in tension if the part loosens. The safety wire must always be installed and twisted so that the loop around the head stays down and does not come up and over the bolt head and leave a loop.

NOTE: This does not necessarily apply to castellated nuts when the slot is close to the top of the nut, the wire will be strongest if it is to pass along the side of the stud.

(2) Use care when you install safety wire to make sure that it is tight but not over stressed.

D. Usage.
(1) A pigtail of 0.25 to 0.50 inch (6.35 to 12.70 mm), which is approximately 3 to 5 twists, must be made at the end of the wiring.
(2) The pigtail must be bent back or under to prevent a snag.
(3) The safety wire must be new upon each application.
(4) When castellated nuts are to be attached with safety wire, tighten the nut to the low side of the selected torque range, unless specified differently. If necessary, continue to tighten the nut until a slot aligns with the hole.
(5) In blind tapped hole applications of bolts or castellated nuts on studs, the safety wiring must be as described in these instructions.
(6) Hollow head bolts are safetied in the manner prescribed for regular bolts.
(7) Drain plugs and cocks can be safetied to a bolt, nut or other part having a free lock hole in accordance with the instructions described in this text.
(8) External snap rings can be locked if necessary that follow with the general locking procedures. Internal snap rings must not be safety wired. Refer to Figure 201.
(9) When safety wire is required on electrical connectors that use threaded coupling rings, or on plugs that use screws or rings to attach the individual parts of the plug together, they must be safety wired with 0.02 inch (0.51 mm) diameter wire in accordance with the safety wiring procedures.
(a) You must safety wire all electrical connectors individually (not attach to each other), unless it is not possible to do so.
(10) Drilled head bolts and screws need not be safety wired if installed into self-locking nuts or installed with lock washers.
(11) Castellated nuts with cotter pins or safety wire is preferred on bolts or studs with drilled shanks. Self-locking nuts are acceptable within the limitations of MS33588.

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(12) Larger assemblies such as hydraulic cylinder heads where safety wiring is required but not specified, must be safety wired as described in these procedures.
(13) Safety wire must not be used to attach or be dependent on a fracture as the basis for the operation of emergency devices such as handles, switches, guards covering handles, that operate emergency mechanisms such as emergency exits, fire extinguishers, emergency cabin pressure release, emergency landing gear release.
(14) Where existing structural equipment or safety of flight emergency devices require shear wire to attach the equipment when not in use, but that are dependent upon shearing or breaking of the safety wire for emergency operation of the equipment, particular care must be exercised to that wiring under these circumstances and must not prevent emergency operations of these devices.

4. Cotter Pin Installation

A. General Selection and Application of Cotter Pins (Refer to Figure 202).

Table 202. Cotter Pin Application

	Cotter Pins (MS24665)	
Material	**Temperature**	**Use**
Carbon Steel	Up to 450°F (232°C)	Pins that contact cadmium pl ated surfaces, general applications and non-corrosive environments.
Corrosion-Resistant	Up to 800°F (427°C)	Pins that contact corrosion-resistant stell and for corrosive environments.

(1) The cotter pin must be new upon each application and the selection must be material in accordance with temperature, atmosphere and service limitations. Refer to Table 201.
(2) When the nuts are to be attached to the fastener with cotter pins, tighten the nut to the minimum of the specified or selected torque range, unless otherwise specified. If necessary, continue to tighten the nut until the slot aligns with the hole. The torgue must not be more than the maximum torque range.
(3) Castellated nuts that are mounted on bolts must be safetied with the preferred procedure of cotter pins. Safety wire is a alternate procedure if cotter pins are not available.
(4) In the event of more than 50 percent of the cotter pin diameter is above the nut castellation, a washer must be used under the nut or a shorter fastener must be used. A maximum of two washers can be permitted under a nut.
(5) The largest nominal diameter cotter pin listed in MS24665, which the hole and slots will accommodate must be used. The pin size must not be less than the sizes described in Figure 202 with application to a nut, bolt or screw.
(6) Install the cotter pin with the head firmly in the slot of the nut with the axis of the eye at right angles to the bolt shank and bend the prongs so that the head and upper prong are firmly seated against the bolt.
(7) In the pin applications, install the cotter pin with the axis of the eye parallel to the shank of the clevis pin or rod end. Bend the prongs around the shank of the pin or rod end.
(8) Cadmium plated cotter pins must not be used in applications that bring them in contact with fuel, hydraulic fluid or synthetic lubricants.

5. Safetying Turnbuckles

A. Use of Safety Wire.
(1) Some turnbuckles are attached with safety wire. The safetying procedures are detailed and illustrated in Federal Publication AC 43-13.1B (or latest revision), Safety Methods For Turnbuckles.

B. Use of Locking Clips (Refer to Figure 203 and Table 203).

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Table 203. Locking Clip Applications

Nominal Cable Diameter	Thread UNF-3	Locking Clip MS21256 (Note 1)	Turnbuckle Body MS21251
1/16	6-40	-1	-B2S
		-2	-B2L
3/32	10-32	-1	-B3S
		-2	-B3L
1/8	1/4-28	-1	-B5S
		-2	-B5L
5/32	1/4-28	-1	-B5S
		-2	-B5L
3/16	5/16-24	-1	-B6S
		-2	-B6L
7/32	3/8-24	-2	-B8L
1/4	3/8-24	-2	-B8L
9/32	7/16-20	-3	-B9L
5/16	1/2-20	-3	-B10L

(1) Before you use safety wire, each threaded terminal must be screwed an equal distance into the turnbuckle barrel at a minimum not more than three threads of any terminal are shown outside the body.

(2) You must adjust the turnbuckle to the lock position with the groove on the terminals and slot indicator notch on the barrel aligned. Insert the end of the locking clip into the terminal and barrel until the "U" curved end of the locking clip is over the hole in the center of the barrel.
   (a) Press the locking clip into the hole to its full extent.
   (b) The curved end of the locking clip will latch in the hole in the barrel.

CAUTION: Do not use a tool since the locking clip can be twisted.

   (c) To check the correct seating of the locking clip, attempt to remove the pressed "U" end from barrel hole with fingers only.

WARNING: Locking clips are for one-time use only.

(3) Each locking clip can be installed in the same or opposite hole of the turnbuckle barrel.

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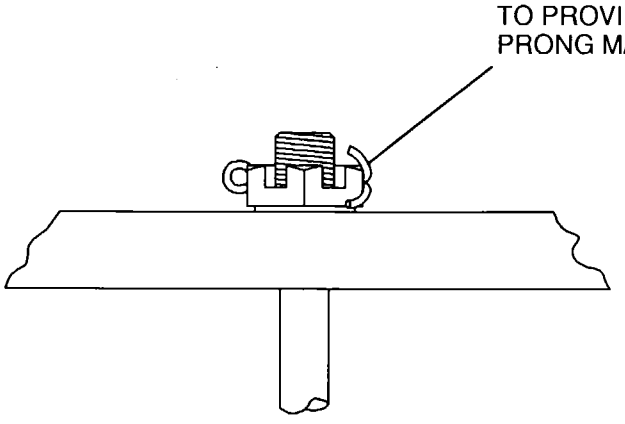
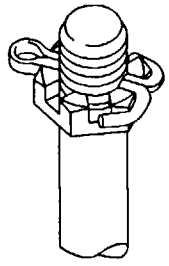
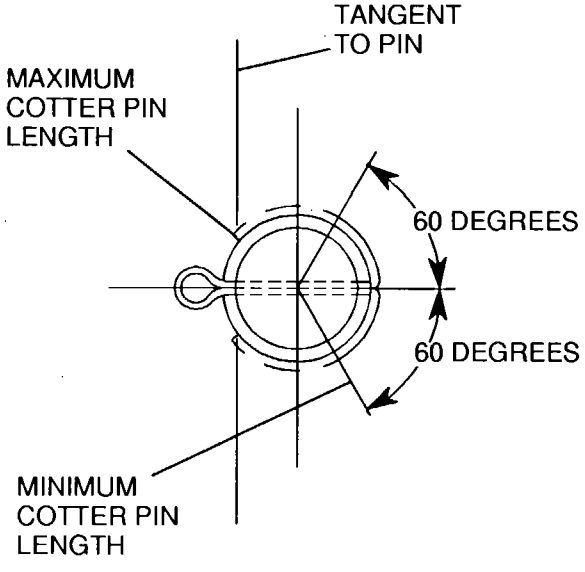


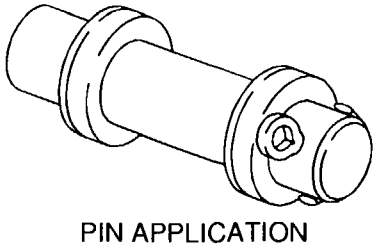
CASTELLATED NUT ON BOLT
PREFERRED METHOD



CASTELLATED NUT ON BOLT
ALTERNATE METHOD



THREAD SIZE	MINIMUM PIN SIZE (INCH)
6	0.028
8	0.044
10	0.044
1/4	0.044
5/16	0.044
3/8	0.072
7/16	0.072
1/2	0.072
9/16	0.086
5/8	0.086
3/4	0.086
7/8	0.086
1	0.086
1 1/8	0.116
1 1/4	0.116
1 3/8	0.116
1 1/2	0.116



PIN APPLICATION

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Cotter Pin Safetying
Figure 202 (Sheet 1)

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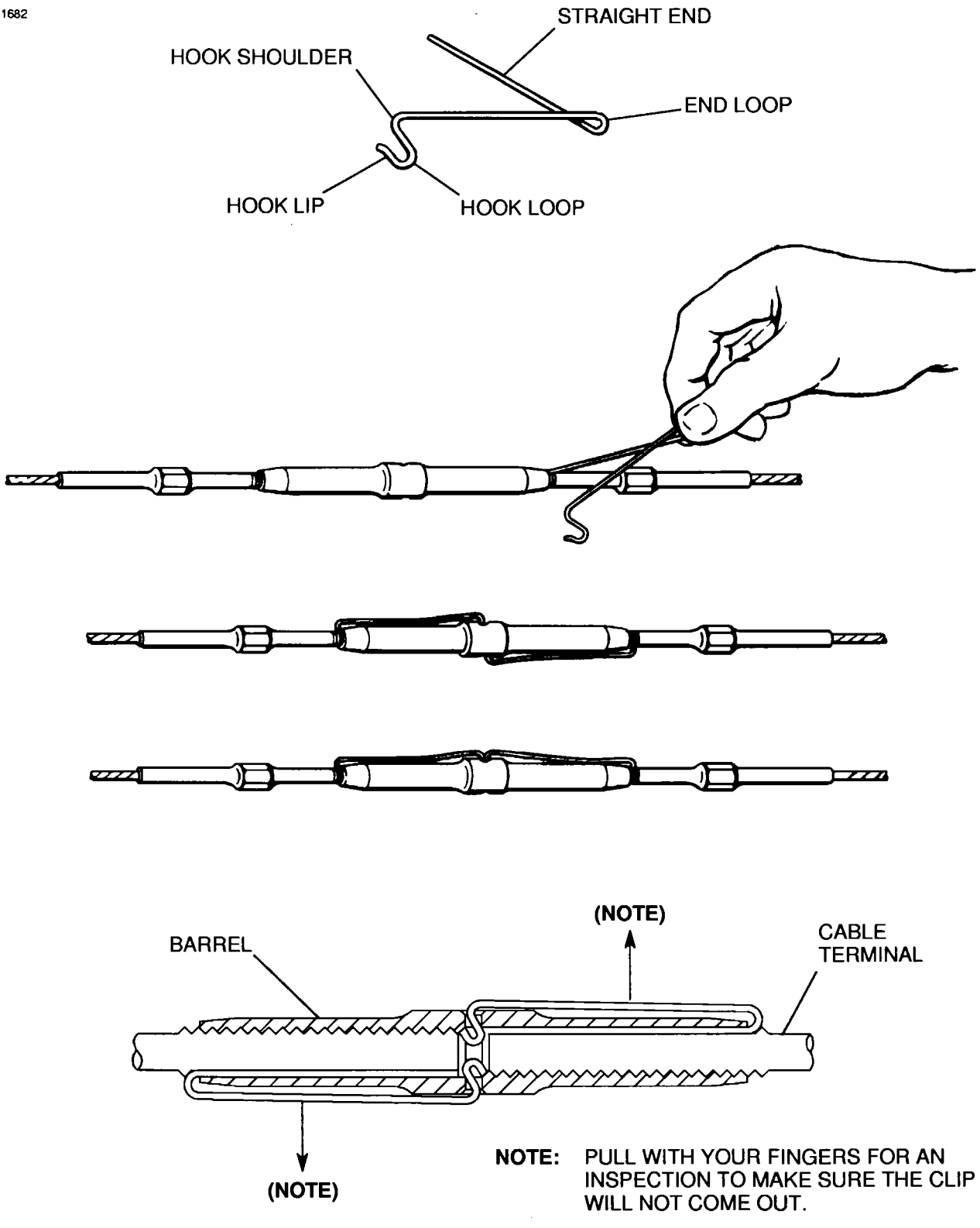

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Safetying Turnbuckle Assemblies
Figure 203 (Sheet 1)

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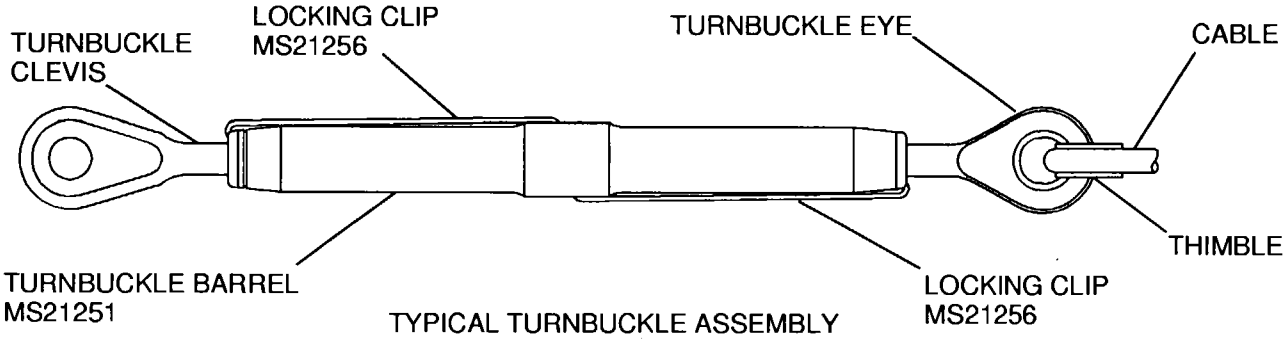
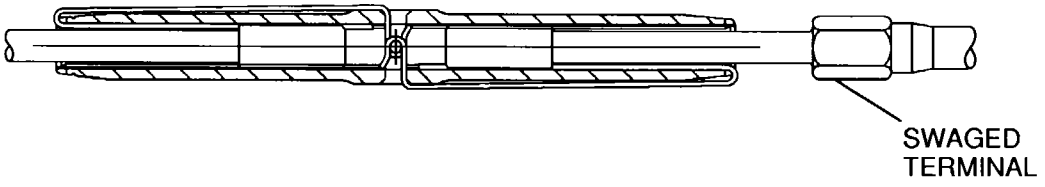


TYPICAL TURNBUCKLE ASSEMBLY



METHOD OF ASSEMBLING LOCKING CLIPS, TURNBUCKLE BARREL AND TERMINALS

0560R1024

Safetying Turnbuckle Assemblies
Figure 203 (Sheet 2)

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SEALING - DESCRIPTION AND OPERATION

1. General

A. A list of the various sealants used throughout the airplane can be found in the Tools, Equipment and Materials table of the effected chapters.

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ACCEPTABLE REPLACEMENTS FOR CHEMICALS AND SOLVENTS - DESCRIPTION AND OPERATION

1. General

A. In response to the Aerospace National Emissions Standards for Hazardous Air Pollutants (NESHAP), this data is being issued to inform customers of acceptable replacements for chemicals and solvents in the Maintenance Manual that have been restricted or prohibited by the standards.

B. For complete details of the regulatory standards, refer to Federal Register, 40 CFR Part 63 (Ad-FRL-5636-1), RIN 2060-AG65.

C. Compliance with the standard is mandatory by September 1, 1998.

2. Hand-Wipe Cleaning Operations

NOTE: All hazardous air pollutants (HAP) or volatile organic compounds (VOC) hand-wipe cleaning solvents must meet a composition requirement, have a vapor pressure less than or equal to 45 MM Hg at 20℃, or meet the requirements specified in an alternative compliance plan administered by the permitting authority and approved under Section 112 (1) of the Clean Air Act.

Table 1. Replacement Products for Hand-Wipe Cleaning Operations

SURFACE	APPROVED PRODUCT/ NUMBER	SUPPLIER ADDRESS
All Metals and Painted Surfaces	Methyl n-propyl ketone (CAS No. 107-87-9)	Eastman Chemical Products Wilcox Dr. And Lincoln St. Kingsport, TN
	Desoclean 110 (020K19)	Dynamold Solvents, Incorporated 2905 Shamrock Ave. Fort Worth, TX 76107
All Plastics	Isopropyl Alcohol (TT-I-735)	Available Commercially
All Rubber (Natural or Synthetic) and Silicone	Isopropyl Alcohol (TT-I-735)	Available Commercially

3. Priming Operations

NOTE: Priming operations may not exceed a maximum Hazardous Air Pollutant (HAP) limit of 2.9 lb./Gallon (350 Grams/Liter) (less water) per application. Priming operations may not exceed a volatile organic compounds (VOC) limit of 2.9 lb./Gallon (350 Grams/Liter) (less water and exempt solvents) per application. Compliance of this limit may be achieved through the use of coatings which fall below content limits, or by using monthly volume-weighted averaging to meet content limits.

Table 2. Replacement Products for Priming Operations

PRIMER APPLICATION	APPROVED PRODUCT/ NUMBER	SUPPLIER ADDRESS
Corrosion Primer (See Notes 1,4)	Corrosion Primer (513 X 419) (910 X 942)	Courtaulds Aerospace 1608 Fourth St. Berkeley, CA 94710
	Corrosion Primer (02-Y-40) (02-4-40 CATA)	DEFT, Inc. 17451 Von Karman Ave. Irvine, CA 92714

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Table 2. Replacement Products for Priming Operations (continued)

PRIMER APPLICATION	APPROVED PRODUCT/ NUMBER	SUPPLIER ADDRESS
	Corrosion Primer (U-1201F/U-1202F)	Sterling Lacquer Mfg. 3150 Brannon Ave. St. Louis, MO 63139
	Corrosion Primer R4001-K14 MAX COR	U.S. Paint Corp. 831 S. 21st St. St. Louis, MO 63103
Fuel Bay Primer (See Notes 2, 4)	Fuel Bay Primer 10P30–5	Dexter Crown Metro Aerospace East Water St. Waukegan, IL 60085
Pretreatment Primer (See Notes 3, 4)	Pretreatment Primer (728-013/702-701)	Sherwin-Williams 630 E. 13th St. Andover, KS 67002

NOTE 1: Any primers which meet MIL-PRF-23377 requirements may be used.

NOTE 2: This primer is restricted to the fuel bay area

NOTE 3: Any pretreatment primers which meet DOD-P-15328 may be used.

NOTE 4: Specific application techniques must be used. If alternative is sought, it can only be used if emissions are less than or equal to HVLP or electrostatic spray application techniques. All application equipment must be operated according to manufacturer's specifications, company procedures, or locally specified operating procedures.

4. Topcoat Operations

NOTE: Topcoat operations may not exceed a maximum Hazardous Air Pollutant (HAP) limit of 3.5 lb./Gallon (420 Grams/Liter) (less water) per application. Topcoat operations may not exceed a volatile organic compounds (VOC) limit of 3.5 lb./Gallon (420 Grams/Liter) (less water and exempt solvents) per application. Compliance of this limit may be achieved through the use of coatings which fall below content limits, or by using monthly volume-weighted averaging to meet content limits. Topcoats which meet the requirements of MIL-C-85285 may also be used.

Table 3. Replacement Products for Topcoat Painting Operations

TOPCOAT APPLICATION	APPROVED PRODUCT/ NUMBER	SUPPLIER ADDRESS
Basecoat (See Note 4)	DeSothane 420HS Hisolids	Courtaulds Aerospace
	Jet Glo High Solids System 810 Series	Sherwin-Williams 630 E. 13th St. Andover, KS 67002
	Low VOC Enamel	Sterling Lacquer Mfg.
	24-F 20 Series	Dexter Crown Metro Aerospace
Paint Stripes (See Note 4)	Low VOC Acrylic 830 Series	Sherwin-Williams 630 E. 13th St. Andover, KS 67002

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5. Paint Stripping Operations

NOTE: Unless exempted, no organic Hazardous Air Pollutant (HAP) are to be emitted from chemical strippers or solvents. Use of organic HAP materials for spot stripping and decal removal is limited to 190 pounds per airplane per year.

Table 4. Replacement Products for Paint Stripping Operations

APPLICATION	APPROVED PRODUCT/ NUMBER	SUPPLIER ADDRESS
Chemical Stripping	Turco T-6776 LO	Turco Products, Inc. Westminster, CA 92684
Mechanical Stripping (See Note 5)	180 Grit or finer	Available Commercially

NOTE 1: Mechanical and hand-sanding operations are exempt from these requirements

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GENERAL SOLVENTS/CLEANERS - MAINTENANCE PRACTICES

1. General

A. Solvents are used in a wide range of cleaning activities and selected solvents can be used in the removal of oil, grease and dirt from objects without harm to metal, plastics or elastomeric parts.

2. Tools, Equipment and Materials

NOTE: The following items are used in conjunction with various solvents to aid in cleaning parts and components.

NAME	NUMBER	MANUFACTURER	USE
Detergent		Commercially available	General cleaning.
ScotchBrite Pads	Type A	Minnesota Mining and Mfg. Co. 3M Center St. Paul, MN 55101	Light abrasion of metal surfaces.
Sandpaper	320 Grit	Commercially available	Light abrasion of metal surfaces.
Rymple Cloth		Commercially available	Wiping and applying cleaning agents.
Wiping cloth white, oil free, absorbent		Commercially available	Wiping and applying cleaning agents.

3. Safety Precautions

A. Solvents are composed of a group of chemicals that often prove toxic. Anyone engaged in maintenance, repair and operation of airplane and airplane accessories may be exposed to these chemicals.

B. To help avoid the effects of these toxic substances, work only a clean, well-lighted and well-ventilated area. Rubber gloves and protective clothing should be worn. Avoid breathing spray vapors as they are highly toxic.

C. When working with toxic substances, always be alert for symptoms of poisoning. If symptoms are observed, immediate removal of the victim from the contaminated area is most important.

4. Description

A. Solvents exhibit a selective solvent action which permits its use in the removal of oil, grease or dirt. For selection of proper solvent, refer to Table 201. For the cleaning of metal, plastics or rubber, proceed as follows:

(1) Metal.

NOTE: Prior to bonding or priming, lightly abrade surface with either a ScotchBrite pad or sandpaper prior to cleaning.

(a) Wipe off all excess oil, grease or dirt from surface.
(b) Apply solvent to a clean cloth by pouring solvent on the cloth from a safety can or other approved container. The cloth should be well saturated but not to the point of dripping.
(c) Wipe the surface with the moistened cloth as required to dissolve or loosen soil. Work on small enough area so the surface being cleaned remains wet.
(d) With a clean dry cloth, immediately wipe the surface while the solvent is still wet. Do not allow the surface to evaporate dry.
(e) Repeat steps (b) through (d) until there is no discoloration on the drying cloth.

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(2) Plastic or Rubber.

NOTE: If cleaning a bonding surface, lightly abrade the bonding surface with sandpaper prior to cleaning.

(a) Remove heavy soil from surface by washing with a water detergent solution.
(b) Apply solvent to a clean cloth by pouring solvent onto cloth from a safety can or other approved container. The cloth should be well saturated but not to the point where dripping.
(c) Wipe the surface with the moistened cloth as required to dissolve or loosen soil. Work on a small enough area so that the surface being clean remains wet.
(d) Using a clean dry cloth, immediately wipe the surface while the surface is still wet. Do not allow the surface to evaporate dry.
(e) Repeat steps (b) through (d) until there is no discoloration on the drying cloth.

Table 201. General Solvents

CLEANER/ SOLVENT	FED-ERAL SPECIFI-CATION	TYPE CLASSIFI-CATION	USE/ DESCRIPTION FUNCTION	CAUTION/ WARNING
Dry	MIL-PFR-680	Type I -100°F Type II -140°F	General cleaning solvent. Dry cleaning of textile materials. Grease removal.	FLAMMABLE.
1,1,1 Inhibited Technical Trichloroethane	O- T-620	Type I - Regular Type II - with dauber Type III - Aerosol	Spot removing from fabrics. General cleaning solvent. Cleaning of assembled equipment.	USE WITH ADEQUATE VENTILATION. AVOID PROLONGED BREATHING OF VAPOR. AVOID PROLONGED CONTACT WITH SKIN.
Turco Seal Solvent Turco Products			Cleaning/Degreasing metal parts.	
Penwalt 2331			Preparing metal plate for painting.	ACID ACTIVATED SOLVENT, DO NOT USE ON PLASTICS.
Carbon Removing Compound	P-C-111A		Use in soak tank tofacilitate removal of carbon, gum, oil and other surface contaminants except rust or corrosion from engine and other metal parts.	REMOVES PAINT. AVOID CONTACT WITH SKIN.
Cleaning Compound	P-C-535		Heavy duty electro cleaner used for removal of soils from ferrous metal surfaces prior to electroplating or other treatments.	
Cleaning Compound, Unfinished Aluminum	MIL-C-5410	Type I - Viscous Emulsion	Used full strength for overhaul of unfinished aluminum surfaces.	

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Table 201. General Solvents (continued)

CLEANER/ SOLVENT	FED-ERAL SPECIFI-CATION	TYPE CLASSIFI-CATION	USE/ DESCRIPTION FUNCTION	CAUTION/ WARNING
		Type II -Clear Liquid	Use full strength or diluted with mineral spirits and water for maintenance of airplane unfinished aluminum surfaces.	
Trichloro-ethylene	O-T-634B	Type I -Regular Type II -Vapor Degreasing	Cleaning of metal parts. Degreasing of metal parts. Special purpose solvent.	REMOVES PAINT AND DAMAGES PLASTICS. USE ONLY WITH ADEQUATE VENTILATION. HIGH CONCENTRATIONS OF VAPOR ARE ANESTHETIC AND DANGEROUS TO LIFE. VERY TOXIC.
Polish, Metal Aluminum	MIL-P-6888C	Type I -Liquid Type IIPaste	Metal polish for use on airplane aluminum surfaces.	FLAMMABLE.
Naphtha, Aliphatic	TT-N-958	Type I	For use with organic coatings only.	DO NOT USE WITH ACRYLIC PLASTICS. FLAMMABLE.
		Type II	Cleaner for acrylic plastics and may be used in placeof Type I General cleaningagent.	VAPOR HARMFUL. AVOID PROLONGED OR REPEATED BREATHING OR CONTACT WITH SKIN.
Methyl Ethyl Ketone	TT-M-261D		Paint and adhesive thinner, cleaning agent.	FLAMMABLE.
Isopropyl Alcohol	TT-I-735	Grade B -0.4% water	For use with organic coatings and as an anti-icing fluid. General Solvent for synthetic rubbers.	USE DISCRIMINATELY WITH ACRYLIC PLASTICS.
Wax, Airplane, Waterproof Solvent Type	MIL-W-18723C		A waterproof wax that can be dissolved or dispersed with an organic solvent.	DO NOT USE SOLVENTS THAT MAY DAMAGE PAINT OR FINISH FOR REMOVAL OF WAX.

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Table 201. General Solvents (continued)

CLEANER/ SOLVENT	FEDERAL SPECIFICATION	TYPE CLASSIFICATION	USE/ DESCRIPTION FUNCTION	CAUTION/ WARNING
Cleaning Compound,Aluminum	MIL-C-5410B	Type I -Viscous Emulsion	Use full strength for maintenance of unfinished aluminum surfaces.	RUBBER OR SYNTHETIC RUBBER GLOVES AND EYE PROTECTIONSHOULD BE USED WHEN HANDLING THE COMPOUND. WASH FROM SKIN IMMEDIATELY WITH WATER OR A SOLUTION OF SODIUM BICARBO-NATE AND APPLY GLYCERIN OR PETROLEUM JELLY. WASH FROM EYES AS PER MANUFACTURER'S INSTRUCTIONS AND REPORT TO NEAREST MEDICAL FACILITY.
		Type II - Clear Liquid	Use full strength or diluted with mineral spirits and water for maintenance of unfinished aluminum surfaces.	
Toluene	A-A-59107D		Use as a solvent or thinner for organic coatings, various resins, and chlorinated rubber. Also used to dilute cellulose lacquers and dopes.	FLAMMABLE VAPOR. VAPOR HARMFUL.

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INTERIOR AND EXTERIOR FINISH - CLEANING/PAINTING

1. General

A. Interior and exterior finish cleaning/painting consists of general information and instructions for applying chemical film treatments, primer and topcoats to the airplane.

2. Interior and Exterior Finishes

A. Detail aluminum parts are chemically pretreated and epoxy primed prior to assembly. The chem-film pretreatment and the epoxy primer are primary coatings and must be maintained and preserved for corrosion control. Exterior assemblies that are to be topcoated receive ScotchBrite, hand solvent cleaning and another overall application of epoxy primer. The airplane exterior then receives an overall topcoat of polyurethane paint.

CAUTION: ALL PLASTIC AND FIBERGLASS PARTS, EXCEPT BUSHINGS, BEARINGS, GROMMETS AND CERTAIN PURCHASED ANTENNA COVERS WHICH ARE NOT COLORED OR PAINTED, SHALL BE COLORED OR PAINTED TO MATCH ADJACENT SURFACE. THE HEAD OF THE PITOT TUBE MUST BE OPEN AND FREE FROM PAINT AND OTHER FOREIGN OBJECTS. THE SURFACE ADJACENT TO STATIC PORT MUST BE SMOOTH AND FREE FROM ALL PAINT IMPERFECTION. DO NOT PAINT PITOT TUBE, FUEL CAPS, TRIM TAB PUSHRODS WHERE THEY OPERATE IN AN ACTUATOR, OLEO STRUT SLIDING SURFACES, STANDARD POLISHED SPINNERS, EXHAUSTS, STALL WARNING VANES, CHROMED ITEMS (HANDLES, LOCKS, ETC.) OR THE TIE-DOWN LUGS (LOCATED ON STRUTS) OR LIGHT LENS. PAINT THE LANDING GEAR BARRELS AND TORQUE LINKS TO MATCH THE OVERALL COLOR.

3. Paint Facility

A. Painting facilities must include the ability to maintain environmental control of temperature at a minimum of 65°F (18°C). All paint equipment must be clean. Ac curate measuring containers should be available for mixing protective coatings. Use of approved respirators while painting is a must for personal safety. All solvent containers should be grounded to prevent static buildup. Catalyst materials are toxic, therefore, breathing fumes or allowing contact with skin can cause serious irritation. Material stock should be rotated to allow use of older materials first, because its useful life is limited. All supplies should be stored in an area where temperature is higher than 50°F (10°C), but lower than 90°F (32°C). Storage at 90°F (32°C) is allowable f or no more than sixty days, providing it is returned to room temperature for mixing and use.

(1) Areas in which cleaning or painting are done shall have adequate ventilation and shall be protected from uncontrolled spray, dust, or fumes.
(2) Areas for prolonged storage of cleaned parts and assemblies awaiting painting shall be free from uncontrolled spray, dust, or fumes, or else positive means of protecting part cleanliness such as enclosed bins or wrapping in kraft paper shall be provided.
(3) Areas in which cleaning or painting are done shall be periodically cleaned and dusted.
(4) Compressed air used for dusting and paint spraying shall be free from oil, water and particulate matter.

4. Sanding Surfacer

A. Purpose and Requirements.

(1) Surfacer is applied over fiberglass and ABS assemblies to provide aerodynamic contour, smoothness and to seal porous surfaces. Application of surfacer also provides a good surface for a polyurethane finish.

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(2) The objective of a surfacer is to fill local depressions, pits, pin holes and other small surface defects so a smooth surface is obtained for paint. The total surfacer thickness shall not be greater than 15 mils (0.38 mm). Only enough surfacer shall be applied to obtain a smooth surface for paint. If less thickness will provide a smooth surface, this is better. A thick layer of surfacer is less flexible and may crack in service.
(3) To complete the airplane's polyurethane finish over surfacer, begin by applying the intermediate coat. Apply topcoat (polyurethane enamel) using same procedure.
(4) Should a repair be required (cracked or chipped paint) to areas where surfacer is applied, sanding surfacer should be removed to expose fiberglass or Kevlar. It may be necessary to remove all sanding surfacer on that individual assembly and/or component to obtain a satisfactory finish. For additional information, refer to Cleaning.
(5) Sanding surfacer methods.
(a) Do not intermix vendor material or substitute material. Also, do not substitute instructions. Select and use one vendor's material and use the corresponding instructions.

B. Cleaning.

CAUTION: DO NOT USE CHEMICAL STRIPPERS ON ABS PLASTIC AND FIBERGLASS ASSEMBLIES. PAINT STRIPPER SOLVENT WILL DAMAGE THESE ASSEMBLIES.

CAUTION: SANDING OF PAINT AND/OR SANDING SURFACER MUST BE VERY CAREFULLY ACCOMPLISHED. DO NOT SAND INTO THE FABRIC LAYERS OF COMPOSITE ASSEMBLIES AS THIS WILL RESULT IN LOSS OF STRENGTH.

(1) Remove paint covering sanding surfacer by sanding. Paint should be removed well beyond damaged area. For best results, it is recommended to remove all paint covering sanding surfacer of that individual composite component.
(2) Remove sanding surfacer by sanding from individual component to expose fabric.
(3) Scuff sand area to be refinished with 320 grit paper. Do not over expose fabric.
(4) Clean surface with Methyl n-Propyl Ketone. Follow manufacturer's instructions for final cleaning prior to sanding surfacer application.

5. Paint Stripping

A. Mechanical Stripping
(1) Mechanical methods of stripping include power sanding with a disc or jitterbug type sander, grinder, hand sanding, and wire brushing.
(a) Ensure mechanical methods do not damage surfaces being stripped. Damage may include, but is not limited to, cutting fibers of composite structures or scratches in the surface of metallic surfaces.

CAUTION: DO NOT USE LOW CARBON STEEL BRUSHES ON ALUMINUM, MAGNESIUM, COPPER, STAINLESS STEEL OR TITANIUM SURFACES. STEEL PARTICLES MAY BECOME EMBEDDED IN THE SURFACES, AND LATER RUST OR CAUSE GALVANIC CORROSION OF THE METAL SURFACES.

(2) Mechanical stripping must be used for stripping composite or plastic surfaces.
(3) Mechanical stripping is recommended for surfaces which might entrap chemical strippers and result in corrosion.
(4) Mechanical stripping is required for painted surfaces masked during chemical stripping.

B. Chemical Stripping.

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WARNING: ALL PAINT STRIPPERS ARE HARMFUL TO EYES AND SKIN. ALL OPERATORS SHOULD WEAR GOGGLE-TYPE EYEGLASSES, RUBBER GLOVES, APRONS AND BOOTS. IN CASE OF CONTACT WITH SKIN, FLUSH WITH WATER. IN CASE OF CONTACT WITH EYES, FLUSH EYES THOROUGHLY WITH WATER AND CONSULT PHYSICIAN IMMEDIATELY. PAINT STRIPPING SHOULD BE DONE IN A WELL VENTILATED AREA.

WARNING: USE OF A HEATER WITH AN OPEN FLAME IN AN AREA IN WHICH STRIPPING WITH A METHYLENE CHLORIDE TYPE STRIPPER IS USED PRODUCES HYDROCHLORIC ACID FUMES. IF ACID IS DEPOSITED ON AIRPLANE IT WILL CORRODE ALL SURFACES.

(1) Thoroughly clean airplane surfaces to remove all grease and other dirt which might keep stripping agent from attacking paint.
(2) All seams and joints must be protected by applying a tape, resistant to strippers, to every joint to prevent stripping chemicals from entering the skin joints. Chemicals used for stripping polyurethane paint are very difficult to remove from joints, and may promote corrosion or deteriorate bonding agents used in assembly of airplane.
(3) Mask following surfaces using plastic sheeting or waxed paper and plastic tape so as to make a safety margin of at least one-half inch (13 mm) between protected surface and surface to be stripped.

NOTE: Do not use masking tape.

(a) Mask all windows and transparencies.

CAUTION: ACRYLIC WINDOWS MAY BE SOFTENED OR OTHERWISE DAMAGED BY PAINT STRIPPER, SOLVENT OR PAINT. USE WATER AND GREASE-PROOF BARRIER MATERIAL AND POLYETHYLENE COATED TAPE TO PROTECT WINDOWS.

1 Place barrier material over window and seal around periphery with polyethylene backed masking tape.
2 Cut second sheet of barrier material an inch (26 mm) or more larger than window.
3 Place second sheet of barrier material over window and seal with polyethylene tape.

(b) Mask all rubber and other non metals.
(c) Composites if possible, shall be removed from airplane prior to stripping.
(d) Mask all honeycomb panels and all fasteners which penetrate honeycomb panels.
(e) Mask all pivots, bearings and landing gear.
(f) Titanium, if used on airplane, must be protected from strippers.
(g) Mask all skin laps, inspection holes, drain holes, or any opening that would allow stripper to enter airplane structure.

CAUTION: DO NOT ALLOW PAINT STRIPPER TO CONTACT HIGH HEAT TREATED STEEL PINS, SUCH AS PINS ATTACHING LANDING GEAR COMPONENTS. PAINT STRIPPERS MAY INDUCE HYDROGEN EMBRITTLEMENT IN HIGH HEAT TREATED STEEL.

(4) Apply approved stripper by spray or brush method.

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WARNING: USE NORMAL SAFETY PRECAUTIONS WHEN USING FLAMMABLE MATERIALS DURING CLEANING AND PAINTING PROCEDURES.

WARNING: PAINT STRIPPER SOLUTION IS HARMFUL TO EYES AND SKIN. WEAR GOGGLES, RUBBER GLOVES, APRON AND BOOTS WHEN WORKING WITH PAINT STRIPPER. ALSO WEAR APPROPRIATE RESPIRATOR WHEN APPLYING "SPRAY-ON" STRIPPERS. THE CHEMICAL SUPPLIER BULLETINS AND INSTRUCTIONS SHOULD BE CLOSELY FOLLOWED FOR PROPER MIXING OF SOLUTION, APPLICATION METHODS AND SAFETY PRECAUTIONS.

(a) If using spray method, apply a mist coat to area to be stripped, then when paint begins to lift, apply a second heavy coat.
(b) If applying with brush, brush across the surface only once, in one direction.

(5) Allow stripper coating to lay on the surface until paint lifts.
(6) After paint begins to lift, use a propylene bristle brush to agitate stripper to allow deeper penetration of stripper.
(7) Remove lifted paint with a plastic squeegee. Dispose of residue in accordance with local regulations.
(8) Inspect all surfaces for incomplete paint removal.
(a) Repeat previous procedural steps as necessary until all paint is removed.
(9) After stripping airplane, thoroughly rinse to remove any stripping residue.
(10) Remove tape applied to protect joints and other masked areas.
(11) Carefully remove remaining paint at skin joints and masked areas by sanding with a hand or jitterbug type sander.
(12) If necessary to remove paint from inside skin joints, refer to Cleanout of Skin Joints.
(13) *If corrosion is encountered, refer to Structural Repair Manual, Chapter 51, Corrosion/Repair, for* corrosion treatment.

C. Cleanout of Skin Joints.
(1) Install a surface conditioning disc on a pneumatic drill.
(2) Taper edge of disc to an edge which will allow edge to fit into skin joint seam.
(a) Run disc against a piece of coarse abrasive paper or a mill file until edge is tapered.

CAUTION: EXCESSIVE PRESSURE OR DWELL TIME WILL CAUSE SCRATCHES OR GROOVES IN METAL. ENSURE DOUBLER AT BOTTOM OF JOINT IS NOT DAMAGED OR GOUGED IN ANY WAY BY THIS PROCESS.

(3) Using tapered surface conditioning disc, remove paint and other material from joint seams.
(4) Carefully, and using as low speed as possible, remove paint and all other material from joint.

NOTE: Surface conditioning disc will wear rapidly, it will be necessary to resharpen (retaper) disc frequently.

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6. Hand Solvent Cleaning

WARNING: WORK IN A WELL VENTILATED AREA FREE FROM SOURCES OF IGNITION. USE ONLY APPROVED SOLVENTS AND MATERIALS.

CAUTION: AIRPLANE SHALL BE GROUNDED DURING SOLVENT WIPE.

A. Surface Cleaning.
   (1) Apply solvent to a clean wiping cloth by pouring from a safety can or other approved container. The cloth should be well saturated with solvent. Avoid dipping wipers into open solvent containers as this contaminates the solvent.
   (2) Wipe the surface with the wet cloth as required to dissolve or loosen soils. Work on a small enough area so that the area being cleaned remains wet with solvent.
   (3) With a clean dry cloth, immediately wipe dry the area being cleaned. Do not allow the surface to evaporate dry.
   (4) Repeat steps (1) through (3) as required and change cloths often.

7. Maintenance of the Interior and Exterior Primary Coatings and Topcoat

A. Rework and repair primary coatings on airplane interior and exterior surfaces for protection and corrosion control.
   (1) Minor scratches or defects, which do not penetrate the epoxy primer or which penetrate the primer and expose bare metal, with the total area of exposed bare metal less than the size of a dime, touch up as follows:
      (a) Hand solvent clean and sand with 320 grit or finer sandpaper.
      (b) Clean with compressed air, hand solvent clean again, then wipe with a tack rag.
      (c) Mix and reapply epoxy primer (MIL P-23377 or equivalent) as directed by the primer manufacturer or supplier.
      (d) On a properly prepared surface, mix and apply polyurethane topcoat as directed by the paint manufacturer or supplier.
   (2) Major defects which expose bare metal to an area larger than the size of a dime, touch up as follows:
      (a) Hand solvent clean and sand with 320 grit or finer sandpaper.
      (b) Clean with compressed air, hand solvent clean again, then wipe with a tack rag.
      (c) Apply a spray wash primer or (preferred method) brush chem film primer. Mask the area to minimize the amount of primer from spreading over the existing epoxy primer. Let cure according to the product manufacturers recommendations.
      (d) Mix and apply epoxy primer (MIL P-23377 or equivalent) to the affected area within four hours.
      (e) If an exterior painted surface, mix and apply polyurethane topcoat as directed by the paint manufacturer or supplier.

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FUEL, WEATHER AND HIGH-TEMPERATURE SEALING - MAINTENANCE PRACTICES

1. General

A. Procedures for application of sealants are provided for various types of sealing required for the airplane.

2. Tools and Equipment

NOTE: Specified sealants, cleaning solvents, parting agents, adhesion inhibitors and equipment are listed for use. Suitable substitutes may be used for sealing equipment only.

Table 201. Sealants Type I, Class A-1/2, or A-2-AMS-S-8802

NAME	NUMBER	MANUFACTURER	USE
Sealants	GC-408	Goal Chemical Sealant Corp. 3137 East 26th Street Los Angeles, CA 90023	Fuel, pressure and weather sealant brush application.
	Pro-Seal 890	PRC-DeSoto International 5454 San Fernando Rd. Glendale, CA 91209	
	PR-1440	PRC-DeSoto International	

Table 202. Sealants Type I, Class B-1/4, Quick Repair-MIL-S-83318

Sealant	GC-435	Goal Chemical Sealant Corp.	Fuel, pressure and weather sealant. For limited repairs requiring rapid curing sealant.

Table 203. Sealants Type I, Class B-1/2, B-2 or B-4-AMS-S-8802

NAME	NUMBER	MANUFACTURER	USE
Sealants	PR-1440	PRC-DeSoto International	Fuel pressure and weather sealant, suitable for application by extrusion gun and spatula.
	AC-236	Advanced Chemistry And Technology	
	CS 3204	Flamemaster Corporation	
	Pro Seal 890	PRC-DeSoto International	

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Table 204. Sealants Type I, Class C-20, C-48 or C-80

Sealant	Pro-Seal 890	PRC-DeSoto International	Fuel, pressure and weather sealant. Suitable for faying surface sealing.

Table 205. Sealants Type IV

Sealant	Dapco 2100	D. Aircraft Inc. Anaheim, CA 92807	Firewall and wire bundle sealing.
	Pro Seal 700	PRC-DeSoto International	Firewall sealing (except wire bundles).
	Q3-6077	Dow Corning	Wire bundle firewall sealing.

Table 206. Sealant Type VI

Sealant	FA-0606 125	HB Fuller St. Paul, MN 55116	Water and weather-tight acrylic latex sealant for windows and metal lap joints.
Sealant	SM8500	Schnee-Moorehead Irving, TX 75017	Water and weather-tight acrylic latex sealant for windows and metal lap joints.

Table 207. Sealant Type VIII, Class B-1/2 or B-2-MIL-S-8784

Sealant	PR-1428 Class	PRC-DeSoto International	Low adhesion access door, fuel, pressure and weather sealing.
	PR-1081 Class	PRC-DeSoto International	

Table 208. Sealant Type XI

Sealant	U000927S	Available from Cessna Parts Distribution Cessna Aircraft Company Department 701 5800 E. Pawnee Rd. Wichita, KS 67218-5590	Permanently pliable extruded tape for fixed windows.

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Table 209. Cleaning Solvents

NAME	NUMBER	MANUFACTURER	USE
1, 1, 1 - Trichloroethane Technical Inhibited (Methyl Chloroform)	Federal Specification ASTM D4126	Commercially Available	Presealing cleaning.
Methyl Propyl Ketone		Commercially Available	Cleaning organic coating.
Naphtha Type II	Federal Specification TT-N-95	Commercially Available	Presealing cleaning.
Cleaning compound	A-A-59281	Commercially Available	Presealing cleaning.
Isopropyl alcohol	Federal Specification TT-I-735	Commercially Available	Cleaning plastic (Except plastic transparencies).

Table 210. Parting Agents

NAME	NUMBER	MANUFACTURER	USE
Silicone compound	AS 8660	Commercially available	Prevent sealant sticking.
Petrolatum technical	Federal Specification VV-P-236	Commercially available	Prevent sealant sticking.

Table 211. Equipment

Pneumatic sealing gun.	Semco Number 250 with accessories (or equivalent)	PRC DeSoto International	Injection sealing.
Hand-operated sealing gun	Semco Number 850	PRC DeSoto International	Injection sealing.
Nozzles,		PRC DeSoto International	Application of sealant.
Round 1/16 orifice	Semco No. 420		
Round 1/8 orifice	Semco No. 440		
Duckbill	Semco No. 8615		

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Table 211. Equipment (continued)

Duckbill	Semco No. 8648		
Comb	Semco No. 8646		
Polyethylene cartridges with plungers and caps for sealant gun.		Commercially available	Application of sealant.
Metal spatulas with either stainless steel or glass plates.		Commercially available	Mixing sealant.
Plastic lined cups, wax-free with caps		Commercially available	Mixing sealant.
Sealant fairing tools		Commercially available	To fair in sealant.
Cheesecloth, lint-free		Commercially available	Cleaning.
Plastic scraper, 45-degree cutting edge.		Commercially available	Removing old sealant.
Durometer	Rex Model 1500 (or equivalent)	Rex Gauge Company, Inc. 3230 West Lake Avenue P.O. Box 46 Glenview, IL 60025	Testing cure of sealant.
Gloves, lightweight lint-free white cotton		Commercially available	Removing old sealant.
Nylon bristle brushes		Commercially available	Removing old sealant.
Pipe cleaners		Commercially available	Cleaning.
Funnel brushes		Commercially available	Cleaning.

3. Definition of Sealing Terms

A. The following definitions are included to provide a basic concept of the special terms used in sealing. This list is not all-inclusive but the more common terms are listed.

(1) Absolute Sealing - There can be no leakage allowed. All openings of any nature through the seal plane are positively sealed. This is the first level of sealing. (All holes, slots, joggles, fasteners and seams must be sealed.)

(2) Accelerator (Activator) - Curing agent for sealants.

(3) Application Time - The length of time sealant remains workable or suitable for application to structure by brush, extrusion gun, spatula or roller.

(4) Base Compound - The major component of a two-part sealing compound which is mixed with the accelerator prior to application to produce a fuel, temperature, pressure, weather and/or firewall sealing material.

(5) Brush Coat - Apply an overcoat or continuous film of appropriate sealing compound by use of a brush.

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(6) Fay Seal or Faying Surface Seal - A seal barrier created by the sandwiching of sealant between mating surfaces of structure. Special attention must be taken to avoid metal chips or dirt at the faying surface.
(7) Fillet Seal - Sealant material applied at the seam, joint or fastener after the assembly has all permanent fasteners installed and shall conform to the dimension in applicable figure.
(8) Hole - An opening that has no appreciable depth, such as a tool hole. Holes that penetrate the seal plane must be metal filled with a fastener, gusset or patch.
(9) Injection Seal - Filling of channels by forcing sealant into a void or cavity after assembly.
(10) Integral Tank - Composition of structure and sealant material which forms a tank that is capable of containing fuel without a bladder.
(11) Intermediate Seal - The second level of sealing. All holes, slots, joggles and seams in the seal plane must be sealed. A minor amount of leakage is tolerable and permanent fasteners are not required to be sealed.
(12) Post-Assembly Seal - A seal that is applied after the structure is assembled. (Fillet and injection seals.)
(13) Preassembly Seal - Sealant material that must be applied during or prior to the assembly of the structure. (Faying surface and pre-pack seals.)
(14) Pre-Pack Seal - A preassembly seal used to fill voids and cavities; can be a primary seal used to provide seal continuity when used in conjunction with a fillet seal. It can be used as a backup seal to support a fillet across a void. Fill the entire cavity to be prepacked. Usage as a primary seal should be kept to a minimum.
(15) Primary Seal - Sealant material that prevents leakage and forms a continuous seal plane. This seal is in direct contact with fuel, vapor, air, acid, etc. With few exceptions, it is in the form of a fillet seal.
(16) Sealant - A compound applied to form a seal barrier.
(17) Seal Plane - A surface composed of structure, sealant and fasteners on which the continuity of seal is established.
(18) Shank Sealing - Sealant compound shall be applied to the hole or to both the shank and the under head area of the fastener in sufficient quantity that the entire shank is coated and a small continuous bead of sealant is extruded out around the complete periphery of each end of the fastener when installed. The fastener shall be installed within the application time of the sealing compound used.
(19) Squeeze-Out Life - Length of time sealant remains suitable for structure assembly in faying surface seal application.
(20) Tack-Free Time - Tack-free time is a stage, during the cure of the sealant compound, after which the sealant compound is no longer tacky. When the sealant compound is pressed firmly with the knuckles, but no longer adheres to the knuckles, the sealant compound is tack-free.

4. Materials

A. Type of Sealants - Sealants are categorized by type of usage. Type I sealants are separated into classes to differentiate the materials according to method of application. Dash numbers following the class designation indicate the minimum application time (in hours) for Class A and Class B, and minimum work life (in hours) for Class C. Refer to Table 212 for application time, curing rate, etc., for Type I sealants.
(1) Type I - Fuel, pressure, and weather sealant.
(a) Class A - Sealant which is suitable for brush application.
(b) Class B - Sealant which is suitable for application by extrusion gun, spatula, etc.
(c) Class C - Sealant which is suitable in faying surface applications.
(d) Quick Repair Sealant - This material is for use only in making repairs when an extremely rapid curing sealant is required. A possible application includes sealing a leaking fuel tank on an airplane which must be dispatched within a few hours.

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CAUTION: Quick repair sealant must be applied within its working life of 15 minutes. Attempts to work quick repair sealant beyond working life will result in incomplete wetting of surface and will result in a failed seal.

(2) Type VIII - Low Adhesion Access Door Sealant. This Class B sealant is designed for sealing faying surfaces where easy separation of the joined surfaces is required. The sealant has low adhesion and forms a gasket that molds itself to fill all irregularities between two surfaces. The sealant is exceptionally resistant to fuels, greases, water, most solvents and oils including hydraulic oil.

NOTE: Time periods presented below are based on a temperature of 77°F (25°C) and 50 percent relative humidity. Any increase in either temperature or relative humidity may shorten these time periods and accelerate the sealant cure.

Table 212. Curing Properties of Type I Sealant

CLASS	APPLICATION TIME (HOURS, MINIMUM)	WORK LIFE (HOURS, MINIMUM)	TACK-FREE TIME (HOURS, MAXIMUM)	CURING RATE (HOURS, MAXIMUM)
A-1/2	1/2		10	40
A-2	2		40	72
B-1/2	1/2		4	6
B-2	2		40	72
B-4	4		48	90
C-24	8	24	96	168 (7 days)
C-48	12	48	120	336 (14 days)
C-80	8	80	120	504 (21 days)

5. General Requirements

A. When working with sealants, observe the following requirements.
(1) Unmixed sealants shall not be more than two months old when received. These sealants shall not be more than six months old when used.
(2) Unmixed sealants stored at temperatures exceeding 80°F (27°C) shall be used within five weeks.
(3) Sealants which have been premixed, degassed and flash frozen shall be maintained at -40°F (-40°C) or lower and shall not be received more than two weeks beyond the date of mixing. These sealants shall not be used more than six weeks after the date of mixing.
(4) Frozen sealant shall be thawed before being used. If sealant were applied at a temperature below 60°F (15°C), it would not be sufficiently pliable for proper application and adhesion could be critically reduced by condensation of moisture. On the other hand, although sealant must extrude freely for proper application, it would be subject to excessive slumping if applied at a temperature above 80°F (27°C). Frozen sealant may be thawed by any suitable means which does not cause contamination or overheating of the sealant and does not shorten the application time of the sealant to an impractical period. Examples: Thawing by exposure to ambient air temperature, accelerated thawing by exposure in a constant temperature bath (using clean, hot water), accelerated thawing in a microwave oven. In any case, thawing temperature and time shall be adjusted to give a thawed sealant temperature between 60°F, and 80°F (15°C and 27°C) at the time the sealant is applied.
(5) Mixed, frozen sealants which have thawed shall not be refrozen.
(6) Complete preassembly operations, such as fitting, filing, drilling, countersinking, dimpling and deburring, prior to cleaning and sealant application.

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(7) Surfaces must be clean and dry, free from dust, lint, grease, chips, oil condensation or other moisture and all other contaminating substances prior to the application of sealant.
   (a) All exposed bonding primer or bonded assemblies which are to be sealed shall be cleaned using Scotch Brite followed by solvent cleaning using Trichloroethane.

   NOTE: Bond primer shall not be removed, just lightly scuffed with Scotch Brite.

(8) Sealant materials may be applied to unprimed or primed surfaces. Nonchromated or epoxy primers shall have good adhesion to the substrate material and shall have aged at least 48 hours prior to sealant application. Adhesive bonding primer shall be scotchbrited and cleaned before applying sealant.
(9) Sealants shall not be applied when the temperature of either the sealant or the structure is below 60°F (15°C).
(10) Sealant applied by the fillet or brush coat methods shall always be applied to the pressure side of a joint if possible.
(11) After application, sealants shall be free of entrapped air bubbles and shall not exhibit poor adhesion. All fillets shall be smoothed down and pressed into the seam or joint with a filleting tool before the sealant application time has expired.
(12) Where fasteners have been shank or under head sealed, extruded sealant shall be evident around the complete periphery of the fastener to indicate adequate sealing. Sealant extruded through a hole by a rivet shall be wiped from the end of the rivet before bucking. Threaded fasteners which have been shank or under head sealed shall not be retorqued after the expiration of the application time of the sealant. Prior to torquing, sealant shall be removed from the threads. In torquing, turn the nut rather than the bolt, if possible.
(13) Pressure testing shall not be accomplished until the sealant is cured.
(14) Sealant shall not be applied over ink, pencil or wax pencil marks. If these materials extend into the sealing area, they must be removed.
(15) If sealing is to be accomplished over primer and the primer is removed during the cleaning process, it is permissible to seal directly over the cleaned area and then touch up the exposed areas after the sealant has been applied and is tack free.
(16) Sealed structure shall not be handled or moved until sealant is tack free (sealant may be dislodged or have the adhesion damaged). Excessive vibration of structure, such as riveting, engine run up, etc. is not permitted.
(17) Drilling holes and installing fasteners through a fay sealed area shall be performed during the working life of the faying sealant or the entire shank and area under fastener head shall be fay sealed.

6. Sealant Curing

A. Room Temperature.
   (1) Room temperature curing properties are based on a temperature of 77°F, +5 or -5°F (25°C, +3 or - 3°C) and a relative humidity of 50 percent unless otherwise indicated.
   (2) Room temperature curing properties of Type I sealants are given in Table 212.
   (3) Curing properties of Type VIII, Class B sealants are the same as for Type I, Class B. Adhesion to aluminum should be (peel) less than two pounds per inch width (1.4 N per 10 mm width).

B. Accelerated Curing.
   (1) Accelerated curing of sealant can be accomplished in several ways. The procedure to be used is dependent on the type of sealant and other factors.
   (2) The cure of Type I sealants can be accelerated by an increase in temperature and/or relative humidity. Warm circulating air at a temperature not to exceed 140°F (60°C) may be used to accelerate cure. Heat lamps may be used if the surface temperature of the sealant does not exceed 140°F (60°C). At temperatures above 120°F (49°C), the relative humidity will normally be so low (below 40 percent) that sealant curing will be retarded. If necessary, the relative humidity may be increased by the use of water containing less than 100 parts per million total solids and less than 10 parts per million chlorides.

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7. Mixing of Sealants

A. Requirements.
(1) Sealants shall be mixed or thinned in accordance with the manufacturers recommendations and thoroughly blended prior to application. All mixed sealant shall be as void free as possible.
(2) Prior to mixing, the sealing compound base and its curing agent, both in their respective original unopened containers, shall be brought to a temperature between 75°F and 90°F (24°C and 32°C) along with all required mixing equipment.

B. Sem-Kit Mixing. (Refer to Figure 201)

WARNING: The cartridge should be held firmly, but must not be squeezed, as the dasher blades may penetrate the cartridge and injure the hand.

(1) Pull dasher rod to the FULL OUT position so that the dasher is at the nozzle end of the cartridge.
(2) Insert ramrod in the center of the dasher rod against the piston and push the piston in approximately one inch (25 mm).

NOTE: Extra force will be needed on the ramrod at the beginning of accelerator injection into the base material.

(3) Move the dasher rod in approximately one inch (25 mm), then push piston in another inch (25 mm). Repeat this action until accelerator is distributed along the entire length of the cartridge.

NOTE: The accelerator has been fully injected into the cartridge when the ramrod is fully inserted into the dasher rod.

(4) Remove and properly discard the ramrod.

NOTE: Mixing the accelerator and base material can be accomplished manually, or as an alternate method, with the use of a drill motor.

(5) Manual Mixing.
(a) Begin mixing operation by rotating the dasher rod in a clockwise direction while slowly moving it to the FULL OUT position.

NOTE: Do not rotate the dasher rod counterclockwise; the four-blade dasher inside the cartridge will unscrew and separate from the dasher rod.

(b) Continue clockwise rotation and slowly move the dasher rod to the FULL IN position.
1 A minimum of five full clockwise revolutions must be made for each full out stroke and for each full in stroke of the dasher rod. Approximately sixty strokes are necessary for a complete mix.

NOTE: If streaks are present in the sealant (viewing through the side of the cartridge), the sealant is not completely mixed.

(c) End mixing operation with the four blade dasher at the bottom of the cartridge.
(d) Hold cartridge upright; unscrew dasher rod from the four blade dasher by gripping the cartridge at the four blade dasher and turn the dasher rod counterclockwise. Remove dasher rod.
(e) Screw appropriate nozzle into the cartridge. If sealant gun is to be used, install cartridge in gun.

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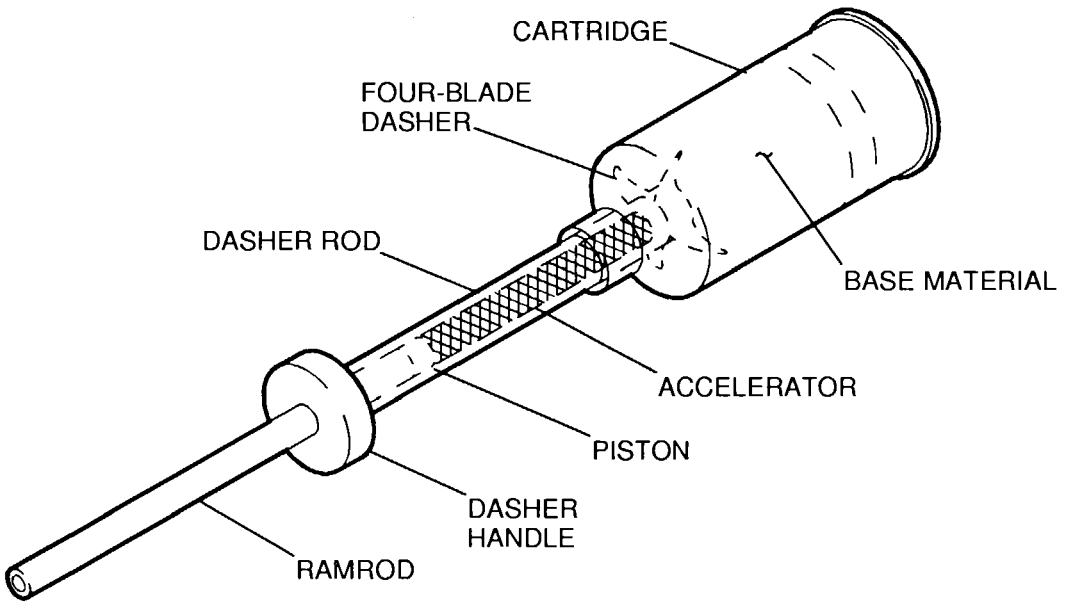

NOTE: CARTRIDGE IS DISPOSABLE AFTER USE.

5580T1044

Two-Part Sealant Cartridge
Figure 201 (Sheet 1)

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(6) Drill motor mixing.

NOTE: A tapered rotary file or a 25/64-inch drill bit may be used with a drill motor to turn the dasher rod.

(a) Insert the rotary file/drill bit into the dasher rod approximately 1/2 inch (13 mm).

WARNING: The cartridge should be held firmly, but not squeezed, as the dasher blades may penetrate the cartridge and injure the hand.

(b) Verify the drill motor will rotate the dasher rod clockwise (looking toward the nozzle end of the cartridge).

(c) With the cartridge held firmly in one hand and the drill motor in the other, rotate the dasher rod at approximately 50 revolutions-per-minute while moving the dasher rod to FULL IN and FULL OUT positions.

1 Mix sealant for at least 50 strokes (a stroke is one complete full in and full out stroke of the dasher rod).

NOTE: If streaks are present in the sealant (viewing through the side of the cartridge), the sealant is not completely mixed.

(d) End mixing operation with the four blade dasher at the bottom of the cartridge.

(e) Hold cartridge upright; remove drill motor and rotary file/drill bit from the dasher rod; unscrew dasher rod from the four blade dasher by gripping the cartridge at the four blade dasher and turn the dasher rod counterclockwise. Remove dasher rod.

(f) Screw appropriate nozzle into the cartridge. If sealant gun is to be used, install cartridge in gun.

8. Cleaning

A. All surfaces to which sealant is to be applied shall be clean and dry.

B. Remove all dust, lint, chips, shavings, etc. with a vacuum cleaner where necessary.

C. Cleaning shall be accomplished by scrubbing the surface with clean cheesecloth moistened with solvent. The cloth shall not be saturated to the point where dripping will occur. For channels and joggles, pipe cleaners and/or funnel brushes may be used instead of cheesecloth.

(1) The solvents to be used for the cleaning in the integral fuel tank are A-A-59281 or TT-M-261 for the first or preliminary cleaning. For the final cleaning, 0-T-620, 1, 1, 1 - Trichloroethane, Technical, Inhibited only must be used.

D. The cleaning solvent should never be poured or sprayed on the structure.

E. The cleaning solvent shall be wiped from the surfaces before evaporation using a piece of clean, dry cheesecloth in order that oils, grease, wax etc., will not be redeposited.

F. It is essential that only clean cheesecloth and clean solvent be used in the cleaning operations. Solvents shall be kept in safety containers and shall be poured onto the cheesecloth. The cheesecloth shall not be dipped into the solvent containers and contaminated solvents shall not be returned to the clean solvent containers.

G. Final cleaning shall be accomplished immediately prior to sealant application by the person who is going to apply the sealant.

(1) The area which is to be sealed shall be thoroughly cleaned. A small clean paint brush may be needed to clean corners, gaps, etc. Always clean an area larger than the area where the sealant is to be applied. Never clean an area larger than 30 inches (0.8 m) in length when practical. When the area is being scrubbed with a moistened cloth in one hand, another clean dry cloth shall be held in the other hand and shall be used to dry the structure. The solvent must be wiped from the surfaces before it evaporates.

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(2) The above procedure shall be repeated until there is no discoloration on the clean drying cloth. Marks resulting from wax or grease pencils must be removed from parts prior to sealing.

H. Allow all cleaned surfaces to dry a minimum of 5 minutes before the application of sealant materials.

I. Sealant shall be applied as soon as possible after cleaning and drying the surfaces to be sealed. Do not handle the parts between the cleaning and sealing operations. Sealant application personnel handling cleaned surfaces shall wear clean white gloves to prevent surface contamination. In the event contamination does occur, the surfaces shall be recleaned.

J. Safety precautions should be observed during the cleaning and sealing operation. Cleaning solvents are toxic and flammable in most cases. Fresh air masks and/or adequate ventilation are required for all closed areas. The structure shall be electrically grounded before starting any cleaning or sealing operation.

9. Sealing Application

A. General.
(1) All new sealing shall be accomplished using the type of sealing material required for the area being sealed. All sealant repairs shall be accomplished using the same type of sealing material as that which is being repaired.
(2) Application time of the sealing compound shall be strictly observed. Material which becomes too stiff and difficult to work or which does not wet the surface properly shall be discarded even though the application time has not expired.
(3) For an illustration of the integral fuel compartment and sealing techniques, refer to Figure 202.
(4) Prior to sealant application, all surfaces to be sealed shall be cleaned. Refer to Cleaning.

B. Fay Surface Sealing (Refer to Figure 202).
(1) A fay surface seal must be made when a new structure is added to the airplane and a fay surface seal is necessary.
(a) The fay sealed joints must be closed and attached before the work life is expired as given in Table 212.
(2) A fay surface seal must be made when the structure and/or parts have been disassembled for causes other than a defective seal.
(a) Fay sealed joints must be closed and attached before the work life is expired as given in Table 212.
(3) A fay sealed joint must have sufficient sealant applied so the space between the assembled fay surfaces is filled with sealant.
(a) A small quantity of sealant must come out in a continuous bead around the edges.
(4) Countersink or ream the holes through the fay sealed joints with temporary or permanent fasteners installed.
(a) Metal work operations must be completed before the clean and seal operations.

NOTE: Fabrication and changes done after the seal are not recommended.

(b) Countersink or ream holes through the fay sealed joint with permanent fasteners in every other hole.
1 Use temporary fasteners (Clecos or bolts) if assembly with permanent fasteners is not possible.
2 Temporary fasteners must be replaced by permanent fasteners before the expiration of the fay surface sealant.
3 Remove temporary fasteners and install permanent fasteners with wet sealing compound.
(5) Immediately after the assembly is completed and all permanent fasteners are installed, remove any sealant that has not cured and unwanted sealant with clean rags moist with A-A-59107, Toluene or Methyl n-Propyl Ketone.

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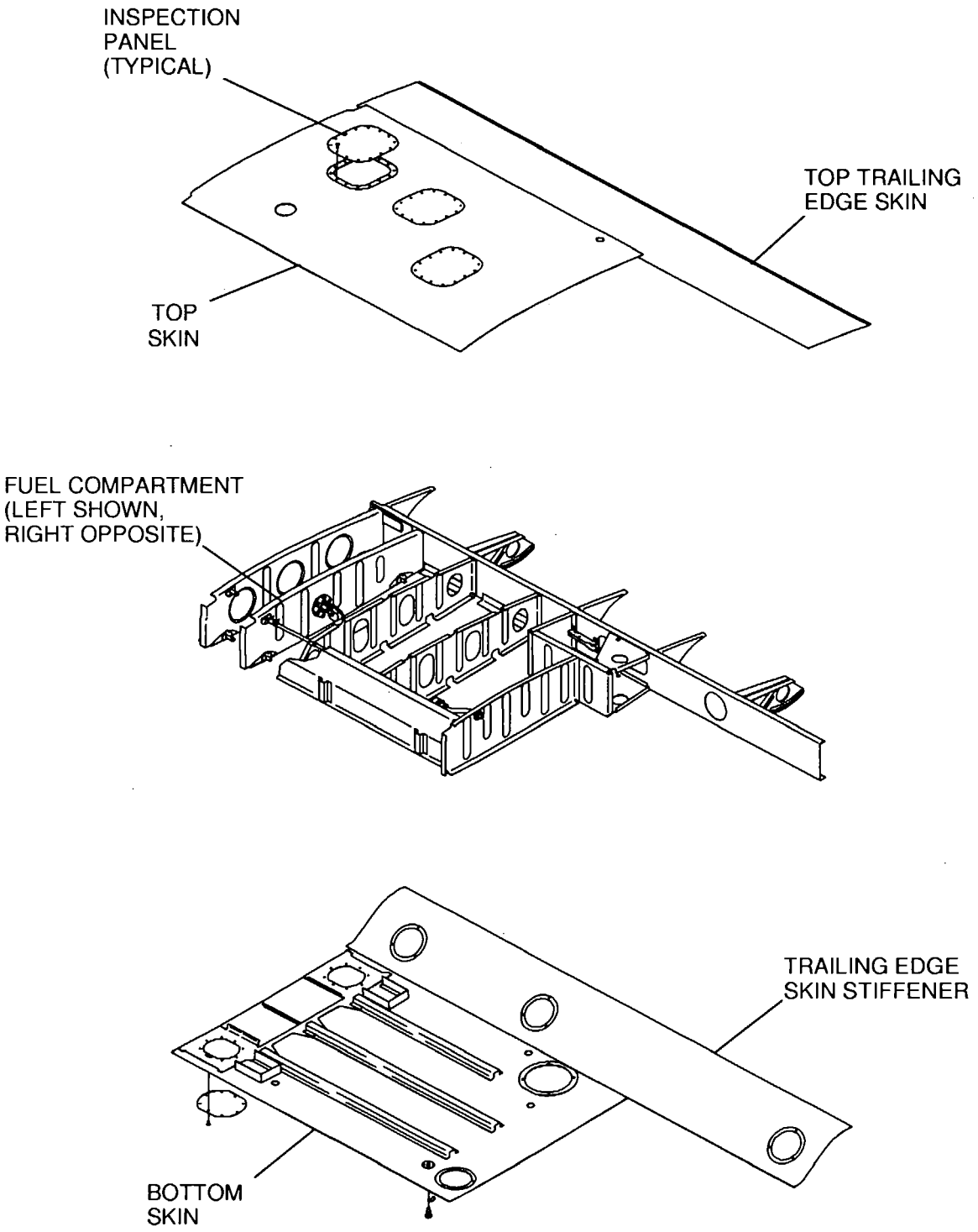

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05261011

Integral Fuel Compartment Sealing
Figure 202 (Sheet 1)

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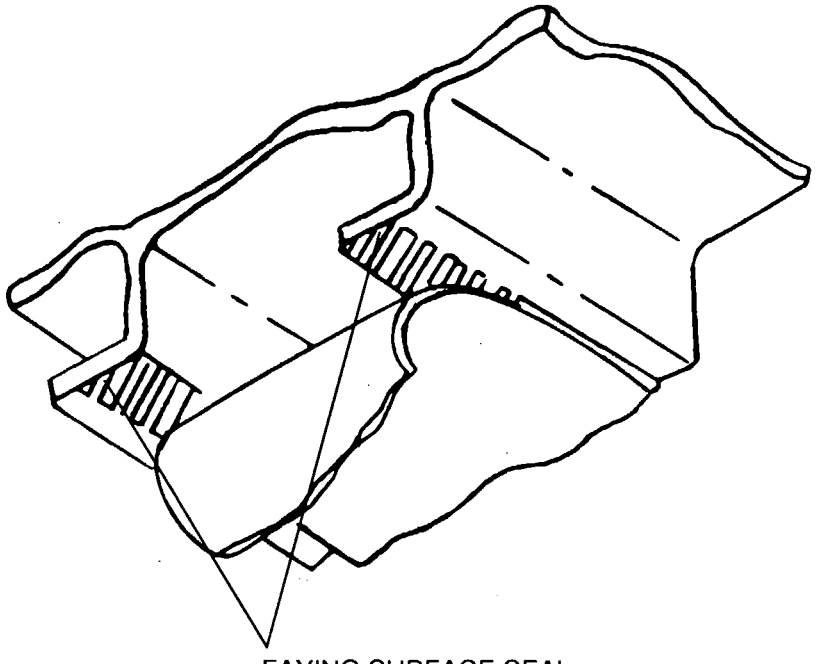

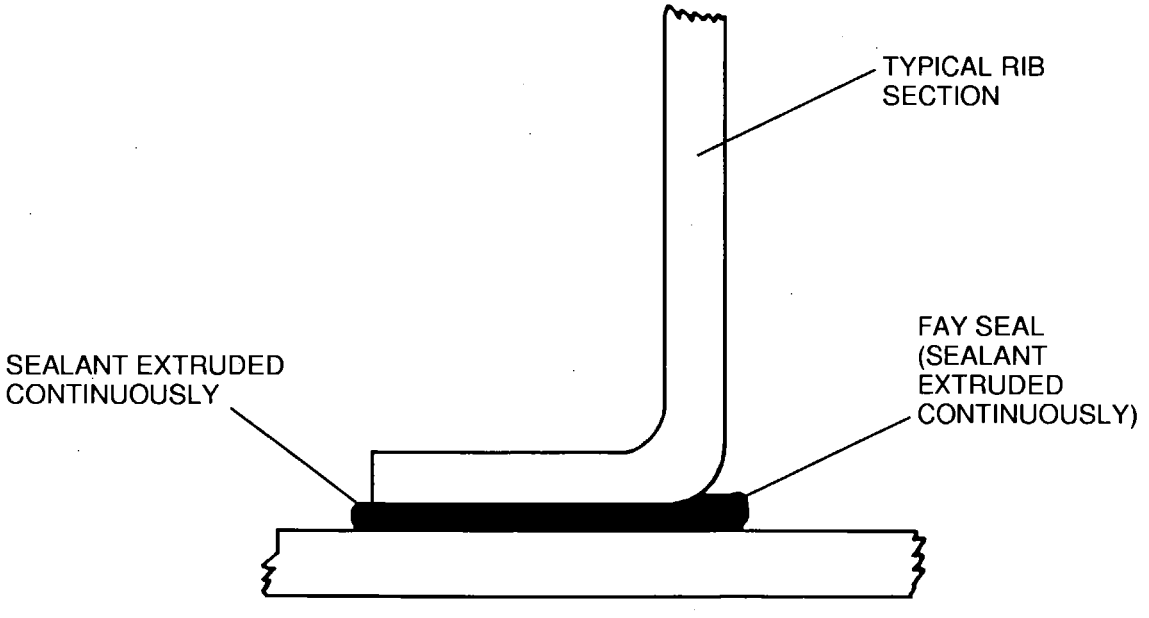

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Integral Fuel Compartment Sealing
Figure 202 (Sheet 2)

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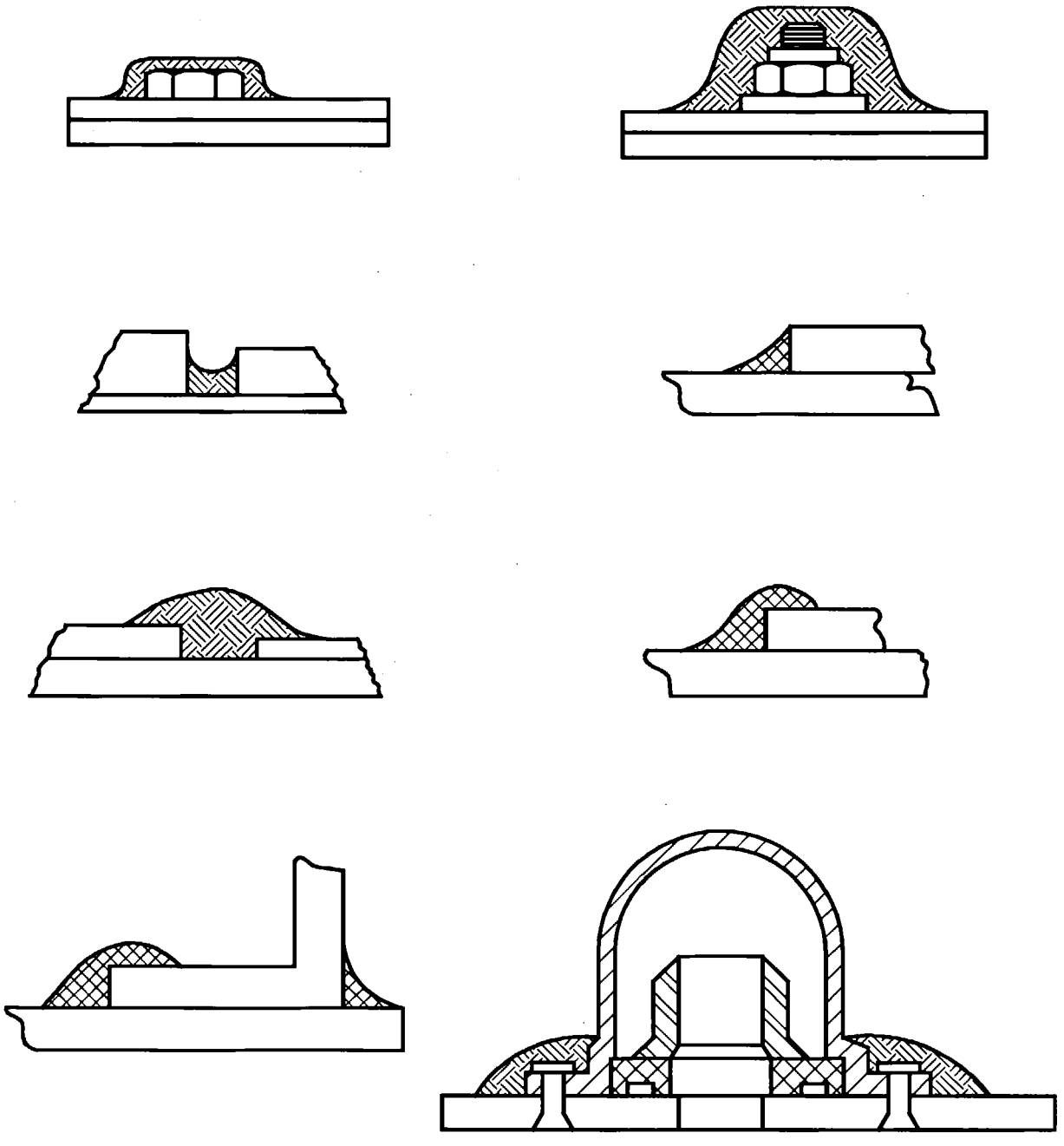

NOTE: THE EXAMPLES SHOW TYPICAL CROSS SECTIONS OF DIFFERENT SEAL METHODS USED IN THE FUEL COMPARTMENT. THE MINIMUM SEALANT THICKNESS AT ANY POINT MUST NOT BE LESS THAN 0.060 INCH (1.5 mm).

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Integral Fuel Compartment Sealing
Figure 202 (Sheet 3)

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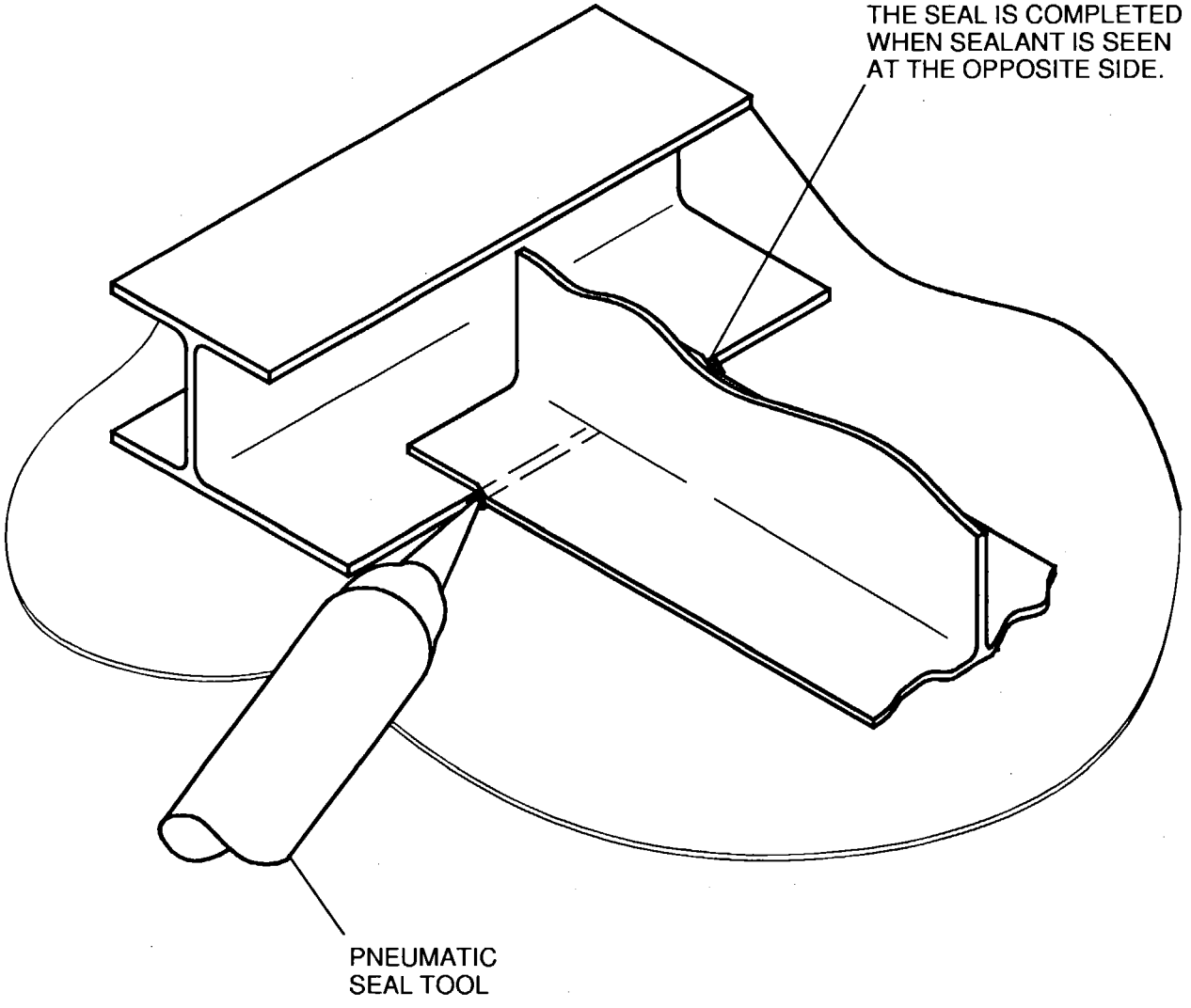

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Integral Fuel Compartment Sealing
Figure 202 (Sheet 4)

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C. Injection Sealing (Refer to Figure 202).
(1) Sealant must be put into the channel, void, or any open space from one point only with a pneumatic sealant tool.
(a) After sealant is added, air must not be trapped in the channel, void, or any open area.
(b) Sealant must be seen at the opposite opening.
1 Cause a blockage at each channel or exit as the sealer is applied in the area so that sealant is seen at the openings of all applicable channels.
(2) Sealant must be put into wire bundles that go through firewalls and bulkheads to fill any voids and open areas between the wires.
(a) Bundle ties must be no more than 6 inches (152.4 mm) from the location to be sealed.
(b) Pull the wires apart from each other.
1 Layer each wire with sealant over the length which goes through the bulkhead or seal assembly.
2 Layer each wire with sealant 0.5 inch (12.7 mm) added length on each side of the bulkhead or seal assembly.
3 Pull the wires through the bulkhead or seal assembly into position.
4 Fill the open areas of the wires that remain until the sealant is seen from the opposite side.
(3) Remove unwanted sealant before the work life of the sealant is expired.
(4) Use an applicable tool to make the sealant smooth and flush with the surface.

D. Fillet Sealing.
(1) Fastener considerations:
(a) Do not fillet seal any parts until they are held completely together by permanent fasteners.
(b) Prior to filleting the periphery of bolted structure and fittings, it is necessary that all bolts, accomplishing the attachment, be properly torqued.
(2) The sealant shall be applied using a sealant gun or spatula.
(3) When using a sealant gun for fillet sealing, the nozzle tip shall be pointed into the seam or joint and shall be maintained nearly perpendicular to the line of travel. A continuous bead of sealant shall precede the tip and the tip size, shape and rate of travel shall be such that sufficient sealant shall be applied to produce the required fillet.
(4) Fillets shall be shaped or formed to meet the size and shape requirements as shown in applicable figures using the nozzle tip and/or fairing tools to press against the sealant while moving parallel to the bead. Exercise caution to prevent folds and entrapment of air during application and shaping of the fillet and work out any visible air bubbles. The fillet shall be formed so that the highest portion of the fillet is centered over the edge of the structure or fitting. Lubrication in any form shall not be used for smoothing purposes. In all cases, fillet size shall be kept as near minimum as practical.
(5) Where it is more convenient or fillet slumping is encountered, the fillet may be applied in two stages. A small first fillet should be applied which is allowed to cure to a tack-free state, followed by a second application of sealant sufficient to form the final fillet conforming to the specified dimensions for a fillet seal. If the first fillet has cured, it must be cleaned before the second application of sealant is made. If the fillet has only cured to a tack-free state, it shall be wiped lightly with a gauze pad or cheesecloth pad dampened with cleaning solvent.
(6) Allow the sealant to cure to a tack-free condition prior to the airplane being moved, handled and/or worked on.
(7) In cases where a fillet seal connects to an injection seal, the full bodied fillet shall extend past the end of the injection and then taper out.
(8) Lap joint and seam fillets shall be as shown in Figure 202 .
(9) Butt joint fillets shall be as shown in Figure 202.
(10) Bolts shall be fillet sealed as shown in Figure 202. The area for sealing shall consist of the area of the structure surrounding the base of the fastener end plus the entire exposed area of the fastener. An optional method of sealing threaded fasteners is to apply a brush coat of Type I, Class A sealant. Where brush coating is used as the method of sealing threaded fasteners, the sealant must be worked around each fastener with a stiff brush and considerable care to be effective. A simple pass of the brush with the sealant is not sufficient to produce an effective seal.

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(11) Dome type nutplates shall be fillet sealed as shown in Figure 202. The area for sealing shall consist of the area of the structure surrounding the base of the fastener and from there up over the rivets to the dome.
(12) Hole filling and slot fillets shall be as shown in Figure 202.
(a) Tooling holes shall be plugged with a shank sealed soft rivet and then brush coated with Type I, Class A sealant.

10. Sealant Repair

A. Materials - Repairs, in general, shall be accomplished with the same type of material as that being repaired.

NOTE: Type I, Class B-1/2 is recommended for use during cold weather to obtain an accelerated cure.

NOTE: Type I, Quick Repair sealant may be used as a repair for sealant in fuel tanks if desired for fast cure and rapid dispatch.

B. Temperature Requirements.
(1) The structure shall be above 60°F (15°C) before the sealant is applied and shall remain above 60°F (15°C) until the sealant is tack-free.

NOTE: For outside operations only, the temperature of the structure may be allowed to drop below 60°F (15°C) but not below 58°F (14°C), after application for a period of time not to exceed 48 hours; however, the structure must be subsequently heated to above 60°F (15°C) and the sealant allowed to become tack-free before the tanks are refueled.

(2) The maximum air temperature allowed to come in contact with the curing sealant is 120°F (49°C).

C. Fillet and Fastener Sealing Repairs.
(1) Repair of damaged or faulty sealant applications shall be accomplished as follows:
(a) Remove all damaged or faulty sealant to ensure solid residual material.
(b) Sealant shall be cut to produce a smooth continuous scarfed face. The sealant shall be completely removed in the affected areas. The cutting tools should only be made from nonmetallic materials that are softer than aluminum.
(c) Inspect repair areas for clean and smooth cuts. Loose chunks or flaps of sealant on the cut areas shall be removed.
(d) Clean the area to be sealed, including the scarfed face of the old seal. Refer to Cleaning.
(e) Apply new fillet seals. Slight overlapping of the fresh material over the existing fillet is permissible. A large buildup of sealant shall not be allowed.
(f) Rework of a fillet which has been oversprayed or brushed with primer shall be accomplished by a scarfed joint and removal of the fillet having primer on it, in the area of the repair. The primer shall not be sandwiched between the old and new sealants.
(g) If the primer is removed during the cleaning operation, it is permissible to apply the new fillet seal directly over the clean bare metal and then touch up with the proper primer all exposed areas of bare metal after the sealant has been applied.

D. Faying Surface Sealing Repair - After determining the area which contains the faulty and/or leaking faying surface seal, the repair shall be accomplished by applying a fillet seal along the edge of the part adjacent to the faying surface seal long enough to fully cover the area of the faulty and/or leaking seal.

E. Brush Coat Sealing Repair - Repair of damaged or leaking brush coat seals shall be accomplished by removing the discrepant brush coat. Clean the area of sealant removal and the surrounding structure and sealant. Refer to Cleaning. Apply a new brush coat of sealant.

F. Integral Fuel Tank Sealing Using PR-1826 Class B Rapid Curing Sealant.
(1) Remove damaged section of sealant with a sharp plexiglass scraper. Taper all cuts in old sealant at 45-degree angles.

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(2) Thoroughly clean with solvent and abrade old areas which are to be over coated. Clean one small area at a time, then dry with a clean cloth before the solvent evaporates.

NOTE: Always pour solvent on the cloth to maintain a clean solvent supply.

NOTE: In fuel tanks which have been in operation, the sealant will be soaked and should be dried in area of the repair with a vapor proof heat lamp or hot air blower before new sealant is applied.

(3) After the surface has been cleaned and dried, apply a heavy layer of PR- 1826 Adhesion Promoter with a clean brush or gauze pad. Allow adhesion promoter a minimum of 30 minutes to dry.

NOTE: Care must be taken to obtain a uniform thin coat of adhesion promoter. Thin enough to cover the surface, but not heavy enough to run.

(4) Mix PR-1826 Class B sealant according to instructions supplied with the material.
(5) Apply PR-1826 Class B sealant, 0.125 to 0.375 inch (3.2 to 9.5 mm) thick, to the repair area with a spatula or paddle shaped tool. Firmly press sealant in place and form to desired shape. Overlap PR-1826 Class B sealant over old sealant from 0.125 to 0.25 inch (3.2 to 6.4 mm).

NOTE: Sealant may be applied up to 8 hours after the application of adhesion promoter. After 8 hours, the surface should be recleaned and adhesion promoter reapplied.

(6) Allow sealant to cure a minimum of 2 hours at 77°F (25°C) before refueling. Curing time is based solely on temperature and will be halved for every 18°F (10°C) increase, and doubled for every 18°F (10°C) decrease from the standard 77°F (25°C).

G. Firewall Wire Bundle Seal Assembly.
(1) Complete fay surface sealing of the mating parts of the seal assembly plate and the firewall. Refer to Sealing Application.
(a) Seal only with Type IV Dapco 2100 or seal with Type IV Q3-6077. Refer to Tools and Equipment.
(2) Complete injection sealing of the wire bundle that passes through the seal assembly. Refer to Sealing Application.
(a) Seal only with Type IV Dapco 2100 or seal with Type IV Q3-6077. Refer to Tools and Equipment.

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CONVERSION DATA - DESCRIPTION AND OPERATION

1. General

A. This section contains information for converting the more commonly used measuring units found in this manual from the common United States system to the International System of Units (metric system).

B. Other conversion factors may be found in manuals such as *Standard for Use of the International System of Units (SI): The Modern Metric System*, prepared by ASTM, 100 Bar Harbor Drive, West Conshohocken, PA 19428-2959 USA.

2. Conversion Factors

A. Distance and Length
   (1) Multiply inches by 25.4 to obtain mm (millimeters).
   (2) Multiply feet by 0.3048 to obtain m (meters).

B. Mass
   (1) Multiply ounces by 28.35 to obtain g (grams).
   (2) Multiply pounds by 0.436 to obtain kg (kilograms).

C. Temperature
   (1) Subtract 32 from degrees Fahrenheit and multiply by 5/9 to obtain degrees Celsius.

D. Torque
   (1) Multiply inch-pounds by 0.11298 to obtain Newton-meters.
   (2) Multiply foot pounds by 1.3588 to obtain Newton-meters.

E. Force
   (1) Multiply pounds of force by 4.4482 to obtain N (Newtons).

F. Pressure
   (1) Multiply pressure (psi) by 6.8948 to obtain kPa (kiloPascals).

G. Mass flow
   (1) Multiply pounds-per-hour by 1.26 X 10^{-4} to obtain kg/sec.

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CHAPTER 21

AIR CONDITIONING

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
21-Title		
21-List of Effective Pages		
21-Record of Temporary Revisions		
21-Table of Contents		
21-00-00	Page 1	Apr 7/2003
21-20-00	Page 1	Apr 7/2003
21-20-00	Pages 201-203	Apr 7/2003
21-21-00	Pages 201-206	Jan 2/2006
21-40-00	Pages 201-203	Apr 7/2003

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

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Tools, Equipment and Materials ..... 21-00-00 Page 1
Definition ..... 21-00-00 Page 1

FRESH AIR DISTRIBUTION - DESCRIPTION AND OPERATION ..... 21-20-00 Page 1
General ..... 21-20-00 Page 1
Description ..... 21-20-00 Page 1
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FRESH AIR DISTRIBUTION - MAINTENANCE PRACTICES ..... 21-20-00 Page 201
General ..... 21-20-00 Page 201
Air Outlet Valve Removal/Installation ..... 21-20-00 Page 201

AVIONICS COOLING FAN - MAINTENANCE PRACTICES ..... 21-21-00 Page 201
General ..... 21-21-00 Page 201
Cooling Fan Removal/Installation ..... 21-21-00 Page 201
Primary Function Display (PFD) Fan Removal/Installation ..... 21-21-00 Page 201
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Deck Skin Fan Removal/Installation ..... 21-21-00 Page 204
Tailcone Avionics Fan Removal/Installation ..... 21-21-00 Page 204
Primary Flight Display (PFD) and Multi-Function Display (MFD) Fan Operational Check ..... 21-21-00 Page 206

HEATING AND DEFROSTING - MAINTENANCE PRACTICES ..... 21-40-00 Page 201
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Shutoff Valve Removal/Installation ..... 21-40-00 Page 201
Control Cable Removal/Installation ..... 21-40-00 Page 203
Distribution System Components Removal/Installation ..... 21-40-00 Page 203

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AIR CONDITIONING - GENERAL

1. Scope

A. This chapter describes those units and components which furnish a means of ventilating and heating the cockpit/cabin area.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
Type II Sealant	PR1488	Courtaulds Aerospace 5426 San Fernando Rd. Glendale, CA 91209	To secure cabin duct to various air outlets.
Type IV Sealant	Pro-Seal 700	Courtaulds Aerospace	To seal shutoff valve to firewall.
Type IV Sealant	GC- 1900	Courtaulds Aerospace	To seal shutoff valve to firewall.

3. Definition

A. This chapter is divided into sections to aid maintenance technicians in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief description of the sections follows:

(1) The section on fresh air distribution describes that portion of the system used to induct and distribute fresh air throughout the cockpit/cabin area.

(2) The section on avionics cooling describes those components used to provide forced air cooling to the rear of the avionics racks.

(3) The section on heating describes those components used to generate and distribute heat for the cockpit/cabin area.

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FRESH AIR DISTRIBUTION - DESCRIPTION AND OPERATION

1. General

A. The cockpit/cabin area is ventilated with fresh air by means of external wing root openings, an adjustable air scoop, and internal ducting.

2. Description

A. Fresh air enters into the cabin from one of five sources. Four of those sources are located in the leading edge area of the wing (two left and two right) and the fifth source is located on the right side of the fuselage, between the firewall and the forward door post.

(1) Each wing leading edge area contains two inlet scoops. One inlet scoop feeds an air valve located at the wing leading edge/windshield intersection; and the other inlet scoop (located in the wing-to-fuselage fairing) feeds a pair of air valves located near the mid torso area (front seat) and overhead area (rear seat).

(2) Fresh air may also be introduced by an adjustable door located on the fuselage. This air is routed directly into the heated air plenum and is distributed through the heated air distribution system.

3. System Operation

A. The amount of fresh air entering the cabin can be controlled by any of the six air valves. Rotating the air valve will vary the airflow from fully closed to fully open.

B. Air flow into the cabin can also be controlled by the CABIN AIR control cable. Pulling the control aft allows the maximum amount of fresh air to flow through the heated air distribution system. Pushing the control forward closes the door and allows no fresh air to flow through the heated distribution system.

NOTE: Air temperature in the heated air distribution system can be altered by use of the CABIN HT control in conjunction with the CABIN AIR control. With the CABIN AIR control fully aft and the CABIN HT control full forward, only ambient temperature air fill flow through the heated air distribution system. As the CABIN HT control is gradually pulled out, more and more heated air will blend with ambient temperature air and be distributed through the heated air distribution system. Either one or both of the controls may be set at any position from full open to full closed.

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FRESH AIR DISTRIBUTION - MAINTENANCE PRACTICES

1. General

A. Fresh air outlet valves are located in the cockpit/cabin area at upper corners of the windshield, in the sidewalls just aft of the instrument panel, and above the passenger seat. Air outlet valve removal/installation is typical at each location.

2. Air Outlet Valve Removal/Installation

A. Remove Air Outlet Valve (Refer to Figure 201).
   (1) Remove retaining ring from air outlet valve.
   (2) Remove upholstery panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (3) Remove clamp securing ducting hose to air outlet valve adapter.
   (4) Remove air outlet valve and adapter.

B. Install Air Outlet Valve (Refer to Figure 201).
   (1) Install air outlet valve and valve adapter to ducting. Secure with clamp.
   (2) Install upholstery panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (3) Install retaining ring to air outlet valve.

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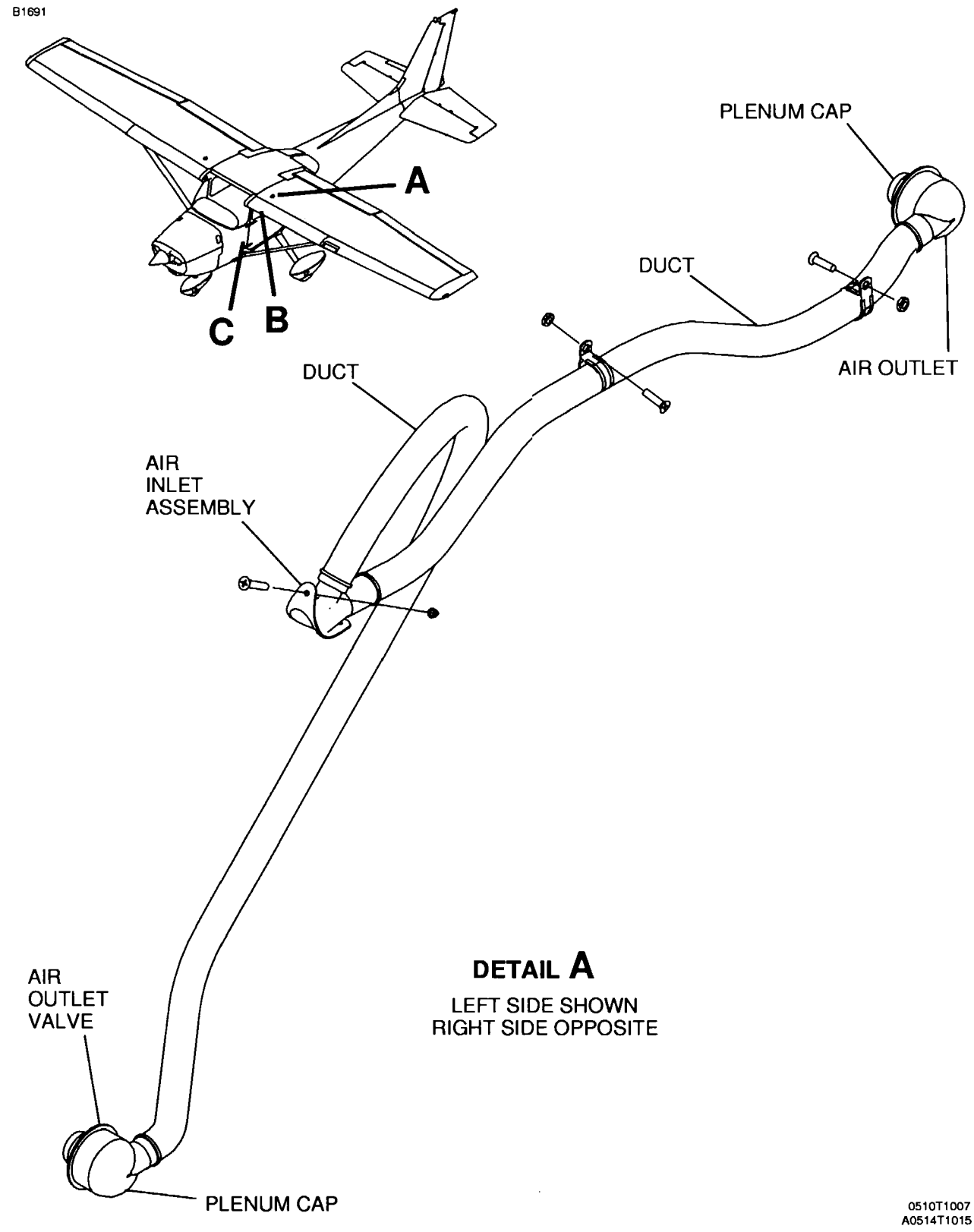

Fresh Air Distribution
Figure 201 (Sheet 1)

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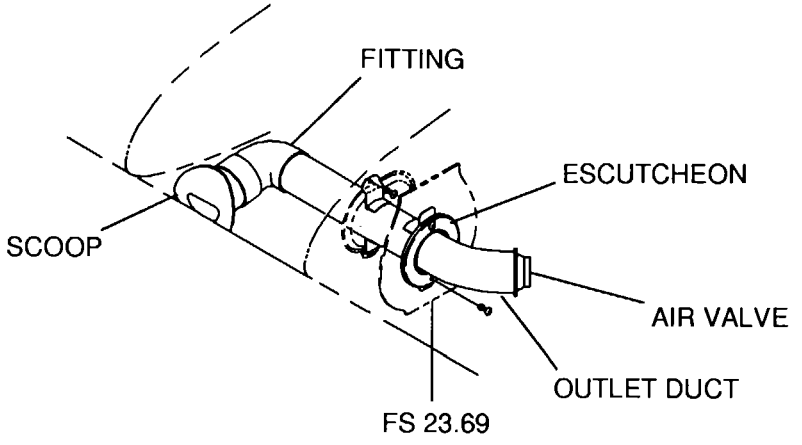
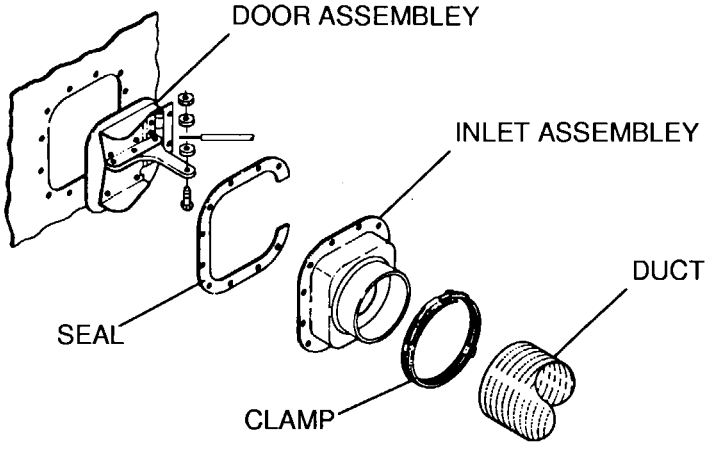


DETAIL B

RIGHT SIDE SHOWN
LEFT SIDE OPPOSITE



DETAIL C

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Fresh Air Distribution
Figure 201 (Sheet 2)

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AVIONICS COOLING FAN - MAINTENANCE PRACTICES

1. General

A. The avionics cooling fan is found behind the instrument panel and is used to make cool the different components in the radio stack. Maintenance on the system is only to remove and install the cooling fan and related ducts.

2. Cooling Fan Removal/Installation

A. Remove the Cooling Fan (Refer to Figure 201).
   (1) Make sure that the airplane MASTER and AVIONICS switches are in the off position.
   (2) Disconnect the negative lead from the battery terminal. Refer to Chapter 24, Battery - Maintenance Practices.
   (3) Remove the bolts that attach the cooling fan to the firewall.
   (4) Disconnect the electrical connector (PC901) from the avionics cooling fan.
   (5) Disconnect the flexible ducts from the cooling fan.
   (6) Remove the cooling fan from the airplane.

B. Install the Cooling Fan (Refer to Figure 201).
   (1) Connect the flexible ducts to the cooling fan. Install the tie wraps.
   (2) Connect the electrical connector (PC901) to the cooling fan.
   (3) Install the cooling fan to the firewall with the bolts.
   (4) Connect the negative lead to the battery terminal. Refer to Chapter 24, Battery - Maintenance Practices.
   (5) Do a test of the cooling fan for correct operation in the steps that follow.
      (a) Put the MASTER switch in the BAT position.
      (b) Put the AVIONICS master switch in the ON position.
      (c) Listen for the operation of the fan.
      (d) Put the AVIONICS master switch and the MASTER switch in the off positions.

3. Primary Function Display (PFD) Fan Removal/Installation

NOTE: The procedures that follow are for airplanes with Garmin G1000.

A. Remove the PFD Fan (Refer to Figure 202).
   (1) Record the fan airflow direction.
   (2) Make sure that the MASTER and AVIONICS switches are in the off position.
   (3) Remove the PFD. Refer to Chapter 34, Garmin Display Unit (GDU) - Maintenance Practices.
   (4) Remove the screws and nuts that attach the fan to the fan bracket.
   (5) Disconnect the electrical connector (PC1316) from the avionics fan.
   (6) Remove the fan from the airplane.

B. Install the PFD Fan (Refer to Figure 202).
   (1) Connect the electrical connector (PC1316) to the avionics fan.
   (2) Make sure that the airflow is directed to the PFD.
   (3) Install the screws and nuts that attach the fan to the fan bracket.
   (4) Complete a test of the fan.
      (a) Put the MASTER and AVIONICS switches in the ON position.
      (b) Listen for the operation of the fan.
   (5) Set the MASTER and AVIONICS switches in the off positions.
   (6) Install the PFD. Refer to Chapter 34, Garmin Display Unit (GDU) - Maintenance Practices.

4. Multi-Function Display (MFD) Fan Removal/Installation

NOTE: The procedures that follow are for airplanes with Garmin G1000.

A. Remove the MFD Fan (Refer to Figure 202).
   (1) Record the fan airflow direction.
   (2) Make sure that the MASTER and AVIONICS switches are in the off position.

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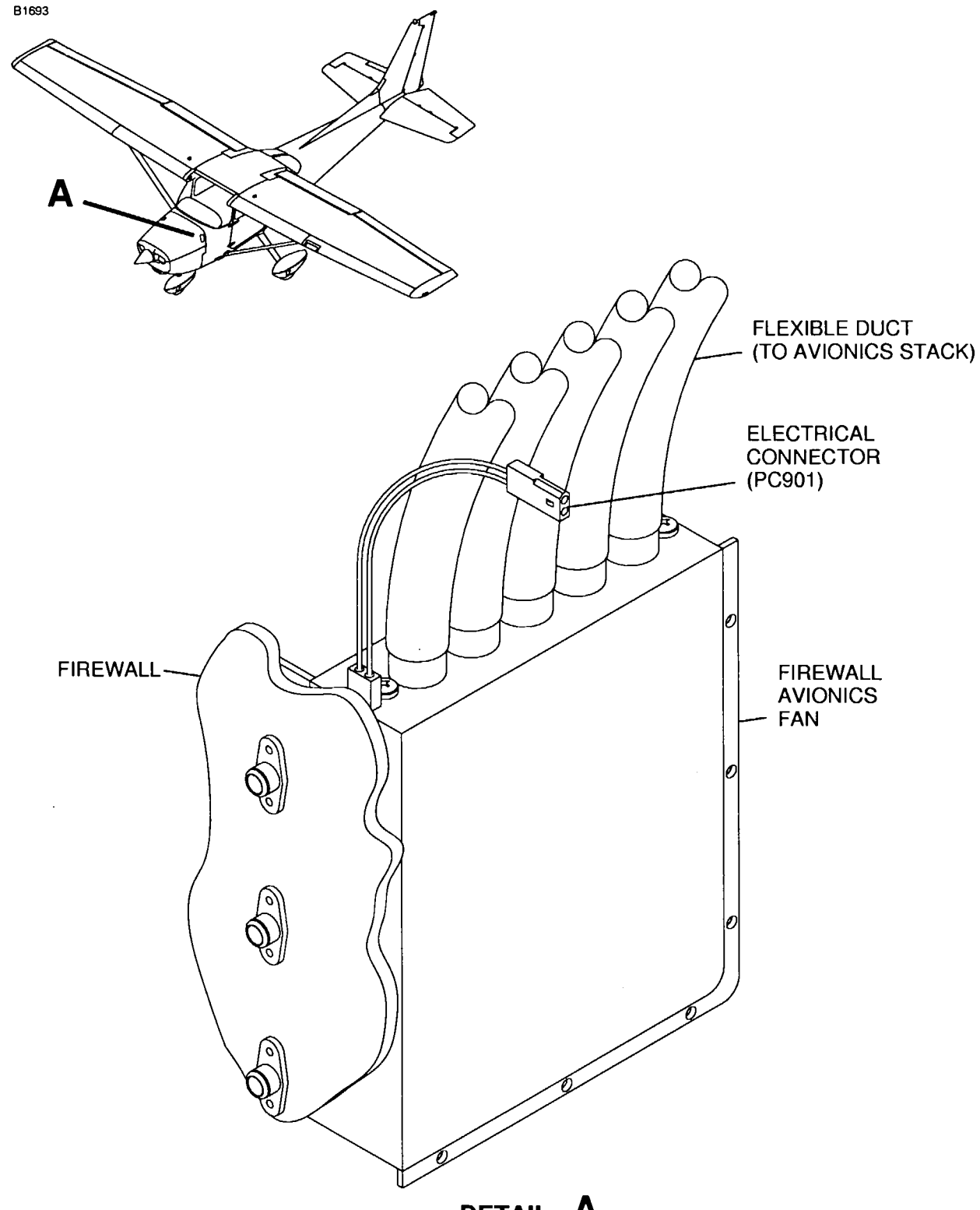

DETAIL A

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Avionics Cooling Fan Installation
Figure 201 (Sheet 1)

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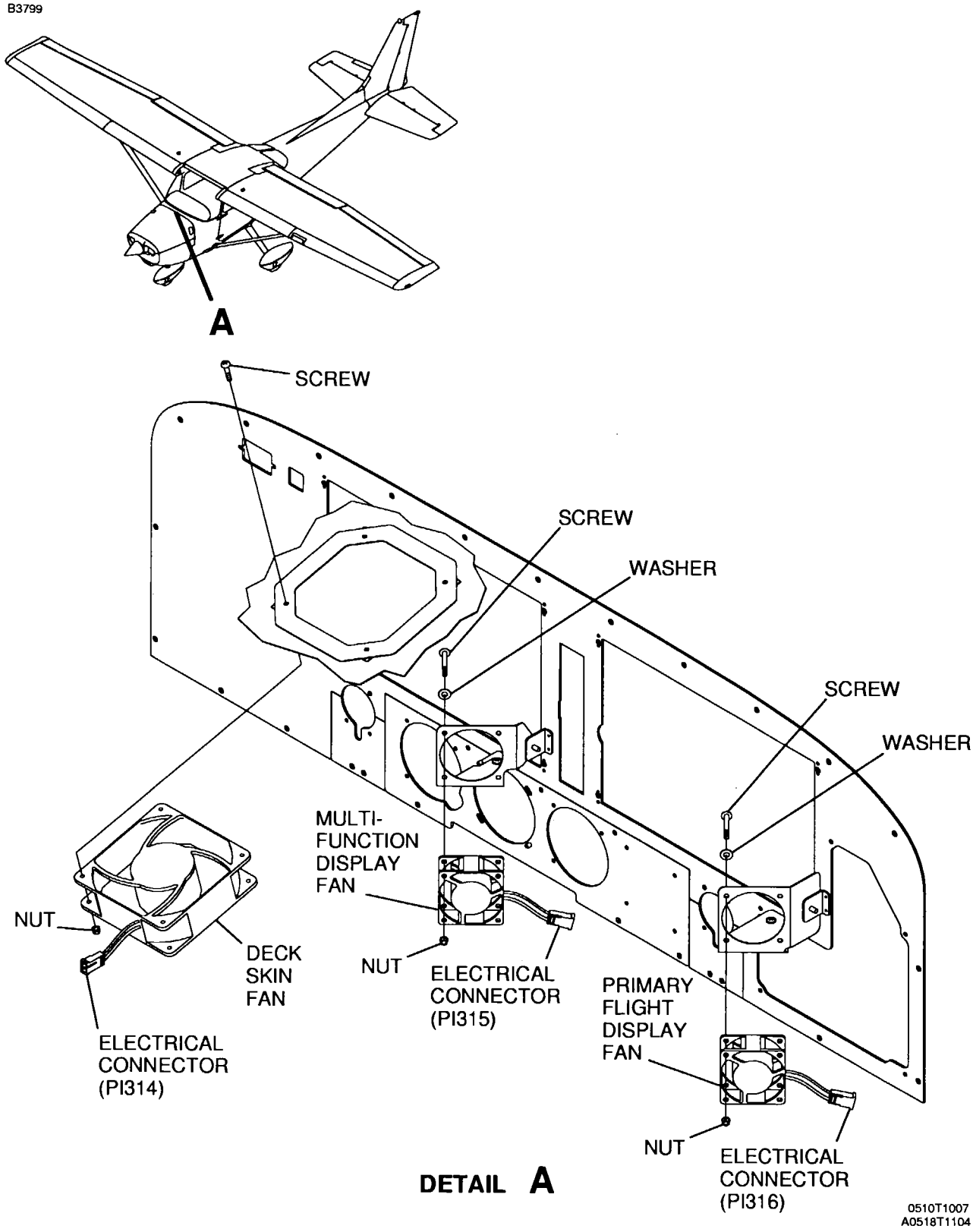

Avionics Cooling Installation
Figure 202 (Sheet 1)

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(3) Remove the turn coordinator. Refer to Chapter 34, Attitude and Direction - Maintenance Practices.
(4) Remove the screws and nuts that attach the fan to the fan bracket.
(5) Disconnect the electrical connector (PI315) from the avionics fan.
(6) Remove the fan through the turn coordinator hole.
(7) Remove the fan from the airplane.

B. Install the MFD Fan (Refer to Figure 202).
(1) Connect the electrical connector (PI315) to the avionics fan.
(2) Make sure that the airflow is directed to the MFD.
(3) Install the fan through the turn coordinator hole.
(4) Install the screws and nuts that attach the fan to the fan bracket.
(5) Complete a test of the fan.
(a) Set the MASTER switch and AVIONICS switch to the ON position.
(b) Listen for the operation of the fan.
(6) Set the AVIONICS switch and MASTER switch to the off positions.
(7) Install the turn coordinator. Refer to Chapter 34, Attitude and Direction - Maintenance Practices.
(8) Install the MFD. Refer to Chapter 34, Garmin Display Unit (GDU) - Maintenance Practices.

5. Deck Skin Fan Removal/Installation

NOTE: The procedures that follow are for airplanes with Garmin G1000.

A. Remove the Deck Skin Fan (Refer to Figure 202).
(1) Record the fan airflow direction.
(2) Make sure that the MASTER and AVIONICS switches are in the off position.
(3) Remove the PFD. Refer to Chapter 34, Garmin Display Unit (GDU) - Maintenance Practices.
(4) Remove the screws and nuts that attach the fan to the deck skin.
(5) Disconnect the electrical connector (PI314) from the deck skin fan.
(6) Remove the fan from the airplane.

B. Install the Deck Skin Fan (Refer to Figure 202).
(1) Connect the electrical connector (PI314) to the deck skin fan.
(2) Install the screws and nuts that attach the fan to the deck skin.
(3) Make sure that the airflow is directed at the windshield.
(4) Complete a test of the fan.
(a) Set the MASTER and AVIONICS switches to the ON position and listen for the fan operation.
(5) Set the AVIONICS and MASTER switches in the off positions.
(6) Install the PFD. Refer to Chapter 34, Garmin Display Unit (GDU) - Maintenance Practices.

6. Tailcone Avionics Fan Removal/Installation

NOTE: The procedures that follow are for airplanes with Garmin G1000.

A. Remove the Tailcone Avionics Fan (Refer to Figure 203).
(1) Make sure that the MASTER and AVIONICS switches are in the off position.

CAUTION: If the engine is removed, make sure there is a tailcone stand in position before you get inside the tailcone.

(2) Remove the baggage divider to get access inside the tailcone.
(3) Disconnect the electrical connector (PT901) from the fan.
(4) Disconnect the ducts from the fan.
(5) If necessary, remove the caps from the unused ports.
(6) Remove the fan from the avionics shelf.

B. Install the Tailcone Avionics Fan (Refer to Figure 203).
(1) Make sure the MASTER and AVIONICS switches are in the off position.

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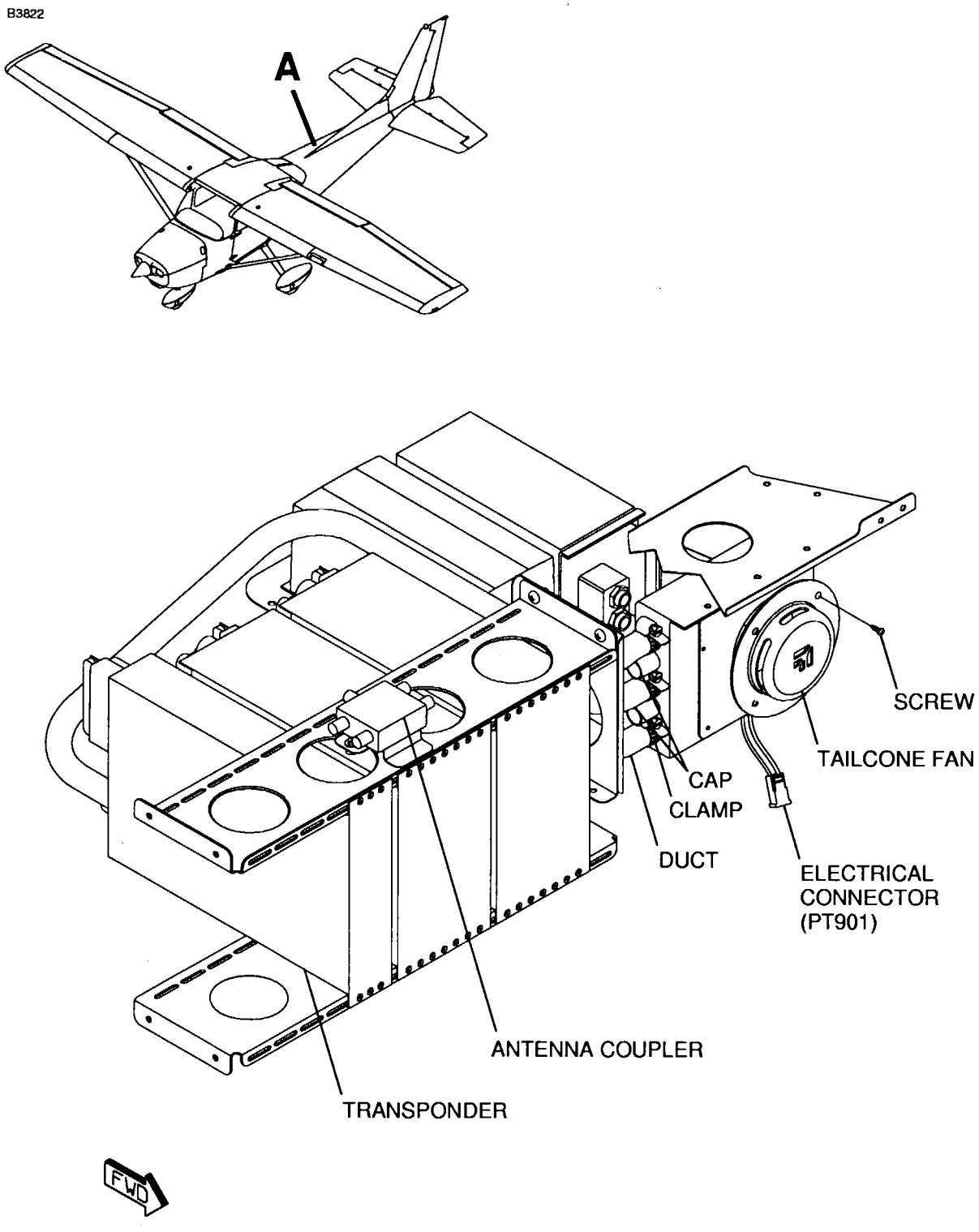

DETAIL A

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Tailcone Avionics Fan Installation
Figure 203 (Sheet 1)

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CAUTION: If the engine is removed, make sure there is a tailcone stand in position before you get inside the tailcone.

(2) Set the fan in position and attach it to the avionics shelf.
(3) Connect the ducts to the fan.
(4) If necessary, install the caps on the unused ports.
(5) Connect the electrical connector (PT901) to the fan.
(6) Set the MASTER and AVIONIC switches to the ON position.
(7) Examine the fan to make sure it operates.
(8) Set the baggage divider in position.

7. Primary Flight Display (PFD) and Multi-Function Display (MFD) Fan Operational Check

A. PFD and MFD Fan Operational Check (Refer to Figure 202).
(1) Remove the PFD and the MFD. Refer to Garmin Display Unit (GDU) - Maintenance Practices.
(2) Put the MASTER and AVIONICS switches in the ON position.
(3) Listen and look for the correct operation of both fans.
(4) Install the PFD and MFD. Refer to Garmin Display Unit (GDU) - Maintenance Practices.

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HEATING AND DEFROSTING - MAINTENANCE PRACTICES

1. General

A. The heating and defrosting system is comprised of the heat exchange section of the exhaust muffler, a shut-off valve mounted on the firewall, a push-pull control on the instrument panel, outlets, and flexible ducting connecting the system.

2. System Operation

A. Ram air enters the engine compartment through cowling inlets located aft of the propeller. A portion of this air is directed toward an exit point in the rear engine baffle. This air is directed, via ducting, to the heat exchange section of the exhaust muffler. As air passes into the heat exchange and around the exhaust muffler, it picks up heat from the engine exhaust. This heated air exits the heat exchange and is directed, via ducting, to a firewall shutoff valve. The shutoff valve is cable controlled from the cockpit, and controls the amount of heated air entering the cockpit area distribution plenum. From the plenum, various ducts distribute the heated air to floorboard and defroster outlets.

NOTE: The cockpit area distribution plenum is also plumbed to receive outside fresh air from the right hand external air scoop (door). This arrangement allows a combination of fresh air and heated air to be mixed and distributed throughout the system

3. System Troubleshooting

A. Most of the operational troubles in the heating, defrosting and ventilating systems are caused by sticking or binding air valves and their controls, damaged air ducting or defects in the exhaust muffler. In most cases, valves or controls can be freed by proper lubrication. Damaged or broken parts must be repaired or replaced. When checking controls, ensure that valves respond freely to control movement, that they move in the correct direction, and that they move through their full range of travel and seal properly. Check that hoses are properly secured, and replace hoses that are burned, frayed or crushed.

B. If fumes are detected in the cabin, a thorough inspection of the exhaust system should be accomplished. Since any holes or cracks may permit exhaust fumes to enter the cabin, replacement of defective parts is imperative, because fumes constitute an extreme danger.

4. Heat Exchanger Removal/Installation

A. Remove Exchanger (Refer to Figure 201).
(1) Remove engine cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
(2) Remove c-clamps securing flexible duct to heat exchanger.
(3) Remove sheet metal screws securing heat exchanger to itself.
(4) Carefully remove exchanger from around muffler.

NOTE: Anytime heat exchanger is removed from around muffler, muffler should be carefully examined and inspected for leaks or cracks. Refer to Chapter 5, Inspection Time Limits for normal inspection time frame. Refer to Chapter 78, Exhaust System - Maintenance Practices for inspection criteria of the muffler.

B. Install Exchanger (Refer to Figure 201).
(1) Carefully wrap heat exchanger around muffler.
(2) Secure heat exchanger to itself using sheet metal screws.
(3) Secure flexible duct to heat exchanger using c-clamps.
(4) Install engine cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

5. Shutoff Valve Removal/Installation

A. The shutoff valve is riveted to the firewall and is not removed from the airplane during normal maintenance. If valve is replaced, firewall should be sealed using Type IV sealant upon reattachment of shutoff valve to firewall. For a list of Type IV sealants, refer to Air Conditioning - General.

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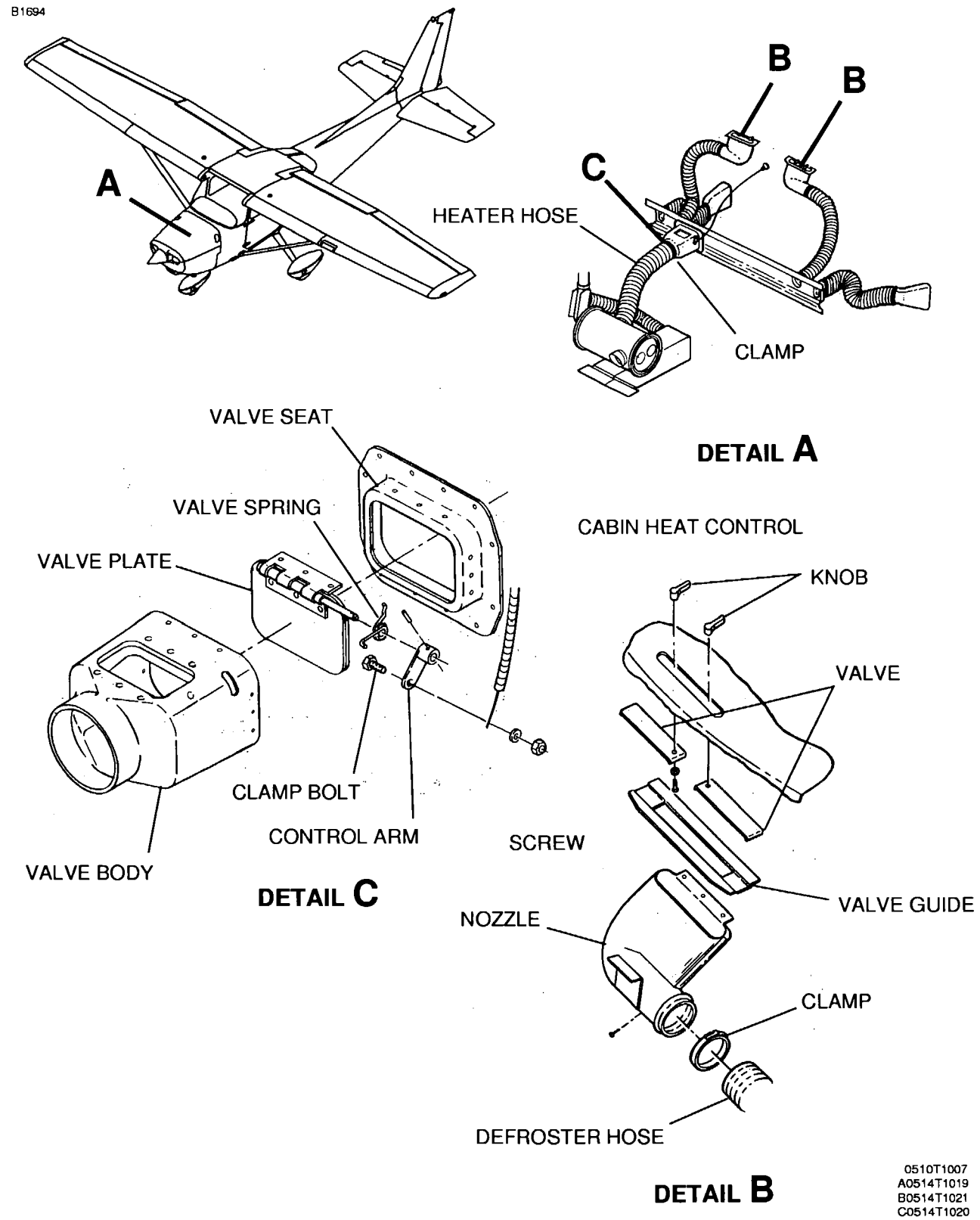

Heating and Defrosting Installation
Figure 201 (Sheet 1)

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6. Control Cable Removal/Installation

A. Remove Control Cable (Refer to Figure 201).
   (1) Remove engine cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
   (2) Carefully straighten end of cabin heat control cable.
   (3) Loosen clamp bolt on control arm and withdraw cable from control arm.
   (4) Loosen screws securing clamp bolt to firewall.
   (5) From inside the cabin, gain access to the backside of the CABIN HT control cable.
   (6) Loosen nut on backside of control cable.
   (7) Carefully withdraw cable from instrument panel and firewall.

B. Install Control Cable (Refer to Figure 201).
   (1) Thread end of control cable through hole in instrument panel and through hole in firewall.
   (2) Secure CABIN HT control cable to backside of instrument panel using existing jam nut.
   (3) Thread end of control cable through the clamp bolt.
   (4) Tighten clamp bolt and test control cable to ensure full range of travel.
   (5) When full range of travel has been established, bend end of control cable around clamp bolt area.
   (6) Install engine cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

7. Distribution System Components Removal/Installation

A. The majority of heated air distribution system components are riveted to the airframe and do not require replacement during normal maintenance. Ducts are secured to these components using c-clamps. If ducts become damaged or worn, they should be replaced with new hose of equal length.

B. Ducts are typically attached to various outlets using Type II sealant. For a list of Type II sealants, refer to Air Conditioning - General.

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CHAPTER

22

AUTO FLIGHT

LIST OF EFFECTIVE PAGES

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22-Title		
22-List of Effective Pages		
22-Record of Temporary Revisions		
22-Table of Contents		
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22-10-00	Pages 201-209	Jan 3/2005
22-10-00	Pages 601-606	Jan 3/2005
22-11-00	Pages 201-207	Jan 1/2008

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AUTO FLIGHT - GENERAL

1. Scope and Definition

A. This chapter has a single section that gives the removal and installation of the autopilot flight computers and pitch and roll servo actuators.

2. Tools, Equipment and Materials

NOTE: Equivalent alternatives can be used for the items that follow.

NAME	NUMBER	MANUFACTURER	USE
Test Stand	071-06028-0000	Honeywell International, Inc. 1 Technology Center Olathe, KS 66061	To hold the servo mount in position while the servo clutch torque setting is adjusted.
Adapter Tool	071-06021-0003	Honeywell International, Inc.	To adjust the servo clutch torque setting.
Adapter Pin	071-06021-0002	Honeywell International, Inc.	To adjust the servo clutch torque setting.

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AUTOPILOT - MAINTENANCE PRACTICES

1. General

A. A single axis autopilot with heading hold is on airplanes with IFR. Heading hold is used with directional gyro input and can have VOR, GPS or Localizer input as required.

B. A dual-axis autopilot is available. The dual-axis system gives both vertical speed and altitude hold selection.

2. Roll Servo Removal/Installation

A. Remove the Roll Servo (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the off position.
(2) Remove access panel 620AB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Disconnect the electrical connector from the roll servo.
(4) Release the control cable tension and loosen the roll servo control cable at the turnbuckle.
(5) Remove the cable guard and cable.
(6) Remove the screws that attach the roll servo to the bracket.
(7) Remove the roll servo from the airplane.
(8) Do an inspection of the servo. Refer to Servo Inspection.

B. Install the Roll Servo (Refer to Figure 201).
(1) Put the roll servo in position on the bracket.
(2) Attach with the screws.
(3) Connect the electrical connector to the roll servo.
(4) Install the roll servo control cable on the roll servo.
(5) Make sure the aileron and bell crank are in the neutral position.
(6) Wind the control cable around the servo drum approximately 1.25 turns in each direction from the swaged ball (drum ball detent inboard).
(7) Make sure the flanges of the control cable guard do not touch the control cable.
(8) Make sure the flanges of the control cable guard are on each side of the notches around the outer edge of the mount.
(9) Use the turnbuckle to adjust the roll servo control cable tension to 15 pounds, +3 or -3 pounds (66.7 N, +13.34 or -13.34 N).
(10) Install the access panel 620AB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(11) Put the MASTER and AVIONICS switches in the ON position.
(12) Do a test of the autopilot to make sure it operates correctly. Refer to Introduction, the List of Manufacturers Technical Publications for the manufacturer's installation manual.

3. Pitch Servo Removal/Installation

A. Remove the Pitch Servo (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the off position.
(2) Remove access plates 310AR, 340AL and 340AR. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Disconnect the electrical connector from pitch servo.
(4) Release the cable tension and loosen the pitch servo cable at the turnbuckle.
(5) Remove the cable guard and cable.
(6) Remove the bolts that attach the pitch servo to the bracket assembly.
(7) Remove the pitch servo from the airplane.
(8) Do an inspection of the servo. Refer to Servo Inspection.

B. Install the Pitch Servo (Refer to Figure 201).
(1) Put the pitch servo in position on the bracket assembly and attach with the bolts.
(2) Connect the electrical connector to the pitch servo.
(3) Install the pitch servo control cable on the pitch servo actuator.
(4) Make sure the aileron and bell crank are in the neutral position.

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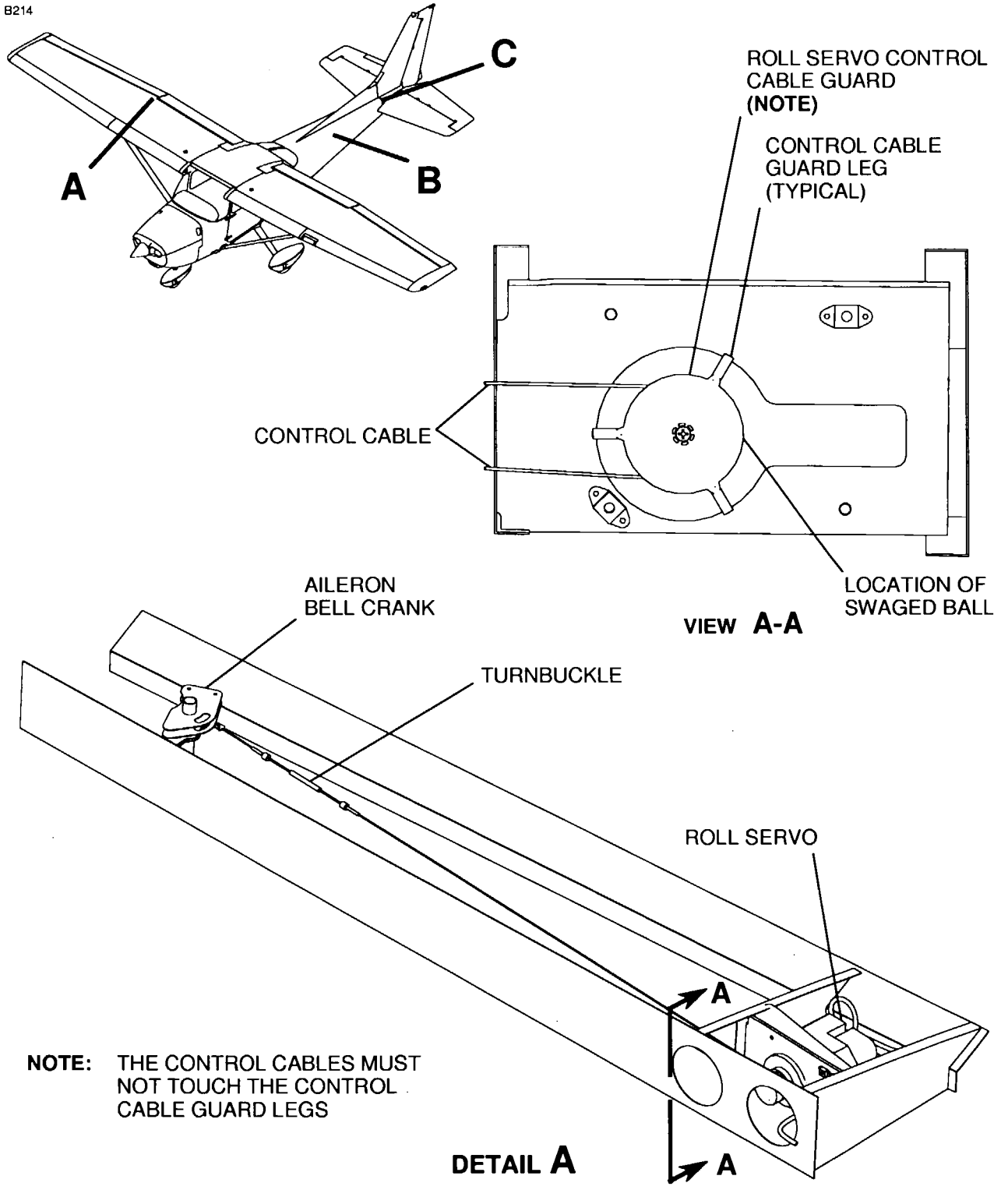

Autopilot Servo Installation
Figure 201 (Sheet 1)

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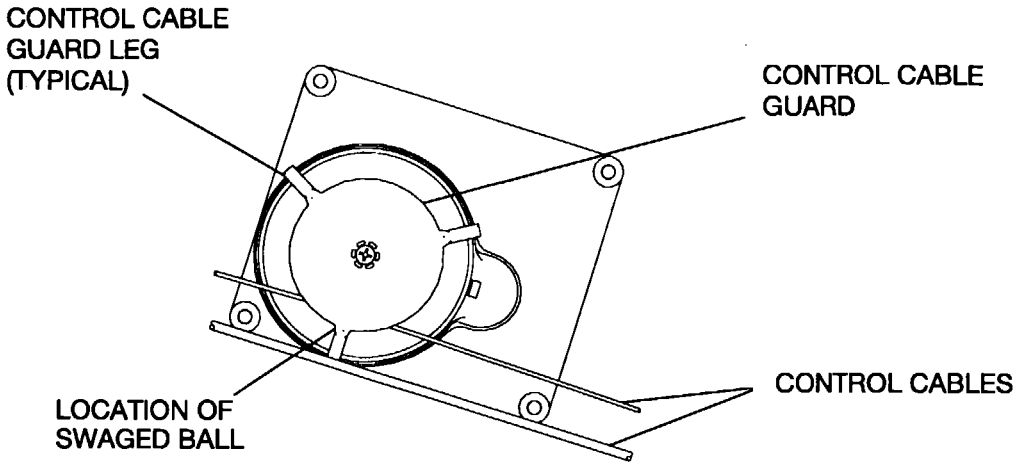

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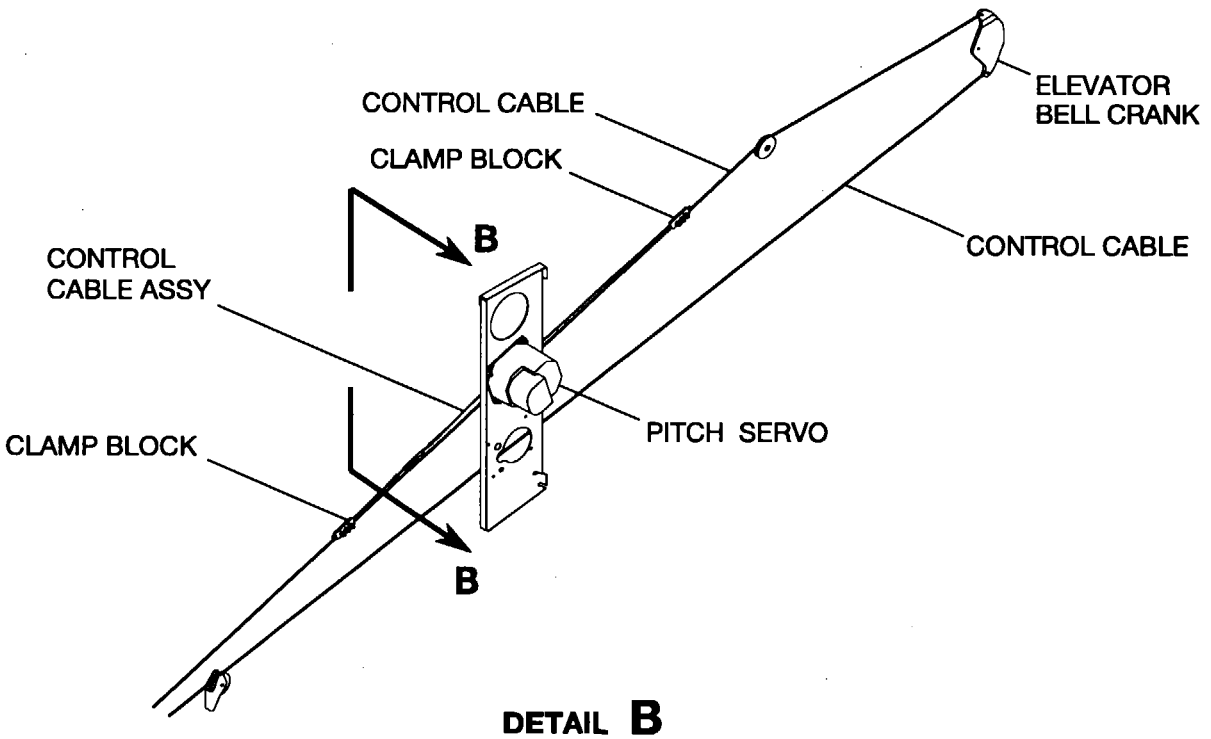

DETAIL B

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Autopilot Servo Installation
Figure 201 (Sheet 2)

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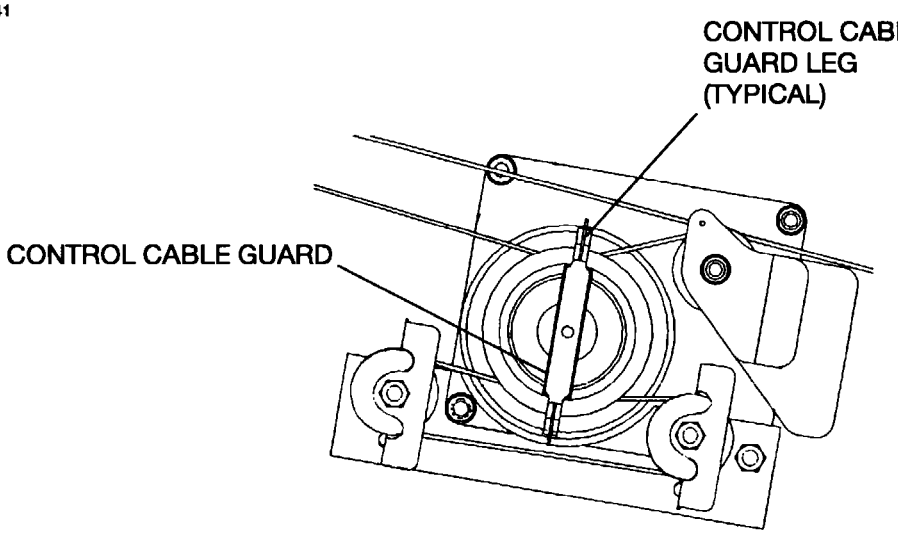

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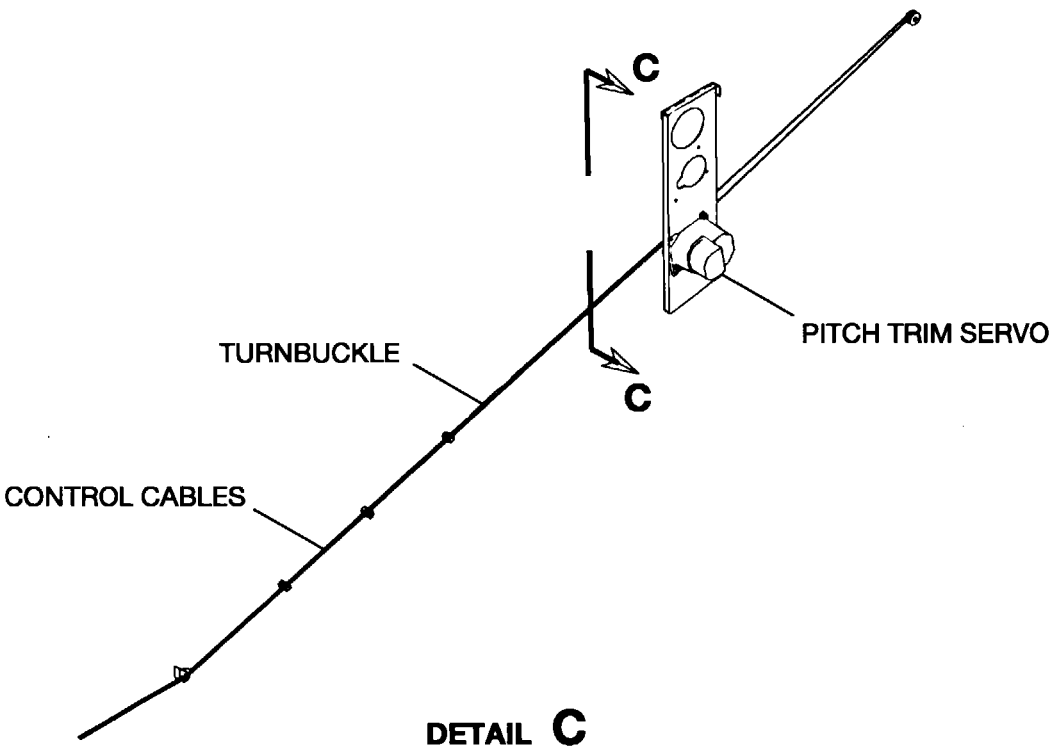

DETAIL C

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Autopilot Servo Installation
Figure 201 (Sheet 3)

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(5) Wind the control cable around the servo drum approximately 1.25 turns in each direction from the swaged ball (drum ball detent inboard).
(6) Make sure the flanges of the control cable guard do not touch the control cable.
(7) Make sure the flanges of the control cable guard are on each side of the notches around the outer edge of the mount.
(8) Use the turnbuckle to adjust the pitch servo cable tension to 15 pounds, +3 or -3 pounds (66.7 N, +13.34 or -13.34 N).
(9) Install access plates 310AR, 340AL and 340AR. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(10) Put the MASTER and AVIONICS switches in the ON position.
(11) Do a test of the autopilot to make sure it operates correctly. Refer to Introduction, the List of Manufacturers Technical Publications for the manufacturer's installation manual.

4. Pitch Trim Servo Removal/Installation

A. Remove the Pitch Trim Servo (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the off position.
(2) Remove access plates 310AR, 340AL and 340AR. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Disconnect the electrical connector from the pitch trim servo.
(4) Release the cable tension and loosen the pitch trim servo cable at the turnbuckle.
(5) Remove the cable guard and the cable.
(6) Remove the bolts that attach the pitch trim servo to the bracket assembly.
(7) Remove the pitch trim servo from the airplane.
(8) Do an inspection of the servo. Refer to Servo Inspection.

B. Install the Pitch Trim Servo (Refer to Figure 201).
(1) Put the pitch trim servo in position on the bracket assembly and attach with the bolts.
(2) Connect the electrical connector to the pitch trim servo.
(3) Install the pitch trim servo cable on the pitch trim servo actuator.
(4) Make sure the flanges of the control cable guard do not touch the control cable.
(5) Make sure the flanges of the control cable guard are on either side of the notches around the outer edge of the mount.
(6) Use the turnbuckle to adjust the pitch trim servo control cable tension to 15 pounds to 20 pounds (66.7 N to 88.9 N).
(7) Install access plates 310AR, 340AL and 340AR. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(8) Put the MASTER and AVIONICS switches in the ON position.
(9) Do a test of the autopilot to make sure it operates correctly. Refer to Introduction, the List of Manufacturers Technical Publications, for the manufacturer's installation manual.

C. Do a check of the pitch trim rigging.
(1) Attach an inclinometer to the trim tab.
(2) Put the trim tab in the 0 degree position.
(3) Manually operate the trim tab to the up and down limits.
(4) Record the limits of travel.
(5) Put an observer at the right-hand access opening of the tailcone.
(6) Put the electrical trim to the full nose-up position until the observer sees the clutch slip.
(7) Turn the manual trim wheel nose-up (test load condition) 1/4 turn more while the clutch slips.
(8) Make sure the swaged ball on the control cable assembly does not turn aft of the tangent point.
(9) Release the trim wheel and disengage the autopilot.
(10) Manually operate the trim to the full nose-up position.
(11) Do a check of the trim tab position with an inclinometer.
(12) Trim tab position that is greater than the limits of travel values recorded is an indication that the stop blocks slipped.
(a) Do the trim system rigging again.
(b) Make sure the stop block bolts torque is correct.
(c) Repeat the check of the pitch trim rigging.

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(13) If necessary, make adjustments to the swaged ball position.
  (a) Put the control cable assembly chain in the applicable position on the gear teeth of the actuator sprocket.

    NOTE: One chain link adjustment is related to approximately 17 degrees of travel on the capstan.

  (b) Apply the applicable tension to the control cable and repeat the check of the pitch trim rigging.
(14) Do the procedure again for the full nose-down trim condition.

5. Servo Capstan Clutch Adjustment

A. Do a check of the clutch torque setting.
  (1) Remove the servo capstan.
  (2) Remove the control cable guard from the servo capstan.
  (3) Attach the servo capstan on the capstan test stand. Refer to Autopilot - General for a list of tools and equipment.
  (4) Place the adapter tool over the servo capstan.
  (5) Insert the adapter pin from the straight up position to attach the adapter tool.
  (6) Insert the torque wrench.
  (7) Apply 28 VDC (1 amp maximum) electrical power to the test stand.
  (8) Do a check of the torque reading with the test stand motor in the clockwise operation.

    NOTE: The check of the torque reading will be done three times.

    (a) Put the capstan switch in the clockwise position.
    (b) Record the torque reading of the torque wrench.
    (c) Put the switch in the off position.
  (9) Do a check of the torque reading with the test stand motor in the counterclockwise operation.

    NOTE: The check of the torque reading will be done three times.

    (a) Put the capstan switch in the counterclockwise position.
    (b) Record the torque reading of the torque wrench.
    (c) Put the switch in the off position.
  (10) Average the six torque readings.

    NOTE: The torque reading to be used is the average of the six torque readings.

  (11) Refer to Table 201 for the correct torque reading of the servo capstan.

Table 201. KAP-140 Autopilot Servo Clutch Torque Setting

Servo	Clutch Plate Torque
Roll	55, +5 or -5 inch-pounds (6.2, +0.56 or -0.56 N-m)
Pitch	18, +2 or -2 inch-pounds (2.0, +0.23 or -0.23 N-m)
Pitch Trim	30, +3 or -3 inch-pounds (3.39, +0.34 or -0.34 N-m)

    (a) If the torque indication is below the value given in Table 201, rotate the clutch adjust nut clockwise and do the check of the torque readings again.
    (b) If the torque indication is above the value given in Table 201, rotate the clutch adjust nut counterclockwise and do the check of the torque readings again.
  (12) Record the slip clutch torque indication, airplane type, axis and date on the decal attached to the servo mount body.

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(13) Install the control cable guard on the servo capstan.
(14) Install the servo capstan.

6. Set the Autopilot Roll Null

A. Set the Autopilot Roll Null (If the Autopilot is Installed).
(1) Make sure the autopilot flight computer completes the pre-flight test.
(2) Disconnect the roll servo connector from the airplane harness.
(3) Apply a ground to pin K of the harness connector.
(4) Connect a digital multimeter across the harness connector at pins D and L to monitor the servo drive voltage.
(5) Push the autopilot AP button on the autopilot flight computer to engage it.
(a) Make sure the default ROL mode is set.

NOTE: For example, the HDG, NAV or APR modes are not engaged.

(b) Use a DMM to measure the DC voltage across pins D and L of the roll servo harness connector.
(c) Adjust the pot until a value of 0 volts, +0.020 or -0.020 volts are measured.
1 If the end of the pot movement is reached before the servo drive is nulled, disengage the autopilot, turn the pot fully to the opposite stop and then engage the autopilot.
(d) The roll null adjustment range emulates a four turn pot that lets the method of the pot adjustment range to be set.

NOTE: This adjustment lets offsets be in the roll axes. This includes the turn coordinator.

(e) Continue to turn the pot to null the voltage.
(6) Connect the airplane roll servo harness connector to the servo connector.

7. KAP-140 Autopilot Controller Removal/Installation

A. Remove the Autopilot Controller (Refer to Figure 202).
(1) Make sure the AVIONICS and MASTER switches are in the off position.
(2) Loosen the mounting screw on the face of the autopilot controller.
(3) Move the autopilot controller aft and remove from the mounting tray.
(4) Disconnect the electrical connector and static line.

B. Install the Autopilot Controller (Refer to Figure 202).
(1) Connect the electrical connector and static line.
(2) Put the autopilot controller in position in the mounting tray.
(3) Tighten the mounting screw on the face of the autopilot controller.
(4) Make sure the static system does not leak. Refer to Pitot/Static Systems - Maintenance Practices.
(5) Do a test of the autopilot to make sure it operates correctly. Refer to Introduction, the List of Manufacturers Technical Publications, for the manufacturer's installation manual.

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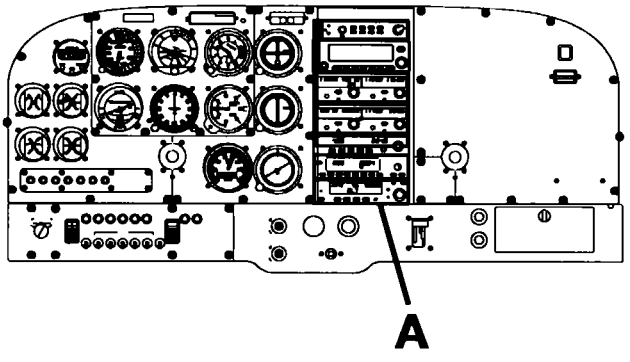

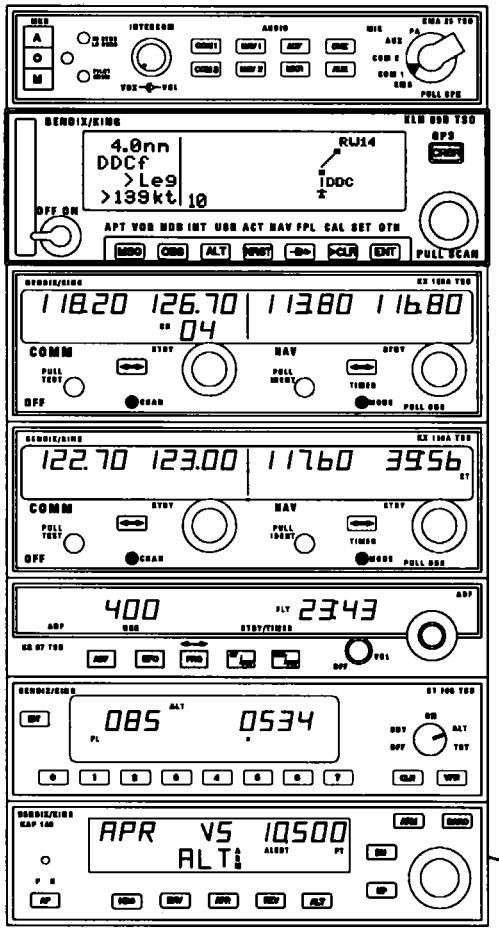

DETAIL A
(STANDARD EQUIPPED AIRCRAFT)

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KAP-140 Autopilot Installation
Figure 202 (Sheet 1)

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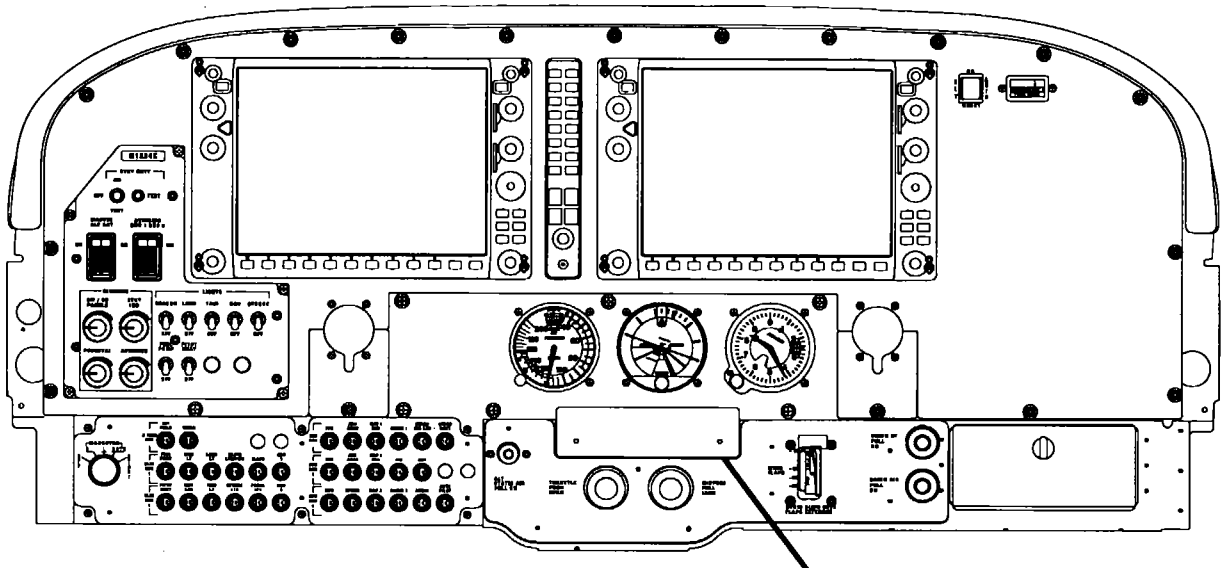
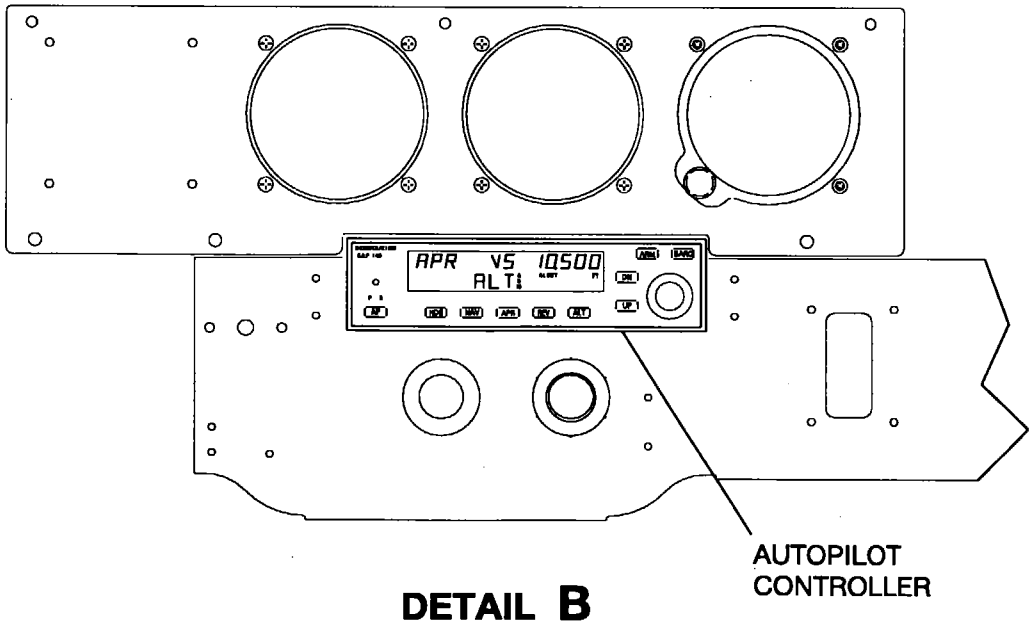


DETAIL A



DETAIL B
(GARMIN G1000 EQUIPPED AIRCRAFT)

A0518T1109
B0518T1111

KAP-140 Autopilot Installation
Figure 202 (Sheet 2)

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AUTOPILOT SERVO - INSPECTION/CHECK

1. General

A. The autopilot on this aircraft uses a pitch servo, a pitch trim servo and a roll servo. This section will give instructions for the inspection of the pitch, pitch trim, and roll servos. There is also an inspection for the pitch trim rigging.

2. Roll Servo Inspection

A. Do an Inspection of the Roll Servo (Refer to Figure 601).
(1) Remove the servo cover.

CAUTION: Make sure the maintenance personnel and the table are electrically grounded. Do disassembly or assembly of the servo at an electrostatic-safe area.

(a) Put an electrical ground on the maintenance personnel and table.
(b) Remove the two screws that attach the cover to the unit.
(c) Carefully remove the cover over the wiring harness.
(d) Put the servo on the table so the inner parts of the unit will not be damaged.
(2) Do an inspection of the solenoid and clutch.
(a) Make sure the solenoid shaft moves freely in and out of the solenoid body.
(b) Make sure there is no dirt, contamination or corrosion around the solenoid shaft.
(c) Make sure the release spring freely pulls the shaft out of the solenoid and against the stop fitting.
(d) Make sure the pinion gear turns and does not touch the clutch gears.
(3) Do a general inspection of the roll servo.
(a) Examine the electrical wiring for indication of wear or damage of the insulation.
(b) Examine the servo for any loose hardware or other defects.
(4) Install the cover.
(a) Carefully put the cover in position.
(b) Install the screws with Loctite 222 or Loctite 242.
(5) Remove the servo capstan assembly and do a check of the slip-clutch torque setting (Refer to Servo Capstan Clutch Adjustment).

3. Pitch Servo Inspection

A. Do an Inspection of the Pitch Servo (Refer to Figure 601).
(1) Remove the servo cover.

CAUTION: Make sure the maintenance personnel and the table are electrically grounded. Do disassembly or assembly of the servo at an electrostatic-safe area.

(a) Put an electrical ground on the maintenance personnel and table.
(b) Remove the two screws that attach the cover to the unit.
(c) Carefully remove the cover from the wiring harness.

CAUTION: Do not move any wires, tie wraps or the spring clamp. The position of each is set by the manufacturer and is necessary for correct operation.

(d) Put the servo on the table so the inner parts of the unit will not be damaged.
(2) Do inspection of the solenoid and clutch.
(a) Make sure the solenoid shaft moves freely in and out of the solenoid body.
(b) Make sure there is no dirt, contamination or corrosion around the solenoid shaft.

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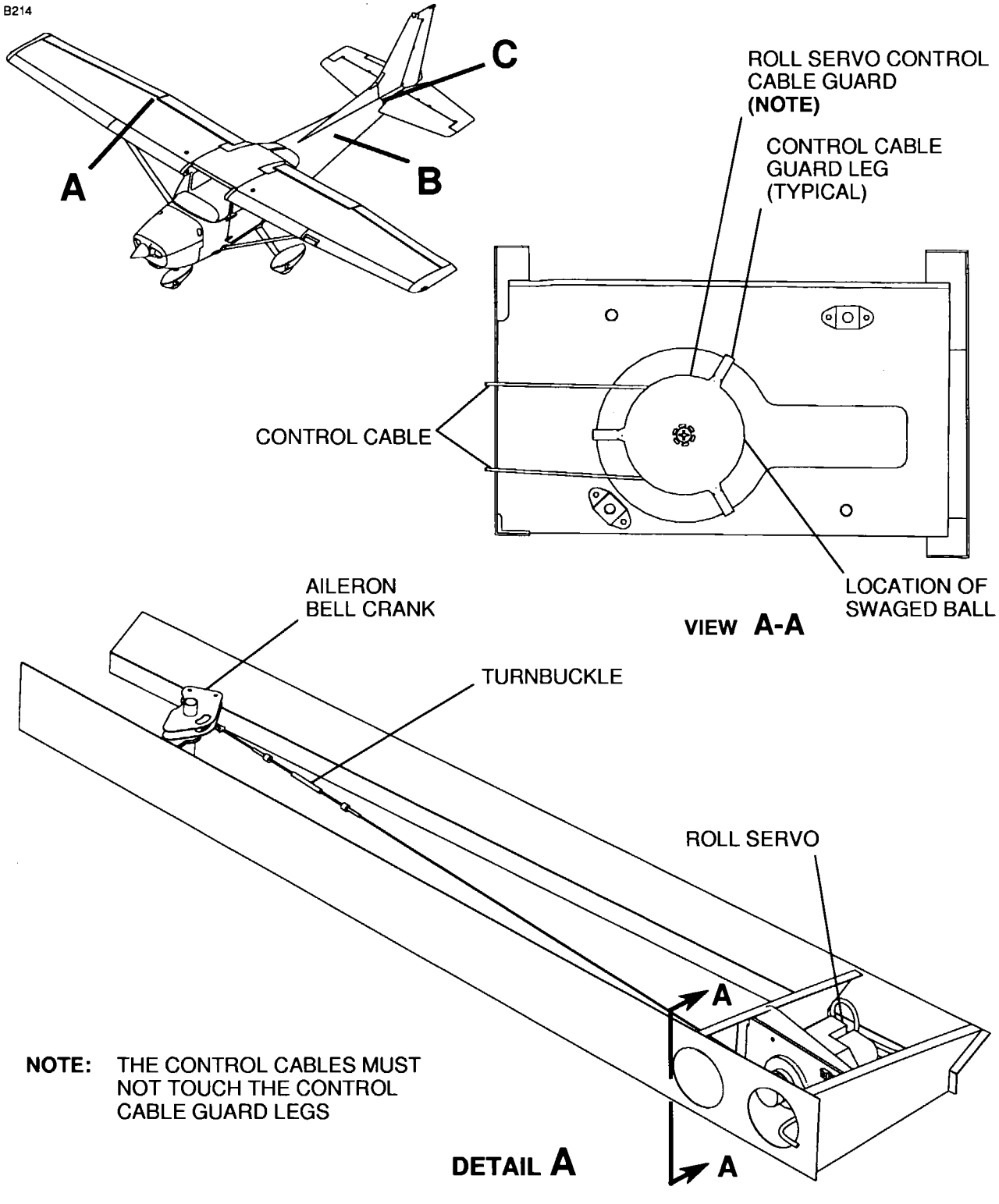

Autopilot Servo Inspection
Figure 601 (Sheet 1)

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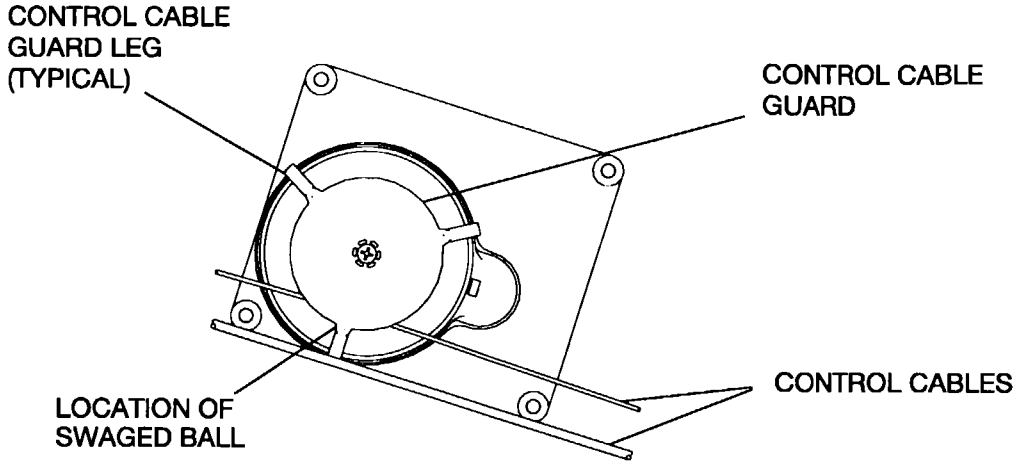
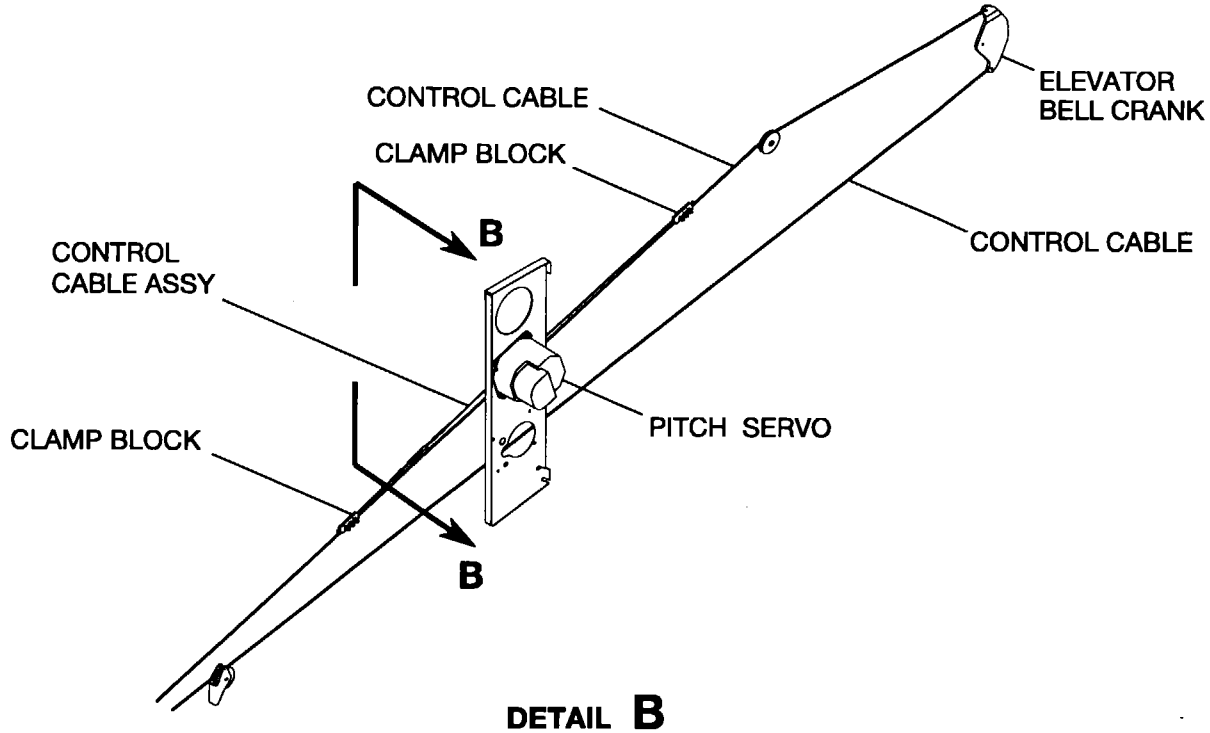
B240



VIEW B-B



DETAIL B

B0560T1018
BB0560T1019

Autopilot Servo Inspection
Figure 601 (Sheet 2)

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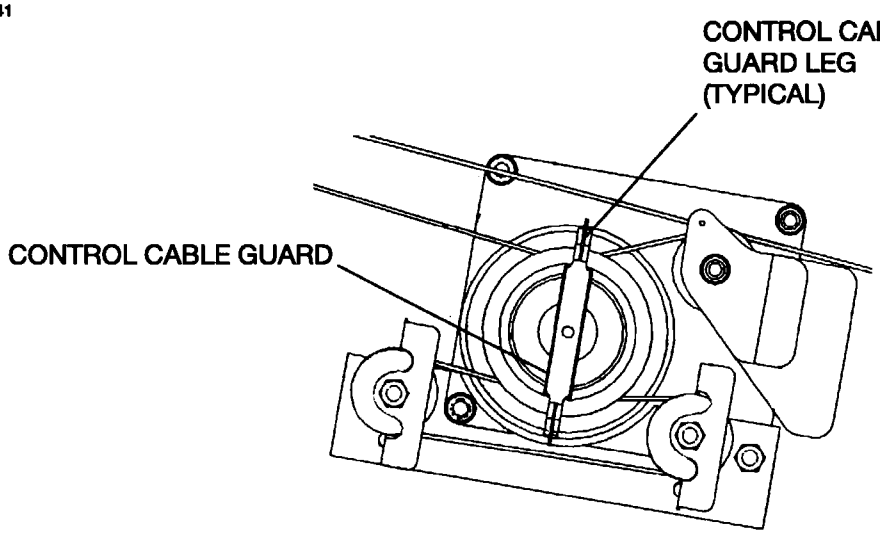
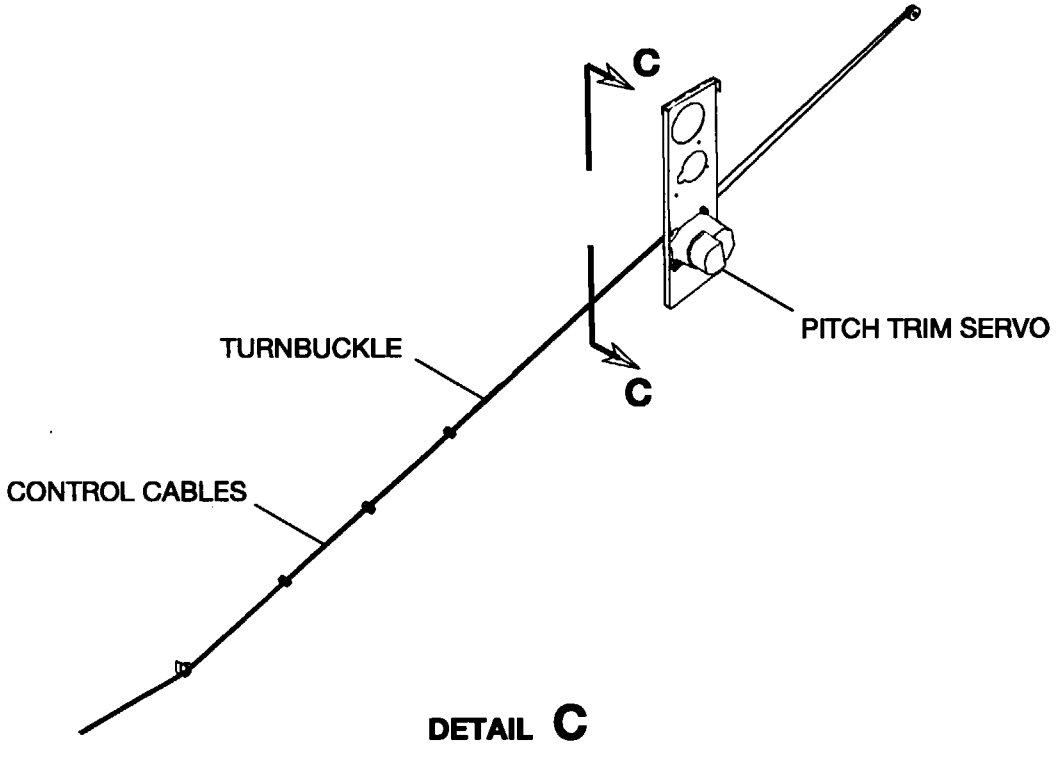
B241



VIEW C-C



DETAIL C

CC0560T1017

Autopilot Servo Inspection
Figure 601 (Sheet 3)

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(c) Make sure the release spring freely pulls the shaft out of the solenoid and against the stop fitting.
(d) Make sure the pinion gear turns and does not touch the clutch gears.
(3) Do a general inspection.
(a) Examine the electrical wiring for indication of wear or damage of the insulation.
(b) Examine the servo for any loose hardware or other defects.
(4) Do an inspection of the pitch servo motor.
(a) Put the servo in position so the baseplate is on the bottom side of the unit.
(b) Hold the top section of the motor and carefully turn the motor shaft.
(c) The motor shaft must turn freely from side to side a small quantity.
(5) Install the cover.
(a) Carefully put the cover in position.
(b) Use screws with Loctite 222 or Loctite 242.
(6) Remove the servo capstan assembly and do a check of the slip-clutch torque setting (Refer to Servo Capstan Clutch Adjustment).

4. Pitch Trim Servo Inspection

A. Do an Inspection of the Pitch Trim Servo (Refer to Figure 601).
(1) Remove the servo cover.

CAUTION: Make sure the maintenance personnel and the table are electrically grounded. Do disassembly or assembly of the servo at an electrostatic-safe area.

(a) Put an electrical ground on the maintenance personnel and table.
(b) Remove the two screws that attach the cover to the unit.
(c) Carefully remove the cover over the wiring harness.
(d) Put the servo on the table so the inner parts of the unit will not be damaged.
(2) Do inspection of the solenoid and clutch.
(a) Make sure the solenoid shaft moves freely in and out of the solenoid body.
(b) Make sure there is no dirt, contamination or corrosion around the solenoid shaft.
(c) Make sure the release spring freely pulls the shaft out of the solenoid and against the stop fitting.
(d) Make sure the pinion gear turns and does not touch the clutch gears.
(3) Do a general inspection.
(a) Examine the electrical wiring for indication of wear or damage of the insulation.
(b) Examine the servo for any loose hardware or other defects.
(4) Install the cover.
(a) Carefully put the cover in position.
(b) Install the screws with Loctite 222 or Loctite 242.
(5) Remove the servo capstan assembly and check the slip-clutch torque setting (Refer to Servo Capstan Clutch Adjustment).

5. Pitch Trim Rigging Inspection

A. Do a check of the pitch trim rigging.
(1) Attach an inclinometer to the trim tab.
(2) Put the trim tab in the 0 degree position.
(3) Manually operate the trim tab to the up and down limits.
(4) Record the limits of travel.
(5) Put an observer at the right-hand access opening of the tailcone.
(6) Put the electrical trim to the full nose-up position until the observer sees the clutch slip.
(7) Turn the manual trim wheel nose-up (test load condition) 1/4 turn more while the clutch slips.
(8) Make sure the swaged ball on the control cable assembly does not turn aft of the tangent point.
(9) Release the trim wheel and disengage the autopilot.
(10) Manually operate the trim to the full nose-up position.
(11) Do a check of the trim tab position with an inclinometer.

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(12) Trim tab position that is greater than the limits of travel values recorded is an indication that the stop blocks slipped.
   (a) Do the trim system rigging again.
   (b) Make sure the stop block bolts torque is correct.
   (c) Repeat the check of the pitch trim rigging.
(13) If necessary, make adjustments to the swaged ball position.
   (a) Put the control cable assembly chain in the applicable position on the gear teeth of the actuator sprocket.

      NOTE: One chain link adjustment is related to approximately 17 degrees of travel on the capstan.

   (b) Apply the applicable tension to the control cable and repeat the check of the pitch trim rigging.
(14) Do the procedure again for the full nose-down trim condition.

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GFC-700 AUTOPILOT - MAINTENANCE PRACTICES

1. General

A. The GFC-700 is a dual-axis autopilot with heading, altitude, and vertical speed hold.

2. Roll Servo Actuator Removal/Installation

A. Remove the Roll Servo (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the OFF position.
(2) Remove the 620AB access panel. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Disconnect the electrical connector from the roll servo actuator.
(4) Remove the bolts and washers that attach the roll servo actuator to the torque mount.
(5) Remove the roll servo actuator from the airplane.

B. Install the Roll Servo (Refer to Figure 201).
(1) Put the roll servo actuator in position on the torque mount and attach with bolts and washers.
(a) Torque the bolts to 45 inch-pounds, +5 or -5 inch-pounds.
(2) Connect the electrical connector to the roll servo actuator.
(3) Do a check to make sure the servo operates correctly. Refer to the Garmin G1000 Maintenance Manual, Revision G or later.
(4) Install the 620AB access panel. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.

3. Roll Servo and Cable Removal/Installation

A. Remove the Roll Servo and Cable (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the OFF position.
(2) Remove the 620AB access panel to get access to the roll servo and the cable. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.
(3) Disconnect the electrical connector.
(4) Release the servo cable tension at the turnbuckle.
(5) Remove the cable guard.
(6) Record how the cable is installed on the capstan.
(7) Disconnect the cable from the turnbuckle.
(8) Remove the cable from the capstan.
(9) Remove the bolts that attach the servo assembly to the bracket.
(10) Remove the servo from the airplane.

B. Install the Roll Servo and Cable (Refer to Figure 201).
(1) Put the servo and the cable in position at the servo mount and install the bolts.
(a) Torque the bolts to 45 inch-pounds, +5 or -5 inch-pounds.
(2) Put the servo cable in position on the capstan.
(3) Wind the cable approximately 1.25 turns each direction around the capstan.
(4) Install the cable guard.
(5) Connect the cable to the turnbuckle.
(6) Use the turnbuckle to adjust the roll servo cable tension to 15 pounds, +3 or -3 pounds.
(7) Connect the electrical connector.
(8) Do a check to make sure the servo operates correctly. Refer to the Garmin G1000 Maintenance Manual, Revision G or later.
(9) Install the 620AB access panel. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

4. Pitch Servo Motor Removal/Installation

A. Remove Pitch Servo (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the OFF position.
(2) Remove the 310AR, 340AL and 340AR access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.

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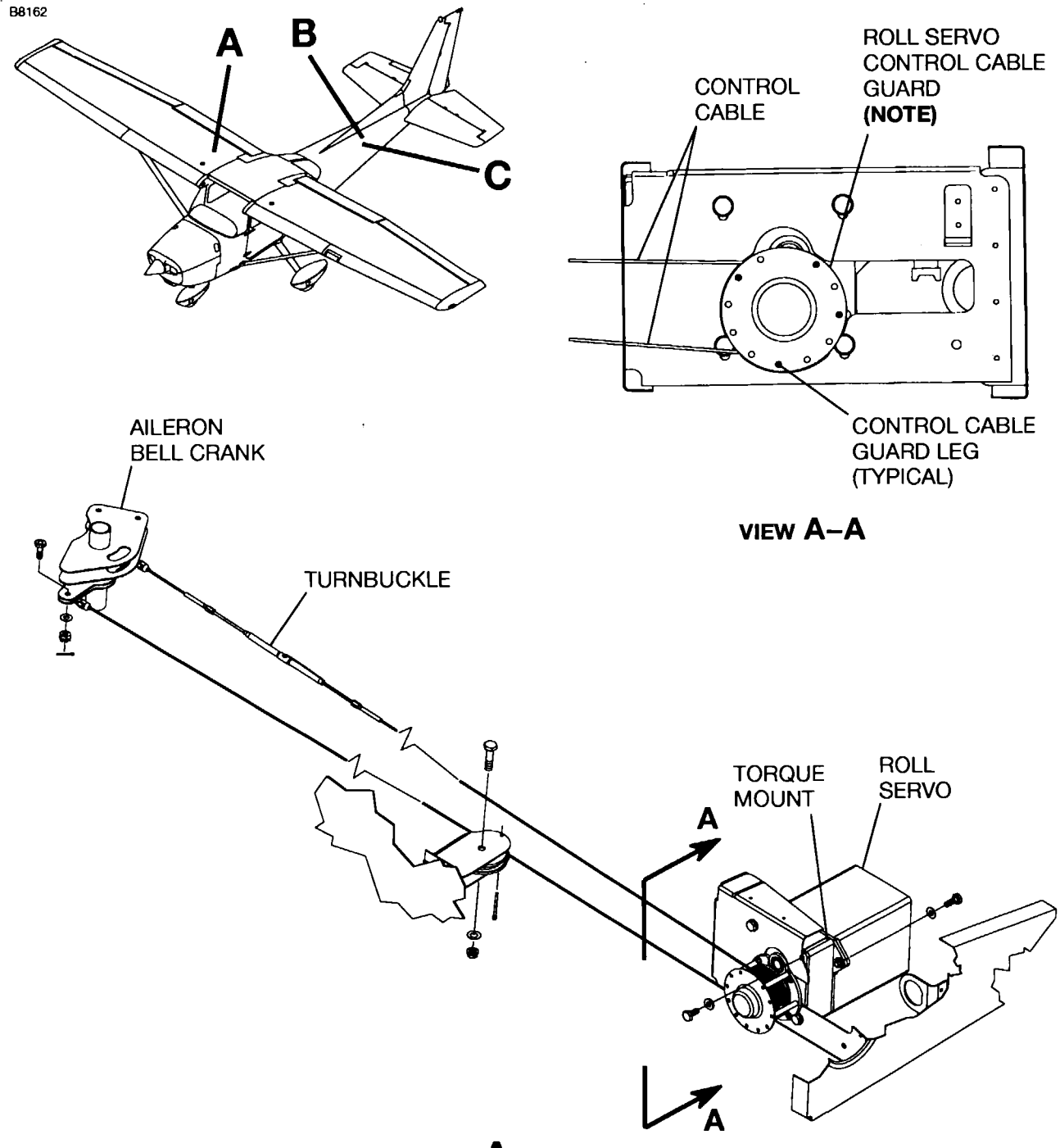

NOTE: THE CONTROL CABLES MUST NOT TOUCH THE CONTROL CABLE GUARD LEGS.

0510T1007
A0560T1030
AA0760T1015

Autopilot Servo Installation
Figure 201 (Sheet 1)

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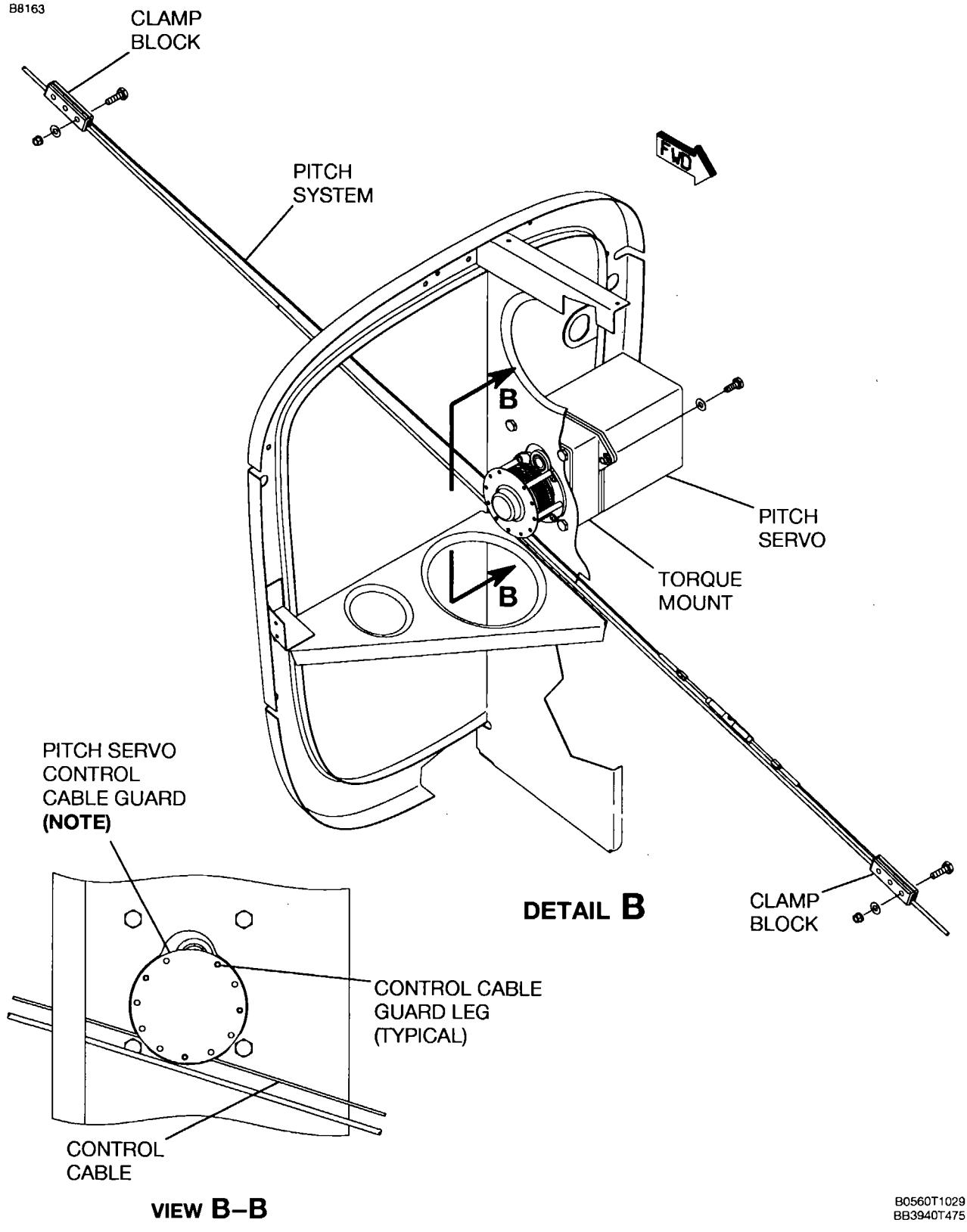

Autopilot Servo Installation
Figure 201 (Sheet 2)

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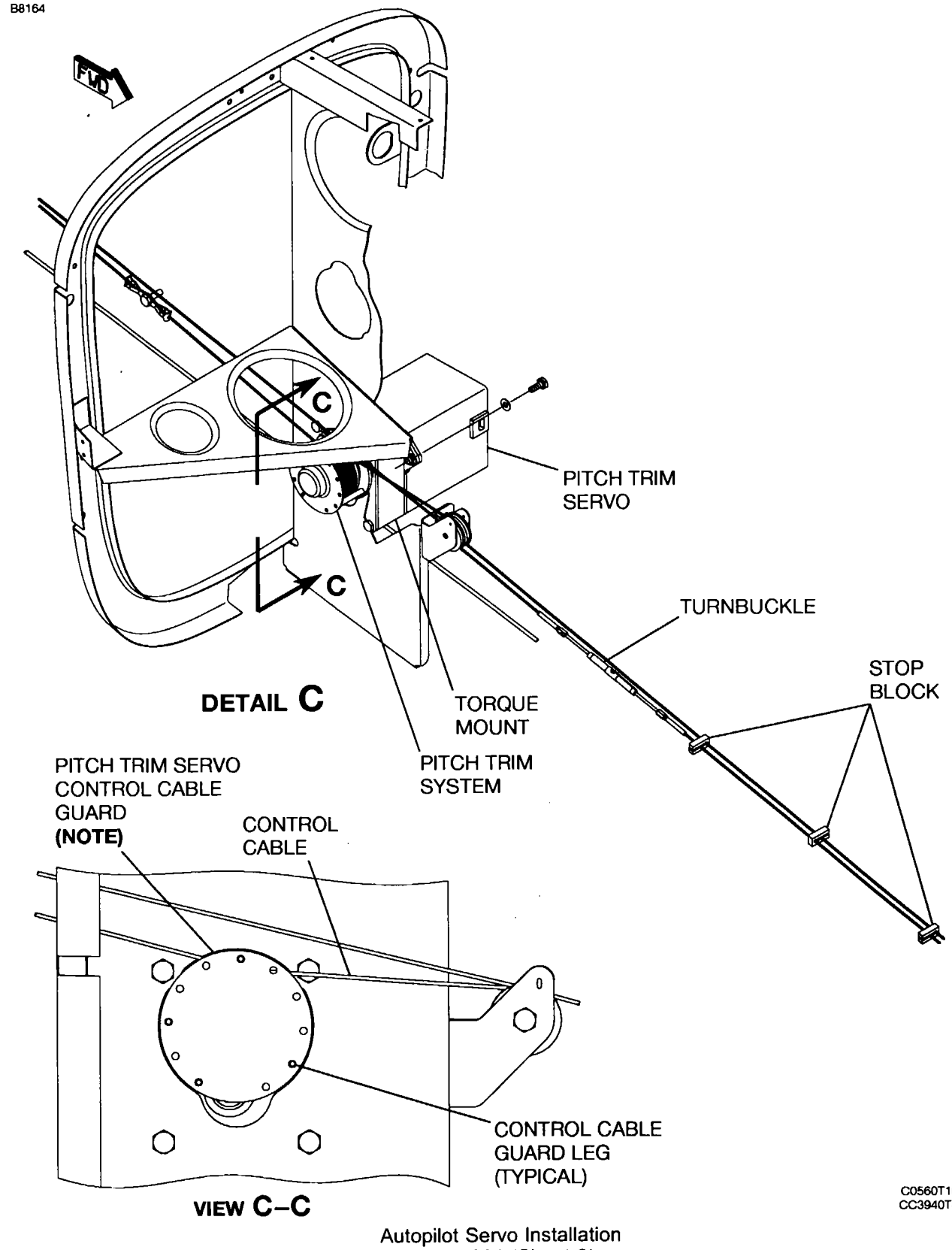

Autopilot Servo Installation
Figure 201 (Sheet 3)

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(3) Disconnect the electrical connector from the pitch servo.
(4) Remove the bolts and washers that attach the pitch servo to the torque mount.
(5) Remove the pitch servo actuator from the airplane.

B. Install the Pitch Servo (Refer to Figure 201).
(1) Put the pitch servo in position on the torque mount and attach with the bolts.
(a) Torque the bolts to 45 inch-pounds, +5 or -5 inch-pounds.
(2) Connect the electrical connector to the pitch servo.
(3) Do a check to make sure the servo operates correctly. Refer to the Garmin G1000 Maintenance Manual, Revision G or later.
(4) Install the 310AR, 340AL and 340AR access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.

5. Pitch Servo and Cable Removal/Installation

A. Remove the Pitch Servo and Cable (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the OFF position.
(2) Remove the 310AR, 340AL and 340AR access panels to get access to the pitch servo and the cable. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.
(3) Disconnect the electrical connector.
(4) Release the servo cable tension at the turnbuckle.
(5) Remove the cable guard.
(6) Record how the cable is installed on the capstan.
(7) Disconnect the cable from the turnbuckle.
(8) Remove the cable from the capstan.
(9) Remove the bolts that attach the servo assembly to the bracket.
(10) Remove the servo from the airplane.

B. Install the Pitch Servo and Cable (Refer to Figure 201).
(1) Put the servo and the cable in position at the servo mount and install the bolts.
(a) Torque the bolts to 45 inch-pounds, +5 or -5 inch-pounds.
(2) Put the servo cable in position on the capstan.
(3) Wind the cable approximately 1.5 turns each direction around the capstan.
(4) Install the cable guard.
(5) Connect the cable to the turnbuckle.
(6) Use the turnbuckle to adjust the roll servo cable tension to 15 pounds, +3 or -3 pounds.
(7) Connect the electrical connector.
(8) Do a check to make sure the servo operates correctly. Refer to the Garmin G1000 Maintenance Manual, Revision G or later.
(9) Install the 310AR, 340AL and 340AR access panel. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

6. Pitch Trim Servo Actuator Removal/Installation

A. Remove the Pitch Trim Servo (Refer to Figure 201).
(1) Make sure the MASTER and AVIONICS switches are in the OFF position.
(2) Remove the 310AR, 340AL and 340AR access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Disconnect the electrical connector from the pitch trim servo.
(4) Remove the bolts and washers that attach the pitch trim servo to the torque mount.
(5) Remove the pitch trim servo from the airplane.

B. Install the Pitch Trim Servo (Refer to Figure 201).
(1) Put the pitch trim servo in position on the torque mount and attach with the bolts and washers.
(a) Torque the bolts to 45 inch-pounds, +5 or -5 inch-pounds.
(2) Connect the electrical connector to the pitch trim servo.
(3) Do a check to make sure the servo operates correctly. Refer to the Garmin G1000 Maintenance Manual, Revision G or later.
(4) Install the 310AR, 340AL and 340AR access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.

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7. Pitch Trim Servo and Cable Removal/Installation

A. Remove the Pitch Trim Servo (Refer to Figure 201).
   (1) Make sure the MASTER and AVIONICS switches are in the OFF position.
   (2) Remove the 310AR, 340AL and 340AR access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
   (3) Disconnect the electrical connector from the pitch trim servo.
   (4) Release the control cable tension and loosen the pitch trim servo control cable at the turnbuckle.
   (5) Remove the bolts and washers that attach the pitch trim servo to the bracket.
   (6) Remove the pitch trim servo from the airplane.

B. Install the Pitch Trim Servo (Refer to Figure 201).
   (1) Put the pitch trim servo in position on the bracket and attach with the bolts and washers.
      (a) Torque the bolts to 45 inch-pounds, +5 or -5 inch-pounds.
   (2) Connect the electrical connector to the pitch trim servo.
   (3) Do the pitch trim servo control cable rigging.
      (a) The servo trim chain must be on the aft sprocket of the actuator before the manual trim system rigging can be done.
      (b) You must do the manual trim system rigging before the servo trim system rigging. Refer to Chapter 27, Elevator Trim Control - Maintenance Practices, Trim Tab Control Adjustment/Test.
      (c) Put the elevator in the neutral position.
      (d) Put the trim tab in a streamlined position with the elevator.

      NOTE: The chain sprocket on the actuator will be at approximately the halfway point in its rotation from the mechanical stops.

      (e) Move the servo trim chain on the aft sprocket of the actuator so that equal lengths of the chain are on either side of the sprocket.
      (f) Wind the control cable around the pitch trim servo drum approximately 1.5 turns each direction from the swaged ball.
      (g) Make sure the flanges of the control cable guard do not touch the control cable.
      (h) Make sure the flanges of the control cable guard are on either side of the notches around the outer edge of the mount.
      (i) Use the turnbuckle to adjust the pitch trim servo control cable tension to 15 pounds, +3 or -3 pounds.
   (4) Do a check to make sure the servo operates correctly. Refer to the Garmin G1000 Maintenance Manual, Revision G or later.
   (5) Install the 310AR, 340AL and 340AR access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.

8. Pitch Trim Rigging Inspection

A. Do a check of the pitch trim rigging.
   (1) Attach an inclinometer to the trim tab.
   (2) Put the trim tab in the 0 degree position.
   (3) Manually operate the trim tab to the up and down limits.
   (4) Record the limits of travel.
   (5) Put an observer at the right-hand access opening of the tailcone.
   (6) Put the electrical trim to the full nose-up position until the observer sees the clutch slip.
   (7) Turn the manual trim wheel nose-up (test load condition) 1/4 turn more while the clutch slips.
   (8) Make sure the swaged ball on the control cable assembly does not turn aft of the tangent point.
   (9) Release the trim wheel and disengage the autopilot.
   (10) Manually operate the trim to the full nose-up position.
   (11) Do a check of the trim tab position with an inclinometer.
   (12) Trim tab position that is greater than the limits of travel values recorded is an indication that the stop blocks slipped.
      (a) Do the trim system rigging again.

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(b) Make sure the stop block bolts torque is correct.
(c) Do the check of the pitch trim rigging again.

(13) If necessary, make adjustments to the swaged ball position.
(a) Put the control cable assembly chain in the applicable position on the gear teeth of the actuator sprocket.

NOTE: One chain link adjustment is related to approximately 17 degrees of travel on the capstan.

(b) Apply the applicable tension to the control cable and do the check of the pitch trim rigging again.

(14) Do the procedure again for the full nose-down trim condition.

9. Servo Capstan Clutch Adjustment

A. Adjust the servo capstan clutch in accordance with the manufactures installation manual. Refer to Introduction, the List of Manufacturers Technical Publications for the manufacturer's installation manual.

Roll Servo Clutch Plate	55, +7 or -7 inch-pounds (6.2, +0.79 or -0.79 N-m)
Pitch Servo Clutch Plate	35, +5 or -5 inch-pounds (3.95, +0.56 or -0.56 N-m)
Pitch Trim Servo Clutch Plate	45, +6 or -6 inch-pounds (5.1, +0.68 or -0.68 N-m)

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CHAPTER 23

COMMUNICATIONS

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23-List of Effective Pages		
23-Record of Temporary Revisions		
23-Table of Contents		
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23-10-00	Pages 201-209	Mar 1/2009
23-50-00	Pages 201-204	Jan 3/2005
23-60-00	Pages 201-202	Apr 7/2003

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

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Tools and Equipment . . . . . 23-00-00 Page 1
Definition . . . . . 23-00-00 Page 1

NAV/COM - MAINTENANCE PRACTICES . . . . . 23-10-00 Page 201
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NAV/COM Radio Removal and Installation . . . . . 23-10-00 Page 201
GIA 63 Integrated Avionics Unit Removal/Installation . . . . . 23-10-00 Page 201
VHF Antenna Removal/Installation . . . . . 23-10-00 Page 205
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COMMUNICATIONS - GENERAL

1. Scope

A. This chapter describes and provides maintenance instructions for equipment which furnishes a means of communicating from one part of the airplane to another, and between the airplane and other airplanes or ground stations

B. Additional information on communications equipment can be found in the Wiring Diagram Manual supplied with the airplane.

C. Technical publications available from the manufacturer of the various components and systems which are not covered in this manual must be utilized as required for maintenance of those components and systems.

2. Tools and Equipment

NOTE: Equivalent substitutes may be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
Type I, Class B-2 Sealant	PR1440	Courtaulds Aerospace 5426 San Fernando Rd. Glendale, CA 91209	To fay seal antenna to fuselage.
Bonding meter	Keithley Model 580	Keithley Instruments, Inc. Instrument Division 28775 Aurora Rd. Cleveland, OH 44139	To check electrical bonding connections.
Megohmmeter	Model 2850	Associated Research, Inc. 3773 W. Belmont Ave. Chicago, IL 60618	To check resistance of static wicks.

3. Definition

A. Information contained in this chapter provides the basic procedures which can be accomplished at the flight line level; such as, removal and installation of components and system operation.

B. This chapter is divided into sections to aid maintenance personnel in locating information. A brief description of each section is as follows:

(1) The speech communication section describes radio equipment used for reception and transmission of voice communication.

(2) The audio integrating system section describes that portion of the system which controls the output of the communications and navigation receivers into the pilot and passengers headphones and speakers, and the output of the pilot's microphone into the communications transmitters.

(3) The static discharging section describes the static discharge wicks used to dissipate static electricity.

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NAV/COM - MAINTENANCE PRACTICES

1. General

A. Maintenance practices for the navigation/communications (NAV/COM) units have procedures for the removal and installation of the different components.

B. The dual NAV/COM radio is in the instrument panel.

C. For airplanes with the Garmin G1000, the center of the Garmin G1000 is the GIA 63 Integrated Avionics Unit (IAU), which is in the tailcone. The GIA 63 operates as a primary communications center that connects all of the Line Replaceable Units (LRUs) with the Primary Function Display (PFD) and Multi-Function Display (MFD). The GIA 63 has the GPS receiver, VHF NAV/COM receivers, and system integration microprocessors. The GIA 63W has the Wide Area Augmentation System (WAAS) installed. The GIA 63 transmits directly to the PFD and MFD by a High-Speed Data Bus (HSDB) Ethernet connection. Software and configurations are sent from the displays through the GIA 63 to the LRU's in the system.

2. Troubleshooting

A. For troubleshooting procedures of the GIA 63 Integrated Avionics Units in airplanes with Garmin G1000, refer to the Garmin G1000 Line Maintenance Manual.

3. NAV/COM Radio Removal and Installation

NOTE: The procedures that follow are for airplanes without Garmin G1000.

CAUTION: Do not interchange the KX-155A and KX-165A NAV/COM Radios. You can cause damage to the NAV/COM Radio.

A. Remove the NAV/COM (Refer to Figure 201).
   (1) Put the MASTER switch in the OFF position.
   (2) Disengage the NAV/COM 1 and/or NAV/COM 2 circuit breaker.
   (3) Turn the recessed mounting screw on the face of the NAV/COM unit counterclockwise until the locking paw releases from the mounting tray.
   (4) Move the NAV/COM unit aft out of the mounting tray to disconnect the electrical connectors (PI1000, PI1002, and PI1004).
   (5) Remove the NAV/COM unit from the mounting tray.

B. Install the NAV/COM (Refer to Figure 201).
   (1) Put the NAV/COM unit in the mounting tray and move the unit forward.
   (2) Connect the electrical connectors (PI1000, PI1002 and PI1004).
   (3) Turn the recessed mounting screw on the face of the NAV/COM unit clockwise until the NAV/COM unit is attached to the mounting tray.
   (4) Engage the NAV/COM 1 and/or NAV/COM 2 circuit breaker.
   (5) Put the MASTER switch in the ON position.
   (6) Put the NAV/COM switch in the ON position.
   (7) Do a check for correct operation.
   (8) Put the MASTER and NAV/COM switches in the OFF position.

4. GIA 63 Integrated Avionics Unit Removal/Installation

NOTE: The procedures that follow are for airplanes with Garmin G1000.

NOTE: The airplane has dual integrated avionics units installed. The removal/installation is typical.

A. Remove the Integrated Avionics Unit (Refer to Figure 202).
   (1) Put the MASTER switch in the off position.
   (2) Disengage the NAV/COM 1 and/or NAV/COM 2 circuit breaker.

