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## SERVICE MANUAL

1978  
thru  
1985

# MODEL 152 SERIES



FAA APPROVAL HAS BEEN OBTAINED ON TECHNICAL DATA  
IN THIS PUBLICATION THAT AFFECTS AIRPLANE DESIGN.

REVISION 1 INCORPORATES TEMPORARY REVISION 1, DATED 3 OCTOBER 1994.

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WICHITA, KANSAS, USA

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REVISION 1

7 FEBRUARY 1985

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## TEMPORARY REVISION NUMBER 3

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This Temporary Revision consists of the following pages, which affect and replace existing pages in the paper copy manual and supersede aerofiche information.

SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
12	12-7	2/A08			

### REASON FOR TEMPORARY REVISION

1. To add a note to Figure 12-3, Detail A that provides a description of the vent valve tube position in the fuel tank.

### FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

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# TEMPORARY REVISION NUMBER 2

DATED 7 January 2000

MANUAL TITLE MODEL 152 SERIES 1978 THRU 1985 SERVICE MANUAL

MANUAL NUMBER - PAPER COPY D2064-1-13 AEROFICHE D2064-1-13AF

TEMPORARY REVISION NUMBER PAPER COPY D2064-1TR2 AEROFICHE N/A

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SECTION	PAGE	AEROFICHE FICHE/FRAME	SECTION	PAGE	AEROFICHE FICHE/FRAME
2	38A	Added			
2	42A	Added			
17	4A	Added			
17	6A	Added			

## REASON FOR TEMPORARY REVISION

To include the inspection requirements of Cessna Service Bulletin SEB99-18.

To provide additional information for the stop drilling of cracks that originate at the trailing edge of control surfaces with corrugated skins.

## FILING INSTRUCTIONS FOR THIS TEMPORARY REVISION

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# MODEL 152 SERIES SERVICE MANUAL

## LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page.

Changes to illustrations are indicated by miniature pointing hands. 

Original . . . 0 . . . 1 February 1985  
Revision . . . 1 . . . 2 October 1995

\* The asterisk indicates pages changed, added, or deleted by the current change.

**TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 504,  
CONSISTING OF THE FOLLOWING:**

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3-26 Blank . . . . .	0	8-9 thru 8-10 . . . . .	0

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### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

# MODEL 152 SERIES SERVICE MANUAL

## CROSS REFERENCE LISTING OF POPULAR NAME VS. MODEL NUMBERS AND SERIALS

All aircraft, 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 aircraft, 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 name, model number, and serial number.

MODEL POPULAR NAME	YEAR	SERIAL MODEL	BEGINNING	ENDING
152	1978	152	15279406	15282031
152II	1979	152	15282032	15283591
	1980	152	15283592	15284541
	1981	152	15284542	15285161
	1982	152	15285162	15285594
	1983	152	15285595	15285833
	1984	152	15285834	15285939
	1985	152	15285940	15286033
REIMS/CESSNA F152	1978	F152	F15201449	F15201528
REIMS/CESSNA F152 II	1979	F152	F15201529	F15201673
	1980	F152	F15201674	F15201808
	1981	F152	F15201809	F15201893
	1982	F152	F15201894	F15201928
	1983	F152	F15201929	F15201943
	1984	F152	F15201944	F15201952
	1985	F152	F15201953	F15201965
	1986	F152	F15201966	F15201980
152 AEROBAT	1978	A152	A1500433, A1520735	A1520808
	1979	A152	681, A1520809	A1520878
	1980	A152	A1520879	A1520948
	1981	A152	A1520949	A1520983
	1982	A152	A1520984	A1521014
	1983	A152	A1521015	A1521025
	1984	A152	A1521026	A1521027
	1985	A152	A1521028	A1521049
REIMS/CESSNA F152 AEROBAT	1978	FA152	FA1520337	FA1520347
	1979	FA152	FA1520348	FA1520357
	1980	FA152	FA1520358	FA1520372
	1981	FA152	FA1520373	FA1520377
	1982	FA152	FA1520378	FA1520382
	1983	FA152	FA1520383	FA1520387
	1984	FA152	NONE	
	1985	FA152	FA1520388	FA1520415
	1986	FA152	FA1520416	FA1520425

## MODEL 152 SERIES SERVICE MANUAL

# INTRODUCTION

This manual contains factory-recommended procedures and instructions for ground handling, servicing, and maintaining Cessna 152 Series Models. Besides serving as a reference for the experienced mechanic, this manual also covers step-by-step procedures for the less experienced.

This service manual is designed for aerofiche presentation. To facilitate the use of the aerofiche, refer to the aerofiche header for basic information.

### KEEPING CESSNA PUBLICATIONS CURRENT

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 News Letters, 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 the Cessna 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 is communicated to the field through Cessna's Authorized Service Stations and/or through Cessna's subscription services.

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**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, PURCHASED, 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.**

1. **REVISIONS/CHANGES.** These are issued to the dealers by Cessna Aircraft Company for this publication required, and include only pages that require updating.
2. **REISSUE.** Manual is reissued to dealers as required, and is a complete manual incorporating all the latest information and outstanding revisions/changes. It supersedes and replaces previous issue(s).

**REVISIONS/CHANGES and REISSUES** can be purchased from a Cessna Service Station or directly from Cessna Parts Distribution (CPD 2), Dept. 701, Cessna Aircraft Company, P. O. Box 949, Wichita, Kansas 67201.

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 aircraft. Therefore, it is recommended that Cessna owners utilize the knowledge and experience of the factory-trained Service Station Organization.

## **MODEL 152 SERIES SERVICE MANUAL**

### **CUSTOMER CARE SUPPLIES AND PUBLICATIONS CATALOG**

A Customer Care Supplies and Publications Catalog is available from a Cessna Service Station or directly from Cessna Parts Distribution, Dept. 701, Cessna Aircraft Company, 5800 East Pawnee, Wichita, Kansas 67201. 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 quarterly and issued on Aerofiche with the quarterly Service Information Summaries. A listing of all available publications is issued periodically by the Cessna Propeller Product Support Department.

### **SUPPLEMENTAL TYPE CERTIFICATE INSTALLATIONS**

Inspection, maintenance, and parts requirements for supplemental type certificate (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.

### **CUSTOMER COMMENTS ON MANUAL**

Cessna Aircraft Company has endeavored to furnish you with an accurate, useful, 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.

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 1 GENERAL DESCRIPTION

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Model A152 and FA152 .....	1A9/1-1		
Description .....	1A9/1-1		

- 1-1. GENERAL DESCRIPTION.
- 1-2. MODEL 152 AND F152 SERIES.
- 1-3. DESCRIPTION. Cessna Model 152 and F152 Series aircraft, described in this manual, are high-wing monoplanes of all-metal, semimonocoque construction. They are equipped with fixed tubular spring-steel main gear struts and a steerable nose gear. The nose gear has an air/hydraulic fluid shock strut. Two-place seating is standard, and a double-width, fold-up auxiliary rear seat is optional. Also featured is a "wrap-around" rear window and a swept-back fin and rudder. Powering these aircraft is a four-cylinder, horizontally-opposed, air-cooled Lycoming "Blue Streak" engine, driving an all-metal, fixed-pitch propeller.
- 1-4. MODEL A152 AND FA152 SERIES.
- 1-5. DESCRIPTION. Aerobat Model A152 and FA152 Series aircraft are a modified version of the current production Model 152. The structure has been "beefed-up" in some areas to meet requirements set forth in Aerobatic Category, CAR, Part 3. In addition, quick-release cabin doors, two-strap shoulder harnesses, and aerobatic paint design are standard. Removable seat and back cushions are provided to allow occupants to use either seat-pack or back-pack type parachutes for aerobatic maneuvers. The FA152 is powered by a Rolls Royce built, four-cylinder, horizontally-opposed, air-cooled Lycoming engine.
- 1-6. AIRCRAFT SPECIFICATIONS. Leading particulars of these aircraft, with dimensions based on gross weight, are given in figure 1-1. If these dimensions are used for constructing a hangar or computing clearances, remember that such factors as nose gear strut inflation, tire pressures, tire sizes and load distribution may result in some dimensions that are considerably different from those listed.
- 1-7. STATIONS. Station diagrams are shown in figures 1-2 and 1-3 to assist in locating equipment when a written description is inadequate or impractical.

# **MODEL 152 SERIES SERVICE MANUAL**

<b>GROSS WEIGHT</b> (Takeoff or Landing) .....	1670 Lbs.
<b>FUEL CAPACITY</b>	
Standard Wing (Total) .....	26 Gal.
Standard Wing (Usable).....	24.5 Gal.
Long Range Wing (Total) .....	39 Gal.
Long Range Wing (Usable) .....	37.5 Gal.
<b>OIL CAPACITY</b>	
Without External Filter .....	6 Qt.
With External Filter .....	7 Qt.
<b>ENGINE MODEL</b> .....	Lycoming O-235 Series
<b>PROPELLER</b> (Fixed Pitch) .....	69" McCauley
<b>MAIN WHEEL TIRES</b> (Optional) .....	6.00 x 6, 4-Ply Rating
Pressure .....	21 Psi
<b>MAIN WHEEL TIRES</b> (Standard) .....	15 x 6.00 x 6, 4-Ply Rating
Pressure .....	29 Psi
<b>NOSE WHEEL</b> Tire (Standard) .....	5.00 x 5, 4-Ply Rating
Pressure .....	30 Psi
<b>NOSE GEAR STRUT PRESSURE</b> (Strut Extended) .....	20 Psi
<b>WHEEL ALIGNMENT</b> (Measured With Airplane Empty)	
Camber .....	3° to +5°
Toe-in .....	0" to + .16"
<b>AILERON TRAVEL</b> (Prior Serials Thru 15279473, A1520736, F15201428 and FA1520336)	
Up.....	20° + 2° -0°
Down.....	14° + 2° -0°
<b>AILERON TRAVEL</b> (Beginning Serial 15279474, A1520737, F15201429 and FA1520337)	
Up.....	20° ± 1°
Down.....	15° ± 1°
Droop .....	1° ± 1/2° Down from <u>Streamlined</u>
<b>WING FLAP TRAVEL</b> .....	30° ± 2° Down
<b>Rudder Travel</b> (Parallel to Water Line)	
Right.....	20° 30' +0° -2°
Left .....	20° 30' +0° -2°
<b>Rudder Travel</b> (Perpendicular to Hinge Line)	
Right.....	23°, +0° -2°
Left .....	23°, +0° -2°
<b>Elevator Travel</b>	
Up.....	25° ± 1°
Down.....	18° ± 1°
<b>Elevator Trim Tab Travel</b>	
Up.....	10° ± 1°
Down.....	20° ± 1°
<b>PRINCIPAL DIMENSIONS</b>	
Wing Span .....	400.00"
Length .....	284.84"
Fin Height (Maximum With Nose Gear Depressed And Flashing Beacon Installed on Fin) .....	102.00"
Track Width.....	91.28"
Tail Span .....	120.00"
<b>BATTERY LOCATION</b> .....	<b>FIREWALL</b> Right Side

## Figure 1-1. Aircraft Specifications

## MODEL 152 SERIES SERVICE MANUAL

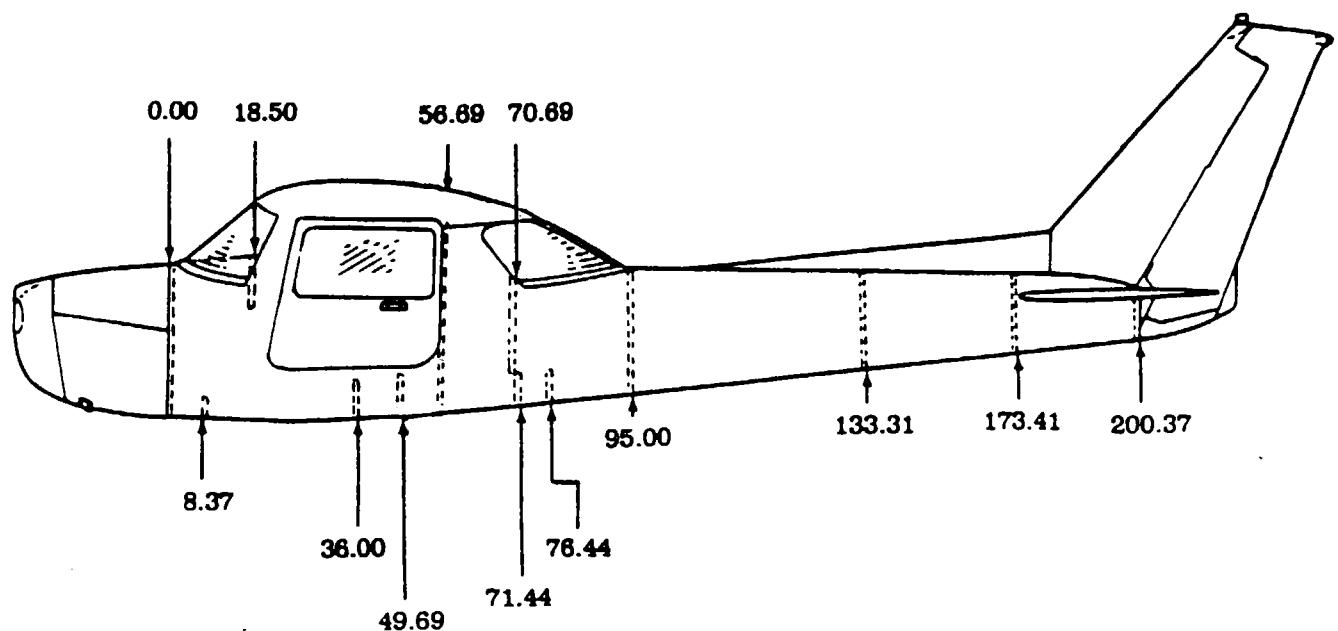


Figure 1-2. Fuselage Stations

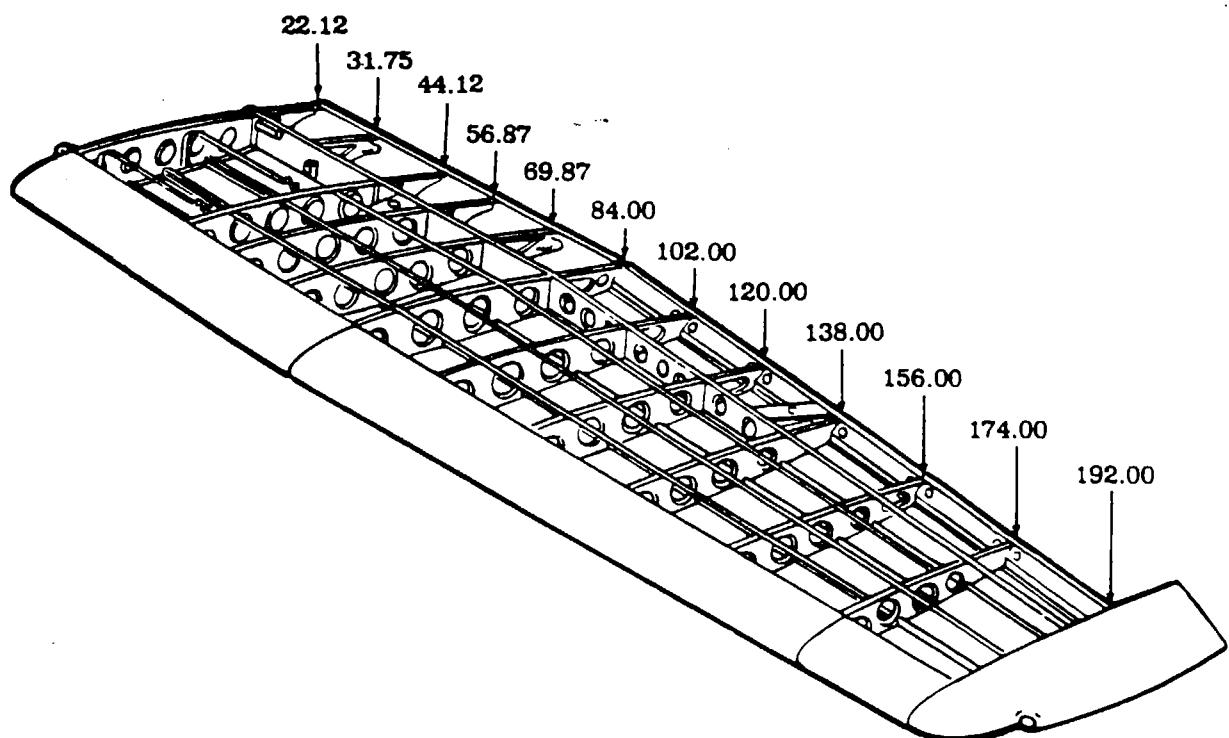


Figure 1-3. Wing Stations

## MODEL 152 SERIES SERVICE MANUAL

- 1-8. **BOLT TORQUES.** The importance of correct application cannot be overemphasized. Under-torque can result in unnecessary wear of nuts and bolts as well as parts they are holding together. When insufficient pressures are applied, uneven loads will be transmitted throughout assembly, which may result in excessive wear or premature failure due to fatigue. Over-torque can be equally damaging because of failure of a bolt or nut from overstressing threaded areas. There are a few simple, but very important, procedures that should be followed to assure that correct torque is applied:
- a. Calibrate torque wrench periodically to assure accuracy; and recheck frequently.
  - b. Be sure that bolt and nut threads are clean and dry unless otherwise specified.
  - c. Run nut down to near contact with washer or bearing surface and check "friction drag torque" required to turn nut.
  - d. Add friction drag torque to desired torque recommended or obtain desired torque as shown in figure 1-4. This is referred to as final torque which should register on indicator or setting for a snapover-type wrench.
  - e. Apply a smooth even pull when applying torque pressure. If chattering or a jerking motion occurs during final torque, back off and re-torque.
  - f. When installing a castle nut, start alignment with cotter pin hole at minimum recommended torque, plus friction drag torque, and do not exceed maximum plus friction drag. If hole and nut castellation do not align, change washers or nut and try again. Exceeding maximum recommended torque is not recommended unless specifically allowed or recommended for that particular installation.

# MODEL 152 SERIES SERVICE MANUAL

BOLT TORQUE VALUES										
BOLTS Steel Tension				Steel Tension		BOLTS	Steel Shear			
AN3 thru AN20 AN42 thru AN48 AN73 thru AN81 AN173 thru AN186 MS20033 thru MS20046 MS20073 MS20074 AN508NK9 MS24694 AN525NK525 MS27039				MS20004 thru MS20024 NAS144 thru NAS148 NAS333 thru NAS340 NAS585 thru NAS590 NAS624 thru NAS644 NAS1303 thru NAS1320 NAS172 NAS174 NAS517		NAS464				
NUTS				NUTS						
Steel Tension		Steel Shear		Steel Tension		Steel Shear				
AN310 AN315 AN363 AN365 NAS1021 MS17825 MS21045 MS20365 MS20500 NAS679		AN320 AN384 NAS1022 MS17826 MS20364		AN310 AN315 AN363 AN365 MS17825 MS20365 MS21045 NAS1021 NAS679 NAS1291		AN320 AN364 NAS1022 MS17826 MS20364				
FINE THREAD SERIES										
Nut-bolt size	Torque Limits in.-lbs.		Torque Limits in.-lbs.		Nut-bolt size	Torque Limits in.-lbs.				
	Min.	Max.		Min.	Max.	Min.	Max.			
8-36	12	15		7	9	10-32	25	30	15	20
10-32	20	25		12	15	1/4-28	80	100	50	60
1/4-28	50	70		30	40	5/16-24	120	145	70	90
5/16-24	100	140		60	85	3/8-24	200	250	120	150
3/8-24	160	190		95	110	7/16-20	520	630	300	400
7/16-20	450	500		270	300	1/2-20	770	950	450	550
1/2-20	480	690		290	410	9/16-18	1100	1300	650	800
9/16-18	800	1000		480	600	5/8-18	1250	1550	750	950
5/8-18	1100	1300		660	780	3/4-16	2650	3200	1600	1900
3/4-16	2300	2500		1300	1500	7/8-14	3550	4350	2100	2600
7/8-14	2500	3000		1500	1800	1-14	4500	5500	2700	3300
1-14	3700	4500		2200	3300	1-1-1/8-12	6000	7300	3600	4400
1-1-1/8-12	5000	7000		3000	4200	1-1-1/4-12	11000	13400	6600	8000
1-1-1/4-12	9000	11000		5400	6600					
COARSE THREAD SERIES										
Nut-bolt size	Torque Limits in.-lbs.		Torque Limits in.-lbs.		COARSE THREAD SERIES NOT USED					
	Min.	Max.		Min.	Max.					
8-32	12	15		7	9					
10-24	20	25		12	15					
1/4-20	40	50		25	30					
5/16-18	80	90		48	55					
3/8-16	160	185		95	110					
7/16-14	235	255		140	155					
1/2-13	400	480		240	290					
9/16-12	500	700		300	420					
5/8-11	700	900		420	540					
3/4-10	1150	1600		700	950					
7/8-9	2200	3000		1300	1800					
1-8	3700	5000		2200	3000					
1-1/8-8	5500	6500		3300	4000					
1-1-1/4-8	6500	8000		4000	5000					

Figure 1-4. Torque Values

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## SECTION 2

### GROUND HANDLING, SERVICING, CLEANING LUBRICATION AND INSPECTION

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

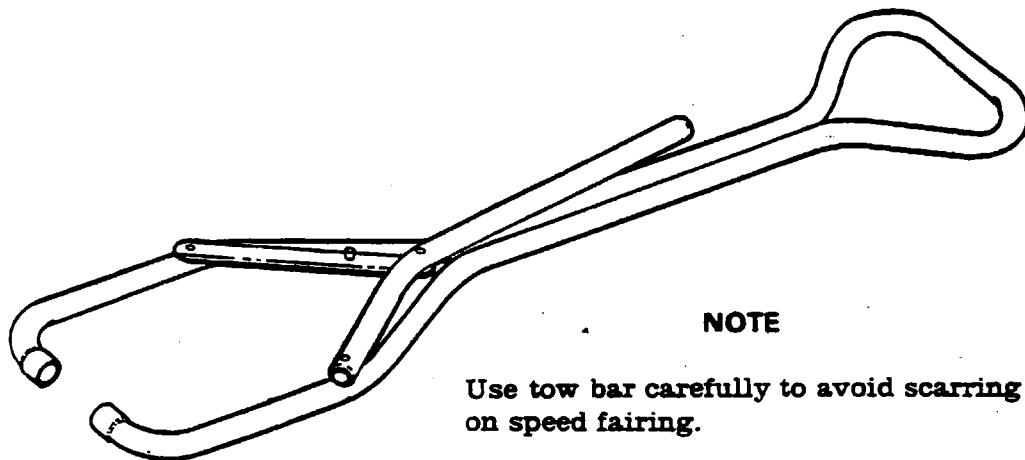
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### 2-1. GROUND HANDLING.

- 2-2. **TOWING.** Moving the aircraft 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 aircraft on the ground. When no tow bar is available, press down at the horizontal stabilizer front spar adjacent to the fuselage to raise the nose wheel off the ground. With the nose wheel clear of the ground, the aircraft can be turned by pivoting it about the main wheels. Beginning with serials 15285162, A1520984, F1521894 and FA1520378, an optional tow bar stowage installation is available. In the baggage area a bracket located at FS 91.75 and a strap located at FS 70.31 are used to secure and store the tow bar assembly when not in use.



#### NOTE

Use tow bar carefully to avoid scarring finish on speed fairing.

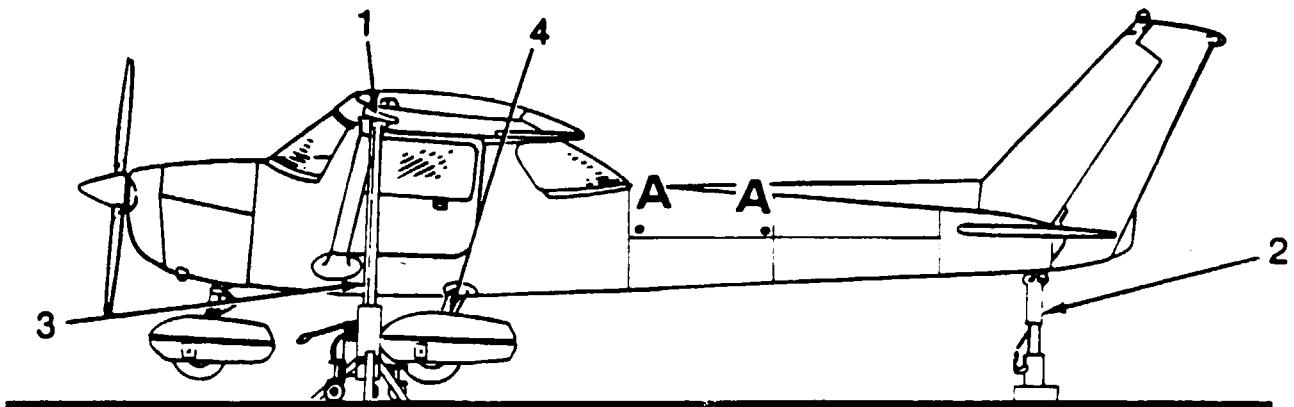
Figure 2-1. Tow Bar

#### CAUTION

When towing the aircraft, never turn the nose wheel more than 30 degrees either side of center or the nose gear will be damaged. Do not push on control surfaces or outboard empennage surfaces. When pushing on the tailcone, always apply pressure at a bulkhead to avoid buckling the skin.

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REFER TO SHEET 2 FOR ITEM NUMBERS



## NOTE

Corresponding points on both upper door sills may be used to level the aircraft laterally.

Reference points for longitudinal leveling of aircraft are two screws on left side of tailcone. These are indicated in illustration by **A**.

(Also refer to paragraph 2-5)

Figure 2-2. Jacking and Leveling (Sheet 1 of 2)

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## JACKING INFORMATION

ITEM	TYPE AND NUMBER	REMARKS
1	Block	1"x4"x4 padded with 1/4" rubber
2	Cessna No. 2-168	Tail Tie-Down Stand
3	Built-in jack pad	Part of step bracket (SEE CAUTION)
4	No. 2-170 Basic jack (includes  No. 2-71 Slide tube: Liftstroke 22-1/2")  No. 2-70 Slide tube: Liftstroke 22-1/2"	Min. closed height: 34"  Max. extension height: 56-1/2"  Min. closed height: 57-1/2"  Max. extension height: 80"
	No. 2-591 Extension cap	Adds 4"
	No. 2-109 Leg extension	Adds 12"

1. Wing jacks (4) are placed under front spar of wing just outboard of wing strut, and must extend far enough to raise wheels off ground, and must be of adequate strength.
2. Attach a Cessna 2-168 stand to the tie-down ring. Be sure tail tie-down stand (2) weighs enough to keep tail down under all conditions and that it is strong enough to support any weight that might be placed on it (place shot bags or sand bags on tail stand). In addition, the base of adjustable tail stand is to be filled with concrete for additional weight as a safety factor.
3. Operate jacks evenly until desired height is reached.

### CAUTION

When using built-in jack pad (3), flexibility of the gear strut will cause the main wheel to slide inboard as the wheel is raised, tilting the jack. The jack must be lowered for a second operation. Jacking both wheels simultaneously at built-in jack pads is not recommended. Jack pad may be used to raise only one main wheel. DO NOT USE brake casting as a jack point.

4. Items (2) and (4) are available from the Cessna Supply Division.

**Figure 2-2. Jacking and Leveling (Sheet 2 of 2)**

- 2-3. HOISTING. The aircraft may be lifted with a hoist of two-ton capacity by using hoisting rings, which are optional equipment, or by means of suitable slings. The front sling should be hooked to each upper engine mount at the firewall, and the aft sling should be positioned around the fuselage at the first bulkhead forward of the leading edge of the stabilizer. If the

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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.

- 2-4. **JACKING.** See figure 2-2 for jacking procedures.
- 2-5. **LEVELING.** Corresponding points on both upper door sills may be used to level the aircraft laterally. The reference points for longitudinal leveling of the aircraft are the two screws on the left side of the tailcone.
- 2-6. **PARKING.** Parking precautions depend principally on local conditions. As a general precaution, set parking brake or chock the wheels and install the controls lock. In severe weather and high wind conditions, tie down the aircraft as outlined in paragraph 2-7 if a hangar is not available.
- 2-7. **TIE-DOWN.** When mooring the aircraft in the open, head into the wind if possible. Secure control surfaces with the internal control lock and set brakes.

### CAUTION

Do not set parking brakes when they are overheated or during cold weather when accumulated moisture may freeze them.

After completing the preceding, proceed to moor the aircraft as follows:

- a. Tie ropes, cables, or chains (700 lbs tensile strength) 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.
  - b. Secure a tie-down rope (no chains or cables) to the exposed portion of the engine mount and secure opposite end of rope to a ground anchor.
  - c. 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.
  - d. Secure control lock on pilot control column. If control lock is not available, tie pilot control wheel back with front seat belt.
  - e. These aircraft are equipped with a spring-loaded steering bungee system which affords protection against normal wind gusts. However, if extremely high wind gusts are anticipated, additional external locks may be installed.
- 2-7A. **WEIGHING AIRCRAFT.** Refer to Pilot's Operating Handbook.
- 2-8. **FLYABLE STORAGE.** Flyable storage is defined as a maximum of 30 days nonoperational storage and/or the first 25 hours of intermittent engine operation.

### NOTE

The aircraft is delivered from Cessna with straight mineral oil, conforming to MIL-L-6082. This oil should be used for the first 25 hours of engine operation. In the event it is necessary to add oil during the first 25 hours of operation, use only aviation grade straight mineral oil of the recommended viscosity conforming to MIL-L-6082.

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During the 30 day nonoperational storage or the first 25 hours of intermittent engine operation, every seventh day the propeller shall be rotated through six revolutions, without running the engine.

### WARNING

When rotating engine by hand, always take proper precautions to make sure the engine cannot fire or start when the propeller is moved.

If the aircraft is stored outside, tie it down in accordance with paragraph 2-7. In addition, the pitot tube, static air vents, air vents, openings in the engine cowling, and other similar openings shall have protective covers installed to prevent entry of foreign material. After 30 days, aircraft should be flown for 30 minutes or ground run-up until oil has reached operating temperature. (lower green arc range)

### CAUTION

Excessive ground operation shall be avoided.

- 2-9. RETURNING AIRCRAFT TO SERVICE. After flyable storage, returning the aircraft 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 clean oil pressure screen (or change external oil filter element). Service engine with correct grade and quantity of engine oil. See figure 2-4 and paragraph 2-21 for correct grade of engine oil.
- 2-10. TEMPORARY STORAGE. Temporary storage is defined as aircraft in a nonoperational status for a maximum of 90 days. The aircraft is constructed of corrosion resistant alclad aluminum, which will last indefinitely under normal conditions if kept clean, however, these alloys are subject to oxidation. The first indication of corrosion on unpainted surfaces is in the form of white deposits or spots. On painted surfaces, the paint is discolored or blistered. Storage in a dry hangar is essential to good preservation and should be procured if possible. Varying conditions will alter the measures of preservation, but under normal conditions in a dry hangar, and for storage periods not to exceed 90 days, the following methods of treatment are suggested.

### NOTE

In order to maintain stored airplanes in "new" condition, it is important they be inspected, cleaned, and serviced regularly. Routine inspections for overall condition such as cleanliness, damage, corrosion, and water leaks are imperative to assure the airplane is being properly maintained. Moisture damage, corrosion, or other damage resulting from neglect while in storage is not covered under the airplane, engine, or other equipment warranties.

- a. Fill fuel tanks with correct grade of aviation fuel.
- b. Clean and wax aircraft thoroughly.
- c. Clean any oil or grease from tires and coat tires with a tire preservative. Cover tires to protect against grease and oil.
- d. Either block up fuselage to relieve pressure on tires or rotate wheels every 30 days to change supporting points and prevent flat spotting the tires.
- e. Lubricate all airframe items and seal or cover all openings which could allow moisture and/or dust to enter.

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### **NOTE**

The aircraft battery serial number is recorded in the aircraft equipment list. To assure accurate warranty records, the battery should be reinstalled in the same aircraft from which it was removed. If the battery is returned to service in a different aircraft, appropriate record changes must be made and notification sent to Cessna Warranty Administration.

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- f. Remove battery and store in a cool, dry place; service battery periodically and charge as required.

### NOTE

An engine treated in accordance with the following may be considered protected against normal atmospheric corrosion for a period not to exceed 90 days.

- g. Disconnect spark plug leads and remove upper and lower spark plugs from each cylinder.

### NOTE

The corrosion preservative oil mixture should conform to MIL-L-6529C Type I heated to 200°F to 220°F spray nozzle temperature.

- h. Using a portable pressure sprayer, atomize spray preservative oil through the upper spark plug hole in each cylinder with the piston in a down position. Rotate crankshaft about five revolutions as each cylinder is sprayed.
- i. After completing step "h," rotate crankshaft so that no piston is at a top position. If the aircraft is to be stored outside, stop two-bladed propeller so that blades are as near horizontal as possible to provide maximum clearance with passing aircraft.
- j. Again spray each cylinder without moving the crankshaft, to thoroughly cover all interior surfaces of the cylinder above the piston.
- k. Install spark plugs and connect spark plug leads.
- l. Apply preservative oil to the engine interior by spraying approximately two ounces of the preservative oil through the oil filler tube.
- m. Seal all engine openings exposed to the atmosphere, using suitable plugs or non-hygroscopic tape. Attach a red streamer at each point that a plug or tape is installed.
- n. If the aircraft is to be stored outside, perform the procedures outlined in paragraph 2-7. In addition, the pitot tube, static source vents, air vents, openings in the engine cowling, and other similar openings should have protective covers installed to prevent entry of foreign material.
- o. Attach a warning placard to the propeller with the following notation, "DO NOT TURN PROPELLER--ENGINE PRESERVED--preservation date."

### 2-11. INSPECTION DURING STORAGE.

- a. Inspect airframe for corrosion at least once a month and remove dust collections as frequently as possible. Clean and wax aircraft as required.
- b. Inspect 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 inspecting interior of cylinder for corrosion.

- c. If at the end of the 90 day period, the aircraft is to be continued in non-operational storage, repeat the procedural steps "g" thru "o" of paragraph 2-10.

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- 2-12. RETURNING AIRCRAFT TO SERVICE. After temporary storage, use the following procedures to return the aircraft to service.
- a. Remove aircraft from blocks and check tires for proper inflation. Check for proper nose gear strut inflation.
  - b. Check battery and install.
  - c. Check that oil sump has proper grade and quantity of engine oil.
  - d. Service induction air filter and remove warning placard from propeller.
  - e. Remove materials used to cover openings.
  - f. Remove, clean and gap spark plugs.
  - g. While spark plugs are removed, rotate propeller several revolutions to clear excess rust preventive oil from cylinders.
  - h. Install spark plugs and torque to value specified in Section 11 and connect spark plug leads.
  - i. 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 moisture and sediment.
  - j. Perform a thorough preflight inspection, then start and warm-up engine.
- 2-13. INDEFINITE STORAGE. Indefinite storage is defined as aircraft in a nonoperational status for an indefinite period of time. Engines treated in accordance with the following may be considered protected against normal atmosphere corrosion, provided the procedures outlined in paragraph 2-14 are performed at the intervals specified.

### NOTE

In order to maintain stored airplanes in "new" condition, it is important they be inspected, cleaned, and serviced regularly. Routine inspections for overall condition such as cleanliness, damage, corrosion, and water leaks are imperative to assure the airplane is being properly maintained. Moisture damage, corrosion, or other damage resulting from neglect while in storage is not covered under the airplane, engine, or other equipment warranties.

- a. Operate engine until oil temperature reaches normal operating range. Drain engine oil sump and reinstall drain plug and safety.
- b. Fill oil sump to normal operating capacity with corrosion-preventive mixture which has been thoroughly mixed.

### NOTE

Corrosion-preventive mixture consists of one part by volume MIL-C-6529C, type I, added to three parts by volume of MIL-L-6082C mineral aircraft engine oil.

- c. Immediately after filling the oil sump with a corrosion-preventive mixture, fly the aircraft for a period of time not to exceed a maximum of 30 minutes.
- d. With engine operating at 1200 to 1500 RPM and induction air filter removed, spray corrosion-preventive mixture into induction airbox, at the rate of one-half gallon per minute, until heavy smoke comes from exhaust stack, then increase the spray until engine is stopped.

### CAUTION

Injecting corrosion-preventive mixture too fast can cause hydrostatic lock.

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- e. Do not rotate propeller after completing step "d."
- f. Remove all spark plugs and spray corrosion-preventive mixture, which has been pre-heated to 220°F to 250°F, into all spark plug holes to thoroughly cover interior surfaces of cylinders.
- g. Install lower spark plug or install solid plugs, and install dehydrator plugs in the upper spark plug holes. Be sure that dehydrator plugs are blue in color when installed.
- h. Cover spark plug lead terminals with shipping plugs (AN4060-1), or other suitable covers.
- i. With throttle in full open position, place a bag of desiccant in the carburetor intake and seal opening with moisture resistant paper and tape.
- j. Place a bag of desiccant in the exhaust tailpipe(s) and seal openings with moisture resistant tape.
- k. Seal cold air inlet to the heater muff with moisture resistant tape.
- l. Seal engine breather hose by inserting a protex plug in the breather hose and clamping in place.
- m. Seal all other engine openings exposed to atmosphere, using suitable plugs or non-hygroscopic tape.
- n. If the aircraft is to be stored outside, perform the procedures outlined in paragraph 2-7. In addition, the pitot tube, static source vents, air vents, openings in the engine cowling and other similar openings should have protective covers installed to prevent entry of foreign material.

### NOTE

Attach a red streamer to each place plugs or bags of desiccant is placed or moisture resistant tape is installed. Either attach red streamers outside of the sealed area with tape or to the inside of the sealed area with safety wire to prevent wicking of moisture into the sealed area.

- o. Drain corrosion-preventive mixture from engine sump and reinstall drain plug.

### NOTE

The corrosion-preventive mixture is harmful to paint and should be wiped from painted surfaces immediately.

- p. Attach a warning placard on the throttle control knob, to the effect that the engine contains no lubricating oil. Attach a warning placard to the propeller with the following notation, "DO NOT TURN PROPELLER--ENGINE PRESERVED--preservation date."
- q. Prepare airframe for storage as outlined in paragraph 2-10a. thru step "f."

### NOTE

As an alternate method of indefinite storage, the aircraft may be serviced in accordance with paragraph 2-10, providing the aircraft is run-up at maximum intervals of 90 days and then reserviced per paragraph 2-10.

#### 2-14. INSPECTION DURING STORAGE. Aircraft in indefinite storage shall be inspected as follows:

- a. Inspect cylinder protex plugs each seven days.
- b. Change protex plugs if their color indicates an unsafe condition.
- c. If the dehydrator plugs have changed color in one-half of the cylinders, all desiccant material in the engine should be replaced with new material.
- d. Every six months, respray the cylinder interiors with corrosion-preventive mixture.

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### NOTE

Before spraying, inspect the interior of one cylinder for corrosion through the spark plug hole and remove at least one rocker box cover and inspect the valve mechanism.

- 2-15. **RETURNING AIRCRAFT TO SERVICE.** After indefinite storage, use the following procedure to return the aircraft to service.

- a. Remove aircraft from blocks and check tires for correct inflation. Check for correct nose gear strut inflation.
- b. Check battery and install.
- c. Remove all paper, tape, desiccant bags, and streamers used to seal and cover openings.
- d. Remove warning placards posted at throttle and propeller.
- e. Remove and clean engine oil screen, then reinstall and safety. On aircraft that are equipped with an external oil filter, install new filter element.
- f. Remove oil sump drain plug (or open quick drain valve) and drain oil sump. Install and safety drain plug (or close quick drain valve) and service engine with correct amount and grade of oil per figure 2-4.

### NOTE

The corrosion-preventive mixture will mix with the engine lubricating oil, so flushing the oil system is not necessary. Draining the oil sump will remove enough of the corrosion-preventive mixture.

### NOTE

The corrosion-preventive mixture is harmful to paint and should be wiped from painted surfaces immediately.

- g. Service and install the induction air filter.
- h. Remove dehydrator plugs and spark plugs or plugs installed in spark plug holes and rotate propeller several revolutions to clear corrosion-preventive mixture from cylinders.
- i. Clean, gap, and install spark plugs. Torque spark plugs to value listed in Section 11.
- j. Check fuel strainer. Remove and clean filter screen. Check fuel tanks and fuel lines for moisture and sediment, and drain enough fuel to eliminate moisture and sediment.
- k. Perform a thorough preflight inspection, then start and warm-up engine.
- l. Thoroughly clean and visually inspect aircraft and flight test aircraft.

- 2-16. **SERVICING.**

- 2-17. Servicing requirements are shown in figure 2-4. The following paragraphs supplement this figure by adding details not included in the figure.

- 2-18. **FUEL.** Fuel tanks should be filled immediately after flight to lessen moisture condensation. Tank capacities are listed in Section 1. The recommended fuel grade to be used is given in figure 2-4.

### WARNING

Do not fly with contaminated or unapproved fuel.

- 2-18A. **USE OF FUEL ADDITIVES FOR COLD WEATHER OPERATION.** Strict adherence to recommended preflight draining instructions will eliminate any free water accumulations from the tank sumps. While small amounts of water may still remain in solution in the gasoline, it will normally be consumed and go unnoticed in the operation of the engine.

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One exception to this can be encountered when operating under the combined effect of: (1) use of certain fuels, with (2) high humidity conditions on the ground (3) followed by flight at high altitude and low temperature. Under these unusual conditions small amounts of water in solution can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel system.

While these conditions are quite rare and will not normally pose a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with, when encountered.

Therefore, to alleviate the possibility of fuel icing occurring under these unusual conditions it is permissible to add isopropyl alcohol or ethylene glycol monomethyl ether (EGME) compound to the fuel supply. See Figure 2-2A for fuel additive mixing ratio.

The introduction of alcohol or EGME compound into the fuel provides two distinct effects: (1) it absorbs the dissolved water from the gasoline and (2) alcohol has a freezing temperature depressant effect.

Alcohol, if used, is to be blended with the fuel in a concentration of 1% by volume. Concentrations greater than 1% are not recommended since they can be detrimental to fuel tank materials.

The manner in which the alcohol is added to the fuel is significant because alcohol is most effective when it is completely dissolved in the fuel. To insure proper mixing the following is recommended:

1. For best results the alcohol should be added during the fueling operation by pouring the alcohol directly on the fuel stream issuing from the fueling nozzle.
2. An alternate method that may be used is to premix the complete alcohol dosage with some fuel in a separate clean container (approximately 2-3 gallon capacity) and then transfer this mixture to the tank prior to the fuel operation.

Any high quality isopropyl alcohol may be used, such as:

Anti-icing fluid (MIL-F-5566) or  
Isopropyl alcohol (Federal Specification TT-I-735a).

Ethylene glycol monomethyl ether (EGME) compound in compliance with MIL-I-27686 or Phillips PFA-55MB, if used, must be carefully mixed with the fuel in concentrations not to exceed 0.15% by volume.

### CAUTION

Mixing of the EGME compound with the fuel is extremely important because concentration in excess of that recommended (0.15 percent by volume maximum) will result in detrimental affects to the fuel tanks, such as deterioration of protective primer and sealants and damage to O-rings and seals in the fuel system and engine components. Use only blending equipment that is recommended by the manufacturer to obtain proper proportioning. Do not allow the concentrated EGME compound to come in contact with the airplane finish or fuel cell as damage can result.

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Prolonged storage of the airplane will result in a water build-up in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

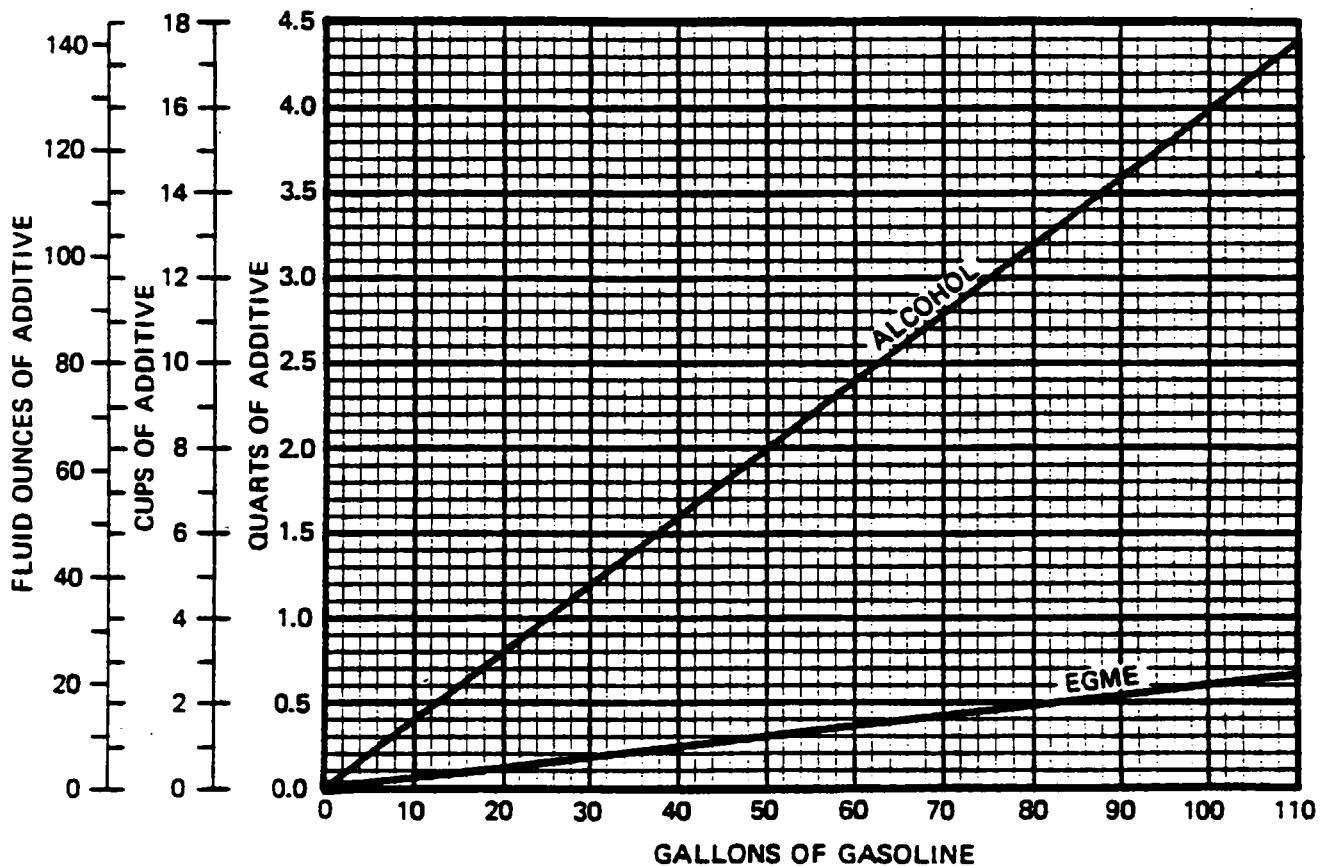


Figure 2-2A. Fuel Additive Mixing Ratio Chart

- 2-18B. USE OF FUEL ADDITIVE TO INHIBIT LEAD FOULING. Tests conducted for lead fouling characteristics of the Lycoming O-235 engine indicate that use of 100 Low Lead fuel significantly improves spark plug life and reduces spark plug cleaning requirements due to lead fouling. Alcor, Inc. markets TCP (Tri-cresyl-phosphate) as a fuel additive used as a lead inhibitor for non-turbocharged Lycoming engines. Fuel system components in Cessna aircraft exhibit no detrimental effects from use of TCP when mixed with aviation fuel in accordance with blending table shown in Figure 2-2B.

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GASOLINE QUANTITY TO BE TREATED U.S. GALLONS	CORRECT AMOUNT OF ALCOR TCP CONCENTRATE			
	2ML/TEL/GAL 100 LL GRADE		4 ML/TEL/GAL 100/130 GRADE	
	LIQUID OUNCEs	CC OR ML	LIQUID OUNCEs	CC IR ML
5	0.5	15	1.1	31
10	1.0	31	2.1	63
15	1.6	45	3.2	94
20	2.1	61	4.2	126
25	2.6	76	5.3	157
30	3.1	92	6.4	188
35	3.6	107	7.4	220
40	4.1	122	8.5	251
45	4.7	138	9.6	282
50	5.2	153	10.6	314
100	10.5	306	21.2	628
155	1 PT.	473	1 QT.	975
310	1 QT.	946	2 QTS.	1950
500	3.2 PTS.	1530	3.3 QTS	3140
600	----	----	1 GAL.	3785
1200	----	----	----	----
1240	1 GAL.	3785	----	----

 Figure 2-2B. TCP Blending Table For Aviation Gasoline

- 2-19. **FUEL DRAINS.** Fuel drains are located in the fuel tanks, fuel line drain tee, fuel strainer and carburetor. The fuel tanks and fuel strainer have drain valves. To activate the tank drain valve and fuel line drain tee for fuel sampling, place cup up to valve and depress valve with rod protruding from cup. See Section 12 for illustration of fuel tank drain valve. The strainer valve is an integral part of the fuel strainer assembly. The strainer drain is equipped with a control which is located adjacent to the oil dipstick. Access to the control is through the oil dipstick access door. Open drains and remove drain cap at intervals specified in figure 2-4. Also, during daily inspection of the fuel strainer, fuel line drain tee and tanks, if water is found in the system, all fuel drains should be temporarily opened and all water drained from the system. If the aircraft has been serviced with improper fuel grade, defuel completely, and refuel with correct grade. Provided weight and balance considerations will permit, fuel tanks should be kept full between flights.

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### NOTE

If fuel tank quick-drains are not installed, at least one quart of fuel should be drained from the fuel strainer with the selector valve in a position to assure each tank is draining fuel.

- 2-20. **CARBURETOR DRAIN PLUG INSPECTION.** In order to prevent the possibility of thread sealant contamination in the carburetor float chamber, cleaning and inspection of the carburetor should be accomplished at each 100-hour inspection and anytime water in the fuel is suspected.
- a. With the fuel valve OFF, remove carburetor drain plug and clean off any sealant present on the end of the plug or in the threads on the plug.
  - b. Inspect drain plug hole in the carburetor and remove any sealant remaining in the hole.
  - c. Turn fuel valve to ON to flush float chamber and drain plug chamber while probing drain plug hole to ascertain that all residue of sealant material is dislodged and washed out of the chamber. Flushing operation should last 15 to 30 seconds.
  - d. A second flushing should then be accomplished and the drained fuel retained for inspection to ensure that no sealant particles are present.
  - e. Install drain plug as follows:
    1. Install drain plug in carburetor 1-1/2 to 2 turns.
    2. Apply sealant to drain plug threads (use NS-40 (RAS-4) or equivalent).
    3. Tighten and safety drain plug.
  - f. Turn fuel valve ON and inspect for evidence of fuel leakage.

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- 2-20A. **CARBURETOR HEAT BUTTERFLY SCREW INSPECTION.** The two screws attaching the carburetor heat to its shaft on the aircraft listed below must be checked for (and tightened, if loose) as a part of every 100-hour or annual inspection.
- Affected aircraft serials numbers:  
15279406 thru 15282096,  
A1520735 thru A1520810,  
F15201429 thru F15201638, and  
FA1520337 thru FA1520351.
- 2-21. **ENGINE OIL.** Check engine lubricating oil with the dipstick five to ten minutes after the engine has been stopped. The aircraft should be in as near a level position as possible when checking the engine oil, that a true reading is obtained. Engine oil should be drained while the engine is still hot, and the nose of the aircraft should be raised slightly for more positive draining of any sludge which may have collected in the engine oil sump. Engine oil should be changed as specified in servicing intervals figure 2-4. Reduce these intervals for prolonged operations in dusty areas, in cold climates where sludging conditions exist, or where short flights and long idle periods are encountered. Always change oil and oil filter (or clean pressure screen) whenever oil appears dirty on dipstick. Aviation grade oil conforming to AVCO Lycoming Service Instruction No. 1014, and any revisions or supplements thereto, shall be used in the "Blue Streak" (Lycoming) engine.

### NOTE

New or newly-overhauled engines should be operated on aviation grade straight mineral oil until the first oil change. If an ashless dispersant oil is used in a new or newly-overhauled engine, high oil consumption may be experienced. The anti-friction additives in detergent and dispersant oils will retard "break-in" of the pistons, rings and cylinder walls. This condition can be avoided by the use of straight mineral oil. If oil must be added during the first 25 hours, use only aviation grade straight mineral oil (non-detergent) conforming to MIL-L-6082. After the first 25 hours of operation, drain engine oil sump and clean the oil pressure screen. If an external oil filter is installed, change the oil filter. Refill sump with straight mineral oil and use until a total of 50 hours have accumulated or oil consumption has stabilized, then change to ashless dispersant oil.

### NOTE

Engine oil contamination increases possibility of sticking and/or stuck valves. More frequent oil and filter changes (50-hour) will minimize accumulation of harmful contaminants. When the aircraft cannot be flown frequently, the oil and filter should be changed sooner than 50-hour interval. Change oil and filter every 25 hours to eliminate moisture and acids that collect in oil of an inactive engine.

### NOTE

Phillips X/C II-Aviation Multi-viscosity oil has not been approved for use by AVCO Lycoming and should not be used in Cessna airplanes.

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Valve shown open. To close, twist screwdriver until valve unlocks and snaps down to closed position.

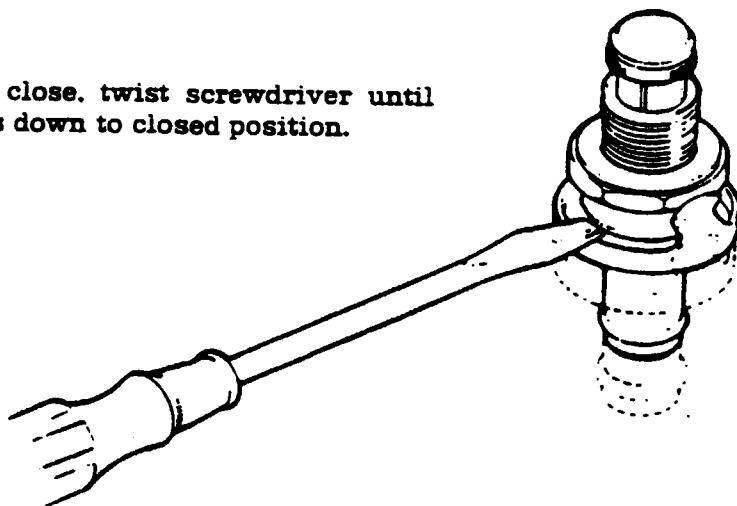


Figure 2-3. Quick-Drain Valve

An oil quick-drain valve may be installed. This valve provides a quicker and cleaner method of draining the engine oil. This valve is installed in the oil drain port of the oil sump and allows oil to be drained by attaching a hose over the fitting end and pushing up, causing the oil to drain through the hose into a container. To drain the engine oil, proceed as follows:

- a. Operate engine until oil temperature is at normal operating temperature.
- b. (With Quick-Drain Valve.) Attach a hose to the quick-drain valve in the oil sump. Push up on quick-drain valve until it locks open, and allow oil to drain through hose into container.
- c. (Without Quick-Drain Valve.) Remove oil drain plug from engine sump and allow oil to drain into a container.
- d. After engine oil has drained, close quick-drain valve as shown in figure 2-3 and remove hose, or install and safety drain plug.
- e. Service engine with correct quantity and grade of engine oil in accordance with figure 2-4.

2-22. ENGINE INDUCTION AIR FILTER. The induction air filter keeps dust and dirt from entering the induction system. The value of maintaining the air filter in a good clean condition can never be overstressed. More engine wear is caused through the use of a dirty or damaged air filter than is generally believed. Engine oil contamination increases possibility of sticking valves, and operating engine with a clean air filter also keeps dirt from accumulating in oil supply. The frequency with which the filter should be removed, inspected, and cleaned will be determined primarily by aircraft operating conditions. A good general rule, however, is to remove, inspect, and clean the filter at least every 100 hours of engine operating time and more frequently if warranted by operating conditions. Some operators prefer to hold spare induction air filters at their home base of operation so that a clean filter is always readily available for use. Under extremely dusty conditions, daily servicing of the filter is recommended. To service the filter, proceed as follows:

- a. Remove filter from aircraft.

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### NOTE

Use care to prevent damage to filter element when cleaning filter with compressed air.

- b. Clean filter by blowing with compressed air (not over 100 psi) from direction opposite of normal air flow. Arrows on filter case indicate direction of normal air flow.

### CAUTION

Do not use solvent or cleaning fluids to wash filter. Use only a water and household detergent solution when washing the filter.

- c. After cleaning as outlined in step "b", the filter may be washed, if necessary, in a solution of warm water and a mild household detergent. A cold water solution may be used.

### NOTE

The filter assembly may be cleaned with compressed air a maximum of 30 times or it may be washed a maximum of 20 times. A new filter should be installed after 500 hours of engine operating time or one year, whichever should occur first. However, a new filter should be installed at anytime the existing filter is damaged. A damaged filter may have sharp or broken edges in the filtering panels which would allow unfiltered air to enter the induction system. Any filter that appears doubtful, shall have a new filter installed in its place.

- d. After washing, rinse filter with clear water until rinse water draining from filter is clear. Allow water to drain from filter and dry with compressed air (not over 100 psi).

### NOTE

The filtering panels of the filter may become distorted when wet, but they will return to their original shape when dry.

- e. Be sure that the air box is clean, inspect filter. If filter is damaged, install a new filter.
- f. Install filter at entrance to air box with gasket on aft face of filter frame and pointed in the correct direction.

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- 2-23. **VACUUM SYSTEM FILTER.** The vacuum system central air filter keeps dirt and dust from entering the vacuum operated instruments. Inspect filter element every 200 hours of operating time for damage. Change central air filter element every 500 hours of operating time and whenever it becomes sufficiently clogged to cause suction gage readings to drop below 4.6 inches of mercury. Also, do not operate the vacuum system with the filter removed, or a vacuum line disconnected as particles of dust or other foreign matter may enter the system and damage the vacuum operated instruments.

### CAUTION

Excessive smoking will cause premature filter clogging.

- 2-24. **BATTERY.** Servicing the 24-volt battery involves adding distilled water to maintain the electrolyte level no higher than bottom of split ring indicator and no lower than top of separators (approximately 1/8-inch below split ring) within filler holes, checking the battery cable connections, and neutralizing and cleaning spilled electrolyte or corrosion. Use bicarbonate of soda (baking soda) and water to neutralize electrolyte or corrosion. Follow with a thorough flushing with water. Brighten cables and terminals with a wire brush, then coat with petroleum jelly before connecting. The battery box also should be checked and cleaned if any corrosion is noted. Distilled water, not acid or "rejuvenators," should be used to maintain electrolyte level. Check the battery every 100 hours (or at least every 30 days), more often in hot weather. See Section 16 for detailed battery removal, installation, and testing instructions.
- 2-25. **TIRES.** Maintain tire pressure at the air pressures specified in figure 1-1. When checking tire pressure, examine tires for wear, cuts, bruises, and slippage. Remove oil, grease, and mud from tires with soap and water.

### NOTE

Recommended tire pressures should be maintained. Especially in cold weather, remember that any drop in temperature of the air inside a tire causes a corresponding drop in air pressure.

- 2-26. **NOSE GEAR SHOCK STRUT.** The nose gear shock strut requires periodic checking to ensure that the strut is filled with hydraulic fluid and is inflated to the correct air pressure. To service the nose gear shock strut, proceed as follows:
- Remove valve cap and release all air.
  - Remove valve housing assembly.
  - Compress strut completely (stops in contact with outer barrel hub).
  - Oil level.
    - Fluid used should comply with specification MIL-H-5606.
    - Fill strut to bottom of valve installation hole.
    - Maintain oil level at bottom of valve installation hole.
  - Fully extend strut.
  - Replace valve housing assembly.
  - With strut fully extended and nose wheel clear of ground, inflate strut to 20 PSI.

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### NOTE

The nose landing gear shock strut will normally require only a minimum amount of service. Maintain the strut extension pressure, as shown in figure 1-1. Lubricate landing gear as shown in figure 2-5. Check landing gear daily for general cleanliness, security of mounting, and for hydraulic fluid leakage. Keep machined surfaces wiped free of dirt and dust, using a clean lint-free cloth saturated with MIL-H-5606 hydraulic fluid or kerosene. All surfaces should be wiped free of excessive hydraulic fluid.

- 2-27. NOSE GEAR SHIMMY DAMPENER. The shimmy dampener should be serviced at least every 50 hours. The shimmy dampener must be filled completely with fluid, free of entrapped air, to serve its purpose. To service the shimmy dampener, proceed as follows:
- Remove shimmy dampener from aircraft.
  - While holding the dampener in a vertical position with fitting end pointed downward, pull fitting end of the dampener shaft to its limit of travel.
  - While holding dampener in this position, fill dampener through open end of cylinder with hydraulic fluid.
  - Push the shaft upward slowly to seal off the filler hole.
  - Clean dampener with solvent. Be sure to keep the shaft protruding through the filler hole until dampener is installed on the aircraft.
  - Install dampener on aircraft.

### NOTE

Keep shimmy dampener, especially the exposed portions of the dampener piston shaft, clean to prevent collection of dust and grit which could cut the seals in the dampener barrel. Keep machined surfaces wiped free of dirt and dust, using a clean lint-free cloth saturated with MIL-H-5606 hydraulic fluid or kerosene. All surfaces should be wiped free of excessive hydraulic fluid.

- 2-28. HYDRAULIC BRAKE SYSTEM. Check brake master cylinders and refill with hydraulic fluid as specified in the inspection charts. Bleed the brake system of entrapped air whenever there is a spongy response to the brake pedals. Refer to Section 5 for filling and bleeding of the brakes.
- 2-29. CLEANING.
- 2-30. Keeping the aircraft clean is important. Besides maintaining the trim appearance of the aircraft, cleaning lessens the possibility of corrosion and makes inspection and maintenance easier.

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### 2-31. CLEANING AND CARE OF THE WINDSHIELD AND WINDOW.

- a. General Maintenance Procedures. The following procedures provide information regarding cleaning and servicing windshields and windows. Improper cleaning, or use of unapproved cleaning agents can cause damage to windshield and windows.
- b. Materials Required:

NAME	MANUFACTURER	USE
Mild soap or detergent (hand dishwashing type)	Commercially available	Cleaning windshields and windows.
Aliphatic Naphtha Type II conforming to Federal Specification TT-N-95	Commercially available	Removing deposits which cannot be removed with mild soap solution.
Polishing wax: (Refer to Note 1)	S.C. Johnson and Son, Inc.	Waxing acrylic windshields and windows.
Turtle Wax (paste)	Turtle Wax, Inc. Chicago, IL 60638	
Great Reflections Paste Wax	E.I. duPont deNemours and Co. (Inc) Wilmington, DE 19898	
Slip-stream Wax (paste)	Classic Chemical Grand Prairie, TX 75050	
Acrylic polish conforming to Federal Specification P-P-560 such as: Permatex plastic cleaner Number 403D	Permatex Company, Inc. Kansas City, KS 66115	Cleaning and polishing acrylic windshields and windows.
Soft cloth, such as: Cotton flannel or old tee shirt material	Commercially available	Applying and removing wax and polish.

#### c. Cleaning Instructions.

#### CAUTION

Windshields and windows (Acrylic Faced) are easily damaged by improper handling and cleaning techniques.

1. Place airplane inside hangar or in shaded area and allow to cool from heat of sun's 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.)

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4. On acrylic windshields and windows only, if soils which 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.
5. Rinse surface thoroughly with clean fresh water and dry with a clean cloth. Do not rub plastic with a dry cloth as this builds up an electrostatic charge which attracts dust.

### CAUTION

Do not use any of the following on or for cleaning windshields and windows: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, fire extinguisher fluid, de-icer fluid, lacquer thinners, commercial or household glass window cleaning sprays.

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-580 applied per the manufacturer's instructions.

### NOTE

When applying and removing wax and polish, use a clean soft cloth such as well worn tee shirt material or cotton flannel.

8. DO NOT USE rain repellent on acrylic surfaces.
- d. Windshield and Window Preventive Maintenance.

### NOTE

Utilization of the following techniques will help minimize windshield and window crazing.

1. Keep all surfaces of windshields and windows clean.
2. If desired, wax acrylic surfaces.
3. Do not park or store airplane where it might be subjected to direct contact with or vapors from: methanol, denatured alcohol, gasoline, benzene, xylene, MEK, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers, or other types of solvents.
4. Do not use solar screens or shields installed on inside of airplane or leave sun visors up against windshield. The reflected heat from these items causes elevated temperatures which accelerate crazing and may cause formation of bubbles in the inner ply of multiple ply windshields.
5. Do not use a canvas cover on the windshield or windows unless freezing rain or sleet is anticipated since the cover may scratch the plastic surface.

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- 2-32. **PLASTIC TRIM.** The instrument panel, plastic trim, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with Stoddard solvent. Volatile solvents, such as mentioned in paragraph 2-32, must never be used since they soften and craze the plastic.
- 2-33. **PAINTED SURFACES.** The painted exterior surfaces of your new Cessna have a durable, long lasting finish. Approximately 10 days are required for the paint to cure completely; in most cases, the curing period will have been completed prior to delivery of the airplane. In the event that polishing or buffing is required within the curing period, it is recommended that the work be done by someone experienced in handling uncured paint. Any Cessna Dealer can accomplish this work.

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 cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

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 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 most 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 de-icing operations.

- 2-34. **ALUMINUM SURFACES.** The aluminum surfaces require a minimum of care, but should never be neglected. The aircraft may be washed with clean water to remove dirt and may be washed with nonalkaline 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 aircraft products.

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- 2-35 ENGINE AND ENGINE COMPARTMENT. 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.

Precautions should be taken when working with cleaning agents such as wearing of rubber gloves, an apron or coveralls and a face shield or goggles. Use the least toxic of available cleaning agents that will satisfactorily accomplish the work. These cleaning agents include: (1) Stoddard Solvent (Specification P-D-680 type II), (2) A water alkaline detergent cleaner (MIL-C-25789J) mixed, 1 part cleaner, 2 to 3 parts water and 8 to 12 parts Stoddard solvent or (3) A solvent base emulsion cleaner (MIL-C-4361B) mixed 1 part cleaner and 3 parts Stoddard solvent.

### CAUTION

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

Perform all cleaning operations in well ventilated work areas and ensure that adequate fire-fighting and safety equipment is available. Do not smoke or expose a flame, within 100 feet of the cleaning area. Compressed air, used for cleaning agent, application or drying, should be regulated to the lowest practical pressure. Use of a stiff bristle brush rather than a steel brush is recommended if cleaning agents do not remove excess grease and grime during spraying.

A recommended procedure for cleaning an engine and accessories is as follows:

### CAUTION

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

- a. Remove engine cowling.
- b. Carefully cover the coupling area between the vacuum pump and the engine drive shaft so that no cleaning solvent can reach the coupling or seal.
- c. Cover the open end of the vacuum discharge tube.
- d. Cover the vacuum relief valve filter, if installed in the engine compartment.
- e. Use fresh water for wash-down when the engine is contaminated with salt or corrosive chemicals. A cleaning agent such as described previously may then be used to remove oil and grime.

### CAUTION

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

- f. Thoroughly rinse with clean warm water to remove all traces of cleaning agents.

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### CAUTION

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.

- g. Completely dry engine and accessories using clean, dry compressed air.
- h. Remove the cover over the coupling area.
- i. Remove the cover from the vacuum discharge tube.
- j. Remove the cover from the vacuum relief valve filter, if installed.
- k. 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.
- l. Reinstall engine cowling.

### WARNING

For maximum safety, check that the magneto switches are OFF, the throttle is closed, the mixture control is in the idle cut-off position, and the airplane is secured before rotating the propeller by hand. Do not stand within the arc of the propeller blades while turning the propeller.

- m. Before starting engine, rotate the propeller by hand no less than four complete revolutions.

### CAUTION

Particular care should be given to electrical equipment before cleaning. Solvent should not be allowed to enter magnetos, starter, alternator, voltage regulator, and the like. Hence, these components should be protected before saturating the engine with solvent. Any fuel, oil, and air openings should be covered before washing the engine with solvent. Caustic cleaning solutions should not be used. After cleaning engine, relubricate all control arms and moving parts.

- 2-35A. **VALVES AND VALVE GUIDES.** Operating with any of the following conditions present can promote deposit build-up reducing valve guide clearance and resulting in valve sticking:

- a. Contaminated, dirty engine oil supply.
- b. High ambient temperatures.
- c. Slow flight with reduced cooling.
- d. High lead content of fuel.

If any of the above is present or valve hesitation or engine missing is observed, then inspection and cleaning is recommended. Field experience has shown that valve guide cleaning is beneficial for reducing valve sticking when accomplished every 500 to 1000 hours, depending on individual engine operating conditions. (Refer to Lycoming Service Instruction 1425 for suggested maintenance procedures).

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- 2-36. **UPHOLSTERY AND INTERIOR.** Keeping the upholstery and interior trim clean prolongs upholstery fabric and interior trim life. To clean the interior, proceed as follows:
- a. Empty all ash trays and refuse containers.
  - b. Brush or vacuum clean the upholstery and carpet to remove dust and dirt.
  - c. Wipe leather and plastic trim with a damp cloth.
  - d. Soiled upholstery fabrics and carpet may be cleaned with a foam-type detergent used according to manufacturer's instructions.
  - e. Oil spots and stains may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place in the fabric to be cleaned. Never saturate the fabric with volatile solvent; it may damage the padding and backing material.

### NOTE

Repair kits are available for the repair of cracks in ABS, PBC, PVCP, graphite and fiberglass material. (Contact a Cessna Service Station for information or to order.)

- 2-37. **PROPELLER.** Wash hub and blade with a soft cloth and Stoddard cleaning solvent or equivalent, then dry thoroughly with compressed air. The propeller should be wiped occasionally with an oily cloth, then wiped with a dry cloth. In salt water areas this will assist in corrosion proofing the propeller.
- 2-38. **WHEELS.** The wheels should be washed periodically and examined for corrosion, chipped paint, and cracks or dents in the wheel halves or in the flanges or hubs. If defects are found, remove and repair in accordance with Section 5. Discard cracked wheel halves, flanges or hubs and install new parts.
- 2-39. **LUBRICATION.**
- 2-40. Lubrication requirements are shown in figure 2-5. Before adding grease to grease fittings, wipe dirt from fitting. Lubricate until grease appears around parts being lubricated, and wipe excess grease from parts. The following paragraphs supplement figure 2-5 by adding details.

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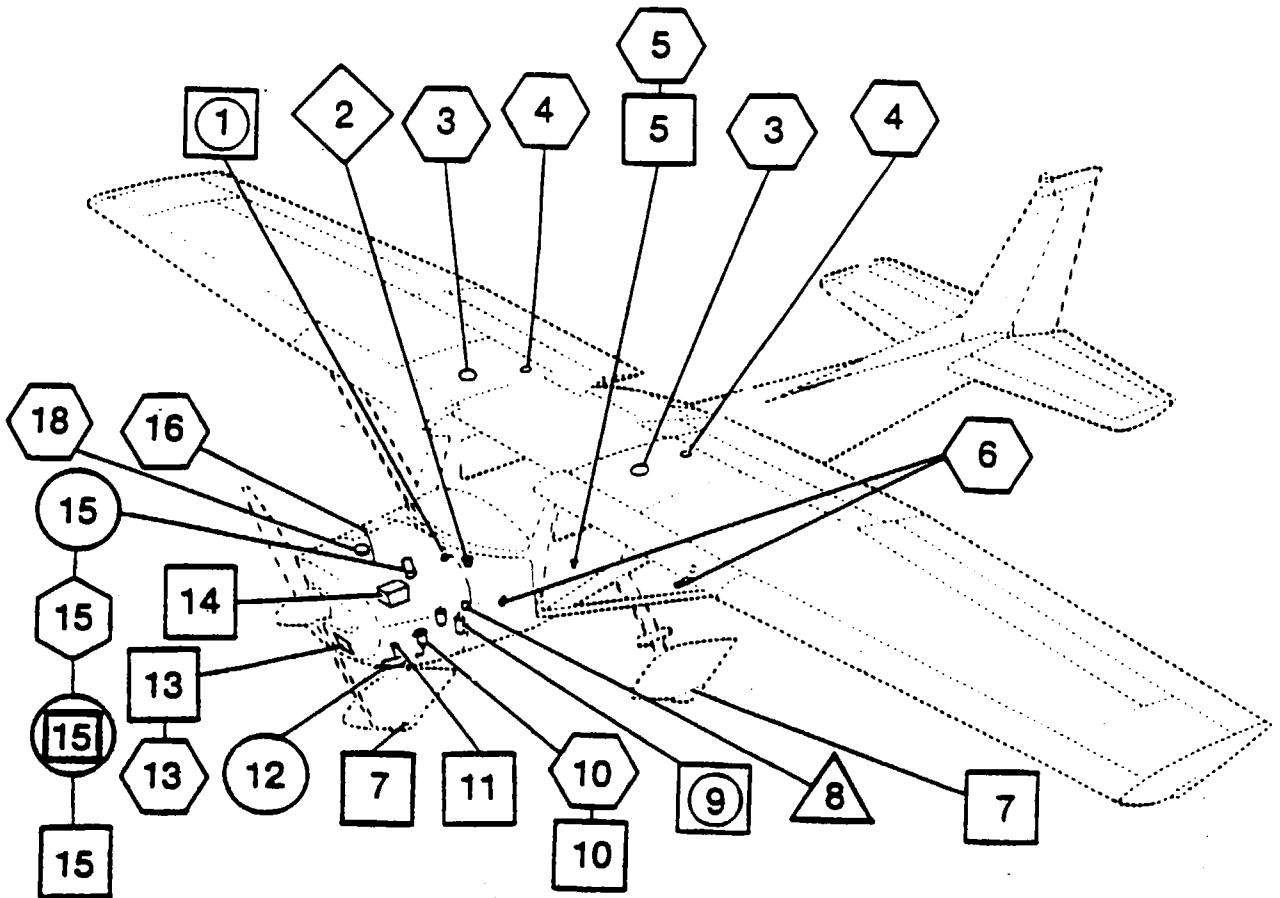
- 2-41. TACHOMETER DRIVE SHAFT. Refer to Section 15.
- 2-42. WHEEL BEARINGS. Clean and repack the wheel bearings at the first 100-hour inspection and at each 500-hour inspection thereafter. If more than the usual number of takeoffs and landings are made, extensive taxiing is required, or the aircraft is operated in dusty areas or under seacoast conditions, cleaning and lubrication of the wheel bearings shall be accomplished at each 100-hour inspection.
- 2-43. NOSE GEAR TORQUE LINKS. Lubricate nose gear torque links every 50 hours. When operating in dusty conditions, more frequent lubrication is required.
- 2-44. WING FLAP ACTUATOR. Clean and lubricate wing flap actuator jack screw each 100 hours as follows:
  - a. Expose jack screw by operating flaps to full down position.
  - b. Clean jack screw threads with solvent rag and dry with compressed air.

### NOTE

It is not necessary to remove actuator from aircraft to clean or lubricate threads.

- c. With oil can, apply light coat of No. 10 weight nondetergent oil to threads of jack screw.
- 2-45. ROD END BEARINGS. Periodic inspection and lubrication is required to prevent corrosion of the bearing in the rod end. At each 100-hour inspection, disconnect the control rods at the aileron, flap and nose gear steering tubes, and inspect each rod end for corrosion. If no corrosion is found, wipe the surface of the rod end balls with general purpose oil and rotate ball freely to distribute the oil over its entire surface and connect the control rods to their respective units. If corrosion is detected during the inspection, install new rod ends.

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**HYDRAULIC FLUID: SPEC. NO. MIL-H-5606**

**SPECIFIED AVIATION GRADE FUELS:**

**WARNING**

**ONLY AVIATION GRADE FUELS ARE APPROVED FOR USE.**

ENGINE MODEL	APPROVED FUEL GRADES	NOTES
LYCOMING O-235-L2C	100LL (blue) or 100 (green) (formerly 100/130)	1, 2, 3
LYCOMING O-235-N2C	100LL (blue) or 100 (green) (formerly 100/130)	1, 2, 3

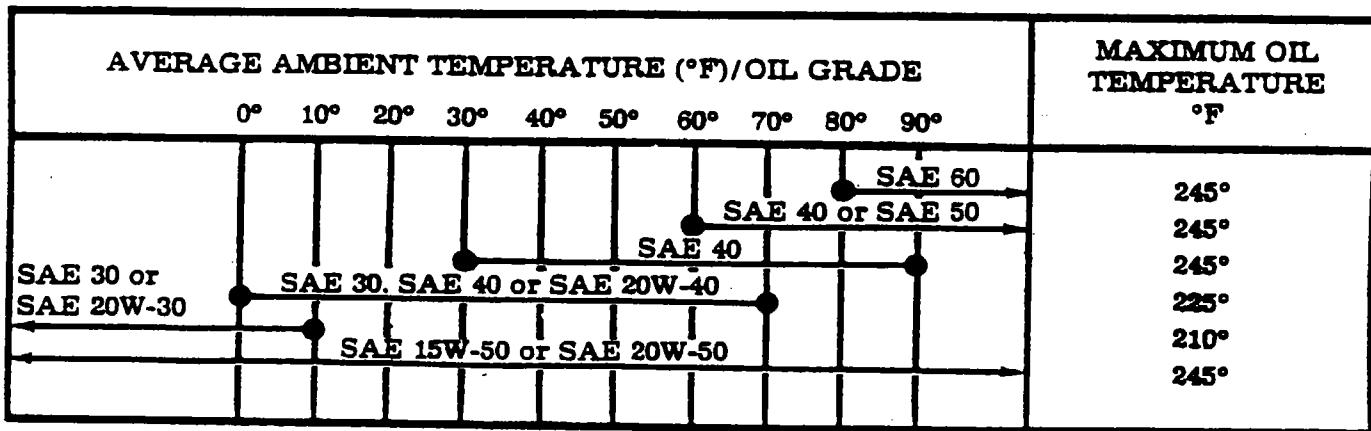
Figure 2-4. Servicing (Sheet 1 of 5)

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## NOTES

1. Compliance with Avco Lycoming Instructions No. 1070, and all revision thereto, must be accomplished.
2. While both 100LL or 100 grade fuels are approved, tests conducted for lead fouling characteristics of the Lycoming O-235 engine indicate that use of 100 Low Lead fuel significantly improves spark plug life and reduces spark plug cleaning requirements. It is recommended that 100LL fuel be used in lieu of 100 grade fuel whenever possible.
3. TCP (Tri-cresyl-phosphate) is a fuel additive used as a "lead fouling inhibitor" for non-turbocharged Lycoming engines. Fuel system components in Cessna aircraft exhibit no detrimental effects from use of TCP when mixed with aviation fuels in accordance with blending table shown in figure 2-2B.

## SPECIFIED AVIATION GRADE OIL:



Refer to paragraph 2-21.

## NOTE

The overlap of oil grades is based on a mid-range of ambient ground temperatures vs. maximum oil inlet temperature. Aviation Grade ashless dispersant oil conforming to Avco Lycoming Service Instruction No. 1014, and all revisions and supplements thereto, MUST BE USED except as noted in paragraph 2-21 herein.

Oil capacities for the aircraft are given in the following chart. To minimize loss of oil through the breather, fill to specified oil level on dipstick for normal operation (flight of less than three hours duration). For extended flight, fill to FULL mark on dipstick. Do not operate with less than MINIMUM FOR FLIGHT quantities listed. If an external oil filter is installed, one additional quart of oil is required when filter is changed.

CAPACITY (TOTAL)	CAPACITY (TOTAL WITH FILTER)	NORMAL OPERATION	MINIMUM FOR FLIGHT
6	7	5	4

Figure 2-4. Servicing (Sheet 2 of 5)

# MODEL 152 SERIES SERVICE MANUAL



DAILY

## 3 FUEL TANK FILLER

Service after each flight. Keep full to retard condensation. Refer to paragraph 2-18 for details.

## 4 FUEL TANK SUMP DRAINS

Drain off any water and sediment before first flight of the day.

## 6 PITOT AND STATIC PORTS

Check for obstructions before first flight of the day.

## 10 FUEL STRAINER

Drain off any water and sediment before first flight of the day. Refer to paragraph 2-19 for details.

## 13 INDUCTION AIR FILTER

Inspect and service under dusty conditions. Refer to paragraph 2-23 for details.

## 16 OIL DIPSTICK

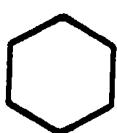
Check on preflight. Add oil as necessary. Refer to paragraph 2-21 for details. Check that filler cap is tight and oil filler is secure.

## 18 OIL FILLER CAP

Whenever oil is added, check that filler cap is tight and oil filler door is secure.

## 5 FUEL LINE DRAIN TEE

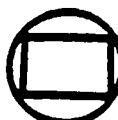
Drain off any water or sediment. Refer to paragraph 2-19.



FIRST 25 HOURS

## 15 ENGINE OIL SYSTEM

Drain engine oil sump, clean oil pressure screen, or if equipped, replace oil filter. Refill with straight mineral oil. Refer to paragraph 2-21.



FIRST 50 HOURS

## 15 ENGINE OIL SYSTEM

Drain engine oil sump, clean oil pressure screen, or if equipped, replace oil filter. Refill with ashless dispersant oil. Refer to paragraph 2-21.



50 HOURS

## 15 ENGINE OIL SYSTEM (WHEN NOT EQUIPPED WITH EXTERNAL OIL FILTER)

Drain engine sump, clean oil pressure screen, and refill with ashless dispersant oil.

### NOTE

Refer to 100-hour servicing interval when equipped with an external oil filter.

Figure 2-4. Servicing (Sheet 3 of 5)

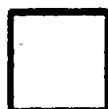
# MODEL 152 SERIES SERVICE MANUAL

## NOTE

Engine oil contamination increases possibility of sticking and/or stuck valves. More frequent oil and filter changes (50-hour) will minimize accumulation of harmful contaminants. When the aircraft cannot be flown frequently, the oil and filter should be changed sooner than 50 hour interval. Change oil and filter every 25 hours to eliminate moisture and acids that collect in oil of an inactive engine.

### 12 NOSE GEAR SHIMMY DAMPENER

Check fluid level and refill as required with hydraulic fluid. Refer to paragraph 2-28 for details.



100 HOURS

### 11 NOSE GEAR SHOCK STRUT

Keep strut filled and inflate to correct pressure. Refer to paragraph 2-27 for details.

### 13 INDUCTION AIR FILTER

Clean filter per paragraph 2-23. Replace as required.

### 14 BATTERY

Check electrolyte level each 100 hours or each 30 days, whichever comes first.

### 7 TIRES

Maintain correct tire inflation as listed in figure 1-1. Refer to paragraph 2-26 for details.

### 5 FUEL LINE DRAIN TEE

Drain off any water or sediment. Refer to paragraph 2-19.

### 10 FUEL STRAINER

Disassemble and clean strainer bowl and screen.

### 15 ENGINE OIL SYSTEM

Drain engine oil sump, clean oil pressure screen, change oil filter, or if equipped replace oil filter. Refill with ashless dispersant oil.

Change engine oil at least every 6 months, even though the recommended hours have not accumulated.

## NOTE

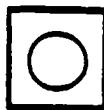
Refer to 50 hour servicing interval when not equipped with an external oil filter.

## NOTE

Engine oil contamination increases possibility of sticking and/or stuck valves. More frequent oil and filter changes (50-hour) will minimize accumulation of harmful contaminants. When the aircraft cannot be flown frequently, the oil and filter should be changed sooner than 50 hour interval. Change oil and filter every 25 hours to eliminate moisture and acids that collect in oil of an inactive engine.

Figure 2-4. Servicing (Sheet 4 of 5)

## MODEL 152 SERIES SERVICE MANUAL



200 HOURS

**1 VACUUM RELIEF VALVE FILTER**

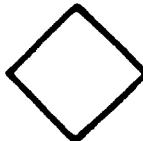
Remove, discard, and replace new filter every 200 hours.

**2 VACUUM SYSTEM CENTRAL AIR FILTER**

Inspect for damage.

**9 BRAKE MASTER CYLINDERS**

Check fluid level and refill as required with hydraulic fluid. Refer to paragraph 2-28 for details. Landing gear brake master cylinders used prior to 1979 still require overhaul every five years to replace rubber components. Refer to Section 5.



500 HOURS

**2 VACUUM SYSTEM CENTRAL AIR FILTER**

Replace every 500 hours.



AS REQUIRED

**8 GROUND SERVICE RECEPTACLE**

Connect to 24-volt DC, negative-ground power unit. Refer to Section 11 for details.

Figure 2-4. Servicing (Sheet 5 of 5)

# MODEL 152 SERIES SERVICE MANUAL

FREQUENCY (HOURS)

50

100

500

1000

## METHOD OF APPLICATION



HAND  
GUN



GREASE



OIL  
CAN



SYRINGE

(FOR POWDERED  
GRAPHITE)

WHERE NO INTERVAL IS SPECIFIED, LUBRICATE  
AS REQUIRED AND WHEN ASSEMBLED OR  
INSTALLED.

## NOTE

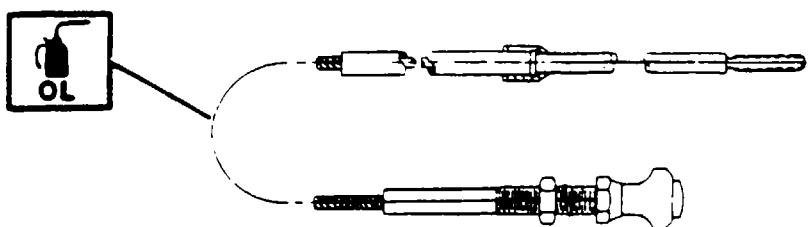
The military specifications listed are not mandatory, but are intended as guides in choosing satisfactory materials. Products of most reputable manufacturers meet or exceed these specifications.

## LUBRICANTS

PG- SS-G-659 .....	POWDERED GRAPHITE
GR- MIL-G-81322A.....	GENERAL PURPOSE GREASE
GH- MIL-G-23827A.....	AIRCRAFT AND INSTRUMENT GREASE
GL- MIL-G-21164C.....	HIGH AND LOW TEMPERATURE GREASE
OG- MIL-L-7870A .....	GENERAL PURPOSE OIL
PL- VV-P-236 .....	PETROLATUM
GP- .....	NO. 10-WEIGHT, NON-DETERGENT OIL
OL- VV-L-800A .....	LIGHT OIL

Figure 2-5. Lubrication (Sheet 1 of 5)

## MODEL 152 SERIES SERVICE MANUAL



### \* ENGINE CONTROLS

\* USE NO LUBRICANT UNDER EXTREME DUSTY CONDITIONS

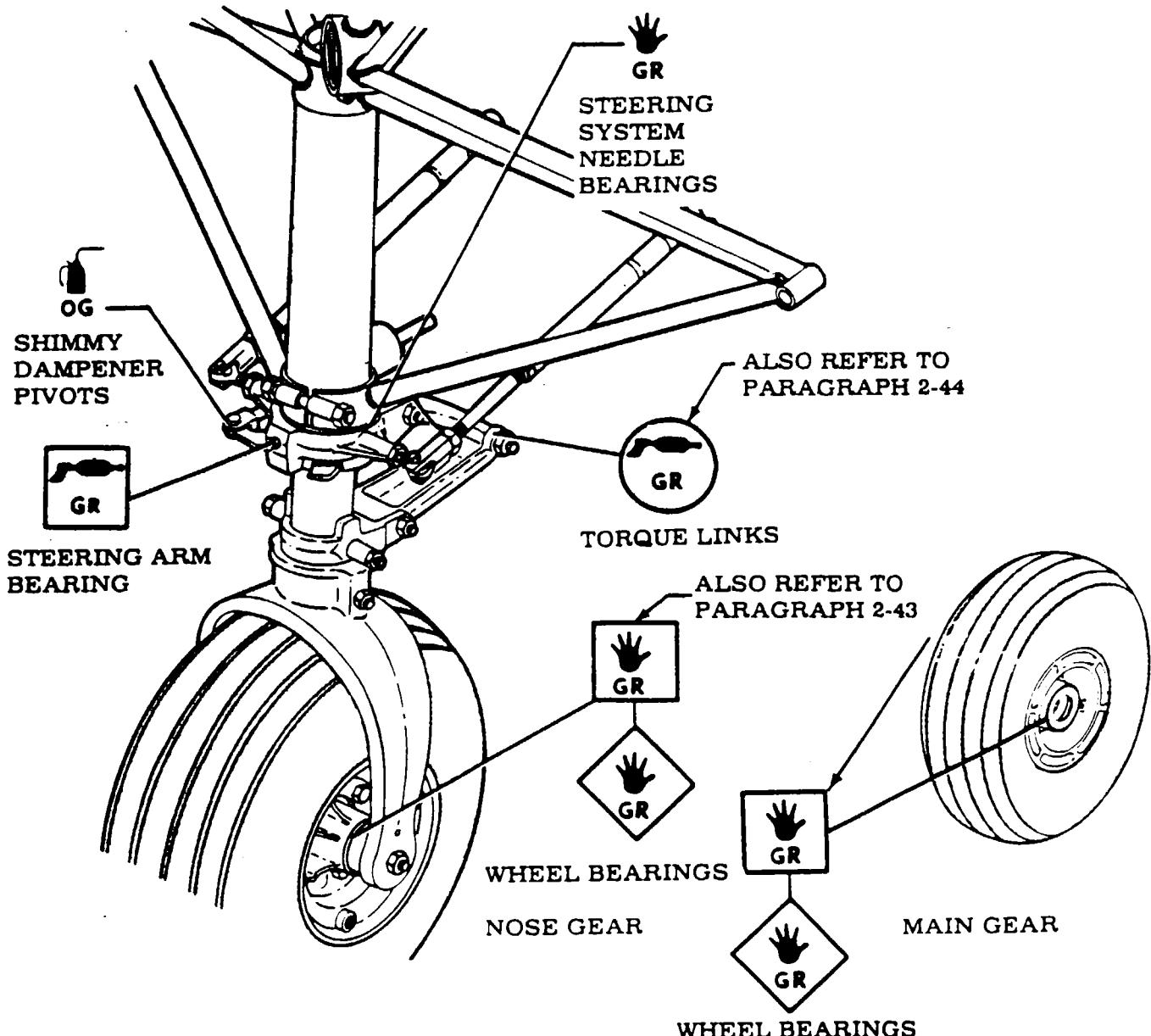


Figure 2-5. Lubrication (Sheet 2 of 5)

## MODEL 152 SERIES SERVICE MANUAL

**BUSHINGS AND  
OILITE BEARINGS**



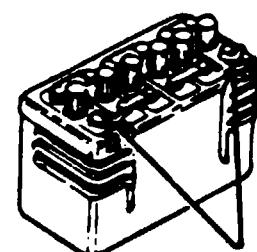
**BUSHINGS AND  
OILITE BEARINGS**



**CONTROL  
WHEEL SHAFT  
UNIVERSALS**



**BUSHINGS AND  
OILITE BEARINGS**



**BATTERY**

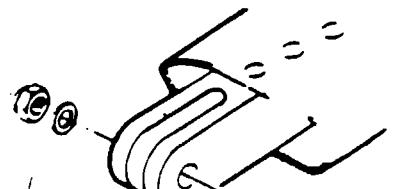


**NEEDLE BEARINGS**



**CONTROL "Y"**

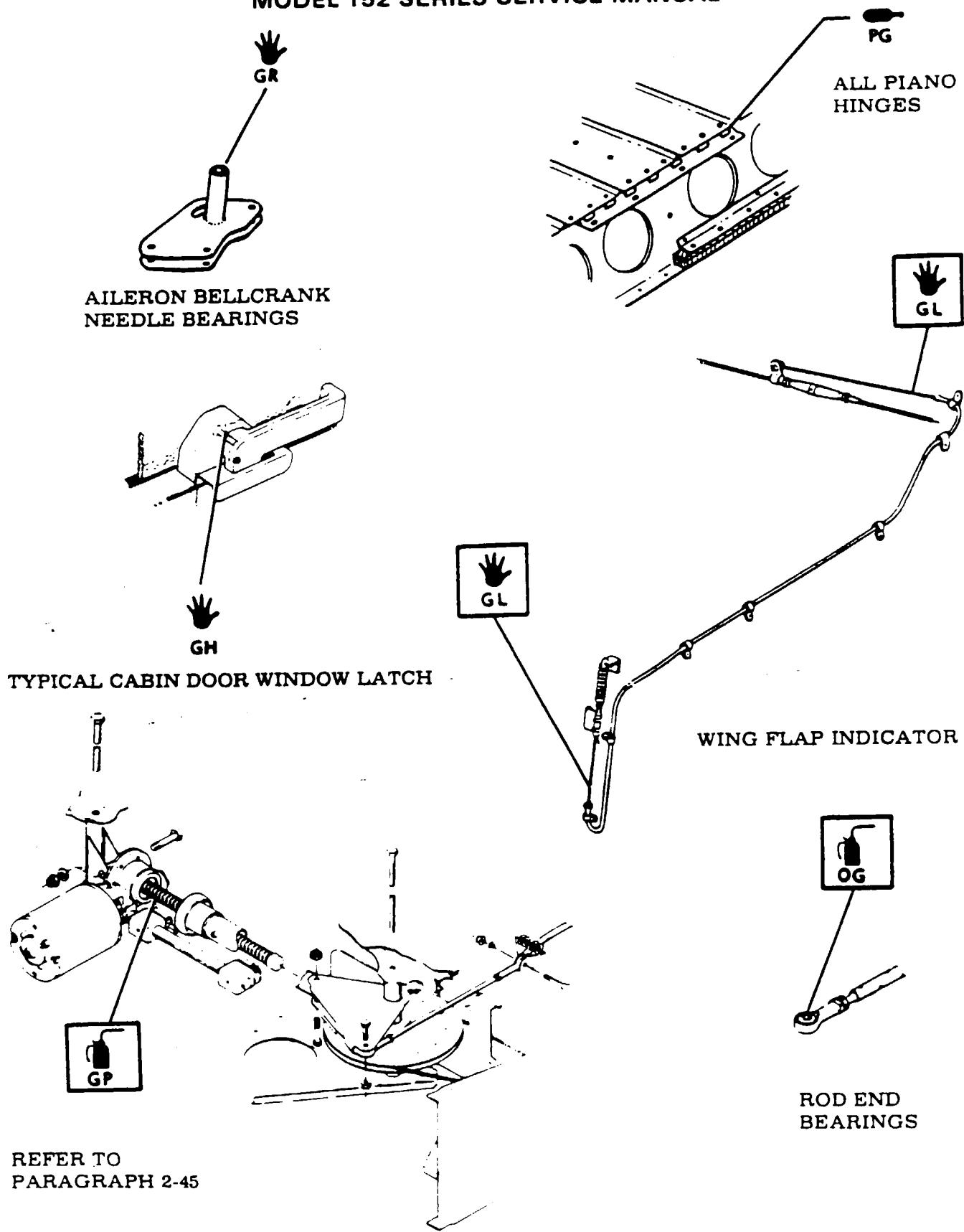
**ELEVATOR  
TRIM TAB  
ACTUATOR**



**ALSO REFER TO INSPECTION  
CHART IN THIS SECTION AND  
TO SECTION 9 OF THIS MANUAL**

**Figure 2-5. Lubrication (Sheet 3 of 5)**

MODEL 152 SERIES SERVICE MANUAL



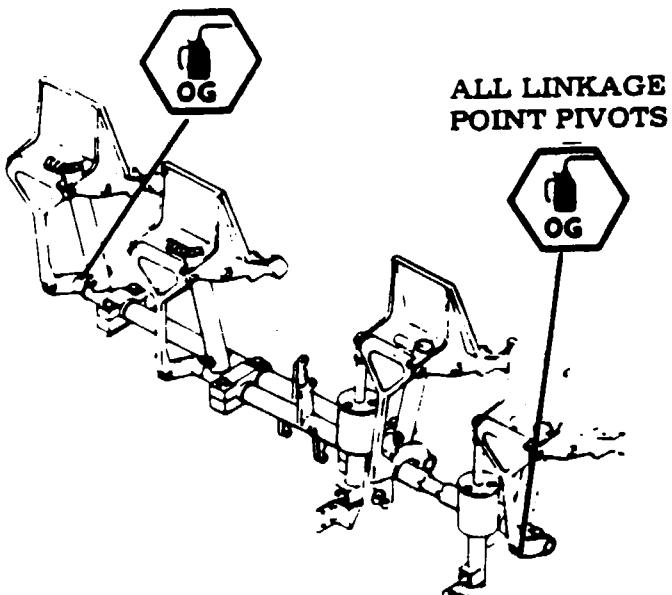
REFER TO  
PARAGRAPH 2-45

ELECTRIC FLAP  
DRIVE MECHANISM

Figure 2-5. Lubrication (Sheet 4 of 5)

## MODEL 152 SERIES SERVICE MANUAL

### OILITE BEARINGS (RUDDER BAR ENDS)



### RUDDER BARS AND PEDALS

### NOTES

Sealed bearings require no lubrication.

Do not lubricate roller chains or cables except under seacoast conditions. Wipe with a clean, dry cloth.

Lubricate unsealed pulley bearings, rod ends, Oilite bearings, pivot and hinge points, and any other friction point obviously needing lubrication, with general purpose oil every 1000 hours or more often if required.

Paraffin wax rubbed on seat rails will ease sliding the seats fore and aft.

Lubricate door latching mechanism with MIL-G-81322A general purpose grease, applied sparingly to friction points, every 1000 hours or more often, if binding occurs. No lubrication is recommended on the rotary clutch.

Figure 2-5. Lubrication (Sheet 5 of 5)

## MODEL 152 SERIES SERVICE MANUAL

- 2-46. **INSPECTION REQUIREMENTS:** As required by Federal Aviation Regulations, all aircraft must undergo a 100 hour and/or annual inspection or may be inspected in accordance with FAA approved Progressive Inspection.
- 2-47. **100 HOUR AND/OR ANNUAL INSPECTIONS:** (Refer to the Inspection Charts, Column 1.) This inspection requires each item marked with a symbol • to be inspected at each 100 hours of flight time and/or each 12th month following the last inspection recorded for the aircraft.
- 2-48. **SPECIAL INSPECTIONS:** (Refer to the Inspection Charts, Column 2.) This inspection requires each item that has a numeral inserted in the column be inspected in accordance with the corresponding numeral listed in the back of the Inspection Charts.
- 2-49. **PROGRESSIVE INSPECTIONS:** (Refer to the Inspection Charts, Column 3.) In lieu of the conventional 100 hour/annual inspection as covered in Part 91.169 of the Federal Aviation Regulations, an aircraft may be inspected in accordance with a progressive inspection. Progressive inspection allows the inspection work load to be divided into smaller operations that can be accomplished in a shorter time period and offers increased safety reliability, and utility while decreasing downtime. Aircraft on this program do not require the 100 hour/annual inspection. "Cessna Progressive Care" has been designed for this purpose. It is highly recommended for aircraft being flown 200 hours or more per year.

### NOTE

The inspection intervals shown in Column 3 are presented for comparative purposes only and SHALL NOT BE USED AS THE PROGRESSIVE CARE INSPECTION SCHEDULE. A complete program and operations manual are available for this purpose.

Cessna Progressive Care has been designed for use Worldwide. While the development of the Cessna Progressive Care Program has been coordinated primarily with the Federal Aviation Administration in the United States, program information has been forwarded to and discussed with the Governmental Aviation Agencies in many countries throughout the World. These Governments are in basic agreement with Progressive Care. Therefore, Export Agencies and Dealers are directed to contact the Governmental Aviation Agency in their areas prior to placing the first aircraft on Progressive Care, to make certain they are in basic accord with the program.

- 2-50. **INSPECTION GUIDE-LINES.** The guide-lines shown, preceding the Inspection Charts, are suggested for your use when making the detailed inspections listed in the Inspection Charts.

### INSPECTION GUIDE LINES.

- (a) **MOVABLE PARTS** 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.
- (b) **FLUID LINES AND HOSES** for: leaks, cracks, dents, kinks, chafing, proper radius, security, corrosion, deterioration, obstruction and foreign matter.
- (c) **METAL PARTS** for: security of attachment, cracks, metal distortion, broken spot-welds, corrosion, condition of paint and any other apparent damage.

## MODEL 152 SERIES SERVICE MANUAL

- (d) WIRING for security, chafing, burning, defective insulation, loose or broken terminals, heat deterioration and corroded terminals.
- (e) BOLTS IN CRITICAL AREAS for: correct torque in accordance with torque values given in the chart in Section 1, when installed or when visual inspection indicates the need for a torque check.
- (f) FILTERS, SCREENS & FLUIDS for: cleanliness, contamination and/or replacement at specified intervals.
- (g) AIRCRAFT FILE.

Miscellaneous data, information and licenses are a part of the aircraft 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 United States Federal Aviation Regulations. Since the regulations of other nations may require other documents and data, owners of exported aircraft should check with their own aviation officials to determine their individual requirements.

To be displayed in the aircraft at all times:

1. Aircraft Airworthiness Certificate (FAA Form 8100-2).
2. Aircraft Registration Certificate (FAA Form 8050-3).
3. Aircraft Radio Station License, if transmitter is installed (FCC Form 556).

To be carried in the aircraft at all times:

1. Weight and Balance, and associated papers (Latest copy of the Repair and Alteration Form, FAA Form 337, if applicable).
2. Aircraft Equipment List.
3. Pilot's Operating Handbook.

To be made available upon request:

1. Aircraft Log Book and Engine Log Book.

## MODEL 152 SERIES SERVICE MANUAL

### (h) ENGINE RUN-UP.

Before beginning the step-by-step inspection, start, runup and shut down the engine in accordance with instructions in the Pilot's Operating Handbook. During the run-up observe the following, making note of any discrepancies or abnormalities:

1. Engine temperatures and pressures.
2. Static RPM. (Also refer to Section 11 of this manual.)
3. Magneto drop. (Also refer to Section 11 of this manual.)
4. Engine response to changes in power.
5. Any unusual engine noises.
6. Fuel shutoff valve; operate engine long enough to ensure shutoff valve functions properly.
7. Idling speed and mixture; proper idle cut-off.
8. Alternator and ammeter.
9. Suction gage.

After the inspection has been completed, an engine run-up should again be performed to determine that any discrepancies or abnormalities have been corrected.

# MODEL 152 SERIES SERVICE MANUAL

## INSPECTION CHARTS

### IMPORTANT

READ ALL PRECEDING PARAGRAPHS FOR  
INSPECTION REQUIREMENTS PRIOR TO USING  
THESE CHARTS.

TYPE OF INSPECTION
<b>3. PROGRESSIVE/INTERVAL HRS.</b>
<b>2. SPECIAL</b>
<b>1. 100 HR/ANNUAL</b>

### PROPELLER

1. Spinner .....	●	100
2. Spinner bulkhead .....	●	200
3. Blades.....	●	100
4. Bolts and/or nuts .....	●	200
5. Hub .....	●	200

### ENGINE COMPARTMENT

Check for evidence of oil and fuel leaks, then clean entire engine compartment, if needed, prior to inspection.

1. Engine oil, filler cap, dipstick, drain plug and external filter element .....	●	100
2. Oil cooler .....	●	100
3. Induction air filter .....	●	100
4. Induction airbox, air valves, doors and controls.....	●	100
5. Cold and hot air hoses .....	●	200
6. Engine baffles .....	●	100
7. Cylinders, rocker box covers and push rod housings	●	100
8. Crankcase, oil sump, accessory section and front crankshaft seal .....	●	100
9. Hoses, metal lines and fittings.....	●	2 100
10. Intake and exhaust systems .....	●	3 100
10A. Exhaust valves and guides .....	●	24 400
11. Ignition harness .....	●	100
12. Spark plugs .....	●	100

Figure 2-6. Inspections (Sheet 1 of 5)

## MODEL 152 SERIES SERVICE MANUAL

	<b>TYPE OF INSPECTION</b>	
(Refer to Para. 2-50)	<b>3. PROGRESSIVE/INTERVAL HRS.</b>	
(Refer to Para. 2-49)	<b>2. SPECIAL</b>	
(Refer to Para. 2-48)	<b>1. 100 HR/ANNUAL</b>	
13. Compression check .....	●	200
14. Crankcase and vacuum system breather lines.....	●	200
15. Electrical wiring.....	●	100
16. Vacuum pump .....	●	100
17. Vacuum relief valve filter .....	●	20
18. Engine controls and linkage .....	●	5
19. Engine shock mounts, mount structure and ground straps .....	●	100
20. Cabin heat valves, doors and controls .....	●	200
21. Starter, solenoid and electrical connections .....	●	100
22. Starter brushes, brush leads and commutator .....	●	6
23. Alternator mounting bracket .....	●	500
24. Alternator, belt and electrical connections .....	●	100
25. Alternator brushes, brush leads, commutator or slip ring .....	●	15
26. Voltage regulator mounting and electrical leads .....	●	6
27. Magnetos (externally) and electrical connections ...	●	100
28. Magnetos (internally) .....	●	18
29. Magneto timing .....	●	23
30. Carburetor and drain plug .....	●	7
31. Firewall .....	●	100
32. Engine cowling .....	●	200
33. Tappet clearance .....	●	100
34. Vacuum system central air filter .....	●	14
	●	21
	●	200
<b>FUEL SYSTEM</b>		
1. Fuel strainer, drain valve and control .....	●	100
2. Fuel strainer screen and bowl .....	●	100
3. Fuel tank vents, caps and placards .....	●	100
4. Fuel tanks, sump drains and fuel line drains .....	●	100
5. Drain fuel and check tank interior, attachment and outlet screens .....	●	4

Figure 2-6. Inspections (Sheet 2 of 5)

## MODEL 152 SERIES SERVICE MANUAL

	<b>TYPE OF INSPECTION</b>	
(Refer to Para. 2-50)	<b>3. PROGRESSIVE/INTERVAL HRS.</b>	
(Refer to Para. 2-49)	<b>2. SPECIAL</b>	
(Refer to Para. 2-48)	<b>1. 100 HR/ANNUAL</b>	
6. Fuel vent valves .....	●	200
7. Fuel vent line drain .....	●	200
8. Fuel shutoff valve and placards .....	●	100
9. Fuel valve drain plug .....	●	200
10. Engine primer .....	●	100
 <b>LANDING GEAR</b>		
1. Main gear wheel and fairings.....	●	13
2. Nose gear wheel, torque links, steering rods, boots and fairing.....	●	13
3. Wheel bearings .....	●	8
4. Nose gear strut and shimmy dampener.....	●	100
5. Tires .....	●	100
6. Brake fluid, lines and hoses, linings, discs, brake assemblies and master cylinders .....	●	17
7. Parking brake system .....	●	200
8. Main gear springs .....	●	200
 <b>AIRFRAME</b>		
1. Aircraft exterior .....	●	100
2. Aircraft structure .....	●	22
3. Windows, windshield, doors and seals .....	●	100
4. Seat belts and shoulder harnesses .....	●	100
5. Seat stops, seat rails, upholstery, structure and mounting .....	●	19
6. Control 'Y' bearings, sprockets, pulleys, cables, chains and turnbuckles .....	●	200
7. Control lock, control wheel and control 'Y' mechanism.....	●	200

Figure 2-6. Inspections (Sheet 3 of 5)

# MODEL 152 SERIES SERVICE MANUAL

## FUEL SYSTEM (Continued from page 2-38)

	<b>TYPE OF INSPECTION</b>
	3. PROGRESSIVE/INTERVAL HRS.
(Refer to Para. 2-50)	2. SPECIAL
(Refer to Para. 2-49)	1. 100 HR/ANNUAL
(Refer to Para. 2-48)	
11. For airplanes equipped with a Stewart Warner manufactured fuel quantity indicating system, perform a fuel indicating system accuracy test. Refer to Cessna Service Bulletin SEB99-18, Fuel Quantity Indicating System Inspection (or latest revision) for detailed accomplishment instructions. ....	25

## MODEL 152 SERIES SERVICE MANUAL

<b>TYPE OF INSPECTION</b>		
<b>3. PROGRESSIVE/INTERVAL HRS.</b>		
<b>2. SPECIAL</b>		
<b>1. 100 HR/ANNUAL</b>		
8. Instruments and markings.....	●	100
9. Gyros central air filter.....	●	200
10. Magnetic compass compensation .....	●	200
11. Instrument wiring and plumbing .....	●	200
12. Instrument panel, shockmounts, ground straps, cover, decals and labeling .....	●	200
13. Defrosting, heating and ventilating systems and controls .....	●	100
14. Cabin upholstery, trim, sunvisors and ash trays .....	●	200
15. Area beneath floor, lines, hose, wires and control cables .....	●	200
16. Lights, switches, circuit breakers, fuses and spare fuses.....	●	10
17. Exterior lights .....	●	100
18. Pitot and static systems .....	●	200
19. Stall warning system .....	●	200
20. Radios, radio controls, avionics and flight instruments.....	●	100
21. Antennas and cables.....	●	200
22. Battery, battery box and battery cables.....	●	100
23. Emergency locator transmitter .....	●	100

### CONTROL SYSTEMS

In addition to the items listed below, always check for correct direction of movement, correct travel and correct cable tension.

1. Cables, terminals, pulleys, pulley brackets, cable  
guards, turnbuckles and fairleads .....
2. Chains, terminals, sprockets and chain guards.....
3. Trim control wheels, indicators, actuator and bungee .....
4. Travel stops .....

Figure 2-6. Inspections (Sheet 4 of 5)

## MODEL 152 SERIES SERVICE MANUAL

TYPE OF INSPECTION	
<u>3. PROGRESSIVE/INTERVAL HRS.</u>	
<u>2. SPECIAL</u>	
<u>1. 100 HR/ANNUAL</u>	
5. Decals and labeling .....	● 200
6. Flap control switch, flap rollers and tracks, flap indicator .....	● 100
7. Flap motor, transmission, limit switches, structure, linkage, bellcranks, etc.....	● 200
8. Elevator and trim tab hinges, tips and control rods .	● 100
9. Elevator trim tab actuator lubrication .....	● 11
10. Elevator trim tab free-play inspection .....	● 12
11. Rudder pedal assemblies and linkage .....	● 200
12. Skins (external) of control surfaces and tabs .....	● 100
13. Internal structure of control surfaces.....	● 200
14. Balance weight attachment .....	● 200
15. Ailerons, hinges and push-pull rods.....	● 200
16. Vertical fin attach brackets.....	● 200

Figure 2-6. Inspections (Sheet 5 of 5)

## MODEL 152 SERIES SERVICE MANUAL

### SPECIAL INSPECTION ITEMS

- 1 Clean filter per paragraph 2-22. Replace as required.
- 2 Replace engine compartment rubber hoses (Cessna installed only) every 5 years or at engine overhaul, whichever occurs first. This does not include drain hoses. Hoses which are beyond these limits and are in a serviceable condition, must be placed on order immediately and then be replaced within 120 days after receiving the new hose(s) from Cessna. Replace drain hoses on condition. Engine flexible hoses (Avco Lycoming installed) (Refer to Avco Lycoming Engine Maintenance Manual and Avco Lycoming Engine Service Bulletins).
- 3 Refer to Section 11 for 100 hour inspection procedures.
- 4 Each 1000 hours, or to coincide with engine overhauls.
- 5 Each 100 hours for general conditions and freedom of movement. These controls are not repairable. Replace every 1500 hours or whenever maximum linear movement exceeds .050 inch.
- 6 Inspect each 500 hours.
- 7 MAGNETO-TO-ENGINE TIMING: Serials Thru 15284027 & A1520914, first 25 hours, first 50 hours, first 100 hours, and thereafter at each 100 hours; Beginning with Serials 15284028 & A1520915, first 100 hours and each 100 hours thereafter, the magneto-to-engine timing should be checked. Refer to Section 11.
- 8 First 100 hours and each 500 hours thereafter. More often if operated under prevailing wet or dusty conditions.
- 9 Replace each 500 hours.
- 10 Refer to Section 16 of this Manual for inspection procedure.
- 11 Lubrication of the actuator is required each 1000 hours or 3 years, whichever comes first.
- 12 Refer to Section 9 of this Manual for free-play limits, inspection, replacement and/or repair.
- 13 If aircraft is flown from surfaces with mud, snow or ice, the speed fairings should be checked that there is no accumulation which could prevent normal wheel rotation.
- 14 Refer to Avco Lycoming Service Overhaul Manual and Avco Lycoming Service Instruction No. 1068, and any applicable Service Bulletins or Service Letters, for further recommendations.
- 15 Refer to Section 16.
- 16 Compliance with Service Letter No. SE78-62, SE79-49, and all Supplements thereto is required.
- 17 Each 5 years, replace all hoses, packings and back-up rings in the brake system.

## MODEL 152 SERIES SERVICE MANUAL

- 18 Following 800 hour replacement of original magnetos, refer to Section 11 of this Manual and Slick 4200/6200 Series Aircraft Magnetos Maintenance and Overhaul Instructions Bulletin, and all revisions and supplements thereto, for 500 hour inspection requirements.
- 19 Inspect seat rails for cracks every 50 hours. Refer to figure 3-10.
- 20 Remove and replace with new filter every 200 hours.
- 21 Inspect for damage every 200 hours; replace every 500 hours.
- 22 Vertical fin attachment each annual or 100 hour inspection. However, it is recommended nutplates used to attach vertical fin be inspected after each 100 operational hours. Refer to paragraph 4-14A for detailed instructions.
- 23 Each 500 hours. Inspect contact points. Inspect carbon brush, high tension lead, and distributor block. Inspect impulse, coupling, and pawls. Replace as required. Inspect and lubricate bearings and contact point cam. Refer to Slick 4300/6300 Series Aircraft Maintenance and Overhaul Instructions Bulletin and all revisions and supplements thereto.
- 24 Each 400 hours. Refer to Textron Lycoming Mandatory Service Bulletin No. 388B, Procedure to Determine Exhaust Valve and Guide Condition, and all revisions and supplements thereto, for 400-hour inspection requirements.

## MODEL 152 SERIES SERVICE MANUAL

### SPECIAL INSPECTION ITEMS (Continued from page 2-42)

25. Fuel quantity indicating system accuracy test is required every 12 months. Refer to Cessna Service Bulletin SEB99-18, Fuel Quantity Indicating System Inspection (or latest revision) for detailed accomplishment instructions.

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 3

### FUSELAGE

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Cracks .....	1C22/3-5	Auxiliary .....	1D11/3-18
Windshield .....	1C22/3-5	Description .....	1D11/3-18
Removal .....	1C22/3-5	Removal/Installation .....	1D11/3-18
Installation .....	1C22/3-5	Repair .....	1D11/3-18
Windows .....	1D2/3-9	Cabin Upholstery .....	1D11/3-18
Movable .....	1D2/3-9	Materials and Tools .....	1D11/3-18
Removal/Installation .....	1D2/3-9	Soundproofing .....	1D11/3-18
Wrap-Around Rear .....	1D2/3-9	Cabin Headliner .....	1D11/3-18
Removal/Installation .....	1D2/3-9	Removal/Installation .....	1D13/3-20
Overhead .....	1D2/3-9	Upholstery Side Panels .....	1D13/3-20
Removal/Installation .....	1D2/3-9	Carpeting .....	1D13/3-20
Cabin Doors .....	1D2/3-9	Baggage Compartment .....	1D13/3-20
Removal/Installation .....	1D2/3-9	Upholstery .....	1D13/3-20
Adjustment .....	1D5/3-12	Safety Provisions .....	1D13/3-20
Weatherstrip .....	1D5/3-12	Cargo Tie-Downs .....	1D13/3-20
Wedge Adjustment .....	1D5/3-12	Safety Belts .....	1D13/3-20
Latches .....	1D5/3-12	Shoulder Harness .....	1D13/3-20
Description .....	1D5/3-12	Inertia Reel Mirror .....	1D13/3-20
		Rear View Mirror .....	1D13/3-20
		Seat Rail Inspection .....	1D17/3-24

#### 3-1. FUSELAGE.

#### 3-2. WINDSHIELD AND WINDOWS.

3-3. **DESCRIPTION.** The windshield and windows are single-piece, acrylic panels set in sealing strips and held by formed retaining strips, secured to the fuselage with screws and rivets. Isocryl 5603 sealant (TMK01 Kit; contact a Cessna Service Station) used in conjunction with a felt seal is applied to all edges of windshield and windows with exception of the wing root area. The wing root fairing has a heavy felt strip which completes the windshield sealing.

#### 3-4. CLEANING. (Refer to Section 2.)

3-5. **WAXING.** Waxing will fill in minor scratches in clear plastic and help protect the surface from further abrasion. Use a good grade of commercial wax applied in a thin, even coat. Bring wax to a high polish by rubbing lightly with a clean, dry flannel cloth.

3-6. **REPAIR.** Replace extensively damaged transparent plastic rather than repair whenever possible, since even a carefully patched part is not the equal of a new section, either optically or structurally. At the first sign of crack development, drill a small hole at the extreme end of the crack as shown in figure 3-1. This serves to localize the cracks and to prevent further splitting by distributing the strain over a large area. If the cracks are small, stopping them

## MODEL 152 SERIES SERVICE MANUAL

with drilled holes will usually suffice until replacement or more permanent repair can be made. The following repairs are permissible; however, they are not to be located in the pilot's line of vision during landing or normal flight.

- a. SURFACE PATCH. If a surface patch is to be installed, trim away the damaged area and round all corners. Cut a piece of plastic of sufficient size to cover the damaged area and extend at least 3/4-inch on each side of the crack or hole. Bevel the edges as shown in figure 3-1. If the section to be repaired is curved, shape the patch to the same contour by heating it in an oil bath at a temperature of 248° to 302°F., or it may be heated on a hot plate until soft. Boiling water should not be used for heating. Coat the patch evenly with plastic solvent adhesive and place immediately over the hole. Maintain a uniform pressure of from 5 to 10 psi on the patch for a minimum of 3 hours. Allow the patch to dry 24 to 36 hours before sanding or polishing is attempted.
- b. PLUG PATCH. In using inserted patches to repair holes in plastic structures, trim the holes to a perfect circle or oval and bevel the edges slightly. Make the patch slightly thicker than the material being repaired, and similarly bevel the edges. Install patches in accordance with procedure illustrated in figure 3-1. Heat the plug until soft and press into the hole without cement and allow to cool to make a perfect fit. Remove the plug, coat the edges with adhesive, and then reinsert in the hole. Maintain a firm light pressure until the cement has set, then sand or file the edges level with the surface; buff and polish.

3-7. SCRATCHES. Scratches on clear plastic surfaces can be removed by hand-sanding operations, followed by buffing and polishing as shown in Sanding Repair, figure 3-1, if steps below are followed carefully.

- a. Wrap a piece of No. 320 (or finer) sandpaper or abrasive cloth around a rubber pad or wood block. Rub surface around scratch with a circular motion, keeping abrasive constantly wet with clean water to prevent scratching surface further. Use minimum pressure and cover an area large enough to prevent formation of "bull's-eyes" or other optical distortions.

### CAUTION

Do not use coarse grade abrasive. Number 320 grit or finer is recommended.

- b. Continue sanding operation, using progressively finer grade abrasives until scratches disappear.
- c. When scratches have been removed, wash area thoroughly with clean water to remove all gritty particles. The entire sanded area will be clouded with minute scratches which must be removed to restore transparency.
- d. Apply fresh tallow or buffing compound to a motor-driven buffering wheel. Hold wheel against plastic surface, moving it constantly over damaged area until cloudy appearance disappears. A 2000-foot-per-minute surface speed is recommended to prevent overheating and distortion. (Example: 750 rpm polishing machine with a 10 inch buffering bonnet.)

### NOTE

Polishing can be accomplished by hand but will require a considerably longer period of time to attain the same result as produced by a buffering wheel.

- e. When buffering is finished, wash area thoroughly and dry with a soft flannel cloth. Allow surface to cool and inspect area to determine if full transparency has been

## MODEL 152 SERIES SERVICE MANUAL

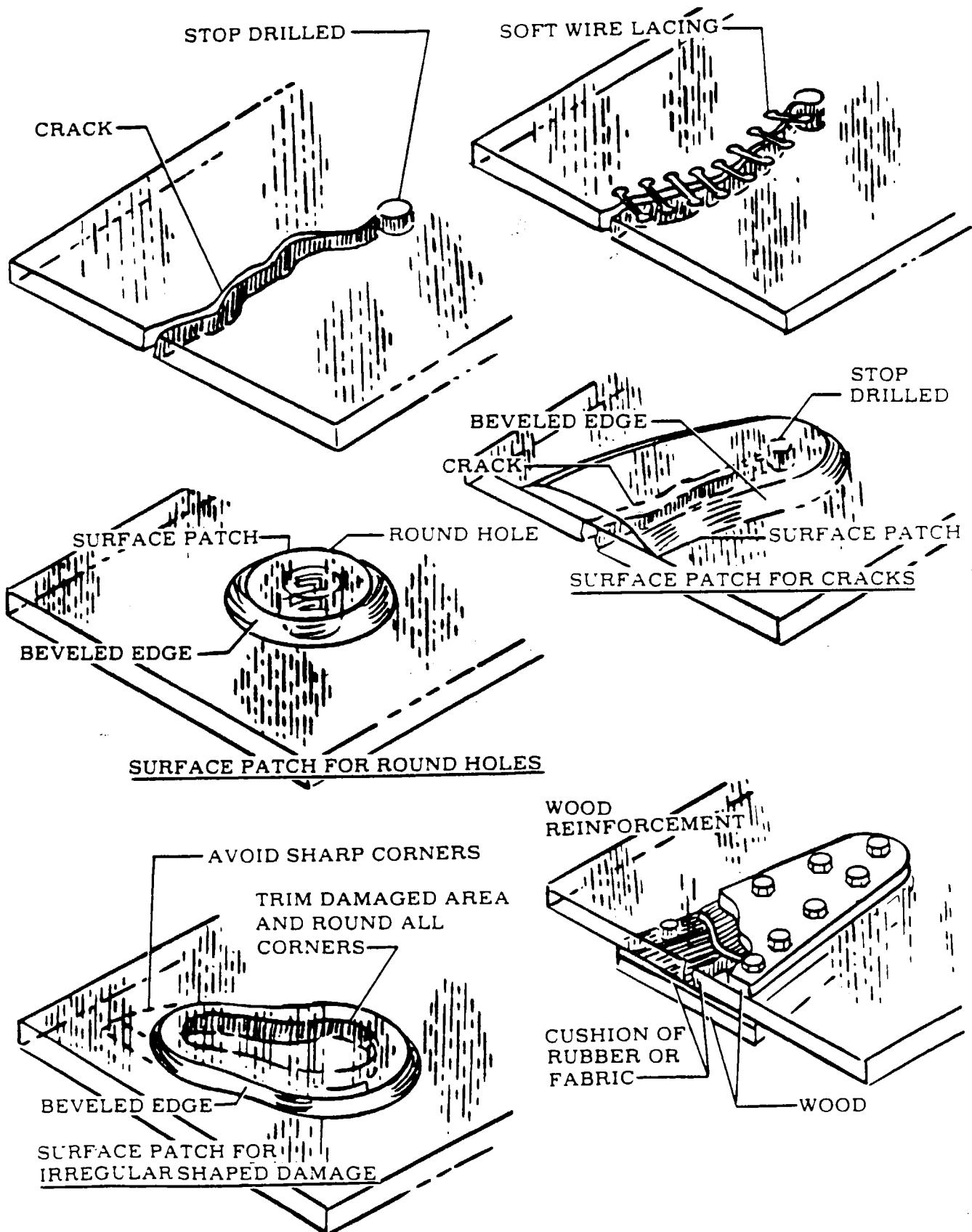


Figure 3-1. Repair of Windshield and Windows (Sheet 1 of 2)

## MODEL 152 SERIES SERVICE MANUAL

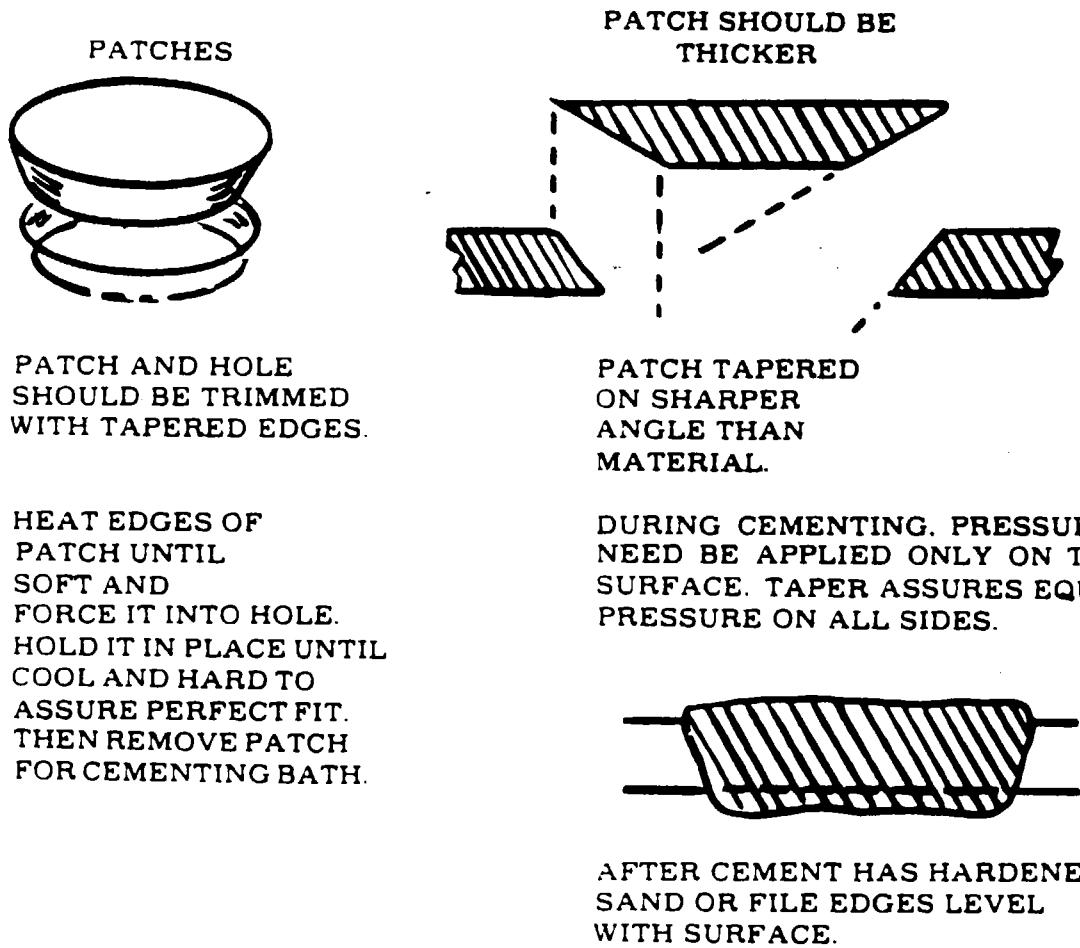
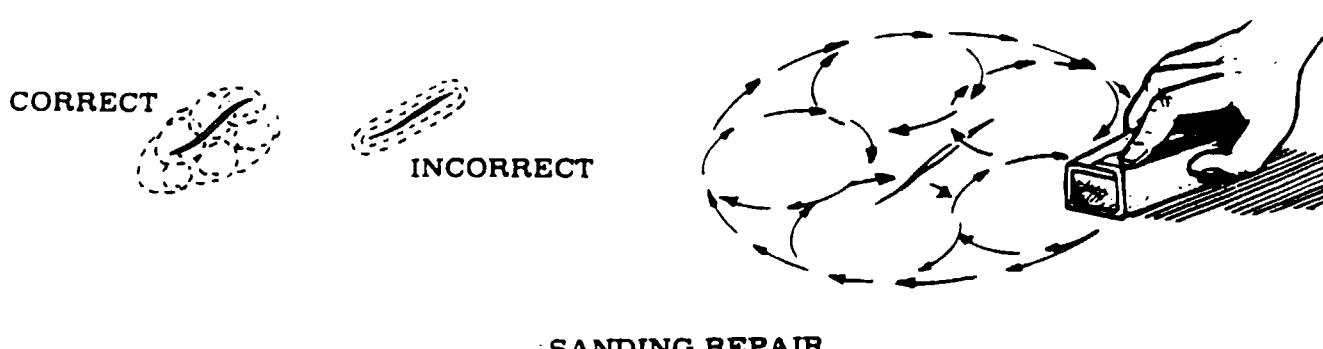


Figure 3-1. Repair of Windshield and Windows (Sheet 2 of 2)

## MODEL 152 SERIES SERVICE MANUAL

restored. Apply a thin coat of hard wax and polish surface lightly with a clean flannel cloth

### NOTE

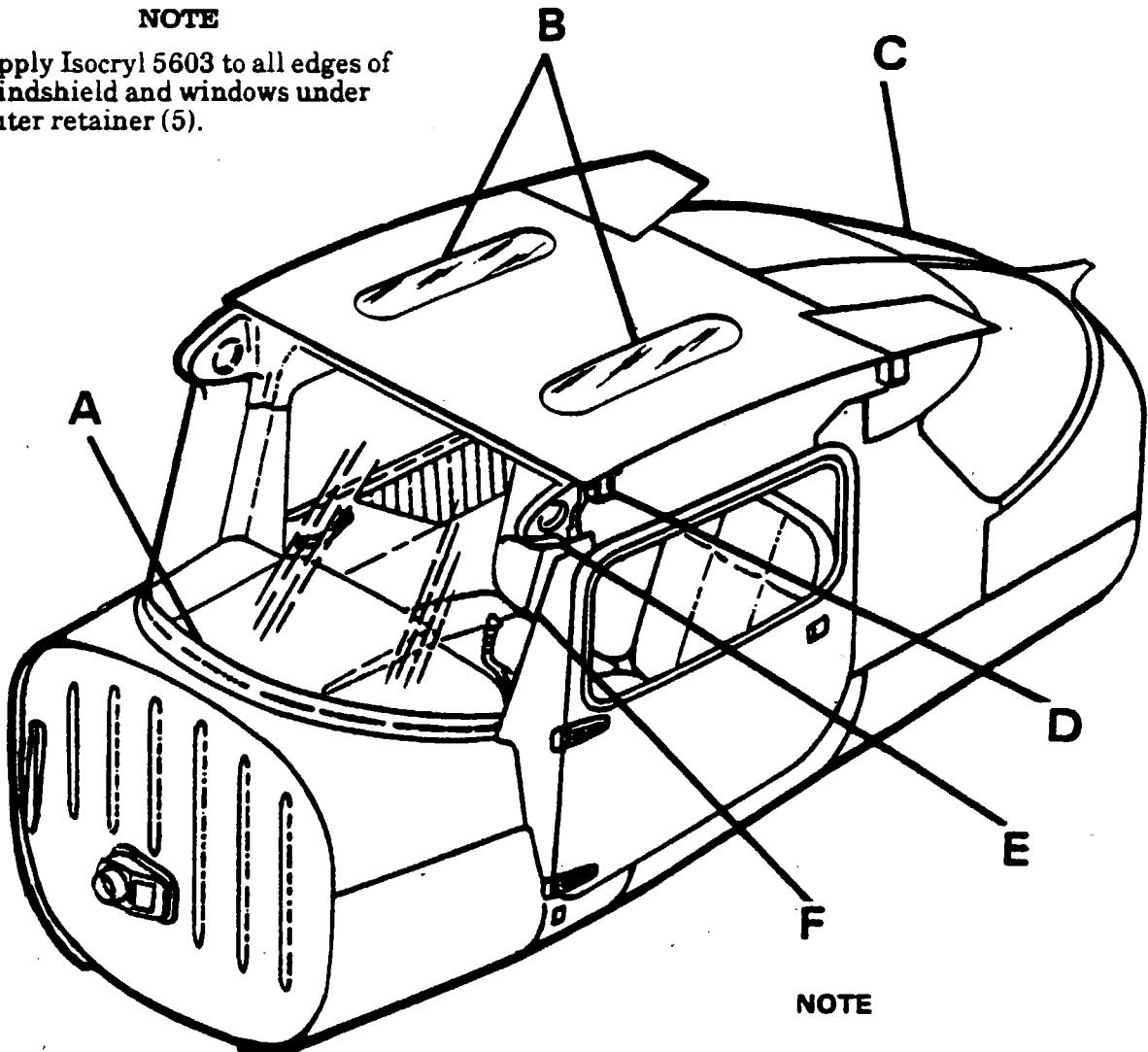
Rubbing plastic surface with a dry cloth will build up an electrostatic charge which attracts dirt particles and may eventually cause scratching of surface. After wax has hardened, dissipate this charge by rubbing surface with a slightly damp chamois. This will also remove dust particles which have collected while wax is hardening.

- f. Minute hairline scratches can often be removed by rubbing with commercial automobile body cleaner or fine-grade rubbing compound. Apply with a soft, clean, dry cloth or imitation chamois.
- 3-8. CRACKS. (Refer to figure 3-1.)
  - a. When a crack appears, drill a hole at end of crack to prevent further spreading. Hole should be approximately 1/8 inch in diameter, depending on length of crack and thickness of material.
  - b. Temporary repairs to flat surfaces can be accomplished by placing a thin strip of wood over each side of surface and inserting small bolts through the wood and plastic. A cushion of sheet rubber or aircraft fabric should be placed between wood and plastic on both sides.
  - c. A temporary repair can be made by drilling small holes along both sides of crack 1/4 to 1/8 inch apart and lacing edges together with soft wire. Small-stranded antenna wire makes a good temporary lacing material. This type of repair is used as a temporary measure ONLY, and as soon as facilities are available, panel should be replaced.
- 3-9. WINDSHIELD. (Refer to figure 3-2.)
- 3-10. REMOVAL.
  - a. Remove wing fairings.
  - b. Remove air vent tubes.
- CAUTION
- If windshield is to be reinstalled, be sure to protect windshield during removal.
- c. With two people sitting in the airplane placing their feet against the windshield, just above the centerline, press upward on windshield forcing it out of lower retainers.
- d. Clean sealer from inner sidewalls and bottom of retainers.
- 3-11. INSTALLATION.
  - a. If windshield is to be reinstalled, clean off old sealer and felt, then install new felt around edges of windshield.
  - b. If new windshield is to be installed, remove protective cover and clean, take care not to scratch windshield.
  - c. Apply new felt to edges of windshield.
  - d. Apply a strip of sealer (Isocryl 5603) along the sides and bottom of felt.
  - e. Position the bottom edge of windshield into lower retainer.
  - f. Using a piece of bent sheetmetal (8 in. 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.
  - g. Install air vent tubes.
  - h. Install wing fairings.

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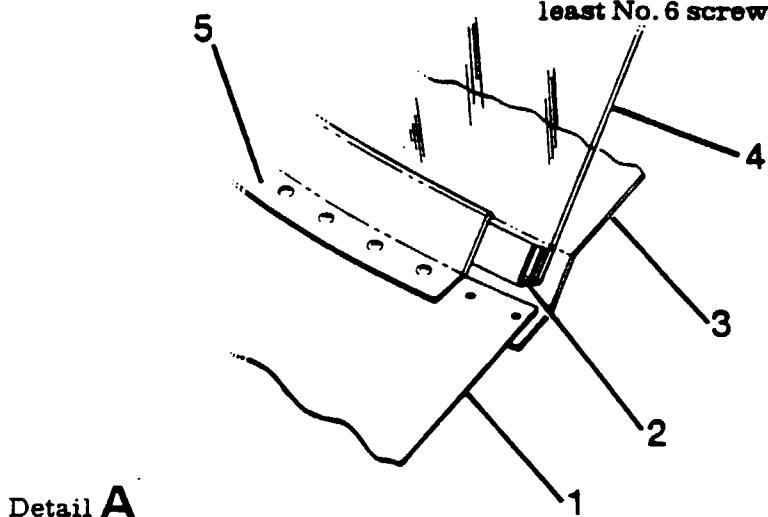
## NOTE

Apply Isocryl 5603 to all edges of windshield and windows under outer retainer (5).



## NOTE

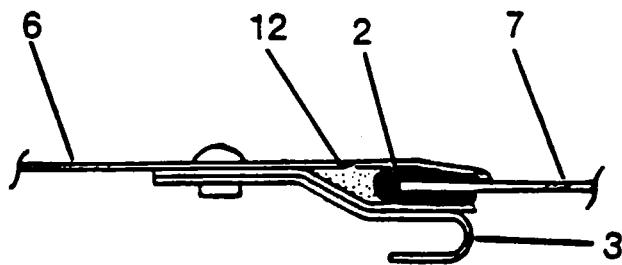
Screws and self-locking nuts may be used instead of rivets which fasten front retaining strip to cowl deck. If at least No. 6 screws are used, no loss of strength will result.



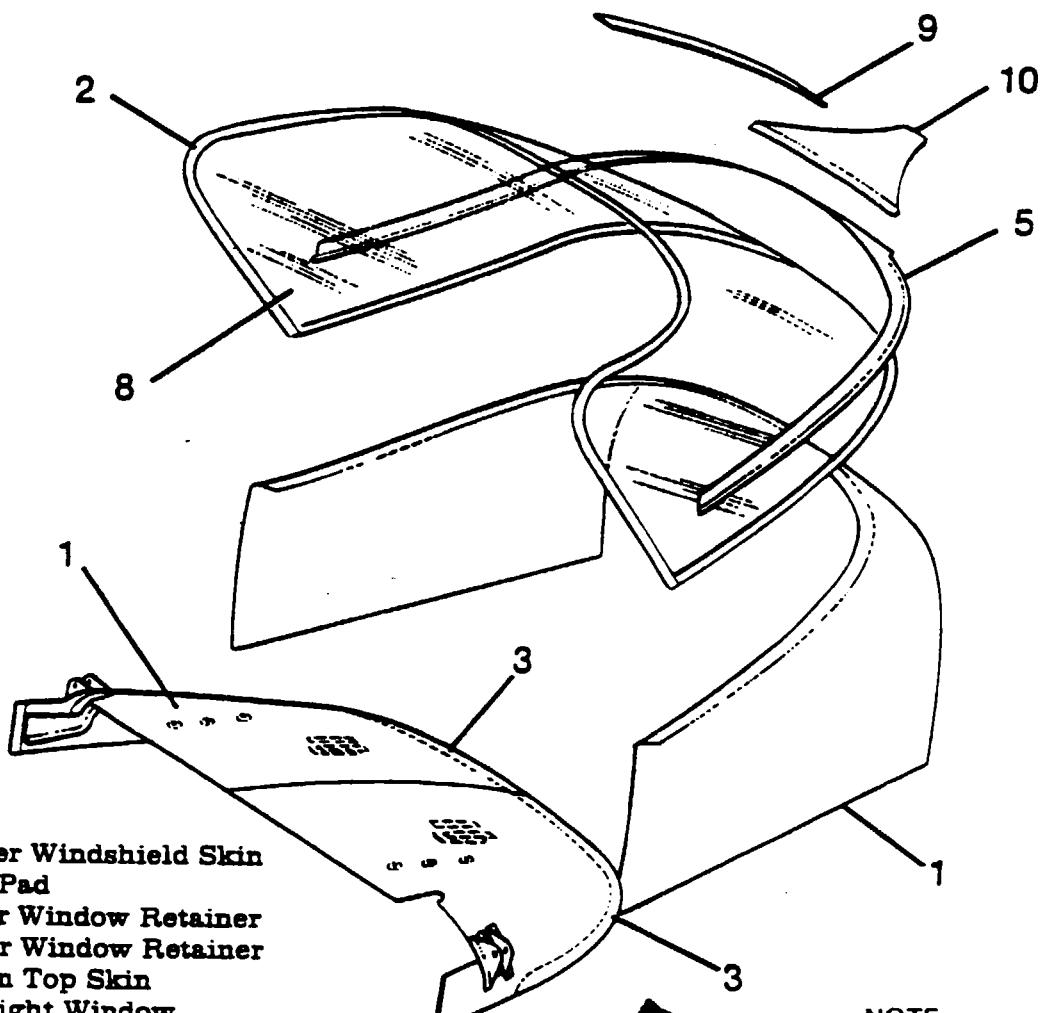
1. Lower Window Skin
2. Felt Pad
3. Inner Window Retainer
4. Windshield
5. Outer Window Retainer

Figure 3-2. Windshield and Rear Window (Sheet 1 of 3)

# MODEL 152 SERIES SERVICE MANUAL



**Detail B**



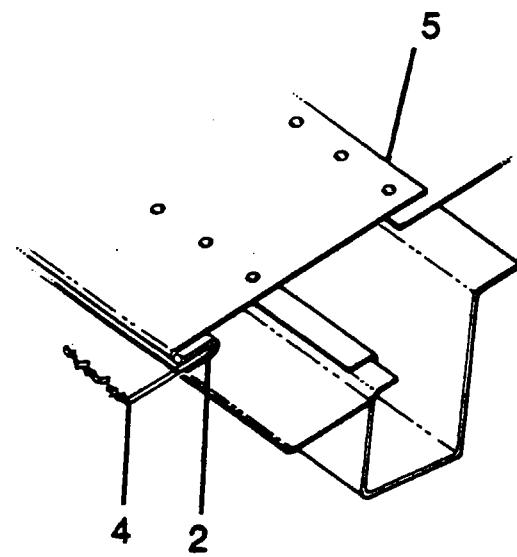
1. Lower Windshield Skin
2. Felt Pad
3. Inner Window Retainer
5. Outer Window Retainer
6. Cabin Top Skin
7. Skylight Window
8. Rear Window
9. Rear Window Retainer
10. Doubler
- \* 12. Sealer

**Detail C**

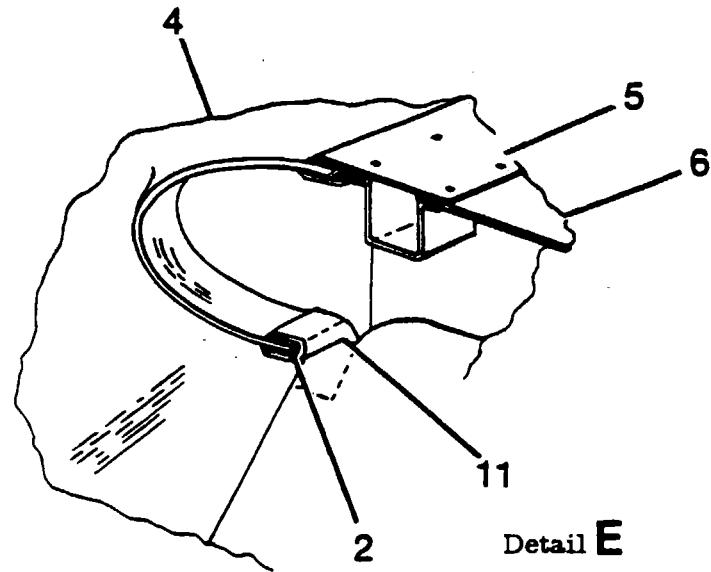
**NOTE**  
\* Apply Isocryl 5603 to all edges of  
windshield and windows under  
outer retainer (5).

**Figure 3-2. Windshield and Rear Window (Sheet 2 of 3)**

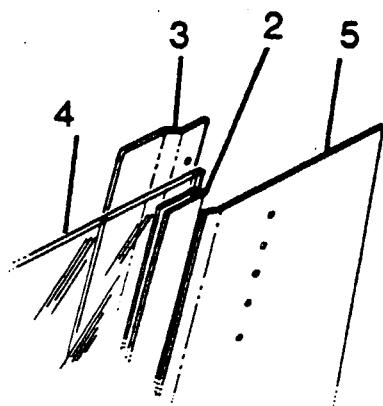
## MODEL 152 SERIES SERVICE MANUAL



Detail D



Detail E



Detail F

- 2. Felt Pad
- 3. Inner Window Retainer
- 4. Windshield
- 5. Outer Window Retainer
- 6. Cabin Top Skin
- 11. Upper Window Edge Cover

Figure 3-2. Windshield and Rear Window (Sheet 3 of 3)

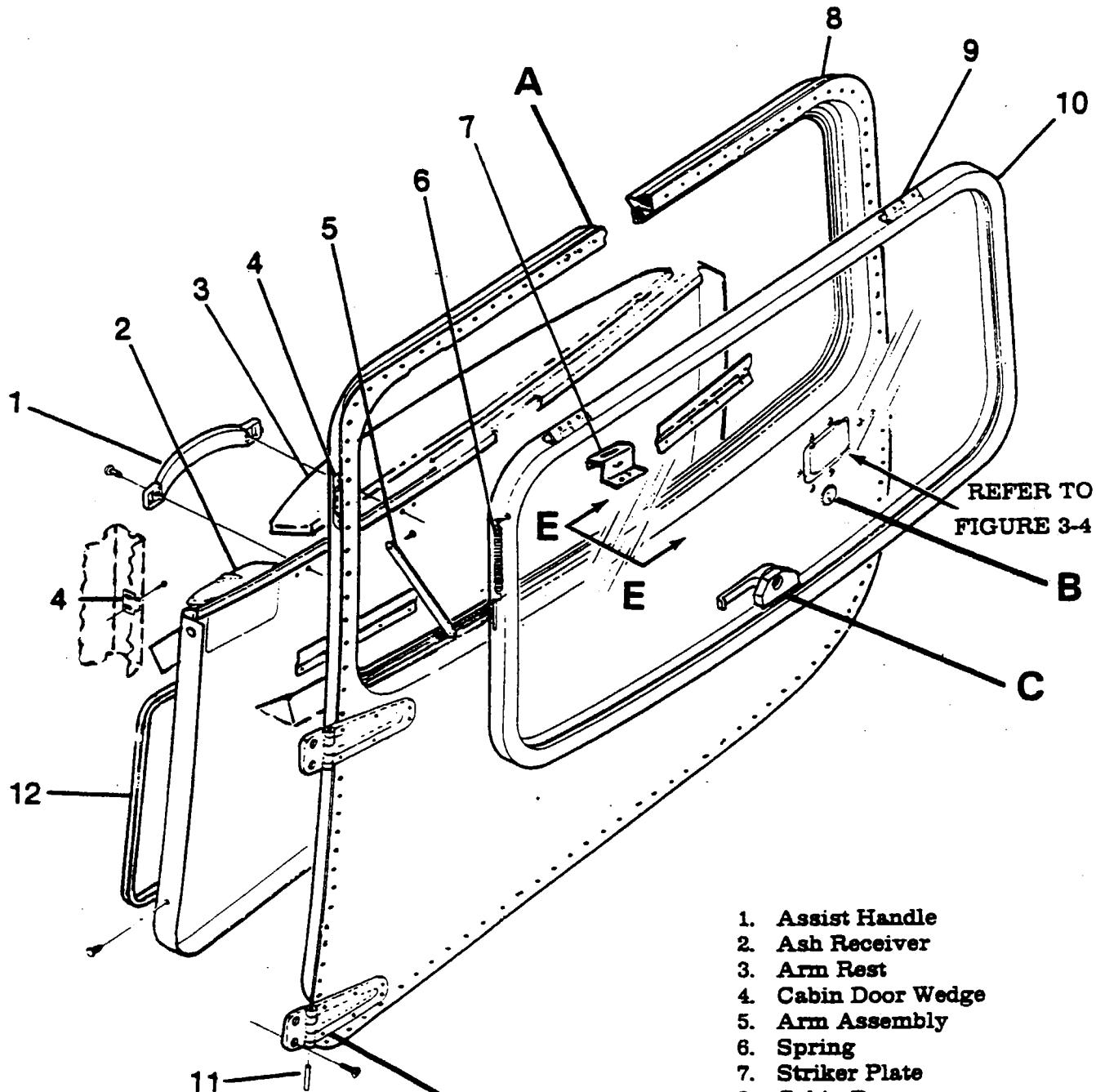
## MODEL 152 SERIES SERVICE MANUAL

- 3-12. WINDOWS.
- 3-13. MOVABLE. (See figure 3-3.) Movable windows, hinged at the top are installed in the cabin doors.
- 3-14. REMOVAL AND INSTALLATION.
- Disconnect arm assembly (5).
  - Remove pins from window hinges (9).
  - Reverse preceding steps for reinstallation. To remove frame from plastic panel, drill out blind rivets at frame splice. When replacing plastic panel in frame, ensure Isocryl 5603 sealing strip and an adequate coating of Presstite No. 579.6 sealing compound is used around all edges of panel. Refer to Section 18 before painting the inside of the window frame.
- 3-15. WRAP-AROUND REAR. (See figure 3-2.) The rear window is a one-piece, acrylic plastic panel set in sealing strips and held in place by retaining strips.
- 3-16. REMOVAL AND INSTALLATION.
- Remove upholstery as necessary to expose retainer strips inside cabin.
  - Remove rear window retainer (9).
  - Drill out rivets to remove outer window retainer (5).
  - Remove window by lifting aft edge and pulling window aft. If difficulty is encountered, rivets securing inner window retainers (3) may also be drilled out and retainers loosened or removed as necessary.
  - Reverse preceding steps for reinstallation. Apply sealing strips and an adequate coating of sealing compound to prevent leaks. When installing a new window, check fit, use care not to crack panel, and file or grind away excess plastic.
- 3-17. OVERHEAD. (See figure 3-2.) Overhead cabin windows, located in the cabin top, may be installed. These windows are one-piece, acrylic plastic panels set in sealing strips and held in place by retaining strips.
- 3-18. REMOVAL AND INSTALLATION.
- Remove headliner and trim panels.
  - Drill out rivets as necessary to remove retainer strips.
  - Reverse preceding steps for reinstallation. Apply sealing strips and an adequate coating of sealing compound to prevent leaks. When installing a new window, use care not to crack panel and file or grind away excess plastic.
- 3-19. CABIN DOORS. (See figure 3-3.)
- 3-20. REMOVAL AND INSTALLATION. On models except A152-Series, removal of cabin doors is accomplished by removing the screws which attach the hinges, or by removing the hinge pins. If permanent hinge pins are removed from the door hinges, they may be replaced with clevis pins, secured with cotter pins, or new hinge pins may be installed by inserting pin through both hinge halves, and chucking a rivet set in a hand drill, hold one end of pin and form head on opposite end. Reverse pin and repeat process. On A152-Series aircraft, hinge pins are of the jettisonable type, which may be removed by pulling the emergency door release. On all Model 152-Series aircraft, when fitting a new door, some trimming and reforming of the door skin and door edges may be necessary to achieve a good fit.

### NOTE

Cabin door release handle pull should be a maximum of 45 lbs.

## MODEL 152 SERIES SERVICE MANUAL



1. Assist Handle
2. Ash Receiver
3. Arm Rest
4. Cabin Door Wedge
5. Arm Assembly
6. Spring
7. Striker Plate
8. Cabin Door
9. Window Hinge
10. Cabin Door Window
11. Hinge Pin
12. Insert

Figure 3-3. Cabin Door and Movable Window (Sheet 1 of 2)

## MODEL 152 SERIES SERVICE MANUAL

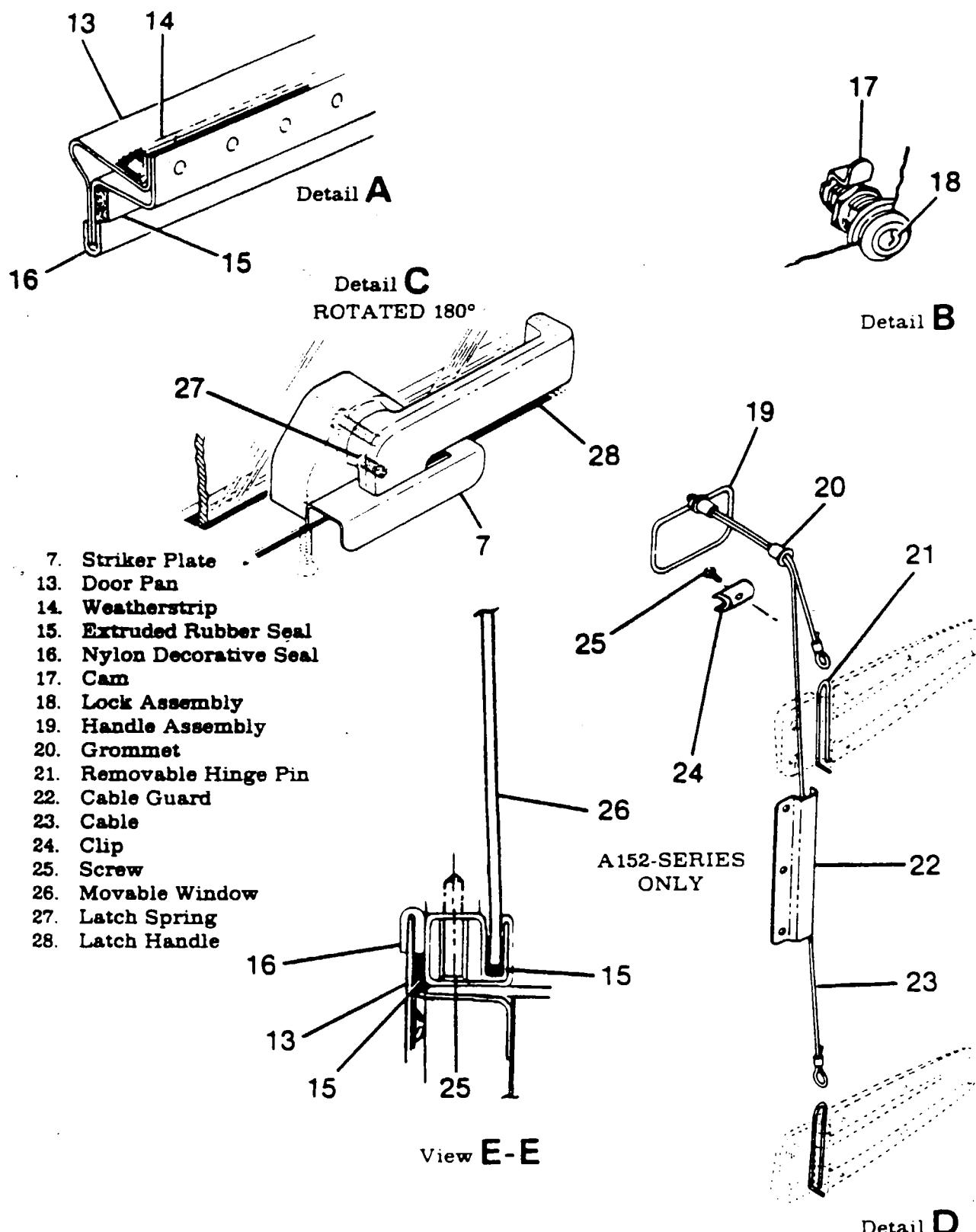


Figure 3-3. Cabin Door and Movable Window (Sheet 2 of 2)

## MODEL 152 SERIES SERVICE MANUAL

3-21. **ADJUSTMENT.** At the time of installation, the door is fitted so that positive latch engagement is assured. There is no adjustment on the door latch, but the rotary clutch can be moved away from the door latch. This is not necessary unless some components parts have been improperly installed.

3-22. **WEATHERSTRIP.** A weatherstrip is cemented around all edges of door. New weatherstrip may be applied after mating surfaces of weatherstrip and door are clean, dry and free from oil or grease. Apply a thin, even coat of adhesive to each surface and allow to dry until tacky before pressing strip in place. Minnesota Mining and Manufacturing Co. No. EC1300L cement is recommended. Cut small notch in hollow-type weatherstrip for drainage and position splice at door low point. Be careful not to stretch weatherstrip around door corners.