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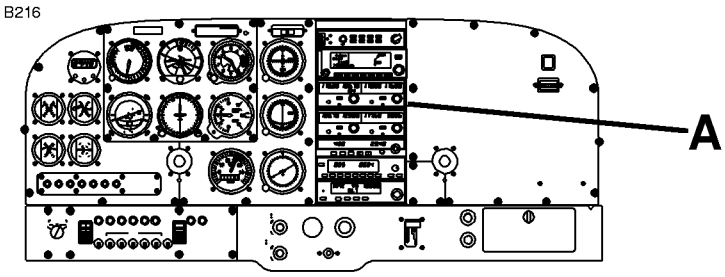

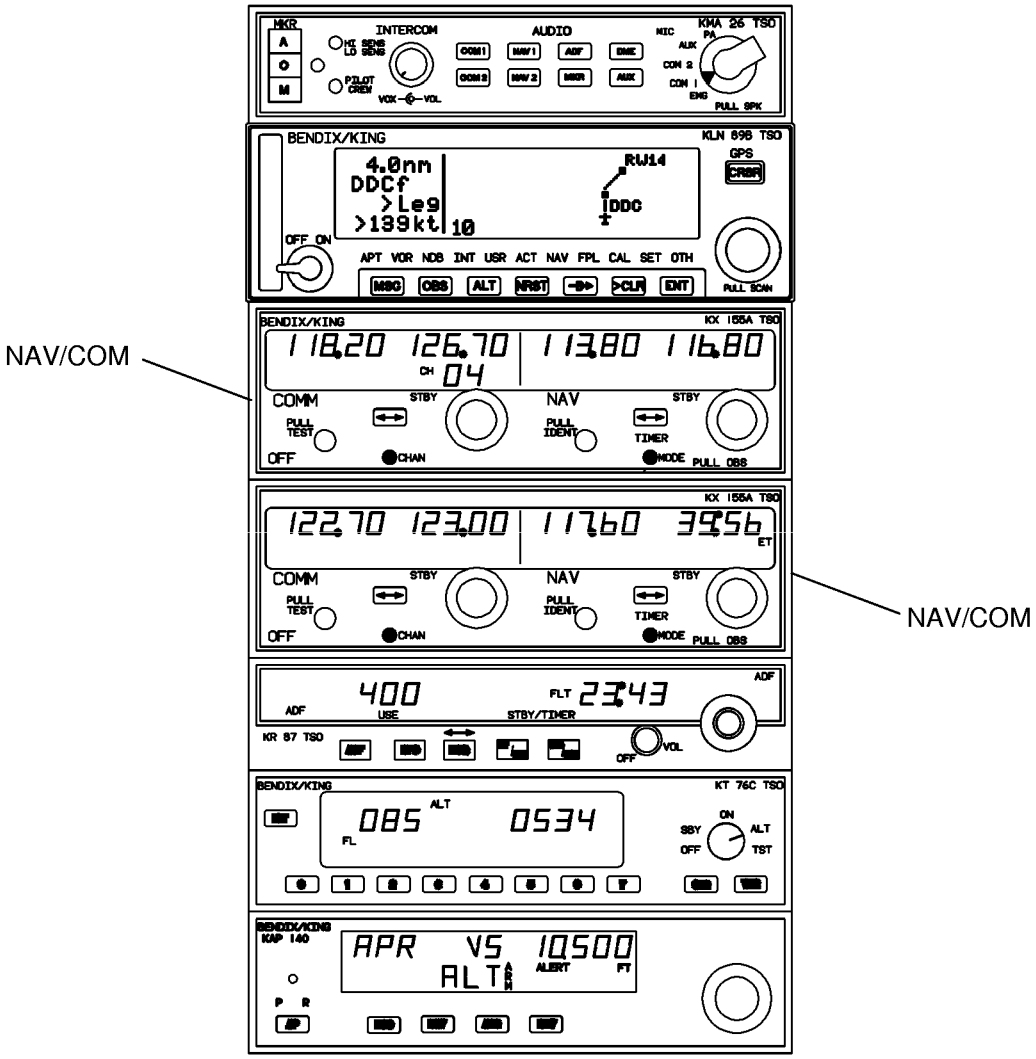

DETAIL A

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A0585T1040

NAV/COM Installation
Figure 201 (Sheet 1)

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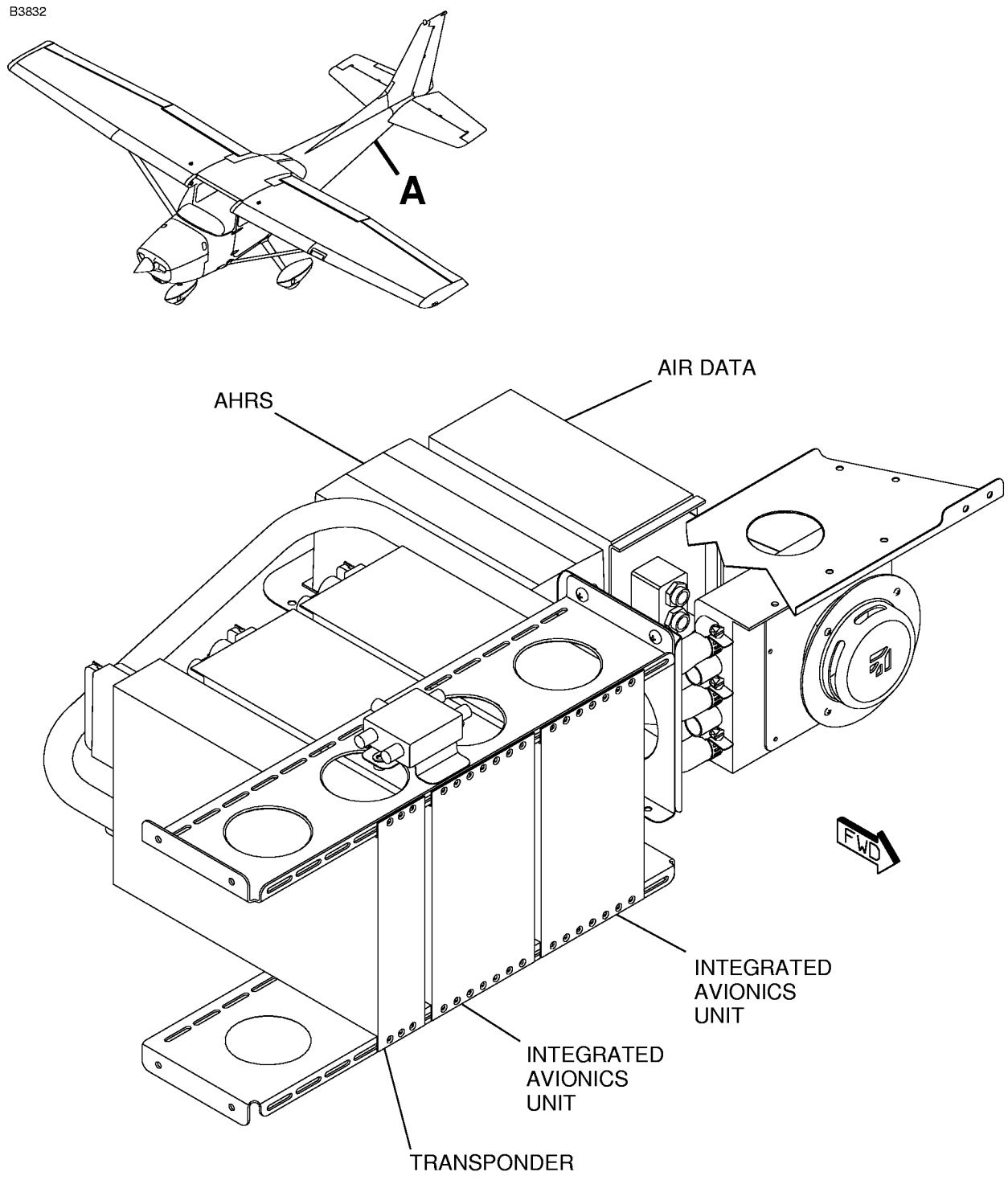

DETAIL A
AIRPLANES THAT HAVE
THE GARMIN G1000

0510T1007
A0518T1103

Tailcone Avionics Installation
Figure 202 (Sheet 1)

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(3) Remove the aft seat to get access to the integrated avionics units. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
(4) Remove the baggage compartment closeout to get access to the integrated avionics units. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(5) Disconnect the duct from the aft side of the unit. Refer to Avionics Cooling - Maintenance Practices.
(6) Release the unit handle.
  (a) For units with a Phillips screw, loosen the screw to unlock the unit handle.
  (b) For units with a D-Ring, push on the D-Ring and turn it 90 degrees counterclockwise to unlock the unit handle.
(7) Move the lever up to disengage the locking stud with the dog leg slot in the mounting rack.
(8) Remove the unit from the mounting rack.

B. Install the Integrated Avionics Unit (Refer to Figure 202).

NOTE: If the unit from the initial installation is installed in its initial position, it is not necessary to load the software or configuration.

NOTE: If the unit from the initial installation is installed in the opposite position, it is not necessary to load the software but the units must be configured.

NOTE: If a new unit is installed, the software and configuration must be loaded.

CAUTION: Make sure the unit goes into position without resistance. Damage to the connectors, unit, or mounting rack will occur if the unit is pushed into position with force.

NOTE: The unit must be in position in the mounting rack to let the locking stud engage the channel.

(1) Make sure the connector and connector pins have no damage.
  (a) Replace the connector or connector pins if applicable. Refer to the Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.
(2) Carefully put the unit in position in the mounting rack.

CAUTION: Make sure the lever moves without resistance. Damage to the unit will occur if the lever is pushed into position with force.

(3) Push the lever down toward the bottom of the unit to engage the locking stud with the dog leg slot in the mounting rack.
(4) Lock the handle in position.
  (a) For units with a Phillips screw, tighten the screw to lock the unit handle.
  (b) For units with a D-Ring, push on the D-Ring and turn it 90 degrees clockwise to lock the unit handle.
(5) Connect the duct to the aft side of the unit. Refer to Avionics Cooling - Maintenance Practices.
(6) Do a check for correct operation or configure the unit. Refer to Test and/or Configure Integrated Avionics Unit.
(7) Install the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(8) Install the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.

C. Test and/or Configure Integrated Avionics Unit.
(1) Initial unit installed in initial position.

NOTE: If the unit from the initial installation is installed in its initial location, it is not necessary to load the software or configuration.

(a) Do a check to make sure the unit operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

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(2) Initial unit installed in the opposite location.

NOTE: If the unit from the initial installation is installed in the opposite location, it is not necessary to load the software but the units must be configured.

(a) Configure the units and do a check to make sure the units operate correctly. Refer to the Garmin G1000 Line Maintenance Manual.

(3) New unit installed.

NOTE: If a new unit is installed, the software and configuration must be loaded.

(a) Load the software and configuration. Refer to the Garmin G1000 Line Maintenance Manual.

5. VHF Antenna Removal/Installation

NOTE: On airplanes with Garmin G1000 avionics, the left VHF antenna is also the GDL-69A antenna and a GPS antenna.

NOTE: The removal and installation procedures are typical for all VHF antennas.

A. Remove the VHF Antenna (Refer to Figure 203).
(1) Put the MASTER switch in the OFF position.
(2) Remove the four screws and washers that attach the VHF antenna to the upper surface of the fuselage.
(3) Pull the antenna away from the fuselage to disconnect the coax connector from the antenna (PC1001 for VHF1 and PC1002 for VHF2).

B. Install the VHF Antenna (Refer to Figure 203).
(1) Connect the coaxial connector to the antenna (PC1001 for VHF1 and PC1002 for VHF2).
(2) Attach the antenna to the upper surface of the fuselage with the four screws and washers.

6. Microphone Switch Removal/Installation

A. Remove the Microphone Switch (Refer to Figure 204).
(1) Remove the nut that attaches the microphone switch (S1) to the escutcheon.
(2) Remove the screw that attaches the escutcheon to the control wheel.
(3) Lift up the escutcheon to get access to the microphone switch and disconnect the microphone switch from the control wheel connection.

B. Install the Microphone Switch (Refer to Figure 204).
(1) Connect the microphone switch (S1) to the connection in the control wheel.
(2) Attach the microphone switch to the escutcheon with the nut.
(3) Set the escutcheon in position and install the screw in the escutcheon.

7. Microphone Switch Button Cleaning

A. Clean the Switch Button (Refer to Figure 204).

NOTE: Oil and dirt can collect on the internal electrical contacts of the switch and cause the button to operate incorrectly.

(1) Apply a sufficient quantity of electrical contact cleaning spray around the full edge of the button so it will soak down into the switch.

NOTE: The electrical cleaner will help to remove oil and dirt from the internal electrical contacts of the switch. The recommended contact cleaner is Electro Contact Cleaner 03116 or equivalent, which is supplied by LPS Laboratories, Inc. The phone number is 1-800-241-8334.

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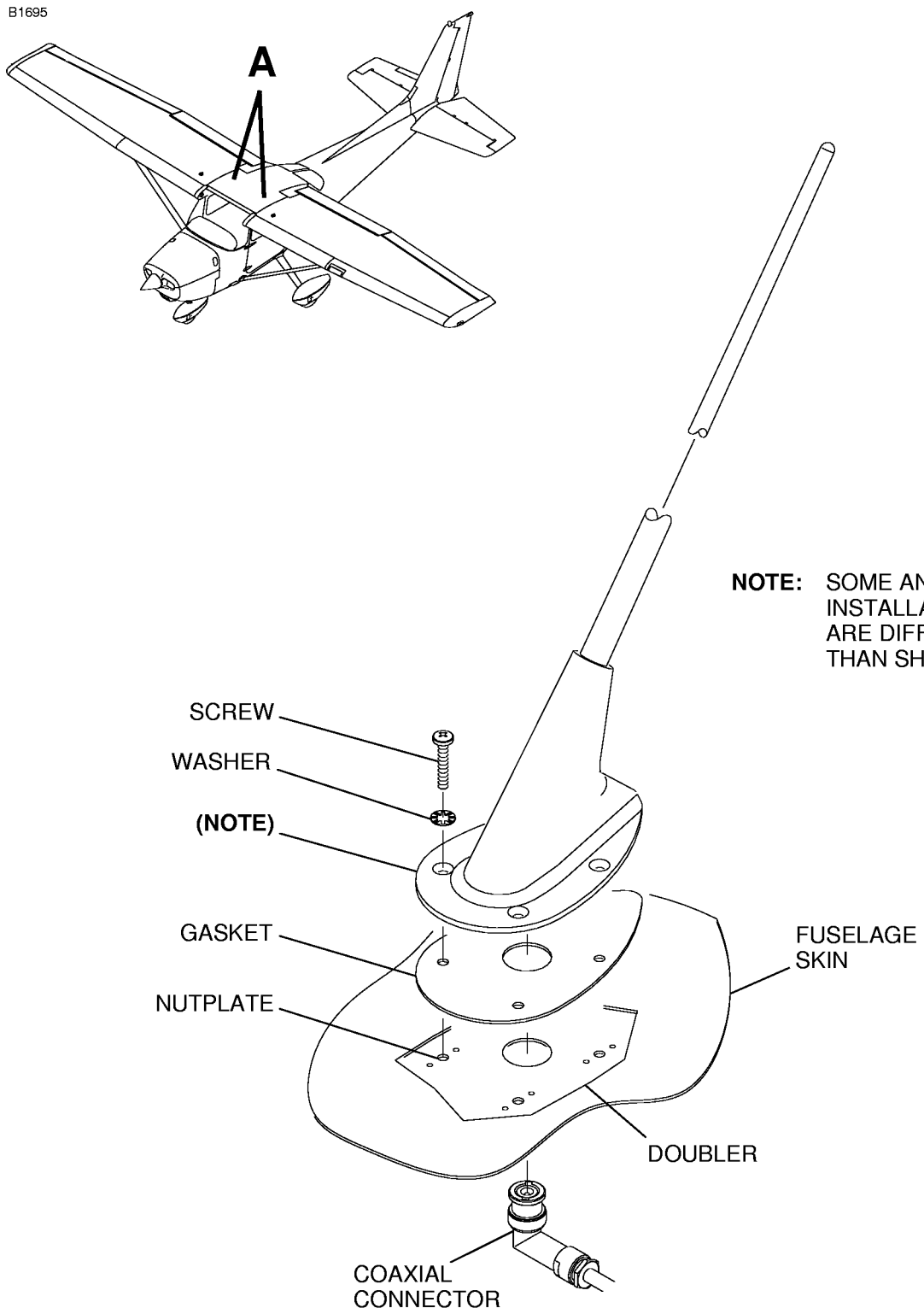

DETAIL A

AIRPLANES WITH VHF ANTENNA

0510T1007
A0518T1025

VHF Communication Antenna Installation
Figure 203 (Sheet 1)

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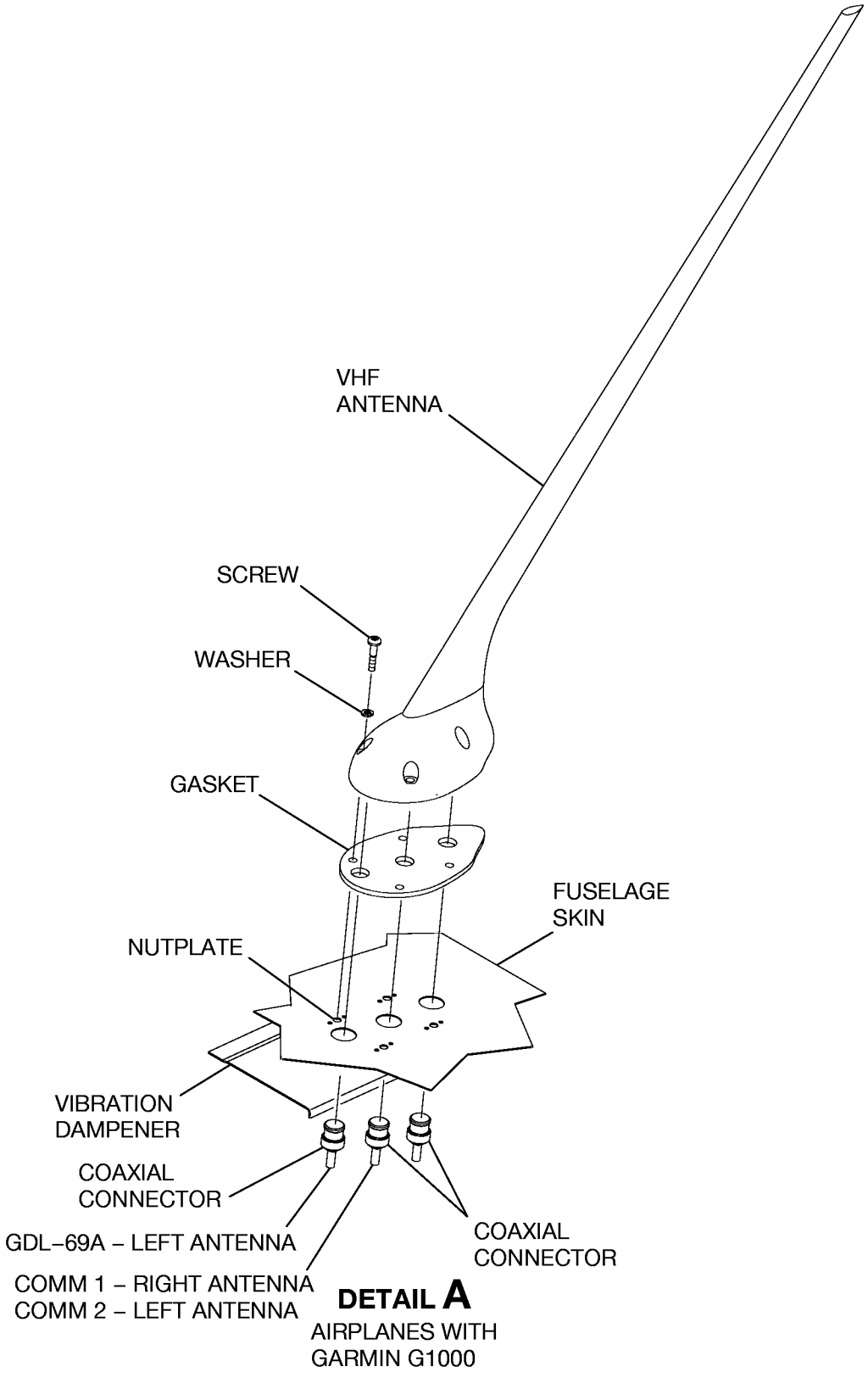

VHF Communication Antenna Installation
Figure 203 (Sheet 2)

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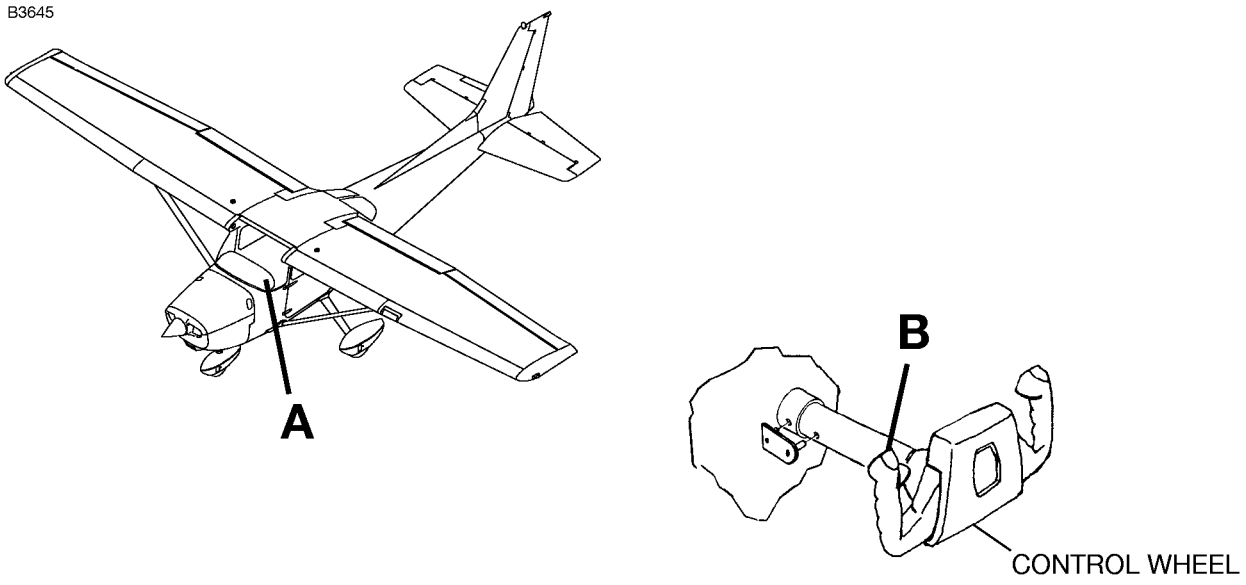
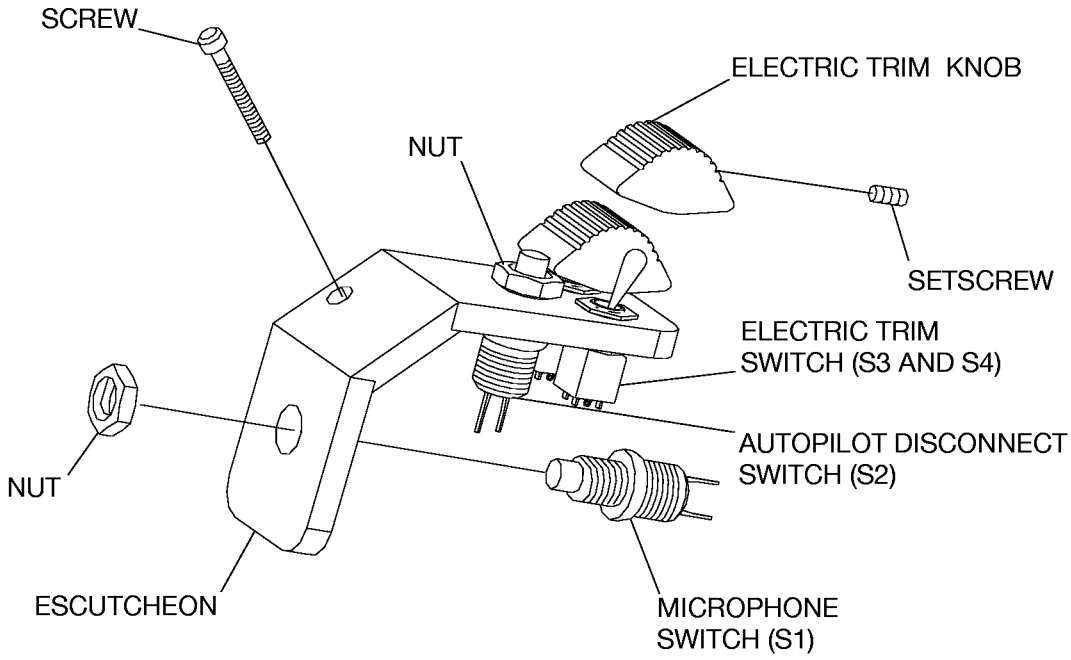


DETAIL A



DETAIL B

0510T1007
A0760R1007
B0715T1004

Microphone Switch
Figure 204 (Sheet 1)

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(2) Press the button many times to make sure the cleaner gets into the internal electrical contacts of the switch.
(3) Complete an operational check of the switch.

NOTE: The transmit light on the COM radio will come on when the power is turned on.

(4) If the button does not operate after the first application of the electric cleaner, apply more cleaner.
(5) If the button continues to operate incorrectly, replace the microphone switch. Refer to Microphone Switch Removal/Installation.

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AUDIO PANEL - MAINTENANCE PRACTICES

1. General

A. The audio panel is in the center of the instrument panel. It has audio function, intercom function, and marker beacon indicators in a single unit.

B. On airplanes with Garmin G1000, the GMA 1347 audio panel is in the center of the instrument panel between the Primary Flight Display (PFD) and Multi-Function Display (MFD). The GMA 1347 mixes NAV/COM digital audio, intercom system and marker beacon controls. The manual display reversionary switch is on the GMA 1347.

C. Maintenance practices for the audio panel have procedures for the removal/installation of the audio panel and the intercom jacks.

D. For removal/installation of the overhead speaker, refer to Chapter 25, Interior Upholstery - Maintenance Practices.

E. For removal/installation of the marker beacon antenna, refer to Chapter 34, Marker Beacon - Maintenance Practices.

2. Troubleshooting

A. For troubleshooting procedures of the GMA 1347 Audio Panel, refer to the Garmin G1000 Line Maintenance Manual.

3. Audio Panel Removal/Installation

NOTE: The audio panel removal and installation is typical for all avionic configurations.

A. Remove the Audio Panel (Refer to Figure 201).
   (1) Make sure the AVIONICS and MASTER switches are in the off position.
   (2) Turn the recessed screw on the face of the audio panel counterclockwise until the locking paw releases from the mounting tray.
   (3) Carefully pull the audio panel out of the mounting tray.

B. Install the Audio Panel (Refer to Figure 201).

NOTE: If a new audio panel is installed on airplanes with Garmin G1000, it is necessary to load the software and configuration.

(1) Put the audio panel in position and move it forward into the mounting tray.

NOTE: The audio panel must be installed correctly into the electrical connections at the back of the mounting tray.

NOTE: The recessed screw must not be tightened too much.

(2) Turn the recessed screw on the face of the audio panel clockwise until the audio panel is attached to the mounting tray.
(3) Make sure the audio panel operates correctly.
   (a) On airplanes without Garmin G1000, do a check to make sure the audio panel operates correctly.
   (b) If a new unit is installed on airplanes with Garmin G1000, load the software and configuration. Refer to the Garmin G1000 Line Maintenance Manual.
   (c) On airplanes with Garmin G1000, do a check to make sure that the audio panel operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

4. Intercom Jacks Removal/Installation

A. Remove the Pilot/Front Passenger Intercom Jacks (Refer to Figure 201).
   (1) Make sure the AVIONICS and MASTER switches are in the off position.

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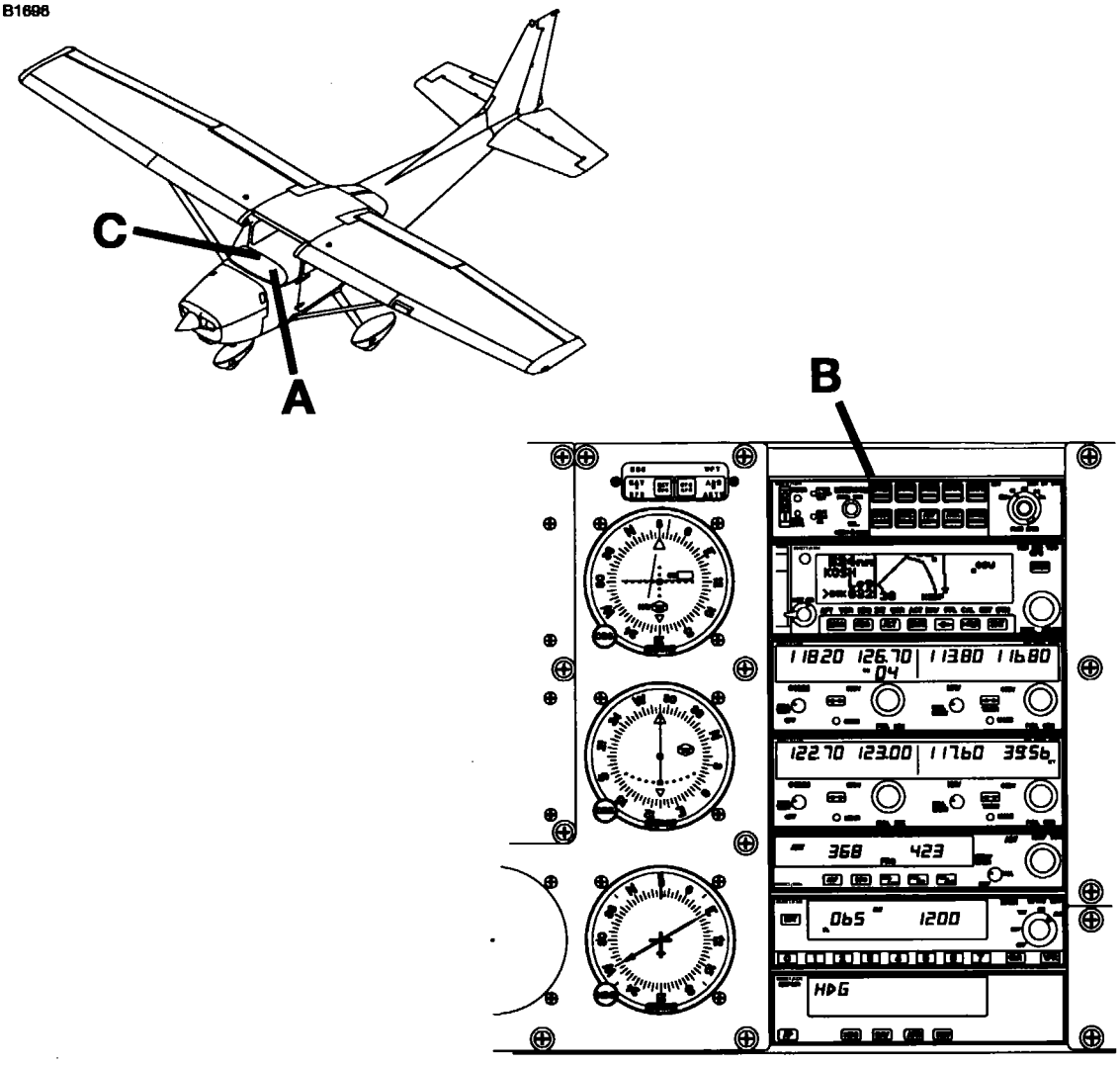
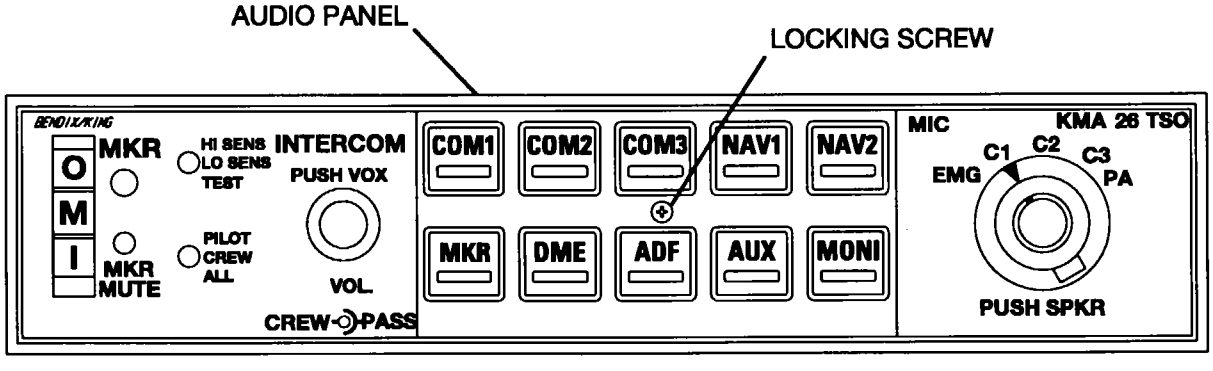


DETAIL A
AIRPLANES WITHOUT GARMIN G1000



DETAIL B

0510T1007
A0518T1033
B0585T1051

Audio Panel Installation
Figure 201 (Sheet 1)

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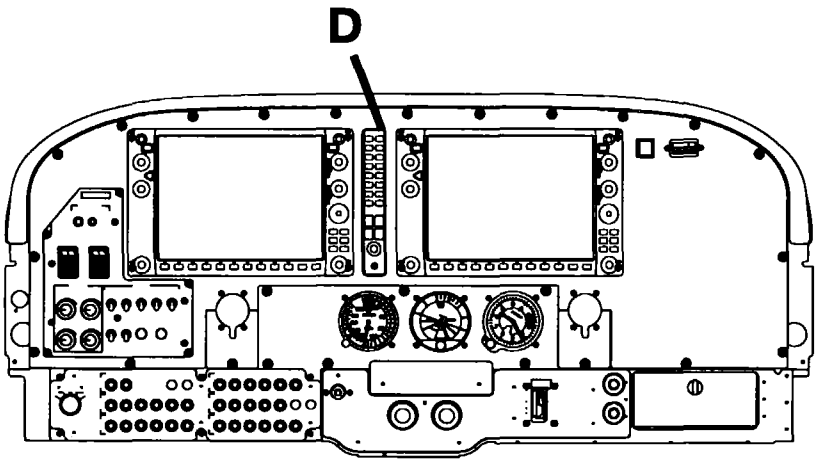
B1697



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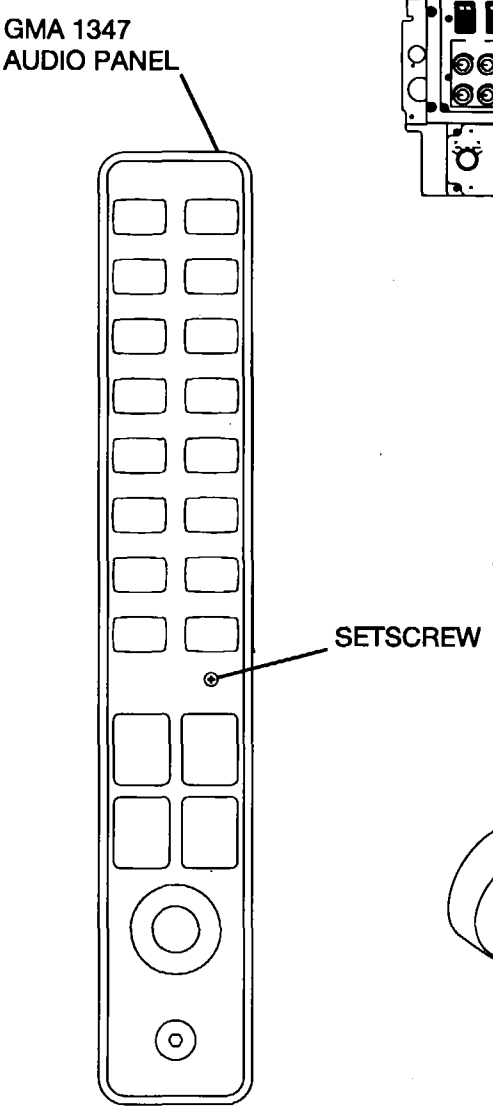
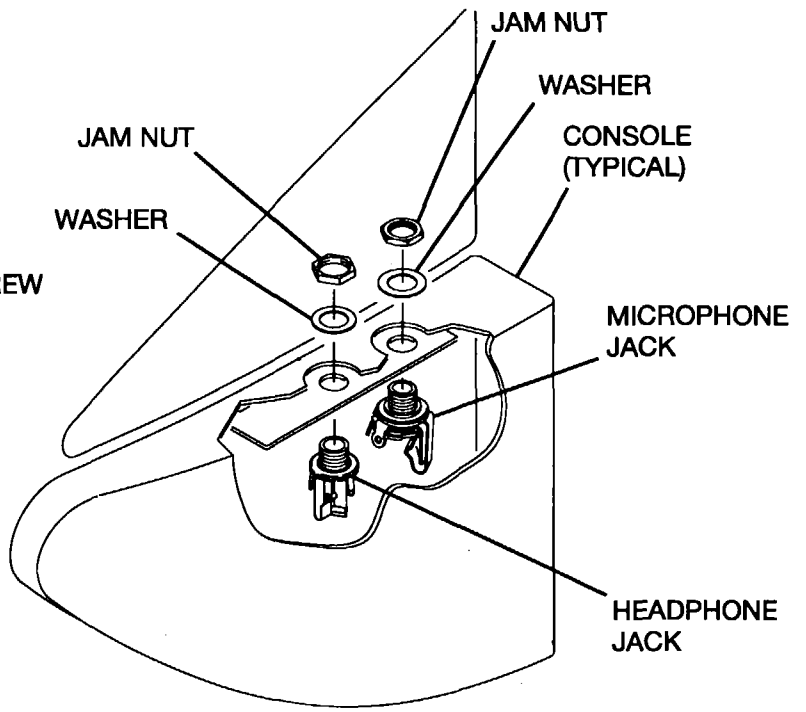


DETAIL D



DETAIL C

A0518T1109
C0518T1041
D0518T1109

Audio Panel Installation
Figure 201 (Sheet 2)

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(2) Remove the interior sidewall panel that is between the instrument panel and the forward doorpost to get access to the back of the jack. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(3) Remove the jam nut and washer that attaches the jack to the interior panel.
(4) Put a label on the applicable wires of the microphone jack (small plug) and headphone jack (large plug).
(5) Cut the wires near the soldered joint of the applicable jack.

B. Install the Pilot/Front Passenger Intercom Jacks (Refer to Figure 201).
(1) Remove all unwanted solder from the jack.
(2) Solder the applicable wires to the jack. Refer to the Model 172 Wiring Diagram Manual, Chapter 20, Soldering - Maintenance Practices.
(3) Attach the jack to the sidewall panel with the jam nut and washer.
(4) Install the sidewall panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

5. Rear Passenger Intercom Jacks Removal/Installation

A. Remove the Rear Passenger Intercom Jacks (Refer to Figure 201).
(1) Make sure the AVIONICS and MASTER switches are in the off position.
(2) Remove the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices, Aft Seat Removal/Installation.
(3) Remove the rear sidewall panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(4) Put a label on the applicable wires of the microphone jack (small plug) and headphone jack (large plug).
(5) Cut the wires near the soldered joint of the applicable jack.
(6) Remove the jam nut and washer that attaches the jack to the interior panel.

B. Install the Rear Passenger Intercom Jacks (Refer to Figure 201).
(1) Remove all unwanted solder from the jack.
(2) Solder the applicable wires to the jack. Refer to the Model 172 Wiring Diagram Manual, Chapter 20, Soldering - Maintenance Practices.
(3) Attach the jack to the sidewall panel with the jam nut and washer.
(4) Install the rear sidewall panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(5) Install the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices, Aft Seat Removal/Installation.

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STATIC WICKS - MAINTENANCE PRACTICES

1. General

A. Maintenance of the static (discharger) wicks consists of removal/replacement of the wick assembly and ensuring that bonding straps are properly connected between control surfaces and primary structure.

B. Static wicks are mounted on the trailing edges of the ailerons, rudder and the elevators. Bonding straps are secured to flight control surfaces and electrically connect those surfaces to the primary structure.

2. Tools and Equipment

A. For a list of applicable tools and equipment, refer to Communications - General.

3. Static Wicks Removal/Installation

A. Remove Static Wick (Refer to Figure 201).
   (1) Carefully drill out mounting rivets which attach static wick to structure. Ensure holes are not drilled oversize.
   (2) Remove static wick from the airplane skin.

B. Install Static Wick (Refer to Figure 201).
   (1) Clean surface of airplane skin where static wick will attach to skin. Remove all traces of contaminants (including paint/primer) using scotchbrite and P-D-680 solvent.
   (2) Secure static wick to airplane skin using rivets.
   (3) Repaint at base of new wick (if required).
   (4) Rebalance control surfaces. Refer to 1996 and On Single Engine Structural Repair Manual.

4. Bonding Straps Removal/Installation

A. Bonding straps are provided to ensure that electrical potential between primary and secondary structure remains nearly equal. If bonding straps are removed, they should be reinstalled using hardware called out in the 172R Illustrated Parts Catalog.

B. The maximum allowable resistance (in ohms) for bonding straps is 0.0025 ohms.

C. Primary and secondary structure should be cleaned using scotchbrite pad and P-D-680 solvent before installing bonding hardware. Aluminum surfaces should be chemically protected (alodine or equivalent) before attaching bonding hardware to surface.

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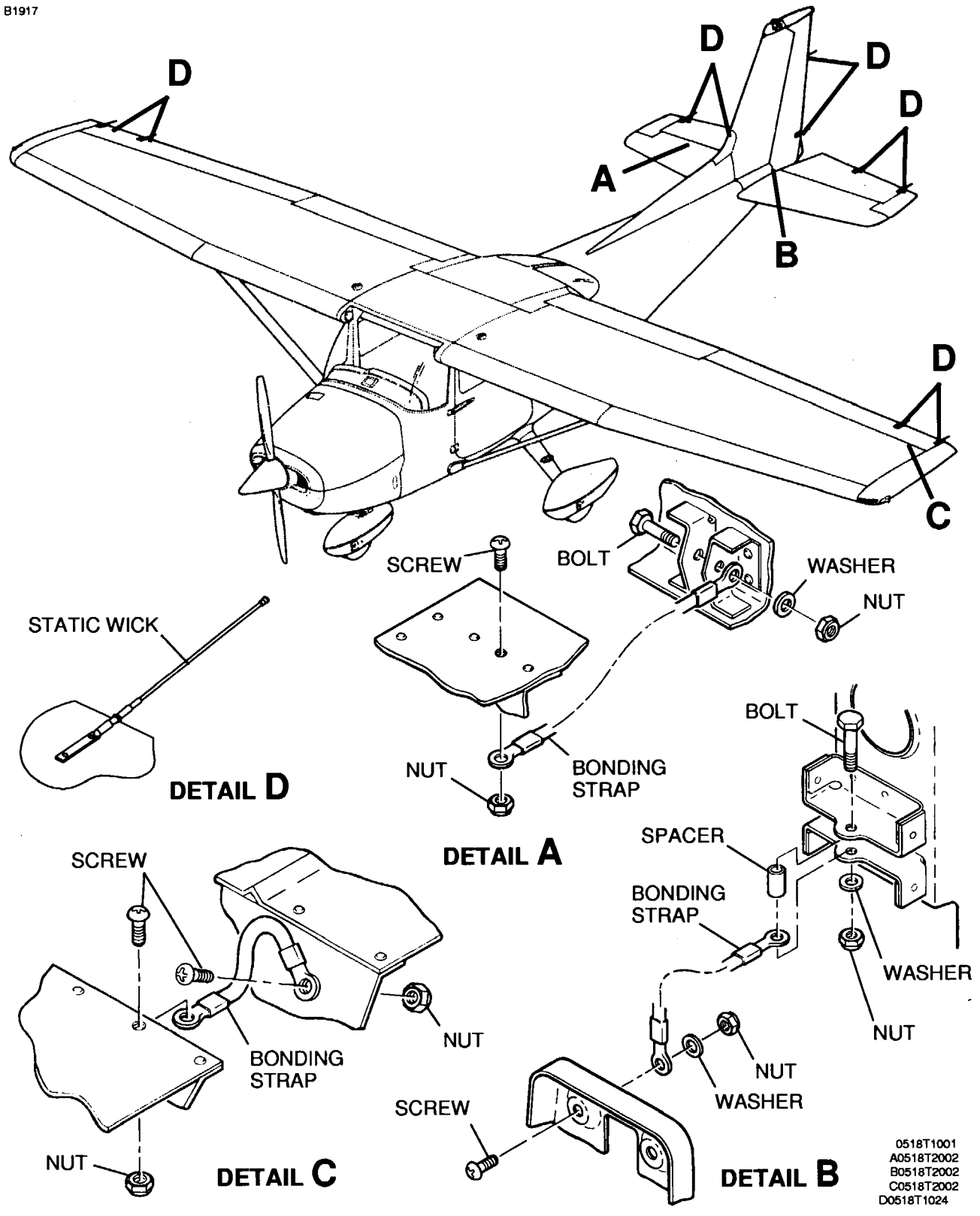

Static Discharger Installation
Figure 201 (Sheet 1)

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CHAPTER 24

ELECTRICAL POWER

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24-30-00	Page 101	Apr 7/2003
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24-60-00	Pages 101-103	DELETED
24-60-00	Pages 201-204	Jul 3/2006
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ELECTRICAL POWER - GENERAL

1. Scope

A. This chapter gives the electrical units and components which control and supply electrical power for the airplane systems. This includes the alternator, batteries, and relays.

B. Electrical energy for the airplanes is supplied by a 28-volt, direct current, single primary bus, negative ground electrical system. A single 24-volt main battery supplies power to the starting system and gives a reserve source of power if an alternator failure were to occur. Airplanes that have the Garmin G1000 system have a second battery known as the Standby Battery. The Standby Battery is controlled and monitored by the Standby Battery Controller and supplies power to the G1000 Essential Bus if there is a failure of the main battery and alternator. A power junction box, also referred to as a Master Control Unit (MCU), is attached to the forward left side of the firewall and includes electrical relays, an alternator control unit (ACU), an ammeter sensor, an external power receptacle, fuses and/or circuit breakers in a single box. An engine-driven alternator is the normal source of power during flight and maintains a battery charge controlled by the ACU. The external power receptacle is used for ground operation of the electrical equipment and helps the main battery during ground starts.

C. Electrical power is supplied to the two primary electrical busses through two 30A fuses, two 30A circuit breakers, or two 40A circuit breakers in the junction box. These electrical busses supply power to two avionics busses through 15A circuit breakers. The two avionics busses are controlled by an avionics master switch.

D. The operation of the main battery and alternator system is controlled by the MASTER ALT BAT switch. The switch is an interlocking split rocker and is found on the left side of the switch panel. The right half of the rocker controls the main battery and the left half controls the alternator. It is possible in this configuration for the main battery to be online without the alternator. However, operation of the alternator without the main battery is not possible. The BAT MASTER switch, when operated, connects the main battery contactor coil to ground so that the contacts close and supply power to the system from the main battery only. The ALT MASTER switch, when ON, applies positive voltage to the ACU and to the alternator contactor coil at the same time, which then applies field voltage to the alternator field and supplies power to the electrical system from the alternator.

E. The operation of the Standby Battery, if installed, is controlled by a three-position STDBY BATT switch. Normal flight operation is with the switch in the ARM position that lets the standby battery charge from the G1000 Essential Bus. If there is an alternator failure, the standby battery controller will not let the standby battery discharge to the G1000 Essential Bus until the depletion or failure of the main battery. It is necessary during preflight to do an "energy level" acceptance test. Refer to the Pilot's Operating Handbook, Chapter 4, Starting Engine, for details of the "energy level" acceptance test.

F. The main battery ammeter is controlled by a sensor found in the power junction box. In flight, without the use of external power, the meter shows the quantity of current that flows to or from the battery. With a low battery and the engine at cruise speed, the ammeter will show a large positive output and a charge of the main battery. When the main battery is fully charged, the ammeter will show a minimum charge rate.

G. The main battery is a 24-volt, 12.75 Amp-hour (5-hour rate), flooded lead-acid type. The battery is installed in the front-left side of the firewall.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes can be used for the following items:

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NAME	NUMBER	MANUFACTURER	USE
Adhesive	41-30	Mid-West Industrial Chemical Company 1509 Sublette St. Louis, MO 63110	Used to bond the battery vent drain tubes to the battery case elbows.
Battery Charger	TDMC-81	Cessna Aircraft Company	Charges the battery.
Cleaning Cloth		Available Commercially	Cleans the battery.
Digital Voltmeter	Model 87	John Fluke Mfg. Co. 6920 Seaway Blvd. Everett, WA 98206	General electrical use.
Hydrometer (1.100 to 1.310 specific gravity range)		Available Commercially	Measures the specific gravity of electrolytes.
MCU Test Set (With instructions, LI-0021)	TE04	Lamar Technology Inc. 14900 40th Avenue North East Marysville, WA 98271	To do the tests and troubleshooting for the J-box, (MCU) and alternator systems.
Nonmetallic Brush (Acid-Resistant)		Available Commercially	Cleans battery cells.
Rubber Gloves, Rubber Apron, and Protective Goggles.		Available Commercially	Give protection when you clean the battery.
Small syringe		Available Commercially	Service of the battery.
Variable Power Supply		Available Commercially	Supplies external power for ground maintenance.
12 Volt DC Power Adapter	D02-0042	Cessna Aircraft Company Cessna Parts Distribution Department 701, CPD 2 5800 East Pawnee Road Wichita, KS 67218-5590	Cabin Power System. Commercial Airline Connector adapts to Automotive Power Port Connector.
24-Volt Battery Charger	TSC-01V	Teledyne Continental Motors Battery Products 840 West Brockton Avenue Redlands, CA 92374 Phone: 1-800-456-0070	Charges the battery.

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ALTERNATOR - TROUBLESHOOTING

1. Troubleshooting

NOTE: Refer to the Lamar TE04 MCU Test Set and the LI-0021 instructions for additional testing procedures of the alternator system. Refer to Electrical Power - General, Tools, Equipment, and Materials.

Engine not running

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR FIELD CIRCUIT BREAKER TRIPS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON	Shorted diodes in alternator	STEP 1: Turn off battery switch and remove "B" lead (alternator feeder wire) and filter capacitor lead from BAT terminal on alternator. If circuit breaker no longer trips when alternator switch is turned on, check filter capacitor for short. Replace filter capacitor as necessary. If filter capacitor is ok, and circuit breaker trips when alternator switch is turned on, reinstall the "B" lead and proceed to step 2.
	Short in alternator "B" lead.	STEP 2: Inspect "B" lead for short to ground. Repair or replace "B" lead as necessary. If no problem with "B" lead is found, proceed to step 3.
	Short in alternator field winding.	STEP 3: Disconnect field wire from FLD terminal on alternator. If circuit breaker no longer trips, replace alternator. Otherwise reinstall the field wire and proceed to step 4.
	Short in field wire.	STEP 4: Inspect field wire for short to ground between alternator and ACU. Repair or replace field wire as necessary. If no problem with the field wire is found, proceed to step 5.
	Defective ACU.	STEP 5: Disconnect the ACU connector in the J-box. If the circuit no longer trips, replace the ACU. Otherwise, reconnect the ACU connector and proceed to step 6.
	Short in alternator relay.	STEP 6: Disconnect the red wire from the small terminal of the alternator relay. If the circuit breaker no longer trips, replace alternator relay. Otherwise, reinstall the red wire and proceed to step 7.

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Engine not running

TROUBLE	PROBABLE CAUSE	REMEDY
	Short in J-box wire.	STEP 7: Disconnect the PB018 J-box connector. If the circuit breaker no longer trips, look for a short to ground in the red wire that goes from pin C of JB018 to the alternator relay and the ACU. Repair and replace as necessary. If nothing is found, proceed to step 8.
	Short in wire between J-box and alternator switch.	STEP 8: Look for a short in the alternator switch wire between the alternator switch and the J-box. Repair and replace as necessary. If nothing is found, proceed to step 9.
	Defective circuit breaker.	STEP 9: Replace the alternator field circuit breaker.
Engine running		
ALTERNATOR FIELD CIRCUIT BREAKER TRIPS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON. (DOES NOT TRIP WHEN ENGINE IS NOT RUNNING)	Defective ACU.	STEP 1: Disconnect ACU connector in J-box. If circuit breaker no longer trips, replace ACU. Otherwise, proceed to step 2.
	Short between field wire and alternator "B" lead.	STEP 2: Look for short between field wire and alternator "B" lead. Repair or replace as necessary.
ALTERNATOR MAKES ABNORMAL WHINING NOISE, NOISE CHANGES PITCH WHEN RPM CHANGES AND GOES AWAY WHEN ALTERNATOR IS TURNED OFF	Broken lead on filter capacitor.	STEP 1: Repair or replace filter capacitor.
	Grounding problem.	STEP 2: Check for proper grounding at alternator, J-box, and ground block. If ok, then check for any loose connections in J-box or alternator. If ok, proceed to step 3.

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Engine not running

TROUBLE	PROBABLE CAUSE	REMEDY
	Shorted diode in alternator.	STEP 3: Turn off battery switch and remove cable from "BAT" terminal of alternator. Disconnect negative battery cable. Using a digital multimeter with the diode function selected, place negative lead on "BAT" terminal of alternator and positive lead on case or "GND" terminal and a reading of approximately 0.8 to 1.0 should be seen. If a reading of about half is seen then suspect a shorted diode in alternator. Reverse the test leads and the meter should indicate an open circuit. If the resistance function of the meter is selected or if using older analog meters the readings will be different but one direction should yield an open circuit and the other a numerical value in very high resistance (usually greater than 1 Megaohm). If using the resistance function and a setting on very high resistance (greater than 1 Megaohm), then the meter may show leakage, although the diodes are fine. Since the alternator has an internal capacitor, readings taken with meters selected on resistance may be unstable. If readings are not ok, then replace alternator.
LOW VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON	Broken terminal on alternator "B" lead.	STEP 1: Replace terminal on "B" lead.
	Defective ACU.	STEP 2: With engine running and alternator switch on, check bus voltage (bus voltage can be displayed on the clock). ACU should turn low voltage light on if voltage in J-box is at or below 24.5 volts. If light remains on and clock displays at or above 26 volts, replace ACU. Otherwise, proceed to step 3.

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Engine not running

TROUBLE	PROBABLE CAUSE	REMEDY
	Loss of power to ACU and alternator relay.	STEP 3: With engine not running and alternator switch on, check voltage at small terminal of alternator relay where red wire attaches. If zero volts, check for open wire, defective alternator switch, or defective alternator field circuit breaker. If nothing is found, proceed to step 4.
	Defective relay.	STEP 4: With engine not running and alternator switch on, check for battery voltage at both large terminals of alternator relay. If battery voltage is present at only one large terminal, replace alternator relay. Otherwise, proceed to step 5.
	Defective alternator.	STEP 5: With engine not running and alternator switch on, check field voltage at FLD terminal of alternator. Field voltage should be approximately 2 volts less than battery voltage. If field voltage is ok, replace alternator. Otherwise, proceed to step 6.
	Open in field wire.	STEP 6: If there is no voltage at FLD terminal, check for open in field wire between alternator and ACU. Repair or replace as necessary. If nothing is found, proceed to step 7.
	Defective ACU.	STEP 7: Replace ACU.
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF, CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES	Defective ACU.	STEP 1: Check bus voltage. If 29 volts or higher, replace ACU.
ALTERNATOR WILL NOT KEEP BATTERY CHARGED	Alternator output voltage insufficient.	STEP 1: This problem should be accompanied by a low voltage light that won't go out. Refer to the section above concerning this problem.

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ALTERNATOR - MAINTENANCE PRACTICES

1. General

A. A 60 amp alternator is installed on the forward side of the engine, below and to the right of the crankshaft.

2. Alternator Removal/Installation

A. Remove Alternator (Refer to Figure 201).
(1) Remove upper and lower cowl.
(2) Disconnect battery cables.
(3) Disconnect electrical connectors from alternator.
(4) Remove safety wire from adjusting bolt. Remove bolt.
(5) Remove alternator mounting bolt.
(6) Remove drive Micro-V-Belt from alternator pulley.
(7) Remove alternator from airplane.

B. Install Alternator (Refer to Figure 201).
(1) Position alternator on mounting bracket and install mounting bolt and nut. Do not tighten at this time.
(2) Place drive Micro-V-Belt on alternator pulley.
(3) Install adjusting bolt.

CAUTION: ANY AIRPLANE WITH A NEW ALTERNATOR BELT INSTALLED, INCLUDING NEW AIRPLANES, BELT TENSION SHOULD BE RE-CHECKED WITHIN THE FIRST 10 TO 25 HOURS OF OPERATION.

(4) Apply a torque wrench to the nut on alternator pulley and adjust the belt tension so the belt slips at 7 to 9 foot-pounds of torque with a used belt, or 11 to 13 foot-pounds of torque with new Micro-V-Belt.
(5) Torque the adjusting bolt to 160-185 inch-pounds and safety wire.
(6) Torque the alternator mounting bolt to 235-255 inch-pounds.

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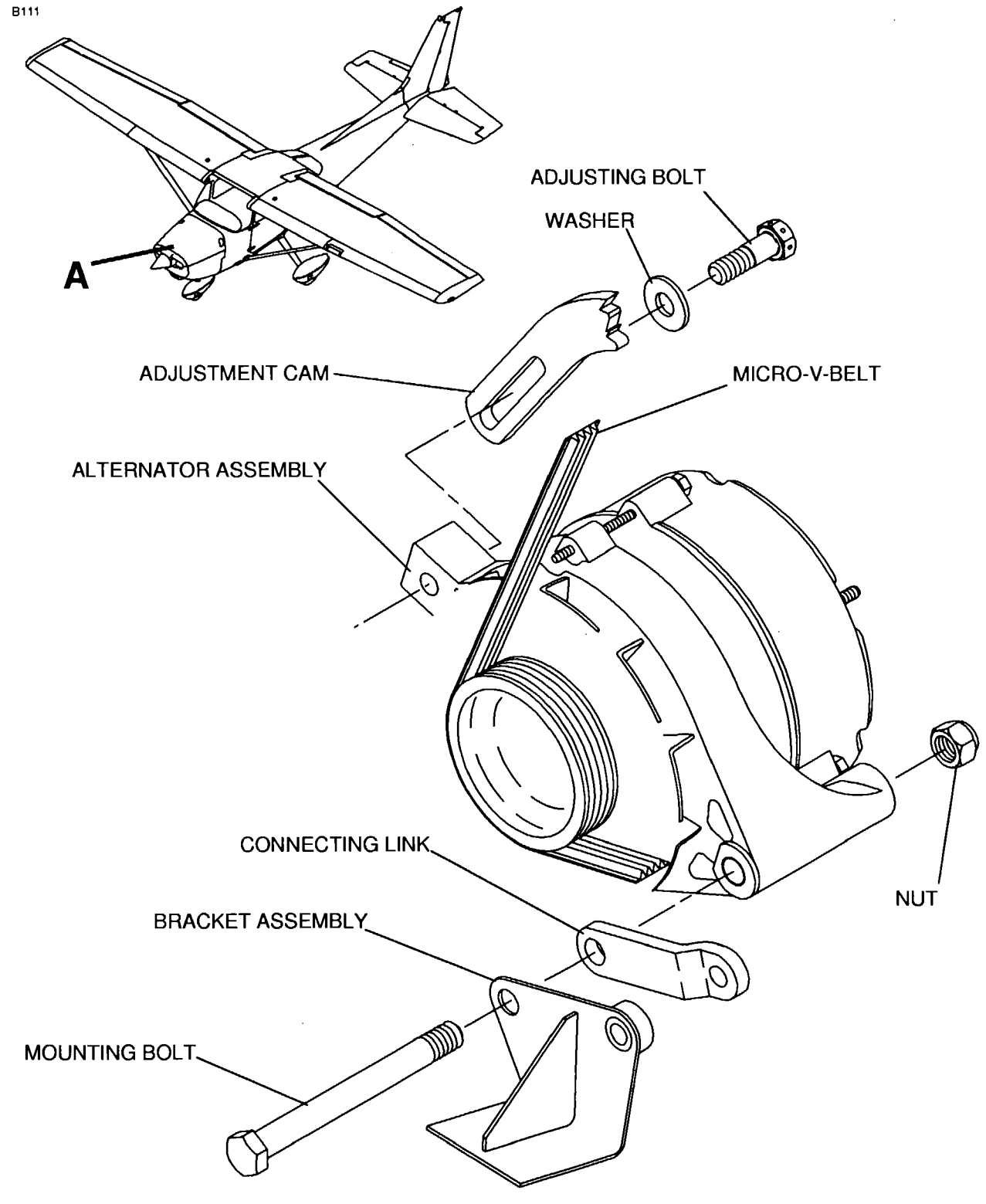

DETAIL A

0510T1007
A0550T1001

Alternator Installation
Figure 201 (Sheet 1)

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BATTERY - TROUBLESHOOTING

1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE	Battery discharged.	STEP 1: Place MASTER switch and TAXI LIGHT switch in ON position. Measure battery voltage across battery terminals. A normally charged battery will indicate 23 volts or more. If voltage is low, proceed to Step 2. If voltage is normal, proceed to Step 3.
	Faulty battery.	STEP 2: Check fluid level in battery cells and charge battery at 28 volts for approximately 30 minutes or until the battery voltage rises to 28 volts. If tester indicates a good battery, the problem was a discharged battery. If the tester indicates a faulty battery, replace the battery.
	Faulty wiring or electrical connection between battery terminal and master switch.	STEP 3: With master switch closed, measure voltage at master switch terminal on bus bar contactor. Normal indication is zero volts. If voltage reads zero, proceed to Step 4. If a voltage reading is otained, check wiring between battery terminal and master switch. Also check master switch.
	Open coil on contactor.	STEP 4: Check continuity between battery terminal and master switch terminal on bus bar contactor. Normal indication is 50 to 70 Ohms. If ohmmeter indicates an open coil, replace contactor. If ohmmeter indicates a good coil, proceed to Step 5.
	Faulty bus bar contacts.	STEP 5: Check voltage on bus side of contact with master switch closed. Meter normally indicates battery voltage. If voltage is zero or intermittent, replace contactor. If voltage is normal, proceed to Step 6.
	Faulty wiring between battery terminal and bus.	STEP 6: Inspect wiring between contactor and bus. Repair or replace wiring as necessary.

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BATTERY - MAINTENANCE PRACTICES

1. General

A. The battery is a 24-Volt, 12.75 Amp-hour or an optional heavy-duty 15.5 Amp-hour flooded lead-acid type battery. Either of these batteries can be installed. The battery is installed on the front-left side of the firewall below the electrical power junction box.

NOTE: The Amp-hour rate is based on a five hour discharge rate.

2. Battery Removal/Installation

A. Remove the Battery (Refer to Figure 201).
(1) Remove the top engine cowl. Refer to Chapter 71, Cowls - Maintenance Practices.

CAUTION: DISCONNECT THE NEGATIVE BATTERY CABLE FIRST, THEN THE POSITIVE CABLE. THIS WILL PREVENT AN ACCIDENTAL SHORT OF THE BATTERY FROM HAND TOOLS.

(2) Cut the tie straps to the positive terminal cover.
(3) Disconnect the negative battery cable.
(4) Disconnect the positive battery cable.
(5) Disconnect the battery vent line at the hose clamp.
(6) Remove the battery hold down bolts and washers.
(7) Remove the cooling shroud from the battery.
(8) Remove the battery from the airplane.

B. Install the Battery (Refer to Figure 201).
(1) Set the battery in the battery tray.
(2) Install the hold-down strap to the battery with the hold-down bolts.

CAUTION: DO NOT TIGHTEN THE HOLD-DOWN BOLTS TOO MUCH OR YOU WILL DAMAGE THE HOLD-DOWN STRAP.

(3) Tighten the hold-down bolts to 10 inch-pounds (1.13N.m).
(4) Connect the battery vent line with the hose clamp.

CAUTION: CONNECT THE POSITIVE BATTERY CABLE FIRST, THEN CONNECT THE NEGATIVE CABLE. THIS WILL PREVENT AN ACCIDENTAL SHORT OF THE BATTERY FROM HAND TOOLS.

(5) Connect the positive battery cable.
(6) Install the positive battery terminal cover.
(7) Attach tie-straps to the terminal cover.
(8) Connect the negative battery cable.
(9) Install the top engine cowl. Refer to Chapter 71, Cowls - Maintenance Practices.

3. Battery Cleaning

A. Clean the Battery (Refer to Figure 201).

NOTE: For correct operation, the battery and connections must be clean at all times.

(1) Remove the battery. Refer to Battery Removal/Installation.
(2) Tighten the battery cell filler caps to prevent the cleaning solution from entering the cells.
(3) Use a clean cloth moistened with a solution of bicarbonate (baking soda) and water to clean the battery cable ends, battery terminals and the surfaces of the battery.
(4) Rinse with clear water.

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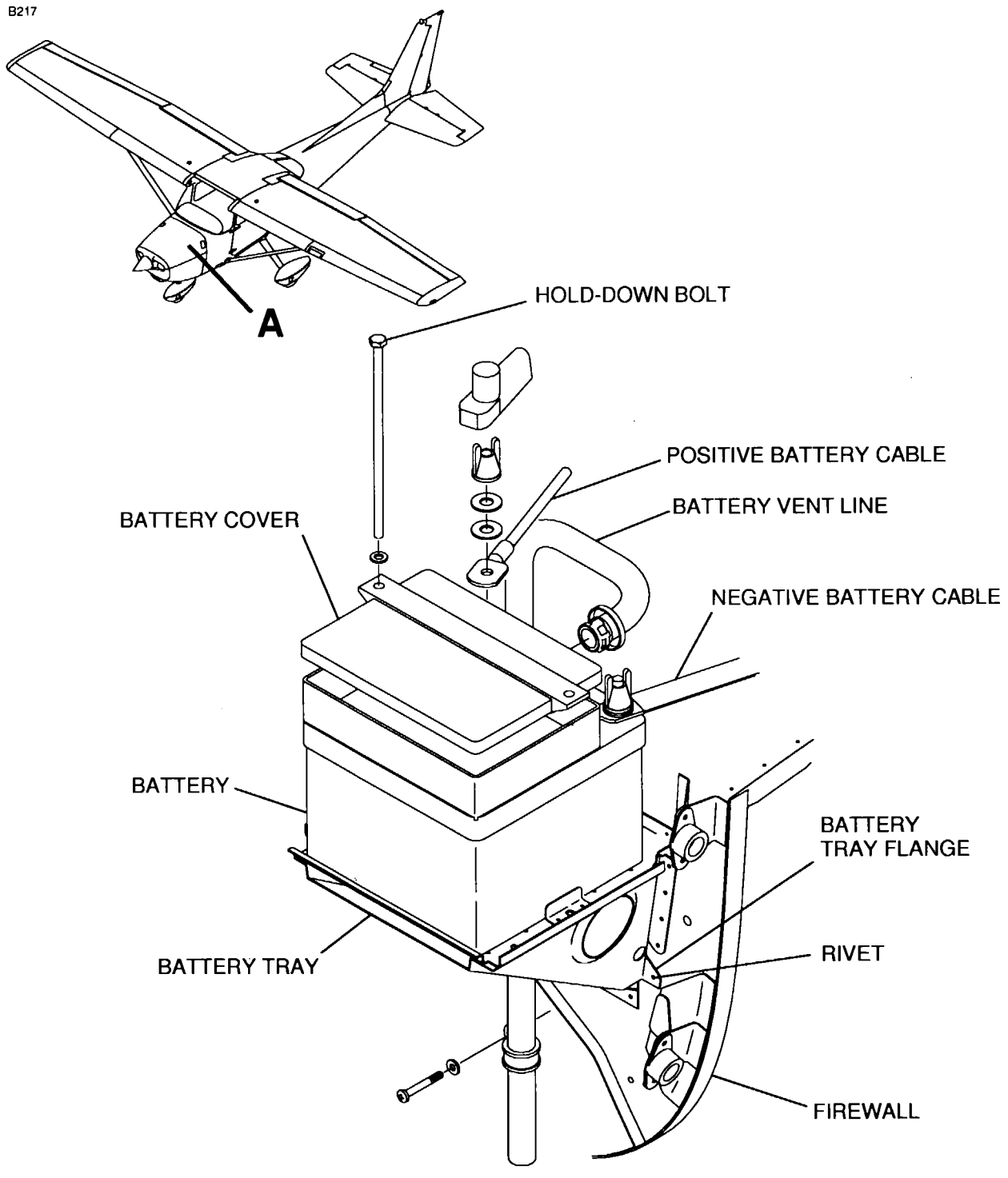

DETAIL A

0510T1007
A0518T1023

Battery Installation
Figure 201 (Sheet 1)

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(5) Use a dry cloth to clean off the water and let the battery dry.
(6) Polish the cable ends and battery terminals with an emery cloth or a wire brush.
(7) Install the battery. Refer to Battery Removal/Installation.
(8) Apply petroleum jelly or an ignition spray product to the battery terminals to decrease corrosion.

4. New Battery Check

A. Complete a New Battery Check.
(1) Do a specific gravity check to make sure the correct strength of electrolyte is used. The electrolyte must be 1.285 +0.005 or -0.005 specific gravity when it is measured between 75°F to 85°F (24°C to 30°C).
(2) To charge a new battery, use the manufacturer's instructions supplied with the battery.
(3) Before you install the battery, clean the battery box. Refer to Chapter 12, Battery - Servicing.
(4) Install the battery in the airplane. Refer to Battery Removal/Installation.

5. Battery Charging

NOTE: The procedures that follow are for batteries that use a Gill TSC-01V or a Gill TDMC Battery Charger.

WARNING: YOU MUST KEEP SPARKS AND OPEN FLAME AWAY FROM THE BATTERY. THE BATTERY MAKES HYDROGEN AND OXYGEN GASES WHEN IT IS CHARGED. THE GASES WILL COLLECT AND CAUSE A HAZARDOUS, EXPLOSIVE CONDITION. YOU MUST HAVE FREE VENTILATION OF THE BATTERY AREA WHEN YOU CHARGE IT.

WARNING: THE BATTERY CELL TEMPERATURE MUST NOT BE MORE THAN 115°F (46°C). DECREASE THE CHARGE RATE IF THE TEMPERATURE INCREASES MORE THAN 115°F (46°C). THE CHARGE MUST NOT CAUSE ACID TO BE BLOWN FROM THE VENTS.

A. If you use a Gill TSC-01V battery charger, do the instructions that follow.

NOTE: The Gill TSC-01V is automated with a typical charge time of approximately two hours. Some batteries will take more time to charge as a result of the battery condition.

(1) Remove the battery from the airplane and place it in a well ventilated area to charge. Refer to Battery Removal/Installation.
(2) Remove the vent caps and make sure the electrolyte level is above the plates and separator material. Do not fill the battery to the split rings at this time.
(3) Do a specific gravity check of the battery electrolyte with a hydrometer such as the Gill FR-1 (or equivalent) to determine the battery charge. Refer to Table 201 and Table 202.
(4) Record the value for each battery cell.
(5) Install the vent caps.
(6) Attach the red cable to the positive battery terminal and the black cable to the negative battery terminal.
(7) Connect the charger to AC power. The procedures that follow will result:
(a) The AC POWER ON indicator light will come on.
(b) The three battery level indicators will flash one time.
(c) The EMPTY battery level indicator will flash on and remain on.

NOTE: The EMPTY battery level indicator shows that the battery is correctly connected.

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(8) If the battery is not fully charged, the PARTIALLY CHARGED indicator light will come on. Make sure that the battery stays connected at this time.

NOTE: Make sure that you let the battery fully charge. This will make sure of a good battery life and performance.

(a) Do not disconnect the battery. The charger will not operate correctly if the battery is disconnected and then connected after the PARTIALLY CHARGED indicator light comes on. If the battery is disconnected, you must disconnect and connect the charger at the electrical outlet to start the charge process.

(9) When the battery is fully charged, the BATTERY READY indicator will come on.

(10) The electrolyte level must touch the bottom of the split ring while the battery is warm and still on the charger.

(a) If the electrolyte level needs to be increased, use only distilled or mineral free water to adjust the electrolyte level. The battery must be warm when the electrolyte level is increased.

NOTE: The electrolyte level decreases as the battery temperature decreases.

(11) Do not add any more fluid after these instructions unless the battery electrolyte spills.

(a) If the fluid level is below the plates and separator material because a spill occurs, add electrolyte with a value of 1.285 specific gravity.

(12) When the BATTERY READY indicator light comes on, turn the AC power off.

(13) Disconnect the battery charger from the electrical outlet.

(14) Disconnect and remove the battery from the charger.

(15) Do a specific gravity check of the battery electrolyte. Refer to Table 201 and Table 202.

(a) The specific gravity values between cells must not have a difference of more than 0.020.

(b) Acceptable specific gravity values that are adjusted for temperature, must be between 1.260 and 1.290.

(c) If the battery does not give sufficient power to crank the engine with the starter, then replace it with a new battery. Refer to New Battery Activation.

B. If you use a Gill TDMC battery charger, do the instructions that follow.

(1) Remove the battery from the airplane and place it in a well ventilated area to charge. Refer to Battery Removal/Installation.

(2) Remove the vent caps and make sure the electrolyte level is above the plates and separator material. Do not fill the battery to the split rings at this time.

(3) Do a specific gravity check of the battery electrolyte with a hydrometer such as the Gill FR-1 (or equivalent) to determine the battery charge. Refer to Table 201 and Table 202.

(4) Record the value for each battery cell.

(5) Install the vent caps.

(6) Click the Gill TDMC charger ON button two times to select the 24 volt position.

(7) Set the timer for 8 to 10 hours.

NOTE: The charger is in a constant current mode when the timer is on.

(8) Set the charge rate to 1.5 amps.

CAUTION: DO NOT LET THE BATTERY CHARGER CHARGE AT 32 VOLTS FOR MORE THAN THIRTY MINUTES.

(9) Charge the battery until the voltage stabilizes for three consecutive hours or shows 32 volts, whichever occurs first.

NOTE: The charge is measured across the battery terminals with the charger on.

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(10) The electrolyte level must touch the bottom of the split ring while the battery is warm and still on the charger.
  (a) If the electrolyte level needs to increased, use only distilled or mineral free water to adjust the electrolyte level. The battery must be warm when the electrolyte level is increased.

    NOTE: The electrolyte level decreases as the battery temperature decreases.

(11) Do not add any more fluid after these instructions unless the battery electrolyte spills.
  (a) If the fluid level is below the plates and separator material because a spill occurs, add electrolyte with a value of 1.285 specific gravity.
(12) Do a specific gravity check of the battery electrolyte. Refer to Table 201 and Table 202.
  (a) The specific gravity values between cells must not have a difference of more than 0.020.
  (b) Acceptable specific gravity values that are adjusted for temperature, must be between 1.260 and 1.290.
  (c) If the battery does not give sufficient power to crank the engine with the starter, then replace it with a new battery. Refer to New Battery Activation.

6. Battery Test

A. Complete a Specific Gravity Check. Refer to Table 201 and Table 202.
  (1) Measure the specific gravity of the battery with a hydrometer to find the condition of the battery charge.

    NOTE: Some hydrometers will have a built-in temperature compensation chart and a thermometer.

  (2) The battery condition for various hydrometer values with an electrolyte temperature of 80°F (27°C) is shown in Table 201.
    (a) Electrolyte measurements with the hydrometer must be compensated for the temperature of the electrolyte. Refer to Table 202.

      NOTE: For increased temperatures, the values will be lower. For decreased temperatures, the values will be higher.

  (3) If the specific gravity indicates the battery is not fully charged, refer to Battery Charging.

    NOTE: For more accurate results, you can use a load type tester after you charge the battery.

    NOTE: A specific gravity check can be completed after the charge. This check will not find cells that short circuit under electrical loads, or have broken connectors between cell plates.

Table 201. Battery Hydrometer Values at 80°F (27°C).

VALUE	BATTERY CONDITION
1.280 Specific Gravity	100% Charged
1.250 Specific Gravity	75% Charged
1.220 Specific Gravity	50% Charged
1.190 Specific Gravity	25% Charged
1.160 Specific Gravity	Not Charged

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Table 202. Specific Gravity Correction to 80°(27°C)

ELECTROLYTE TEMPERATURE	ADD TO VALUE	SUBTRACT FROM VALUE
140°F (60°C)	1.024	
130°F (54°C)	1.020	
120°F (49°C)	1.016	
110°F (43°C)	0.012	
100°F (38°C)	0.008	
90°F (32°C)		
80°F (27°C)		
70°F (21°C)		
60°F (16°C)		0.008
50°F (10°C)		0.012
40°F (4°C)		0.016
30°F (-1°C)		0.020
20°F (-7°C)		0.024
10°F (-12°C)		0.028
0°F (-18°C)		0.032
-10°F (-23°C)		0.036
-20°F (-29°C)		0.040
-30°F (-34°C)		0.044

7. Battery Tray Flange Repair

A. Repair the Battery Tray Flange.

(1) If you find cracks on the bottom outboard battery tray flange, do the procedures that follow:

CAUTION: MAKE SURE YOU DO NOT CUT INTO THE FIREWALL WHEN YOU CUT THE FLANGE OFF THE BATTERY TRAY.

(a) Remove the cracked flange from the battery tray.
(b) Remove the screws that attach the left rudder bar shield and remove the rudder bar shield.
(c) Pull the insulation up and away from the aft side of the firewall to get access to the battery tray rivet.
(d) Drill the rivet that attaches the cracked battery tray flange to the firewall.
(e) Use an applicable rivet to plug the hole.
(f) Pull the insulation down against the aft side of the firewall.
(g) Install the left rudder bar shield.
(h) Flatten the area of the battery tray with a file and sandpaper where the flange was removed.
(i) Apply Alodine and paint to the repaired area. Refer to Chapter 20, Interior and Exterior Finish - Cleaning/Painting.

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STANDBY BATTERY - MAINTENANCE PRACTICES
Airplanes with Garmin G1000

1. General

A. The maintenance procedures that follow have information for the removal, installation, capacity test and how to charge the standby battery, which is installed behind the Primary Flight Display. If there is no primary power source, the standby battery will give power to the essential bus for a period of time. The standby battery PC board is installed on the back of the switch panel. The standby battery PC board controls and monitors the release of electrical power to and from the standby battery.

2. Standby Battery Removal/Installation

A. Remove the Standby Battery (Refer to Figure 201).
   (1) Make sure the STDBY BATT switch is in the OFF position.
   (2) Make sure the MASTER ALT/BAT switch is in the OFF position.
   (3) Remove the Primary Flight Display. Refer to Chapter 34, Garmin Display Unit - Maintenance Practices.
   (4) Disconnect the standby battery (UC005) electrical connector (P1).
   (5) Remove the bolts and washers that attach the bracket to the bracket assembly.
   (6) Carefully remove the standby battery from the airplane.

B. Install the Standby Battery (Refer to Figure 201).
   (1) Carefully put the standby battery (UC005) in the correct position on the tray.
   (2) Set the bracket in the correct position on the top of the standby battery.
   (3) Install the bolts and washers that attach the bracket to the bracket assembly.
   (4) Connect the standby battery electrical connector (P1).
   (5) Install the Primary Flight Display. Refer to Chapter 34, Garmin Display Unit - Maintenance Practices.
   (6) Turn the standby battery switch to the ARM position to make sure the standby battery and essential bus voltage for the primary flight display operates correctly.

3. Standby Battery Printed Circuit Board Removal/Installation

A. Remove the Standby Battery Printed Circuit Board (PCB) (Refer to Figure 202).

CAUTION: Make sure you use a wrist strap when the standby battery PCB is removed. The standby battery PCB is sensitive to electrostatic discharge.

   (1) Make sure the STDBY BATT switch is in the OFF position.
   (2) Make sure the MASTER ALT/BAT switch is in the OFF position.
   (3) Remove the switch panel. Refer to Chapter 31, Instrument and Control Panels - Maintenance Practices.
   (4) Put on a wrist strap and ground the wrist strap to the airframe.
   (5) Disconnect the standby PCB from the electrical connector (PI036).
   (6) Remove the screws that attach the standby battery PC board (NZ001) to the extrusion.
   (7) Carefully remove the board from the extrusion.
   (8) If applicable, put the PC board in a electrostatic safe bag.

B. Install the Standby Battery PC Board (Refer to Figure 202).

CAUTION: Make sure a wrist strap is used when the standby battery PC board is installed. The standby battery PC board is sensitive to electrostatic discharge.

   (1) Put on a wrist strap and ground the wrist strap to the airframe.
   (2) Carefully install the PC board in the extrusion.
   (3) Install the screws that attach the board to the extrusion.

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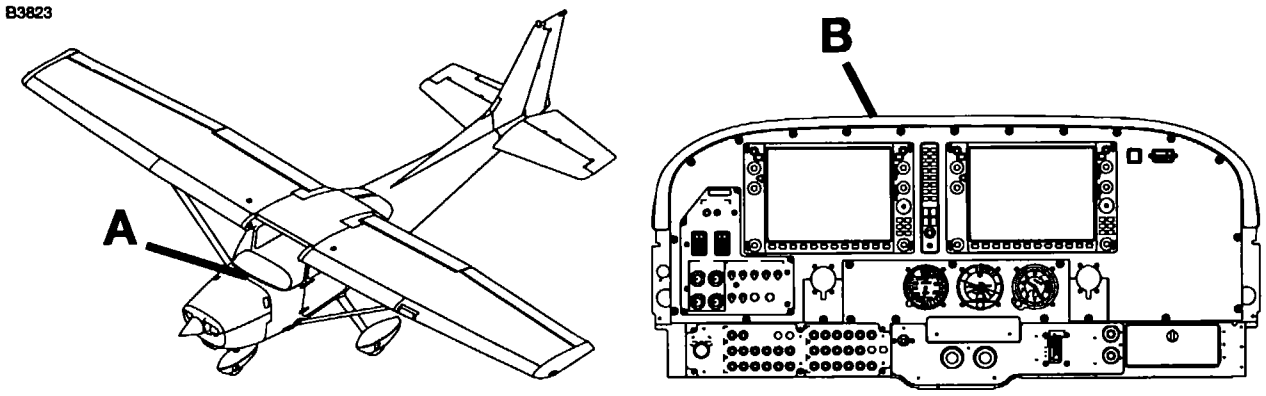
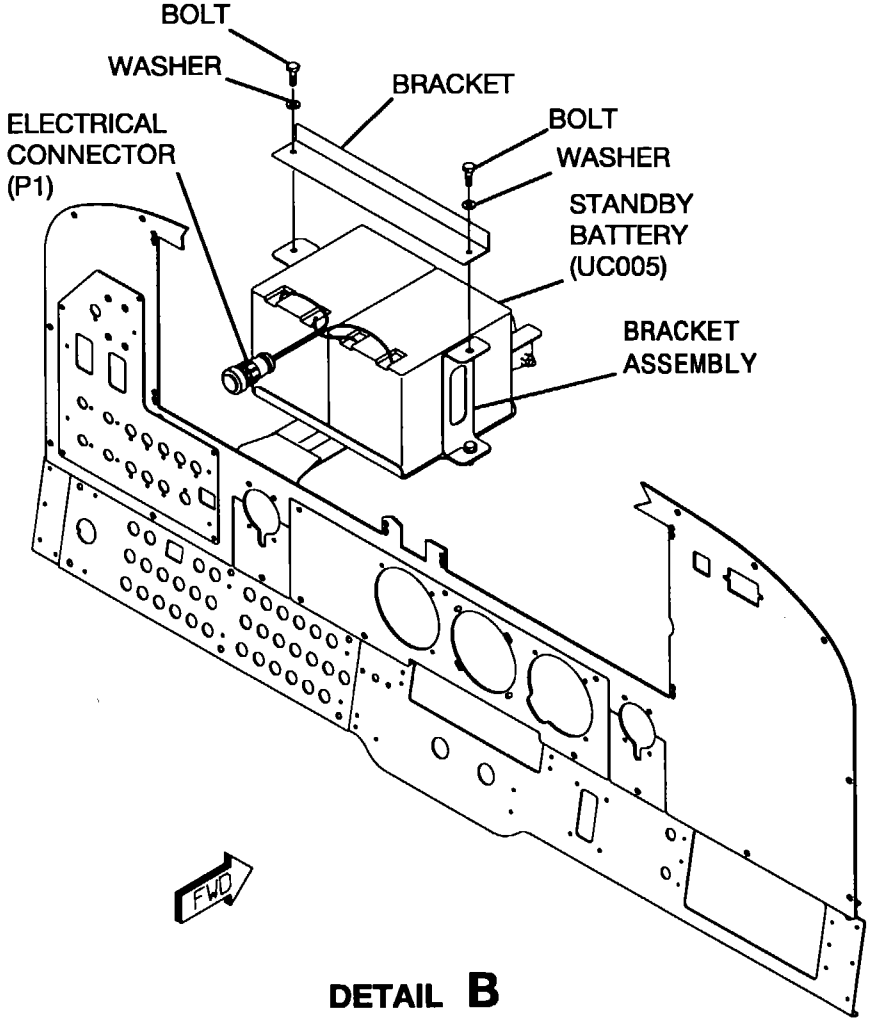


DETAIL A
AIRPLANES WITH GARMIN G1000 OPTION



DETAIL B

0510T1007
A0518T1109
B0518T1113

Standby Battery Installation
Figure 201 (Sheet 1)

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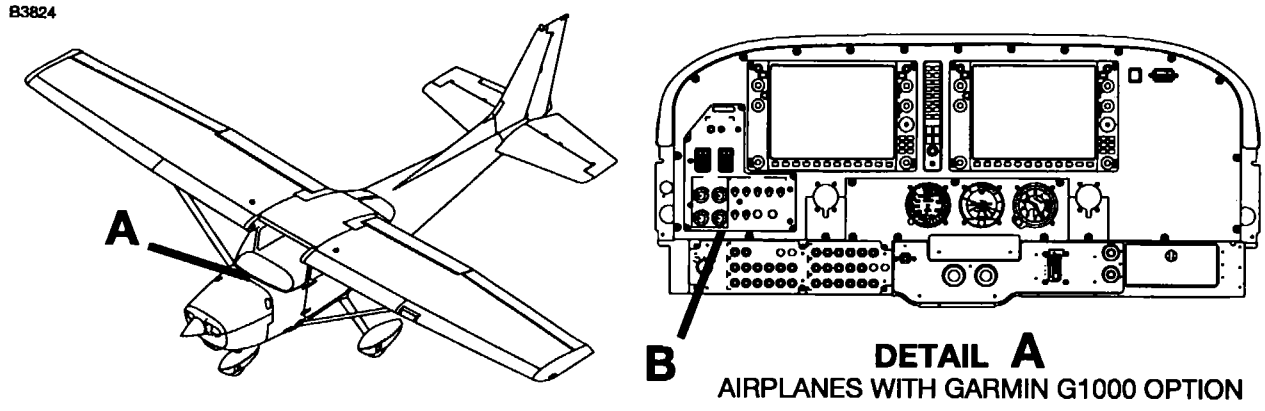

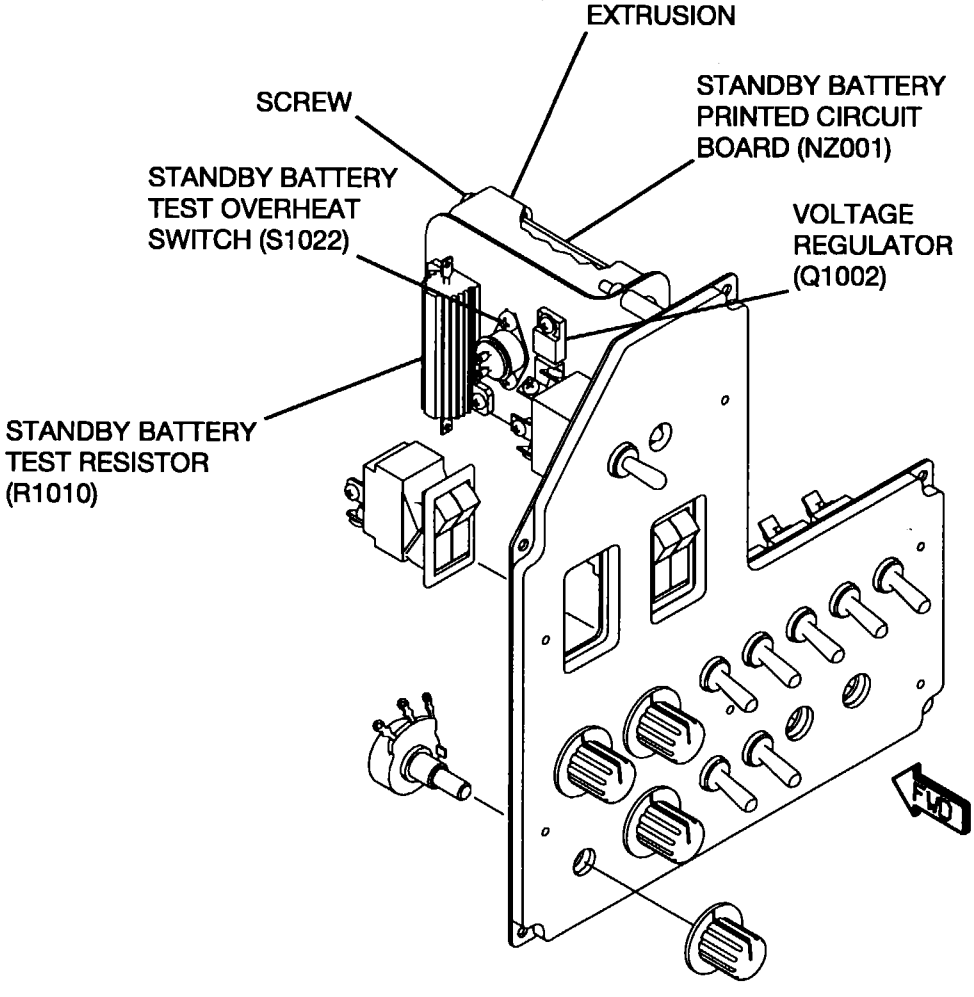

0510T1007
A0518T1109
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Standby Battery Printed Circuit Board Installation
Figure 202 (Sheet 1)

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(4) Connect the board to the electrical connector (PI036).
(5) Install the switch panel. Refer to Chapter 31, Instrument and Control Panels - Maintenance Practices.

4. Standby Battery Charging

A. Charge the Battery.
(1) Remove the battery from the airplane and put it in a well ventilated area to charge. Refer to Chapter 24, Standby Battery - Removal/Installation.
(2) Connect the battery to the charger with the black, round Standby Battery Connector (P1). A mating connector (JC032) can be purchased through Cessna. Refer to the Model 172R/172S Wiring Diagram Manual - Chapter 24, Electrical Power.

NOTE: To charge the standby battery, a constant voltage charger, constant current charger or a modification of both can be used. Use only chargers that are made to charge lead acid batteries. A constant voltage "fast" charge can be done with a charger that has a DC voltage between 28.3 and 30.0. A "float" charge can be done with a charger that has a DC voltage between 27.2 and 28.2.

CAUTION: Never set the charger to a level that is higher than 30.0 volts or you can cause damage to the battery.

(3) For a constant current charger, charge the battery. Refer to the charger's instructions.

NOTE: There is no limit on the initial charge current as long as the voltage is not more than 30.0 volts. If it is necessary to set the charger to the battery capacity, use 8 amp-hour as the standby battery capacity.

(4) For a constant voltage charger, charge the battery for up to 16 hours with a "fast" charge voltage between 28.3 and 30.0 volts.

NOTE: If the state of charge of the battery is satisfactory, charge times of less than 16 hours are possible. The battery can be thought to be completely charged if the charge current stays stable (approximately .1 to .2 amps) for a minimum of one hour. Charge times of more than 16 hours can be done if the charge voltages are kept between the recommended float charge range of 27.2 to 28.2.

(5) Install the battery. Refer to Standby Battery - Removal/Installation.
(6) Do the Standby Battery Energy Level Test described in the Pilot's Operating Handbook, Chapter 4 - Starting Engine Procedures. Make sure the green standby battery test light comes on and stays on for the described time period.

5. Standby Battery Storage

A. For the best battery life, the standby battery must be kept in a fully charged state when not in use. This is true when installed on the aircraft and when in long term storage. To leave the battery in an uncharged state for any given period of time will decrease the life of the battery. It is recommended to charge the battery at a minimum of once every three months of inactivity. In warm climates, a more frequent charge will be necessary.

B. Prevent long term storage of the battery in a temperature environment greater than approximately 25°C. Sun shades that cover the aircraft deck skin that decrease the temperature of the battery are recommended when the aircraft is parked in direct sunlight.

6. Standby Battery Capacity Test

A. The battery capacity must be tested according to the time limits set forth in Chapter 5, Inspection Time Limits. This test is also necessary to give the battery condition if the battery voltage decreases to less than 20.0 volts such as in an unintentional deep discharge.

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B. Battery Capacity Test

(1) Make sure that the battery is fully charged before the capacity test is started. If the charge condition is unknown, charge the battery. Refer to Chapter 24, Standby Battery Charging.

(2) Put the airplane in an area where there are high cabin light levels. Use sunlight or a well lit hangar facility.

NOTE: It is important that the photocell on the PFD controls the PFD light level to FULL BRIGHT. The manual AVIONICS rheostat is not operational with the primary alternator and main battery power turned off.

(3) Turn the STDBY IND rheostat to the full clockwise position.

NOTE: A stopwatch will be necessary in the following steps to time the battery discharge.

(4) With the BAT/ALT MASTER switch in the OFF position, set the STDBY BATT switch to the ARM position and immediately start the stopwatch.

(5) Make sure that all of the equipment on the essential bus operates correctly.

NOTE: After initialization, the PFD will be functioning in full bright mode with only red X's over the NAV 2, COM 2, and XPDR functions.

(6) Make sure that all the standby indicator lights come on.

(7) Make sure that the MFD and all the other electrical and avionic equipment on the primary busses are not on.

(a) If the conditions in steps 6 through 8 are not met, stop the test and correct these conditions.

(b) Start at Step 1 when the condition has been corrected.

NOTE: The standby battery initial current discharge will be between 2.1 and 3.1 amps as shown on the PFD standby battery ammeter. The essential bus initial voltage will be approximately 24.2 volts as shown on the PFD essential bus voltmeter.

(8) Continuously monitor the essential bus voltage as shown on the PFD essential bus voltmeter. The battery capacity is satisfactory if the bus voltage stays more than 20.0 volts for 55 minutes.

(9) Set the STDBY BATT switch to OFF if the essential bus decreases to 20.0 volts or after a minimum of 55 minutes.

CAUTION: Do not let the essential bus voltage decrease below 20.0 volts or the standby battery can be damaged. Set the STDBY BATT switch to the OFF position before the voltage drops to less than 20.0 volts. Voltage values less than 22.5 volts can decrease quickly, so monitor the voltage closely. If the voltage drops to less than 20.0 volts, charge the battery immediately and do the test again.

NOTE: If the standby battery voltage does not stay more than 20.0 volts for 55 minutes during the standby battery capacity test, the battery is not acceptable for return to service.

(10) Charge the battery. Refer to Standby Battery Charging.

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POWER JUNCTION BOX - MAINTENANCE PRACTICES

1. General

A. The power junction box, also referred to as a Master Control Unit (MCU), is installed on the forward, left side of the firewall. The power junction box has a battery relay, starter relay, alternator relay, current sensor, external power relay, alternator control unit, power distribution bus, and bus fuses (or circuit breakers as applicable).

2. Power Junction Box Removal/Installation

A. Remove the Power Junction Box (Refer to Figure 201).
   (1) Remove the upper cowl. Refer to Chapter 71, Cowls - Maintenance Practices.
   (2) Disconnect the battery cables. Refer to Battery - Maintenance Practices.
   (3) Remove the cover from the power junction box.
   (4) Disconnect the electrical connectors, cables, and ground strap from the power junction box.
   (5) Remove the bolts that attach the power junction box to the firewall.
   (6) Remove the power junction box from the airplane.

B. Install the Power Junction Box (Refer to Figure 201)
   (1) Put the power junction box on the firewall and attach it with the bolts.
   (2) Connect the electrical connectors, cables, and ground strap to the power junction box.
   (3) Install the cover on the power junction box.
   (4) Connect the battery cables. Refer to Battery - Maintenance Practices.
   (5) Install the upper cowl. Refer to Chapter 71, Cowls - Maintenance Practices.

3. Component Removal/Installation

A. General Precautions and Notes.

CAUTION: Make sure that all electrical power is removed from the airplane and that the battery is disconnected before work is done on power junction box components.

   (1) Components such as relays, current sensors, and the alternator control unit can be replaced as necessary. Refer to the Model 172R/172S Illustrated Parts Catalog for replacement part numbers.
   (2) Before you disconnect the wires, identify them with labels for correct installation.
   (3) Find the torque values for ground and conductive studs in Chapter 20, Torque Data - Maintenance Practices.

4. Power Junction Box Troubleshooting

A. Complete the Power Junction Box Troubleshooting.
   (1) The power junction box troubleshooting is done with the Lamar TE04 MCU Test Set. Use the LI-0021 instructions. Refer to Electrical Power - General, Tools, Equipment, and Materials.

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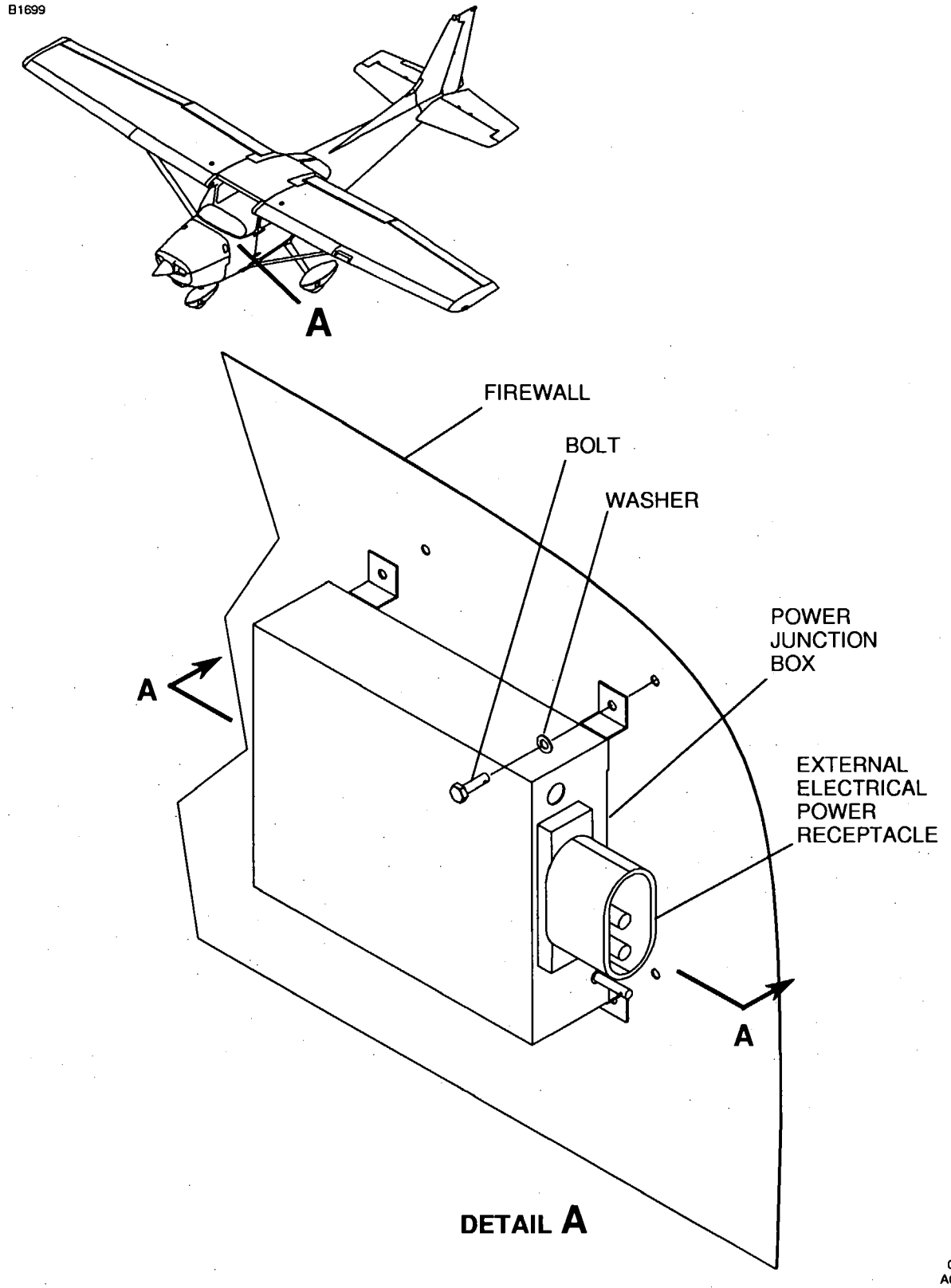

Power Junction Box Installation
Figure 201 (Sheet 1)

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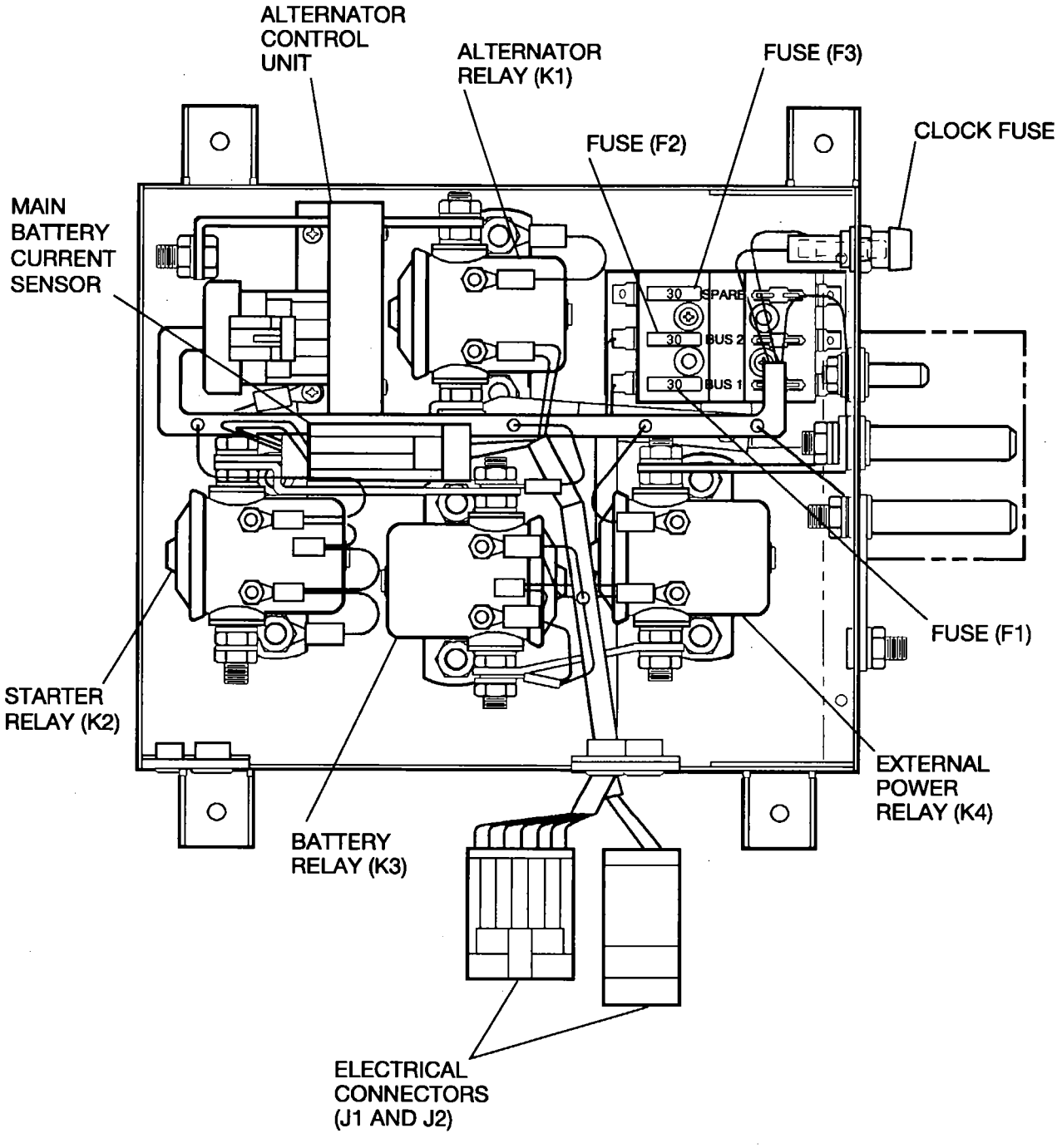

VIEW A-A
AIRPLANES 17280001 THRU 17280983 AND
AIRPLANES 172S8001 THRU 172S8703
THAT DO NOT INCORPORATE SB00-24-01

0558T1002

Power Junction Box Installation
Figure 201 (Sheet 2)

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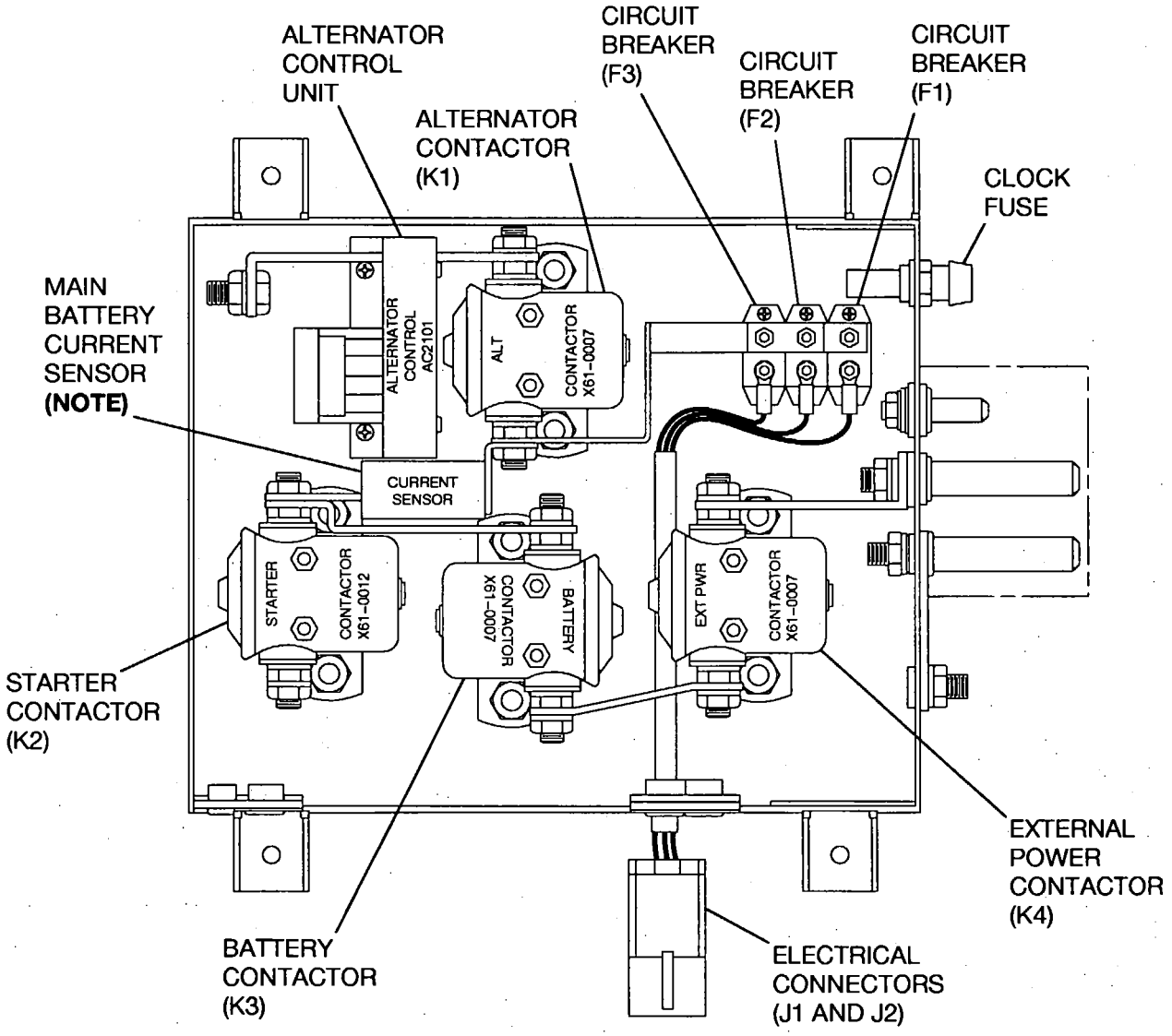

VIEW A–A

AIRPLANES 17280984 AND ON AND
AIRPLANES 172S8704 AND ON AND
AIRPLANES INCORPORATING SB00-24-01

NOTE: CS3100 CURRENT SENSOR SHOWN
CS3200 CURRENT SENSOR SIMILAR
FOR J-BOXES MC01-3A(IC10) AND ON.

AA0558T1007

Power Junction Box Installation
Figure 201 (Sheet 3)

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ALTERNATOR CONTROL UNIT - MAINTENANCE PRACTICES

1. General

A. The Alternator Control Unit (ACU) is found inside the power junction box, also referred to as a Master Control Unit (MCU) or J-Box. The alternator system includes the ACU, Alternator Contactor, and alternator field circuit. The ACU functions are as follows:
   (1) Alternator Voltage Regulation - The ACU controls the alternator field circuit to supply a main bus voltage of approximately 28.5 volts.
   (2) Low Voltage Annunciation - The ACU monitors the main bus voltage in the power junction box and supplies an output for low voltage (less than 24.5 +0.35 or -0.35 volts) for the annunciation.
   (3) Over-voltage Protection - The ACU monitors the main bus voltage in the power junction box and disengages the aircraft ALT FIELD circuit breaker. This removes the power from the alternator system if there is an over-voltage condition greater than 31.75 +0.5 or -0.5 volts.
   (4) Reverse Alternator Current Protection - The ACU monitors the alternator output current and disengages the aircraft ALT FIELD circuit breaker. This removes the power from the alternator system if there is a reverse alternator current.
   (5) Excess Field Current Protection - The ACU monitors the alternator field current and disengages the aircraft ALT FIELD circuit breaker. This removes the power from the alternator system if there is an excessive field current.

2. Alternator Control Unit Removal/Installation

A. Remove the Alternator Control Unit. Refer to Power Junction Box - Maintenance Practices, Component Removal/Installation.

B. Install the Alternator Control Unit. Refer to Power Junction Box - Maintenance Practices, Component Removal/Installation.

3. Over-voltage Protection Circuit Test

A. General.
   (1) The ACU Over-voltage Protection Circuit must be tested in accordance with the time limits in Chapter 5, Inspection Time Limits. Use one of the two procedures that follow to do the test of the Over-voltage Protection Circuit. The recommended procedure uses the Lamar TE04 MCU Test Set. The external battery procedure can be used if a TE04 test set is not available.

B. Over-voltage Protection Circuit Test with the Lamar TE04 MCU Test Set
   (1) Use a Lamar TE04 MCU Test Set and do steps 4.2, 4.3.A, 4.3.B, and 4.3.I in the Lamar's TE04 MCU Test Set instructions LI-0021(refer to Electrical Power - General, Tools, Equipment, and Materials).
   (2) If the ACU TRIP indicator on the TE04 MCU Test Set does not illuminate in step 4.3.I, the Over-voltage Protection Circuit is not operational.
      (a) Replace the ACU.
      (b) Do this test again.
   (3) If the ACU TRIP indicator does illuminate in step 4.3.I, the Over-voltage Protection Circuit is operational.
      (a) Complete the Lamar procedure 4.3.I.
      (b) Remove the TE04 MCU Test Set.
      (c) Continue with step D in this section.

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C. Over-voltage Protection Circuit Test with External Batteries

NOTE: It is necessary to use two general non-rechargeable 9 volt batteries in new condition to apply a temporary over-voltage condition on the ACU Sense wire. A locally fabricated battery test harness is also necessary. The test harness uses two 9-volt snap connectors and two insulated alligator clips. (Refer to Figure 201.) These components are available at most battery supply stores. For ground safety reasons, only general household 9 volt batteries which have a relatively low ampere rating are used.

(1) Make sure the BAT MASTER, ALT MASTER, AVIONICS master, and all electrical system switches are in the OFF position.
(2) Remove the upper cowl. Refer to Chapter 71, Cowls – Maintenance Practices.
(3) Disconnect the airplane 24 volt battery cables from the battery. Refer to Battery – Maintenance Practices.
(4) Remove the cover from the power junction box.
(5) Find the orange ACU sense wire attached to the upper Battery Contactor terminal inside the power junction box. Refer to Figure 201.
    (a) Remove the nut, washer, and orange ACU sense wire ring terminal from the upper Battery Contactor terminal.

        NOTE: The ACU sense wire is connected to Pin B in the ACU connector.

(6) Connect the battery test harness in series with the orange ACU Sense wire and the upper Battery Contactor terminal as shown in Figure 201.
    (a) Use tape or an equivalent as electrical insulation on the bare sense wire ring terminal.

        NOTE: This will help prevent accidental electrical shorts.

(7) Connect two new 9-volt batteries to the harness.
    (a) Put the 9 volt batteries in position below the power junction box as shown in Figure 201.
(8) Connect the airplane 24 volt battery cables to the battery. Refer to Battery – Maintenance Practices.
(9) Make sure the ALT FIELD circuit breaker on the pilot's circuit breaker panel is engaged.
(10) Put the BAT and ALT MASTER switches to the ON position for 5 seconds and then return to the OFF position.
    (a) Make sure the ALT Field circuit breaker opens or the cap pops out.
    (b) If the circuit breaker opens, the Over-voltage Protection circuit is operational. Continue with step 11.
    (c) If the circuit breaker does not open, do step 10 a second time.
        1 Use a digital voltmeter and measure the voltage between the orange ACU sense wire ring terminal and the power junction box ground stud.
    (d) If the circuit breaker does not open the second time and the ACU sense voltage is greater than 34 volts, the Over-voltage Protection Circuit is not operational.
        1 Replace the ACU.
    (e) Do step 10 again after a new ACU is installed.
(11) Engage the ALT Field circuit breaker.
(12) Disconnect the airplane 24 volt battery cables from the battery. Refer to Battery – Maintenance Practices.
(13) Disconnect the two 9-volt batteries from the harness.
(14) Disconnect the battery test harness.
(15) Install the nut, washer, and orange ACU sense wire ring terminal to the upper Battery Contactor terminal.
    (a) Torque the terminal nut from 35 to 45 inch-pounds.
(16) Install the cover on the power junction box.
(17) Connect the airplane 24 volt battery cables to the battery. Refer to Battery – Maintenance Practices.
(18) Install the upper cowl. Refer to Chapter 71, Cowls – Maintenance Practices.
(19) Continue with step D in this section.

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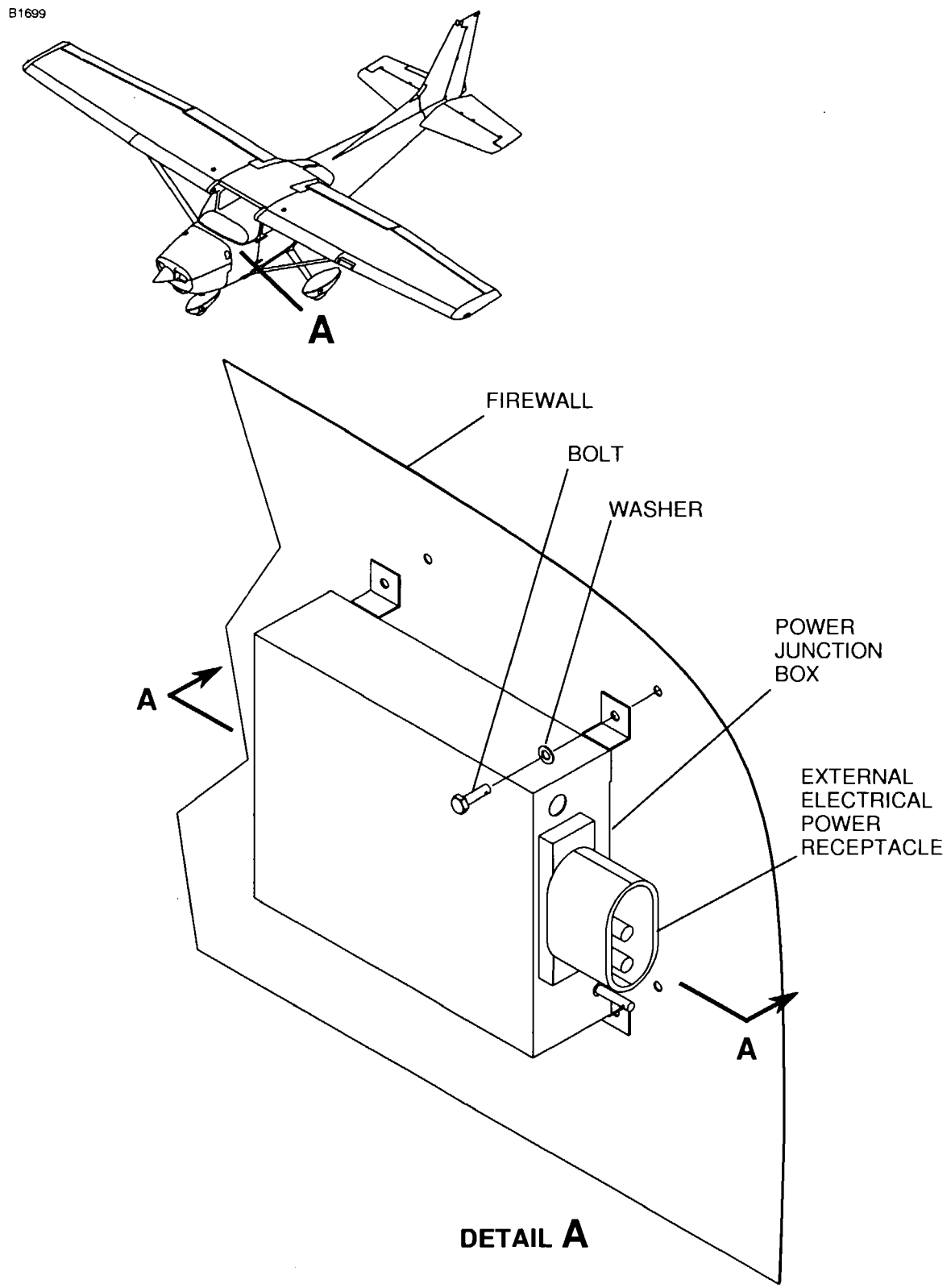

Over-Voltage Protection Circuit Test with External Batteries
Figure 201 (Sheet 1)

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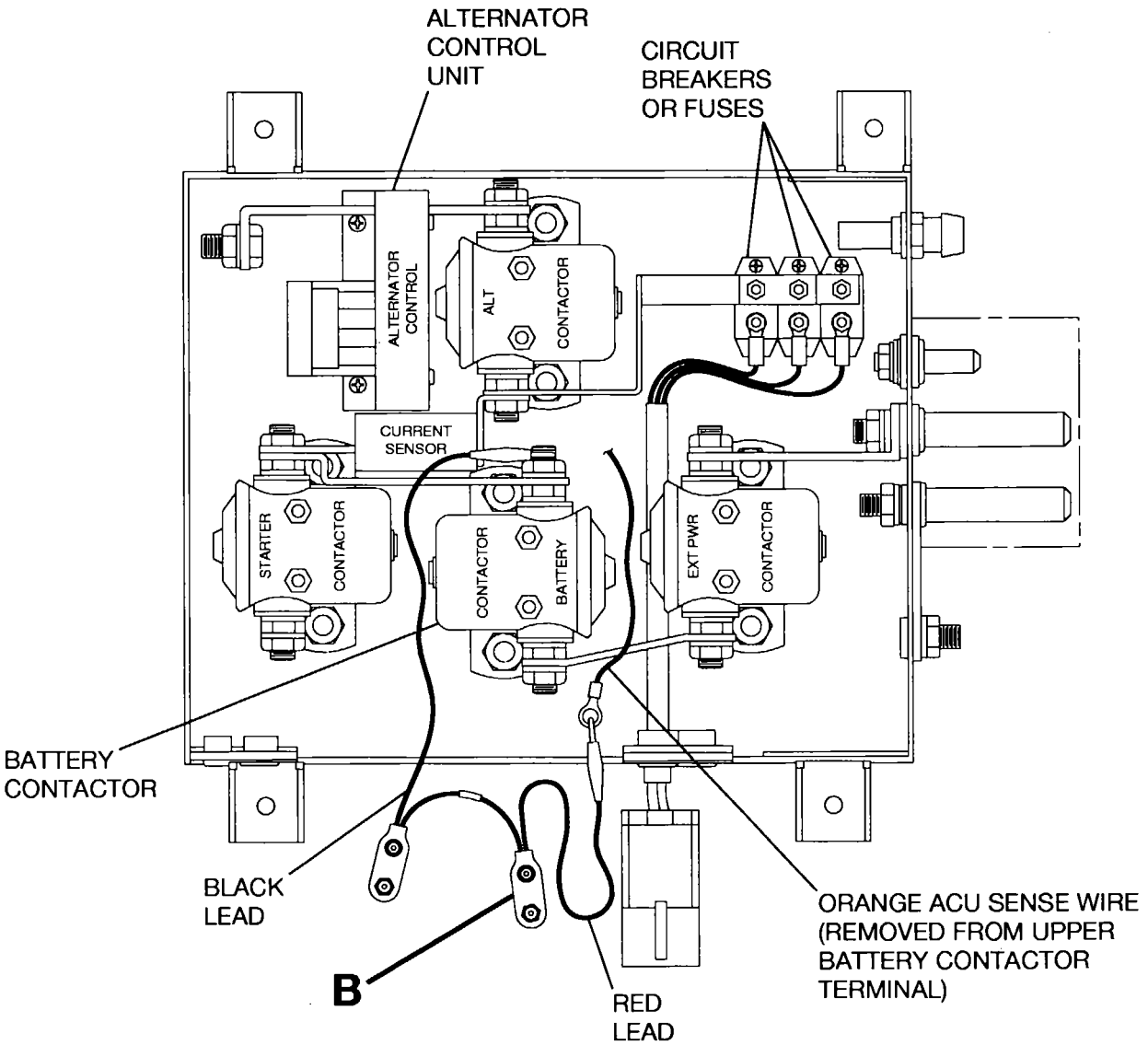

VIEW A–A

AA0558T1007

Over-Voltage Protection Circuit Test with External Batteries
Figure 201 (Sheet 2)

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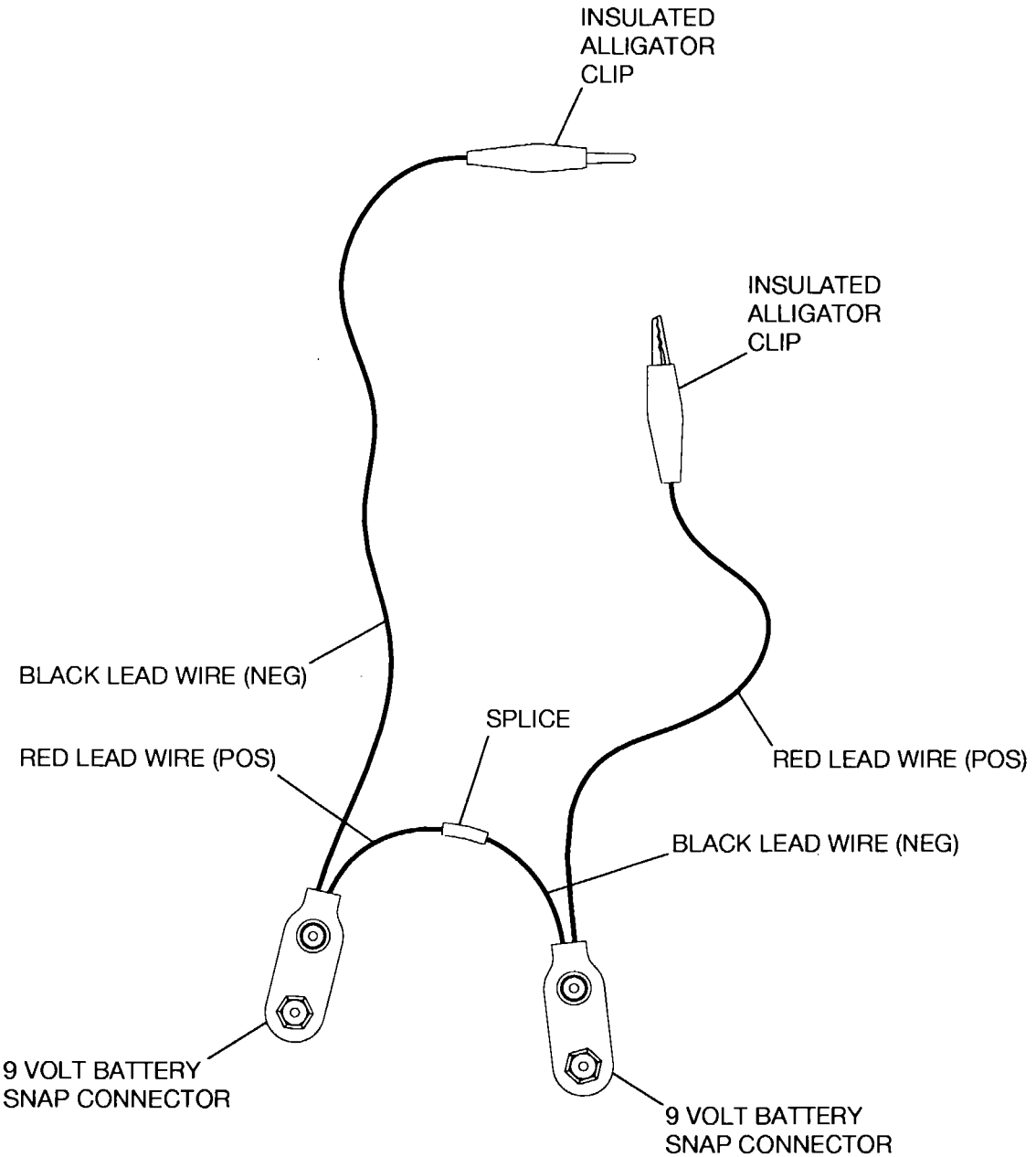

DETAIL B

B0558T1007

Over-Voltage Protection Circuit Test with External Batteries
Figure 201 (Sheet 3)

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D. Make sure of the correct ACU functions immediately after the next engine start.
(1) Start the engine in accordance with the Pilot's Operating Handbook, Starting Engine (Using Battery) procedure but make sure the ALT MASTER switch is in the OFF position.
(2) After the engine start and oil pressure check, set the engine RPM to idle.
(3) Make sure the Low Voltage annunciator is On.
(4) While you monitor the aircraft voltmeter, set the ALT MASTER switch to the ON position.
(a) If the voltmeter shows more than 29 volts, immediately set the ALT MASTER switch to the OFF position and stop the engine.

NOTE: The ACU regulation circuit is non operational. The ALT FLD circuit breaker should open if the voltage is more than 32 volts.

1 Replace the ACU and do the Over-voltage Protection Test again.
(b) If the voltmeter shows less than 29 volts, slowly increase the throttle to an engine speed of 1300 RPM.
(5) If the voltmeter shows approximately 28 volts at an engine speed of 1300 RPM the ACU regulation circuit is operational.
(6) Make sure the battery charge is shown on the aircraft battery ammeter.
(7) Make sure the LOW VOLTS annunciator is off.

4. Alternator Control Unit Troubleshooting

A. Complete the Alternator Control Unit Troubleshooting.
(1) The Alternator Control Unit troubleshooting is done with the Lamar TE04 MCU Test Set. Use the LI-0021 instructions. Refer to Electrical Power - General, Tools, Equipment, and Materials.

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12-VOLT CABIN POWER SYSTEM - MAINTENANCE PRACTICES

1. General

A. The 12-Volt Cabin Power Outlet on the pedestal uses a power converter to convert 28-volt DC input power to 13.8-volt DC output power.

B. The converter output is used to power electrical devices that require a 12-volt power input. The electrical connections are made with the use of a terminal block that is on the side of the converter. The converter's output can be turned on and off by the use of the ON/OFF signal terminal on the converter's terminal block. When 28 VDC is applied to this terminal, the converter will turn the output on. When the 28 VDC is removed from the terminal, the output is turned off.

2. 12 Volt DC Power Converter Removal/Installation (Firewall Installation)

NOTE: All G1000 equipped airplanes prior to the model year 2008 have the power converter mounted on the firewall.

A. Remove the Power Converter (Refer to Figure 201).
   (1) Put the MASTER switch in the off position.
   (2) Put the AVIONICS switch in the off position.
   (3) Remove the Multi-Function Display (MFD). Refer to Chapter 34, Control Display Unit - Maintenance Practices.
   (4) Disconnect the electrical connector.
   (5) Remove the screws.
   (6) Remove the unit from the airplane.

B. Install the Power Converter (Refer to Figure 201).
   (1) Install the power converter with screws
   (2) Connect the electrical connector.
   (3) Install the MFD. Refer to Chapter 34, Control Display Unit - Maintenance Practices.
   (4) Check the cabin power system for correct operation. Refer to Cabin Power System Test

3. 12 Volt DC Power Converter Removal/Installation (Tailcone Installation)

NOTE: All non G1000 airplanes and G1000 equipped airplanes model year 2008 and On have the power converter mounted in the tailcone

A. Remove the Power Converter (Refer to Figure 201).
   (1) Put the MASTER switch in the off position.
   (2) Put the AVIONICS switch in the off position.
   (3) Get access to the power converter through the baggage compartment door on the left side.
      (a) Remove the upper baggage closeout from the baggage area . Refer to Interior Upholstery-Maintenance Practices.
   (4) Disconnect the electrical connector.
   (5) Remove the screws.
   (6) Remove the unit from the airplane.

B. Install the Power Converter (Refer to Figure 201).
   (1) Install the power converter with screws
   (2) Connect the electrical connector.
   (3) Install the upper baggage closeout from the baggage area . Refer to Interior Upholstery-Maintenance Practices.
   (4) Check the cabin power system for correct operation. Refer to Cabin Power System Test

4. Cabin Power System Test

A. Complete a Test of the Cabin Power System.
   (1) Make sure the ALT/BAT Master switch is in the ON position.

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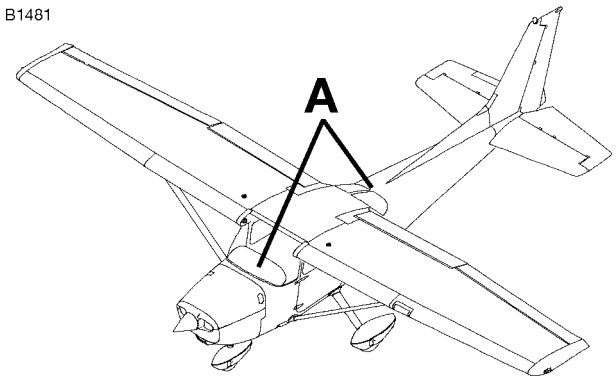
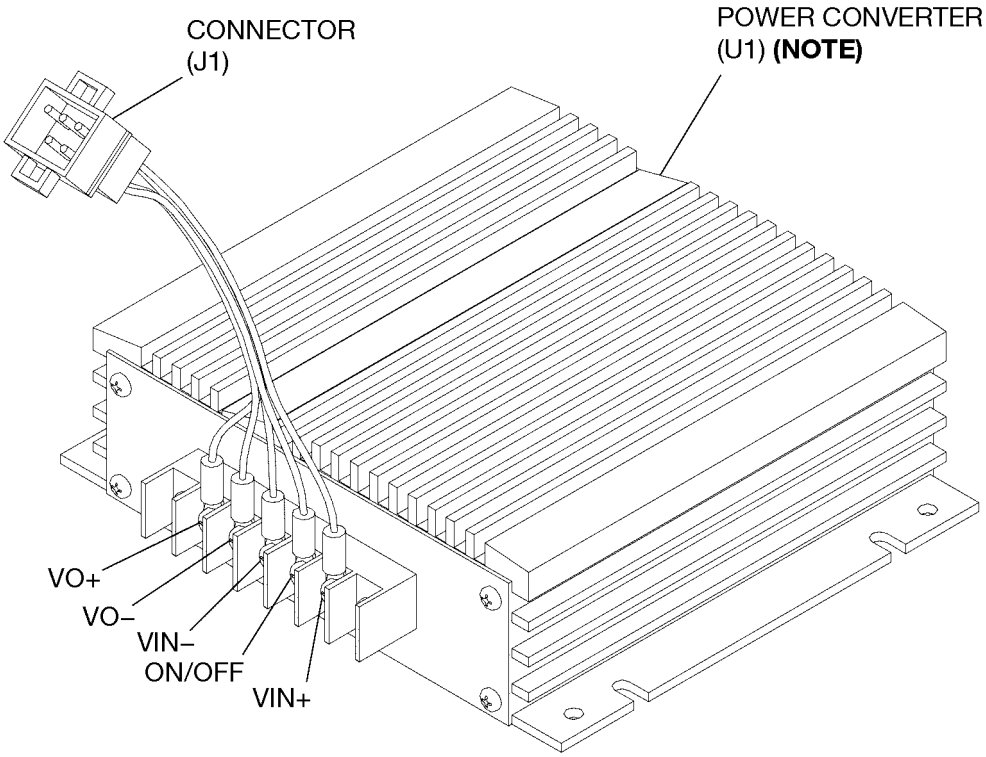


NOTE: THE POWER CONVERTER CAN BE IN DIFFERENT LOCATIONS.



DETAIL A

0510T1007
A1260T1012

12 Volt DC Power Converter Removal/Installation
Figure 201 (Sheet 1)

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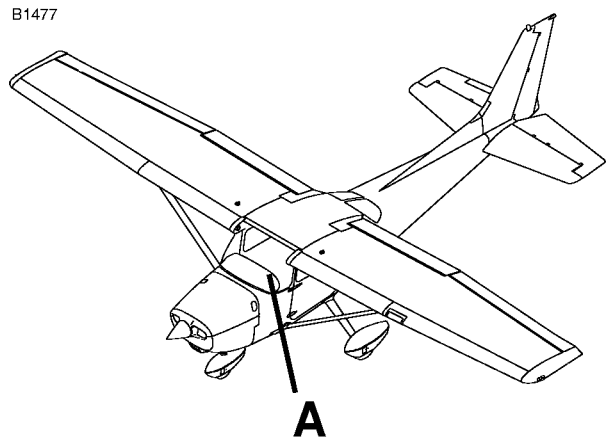
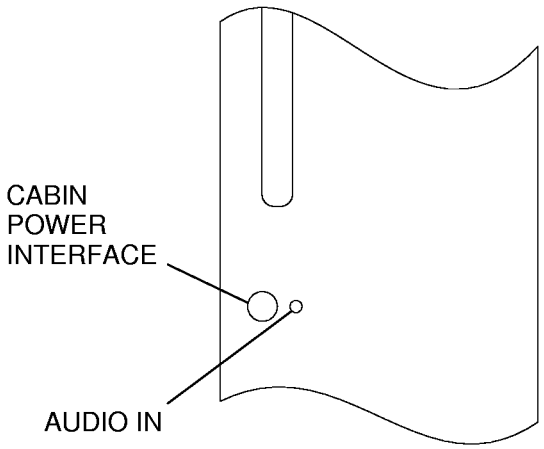
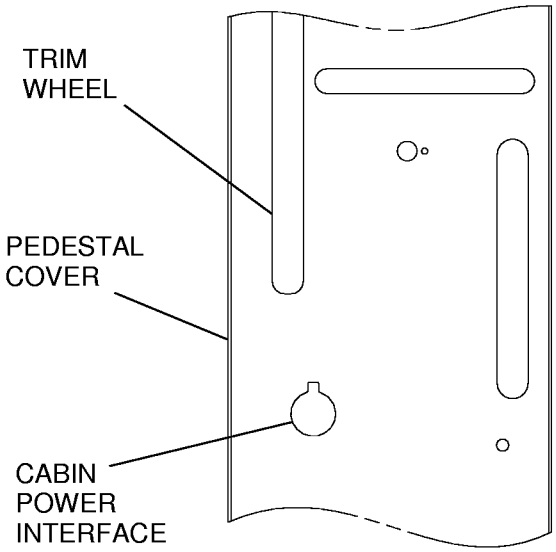




DETAIL A
AIRPLANES 17280001 THRU 17281142 AND
AIRPLANES 172S8001 THRU 172S9288



DETAIL A
AIRPLANES 17281143 AND ON AND
AIRPLANES 172S9289 AND ON

0510T1007
A0719T1031
A0719T1032

Cabin Power Interface
Figure 202 (Sheet 1)

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(2) For airplanes with serials 1728001 thru 17281142 and airplanes 172S8001 thru 172S9288, you will have to use a 12-Volt DC power adapter to do the test. Refer to Tools, Equipment and Materials.
   (a) Attach the adapter to the cabin power system.
(3) Use a voltmeter to make sure the output shows 13.4 volts, +0.9 or -0.9 volts at the cabin power interface. Refer to Figure 202
(4) If the correct voltage is not shown, do the troubleshooting of the Power Converter.

5. Power Converter Troubleshooting

A. Troubleshoot the Power Converter (Refer to Figure 201 and to the Model 172 Wire Diagram Manual, Chapter 24, Power Interface).
   (1) Disconnect the connector (JI).
   (2) Make sure there is approximately 24-Volts between VI+ and VI- at the aircraft side of the connector (JI).
   (3) Make sure there is approximately 24-Volts between the ON/OFF and VI- at aircraft side of the connector (JI).
   (4) If there is no voltage, make sure the wiring from the power convertor to the connector (JI) is not damaged or has a bad connection.
      (a) Repair or replace the connector (JI) or the wiring as necessary.
         1 Attach the connector (JI).
         2 Make sure the cabin power interface operates correctly. Refer to Cabin Power Interface.
   (5) If the cabin interface does not operate correctly, make sure the pins VO+ and VO- at the converter have an output of 13.4 +0.9 or -0.9 volts.
      (a) If the correct voltage is supplied, do a check of the continuity from the aircraft side of the connector (J1) to the cabin power interface (JC022 automotive style) or (JC008 airline style).
         1 If the wire continuity is not correct or the wire is damaged, replace the wiring as necessary.
         2 If the wire continuity is correct, replace the power converter.

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CIRCUIT BREAKER - MAINTENANCE PRACTICES

1. General

A. On airplanes without Garmin G1000, the circuit breaker panel is on the left lower instrument panel, below the pilot's control wheel. The circuit breaker panel has electrical circuit breakers, the MAGNETO switches, the ALT BAT MASTER switch, the AVIONICS MASTER switch and panel lighting controls.

B. On airplanes with Garmin G1000, the circuit breaker panel is on the left lower instrument panel, below the pilot's control wheel. The circuit breaker panel has electrical circuit breakers and the MAGNETO switches.

2. Circuit Breaker Removal/Installation (Airplanes without Garmin G1000)

A. Remove the Circuit Breaker (Refer to Figure 201).
(1) Remove the top cowl. Refer to Chapter 71, Cowls - Maintenance Practices.
(2) Disconnect the battery cables. Refer to Battery - Maintenance Practices.
(3) Remove the screws that attach the circuit breaker panel to the lower instrument panel.
(4) Remove the screws that attach the circuit breaker cover to the panel.
(5) Put a label on the applicable circuit breaker wires.
(6) Disconnect the applicable circuit breaker wires.
(7) Remove the nut and washer that attach the circuit breaker to the circuit breaker panel.
(8) Remove the circuit breaker.

B. Install the Circuit Breaker (Refer to Figure 201).
(1) Remove the labels and attach the wires to the applicable circuit breakers.
(2) Put the circuit breaker in the circuit breaker panel and attach with the washer and nut.
(3) Put the circuit breaker cover in position on the back of the panel and attach with the screws.
(4) Put the circuit breaker panel in position on the lower instrument panel and attach with the screws.
(5) Connect the battery cables. Refer to Battery - Maintenance Practices.
(6) Install the top cowl. Refer to Chapter 71, Cowls - Maintenance Practices.

3. Circuit Breaker Removal/Installation (Airplanes with Garmin G1000)

A. Remove the Circuit Breaker (Refer to Figure 202).
(1) Remove the top cowl. Refer to Chapter 71, Cowls - Maintenance Practices.
(2) Disconnect the battery cables. Refer to Battery - Maintenance Practices.
(3) Remove the screws that attach the circuit breaker panel to the lower instrument panel.
(4) Cut the tie straps from the applicable circuit breaker cover and remove the cover.
(5) Put a label on the applicable circuit breaker wires.
(6) Disconnect the applicable circuit breaker wires.
(7) Remove the screws and washers that attach the bus bar to the circuit breakers.
(8) Remove the bus bar.
(9) Remove the nut and washer that attach the circuit breaker to the circuit breaker panel.
(10) Remove the circuit breaker.

B. Install the Circuit Breaker (Refer to Figure 202).
(1) Attach the circuit breaker to the circuit breaker panel with the nut and washer.
(2) Attach the bus bar to the circuit breakers with the screws and washers.
(3) Remove the labels and connect the applicable wires to the circuit breaker.
(4) Put the tie straps around the circuit breaker panel cover and through the 0.20 inch (5.08 mm) diameter holes to attach the cover.
(a) For the inboard cover, put one tie strap each between circuit breakers HI034 and HI035 and between circuit breakers HI036 and HI037.
(b) For the outboard cover, put one tie strap each between circuit breakers HI054 and HI058 and between circuit breakers HI055 and HI057.
(5) Attach the circuit breaker panel to the lower instrument panel with the screws.
(6) Connect the battery cables. Refer to Battery - Maintenance Practices.
(7) Install the top cowl. Refer to Chapter 71, Cowls - Maintenance Practices.

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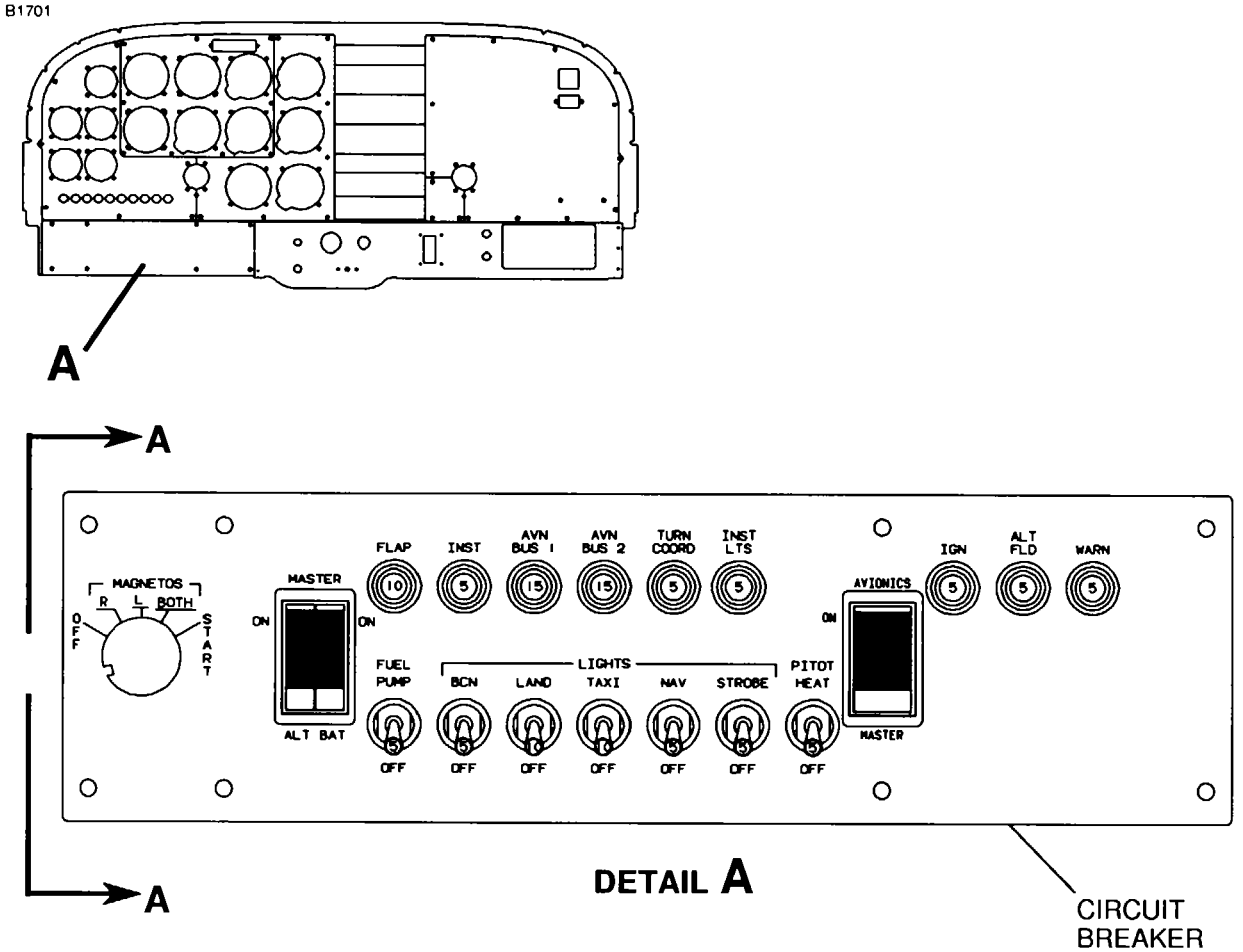

Circuit Breaker Panel Installation
Figure 201 (Sheet 1)

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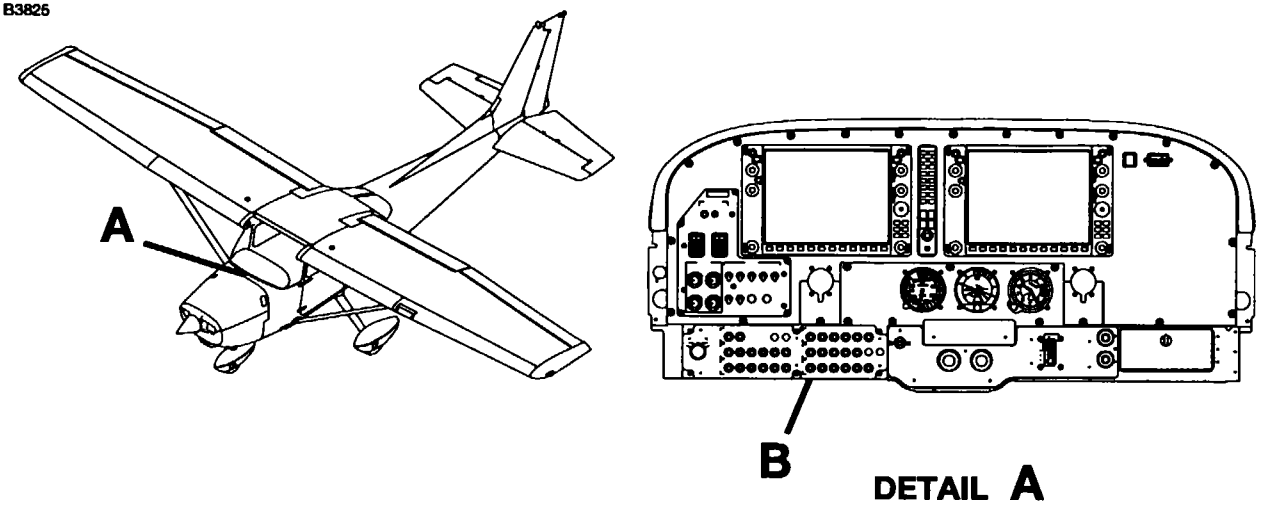
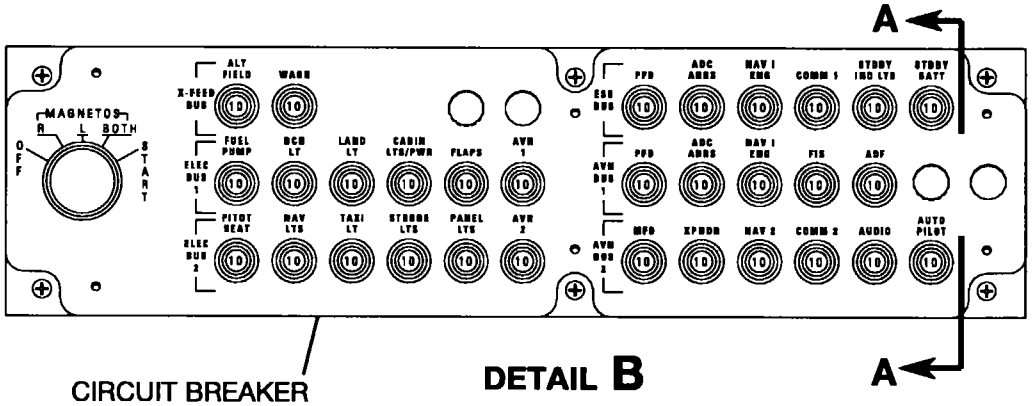
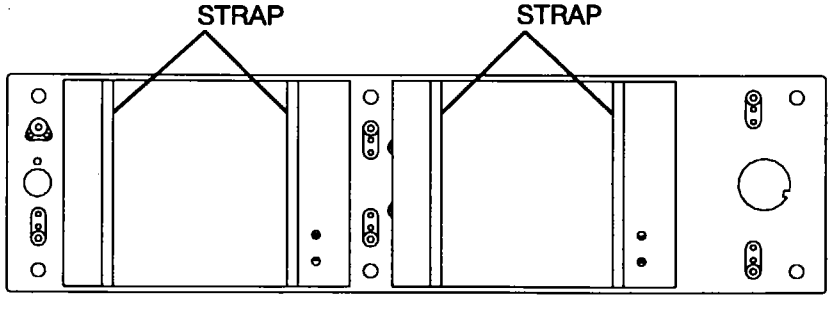


DETAIL A
AIRPLANES WITH GARMIN G1000 OPTION

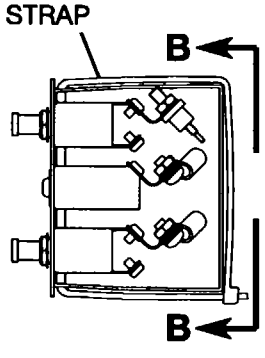


CIRCUIT BREAKER PANEL

DETAIL B



VIEW B-B



VIEW A-A

0510T1007
A0518T1109
B0518T1109
AA0518T1114
BB0518T1115

Circuit Breaker Panel Installation
Figure 202 (Sheet 1)

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ESSENTIAL AND CROSSFEED BUS DIODES - MAINTENANCE PRACTICES

1. General

A. Airplanes with Garmin G1000 have an essential bus and a crossfeed bus. Airplanes without Garmin G1000 have only a crossfeed bus.

B. The essential and crossfeed bus diodes are on the circuit breaker panel. The diodes give power to the essential and crossfeed buses from the two primary buses and at the same time isolate the two primary buses.

C. For maintenance data on the power junction box, refer to Power Junction Box - Maintenance Practices.

2. Essential/Crossfeed Bus Diode Removal/Installation

A. Remove the Essential or Crossfeed Bus Diode (Refer to Figure 201).
(1) Remove the circuit breaker panel. Refer to Chapter 24, Circuit Breaker - Maintenance Practices.
(2) Carefully remove the heat shrinkable tubing from the diode. Refer to the Model 172R/172S Wiring Diagram Manual, Chapter 20, Heat Shrinkable Tubing - Maintenance Practices.
(3) Remove the solder from the wire and from the diode. Refer to the Model 172R/172S Wiring Diagram Manual, Chapter 20, Soldering - Maintenance Practices.
(4) Remove the nut and the washer from the diode.
(5) Remove the diode.

B. Install the Essential or Crossfeed Bus Diode (Refer to Figure 201).
(1) Put the diode in position on the circuit breaker panel.
(2) Attach the diode with the nut and the washer to the circuit breaker panel.
(3) Install the heat shrinkable tubing over the wire. Refer to Model 172 Wiring Diagram Manual, Chapter 20, Heat Shrinkable Tubing - Maintenance Practices.
(4) Add solder to attach the wire to the diode. Refer to Model 172 Wiring Diagram Manual, Chapter 20, Soldering - Maintenance Practices.
(5) Apply heat to the heat shrinkable tubing with a heat gun until the tubing is tight around the wire and diode. Refer to Model 172 Wiring Diagram Manual, Chapter 20, Heat Shrinkable Tubing - Maintenance Practices.
(6) Install the circuit breaker panel. Refer to Chapter 24, Circuit Breaker - Maintenance Practices.

3. Essential and Crossfeed Bus Diode Inspection

NOTE: When the diodes are replaced, the inspections that follow (3A, 3B, or 3C) are required to make sure that all of the diodes operate correctly.

NOTE: The Lamar TE04 MCU Test Set is used as an alternative to inspections 3A, 3B, or 3C. Refer to the Lamar TE04 MCU Test Set, instructions LI-0021 steps 4.3.A through 4.3.E.

A. Do an inspection of the crossfeed bus diodes. (Refer to Figure 201). The inspection procedure that follows is for power junction boxes that have primary bus fuses. Do inspections of the essential and crossfeed bus diodes in accordance with the time limits shown in Chapter 5, Inspection Time Limits.

NOTE: Airplanes 17280984 and ON, Airplanes 172S8704 and ON, and Airplanes incorporating SB00-24-01 do not use fuses in the power junction box.

CAUTION: Do not remove fuses with the MASTER BAT switch in the ON position.

(1) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(2) Make sure that the landing light, taxi light, and oil pressure annunciation come on.
(3) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(4) Remove the screws that attach the power junction box cover.
(5) Remove the power junction box cover.
(6) Remove the fuse (F1). (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(7) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.

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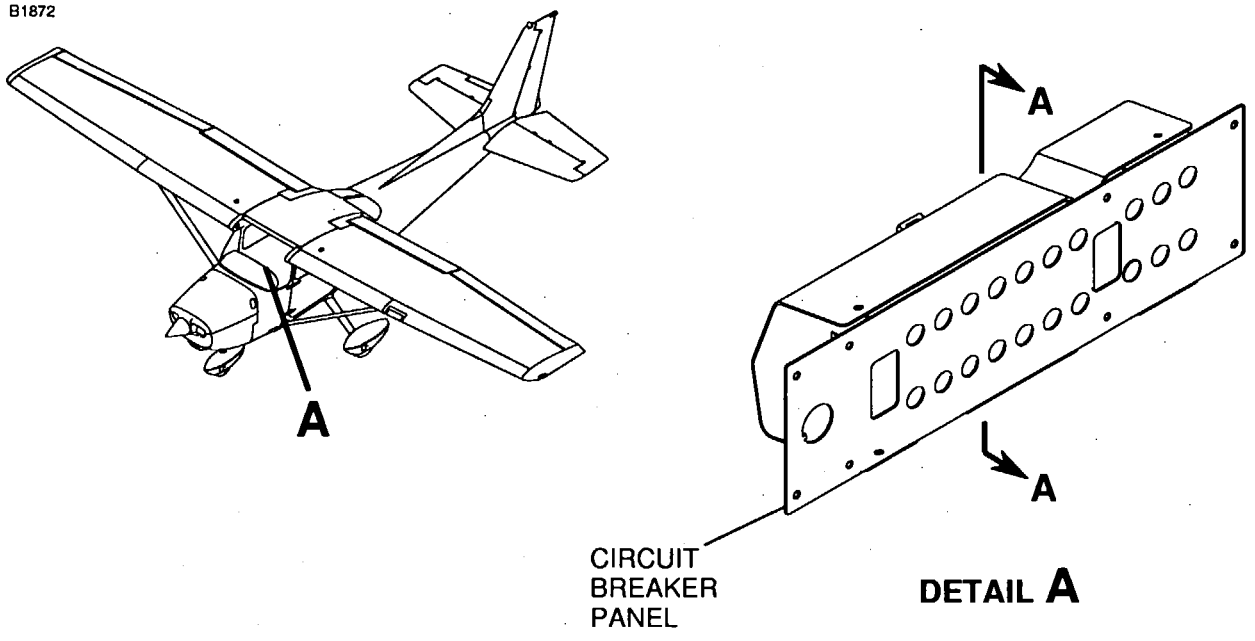
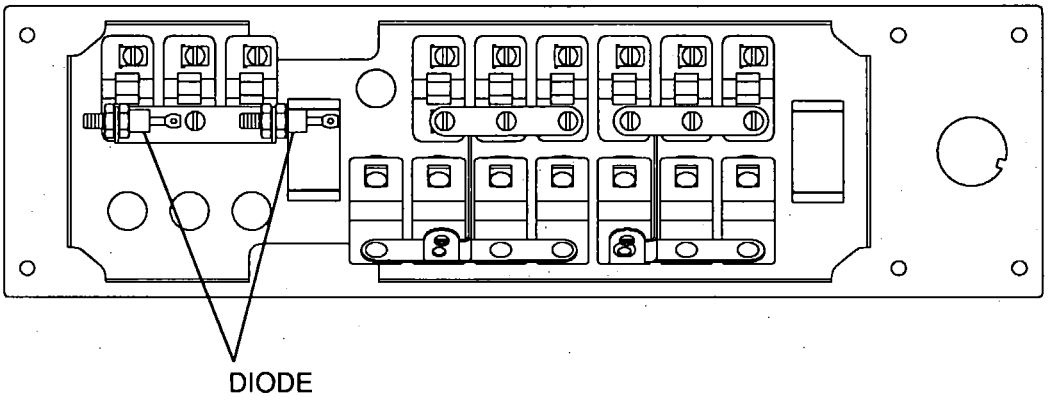


DETAIL A



VIEW A-A
VIEW LOOKING AFT

0510T1007
A0518T1015
AA0518T1016

Essential Bus and Crossfeed Diode Inspection
Figure 201 (Sheet 1)

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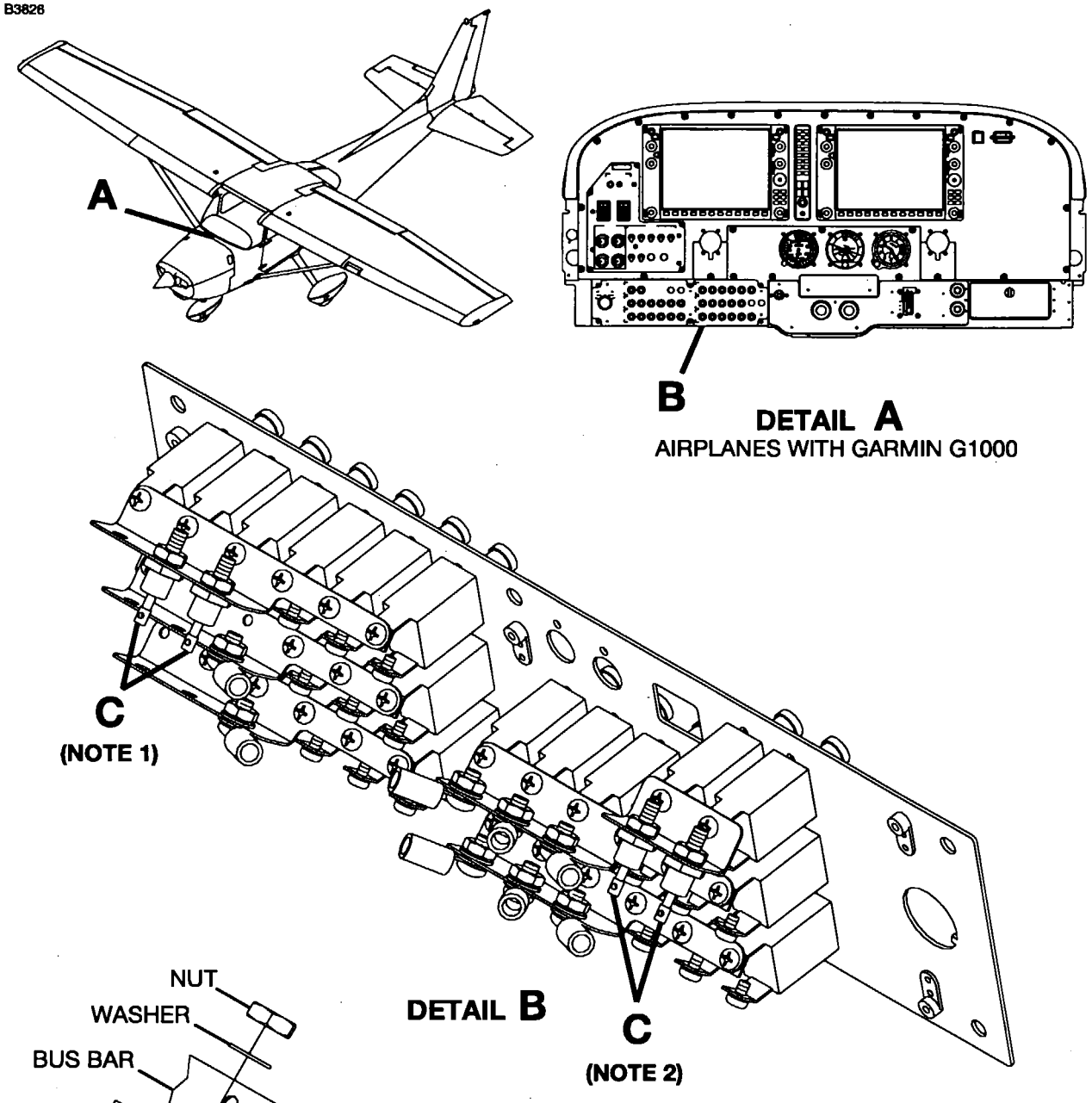

DETAIL A
AIRPLANES WITH GARMIN G1000

DETAIL B

DETAIL C

NOTE 1: ESSENTIAL BUS DIODES
NOTE 2: CROSSFEED BUS DIODES

0510T1007
A0518T1109
B0518T1112
C0718T1055

Essential Bus and Crossfeed Diode Inspection
Figure 201 (Sheet 2)

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(8) Make sure that the landing light and oil pressure annunciation come on. If the taxi light comes on or the oil pressure annunciation does not come on, do a test of the crossfeed bus diodes with the diode test function of a digital multimeter to find which diodes you must replace. Refer to Essential and Crossfeed Bus Diode Multimeter Test.
(9) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(10) Install the fuse (F1) in the power junction box. If the fuse is pitted, arced, or does not fit tightly into the fuse receptacle, replace the fuse with one of the same type. Do not replace the fuse with thinner blades.
(11) Remove the fuse (F2). (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(12) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(13) Make sure that the taxi light and oil pressure annunciation come on. If the landing light comes on or the oil pressure annunciation does not come on, do a test of the crossfeed bus diodes with the diode test function of a digital multimeter to find which diodes must be replaced. Refer to Essential and Crossfeed Bus Diode Multimeter Test.
(14) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(15) Install the fuse (F2) in the power junction box. If the fuse is pitted, arced, or does not fit tightly into the fuse receptacle, replace the fuse with one of the same type. Do not replace the fuse with thinner blades.
(16) If the diodes are replaced, do this test again to make sure that all diodes operate correctly.
(17) Install the junction box cover with the screws.

B. Do an inspection of the crossfeed bus diodes. (Refer to Figure 201). The inspection procedure that follows is for power junction boxes that have primary bus circuit breakers.

NOTE: The inspection procedure that follows is for airplanes without Garmin G1000 avionics.

CAUTION: Do not remove bus wires from the circuit breakers with MASTER BAT switch in the ON position.

(1) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(2) Make sure that the landing light, taxi light, and oil pressure annunciation come on.
(3) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(4) Remove the screws that attach the power junction box cover.
(5) Remove the power junction box cover.
(6) Remove the hex nut and lock washer that connect the bus wire to the circuit breaker (F1). (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(7) Remove the wire terminal from the F1 circuit breaker stud that has a label of AUX and isolate the end of the bus wire.
(8) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(9) Make sure that the landing light and oil pressure annunciation come on. If the taxi light comes on, or the oil pressure annunciation does not come on, do a test of the crossfeed bus diodes with the diode test function of a digital multimeter to find which diodes must be replaced. Refer to Essential and Crossfeed Bus Diode Multimeter Test.
(10) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(11) Install the bus wire to the circuit breaker (F1) terminal. Use the same hex nut and washer that were removed.
(12) Torque the nut to 20 inch-pounds to 25 inch-pounds (2.3 N-m to 2.8 N-m).
(13) Remove the hex nut and lock washer that connect the bus wire to the circuit breaker (F2). (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(14) Remove the wire terminal from the F2 circuit breaker stud with the label of AUX and isolate the end of the bus wire.
(15) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(16) Make sure that the taxi light and oil pressure annunciation come on. If the landing light comes on or the oil pressure annunciation does not come on, do a test of the crossfeed bus diodes with the diode test function of a digital multimeter to find which diodes you must replace. Refer to Essential and Crossfeed Bus Diode Multimeter Test.
(17) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.

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(18) Install the bus wire to the circuit breaker (F2) terminal. Use the same hex nut and washer that were removed. (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(19) Torque the nut to 20 inch-pounds to 25 inch-pounds (2.3 N-m to 2.8 N-m).
(20) If you replaced the diodes, do this test again to make sure that all diodes operate correctly.
(21) Install the junction box cover with the screws.

C. Do an inspection of the essential and crossfeed bus diodes. (Refer to Figure 201). The inspection procedure that follows is for airplanes that have Garmin G1000 avionics.

CAUTION: Do not remove bus wires from the circuit breakers with the MASTER BAT or the STDBY BATT switches in the ON position.

(1) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(2) Make sure that the STDBY BATT and the AVIONICS master switches are in the OFF position.
(3) Make sure that the landing and taxi lights come on.
(4) Make sure that a minimum of 20 volts shows on the primary flight display (PFD) for the main and essential bus voltmeters.

NOTE: A minimum of 20 volts shows that there is power to the crossfeed and essential buses. The GEA-71 must be on to show the voltage of the crossfeed bus. If there are no red X's on the engine indications, the GEA-71 is on.

(5) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(6) Remove the screws that attach the power junction box cover to the power junction box.
(7) Remove the power junction box cover.
(8) Remove the hex nut and lock washer that connect the bus wire to the circuit breaker (F1). Keep the hex nut and lock washer. (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(9) Remove the wire terminal from the F1 circuit breaker stud that has a label of AUX and isolate the end of the bus wire.
(10) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(11) Make sure that the landing light comes on and the main and essential bus voltages show a minimum of 20 volts on the primary flight display (PFD). If the taxi light comes on or the main and essential bus voltages do not show a minimum of 20 volts, or the PFD does not come on, do a test of the essential and crossfeed bus diodes with the diode test function of a digital multimeter to find which diodes must be replaced. Refer to Essential and Crossfeed Bus Diode Multimeter Test.
(12) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(13) Install the bus wire to the circuit breaker (F1) terminal. Use the same hex nut and washer that was removed. (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(14) Torque the nut to 20 inch-pounds to 25 inch-pounds (2.3 to 2.8 N-m).
(15) Remove the hex nut and lock washer that connects the bus wire to the circuit breaker (F2). (Refer to Power Junction Box - Maintenance Practices, Figure 201).
(16) Remove the wire terminal from the circuit breaker (F2) stud and isolate the end of the bus wire.
(17) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the ON position.
(18) Make sure that the taxi light comes on and the main and essential bus voltages show a minimum of 20 volts on the PFD. If the landing light comes on, or the main and essential bus voltages do not show a minimum of 20 volts, or the PFD does not come on, do a test of the essential and crossfeed bus diodes with the diode test function of a digital multimeter to find which diodes must be replaced. Refer to Essential and Crossfeed Bus Diode Multimeter Test.
(19) Set the MASTER BAT, TAXI LIGHT, and LAND LIGHT switches to the OFF position.
(20) With the hex nut and lock washer, install the bus wire to the circuit breaker (F2) terminal. (Refer to Power Junction Box - Maintenance Practices, Figure 201).
  (a) Tighten the nut to a torque of 20 inch-pounds to 25 inch-pounds (2.3 to 2.8 N-m).
(21) If the diodes are replaced, do this test again to make sure that all diodes operate correctly.
(22) Install the junction box cover with the screws.

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4. Essential and Crossfeed Bus Diode Multimeter Test

NOTE: Do the essential or crossfeed bus diode inspection procedure applicable to your airplane before the test that follows is done. Refer to Essential and Crossfeed Bus Diode Inspection.

NOTE: The test that follows must be done only if required by the essential or crossfeed bus diode inspections. The replacement of all the essential/crossfeed diodes is an alternative to the test procedure that follows.

A. Do a test of the essential/crossfeed bus diodes.
   (1) Remove the circuit breaker panel to get access to the essential and crossfeed bus diodes. Refer to Circuit Breaker - Maintenance Practices.
   (2) Remove the nut and washer from each diode. (Refer to Figure 201).
   (3) Isolate the diode from the bus bar on the circuit breaker panel. Do not remove the heat shrink or wire from the diode.
   (4) Do a test of each diode with the diode test function of a Fluke 75, 77, or 87 digital multimeter (or equivalent digital multimeter with a diode test function).
      (a) Connect the negative (-) or common lead of the meter to the threaded part of the diode and the positive (+) lead of the meter to the opposite end of the wire to which the diode is soldered. If the diode operates correctly, it will be conductive of an electric current and the meter will show the forward voltage drop of the diode (approximately 0.2 to 0.8 volts).
      (b) Interchange the meter leads. Connect the positive (+) lead of the meter to the threaded part of the diode and the negative (-) or common lead of the meter to the opposite end of the wire to which the diode is soldered. If the diode operates correctly, it will not be conductive of an electric current and the meter will give an open circuit indication. This indication on the meter will be the same as if the leads are not connected.
      (c) Replace each diode that does not give a satisfactory indication during the multimeter test. Refer to Essential and Crossfeed Bus Diode Removal/Installation.
   (5) Install the diodes that give a satisfactory indication during the multimeter test. Refer to Essential and Crossfeed Bus Diode Removal/Installation.
   (6) When you replace the diodes, do the applicable essential/crossfeed diode inspection (3A, 3B, or 3C) again to make sure that all diodes operate correctly.
   (7) Install the circuit breaker panel. Refer to Circuit Breaker - Maintenance Practices.

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ELECTRICAL LOAD ANALYSIS - DESCRIPTION AND OPERATION

1. General

A. The tables give an electrical load analysis of some of the components used on the airplane.

Table 1. Components on all airplanes

Component	Draw at 24 VDC (Amperes)	Draw at 28 VDC (Amperes)
Landing Light (4596 Lamp)	7.65	8.93
Landing Light (4591 Lamp)	3.06	3.57
Landing Light (35 Watt HID)	1.65	1.41
Taxi Light (4587 Lamp)	7.65	8.93
Taxi Light (4626 Lamp)	4.59	5.36
Taxi Light (35 Watt HID)	1.65	1.41
Navigation Lights	2.65	3.1
Wing Anti-collision Lights (average value) (Qty. 2)	1.98	1.7
Beacon Light (peak value)	1.07	1.25
Under Wing Courtesy Lights (Qty. 2)	0.98	1.14
Pilot Overhead Light (1864 Lamp)	0.14	0.16
Pilot Overhead Light (LED Lamp)	0.02	0.02
Copilot Overhead Light (1864 Lamp)	0.14	0.16
Copilot Overhead Light (LED Lamp)	0.02	0.02
Passenger Overhead Light (1864 Lamp)	0.14	0.16
Passenger Overhead Light (LED Lamp)	0.02	0.02
Map Light	0.08	0.09
Instrument Light (2 and 3 inch round) (Each)	0.02	0.02
Pedestal Lights (Qty. 1)	0.04	0.05
Flap Motor	2.06	2.4
Fuel Pump	3.00	3.50
Pitot Heat	3.33	3.89
12V Cabin Power Converter (Peak 10A out)	6.33	5.42
Hourmeter	0.01	0.02
Battery Relay Coil	0.29	0.33
Start Relay Coil	0.85	N/A
Alternator Relay Coil	0.29	0.33
Alternator Field and ACU Power (Maximum)	1.63	1.9

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Table 1. Components on all airplanes (continued)

ACU Bus Sense	0.02	0.02
Start Motor	86	N/A
Autopilot Computer (KAP 140)	0.58	0.5
Pitch Servo & Clutch	0.58	0.5
Pitch Trim Servo & Clutch	0.58	0.5
Roll Servo & Clutch	0.53	0.45
Turn Coordinator	0.27	0.33
ADF Receiver (KR 87)	0.6	0.52

Table 2. Components used only on airplanes that do not have Garmin G1000 installation

Component	**Draw at 24 VDC (Amperes)**	**Draw at 28 VDC (Amperes)**
Glareshield Light (Fluorescent)	0.86	1
Glareshield Light (LED)	0.17	0.2
Radio Lights	0.17	0.2
Annunciator Panel (All annunciations on)	0.35	0.3
Avionics Fan	0.43	0.5
Engine and Fuel Gauges	0.38	0.45
Audio Panel (KMA-26) (Maximum)	1.5	1.29
Audio Panel (KMA-28) (Maximum)	1.5	1.29
MFD (KMD-550)	0.93	0.8
GPS (KLN 89/89B)	1.45	1.25
GPS (KLN 94)	1.4	1.2
Transponder (KT 73) (Maximum)	1.07	1.25
Transponder (KT 76) (Maximum)	0.6	0.7
Altitude Encoder (SSD120)	0.2	0.23
HSI (KCS 55A) (Maximum)	1.46	1.25
#1 Nav/Comm (KX 155A) (Receive)	0.8	0.69
#1 Nav/Comm (KX 155A) (Transmit) (Maximum)	6	6
#2 Nav/Comm (KX 165A) (Receive)	0.8	0.69
#2 Nav/Comm (KX 165A) (Transmit) (Maximum)	6	6

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Table 3. Components used only on airplanes that have Garmin G1000 installation

Component	Draw at 24 VDC (Amperes)	Draw at 28 VDC (Amperes)
Circuit Breaker Panel Light (LED)	0.07	0.08
Switch Panel Light (LED)	0.07	0.08
Avionics Panel Lights (MFD, PFD, A/P)	0.17	0.2
Throttle/Flap Panel Light (LED)	0.07	0.08
Standby Battery Main Volt Sense	0.001	0.001
Standby Battery Controller	0.007	0.008
Standby Battery Test	2	N/A
Main Bus Voltage Sense	0.001	0.001
Essential Bus Voltage Sense	0.001	0.001
Deck Skin Fan	0.28	0.33
PFD Fan	0.08	0.09
MFD Fan	0.08	0.09
#1 Comm (GIA 63) (Receive)	0.22	0.19
#1 Comm (GIA 63) (Transmit) (VSWR 3)	4.96	4.16
#2 Comm (GIA 63) (Receive)	0.22	0.19
#2 Comm (GIA 63) (Transmit) (VSWR 3)	4.96	4.16
#1 Nav (GIA 63)	0.94	0.8
#2 Nav (GIA 63)	0.94	0.8
PFD (GDU 1040)	1.46	1.25
MFD (GDU 1040)	1.46	1.25
AHRS (GRS 77)	0.29	0.25
Air Data Computer (GDC 74)	0.25	0.21
Engine/Airframe Unit (GEA 71)	0.2	0.17
Transponder (GTX 33)	1.17	1
Audio Panel (GMA 1347)	1.58	1.36
FIS (GDL 69A)	0.42	0.36

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Table 3. Nav III Equipped Electrical Load Analysis (Optional Equipment) (continued)

Blind Turn Coordinator (KAP 140)	0.27	0.32	A
FIS (GDL69A)	0.42	0.36	A
ADF (KR 87)	0.60	0.52	A

Note	Definition
A	Current draw is from vendor data maximum.
B	Current draw is from previous load analysis report.
C	Current draw is from measurements on conformed equipment.
D	Avionics panel lights includes autopilot and ADF displays.
G	Fuel pump current draw: 3.0 amp maximum at 24.0 volts.
H	12 volt cabin power convertor has a maximum rating and current limited to 10 amps out. This equals approximately 5.50 amp input.
I	Alternator field current maximum of 1.9 with 60 amp alternator. This includes alternator control unit power.
J	For calculation, 1 minute of transmission for every 10 minutes of flight. Antenna VSWR 1:3.
K	For calculation, Comm #2 will be in receive mode 100% of the time. Comm #1 and Comm #2 cannot transmit at the same time.
M	Hour meter average current = 0.015 amps.
N	Beacon light has a 50% duty cycle ON/OFF period.
O	12 volt cabin converter has a pilot operating handbook limitation that prevents use during takeoff and landing. Converter OFF current = 0.10 amp.
P	Equipment can draw power from the essential bus (HI020) and/or the avionics Bus 1 (HI018). For calculation of the alternator operation collums, It is given that all power is from the Avionics Bus 1.
Q	It is given that the dimmer control turned to FULL BRIGHT.
R	Main battery only operational after these electrical loads are OFF: Alternator Master, Avionics Bus 1 Master, All external lights, Comm #2, Nav #2, audio, and 12 volt cabin power.
S	For calculation, pitch trim servo and clutch are given to be on 25% of the time.
T	Wing Anti-Collision Light average current = 0.85 amps with peak current of 1.7 amps.

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CHAPTER 25

EQUIPMENT/ FURNISHINGS

LIST OF EFFECTIVE PAGES

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25-Table of Contents		
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25-10-10	Pages 201-208	Jan 1/2007
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25-50-00	Pages 201-202	Apr 7/2003
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EQUIPMENT/FURNISHING - GENERAL

1. Scope

A. This chapter describes the interior equipment and furnishings used throughout the airplane. The emergency locator transmitter and the carbon monoxide detector information is also included in this chapter.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following listed items:

NAME	NUMBER	MANUFACTURER	USE
Aeroflex Communications Test Set	IFR 4000	Aeroflex, Wichita Division 10200 West York Street Wichita, KS 67215-8935	To complete the functional test of the Artex ELT ME406 Emergency Locator Transmitter.
Spray Adhesive	Airtac2	Advanced Materials Group 2542 East Del Amo Blvd. Box 6207 Carson, CA	To adhere soundproofing and insulation to fuselage structure.
V23 System Diagnostic Tool	508668-201	Cessna Aircraft Company Cessna Parts Distribution, Department 701, 5800 East Pawnee Road Wichita, KS 67218-5590	Test of the inflatable restraint system.
SARSAT Beacon Test Set	453-0131	Artex PO Box 1270 Canby, OR 97013	To complete the functional test of the Artex ELT.
30-dB Attenuator			To test the ELT.

3. Definition

A. The chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief definition of the subjects and sections incorporated in this chapter is as follows:

(1) The section on Flight Compartment covers those items installed in the cabin area, including seats, seat restraints systems, carpets and interior panels.

(2) The section on emergency equipment covers the emergency locator transmitter installed behind the aft baggage compartment. It also covers the carbon monoxide detector installed forward of the instrument panel on airplanes that are equipped with Garmin G1000.

(3) The section on soundproofing and insulation covers the material used to deaden sound throughout the airplane.

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FLIGHT COMPARTMENT - MAINTENANCE PRACTICES

1. General

A. This maintenance practices section gives the removal and installation for the crew seats, seat rails, seat belts, and shoulder harnesses. The seat belt and shoulder harness components are non-repairable field items. You must replace any component that does not operate correctly.

WARNING: If the airplane has AMSAFE inflatable restraints, do not do maintenance on the crew seats, seat rails, seat belts, or shoulder harnesses until you first look at and obey all applicable precautions and instructions supplied in AMSAFE publications and this maintenance manual. If you do not obey these instructions and safety precautions, damage to equipment and harm to personnel can occur.

B. If your airplane has the AMSAFE inflatable restraint system, do not do maintenance on the seats or the seat restraint system unless you first obey all applicable precautions and instructions in the E508804 Supplemental Amsafe Maintenance Manual and this Maintenance Manual. Refer to Inflatable Restraint System - Maintenance Practices.

2. Seat Removal/Installation

A. Seat Removal (Refer to Figure 201).

WARNING: If the airplane has AMSAFE inflatable restraints, do not remove seats with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

(1) Disarm the AMSAFE Inflatable Restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.
(2) Remove the seat stops from the forward and aft of each seat track.
(3) Unlatch the seat from the seat track and move the seat forward on the seat track until the forward roller clears the seat track.
(4) Move the seat aft on the seat track until the aft rollers clear the seat track.
(5) Remove the seat from the airplane.

B. Seat Installation (Refer to Figure 201).
(1) Set the aft roller of the seat in position on the seat track.
(2) Move the seat forward on the seat track until you can install the front roller on the seat track.
(3) Install the seat stops to the front and the rear of the seat track.

WARNING: Make sure the seat stops are set correctly. Incorrectly installed seat stops can let the seat move during flight, with the result of serious injury or death.

(4) Make sure the seat stops are installed correctly.
(5) Arm the AMSAFE Inflatable Restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.
(6) Complete a test of the seat through the full range of motion to make sure of the correct operation.

3. Shoulder Harness Guide Removal/Installation

NOTE: The removal/installation procedures are typical for the pilot and copilot seats.

A. Shoulder Harness Guide Removal (Refer to Figure 201).
(1) Move the seat in the full forward position.
(2) Put the seat back in the forward position.

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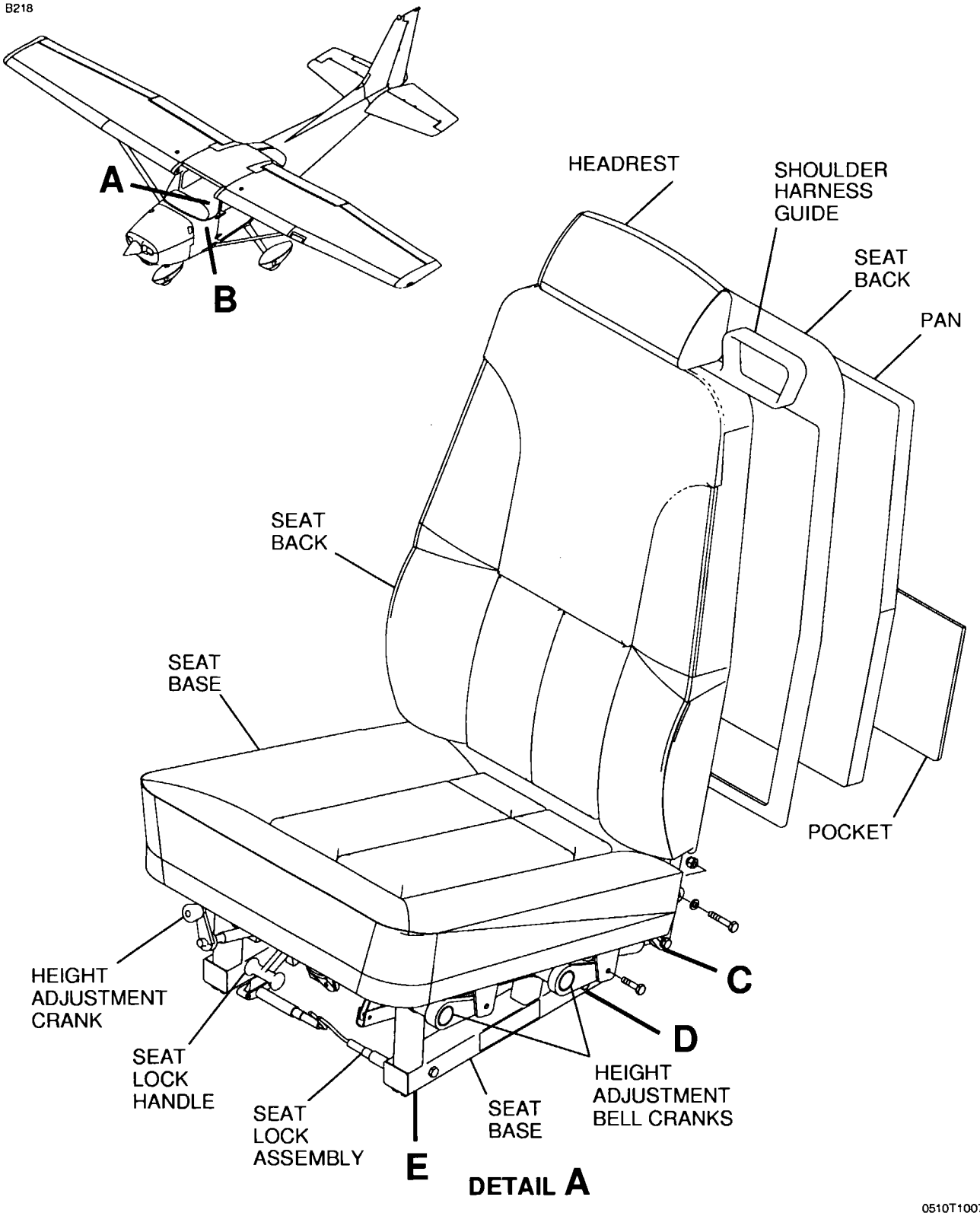

Seat Installation
Figure 201 (Sheet 1)

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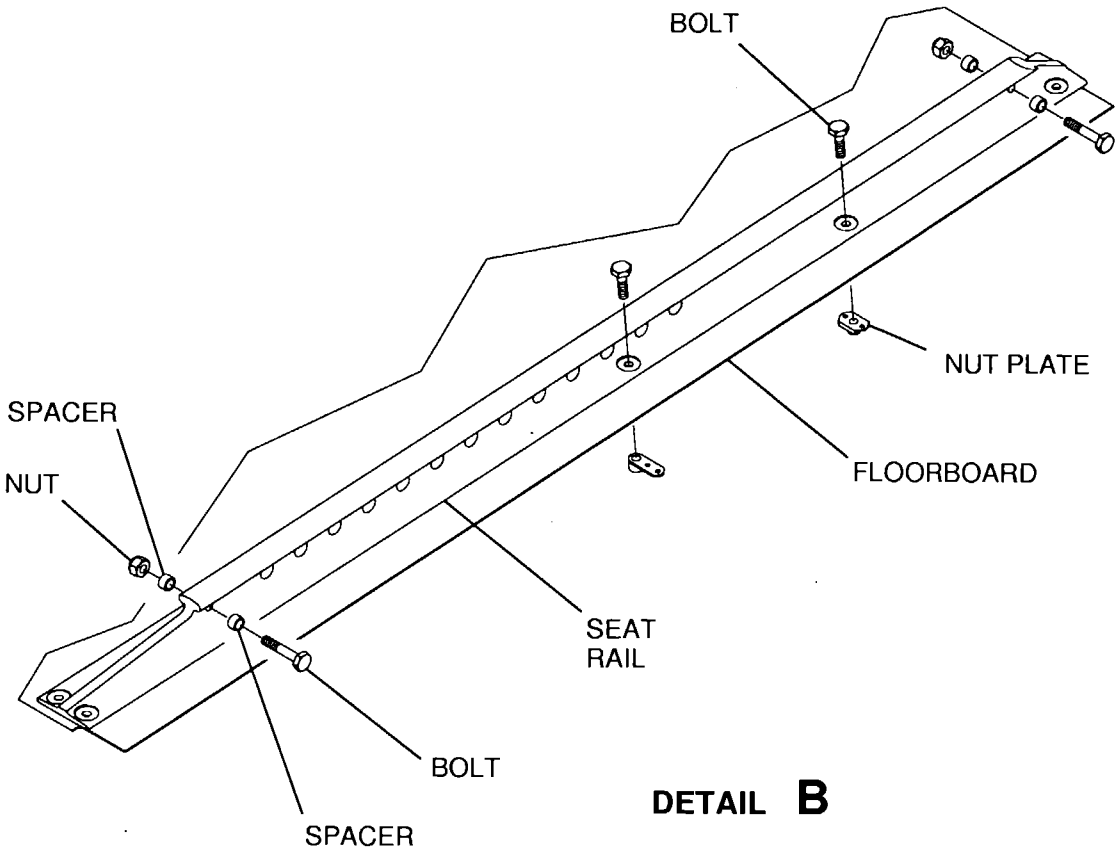

DETAIL B

WARNING: YOU MUST MAKE SURE THAT THE STOPS FOR THE SEATS ARE INSTALLED CORRECTLY. THE MOVEMENT OF THE AIRPLANE CAN LET THE SEAT DISENGAGE FROM THE SEAT RAILS WHICH WILL CAUSE A DANGEROUS SITUATION.

B0511T1001

Seat Installation
Figure 201 (Sheet 2)

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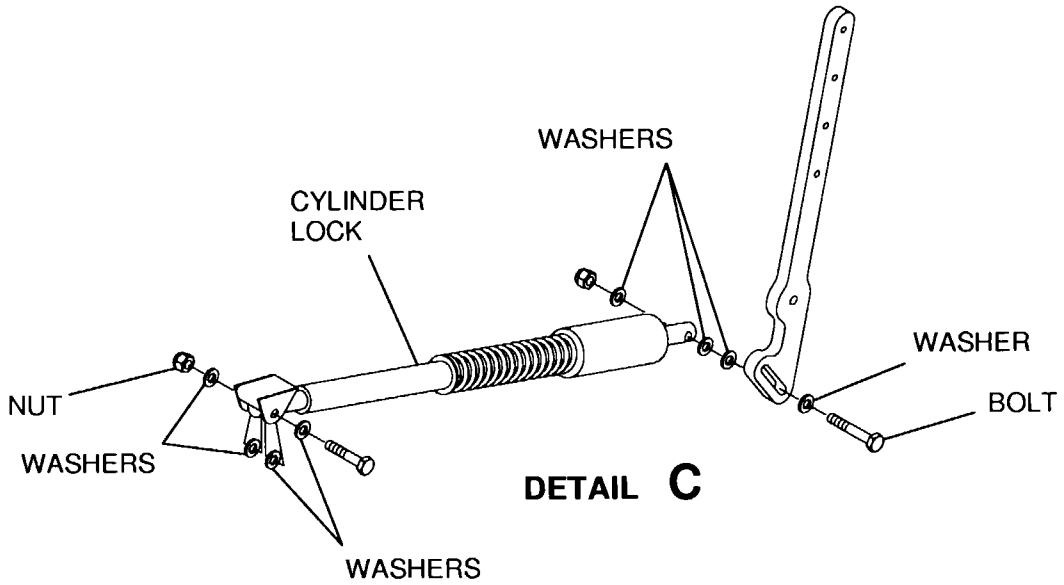
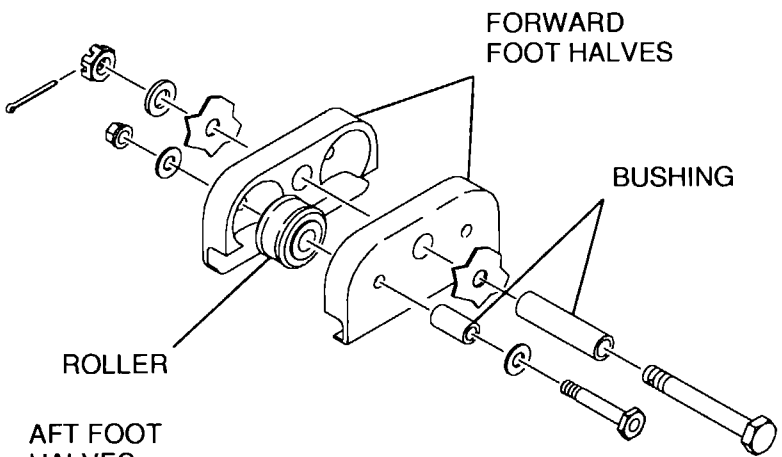
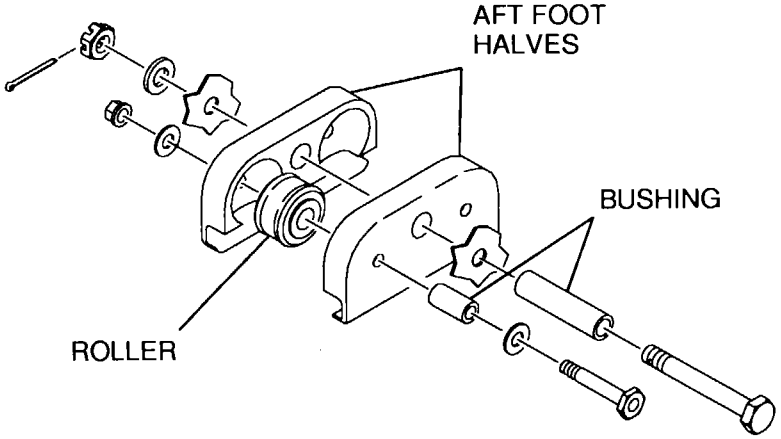


DETAIL C



DETAIL D



DETAIL E

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D0519T1037
E0519T1039

Seat Installation
Figure 201 (Sheet 3)

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CAUTION: Make sure you are careful when you lift up the upholstery so you do not cause damage.

(3) Lift the upholstery above the pocket on the seat back to get access to the headrest frame and cotter pins.
(4) Remove the cotter pins from the headrest frame.
(5) Lift the headrest up and out of the seat back.
(6) Remove the shoulder harness guide.
(7) If you do not install a new shoulder harness guide, do the procedures that follow.
(a) Install the headrest into the seat back.
(b) Install new cotter pins in the headrest frame.

CAUTION: Make sure you are careful when you pull down the upholstery so you do not damage it.

(c) Pull down the upholstery over the seat back.
(d) Move the seat aft and set the seat back in the vertical position.

B. Shoulder Harness Guide Installation (Refer to Figure 201).
(1) If the seat is not in the same position as it was when the shoulder harness guide was removed, complete the procedures that follow.

NOTE: If the seat headrest is removed from the seat back, go on to the next step. You do not have to complete this step.

(a) Move the seat in the full forward position.
(b) Put the seat backs in the forward position.

CAUTION: Make sure you are careful when you lift the upholstery so you do not cause damage.

(c) Lift the upholstery above the pocket on the seat back to get access to the headrest frame and cotter pins.
(d) Remove the cotter pins from the headrest frame.
(e) Lift the headrest up and out of the seat back.
(2) Install the shoulder harness guide on the headrest.
(3) Install the headrest with the shoulder harness guide into the seat back frame.
(4) Install new cotter pins in the headrest frame.
(5) Move the seat aft and set the seat back in the vertical position.

CAUTION: Make sure you are careful when you pull down the upholstery so you do not cause damage.

(6) Pull down the upholstery over the seat back.
(7) Move the seat aft and set the seat back in the vertical position.

4. Seat Rail Removal/Installation

A. Seat Rail Removal (Refer to Figure 201).
(1) Remove the bolts that attach the seat rails to the fuselage.

B. Seat Rail Installation (Refer to Figure 201).
(1) Install the seat rails to the fuselage with bolts.

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5. Shoulder Harness and Seat Belt Inspection

A. The shoulder harness and seat belt assembly must be inspected in accordance with the time intervals in Chapter 5, Inspection Time Limits. The shoulder harness and seat belt assemblies have a time life associated with them. Refer to Chapter 5, Component Time Life for these limits.

6. Crew Shoulder Harness and Seat Belt Removal/Installation

NOTE: The removal and installation of the shoulder harness and seat belt assembly are typical.

A. Shoulder Harness and Seat Belt Assembly Removal (Refer to Figure 202).
   (1) If necessary, disconnect the AMSAFE components as follows (refer to the applicable Warnings and steps inInflatable Restraint System – Maintenance Practices, Inflatable Restraint System Removal/Installation):
      (a) Disarm the AMSAFE inflatable restraints.
      (b) Disconnect the squib connector from the inflator assembly.
      (c) Disconnect the gas hose from the inflator assembly.
   (2) Remove the access covers (if installed) to get access to the attached hardware.
   (3) Remove the nuts, bolts, washers, and spacers that attach the shoulder harness and seat belt assembly to the fuselage and to the seats.
   (4) Remove the shoulder harness and seat belt assembly from the airplane.

B. Shoulder Harness and Seat Belt Assembly Installation (Refer to Figure 202).
   (1) Install the shoulder harness to the fuselage and/or the seat belt assembly to the seat.
      (a) Make sure the spacers (if installed) are in the correct position.
   (2) Install the access covers (if equipped).
   (3) If necessary, connect the AMSAFE components as follows (refer to the applicable Warnings and steps in Inflatable Restraint System – Maintenance Practices, Inflatable Restraint System Removal/Installation):
      (a) Connect the gas hose to the inflator assembly.
      (b) Attach the squib connector to the inflator assembly.
      (c) Arm the AMSAFE inflatable restraints.
   (4) Complete a check of the system for the correct installation and operation.

7. Map Compartment Removal/Installation

A. Map Compartment Removal (Refer to Figure 203).
   (1) Remove the interior screws that attach the map compartment to the instrument panel.
   (2) Pull out the map compartment from the instrument panel.

B. Map Compartment Installation (Refer to Figure 203).
   (1) Put the map compartment in the instrument panel.
   (2) Attach the map compartment to the instrument panel with the screws.

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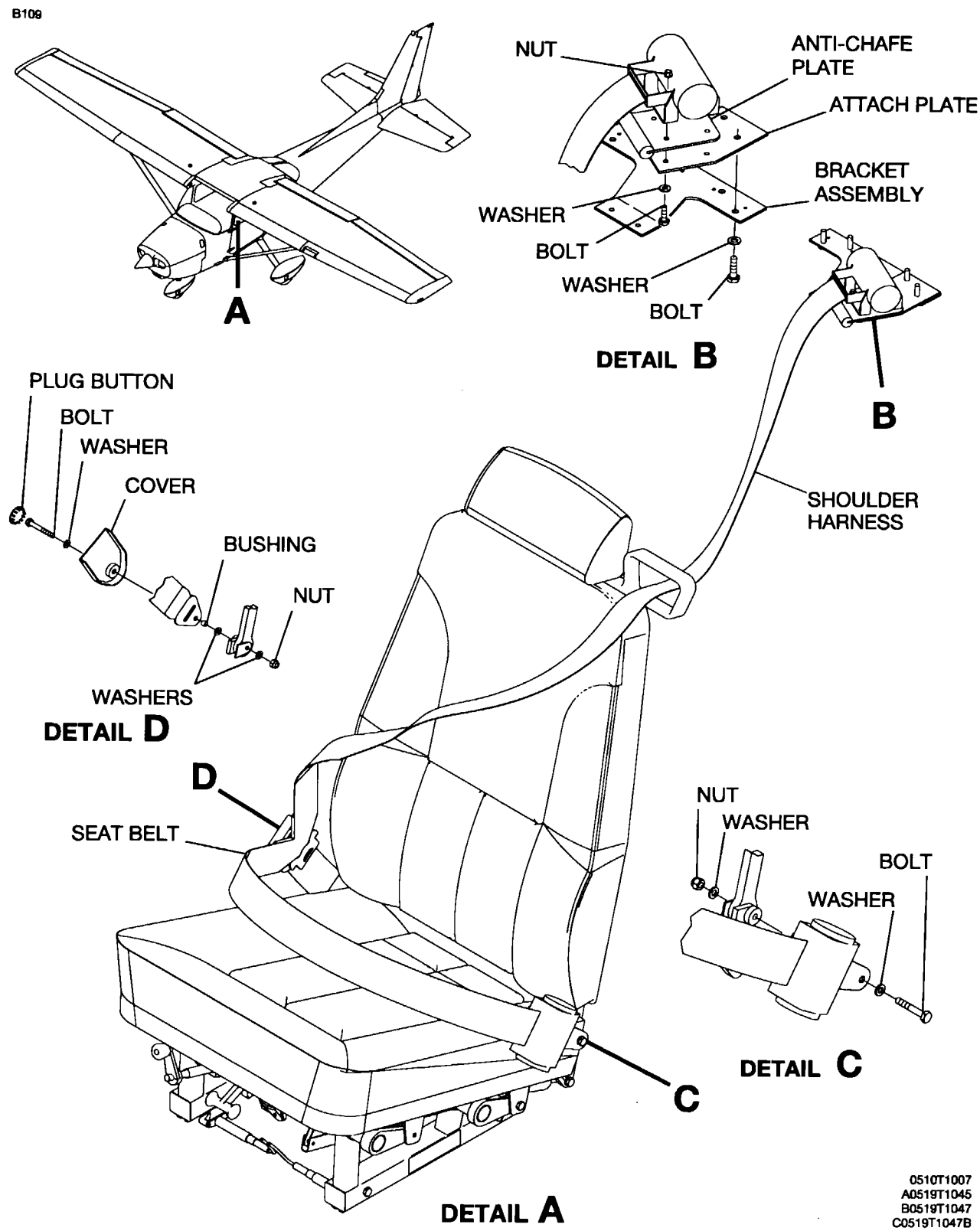

Seat Belts and Restraints Installation
Figure 202 (Sheet 1)

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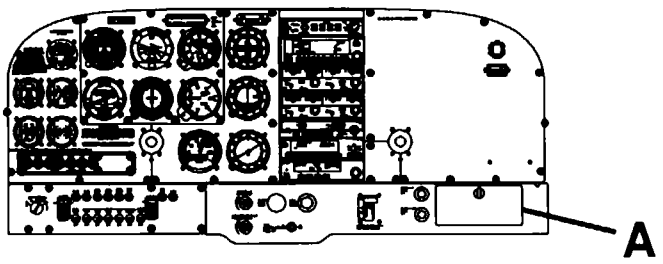

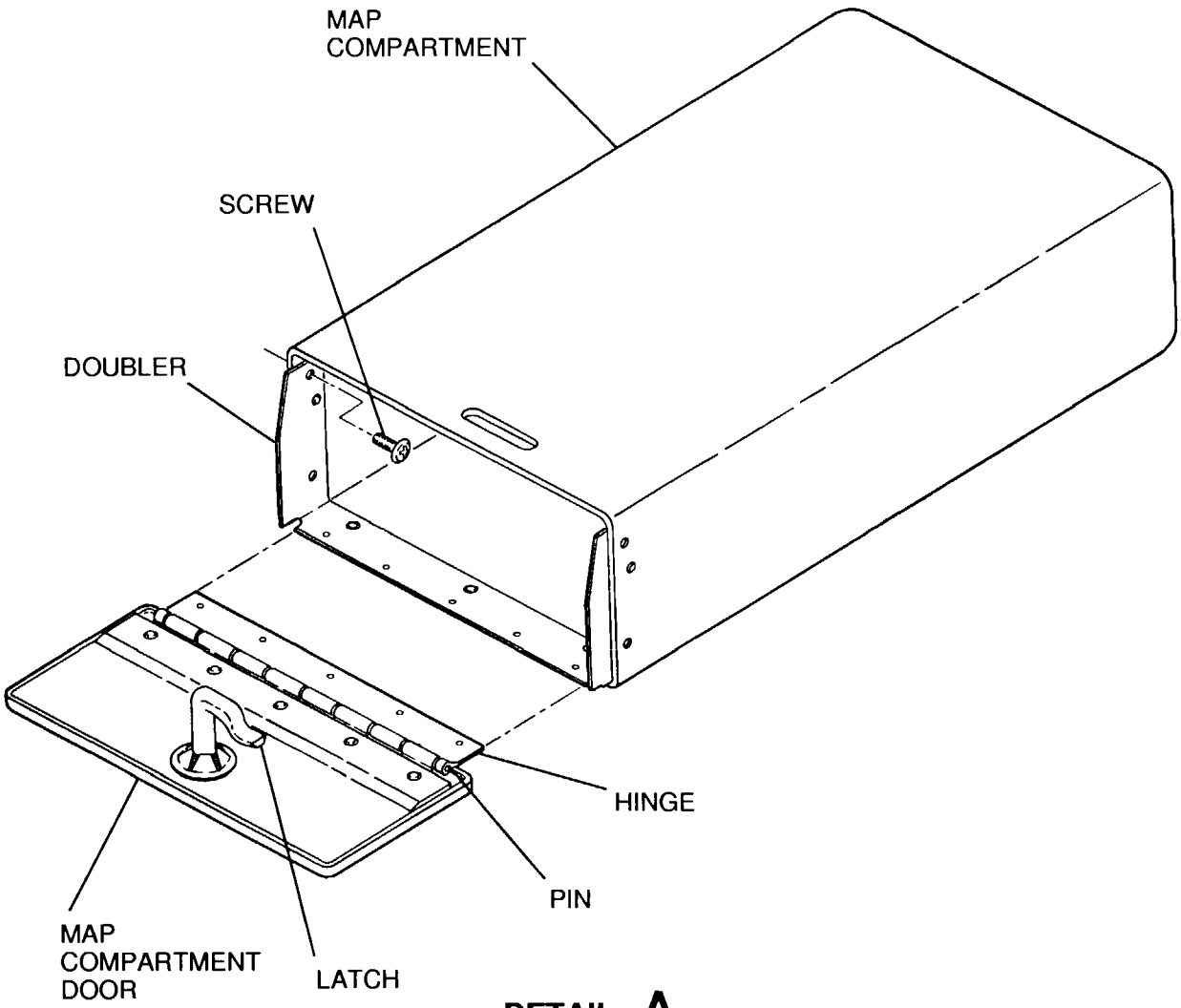

DETAIL A

A05193003

Map Compartment Installation
Figure 203 (Sheet 1)

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INFLATABLE RESTRAINT SYSTEM - MAINTENANCE PRACTICES
Airplanes with AMSAFE Inflatable Restraint System

1. General

A. This section has maintenance information for the AMSAFE Aviation Inflatable Restraint (AAIR). The AAIR is a self-contained, modular, three-point restraint system that will help to protect occupants from head-impact injury during an accident. The AAIR system has four core components: the air bag assembly, the inflation assembly, the electronics module assembly (EMA), and the cable interface assembly.

WARNING: Do not try to open the inflator assembly. Do not apply an electric current to the electronics connection. The inflator assembly is a stored, gas/energetic material device and can cause injury if accidentally deployed.

2. Inflatable Restraint System Component Cleaning

A. AMSAFE recommends that the AAIR components be cleaned on a regular (annual) basis. Buildup of dirt and unwanted material can cause problems with system operation, decrease the life of the system, and help cause corrosion of the metal parts in the system. Clean the belt assembly, hoses, cables, inflation device/cap assembly, and the EMA.

CAUTION: Use care to keep contamination and cleaning agents away from the hardware assemblies.

CAUTION: Do not let any part of the AAIR soak in any solution. This can cause damage to the AAIR system. Do not use too much water when you clean the AAIR parts. Too much water can cause damage to the internal components and cause them to be unserviceable.

CAUTION: Only use sufficient cleaning agent to make minimal suds. Excess soap must be removed before the part is installed in the system.Do not dry the belt assembly in sunlight or near any source of heat. Do not dry clean the belt assembly. Do not put the belt assembly fully into water.

CAUTION: Keep the isopropyl alcohol away from the webbing, air bag cover, and the gas hose material.

CAUTION: Do not use soap or water on metal parts.

(1) Clean non-metallic parts with warm water and a household soap/laundry detergent and a moist cloth.
(2) Flush the parts with clear water on a clean cloth.
(3) Use a soft brush, and cold soap solution to clean the webbing, air bag cover, and gas hose by hand. Use a household liquid soap or detergent.
(4) Let the belt assembly dry by air.
(5) Clean any spacers, washers, nuts, or bolts with a lint-free cloth and isopropyl alcohol.
(6) Cover the cable opening into the EMA with pieces of cloth. Clean the inflator and cables by hand with a lint-free cloth and a cold water and mild soap solution.

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3. Inflatable Restraint System Inspection

NOTE: The AMSAFE Aviation Inflatable Restraint (AAIR) must be examined in accordance with the time intervals in Chapter 5, Inspection Time Limits. The AMSAFE Aviation Inflatable Restraint (AAIR) assemblies have a time life associated with them. Refer to Chapter 5, Component Time Life for these limits.

A. Do an inspection of the AAIR system parts.
   (1) Air bag assembly.
      (a) Make sure that the attachments are tightly connected.
      (b) Do a visual inspection for dirt, oil, grease or other unwanted material.
      (c) Do a check for wear on the edges of the belt.
      (d) Do a check for damage on stitching or fabric threads.
      (e) Do a check for holes or rub marks on the air bag cover.
      (f) Do a check of the end fittings, buckle and connector for cracks, dents, or corrosion.
   (2) Inflator hose.
      (a) Do a check for fraying, wear, or tears.
   (3) Cable interface assembly.
      (a) Make sure all attachments are tightly connected.
   (4) Inflator assembly.
      (a) Do a check for loose mounting hardware.
      (b) Do a check of the hose connection.
      (c) Do a check of the electrical connection.
   (5) Electronics module assembly (EMA).
      (a) Do a check for loose connections and mounting hardware.

4. Storage of Spares

A. Inflator Assembly.

NOTE: The maximum continuous storage time for the inflator assembly is seven years from the date of manufacture. After seven years, send the inflator assembly to AMSAFE Aviation for inspection and repair.

   (1) Keep the inflator assembly in a cool and dry area. The permitted temperature range is -30° C to +55° C.
   (2) Keep the inflator assembly away from sunlight, dust, moisture, and other contamination.
   (3) Keep the inflator assembly away from high electromagnetic, radio frequency, and electrostatic environments.
   (4) Obey all local storage regulations.

B. Electronics Module Assembly (EMA).

NOTE: The maximum continuous storage time for the EMA is seven years from the date of manufacture. After seven years, send the EMA to AMSAFE Aviation for inspection and repair.

   (1) Keep the EMA assembly in a cool and dry area. The permitted temperature range is -30° C to +55° C.
   (2) Make sure that the EMA is kept away from sunlight, dust, moisture, and other contamination.
   (3) Keep the inflator away from EMI/RFI/ESD environments.
   (4) Obey all local storage regulations.

C. Air Bag Assembly.
   (1) Keep the air bag assembly in a cool and dry area. The permitted temperature range is -30° C to +55° C.
   (2) Make sure that the air bag assembly is kept away from sunlight, dust, moisture, and other contamination.

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5. AMSAFE Inflatable Restraint Disarm/Arm

A. Disarm the AMSAFE Inflatable Restraints.
(1) Make sure all seat belts are unbuckled.
(2) Find the end-release connector at the seat base.
(3) Remove the tie straps that attach the cable and end-release connector.
(4) Disconnect the end-release connector to disable the inflatable restraint.

B. Arm the AMSAFE Inflatable Restraints.
(1) Connect the end-release connector.
(2) Attach the cable and end-release connector to the seat frame with tie wraps.

6. Inflatable Restraint System Removal/Installation

WARNING: Keep all magnetic fields away from the electronics module assembly (EMA) during the removal and installation procedure. Accidental deployment of the system can cause injury.

A. Restraint System Removal. Refer to Figure 201.

WARNING: Do not remove seats from the airplane with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

WARNING: Do not connect the EMA to the cable interface assembly unless the EMA is first mounted to the airplane structure. Accidental deployment can cause injury.

(1) Disarm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.
(2) Disconnect the squib connector from the inflator assembly.
(3) Disconnect the gas hose from the inflator assembly.

NOTE: The gas hose barb has a layer of Loctite and is tightly attached to the fitting. Use soft-grip channel locks to hold the barb while you disconnect the hose.

(4) Loosen the clamps on the inflator-assembly mounting bracket.
(5) Remove the inflator assembly from the mounting bracket.
(6) Put shipping caps on the inflator-hose connector fitting. Refer to Table 201.

Table 201. Torque Values and Tool Sizes

PART DESCRIPTION	RELATED SUBASSEMBLY	TOOL AND SIZE	TORQUE (IN-LBS.)
Inflator Shipping Cap	Inflator Assembly	Torque Wrench (In-lb. type)	5 - 10
Hose Connection to the Inflator	Air Bag Assembly/Inflator Assembly	Torque Wrench (In-lb. type)	110 - 130

(7) Remove the inertia reel (three-point air bag belt) from the airplane. Refer to Chapter 25, Flight Compartment - Maintenance Practices.
(8) Remove the end-release buckle assembly from the airplane. Refer to Chapter 25, Flight Compartment - Maintenance Practices.
(9) Disconnect the cable interface assembly from the EMA.
(a) Push down on the locking clip on the EMA connector and pull on the connector.
(10) Remove the cable interface assembly from the airplane.

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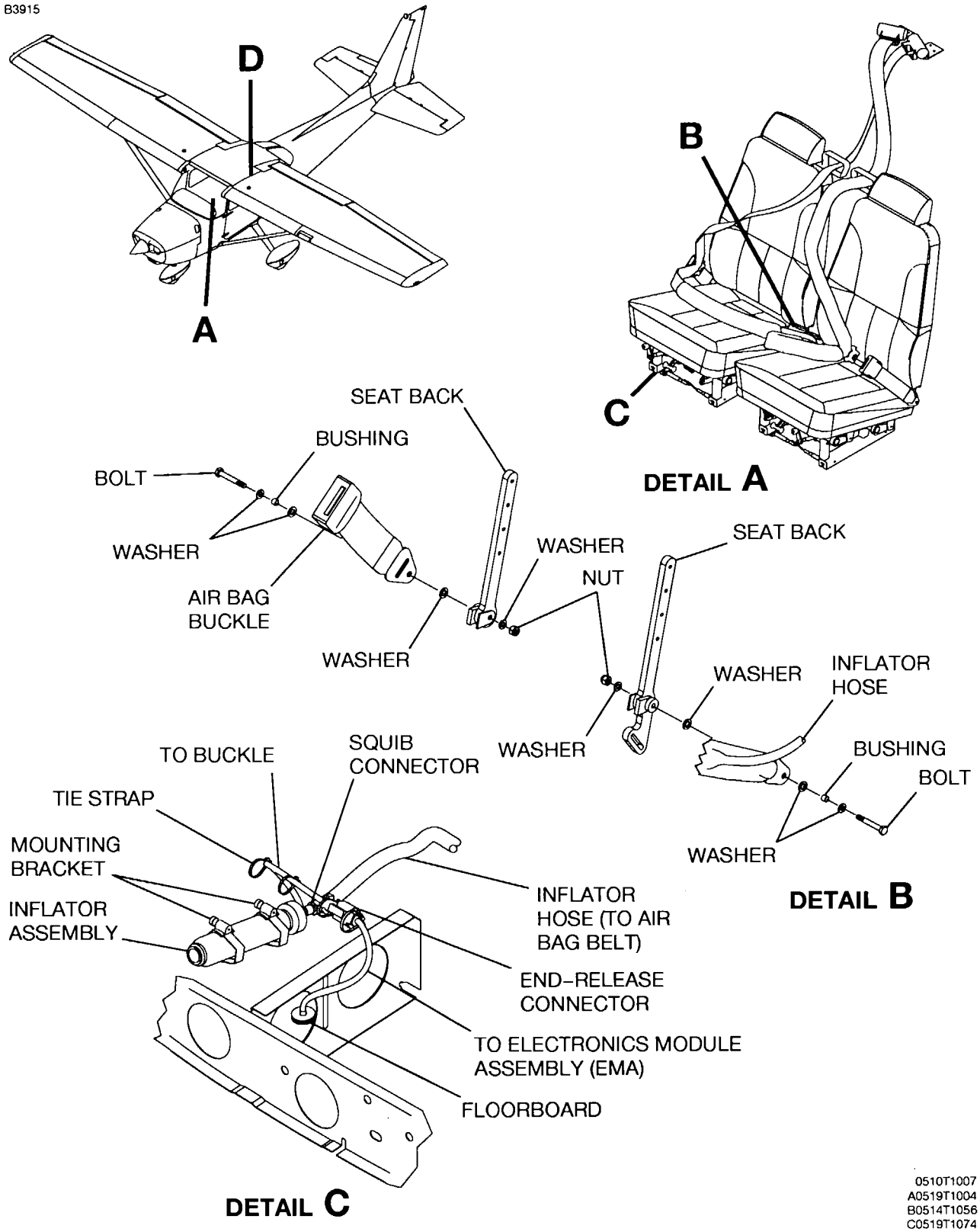

0510T1007
A0519T1004
B0514T1056
C0519T1074

AMSAFE Aviation Inflatable Restraint System
Figure 201 (Sheet 1)

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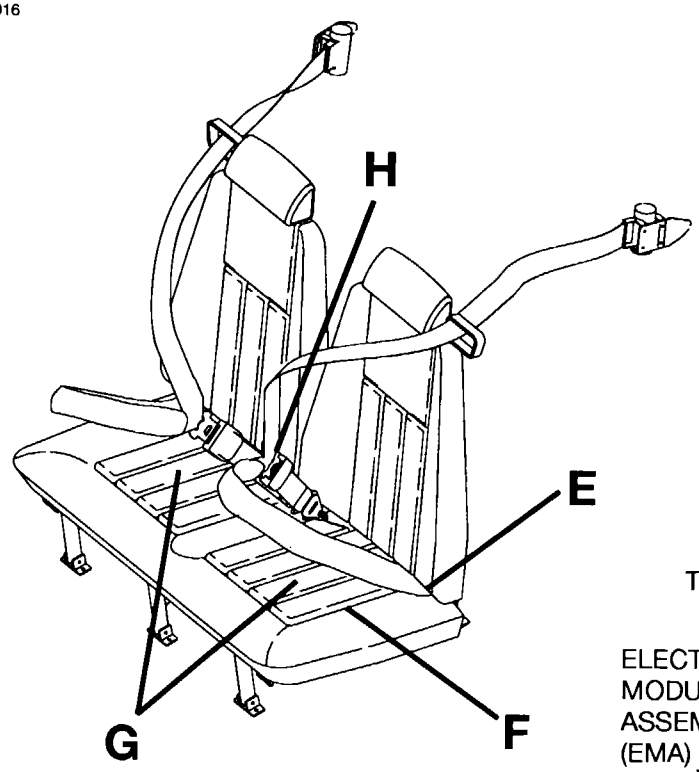
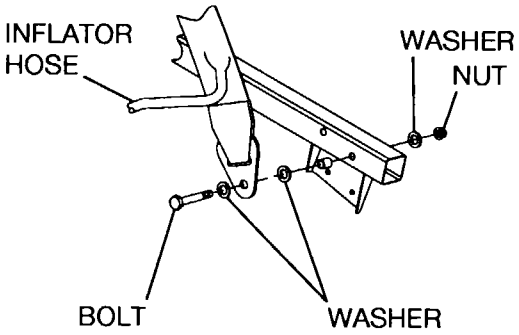
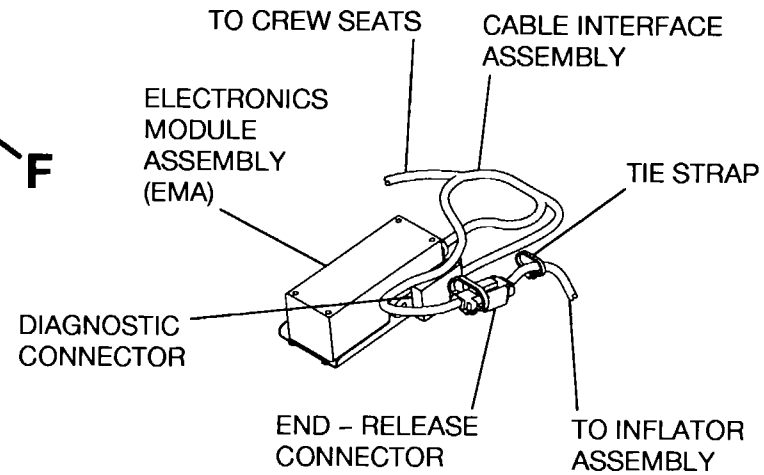
B3916



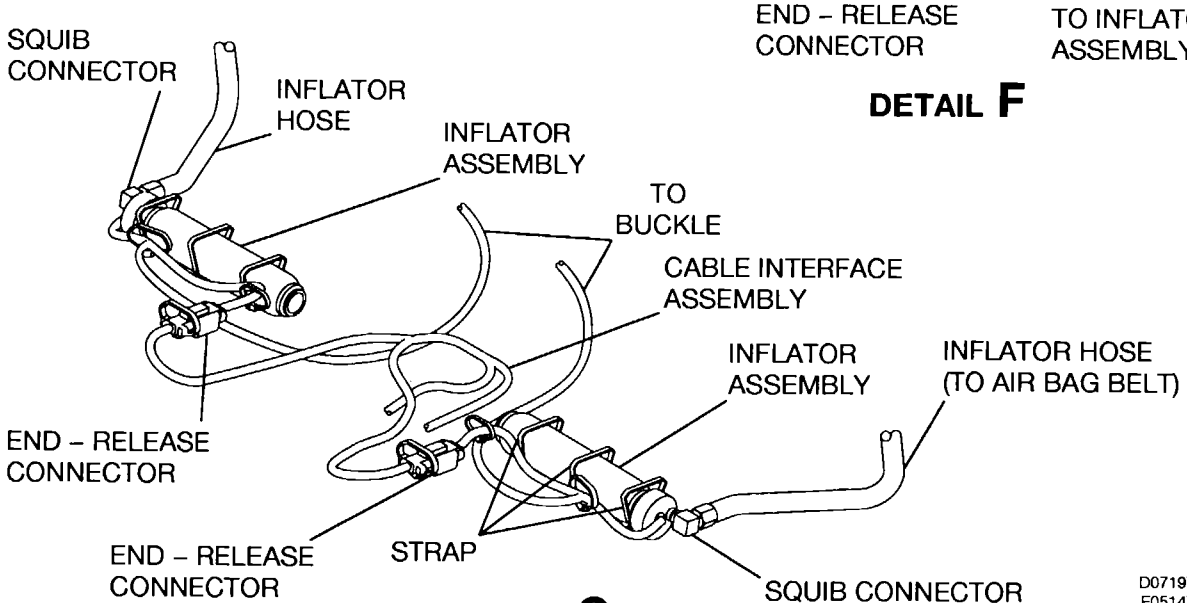
DETAIL D



DETAIL E



DETAIL F



DETAIL G

D0719T1009
E0514T1049
F0719T1039
G0514T1050

AMSAFE Aviation Inflatable Restraint System
Figure 201 (Sheet 2)

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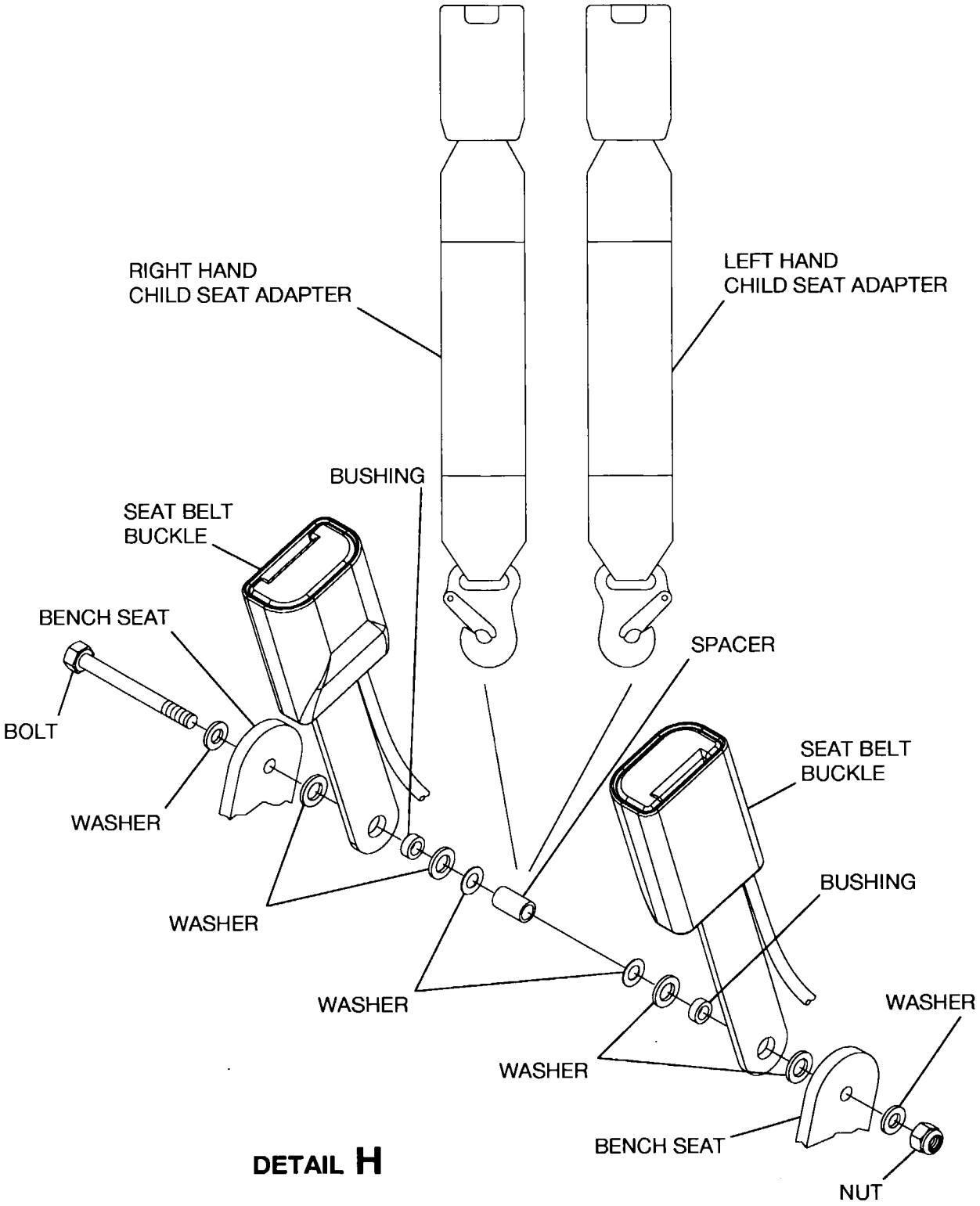
B6058



DETAIL H

H0514T1054

AMSAFE Aviation Inflatable Restraint System
Figure 201 (Sheet 3)

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(11) Remove the EMA from the airplane.
  (a) Remove the nuts, washers and bolts that attach the EMA to the floorboard.
  (b) Carefully remove the EMA from the airplane.

B. Restraint System Installation. Refer to Figure 201.

NOTE: Leave the protective plastic bag on the air bag belt during installation to keep it clean.

(1) Remove and keep the shipping caps from the inflator-hose connector fitting.

NOTE: The shipping caps can be used again.

(2) Put the inflator assembly into the mounting bracket. Do not tighten the clamps on the mounting bracket.
(3) Remove and discard the end cap plug (if new) from the three-point air bag belt hose. Do not remove the safety cable tie for the air bag connector tongue.

NOTE: If the three-point air bag belt is not new and the inflator is new, apply a thin layer of Loctite 242 thread locking compound on the hose barb threads before you attach the inflator assembly.

(4) Make sure that the three-point seat belt air bag belt is aligned correctly.

NOTE: If aligned correctly, the gas hose will be on top of the seat belt attachment hardware. The label will be on aft side of the belt.

(5) Connect the gas hose from the three-point air bag belt to the inflator assembly with the correct torque. Refer to Table 201.

NOTE: The inflator hose connector fitting is a pressure fitting which must be fully extended onto the gas hose barb to make an airtight connection.

(6) Attach the squib connector to the inflator assembly.
(7) Tighten the clamps on the mounting bracket to between 21 and 25 inch-pounds of torque.
(8) Attach the EMA to the floorboard with the washers, nuts, and bolts.
(9) Connect the cable interface assembly to the EMA.
(10) Make sure that the cables and hoses of the AAIR are clear of the height-adjustment crank, the seat lock handle, and the seat-back adjustment lever.
(11) Install the inertia reel (three-point air bag belt) in the airplane. Refer to Chapter 25, Flight Compartment - Maintenance Practices.
(12) Arm the AMSAFE inflatable restraints. Refer to AMSAFE Inflatable Restraint Disarm/Arm.
(13) Remove the safety cable tie from the air bag buckle tongue.
(14) Do a seat operation test on the pilot's and copilot's seat.
  (a) Move the seat-back aft and forward to its maximum travel.
  (b) Move the seat-base up an down to its maximum travel.
  (c) Move the seat-base aft and forward to its maximum travel.
(15) Do a functional test on the system. Refer to the AMSAFE Aviation AAIR Supplemental Maintenance Manual, V23 System Diagnostic Tool - Operation and Maintenance Manual.

7. Inflatable Restraint System Adjustment/Test

A. The AAIR diagnostic check gives a system functional test of the AAIR circuits. To find problems in system components, use a replace-and-test procedure. There are two seats in each AAIR system. The 1 LED light will show an indication for the first seat on the AAIR system circuit. The 2 LED light will show an indication for the second seat on the AAIR system circuit. Once the V23 system diagnostic tool (SDT) is connected to the airplane, a check of the system is done one seat at a time.

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B. The V23 system diagnostic tool uses a 9-volt battery that can be replaced. A check of the diagnostic tool must be done yearly. The label on the back of the diagnostic tool will show when a check of the tool needs to be done. The diagnostic tool must only be sent to AMSAFE to be calibrated.

CAUTION: Calibrate the V23 system diagnostic tool again before use if it is hit, shaken, or if it falls to the floor.

C. Before the V23 system diagnostic tool is connected to the airplane, do the steps that follow.
(1) Set the SDT ON/OFF Switch to the ON position.
(2) Look at the Tool Battery Indicator LED light.
(a) If the LED light is green, the battery condition is satisfactory.
(b) If the LED light is red, replace the 9-volt battery on the back of the SDT.

D. Do the System Functional Test.

NOTE: There are two seats in each AAIR system. This functional test must be completed for each AAIR system on the airplane.

(1) Make sure that the seat belt safety buckles are not attached.
(2) Remove the protective cap from the cable interface assembly.
(3) Connect the V23 system diagnostic tool to the diagnostic connector.
(4) Set the SDT ON/OFF Switch to the ON position.
(5) Look at the Seat Position PASS/FAIL LED light.
(6) If the 1 and 2 LED lights are amber, do the steps that follow. If the 1 and 2 LED lights do not give an amber indication, troubleshoot the system. Refer to Inflatable Restraint System Troubleshooting.
(a) Connect the air bag safety buckle on the seat.
(b) If the 1 LED light is green, the AAIR system for that seat is satisfactory.
(c) If there is an amber LED light indication, a red indication, or no indication, troubleshoot the system. Refer to Inflatable Restraint System Troubleshooting.
(d) Disconnect the air bag safety buckle.
(e) Do the system functional test again for the second seat location.

NOTE: For the second seat location, the 2 LED light will be used to give an indication.

(7) Set the SDT ON/OFF Switch to the OFF position.
(8) Disconnect the V23 system diagnostic tool from the diagnostic connector.
(9) Put the protective cap on the cable interface assembly.

8. Inflatable Restraint System Troubleshooting

A. The procedures in this section must be done if the V23 system diagnostic tool gives an unsatisfactory indication for the seats in the AAIR System Adjustment/Test. An unsatisfactory indication by the seat LED light is an amber indication, red indication, or no indication. If the V23 system diagnostic tool gives a satisfactory indication after the replacement of the individual components, stop the troubleshooting procedure.
(1) If an unsatisfactory indication is given before the safety buckle is connected, do the steps that follow.
(a) Do a check of all connections and tighten loose connections that are found. Do the Adjustment/Test procedure again if there are loose connections found.
(b) Replace the cable interface assembly. Do the Adjustment/Test procedure again.
(c) Replace the EMA. Do the Adjustment/Test procedure again.
(d) Replace the inflator. Do the Adjustment/Test procedure again.
(2) If an unsatisfactory indication is given after the safety buckle is connected, do the steps that follow.
(a) Replace the cable interface assembly. Do the Adjustment/Test procedure again.
(b) Replace the air bag safety buckle. Do the Adjustment/Test procedure again.
(c) Replace the EMA. Do the Adjustment/Test procedure again.
(d) Replace the inflator. Do the Adjustment/Test procedure again.

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PASSENGER COMPARTMENT - MAINTENANCE PRACTICES

1. General

A. This section gives instruction for the removal and installation of the aft seat and the seat belt and shoulder harness assembly. The seat belt and shoulder harness components are non-repairable field items. If any component does not operate correctly, the system must be replaced.

WARNING: If the airplane has AMSAFE inflatable restraints, do not do maintenance on the seats, seat rails, seat belts, or shoulder harnesses until you first look at and obey all applicable precautions and instructions supplied in AMSAFE publications and this maintenance manual. If you do not obey these instructions and safety precautions, damage to equipment and harm to personnel can occur.

B. If your airplane is equipped with the AMSAFE inflatable restraint system, do not do maintenance on the seats or the seat restraint system unless you first obey all applicable precautions and instructions in the E508804 Supplemental Amsafe Maintenance Manual and this Maintenance Manual. Refer to Inflatable Restraint System - Maintenance Practices.

2. Aft Seat Removal/Installation

A. Aft Seat Removal (Refer to Figure 201).

WARNING: If the airplane is equipped with AMSAFE inflatable restraints, do not remove seats with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

(1) Remove the bolts and washers that attach the seat frame to the fuselage.
(2) Remove the seat from the airplane.

B. Aft Seat Installation (Refer to Figure 201).
(1) Install the seat to the fuselage with the bolts and washers.

3. Observer Seat Removal/installation

A. Observer Seat Removal (Refer to Figure 202).

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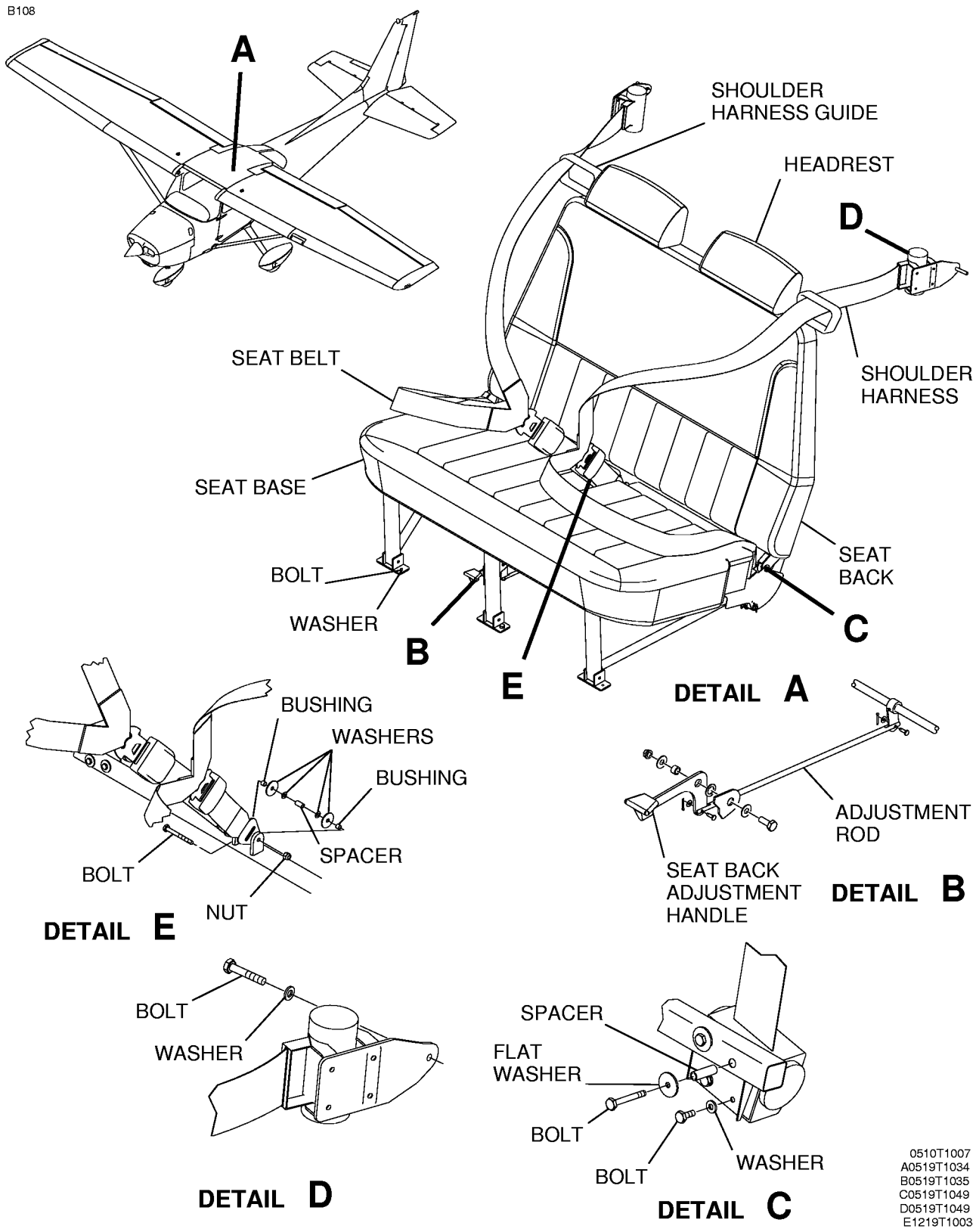

Aft Seat Installation
Figure 201 (Sheet 1)

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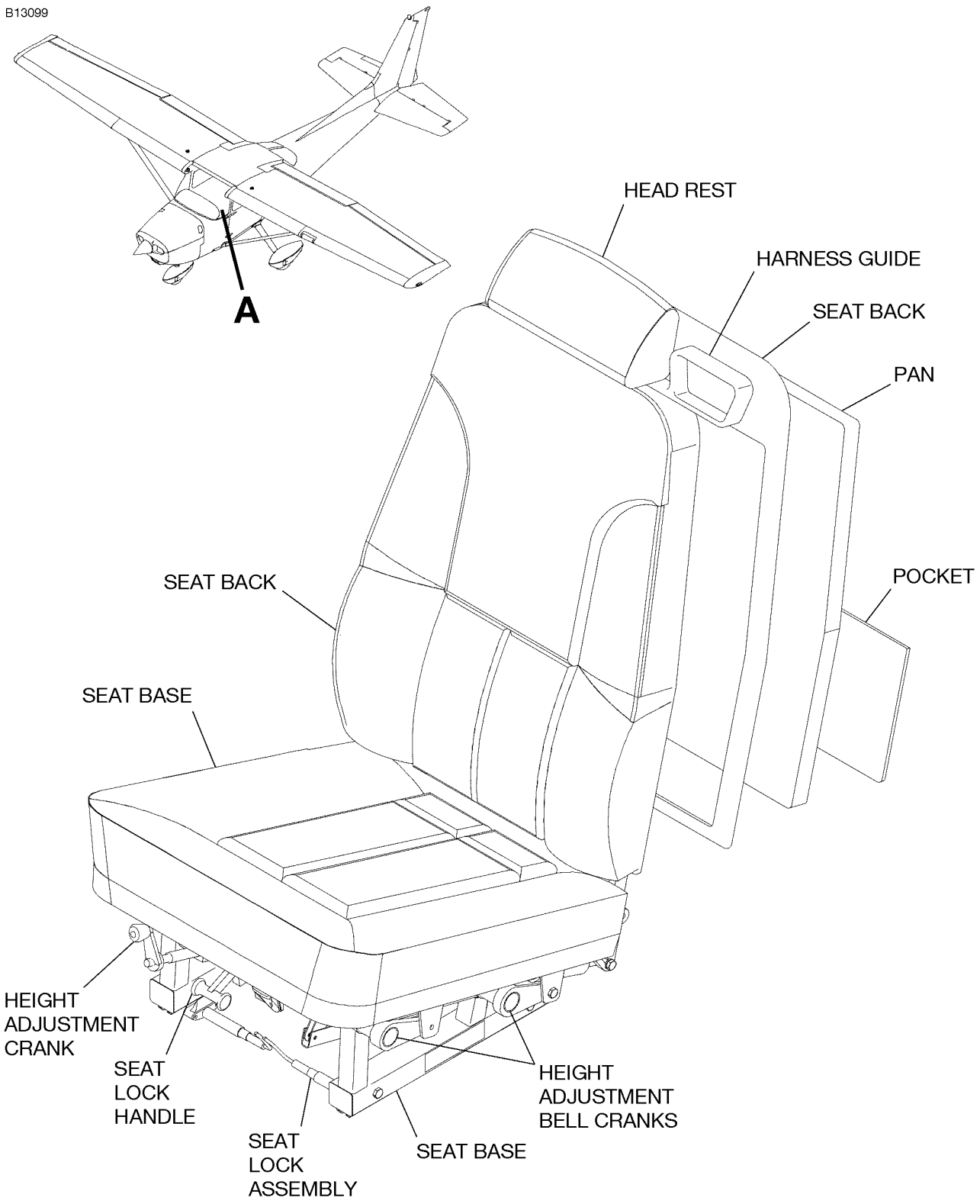

Observer Seat Installation
Figure 202 (Sheet 1)

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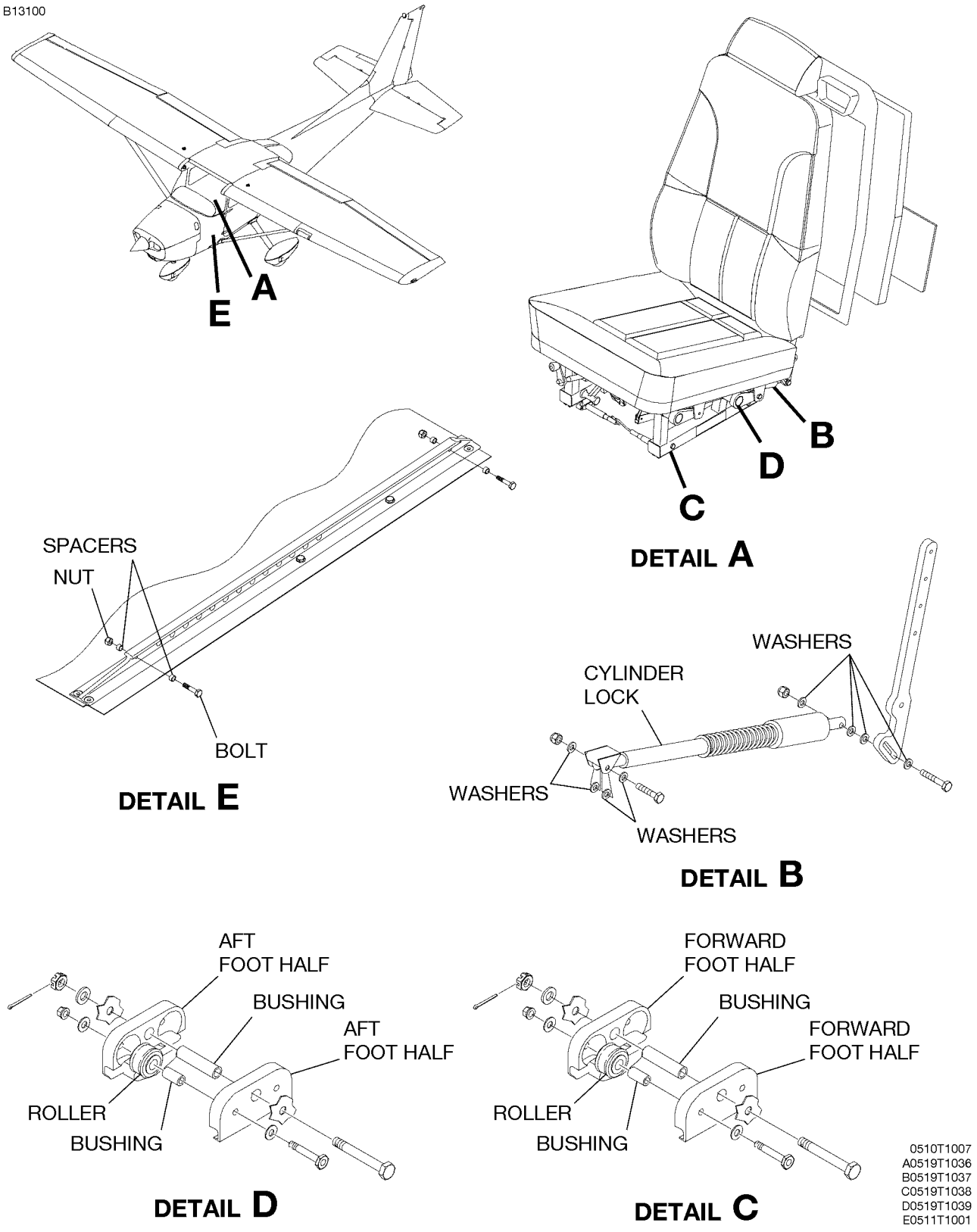

Observer Seat Installation
Figure 202 (Sheet 2)

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WARNING: If the airplane has the AMSAFE inflatable restraints, do not remove seats with the seat belts buckled or the EMA connected. Damage can occur to the system and an accidental deployment of the system can cause injury.

(1) Remove restraints prior to seat removal. Refer to Seat Belt and Shoulder Harness Assembly Removal.
(2) Remove seat stops from front and rear of each seat track.
(3) Unlatch seat from seat track and move seat forward on seat track until forward roller clears seat track.
(4) Remove seat from airplane.

B. Observer Seat Installation (Refer to Figure 202).
(1) Position rear roller of seat on seat track.
(2) Move seat forward on seat track until front roller can be installed on seat track.
(3) Install seat stops to front and rear of seat track.

WARNING: Improperly installed seat stops could allow seat movement during flight maneuvers, resulting in serious injury or death.

(4) Test the seat through full range of motion to make sure of proper operation. Make sure the seat stops are properly installed.
(5) Install restraints. Refer to Seat Belt and Shoulder Harness Assembly Installation.

4. Seat Belt and/or Shoulder Harness Assembly Removal/Installation

A. Seat Belt and Shoulder Harness Assembly Removal (Refer to Figure 201).
(1) If installed, remove the access covers to get access to the assembly hardware.
(2) Remove the nuts, bolts, washers, and spacers that attach the assemblies to fuselage and/or seats.
(3) Remove the assembly from the airplane.

B. Seat Belt and Shoulder Harness Assembly Installation (Refer to Figure 201).
(1) Install the assembly to the fuselage and/or the seat.
(2) Make sure the spacers (if installed) are positioned correctly.
(3) Install the access covers (if equipped).
(4) Complete a check of the assembly for the correct installation and operation.

5. Seat Belt and Shoulder Harness Assembly Test

A. The seat belt and shoulder harness assembly must have an inspection completed in accordance with the time intervals in Chapter 5, Inspection Time Limits. Make sure you complete a check of the time life of the assembly referred in Chapter 5, Component Time Life for these limits.

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INTERIOR UPHOLSTERY - MAINTENANCE PRACTICES

1. General

A. This section provides general instructions for removal and installation of the interior panels, carpet and rubber mat.

2. Cabin Panels Removal/Installation

A. Interior panels are typically attached to fuselage structure using screws. Refer to Figure 201 for an exploded view of the interior panels, headliner and overhead console.

3. Door Panels, Carpet and Rubber Mat Removal/Installation

A. Cabin door panels are typically attached to the fuselage and door structure using small screws. Carpet and rubber mats are attached to the floorboard using Velcro. Refer to Figure 202 for a view of the side panels, carpet and rubber mat.

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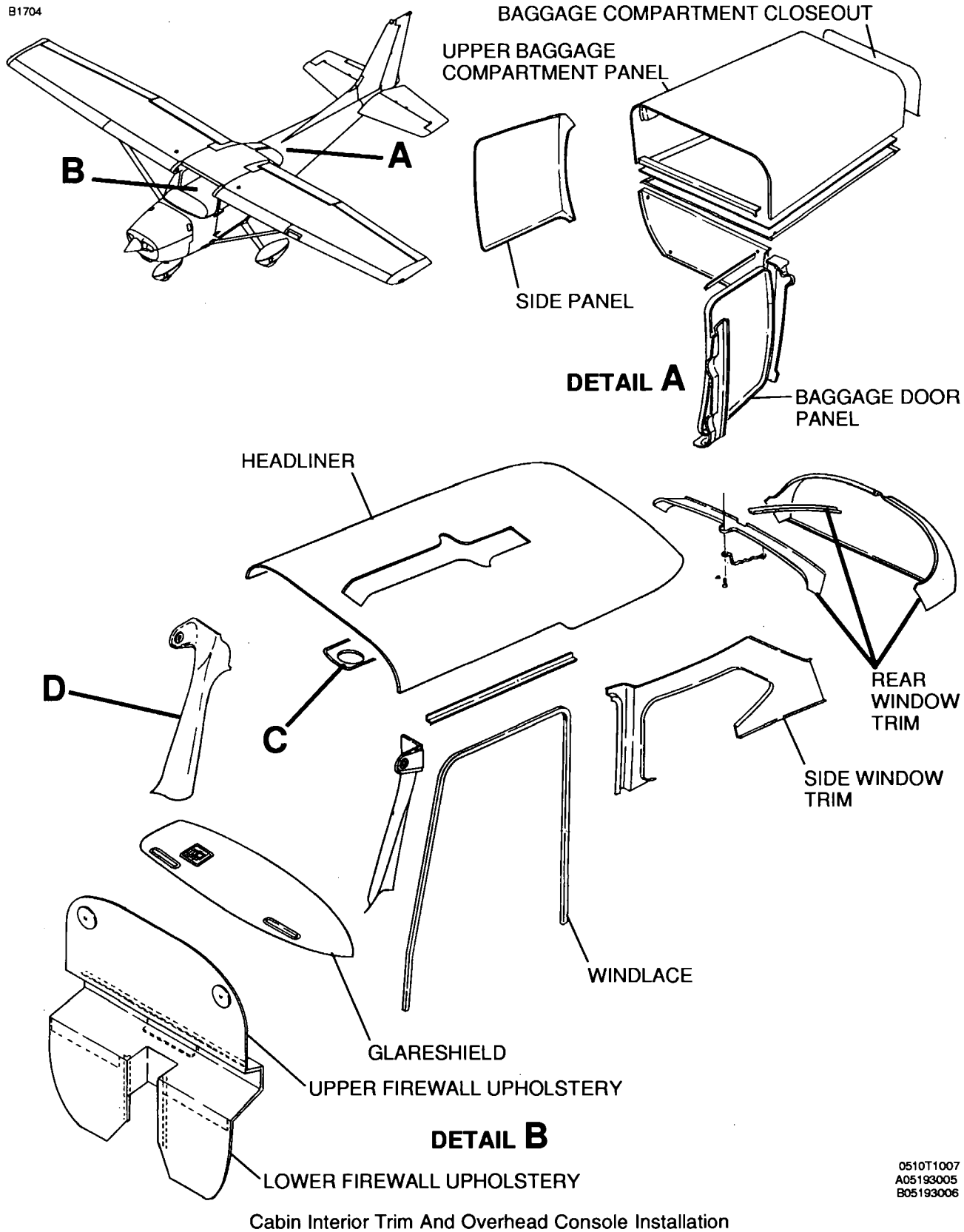

Cabin Interior Trim And Overhead Console Installation
Figure 201 (Sheet 1)

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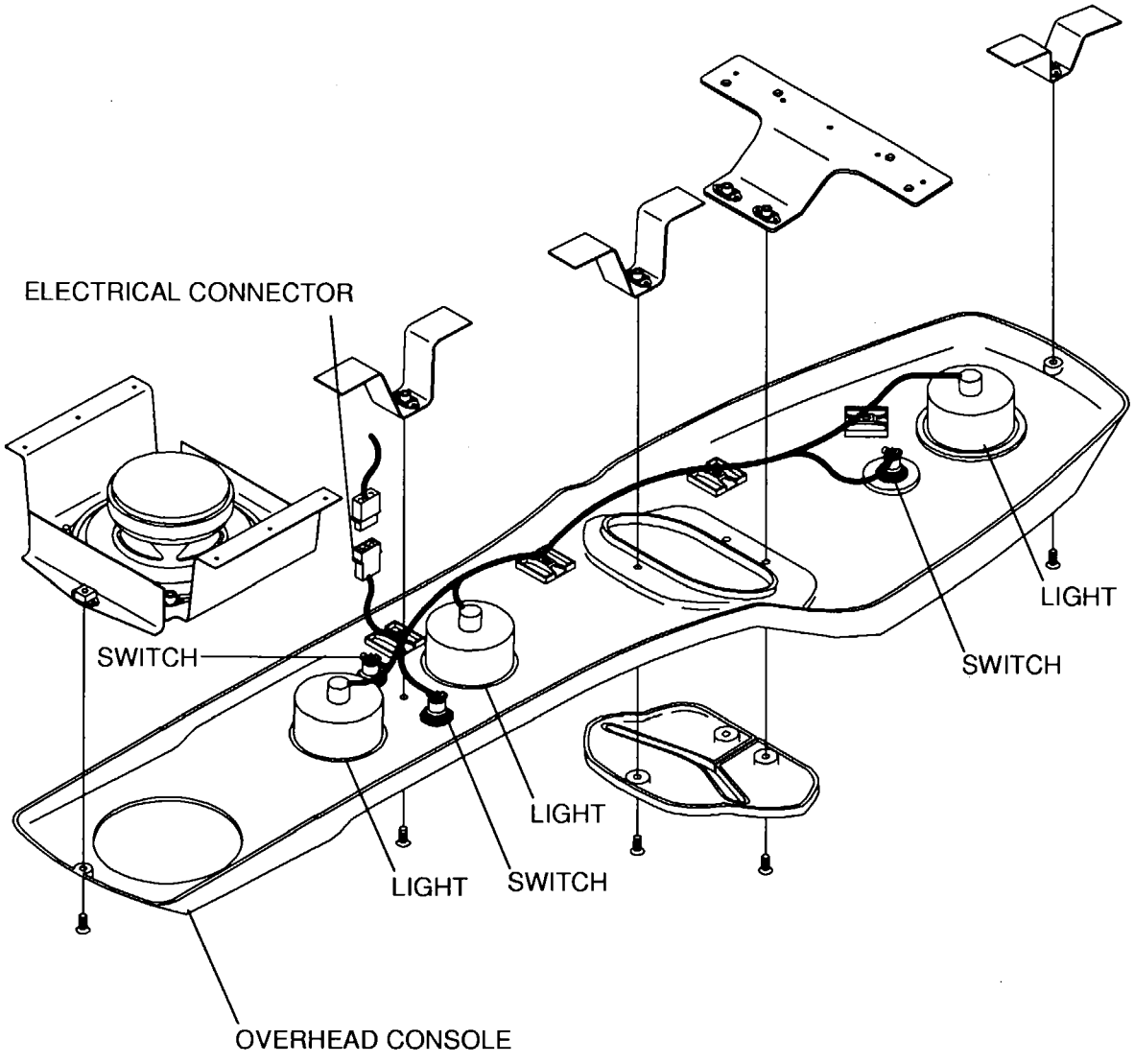
B1705



DETAIL C

C0519T1050

Cabin Interior Trim And Overhead Console Installation
Figure 201 (Sheet 2)

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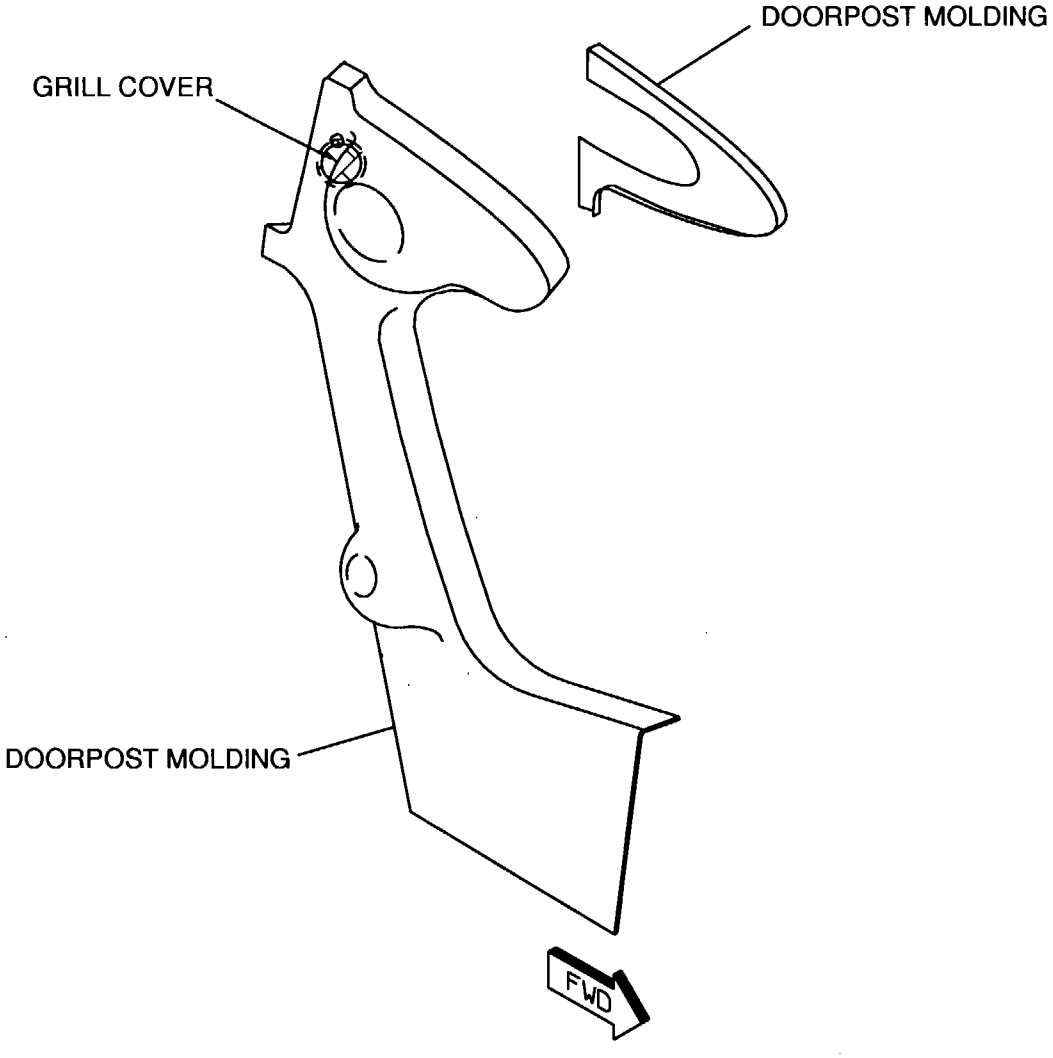
B3271



DETAIL D
LEFT SIDE SHOWN
RIGHT SIDE OPPOSITE
172080984 THRU 172081074 AND
172S087704 THRU 172S08908

D0719T1012

Cabin Interior Trim And Overhead Console Installation
Figure 201 (Sheet 3)

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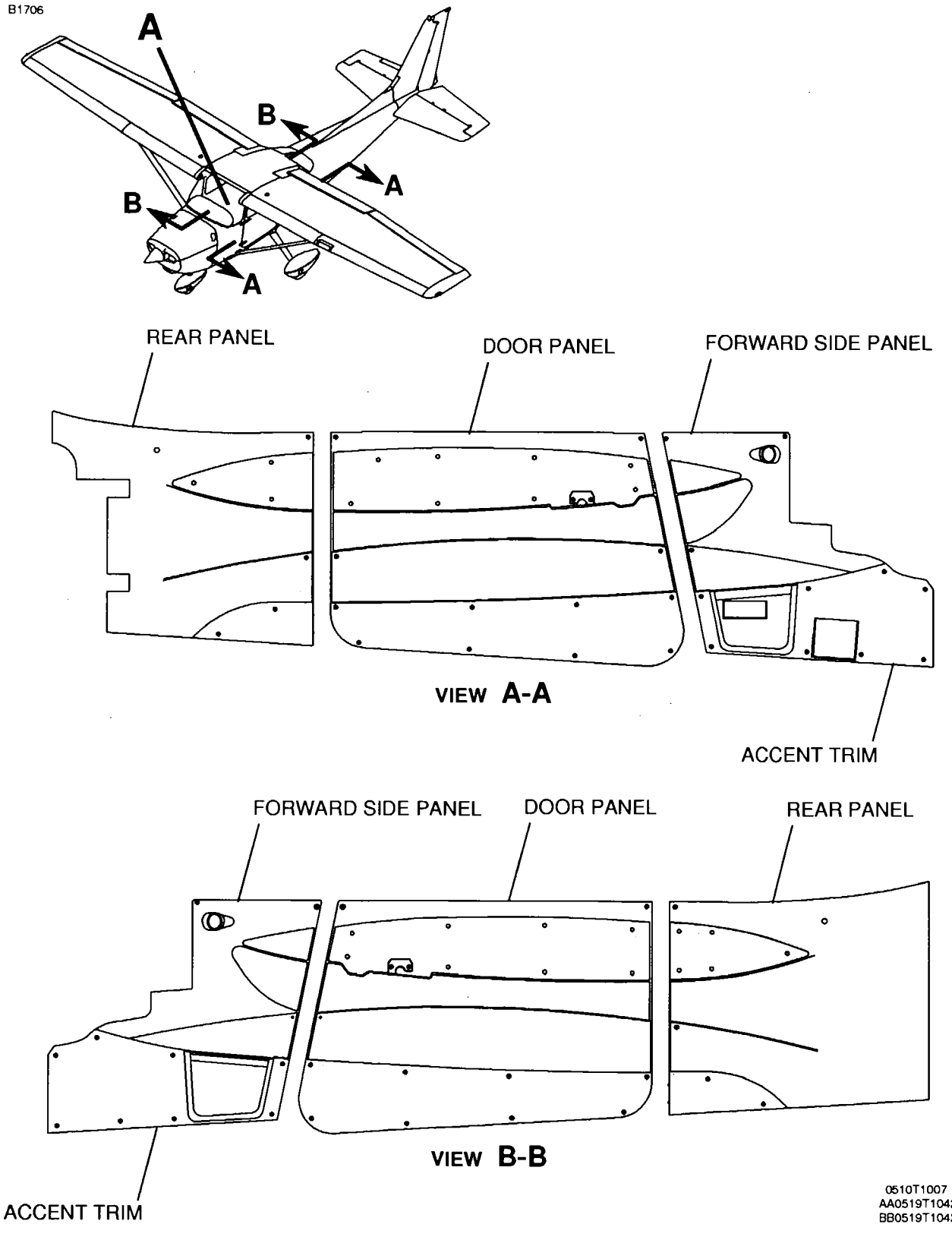

Cabin Side Panel And Floorboard Upholstery Installation
Figure 202 (Sheet 1)

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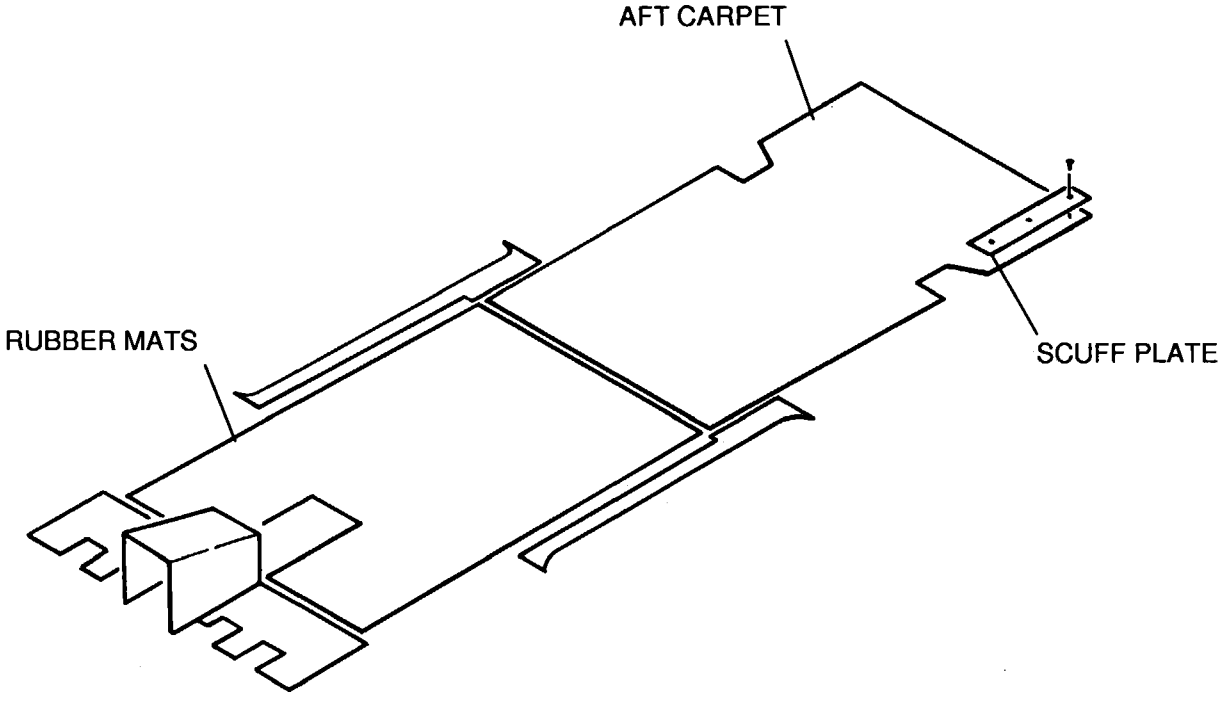
B1707



DETAIL A

A0519T1040

Cabin Side Panel And Floorboard Upholstery Installation
Figure 202 (Sheet 2)

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CARGO TIE-DOWNS - MAINTENANCE PRACTICES

1. General

A. Cargo tie-downs are provided for the airplane to accommodate a variety of loading positions. These tie-downs are secured directly to the floorboard through nutplates or indirectly to the floorboard through seat rails. Refer to Figure 201 for an illustration of these tie- downs.

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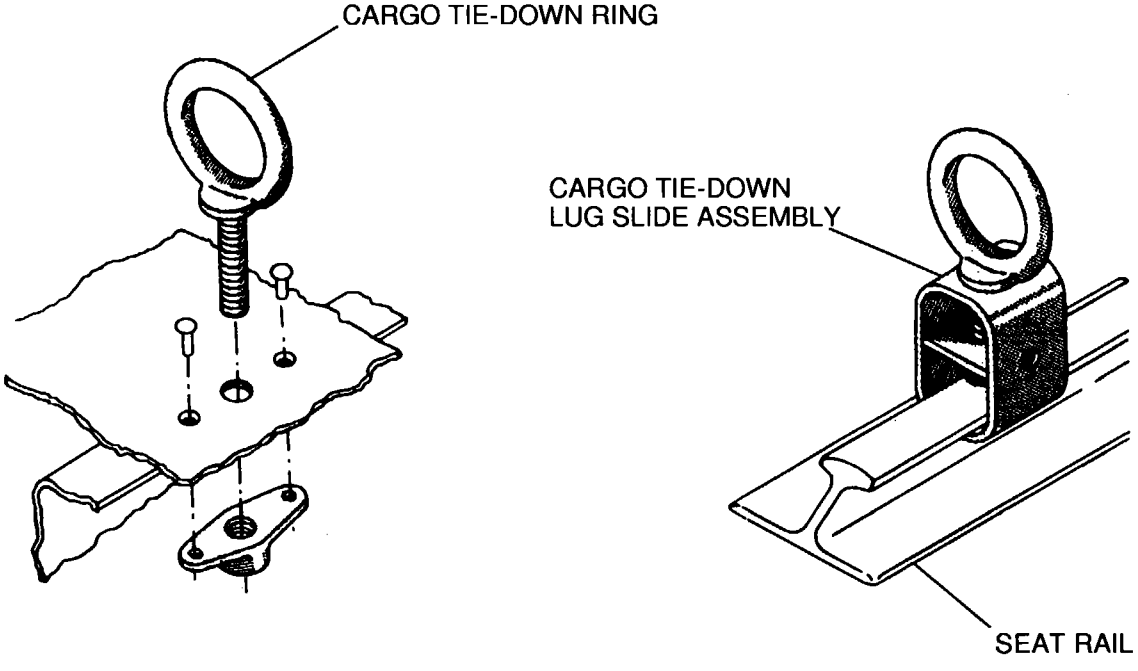
B1708



0514T1010

Cargo Tie-Downs Installation
Figure 201 (Sheet 1)

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POINTER EMERGENCY LOCATOR TRANSMITTER - MAINTENANCE PRACTICES

1. General

A. This section gives maintenance practices for the Emergency Locator Transmitter (ELT). The ELT is activated by an internal G-switch or manually by a remote switch on the instrument panel, or by the ELT master switch. The ELT transmits an emergency distress signal on 121.5/243.0 MHz.

2. Pointer ELT Removal/Installation

A. ELT Removal (Refer to Figure 201).
(1) Get access to the ELT through the baggage compartment door on the left side.
(a) On airplanes without the G1000 system, remove the bolts, tiedowns, and plastic closeout from the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
(b) On airplanes with the G1000 system, remove the molding between the upper baggage compartment panel and the rear window trim.
(2) Put the ELT master switch in the OFF/RESET (center) position.

CAUTION: Do not disconnect the ELT remote connector before you put the ELT master switch in the OFF/RESET (center) position. ELT internal fuse failure can occur if the ELT remote connector is disconnected before the ELT master switch is put in the OFF/RESET (center) position.

(3) Disconnect the ELT antenna coaxial cable from the ELT.
(4) Disconnect the ELT remote connector from the ELT.
(5) Disengage the attach strap from around the ELT and remove the ELT from the airplane.

B. ELT Installation (Refer to Figure 201).
(1) Complete an ELT G-Switch Operation Check. Refer to ELT Operational Test, ELT G-Switch Operation Check.

CAUTION: Make sure that the direction-of-flight arrow on the ELT points to the nose of the airplane.

CAUTION: Make sure that the ELT master switch is in the OFF/RESET position. ELT internal fuse failure can occur if the ELT remote connector is installed with the ELT master switch in the ON or AUTO position.

(2) Put the ELT into the ELT bracket and tighten the ELT attach strap.
(3) Connect the ELT remote connector to the ELT.
(4) Connect the ELT antenna coaxial cable to the ELT.
(5) Put the ELT master switch in the AUTO position.
(6) Complete the Control Tower Monitored or Locally Monitored ELT Operational Test. Refer to ELT Operational Test, Control Tower Monitored ELT Operational Test or Locally Monitored ELT Operational Test.
(7) Install the removed interior pieces.
(a) On airplanes without the G1000 system, install the bolts, tiedowns, and plastic closeout to the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
(b) On airplanes with the G1000 system, install the molding between the upper baggage compartment panel and the rear window trim.

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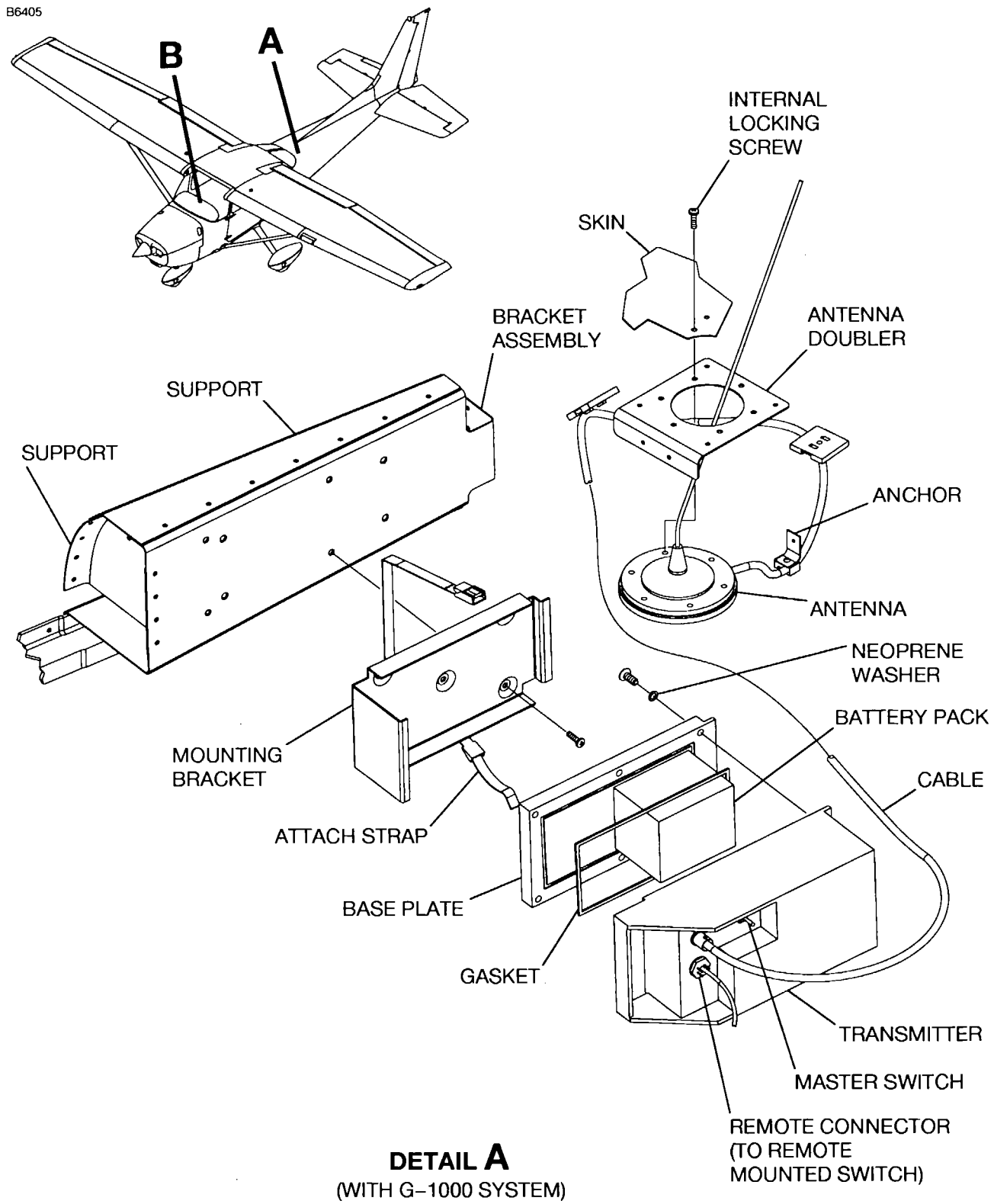

DETAIL A
(WITH G-1000 SYSTEM)

0510T1007
A0518T1153

Pointer Emergency Locator Transmitter Installation
Figure 201 (Sheet 1)

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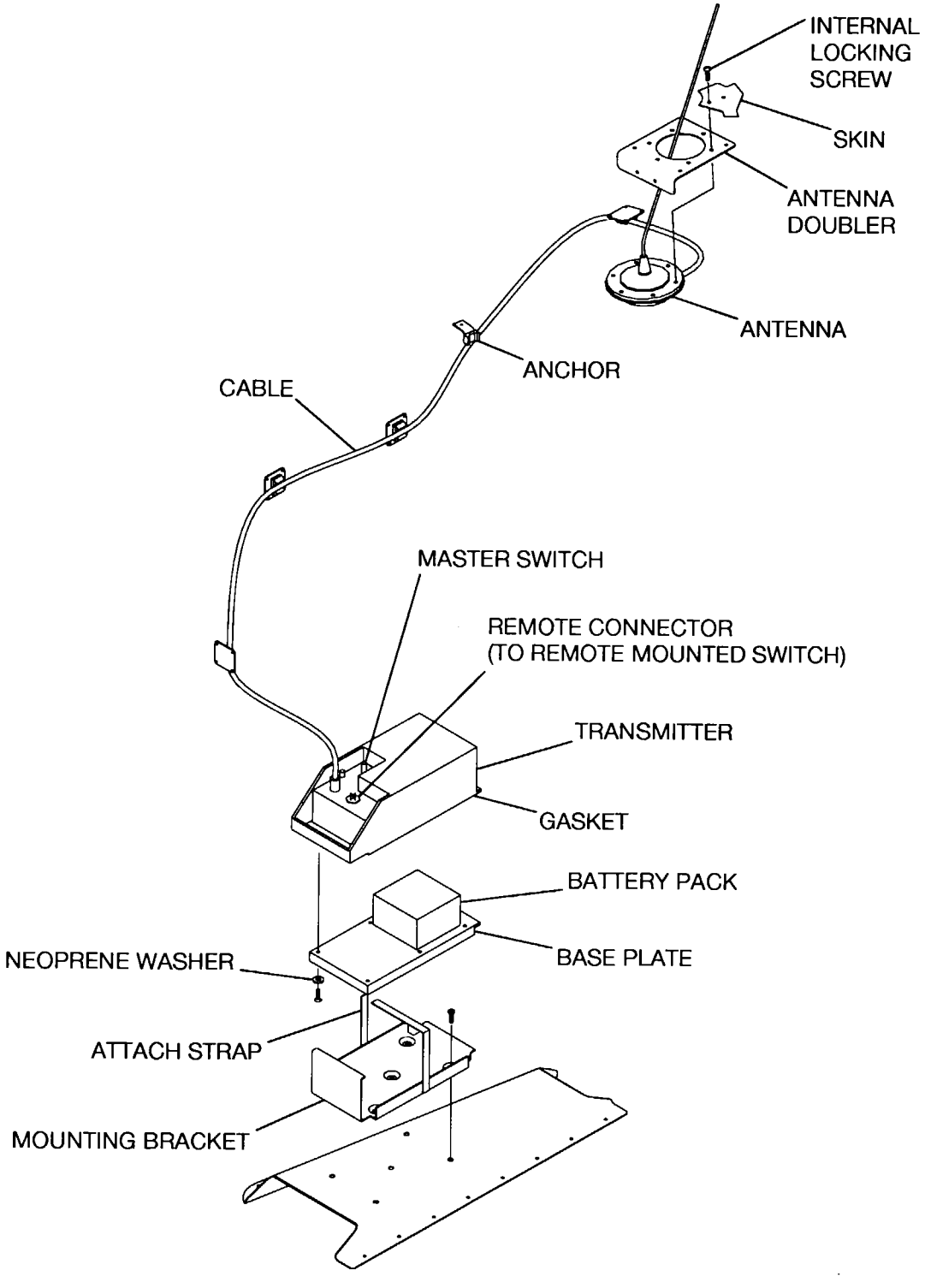
B220



DETAIL A

(WITHOUT G-1000 SYSTEM)

A0518T1014

Pointer Emergency Locator Transmitter Installation
Figure 201 (Sheet 2)

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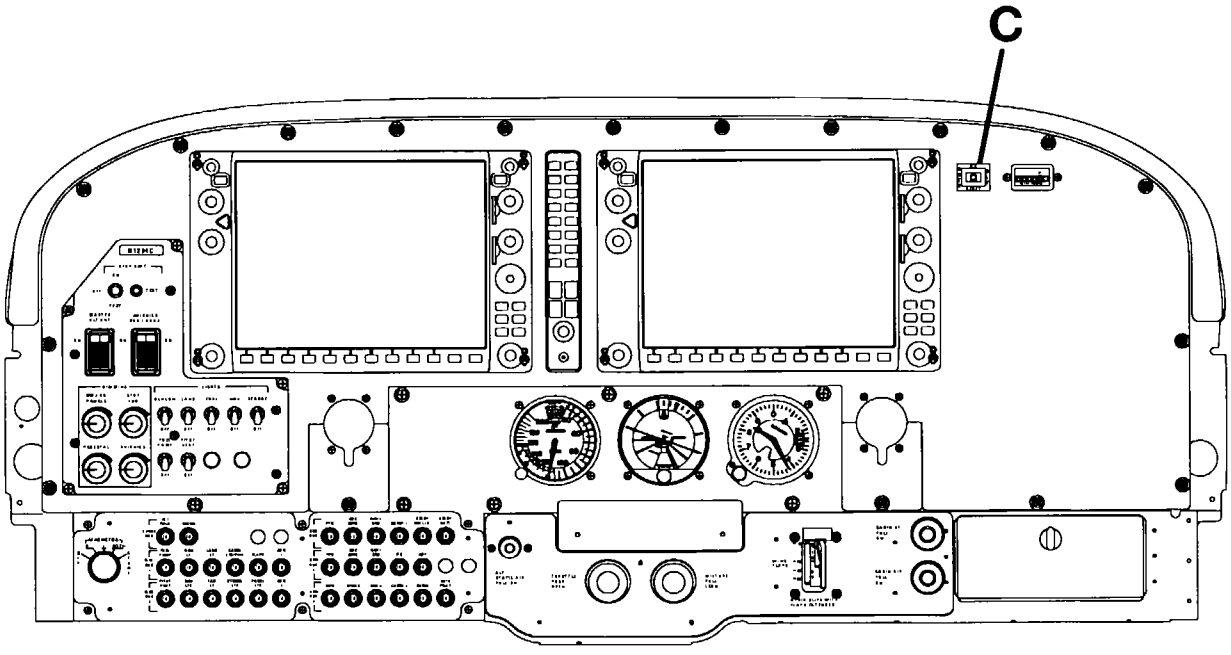
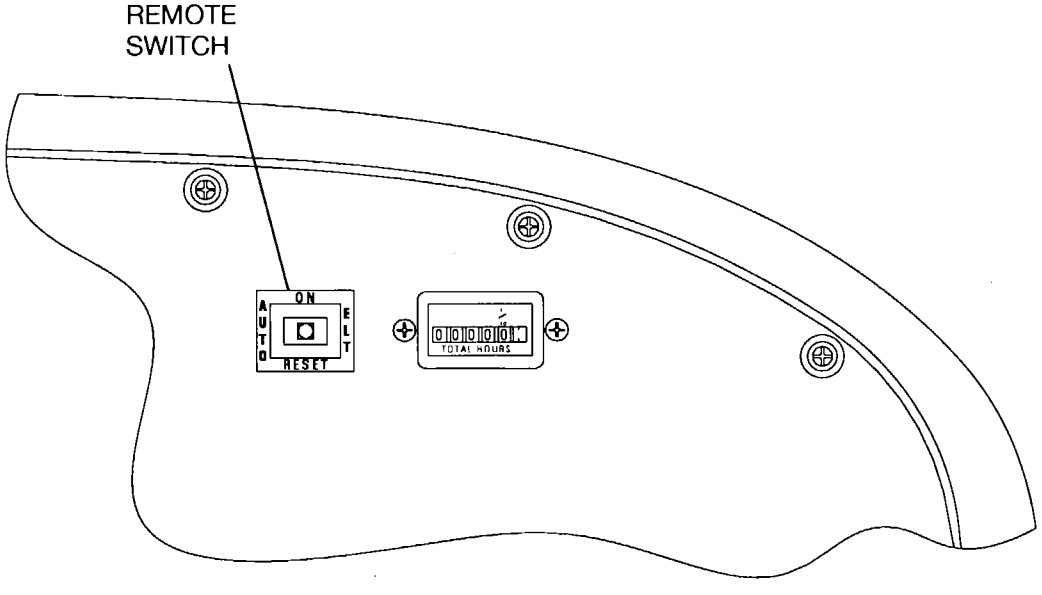
B6406



DETAIL B



DETAIL C

B0518T1109
C0518T1109

Pointer Emergency Locator Transmitter Installation
Figure 201 (Sheet 3)

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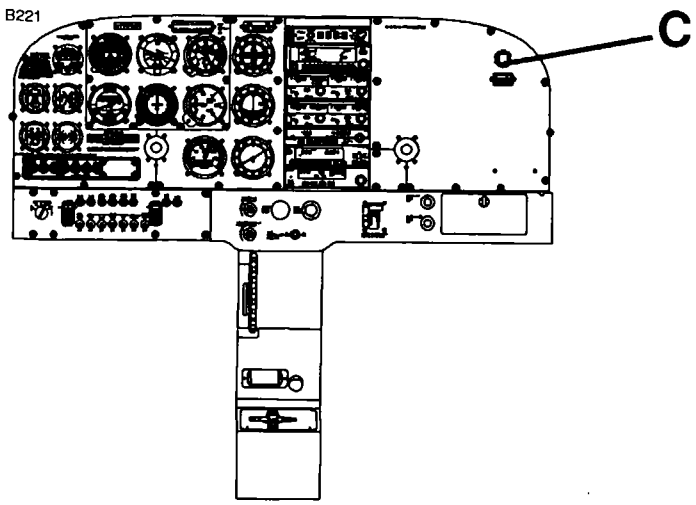
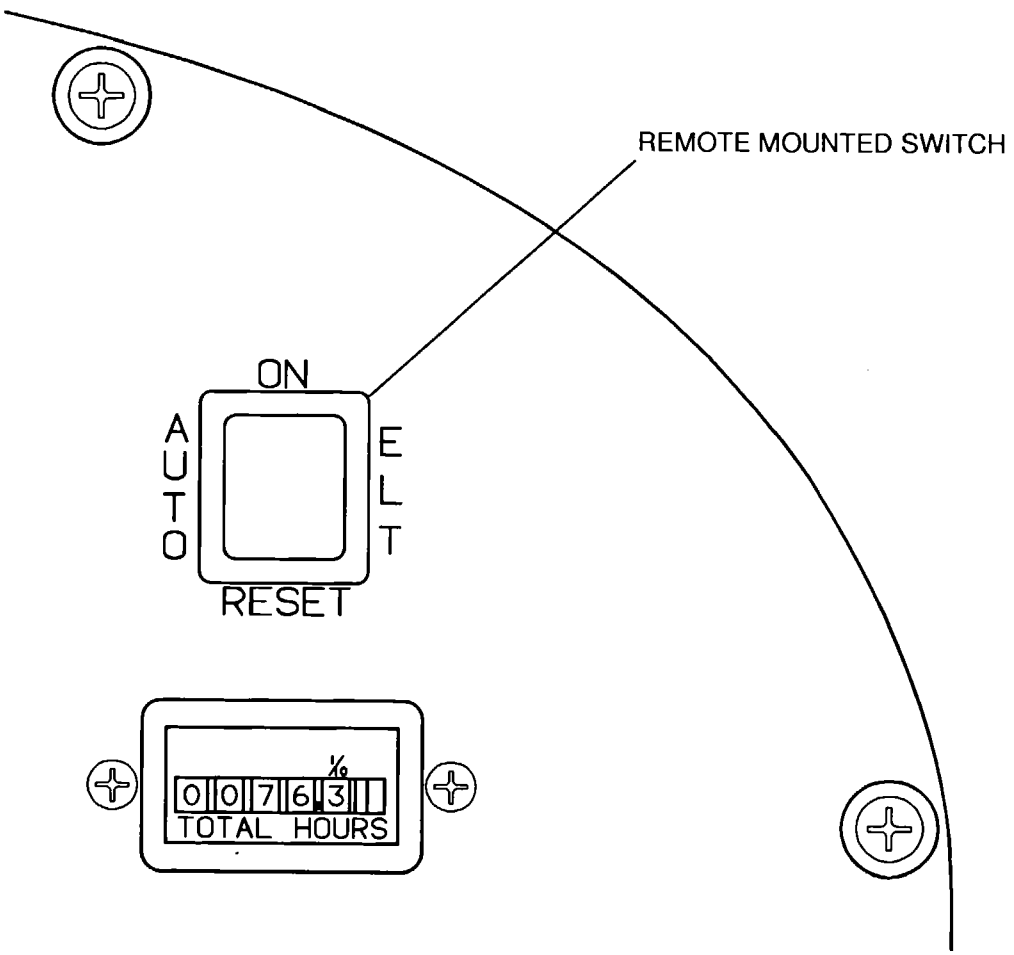


DETAIL B



DETAIL C

B0585T1040
C0585T1040

Pointer Emergency Locator Transmitter Installation
Figure 201 (Sheet 4)

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3. ELT Remote Switch Removal/Installation

CAUTION: Do not disconnect the ELT remote connector before you put the ELT master switch in the OFF/RESET (center) position. ELT internal fuse failure can occur if the ELT remote connector is disconnected before the ELT master switch is put in the OFF/RESET (center) position.

CAUTION: Disconnect the ELT remote connector from the ELT before you remove the ELT remote switch or disconnect the ELT remote switch connector. ELT internal fuse failure can occur if the ELT remote switch or disconnect is removed before the ELT remote connector is disconnected.

A. ELT Remote Switch Removal (Refer to Figure 201).
   (1) Put the aircraft master switch (ALT/BAT) to the OFF position.
   (2) Get access to the ELT through the baggage compartment door on the left side.
      (a) On airplanes without the G1000 system, remove the bolts, tiedowns, and plastic closeout from the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
      (b) On airplanes with the G1000 system, remove the molding between the upper baggage compartment panel and the rear window trim.
   (3) Put the ELT master switch in OFF/RESET (center) position.
   (4) Disconnect the ELT remote connector from the ELT.
   (5) Get access to the back of the ELT remote switch (Zone 221).
   (6) Disconnect the ELT remote switch connector.
   (7) Compress and hold the locking tabs on the ELT remote switch. Pull the ELT remote switch aft and away from the instrument panel.

B. ELT Remote Switch Installation (Refer to Figure 201).
   (1) Hold the edges of the ELT remote switch and put it into the instrument panel cutout.
   (2) Make sure the locking tabs engage and that the switch is correctly installed.
   (3) Connect the ELT remote switch connector.
   (4) Put the ELT remote switch to the AUTO position.

CAUTION: Make sure that the ELT master switch is in the OFF/RESET position. ELT internal fuse failure can occur if the ELT remote connector is installed with the ELT master switch in the ON or AUTO position.

   (5) Connect the ELT remote connector to the ELT.
   (6) Put the ELT master switch in the AUTO position.
   (7) Complete the Control Tower Monitored or Locally Monitored ELT Operational Test. Refer to ELT Operational Test, Control Tower Monitored ELT Operational Test or Locally Monitored ELT Operational Test.
   (8) Install the removed interior pieces.
      (a) On airplanes without the G1000 system, install the bolts, tiedowns, and plastic closeout to the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
      (b) On airplanes with the G1000 system, install the molding between the upper baggage compartment panel and the rear window trim.

4. ELT Antenna Removal/Installation (Integral Base with Coaxial Cable)

A. ELT Antenna Removal (Refer to Figure 201).
   (1) Get access to the ELT and ELT antenna through the baggage compartment door on the left side.
      (a) On airplanes without the G1000 system, remove the bolts, tiedowns, and plastic closeout from the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

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(b) On airplanes with the G1000 system, remove the molding between the upper baggage compartment panel and the rear window trim.

(2) Disconnect the ELT antenna coaxial cable from the ELT.

(3) Remove all of the tie straps that attach the ELT antenna coaxial cable to the fuselage.

(4) On the external skin of the airplane, remove the six internal locking screws that attach the ELT antenna to the fuselage.

NOTE: The ELT antenna has an integral base and coaxial cable.

(5) Remove the ELT antenna from inside of the airplane.

B. ELT Antenna Installation (Refer to Figure 201).

(1) From inside the airplane, put the ELT antenna in position on the fuselage with the ELT antenna pointing aft.

(2) On the external skin of the airplane, use the internal locking screws to attach the ELT antenna base to the fuselage.

(3) Connect the ELT antenna coaxial cable to the ELT.

(4) Use tie straps to attach the ELT antenna coaxial cable to the fuselage.

(5) Complete the Control Tower Monitored or Locally Monitored ELT Operational Test. Refer to ELT Operational Test - Control Tower Monitored ELT Operational Test or Locally Monitored ELT Operational Test.

(6) Install the removed interior pieces.

(a) On airplanes without the G1000 system, install the bolts, tiedowns, and plastic closeout to the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

(b) On airplanes with the G1000 system, install the molding between the upper baggage compartment panel and the rear window trim.

5. ELT Whip Antenna Removal/Installation.

A. ELT Whip Antenna Removal (Refer to Figure 201).

(1) Get access to the ELT and ELT antenna through the baggage compartment door on the left side.

(a) On airplanes without the G1000 system, remove the bolts, tiedowns, and plastic closeout from the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

(b) On airplanes with the G1000 system, remove the molding between the upper baggage compartment panel and the rear window trim.

(2) Disconnect the ELT whip antenna coaxial cable from the ELT whip antenna.

(3) From inside the airplane, remove the nut and washer that attach the ELT whip antenna to the fuselage.

(4) Remove the ELT whip antenna from the external skin of the airplane.

B. ELT Whip Antenna Installation (Refer to Figure 201).

(1) Put the ELT whip antenna in position on the external skin of the fuselage with the ELT whip antenna pointing aft.

(2) From inside the airplane, use the nut and washer to connect the ELT whip antenna to the fuselage.

(3) Connect the ELT antenna coaxial cable to the ELT whip antenna.

(4) Complete the Control Tower Monitored or Locally Monitored ELT Operational Test. Refer to ELT Operational Test, Control Tower Monitored ELT Operational Test or Locally Monitored ELT Operational Test.

(5) Install the removed interior pieces.

(a) On airplanes without the G1000 system, install the bolts, tiedowns, and plastic closeout to the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

(b) On airplanes with the G1000 system, install the molding between the upper baggage compartment panel and the rear window trim.

6. ELT Battery Pack Removal/Installation.

A. ELT Battery Pack Removal (Refer to Figure 201).

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WARNING: Obey the correct procedures to discard the unserviceable ELT battery pack to prevent damage to the environment or personal injury.

(1) Remove the ELT from the airplane. Refer to ELT Removal/Installation.
(2) Remove the screws that attach the ELT base plate to the ELT.
(3) Disconnect the battery pack connector for the ELT.
(4) Remove the ELT battery pack from the ELT.

B. ELT Battery Pack Installation (Refer to Figure 201).

CAUTION: Use only the recommended battery pack for the ELT, or the operating life and/or signal strength of the ELT will decrease. The incorrect battery pack can also change the mechanical configuration, which will cause too much vibration and corrosion.

(1) Put the ELT battery pack in the ELT.
(2) Connect the ELT battery pack connector.

CAUTION: Do not tighten the ELT gasket and screws too much.

(3) Use screws to attach the ELT base plate and gasket to the ELT.

NOTE: When the new battery pack expiration date is put in the airplane records, it is also recommended that you record the expiration date in the ELT owner's manual for quick reference.

(4) Put the new replacement date on the outside of ELT transmitter with a stamp. Put the date on the ELT switch nameplate, on the side of the ELT transmitter, and in instruction nameplate on top of the ELT transmitter.
(5) Install the ELT in the airplane. Refer to ELT Removal/Installation.

7. Pointer ELT Operational Test

A. Control Tower Monitored ELT Operational Test.

CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. Refer to the FAA Advisory Circular AC-91-44A.

(1) Request permission from the control tower and/or flight service station to do a test of the ELT system.

CAUTION: Do not operate the ELT system for more than three pulses of the audio signal. Longer operation can decrease the ELT battery power supply.

NOTE: The airplane's VHF receiver or ADF will not correctly do a check of the power of the ELT audio signal.

(2) Put the ELT remote switch to the ON position.
(3) Contact the control tower and/or flight service station to make sure the ELT system operates correctly.
(4) Momentarily put the ELT remote switch to RESET position.
(5) Put the ELT remote switch in the AUTO position.
(6) Contact the control tower and/or flight service station to make sure the ELT stopped transmission.

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B. Locally Monitored ELT Operational Test.

CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. Refer to the FAA Advisory Circular AC-91-44A.

(1) (1) Put a small, hand held AM radio tuned to any frequency, within six inches of the ELT antenna.

CAUTION: Do not operate the ELT system for more than three pulses of the audio signal. Longer operation can decrease the ELT battery power supply.

NOTE: The airplane's VHF receiver or ADF will not correctly do a check of the power of the ELT audio signal.

(2) Put the ELT remote switch to the ON position.
(3) Make sure that the ELT signal is heard on the AM radio.
(4) Momentarily put the ELT remote switch to RESET position.
(5) Put the ELT remote switch in the AUTO position.

C. ELT Master Switch Operational Test.

CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the ELT system for more than three pulses of the audio signal. Longer operation can decrease the ELT battery power supply.

(1) Put the ELT master switch to the ON position.
(2) Make sure the signal is heard by either the Control Tower, Flight Service Station or AM radio.
(3) Put the ELT master switch in the OFF/RESET position.
(4) Put the ELT master switch in the AUTO position.

D. ELT G-Switch Operational Check.
(1) Remove the ELT from the airplane. Refer to ELT Removal/Installation.
(2) Put the ELT master switch in the AUTO position.
(3) Hold the ELT tightly in one hand, and move the ELT fast in one direction, followed by a sudden reversal of direction.
(4) Make sure that the ELT G-switch has been actuated.
(5) Put the ELT master switch in the OFF/RESET position to reset the ELT G-switch.
(6) Install the ELT in the airplane. Refer to ELT Removal/Installation.

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ARTEX C406-N EMERGENCY LOCATOR TRANSMITTER - MAINTENANCE PRACTICES

1. General

A. This section gives maintenance practices for the emergency locator transmitter (ELT) system. Components in the ELT system include the ELT, antenna, remote switch, and buzzer.

2. Artex C406-N ELT Removal/Installation.

A. ELT Removal (Refer to Figure 201).
(1) Get access to the ELT through the baggage compartment door on the left side.
(a) Remove the molding between the upper baggage compartment panel and the rear window trim.
(2) Put the ELT master switch in the OFF position.
(3) Disconnect the electrical connector (PT905) and the coaxial connector (PT1029) from the ELT.
(4) Loosen the knurl nuts on the end cap of the transmitter and the mounting tray.
(5) Pull the front cover away from the transmitter and the mounting tray.
(6) Carefully pull the mounting tray end and the tray away from the ELT.
(7) Remove the ELT from the mounting tray.
(8) Remove the screws that attach the mounting tray to the shelf assembly.

B. ELT Installation (Refer to Figure 201).
(1) Attach the mounting tray to the shelf assembly with the screws.

CAUTION: Make sure that the direction-of-flight arrow on the ELT points to the nose of the airplane.

(2) Put the ELT transmitter in position in the tray at an angle. Move the locking ears at the end opposite to the direction-of-flight arrow into the mounting tray locking slots.
(3) Make sure that the ELT switch on the ELT is in the OFF position.
(4) Put the mounting tray end in position on the ELT.
(5) Make sure that the slots at the end of the cover go into the locking ears on the ELT.
(6) Put the top cover on the top of the transmitter.
(7) Make sure that the top cover locks into the aft end of the transmitter.
(8) Put the end cap on the transmitter and the mounting tray.
(9) Tighten the knurl nuts.
(10) Connect the electrical connectors (PT905) and (PT1029) to the ELT transmitter.
(11) Connect the electrical power to the airplane.
(12) Do a functional test of the ELT. Refer to Artex C406-N ELT Functional Test.
(13) Install the molding between the upper baggage compartment panel and the rear window trim.

3. ELT Remote Switch Removal/Installation

A. ELT Remote Switch Removal (Refer to Figure 201).
(1) Put the aircraft master switch (ALT/BAT) to the OFF position.
(2) Get access to the ELT through the baggage compartment door on the left side.
(a) Remove the molding between the upper baggage compartment panel and the rear window trim.
(3) Put the ELT master switch in the OFF position.
(4) Disconnect the electrical connector (PT905) from the ELT.
(5) Get access to the back of the ELT remote switch (Zone 221).
(6) Disconnect the ELT remote switch connector.
(7) Remove the screws that attach the ELT remote switch to the instrument panel.
(8) Remove the ELT remote switch from the airplane.

B. ELT Remote Switch Installation (Refer to Figure 201).
(1) Put the ELT remote switch in position in the instrument panel.
(2) Attach the ELT remote switch to the instrument panel with the screws.
(3) Connect the ELT remote switch connector.
(4) Put the ELT remote switch to the AUTO position.

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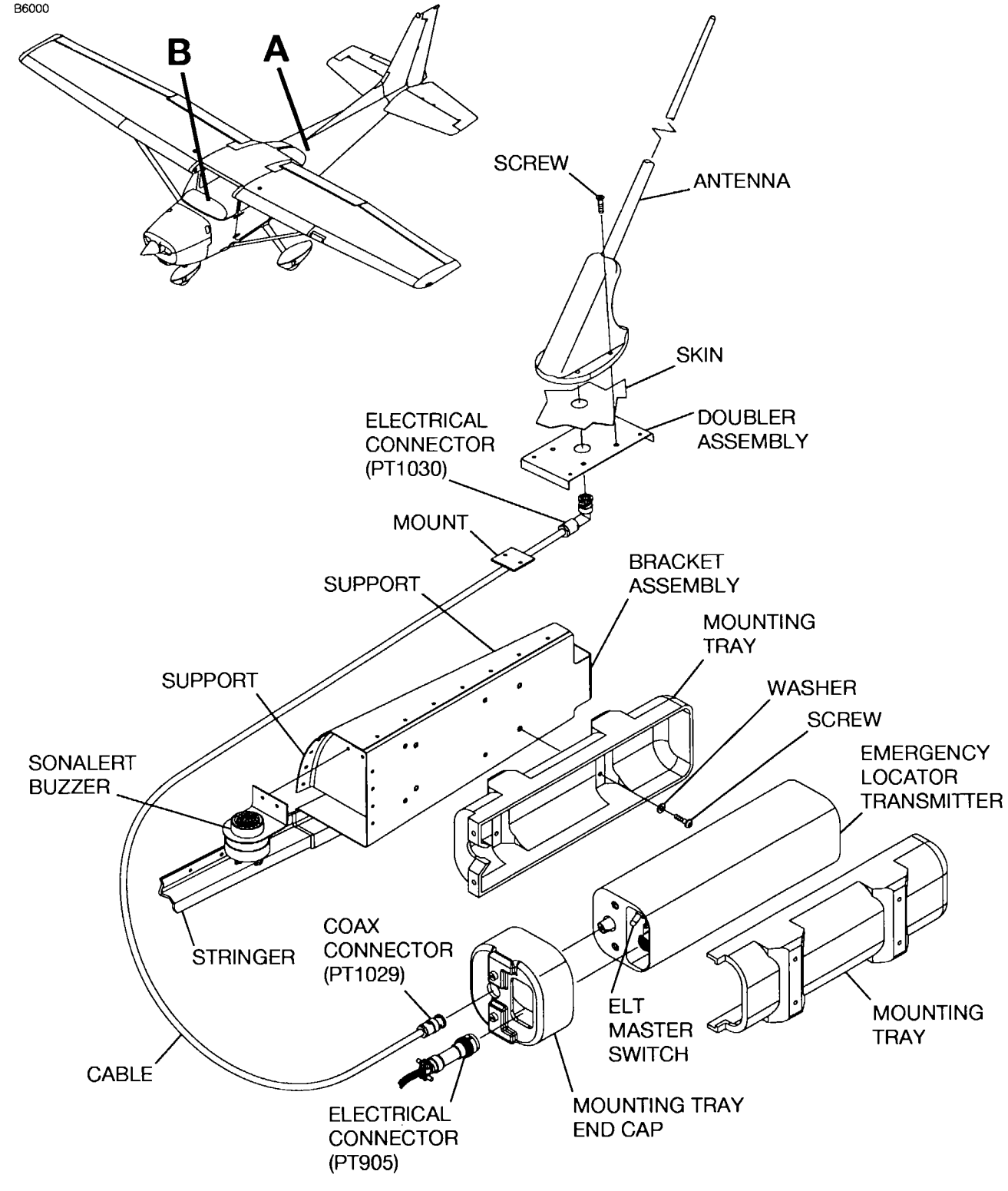

DETAIL A

0510T1007
A0518T1154

Artex C406-N ELT Installation
Figure 201 (Sheet 1)

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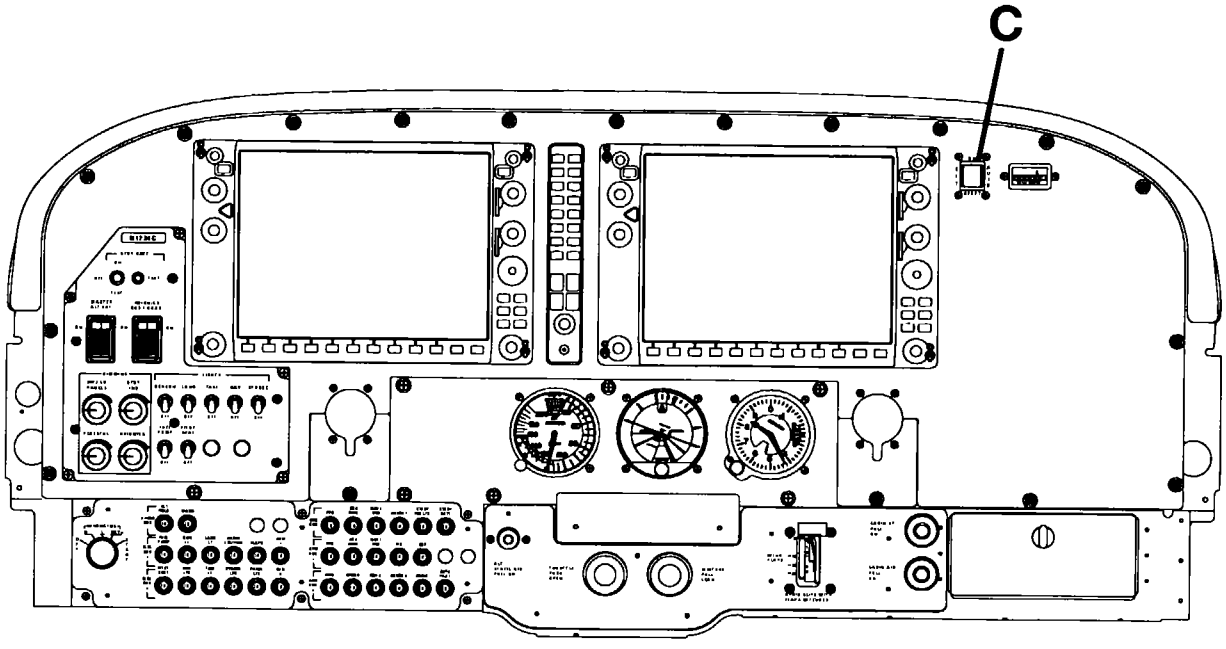
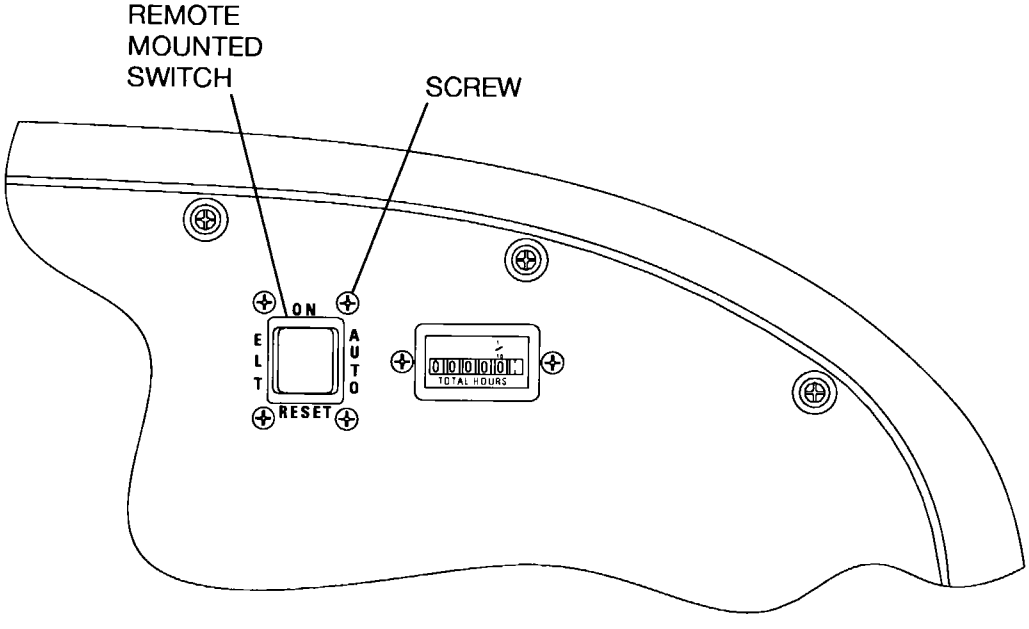
B6001



DETAIL B



DETAIL C

B0518T1109
C0518T1109

Artex C406-N ELT Installation
Figure 201 (Sheet 2)

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(5) Connect the electrical connector (PT905) to the ELT.
(6) Make sure that the ELT master switch is set to the OFF position.
(7) Do a functional test of the ELT system. Refer to Refer to Artex C406-N ELT Functional Test.
(8) Install the molding between the upper baggage compartment panel and the rear window trim.

4. ELT Rod Antenna Removal/Installation

A. ELT Antenna Removal (Refer to Figure 201).
(1) Get access to the ELT and the ELT antenna through the baggage compartment door on the left side.
(a) Remove the molding between the upper baggage compartment panel and the rear window trim.
(2) Disconnect the coaxial cable connector (PT1030) for the ELT antenna from the ELT.
(3) Remove the tie strap that attaches the ELT antenna coaxial cable to the fuselage.
(4) Remove the four screws that attach the ELT antenna to the fuselage.
(5) Remove the ELT antenna from the airplane.

B. ELT Antenna Installation (Refer to Figure 201).
(1) Remove all of the old sealant from the ELT rod antenna and from the airplane skin. Refer to Chapter 20, General Solvents/Cleaners - Maintenance Practices.
(2) Put the ELT antenna in position on the fuselage with the ELT antenna pointing aft.
(3) Install the four screws that attach the ELT antenna to the fuselage.
(4) Connect the ELT antenna coaxial cable to the ELT.
(5) With the tie strap, attach the ELT antenna coaxial cable to the mount on the fuselage.
(6) Make sure that there is a correct electrical bond between the antenna and the airplane structure.
(a) Remove one screw.
(b) With an ohmmeter, measure the electrical resistance from the antenna base metal insert and back to the structure at the screw positon.

NOTE: The maximum allowable resistance (in ohms) at each of the four measured positions is 0.0025.

(c) Install the screw and remove and install each of the remaining screws in turn as you measure the electrical resistance at each screw hole.
(7) Apply a fillet seal around the antenna with Type I Class B Sealant. Do not cover the screw head with the sealant. Refer to Chapter 20, Fuel, Weather and High-Temperature Sealing - Maintenance Practices.
(8) Do a functional test of the ELT system. Refer to Refer to Artex C406-N ELT Functional Test.
(9) Install the molding between the upper baggage compartment panel and the rear window trim.

5. Buzzer Removal/Installation

A. Buzzer Removal (Refer to Figure 201).
(1) Get access to the buzzer through the baggage compartment door on the left side.
(a) Remove the molding between the upper baggage compartment panel and the rear window trim.
(2) Make sure that the ELT master switch on the ELT transmitter is in the OFF position.
(3) Tag the wires and terminals for identification.
(4) Remove the screws that attach the electrical terminals to the buzzer.
(5) Loosen the black retainer ring on the outboard side of the buzzer.
(6) Remove the buzzer from the bracket.

B. Buzzer Installation (Refer to Figure 201).
(1) Put the buzzer in the bracket.
(2) Install the black retainer ring on the outboard face of the buzzer.
(3) Connect the electrical wires to the buzzer with the screws.
(4) Do a check of the ELT system. Refer to Refer to Artex C406-N ELT Functional Test.
(5) Install the molding between the upper baggage compartment panel and the rear window trim.

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ARTEX C406-N EMERGENCY LOCATOR TRANSMITTER - INSPECTION/CHECK

1. General

A. This section gives the procedures that are necessary to do the inspection and operational checks are necessary to comply with 14 CFR 91.207, for the Artex C406-N Emergency Locator Transmitter (ELT) System.

2. Artex C406-N ELT Functional Test

CAUTION: Operate the Emergency Locator Transmitter system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the emergency locator transmitter for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz signal after the ELT is active for approximately 50 seconds. This signal is identified as a distress signal

A. Prepare for the Artex C406-N ELT Functional Test.
   (1) You must replace the ELT battery with a new ELT battery if one or more of the conditions that follow occur:
      - Use of the ELT battery in an emergency
      - Operation for an unknown amount of time
      - Use for more than one hour of cumulative time
      - On or before the replacement date shown on the battery label.
   (2) Examine the ELT battery to make sure that it is not due for replacement.
   (3) If the battery must be replaced, follow the manufacturer's instructions to replace it.
   (4) Supply +28 V, +0.25 or −0.25 V, external electrical power to the airplane.
   (5) Initialize the global positioning system (GPS) on the multi function display (MFD).

B. Do the ELT Transmitter Test.
   (1) Adjust the volume to make sure that the transmissions from the radio are heard in the cockpit.
   (2) Adjust the COM 1 frequency to 121.50 MHz. Make sure that the audio is heard through the cockpit speakers.
   (3) Put the cockpit ELT switch in the ON position for approximately one second.
   (4) Make sure that the ELT audio signal and the cockpit ELT switch light adjacent to the ELT remote switch come on.
   (5) Immediately put the cockpit ELT switch in the ARM position.
   (6) Make sure that the LED stays on for approximately one second before it goes off.
   (7) If the ELT system has sensed a fault in the system, the LED will flash a fault code at this time. Refer to the Installation and Operation Manual for the Artex ELT system for information on the possible codes.

C. Do the NAV Interface Test.
   (1) Hold the SARSAT tester no more than fifteen feet from the antenna.

   NOTE: The SARSAT tester is used as an example to gather test information. However, other equivalent test equipment such as the Aeroflex IFR 4000 Communications Test Set is acceptable.

   (2) Turn on the SARSAT tester.
   (3) Engage the receive function of the SARSAT tester.
   (4) Make sure that the display on the tester shows that it is searching for a signal.
   (5) Put the ELT remote switch in the ON position.
   (6) Within 15 seconds, put the ELT remote switch in the ARM position.

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(7) Monitor the SARSAT tester to see if it received a signal from the ELT system.
  (a) If no signal was received, do the test again after the 15-second off cycle.
(8) Make sure that the tail number on the SARSAT tester is correct.
(9) Make sure that the Mode S code shown on the SARSAT tester is the same as the number that is on the back of the transmitter.
(10) Make sure that the latitude and longitude information is the same as that shown on the MFD display.
(11) Turn the SARSAT tester off.
(12) Disconnect external electrical power from the aircraft.

D. Do the G-Switch Operational Test.

CAUTION: Operate the emergency locator transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30-dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the emergency locator transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz signal after the ELT is active for approximately 50 seconds. This signal is identified as a distress signal.

(1) Remove the ELT from the airplane. Refer to Artex C406-N ELT Removal/Installation.
(2) Install a jumper wire between pins 12 and 13 on the electrical connector of the ELT.

NOTE: The ELT will not activate with the G-switch unless electrical pins 12 and 13 have a jumper wire installed between them (this happens automatically when the ELT is locked into the mount tray with the electrical connector in position). Because of the potential physical damage that can occur if the jumper wire is not installed correctly, it is recommended that an experienced technician do this procedure.

(3) Put the ELT switch in the OFF position.
(4) Use a receiver, and set it to 121.5 MHz to listen for the aural warning sweep tone.
(5) Hold the ELT transmitter tightly in one hand and make a throwing movement followed by an opposite movement of the ELT transmitter.
(6) Make sure that the G-switch operates and that the aural warning sweep tone is heard on the receiver set to 121.5 MHz.
(7) Set the ELT switch to the ON position and then back to the OFF position to reset the G-switch.
(8) Remove the jumper wire from electrical pins 12 and 13 on the electrical connector of the ELT.
(9) Install the emergency locator transmitter in the airplane. Refer to Artex C406-N ELT Removal/ Installation.

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ARTEX ME406 EMERGENCY LOCATOR TRANSMITTER SYSTEM - DESCRIPTION AND OPERATION

1. General

A. An Artex ME406 Emergency Locator Transmitter (ELT) System is installed to help rescue teams find the airplane in the event of a crash. It is made to operate in a wide range of environmental conditions and is resistant to the forces caused by many types of accidents.

2. Description

A. Artex ME406 ELT.
   (1) The Artex ME406 Emergency Locator Transmitter (ELT) system includes an ELT unit, an integral battery pack, warning buzzer, internal G-switch, antenna, remote switch, cable assembly, and antenna coaxial cable. The ELT unit transmits on 121.5 MHz and 406.028 MHz.
   (2) The battery pack has two D-size lithium cells mounted under a battery cover. The battery pack is replaced as necessary in the field.
   (3) The ELT activates a buzzer that is installed near the ELT assembly. The buzzer makes a loud noise to let people know that the ELT is on.
   (4) The G-switch is internally installed in the ELT transmitter and is activated with a sudden reduction in forward speed.

B. Artex ELT Antenna.
   (1) The ELT system uses an antenna to transmit the emergency locator signal. The ELT antenna is installed on top of the tailcone skin, forward of the vertical stabilizer. The ELT antenna is connected with a coaxial cable to the ELT unit inside the dorsal.

C. ELT Remote Switch.
   (1) The ELT remote switch is installed on the right panel. The ELT remote switch is a two-position rocker switch that can be set in the ARM or the ON positions.

3. Operation

CAUTION: Operate the emergency locator transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the emergency locator transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz signal after the ELT is active for approximately 50 seconds. This signal is identified as a distress signal.

A. Artex ME406 ELT.
   (1) During an accident, the ELT will activate automatically and transmit a standard swept tone on 121.5 MHz (emergency frequency). The 121.5 MHz signal will continue until the ELT battery has expired. Every 50 seconds for 440 milliseconds, the 406.028 MHz transmitter will activate and send a message to the satellite. The 406.028 MHz transmission will continue for 24 hours and then stop. During operation, the ELT will receive electrical power from the ELT battery pack only.

B. ELT Remote Switch.
   (1) The ELT can also be activated manually in the cockpit with the ELT remote switch. To manually activate the ELT, put the ELT remote switch in the ON position. The red LED will come on when the remote switch is set in the ON position. The ELT remote switch can also be used to do a test of the ELT system (refer to Artex ME406 Emergency Locator Transmitter - Troubleshooting). During typical operation, the ELT remote switch will be in the ARM position.

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ARTEX ME406 EMERGENCY LOCATOR TRANSMITTER SYSTEM - TROUBLESHOOTING

1. General

A. This section contains the information that is needed to complete the self test for the ARTEX ME406 Emergency Locator Transmitter (ELT) system. The system transmits on two frequencies at the same time.

2. Tools and Equipment

A. For information on tools and equipment, refer to Equipment and Furnishings - General.

3. ME406 Emergency Locator Transmitter Self Test Preparation

CAUTION: Operate the emergency locator transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the emergency locator transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz signal after the ELT is active for approximately 50 seconds. This signal is identified as a distress signal.

A. Prepare the Airplane for the ME406 Emergency Locator Transmitter Troubleshooting.
   (1) Put the BATTERY switch in the ON position.
   (2) Examine the ELT battery to make sure that it is serviceable.
      (a) If the battery must be replaced, follow the manufacturers instructions to replace it.

B. ELT 121.5 MHz Test.
   (1) Tune the receiver (usually the aircraft radio) to 121.5 MHz.
   (2) Set the ELT instrument panel remote switch to the ON position and wait for 3 sweeps on the receiver which takes about 1 second.
   (3) Set the remote switch back to the ARM (OFF) position immediately and the switch LED and buzzer will give 1 pulse. If more pulses are displayed, find the problem from the list below.
      (a) One flash - Shows that the system is operational and that no error conditions were found.
      (b) Three flashes - Shows an open or short condition on the antenna output or cable. Use the list below to isolate and repair the problem:
         1 Examine that the coaxial cable is connected and in good condition. Do a continuity check of the center conductor and shield. Examine for a shorted cable.
         2 Examine for a intermittent connection in the coaxial cable.
         3 Examine the antenna installation if this error code persists. This can be examined with a VSWR meter. Examine the antenna for opens, shorts, and a resistive ground plane connection.
      (c) Four flashes - This shows a low power condition. This occurs if the output power is below approximately 33 dBm (2 watts) for the 406.028 MHz signal, or 17 dBm (50mW) for the 121.5 MHz signal. Also this can show that the 406.028 MHz signal is off frequency. For this error code the ELT must be sent back for repair or replacement.
      (d) Five flashes - This shows that the ELT has not been programmed, however this does not show erroneous or corrupted programmed data.
      (e) Six flashes - This shows that the G-switch loop between pins 5 and 12 at the D-sub connector is not installed. The ELT will not activate during a crash.
         1 Do a resistance test to make sure the harness D-sub jumper is installed. There must be less than 1 ohm of resistance between pins 5 and 12.
      (f) Seven flashes - This shows that the ELT battery has too much accumulated operation time and must be replaced to meet FAA specifications.

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C. Put the BATTERY switch in the OFF position.

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ARTEX ME406 EMERGENCY LOCATOR TRANSMITTER SYSTEM - MAINTENANCE PRACTICES

1. General

A. This section gives maintenance practices for the emergency locator transmitter (ELT) system. Components in the ELT system include the ELT, antenna, remote switch, and buzzer.

2. Emergency Locator Transmitter (ELT) Removal/Installation

A. Remove the Emergency Locator Transmitter (ELT) (Refer to Figure 201).
   (1) Make sure the MASTER switch is in the OFF position.
   (2) Get access to the ELT through the baggage compartment door on the left side.
      (a) Remove the closeout from the baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
   (3) Make sure the ON/ARM switch on the ELT in the ARM position.

CAUTION: Although the ELT is off with the electrical connector removed, the ELT can be activated if the switch on the front is moved to the ON position. Be careful not to move the switch to the ON position.

   (4) Disconnect the BNC connector (PT1029) and the electrical connector (PT907) from the ELT.

NOTE: The ELT is off when the electrical connector is removed from the ELT.

   (5) Open the Velcro strap that holds the ELT to the mounting tray.
   (6) Remove the ELT from the airplane.

B. Install the Emergency Locator Transmitter (ELT) (Refer to Figure 201).

NOTE: The ELT is off when the electrical connector is removed from the ELT.

CAUTION: Although the ELT is off with the electrical connector removed, the ELT can be activated if the switch on the front is moved to the ON position. Be careful not to move the switch to the ON position.

   (1) Put the ELT in the mounting tray at an angle to engage the lock mechanism at the opposite end of the ELT.
   (2) Push the ELT down into the mounting tray until it is fully installed in the tray.
   (3) Connect the Velcro strap that holds the ELT firmly to the mounting tray.
   (4) Connect the BNC connector and the electrical connector to the ELT.
   (5) Make sure the ON/ARM switch is in the ARM position.
   (6) Complete a functional test of the ELT system to make sure the installation is correct. Refer to Artex ME406 Emergency Locator Transmitter - Adjustment/Test.
   (7) Install the closeout in the baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

3. ELT Buzzer Removal/Installation

A. Remove the ELT Buzzer (Refer to Figure 201).
   (1) Get access to the buzzer through the baggage compartment door on the left side.
      (a) Remove the closeout from the baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
   (2) Make sure that the ELT master switch on the ELT transmitter is in the ARM position.
   (3) Tag the wires and terminals for identification.
   (4) Remove the screws that attach the electrical wire to the terminals to the buzzer.
   (5) Loosen the black retainer ring on the outboard side of the buzzer.
   (6) Remove the buzzer from the bracket.

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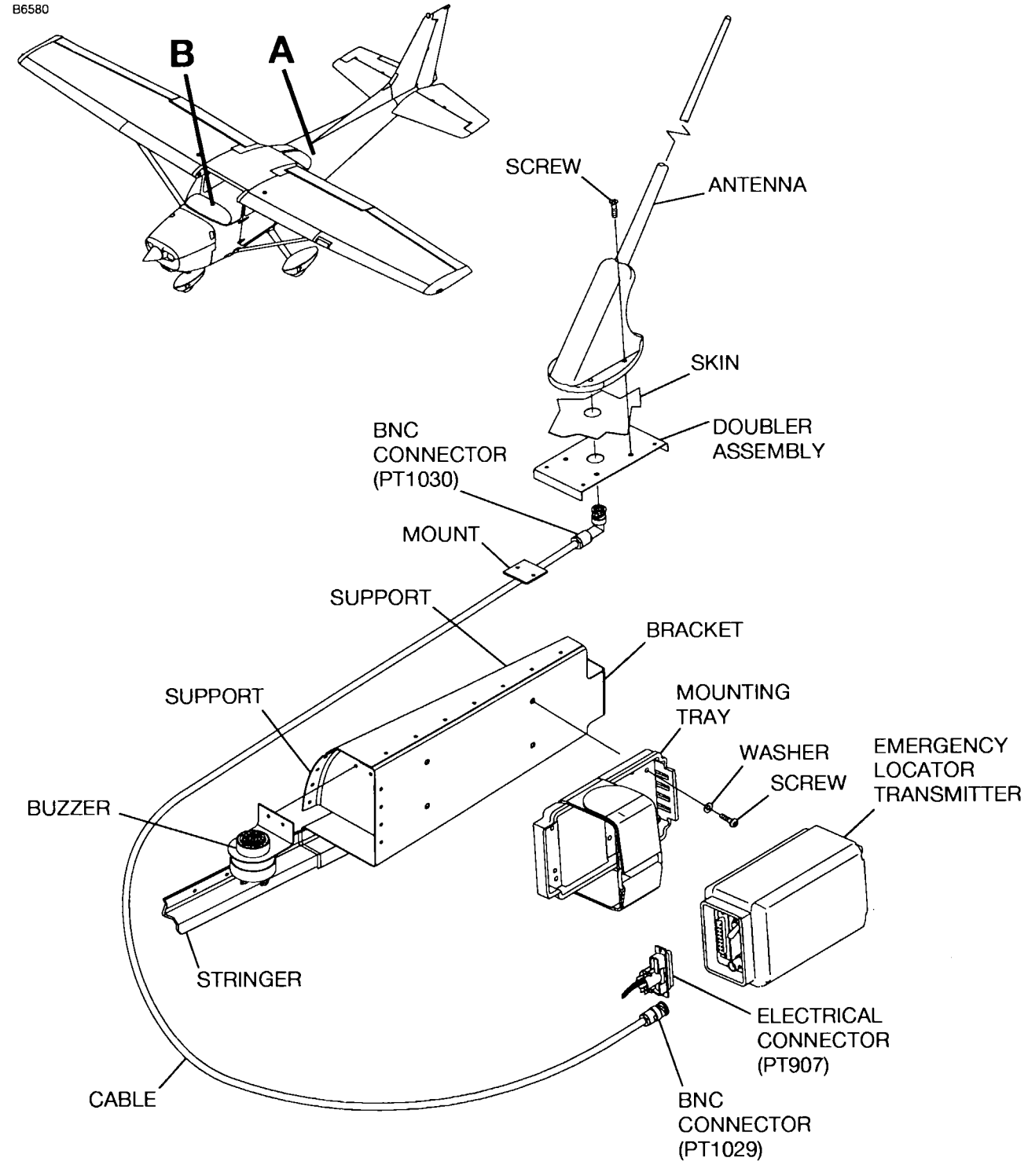

DETAIL A

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Artex ME406 Emergency Locator Transmitter System Installation
Figure 201 (Sheet 1)

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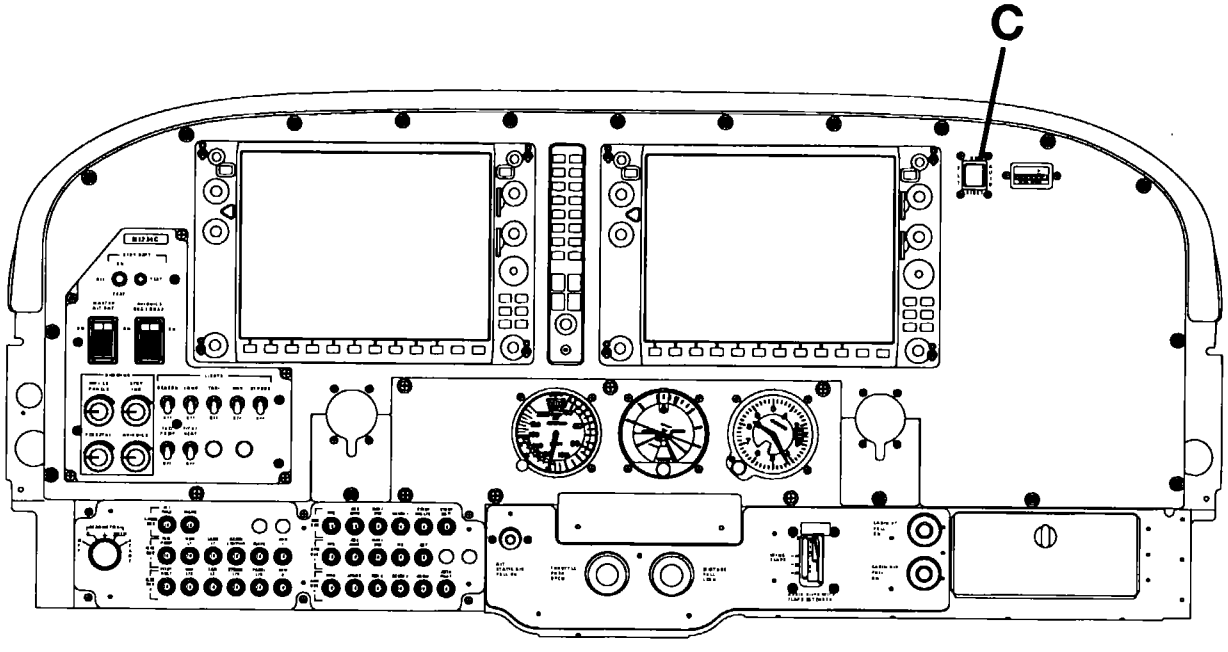
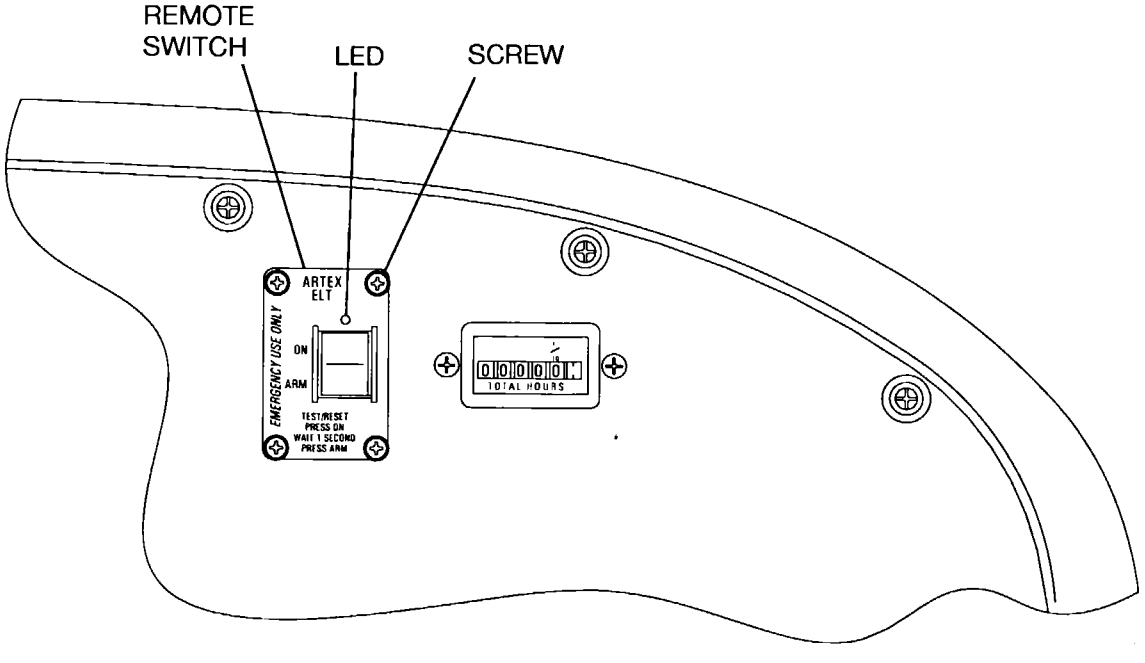


DETAIL B



DETAIL C

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Artex ME406 Emergency Locator Transmitter System Installation
Figure 201 (Sheet 2)

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B. Install the ELT Buzzer (Refer to Figure 201).
   (1) Put the buzzer in the bracket.
   (2) Install the black retainer ring on the outboard face of the buzzer.
   (3) Remove the tags from the wires and terminals.
   (4) Connect the electrical wires to the buzzer with the screws.
   (5) Do a check of the ELT system. Refer to Refer to Artex ME406 ELT Functional Test.
   (6) Install the closeout in the baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

4. Remote Switch Removal/Installation

A. Remove the Remote Switch.
   (1) Remove electrical power from the aircraft.
   (2) Get access to the ELT through the baggage compartment door on the left side.
      (a) Remove the closeout from the baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.
   (3) Disconnect the electrical connector (PT907) from the ELT.
   (4) Remove the screws from the front of the remote switch.
   (5) Pull the remote switch from the panel to get to the electrical connector.
      (a) Disconnect the connector from the back of the switch.

B. Install the Remote Switch.
   (1) Connect the electrical connector to the back of the switch.
   (2) Put the remote switch into the panel.
      (a) Install the screws that attach switch to the panel.
   (3) Connect the electrical connector to the ELT.
   (4) Complete a functional test of the ELT system to make sure the installation is correct. Refer to Artex ME406 ELT Functional Test.
   (5) Install the closeout in the baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

5. ELT Antenna Removal/Installation

A. Remove the ELT Antenna (Refer to Figure 201).
   (1) Remove the screws that attach the antenna to the fuselage.
   (2) Pull the antenna upward from fuselage and disconnect the BNC connector (PT1030) from antenna.
   (3) Remove the antenna from the airplane.
   (4) Remove sealant from antenna and airplane.

B. Install the ELT Antenna (Refer to Figure 201).
   (1) Put the antenna near the mounting position and connect the BNC connector (PT1030) to the antenna.
   (2) Install the screws that attach the antenna to the fuselage.
   (3) Make sure that there is a correct electrical bond between the antenna and the airplane structure.
      (a) Remove one screw.
      (b) With an ohmmeter, measure the electrical resistance from the antenna base metal insert to the structure at the screw position.

         NOTE: The maximum allowable resistance (in ohms) at each of the four measured positions is 0.0025.

      (c) Install the screw and remove and install each of the remaining screws in turn as you measure the electrical resistance at each screw hole.
   (4) Apply a fillet seal around the antenna with Type I Class B Sealant. Do not cover the screw head with the sealant. Refer to Chapter 20, Fuel, Weather and High-Temperature Sealing - Maintenance Practices.
   (5) Do a functional test of the ELT system. Refer to Artex ME406 ELT Functional Test.

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ARTEX ME406 EMERGENCY LOCATOR TRANSMITTER (ELT) SYSTEM - INSPECTION/CHECK

1. General

A. This section gives the procedures that are necessary to do the inspection and operational checks necessary to comply with 14 CFR 91.207, for the Artex ME406 Emergency Locator Transmitter (ELT) System. The system transmits on two frequencies. The 121.5 MHz frequency has the standard swept tone that rescue personnel can follow to the source. The other frequency is 406.028 MHz and is used to activate a satellite tracking system. The 406.028 MHz frequency includes other information such as the country code of the airplane, the aircraft identification beacon serial number, the 24-bit address, the tail number, or other identification.

2. Tools and Equipment

A. For information on tools and equipment, refer to Equipment and Furnishings - General.

3. Artex ME406 Emergency Locator Transmitter (ELT) Inspection

A. Get access to the ELT.
   (1) Get access to the ELT through the baggage compartment door on the left side.
      (a) Remove the bolts, tiedowns, and plastic closeout from the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

B. Do an inspection of the ELT, mounting tray, antenna, and the ELT battery for condition and correct installation.
   (1) Make sure that the ELT switch, found on the forward end of the ELT, is set to the ARM position.
   (2) Remove the ELT from the mounting tray. Refer to Artex ELT ME406 Emergency Locator Transmitter System - Maintenance Practices.

CAUTION: Do not use solvents to clean the ELT, mounting tray, or electrical contacts. Solvents used in these areas can cause damage to the ELT housing.

   (3) Examine the ELT and the mounting tray for correct installation, cleanliness, cracks, or other damage.
   (4) Examine the ELT battery for corrosion.
   (5) Look at the battery expiration date.
      (a) Make sure that the battery life limit is not expired.
      (b) Make sure that the battery expiration date is shown correctly in the Maintenance Records.

NOTE: The battery manufacturer puts a mark on the battery to show the battery life limit. When you install a new battery in an ELT, make sure a record of the expiration date is put in the space given on the ELT name and data plate.

      (c) If you have to replace the ELT battery, refer to Artex Maintenance Manual 570-1600.
      (d) You must replace the ELT battery with a new battery if one or more of the conditions that follow occur:
         - Use of the ELT battery in an emergency
         - Operation for an unknown amount of time
         - Use for more than one hour of cumulative time
         - Replacement date shown on the battery label has expired.
      (e) Record the new battery expiration date in the maintenance log if you replaced it.
   (6) Examine the ELT antenna for correct installation and cracks or other damage.
   (7) Install the ELT into the mounting tray. Refer to Artex ELT ME406 Emergency Locator Transmitter System - Maintenance Practices.

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4. Artex ME406 Emergency Locator Functional Test

NOTE: If possible, do the test procedure for the emergency locator transmitter inside a metal hangar with the doors closed to decrease the signal transmission from the ELT unit during the test.

A. Do a G-Switch Operational Test:

CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the Emergency Locator Transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz distress signal after it is activated for approximately 50 seconds.

(1) Remove the ELT from the airplane. Refer to Artex ELT ME406 Emergency Locator Transmitter System - Maintenance Practices.
(2) Install a jumper wire between pins 5 and 12 on the electrical connector of the ELT.

CAUTION: It is recommended that an experienced technician do this procedure because of the potential physical damage that can occur if the jumper wire is not installed correctly.

NOTE: The ELT will not activate with the G-switch unless electrical pins 5 and 12 have a jumper wire installed between them (this happens automatically when the ELT is locked into the mount tray with the electrical connector in position).

(3) Make sure the ELT switch is in the ARM position.
(4) Use a receiver set to 121.5 MHz to listen for the aural warning sweep tone.
(5) Hold the ELT transmitter tightly in one hand and make a throwing movement followed by an opposite movement of the ELT transmitter.
(6) Make sure that the G-switch operates and that the aural warning sweep tone is heard on the receiver set to 121.5 MHz.
(7) Set the ELT switch to the ON position and then back to the ARM position to reset the G-switch.
(8) Remove the jumper wire from electrical pins 5 and 12 on the electrical connector of the ELT.
(9) Install the emergency locator transmitter in the airplane. Refer to Artex ELT ME406 Emergency Locator Transmitter System - Maintenance Practices.

B. Do a Transmitter Test of the Artex ME406 Emergency Locator Transmitter (ELT) System:

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CAUTION: Operate the Emergency Locator Transmitter (ELT) system only during the first five minutes of each hour. If you must complete the functional test at a time other than the first five minutes of the hour, you must do the test with a direct connection to the ELT and a 30 dB attenuator. Refer to the FAA Advisory Circular AC-91-44A.

CAUTION: Do not operate the Emergency Locator Transmitter (ELT) for more than five seconds at a time. Do not operate the ELT again for 15 seconds. The ELT will transmit a 406.028 MHz distress signal after it is activated for approximately 50 seconds.

(1) Make sure the BATTERY switch and the AVIONICS switches are in the OFF position.
(2) Connect external electrical power to the airplane.
(3) Make sure that the COM/NAV 1 and AUD/MKR circuit breakers on the circuit breaker panel are engaged.
(4) Set the BATTERY switch to the ON position.
(5) Set the AVIONICS switches to the ON position.
(6) Make sure that the ELT remote switch on the right panel is in the ARM position.
(7) Set one of the communication units to receive a frequency of 121.5 MHz.
(8) Set the communication unit to the airplane speakers at an audio level loud enough to be heard.

NOTE: The SARSAT tester is used as an example to gather test information. However, other equivalent test equipment such as the Aeroflex IFR 4000 Communications Test Set is acceptable.

(9) Have another person use the SARSAT tester set to the RECV function. Refer to Figure 601.

NOTE: The SARSAT tester must be less than 15 feet from the ELT antenna and must have a line-of-sight between the ELT antenna and SARSAT tester.

NOTE: The person with the SARSAT tester must make sure that the ELT buzzer is heard during the test.

NOTE: If it is necessary to do the transmitter test after the first five minutes of the hour, the SARSAT tester is connected directly to the ELT with a coaxial cable and a 30 dB attenuator. You will not hear the sweep tone from the ELT on the airplane speakers with the attenuator installed.

(10) Install the 30 dB attenuator between the ELT and SARSAT tester if necessary.
(11) Set the ELT remote switch on the right panel to the ON position.
(12) Let the ELT make three sweeps on the airplane speakers.

NOTE: This will take one second. The ELT remote switch will start to flash.

(13) Set the ELT remote switch back to the ARM position and monitor the LED.

NOTE: The ELT will do a self-test. The LED will stay on for one second and the ELT sweeps are not audible on the airplane speakers if the ELT operation is normal.

NOTE: The ELT does not transmit a 406.028 MHz test signal to the SARSAT tester until the ELT remote switch is set back to the ARM position.

(14) If the LED continues to flash, refer to Artex ME406 Emergency Locator Transmitter System - Troubleshooting.
(15) If the SARSAT tester did not receive a 406.028 MHz signal and the ELT remote switch LED does not show a transmitter problem, do the test again.

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(16) When the SARSAT tester receives a 406.028 MHz signal, scroll the pages on the tester and make sure of the information that follows:
   (a) Make sure the information shown by the SARSAT tester agrees with the placard on the ELT.

   NOTE: The information that follows must match the data on the ELT placard:

   - COUNTRY code
   - 15-digit Hex code ID
   - Aircraft identification number.

   (b) Make sure that the SARSAT tester shows the messages that follow:
   - S' TEST OK
   - Frequency - PASS
   - Homing frequency
   - Message format (short).

   NOTE: When ownership of an aircraft is transferred within the same country, the ME406 ELT should be reregistered with the applicable authority. When an aircraft with a ME406 ELT changes tail number or country registration, the ELT will need to have the new identification data entered. The ELT will also need to be registered with the applicable authority.

(17) Install the bolts, tiedowns, and plastic closeout to the lower baggage area (Zone 240). Refer to Airplane Zoning - Description and Operation.

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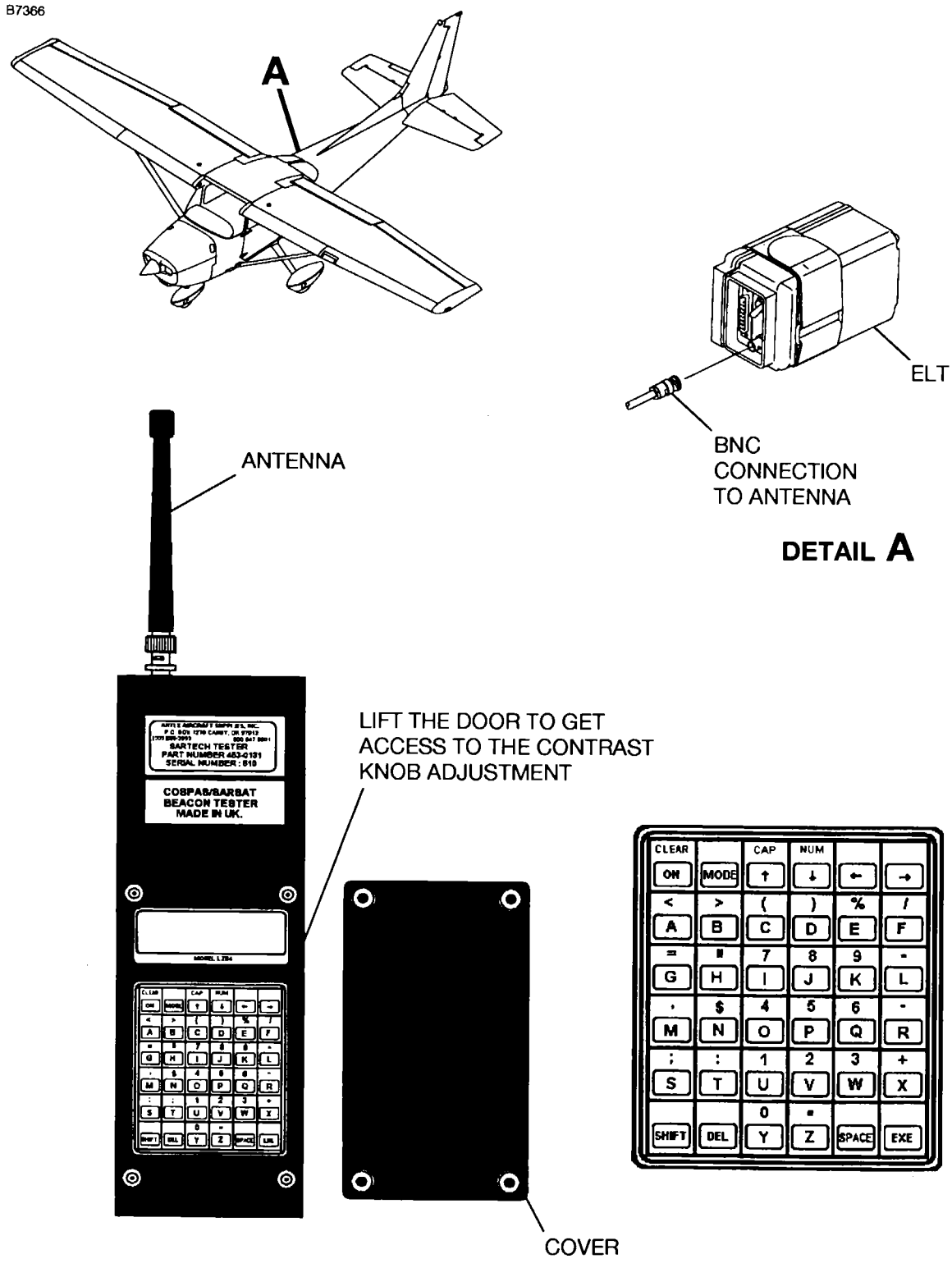

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Artex ME406 Emergency Locator Transmitter (ELT) SARSAT Test Set-up
Figure 601 (Sheet 1)

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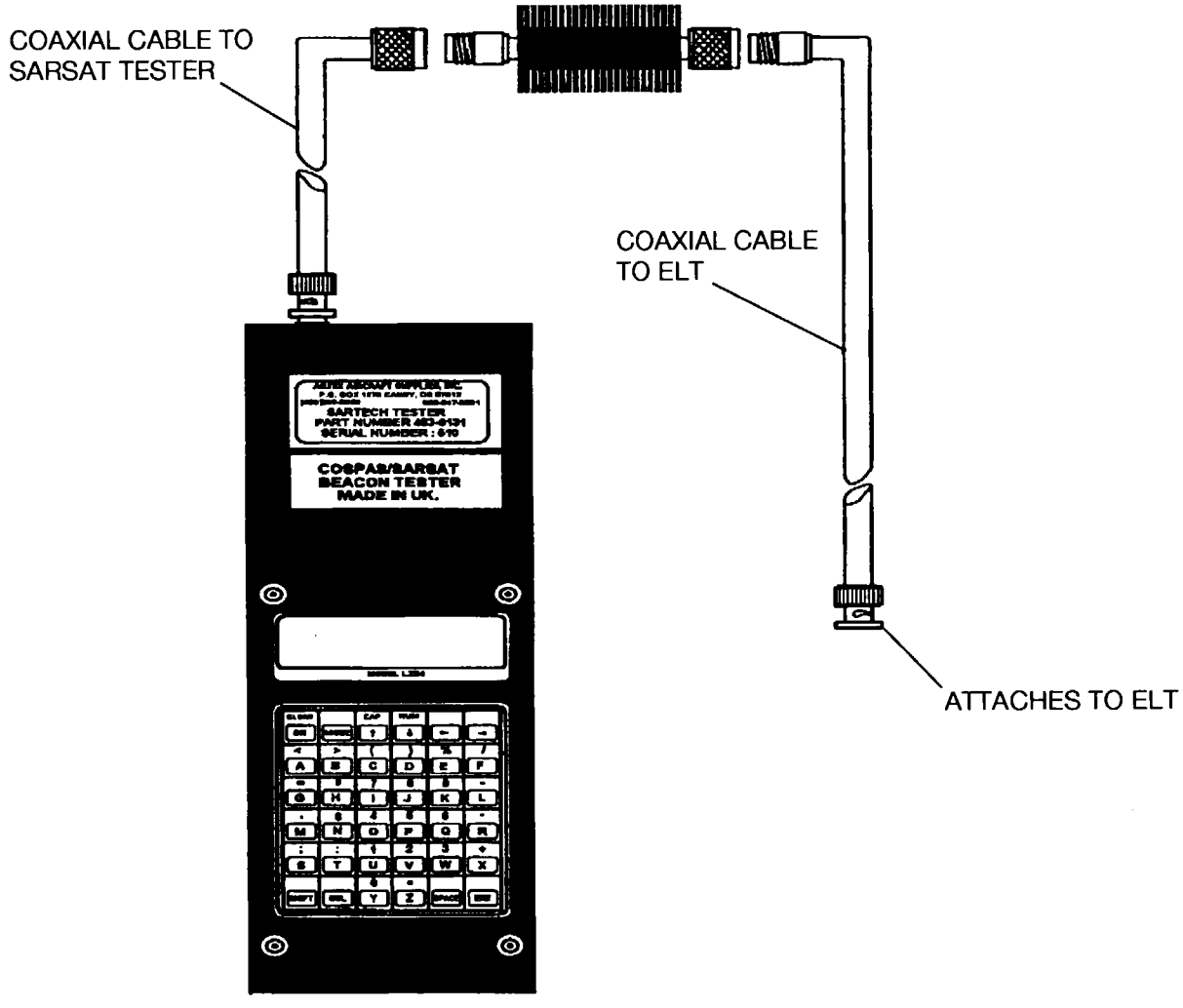

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Artex ME406 Emergency Locator Transmitter (ELT) SARSAT Test Set-up
Figure 601 (Sheet 2)

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CARBON MONOXIDE DETECTOR - MAINTENANCE PRACTICES

1. General

A. The carbon monoxide (CO) detector is installed on Airplanes 17281273 and On and Airplanes 172S10103 and On that have the Garmin G1000.

B. The CO detector detects, measures, and gives an alert to the crew before the cockpit level of CO reaches a critical level. The CO data is displayed and controlled through the CO detector RS232 interface with the Multi-Function Display (MFD).

2. Carbon Monoxide Detector Removal/Installation

A. Carbon Monoxide Detector Removal (Refer to Figure 201).
   (1) Put the AVIONICS MASTER switch in the off position.
   (2) Remove the MFD from the pilot side of the instrument panel. Refer to Chapter 34, Control Display Unit - Maintenance Practices.
   (3) Disconnect the electrical connector (P1903) from the CO detector.
   (4) Remove and keep the three screws and three washers that connect the CO detector to the avionics support structure.
   (5) Remove the CO detector from the airplane.

B. Carbon Monoxide Detector Installation (Refer to Figure 201).
   (1) Put the CO detector in position on the avionics support structure.
   (2) Attach the CO detector to the structure with the three kept screws and three kept washers.
   (3) Connect the electrical connector (P1903) to the CO detector.
   (4) Install the MFD on the pilot side of the instrument panel. Refer to Chapter 34, Control Display Unit - Maintenance Practices.
   (5) Put the AVIONICS MASTER switch in the ON position.
   (6) On the Primary Flight Display (PFD), do a check to make sure that the CO detector operates correctly.

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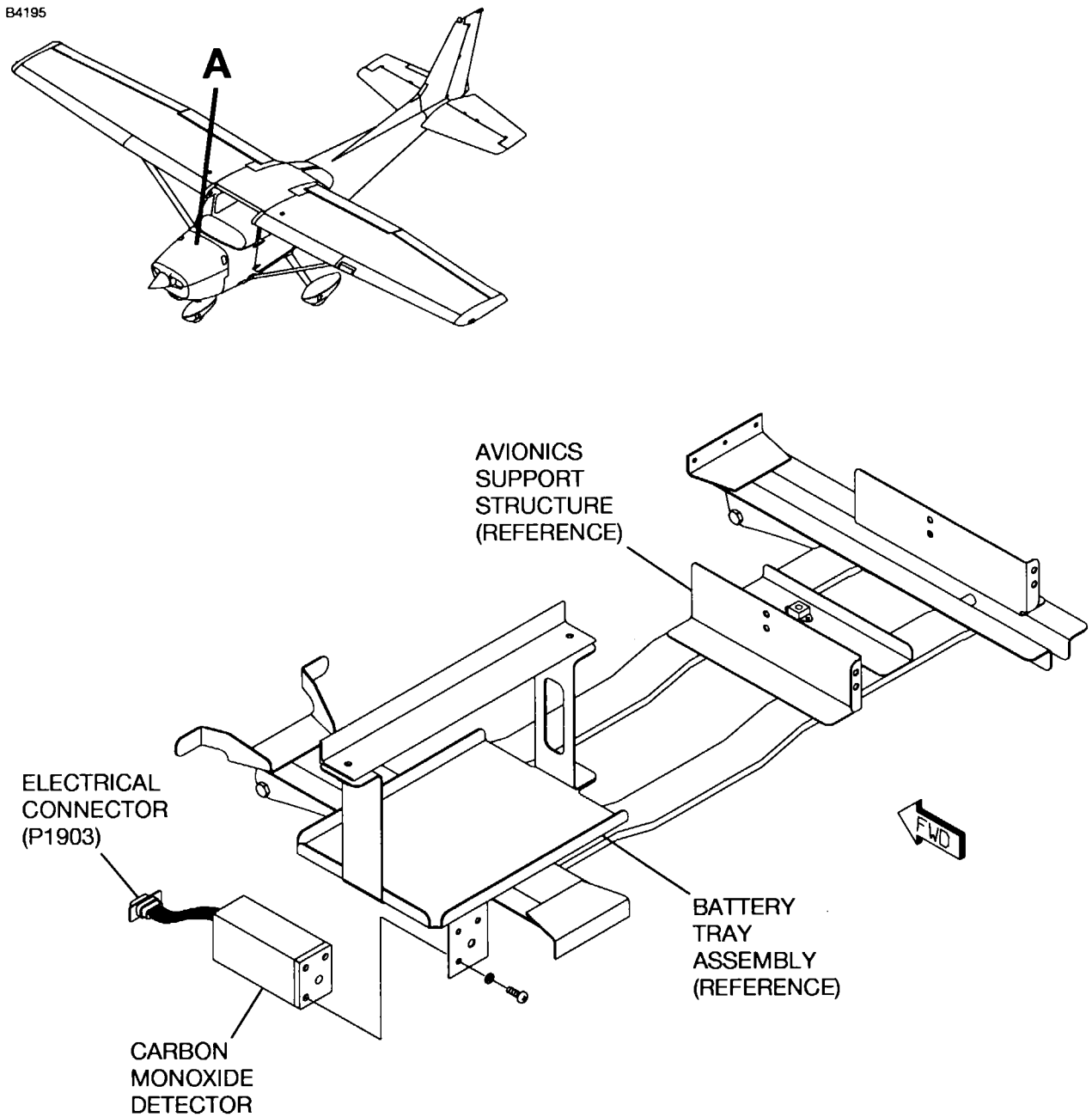

DETAIL A

AIRPLANES THAT HAVE GARMIN G1000

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Carbon Monoxide Detector Installation
Figure 201 (Sheet 1)

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SOUNDPROOFING AND INSULATION - MAINTENANCE PRACTICES

1. General

A. The airplane utilizes soundproofing and insulation throughout the fuselage area. This material is glued into place using spray adhesive. Anytime old material is being replaced, care should be taken to ensure all traces are removed from fuselage skin before reapplication. For a list of spray adhesives, refer to Equipment/Furnishing - General.

B. For an illustration of soundproofing and insulation locations, refer to Figure 201 and Figure 202.

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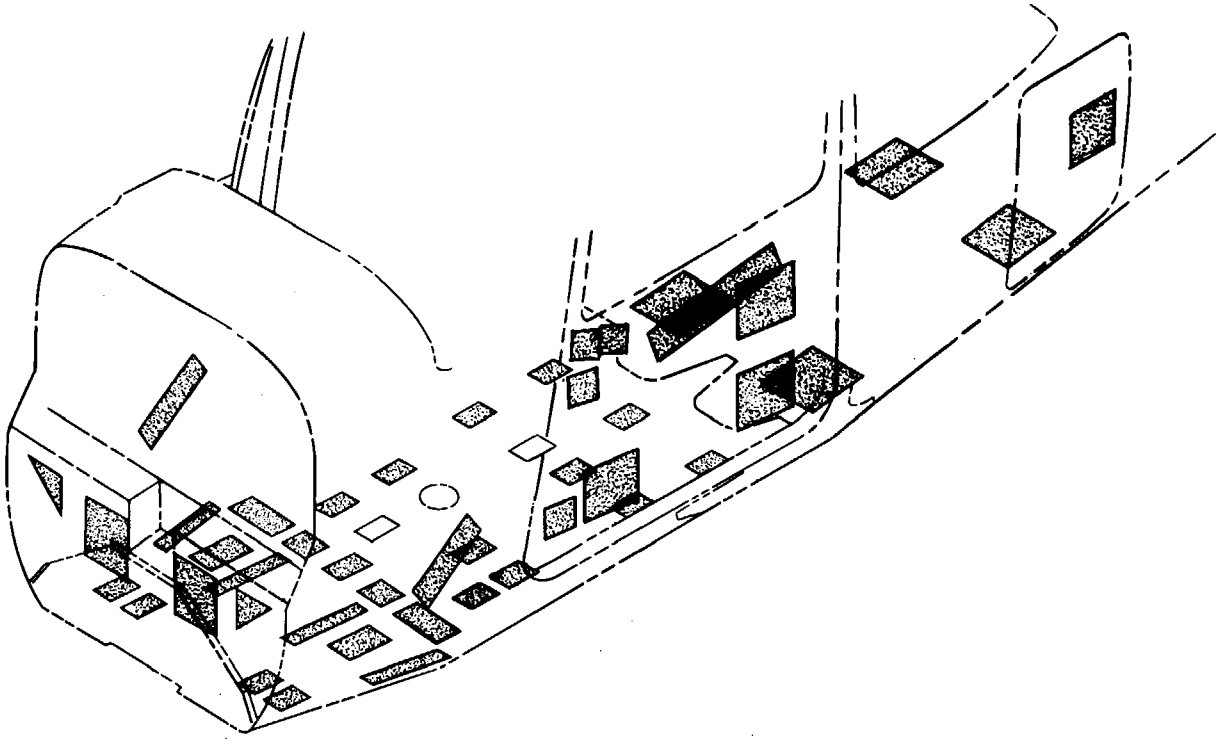

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Soundproofing Installation
Figure 201 (Sheet 1)

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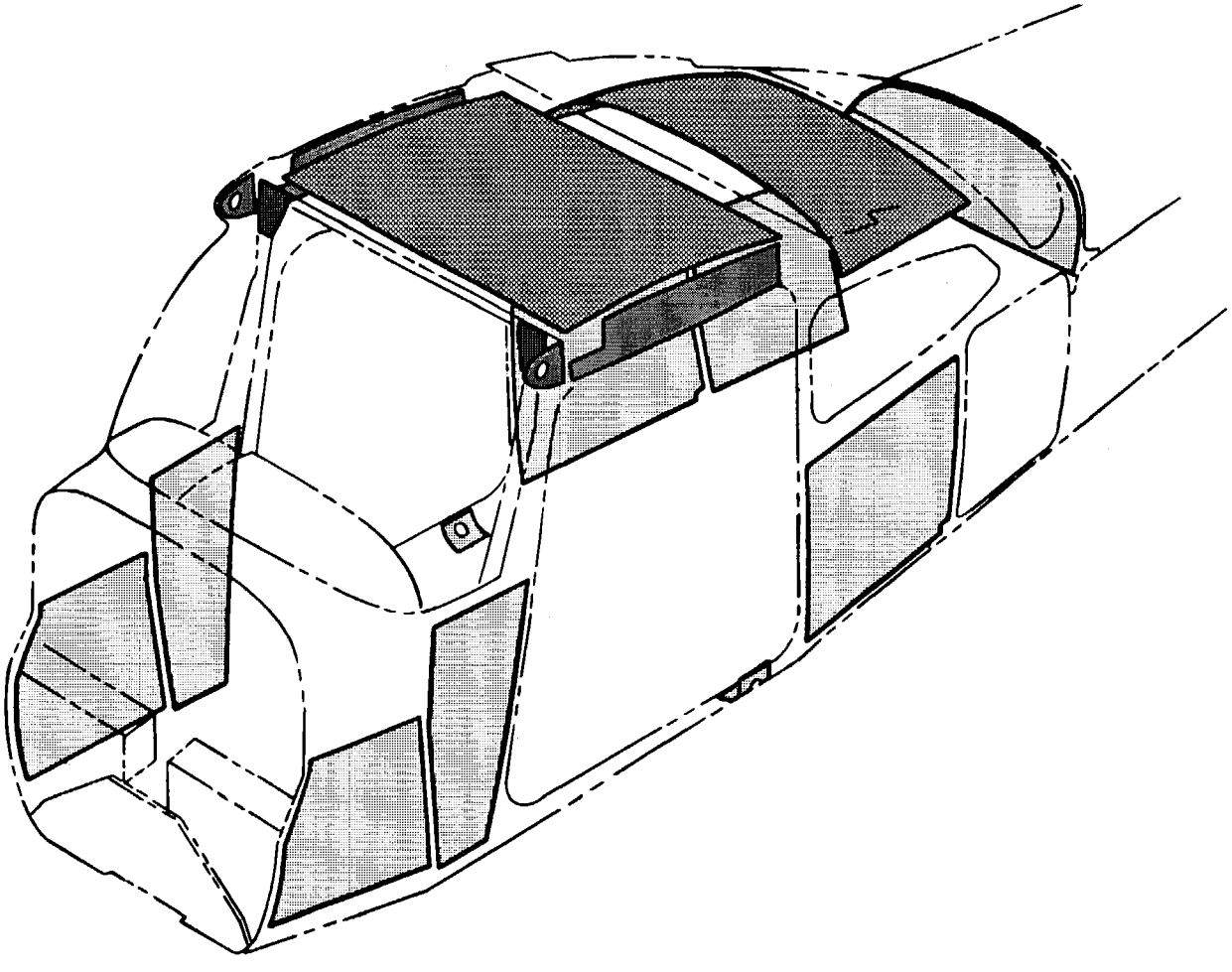

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Insulation Installation
Figure 202 (Sheet 1)

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CHAPTER

26

FIRE PROTECTION

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FIRE PROTECTION - GENERAL

1. Scope and Definition

A. This chapter contains a single section which describes the portable fire extinguisher used in the cabin.

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HAND FIRE EXTINGUISHER - DESCRIPTION AND OPERATION

1. Description

A. A portable, hand operated fire extinguisher is mounted on the floor between the pilot and copilot seats for use in the event of a fire. The extinguishing agent is Halon 1211 and may be used on solid combustible, electrical or liquid fires. Servicing of the extinguisher can be handled by most fire equipment dealers. The fire extinguisher is mounted within a quick release, clamp type bracket assembly. (Refer to Figure 1).

2. Operation

A. For operation of the fire extinguisher, refer to Section 7 of the Pilot's Operating Handbook.

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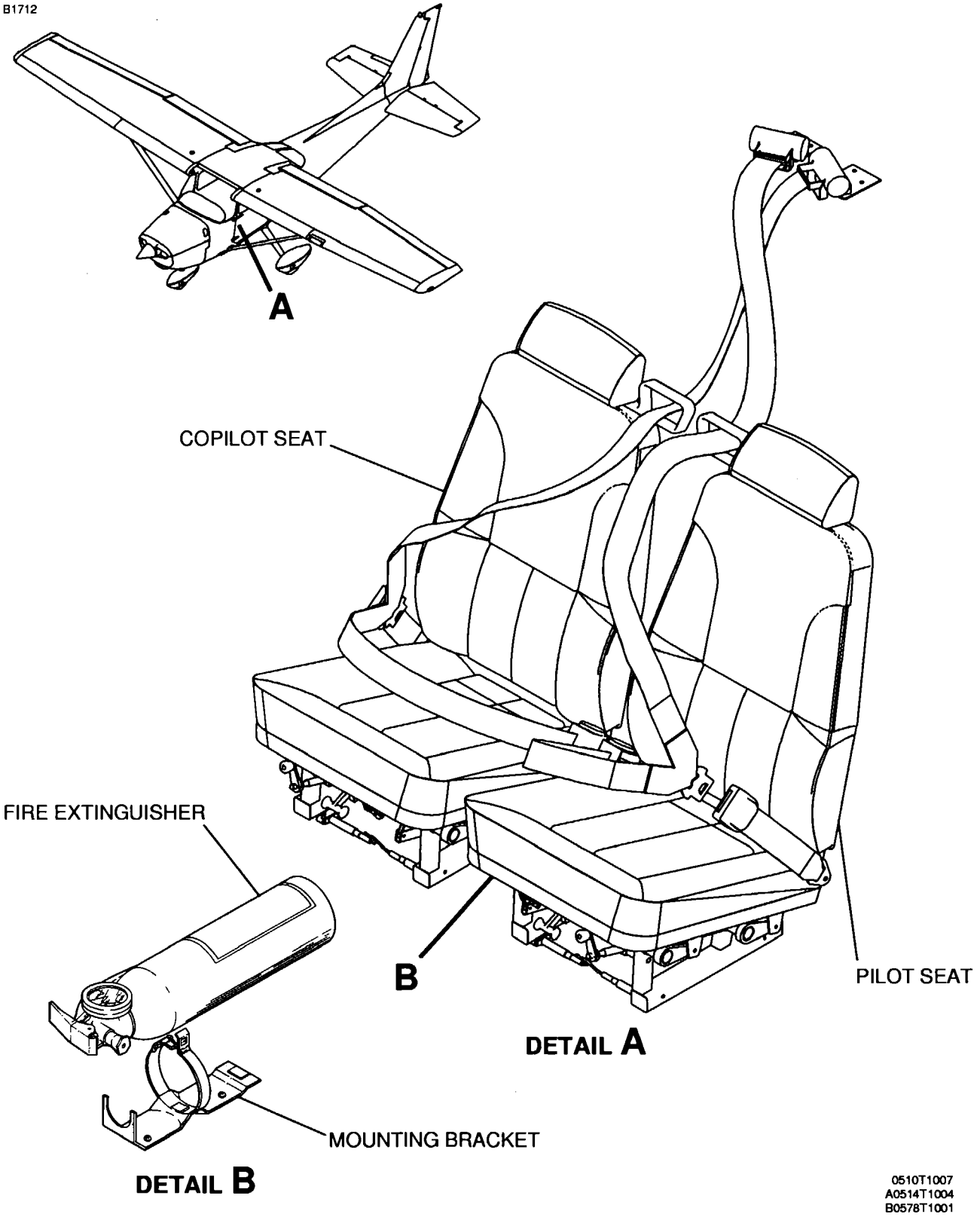

Fire Extinguisher Installation
Figure 1 (Sheet 1)

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CHAPTER

27

FLIGHT CONTROLS

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FLIGHT CONTROLS - GENERAL

1. General

A. This chapter provides maintenance of components which furnish a means of manually controlling the flight attitude characteristics of the airplane, including flaps.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
Tensiometer		Available commercially	To measure and obtain cable tension.
Inclinometer	SE716	Cessna Aircraft Company Cessna Distrubution Department 701, CPD 25800 East Pawnee Road Wichita, KS 67218-5590	To measure control surface deflection.
Polyurethane Tape	Y8761	3M 3M Center Minneapolis, MN 55144	To prevent flap chafing.

3. Definition

A. This chapter is divided into sections and subsections to assist maintenance personnel in locating specific systems and information. The following is a brief description of each section. For locating information within the chapter, refer to the Table of Contents at the beginning of the chapter.
   (1) The aileron section provides information on control wheels, cables, linkage and aileron assemblies.
   (2) The rudder section provides information on rudder pedals, cables, linkage and rudder assembly.
   (3) The elevator section provides information on control column, cables, linkage and elevator assemblies.
   (4) The flap section provides information on the flap actuator, cables, linkage, and the flap assemblies.

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CONTROL CABLE WIRE BREAKAGE AND CORROSION LIMITATIONS - MAINTENANCE PRACTICES

1. Examination of Control Cables

A. Control cable assemblies are subject to a variety of environmental conditions and forms of deterioration. Some deterioration, such as wire or strand breakage, is easy to recognize. Other deterioration, such as internal corrosion or cable distortion, is harder to identify. The following information will aid in detecting these cable conditions.

B. Broken Wire Examination (Refer to Figure 201).
   (1) Examine cables for broken wires by passing a cloth along length of cable. This will detect broken wires, if cloth snags on cable. Critical areas for wire breakage are those sections of cable which pass through fairleads, across rub blocks, and around pulleys. If no snags are found, then no further inspection is required. If snags are found or broken wires are suspected, then a more detailed inspection is necessary which requires that the cable be bent in a loop to confirm broken wires. Loosen or remove cable to allow it to be bent in a loop as shown. While rotating cable, inspect bent area for broken wires.
   (2) Wire breakage criteria for cables in flap, aileron, rudder, and elevator systems are as follows:
      (a) Individual broken wires at random locations are acceptable in primary and secondary control cables when there are no more than six broken wires in any given ten-inch cable length.

C. Corrosion.
   (1) Carefully examine any cable for corrosion that has a broken wire in a section not in contact with wear-producing airframe components, such as pulleys, fairleads, rub blocks, etc. It may be necessary to remove and bend cable to properly inspect it for internal strand corrosion, as this condition is usually not evident on outer surface of cable. Replace cable if internal corrosion is found. If a cable has been wiped clean of its corrosion-preventive lubricant and metal-brightened, the cable shall be examined closely for corrosion. For description of control cable corrosion, refer to Chapter 51, Corrosion and Corrosion Control - Maintenance Practices

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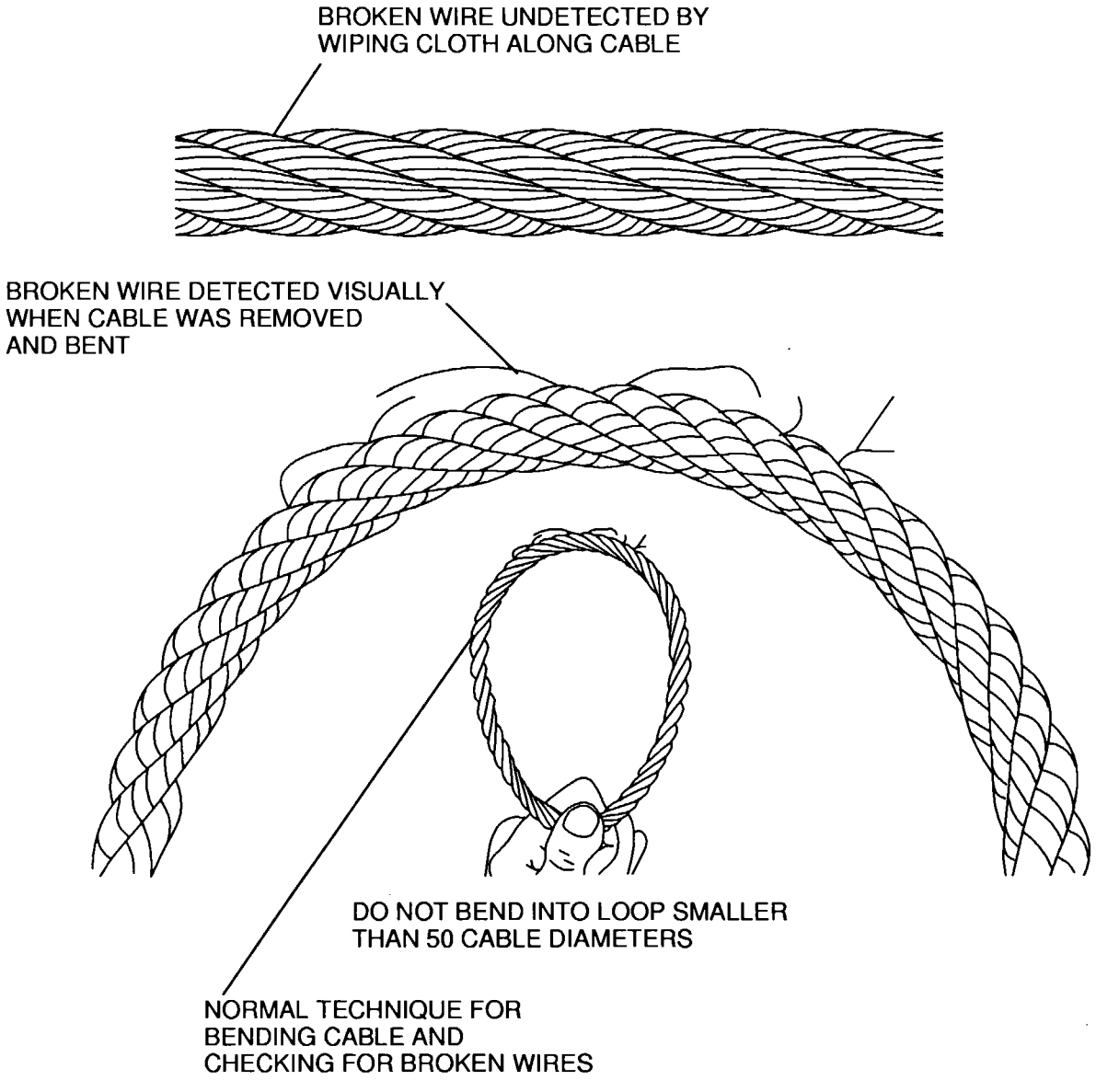

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Cable Broken Wire Examination
Figure 201 (Sheet 1)

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AILERON CONTROL SYSTEM - TROUBLESHOOTING

1. Troubleshooting

A. Actions listed in the Remedy column can be found in Aileron Control System - Maintenance Practices, unless otherwise noted.

TROUBLE	PROBABLE CAUSE	REMEDY
LOST MOTION IN CONTROL WHEELS	Loose control cables.	Adjust cables to proper tension.
	Broken pulley or bracket, cable off pulley or worn rod end bearings.	Replace worn or broken parts, install cables correctly.
	Sprung bellcrank.	Replace bellcrank.
	Loose chains.	Adjust chain tension.
RESISTANCE TO CONTROL WHEEL MOVEMENT	Cables too tight.	Adjust cables to proper tension.
	Pulleys binding or cable off track.	Replace defective pulleys. Install cables correctly.
	Bellcrank distorted or damaged.	Replace bellcrank.
	Defective U-joints.	Replace defective U-joints.
	Clevis bolts in system too tight.	Loosen, then tighten properly and safety.
	Rusty chain or chain binding with sprocket.	Replace chain or defective parts.
CONTROL WHEELS NOT LEVEL WITH AILERONS NEUTRAL	Improper adjustment of chains or cables. With control wheel centered, aileron bellcrank stop bushing should be centered in slot (both left and right bellcranks).	Adjust in accordance with Aileron Control System - Maintenance Practices (Adjustment/Test).
	Improper adjustment of aileron push-pull rods. If chains and cables are properly rigged and bellcrank stop bushings are not centered in slots, push-pull rods are adjusted incorrectly.	Adjust in accordance with Aileron Control System - Maintenance Practices (Adjustment/Test).
DUAL CONTROL WHEELS NOT COORDINATED	Chains improperly adjusted.	Adjust in accordance with Aileron Control System - Maintenance Practices (Adjustment/Test).
INCORRECT AILERON TRAVEL	Push-pull rods not adjusted properly.	Adjust in accordance with Aileron Control System - Maintenance Practices (Adjustment/Test).
	Worn bellcrank stop bushings or bellcrank slots.	Replace worn parts.

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AILERON CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General

A. The ailerons receive input from the pilot or copilot control wheel through a series of sprockets, chains, pulleys, cables, bell cranks, and pushrods. For an overview of the system, refer to Figure 201. For a breakdown of system components, refer to Figure 202, Figure 203, and Figure 204.

2. Control Yoke Removal/Installation

A. Control Yoke Removal (Refer to Figure 202).
(1) Disconnect the battery cables and insulate the terminals as a precaution.
(2) Remove the center pedestal cover.
(3) Remove the rudder bar shields, carpeting, and plates as necessary for access to the lower end of the control yoke.
(4) Remove the avionics equipment and attaching hardware as necessary.
(5) Remove the engine controls and the cabin air controls as necessary.
(6) Remove the right-forward side-upholstery panel.
(7) Remove the bolt from each end of the parking brake assembly and move the assembly away from the work area.
(8) On the upper right side of the control yoke, remove the bolt that attaches the bearing to the yoke. On the left side of the control yoke (Figure 202, Detail B), remove the equivalent bolt that attaches the spacer and the roller to the upper yoke.
(9) Remove the instrument panel and the structure as necessary to let the yoke slide out under the right side of the instrument panel.
(10) Remove the safety wire/clip and disconnect the direct cable turnbuckles.
(11) Remove the bolts that attach the control wheel tubes to the universal joints.
(12) Remove the bolt that attaches the elevator push-pull tube to the control yoke.
(13) Remove the pivot bolt from the bottom of the control yoke and carefully move the control yoke out from under the right side of the instrument panel.

B. Control Yoke Installation (Refer to Figure 202).
(1) Put the control yoke in position under the instrument panel.
(2) Attach the control yoke to the structure with the pivot bolt.
(3) Connect the elevator push-pull tube to the control yoke.
(4) Connect the control wheel tubes to the universal joints with the bolt.
(5) Connect the direct cable turnbuckles and safety the turnbuckles.
(6) Install the instrument panel structure and the instrument panel.
(7) Install the engine and the cabin-air control cables.
(8) Attach the spacers, rollers, bushings, and bearings on the upper left and the upper right control yoke.
(9) Install the parking brake assembly to the structure.
(10) Do a rigging of the aileron cables. Refer to Adjustment/Test.
(11) Do a check and/or rigging of the elevator control system.
(12) Do a check and/or rigging of all of the engine and the cabin air controls.
(13) Do a check of all of the avionics and/or electrical equipment that possibly was disconnected or stopped operation while you did the removal of the yoke.
(14) Install all items that you removed for access.

3. Aileron Removal/Installation

A. Aileron Removal (Refer to Figure 203 and Figure 204).
(1) Remove the nut, washer(s), and bolt from the aileron pushrod, and disconnect the aileron pushrod from the aileron.
(2) Disconnect the electrical bonding straps.
(3) Remove the screws and the nuts that attach the aileron hinges to the trailing edge of the wing.
(4) Carefully pull the aileron out and down to move the hinges from under the wing skin and the auxiliary spar reinforcements.

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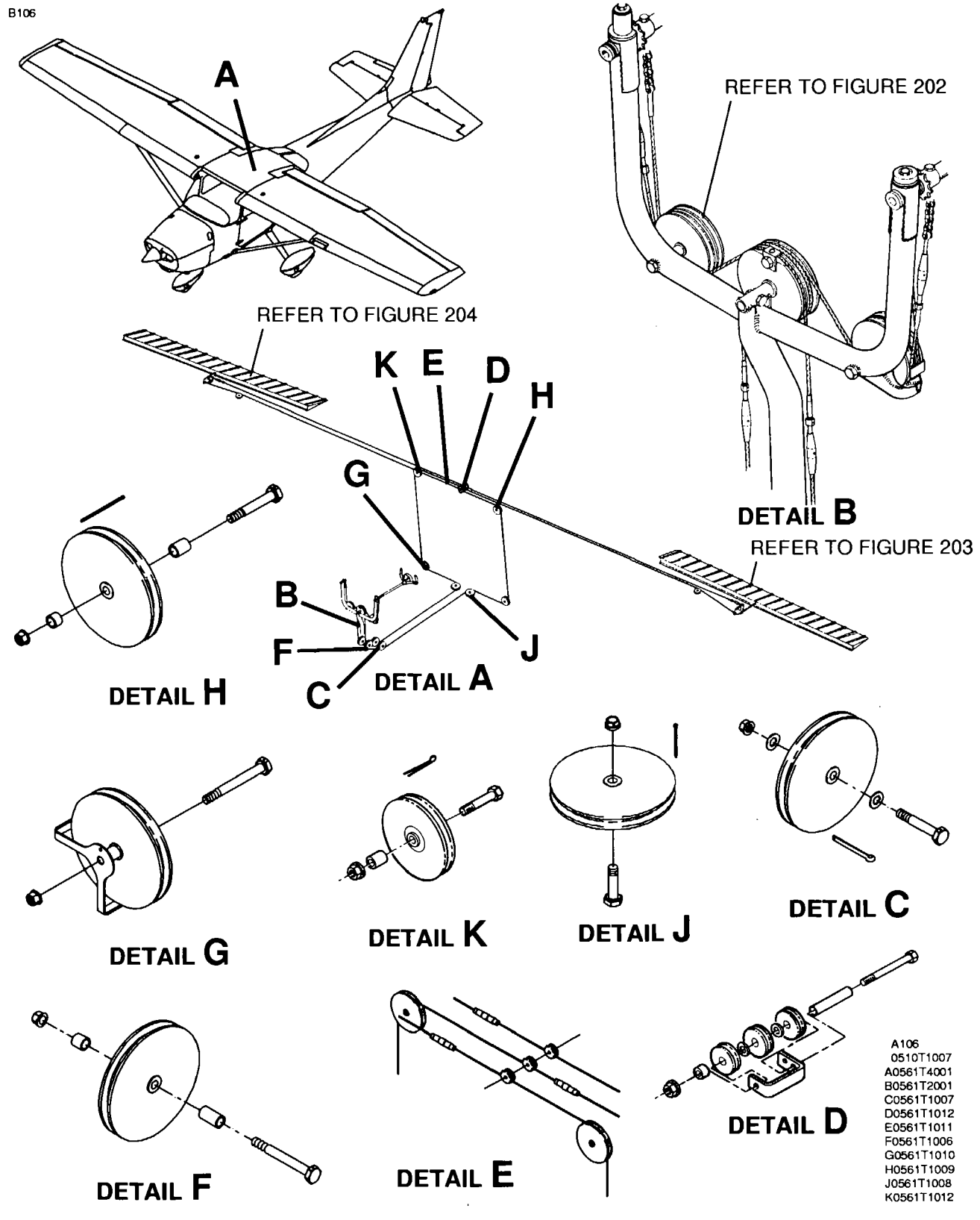

Aileron Control System
Figure 201 (Sheet 1)

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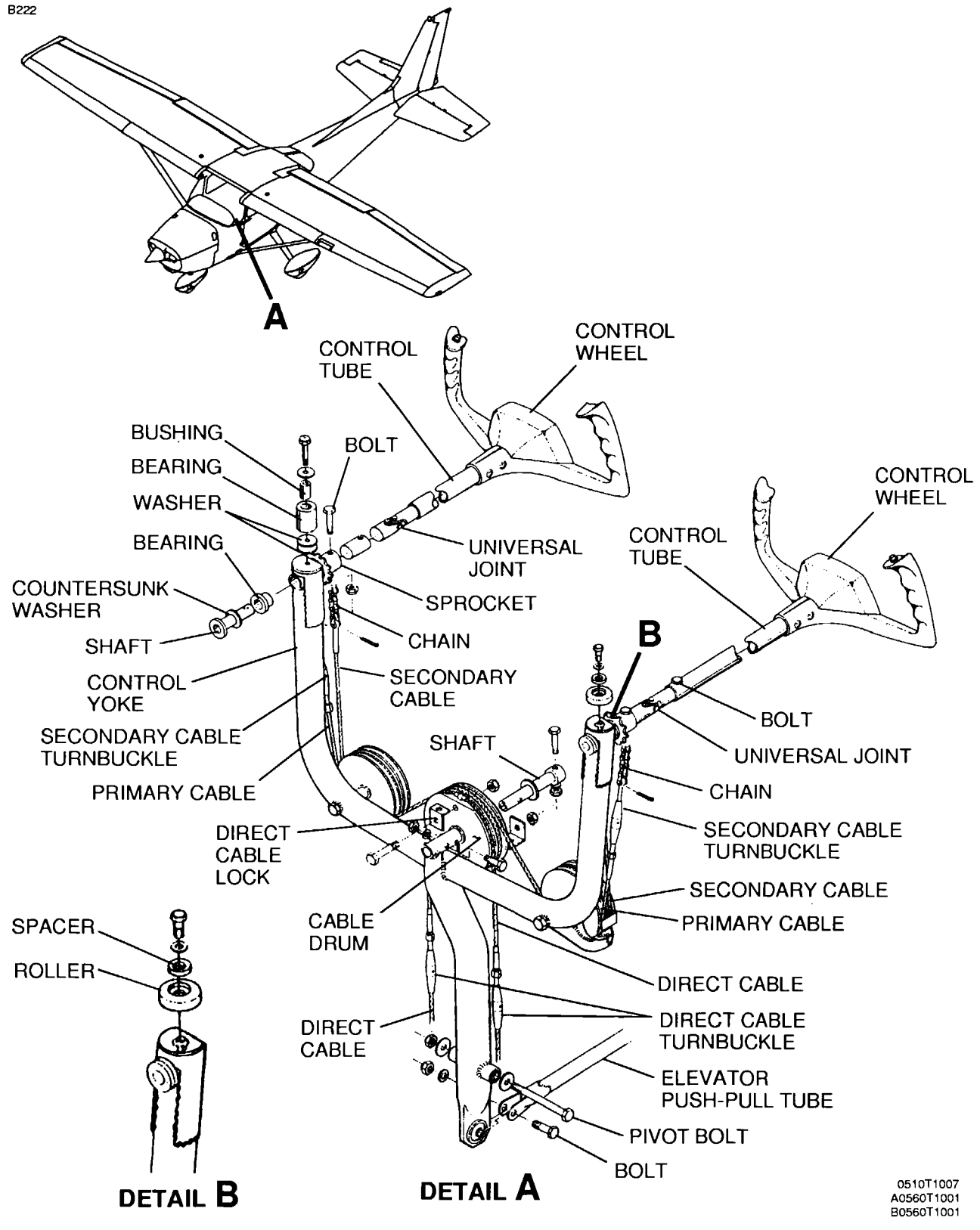

Control Yoke Installation
Figure 202 (Sheet 1)

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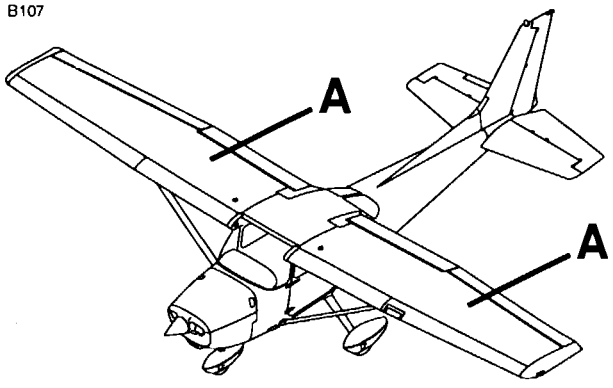
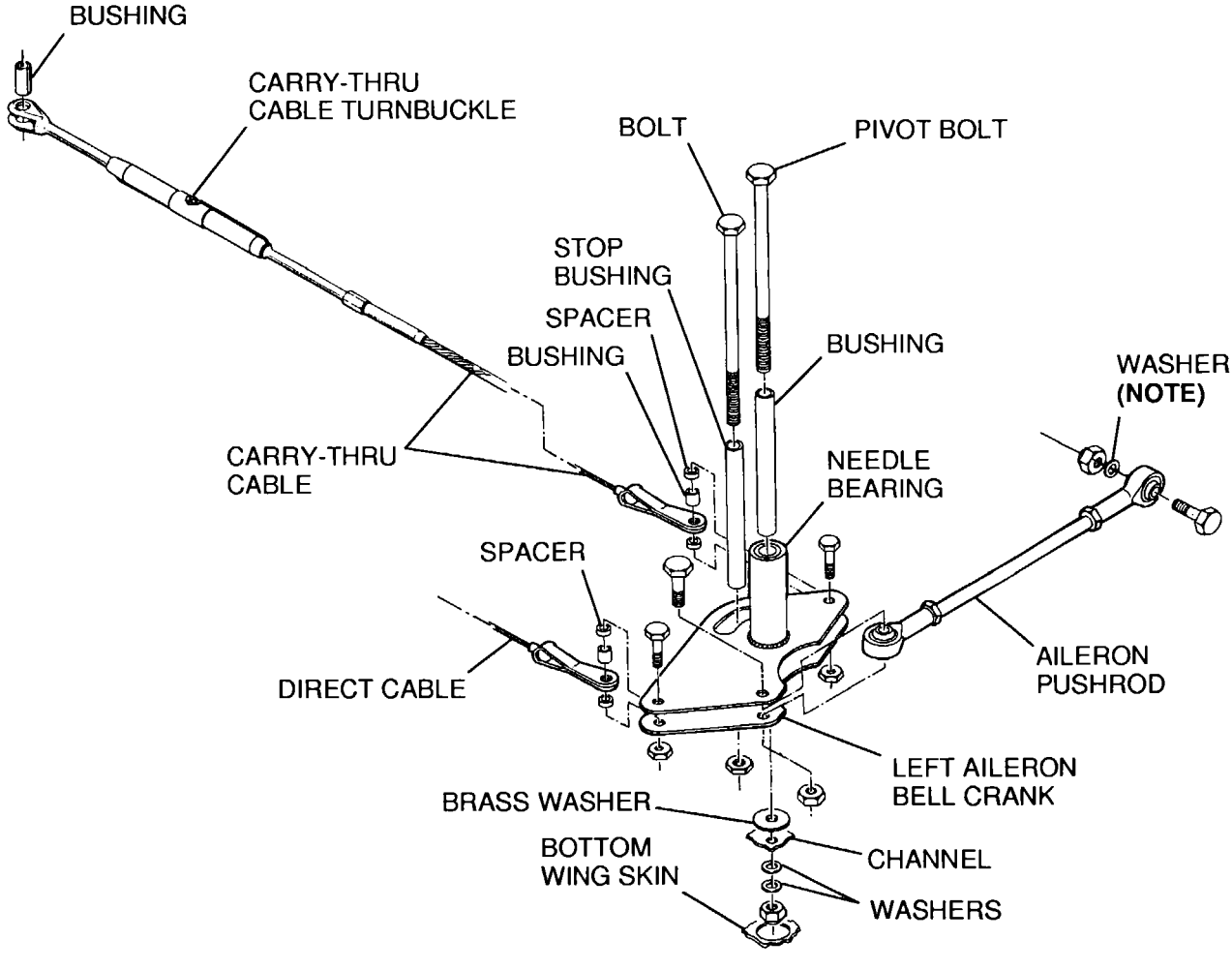


NOTE: ADD WASHERS AS NECESSARY TO FILL THE GAP.



DETAIL A
LEFT SIDE SHOWN,
RIGHT SIDE TYPICAL

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Aileron Bell Crank Installation
Figure 203 (Sheet 1)

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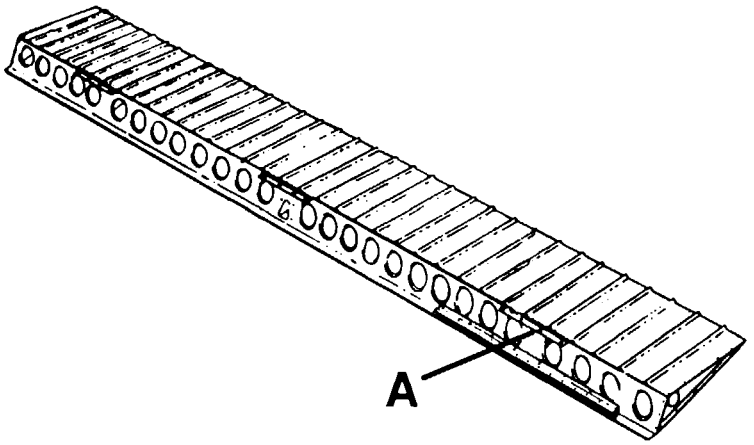

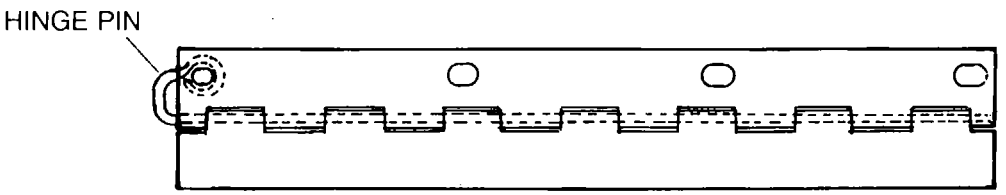

DETAIL A
AILERON HINGE

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Aileron Installation
Figure 204 (Sheet 1)

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B. Aileron Installation (Refer to Figure 203 and Figure 204).
(1) Put the aileron hinges in position between the skin and the auxiliary spar reinforcements, and install the screws and the nuts that attach the hinges to the trailing edge of the wing.
(2) Make sure that the hinge pins are attached with the screws and the nuts.
(3) Connect the electrical bonding straps.
(4) Attach the aileron pushrod to the aileron with the bolt, washer(s), and nut.
(a) Add washers as necessary to fill the gap.
(5) Do a check of aileron travel. Refer to Adjustment/Test below.

4. Aileron Bell Crank Removal/Installation

NOTE: The left and right aileron bell crank removal/installation is typical.

A. Aileron Bell Crank Removal (Refer to Figure 203).
(1) Remove the access plate inboard of the bell crank on the underside of each wing.
(2) Loosen the carry-thru cable turnbuckle to release the control cable tension.
(3) Disconnect the control cables from the bell crank.
(4) Disconnect the aileron pushrod at the bell crank.
(5) Remove the nuts, washers, and bolts that attach the stop bushing of the bell crank and the bell crank to the wing structure.
(6) Remove the bell crank through the access opening. Make sure that the bearing bushing is not dropped from the bell crank.

B. Aileron Bell Crank Installation (Refer to Figure 203).
(1) Install the bell crank to the structure. Make sure that the bushings are in the correct position.
(2) To take out excess clearance, install the brass washers between the lower end of the bell crank and the wing channel.
(3) Connect the aileron pushrod to the bell crank.
(4) Connect the control cables to the bell crank. Make sure that the necessary spacers and bushings are correctly installed.
(5) Adjust the cable tension. Refer to Adjustment/Test.
(6) Safety the turnbuckle. Refer to Chapter 20, Safetying - Maintenance Practices.

5. Adjustment/Test

A. Rig Aileron Cables (Refer to Figure 205).
(1) Make sure that the primary cable is in the aft groove of the cable drum and that it is wound once around the drum.

NOTE: The primary cable lock is installed at the bottom of the drum and the direct cable lock is installed at the top.

(2) With the control wheels in neutral, make sure that the chain ends are approximately equal distances from the center of the sprockets.
(3) With the control wheels in the neutral position, tighten the secondary cable turnbuckles so that the control wheels are level in the neutral position (synchronized). There must be sufficient tension on the cables, but they must also move freely. Results of turnbuckle adjustment are as follows:
(a) When you loosen the secondary cable turnbuckles and tighten the direct cable turnbuckles at the center of the control yoke, the inboard sides of both control wheels move down.
(b) When you tighten one or both of the primary control cable turnbuckles and loosen the secondary cable turnbuckles at the center of the control yoke, the outboard side of the applicable control wheel will move down.
(4) Put a bar in position and attach it with tape across the two control wheels to hold them in the neutral position.
(5) Adjust the direct cable turnbuckles below the control yoke and the single carry-thru turnbuckle at the aileron bell crank so that the bell crank stop bushings are centered in the two bell crank slots with 40 pounds, +10 or -10 pounds (177.93 N, +44.48 or -44.48 N) of tension at 70 °F (21 °C) on

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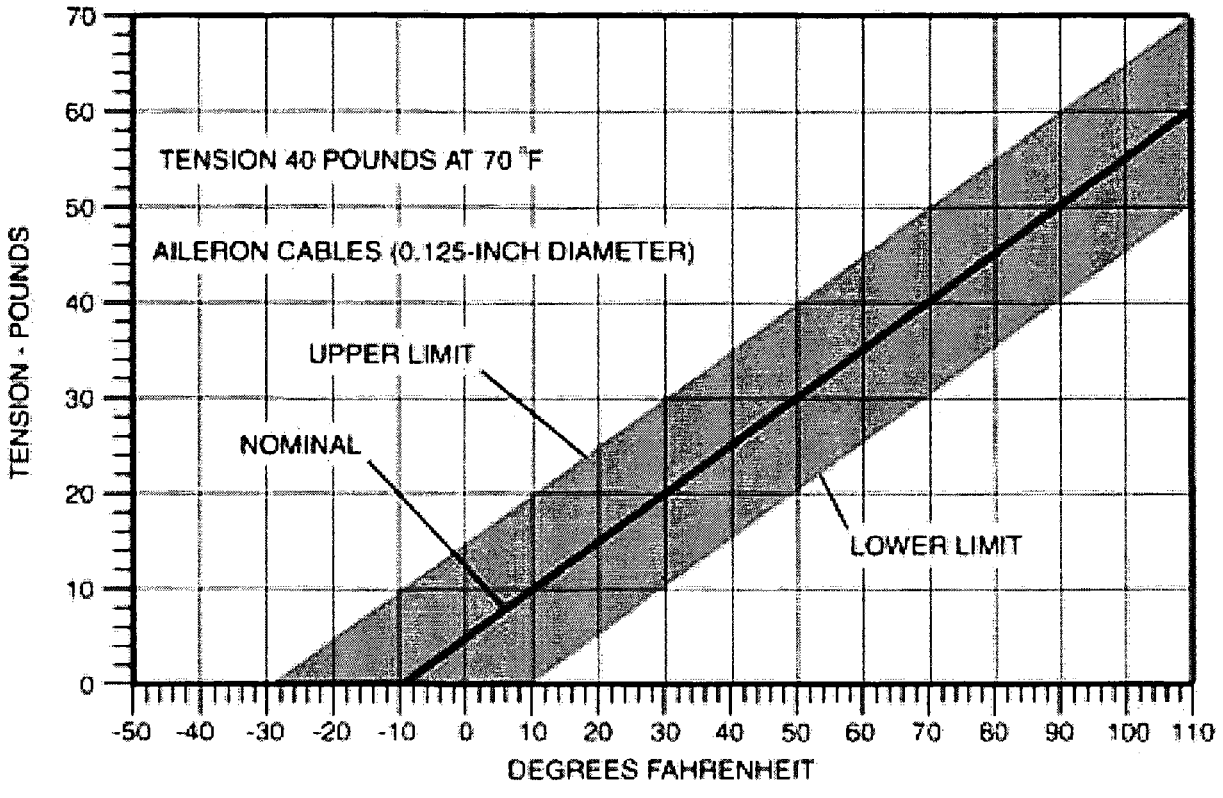

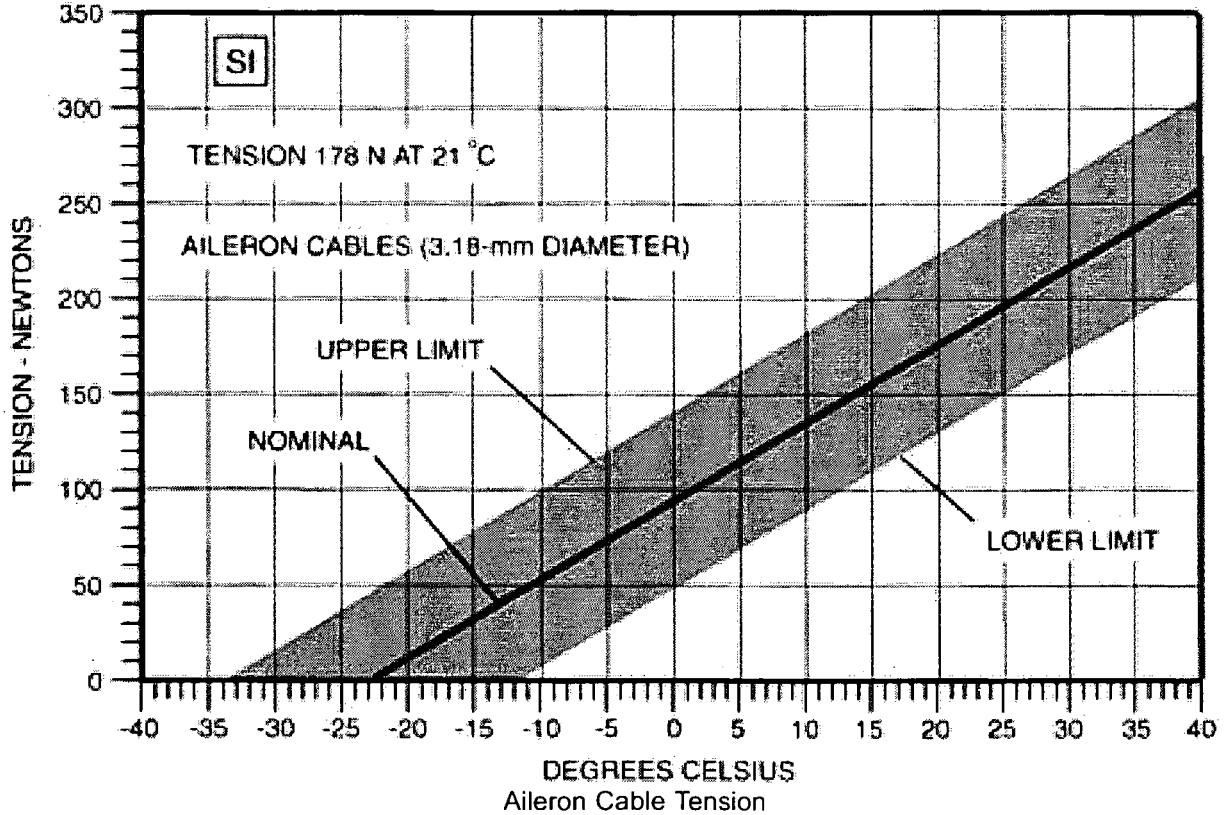

Aileron Cable Tension
Figure 205 (Sheet 1)

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the aileron carry-thru cable. Refer to Figure 205 for the correct tensions at other temperatures. Ignore the tension on the direct cables. This tension will be different than the tension on the carry-thru cable.

(6) Adjust the pushrods at the two ailerons until the ailerons are neutral with reference to the trailing edge of the wing flaps. Be sure that the wing flaps are fully up when you make this adjustment.
(7) Remove the bar from the control wheels.
(8) With an inclinometer, do a check of the ailerons for correct travel. Make adjustments if necessary and make sure that the bushing travel stops are correctly centered in the bell cranks.

NOTE: For aileron rigging specifications, refer to Chapter 6, Airplane Dimensions and Specifications - Description and Operation.

(9) Safety all turnbuckles. Refer to Chapter 20, Safetying - Maintenance Practices.
(10) Install all items that you removed for access.

WARNING: Make sure that the ailerons move in the correct direction when you move the control wheel.

(11) Do a check for the correct travel of the aileron.

6. Cables And Pulleys Removal/Installation

A. Cables and Pulleys Removal.
(1) Remove the access plates, wing root fairings, and upholstery as necessary.
(2) Disconnect the cables from the aileron bell cranks and remove the cable guards and the pulleys as necessary to move the cables free of the aircraft.

NOTE: To ease the routing of cables, a length of wire can be attached to the end of the cable before it is removed from the airplane. Leave the wire in position, installed through the structure; and then attach the cable that you install and use the wire to pull the cable into position.

B. Cables and Pulleys Installation.
(1) Route the cable and install the pulleys and the cable guards.

NOTE: Make sure that the cable is in the correct position in the pulley groove before you install the guard.

(2) Do a rigging of the aileron system.
(3) Safety the turnbuckles.
(4) Install the access plates, fairings, and upholstery.

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RUDDER CONTROL SYSTEM - TROUBLESHOOTING

1. Troubleshooting

A. Actions listed in the Remedy column can be found in Rudder Control System - Maintenance Practices, unless otherwise noted.

TROUBLE	PROBABLE CAUSE	REMEDY
RUDDER DOES NOT RESPOND TO PEDAL MOVEMENT	Broken or disconnected cables.	Connect or replace cables.
BINDING OR JUMPY MOVEMENT OF RUDDER PEDALS	Cables too tight.	Ensure distance from firewall to pivot shaft is 6.50 inches.
	Cables not riding properly on pulleys.	Route cables correctly over pulleys.
	Binding, broken or defective pulleys or cable guards.	Replace defective pulleys and install guards properly.
	Pedal bars need lubrication.	Lubricate as required.
	Defective rudder bar bearings.	If lubrication fails to eliminate binding, replace bearing blocks.
	Defective rudder hinge bushings.	Replace defective bushings.
	Clevis bolts too tight	Readjust to eliminate binding.
	Steering rods not adjusted properly.	Re-rig system. Refer to Rudder Control Adjustment/Test.
LOST MOTION BETWEEN RUDDER PEDALS AND RUDDER	Insufficient cable tension.	Ensure distance from firewall to pivot shaft is 6.50 inches.
INCORRECT RUDDER TRAVEL	Incorrect rigging.	Re-rig system. Refer to Rudder Control Adjustment/Test.

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RUDDER CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General

A. Rudder control is maintained through use of conventional rudder pedals which also control nose wheel steering. The system is comprised of rudder pedals, cables and pulleys, all of which link the pedals to the rudder and nose wheel steering. For an illustration of the rudder system, refer to Figure 201.

2. Rudder Pedal Assembly Removal/Installation

A. Remove Rudder Pedal Assembly (Refer to Figure 201).
(1) Remove upholstery from area below instrument panel as necessary.
(2) Disconnect master cylinders at pilot rudder pedals.
(3) Disconnect parking brake cables at master cylinders.
(4) Remove rudder pedals and brake links.
(5) Relieve cable tension at clevis adjustments.
(6) Disconnect cables, return springs, trim bungee and steering tubes from rudder bars.
(7) Remove bolts securing bearing blocks and work rudder bars out of area below instrument panel.

B. Install Rudder Pedal Assembly (Refer to Figure 201).

NOTE: Rudder bar assemblies should be checked for excessive wear before installation. The bearing blocks are nylon and require no lubrication unless binding occurs. A few drops of general purpose oil should eliminate such binding.

(1) Position rudder bars in area below instrument panel and secure bearing blocks with bolts.
(2) Reconnect cables, return springs, trim bungee and steering tubes to rudder bars.
(3) Set distance from pivot shaft to firewall at 6.50 inches.
(4) Install rudder pedals and brake links.
(5) Connect parking brake cables at master cylinders.
(6) Connect master cylinders at pilot rudder pedals.
(7) Install upholstery to tunnel area as necessary.

3. Rudder Removal/Installation

A. Remove Rudder (Refer to Figure 201).
(1) Disconnect shackles at rudder bellcrank.
(2) Disconnect tail navigation light quick-disconnect at bottom of rudder.
(3) With rudder supported, remove hinge bolts (including electrical bonding strap) and lift rudder free of vertical fin.

B. Install Rudder (Refer to Figure 201).
(1) Install rudder (with electrical bonding strap) to vertical fin. Torque nuts to 50 to 70 inch pounds plus free running torque.
(2) Reconnect tail navigation light quick-disconnect at bottom of rudder.
(3) Attach shackles to rudder bellcrank.

NOTE: Do not over tighten. Shackle must pivot freely.

4. Rudder Control Adjustment/Test

A. Rig Rudder Controls.

NOTE: For rudder travel angles, refer to Chapter 6, Airplane Dimensions and Specifications - Description and Operation.

(1) Using a digital inclinometer, adjust travel stops on rudder to obtain proper rudder travel.

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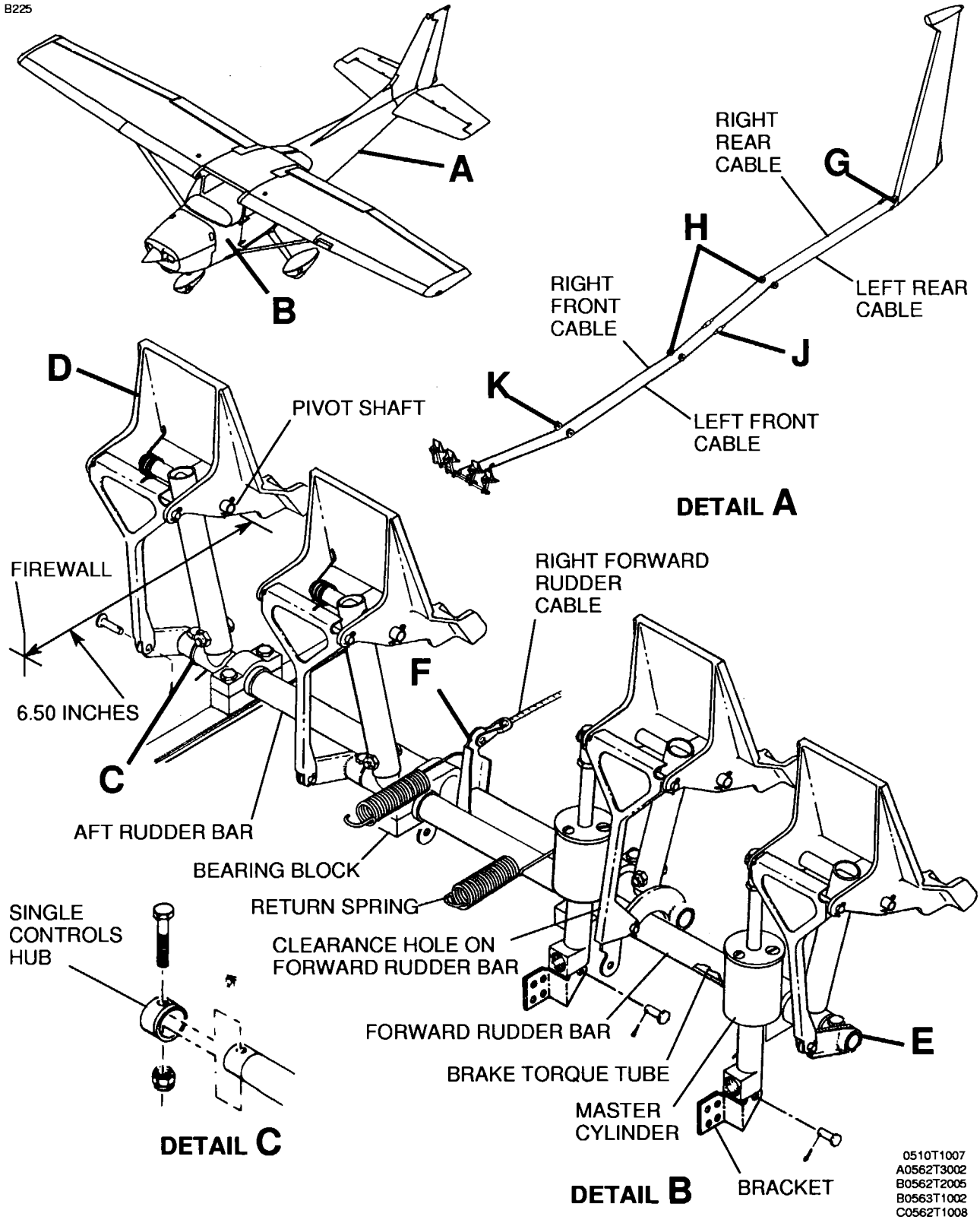

Rudder Control Installation
Figure 201 (Sheet 1)

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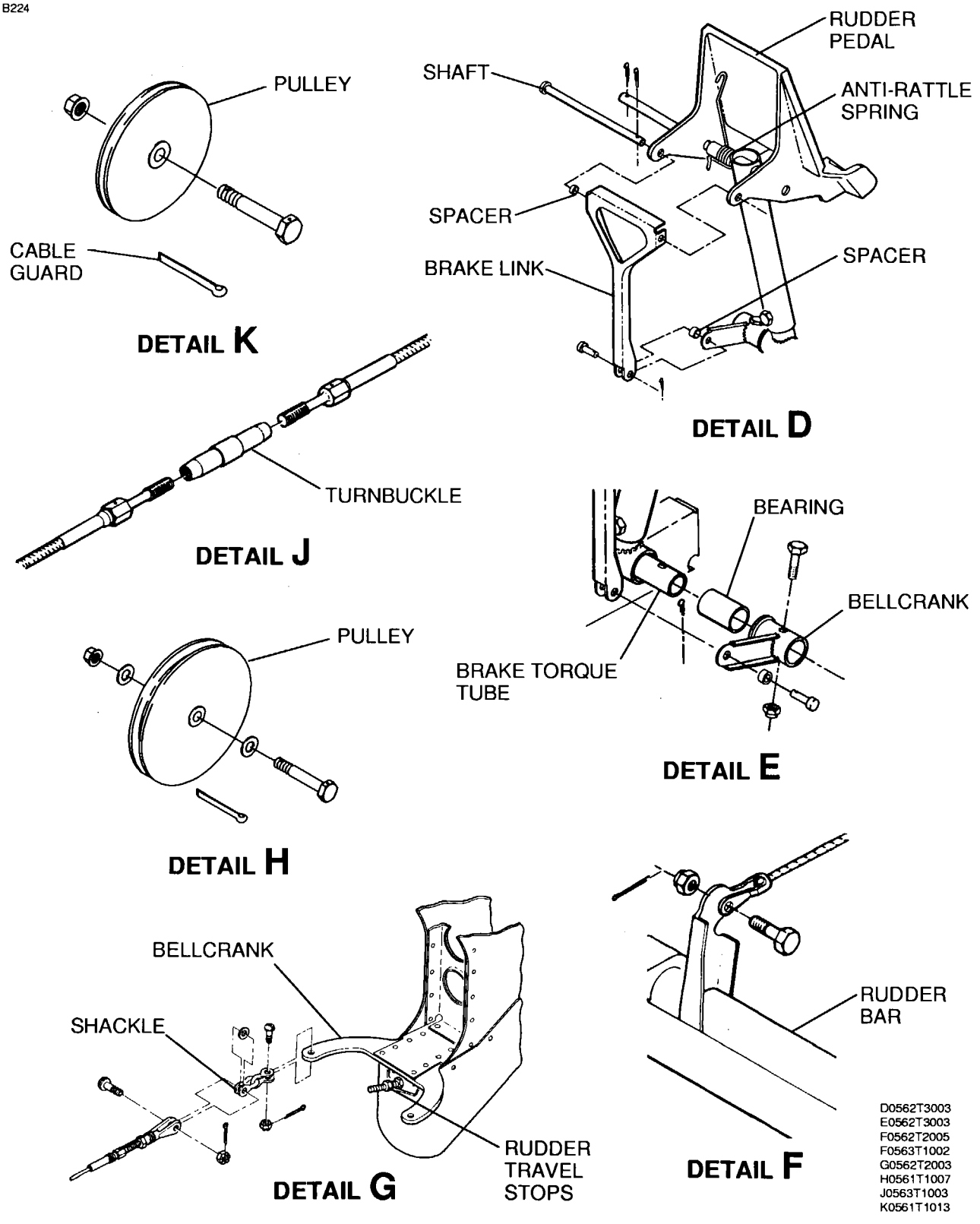

Rudder Control Installation
Figure 201 (Sheet 2)

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(2) As an alternate means of establishing travel limits, refer to Figure 202 in conjunction with the following steps:
   (a) Establish neutral position of rudder by clamping straightedge (such as wooden 2 X 4) on each side of fin and rudder, and blocking trailing edge of rudder half the distance between straightedges as shown in Figure 202.
   (b) Tape a length of soft wire to one elevator in such a manner that it can be bent to index with a point on rudder trailing edge just above the lower rudder tip (disregard fixed trim tab).
   (c) Using soft led pencil, mark rudder at point corresponding to soft wire indexing point (neutral).
   (d) Remove straightedges.
   (e) Hold rudder against right, then left rudder stops. Measure the distance from pointer to pencil mark on rudder in each direction of travel. Distance should be between 5.29 inch and 5.91 inch.