Apply 5423 U.H.M.W. Polyethylene Film Tape (Industrial Tape Division/3M, 220 E. 3M Center, St. Paul, MN 55144) (1.00 width x 96.00 length) on cowl flange at Sta. 0.00. Provide slots through tape for cowl fasteners.

3-23. **WEDGE ADJUSTMENT.** Wedges at upper forward edge of doors aid in preventing air leaks at this point. They engage as door is closed. Several attaching holes are located in wedges and holes which gives best results should be selected.

3-24. **LATCHES.** (Refer to figure 3-4.)

3-25. **DESCRIPTION.** The cabin door latch utilizes a rotary clutch for positive bolt engagement. As door is closed, teeth on underside of bolt engage gear teeth on clutch. The clutch gear rotates in one direction only and holds door closed. Flush-mounted outside and inside door handles are used to actuate door latches.

3-26. **ADJUSTMENT.** Adjustment of latch or clutch cover is afforded by oversize and/or slotted holes. This adjustment ensures sufficient gear-to-bolt engagement and proper alignment.

### NOTE

Lubricate door latch per Section 2. No lubrication is recommended on rotary clutch.

3-27. **LOCK.** In addition to an interior lock used on the righthand door only, a cylinder and key type lock is installed on left door. If lock is to be replaced, the new one may be modified to accept the original key. This is desirable, as the same key is used for ignition switch and cabin door lock. After removing old lock from door, proceed as follows:

- a. Remove lock cylinder from new housing.
- b. Insert original key into new cylinder and file off any protruding tumblers flush with cylinder. Without removing key, check that cylinder rotates freely in housing.
- c. Install lock assembly in door and check lock operation with door open.
- d. Destroy new key and disregard code number on cylinder.

3-28. **SEATS.** (Refer to figures 3-5 and 3-6.)

3-29. **PILOT AND COPILOT.**

- a. RECLINING BACK/FORE-AND-AFT ADJUSTABLE BOTTOM.
- b. RECLINING BACK/FORE-AND-AFT AND VERTICALLY ADJUSTABLE BOTTOM.

## MODEL 152 SERIES SERVICE MANUAL

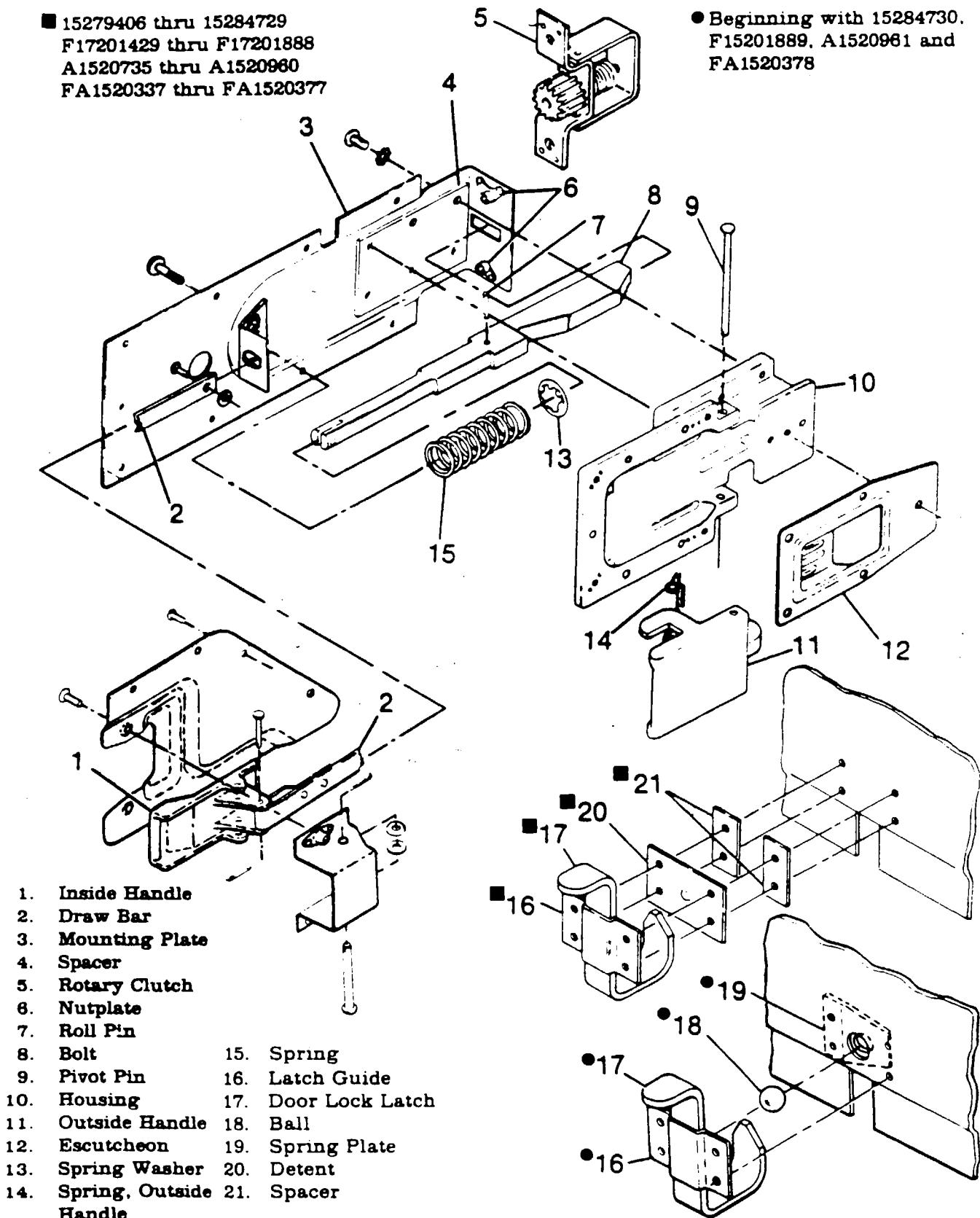


Figure 3-4. Cabin Door Latch

# MODEL 152 SERIES SERVICE MANUAL

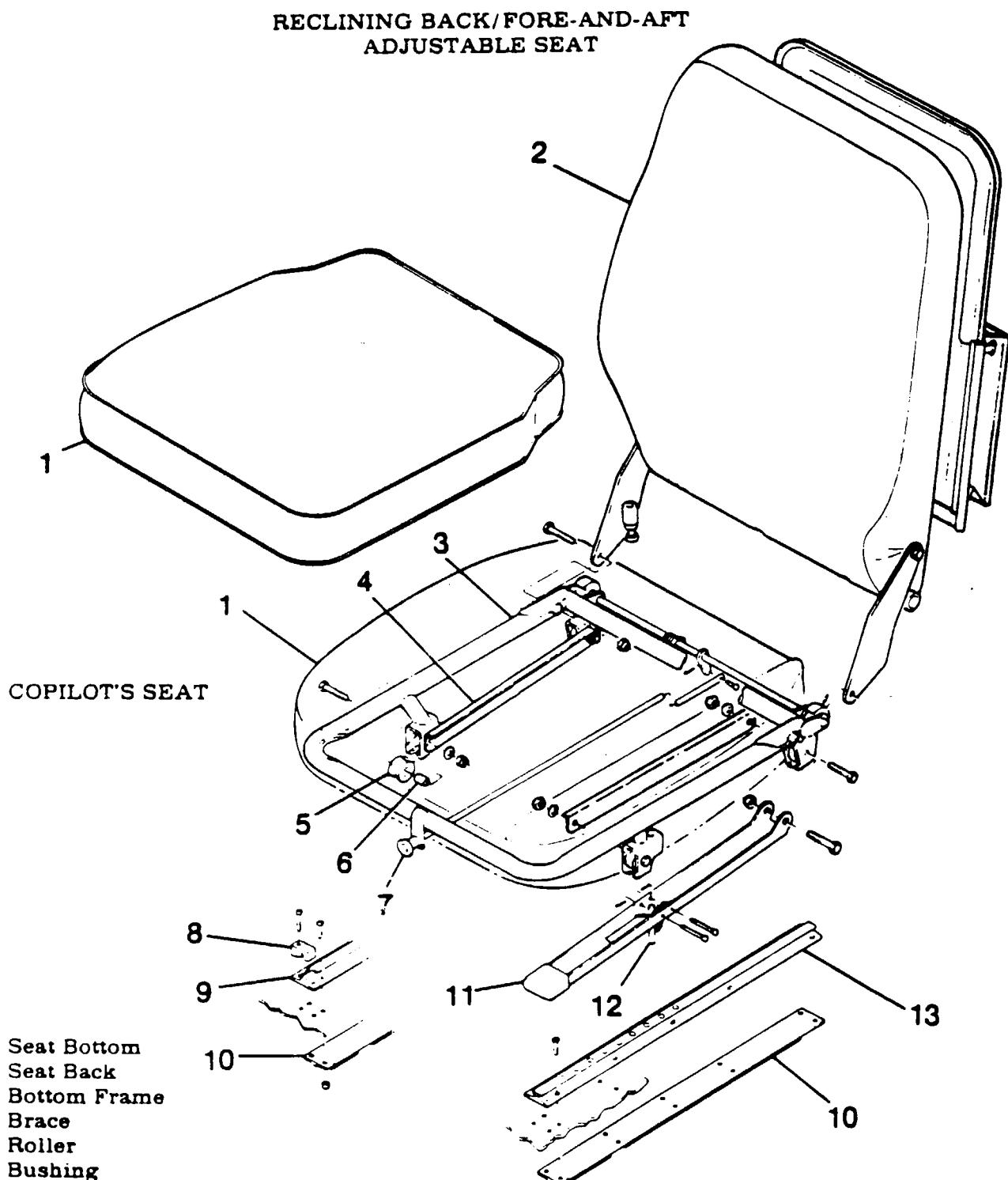


Figure 3-5. Pilot and Copilot Seat Installation (Sheet 1 of 3)

## MODEL 152 SERIES SERVICE MANUAL

1. Seat Bottom
2. Seat Back
3. Recline Handle
4. Bottom Frame
5. Spacer
6. Vertical Adjust Spring
7. Spring
8. Locking Pin - Fore/Aft Adjust
9. Fore/Aft Adjust Handle
10. Inboard Seat Rail
11. Vertical Adjust Handle
12. Roller
13. Seat Stop
14. Outboard Seat Rail
15. Floorboard Stiffener
16. Link
17. Pin
18. Locking Pin - Vertical Adjust
19. Bellcrank
20. Spacer

### RECLINING BACK: FORE-AND-AFT AND VERTICALLY ADJUSTABLE SEAT

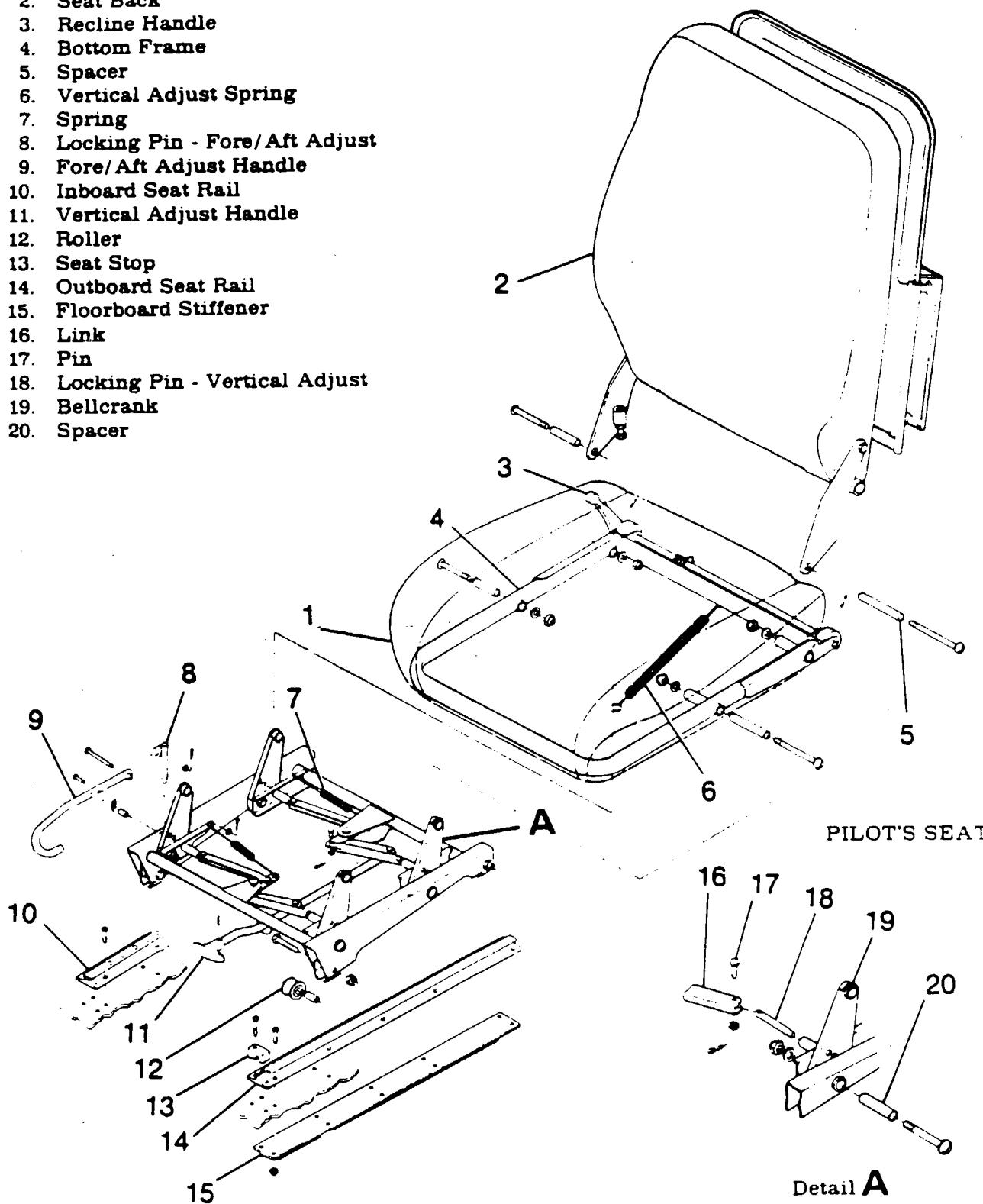
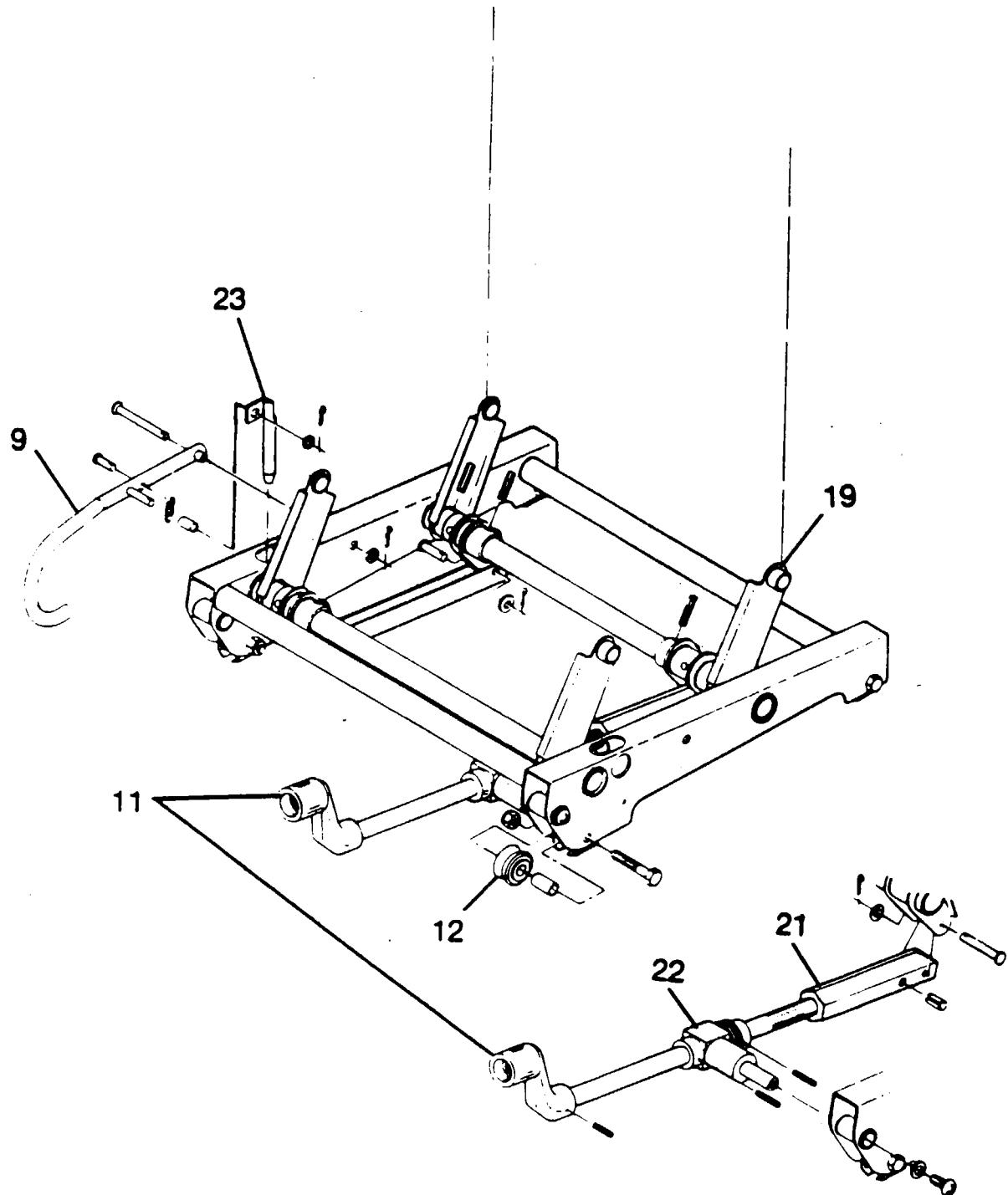


Figure 3-5. Pilot and Copilot Seat Installation (Sheet 2 of 3)

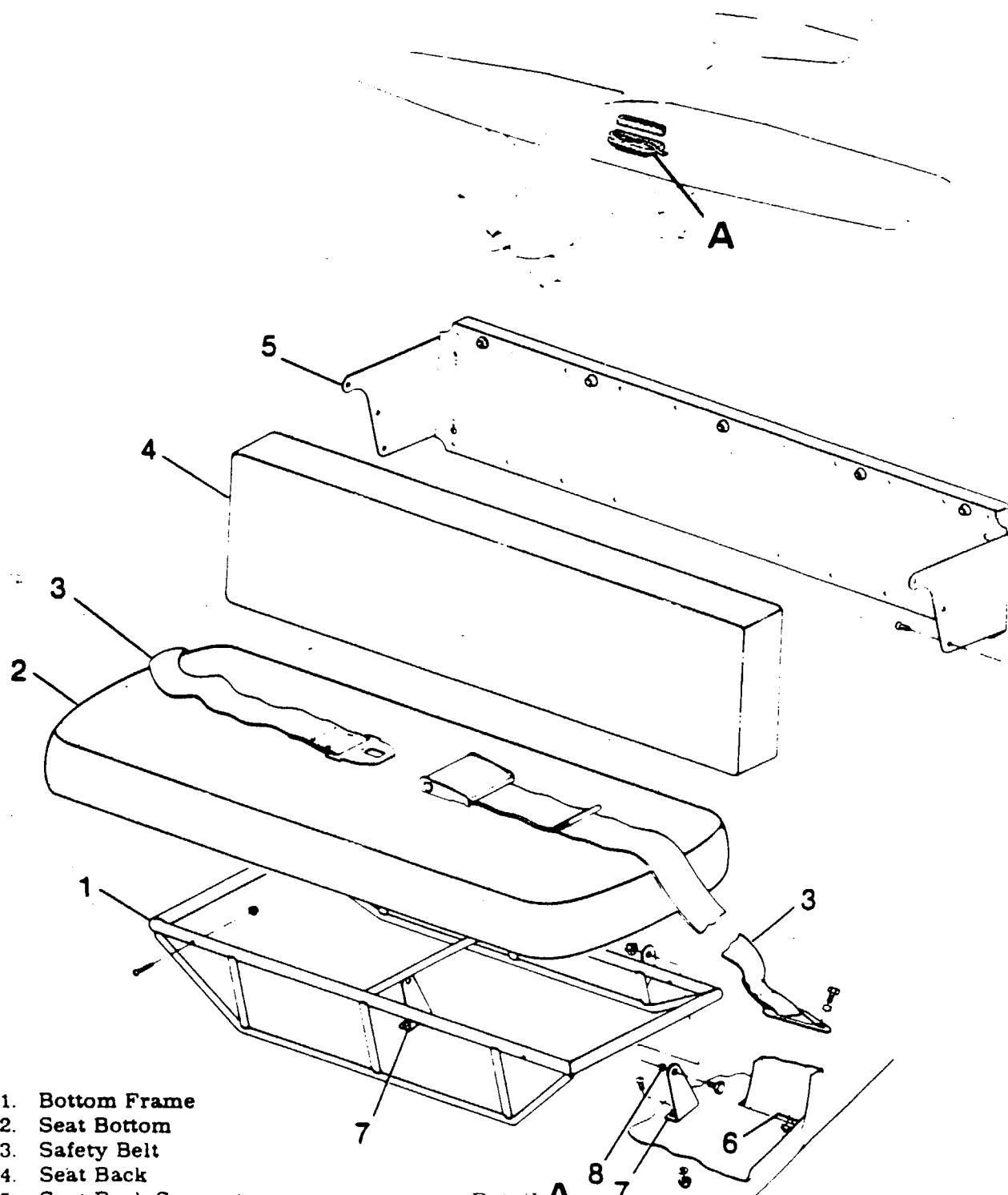
## MODEL 152 SERIES SERVICE MANUAL



- 9. Fore/Aft Adjust Handle
- 11. Vertical Adjust Handle
- 12. Roller
- 19. Bellcrank
- 21. Vertical Adjustment Nut
- 22. Bearing Block Assembly
- 23. Fore/Aft Adjust Locking Pin

Figure 3-5. Pilot and Copilot Seat Installation (Sheet 3 of 3)

## MODEL 152 SERIES SERVICE MANUAL



1. Bottom Frame
2. Seat Bottom
3. Safety Belt
4. Seat Back
5. Seat Back Support
6. Belt Anchor
7. Frame Bracket
8. Spacer

Figure 3-6. Auxiliary Seat Installation

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- 3-30. **DESCRIPTION.** The standard seats consist of individual chair units for the pilot and copilot positions with fore-and-aft adjustment on seat rails and two position adjustable backs. Optional pilot and copilot seats feature a fore-and-aft adjustment plus a 3 position vertical adjustment. Standard and optional seats feature removable seat bottom cushions on A152 and FA152 ONLY.
- 3-31. **REMOVAL AND INSTALLATION.**
- Remove seat stops from rails.
  - Slide seat fore-and-aft to disengage seat rollers from rails and lift seat out.
  - Reverse preceding steps for installation. Ensure all seat stops are reinstalled.

### WARNING

Be sure seat stops are installed, because acceleration and deceleration can cause seat to disengage from rails creating a safety of flight condition. This is especially dangerous during takeoff and landing attitudes.

- 3-32. **AUXILIARY.**
- 3-33. **DESCRIPTION.** The double width auxiliary seat is permanently bolted to the cabin structure and has no adjustment provisions. The seat structure is mounted on hinge brackets with pivot bolts, thus allowing seat to be pivoted upward for more baggage area.
- 3-34. **REMOVAL AND INSTALLATION.**
- Remove bolts securing seat structure to hinge brackets.
  - Unsnap seat back from aft cabin wall.
  - Lift seat out.
  - Reverse preceding steps for installation.
- 3-35. **REPAIR.** Replacement of defective parts is recommended in repair of seats.
- 3-36. **CABIN UPHOLSTERY.** Due to the wide selection of fabrics, styles and colors, it is impossible to depict each particular type of upholstery. The following paragraphs describe general procedures which will serve as a guide in removal and replacement of upholstery. Major work if possible, should be done by an experienced mechanic. If the work must be done by a mechanic unfamiliar with upholstery practices, the mechanic should make careful notes during removal of each item to facilitate replacement later.
- 3-37. **MATERIALS AND TOOLS.** Materials and tools will vary with the job. Scissors for trimming upholstery to size and a dull-bladed putty knife for wedging material beneath retainer strips are the only tools required for most trim work. Use industrial rubber cement to hold soundproofing mats and fabric edges in place.
- 3-38. **SOUNDPROOFING.** The aircraft is insulated with spun glass mat-type insulation and a sound deadener compound applied to inner surfaces of skin in most areas of cabin and baggage compartment. All soundproofing material should be replaced in its original position any time it is removed. A soundproofing panel is placed in gap between wing and fuselage and held in place by wing root fairings.
- 3-39. **CABIN HEADLINER.** (Refer to figure 3-7.)

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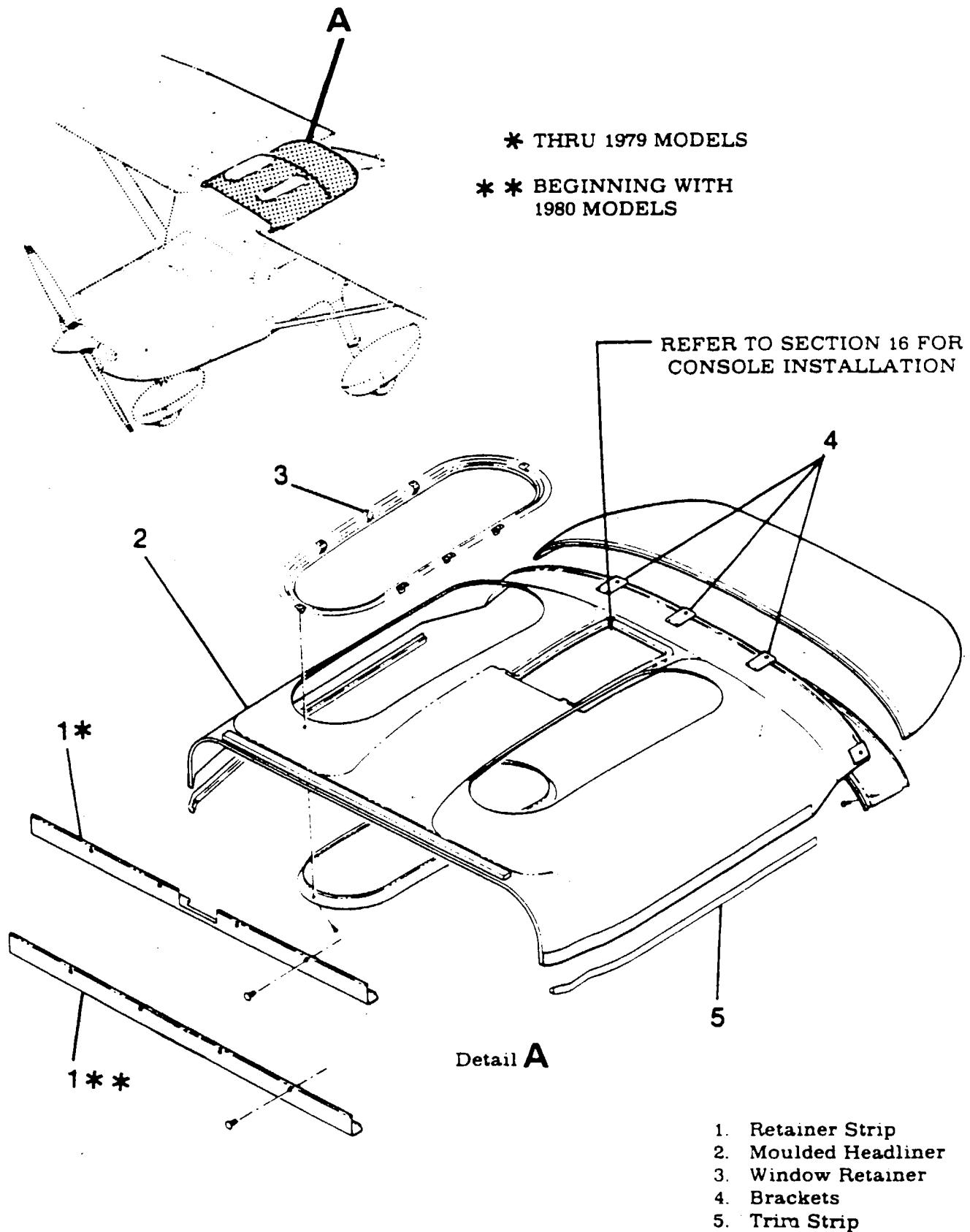


Figure 3-7. Cabin Headliner Installation

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### 3-40. REMOVAL AND INSTALLATION.

- a. Remove sun visors, all inside finish strips and plates, overhead console, upper doorpost shields and any other visible retainers securing headliner.
- b. Remove molding from fixed windows.
- c. Remove screws securing headliner and carefully take down headliner.
- d. Remove spun glass soundproofing panels above headliner.

#### NOTE

The lightweight soundproofing panels are held in place with industrial rubber cement.

- e. Reverse preceding steps for installation. Before installation, check all items concealed by headliner for security. Use wide cloth tape to secure loose wires to fuselage and to seal openings in wing roots.

### 3-41. UPHOLSTERY SIDE PANELS.

Removal of upholstery side panels is accomplished by removing seats for access, then removing parts attaching panels. Remove screws, retaining strips, arm rests and ash trays as required to free the various panels. Automotive type spring clips attach most door panels. A dull putty knife makes an excellent tool for prying clips loose. When installing upholstery side panels, do not over-tighten sheet metal screws. Larger screws may be used in enlarged holes as long as area behind hole is checked for electrical wiring, fuel lines and other components which might be damaged by using a longer screw.

### 3-42. CARPETING.

Cabin area and baggage compartment carpeting is held in place by rubber cement, sheet metal screws and retaining strips. When fitting a new carpet, use old one as a pattern for trimming and marking screw holes.

### 3-43. BAGGAGE COMPARTMENT UPHOLSTERY.

A washable plastic held in place by screws and retainers is used in the baggage compartment. Cargo tie-down and/or seat belt brackets must be removed as necessary to facilitate upholstery removal.

### 3-44. SAFETY PROVISIONS.

#### 3-45. CARGO TIE-DOWNS.

Cargo tie-downs are used to retain baggage. A net designed to be secured to the aft wall and cabin floor is available to hold baggage in the aft cabin area.

#### 3-46. SAFETY BELTS.

Safety belts, bolted to the cabin structure are provided for each seat. Belts should be replaced if frayed or cut, latches are defective or stitching is broken. Attaching parts should be replaced if worn excessively or defective. Refer to figure 3-8.

#### 3-47. SHOULDER HARNESS.

Shoulder harnesses may be installed in the aircraft. The latches require no lubrication. Component parts should be replaced as outlined in preceding paragraph. Refer to figure 3-8.

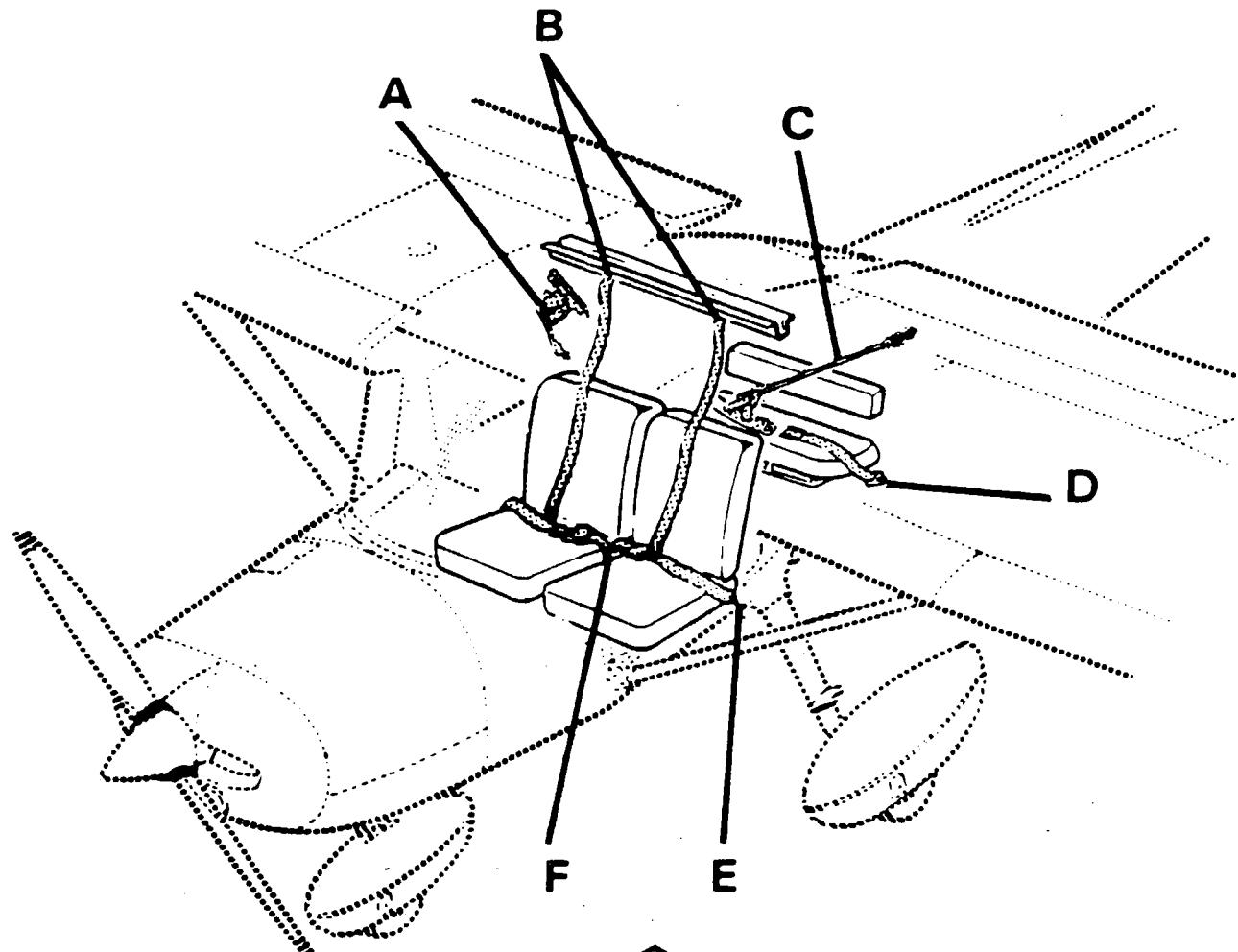
#### 3-48. INERTIA REEL SHOULDER HARNESS.

An inertia reel shoulder harness may be installed. The inertia reel allows free movement for the seat occupant but will lock when subjected to a sudden load. Proper operation of the reel can be checked by applying a quick jerk to the belt. Inertia reel should lock and hold. Figure 3-8 may be used as a guide for removal and installation.

#### 3-49. REAR VIEW MIRROR.

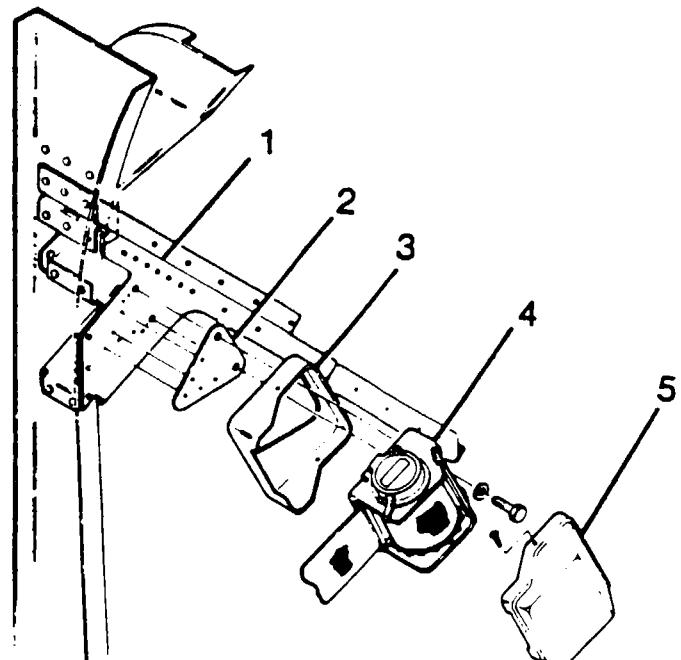
Thru serial 15282031 a rear view mirror may be installed in the instrument panel glareshield. Refer to figure 3-9 for removal and installation.

## MODEL 152 SERIES SERVICE MANUAL



\* 152 AND F152 SERIES ONLY  
 \* \* A152 AND FA152 SERIES ONLY

1. Bracket Assembly
2. Spacer
3. Bottom Cover
4. Inertia Reel Assembly
5. Top Cover



Detail A \*

Figure 3-8. Seat Belt and Shoulder Harness Installation (Sheet 1 of 2)

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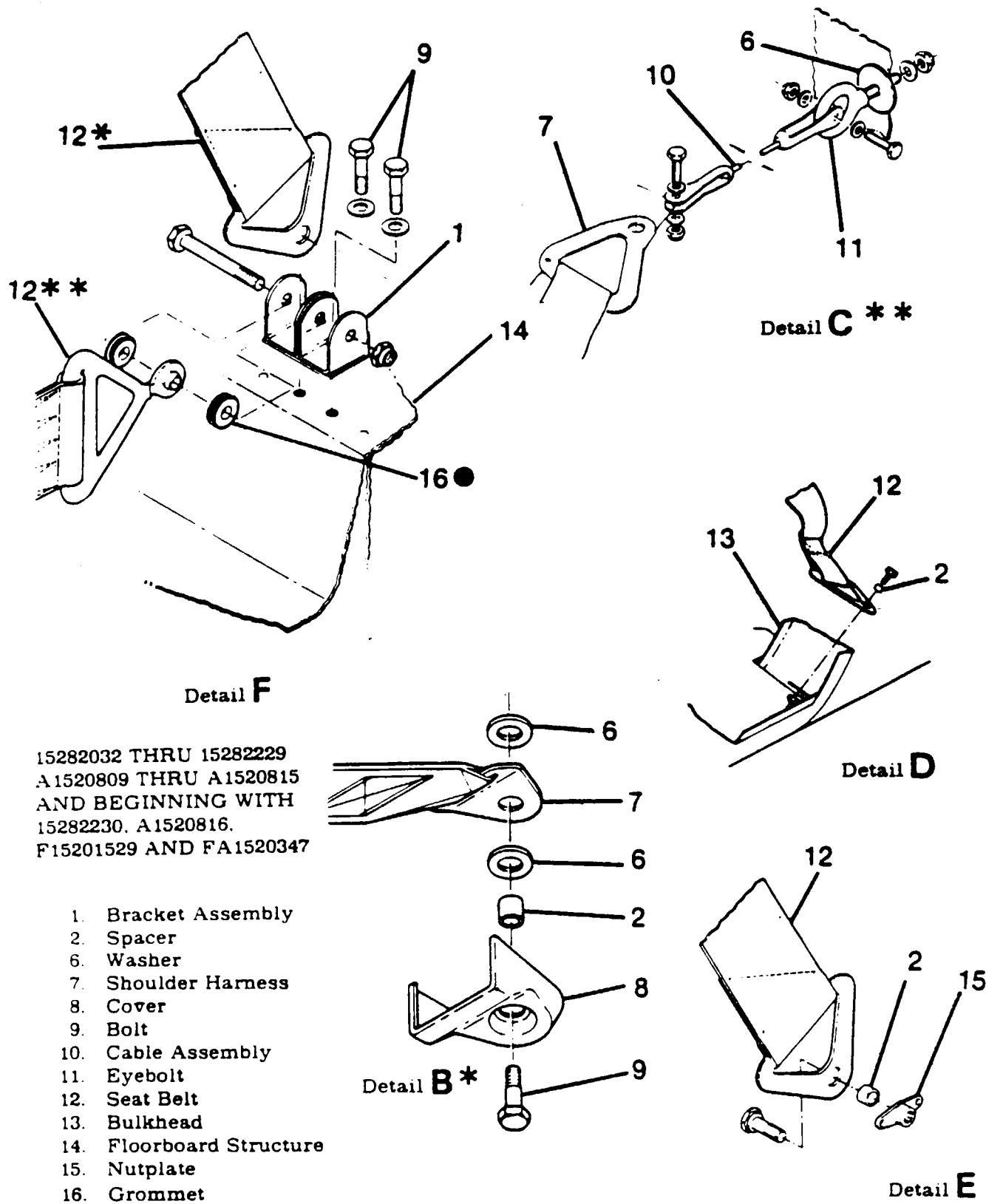
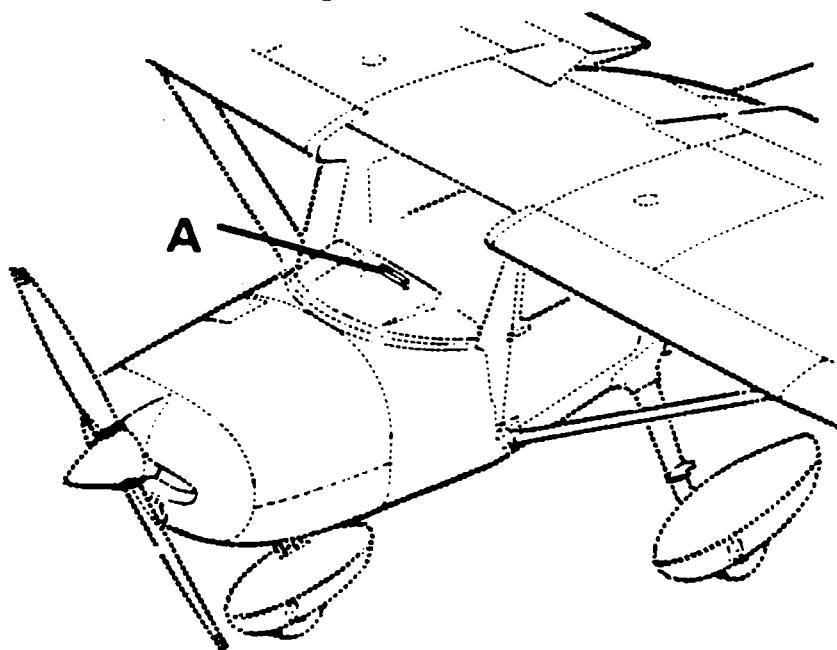
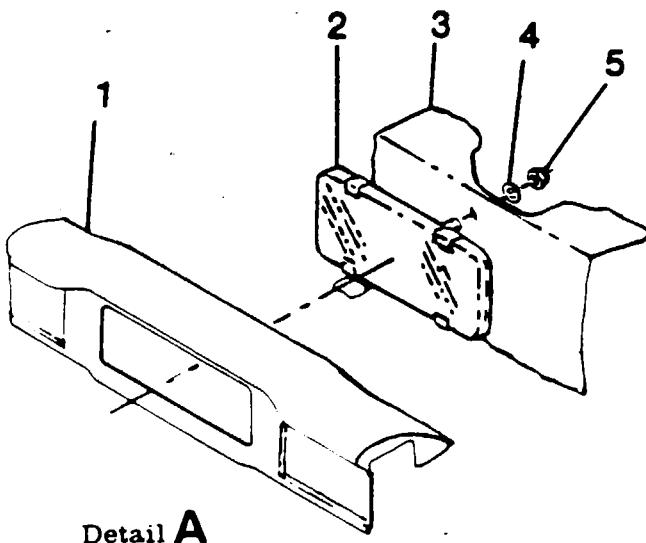


Figure 3-8. Seat Belt and Shoulder Harness Installation (Sheet 2 of 2)

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THRU 15282031



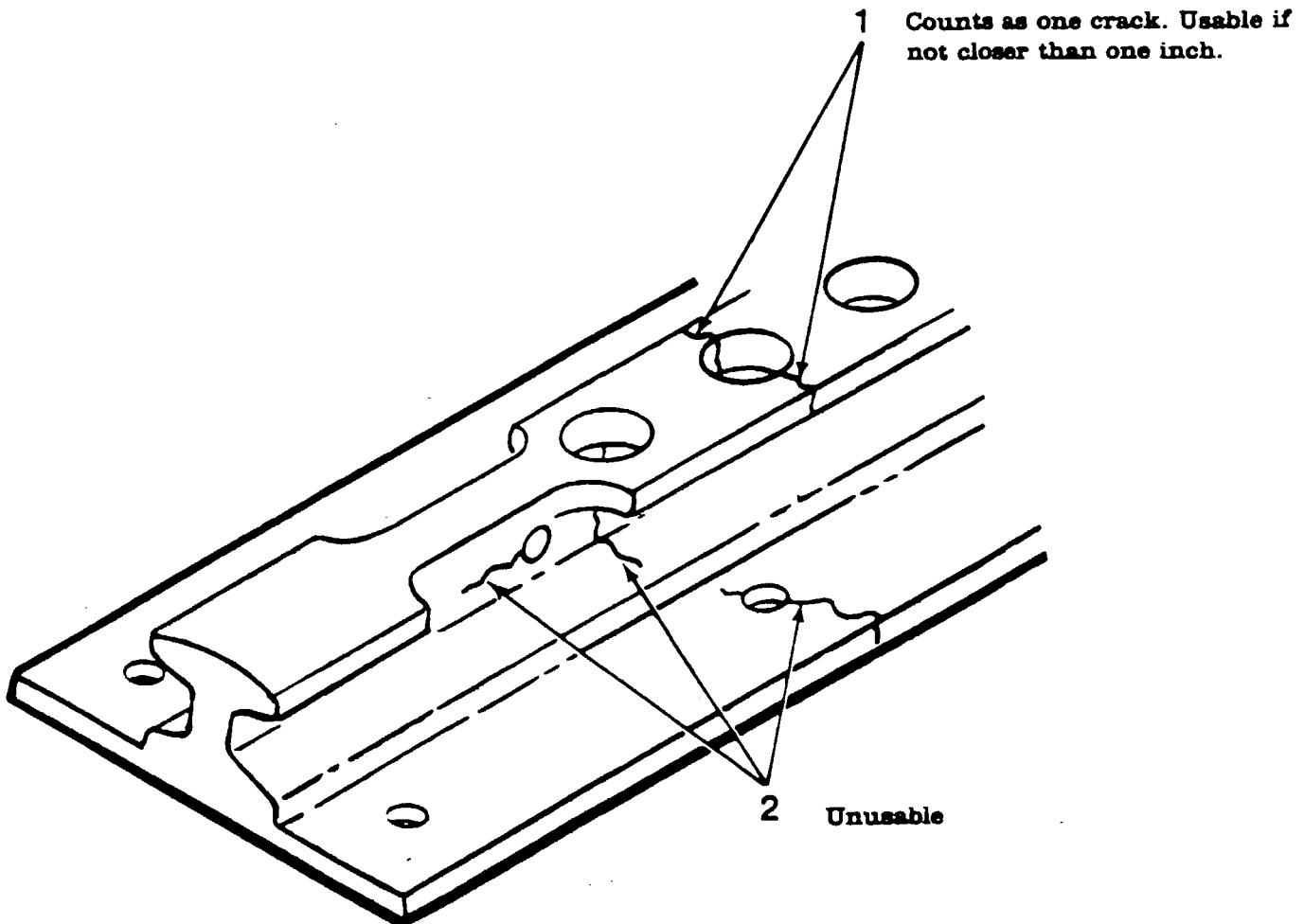
- 1. Glareshield
- 2. Mirror Assembly
- 3. Deck Skin
- 4. Washer
- 5. Nut

Figure 3-9. Rear View Mirror Installation

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- 3-50. **SEAT RAIL INSPECTION.** A special inspection of seat rails should be conducted each 50 hours. See figure 3-10 for inspection procedures.

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### REPLACE SEAT RAIL WHEN:

- a. Any portion of web or lower flange is cracked (index 2).
- b. Any crack in crown of rail is in any direction other than right angle to length of rail.
- c. Number of cracks on any one rail exceeds four, or any two cracks (index 1) are closer than one inch.

### NOTE

Use of seat rail cargo tie-downs is not permissible on seat rails with cracks.

Figure 3-10. Seat Rail Inspection

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## SECTION 4

### WINGS AND EMPENNAGE

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#### 4-1. WINGS AND EMPENNAGE.

#### 4-2. WINGS. (See figure 4-1.)

4-3. DESCRIPTION. Each all-metal wing is a semicantilever, semimonocoque 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, flaps and a detachable wing tip are mounted on each wing assembly. A single metal fuel tank is mounted between the wing spars at the inboard end of each wing. Colored navigation lights are mounted at each wing tip.

4-4. REMOVAL. Wing panel removal is most easily accomplished if four men are available to handle the wing. Otherwise, the wing should be supported with a sling or maintenance stand when the fastenings are loosened.

- a. Remove wing root fairings and fairing plates.
- b. Remove all wing inspection plates.
- c. Drain fuel from tank of wing being removed.
- d. Disconnect:
  1. Electrical wires at wing root disconnects.
  2. Fuel lines at wing root. (Observe precautions outlined in Section 12.)
  3. Pitot line (left wing only) at wing root.
  4. Cabin ventilator hose at wing root.
- e. Reduce aileron cable tension by loosening turnbuckles and disconnect cables at aileron bellcranks. Disconnect flap cables at turnbuckles above headliner, and pull cables into wing root area.

#### NOTE

To ease rerouting the cables, a guide wire may be attached to each cable before it is pulled free of the wing. Cable may then be disconnected from the wire. Leave the guide wire routed through the wing; it may be attached again to the cable during reinstallation and used to pull the cable into place.

## MODEL 152 SERIES SERVICE MANUAL

- f. Remove screws from strut fairings and slide toward center of strut.
- g. Support wing at outboard end and remove strut-to-wing attach bolt.
- h. Lower strut carefully to avoid damage to lower strut-to-fuselage fitting.

### NOTE

Tape flaps in the streamlined position during wing removal. This will prevent flap damage due to the uncured free swinging action when handling wing.

- i. Mark position of wing attachment eccentric bushings (See figure 4-1); these bushings are used to rig out "wing heaviness".
- j. Remove nuts, washers, bushings and bolts attaching wing spars to fuselage.

### NOTE

It may be necessary to rock the wings slightly while pulling attaching bolts, or to use a long drift punch to drive out attaching bolts.

- k. Remove wing and lay on padded stand.

4-5. REPAIR. A damaged wing panel may be repaired in accordance with instructions outlined in Section 17. Extensive repairs of wing skin or structure are best accomplished using the wing repair jig, which may be obtained from Cessna. The wing jig serves not only as a holding fixture, making work on the wing easier, but also assures the absolute alignment of the repaired wing.

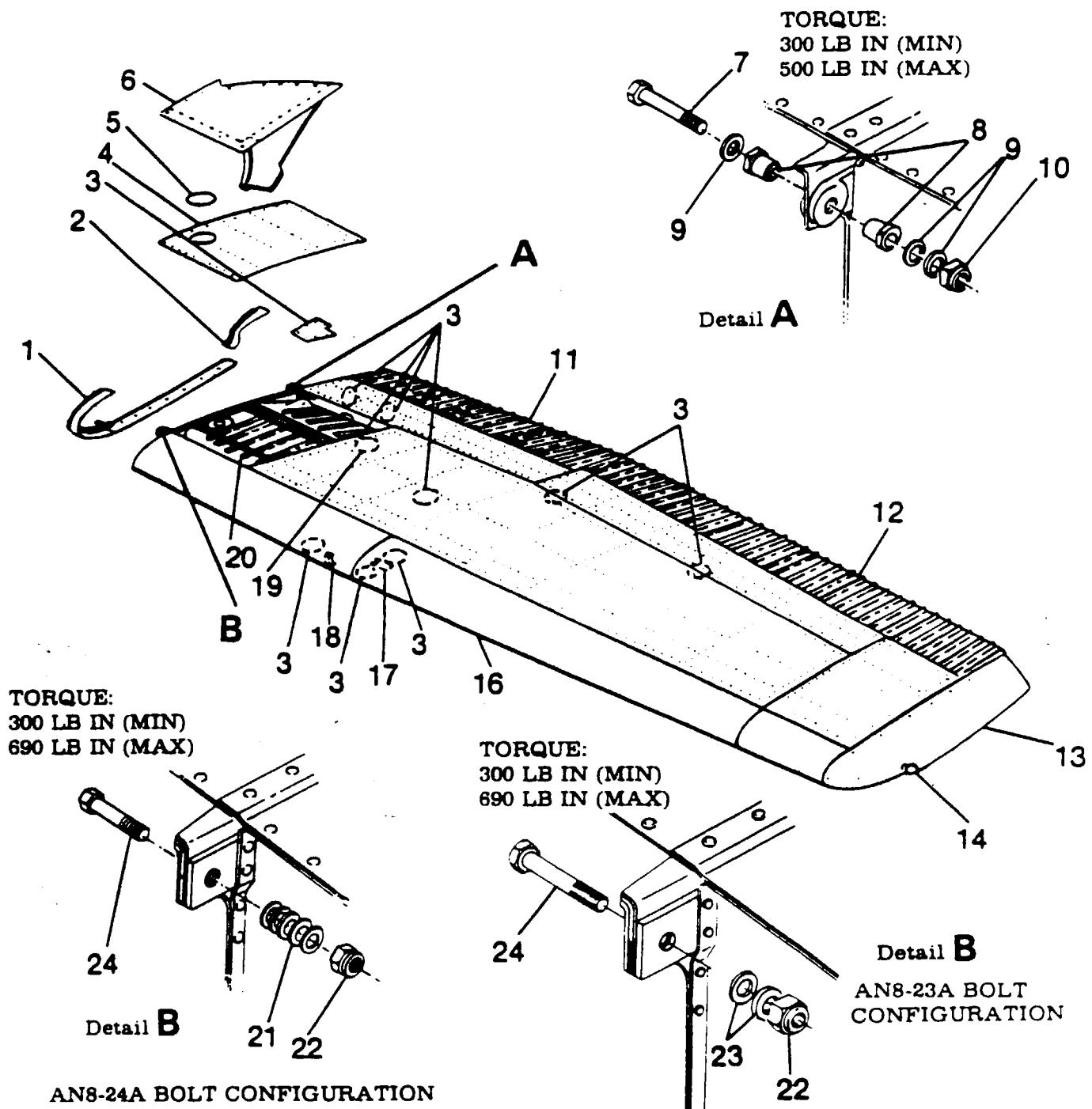
4-6. INSTALLATION. (See figure 4-1.)

### NOTE

There are 2 sizes of forward wing-attach bolts in the field. Some aircraft are equipped with AN8-24 bolts, and some are equipped with AN8-23 bolts. Each type of bolt must be installed with its own washer and nut configuration. Figure 4-1 illustrates both configurations. The torque value is the same for both configurations since they are both 1/2-inch bolts. Minimum torque is 300 lb-in, and the maximum torque is 690 lb-in. The aft wing-attach fittings are fastened with AN7-24 bolts. These bolts have a minimum torque of 300 lb-in and a maximum torque of 500 lb-in.

- a. Hold wing in position and install bolts, bushings, washers and nuts attaching wing spars to fuselage fittings. Ensure eccentric bushings are positioned as marked. Torque nuts to values stipulated in note preceding this step.

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- |                             |                      |                           |
|-----------------------------|----------------------|---------------------------|
| 1. Fairing                  | 9. AN960-716 Washer  | 17. Cover Plate           |
| 2. Lower Rear Fairing       | 10. MS20365-720C Nut | 18. Stall Warning Opening |
| 3. Inspection Plate         | 11. Wing Flap        | 19. Courtesy Light        |
| 4. Fuel Tank Cover          | 12. Aileron          | 20. Fuel Tank             |
| 5. Fuel Gage Access Cover   | 13. Wing Tip         | 21. AN960-816L Washer     |
| 6. Wing-To-Fuselage Fairing | 14. Position Light   | 22. MS20365-820C Nut      |
| 7. AN7-24A Bolt             | 15. Deleted          | 23. AN960-816 Washer      |
| 8. Eccentric Bushings       | 16. Wing Assembly    | 24. AN8-23A Bolt          |

Figure 4-1. Wing Installation

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- b. Install bolts, spacers and nuts to secure upper and lower ends of wing strut to wing and fuselage fittings.
- c. Route flap and aileron cables, using guide wires. (Refer to note in following step "e" in paragraph 4-4.)
- d. Connect the following:
  1. Electrical wires at wing root disconnects.
  2. Fuel lines at wing root. (Observe precautions outlined in Section 12.)
  3. Pitot line, if left wing is being installed.
- e. Rig aileron system as outlined in Section 6.
- f. Rig flap system as outlined in Section 7.
- g. Fill tank with fuel and check for leaks, observing precautions outlined in Section 12.
- h. Check operation of fuel quantity gage.
- i. Install wing root fairings.

### NOTE

Apply fillet-type sealant (Permagum 578.1, Inmont Corp., St. Louis, Missouri) or equivalent to area between cabin top and wing skin, and also to area across top of lower strut fitting at skin cutout. Gap between windshield and wing leading edge with cloth-backed, waterproof tape (Polyken 230 or 231, Kendall-Polyken Division, Chicago, Illinois) or equivalent.

### NOTE

Be sure to insert soundproofing panel in wing gap, if such a panel was installed originally, before replacing wing root fairings.

- j. Install all wing inspection plates, interior panels and upholstery.

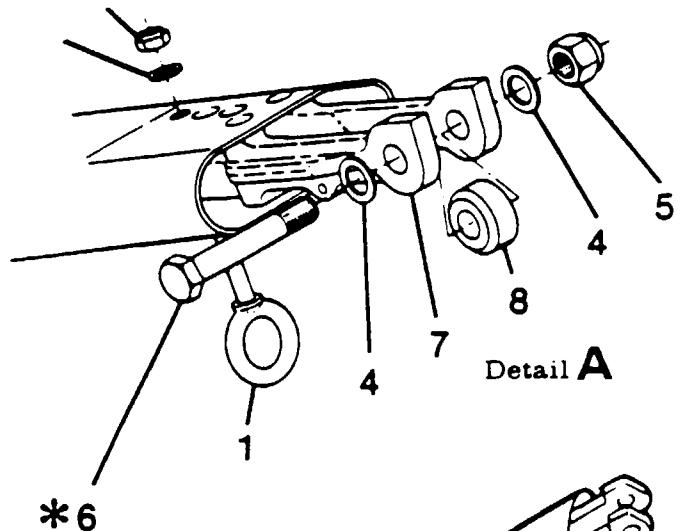
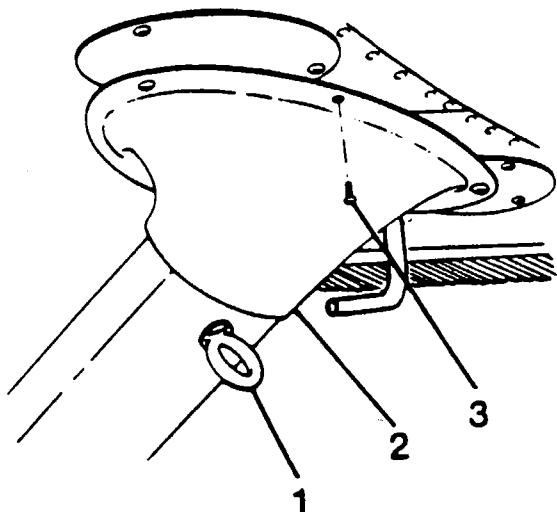
4-7. **ADJUSTMENT (CORRECTING "WING-HEAVY" CONDITION).** (Refer to figure 4-1.) If considerable control wheel pressure is required to keep the wings level in normal flight, a "wing-heavy" condition exists. To remedy this condition, proceed as follows:

- a. Remove wing root fairing strip on "wing-heavy" side of aircraft.
- b. Loosen nut (10) and rotate eccentric bushings (8) simultaneously until the bushings are positioned with the thick sides of the eccentrics up. This will lower the trailing edge of the wing, and decrease "wing-heaviness" by increasing the angle-of-incidence of the wing.

### CAUTION

Be sure to rotate the eccentric bushings 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 fitting.

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\* NOTE

\*6

LUBRICATE BOLT AND  
HOLE PER SECTION 2.

1. Mooring Ring
2. Upper Fairing
3. Screw
4. Washer
5. Nut
6. Bolt
7. Wing Attachment Fitting
8. Spacer
9. Fuselage Attachment Fitting
10. Lower Fairing

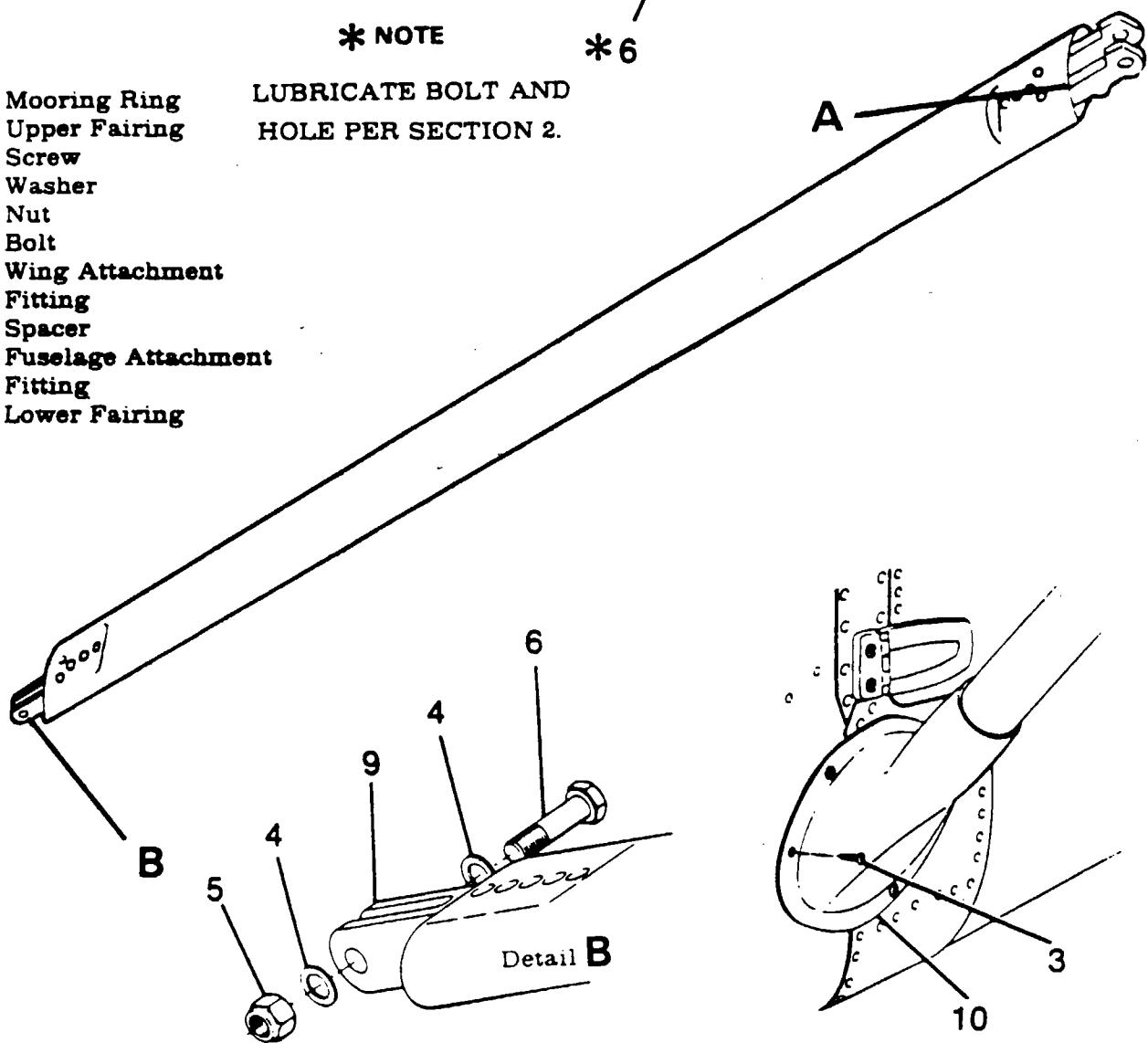


Figure 4-2. Wing Strut

## MODEL 152 SERIES SERVICE MANUAL

- c. Torque nuts (10), and reinstall fairing strip.
- d. Test-fly the aircraft. If the wing-heavy condition still exists, remove fairing strip on the "lighter" wing, loosen nut and rotate bushings 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.
- e. Torque nut (10), install fairing strip, and repeat test flight.

### 4-8. WING STRUTS. (See figure 4-2.)

4-9. **DESCRIPTION.** Each wing has a single lift strut which transmits a part of the wing load to the lower portion of the fuselage. The strut consists of a streamlined tube with fittings for attachment at the fuselage and wing.

### 4-10. REMOVAL AND INSTALLATION.

- a. Remove screws from strut fairings and slide fairings along strut.
- b. Remove fuselage and wing inspection plates at strut junction points.
- c. Support wing securely, then remove nut and bolt securing strut to fuselage.
- d. Remove nut, bolt and spacer used to attach strut to wing, then remove strut from aircraft.
- e. Reverse preceding steps to install strut.

#### NOTE

Seal across top of lower strut fitting at skin cutout with 576.1 Permagum.

### 4-11. REPAIR.

#### a. For grooves in wing strut caused by strut fairings, the following applies:

1. If groove exceeds .010 inch in depth and is less than .75 inch from a rivet center, the strut should be replaced.
2. If groove exceeds .030 inch in depth and is more than .75 inch from a rivet center, the strut should be replaced.
3. If groove depth is less than .030 inch and is more than .75 inch from a rivet center, strut should be repaired by tapering gradually to the original surface and burnishing out to a smooth finish. The local area should be checked with dye penetrant to ensure that no crack has developed.

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- b. The following applies to wing struts with grooves worn in the lower trailing edge. This type damage can occur after extensive cabin door usage with a missing or improperly adjusted door stop which allows the door to bang against the aft edge of the strut at the lower end.

### NOTE

Struts with a groove deeper than 50% of the original material thickness should be replaced. Lesser damage may be repaired as follows:

1. Without making the damage deeper, remove strut material on each side of groove to reduce notch effect of damage. Smooth and blend the surface to provide a gradual transition of strut tube material thickness in damaged area. The local area should be checked with dye penetrant to insure that no crack has developed.
  2. Apply brush alodine or nonzinc chromate primer and repaint area.
  3. Re-rig the door stop and/or re-form the lower portion of the door pan and skin in-board to prevent the door from rubbing the strut tube. If these actions prove to be ineffective, install some form of protective bumper, either on strut or lower portion of door, to prevent further damage. A short, hard rubber strip bonded to the trailing edge of the strut where the door comes close to strut is a possibility.
- c. Tie-downs and attaching parts may be replaced. If the strut is badly dented, cracked or deformed, it should be replaced.
- 4-12. FIN. (See figure 4-3.)
- 4-13. DESCRIPTION. The fin is primarily of metal construction, consisting of ribs and spars covered with skin. Fin tips are of ABS or glass fiber construction. Hinge brackets at the fin rear spar attach the rudder.
- 4-14. REMOVAL AND INSTALLATION. The fin may be removed without first removing the rudder. However, for access and ease of handling, the rudder may be removed in accordance with procedures outlined in Section 10. Remove fin as follows:
- a. Remove fairings (3) and (4) from sides of fin.
  - b. Disconnect flashing beacon lead, tail navigation light lead, antennas and antenna leads, and rudder cables, if rudder has not been removed.
  - c. Thru 1979 Models, remove bolts attaching rear fin brackets to horizontal stabilizer.
  - d. Beginning with 1980 Models, remove screws attaching rear fin to tailcone bulkhead.
  - e. Remove bolts attaching front fin brackets to fuselage and remove fin.
  - f. Install fin by reversing preceding steps. Be sure to check and reset rudder and elevator travel if any stop bolts were removed or their settings disturbed. (Refer to Sections 2, 9 and 10).

### NOTE

Torque screws (16) to a value of 100-120 lb-in.

- 4-14A. ATTACHMENT INSPECTION AND NUTPLATE REPLACEMENT. (See figure 4-3A.) Federal Aviation Regulations (FAR) rules call for inspection of key and primary structural attachments, including the vertical fin attachment, on either an annual or 100 hour basis. However, for airplanes through 1980 models, it is recommended that the nutplates used to attach the fin be inspected after each 100 hours of operation.

## MODEL 152 SERIES SERVICE MANUAL

- a. Position rudder to one side as far as possible. Through access holes in end of vertical fin attach bracket, use an inspection light and small mirror to inspect fin attach bracket and nutplates on upper and lower flange of attach bracket. Inspect for cracks in fittings.
- b. Position rudder to opposite side, and repeat same inspection for opposite end of attach bracket.
- c. If nutplates show no indication of cracking, they are correct.
- d. If nutplates are cracked in threaded area, they require replacement.
- e. Replace nutplates.
  1. Remove rudder, elevators, and vertical fin per sections 10, 8, and paragraph 4-14.
  2. Remove bolts securing stabilizer rear spar to fuselage tailcone.
  3. Remove bolts securing forward stabilizer attach points. Remove stabilizer.
  4. Drill out existing rivets that secure the attach bracket to the stabilizer spar and remove bracket assembly.
  5. Remove damaged nutplates by drilling out securing rivets.
  6. Using rivets, install replacement nutplates to attach bracket.
  7. Remove access cover from top of stabilizer skin for use of bucking bar below skin.
  8. Reinstall attach bracket to stabilizer spar.
  9. Reinstall stabilizer, vertical fin, rudder, and elevators per paragraph 4-14 and sections 10 and 8.

### NOTE

Torque bolts to 70 to 100 lb-in.

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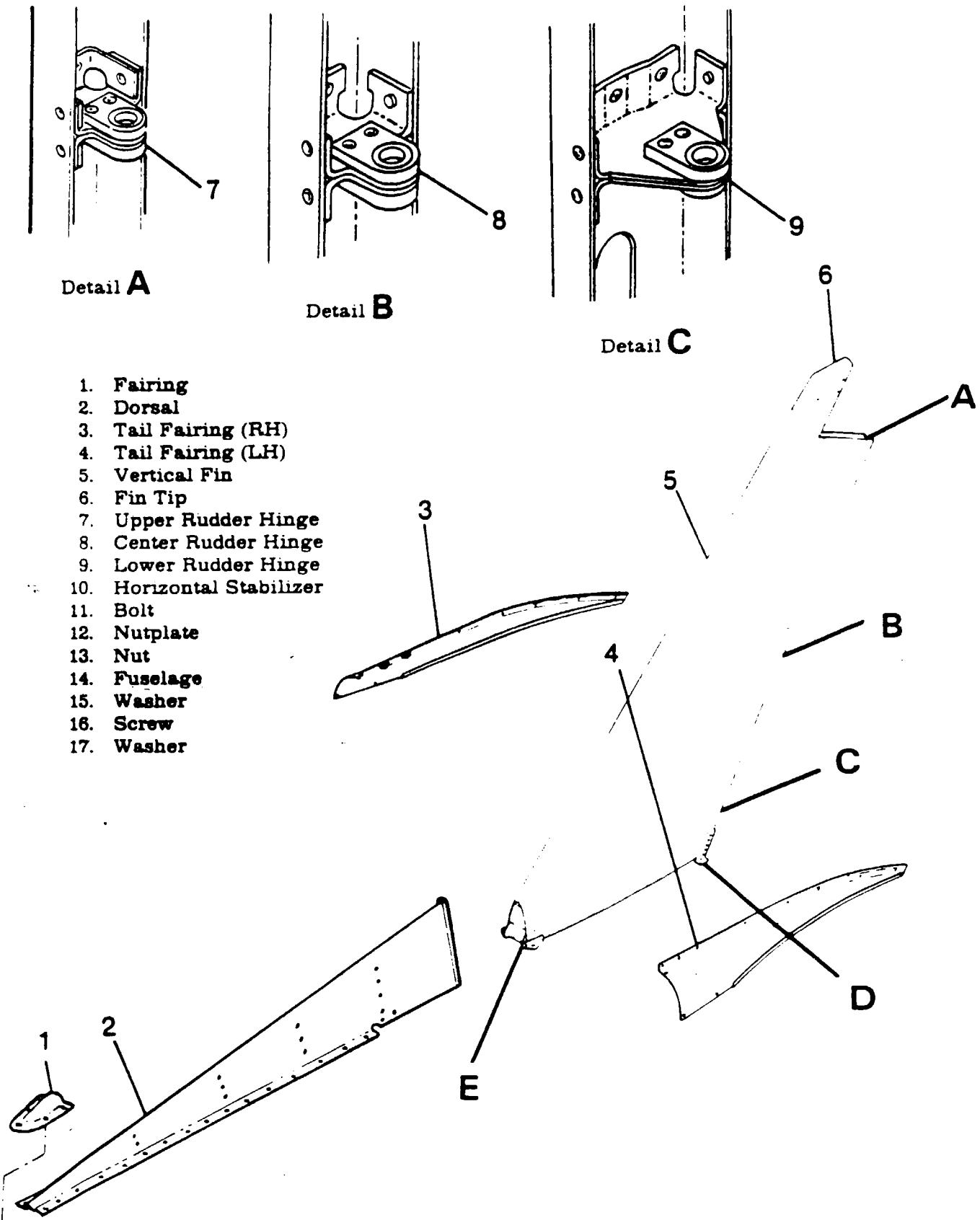


Figure 4-3. Vertical Fin Installation (Sheet 1 of 2)

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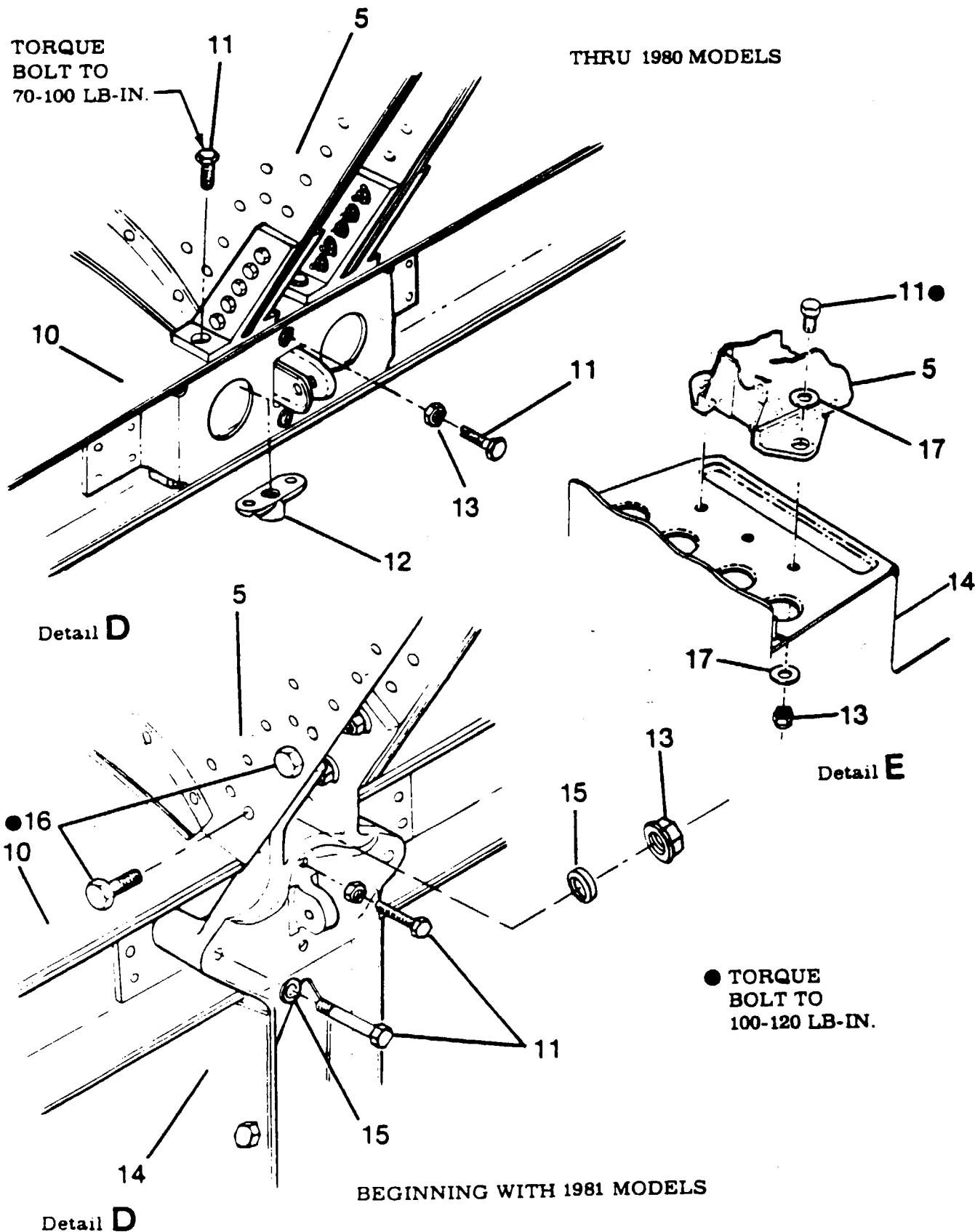


Figure 4-3. Vertical Fin Installation (Sheet 2 of 2)

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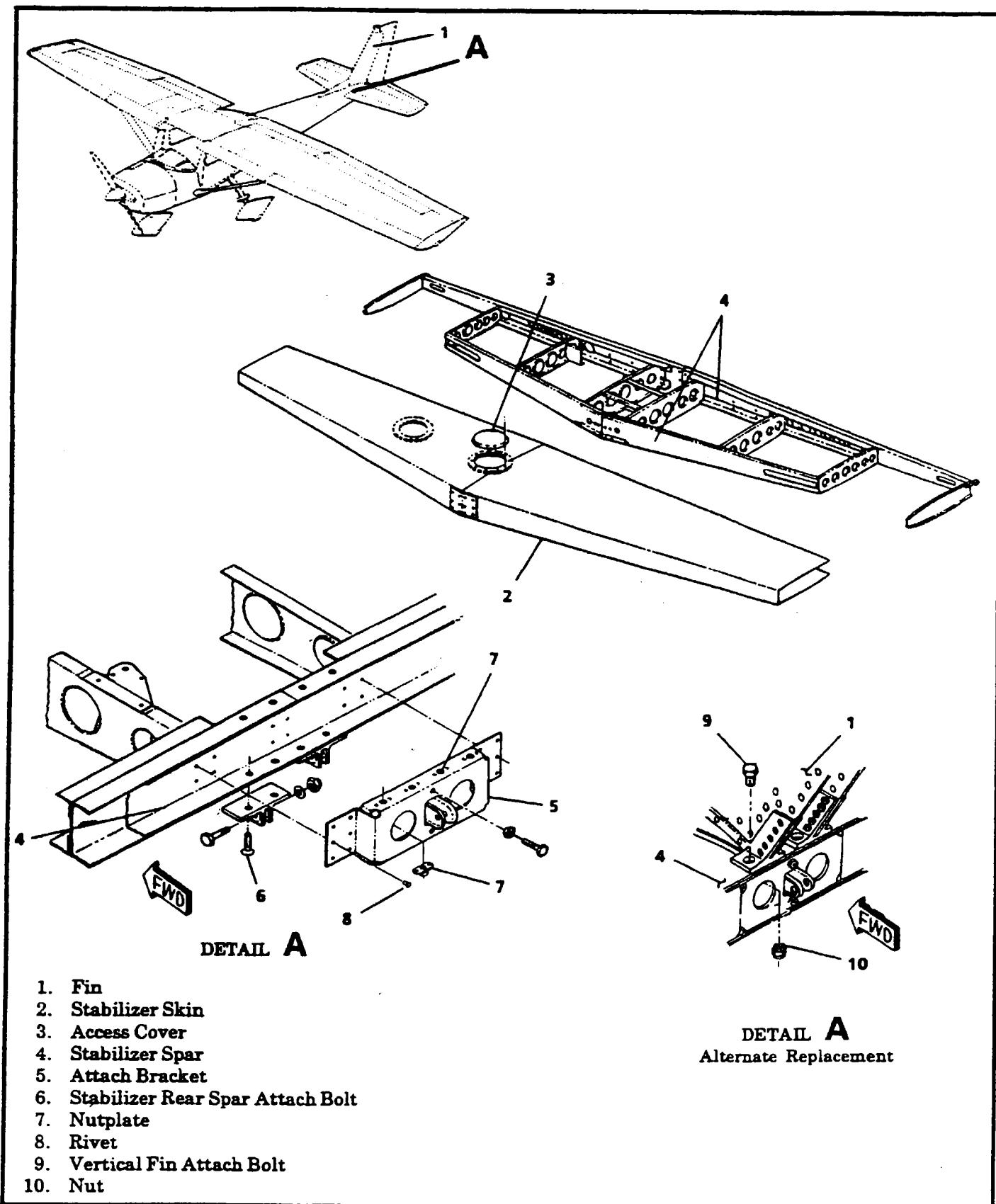


Figure 4-3A. Fin Attachment Inspection and Nutplate Replacement (Thru 1980 Model Airplanes)

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- e. Remove bolts attaching front fin brackets to fuselage and remove fin.
- f. Install fin by reversing preceding steps. Be sure to check and reset rudder and elevator travel if any stop bolts were removed or their settings disturbed. (Refer to Sections 2, 9 and 10.)