(3) After rudder travel has been established, disconnect nose wheel steering tubes from nose strut.

(4) Establish rudder neutral position by clamping straight edge such as wooden 2x4 on each side of vertical stabilizer and rudder and blocking trailing edge of rudder half the distance between the straightedges.

(5) Adjust cables at clevis to align rudder and pedals in neutral position to 6.50 inches from firewall to pedal pivot shafts. Cable tension is automatically set by return springs on the rudder bar.

NOTE: Due to thickness of insulation of firewall, it is recommended that a piece of 0.0625 inch welding rod be ground to a sharp point and notched at the 6.50 inch dimension. Pierce insulation on firewall and use notch to measure proper dimension.

(6) Tie down or weight tail to raise nose wheel free of ground.

(7) Center nose gear against external stop.

NOTE: Do not compress springs when extending steering tubes.

(8) Extend steering tubes until free play is removed.

(9) Adjust steering tube rod ends to 1.00 inch between steering arm assembly and bolt hole and tighten jam nuts.

(10) Adjust steering tube clevises to align with rod end bearings.

NOTE: Extend steering tubes to seat rods against internal springs, but do not attempt to preload these springs by shortening rod end clevises after alignment. Preload is built into steering tubes.

(11) Install clevises on rod ends.

(12) Safety clevises, remove tail stand and straight edges and install all items removed for access.

WARNING: ENSURE THAT RUDDER MOVES IN CORRECT DIRECTION WHEN OPERATED BY RUDDER PEDALS.

(13) Flight test airplane to determine if ground adjustment of fixed trim tab is necessary.

NOTE: Do not rig rudder off-center unless trim tab does not provide adequate correction.

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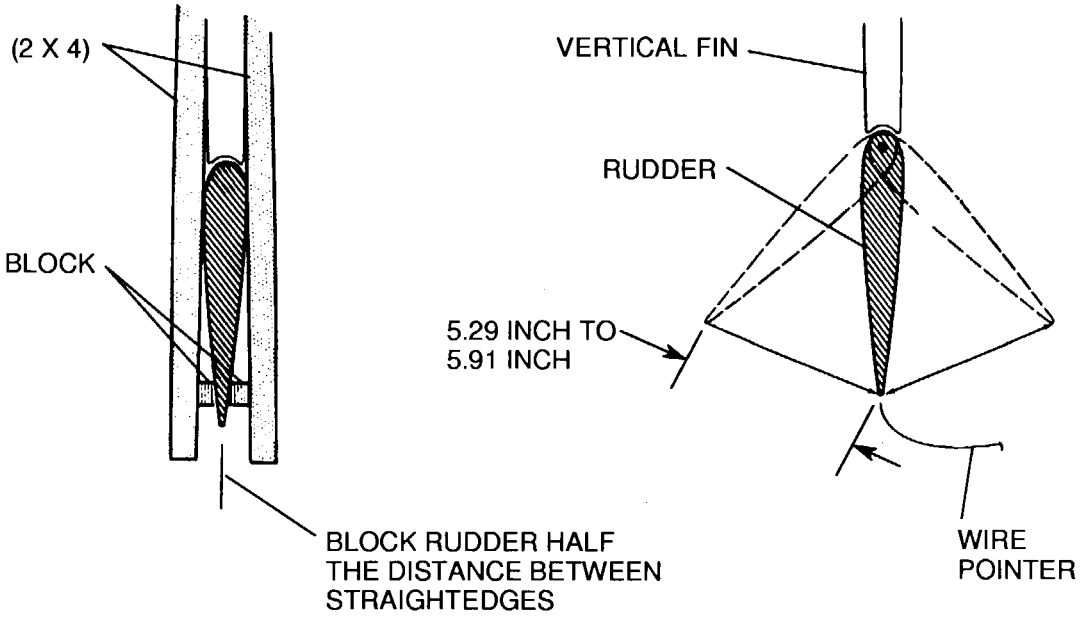
STEP 1: ESTABLISHING NEUTRAL POSITION OF RUDDER.

STEP 2: MEASURING RUDDER TRAVEL.



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Rudder Travel Adjustment
Figure 202 (Sheet 1)

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ELEVATOR CONTROL SYSTEM - TROUBLESHOOTING

1. Troubleshooting

NOTE: Due to remedy procedures in the following troubleshooting chart, it may be necessary to rerig system.

TROUBLE	PROBABLE CAUSE	REMEDY
NO RESPONSE TO CONTROL WHEEL FORE AND AFT MOVEMENT	Forward or aft end of push- pull tube disconnected.	Attach push-pull tube correctly.
	Cables disconnected.	Attach cables and rig system.
BINDING OR JUMPY MOTION FELT IN MOVEMENT OF ELEVATOR SYSTEM	Defective forward or rear bellcrank pivot bearing.	Move to check for play or binding. Replace bellcrank.
	Cables slack.	Adjust to specified tension per rigging procedure.
	Cables not riding correctly on pulleys.	Open access plates and observe pulleys. Route cables correctly over pulleys.
	Nylon bearing on instrument panel binding.	Disconnect universal joint and check for binding. Replace bearing if binding is felt.
	Defective control yoke pivot bearing.	Disconnect elevator push-pull tube at lower end of control yoke and check that control yoke moves freely. Replace bearing if found defective.
	Defective elevator hinges.	Move elevators by hand checking hinges. Replace defective hinges.
	Clevis bolts too tight.	Readjust to eliminate bolt binding.
	Lubrication needed.	Lubricate in accordance with Chapter 12, Flight Controls - Lubrication.
	Defective pulleys or cable guards.	Replace defective parts and install guards properly.
ELEVATORS FAIL TO ATTAIN PRESCRIBED TRAVEL	Stops are incorrectly set.	Check elevator travel with inclinometer. Re-rig system if required.
	Cables tightened unevenly.	Re-rig system.
	Interference at instrument panel.	Re-rig system.

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ELEVATOR CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General

A. The elevators are operated by power transmitted through forward and aft movement of the control yoke. This movement goes to the elevators through a system that has a push-pull tube, cables, and bell cranks. The elevator control cables, at their aft ends, are attached directly to a bell crank that is installed between the elevators. This bell crank connects the elevators, and is a bearing point for the travel stop bolts. A trim tab is installed on the right elevator. For an illustration of the elevator control system, refer to Figure 201.

2. Forward Elevator Bell Crank Removal/Installation

A. Forward Elevator Bell Crank Removal (Refer to Figure 201).
   (1) Remove the front seats and the carpet. Refer to Chapter 25, Front Seats - Maintenance Practices and Interior Upholstery - Maintenance Practices.
   (2) Remove the floorboard access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
   (3) Release the cable tension at the turnbuckles and disconnect the cables from the forward bell crank.
   (4) Disconnect the push-pull tube from the forward bell crank.
   (5) Remove the pivot bolt and remove the forward bell crank.

B. Forward Elevator Bell Crank Installation (Refer to Figure 201).
   (1) Put the forward bell crank in position and install the pivot bolt.
   (2) Connect the push-pull tube to the forward bell crank.
   (3) Install the cables to the forward bell crank and do a rigging of the system. Refer to Elevator Control Adjustment/Test.
   (4) Install the floorboard access panels. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
   (5) Install the seats and the carpet. Refer to Chapter 25, Front Seats - Maintenance Practices and Interior Upholstery - Maintenance Practices.

3. Aft Elevator Bell Crank Removal/Installation

A. Aft Elevator Bell Crank Removal (Refer to Figure 201).
   (1) Remove the rudder. Refer to Rudder Control System - Maintenance Practices.
   (2) Release the cable tension at the turnbuckles and disconnect the cables from the rear bell crank.
   (3) Remove the bolts that attach the elevators to the bell crank.
   (4) Remove the bell crank pivot bolt and slide the bell crank out from between the tube assemblies.

   NOTE: If necessary, remove one of the stabilizer attach bolts for clearance when you remove the bell crank pivot bolt.

B. Aft Elevator Bell Crank Installation (Refer to Figure 201).
   (1) Put the bell crank in position and install the pivot bolt. Replace all components that it was necessary to remove when you removed the aft bell crank.
   (2) Install the bolts that attach the elevators to the bell crank.
   (3) Connect the cables to the rear bell crank and do a rigging of the system. Refer to Elevator Control Adjustment/Test.
   (4) Install the rudder. Refer to Rudder Control System - Maintenance Practices.

4. Elevator Removal/Installation

A. Elevator Removal (Refer to Figure 202).

   NOTE: This procedure is written for the right elevator with the attached trim tab. The left elevator removal/installation is almost the same, but without the trim tab.

   (1) Disconnect the push-pull channel from the elevator trim-tab horn.

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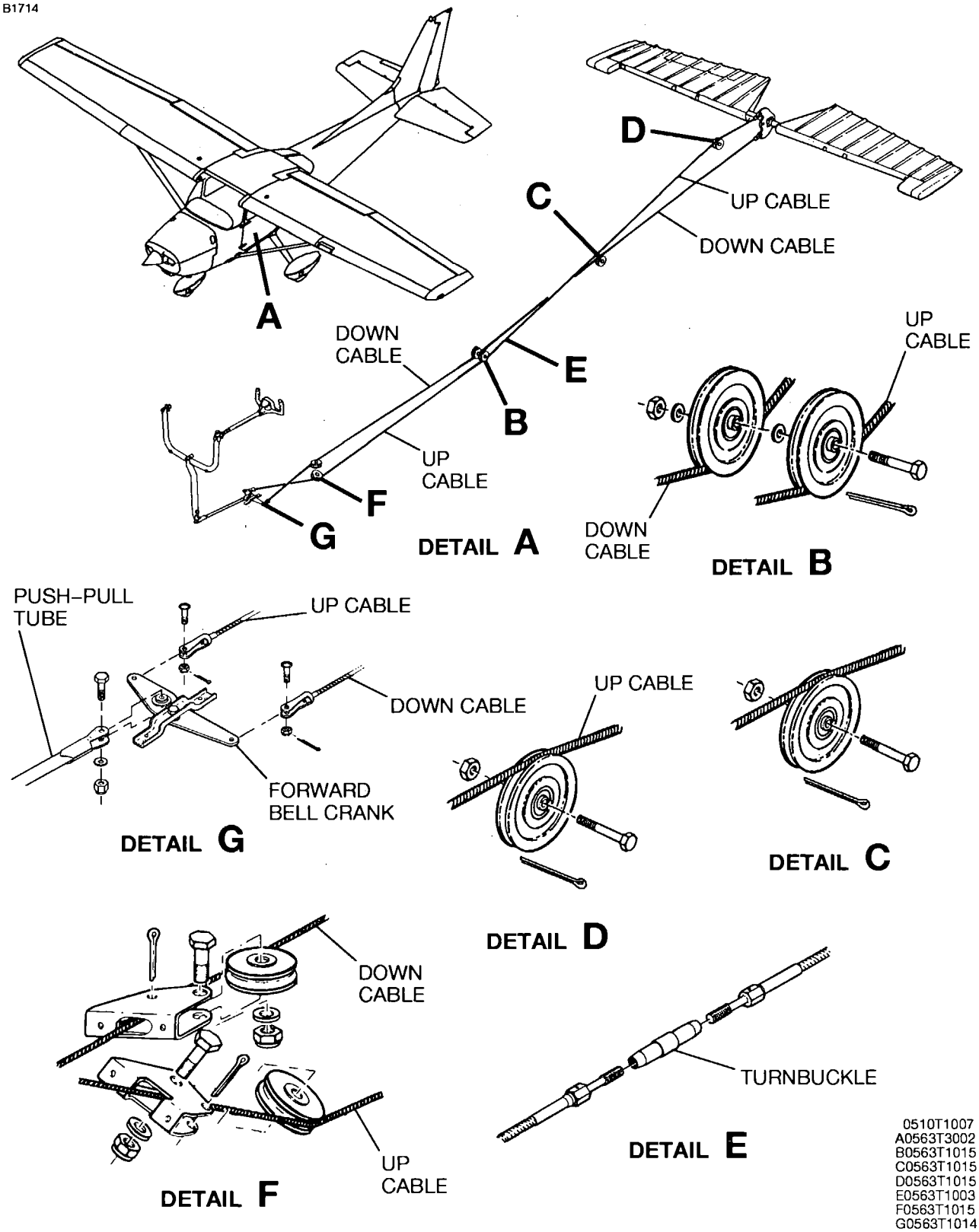

Elevator Control System
Figure 201 (Sheet 1)

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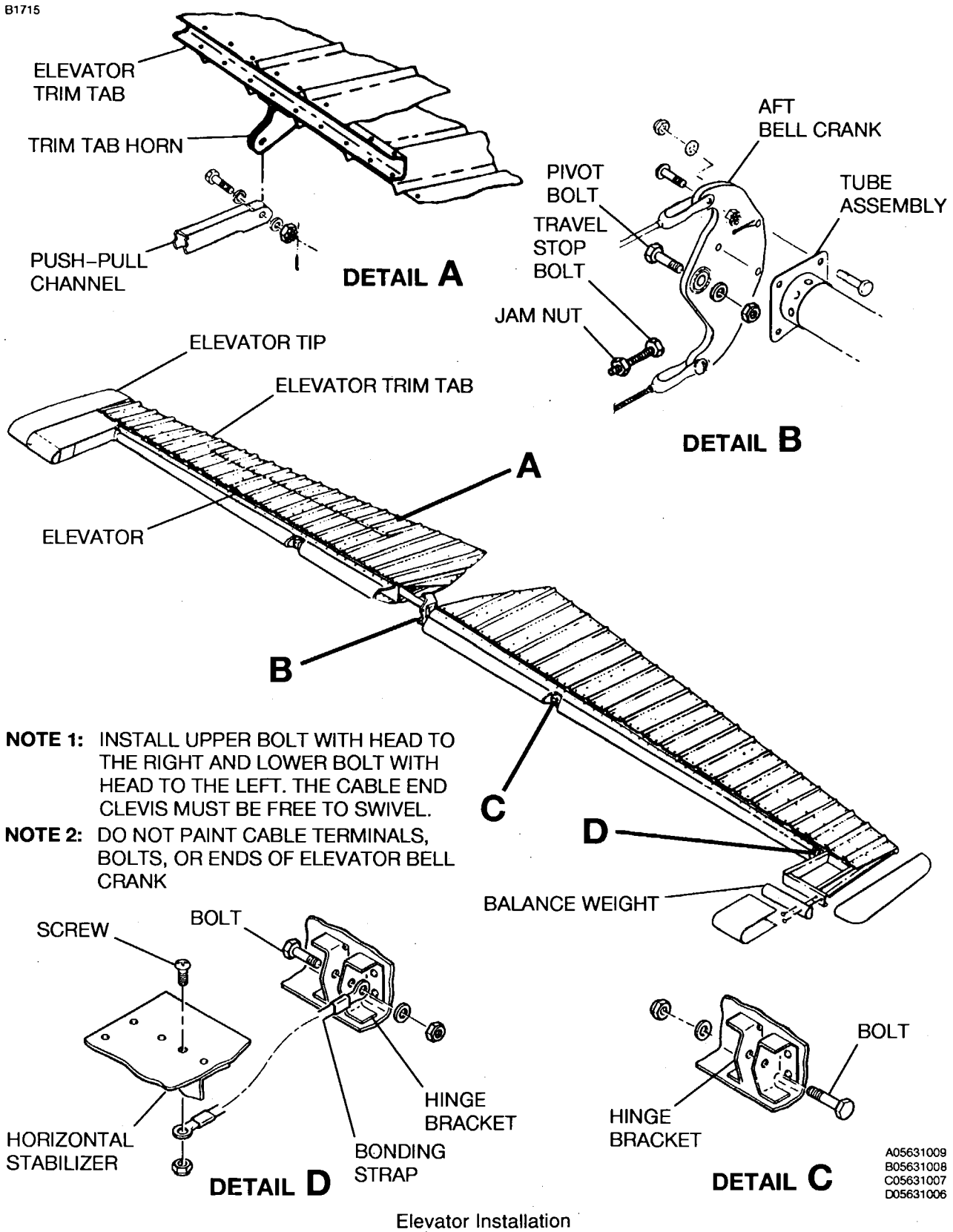

Elevator Installation
Figure 202 (Sheet 1)

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(2) Remove the bolts that attach the tube assembly to the aft bell crank.
(3) With a support for the elevator installed, remove the bolts from the elevator hinge brackets and remove the elevator half.

B. Elevator Installation (Refer to Figure 202).
(1) Attach the elevator to the horizontal stabilizer at the hinge points with the bolts.
(2) Attach the tube assembly of the elevator to the aft bell crank.
(3) Connect the push-pull channel (opening down) to the elevator trim-tab horn.

5. Elevator Control Adjustment/Test

A. Do the rigging of the Elevator (Refer to Figure 202, Figure 203, and Figure 204).
(1) Lock the elevator control in the neutral position with a neutral rigging tool.
(2) Streamline the elevators to neutral with the horizontal stabilizer.

NOTE: Neutral position is measured with the bottom of the elevator balance area flush with the bottom of the stabilizer.

(3) While you hold the elevators in the neutral position, adjust the turnbuckles equally to 30 pounds, +10 or -10 pounds (133.45 N, +44.48 or -44.48 N), of cable tension at 70 °F (21 °C). Refer to Figure 204 for the correct tensions at other temperatures.
(4) Mount an inclinometer on the elevator and as you keep the elevator streamlined with the stabilizer, set the inclinometer to 0 degrees.
(5) Remove the control-column neutral rigging tool and adjust the travel stop bolts to the range of travel in Chapter 6, Airplane Dimensions and Specifications - Description and Operation.
(6) Make sure that the control yoke does not touch the instrument panel in the full UP position or the firewall in the full DOWN position.

WARNING: Make sure that the elevators move in the correct direction when operated by the controls.

(7) Safety the turnbuckles and the travel stop bolts.
(8) Do a check of the remaining elevator control system to make sure that it is correctly attached.
(9) Install all items that you removed for access.

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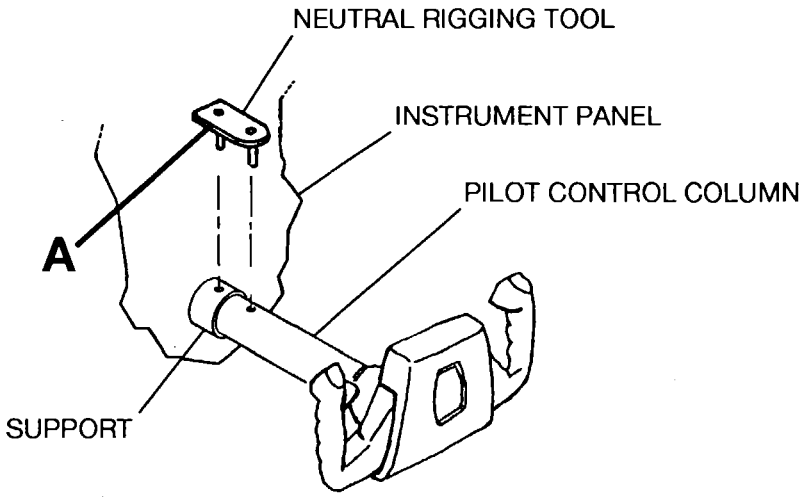

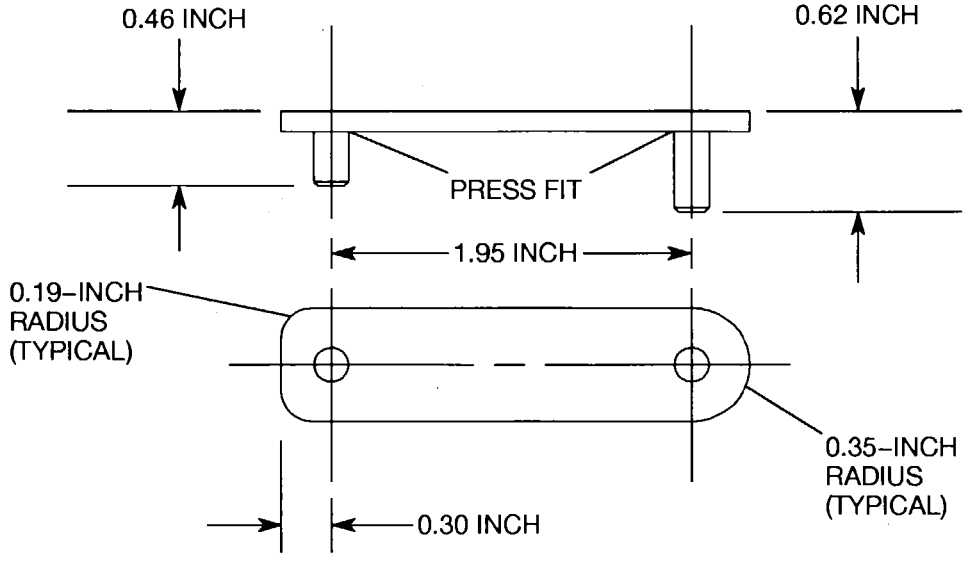

DETAIL A

NOTE: MAKE TOOL FROM 0.125–INCH STEEL PLATE AND 0.209–INCH DIAMETER DRILL ROD.

0560T1005
A0560T1004

Control Column Neutral Rigging Tool
Figure 203 (Sheet 1)

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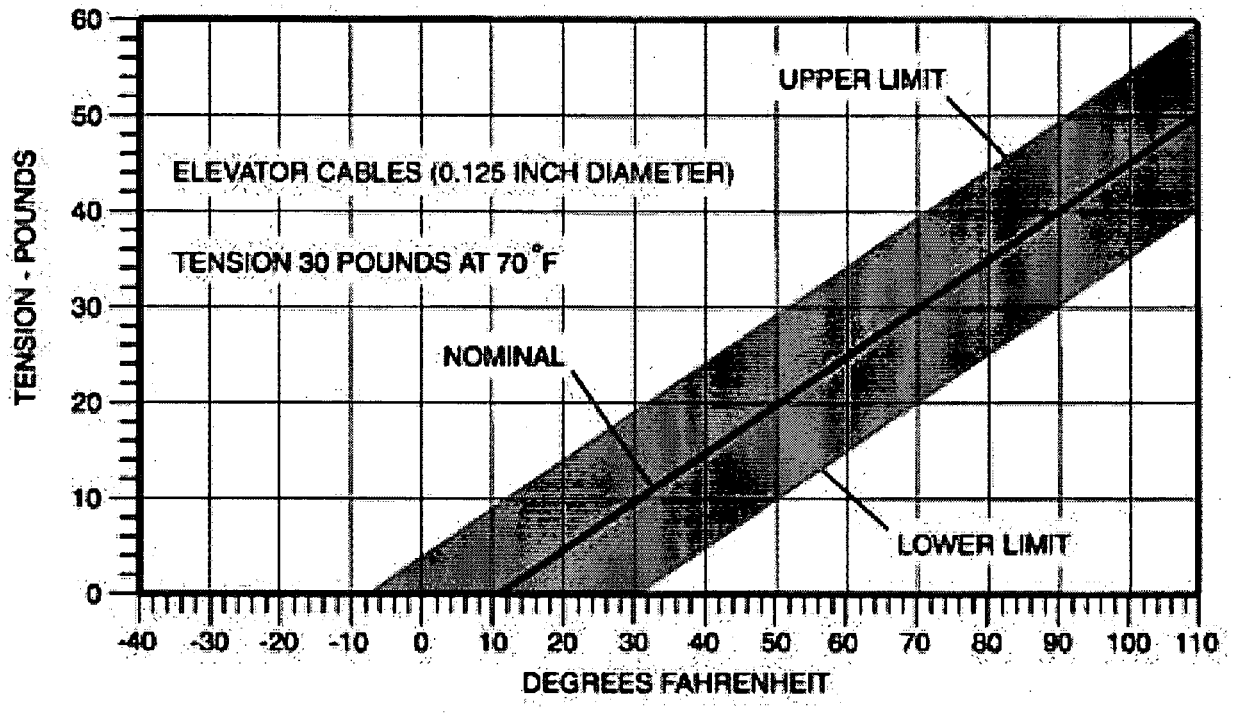
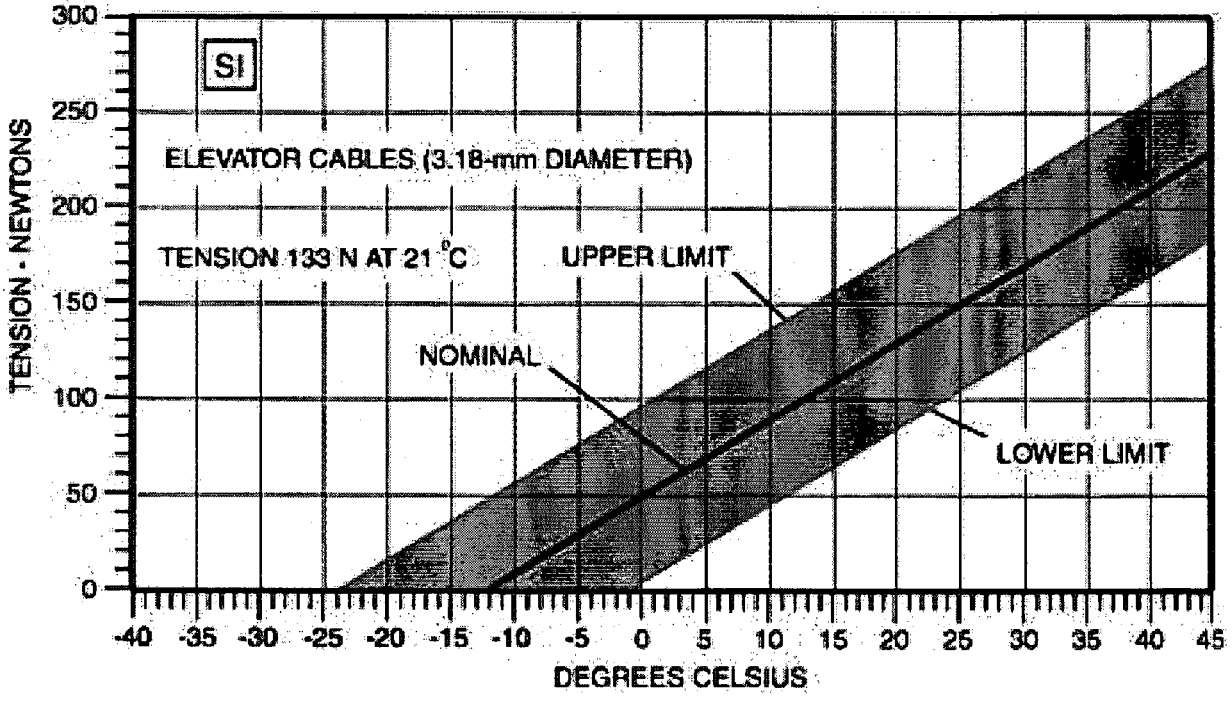
E4201





Elevator Cable Tension
Figure 204 (Sheet 1)

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ELEVATOR TRIM CONTROL - TROUBLESHOOTING

1. Troubleshooting

NOTE: Due to remedy procedures in the following chart, it may be necessary to re-rig the system after trouble has been corrected.

TROUBLE	PROBABLE CAUSE	REMEDY
TRIM CONTROL WHEEL MOVES WITH EXCESSIVE FORCE.	Cable tension too high.	Adjust tension from 15 to 20 foot-Lbs at average temperature for the area.
	Pulleys binding or rubbing.	Repair or replace as necessary.
	Cables not in place on pulley.	Install cables correctly.
	Trim tab hinge binding.	Disconnect actuator and move tab to check resistance. Lubricate or replace hinge as necessary.
	Defective trim tab actuator.	Remove chain from actuator sprocket and operate actuator manually. Replace actuator if defective.
	Rusty chain.	Replace rusty chain.
	Damaged sprocket.	Replace damaged sprocket
	Bent sprocket shaft.	Observe motion of sprockets. Replace bent sprocket shaft.
LOST MOTION BETWEEN CONTROL WHEEL AND TRIM TAB.	Cable tension too low.	Adjust tension from 15 to 20 foot-Lbs at average temperature for the area.
	Broken pulley.	Replace defective pulley.
	Cables not in place on pulleys.	Install cables correctly.
	Worn trim tab actuator.	Remove and replace worn actuator.
	Actuator attachment loose.	Tighten.
TRIM INDICATOR FAILS TO INDICATE CORRECT TRIM POSITION.	Indicator incorrectly engaged on wheel track.	Reset indicator.
INCORRECT TRIM TAB TRAVEL.	Stop blocks loose or incorrectly adjusted.	Adjust stop blocks on cables.

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ELEVATOR TRIM CONTROL - MAINTENANCE PRACTICES

1. General

A. The elevator trim tab on the right elevator is controlled by a trim wheel in the pedestal. Movement to operate the tab goes from the trim control wheel with chains, cables, and an actuator. A mechanical pointer adjacent to the trim wheel shows the tab position. A nose up setting on the trim wheel gives a tab down position. For an illustration of tab system components, refer to Figure 201.

2. Trim Tab Actuator Removal/Installation

A. Trim Tab Actuator Removal (Refer to Figure 201 and Figure 202).
(1) Remove the baggage compartment aft wall for access to the stop blocks for the elevator trim control cable. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

CAUTION: Put a support stand under the tail tiedown ring when you work in the tail of the airplane or the tailcone can fall.

(2) Remove the safety wire and release the cable tension at the turnbuckle.
(3) At the elevator hinge gap, disconnect the push-pull channel from the actuator.
(4) Remove the access plate 320AB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(5) Remove the chain guard.
(6) Remove the chain from the actuator sprocket.
(7) Remove the screws that attach the actuator clamps to the bracket, and carefully work the actuator out through the access opening.

B. Trim Tab Actuator Installation (Refer to Figure 201 and Figure 202).
(1) Put the actuator in position and attach the actuator clamps to the bracket with the screws.
(2) Install the chain to the actuator sprocket.
(3) Install the chain guard.
(4) Install the access plate 320AB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(5) At the elevator hinge gap, connect the push-pull channel to the actuator.
(6) Do the rigging of the trim system. Refer to Trim Tab Control Adjustment/Test.

3. Trim Tab Actuator Disassembly/Assembly

A. Trim Tab Actuator Disassembly (Refer to Figure 203).
(1) Remove the trim tab actuator. Refer to Tim Tab Actuator Removal/Installation.
(2) Turn the screw assembly to loosen and remove it from the actuator.

B. Trim Tab Actuator Assembly (Refer to Figure 203).
(1) If a new bearing is necessary, press it into the boss on the screw assembly. Make sure that the force pushes against the outer race of the bearing.
(2) Install the screw assembly into the actuator as follows:
(a) Pack the internal housing with MIL-G-21164C grease.

NOTE: This supplies the lubrication for the screw assembly.

(b) Install the screw assembly in the housing.
(c) If necessary, clean the unwanted grease from the housing.
(3) Hold the screw assembly and turn the sprocket by hand to do a test of the actuator assembly.

NOTE: The screw assembly must move smoothly in the actuator.

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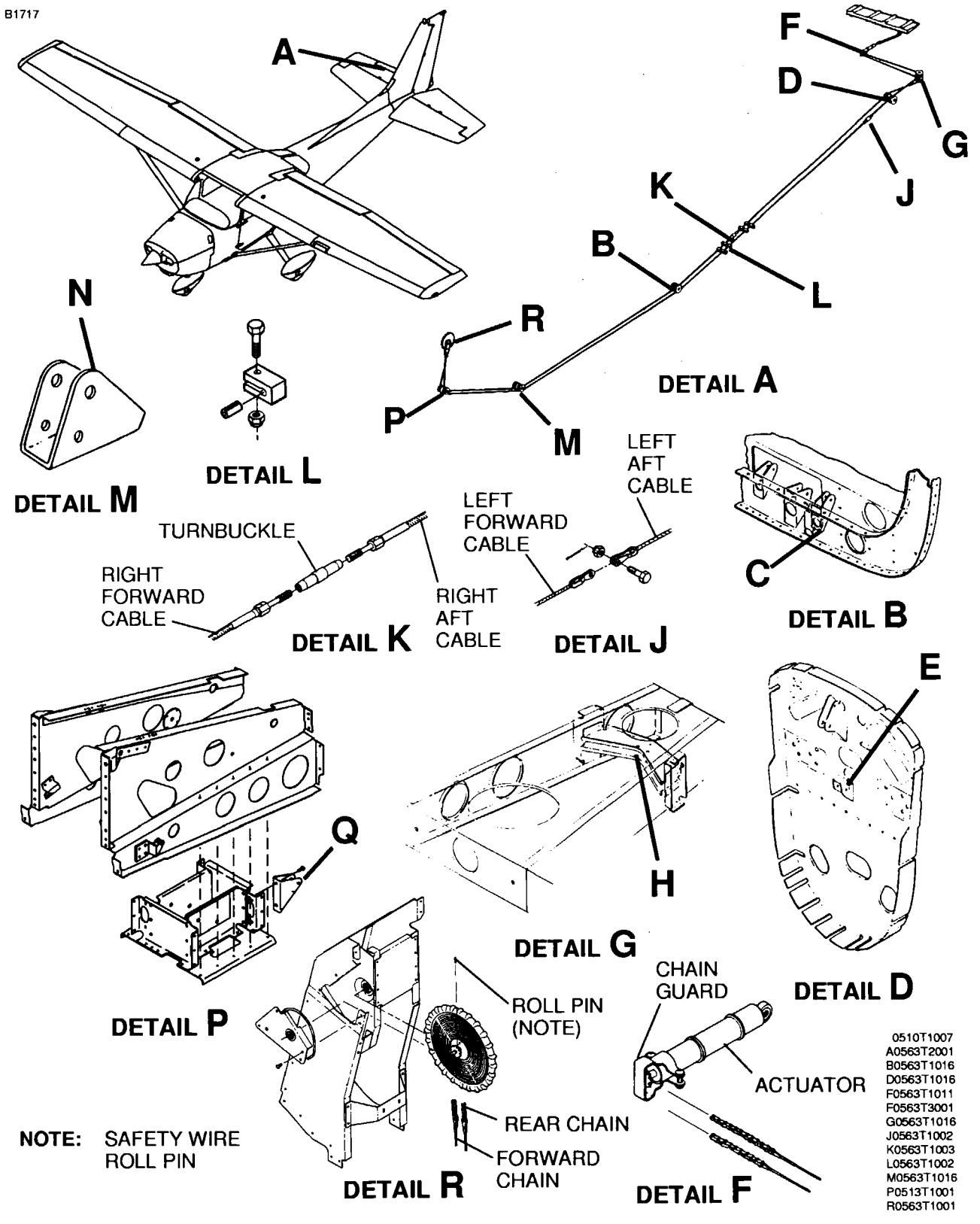

Elevator Trim Tab Control System
Figure 201 (Sheet 1)

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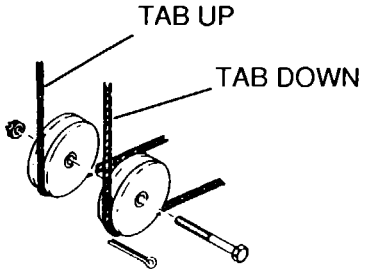
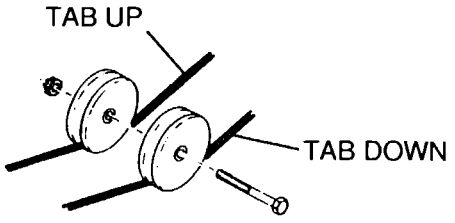
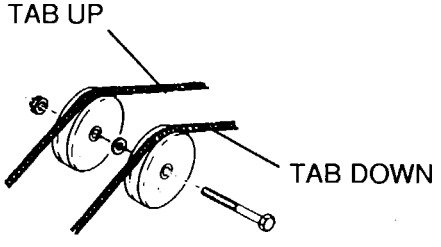


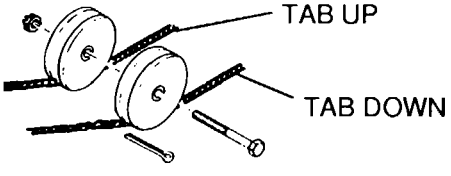
DETAIL Q



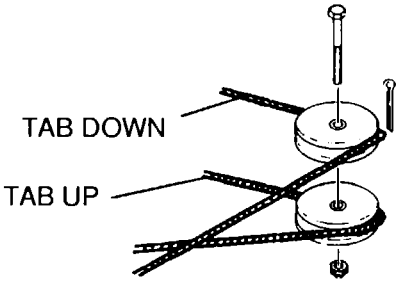
DETAIL C



DETAIL E



DETAIL N



DETAIL H

C0563T1017
E0563T1017
H0563T1017
N0563T1017
Q0563T1017

Elevator Trim Tab Control System
Figure 201 (Sheet 2)

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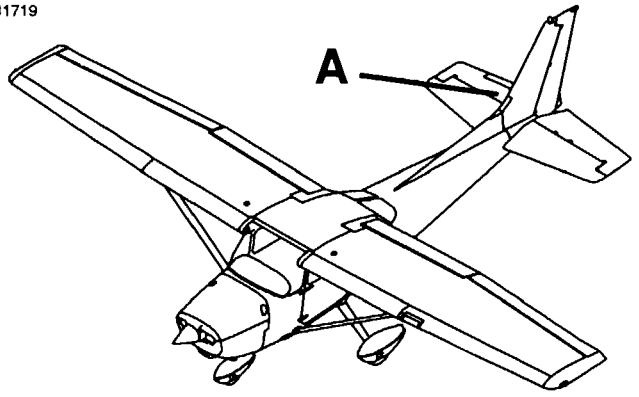

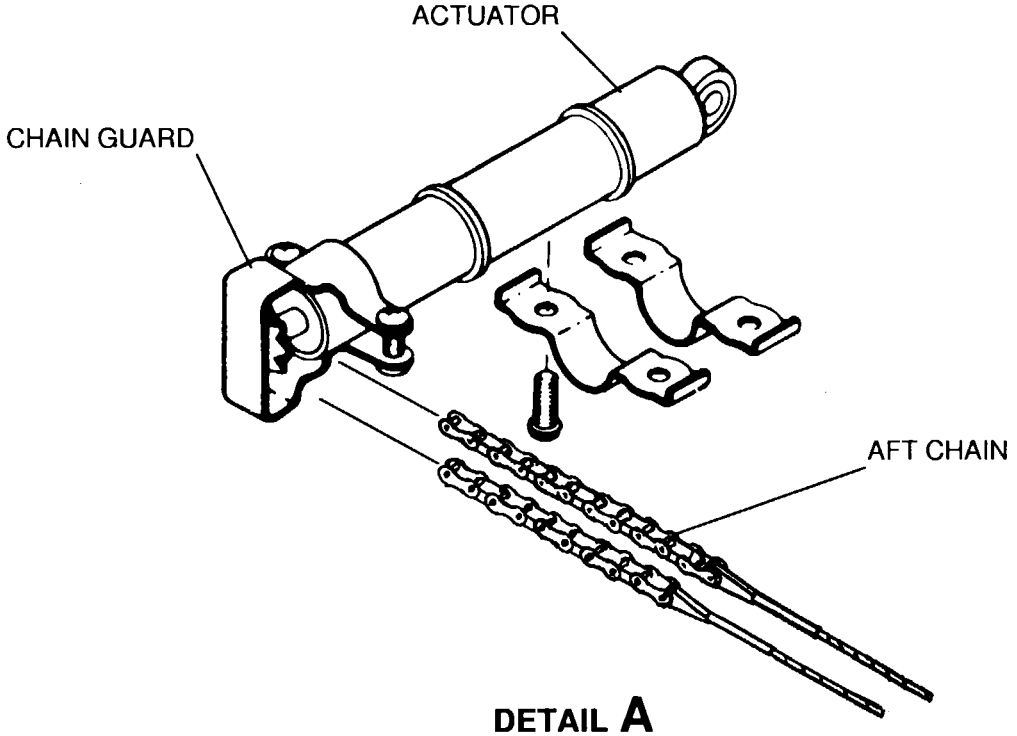

DETAIL A

0510T1007
A0563T1011
A0563T3001

Elevator Trim Tab Actuator Installation
Figure 202 (Sheet 1)

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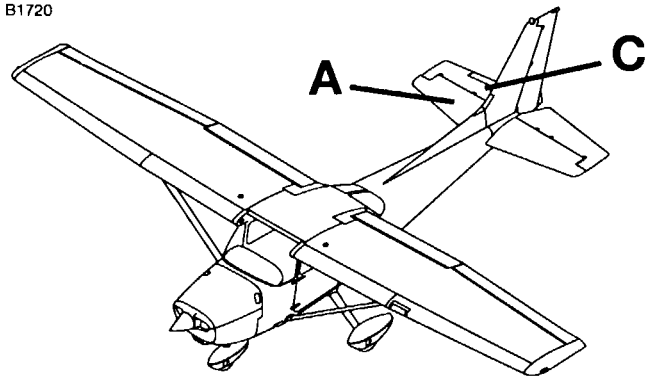

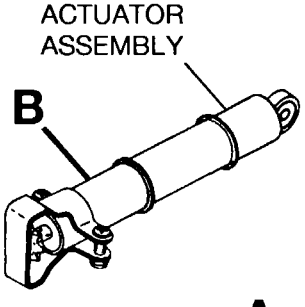

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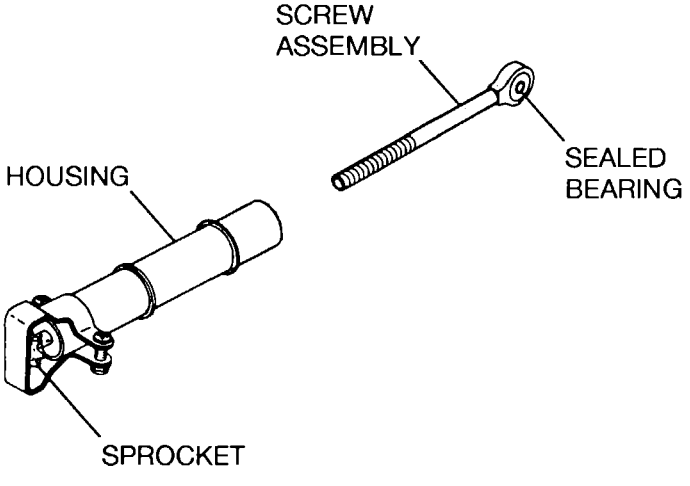

DETAIL B

0510T1007
A0563T1010
B0563T1010

Elevator Trim Tab Actuator Cleaning and Inspection
Figure 203 (Sheet 1)

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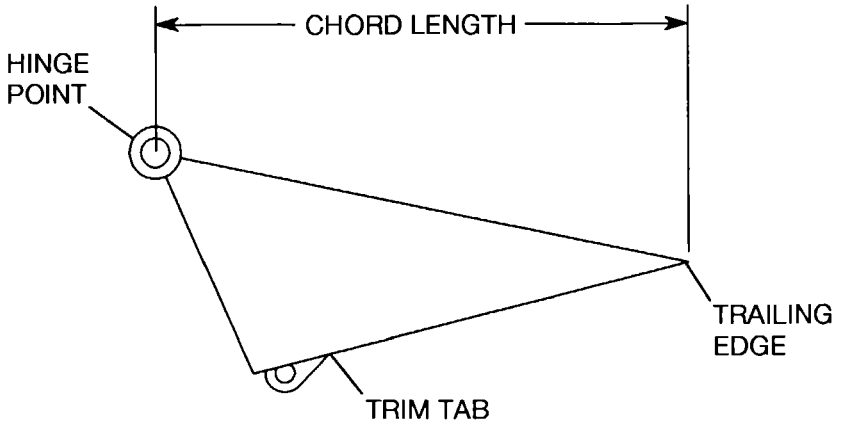
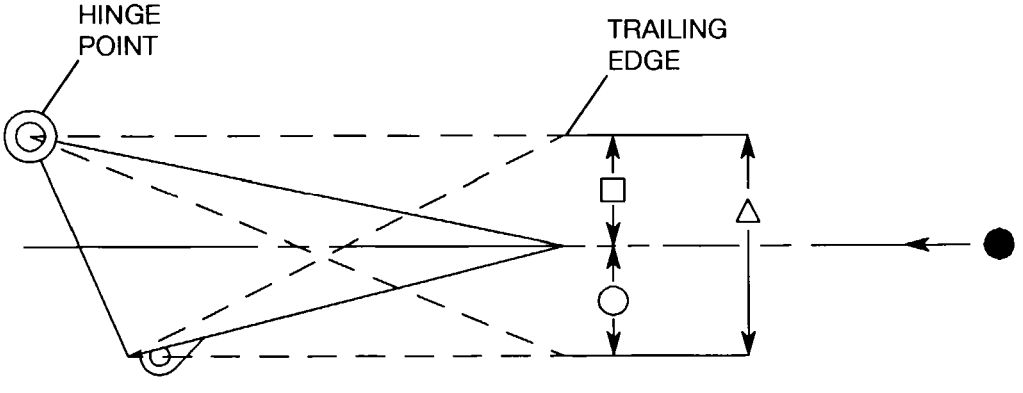


DETAIL C



□ FREE PLAY UP

● NEUTRAL POSITION

○ FREE PLAY DOWN

△ TOTAL FREE PLAY

C0563T1012

Elevator Trim Tab Actuator Cleaning and Inspection
Figure 203 (Sheet 2)

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4. Trim Tab Actuator Cleaning and Inspection

A. Complete a Trim Tab Actuator Cleaning and Inspection (Refer to Figure 203).
(1) Remove the screw assembly from the housing. Refer to Trim Tab Actuator Disassembly/Assembly.
(a) Do not remove the sealed bearing from the screw assembly unless the bearing replacement is necessary.
(2) Wash the screw assembly, except the sealed bearing, in Stoddard solvent or equivalent. Do not clean the sealed bearing.
(3) Examine the sealed bearing and screw assembly for wear and for parts that have scores. Refer to Table 201 for dimensions.

Table 201. Actuator Wear Limits

COMPONENT	MAXIMUM DIMENSION	MINIMUM DIMENSION
Aft End Bearing Inside Diameter	0.249 Inch	0.248 Inch
Screw Assembly Outside Diameter	0.246 Inch (Shank)	0.245 Inch (Shank)

(4) Examine the screw assembly and the screw for threads that have damage or dirt particles that can cause the assembly to operate incorrectly.
(5) Examine the screw assembly sealed bearing for smoothness of operation.
(6) Examine the housing components for stripped threads, cracks, deep nicks, dents, and other signs of damage.
(7) Examine the sprocket for broken, chipped, and/or worn teeth.
(8) Examine the linear free play at the sprocket end of the housing.

NOTE: The linear free play at the sprocket end must not be more than 0.010 inch maximum.

(a) If the free play is more than the permitted limits, replace the actuator.
(9) Do not try to repair the actuator assembly parts that have damage or wear.
(10) Install the screw assembly into the housing. Refer to Trim Tab Actuator Disassembly/Assembly.

5. Trim Tab Free Play Inspection

A. Do an Inspection for Trim Tab Free Play (Refer to Figure 203).
(1) Put the elevator and trim tab in the neutral position and keep the elevator from movement with the elevator gust lock.
(2) Find the maximum amount of permitted free play.
(a) Measure the chord length at the inboard end of trim tab as shown in Detail C.
(b) Multiply the chord length by 0.025 to get the maximum permitted free play.
(c) Measure the free play at the same point on the trim tab that the chord length was measured.
(d) Make sure that the total free play is not more than the maximum permitted free play.
(3) Use a moderate hand pressure (up and down) to measure the free play at the trailing edge of the trim tab.
(4) If the trim tab free play is less than the maximum permitted free play, the system is in the permitted limits.
(5) If the trim tab free play is more than the maximum permitted, examine the items that follow for looseness while you move the trim tab up and down.
(a) Examine the push-pull channel to trim tab horn assembly attachment for looseness.
(b) Examine the push-pull channel to actuator assembly threaded rod end attachment for looseness.
(c) Examine the actuator assembly threaded rod end for looseness in the actuator assembly.
(6) If looseness is apparent in the push-pull channel to trim tab horn assembly attachment or the push-pull channel to actuator assembly threaded rod end attachment, repair with the installation of new parts.

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(7) If looseness is apparent in the actuator-assembly threaded rod end, the screw assembly is out of tolerance and you must replace it.

6. Trim Tab Control Wheel Removal/Installation

A. Trim Tab Control Wheel Removal (Refer to Figure 204).
(1) Release the cable tension at the turnbuckle.
(2) Remove the pedestal cover.
(3) Remove the screws that attach the control wheel retainer.
(4) Remove the retainer and the pointer. Hold the trim control wheel securely.

B. Trim Tab Control Wheel Installation (Refer to Figure 204).
(1) Install the retainer and the pointer with the screws.
(2) Install the pedestal cover.
(3) Set the cable tension at the turnbuckle. Refer to Trim Tab Control Adjustment/Test.

7. Trim Tab Control Adjustment/Test

CAUTION: Put a support stand under the tail tiedown ring when you do work in the tail of the airplane or the tailcone can fall.

A. Set Trim Tab Control Cable Tension (Refer to Figure 205 and Figure 206).
(1) Remove the rear baggage compartment panel and the access plates as necessary.
(2) Loosen the travel stop blocks on the cables.
(3) Disconnect the actuator from the trim tab push-pull channel.
(4) Adjust the turnbuckle as necessary to get 15 to 20 pounds (66.72 to 88.96 N) of cable tension at 70°F (21°C). Refer to Figure 206 for the correct tensions at other temperatures.

NOTE: For the installation of chains or cables, let the actuator screw turn freely, as chains and cables are connected.

(5) Turn the trim wheel full forward. Make sure that the pointer does not limit wheel movement. If necessary, move the pointer with a thin screwdriver to pry the trailing leg of the pointer out of the groove.
(6) With the elevator and the trim tab in the neutral position, put an inclinometer on the tab and set it at zero.
(7) Turn the actuator screw in or out as necessary to put the tab up with a maximum of two degrees overtravel, with the actuator screw connected to the push-pull channel.
(8) Turn the trim wheel to put the tab up and down, and adjust the actuator screw as necessary to get overtravel in the two directions.
(9) Put the stop blocks in position (standard configuration) (Refer to Figure 205).
(a) With the elevators in the neutral position, set the trim tab to neutral (streamlined).
(b) Put the stop blocks (2) and (3) approximately 0.25 inch forward and aft of the turnbuckle and attach it to cable A.
(c) Put the inclinometer on the trim tab and run the tab to DOWN TRAVEL limit of 19 degrees, +1 or -0 degree.
(d) Put the stop block (4) against the stop block (3) and attach it to cable B.
(e) Run the trim tab to UP TRAVEL limit of 22 degrees, +1 or -0 degree, place stop block (1) against the stop block (2) and attach it to cable B.
(10) Put the stop blocks in position (configuration with optional dual-axis autopilot) (Refer to Figure 205).
(a) With the elevators in the neutral position, set the trim tab to neutral (streamlined).
(b) Put the stop block (3) approximately 1.0 inch forward of the turnbuckle, and attach it to cable A.
(c) Put the inclinometer on the trim tab and run the tab to UP TRAVEL limit of 22 degrees, +1 or -0 degree.
(d) Put the stop block (2) against the stop block (3) and attach it to cable B.
(e) Run the trim tab to DOWN TRAVEL limit of 19 degrees, +1 or -0 degree, place the stop block (1) against the stop block (2) and secure it to cable A.

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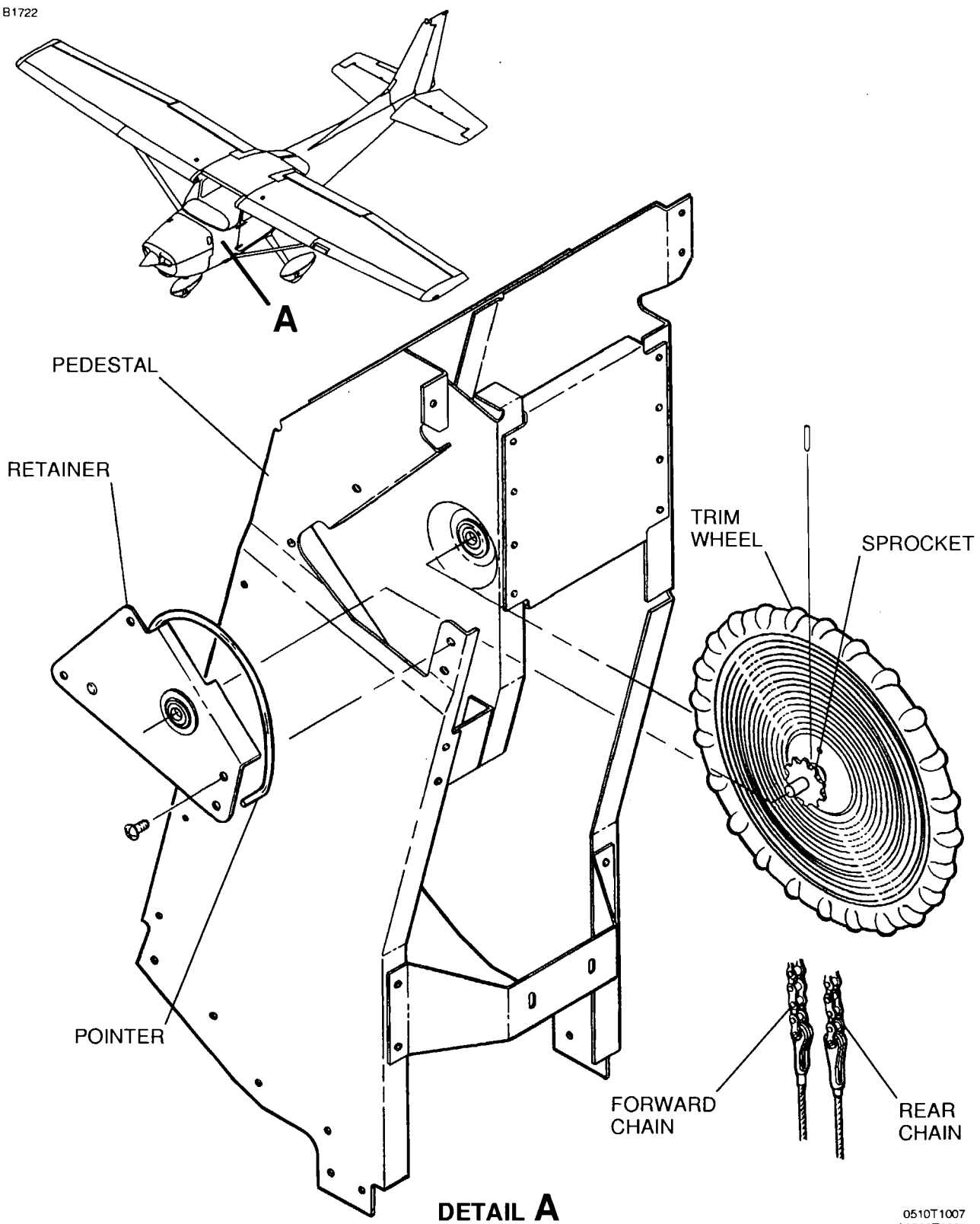

Elevator Trim Tab Wheel Installation
Figure 204 (Sheet 1)

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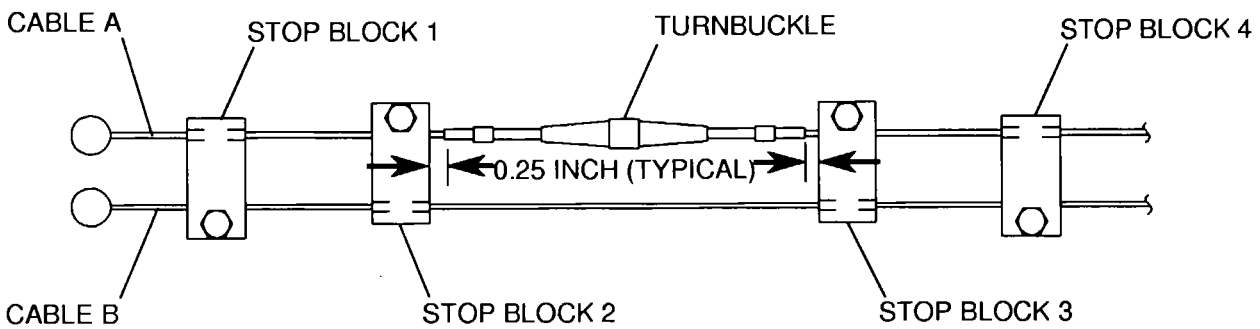

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Elevator Trim Tab Travel Adjustment
Figure 205 (Sheet 1)

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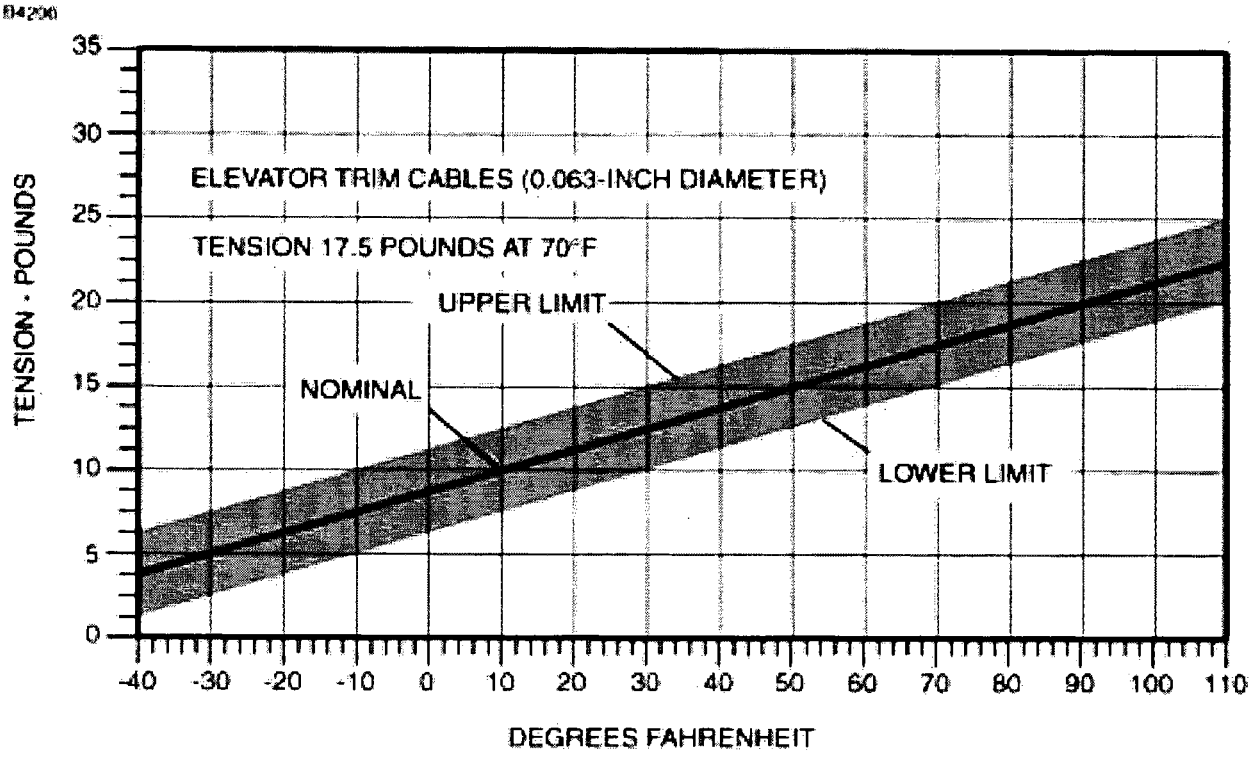

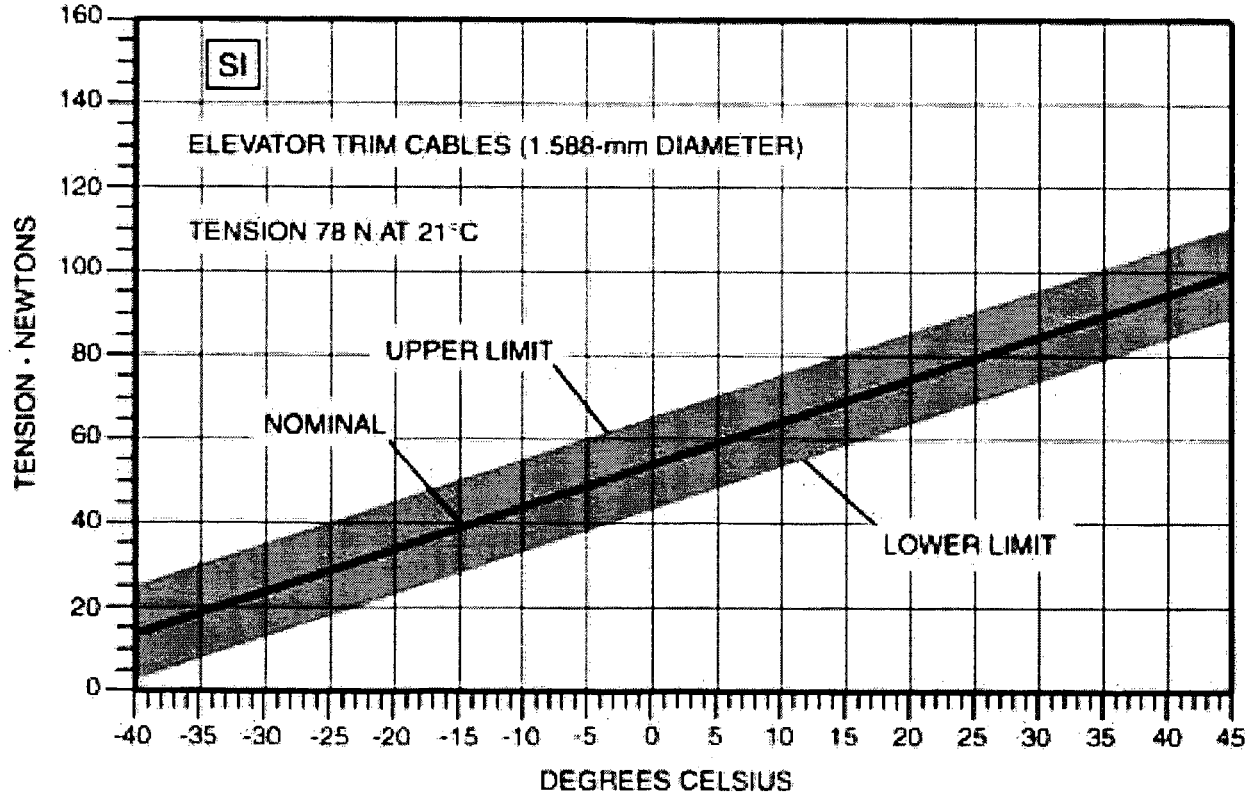

Elevator Trim Cable Tension
Figure 206 (Sheet 1)

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(f) Do a check of the pitch trim rigging.
1 Streamline the elevator and the trim tab. Put an inclinometer to the trim tab and set it to 0 degrees. Manually move the trim tab to up and down limits and record the limits of travel.
2 Put an observer at the bottom aft access opening in the tailcone. Apply power to the aircraft and move the electric trim to full nose-up position until the observer sees clutch slippage. With the servo clutch still slipping, apply an additional quarter turn of the manual trim wheel nose-up (test load condition).
3 In this condition, the observer must make sure that the stop blocks do not slip on the trim tab cables.
4 Release the trim wheel and disengage the autopilot. Manually move the trim to full nose-up position and do a check of the trim tab deflection with an inclinometer. Additional trim tab deflection (compared with the values that you recorded) shows slippage of the stop blocks.
5 Do a rigging of the trim system.
6 Measure the torque on the stop block bolts and then do the check of the pitch trim rigging
7 If the swaged ball needs adjustment, move the cable assembly chain on the gear teeth of the actuator sprocket to make the adjustments. One chain link corresponds to approximately 17 degrees of travel on the capstan. Tension the cable and do the check of the pitch trim rigging again.
8 Do this procedure again for the full nose-down trim condition.

(11) Make sure that the trim wheel pointer travels the same distance from the ends of the slot in the cover. If necessary, move the trailing leg of the pointer.

WARNING: Make sure that the trim tab moves in the correct direction when you operate it with the trim wheel. The nose down trim corresponds to the tab up position.

(12) Safety the turnbuckle and install all items removed to get access to the components.

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STALL WARNING SYSTEM - MAINTENANCE PRACTICES

1. General

A. The stall warning system includes a stall warning horn and a scoop assembly. The stall warning horn is found on the inside of the cabin, behind the door post molding and to the outboard side of the pilot, on the fuselage rib. The scoop assembly is installed on the leading edge of the left wing at WS 91.25.

B. The scoop assembly is operated by airflow over the surface of the wing. There is an internal reed that will make a warning sound when the airspeed is approximately 4.5 to 9.0 knots faster than the airplane stall speed.

2. Scoop Assembly Removal/Installation

A. Remove the scoop assembly (Refer to Figure 201).
(1) Remove the screws that attach the wing strut fairing to the wing.
(2) Move the wing strut fairing to the center of the strut.
(3) Remove the access panel (510CB).
(4) Remove the screws from the outside of the wing that attach the scoop assembly to the inside wing skin.
(5) Remove the clamp that connects the scoop assembly to the tube.
(6) Remove the scoop assembly from the airplane through the access panel (510CB).

B. Install the scoop assembly (Refer to Figure 201).
(1) Put the scoop assembly in position against the wing skin through the access panel (510EB).
(2) Attach the tube to the scoop assembly with the clamp.
(3) Attach the scoop assembly to the inside of the wing skin with screws.
(4) Install the access panel (510CB).
(5) Move the wing strut fairing so that it is against the bottom of the wing.
(6) Install the screws that attach the wing strut fairing to the wing.

3. Stall Warning Horn Removal/Installation

A. Remove the stall warning horn (Refer to Figure 201).
(1) Remove the scoop assembly. Refer to Scoop Assembly Removal/Installation.
(2) Remove the doorpost molding (LH). Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(3) Remove the access panels (510AB and 510BB) from the wing.
(4) Remove the clamps and brackets from the tube through the access panels (510AB and 510BB).
(5) Carefully remove the stall warning horn and tube from the wing through the cabin.

B. Install the stall warning horn (Refer to Figure 201).
(1) Put the tube and stall warning horn into the wing through the upper door post shield.
(2) Install the clamps and brackets on the tube through the access panels (510AB and 510BB).
(3) Install the access panels (510AB and 510BB).
(4) Install the door post molding (LH). Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(5) Install the scoop assembly. Refer to Scoop Assembly Removal/Installation.

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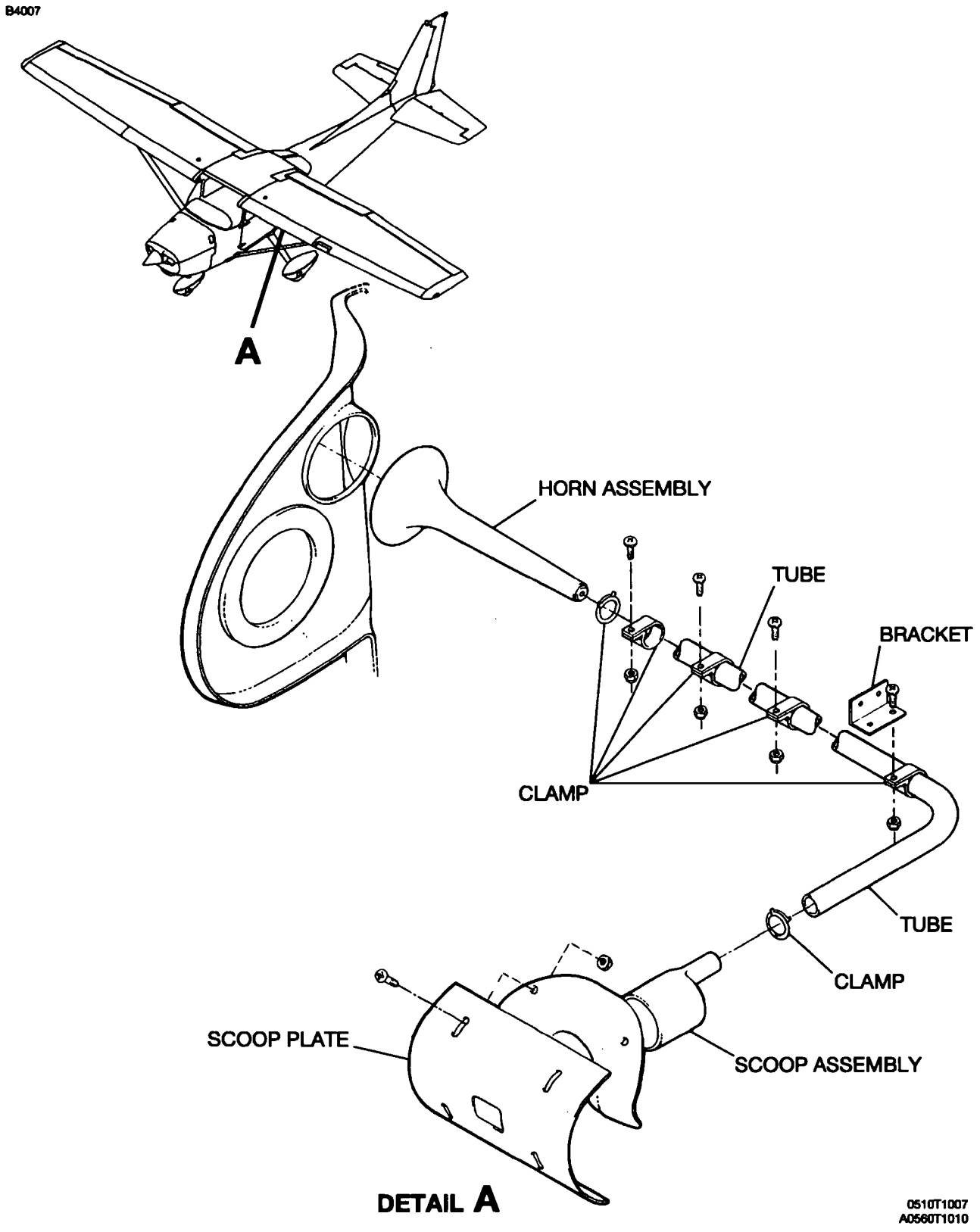

Stall Warning System Installation
Figure 201 (Sheet 1)

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FLAP CONTROL SYSTEM - TROUBLESHOOTING

1. Troubleshooting

NOTE: Due to remedy procedures in the following chart, it may be necessary to re-rig the system after trouble has been corrected.

TROUBLE	PROBABLE CAUSE	REMEDY
BOTH FLAPS FAIL TO MOVE	Open circuit breaker.	Reset and check continuity. Replace breaker if defective.
	Defective switch.	Place jumper across switch. Replace if defective.
	Defective motor.	Remove and bench test motor. Replace if defective.
	Broken or disconnected wires.	Run a continuity check of wiring. Connect or repair wiring.
	Defective or disconnected transmission.	Connect transmission. Remove, bench test and replace transmission if defective.
	Defective limit switch.	Check continuity of switches. Replace switches found defective.
BINDING IN SYSTEM AS FLAPS ARE RAISED AND LOWERED.	Cables not riding on pulleys.	Check visually. Route cables correctly over pulleys.
	Bind in drive pulleys.	Check drive pulleys in motion. Replace drive pulleys found defective.
	Broken or binding pulleys.	Check pulleys for free rotation or breaks. Replace defective pulleys.
	Frayed cable.	Check visually. Replace defective cable.
	Flaps binding on tracks.	Observe flap tracks and rollers. Replace defective parts.
LEFT FLAP FAILS TO MOVE	Disconnected or broken cable.	Check cable tension. Connect or replace cable.
	Disconnected push-pull rod.	Check visually. Attach push- pull rod.
INCORRECT FLAP TRAVEL	Incorrect rigging.	Rig correctly. Refer to Flap Control System Adjustment/Test.
	Defective operating switch.	Check continuity of switches. Replace switches found defective.

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TROUBLE	PROBABLE CAUSE	REMEDY
FLAPS FAIL TO RETRACT	Defective or disconnected flaps UP operating switch.	Check continuity of switch. Connect or replace switch.
FLAPS FAIL TO EXTEND	Defective or disconnected flaps DOWN operating switch.	Check continuity of switch. Connect or replace switch.

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FLAP CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General

A. The wing flap control system has an electric motor and transmission assembly, drive pulleys, push-pull rods, cables, and a follow-up control. Power from the motor and the transmission assembly goes to the flaps by a system of drive pulleys, cables, and push-pull rods. Electrical power to the motor is controlled by two microswitches mounted on a floating arm assembly, a cam lever, and a follow-up control. As the flap control lever moves to the necessary flap setting, the attached cam activates one of the microswitches, and that activates the flap motor. As the flaps move to the necessary position, the floating arm is turned by the follow-up control until the active microswitch clears the cam. The circuit breaks and the motor stops. To move the flap in the opposite direction, the control lever is moved in the opposite direction. This causes the cam to activate the second microswitch, which changes the direction of the flap motor. The follow-up control moves the cam until it is clear of the second switch, which stops the flap motor. Limit switches at the flap actuator assembly control flap travel as the flaps get to the full UP or DOWN position.

B. For a schematic of the flap system, refer to Figure 201.

2. Flap Motor and Transmission Assembly Removal/Installation

A. Flap Motor and Transmission Assembly Removal (Refer to Figure 202).
(1) Lower the flaps.
(2) Disconnect the electrical power.
(3) Remove the access plate 610GB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(4) Remove the bolt that attaches the actuating tube to the drive pulley.
(5) Turn the actuating tube in toward the transmission as far as possible by hand.
(6) Remove the bolt that attaches the flap motor hinge to the wing.
(7) Keep the brass washer that is installed between the hinge and the wing structure.
(8) Disconnect the electrical connectors from the motor and the limit switches.
(9) Carefully move the assembly from the wing through the access opening.

B. Flap Motor and Transmission Assembly Installation (Refer to Figure 202).
(1) Carefully move the assembly into the wing through the access opening.

NOTE: If the hinge assembly was removed from the transmission, make sure that the short end of the hinge is installed toward the top.

(2) Connect the electrical connectors to the motor and the limit switches.
(3) Attach the flap motor hinge to the wing with the bolt and the brass washer.
(4) Turn the actuating tube out toward the bell crank.
(5) Install the bolt that attaches the actuating tube to the drive pulley.
(6) Install the access plate 610GB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(7) Connect the electrical power.
(8) Do an operational check of the flaps. Refer to Flap System Adjustment/Test for the rigging instructions.

3. Flap Removal/Installation

A. Flap Removal (Refer to Figure 202).
(1) Make sure that the flap track slot width is 0.5735 inch +0.03 or –0.03 inch. If the width of the flap track slot is not in these limits, you must replace the flap track.
(2) If necessary, apply 3M Y8671 (or equivalent) polyurethane tape to the upper flap skins. The upper flap skins must not rub against the wing trailing edge.
(3) Put the Master Switch in the BATT position and lower the flaps with the flap selector switch.
(4) Return the BATT portion of the Master Switch to the OFF position.

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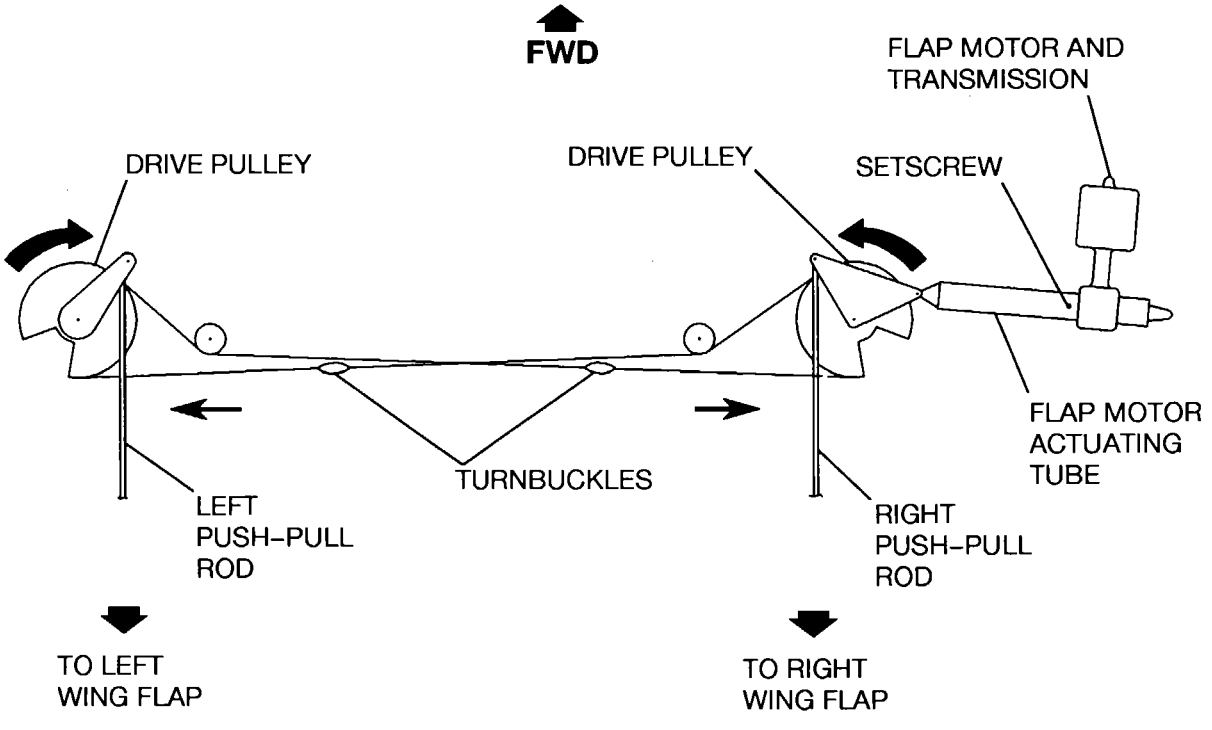

VIEW LOOKING DOWN

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Flap System Schematic
Figure 201 (Sheet 1)

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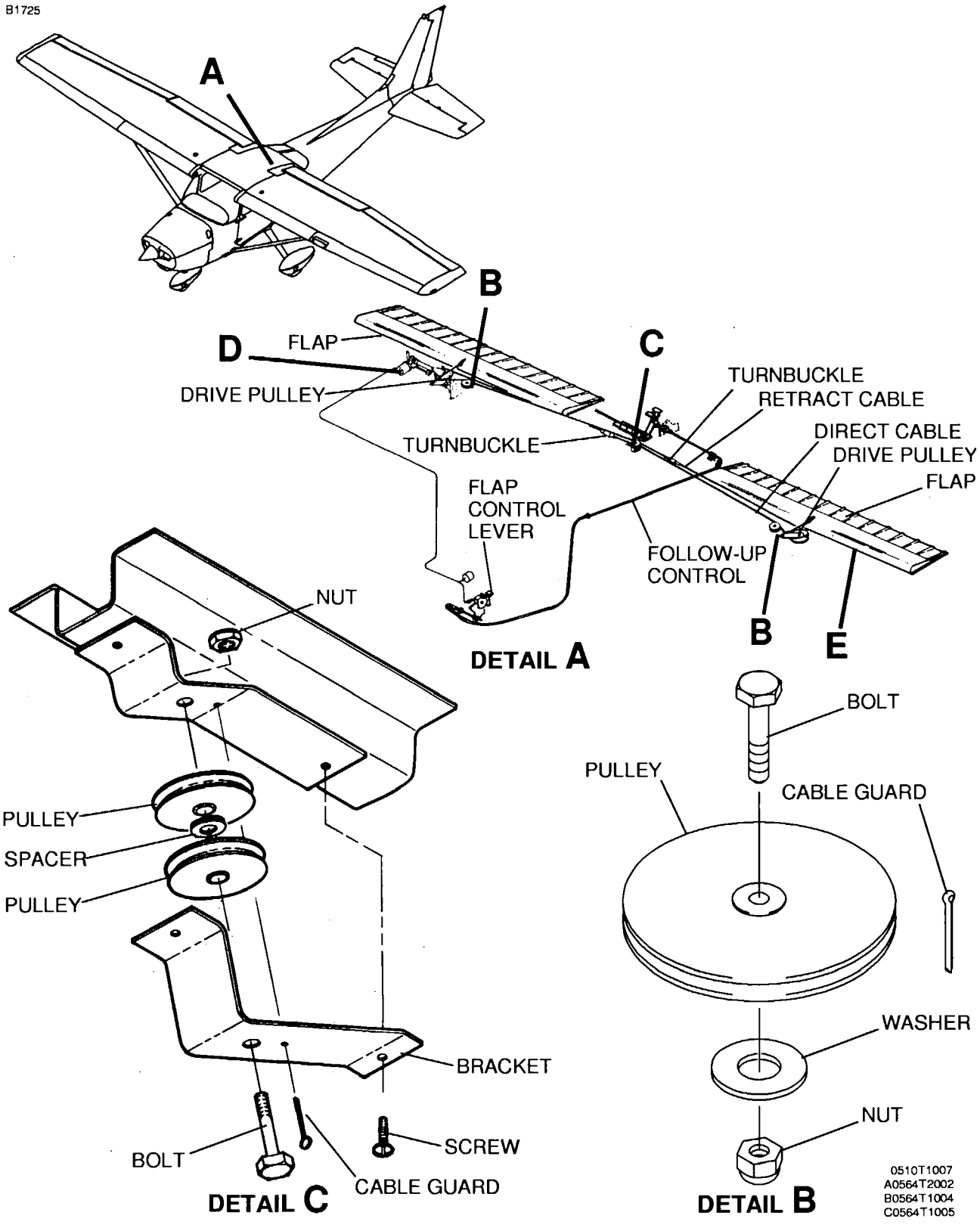

Flap System Installation
Figure 202 (Sheet 1)

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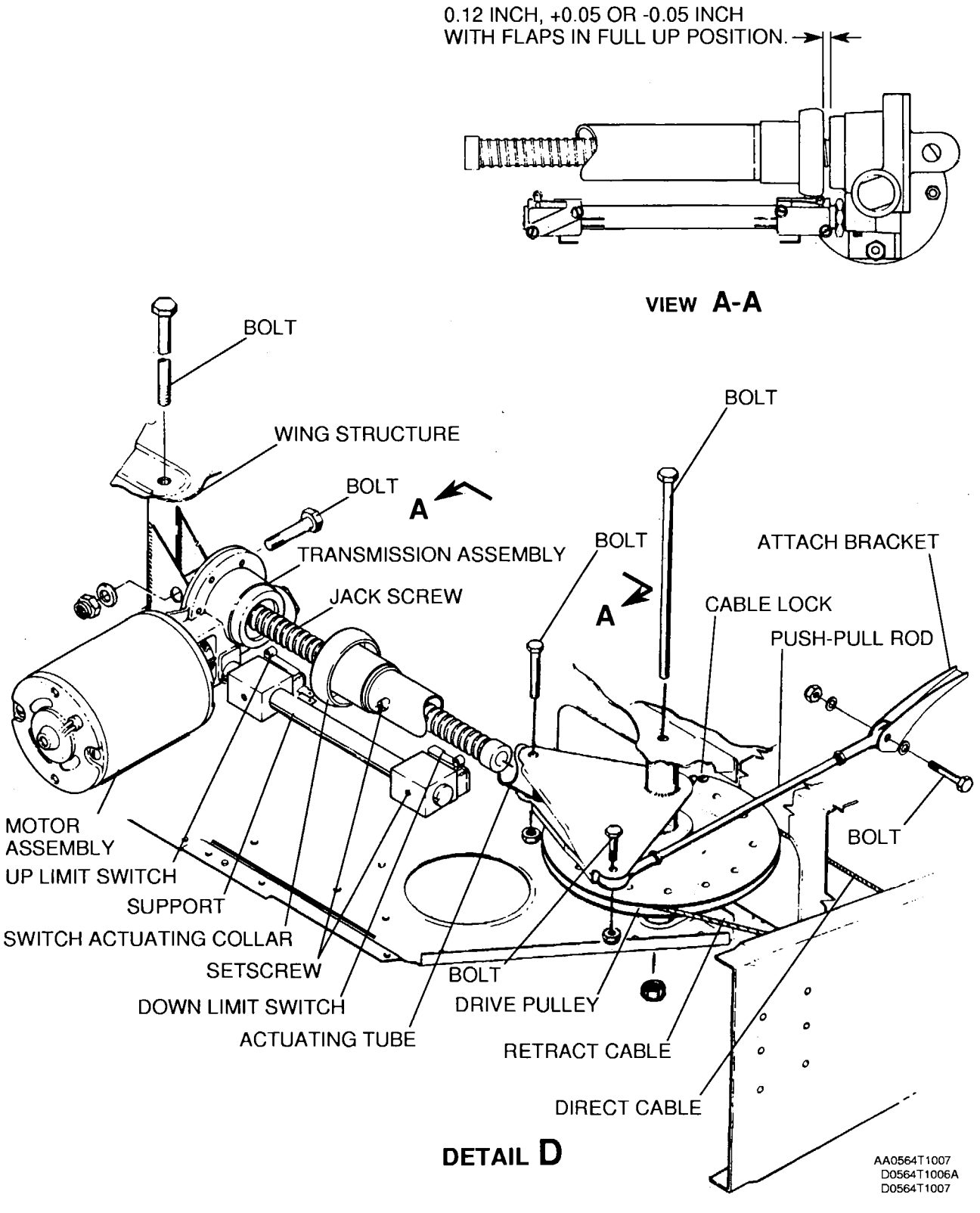

Flap System Installation
Figure 202 (Sheet 2)

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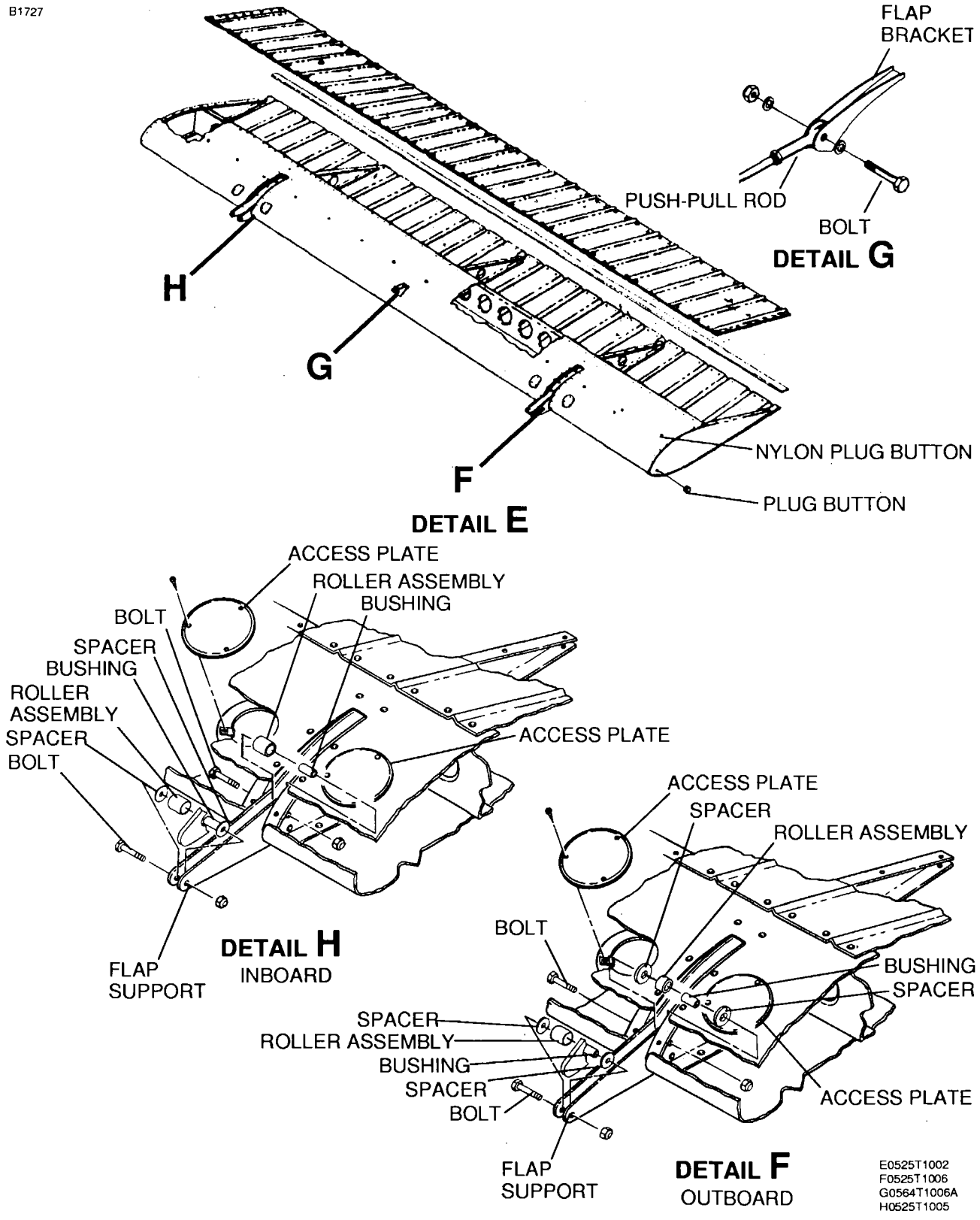

Flap System Installation
Figure 202 (Sheet 3)

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(5) Remove access panels 511AT (611AT), 511BT (611BT), 511CT (611CT), and 511DT (611DT) from the leading edge of the flap. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(6) Disconnect the push-pull rod at the flap bracket.
(7) Remove the bolts at each flap track. As you remove the flap from the wing, all washers, rollers, and bushings will fall free. Keep them.

B. Flaps Installation (Refer to Figure 202).
(1) Install the flap to the flap tracks with the kept hardware.
(2) Connect the push-pull rod to the flap bracket.
(3) If the push-pull rod adjustment was changed during this procedure, you must do the rigging of the flaps again. Refer to Flap Control Adjustment/Test.
(4) Install access panels 511AT (611AT), 511BT (611BT), 511CT (611CT), and 511DT (611DT) to the leading edge of the flap. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(5) Put the Master Switch in the BATT position and raise the flaps with the flap selector switch.
(6) Return the BATT portion of the Master Switch to the OFF position.

4. Flap Drive Pulley Removal/Installation

NOTE: Left and right flap drive pulley removal and installation are typical.

A. Flap Drive Pulley Removal (Refer to Figure 202).
(1) In the cockpit/cabin area, remove the overhead center console.
(2) Remove the safety wire and loosen the flap adjustment turnbuckles.
(3) Remove the access plate610GB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(4) Remove the bolt that attaches the flap push-pull rod to the drive pulley and carefully lower the right flap.
(5) Remove the bolt that attaches the actuating tube to the drive pulley and carefully lower the left flap.
(6) Remove the cable locks that attach the control cables to the drive pulley. Tag the cables for identification.
(7) Remove the bolt that attaches the drive pulley to the wing structure.
(8) Remove the drive pulley through the access opening. Do not drop the bushing.
(9) Keep the brass washer that is installed between the drive pulley and the wing structure.

B. Flap Drive Pulley Installation (Refer to Figure 202).
(1) Install the drive pulley and the bushing through the access opening, install the brass washer, and attach them to the wing structure with the bolt.
(2) Remove the tags and install the cable locks that attach the control cables to the drive pulley.
(3) Raise the left flap and install the bolt that attaches the actuating tube to the drive pulley.
(4) Raise the right flap and install the bolt that attaches the flap push-pull rod to the drive pulley.
(5) Do the rigging of the system. Refer to Flap Control Adjustment/Test.
(6) Install the access plate 610GB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(7) Install the overhead center console.

5. Flap Control System Adjustment/Test

A. Rigging of the Flap Control System (Refer to Figure 202 and Figure 203).
(1) In the cockpit/cabin area, remove the overhead console.
(2) With the flaps in the UP position, remove the clevis that attaches the follow-up cable to the bell crank to disconnect the follow-up cable.
(3) Remove the safety wire, release the cable tension, disconnect the turnbuckles, and carefully lower the left flap.
(4) Disconnect the push-pull rods at the drive pulleys in both wings and carefully lower the right flap.
(5) Disconnect the actuating tube from the drive pulley.

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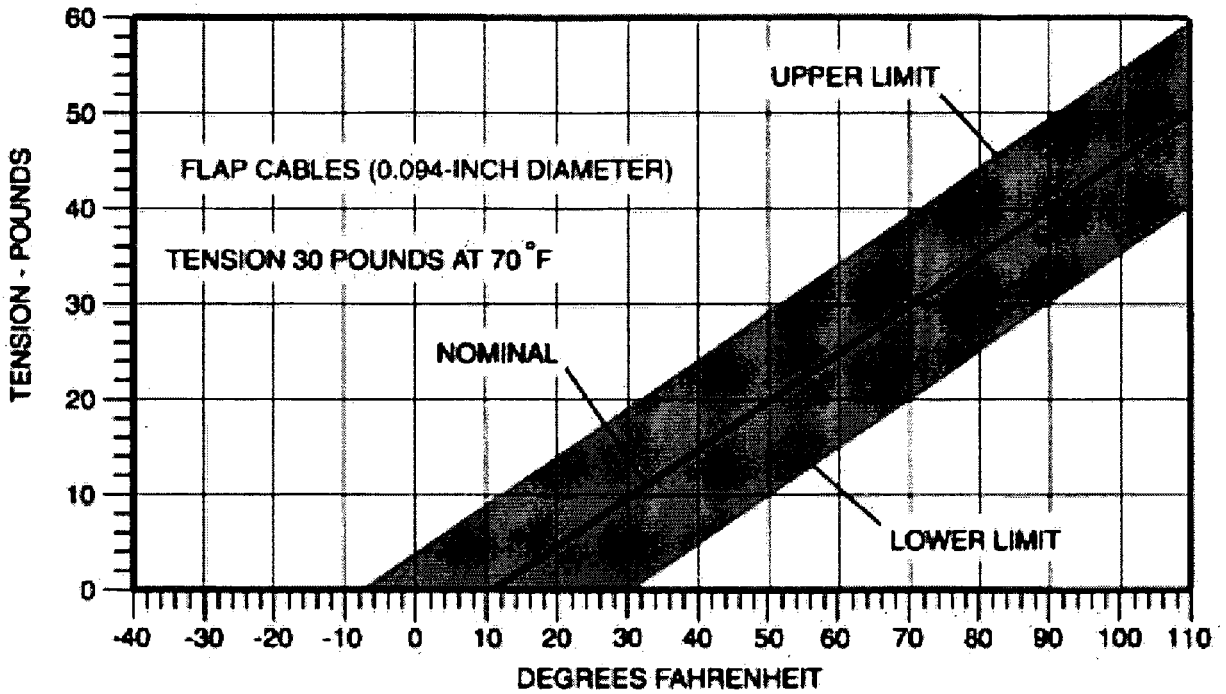

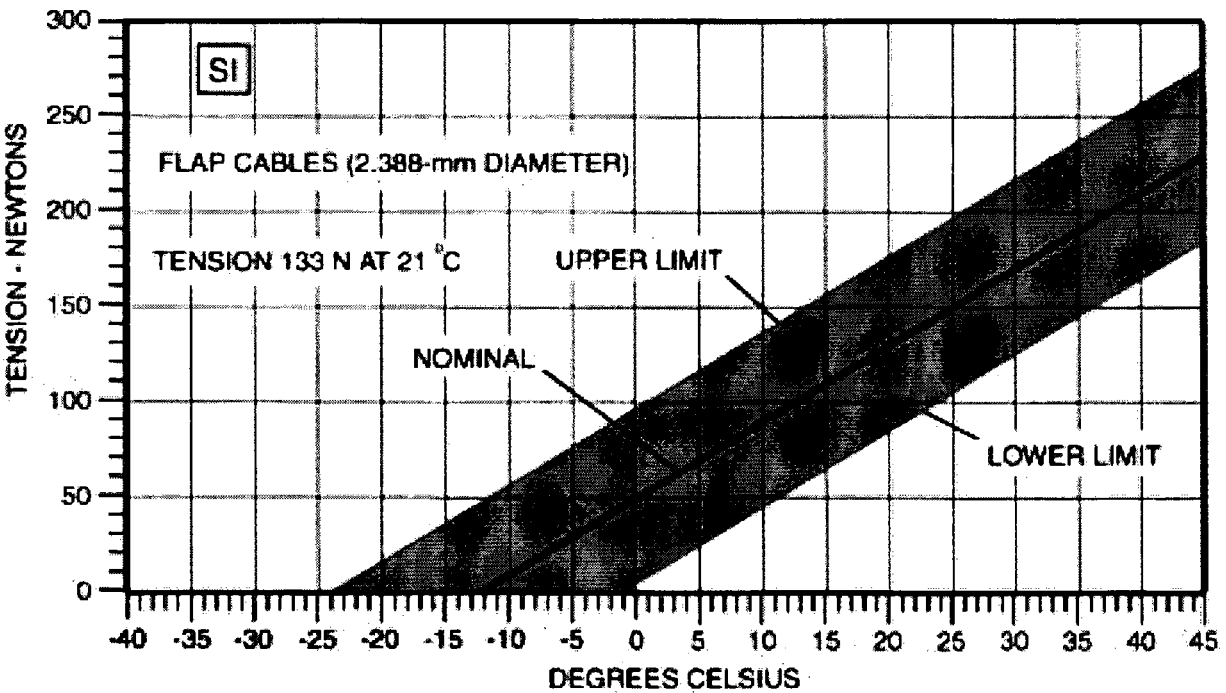

Flap Cable Tension
Figure 203 (Sheet 1)

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(6) Adjust both push-pull rods to 8.83 inches +0.12 or -0.12 inch between the centers of the rod end bearings, and tighten the lock nuts on both ends. Connect the push-pull rods to the flaps and the drive pulleys.
(7) If the control cables are not connected to the left and the right drive pulleys, you must disconnect the actuating tube and the push-pull rods before you install the cables. If the drive pulleys are not installed, you must attach the control cables before you install the drive pulleys in the wings.
(8) Turn the actuating tube in toward the transmission by hand to 0.12 inch +0.05 or -0.05 inch between the switch actuating collar and the transmission.
(9) Temporarily connect the cables at the turnbuckles and test the flaps by hand to make sure that the two flaps extend and retract together. If they do not, the cables are not correctly attached to the drive pulleys. Make sure that the right drive pulley turns clockwise when you monitor it from below, and extend the flaps. Put the tag on the cables for identification, and disconnect the turnbuckles again.
(10) Loosen the setscrew that attaches the actuating tube to the switch actuating collar and hold the collar to keep 0.12 inch +0.05 or -0.05 inch while you hold the right flap up, and adjust the actuating tube in or out as necessary to align it with the attachment hole in the drive pulley.
(11) Apply Loctite grade CV sealant to the threads of the setscrew and torque to 60 inch-pounds.
(12) Disconnect the push-pull rod at the drive pulley to let the connecting actuating tube drive the pulley.
(13) Manually hold the right flap in the full up position and adjust the push-pull rod to align it with the attachment hole in the drive pulley. Connect the push-pull rod and tighten the jam nuts.
(14) With the flaps in the full up position, loosen the setscrew and slide the up limit switch adjustment block on support to just activate the switch and shut off the electrical power to the motor at this position. Tighten the setscrew.
(15) Manually hold the left flap full up and connect the control cables at the turnbuckles. Remove the tags that you installed for identification.
(16) Adjust the retract cable first. With the flaps up, adjust the turnbuckles to 30 pounds +10 or -10 pounds (133.45 N, +44.48 or -44.48 N) of tension on the cables at 70 °F (21 °C). Refer to Figure 203 for the correct tensions at other temperatures.
(17) Disconnect the push-pull rod at the left drive pulley.
(18) Run the motor to extend the flaps approximately 20 degrees and check the tension on each flap cable.
(19) Adjust the turnbuckles as necessary to maintain 30 pounds +10 or -10 pounds (133.45 N +44.48 or -44.48 N) of tension on the cables at 70 °F (21 °C). Refer to Figure 203 for the correct tensions at other temperatures.
(20) Fully retract the right flap.
(21) Manually hold the left flap in the up position and adjust the push-pull rod to align it with the attach holes in the drive pulley.
(22) Connect the push-pull rod and tighten the lock nuts.
(23) Mount an inclinometer in the right flap and adjust to zero degrees.
(24) Run the flaps to the full down position and adjust the down limit switch to the stop motor and flap at 30 degrees +0 or -2 degrees. Do the check on the left flap. Check the limit switch through some flap cycles.
(25) Connect and do a rigging of the flap follow up system.
(26) Do an operational check of the system. Refer to the Operational Check.
(27) Check all items for correct safetying and install the items that you removed for access.

6. Operational Check

A. Operational Check Procedures
(1) Operate the flaps through their full range of travel, and look for uneven travel or jumpy motion, binding, or lost motion. Make sure that the flaps move together through their full range of travel.
(2) Check for positive shut off of the motor at flap travel extremes to prevent damage to the actuator assembly.
(3) With the flap full UP, mount an inclinometer on one flap and set to 0 degrees. Lower the flaps to full DOWN position and check the flap angle as specified in Chapter 6, Airplane Dimensions and Specifications - Description and Operation. Do this procedure again for the opposite flap.

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FLAP FOLLOW UP AND INDICATING SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. The flap follow up and indicating system consists of a sheathed cable assembly, pointers and micro switches. One end of the cable is attached to the flap operating switch operating arm. The other end is clamped to the flap direct cable, above the headliner in the rear cabin area. Motion of the flap cable is transmitted through the follow up control to the pointer, attached to the switch mounting arm. Pointer moves along a scale as the flaps are extended or retracted. When the motion of the switch mounting arm with the attached operating switches positions the "active" operating switch to clear the cam on flap lever, flap motor circuit is broken and flaps stop at selected position.

2. Follow Up and Indicating System Removal/Installation

A. Figure 201 may be used as a guide for removal and installation of the flap follow up and indicating system.

NOTE: If the knob on the flap selector lever becomes loose, remove knob and clean threads on lever with methyl n-propyl ketone or equivalent. After threads have thoroughly dried, prime threads and allow to dry. Secure knob to lever using loctite (MIL-S-22473) or equivalent. Allow loctite to cure for approximately 30 minutes before returning to service.

3. System Rigging

A. Rigging Procedures (Refer to Figure 201).

NOTE: The flaps must be properly rigged before rigging the follow up system.

(1) Disconnect spring from switch mounting arm (Detail C).
(2) With flaps and flap lever in full UP position and holding flap position indication to a clearance of 0.03 inch maximum with top of instrument panel opening, pull center cable of flap follow up cable (Detail B) to remove slack. Thread cable thru the clamp bolt (Detail C).
(3) Lubricate the slots of guide and bellcrank (Detail B) with LPS 3 or equivalent.
(4) Connect spring to switch mounting arm (Detail C).
(5) Adjust switches in slotted holes of mounting arm until cam is centered between switch rollers.
(6) Mount an inclinometer on one flap and set to 0 degrees. Turn master switch ON and move flap lever to 10 degree position.
(7) Observe inclinometer reading when flap stops. Adjust flaps DOWN operating switch in slotted holes on mounting arm as required to obtain flap travel of 10 degrees, + 0 or -2 degrees.
(8) Adjust flaps UP operating switch to obtain positive clearance with cam when flaps DOWN operating switch has just opened in the 10 degree position.
(9) Repeat steps 6 thru 7 for the 20 degree flap position. Travel should be 20 degrees, +0 or -2 degrees.
(10) Run flaps to full DOWN position (30 degrees, +0 or -2 degrees). Ensure that flaps DOWN operating switch remains closed as flap motor limit switch stops flaps in full DOWN position.
(11) Check flaps through several cycles, recheck all components for security, and replace items removed for access.

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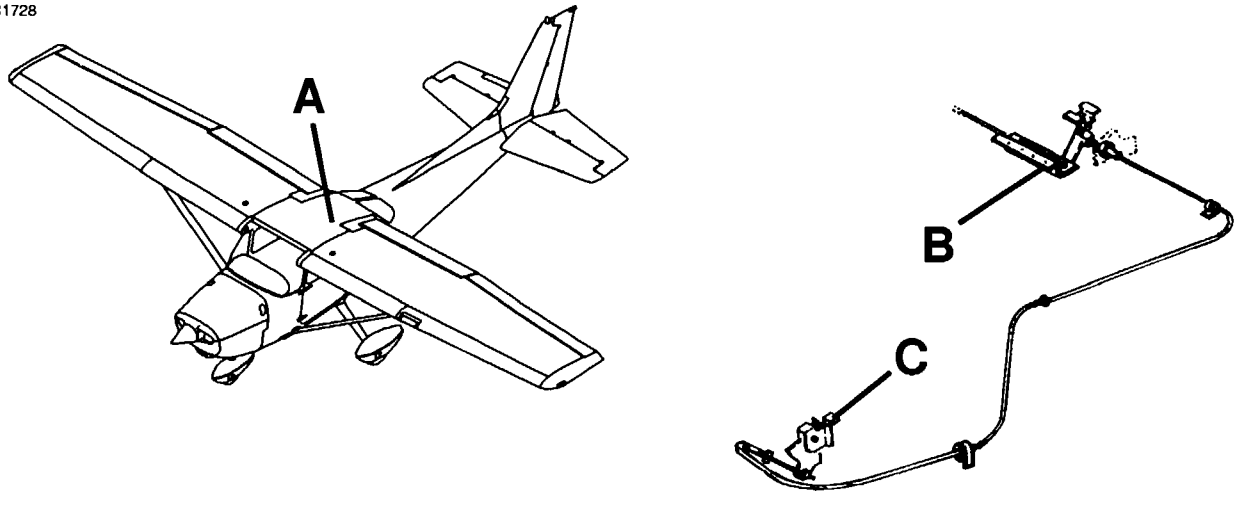
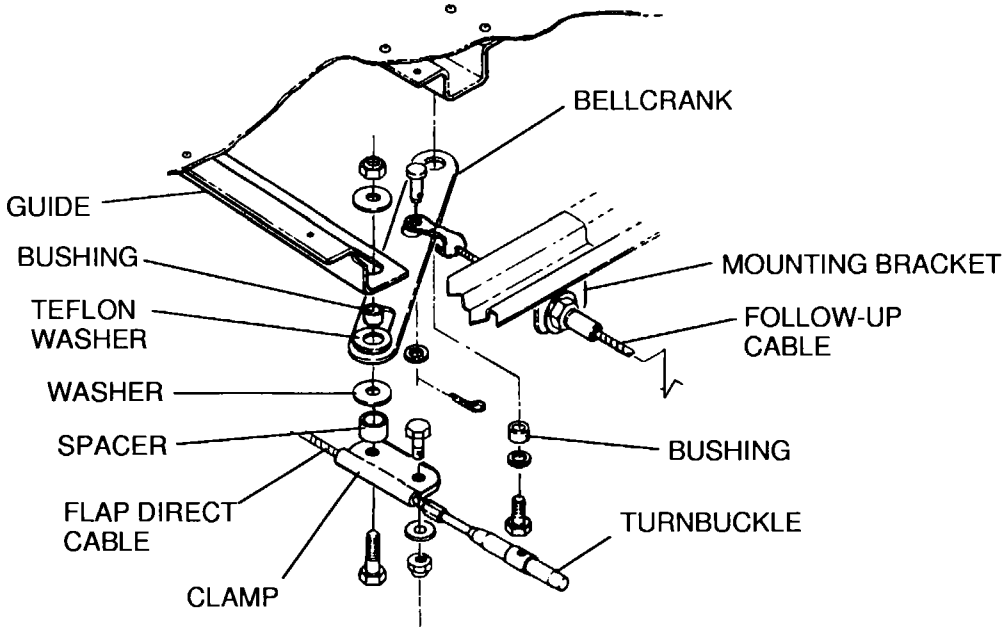


DETAIL A



DETAIL B

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Flap Indicator Installation
Figure 201 (Sheet 1)

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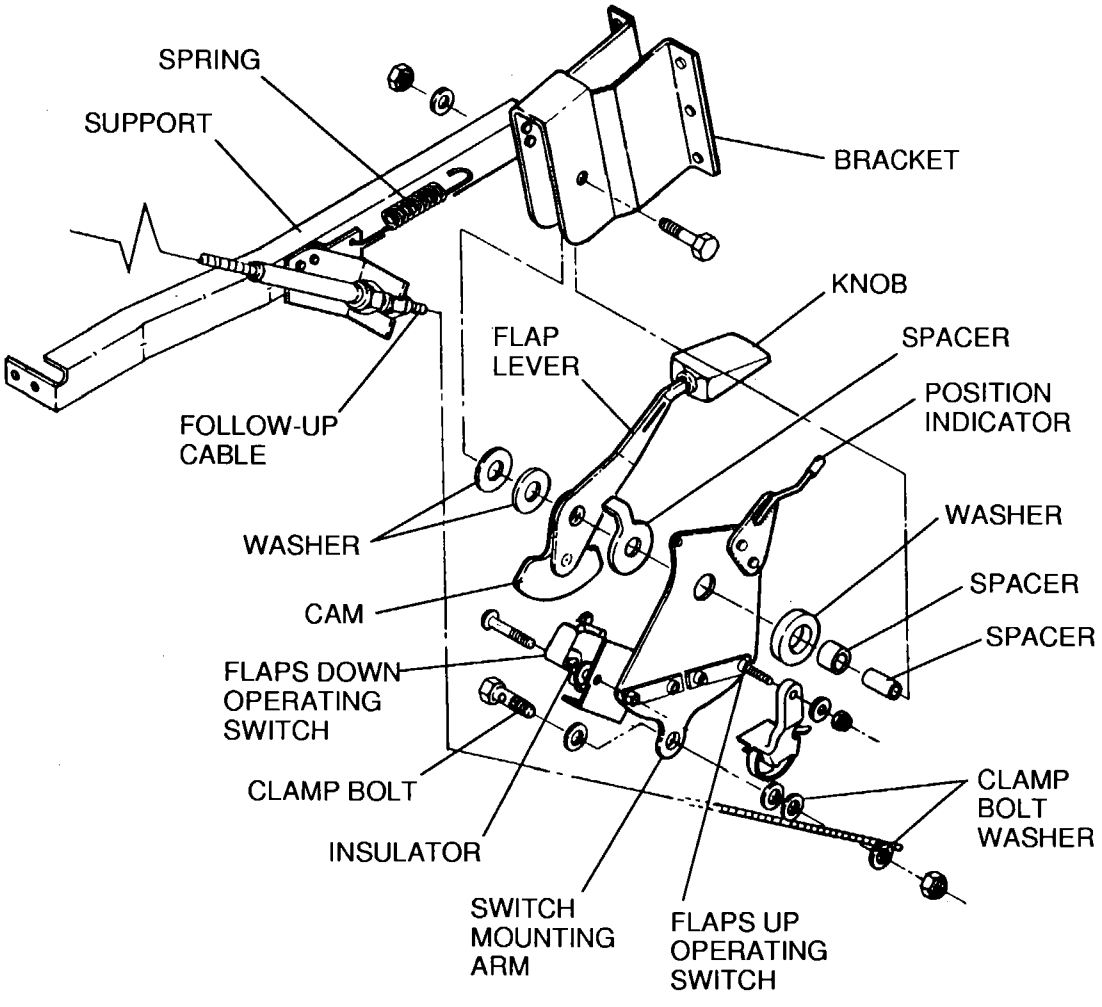

DETAIL C

C0564T1002

Flap Indicator Installation
Figure 201 (Sheet 2)

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CHAPTER

28

FUEL

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28-40-00	Pages 401-404	Mar 1/2009
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FUEL - GENERAL

1. Scope

A. This chapter provides information on systems and componnets associated with fuel storage, fuel distribution, refueling and fuel quantity indicating.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following items:

NAME	NUMBER	MANUFACTURER	USE
Sealant Type 1	CS-3204 Class A-1/2 Class A-2	Flame Master Chem Seal Div. 11120 Sherman Way Sun Valley, CA 91352	To seal fuel tank area.
Sealant Type 1	Pro-Seal 890 Class A-2	Courtaulds Aerospace 5426 San Fernando Rd. Glendale, CA 91209	To seal fuel tank area.
Sealant Type 1	PR-1440 Class A-1/2 Class A-2 Class B-2	Courtaulds Aerospace	To seal fuel tank area.
Sealant Type 1	Pro-Seal 890 Class B-1/2 Class B-2	Courtaulds Aerospace	To seal fuel tank area.
Sealant Type 1	PR-1440 Class B-1/2 Class B-2	Courtaulds Aerospace	To seal fuel tank area.
Sealant Type 1	PR-1826 Class B	Courtaulds Aerospace	To seal fuel tank area.
Sealant Type 1	CS-3204 Class B-1/2 Class B-2	Flame Master, Chem Seal Div.	To seal fuel tank area.
Sealant Type VIII	PR-1428 Class B-1/2 Class B-2	Courtaulds Aerospace	To seal fuel tank access panels.
Sealant Type VIII	FR-1081 Class B-1/2 Class B-2	Fiber Resin Corp. 170 W. Providencia Ave. Burbank, CA 91502	To seal fuel tank access panels.
Pressure Regulator		Commercially Available	To regulate input pressue.
Fahrenheit Thermometer		Commercially Available	To monitor test area temperature.
Leak Detector	Eldorado LD-4	Eldorado Chemical Co. Inc. 14350 Lookout Road P. O. Drawer 34837 San Antonio, TX 78265-4837	To locate source of leak.

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NAME	NUMBER	MANUFACTURER	USE
Cleaner	Methyl n-propyl ketone	Commercially Available	To clean surfaces prior to sealing.
Scotchbrite Pad	N/A	Commercially Available	To remove loose primer.
Fuel Quantity Test Box	0580001-1	Cessna Aircraft Company	To calibrate fuel quantity system.
	680	Loctite	To improve the installation of the fuel strainer fittings.

3. Definition

A. This chapter is divided into sections and subsections to assist maintenance personnel in locating, specific systems and information. For locating information within the chapter, refer to the Table of Contents at the beginning of the chapter.

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FUEL STORAGE AND DISTRIBUTION - DESCRIPTION AND OPERATION

1. General

A. The airplane has a wet wing fuel storage system. The system has two integral fuel tanks (one in each wing), a three position selector valve, a fuel reservoir tank, an electrically-driven auxiliary fuel pump, a fuel shutoff valve and a fuel strainer.

B. Components forward of the fuel strainer include the engine-driven fuel pump, the fuel injection servo and the fuel distribution valve. These components are part of the powerplant and are in Chapter 71, Engine - Description and Operation and in Chapter 73, Fuel Injection System - Description and Operation.

C. A schematic diagram of the fuel system is shown to help maintenance personnel know the system. Refer to Figure 1.

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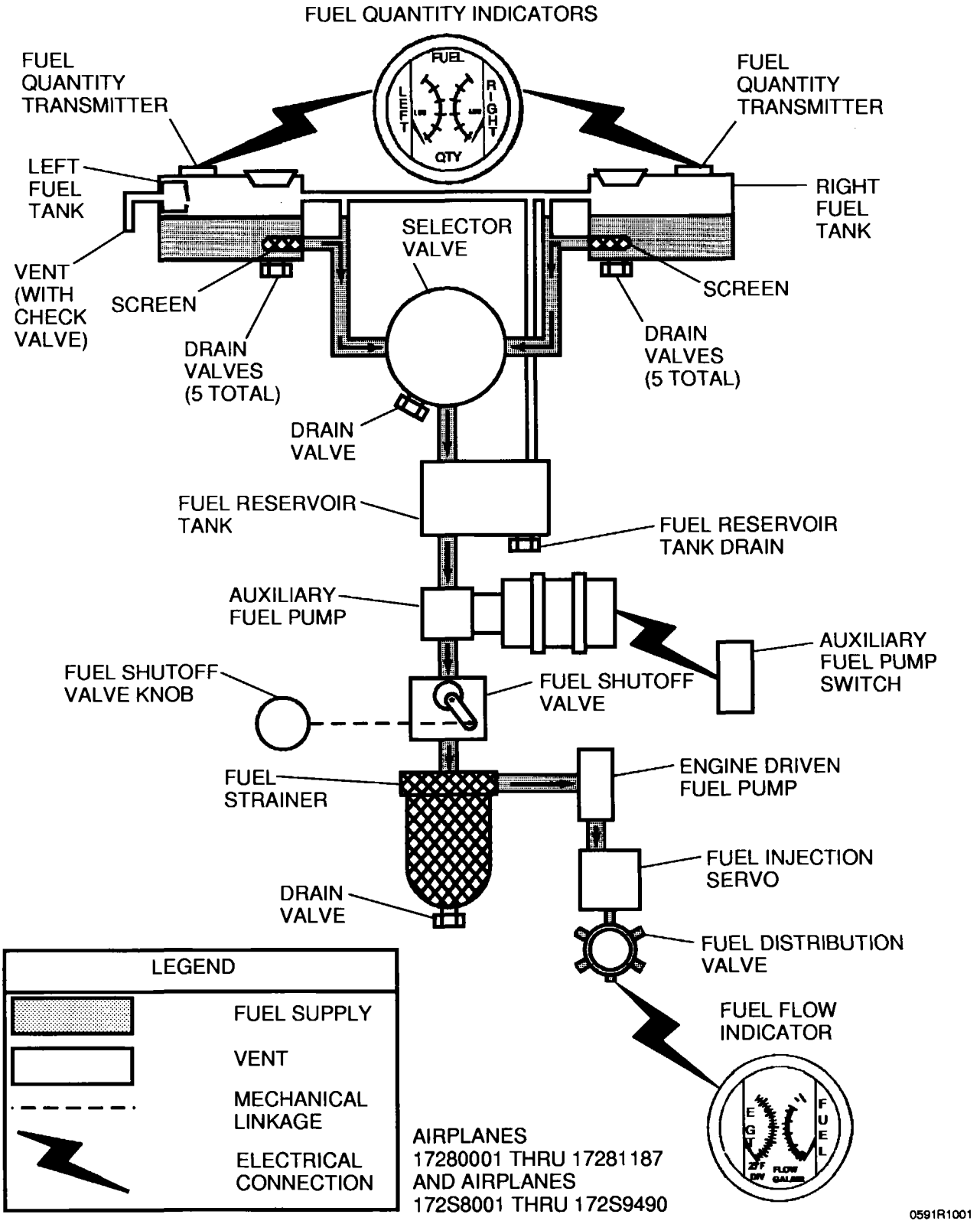

Fuel System Schematic
Figure 1 (Sheet 1)

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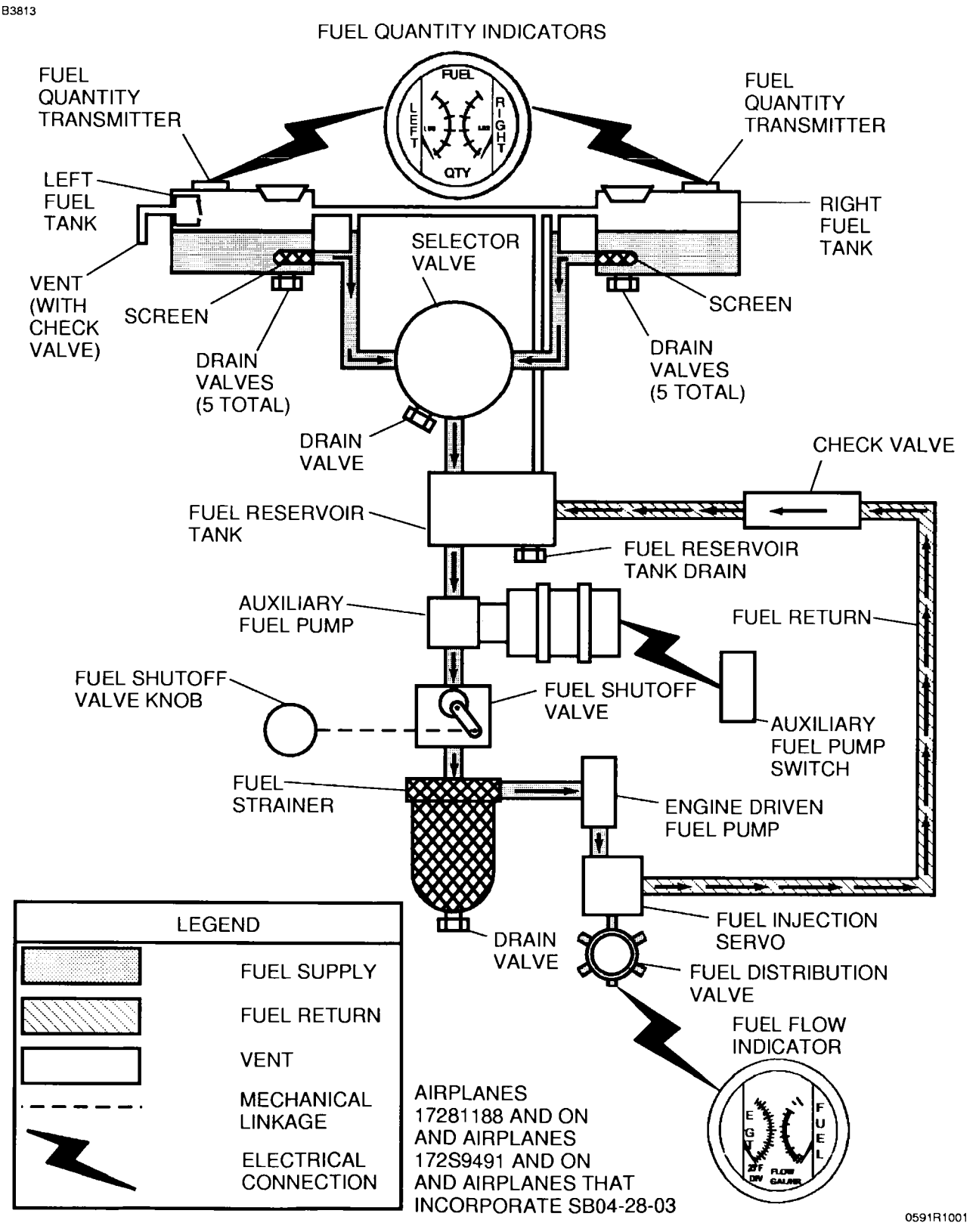

Fuel System Schematic
Figure 1 (Sheet 2)

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FUEL STORAGE AND DISTRIBUTION - MAINTENANCE PRACTICES

1. General

A. This section gives information for the removal, installation and adjustment of fuel system components. For an illustration of the fuel system, refer to Figure 201.

2. Precautions

A. Obey the general precautions that follow and rules when fueling, defueling, fuel bay purging, repairing, assembly or disassembly of system components, and electrical system checks and repairs on the airplane fuel system.
   (1) Plugs or caps must be placed on all disconnected hoses, lines and fittings to prevent residual fuel drainage, thread damage, or entry of dirt or foreign material into fuel system.
   (2) Any time the fuel system is opened, flush the system with 1/2 gallon of fuel at the inlet of servo and flow divider with the fuel boost pump.
   (3) When you do work on the fuel injection system, keep all the parts clean and free of contaminants.

3. Fuel Drain Valve Removal/Installation

NOTE: Drain valve removal and installation is typical for all fuel drains on both wing tanks.

A. Remove the Fuel Drain Valve (Refer to Figure 202).
   (1) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
   (2) Use a fuel sampler cup to push the fuel drain valve up to make sure the fuel bay is drained.
   (3) Cut the safety wire and remove the fuel drain valve from the fuel bay.

B. Install the Fuel Drain Valve (Refer to Figure 202).
   (1) Install the fuel drain valve in the fuel bay.
   (2) Tighten the drain valve until the O-ring compresses and makes a fuel-tight seal.
   (3) Install safety wire on the drain valve. Refer to Chapter 20, Safetying - Maintenance Practices.
   (4) Add a small quantity of fuel to the fuel bay and make sure the fuel drain valve does not leak.

4. Fuel Reservoir Removal/Installation

A. Remove the Fuel Reservoir (Refer to Figure 203).
   (1) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
   (2) Remove the copilot seat and carpet. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices and Chapter 25, Interior Upholstery - Maintenance Practices.
   (3) Remove access panels 230BT and 230CT directly aft of the copilot rudder pedals to get access to the reservoir. Refer to Chapter 6, Access/Inspection Plates - Description and Operation .
   (4) Put a container below the fuel drain in the fuselage.
   (5) Drain the fuel from the reservoir.
   (6) Disconnect the reservoir vent tube.
   (7) Disconnect the reservoir inlet tube.
   (8) Disconnect the reservoir outlet tube.
   (9) Disconnect the line assembly on airplanes with the fuel return system,
   (10) Remove the screws that attach the reservoir to the airplane structure.
   (11) Remove the reservoir from the airplane.

B. Install the Fuel Reservoir (Refer to Figure 203).
   (1) Put the fuel reservoir in position and attach with the screws.
   (2) Connect the reservoir outlet tube.
   (3) Connect the reservoir inlet tube.
   (4) Connect the reservoir vent tube.
   (5) Connect the line assembly on airplanes with the fuel return system.
   (6) Make sure the fuel reservoir drain is closed.
   (7) Refuel the airplane. Refer to Chapter 12, Fuel - Servicing.
   (8) Put the fuel shutoff valve in the ON position.
   (9) Make sure the fuel reservoir connections do not have fuel leaks.

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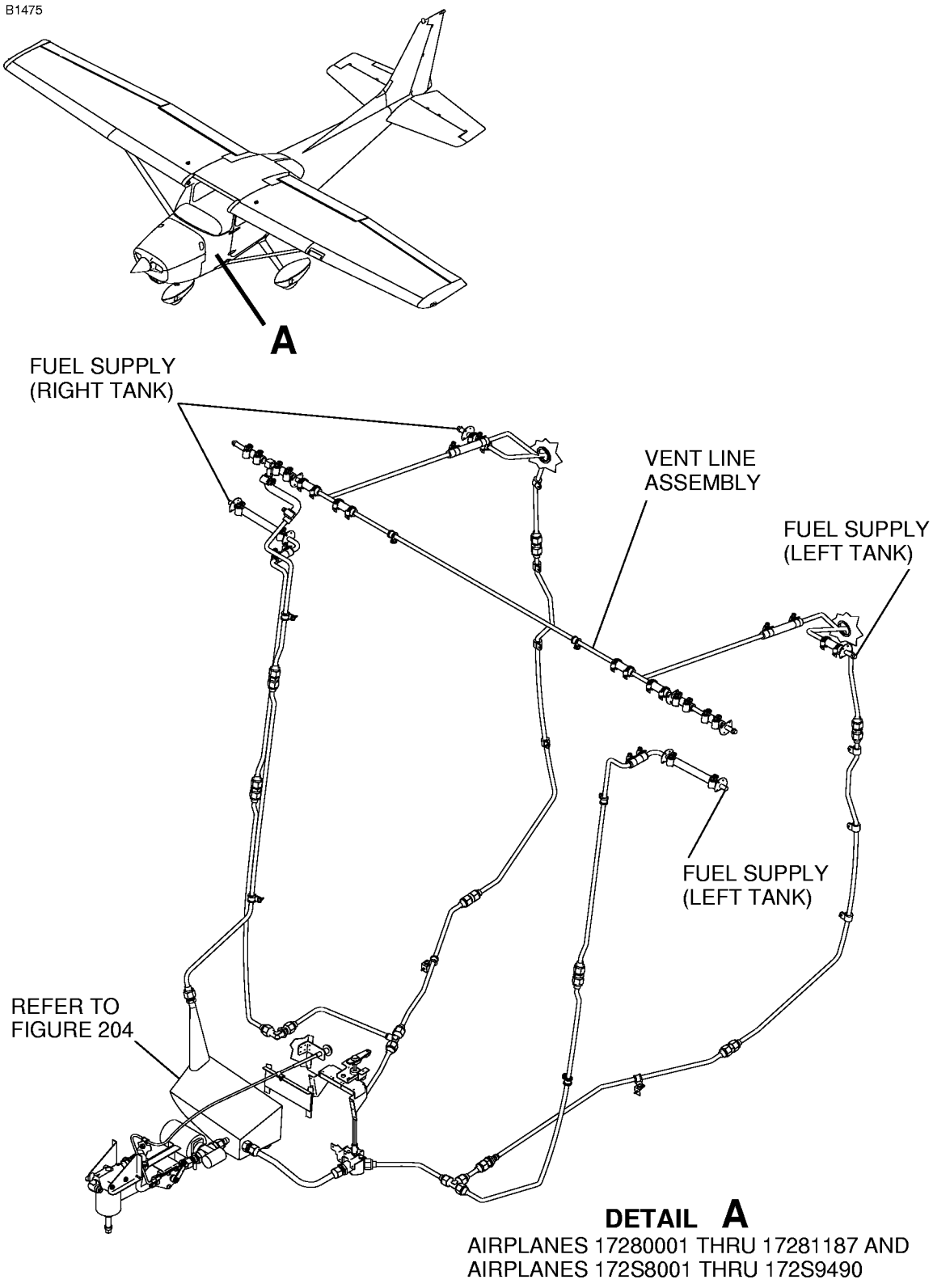

Fuel System Installation
Figure 201 (Sheet 1)

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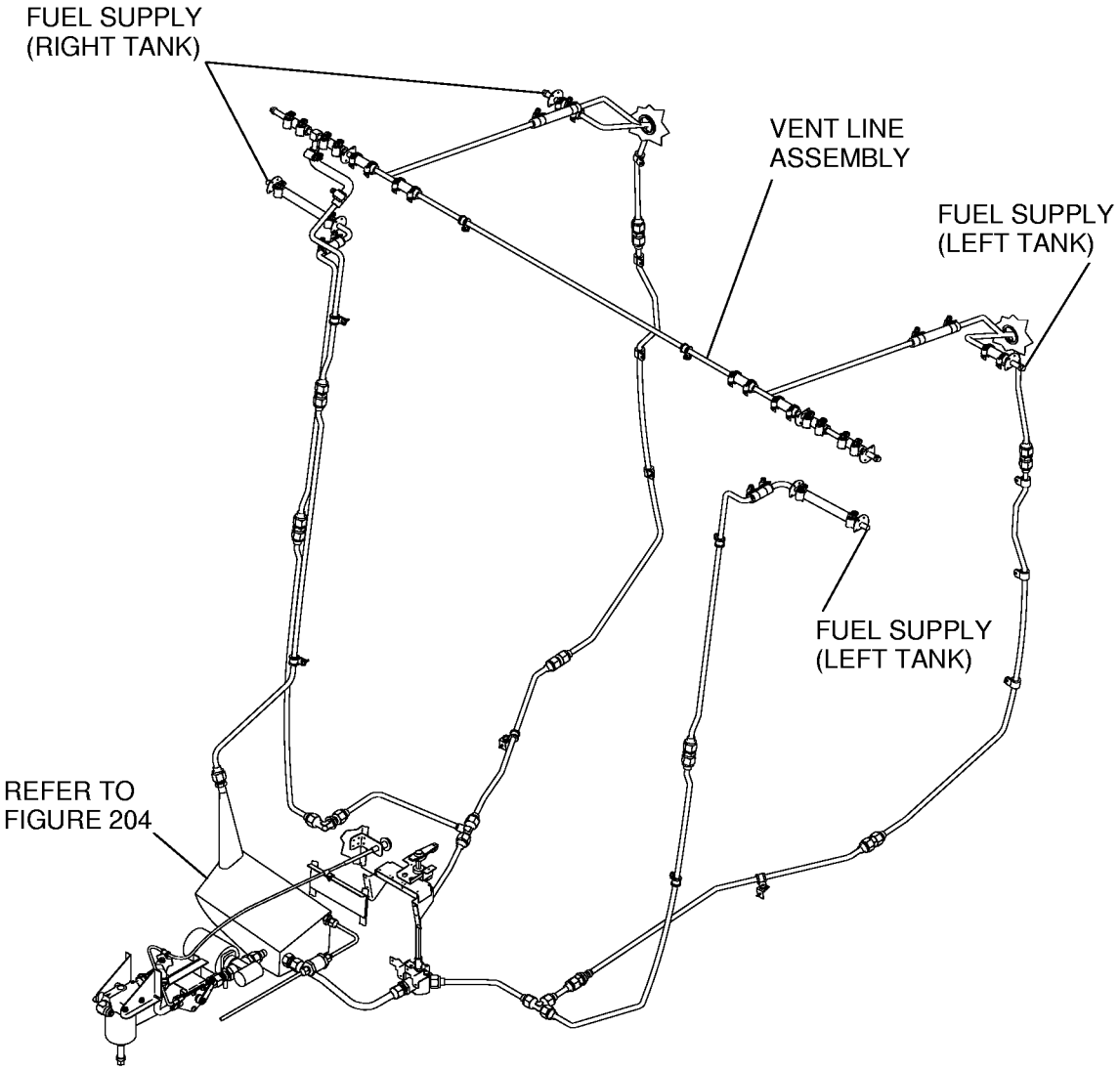

DETAIL A

AIRPLANES 17281188 AND ON, AND
AIRPLANES 172S9491 AND ON, AND
AIRPLANES THAT INCORPORATE SB04-28-01

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Fuel System Installation
Figure 201 (Sheet 2)

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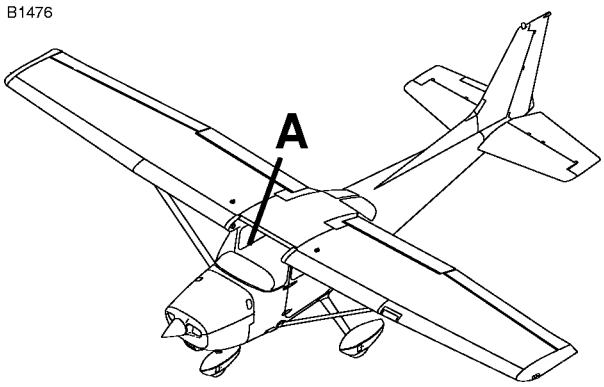
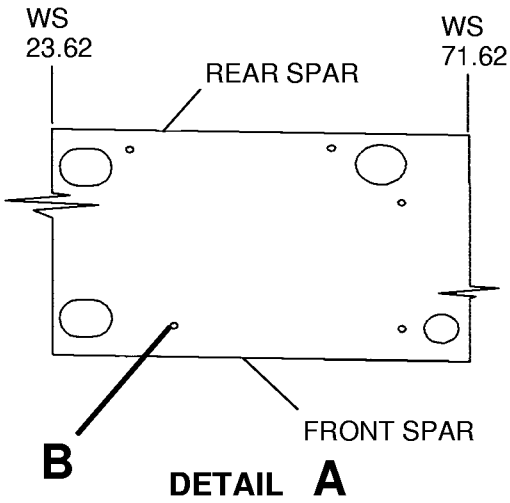
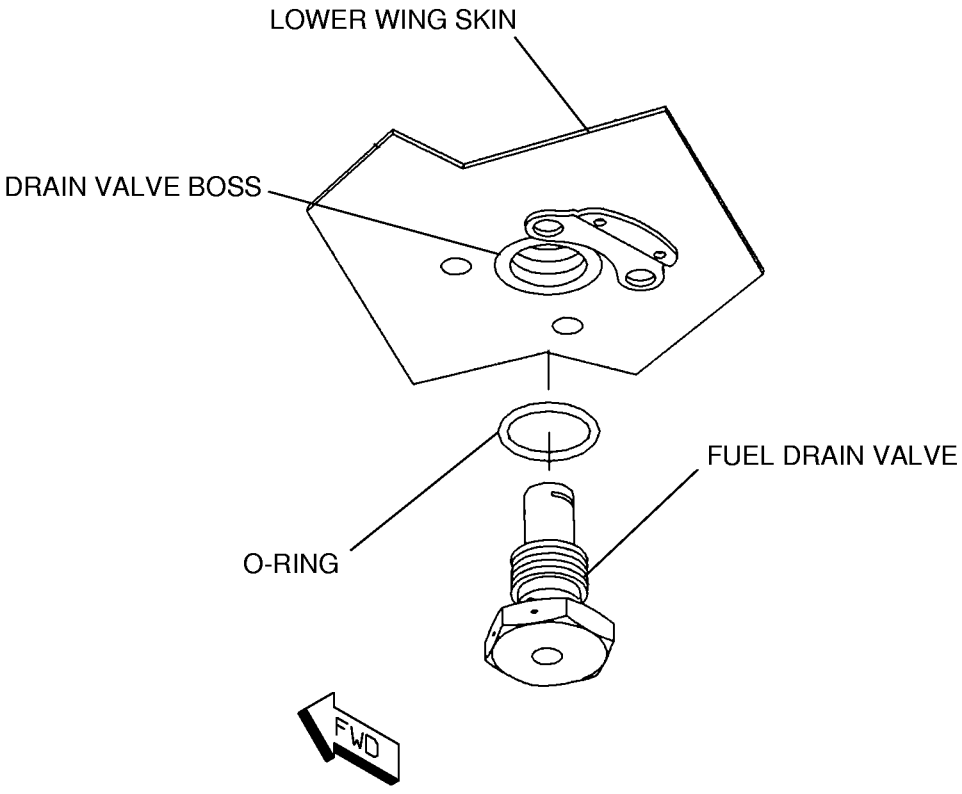




DETAIL A

LOOKING UP AT BOTTOM OF WING
RIGHT SIDE SHOWN
(LEFT SIDE TYPICAL)



DETAIL B

0510T1007
A0516R1016
B1516R1017

Fuel Drain Valve Installation
Figure 202 (Sheet 1)

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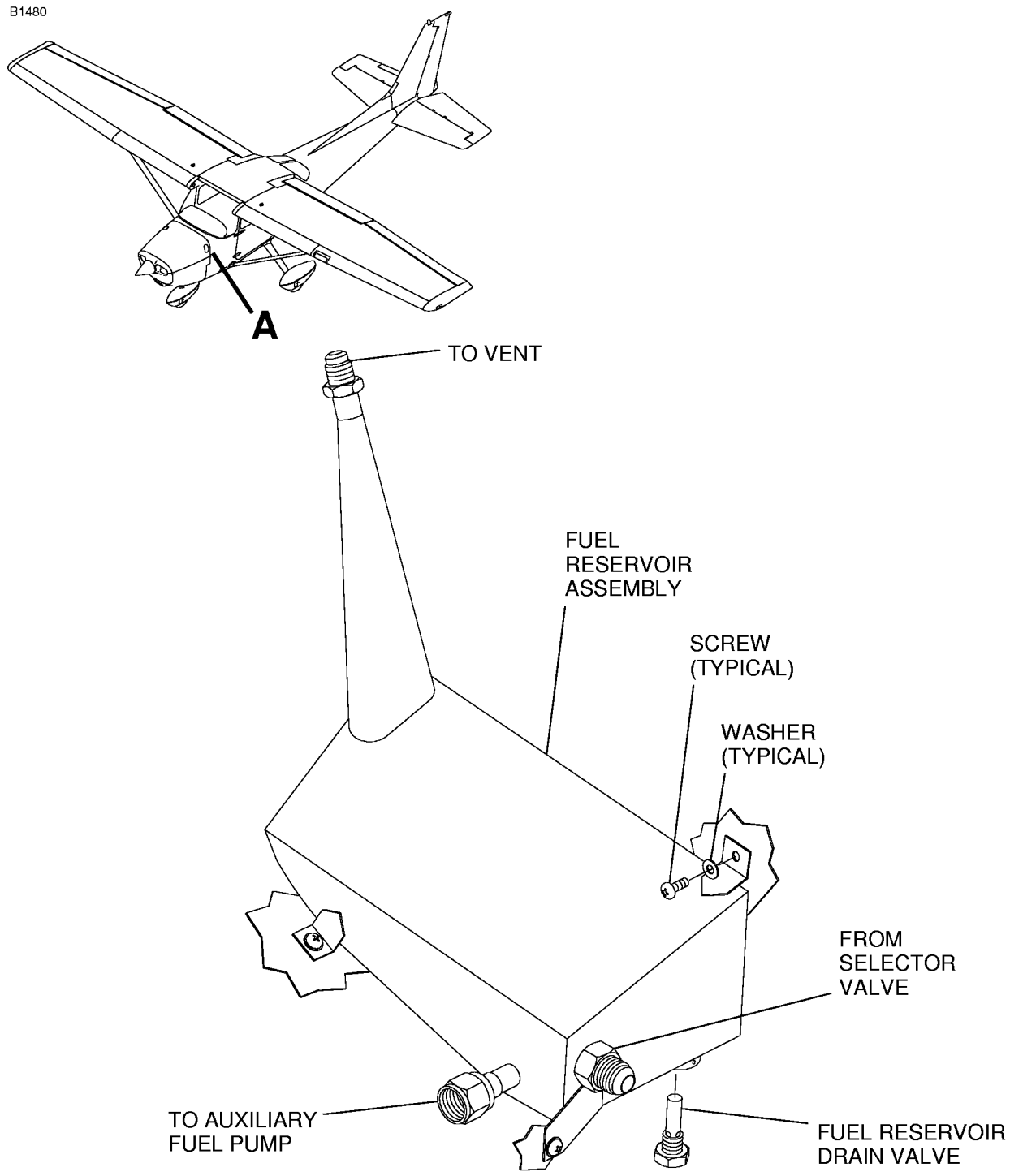

DETAIL A
AIRPLANES 17280001 THRU 17281187 AND
AIRPLANES 172S8001 THRU 1729490

0510T1007
A0516T1004

Fuel Reservoir Installation
Figure 203 (Sheet 1)

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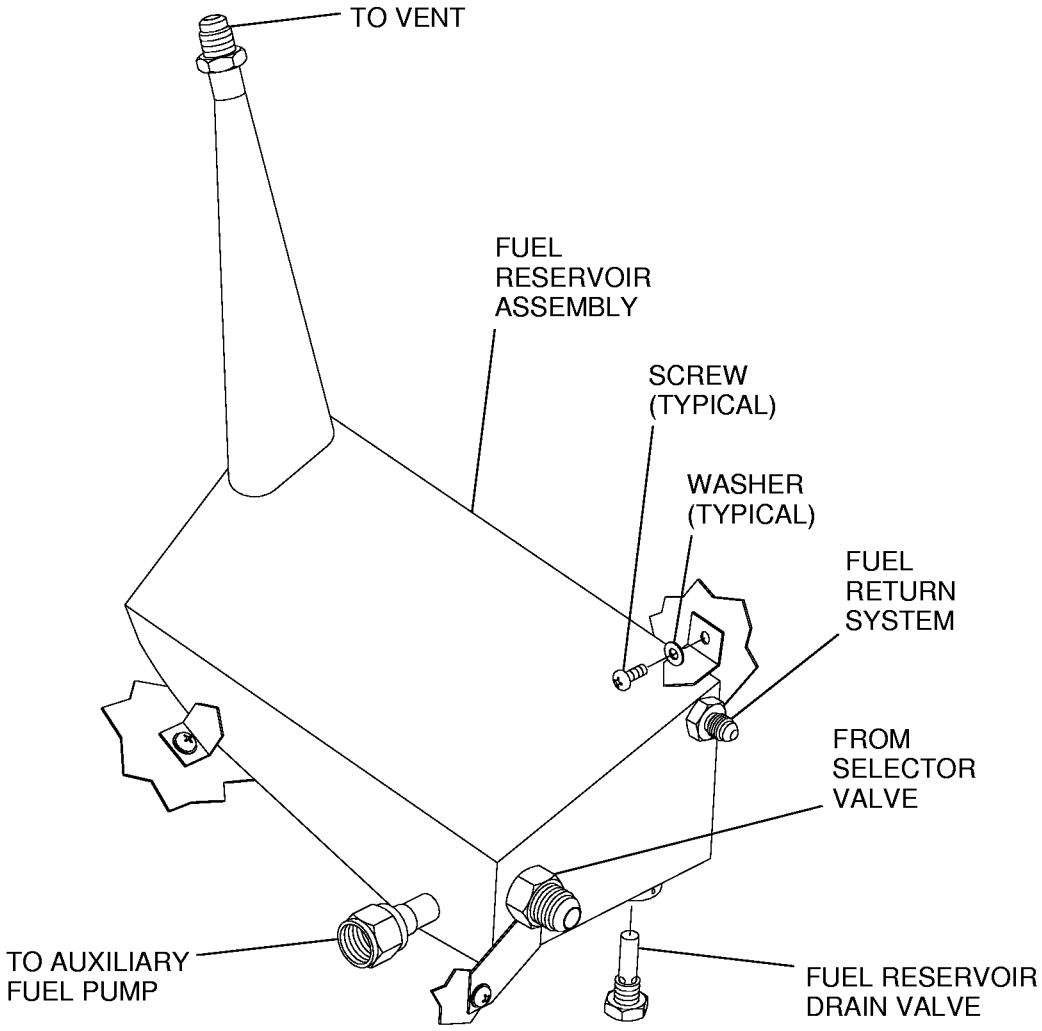

DETAIL A

AIRPLANES 17281188 AND ON, AND
AIRPLANES 172S9491 AND ON, AND
AIRPLANES THAT INCORPORATE SB04-28-03

A0516T1004A

Fuel Reservoir Installation
Figure 203 (Sheet 2)

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(10) Operate the auxiliary fuel pump to make sure the fuel pressure gage has positive fuel pressure.
(11) Install access panels 230BT and 230CT. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(12) Install the carpet and copilot seat. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices and Chapter 25, Interior Upholstery - Maintenance Practices.

5. Fuel Selector Shaft Removal/Installation

A. Remove the Fuel Selector Shaft (Refer to Figure 204).
(1) Make sure the fuel selector is in the BOTH position.
(2) Remove the plug button from the top of the fuel selector handle to get access to the screw.
(3) Remove the screw and washer from the top of the handle.
(4) Remove the pedestal cover and components to get access to the fuel shaft assembly.
(5) Remove the fuel selector placard from the pedestal.
(6) Remove the microphone mount bracket.
(7) Remove the fuel shut-off control knob.
(8) Disconnect the pedestal light.
(9) Remove the screws from the pedestal column.

CAUTION: Do not bend the pedestal cover too much when it is removed or it will break.

(10) Remove the pedestal cover.
(11) Remove the support assembly.
(12) Move the carpet as necessary to get to the floor access plate at the bottom of the pedestal.
(13) Remove access panel 230FT to get access to the selector shaft assembly. Refer to Access/ Inspection Plates - Description and Operation.
(14) Remove and discard the cotter pin from the pin that attaches the selector shaft to the fitting.
(15) Remove the pin from the shaft assembly.
(16) Remove the selector shaft.

B. Install the Fuel Selector Shaft (Refer to Figure 204).
(1) Install the selector shaft into the fitting with the pin and a new cotter pin.
(2) Install access panel 230FT. Refer to Access/Inspection Plates - Description and Operation.
(3) Put the carpet in place.
(4) Install the selector shaft support.
(5) Install the pedestal cover.
(6) Connect the pedestal light.
(7) Install the fuel shut-off control knob.
(8) Install the fuel selector placard on the pedestal.
(9) Install the handle on the selector shaft with the washer, screw and plug button.
(10) Move the selector shaft to the LEFT, RIGHT and BOTH positions to make sure it operates correctly.

6. Fuel Selector Valve Removal/Installation

A. Remove the Fuel Selector Valve (Refer to Figure 205).
(1) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(2) Remove the plug button from the top of the fuel selector handle to get access to the screw.
(3) Remove the screw and lift up on the handle to disconnect it from the fuel selector valve shaft.
(4) Remove the metal placard from the pedestal to get access to the valve, plumbing and universal joints.
(5) Remove the carpet as applicable to get access to inspection plates aft of the pedestal structure. Refer to Chapter 25, Interior Upholstery - Maintenance Practices
(6) Disconnect the fitting at the bottom of the shaft assembly from the valve shaft.
(7) Disconnect the fuel lines.
(8) Put caps on the fuel lines.
(9) Remove the screws that attach the valve to the bracket.
(10) Remove the valve.

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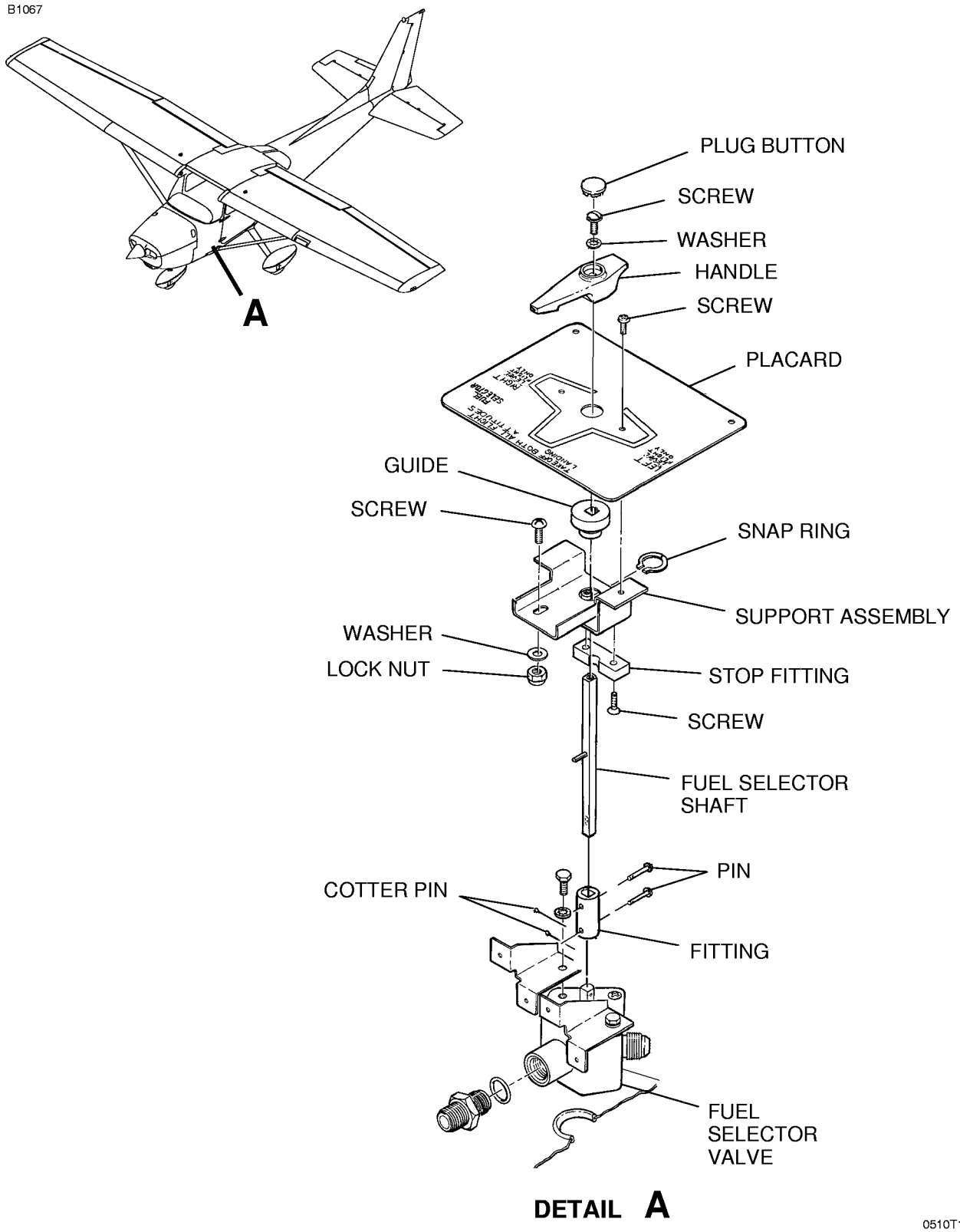

Fuel Selector Shaft
Figure 204 (Sheet 1)

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B. Install the Fuel Selector Valve (Refer to Figure 205).
(1) Attach the selector valve to the bracket.
(2) Remove the caps and connect the fuel lines to the valve.
(3) Connect the valve shaft assembly.
(4) Refuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(5) Make sure the fuel lines do not leak.
(6) Install the inspection plates.
(7) Install the carpet. Refer to Chapter 25, Interior Upholstery - Maintenance Practices
(8) Install the metal placard to the center pedestal.
(9) Install the fuel selector valve handle to the shaft.
(10) Attach the fuel selector valve handle with the screw.
(11) Install the plug button.

7. Fuel Return Valve Removal/Installation

A. Remove the Fuel Return Valve (Refer to Figure 205).
(1) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(2) Remove the copilot seat and carpet. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices and Chapter 25, Interior Upholstery - Maintenance Practices.
(3) Remove access panels 230BT and 230CT directly aft of the copilot rudder pedals to get access to the reservoir. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(4) Put a container below the fuel drain in the fuselage.
(5) Drain the fuel from the reservoir.

NOTE: Make a note of the arrow direction on the valve.

(6) Remove the valve.
(7) Put caps on the fuel return line assembly.

B. Install the valve (Refer to Figure 205).
(1) Install the valve.

NOTE: The arrow must point in the proper direction, away from the engine, or fuel will not flow through the line assembly.

(2) Make sure the fuel reservoir drain is closed.
(3) Refuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(4) Put the fuel shutoff valve in the ON position.
(5) Make sure the fuel reservoir connections do not have fuel leaks.
(6) Operate the auxiliary fuel pump to make sure the fuel pressure gage has positive fuel pressure.
(7) Install access panels 230BT and 230CT. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(8) Install the carpet and copilot seat. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices and Chapter 25, Interior Upholstery - Maintenance Practices.

8. Fuel Shutoff Valve Control Cable/Arm Adjustment

A. Adjust the Fuel Shutoff Cable and Control Arm (Refer to Figure 205).
(1) Remove the copilot seat. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices.
(2) Move the footwell carpet away from the copilot's rudder pedal shields to get access to the shield screws.
(3) Remove the screws from the pedal shields.
(4) Remove the pedal shields from the airplane.
(5) Remove the lock nut.

NOTE: Lock nuts can be used again unless they can be run-up finger tight.

NOTE: When fiber-type self-locking nuts are used again, make sure the fiber locking function has not decreased or become brittle.

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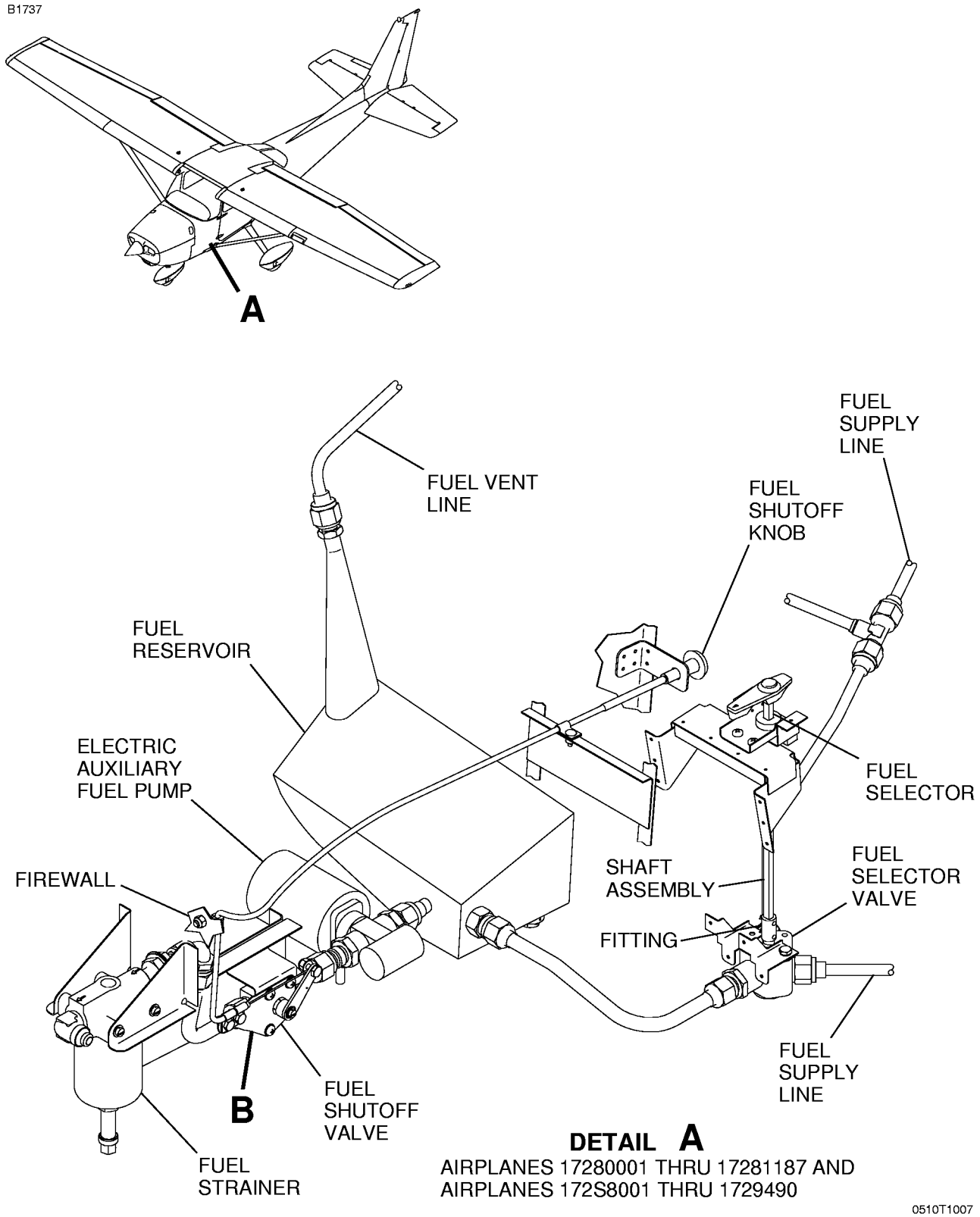

Fuel System Details
Figure 205 (Sheet 1)

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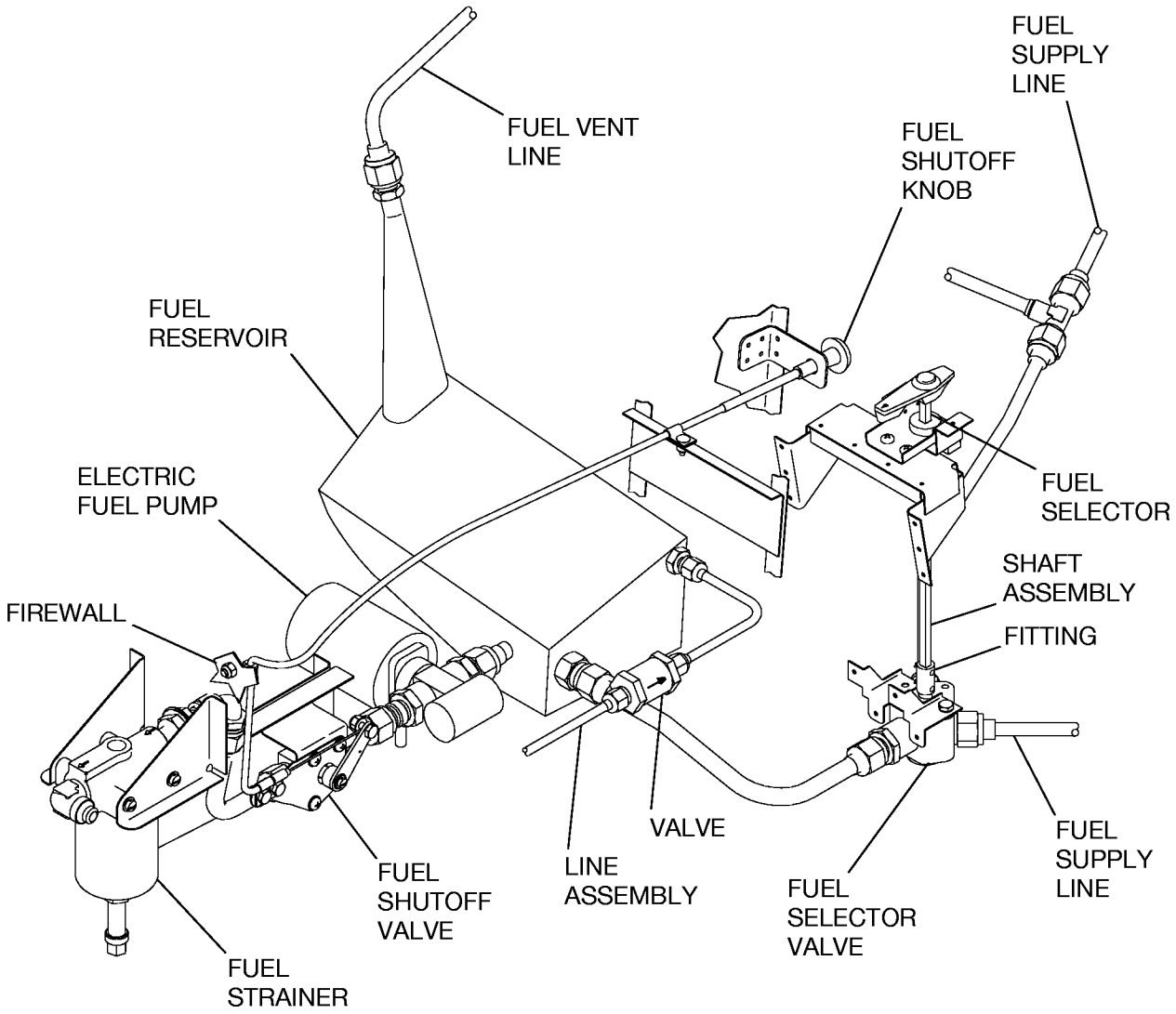

DETAIL A

AIRPLANES 17281188 AND ON, AND
AIRPLANES 172S9491 AND ON, AND
AIRPLANES THAT INCORPORATE
SB04–28–03

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Fuel System Details
Figure 205 (Sheet 2)

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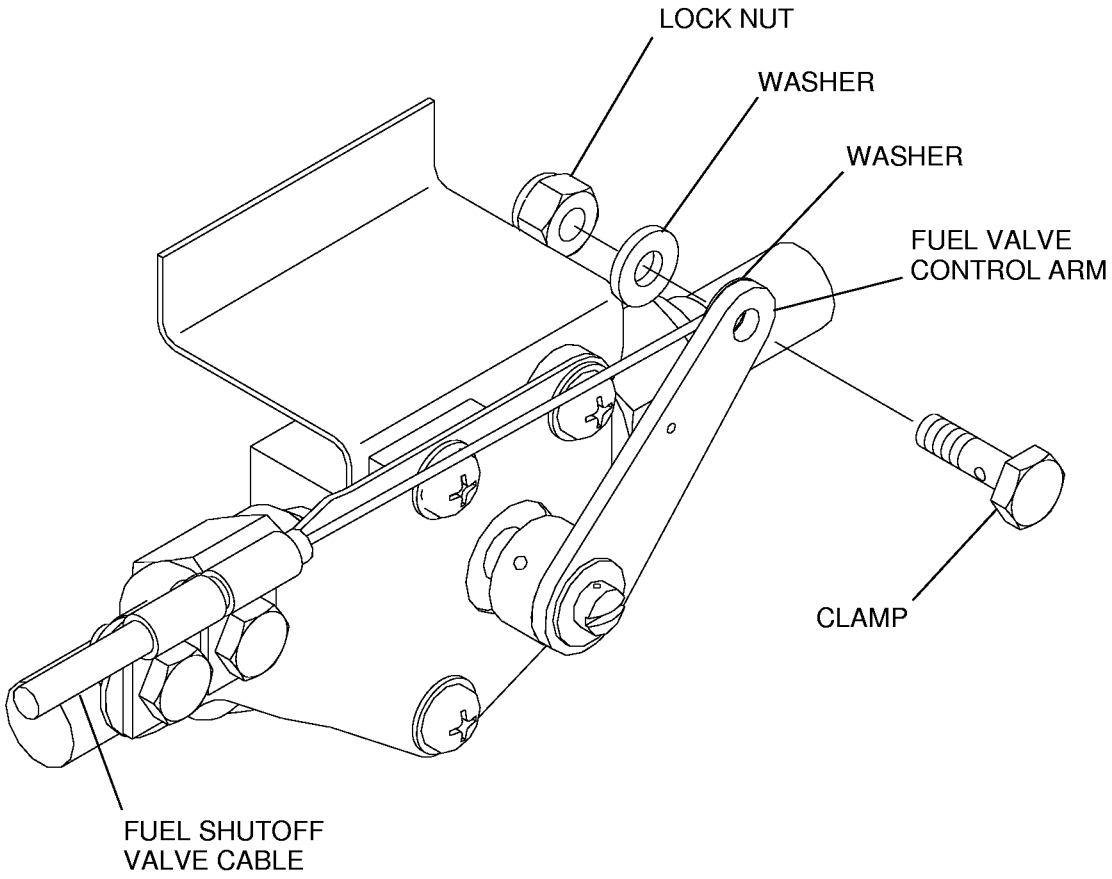

DETAIL B

B0516T1014

Fuel System Details
Figure 205 (Sheet 3)

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(6) Remove and replace the washers.
(7) Install the lock nut and tighten to a minimum of 15 inch-pounds to attach the control cable.

NOTE: After the nut is tightened, the swivel clamp must pivot freely in the control arm.

(8) Lubricate the swivel clamp with a dry film lubricant such as Molykote 321.
(9) Make sure the control arm moves smoothly.
(10) Operate the fuel shutoff control cable knob to make sure the fuel shutoff valve control cable/arm connection moves smoothly.
  (a) Adjust the control assembly until the connection operates smoothly.
  (b) If adjustment does not give smooth operation, replace the assembly and adjust the control assembly until it operates smoothly.
(11) Put the copilot's rudder pedal shields in position and attach with the screws.
(12) Install the footwell carpet.
(13) Install the copilot's seat. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices.

9. Electric Auxiliary Fuel Pump Removal/Installation

A. Remove the Electric Auxiliary Fuel Pump (Refer to Figure 205).
(1) Put the MASTER ALT/BAT switch to the OFF position.
(2) Disconnect the battery ground cable from the battery.
(3) Put the fuel selector handle to the fuel tank with less fuel.
(4) Defuel the fuel tank. Refer to Chapter 12, Fuel - Servicing.
(5) Remove the copilot seat and carpet. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices and Chapter 25, Interior Upholstery - Maintenance Practices.
(6) Remove access panels 230BT and 230CT. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(7) Disconnect the electrical connection (P1) from the electric auxiliary fuel pump (UF005).
(8) Disconnect the fuel lines and drain line from the electric auxiliary fuel pump.
(9) Loosen the clamps that attach the electric auxiliary fuel pump.
(10) Remove the pump from the airplane.
(11) Remove all fuel fittings from the electric auxiliary fuel pump.
(12) Discard the inlet and outlet fuel fitting O-rings.

B. Install the Electric Auxiliary Fuel Pump (Refer to Figure 205).
(1) Put new O-rings on the inlet and outlet fuel fittings.
(2) Install the inlet and outlet fuel fittings into the electric auxiliary fuel pump and tighten. Refer to Chapter 20, Torque Data - Maintenance Practices.
(3) Install the fuel drain fitting into the electric auxiliary fuel pump and tighten. Refer to Chapter 20, Torque Data - Maintenance Practices.
(4) Place the electric auxiliary fuel pump into the clamps.
(5) Loosely tighten the clamps.
(6) Connect the fuel lines to the inlet and outlet fittings and tighten by hand.
(7) Tighten the clamps. Refer to Chapter 20, Torque Data - Maintenance Practices.
(8) Tighten the fuel line fittings. Refer to Chapter 20, Torque Data - Maintenance Practices.
(9) Connect the electrical connection to the electric auxiliary fuel pump.
(10) Put the on/off valve to the OFF position.
(11) Put the fuel selector handle to the tank that has fuel.
(12) Make sure the electric auxiliary fuel pump and fuel fittings do not leak.
(13) Connect the battery ground cable to the battery.
(14) Loosen the fuel supply hose at the fuel injection servo inlet.
(15) Put the mixture control to the OFF position.
(16) Put the throttle control to the IDLE STOP position.
(17) Put the on/off valve to the ON position.
(18) Put the MASTER ALT/BAT switch to the ON position.
(19) Put the FUEL PUMP switch to the ON position.
(20) Operate the electric auxiliary fuel pump to bleed air from the fuel lines and prime the electric auxiliary fuel pump.
(21) Put the FUEL PUMP switch to the OFF position.

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(22) Put the MASTER ALT/BAT switch to the OFF position.
(23) Tighten the fuel supply hose at the fuel injection servo inlet. Refer to Chapter 20, Torque Data - Maintenance Practices.
(24) Put the MASTER ALT/BAT switch to the ON position.
(25) Put the FUEL PUMP switch to the ON position.
(26) Operate the electric auxiliary fuel pump to make sure all fuel fittings do not leak.
(27) Put the FUEL PUMP switch to the OFF position.
(28) Put the MASTER ALT/BAT switch to the OFF position.
(29) Install access panels 230BT and 230CT. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(30) Install the carpet and copilot seat. Refer to Chapter 25, Front Seats and Rails - Maintenance Practices and Chapter 25, Interior Upholstery - Maintenance Practices.

10. Fuel Bay Vents Adjustment/Test

NOTE: If the fuel vent or vent bleed hole is blocked while the engine operates, the engine power can decrease or stop because of a decrease in fuel supply.

NOTE: If the fuel vent or vent bleed hole is blocked while the engine does not operate, fuel expansion can pressurize the fuel bays and cause fuel leaks.

A. Test the Fuel Bay Vents (Refer to Figure 206).
(1) Attach a rubber tube to the end of the vent line below the wing.
(2) Blow into the tube to pressurize the fuel bay.

NOTE: The vent line is open if air can be blown into the fuel bay.

(3) After the tank is pressurized, put the end of the rubber tube in a container of water and look for continuous bubbles.

NOTE: Continuous bubbles show that the valve assembly bleed hole is open and that pressure is released.

(4) Replace the fuel vent check valve if it does not operate correctly. Refer to Fuel Vent Check Valve Removal/Installation.
(5) Loosen the filler cap on the opposite wing.
(6) Blow into the tube again to pressurize the fuel bay.

NOTE: The crossover line is open if pressure is released from the filler cap.

11. Fuel Vent Check Valve Removal/Installation

A. Remove the Fuel Vent Check Valve (Refer to Figure 207).
(1) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(2) Remove wing access panels 510KB and 610KB to get access to the fuel vent check valve. Refer to Chapter 6, Inspection/Access Plates - Description and Operation.
(3) Remove the unserviceable fuel vent check valve.
(4) Put caps on the vent line.

B. Install the Fuel Vent Check Valve (Refer to Figure 207).

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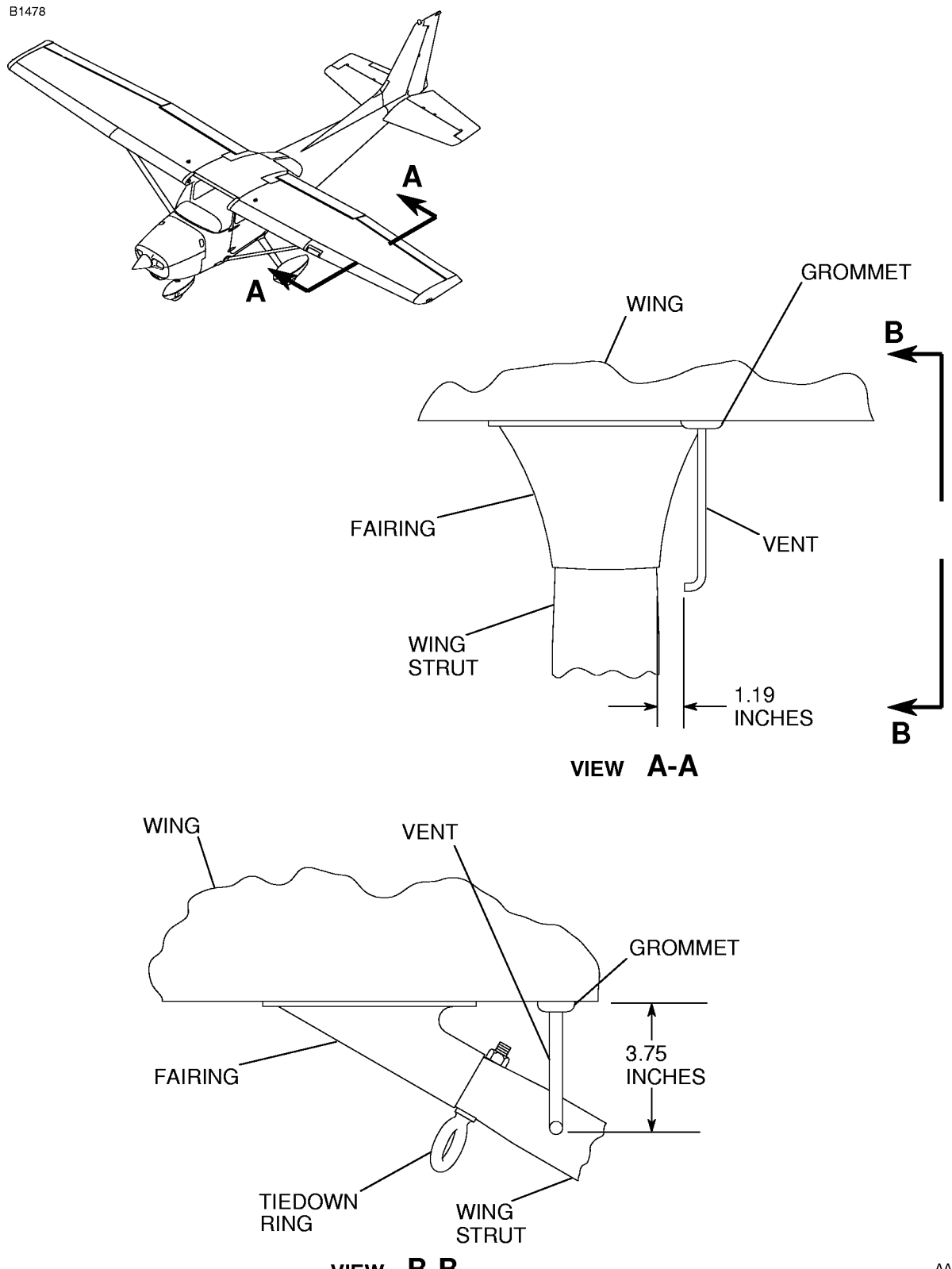

Fuel Vent Location
Figure 206 (Sheet 1)

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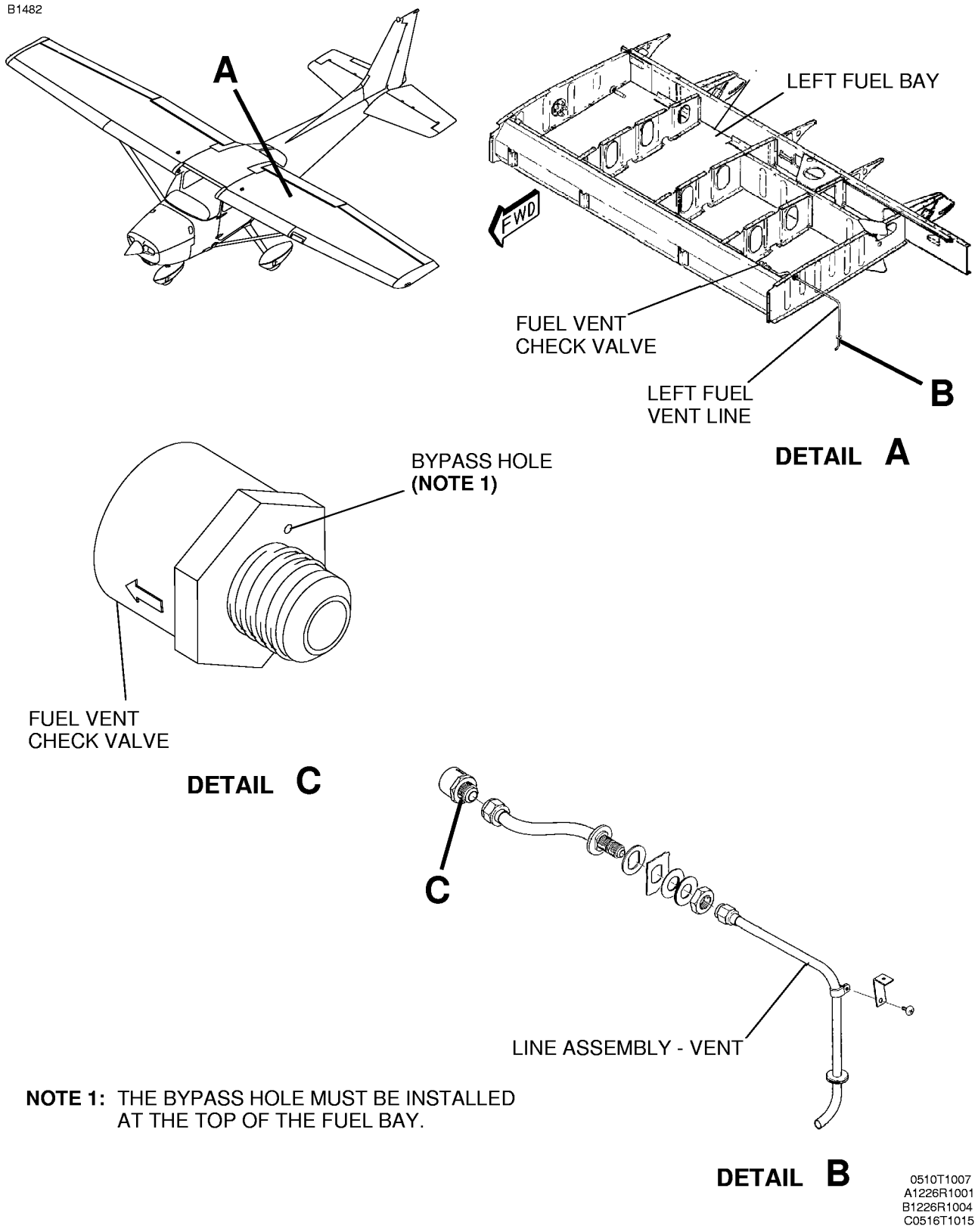

Fuel Vent Check Valve
Figure 207 (Sheet 1)

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WARNING: You must correctly align the fuel vent line below the wing near the wing strut to prevent icing of the vent tube.

WARNING: You must correct any fuel vent component that is blocked or restricted before the airplane returns to service.

(1) Remove the caps from the vent line.

NOTE: The fuel vent check valve bypass hole on the valve flap must be at the top of the fuel bay.

(2) Install the new fuel vent check valve with the bypass hole on the valve flap at the top of the fuel bay.
(3) Install the wing access panels.
(4) Do a test to make sure the fuel vent check valve operates correctly. Refer to Fuel Bay Vents Adjustment/Test.
(5) Refuel the airplane and make sure there are no leaks.
(6) Make sure the fuel vent line below the wing is correctly aligned. Refer to Figure 206.

12. Vented Fuel Filler Cap Inspection

A. Do an Inspection of the Vented Fuel Filler Cap (Refer to Figure 208).
(1) Remove the vented fuel filler cap from the adapter assembly.
(2) Disconnect the safety chain (if installed).
(3) Put a cover on the tank opening.
(4) Do a check of the gasket and frictionless washer.
(5) Replace the gasket and frictionless washer as required.

B. Clean the rubber umbrella.
(1) Use cotton swabs and solvent to gently lift the edges of the rubber umbrella and to clean the seat and the umbrella.
(2) Use a second swab to wipe the seat and umbrella thoroughly to remove cotton particles.
(3) Clean the rubber umbrella and seat until the swabs show no discoloration.

C. Replace the umbrella if it leaks fuel or has deterioration.
(1) To remove the umbrella, lubricate the umbrella stem with hydraulic fluid (MIL-PRF-5606) to prevent damage to the stem.
(2) To install the new umbrella, lubricate the stem with hydraulic fluid (MIL-PRF-5606) and use a small blunt tool to insert the retaining knob on the umbrella into the check valve body.

D. Connect the fuel cap to safety chain (if installed) and install the cap in the adapter assembly.

13. Fuel Strainer Disassembly/Cleaning/Assembly

A. Disassemble and Clean the Fuel Strainer (Refer to Figure 209).
(1) Put the fuel selector valve in the off position.
(2) Make sure the top assembly is installed correctly .

NOTE: The top assembly is installed correctly when the arrows on top point with the direction of fuel flow to the engine.

(3) Disconnect and remove the safety wire, nut, and washer at the bottom of the filter bowl.
(4) Remove the bowl.
(5) Carefully remove the standpipe.
(6) Remove the filter screen and gasket.
(7) Wash the filter screen and bowl in solvent.
(8) Dry the filter screen with compressed air.

B. Assemble the Fuel Strainer (Refer to Figure 209).
(1) Install a new gasket between the filter screen and top assembly.

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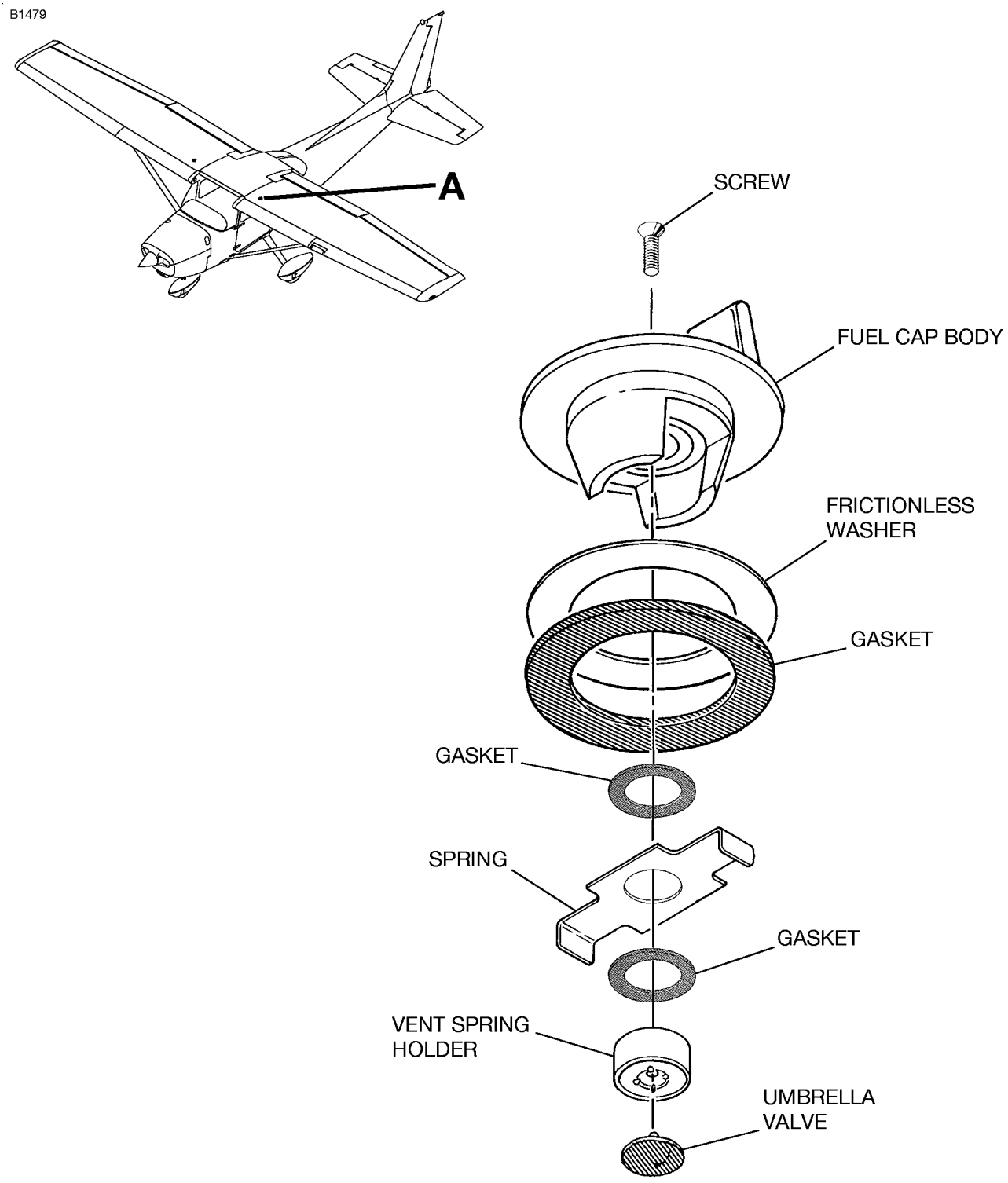

DETAIL A

LEFT SIDE SHOWN
(RIGHT SIDE TYPICAL)

0710T1001
A0526T1006

Vented Fuel Filler Cap
Figure 208 (Sheet 1)

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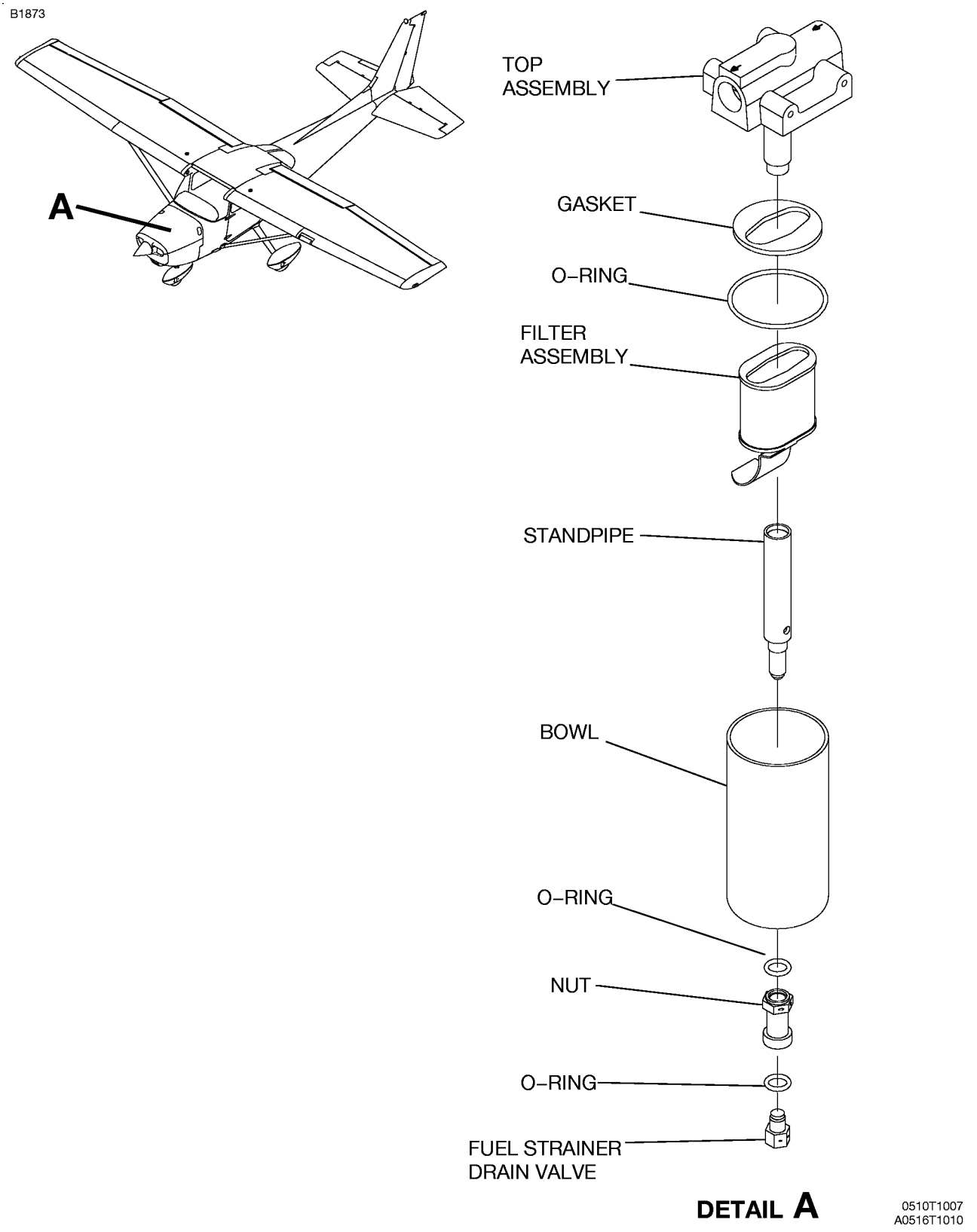

Fuel Strainer Assembly
Figure 209 (Sheet 1)

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(2) Install the screen.
(3) Install the standpipe finger tight.

NOTE: The step-washer at the bottom of the bowl is installed so the step is against the O-ring. It is satisfactory to use O-ring lubrication such as Dow Corning 4 (DC-4) Silicon Grease, part number U000717.

(4) Install the bowl with new O-rings. Torque the nut 25 to 30 inch-pounds.

NOTE: The safety wire must be twisted in the right hand direction with at least 45 degrees.

(5) Safety wire the bottom nut to the top assembly.
(6) Put the fuel selector valve in the on position and make sure there are no leaks.
(7) Make sure the fuel selector valve operates correctly.
(8) Bleed the air from the fuel strainer.
  (a) Loosen the fuel supply hose at the fuel injection servo inlet.
  (b) Set the mixture control to the OFF position.
  (c) Set the throttle control to the IDLE STOP position.
  (d) Set the FUEL PUMP switch to the ON position.
  (e) Operate the electric auxiliary fuel pump until the air is removed from the fuel lines and the electric auxiliary fuel pump is primed.
  (f) Set the FUEL PUMP switch to the OFF position.
  (g) Tighten the fuel supply hose at the fuel injection servo inlet. Refer to Chapter 20, Torque Data - Maintenance Practices.

14. Auxiliary Fuel Pump Serviceable Test

A. Do a Test of the Auxiliary Fuel Pump (Refer to Table 201).

WARNING: Obey all fuel system fire and safety procedures.

WARNING: Remove all flammable sources from the airplane and all vapor hazard areas.

(1) Remove the fuel supply hose from the engine driven fuel pump inlet fitting.
(2) Install a T-fitting on the fuel supply hose.
(3) Connect a calibrated fuel pressure test gage and a locally purchased fuel shutoff valve to the T-fitting.
(4) Point the fuel shutoff valve so it drains the fuel into a container.
(5) Use a multimeter to measure the electric current.
(6) Use a controlled electric power source to supply the 24 VDC electric power to the aircraft.
  (a) Operate the auxiliary fuel pump and adjust the fuel shutoff valve to get a pressure value as shown in Table 201 for the applicable part number to test.
  (b) Monitor the current pull of the auxiliary fuel pump electric motor.

NOTE: To help determine an acceptable pump output, the output will be 1 gallon in 2.5 minutes (24 GPH).

  (c) Measure the fuel pump current draw and pump output.

NOTE: The Dukes Model 5100-00-1 auxiliary fuel pumps that can give a minimum flow rate of 23.5 GPH at 23 PSI and have a maximum current draw of 3.0 amps at 24 volts DC are serviceable.

NOTE: Dukes Models 5100-00-3 and 5100-00-4 auxiliary fuel pumps that can give a minimum flow rate of 23.5 GPH at 14 PSI and have a maximum current draw of 3.0 amps at 24 volts DC are serviceable.

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(7) If the fuel pump does not meet the requirements, replace it with a pump that meets the requirements.
(8) If the fuel pump meets the requirements, it is serviceable.

Table 201. Dukes Model 5100 Serviceable Requirements

PUMP PART NUMBER	FUEL FLOW VOLUME (MINIMUM)	FUEL FLOW PRESSURE	SUPPLIED VOLTAGE	MAXIMUM FUEL PUMP CURRENT
5100-00-1 (or -1RX)	23.5 GPH	23 PSI	24 Volts DC	3.0 Amps
5100-00-3 (or -3RX)	23.5 GPH	14 PSI	24 Volts DC	3.0 Amps
5100-00-4 (or -4RX)	23.5 GPH	14 PSI	24 Volts DC	3.0 Amps

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FUEL BAY SEALING - MAINTENANCE PRACTICES

1. General

A. The fuel bays may need to be resealed if a leak has developed, or if the wing has been repaired. These procedures provide instructions for sealing fuel bays, classifying fuel leaks, and testing fuel bays after repair.

2. Tools and Equipment

A. Refer to Fuel - General for Tools and Equipment.

3. Classification of Fuel Leaks

A. Fuel leaks are classified into one of four categories based on the observed size of the leaks. Dependent on where the leak is located, immediate corrective action may be required prior to flight. Leaks may be classified as follows and are illustrated in Figure 201:
   (1) Stains - An area of 0.75 inch (19.05 mm) or less in diameter.
   (2) Seep - An area from 0.75 inch to 1.50 inch (19.05 mm to 38.1 mm) in diameter.
   (3) Heavy Seep - An area from 1.50 inch to 4.00 inch (38.1 mm to 101.6 mm) in diameter.
   (4) Running Leak -- Size varies with location and intensity of leak.

B. The following leaks require corrective action before further flight:
   (1) Running leaks in any area.
   (2) Stains, seeps, or heavy seeps in an enclosed area.

   NOTE: An enclosed area is defined as the wing leading edge and the section of wing inboard or outboard of the fuel bays.

C. The following leaks require correction when the airplane is grounded for other maintenance:
   (1) Stains, seeps, or heavy seeps not in an enclosed area.

4. Sealing Fuel Leaks

A. Determine Source of Leak.
   (1) Fuel can flow along a seam or structure of the wing for several inches, making the leak source difficult to find. A stained area is an indication of the leak source.
   (2) Fuel leaks can be found by testing the complete bay as described in Testing Integral Fuel Bay.
   (3) Another method of detecting the source of a fuel leak is to remove access doors and blow with an air nozzle from the inside of the bay in the area of the leak while soap bubble solution is applied to the outside wing skin.

B. Repair Leak.
   (1) Remove existing sealant in the area of the leak.
   (2) Clean the area and apply a filet seal. Press sealant into leaking area with a small paddle, working out all air bubbles.
   (3) If leakage occurs around a rivet or bolt, replace the rivet or loosen bolt, retorque, and reseal around nutplate.
   (4) Apply Type VIII sealant to access doors, fuel quantity transmitter, etc., as required and reinstall to structure. Refer to Chapter 20, Fuel, Weather and High-Temperature Sealing - Maintenance Practices.
   (5) Allow sealant to completely cure.
   (6) Test fuel bay for leakage. Refer to Testing Integral Fuel Bay.

5. Testing Integral Fuel Bay

A. The fuel system consists of two vented, integral fuel tanks (one in each wing). The following procedure should be used only after sealant has fully cured.
   (1) Remove vent line from vent fitting and cap fitting.
   (2) Disconnect fuel lines from bay.

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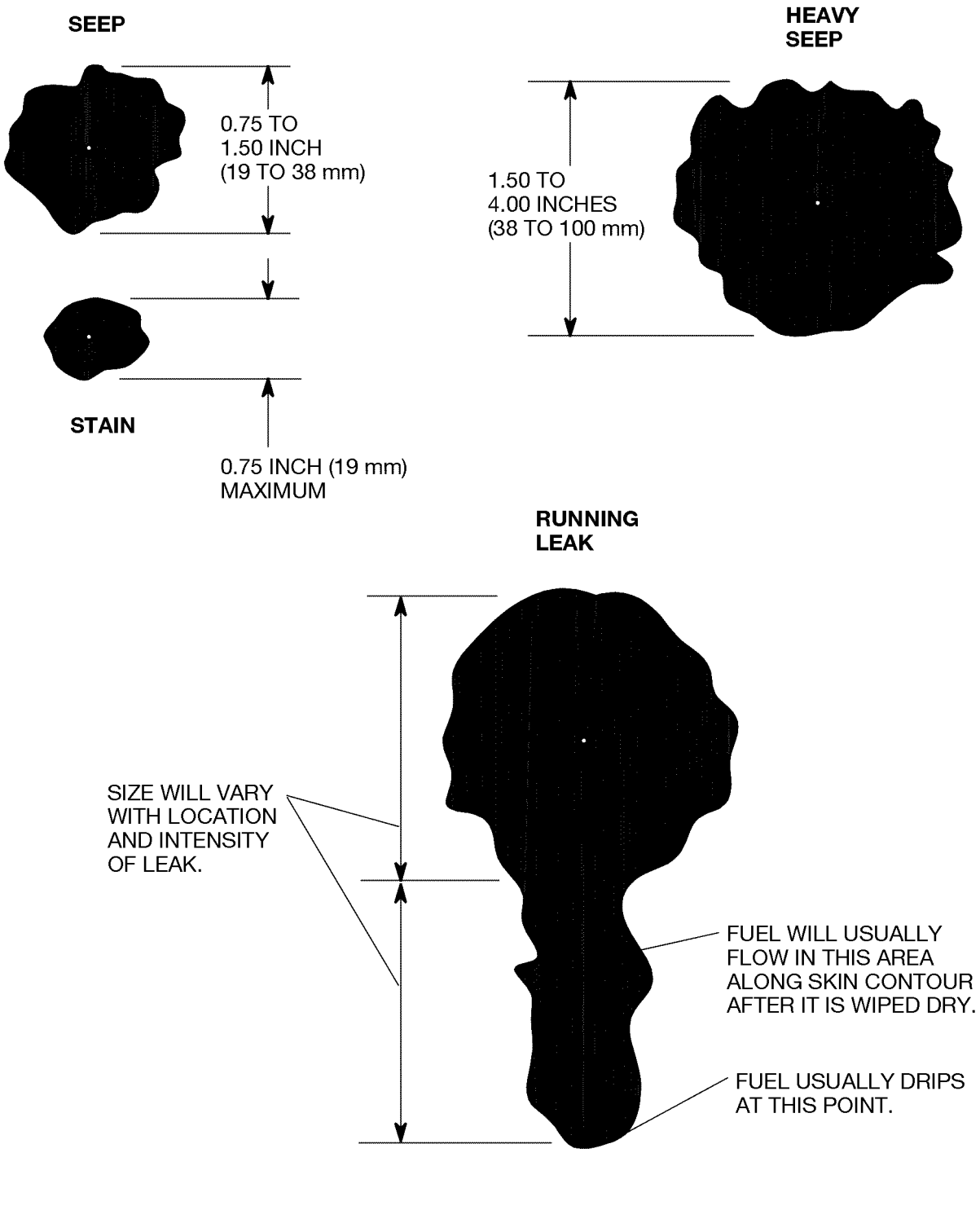

0510T1007

Classification of Fuel Leaks
Figure 201 (Sheet 1)

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(3) To one of the bay fittings, attach a water manometer capable of measuring 20 inches (.508 m) of water.
(4) To the other bay fitting, connect a well-regulated supply of air (0.5 PSI (415 Pa) maximum, or 13.8 inches (0351 m) of water. Nitrogen may be used where the bay might be exposed to temperature changes while testing.
(5) Make sure filler cap is installed and sealed.
(6) Apply pressure slowly until 0.5 PSI (415 Pa) is obtained.
(7) Apply a soap solution as required.
(8) Allow 15 to 30 minutes for pressure to stabilize.
(9) If bay holds for 15 minutes without pressure loss, seal is acceptable.
(10) Reseal and retest if any leaks are found.

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FUEL QUANTITY INDICATION SYSTEM - TROUBLESHOOTING

1. Troubleshooting

A. This section provides troubleshooting information for the fuel quantity indication system on airplanes with the CAN bus fuel sensors.

TROUBLE	PROBABLE CAUSE	REMEDY
RED Xs OVER THE FUEL QUANTITY INDICATORS.	1. Proper software configuration not loaded.	Check the software configuration. Refer to Software Configuration Check.
	2. No information transmitted between the fuel quantity sensor and the Integrated Avionics Unit (GIA).	Check the system wiring. Refer to the System Wiring Resistance Check.
	3. No electrical power to the fuel quantity sensors.	Check for power to the sensor in question. Refer to System Power Check.
	4. Damaged fuel quantity sensor.	Remove the fuel quantity sensor in question and connect it to the connector on the opposite side. If the problem follows the sensor, replace it. Refer to Fuel Quantity Indication System-Removal/Intallation. If the problem does not follow the sensor, contact Cessna Customer Services at 316-517-5800.
Questionable Fuel Quantity Indication Value	1. Proper software configuration not loaded.	Check the software configuration. Refer to Software Configuration Check.
	2. A Fuel Quantity Calibration necessary.	Do a fuel quantity calibration. Refer to Fuel Quantity System Calibration (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

2. Software Configuration Check

A. Check the software configuration.
(1) Put the BAT MASTER switch and the AVIONICS MASTER switches to the ON position to start the G1000 system in normal mode.
(2) Disengage the MFD and both PFD circuit breakers.
(3) After 10 seconds, engage both PFD circuit breakers while the ENT button is pushed on the PFD.
(4) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

(5) Use the Flight Management System (FMS) outer knob to go to the GIA page group.
(6) Use the FMS inner knob to go to the CAN CONFIGURATION page.
(7) Push the inner FMS knob to start the cursor.
(8) Use the outer FMS knob to move the cursor over CHNL 1.
(9) Use the FMS inner knob to go to the CHNL 2.

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(10) Make sure that the values on the PFD match the values in Tables 101 and 102.
(a) If the values on the PFD do not match the values in Tables 101 and 102, load the configuration data. Refer to Fuel Quantity Indication System-Adjustment/Test.

Table 101. CAN I/O (Inputs/Outputs)

	SET	ACTIVE
INPUT DATA	VIBRO-METER FUEL PROBE	VIBRO-METER FUEL PROBE
OUTPUT DATA	OFF	OFF
SPEED	0000125000	0000125000

Table 102. FUEL PACKETS PRESENT

	SET	ACTIVE
FUEL QNTY L #1	ON	ON
FUEL QNTY L #2	OFF	OFF
FUEL QNTY L #3	OFF	OFF
FUEL QNTY L #4	OFF	OFF
FUEL QNTY L #5	OFF	OFF
FUEL QNTY C #1	OFF	OFF
FUEL QNTY C #2	OFF	OFF
FUEL QNTY R #1	ON	ON
FUEL QNTY R #2	OFF	OFF
FUEL QNTY R #3	OFF	OFF
FUEL QNTY R #4	OFF	OFF
FUEL QNTY R #5	OFF	OFF

3. System Wiring Resistance Check

A. Check the system wiring resistance. Refer to Figure 101
(1) Remove electrical power from the plane.
(2) Remove access panels 510DB and 510HB (left wing) or 610DB and 610HB (right wing). Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Test the system as described in Table 103, Continuity and Resistance Test
(a) If necessary, repair the damaged wiring.

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Table 103. Continuity and Resistance Test

Airplane Configuration	Pins to measure		Acceptable Resistance (Ohms)
	Positive meter lead	Negative meter lead	
Left sensor (PL900) disconnected to take measurements on PL900. Right sensor connected. Airplane master switches OFF.	Pin 3 (CAN BUS HI)	Pin 4 (CAN BUS LO)	Approximately 120Ω
	Pin 3 (CAN BUS HI)	Airplane ground	Greater than 100kΩ
	Pin 4 (CAN BUS LO)	Airplane ground	Greater than 100kΩ
	Pin 3 (CAN BUS HI)	Pin 1 (28VDC)	Greater than 100kΩ
	Pin 4 (CAN BUS LO)	Pin 1 (28VDC)	Greater than 100kΩ
	Pin 6 (CONFIG 0)	Pin 11 (CONFIG RETURN)	Approximately 0Ω
	Pin 12 (CAN TERM RES START)	Pin 5 (CAN TERM RES END)	Approximately 0Ω
	Make sure pins 7, 8, 9, 10, and 13 have no connection.		
Right sensor (PR900) disconnected to take measurements on PR900. Left sensor connected. Airplane master switches OFF.	Pin 3 (CAN BUS HI)	Pin 4 (CAN BUS LO)	Approximately 120Ω
	Pin 3 (CAN BUS HI)	Airplane ground	Greater than 100kΩ
	Pin 4 (CAN BUS LO)	Airplane ground	Greater than 100kΩ
	Pin 3 (CAN BUS HI)	Pin 1 (28VDC)	Greater than 100kΩ
	Pin 4 (CAN BUS LO)	Pin 1 (28VDC)	Greater than 100kΩ
	Pin 9 (CONFIG 0)	Pin 11 (CONFIG RETURN)	Approximately 0Ω
	Pin 12 (CAN TERM RES START)	Pin 5 (CAN TERM RES END)	Approximately 0Ω
	Make sure pins 6, 7, 8, 10, and 13 have no connection.		
Both sensors (PR900 and PL900) disconnected. Take measurements on PR900. Airplane master switches OFF.	Pin 3 (CAN BUS HI)	Pin 4 (CAN BUS LO)	Greater than 1kΩ

4. System Power Check

A. Check the System Power.
(1) Disengage the NAV1 ENG circuit breaker on the ESS BUS.
(2) Put a wires in Pin 1 (28VDC) and Pin 2 (GROUND) of the connector.
(3) Put the voltmeter probes on the wire to the applicable pin.

CAUTION: Make sure the wires or probes do not touch when the NAV1 ENG circuit breaker is engaged. If the wires or probes touch, the inline system protection fuse will open.

(4) Engage the NAV1 ENG circuit breaker.

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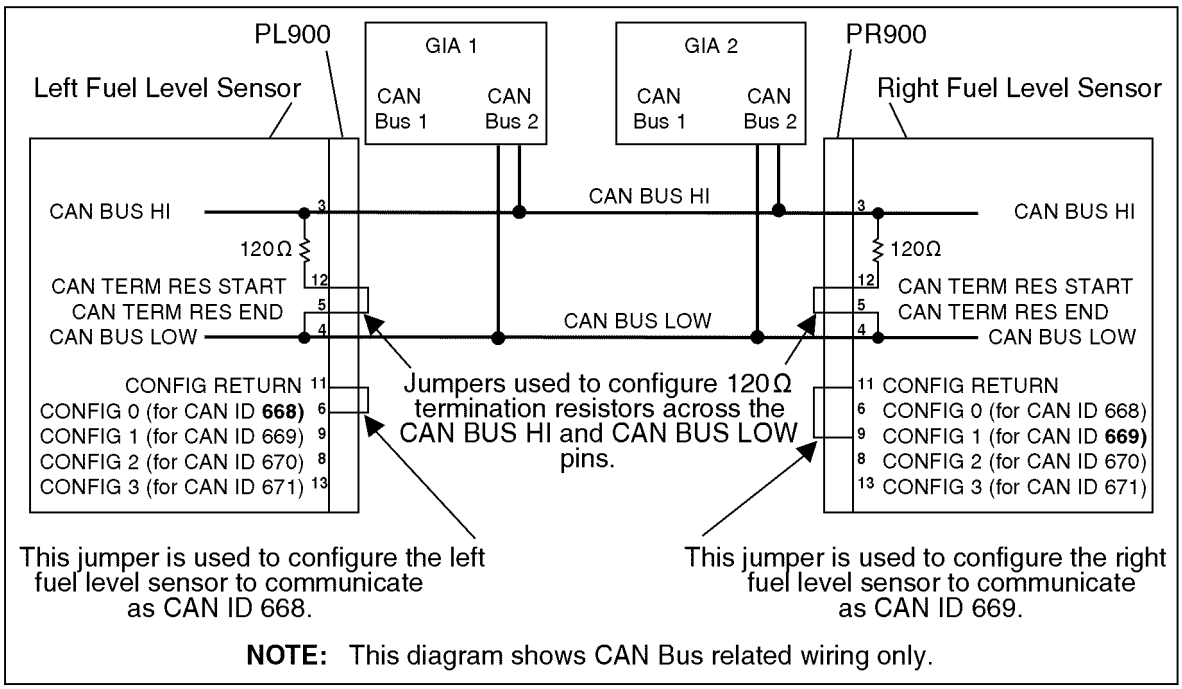

CAN Bus Wiring Diagram
Figure 101 (Sheet 1)

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(5) Make the system reads 28 volts.
   (a) If the system does not have power, toubleshoot the power distribution system including the inline system protection fuse.
(6) Disengage the NAV1 ENG circuit breaker.
(7) Remove the wires from the connector.