### NOTE

Torque screws (16) to a value of 100-120 lb-in.

- 4-15. REPAIR. Fin repair should be accomplished in accordance with applicable instructions outlined in Section 17.
- 4-16. HORIZONTAL STABILIZER. (See figure 4-4.)
- 4-17. DESCRIPTION. The horizontal stabilizer is primarily of all-metal construction, consisting of ribs and spars covered with skin. Stabilizer tips are of ABS construction. 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.
- 4-18. REMOVAL AND INSTALLATION.
  - a. Remove elevators and rudder in accordance with procedures outlined in Sections 8 and 10.
  - b. Remove vertical fin in accordance with procedures outlined in paragraph 4-14.
  - c. Disconnect elevator trim control cables at clevis and turnbuckle inside tailcone. remove pulleys which route the aft cables into horizontal stabilizer and pull cables out of tailcone.
  - d. Remove bolts securing horizontal stabilizer to fuselage.
  - e. Remove horizontal stabilizer.
  - f. Install horizontal stabilizer by reversing preceding steps. Rig control systems as necessary. Check operation of tail navigation light and flashing beacon.

### NOTE

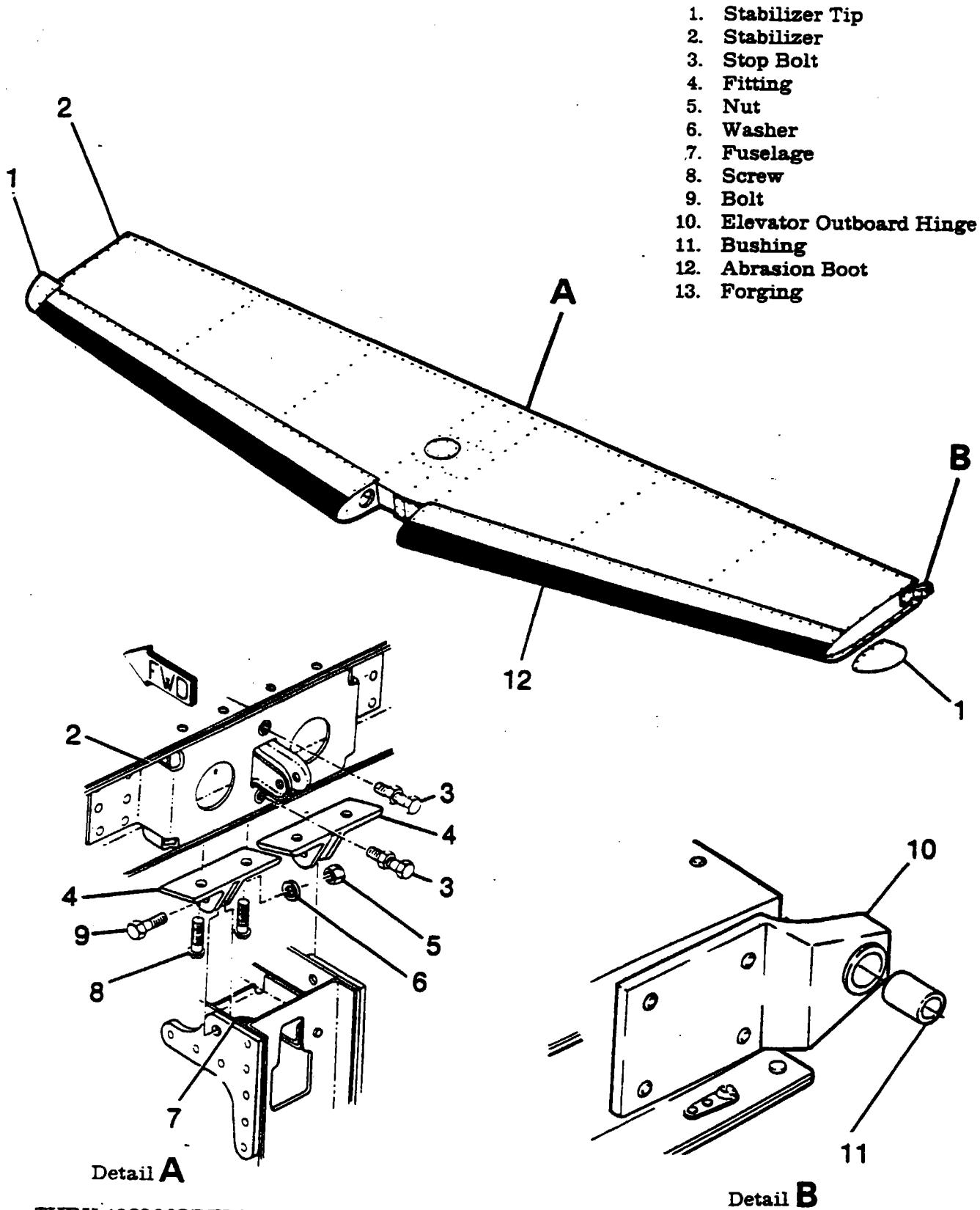
When installing horizontal stabilizer to fuselage attach bolts, torque bolts 100-120 lb-in.

- 4-19. REPAIR. Horizontal stabilizer repair should be accomplished in accordance with applicable instructions outlined in Section 17.
- 4-20. STABILIZER ABRASION BOOTS. (See figure 4-4.)

### NOTE

An Accessory Kit (AK182-217) is available from Cessna Parts Distribution (CPD 2) through Cessna Service Stations for installation of abrasion boots on aircraft not so equipped.

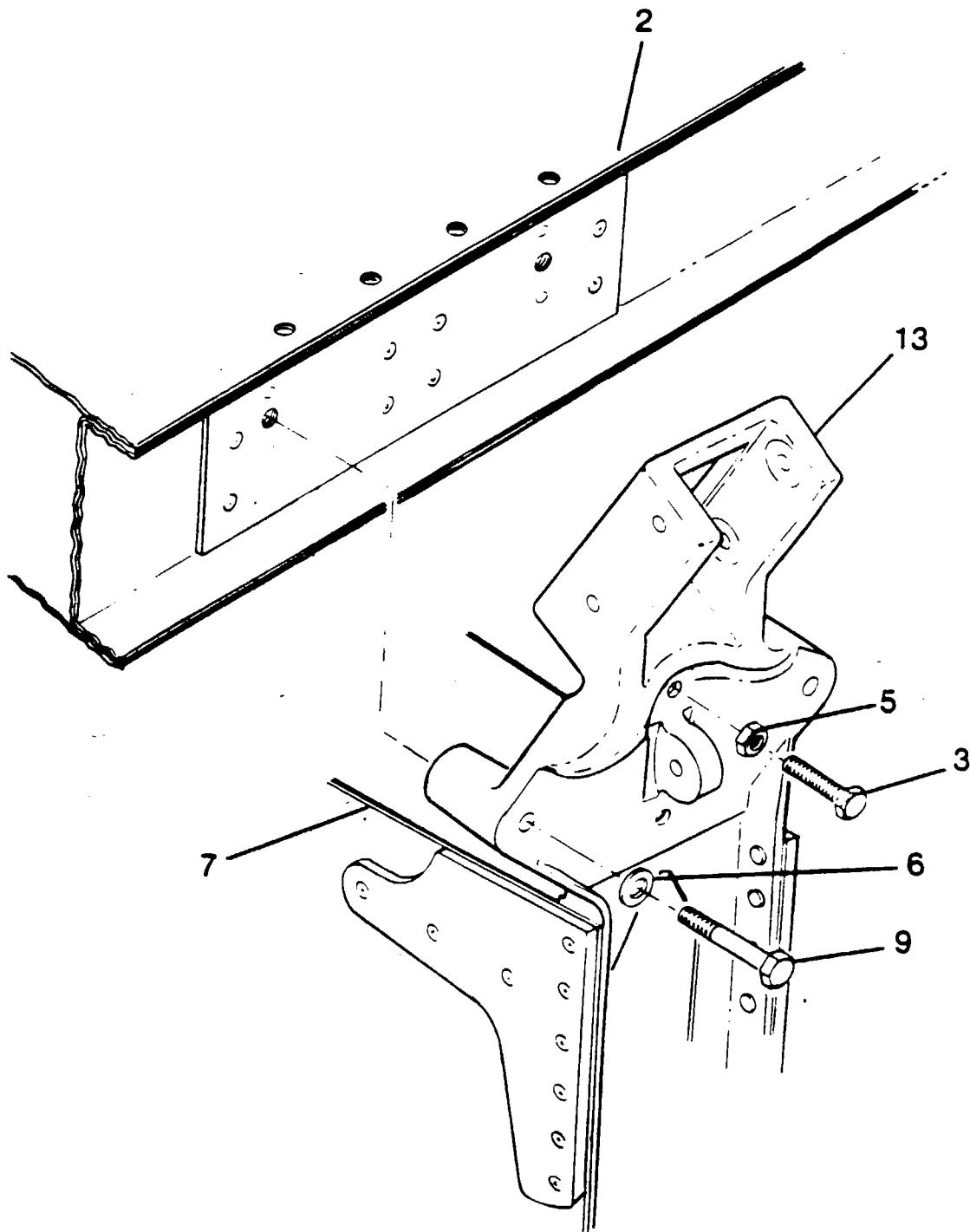
## MODEL 152 SERIES SERVICE MANUAL



THRU 1980 MODELS

Figure 4-4. Horizontal Stabilizer Installation (Sheet 1 of 2)

**MODEL 152 SERIES SERVICE MANUAL**



**Detail A**

BEGINNING WITH 1981 MODELS

Figure 4-4. Horizontal Stabilizer Installation (Sheet 2 of 2)

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- 4-21. **DESCRIPTION.** The aircraft may be equipped with two extruded rubber abrasion boots, one on the leading edge of each horizontal stabilizer. These boots are installed to protect the stabilizer leading edge from damage caused by rocks thrown back by the propeller.
- 4-22. **REMOVAL.** The abrasion boots can be removed by loosening one end of the boot and pulling it off the stabilizer with an even pressure. Excess adhesive or rubber can be removed with Methyl-Ethyl-Ketone.
- 4-23. **INSTALLATION.** Install abrasion boots as outlined in the following procedures.
- Trim boots to desired length.
  - Mask off boot area on leading edge of stabilizer with 1-inch masking tape, allowing 1/4-inch margin.
  - Clean metal surfaces of stabilizer, where boot is to be installed with Methyl-Ethyl-Ketone.
  - Clean inside surface of abrasion boot with Methyl-Ethyl-Ketone and a Scotch brite pad to ensure complete removal of paraffin/talc. Then, a normal wipe down with MEK on a cloth will leave surface suitable for bonding to the aluminum.

### NOTE

Boots may be applied over epoxy primer, but if the surface has been painted, the paint shall be removed from the bond area. This shall be done by wiping the surfaces with a clean, lint-free rag, soaked with solvent, and then wiping the surfaces dry, before the solvent has time to evaporate, with a clean, dry lint-free rag.

- Stir cement (EC-1300 Minnesota Mining and Manufacturing Co.) thoroughly.
- Apply one even brush coat to the metal and the inner surface of the boot. Allow cement to air-dry for a minimum of 30 minutes, and then apply a second coat to each surface. Allow at least 30 minutes (preferably one-hour) for drying.
- After the cement has thoroughly dried, reactivate the surface of the cement on the stabilizer and boot, using a clean, lint-free cloth, heavily moistened with toluol. Avoid excess rubbing which would remove the cement from the surfaces.
- Position boot against leading edge, exercising care not to trap air between boot and stabilizer.

### NOTE

Should boot be attached "off-course", pull it up immediately with a quick motion, and reposition properly.

- Press or roll entire surface of boot to assure positive contact between the two surfaces.
- Apply a coat of GACO N700A sealer or equivalent (conforming to MIL-C-21067) along the trailing edges of the boot to the surface of the skin to form a neat straight fillet.
- Remove masking tape and clean stabilizer of excess material.
- Mask to the edge of boot for painting stabilizer.

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## SECTION 5

### LANDING GEAR, BRAKES AND HYDRAULIC SYSTEM

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Installation .....	1G6/5-39
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Description .....	1G7/5-40
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Removal/Installation .....	1G10/5-43
Inspection and Repair .....	1G10/5-43

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### 5-1. LANDING GEAR

5-2. DESCRIPTION. The aircraft is equipped with a fixed tricycle landing gear, consisting of tubular spring-steel main gear struts, and an air/oil steerable nose gear shock strut. Two-piece, die-cast aluminum wheels are installed on the main and nose landing gear. The wheels are equipped with tubes and disc-type brakes. The nose wheel is steerable with the rudder pedals up to a maximum pedal deflection, after which it becomes free-swiveling, up to a maximum of 30 degrees, each side of center. Nose and main wheel fairings are available for installation.

### 5-3. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
AIRCRAFT LEANS TO ONE SIDE.	Incorrect tire inflation. Landing gear attaching parts too tight. Landing gear spring excessively sprung. Bent axles.	Inflate to pressure specified in figure 1-1. Tighten loose parts; replace defective parts with new parts. Remove and install new part(s). Install new part(s).
TIRES WEAR EXCESSIVELY.	Incorrect tire inflation. Main wheels out of alignment. Landing gear spring excessively sprung. Bent axles. Dragging brakes. Wheel bearings excessively tight. Wheels out of balance. Loose torque links.	Inflate to pressure specified in figure 1-1. Remove and install new part(s). Remove and install new part(s). Install new part(s). Refer to paragraph 5-62. Adjust properly. Correct in accordance with paragraph 5-25. Add shims or install new parts as required.
WHEEL BOUNCE EVIDENT ON SMOOTH SURFACE.	Out of balance condition.	Refer to paragraph 5-25.

### 5-4. MAIN LANDING GEAR.

5-5. DESCRIPTION. The tubular, spring-steel main landing gear struts are attached to the

## MODEL 152 SERIES SERVICE MANUAL

aircraft at inboard and outboard forgings, located in the belly of the aircraft. A bracket is bonded to each strut for attachment of a step. Hydraulic brake lines are routed down and clamped to each main gear strut. The axles, main wheels and brake assemblies are installed at the lower end of each strut.

### 5-6. MAIN GEAR STRUT REMOVAL. (See figure 5-1.)

#### NOTE

The following procedure removes the landing gear as a complete assembly. Refer to applicable paragraphs for removal of individual components.

- a. Remove floorboard access covers over inboard and outboard landing gear forgings (2) and (3).
- b. Hoist or jack aircraft in accordance with procedures outlined in Section 2.
- c. Remove screws attaching fuselage fairing (19), and allow fairing to slide down over spring-strut fairing (18).
- d. Drain hydraulic fluid from brake line (6) on strut being removed.
- e. Disconnect hydraulic brake line (6) at fitting where brake line emerges from fuselage skin. Cap or plug disconnected fittings.
- f. Remove nut, washer and bolt attaching inboard end of tubular strut to the inboard landing gear bulkhead fitting.
- g. Pull tubular strut from fitting and bushing. Use care when removing strut to prevent damage to hydraulic brake line.

#### NOTE

The tubular strut is a compression fit in the bushing in the outboard landing gear forging (3).

### 5-7. MAIN GEAR STRUT INSTALLATION. (See figure 5-1.)

#### NOTE

The following procedure installs the landing gear as a complete assembly. Refer to applicable paragraphs for installation of individual components.

- a. Install all parts removed from strut.
- b. Apply Dow Corning Compound DC-7 to approximately 11 inches on upper end of tubular strut.

#### NOTE

Avoid use of Dow Corning DC-7 on surfaces to be painted. DC-7 contains silicone which is harmful to painted surfaces.

- c. Slide tubular strut into place through bushing in outboard strut fitting and into inboard strut fitting.
- d. Align tubular strut in inboard fitting and install bolt through fitting and strut. Install washer and nut on bolt and tighten to torque value listed in Section 1.
- e. Connect hydraulic brake line to fitting. Fill and bleed brake system in accordance

## MODEL 152 SERIES SERVICE MANUAL

with applicable paragraph in this section.

- f. Install fairing.
- g. Lower aircraft and install floorboard access covers.

### 5-8. STEP BRACKET INSTALLATION.

#### NOTE

The step bracket is secured to the tubular gear strut with EA9309, EC2216, EC2214, EC3445, or a similar epoxy base adhesive.

- a. Mark position of the bracket so that the new step bracket will be installed in approximately the same position on the strut.
- b. Remove all traces of the original bracket and adhesive as well as any rust, paint or scale with a wire brush and coarse sandpaper.
- c. Leave surfaces slightly roughened or abraded, but deep scratches or nicks should be avoided.
- d. Clean surfaces to be bonded together thoroughly. If a solvent is used, remove all traces of the solvent with a clean, dry cloth. It is important that the bonding surfaces be clean and dry.
- e. Check fit of step bracket on the tubular strut.
- f. Mix adhesive (any of those listed in note preceding step "a") in accordance with manufacturer's directions.
- g. Spread a coat of adhesive on bonding surfaces, and place step bracket in position on the tubular strut. Clamp bracket to strut to ensure a good tight fit.
- h. Form a small fillet of the adhesive at all edges of the bonded surfaces. Remove excess adhesive with lacquer thinner.
- i. Allow adhesive to cure thoroughly according to manufacturer's recommendations before flexing the tubular gear strut or applying loads to the strut.
- j. Paint tubular strut and step bracket after curing is completed.

### 5-9. MAIN LANDING GEAR FAIRINGS. (See figures 5-1 and 5-2.)

5-10. DESCRIPTION. Some aircraft are equipped with fuselage fairings, attached to the fuselage and the tubular strut fairings with screws. The tubular strut fairings cover the tubular landing gear struts, and attach to the fuselage fairings at the upper end and to fairing caps at the lower end. The fairing caps attach to the tubular strut fairings at the upper end and clamped to the tubular struts at the lower end. Brake fairings are installed at the lower end of the tubular strut fairings and are attached to the wheel speed fairings by screws around their outer perimeters. The speed fairings are installed over the wheels and are attached to mounting plates, attached to the axles. The wheel fairings are equipped with adjustable scrapers, installed in the lower aft part of the fairings, directly behind the wheels.

### 5-11. REMOVAL AND INSTALLATION OF MAIN LANDING GEAR FAIRINGS. (See figure 5-1.)

- a. To remove brake fairings (15), proceed as follows:
  1. Remove screws from perimeter of fairings.
  2. Remove screws from nutplates holding fairings together.
  3. Spring fairings open to slide over spring strut fairings.
  4. Remove brake fairings.
  5. Reverse preceding steps to install brake fairings.
- b. To remove fairing caps (17), proceed as follows:
  1. Remove brake fairings (15), as outlined in step "a".

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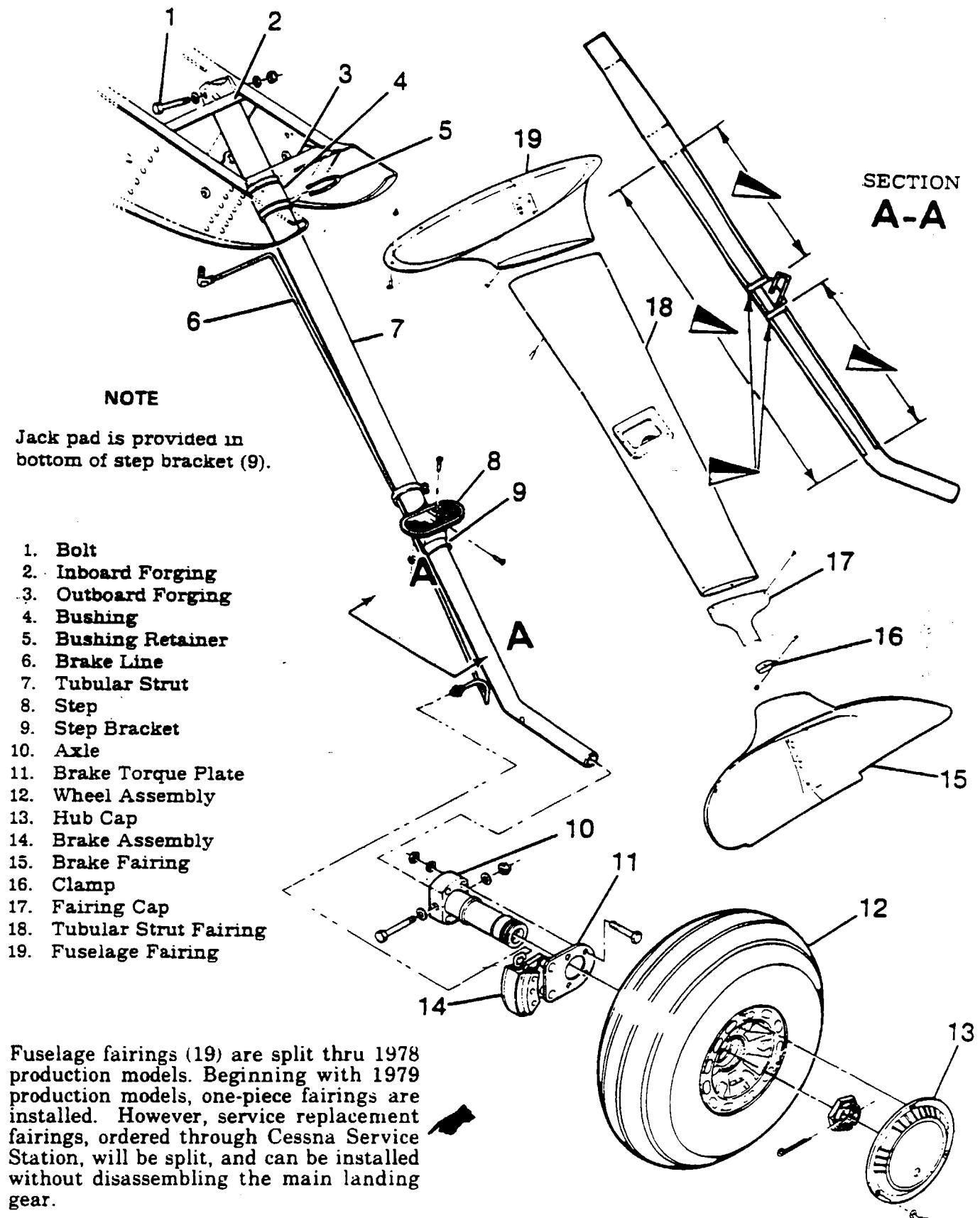


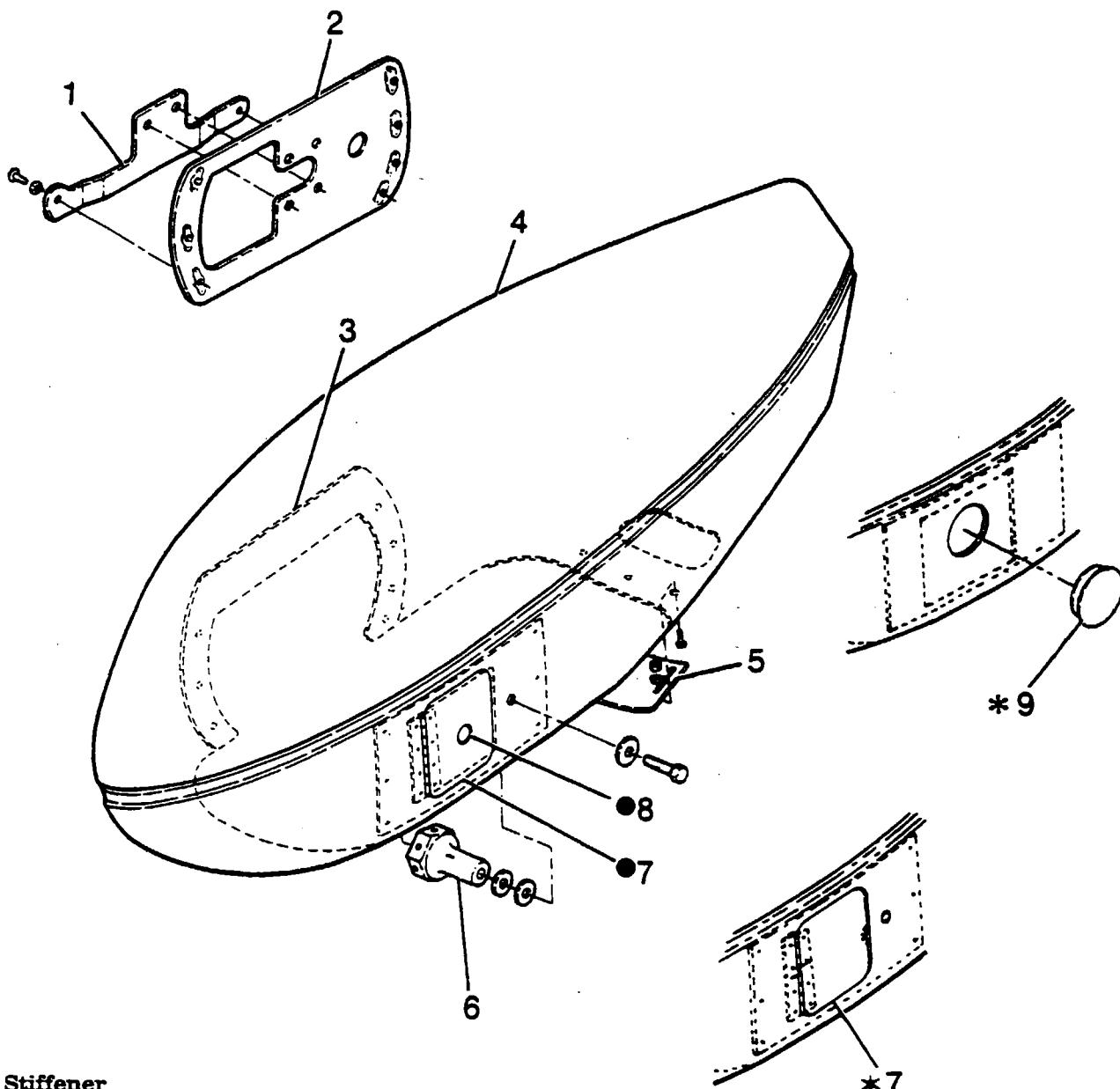
Figure 5-1. Main Landing Gear Installation

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● 15279406 thru 15282762  
 F15201429 thru F15201578  
 A1520735 thru A1520839  
 FA1520337 thru FA1520356

\*15282763 thru 15283958  
 F15201579 thru F15201783  
 A1520840 thru A1520909  
 FA1520357 thru FA1520372

\*15283959 & On  
 F15201784 & On  
 A1520910 & On  
 FA1520373 & On



1. Stiffener
2. Mounting Plate
3. Doubler
4. Fairing
5. Scraper
6. Axle Nut
7. Door, Access
8. Latch
9. Plug

Figure 5-2. Main Wheel Speed Fairing

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2. Remove screws attaching fairing caps to spring strut fairings (18).
3. Remove bolt and nut attaching clamps (16) to spring struts (7).
4. Slide clamps (16) down tubular struts (7); remove fairing caps (17).

### NOTE

Clamps may be sprung over tubular struts for removal.

5. Reverse preceding steps to install fairing caps.
- c. To remove fuselage fairings (19), proceed as follows:
  1. Remove screws attaching fairings to fuselage.
  2. Slide fairings down tubular strut fairings and, thru 1978 Models, remove screws from nutplates holding fairings together, and spring fairings open to slide over strut fairings. Beginning with 1979 Models, fairings are one-piece and cannot be sprung apart.
  3. Reverse preceding steps to install fuselage fairings.
- d. To remove tubular strut fairings (18), proceed as follows:
  1. Remove brake fairings (15) as outlined in step "a".
  2. Remove fairing caps (17) as outlined in step "b".
  3. Remove fuselage fairings (19) as outlined in step "c".
  4. Remove steps (8).
  5. Remove screws from nutplates along strut fairings.
  6. Spring fairing over tubular struts, using care not to damage brake lines (6).
  7. Reverse the preceding steps to install fairings.

- 5-12. MAIN WHEEL SPEED FAIRING REMOVAL. (See figure 5-2.)
- a. Remove brake fairing as outlined in paragraph 5-11, step "a".
  - b. Remove screws attaching stiffener (1) and inboard side of wheel speed fairing (4) to mounting plate (2), which is attached to the axle.
  - c. Remove bolt securing outboard side of fairing to axle nut (6).
  - d. Loosen scraper (5), if necessary, and work speed fairing from wheel.

- 5-13. MAIN WHEEL SPEED FAIRING INSTALLATION. (See figure 5-2.)

- a. Work speed fairing down over wheel.
- b. Install bolt securing outboard side of speed fairing to axle nut.
- c. Install screws attaching stiffener (1) and inboard side of wheel speed fairing (4) to mounting plate (2), which is bolted to the axle.
- d. Install brake fairing by reversing procedures outlined in step "a" of paragraph 5-11.
- e. After installation, check scraper-to-tire clearance for a minimum of 0.25-inch to a maximum of 0.50-inch. Elongated holes in the scraper are provided for clearance adjustments.

### CAUTION

Always check scraper clearance after installing speed fairing, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. Set clearance between tire and scraper for a minimum of 0.25-inch to a maximum of 0.50-inch. Elongated holes in the scraper are provided for adjustment. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairings should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Wipe fuel and oil from speed fairing to prevent staining and deterioration of the fairing.

## MODEL 152 SERIES SERVICE MANUAL

### 5-14. MAIN WHEEL REMOVAL. (See figure 5-1.)

#### NOTE

It is not necessary to remove the main wheel to reline brakes or to remove brake parts, other than the brake disc on the torque plate.

- a. Hoist or jack aircraft in accordance with procedures outlined in Section 2.
- b. Remove speed fairing, if installed, as outlined in paragraph 5-12.
- c. Remove hub caps, if installed, cotter pin and axle nut.
- d. Remove bolts and washers attaching brake back plate to brake cylinder, and remove back plate.
- e. Pull wheel from axle.

### 5-15. MAIN WHEEL DISASSEMBLY. (McCauley) (See figure 5-3.)

- a. Completely deflate tire and tube and break loose tire beads. Extreme care must be exercised to prevent tire tool damage when removing tire from wheel halves (6).

#### WARNING

Serious injury can result from attempting to separate wheel halves with tire and tube inflated.

- b. Remove nuts (10) and washers (9).
- c. Remove thru-bolts (24) and washers (25).
- d. Separate and remove wheel halves (6) from tire and tube.
- e. Remove retaining rings (1), grease seal retaining rings (2), grease seal felts (3), grease seal retainers (4) and bearing cones (5) from both wheel halves (6).

#### NOTE

Bearing cups (races) (27) are a press fit in wheel halves (6), and should not be removed unless a new part is to be installed. To remove bearing cups, heat wheel half in boiling water for 30 minutes, or in an oven, not to exceed 121°C (250°F). Using an arbor press, if available, press out bearing cup and press in a new bearing cup while wheel half is still hot.

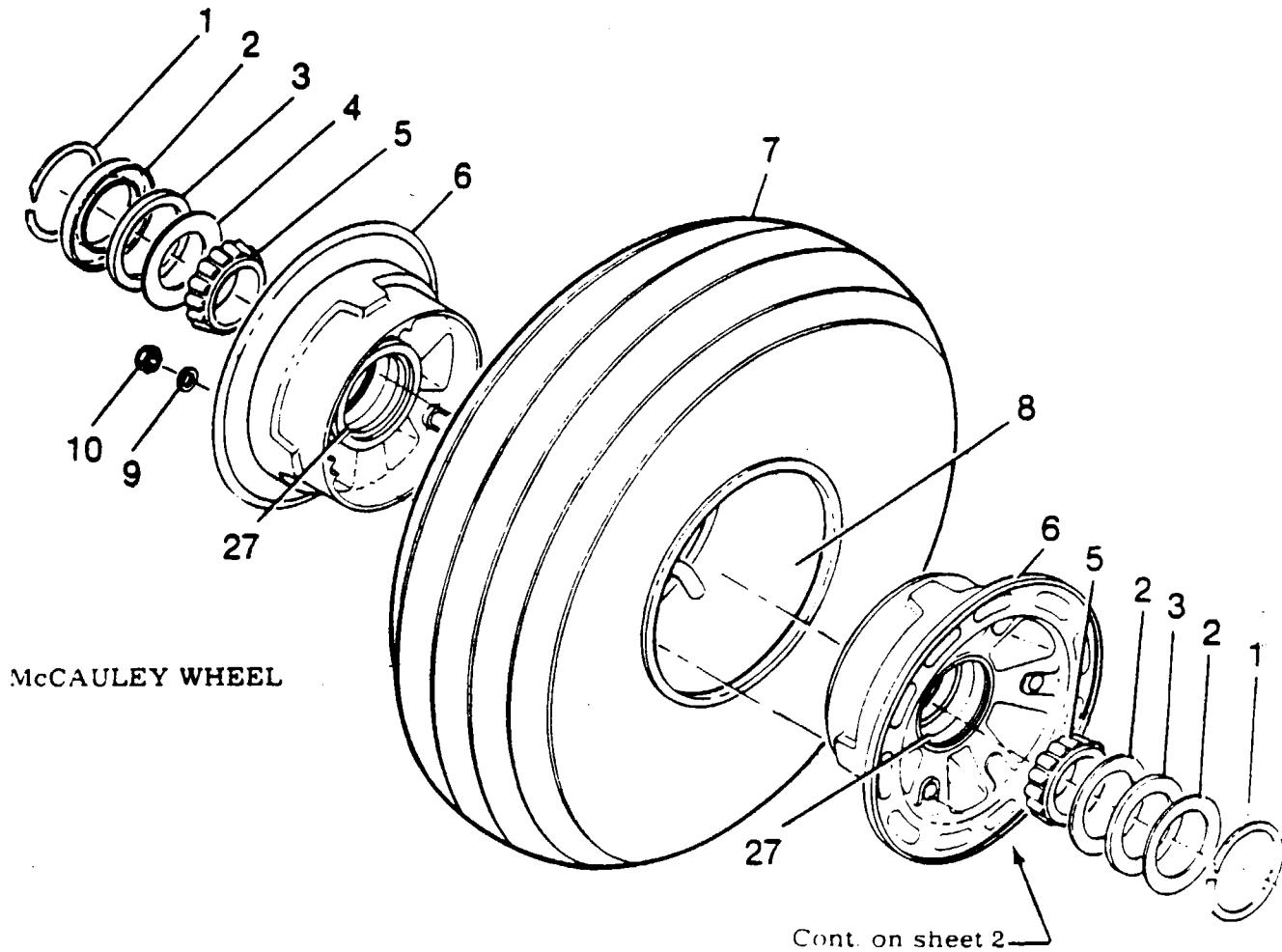
### 5-16. MAIN WHEEL INSPECTION AND REPAIR. (McCauley) (See figure 5-3.)'

#### NOTE

A soft bristle brush may be used to remove hardened grease, dust or dirt.

- a. Inspect wheel halves (6) for cracks or damage.
- b. Inspect bearing cones (5), cups (27), retaining rings (1), grease seal retainers (2), grease seal felts (3) and grease seal retainers (4) for wear or damage. Inspect brakes per paragraph 5-78.
- c. Inspect thru-bolts (24) and nuts (10) for cracks in threads or cracks in radius under bolt head.
- d. Replace cracked or damaged wheel half (6).

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1. Retaining Ring
2. Grease Seal Retainer
3. Grease Seal Felt
4. Grease Seal Retainer
5. Bearing Cone
6. Wheel Half
7. Tire
8. Tube
9. Washer
10. Nut
27. Bearing Cup

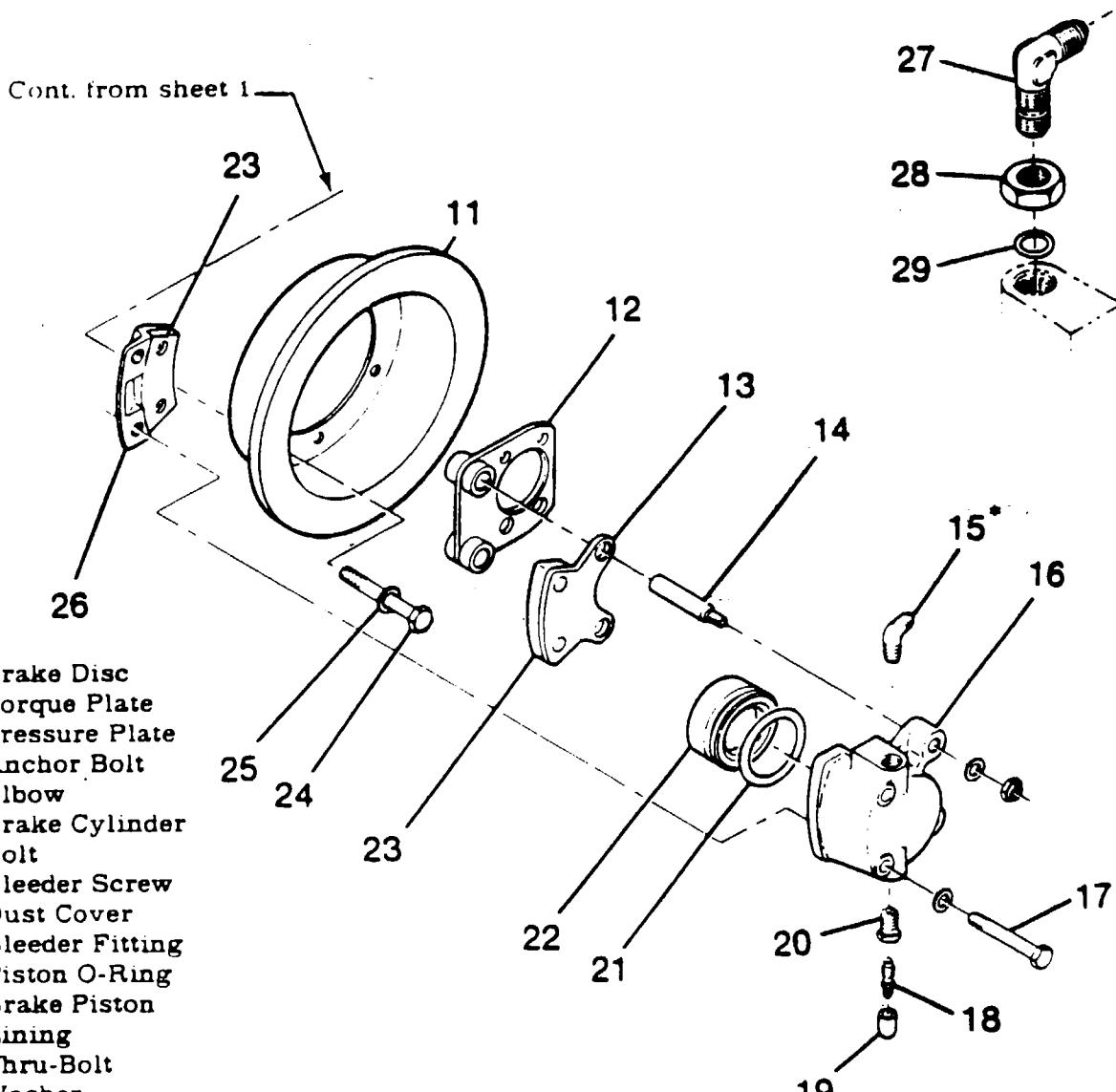
Figure 5-3. Main Landing Gear Wheel and Brake (Sheet 1 of 4)

# MODEL 152 SERIES SERVICE MANUAL

## NOTE

Maximum torque on elbow (15) to be 60 lb. in. Lube Seal elbow (15) Liquid-O-Ring No. 404 (Oil Center Research, P.O. Box 51871, Lafayette, Louisiana 70501). Torque bolts (17) to 100-110 lb. in. and safety-wire.

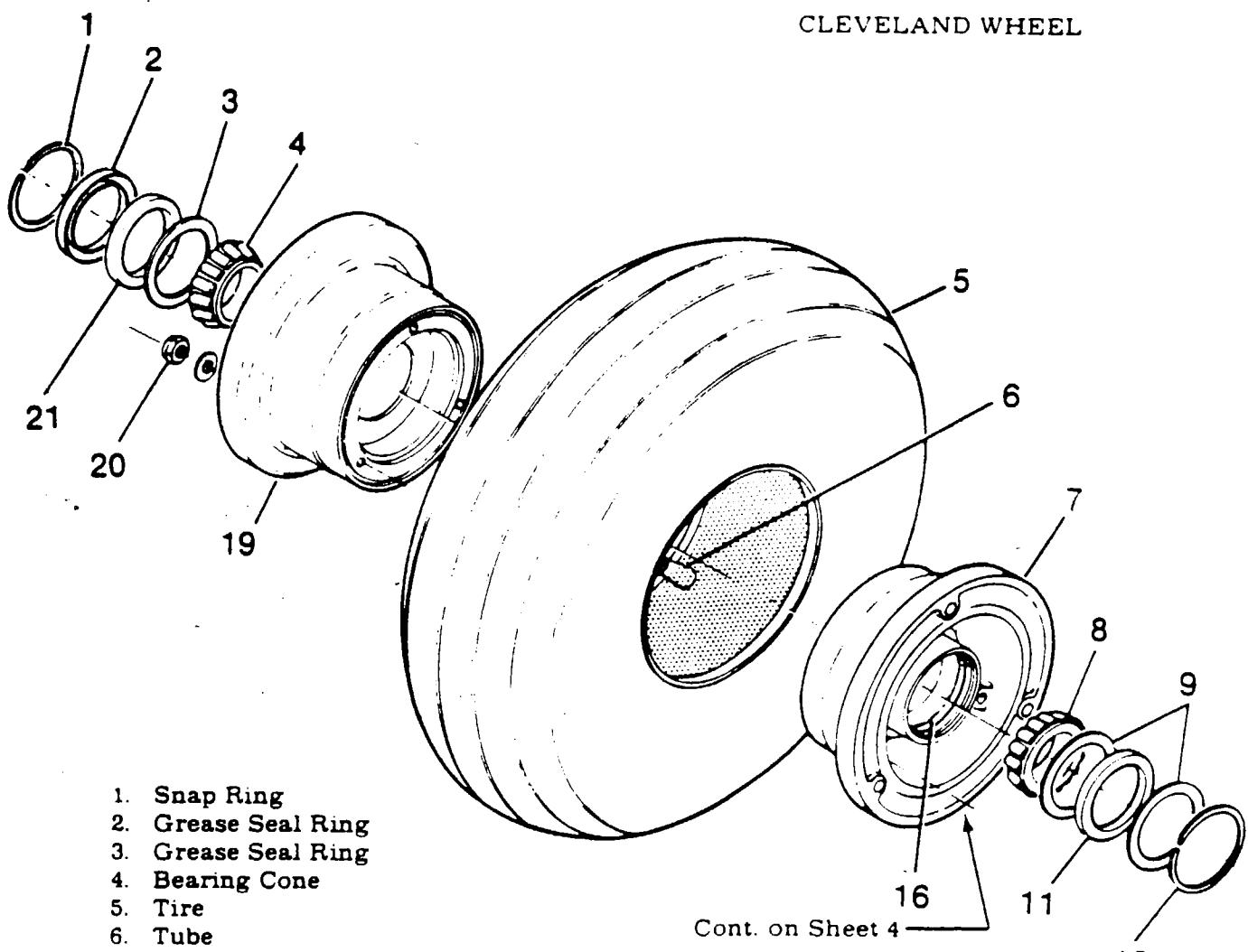
**Beginning with 1982 Models**



McCAULEY BRAKE

Figure 5-3. Main Landing Gear Wheel and Brake (Sheet 2 of 4)

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Cont. on Sheet 4

1. Snap Ring
2. Grease Seal Ring
3. Grease Seal Ring
4. Bearing Cone
5. Tire
6. Tube
7. Male Wheel Half
8. Bearing Cone
9. Grease Seal Ring
10. Snap Ring
11. Grease Seal Felt
16. Bearing Cup
19. Female Wheel Half
20. Nut
21. Grease Seal Felt

Figure 5-3. Main Landing Gear Wheel and Brake (Sheet 3 of 4)

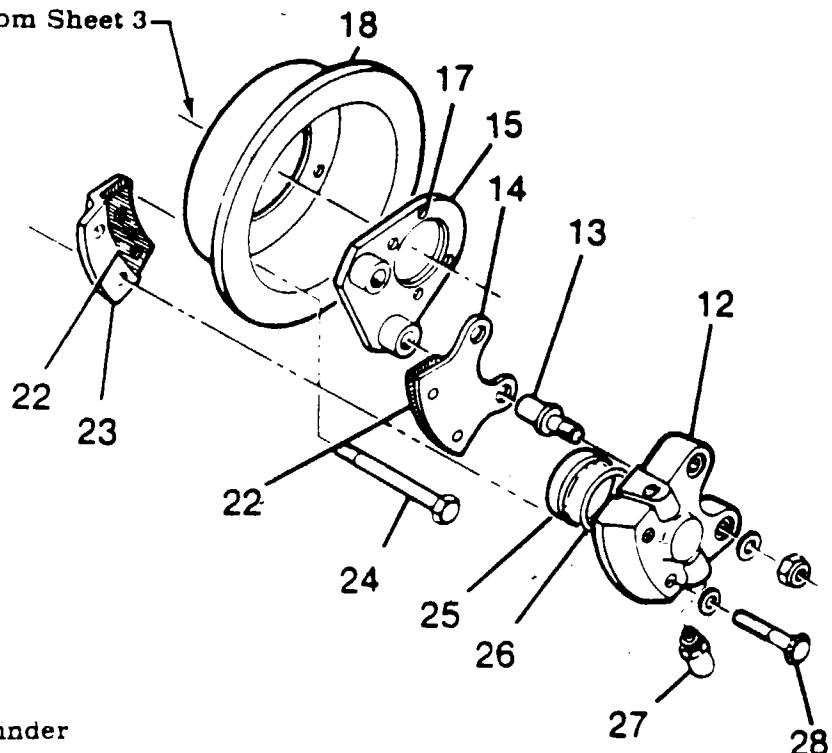
# MODEL 152 SERIES SERVICE MANUAL

## NOTE

Torque back plate mounting bolts (28) to 80-90 lb. in.

## CLEVELAND BRAKE

Cont. from Sheet 3



- 12. Brake Cylinder
- 13. Anchor Plate
- 14. Pressure Plate
- 15. Torque Plate
- 17. Bushing
- 18. Brake Disc
- 22. Brake Lining
- 23. Back Plate
- 24. Bolt
- 25. Piston
- 26. O-Ring
- 27. Bleeder Screw
- 28. Bolt



Figure 5-3. Main Landing Gear Wheel and Brake (Sheet 4 of 4)

## MODEL 152 SERIES SERVICE MANUAL

- e. Replace damaged retainer rings (1) and seals (2), (3) and (4).
  - f. Replace worn or damaged bearing cups (27) and cones (5).
  - g. Replace any worn or cracked thru-bolts (24) or nuts (10).
  - h. Remove any corrosion or small nicks.
  - i. Repair reworked areas of wheel by cleaning thoroughly, then applying one coat of clear lacquer paint.
  - j. Pack bearings with grease specified in Section 2 of this manual.
- 5-17. MAIN WHEEL REASSEMBLY. (McCauley) (See figure 5-3.)
- a. Assemble bearing cone (5), grease seal retainer (4), grease seal felt (3), grease seal retainer (2) and retaining ring (1) into each wheel half (6).
  - b. Insert tube in tire, aligning index marks on tire and tube.
  - c. Place wheel half (6) into tire and tube (side opposite valve stem), aligning base of valve stem in valve slot. With washer (25) under head of thru-bolt (24), insert bolt through wheel half (6).
  - d. Place wheel half (6) into other side of tire and tube, aligning valve stem in valve slot.
  - e. Insert washers (9) and nuts (10) on thru-bolts (24), and pre-torque to 10 to 50 lb. in.

### CAUTION

Uneven or improper torque of the nuts can cause failure of the bolts with resultant wheel failure.

- f. Prior to torquing nuts (10), inflate tube with approximately 15-20 psi air pressure to seat tire.

### CAUTION

Do not use impact wrenches on thru-bolts or nuts.

- g. Dry torque all nuts (10) evenly to a torque value of 140-150 lb. in.
- h. Inflate tire to correct pressure specified in figure 1-1 of this manual.

5-18. DISASSEMBLY. (Cleveland.) (See figure 5-3.)

### WARNING

Injury can result from attempting to separate wheel halves with tire inflated. Avoid damaging wheel flanges when breaking tire beads loose.

- a. Deflate tire and break tire beads loose. Tire irons should not be used.
- b. Remove thru-bolts and separate wheel halves.
- c. Remove tire and tube.
- d. From brake side of wheel, remove brake disc and inner wheel half. If disc sticks, pry out, using non-metallic instrument.
- e. To disassemble inner and outer wheel half, remove snap rings, grease seal, felts and bearing cone

## MODEL 152 SERIES SERVICE MANUAL

### NOTE

Bearing cups are press-fit in the wheel halves and should not be removed unless replacement is necessary. To remove cups, insert wheel half in boiling water for 15 minutes, or place in an oven not to exceed 250°F for 15 minutes. Remove from source of heat and invert wheel half. If cup does not drop out, tap cup evenly from axle bore with fiber drift pin or suitable arbor press. To replace a new cup, press in new cup while wheel half is still hot.

### 5-19. INSPECTION AND REPAIR. (Cleveland.)

- a. Degrease all parts and dry thoroughly.
- b. Visually inspect bearing cups and cones for nicks, heat discoloration, roller wear, cracks or distortion. Replace all worn parts.
- c. Inspect wheel halves for cracks, corrosion, nicks and other damage. Cracked or badly damaged wheel halves will be replaced. Small nicks, scratches or pits can be blended out, using fine 400 grit sandpaper.
- d. Inspect snap rings and grease seal distortion or wear. Replace grease seal felts if they are hard or contaminated. Lightly saturate grease seal felts with SAE 10 oil (do not soak.)
- e. Inspect brakes per paragraph 5-78.
- f. Inspect wheel bolts for cracks and corrosion. Replace cracked bolts. Inspect metallic self-locking nuts. Replace if nut can be turned onto bolt past nut's locking section, by hand.
- g. Wheels may be repainted if parts have been repaired and thoroughly cleaned. Paint exposed area with one coat of zinc primer and one coat of aluminum lacquer.

### NOTE

Never paint working surfaces of bearing cups.

### 5-20. REASSEMBLY. (Cleveland.)

- a. Reassemble bearing cones, grease seals, felts and snap rings into the proper wheel halves.
- b. Inflate tube sufficiently to round it out. Insert tube into tire so that balance mark (yellow or white band) is radially aligned with tire balance mark (red dot).
- c. Place outer wheel half into tire and pull tube valve stem through valve hole.
- d. Turn tire and outer wheel half over, and place inner wheel half into tire and align bolt holes with outer wheel half. Place brake disc into inner wheel half and align bolt holes. Install bolts through inner wheel half and washers and nuts on outer wheel half. Torque wheel nuts to torque value of 90 lb-in.
- e. Inflate tire to pressure stipulated in Section 1 of this manual.

### 5-21. MAIN WHEEL INSTALLATION.

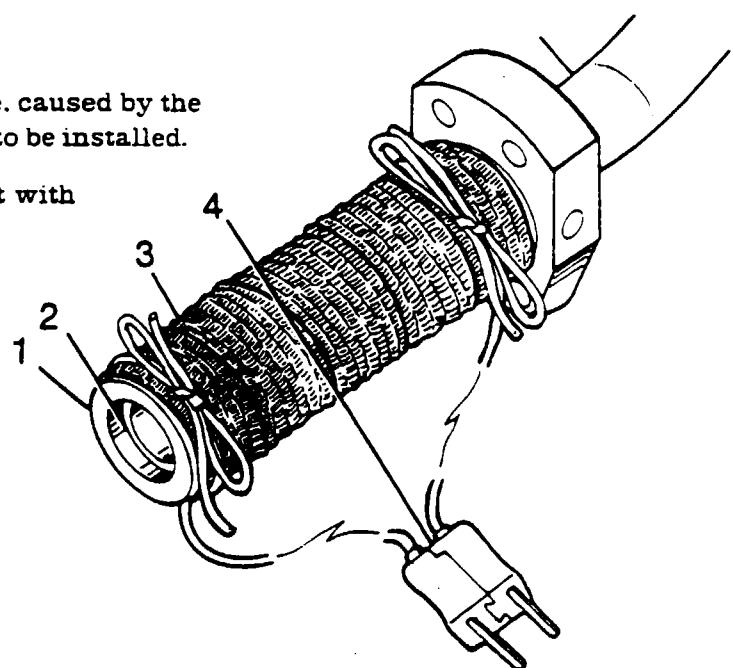
- a. Place wheel assembly on axle.
- b. Install axle nut and tighten axle nut until a slight bearing drag is obvious when the wheel is rotated. Back off nut to nearest castellation and install cotter pin.
- c. Place brake back plate in position and secure the bolts and washers.
- d. Install hub cap. Install speed fairing (if used) as outlined in paragraph 5-13.

# MODEL 152 SERIES SERVICE MANUAL

## CAUTION

Due to aging of the aluminum axle, caused by the heating tape, a new axle will have to be installed.

Do not place tape in direct contact with tubular gear spring.



1. Axle
2. Tubular Gear Strut
3. Electrical Heating Tape
4. Plug

Figure 5-4. Main Wheel Axle Removal

## CAUTION

Always check scraper-to-tire clearance after installing speed fairings, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairing should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Refer to paragraph 5-13 for correct scraper-to-tire clearance.

### 5-22. MAIN WHEEL AXLE REMOVAL.

- a. Remove speed fairings, if installed, according to procedures outlined in applicable paragraph in this section.
- b. Remove wheels in accordance with procedures outlined in applicable paragraph in this section.
- c. Disconnect, drain and cap or plug hydraulic brake line at the wheel brake cylinder.
- d. Remove cotter pin, nut and bolt attaching axle to spring strut.
- e. Remove brake components and speed fairing plate from axle.

## NOTE

Axles are bonded to the struts of tubular gear aircraft with EA9309-25GR adhesive, which is available from Cessna Parts Distribution (CPD 2) through Cessna Service Stations. The bond is too strong to allow the axle to be removed without first weakening the bond strength. The only methods of weakening the bond are with heat or cryogenic cold; heat being the most practical. A temperature of approximately 500°F (260°C) is sufficient to weaken the bond so the axle can be removed. This is still a low enough temperature to prevent damage to the tubular strut.

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- f. Remove axles as follows:

### NOTE

Axles should be removed from strut, using electric heating tape. Heating tape, P/N 135-459, can be obtained from Cessna Parts Distribution (CPD 2) through Cessna Service Stations.

- g. Wrap heating tape around axle from base head to outer end of axle and tie it on with string provided with the tape, as shown in the figure.

### CAUTION

Do not place tape in direct contact with tubular gear spring.

- h. Plug electric tape into 110 volt wall socket and heat for 20 to 30 minutes.
- i. Unplug tape and remove from axle. Remove axle by striking axle base head with a few sharp blows.
- j. Clean any old adhesive off landing gear spring with a wire brush. Brush strokes should run lengthwise along the spring. After old adhesive has been removed, wipe with clean rag saturated with acetone or alcohol. Immediately wipe dry with a clean, lint free cloth.

### WARNING

Due to aging of the aluminum axle, caused by the heating tape, a new axle will have to be installed.

#### 5-23. MAIN WHEEL AXLE INSTALLATION.

- a. Prior to installing new axle, wipe outer surface of tubular gear and inside of axle with solvent, drying immediately with a clean, lint free cloth.
- b. Mix EA9309-25GR adhesive, available from Cessna Parts Distribution (CPD 2) through Cessna Service Stations, in accordance with instruction in the package. Spread adhesive thinly and evenly on outer surface of landing gear spring in area that will be covered by axle.
- c. Place axle on gear spring and rotate axle to assure even coverage between inner surface of axle and outer surface of spring.
- d. Install retaining bolt, washers, nut and cotter pin. Tighten nut securely.
- e. Allow 24 hours at 75°F (24°C) for adhesive to cure, or 30 minutes at 250°F (121°C), if heating equipment is available.
- f. Install brake components and speed fairing mounting plate to axle.
- g. Install wheel on axle in accordance with procedures outlined in applicable paragraph of this section.
- h. Connect hydraulic brake line to wheel brake cylinder.
- i. Fill and bleed hydraulic brake system in accordance with applicable paragraph in this section.

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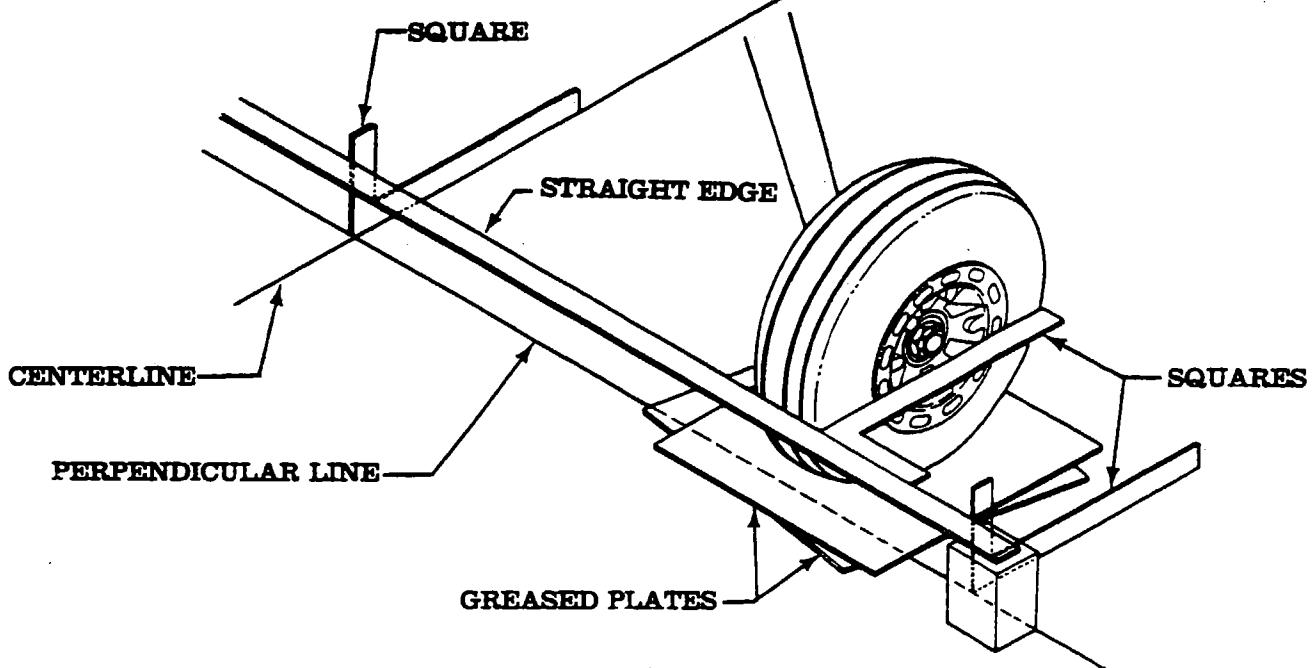
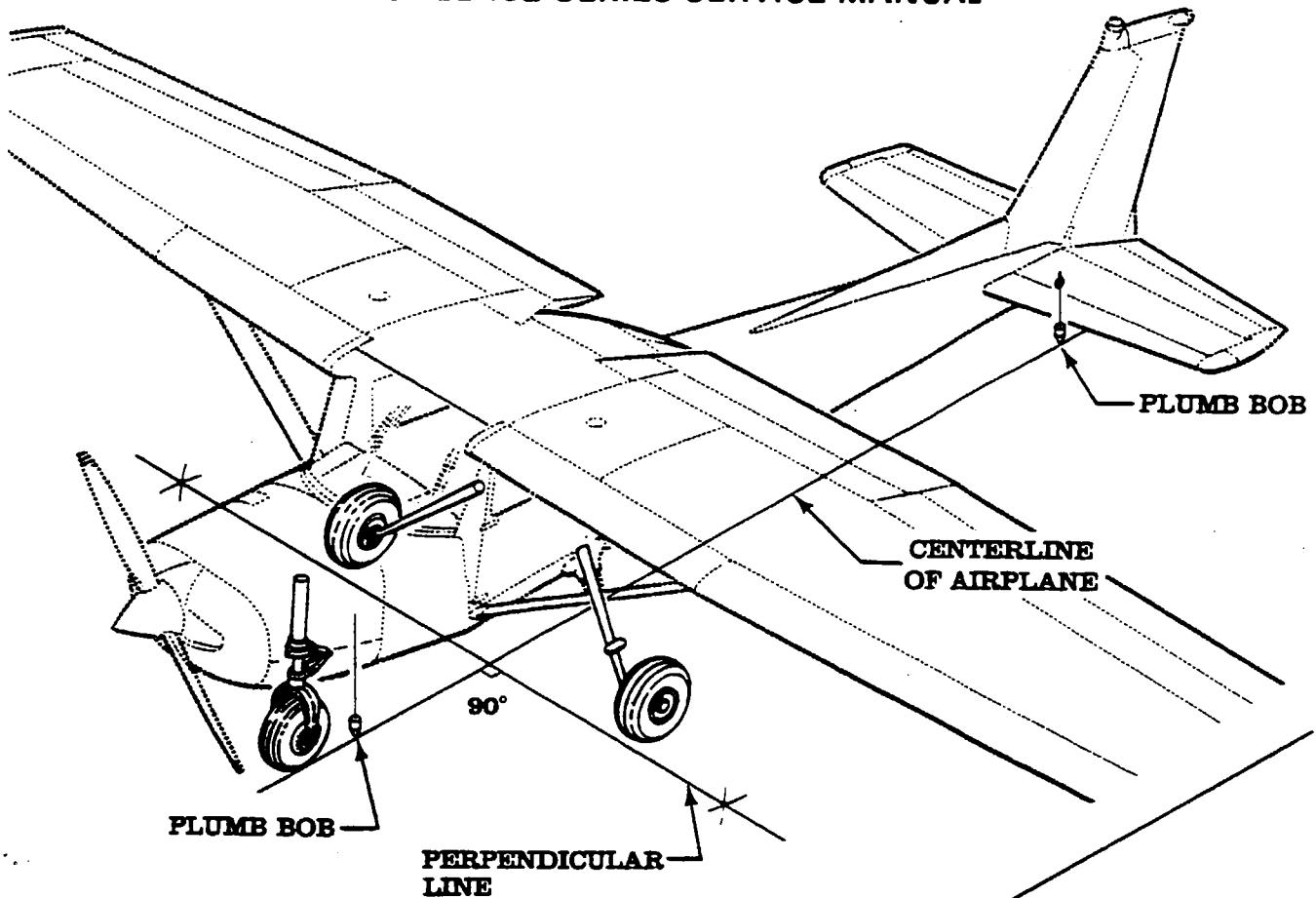


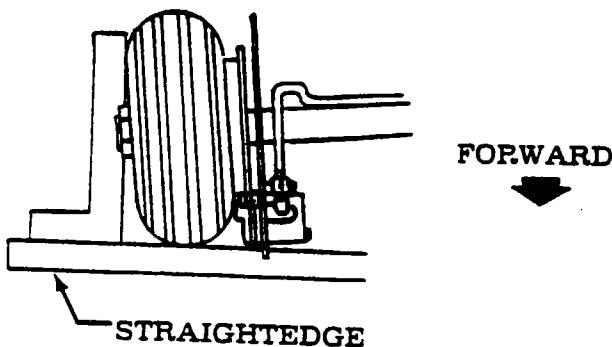
Figure 5-5. Main Wheel Alignment (Sheet 1 of 2)

# MODEL 152 SERIES SERVICE MANUAL

## TOP VIEW OF TOE-IN CHECK

Measure toe-in at edges of wheel flange. Difference in measurements is toe-in for 1 wheel.

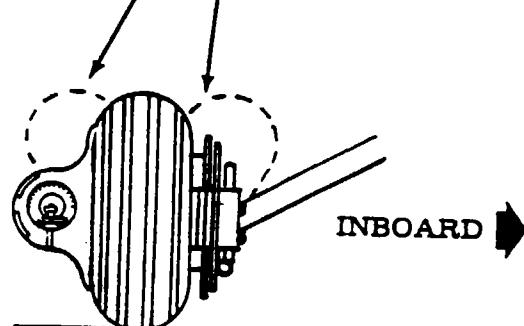
## CARPENTER'S SQUARE



## FRONT VIEW OF CAMBER CHECK

Measure camber by reading protractor level held vertically against outboard flanges of wheel.

POSITIVE CAMBER  
NEGATIVE CAMBER



## NOTE

These procedures are specifically for checking wheel alignment. No provisions are made for aligning the nose wheel. Refer to paragraph 5-24 or the chart in figure 1-1 of this manual for camber and toe-in limitations.

Figure 5-5. Main Wheel Alignment (Sheet 2 of 2)

- j. Install speed fairings, if used, in accordance with applicable paragraph in this section.

5-24. **MAIN WHEEL ALIGNMENT CHECK.** Figure 5-5 contains procedures for checking toe-in and camber. Toe-in limitations are .00" to +.16". Camber limitations are 3° to 5°. If wheel alignment is out of these limitations, a new tubular spring strut will have to be installed.

5-25. **WHEEL BALANCING.** Since uneven tire wear is usually the cause of wheel unbalance, replacing the tire will probably correct this condition. Tire and tube manufacturing tolerances permit a specified amount of static unbalance. The light-weight point of the tire is marked with a red dot on the tire sidewall and the heavy-weight point of the tube is marked with a contrasting color line (usually near the inflation valve stem). When installing a new tire, place these marks adjacent to each other, if a wheel shows evidence of unbalance during service, it may be statically balanced. Wheel balancing equipment is available from Cessna Parts Distribution (CPD 2) through Cessna Service Stations.

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### 5-26. NOSE GEAR.

5-27. DESCRIPTION. A steerable nose wheel, mounted in a fork, attached to an air/oil (oleo) shock strut, make up the nose gear. The shock strut is secured to the tubular engine mount. Nose wheel steering is accomplished by two spring-loaded push-pull tubes linking the nose gear steering collar to the rudder pedal bars. A hydraulic fluid-filled shimmy dampener is provided to minimize nose wheel shimmy. A nose wheel speed fairing may be installed on some aircraft.

### 5-28. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NOSE WHEEL SHIMMY. (Also refer to Service Letter SE84-21.)	Nose strut attaching bolts loose.  Loose or worn nose wheel steering linkage.  Nose wheel out of balance.  Wheel bearings too loose.  Defective shimmy dampener.  Shimmy dampener fluid low.  Loose torque links.	Tighten nose strut attaching bolts.  Tighten. Replace defective parts with new parts.  Refer to paragraph 5-41.  Adjust properly.  Repair, or install new dampener.  Service in accordance with Section 2.  Add shims, or install new parts as required.
NOSE STRUT DOES NOT HOLD AIR PRESSURE.	Worn steering arm assembly shims.  Defective or loose air filler valve.	Replace or add shims as required.  Check gasket and tighten loose valve. Install new valve if defective.
HYDRAULIC FLUID LEAKAGE FROM NOSE STRUT.	Defective strut seals.	Install new seals.
	Defective strut seals.	Install new seals.

### 5-29. NOSE GEAR REMOVAL. (See figure 5-6.)

- a. Remove engine cowling for access.
- b. Weight or tie down tail of aircraft to raise nose wheel off the floor.
- c. Disconnect nose wheel steering tubes from nose gear steering collar.
- d. Remove screws attaching hose clamps to strut.
- e. Remove air filler valve core and deflate strut completely, and telescope strut to its shortest length.

#### WARNING

Be sure strut is deflated completely before removing bolt or roll pin at top of strut.

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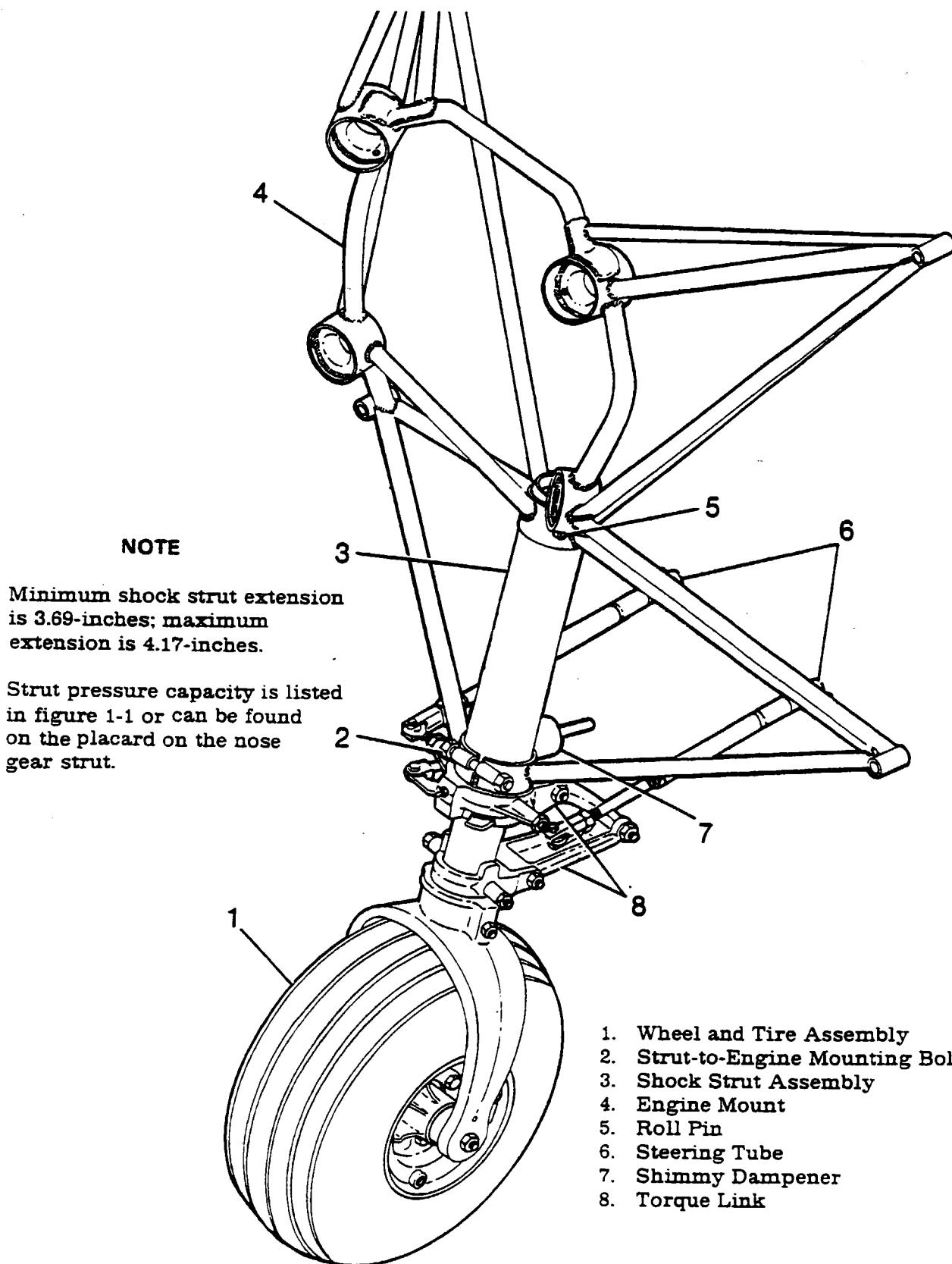


Figure 5-6. Nose Gear Installation

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● 15279406 thru 15282762  
 F15201429 thru F15201578  
 A1520735 thru A1520839  
 FA1520337 thru FA1520356

\* 15282763 thru 15283958  
 F15201579 thru F15201783  
 A1520840 thru A1520909  
 FA1520357 thru FA1520372

\* 15283959 & On  
 F15201784 & On  
 A1520910 & On  
 FA1520373 & On

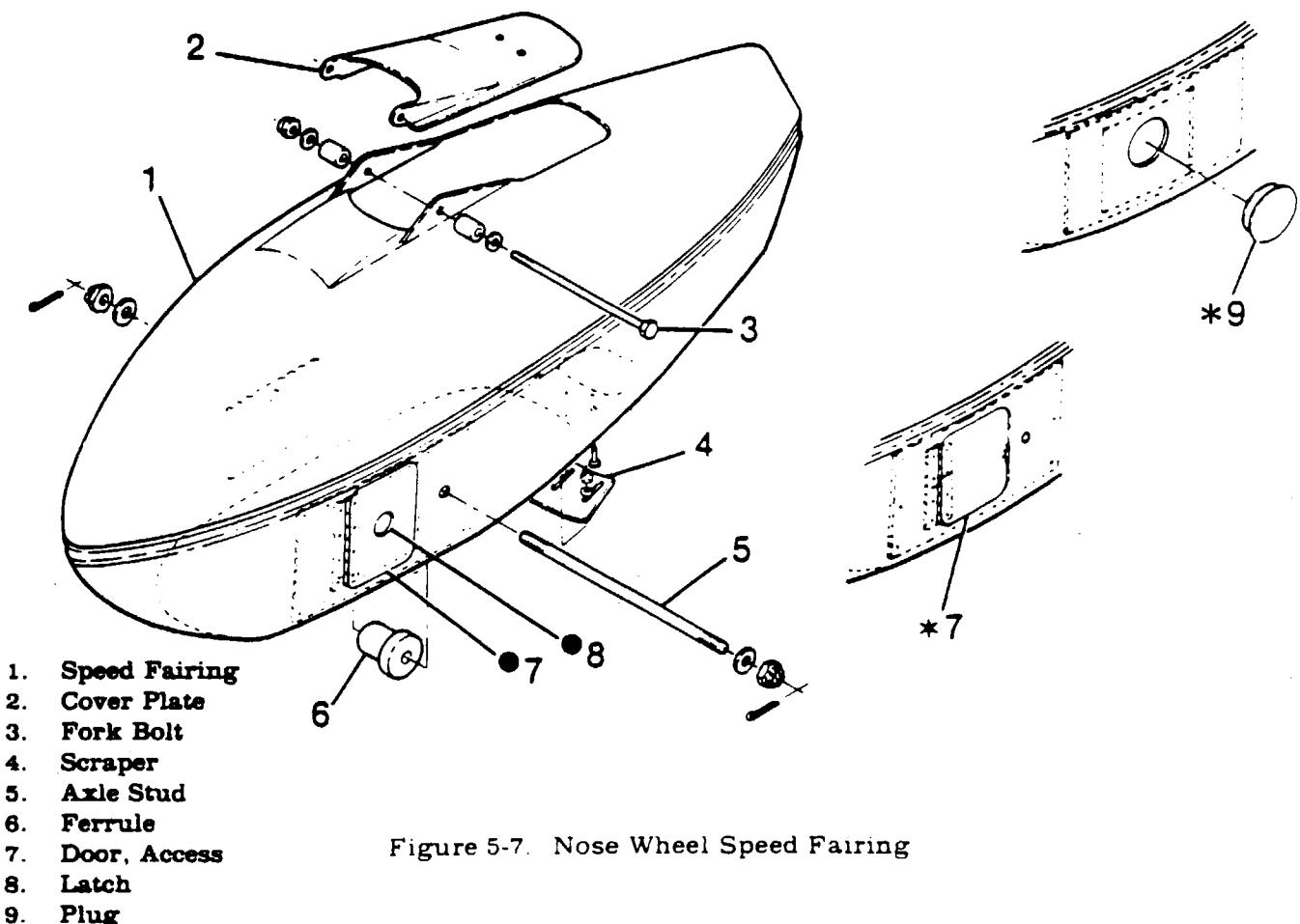


Figure 5-7. Nose Wheel Speed Fairing

- f. Remove roll pin at top of strut, and remove bolt which clamps strut to lower part of engine mount.
- g. Pull the strut assembly down out of engine mount fitting.