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FUEL QUANTITY INDICATION SYSTEM - REMOVAL/INSTALLATION

1. General

A. This section gives the instructions for removal and installation of the components fuel quantity indication system.

2. Float-type Fuel Level Sender Removal/Installation

NOTE: Fuel level sender removal/installation is typical for the left and right fuel bays.

A. Remove the Fuel Level Sender (Refer to Figure 401).
   (1) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
   (2) Remove access panels 510DB and 510HB (left wing) or 610DB and 610HB (right wing). Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
   (3) Disconnect the wire ring terminals from the fuel level sender.
   (4) Disconnect the fuel level sender ground wire from the wing rib.

CAUTION: Do not bend the fuel level sender float arm. A bent float arm will give incorrect operation

   (5) Remove the screws that attach the fuel level sender to the bracket.
   (6) Carefully remove the fuel level sender from the fuel bay

B. Install the Fuel Level Sender (Refer to Figure 401).

NOTE: If the fuel level senders are replaced, the system must be calibrated. Refer to Fuel Quantity Calibration.

   (1) Make sure the fuel level senders operates correctly before the fuel quantity indicator is replaced.
      (a) Carefully move the float arm by hand from the lower stop to the upper stop and back to the lower stop 80 times.

NOTE: The movement of the float will clean the contacts of the probe.

      (b) Make sure the resistance is 3 ohms, +2 or -2 ohms when the tanks are empty.
      (c) Make sure the resistance is 90 ohms, +5 or -5 ohms when the tanks are full.
   (2) Install the new gaskets on the fuel level sender.
   (3) Install the five bushings that come with the fuel level sender into the mounting screw holes with the shoulder to the outside of the sender.

CAUTION: Do not bend the fuel level sender float arm. A bent float arm will give incorrect operation

   (4) Carefully install the fuel level sender in the fuel bay.
   (5) Attach the fuel level sender with screws and torque the screws to 20 inch-pounds.
   (6) Connect the larger ring terminal to fuel level sender center stud (stud #1). Torque nut to 12 inch-pounds.
   (7) Connect the fuel level sender ground wire to the small stud (stud #2).
   (8) Install access panels 510DB and 510HB (left wing) or 610DB and 610HB (right wing). Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
   (9) Do a fuel quantity calibration. Refer to Fuel Quantity Calibration.

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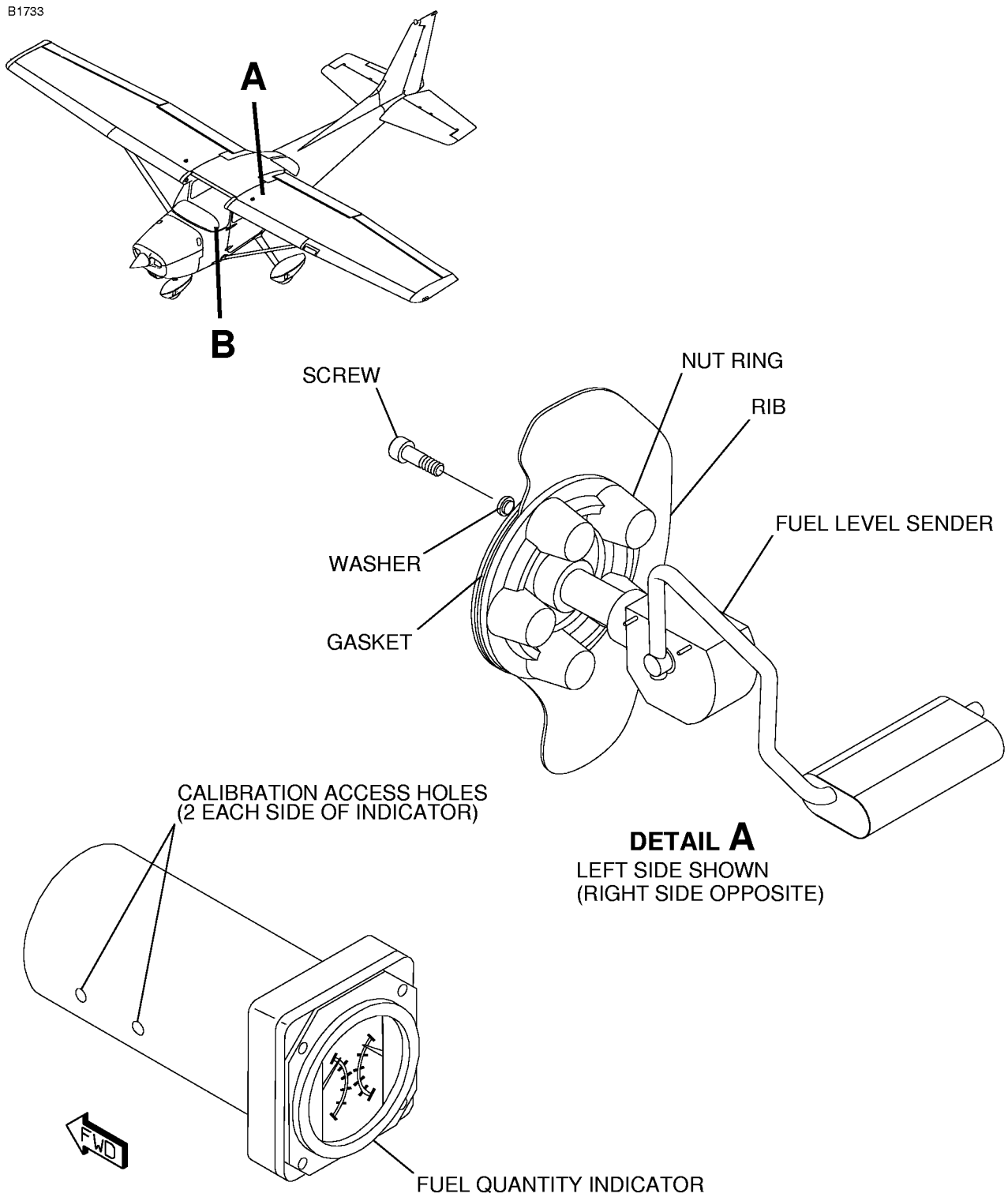

DETAIL A
LEFT SIDE SHOWN
(RIGHT SIDE OPPOSITE)

DETAIL B
AIRPLANES WITHOUT GARMIN G1000 OPTION

0510T1007
A0526T1007
B0714T1039

Float-type Fuel Level Sender
Figure 401 (Sheet 1)

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3. Fuel Quantity Indicator Removal/Installation

A. Make sure the fuel level senders operates correctly before the fuel quantity indicator is replaced.
(1) Carefully move the float arm by hand from the lower stop to the upper stop and back to the lower stop 80 times.

NOTE: The movement of the float will clean the contacts of the probe.

(2) Make sure the resistance is 3 ohms, +2 or -2 ohms when the tanks are empty.
(3) Make sure the resistance is 90 ohms, +5 or -5 ohms when the tanks are full.

B. Remove the Indicator (Refer to Figure 401).
(1) Make sure the electrical power is OFF.
(2) Get access to the forward of the fuel quantity indicator and disconnect the electrical connector.
(3) Remove the screws that attach the indicator to the instrument panel and remove the indicator from the airplane.

C. Install the Indicator (Refer to Figure 401).

NOTE: If the indicator is replaced, the system must be calibrated. Refer to Fuel Quantity Calibration.

(1) Connect the electrical connector to the indicator.
(2) Put the indicator in position and attach to the instrument panel with screws.
(3) Make sure the fuel quantity gauge operates correctly.

4. CAN Bus Fuel Level Sensor Removal/Installation

A. Remove the Sensor (Refer to Figure 402.)
(1) Make sure the electrical power is OFF.
(2) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(3) Remove access panels 510DB and 510HB (left wing) or 610DB and 610HB (right wing). Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(4) Disconnect the electrical connector from the fuel level sensor.
(5) Disconnect the fuel level sensor ground braid.
(6) Remove the screws that attach the fuel level sensor to the bracket.

CAUTION: Do not bend the tube. A bent tube will give incorrect operation.

(7) Carefully remove the fuel level sender from the fuel bay

B. Install the Sensor (Refer to Figure 402.)

NOTE: If the fuel level senders are replaced, the system must be calibrated. Refer to Fuel Quantity Calibration.

(1) Install the new gaskets on the fuel level sensor.

CAUTION: Do not bend the tube. A bent tube will give incorrect operation.

(2) Carefully install the fuel level sender in the fuel bay.
(3) Attach the fuel level sensor with screws and torque the screws to 20 inch-pounds.
(4) Connect the electrical connector to fuel level sensor.
(5) Connect the fuel level sensor ground braid.
(6) Install access panels 510DB and 510HB (left wing) or 610DB and 610HB (right wing). Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(7) Do a fuel quantity calibration. Refer to Fuel Quantity System Calibration (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

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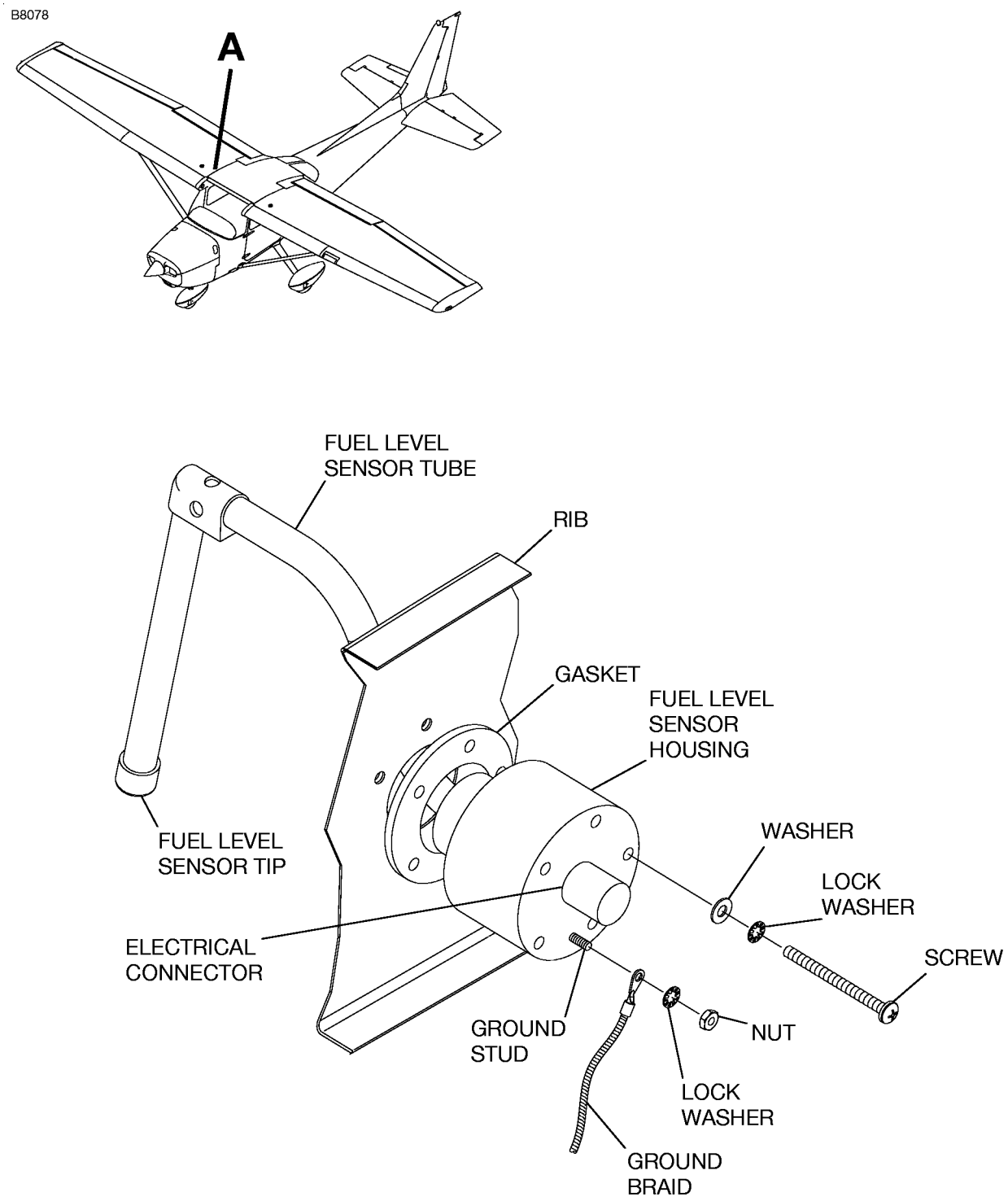

DETAIL A
RIGHT SIDE SHOWN
(LEFT SIDE OPPOSITE)

0510T1007
A0526T1019

CAN Bus Fuel Level Sensor
Figure 402 (Sheet 1)

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FUEL QUANTITY INDICATION SYSTEM - ADJUSTMENT/TEST

1. General

A. This section gives the adjustment/test procedures for the fuel storage and distribution system.

2. Fuel Quantity Calibration And Check (Airplanes without Garmin G1000)

A. Fuel Indicator Calibration
(1) Put the fuel selector valve in the BOTH position.
(2) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
(a) Open all the wing drain valves and drain the fuel bays until both are empty.
(b) Drain the fuel selector valve until empty.
(3) Put the fuel selector valve in the RIGHT position.
(4) Remove the fuel quantity indicator from the instrument panel.
(5) Install a 0580001-1 test box between the wire harness connector and the fuel quantity indicator connector.

NOTE: The internal light for the fuel quantity indicator will not work when the test box is connected.

(6) Make the airplane level.
(a) Make the wings level to 0.00 degree, +0.25 degree or -0.25 degree. Use blocks under the wheels or adjust the tire pressure to make the wings level. Refer to Chapter 8, Leveling - Maintenance Practices.
(b) Make the airplane level to 2.00 degrees, +0.25 or -0.25 degrees nose up position. Refer to Chapter 8, Leveling - Maintenance Practices.
(7) Use an external power source to apply 28 VDC, +0.5 or -0.5 VDC, to the airplane, and put the master switch in the ON position. Put both switches on the test box to the NORM position.
(8) Add unusable fuel to each fuel bay. Refer to Pilot's Operating Handbook for the amount of unusable fuel.
(9) Put the fuel selector valve in the BOTH position.
(10) Let the fuel levels equalize for five minutes.
(11) Put the fuel selector valve in the RIGHT position.
(12) Move the wing tips approximately 5 inches up and down for approximately 10 seconds.
(13) Let the airplane become stable for approximately 30 seconds.
(14) Make sure that the airplane is still at 2 degrees nose up and the wings are still level.
(15) Adjust the "EMPTY" potentiometer, on the fuel quantity indicator, for the left and right gages until the indicator pointer is in the middle of the red radial line.

NOTE: A nonmagnetic screwdriver must be used when you adjust the potentiometers on the fuel quantity indicator.

(16) Make sure that the low-fuel warning-lamps come on after 60 seconds.
(17) Fill both fuel bays with the fuel selector valve in the RIGHT position.
(18) Adjust the "FULL" potentiometer for the left and right gages until the pointer is in the middle of the white radial line at the full indication.
(19) Make sure the low-fuel warning-lamps go off.
(20) Proceed to the Fuel Warning System Check.

B. Fuel Warning System Check.
(1) Configure the airplane for the Fuel Warning System Check.
(a) Apply 28 VDC to the airplane.
(b) Set the master switch to ON.
(c) Move the test box switches to NORM.
(d) Make sure the fuel gages read FULL.
(e) Make sure the low-fuel annunciator is OFF.

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(2) Turn the NORM/OPEN switch on the test box to the OPEN position and start the timer.

NOTE: The airplane's digital clock can be used in the timer mode to measure the time of the annunciators. The interval for this test is from switch operation until the annunciator begins to flash. The annunciators will flash for approximately 10 seconds before they come continuously on without a flash.

(3) Monitor the fuel quantity indicator.
  (a) Make sure the pointer goes to the power off position below the first graduation.
  (b) The annunciators must come on within 75 seconds.
(4) Put the NORM/OPEN switch to the NORM position.
  (a) The indicators must read full and the annunciators must go off.
  (b) Set the timer again.
(5) Turn the SHORT/NORM/100+ OHM switch to the 100+ OHM position. Start the timer.
(6) Monitor the fuel quantity indicator.
  (a) Make sure the pointer goes to the power off position below the first graduation.
  (b) The annunciators must come on within 75 seconds.
(7) Turn the SHORT/NORM/100+ OHM switch to the NORM position.
  (a) The indicators must read full and the annunciators must go off.
  (b) Set the timer again.
(8) Turn the SHORT/NORM/100+ OHM switch to the SHORT position. Start the timer.
(9) Monitor the fuel quantity indicator.
  (a) Make sure the pointer goes to the power off position below the first graduation.
  (b) The annunciators must come on within 75 seconds.
(10) Turn the SHORT/NORM/100+ OHM switch to the NORM position.
  (a) The indicators must read full and the annunciators must go off.
(11) Set the airplane digital clock back to the clock mode.
(12) Set the master switch to OFF.
(13) Remove the test box.
(14) Install the fuel quantity indicator in the instrument panel.
(15) Set the master switch to ON.
(16) Make sure the fuel quantity indicators show FULL and the annunciators are off.
(17) Set the master switch to OFF.

3. Fuel Quantity System Calibration and Check Setup (Airplanes with Garmin G1000 and float-type fuel level senders).

NOTE: All G1000 airplanes must have software version 563.03 or later. The software version is shown on the upper right corner of the MFD on the first page shown after the MFD is powered on in normal operation.

NOTE: If the fuel quantity indicator on the Garmin G1000 system has a red X on it during normal operation, examine the fuel level sender and wiring and refer to the Garmin G1000 Line Maintenance Manual for more Garmin system troubleshooting. If the values given on the PFD are not the same as the values given in the calibration procedure, refer to the Garmin G1000 Line Maintenance Manual for troubleshooting.

A. Do a Fuel Quantity Calibration and Check Setup.
  (1) Put the selector valve in the BOTH position.
  (2) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
    (a) Drain the fuel tanks with all wing drain valves until the two tanks are empty.
    (b) Drain the fuel-selector drain valve until it is empty.
  (3) Put the fuel selector valve in the RIGHT position.
  (4) Make the airplane level.
    (a) Make the wings level to 0.0 degrees, +0.25 or -0.25 degree. Use blocks under the wheels or adjust tire pressure to make the wings level. Refer to Chapter 8, Leveling - Maintenance Practices.

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(b) Make the airplane level to 2.00 degrees, +0.25 or -0.25 degrees nose up position. Refer to Chapter 8, Leveling - Maintenance Practices.

(5) Add unusable fuel to each fuel tank. Refer to the Pilot's Operating Handbook for the unusable fuel quantity.
(6) Put the fuel selector valve in the BOTH position.
(7) Let the fuel levels equalize for five minutes.
(8) Put the fuel selector valve in the RIGHT position.
(9) Move the wing tips approximately 5 inches up and down for approximately 10 seconds.
(10) Let the airplane become stable for approximately 30 seconds.
(11) Put the BAT MASTER switch and the AVIONICS MASTER switches to the ON position to start the G1000 system in normal mode.
(12) Make sure the fuel quantity indications do not show red Xs.
(13) Disengage both NAV1 ENG circuit breakers and make sure that red Xs are shown for the fuel quantity.
(14) Engage both NAV1 ENG circuit breakers and make sure no red Xs are shown for the fuel quantity.
(15) After 60 seconds with no red Xs, make sure LOW FUEL L and LOW FUEL R annunciations are seen.

NOTE: The annunciations will be seen when the fuel quantity indicates less than 5 gallons for 60 seconds.

(16) Disengage the MFD and both PFD circuit breakers.
(17) After 10 seconds, engage both PFD circuit breakers while the ENT button is pushed on the PFD.
(18) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

(19) Use the Flight Management System (FMS) large knob to go to the CAL page group.
(20) Use the FMS inner knob to go to the FUEL TANK CALIBRATION page.
(21) Engage the MFD circuit breaker while the ENT button is pushed on the MFD.
(22) Release the ENT button after the words INITIALIZING SYSTEM show on the MFD.

NOTE: Before you do the calibration procedure, you must turn on the G1000 system and let it become stable for a minimum of three minutes.

NOTE: The MFD is now in the configuration mode.

(23) Use the FMS large knob to go to the GRS page group on the MFD.
(24) Use the FMS small knob to go to the GRS/GMU CALIBRATION page on the MFD.
(25) Do the steps that follow:
(a) If only a fuel quantity system check needs done, do a Fuel Quantity System Check (Airplanes with Garmin G1000 and float-type fuel level senders).
(b) If a fuel quantity system calibration needs done, do a Fuel Quantity System Calibration (Airplanes with Garmin G1000 and float-type fuel level senders).

4. Fuel Quantity System Calibration (Airplanes with Garmin G1000 and float-type fuel level senders).

A. Do the Fuel Quantity System Calibration.
(1) If not completed before, do the Fuel Quantity System Calibration and Check Setup (Airplanes with Garmin G1000 and float-type fuel level senders).
(2) Push the softkeys on the FUEL CALIBRATION page of the PFD, in the sequence that follows, to enter the password.
(a) Push Softkey 12 (far right softkey).
(b) Push Softkey 11.
(c) Push Softkey 10.
(d) Push Softkey 9.

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(3) Make sure that the FUEL FLOW ENG 1 SCALE value is 1.00000.
   (a) If the FUEL FLOW ENG 1 SCALE value is not 1.00000, use the FMS knobs to make it 1.00000. Push in the inner FMS knob to activate the cursor. Use the outer FMS knob to select FUEL FLOW ENG 1 SCALE. Use the inner FMS knob to change the value.
(4) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(5) Turn the inner FMS knob to select LEFT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(6) Make sure that the airplane is level at 2.0 degrees nose up and 0.0 degrees wings level attitude.
(7) Calibrate empty for the left fuel tank.
   (a) Make sure that the CALIBRATED TOTAL value shown for the LEFT tank is stable.
   (b) Push the EMPTY softkey and push the enter (ENT) button to add or overwrite the 0.00 GL calibration point in the CALIBRATION TABLE.
   (c) Make sure that the CALIBRATED TOTAL values are between -0.10 and +0.10 gallon (-0.38 and +0.38l) for the LEFT tank.
   (d) Make sure there is only one calibration point in the CALIBRATION TABLE. Under ACTUAL QUANTITY you must have "0.00 GL" and you must have one number under CALIBRATED VALUE. If you have more points in the CALIBRATION TABLE highlight them and use the DELETE softkey to delete them. Calibrate empty for the left fuel tank again if more than one calibration point was found.
(8) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(9) Turn the inner FMS knob to select RIGHT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(10) Calibrate empty for the right fuel tank.
   (a) Make sure that the CALIBRATED TOTAL value shown for the RIGHT tank is stable.
   (b) Push the EMPTY softkey and push the ENT button to add or overwrite the 0.00 GL calibration point in the CALIBRATION TABLE.
   (c) Make sure that the CALIBRATED TOTAL values are between -0.10 and +0.10 gallon (-0.38 and +0.38l) for the RIGHT tank.
   (d) Make sure there is only one calibration point in the CALIBRATION TABLE. Under ACTUAL QUANTITY you must have "0.00 GL" and you must have one number under CALIBRATED VALUE. If you have more points in the CALIBRATION TABLE highlight them and use the DELETE softkey to delete them. Calibrate empty for the right fuel tank again if more than one calibration point was found.
(11) Do the Fuel Quantity System Check (Airplanes with Garmin G1000 and float-type fuel level senders).

5. Fuel Quantity System Check (Airplanes with Garmin G1000 and float-type fuel level senders).

A. Do the Fuel Quantity System Check.
   (1) If not completed before, do the Fuel Quantity System Calibration and Check Setup (Airplanes with Garmin G1000 and float-type fuel level senders).
   (2) Make sure that the left, L, and right, R, fuel quantity pointers are on the red line on the MFD on the GRS group GRS/GMU CALIBRATION page.
   (3) Make sure the fuel selector valve is in the RIGHT position.
   (4) Add 5 gallons of fuel (low fuel level) to the left fuel tank. Refer to Chapter 12, Fuel - Servicing.
   (5) Make sure fuel is sensed in the LEFT tank.
   (6) Add 5 gallons of fuel (low fuel level) to the right fuel tank. Refer to Chapter 12, Fuel - Servicing.
   (7) Make sure fuel is sensed in the RIGHT tank.
   (8) Move the wing tips approximately 5 inches up and down for approximately 10 seconds.
   (9) Let the airplane become stable for approximately 30 seconds.
   (10) Make sure that the airplane is level at 2.0 degrees nose up and 0.0 degrees wings level attitude.
   (11) Push the TNK SEL softkey to highlight the CURRENT TANK field.

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(12) Turn the inner FMS knob to select LEFT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(13) Make sure the CALIBRATED TOTAL value for the LEFT tank is stable and between 2.5 to 6.1 gallons.
(14) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(15) Turn the inner FMS knob to select RIGHT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(16) Make sure the CALIBRATED TOTAL value for the RIGHT tank is stable and between 2.5 to 6.1 gallons.
(17) If the values are in tolerance, the procedure is complete.
(18) If the CALIBRATED TOTAL values are not in the range:
  (a) Move the wing tips approximately 5 inches up and down for approximately 10 seconds.
  (b) Let the airplane become stable for approximately 30 seconds.
  (c) Make sure that the airplane is level at 2.0 degrees nose up and 0.0 degrees wings level attitude.
  (d) Make sure the CALIBRATED TOTAL value for the LEFT tank is stable and between 2.5 to 6.1 gallons.
    1 If the CALIBRATED TOTAL is still not in the tolerance range, drain the fuel from the tanks and do the fuel calibration procedure again.
  (e) Make sure the CALIBRATED TOTAL value for the RIGHT tank is stable and between 2.5 to 6.1 gallons.
    1 If the CALIBRATED TOTAL is still not in the tolerance range, drain the fuel from the tanks and do the fuel calibration procedure again.
(19) Make sure the tires are inflated to the correct pressure if necessary.
(20) Remove blocks from under the gear if necessary.
(21) Put the AVIONICS switch to the OFF position.
(22) Put the BAT MASTER switch to the OFF position.

6. Fuel Quantity System Calibration and Check Setup (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

NOTE: All G1000 airplanes must have software version 563.03 or later. The software version is shown on the upper right corner of the MFD on the first page shown after the MFD is powered on in normal operation.

NOTE: If the fuel quantity indicator on the Garmin G1000 system has a red X on it during normal operation, examine the fuel quantity sensor and wiring and refer to the Garmin G1000 Line Maintenance Manual for more Garmin system troubleshooting. If the values given on the PFD are not the same as the values given in the calibration procedure, refer to Fuel Quantity Indication System - Troubleshooting.

A. Do a Fuel Quantity Calibration and Check Setup.
  (1) Put the selector valve in the BOTH position.
  (2) Defuel the airplane. Refer to Chapter 12, Fuel - Servicing.
    (a) Drain the fuel tanks with all wing drain valves until the two tanks are empty.
    (b) Drain the fuel-selector drain valve until it is empty.
  (3) Put the fuel selector valve in the RIGHT position.
  (4) Make the airplane level.
    (a) Make the wings level to 0.0 degrees, +0.25 or -0.25 degree. Refer to Chapter 8, Leveling - Maintenance Practices.
    (b) Make the airplane level to 2.00 degrees, +0.25 or -0.25 degrees nose up position. Refer to Chapter 8, Leveling - Maintenance Practices.

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(5) Add unusable fuel to each fuel tank. Refer to the Pilot's Operating Handbook for the unusable fuel quantity.
(6) Put the fuel selector valve in the BOTH position.
(7) Let the fuel levels equalize for five minutes.
(8) Put the fuel selector valve in the RIGHT position.
(9) Put the BAT MASTER switch and the AVIONICS MASTER switches to the ON position to start the G1000 system in normal mode.
(10) Make sure the fuel quantity indications do not show red Xs.
(11) Disengage the NAV1 ENG circuit breaker on the ESS BUS and make sure that red Xs are shown for the fuel quantity.
(12) Engage the NAV1 ENG circuit breaker on the ESS BUS and make sure no red Xs are shown for the fuel quantity.
(13) After 60 seconds with no red Xs, make sure LOW FUEL L and LOW FUEL R annunciations are seen.

NOTE: The annunciations will be seen when the fuel quantity indicates less than 5 gallons for 60 seconds.

(14) Disengage the MFD and both PFD circuit breakers.
(15) After 10 seconds, engage the MFD circuit breaker while the ENT button is pushed on the MFD.
(16) Release the ENT button after the words INITIALIZING SYSTEM show on the MFD.

NOTE: Before you do the calibration procedure, you must turn on the G1000 system and let it become stable for a minimum of three minutes.

NOTE: The MFD is now in the configuration mode.

(17) Use the FMS outer knob to go to the GRS page group on the MFD.
(18) Use the FMS inner knob to go to the GRS/GMU CALIBRATION page on the MFD.
(19) After 10 seconds, engage both PFD circuit breakers while the ENT button is pushed on the PFD.
(20) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

(21) Use the Flight Management System (FMS) outer knob to go to the CAL page group.
(22) Use the FMS inner knob to go to the FUEL TANK CALIBRATION page.
(23) Do the steps that follow:
(a) If only a fuel quantity system check is needed, do a Fuel Quantity System Check (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).
(b) If a fuel quantity system calibration is needed, do a Fuel Quantity System Calibration (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

7. Fuel Quantity System Calibration (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

A. Do the Fuel Quantity System Calibration.
(1) If not completed before, do the Fuel Quantity System Calibration and Check Setup (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).
(2) Make sure the software configuration is correct. Refer to Fuel Quantity Indication System-Troubleshooting.
(a) If the configuration is correct, continue the calibration procedure.
(b) If the configuration is not correct, do a CAN Bus Fuel Level Sensor Configuration Load.
(3) Push the softkeys on the FUEL CALIBRATION page of the PFD, in the sequence that follows, to enter the password.
(a) Push Softkey 12 (far right softkey).
(b) Push Softkey 11.
(c) Push Softkey 10.
(d) Push Softkey 9.

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(4) Make sure that the FUEL FLOW ENG 1 SCALE value is 1.00000.
   (a) If the FUEL FLOW ENG 1 SCALE value is not 1.00000, use the FMS knobs to make it 1.00000. Push in the inner FMS knob to activate the cursor. Use the outer FMS knob to move the cursor. Use the inner FMS knob to change the value. Push the ENT button.
(5) Push the SCALE softkey to select the scale function.

NOTE: The SCALE softkey will be gray with black letters when it is selected.

NOTE: The scale function needs to be selected when overwriting the 0.00 GL calibration points for both the left and right tank.

(6) Make sure the SCALE softkey on the PFD is gray with black letters.
(7) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(8) Turn the inner FMS knob to select LEFT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(9) Make sure that the LEFT 1 FLOOR value is 0.00000.
   (a) If the LEFT 1 FLOOR value is not 0.00000, use the FMS knobs to make it 0.00000. Push in the inner FMS knob to activate the cursor. Use the outer FMS knob to move the cursor. Use the inner FMS knob to change the value. Push the ENT button.
(10) Make sure that the LEFT 1 CEILING value is 100.00000.
   (a) If the LEFT 1 CEILING value is not 100.00000, use the FMS knobs to make it 1.00000. Push in the inner FMS knob to activate the cursor. Use the outer FMS knob to move the cursor. Use the inner FMS knob to change the value. Push the ENT button.
(11) Make sure that the airplane is level at 2.0 degrees nose up and 0.0 degrees wings level attitude.
(12) After 30 seconds, make sure that the CALIBRATED TOTAL value shown for the LEFT tank is stable.
(13) Push the EMPTY softkey and push the enter (ENT) button to overwrite the 0.00 GL calibration point in the CALIBRATION TABLE.

NOTE: There will be several calibration points in 2.00 GL increments in the CALIBRATION TABLE. If the SCALE function operates correctly, small changes to the calibration points can occur when the EMPTY and ENT buttons are pushed. These changes occur when the new CALIBRATED VALUE for the 0.00 GL calibration point is different than the previous CALIBRATED VALUE for the 0.00 GL calibration point.

(14) Make sure that the CALIBRATED TOTAL values are between -0.10 and +0.10 gallon (-0.38 and +0.38l) for the LEFT tank.
(15) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(16) Turn the inner FMS knob to select RIGHT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(17) Make sure that the RIGHT 1 FLOOR value is 0.00000.
   (a) If the RIGHT 1 FLOOR value is not 0.00000, use the FMS knobs to make it 0.00000. Push in the inner FMS knob to activate the cursor. Use the outer FMS knob to move the cursor. Use the inner FMS knob to change the value. Push the ENT button.
(18) Make sure that the RIGHT 1 CEILING value is 100.00000.
   (a) If the RIGHT 1 CEILING value is not 100.00000, use the FMS knobs to make it 1.00000. Push in the inner FMS knob to activate the cursor. Use the outer FMS knob to move the cursor. Use the inner FMS knob to change the value. Push the ENT button.
(19) After 30 seconds, make sure that the CALIBRATED TOTAL value shown for the RIGHT tank is stable.

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(20) Push the EMPTY softkey and push the ENT button to overwrite the 0.00 GL calibration point in the CALIBRATION TABLE.

NOTE: There will be several calibration points in 2.00 GL increments in the CALIBRATION TABLE. If the SCALE function operates correctly, small changes to the calibration points can occur when the EMPTY and ENT buttons are pushed. These changes occur when the new CALIBRATED VALUE for the 0.00 GL calibration point is different than the previous CALIBRATED VALUE for the 0.00 GL calibration point.

(21) Make sure that the CALIBRATED TOTAL values are between -0.10 and +0.10 gallon (-0.38 and +0.38l) for the RIGHT tank.
(22) Do the Fuel Quantity System Check (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

8. Fuel Quantity System Check (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

A. Do the Fuel Quantity System Check.
(1) If not completed before, do the Fuel Quantity System Calibration and Check Setup (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).
(2) Make sure the airplane is 2 degrees nose up and wings are level.
(3) Make sure that the left, L, and right, R, fuel quantity pointers are on the red line on the MFD on the GRS group GRS/GMU CALIBRATION page.
(4) Make sure the CALIBRATED VALUE on the CALIBRATION TABLE on the PFD agrees with the values in the Verification Table.
(a) On PFD on the FUEL TANK CALIBRATION page, find the CALIBRATED VALUE next to 0.00 GL. Find that number on the Verification Table in a "0.00 GL Calibrated Value" column.
(b) On the Verification Table, find the value in the 2.00 GL Calibrated Value (+0.3 or -0.3) column next to the chosen 0.00 GL Calibrated Value.
(c) Compare the 2.00 GL Calibrated Value on Verification Table to the 2.00 GL CALIBRATED VALUE on the PFD.

NOTE: For example, if the 0.00 GL CALIBRATED VALUE is 6.00000 then the 2.00 GL CALIBRATED VALUE should be 15.71750, +0.3 or -0.3.

(d) If the 2.00 GL CALIBRATED VALUE does not agree with the Verification Table, +0.3 or -0.3, do a Fuel Calibration Initialization Data Load and a Fuel Quantity System Calibration (Airplanes with Garmin G1000 and CAN bus type fuel level sensors).

Table 501. Verification Table

0.00GL Calibrated Value	2.00GL Calibrated Value (+/- 0.3)	0.00GL Calibrated Value	2.00GL Calibrated Value (+/- 0.3)	0.00GL Calibrated Value	2.00GL Calibrated Value (+/- 0.3)	0.00GL Calibrated Value	2.00GL Calibrated Value (+/- 0.3)
0.00000	10.33777	0.10000	10.42743	0.20000	10.51709	0.30000	10.60676
0.40000	10.69642	0.50000	10.78608	0.60000	10.87574	0.70000	10.96540
0.80000	11.05507	0.90000	11.14473	1.00000	11.23439	1.10000	11.32405
1.20000	11.41372	1.30000	11.50338	1.40000	11.59304	1.50000	11.68270
1.60000	11.77236	1.70000	11.86203	1.80000	11.95169	1.90000	12.04135
2.00000	12.13101	2.10000	12.22068	2.20000	12.31034	2.30000	12.40000
2.40000	12.48966	2.50000	12.57932	2.60000	12.66899	2.70000	12.75865
2.80000	12.84831	2.90000	12.93797	3.00000	13.02764	3.10000	13.11730

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Table 501. Verification Table (continued)

3.20000	13.20696	3.30000	13.29662	3.40000	13.38628	3.50000	13.47595
3.60000	13.56561	3.70000	13.65527	3.80000	13.74493	3.90000	13.83460
4.00000	13.92426	4.10000	14.01392	4.20000	14.10358	4.30000	14.19324
4.40000	14.28291	4.50000	14.37257	4.60000	14.46223	4.70000	14.55189
4.80000	14.64156	4.90000	14.73122	5.00000	14.82088	5.10000	14.91054
5.20000	15.00020	5.30000	15.08987	5.40000	15.17953	5.50000	15.26919
5.60000	15.35885	5.70000	15.44852	5.80000	15.53818	5.90000	15.62784
6.00000	15.71750	6.10000	15.80716	6.20000	15.89683	6.30000	15.98649
6.40000	16.07615	6.50000	16.16581	6.60000	16.25548	6.70000	16.34514
6.80000	16.43480	6.90000	16.52446	7.00000	16.61412	7.10000	16.70379
7.20000	16.79345	7.30000	16.88311	7.40000	16.97277	7.50000	17.06244
7.60000	17.15210	7.70000	17.24176	7.80000	17.33142	7.90000	17.42108
8.00000	17.51075	8.10000	17.60041	8.20000	17.69007	8.30000	17.77973
8.40000	17.86940	8.50000	17.95906	8.60000	18.04872	8.70000	18.13838
8.80000	18.22805	8.90000	18.31771	9.00000	18.40737	9.10000	18.49703
9.20000	18.58669	9.30000	18.67636	9.40000	18.76602	9.50000	18.85568
9.60000	18.94534	9.70000	19.03501	9.80000	19.12467	9.90000	19.21433
10.00000	19.30399	10.10000	19.39365	10.20000	19.48332	10.30000	19.57298
10.40000	19.66264	10.50000	19.75230	10.60000	19.84197	10.70000	19.93163
10.80000	20.02129	10.90000	20.11095	11.00000	20.20061	11.10000	20.29028
11.20000	20.37994	11.30000	20.46960	11.40000	20.55926	11.50000	20.64893
11.60000	20.73859	11.70000	20.82825	11.80000	20.91791	11.90000	21.00757
12.00000	21.09724	12.10000	21.18690	12.20000	21.27656	12.30000	21.36622
12.40000	21.45589	12.50000	21.54555	12.60000	21.63521	12.70000	21.72487
12.80000	21.81453	12.90000	21.90420	13.00000	21.99386	13.10000	22.08352
13.20000	22.17318	13.30000	22.26285	13.40000	22.35251	13.50000	22.44217
13.60000	22.53183	13.70000	22.62149	13.80000	22.71116	13.90000	22.80082
14.00000	22.89048	14.10000	22.98014	14.20000	23.06981	14.30000	23.15947
14.40000	23.24913	14.50000	23.33879	14.60000	23.42845	14.70000	23.51812
14.80000	23.60778	14.90000	23.69744	15.00000	23.78710	15.10000	23.87677
15.20000	23.96643	15.30000	24.05609	15.40000	24.14575	15.50000	24.23541
15.60000	24.32508	15.70000	24.41474	15.80000	24.50440	15.90000	24.59406
16.00000	24.68373	16.10000	24.77339	16.20000	24.86305	16.30000	24.95271
16.40000	25.04237	16.50000	25.13204	16.60000	25.22170	16.70000	25.31136
16.80000	25.40102	16.90000	25.49069	17.00000	25.58035	17.10000	25.67001
17.20000	25.75967	17.30000	25.84933	17.40000	25.93900	17.50000	26.02866

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Table 501. Verification Table (continued)

17.60000	26.11832	17.70000	26.20798	17.80000	26.29765	17.90000	26.38731
18.00000	26.47697	18.10000	26.56663	18.20000	26.65629	18.30000	26.74596
18.40000	26.83562	18.50000	26.92528	18.60000	27.01494	18.70000	27.10461
18.80000	27.19427	18.90000	27.28393	19.00000	27.37359	19.10000	27.46325
19.20000	27.55292	19.30000	27.64258	19.40000	27.73224	19.50000	27.82190
19.60000	27.91157	19.70000	28.00123	19.80000	28.09089	19.90000	28.18055

(5) Make sure the fuel selector valve is in the RIGHT position.
(6) Add 5 gallons of fuel (low fuel level) to the left fuel tank. Refer to Chapter 12, Fuel - Servicing.
(7) Make sure the fuel that was added is sensed in LEFT tank and not in the RIGHT tank.
(8) Add 5 gallons of fuel (low fuel level) to the right fuel tank. Refer to Chapter 12, Fuel - Servicing.
(9) Make sure the fuel that was added is sensed in RIGHT tank and not in the LEFT tank.
(10) Make sure that the airplane is level at 2.0 degrees nose up and 0.0 degrees wings level attitude.
(11) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(12) Turn the inner FMS knob to select LEFT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(13) After 30 seconds, make sure the CALIBRATED TOTAL value for the LEFT tank is stable and between 3.2 to 6.8 gallons.
(14) Push the TNK SEL softkey to highlight the CURRENT TANK field.
(15) Turn the inner FMS knob to select RIGHT.

NOTE: After turning the inner FMS knob, some versions of software will make it necessary to push the ENT button to select the tank.

(16) After 30 seconds, make sure the CALIBRATED TOTAL value for the RIGHT tank is stable and between 3.2 to 6.8 gallons.
(17) If the values are in tolerance, the procedure is complete.
(18) If the CALIBRATED TOTAL values are not in the range:
  (a) Move the wing tips up and down for approximately 10 seconds.
  (b) Let the airplane become stable for approximately 30 seconds.
  (c) Make sure that the airplane is level at 2.0 degrees nose up and 0.0 degrees wings level attitude.
  (d) After 30 seconds, make sure the CALIBRATED TOTAL value for the LEFT tank is stable and between 3.2 to 6.8 gallons.
    1 If the CALIBRATED TOTAL is still not in the tolerance range, drain the fuel from the tanks and do the fuel calibration procedure again.
  (e) After 30 seconds, make sure the CALIBRATED TOTAL value for the RIGHT tank is stable and between 3.2 to 6.8 gallons.
    1 If the CALIBRATED TOTAL is still not in the tolerance range, drain the fuel from the tanks and do the fuel calibration procedure again.
(19) Put the AVIONICS switch to the OFF position.
(20) Put the BAT MASTER switch to the OFF position.

9. CAN Bus Fuel Level Sensor Configuration Load

A. Load the CAN Bus Fuel Level Sensor Configuration.
  (1) Disengage both PFD circuit breakers (ESS and AVN BUS 1) and the MFD circuit breaker on the avionics circuit breaker panel.
  (2) Remove the database cards from the bottom SD card slots on the PFD and MFD.
  (3) Install the SD loader card in the top SD card slot on the PFD.
  (4) Start the system in configuration mode.
    (a) Engage the MFD circuit breaker while the ENT button is pushed on the MFD.

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(b) Release the ENT button after the words INITIALIZING SYSTEM show on the MFD.

NOTE: The MFD is now in the configuration mode.

(c) Engage the PFD circuit breakers while the ENT button is pushed on the PFD.
(d) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

(5) Push the NO softkey when asked "DO YOU WANT TO UPDATE THE SYSTEM FILES?".
(6) Use the FMS knobs to go to the SYSTEM group's SYSTEM UPLOAD page .
(7) Push the inner FMS knob to start the cursor.
(8) Use the cursor to highlight the applicable model for the AIRFRAME menu.
(9) Push the ENT button.
(10) Turn the inner FMS knob to expand the FILE menu.
(11) Highlight the file CESSNA NAV III CAN BUS FUEL LEVEL SENSORS.
(12) Push the ENT button.
(13) Push the LOAD softkey to start the software update.
(14) Monitor the upload status.
(a) If the upload fails, push the LOAD softkey again. If the upload fails five times, contact Cessna Customer Service for assistance; (316) 517-5800 or Fax (316) 942-9006.
(b) If the upload is successful, push the ENT button to accept the end of the upload.
(15) Push the "UPDT CFG" softkey.
(16) Select "YES" when asked "Update Config Module?".
(17) Push the ENT button.
(18) When the update is complete, push the ENT button.
(19) Disengage both PFD and MFD circuit breakers.
(20) Install the database cards in the bottom SD card slots on the PFD and MFD.
(21) Remove the SD loader card from the top SD card slot on the PFD.
(22) Start the system in configuration mode.
(a) Engage the MFD circuit breaker while the ENT button is pushed on the MFD.
(b) Release the ENT button after the words INITIALIZING SYSTEM show on the MFD.

NOTE: The MFD is now in the configuration mode.

(c) Engage the PFD circuit breakers while the ENT button is pushed on the PFD.
(d) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

10. Fuel Calibration Initialization Data Load

A. Load the Fuel Calibration Initialization Data.
(1) Disengage both PFD circuit breakers (ESS and AVN BUS 1) and the MFD circuit breaker on the avionics circuit breaker panel.
(2) Remove the database cards from the bottom SD card slots on the PFD and MFD.
(3) Install the SD loader card in the top SD card slot on the PFD.
(4) Start the system in configuration mode.
(a) Engage the MFD circuit breaker while the ENT button is pushed on the MFD.
(b) Release the ENT button after the words INITIALIZING SYSTEM show on the MFD.

NOTE: The MFD is now in the configuration mode.

(c) Engage the PFD circuit breakers while the ENT button is pushed on the PFD.
(d) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

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(5) Push the NO softkey when asked "DO YOU WANT TO UPDATE THE SYSTEM FILES?".
(6) Use the FMS knobs to go to the SYSTEM group's SYSTEM UPLOAD page .
(7) Push the inner FMS knob to start the cursor.
(8) Use the cursor to highlight the applicable model for the AIRFRAME menu.
(9) Push the ENT button.
(10) Turn the inner FMS knob to expand the FILE menu.
(11) Highlight the file INITIALIZE FUEL CAL DATA.
(12) Push the ENT button.
(13) Push the LOAD softkey to start the software update.

NOTE: Every time after the "INITIALIZE FUEL CAL DATA" is loaded the Fuel Quantity System Calibration (Airplanes with Garmin G1000 and CAN bus type fuel level sensors) must be performed for each tank.

(14) Monitor the upload status.
  (a) If the upload fails, push the LOAD softkey again. If the upload fails five times, contact Cessna Customer Service for assistance; (316) 517-5800 or Fax (316) 942-9006.
  (b) If the upload is successful, push the ENT button to accept the end of the upload.
(15) Push the "UPDT CFG" softkey.
(16) Select "YES" when asked "Update Config Module?".
(17) Push the ENT button.
(18) When the update is complete, push the ENT button.
(19) Disengage both PFD and MFD circuit breakers.
(20) Install the database cards in the bottom SD card slots on the PFD and MFD.
(21) Remove the SD loader card from the top SD card slot on the PFD.
(22) Start the system in configuration mode.
  (a) Engage the MFD circuit breaker while the ENT button is pushed on the MFD.
  (b) Release the ENT button after the words INITIALIZING SYSTEM show on the MFD.

NOTE: The MFD is now in the configuration mode.

  (c) Engage the PFD circuit breakers while the ENT button is pushed on the PFD.
  (d) Release the ENT button after the words INITIALIZING SYSTEM show on the PFD.

NOTE: The PFD is now in the configuration mode.

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CHAPTER

31

INDICATING/ RECORDING SYSTEMS

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INDICATING/RECORDING SYSTEMS - GENERAL

1. Scope

A. This chapter contains information on those systems and components used to indicate and/or record various parameters of the engine, airframe or related flight operations. Also included in this chapter is information on the instrument panels that house the indicating/recording systems.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:
   (1) The section on instrument and control panels provides general removal and installation instructions for the various panels used in the cockpit.
   (2) The section on indicating provides information on the digital clock.
   (3) The section on recording provides information on the hour meter.
   (4) The section on annunciation provides information on the multi-system panel annunciator.

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INSTRUMENT AND CONTROL PANELS - MAINTENANCE PRACTICES

1. Description and Operation

A. The instrument panel is divided into sections to facilitate easy removal and installation of particular components without removing the entire panel.
   (1) The pilot side of the instrument panel is broken up into three separate panels, with the flight instruments grouped in a panel, the avionics dials and tachometer located in a panel, and the indicating/recording instruments grouped in a third panel.
   (2) The switch panel is located below the pilot side instrument panel and houses the majority of switches and circuit breakers in a single location.
   (3) The copilot side of the instrument panel houses the Hobbs meter and remote ELT activation switch, and is designed to allow for panel expansion.

NOTE: For an overview of the various sub panels which make up the instrument panel, refer to Figure 201.

2. Panel Removal and Installation

A. The individual panels may be removed by unscrewing the perimeter screws located on each panel. The flight instrument sub-panel has been designed to be moved aft without disconnecting the electrical or mechanical connections to that panel.

B. If entire panels are being removed, it may be necessary to disconnect various electrical and/or mechanical connections prior to removing the panel.

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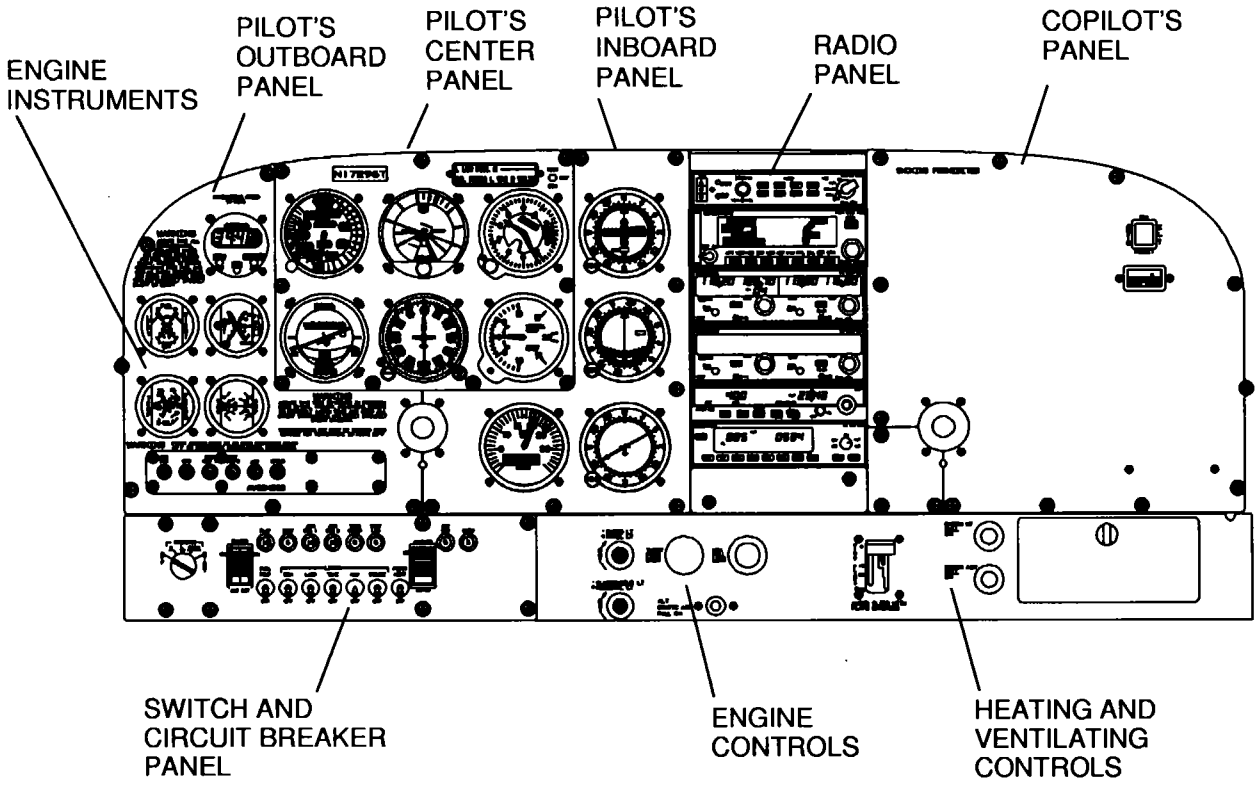

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Instrument Panels
Figure 201 (Sheet 1)

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INSTRUMENT AND CONTROL PANELS - MAINTENANCE PRACTICES
Airplanes with Garmin G1000

1. General

A. This section gives removal and installation procedures for the center panel, switch panel, throttle/flap panel, and instrument panel.

2. Center Panel Removal/Installation

A. Remove the Center Panel (Refer to Figure 201).
   (1) Make sure the MASTER and AVIONICS switches are in the off position.
   (2) Remove the screws that attach the center panel to the instrument panel.
   (3) Carefully pull out the center panel as necessary to get access behind the panel.
   (4) Put labels on the electrical connectors and hoses and disconnect them from the instruments.

B. Install the Center Panel (Refer to Figure 201).
   (1) Connect the electrical connectors and hoses to the applicable instruments.
   (2) Remove the labels from the electrical connectors and hoses.
   (3) Carefully put the center panel in the instrument panel.
   (4) Install the screws that attach the center panel.

3. Switch Panel Removal/Installation

A. Remove the Switch Panel (Refer to Figure 201).
   (1) Make sure the MASTER and AVIONICS switches are in the off position.
   (2) Remove the screws that attach the switch panel to the instrument panel.
   (3) Carefully pull the switch panel out from the instrument panel to get access behind the panel.
   (4) Disconnect the switches from the electrical connections.

B. Install the Switch Panel (Refer to Figure 201).
   (1) Connect the electrical connections to the switches.
   (2) Put the switch panel in the instrument panel.
   (3) Attach the switch panel with the screws.

4. Throttle/Flap Panel

A. Throttle/Flap Panel Removal (Refer to Figure 201).
   (1) Disconnect the negative cable from airplane battery. Refer to Chapter 24, Battery - Maintenance Practices.
   (2) Make sure the MASTER ALT/BAT and AVIONICS switches are in the off position.
   (3) Remove the screws that attach the throttle/flap panel to the instrument panel.
   (4) Carefully pull the throttle/flap panel out from the instrument panel to get access behind the panel.
   (5) Disconnect the switches from the electrical connections.

B. Throttle/Flap Panel Installation (Refer to Figure 201).
   (1) Connect the electrical connections to the switches.
   (2) Put the throttle/flap panel in the instrument panel.
   (3) Attach the throttle/flap panel with the screws.
   (4) Connect the negative battery cable. Refer to Chapter 24, Battery - Maintenance Practices.

5. Instrument Panel Removal/Installation

A. Remove the Instrument Panel (Refer to Figure 201).
   (1) Disconnect electrical power to the airplane.
      (a) Make sure the AVIONICS switch is in the off position.
      (b) Disengage the two PFD circuit breakers, the MFD, STDBY BATT, STDBY IND-LTS AUDIO circuit breakers.
   (2) Remove the center panel. Refer to Center Panel - Removal/Installation.
   (3) Remove the switch panel. Refer to Switch Panel - Removal/Installation.
   (4) Remove the Audio Panel. Refer to Audio Panel - Maintenance Practices.

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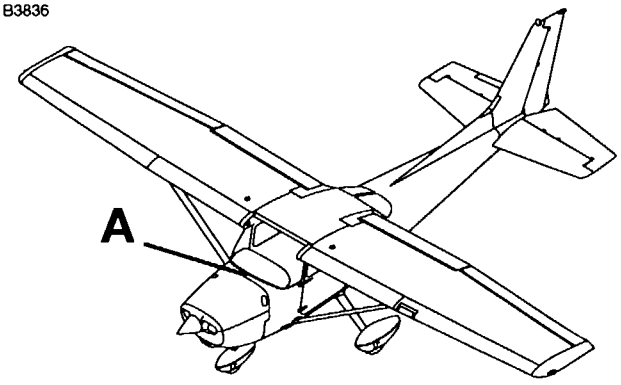

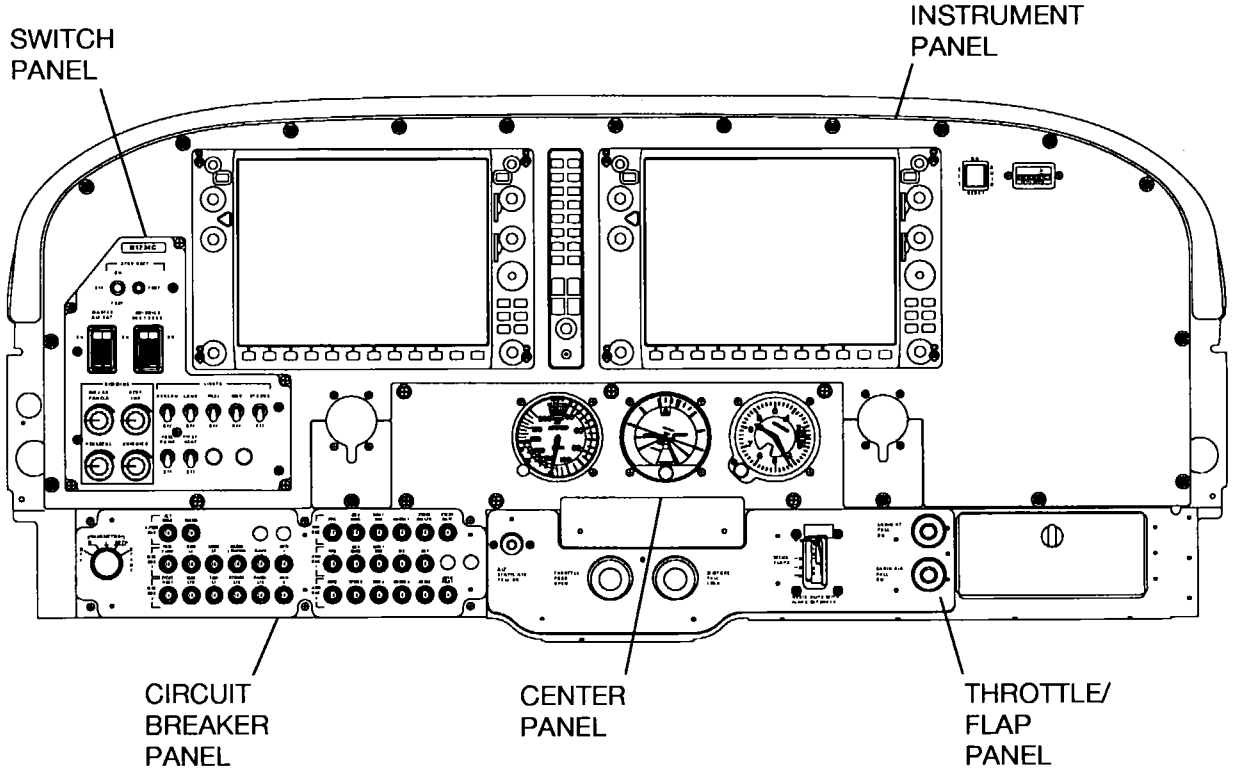

DETAIL A
AIRPLANES WITH GARMIN G1000

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Instrument and Control Panel Installation
Figure 201 (Sheet 1)

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(5) Remove the screws that attach the control column collars to the instrument panel.
(6) Remove the hourmeter.
  (a) Remove the screws for the hourmeter.
  (b) Pull the hourmeter out and disconnect the connector.
(7) Remove the Control Display Units (CDU). Refer to Control Display Unit (CDU) - Maintenance Practices.
(8) Remove the screws from the instrument panel.
(9) Disconnect and remove the ELT switch from the instrument panel.

NOTE: The ELT switch can only be removed from the back of the instrument panel.

(10) Remove the instrument panel.

B. Install the Instrument Panel (Refer to Figure 201).
(1) Put the instrument panel in position.
(2) Install the ELT switch and connect the electrical connector.
(3) Install the instrument panel screws.
  (a) Make sure to put the electrical connector for the hourmeter through the panel hole for the hourmeter installation.
(4) Connect the electrical connector to the hourmeter.
(5) Install the hourmeter.
(6) Attach the collar for the control column to the instrument panel.
(7) Put the switch panel in position and connect the electrical connections to the switches.
(8) Install the switch panel to the instrument panel with the screws.
(9) Put the center panel in position and connect the electrical connectors and vacuum hoses to the instruments.
(10) Install the center panel to the instrument panel with the screws.
(11) Install the Control Display Units (CDU). Refer to Control Display Unit (CDU) - Maintenance Practices.

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DIGITAL CLOCK - MAINTENANCE PRACTICES

1. Description and Operation

A. The digital clock is located in upper left side of the instrument panel and incorporates clock, temperature and voltage readings in a single unit. For removal/installation of the OAT/Clock, refer to Chapter 34, Outside Air Temperature Gauge - Maintenance Practices.

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HOUR METER - MAINTENANCE PRACTICES

1. Description and Operation

A. The hour (Hobbs) meter is located in the upper right corner of the instrument panel and provides indication of flight hours based on engine operation.

B. The hour meter receives power through the WARN circuit breaker located on the lower instrument panel. The hour meter is grounded through the Oil Pressure Switch, and anytime oil pressure exceeds 20 PSI a ground is sent from the switch to the hour meter, completing a circuit and activating the hour meter.

2. Hour Meter Removal/Installation

A. Remove Hour Meter (Refer to Figure 201).
   (1) Gain access to backside of instrument panel and hold nuts while loosening screws.
   (2) Disconnect electrical connectors leading into hour meter.

B. Install Hour Meter (Refer to Figure 201).
   (1) Connect electrical connectors to hour meter.
   (2) Install hour meter to panel and secure using screws and nuts.

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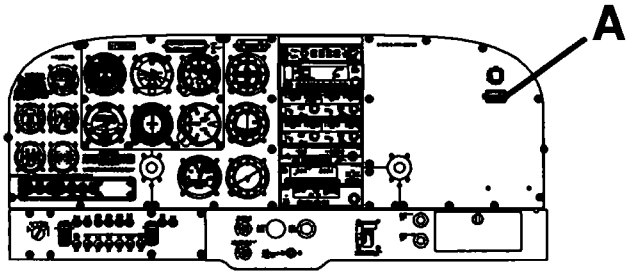

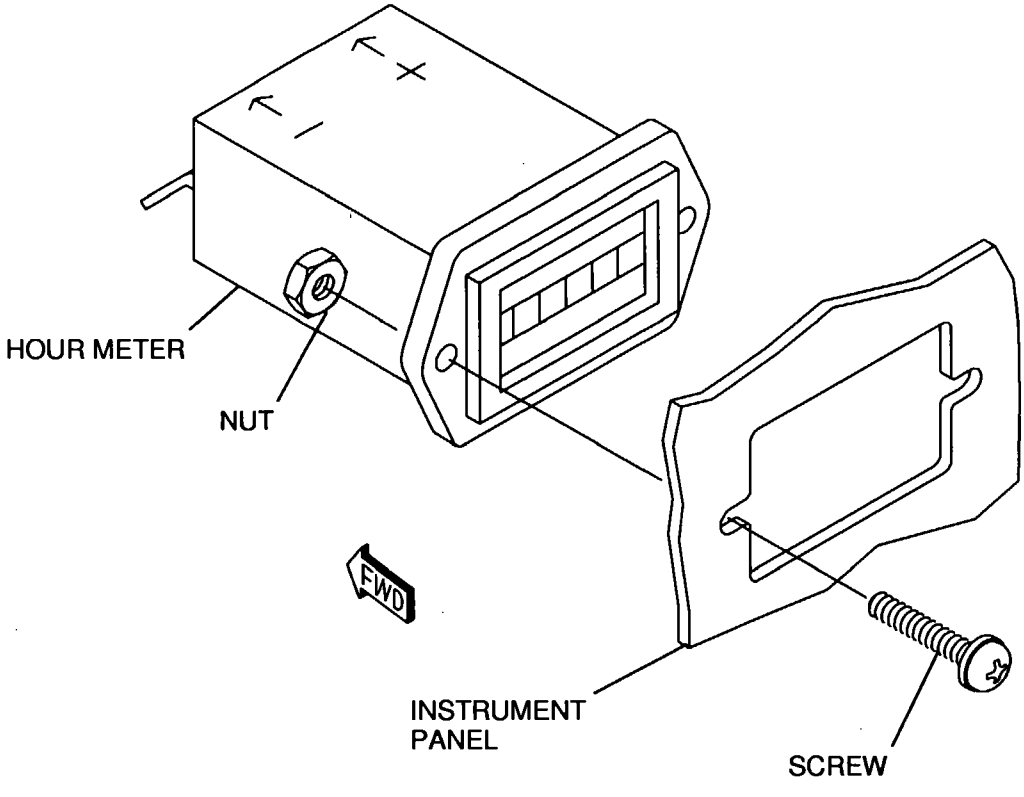

DETAIL A

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A0518T1020

Hour Meter Installation
Figure 201 (Sheet 1)

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ANNUNCIATOR PANEL - MAINTENANCE PRACTICES

1. Description and Operation

A. The annunciator panel is a multi-system display which provides visual warning and caution information related to various systems and fuel levels throughout the airplane. The annunciator presents this visual information in either amber (caution) or red (warning) messages. Refer to Table 201 for a breakdown of messages and their inputs.

B. Table 201 is provided to give a basic overview of the annunciator system and its inputs. This table should be used in conjunction with the Wiring Diagram Manual to aid in system troubleshooting.

Table 201. Annunciator Panel Messages and Inputs

MESSAGE	COLOR	MEANING	SOURCE OF SIGNAL
L LOW FUEL	Amber	Low fuel condition detected in the left tank.	Left fuel quantity system.
LOW FUEL R	Amber	Low fuel condition detected in the right tank.	Right fuel quantity system.
L LOW FUEL R	Amber	Low fuel condition detected in both the left and right fuel tanks.	Left and right fuel quantity systems.
L LOW FUEL and left fuel gauge needle parked below 0	Amber	Short, open or increasing resistance over time.	Left fuel transmitter or electrical line between transmitter and fuel gauge.
LOW FUEL R and right fuel gauge needle parked below 0	Amber	Short, open or increasing resistance over time.	Right fuel transmitter or electrical line between transmitter and fuel gauge.
L LOW FUEL R and both fuel gauge needles parked below 0	Amber	Short, open or increasing resistance over time.	Left and right transmitters or electrical lines between transmitters and fuel gauge.
OIL PRESS	Red	Oil pressure less than 20 PSI.	Oil pressure switch (SN001) supplying ground to annunciator.
L VAC	Amber	Vacuum less than 3.0 In.Hg.	Left vacuum switch (SN012) supplying ground to annunciator.
VAC R	Amber	Vacuum less than 3.0 In.Hg.	Right vacuum switch (SN011) supplying ground to annunciator.

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Table 201. Annunciator Panel Messages and Inputs (continued)

MESSAGE	COLOR	MEANING	SOURCE OF SIGNAL
L VAC R	Amber	Vacuum less than 3.0 In.Hg.	Right vacuum switch and left vacuum switch supplying ground to annunciator.
VOLTS	Red	Voltage less than 24.5 VDC, +0.35 or -0.35 VDC.	Ground from the alternator control unit to the annunciator panel.
PITCH TRIM	Red	Autopilot pitch trim failure.	Autopilot flight computer.

2. Annunciator Panel Removal/Installation

A. Remove Annunciator Panel (Refer to Figure 201).
(1) Ensure electrical power to airplane is OFF.
(2) Gain access to backside of annunciator panel and disconnect electrical connector.
(3) Remove screws securing annunciator panel to instrument panel and remove from airplane.

B. Install Annunciator Panel (Refer to Figure 201).
(1) Connect electrical connector to annunciator panel.
(2) Position annunciator panel to instrument panel and secure using screws.
(3) Restore electrical power to airplane.
(4) Check annunciator panel for proper operation.

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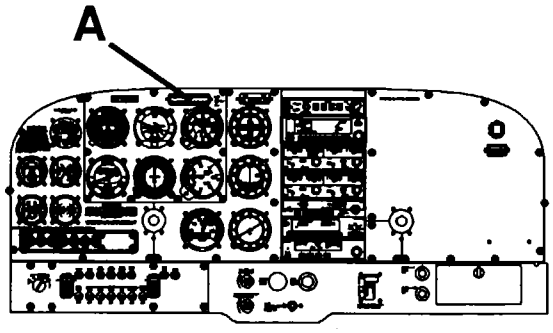

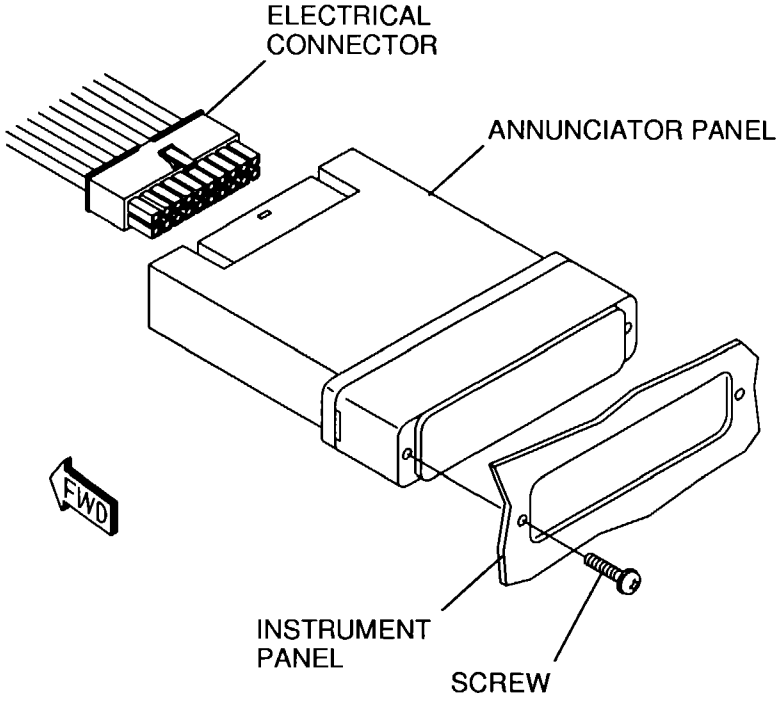

DETAIL A

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A0518T1022

Annunciator Panel Installation
Figure 201 (Sheet 1)

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CHAPTER

32

LANDING GEAR

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LANDING GEAR - GENERAL

1. Scope

A. This chapter contains maintenance information concerning the landing gear and associated components which provide a means of supporting, braking and steering the airplane during takeoff, landing, taxiing, towing and parking.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:

(1) The section on main landing gear provides troubleshooting, maintenance practices and adjustment instructions for the main landing gear.

(2) The section on nose landing gear provides troubleshooting, maintenance practices and inspection/checks for the nose landing gear.

(3) The section on wheels and brakes provides description/operation, troubleshooting, maintenance practices and adjustment/test instructions for the main gear brake system.

(4) The section on nose gear steering provides troubleshooting, maintenance practices and adjustment/test instructions for the nose gear steering system and related components.

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MAIN LANDING GEAR - TROUBLESHOOTING

1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
AIRPLANE LEANS TO ONE SIDE.	Incorrect tire pressure.	Ensure tire is inflated to correct air pressure.
	Landing gear attaching parts not tight.	Tighten loose parts or replace defective parts with new parts.
	Landing gear tubular strut excessively sprung.	Replace tubular strut. Refer to Main Landing Gear - Maintenance Practices.
	Bent axle.	Replace axle. Refer to Main Landing Gear Wheel and Axle - Maintenance Practices.
TIRES WEAR EXCESSIVELY.	Incorrect tire pressure.	Ensure tire is inflated to 28 PSI air pressure.
	Main wheels out of alignment.	Check main wheel alignment. Refer to Main Landing Gear Wheel and Axle - Maintenance Practices.
	Landing gear tubular strut excessively sprung	Replace tubular strut. Refer to Main Landing Gear - Maintenance Practices.
	Bent axle.	Replace axle. Refer to Main Landing Gear Wheel and Axle - Maintenance Practices.
	Dragging brakes.	Adjust brakes. Refer to Brakes - Maintenance Practices.
	Wheel bearings excessively tight.	Properly install wheel bearings. Refer to Main Landing Gear Wheel and Axle - Maintenance Practices.
TIRE BOUNCE EVIDENT ON SMOOTH SURFACE.	Tire out of balance.	Balance tire. Refer to Main Landing Gear Wheel and Axle - Maintenance Practices.

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MAIN LANDING GEAR - MAINTENANCE PRACTICES

1. General

A. The airplane is installed with fixed, tubular spring, steel main gear struts that are bolted into the fuselage bottom. Attached to the outboard end of each strut is a die-cast aluminum wheel and disc brake assembly.

B. The maintenance practices give instructions for the fairing, strut and step bracket removal/installation. Also included in this section are procedures for a check of the main wheel alignment.

C. For the wheel and tire maintenance, refer to Main Landing Gear Wheel and Axle - Maintenance Practices. For the brake maintenance, refer to Brakes - Maintenance Practices.

2. Main Wheel Speed Fairing Removal/Installation

A. Remove the Main Wheel Speed Fairings (Refer to Figure 201).
(1) Remove the screws that attach the brake fairing to the main wheel speed fairing.
(2) Remove the screws that attach the main wheel speed fairing to the attach plate, which is bolted to axle.
(3) Remove the bolt that attaches the outboard side of the main wheel speed fairing to the axle nut.
(4) Loosen the mud scraper if necessary, and work the main wheel speed fairing from the wheel.

B. Install the Main Wheel Speed Fairings (Refer to Figure 201).
(1) Work the speed fairing over the wheel.

CAUTION: Damage will result if the correct clearance is not set between the tire and the mud scraper. You must do a check of the clearance every time the scraper has been moved, the tire changed, or the speed fairings installed. If any mud, snow or ice collects on the scraper, it will prevent the tire from correct rotation. You must clean the scraper for correct tire rotation.

(2) Complete a check of the clearance between the tire and scraper.
(a) Clean off any dirt or ice that has collected on the scraper.
(b) Adjust the clearance as necessary to have a minimum of 0.55 inch (14 mm) to a maximum of 0.80 inch (20 mm).
(3) Install the bolt that attach outboard side of main wheel speed fairing to the axle nut.
(4) Install the screws that attach the main wheel speed fairing to the attach plate, which is bolted to axle.
(5) Install the screws that attach the brake fairing to the main wheel speed fairing.

3. Brake Fairing Removal/Installation

A. Remove the Brake Fairing (Refer to Figure 201).
(1) Remove the screws from the bottom side of the brake fairing.
(2) Remove the brake fairing from the landing gear.

B. Install the Brake Fairing (Refer to Figure 201).
(1) Set the brake fairing over the landing gear.
(2) Install the screws in the bottom side of the brake fairing.

4. Cap Fairing Removal/Installation

A. Remove the Cap Fairing (Refer to Figure 201).
(1) Remove the screws and clamp that attaches the cap fairing to the tubular strut fairing.
(2) Remove the cap fairing and clamp.

B. Install the Cap Fairing (Refer to Figure 201).
(1) Set the cap fairing and clamp over the tubular strut.
(2) Attach the cap fairing with the screws and clamp.

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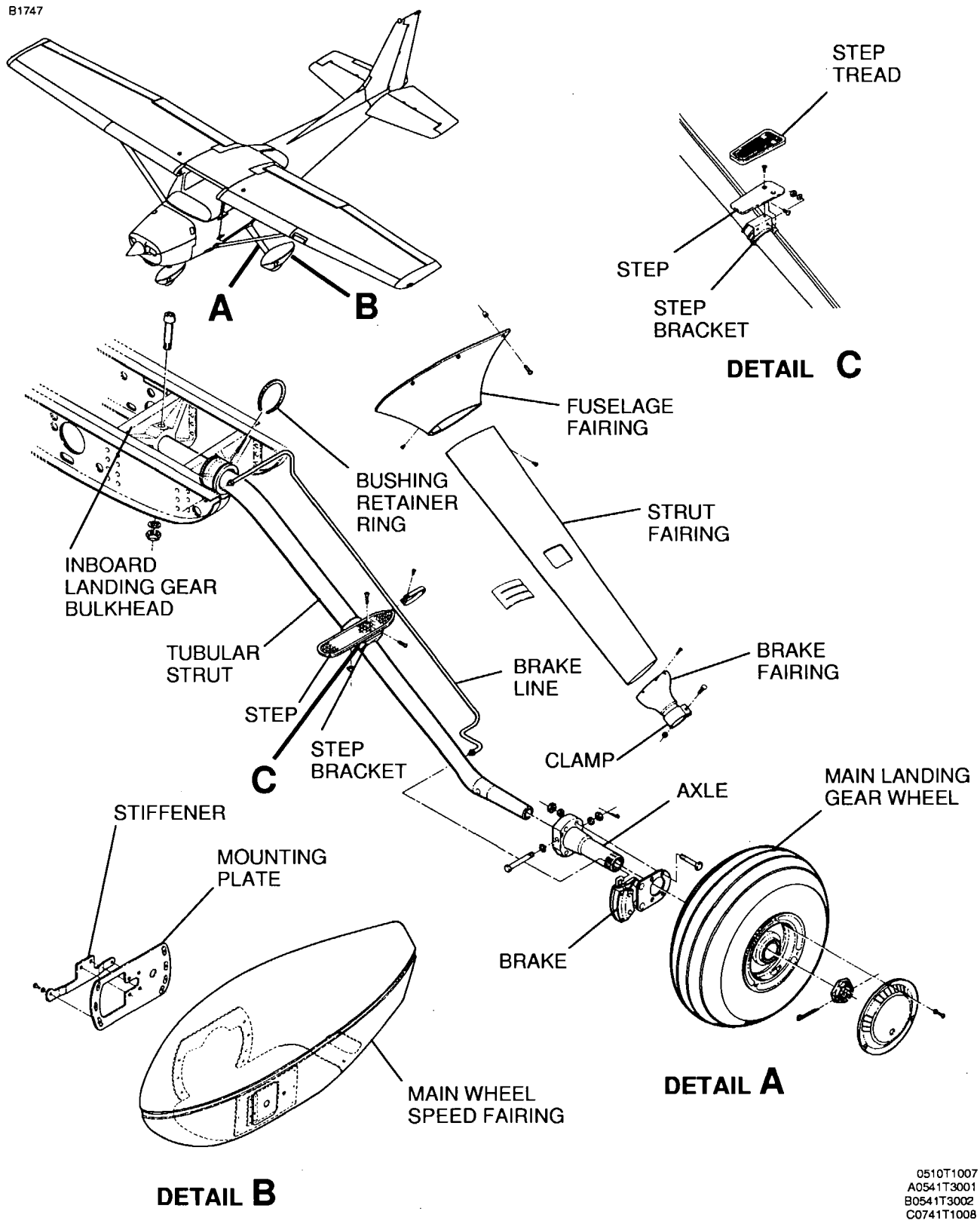

Main Landing Gear Installation
Figure 201 (Sheet 1)

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5. Tubular Strut Fairing Remova/Installation

A. Remove the Tubular Strut Fairing (Refer to Figure 201).
(1) Remove the screws that attach the step to the step bracket.
(2) Remove the screws from the bottom side of the tubular strut fairing.
(3) Carefully remove the tubular strut fairing along the aft edge and move it over the step bracket.
(4) Pull the tubular strut fairing out of the fuselage fairing and remove it from the tubular strut.

B. Install the Tubular Strut Fairing (Refer to Figure 201).
(1) Set the tubular strut fairing over the tubular strut and position it over the step bracket and into the fuselage fairing.
(2) Attach the tubular strut fairing with screws.
(3) Install the step to the step bracket.

6. Fuselage Fairing

A. Remove the Fuselage Fairing (Refer to Figure 201).
(1) Remove the main landing gear wheel. Refer to Main Landing Gear Wheel And Axle - Maintenance Practices.
(2) Remove the main wheel speed fairing attach plate.
(3) Remove the brake torque plate.
(4) Remove the screws that attach the fuselage fairing to the fuselage.
(5) Move the fuselage fairing down the tubular strut and move it over the main landing gear axle.

B. Install the Fuselage Fairing (Refer to Figure 201).
(1) Move the fuselage fairing over the main landing gear axle and slide it up to the fuselage.
(2) Attach the fuselage fairing with screws.
(3) Install the brake torque plate.
(4) Install the main wheel speed fairing attach plate.
(5) Install the main landing gear wheel. Refer to Main Landing Gear Wheel And Axle - Maintenance Practices.

CAUTION: Damage can result to the fairings if the tire pressure is not correct.

(6) Complete a check of the tire pressure and adjust it as necessary. Refer to Chapter 12, Tires - Servicing.

7. Main Landing Gear Removal/Installation

A. Remove the Main Landing Gear (Refer to Figure 201).
(1) Remove the front seat(s) to get access to the fuselage floor. Refer to Chapter 25, Equipment/ Furnishings - Maintenance Practices.
(2) Pull up the carpet and remove the floorboard access plate (231AT) to get access to the landing gear components under the fuselage floorboard. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(3) Jack the airplane. Refer to Chapter 7, Jacking - Maintenance Practices.
(4) Remove the screws that attach the fuselage fairing to the fuselage.
(5) Remove screws at the splice in the fuselage fairing.
(6) Remove the fuselage fairing from the strut fairing.
(7) Drain the hydraulic fluid from the brake line on the strut.
(8) Disconnect the hydraulic brake line at the fitting where the brake line comes out from the fuselage skin.
(9) Put a cap or plug on disconnected fittings.
(10) Remove the nut, washer and bolt the attach the inboard end of the tubular strut to the inboard landing gear bulkhead fitting.

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CAUTION: Be careful when you remove the strut to prevent damage to the hydraulic brake line.

(11) Pull the tubular strut from the fitting and bushing.

NOTE: The tubular strut is a compression fit in the bushing in the outboard landing gear forging.

B. Install the Main Landing Gear (Refer to Figure 201).
(1) Install all parts removed from strut.
(2) Apply U000992 grease to approximately 11 inches on the top end of the tubular strut. For the grease supplier, refer to Chapter 12, Lubricants.
(3) Move the tubular strut into position through the bushing in the outboard strut fitting and into the inboard strut fitting.
(4) Align the bolt holes in the tubular strut and the inboard fitting.
(5) Install the bolt through the tubular strut and the inboard fitting.
(6) Install the washer and nut on the bolt and tighten to a torque value of 100 foot-pounds, +8 or -8 foot-pounds (136 N.m., +11 or -11 N.m).
(7) Connect the hydraulic brake line to the fitting.
(8) Fill and bleed brake the system.
(9) Install the fuselage fairing.
(10) Remove the airplane from the jacks. Refer to Chapter 7, Jacking - Maintenance Practices.
(11) Install the floorboard access plate (231AT). Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(12) Install the carpet and seat(s). Refer to Chapter 25, Equipment/Furnishings - Maintenance Practices.

8. Step Bracket Removal/Installation

A. Remove the Step Bracket (Refer to Figure 201).
(1) Remove the main landing gear fairings. Refer to Main Landing Gear Fairings Removal/ Installation.
(2) Remove the step bracket.
(a) Use long handled pliers or other similar tool to apply an upward force to the step support.

CAUTION: Do not continue to apply heat to the tubular strut to a temperature where the paint or epoxy blisters.

(b) Apply heat to epoxy using heat gun, until epoxy softens and upward force of pliers breaks step support away from landing gear strut. Quickly remove heat.

CAUTION: Do not finish sand the parts. A rough surface is necessary to get a good bond.

(3) Use 180 grit aluminum oxide sandpaper or cloth to remove all the corrosion and old adhesive from the step bracket and the tubular strut.
(4) Blend all nicks and scratches.

B. Install the Step Bracket (Refer to Figure 202).
(1) Mark the position of the step support so that the new step support will be installed in the same position on the strut.
(2) Clean the surfaces that you will bond together. If you use a solvent, make sure to remove all of the solvent with a clean, dry cloth. It is important that the bonding surfaces are clean and dry.
(3) Make sure to do a check fit of the step support on the tubular strut. A small gap is acceptable between the step support and the tubular strut.
(4) Apply primer to the step bracket. Refer to Chapter 20, Interior and Exterior Finish - Cleaning/ Painting.

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(5) Apply primer to the tubular strut. Refer to Chapter 20, Interior and Exterior Finish - Cleaning/ Painting.
(6) Bond the step bracket to the tubular strut with EA9309 adhesive. Use the manufacturers procedures to mix the adhesive.
(7) Apply a layer of adhesive on each of the bonding surface.
(8) Set the step bracket in position on the tubular strut.
(9) Use a clamp to attach the step bracket to the strut to make sure of a good, tight fit.
(10) Apply a small fillet of the adhesive at all edges of the bonded surfaces.

CAUTION: Do not set any weight on the step or strut until the sealant has fully cured.

(11) Let the adhesive to fully cure. Refer to the manufacture's instructions.
(12) Apply paint to the tubular strut and step bracket after the adhesive is fully cured.
(13) Install the main landing gear fairings. Refer to Main Landing Gear Fairings Removal/Installation.

9. Alignment Inspection/Check

A. Check the Main Wheel Alignment (Refer to Figure 202).
(1) The toe-in limitations are 0.00 to 0.18 inch (0.00 to 4.57mm).
(2) The camber limitations are 2 to 4 degrees.
(3) If the wheel alignment is out of the limits, a new tubular spring strut will have to be installed.

NOTE: There is no adjustment for the main landing gear strut.

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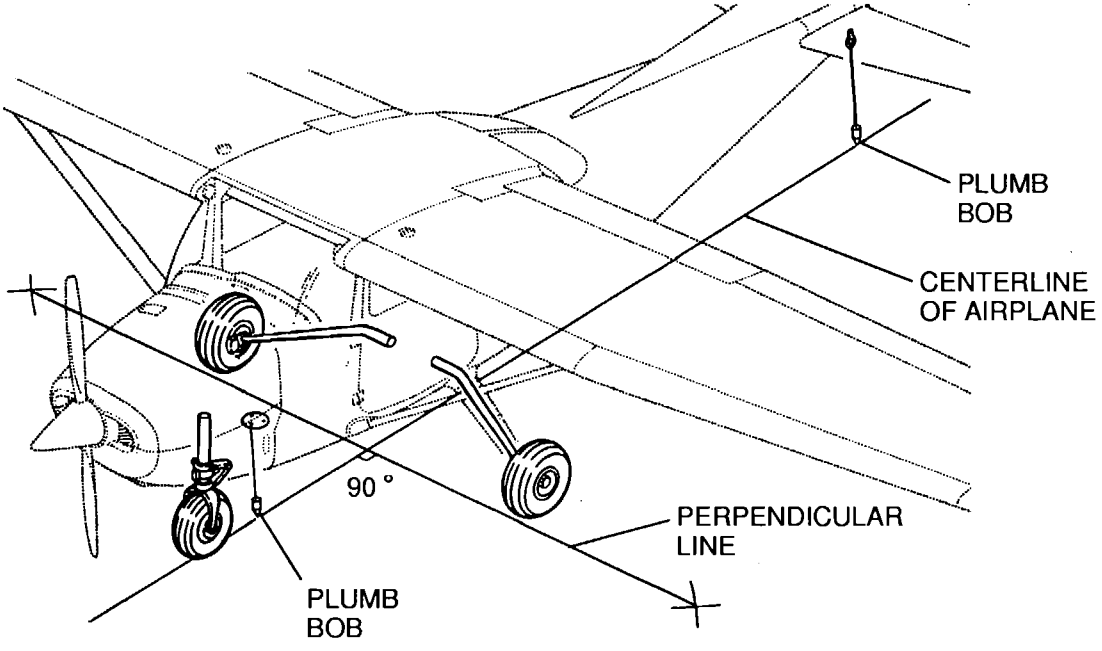
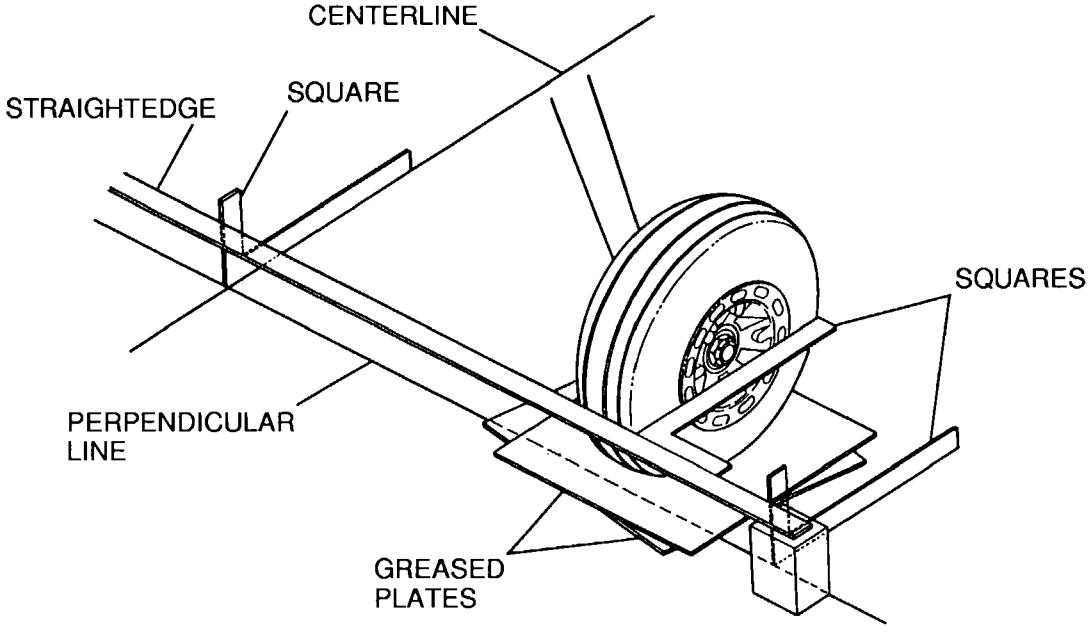


NOTE: MAKE SURE THE FLOOR IS LEVEL IN THE WORK AREA. ATTACH A PLUMB BOB FROM THE TAIL TIE-DOWN RING (AFT). LOOSEN THE FORWARD SCREW ON THE COVER PLATE FOUND JUST AFT OF THE NOSE GEAR AND ATTACH A SECOND PLUMB BOB TO THE COVER PLATE.



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Main Wheel Alignment Check
Figure 202 (Sheet 1)

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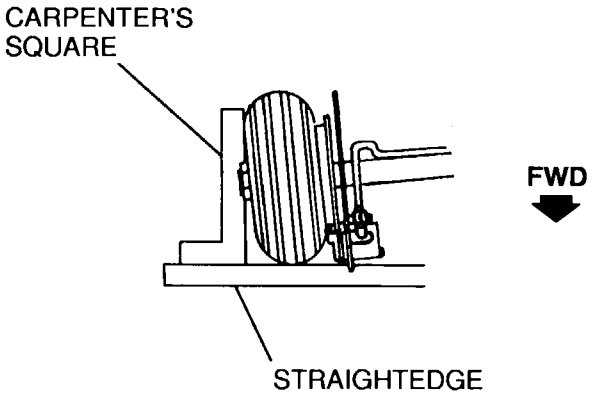
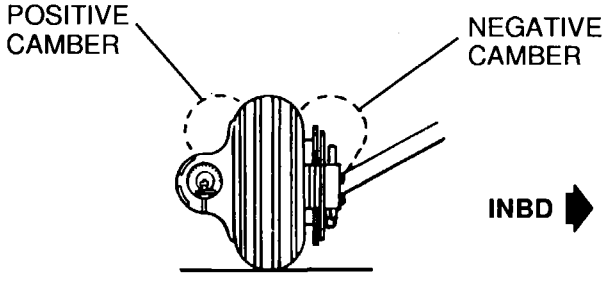
TOP VIEW OF THE TOE-IN CHECK



MEASURE THE TOE-IN AT THE EDGES OF THE WHEEL FLANGE. THE DIFFERENCE IN MEASUREMENTS IS THE TOE-IN FOR ONE WHEEL. (HALF OF THE TOTAL TOE-IN.)

FRONT VIEW OF THE CAMBER CHECK



HOLD THE PROTRACTOR LEVEL VERTICAL AGAINST THE OUTBOARD FLANGES OF THE WHEEL TO MEASURE AND READ THE CAMBER.

NOTE: THESE PROCEDURES ARE FOR A MAIN WHEEL ALIGNMENT CHECK. NO PROVISIONS ARE MADE TO ALIGN THE NOSE WHEEL. FOR CAMBER AND TOE-IN SPECIFICATIONS, REFER TO CHAPTER 6, AIRPLANE DIMENSIONS AND SPECIFICATIONS.

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Main Wheel Alignment Check
Figure 202 (Sheet 2)

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NOSE LANDING GEAR - TROUBLESHOOTING

1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
NOSE WHEEL SHIMMY.	Nose strut attaching bolts loose.	Tighten nose strut attaching bolts.
	Loose or worn nose wheel steering linkage.	Tighten linkage. Replace defective parts with new parts.
	Nose wheel out of balance.	Balance nose wheel. Refer to Nose Landing Gear - Maintenance Practices.
	Wheel bearings too loose.	Properly install wheel bearings.
	Defective shimmy damper.	Repair or install new damper.
	Shimmy damper fluid low.	Service shimmy damper. Refer to Chapter 12, Nose Gear Shimmy Damper - Servicing.
	Loose torque links.	Add shims, or install new parts as required.
NOSE STRUT DOES NOT HOLD AIR PRESSURE.	Defective strut seals.	Install new seals. Refer to Nose Landing Gear - Maintenance Practices.
	Defective or loose air filler valve.	Check gasket and tighten loose valve. Install new valve if defective.
HYDRAULIC FLUID LEAKAGE FROM NOSE STRUT.	Defective strut seals.	Install new seals. Refer to Nose Landing Gear - Maintenance Practices.

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NOSE LANDING GEAR - MAINTENANCE PRACTICES

1. Description and Operation

A. The airplane has a steering nosewheel that is linked through the rudder pedals to give ground control. Major components of the nose landing gear are as follows:
   (1) Shock Strut - The shock strut is made of top and bottom machined cylinders that contain a mixture of oil and air. The top and bottom cylinders give changes in the shock-absorb rates.
   (2) Torque Links - The torque links give a mechanical link between the top and bottom parts of the shock strut and help to keep the nosewheel aligned with the airframe.
   (3) Nosewheel Steering - The nosewheel steering operates through the use of the rudder pedals. The spring-loaded steering rod assemblies connect the nose gear steering arm assembly to the arms on the rudder pedals. The steering gives up to approximately 10 degrees each side of neutral, after which the brakes can be used to get a maximum deflection of 30 degrees right or left of the center.
   (4) Shimmy Damper (For airplanes with the Lord Shimmy Damper) - The shimmy damper uses rubber with a lubricant to absorb nosewheel vibration. The damper is connected between the shock strut and the steering arm assembly.
   (5) Shimmy Damper (For airplanes that do not have the Lord Shimmy Damper) - The shimmy damper gives resistance to shimmy when it moves hydraulic fluid through the small orifices in a piston. The damper is connected between the shock strut and the steering arm assembly.

2. Nosewheel Speed Fairing Removal/Installation

A. Speed Fairing Removal (Refer to Figure 201).
   (1) Remove the bolt that attaches the cover plate to the bottom torque link and remove the cover plate. Install the bolt.
   (2) Weight or tie down the tail of the airplane to raise the nosewheel from the floor.
   (3) Remove the nosewheel axle stud.
   (4) Remove the bolt that attach the speed fairing and towbar spacers to the strut.
   (5) Move the speed fairing up and remove the nosewheel. Loosen the scraper as necessary.
   (6) Turn the speed fairing 90 degrees to center line of airplane and work the fairing down over the fork to remove it.

B. Speed Fairing Installation (Refer to Figure 201).
   (1) Move the speed fairing up over the nose gear fork with the speed fairing at 90 degrees to the center line of the airplane.
   (2) Move the speed fairing up and install the nosewheel in fork.
   (3) Install the axle stud.
   (4) Set the speed fairing over the nosewheel and tighten the axle stud nut until you feel friction when the wheel is turned.
   (5) Loosen the nut to the nearest castellation and install a cotter pin.
   (6) Install the bolt, towbar spacers, washers, and the nut that attach the fairing to the strut.

CAUTION: Damage will result if the correct clearance is not set between the tire and scraper. You must do a check of the clearance every time the scraper moves or the tire is changed when you install the speed fairings. If any mud, snow, or ice collects on the scraper, it will prevent the tire from correct rotation. You must keep the scraper clean for correct tire rotation.

   (7) Complete a check of the clearance between the tire and the scraper.
      (a) Clean off any dirt or ice that has collected on the scraper.
      (b) Adjust the clearance as necessary to have a minimum of 0.55 inch (14 mm) to a maximum of 0.80 inch (20 mm).
   (8) Lower the nose of the airplane to the floor.
   (9) Remove the bottom torque link attach bolt.
   (10) Set the cover plate over the speed fairing and attach it with the bottom torque link attach bolt.

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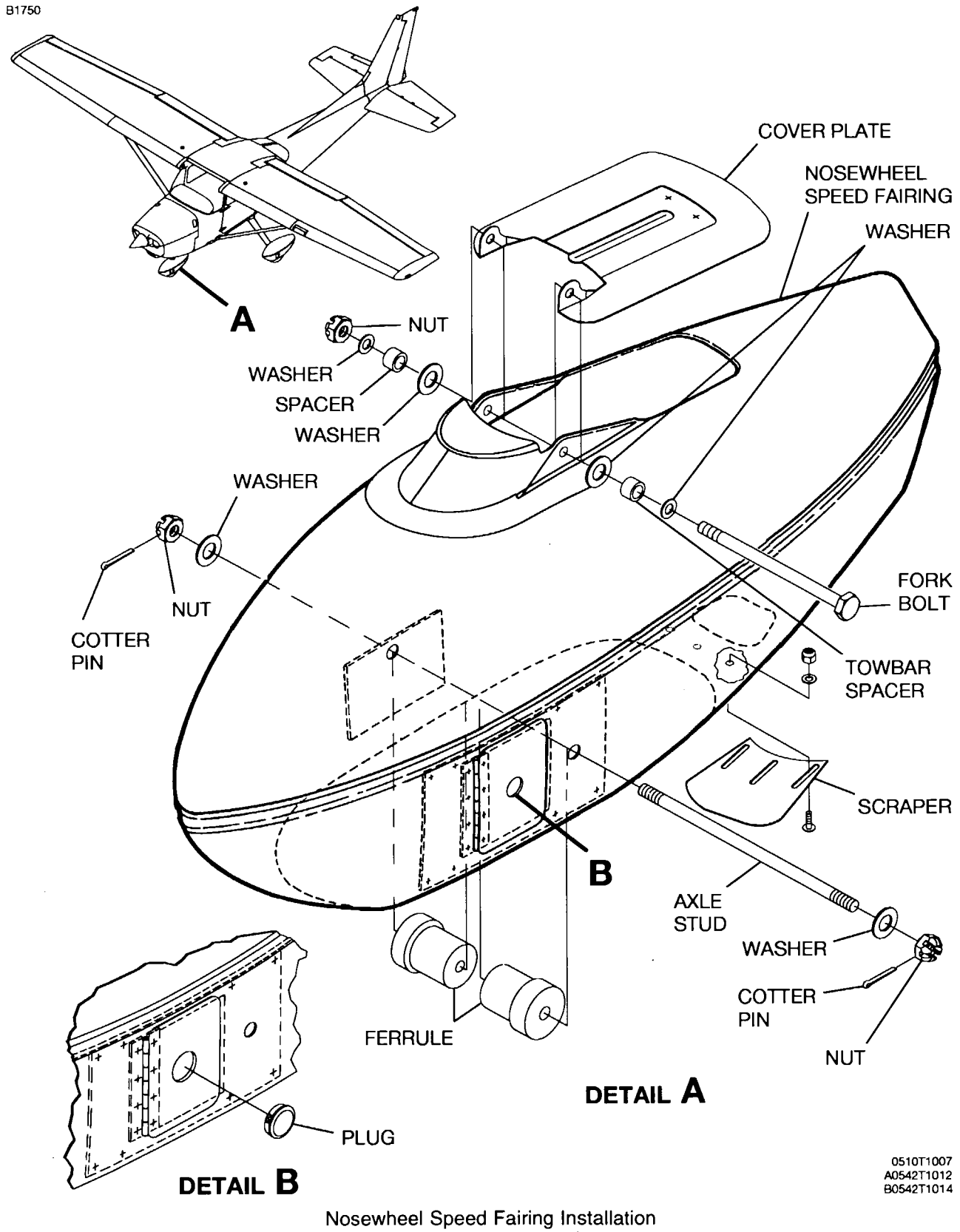

Nosewheel Speed Fairing Installation
Figure 201 (Sheet 1)

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3. Nose Landing Gear Removal/Installation

A. Nose Landing Gear Removal (Refer to Figure 202).
(1) Remove the cowl. Refer to Chapter 71, Cowl - Removal/Installation.
(2) Weight or tie down the tail of the airplane to raise the nosewheel from the floor.
(3) Disconnect the nosewheel steering tubes from the nose gear steering collar.

CAUTION: Make sure the strut is fully deflated before you remove the bolt or roll pin at the top of the strut.

(4) Remove the strut clamp cap and shims from the bottom strut fitting.
(5) Deflate the strut fully and extend the strut to its shortest length.
(6) Remove the bolt from the top of the strut.
(7) Pull the strut assembly down from the top attach forging.

B. Nose Landing Gear Installation (Refer to Figure 202).
(1) Before you inflate the nose gear strut, install the top of the strut in the top attach forging and attach it with a bolt.
(2) Extend the strut to connect the cap to the strut clamp with the bottom strut fitting on the firewall.
(3) Install the shims and the cap for the strut clamp attaching strut to lower strut fitting.

NOTE: When you install the cap, examine the gap between the cap and the strut fitting before the attach bolts are tightened. The gap tolerance is 0.010 inch (0.254 mm) minimum and 0.016 inch (0.406 mm) maximum. If the gap is more than the maximum tolerance, install shims as necessary. Replace the cap with shims to get the correct gap if the gap is less than the minimum. Install the shims as equal as possible between the sides of the gap.

(4) Inflate and service the shock strut. Refer to Chapter 12, Nose Landing Gear Shock Strut - Servicing.
(5) Rig the nosewheel steering tubes. Refer to Chapter 27, Rudder Control System - Maintenance Practices.
(6) Remove the weights or the tie down from the tail, and lower the nosewheel to the floor.
(7) Install the cowl. Refer to Chapter 71, Cowl - Removal/Installation.

4. Nose Landing Gear Steering Tube Removal/Installation

A. Nose Landing Gear Steering Tube Removal (Refer to Figure 202).
(1) Remove the upholstery from the area below the instrument panel as necessary.
(2) Weight or tie down the tail of the airplane to raise the nosewheel from the floor.
(3) Loosen the clamp that holds the fire sleeve around the steering tube.
(4) From inside the airplane, remove the nut that attaches the ball joint part of the steering tube to the rudder bar.
(5) Remove the bolt and the nut that attach the clevis on the steering tube to the rod end on the nosewheel strut.
(6) Remove the steering tube from the airplane.

B. Nose Landing Gear Steering Tube Installation (Refer to Figure 202).
(1) From inside the airplane, attach the ball joint part of the steering tube to the rudder bar with the nut.
(2) Loosen the jam nut.
(3) Turn the clevis until the holes in the rod end and the clevis align.
(4) Attach the clevis to the rod end with the bolt and the nut.
(5) Tighten the jam nut.
(6) Pull the fire sleeve down around the steering tube and attach it with the clamp.
(7) Remove the weights or the tie down from the tail and lower the nosewheel to the floor.
(8) Install the upholstery in the area below the instrument panel as necessary.

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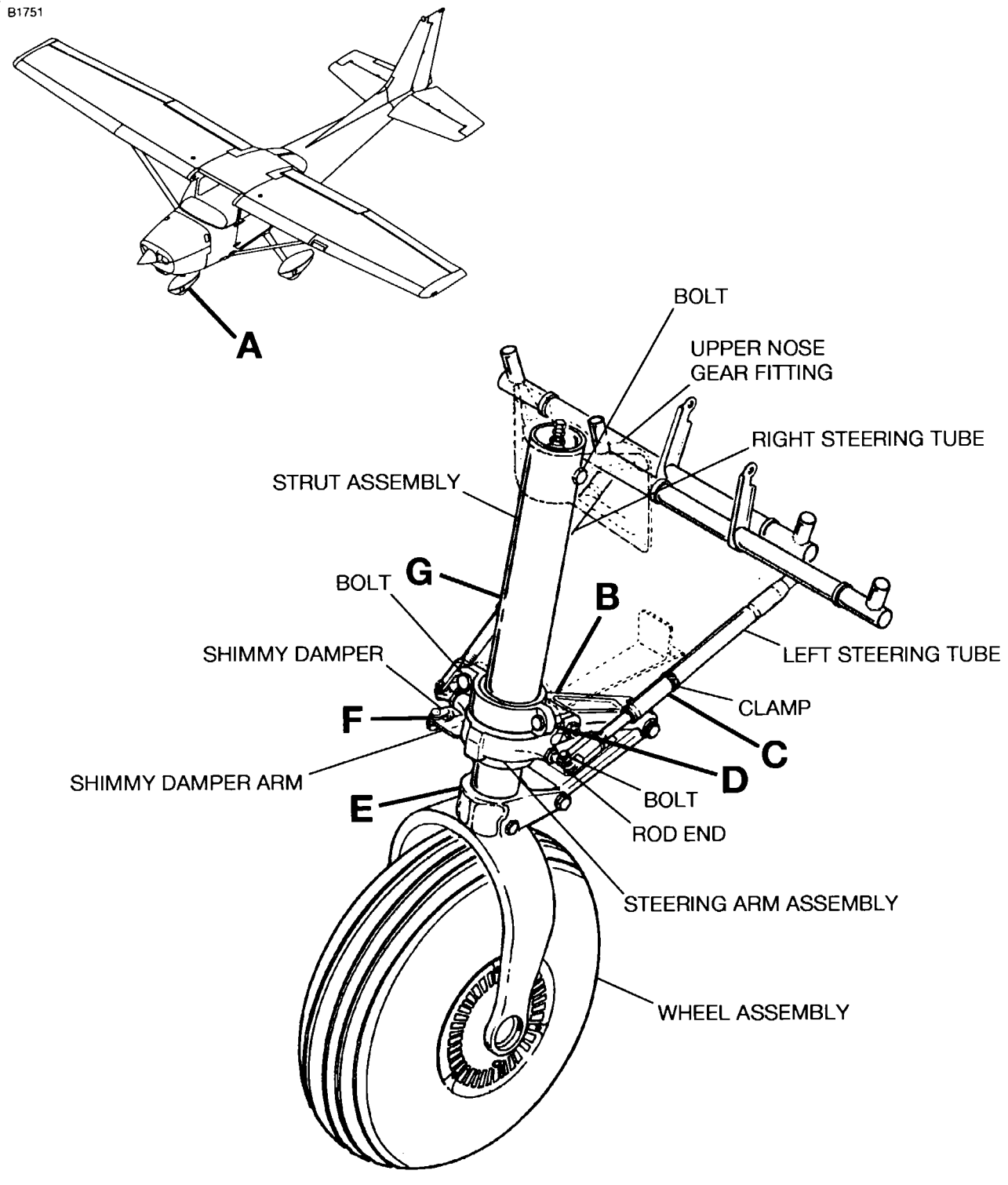

DETAIL A

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Nose Landing Gear Installation
Figure 202 (Sheet 1)

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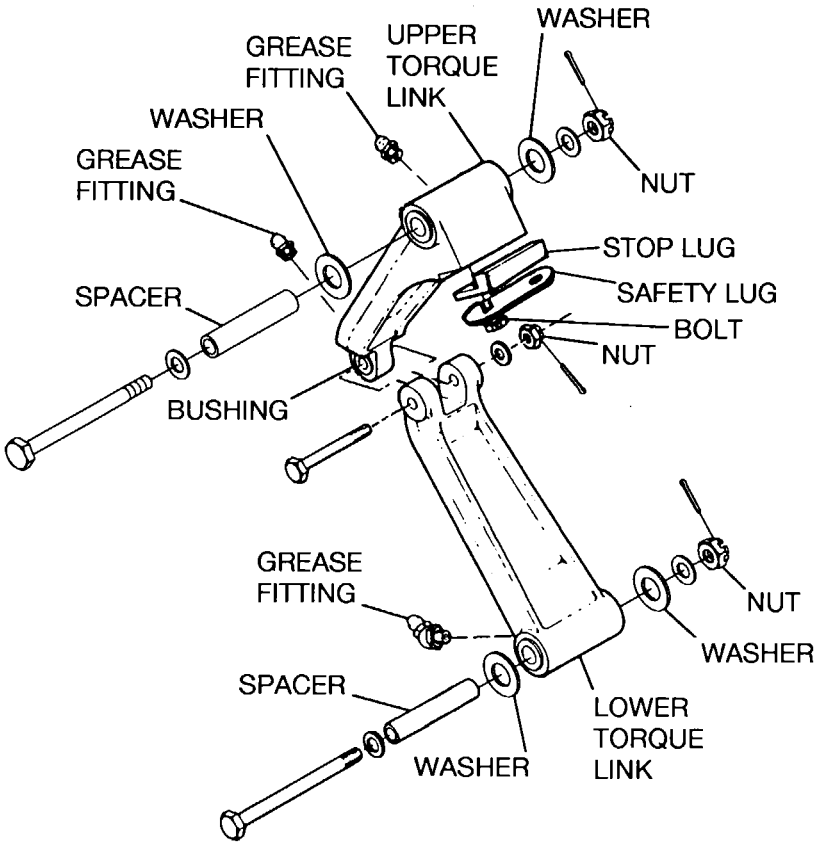
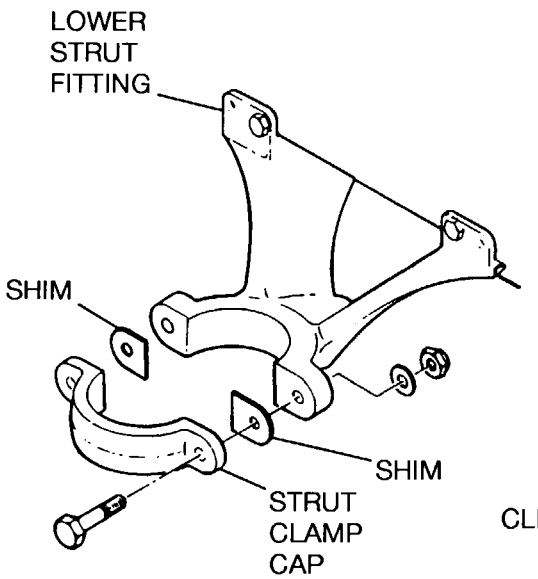
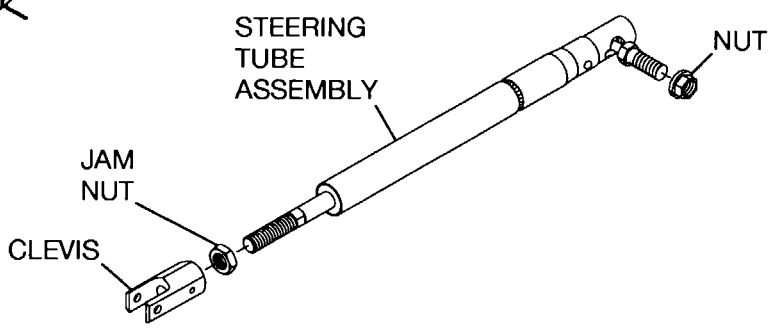


DETAIL B



DETAIL D



DETAIL C

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Nose Landing Gear Installation
Figure 202 (Sheet 2)

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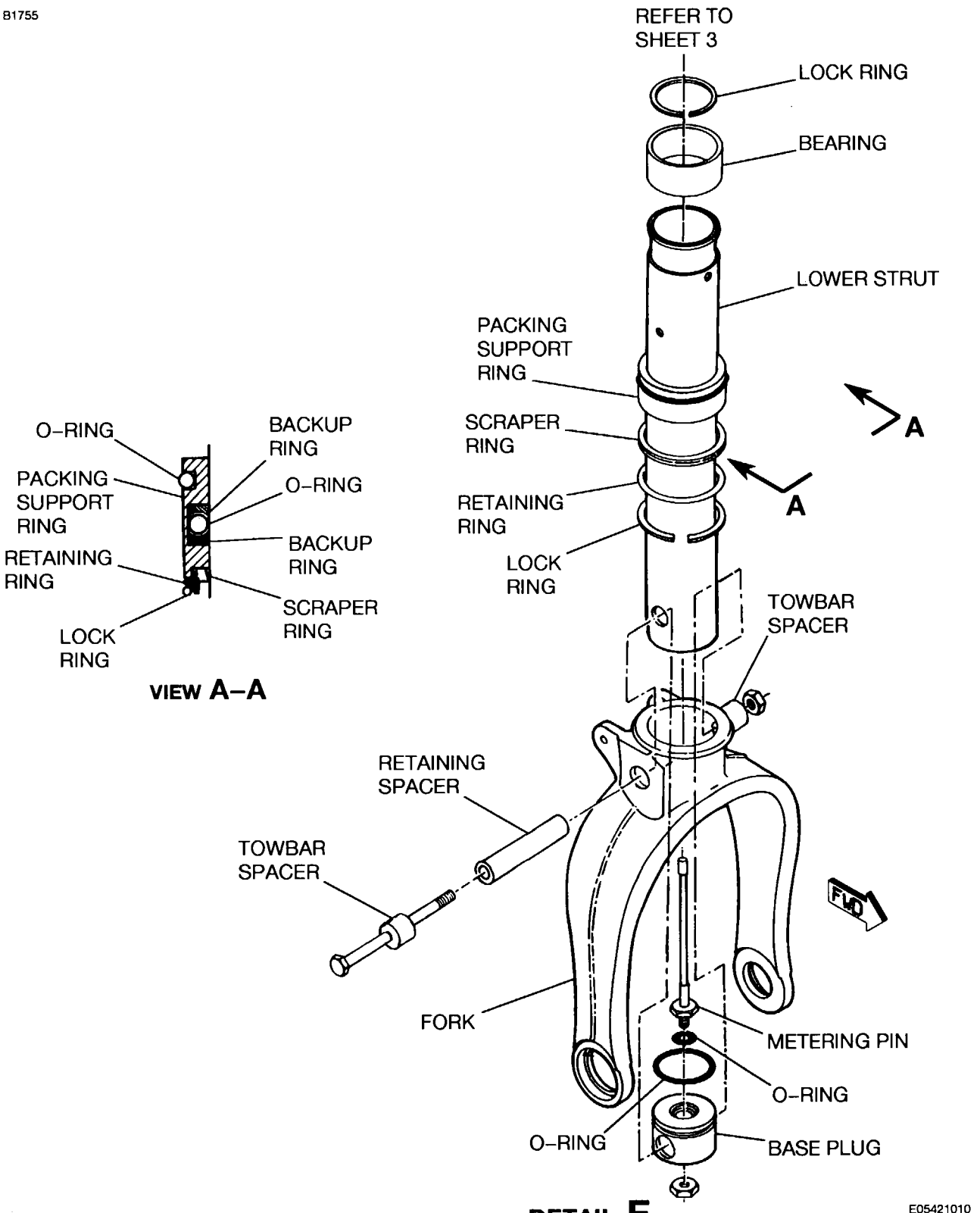

Nose Landing Gear Installation
Figure 202 (Sheet 3)

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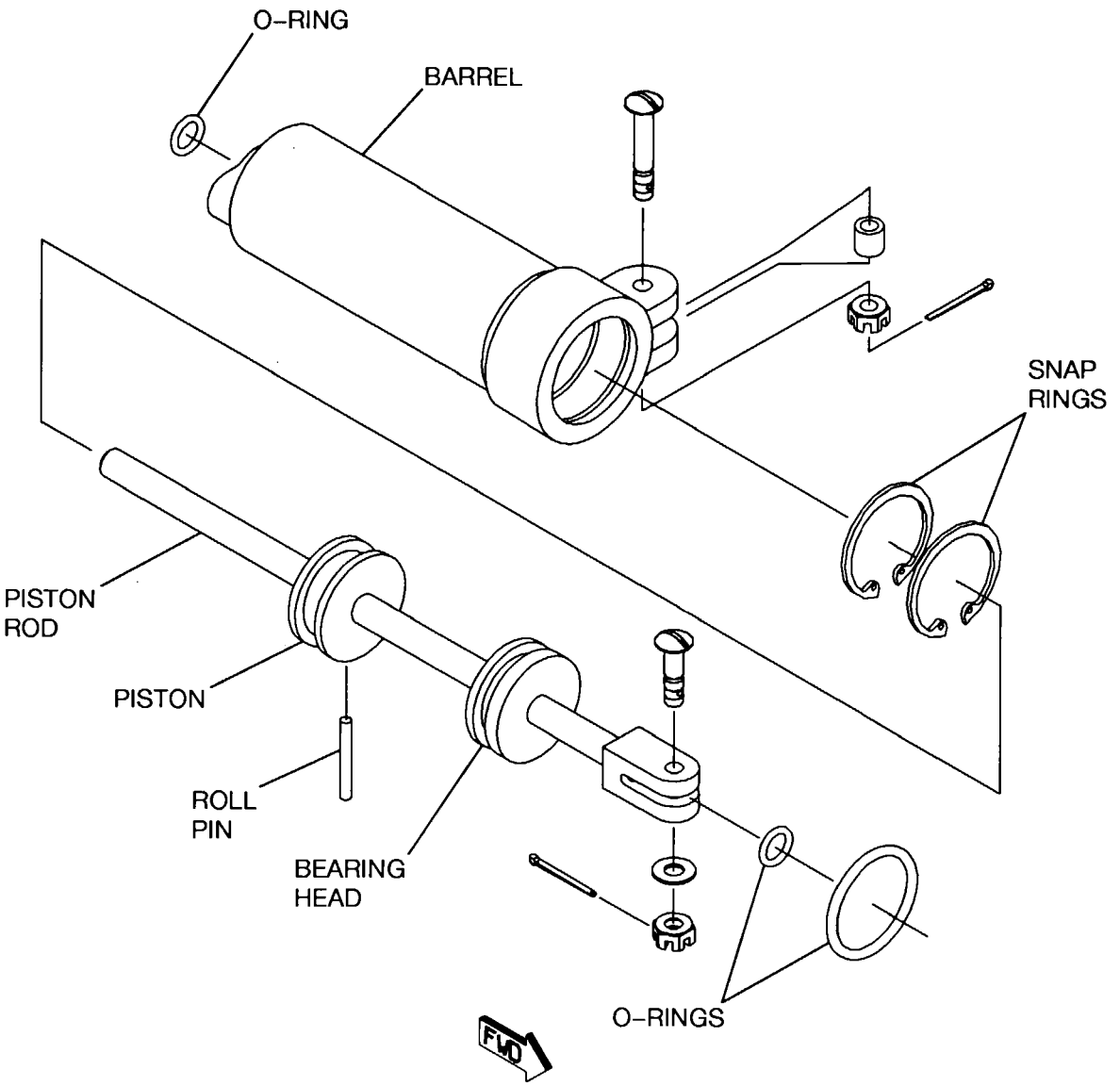

DETAIL F

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Nose Landing Gear Installation
Figure 202 (Sheet 4)

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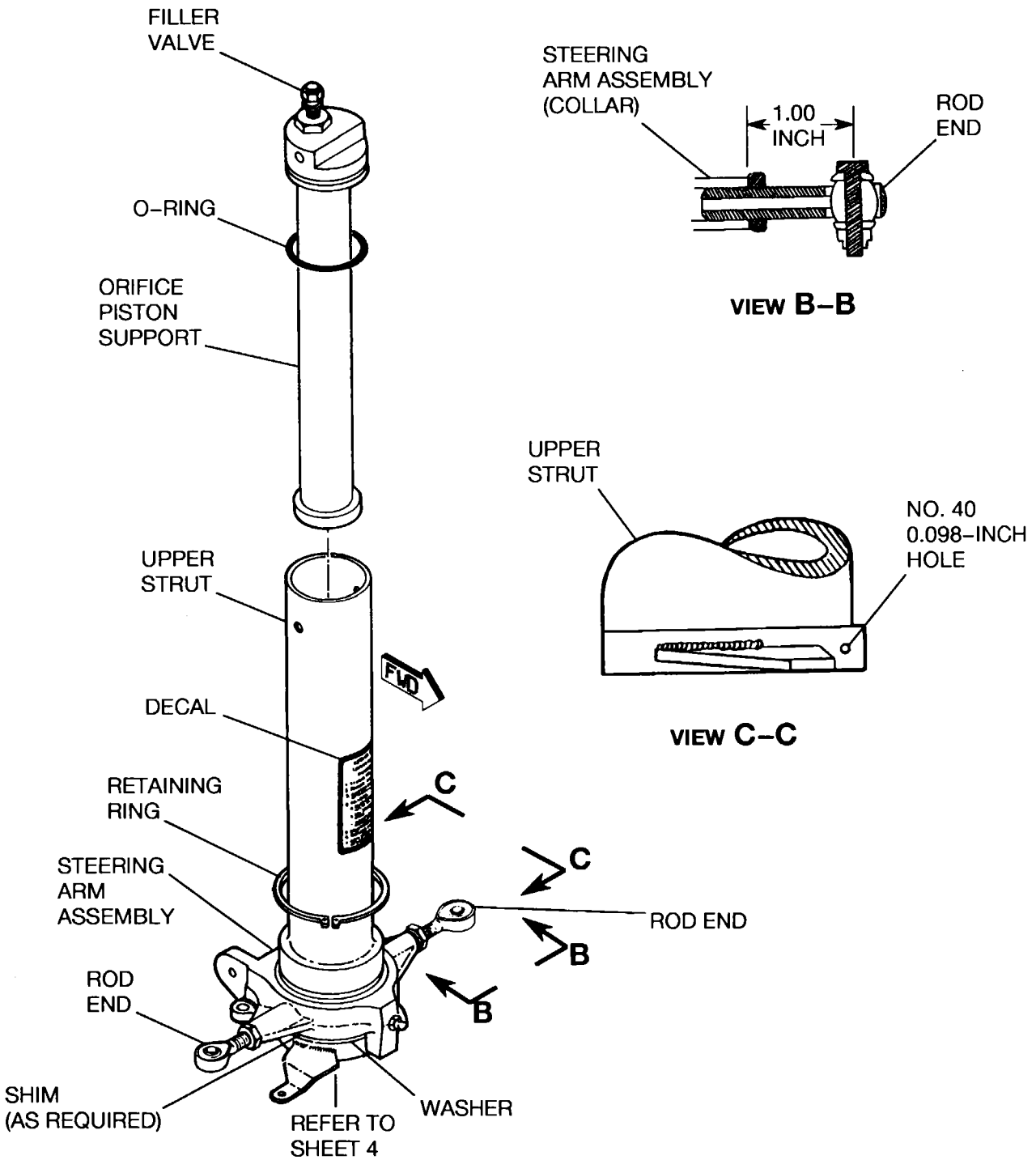

DETAIL G

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Nose Landing Gear Installation
Figure 202 (Sheet 5)

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(9) Do the rigging of the nosewheel steering tubes. Refer to Chapter 27, Rudder Control System - Maintenance Practices.

5. Torque Link Removal/Installation

A. Torque Link Removal (Refer to Figure 202).

WARNING: Completely deflate the shock strut before you remove the torque links.

(1) Disconnect the top and bottom attach bolts, spacers, shims, and nuts.
(2) Remove the torque links.

B. Torque Link Installation (Refer to Figure 202).

NOTE: If the safety lug and stop lug are removed from the top torque link during disassembly, they must be installed and the retaining bolts tightened 20 to 25 In-lbs (2.26 to 2.82 N.m). After you tighten the bolts, bend the tips of the safety lug to safety them into position.

(1) Install the top and bottom torque link assemblies with the shock strut fully deflated.
(2) Install the bolt that attaches the top and bottom assemblies.
(3) Tighten the nuts at each end of the torque links until they are almost tight. Then tighten the nuts to align the next castellation with a cotter pin hole in the bolt.
(4) Examine the top and bottom torque link for looseness. If looseness is apparent, shims can be installed to remove any slack. This will help to prevent nosewheel shimmy.
(5) Fill and inflate the shock strut to the correct pressure. Refer to Chapter 12, Nose Landing Gear Shock Strut - Servicing.

6. Shimmy Damper Removal/Disassembly/Installation

A. Shimmy Damper Removal (Refer to Figure 202).

NOTE: There are no inspection or overhaul requirements for the Lord Shimmy Damper. The Lord Shimmy Dampener is discarded.

(1) Remove the cotter pin, nut, washer, and bolt that attach the piston shaft clevis to the bracket that is welded on the bottom of the top strut tube.
(2) Remove the cotter pin, nut, spacer, and bolt that attach the housing to the steering arm assembly.
(3) Remove the shimmy damper.
(4) For airplanes with the Lord shimmy damper, discard the Lord Shimmy Damper.

B. Disassemble and Assemble the Hydraulic Shimmy Damper (Refer to Figure 202).

NOTE: There are no inspection or overhaul requirements for the Lord Shimmy Damper. The Lord Shimmy Dampener is discarded.

(1) Use Detail F as a guide to disassemble the shimmy damper. When you assemble the damper, all of the new O-rings must be used. All parts must be lubricated before you assemble with clean hydraulic fluid.
(2) When the damper is fully assembled, it must be serviced using procedures in Chapter 12, Nose Landing Gear Shimmy Damper - Servicing.

C. Shimmy Damper Installation (Refer to Figure 202).
(1) Before you install the shimmy damper, do the maintenance that follows:
(a) If a Lord Shimmy Damper has been in storage for a long period, make sure that the shaft moves freely before you install it. Refer to Chapter 12, Nose Landing Gear Shimmy Damper - Servicing.
(b) Make sure that the tire is in good condition, is balanced, and has no tears or foreign objects in it.

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(c) Examine the interface between the bottom of the steering collar and the top of the nose gear fork. If there is looseness here, replace or add more shims under the collar.
(d) Examine the assembly hardware such as bolts and nuts for wear, and replace as necessary.
(e) Examine the shimmy damper arm attach points on the landing gear and structure for wear and replace as necessary.

(2) Attach the shimmy damper housing to the steering arm assembly with the bolt, spacer, nut, and cotter pin.
(3) Attach the shimmy damper piston rod clevis to the bracket that is welded on the bottom of the top strut tube with the bolt, washers (as necessary), and nut.
(4) For cleaning and servicing of the shimmy damper, refer to Chapter 12, Nose Landing Gear Shimmy Damper - Servicing.

7. Shock Strut Disassembly/Inspection/Assembly

A. Dissemble the Shock Strut (Refer to Figure 202).

NOTE: The procedures that follow apply to the nose gear shock strut after it has been removed from the airplane and the speed fairings and nosewheel have been removed. If you separate the top and the bottom strut, you do not have to remove or completely disassemble the strut to do an inspection and parts installation.

WARNING: Make sure that you completely deflate the shock strut before you remove the lock ring in the bottom end of the top strut and before you disconnect the torque links.

(1) Remove the shimmy damper. Refer to Shimmy Damper Removal/Disassembly/Installation.
(2) Remove the torque links. Refer to Torque Link Removal/Installation.
(a) To help in assembly, record the position of the washers, shim, and spacers.
(3) Remove the lock ring from the groove inside the bottom end of the top strut.

NOTE: There is a small hole at the lock ring groove to help you remove the lock ring.

NOTE: Hydraulic fluid will drain from the strut halves as the bottom strut is pulled from the top strut.

(4) Use a straight, hard pull to separate the top and bottom struts.
(a) Turn the bottom strut upside down and drain the hydraulic fluid.
(5) Remove the lock ring and the bearing at the top end of the bottom strut assembly.
(a) Make a mark on the top side of the bearing for assembly.
(6) Slide the packing support ring, scraper ring, retaining ring, and lock ring from the bottom strut.
(a) Make a mark at the relative position and the top side of each ring. Wire or tape the rings together to be sure that you install them in the correct position.
(7) Remove the O-ring and the backup rings from the packing support ring.
(8) Remove the bolt that attaches the towbar spacers.

NOTE: The bolt that attaches the towbar spacers also holds the bushing and the base plug in position.

(9) Remove the bolt that attaches the fork to the strut barrel.
(10) Remove the base plug and the metering pin from the bottom strut.
(11) Remove the O-rings and the metering pin from the base plug.

NOTE: The bottom strut barrel and fork are a press fit and are drilled on the assembly. Separation of these parts is not recommended unless you install a new part.

(12) Remove the retaining ring that attaches the steering arm assembly on the top strut.

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(13) Remove the steering arm assembly, shims (if installed), and washer.
  (a) If shims are installed, record the quantity and position of each shim.
(14) Push the orifice support from the top strut and remove the O-ring.
(15) Remove the filler valve from the orifice support.

B. Inspect/Repair the Strut.
(1) Clean all the parts in cleaning solvent.
(2) Examine all the parts for damage and wear.
(3) Replace all parts that show wear or damage and all O-rings and backup rings with new parts.
(4) Sharp metal edges must be smoothed with Number 400 emery paper and cleaned with solvent.

C. Assemble the Shock Strut (Refer to Figure 202).

NOTE: All parts must be cleaned and lubricated with hydraulic fluid before assembly. All O-rings must be new.

(1) Install the washer and the shims.
(2) Lubricate the needle bearings in the steering collar.
(3) Install collar and retaining ring.
(4) Make sure the steering collar has a tight fit against washer.
  (a) Shims of variable thicknesses are available from Cessna Aircraft Company to give a tight fit for the collar against the washer. Refer to the Model 172 Illustrated Parts Catalog for the shim numbers.
(5) Install the rod ends in the steering collar.
(6) Adjust the rod ends to the dimensions specified in View A-A.
(7) Install the O-rings and filler valve in the orifice piston support.
(8) Install the orifice piston support in the top strut.
(9) Install the O-ring and metering pin with the O-ring in the base plug. Attach with a nut.

NOTE: If the base plug is to be replaced, the new part will need to be line-drilled to accept the NAS75-5 bushing.

(10) Install the bushing (if removed) in the base plug.
(11) Install the base plug assembly in the bottom strut.
  (a) Align the holes of the bushing, hole in the bottom strut, and the hole in the fork.
  (b) Install the towbar spacer under the head of the bolt.
  (c) Install the bolt through the fork, bottom strut and bushing, which is installed in base plug.
  (d) Install the towbar spacer on the threaded end of the bolt.
  (e) Install and tighten the nut.
(12) Install the lock ring, retaining ring, and scraper ring on the bottom strut. Make sure they are installed in the same positions before they were removed.
(13) Install the O-rings and backup rings in the packing support ring.
(14) Move the packing support ring over the bottom strut.
(15) Install the bearing and the lock ring at the top end of the bottom strut assembly. Note top side of bearing.
(16) Install the top strut assembly over the bottom strut assembly.
(17) Install the lock ring in the groove of the bottom end of the top strut.
  (a) Set the lock ring in position so that one of its ends covers the small access hole in the lock ring groove (View C-C).
(18) Install the torque links.
  (a) Set the washers, shims, and spacers in the same positions as before they were removed.
(19) Install the shimmy damper.
(20) After the shock strut assembly is complete, install the strut on the airplane.
(21) Fill and inflate the strut. Refer to Chapter 12, Nose Landing Gear Shock Strut - Servicing.

8. Steering Rod Assembly Adjustment

A. Adjustment Criteria (Refer to Figure 202).
(1) Adjust the rod ends to the dimension specified in Detail E, View A-A.

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(2) Attach the nosewheel steering rods to the rod ends protruding from the steering arm assembly.

NOTE: The nosewheel steering and rudder systems are connected. An adjustment to one system can have an effect on the other system and must be taken into consideration.

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MAIN LANDING GEAR WHEEL AND AXLE - MAINTENANCE PRACTICES

1. General

A. The main landing gear wheel maintenance practices give removal/installation instructions for left main wheel. The removal/installation for the right main wheel is typical.

2. Main Landing Gear Wheel Removal/Installation

NOTE: The wheel removal is not necessary to reline the brakes or to remove the brake parts, other than the brake disc on the torque plate.

A. Remove the Wheel (Refer to Figure 201).
(1) Lift the airplane with jacks. Refer to Chapter 7, Jacking - Maintenance Practices.
(2) Remove the speed fairing if it is installed. Refer to Main Landing Gear - Maintenance Practices.
(3) Remove the hub caps, cotter pin and the axle nut.
(4) Remove the bolts that attach the brake backing plate to the brake cylinder.
(5) Remove the backing plate.
(6) Pull the wheel from the axle.

B. Install the Wheel (Refer to Figure 201).
(1) Set the wheel assembly on the axle.
(2) Install and tighten the axle nut until a you feel friction when the wheel is rotated.
(3) Loosen the nut to the nearest castellation.
(4) Install the cotter pin.
(5) Set the brake backing plate in position and attach with bolts.
(6) Install the hub cap.
(7) Install the speed fairing. Refer to Main Landing Gear - Maintenance Practices.

3. Main Wheel Axle Removal/Installation

A. Remove the Axle (Refer to Figure 201).
(1) Remove the speed fairing. Refer to Main Landing Gear - Maintenance Practices.
(2) Remove the wheel. Refer to Main Landing Gear Wheel Removal/Installation.
(3) Disconnect, drain and put a cap or plug in the hydraulic brake line of the wheel brake cylinder.
(4) Remove the bolts that attach the brake torque plate and speed fairing mounting plate to the axle.
(5) Remove the cotter pin, nut, washer and bolt that attach the axle to the tubular strut.
(6) Remove the axle from the spring strut.

B. Install the Axle (Refer to Figure 201).
(1) Apply epoxy primer to the surfaces of the axle and tubular strut.
(2) Install the axle onto the tubular strut with the tapered edge on the bottom, when the primer is wet.
(3) Install the bolt, washer and nut that attach the axle to the tubular strut.
(4) Install the cotter pin after you tighten the nut.
(5) Install the brake components and the speed fairing mounting plate to the axle.
(6) Install the wheel on the axle.
(7) Connect the hydraulic brake line to the wheel brake cylinder.
(8) Fill and bleed the hydraulic brake system. Refer to Brakes - Maintenance Practices.
(9) Install the main wheel speed fairing. Refer to Main Landing Gear - Maintenance Practices.

4. Main Wheel Disassembly/Assembly

A. Disassemble the Wheel (Refer to Figure 202).

WARNING: DO NOT REMOVE THE WHEEL WITH THE TIRE AND TUBE INFLATED WITH AIR. SERIOUS INJURY OR DEATH CAN RESULT.

(1) Fully deflate the tire and tube.

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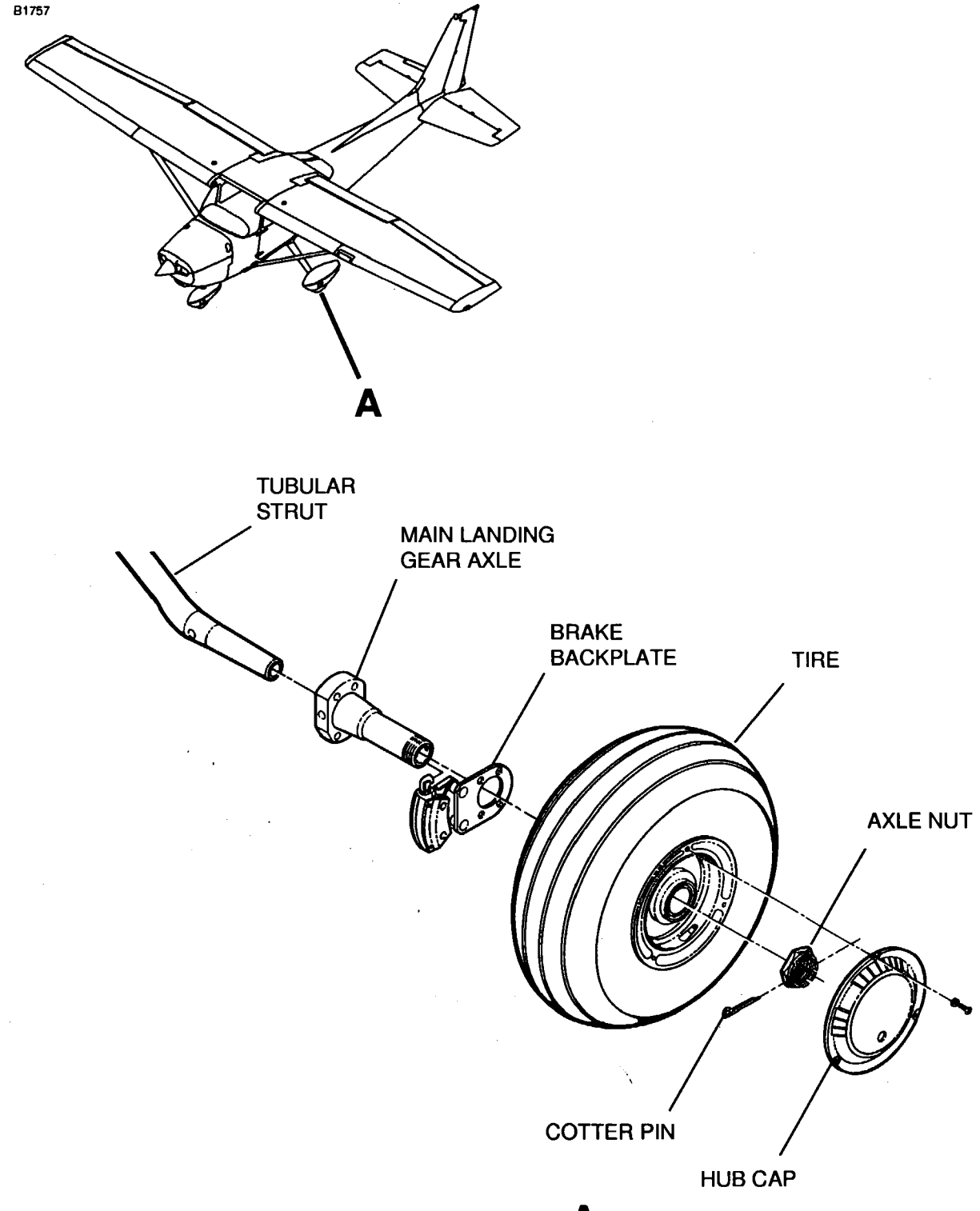

DETAIL A

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A0541T3001

Main Wheel Installation
Figure 201 (Sheet 1)

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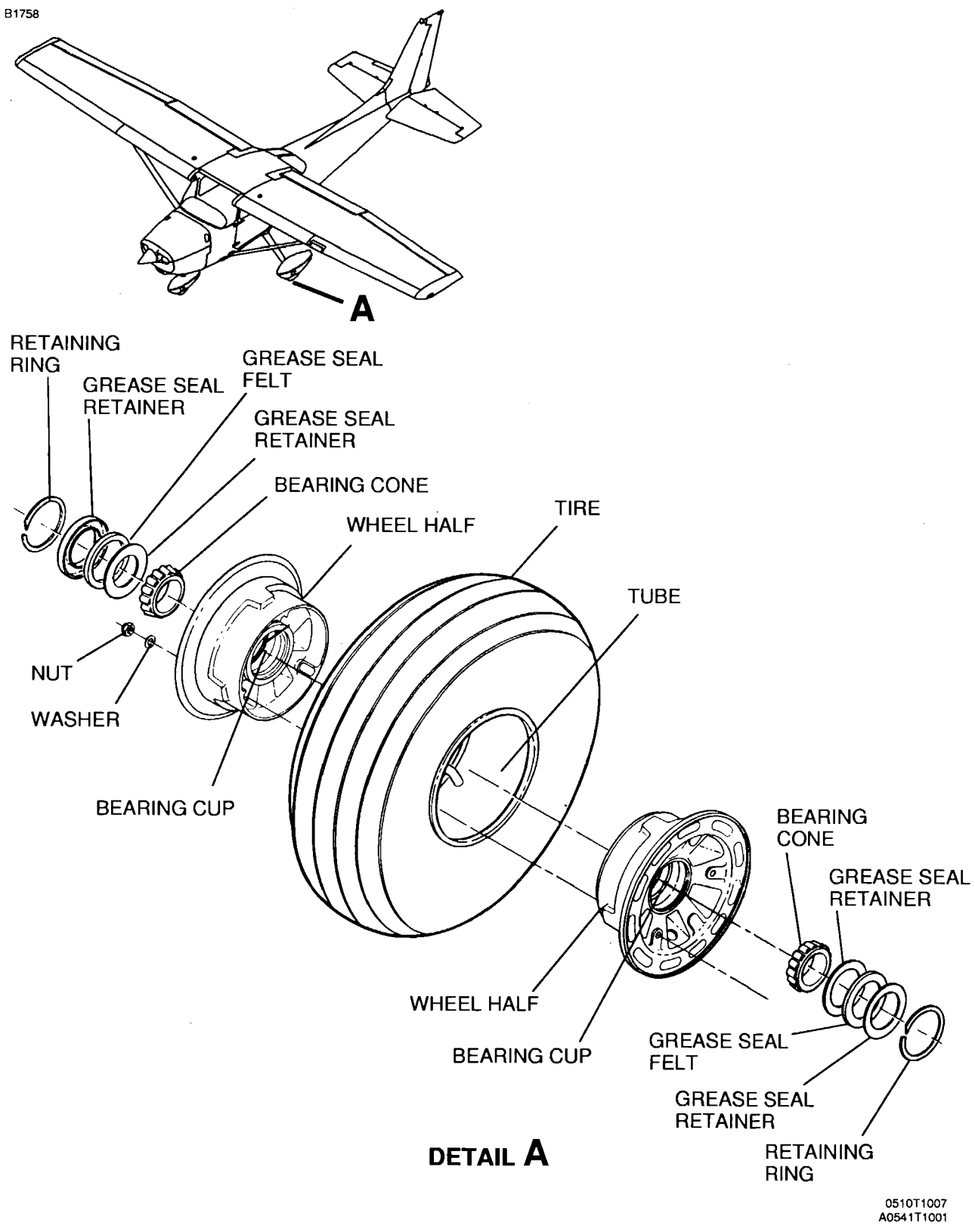

Main Wheel Assembly
Figure 202 (Sheet 1)

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CAUTION: BE CAREFUL TO PREVENT TOOL DAMAGE TO THE TIRE WHEN YOU REMOVE THE TIRE FROM THE WHEEL HALVES.

(2) Break loose the tire bead.
(3) Remove the bolts that attach the wheel halves together.
(4) Separate and remove the tire and tube from the wheel halves.
(5) Remove the retaining rings, grease seal retainers, grease seal felts, grease seal retainers and bearing cones.
(6) The bearing cups (races) are a press fit in the wheel halves and must not be removed unless a new part is to be installed.
  (a) To remove the bearing cups, heat the wheel half in boiling water for 30 minutes or in an oven, not to exceed 250°F (121°C).
  (b) Use an arbor press if available, to press out bearing cup and press in a new bearing cup while the wheel half is still hot.

B. Assemble the Wheel (Refer to Figure 202).
(1) Apply a small quantity of SAE 10 oil for lubrication on the felt grease seal.
(2) Install the bearing cone, grease seal retainer, grease seal felt, grease seal retainer and retaining ring into each wheel half.
(3) Install the tube in the tire. Make sure to align the index marks on the tire and tube.
(4) Set the wheel half into the tire and tube (side opposite valve stem).
(5) Install the bolt through the wheel half with a washer under the head of the bolt.
(6) Set the other wheel half into the other side of the tire and tube. Make sure to align the valve stem in the valve slot.
(7) Make sure the tube is not pinched between the wheel halves before you torque the nuts.

CAUTION: MAKE SURE THE NUTS HAVE THE CORRECT TORQUE. THE BOLTS CAN CAUSE DAMAGE OF THE WHEEL IF THE NUTS DO NOT HAVE THE CORRECT TORQUE.

CAUTION: DO NOT USE IMPACT WRENCHES ON THE BOLTS OR NUTS.

(8) Install the washers and nuts on the bolts.
(9) Tighten the nuts to a dry torque of 90 inch-pounds, +2 or -2 inch-pounds (10.17 N.m, +0.23 or -0.23 N.m).
(10) Inflate the tire to seat the tire beads.
(11) Adjust the air in the tire to the correct pressure.

5. Main Wheel Inspection/Check

A. Remove the Wheel. Refer to Main Wheel Removal/Installation.

B. Disassemble the Wheel. Refer to Main Wheel Disassembly/Assembly.

C. Inspect the Main Wheel (Refer to Figure 202).
(1) Clean all metal parts and grease seal felts in solvent, and dry thoroughly.

NOTE: A soft bristle brush can be used to remove hardened grease, dust or dirt.

(2) Examine the wheel halves for cracks or damage.
(3) Examine the bearing cones, cups, retaining rings, grease seal retainers, grease seal felts and grease seal retainers for wear or damage.
(4) Examine the bolts for cracks in the bolt head.
(5) Replace the wheel half if it is cracked or damaged.
(6) Replace damaged retainer rings and seals.
(7) Replace worn or damaged bearing cups and cones.
(8) Replace any worn or damaged bolts.
(9) Remove any corrosion or small nicks with a minimum of 320 grit sandpaper.

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(10) Clean and paint repaired areas with a layer of clear lacquer paint. Refer to Chapter 20, Interior and Exterior Finish - Cleaning/Painting.
(11) Pack the bearings with MIL-PRF-81322 wheel bearing grease.

D. Assemble the Wheel. Refer to Main Wheel Disassembly/Assembly.

E. Install the Wheel. Refer to Main Landing Gear Wheel Removal/Installation.

6. Wheel Balancing

A. Tire wear that is not equal is usually the result of the wheel not correctly balanced. Replacement of the tire will usually correct the condition.
(1) The light weight point of the tire is marked with a red dot on the tire sidewall. The heavy weight point of the tube is marked with a contrasting color line (usually near the inflation valve stem). When you install a new tire, set the marks adjacent to each other. The wheel can be statically balanced but not dynamically balanced if a wheel shows indication of unbalance when you service it.

NOTE: Static balance is the balance of the control surface, which is balanced from its hinge point. A tire that is not dynamically balanced will cause vibration and can be examined when the tire rotates.

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NOSE LANDING GEAR WHEEL - MAINTENANCE PRACTICES

1. General

A. The maintenance practices for the wheel of the nose landing gear gives instructions for the nose wheel removal/installation, nose wheel disassembly/assembly and the nose landing gear wheel inspection/check.

2. Nose Landing Gear Wheel Removal/Installation

A. Remove the Wheel (Refer to Figure 201).
(1) Weight or tie down the tail of the airplane to lift the nose wheel from the floor.
(2) Remove the nose wheel axle stud.
(3) Pull the nose wheel assembly from the fork.
(4) Remove the axle tube from the nose wheel. Loosen the wheel scraper as necessary on airplanes that are installed with a speed fairing.

B. Install the Wheel (Refer to Figure 201).
(1) Install the axle tube in the nose wheel.
(2) Install the nose wheel assembly in the fork.
(3) Install the nose wheel axle stud.
(4) Tighten the axle stud until you feel friction when the wheel is rotated.
(5) Loosen the nut to the nearest castellation and install the cotter pins.
(6) Airplanes that are installed with speed fairings will require a check of the scraper clearance. Refer to Nose Landing Gear - Maintenance Practices.

3. Nose Landing Gear Wheel Disassembly/Assembly

A. Disassemble the Wheel (Refer to Figure 201).

WARNING: DO NOT REMOVE THE WHEEL WITH THE TIRE AND TUBE INFLATED WITH AIR. SERIOUS INJURY OR DEATH CAN RESULT.

(1) Fully deflate the tire and tube.
(2) Loosen the tire beads.
(3) Remove the bolts and washers.

CAUTION: BE CAREFUL TO PREVENT TOOL DAMAGE TO THE TIRE WHEN YOU REMOVE THE TIRE FROM THE WHEEL HALVES.

(4) Separate and remove each wheel half from the tire and tube.
(5) Remove the retaining rings, grease seal retainer, felt grease seal, grease retainer and bearing cone from each wheel half.
(6) Bearing cups (races) are a press fit in each wheel half and must not be removed unless a new part is to be installed.
(a) To remove the bearing cups, heat the wheel half in boiling water for 30 minutes or in an oven, no more than 250°F (121°C).
(b) Use an arbor press if available, to press out the bearing cup.
(c) Press in a new bearing cup with the wheel half is still hot.

B. Assemble the Wheel (Refer to Figure 201).
(1) Apply a small quantity of SAE 10 oil for lubrication on the felt grease seal.
(2) Install the bearing cone, grease seal retainer, felt grease seal, grease seal retainer and retaining ring into each of the wheel halves.
(3) Install the tube in the tire. Make sure to align the index marks on the tire and tube.
(4) Set the wheel half into the tire and tube.
(5) Install the bolt through the wheel half with the washer under the head of the bolt.

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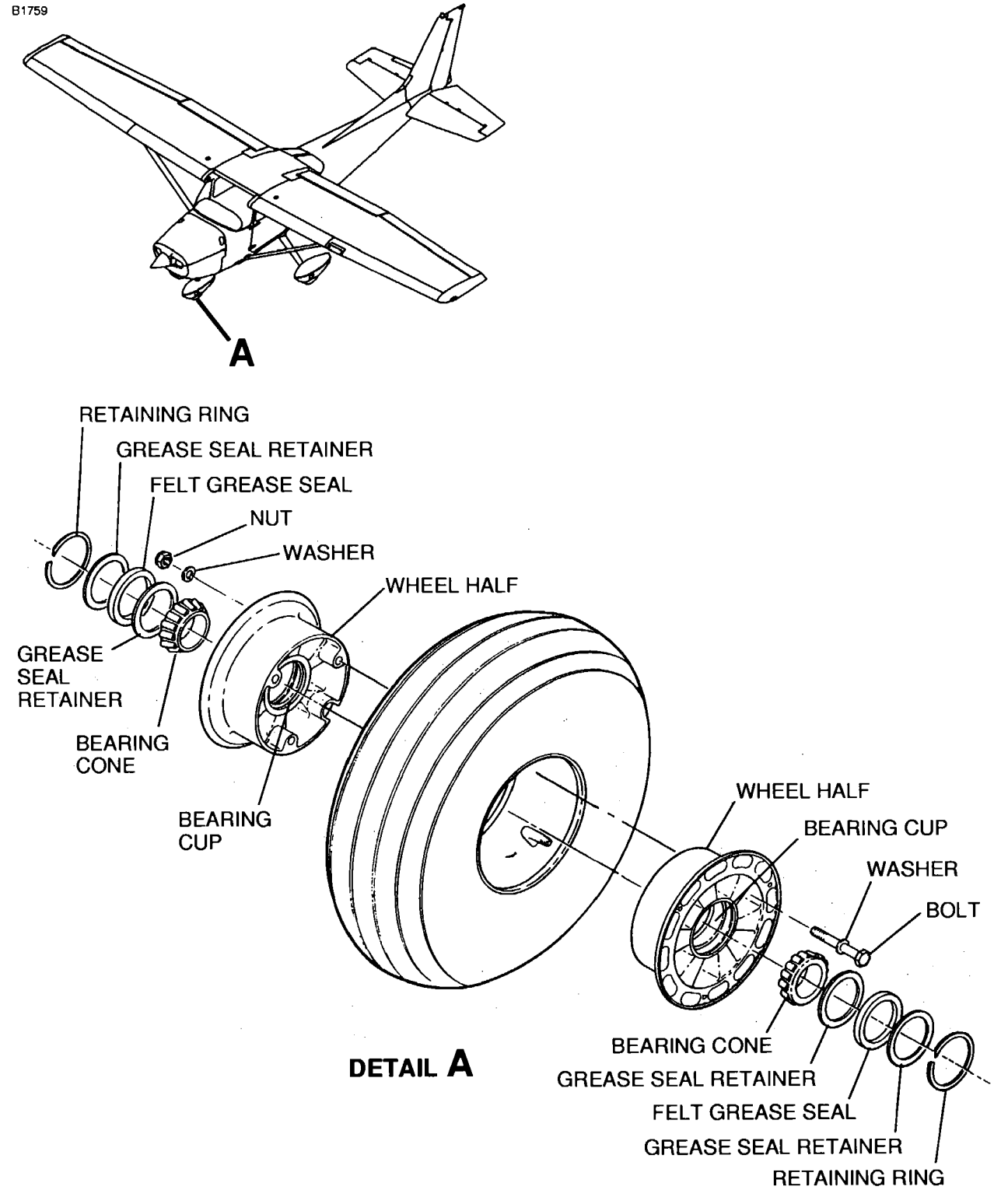

Nose Landing Gear Wheel Assembly
Figure 201 (Sheet 1)

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(6) Set the other wheel half into the other side of the tire and tube.
  (a) Make sure to align the valve stem in the valve slot.
(7) Make sure the tube is not pinched between the wheel halves before you tighten the nuts.

CAUTION: MAKE SURE THE NUTS HAVE THE CORRECT TORQUE. THE BOLTS CAN CAUSE DAMAGE TO THE WHEEL IF THE NUTS DO NOT HAVE THE CORRECT TORQUE.

CAUTION: DO NOT USE IMPACT WRENCHES ON THE BOLTS OR NUTS.

(8) Install the washers and nuts on the bolts.
(9) Tighten the nuts to a dry torque of 90 inch-pounds, +2 or -2 inch-pounds (10.17 N.m, +0.23 or -0.23 N.m).
(10) Inflate the tire to seat the tire beads.
(11) Adjust the air in the tire to the correct pressure.

4. Nose Landing Gear Wheel Inspection/Check

A. Remove the Wheel. Refer to Nose Landing Gear Removal/Installation.

B. Disassemble the Wheel. Refer to Nose Landing Gear Wheel Disassembly/Assembly.

C. Inspect the Wheel (Refer to Figure 201).
(1) Clean all of the metal parts and felt grease seals in Stoddard solvent or equivalent, and dry fully.
(2) Examine the wheel halves for cracks or damage.
(3) Examine the bearing cones, cups, retaining rings, and seals for wear or damage.
(4) Examine the bolts and nuts for cracks in the threads or radius of the bolt heads.
(5) Replace cracked or damaged wheel half.
(6) Replace damaged retaining rings and seals.
(7) Replace any worn or cracked bolts or nuts.
(8) Replace worn or damaged bearing cups or cones.
(9) Remove any corrosion or small nicks with a minimum of 320 grit sandpaper.
(10) Clean and paint repaired areas with a layer of clear lacquer paint. Refer to Chapter 20, Interior and Exterior Finish - Cleaning/Painting.

D. Assemble the wheel. Refer to Nose Landing Gear Wheel Disassembly/Assembly.

E. Install the wheel. Refer to Nose Landing Gear Removal/Installation.

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BRAKES - TROUBLESHOOTING

1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
DRAGGING BRAKES.	Brake pedal binding.	Check and adjust properly. Refer to Brakes - Maintenance Practices.
	Parking brake linkage holding brake pedal down.	Check and adjust properly. Refer to Brakes - Maintenance Practices.
	Worn or broken piston return spring in master cylinder.	Repair, or install new master cylinder. Refer to Brakes - Maintenance Practices.
	Restriction in hydraulic lines or restrictions in compensating port in master cylinder.	Drain brake line and clean inside of brake line with filtered compressed air. If cleaning lines fails to give satisfactory results, the master cylinder may be faulty and should be repaired.
	Worn, scored or warped brake disc.	Install new disc and brake linings. Refer to Brakes - Maintenance Practices.
	Damaged or accumulated dirt restricting free movement of wheel brake parts.	Clean and repair or install new parts as necessary. Refer to Brakes - Maintenance Practices.
BRAKES FAIL TO OPERATE.	Leak in system.	If brake master cylinders or wheel cylinder assemblies are leaking, repair, or install new parts. Refer to Brakes - Maintenance Practices.
	Air in system.	Bleed system. Refer to Brakes - Maintenance Practices.
	Lack of fluid in master cylinders.	Fill and bleed system. Refer to Brakes - Maintenance Practices.
	Defective master cylinder.	Repair or install new parts as necessary. Refer to Brakes - Maintenance Practices.

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BRAKE SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. The hydraulic brake system is comprised of two master cylinders, located immediately forward of the pilot's rudder pedals, brake lines and hoses, and single-disc, floating cylinder brake assemblies located at each main landing gear wheel.

B. The parking brake system is comprised of a pull-type handle and mechanical connections which are linked to the rudder pedal assembly. Pulling aft on the brake handle applies mechanical pressure to the rudder pedals, activating the brakes and locks the handle in place. Turning the handle 90 degrees will release the parking brake and allow for normal operation through the rudder pedals.

C. Brake operation is accomplished by pushing on the upper part of each rudder pedal. This motion is mechanically transmitted to the respective brake master cylinder, and through fluid-carrying lines out to the brake assembly where fluid pressure acts to exert friction (through brake pads) against brake discs.

D. For an illustration of brake system, refer to Figure 201. For an illustration of the brake master cylinder, refer to Figure 202.

2. Brake Line Removal

A. Brake lines in the system are mostly metal, with flexible rubber lines installed near the master cylinders. Rigid lines may be replaced in sections using pre-formed parts available from Cessna. Flexible lines should be inspected for cracks, deterioration wear and damage, and are also available in replacement assemblies through Cessna.

3. Brake Assembly and Line Removal/Installation

A. Remove Brake Assembly (Refer to Figure 201).
(1) Ensure parking brake is OFF.
(2) Disconnect brake line at brake assembly.
(3) Remove bolts securing back plate and remove brake assembly.

NOTE: If torque plate needs to be removed, wheel must be removed from axle. If brake disc is to be removed, the tire and wheel assembly must be removed, deflated and split.

(4) Inspect components. Refer to Brake Component Inspection below.

B. Install Brake Assembly (Refer to Figure 201).
(1) Position brake assembly in place and secure using bolts. Torque from 80 to 90 in-lbs (9.04 to 10.17 N.m).
(2) Reconnect brake line and bleed brakes.

C. Remove Brake Lining (Refer to Figure 201).
(1) Remove back plate.
(2) Pull brake cylinder out of torque plate and slide pressure plate off anchor bolts.
(3) Place back plate on a table with lining side down flat. Center a 9/64-inch (3.58 mm) punch in the roller rivet, and hit the punch sharply with a hammer. Punch out all rivets securing the linings to the back plate and pressure plate in the same manner.

D. Install Brake Lining (Refer to Figure 201).
(1) Install new lining on back and pressure plates. Secure to plates using rivets.
(2) Position pressure plate on anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.
(3) Install back plates with bolts and washers. Torque the nuts to 100 to 140 in-lbs (11.30 to 15.82 N.m).
(4) Burn in brake lining. Refer to procedure below.

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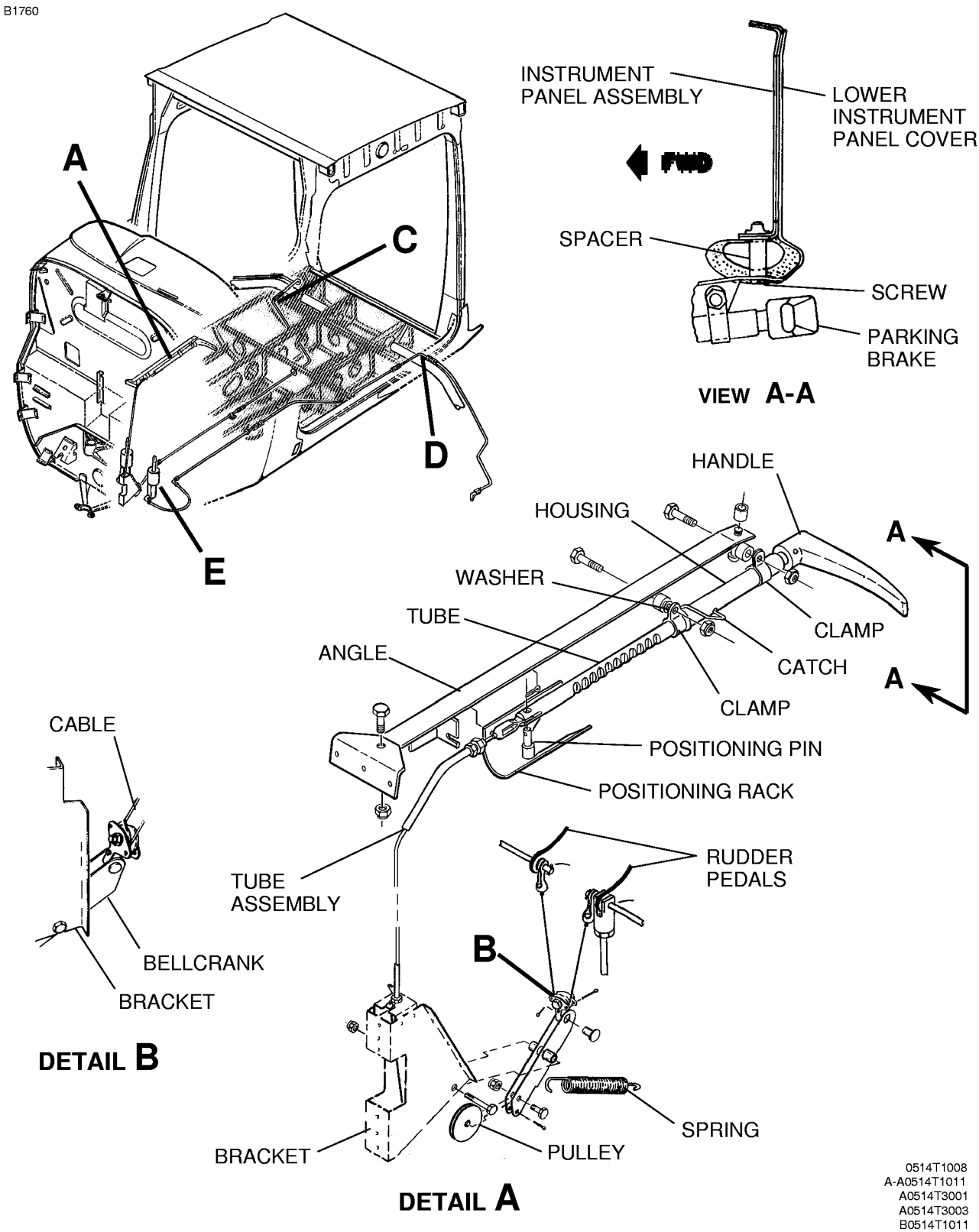

Brake System Installation
Figure 201 (Sheet 1)

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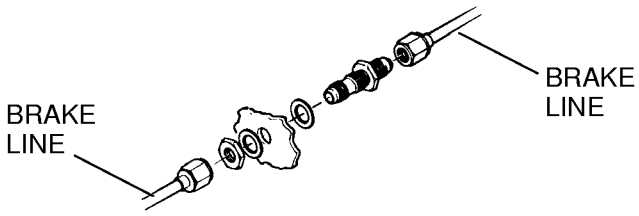
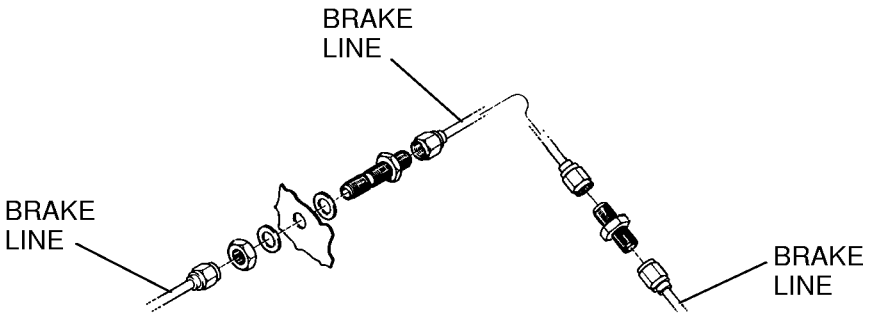
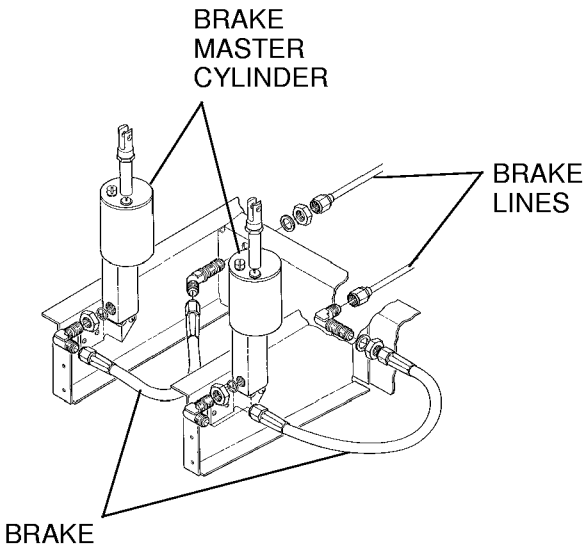


DETAIL C



DETAIL D



DETAIL E

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D0514T1009
E0514T3002

Brake System Installation
Figure 201 (Sheet 2)

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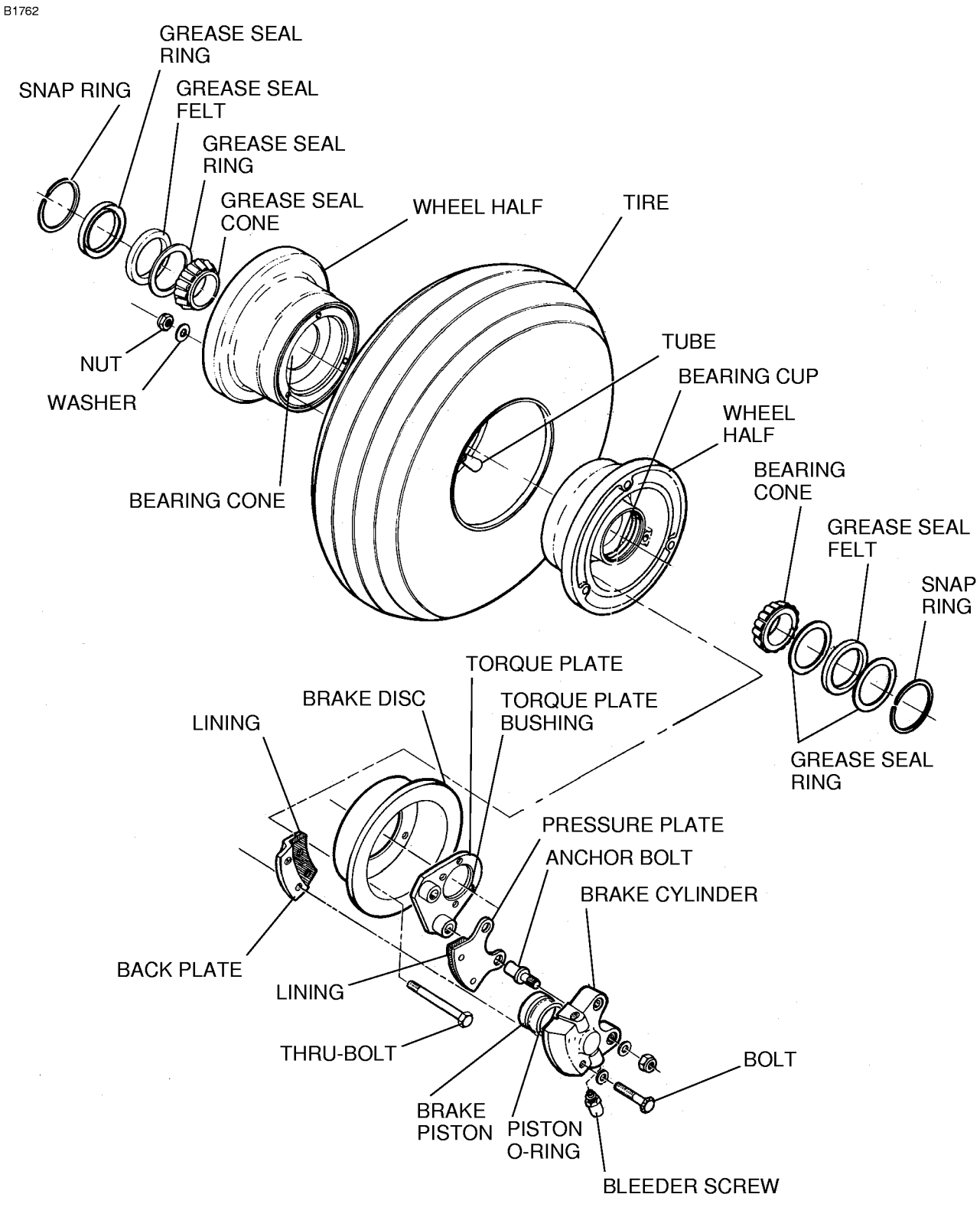

Brake System Installation
Figure 201 (Sheet 3)

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4. Brake Component Inspection

A. Brake components should be inspected as follows:
(1) Clean all parts except brake linings and O-rings in dry cleaning solvent and dry thoroughly.
(2) Install all new O-rings. Ensure all components are clean and lubricated with brake fluid before reinstallation.
(3) Check brake linings for deterioration and wear. Minimum allowable thickness is 3/32-inch (2.39 mm).
(4) Inspect brake cylinder bore for scoring. A scored cylinder will leak or cause rapid O-ring wear. Install a new brake cylinder if the bore is scored.
(5) If the anchor bolts on the brake assembly are nicked or gouged, they must be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are installed, press out old bolts and install new bolts with a soft mallet.
(6) Inspect wheel brake disc for thickness. Minimum thickness is 0.205 inch (5.207 mm).

5. New Brake Lining Conditioning

A. Non-asbestos organic lining:
(1) Taxi airplane for 1500 feet (457.2 m) with engine at 1700 RPM, applying brake pedal force as needed to develop a 5 to 9 knots (9.3 to 16.7 km/hr) taxi speed.
(2) Allow brakes to cool for 10 to 15 minutes.
(3) Apply brakes and check to see if a high throttle static run up may be held with normal pedal force. If so, burn-in is completed.
(4) If static run up cannot be held, allow brakes to completely cool then repeat steps 1 through 3 as needed to successfully hold.

B. Iron-based metallic lining:
(1) Perform two consecutive full stop braking applications from 30 to 35 knots (55.6 to 64.8 km/hr). Do not allow the brake discs to cool substantially between stops.

NOTE: Light brake usage can cause the glaze to wear off, resulting in reduced brake performance. In such cases, the lining may be conditioned again following the instructions set forth in this conditioning procedure.

6. Master Cylinder Removal/Disassembly/Installation

A. Remove Master Cylinder (Refer to Figure 201).
(1) Remove front seats and rudder bar shield to access the brake master cylinders.
(2) Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake cylinders.
(3) Disconnect parking brake and disconnect brake master cylinders from rudder pedals. Disconnect hydraulic hose from brake master cylinders and remove cylinders.
(4) Plug or cap hydraulic fittings, hose and lines to prevent entry of foreign material.

B. Disassemble Master Cylinder (Refer to Figure 202).
(1) Unscrew clevis and nut from piston.
(2) Remove filler plug.
(3) Unscrew cover and remove from piston.
(4) Remove piston and spring.
(5) Remove packing and back-up ring from piston.

C. Inspect and Repair Master Cylinder.
(1) Repair is limited to installation of new parts and cleaning. Use clean hydraulic fluid as a lubricant during reassembly of the cylinders. Replace packing and back-up ring. Filler plug must be vented so pressure cannot build up during brake operation. If plug is not vented, drill a 1/16-inch (1.6 mm) hole, 30 degrees from vertical. Refer to Figure 202, View A-A for vent location.

D. Reassemble Master Cylinder (Refer to Figure 202).
(1) Install spring in cylinder body.
(2) Install back-up ring and packing in groove of piston.
(3) Install piston in cylinder body. Install cover over piston and screw cover into cylinder body.

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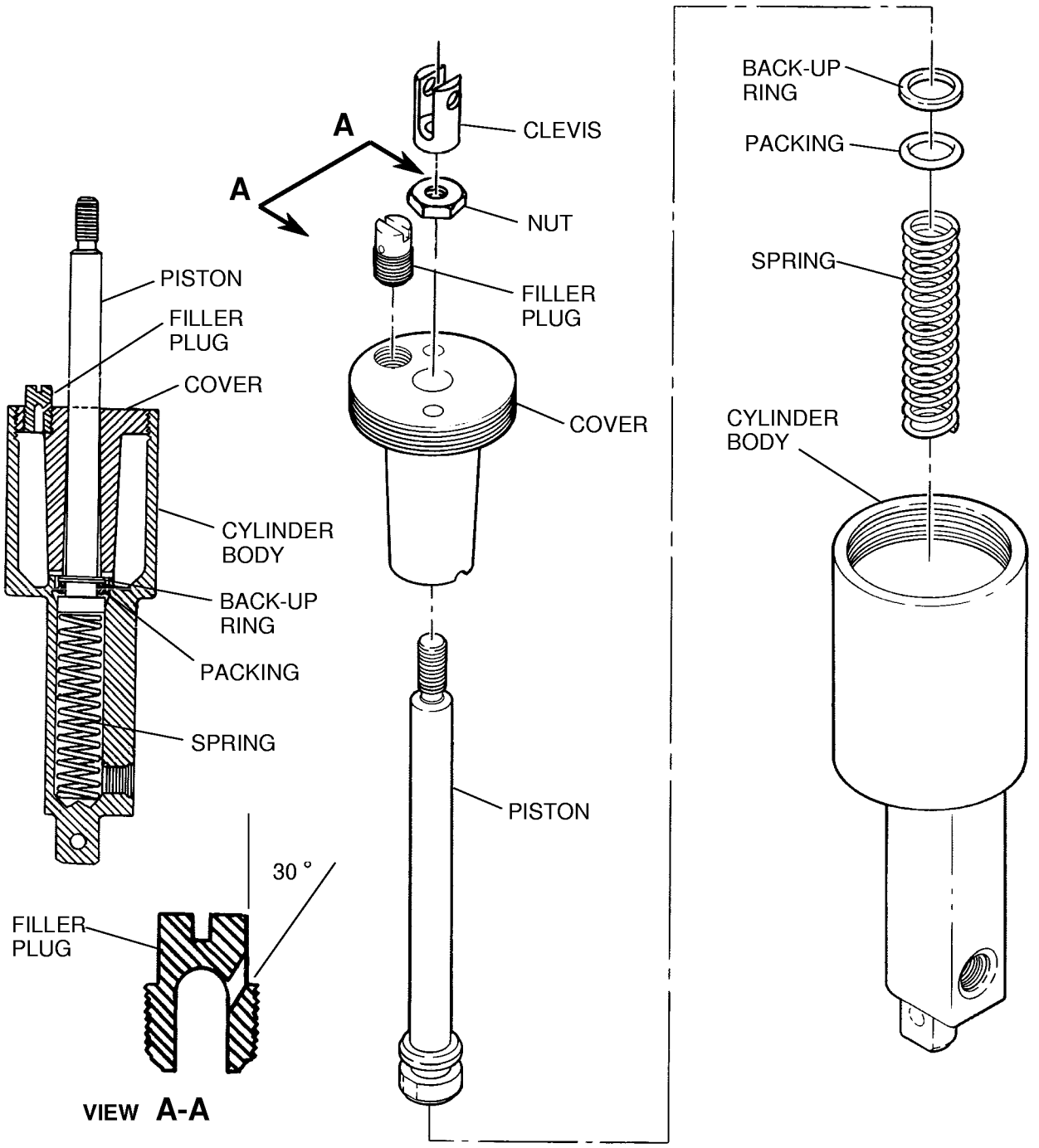

0514T1012
A-A0514T1012

Brake Master Cylinder
Figure 202 (Sheet 1)

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(4) Install nut and clevis on piston.
(5) Install filler plug. Ensure vent hole is open.

E. Install Master Cylinder (Refer to Figure 201).
(1) Connect hydraulic hoses to brake master cylinders and install cylinders.
(2) Connect brake master cylinders to rudder pedals and connect parking brake linkage.
(3) Install bleeder screw at wheel brake assembly.
(4) Fill and bleed brake system. Refer to Brake System Bleeding below.

WARNING: ENSURE SEAT IS POSITIONED CORRECTLY ON SEAT RAILS AND THAT SEAT STOPS ARE PROPERLY INSTALLED.

(5) Install seat and rudder bar shield.

7. Brake System Bleeding

A. Bleeding Procedures.
(1) Remove brake master cylinder filler plug.
(2) Screw flexible hose with appropriate fitting into the filler hole.
(3) Immerse opposite end of flexible hose in a container with enough hydraulic fluid to cover the end of the hose.
(4) Connect a clean hydraulic pressure source to the bleeder valve in the wheel cylinder.
(5) Pump clean hydraulic fluid into the system. Observe the immersed end of the hose at the master brake cylinder for evidence of air bubbles being forced from the brake system. When bubbling has ceased, all air has been removed from system.
(6) Close bleeder valve at wheel cylinder and tighten. Remove pressure source from wheel cylinder bleeder valve. Remove flexible hose from master cylinder filler hose.
(7) Reinstall filler plug on master cylinder.
(8) Test system and ensure brakes are operating properly.

8. Parking Brake System

A. Figure 201, Detail A may be used as a guide in removal and installation of parking brake components.

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CHAPTER

33

LIGHTS

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LIGHTING - GENERAL

1. Scope

A. This chapter provides information on internal and external lighting.

2. Definition

A. This chapter is divided into section and subsections to assist maintenance personnel in locating specific components and information. Consulting the Table of Contents will further assist in locating a particular subject.

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FLOOD LIGHTING - MAINTENANCE PRACTICES

1. General

A. Cabin flood lighting is mounted in the aft and the forward parts of the overhead console. Each flood light has a switch. The forward and the aft lights are reading lights.

2. Floodlight Bulb Removal/Installation

CAUTION: The floodlight bulb can break if you apply too much pressure when you remove and install it.

A. Floodlight Bulb Removal (Refer to Figure 201).
   (1) Press the lens holder up and turn it counterclockwise.
   (2) Remove the lens holder.
   (3) Carefully push the bulb up and turn it counterclockwise.
   (4) Remove the bulb.

B. Floodlight Bulb Installation (Refer to Figure 201).
   (1) Put the bulb in position.
   (2) Carefully push the bulb up and turn it clockwise.
   (3) Put the lens in position.
   (4) Push the lens holder up and turn it clockwise.

3. Light Assembly Removal/ Installation

A. Light Assembly Removal (Refer to Figure 201).

NOTE: Removal/Installation is typical for all three floodlights.

(1) Put the ALT/BAT MASTER switch in the off position.

CAUTION: Support the overhead console when you remove the screws to prevent damage to the electrical wiring in the overhead console.

(2) Remove the screws that attach the overhead console to the attach brackets.
(3) Identify, tag, and disconnect the electrical wires from the light assembly.
(4) Remove the light assembly from the overhead console.

B. Light Assembly Installation (Refer to Figure 201).
   (1) Put the light assembly in position.
   (2) Attach the light assembly to the overhead console.
   (3) Connect the electrical wires to the light assembly.
   (4) Attach the overhead console to the attach brackets with the screws.
   (5) Put the ALT/BAT MASTER switch in the ON position.

4. Light Assembly Switch Removal/Installation

A. Light Assembly Switch Removal (Refer to Figure 201).
   (1) Put the ALT/BAT MASTER switch in the off position.

CAUTION: Support the overhead console when you remove the screws to prevent damage to the electrical wiring in the overhead console.

(2) Remove the overhead console from the attach brackets.
(3) Identify, tag, and disconnect the wires from the switch.
(4) Remove the switch from the overhead console.

B. Light Assembly Switch Installation (Refer to Figure 201).
   (1) Install the switch in the overhead console.

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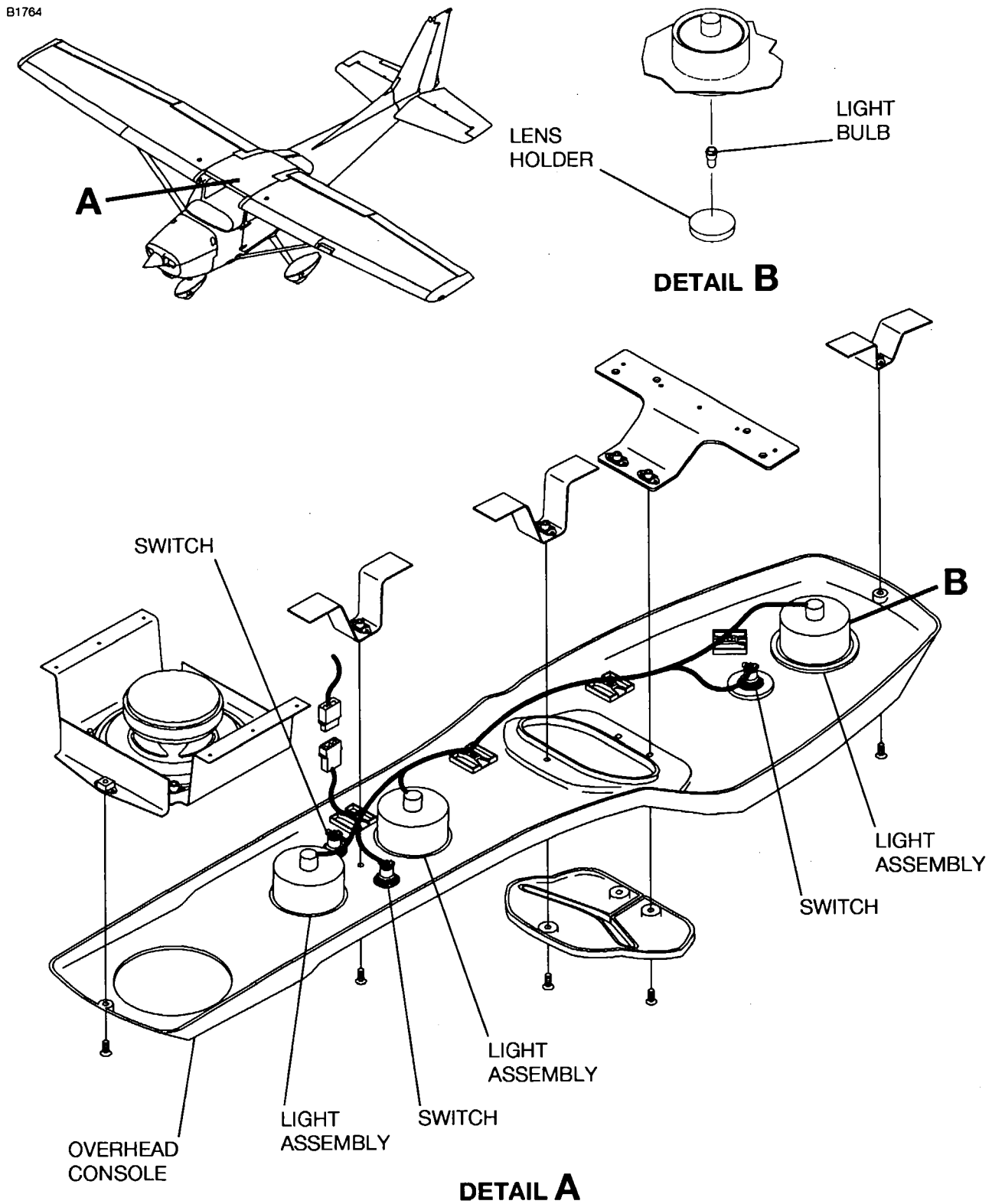

AIRPLANES WITHOUT GARMIN G1000

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A0519T1050

Flood Light Installation
Figure 201 (Sheet 1)

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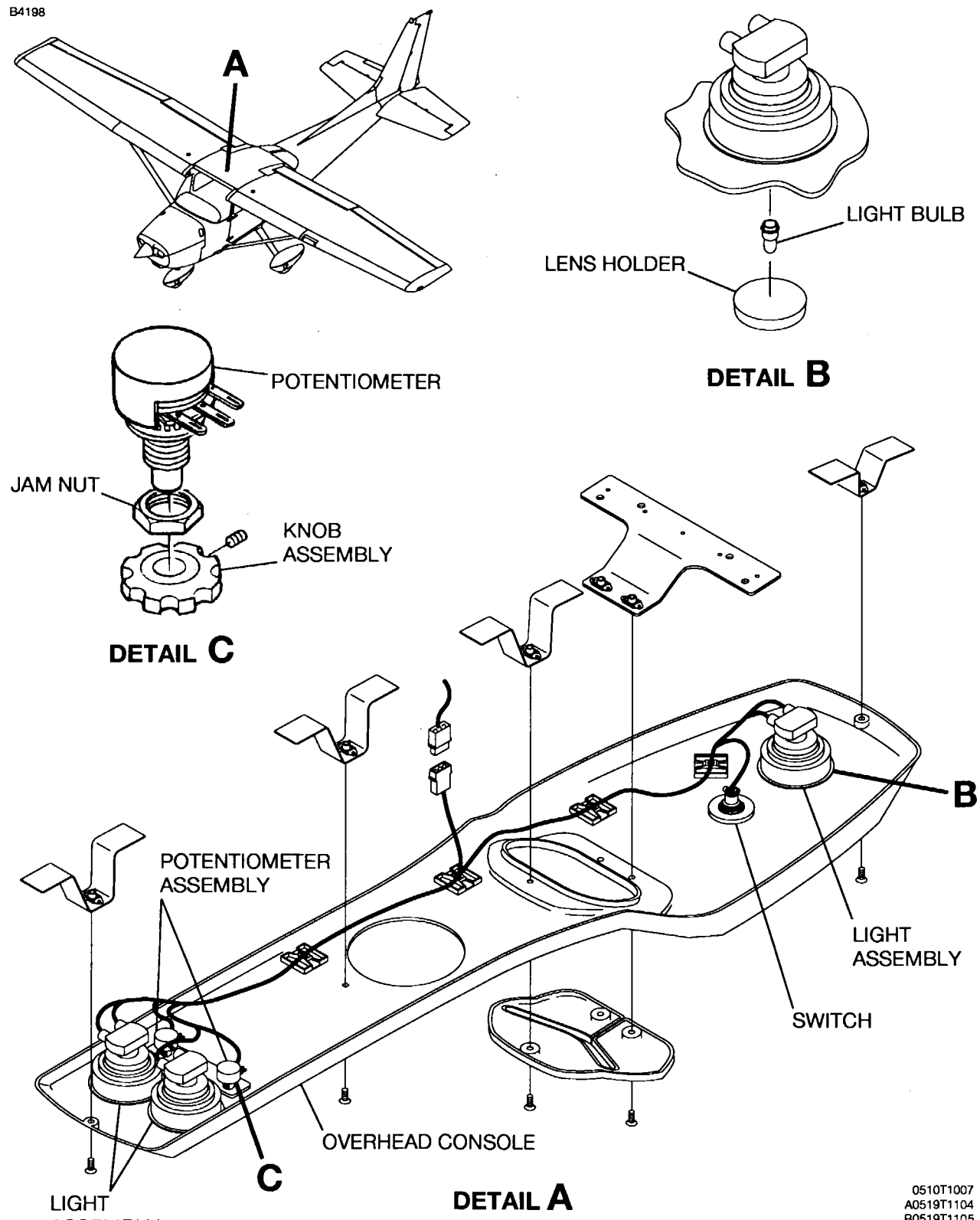

AIRPLANES WITH GARMIN G1000

Flood Light Installation
Figure 201 (Sheet 2)

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(2) Connect the electrical wires to the switch.
(3) Attach the overhead console to the attach brackets with the screws.
(4) Put the ALT/BAT MASTER switch in the ON position.

5. Potentiometer Removal/Installation

A. Potentiometer Removal (Refer to Figure 201).
(1) Put the ALT/BAT MASTER switch in the off position.

CAUTION: Support the overhead console when you remove the screws to prevent damage to the electrical wiring in the overhead console.

(2) Remove the overhead console from the attach brackets.
(3) Identify, tag, and disconnect the wires from the switch.
(4) Remove the knob assembly and the jam nut from the potentiometer.
(5) Remove the potentiometer from the overhead console.

B. Potentiometer Installation (Refer to Figure 201).
(1) Install the jam nut and the knob assembly.
(2) Connect the electrical wires to the potentiometer.
(3) Attach the overhead console to the attach brackets with the screws.
(4) Put the ALT/BAT MASTER switch in the ON position.

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GLARESHIELD LIGHTING - MAINTENANCE PRACTICES

1. General

A. A single white neon tube installed under the glareshield provides overall lighting for the instrument panel. A glareshield dimming control is mounted below and to the left of the throttle.

2. Glareshield Light Removal/Installation

A. Remove Glareshield Light (Refer to Figure 201).
(1) Remove glareshield.
(2) Disconnect glareshield electrical connector.
(3) Remove glareshield light lens.
(4) Remove light tube from individual retainers.

B. Install Glareshield Light (Refer to Figure 201).
(1) Secure light tube with individual retainers.
(2) Install glareshield light lens.
(3) Connect glareshield electrical connector.
(4) Install glareshield.

3. Glareshield Light Power Supply Removal/Installation

A. Remove Glareshield Light Power Supply (Refer to Figure 201).
(1) Remove electrical connector from power supply.
(2) Remove screws securing power supply to back of instrument panel.

B. Install Glareshield Light Power Supply (Refer to Figure 201).
(1) Secure power supply to back of instrument panel with screws.
(2) Connect electrical connector to power supply.

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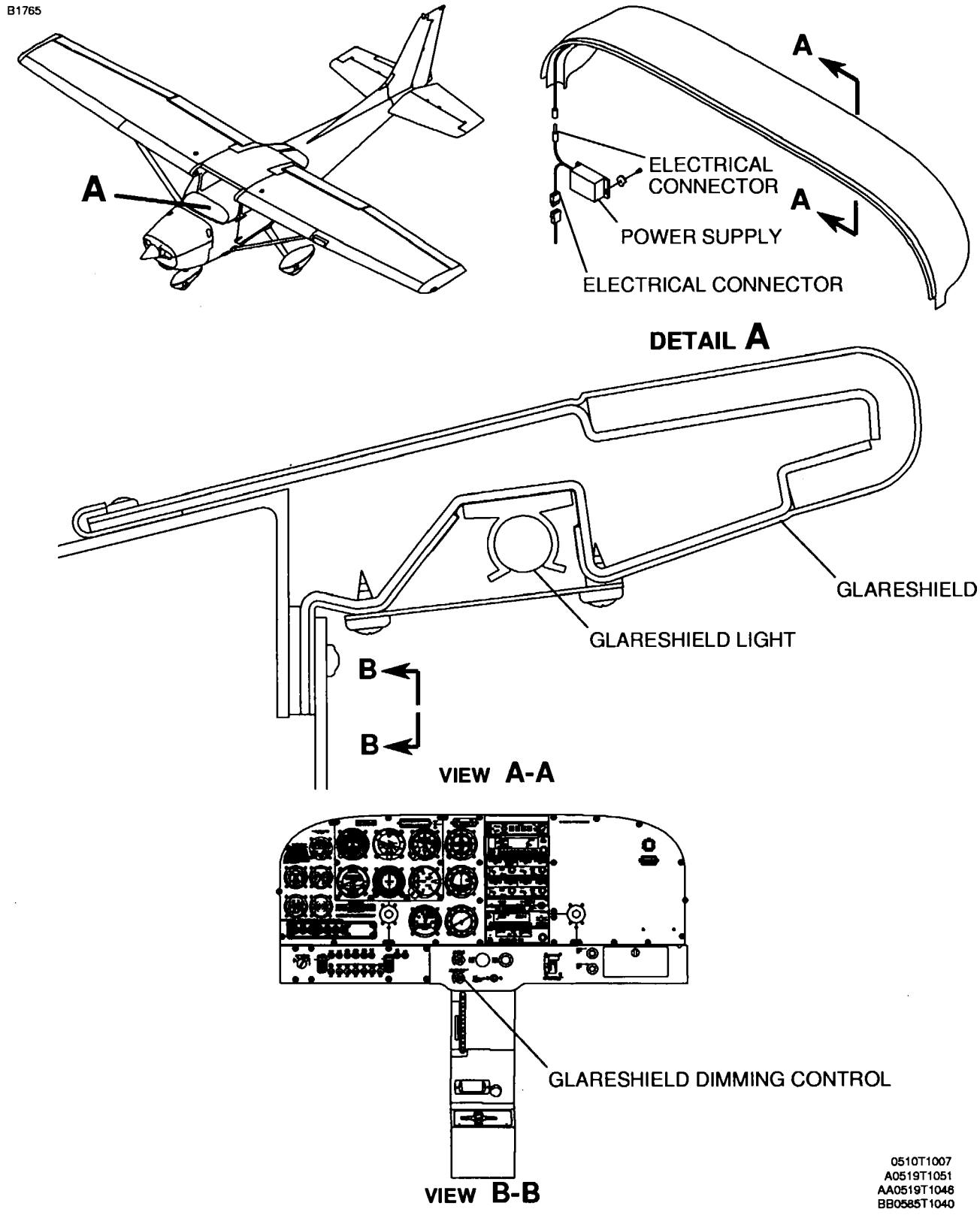

Glareshield Lighting Installation
Figure 201 (Sheet 1)

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PEDESTAL LIGHTING - MAINTENANCE PRACTICES

1. General

A. A single bulb-type light is installed on the pedestal. This light provides illumination of the fuel selector.

2. Pedestal Light Bulb Replacement

A. Replace Pedestal Light (Refer to Figure 201).
   (1) Remove screws securing light hood to pedestal.
   (2) Replace pedestal light bulb.
   (3) Secure light hood to pedestal.

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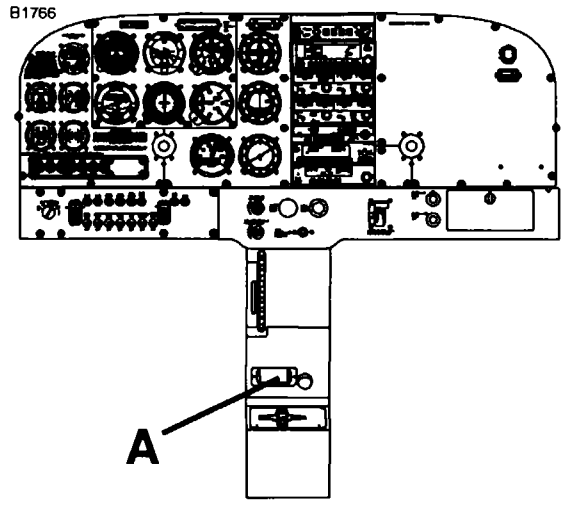

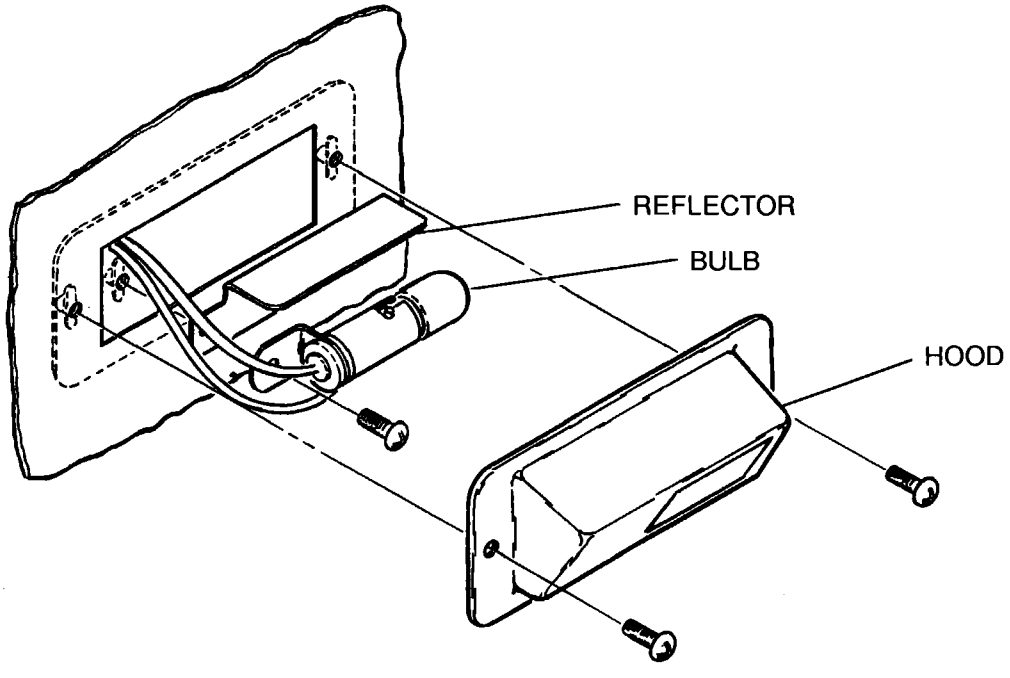

DETAIL A

0585T1040
A0518T1012

Pedestal Lighting Installation
Figure 201 (Sheet 1)

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INSTRUMENT LIGHTING - MAINTENANCE PRACTICES

1. General

A. The flight instruments individually light by a replaceable light bar assembly. The light bar assembly is at the top of the instrument. Engine instruments are individually lighted by replaceable light bulb assemblies. Both flight and engine instruments are operated by a dimming control unit.

2. Flight Instrument Light Bar Assembly

A. Remove the Flight Instrument Light Bar Assembly (Refer to Figure 201).
   (1) Remove the applicable flight instrument.
   (2) Remove the screws that attach the light bar assembly to the flight instrument.

B. Install the Flight Instrument Light Bar Assembly (Refer to Figure 201).
   (1) Replace the light bar assembly.
   (2) Install the flight instrument.

3. Engine Instrument Light Bulb Assembly

A. Remove the Engine Instrument Light Bulb Assembly (Refer to Figure 201).

   NOTE: The engine instrument light bulb assembly is on the forward side of the engine instrument.

   (1) Remove the applicable engine instrument.
   (2) Turn the light bulb assembly one-quarter turn.
   (3) Remove the light bulb assembly from the engine instrument.

B. Install the Engine Instrument Light Bulb Assembly (Refer to Figure 201).

   NOTE: The engine instrument light bulb assembly is on the forward side of the engine instrument.

   (1) Put the light bulb assembly in position.
   (2) Turn the light bulb assembly one quarter turn to attach to the engine instrument.
   (3) Install the engine instrument.

4. Dimming Assembly Removal/Installation

A. Remove the Dimming Assembly (Refer to Figure 201).
   (1) Remove the screws that attach the dimming assembly (ZC001) to the structure.
   (2) Disconnect the dimming assembly electrical connector (P1).
   (3) Remove the dimming assembly.

B. Install the Dimming Assembly (Refer to Figure 201).
   (1) Connect the dimming assembly electrical connector (P1).
   (2) Attach the dimming assembly (ZC001) to the structure with screws.

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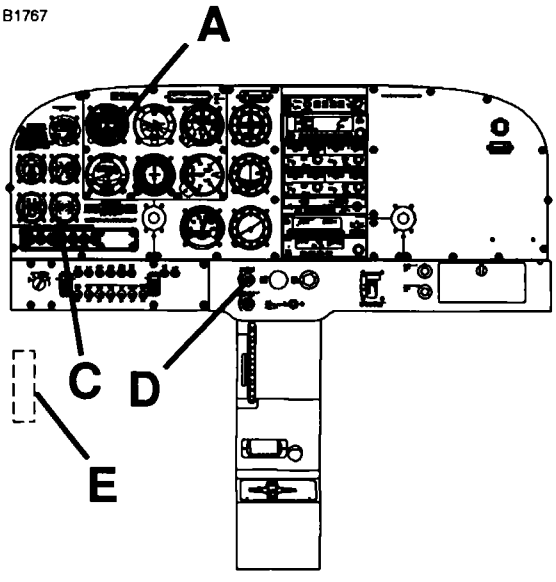
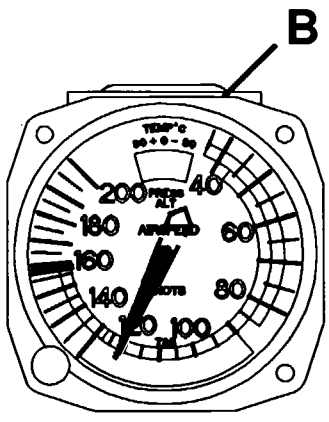
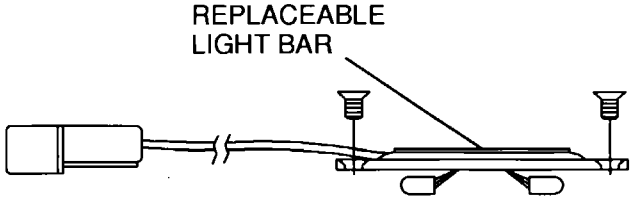
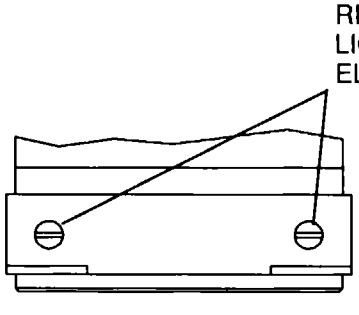




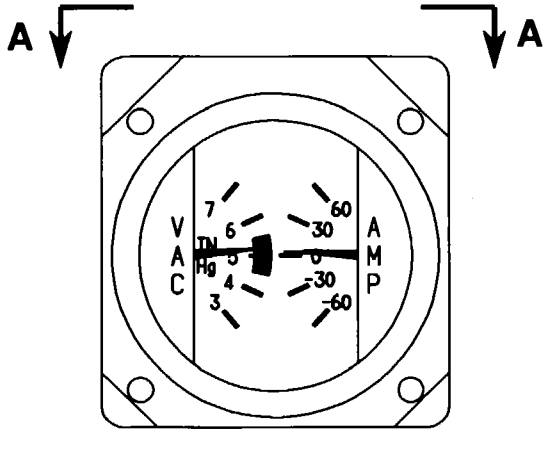
DETAIL A
TYPICAL FLIGHT INSTRUMENT LIGHTING



DETAIL B



VIEW A-A



DETAIL C
TYPICAL ENGINE
INSTRUMENT LIGHTING

0585T1040
A0518T1036
B0518T1036
C0518T1037
AA0518T1037

Instrument Lighting Installation
Figure 201 (Sheet 1)

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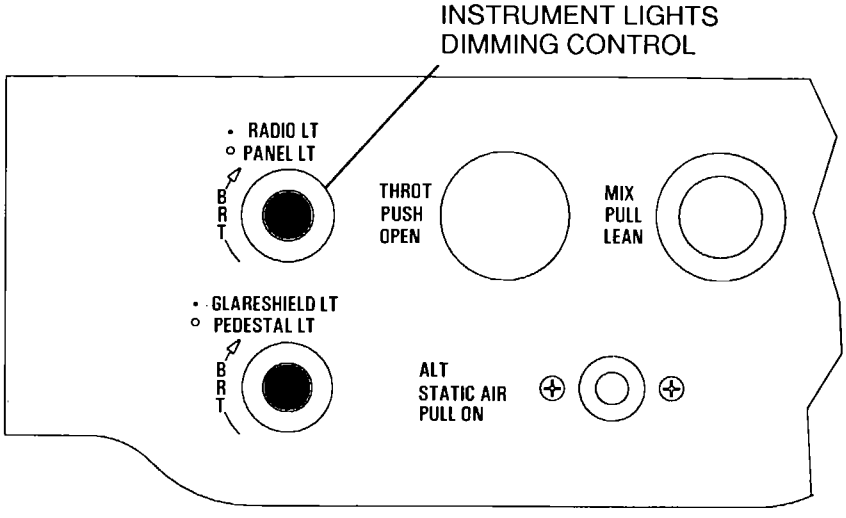
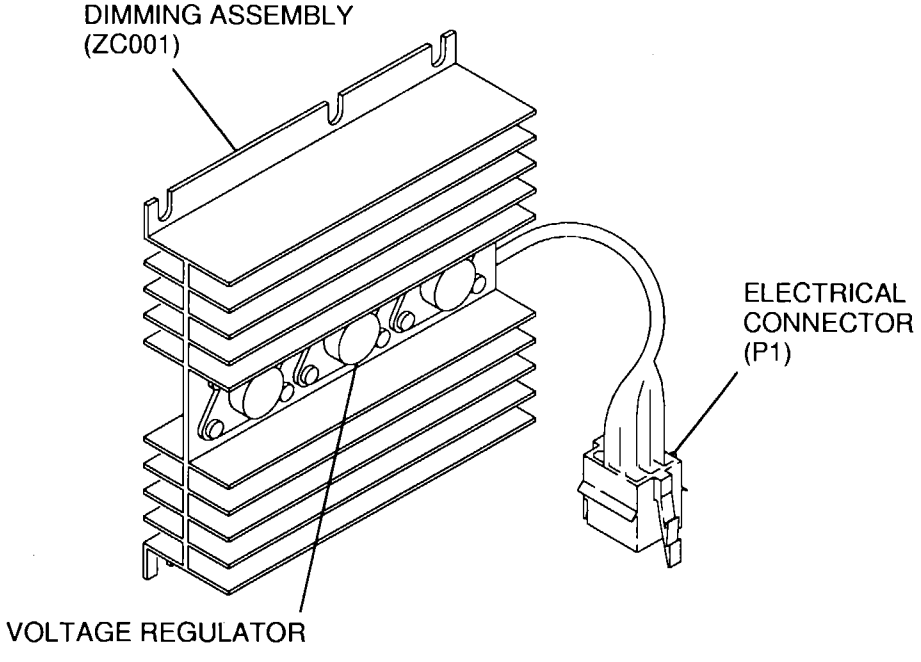


DETAIL E



DETAIL F

E0585T1040
F0518T1039

Instrument Lighting Installation
Figure 201 (Sheet 2)

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RADIO LIGHTING - MAINTENANCE PRACTICES

1. General

A. Radio lighting consists of internally lighted radios, a dimming module and a dimmer control. Maintenance practices include dimming module removal/installation and dimmer control removal/installation.

2. Dimming Module Removal/Installation

A. For Dimming Module Removal/Installation, refer to Instrument Lighting - Maintenance Practices, located in this chapter.

3. Dimmer Control Removal/Installation

A. Remove Dimmer Control (Refer to Figure 201).
   (1) Remove nut securing dimmer control to back of instrument panel.
   (2) Label and de-solder wires connected to dimmer control.
   (3) Remove dimmer control.

B. Install Dimmer Control (Refer to Figure 201).
   (1) Solder proper pins to existing labeled wires as prepared in paragraph 3.A.(2).
   (2) Place dimmer control through hole in instrument panel and secure with nut.

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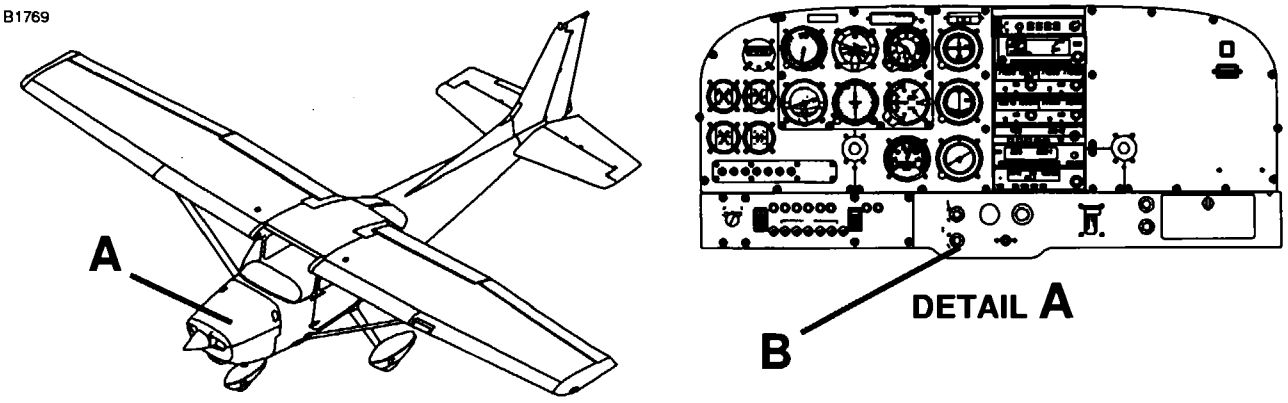

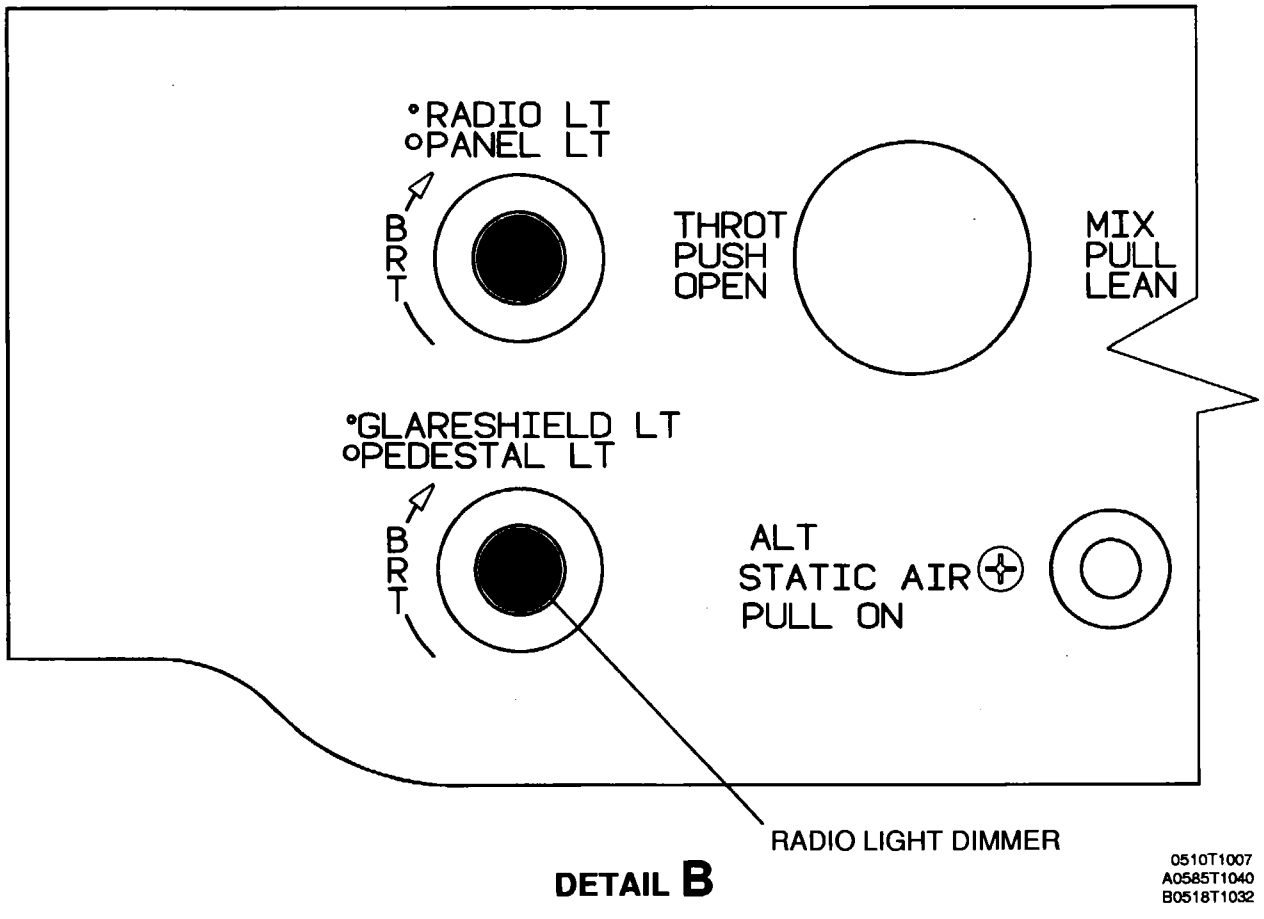

Radio Lighting Installation
Figure 201 (Sheet 1)

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PILOT CONTROL WHEEL LIGHTING - MAINTENANCE PRACTICES

1. General

A. A map light is installed on the lower surface of the pilot's control wheel.

2. Map Light Removal/Installation

A. Remove Map Light (Refer to Figure 201).
   (1) Remove nut and washer securing map light to control wheel.
   (2) Remove map light.

B. Install Map Light (Refer to Figure 201).
   (1) Place map light over control wheel stud and secure with nut and washer.

3. Map Light Rheostat Removal/Installation

A. Remove Map Light Rheostat (Refer to Figure 201).
   (1) Remove thumbwheel and jamnut from rheostat.
   (2) Pull rheostat out of control wheel and remove electrical wires.

B. Install Map Light Rheostat (Refer to Figure 201).
   (1) Connect electrical wires to rheostat and place in control wheel.
   (2) Install jamnut and thumbwheel.

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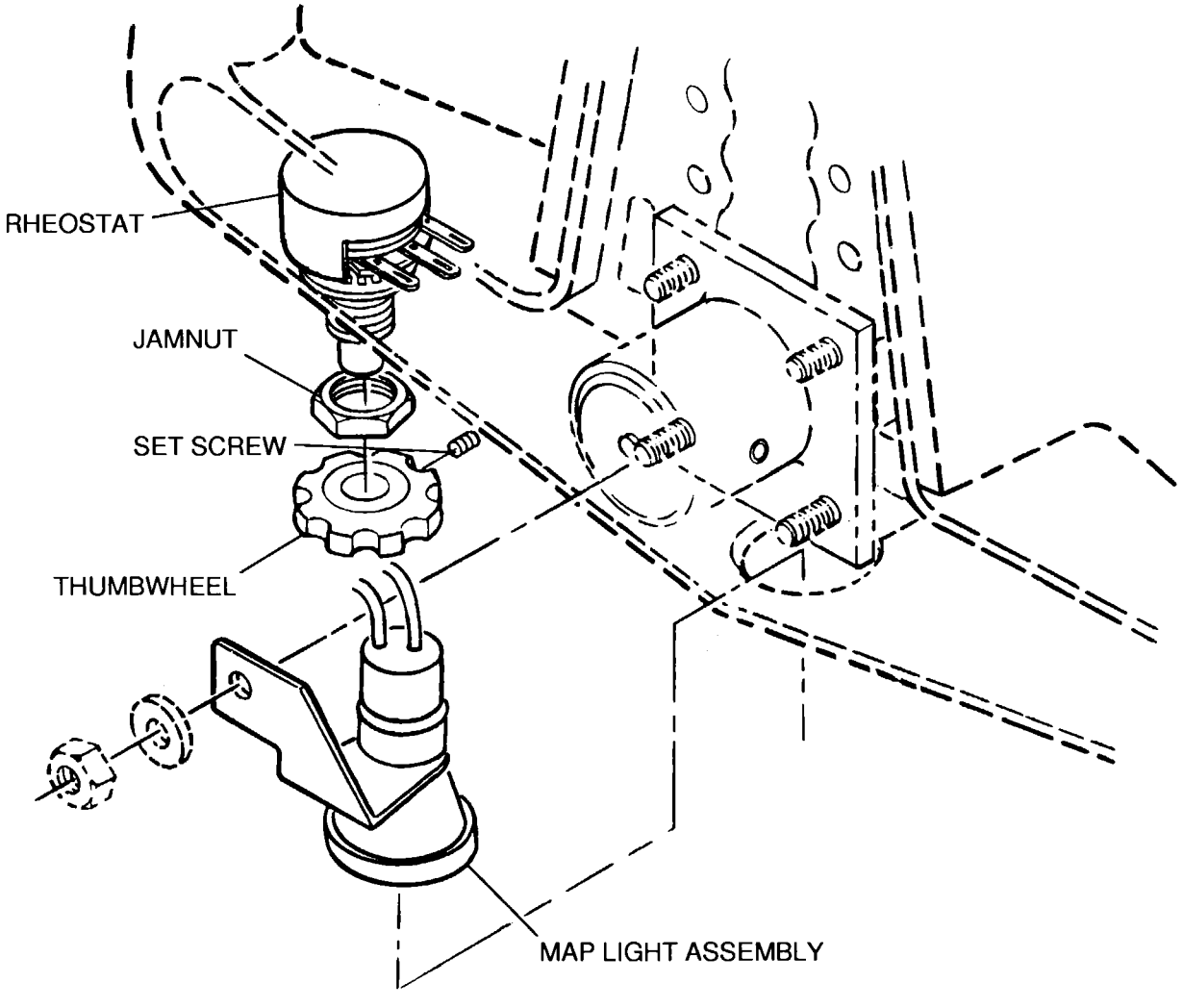

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Control Wheel Lighting Installation
Figure 201 (Sheet 1)

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NAVIGATION AND STROBE LIGHTS - MAINTENANCE PRACTICES

1. Description and Operation

A. The airplane is equipped with both fixed intensity navigation lights and pulsing strobe lights.
   (1) Navigation lights are located on the left wing tip, right wing tip and tailcone. The navigation lights in the wing tip are co-located with the strobe assemblies, and the light in the tailcone is located in its own housing.
      (a) Bulbs for all three navigation lights are clear. The lens assembly on the right wing tip is colored green, the lens assembly on the left wing tip is colored red, and the lens assembly on the tailcone is clear.
      (b) The navigation lights are activated by placing the switch/circuit breaker in the NAV position. This position supplies power concurrently to all three lights.
   (2) Strobe lights are co-located with navigation lights in the wing tip housing.
      (a) The strobe and lens assembly are both clear. The strobes are activated by placing the switch/circuit breaker in the STROBES position. This position supplies power to the right and left power supply, providing pulsed energy to fire the strobes.

2. Navigation Lights Removal/Installation

A. Remove Wing tip Navigation Lights (Refer to Figure 201).

NOTE: Removal is typical for both the left and right bulbs.

   (1) Ensure electrical power to airplane is OFF.
   (2) Remove screws securing lens retainer to wing tip.
   (3) Remove lens from navigation portion of assembly.
   (4) Grasp bulb, depress slightly and turn counterclockwise to release bulb from bayonet mount.

B. Install Wing tip Navigation Lights (Refer to Figure 201).
   (1) Place bulb in bayonet socket, depress, and gently turn clockwise until bulb seats in socket.
   (2) Position lens and gasket in place.
   (3) Secure lens assembly using lens retainer and screws.

C. Remove Tailcone-Mounted Navigation Light (Refer to Figure 201).
   (1) Ensure electrical power to airplane is OFF.
   (2) Remove screws and lens retainer.
   (3) Remove lens to gain access to bulb.
   (4) Grasp bulb, depress slightly and turn counterclockwise to release bulb from bayonet mount.

D. Install Tailcone-Mounted Navigation Light (Refer to Figure 201).
   (1) Place bulb in bayonet socket, depress, and gently turn clockwise until bulb seats in socket.
   (2) Position lens and gasket over bulb.
   (3) Secure using lens retainer and screws.

3. LED Navigation Lights Removal/Installation

A. Remove the LED Wing Tip Navigation Lights (Refer to Figure 201.)
   (1) Make sure the electrical power is off.
   (2) Remove the wing tip.
   (3) Disconnect the electrical connections for the navigation light and strobe light.
   (4) Remove the lens shield from the wing tip.
   (5) Remove the shroud from the light assembly.
   (6) Remove the light assembly.

B. Install the LED Wing Tip Navigation Lights (Refer to Figure 202).
   (1) Install the light assembly.
   (2) Install the shroud on the light assembly.
   (3) Install the lens shield on the wing tip.
   (4) Connect the electrical connections for the navigation light and strobe light.
   (5) Install the wing tip.

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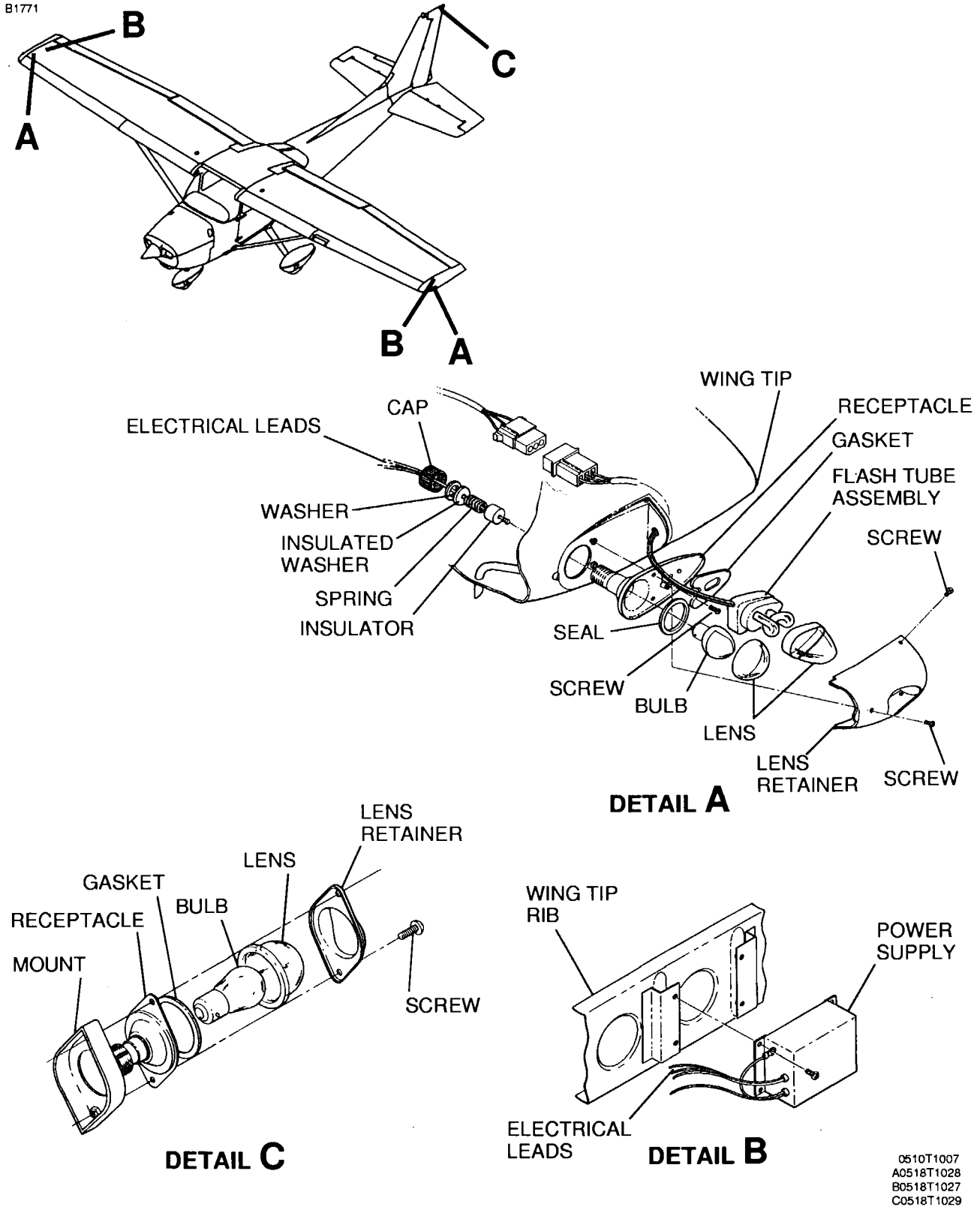

Navigation and Anti-Collision Strobe Light Installation
Figure 201 (Sheet 1)

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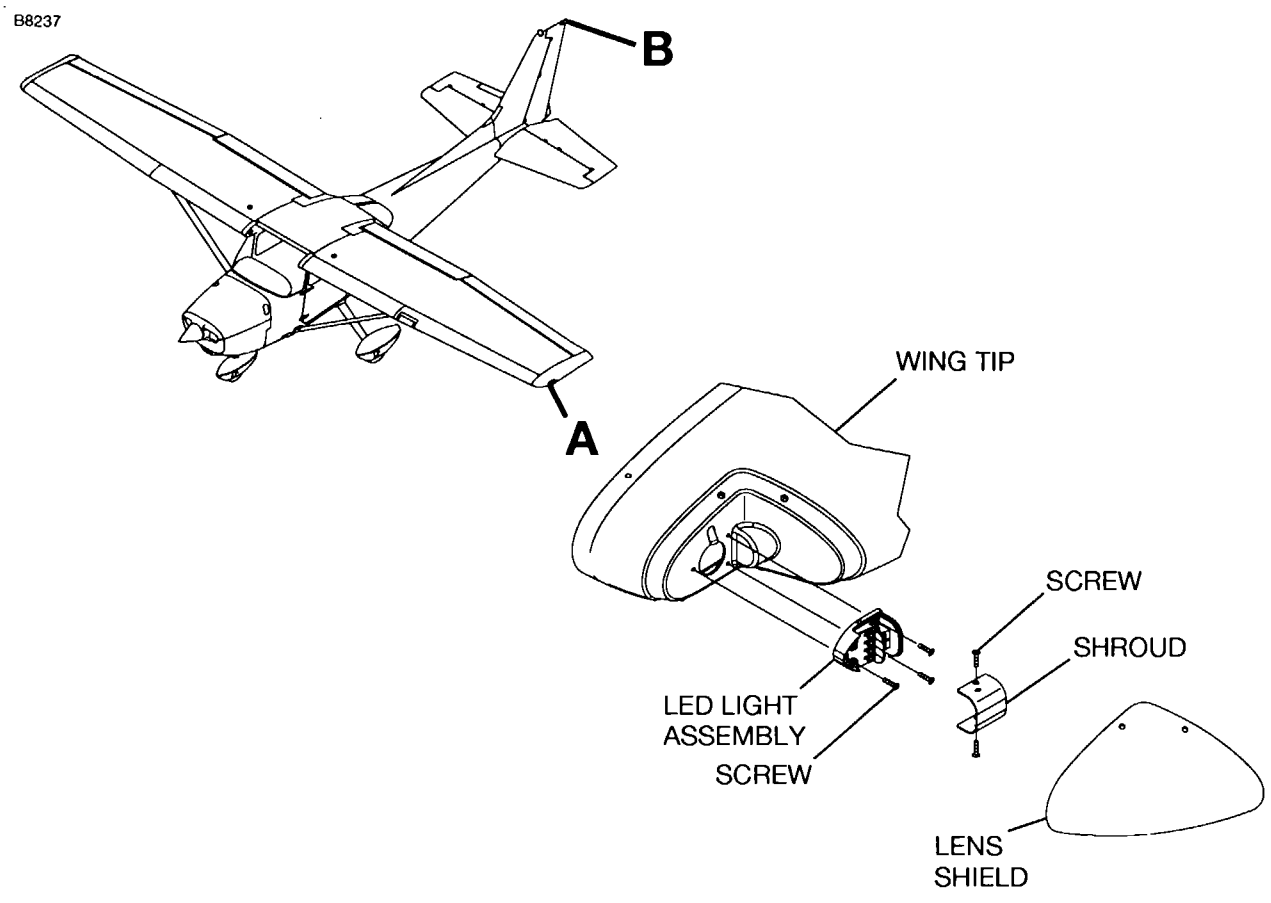
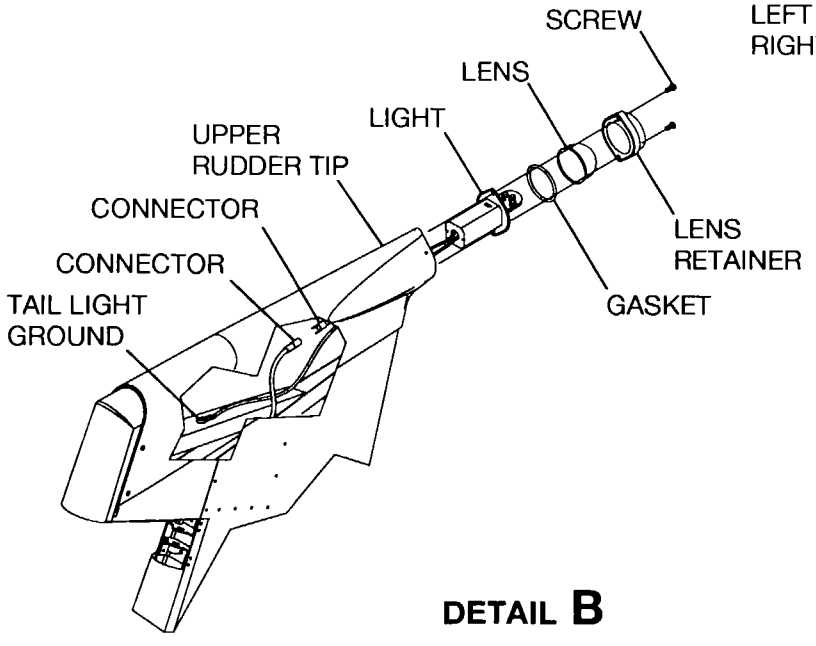


DETAIL A
LEFT SHOWN
RIGHT OPPOSITE



DETAIL B

0510T1007
A0723T1001
B0518T1155

LED Navigation Light Installation
Figure 202 (Sheet 1)

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(6) Make sure the light operates correctly.
  (a) Put the MASTER (BAT only) switch to the ON position.
  (b) Put the LIGHTS NAV/OFF switch to NAV.
  (c) Make sure the light comes on and is the correct color.
  (d) If necessary, replace the light.

C. Remove Tailcone-Mounted Navigation Light (Refer to Figure 202).
(1) Make sure the electrical power is off.
(2) Remove the screws from the upper rudder tip.
(3) Lift the upper rudder tip.
(4) Disconnect the electrical connector.
(5) Remove the screw that attaches the tail light ground.
(6) Remove the screws that attach the light.
(7) Pull the light out of the rudder tip.

D. Install Tailcone-Mounted Navigation Light (Refer to Figure 202).
(1) Put the light in position in the rudder tip.
  (a) Install the screws that attach the light.
(2) Install the screw that attaches the tail light ground.
(3) Connect the electrical connector.
(4) Install the upper rudder tip.
  (a) Install the screws that attach upper rudder tip.
(5) Make sure the light operates properly.
  (a) Put the MASTER (BAT only) switch to the ON position.
  (b) Put the LIGHTS NAV/OFF switch to NAV.
  (c) Make sure the light comes on.
  (d) If necessary, replace the light.

4. Strobe Lights Removal/Installation

A. Remove Strobe Light Assembly (Refer to Figure 201).

NOTE: Removal/installation is typical for both the FR003 right strobe light and FL005 left strobe light.

(1) Ensure electrical power to airplane is OFF.
(2) Remove screws securing lens retainer to wing tip.
(3) Remove lens from in front of flash tube assembly.
(4) Disconnect electrical connector P1 from power supply.

NOTE: It will be necessary to remove wing tip to gain access to electrical connector PI and power supply.

(5) Remove flash tube assembly from wing tip.

B. Install Strobe Light Assembly (Refer to Figure 201).
(1) Install flash tube assembly to wing tip. Use protective gloves or cotton wrap to ensure fingertip oil does not come in contact with flash tube assembly.
(2) Connect electrical connect PI to power supply.
(3) Reinstall wing tip.
(4) Place lens on flash tube assembly.
(5) Secure lens using lens retainer and screws.

C. Remove Power Supply (Refer to Figure 201).

NOTE: Removal and installation is typical for both the UL001 left and UR001 right power supply.

(1) Ensure electrical power to airplane is OFF.
(2) Remove wing tip.
(3) Disconnect electrical connectors from both ends of power supply.

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(4) Remove ground wires as required.
(5) Remove screws securing power supply to wing, and remove power supply from wing.

D. Install Power Supply (Refer to Figure 201).
(1) Secure power supply to wing using screws.
(2) Secure ground wires from power supply to wing structure.
(3) Reconnect electrical connectors.
(4) Install wing tip.
(5) Check strobe for proper operation.

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VERTICAL FIN BEACON - MAINTENANCE PRACTICES

1. Description and Operation

A. The vertical fin beacon is located on top of the vertical fin cap assembly and provides a flashing red light to aid in airplane recognition.

B. Put the LIGHTS BCN/OFF switch to the BCN position to start the flashing beacon. This position supplies power to the light. Internal circuitry makes the light flash on and off at approximately 50 cycles per minute.

2. Beacon Removal/Installation

A. Remove Beacon (Refer to Figure 201).
   (1) Loosen screw on clamp ring assembly.
   (2) Remove lens assembly from base assembly.
   (3) Remove lamp assembly from base.

B. Install Beacon (Refer to Figure 201).
   (1) Install lamp assembly to base.
   (2) Place lens assembly and gasket on base assembly.
   (3) Secure lens assembly to base assembly by tightening clamp ring assembly.

3. LED Beacon Removal/Installation

A. Remove the LED Beacon (Refer to Figure 202).
   (1) Make sure the electrical power is off.
   (2) Remove the screws and washers that attach the lens retainer.
   (3) Remove the lens retainer, lens and lens gasket.
   (4) Remove the screws that attach the beacon.
   (5) Lift the beacon out of the cap assembly.
      (a) Make sure the mounting gasket is removed.
   (6) Disconnect the electrical connector.

B. Install the LED Beacon (Refer to Figure 202).
   (1) Connect the electrical connector.
   (2) Put the beacon in the top of the cap assembly.
      (a) Make sure the mounting gasket is put between the beacon and cap assembly.
   (3) Install the screws that attach the beacon.
   (4) Install the lens gasket, lens, and lens retainer with screws and washers.
   (5) Make sure the beacon operates properly.
      (a) Put the MASTER (BAT only) switch to the ON position.
      (b) Put the BEACON switch to the ON position.
      (c) Make sure the beacon flashes correctly.

      NOTE: During correct operation the beacon will flash at a rate of 45 flashes per minute, +5 or -5 flashes per minute.

      (d) If necessary, replace the beacon.
   (6) Make sure electrical power is off.

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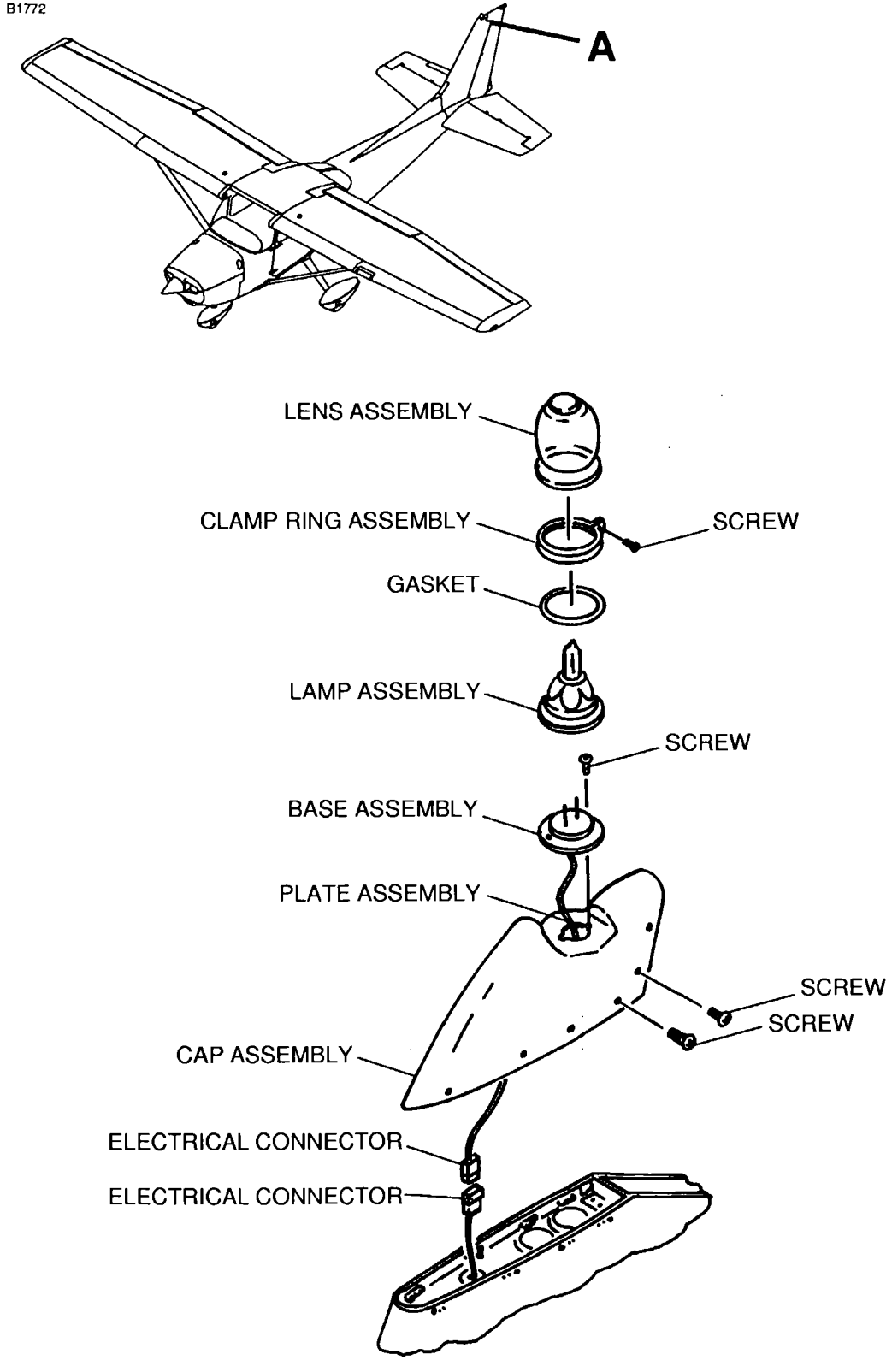

Flashing Beacon Light Installation
Figure 201 (Sheet 1)

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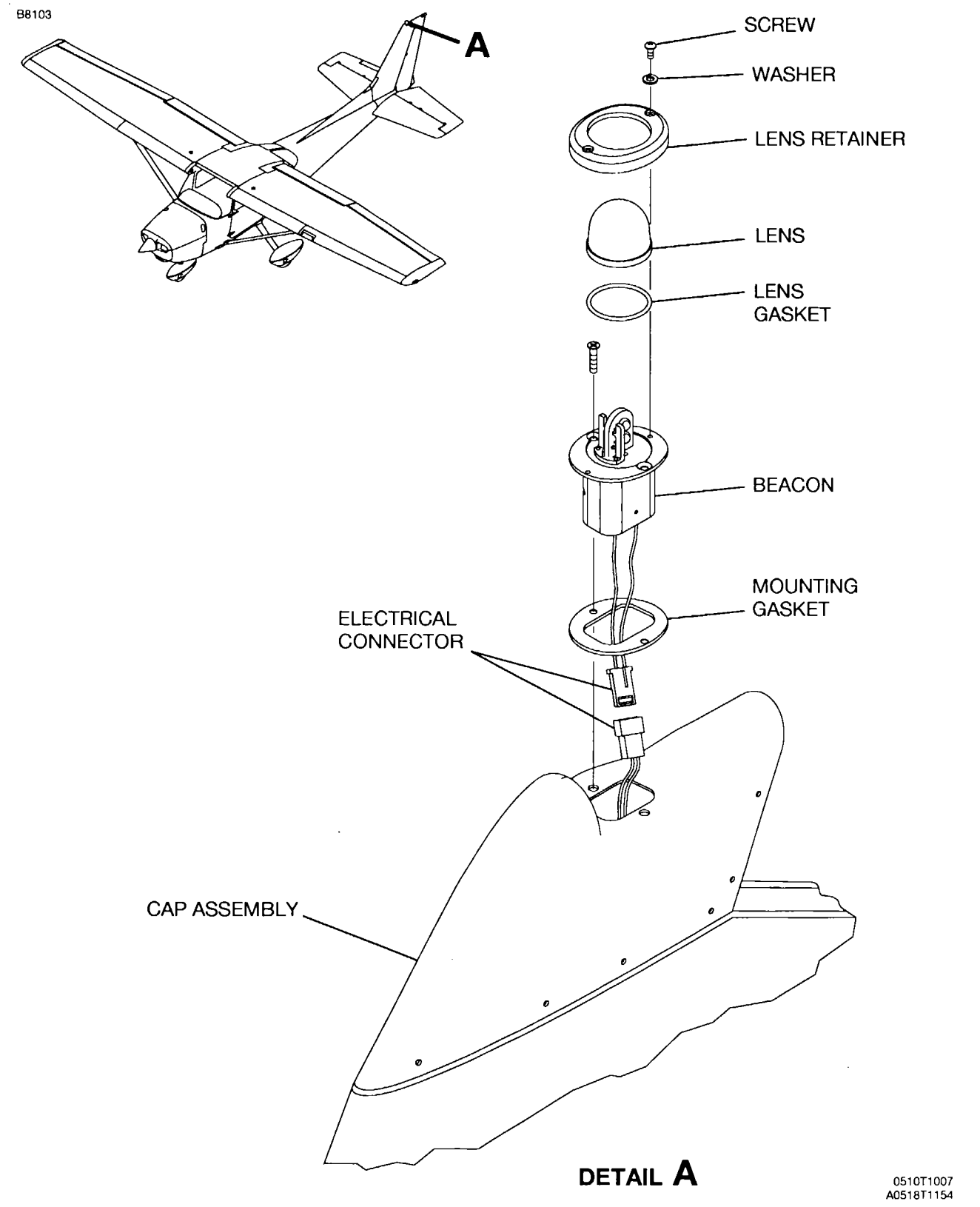

LED Flashing Beacon Light Installation
Figure 202 (Sheet 1)

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LANDING/TAXI LIGHTS - TROUBLESHOOTING

1. High-Intensity Discharge (HID) Landing and Taxi Lights Troubleshooting

A. The troubleshooting flow chart that follows is for Airplanes 17281234 and On and 172S9771 and On, and Airplanes 17280001 thru 17281233 and Airplanes 172S8001 thru 172S9770 incorporating MK172-33-01 that have high-intensity discharge (HID) lighting installed.

NOTE: The troubleshooting procedure is typical for the landing light and taxi light.

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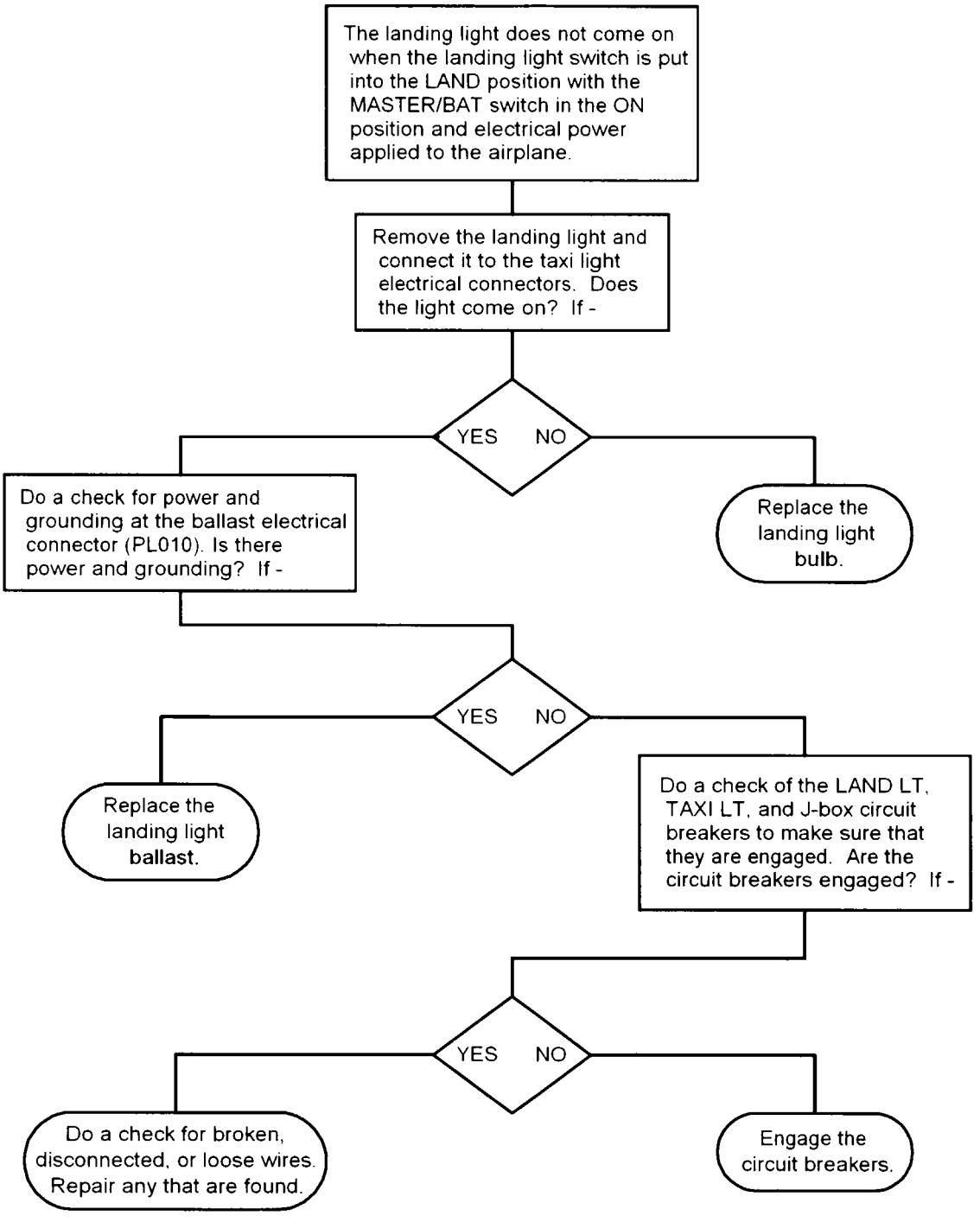

Landing/Taxi Light Troubleshooting
Figure 101 (Sheet 1)

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LANDING/TAXI LIGHTS - MAINTENANCE PRACTICES

1. General

A. Airplanes 17280001 thru 17281233 and Airplanes 172S8001 thru 172S9770 not incorporating MK172-33-01 have an incandescent landing and taxi light installed. The landing and taxi lights are installed on the left wing leading edge between WS 100.00 and WS 118.00. The landing and taxi lights are controlled by two switches on the circuit panel assembly. The landing light is operated by the landing light switch and the taxi light is operated by the taxi light switch.

B. Airplanes 17281234 and On and Airplanes 172S9771 and On, and Airplanes 17280001 thru 17281233 and Airplanes 172S8001 thru 172S9770 incorporating MK172-33-01 have a high-intensity discharge (HID) landing and taxi light installed. The landing and taxi lights have an igniter installed on the back side of each light. A ballast is necessary for the operation of the HID bulbs. The ballast for the landing light HID bulb (inboard bulb) is installed on a bracket that is attached to a wing leading-edge rib inboard of the bulb. The ballast for the taxi light HID bulb (outboard bulb) is installed on a bracket that is attached to a wing leading-edge rib outboard of the bulb. The wiring is almost the same as the incandescent bulb installation, but there is one more cable necessary to connect the ballast to the HID bulbs. The landing and taxi light switches, and the landing and taxi light circuit breakers for the HID lighting system are the same as those for the incandescent lighting system.

2. Troubleshooting

A. For troubleshooting of the HID landing and taxi light installation, refer to Chapter 33, Landing/Taxi Lights - Troubleshooting.

3. Light Adjustment

A. The landing and taxi lights are set to specified positions, but you can adjust them as necessary. The procedures that follow give information on the correct landing and taxi light adjustment procedure. The procedures that follow are typical for incandescent and HID lights.
   (1) Park the airplane on a flat, level surface with the landing and taxi lights in front of a light-reflecting object. Make sure that the waterline of the airplane is level and that the wings are level. Refer to Chapter 8, Leveling - Maintenance Practices.
   (2) Park the airplane so that the distance from the light-reflecting object to the rivet line on the bottom of the front spar is approximately 3 feet.
   (3) Set the landing light switch to the LAND position.
   (4) Measure the distance from the floor to the center of the beam that shines on the light-reflecting object. The correct distance is 74.41 inches.
   (5) Set the landing light switch to the OFF position
   (6) Set the taxi light switch to the TAXI position.
   (7) Measure the distance from the floor to the center of the beam that shines on the light-reflecting object. The correct distance is 73.29 inches.
   (8) Set the taxi light switch to the OFF position.
   (9) To adjust the beam to the correct position, add or remove washers between the spacers and the plate.

4. Light Removal and Installation

NOTE: Removal and installation is typical for incandescent and HID landing and taxi lights.

A. Remove the Light (Refer to Figure 201).
   (1) Disconnect the main battery from the airplane. Refer to Chapter 24, Battery - Maintenance Practices.
   (2) Set the landing light and the taxi light switches to OFF.
   (3) Remove the screws that attach the lens assembly to the leading edge of the wing.
   (4) Remove the screws, brackets, and nuts that hold the light in position against the plate.

NOTE: Some airplanes that have the HID landing and taxi lights have an aluminum ring installed between the HID landing and taxi lights and the bracket.

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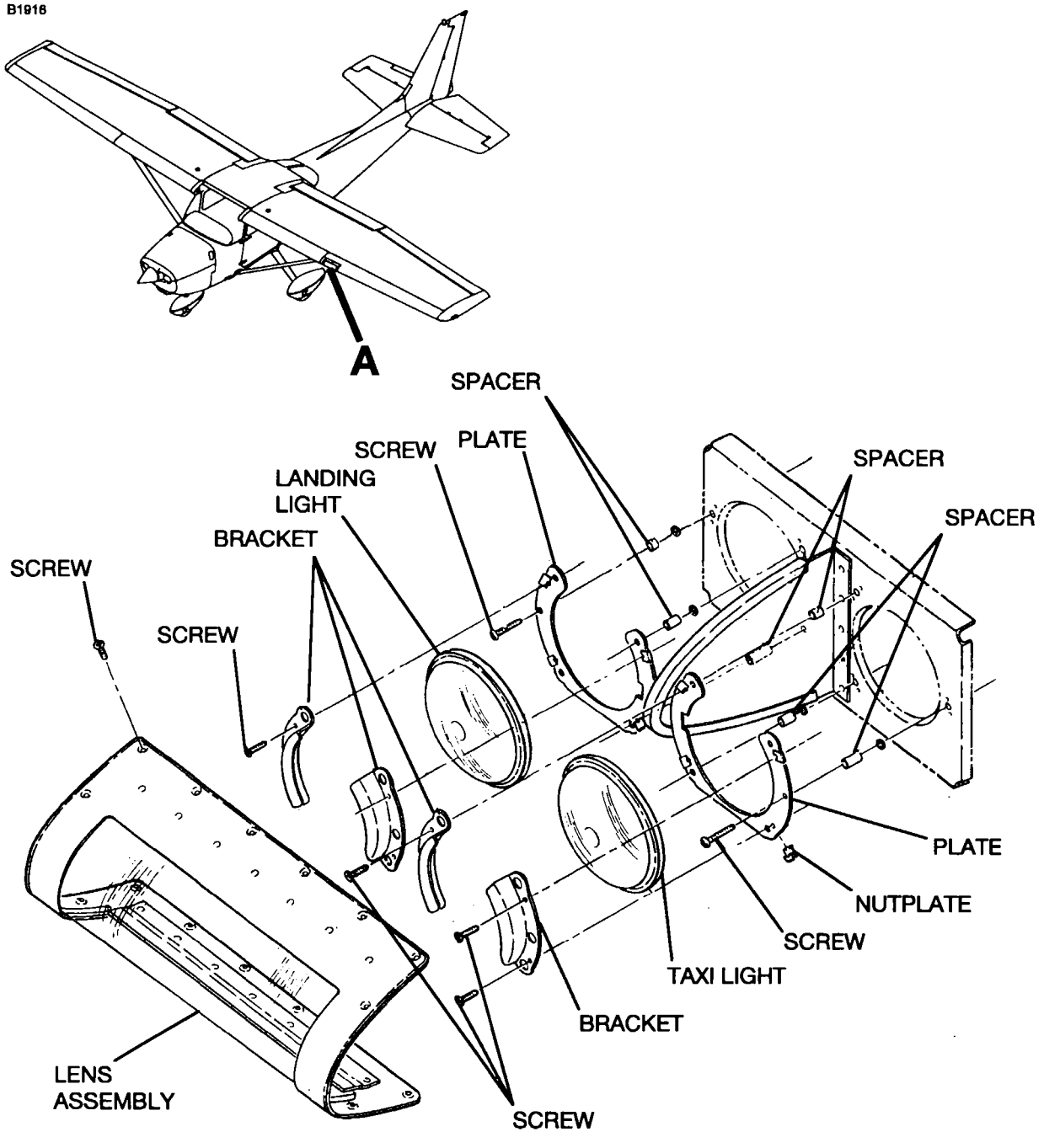

DETAIL A

AIRPLANES 17280001 THRU 17281233 AND
AIRPLANES 172S8001 THRU 172S9770
NOT INCORPORATING MK172-33-01

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Landing and Taxi Light Installation
Figure 201 (Sheet 1)

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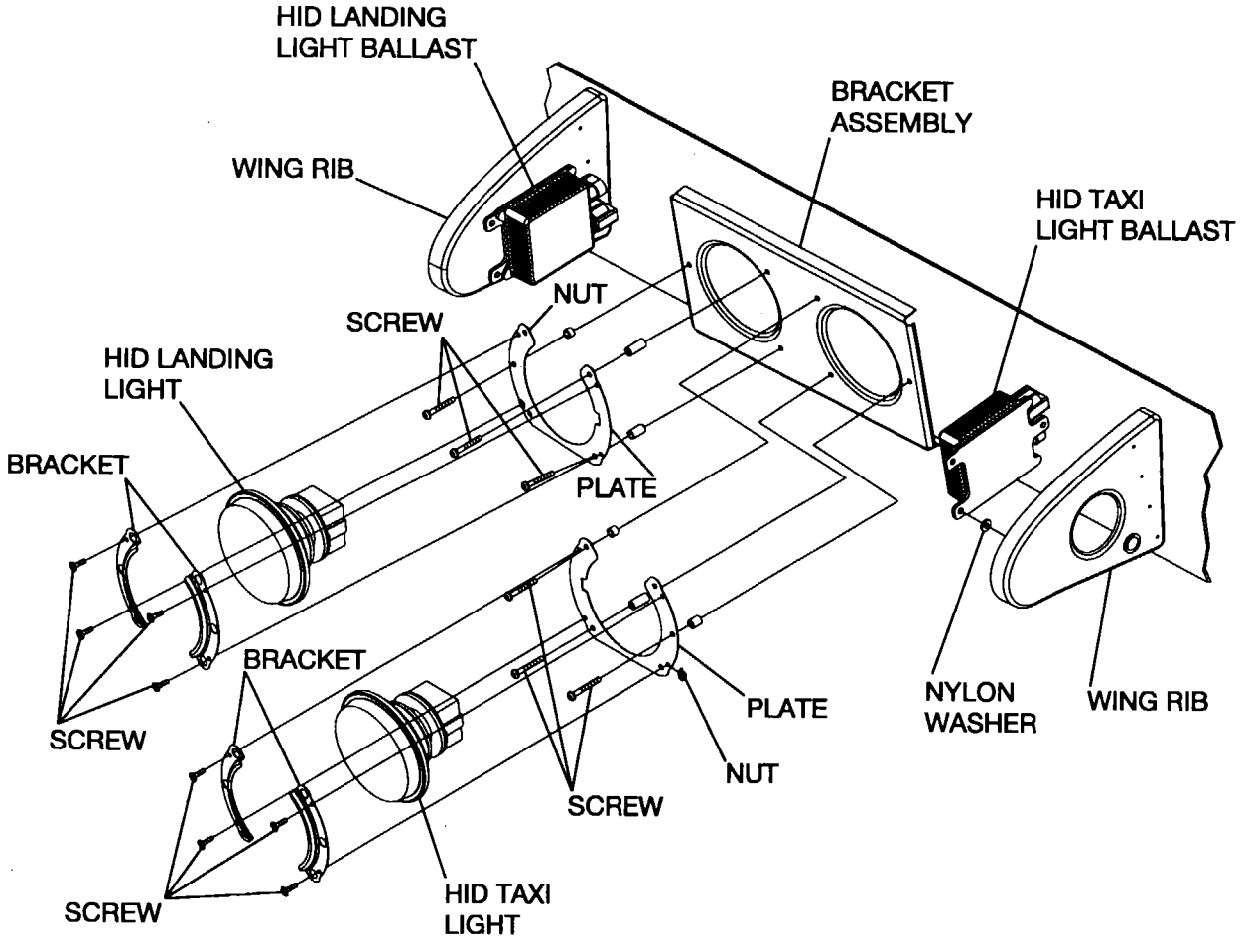

DETAIL A

AIRPLANES 17281234 AND ON AND
AIRPLANES 172S9771 AND ON AND
AIRPLANES 17280001 THRU 17281233
AND AIRPLANES 172S8001 THRU 172S9770
INCORPORATING MK172-33-01

A0528T1002

Landing and Taxi Light Installation
Figure 201 (Sheet 2)

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(5) Disconnect the electrical wires from the back side of the light and remove the light from the airplane.

B. Install the Light (Refer to Figure 201).
(1) Put the light at the correct wing location (between WS 100.00 and WS 118.00) and connect the electrical wires to the light.
(2) With screws and nuts, attach the light to the bracket so the light is attached tightly against the plate.

NOTE: The top of the nuts is not flush with the lip of the plate. The remaining part of the nuts is behind the plate at the screw opening.

NOTE: Some airplanes that have the HID landing and taxi lights will have an aluminum ring installed between the HID landing and taxi lights and the bracket.

(3) Install the lens assembly to the leading edge of the wing.
(4) Connect the main battery to the airplane. Refer to Chapter 24, Battery - Maintenance Practices.
(5) Set the landing light switch to LAND and the taxi light switch to TAXI.
(6) Do a check of the operation of the landing and taxi lights.

5. High-Intensity Discharge (HID) Ballast Removal and Installation

NOTE: The procedures that follow are for airplanes that have the HID landing and taxi light installation.

A. Remove the HID ballast (Refer to Figure 201).

NOTE: Removal and installation procedures are typical for the HID landing and taxi lights.

(1) Disconnect the main battery from the airplane. Refer to Chapter 24, Battery - Maintenance Practices.
(2) Put the landing and taxi light switches in the OFF position.
(3) Remove the HID landing and taxi lights. Refer to Light Removal and Installation.
(4) Remove the screws and nylon washers that attach the HID ballast to the support bracket on the wing leading-edge rib.
(5) Disconnect the electrical connectors from the HID ballast.
(a) Landing light connectors: PL010 and UL005.
(b) Taxi light connectors: PL011 and UL006.
(6) Remove the HID ballast from the airplane.

B. Install the HID ballast (Refer to Figure 201).
(1) Disconnect the main battery from the airplane. Refer to Chapter 24, Battery - Maintenance Practices.
(2) Put the landing and taxi light switches in the OFF position.
(3) Put the ballast at the correct wing location.
(a) Landing light: outboard side of the wing rib found at WS 100.00.
(b) Taxi light: inboard side of the wing rib found at WS 118.00.
(4) Connect the electrical connectors to the HID ballast.
(a) Landing light connectors: PL010 and UL005.
(b) Taxi light connectors: PL011 and UL006

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CAUTION: Do not install the HID ballast to the support bracket without the nylon shoulder washers between the HID ballast and the support bracket and the nylon washers between the HID ballast and the screw head. If the HID ballast is installed without the nylon washers, an electromagnetic field in the wing structure can cause incorrect operation of the magnetometer.

(5) Install the screws and nylon washers that attach the HID ballast to the support bracket on the wing leading-edge rib.
(6) Install the HID landing and taxi lights. Refer to Light Removal and Installation.
(7) Connect the battery to the airplane. Refer to Chapter 24, Battery - Maintenance Practices.
(8) Set the landing light switch to LAND and the taxi light switch to TAXI.
(9) Do a check of the operation of the landing and taxi lights.

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COURTESY WING LIGHTS - MAINTENANCE PRACTICES

1. Description and Operation

A. Each wing is equipped with a courtesy light located near the strut/wing intersection. The left wing light, the right right light and the rear dome light are connected in parallel on a single circuit. Pressing the overhead light switch supplies power to all three lights.Pressing the overhead light switch again removes power from all three lights.

2. Courtesy Wing Light Removal/Installation

A. Remove Light (Refer to Figure 201).
   (1) Ensure electrical power to the airplane is OFF.
   (2) Remove screws securing cover to underside of wing.
   (3) Push in on lamp, rotate counterclockwise and remove lamp from bayonet socket.

B. Install Light (Refer to Figure 201).
   (1) Insert lamp into bayonet socket. Turn clockwise until lamp seats in socket.
   (2) Reinstall cover to underside of wing.

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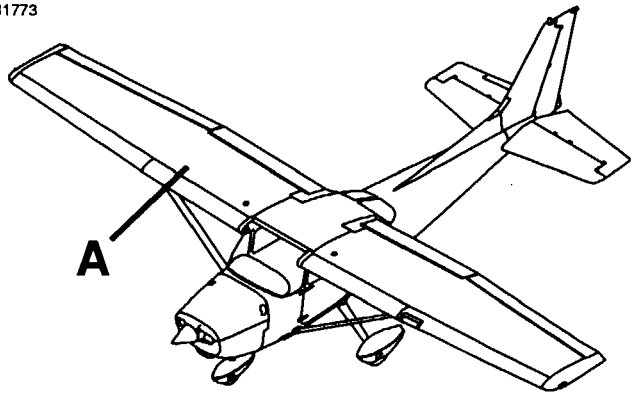

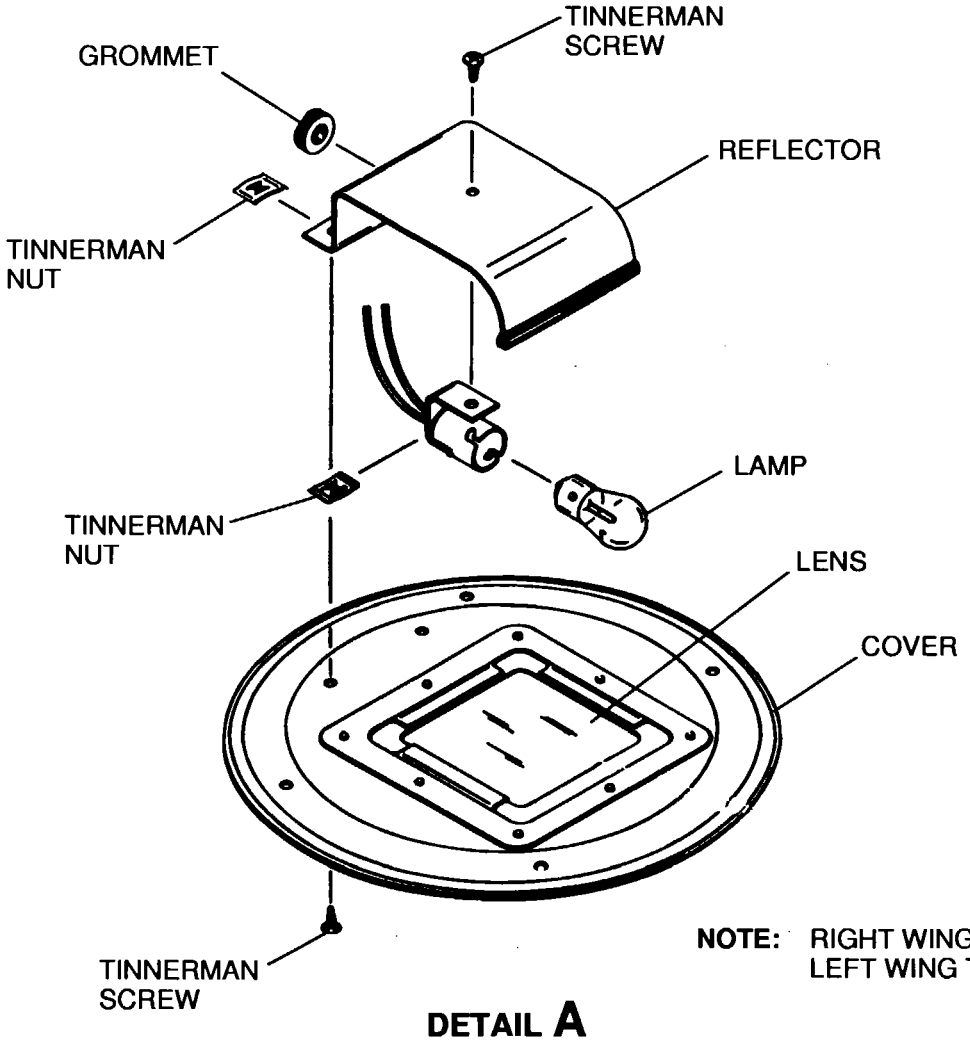

NOTE: RIGHT WING SHOWN, LEFT WING TYPICAL

DETAIL A

0510T1007
A0528T1001

Courtesy Wing Light Installation
Figure 201 (Sheet 1)

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CHAPTER

34

NAVIGATION

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NAVIGATION - GENERAL

1. Scope

A. This chapter describes the navigation systems, units, and components which provide airplane navigational information. Included are pitot/static temperature, gyros, compass, VOR and indicators. For King KAP140 Autopilot information refer to Chapter 22.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the table of Contents will further assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:

(1) The Flight Environmental Data Section describes systems that sense environment conditions, and use data to influence navigation of the airplane. This includes systems that depend on pitot and static information.

(2) The Attitude and Direction Section describes systems that use magnetic gyroscopic and inertia forces. This includes items like gyros, compass, magnetic heading, and turn and bank.

(3) The Dependent Position Determining Section describes systems that provide information to determine position, and are mainly dependent on ground installation. This includes systems like VOR, ADF, GPS, and transponders.

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PITOT/STATIC SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. The pitot system supplies ram air pressure to the airspeed indicator. The static system connects the vertical speed indicator, altimeter, and airspeed indicator to atmospheric pressure through plastic tubing connected to a static port. A static line sump is installed at the source button to collect condensation in the static system. A heated pitot tube is standard, with the heating element controlled by a switch on the instrument panel and powered by the electrical system. An alternate static source valve is installed on the instrument panel to use when the external static source is not in operation. Refer to Figure 201 for the pitot/static system schematic.

B. On airplanes with an autopilot, there is a tube that connects the autopilot to a static port on the left side of the airplane at FS 117.25. This part of the pitot/static system is not connected to the other parts of the pitot/static system.

C. Correct maintenance of pitot and static system is essential for correct operation of altimeter, vertical speed and airspeed indicators, and, if installed, the autopilot. Leaks, moisture, and blockage can have an effect on the readings of the instruments. Under instrument flight conditions, you must use the instrument readings for the safe operation of the airplane. Keep the system clean and all instruments and all parts of the system correctly attached to the airplane. Keep the pitot tube and static ports clean with no blockage.
   (1) Test the pitot/static system in accordance with the time limits set forth in Chapter 5, Inspection Time Limits, or anytime components or lines within the system are opened. Refer to 14 CFR 91.411.

2. Pitot Tube Removal/Installation

A. Pitot Tube Removal (Refer to Figure 202).
   (1) Remove the screws that attach the pitot tube to the wing and remove the pitot tube.
   (2) Disconnect the ram air tube from the pitot.
   (3) Disconnect the electrical connectors from the pitot heater and the pitot heat ground.

B. Pitot Tube Installation (Refer to Figure 202).

CAUTION: Do not blow through the pitot lines toward the instrument, as damage will occur to the instruments.

CAUTION: You must keep the pitot tube assembly clean and all system components free of blockage and leaks for correct operation.

   (1) Connect the ram air tube to the pitot.
   (2) Connect the electrical connectors to the pitot heater and the pitot heat ground.
   (3) Do a check of the system for leaks. Refer to Pitot System Leak Test.

3. Sump Assembly Removal/Installation

NOTE: The removal/installation is typical for the two sump assemblies.

A. Sump Assembly Removal (Refer to Figure 202).
   (1) Get access to the sump assembly.
   (2) Loosen the nut that connects the static tube to the sump assembly nipple.
   (3) Turn the sump assembly and remove the sump assembly from the elbow.

B. Sump Assembly Installation (Refer to Figure 202).
   (1) Attach the sump assembly to the elbow. Apply Teflon® tape (U000912) as necessary where plastic and metal connections interface.
   (2) Connect static tube to the sump assembly nipple with nut.
   (3) Do a leak check. Refer to the Static Pressure System Inspection and Leakage Test.

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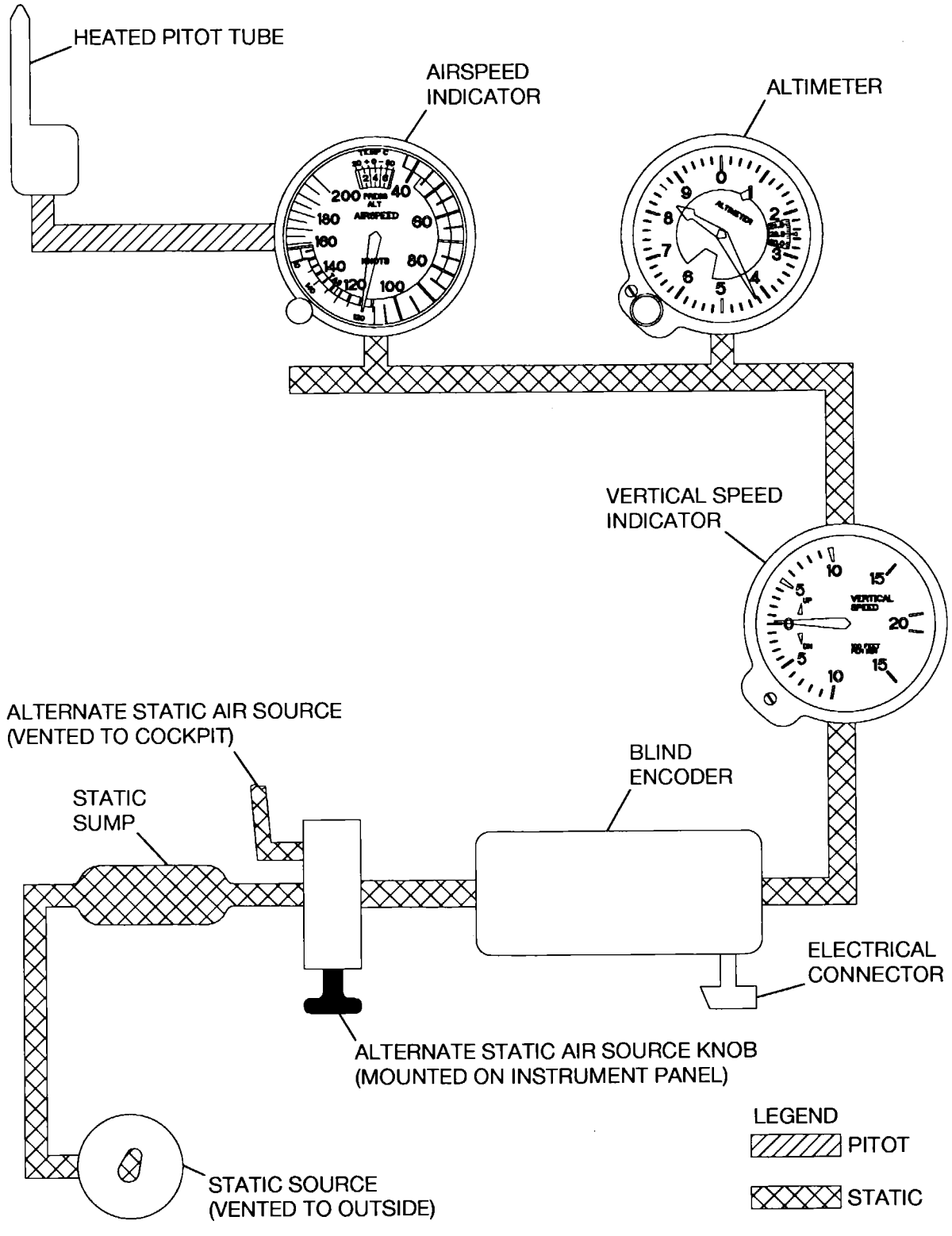

AIRPLANES WITHOUT GARMIN G1000

0595T1001

Pitot/Static System Schematic
Figure 201 (Sheet 1)

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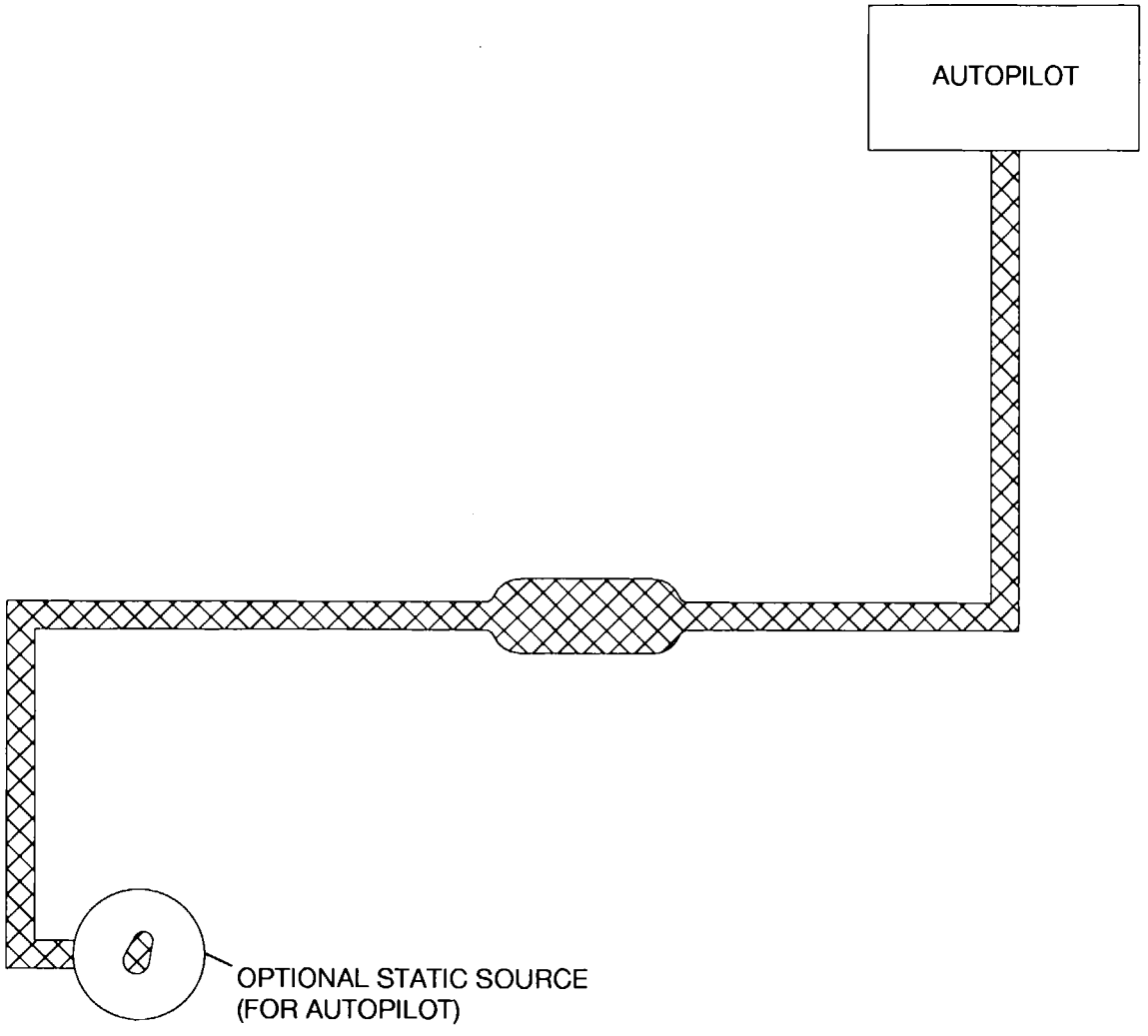

AIRPLANES WITH KAP–140 AUTOPILOT

0595T1001

Pitot/Static System Schematic
Figure 201 (Sheet 2)

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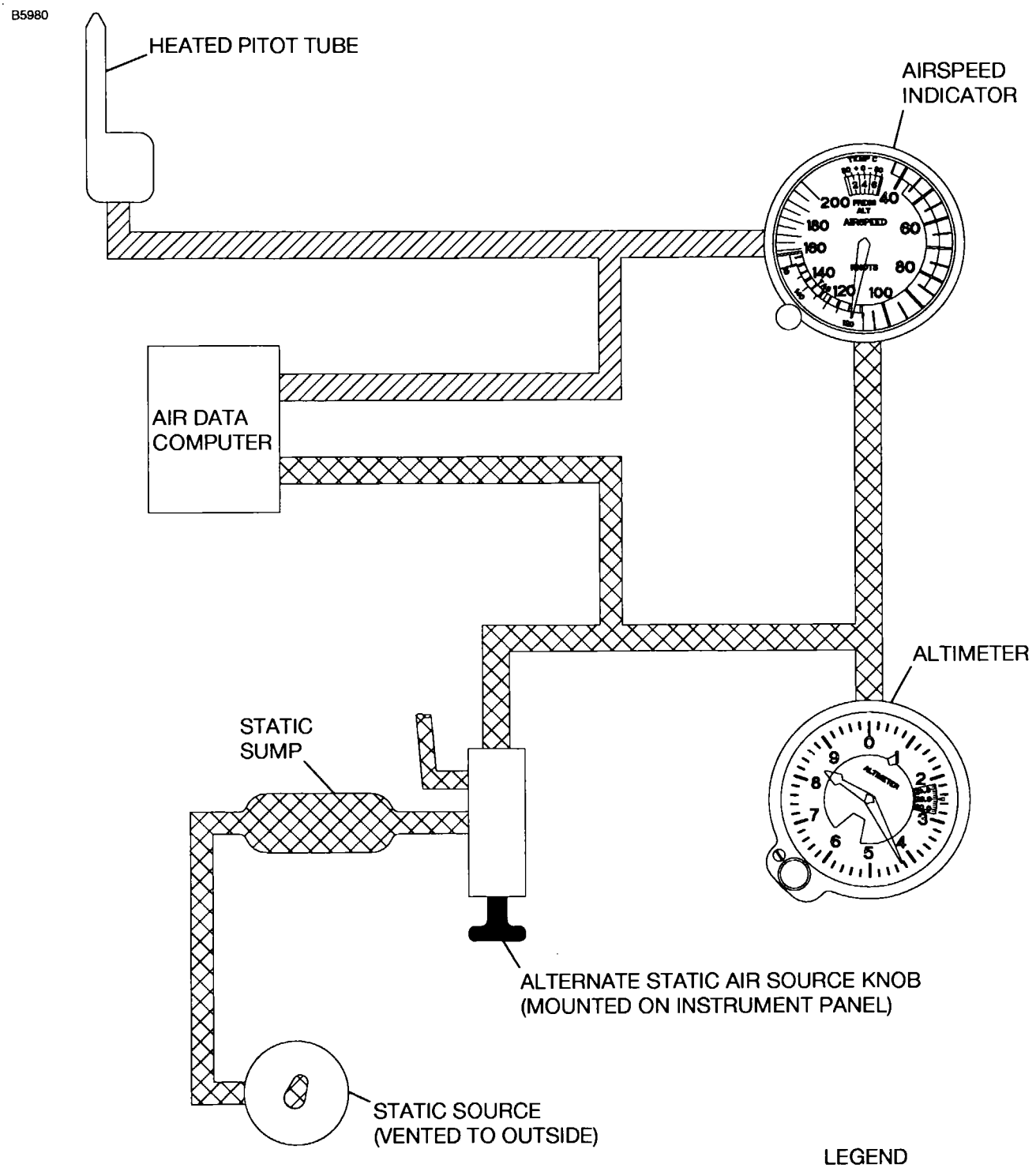

AIRPLANES WITH GARMIN G1000

Pitot/Static System Schematic
Figure 201 (Sheet 3)

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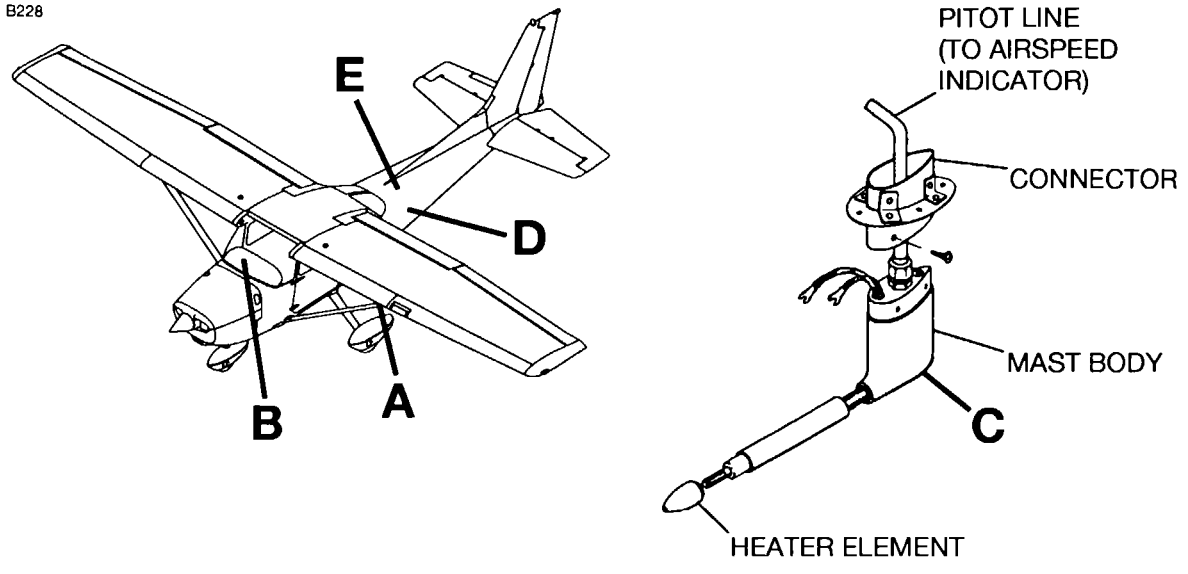
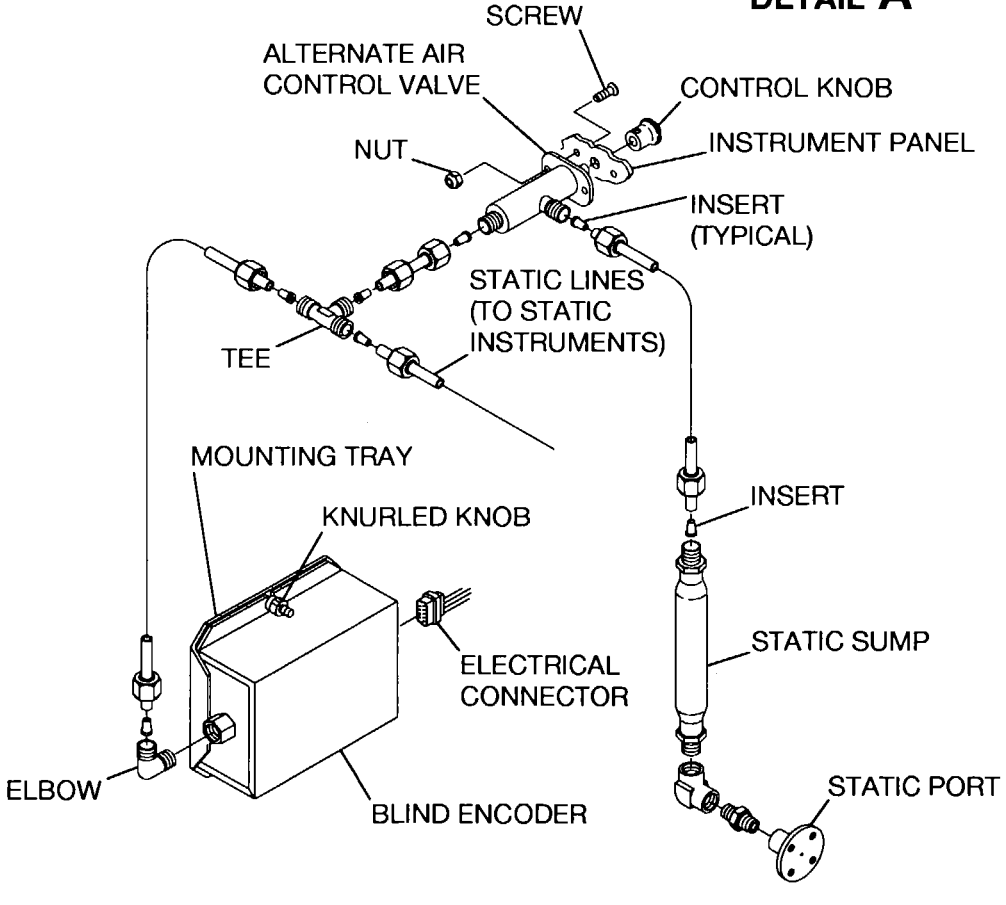


DETAIL A



DETAIL B

AIRPLANES WITHOUT GARMIN G1000

0510T1007
A0518R1046
B0518T1040

Pitot/Static System Installation
Figure 202 (Sheet 1)

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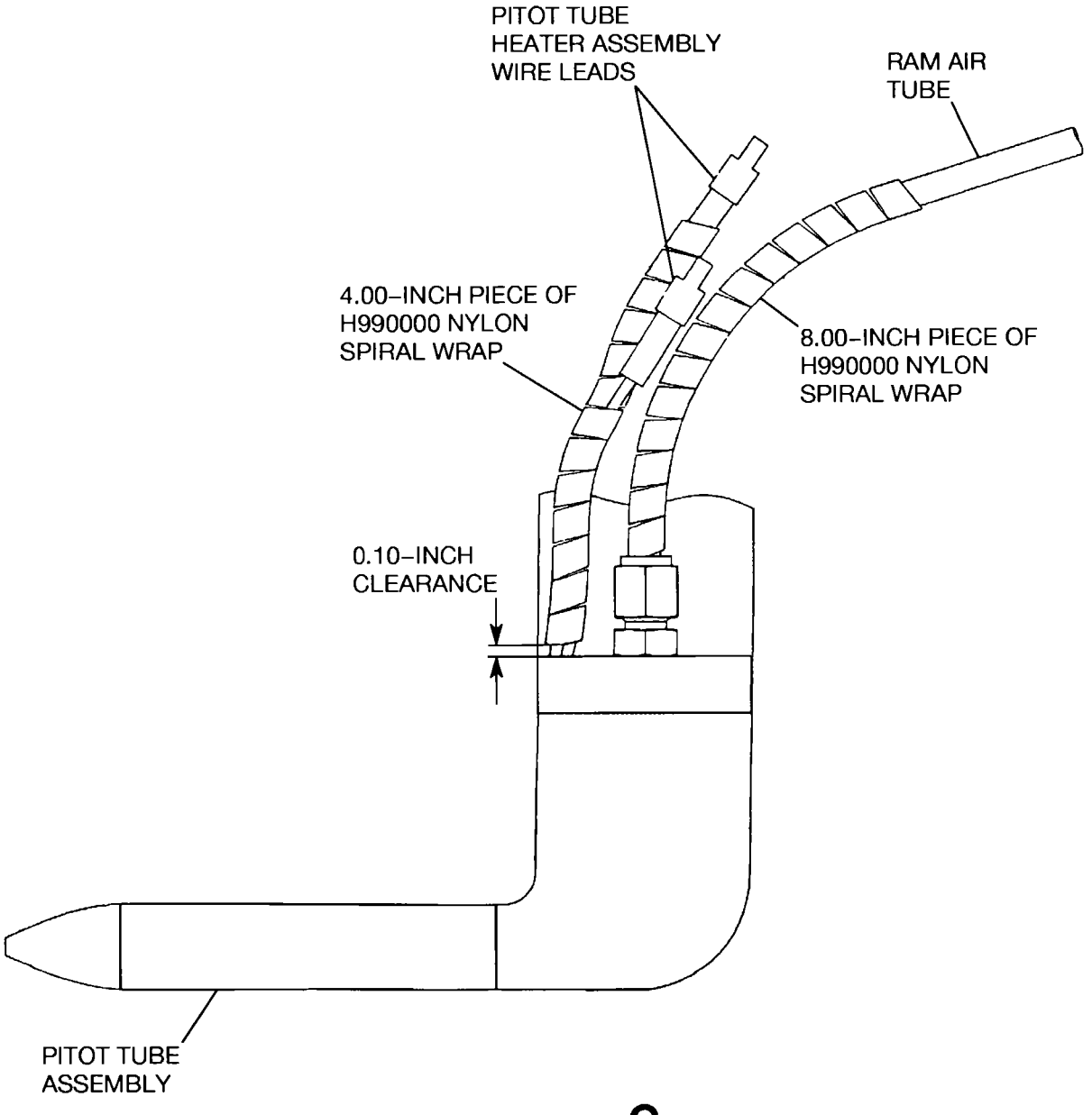

DETAIL C

C0518R1070

Pitot/Static System Installation
Figure 202 (Sheet 2)

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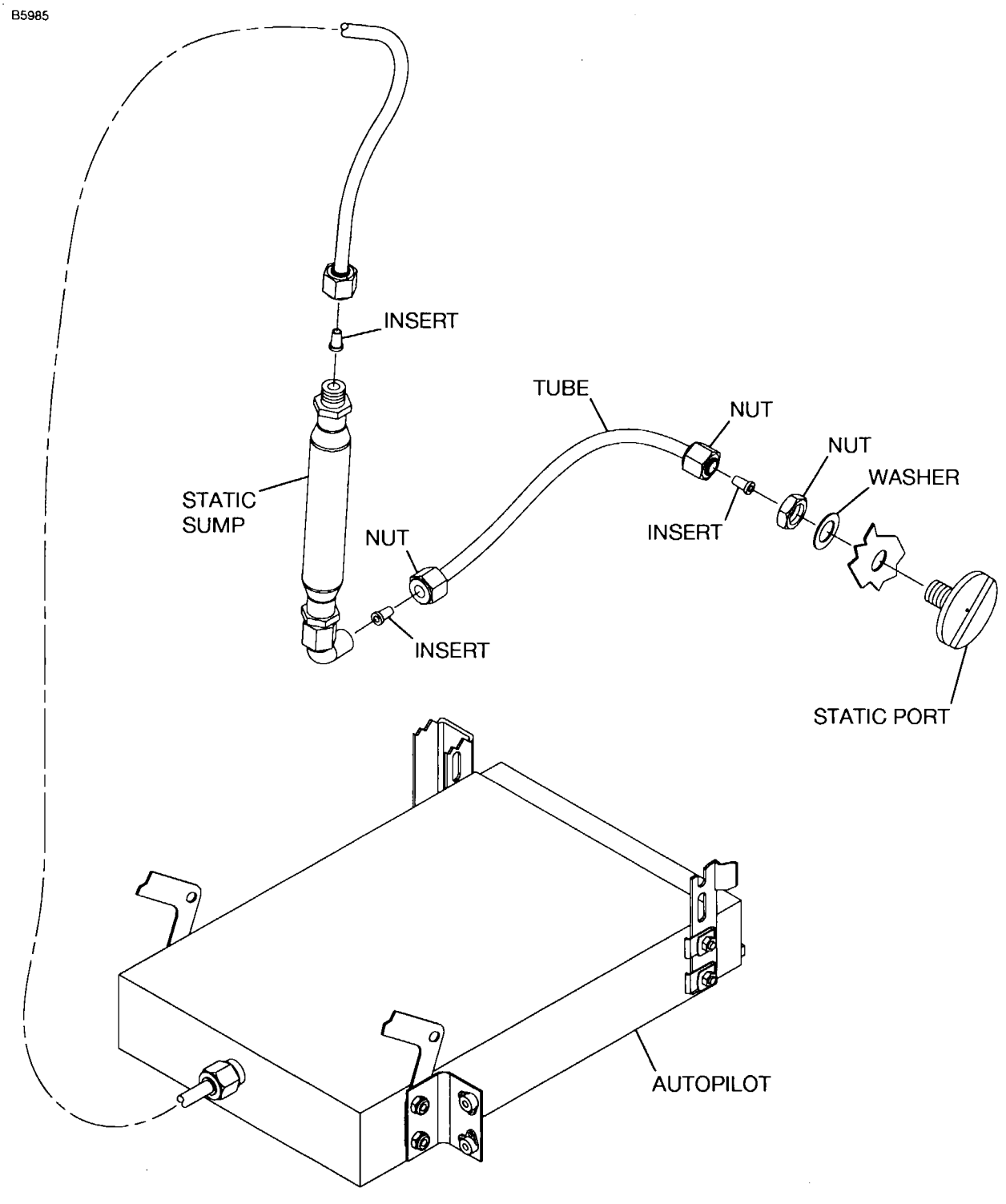

DETAIL D

AIRPLANES WITH KAP-140 AUTOPILOT

D0518T1153

Pitot/Static System Installation
Figure 202 (Sheet 3)

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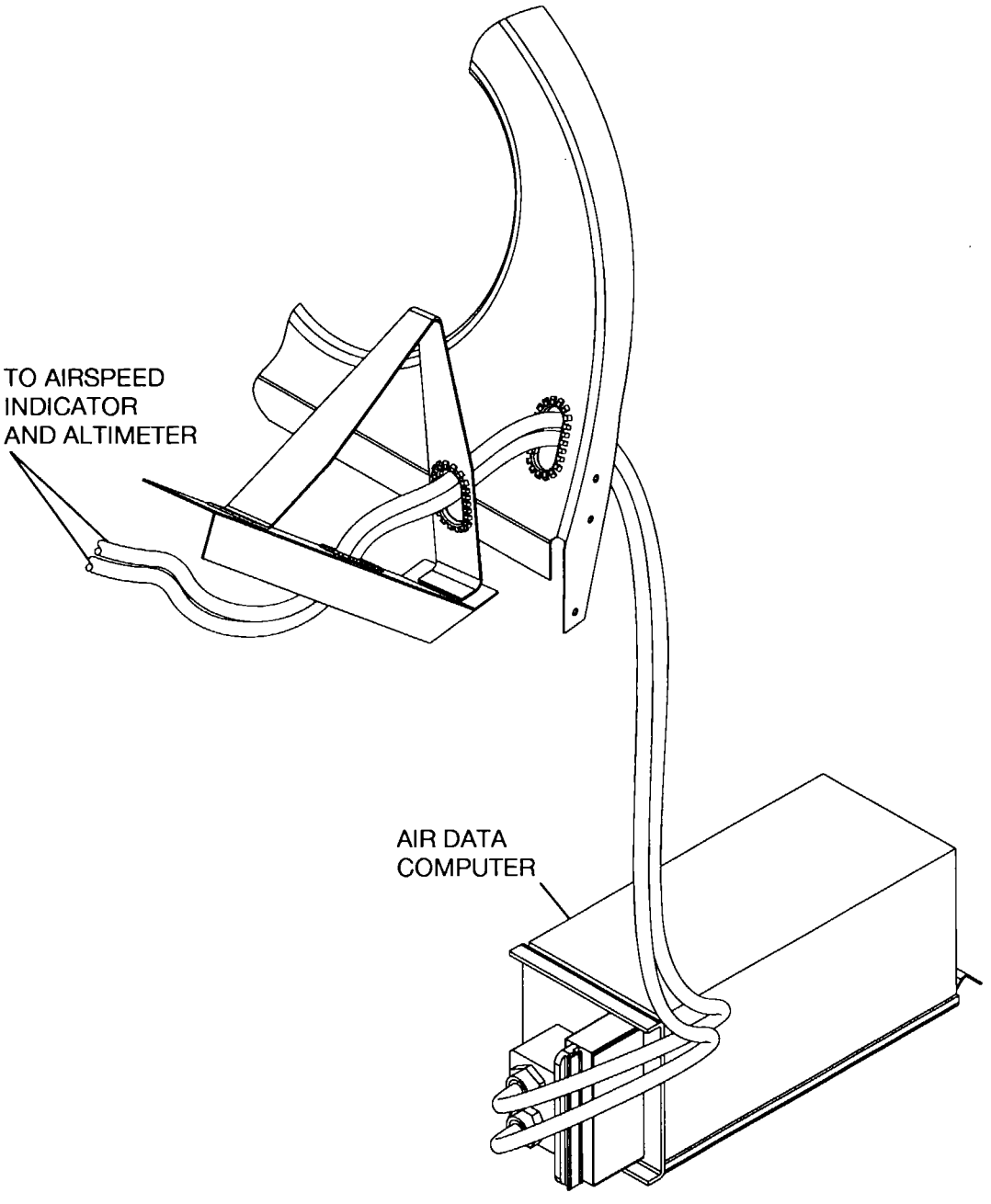

DETAIL E

AIRPLANES WITH GARMIN G1000

E0518T1152

Pitot/Static System Installation
Figure 202 (Sheet 4)

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4. Pitot Tube Heater Insulation Removal/Installation.

A. Pitot Tube Heater Insulation Removal (Refer to Figure 202).
(1) Set the ALT/BATT Master Switch to OFF.
(2) Make sure that the PITOT HEAT/OFF switch is put in the OFF position.
(3) Remove the 510BB access plate. Refer to Chapter 6, Access/Inspection Plates - Description And Operation.

CAUTION: Do not disconnect the pitot ram air tube from the pitot tube.

(4) Remove the screws that attach the pitot tube to the wing.
(5) Remove and discard all nylon spiral wrap insulation.

B. Pitot Tube Heater Insulation Installation (Refer to Figure 202).
(1) Cut new nylon spiral wrap into two pieces. Make one piece that is 4.0 inches in length and make one piece that is 8.0 inches in length.
(2) Start 0.10 inch from the pitot tube and install the 4.0-inch piece of spiral wrap around the pitot tube heater assembly.
(a) Trim as necessary.

CAUTION: Do not let the pitot heater assembly wire leads touch the pitot ram air tubing, wire bundles, or heat-sensitive components. The pitot tube heater assembly wire leads operate at high temperatures.

(3) Install the 8.0-inch piece of spiral wrap around the pitot ram air tube.
(a) Trim as necessary.
(4) Attach the pitot tube to the wing with the screws.

CAUTION: Do not blow through the pitot lines toward the instrument, as damage will occur to the instruments if you do.

CAUTION: Keep the pitot tube assembly clean and make sure that all system components are free of blockage and leaks for correct operation.

(5) Install the 510BB access plate. Refer to Chapter 6, Access/Inspection Plates - Description And Operation.
(6) Connect electrical power to the airplane as necessary.

5. Vertical Speed Indicator Removal/Installation

A. Vertical Speed Indicator (VSI) Removal (Refer to Figure 203).
(1) Remove the screws that attach the flight instrument panel to the instrument panel.
(2) Disconnect the static tube and the electrical connector from the VSI.
(3) Remove the screws that attach the VSI to the flight instrument panel.
(4) Remove the VSI from the airplane.

B. Vertical Speed Indicator (VSI) Installation (Refer to Figure 203).
(1) Put the VSI on the flight instrument panel and attach it with screws.
(2) Connect the static tube and the electrical connector to the VSI.
(3) Attach the flight instrument panel to the instrument panel with the screws.
(4) Do a check of the system for leaks. Refer to the Static System Leak Test.

6. Alternate Static Source Valve Removal/Installation

A. Alternate Static Source Valve Removal (Refer to Figure 202).
(1) Behind the stationary control panel, loosen the nuts that attach the two static tubes to the alternate static source valve. Disconnect the static tubes from the alternate static source valve.
(2) Remove the screws that attach the alternate static source valve to the stationary control panel.

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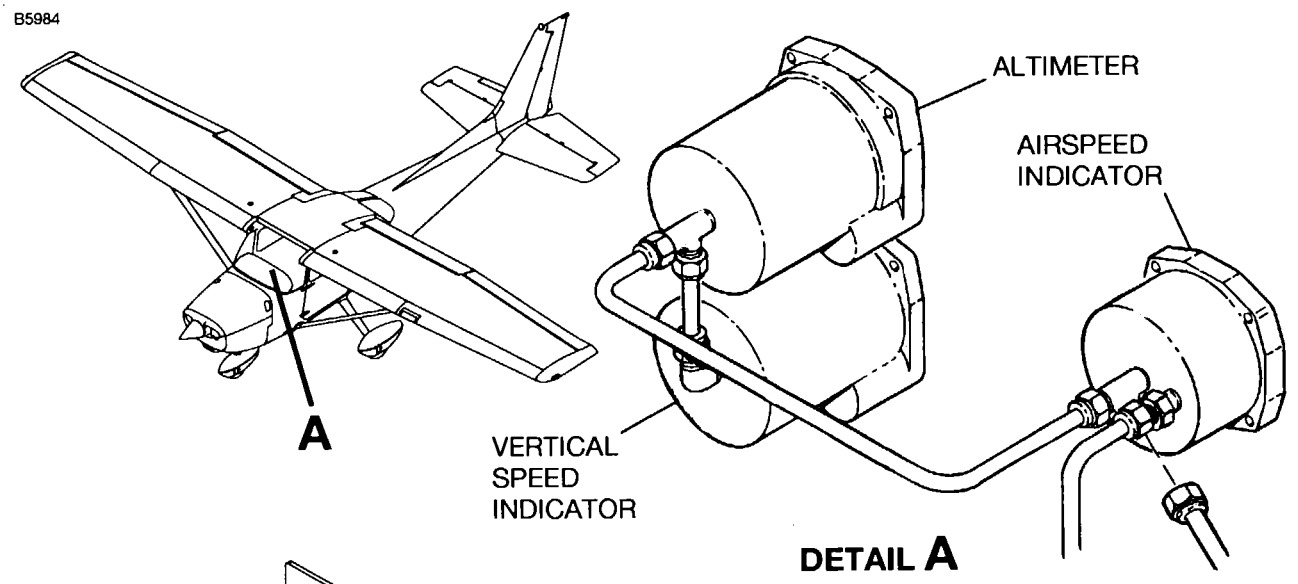
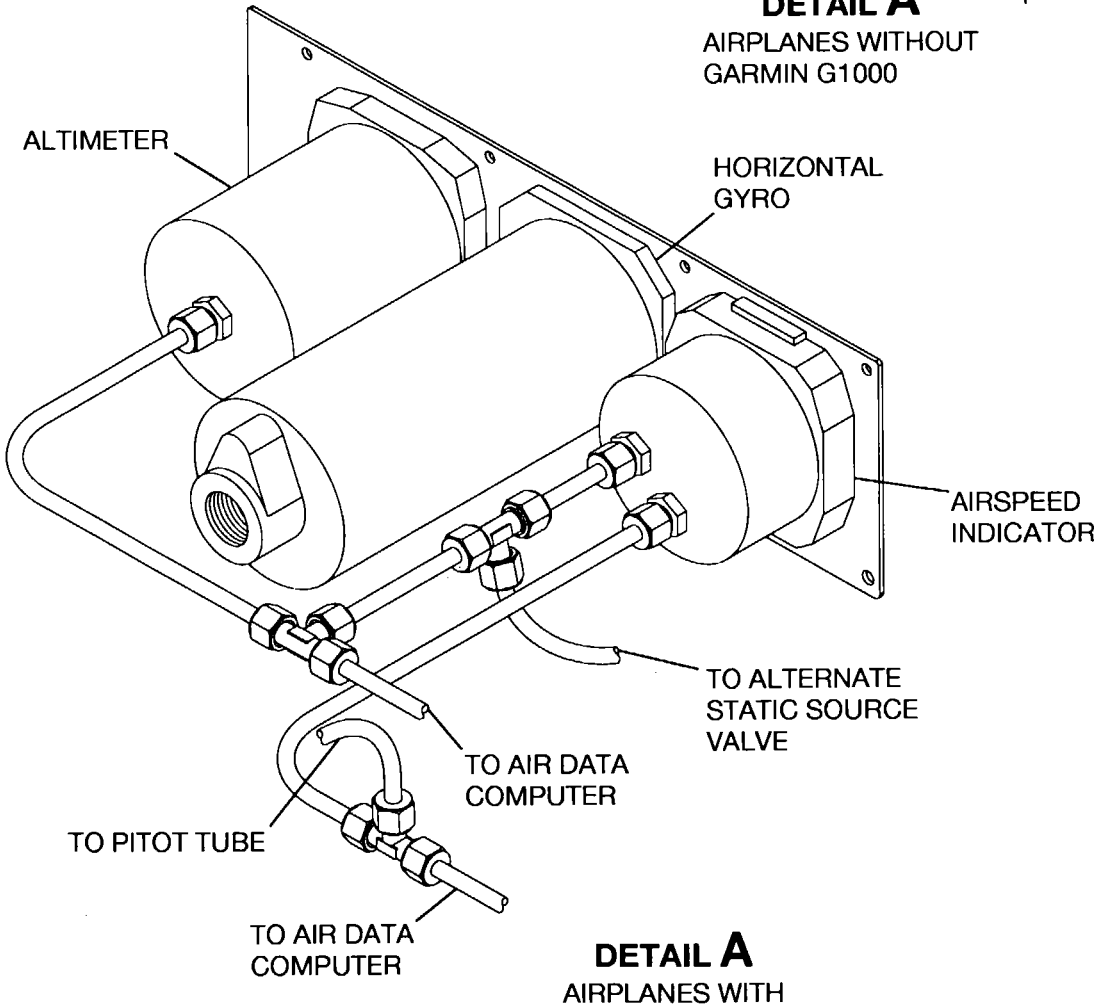


DETAIL A
AIRPLANES WITHOUT
GARMIN G1000



DETAIL A
AIRPLANES WITH
GARMIN G1000

0510T1007
A0718R1006
A0518T1151

Pitot and Static System Indicator Installation
Figure 203 (Sheet 1)

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(3) Remove the alternate static source valve from the airplane.

B. Alternate Static Source Valve Installation (Refer to Figure 202).
(1) Put the alternate static source valve behind the stationary control panel and attach the static tubes with the nuts.
(2) Attach the alternate static source valve to the stationary control panel with the screws.

7. Blind Encoder Removal/Installation (For Airplanes without Garmin G1000)

A. Blind Encoder Removal (Refer to Figure 202).

NOTE: The blind encoder is under the dash on the copilot side.

(1) Disconnect the static tube and the electrical connector and remove the encoder from the airplane.
(2) Loosen the knurled knob and remove the encoder from the mount.

B. Blind Encoder Installation (Refer to Figure 202).
(1) Put the encoder on the mount and attach with the knurled knob.
(2) Connect the static tube and the electrical connector to the encoder.
(3) Do a check of the system for leaks. Refer to the Static System Leak Test.

8. Altimeter Removal/Installation

A. Altimeter Removal (Refer to Figure 203).
(1) To get access to the back of the altimeter, remove the screws that attach the flight instrument panel to the instrument panel.
(2) Disconnect the static tube and the electrical connector from the altimeter.
(3) Remove the screws that attach the altimeter to the flight instrument panel.
(4) Remove the altimeter from the airplane.

B. Altimeter Installation (Refer to Figure 203).
(1) Put the altimeter on the flight instrument panel and attach it with screws.
(2) Connect the static tube and the electrical connector to the altimeter.
(3) Attach the flight instrument panel to the instrument panel with the screws.
(4) Do a check of the system for leaks. Refer to the Static System Leak Test.

9. Airspeed Indicator Removal/Installation

A. Airspeed Indicator Removal (Refer to Figure 203).
(1) Remove the screws that attach the flight instrument panel to the instrument panel to get access to the back of the airspeed indicator.
(2) Disconnect the static tube and the electrical connector from the airspeed indicator.
(3) Remove the screws that attach the airspeed indicator to the flight instrument panel.
(4) Remove the airspeed indicator from the airplane.

B. Airspeed Indicator Installation (Refer to Figure 203).
(1) Put the airspeed indicator on the flight instrument panel and attach with the screws.
(2) Connect the static tube and the electrical connector to the airspeed indicator.
(3) Attach the flight instrument panel to the instrument panel with the screws.
(4) Do a check of the system for leaks. Refer to the Static System Leak Test.

10. Pitot System Leak Test

A. Test Procedures.
(1) Put a piece of tape over the small hole in the lower aft end of the pitot tube.
(2) Attach a piece of rubber or plastic tubing over the pitot tube and close the opposite end of the tube.
(3) Slowly roll up the tube until the airspeed indicator shows in cruise range.

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(4) Attach the tube to prevent air pressure change, and look at the airspeed after one minute. If there is a leak, the pressure in the system is reduced, and you will see a lower airspeed on the airspeed indicator.
(5) If there is a leak in the system, you must examine and tighten all connections, hoses, and fittings before you do another check.
(6) If there are no leaks, slowly unroll the tubing to let the pressure in the instrument slowly return to ambient pressure.

11. Static System Leak Test

A. Test Procedures.
(1) Make sure that the static system is free from moisture that is caught in the system, and that there are no restrictions in the system.
(2) Make sure that there are no changes in or deformations to the airframe surface that can affect the relation between the air pressure in the static pressure system and true ambient static air pressure for any flight configuration.
(3) Close the static pressure alternate source control.
(4) Attach a vacuum source to the static pressure source opening.
(5) Slowly apply the vacuum source until the altimeter indication is a 1,000-foot increase in altitude.
(6) Cut off the vacuum source to make sure that there is a closed system for one minute.
(7) If the altimeter loss is not more than 100 feet after one minute, the system is good and you can slowly release the vacuum until the system goes back to ambient. If the altimeter loss is more than 100 feet, tighten all connections and do the leak test again. If the rate continues to be more than the maximum allowable, do as follows.
(a) Disconnect the static pressure lines from the airspeed indicator and the vertical speed indicator. Use suitable fittings to connect the lines together so that the altimeter is the only instrument connected into the static pressure system.
(b) Do the leakage test again to see if the static pressure system or the instruments that you bypassed are the cause of the leakage. If the instruments are the cause of the leak, you must have the instruments repaired by an approved repair station, or replaced. If the static pressure system is the problem, do as follows.

CAUTION: Do not apply positive pressure with the airspeed indicator or the vertical speed indicator connected to the static pressure system.

1 Attach a source of positive pressure to the static source opening.
2 Slowly apply positive pressure until the altimeter indication decreases 500-feet, and stops on this value.
3 Put a solution of mild soap and water on the line connections and the static source flange, and look for bubbles to find leaks.
4 Tighten all leaking connections. Repair or replace all damaged parts.
5 Connect the airspeed and the vertical speed indicators into the static pressure system and do the static system leak test again.

12. Blow Out the Lines

CAUTION: Do not blow through the pitot or static lines toward the instrument as damage will occur to the instrument.

A. Pitot Lines.
(1) Although the pitot system drains down to the pitot tube opening, condensation can collect at other areas in the system and cause some blockage of the line. To remove the blockage, disconnect the line at the airspeed indicator. With low-pressure air, blow from the indicator end of the line toward the pitot tube.

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B. Static Lines.

(1) Keep static lines clear and keep connections tight. All models have a static source sump which collects moisture and keeps the system clear. If necessary, disconnect the static line at the first instrument to which it is connected, and then blow line clear with low-pressure air.

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OUTSIDE AIR TEMPERATURE INDICATOR - MAINTENANCE PRACTICES

1. Description and Operation

A. Outside air temperature is measured using a remote-mounted probe connected to a cockpit-mounted indicator.
   (1) The OAT (outside air temperature) probe is mounted on the upper cabin roof line at FS 46.46. This probe transmits an electrical millivolt signal to the cockpit mounted gauge through a pair of wires which route above the cabin headliner, through the left side windshield pillar, and terminating behind the instrument panel.
   (2) The cockpit-mounted indicator is located in the upper left portion of the instrument panel. The indicator also incorporates a digital clock and voltage-reading functions. Inputs into the indicator include 28.0 VDC for power, internal lighting and keep-alive clock functions, and millivolt inputs from the temperature probe.

      NOTE: The indicator has provisions for a single 1.5 VDC "AA" battery used to power the clock independent of airplane power. This battery, if installed, should be replaced every two years.

B. Maintenance practices consist of removal and installation of the probe and indicator. The probe and indicator are not matched, and may be replaced independent of each other. Probe replacement will require new shielded terminal pins to be attached at the indicator end of the probe.

2. OAT Probe Removal/Installation

A. Remove Probe (Refer to Figure 201).
   (1) Remove overhead console. Refer to Chapter 25, Interior Upholstery - Maintenance Practices, Figure 201.
   (2) From outside of cabin, loosen and remove nut securing probe to roof skin.
   (3) From inside of cabin, withdraw probe through roof skin.
   (4) Remove interior panels as required to free probe wiring from airplane structure.
   (5) Disconnect electrical connector from backside of OAT/Clock indicator.
   (6) Remove probe pins from electrical connector.

B. Install Probe (Refer to Figure 201).
   (1) Install new terminal pins to end of replacement probe. Ensure shielded wiring is properly grounded. Refer to Model 172R Wiring Diagram Manual, Chapter 20, Bonding and Grounding - Maintenance Practices.
   (2) Install terminal pins into electrical connector.
   (3) Reconnect electrical connector to backside of OAT/Clock indicator.
   (4) Reroute probe wiring in cabin area, and insert probe and ground lug through roof skin.
   (5) From outside of cabin, install metal washer (with o-ring insert) and hex nut to probe. Tighten until o-ring compresses and forms a water-tight seal.
   (6) Reinstall interior panels and overhead console. Refer to Chapter 25, Interior Upholstery - Maintenance Practices, Figure 201.

3. Clock/OAT Indicator Removal/Installation

A. Remove Indicator (Refer to Figure 201).
   (1) Remove fuse F4 from the power junction box.
   (2) Remove screws securing instrument sub panel to airplane structure.
   (3) Withdraw sub panel aft to gain access to electrical connector.
   (4) Remove electrical connector from OAT indicator.
   (5) Remove screws securing OAT indicator to sub panel.

B. Install Indicator (Refer to Figure 201).
   (1) Secure OAT indicator to instrument sub panel using screws.
   (2) Connect electrical connector to backside of OAT Indicator.
   (3) Reinstall instrument sub panel to airplane structure.
   (4) Reinstall fuse F4 to power junction box.

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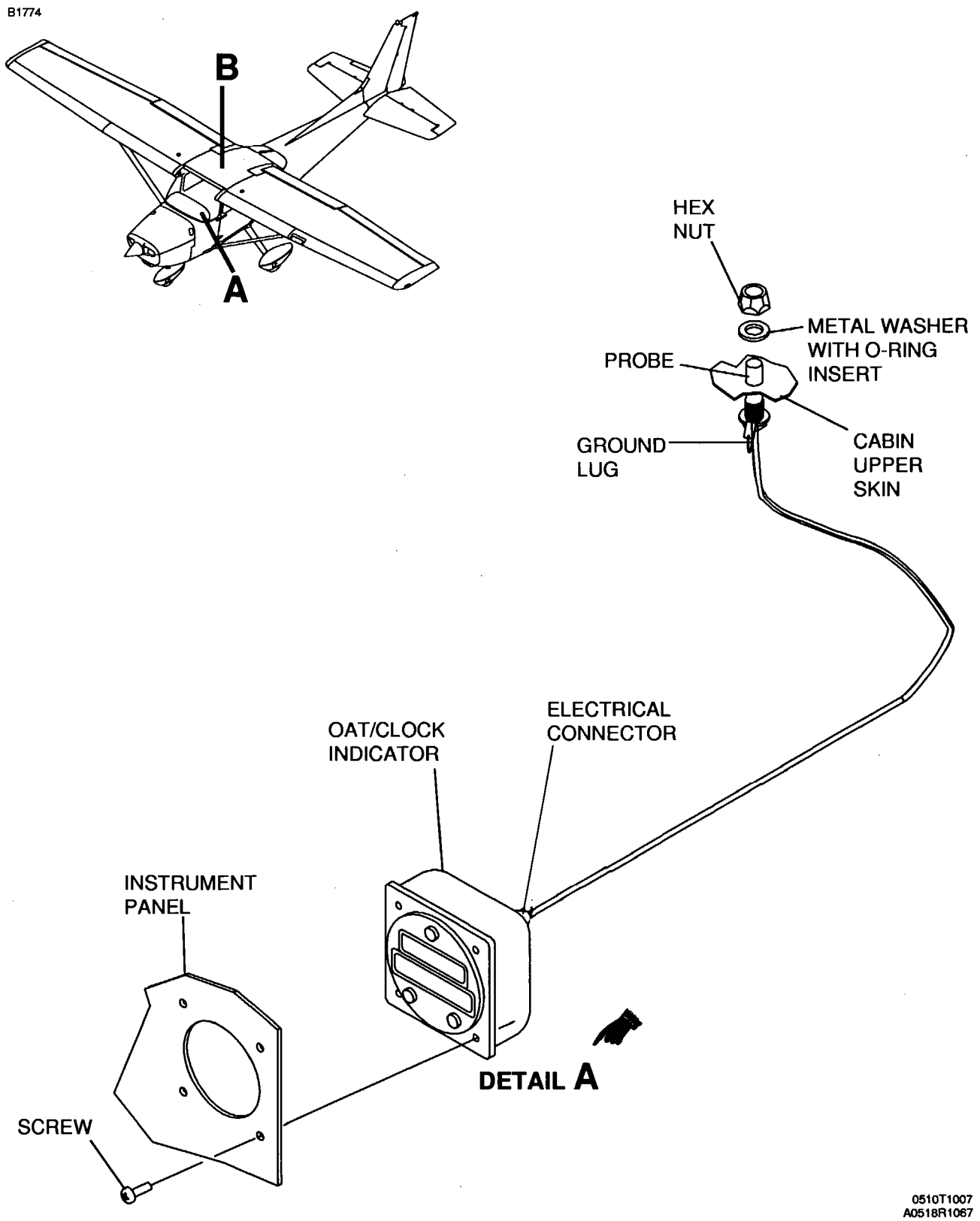

Outside Air Temperature Installation
Figure 201 (Sheet 1)

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(5) Test for proper operation. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual, Supplements, for operation/test instructions.

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AIR DATA COMPUTER - MAINTENANCE PRACTICES

1. General

A. On airplanes with Garmin G1000, the GDC 74A air data computer compiles information from the pitot/static system and various sensors. The GDC 74A gives pressure, altitude, airspeed, vertical speed, and OAT information to the G1000 system. The GDC 74A communicates with the GIA 63 Integrated Avionics Units, GDU 1040 Control Display Units, and GRS 77 AHRS.

B. Maintenance practices give procedures for the removal and installation of the GDC 74A air data computer. The unit is in the tailcone.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. GDC 74A Air Data Computer Removal/Installation

A. Remove the Air Data Computer (Refer to Figure 201).
(1) Put the MASTER switch in the off position.
(2) Put the AVIONICS switch in the off position.
(3) Remove the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
(4) Remove the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(5) Loosen the two thumb screws that attach the air data computer to the mounting rack.
(6) Disconnect the electrical connector.
(7) Disconnect the pitot/static lines.

CAUTION: Do not let foreign object debris get in the air data computer. Foreign object debris can cause a blockage and make the computer give incorrect indications.

(8) Put caps on the pitot/static lines and air data computer ports.

B. Install the Air Data Computer (Refer to Figure 201).

NOTE: If a new air data computer is installed, the software must be loaded.

(1) Make sure the electrical connector and connector pins have no damage.
(a) Replace the electrical connector or connector pins if applicable. Refer to the Model 172 Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.
(2) Remove the caps from the pitot/static lines and air date computer ports.
(3) Make sure the pitot/static lines and air data computer ports have no damage.
(a) Replace the pitot/static lines and/or air data computer ports if applicable. Refer to Chapter 34, Pitot/Static System - Maintenance Practices.
(4) Connect the electrical connector.
(5) Connect the pitot/static lines.
(6) Tighten the two thumb screws that attach the air data computer to the mounting rack.
(7) If a new unit is installed, load the software. Refer to the Garmin G1000 Line Maintenance Manual.
(8) Do a pitot system leak test and a static system leak test. Refer to Chapter 34, Pitot/Static System - Maintenance Practices.
(9) Do a check to make sure the air data computer operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.
(10) Install the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(11) Install the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.

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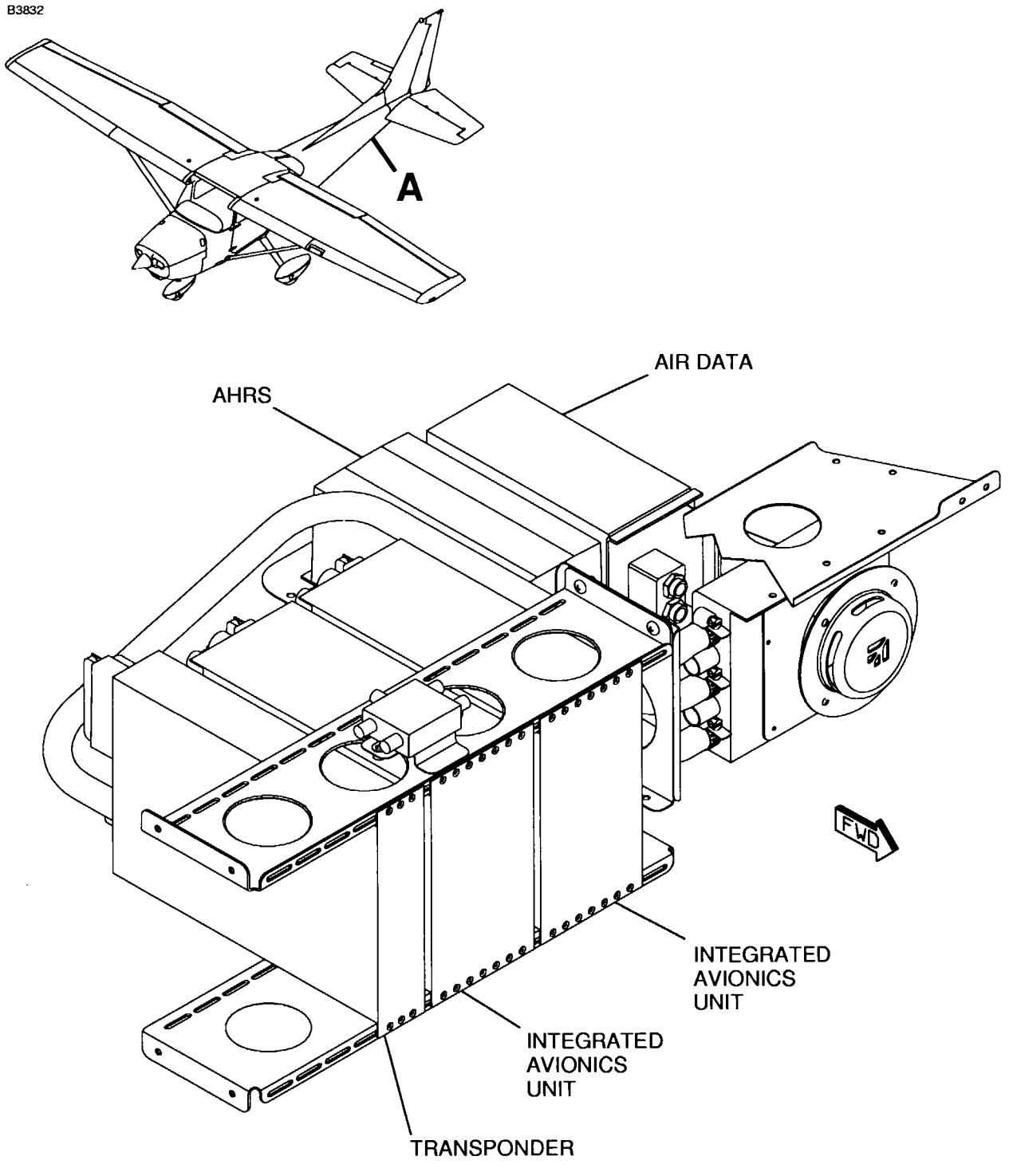

DETAIL A
AIRPLANES THAT HAVE
THE GARMIN G1000

0510T1007
A0518T1103

Forward Avionics Equipment Installation
Figure 201 (Sheet 1)

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ATTITUDE AND DIRECTION - MAINTENANCE PRACTICES

1. General

A. This section gives maintenance information, removal and installation procedures, and operational checks for the horizon attitude gyro, directional gyro, and turn coordinator.

B. On airplanes without Garmin G1000, three gyroscopic instruments show attitude and direction. The instruments are in the pilot's instrument panel. Included are the horizon gyro (attitude indicator), directional gyro, and turn coordinator (roll rate gyro).

C. On airplanes with Garmin G1000, two gyroscopic instruments give attitude and direction. The horizon gyro is in the center instrument panel. The horizon gyro gives attitude and direction and is the middle standby instrument. The turn coordinator gives roll rate data to the autopilot and is installed on the left side of the center instrument panel. The turn coordinator cannot be seen in the cockpit.

2. Operation Notes

A. The vacuum system supplies air flow necessary to move the gyro rotor in the horizon gyro. Incorrect operation of the vacuum system will cause the horizon gyro to operate incorrectly.

B. It is necessary for the horizon gyro to have 4.5 to 5.5 inches Hg of vacuum to operate correctly. The gyro will reach rated performance with correct vacuum applied in a minimum of 3 minutes of rotor spin time.

C. The gyro rotor can continue to spin for approximately 15 minutes after vacuum in the system is removed. It can show a change in the roll and/or pitch indication while the rotor speed decreases. The gyro rotor will remain in a roll and/or pitch indication when stopped until the system starts again.

D. If a gyro has been shut down and started again before the rotor has been permitted to stop, more time will be necessary to get the correct pitch and roll indication.

3. Precautions

A. Gyroscopic instruments are very sensitive. They have precision bearings on the gyroscope rotor, pivots, and yoke shaft. Be careful when you move or touch the instrument when it is out of the airplane. If you are not careful when you move or touch the instrument, you can cause damage to the bearings. Dirt and other contaminants can also cause damage to the bearings. Obey these special precautions when you move, install, remove, or ship any gyroscopic instruments.

(1) To prevent damage to the gyro, do not move a gyro after the electrical power or vacuum pressure is removed and before the gyro rotor has stopped. The gyro rotor will not fully stop for approximately 15 minutes after the electrical power or vacuum pressure is removed.

(2) During the removal of instruments, put soft material between the instruments and the control column.

(3) Do not shake or cause vibration of the panel or the instruments.

(4) Do not hit the gyroscope against any other object. Do not shake the gyroscope or put the gyroscope on a hard surface. If you are not careful, you can cause damage to the instrument.

(5) Always be very careful when you move or hold gyroscopic instruments, because you can easily cause damage.

(6) Do not remove any wires, labels, tie straps, or any other parts of the gyro that are installed by the manufacturer.

(7) Visually examine the gyro for any external damage. There must be no scratches, dents, or dings on any part of the gyro. Do not install gyros that have scratches, dents, or dings.

(8) If you must ship a gyroscopic instrument, make sure that all the female ports have plugs that you can remove, and that all the male receptacles have plastic caps that you can remove.

(9) Put connector caps on all the electrical pin connectors to make sure that they are not bent or broken.

(10) Put all gyros in Styrofoam or other soft material for storage and transportation. If possible, ship the gyroscope in the box from the manufacturer in which it was received.

(11) Keep the plugs in the ports unless the instrument is installed in an airplane or maintenance personnel are doing a test.

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4. Prepare the Gyroscopic Instruments for Shipping

A. All gyros that are shipped must obey the instructions that follow.
(1) All ports and vents must have plugs installed in them.
(2) All initial seals from the manufacturer must be installed and not damaged.
(3) All gyros must be carefully put in the same type of container in which the replacement gyro was received.
(4) Put connector caps or adhesive tape on all electrical pin connectors to make sure that they are not bent or broken.

5. Horizon Attitude Gyro Description and Operation

A. The vacuum system supplies the air flow necessary to move the gyro rotor in the horizon attitude gyro. Incorrect operation of the vacuum system will cause the horizon attitude gyro to operate incorrectly. Problems with the vacuum system can cause incorrect indication and decreased performance.

B. The horizon attitude gyro must have between 4.5 and 5.5 inches Hg of vacuum to operate correctly. With the correct vacuum applied, the gyro will get rated performance in a minimum of 3 minutes of rotor turn time.

C. The horizon attitude gyro rotor can continue to turn for approximately 15 minutes after the vacuum in the system is removed. It can show a change in the roll and/or pitch indication while the rotor speed decreases. When fully stopped, the gyro rotor will stay in a roll and/or pitch indication until the system starts again.

D. If a gyro has been stopped and started again before the rotor fully stops, more time will be necessary for the gyro to correctly indicate the pitch and roll of the airplane.

6. Horizon Gyro Removal and Installation

A. Horizon Gyro Removal (Refer to Figure 201 or Figure 202).

CAUTION: Make sure that the gyro rotor has fully stopped before you move the instrument. The gyro rotor will not stop for approximately 15 minutes after the electrical power or vacuum source is removed. Damage to the instrument will occur if the instrument is moved before the gyro rotor has stopped.

CAUTION: Be careful with the gyroscopic instruments. Do not hit, shake, or put the instruments on a hard surface. Put soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in its initial condition as received from the manufacturer.

(1) Put the MASTER switch and the AVIONICS switch in the off position.
(2) Remove the screws from the center pilot panel to get access to the back of the horizon gyro.

CAUTION: Make sure that you put soft material between the horizon attitude gyro and the control column before you remove the gyro. If you put the sub panel on the control column without any protection, you can damage the horizon attitude gyro and/or the other instruments in the sub panel. Be very careful when you remove the sub panel so that you do not hit the gyro.

(3) Put a label on the three hoses that are attached to the horizon gyro.
(4) Loosen the clamps and remove the hoses from the horizon gyro.

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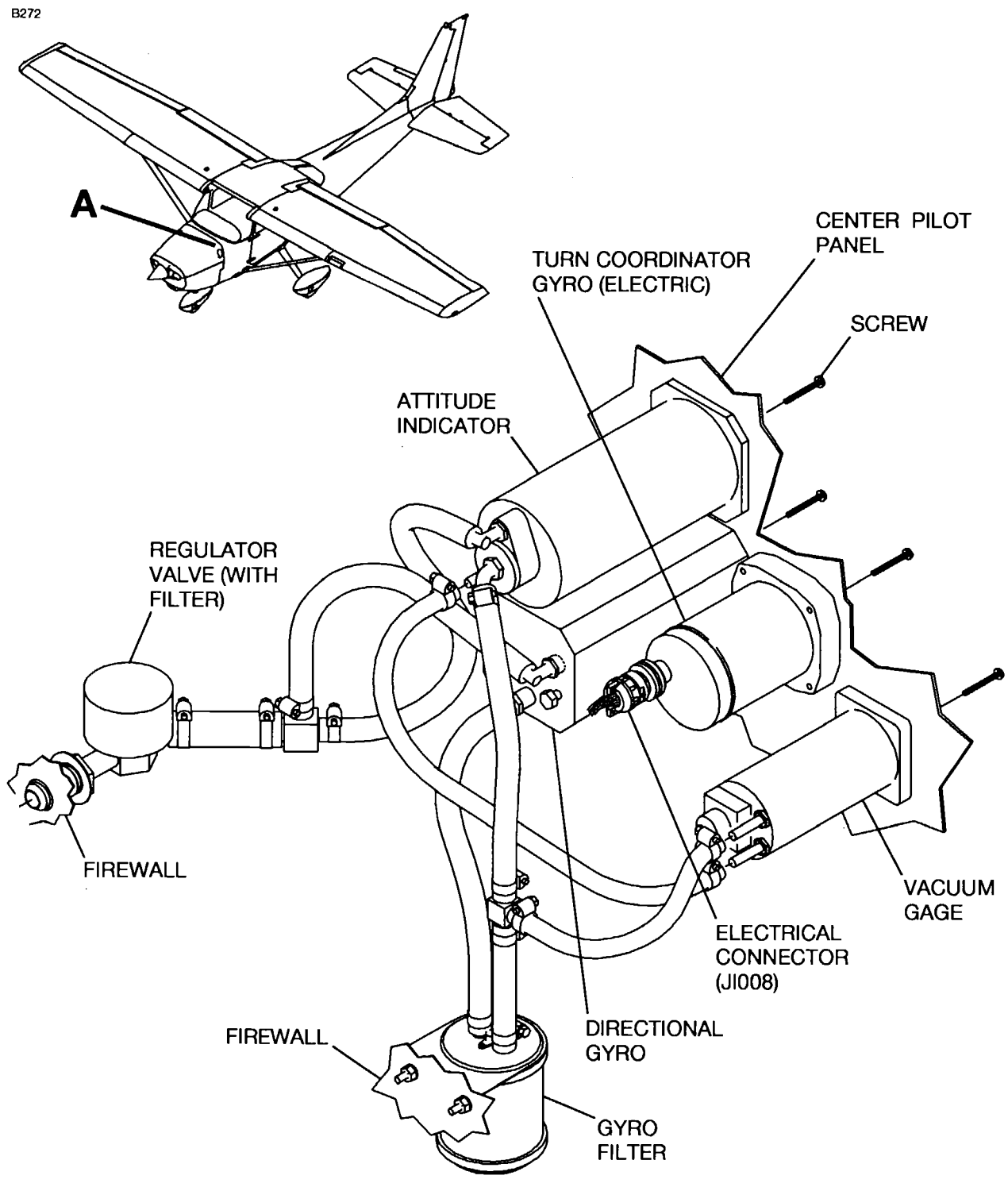

DETAIL A

AIRPLANES WITHOUT GARMIN G1000

0510T1007
A0518T1052

Attitude and Direction Instrument Installation (Airplanes without Garmin G1000)
Figure 201 (Sheet 1)

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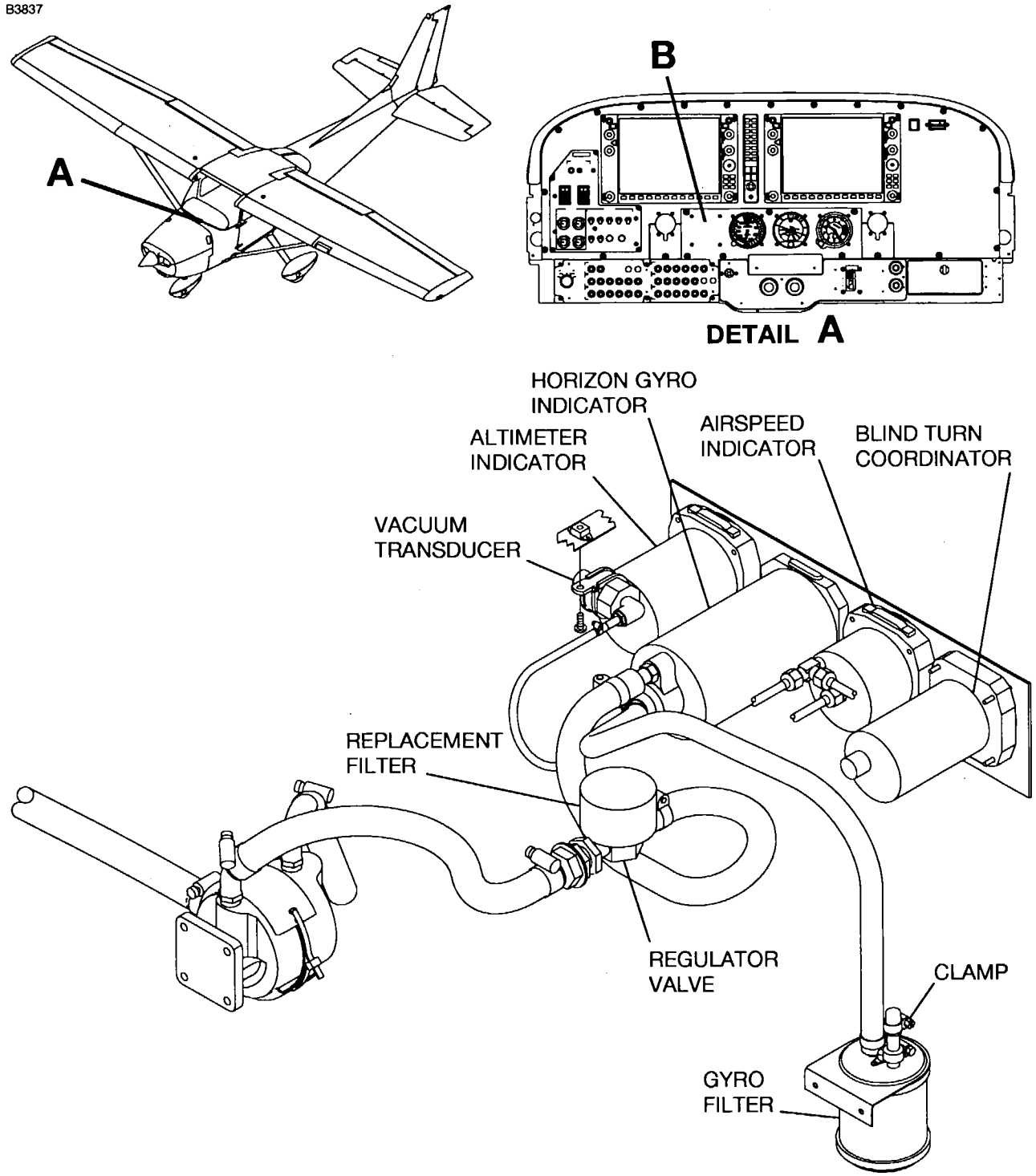

Attitude and Direction Instrument Installation (Airplanes with Garmin G1000)
Figure 202 (Sheet 1)

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(5) Disconnect the electrical connector from the horizon gyro.
(6) Put female plugs over the ports and put a connector cap on the electrical connector.
(7) Remove the screws that attach the horizon attitude gyro to the center pilot panel.

CAUTION: Put a cover on the applicable hose or port or on the applicable electrical connector when the gyroscopic instrument is out of the airplane or is to be shipped. Damage to the instrument will occur from foreign object debris if a cover is not used.

(8) Remove the horizon gyro from the airplane.

B. Horizon Gyro Installation (Refer to Figure 201 or Figure 202).

CAUTION: Do not remove the horizon attitude gyro from the box in which it was shipped until it is ready to be installed into the airplane. This will minimize the possibility of accidentally causing damage to the gyro.

CAUTION: Remove all plugs from the horizon attitude gyro before you install it in the airplane.

CAUTION: Be careful with the gyroscopic instruments. Do not drop, shake, bump or put on a hard surface. Use soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in it's initial condition as received from the manufacturer.

(1) Attach the horizon gyro to the center pilot panel with the screws.
(2) Make sure that the horizon altitude gyro is installed level in the panel.
(3) Remove the female plugs from the ports and remove the connector cap from the electrical connector.
(4) Make sure that the vacuum lines and the static lines have no kinks in them.
(5) Attach the applicable hoses to the horizon gyro and tighten the clamps.
(6) Attach the horizon gyro connector to the horizon gyro.
(7) Attach the center pilot panel with the screws.
(8) Tighten the screws in an opposite sequence.
(9) Put the MASTER switch and the AVIONICS switch in the ON position.
(10) Do an operational check of the horizon attitude gyro to make sure that it operates correctly.

7. Horizon Attitude Gyro Operational Check

A. Horizon Attitude Gyro Operational Check.
(1) Start the airplane engine.
(2) Let the engine run for no less than 3 minutes.
(3) Make sure that the vacuum gage shows between 4.5 and 5.5 inches Hg.
(4) Make sure that the horizon bar becomes stable at the correct position for the attitude of the airplane, or becomes stable at the correct position, begins to vibrate, and then slowly stops vibration altogether.
(5) Taxi in a straight line. Make sure that the horizon bar stays in the horizontal position while you taxi.
(6) Do a 360-degree turn. Do not turn sharply as you make the turn. Make sure that the horizon bar does not tip more than 4 degrees from the horizontal during the turn.
(7) If the horizontal gyro precession is more than 4 degrees from a heading in either direction during a 10-minute period, or does not operate within one or more of the limits given in steps 4 through 6 of this operational check, you must repair the system and/or replace the gyro.

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8. Directional Gyro Description and Operation

A. The vacuum system supplies the air flow necessary to move the gyro rotor in the directional gyro. Incorrect operation of the vacuum system will cause the horizon attitude gyro to operate incorrectly. Problems with the vacuum system can cause incorrect indication and decreased performance.

B. The directional gyro must have between 4.5 and 5.5 inches Hg of vacuum to operate correctly. With the correct vacuum applied, the gyro will get rated performance in a minimum of 3 minutes of rotor turn time.

C. The directional gyro rotor can continue to turn for approximately 15 minutes after the vacuum in the system is removed. It can show a change in the directional indication while the rotor speed decreases, or the directional gyro dial can start to turn. When fully stopped, the gyro rotor will not correctly indicate changes in the airplane's direction until the system starts again.

D. If a gyro has been stopped and started again before the rotor fully stops, more time will be necessary for the gyro to correctly indicate the directional changes of the airplane.

E. The permitted limit for directional gyro drift on the ground or in flight is 4 degrees from a fixed heading, during a 10-minute period.

F. Continuous turns around a point and/or banks of more than 55 degrees can cause the directional gyro to turn. This is a limit of the gyro and not a cause for removal.

9. Directional Gyro Removal and Installation (Airplanes without Garmin G1000)

A. Directional Gyro Removal (Refer to Figure 201).

CAUTION: Make sure that the gyro rotor has fully stopped before you move the instrument. The gyro rotor will not stop for approximately 15 minutes after the vacuum source is removed. Damage to the instrument will occur if the instrument is moved before the gyro rotor has stopped.

CAUTION: Be careful with the gyroscopic instruments. Do not hit, shake, or put the instruments on a hard surface. Put soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in its initial condition as received from the manufacturer.

(1) Put the MASTER switch and the AVIONICS switch in the off position.
(2) Remove the screws of the center pilot panel to get access to the back of the directional gyro.

CAUTION: Make sure that you put soft material between the directional gyro and the control column before you remove the gyro. If you put the sub panel on the control column without any protection, you can damage the directional gyro and/or the other instruments in the sub panel. Be very careful when you remove the sub panel so that you do not to hit the gyro.

(3) Put a label on the two hoses that are attached to the directional gyro.
(4) Loosen the clamps and remove the hoses from the directional gyro.
(5) Disconnect the gyro connector and electrical connector from the directional gyro.
(6) Put female plugs over the ports and put a connector cap on the electrical connector.
(7) Remove the directional gyro screws from the center pilot panel.

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CAUTION: Put a cover on the applicable hose or port or on the applicable electrical connector when the gyroscopic instrument is out of the airplane or is to be shipped. Damage to the instrument will occur from foreign object debris if a cover is not used.

(8) Remove the directional gyro from the airplane.

B. Directional Gyro Installation (Refer to Figure 201).

CAUTION: Do not remove the directional gyro from the box in which it was shipped until it is ready to be installed into the airplane. This will minimize the possibility of accidentally causing damage to the gyro.

CAUTION: Remove all plugs from the directional gyro before you install it in the airplane.

CAUTION: Be careful with the gyroscopic instruments. Do not drop, shake, bump or put on a hard surface. Use soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in it's initial condition as received from the manufacturer.

(1) Attach the directional gyro to the center pilot panel with the screws.
(2) Remove the female plugs from the ports and remove the connector cap from the electrical connector.
(3) Attach the applicable hoses to the directional gyro and tighten the clamps.
(4) Attach the electrical and gyro connectors to the directional gyro.
(5) Attach the center pilot panel with the screws.
(6) Put the MASTER switch and the AVIONICS switch in the ON position.
(7) Do a test of the directional gyro to make sure it operates correctly. Refer to Directional Gyro Operational Check.

10. Directional Gyro Operational Check

A. Directional Gyro Check (Refer to Figure 201).

NOTE: The permitted limit for gyro drift on the ground or in flight is 4 degrees from a fixed heading, during a 10-minute period.

(1) Start the airplane engine.
(2) Make sure that the vacuum system operates correctly.
  (a) The vacuum gage must show between 4.5 and 5.5 inches Hg.
(3) Let the directional gyro become stable for at least 3 minutes.
(4) If the directional gyro dial starts to turn, let the gyro become stable and then push the gyro-caging knob. If the gyro dial continues to turn, repair the system and/or replace the gyro.

NOTE: It is usual for the directional gyro dial to turn when the gyro becomes stable. This is not a cause for removal.

(5) Point the airplane's heading to the north.
(6) Set the directional gyro to the north.
(7) Make sure that the directional gyro dial drift is not more than 4 degrees in a 10-minute period.
(8) Do steps 5 through 7 again for each cardinal heading (North, West, South, and East).

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(9) If the directional gyro dial drift is not satisfactory at any heading, repair the system and/or replace the gyro.

NOTE: After you stop operation of the airplane, it is usual for the directional gyro dial to continue to turn. This is not a cause to remove the gyro.

11. Turn Coordinator Removal and Installation (Airplanes without Garmin G1000)

A. Turn Coordinator Removal (Refer to Figure 201).

CAUTION: Make sure that the gyro rotor has fully stopped before you move the instrument. The gyro rotor will not stop for approximately 15 minutes after the vacuum source is removed. Damage to the instrument will occur if the instrument is moved before the gyro rotor has stopped.

CAUTION: Be careful with the gyroscopic instruments. Do not hit, shake, or put the instruments on a hard surface. Put soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in its initial condition as received from the manufacturer.

(1) Put the MASTER switch and the AVIONICS switch in the off position.
(2) Remove the screws from the center pilot panel to get access to the turn coordinator.

CAUTION: Make sure that you put soft material between the turn coordinator and the control column before you remove the turn coordinator. If you put the sub-panel on the control column without any protection, you can damage the turn coordinator and/or the other instruments in the sub-panel. Be very careful when you remove the sub-panel so that you do not to hit the turn coordinator.

(3) Disconnect the turn coordinator connector and electrical connector from the turn coordinator.

CAUTION: Put a cover on the applicable electrical connector when the gyroscopic instrument is out of the airplane or is to be shipped. Damage to the instrument will occur from contamination if a cover is not used.

(4) Put connector caps on the turn coordinator avionics connector and electrical connector.
(5) Remove the screws that attach the turn coordinator to the center pilot panel.
(6) Remove the turn coordinator from the airplane.

B. Turn Coordinator Installation (Refer to Figure 201).

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CAUTION: Do not remove the turn coordinator from the box in which it was shipped until it is ready to be installed into the airplane. This will minimize the possibility of accidentally causing damage to the gyro.

CAUTION: Remove all plugs from the turn coordinator before you install it in the airplane.

CAUTION: Be careful with the gyroscopic instruments. Do not drop, shake, bump or put on a hard surface. Use soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in its initial condition as received from the manufacturer.

(1) Attach the turn coordinator to the center pilot panel with the screws.
(2) Remove the connector caps from the turn coordinator avionics connector and the electrical connector.
(3) Attach the turn coordinator connector and electrical connector to the turn coordinator.
(4) Install the center pilot panel with the screws.
(5) Put the MASTER switch and the AVIONICS switch in the ON position.
(6) Set the autopilot roll null (if autopilot is installed). Refer to Autopilot - Maintenance Practices.
(7) Do an operational check of the turn coordinator to make sure that it operates correctly.

12. Turn Coordinator Removal and Installation (Airplanes with Garmin G1000)

A. Turn Coordinator Removal (Refer to Figure 202).

CAUTION: Make sure that the gyro rotor has fully stopped before you move the instrument. The gyro rotor will not stop for approximately 15 minutes after the vacuum source is removed. Damage to the instrument will occur if the instrument is moved before the gyro rotor has stopped.

CAUTION: Be careful with the gyroscopic instruments. Do not hit, shake, or put the instruments on a hard surface. Use soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in its initial condition as received from the manufacturer.

(1) Put the MASTER switch and the AVIONICS switch in the off position.
(2) Remove the center instrument panel.
(3) Remove the screws that attach the turn coordinator to the center instrument panel.
(4) Move the turn coordinator aft to get access to the turn coordinator avionics connector.

CAUTION: Put a cover on the applicable electrical connector when the gyroscopic instrument is out of the airplane or is to be shipped. Damage to the instrument will occur from foreign object debris if a cover is not used.

(5) Disconnect the electrical connector and remove the turn coordinator from the airplane.
(6) Put connector caps on the electrical connector.

B. Turn Coordinator Installation (Refer to Figure 202).

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CAUTION: Do not remove the turn coordinator from the box in which it was shipped until it is ready to be installed into the airplane. This will minimize the possibility of accidentally causing damage to the gyro.

CAUTION: Remove all plugs from the turn coordinator before you install it in the airplane.

CAUTION: Be careful with the gyroscopic instruments. Do not drop, shake, bump or put on a hard surface. Use soft material between the gyroscopic instruments and any hard surface. Damage to the instruments will occur if the instruments are not carefully moved. The manufacturer's warranty can become void if the gyro is not kept in its initial condition as received from the manufacturer.

(1) Remove the connector caps from the electrical connector.
(2) Connect the electrical connector.
(3) Put the turn coordinator in position on the center instrument panel.
(4) Attach the turn coordinator with screws.
(5) Install the center instrument panel.
(6) Put the MASTER switch and the AVIONICS switch in the ON position.
(7) Set the autopilot roll null (if autopilot is installed). Refer to Autopilot - Maintenance Practices.
(8) Do an operational check of the turn coordinator to make sure that it operates correctly.

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COMPASS INSTALLATION - MAINTENANCE PRACTICES

1. General

A. A lighted, magnetic compass is installed on top of the glareshield at the airplane centerline.

2. Compass Removal/Installation

A. Remove Compass (Refer to Figure 201).
   (1) Remove screws securing compass to compass base.
   (2) Disconnect electrical connector.

B. Install Compass (Refer to Figure 201).
   (1) Connect electrical connector.
   (2) Secure compass to compass base with screws.
   (3) Check compass accuracy on compass rose.

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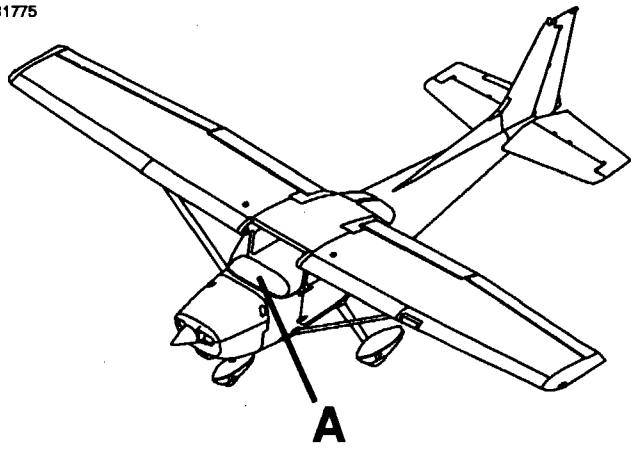
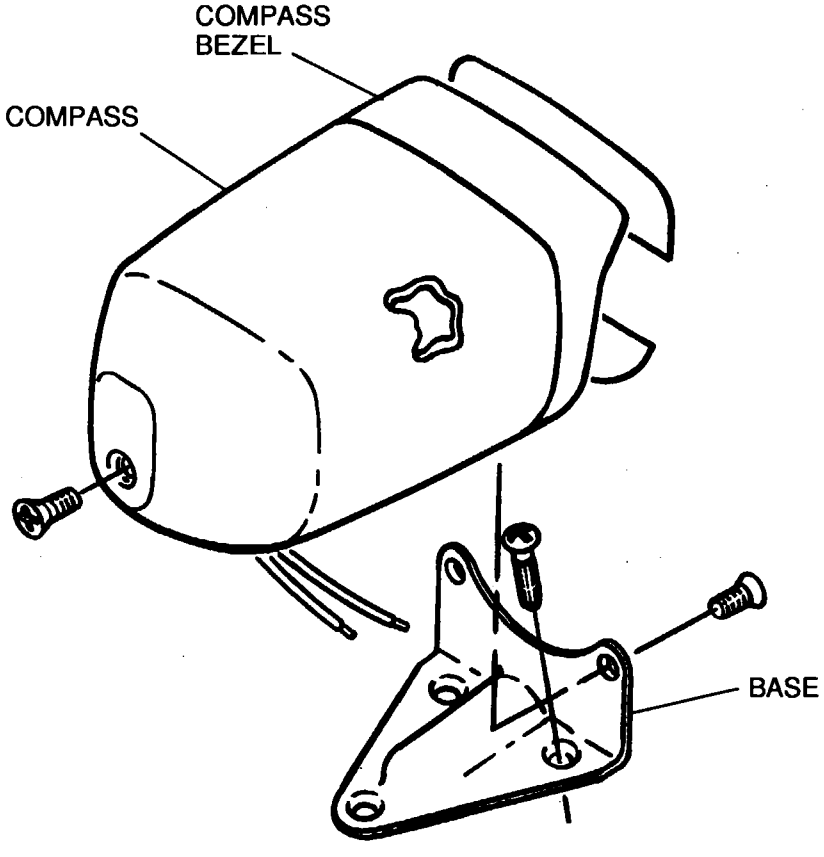
B1775





DETAIL A

0510T1007
A0514T1007

Compass Installation
Figure 201 (Sheet 1)

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MAGNETOMETER - MAINTENANCE PRACTICES

1. General

A. On airplanes with Garmin G1000, the GMU 44 magnetometer senses magnetic field information. The data is used by the GRS 77 AHRS to find aircraft magnetic heading.

B. Maintenance practices give procedures for the removal and installation of the GMU 44 magnetometer. The unit is removed and installed through an access panel on the bottom side of the left wing.

C. Maintenance practices also give procedures for the AHRS and magnetometer checkout.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. GMU 44 Magnetometer Removal/Installation

A. Remove the Magnetometer (Refer to Figure 201).
(1) Put the MASTER switch in the off position.
(2) Put the AVIONICS switch in the off position.

CAUTION: Do not use magnetized tools or screws around the magnetometer. Use of magnetized tools or screws can cause an incorrect heading indication.

(3) Remove access plate 520HB to get access to the magnetometer. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(4) Remove the screws that attach the magnetometer to the flux detector bracket.
(5) Disconnect the electrical connector.

B. Install the Magnetometer (Refer to Figure 201).

NOTE: If a new unit is installed, the software must be loaded.

(1) Make sure the electrical connector and connector pins have no damage.
(a) Replace the electrical connector or connector pins if applicable. Refer to the Model 172 Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.
(2) Connect the electrical connector.
(3) Attach the magnetometer to the flux detector bracket with the screws.
(a) Put the magnetometer in position on the flux detector bracket, temporarily aligned parallel to the longitudinal axis of the airplane.
(4) If a new unit is installed, load the software. Refer to the Garmin G1000 Line Maintenance Manual.
(5) Do the calibration procedure. Refer to the Garmin G1000 Line Maintenance Manual.
(6) Install access plate 520HB. Refer to Chapter 6, Access/Inspection Plates - Description and Operation.
(7) Do a check to make sure the magnetometer operates correctly. Refer to the Garmin G1000 Line Maintenance Manual and Chapter 34, Attitude Heading Reference System (AHRS) - Maintenance Practices, AHRS and Magnetometer Checkout Procedure.

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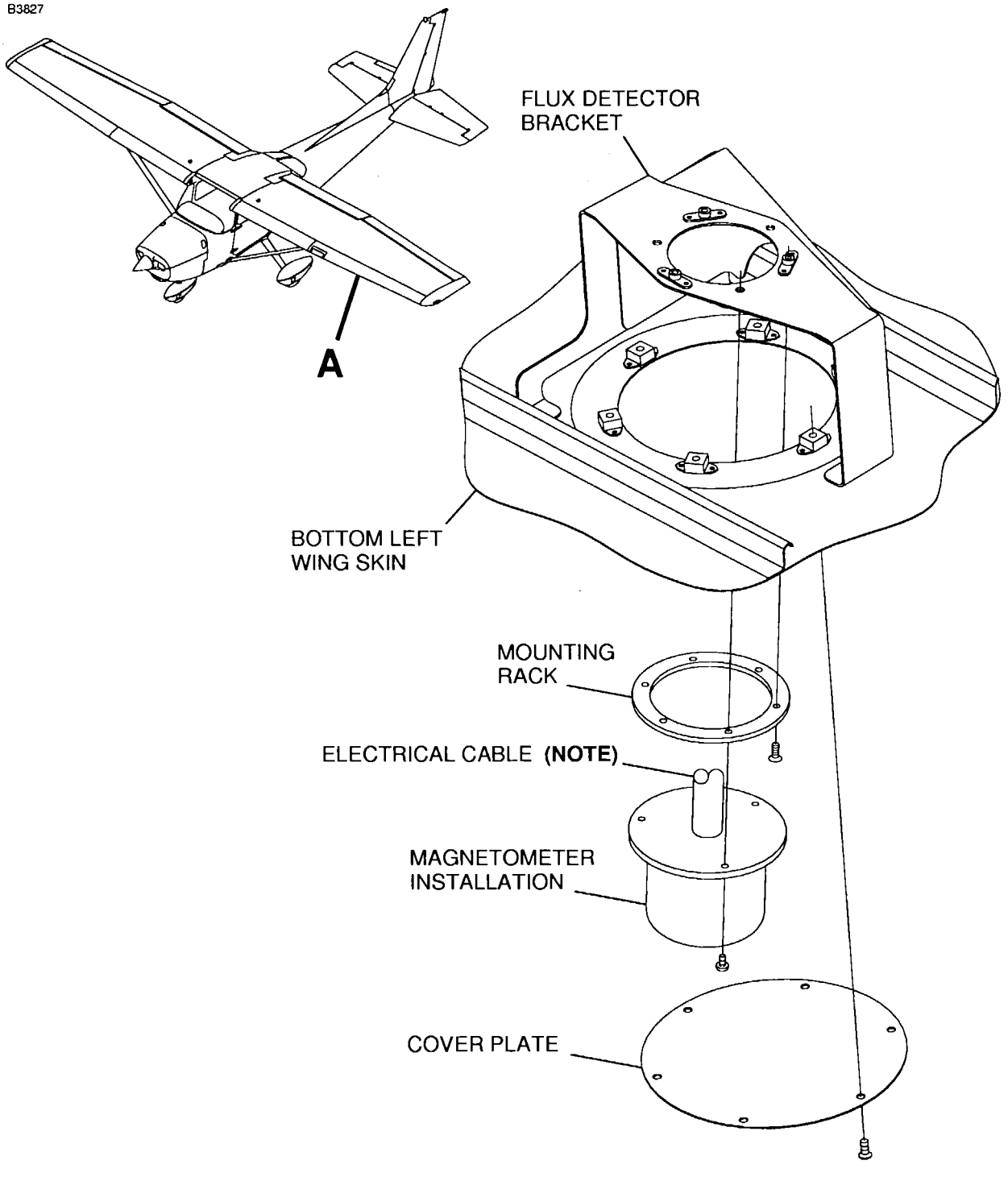

NOTE: ELECTRICAL CABLE THAT EXTENDS TO ELECTRICAL CONNECTOR. (PL302)

DETAIL A

0510T1007
A0518T1110

Magnetometer Installation
Figure 201 (Sheet 1)

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ATTITUDE HEADING REFERENCE SYSTEM (AHRS) - MAINTENANCE PRACTICES

1. General

A. On airplanes with Garmin G1000, the GRS 77 AHRS is an attitude, heading, and reference unit that gives airplane attitude and flight characteristics information to the Primary Flight Display (PFD) and Multi-Functin Display (MFD) and the GIA 63 Integrated Avionics Units. The unit has advanced tilt sensors, accelerometers, and rate sensors. In addition, the GRS 77 AHRS interfaces with both the GDC 74A Air Data computer and the GMU 44 Magnetometer. The GRS 77 AHRS also utilizes GPS signals sent from the GIA 63.

B. Maintenance practices give procedures for the removal and installation of the GRS 77 AHRS. The unit is in the tailcone.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. GRS 77 AHRS Removal/Installation

NOTE: If the mounting bolts that attach the mounting rack to the airplane structure are loosened after post-calibration has been completed, the GRS 77 AHRS must be calibrated.

A. Remove the AHRS unit (Refer to Figure 201).
   (1) Make sure the MASTER and AVIONICS switches are in the off position.
   (2) Remove the aft seat to get access to the AHRS unit. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
   (3) Remove the baggage compartment closeout to get access to the AHRS unit. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (4) Disconnect the electrical connector.
   (5) Remove the screws that attach the AHRS unit to the mounting tray.

B. Install the AHRS unit (Refer to Figure 201).

NOTE: If a new AHRS unit is installed, the software must be loaded.

NOTE: If the mounting bolts that attach the mounting rack to the airplane structure are loosened after post-calibration has been completed, the GRS 77 AHRS must be calibrated.

   (1) Make sure the electrical connector and connector pins have no damage.
      (a) Replace the electrical connector or connector pins if applicable. Refer to the Model 172 Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.
   (2) Put the AHRS unit in position in the mounting tray.
   (3) Attach the AHRS unit with the screws.
   (4) Connect the electrical connector.
   (5) Install the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (6) Install the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
   (7) Make sure the AHRS unit operates correctly.
      (a) If the mounting bolts that attach the mounting rack to the airplane structure have been loosened after post-calibration has been completed, calibrate the AHRS unit. Refer to the Garmin Line Maintenance Manual.
      (b) If a new unit is installed, load the software. Refer to the Garmin G1000 Line Maintenance Manual.
      (c) Do a check to make sure the AHRS operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

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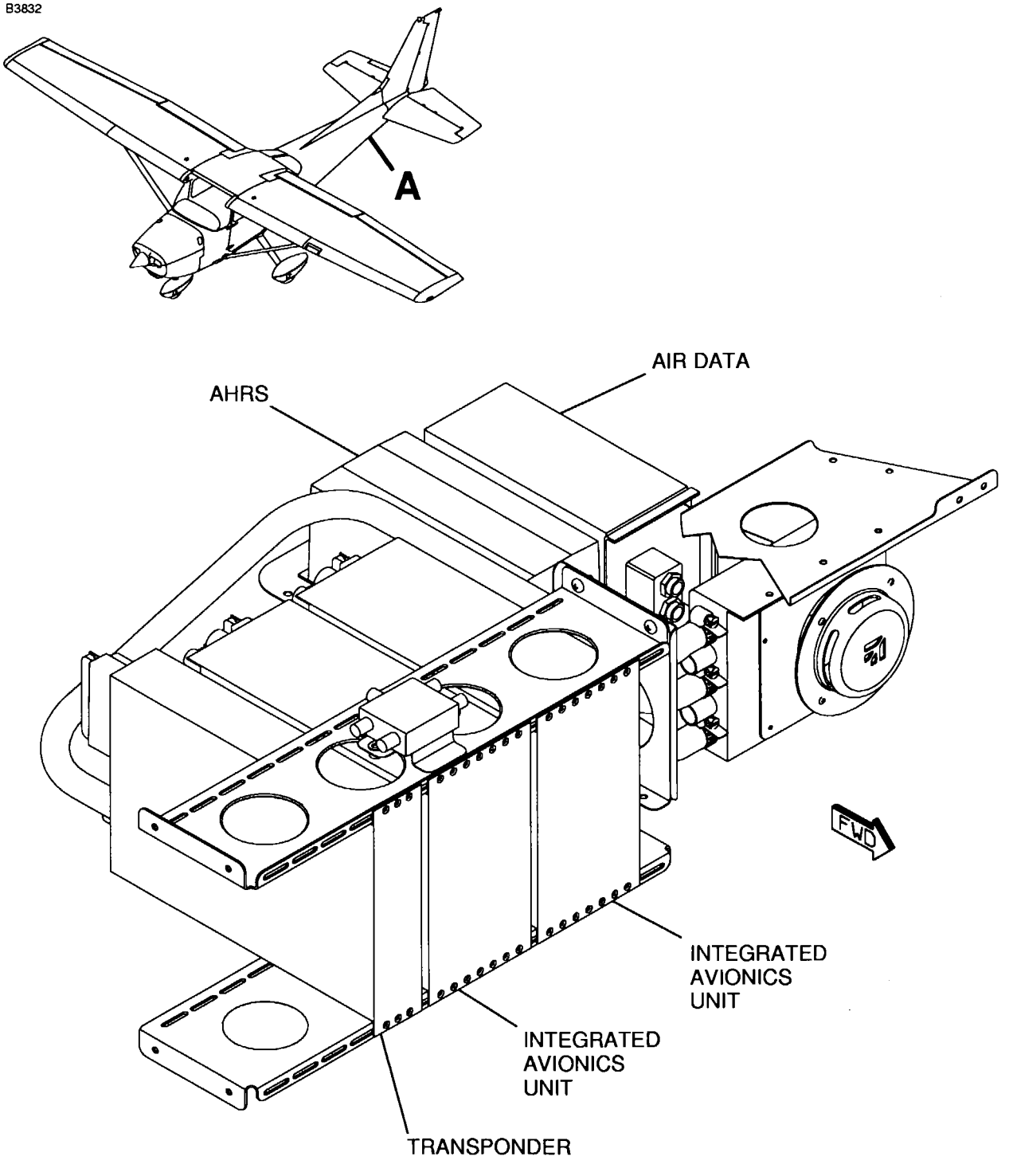

DETAIL A

AIRPLANES THAT HAVE
THE GARMIN G1000

0510T1007
A0518T1103

Forward Avionics Equipment Installation
Figure 201 (Sheet 1)

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4. AHRS and Magnetometer Checkout Procedure

A. Checkout Instructions

NOTE: The installation and verification of the system software must be completed before the AHRS and magnetometer checks can be done.

(1) Use the Garmin GRS 77/GMU 44 Installation Manual (P/N 190-00303-10) to do the check.

B. Post Installation Calibration Procedures

(1) Read Section 5.2 in the Garmin GRS 77/GMU 44 Installation Manual (P/N 190-00303-10).

NOTE: The Garmin Calibration Procedures A-1, B, and D must be fully completed.

(2) Do the Calibration Procedure A-1 in Section 5.3 of the Garmin GRS 77/GMU 44 Installation Manual.
   (a) Make the wings level to 0 degrees, +0.25 or -0.25 degrees. Refer to Chapter 8, Leveling - Maintenance Practices.
   (b) Make the airplane nose up 2 degrees, +0.25 or -0.25 degrees. Refer to Chapter 8, Leveling - Maintenance Practices.
   (c) Do the calibration procedure.

(3) Do the Calibration Procedure B in Section 5.5 of the Garmin GRS 77/GMU 44 Installation Manual.

(4) Do the Calibration Procedure D in Section 5.7 of the Garmin GRS 77/GMU 44 Installation Manual.

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MARKER BEACON - MAINTENANCE PRACTICES

1. General

A. Maintenance practices have procedures for the removal and installation of the audio panel and marker beacon antenna.

2. Audio Panel Removal/Installation

A. For removal and installation of the audio panel, refer to Chapter 23, Audio Panel - Maintenance Practices.

3. Marker Beacon Antenna Removal/Installation

A. Remove the Marker Beacon Antenna (Refer to Figure 201).
   (1) Make sure the AVIONICS and MASTER switches are in the off position.
   (2) Remove the baggage compartment lower access panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (3) Remove the aft floorboard access/inspection plate to get access to the marker beacon antenna.
   (4) Disconnect the coaxial cable from the antenna.

CAUTION: Be careful when you remove the screws from the antenna. It can fall to the ground and as a result, be damaged.

   (5) Remove the screws that attach the antenna to the bottom of the fuselage.

B. Install the Marker Beacon Antenna (Refer to Figure 201).
   (1) Put the marker beacon antenna in position on the bottom of the fuselage.
   (2) Attach the antenna with the screws.
   (3) Attach the coaxial cable to the antenna.
   (4) Install the access/inspection plate to the floor of airplane.
   (5) Install the baggage compartment lower access panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

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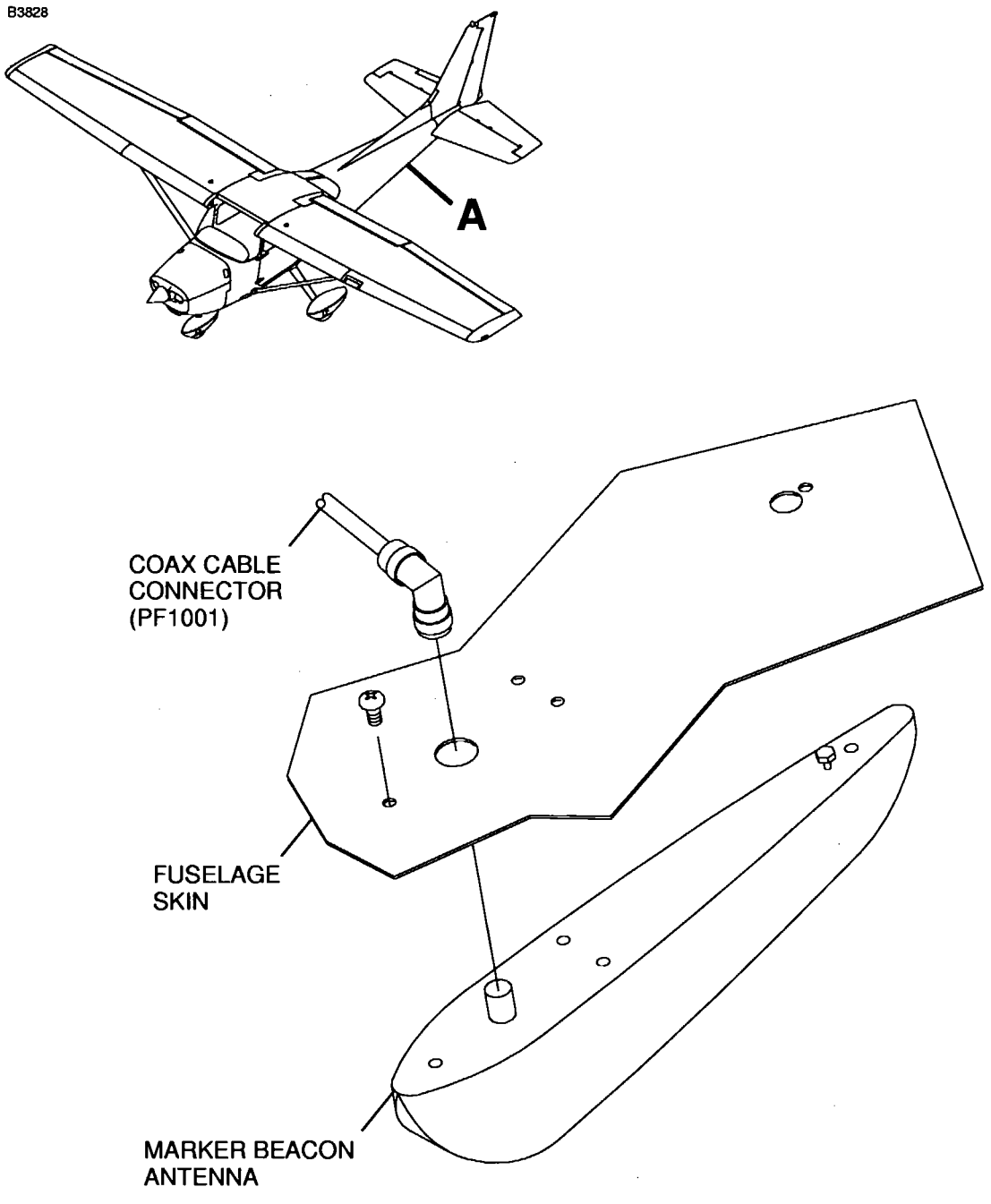

DETAIL A

0510T1007
A0518T1035

Marker Beacon Antenna
Figure 201 (Sheet 1)

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NAV/COM - MAINTENANCE PRACTICES

1. General

A. Nav/Com maintenance practices is primarily concerned with navigation hardware removal/installation. For removal/installation of the KX155A radio, refer to Chapter 23, Communications - Maintenance Practices.

CAUTION: Do not interchange the KX-155A and KX-165A NAV/COM Radios. You can cause damage to the NAV/COM Radio.

2. Nav Antenna Removal/Installation

A. Remove Nav Antenna (Refer to Figure 201).
   (1) Remove boots over antenna rods.
   (2) Remove antenna rods by threading from base.
   (3) Remove fin cap assembly.
   (4) Remove screws securing antenna base to vertical fin.
   (5) Remove antenna base and disconnect coax connector.

B. Install Nav Antenna (Refer to Figure 201).
   (1) Connect coax connector to antenna base.
   (2) Secure antenna base to vertical fin with screws.
   (3) Install fin cap assembly.
   (4) Thread antenna rods into base.
   (5) Install boots over antenna rods.

3. Nav Antenna Coupler Removal/Installation

A. Remove Nav Antenna Coupler (Refer to Figure 201).
   (1) Label and disconnect antenna coax connectors from nav antenna coupler.
   (2) Remove screws securing nav antenna coupler to fuselage.
   (3) Remove nav antenna coupler.

B. Install Nav Antenna Coupler (Refer to Figure 201).
   (1) Place nav antenna coupler on fuselage and secure with screws.
   (2) Connect antenna coax connectors to nav antenna coupler.

4. Nav Indicator Removal/Installation

A. Remove Nav Indicator.
   (1) Remove screws securing right instrument sub-panel to instrument panel.
   (2) Disconnect electrical connector from nav indicator.
   (3) Remove screws securing nav indicator to right instrument sup-panel.
   (4) Remove nav indicator.

B. Install Nav Indicator.
   (1) Place nav indicator on right instrument sub-panel and secure with screws.
   (2) Install electrical connector to nav indicator.
   (3) Secure right instrument sub-panel to instrument panel with screws.

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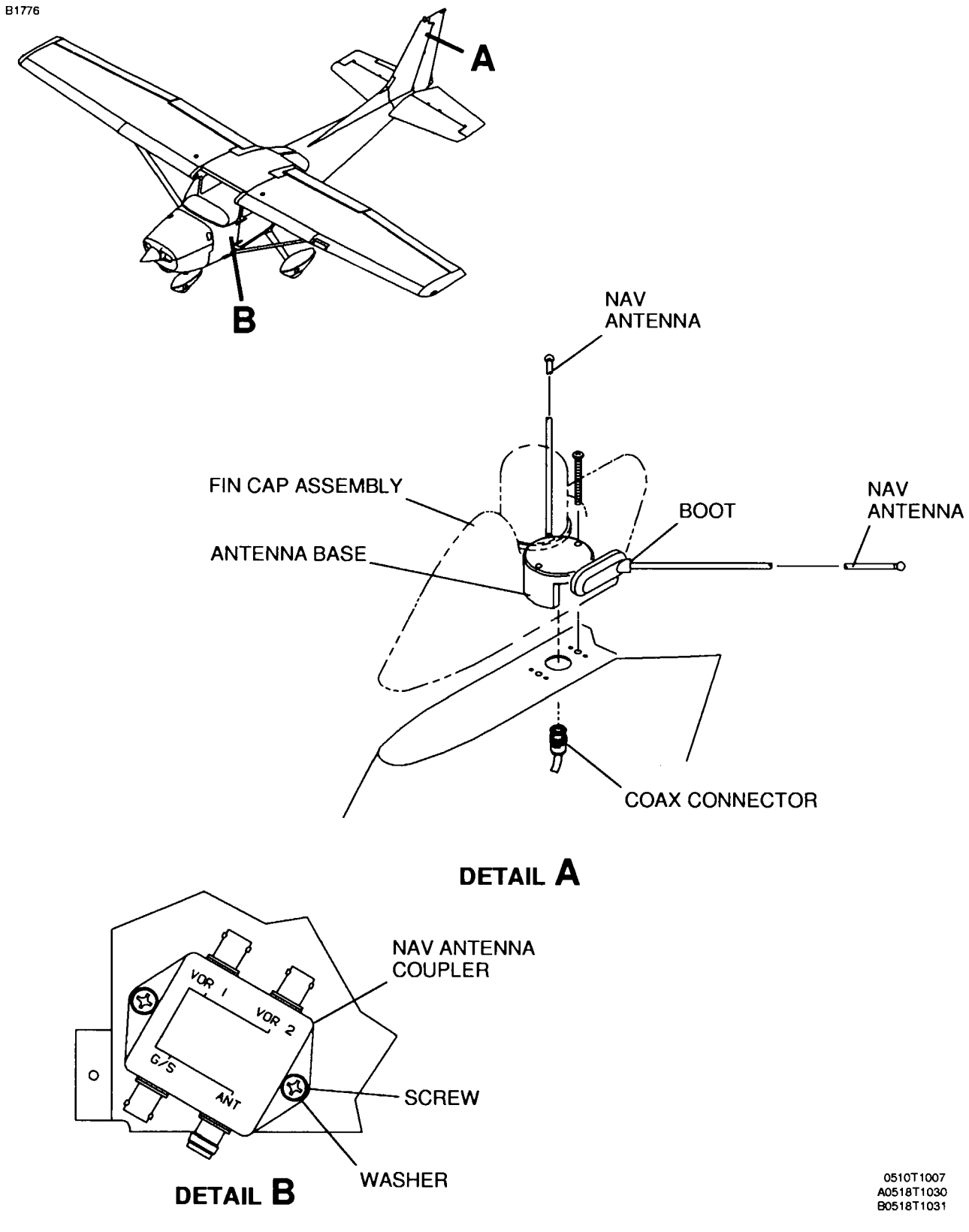

Nav Antenna Installation
Figure 201 (Sheet 1)

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GIA 63 INTEGRATED AVIONICS INSTALLATION - MAINTENANCE PRACTICES

1. General

A. Two GIA 63 Integrated Avionics Units (IAU's) are on the avionics shelf in the tailcone.

B. The units have the communication and navigation receiver/transmitter components to operate the GPS, NAV, COM, and Glideslope functions. The GIA 63W has the Wide Area Augmentation System (WAAS) installed. The units are integrated components of the Garmin G1000 avionics system.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. GIA 63 Integrated Avionics Unit Removal/Installation

A. Remove the Integrated Avionics Unit.
(1) Refer to Chapter 23, Communications - Maintenance Practices

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GPS - MAINTENANCE PRACTICES

1. General

A. The KLN89B or the optional KLN94GPS is installed in the avionics panel radio rack. The GPS antenna is mounted above the cabin, in the general proximity of the comm antennas.

2. GPS Removal/Installation

A. Remove GPS (Refer to Figure 201).
   (1) Loosen single locking screw located in recessed hole on face of receiver.
   (2) Pull GPS from radio rack.

B. Install GPS (Refer to Figure 201).
   (1) Place GPS in radio rack and slide forward, engaging fixed electrical plug.
   (2) Tighten single locking screw located in recessed hole on face of receiver.

3. GPS Antenna Removal/Installation

A. Remove GPS Antenna (Refer to Figure 201).
   (1) Remove screws securing GPS antenna to fuselage skin.
   (2) Disconnect coax connector from GPS antenna.
   (3) Remove antenna and gasket.

B. Install GPS Antenna (Refer to Figure 201).
   (1) Place GPS antenna gasket in position on fuselage skin.
   (2) Connect coax connector to GPS antenna.
   (3) Secure GPS antenna to fuselage skin with screws.

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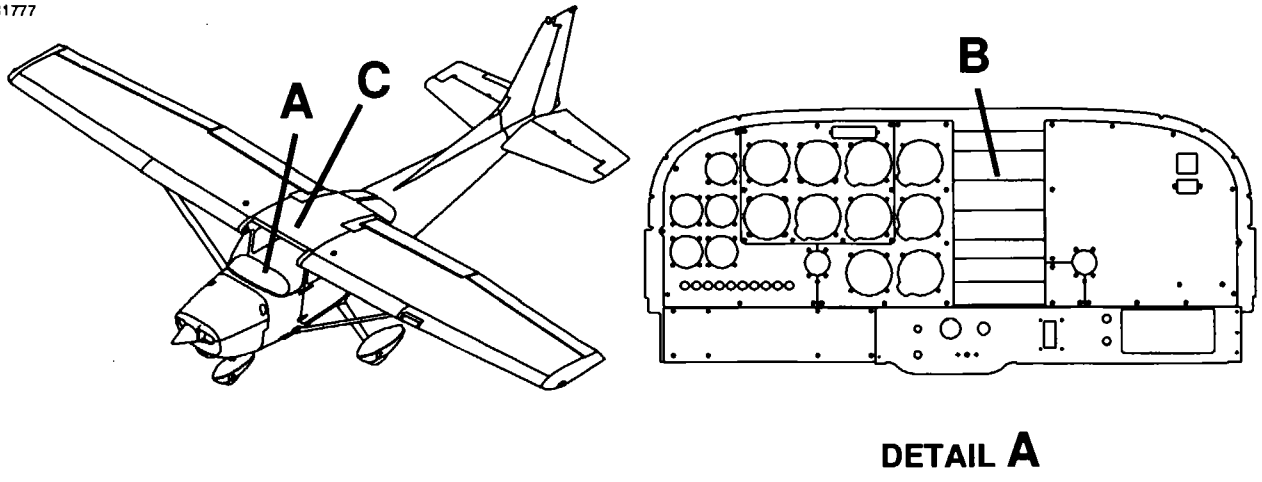
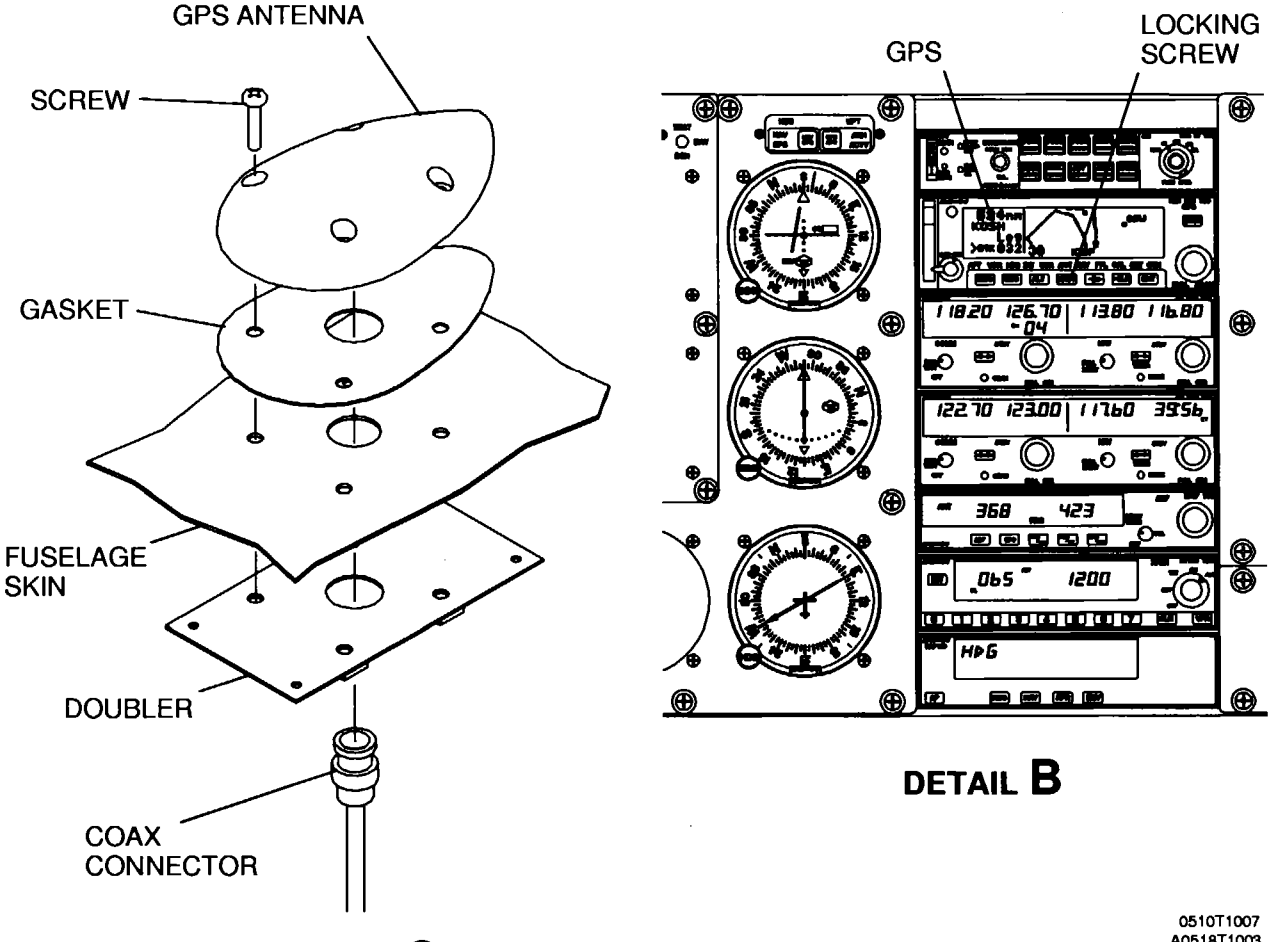


DETAIL A



DETAIL C

DETAIL B

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GPS Installation
Figure 201 (Sheet 1)

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KR-87 ADF SYSTEM - MAINTENANCE PRACTICES

1. General

A. This section gives removal and installation procedures for the KI-227 Automatic Direction Finder (ADF) indicator, KR-87 ADF receiver, and KA-44B ADF antenna.

B. On airplanes without Garmin G1000, the KR-87 ADF receiver is installed in the avionics panel radio rack. The ADF antenna is installed on the bottom fuselage below the cabin. Use the KR-87 ADF receiver to tune the KR-87 system. Indications are shown on the KI-227 ADF indicator, located to the left of the receiver.

C. On airplanes with Garmin G1000, the KR-87 ADF receiver is installed on the instrument panel to the right of the Multi-Function Display (MFD). The ADF antenna is installed along the bottom fuselage centerline under the cabin. To tune the KR-87 ADF system, use the KR-87 ADF receiver. All indications are shown on the G1000 Primary-Flight Display (PFD).

2. KR-87 ADF Receiver Removal/Installation (Airplanes without Garmin G1000)

A. ADF Receiver Removal (Refer to Figure 201).
(1) Remove electrical power from the airplane and turn the master switch to off. Disengage the ADF circuit breaker on the avionics circuit breaker panel.
(2) Loosen the single locking screw that is in the recessed hole on the face of the receiver.
(3) Pull the ADF receiver from the radio rack and remove from airplane.

B. ADF Receiver Installation (Refer to Figure 201).
(1) Put the ADF receiver in the radio rack and slide it forward to engage the fixed electrical plug.
(2) Tighten the single locking screw that is in the recessed hole on the face of the receiver.
(3) Connect electrical power to the airplane as needed and turn the master switch to ON. Engage the ADF circuit breaker on the avionics circuit breaker panel.
(4) Do an operational test of the ADF receiver.
(5) Remove electrical power from the airplane and turn the master switch to off. Disengage the ADF circuit breaker on the avionics circuit breaker panel.

3. KR-87 ADF Receiver Removal/Installation (Airplanes with Garmin G1000)

A. ADF Receiver Removal (Refer to Figure 202).
(1) Remove electrical power from the airplane and turn the master switch to off. Disengage the ADF circuit breaker on the avionics circuit breaker panel.
(2) Loosen the single locking screw that is in the recessed hole on the face of the receiver.
(3) Carefully pull the ADF receiver and the bezel from the instrument panel to disengage the electrical connector (P1602) from the ADF receiver.
(4) Remove the ADF receiver, with the bezel, from the airplane.

B. ADF Receiver Installation (Refer to Figure 202).
(1) Carefully put the bezel on the rear of the ADF receiver and pull it forward until it is in position directly behind the face of the ADF receiver.
(2) Put the ADF receiver in position in the instrument panel and pull it forward to engage the electrical connector (P1602) with the ADF receiver.
(3) Tighten the single locking screw located in the recessed hole on the face of the receiver.
(4) Connect electrical power to the airplane as needed and turn the master switch to ON. Engage the ADF circuit breaker on the avionics circuit breaker panel.
(5) Do an operational test of the ADF receiver.
(6) Remove electrical power from the airplane and turn the master switch to off. Disengage the ADF circuit breaker on the avionics circuit breaker panel.

4. KA-44B ADF Antenna Removal/Installation (For Airplanes With or Without Garmin G1000)

A. ADF Antenna Removal (Refer to Figure 201).
(1) Remove electrical power from airplane and turn the master switch to off.
(2) Remove the screws that attach the ADF antenna to the fuselage skin.

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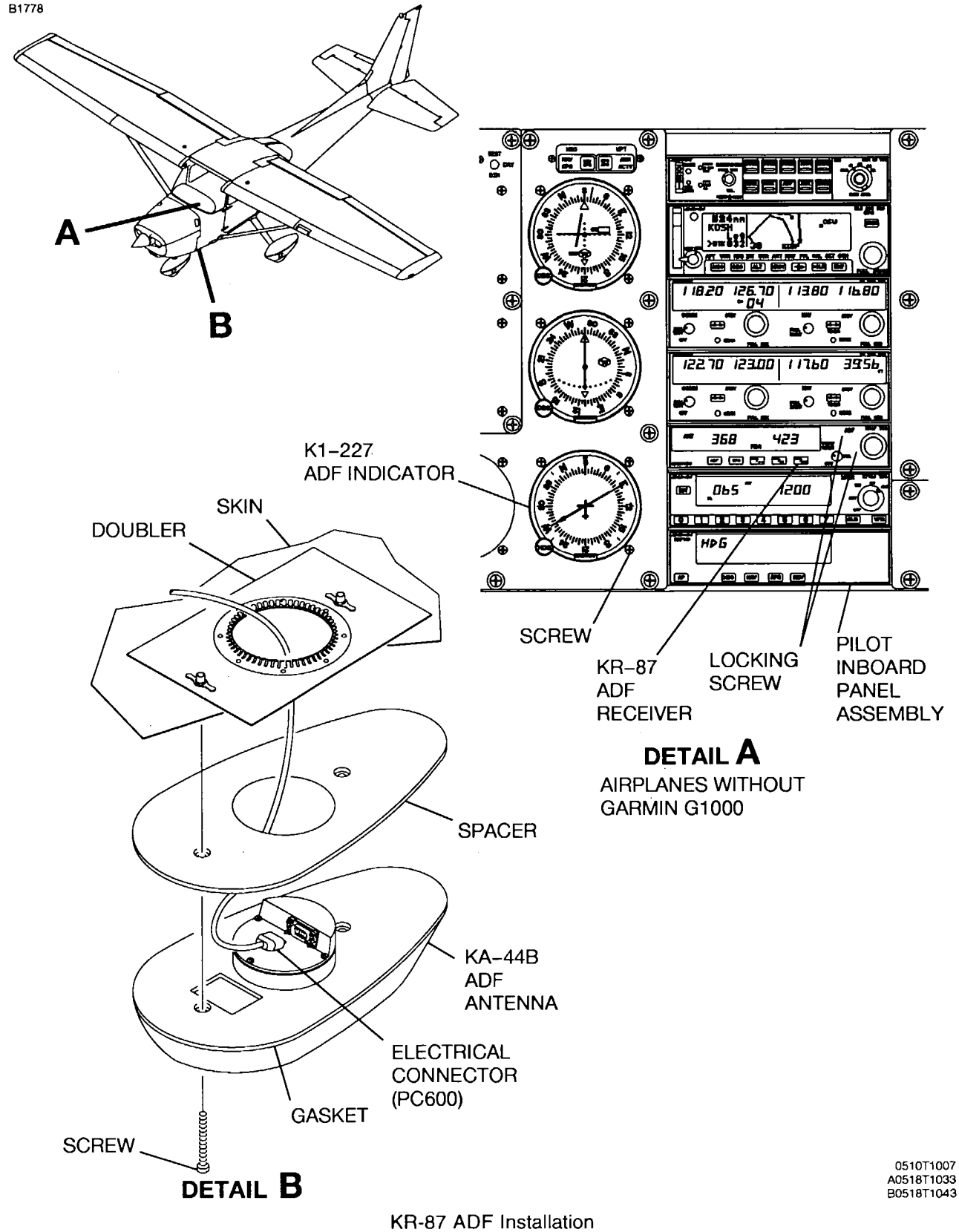

KR-87 ADF Installation
Figure 201 (Sheet 1)

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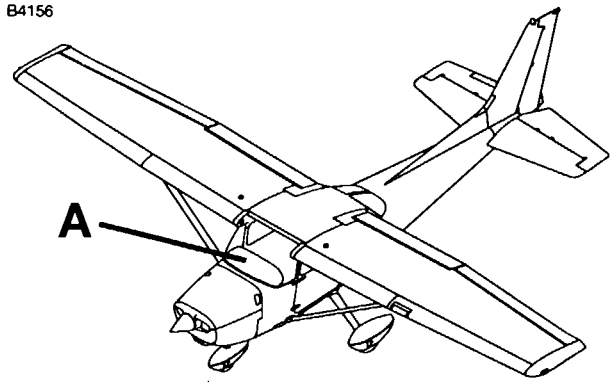

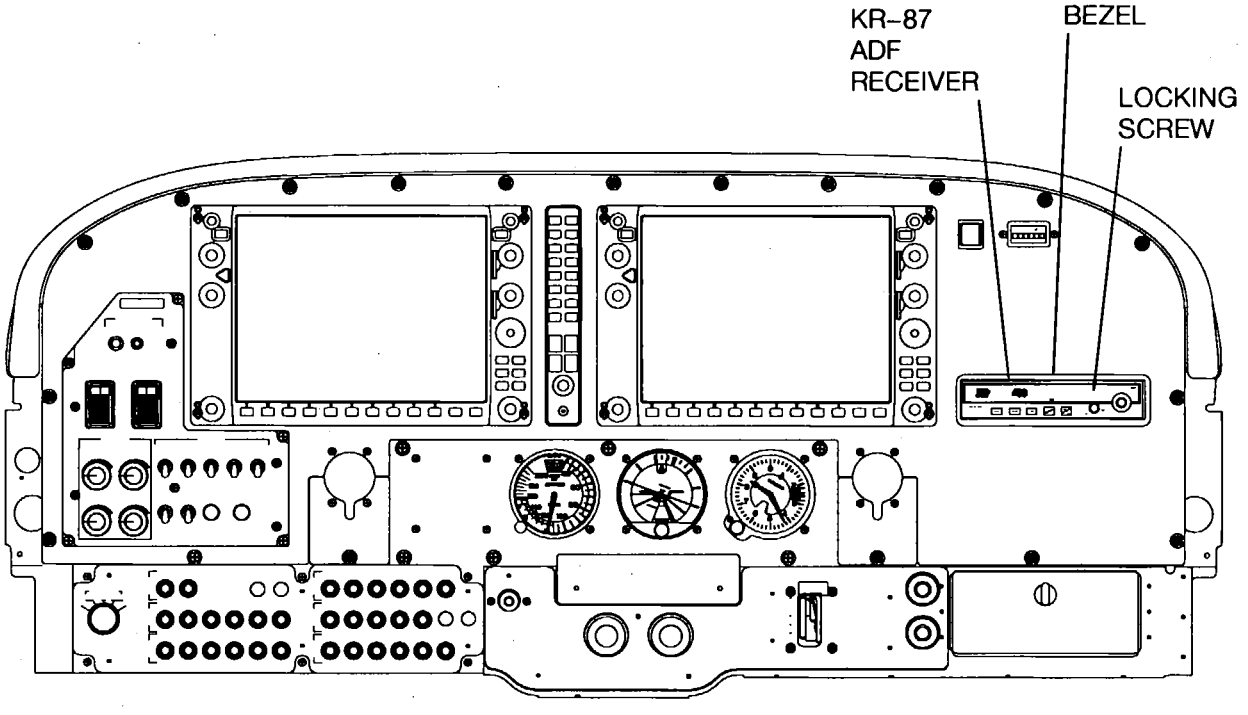

DETAIL A

AIRPLANES WITH THE
GARMIN G1000

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KR-87 ADF Installation
Figure 202 (Sheet 1)

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(3) Disconnect the antenna connector (PC600) from the ADF antenna.
(4) Remove the antenna and the gasket.

B. ADF Antenna Installation (Refer to Figure 201).
(1) Connect the electrical connector (PC600) to the ADF antenna.
(2) Attach the ADF antenna to the fuselage skin with the screws.

5. KI-227 ADF Indicator Removal/Installation

A. ADF Indicator Removal (Refer to Figure 201).
(1) Remove electrical power from airplane and set the MASTER switch to the off position.
(2) Remove the inboard pilot panel assembly to gain access to the ADF indicator. Refer to Chapter 31, Instrument and Control Panels - Maintenance Practices.
(3) Disconnect the electrical connector (P1603) from the ADF indicator.
(4) Remove the screws that attach the ADF indicator to the inboard pilot panel assembly.
(5) Remove the ADF indicator from the airplane.

B. ADF Indicator Installation (Refer to Figure 201).
(1) Put the ADF indicator on the inboard pilot panel assembly and attach with the screws.
(2) Connect the electrical connector (P1603) to the ADF indicator.
(3) Attach the inboard pilot panel assembly to the structure with the screws. Refer to Chapter 31, Instrument and Control Panels - Maintenance Practices.
(4) Connect power and set the MASTER switch to the ON position.

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KT76C TRANSPONDER - MAINTENANCE PRACTICES

1. General

A. The KT76C transponder is in the avionics panel radio rack. The transponder antenna is on the bottom of the cabin forward of the baggage area.

2. Transponder Removal/Installation

A. Remove the Transponder (Refer to Figure 201).
   (1) Loosen the locking screw found in the recessed hole on the face of the receiver.
   (2) Pull the transponder from the radio rack.

B. Install the Transponder (Refer to Figure 201).
   (1) Put the transponder in the radio rack and move it forward to engage the electrical plug.
   (2) Tighten the locking screw found in the recessed hole on the face of the receiver.

3. Transponder Antenna Removal/Installation

A. Remove the Transponder Antenna (Refer to Figure 201).
   (1) Remove the aft cabin panel to get access to the tailcone and transponder antenna.
   (2) Remove the nuts and washers that attach the transponder antenna to the tailcone.
   (3) From outside the airplane, disconnect the coax connector.

B. Install the Transponder Antenna (Refer to Figure 201).
   (1) From outside the airplane, connect the coax connector to the transponder antenna.
   (2) From the tailcone, put the antenna studs through the mounting holes and attach with the nuts and washers.

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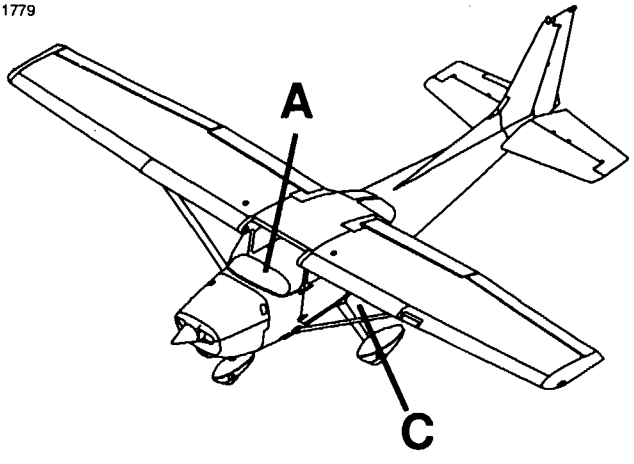

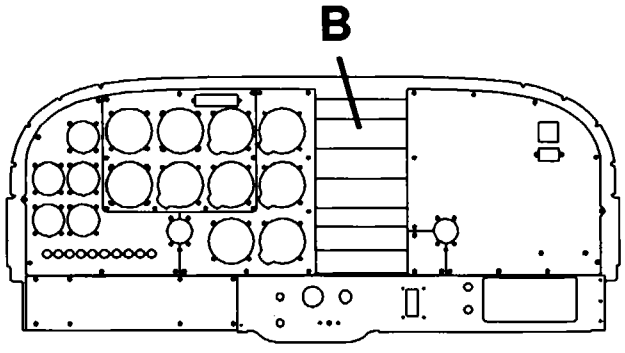

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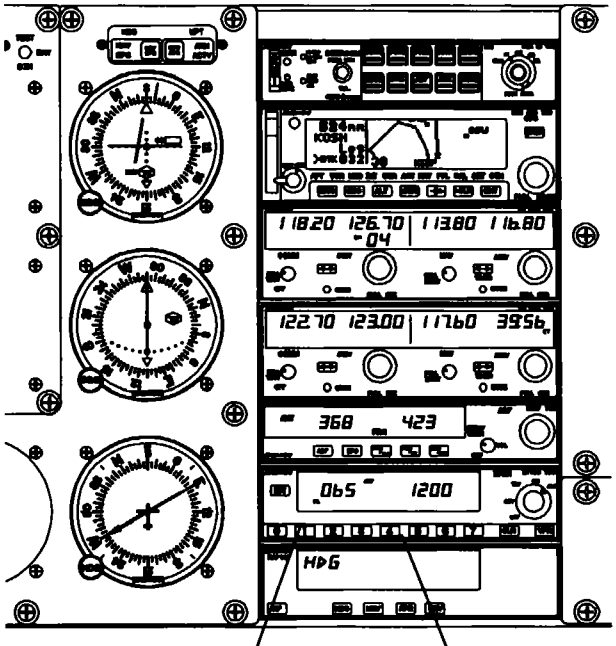
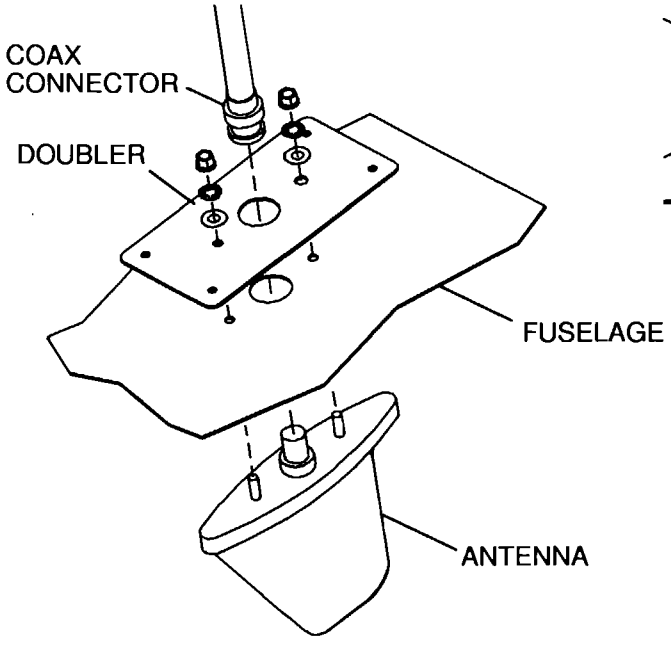


DETAIL B



DETAIL C

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Transponder Installation
Figure 201 (Sheet 1)

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KT-73 MODE S TRANSPONDER - MAINTENANCE PRACTICES

1. General

A. The KT-73 (Mode S) transponder is installed in the avionics-panel radio mounting rack. The CI-105 transponder antenna is installed on the bottom of the fuselage. For removal and installation procedures on the CI-105 transponder antenna, refer to Chapter 34, KT-76C Transponder - Maintenance Practices.

2. KT-73 Mode S Transponder Removal and Installation

A. KT-73 Transponder Removal (Refer to Figure 201).
(1) Disconnect the main battery. Refer to Chapter 24, Battery - Maintenance Practices.
(2) Turn the single hex-screw counterclockwise.

NOTE: The hex screw is in the recessed hole on the face of the transponder.

(3) Remove the single hex screw from the transponder.
(4) Pull the transponder from the radio mounting rack.
(5) Disconnect the coaxial cable and electrical connector from the transponder.
(6) Remove the transponder from the airplane.

B. KT-73 Transponder Installation (Refer to Figure 201).
(1) Put the transponder in the avionics radio mounting rack.
(2) Connect the electrical connector and the coaxial cable.
(3) Put the single hex screw in the recessed hole on the face of the transponder and turn it clockwise until it is tight.
(4) Do a test of the KT-73 transponder.

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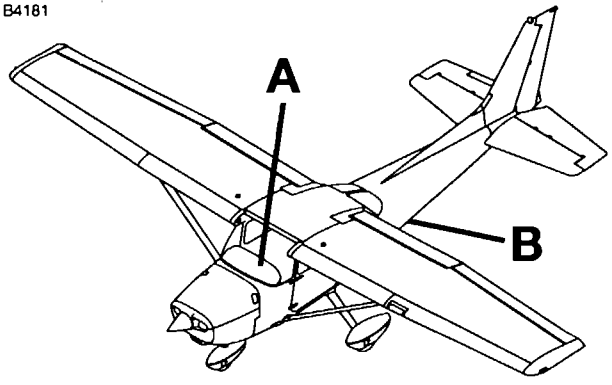
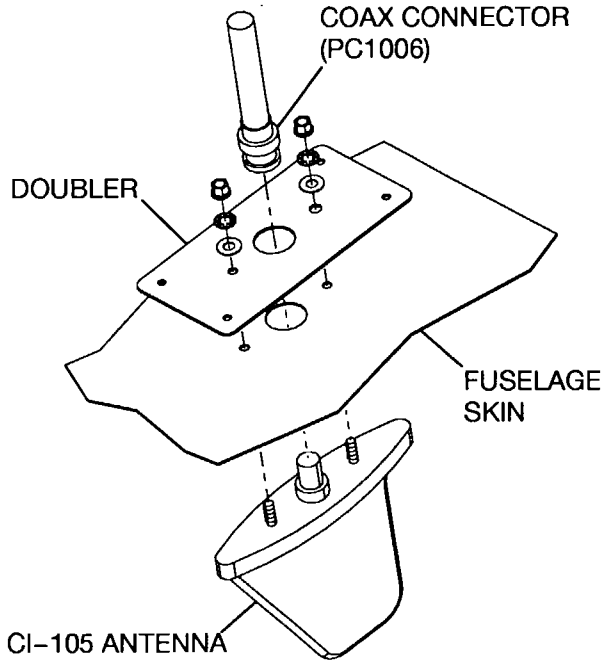
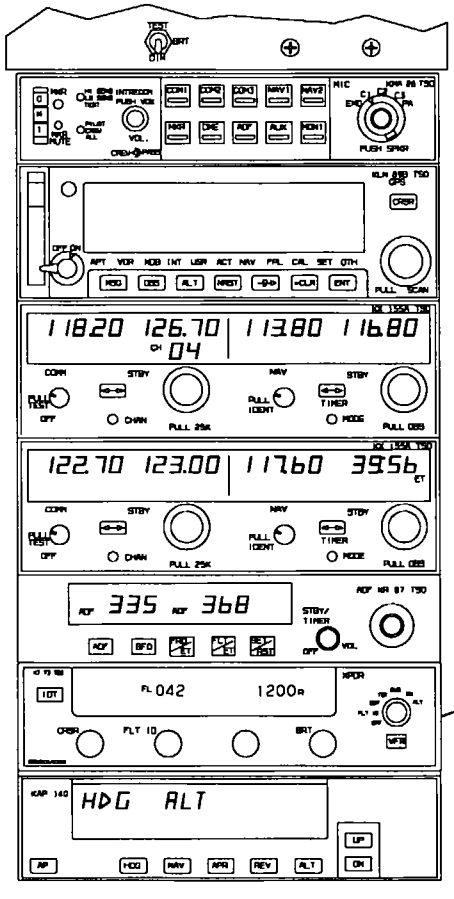




DETAIL B



DETAIL A

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KT-73 Mode S Transponder Installation
Figure 201 (Sheet 1)

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GTX 33 TRANSPONDER - MAINTENANCE PRACTICES

1. General

A. On airplanes with Garmin G1000, the GTX 33 Transponder is a solid-state Mode-S transponder that gives Mode A, C, and S functions. Control and operation is through the Primary Flight Display (PFD). The transponder speaks with the GIA 63 Integrated Avionics Units.

B. Maintenance practices give procedures for the removal and installation of the transponder. The transponder is in the tailcone.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. GTX 33 Transponder Removal/Installation

A. Remove the GTX 33 Transponder (Refer to Figure 201).
   (1) Put the MASTER switch to the off position.
   (2) Put the AVIONICS switch to the off position.
   (3) Remove the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
   (4) Remove the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (5) Disconnect the duct from the aft side of the unit. Refer to Avionics Cooling - Maintenance Practices.
   (6) Release the unit handle.
      (a) For units with a Phillips screw, loosen the screw to unlock the unit handle.
      (b) For units with a D-Ring, push on the D-Ring and turn it 90 degrees counterclockwise to unlock the unit handle.
   (7) Move the lever up to disengage the locking stud with the dogleg slot in the mounting rack.
   (8) Remove the unit from the mounting rack.

B. Install the GTX 33 Transponder (Refer to Figure 201).

NOTE: If a new unit is installed, it is necessary for the software and configuration to be loaded.

CAUTION: Make sure the unit goes into position without resistance. Damage to the connectors, unit, or mounting rack will occur if the unit is pushed into position with force.

NOTE: The unit must be in position in the mounting rack to let the locking stud engage the channel.

   (1) Make sure the connector and connector pins have no damage.
      (a) Replace the connector or connector pins if applicable. Refer to the Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.
   (2) Carefully put the unit in position in the mounting rack.

CAUTION: Make sure the lever moves without resistance. Damage to the unit will occur if the lever is pushed into position with force.

   (3) Push the lever down toward the bottom of the unit to engage the locking stud with the dogleg slot in the mounting rack.
      (a) If the lever does not go down, adjust the backplate while the unit is engaged.
   (4) Lock the handle in position.
      (a) For units with a Phillips screw, tighten the screw to lock the unit handle.
      (b) For units with a D-Ring, push on the D-Ring and turn it 90 degrees clockwise to lock the unit handle.
   (5) Connect the duct to the aft side of the unit. Refer to Avionics Cooling - Maintenance Practices.

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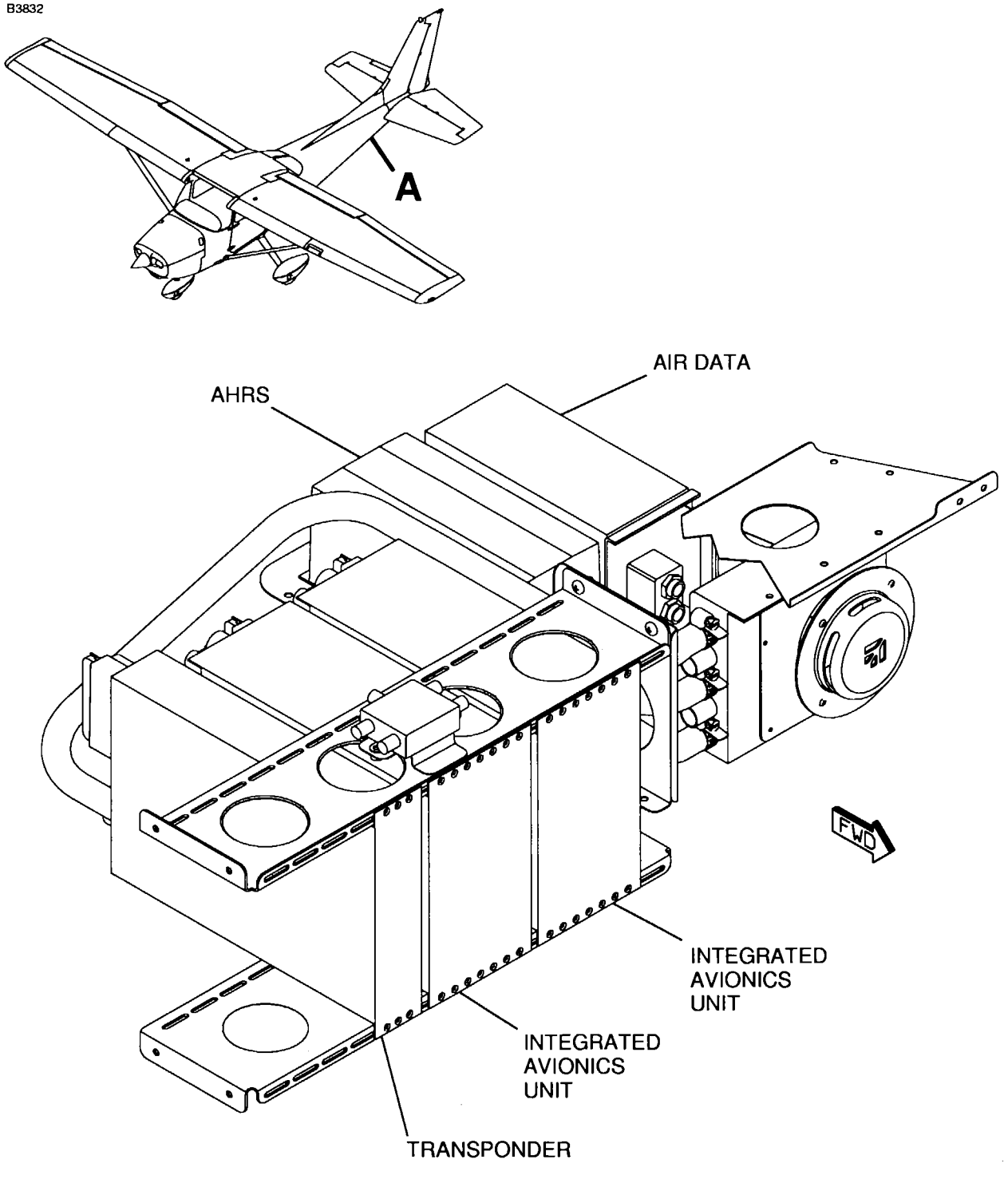

DETAIL A

AIRPLANES THAT HAVE
THE GARMIN G1000

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Forward Avionics Equipment Installation
Figure 201 (Sheet 1)

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(6) Install the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(7) Install the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
(8) If a new unit is installed, load the software and configuration. Refer to the Garmin G1000 Line Maintenance Manual.
(9) Do a check to make sure the transponder operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

4. Transponder Antenna Removal/Installation

A. Remove the Transponder Antenna (Refer to Figure 202).
(1) Set the MASTER switch and AVIONICS switch to the off position.
(2) Remove the screws that attach the antenna to the bottom of the fuselage.
(3) Disconnect the coaxial cable from the antenna (PC1006).

B. Install the Transponder Antenna (Refer to Figure 202).
(1) Attach the coaxial cable to the antenna (PC1006).
(2) Put the transponder antenna in position on the bottom of the fuselage.
(3) Attach the antenna with screws.