## 5-30. NOSE GEAR INSTALLATION. (See figure 5-6.)

- a. Reverse steps in paragraph 5-29 to install nose gear.

### NOTE

Always install roll pin before clamping strut into lower portion of engine mount to prevent misalignment. Torque clamp bolt in lower portion of engine mount fitting to  $120 \pm 20$  lb-in.

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### 5-31. NOSE WHEEL SPEED FAIRING REMOVAL.

- a. Weight or tie down tail of aircraft to raise nose wheel off floor.
- b. Remove nose wheel axle stud.
- c. Remove bolt securing cover plate and fairing to strut; remove cover plate.

#### WARNING

Do not remove bolt attaching tow bar spacers, unless strut has been completely deflated.

- d. Slide speed fairing up and remove nose wheel. Loosen scraper if necessary.
- e. Rotate speed fairing 90 degrees and work fairing down over the fork to remove.

### 5-32. NOSE WHEEL SPEED FAIRING INSTALLATION.

- a. Rotate speed fairing 90 degrees and work fairing up over the fork; rotate fairing to correct position.
- b. Slide fairing to correct position.
- c. Tighten axle stud until a slight bearing drag is obvious when the wheel is rotated. Back off nut to the nearest castellation, and install cotter pins.
- d. If shock strut was deflated, service after installation has been completed. Refer to servicing instructions in Section 2.
- e. Adjust wheel scraper clearance in accordance with the following caution.

#### CAUTION

Always check scraper clearance after installing speed fairing, whenever a tire has been changed, and whenever scraper adjustment has been disturbed. Set clearance between tire and scraper for a minimum of 0.25-inch to a maximum of 0.50-inch. Elongated holes in the scraper are provided for adjustment. If the aircraft is flown from surfaces with mud, snow, or ice, the speed fairings should be checked to make sure there is no accumulation which could prevent normal wheel rotation. Wipe fuel and oil from speed fairing to prevent staining and deterioration of the fairing.

### 5-33. NOSE WHEEL REMOVAL.

- a. Weight or tie down tail of aircraft to raise the nose wheel off the floor.
- b. Remove nose wheel axle stud.
- c. Pull nose wheel assembly from fork and remove axle tube from nose wheel. Loosen wheel scraper if necessary, if wheel is equipped with a speed fairing.

### 5-34. DISASSEMBLY (McCauley) (See figure 5-8, sheet 1.)

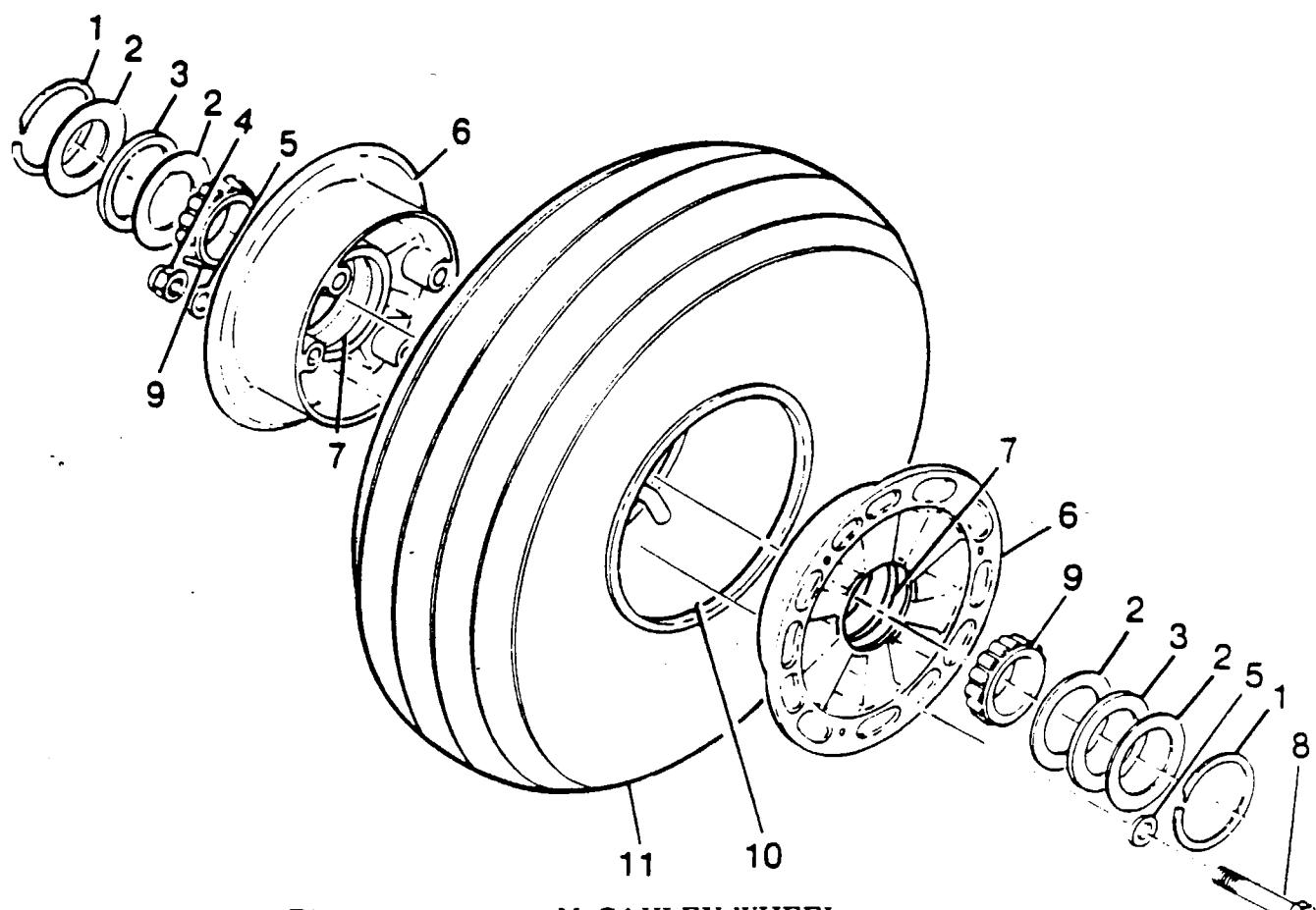
- a. Completely deflate tire and tube and break loose tire beads. Extreme care must be exercised to prevent tire tool damage when removing tire from wheel halves (6).

#### WARNING

Serious injury can result from attempting to separate wheel halves with tire and tube inflated.

- b. Remove nuts (4) and washers (5).
- c. Remove thru-bolts (8) and washers (5).

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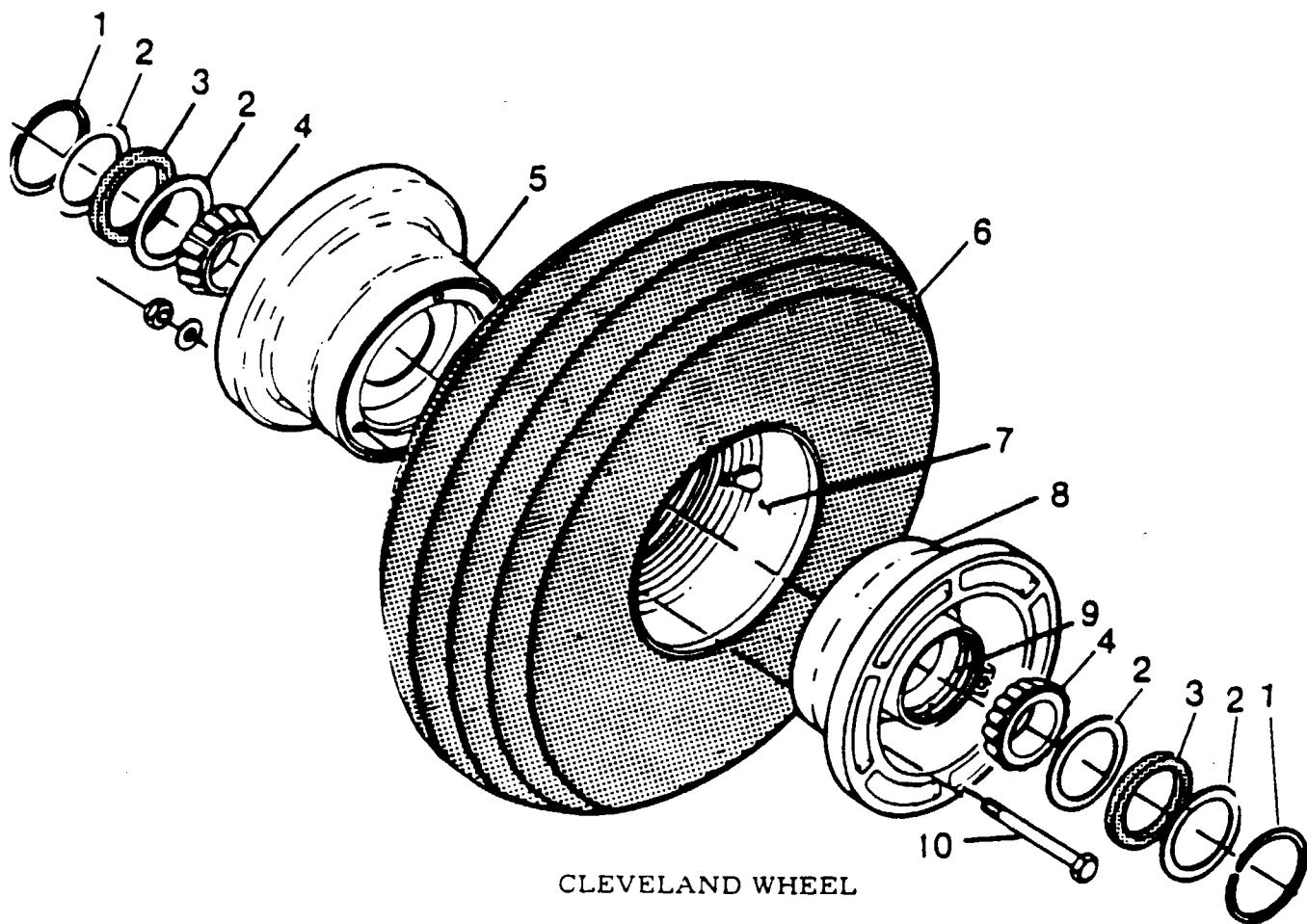


- 1. Retainer Ring
- 2. Grease Seal Retainer
- 3. Grease Seal Felt
- 4. Nut
- 5. Washer
- 6. Wheel Half
- 7. Bearing Cup
- 8. Thru Bolt
- 9. Bearing Cone
- 10. Tube
- 11. Tire

McCAULEY WHEEL

Figure 5-8. Nose Wheel and Tire (Sheet 1 of 2)

## MODEL 152 SERIES SERVICE MANUAL



- 1. Snap Ring
- 2. Grease Seal Ring
- 3. Grease Seal Felt
- 4. Bearing Cone
- 5. Outer Wheel Half
- 6. Tire
- 7. Tube
- 8. Inner Wheel Half
- 9. Bearing Cone
- 10. Thru-Bolt

Figure 5-8. Nose Wheel and Tire (Sheet 2 of 2)

## MODEL 152 SERIES SERVICE MANUAL

- d. Separate and remove wheel halves (6) from tire and tube.
- e. Remove retaining rings (1), grease seal retainer (2), felt grease seal (3), grease retainer (2) and bearing cone (9) from both wheel halves (6).

### NOTE

Bearing cups (races) (7) are a press fit in wheel half (6) and should not be removed unless a new part is to be installed. To remove bearing cups, heat wheel half in boiling water for 30 minutes, or in an oven, not to exceed 121°C (250°F). Using an arbor press, if available, press out bearing cup and press in new bearing cup while wheel half is still hot.

### 5-35. INSPECTION AND REPAIR. (McCauley) (See figure 5-8, sheet 1.)

- a. Clean all metal parts and felt grease seals in Stoddard solvent or equivalent, and dry thoroughly.

### NOTE

A soft bristle brush may be used to remove hardened grease, dust or dirt.

- b. Inspect wheel halves (6) for cracks or damage.
- c. Inspect bearing cones (9), cups (7), retaining rings (1) and seals (2) and (3), for wear or damage.
- d. Inspect thru-bolts (8) and nuts (4) for cracks in threads or cracks in radius under bolt head.
- e. Replace cracked or damaged wheel half (6).
- f. Replace damaged retaining rings (1) and seals (2) and (3).
- g. Replace worn or damaged bearing cups (7) and cones (9).
- h. Replace any worn or cracked thru-bolts (8) or nuts (4).
- i. Remove any corrosion or small nicks.
- j. Repair reworked areas of wheel by cleaning thoroughly, then applying one coat of clear lacquer paint.
- k. Pack bearings with grease specified in Section 2.

### 5-36. REASSEMBLY. (McCauley) (See figure 5-8, sheet 1.)

- a. Assemble bearing cone (9), grease seal retainer (2), felt grease seal (3), grease seal retainer (2) and retaining ring (1) into both wheel halves (6).
- b. Insert tube in tire, aligning index marks on tire and tube.
- c. Place wheel half (6) into tire and tube (side opposite valve stem), aligning base of valve stem in valve slot. With washer (5) under head of thru-bolt (8), insert bolt through wheel half (6).
- d. Place wheel half (6) into other side of tire and tube, aligning valve stem in valve slot.
- e. Install washers (5) and nuts (4) on thru-bolts (8) and pre-torque to 10-50 lb. in.

### CAUTION

Uneven or improper torque of the nuts can cause failure of the bolts with resultant wheel failure.

- f. Prior to torquing nuts (4), inflate tube with approximately 10-15 psi air pressure to seat tire.

## MODEL 152 SERIES SERVICE MANUAL

### CAUTION

Do not use impact wrenches on thru-bolts or nuts.

- g. Dry torque all nuts (4) evenly to a torque value of 140-150 lb. in.
- h. Inflate tire to correct pressure specified in figure 1-1.)

### 5-37. DISASSEMBLY. (Cleveland) (See figure 5-8, sheet 2.)

### WARNING

Injury can result from attempting to separate wheel halves with tire inflated. Avoid damaging wheel flanges when breaking tire beads loose.

- a. Deflate tire and break tire beads loose.
- b. Remove thru-bolts and separate wheel halves.
- c. Remove tire and tube.
- d. Remove snap ring, grease seal felt, grease seal rings and bearing cones from both wheel halves.

### NOTE

Bearing cups are a press-fit in the wheel halves and should not be removed unless replacement is necessary. To remove bearing cups, heat wheel half in boiling water for 15 minutes. Using an arbor press, if available, press out bearing cup and press in new cup while wheel is still hot.

### 5-38. INSPECTION AND REPAIR. (Cleveland) (See figure 5-8, sheet 2.)

- a. Clean all metal parts and grease seal felts in solvent and dry thoroughly.
- b. Inspect wheel halves for cracks. Cracked wheel halves must be replaced. Sand out nicks, gouges and corroded areas. Where protective coating has been removed, area should be cleaned thoroughly, primed with zinc chromate primer and painted with aluminum lacquer.
- c. Bearing cups and cones must be inspected carefully for damage and discoloration. After cleaning, repack cones with clean aircraft wheel bearing grease (Section 2) before installation in the wheel. To replace bearing cups, refer to note in paragraph 5-37.

### 5-39. REASSEMBLY. (Cleveland) (See figure 5-8, sheet 2.)

- a. Insert tire in tube, aligning index marks on tire and tube.
- b. Place tire and tube on wheel half and position valve stem through hole in wheel half.
- c. Insert thru-bolts, position other wheel half, and secure with nuts and washers. Take care to avoid pinching tube between wheel halves. Torque bolts to 90 lb-in.

### CAUTION

Uneven or improper torque on thru-bolt nuts may cause bolt failure with resultant wheel failure.

- d. Clean and repack bearing cones with clean aircraft wheel bearing grease (Section 2.)
- e. Assemble bearing cones, seals and retainers into wheel halves.

## MODEL 152 SERIES SERVICE MANUAL

- f. Inflate tire to seat tire beads, then adjust to correct pressure.
  - g. Install wheel in accordance with paragraph 5-40.
- 5-40. NOSE WHEEL INSTALLATION.
- a. Install axle tube in nose wheel.
  - b. Install nose wheel assembly in fork and install nose wheel axle stud.
  - c. Tighten axle stud until a slight bearing drag is obvious when wheel is rotated. Back the nut off to the nearest castellation and insert cotter pin.
- CAUTION**
- On aircraft thru serials 15285834 and A1521034, equipped with speed fairings, always check scraper-to-tire clearance after installing speed fairing, whenever a tire has been changed, or whenever scraper adjustment has been disturbed. Set scraper clearance in accordance with procedures outlined in the Caution following paragraph 5-32.
- 5-41. WHEEL BALANCING. Refer to paragraph 5-25 for procedures.
- 5-42. NOSE GEAR SHOCK STRUT DISASSEMBLY. (See figure 5-9.)

### NOTE

The following procedures apply to the nose gear shock strut after it has been removed from the aircraft, and the speed fairing and nose wheel have been removed. In many cases, separation of the upper and lower strut will permit inspection and parts installation without removal or complete disassembly of the strut.

### WARNING

Be sure strut is completely deflated before removing lock ring in lower end of upper strut, or disconnecting torque links.

- a. Remove shimmy dampener.
- b. Remove torque links. Note position of washers, shims and spacers.
- c. Remove lock ring from groove inside lower end of upper strut. A small hole is provided at the lock ring groove to facilitate removal of the lock ring (refer to view C-C.)

### NOTE

Hydraulic fluid will drain from strut halves as lower strut is pulled from upper strut.

- d. Using a straight, sharp pull, separate upper and lower strut. Invert lower strut and drain hydraulic fluid.
- e. Remove lock ring and bearing at upper end of lower strut assembly. Note top side of bearing.
- f. Slide packing support ring, scraper ring, retaining ring and lock ring from lower

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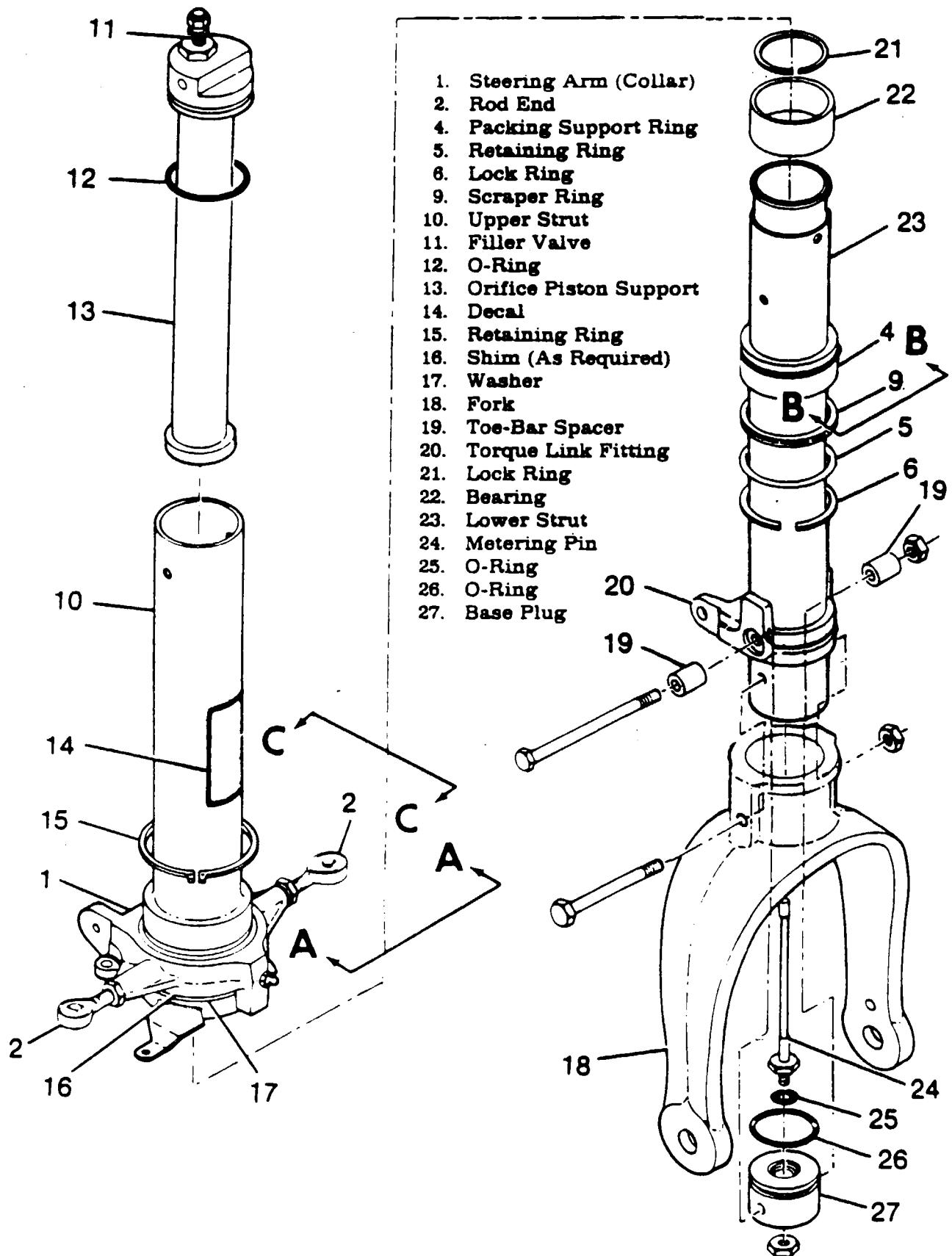
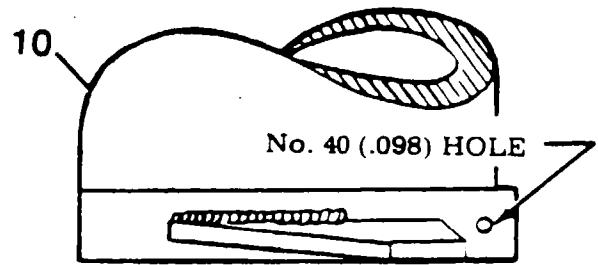
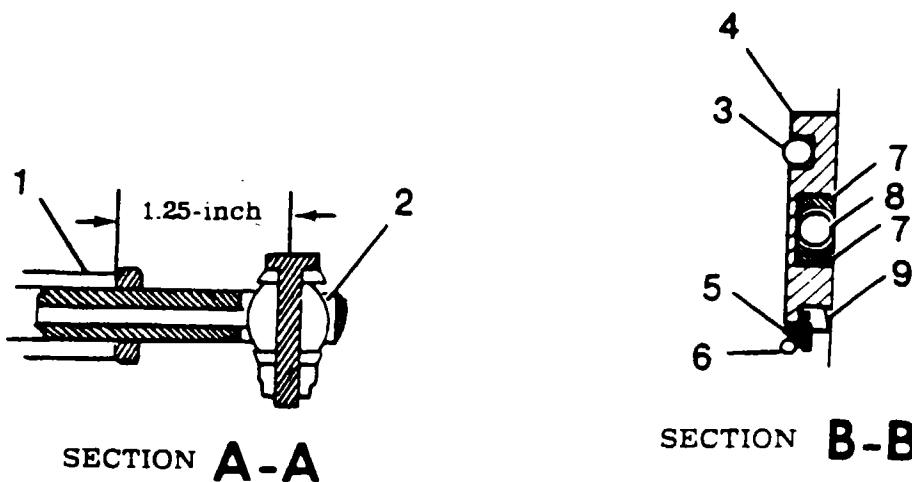


Figure 5-9. Nose Gear Shock Strut (Sheet 1 of 2)

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1. Steering Arm (Collar)
2. Rod End
3. O-Ring
4. Packing Support Ring
5. Retaining Ring
6. Lock Ring
7. Back-Up Ring
8. O-Ring
9. Scraper Ring
10. Upper Strut

Figure 5-9. Nose Gear Shock Strut (Sheet 2 of 2)

## MODEL 152 SERIES SERVICE MANUAL

- strut, noting relative position and top side of each ring; wire or tape together, if desired.
- g. Remove O-rings and back-up rings from packing support ring.
  - h. Remove bolt securing tow bar spacers.

### NOTE

Bolt attaching tow bar spacers also hold base plug in place.

- i. Remove bolt attaching fork to strut barrel, and remove base plug and metering pin from lower strut. Remove O-rings and metering pin from base plug.
- j. Pull orifice piston support from upper strut. Remove O-ring and filler valve.
- k. Remove retaining ring securing steering collar to upper strut. Slide steering collar, shims and washer from upper strut. Note number of shims between washer and steering collar.

### 5-43. NOSE GEAR SHOCK STRUT INSPECTION AND REPAIR. (See figure 5-9.)

- a. Thoroughly clean all parts in cleaning solvent and inspect them carefully.
- b. All worn or defective parts and all O-rings and back-up rings must be replaced with new parts.
- c. Sharp metal edges should be smoothed with No. 400 emery paper, then cleaned with solvent.

### 5-44. NOSE GEAR SHOCK STRUT REASSEMBLY. (See figure 5-9.)

### NOTE

Assemble these parts, lubricated with a film of Petrolatum VV-P-238, Hydraulic Fluid MIL-H-5606, or Dow-Corning DC-7. Do not use DC-7 on surfaces to be painted.

- a. Install washer (17) and shim(s) (16), if installed.
- b. Lubricate needle bearings in steering collar (1), as shown in Section 2, and install collar and retaining ring (15).
- c. Check steering collar for snug fit against washer. Shims of variable thickness are available from the Cessna Supply Division to provide a snug fit for collar against washer.

### NOTE

If shims are required, remove retaining ring and steering collar and add shims as necessary to provide a snug fit with steering collar retaining ring installed. Shims are available in the following part numbers and thicknesses: 1243030-5 (.008 inch), 1243030-6 (.012 inch), and 1243030-7 (.020 inch).

- d. Install rod ends (2) in steering collar (1), and adjust rod ends to dimension specified in Section view A-A.
- e. Install O-ring (12) and filler valve (11) in orifice piston support (13), and install orifice piston support in upper strut (10).

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- f. Install O-ring (26) and metering pin assembly in lower strut (23); install bolt attaching fork (18) to lower strut.
- g. Align base plug (27) holes with holes in lower strut/fork (23) and (18) assembly; install bolt and tow bar spacers (19). Install and tighten nut.

### NOTE

If base plug (27) is to be replaced, new part will need to be line-drilled to accept AN5 bolt.

- h. Install lock ring (6), retaining ring (5) and scraper ring (9) on lower strut, making sure they are installed in same positions as they were removed.
- i. Install O-rings (8) and (3) and back-up rings in packing support ring (4); slide packing support ring over lower strut (23).
- j. Install bearing (22) and lock ring (21) at upper end of lower strut assembly. Note top side of bearing.
- k. Install upper strut assembly over lower strut assembly.
- l. Install lock ring (6) in groove in lower end of upper strut. Position lock ring so that one of its ends covers the small access hole in the lock ring groove at the bottom of the upper strut. (Refer to Detail C-C.)
- m. Install torque links, positioning washers, shims and spacers exactly as removed.
- n. Install shimmy dampener.
- o. After shock strut assembly is complete, install strut on aircraft as outlined in paragraph 5-30.
- p. After strut is installed in aircraft, fill and inflate shock strut in accordance with procedures outlined in Section 2. See figure 5-6 for minimum and maximum extension.

### 5-45. TORQUE LINKS. (See figure 5-10.)

### 5-46. DESCRIPTION. Torque links keep the lower strut aligned with the nose gear steering system, but permit shock strut action.

### 5-47. REMOVAL.

### WARNING

Completely deflate strut before removing torque links.

- a. Completely deflate shock strut.
- b. Disconnect upper and lower attaching bolts, spacers, shims and nuts, and remove torque links.

### 5-48. INSPECTION. Torque link bushings should not be removed except for replacement of parts; replace if excessively worn.

### 5-49. INSTALLATION. (See figure 5-10.)

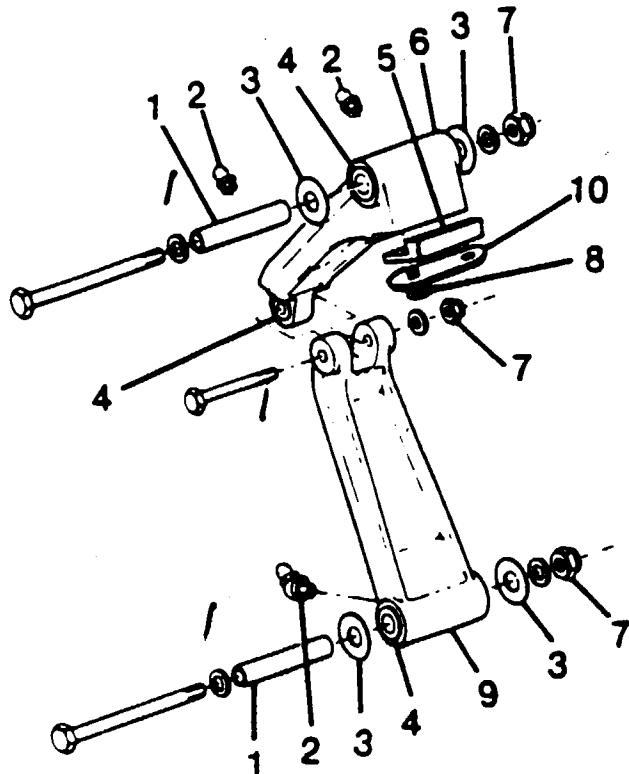
### NOTE

If bolts (8), safety lug (10) and stop lug (5) were removed, upon installation, torque bolts (8) to 20-25 lb-in. then safety the bolts by bending tips of safety lug (10).

- a. With shock strut completely deflated, install upper and lower torque link assemblies.

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1. Spacer
2. Grease Fitting
3. Shim
4. Bushing
5. Stop Lug
6. Upper Torque Link
7. Nut
8. Bolt
9. Lower Torque Link
10. Safety Lug



**Figure 5-10. Torque Links**

- b. Install bolt attaching upper and lower assemblies.
- c. Tighten nuts (7) snugly, then tighten to align next castellation with cotter pin hole in bolt.
- d. Check upper torque link (6) and lower torque link (9) for looseness. If looseness is apparent, remove nuts (7) and bolts and install shims (3) as necessary to take up any looseness. This will assist in preventing nose wheel shimmy.
- e. Retighten nuts (7) snugly, then tighten to align next castellation with cotter pin hole in bolt; install cotter pin.
- f. Fill and inflate shock strut in accordance with procedures outlined in Section 2.

### **5-50. SHIMMY DAMPENER.**

**5-51. DESCRIPTION.** The shimmy dampener provided for the nose gear offers resistance to shimmy by forcing hydraulic fluid through small orifices in a piston. The dampener piston shaft is secured to a stationary part and the housing is secured to the nose wheel steering collar which moves as the nose wheel is turned right or left, causing relative motion between the dampener shaft and housing.

### **5-52. REMOVAL.**

- a. Remove cotter pin, nut, washers and bolt attaching piston rod clevis.
- b. Remove cotter pin, nut, spacer and bolt attaching housing to steering collar.

### **5-53. DISASSEMBLY AND REASSEMBLY. (See figure 5-11.)**

- a. Refer to the phantom view of the internal parts of the dampener for disassembly and assembly.
- b. When reassembling dampener, install all new O-rings. Lubricate all parts with clean hydraulic fluid, Petrolatum VV-P-236, or Dow-Corning DC-7. Keep DC-7 away from

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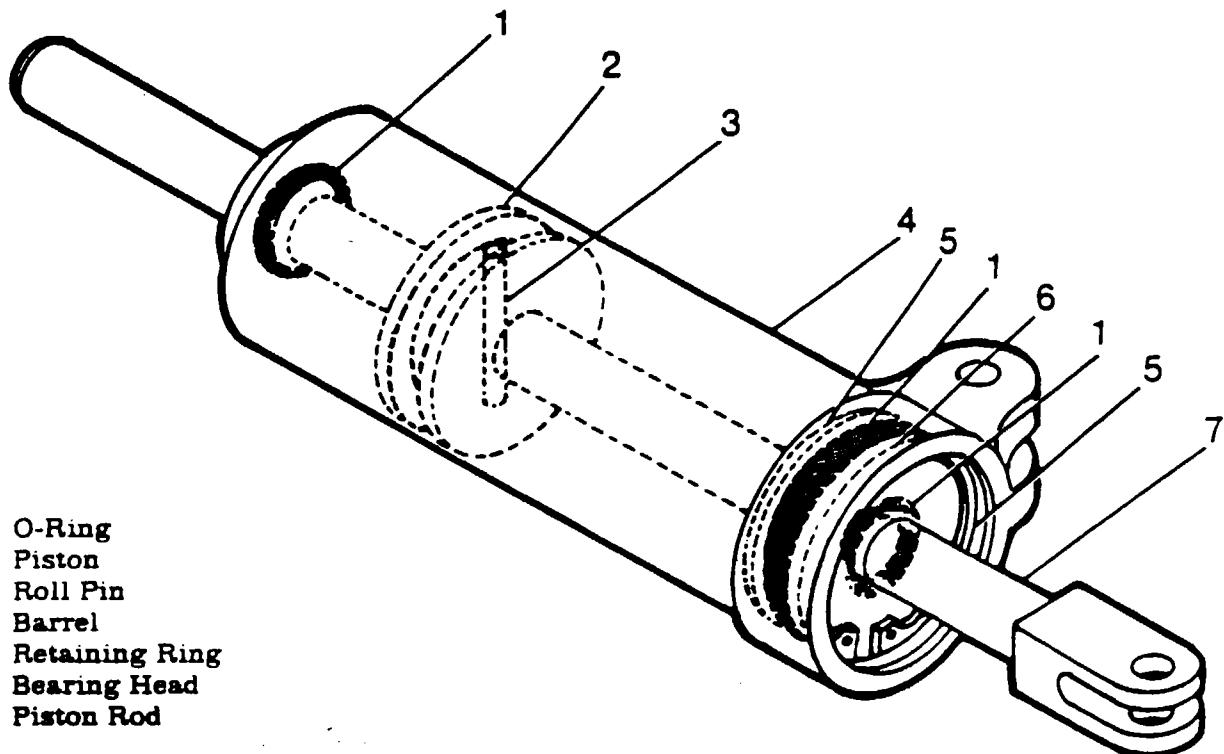


Figure 5-11. Nose Gear Shimmy Dampener

painted surfaces.

- c. When dampener is completely assembled, service in accordance with procedures outlined in Section 2.

### 5-54. INSTALLATION.

- a. Attach dampener piston rod clevis to structure with bolt, washers (as required), nut and cotter pin.
- b. Attach body of shimmy dampener to steering collar with bolt, spacer, washers, nut and cotter pin.

### 5-55. NOSE WHEEL STEERING SYSTEM.

5-56. DESCRIPTION. Nose wheel steering is accomplished through use of the rudder pedals. Spring-loaded steering rod assemblies connect the nose gear steering collar to arms on the rudder bars. Steering is afforded up to approximately 10 degrees each side of neutral, after which brakes may be used to gain a maximum deflection of 30 degrees right or left of center. A flexible boot seals the fuselage entrance of the steering rod assembly.

### 5-57. NOSE WHEEL STEERING ROD ASSEMBLY.

5-58. DESCRIPTION. The steering rods are connected by a clevis to the rod ends extending from

## MODEL 152 SERIES SERVICE MANUAL

the nose gear steering collar, and to an arm on the rudder pedal crossbars.

- 5-59. NOSE WHEEL STEERING ADJUSTMENT. Since the nose wheel steering system and the rudder system are interconnected, adjustment to one system might affect the other system. Refer to Section 10 of this manual for instructions for rigging the nose wheel steering and the rudder system.
- 5-60. BRAKE SYSTEM.
- 5-61. DESCRIPTION. The hydraulic brake system is comprised of two master cylinders, located immediately forward of the pilot's rudder pedals, brake lines and hose connecting each master cylinder to its wheel brake cylinder, and the single-disc, floating cylinder-type brake assembly, located at each main landing gear wheel.
- 5-62. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
DRAGGING BRAKES.	Brake pedal binding. Parking brake linkage holding brake pedal down. Worn or broken piston return spring (in master cylinder.) Insufficient clearance at Lock-O-Seal or incorrect adjustment of cylinder overall length (Thru 1978 Models.) Restriction in hydraulic lines or restrictions in compensating port in brake master cylinder.	Check and adjust properly. Check and adjust properly. Repair, or install new cylinder. Adjust as outlined in paragraph 5-68. Drain brake line and clear the inside of the brake line with filtered compressed air. If cleaning the lines fails to give satisfactory results, the master cylinder may be faulty and should be repaired.
	Worn, scored or warped brake disc. Damaged or accumulated dirt restricting free movement of wheel brake parts.	Install new disc and brake linings. Clean and repair or install new parts as necessary.

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## 5-62. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
BRAKES FAIL TO OPERATE.	Leak in system.	If brake master cylinders or wheel cylinder assemblies are leaking, repair, or install new parts.
	Air in system. Lack of fluid in master cylinders.	Bleed system. Fill and bleed system.
	Defective master cylinder.	Repair, or install new parts.

## 5-63. BRAKE MASTER CYLINDERS.

5-64. DESCRIPTION. The brake master cylinders, located immediately forward of the pilot's rudder pedals, are actuated by applying pressure at the top of the rudder pedals. A small reservoir is incorporated into each master cylinder for the fluid supply. When dual brakes are installed, mechanical linkage permits the copilot pedals to operate the master cylinders.

## 5-65. BRAKE MASTER CYLINDER REMOVAL.

- Remove bleeder screw at wheel brake assembly and drain hydraulic fluid from brake cylinders.
- Remove front seats and rudder bar shield for access to the brake master cylinders.
- Disconnect parking brake linkage and disconnect brake master cylinders from rudder pedals.
- Disconnect brake master cylinders at lower attach points.
- Disconnect hydraulic hose from master cylinders and remove cylinders.
- Plug or cap hydraulic fittings, hose and lines to prevent entry of foreign matter.

## 5-66. DISASSEMBLY. (Thru 1978 Models.) (See figure 5-12, sheet 1 of 3.)

- Unscrew clevis (1) and jamnut (2).
- Remove screw (18), spring (21), lock plate (22), washer (19) and spacer (20).
- Remove filler plug (17).
- Remove setscrew (5).
- Unscrew cover (4) and remove up over piston rod (3).
- Remove piston rod (3) and compensating sleeve (16).
- Slide sleeve (16) up over rod (3).
- Unscrew nut (12) from threads of piston rod (3).
- Remove Lock-O-Seal (15).

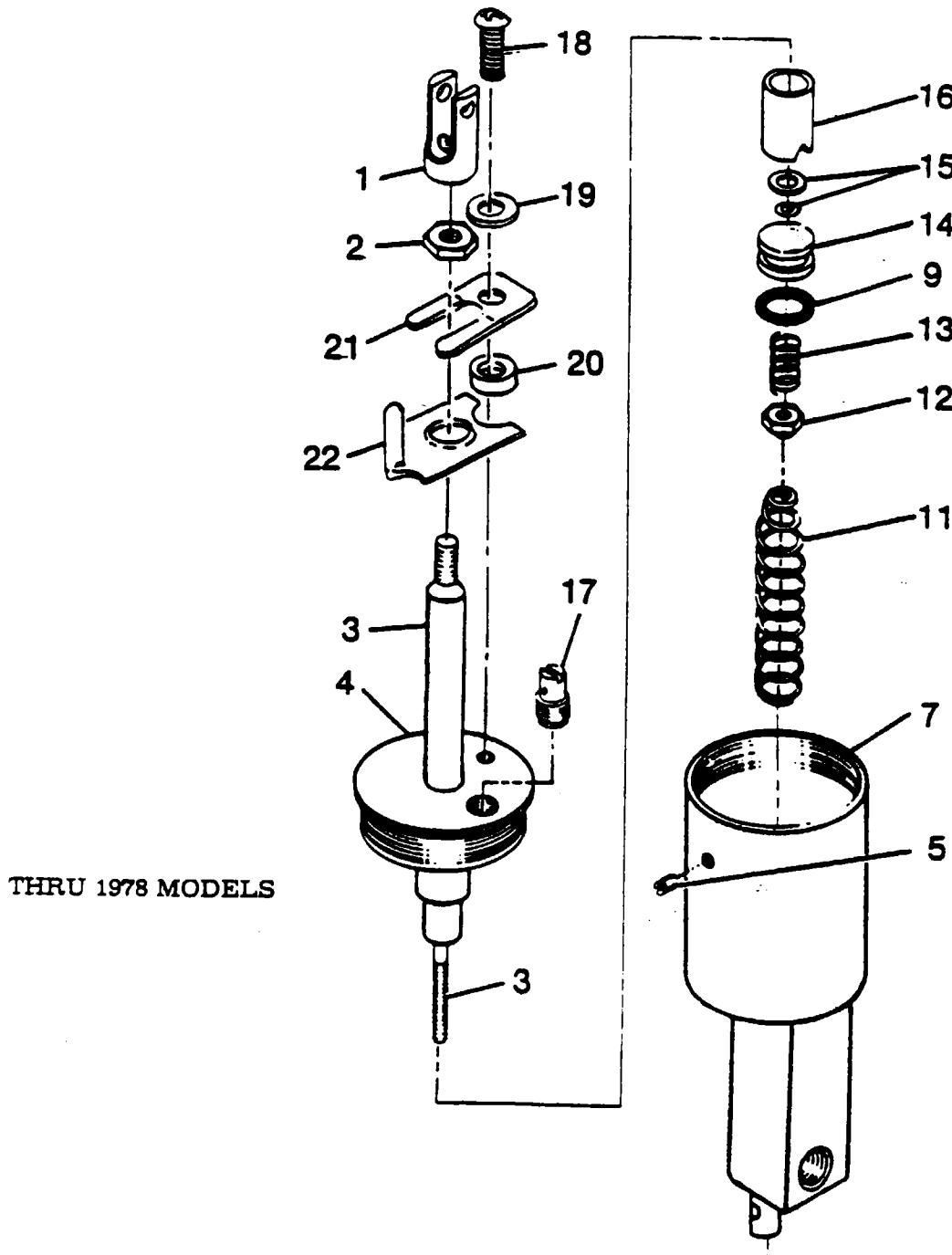
## 5-67. INSPECTION, REPAIR, AND OVERHAUL. (Thru 1978 Models.) (See figure 5-12, sheet 1 of 3). Repair and overhaul are limited to installation of new parts, cleaning, and adjusting. (Refer to reassembly paragraph for adjustment.) Use clean hydraulic fluid (MIL-H-5606) as a lubricant during reassembly of the cylinders.

- Inspect Lock-O-Seal (Parker Seal Co. p/n 800-001-6) and replace if damaged. Replace all O-rings. Filler plug (17) must be vented so pressure cannot build up in the reservoir during brake operation. Remove plug and drill 1/16-inch hole, 30° from vertical, if plug is not vented.

## 5-68. REASSEMBLY. (Thru 1978 Models.) (See figure 5-12, sheet 1 of 3.)

- Install Lock-O-Seal (12) at bottom of piston rod (3).

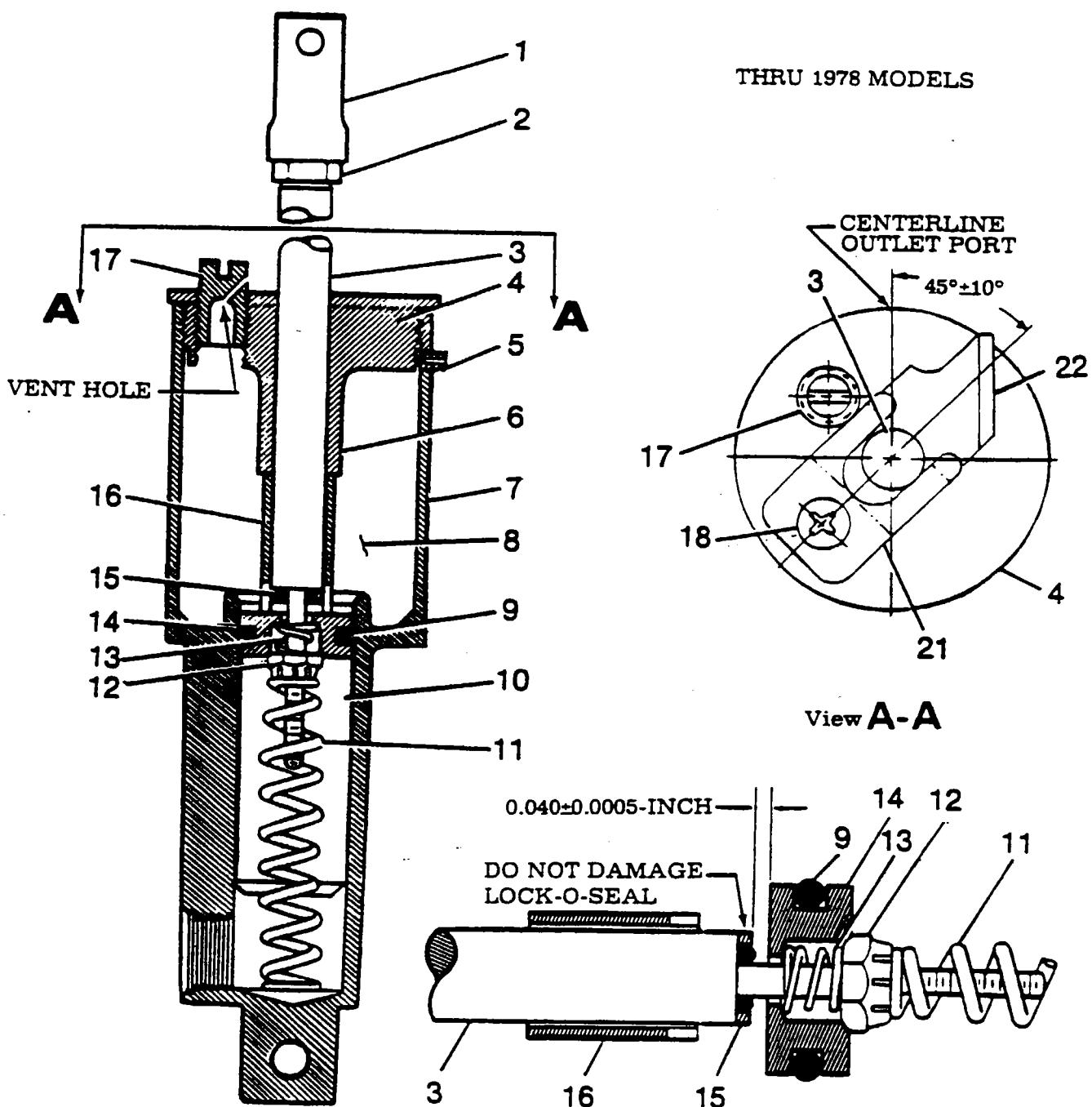
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- |               |                          |                         |
|---------------|--------------------------|-------------------------|
| 1. Clevis     | 8. Reservoir             | 16. Compensating Sleeve |
| 2. Jamnut     | 9. O-Ring                | 17. Filler Plug         |
| 3. Piston Rod | 10. Cylinder             | 18. Screw               |
| 4. Cover      | 11. Piston Return Spring | 19. Washer              |
| 5. Setscrew   | 12. Nut                  | 20. Spacer              |
| 6. Cover Boss | 13. Piston Spring        | 21. Spring              |
| 7. Body       | 14. Piston               | 22. Lock Plate          |
|               | 15. Lock-O-Seal          |                         |

Figure 5-12. Brake Master Cylinder (Sheet 1 of 3)

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- |               |                          |                         |
|---------------|--------------------------|-------------------------|
| 1. Clevis     | 7. Body                  | 14. Piston              |
| 2. Jamnut     | 8. Reservoir             | 15. Lock-O-Seal         |
| 3. Piston Rod | 9. O-Ring                | 16. Compensating Sleeve |
| 4. Cover      | 10. cylinder             | 17. Filler Plug         |
| 5. Setscrew   | 11. Piston Return Spring | 18. Screw               |
| 6. Cover Boss | 12. Nut                  | 21. Spring              |
|               | 13. Piston Spring        | 22. Lock Plate          |

Figure 5-12. Brake Master Cylinder (Sheet 2 of 3)

# MODEL 152 SERIES SERVICE MANUAL

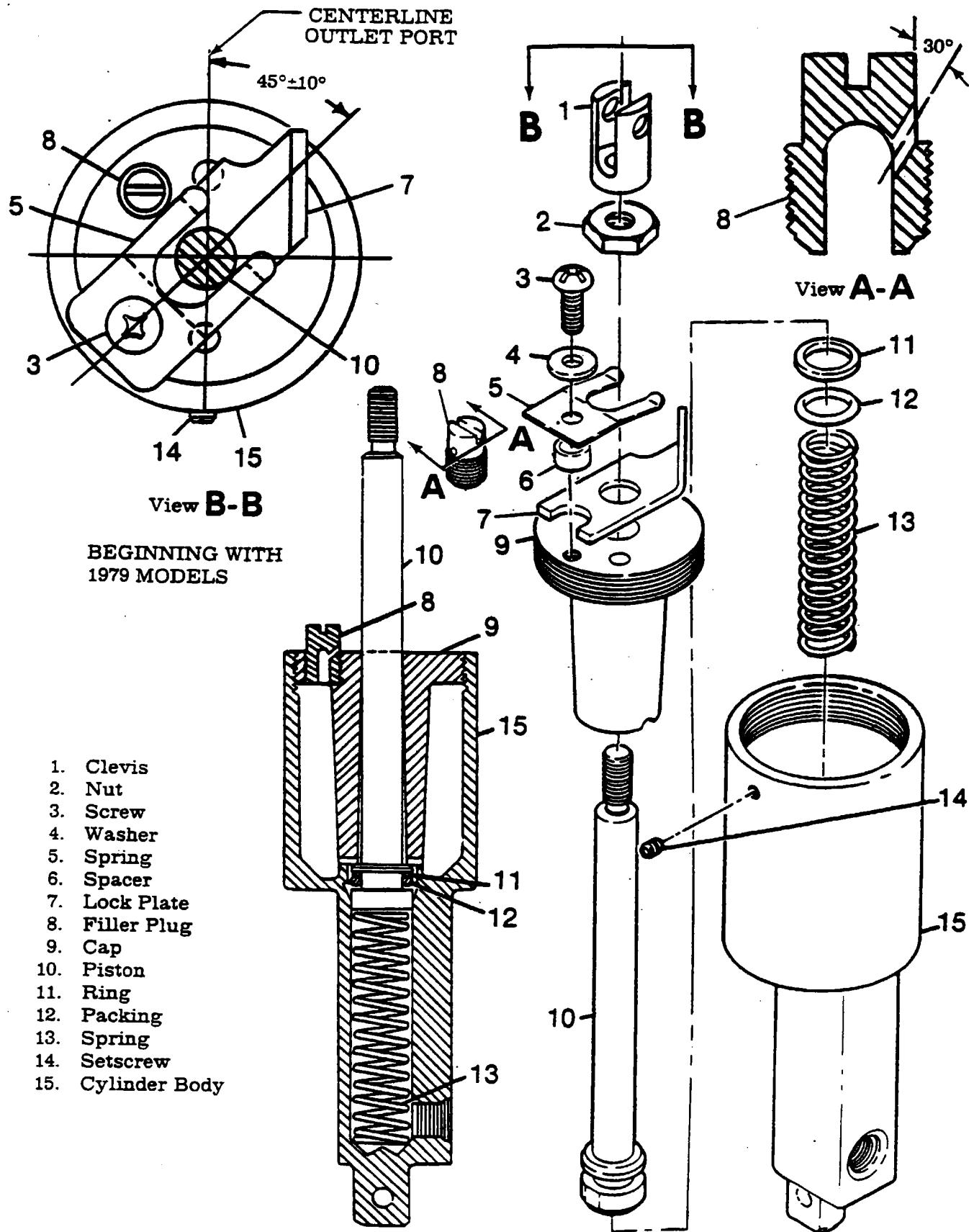


Figure 5-12. Brake Master Cylinder (Sheet 3 of 3)

## MODEL 152 SERIES SERVICE MANUAL

- b. Install O-ring (9) in groove in piston (14); insert piston spring (13) into piston and slide assembly up on bottom threaded portion of piston rod (3).
- c. Run nut (12) up threads to spring (13). Tighten nut (12) enough to obtain  $0.040 \pm 0.005$  inch clearance between top of piston and bottom of Lock-O-Seal, as shown in the figure.
- d. Install piston return spring (11) into cylinder (10) portion of body (7).
- e. Install piston rod (3) end through spring (11).
- f. Slide compensating sleeve (16) over rod (3).
- g. Install cover (4), lock plate (22), spacer (20), washer (19), spring (21) and screw (18).

### NOTE

Installation of spring (21) must not contact rod (3).

- h. Install jannut (2) and clevis (1).
- i. Install filler plug (17), making sure vent hole is open.
- j. Install setscrew (5).

### 5-69. DISASSEMBLY. (Beginning with 1979 Models.) (See figure 5-12, sheet 3 of 3.)

- a. Unscrew clevis (1) and nut (2).
- b. Remove screw (3), washer (4) spring (5), spacer (6) and lock plate (7).
- c. Remove filler plug (8).
- d. Remove setscrew (14).
- e. Unscrew cover (9) and remove up over piston (10).
- f. Remove piston (10) and spring (13).
- g. Remove packing (12) and back-up ring (11) from piston (10).

### 5-70. INSPECTION AND REPAIR. (Beginning with 1979 Models.) (See figure 5-12, sheet 3 of 3.)

Repair is limited to installation of new parts and cleaning. Use clean hydraulic fluid (MIL-H-5606) as a lubricant during reassembly of the cylinders. Replace packing and back-up ring. Filler plug (8) must be vented so pressure cannot build up during brake operation. Remove plug and drill 1/16-inch hole, 30° from vertical, if plug is not vented. Refer to view A-A for location of vent hole.

### 5-71. REASSEMBLY. (Beginning with 1979 Models.) (See figure 5-12, sheet 3 of 3.)

- a. Install spring (13) in cylinder body (15).
- b. Install back-up ring (11) and packing (12) in groove of piston (10).
- c. Install piston (10) in cylinder body (15).
- d. Install cap (9) over piston (10) and screw cap into cylinder body (15).
- e. Install lock plate (7), spacer (6), spring (5), washer (4) and screw (3).
- f. Install nut (2) and clevis (1).
- g. Install setscrew (14).
- h. Install filler plug (8), making sure vent hole is open.

### 5-72. BRAKE MASTER CYLINDER INSTALLATION.

- a. Connect hydraulic hose to cylinder.
- b. Install cylinder at lower attach point.
- c. Connect master cylinder to rudder pedals.
- d. Connect parking brake linkage
- e. Install rudder bar shield and install front seats.
- f. Fill and bleed brake system in accordance with applicable paragraph in this section.

### 5-73. HYDRAULIC BRAKE LINES.

## MODEL 152 SERIES SERVICE MANUAL

- 5-74. **DESCRIPTION.** The brake lines are rigid tubing, except for flexible hose used at the brake master cylinders. A separate line is used to connect each brake master cylinder to its corresponding wheel brake cylinder.
- 5-75. **WHEEL BRAKE ASSEMBLIES.**
- 5-76. **DESCRIPTION.** (See figure 5-3.) The wheel brake assemblies use a disc which is attached to the main wheel. The assemblies also employ a floating brake assembly.
- 5-77. **WHEEL BRAKE REMOVAL.** (See figure 5-3.) Wheel brake assemblies can be removed by disconnecting the brake line (drain hydraulic brake fluid when disconnecting line) and removing the brake back plate. The brake disc is removed after the wheel is removed and disassembled. To remove the torque plate, remove wheel and axle. See figure 5-3 for brake disassembly.
- 5-78. **WHEEL BRAKE INSPECTION AND REPAIR.**
- Clean all parts except brake linings and O-rings in dry cleaning solvent and dry thoroughly.
  - Install all new O-rings. If O-ring reuse is necessary, wipe with a clean cloth saturated in hydraulic fluid and inspect for damage.

### NOTE

Thorough cleaning is important. Dirt and chips are the greatest single cause of malfunctions in the hydraulic brake system.

- Check brake lining for deterioration and maximum permissible wear. (Refer to applicable paragraph for maximum wear limit.)
  - 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.
  - If the anchor bolts on the brake assembly are nicked or gouged, they shall be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are to be installed, press out old bolts and install new bolts with a soft mallet.
  - Inspect wheel brakes disc for a minimum thickness of 0.190 (McCauley) or 0.190 (Cleveland). If brake disc is below minimum thickness, install a new part.
- 5-79. **WHEEL BRAKE REASSEMBLY.** (See figure 5-3.)

### NOTE

Lubricate parts with clean hydraulic fluid during brake reassembly.

- See figure 5-3 for assembly procedures.
- 5-80. **WHEEL BRAKE INSTALLATION.**
- Place brake assembly in position with pressure plate in place.

### NOTE

If torque plate was removed, install as the axle is installed or install on axle. If the brake disc was removed from the wheel, install as wheel is assembled.

## MODEL 152 SERIES SERVICE MANUAL

- 5-81. **CHECKING BRAKE LINING WEAR.** New brake lining should be installed when the existing lining has worn to a minimum thickness of 3/32-inch. A 3/32-inch thick strip of material held adjacent to each lining can be used to determine amount of wear. The shank end of a drill bit of the correct size can also be used to determine wear of brake linings.
- 5-82. **BRAKE LINING INSTALLATION.** (See figure 5-3.)
- Remove bolts securing back plate, and remove back plate.
  - Pull brake cylinder out of torque plate and slide pressure plate off anchor bolts.
  - Place back plate on a table with lining side down flat. Center a 9/64-inch (or slightly smaller) punch in the rolled 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.

### NOTE

A rivet setting kit, Part No. 199-00100, is available from Cessna Parts Distribution (CPD 2) through Cessna Service Stations.

- Clamp the flat side of the anvil in a vise.
- Align new lining on back plate and place brake rivet in hole with rivet head in the lining. Place the head against the anvil.
- Center rivet setting punch on lips of rivet. While holding back plate down firmly against lining, hit punch with hammer to set rivet. Repeat blows on punch until lining is firmly against back plate.
- Realign the lining on the back plate and install and set rivets in the remaining holes.
- Install a new lining on pressure plate in the same manner.
- Position pressure plate on anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.
- Install back plate with bolts and washers.
- Complete brake lining conditioning. Refer to paragraph 5-83A.

5-83. **BRAKE SYSTEM BLEEDING.**

### NOTE

Bleeding with a clean hydraulic pressure source connected to the wheel bleeder is recommended.

- Remove brake master cylinder filler plug and screw flexible hose with appropriate fitting into the filler hole at top of the master cylinder.
- Immerse opposite end of flexible hose in a container with enough hydraulic fluid to cover the end of the hose.
- Connect a clean hydraulic pressure source, such as a hydraulic hand pump or Hydro-Fill unit, to the bleeder valve in the wheel cylinder.
- As fluid is pumped 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, remove bleeder source from wheel cylinder and tighten the bleeder valve.

### NOTE

Ensure that the free end of the hose from the master cylinder remains immersed during the entire bleeding process.

## MODEL 152 SERIES SERVICE MANUAL

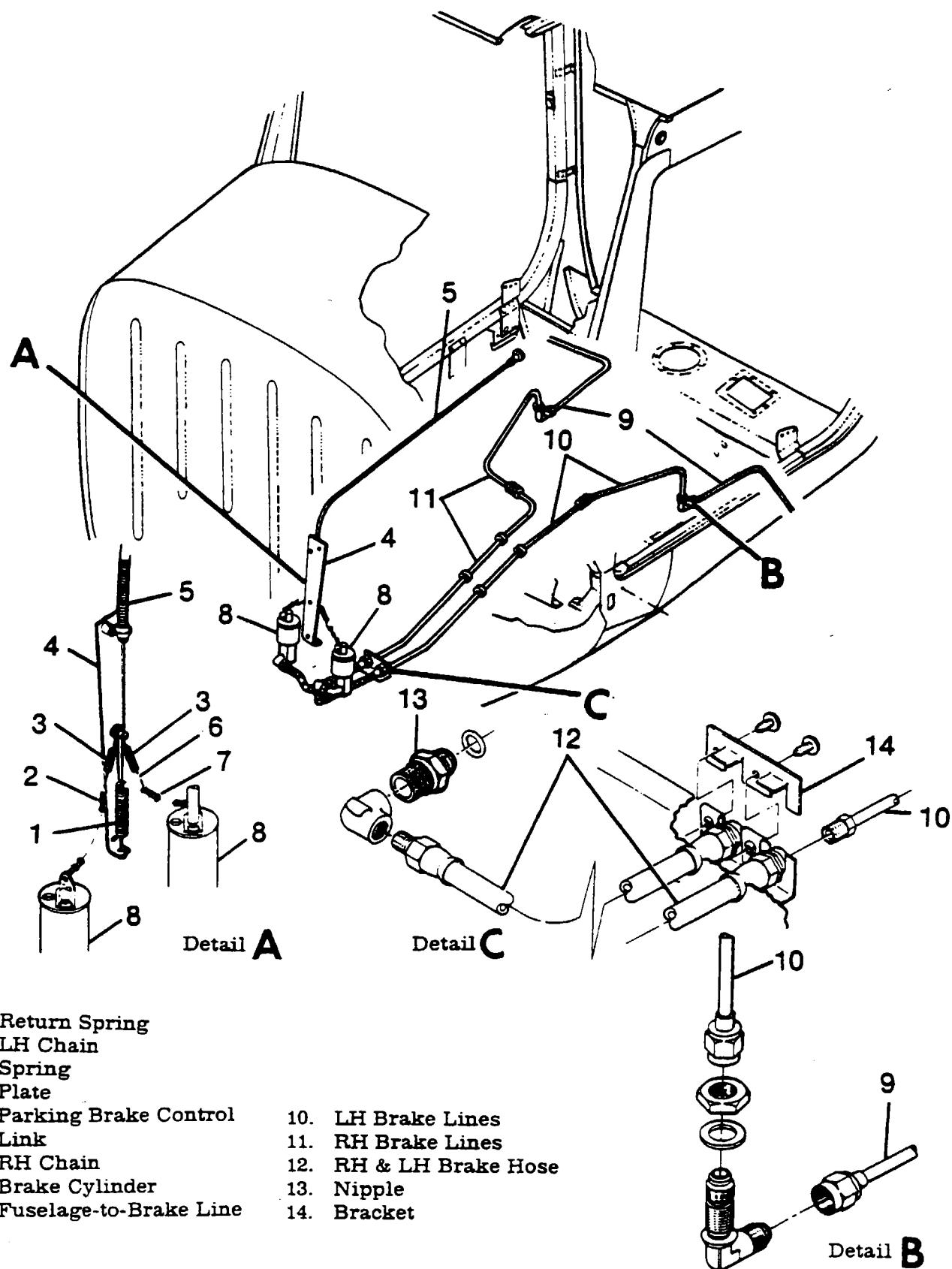


Figure 5-13. Brake Systems

## MODEL 152 SERIES SERVICE MANUAL

- 5-83A. **BRAKE LINING CONDITIONING.** The brake lining pads used in this assembly are either non-asbestos organic composition or iron based metallic composition. Brake pads must be properly conditioned (glazed) before use in order to provide optimum service life. This is accomplished by a brake burn-in. Burn-in also wears off brake high spots prior to operational use. If brake use is required before burn-in, use brakes intermittently at LOW taxi speeds.

### CAUTION

Brake burn-in must be performed by a qualified person familiar with acceleration and stop distances of the airplane.

- a. Non-asbestos Organic Composition Burn-in.
  1. Taxi the airplane for 1500 feet, with engine at 1700 rpm, applying brake pedal forces as needed to maintain 5 to 10 M.P.H. (5 to 9 knots).
  2. Allow brakes to cool for 10 to 15 minutes.
  3. Apply brakes and check to see if a high throttle static engine run-up can be held with normal pedal force. If so, conditioning burn-in is complete.
  4. If static run-up cannot be held, repeat Steps 1. thru 3. as needed.
- b. Metallic Composition Burn-in.
  1. Taxi the airplane at 34 to 40 M.P.H. (30 to 35 knots) and perform full stop braking application.
  2. Without allowing brake discs to cool substantially, repeat Step 1. for second full stop braking application.
  3. Apply brakes and check to see if a high throttle static engine run-up can be held with normal pedal force. If so, conditioning burn-in is complete.
  4. If static run-up cannot be held, repeat Steps 1. thru 3. as needed.

### NOTE

Normal brake usage should generate enough heat to maintain the glaze throughout the life of the lining. 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 above.

- 5-84. **PARKING BRAKE SYSTEM.** (See figure 5-13.)
- 5-85. **DESCRIPTION.** The parking brake system consists of a control knob on the instrument panel which is connected to linkage at the brake master cylinders. At the brake master cylinders, the control operates locking plates which trap pressure in the system after the master cylinder piston rods have been depressed by toe operation of the rudder pedals. To release the parking brake, depress the pedals and push the control knob full in.
- 5-86. **REMOVAL AND INSTALLATION.** (See figure 5-13.) See the figure for relative locations of system components. The illustration may be used as a guide during removal and installation of components.
- 5-87. **INSPECTION AND REPAIR OF SYSTEM COMPONENTS.** Inspect lines for leaks, cracks, dents, chafing, proper radius, security, corrosion, deterioration, obstruction and foreign matter. Check brake master cylinders, and repair as outlined in applicable paragraph in this section. Check parking brake control for operation and release. Replace worn or damaged parts.

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 6

### AILERON CONTROL SYSTEM

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Description .....	1G15/6-2
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Bellcrank .....	1G16/6-3
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Ailerons .....	1G23/6-10
Removal .....	1G23/6-10
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Rigging (Thru 15279473, A1520736, F15201428, and FA1520336) .....	1G23/6-10
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#### 6-1. AILERON CONTROL SYSTEM. (See figure 6-1.)

6-2. **DESCRIPTION.** The aileron control system is comprised of push-pull rods, bellcranks, cables, pulleys, sprockets and roller chains, all of which link the control wheels to the ailerons. A control "Y" interconnects the control wheels to the aileron cables.

#### 6-3. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart, it may be necessary to rerig system. Refer to paragraph 6-15 or 6-16.

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.

## MODEL 152 SERIES SERVICE MANUAL

### 6-3. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
RESISTANCE TO CONTROL WHEEL MOVEMENT.	Cables too tight.	Adjust cables to proper tension.
	Pulleys binding or cable off.	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.	Adjust in accordance with paragraph 6-15 and 6-16.
	Improper adjustment of aileron push-pull rods.	Adjust in accordance with paragraph 6-15 and 6-16.
DUAL CONTROL WHEELS NOT COORDINATED.	Chains improperly adjusted.	Adjust in accordance with paragraph 6-15 and 6-16.
INCORRECT AILERON TRAVEL.	Push-pull rods not adjusted properly.	Adjust in accordance with paragraph 6-15 and 6-16.
	Worn bellcrank stop bushings on bellcrank slots.	Replace worn parts.

### 6-4. CONTROL "Y". (See figure 6-2.)

6-5. DESCRIPTION. The control "Y" transforms rotation of the control wheels into pulling motion on the aileron cables by means of sprockets and chains. The "Y" is pivoted at the lower end to operate the elevator control system.

### 6-6. REMOVAL AND INSTALLATION.

- a. Remove control cover and carpeting as necessary to gain access to lower end of control "Y".
- b. Release cable tension by loosening turnbuckle (index 3, figure 6-1).
- c. Remove bolt (17) attaching control link (14).
- d. Remove bolts (8) securing control wheel tubes (9) to universal joints (7).
- e. Remove bolts securing cable ends to control arm (5).
- f. Remove pivot bolt (16) and remove control "Y".
- g. Reverse preceding steps for installation.
- h. Rig aileron system in accordance with applicable paragraph in this section. safety turnbuckle and reinstall all items removed in step "a".
- i. Check and/or rig elevator control system in accordance with applicable paragraph in Section 8.

## MODEL 152 SERIES SERVICE MANUAL

### 6-7. AILERON BELLCRANK. (See figure 6-3.)

#### 6-8. REMOVAL.

- a. Remove access plate inboard of each bellcrank on underside of wing. Remove headliner if required.
- b. Relieve control cable tension by loosening turnbuckle barrel (index 3, figure 6-1).
- c. Disconnect control cables from bellcrank. Retain all spacers (15).
- d. Disconnect aileron push-pull rod (7) at bellcrank.
- e. Remove nut, washer and bolt securing bellcrank stop bushing (17) and bellcrank (11) to wing structure.
- f. Remove bellcrank through access opening, using care that bushing (5) is not dropped from bellcrank.

#### NOTE

Brass washers (10) may be used as shims between lower end of bellcrank and wing channel (8). Retain these shims. Tape open ends of bellcrank to prevent dust and dirt from entering bellcrank needle bearings (6).

#### 6-9. INSTALLATION.

- a. Place bushing (5) and stop bushing (17) in bellcrank and position bellcrank in wing.
- b. Install brass washers (10) between lower end of bellcrank and wing channel (8) to shim out excess clearance.
- c. Install bellcrank pivot bolt (4), washers and nut.
- d. Position bellcrank stop-bushing (17) and install attaching bolt (18), washers and nut.
- e. Connect aileron cables to bellcrank.
- f. Rig aileron system in accordance with applicable paragraph in this section, safety turnbuckle and install access plates.

### 6-10. CABLES AND PULLEYS. (See figure 6-1.)

#### 6-11. REMOVAL AND INSTALLATION.

- a. Remove access plates, wing root fairings and upholstery as required.
- b. Disconnect cables from aileron bellcranks and remove cable guards and pulleys as necessary to work cables free of aircraft.

#### NOTE

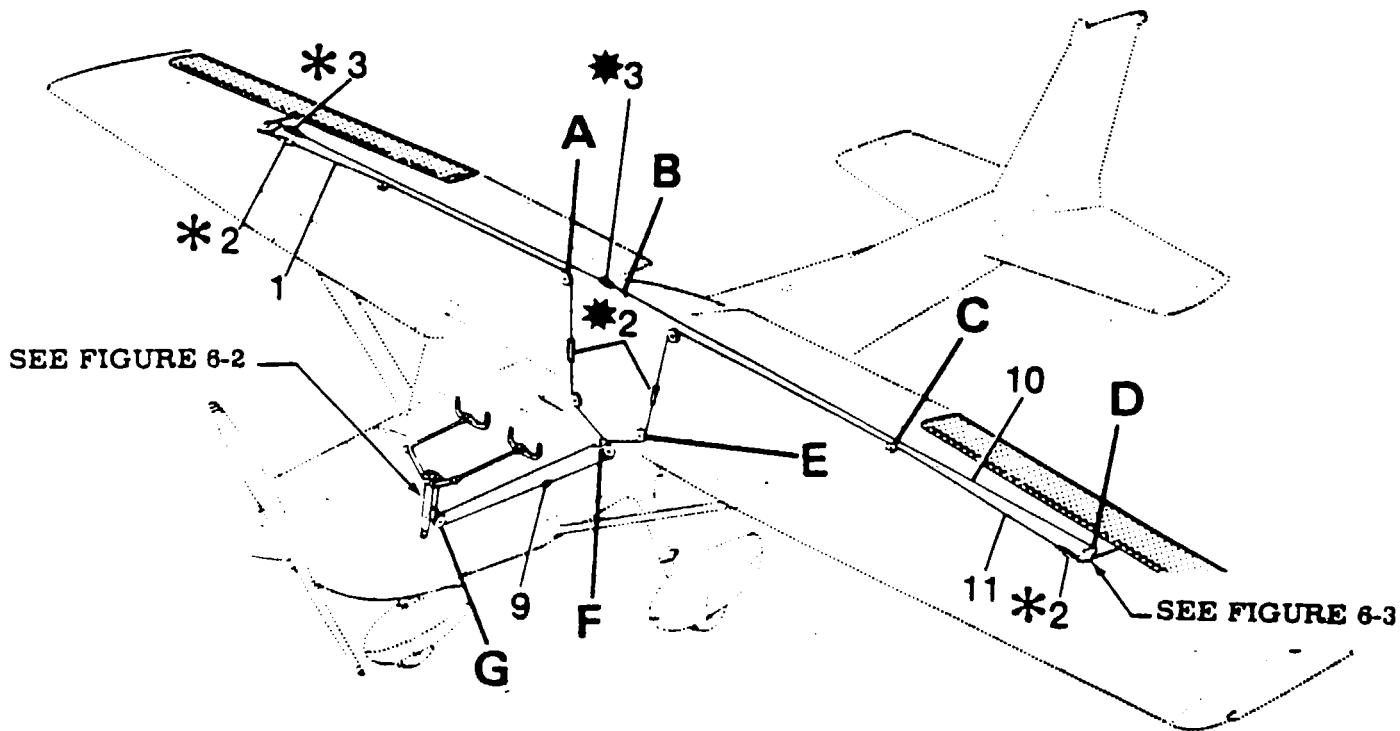
To ease routing of cables, a length of wire may be attached to end of cable before being withdrawn from aircraft. Leave wire in place, routed through structure; then attach to cable being installed and use to pull cable into position. Carry-thru cable turnbuckle (3) may be located at either the right or left aileron bellcrank. Direct cable turnbuckles are located at bellcranks.

- c. After cable is routed, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guard.
- d. Rig aileron system in accordance with applicable paragraph in this section, safety turnbuckles and install access plates, fairings and upholstery removed in step "a".

# MODEL 152 SERIES SERVICE MANUAL

\* THRU  
15281426  
A1520785  
F1521538  
FA1520352

\* BEGINNING WITH  
15281427  
A1520786  
F1521539  
FA1520353



1. Right Direct Cable
  2. Direct Cable Turnbuckle
  3. Carry-Thru Cable Turnbuckle
  4. Pulley Bracket
  5. Bushing
  6. Cable Guard
  7. Pulley
  8. Clip
  9. Fairlead
  10. Carry-Thru Cable
  11. Left Direct Cable
  12. Spacer
- Note      Shaded pulleys are used in this system only.

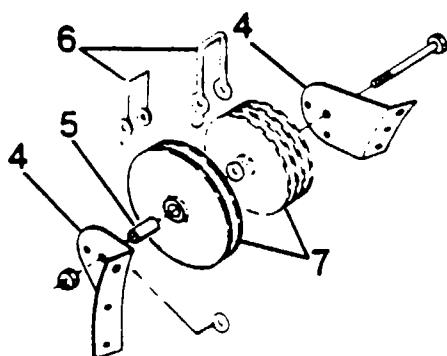
## CAUTION

### MAINTAIN SPECIFIED CONTROL CABLE TENSION

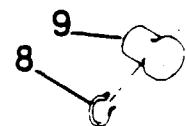
**CABLE TENSION:**  
40 LBS  $\pm$  10 LBS ON AILERON CARRY-THRU CABLE (AT AVERAGE TEMPERATURE FOR THE AREA.)  
SEE FIGURE 1-1 FOR TRAVEL.