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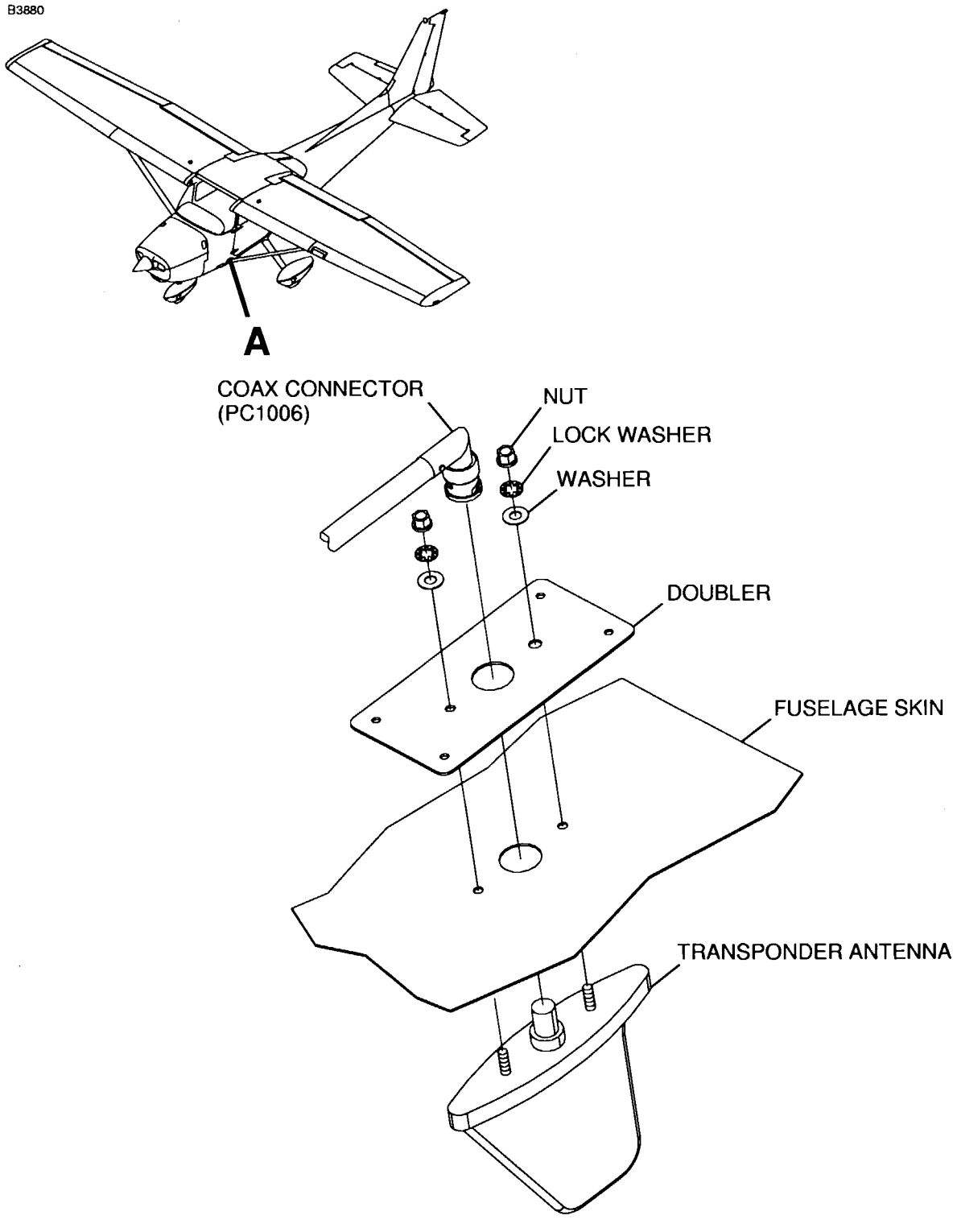

DETAIL A

0510T1007
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Forward Avionics Equipment Installation
Figure 202 (Sheet 1)

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GDL-69A FIS - DESCRIPTION AND OPERATION

1. General

A. The GDL-69A Flight Information System (FIS) is a remote-mounted component of the Garmin G1000 avionics system. The GDL-69A gives weather and FIS information to the pilot. The information is controlled and seen through the Multi-Function Display (MFD). Information is sent from the data link receiver to the MFD through the high-speed data bus ethernet data path.

With a current subscription, XM satellite radio service is available with the GDL-69A. The signals that the data link receives from satellites give better coverage than land-based transmissions. The XM radio is tuned through the MFD. Analog audio is sent to the audio panel and shares the AUX music input with the external audio entertainment input.

GDL-69A capabilities include:

- Graphical NEXRAD Data (NEXRAD)
- Graphical METAR Data (METAR)
- Textual METAR Data
- Textual Terminal Aerodrome Forecasts (TAF)
- City Forecast Data
- Graphical Wind Data (WIND)
- Graphical Echo Tops (ECHO TOP)
- Graphical Cloud Tops (CLD TOP)
- Graphical Lightning Strikes (XM LTNG)
- Graphical Storm Cell Movement (CELL MOV)
- NEXRAD Radar Coverage (displayed with NEXRAD data)
- SIGMETs/AIRMETs (SIG/AIR)
- Surface Analysis with City Forecasts (SFC)
- County Warnings (COUNTY)
- Freezing Levels (FRX LVL)
- Hurricane Track (CYCLONE)
- Temporary Flight Restrictions (TFR).

B. The GDL-69A XM Weather Data Link is the receiver for the FIS, and is installed aft of FS 108.00. It is a remote sensor.

C. The CI-2480 antenna for the GDL-69A FIS is installed on the upper surface of the fuselage at FS 64.57.

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GDL-69A FIS - MAINTENANCE PRACTICES

1. General

A. The maintenance practices give the removal and the installation procedures for the GDL-69A XM Weather Data Link. For removal and installation of the CI-2480 antenna for the GDL-69A Flight Information System (FIS), refer to Chapter 23, Communications - Maintenance Practices.

2. GDL-69A XM Weather Data Link Removal/Installation

A. Data Link Removal (Refer to Figure 201).
(1) Set the MASTER switch and the AVIONICS switch to the off position.
(2) Remove the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
(3) Remove the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(4) Turn the quarter-turn fastener 90 degrees counterclockwise and lift the locking lever to disengage the data link.
(5) Move the data link out of the mounting rack.
(6) Remove the data link from the airplane.

B. Data Link Installation (Refer to Figure 201).
(1) Inspect the connector for damaged pins.

CAUTION: Make sure the unit goes into position without resistance. Damage to the connectors, unit, or mounting rack will occur if the unit is pushed into position with force.

(2) Carefully push the data link into the rack to engage the connector.
(3) Put the data link in position with the locking lever stud in the mounting rack slot.
(4) Push the locking lever down and turn the quarter-turn fastener 90 degrees clockwise to attach the data link to the mounting rack.
(5) Install the baggage compartment closeout. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(6) Install the aft seat. Refer to Chapter 25, Passenger Compartment - Maintenance Practices.
(7) Set the MASTER switch and the AVIONICS switch to the ON position.
(8) Do a check of the GDL-69A XM Weather Data Link FIS to make sure that it operates correctly. Refer to the Garmin G1000 Line Maintenance Manual, Revision D or later.

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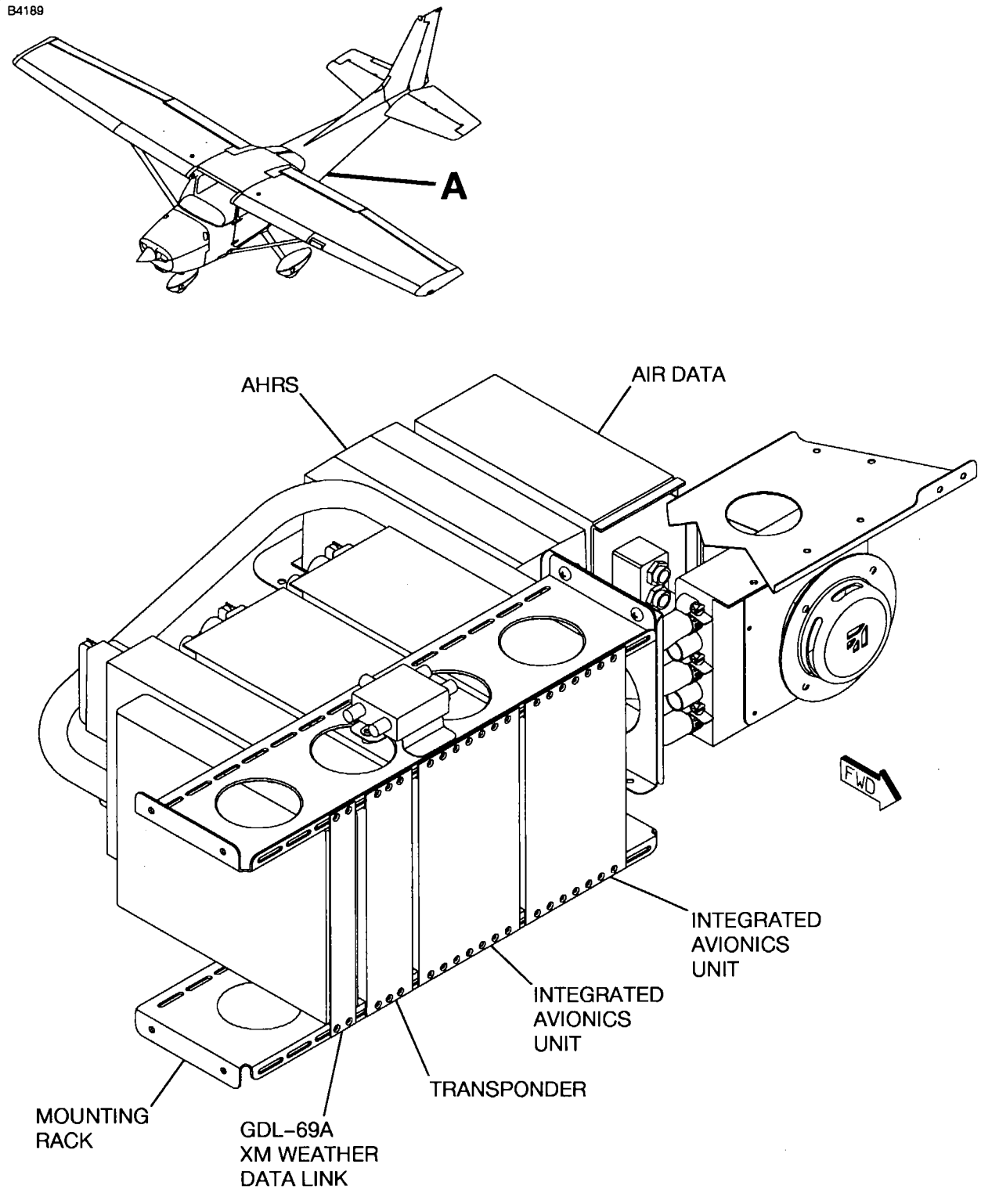

DETAIL A

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GDL-69A XM Weather Data Link Installation
Figure 201 (Sheet 1)

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DME - MAINTENANCE PRACTICES

1. General

A. On airplanes with Garmin G1000, the KN-63 Distance Measuring Equipment (DME) gives range, speed, and time-to-station information displayed through the G1000 display system. The KN-63 DME has a remote-mounted receiver in the rear fuselage aft of FS 142.00. The DME antenna is on the bottom fuselage below the cabin at FS 114.50.

2. KN-63 DME Receiver Removal/Installation

A. KN-63 DME Receiver Removal (Refer to Figure 201).
(1) Set the MASTER and the AVIONICS switches to the off position.
(2) Disengage the DME/ADF circuit breaker on the avionics circuit breaker panel.
(3) Remove the right, aft cabin panel for access to the DME receiver unit.
(4) Disconnect the electrical connector (PT1031) from the receiver.
(5) Disconnect the electrical connector (PT801) from the receiver.
(6) Loosen the hold down screw.
(7) Remove the screws that attach the mounting rack to the hold down bars.
(8) Remove the hold down bars, rack, DME unit, and hardware from the airplane.

B. KN-63 DME Receiver Installation (Refer to Figure 201).
(1) Install the receiver with the connectors toward the rear of the airplane.
(2) Install the receiver with the connectors on the same end of the mounting tray as the hold down clamp.
(3) Attach the hold down clamp, hold down screw, compression spring, and lock washer to one of the hold down bars.
(4) Put the two hold down bars under the mounting rack.
(5) Attach the mounting rack to the hold down bars with the screws.
(6) Tighten the hold down screw.
(7) Make sure that there is a correct electrical bond between the unit and the airplane structure.
(8) Attach the electrical connector (PT801) to the DME receiver.
(9) Attach the electrical connector (PT1031) to the DME receiver.
(10) Install the right, aft cabin panel.
(11) Set the MASTER and the AVIONICS switches to the ON position.
(12) Engage the DME/ADF circuit breaker on the avionics circuit breaker panel.

3. DME Antenna Removal/Installation

A. DME Antenna Removal (Refer to Figure 202).
(1) Set the MASTER and the AVIONICS switches to the off position.
(2) Disengage the DME/ADF circuit breaker on the avionics circuit breaker panel.

CAUTION: Be careful when you remove the nuts from the antenna. The antenna can fall to the ground.

(3) Remove the nuts and the washers that attach the DME antenna to the airplane at FS 114.50.
(4) Disconnect the electrical connector (PF1011) from the antenna.
(5) Remove the antenna from the airplane.

B. DME Antenna Installation (Refer to Figure 202).
(1) Solvent clean the surface of the airplane skin where you will install the antenna.
(2) Put the antenna in position on the airplane skin.
(3) Attach the antenna to the airplane skin with the nuts and the washers.
(4) Make sure that there is a correct electrical bond between the antenna connector and the skin.
(5) Connect the electrical connector (PF1011) to the antenna.
(6) Set the MASTER and the AVIONICS switches to the ON position.
(7) Engage the DME/ADF circuit breaker on the avionics circuit breaker panel.

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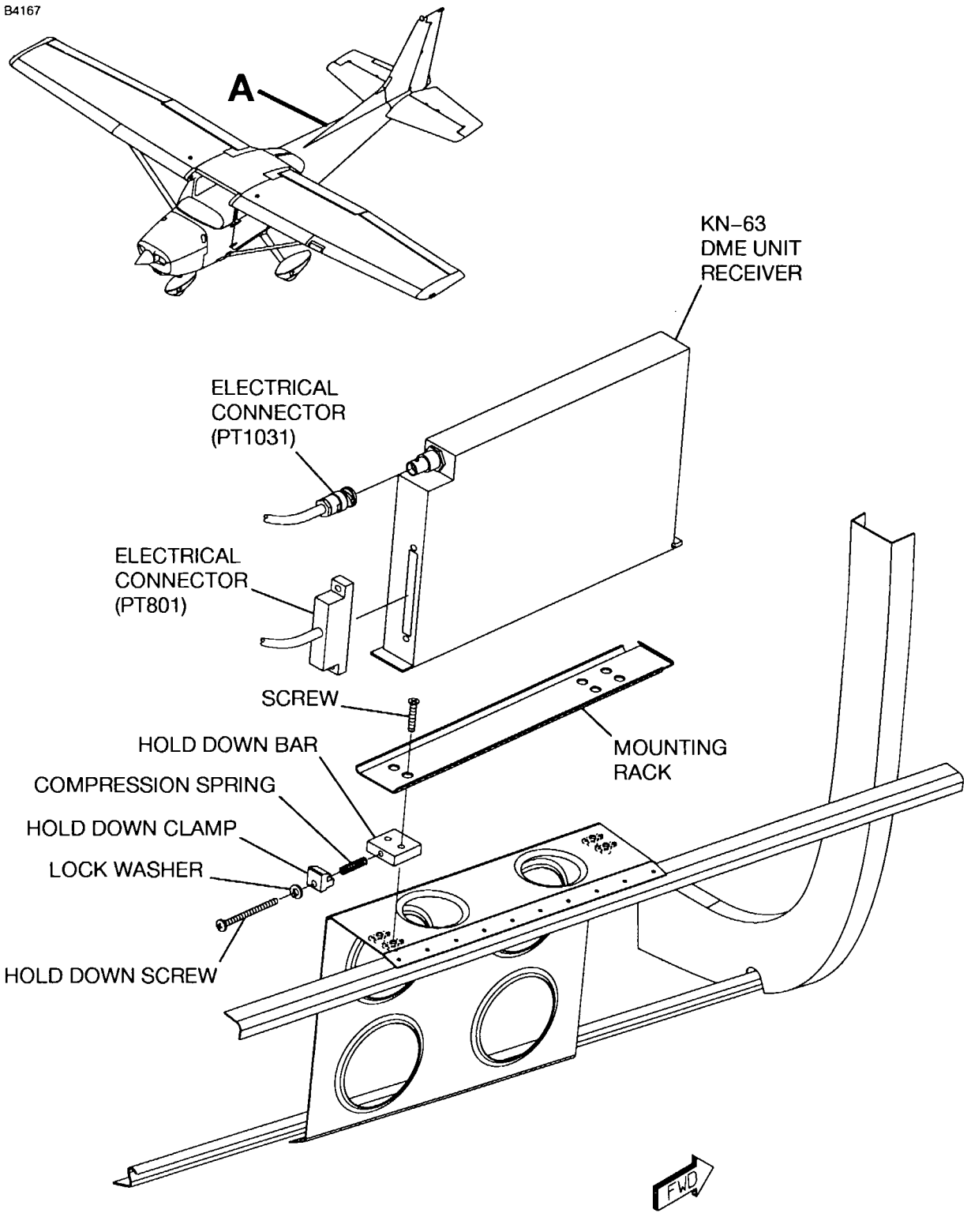

DETAIL A

0510T1007
A0518T1139

KN-63 DME Receiver Installation
Figure 201 (Sheet 1)

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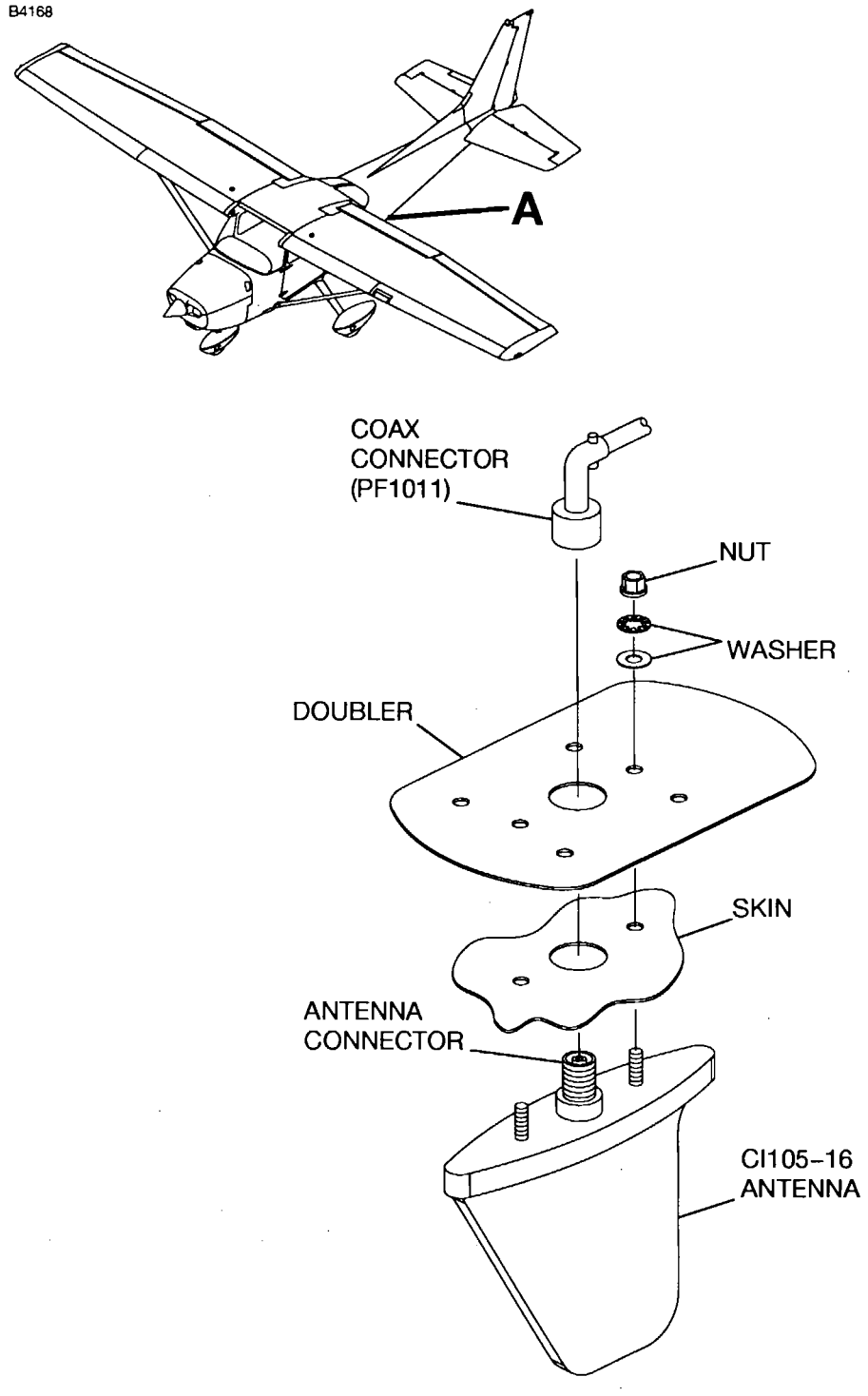

DETAIL A

0510T1007
A0518T1138

DME Antenna Installation
Figure 202 (Sheet 1)

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KMD-540 MULTI-FUNCTION DISPLAY - MAINTENANCE PRACTICES

1. General

A. The KMD-540 is a multi-function display (MFD) that can be installed to give the pilot more situational awareness during flight. Enhanced ground proximity warning system (EGPWS) and traffic advisory system (TAS) data is given on the color MFD display. Other data, such as global positioning system (GPS) data and weather data can be shown on the display. These displays can give the pilot more data that is easy to read in a short period of time.

2. KMD-540 Multi-Function Display (MFD) Removal and Installation

A. Remove the KMD-540 MFD. (Refer to Figure 201).
   (1) Disconnect the main battery. Refer to Chapter 24, Battery - Maintenance Practices.
   (2) Disengage the MFD circuit breaker on the circuit breaker panel.
   (3) Remove the screw in the face of the MFD.
   (4) Carefully pull the unit out of the avionics rack.
   (5) Disconnect the electrical connector from the MFD.
   (6) Remove the MFD from the airplane.

B. Install the KMD-540 MFD. (Refer to Figure 201).
   (1) Put the MFD in the avionics rack.
   (2) Connect the electrical connector to the MFD.
   (3) Install the screw in the face of the MFD.
   (4) Engage the MFD circuit breaker on the circuit breaker panel.
   (5) Connect the main battery. Refer to Chapter 24, Battery - Maintenance Practices.
   (6) Do the operational check of the MFD.

3. Operational Check of the MD-540 Multi-Function Display

A. Do the MFD operational check.
   (1) Set the MASTER ALT/BAT switch to the ON position.
   (2) Set the AVIONICS master switch to the ON position.
   (3) Turn the ON/OFF knob on the KMD-540 MFD to the ON position.
   (4) Make sure that the KMD-540 title page comes on the screen.
   (5) Turn the ON/OFF knob on the KMD-540 MFD to the OFF position.
   (6) Set the AVIONICS master switch to the off position.
   (7) Set the MASTER ALT/BAT switch to the off position.

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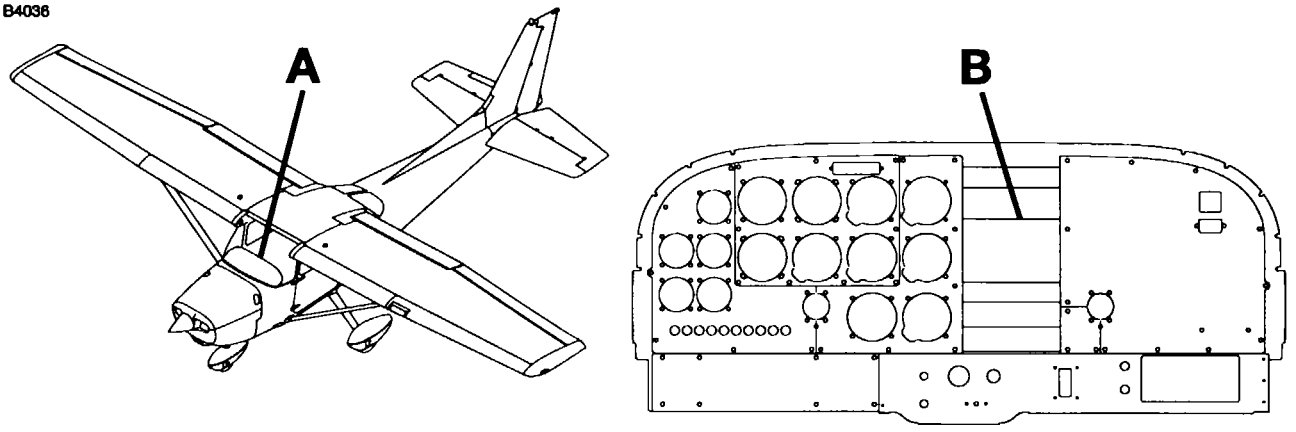
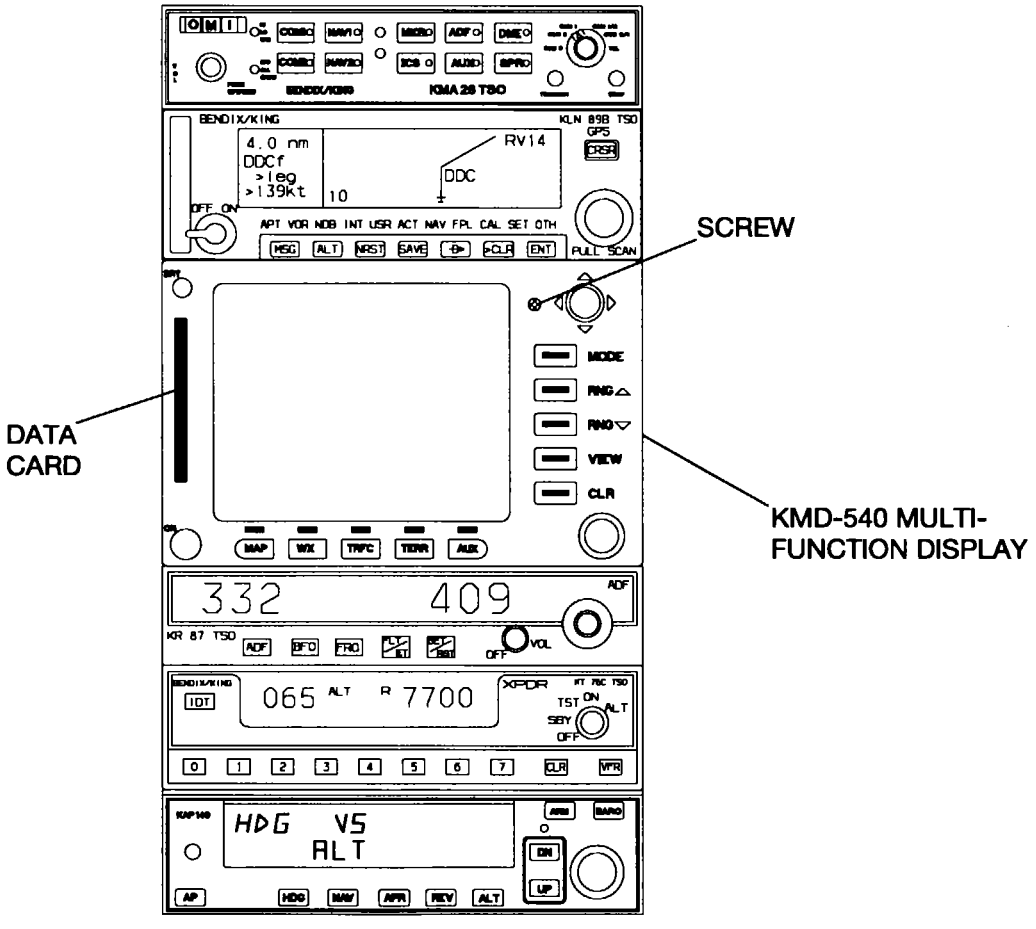


DETAIL A



DETAIL B

0510T1007
A0518T1003
B0518T1081

KMD-540 Multi-Function Display Installation
Figure 201 (Sheet 1)

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GARMIN DISPLAY UNIT (GDU) - MAINTENANCE PRACTICES

1. General

A. The GDU 1040 has a 10.4 inch LCD display with 1024x768 resolution. The cockpit has two GDU 1040s. One is configured as a Primary Flight Display (PFD) and the other is configured as the Multi-Function Display (MFD). The MFD shows navigation, engine, and airframe information. The PFD shows primary flight information, in place of gyro systems. Both GDU 1040s connect and show all functions of the G1000 system during flight. The displays communicate with each other and the GIA 63 Integrated Avionics Units (IAU) through a High-Speed Data Bus (HSDB) Ethernet connection. The PFD and MFD have a reversionary switch in which one display can show all information usually shown by both displays in the event that one does not operate correctly.

B. Two GDUs are in the instrument panel of airplanes with Garmin G1000. Maintenance practices give removal and installation procedures.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. Control Display Unit Removal/Installation

CAUTION: If possible, do not touch the lens. The GDU 1040 lens has a layer of anti-reflective material which is very sensitive to skin oils, waxes and abrasive cleaners.

CAUTION: Do not use cleaners that contain ammonia. Ammonia will cause damage to the anti-reflective material. It is very important to clean the lens with a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective material.

A. Remove the Garmin Display Unit (GDU) (Refer to Figure 201).
   (1) Disengage the applicable Primary Function Display (PFD) or Multi-Function Display (MFD) circuit breaker for the GDU.
   (2) Turn the quick release fasteners 1/4 turn counterclockwise with a 3/32" hex drive tool.
   (3) Carefully pull the GDU from the instrument panel.
   (4) Disconnect the electrical connector from the GDU.

B. Install the Garmin Display Unit (GDU) (Refer to Figure 201).

CAUTION: If possible, do not touch the lens. The GDU 1040 lens has a layer of anti-reflective material which is very sensitive to skin oils, waxes and abrasive cleaners.

CAUTION: Do not use cleaners that contain ammonia. Ammonia will cause damage to the anti-reflective material. It is very important to clean the lens with a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective material.

NOTE: If a new unit is installed, it is necessary to load the software and configuration.

NOTE: If the initial unit is installed in the initial location or in the opposite location, it is not necessary to load the software and configuration.

(1) Make sure the connector and connector pins have no damage.
   (a) Replace the connector or connector pins if applicable. Refer to The Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.

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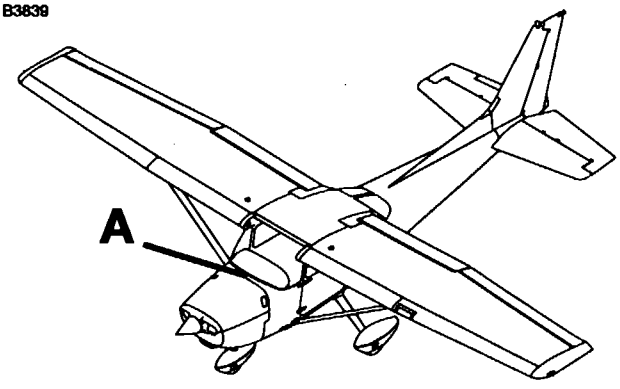

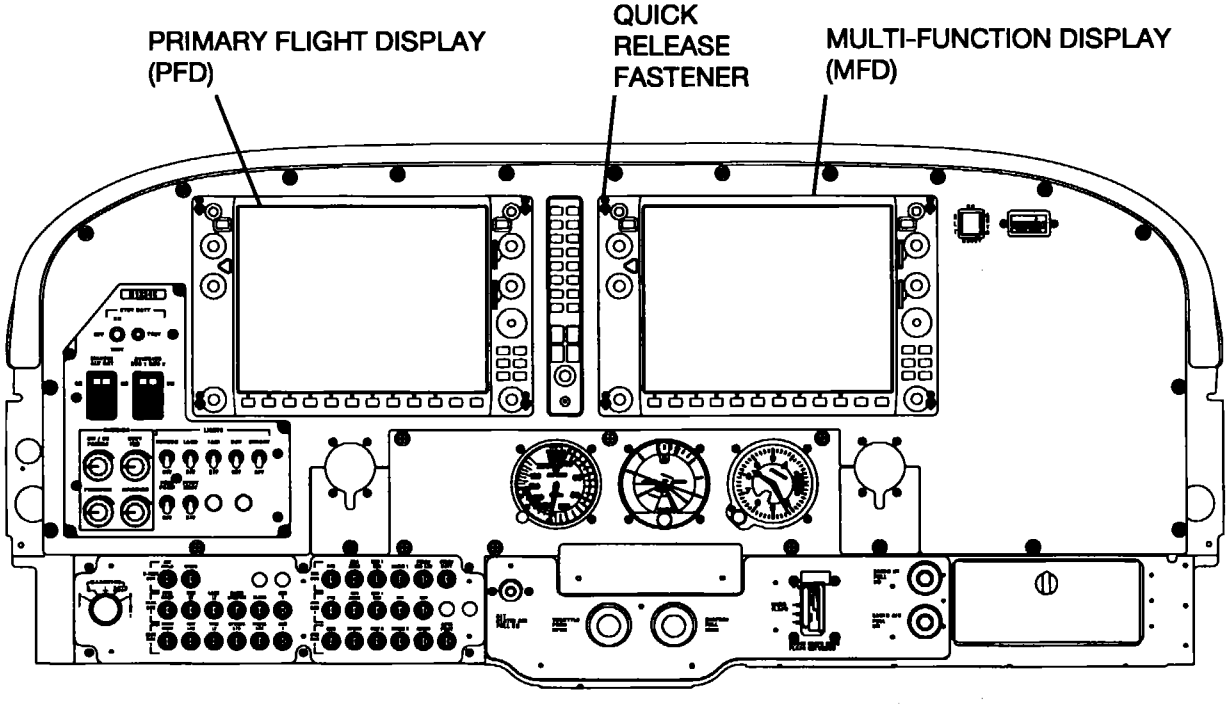

DETAIL A
AIRPLANES WITH GARMIN G1000 OPTION

0510T1007
A0518T1109

Control Display Unit Installation
Figure 201 (Sheet 1)

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(2) Connect the electrical connector to the GDU.
(3) Put the GDU in position flush with the instrument panel.
(4) Make sure the locking-stud alignment marks are in the vertical position.

NOTE: Light forward pressure can be required to engage the quick release fasteners.

(5) Turn the quick release fasteners 1/4 turn clockwise with a 3/32" hex drive tool.
(6) Make sure the GDU operates correctly.
   (a) If a new unit is installed, load the software and configuration. Refer to the Garmin G1000 Line Maintenance Manual.
   (b) Do a check to make sure the GDU operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

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CHAPTER 37

VACUUM

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
37-Title		
37-List of Effective Pages		
37-Record of Temporary Revisions		
37-Table of Contents		
37-00-00	Page 1	Apr 7/2003
37-10-00	Page 101	Apr 7/2003
37-10-00	Pages 201-210	Jan 2/2006

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

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Definition ..... 37-00-00 Page 1

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Troubleshooting ..... 37-10-00 Page 101

VACUUM SYSTEM - MAINTENANCE PRACTICES ..... 37-10-00 Page 201
Description and Operation ..... 37-10-00 Page 201
Vacuum Pump Removal/Installation ..... 37-10-00 Page 201
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Regulator Valve Filter Removal/Installation ..... 37-10-00 Page 208
Gyro Filter Removal/Installation ..... 37-10-00 Page 208
Vacuum Gage Removal/Installation ..... 37-10-00 Page 208
Vacuum Transducer Removal/Installation ..... 37-10-00 Page 209
Vacuum Manifold Test (For airplanes with the Parker Airborne manifold) ..... 37-10-00 Page 209
Vacuum Pressure Adjustment/Test (For airplanes with the Parker Airborne regulator valve or the Aero Accessories regulator valve) ..... 37-10-00 Page 209

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VACUUM - GENERAL

1. Scope

A. This chapter describes those units and components used to provide vacuum necessary to operate the artificial horizon and directional gyros.

2. Definition

A. This chapter consists of a single section which describes those components used to distribute and indicate vacuum air.

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VACUUM - TROUBLESHOOTING

1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
OIL IN DISCHARGE.	Damaged engine driven seal.	Replace gasket.
HIGH SUCTION.	Vacuum regulator filter clogged.	Check filter for obstructions.
LOW SUCTION.	Vacuum regulator leaking.	Replace vacuum regulator.
	Vacuum pump failure.	Substitute known good pump and check pump suction. Replace vacuum pump as required.
LOW PRESSURE.	Vacuum regulator leaking.	Replace safety valve.
	Vacuum pump failure.	Substitute known good pump and check pump pressure. Replace vacuum pump as required.

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VACUUM SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. The vacuum system has a filter, vacuum gage, vacuum instruments, regulator valve, vacuum manifold, low vacuum annunciator switches, engine-driven vacuum pumps and related plumbing.

B. On airplanes without Garmin G1000, the source of vacuum air is in the cabin and is pulled through the system by the engine-driven vacuum pumps. This air goes through the gyro filter at the cabin inlet source before it goes through the vacuum gage and gyro instruments. The vacuum is controlled by the regulator valve. The regulator valve is on the aft side of the firewall. The vacuum air is then pulled through the vacuum manifold and past the low vacuum annunciator switches and then into the vacuum pumps.

C. On airplanes without Garmin G1000, vacuum pressure is measured by the low vacuum annunciator switches in the engine compartment. The vacuum gage in the instrument panel shows the vacuum pressure.
   (1) The vacuum gage gives a direct indication of the system vacuum in inches of mercury (in.hg.).
   (2) The low vacuum annunciator switches are part of the panel annunciator warning system.
      (a) If the left vacuum switch (SN012) senses a vacuum below 3.0 in.hg., the VAC annunciator will show L VAC.
      (b) If the right vacuum switch (SN011) senses a vacuum below 3.0 in.hg., the VAC annunciator will show VAC R.
      (c) If both switches sense a vacuum below 3.0 in.hg., the VAC annunciators will show L VAC R.
   (3) For more information on the maintenance practices for the panel-mounted annunciator (UI005), refer to Chapter 31, Annunciator Panel - Maintenance Practices.

D. On airplanes with Garmin G1000, the source of vacuum air is in the cabin and is pulled through the system by the engine-driven vacuum pump. The vacuum pressure is measured by a vacuum transducer. The air goes through the gyro filter at the cabin inlet source before it is goes through the horizon gyro indicator. The vacuum is controlled by the regulator valve. The regulator valve and the vacuum transducer are on the aft side of the firewall.

2. Vacuum Pump Removal/Installation

NOTE: Removal/Installation is typical for the vacuum pumps.

A. Remove the Vacuum Pump (Refer to Figure 201).
   (1) Remove engine cowl. Refer to Chapter 71, Cowl - Maintenance Practices.
   (2) Remove the cooling shroud.
   (3) Disconnect the hoses from the inlet and outlet ports of the vacuum pump.
      (a) Put caps on the hoses and the vacuum pump ports to prevent entry of foreign object debris.
   (4) Remove the nuts, lockwashers, and flat washers that attach the vacuum pump to the engine.
   (5) Remove the vacuum pump from the engine.
   (6) Remove the elbow from the pump.
   (7) Replace any damaged fittings or nuts.

B. Install the Vacuum Pump (Refer to Figure 201).

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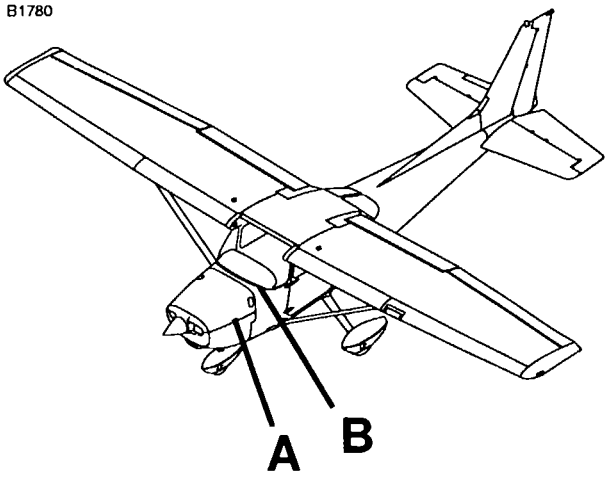
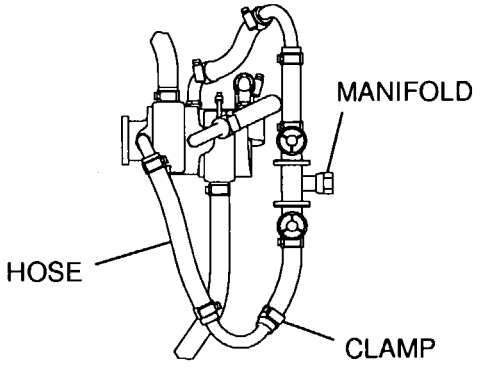
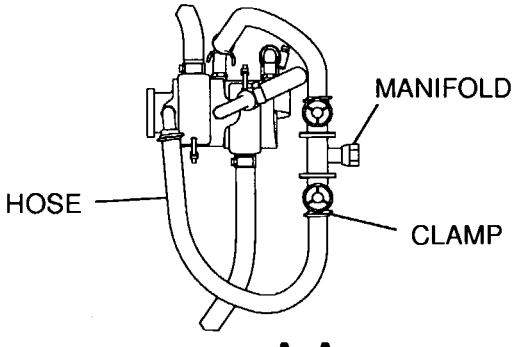




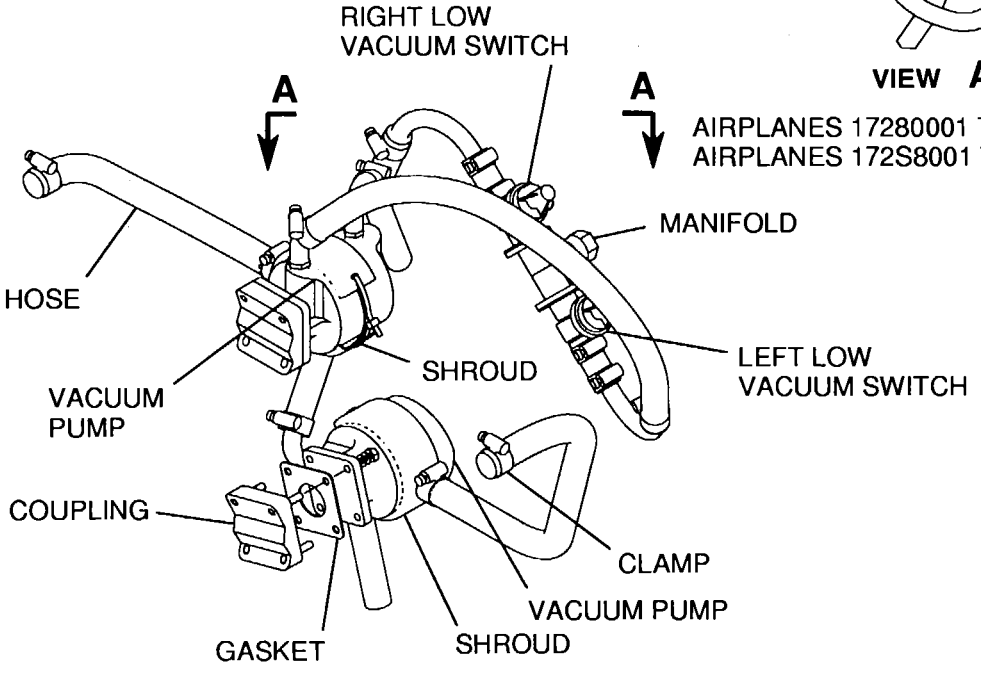
VIEW A-A

AIRPLANES 17280832 THRU 17280983 AND
AIRPLANES 172S8349 THRU 172S8703



VIEW A-A

AIRPLANES 17280001 THRU 17280831 AND
AIRPLANES 172S8001 THRU 172S8348



DETAIL A

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A0514T1032
AA0514T1033
AA0514T1034

Vacuum System Installation
Figure 201 (Sheet 1)

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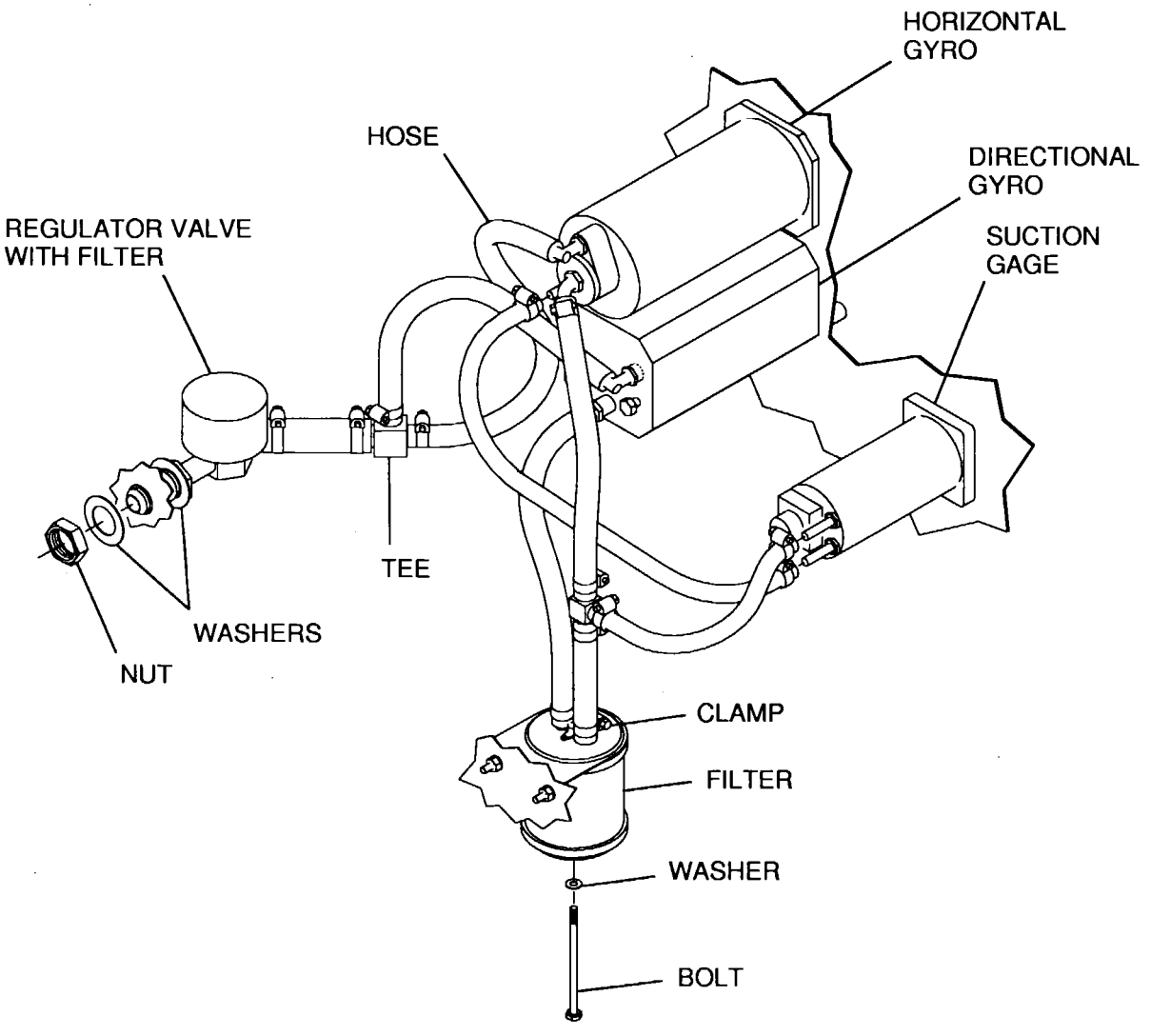

DETAIL B

GYRO INSTALLATION WITHOUT HSI

B0514T1031

Vacuum System Installation
Figure 201 (Sheet 2)

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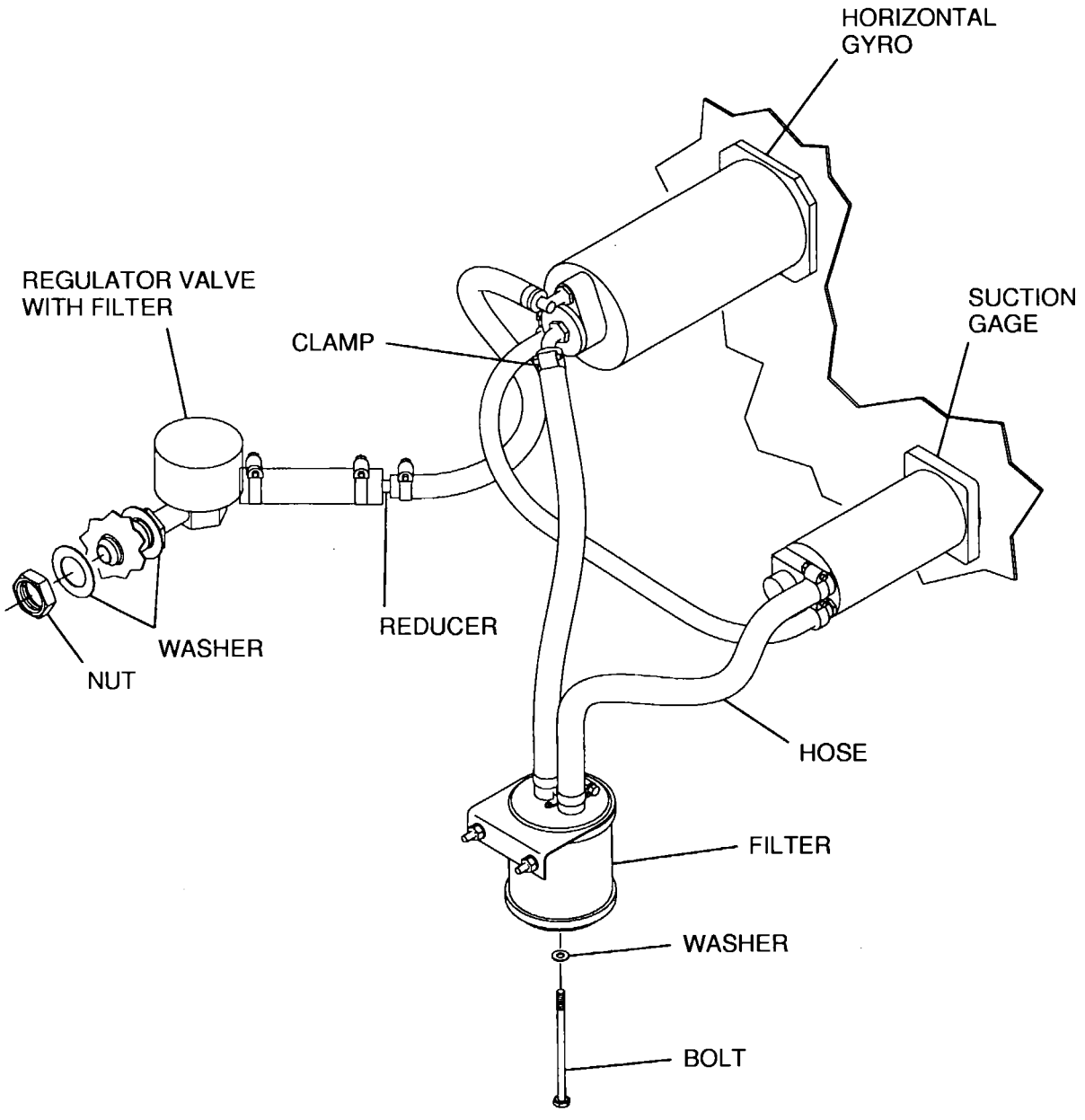
B1559



DETAIL B

GYRO INSTALLATION WITH OPTIONAL HSI
AIRPLANES 1728180 AND ON AND
AIRPLANES 172S8922 AND ON

B0514T1030

Vacuum System Installation
Figure 201 (Sheet 3)

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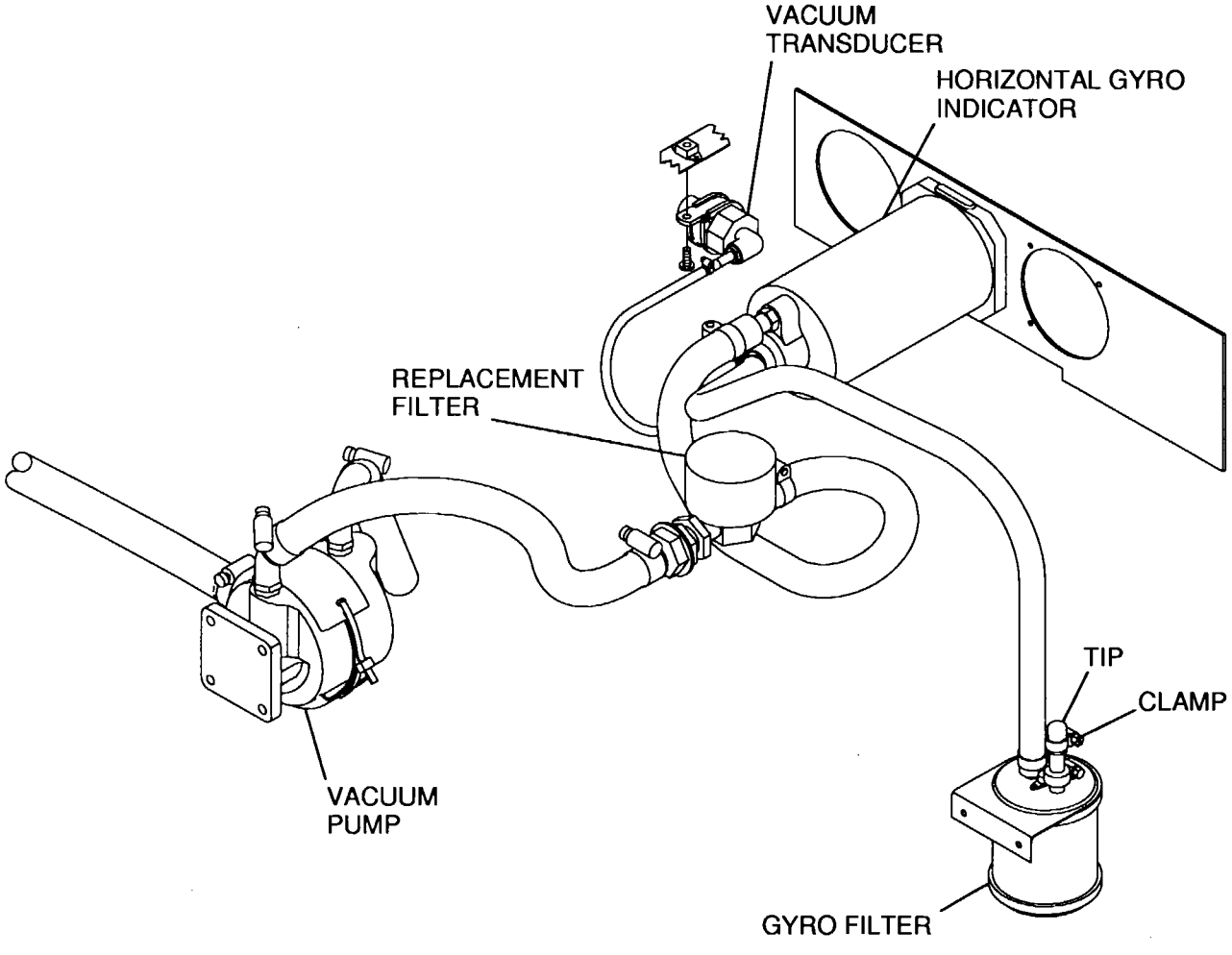

DETAIL B
AIRPLANES WITH GARMIN G1000

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B0518T1105

Vacuum System Installation
Figure 201 (Sheet 4)

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CAUTION: Do not install a vacuum pump that has been dropped or shows that it was incorrectly held in a vise.

CAUTION: Do not use any cork-type gaskets when the vacuum pump is installed.

CAUTION: Make sure all unwanted material is removed from the system. Foreign object debris will cause damage to the vacuum system components.

CAUTION: If a vise is used, hold the pump housing by the flange and protect the flange with soft material such as aluminum, copper or wood. The pump housing must never be set in a vise with pressure applied across the center of the housing. The pressure will cause damage to the carbon rotor.

CAUTION: Do not use Teflon tape, pipe dope, or thread lubricants of any type. Foreign object debris will cause damage to the vacuum system components.

(1) Put the vacuum pump in a jaw protected vise, with the drive coupling downward.
(2) Install the elbow in the pump hand tight.
(3) Use only a box end wrench to tighten the fittings to the necessary position. Do not make more than 1.5 turns beyond the hand tight position
(4) Make sure the pump and engine surfaces are clean and free of any old gasket material.
(5) Set the new pad gasket on the studs of the engine.
(6) Put the vacuum pump on the studs.
(7) Attach the pump to the engine with the flat washers, new lockwashers, and nuts.
(8) Torque and tighten the nuts in a cross pattern to 70 inch-pounds, +10 or -10 inch-pounds (7.9 N-m, +1.1 or - 1.1 N-m).
    (a) To torque the nuts, fabricate a torque wrench adapter (Refer to Figure 202).
        1 Weld a 3/8 inch drive to a 7/16 inch wrench with a 12 point cut out in the box end of the wrench.
        2 The wrench length must be 2.25 inches (57.15 mm) from the center of box end to the center of the drive.

CAUTION: For airplanes that are equipped with an HSI gyro system, make sure that the two hoses connected together between the horizon gyro and the regulator valve are connected with a metal reducer. If there is no metal reducer, you must install one. If a plastic reducer is installed, it can crack or break from maintenance. Refer to Service Bulletin SB02-37-03.

(9) Connect the hose to the inlet and the outlet ports of the vacuum pump.
(10) Put the hose in position so that the exhaust from the vacuum pump is not pointed at the magnetos or the electrical wiring.
(11) Install the cooling shroud.
(12) Operate the engine and examine the indication on the vacuum gage. Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
(13) Adjust the indication on the vacuum gage, if necessary. Refer to the vacuum pressure adjustment/test.
(14) Install the upper engine cowl. Refer to Chapter 71, Cowl - Removal/Installation.

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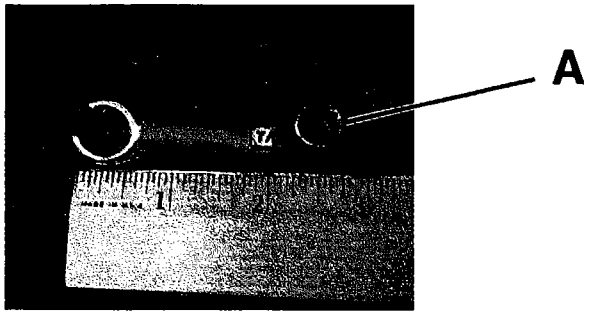
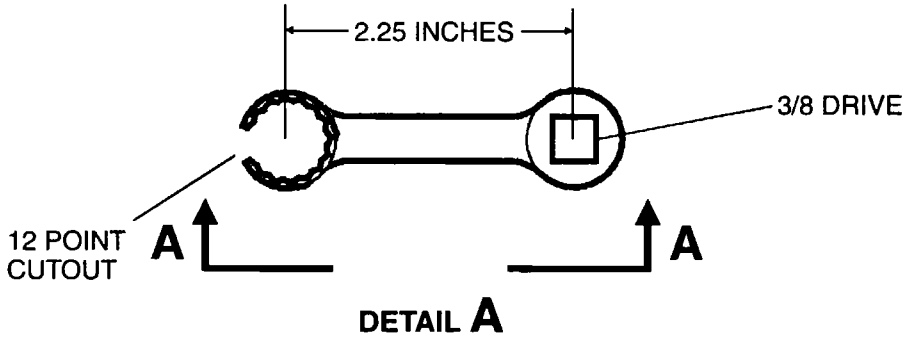
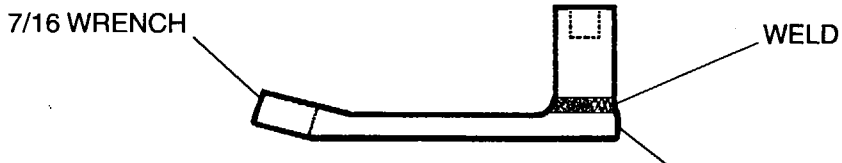
B1876



FABRICATED TORQUE WRENCH ADAPTOR



DETAIL A



VIEW A-A

Vacuum Pump Torque Wrench Adapter
Figure 202 (Sheet 1)

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3. Vacuum Manifold Removal/Installation

NOTE: The vacuum manifold has the check valve and vacuum switches.

NOTE: Airplanes with Garmin G1000 do not have vacuum manifolds.

NOTE: Removal/Installation is typical for the vacuum manifolds.

A. Remove the Vacuum Manifold (Refer to Figure 201).
   (1) Remove the engine cowl. Refer to Chapter 71, Cowl - Removal/Installation.
   (2) Remove the hoses from the vacuum manifold.
   (3) Put a label on the applicable electrical connector (SN012 left, SN011 right).
   (4) Disconnect the applicable electrical connector from the vacuum manifold.
   (5) Loosen the B-nut that attaches the vacuum manifold to the nipple in the firewall.
   (6) Remove the vacuum manifold from the airplane.

B. Install the Vacuum Manifold (Refer to Figure 201).
   (1) Attach the vacuum manifold to the nipple in the firewall and tighten the B-nut.
   (2) Connect the applicable electrical connector (SN012 left, SN011 right) to the vacuum manifold.
   (3) Connect the hoses to the vacuum manifold and attach with the clamps.
   (4) Install the upper engine cowl. Refer to Chapter 71, Cowl - Removal/Installation.

4. Regulator Valve Filter Removal/Installation

A. Remove the Regulator Valve Filter (Refer to Figure 201).
   (1) Get access to the regulator valve which is forward of the radio stack.
   (2) Carefully stretch the foam element filter over the top of the retaining bezel, and remove the filter from the regulator valve.

B. Install the Regulator Valve Filter (Refer to Figure 201).
   (1) Stretch the regulator valve filter over the top of the retaining bezel.

5. Gyro Filter Removal/Installation

A. Remove the Gyro Filter (Refer to Figure 201).
   (1) Remove the bolt and retainer from the mount and remove the gyro filter.

B. Install the Gyro Filter (Refer to Figure 201).
   (1) Put the gyro filter and the retainer on the mount and attach with the bolt.

6. Vacuum Gage Removal/Installation

NOTE: Airplanes with Garmin G1000 do not have a vacuum gage.

NOTE: The vacuum gage and ammeter operate together as a single instrument.

A. Remove the Vacuum Gage (Refer to Figure 201).
   (1) Disconnect the vacuum and air hoses from the vacuum gage.
   (2) Disconnect the electrical connector (JI019) from the vacuum gage.
   (3) Remove the screws that attach the vacuum gage to the instrument panel and remove the vacuum gage.

B. Install the Vacuum Gage (Refer to Figure 201).
   (1) Install the vacuum gage in the instrument panel.
   (2) Attach with the screws.
   (3) Connect the electrical connector (JI019) to the vacuum gage.
   (4) Connect the vacuum and air hoses to the vacuum gage.

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7. Vacuum Transducer Removal/Installation

NOTE: Only airplanes with the Garmin G1000 have a vacuum transducer.

A. Remove the Vacuum Transducer (Refer to Figure 201).
   (1) Remove the center panel. Refer to Chapter 31, Instrument and Control Panels - Maintenance Practices.
   (2) Remove the screw and clamp that hold the vacuum transducer in position.
   (3) Remove the vacuum transducer.

B. Install the Vacuum Transducer (Refer to Figure 201).
   (1) Install the vacuum transducer.
   (2) Install the screw and clamp that hold the vacuum transducer in position.
   (3) Install the center panel. Refer to Chapter 31, Instrument and Control Panels - Maintenance Practices.

8. Vacuum Manifold Test (For airplanes with the Parker Airborne manifold)

A. The vacuum manifold must be tested periodically to determine its condition and serviceability. Refer to Chapter 5, Inspection Time Limits for inspection intervals. Refer to Parker Hannifin Corporation/ Airborne Division's Product Reference Memo #39 (or latest revision) for the procedures.

9. Vacuum Pressure Adjustment/Test (For airplanes with the Parker Airborne regulator valve or the Aero Accessories regulator valve)

NOTE: Before the adjustment procedure, the entire pneumatic system must be inspected and tested for leaks, restrictions, and unserviceable components. Failure to correct all system anomalies will lead to reduced dry air pump service life.

A. Prepare the System for the Test (Refer to Figure 201).
   (1) Remove the gyro (central air) filter.

B. Do a Check of the Regulator Valve.

CAUTION: Make sure that the temperature of the engine does not go above the maximum engine temperature during the adjustment/test of the regulator valve.

NOTE: At engine speeds between 1200 RPM and full throttle, suction must fall between 4.5 in.hg. and 5.5 in.hg. (green range on gage).

(1) Start the engine, warm up to the normal operating temperature, and run at static RPM. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
(2) Make sure the suction gage indication does not go above 5.5 in.hg.
(3) Run the engine at 1200 RPM and make sure the gage indication does not go below 4.5 in.hg.
(4) If the suction indication falls outside of the range, shut down the engine and adjust the regulator valve in the steps that follow.
   (a) Bend the locking tab upward on the lower surface of the regulator valve.

CAUTION: Be careful when you turn the adjustment screw. Do not turn it too much in either direction. When you turn it too much in either direction, damage can occur to the equipment.

   (b) Turn the adjustment screw on the lower surface of the regulator valve in the direction to increase or decrease the pressure as necessary.

NOTE: As you face the adjustment screw, when you turn it clockwise the pressure increases. When you turn it counterclockwise, the pressure decreases.

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(c) Tap the regulator after you adjust it to help reset the components.
(d) Bend the locking tab downward to keep the adjustment screw in place when the correct pressure has been set.

(5) Run the engine at static RPM and make sure the gage indication does not go above 5.5 in.hg.
(6) Run the engine at 1200 RPM and make sure the gage indication does not go below 4.5 in.hg.
(7) Shut down the engine.
(a) For airplanes without the Garmin G1000, make sure that the L VAC R lights come on.
(b) For airplanes with the Garmin G1000, make sure that the low vacuum annunciator visual and aural warnings come on.
(8) Attach the filter element to the gyro (central air) filter.
(9) Before you start the engine, make sure that the low vacuum annunciations are on.
(a) For airplanes without the Garmin G1000, make sure that the L VAC R lights are on.
(b) For airplanes with the Garmin G1000, make sure that the low vacuum annunciator visual warning is on.
(10) Run the engine for a final time at static RPM and observe the indication on the suction gage.
(a) If the indication falls noticeably after the filter is installed, replace the filter.
(11) Reduce the engine speed to 1200 RPM and make sure that the suction stays in the green range (does not fall below 4.5 in.hg.). and that the low vacuum annunciations are off.
(a) For airplanes without the Garmin G1000, make sure that the L VAC R lights go off.
(b) For airplanes with the Garmin G1000, make sure that the low vacuum annunciator visual and aural warnings go off.
(12) Shut down the engine.

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CHAPTER 51

STANDARD PRACTICES - STRUCTURES

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STRUCTURES - GENERAL

1. Scope

A. This chapter provides a description of general airplane structures and corrosion characteristics. For repair of structural members and repair techniques used throughout the airplane, refer to the Single Engine Structural Repair Manual 1996 and On.

2. Definition

A. This chapter is divided into two sections briefly described below.
   (1) The section on structures provides an overall description of the airplane structure and methods of construction used on the airplane.
   (2) The section on corrosion provides a general description of corrosion characteristics, types of corrosion and typical corrosion areas.

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STRUCTURES - DESCRIPTION AND OPERATION

1. Description

A. The fuselage is of semimonocoque construction and consists of three major sections: forward section, center section, and tailcone section. Construction consists of formed bulkheads, longitudinal stringers, reinforcing channels and skin. Frame members of the cabin section are constructed of formed bulkhead channels. Bulkheads are formed "U" channel sections. Principal material is 2024-0 alclad aluminum alloy which, after forming, is heat treated to a 2024-T42 condition and painted with epoxy primer. All bulkheads in the fuselage are constructed of formed sheet metal or reinforced sheet metal.

B. The wings are of all-metal, strut-braced, semi monocoque construction, utilizing two spars. Each wing consists of an outer wing panel with an integral fuel bay, an aileron and a flap. Flanged upper and lower edges of all ribs serve as cap- strips, in addition to providing rigidity to the rib. The skin, riveted directly to each rib flange, provides the cellular strength for each successive rib bay. The nose, center, and trailing edge rib segments are riveted together through the front and rear spars to form the basic airfoil sections. Alclad stringers stiffen the skin between ribs. Spars are comprised of machine milled, tapered extrusions riveted to sheet metal webs.

C. The full-cantilever, all- metal tail group consists of a vertical stabilizer and rudder, and a horizontal stabilizer and elevators. The horizontal stabilizer is of one-piece construction, consisting of spars, ribs and skins. Elevators are constructed of aluminum spars, ribs and skin panels. The skin panels are riveted to ribs and spars. A balance weight is located in the outboard end of each elevator, forward of the hinge line. An elevator trim tab, attached to each elevator, is constructed of a spar, ribs, and skin; all riveted together. The vertical stabilizer is constructed of a forward spar and aft spar, ribs and skin. The rudder is constructed of spars, ribs and skin panels. The rudder trim tab is constructed of a spar, ribs, and skin; all riveted together.

D. The main landing gear is constructed of 6150 alloy spring-steel tubing with attaching parts of high strength 7075-T73 aluminum alloy forgings. Nose gear components are 4130, 6150 alloy steel and 7075-T73 aluminum alloy forgings.

E. The engine mount is constructed of welded 4130 steel tubing.

F. The engine cowling consists of upper and lower formed aluminum sections. The upper section includes and oil inspection door, and the lower section includes an air induction scoop with an engine oil filter. Both sections are removable.

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CORROSION - DESCRIPTION AND OPERATION

1. General

A. This section describes corrosion so the maintenance technician can identify the various types of corrosion and apply preventative measures to minimize corrosion activity. For corrosion control and corrosion damage, refer to the Single Engine Structural Repair Manual 1996 and On.

2. Characteristics of Corrosion

A. Corrosion is a natural phenomenon which destroys metal by chemical or electrochemical action and converts it to a metallic compound, such as an oxide, hydroxide, or sulfate. All metals used in airplane construction are subject to corrosion. Attack may take place over an entire metal surface, if exposed, or it may be penetrating in nature, forming deep pits. It may follow grain boundaries or it may penetrate a surface at random. Corrosion may be accentuated by stresses from external loads or from lack of homogeneity in the metallic structure or from improper heat treatment. It is promoted by contact between dissimilar metals or with materials which absorb moisture, such as wood, rubber, felt, dirt, etc.

(1) The following conditions must exist for electrochemical corrosion to occur. Refer to Figure 1 for an illustration of electrochemical corrosion.
   (a) There must be a metal that corrodes and acts as the anode.
   (b) There must be a less corrodible metal that acts as the cathode.
   (c) There must be a continuous liquid path between the two metals which acts as the electrolyte, usually condensation and salt or other contaminations.
   (d) There must be a conductor to carry the flow of electrons from the cathode to the anode. This conductor is usually in the form of a metal-to-metal contact (rivets, bolts, welds, etc.)

(2) The elimination of any one of the four conditions described above will stop the corrosion reaction process.

(3) One of the best ways to eliminate one of the four described conditions is to apply an organic film (such as paint, grease, plastic, etc.) to the surface of the metal affected. This will prevent the electrolyte from connecting the cathode to the anode, and current cannot flow, therefore, preventing corrosion reaction. Refer to Figure 1 for a typical organic film application.

(4) At normal atmospheric temperatures, metals do not corrode appreciably without moisture, but the moisture in the air is usually enough to start corrosive action.

(5) The initial rate of corrosion is usually much greater than the rate after a short period of time. This slowing down occurs because of the oxide film that forms on the metal's surface. This film tends to protect the metal underneath.

(6) When components and systems constructed of many different types of metals must perform under various climatic conditions, corrosion becomes a complex problem. Salt on metal surfaces (from sea coast operation) greatly increases the electrical conductivity of any moisture present and accelerates corrosion.

(7) Other environmental conditions which contribute to corrosion are:
   (a) Moisture collecting on dirt particles.
   (b) Moisture collecting in crevices between lap joints, around rivets, bolts and screws.

3. Types of Corrosion

A. Corrosion Types.

(1) Direct Surface Attack - The most common type of general surface corrosion results from direct reaction of a metal surface with oxygen in the atmosphere. Unless properly protected, steel will rust and aluminum and magnesium will form oxides. The attack may be accelerated by salt spray or salt-bearing air, by industrial gases or by engine exhaust gases.

(2) Pitting - While pitting can occur in any metal, it is particularly characteristic of passive materials, such as the alloys of aluminum, nickel and chromium. It is first noticeable as a white or gray powdery deposit similar to dust, which blotches the surface. When the deposits are cleaned away, tiny pits can be seen in the surface.

(3) Dissimilar Metal Corrosion - When two dissimilar metals are in contact and are connected by an electrolyte (continuous liquid or gas path), accelerated corrosion of one of the metals occurs. The most easily oxidized surface becomes the anode and corrodes. The less active member

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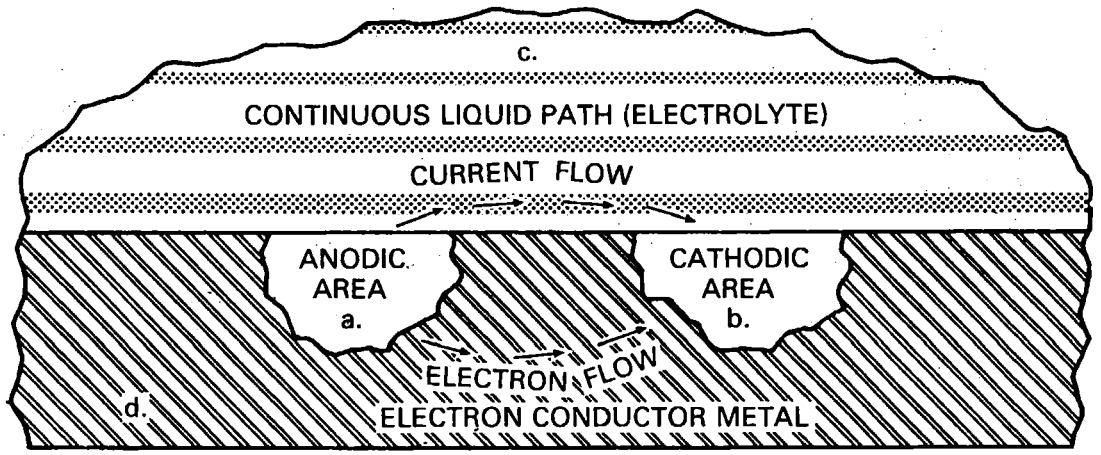
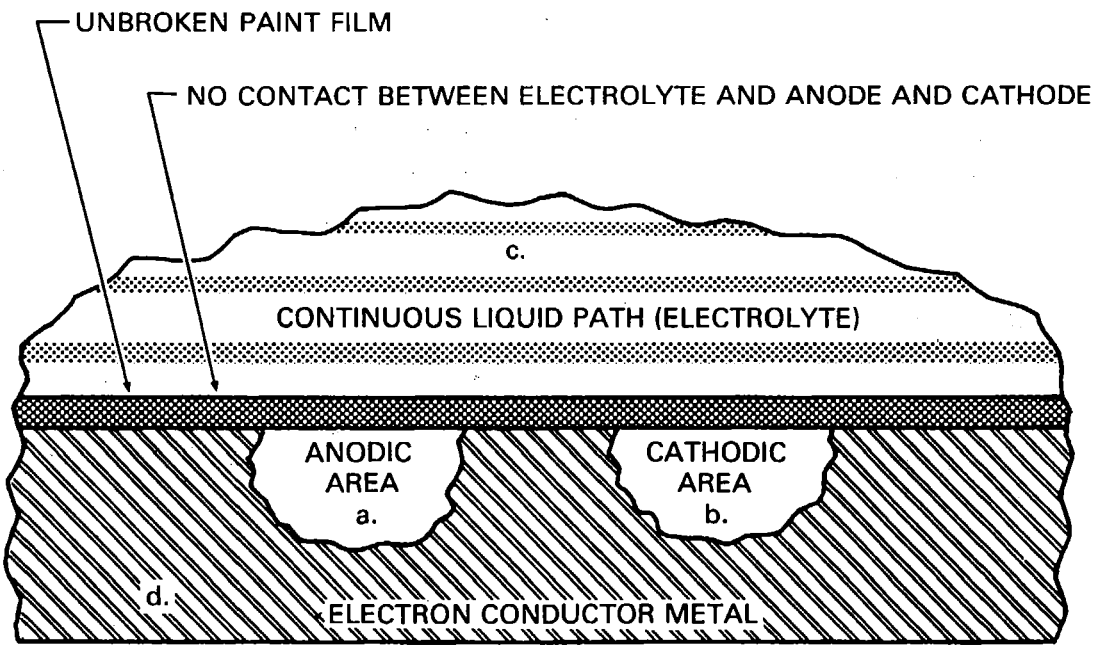


SIMPLIFIED CORROSION CELL



CORROSION ELIMINATION BY APPLICATION OF ORGANIC FILM 2682T1017

Corrosion Identification
Figure 1 (Sheet 1)

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of the couple becomes the cathode of the galvanic cell. The degree of attack depends on the relative activity of the two surfaces; the greater the difference in activity the more severe the corrosion. Relative activity in descending order is as follows:

(a) Magnesium and its alloys.
(b) Aluminum alloys 1100, 3003, 5052, 6061, 220, 355, 356, cadmium and zinc.
(c) Aluminum alloys 2014, 2017, 2024, 7075 and 195.
(d) Iron, lead and their alloys (except stainless steel).
(e) Stainless steels, titanium, chromium, nickel, copper, and their alloys.
(f) Graphite (including dry film lubricants containing graphite).

(4) Intergranular Corrosion - Selective attack along the grain boundaries in metal alloys is referred to as intergranular corrosion. It results from lack of uniformity in the alloy structure. It is particularly characteristic of precipitation hardened alloys of aluminum and some stainless steels. Aluminum extrusions and forgings in general may contain nonuniform areas, which in turn may result in galvanic attack along the grain boundaries. When attack is well advanced, the metal may blister or delaminate, which is referred to as 'exfoliation".

(5) Stress Corrosion - This results from the combined effect of static tensile stresses applied to a surface over a period of time. In general, cracking susceptibility increases with stress, particularly at stresses approaching the yield point, and with increasing temperature, exposure time and concentration of corrosive ingredients in the surrounding environment. Examples of parts which are susceptible to stress corrosion cracking are aluminum alloy bellcranks employing pressed-in taper pins, landing gear shock struts with pipe thread-type grease fittings, clevis joints and shrink fits.

(6) Corrosion Fatigue - This is a type of stress corrosion resulting from the cyclic stresses on a metal in corrosive surroundings. Corrosion may start at the bottom of a shallow pit in the stressed area. Once attack begins, the continuous flexing prevents repair of protective surface coating or oxide films and additional corrosion takes place in the area of stress.

4. Typical Corrosion Areas

A. This section lists typical areas of the airplane which are susceptible to corrosion. These areas should be carefully inspected at periodic intervals to detect corrosion as early as possible.

(1) Engine Exhaust Trail Areas.

(a) Gaps, seams and fairings on the lower right side of the fuselage, aft of the engine exhaust stack, are typical areas where deposits may be trapped and not reached by normal cleaning methods.

(b) Around rivet heads, skin laps and inspection covers on the airplane lower fuselage, aft of the engine secondary exhaust stack, should be carefully cleaned and inspected.

(2) Battery Box and Battery Vent Opening.

(a) The battery, battery cover, battery box and adjacent areas, especially areas below the battery box where battery electrolyte may have seeped, are particularly subject to corrosive action. If spilled battery electrolyte is neutralized and cleaned up at the same time of spillage, corrosion can be held to a minimum by using a weak boric acid solution to neutralize the battery electrolyte (ni-cad battery) or baking soda solution to neutralize the lead acid-type battery electrolyte. If boric acid or baking soda is not available, flood the area with water.

(3) Steel Control Cables (including Stainless Steel).

(a) Checking for corrosion on control cables is normally accomplished during the preventative maintenance check. During preventative maintenance, broken wires and wear of the control cables are also checked.

(b) If the surface of the cable is corroded, carefully force the cable open by reverse twisting and visually inspect the interior. Corrosion on the interior strands of the cable constitutes failure and the cable must be replaced. If no internal corrosion is detected, remove loose external rust and corrosion with a clean, dry, coarse-weave rag or fiber brush.

NOTE: Do not use metallic wools or solvents to clean installed cables. Use of metallic wool will embed dissimilar metal particles in the cables and create further corrosion. Solvents will remove internal cable lubricant, allowing cable strands to abrade and further corrode.

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(c) After thorough cleaning of the exterior cable surface, apply a light coat of lubricant (VV-L-800) to the external cable surface.

(4) Internal Fuel Tanks.

(a) The presence of soil contamination (a brown slimy substance) and pitting-type corrosion may occur in the lower areas of the integral fuel tanks of certain airplanes. This condition can cause a general degradation of some top coating and some depolymerization and loosening of sealant materials in lower areas.

(b) The contaminants resemble normal aluminum corrosion products, including a considerable quantity of iron. The brown, slimy deposits are microbial in nature. Examination of the corrosion pits by metallurgical techniques indicate the presence of intergranular attacks.

5. Corrosion Detection

A. The primary means of corrosion detection is visual, but in situations where visual inspection is not feasible, other techniques must be used. The use of liquid dye penetrant, magnetic particle, X-ray and ultra-sonic devices can be used, but most of these sophisticated techniques are intended for the detection of physical flaws within metal objects, rather than the detection of corrosion.

(1) Visual Inspection. A visual check of the metal surface can reveal the signs of corrosive attack, the most obvious of which is a corrosive deposit. Corrosion deposits of aluminum or magnesium are generally a white or grayish-white powder, while the color of ferrous compounds varies from red to dark reddish-brown.

(a) The indications of corrosive attack are small, localized discolorations of the metal surface. Surfaces protected by paint or plating may only exhibit indications of more advanced corrosive attack by the presence of blisters or bulges in the protective film. Bulges in lap joints are indications of corrosive build-up which is well advanced.

(b) In many cases the inspection area is obscured by structural members, equipment installations or, for other reasons, are awkward to check visually. In such cases, mirrors, borescope or similar devices can be used to inspect the obscured areas. Any means which allows a thorough inspection can be used. Magnifying glasses are valuable aids for determining whether or not all corrosive products have been removed during clean up operations.

(2) Liquid Dye Penetrant Inspection. Inspection for large stress-corrosion or corrosion fatigue cracks on nonporous or nonferrous metals may be accomplished using dye penetrant processes. The dye applied to a clean metallic surface will enter small openings or cracks by capillary action. After the dye has an opportunity to be absorbed by any surface discontinuity, the excess dye is removed and a developer is applied to the surface. The developer acts like a blotter and draws the dye from cracks or fissures back to the surface, giving visible indication of any fault that is present on the surface. The magnitude of the fault is indicated by the quantity of dye brought back to the surface by the developer.

6. Corrosion Damage Limits

A. Following cleaning and inspection of the corroded area, the actual extent of the damage may be evaluated using the following general guidelines and good, sound maintenance judgement. Determine the degree of corrosion damage (light, moderate, or severe) with a dial-type depth gage, if accessibility permits. If the area is inaccessible, clay impressions, or any other means which will give accurate results, should be used. In the event the corrosion damage is severe, contact Cessna Propeller Aircraft Product Support for assistance.

(1) Light Corrosion - Characterized by discoloration or pitting to a depth of approximately 0.001 inch maximum. This type of damage is normally removed by light hand-sanding or a minimum of chemical treatment.

(2) Moderate Corrosion - Appears similar to light corrosion except there may be blistering or some evidence of scaling or faking. Pitting depths may be as deep as 0.010 inch. This type of damage is normally removed by extensive hand-sanding or mechanical sanding.

(3) Severe Corrosion - General appearance may be similar to moderate corrosion with severe blistering exfoliation and scaling or flaking. Pitting depths may be as deep as 0.10 inch. This type of damage is normally removed by extensive mechanical sanding or grinding (if not complete part replacement).

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CHAPTER 52

DOORS

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DOORS - GENERAL

1. Scope

A. This chapter provides maintenance information on doors. Provided are removal/installation instructions and rigging procedures.

2. Definition

A. This chapter is divided into sections and subsections to assist maintenance personnel in locating specific systems and information. The following is a brief description of each section. For locating information within the chapter, refer to the Table of Contents at the beginning of the chapter.
   (1) The cabin door section provides information on removal/installation and rigging of the doors.
   (2) The baggage door section provides information on removal/installation of baggage door, seal replacement and inspection.

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CABIN DOORS - DESCRIPTION AND OPERATION

1. Description

A. A cabin door is installed on each side of the airplane. Each door has an outer sheet skin that is chemically bonded to an inner pan assembly. Each door has a latch assembly, an inside handle, a pair of external hinges, and a doorstop assembly.

2. Operation

A. The cabin doors open by the inside or outside handle, that is connected to internal components.
   (1) The cabin door latch is a two-part assembly latch base, external handle, spring-loaded latch bolt and pull-bar assembly, and a spring-loaded catch pin assembly. The interior handle base plate assembly is directly connected to the cabin door latch by an adjustable push rod assembly. This push rod assembly has two clamps attached 180 degrees apart on the main rod. These clamps operate a cable assembly that moves a cable pin from the top aft end of the cabin door into the aft top door sill.
   (2) The door latch exterior handle is extended when the cabin door is open. The handle is held in position by the spring-loaded latch catch engaged with the latch bolt through the hole in the bolt. The push rod assembly will move forward. The attached cable assembly will be retracted from the top door sill with the cable pin in a recess in the pin guide. The interior handle will move approximately 15 degrees aft of the vertical position.

B. The cabin doors close and latch by the internal or external handle connected with internal components.
   (1) The cabin door moves the catch pin over the actuator attached to the cover plate. The cover plate is on the rear door post. The catch pin disengages the latch catch from the latch bolt as the catch pin is moved forward. The latch handle extends and the pull-bar assembly compresses. The latch handle is pulled in and the latch bolt is moved on the latch striker. The latch striker is on the rear door post.
   (2) The push rod assembly moves aft and moves the cable pin from the pin guide in the door into the top aft door sill receptacle when the exterior handle is pushed flush with the fuselage skin. The interior door handle has moved from approximately 15 degrees aft of the vertical position to approximately 45 degrees forward of the vertical position. The interior handle pushed to the horizontal position, flush with the armrest, will overcenter the door latch.

C. The cabin doors have a key lock.
   (1) The key lock turns and moves the pin into the exterior latch handle when the cabin door is closed and the exterior latch handle is flush.

NOTE: It is possible to lock the cabin door when the exterior handle is used and the push rod assembly is not adjusted correctly. The rigging and adjustment procedures must be used to correctly adjust the push rod.

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CABIN DOORS - MAINTENANCE PRACTICES

1. General

A. The cabin door maintenance practices give procedures for the removal and installation of the cabin doors, weatherstrip, locks, latches, handles, and cable assemblies.

B. The cabin door maintenance practices also give procedures for the adjustment and test of the cabin door, latch cable, and inside handle.

C. An optional Medeco lock is installed on the cabin doors on some airplanes.

2. Cabin Door Removal/Installation

NOTE: The removal and installation procedures given are for the pilot's door. The procedures for the copilot's door are typical.

A. Cabin Door Removal (Refer to Figure 201).
(1) Open the cabin door.
(2) Remove the nut, screw, and spacers from the stop fitting.
(3) Remove the nuts and screws that attach the hinges to the fuselage structure.
(4) Remove the cabin door from the airplane.

B. Cabin Door Installation (Refer to Figure 201).
(1) Put the cabin door in position and attach the door with the screws and nuts.
(2) Install the screw, spacers, and nut on the stop fitting.
(3) Close and latch the cabin door.
(4) Make sure the cabin door is correctly adjusted. Refer to Cabin Door Adjustment/Test.

3. Cabin Door Weatherstrip Removal/Installation

A. Cabin Door Weatherstrip Removal (Refer to Figure 201).
(1) Use a nonmetallic scraper to remove the weatherstrip and adhesive from the door assembly.
(2) Use solvent to remove all remaining adhesive from the door surface.

B. Cabin Door Weatherstrip Installation (Refer to Figure 201).
(1) Cut the new weatherstrip to the correct length with the used weatherstrip as a template.
(2) Cut a small notch in the butt ends of the new weatherstrip to let water drain.
(3) Put the weatherstrip in position with the notches at the door low point.
(4) Apply a thin, smooth layer of EC-1300L, or equivalent adhesive to the two surfaces.
(5) Let the adhesive dry until it is tacky.
(6) Push the weatherstrip in position.
(7) Do not stretch the weatherstrip around the door corners.

4. Cabin Door Latch Lock Removal/Installation

A. Cabin Door Latch Lock Removal (Refer to Figure 201).
(1) Remove the cam from the latching side of the locking arm.
(2) Remove the washers between the cam and the locking arm.
(3) Remove the locking arm pin from the locking arm and the catch base assembly.

B. Cabin Door Latch Lock Installation (Refer to Figure 201).
(1) Assemble the locking arm with the locking arm pin.
(a) Put one washer on each side of the locking arm.
(b) Swage the locking arm pin so there is minimum movement between the parts.
(c) Cut the unwanted material from the pin.
(2) Put the locking arm pin into the 0.125 inch (3.2 mm) diameter hole at the catch base assembly.
(3) Align the hole in the locking arm with the hole in the latch base assembly and install the pin.
(4) Put three washers between the cam and the locking arm.
(5) Attach the cam to the latch side of the locking arm.

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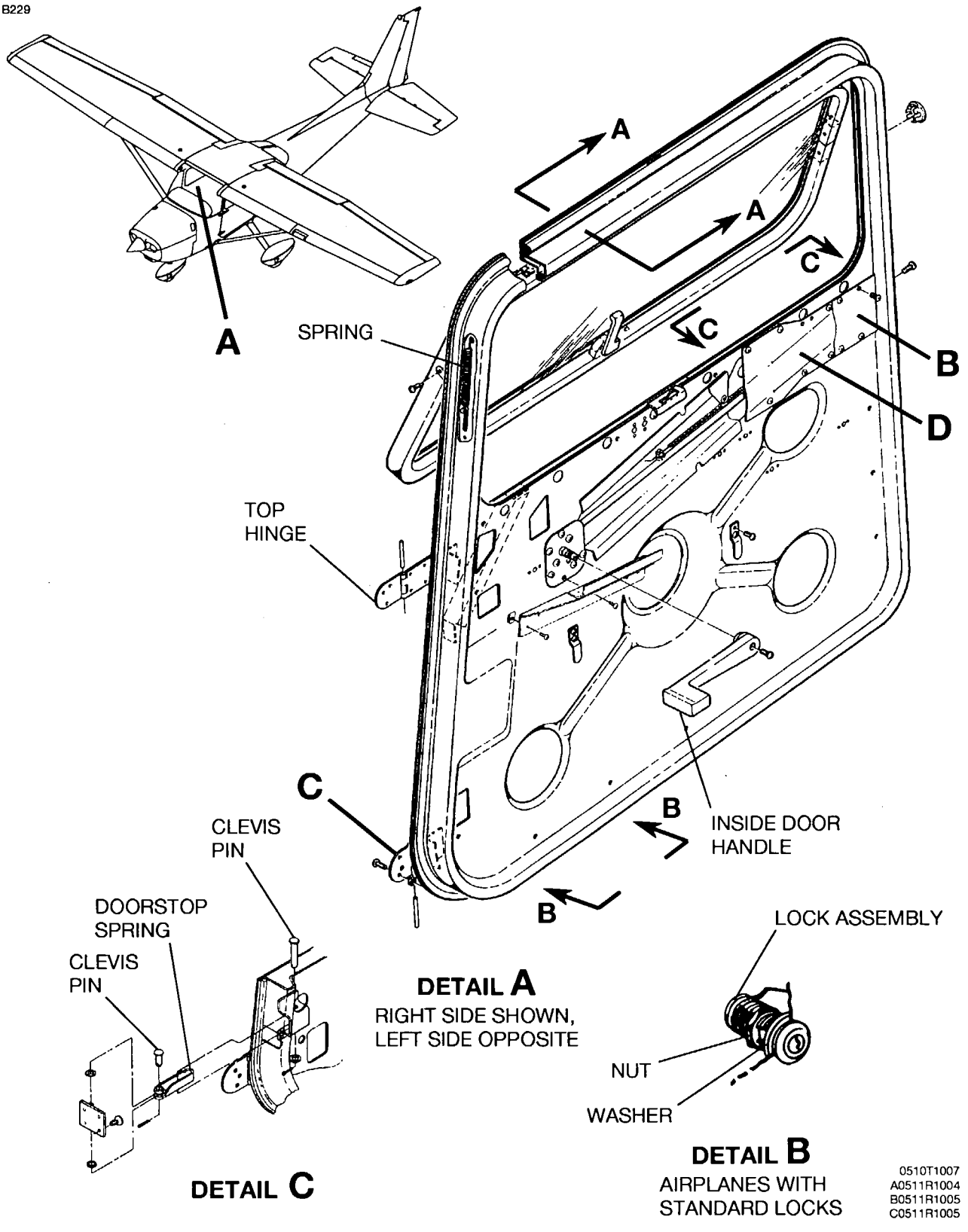

Cabin Door Installation
Figure 201 (Sheet 1)

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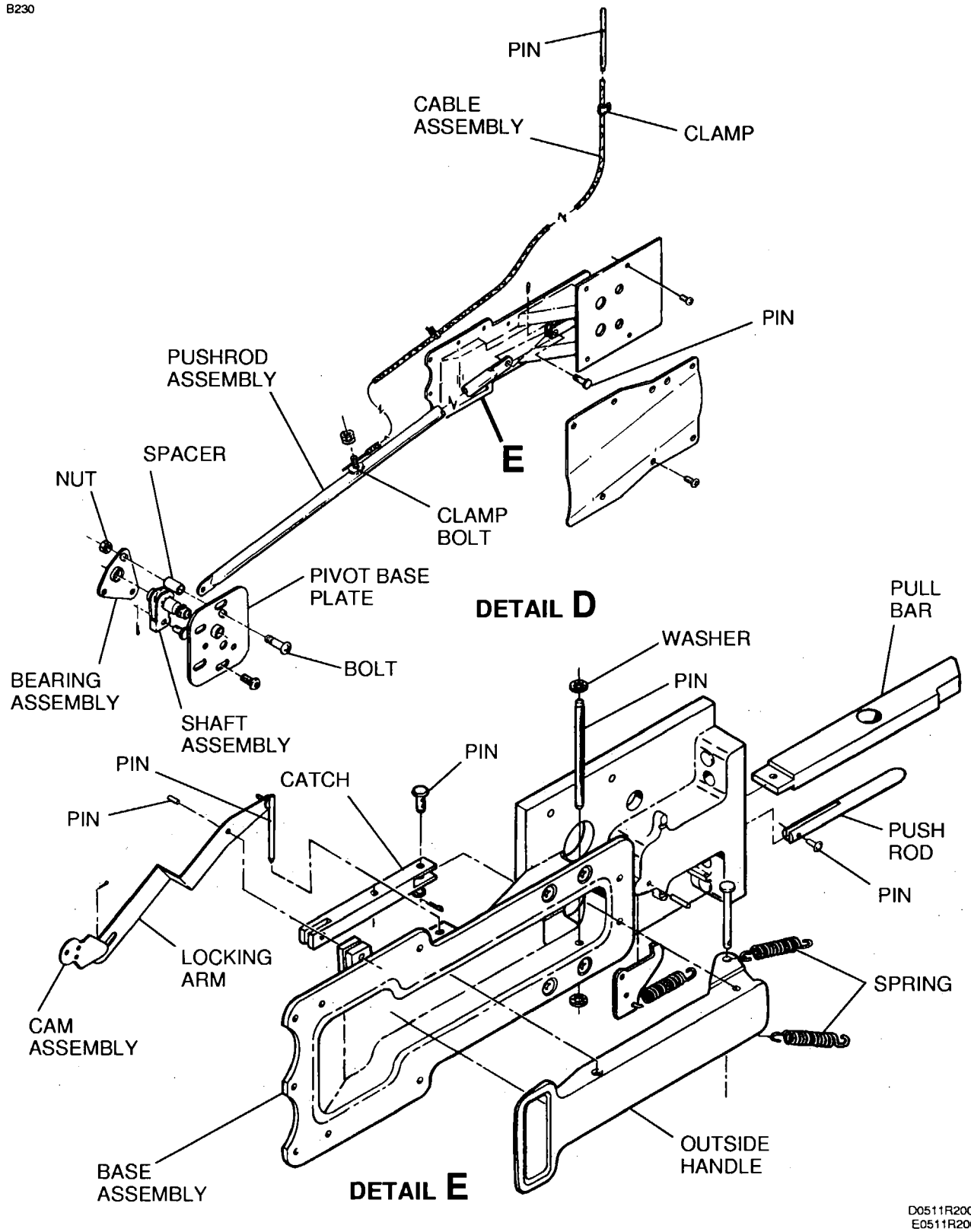

Cabin Door Installation
Figure 201 (Sheet 2)

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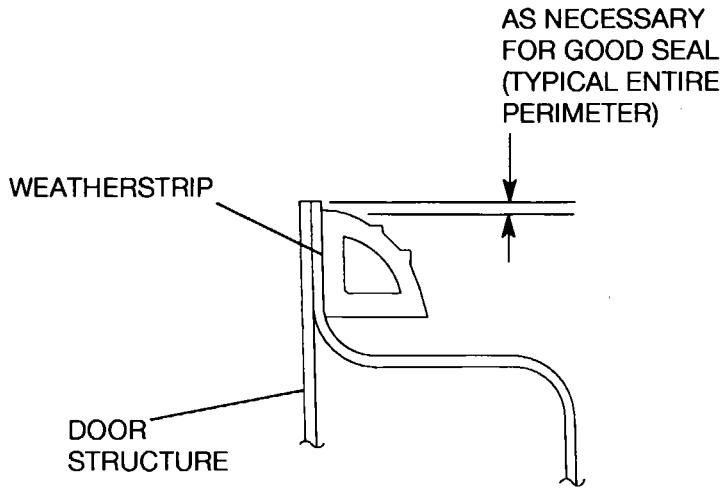
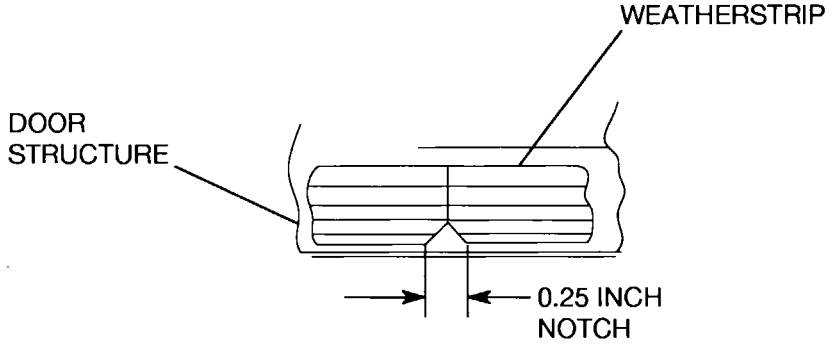


VIEW A–A



VIEW B–B

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Cabin Door Installation
Figure 201 (Sheet 3)

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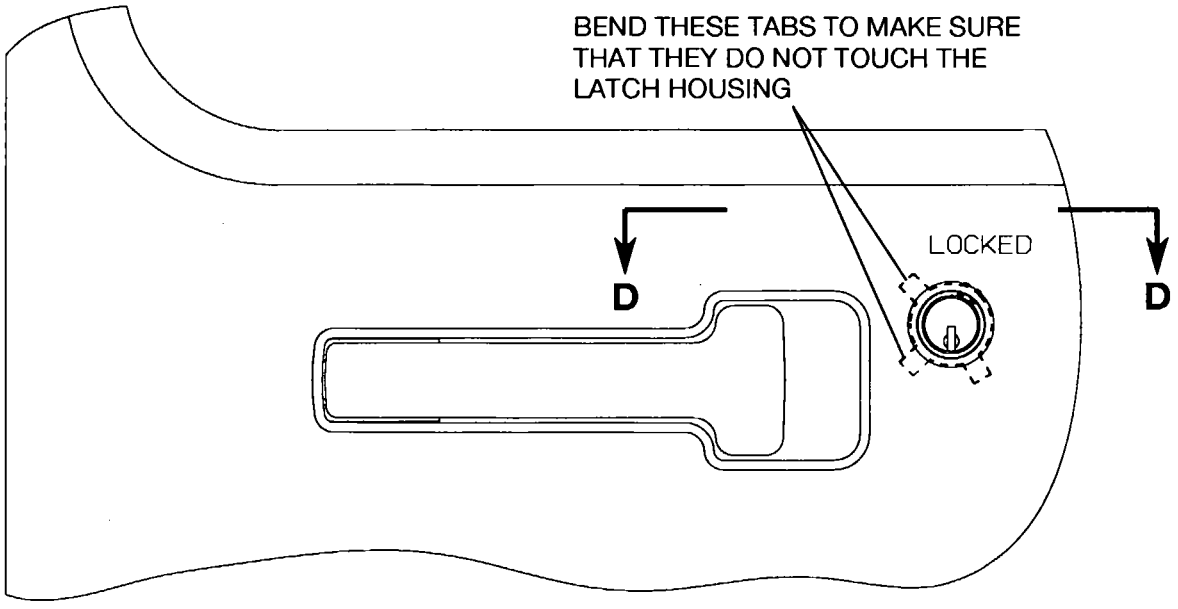
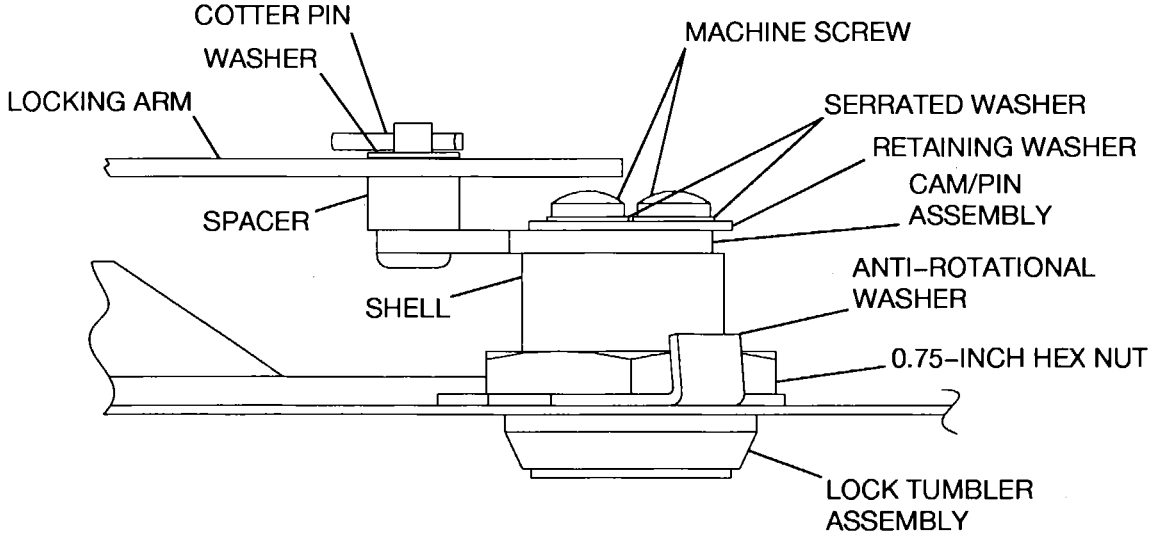


VIEW C–C
AIRPLANES WITH MEDECO LOCK



VIEW D–D
LOCK SHOWN IN UNLOCKED POSITION

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Cabin Door Installation
Figure 201 (Sheet 4)

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5. Cabin Door Latch Assembly Removal/Installation

A. Cabin Door Latch Assembly Removal (Refer to Figure 201).
(1) Remove the cabin door lock assembly. Refer to Cabin Door Lock Assembly Removal/ Installation.
(2) Remove the rivets that attach the latch base to the door skin.
(3) Remove the screws that attach the latch to the door pan.
(4) Remove the pushrod and bolt.
(5) Pull the latch handle through the cutout in the door skin.
(6) Remove the latch assembly from the airplane.

B. Cabin Door Latch Assembly Installation (Refer to Figure 201).
(1) Put the latch assembly in the closed position between the door pan and the door skin.
(2) Make sure the cable assembly is forward of the latch base attach plate, and inboard of latch base cup.
(3) Extend the latch handle through the cutout in the door skin.
(4) Push the latch assembly aft so the bolt and pushrod extend through their related holes.
(5) Release the pushrod so the bolt is fully extended and the handle is flush.
(6) Attach the latch to the door pan with the screws through the base assembly and through the aft flange of the door pan.
(7) Make sure the door skin dimension around the latch assembly is correct.

CAUTION: Do not make the holes oversize in the latch base.

(8) Drill eleven 0.128 inch (3.25 mm) diameter holes that align with the latch base.
(9) Make sure the cabin door latch cable assembly rigging and the cabin door inside handle rigging is done before the latch base is attached to the skin. Refer to Cabin Door Latch Cable Assembly Adjustment/Test and Cabin Door Inside Handle Rigging.
(10) Attach the latch base to the door skin with rivets.
(11) Install the cabin door lock assembly. Refer to Cabin Door Lock Assembly Removal/Installation.

6. Cabin Door Latch Cable Assembly Installation

A. Cabin Door Latch Cable Assembly Removal (Refer to Figure 201).
(1) Remove the screw and clamp that attach the cable assembly to the door.
(2) Remove the plug button.
(3) Remove the pin from the pin guide.
(4) Pull the pin end of the cable from the top of the door.
(5) Remove the nut and clamp from the opposite end of the cable casing.
(6) Remove the cable assembly from the door.

B. Cabin Door Latch Cable Assembly Installation (Refer to Figure 201).
(1) Attach the clamp and nut one inch (25 mm) from the end of the cable casing on the pin end of the cable assembly.
(2) Put the pin end of the cable between the door pan and the door skin at the aft end of the door.
(3) Push the pin end of the cable to the top of the door.
(4) Remove the plug button and align the pin of the cable with the pin guide.
(5) Put the pin through the pin guide.
(6) Align the clamp on the cable casing through the hole that is below the 0.875 inch (22.22 mm) access hole.
(7) Install the screw.
(8) Make sure the cable operates freely.
(a) Add washers as required if the cable does not operate freely.
(9) Do the cabin door latch cable assembly rigging. Refer to Cabin Door Latch Cable Assembly Rigging.

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7. Cabin Door Lock Assembly Removal/Installation (on airplanes with standard locks)

A. Cabin Door Lock Assembly Removal (Refer to Figure 201).
(1) Remove the lower door accent panel and main door panel to get access to the cabin door lock assembly. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(2) Remove the armrest door plugs, door panel insert, armrest, door handle, and cover plate from the door to get access to the cabin door lock assembly.
(3) Remove the nut and washer.
(4) Remove the cabin door lock assembly.

B. Cabin Door Lock Assembly Installation (Refer to Figure 201).
(1) Put the cabin door lock assembly in position.
(2) Install the washer and nut.
(3) Install the armrest door plugs, door panel insert, armrest, door handle and cover plate.
(4) Install the lower door accent panel and main door panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

8. Cabin Door Lock Assembly Removal/Installation (on airplanes with Medeco locks)

A. Cabin Door Lock Assembly Removal (Refer to Figure 201).
(1) Remove the lower door accent panel and main door panel to get access to the cabin door lock assembly. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(2) Remove the armrest door plugs, door panel insert, armrest, door handle, and cover plate from the door to get access to the cabin door lock assembly.
(3) Remove the cotter pin, washer, locking arm, and spacer from the lock assembly.
(4) Remove the hex nut and the anti-rotational washer that attach the lock tumbler assembly to the door structure and the cam assembly.
(5) Remove the lock assembly from the door.

B. Cabin Door Lock Assembly Installation (Refer to Figure 201).
(1) Put the cabin door lock assembly in position on the cabin door.
(2) Install the hex nut and the anti-rotational washer that attach the lock tumbler assembly to the door structure and the cam assembly. Make sure that the anti-rotational washer is installed under the hex nut.
(3) Torque the nut.
(4) Bend the applicable tab on the anti-rotational washer against the flat part of the nut.
(5) Install the spacer, locking arm, washer, and cotter pin that connect the lock assembly to the door handle.
(6) Bend the applicable tabs on the cam-pin assembly to make sure that they do not touch the latch housing.
(7) Install the armrest door plugs, door panel insert, armrest, door handle, and cover plate.
(8) Install the lower door accent panel and the main door panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

9. Cabin Door Lock Cam Assembly Removal/Installation (on airplanes with standard locks)

A. Cabin Door Lock Cam Assembly Removal (Refer to Figure 201).
(1) Remove the lower door accent panel and the main door panel to get access to the cabin door lock cam assembly. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(2) Remove the armrest door plugs, door panel insert, armrest, door handle, and cover plate from the door to get access to the cabin door lock cam assembly.
(3) Remove the cam stop screw from the cabin door lock cam assembly.
(4) Remove the cam assembly.

B. Cabin Door Lock Cam Assembly Installation (Refer to Figure 201).
(1) Put the cam assembly in position.
(2) Install the cam stop screw with Loctite 242.
(3) Install the armrest door plugs, door panel insert, armrest, door handle and cover plate.
(4) Install the lower door accent panel and main door panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

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10. Cabin Door Lock Cam Assembly Removal/Installation (on airplanes with Medeco locks)

A. Cabin Door Lock Cam Assembly Removal (Refer to Figure 201).
(1) Remove the lower door accent panel and main door panel to get access to the cabin door lock cam assembly. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(2) Remove the armrest door plugs, door panel insert, armrest, door handle, and cover plate from the door to get access to the cabin door lock cam assembly.
(3) Remove the machine screws, serrated washers, and retaining washer from the cabin door lock cam assembly.
(4) Remove the cam assembly.

B. Cabin Door Lock Cam Assembly Installation (Refer to Figure 201).
(1) Put the cam assembly in position.
(2) Install the machine screws, serrated washers, and retaining washer that attach the cam assembly to the cabin door lock. Install the machine screws with Loctite 242.
(3) Install the armrest door plugs, door panel insert, armrest, door handle, and cover plate.
(4) Install the lower door accent panel and main door panel. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

11. Cabin Door Adjustment/Test

A. Adjust the new cabin doors.

CAUTION: Do not adjust the bonded door flange or the airplane structure with force. Damage to the bonded areas and the structural components can occur.

(1) Trim the door flange as required to get a gap between the door skin and fuselage skin of 0.09 inch (2.3 mm) or less.

B. Adjust the cabin doors.

NOTE: The cabin doors must be smooth with the fuselage skin.

(1) Use the slots at the door latch plate to adjust the latch assembly and the bolt engagement with the rotary clutch on the door post.

12. Cabin Door Latch Cable Assembly Rigging

A. Do the Cabin Door Latch Cable Assembly Rigging (Refer to Figure 201).
(1) Pull the cable tight.
(2) Attach the clamp and the nut to the cable so it aligns with the 0.193 inch (4.9 mm) diameter hole in the door pan.
(3) Make sure the door latch is open.
(4) Cut the casing of the cable assembly approximately two inches (50 mm) from the clamp bolt on the push rod assembly.
(5) Put the core of the cable through the clamp.
(6) Pull the core of the cable through the clamp bolt so the pin extends approximately 0.125 inch (3.2 mm) from the door pan contour.
(7) Cut the core of the cable approximately one inch (25 mm) forward of the push rod clamp.
(8) Attach the two nuts to the push rod clamp bolt.
(9) Make sure the latch operates freely.
(a) Remove the cable core from the clamp and operate the latch if the latch binds and will not operate freely.
(b) Do a check of the cable for possible adjustments that will make the operation easier.
(10) Install the cover assembly and do another check of the cable operation.

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13. Latch Assembly Adjustment/Test

A. Do the adjustment of the latch assembly. (Refer to Figure 201).
(1) Make sure the cabin door is installed and fitted to the fuselage before the adjustment/test can be done.
(2) Make sure the cabin door latch is in the OPEN position before the adjustment/test can be done.
(3) Make sure the door latch operates smoothly and freely.
(4) Make sure the bolt or pull bar are not filed, ground or sanded in any way.

NOTE: A noise can be heard when the inside handle is pushed down. It is recommended that the outside door handle be flush with the door skin, although the noise is heard.

(5) Install shims to adjust the striker plate forward to give a minimal clearance between the bolt and the striker plate.

NOTE: This adjustment will make sure the pushrod will engage the latch catch. It will also make sure the exterior handle will stay open until the door is closed again when the door is opened from the outside.

(6) Install shims as required, beneath the actuator on the cover assembly.

NOTE: If the cabin door is too far forward for correct operation of the door latch, the latch assembly pushrod will not let the bolt move.

(7) Close the cabin door.
(8) Make sure the exterior handle is flush with the door skin when the door is closed.
(a) Adjust the push-pull rod out, if the exterior handle is not flush with the door skin when the door is closed.
1 Remove the screws and nuts that attach the base plate to the door.
2 Remove the smaller end of the push-pull rod and turn it 180 degrees.
3 Install the screws and nuts that attach the base plate.
(9) Do a check for slippage between the cable casing and clamps that attach the cable.
(10) Install the cotter pin in the clevis pin.

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BAGGAGE DOOR - MAINTENANCE PRACTICES

1. General

A. A baggage door is installed on the left side of the airplane, aft of the cabin door. The baggage door allows access into the baggage area and into the tailcone.

B. A rubber weatherstrip is cemented around the edge of the baggage door. It seals the door to the fuselage structure when the door is closed.

C. An optional Medeco lock is installed on the baggage door on some airplanes.

2. Baggage Door Removal/Installation

A. Baggage Door Removal (Refer to Figure 201).
(1) Open the baggage door.
(2) Disconnect the doorstop chain.
(3) Remove the upholstery panel from the door.
(4) Remove the bolts that attach the door to the hinges.

B. Baggage Door Installation (Refer to Figure 201).
(1) Put the baggage door in position on the hinges and attach it with the bolts.
(2) Install the upholstery panel to the door.
(3) Connect the door stop chain.
(4) Close the baggage door and do a check for smooth operation.

3. Baggage Door Weatherstrip Removal/Installation

A. Baggage Door Weatherstrip Removal (Refer to Figure 201)..
(1) Remove the baggage door.
(2) With a nonmetallic scraper, remove the seal and adhesive from the baggage door.
(3) Remove the adhesive residue and clean the door seal area with DeSoclean 110 Solvent.
(4) Install the baggage door.

B. Baggage Door Weatherstrip Installation (Refer to Figure 201)..
(1) With the old seal or the door seal area of the baggage door as a pattern, measure and cut the new seal to length.
(2) Apply a thin, even coat of RTV157 Adhesive around the circumference of the door seal area of the baggage door.
(3) Make sure that you do not stretch the seal around the corners of the door.
(4) Push the new seal into the adhesive. Let the adhesive cure in accordance with the manufacturer's instructions, and make sure that the seal is completely adhered to the door with no gaps between the seal and the door.

4. Baggage Door Weatherstrip Inspection

A. Do an Inspection of the Baggage Door Weatherstrip.
(1) Put a 4-inch by 11-inch piece of paper between the baggage doorframe and the baggage door. Close the baggage door. Slowly pull on the paper to make sure that there is seal tension. Move the paper around the perimeter of the door to do a test of the door seal tension.
(2) Remove the paper from the doorframe. Make sure that the baggage door is closed. Pour a gallon of water over the door and tailcone doorframe. After the water no longer drips, open the door and do an inspection for leaks.
(3) If any leaks are found, towel dry the upholstery with a clean, dry towel. Install the weatherstrip again as necessary to make sure that there are no leaks around the seal area of the baggage door.
(4) If necessary, apply U064158 Aerodynamic Filler Compound before you install the seal. Sand and do a touch-up of the paint as necessary.

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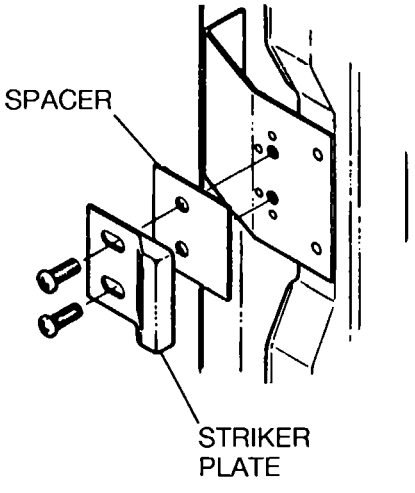
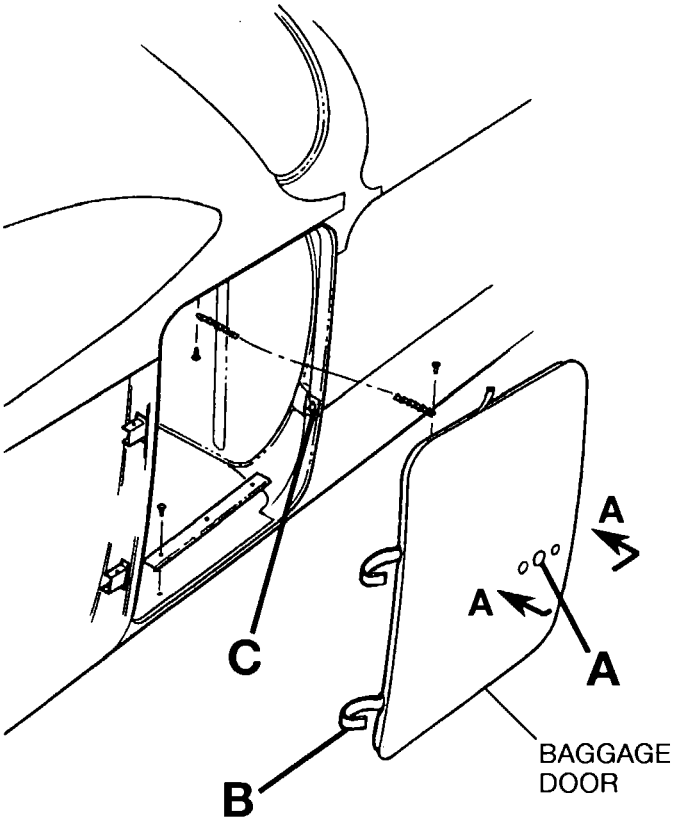
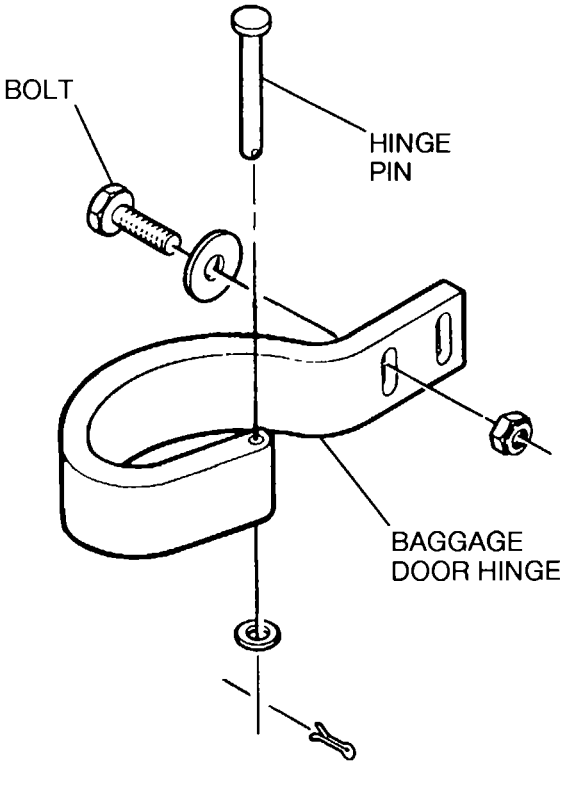


DETAIL C





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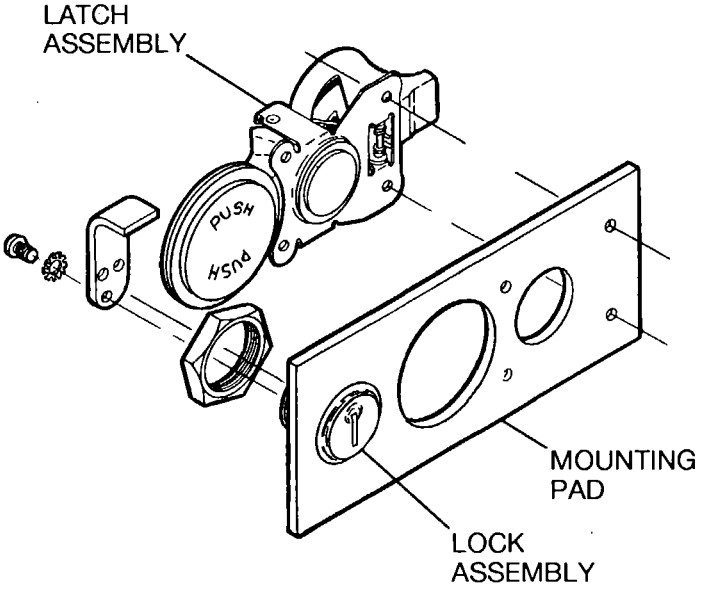

DETAIL A
AIRPLANES WITH STANDARD LOCK

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A0512T1006
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C0512T1007

Baggage Door Installation
Figure 201 (Sheet 1)

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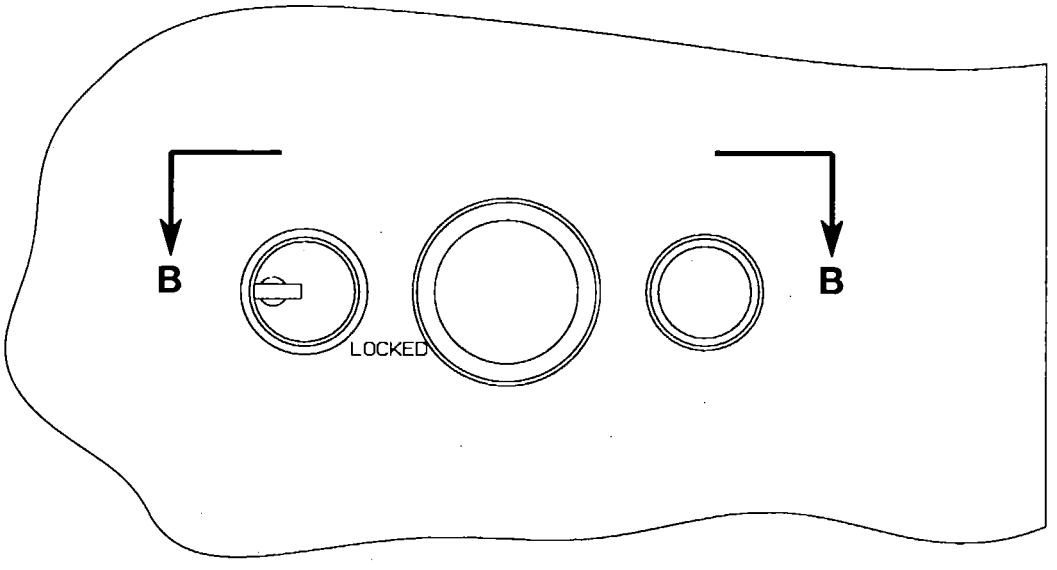
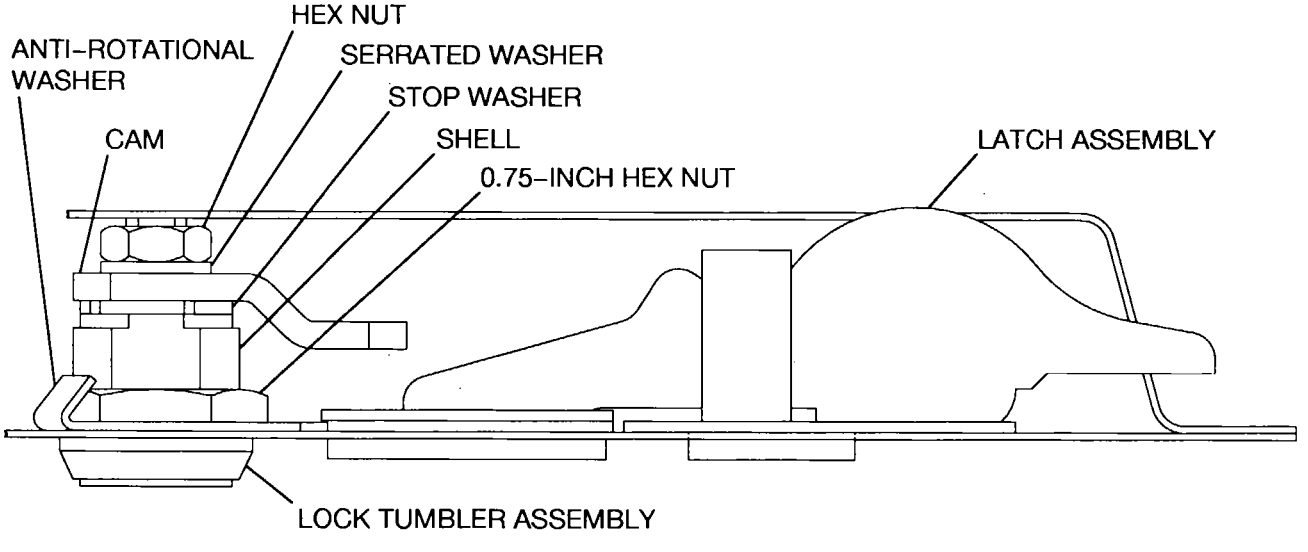


VIEW A–A
AIRPLANES WITH MEDECO LOCK



VIEW B–B
LOCK SHOWN IN LOCKED POSITION

AA0711T1048
BB0711T1048

Baggage Door Installation
Figure 201 (Sheet 2)

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5. Baggage Door Lock Assembly Removal/Installation (On airplanes with Medeco lock)

A. Baggage Door Lock Assembly Removal (Refer to Figure 201).
(1) Remove the baggage door panel to get access to the baggage door lock assembly. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(2) Remove the 0.75-inch hex nut and the anti-rotational washer that attach the lock tumbler assembly to the door structure and the cam assembly.
(3) Remove the lock assembly from the door.

B. Baggage Door Lock Assembly Installation (Refer to Figure 201).
(1) Put the baggage door lock assembly in position on the baggage door.
(2) Install the 0.75-inch hex nut and the anti-rotational washer that attach the lock tumbler assembly to the door structure and the cam assembly. Make sure that the anti-rotational washer is installed under the 0.75-inch hex nut.
(3) Torque the nut.
(4) Bend the applicable tab on the anti-rotational washer against the flat part of the nut.
(5) Install the baggage door panel to the baggage door. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

6. Baggage Door Lock Cam Assembly Removal/Installation (On airplanes with Medeco lock)

A. Baggage Door Lock Cam Assembly Removal (Refer to Figure 201).
(1) Remove the baggage door panel to get access to the baggage door lock assembly. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
(2) Remove the hex nut and the serrated washer that attach the cam assembly to the baggage door lock.
(3) Remove the cam assembly.

B. Baggage Door Lock Cam Assembly Installation (Refer to Figure 201).
(1) Put the cam assembly in position.
(2) Install the hex nut and the serrated washer that attach the cam assembly to the baggage door lock. Install the hex nut with Loctite 242.
(3) Install the baggage door panel to the baggage door. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

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CHAPTER

55

STABILIZERS

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Vertical Stabilizer Fin Removal/Installation ..... 55-30-00 Page 201

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STABILIZERS - GENERAL

1. Scope

A. This chapter provides maintenance information on the horizontal and vertical stabilizer.

2. Definition

A. The section on horizontal stabilizer provides instructions for removal and installation of the horizontal stabilizer.

B. The section on vertical stabilizer fin provides instructions for removal and installation on the vertical stabilizer fin.

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HORIZONTAL STABILIZER - MAINTENANCE PRACTICES

1. General

A. The horizontal stabilizer is primarily of all-metal construction, consisting of ribs and spars covered with skin. A formed metal leading edge is riveted to the assembly to complete the structure. The elevator trim tab actuator is contained within the horizontal stabilizer. The underside of the stabilizer contains a covered opening which provides access to the actuator. Hinges are located on the rear spar assembly to support the elevators.

B. This section provides removal and installation instructions for the horizontal stabilizer.

2. Horizontal Stabilizer Removal/Installation

A. Remove Horizontal Stabilizer (Refer to Figure 201).
   (1) Remove elevators. Refer to Chapter 27, Elevator Control System- Maintenance Practices.
   (2) Remove rudder. Refer to Chapter 27, Rudder Control System - Maintenance Practices.
   (3) Remove vertical stabilizer. Refer to Vertical Stabilizer - Maintenance Practices.
   (4) Disconnect elevator trim control cables at clevis and turnbuckle inside tailcone.
   (5) Remove pulleys which route the aft cables into horizontal stabilizer, and pull cables out of tailcone.
   (6) Remove bolts securing horizontal stabilizer to fuselage.

      NOTE: Note the order in which any spacers or shims are removed for reinstallation.

   (7) Remove horizontal stabilizer.

B. Install Horizontal Stabilizer (Refer to Figure 201).
   (1) Install horizontal stabilizer to fuselage using bolts.

      NOTE: Reinstall any spacers and shims in the exact order in which they were removed.

   (2) Reroute cables into tailcone and install pulleys.
   (3) Reconnect elevator trim control cables at clevis and turnbuckle inside tailcone.
   (4) Install vertical stabilizer. Refer to Vertical Stabilizer - Maintenance Practices.
   (5) Install rudder. Refer to Chapter 27, Rudder Control System - Maintenance Practices.
   (6) Install elevators. Refer to Chapter 27, Elevator Control System - Maintenance Practices.

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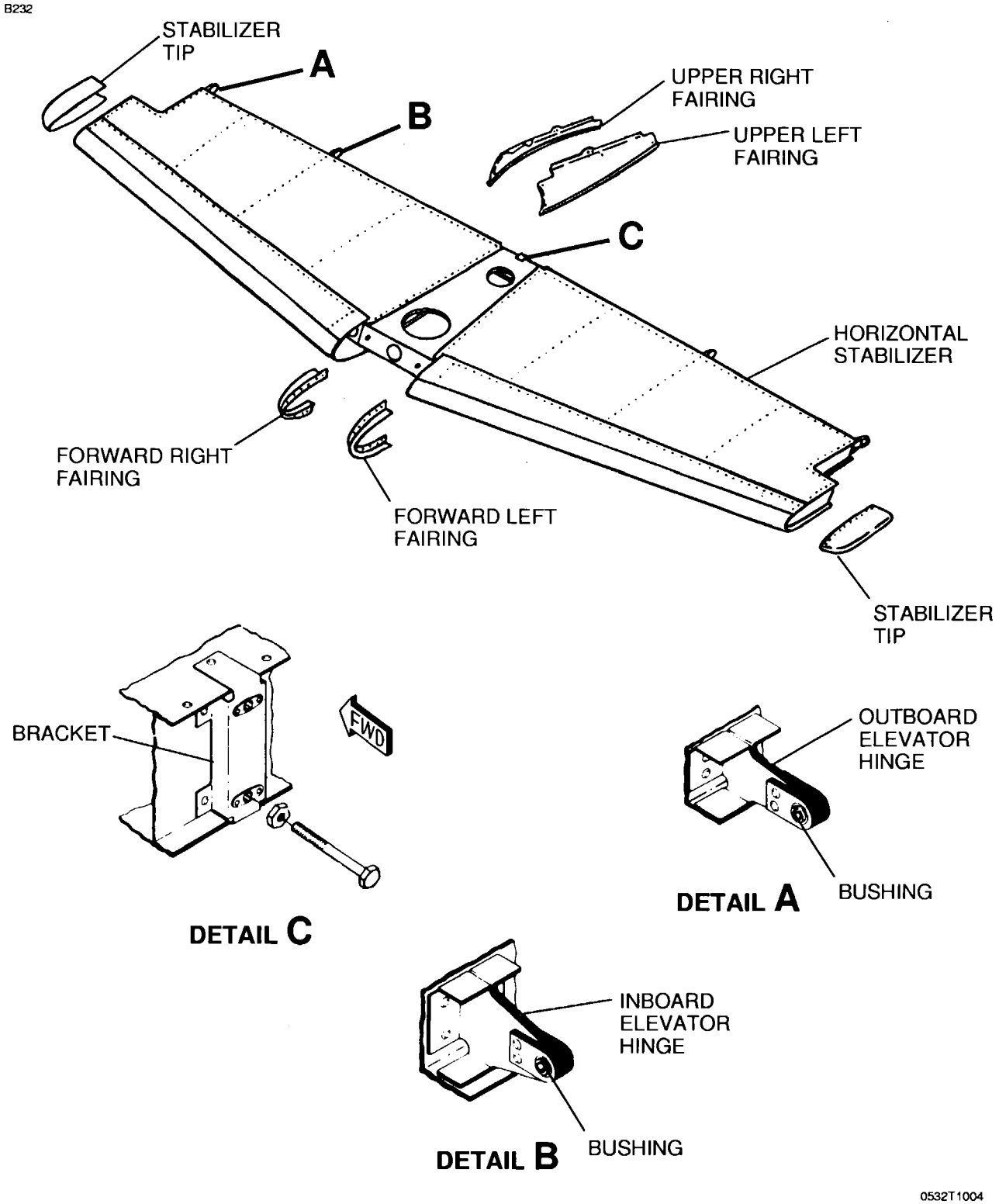

Horizontal Stabilizer Installation
Figure 201 (Sheet 1)

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VERTICAL STABILIZER FIN - MAINTENANCE PRACTICES

1. General

A. The vertical stabilizer fin is of metal construction, consisting of ribs and spars covered with aluminum skin. The trailing edge of the fin contains three hinges used to attach the rudder.

B. Maintenance practices consist of removal and installation of the vertical stabilizer fin.

2. Vertical Stabilizer Fin Removal/Installation

A. Remove Vertical Stabilizer Fin (Refer to Figure 201).
(1) Remove rudder. Refer to Chapter 27, Rudder Control System - Maintenance Practices.
(2) Remove upper left and upper right fairings.
(3) Disconnect all electrical, navigation light, and antenna leads from base of fin area.
(4) Remove screws attaching dorsal to fin.
(5) Disconnect elevator cable from elevator bellcrank.
(6) Remove bolts and shims (if installed) attaching fin rear spar to fuselage fitting.
(7) Remove upper elevator stop bolt.
(8) Remove bolts attaching fin front spar to fuselage bulkhead and remove fin from fuselage.

B. Install Vertical Stabilizer Fin (Refer to Figure 201).
(1) Place fin on fuselage and secure front spar of fin to fuselage.
(2) Install upper elevator stop bolt.
(3) Attach fin rear spar to fuselage fitting using shims (if required) and bolts

NOTE: If new fin is being installed, gap between the fin rear spar and the fuselage fitting should not exceed 0.030 inch. If gap exceeds this dimension, it is permissible to use one shim per bolt to obtain desired clearance. Use the following chart for shim part numbers:

Gap between fitting and spar	Shim Thickness	Shim Part Number
0.030 to 0.050 inch	0.020 inch	0531115-1
0.050 to 0.070 inch	0.040 inch	0531115-2

(4) Connect elevator cable to elevator bellcrank.
(5) Secure dorsal to fin using screws.
(6) Reconnect all electrical, navigation, and antenna leads.
(7) Install upper left and upper right fairings.
(8) Install rudder. Refer to Chapter 27, Rudder Control System - Maintenance Practices.

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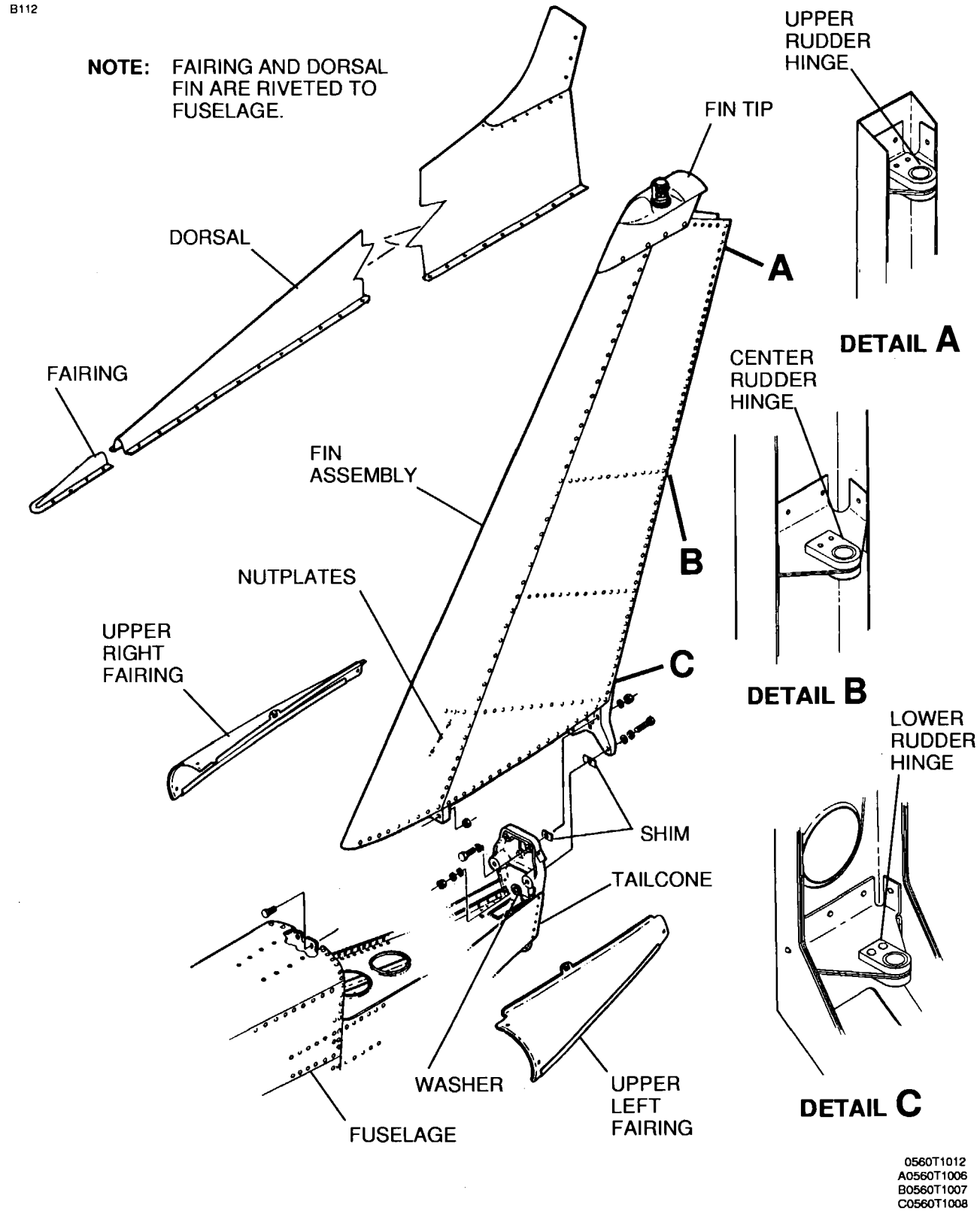

Vertical Stabilizer Fin Installation
Figure 201 (Sheet 1)

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CHAPTER 56

WINDOWS

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56-20-00	Pages 201-202	Apr 7/2003
56-30-00	Pages 201-202	Apr 7/2003

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Cabin Door Window Removal/Installation ..... 56-30-00 Page 201

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WINDOWS - GENERAL

1. Scope

A. This chapter provides information on windows used throughout the airplane.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following listed items:

NAME	NUMBER	MANUFACTURER	USE
Mild Soap or Detergent (hand dishwashing type without abrasives)		Commercially Available	To clean windshields and windows.
Aliphatic Naphtha	Type II Federal Specification TT-N-95	Commercially Available	To remove deposits from windshields and windows.
Novus	Number 1	Commercially Available	To clean acrylic windshields and windows.
Novus	Number 2	Commercially Available	To remove minor surface scratches in acrylic windshields and windows.
Novus	Number 3	Commercially Available	To remove heavy scratches and abrasions in acrylic windshields and windows.
Mirror Glaze	MGH-7	Meguiars Mirror Bright Polish 210 N First Ave. Arcadia, CA 91006	To clean and polish acrylic windshields and windows.
Soft cloth, such as: Cotton flannel or cotton terry cloth		Commercially Available	To apply and remove wax and polish.
Windshield sealant tape	U000927S	Available from Cessna Parts Distribution Cessna Aircraft Company Department 701 5800 E. Pawnee Rd. Wichita, KS 67218-5590	To seal windshield.
Repcon rain repellent	6850-00-139-5297	Unelko Corporation 7428 East Karen Drive Scottsdale, Arizona 85260	To repell rain from windshield.

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3. Definition

A. This chapter is divided into sections and subsections to assist maintenance personnel in locating specific systems and information. The following is a brief description of each section. For locating information within the chapter, refer to the Table of Contents at the beginning of the chapter.

(1) The section on windshields and windows provides installation notes and precautions applicable to the entire chapter.

(2) The section on flight compartment windows provides maintenance instructions for repair and replacement of the windshield.

(3) The section on cabin windows provides maintenance instructions for the cabin side and cabin rear windows.

(4) The section on door windows provides maintenance instructions for openable windows located in the cabin doors.

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WINDSHIELDS AND WINDOWS - DESCRIPTION AND OPERATION

1. General

A. This section provides instructions and tips for cleaning and installing windshields and windows used in the airplane.

2. Tools, Equipment and Materials

A. For a list of required tools, equipment and materials, refer to Windows - General.

3. Cleaning Instructions

CAUTION: WINDSHIELDS AND WINDOWS (ACRYLIC-FACED) ARE EASILY DAMAGED BY IMPROPER HANDLING AND CLEANING TECHNIQUES.

CAUTION: DO NOT USE METHANOL, DENATURED ALCOHOL, GASOLINE, BENZENE, XYLENE, METHYL N-PROPYL KETONE, ACETONE, CARBON TETRACHLORIDE, LACQUER THINNERS, COMMERCIAL OR HOUSEHOLD WINDOW CLEANING SPRAYS ON WINDSHIELDS OR WINDOWS.

A. Instructions For Cleaning.
   (1) Place airplane inside hangar or in shaded area and allow to cool from heat of suns direct rays.
   (2) Using clean (preferably running) water, flood the surface. Use bare hands with no jewelry to feel and dislodge any dirt or abrasive materials.
   (3) Using a mild soap or detergent (such as a dishwashing liquid) in water, wash the surface. Again use only the bare hand to provide rubbing force. (A clean cloth may be used to transfer the soap solution to the surface, but extreme care must be exercised to prevent scratching the surface.)
   (4) When contaminants on acrylic windshields and windows cannot be removed by a mild detergent, Type II aliphatic naphtha, applied with a soft clean cloth, may be used as a cleaning solvent. Be sure to frequently refold cloth to avoid redepositing contaminants and/or scratching windshield with any abrasive particles.
   (5) Rinse surface thoroughly with clean fresh water and dry with a clean cloth.
   (6) Hard polishing wax should be applied to acrylic surfaces. (The wax has an index of refraction nearly the same as transparent acrylic and will tend to mask any shallow scratches on the windshield surface).
   (7) Acrylic surfaces may be polished using a polish meeting Federal Specification P-P-560 applied per the manufacturers instructions.

      NOTE: When applying and removing wax and polish, use a clean, soft cloth, such as cotton or cotton flannel.

4. Windshield and Window Preventive Maintenance

NOTE: Utilization of the following techniques will help minimize windshield and window crazing.

A. General Notes and Techniques For Acrylic Windshields.
   (1) Keep all surfaces of windshields and windows clean.
   (2) If desired, wax acrylic surfaces.
   (3) Carefully cover all surfaces during any painting, powerplant cleaning or other procedure that calls for use of any type of solvents or chemicals.
   (4) Do not park or store airplane where it might be subjected to direct contact with or vapors from: methanol, denatured alcohol, gasoline, benzene, xylene, methyl n-propyl ketone, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers, or other types of solvents.

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(5) Do not leave sun visors up against windshield when not in use. The reflected heat from these items causes elevated temperatures on the windshield. If solar screens are installed on the inside of the airplane, make sure they are the silver appearing, reflective type.
(6) Do not use a power drill motor or other powered device to clean, polish, or wax surfaces.

5. Windshield and Window Installation Techniques

A. Installation Techniques.
(1) Special drills must be used when drilling holes in acrylic. Standard drills will cause the hole to be oversized, distorted, or excessively chipped.
(2) Whenever possible, a coolant such as a plastic drilling wax should be used to lubricate the drill bit.
(3) Drilled holes should be smooth with a finish of 125 rms (root mean square).
(4) The feed and speed of the drill is critical. Refer to Table 1 for thickness verses drill speed information.

Table 1. Material Thickness vs. Drill Speed

Thickness (in inches)	Drill Speed (RPM)
0.062 to 0.1875	1500 to 4500
0.250 to 0.375	1500 to 2000
0.4375	1000 to 1500
0.500	500 to 1000
0.750	500 to 800
1.00	500

(5) In addition to feed and speed of the drill bit, the tip configuration is of special importance when drilling through acrylic windows and windshields. Tip configuration varies with hole depth, and the following information applies when drilling through acrylic:
(a) Shallow Holes - When hole depth to hole diameter ratio is less than 1.5 to 1, the drill shall have an included tip angle of 55 degrees to 60 degrees and a lip clearance angle of 15 degrees to 20 degrees.
(b) Medium Deep Holes - When hole depth to hole diameter ratio is from 1.5 to 1 up to 3 to 1, the drill shall have an included tip angle of 60 degrees to 140 degrees and a lip clearance angle of 15 degrees to 20 degrees.
(c) Deep Holes - when hole depth of hole diameter ratio is greater than 3.0 to 1, the drill shall have an included tip angle of 140 degrees and a lip clearance of 12 degrees to 15 degrees.
(6) Parts which must have holes drilled shall be backed up with a drill fixture. Holes may be drilled through the part from one side. However, less chipping around holes will occur if holes are drilled by drilling the holes from both sides. This is accomplished by using a drill with an acrylic backup piece on the opposite side. Remove the drill from the hole and switch the backup plate and finish drilling from the opposite side.

6. Windshield Rain Repellent

A. Repcon is a rain repellent and surface conditioner that may be used to increase the natural cleaning of the windshield during rain. Apply in accordance with manufacturers instructions.

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WINDSHIELD - MAINTENANCE PRACTICES

1. General

A. This section provides instructions for removal and installation of the window as well as repair techniques applicable to acrylic windshields and windows.

2. Windshield Removal/Installation

A. Remove Windshield (Refer to Figure 201).
   (1) Remove wing fairings.
   (2) Remove air vent tubes.
   (3) Drill out rivets securing front retainer strip.

CAUTION: IF WINDSHIELD IS TO BE REINSTALLED, BE SURE TO PROTECT WINDSHIELD DURING REMOVAL.

   (4) Pull windshield straight forward, out of side and top retainers. Remove top retainer if necessary.
   (5) Clean sealer from inner sidewalls and bottom of retainers.

B. Install Windshield (Refer to Figure 201).
   (1) If windshield is to be reinstalled, clean off old sealer and felt, then install new felt around edges of windshield.
   (2) If new windshield is to be installed, remove protective cover and clean.
   (3) Apply new felt to edges of windshield.
   (4) Apply windshield sealant tape along the sides and bottom of felt. Refer to Windows - General for a list of sealant tape.
   (5) Position the bottom edge of windshield against deck skin.
   (6) Using a piece of bent sheet metal (8 inches wide x length of top edge of windshield) placed under top edge of upper retainer, bow windshield and guide top edge of windshield into upper retainer using bent sheet metal in a shoe horn effect.
   (7) Secure front retainer strip using rivets.
   (8) Install air vent tube.
   (9) Install wing fairings.

3. Temporary Repairs

A. Temporary repairs to windshields and windows can be accomplished using techniques illustrated and described in the Single Engine Structural Repair Manual, Chapter 56, Plastic Window Surface Repair.

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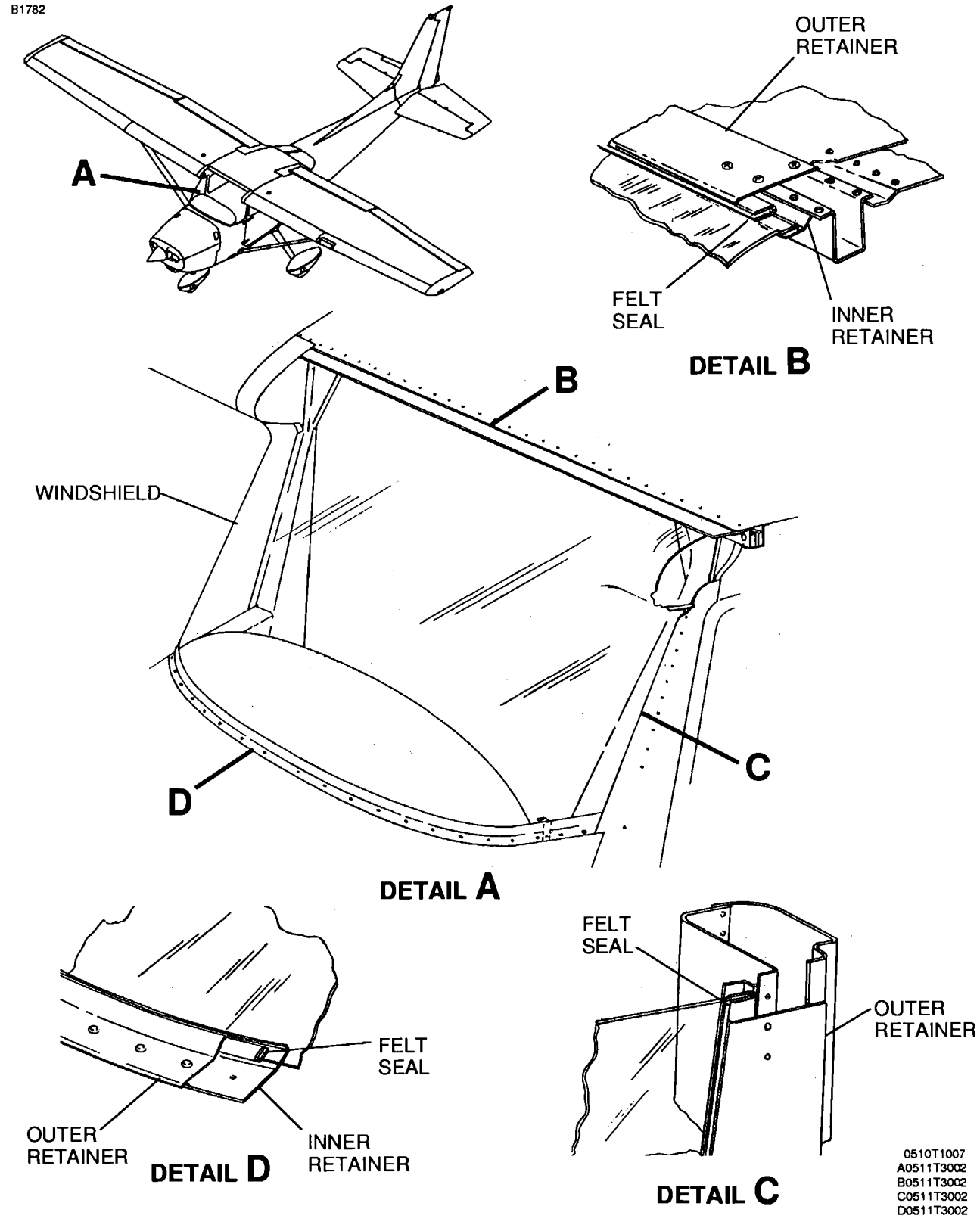

Windshield Installation
Figure 201 (Sheet 1)

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CABIN WINDOWS - MAINTENANCE PRACTICES

1. General

A. The airplane is equipped with two side windows and a rear window, all located in the rear cabin area. Maintenance practices are limited to removal and installation of the windows. For instructions on temporary repair, refer to Windshield - Maintenance Practices.

2. Rear Window Removal/Installation

A. Remove Rear Window (Refer to Figure 201).
   (1) Remove external center strip retainer.
   (2) Remove upholstery as necessary to expose retainer strips inside cabin. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (3) Drill out rivets as necessary to remove outer retainer strip along aft edge of window.
   (4) Remove window by lifting aft edge and pulling window aft. If difficulty is encountered, rivets securing retainer strips inside cabin may also be drilled out and retainer strips loosened or removed.

B. Install Rear Window (Refer to Figure 201).
   (1) If old window is being reinstalled, remove all traces of old sealant from window.
   (2) Clean out channels and retainers to remove all traces of old sealant.
   (3) Check fit and carefully file or grind away excess plastic.
   (4) Apply felt strip and sealant to all edges of window to prevent leaks.
   (5) Reinstall rear window to airplane and secure using retainer strips and rivets.
   (6) Install upholstery. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

3. Side Window Removal/Installation

A. Remove Side Window (Refer to Figure 201).
   (1) Remove upholstery as required to gain access to retainer strips inside cabin. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.
   (2) Drill out rivets securing retainer strips to airplane.

B. Install Side Window (Refer to Figure 201).
   (1) If old window is being reinstalled, remove all traces of old sealant from window.
   (2) Clean out channels and retainers to remove all traces of old sealant.
   (3) Apply felt strip and sealant to all edges of window to prevent leaks.
   (4) Reinstall retainer strips using rivets.
   (5) Reinstall upholstery. Refer to Chapter 25, Interior Upholstery - Maintenance Practices.

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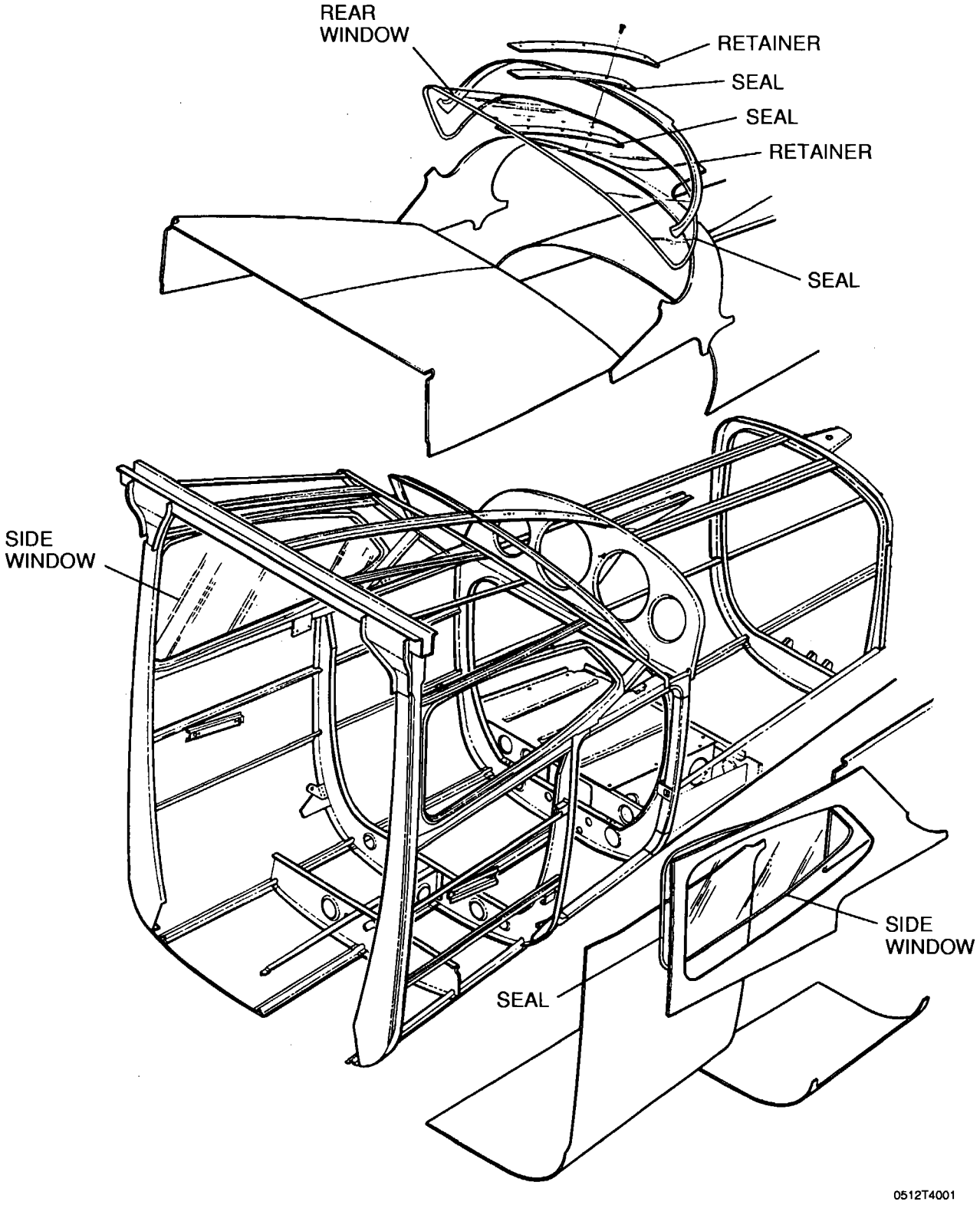

Cabin Windows Installation
Figure 201 (Sheet 1)

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CABIN DOOR WINDOWS - MAINTENANCE PRACTICES

1. General

A. This maintenance practices section consists of removal and installation of the hinged windows located in each door. For instructions on temporary repair to the cabin door windows, refer to Windshield - Maintenance Practices.

2. Cabin Door Window Removal/Installation

A. Remove Cabin Door Window (Refer to Figure 201).
   (1) Disconnect arm from window assembly.
   (2) Remove hinge pins from hinge.

B. Install Cabin Door Window (Refer to Figure 201).
   (1) Position window assembly to door.
   (2) Secure window assembly to hinge using hinge pin.

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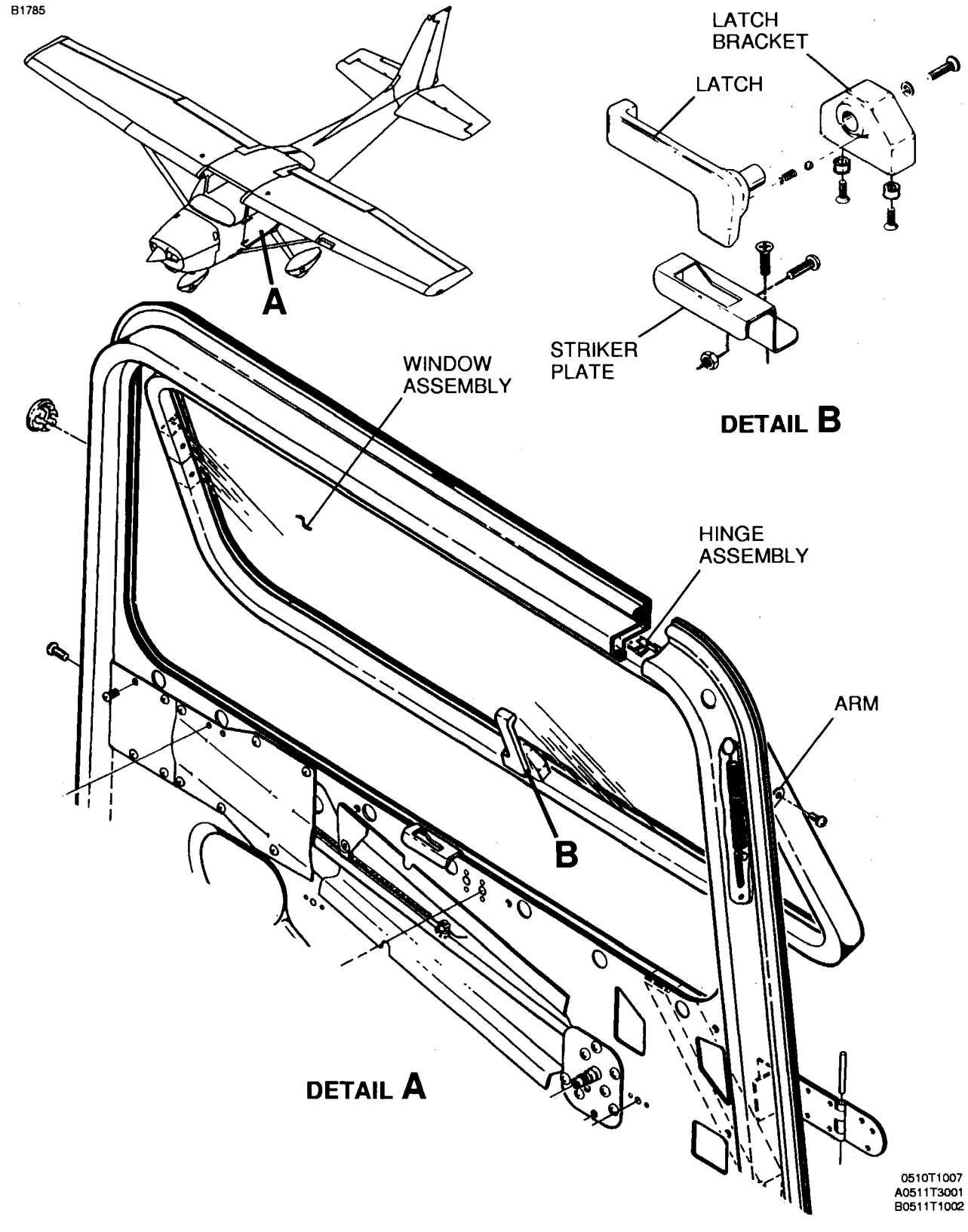

Cabin Door Window Installation
Figure 201 (Sheet 1)

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CHAPTER

57

WINGS

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WINGS - GENERAL

1. Scope

A. This chapter provides instructions on wing removal and installation. Information and repair procedures beyond the scope of this chapter can be found in the Single Engine 1996 and On Structural Repair Manual.

2. Tools, Equipment and Materials

NOTE: Equivalent substitutes may be used for the following listed items:

NAME	NUMBER	MANUFACTURER	USE
Grease	MIL-G-21164	E/M Corporation Box 2200 Highway 52 N.W. West Lafayette, IN 47906	To lubricate wing attach fittings and bolts upon reinstallation.

3. Definition

A. This chapter contains a single section on wing removal, installation and adjustment.

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WINGS AND WING STRUTS - MAINTENANCE PRACTICES

1. Description and Operation

A. Each metal wing is a strut braced type, with two main spars and suitable ribs for the attachment of the skin. Skin panels are riveted to ribs, spars and stringers to complete the structure. An all metal, piano hinged aileron, flap and detachable wing tip are mounted on each wing assembly. Each wing also incorporates an integral fuel bay located between the two spars at the inboard portion of the wing. Each wing is supported in position by a single lift strut which consists of a streamlined tube riveted to two end fittings for attachment at the wing and at the fuselage.

B. For a skeletal view of the wing assembly, refer to Chapter 6, Airplane Stations - Description and Operation, Figure 2.

2. Wing and Strut Removal/Installation

A. Remove Wing and Strut (Refer to Figure 201).

NOTE: Wings are most easily removed if four people are available to handle the wing. Otherwise, the wing should be supported with a sling or maintenance stand when the fasteners are loosened.

(1) Remove fasteners from fairings at wing/fuselage intersections.
(2) Remove inspection plates as required to allow for disconnection of all electrical, mechanical and fuel connections.
(3) Drain fuel from wing.
(4) Disconnect electrical wires at wing root disconnects.
(5) Disconnect fuel lines at wing root.
(6) On left wing, disconnect pitot line.
(7) Disconnect fresh air distribution duct at wing root.
(8) Loosen and disconnect aileron cables at aileron bellcrank.
(9) Disconnect flap cables at turnbuckle above cabin headliner, and pull cables into wing root area.

NOTE: To ease rerouting of cables, a guide wire may be attached to each cable before it is pulled free from the wing. Cable may then be disconnected from the guide wire. Leave the guide wire routed through the wing; it will be reattached to the cable during installation and used to pull the cable into place.

(10) Remove screws from strut fairings and slide fairings toward center of strut.
(11) Support wing at outboard end. Remove strut-to-wing attach bolt and strut-to-fuselage attach bolt.
(12) Remove strut from between wing and fuselage.

NOTE: Tape flaps in the streamlined position during wing removal. This will prevent flap movement during handling.

(13) Mark position of wing attachment eccentric bushings in relationship to fittings. These bushings are used to rig out wing heaviness, and if bushings are not marked, wings may require readjustment at installation.
(14) Remove nuts, washers, bushings and bolts attaching wing spars to fuselage.

NOTE: It may be necessary to rock the wings slightly and/or to use a long drift punch to remove attaching bolts.

(15) Remove wing and lay on padded stand.

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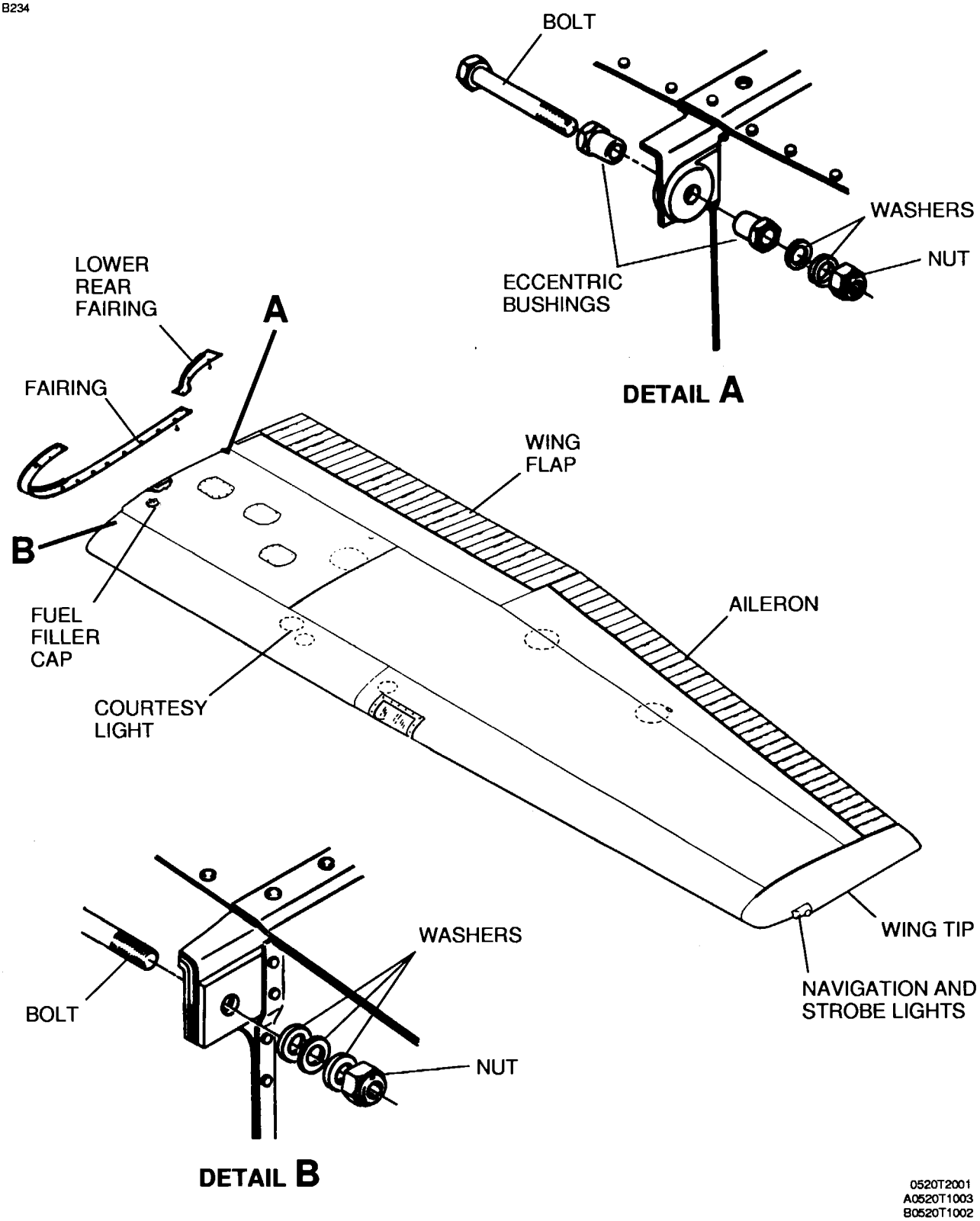

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Wing Installation
Figure 201 (Sheet 1)

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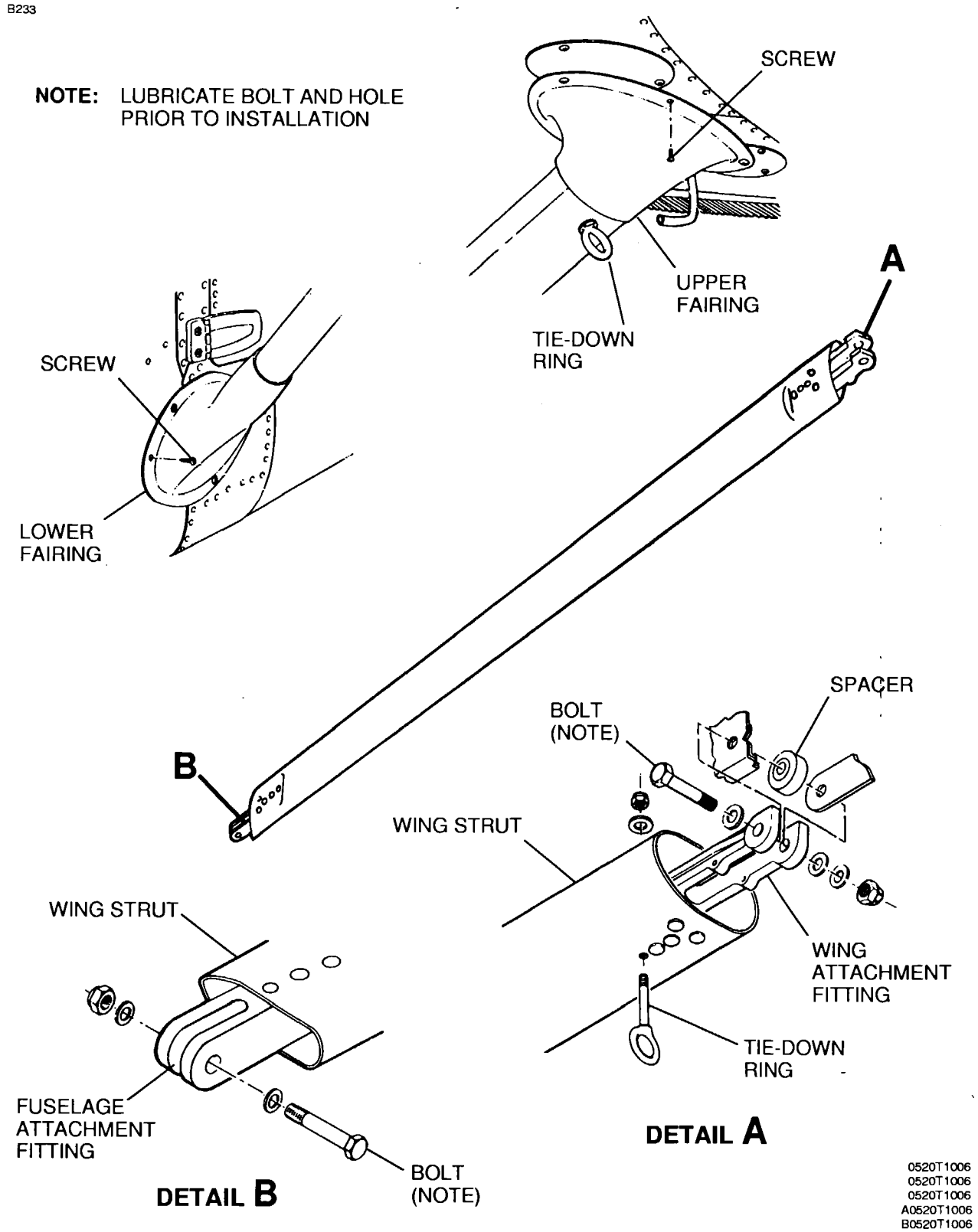

Wing Installation
Figure 201 (Sheet 2)

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B. Install Wing and Strut (Refer to Figure 201).
(1) Hold wing in position and install bolts, bushings, washers and nuts attaching wing spars to fuselage fittings. Ensure eccentric bushings are positioned as marked.

NOTE: Lightly lubricate wing attach bolts and holes with MIL-G-21164 grease before installing bolts.

CAUTION: DO NOT LUBRICATE THE THREADS OF THE BOLTS.

(2) Torque front wing spar bolts from 300 to 690 inch pounds. Torque rear wing spar bolts from 300 to 500 inch pounds.
(3) Position upper and lower strut fairings on strut.

NOTE: Wrap wing strut using 3MY8671 polyurethane tape (1 inch wide) centered at point where cuff terminates.

(4) Install bolts, spacers and nuts to secure upper and lower ends of wing strut to wing and fuselage fittings. Torque nuts to 480 to 690 inch-pounds.

NOTE: Lightly lubricate bolts and holes with MIL-G-21164 grease before installing bolts.

CAUTION: DO NOT LUBRICATE THE THREADS OF THE BOLTS.

(5) Route flap and aileron cables, using guide wires.
(6) Reconnect all fuel, electrical and mechanical connections removed above.
(7) Rig flap system. Refer to Chapter 27, Flap Control System - Maintenance Practices.
(8) Rig aileron systems. Refer to Chapter 27, Aileron Control System - Maintenance Practices.
(9) Refuel wing tank.
(10) Check operation of all mechanical, electrical and fuel systems.
(11) Install wing root fairings.
(12) Install all removed access/inspection plates and upholstery.

3. Adjustment (Correcting Wing Heavy Conditions)

NOTE: If considerable control wheel pressure is required to keep the wings level in normal flight, a "wing heavy" condition exists and can be corrected by the following procedure.

A. Adjustment Procedures (Refer to Figure 201, Detail A).
(1) Remove wing fairing strip on the wing heavy side of the airplane.

CAUTION: ENSURE THE ECCENTRIC BUSHINGS ARE ROTATED SIMULTANEOUSLY. ROTATING THEM SEPARATELY WILL DESTROY THE ALIGNMENT BETWEEN THE OFF-CENTER BOLT HOLES IN THE BUSHINGS, THUS EXERTING A SHEARING FORCE ON THE BOLT, WITH POSSIBLE DAMAGE TO THE HOLE IN THE WING SPAR.

NOTE: The eccentric cams should only be adjusted after other flight control systems have been adjusted and rigged.

(2) Loosen nut and rotate eccentric bushings simultaneously until the bushings are positioned with the thick side of the eccentrics up. This will lower the trailing edge of the wing, and decrease wing heaviness by increasing angle of incidence of the wing.
(3) Torque the nut from 300 to 500 inch pounds and reinstall fairing strip.

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(4) Test fly the airplane. If the wing heavy condition still exists, remove fairing strip on the lighter wing, loosen nut and rotate bushing simultaneously until the bushings are positioned with the thick side of the eccentrics down. This will raise the trailing edge of the wing, thus increasing wing heaviness to balance heaviness in the opposite wing.
(5) Torque nut from 300 to 500 inch pounds, install fairing strip and repeat flight test.

4. Strut Damage and Repair Criteria

A. For wing strut damage and repair criteria, refer to the Single Engine Structural Repair Manual Chapter 57, Wing Damage Classification.

5. Wing Tip Removal/Installation

A. Remove Wing Tip (Refer to Figure 202).
(1) Remove screws securing wing tip to wing.
(2) Remove screw securing strobe light and navigation light ground straps to power supply.
(3) Disconnect navigation light electrical connector.
(4) Disconnect strobe light electrical connector.
(5) Remove wing tip from wing.

B. Install Wing Tip (Refer to Figure 202).
(1) Connect strobe light electrical connector, and connect navigation light electrical connector.
(2) Slide the wing tip into position over the wing tip rib ensuring the existing holes in the wing tip align with the attach holes in the wing skin/rib nutplates.
(3) Fabricate a curved spacer from phenolic or aluminum which is 0.01 to 0.03 inch thick X 1.0 inch X 2.0 inches which matches the contour of the leading edge.
(4) Insert the spacer at the leading edge of the wing between the skin and the inside contour of the wing tip.
(5) Secure wing tip to wing using screws starting at the aft of the tip and working forward.
(6) When all screws are secure, remove the spacer to leave a gap of 0.01 inch to 0.03 inch between the skin and the inside contour of the wing tip.

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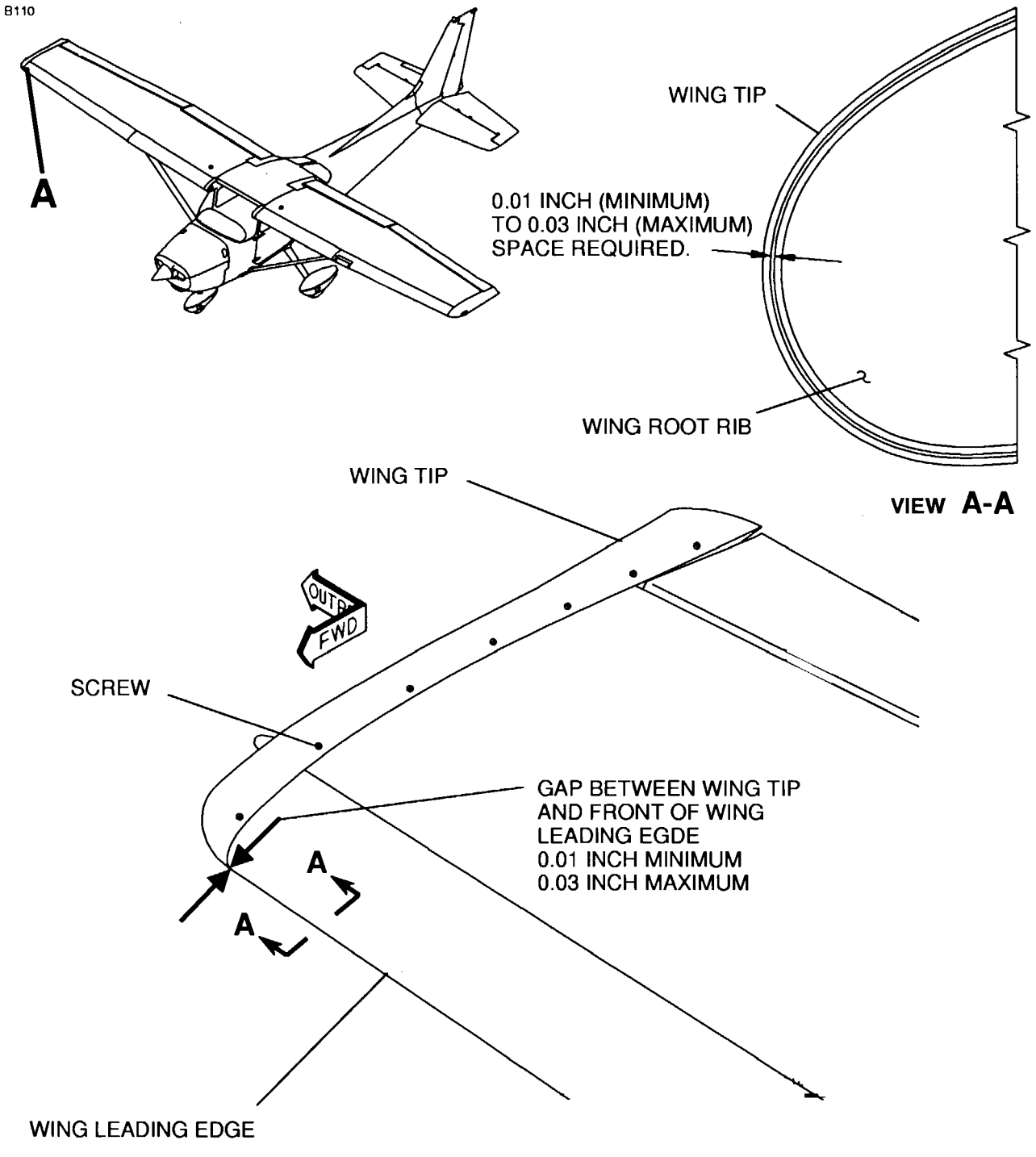

DETAIL A

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Wing Tip Installation
Figure 202 (Sheet 1)

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CHAPTER

61

PROPELLERS

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61-10-00	Pages 201-203	Jul 1/2007

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PROPELLERS - GENERAL

1. Scope

A. This chapter provides instructions on propeller and spinner.

2. Definition

A. This chapter contains a single section on removal and installation of the propeller and spinner.

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PROPELLER - MAINTENANCE PRACTICES

1. Description and Operation

A. The airplane is equipped with a two bladed, fixed pitch metal propeller. Maintenance practices consist of propeller/spinner removal and installation. For information beyond the scope of this section, refer to the applicable McCauley Service Manual.

2. Propeller and Spinner Removal/Installation

A. Remove the Propeller and Spinner (Refer to Figure 201).

WARNING: Exercise care when working with the propeller. Ensure magneto switch is in the off position before turning propeller.

(1) Remove the cowling and nosecap. Refer to Chapter 71, Cowling - Maintenance Practices.
(2) Remove screws securing the spinner to the forward and aft bulkheads. Remove the spinner.
(3) Cut and discard safety wire from the propeller mounting bolts.
(4) Remove the mounting bolts, forward bulkhead, propeller, aft bulkhead and spacer from crankshaft.

NOTE: A dowel pin holds the propeller, aft bulkhead and spacer together when removed.

(5) The propeller mounting bolts must be magnetic particle inspected, refer to ASTM E-1414 or liquid penetrant inspected, refer to ASTM E-1417, or replaced at every overhaul. The propeller mounting bolts must be replaced when the propeller is involved in a blade strike.
(6) Remove the spacer and the aft bulkhead from the propeller.
  (a) Support the propeller by setting it between two sand filled bags placed as close to the hub as possible with the spacer down. Allow two (2) inches of clearance for the spacer and aft bulkhead to separate from the hub.
  (b) Select a rod of proper diameter and is six (6) inches long. Insert rod into propeller hub dowel pin holes. Using a hammer, lightly tap dowels in a alternating pattern to free the spacer and bulkhead from propeller hub. The dowels will remain in the spacer.
  (c) If the tapered end of dowels were installed in the propeller hub, remove dowels from spacer by inserting the rod into dowel pin holes in spacer. Using a hammer, lightly tap dowels in a alternating pattern to remove dowels from spacer.

B. Aft bulkhead and spacer assembly.

CAUTION: The spacer and propeller are balanced as a pair and must be installed together. Do not exchange spacers or propellers from other airplanes.

(1) Position spacer on a arbor press table with hub mating surface facing up.
(2) If dowels were removed from spacer, install dowels with tapered end into spacer.
  (a) Lightly oil each dowel and press into spacer.
  (b) Engage dowel into spacer enough to hold dowel firmly. Extension of both dowels above face of spacer must be the same after pressing.

NOTE: Final dowel location will be made when spacer is installed in propeller hub.

  (c) Position propeller hub on arbor press table with spacer mating surface facing up.
  (d) Place bulkhead over hub aligned with dowel holes.
  (e) Align serial number on spacer with serial number on propeller hub.
  (f) Press spacer down against hub and allow the bulkhead to rotate against the dowels for adjustment.

C. Install the Propeller and Spinner (Refer to Figure 201).

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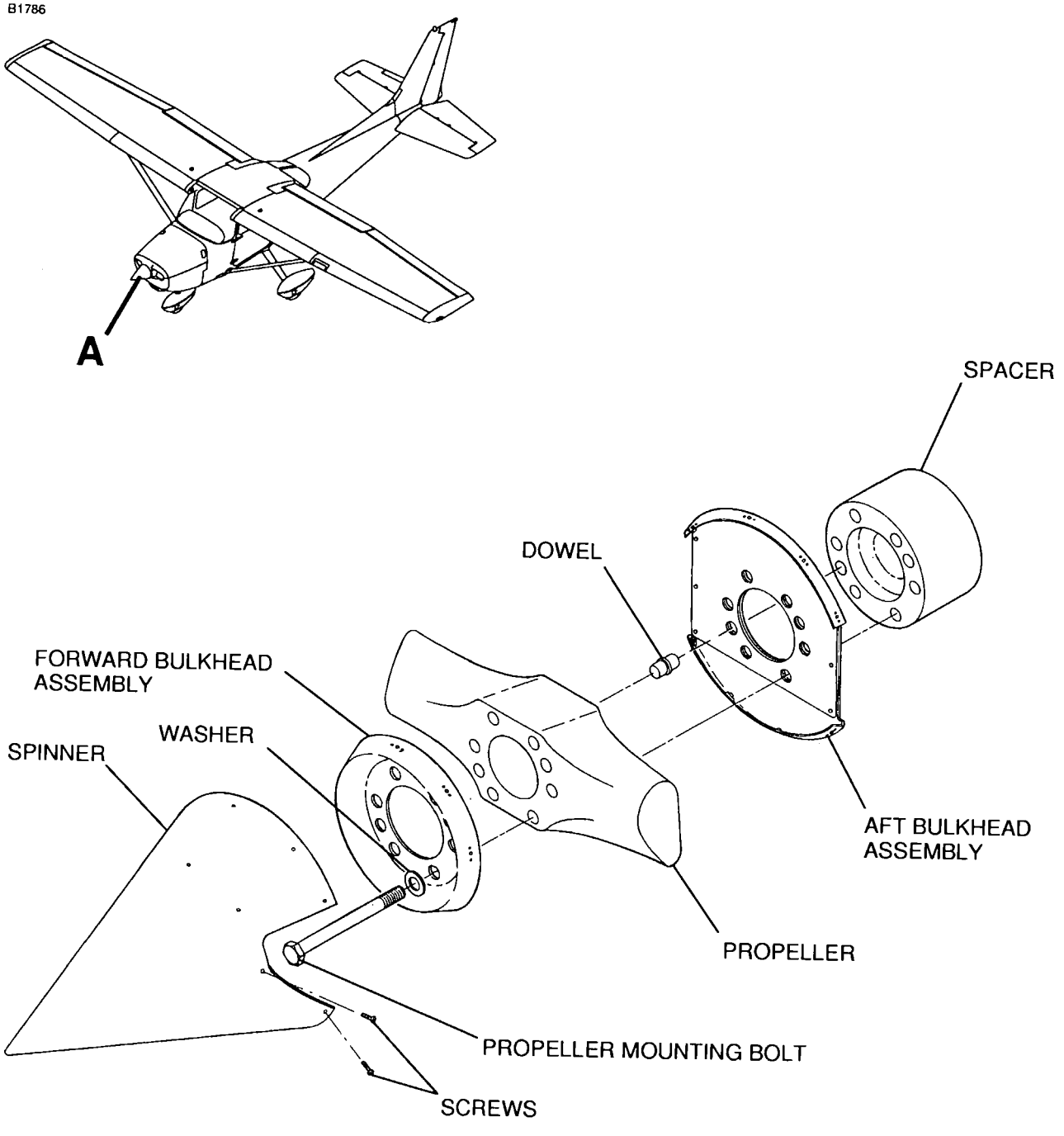

DETAIL A

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Propeller and Spinner Installation
Figure 201 (Sheet 1)

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CAUTION: The spacer and propeller are balanced as a pair and must be installed together. Do not exchange spacers or propellers from other airplanes.

(1) Clean the mating surfaces and install the spacer, propeller and bulkheads to crankshaft. Make sure the serial number stamped on the side of the spacer lines up with either of the propeller blades.
(2) Clock the propeller as follows:
  (a) Find the top center (TC) mark on the aft face of the starter ring gear.
  (b) Align one of the propeller blades with the TC mark.
  (c) Rotate the propeller clockwise, looking from in front of the airplane until the bolt holes align.
(3) Install the spacer, aft bulkhead, propeller and forward bulkhead to crankshaft with mounting bolts finger tight.
(4) Install spinner over bulkheads and install screws in forward bulkhead finger tight.

NOTE: The aft bulkhead may need to be pushed forward slightly to engage spinner screws. It may be necessary to rotate the spinner 180 degrees for the best spinner and screw attach alignment.

(5) Rotate the aft bulkhead until the spinner screws can be installed with little effort.
(6) Identify on the propeller, spinner, forward and aft bulkheads index marks for screw alignment.
(7) Carefully remove spinner so the forward and aft bulkhead remains in the same aligned position.

NOTE: The mounting bolt holes in the forward bulkhead may be undersized due to the original torquing of the mounting bolts. This may cause the spinner to bulkhead screws holes not to align. The required hole diameter for the forward bulkhead is 0.516 inch diameter to 0.527 inch diameter. If necessary, remove the forward bulkhead and enlarge bolt hole using a 33/64th (0.516 inch diameter) drill.

NOTE: If necessary, the spinner screw holes in the aft bulkhead flanges may be increased to 0.205 inch diameter for adjustment.

(8) Secure propeller assembly using the propeller bolts and washers. Tighten the mounting bolts in a crossing pattern to 660-780 inch-pounds dry (55-65 foot-pounds dry). Safety wire the mounting bolts. Refer to Chapter 20, Safetying - Maintenance Practices.

D. Install spinner in same position with index marks

E. Check the spinner to aft bulkhead clearance.
(1) If not removed, remove upper cowling and upper nosecap. Refer to Chapter 71, Cowling - Maintenance Practices.
(2) Using a 0.03 inch feeler gauge insert gauge between spinner and aft bulkhead to ensure the gap is 0.03 inches or less. If a gauge is not available, fabricate a gauge from phenolic, aluminum or steel that is 0.5 inches wide by 0.03 inches thick and 2.0 inches long.
(3) Replacement of the Aft Bulkhead will be required if gap is more than 0.03 inches.
(4) Adjust alternator belt tension. Refer to Chapter 24, Alternator - Maintenance Practices.
(5) Install nosecap and cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

F. Check the spinner to propeller clearance.
(1) Clearance between the spinner and propeller must be a minimum of 0.10 inch.
(2) If clearance is not a minimum of 0.10 inch, remove and adjust the spinner.

NOTE: It is acceptable to trim the spinner a maximum of 0.08 inch. Trim spinner only if maximum adjustment does not allow adequate clearance. Trim as little as possible to obtain clearance. Apply corrosion protection. Refer to Chapter 20, Interior and Exterior Finish - Cleaning/Painting.

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CHAPTER 71

POWER PLANT

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
71-Title		
71-List of Effective Pages		
71-Record of Temporary Revisions		
71-Table of Contents		
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71-00-01	Pages 1-5	Jan 3/2005
71-00-01	Pages 101-105	Jan 3/2005
71-00-01	Pages 201-203	Jan 3/2005
71-10-00	Pages 201-203	Apr 7/2003
71-20-00	Pages 201-204	Jan 1/2007
71-60-00	Pages 201-203	Jan 3/2005
71-70-00	Pages 201-202	Apr 7/2003

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RECORD OF TEMPORARY REVISIONS

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POWERPLANT - GENERAL

1. Scope

A. This chapter contains maintenance information on the powerplant and associated components. For engine related information not found in this chapter, refer to applicable Textron Lycoming maintenance manuals, listed in Introduction - List of Supplier Publications.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief definition of the sections incorporated in this chapter is as follows:

(1) The section on powerplant provides description, operation, troubleshooting and removal/installation information for the engine.

(2) The section on engine cowlings provides removal and installation instructions for the engine cowlings.

(3) The section on mounts provides removal and installation procedures for the engine mount.

(4) The section on air induction provides removal and installation procedures for the air induction part of the fuel system.

(5) The section on drain lines provides removal and installation instructions on the various drain lines used in the engine compartment.

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ENGINE - DESCRIPTION AND OPERATION

1. Description and Operation

A. The Textron Lycoming IO-360-L2A engine is direct drive, four cylinder, fuel injected, horizontally opposed, and air cooled. The cylinders, numbered from front to rear, are staggered to have individual throws on the crankshaft for each connecting rod. The right front cylinder is number 1 and cylinders on the right side of the engine are identified by odd numbers 1 and 3. The left front cylinder is number 2 and the cylinders on the left side are identified as 2 and 4.

B. For a technical description of the engine, refer to Table 1. For an illustration of the engine, refer to Figure 1.

C. If more information is necessary than is given in this chapter, refer to the applicable engine manuals given in the Introduction - List of Supplier Publications.

Table 1. IO-360-L2A Technical Description

172R Rated Horsepower at 2400 RPM	160
172S* Rated Horsepower at 2700 RPM	180
Number of Cylinders	4 Horizontally Opposed
Displacement	361.0 Cubic Inches
Bore	5.125
Stroke	4.375
Compression Ratio	8.5:1
Firing Order	1-3-2-4
Magnetos:	
Right Magneto	Slick Model No. 4371 (fires at 25° BTDC)
Left Magneto	Slick Model No. 4371 (fires at 25° BTDC)
Spark Plugs	18MM
Torque:	420 In lbs
Valve Rocker Clearance (hydraulic tappets collapsed)	0.028 to 0.080 inch
Fuel Injector	RSA-5AD1
Tachometer	Mechanical Drive
Oil Capacity	8.0 Quarts
Oil Pressure	
Minimum Idling	20 PSI
Normal	50 to 90 PSI
Maximum	115 PSI
Oil Temperature	
Normal	100℉ to 245℉

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Table 1. IO-360-L2A Technical Description (continued)

Maximum	245°F
Dry Weight - without alternator or vacuum pumps	278 Lbs

*And 172R Airplanes that incorporate MK172-72-01

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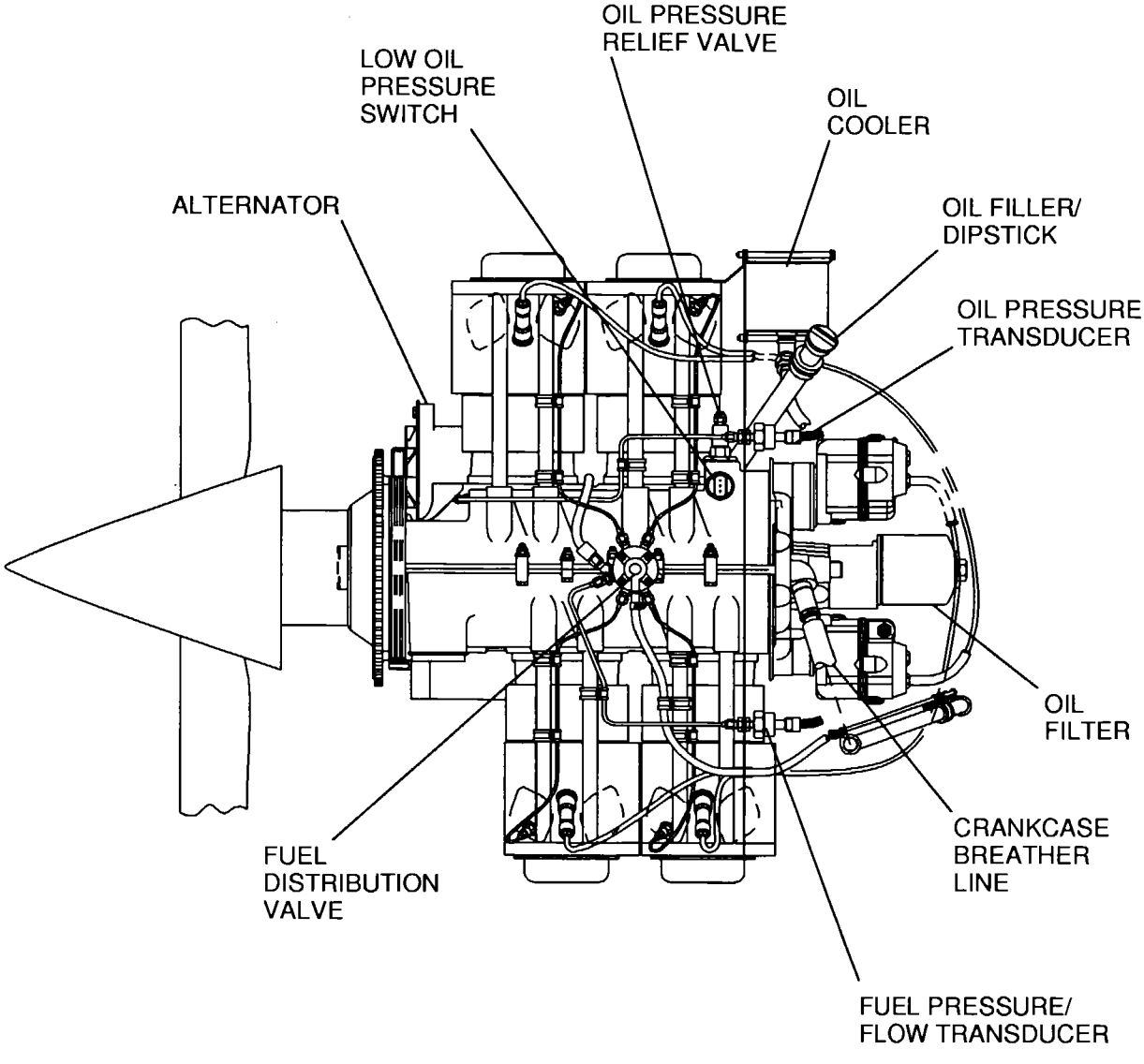

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Engine Installation
Figure 1 (Sheet 1)

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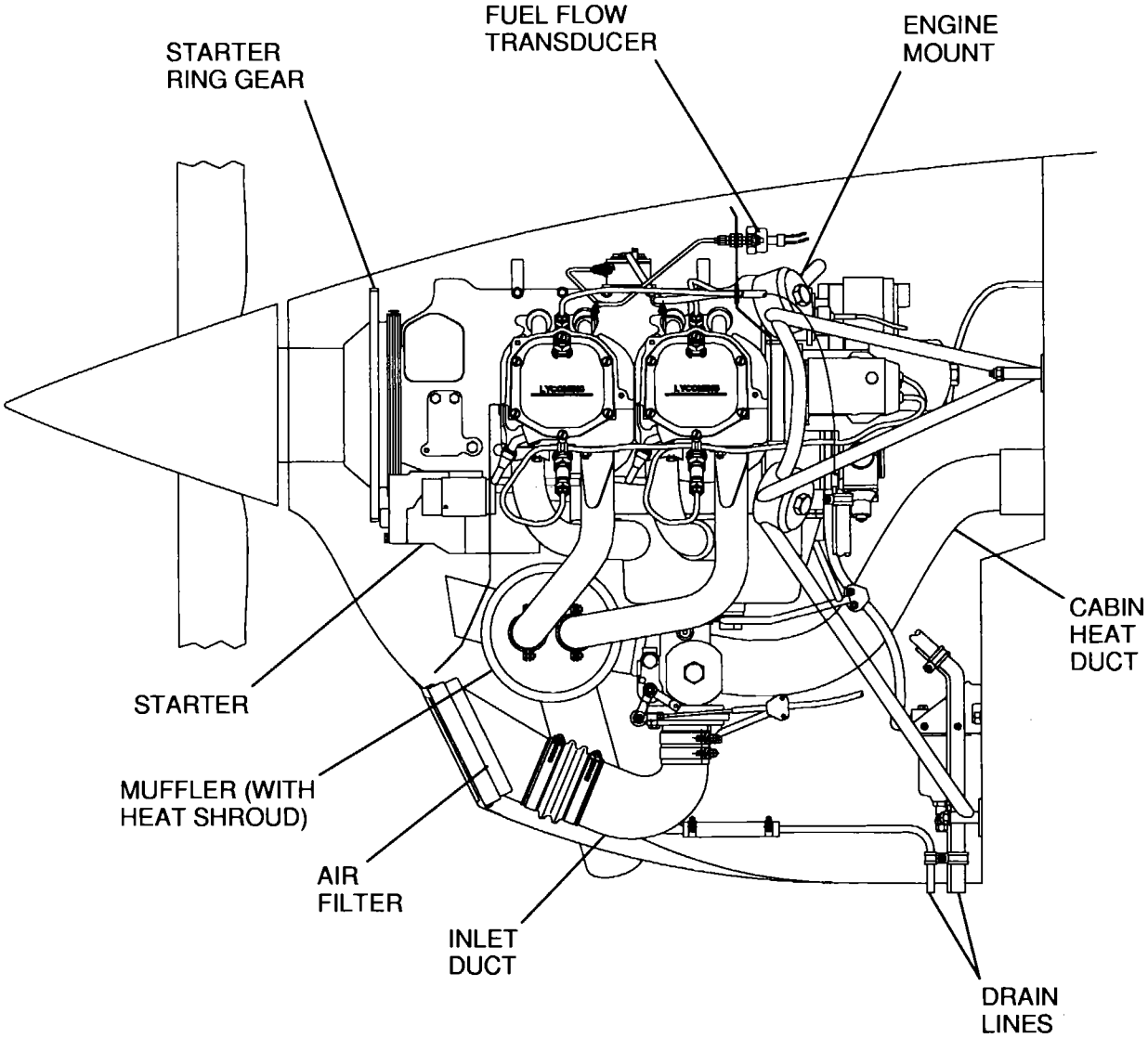

AIRPLANES 17280001 THRU 17281187 AND
AIRPLANES 172S8001 THRU 172S9490

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Engine Installation
Figure 1 (Sheet 2)

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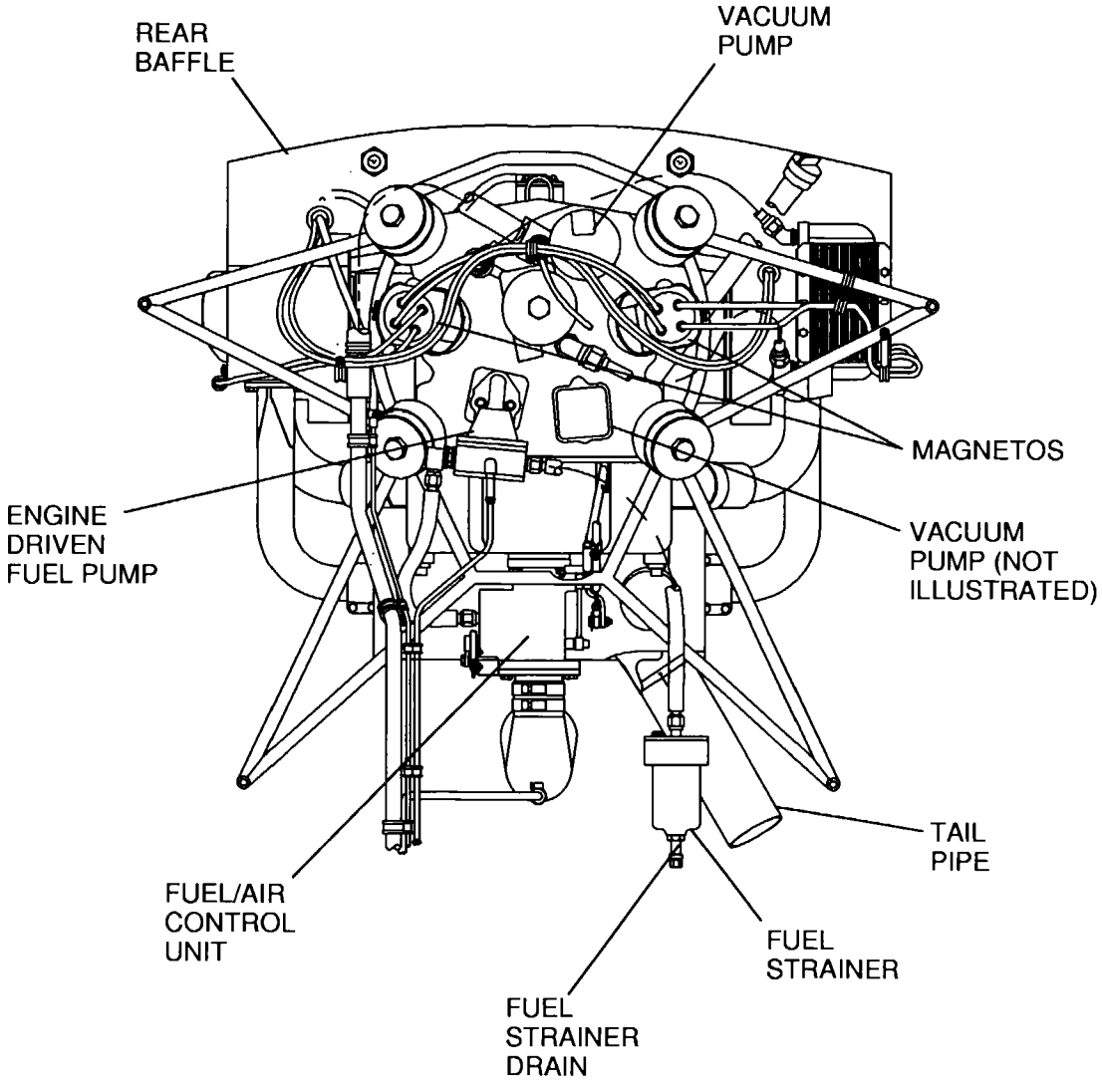

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Engine Installation
Figure 1 (Sheet 3)

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IO-360-L2A - TROUBLESHOOTING

1. Troubleshooting Chart

A. The following chart has been provided to help maintenance technicians in system troubleshooting. This chart should be used in conjunction with Chapter 73, Fuel Injection System - Troubleshooting and Chapter 74, Ignition System - Troubleshooting to get a comprehensive look at solutions to engine problems. For information beyond the scope of this chapter, refer to applicable engine manuals and publications listed in Introduction - List of Supplier Catalogs.

NOTE: If low power is suspected, the following static run-up procedures may by used in conjunction with the troubleshooting chart to develop a diagnosis:

B. Static Run-Up Procedures.
(1) Align airplane 90 degrees to the right of wind direction.
(2) Run up engine at full throttle in accordance with procedures outlined in the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
(3) Record RPM.
(4) Realign airplane 90 degrees to the left of wind direction and perform second run-up.
(5) Record RPM from second run-up.
(6) Average the results of the RPM from the two run-ups.
(a) For the 172R, RPM must be from 2065 to 2165 RPM.
(b) For the 172S, RPM must be from 2300 to 2400 RPM.

NOTE: Variances in atmospheric pressure, temperature and humidity can have a significant impact on run-up RPM. Low static run-up RPM information should be used only in conjunction with other troubleshooting procedures to determine if a problem actually exists.