Figure 6-1. Aileron Control System (Sheet 1 of 2)

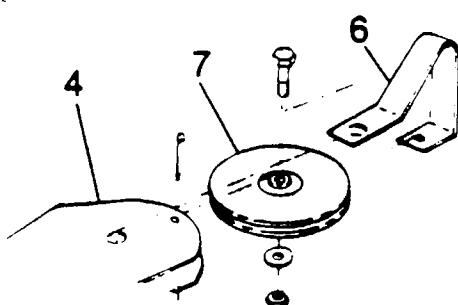
# MODEL 152 SERIES SERVICE MANUAL



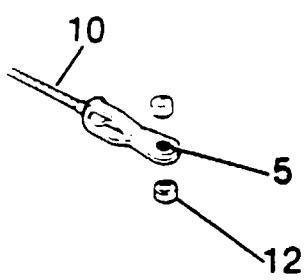
**Detail A**



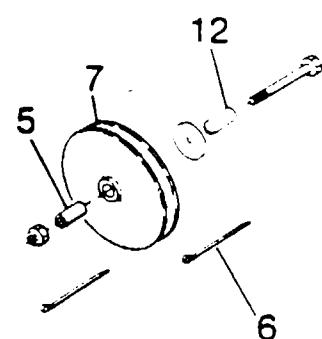
**Detail B**



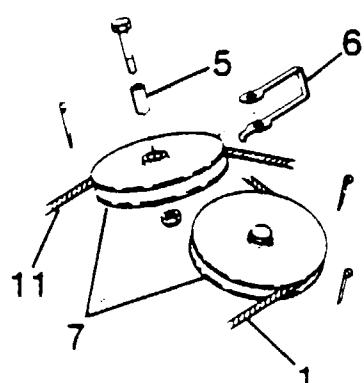
**Detail C**



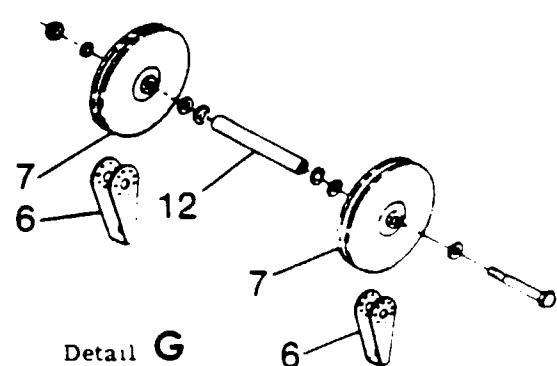
**Detail D**



**Detail E**



**Detail F**

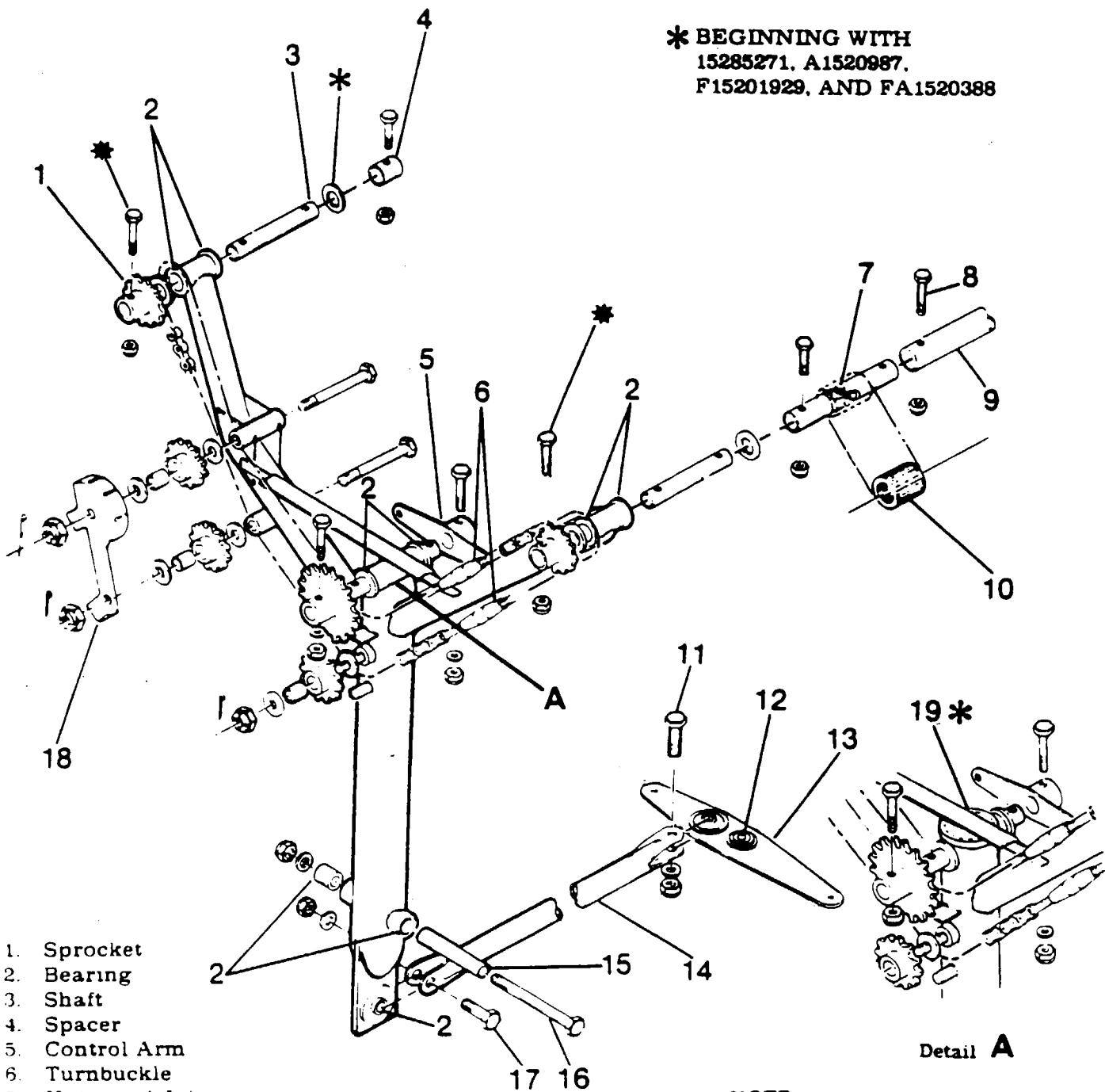


**Detail G**

**Figure 6-1. Aileron Control System (Sheet 2 of 2)**

# MODEL 152 SERIES SERVICE MANUAL

\* BEGINNING WITH  
15285271, A1520987,  
F15201929, AND FA1520388



1. Sprocket
2. Bearing
3. Shaft
4. Spacer
5. Control Arm
6. Turnbuckle
7. Universal Joint
8. Bolt
9. Control Wheel Tube
10. Cover
11. Bolt
12. Bearing
13. Bellcrank
14. Control Link
15. Bushing
16. Pivot Bolt
17. Bolt
18. Chain Guard
19. Cap

## NOTE

When dual controls are installed, spacer (4) is replaced with a universal joint to which the right control wheel is attached.

Chains are to have minimum amount of tension which will remove slack from chains.

\* Use as required for maximum .005 inch end play per side.

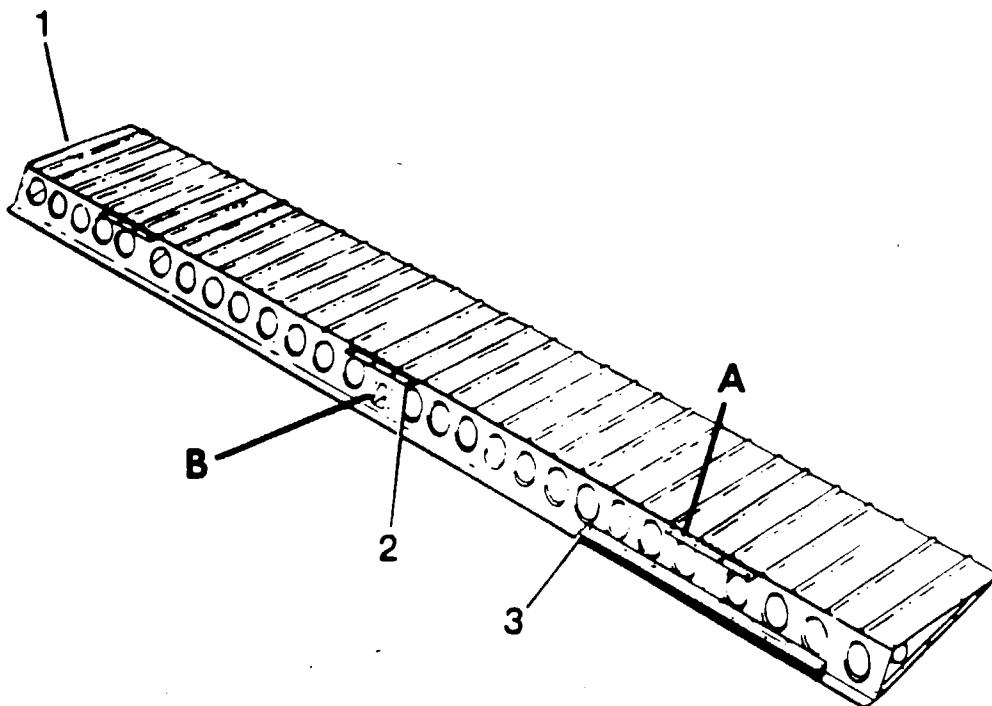
\* Left and right bolts are to be parallel.

Figure 6-2. Control "Y" Installation

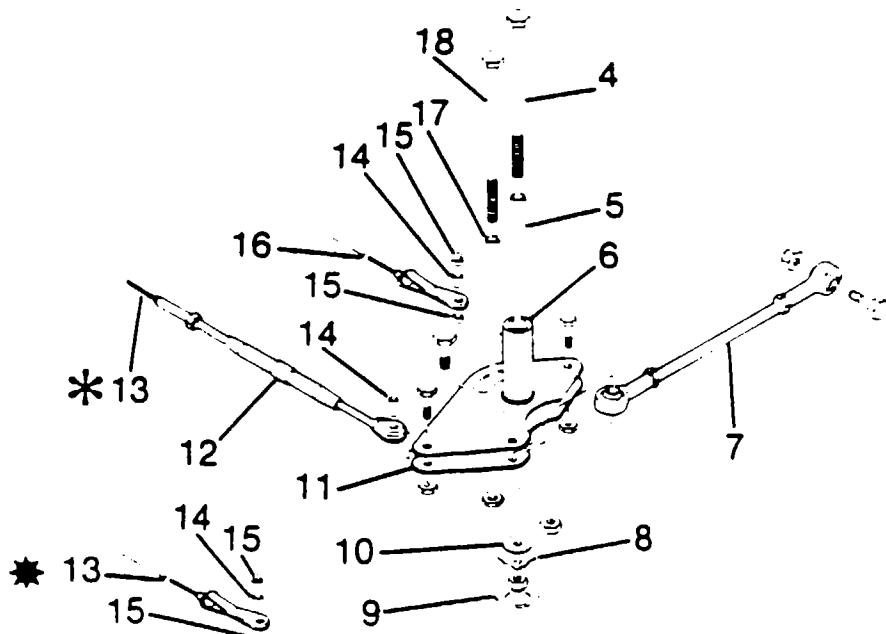
# MODEL 152 SERIES SERVICE MANUAL

\* THRU  
 15281426  
 A1520785  
 F1521538  
 FA1520352

\* BEGINNING WITH  
 15281427  
 A1520786  
 F1521539  
 FA1520353



1. Aileron
2. Hinge
3. Balance Weight
4. Pivot Bolt
5. Bushing
6. Needle Bearing
7. Push-Pull Rod
8. Channel
9. Lower Wing Skin
10. Brass Washer
11. Bellcrank
12. Turnbuckle
13. Direct Cable
14. Bushing
15. Spacer
16. Carry-Thru Cable
17. Stop Bushing
18. Bolt

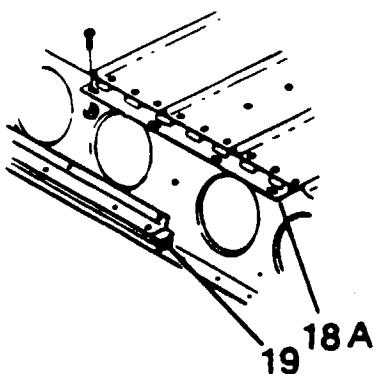


Detail B

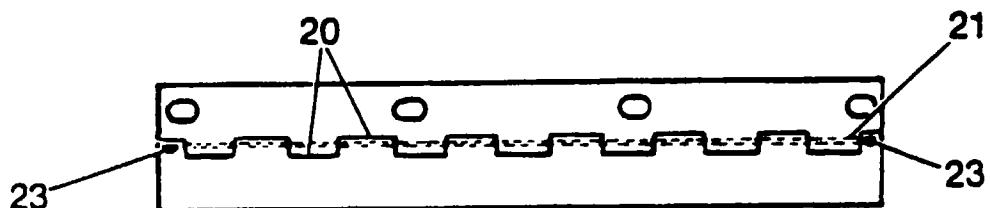
Figure 6-3. Aileron and Bellcrank Installation (Sheet 1 of 3)

## MODEL 152 SERIES SERVICE MANUAL

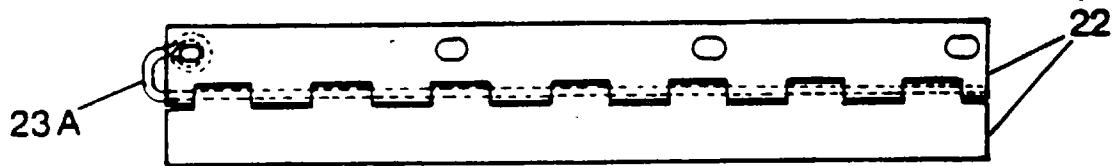
- 18A. Hinge
- 19. Balance Weight
- 20. Hinge
- 21. Hinge Pin
- 22. Hinge
- 23. Cotter Pin
- 23A. Hinge Pin



**Detail A**



**AILERON HINGE (TYP)**  
Used through serial 15285915 and A1521027



**AILERON HINGE (TYP)**  
Beginning Serials: 1525916 and A1521028

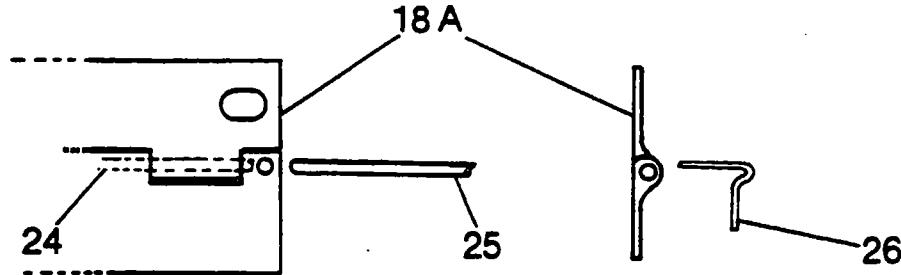
**Detail B**

### NOTE

Install loop of hinge pin (23A) on outboard end of hinge.

**Figure 6-3. Aileron and Bellcrank Installation (Sheet 2 of 3)**

# MODEL 152 SERIES SERVICE MANUAL



Detail C

- 18A. Hinge
- 24. Hinge Pin
- 25. 0.89 Diameter Drill Rod
- 26. MS24665 Cotter Pin

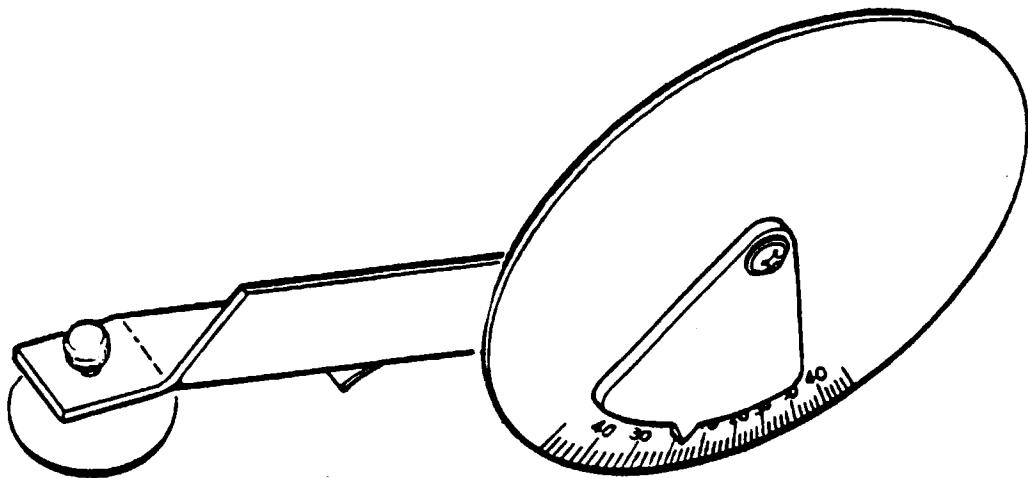
## NOTE

The following method may be utilized to check for wear on aileron hinges used prior to Serial 15285915 and A1521027. Refer to Service Letters SE83-18 and SE84-22 for specific serial numbers affected:

- (1) Remove cotter pins (26) from both ends of hinges (18A).
- (2) Push drill rod (25) or number 43 drill bit into hinge pin hole past holes from cotter pins (26) were removed.
- (3) Bend one leg of cotter pin (26) back and attempt to install the other leg into the cotter pin hole past drill rod (25). If leg of cotter pin (26) GOES, replace hinge (18A). If NO GO condition exists, hinges are not worn sufficiently to require replacement.
- (4) Remove drill rods (25) and replace new cotter pins (26) in hinges (18A).

Figure 6-3. Aileron and Bellcrank Installation (Sheet 3 of 3)

# **MODEL 152 SERIES SERVICE MANUAL**



**AVAILABLE FROM CESSNA PARTS DISTRIBUTION (CPD 2) THROUGH A CESSNA SERVICE STATION (TOOL NO. SE716)**

Figure 6-4. Inclinometer for Measuring Control Surface Travel

## 6-12. AILERONS (See figure 6-3.)

### **6-13. REMOVAL.**

- a. Disconnect push-pull rod (7) at aileron.
  - b. Remove screws and nuts attaching aileron hinges (2) to trailing edge of wing.
  - c. Using care, pull aileron out and down to slide hinges from under wing skin and auxiliary spar reinforcements.

## 6-14. INSTALLATION.

- a. Position aileron hinges between skin and auxiliary spar reinforcements and install screws and nuts attaching hinges to trailing edge of wing.
  - b. Attach push-pull rod to aileron.

## **NOTE**

If rigging was correct and push-pull rod adjustment was not disturbed, it should not be necessary to rig system.

- c. Check aileron travel and alignment, rig if necessary, in accordance with applicable paragraph in this section.

6-15. RIGGING. (THRU SERIALS 15279473 A1520736 E15201428 AND EA1520226)

- a. (See figure 6-2.) Position arm (5) horizontal and install chain with an equal number of links extending from central drive sprocket on arm (5).
  - b. Adjust turnbuckles (6) to remove slack from chain and synchronize control wheels (level).

## MODEL 152 SERIES SERVICE MANUAL

### NOTE

Adjust chain turnbuckles (6) to minimum tension required to remove slack.

- c. Tape a bar across both control wheels to hold them in neutral position.
- d. (Refer to figure 6-3.) Adjust turnbuckles at bellcranks (11) so stop bushings (17) are centered in bellcrank slots (11) with  $40 \pm 10$  pounds tension on carry-thru cable (16).
- e. Adjust push-pull rod (7) at each aileron until ailerons are neutral with reference to trailing edge of wing flaps. Be sure wing flaps are fully up when making this adjustment. Tighten push-pull rod jamnuts.
- f. Safety all turnbuckles by the single-wrap method using 0.040-inch diameter monel safety wire.
- g. Remove bar from control wheels and install all parts removed for access.
- h. Using inclinometer, check ailerons for correct travel. An inclinometer is shown in figure 6-4. Refer to figure 1-1. for travel specifications.

### WARNING

Be sure ailerons move in correct direction when operated by control wheel.

#### 6-16. RIGGING (BEGINNING WITH SERIALS 15279474, A1520737, F15201429, AND FA1520337.)

- a. Complete steps a. thru d. of paragraph 6-15.
- b. Manually hold one aileron in streamline position so that trailing edge aligns with trailing edge of flap. Be sure flaps are fully UP.
- c. Mount an inclinometer on aileron trailing edge and set to  $0^\circ$ .

### NOTE

An inclinometer suitable for measuring control surface travel is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. See figure 6-4.

- d. Adjust push-pull rod (7) so that aileron droops  $1^\circ \pm 1/2^\circ$  DOWN from  $0^\circ$  position set in step c. Tighten push-pull rod jamnuts.
- e. Repeat steps b. thru d. for opposite aileron.
- f. Safety all turnbuckles using single wrap method and 0.040-inch diameter monel safety wire.
- g. Remove bar from control wheels and check aileron travel with values shown in Section 1.

### NOTE

Measure aileron travel from "DROOP" position determined in step d. above.

- h. Reinstall all items removed for access.

### WARNING

Ensure ailerons move in correct direction when operated by control wheel.

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## SECTION 7

### WING FLAP CONTROL SYSTEM

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#### 7-1. WING FLAP CONTROL SYSTEM. (See figure 7-1.)

7-2. DESCRIPTION. The wing flap control system is comprised of an electric motor and transmission assembly, drive pulleys, push-pull rods, cables and a follow-up control. Power from the motor and transmission assembly is transmitted 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, by a camming lever and follow-up control. As the flap control lever is moved to the desired flap setting, the attached cam trips one of the microswitches, activating the flap motor. As the flaps move to the position selected, the floating arm is rotated by the follow-up control until the active microswitch clears the cam breaking the circuit and stopping the motor. To reverse flap direction, the control lever is moved in the opposite direction causing the cam to trip the second microswitch which reverses the flap motor. The follow-up control moves the cam until it is clear of the second switch, shutting off the flap motor. Limit switches on flap actuator assembly prevent over-travel of the flaps in the full UP or DOWN positions.

#### 7-3. OPERATIONAL CHECK.

- a. Operate flaps through their full range of travel observing for uneven travel or jumpy motion, binding or lost motion. Ensure flaps are moving together through their full range of travel.
- b. Check for positive shutoff of motor at flap travel extremes to prevent damage to actuator assembly.
- c. With flaps full UP, mount an inclinometer on one flap and set to 0°. Lower flaps to full DOWN position and check flap angle as specified in figure 1-1. Check approximate mid-range percentage setting against degrees as indicated on inclinometer. Repeat the same procedure for opposite flap.

#### NOTE

An inclinometer for measuring control surface travel is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. See figure 6-4.

- d. Remove access plates adjacent to flap drive pulleys and attempt to rock pulleys to check for bearing wear.
- e. Inspect flap rollers and tracks for evidence of binding or defective parts.

## MODEL 152 SERIES SERVICE MANUAL

### 7-4. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart it may be necessary to rerig system, refer to paragraph 7-16 and 7-20.

TROUBLE	PROBABLE CAUSE	REMEDY
BOTH FLAPS FAIL TO MOVE.	Popped circuit breaker. Defective switch. Defective motor. Broken or disconnected wires. Defective or disconnected transmission. Defective limit switch.	Reset and check continuity. Check continuity of switch. Replace if defective. Remove and bench test motor. Replace if defective. Run a continuity check. Connect or repair wiring. Connect or replace transmission. Check continuity of switches. Replace switches found defective.
BINDING IN SYSTEM AS FLAPS ARE RAISED AND LOWERED.	Cables not riding on pulleys. Bind in drive pulleys. Broken or binding pulleys. Frayed cable. Flaps binding on tracks.	Check visually. Route cables correctly over pulleys. Check drive pulleys in motion. Replace drive pulleys found defective. Check pulleys for free rotation or breaks. Replace defective pulleys. Check visually. Replace defective cable. Observe flap tracks and rollers. Replace defective parts.
LEFT FLAPS FAILS TO MOVE.	Disconnected or broken cable. Disconnected push-pull rod.	Check cable tension. Connect or replace cable. Check visually. Attach push-pull rod.

## MODEL 152 SERIES SERVICE MANUAL

### 7-4. TROUBLE SHOOTING (CONT.).

TROUBLE	PROBABLE CAUSE	REMEDY
INCORRECT FLAP TRAVEL.	Incorrect rigging.	Refer to paragraph 7-16 and 7-20.
	Defective operating switch.	Check continuity of switches. Replace switches found defective.
FLAPS FAIL TO RETRACT.	Defective or disconnected flaps UP operating switch.	Check continuity of switch. Connect or replace limit switch.
FLAPS FAIL TO EXTEND.	Defective or disconnected flaps DOWN operating switch.	Check continuity of switch. Connect or replace limit switch.

### 7-5. FLAP MOTOR AND TRANSMISSION ASSEMBLY.

#### 7-6. REMOVAL AND INSTALLATION. (See figure 7-2.)

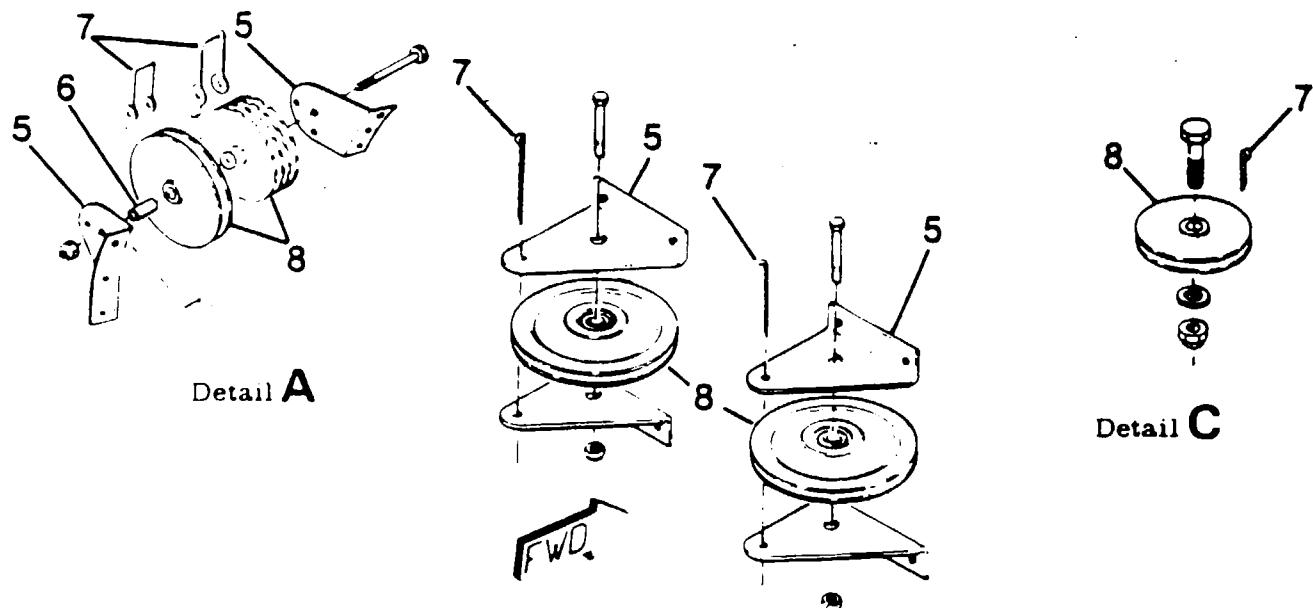
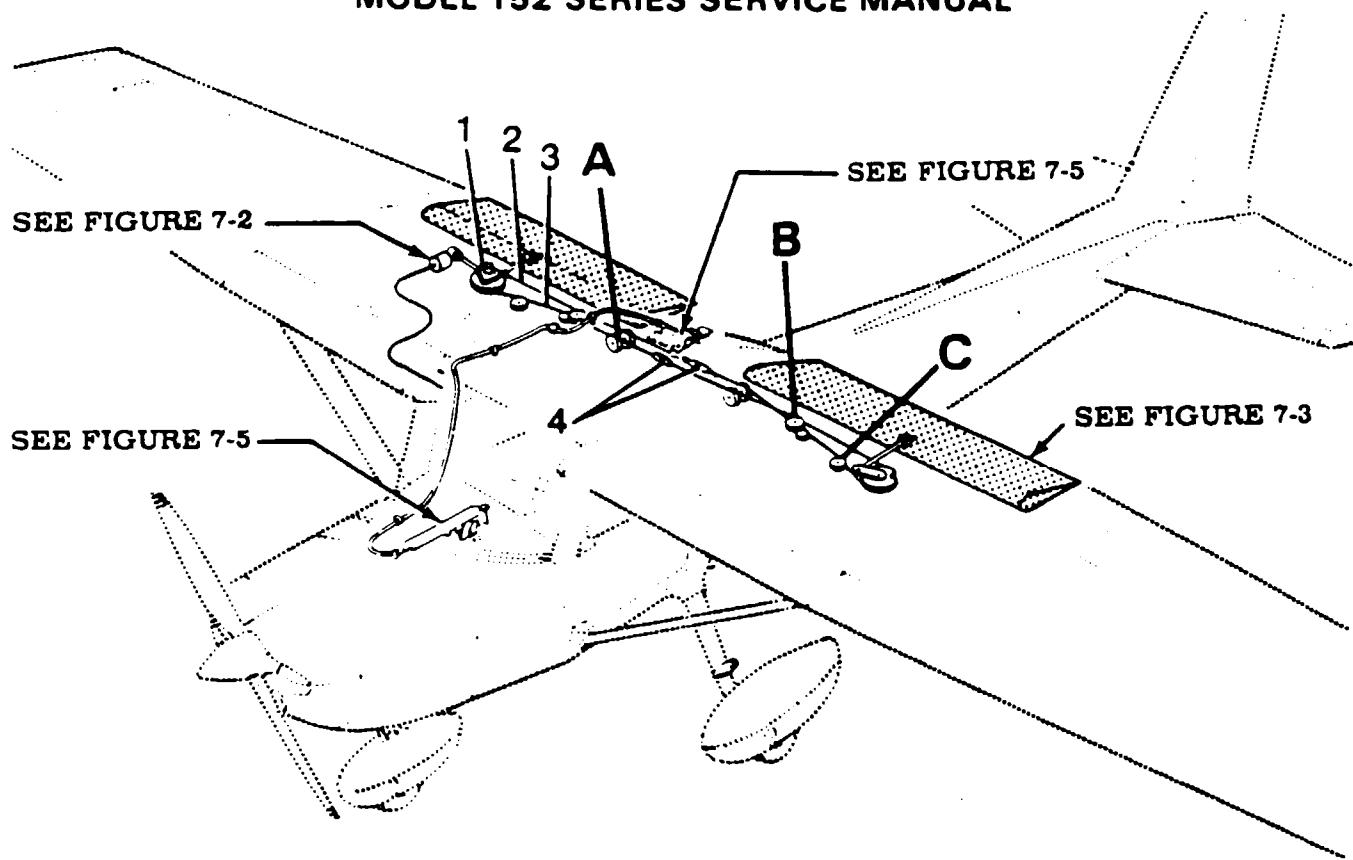
- a. Run flaps to full DOWN position.
- b. Disconnect battery ground cable and insulate terminal as a safety precaution.
- c. Remove access plates beneath flap motor and transmission assembly in right wing.

#### NOTE

Flap motor (9), transmission (7), hinge assembly (10) and actuating tube (5) are removed from the aircraft as a unit.

- d. Remove bolt (20) securing actuating tube (5) to drive pulley (13).
  - e. Screw actuating tube (5) in toward transmission (7) as far as possible by hand.
  - f. Remove bolt (1) securing flap motor hinge (10) to wing. Retain brass washer between hinge and wing structure for use on reinstallation.
  - g. Disconnect motor electrical leads at quick-disconnects.
  - h. Disconnect wiring at limit switches (23 and 26).
  - i. Carefully work assembly from wing through access opening.
  - j. Reverse preceding steps for reinstallation. If hinge assembly (10) was removed from the transmission (7) for any reason, ensure that short end of hinge is reinstalled toward the top.
  - k. Use Loctite grade CV adhesive on threads of setscrew (6) and collar (24) whenever actuating tube (5) is removed. Torque setscrew to 40 pound-inches.
  - l. Complete operational check as outlined in paragraph 7-3 and rerig system in accordance with paragraph 7-16.
- 7-7. REPAIR. Repair consists of replacement of motor, transmission, actuating tube and associated hardware. Bearings in hinge assembly may also be replaced. Lubricate as outlined in Section 2.
- 7-8. FLAP CONTROL LEVER. (See figure 7-2.)

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1. Drive Pulley
2. Direct Cable
3. Retract Cable
4. Turnbuckle
5. Bracket
6. Bushing
7. Cable Guard
8. Pulley
9. Follow-Up Control

**Detail B**

**CAUTION**

**MAINTAIN SPECIFIED CONTROL  
CABLE TENSION**

**CABLE TENSION:**  
30 LBS  $\pm$  10 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)  
**SEE FIGURE 1-1 FOR TRAVELS.**

**Figure 7-1. Wing Flap Control System**

## MODEL 152 SERIES SERVICE MANUAL

### 7-9. REMOVAL AND INSTALLATION.

- a. Remove access plate adjacent to drive pulley (13) in right wing.
- b. Unzip or remove headliner as necessary for access to turnbuckles (index 4, figure 7-1), remove safety wire and loosen turnbuckles.
- c. Remove bolt (19) securing flap push-pull rod (14) to drive pulley (13) and lower RIGHT flap gently.
- d. Remove bolt (20) securing actuating tube (5) to drive pulley (13) and lower LEFT flap gently. Retain bushing.
- e. Remove cable locks (12) securing control cables to drive pulley (13). Tag cables for reference on reinstallation.
- f. Remove bolt (11) attaching drive pulley (13) to wing structure.
- g. Using care, remove drive pulley through access opening, being careful not to drop bushing. Retain brass washer between drive pulley and wing structure for use on reinstallation. Tape open ends of drive pulley after removal to protect bearings.
- h. To remove left wing drive pulley, use this same procedure omitting step "d".
- i. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 7-16, safety turnbuckles and reinstall all items removed for access.

7-10. REPAIR. Repair is limited to replacement of bearings. Cracked, bent or excessively worn drive pulleys must be replaced. Lubricate bearings as outlined in Section 2.

7-11. FLAPS. (See figure 7-3.)

### 7-12. REMOVAL AND INSTALLATION.

- a. Run flaps to full DOWN position.
- b. Remove access plates (1) from top leading edge of flap.
- c. Disconnect push-pull rod (6) at flap bracket (7).
- d. Remove bolts (5) at each flap track. As flap is removed from wing, all washers, rollers and bushings will fall free. Retain these for reinstallation.
- e. Reverse the preceding steps for reinstallation. If push-pull rod (6) adjustment is not disturbed, rerigging of system should not be necessary. Check flap travel and rig in accordance with paragraph 7-16, if necessary.

#### NOTE

Bushings (4), rollers (3) and spacers (9) are first positioned through slots in flap tracks, then are secured to the flap roller supports (2) with attaching bolts, washers and nuts. Nylon plug buttons (11) prevent wing flap from chafing wing trailing edge.

Position spacers (9) and direction of bolts (5) as required to provide adequate flap clearance at wing root, flap well skin and aileron. Some lateral movement of flap is inherent due to the width of rollers. This movement should be considered when positioning spacers and direction of bolts.

7-13. REPAIR. Flap repair may be accomplished in accordance with instructions outlined in Section 17.

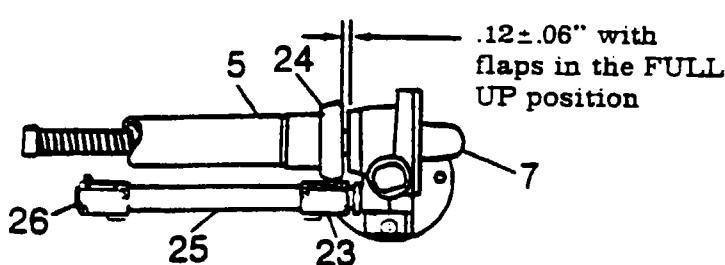
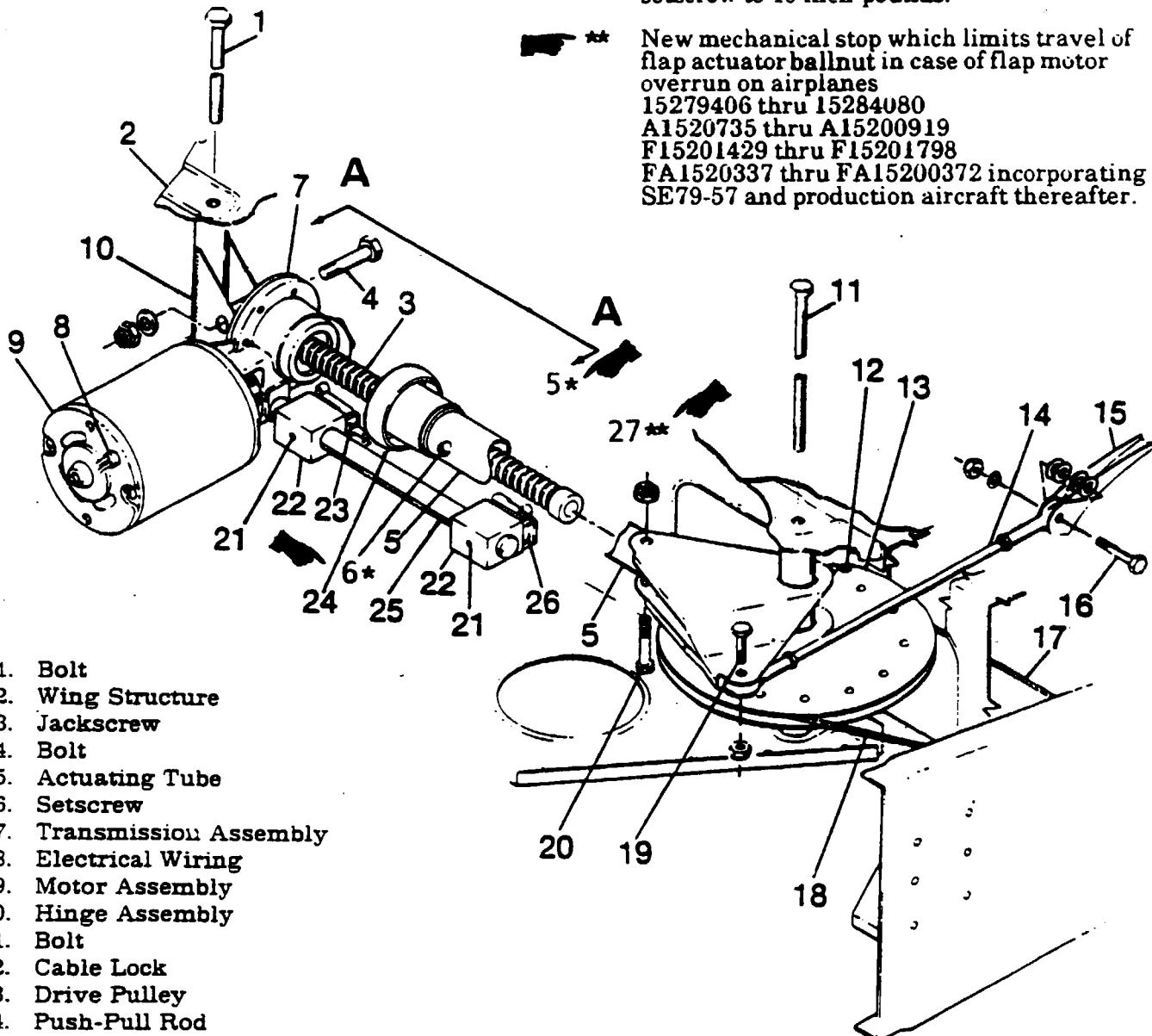
7-14. CABLES AND PULLEYS. (See figure 7-1.)

# MODEL 152 SERIES SERVICE MANUAL

## NOTES

\* Use Loctite grade CV adhesive on threads of setscrew (6) and collar (30) whenever actuating tube (5) is removed. Torque setscrew to 40 inch-pounds.

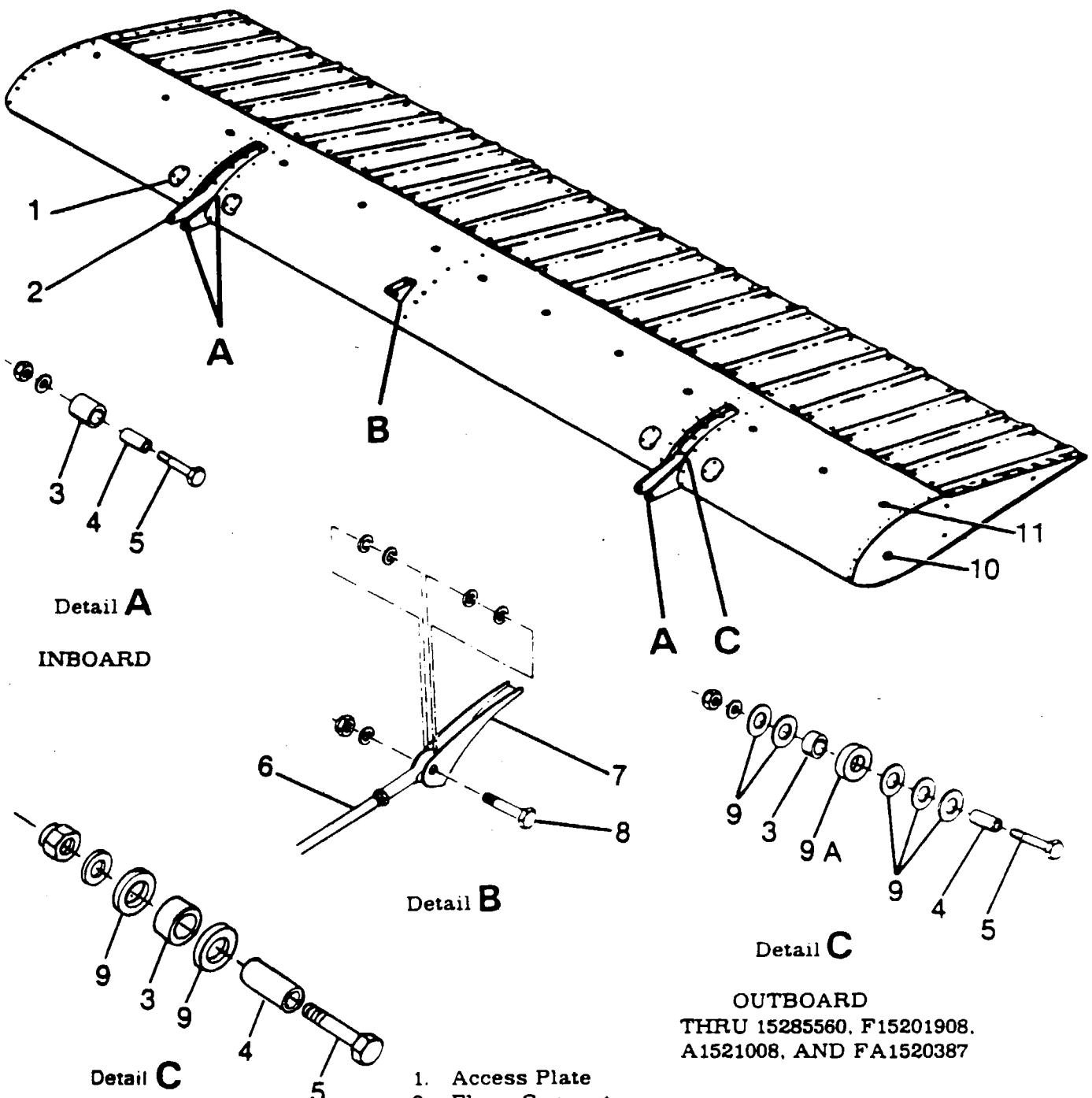
\*\* New mechanical stop which limits travel of flap actuator ballnut in case of flap motor overrun on airplanes  
15279406 thru 15284080  
A1520735 thru A15200919  
F15201429 thru F15201798  
FA1520337 thru FA15200372 incorporating SE79-57 and production aircraft thereafter.



VIEW A-A

Figure 7-2. Flap Motor and Transmission Installation

## MODEL 152 SERIES SERVICE MANUAL



BEGINNING WITH  
15285561, F15201909,  
A1521009, AND FA1520388

1. Access Plate
2. Flap Support
3. Roller Assembly
4. Bushing
5. Bolt
6. Push-Pull Rod
7. Flap Bracket
8. Bolt
9. Spacer
- 9A. Spacer
10. Plug Button
11. Nylon Plug Button

Figure 7-3. Flap Installation

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### 7-15. REMOVAL AND INSTALLATION.

- a. Remove access plates, fairings, headliner and upholstery as necessary for access.
- b. If the direct cables (2) are to be removed, disconnect clamp (index 19, figure 7-5) from bellcrank (index 15, figure 7-5).
- c. Remove safety wire, relieve cable tension, disconnect turnbuckles (4) and carefully lower LEFT flap.
- d. Disconnect cables at drive pulleys, remove cable guards and pulleys as necessary to work cables free of aircraft.

#### NOTE

To ease routing of cables, a length of wire may be attached to the end of cable being withdrawn from aircraft. Leave wire in place, routed through structure; then attach the cable being installed and use wire to pull cable into position.

- e. Reverse the preceding steps for reinstallation.
- f. After cables are routed in position, install pulleys and cable guards. Ensure cables are positioned in pulley grooves before installing guards.
- g. Rerig flap system in accordance with paragraph 7-16 and safety turnbuckles.
- h. Rerig follow-up system in accordance with paragraph 7-19 and reinstall all items removed in step "a".

### 7-16. RIGGING.

- a. (See figure 7-1.) Unzip or remove headliner as necessary for access to turnbuckles (4).
- b. With flaps in the full UP position, disconnect follow-up cable (index 1, figure 7-5) by loosening clamp bolt (14).
- c. (See figure 7-1.) Remove safety wire, relieve cable tension, disconnect turnbuckles (4) and carefully lower LEFT flap.
- d. (See figure 7-2.) Disconnect push-pull rods (14) at drive pulleys (13) in both wings and lower RIGHT flap gently.
- e. Disconnect actuating tube (5) from drive pulley (13).

#### NOTE

If control cables are not connected to left and right drive pulleys, actuating tube (5) and push-pull rods (14) must be disconnected before installing cables. If drive pulleys (13) are not installed, attach control cables before installing drive pulleys in the wings as illustrated in figure 7-4.

# MODEL 152 SERIES SERVICE MANUAL

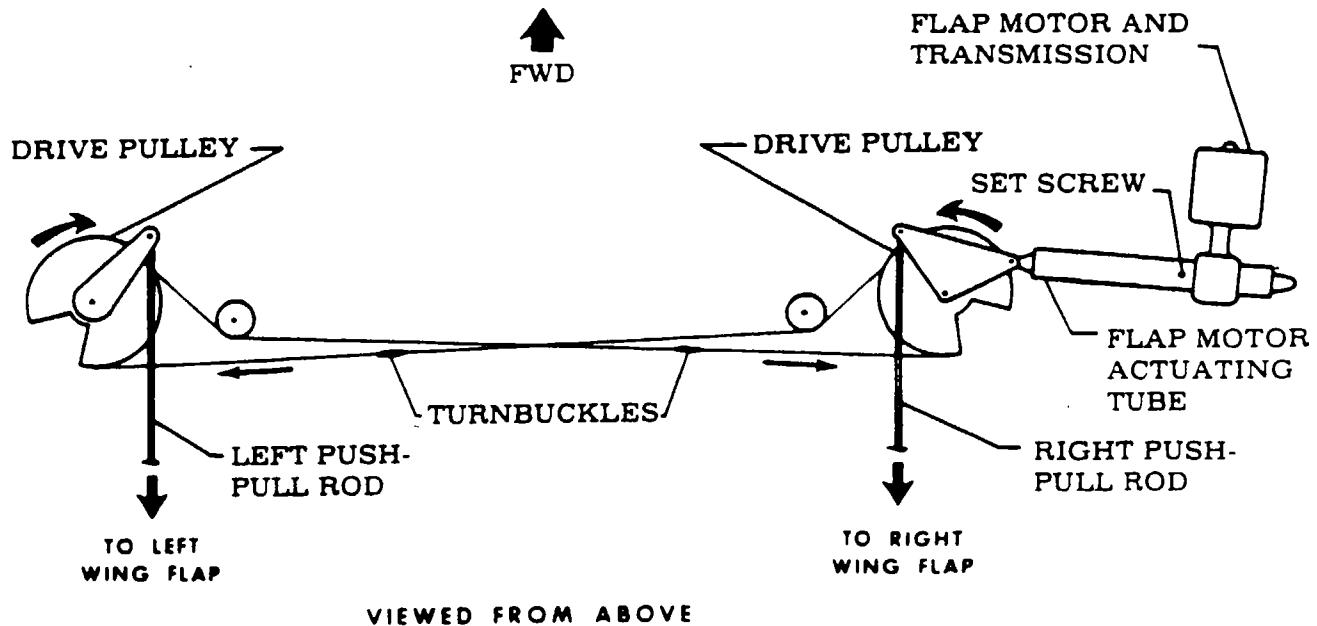


Figure 7-4. Flap System Schematic

- f. Adjust both push-pull rods (14) to  $8.83 \pm .12$  inches between centers of rod end bearings and tighten locknuts on both ends. Connect push-pull rods to flaps and drive pulleys.

#### NOTE

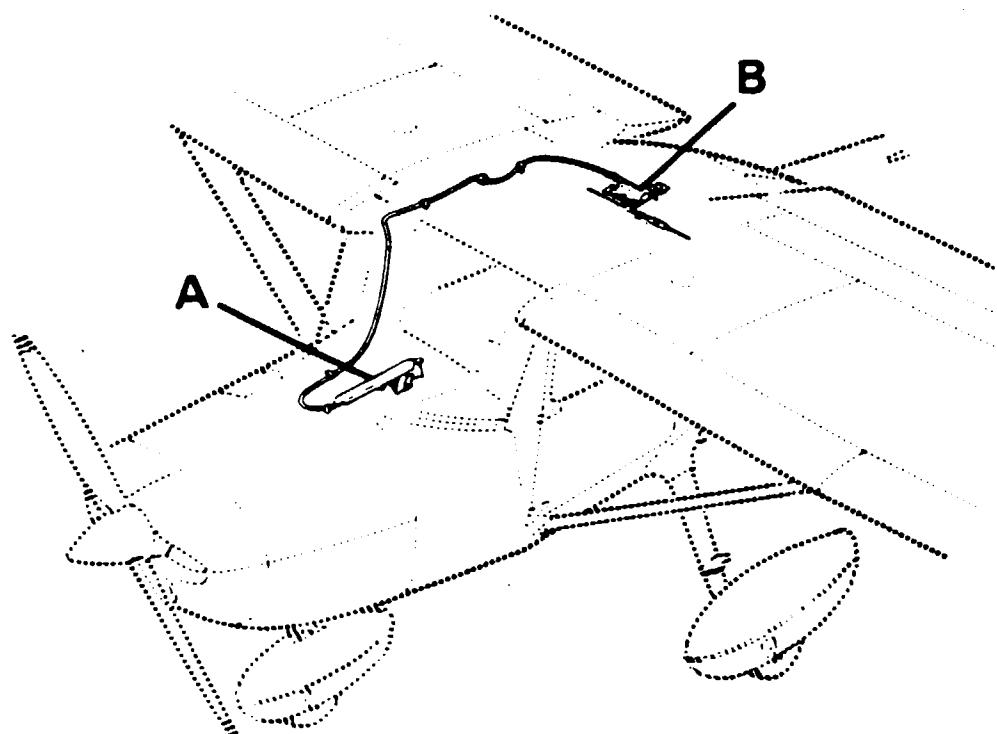
Temporarily connect cables at turnbuckles (index 4, figure 7-1) and test flaps by hand to ensure both flaps extend and retract together. If they will not, the cables are incorrectly attached to the drive pulleys. Ensure that the right drive pulley rotates clockwise, when viewed from below, as the flaps are extended. Tag cables for reference and disconnect turnbuckles again.

- g. (See figure 7-2.) Screw actuating tube (5) IN toward transmission (7) by hand to  $.12 \pm .05$  inches between switch actuating collar (24) and transmission as illustrated in VIEW A-A.
- h. Loosen setscrew (6) securing actuating tube (5) to switch actuating collar (24) and hold collar to maintain  $.12 \pm .05$  inch while holding RIGHT flap in the full UP position and adjust actuating tube (5) IN or OUT as necessary to align with attachment hole in drive pulley (13).
- i. Apply Loctite grade CV sealant (or equivalent) to threads of setscrew (6) and torque to 40 pound-inches

#### NOTE

If actuating tube (5) is too long to allow attachment to drive pulley after completion of step "h", proceed to step "j".

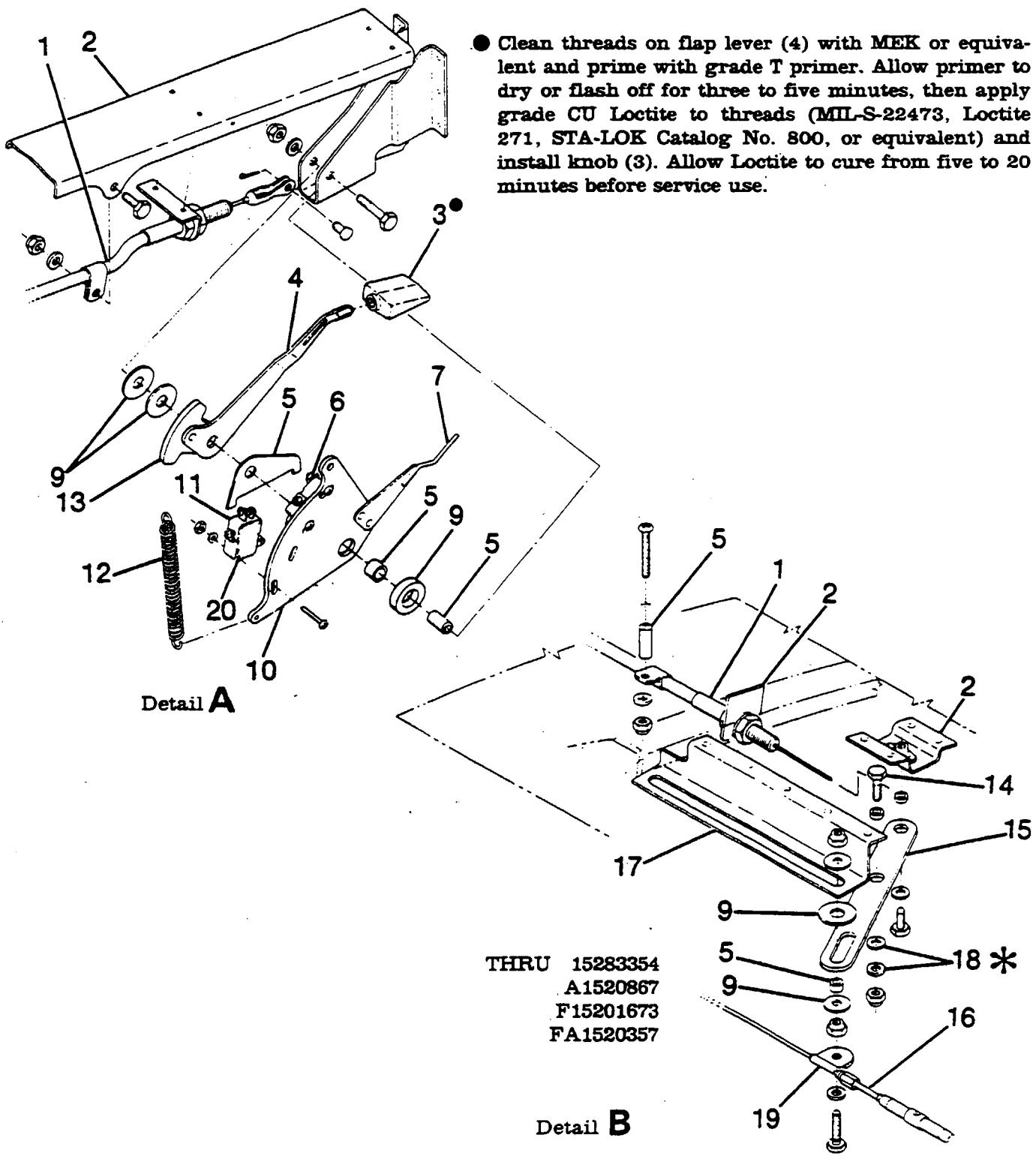
## MODEL 152 SERIES SERVICE MANUAL



1. Follow-Up Cable
2. Mounting Bracket
3. Knob
4. Flap Lever
5. Spacer
6. Flaps DOWN Operating Switch
7. Position Indicator
8. Bushing
9. Washer
10. Switch Mounting Arm
11. Flaps UP Operating Switch
12. Return Spring
13. Cam
14. Clamp Bolt
15. Bellcrank
16. Flap Cable
17. Guide
18. Clamp Bolt Washers
19. Clamp
20. Insulator

Figure 7-5. Flap Follow-Up and Indicating System (Sheet 1 of 3)

## MODEL 152 SERIES SERVICE MANUAL



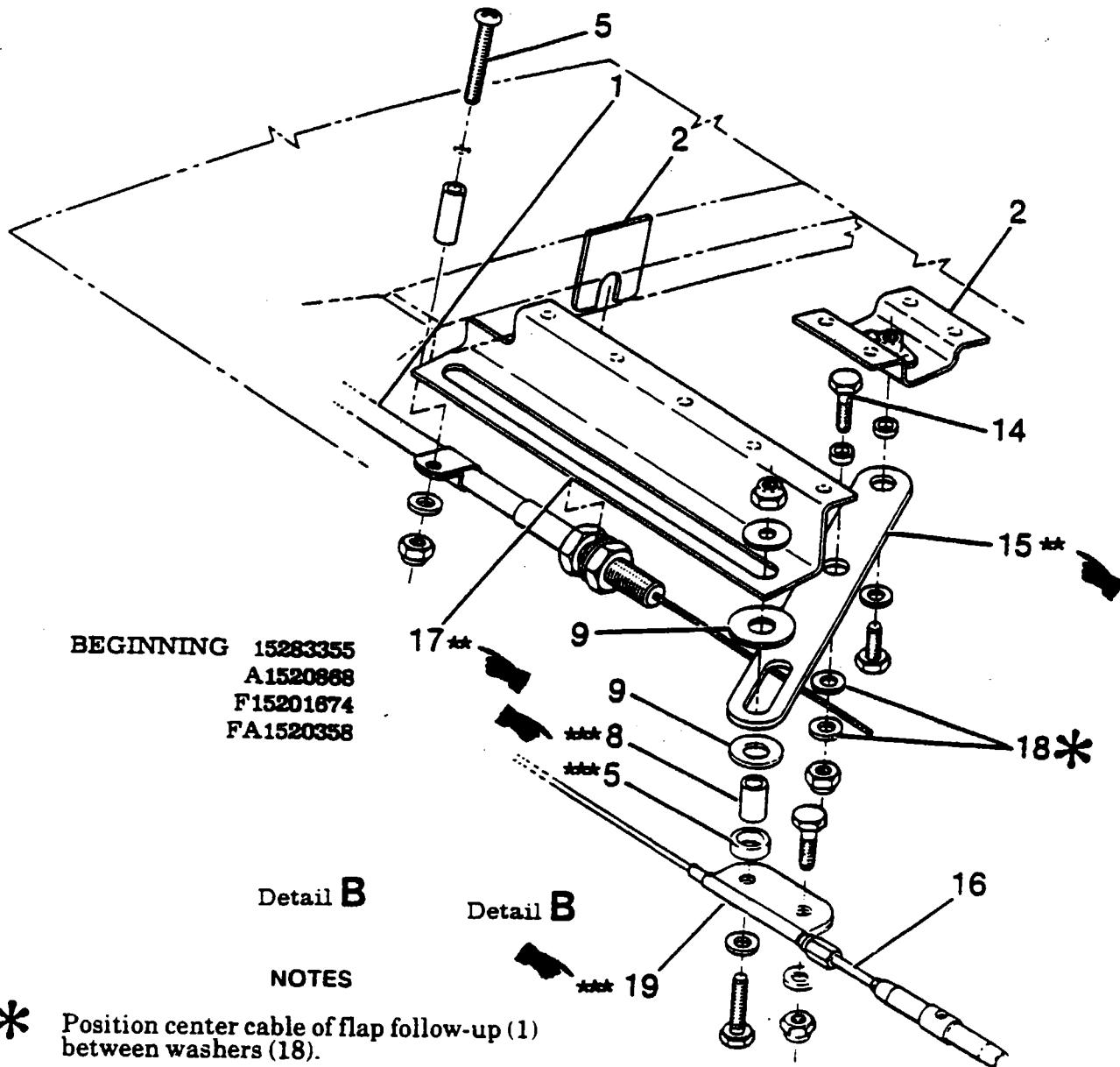
**\*** NOTE

Position center cable of flap follow-up (1) between washers (18).

Lubricate slots of guide (17) and bellcrank (15) with Lubri-Bond "A" or Lubri-Bond 220 (Electrofilm Inc.) North Hollywood, California or Perma-Silk (Everlube Corp.) North Hollywood, California.

Figure 7-5. Flap Follow-Up and Indicating System (Sheet 2 of 3)

## MODEL 152 SERIES SERVICE MANUAL



\* Position center cable of flap follow-up (1) between washers (18).

\*\* Lubricate slots of guide (17) and bellcrank (15) with Lubri-Bond "A" or Lubri-Bond 220 (Electrofilm Inc.), North Hollywood, California, or Perma-Silk (Everlube Corp.), North Hollywood, California.

\*\*\* Improved clamp installation on airplanes  
15279406 thru 15283354  
A1520735 thru A1520867  
F15201429 thru F15201683  
FA1520337 thru FA1520357  
incorporating SK172-60A and production aircraft thereafter.

Figure 7-5. Flap Follow-Up and Indicating System (Sheet 3 of 3)

## MODEL 152 SERIES SERVICE MANUAL

- j. Disconnect push-pull rod (14) at drive pulley (13) to allow connecting actuating tube (5) to drive pulley.
- k. Manually hold RIGHT flap in full UP position and readjust push-pull rod (14) to align with attachment hole in drive pulley. Connect push-pull rod and tighten locknuts.

### NOTE

The right flap and actuator must be correctly rigged before cables and left flap can be rigged.

- l. With flaps in full UP position, loosen setscrews (21) and slide up limit switch adjustment block (22) on support (25) to just activate switch and shut off electrical power to motor at this position. Tighten setscrew.
- m. Manually hold LEFT flap full UP and connect control cables at turnbuckles (index 4, figure 7-1). Remove reference tags previously installed in step "f".
- n. With flaps full UP, adjust turnbuckles to obtain  $30 \pm 10$  pounds tension on cables. Adjust retract cable (18) first.

### NOTE

Ensure cables are positioned in pulley grooves and cable ends are positioned correctly at drive pulleys before tightening turnbuckles.

- o. Disconnect push-pull rod at left drive pulley. Run motor to extend flaps approximately  $20^\circ$  and check tension on each flap cable. If necessary, readjust turnbuckles to maintain  $30 \pm 10$  pounds tension on each cable and safety turnbuckles.
- p. Fully retract right flap. Manually hold left flap in full UP position and readjust push-pull rod to align with attaching hole in drive pulley. Connect push pull rod and tighten locknuts.

### NOTE

An inclinometer for measuring control surface travel is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. See figure 6-4.

- q. Mount an inclinometer on RIGHT flap and adjust to  $0^\circ$ .
- r. Run flaps to full DOWN position and adjust DOWN limit switch (26) to stop motor and flap at degree of travel specified in figure 1-1. Repeat check on LEFT flap. Recheck limit switch through several flap cycles.

### NOTE

All flap rollers may not bottom in the flap tracks at the travel extremes.

- s. Reconnect and rerig the flap follow-up system in accordance with paragraph 7-20. Perform an operational check in accordance with paragraph 7-3, recheck all items for proper safetying and replace items removed for access.

## MODEL 152 SERIES SERVICE MANUAL

- 7-17. FLAP FOLLOW-UP AND INDICATING SYSTEM. (See figure 7-5.)
- 7-18. DESCRIPTION. The flap follow-up and indicating system consists of a sheathed cable assembly one end of which is attached to the flap operating switch mounting arm and 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 along a scale as the flaps are extended or retracted.
- 7-19. REMOVAL AND INSTALLATION. Figure 7-5 can be used as a guide to removal and installation of the flap follow-up and indicating system.
- 7-20. RIGGING. (See figure 7-5.)
- a. Flap control system must be rigged in accordance with paragraph 7-16 before flap follow-up control can be rigged.
  - b. Disconnect spring (12) from switch mounting arm (10).
  - c. With flaps in full UP position, pull center cable of flap follow-up control (1) detail B, figure 7-5) to remove slack.
  - d. Ensure flap lever (4) is in full UP position while indicator (7) has a .03 - .06 inch clearance with top of instrument panel cut-out. Secure follow-up cable to bellcrank (15) with clamp bolt (14) while observing note in figure 7-5..
  - e. Connect spring (12) to switch mounting arm (10).
  - f. Adjust switches (6) and (11) in slotted holes on mounting arm (10) until cam (13) is centered between switch rollers.
  - g. Mount an inclinometer on one flap and set to 0° (flaps full UP). Turn master switch ON and move flap lever (4) to 10° flap position.

### NOTE

An inclinometer for measuring control surface travel is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. See figure 6-4.

- h. Observe inclinometer reading when flaps stop. Adjust flaps DOWN operating switch (6) in slotted holes on mounting arm (10) as required to obtain flap travel of 10±2.
- i. Adjust flaps UP operating switch (11) in slotted holes to obtain positive clearance with cam (13) when flaps DOWN operating switch has just opened in the 10° position.
- j. Repeat steps "h" and "i" for 20° flap position.
- k. Run flaps to full DOWN position and check that flaps DOWN operating switch (6) remains closed as flap motor limit switch (index 26, figure 7-2) stops flaps at full DOWN position.
- l. Check flaps through several cycles. recheck all items removed for security and replace items removed for access.

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 8

### ELEVATOR CONTROL SYSTEM

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Cables and Pulleys .....	1I4/8-7
Removal/Installation .....	1I4/8-7
Rigging .....	1I4/8-7

#### 8-1. ELEVATOR CONTROL SYSTEM.

8-2. DESCRIPTION. The elevators are operated by power transmitted from the control wheels through a series of cables, bellcranks and a push-pull tube. The rear bellcrank serves as an interconnect between the elevators and a bearing point for the travel stop bolts. An elevator trim tab is installed on the right elevator and is described in Section 9.

#### 8-3. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart, it may be necessary to rerig system. Refer to paragraph 8-14.

TROUBLE	PROBABLE CAUSE	REMEDY
NO RESPONSE TO CONTROL WHEEL FORE-AND-AFT MOVEMENT.	Forward or aft end of push-pull tube disconnected. Cables disconnected.	Attach push-pull tube correctly. Attach cables and rig system in accordance with paragraph 8-14.

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### 8-3. TROUBLE SHOOTING (CONT.).

TROUBLE	PROBABLE CAUSE	REMEDY
BINDING OR JUMPY MOTION FELT IN MOVE- MENT OF ELEVATOR SYSTEM.	Defective forward or rear bellcrank pivot bearing.	Replace bellcrank
	Cables slack.	Adjust to tension specified in figure 8-1.
	Cables not riding correctly on pulleys.	Route cables correctly over pulleys.
	Nylon grommet on instru- ment panel binding.	Replace grommet.
	Defective control "y" pivot bearing.	Replace bearing.
	Defective elevator hinges or lubrication needed.	Replace defective hinges. Lubricate per Section 2.
	Clevis bolts too tight.	Readjust to eliminate bolt binding.
	Lubrication needed.	Lubricate piano hinges.
	Defective pulleys or cable guards.	Replace defective parts and install guards properly.
ELEVATORS FAIL TO AT- TAIN PRESCRIBED TRAVEL.	Stops incorrectly set.	Rig system in accordance with paragraph 8-14.
	Cables tightened unevenly.	Rig system in accordance with paragraph 8-14.
	Interference at firewall or instrument panel.	Rig system in accordance with paragraph 8-14.

### 8-4. ELEVATORS. (See figure 8-2.)

### 8-5. REMOVAL AND INSTALLATION.

#### NOTE

This procedure is written primarily for the right elevator  
since the trim tab is attached to this elevator.

- a. Disconnect trim tab push-pull tube (2) at tab actuator.
- b. Remove bolts (8) securing elevators to bellcrank (7).

## MODEL 152 SERIES SERVICE MANUAL

### NOTE

If trim system is not moved and actuator screw is not turned, rigging of trim system should not be necessary after reinstallation of elevator.

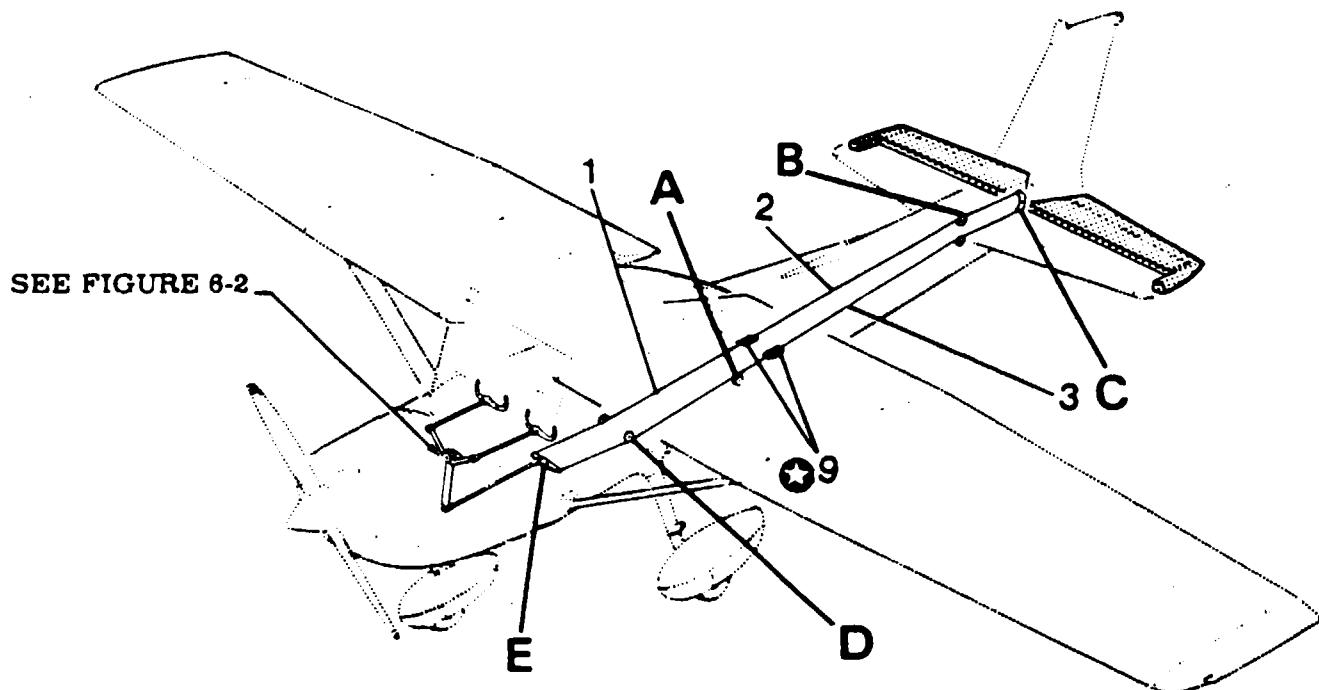
- c. Remove bolts (10) from elevator hinges.
  - d. Using care, remove elevator.
  - e. To remove left elevator use same procedure, omitting step "a".
  - f. Reverse the preceding steps for installation. Rig system in accordance with applicable paragraph in this section if necessary.
- 8-6. REPAIR. Repair may be accomplished as outlined in Section 17. Hinge bearings may be replaced as necessary. If repair has affected static balance, check and rebalance as required.
- 8-7. BELLCRANKS.
- 8-8. FORWARD. (See figure 8-1.)
- 8-9. REMOVAL AND INSTALLATION.
  - a. Remove seats, upholstery and access plates as necessary.
  - b. Relieve tension at turnbuckles (9) and disconnect cables from bellcrank (16).
  - c. Disconnect push-pull tube (12) from bellcrank.
  - d. Remove pivot bolt (15) and remove bellcrank.
  - e. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety turnbuckles and reinstall all items removed in step "a".
- 8-10. REAR. (See figure 8-2.)
- 8-11. REMOVAL AND INSTALLATION.
  - a. Remove rudder. (Refer to Section 10.)
  - b. Remove seats, upholstery and access plates as necessary for access to turnbuckles (index 10, figure 8-1).
  - c. Relieve cable tension at turnbuckles and disconnect cables from rear bellcrank (7).
  - d. Remove bolts (8) securing elevators to bellcrank.
  - e. Remove bellcrank pivot bolt and slide bellcrank from between tube assemblies (6).

### NOTE

It may be necessary to remove one of the attaching bolts (10) for clearance when removing the bellcrank pivot bolt.

- f. Reverse preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety turnbuckles and reinstall all items removed in step "b".

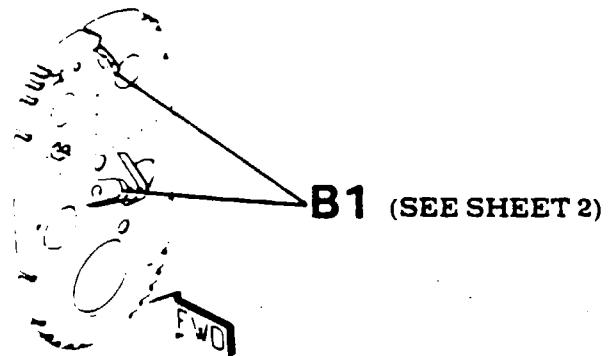
# MODEL 152 SERIES SERVICE MANUAL



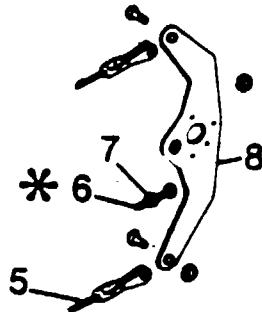
**A1** (SEE SHEET 2)



Detail A



Detail B



Detail C

\* The travel-stop bolts (6) are safetied.

● BEGINNING WITH

15281427

A1520786

F15201539

FA1520353

**CAUTION**

**MAINTAIN SPECIFIED CONTROL  
CABLE TENSION.**

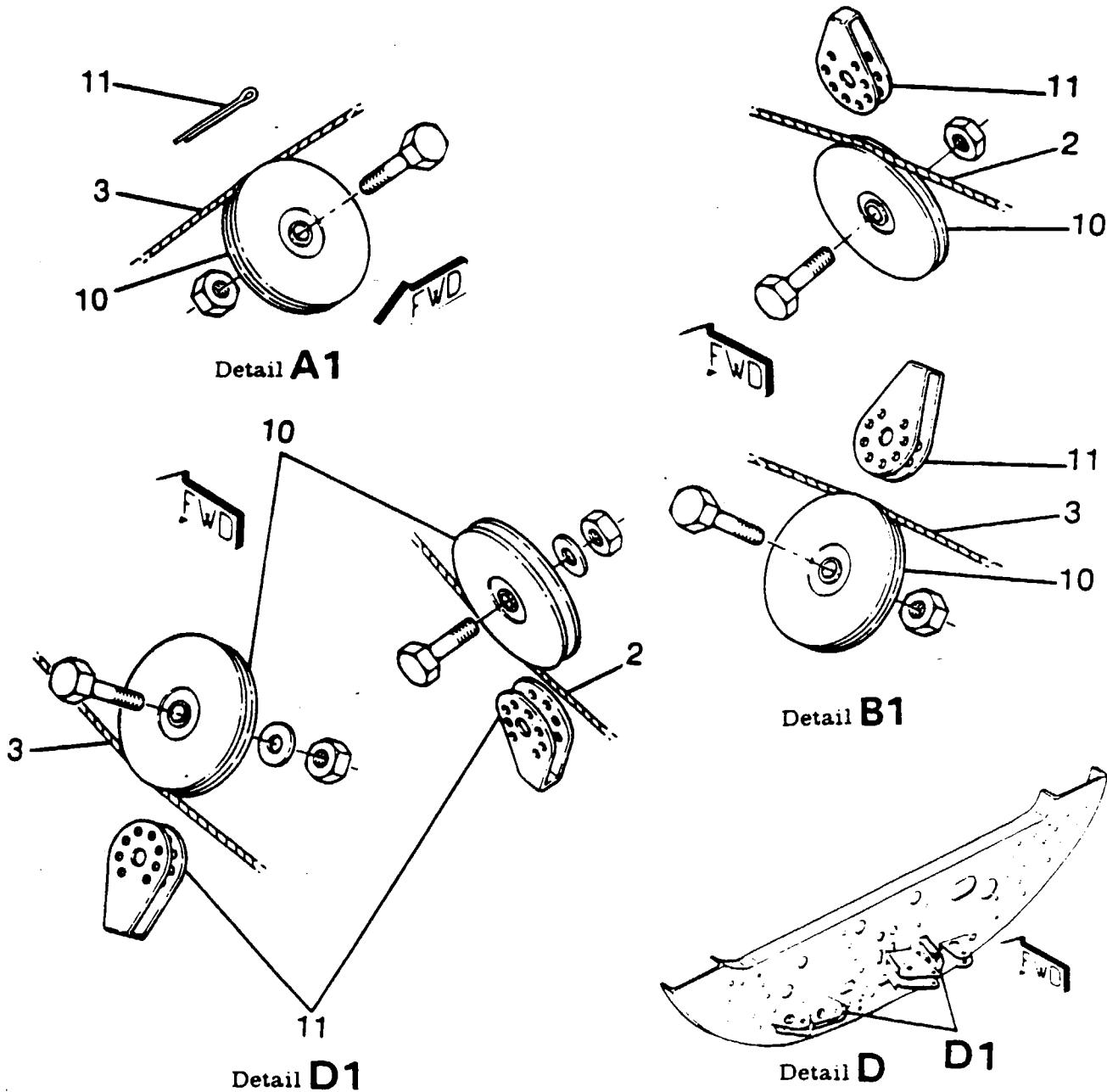
**CABLE TENSION:**

30 LBS ± 10 LBS (AT AVERAGE TEMPERATURE FOR THE AREA.)

SEE FIGURE 1-1 FOR TRAVEL.