(7) If run-up indicates low power, check the following items:
(a) Do a check of the operation of the alternate air door and make sure the door remains closed in normal operation.
(b) Do a check of the magneto timing, spark plugs and ignition harness for settings and condition.
(c) Do a check of the fuel injection nozzles for restriction and check for correct unmetered fuel flow.
(d) Do a check of the condition of the induction air filter. Clean or replace as required.
(e) Do an engine compression check.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START (NO FLOW INDICATED ON FUEL GAUGE).	No fuel to engine.	Check fuel level in tanks, check mixture control for proper position, fuel boost pump on and operating, fuel valves open, fuel filters clean and unblocked.
ENGINE WILL NOT START (SUFFICIENT FUEL FLOW INDICATED ON FUEL GAUGE).	Engine flooded.	Reset throttle, clear engine of excess fuel and attempt re-start.
ENGINE WILL NOT START (SUFFICIENT FUEL FLOW INDICATED ON FUEL GAUGE) (Cont.).	No fuel to engine.	Loosen line at fuel injector nozzle. If there is no fuel flow with fuel flow showing on gauge, replace the flow divider valve.

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TROUBLE	PROBABLE CAUSE	REMEDY
	Grounded ignition switch wires.	Check for grounded switch wires.
	Magneto improperly timed to engine.	Retime magnetos. Refer to Chapter 74, Ignition System - Maintenance Practices.
	Magneto internal timing incorrect, weak capacitor, or improperly adjusted breaker points.	Refer to applicable Bendix supplier Publications.
	Fouled spark plugs.	Remove and clean, check gaps and insulators. Reinstall with new gaskets. Check ignition harness.
	Weak spark, magneto coils burned out, moisture in distributor.	Remove and bench test magnetos, ignition harness and spark plugs.
	Leak in intake manifold.	Check hose connections, gaskets and tighten hose clamps and flange attaching bolts.
ENGINE WILL NOT RUN AT IDLING SPEED.	Idle stop screw or idle mixture lever incorrectly adjusted.	Refer to Chapter 73, Fuel Injection System - Maintenance Practices.
	Air leak in intake manifold.	Tighten loose connections or replace damaged parts.
	Weak magneto capacitor.	Install new capacitor.
	Spark plugs fould by oil escaping past piston rings.	Top overhaul engine.
ROUGH IDLING.	Improper idle mixture adjustment.	Refer to Chapter 73, Fuel Injection System - Maintenance Practices.
	Manual mixture control set for lean mixture.	Use full rich mixture for all ground operation.
	Fouled spark plugs.	Remove and clean, adjust gaps, test ignition harness, inspect magneto breaker points. If persistent, top overhaul engine.
	Loose or deteriorated engine mounts.	Check mounts, tighten or install new parts.
	Burned or warped exhaust valves and/or seats. Scored valve stems.	Top overhaul engine.

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TROUBLE	PROBABLE CAUSE	REMEDY
	Hydraulic tappet sticking or worn.	Listen for tappet noise. Refer to applicable engine overhaul manual in Introduction - List of Supplier's Publications.
ENGINE DOES NOT ACCELERATE PROPERLY.	Idle mixture too lean.	Refer to Chapter 73, Fuel Injection System - Maintenance Practices.
	Worn throttle or mixture linkage.	Install new parts as required.
ENGINE RUNS ROUGH AT HIGH SPEED.	Loose or deteriorated engine mount pads.	Check, tighten or install new parts.
	Propeller out of balance or track.	Remove and repair.
	Spark plug gasket leaking, improper gap, or damaged insulator.	Install new parts.
	Ignition cable insulator deteriorated.	Test cables for leakage and install new parts as necessary.
	Improper mixture.	Check mixture control setting.
CONSTANT MISFIRING AT HIGH RPM.	Valve spring broken.	Install new spring.
	Valve warped or burned.	Top overhaul engine.
	Hydraulic tappet worn or dirty.	Remove, clean or install new parts.
SLUGGISH OPERATION AND LOW POWER.	Injectors clogged.	Test and clean injectors.
	Worn valve seats.	Top overhaul engine.
	Worn or stuck piston rings.	Top overhaul engine.
LOW FLOW ON FUEL FLOW GAUGE.	Line to flow transducer clogged or restricted.	Check line for bends, kinks or obstructions.
	Restricted flow to flow divider valve.	Check mixture control for full travel. Check for clogged fuel filters.
LOW FLOW ON FUEL FLOW GAUGE (Cont.).	Inadequate flow from pump.	Worn pump or pump plunger shaft. Install new parts.
	Interference with mixture control.	Check mixture control for freedom of movement.

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TROUBLE	PROBABLE CAUSE	REMEDY
HIGH FLOW ON FUEL FLOW GAUGE.	Restricted flow beyond flow divider valve.	Check for restricted nozzles or flow divider valve. Clean nozzles or install new valve.
FLUCTUATING PRESSURE ON FUEL FLOW INDICATOR.	Vapor in system. Excessive fuel temperature.	If not cleared with boost pump, drain fuel pressure line.
	Fuel leak in line from flow divider to flow transducer.	Check line, replace as required.
ENGINE DOES NOT STOP WITH MIXTURE CONTROL IN IDLE CUTOFF.	Mixture control valve leaking in idle cutoff position.	Check mixture control, should be in full idle cutoff. Check fuel boost pump off.
HIGH OIL TEMPERATURE.	Oil cooler fins clogged.	Clean thoroughly.
	Oil cooler oil passages restricted.	Remove and flush cooler.
	Oil cooler bypass valve damaged or held open.	Remove cooler, and clean valve and seat.
	Low oil supply.	Replenish.
	Oil viscosity too high.	Use correct grade of oil.
	Prolonged high speed operation on ground.	Avoid prolonged ground operation above 1500 RPM.
	Dirty/clogged oil filter.	Replace filter.
HIGH CYLINDER HEAD TEMPERATURE.	Low fuel grade.	Use correct grade of fuel.
	Excessive carbon deposits in cylinder head and on piston.	Top overhaul engine.
	Clogged cylinder fins.	Clean thoroughly.
	Leaking exhaust valves.	Top overhaul engine.
LOW OIL PRESSURE.	Low oil supply.	Add oil.
	Viscosity too low.	Use correct grade oil.
	Sludge or foreign material in relief valve.	Remove and clean valve.
	Defective oil pressure gauge.	Install new gauge.

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TROUBLE	PROBABLE CAUSE	REMEDY
	Restricted oil transducer line.	Check line from front of crankcase to pressure transducer for kinks or restrictions.
	Internal leak, damaged gasket or bearing.	Major overhaul engine.
OIL LEAK AT FRONT OF ENGINE.	Crankshaft oil seal leaking.	Install new seal.
OIL LEAK AT PUSHROD HOUSING.	Damaged housing seal.	Install new seals.
LOW COMPRESSION.	Worn cylinder and/or rings.	Top overhaul engine or replace defective cylinder.
	Valve not properly seating.	Top overhaul engine or replace defective cylinder.
EXCESSIVE OIL CONSUMPTION.	Low grade of oil.	Use specified grade of oil.
	Failed or failing bearings.	Check oil filter for metal particles, and if found, overhaul engine.
	Worn piston rings.	Install new rings.
	Incorrect ring installation.	Install new rings.

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IO-360-L2A - MAINTENANCE PRACTICES

1. General

A. This section gives instructions to remove and install the engine and mount from the firewall. If more information is necessary than is given in this chapter, refer to the applicable engine publications which are given in the Introduction - List of Supplier Publications.

2. Engine Removal/Installation

A. Remove the Engine and Mount.

NOTE: The procedures that follow remove the engine and mount from the firewall. If the engine is removed from the mount and the mount will stay attached to the firewall, some of the steps will not be necessary. To remove the engine from the mount, the four bolts that connect the four shock mounts to the engine mounting flange and the engine mount tube must be removed.

(1) Put all cabin switches and the fuel shutoff valve in the OFF position.
(2) Remove the engine cowl.

NOTE: The steps that follow can be done from the right side of the airplane.

(3) Disconnect the positive and negative battery leads from the battery.
(4) Loosen the clamp that attaches the flexible duct to the firewall-mounted heater valve.
(5) Remove the flexible duct from the heater valve.

WARNING: When the P lead wire is disconnected from the magnetos to remove the electrical ground from the magneto circuit, the magnetos become electrically active. A ground wire must be connected to the magnetos or the high tension wires removed from the spark plugs to prevent accidental engine start when the propeller is turned. An accidental engine start can cause injury to persons in the area of the propeller.

(6) Disconnect the P lead wires on the magnetos.

NOTE: Airplanes with Garmin G1000 have EGT probes at each cylinder.

NOTE: Airplanes without Garmin G1000 have one EGT probe in the exhaust pipe.

(7) Remove the propeller. Refer to Chapter 61, Propeller - Maintenance Practices.
(8) Disconnect the electrical connector from the EGT probe.
(9) Disconnect the fuel outlet line at the fuel strainer.
(10) Disconnect the throttle and mixture cables at the fuel/air control unit.
(11) Record the position of the washers and spacers for assembly.
(12) Disconnect the vacuum hoses at the firewall-mounted manifold/check valve.
(13) Put a label on the electrical wires on the low vacuum annunciator switches, low oil pressure transducer, and alternator.
(14) Disconnect the low vacuum annunciator switches, low oil pressure transducer, and alternator.

NOTE: The steps that follow can be done from the left side of the airplane.

(15) Remove the tachometer drive cable or electrical connector.
  (a) On airplanes without Garmin G1000, loosen and remove the tachometer drive cable.
  (b) On airplanes with Garmin G1000, disconnect the electrical connector from the tachometer sending unit.

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(16) Cut the tie wraps (sta straps) that attach the wire bundles to the engine mount.
(17) On the bottom side of the engine, loosen and remove the clamps that attach the starter wires to the sump area.
(18) Remove the starter wires from the starter.
(19) Disconnect the ground strap from the engine mount.
(20) Disconnect the electrical connector (JN001) from the fuel flow transducer (UN003).
(21) Disconnect the electrical connector (JN005) from the low oil pressure switch (SN001).
(22) Disconnect the electrical connector (JN004) from the oil pressure transducer (UI006).

NOTE: To remove the electrical connector JN004 from the baffle area, it will be necessary to remove the two screws on the rear of the upper right baffles and remove the baffles from each other.

(23) Loosen the clamps that attach the battery vent tube to the drain line cluster.
(24) Remove the vent tube through the clamps.
(25) Remove the bolt and spacer that attach the drain lines to the firewall.
(26) Loosen and remove the ram air tubes on the rear of the upper left baffle.
(27) Put a stand under the tail tie-down.
(28) Attach a hoist to the lifting strap on the top of the engine.
(29) Lift the engine only as high as necessary with the hoist.

NOTE: It can be necessary to get access to the bolt heads from the inside of the cockpit.

(30) Remove the bolts that attach the engine and the engine mount to the firewall.
(31) Record the sequence of the nuts, washers and flat washers.
(32) Slowly lift the engine with the hoist until the engine and the mount move from the bolts.

B. Install the Engine and Mount.
(1) Lift the engine into position and attach the mount to the firewall with the hardware removed. Refer to Engine Mount - Maintenance Practices for the sequence of the washer, nut and flat washer.
(2) Torque the firewall bolts from 160 in-lbs to 190 in-lbs (18.1 N-m to 21.5 N-m).
(3) Remove the stand from the tail tie-down.
(4) Attach the ram air tubes to the rear of the upper left baffle.
(5) Attach the drain lines to the firewall with the bolt and spacer.
(6) Put the battery vent tube through the drain line clamps and tighten the clamps.
(7) Put the wires from electrical connector JN004 through the baffle cutout area.
(8) Attach the baffle pieces to each other with the screws.
(9) Connect the electrical connector (JN004) to the oil pressure transducer (UI006).
(10) Connect the electrical connector (JN005) to the low oil pressure switch (SN001).
(11) Connect the electrical connector (JN001) to the fuel flow transducer (UN003).
(12) Connect the ground strap to the engine mount.
(13) Install the starter wires to the starter.
(14) Attach the starter wires to the sump area with the clamps.
(15) Attach the wire bundles to the engine mount with tie wraps.
(16) Attach the tachometer drive cable or electrical connector.
  (a) On airplanes without Garmin G1000, attach the tachometer drive cable.
  (b) On airplanes with Garmin G1000, connect the electrical connector to the tachometer sending unit.
(17) Connect the wires to the low vacuum annunciator switches, low oil pressure transducer, and alternator.
(18) Remove the labels from the low vacuum annunciator switches, low oil pressure transducer, and alternator.
(19) Connect the vacuum lines to the firewall-mounted manifold/check valve.
(20) Connect the throttle and mixture control cables to the fuel air control unit.

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(21) Connect the fuel outlet line at the fuel strainer.

NOTE: Airplanes with Garmin G1000 have EGT probes at each cylinder.

NOTE: Airplanes without Garmin G1000 have one EGT probe in the exhaust pipe.

(22) Connect the electrical connector to the EGT probe.
(23) Install the propeller. Refer to Chapter 61, Propeller - Maintenance Practices.
(24) Connect the P leads to the magnetos.
(25) Connect the high tension wires to the spark plugs, if applicable.
(26) Connect the flexible duct to the firewall-mounted heater valve.
(27) Make sure all controls and lines are correctly installed and move freely.
(28) Make sure all fuel fittings are tight and do not have leaks.
(29) Connect the positive and negative leads to the battery.
(30) Install the engine cowl.
(31) Make sure the engine operates correctly.

3. Engine Cleaning

A. The engine can be cleaned with a stoddard solvent or equivalent chemicals. Be careful that all openings have caps or plugs to prevent solvent entry into the engine. All electrical accessories (starter, alternator, etc.) must have covers before the solvent is applied.

4. Engine Storage

A. If the engine is removed and is to be stored, it must be preserved. Refer to Chapter 10, Storage - Description and Operation for preservation procedures.

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COWL - MAINTENANCE PRACTICES

1. Description and Operation

A. The engine cowl consists of upper and lower sheet metal halves and upper and lower composite nose pieces. The cowl is attached to the shock mounts using quick release, quarter turn fasteners to allow for easy removal and installation. The nose pieces are attached to each other using screws and nutplates.

2. Cowl Removal/Installation

A. Remove Cowl (Refer to Figure 201).
   (1) Release quick release fasteners around perimeter of upper cowl.
   (2) Remove upper cowl.
   (3) Remove induction air filter bracket from lower cowl.
   (4) Unscrew upper nose piece from lower nose piece.
   (5) Release quick release fasteners around perimeter of lower cowl.
   (6) Remove lower cowl.

B. Install Cowl (Refer to Figure 201).
   (1) Install lower cowl to engine area and secure using quick release fasteners.
   (2) Install induction air filter bracket to lower cowl using quick release fasteners.
   (3) Attach upper nose piece to lower nose piece using screws.
   (4) Install upper cowl to engine area and secure using quick release fasteners.

3. Cowl Shock Mounts

A. Shock Mount Adjustment/Replacement (Refer to Figure 202).
   (1) The shock mounts are riveted to brackets, which in turn are secured to the fuselage. Mounts may be replaced as needed or adjusted with shims as shown in Figure 202.
   (2) If new shock mounts or brackets are installed, careful measurements should be taken to ensure new parts are positioned correctly on the firewall. New parts are not pre- drilled and care should be taken to align new shock mounts with existing cowl openings. If required, sheet aluminum may be used as shim stock to provide proper cowl contour.

4. Cowl Repair

A. For repair procedures to the cowl, refer to the Structural Repair Manual.

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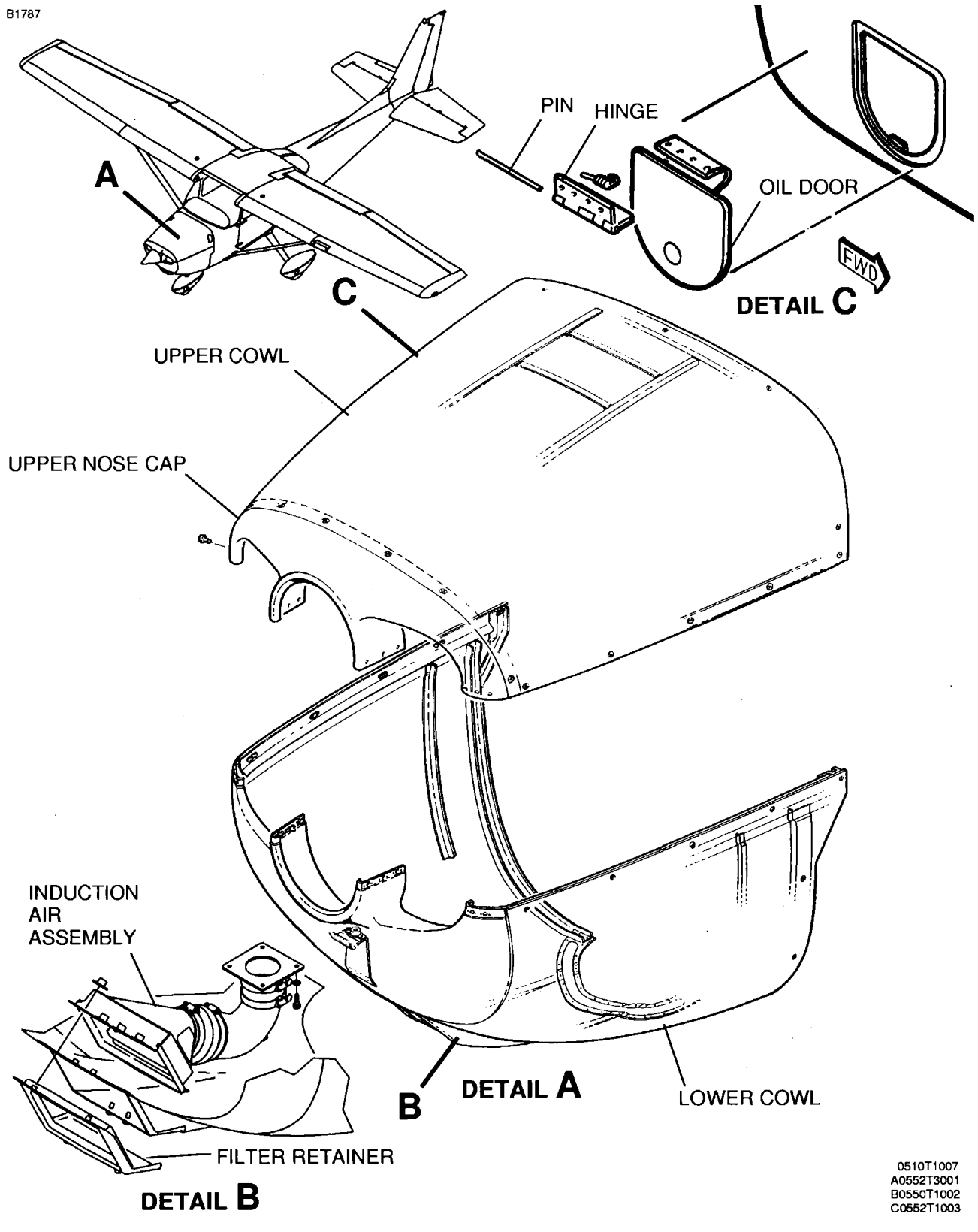

Engine Cowl Installation
Figure 201 (Sheet 1)

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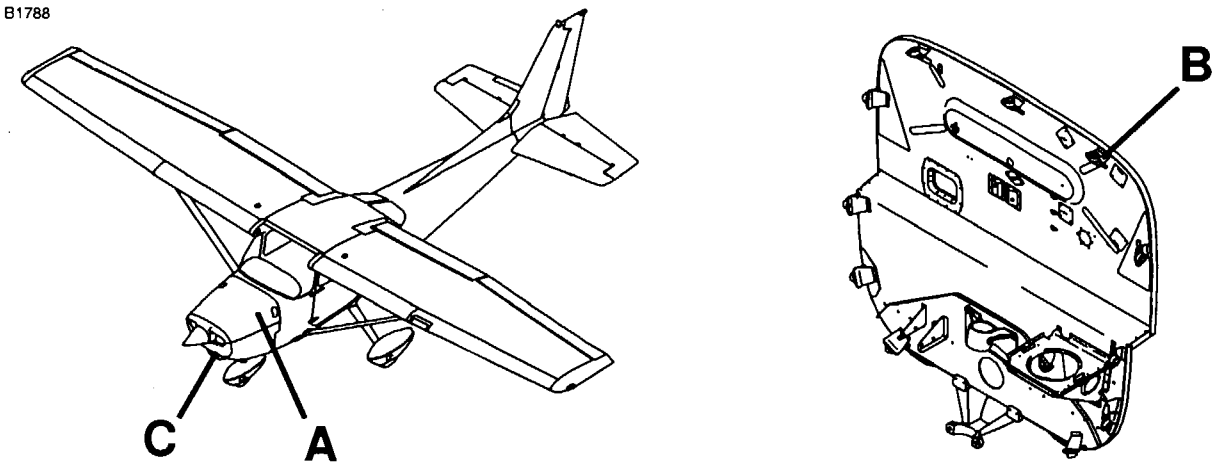
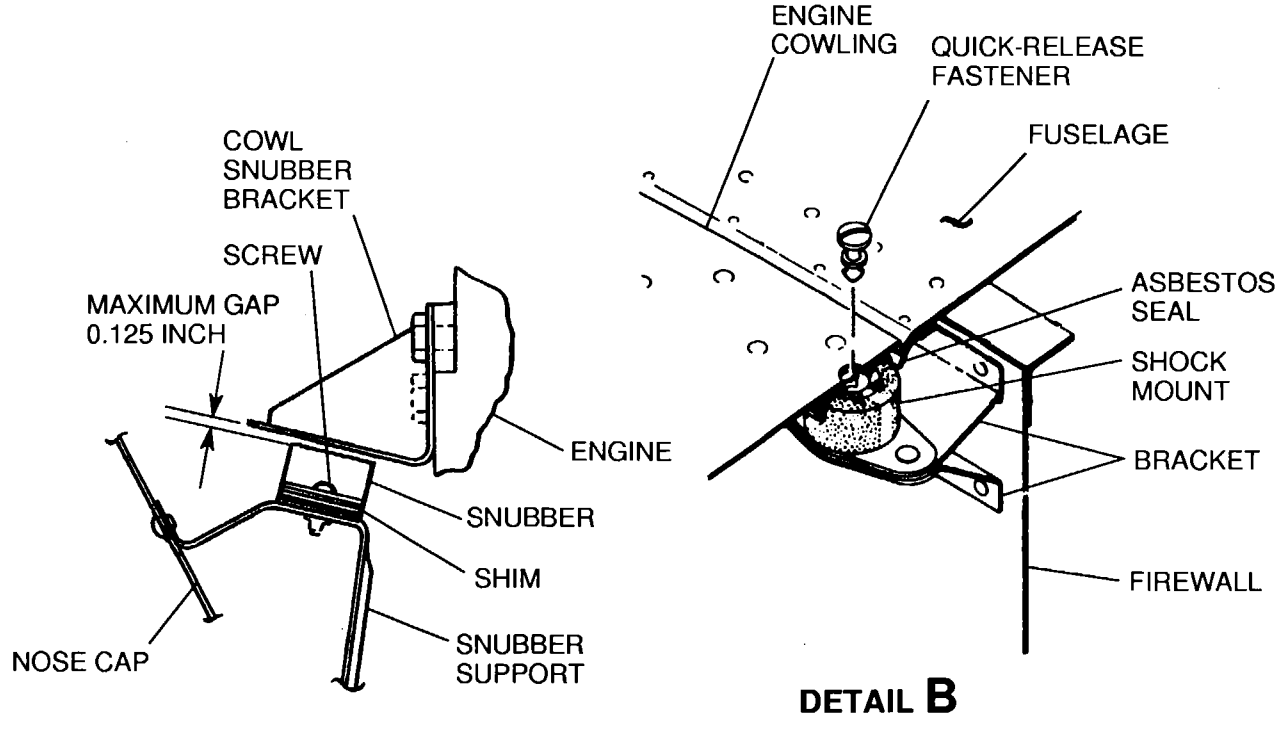


DETAIL A



DETAIL C

DETAIL B

NOTE: SHIM CAN BE INSTALLED AS REQUIRED (MAXIMUM 4) BETWEEN SNUBBER SUPPORT AND SNUBBER TO OBTAIN A MAXIMUM GAP OF 0.125 INCH BETWEEN SNUBBER AND COWL SNUBBER BRACKET.

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A0511T1006
B0552T1002
C0552T1002

Engine Cowl Shock Mount Installation
Figure 202 (Sheet 1)

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ENGINE MOUNT - MAINTENANCE PRACTICES

1. Description and Operation

A. The dynafocal engine mount is made of 4130 steel and uses four rubber mounts to isolate engine noise and vibration from the engine mount. The mount is attached to the fuselage at four points on the firewall using bolts, washers and nuts.

2. Engine Mount Procedures

A. Shock Mount Procedures (Refer to Figure 201).
(1) The shock mounts which connect the engine to the engine mount are of rubber and metal construction and are assembled in a sandwich to isolate noise and vibration from the cabin area. Shock mounts should be assembled as illustrated in Figure 201. Nuts should be torqued from 450 to 500 In-lbs upon installation.
(a) If necessary, adjust the oil filler tube clearance. Make sure the oil filler tube does not touch the engine mount or hoses.

NOTE: One or two washers are permitted between the mounting and engine flange to adjust the oil filler-tube clearance. Both of the bottom mounts must have the same number of washers between the mounting and engine flange. Both top mounts must have the same number of washers between the mounting and engine flange.

(2) The shock mounts should never be cleaned with any type of solvent. If shock mounts need cleaning, use a clean, dry cloth.
(3) Shock mounts should be inspected when removed. Metal components should be inspected for cracks and excessive wear due to aging and deterioration. Rubber components should be inspected for separation, swelling, cracking or a pronounced set of the pad. Shock mounts showing any of these signs should be replaced.

B. Firewall Mounting Procedures (Refer to Figure 202).
(1) The engine mount should be secured to the firewall using bolts, washers, flatwashers and nuts as illustrated in Figure 202. Nuts should be torqued from 160 to 190 In-lbs.

C. Removal Notes.
(1) Specific instructions for removing the engine mount have been included earlier in this chapter under IO-360-L2A - Maintenance Practices.

3. Engine Mount Repairs

A. The engine mount may be repaired using procedures described in the Single Engine 1996 and On Structural Repair Manual.

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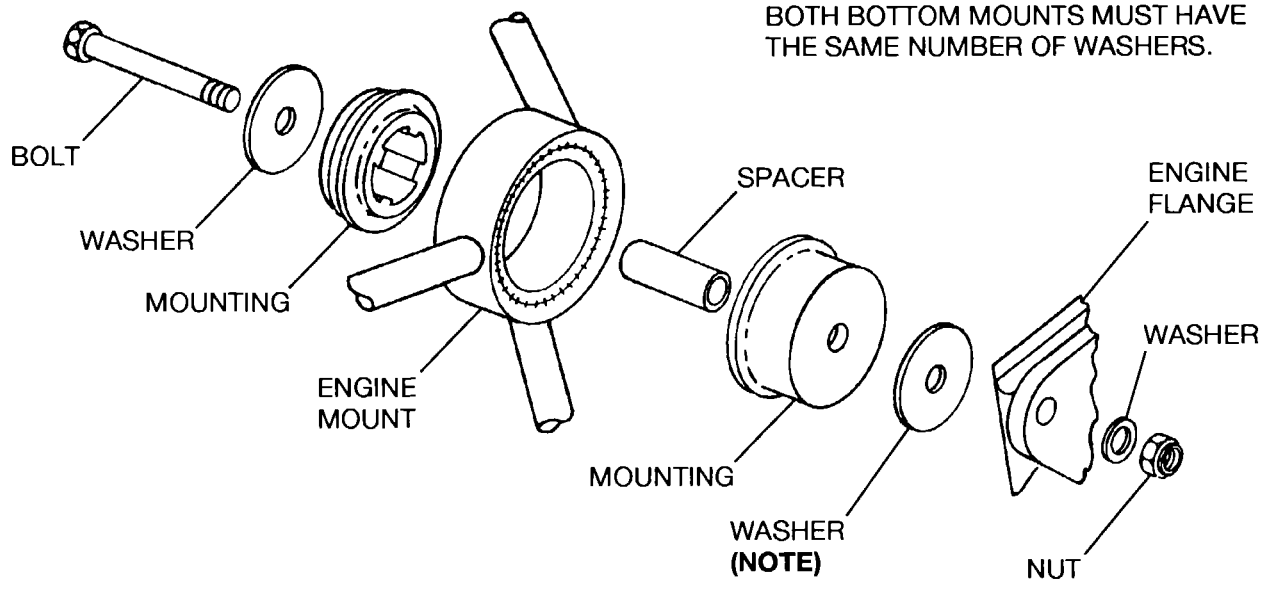
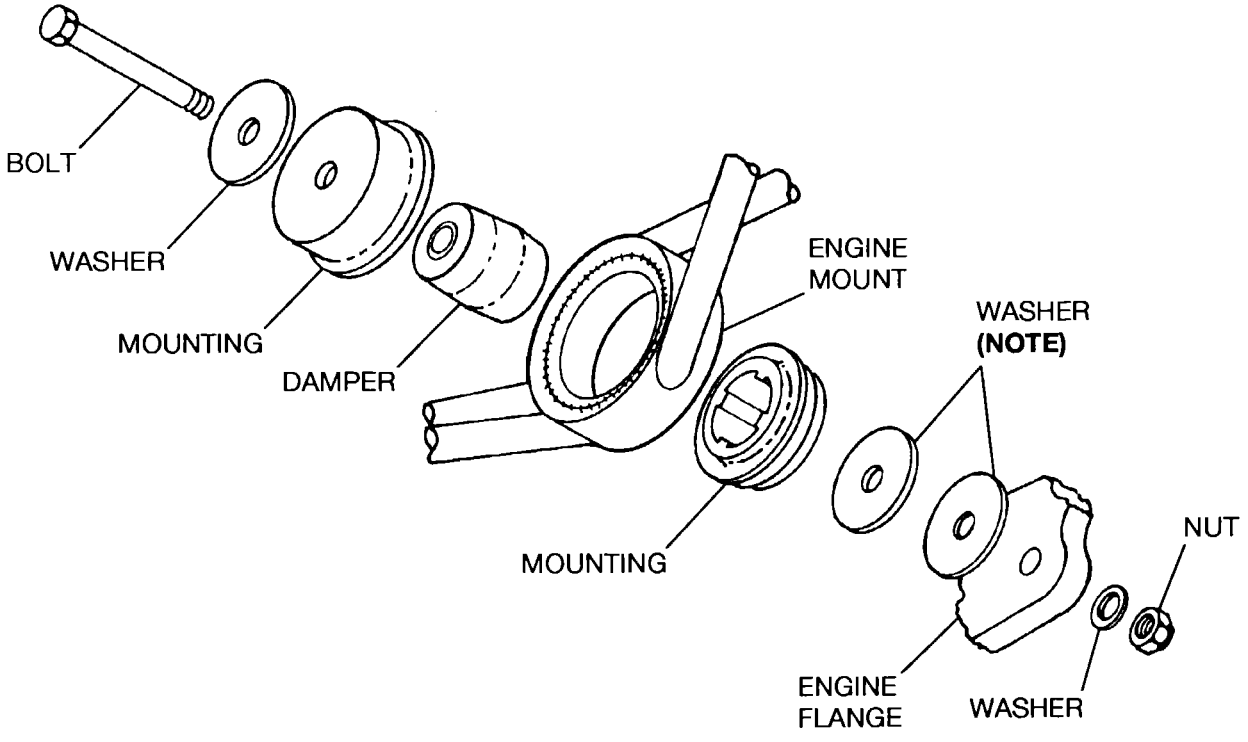
NOTE: ONE OR TWO WASHERS PERMITTED.
BOTH TOP MOUNTS MUST HAVE THE SAME NUMBER OF WASHERS.
BOTH BOTTOM MOUNTS MUST HAVE THE SAME NUMBER OF WASHERS.



UPPER RIGHT HAND SHOCK MOUNT



LOWER RIGHT HAND SHOCK MOUNT

05511002
05511002

Engine Shock Mount Installation
Figure 201 (Sheet 1)

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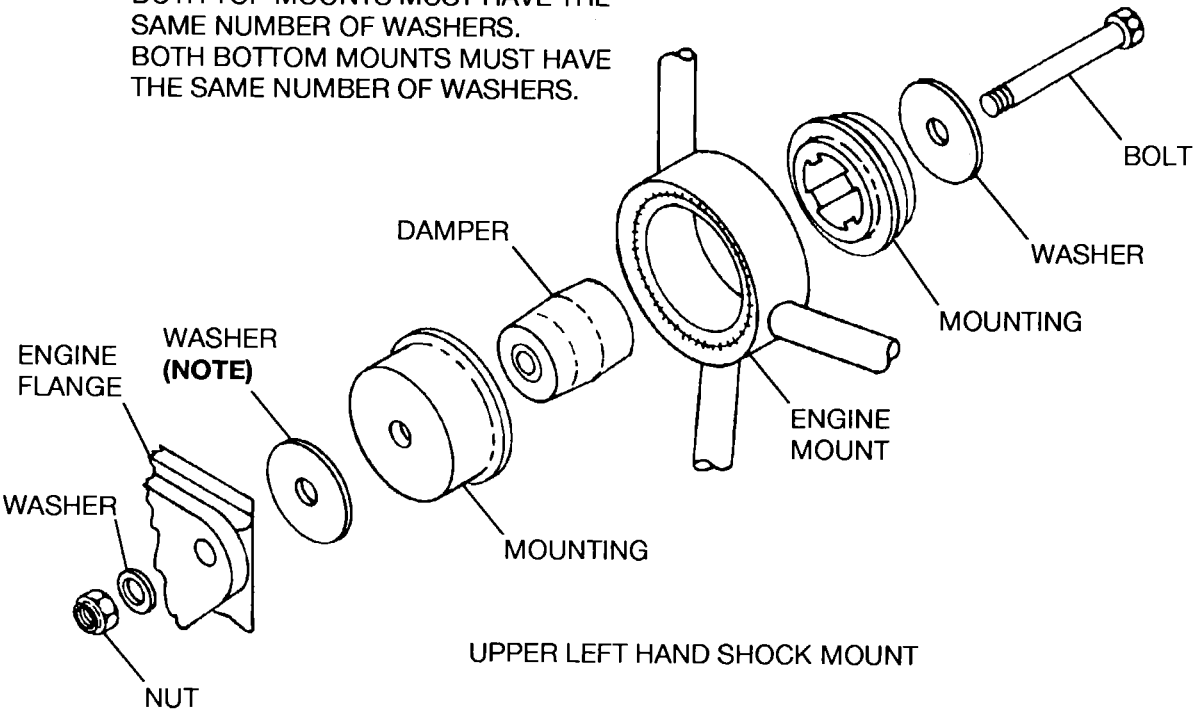
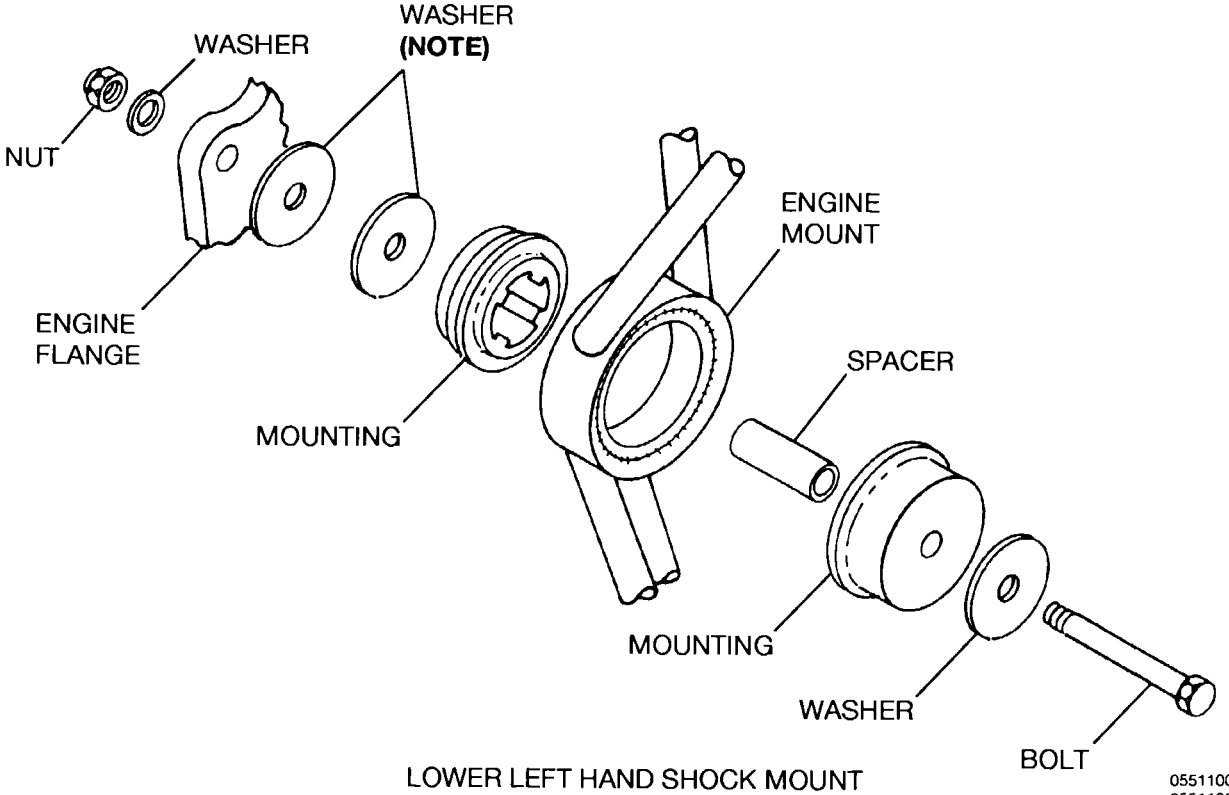
NOTE: ONE OR TWO WASHERS PERMITTED.
BOTH TOP MOUNTS MUST HAVE THE SAME NUMBER OF WASHERS.
BOTH BOTTOM MOUNTS MUST HAVE THE SAME NUMBER OF WASHERS.



UPPER LEFT HAND SHOCK MOUNT



LOWER LEFT HAND SHOCK MOUNT

05511002
05511002

Engine Shock Mount Installation
Figure 201 (Sheet 2)

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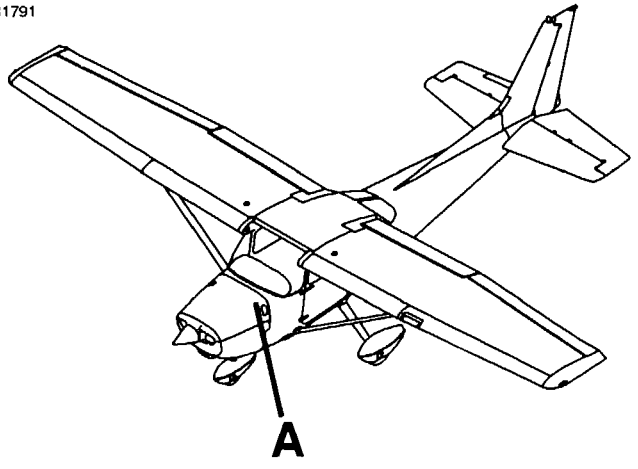

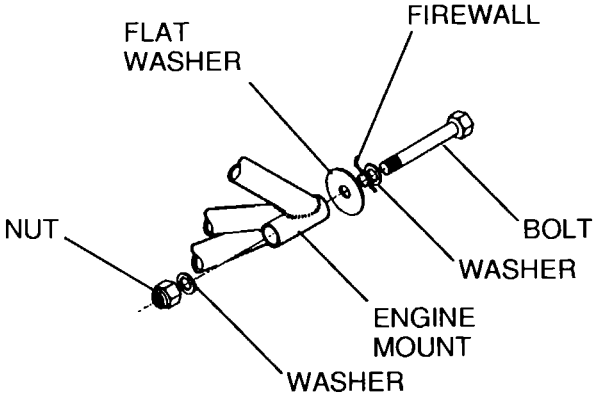

DETAIL A

0510T1007
A0551T1001

Firewall Engine Mount Installation
Figure 202 (Sheet 1)

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AIR INDUCTION SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. Ram air to the engine goes into the induction air box through the induction filter in the forward part of the lower engine cowl. From the induction air box, the air is pointed to the inlet of the fuel/air control unit and through the intake runners of the related cylinders.

B. For more information of how the air induction system relates to fuel injection, refer to Chapter 73, Fuel Injection System - Description and Operation.

2. Air Induction System Removal/Installation

A. Remove the System Components (Refer to Figure 201).
(1) Loosen the fasteners that attach the air filter bracket to the lower cowl.
(2) Remove the air filter bracket and the air filter.
(3) Remove the lower cowl. Refer to Cowling - Maintenance Practices.
(4) Loosen the clamps on the duct to disconnect the filter box from the induction air elbow.
(5) To remove the induction air elbow, loosen the clamps at the inlet adapter and at the drain line.
(6) Move the induction air elbow down and away from the inlet adaptor.

B. Install the System Components (Refer to Figure 201).
(1) Put the induction air elbow in position to the inlet adaptor and attach with the clamp.
(2) Attach the drain line to the induction air elbow with the clamp.
(3) Install the lower cowl. Refer to Cowling - Maintenance Practices.
(4) Attach the air filter and the air filter bracket to the lower cowl with the quick release fasteners.

3. 172S Engine Induction Air Filter Maintenance Practices

A. The induction air filter keeps dust and dirt from the induction system. The air filter must be kept in a good clean condition. More engine wear is caused through the use of a dirty or damaged air filter than is usually thought. The frequency with which the filter must be removed, examined and cleaned will be given by aircraft conditions of operation. A good general rule, however, is to remove, examine and clean the filter at least every 100 hours of engine operation time, and more frequently if given by the conditions of operation. Under very dusty conditions, daily servicing of the filter is recommended. To service the induction filter, do the steps that follows.
(1) Remove the filter from the airplane.

NOTE: Be careful when the filter element is cleaned with compressed air.

NOTE: Arrows on the filter case show the direction of normal airflow.

(2) Clean the filter with compressed air (not over 100 psi) from the direction opposite of normal airflow.

NOTE: The bond holds the paper pleats to the face screen and, if the bond is broken, the pleats are free to move and decrease filter operation. A face screen that is loose or has gaps shows that the bond is broken and the filter element must be replaced.

(3) Do a check to make sure the paper pleats are correctly bonded to the face screen.

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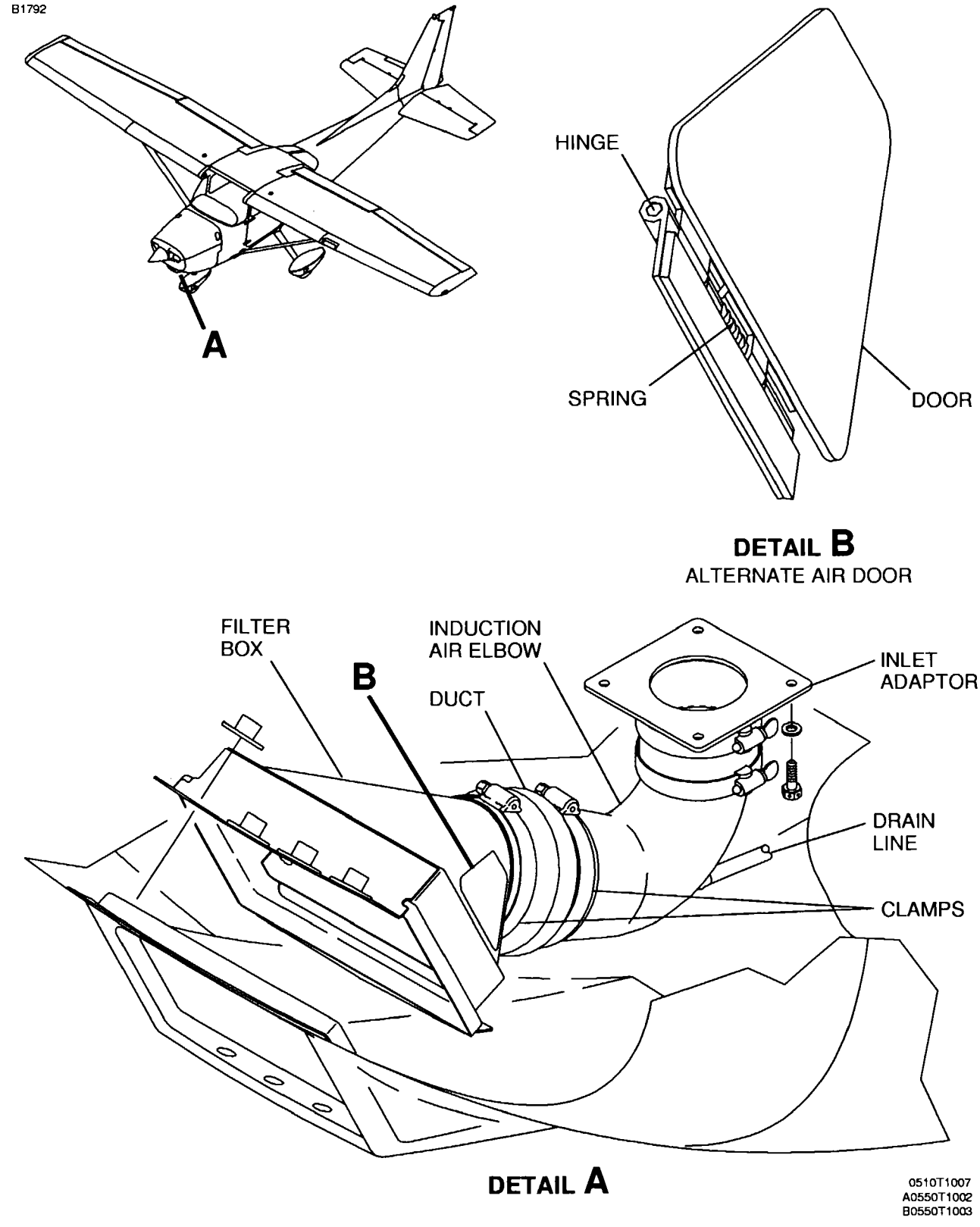

Induction Air Installation
Figure 201 (Sheet 1)

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CAUTION: Do not use solvent or cleaning fluids to wash the filter. Use only a water and household detergent solution when washing the filter.

(4) After compressed air has been blown through the filter, the filter can be washed, if necessary, in a solution of warm water and a mild household detergent. A cold water solution can be used.

NOTE: The filter assembly can be cleaned with compressed air a maximum of 30 times or it can be washed a maximum of 20 times.

NOTE: A new filter must be installed at 500 hours of engine operation or one year, whichever occurs first. A new filter must be installed if the filter is damaged.

(5) Flush the filter with clear water until the water from the filter is clear. Let the water drain from the filter and dry with compressed air (not over 100 psi).

NOTE: The panels of the filter can have distortion when wet, but they will go back to their normal shape when dry.

(6) Make sure the airbox is clean.
(7) Examine the filter and replace if applicable.
(8) Install the filter in the airbox with the gasket on the aft face of the filter frame and with the flow arrows on the filter frame pointed in the correct direction.

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DRAIN LINES - MAINTENANCE PRACTICES

1. Description and Operation

A. Various components within the engine compartment are equipped with drain lines to allow fluid and/or vapor to escape and vent to the atmosphere. These lines are typically secured using hose clamps, and are routed together in a cluster on the left side of the forward firewall.

2. Maintenance Practices

A. Maintenance practices for all drain lines are typical. Line removal and installation consists of removing clamps and other devices used to secure the lines to various structure. Lines should be checked for condition and security when removed, and installed in reverse order.

B. For an illustration of various drain lines, refer to Figure 201.

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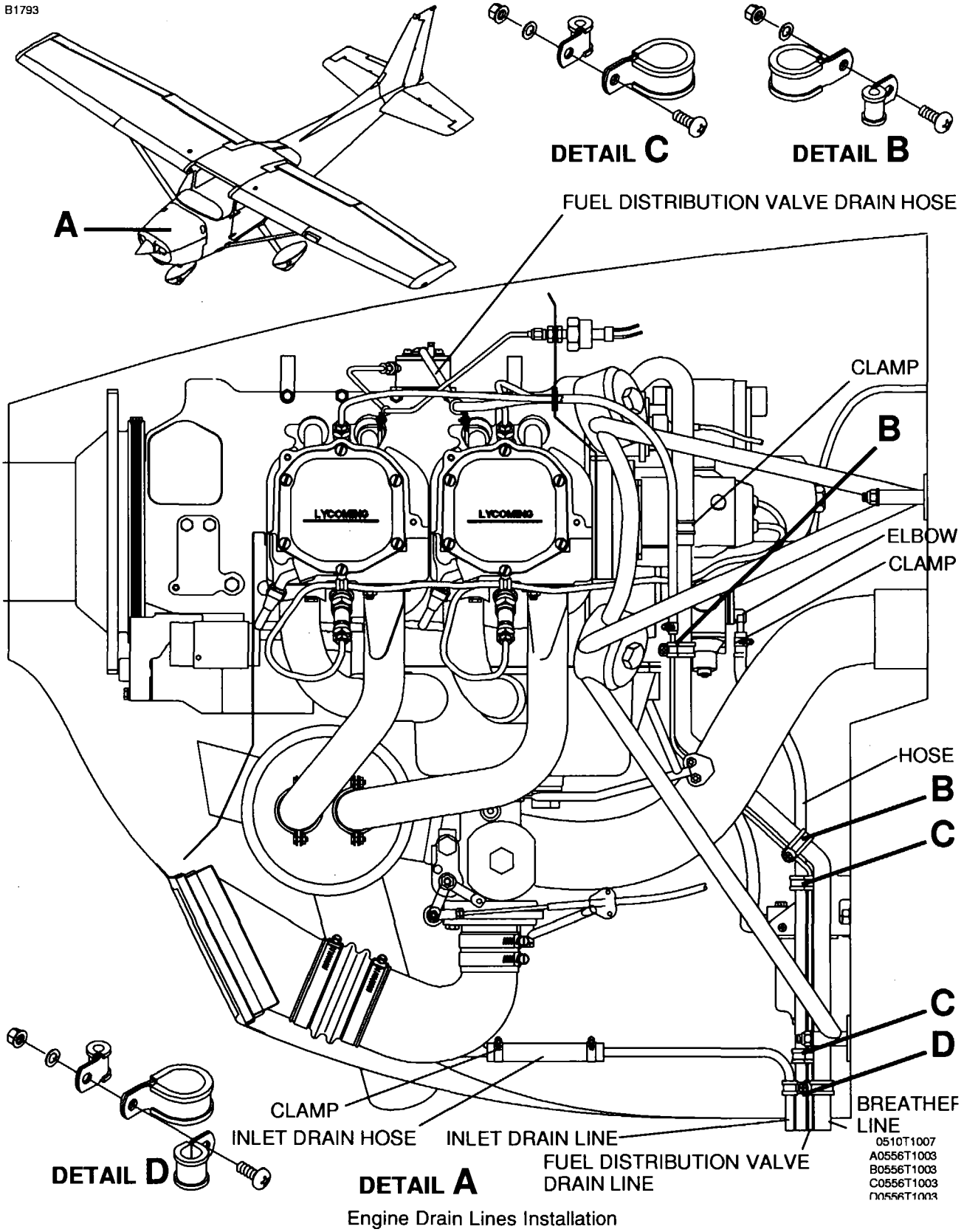

Engine Drain Lines Installation
Figure 201 (Sheet 1)

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CHAPTER 73

ENGINE FUEL AND CONTROL

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
73-Title		
73-List of Effective Pages		
73-Record of Temporary Revisions		
73-Table of Contents		
73-00-00	Page 1	Apr 7/2003
73-00-01	Pages 1-3	Apr 7/2003
73-00-01	Pages 101-102	Jan 1/2007
73-00-01	Pages 201-205	Mar 1/2009
73-30-00	Pages 201-202	Jan 3/2005

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

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ENGINE FUEL AND CONTROL - GENERAL

1. Scope

A. This chapter provides information on the fuel injection system used for the IO-360- L2A engine. Information beyond the scope of this chapter can be found in Chapter 28, Fuel - General and in various publications which are listed in Introduction - General.

2. Definition

A. This chapter is divided into sections and subsections to assist maintenance personnel in locating specific systems and information. The following is a brief description of each section. For locating information within the chapter, refer to the Table of Contents at the beginning of the chapter.
   (1) The section on fuel injection covers procedures used to troubleshoot and maintain the fuel injection system.
   (2) The section on fuel flow indicator covers procedures used to maintain the indicating portion of the system.

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FUEL INJECTION SYSTEM - DESCRIPTION AND OPERATION

1. General

A. This section covers the RSA Fuel Injection system used on the IO- 360-L2A engine. For a schematic of the fuel injection system, refer to Figure 1.

2. Description

A. The fuel injection system is a low pressure, multi nozzle, continuous flow system which injects raw fuel into the engine cylinder heads. The injection system is based on the principle of measuring engine air consumption to control fuel flow. More air flow through the venturi will result in more fuel being delivered to the engine, and less air flow through the venturi results in a decreased flow of fuel to engine.

B. System components consist of the fuel/air control unit, the fuel distribution valve (flow divider), injection nozzles (4 total) and lines used to connect the components. A description of the components is as follows:

(1) Fuel/Air Control Unit - The fuel/air control unit, also known as the 'servo regulator,' is located on the underside of the engine and integrates the functions of measuring airflow and controlling fuel flow. The control unit consists of an airflow sensing system, a regulator section and a fuel metering section.

(2) Fuel Distribution Valve - The fuel distribution valve, also known as a 'spider' or a flow divider, is located on top of the engine and serves to distribute fuel evenly to the four cylinders once it has been regulated by the fuel/air control unit. Also attached to the fuel distribution valve is a rigid line which feeds into a pressure transducer. This transducer measures fuel pressure and translates that reading into fuel flow at the cockpit indicator.

(3) Injection Nozzles - Each cylinder contains an injection nozzle, also known as an air bleed nozzle or a fuel injector. This nozzle incorporates a calibrated jet that determines, in conjunction with fuel pressure, the fuel flow entering each cylinder. Fuel entering the nozzle is discharged through the jet into an ambient air pressure chamber within the nozzle assembly. This nozzle assembly also contains a calibrated opening which is vented to the atmosphere, and allows fuel to be dispersed into the intake portion of the cylinder in an atomized, cone-shaped pattern.

3. Operation

A. Fuel is stored in the wing tanks and is delivered to the fuel injection system via a series of lines, valves and pumps. From the engine-driven fuel pump, fuel enters the fuel/air control unit, passes through the fuel distribution valve, and is routed to individual injection nozzles at each cylinder.

NOTE: For a schematic of the entire fuel system, refer to Chapter 28, Fuel Storage and Distribution - Description and Operation, Figure 1.

B. The heart of the injection system is the fuel/air control unit, which occupies the position ordinarily used by the carburetor at the engine intake manifold inlet. The fuel/air control unit is comprised of an integrated airflow sensing system, a regulator section and a fuel metering section. Operation of the fuel injection system is based on the principle of measuring airflow and using the airflow signal to operate a servo valve. The accurately regulated fuel pressure established by the servo valve, when applied across the fuel control system, makes fuel flow proportional to airflow.

(1) THE AIRFLOW SENSING SYSTEM consists of a throttle body which houses the air throttle valve, the venturi, servo valve and fuel control unit. The differential pressure between impact air and the venturi throat pressure is a measurement of the velocity of the air entering the engine. These pressures are vented through drilled channels in the throttle body to both sides of an air diaphragm and create a force across the diaphragm. A change in air throttle position or a change in engine speed will change the air velocity, which in turn changes the force across the air diaphragm.

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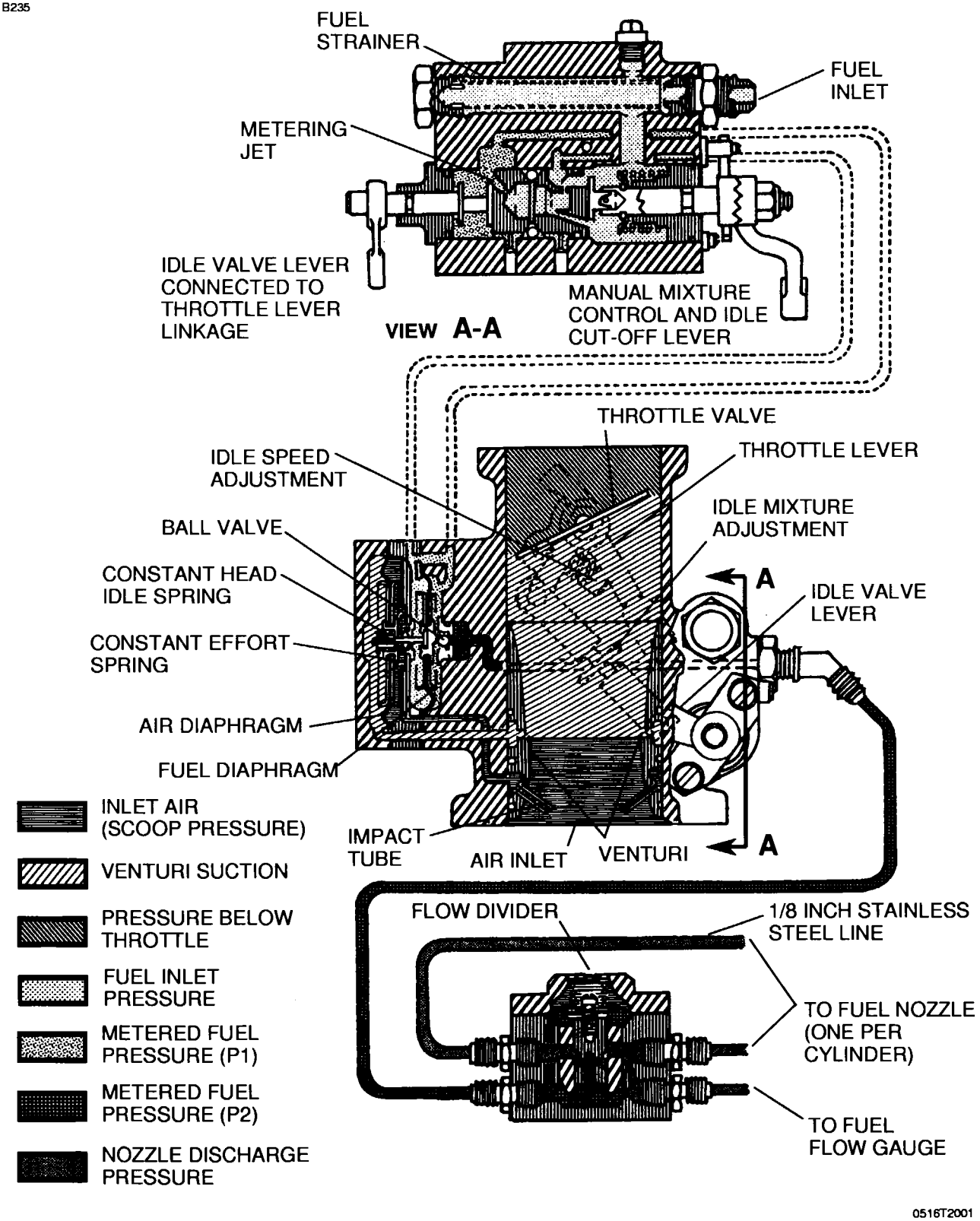

Fuel Injection System Schematic
Figure 1 (Sheet 1)

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(2) THE REGULATOR SECTION contains the air diaphragm mentioned in the preceding paragraph and a fuel diaphragm. Fuel inlet pressure is applied to one side of the fuel diaphragm. The other side of the fuel diaphragm is exposed to fuel that has passed through the metering jet (metered fuel pressure). The differential pressure across the fuel diaphragm is referred to as the fuel metering force.

(a) The air metering force applied to the air diaphragm is transmitted through the regulator stem and tends to move the ball valve in the opening direction. The fuel metering force across the fuel diaphragm acts to oppose the air metering force and tends to close the ball valve. Because the air forces are very low in the idle range, a constant head idle spring is provided to maintain an adequate fuel metering force at low rpm.

(b) As the air metering force increases, the spring compresses until the spring retainer touches the air diaphragm and acts as a solid member. The constant effort spring produces a force which provides a smooth transfer from idle to low power cruise operation. Whenever the air metering, fuel metering and spring forces are balanced, the ball valve maintains a fixed position.

(3) THE FUEL METERING SECTION is contained within the throttle body casting and consists of an inlet fuel screen, a rotary idle valve and a rotary mixture valve. Both idle speed (closed throttle position) and idle mixture (relationship between throttle position and idle valve position) may be adjusted externally to meet individual engine requirements.

(a) The idle valve is connected to the throttle valve by means of an external adjustable link. The idle valve controls fuel flow through the low speed range of operation and is adjustable to obtain good idling characteristics without affecting fuel metering in the high power range.

(b) The mixture control valve gives full rich mixture on one stop and a progressively leaner mixture as it is moved toward idle cutoff. The full rich stop defines sea level requirements and the mixture control provides for altitude leaning.

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Fuel Injection System - TROUBLESHOOTING

1. General

A. This section gives troubleshooting information for the installation of the fuel injection system.

2. Fuel Injection System Troubleshooting

A. Do the troubleshooting procedures if the problem is found on the chart. Refer to Table 101.

Table 101. Fuel Injection System Troubleshooting

PROBLEM	PROBABLE CAUSE	SOLUTION
HIGH FUEL FLOW READING.	Plugged nozzle if the high fuel flow reading is combined with a loss of power and roughness.	Remove and clean the nozzles. Soak the nozzles in Hoppes #9 Gun cleaning solvent for 20 minutes. Rinse the nozzles in a Stoddard solvent. Blow dry the nozzles. Do a check of the system for contamination.
	Faulty gage or pressure transducer.	Replace the gage or pressure transducer.
UNSATISFACTORY FUEL CUTOFF.	Incorrect installation of the aircraft linkage to the mixture control.	Adjust the linkage. Refer to servo mixture value RS-16.
ENGINE WILL NOT INCREASE TO THE NECESSARY RPM.	Contamination in the air chamber.	Refer to Precision Airmotive Corporation service information letter RS-40.
ROUGH IDLE.	Small air leaks in the induction system through loose intake pipes or a damaged O-ring.	Do a check of the clamps and connectors. Repair leaks as necessary.
	Large air leaks in the induction system.	Repair leaks as necessary.
	Fuel vaporizes in the fuel lines or distributor. Found only in high ambient temperature conditions or after a long operation at a low RPM setting.	Keep temperatures low: Avoid long ground runs. During a hot engine restart: Operate the engine at 1,200 - 1,500 for several minutes to reduce residual heat in the engine compartment.
LOW TAKEOFF FUEL FLOW.	Faulty gage or pressure transducer.	Replace the gage or pressure transducer.
	Contamination in the flow divider.	Clean the flow divider.

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Table 101. Fuel Injection System Troubleshooting (continued)

ENGINE IS DIFFICULT TO START.	Incorrect starting procedure.	Refer to the Pilot's Operating Handbook.
	Flooded engine.	Crank the engine to clear it with the throttle open and the mixture in the IDLE/CUTOFF position.
	Throttle valve is opened too far.	Open the throttle to approximately 800 RPM.
	A prime that is not sufficient (usually combined with a backfire).	Increase the quantity of priming.
ENGINE OPERATES ROUGH.	Too rich or too lean mixture.	Adjust the mixture control. If the mixture is too rich, the engine will run smoothly when leaned. If the mixture is too lean, the engine will run smoothly when the mixture is enriched. Adjust idle mixture to give a 10 - 50 PRM rise at idle.
	Plugged nozzle(s) (usually combined with high takeoff fuel flow).	Remove and clean the nozzles. Soak the nozzles in a Hoppes #9 Gun cleaning solvent for 20 minutes. Rinse the nozzles with a Stoddard solvent. Blow dry the nozzles. Do a check of the system for contamination.
	Air leak in the induction system.	Do a check for leaks.
	Air leak in the fuel line from the fuel tank to the servo.	Do a check for the leak. Connect clear tubing between the servo and the flow divider and look for air bubbles. Find and correct the source of the leak. This can include the boost pump or the engine-driven pump.
	Flow divider sticks.	Do an inspection of the flow divider. Clean the flow divider.

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FUEL INJECTION SYSTEM - MAINTENANCE PRACTICES

1. General

A. This section provides instructions for removal/installation, adjustment and cleaning of various components used in the fuel injection system. For maintenance information beyond the scope of this section, refer to applicable fuel injection component maintenance manuals which are listed in Introduction - List of Supplier Publications.

2. Precautions

A. Observe the following general precautions and rules during fueling, defueling, fuel bay purging, repairing, assembly or disassembly of system components, and electrical system checks and repairs on the airplane fuel system.
   (1) Plugs or caps should be placed on all disconnected hoses, lines and fittings to prevent residual fuel drainage, thread damage, or entry of dirt or foreign material into fuel system.
   (2) Any time fuel system is opened, flush system with 1/2 gallon of fuel at the inlet of servo and flow divider using the fuel boost pump.
   (3) When working on fuel injection system, keep all parts clean and free of contaminants.

3. Fuel/Air Control Unit Removal/Installation

A. Remove Fuel/Air Control Unit.
   (1) Place cockpit-mounted FUEL SHUTOFF valve in the OFF position.
   (2) Remove lower cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
   (3) Remove clamp securing induction air elbow to inlet adaptor.
   (4) Disconnect fuel inlet and outlet lines from control unit.
   (5) Remove mixture and throttle control linkages from control unit. Note number and position of washers for reinstallation.
   (6) Cut safety wire at base of control unit. Remove bolts securing inlet adaptor and throttle cable bracket to base of control unit and mixture cable bracket.
   (7) Remove nuts, lock washers and flat washers securing control unit to oil sump/intake manifold. Cover engine intake opening and place control unit in a sealed, dust-free environment to prevent accumulation of foreign particles into unit.

B. Install Fuel/Air Control Unit.
   (1) Remove engine intake cover from sump area.
   (2) Install control unit, spacer and gaskets to sump using washers, new lock washers and nuts. Finger tighten nuts to control unit.
   (3) First torque nuts in a crisscross (opposite) pattern to 90 inch-pounds and then retorque nuts in the same manner to a final torque value of 180-200 inch pounds.
   (4) Install inlet adaptor and throttle cable bracket to base of control unit using hardware removed above. Safety wire bolts.
   (5) Install mixture cable bracket.
   (6) Install mixture and throttle control linkages to control unit. Ensure all washers are in proper position. Refer to Chapter 76, Throttle Control - Maintenance Practices, Figure 201 and Chapter 76, Fuel Mixture Control - Maintenance Practices, Figure 201 for an illustration of washer and linkage sequence.

CAUTION: Do not back the nuts off to line the cotter pin hole up with the castellations in the nut.

   (7) Torque each nut to 30 inch-pounds and then proceed tightening the nut until the cotter pin hole lines up with the castellation in each nut. Do not exceed 50 inch-pounds.
      (a) If the cotter pin hole and the nut castellations will not line up, install a different thickness NAS1149F0363P washer or use a thin, NAS1149F0332P washer at the location between the throttle cable rod end and S1450-3-14-032 washer to obtain the specified torque on the nut. It may also be necessary to use a different AN310-3 nut.
   (8) Install cotter pins.

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(9) Move the mixture and throttle control through each controls entire range of movement and ensure that there is no binding.
(10) Connect fuel inlet and outlet lines to control unit.
(11) Secure induction air elbow to inlet adaptor using clamp.
(12) Install lower cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
(13) Place cockpit-mounted FUEL SHUTOFF valve in the ON position.
(14) Check for leaks during engine run.

4. Fuel Distribution Valve Removal/Installation

A. Remove Fuel Distribution Valve.
(1) Remove upper cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
(2) Disconnect all lines leading in to and out of fuel distribution valve.
(3) Remove nuts, bolts, washers and spacers securing fuel distribution valve to engine case.

B. Install Fuel Distribution Valve.
(1) Secure fuel distribution valve to engine case using nuts, bolts, washers and spacers. Torque to 75 inch-pound.
(2) Reinstall all lines leading in to and out of fuel distribution valve.
(3) Check for leaks during engine run.
(4) Install upper cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

5. Injection Nozzles Removal/Installation

A. Remove Injection Nozzles.
(1) Remove upper cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
(2) Remove rigid fuel lines leading into individual nozzles.
(3) Remove nozzles from cylinders.

B. Install Injection Nozzles.

CAUTION: Use only fuel-soluble lubricants (such as engine oil) on the nozzle threads during installation.

(1) Install nozzles to intake cylinders. Torque from 55 to 60 inch-pound.
(2) Install rigid fuel lines to nozzles. Torque 25 to 50 inch-pound.
(3) Install upper cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

6. Injection Nozzle Flow Test

A. Check Injection Nozzles For Plugging.
(1) If nozzle plugging is suspected, disconnect injector lines at the nozzles.
(2) Cap nozzles with clean valve stem caps to protect nozzles from contamination during removal.
(3) Remove nozzles. Refer to Injection Nozzles Removal/Installation.
(4) Pull up injector lines taking care that lines are not kinked.
(5) Install nozzles back into lines and torque from 25 to 50 inch-pound.
(6) Using clear containers (bottles with graduations are preferred) flow fuel into containers using aircraft boost pump and observe nozzle discharge pattern.
(7) When the mixture control is placed in the full rich position the nozzles should display a pencil stream pattern. The nozzles should also flow the same amount of fuel from cylinder to cylinder. If an unusual flow pattern or an unequal amount of fuel is noted in any of the containers the nozzles should be thoroughly cleaned. Refer to Injector Nozzle Cleaning.
(8) After cleaning install clean protective valve stem caps. It is recommended that after cleaning the nozzles, they be reinstalled in the injector lines and a nozzle flow check is conducted to verify that the nozzles are clean.
(9) Following a successful flow check reinstall the protective flow caps and reinstall the nozzles in the cylinders and torque from 55 to 60 inch-pound.
(10) Remove protective caps and reinstall injector lines to the nozzles and torque from 25 to 50 inch-pound.
(11) Perform leak check.

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7. Idle Speed and Mixture Adjustment

A. Adjustment Procedures (Refer to Figure 201).

WARNING: During adjustment procedure stay clear of propeller and/or propeller blast to avoid possible injury or death.

NOTE: For additional information in conjunction with procedures below, refer to the Precision Airmotive Service Letter SIL RS-67.

(1) Make sure that the alternate air door is in the closed position during this adjustment.
(2) Operate the engine until the oil temperature increases to 150°F (65°C).

NOTE: It may not be possible to get an oil temperature of 150°F (65°C) at cooler ambient temperatures. In that condition, it will be necessary to set the idle speed and mixture at a lower temperature.

(3) With the mixture control in the full rich position, set the idle speed to 675 RPM, +25 or -25 RPM.
(4) Advance the throttle to approximately 1800 RPM and immediately return it to idle. Idle speed should be approximately the same as set above.
(5) Adjust the fuel mixture control by rotating the knob counterclockwise, toward lean, quickly for approximately one inch, then very slowly until the peak RPM is obtained and the engine speed starts to drop off.
    (a) When the engine speed first starts to increase, you will see a slight rise in RPM.

    NOTE: Do not mistake this as the total RPM rise.

    (b) Continue the slow rotation movement of the mixture control until you will see or sense a drop in the engine RPM.
    (c) The maximum RPM before the drop in engine RPM is the total RPM rise which indicates the mixture strength at the engine idle speed.
(6) If the rise is less than 10 RPM it is necessary to enrichen the fuel mixture.
(7) If the rise is more than 50 RPM it is necessary to lean the fuel mixture.

NOTE: To aid in the adjustment of the fuel mixture, the clevis on the fuel servo has an L (lean) and R (rich) stamp on it to indicate the direction that the thumb wheel should be moved to enrichen the fuel mixture and increase the RPM rise. Turn the thumb wheel in the opposite direction you will lean the fuel mixture and decrease the RPM rise.

(8) Adjust the thumb wheel to set a rise 10 to 50 RPM.
(9) If the adjustment thumb wheel bottoms out on the blocks, center it as follows:
    (a) Measure the distance between the two blocks.
    (b) Disconnect the spring from the linkage pin.
    (c) Remove the cotter pin, linkage pin, wave washer, and flat washer.
    (d) Turn the block and adjustment screw until the adjusting thumb wheel is centered.
    (e) The distance between the blocks should measure the same as above.
    (f) Install the linkage pin, flat washer, wave washer, cotter pin, and spring.
(10) After each adjustment is made, the engine speed should be increased to approximately 1800 RPM and held for approximately 10 to 15 seconds to clean the spark plugs and clear the cylinders of excess fuel.
(11) Put throttle in idle position.

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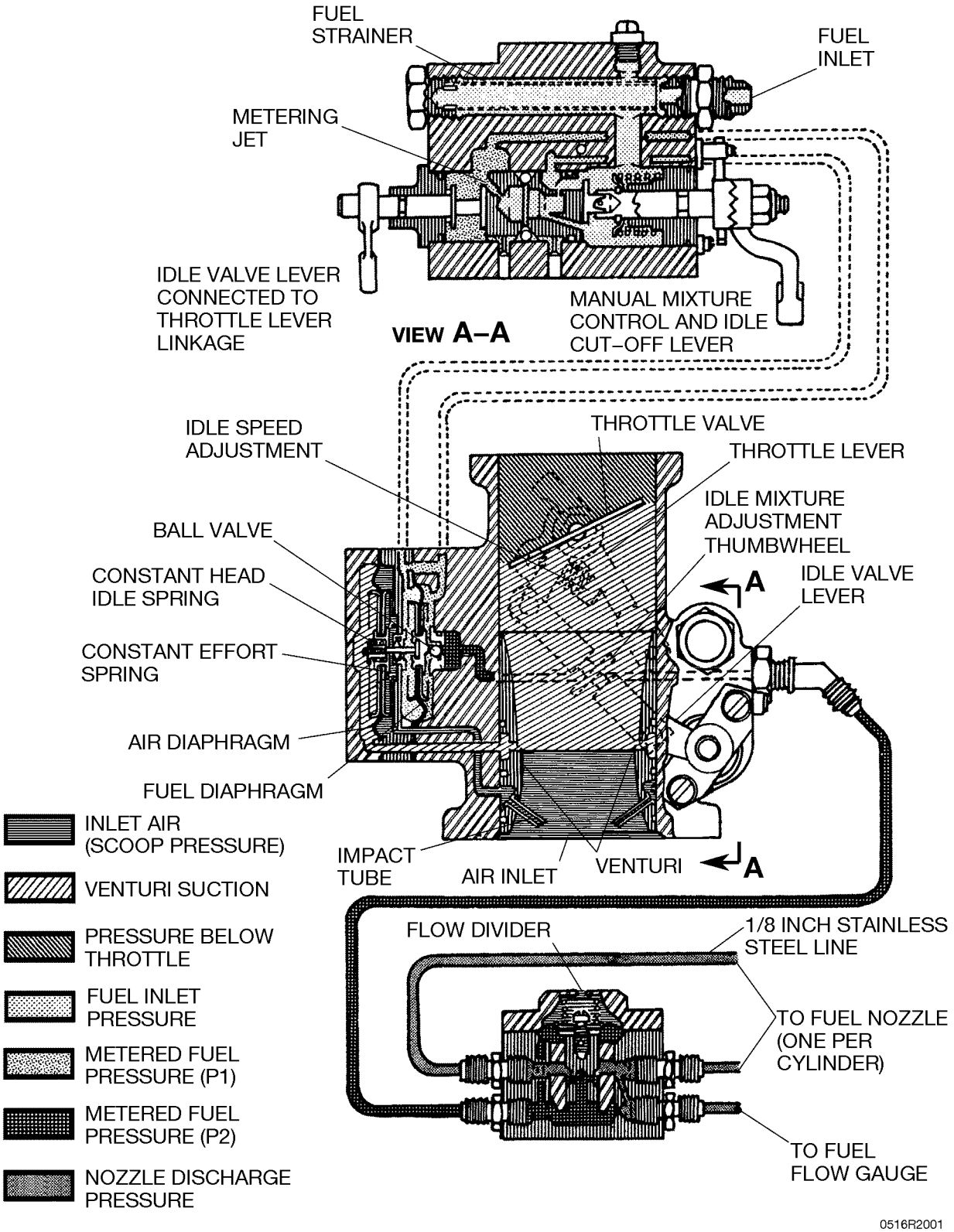

Idle and Mixture Adjustment
Figure 201 (Sheet 1)

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(12) Repeat the procedure until you get the desired RPM rate change at idle.

NOTE: If the mixture was excessively rich or lean when this procedure was started the engine speed will require readjustment as the fuel mixture is adjusted to the desired value. Set the idle speed to the specified RPM after the mixture has been set to get the 10 to 50 RPM rise a lean condition.

(13) Operate engine to full throttle and back to idle to make sure that the setting has not changed.

NOTE: Small changes in the idle speed and RPM are permitted. Find the cause of any large variations in RPM.

8. Injector Nozzle Cleaning

A. The injector nozzles should be cleaned at time intervals set forth in Chapter 5, Inspection Time Limits.

B. Cleaning Procedures.
(1) Remove nozzles from engine. Individual two-piece nozzles should be kept as matched assemblies.
(2) Inspect carefully for evidence of varnish build up and/or contaminated screens.
(3) Soak nozzles in Methyl Ethyl Ketone, Acetone or other suitable solvent to remove all contamination and varnish from nozzle. Stubborn deposits may benefit from ultrasonic cleaning methods.
(4) Dry nozzles using compressed shop air not to exceed 30 PSI. Blow through nozzle in direction opposite of fuel flow.
(5) Install nozzles to intake cylinders. Torque from 55 to 60 inch-pound.
(6) Install rigid fuel lines to nozzles. Torque 25 to 50 inch-pound.
(7) Perform leak check.

9. Fuel Strainer Cleaning

A. The fuel strainer should be cleaned at time intervals set forth in Chapter 5, Inspection Time Limits.

B. Cleaning Procedures (Refer to Figure 201).
(1) Remove fuel inlet hose to access fuel strainer.
(2) Remove and clean fuel strainer in Stoddard solvent.
(3) Using new O-rings, install fuel strainer to control unit. Torque 65 to 70 inch-pound.
(4) Install the fuel inlet hose. Use a wrench to hold the fuel strainer adapter and torque to 270 to 300 inch-pound.
(5) Perform leak check.

10. Air Throttle Shaft Lubrication

A. The air throttle shaft should be lubricated at time intervals set forth in Chapter 5, Inspection Time Limits.

B. To lubricate air throttle shaft, apply a drop of engine oil to ends of air throttle shaft in such a manner that the oil can work into throttle shaft bushings.

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FUEL FLOW INDICATOR - MAINTENANCE PRACTICES

1. General

A. Airplanes without Garmin G1000, engine fuel flow is measured by an engine-compartment attached transducer and an indicator in the cockpit. Components of the system are the fuel flow transducer, the EGT/Fuel Flow gage in the cockpit, wiring to connect the two electrical components and fuel line from the fuel distribution valve to the transducer.

B. Maintenance practices are given for the removal and installation of the components.

C. Airplanes with Garmin G1000 use the fuel flow transducer installed on the engine and the fuel flow indicator on the Garmin Display Units to show fuel flow. For information applicable to the Garmin Display Units, refer to Garmin Display Unit - Maintenance Practices.

2. EGT/Fuel Flow Gage Removal/Installation

NOTE: The fuel flow gage is on the right half of the dual-function EGT/Fuel Flow gage on the left side of the instrument panel.

A. Remove the Fuel Flow Gage.
   (1) Make sure all electrical power to the airplane is off.
   (2) Remove the screws that attach the gage to instrument panel.
   (3) Carefully remove the gage from the bottom side of the instrument panel and disconnect electrical connector from the gage.

B. Install the Fuel Flow Gage.
   (1) Connect the electrical connector to the gage.
   (2) Install the gage in the instrument panel with the screws.
   (3) Make sure the gage operates correctly.

3. Transducer and Line Removal/Installation

NOTE: Transducer and line removal and installation are typical for all avionics packages.

A. Remove the Transducer (Refer to Figure 201).
   (1) Make sure the electrical power to airplane is off.
   (2) Remove the upper cowl. Refer to Chapter 71, Cowling - Maintenance Practices.
   (3) Disconnect the electrical connector from the fuel flow transducer.
   (4) Disconnect the fuel line from the fuel distribution valve to the transducer.
   (5) Remove the transducer from the baffle.
   (6) Remove the fitting from the transducer.

B. Install the Transducer (Refer to Figure 201).
   (1) Install the fitting and the O-ring in the transducer.
   (2) Install the fuel flow transducer to the baffle.
   (3) Connect the fuel line from the fuel distribution valve to the transducer.
      (a) Torque the fuel line to 25 in-lbs to 50 in-lbs (2.8 N-m to 5.6 N-m).
   (4) Connect the electrical connector to the fuel flow transducer.
   (5) Install the upper cowl. Refer to Chapter 71, Cowling - Maintenance Practices.
   (6) Make sure the gage operates correctly.

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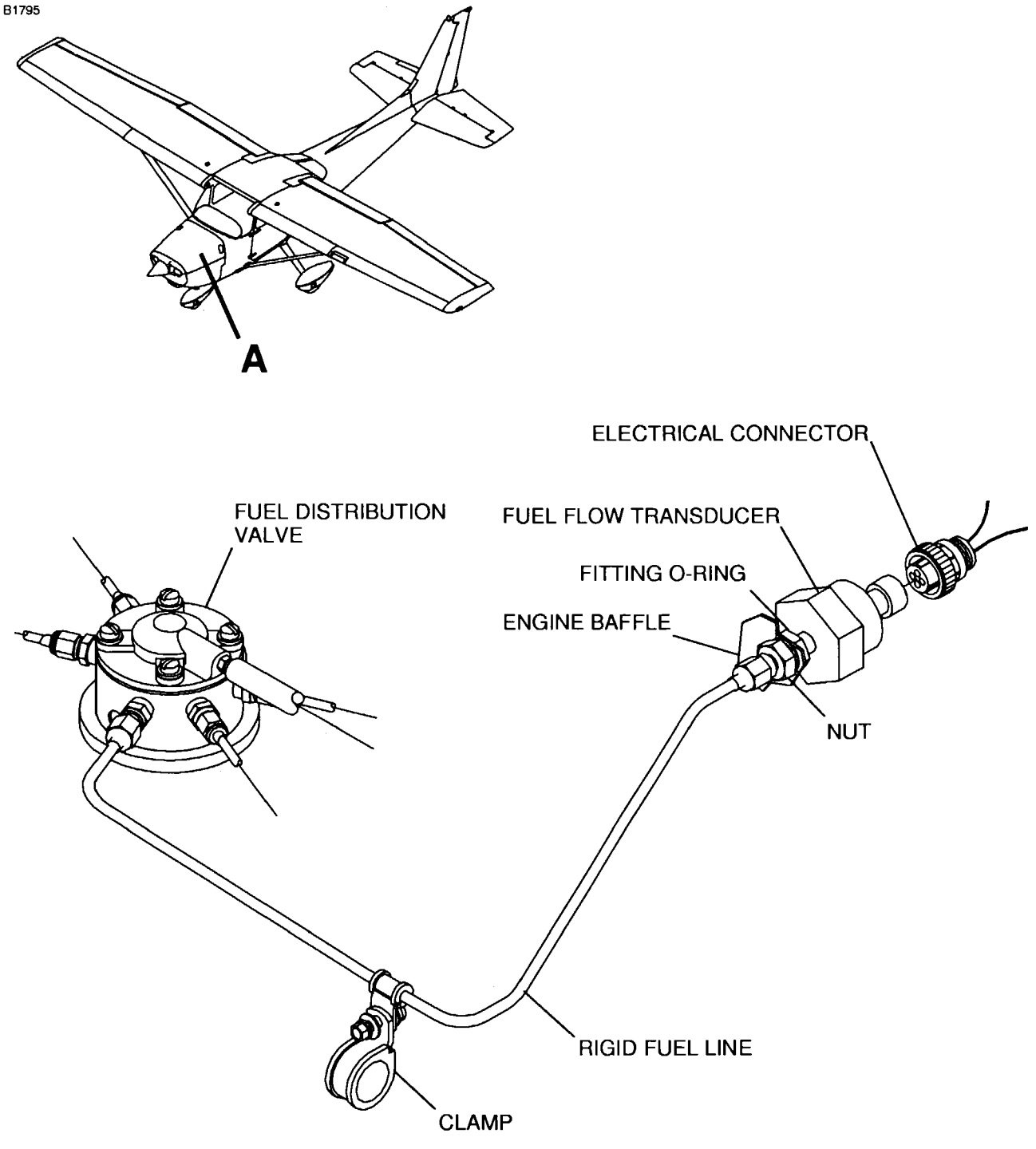

DETAIL A

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Fuel Flow Indicating Installation
Figure 201 (Sheet 1)

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CHAPTER 74

IGNITION

LIST OF EFFECTIVE PAGES

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74-10-00	Pages 201-205	Mar 1/2009
74-30-00	Pages 601-602	Apr 7/2003

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Magneto Removal/Installation . . . . . 74-10-00 Page 201
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IGNITION SYSTEM - GENERAL

1. Scope

A. This chapter covers the ignition system used on the IO-360 L2A engine.

2. Tools, Equipment and Materials

NOTE: Refer to the following table for tools, equipment and material used throughout the chapter.

NAME	NUMBER	MANUFACTURER	USE
Luberex Grease	10-1206	Cessna Aircraft Company Cessna Parts Distribution Department 701, CPD 25800 East Pawnee Wichita, KS 67218-5590	To lubricate ignition switch components.
Ignition Switch Parts Kit	A3770	Cessna Aircraft	To rebuild ignition switch.

3. Definition

A. This chapter contains two sections on the ignition system. The first section provides a troubleshooting chart to aid in identifying common problems which may occur in the ignition system. The second section contains maintenance practices for the ignition system.

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IGNITION SYSTEM - TROUBLESHOOTING

1. General

A. The following chart has been provided to aid maintenance technicians in system troubleshooting. This chart should be used in conjunction with Chapter 71, IO-360-L2A - Troubleshooting to provide a comprehensive look at solutions to engine problems. For information beyond the scope of this chapter, refer to applicable engine and ignition system manuals and publications listed in Introduction - List of Supplier Catalogs.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START	Defective ignition switch.	Check switch continuity. Replace if defective.
	Spark plugs defective, improperly gapped or fouled by moisture or deposits.	Clean, regap and test plugs. Replace if defective.
	Defective ignition harness.	If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.
	Magneto "P" lead grounded.	Check continuity. "P" lead should not be grounded in the ON position, but should be grounded on OFF position. Repair or replace "P" lead.
	Failure of impulse coupling.	Impulse coupling pawls should engage at cranking speeds. Listen for loud clicks as impulse couplings operate. Remove magnetos and determine cause. Replace defective magnetos.
	Defective magneto.	Refer to Ignition System - Maintenance Practices.
	Broken drive gear.	Remove magneto and check magneto and engine gears. Replace defective parts. Make sure no pieces of damaged parts remain in engine, or engine disassembly will be required.
ENGINE WILL NOT IDLE OR RUN PROPERLY.	Spark plugs defective, improperly gapped or fouled by moisture or deposits.	Clean, regap and test plugs. Replace if defective.
	Defective ignition harness.	If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.

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TROUBLE	PROBABLE CAUSE	REMEDY
	Defective magneto.	Refer to Ignition System - Maintenance Practices.
	Impulse coupling pawls remain engaged.	Listen for loud clicks as impulse coupling operates. Remove magneto and determine cause. Replace defective magneto.
	Spark plugs loose.	Check and install properly.

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IGNITION SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. The engine uses two Unison/Slick 4371 series, impulse-coupled magnetos to fire two spark plugs in each cylinder.

B. For complete description, operation, troubleshooting, maintenance, overhaul and lubrication requirements of the magnetos, refer to the Lycoming Direct Drive Engine Overhaul Manual, Lycoming Operators Manual, Lycoming Service Instruction 1437 and the Unison 4300/6300 Series Magneto Maintenance and Overhaul Manual.

C. For the inspection time requirements of the magnetos, refer to Chapter 5, Inspection Time Limits. For the inspection procedures, refer to the Unison 4300/6300 Series Magneto Maintenance and Overhaul Manual.

2. Magneto Removal/Installation

NOTE: The removal and installation for each magneto is typical.

A. Remove the Magneto (Refer to Figure 201).
   (1) Remove the engine cowl. Refer to Chapter 71, Engine Cowl - Maintenance Practices.

WARNING: Make sure that each magneto P lead is grounded.

WARNING: Before you rotate the propeller remove a minimum of one spark plug from each cylinder to prevent the start of the engine.

   (2) Remove the screws that attach the high tension outlet cover to the magneto.
   (3) Disengage the high tension cover from the magneto.
   (4) For a reference point when you install the magneto, turn the propeller in the normal direction until each impulse coupling releases near Top Dead Center (TDC) on the number one cylinder compression stroke.

NOTE: You will hear a click sound from the impulse couplings when they release.

   (5) The crankshaft position can be found by the marks on the front or aft face of the starter ring gear support. Refer to the Lycoming Service Instruction 1437 or latest revision for more instructions.
      (a) When you use the marks on the front face of the ring gear, they must be aligned with the small hole that is found at the two o'clock position on the front face of the starter housing.
      (b) When you use the marks on the aft face of the ring gear, they must be aligned with the engine case parting line.
   (6) Turn the propeller in the opposite direction of the normal propeller operation to approximately 30 degrees BTDC (Before Top Dead Center) on the number one cylinder compression stroke.
   (7) Turn the propeller in the normal direction to 25 degrees BTDC on the number one cylinder compression stroke.
   (8) Disconnect the P lead and ground wire from the magneto.
   (9) Examine the magneto angle to help make sure you put it in the same position for installation.
   (10) Remove the nuts, washers and clamps that attach the magneto to the engine housing.
   (11) Remove the magneto from the housing.

B. Install the Magneto (Refer to Figure 201).
   (1) Apply a small quantity of silicone grease such as DC4 to each side of the new magneto base gasket, which will help future timing adjustments.
   (2) Make sure the magneto drive gear is installed correctly, the nut torqued correctly and the cotter pin is installed. Refer to the Lycoming Service Instructions 1437 or latest revision and the Unison 4300/6300 Magneto Maintenance and Overhaul Manual Instructions.

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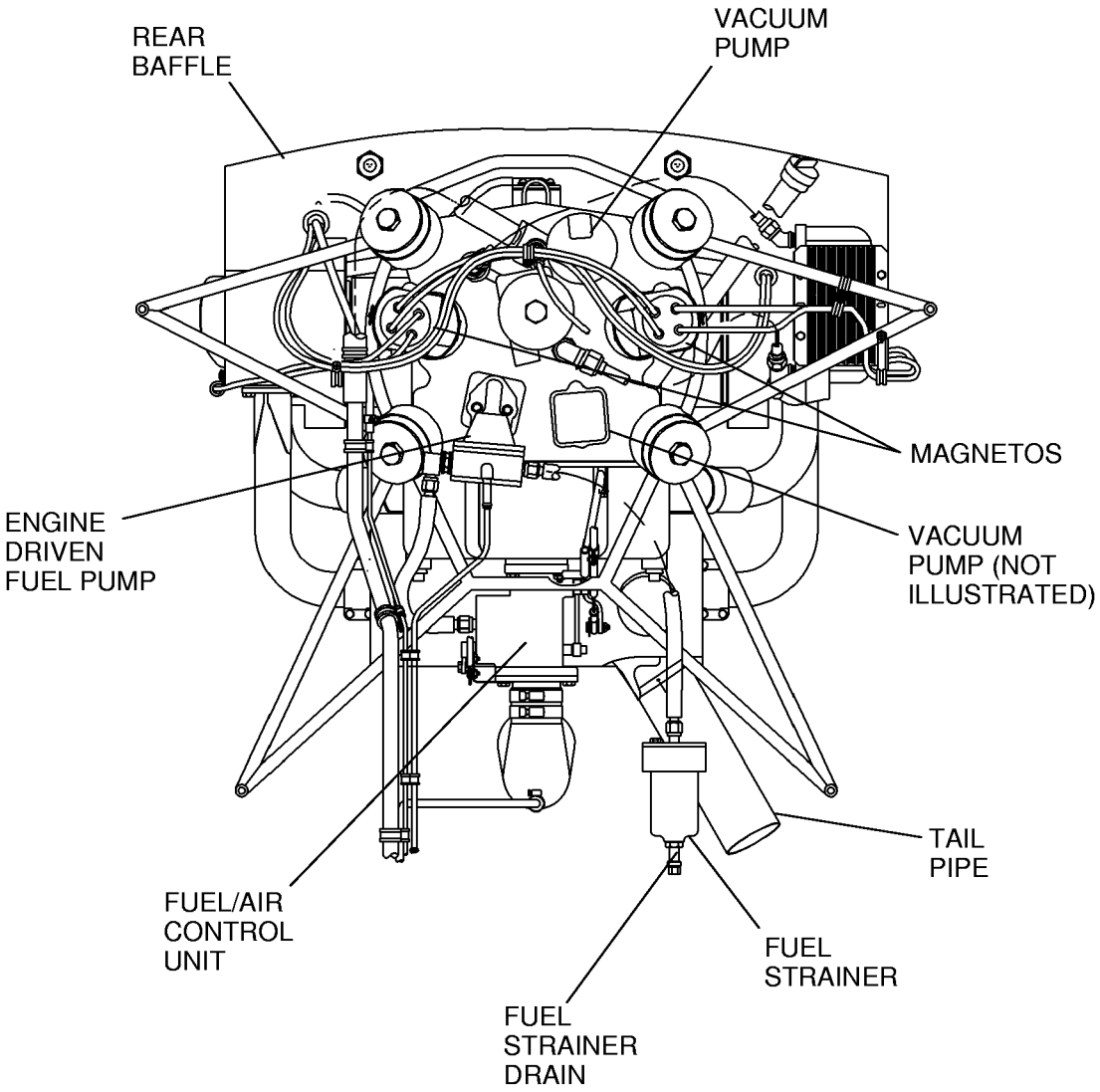

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Magneto Installation
Figure 201 (Sheet 1)

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CAUTION: Make sure you remove the T-118 timing pin immediately after you attach the magneto to the accessory case and before the magneto or propeller is turned.

(3) Insert the T-118 timing pin into the L timing hole in the magneto distributor block.
(4) Turn the magneto rotor in the opposite of normal direction until the timing pin is engaged fully into the distributor gear.
  (a) If the magneto rotor does not move freely and the pin will not go into the hole in the gear, the pin has hit the pointer on the gear.
  (b) Pull the pin out far enough to continue to turn the magneto freely in the opposite direction of normal movement until the pointer has passed the pin, then insert the pin.
    1 Turn the magneto rotor until the pin engages the gear.
(5) Do a check of the crankshaft to make sure the propeller has not moved and is still set in position with the number one cylinder at 25 degrees BTDC (Before Top Dead Center) on the compression stroke.
(6) If the propeller as been turned and only one magneto was removed, it will be necessary to engage the impulse coupling on the magneto that is installed, and establish the crankshaft position. Refer to step 2.A.(4) thru 2.A.(7) before you continue.
(7) With the number one cylinder at 25 degrees BTDC on the compression stroke, do the steps that follow.

CAUTION: Make sure you remove the T-118 timing pin immediately after you attach the magneto to the accessory case and before the magneto or propeller is turned.

  (a) Install the magneto with the new base gasket and the T-118 timing pin in position.
  (b) Engage the magneto drive gear with the engine gear, in a position that will give a range of magneto timing adjustments in each direction.
  (c) Hold the magneto in position against the accessory case and install the nuts, flat washers, clamps and new lock washers.
  (d) Finger tighten each nut by hand.
  (e) Remove the timing pin.
(8) Before you continue, you must adjust the magneto timing. Refer to Magneto-to Engine External Timing Adjustment.
(9) With the magneto set in position, first tighten each nut to 8 foot-pounds (10 N-m).
(10) Tighten each nut from one side to another, to a torque of 17 foot-pounds (23 N-m).
(11) Connect the P lead to the magneto.
(12) Attach a ground wire to the magneto.
(13) Attach the high tension outlet cover to the magneto.
(14) Tighten the P lead nut to a torque of 13 to 15 inch-pounds (1.5 to 1.7 N-m).

CAUTION: Make sure you remove the T-118 timing pin before the magneto or propeller is turned.

(15) Install the spark plugs.
(16) Install the cowl. Refer to Chapter 71, Engine Cowl - Maintenance Practices.
(17) Complete a engine preflight operational check of the ignition system. Refer to the Pilot's Operating Handbook.

3. Magneto-to-Engine External Timing Adjustment

A. Adjust the Magneto-to-Engine Timing (Refer to Figure 201).
  (1) Make sure the ignition is in the OFF position.
  (2) Remove the engine cowl. Refer to Chapter 71, Engine Cowl - Maintenance Practices.
  (3) Remove a minimum of one spark plug from each cylinder.

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(4) Turn the propeller in the normal direction of movement until each impulse coupling releases as the number one cylinder moves near TDC (Top Dead Center) on the compression stroke.

NOTE: You will hear a click sound from the impulse couplings when they release.

(5) Turn the propeller in the opposite direction of normal movement to approximately 30 degrees BTDC (Before Top Dead Center) on the number one cylinder compression stroke.
(6) Make sure that cylinder number one is at 25 degrees BTDC (Before Top Dead Center) on the compression stroke.
(7) Connect a standard aircraft magneto timing light between a acceptable engine ground and the P lead terminal of the magneto.

NOTE: Most standard aircraft magneto timing lights show open points with a Light On condition and/or a signal that you can hear.

(8) Loosen the mount clamps that attach the magneto to the accessory case so that the magneto will turn on the accessory case.
(9) Turn the ignition switch to the BOTH position.
   (a) Look at the magneto from the aft side of the engine.
      1 If the timing light is luminated, turn the magneto frame clockwise until the timing light shuts off.
      2 Turn the magneto frame counter-clockwise until the timing light comes on, which shows that the contact breaker points are open.

CAUTION: Do not torque the nuts more than 17 foot-pounds (23 N-m.) or the mounting flange can crack.

(10) With the magneto set in position, first tighten each nut to 8 foot-pounds (10 N-m).
(11) Tighten each nut from one side to another, to a torque of 17 foot-pounds (23 N-m).
(12) Complete a check of the magneto timing to make sure it has not changed. Refer to Magneto-to-Engine Timing Check.

4. Magneto-to-EngineTiming Check

A. Complete a Check of the Magneto-to-Engine Timing (Refer to Figure 201).
   (1) Make sure the ignition is in the OFF position.
   (2) Remove the engine cowl. Refer to Chapter 71, Engine Cowl - Maintenance Practices.
   (3) Remove a minimum of one spark plug from each cylinder.
   (4) Connect a standard aircraft magneto timing light between an acceptable engine ground and the P lead terminal of the magneto.

NOTE: Most standard aircraft magneto timing light indicate open points with a Light On condition and/or an signal that you can hear.

   (5) Turn the ignition switch to the BOTH position.
   (6) Turn the propeller in the normal direction of movement until each impulse coupling releases as the number one cylinder moves near TDC (Top Dead Center) on the compression stroke.

NOTE: You will hear a click sound from the impulse couplings when they release.

   (7) Turn the propeller in the opposite direction of normal movement to approximately 30 degrees BTDC (Before Top Dead Center) on the number one cylinder compression stroke.
   (8) Slowly turn the propeller in the normal direction of movement until the timing light comes on.
   (9) Examine the crankshaft to make sure it is in the correct position.

NOTE: The timing light must come on at 25 degrees BTDC with the number one cylinder on the compression stroke.

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(10) If the crankshaft is not in the correct position you will have to make an adjustment. Refer to Magneto-to-Engine External Timing Adjustment.
(11) Turn the ignition switch to the OFF position.
(12) Install the spark plugs.
(13) Install the ignition leads on the spark plugs.
(14) Install the cowl. Refer to Chapter 71, Engine cowl - Maintenance Practices.
(15) Complete a engine preflight operational check of the ignition system. Refer to the pilot's operating handbook.

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IGNITION SWITCH - INSPECTION/CHECK

1. Description

A. The following inspection and lubrication procedures are designed for the ACS brand ignition switch and should be accomplished every 2000 hours.

2. Tools, Equipment and Materials

A. Refer to Ignition System - General for a list of required tools, equipment and materials.

3. ACS Ignition Switch Inspection and Lubrication

NOTE: Refer to Figure 601 for the following steps.

A. Switch Removal.
   (1) Disconnect battery.
   (2) Remove switch assembly from instrument panel by loosening locknut on the forward side of panel and removing decorative nut on aft side of panel.

      NOTE: Wiring need not be removed from posts of switch if wiring is of sufficient length to allow switch assembly to be moved to a position where disassembly can be accomplished. If wiring is to be disconnected, tag or mark wires for reinstallation.

B. Switch Disassembly.
   (1) Hold switch body in position shown in Figure 601.
   (2) Remove screws and washers.
   (3) Lift terminal board assembly from body, being careful not to lose springs and cups.

C. Switch Cleaning.
   (1) Clean switch contacts and the three movable contact cups using alcohol on a cotton tip swab.

D. Switch Inspection.
   (1) Inspect movable contact cups and switch contacts on the terminal board assembly for excessive wear or corrosion and for loose contacts or terminals. If the silver plating on the contact cups is worn through to the brass material, or they are burned or pitted from arcing or are corroded, they should be replaced. If the contacts on the contact block exhibit any of the above conditions or the terminals are loose, the terminal board assembly should be replaced.

E. Switch Reassembly.
   (1) Apply a thin coating of Luberex 10-1206 lubricant to switch contacts and the three movable contact cups. Ensure all contact areas are covered with lubricant.
   (2) Reassemble switch using new parts, if required. Ensure that cups and springs are positioned in switch body so that no binding occurs. Secure terminal board assembly to switch body with retained washers and screws.
   (3) Mark switch with a dab of red paint on the terminal board retaining screws.
   (4) If removed, reconnect wiring to backside of switch.
   (5) Install switch in panel and secure using existing hardware.
   (6) Reconnect battery and perform an operational check of the switch.

F. Operational Check.
   (1) Start engine. Refer to Model 172R Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.
   (2) Check magnetos for normal engine RPM drop.
   (3) Verify that both magnetos are grounded when switch is in the OFF position.
      (a) Reduce engine RPM to idle, and turn switch to the OFF position. Engine should quit immediately, signifying that both magnetos have been grounded through the ignition switch.
   (4) After engine stops, move mixture control to idle cutoff position.

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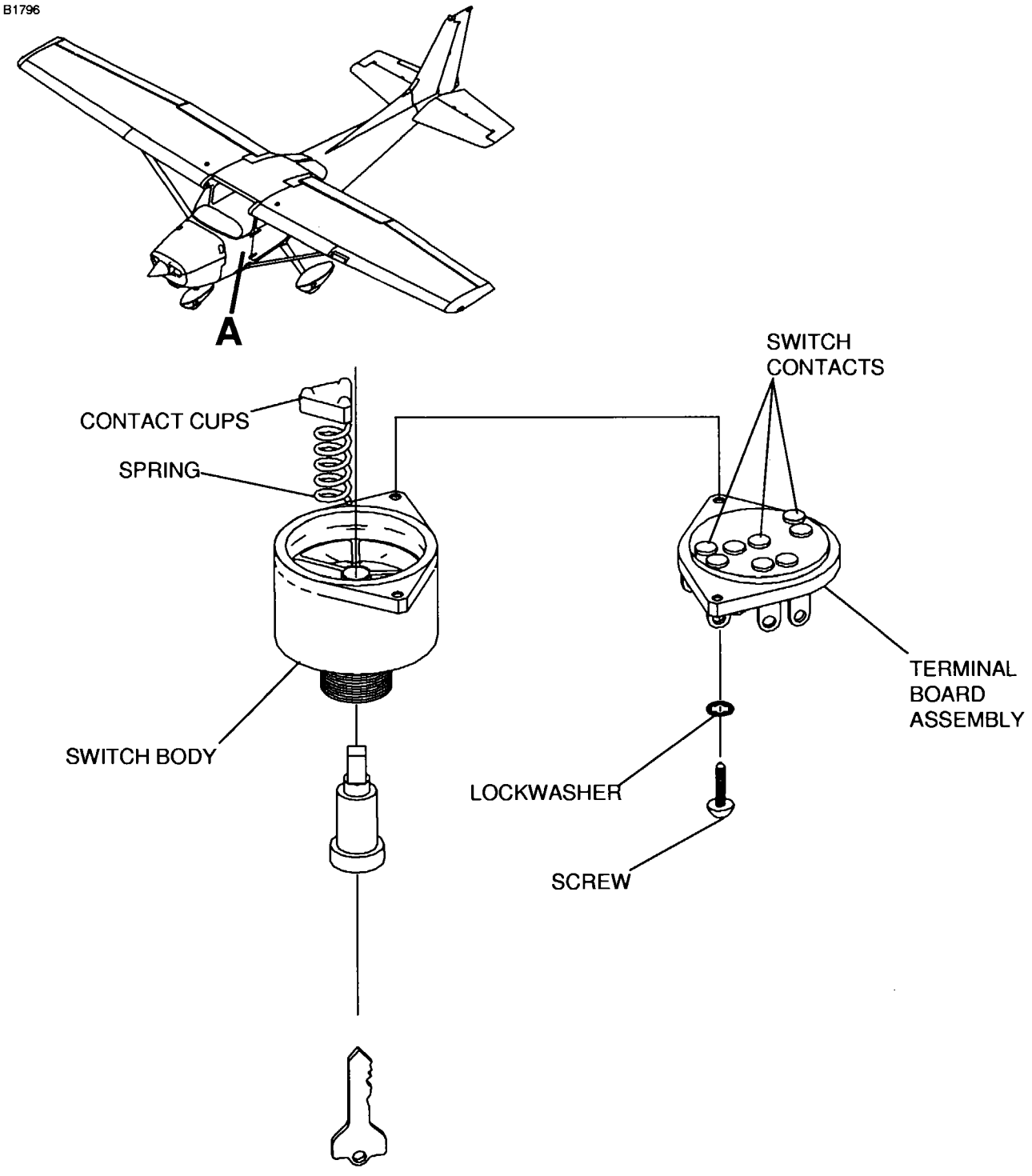

DETAIL A

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ACS Ignition Switch Inspection/Lubrication
Figure 601 (Sheet 1)

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CHAPTER 76

ENGINE CONTROLS

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76-10-00	Pages 201-203	Jan 2/2006
76-11-00	Pages 201-203	Jan 2/2006

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ENGINE CONTROLS - GENERAL

1. Scope

A. This chapter describes those controls used to regulate engine power.

2. Definition

A. This Chapter is divided into sections to aid maintenance technicians in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief description of the sections follows:
   (1) The section on throttle control describes the throttle handle, cable and linkage.
   (2) The section on fuel mixture control describes the mixture handle, cable and linkage.
   (3) Both sections include removal/installation, rigging and inspection requirements.

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THROTTLE CONTROL - MAINTENANCE PRACTICES

1. General

A. The throttle control is the push-pull type that incorporates a knurled friction knob, which prevents vibration induced "creeping" of the control. The ball bearing-type rod end on the throttle is secured to the engine with a predrilled AN bolt, a castellated nut and a cotter pin.

NOTE: Steel AN bolts with an undrilled shank are identified with an "A" suffix (AN3-6A). A steel bolt of the same size, with the shank drilled for castellated nut and cotter pin is identified as AN3-6. Aluminum AN bolts shall not be used in this application.

B. When adjusting the throttle control, it is important to check that throttle control slides smoothly throughout its full range of travel, that it locks securely with the friction lock and the throttle arm operates through its full arc of travel. Do not lubricate throttle control. If excessive binding is noticed, replace throttle control.

C. Whenever engine controls are being disconnected, pay particular attention to the exact position, size and number of attaching parts for re-connecting controls.

2. Throttle Control Removal/Installation

A. Remove Throttle Control (Refer to Figure 201).
(1) Remove engine cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
(2) Remove cotter pin, castellated nut, bolt and washers securing throttle control rod end to throttle body arm.
(3) Remove clamp securing throttle control to engine mount.
(4) Remove throttle cable retaining nut and washer from forward side of firewall.
(5) Inside the cockpit/cabin area, remove throttle cable retaining nut and washer from forward side of instrument panel.
(6) Carefully pull throttle control through firewall and instrument panel, and remove from airplane.

B. Install Throttle Control (Refer to Figure 201).

NOTE: When installing throttle control, ensure that control is routed exactly as previously installed. Ensure that no binding or preloading occurs from a too small bend radius.

(1) Inside the cockpit/cabin area, carefully route throttle control rod end through instrument panel and then place washer and retaining nut over rod end.
(2) Route throttle control rod end through firewall and position throttle control in instrument panel.
(3) Secure throttle control in instrument panel by tightening retaining nut against washer and instrument panel.

NOTE: To prevent damage to the instrument panel finish and markings, ensure the control housing does not rotate against the instrument panel during installation.

(4) In the engine compartment, place washer and retaining nut over throttle control rod end and secure against firewall.
(5) Attach throttle control rod end to throttle body with bolt, washers, castellated nut and cotter pin.
(6) Secure throttle control to engine mount with clamp.
(7) Adjust throttle control as required. Refer to Throttle Control Adjustment/Test.
(8) Install engine cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

3. Throttle Control Adjustment/Test

A. Check Throttle Control (Refer to Figure 201).
(1) Pull throttle control knob full out and check that idle stop on throttle body is contacted.
(2) Push throttle control knob full in and check that full power stop on throttle body is contacted.
(3) Do a check to make sure that the throttle has no less than 0.12-inch (3.18 mm) and no more than 0.25-inch (6.35 mm) cushion at each stop.

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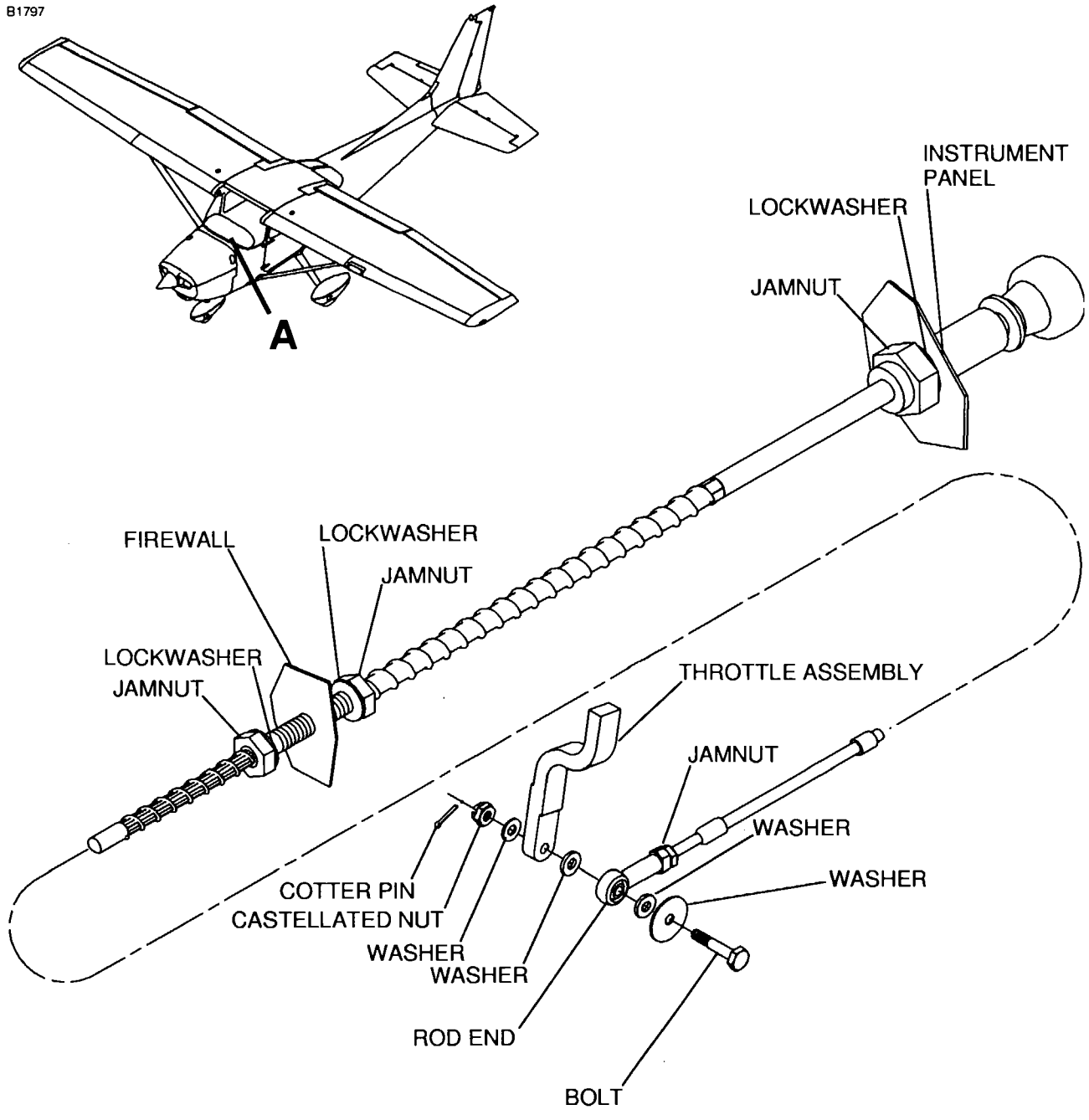

DETAIL A

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Throttle Control Installation
Figure 201 (Sheet 1)

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(4) Work throttle control in and out several times to check for binding.

B. Adjust Throttle Control (Refer to Figure 201).
(1) Disconnect throttle control rod end from the throttle body.
(2) Loosen jam nut and adjust throttle control rod end to obtain desired setting.
(3) Tighten jam nut.
(4) Connect throttle control rod end to throttle body.

4. Throttle Control Inspection/Check

A. Inspection of Throttle Control.
(1) The throttle control attachment to throttle body should be inspected in accordance with time limits established in Chapter 5, Inspection Time Limits. Do a check of the bolt, castellated nut, cotter pin, rod end, and rod end jam nut for security and condition.
(2) Do a check of the rod end witness hole for proper rod end engagement with the throttle control.
(3) Do a check to make sure that the throttle control slides smoothly throughout its full range of travel, that it locks securely with the friction lock, and that the throttle arm operates through its full arc of travel.

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FUEL MIXTURE CONTROL - MAINTENANCE PRACTICES

1. General

A. The mixture control is the push-pull type that incorporates a threaded vernier mechanism for fine adjustment. The ball bearing rod end on the mixture control is secured to the engine with a predrilled AN bolt, a castellated nut and a cotter pin.

NOTE: Steel AN bolts with an undrilled shank are identified with an 'A' suffix (AN3-6A). A steel bolt of the same size, with the shank drilled for castellated nut and cotter pin is identified as AN3-6. Aluminum bolts and undrilled bolts must not be used in this application.

B. When adjusting the fuel mixture control, it is important to check that fuel mixture control slides smoothly throughout its full range of travel, that it adjusts through its full vernier range and the mixture arm operates through its full arc of travel. Do not lubricate fuel mixture control. If excessive binding is noticed, replace fuel mixture control.

C. Whenever engine controls are being disconnected, pay particular attention to the exact position, size and number of attaching parts as noted when connecting controls.

2. Fuel Mixture Control Removal/Installation

A. Remove Fuel Mixture Control (Refer to Figure 201).
(1) Remove engine cowling. Refer to Chapter 71, Cowling - Removal/Installation.
(2) Remove cotter pin, nut, bolt and washers securing mixture control rod end to throttle body mixture arm.
(3) Remove clamp securing fuel mixture control to mixture control bracket.
(4) Remove fuel mixture control retaining nut and washer from forward side of firewall.
(5) In the cockpit/cabin area, remove mixture control retaining nut and washer from forward side of instrument panel.
(6) Carefully pull mixture control through firewall and instrument panel, and remove from airplane.

B. Install Fuel Mixture Control (Refer to Figure 201).

NOTE: When installing mixture control ensure that control is routed exactly as previously installed. Ensure that no binding or preloading occurs from a too small bend radius.

(1) In the cabin/cockpit area, carefully route fuel mixture control through instrument panel, and then place washer and retaining nut over fuel mixture control rod end.
(2) Route fuel mixture control through firewall.
(3) Secure fuel mixture control in instrument panel by tightening retaining nut against washer and instrument panel.

NOTE: To prevent damage to the instrument panel finish and markings, ensure the control housing does not rotate against the instrument panel during installation.

(4) In the engine compartment, place washer and retaining nut over fuel mixture control rod end and secure against firewall.
(5) Attach mixture control rod end to throttle body mixture arm with bolt, washers, nut and cotter pin.
(6) Secure fuel mixture control to mixture control bracket with clamp.
(7) Install Engine Cowling. Refer to Chapter 71, Cowling - Removal/Installation.

3. Fuel Mixture Control Adjustment/Test

A. Check Fuel Mixture Control.
(1) Push fuel mixture control full in and verify that mixture arm on throttle body is fully open (rich).
(2) Pull fuel mixture control full out and verify that mixture arm on throttle body is fully closed (lean).
(3) Do a check to make sure that the fuel mixture control has no less than 0.12-inch (3.18 mm) and no more than 0.25-inch (6.35 mm) cushion at each stop.
(4) Work fuel mixture control in and out several times to check for binding.

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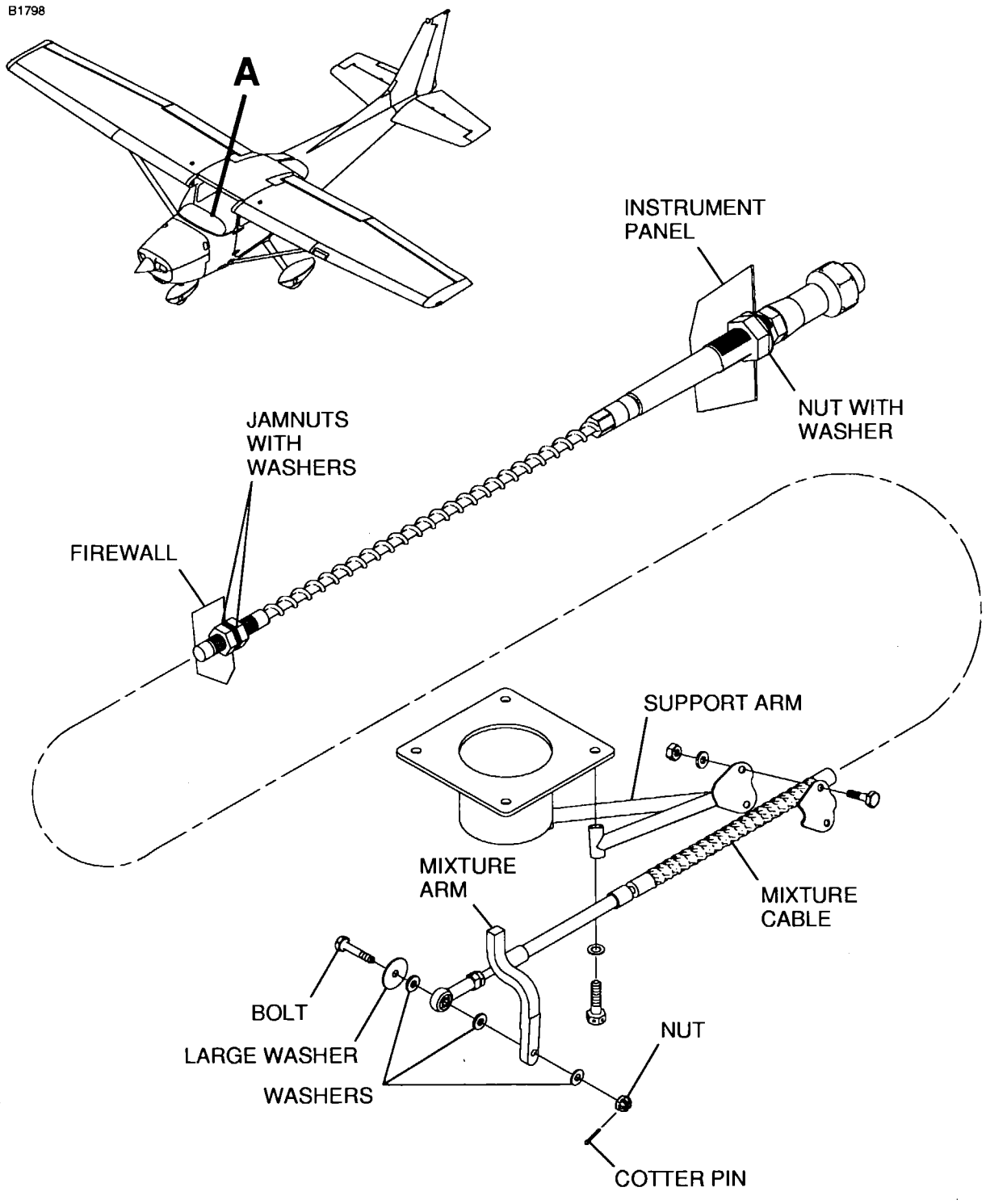

DETAIL A

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Fuel Mixture Control
Figure 201 (Sheet 1)

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B. Adjust Fuel Mixture Control.
   (1) Disconnect fuel mixture control rod end from throttle body.
   (2) Loosen jam nut and adjust rod end to obtain desired setting. The witness hole in the rod end must be covered with the mixture cable threads.
   (3) Tighten jam nut.
   (4) Connect rod end to throttle body. If necessary, you can reposition the mixture control housing in the mixture control bracket clamp.

4. Fuel Mixture Control Inspection/Check

A. Inspect Fuel Mixture Control.
   (1) The mixture control attachment to the throttle body should be inspected in accordance with time limits established in Chapter 5, Inspection Time Limits. Check bolt, castellated nut, cotter pin and rod end for security and condition. The witness hole in the rod end must be covered with the mixture cable threads. Check that fuel mixture control slides smoothly throughout its full range of travel, that it adjusts through its full vernier range and the mixture arm operates through its full arc of travel.

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CHAPTER

77

ENGINE INDICATING

LIST OF EFFECTIVE PAGES

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77-Title		
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77-10-00	Pages 201-203	Jan 1/2008
77-20-00	Page 1	Jan 3/2005
77-20-00	Pages 201-205	Jan 1/2008
77-40-00	Pages 201-202	Jul 3/2006

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RECORD OF TEMPORARY REVISIONS

Temporary Revision Number	Page Number	Issue Date	By	Date Removed	By

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ENGINE INDICATING - GENERAL

1. Scope

A. This chapter describes those components used to measure and indicate engine output.

2. Definition

A. This chapter is divided into sections to aid maintenance technicians in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief description of the sections follows:
   (1) The section on tachometer describes the instrument used to measure engine RPM.
   (2) The section on exhaust gas temperature describes the system used to monitor and measure engine temperature.

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TACHOMETER - MAINTENANCE PRACTICES

1. Description and Operation

A. On airplanes with standard avionics, the engine speed (RPM) is measured by an indicator in the cockpit. The tachometer maintenance practices give removal and installation procedures for the tachometer and drive cable.

B. On airplanes with Garmin G1000, the engine speed (RPM) is measured by the tachometer sending unit and changed to an electrical signal. The Garmin Control Display Units (CDU) display the engine speed. The tachometer maintenance practices give removal and installation procedures for the tachometer sending unit.

2. Tachometer and Drive Cable Removal/Installation

NOTE: Airplanes without Garmin G1000 have a tachometer and drive cable.

A. Remove the Tachometer and Drive Cable (Refer to Figure 201).
   (1) Disconnect the drive cable from the tachometer.
   (2) Disconnect the electrical connector (JI014) from the tachometer.
   (3) Remove the screws that attach the tachometer to the instrument panel and remove the tachometer.
   (4) Remove the upper engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.
   (5) Disconnect the drive cable at the rear of the accessory case.
   (6) Remove the two screws that attach the firewall shield to the firewall.
   (7) Remove the drive cable through the firewall.

B. Install the Tachometer and Drive Cable (Refer to Figure 201).
   (1) Install the drive cable through the firewall.
   (2) Connect the drive cable to the accessory case housing.
   (3) Install the firewall shield to the firewall with the screws.
   (4) Install the tachometer to the instrument panel with the screws.
   (5) Connect the electrical connector (JI014) to the tachometer.
   (6) Connect the drive cable to rear of the tachometer.
   (7) Install the upper engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

3. Tachometer Sending Unit Removal/Installation

NOTE: Airplanes with Garmin G1000 have a tachometer sending unit.

A. Remove the Tachometer Sending Unit (Refer to Figure 202).
   (1) Make sure the MASTER switch is in the off position.
   (2) Remove the side cowl. Refer to Chapter 71, Cowl - Maintenance Practices.
   (3) Disconnect the electrical connector.
   (4) Loosen the knurled nut.
   (5) Remove the tachometer sending unit from the airplane.

B. Install the Tachometer Sending Unit (Refer to Figure 202).
   (1) Put the tachometer sending unit in position on the airplane.
   (2) Tighten the knurled nut.
   (3) Connect the electrical connector.

      NOTE: If irregular tachometer indications have occurred, the use of Stabilant 22 contact enhancer on the electrical connector (PN025) can possibly decrease the occurrence of these indications.

   (4) Install the side cowl. Refer to Chapter 71, Cowl - Maintenance Practices.

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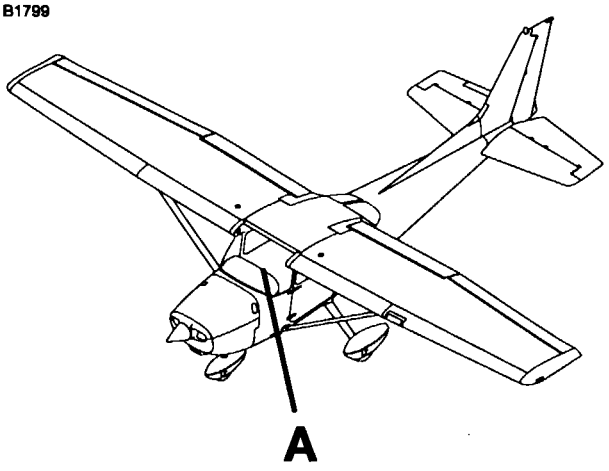

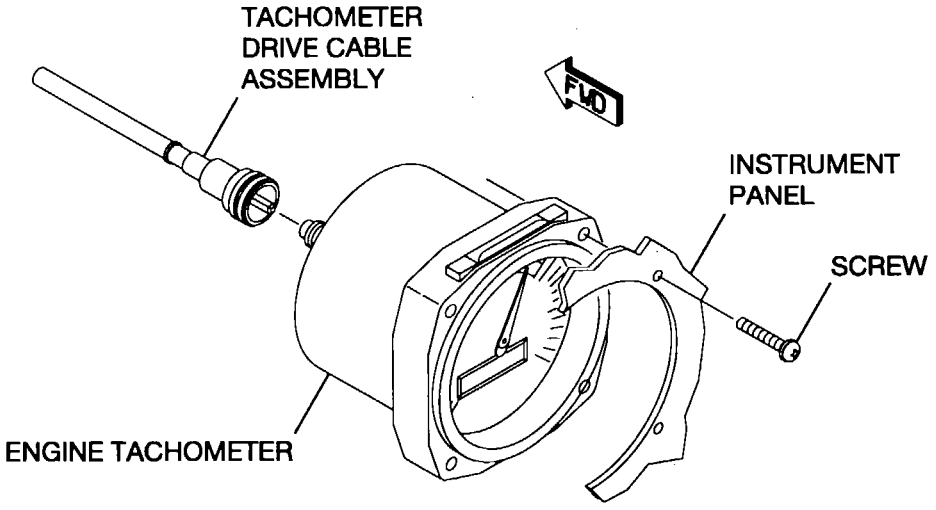

DETAIL A
(WITHOUT GARMIN G1000)

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Tachometer Installation
Figure 201 (Sheet 1)

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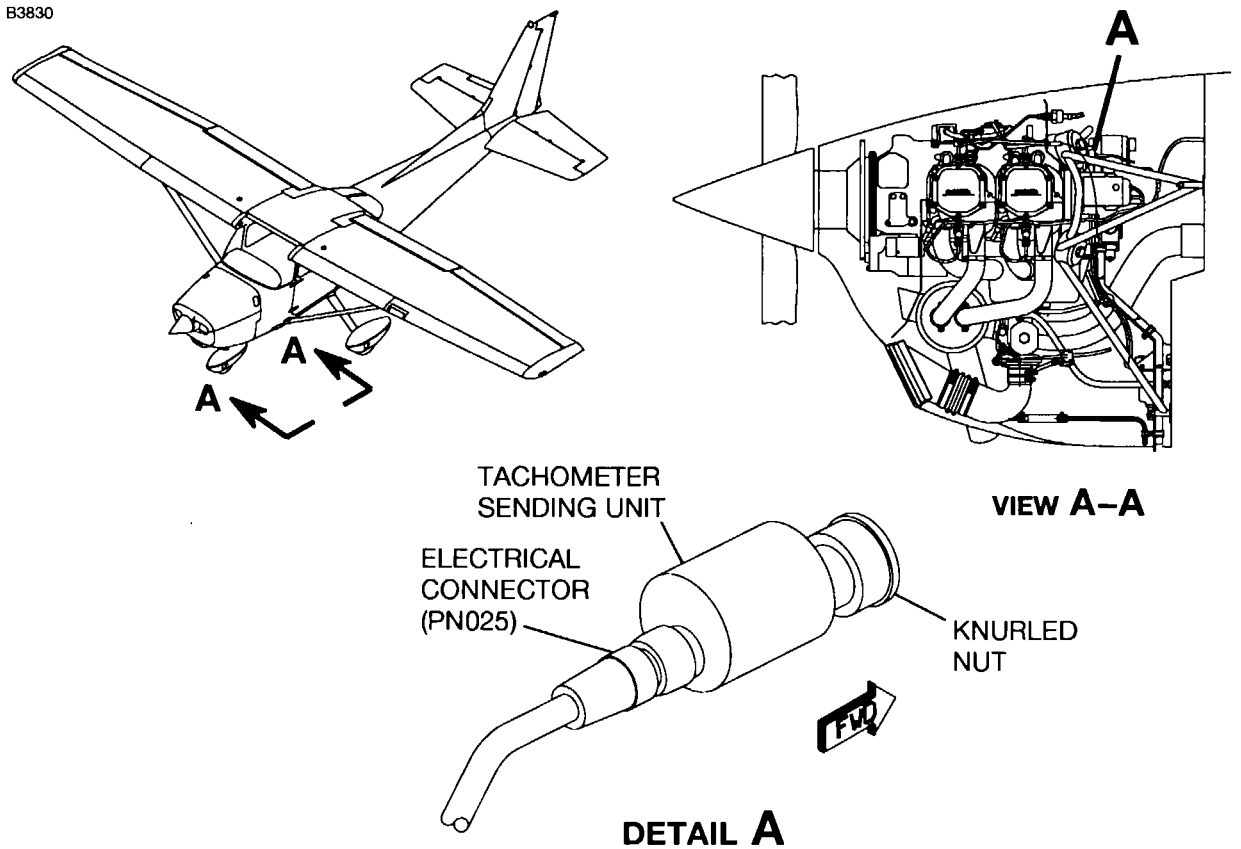
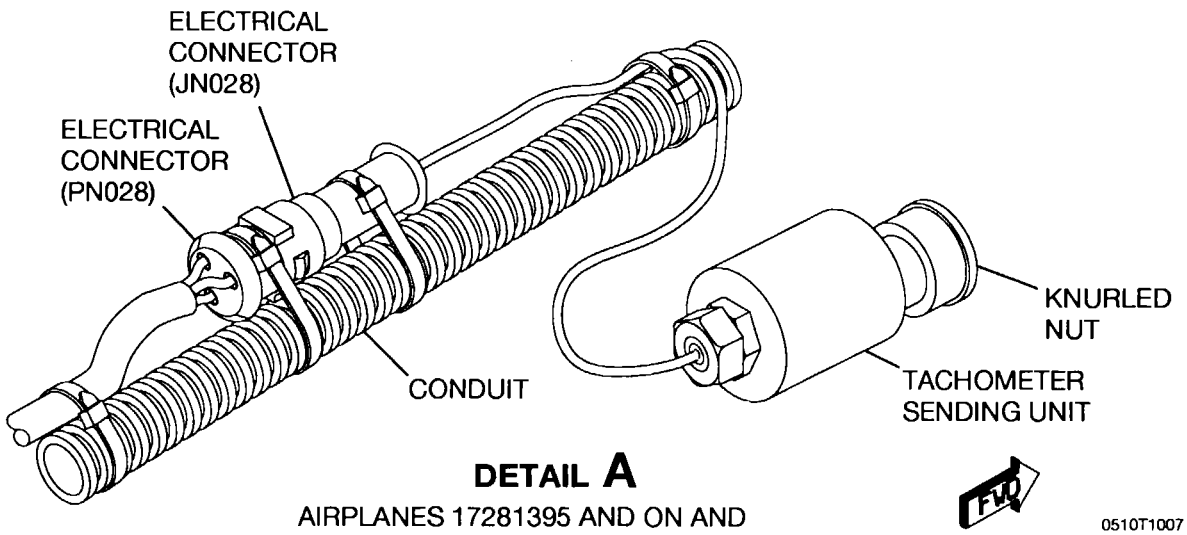


VIEW A–A

DETAIL A

AIRPLANES 17281241 THRU 17281394 AND
AIRPLANES 172S09810 THRU 172S10513



DETAIL A

AIRPLANES 17281395 AND ON AND
AIRPLANES 172S10514 AND ON AND
AIRPLANES INCORPORATING MK206-77-01

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Tachometer Sending Unit Installation
Figure 202 (Sheet 1)

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ENGINE TEMPERATURE - DESCRIPTION AND OPERATION

1. Description

A. The section that follows has removal and installation procedures for the system which will show different temperatures in the engine. The system that shows the temperature for the engine includes the indicators and probes for the Cylinder Head Temperature (CHT) and Exhaust Gas Temperature (EGT).

2. Operation

A. The EGT system is used to measure the temperature of the exhaust gas. The measurement gives an indication of the fuel/air mixture for the pilot. The system has one indicator installed in the instrument panel, which gives the two functions that show the EGT and CHT information. A probe installed in the exhaust and a probe installed in a cylinder, send the temperature information to the EGT/CHT indicator. On airplanes with Garmin G1000, each cylinder has EGT and CHT probes.

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ENGINE TEMPERATURE INDICATING SYSTEM - MAINTENANCE PRACTICES

1. Description and Operation

A. Maintenance of the engine temperature system includes the removal and installation of the different components.

2. EGT Indicator Removal/Installation

NOTE: The procedures that follow are for airplanes without Garmin G1000.

A. Remove the EGT Indicator (Refer to Figure 201).
   (1) Get access to the forward side of the indicator.
   (2) Disconnect the electrical connector from the indicator.
   (3) Remove the screws that attach the indicator to the instrument panel and remove the indicator from the airplane.

B. Install the EGT Indicator (Refer to Figure 201).
   (1) Put the indicator in the instrument panel and attach with the screws.
   (2) Connect the electrical connector to the indicator.

3. EGT Probe Removal/Installation

NOTE: The procedures that follow are for airplanes without Garmin G1000.

A. Remove the EGT Probe (Refer to Figure 201).
   (1) Remove the engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

CAUTION: Make sure that the exhaust system and engine are cool before you remove the probes.

   (2) Cut the tie strap that attaches the electrical connectors (JN006) and wire.
   (3) Disconnect the probe at the electrical connector.
   (4) Remove the probe from the muffler tailpipe.

B. Install the EGT Probe (Refer to Figure 201).
   (1) Install the probe to the muffler tailpipe.
   (2) Tighten the screw for the clamp.
   (3) Attach safety wire to the EGT probe clamp and screw. Refer to Chapter 20, Safetying - Maintenance Practices.
   (4) Connect the probe at the electrical connector (JN006).
   (5) Attach the electrical connector and wire with the tie straps.
   (6) Install the engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

4. EGT Probe Removal/Installation (Airplanes with Garmin G1000)

A. Remove the EGT Probe (Refer to Figure 202).

NOTE: The EGT probe is welded to the clamp.

NOTE: Airplanes with Garmin G1000 have an EGT probe at each cylinder. Removal and installation of the EGT probes are typical.

   (1) Remove the engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

CAUTION: Make sure the exhaust system and engine are cool before the probes are removed.

   (2) Disconnect the electrical connectors.
   (3) Cut and remove the safety wire from the EGT probe clamp and screw.

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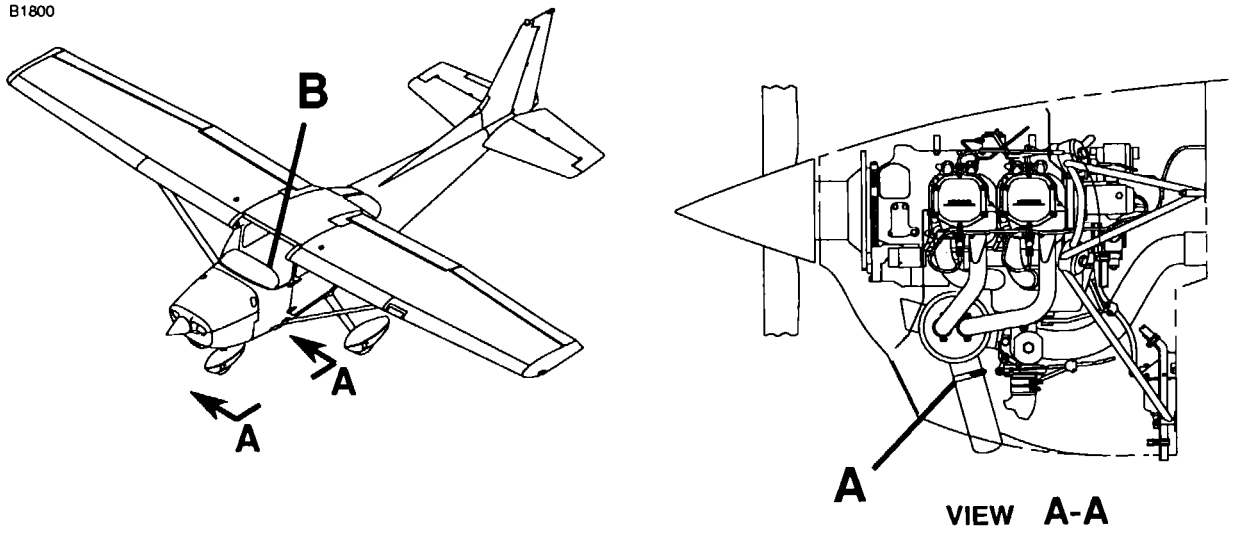
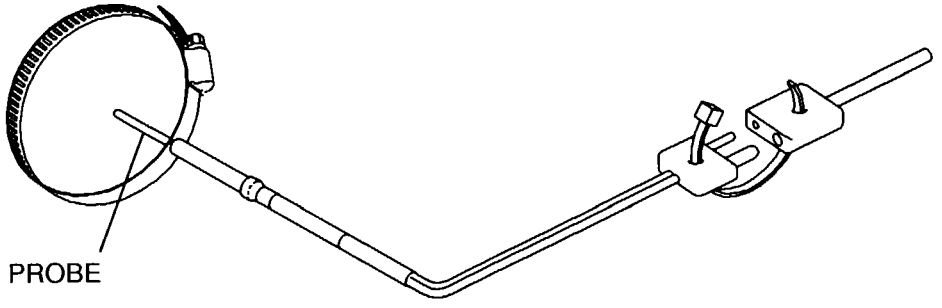
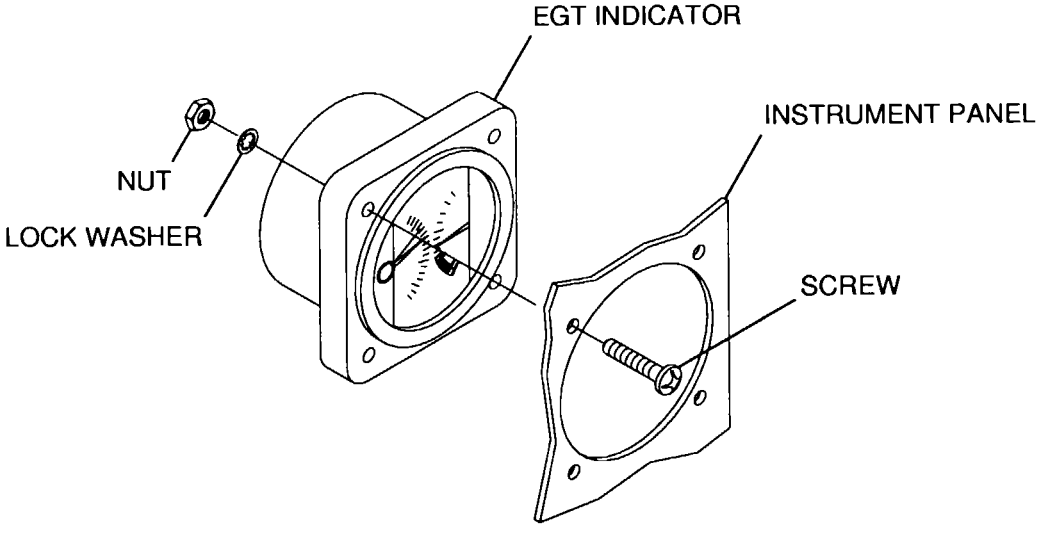




DETAIL A



DETAIL B

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EGT Installation
Figure 201 (Sheet 1)

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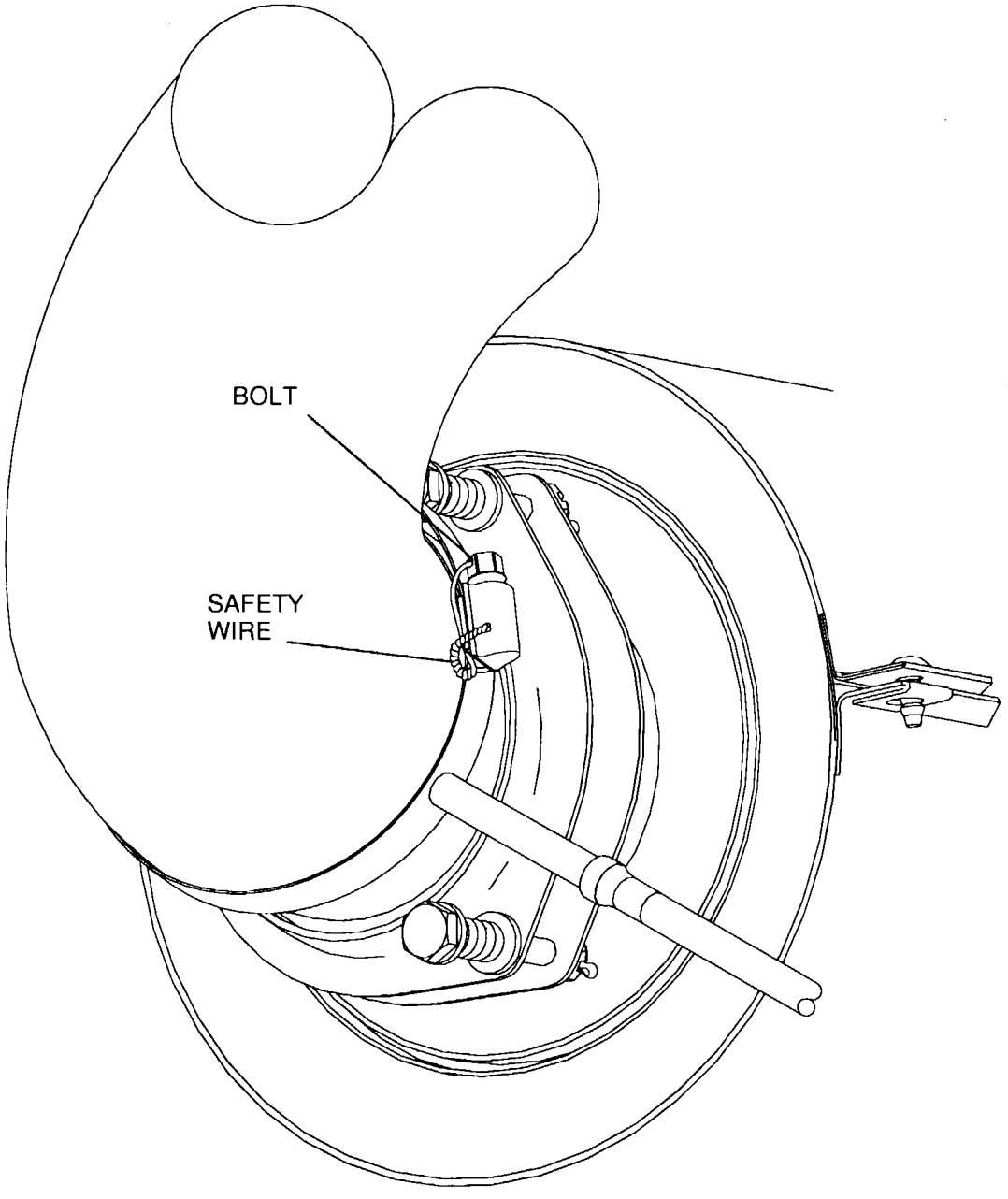

DETAIL C

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EGT Installation
Figure 201 (Sheet 2)

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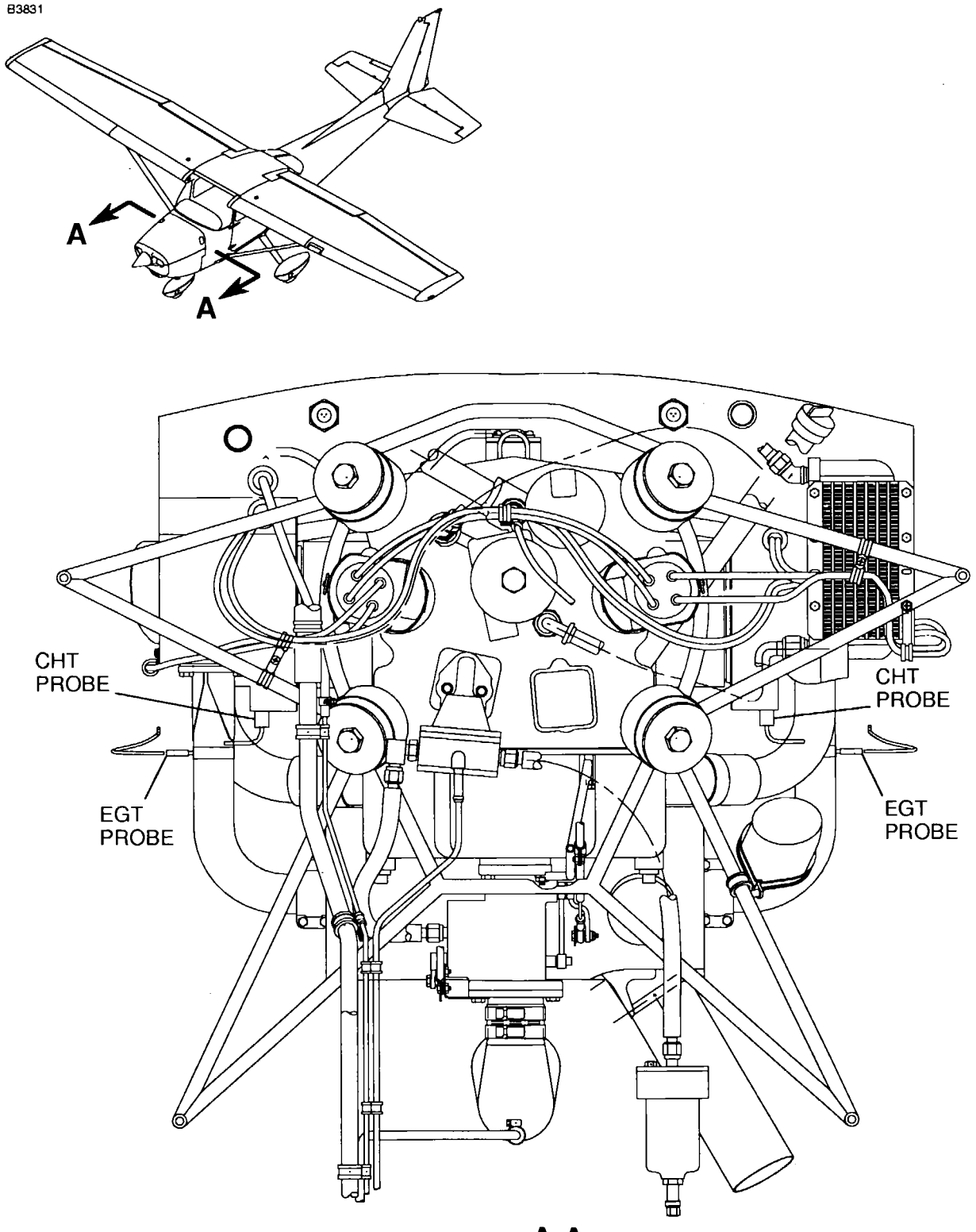

VIEW A-A
AIRPLANES WITH GARMIN G1000

0510T1007
A0555T1009

EGT/CHT Probe Location
Figure 202 (Sheet 1)

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(4) Loosen the clamp screw.
(5) Remove the clamp with the attached probe from the exhaust pipe.

B. Install the EGT Probe (Refer to Figure 202).
(1) Attach the clamp with the EGT probe to the exhaust pipe.
(2) Tighten the screw on the clamp
(3) Attach safety wire to the EGT probe clamp and screw.
(4) Connect the electrical connectors.
(5) Attach the connectors together with a tie strap.
(6) Install the engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.
(7) Make sure the EGT probe operates correctly. Refer to the Pilot's Operating Handbook.

5. EGT Probe Lead Wire Repair

A. EGT Probe Lead Wire Repair.
(1) Remove the screws to separate the EGT terminal connector housing.
(2) Cut the broken wire to a good termination.
(3) Make both wires the same length.
(4) Remove the insulation to get 1/4 inch of good wire strands.
(5) Replace the terminal connector housing if it is damaged.
(6) Wrap the wire around the terminal screws and tighten the screws.
(a) Make sure to keep the original polarity (red wire to the alumel (negative) terminal, yellow wire to the chromel (positive) terminal).
(7) Make sure the strain relief bracket is installed.

CAUTION: Damage to the lead wire can occur because of engine movement during startup and shutdown if there is not sufficient length in the lead wire.

(8) Make sure the lead wire has sufficient length.
(9) Do an operational check of the EGT indication on the ground.

6. CHT Probe Removal/Installation

A. Remove the CHT Probe (Refer to Figure 202).

NOTE: The CHT probes use a bayonet-style connector.

NOTE: Airplanes with Garmin G1000 have a CHT probe for each cylinder. Removal and installation of the CHT probes is typical.

(1) Remove the engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

CAUTION: Make sure the exhaust system and engine are cool before the probes are removed.

(2) Remove the terminal nut.
(3) Disconnect the terminal from the CHT probe.
(4) Turn the CHT probe to remove from the cylinder head.

B. Install the CHT Probe (Refer toFigure 202).
(1) Install the CHT probe into the cylinder head.
(2) Connect the terminal on the CHT probe.
(3) Install the terminal nut.
(4) Install the engine cowl. Refer to Chapter 71, Engine Cowling - Maintenance Practices.
(5) Make sure the CHT operates correctly. Refer to the Pilot's Operating Handbook.

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ENGINE/AIRFRAME UNIT - MAINTENANCE PRACTICES

1. General

A. On airplanes with Garmin G1000, the GEA 71 Engine/Airframe Unit is a microprocessor-based Line Replaceable Unit (LRU) that receives and processes signals from the engine and airframe sensors. The GEA 71 Engine/Airframe Unit speaks directly with the GIA 63 Integrate Avionics Units.

B. Maintenance practices give procedures for the removal and installation of the GEA 71 Engine/Airframe Unit. The unit is in the cockpit forward of the instrument panel.

2. Troubleshooting

A. For troubleshooting procedures, refer to the Garmin G1000 Line Maintenance Manual.

3. GEA 71 Engine/Airframe Unit Removal/Installation

A. Remove the Engine/Airframe Unit (Refer to Figure 201).
   (1) Put the MASTER switch in the off position.
   (2) Put the AVIONICS switch in the off position.
   (3) Remove the Multi-Function Display (MFD). Refer to Chapter 34, Control Display Unit - Maintenance Practices.
   (4) Release the engine/airframe unit handle.
      (a) For units with a Phillips screw, loosen the screw to unlock the unit handle.
      (b) For units with a D-Ring, push on the D-Ring and turn it 90 degrees counterclockwise to unlock the unit handle.
   (5) Move the lever up to disengage the locking stud with the dogleg slot in the mounting rack.
   (6) Remove the unit from the mounting rack.

B. Engine/Airframe Unit Installation (Refer to Figure 201).

NOTE: If a new unit is installed, it is necessary to load the software and configuration.

CAUTION: Make sure the unit goes into position without resistance. Damage to the connectors, unit, or mounting rack will occur if the unit is pushed into position with force.

NOTE: The unit must be in position in the mounting rack to let the locking stud engage the channel.

   (1) Make sure the electrical connector and connector pins have no damage.
      (a) Replace the electrical connector or connector pins if applicable. Refer to the Wiring Diagram Manual and the Garmin G1000 Line Maintenance Manual.
   (2) Carefully put the unit in position in the mounting rack.

CAUTION: Make sure the lever moves without resistance. Damage to the unit will occur if the lever is pushed into position with force.

   (3) Push the lever down toward the bottom of the unit to engage the locking stud with the dogleg slot in the mounting rack.
      (a) If the lever does not go down, adjust the backplate while the unit is engaged.
   (4) Lock the handle in position.
      (a) For units with a Phillips screw, tighten the screw to lock the unit handle.
      (b) For units with a D-Ring, push on the D-Ring and turn it 90 degrees clockwise to lock the unit handle.
   (5) Install the MFD. Refer to Chapter 34, Control Display Unit - Maintenance Practices.
   (6) If a new unit is installed, load the software and configuration. Refer to the Garmin G1000 Line Maintenance Manual.
   (7) Do a check to make sure that the engine/airframe unit operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

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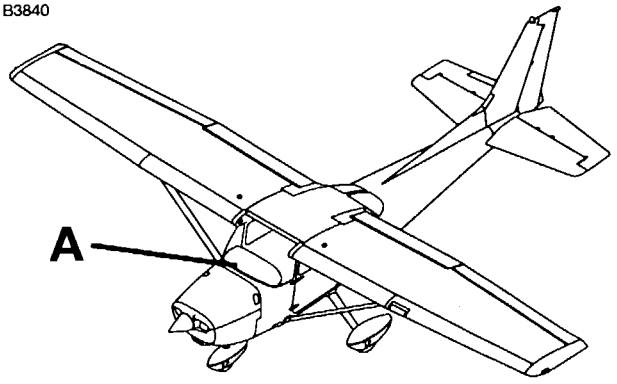
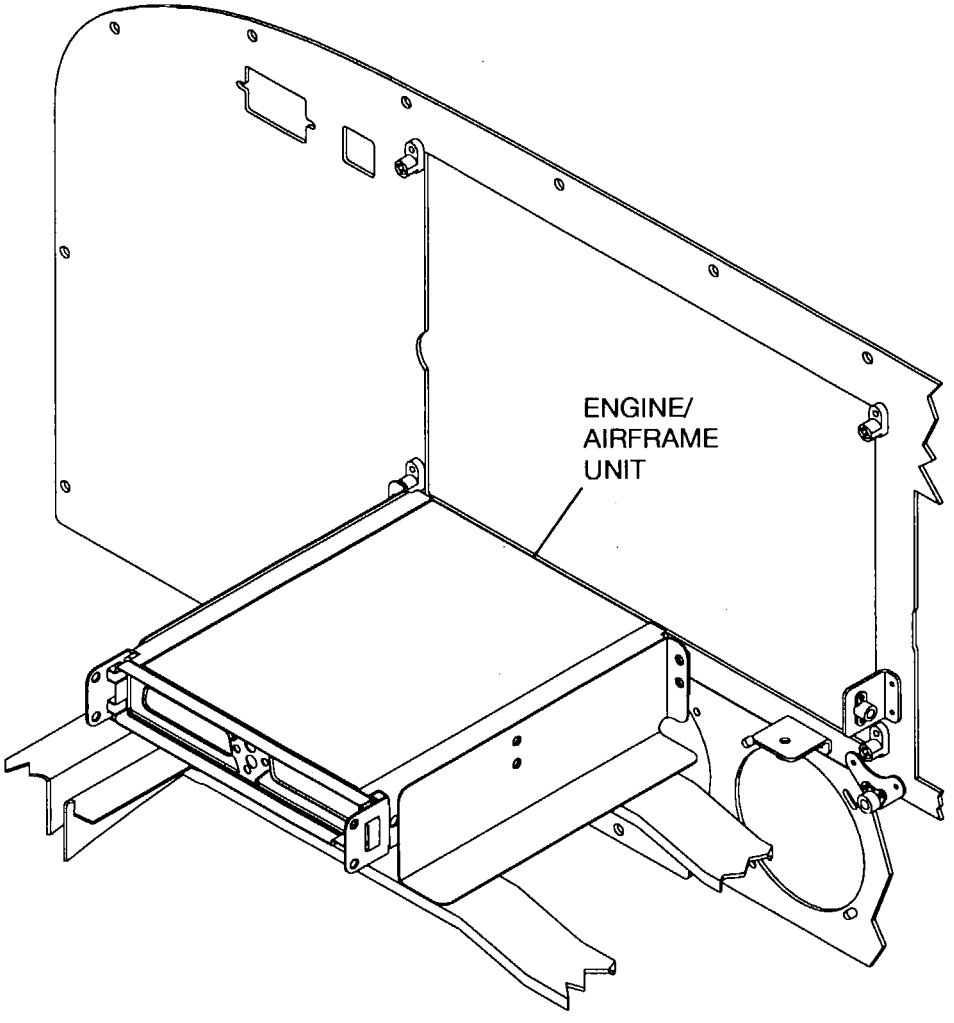


NOTE: MULTI-FUNCTION DISPLAY NOT SHOWN.



DETAIL A

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Engine/Airframe Unit Removal/Installation
Figure 201 (Sheet 1)

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(7) Do a check to make sure the engine interface unit operates correctly. Refer to the Garmin G1000 Line Maintenance Manual.

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CHAPTER 78

EXHAUST

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Exhaust System Removal/Installation ..... 78-10-00 Page 201
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EXHAUST - GENERAL

1. Scope and Definition

A. This chapter is comprised of a single section on the exhaust system. The section details removal, installation and testing procedures for the exhaust system.

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EXHAUST SYSTEM - MAINTENANCE PRACTICES

1. Description

A. The exhaust system consists of an exhaust pipe (riser) from each cylinder to the muffler with a single tailpipe which routes exhaust gases out through the lower cowling area. The muffler is located beneath the engine, and is enclosed by a shroud which captures radiated exhaust heat. This heated air is then ducted to the airplane cabin through flexible hoses.

B. Maintenance practices for the exhaust system consist of removal, installation and testing of the exhaust system for leaks.

2. Exhaust System Removal/Installation

A. Remove Exhaust System (Refer to Figure 201).
(1) Remove engine cowling. Refer to Chapter 71, Engine Cowling - Maintenance Practices.
(2) Loosen left front baffle to allow heat shroud inlet to clear baffle.
(3) Remove EGT probe.
(4) Disconnect flexible heat duct from heat shroud.
(5) Remove clamps securing risers to muffler.
(6) Remove nuts and washers securing risers to engine and remove risers/muffler as an assembly from engine.
(7) Remove screws securing heat shroud to itself, and unwrap heat shroud from around muffler.
(8) Inspect muffler for leaks. Refer to Muffler Inspection below.

B. Install Exhaust System (Refer to Figure 201).
(1) Wrap heat shroud around muffler and secure to itself using screws.
(2) Loosely install risers (4 total) to muffler using clamps.
(3) Install riser/muffler assembly to engine using new gaskets.
(4) Tighten risers 200-210 inch-pounds at engine, then tighten clamps connecting risers to muffler.
(5) Reconnect EGT probe.
(6) Reinstall engine cowling. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

3. Muffler Inspection

NOTE: The exhaust system must be thoroughly inspected at time intervals set forth in Chapter 5, Inspection Time Limits, or anytime exhaust fumes are detected in the cabin.

WARNING: FAILURE TO INSPECT MUFFLER FOR LEAKS COULD RESULT IN CARBON MONOXIDE ENTERING THE CABIN, LEADING TO SERIOUS INJURY OR DEATH.

A. Inspection Procedures.

NOTE: If muffler shows signs of leaks or damage as indicated in steps 3.A.(1) thru 3.A.(3), it must be replaced.

(1) Using a flashlight and mirror, examine the interior of the muffler, looking for cracks or general deterioration.
(2) Using visual inspection, examine the exterior of muffler, looking for holes, cracks and burned spots. Pay special attention to areas adjacent to welds and to exhaust gas deposits (which indicate an exhaust leak).
(3) After visual inspection an air leak check should be made on the system as follows:
(a) Attach the pressure side of an industrial vacuum cleaner to the tail pipe opening, using a rubber plug to effect a seal as required.

NOTE: The inside of vacuum cleaner hose should be free of any contamination that might be blown into the engine exhaust system.

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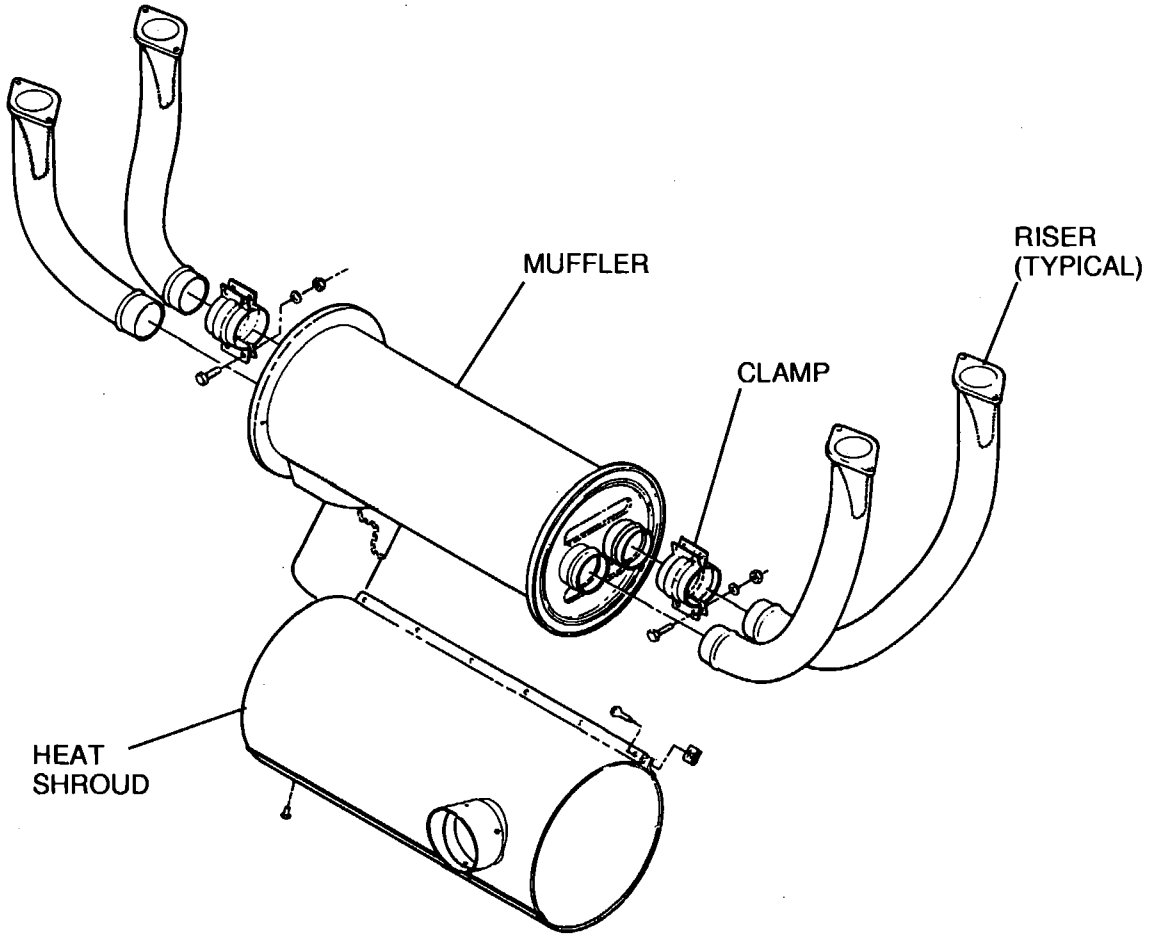

0555T2001

Exhaust System Installation
Figure 201 (Sheet 1)

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(b) With vacuum cleaner operating, all joints in the exhaust system may be checked by using a soap and water solution and watching for bubbles. Forming of bubbles is considered acceptable; if bubbles are blown away, system is not considered acceptable.

(4) Use a water test to determine muffler integrity:

(a) Seal openings in muffler using rubber expansion plugs.

NOTE: One expansion plug should be adapted to allow for introduction of low-pressure air into muffler.

(b) Using a pressure gauge or manometer, apply approximately 3.0 PSI, +0.5 or -0.5 PSI (6 inches mercury), to interior of muffler and submerge muffler into water. Any leaks will appear as bubbles and can be readily detected.

(c) If any leaks are detected, the muffler must be removed from service and repaired or replaced.

(d) If no defects are found, remove muffler from water, remove plugs and dry muffler with compressed air.

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CHAPTER 79

OIL

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Oil Temperature/Oil Pressure Indicator Removal/Installation ..... 79-31-00 Page 201

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OIL - GENERAL

1. Scope

A. This chapter provides maintenance instructions for those components which distribute oil and which indicate oil condition. For information beyond the scope of this material, refer to appropriate Textron Lycoming Operator's and Overhaul Manuals, and to Chapter 71, IO-360-L2A - Troubleshooting.

2. Definition

A. This chapter is divided into sections to assist maintenance personnel in locating specific information. The following is a brief description of each section. For locating information within the chapter, refer to the Table of Contents at the beginning of the chapter.

(1) The section on distribution provides information on removal and installation of the external oil cooler.

(2) The section on indicating provides information on gauges, transducers and switches used to indicate oil temperature and pressure.

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OIL COOLER - MAINTENANCE PRACTICES

1. General

A. This section provides maintenance instructions for removal and installation of the externally mounted oil cooler.

2. Oil Cooler Removal/Installation

A. Remove Oil Cooler (Refer to Figure 201).
   (1) Remove upper cowling. Refer to Chapter 71, Cowling - Maintenance Practices.
   (2) Label and disconnect inlet and outlet hoses leading into oil cooler.
   (3) Remove bolts, washers and spacers securing oil cooler to back of engine baffles.

B. Install Oil Cooler (Refer to Figure 201).
   (1) Secure oil cooler to rear of engine baffles using bolts, spacers and washers.
   (2) Attach inlet and outlet hoses to oil cooler.
   (3) Run engine and check oil cooler for leaks.
   (4) Install upper cowling. Refer to Chapter 71, Cowling - Maintenance Practices.

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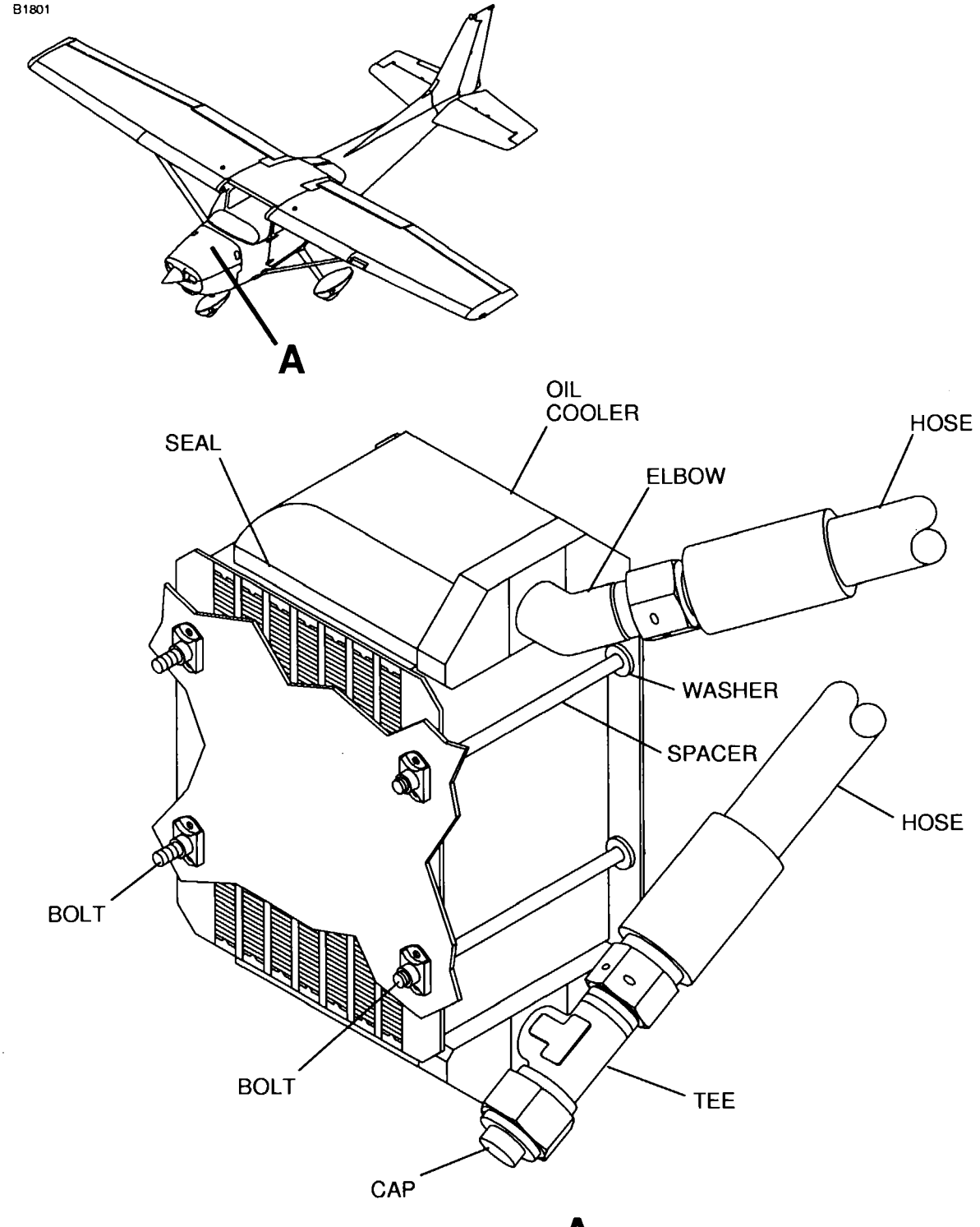

DETAIL A

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A0550T1004

Oil Cooler Installation
Figure 201 (Sheet 1)

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OIL PRESSURE INDICATOR - TROUBLESHOOTING

1. General

A. On airplanes with Garmin G1000, the oil pressure is shown on the Multi-Function Display (MFD). Refer to the Garmin G1000 Line Maintenance Manual for GDU 1040 troubleshooting.

B. This section gives a troubleshooting chart and table to help find the problem that will not let the oil pressure indicator system function correctly. To help with troubleshooting the oil pressure indicator, refer to the Model 172 1996 and On Wiring Diagram Manual.
(1) The table that follows is to be used with the troubleshooting chart (refer to Figure 101).

CAUTION: Do not apply voltages that are more than the voltages shown in Table 101. Too much voltage can cause damage to the indicator.

CAUTION: Do not calibrate the oil pressure indicator without a calibrated pressure source.

NOTE: A test of the calibration for the oil pressure transducer (JN004) can be completed at a facility that has a calibrated pressure source. Table 101 can be used to do a check of the correct output of the transducer.

Table 101. Oil Pressure Values

Volts Output at 77°F (25°C)	Oil Pressure
1.03 volts +0.080 or -0.080 volts	20 psi
2.63 volts +0.080 or -0.080 volts	80 psi
3.57 volts +0.080 or -0.080 volts	115 psi

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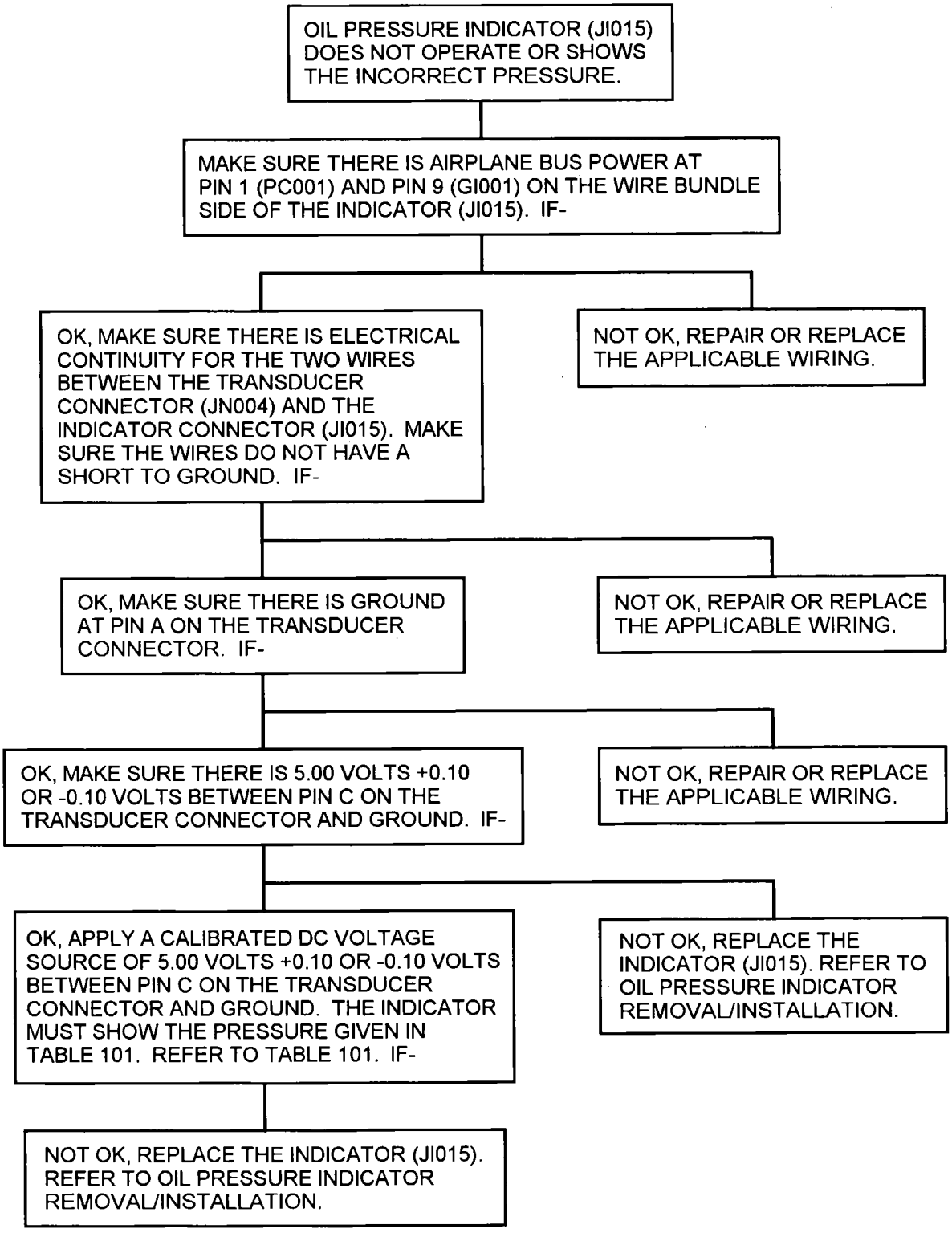

Oil Pressure Indicator
Figure 101 (Sheet 1)

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OIL PRESSURE INDICATOR - MAINTENANCE PRACTICES

1. Description and Operation

A. Oil pressure is measured at two points on the engine and gives both indicator readings and low oil pressure annunciation.
   (1) On airplanes with Garmin G1000, the oil pressure is shown on the Multi-Function Display (MFD). The oil pressure transducer is the same for all avionics packages.
   (2) The oil pressure indicator system has an oil pressure line, a transducer and a pressure/temperature indicator in the cockpit. Oil for the system is tapped at the upper right side of the case. This oil goes through a rigid line to a transducer on the rear baffle area. This transducer gives an electrical signal which goes to the oil pressure/oil temperature indicator in the cockpit.
   (3) The low oil pressure annunciation system has a pressure switch and related wiring. The switch is on the upper right rear of the engine case. It is configured so that when oil pressure is below 20 PSI, a ground is supplied to the annunciator in the instrument panel. This causes the OIL PRESS light on the annunciator to come on. When oil pressure is greater than 20 PSI, the ground switches to the Hobbs meter and extinguishes the OIL PRESS light.

2. Oil Pressure Indicator and Transducer Removal/Installation

NOTE: On airplanes with Garmin G1000, the oil pressure is shown on the Multi-Function Display (MFD). Refer to Control Display Unit - Maintenance Practices for removal and installation procedures of the MFD.

NOTE: Oil pressure transducer removal and installation is typical for all avionics packages.

A. Remove the Oil Pressure Indicator (Refer to Figure 201).
   (1) Make sure the electrical power to airplane is off.
   (2) Remove screws that attach the indicator to instrument panel.
   (3) Disconnect the electrical connector from forward side of the indicator.
   (4) Carefully remove the indicator from the instrument panel.

B. Install the Oil Pressure Indicator (Refer to Figure 201).
   (1) Connect the electrical connector to the indicator.
   (2) Put the indicator in position in the instrument panel.
   (3) Attach the indicator with the screws.
   (4) Operate the engine to make sure the indicator operates correctly.

C. Remove the Transducer (Refer to Figure 201).
   (1) Remove the upper cowl. Refer to Chapter 71, Cowling - Maintenance Practices.
   (2) Disconnect the oil pressure line at the transducer.
   (3) Disconnect the electrical connector from the transducer.
   (4) Remove the nut that attaches the transducer to the rear of the baffle and remove the transducer.
   (5) Remove the O-ring and fitting, if applicable.

D. Install the Transducer (Refer to Figure 201).
   (1) Install the O-ring and fitting to the transducer.
   (2) Install the transducer to the rear baffle and attach with the nut.
   (3) Connect the electrical connector to the transducer.
   (4) Connect the oil line at the transducer.
   (5) Install the upper cowl. Refer to Chapter 71, Cowling - Maintenance Practices.
   (6) Operate the engine to make sure the transducer operates correctly and does not have leaks.

3. Low Oil Pressure Switch Removal/Installation

A. Remove the Low Oil Pressure Switch (Refer to Figure 201).
   (1) Make sure the electrical power to the airplane is off.
   (2) Remove the upper cowl. Refer to Chapter 71, Cowling - Maintenance Practices.
   (3) Disconnect the electrical connector from the switch.
   (4) Remove the switch from the engine case.

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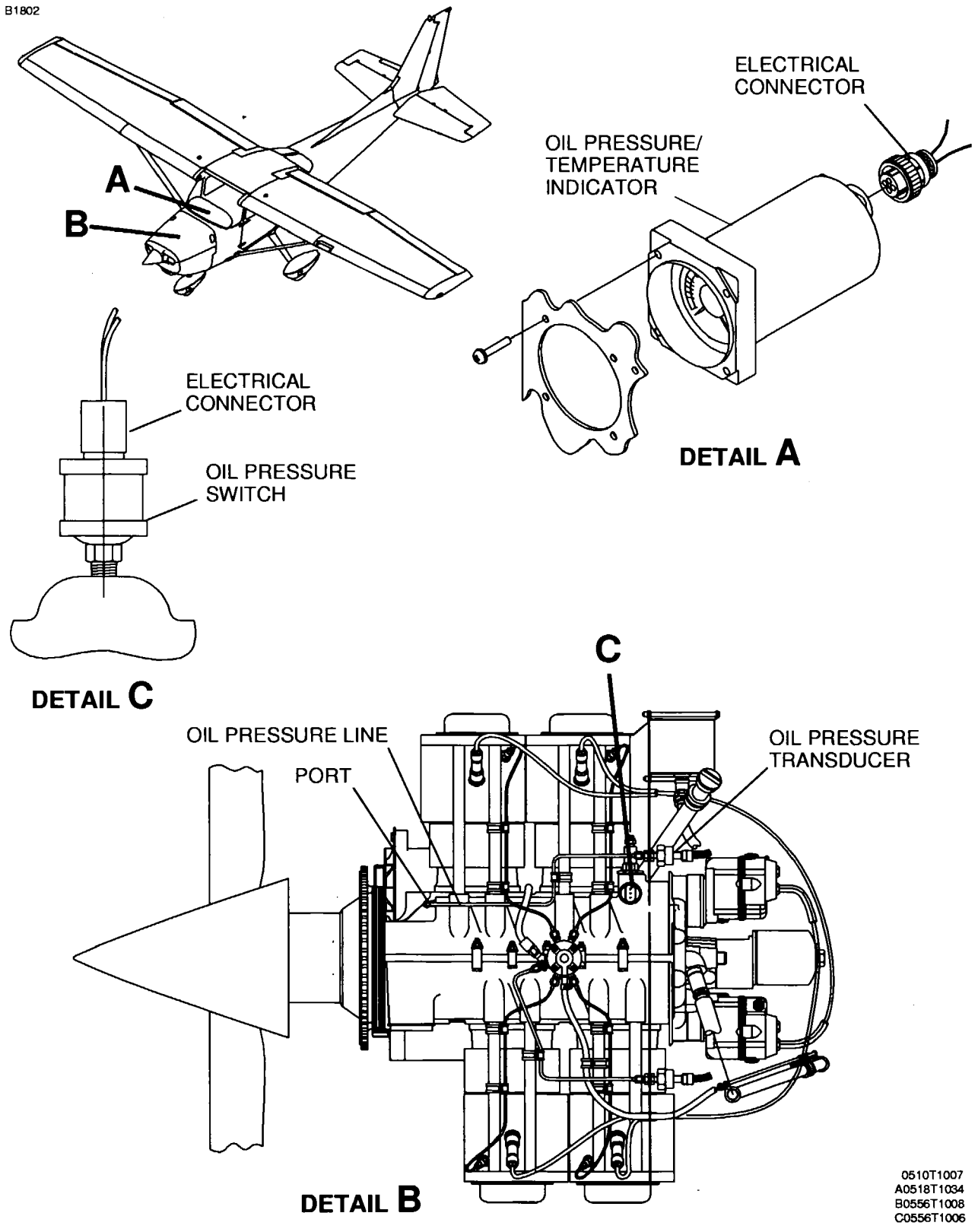

Oil Pressure Indication Installation
Figure 201 (Sheet 1)

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B. Install the Low Oil Pressure Switch (Refer to Figure 201).

CAUTION: Do not use teflon tape.

CAUTION: Clean any sealer or other foreign object debris from the switch fitting before installation. Make sure foreign object debris is removed and clear of the pressure hole in the end of the switch fitting.

(1) Put U544006 sealant (or equivalent) on threads.

CAUTION: Do not use too much torque on the plastic switch connection housing when the switch is tightened by hand.

(2) Install switch and tighten by hand.

CAUTION: Use only the hex fitting to final tighten. Too much torque will damage the switch. Do not damage the corners of the hex fitting.

(3) Use a 7/16 inch wrench to tighten switch approximately 1 to 1 1/2 turns beyond hand tight. Do not tighten the switch to more than 60 in-lbs (6.8 N-m).
(4) Connect the electrical connector to the switch.
(5) Install the upper cowl. Refer to Chapter 71, Cowling - Maintenance Practices.

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OIL TEMPERATURE INDICATOR - TROUBLESHOOTING

1. General

A. On airplanes with Garmin G1000 the oil temperature is shown on the Multi-Function Display (MFD). Refer to the Garmin G1000 Line Maintenance Manual for GDU 1040 troubleshooting.

B. This section gives a troubleshooting chart and table to help find the problem that will not let the oil temperature indicator system function correctly. To help with troubleshooting the oil temperature indicator, refer to the Model 172 1996 and On Wiring Diagram Manual.
(1) The table that follows is to be used with the troubleshooting chart (refer to Figure 101).

Table 101. Oil Temperature Values

OHMS	Temperature
497 +65 or -65	100°F (38°C)
36 +2 or -2	245°F (118°C)

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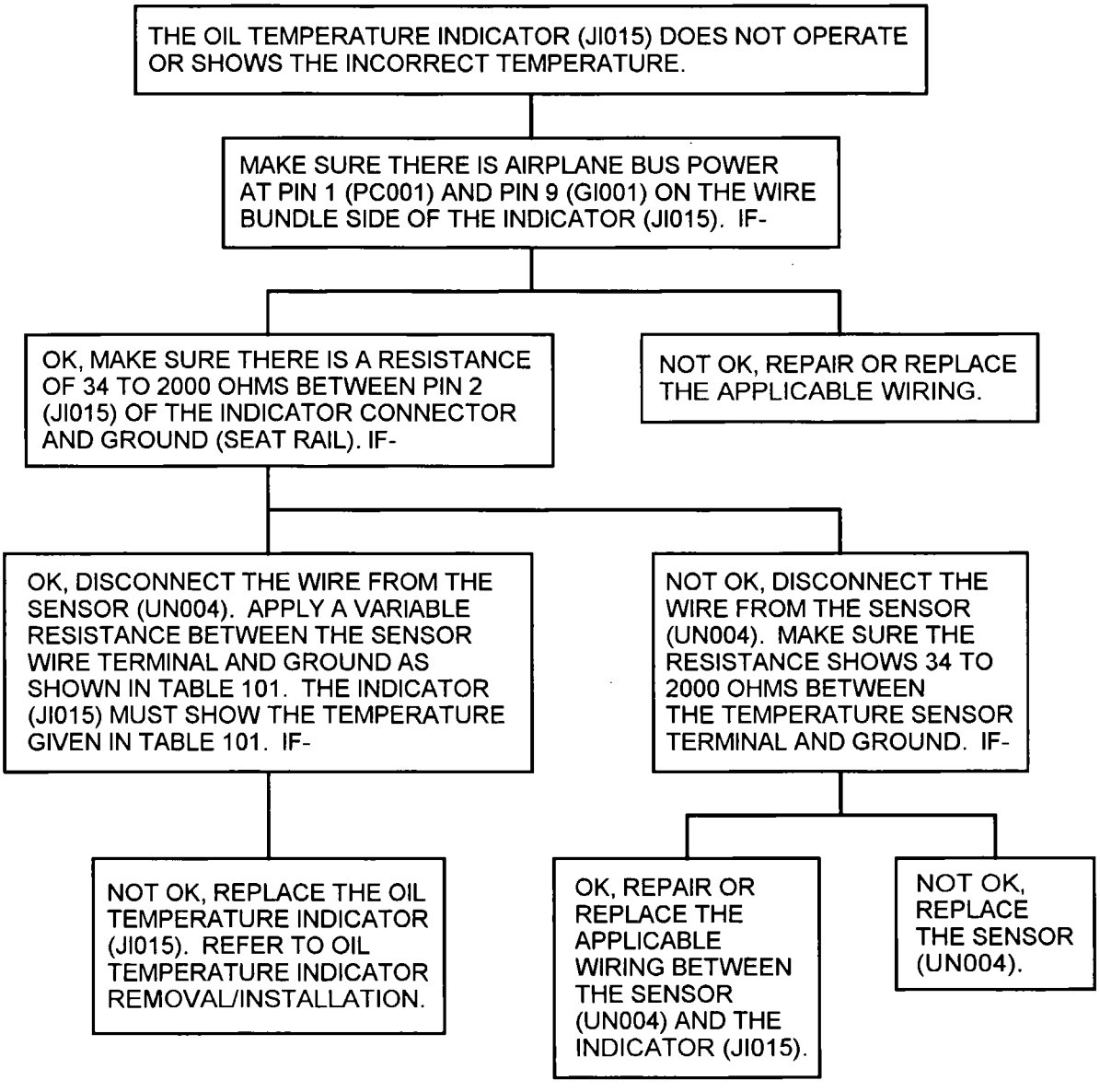

Oil Temperature Indicator
Figure 101 (Sheet 1)

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OIL TEMPERATURE INDICATOR - MAINTENANCE PRACTICES

1. Description and Operation

A. On airplanes with Garmin G1000, the oil temperature is shown on the Multi-Function Display (MFD). The oil temperature sending unit is the same for all avionics packages.

B. The oil temperature system has a sending unit, an oil temperature/oil pressure indicator and wire between the two components. Oil temperature is measured in the accessory case area and gives cockpit readings in °F.

2. Oil Temperature Sending Unit Removal/Installation

NOTE: Oil temperature sending unit removal and installation is typical for all avionics packages.

A. Remove the Oil Temperature Sending Unit (Refer to Figure 201).
   (1) Remove the upper engine cowl. Refer to Chapter 71, Cowling - Maintenance Practices.
   (2) Disconnect the ring terminal wiring at the sending unit.
   (3) Loosen and remove the sending unit from the accessory case.

B. Install the Oil Temperature Sending Unit (Refer to Figure 201).
   (1) Install the sending unit to the accessory case.
   (2) Attach the ring terminal wire to the sending unit.
   (3) Torque the jamnut to a maximum of 20 in-lbs (2.3 N-m).
   (4) Operate the engine to make sure the indicator operates correctly and there are no leaks.
   (5) Install the upper engine cowl. Refer to Chapter 71, Cowling - Maintenance Practices.

3. Oil Temperature/Oil Pressure Indicator Removal/Installation

A. On airplanes with Garmin G1000, the oil temperature is shown on the Mult-Function Display (MFD). Refer to Control Display Unit - Maintenance Practices for removal and installation procedures of the MFD.

B. For removal and installation of the Oil Temperature/Oil Pressure Indicator, refer to Oil Pressure Indicators - Maintenance Practices.

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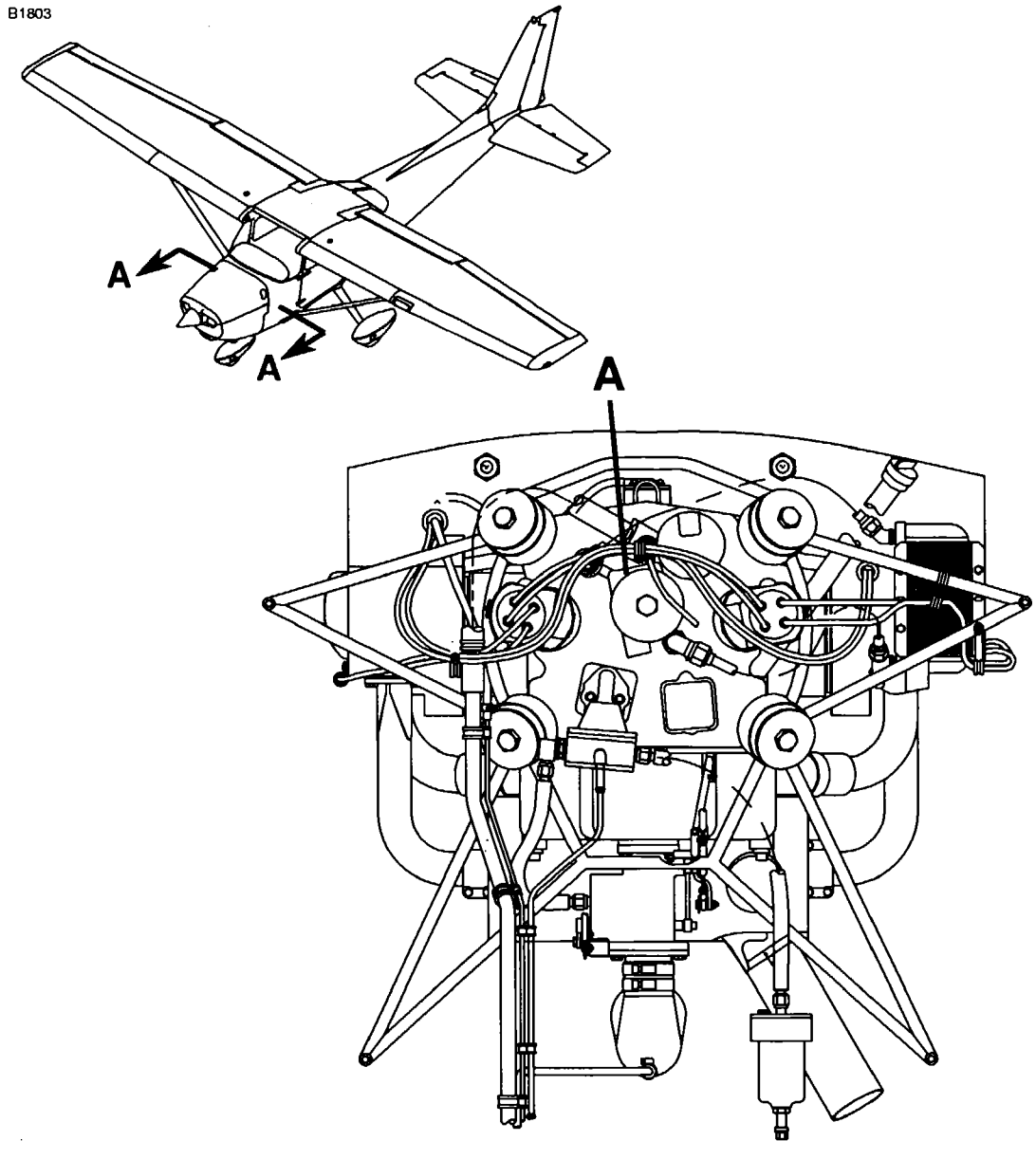
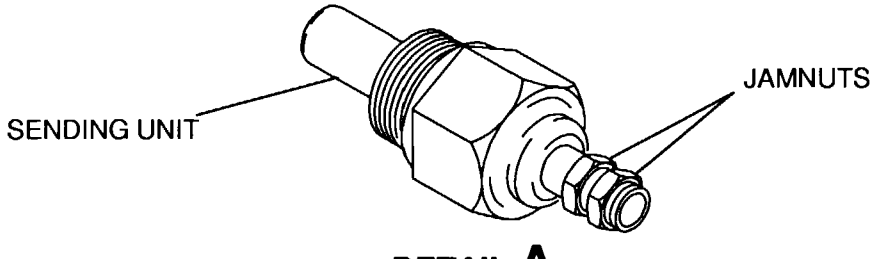


VIEW **A-A**



DETAIL A

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AS2335C

Oil Temperature Installation
Figure 201 (Sheet 1)

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CHAPTER 80

STARTING

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STARTING - GENERAL

1. Scope and Definition

A. This chapter is comprised of a single section on the starting system. The section details removal and installation instructions for the engine starter.

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STARTER - MAINTENANCE PRACTICES

1. Description and Operation

A. The airplane is equipped with a direct drive 24 VDC starter mounted at the front (propeller end) lower left side of the engine. The ignition key in the instrument panel operates the starter solenoid. When the solenoid is operated, its contacts close and a electrical current energizes the starter. A pinion gear in the starter engages the crankshaft ring gear. When the engine reaches a given speed, centrifugal action decouples the starter pinion from the crankshaft ring gear.

2. Starter Removal/Installation

A. Remove the Starter (Refer to Figure 201).
   (1) Remove the upper and lower engine cowling. Refer to Chapter 71, Engine Cowling - Maintenance Practices.
   (2) Disconnect the negative terminal from the battery.
   (3) Remove the screws securing the left front baffle to the engine assembly.
   (4) Remove the baffle from the engine.
   (5) Disconnect the large electrical wire which is the positive lead, at the starter.
   (6) Cut and discard the safety wire to the bolt securing the alternator attach bracket to the starter.
   (7) Remove the bolt that attaches the alternator attach bracket to the starter. If necessary, loosen the alternator belt.
   (8) Remove the one bolt and three nuts that attach the starter to the crankcase and remove the starter from the engine.

B. Install the Starter (Refer to Figure 201).
   (1) With the one bolt and three nuts, attach the starter to the engine crankcase. Step torque the fasteners diagonally.
      (a) On Sky-Tec starters, torque the bolt and nuts to 204 inch-pounds.
   (2) Attach the alternator attach bracket to the starter with the bolt and torque.
      (a) On Sky-Tec starters, torque the bolt to 204 inch-pounds.
   (3) If necessary, reset the alternator belt tension.
   (4) Safety wire the bolt to the attach bracket. Refer to Chapter 20, Safetying - Maintenance Practices.
   (5) Connect the positive lead to the starter. Make sure the protective boot fully covers the power terminal stud on the starter.
      (a) On Sky-Tec starters, torque the nut on the power terminal stud to 50 inch-pounds, +5 or -5 inch-pounds.

      NOTE: Sky-Tec starters have a metric nut on the power terminal stud.

   (6) On Sky-Tec starters, use high-temperature tie straps and connector to attach the positive lead to the starter. Refer to Figure 202.
   (7) Attach the left front baffle to the engine assembly.
   (8) Attach the negative terminal to the battery.
   (9) Install the upper and lower engine cowling. Refer to Chapter 71, Engine Cowling - Maintenance Practices.

3. Bendix Drive Starter Assembly Cleaning And Lubrication

A. Clean the Bendix starter drive assembly (Refer to Figure 201).

CAUTION: Use only a clean petroleum spirit. Do not use any other type of solvent.

   (1) Clean the starter drive with a clean petroleum spirit.

B. Lubricate the starter drive assembly (Refer to Figure 201).

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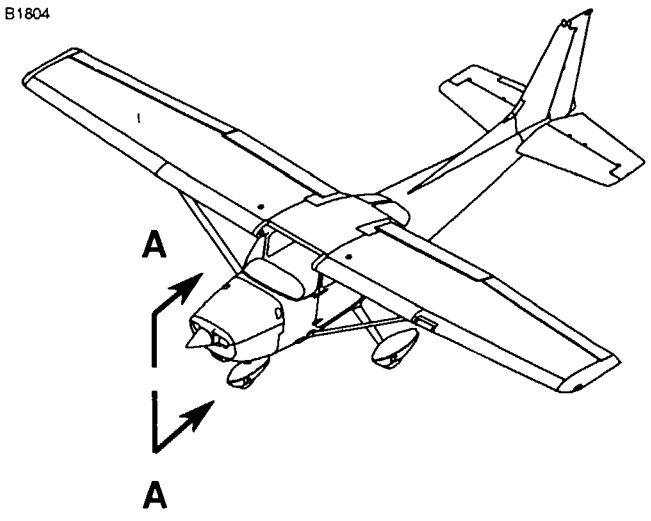

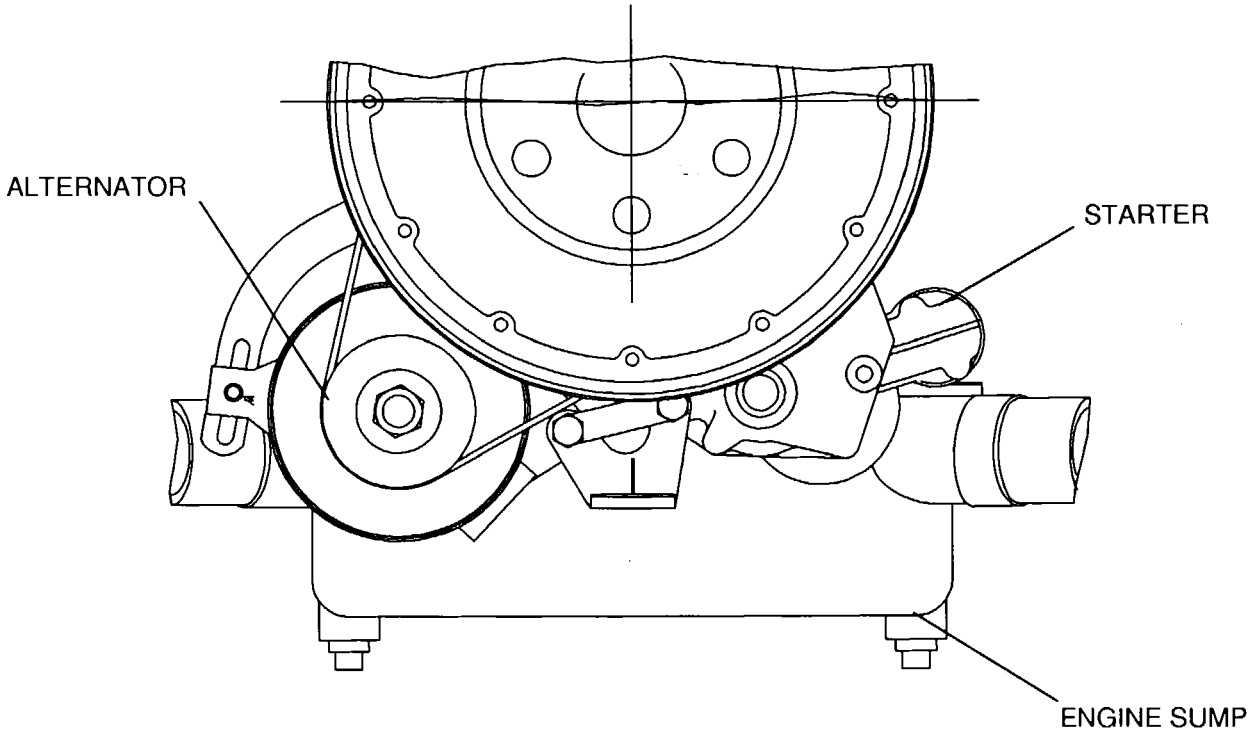

VIEW A-A

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Starter Installation
Figure 201 (Sheet 1)

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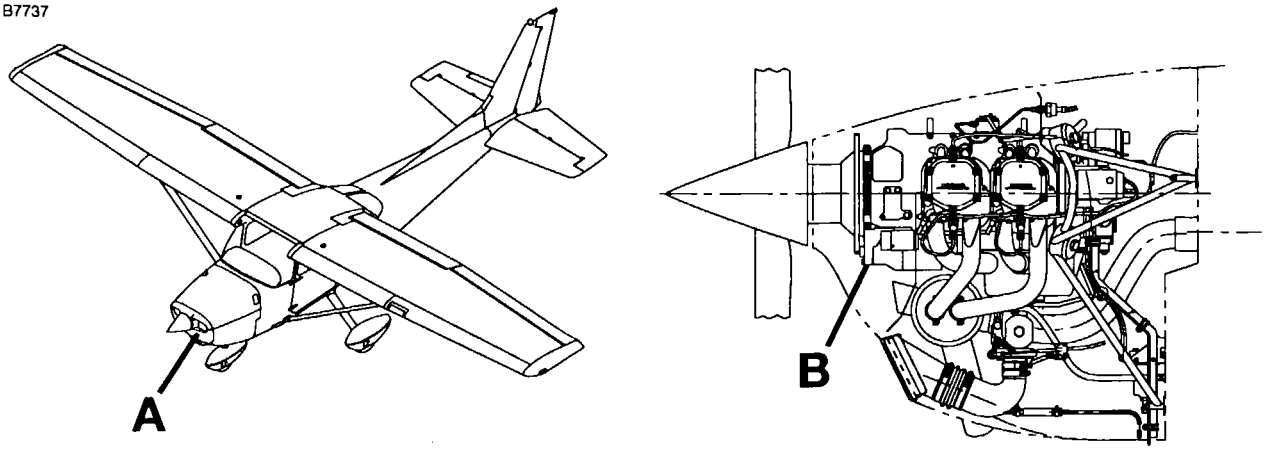
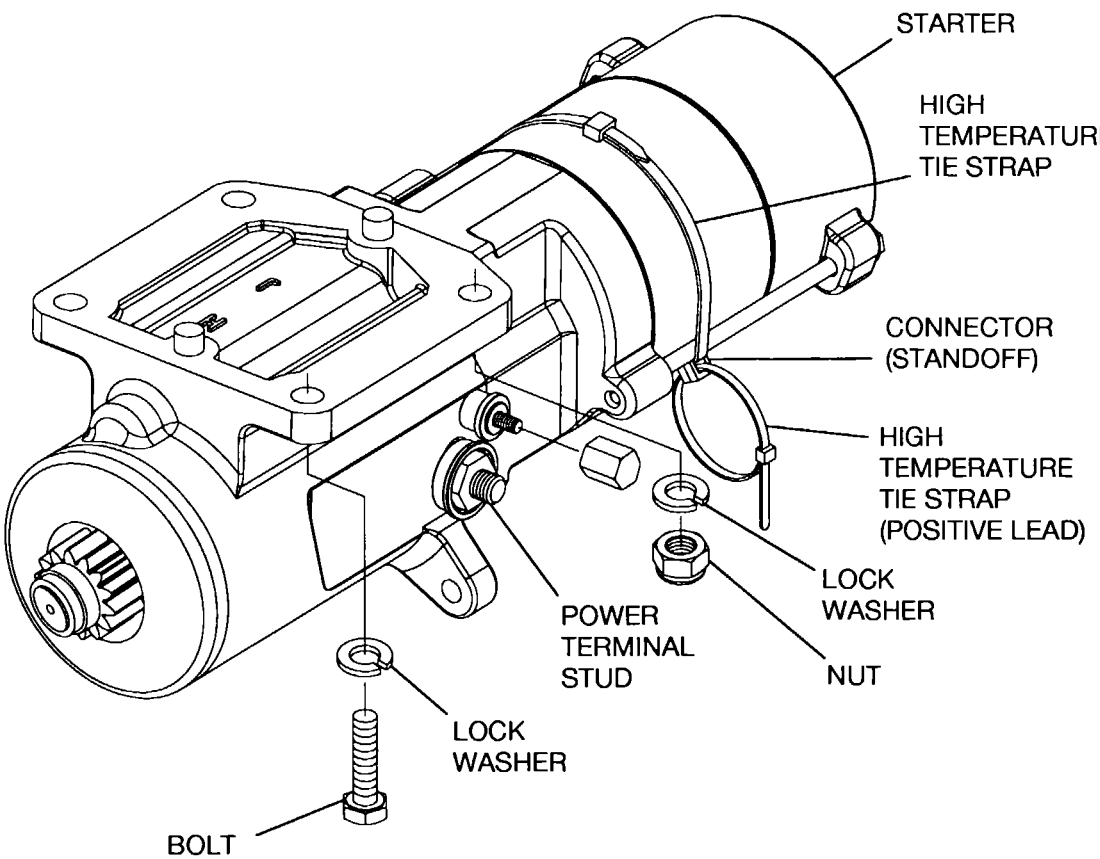


DETAIL A



DETAIL B

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B0550T1010
C0550T1010

Sky-Tec Starter Installation
Figure 202 (Sheet 1)

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CAUTION: Do not use grease, oil or graphite lubricants. Use only silicone spray lubricants which are recommended for correct operation.

(1) Lubricate the Bendix starter drive assembly with a silicone spray such as Crown Industrial Products silicone spray 8034.

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