Figure 8-1. Elevator Control System (Sheet 1 of 3)

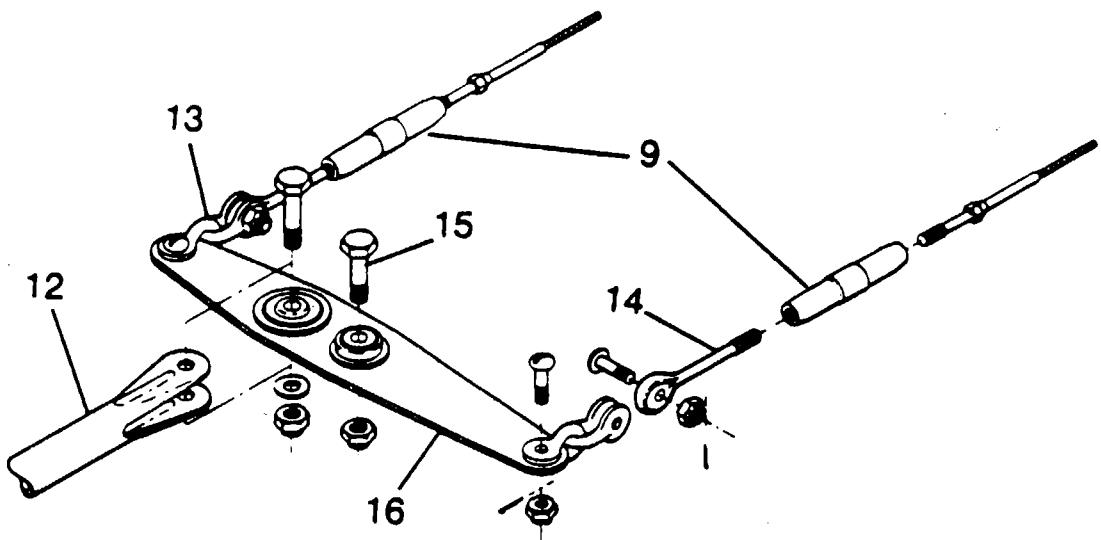
**MODEL 152 SERIES SERVICE MANUAL**



- 2. Up Cable
- 3. Down Cable
- 10. Pulley
- 11. Cable Guard

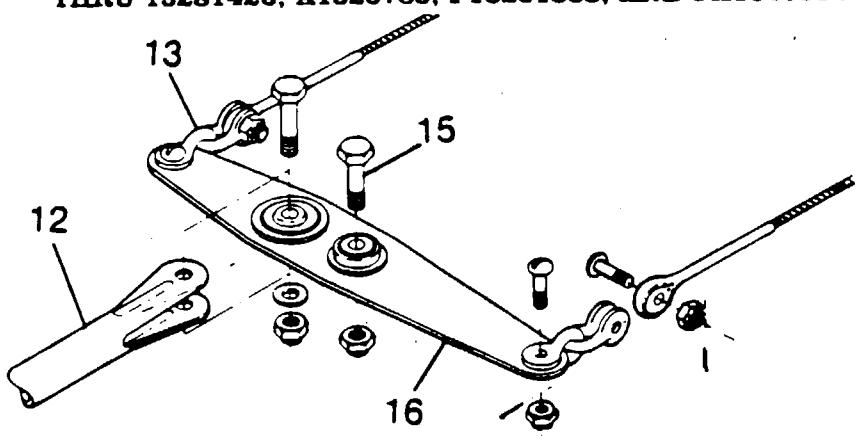
Figure 8-1. Elevator Control System (Sheet 2 of 3)

**MODEL 152 SERIES SERVICE MANUAL**



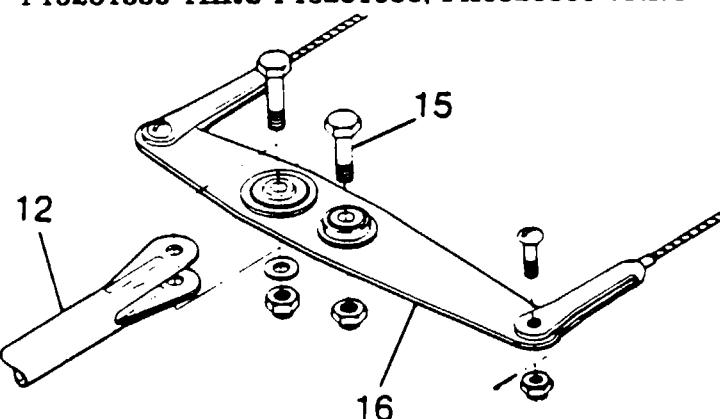
**Detail E**

THRU 15281428, A1520785, F15201538, AND FA1520352



**Detail E**

15281427 THRU 15285398, A1520786 THRU A1521000  
F15201539 THRU F15201936, FA1520353 THRU FA1520387



- 9. Turnbuckle
- 12. Push-Pull Tube
- 13. Shackle
- 14. Turnbuckle Eye
- 15. Bolt
- 16. Forward Bellcrank

**Detail E**

BEGINNING WITH 15285397, A1521001, F15201937, AND FA1520388

**Figure 8-1. Elevator Control System (Sheet 3 of 3)**

## MODEL 152 SERIES SERVICE MANUAL

### 8-12. CABLES AND PULLEYS. (See figure 8-1.)

### 8-13. REMOVAL AND INSTALLATION.

- a. Remove seats, upholstery, and access plates as necessary.
- b. Relieve cable tension at turnbuckles (9).
- c. Disconnect cables at forward bellcrank.
- d. Disconnect cables at rear bellcrank (8).
- e. Remove fairleads, cable guards, and pulleys as necessary to work cables free of aircraft.

#### NOTE

To ease routing of cables, a length of wire may be attached to end of cable before being withdrawn from aircraft. Leave wire in place, routed through structure, attach cable being installed and pull cable into position.

- f. After cable is routed in position, install pulleys and cable guards. Ensure cable is positioned in pulley groove before installing guards.
- g. Rig system in accordance with applicable paragraph in this section, safety turnbuckles and reinstall all items removed in step "a".

### 8-14. RIGGING. (See figure 8-1.)

- a. Remove seats, upholstery and access plates as required to gain access to turnbuckles (9).
- b. Lock control column in neutral position by installing neutral position rigging tool (index 2, figure 8-3).
- c. Streamline elevators to neutral with horizontal stabilizer.
- d. Holding elevators in neutral (streamlined) position, adjust cable tension to  $30 \pm 10$  pounds by tightening turnbuckles.
- e. With elevators still in neutral position, mount an inclinometer on one elevator and set to  $0^\circ$ .

#### NOTE

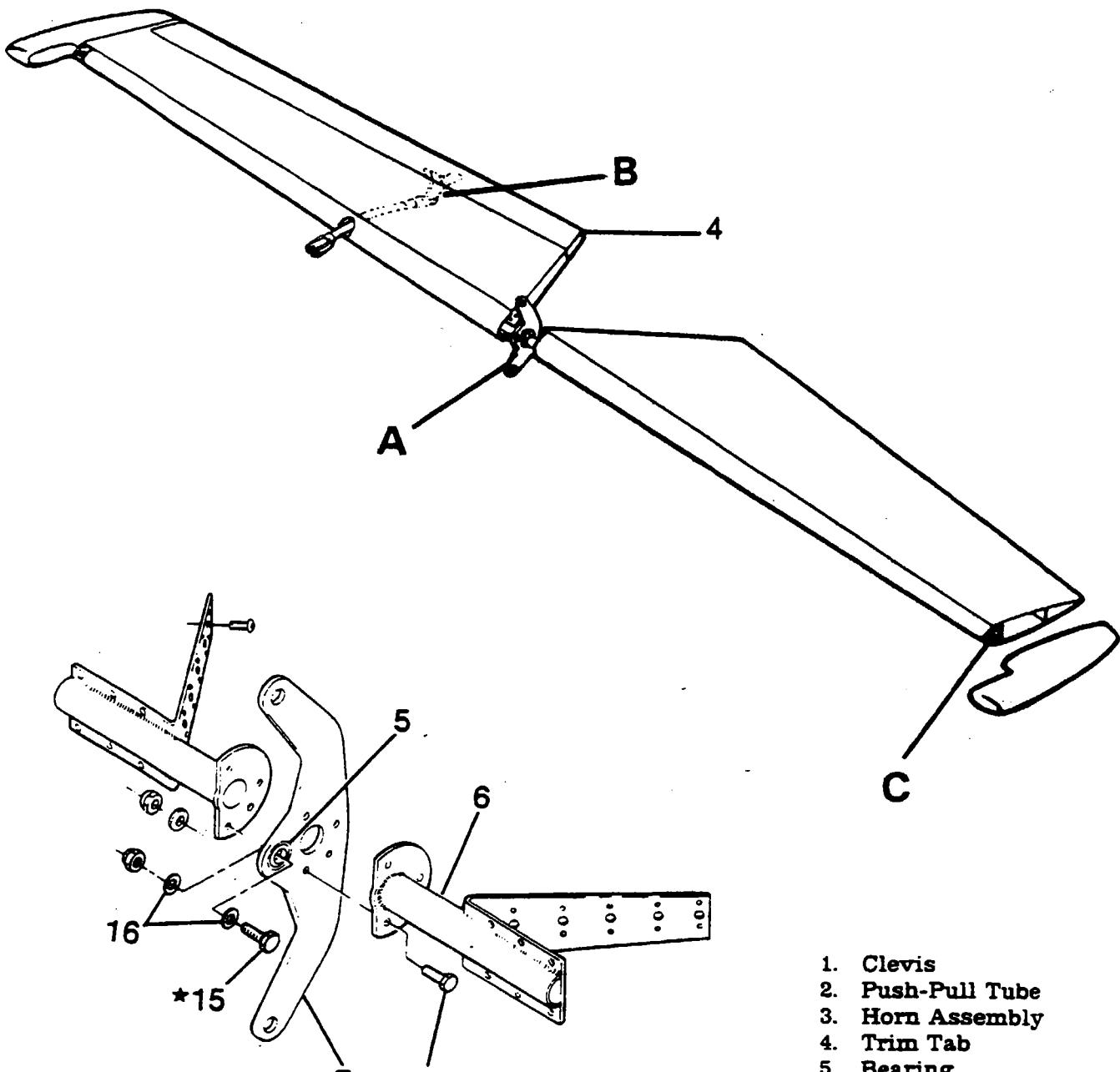
An inclinometer for measuring control surface travel is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. See figure 6-4.

- f. Remove control column neutral position rigging tool and adjust travel stop bolts (6) so elevators attain degree of travel specified in figure 1-1. Ensure control "Y" does not contact firewall in full DOWN position or instrument panel in full UP position.
- g. Check all components for security, safety turnbuckles and reinstall all items removed for access.

#### WARNING

Make sure elevators move in correct direction when operated by control column.

## MODEL 152 SERIES SERVICE MANUAL



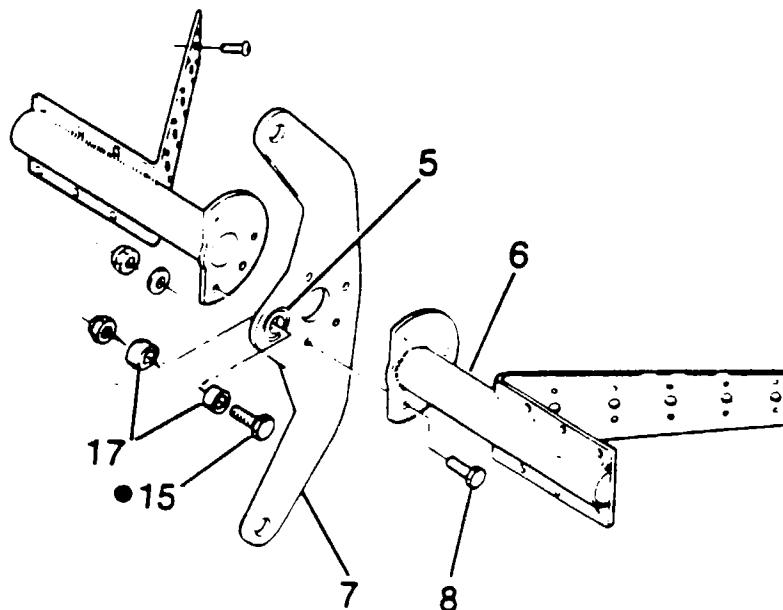
**Detail A**

\* 15284651 THRU 15285834, A1520956 THRU A1521025,  
F15201891, 1892, 1894 THRU F15201943 AND  
FA1520378 THRU FA1520387, TORQUE BOLT 100-140  
LB-IN. EXCEPT WHEN THE BELLCRANK AND  
WASHERS HAVE BEEN REPLACED WITH THE  
0432012-4 BELLCRANK AND 0432013-1 BUSHINGS (See  
sheet 2 of 3).

1. Clevis
2. Push-Pull Tube
3. Horn Assembly
4. Trim Tab
5. Bearing
6. Tube Assembly
7. Bellcrank
8. Bolt
9. Spacer
10. Bolt
11. Bushing
12. Cotter Pin
13. Castellated Nut
14. Channel
15. Bolt
16. Washers
17. Bushings

**Figure 8-2. Elevator Installation (Sheet 1 of 3)**

## MODEL 152 SERIES SERVICE MANUAL

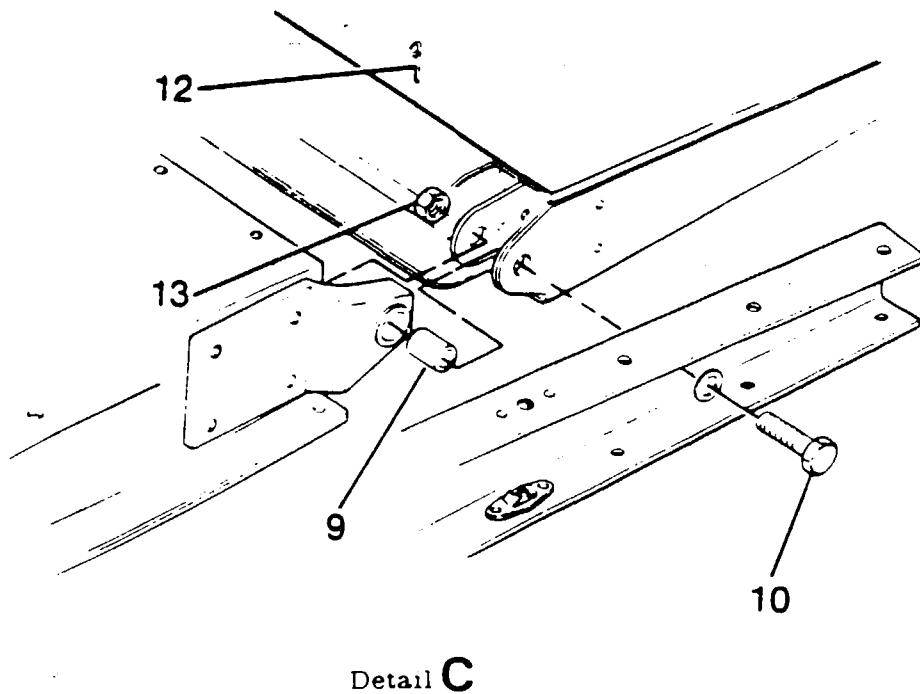
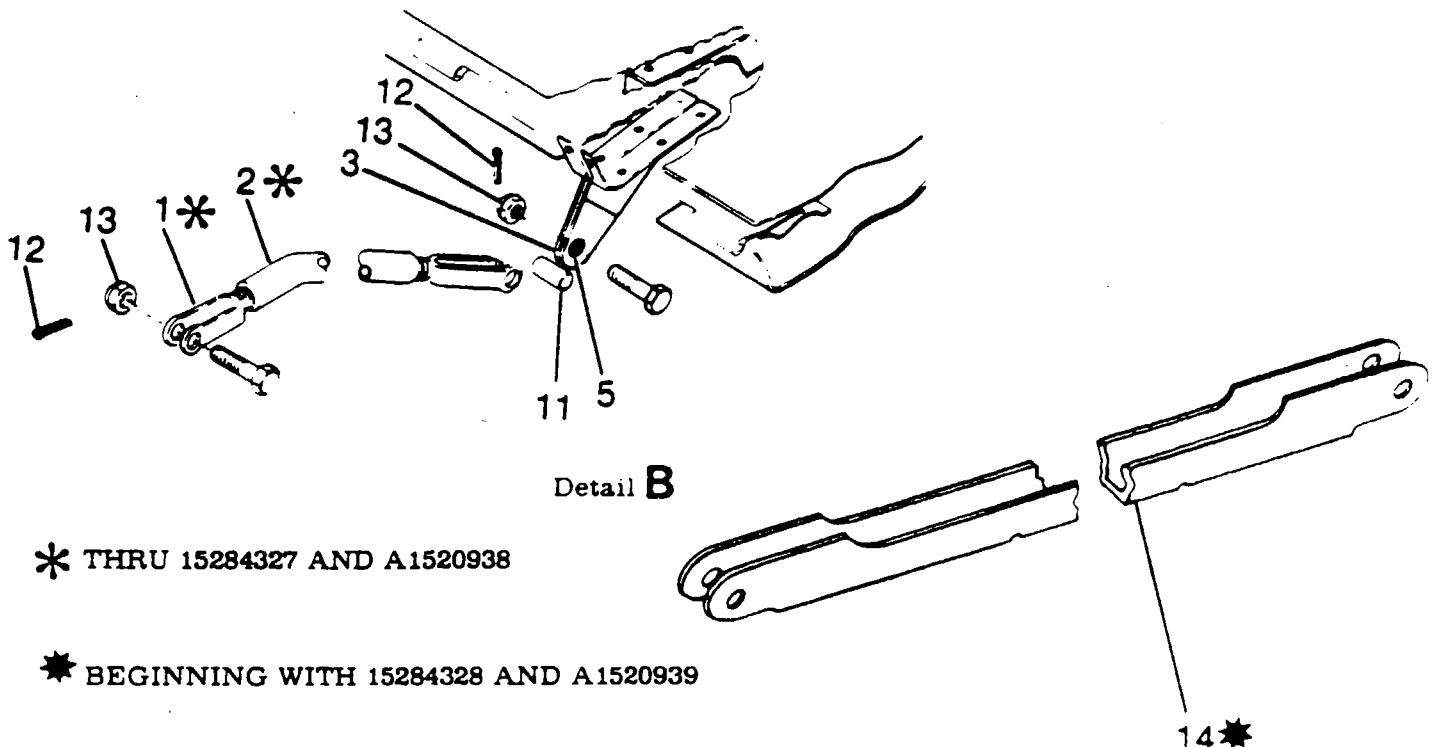


Detail A

- BEGINNING WITH 15285835, A1521025, F15201944 AND FA1520388, TORQUE BOLTS 20-25 LB-IN. AFTER BUSHINGS ARE INSTALLED AND BOLT TORQUED, APPLY LOCTITE 290 TO BUSHINGS AND FORGING JOINT. THIS ALSO APPLIES TO 15284651 THRU 15285834, A1520956 THRU A1521025, F15201891, 1892, 1894 THRU F15201943, AND FA1520378 THRU FA1520387 WHEN THE 0432012-4 BELLCRANK AND 0432013-1 BUSHINGS HAVE BEEN INSTALLED.

Figure 8-2. Elevator Installation (Sheet 2 of 3)

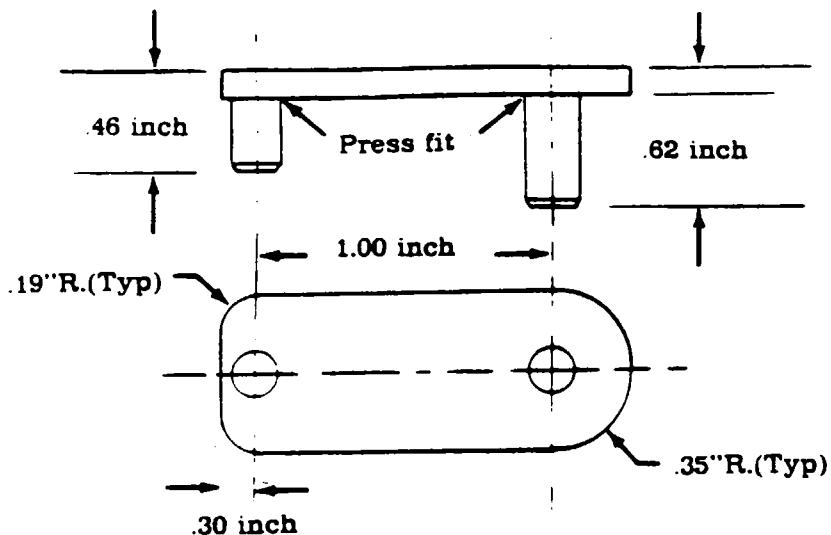
**MODEL 152 SERIES SERVICE MANUAL**



Detail C

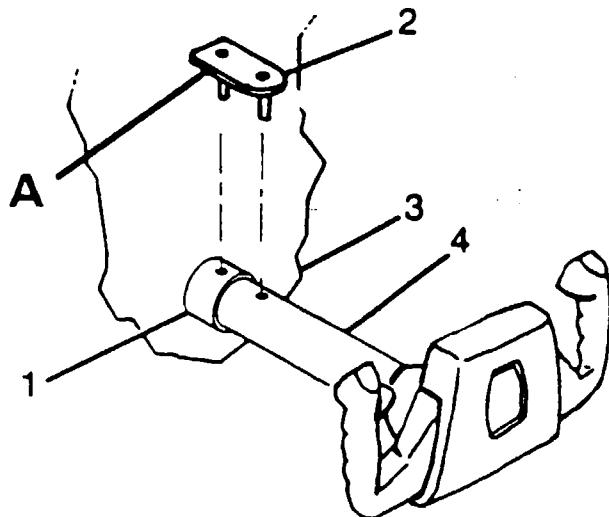
Figure 8-2. Elevator Installation (Sheet 3 of 3)

## MODEL 152 SERIES SERVICE MANUAL



**Detail A**

Fabricate from .125 inch steel plate and .209 inch dia. drill rod according to dimensions shown.



1. Support
2. Neutral Rigging Tool
3. Instrument Panel
4. Pilot's Control Column

Figure 8-3. Control Column Neutral Position Rigging Tool

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 9

### ELEVATOR TRIM TAB CONTROL SYSTEM

TABLE OF CONTENTS	Page No. Aerofiche/ Manual
<b>ELEVATOR TRIM CONTROL SYSTEM</b> .....	II13/9-1
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Trouble Shooting .....	II13/9-1
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Removal/Installation .....	II14/9-2
Tab Actuator .....	II14/9-2
Removal/Installation .....	II14/9-2
Disassembly .....	II15/9-3
Cleaning, Inspection, and Repair .....	II15/9-3
Reassembly .....	II20/9-8
Operational Check .....	II20/9-8
Trim Tab Free-Play Inspection .....	II22/9-10
Trim Tab Control Wheel .....	II23/9-11
Removal/Installation .....	II23/9-11
Rigging .....	II23/9-11

#### 9-1. ELEVATOR TRIM CONTROL SYSTEM.

9-2. **DESCRIPTION.** The elevator trim tab, located on the right elevator, is controlled by a trim wheel mounted in the lower instrument panel. Power to operate the tab is transmitted from the trim control wheel by means of chains, cables and an actuator. A mechanical pointer, adjacent to the trim wheel, indicates tab position. A "nose-up" setting results in a tab-down position.

#### 9-3. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart, it may be necessary to rerig system. Refer to paragraph 9-16.

TROUBLE	PROBABLE CAUSE	REMEDY
TRIM CONTROL WHEEL MOVES WITH EXCESSIVE RESISTANCE.	Cable tension too high.	Adjust tension.
	Pulleys binding or rubbing.	Repair or replace as necessary.
	Cables not in place on pulleys.	Install cables correctly.
	Trim tab hinge binding.	Lubricate or replace hinge as necessary.
	Defective trim tab actuator.	Replace actuator.
	Rusty chain.	Replace rusty chain.
	Damaged sprocket.	Replace damaged sprockets.
	Bent sprocket shaft.	Replace bent sprocket shafts.

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### 9-3. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
LOST MOTION BETWEEN CONTROL WHEEL AND TRIM TAB.	Cable tension too low.	Adjust tension.
	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.

### 9-4. TRIM TAB.

### 9-5. REMOVAL AND INSTALLATION.

- Disconnect push-pull tube from horn assembly.
- Drill out rivets attaching hinge to elevator.

#### NOTE

After tab has been removed and if hinge pin is to be removed, it is necessary to spread the crimped ends of the hinge before driving out pin. When a pin has been installed, crimp ends of hinge to prevent pin from working out.

- Reverse the preceding steps for installation.

### 9-6. TRIM TAB ACTUATOR.

### 9-7. REMOVAL AND INSTALLATION. (See figure 9-1.)

#### CAUTION

Position a support stand under the tail tie-down ring to prevent tailcone from dropping while working inside.

- Remove baggage compartment aft wall for access.
- Remove safety wire and relieve cable tension at turnbuckle (15).
- Disconnect push-pull tube (12) at actuator (9).
- Remove access plate from underside of right hand stabilizer beneath actuator.
- Remove chain guard (8) and disengage chain (8A) from actuator sprocket.

## MODEL 152 SERIES SERVICE MANUAL

- f. Remove screws (8B) and spacers (10) attaching clamps to stabilizer structure (11) and carefully work actuator out through access opening.
- g. Reverse the preceding steps for reinstallation. Rig system in accordance with paragraph 9-16. safety turnbuckle (15) and reinstall all items removed for access.

### 9-8. DISASSEMBLY. (See figure 9-2.)

- a. Remove actuator in accordance with paragraph 9-7.
- b. Disassemble actuator assembly (1) as illustrated in Detail A as follows:
  1. Remove chain guard (3) if not previously removed in step "e." of paragraph 9-7.
  2. Using suitable punch and hammer, remove groove-pins (8) securing sprocket (5) to screw (9) and remove sprocket from screw.
  3. Unscrew threaded rod end (15) and remove rod end from actuator.
  4. Remove groove-pins (10) securing bearings (6 and 14) at the housing ends.
  5. Lightly tap screw (9) toward the sprocket end of housing, remove bearing (6), and collar (7).
  6. Lightly tap screw (9) in the opposite direction from sprocket end, remove bearing (14), O-ring (13), and collar (7).
  7. It is not necessary to remove retaining rings (11).

### 9-9. CLEANING, INSPECTION AND REPAIR. (See figure 9-2.)

- a. DO NOT remove bearing (16) from threaded rod end (15) unless replacement of bearing is necessary.
- b. Clean all component parts, except bearing (16), by washing in Stoddard solvent or equivalent. Do not clean sealed bearing (16).
- c. Inspect all component parts for obvious indications of damage such as stripped threads, cracks, deep nicks and dents.
- d. Check bearings (6 and 14), screw (9), and threaded rod end (15) for excessive wear and scoring.

Dimensions of the parts are as follows:

BEARING (6)	
INSIDE DIAMETER	0.373" MIN.
INSIDE DIAMETER	0.380" MAX.

BEARING (14)	
INSIDE DIAMETER	
SMALL HOLE	0.248" MIN.
SMALL HOLE	0.253" MAX.
LARGE HOLE	0.373" MIN.
LARGE HOLE	0.380" MAX.

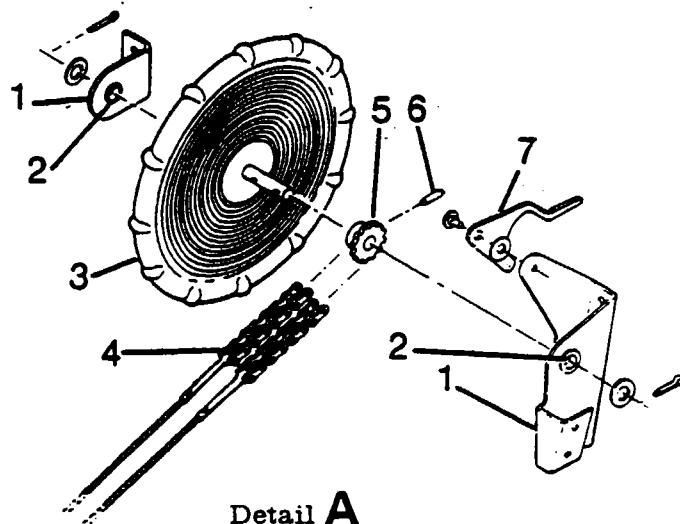
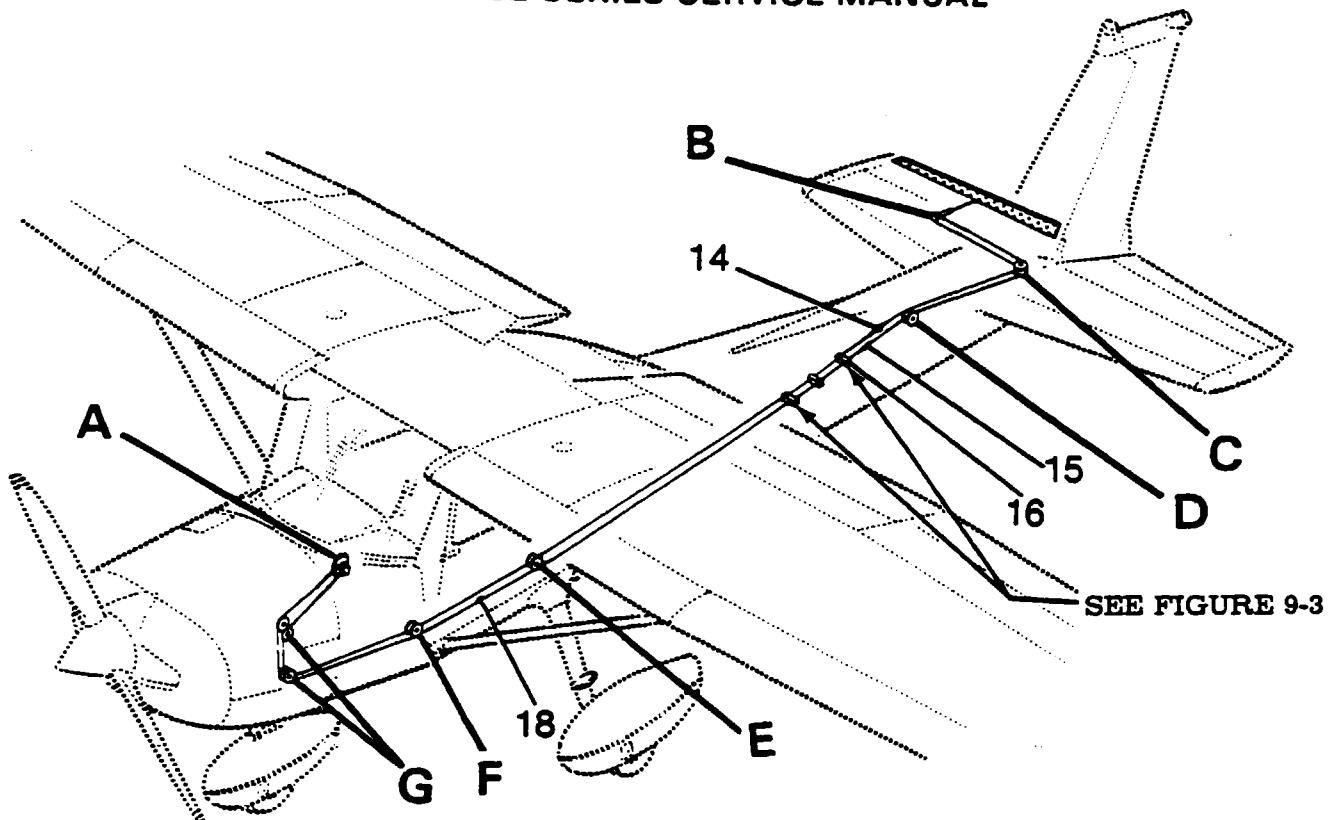
THREADED ROD END (15)	
OUTSIDE DIAMETER	
(SHANK)	0.242" MIN.
(SHANK)	0.246" MAX.

SCREW (9)	
OUTSIDE DIAMETER	0.367" MIN.
OUTSIDE DIAMETER	0.370" MAX.

### NOTE

Relative linear movement between internal threaded screw (9) and bearing (14) should be 0.004 to 0.010 inch at room temperature.

# MODEL 152 SERIES SERVICE MANUAL



Detail A

- |                |                             |
|----------------|-----------------------------|
| 1. Bracket     | 10. Spacer                  |
| 2. Bearing     | 11. Stabilizer Structure    |
| 3. Trim Wheel  | 12. Push-Pull Tube          |
| 4. Chain       | 13. Pulley (Tab Up)         |
| 5. Sprocket    | 13A. Pulley (Tab Down)      |
| 6. Roll Pin    | 14. Clevis                  |
| 7. Indicator   | 15. Turnbuckle              |
| 8. Chain Guard | 16. Elevator Tab Stop Block |
| 8A. Chain      | 17. Cable Guard             |
| 8B. Screw      | 18. Fairlead                |
| 9. Actuator    | 19. Channel                 |

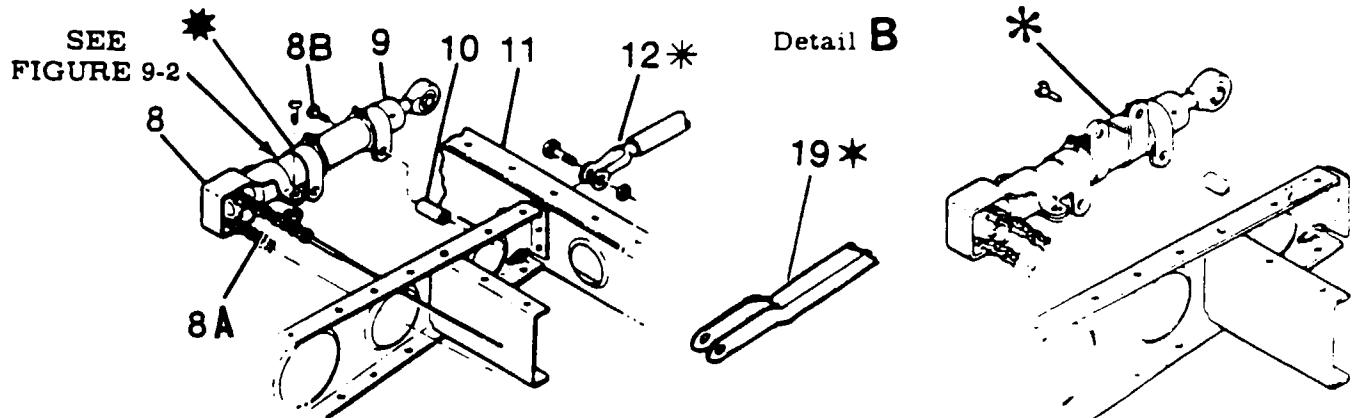
## CAUTION

### MAINTAIN SPECIFIED CONTROL CABLE TENSION

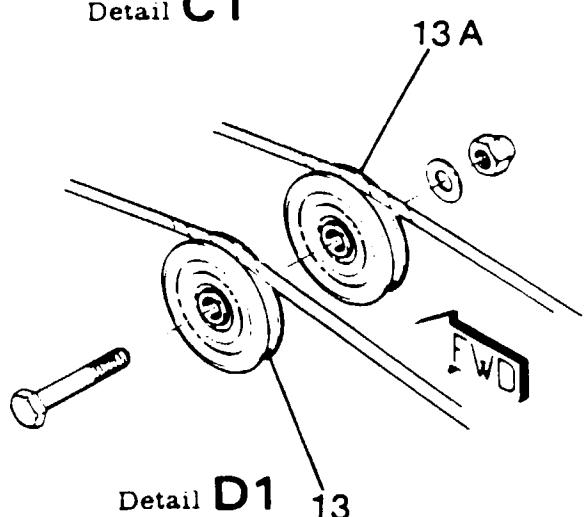
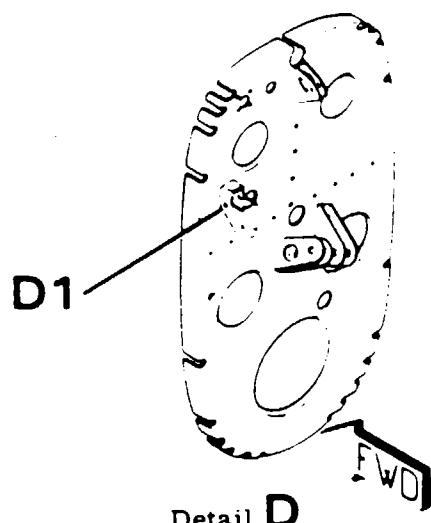
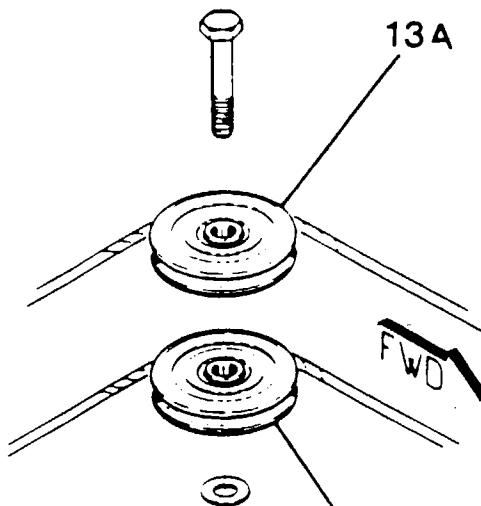
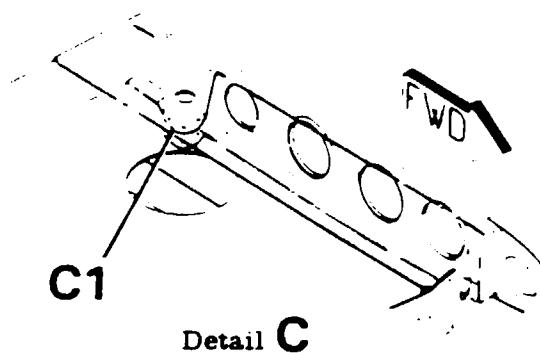
**CABLE TENSION:**  
10 to 20 LBS (AT AVERAGE TEMPER-  
ATURE FOR THE AREA.)  
SEE FIGURE 1-1 FOR TRAVEL.

Figure 9-1. Elevator Trim Control System (Sheet 1 of 4)

# MODEL 152 SERIES SERVICE MANUAL



\* Beginning with 15282055, A1520810  
F15201579 and FA1520358

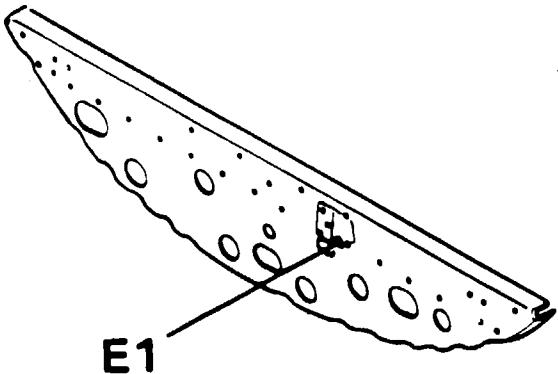


\* BEGINNING WITH 15284356, A1520941,  
F15201829 AND FA1520373

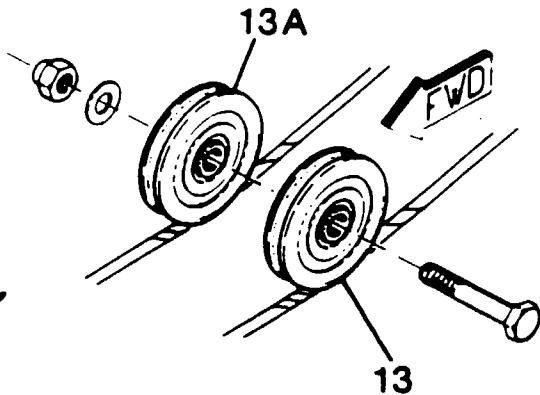
\* THRU 15284355, A1520940, F15201828  
AND FA1520372

Figure 9-1. Elevator Trim Control System (Sheet 2 of 4)

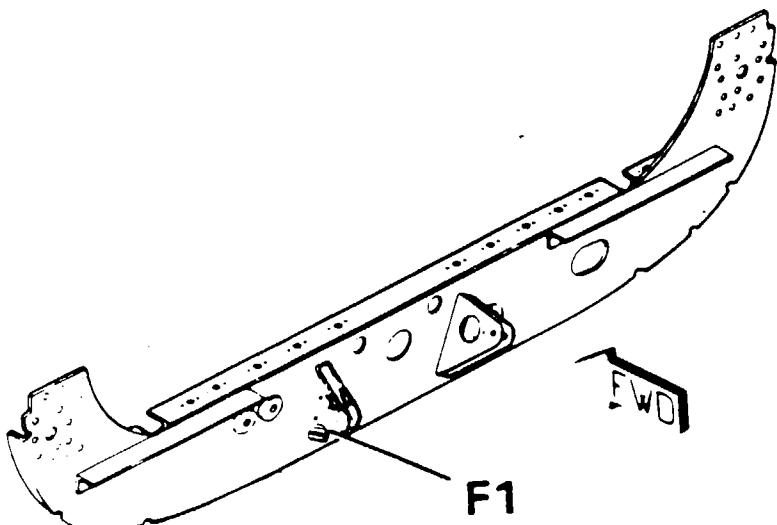
**MODEL 152 SERIES SERVICE MANUAL**



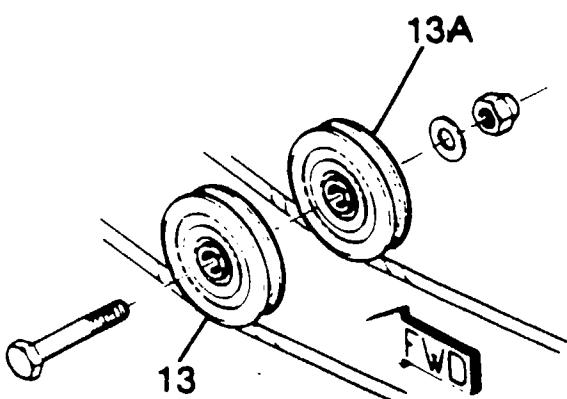
**Detail E**



**Detail E1**



**Detail F**



**Detail F1**

**Figure 9-1. Elevator Trim Control System (Sheet 3 of 4)**

## MODEL 152 SERIES SERVICE MANUAL

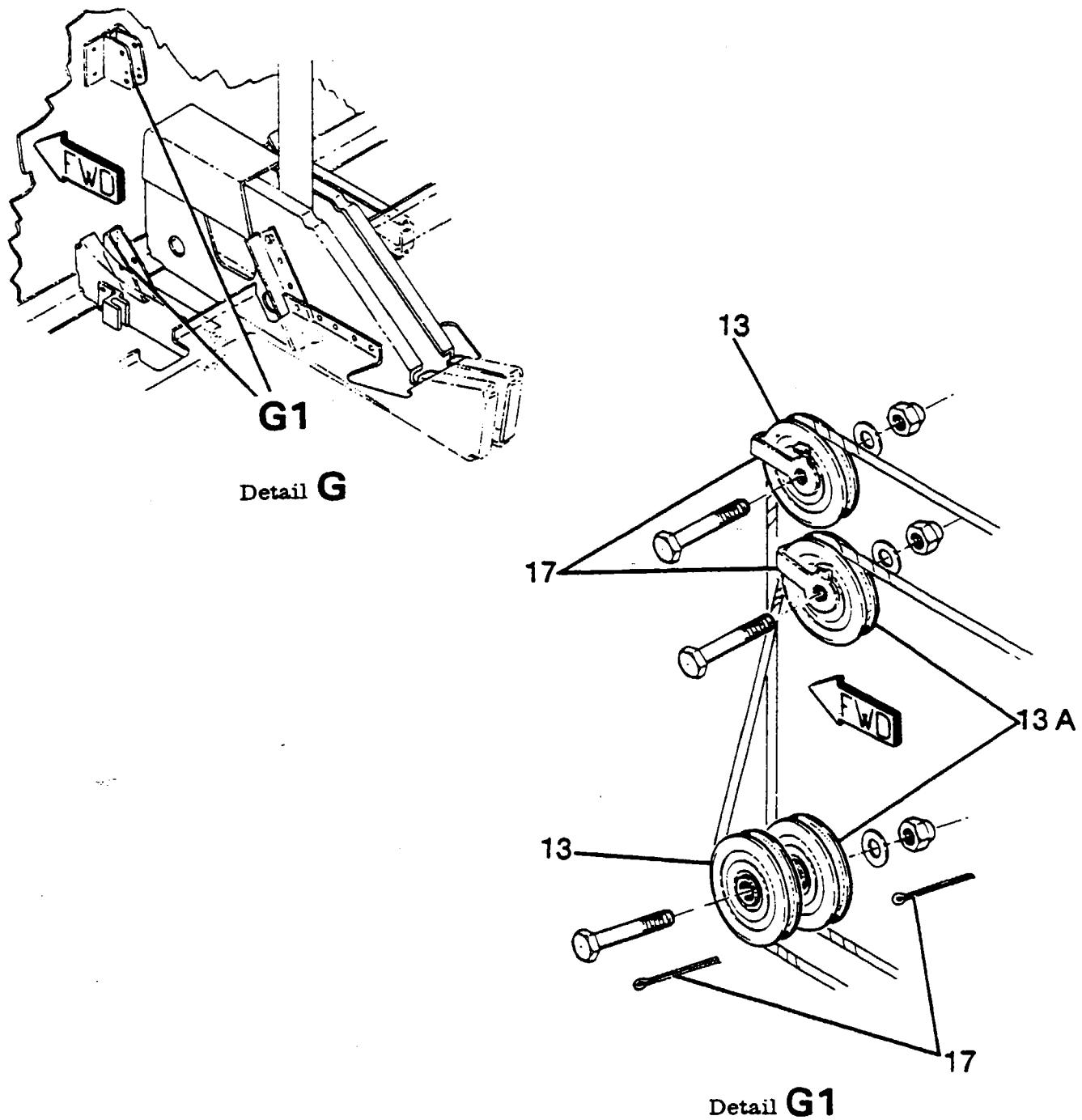


Figure 9-1. Elevator Trim Control System (Sheet 4 of 4)

## MODEL 152 SERIES SERVICE MANUAL

- e. Examine threaded rod end (15) and screw (9) for damaged threads or dirt particles that may impair smooth operation.
- f. Check sprocket (5) for broken, chipped, and/or worn teeth.
- g. Check bearing (16) for smoothness of operations.
- h. DO NOT attempt to repair damaged or worn parts of the actuator assembly. Discard all defective items and install new parts during reassembly.

### 9-10. REASSEMBLY. (See figure 9-2).

- a. Always discard the following items and install new parts during reassembly.
  - 1. Bearings (6 and 14).
  - 2. Groove-pins (8 and 10).
  - 3. O-Ring (13).
  - 4. Nuts (2).
- b. During reassembly, lubricate collars (7), screw (9), and threaded rod end (15) in accordance with Section 2.
- c. Press sprocket (5) into the end of screw (9), align groove-pin holes, and install new groove-pins (8).
- d. Slip bearing (6) and collar (7) on screw (9) and slide them down against sprocket (5).
- e. Insert screw (9), with assembled parts, into housing (12) until bearing (6) until bearing (6) is flush with the end of housing.

#### NOTE

When inserting screw (9) into housing (12), locate the sprocket (5) at the end of housing which is farther away from the groove for retaining ring (11).

The bearings (6 and 14) are not pre-drilled and must be drilled on assembly. The groove-pins (10) are 3/32 inch in diameter, therefore, requiring a 3/32 inch (0.0937) inch drill.

- f. With bearing (6) flush with end of housing (12), carefully drill bearing so the drill will emerge from the hole on the opposite side of housing (12). DO NOT ENLARGE HOLES IN HOUSING.
- g. Press new groove-pins (10) into pin holes.
- h. Insert collar (7), new O-ring (13), and bearing (14) into opposite end of housing (12).
- i. Complete steps "f." and "g." for bearing (14).
- j. If a new bearing (16) is required, a new bearing may be pressed into the boss. Be sure force bears against the outer race of bearing.
- k. Screw the threaded rod end (15) into screw (9).
- l. Install retaining rings (11), if they were removed.

### 9-10A. OPERATIONAL CHECK. (See figure 9-2.)

- a. Test actuator assembly by rotating sprocket (5) with fingers while holding threaded rod end (15). The threaded rod end should travel in and out smoothly, with no indication of binding.
- b. Reinstall actuator assembly and rering system in accordance with paragraphs 9-7, and 9-16.
- c. Replace access covers and any other items removed to gain access and rig system.
- d. Check trim tab free-play. Refer to paragraph 9-11.

## MODEL 152 SERIES SERVICE MANUAL

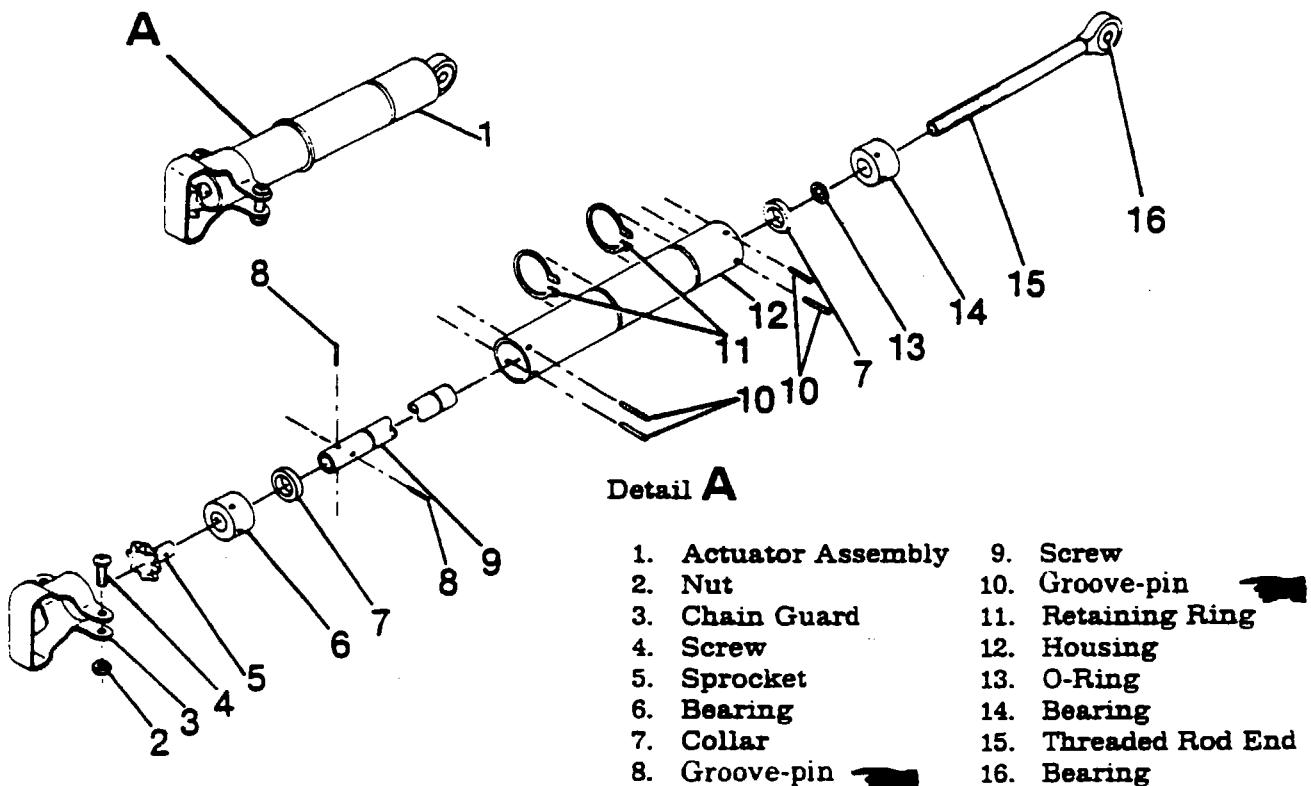
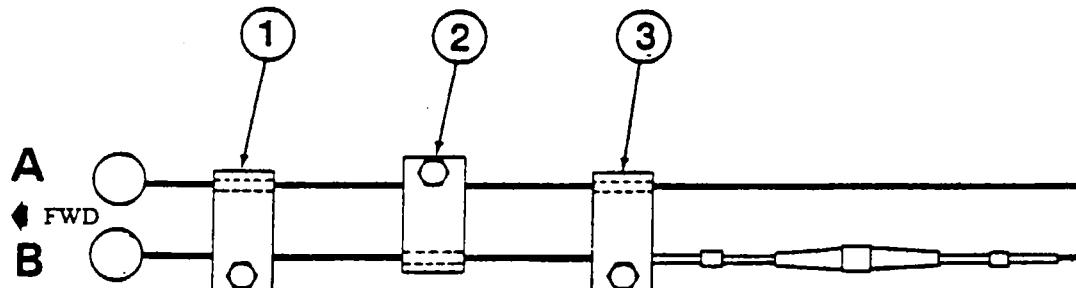


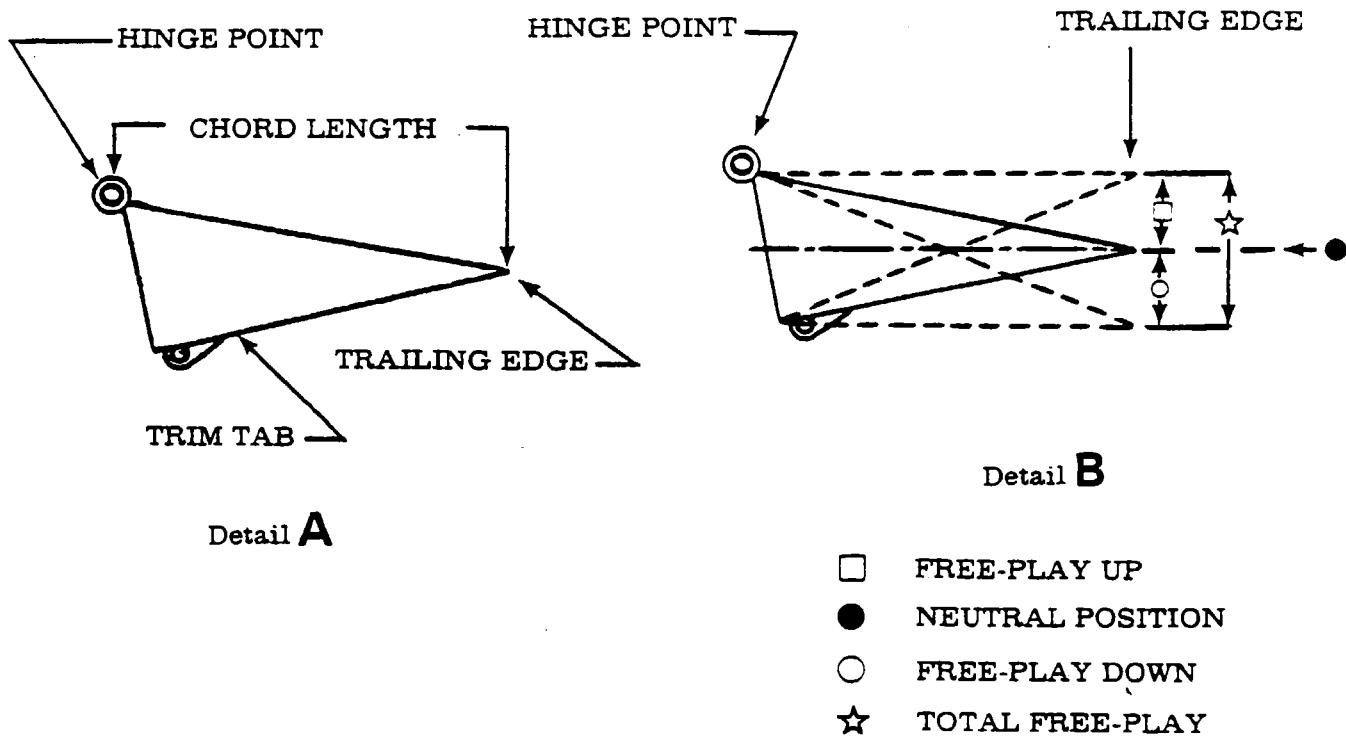
Figure 9-2. Elevator Trim Tab Actuator Assembly



1. With elevators in neutral, set trim tab to neutral (streamlined).
2. Position stop block (3) against turnbuckle and secure to cable B.
3. Place inclinometer on trim tab and run tab to UP TRAVEL limit listed in Section 1.
4. Position stop block (2) against stop block (3) and secure to cable A.
5. Run trim tab to DOWN TRAVEL limit listed in Section 1, place stop block (1) against stop block (2) and secure to cable (B).

Figure 9-3. Elevator Trim Tab Travel Adjustment

# MODEL 152 SERIES SERVICE MANUAL



1. Measure chord length at extreme inboard end of trim tab as shown in detail A.
2. Multiply chord length by 0.025 to obtain maximum allowable free-play.
3. Measure free-play at same point on trim tab that chord length was measured.
4. Total free-play must not exceed maximum allowable. See detail B.

Figure 9-4. Trim Tab Free-Play Inspection

## 9-11. TRIM TAB FREE-PLAY INSPECTION.

- a. Place elevators and trim tab in the neutral position and secure from movement.
- b. Determine maximum allowable free-play using formula shown in figure 9-4
- c. Using moderate hand pressure (up and down), measure free-play at trailing edge of trim tab.
- d. If trim tab free-play is less than the maximum allowable, the system is within prescribed limits.
- e. If the trim tab free-play is more than the maximum allowable, check the following items for looseness while moving the trim tab up and down.
  1. Check push-pull tube to trim tab horn assembly attachment for looseness.
  2. Check push-pull tube to actuator assembly threaded rod end attachment for looseness.
  3. Check actuator assembly threaded rod end for looseness in actuator assembly.
- f. If looseness is apparent while checking steps "e-1" and "e-2", repair by installing new parts.
- g. If looseness is apparent while checking step "e-3", refer to paragraphs 9-6 through 9-10.

## MODEL 152 SERIES SERVICE MANUAL

9-12. TRIM TAB CONTROL WHEEL. (See figure 9-1.)

9-13. REMOVAL AND INSTALLATION.

- Relieve cable tension at turnbuckle (15).

### CAUTION

Position a support stand under the tail tie-down ring to prevent tailcone from dropping while working inside.

- Disengage chain from sprocket (5).
- Remove cotter pin at each end of trim wheel shaft.
- Slide shaft assembly into either bearing (2) as far as possible.
- Carefully deform brackets (1) and slide shaft assembly free of bearings (2).
- Reverse the preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety turnbuckle and reinstall all items removed for access.

9-14. CABLES AND PULLEYS. (See figure 9-1.)

9-15. REMOVAL AND INSTALLATION.

- Remove seats, upholstery and access plates as necessary.
- Disconnect cables at turnbuckle (15) and clevis (14).
- Remove fairlead, cable guards and pulleys as necessary to work cables free of aircraft.

### NOTE

To ease routing of cables, a length of wire may be attached to end of the cable before being withdrawn from aircraft. Leave wire in place, routed through structure, attach cable being installed and pull cable into position.

- After cable is routed in position, install pulleys and cable guards. Make sure cable is positioned in pulley groove before installing guards.
- Rig system in accordance with applicable paragraph in this section, safety turnbuckle and reinstall all items removed in step "a".

9-16. RIGGING. (See figure 9-1.)

### CAUTION

Position a support stand under the tail tie-down ring to prevent tailcone from dropping while working inside.

- Remove rear baggage compartment panel and access plates as necessary.
- Loosen travel stop blocks (16) on cables.
- Disconnect actuator (9) from push-pull tube (12).
- Check cable tension and readjust turnbuckle (15) if necessary.

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### NOTE

If chains and/or cables are being installed, permit actuator screw to rotate freely as chains and cables are connected. Set cable tension.

- e. Rotate trim control wheel (3) full forward (nose down). Ensure that indicator (7) does not restrict wheel movement. If necessary, reposition indicator using a thin screwdriver to pry trailing leg of indicator out of groove.

### NOTE

Full forward (nose down) position of trim wheel is where further movement is prevented by chain or cable ends contacting sprockets or pulleys.

- f. With elevator and trim tab both in neutral (streamlined), place an inclinometer on tab and set to zero.

### NOTE

An inclinometer for measuring control surface travel is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. See figure 6-4.

- g. Rotate actuator screw in or out as required to place tab up with a maximum of 2° overtravel, with actuator screw connected to push-pull tube (12).
- h. Rotate trim wheel to position trim tab up and down, readjusting actuator screw as required to obtain overtravel in both directions.
- i. Position stop blocks (16) and adjust as illustrated in figure 9-3 to limit travel to the degree specified in Section 1.
- j. Check that trim wheel indicator is same distance from ends of slot in cover. Reposition trailing leg of indicator if necessary (refer to step "e.").
- k. Safety turnbuckle and reinstall all items removed in step "a".

### WARNING

Be sure trim tab moves in correct direction when operated by the trim wheel. Nose down trim corresponds to tab up position.

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## SECTION 10

### RUDDER AND RUDDER TRIM CONTROL SYSTEMS

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10-1. RUDDER CONTROL SYSTEM. (See figure 10-1.)

10-2. DESCRIPTION. Rudder control is maintained through use of conventional rudder pedals which also control nose wheel steering. The system is comprised of the rudder pedals, cables and pulleys, all of which link the pedals to the rudder and nose wheel steering.

10-3. TROUBLE SHOOTING.

#### NOTE

Due to remedy procedures in the following trouble shooting chart, it may be necessary to rerig system. Refer to paragraph 10-11.

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.  Cables not riding properly on pulleys.  Binding, broken or defective pulleys or cable guards.  Pedal bars need lubrication.  Defective rudder bar bearings.  Defective rudder hinge bushings or bellcrank bushings.  Clevis bolts too tight.  Steering rods not adjusted properly.	Adjust cable tension in accordance with paragraph 10-11.  Route cables correctly over pulleys.  Replace defective pulleys and install guards properly.  Refer to Section 2.  Replace bearing blocks.  Replace defective bushings.  Readjust to eliminate binding.  Rig system in accordance with paragraph 10-11.

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### 10-3. TROUBLE SHOOTING (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
LOST MOTION BETWEEN RUDDER PEDALS AND RUDDER.	Insufficient cable tension.	Adjust cable tension in accordance with paragraph 10-11.
INCORRECT RUDDER TRAVEL.	Incorrect rigging.	Rig system in accordance with paragraph 10-11.

### 10-4. RUDDER PEDAL ASSEMBLY. (See figure 10-2.)

#### 10-5. REMOVAL AND INSTALLATION.

- a. Remove carpeting, shields and soundproofing from pedal and tunnel areas as necessary.
- b. Disconnect master cylinders (11) at pilot rudder pedals.
- c. Disconnect parking brake cables at master cylinders.
- d. Remove rudder pedals (2) and brake links (12).
- e. Relieve cable tension at clevises (index 5, figure 10-1).
- f. Disconnect cables, return springs and steering tubes from rudder bars.
- g. Remove bolts securing bearing blocks (15) and work rudder bars out of tunnel area.

#### 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.

- h. Reverse the preceding steps for installation. Rig system in accordance with applicable paragraph in this section, safety clevises and reinstall all items removed in step "a".

### 10-6. RUDDER. (See figure 10-3.)

#### 10-7. REMOVAL AND INSTALLATION.

- a. Disconnect tail navigation light quick-disconnect (10).
- b. Relieve cable tension at clevises (index 5, figure 10-1) and disconnect clevises from rudder bellcrank (8).
- c. With rudder supported, remove hinge bolts (4) and lift rudder free of vertical fin.
- d. Reverse the preceding steps for installation. Rig system in accordance with applicable paragraph in this section and safety clevises.

#### 10-8. REPAIR. Repair may be accomplished as outlined in Section 17. Hinge bushings may be replaced as necessary.

#### 10-9. CABLES AND PULLEYS. (See figure 10-1.)

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### 10-10. REMOVAL AND INSTALLATION.

- a. Remove seats, upholstery and access plates as necessary.
- b. Disconnect cable at rudder bar (10) and bellcrank (7).
- c. Remove cable guards, pulleys and fairleads as necessary to work cables free of aircraft.

#### NOTE

To ease routing of cables, a length of wire may be attached to end of the cable before being withdrawn from aircraft. Leave wire in place, routed through structure, attach cable being installed, and pull cable into position.

- d. After cable is routed in position, install pulleys, fairleads and cable guards. Ensure cable is positioned in pulley groove before installing guard.
- e. Rig system in accordance with applicable paragraph in this section, safety clevises and reinstall all items removed in step "a".

### 10-11. RIGGING. (See figure 10-1).

- a. Adjust stop screws (8) to attain travel specified in Section 1. Figure 10-4 illustrates correct travel and one method of checking.
- b. Disconnect nose wheel steering tubes (index 6, figure 5-6) from nose strut.
- c. Adjust cables at clevises (5) to align rudder and pedals in neutral position, 6.00 inches from firewall and pedal pivot shafts (index 4, figure 10-2). This step automatically determines cable tension through use of return springs (14).

#### NOTE

Due to thickness of insulation on firewall, it is recommended that a piece of 1/16 inch welding rod be ground to a sharp point and notched at the 6.00 inch dimension. Pierce insulation on firewall and use notch to measure proper dimension.

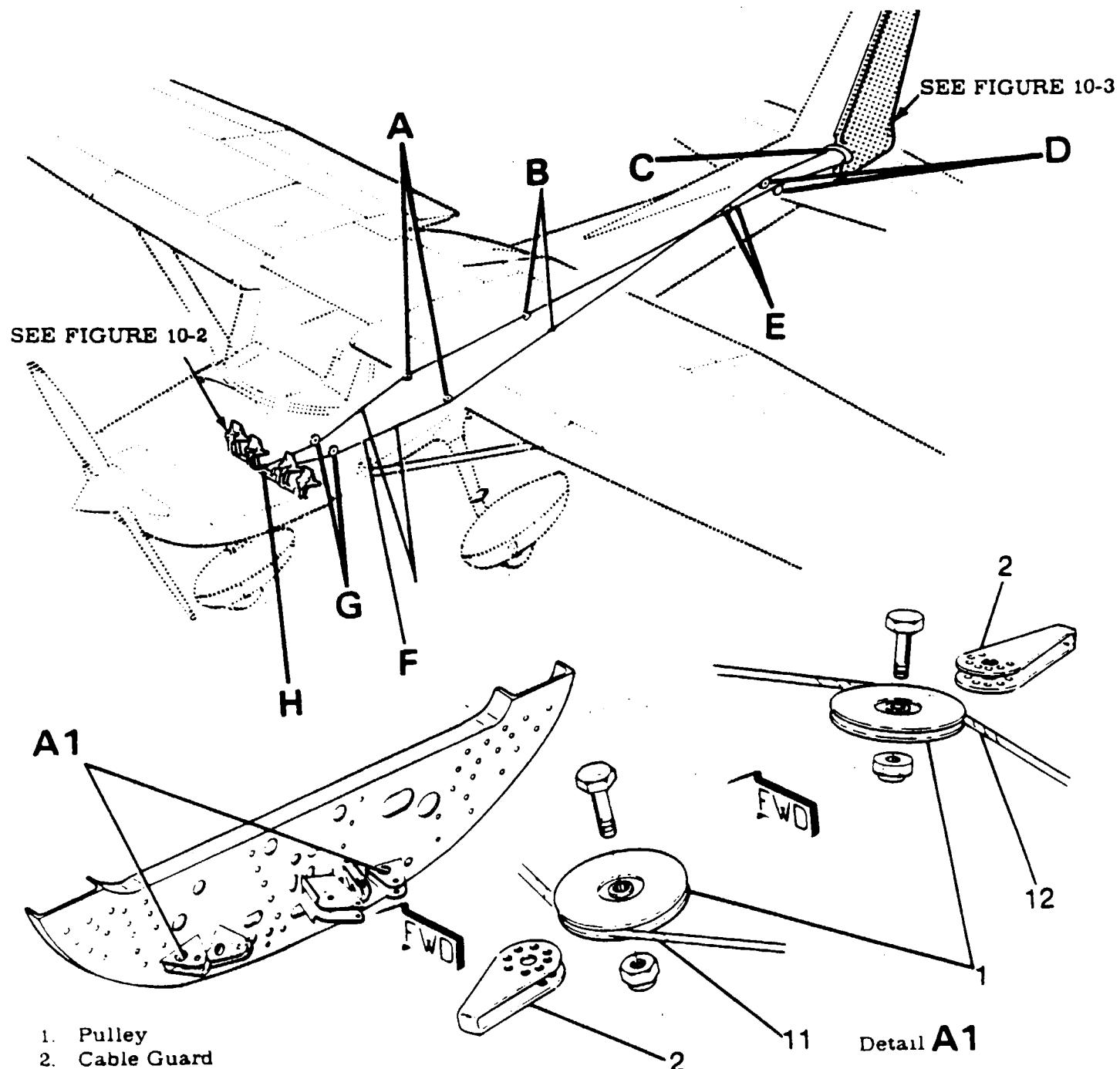
- d. Tie down or weight tail to raise nose wheel free of ground.
- e. Center nose gear against external stop.
- f. Extend steering tubes until free play is removed. DO NOT COMPRESS SPRINGS.
- g. Adjust steering tube rod ends to 1.25 inch dimension between steering arm assembly and bolt hole as illustrated in figure 5-9 and tighten jam nuts.
- h. 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.

- i. Install clevises on rod ends.

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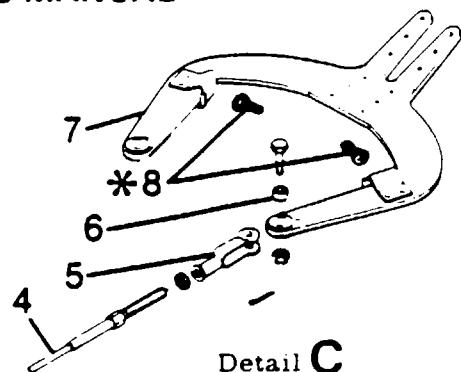
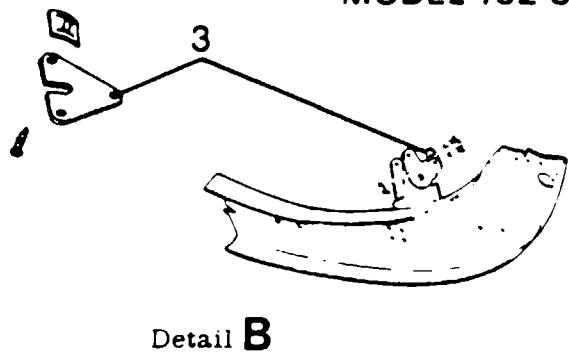
1. Pulley
2. Cable Guard
3. Fairlead
4. Rudder Cable
5. Clevis
6. Bushing
7. Bellcrank
8. Stop Screw
9. Clip
10. Rudder Bar
11. Left Cable
12. Right Cable
13. Turnbuckle

**CAUTION**  
Maintain specified control cable tension.

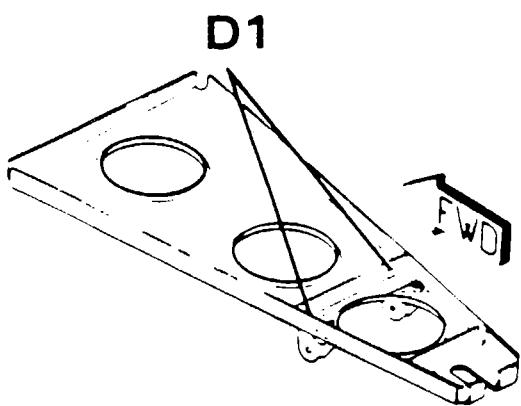
**CABLE TENSION:**  
REFER TO RIGGING PARAGRAPH IN  
THIS SECTION.  
SEE FIGURE 1-1 FOR TRAVEL.

Figure 10-1. Rudder Control System (Sheet 1 of 3)

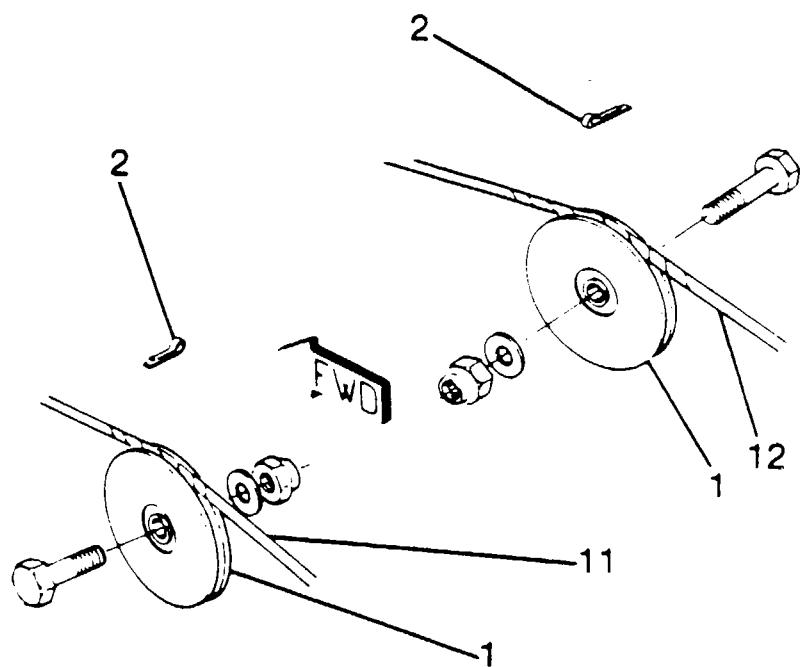
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\* Safety wire travel stop screws (8)



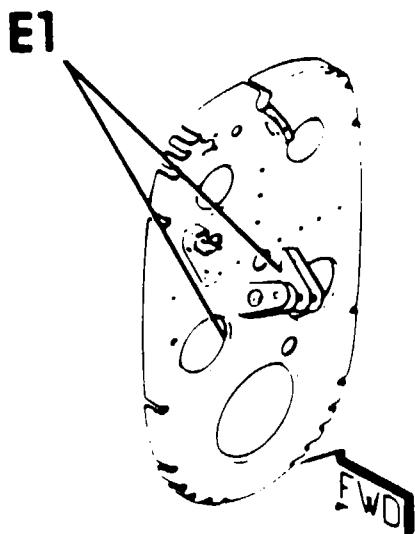
Detail D



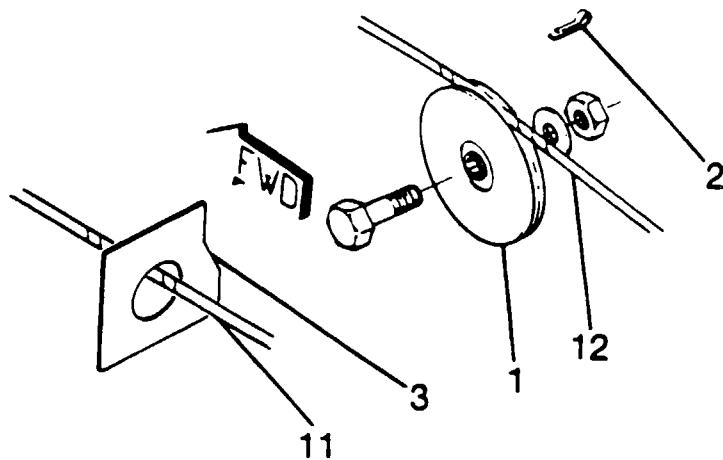
Detail D1

Figure 10-1. Rudder Control System (Sheet 2 of 3)

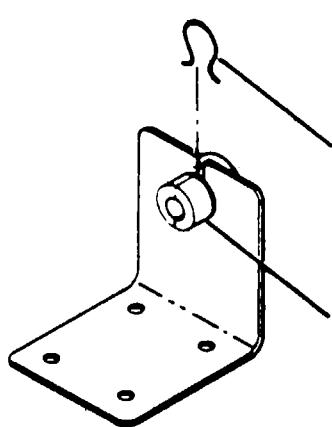
**MODEL 152 SERIES SERVICE MANUAL**



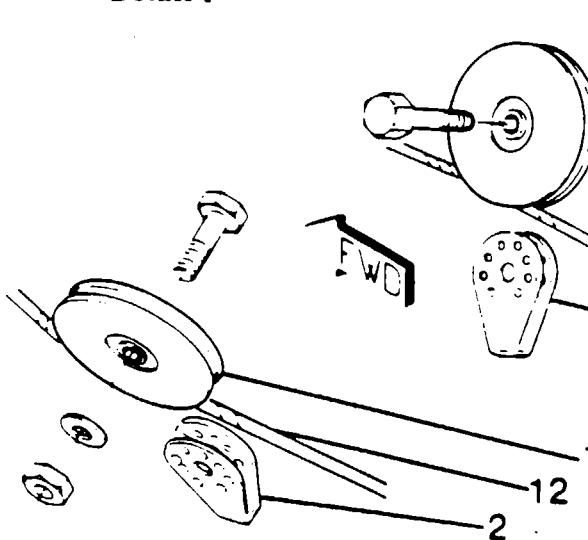
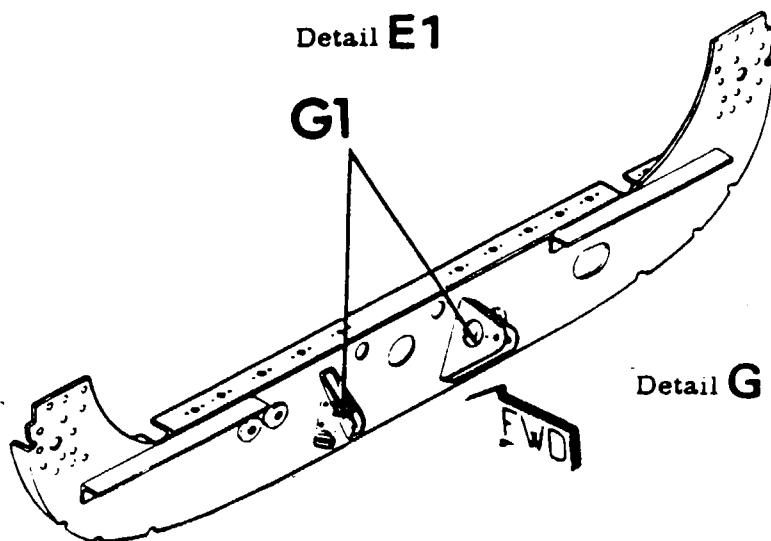
Detail E



Detail E1



Detail F



Detail G1

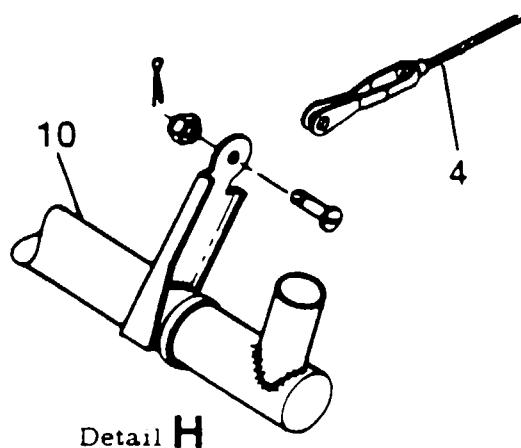
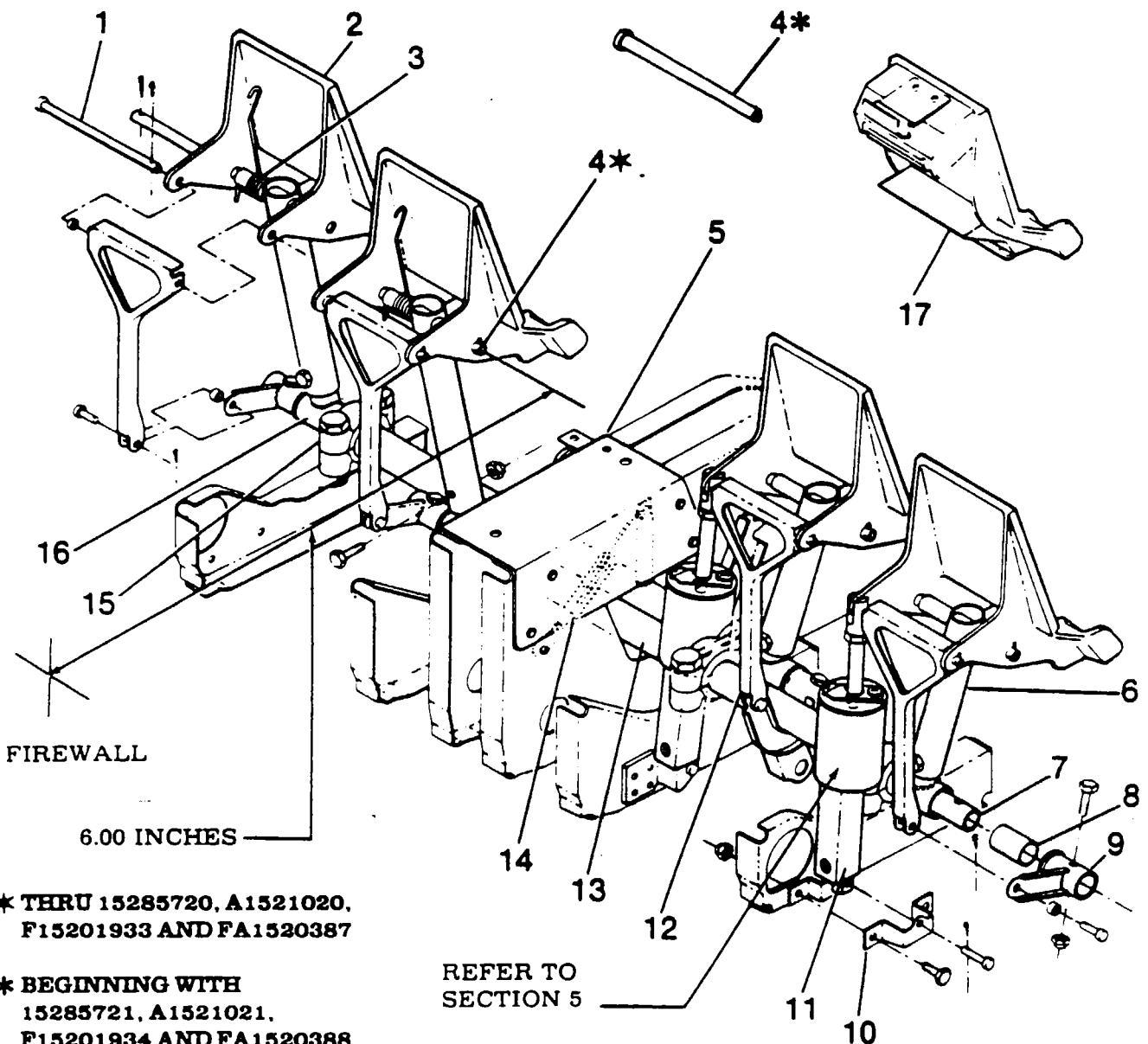


Figure 10-1. Rudder Control System (Sheet 3 of 3)

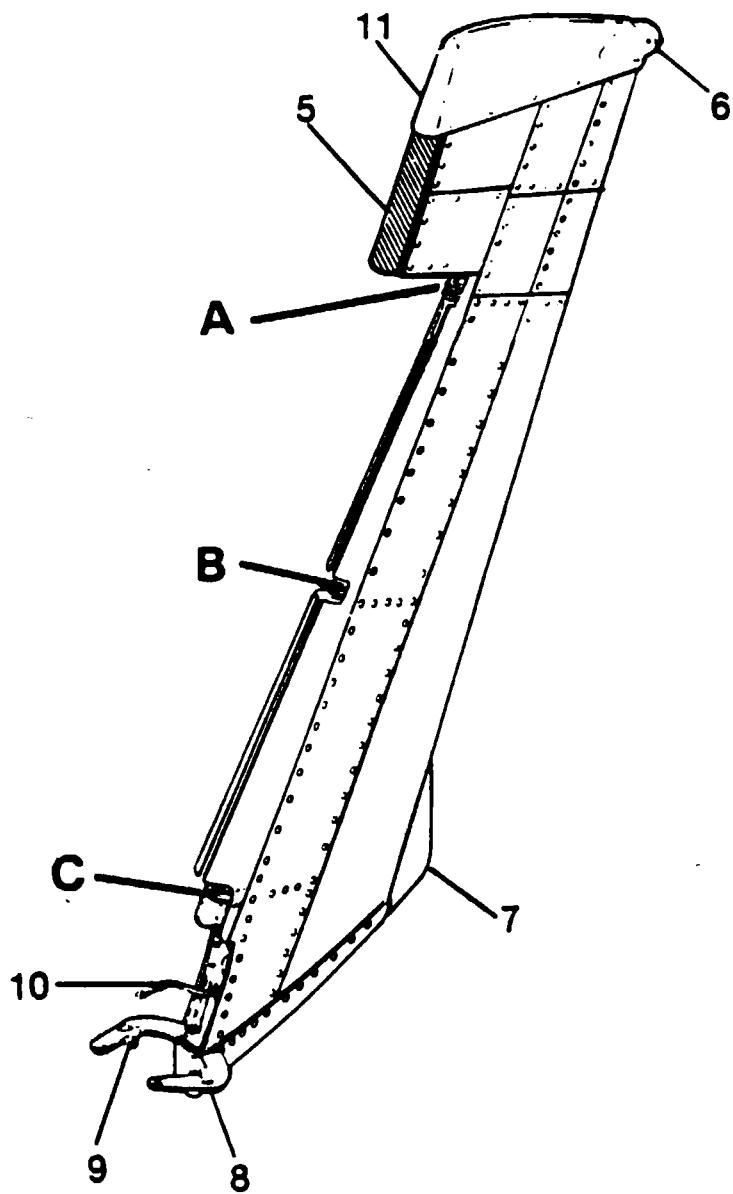
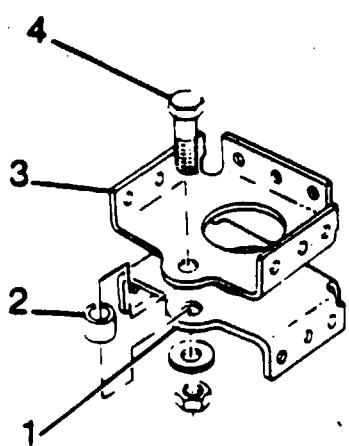
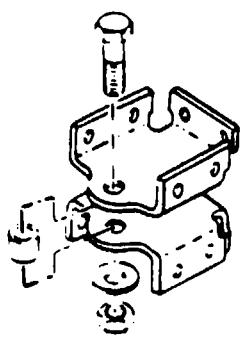
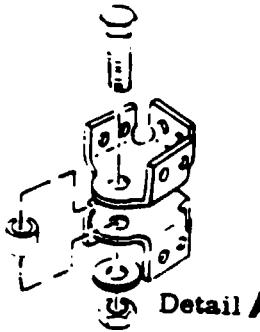
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- |                       |                      |                            |
|-----------------------|----------------------|----------------------------|
| 1. Brake Link Pin     | 6. Pedal Arm         | 12. Brake Link             |
| 2. Pedal              | 7. Brake Torque Tube | 13. Left Rudder Bar        |
| 3. Anti-Rattle Spring | 8. Bearing           | 14. Return Spring          |
| 4. Pivot Shaft        | 9. Bellcrank         | 15. Bearing Block          |
| 5. Fuselage Structure | 10. Bracket          | 16. Right Rudder Bar       |
|                       | 11. Master Cylinder  | 17. Rudder Pedal Extension |

Figure 10-2. Rudder Pedals Installation

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1. Lower Hinge Half
2. Bushing
3. Upper Hinge Half
4. Bolt
5. Balance Weight
6. Navigation Light
7. Trim Tab
8. Bellcrank
9. Stop
10. Quick-Disconnect
11. Rudder Tip

Figure 10-3. Rudder Installation

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### **NOTE**

**DO NOT adjust rudder trim with steering tubes. Degree of steering travel cannot be adjusted.**

- j. Safety cable clevises and install all parts removed for access.

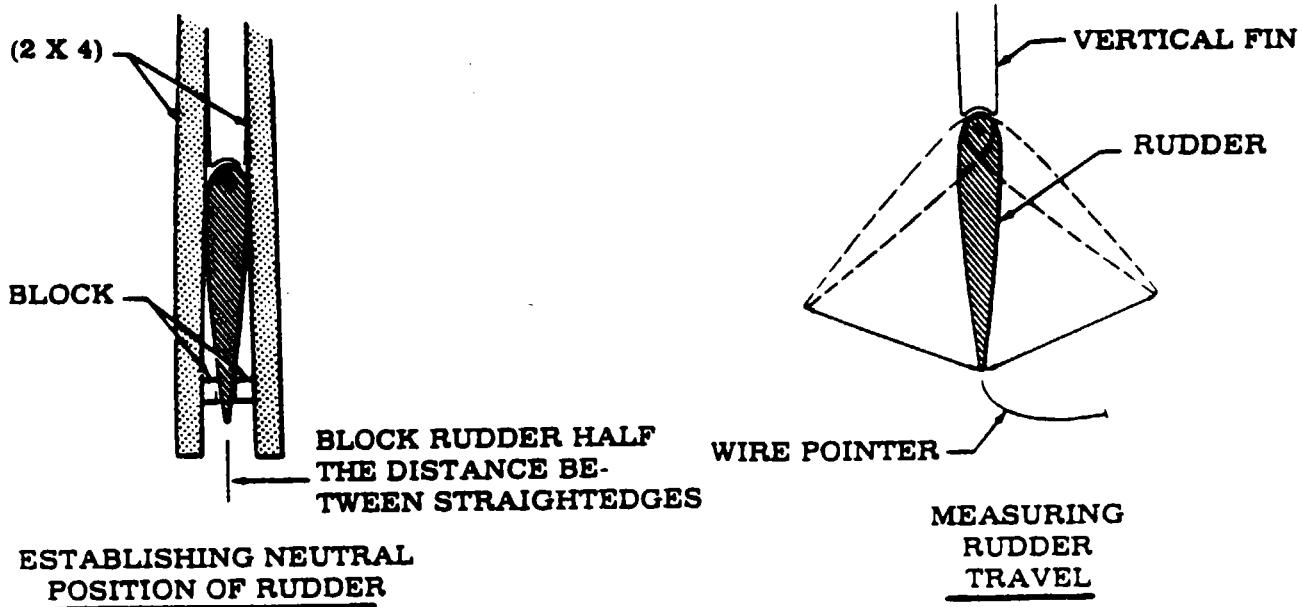
### **NOTE**

**Flight test airplane to determine if ground adjustment of fixed trim tab is necessary. DO NOT rig rudder "off-center" unless trim tab does not provide adequate correction.**

### **WARNING**

**Be sure rudder moves in correct direction when operated by pedals.**

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### ESTABLISHING NEUTRAL POSITION OF RUDDER

1. 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.
2. 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 (rudder butt).
3. Using soft lead pencil, mark rudder at point corresponding to soft wire indexing point (neutral).
4. Remove straightedges.
5. Hold rudder against right, then left, rudder stop. Measure distance from pointer to pencil mark on rudder in each direction of travel. Distance should be between 6.04" and 6.60".

Figure 10-4. Checking Rudder Travel

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## SECTION 11

### ENGINE

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow any one else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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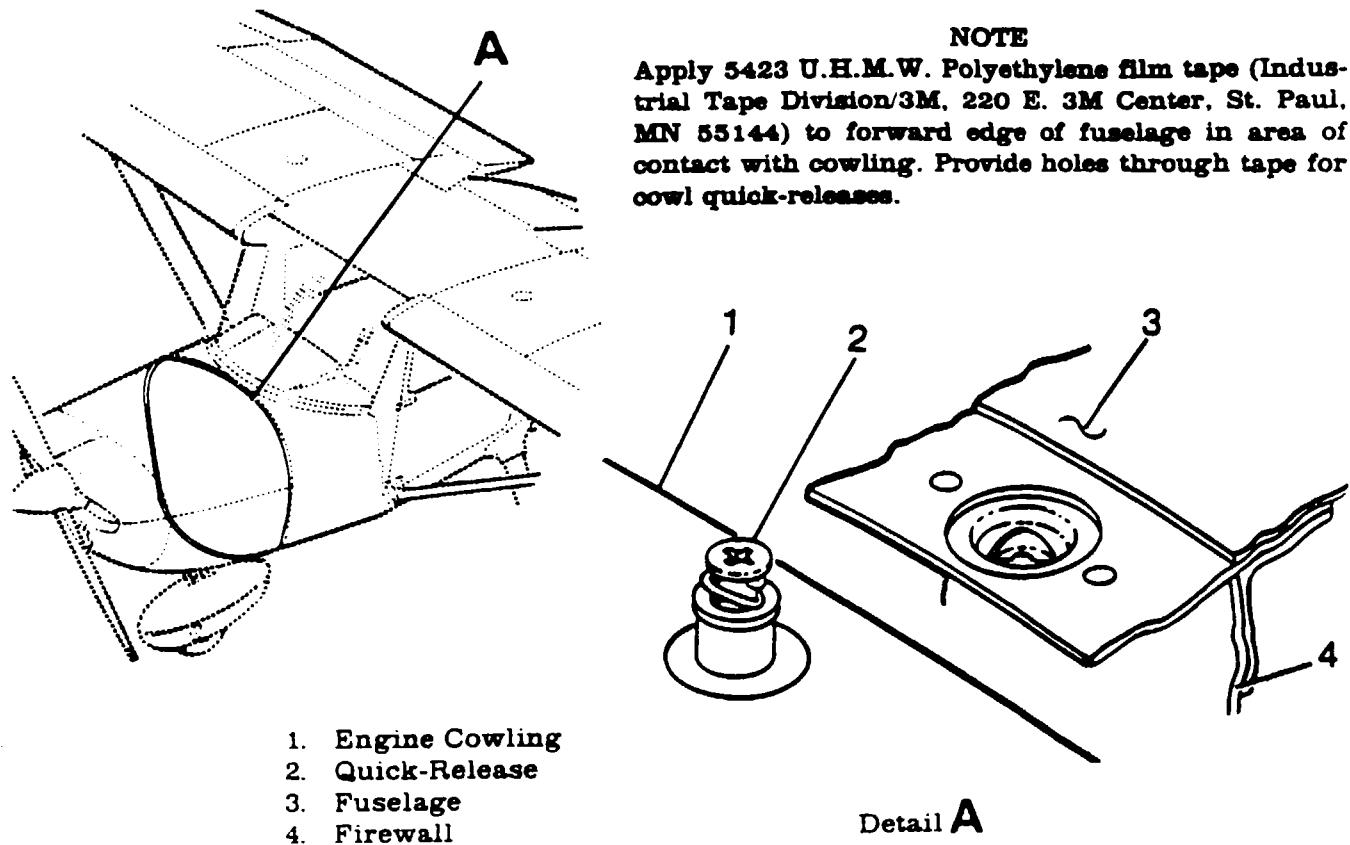
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## 11-1. ENGINE COWLING.

- 11-2. **DESCRIPTION.** The engine cowling is comprised of upper and lower cowl segments and a nose cap. A large access door on the right side of the upper cowl provides access to fuel strainer drain, oil filler cap and dipstick. A small access door on the left side of the upper cowl permits access to the ground service receptacle. Quick release fasteners are used to detach the upper cowl from the lower cowl. Screws and quick release fasteners secure the lower cowl to the aircraft structure.
- 11-3. **REMOVAL AND INSTALLATION.** Removal and installation of the engine cowl is accomplished by releasing the quick release fasteners securing the upper cowl to the lower cowl and firewall. The lower cowl removal is accomplished by releasing the quick release fasteners at the air box inlet and by removing screws at the firewall and nose cap. Remove landing light wires from brackets on the left side of the cowl. To remove the nose cap, upper and lower cowl should be removed and wires to the landing light disconnected. Refer to Section 13 for removal of the propeller. When installing the cowling, be sure to connect any items disconnected during removal. Make sure that baffle seals are turned in the correct direction to confine and direct airflow around the engine. The vertical installed seals fold forward and the side seals fold upward.
- 11-4. **CLEANING AND INSPECTION.** Wipe the inner surfaces of the cowling segments with a cloth saturated with cleaning solvent (Federal Specification PS-661 or equivalent). If the inside surface of the cowling is coated heavily with oil or dirt, allow solvent to soak until foreign material can be removed. Wash painted surfaces of the cowling with a solution of mild soap and water and rinse thoroughly. After washing, a coat of wax applied to the painted surfaces, is recommended to prolong paint life. After cleaning, inspect cowling for dents, cracks, loose rivets or spot welds. Repair all defects to prevent spread of damage.
- 11-5. **REPAIR.** If cowling skins are extensively damaged, new complete section of the cowling should be installed. Standard insert-type patches may be used for repair if repair parts are formed to fit contour of cowling. Small cracks may be stop-drilled and small dents straightened if they are reinforced on the inner surface with a doubler of the same material. Damaged reinforcement angles should be replaced with new parts. Due to their small size, new reinforcement angles are easier to install than to repair the damaged part.

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**Figure 11-1. Engine Cowling**

## 11-6. ENGINE.

11-7. **DESCRIPTION.** An air cooled, wet-sump, four-cylinder, horizontally-opposed, direct-drive, carbureted (Lycoming) O-235-L or O-235-N2C series engine is used to power the aircraft. The cylinders numbered from front to rear, are staggered to permit a separate throw on the crankshaft for each connecting rod. The right front cylinder is number 1 and cylinders on the right side 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 number 2 and 4. For repair and overhaul of the engine accessories and propeller, refer to the appropriate publications issued by their manufacturers. These publications are available from Cessna Supply Division.

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### 11-8. ENGINE DATA.

AIRCRAFT Model	152
MODEL (Lycoming)	O-235-L2C Thru 15285594 O-235-N2C Beginning with 15285595
Rated Horsepower at RPM	110 at 2550 thru 15285594 108 at 2550 Beginning with 15285595
Number of Cylinders	4 Horizontally-Opposed
Displacement	233.3 Cubic Inches
Bore	4.375 Inches
Stroke	3.875 Inches
Compression Ratio	8.5:1
Magneton (Type 4050 & 4052) Thru 15282031 & A1520808	Slick (4050 RH, 4052 LH) Fires 20° BTC Fires 20° BTC
Right Magneto (fires all bottom plugs) Left Magneto (fires all top plugs)	
Beginning With 15282032 & A1520809	Slick (4052 RH & LH)
Right Magneto (fires bottom RH & top LH Plugs) Left Magneto (fires top RH & bottom LH plugs)	Fires 20° BTC Fires 20° BTC
Magneton (Type 4281) Beginning With 15284028 & A1520915	Slick (4281 RH & LH) Fires 20° BTC Fires 20° BTC
Right Magneto (fires bottom RH & top LH plugs) Left Magneto (fires top RH & bottom LH plugs)	
Firing Order	1-3-2-4
Spark Plugs	18mm (Refer to Avco Lycoming Service Instruction No. 1042 for factory approved spark plugs and required gap.)
Torque	390±30 LB-IN.
Carburetor (Marvel-Schebler) Thru 15283591 & A1520878	MA3A or MA3PA
Beginning With 15283592 & A1520879	MA3PA
Alternator	28 Volt, 60-Ampere
Starter	Automatic Engagement
Tachometer	Mechanical
Oil Sump Capacity With External Filter	6 U.S. Quarts 7. U.S. Quarts

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### 11-8. ENGINE DATA (Cont.).

Oil Pressure (PSI)	
Normal	60-90
Minimum Idling	25
Maximum (Cold Oil Starting)	115
Oil Temperature	
Normal Operating	Within Green Arc
Maximum	Red Line (245°F)
Cylinder Head Temperature	500°F Maximum (Not Indicated)
Dry Weight - With Accessories	257 LB (Weight is approximate and will vary with optional accessories installed.)

- 11-9. TIME BETWEEN OVERHAUL (TBO). Avco Lycoming recommends engine overhaul at 2000 hours operating time for the O-235 Series engine (2400 operating hours for engines with serial numbers L-24231-15 and up; remanufactured engines shipped after March 20, 1986 [except serial numbers RL-20600-15, RL-24190-15, RL-24191-15, and RL-24203-15]; factory overhauled engines shipped after April 1, 1986; and engines otherwise modified with TBO-Extension Kits, Part Number 05K19613 [Chrome Cylinders] or Part Number 05K19614 [Nitrided Cylinders], each containing increased strength piston, Part Number LW-18729). Refer to Avco Lycoming Service Instruction No. 1009X and to any superseding bulletins, revisions, or supplements thereto for further recommendations. At the time of overhaul, engine accessories should be overhauled.
- 11-10. OVERSPEED LIMITATIONS. The engine must not be operated above specified maximum continuous RPM. However, should inadvertent overspeed occur, refer to Avco Lycoming Service Bulletin 369D, and to any superseding bulletins or supplements thereto, for further recommendations.

### 11-11. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE WILL NOT START.	Improper use of starting procedure.	Refer to Pilot's Operating Handbook.
	Fuel tanks empty.	Visually inspect tanks. Fill with proper grade and quantity of gasoline.
	Mixture control in the IDLE CUT-OFF position.	Move control to the full RICH position.
	Fuel shutoff valve in OFF position.	Turn shutoff valve ON and safety.
	Defective carburetor.	Repair or replace carburetor.
	Carburetor screen or fuel strainer plugged.	Remove carburetor and clean thoroughly. Refer to paragraph 11-47.

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### 11-11. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
<b>ENGINE WILL NOT START (Cont).</b>		
	<b>Engine flooded.</b>	<b>Refer to Pilot's Operating Handbook.</b>
	<b>Water in fuel system.</b>	<b>Open fuel strainer drain and check for water. If water is present, drain fuel tank sumps, lines, strainer, carburetor and fuel line drain tee.</b>
	<b>Defective magneto switch or grounded magneto leads.</b>	<b>Check continuity. Repair or replace switch or leads.</b>
	<b>Spark plugs fouled.</b>	<b>Remove, clean and regap plugs. Test harness cables to persistently fouled plugs. Replace if defective.</b>
<b>ENGINE STARTS BUT DIES, OR WILL NOT IDLE.</b>		
	<b>Idle stop screw or idle mixture incorrectly adjusted.</b>	<b>Refer to paragraph 11-49.</b>
	<b>Carburetor idling jet plugged.</b>	<b>Clean carburetor and fuel strainer.</b>
	<b>Spark plugs fouled or improperly gapped.</b>	<b>Remove, clean and regap plugs. Replace if defective.</b>
	<b>Water in fuel system.</b>	<b>Open fuel strainer drain and check for water. If water is present, drain fuel tank sumps, lines, strainer, carburetor and fuel line drain tee.</b>
	<b>Defective ignition system.</b>	<b>Refer to paragraph 11-53.</b>
	<b>Induction air leaks.</b>	<b>Check visually. Correct the cause of leaks.</b>
	<b>Manual primer leaking.</b>	<b>Disconnect primer outlet line. If fuel leaks through primer, repair or replace primer.</b>

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### 11-11. TROUBLE SHOOTING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE STARTS BUT DIES, OR WILL NOT IDLE. (Cont.).	Leaking float valve or float level set too high.	Perform an idle mixture check. Attempt to remove any rich indication with the idle mixture adjustment. If the rich indication cannot be removed, the float valve is leaking or the float level is set too high. Replace defective parts; reset float level.
	Defective carburetor.	If engine will start when primed but stops when priming is discontinued, with mixture control in full RICH position, the carburetor is defective. Repair or replace carburetor.
	Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.
UNEXPLAINED REDUCTION OF STATIC RPM OR UNEVEN ENGINE OPERATION.	Restricted or clogged air induction system.	Check induction air system for restrictions. Clean or replace dirty/clogged air filter.
	Leaky alternate air induction (carburetor heat). Improperly positioned carburetor butterfly.	Check alternate air induction system for leaks and correct as required. Adjust butterfly as required.
	Lack of full throttle and/or mixture control travel at carburetor.	Adjust throttle and mixture controls as required for full control.
	Excessive magneto drop-off.	Check magneto at 2000 RPM. Drop-off should not exceed 175 RPM (50 RPM between left and right magnetos). Retime as required. Check, clean or replace, regap, and reinstall spark plugs as necessary.
	Erroneous magneto-to-engine timing.	Check magneto-to-engine timing; retime as necessary.
	Fouled or incorrectly gapped spark plugs.	Remove, clean, check, regap, and reinstall spark plugs.

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### 11-11. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
<b>UNEXPLAINED REDUCTION OF STATIC RPM OR UNEVEN ENGINE OPERATION. (Cont.).</b>	Over-rich or over-lean carburetor.	Check for over-rich carburetor. At maximum static RPM (full throttle), slowly pull mixture control toward idle cut-off and watch for RPM increase. A rise of 0 to 75 RPM is normal. A rise over 1000 RPM will result in power loss through over-richness. If no rise in RPM or a rapid fall-off of RPM is noted, apply full carburetor heat (to enrich mixture). If carburetor heat brings an RPM rise, the carburetor is OVER-LEAN. In either case, correct mixture control as required.
	Excessive wear or looseness of ball end of valve tappets.	Check valve tappet clearances. Clearances should be 0.007 to 0.009 inch with cold engine and 0.006 to 0.012 inch with hot engine. Compare clearances with last 100 hour inspection. If clearances have increased 0.015 inches or more than the figures at 100 hour inspection, remove push rod and check for excessive wear or looseness of ball end of tappets. Push rods should be 11-9/16 inches. Replace push rods as required.
	Faulty cylinder compression.	NOTE
	Miscalibrated tachometer.	Engines with no previous recorded 100 hour inspection of valve tappet clearance will use 0.019 inch for cold engine or 0.022 inch for hot engine to determine whether to inspect the push rod.
	Propeller is too long, out-of-balance, or has incorrect pitch.	Check cylinder compression and correct as required.
		Check tachometer and re-calibrate as required.
		Check propeller and, if possible, correct pitch or balance as required. Replace propeller if necessary.

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### 11-11. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE RUNS ROUGHLY OR WILL NOT ACCELERATE PROPERLY.	Restriction in aircraft fuel system.	Refer to Section 12.
	Worn or improperly rigged throttle or mixture control.	Check visually. Replace worn linkage. Rig properly.
	Spark plugs fouled or improperly gapped.	Remove, clean and regap plugs. Replace if defective.
	Defective ignition system.	Refer to paragraph 11-53.
	Defective or badly adjusted accelerator pump in carburetor.	Check setting of accelerator pump linkage and adjust as necessary.
	Float level set too low.	Check and reset float level.
	Defective carburetor.	Repair or replace carburetor.
	Defective engine.	Check compression. Listen for unusual engine noises. Engine repair is required.
	Restricted carburetor air filter.	Check visually. Clean in accordance with Section 2.
	Cracked engine mount.	Inspect and repair or replace mount as required.
POOR IDLE CUT-OFF.	Defective mounting bushings.	Inspect and install new bushings as required.
	Worn or improperly rigged mixture control.	Check that idle cut-off stop on carburetor is contacted. Replace worn linkage. Rig properly.
	Manual primer leaking.	Disconnect primer outlet line. If fuel leaks through primer, it is defective. Repair or replace primer.
	Defective carburetor.	Repair or replace carburetor.
	Fuel contamination.	Check all screens in fuel system. Drain all fuel and flush out system. Clean all screens, lines, strainer and carburetor.

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11-11A. LOCATING OIL LEAKS. Oil leaks, especially those in the engine compartment, can be elusive due to airflow patterns. One method to consider in pin-pointing these leaks is to

- a. Clean suspected leak areas thoroughly with solvent and dry.
- b. Spray the suspected area with dye penetrant developer.
- c. Reinstall the engine cowling and other removed equipment to normal configuration to ensure air flow for cooling and leak detection.
- d. Accomplish a short run-up, preferably to static RPM, in accordance with Pilot's Operating Handbook.
- e. Dye penetrant developer will enhance the presence of oil leaks. Most leaks are very apparent against the white background.
- f. After locating the leak and effecting repairs, thoroughly clean the area sprayed with the developer. It is highly corrosive.

11-12. REMOVAL. If the engine is to be placed in storage or returned to the manufacturer for overhaul, proper preparatory steps should be taken prior to beginning the removal procedure. Refer to Indefinite Storage in Section 2 for preparation of the engine for storage. The following engine removal procedure is based upon the engine being removed from the aircraft with the engine mount attached to the firewall and all engine hose and lines being disconnected at the firewall. The reason for engine removal will determine where components are to be disconnected.

### NOTE

Tag each item when disconnected to aid in identifying wires, hose, lines and control linkages when engine is installed. Protect openings, exposed as a result of removing or disconnecting units, against entry of foreign material by installing covers or sealing with tape.

- a. Place all cabin switches and the fuel shutoff valve in the OFF position.
- b. Remove engine cowling. (Refer to paragraph 11-3.)
- c. Open battery circuit by disconnecting battery cable(s) at the battery. Insulate cable terminal(s) as a safety precaution.
- d. Disconnect ignition switch primary ("P") leads at the magnetos.

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### WARNING

The magneto is in a SWITCH ON condition when the switch wire is disconnected. Ground the magneto points or remove the high tension outlet plate from the magneto or disconnect spark plug lead wires at spark plugs to prevent accidental firing when the propeller is rotated.

- e. Drain engine oil from sump.
- f. Remove propeller and spinner. (Refer to Section 13.)

### NOTE

During the following procedures, remove any clamps which secure controls, wires, hose or lines to the engine, engine mount, or attached brackets, so they will not interfere with removal of the engine. Omit any of the items which are not present on a particular engine installation.

- g. Disconnect throttle and mixture control at carburetor. Pull these controls free of engine and engine mount, using care not to damage them by bending too sharply. Note position, size and number attaching washers and spacers.
- h. Disconnect carburetor heat control from arm on carburetor air intake housing assembly. Remove clamps and pull control aft clear of the engine.
- i. Disconnect wires and cables as follows:

### CAUTION

When disconnecting starter cable, do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between terminal and field coils causing the starter to be inoperative.

1. Starter electrical cable at starter.
2. Electrical wires and wire shielding ground at alternator.
3. Tachometer drive shaft at adapter on engine.
4. Remove all clamps attaching wires and cables to the engine or engine mount. Pull all wires and cables aft to clear the engine.
- j. Disconnect and cap or plug lines and hose as follows:
  1. Vacuum hose at firewall.

### WARNING

Residual fuel and oil draining from disconnected lines and hose is a fire hazard. Use care to prevent accumulation of such fuel and oil when lines or hose are disconnected.

2. Oil pressure hose at firewall.
3. Oil temperature bulb at engine.
4. Primer line to engine at firewall.
5. Fuel hose to engine at fuel strainer on firewall.
6. Remove all clamps attaching lines and hose to engine or engine mount which interferes with engine removal from engine mount.

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### CAUTION

Attach a tail stand to the tail tie-down fitting before removing the engine. The loss of engine weight will allow the tail to drop. Do not raise engine higher than necessary when removing engine-to-mount bolts. Raising the engine too high places a strain on the attach bolts and hinders their removal.

- k. Attach a hoist to the lifting lug on top of the engine and take up engine weight on hoist.
- l. Remove bolts attaching engine-to-mount. Note direction of bolt installation and position and numbers of washers. Balance the engine by hand as the last of the bolts are removed. Remove ground straps at lower mount legs as bolts are removed.

### CAUTION

Hoist engine slowly and ascertain that all items attaching engine and accessories to engine mount and airframe are disconnected.

- m. Carefully guide disconnected components out of engine assembly.

11-13. CLEANING. Refer to Section 2 for cleaning procedures.

11-14. ACCESSORIES REMOVAL. Removal of engine accessories for overhaul or for engine replacement involves stripping the engine of parts, accessories, and components to reduce the engine assembly to the bare engine. During removal, carefully examine removed items and tag defective parts for repair or replacement with a new part.

### NOTE

Items easily confused with similar items should be tagged to provide a means of identification when being installed on a new engine. All openings exposed by the removal of an item should be closed by installing a suitable cover or cap over the opening. This will prevent entry of foreign particles. If suitable covers are not available, tape may be used to cover the opening.

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- 11-15. INSPECTION. For specific items to be inspected, refer to engine Manufacturer's Overhaul and Repair Manual.
- a. Visually inspect the engine for loose nuts, bolts, cracks, and fin damage.
  - b. Inspect baffles, baffle seals, and brackets for cracks, deterioration, and breakage.
  - c. Inspect all hoses for internal swelling, chafing through protective plies, cuts, breaks, stiffness, damaged threads, and loose connections. Excessive heat on hoses will cause them to become brittle and easily broken. Hoses and lines are most likely to crack or break near the end of fittings and support points.
  - d. Inspect for color bleaching of the end fittings or severe discoloration of the hoses.

### NOTE

Avoid excessive flexing and sharp bends when examining hoses for stiffness.

- e. Refer to Section 2 for replacement intervals for flexible fluid carrying hoses in the engine compartment.
  - f. Textron Lycoming Mandatory Service Bulletin No. 388B, Procedures to Determine Exhaust Valve And Guide Condition, dated May 13, 1992, requires that all engine exhaust valves and guides be inspected every 400 hours of operation or earlier if valve sticking is suspected. Failure to comply could result in excessive carbon build-up, broken exhaust valves, excessive guide wear, or engine failure. Refer to Textron Lycoming Mandatory Service Bulletin No. 388B.
  - g. For major engine repairs, refer to the manufacturer's overhaul and repair manual.
- 11-15A. OVERHAUL. During engine overhaul, it is mandatory that certain parts be replaced, regardless of their apparent condition. Refer to Textron Lycoming Mandatory Service Bulletin No. 240M (or later revision) (Cessna Single Engine Service Bulletin SEB92-11).

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- 11-16. **BUILDUP.** Engine buildup consists of installation of parts, accessories, and components to the basic engine to build up an engine unit ready for installation in the aircraft. All safety wire, lock-washers, nuts, gaskets, and rubber connections should be new parts.
- 11-17. **INSTALLATION.** Before installing the engine on the aircraft, install any items which were removed from the engine or aircraft after the engine was removed.

### NOTE

Remove all protective covers, plugs, caps and identification tags as each item is connected or installed.

- a. Hoist the engine to a point near the engine mount.
- b. Install engine shock-mount pads as illustrated in figure 11-2.
- c. Carefully lower engine slowly into place on the engine mount. Route controls, lines, hoses and wires in place as the engine is positioned on the engine mount.
- d. Install engine mount bolts in the following sequence:
  1. Install the upper right hand (looking forward) bolt, washer and nut, and tighten until one thread of the bolt is visible past the nut.
  2. Install the lower right hand bolt, washer and nut and torque bolt to 450-500 lb-in.
  3. Next install the upper left hand bolt, washer and nut and tighten until one thread of the bolt is visible past the nut.
  4. The lower left hand bolt, washer and nut are the last to be installed.

### CAUTION

Care must be taken on installation of the engine mount bolts so as not to score the inside of the holes in the engine mount foot.

5. Torque bolts mentioned in steps 1, 3 and 4 to 450-500 lb-in.
- e. Route throttle, mixture and carburetor heat controls to the carburetor and airbox and connect. Secure controls in position with clamps.

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### **NOTE**

Throughout the aircraft fuel system, from the tanks to the carburetor, use NS-40 (RAS-4) (Snap-On-Tools Corp., Kenosha, Wisconsin), MIL-T-5544 (Thread Compound Antiseize, Graphite Petrolatum), USP Petrolatum or engine oil as a thread lubricator or to seal a leaking connection. Apply sparingly to male threads, exercising extreme caution to avoid "stringing" sealer across the end of the fitting. Always ensure that a compound, the residue from a previously used compound, or any other foreign material cannot enter the system.

- f. Connect lines and hoses as follows:
  1. Connect oil cooler hoses at cooler.
  2. Connect oil pressure line at firewall fitting.
  3. Connect fuel supply hose at carburetor.
  4. Connect primer line at firewall fitting.
  5. Connect oil temperature bulb at adapter.
  6. Connect engine breather hose at top of accessory case.
  7. Connect vacuum hose at firewall fitting.
  8. Install clamps and lacings attaching lines and hoses to engine, engine mount and brackets.

### **NOTE**

All lines, flex ducts & hoses must have a minimum of .50" clearance with other lines, flex ducts & hoses or surrounding objects, or be butterfly clamped to the same, or be tied together with S-2209-3 Sta-Strap as required.

- g. Connect wires and cables as follows:
  1. Connect electrical wires and wire shielding ground at alternator.

### **CAUTION**

When connecting starter cable, do not permit starter terminal bolt to rotate. Rotation of the bolt could break the conductor between bolt and field coils causing the starter to be inoperative.

2. Connect starter electrical cable at starter.
  3. Connect tachometer drive shaft at adapter. Be sure drive cable engages drive in adapter. Hand tighten housing attach nut then tighten 1/4 turn more.
  4. Install clamps and lacings securing wires and cables to engine, engine mount and brackets.
- h. Install flexible duct to heater valve and engine baffle and install clamps.
  - i. Install flexible duct to engine baffle and oil cooler and install clamps.
  - j. Install propeller and spinner in accordance with instructions outlined in Section 13.
  - k. Complete a magneto switch ground-out and continuity check, then connect primary lead wires to the magnetos. Remove the temporary ground or connect spark plug leads, whichever procedure was used during removal.

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- l. Clean and install induction air filter.
- m. Service engine with proper grade and quantity of engine oil. Refer to Section 2 if engine is new, newly overhauled or has been in storage.
- n. Check all switches are in the OFF position, and connect battery cables.
- o. Rig engine controls in accordance with paragraphs 11-64, 11-65 and 11-66.
- p. Inspect engine installation for security, correct routing of controls, lines, hoses and electrical wiring, proper safetying and tightness of all components.
- q. Install engine cowling in accordance with paragraph 11-3.
- r. Perform an engine runup and make final adjustments on the engine controls.

### 11-18. FLEXIBLE FLUID HOSES.

#### 11-19. LEAK TEST.

- a. After each 100 hours of engine operation, all flexible fluid hoses in the engine compartment should be checked for leaks as follows:
  1. Examine the exterior of hoses for evidence of leakage of wetness.
  2. Hoses found leaking should be replaced.
  3. Refer to paragraph 11-15 for detailed inspection procedures for flexible hoses.

#### 11-20. REPLACEMENT.

- a. Hoses should not be twisted on installation. Pressure applied to a twisted hose may cause failure or loosening of the nut.
- b. Provide as large a bend radius as possible.
- c. Hoses should have a minimum of one-half inch clearance from other lines, ducts, hoses or surrounding objects or be butterfly clamped to them.
- d. Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set will result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to its original position.
- e. Refer to Advisory Circular 43.13-1, Chapter 10, for additional installation procedures for flexible fluid hose assemblies.

#### 11-21. STATIC RUN-UP PROCEDURES. In a case of suspected low engine power, a static RPM run-up should be conducted as follows:

- a. Run up engine, using full throttle (mixture leaned to obtain maximum RPM with the aircraft facing four different directions, each 90° to the other).
- b. Record the rpm obtained in each run-up position.

#### NOTE

Daily changes in atmospheric pressure and humidity will have a slight effect on static rpm. For changes in static rpm, see figure 11-1A.

- c. Average the results of the rpm obtained. It should be within  $\pm$  50 rpm of that shown in figure 11-1A.
- d. If the average results of the rpm obtained are lower than stated above, the following recommended checks may be performed to determine a possible deficiency.
  1. Check carburetor heat control for proper rigging. If partially open it would cause a slight power loss.
  2. Check magneto timing, spark plugs and ignition harness for settings and conditions.

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STATIC RPM  
FULL THROTTLE, MIXTURE LEANED  
FOR MAXIMUM RPM.

ALLOWABLE TOLERANCE =  $\pm 50$

STATIC RPM

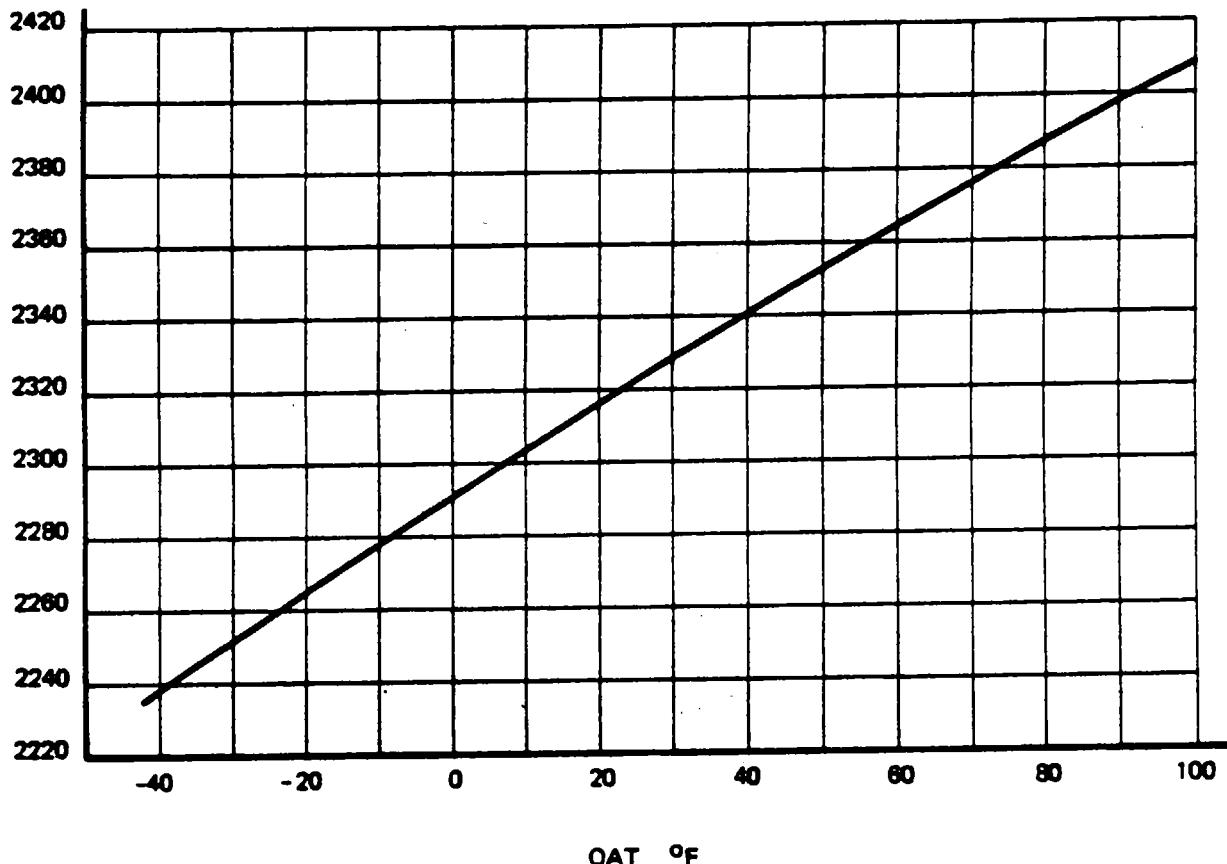


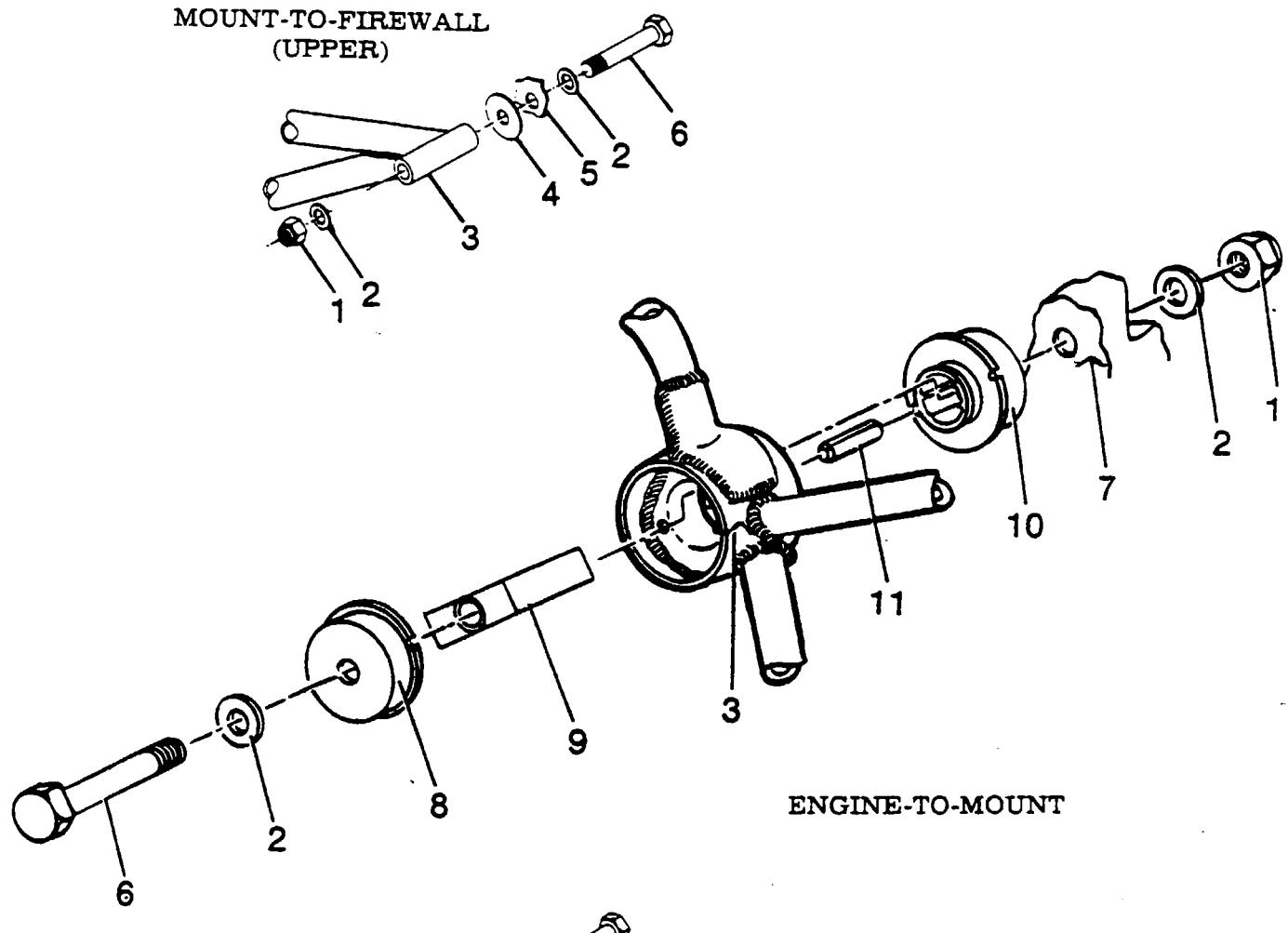
Figure 11-1A. Static RPM

3. Check condition of induction air filter. Clean if necessary.
4. Perform an engine compression check. (Refer to engine Manufacturer's Overhaul and Repair Manual).

### 11-22. BAFFLES.

- 11-23. DESCRIPTION. The sheet metal installed on the engine directs the cooling air flow around the cylinders and other engine components to provide optimum engine cooling. These baffles incorporate rubber-asbestos composition seals at points of contact with the engine cowling to help confine and direct cooling air to the desired area. The baffles, air blast tubes and air scoops are accurately positioned to maintain engine cooling efficiency and their removal will cause improper air circulation and engine overheating.

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### NOTE

Locating pin (11) should be installed in the engine mounts, with equal length protruding from each side. This must be done prior to the installation of the shock mount pads (8) and (10).

1. Nut
2. Washer
3. Engine Mount
4. Washer
5. Firewall
6. Bolt
7. Engine Mount Foot
8. Shock Mount Pad
9. Shock Mount Dampener
10. Shock Mount Pad
11. Locating Pin

Figure 11-2. Engine Mount Details

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- 11-24. **CLEANING AND INSPECTION.** Engine baffles should be cleaned with a suitable solvent to remove dirt and oil.

### NOTE

The rubber-asbestos seals are oil and grease resistant but should not be soaked in solvent for long periods.

Inspect baffles for cracks in the metal and for loose and/or torn seals. Replace defective parts.

- 11-25. **REMOVAL AND INSTALLATION.** Removal and installation of the various baffle segments is possible with the cowling removed. Be sure that any replacement baffles and seals are installed correctly and that they seal to direct the cooling air in the correct direction.
- 11-26. **REPAIR.** Baffles ordinarily should be replaced if damaged or cracked. However, small plate reinforcements riveted to the baffle will often prove satisfactory both to the strength and cooling requirements of the unit.

11-27. **ENGINE MOUNT.**

- 11-28. **DESCRIPTION.** The engine mount is composed of sections of steel tubing welded together and reinforced with gussets. The mount is fastened to the fuselage at four points. The engine is attached to the engine mount with shock-mount assemblies which absorb engine vibrations.

- 11-29. **REMOVAL AND INSTALLATION.** Removal of the engine mount is accomplished by removing the engine as outlined in paragraph 11-12, then removing the engine mount from the firewall. On reinstallation torque the mount-to-firewall bolts to 160-190 lb-in. Torque the engine-to-mount bolts to 450-500 lb-in.

- 11-30. **REPAIR.** Refer to Section 17 of this manual for repair procedures.

- 11-31. **PAINTING.** Refer to Section 18 of this manual for painting procedures.

- 11-32. **ENGINE SHOCK-MOUNT PADS.** (See figure 11-2.) The bonded rubber and metal shock-mounts are designed to reduce transmission of engine vibrations to the airframe. The rubber pads should be wiped clean with a clean dry cloth.

### NOTE

Do not clean the rubber pads and dampener assembly with any type of cleaning solvent.

Inspect the metal parts for cracks and excessive wear due to aging and deterioration. Inspect the rubber pads for separation between the pad and metal backing, swelling, cracking or a pronounced set of the pad. Install new parts for all parts that show evidence of wear or damage.

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11-32A. **REDUCING VALVE STICKING.** Field experience has shown that engine oil contamination increases the possibility of sticking and/or stuck valves. This situation occurs when contaminants in engine lubrication oil become deposited on the valve stems, restricting valve movement, and resulting in intermittent engine hesitation or miss. Operating with any of the following conditions present can promote deposit buildup reducing valve guide clearance and resulting in valve sticking:

- a. Contaminated, dirty engine oil supply.
- b. High ambient temperature.
- c. Slow flight with reduced cooling.
- d. High lead content of fuel.

More frequent oil and filter changes (50 hour) will minimize accumulation of harmful contaminants, the prime cause of valve sticking. When the aircraft cannot be flown frequently, the oil and filter should be changed even sooner. Changing oil and filter every 25 hours will eliminate moisture and acids that collect in oil of an inactive engine. Operating the engine with a clean air filter is all important for keeping dirt from accumulating in the oil supply. Therefore, the entire air induction system should be sealed to prevent the entry of unfiltered air.

It is important that cooling air baffles and baffle strips be in good condition to prevent localized overheating problems. In addition, exposing the engine to sudden cool down, as in a rapid descent with reduced power or shutting down the engine before it has sufficiently cooled down, can also induce valve sticking.

The lead salts that accumulate in lubricating oil from the use of leaded fuels contribute to deposit buildup in valve guides. They are mostly eliminated each time the oil and filter are changed; however, regular use of low-leaded fuels will reduce deposit accumulation and valve sticking.

Refer to Section 2 for valve and valve guide cleaning procedures.

11-33. **ENGINE OIL SYSTEM.**

11-34. **DESCRIPTION.** The lubricating system is of the full pressure wet sump type. Refer to applicable engine manufacturer's overhaul manual for specific details and descriptions.

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## 11-35. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO OIL PRESSURE.	No oil in sump.  Oil pressure line broken, disconnected or pinched.  Oil pump defective.  Defective oil pressure gage.  Oil congealed in gage line.  Relief valve defective.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.  Inspect pressure lines. Replace or connect lines as required.  Remove and inspect. Examine engine. Metal particles from damaged pump may have entered engine oil passages.  Check with a known good gage. If second reading is normal, replace gage.  Disconnect line at engine and gage; flush with kerosene. Pre-fill with kerosene and install.  Remove and check for dirty or defective parts. Clean and install; replace valve if defective.
LOW OIL PRESSURE.	Low oil supply.  Low viscosity oil.  Oil pressure relief valve spring weak or broken.  Defective oil pump.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.  Drain sump and refill with proper grade and quantity of oil.  Remove and inspect spring. Replace weak or broken spring.  Check oil temperature and oil level. If temperature is higher than normal and oil level is correct, internal failure is evident. Remove and inspect. Examine engine. Metal particles from damaged pump may have entered oil passages.

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### 11-35. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
LOW OIL PRESSURE (Cont.).	Secondary result of high oil temperature.	Observe oil temperature gage for high indication. Determine and correct reason for high oil temperature.
	Leak in pressure or suction line.	Inspect gasket between accessory housing and crank-case. Repair engine as required.
	Dirty oil screens.	Remove and clean oil screens.
HIGH OIL PRESSURE.	High viscosity oil.	Drain sump and refill with proper grade and quantity of oil.
	Relief valve defective.	Remove and check for dirty or defective parts. Clean and install; replace valve if defective.
	Defective oil pressure gage.	Check with a known good gage. If second reading is normal, replace gage.
LOW OIL TEMPERATURE.	Defective oil temperature gage or temperature bulb.	Check with a known good gage. If second reading is normal, replace gage. If reading is similar, the temperature bulb is defective. Replace bulb.
	Oil cooler thermostatic valve/bypass valve defective or stuck.	Remove valve and check for proper operation. Replace valve if defective.
HIGH OIL TEMPERATURE.	Oil cooler air passages clogged.	Inspect cooler core. Clean air passages.
	Oil cooler oil passages clogged.	Drain oil cooler. Inspect for sediment. Remove cooler and flush thoroughly.
	Thermostatic valve or bypass valve damaged or held open by solid matter.	Feel front of cooler core with hand. If core is cold, oil is bypassing cooler. Remove and clean valve and seat. If still inoperative, replace.

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### 11-35. TROUBLE SHOOTING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH OIL TEMPERATURE (Cont.).	Low oil supply.	Check with dipstick. Fill sump with proper grade and quantity of oil. Refer to Section 2.
	Oil viscosity too high.	Drain sump and refill with proper grade and quantity of oil.
	Prolonged high speed operation on the ground.	Hold ground running above 1500 RPM to a minimum.
	Defective oil temperature gage.	Check with a known good gage. If second reading is normal, replace gage.
	Defective oil temperature bulb.	Check for correct oil pressure, oil level and cylinder head temperature. If they are correct, check oil temperature gage for being defective; if similar reading is observed, bulb is defective. Replace bulb.
	Oil congealed in cooler.	This condition can occur only in extremely cold temperatures. If congealing is suspected, use an external heater or a heated hangar to warm the congealed oil.
OIL LEAK AT FRONT OF ENGINE.	Damaged crankshaft seal.	Replace.
OIL LEAK AT PUSH ROD HOUSING.	Damaged push rod housing oil seal.	Replace.

### 11-36. FULL-FLOW OIL FILTER. (See figure 11-3.)

11-37. DESCRIPTION. An external oil filter may be installed on the engine. The filter and filter adapter replace the regular engine oil pressure screen and cast chamber on the accessory housing. The filter adapter incorporates mounting provisions for the oil cooler bypass valve and the oil temperature sensing bulb. If the filter element should become clogged, the bypass valve allows engine oil to flow to the engine oil passages. Beginning with aircraft 15284592 & on, and A15200949 & on, the Full-Flow oil filter will be included as standard equipment.

## MODEL 152 SERIES SERVICE MANUAL

### 11-38. REMOVAL AND INSTALLATION. (See figure 11-3.)

#### NOTE

Replacement filters are available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station.

- a. Remove engine cowling in accordance with paragraph 11-3.
- b. Remove safety wire from filter.
- c. Unscrew filter from adapter.
- d. Lightly lubricate gasket with engine oil only prior to installations.
- e. Install spin-on filter on the stud and torque to 19-29 lb-ft or 3/4 to 1 full turn after gasket makes contact.
- f. Safety wire filter to adapter.
- g. After first engine run check for oil leaks.

### 11-39. FILTER ADAPTER.

### 11-40. REMOVAL. (See figure 11-3.)

- a. Remove filter assembly in accordance with paragraph 11-36.
- b. Remove oil temperature bulb (5) from adapter (3).
- c. Remove the three bolts and washers attaching adapter to accessory housing.
- d. Remove nut and washers attaching the lower left corner of adapter to accessory housing and remove adapter.
- e. Remove gasket (2) from adapter mounting pad and discard.

### 11-41. DISASSEMBLY, INSPECTION AND REASSEMBLY.

After removal of the adapter (3), remove thermostatic bypass valve (8) for cleaning. Do not disassemble the valve. Clean adapter and thermostatic valve in solvent and dry with compressed air. Ensure that all passages in adapter are open. Remove any gasket material that may have adhered to the adapter. Inspect adapter for cracks, damaged threads, scratches or gouges to gasket seats. If any of these are found, install a new adapter. Using a new gasket install thermostatic bypass valve in adapter.

### 11-42. INSTALLATION.

- a. Using a good grade gasket sealant, install a new gasket on accessory housing adapter mount pad. Note that one side of the gasket is marked "OIL FILTER SIDE".
- b. Install adapter on mounting pad and install bolts, washers and nut. Use lockwashers next to bolt heads and nut.
- c. Tighten bolts and nut to 75 lb-in.
- d. Install oil temperature bulb in adapter.
- e. Install filter assembly in accordance with paragraph 11-38.
- f. Install any components removed for access.

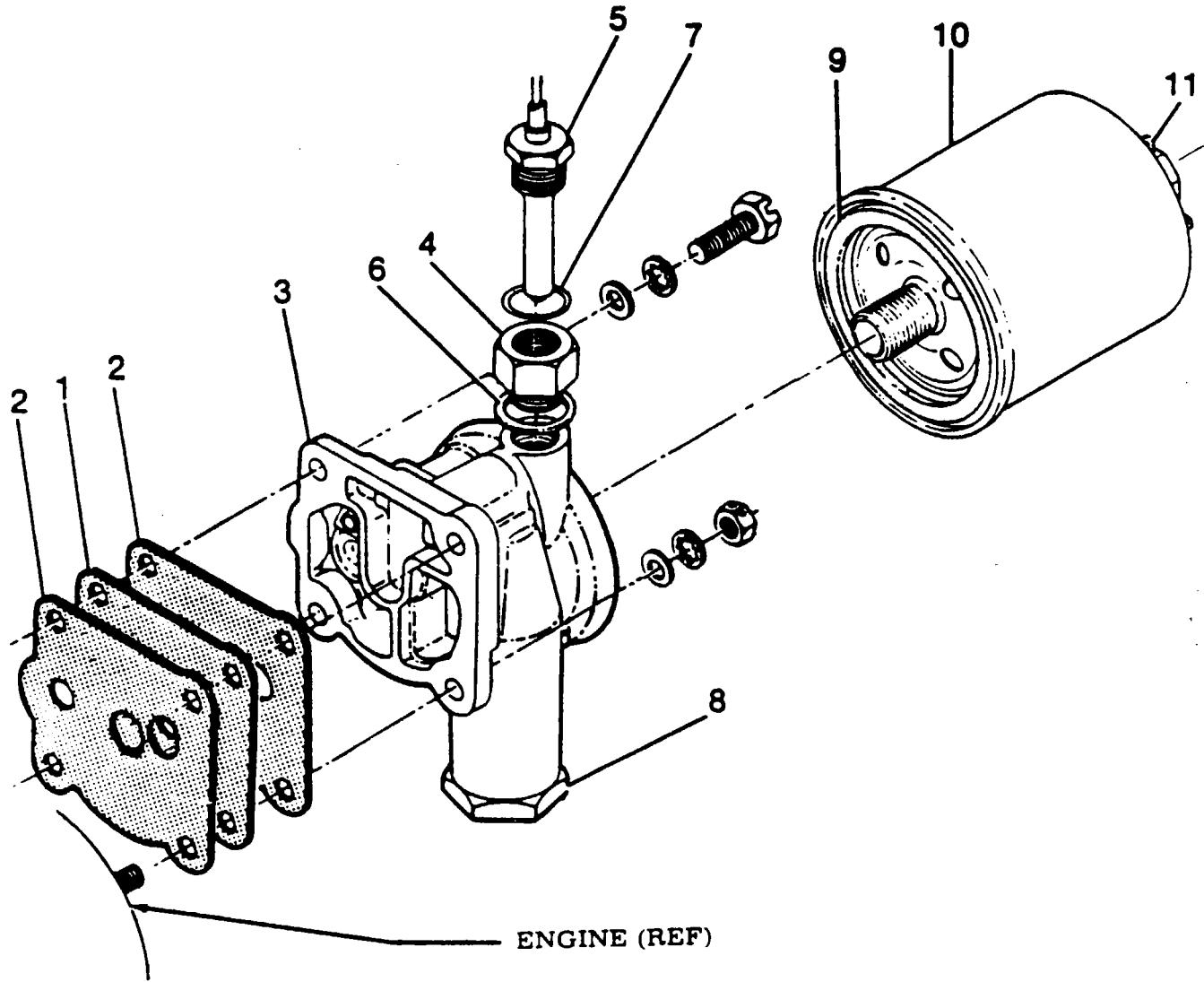
### 11-43. OIL COOLER.

### 11-44. DESCRIPTION.

The external oil cooler is mounted on the left forward baffle. Flexible hoses carry the oil to and from the cooler. Ram air passes through the coil cooler and is discharged into the engine compartment. A capped tee is provided for draining the oil cooler.

### 11-45. ENGINE FUEL SYSTEM.

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**NOTE**

One side of gasket (2) is marked OIL FILTER SIDE.

1. Plate
2. Gasket
3. Adapter
4. Oil Temperature Bulb Adapter
5. Oil Temperature Bulb
6. Gasket
7. Gasket
8. Thermostatic Valve
9. Oil Filter Gasket
10. Spin-On Oil Filter
11. Safety Wire Tab

Figure 11-3. Full-Flow Oil Filter

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11-46. **DESCRIPTION.** A single barrel, float-type up-draft carburetor is installed on the engine. The carburetor is equipped with a manual mixture control and an idle cut-off. Beginning with aircraft 152S3592 & on, and A1520379 & on, carburetor incorporates an accelerator pump. The accelerator pump rod must be attached to the lowest (shortest stroke) hole of the pump actuating lever. For repair and overhaul of the carburetor, refer to the manufacturer's overhaul and repair manual.

11-47. **CARBURETOR.**

11-48. **REMOVAL AND INSTALLATION.**

- a. Place fuel shut-off valve in the OFF position.
- b. Remove engine cowling in accordance with paragraph 11-3.
- c. Drain fuel from strainer and lines with strainer drain control.
- d. Disconnect throttle and mixture controls at carburetor. Note the EXACT position, size and number of washers and spacers for reference on reinstallation.
- e. Disconnect and cap or plug fuel line at carburetor.
- f. Remove induction airbox.
- g. Remove nuts and washers attaching carburetor to intake manifold and remove carburetor.
- h. Reverse the preceding steps for reinstallation. Use new gasket between carburetor and intake manifold. Check carburetor throttle arm to idle stop arm attachment for security and proper safetying at each normal engine inspection in accordance with figure 11-4A.

11-49. **IDLE SPEED AND MIXTURE ADJUSTMENTS.** Since idle RPM may be affected by idle mixture adjustment, it may be necessary to readjust idle RPM after setting the idle mixture.

- a. Start and run engine until the oil temperature and oil pressure are in the normal operating range.
- b. Check the magnetos for proper operation in accordance with paragraph 11-53.
- c. Clear the engine by advancing the RPM to approximately 1000, then retard the throttle to the idle position. The engine RPM should stabilize at  $600 \pm 25$ . If not, adjust the idle speed screw IN to increase and OUT to decrease RPM.

### NOTE

An engine should idle smoothly, without excessive vibrations. The idle speed should be high enough to maintain idling oil pressure and to preclude any possibility of engine stoppage in flight when the throttle is closed.

- d. After the idle speed has stabilized ( $600 \pm 25$  RPM), move the mixture control slowly toward the IDLE CUT-OFF position and observe the tachometer for any minute change during this manual leaning procedure.
- e. Quickly return the mixture control to the FULL RICH position before the engine stops.
- f. A momentary increase of approximately 25 RPM while slowly manually leaning the mixture is most desirable. An increase of more than 25 RPM indicates a rich idle mixture and an immediate decrease in RPM (if not preceded by a momentary increase) indicates a lean idle mixture.
- g. If the idle mixture is too rich, turn the idle mixture adjustment center screw one or two notches in a clockwise direction as viewed from the aft end of the unit, then repeat steps "d" through "f".

## MODEL 152 SERIES SERVICE MANUAL

### NOTE

After each adjustment to the idle mixture, run engine up to approximately 2000 RPM to clear the engine of excess fuel and obtain a correct idle speed.

- h. If the idle mixture is too lean, turn the idle mixture adjustment center screw one or two notches in a counterclockwise direction as viewed from the aft end of the unit. then repeat steps "d" thru "f".
- i. This method of adjustment will give the desired idle RPM. If the adjustments do not remain stable, check the throttle and mixture linkage for evidence of wear and improper rigging. Any looseness of the throttle and mixture linkage will cause erratic idling. In all cases, allowance should be made for the effect of weather condition upon idling adjustment. The relation of the aircraft to the prevailing wind direction will have an effect on the propeller load and engine RPM. It is advisable to make idle adjustments with the aircraft crosswind.

### 11-50. INDUCTION AIR SYSTEM.

- 11-51. DESCRIPTION. Ram air to the engine enters the induction airbox through an opening in the forward part of the lower engine cowling nose cap. The air is filtered through a filter which is located at the opening in the nose cap. From the induction airbox the filtered air is directed to the inlet of the carburetor, mounted on the lower side of the engine, and through the carburetor, where fuel is mixed with the air, to the intake manifold. From the intake manifold, the fuel-air mixture is distributed to each cylinder by separate intake pipes. The intake pipes are attached to the intake manifold with hose and clamps and to the cylinder with a two bolt flange which is sealed with a gasket. The induction airbox contains a valve, operated by the carburetor heat control in the cabin, which permits air from an exhaust heated source to be selected in the event carburetor icing or filter icing should be encountered.

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### 11-52. REMOVAL AND INSTALLATION.

- a. Remove airbox and carburetor as outlined in paragraph 11-48.
- b. Remove intake pipes by disconnecting hose and removing nuts and washers attaching pipes to cylinders.
- c. Installation of the system is the reverse of the preceding steps. Use new gaskets at installation.

### 11-53. IGNITION SYSTEM.

11-54. DESCRIPTION. Sealed, lightweight Slick magnetos are used on the engine. The 4052 magneto is equipped with an impulse coupling. The magnetos MUST NOT BE DISASSEMBLED. Internal timing is fixed and the breaker points are not adjustable. Timing marks are provided on the distributor gear and distributor block, visible through the air vent holes, for timing to the engine. A timing hole is provided in the bottom of the magneto adjacent to the magneto flange. A timing pin (or 0.093 inch 8-penny nail) can be inserted through this timing hole into the mating hole in the magneto rotor shaft to lock the magneto approximately in the proper firing position. Slick lightweight ignition harness is used with the lightweight magnetos. For ignition harness repair, refer to the manufacturer's Service Manual.

#### **WARNING**

During all magneto maintenance, always take proper precautions to make sure the engine can not fire or start when the propeller is moved.

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### 11-54A. TROUBLE SHOOTING - IGNITION SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START.	Defective ignition switch.  Spark plugs defective, improperly gapped or fouled by moisture or deposits.  Defective ignition harness.	Check switch continuity. Replace if defective.  Clean, regap and test plugs. Replace if defective.  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 in 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 magneto(s).
	Defective magneto.	Refer to paragraph 11-54.
	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.

## MODEL 152 SERIES SERVICE MANUAL

### 11-54A. TROUBLE SHOOTING - IGNITION SYSTEM (Cont).

ENGINE WILL NOT IDLE IDLE OR RUN PROPERLY.	Spark plugs defective, improperly gapped or  Defective ignition harness  Defective magneto.  Impulse coupling pawls remain engaged.  Spark plugs loose.	Clean, regap and test plugs. Replace if defective. fouled by moisture deposits.  If no defects are found by a visual inspection, check with a harness tester. Replace defective parts.  Refer to paragraph 11-54.  Listen for loud clicks as impulse coupling operates. Remove magneto and determine cause. Replace defective magneto.  Check and install properly.
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- 11-55. **MAGNETO REMOVAL.** Remove high-tension outlet plate, disconnect primary "P" lead, and remove nuts and washers securing magneto to the engine. Note the approximate angular position at which the magneto is installed, then remove the magneto.
- 11-56. **INTERNAL TIMING.** Internal timing is accomplished during manufacture of the magneto. Since these magnetos are NOT TO BE DISASSEMBLED, there is no internal timing involved.
- 11-57. **REPLACEMENT INTERVAL.** These magnetos cannot be overhauled in the field. The coil, capacitor, and breaker assembly are non-replacable. As a good maintenance practice, and to have the benefit of good ignition at all times, it is recommended that the magnetos be removed at 900 hours of magneto time, and install new exchange magnetos.
- 11-58. **MAGNETO INSTALLATION AND TIMING TO ENGINE.** The magneto must be installed with its timing marks correctly aligned, with number one cylinder on its compression stroke, and with the number one piston at its advanced firing position. Refer to paragraph 11-8 for the advanced firing position of number one piston. To locate the compression stroke of the number one cylinder, remove the lower spark plug from number two, three, and four cylinders and remove the upper spark plug from number one cylinder. Place the thumb of one hand over the spark plug hole of number one cylinder and rotate crankshaft in the direction of normal rotation until the compression stroke is indicated by positive pressure inside the cylinder lifting the thumb off the spark plug hole. After the compression stroke is obtained, locate number one piston at its advanced firing position. Locating the advanced firing position of number one piston may be obtained by rotating the crankshaft in direction of normal rotation until No. 1 cylinder is on the compression stroke and approximately 35° BTC. Clamp the ignition timing pointer on the advance timing mark on the rear of the starter ring gear. The starter ring gear may be marked at 20° and 25°. Consult engine nameplate for correct advance timing mark to use. Continue rotating the crankshaft until the timing

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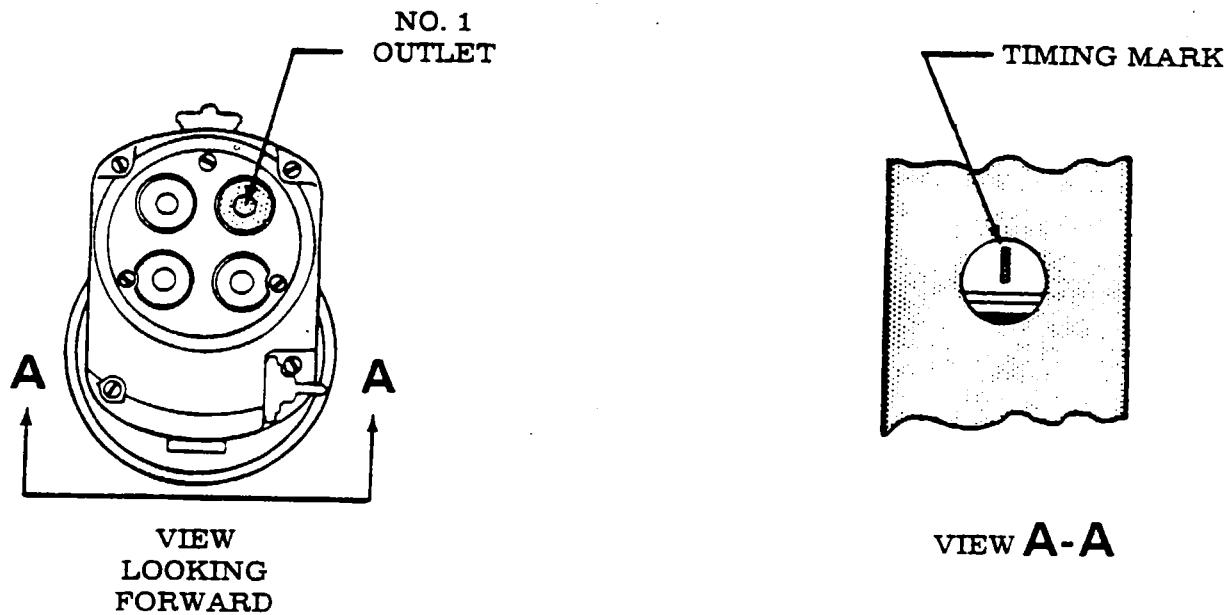
pointer and the parting flange of the crankcase align. Leave the crankshaft in this position until the magneto is installed. In the event that an ignition timing pointer is not available an alternate method may be used. Rotate the crankshaft in direction of normal rotation until No. 1 cylinder is on the compression stroke and continue rotating the crankshaft until the correct advance timing mark on the front of the starter ring gear is in exact alignment with the small drilled hole located at the two o'clock position on the front face of the starter housing. Leave the crankshaft in this position until the magneto is installed.

### NOTE

In all cases, it must be definitely determined that No. 1 cylinder is at the correct firing position, on its compression stroke, when the crankshaft is rotated in its normal direction of rotation.

After the engine has been placed in the correct firing position, install and time magneto to the engine in the following manner.

- a. Remove the timing (vent) plug from the bottom of the magneto. The vent plug in the top of the magneto need not be removed.
- b. Rotate magneto shaft until timing mark on rotor is visible through the vent plug hole. Impulse coupling pawls must be depressed to turn magneto shaft in normal direction of rotation.
- c. Establish that the magneto is at number one firing position. It is possible for the timing mark to be visible while firing position is 180 degrees from number one firing position.



MODEL NO. 4050 SLICK MAGNETO

Figure 11-4. No. 1 Magneto Outlet

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### NOTE

It is necessary to "spark" the magneto to establish the correct firing position. The outlet plate with spark plug leads must be installed on the magneto. Hold number one spark plug lead close to magneto case, or ground the magneto and hold the number one spark plug lead close to a good ground. Rotate impulse coupling in normal direction of rotation until a spark occurs at this lead. (Impulse coupling pawls must be depressed to turn magneto shaft in normal direction of rotation.) Turn impulse coupling backward a few degrees, until timing mark on rotor is centered in vent plug hole and install timing pin (or 0.093 inch 6-penny nail) through hole in bottom of magneto next to the flange and into the mating hole in the rotor shaft. This locks the magneto approximately in firing position while installing it on the engine.

- d. Keep timing mark centered in vent plug hole during installation.
- e. Be sure magneto gaskets are in place and that engine is in correct firing position, then install magneto(s) at the angle noted during removal, tighten mount nuts finger tight.

### CAUTION

Remove timing pin from magneto, if installed. Be sure to remove this pin before rotating crankshaft.

- f. Connect one lead of timing light to the capacitor terminal at the rear of the magneto and ground lead of timing light to a good ground.
- g. Rotate propeller opposite to normal direction of rotation a few degrees (approximately 5 degrees) to close magneto contact points.

### NOTE

Do not rotate propeller back far enough to engage impulse coupling, or propeller will have to be rotated in normal direction of rotation until impulse coupling releases, then backed up a few degrees before the firing position.

- h. Slowly advance propeller (tap forward with minute movements as firing position is approached) in normal direction of rotation until timing light indicates position at which contact points break. The contact points should break at the advanced firing position of number one cylinder. Loosen mounting nuts slightly and rotate magneto case to make contact points break at the correct position. Tighten mounting nuts.

### CAUTION

To prevent possible condenser damage, do not exceed 13-15 lb-in torque when tightening "P" lead nut during installation of Slick magneto.

- i. After tightening magneto mounting nuts, recheck timing. Make sure both magnetos are set to fire at the same time. Remove timing equipment and connect spark plug leads and ignition switch leads.

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### NOTE

Beginning with the number one outlet, the magneto fires at each successive outlet in a counterclockwise direction, looking at the outlets. Connect number one magneto outlet to number one cylinder spark plug lead, number two outlet to the next cylinder to fire, etc. Engine firing order is listed in paragraph 11-8.

- 11-59. **MAGNETO CHECK.** Advanced timing settings in some cases, is the result of the erroneous practice of bumping magnetos up in timing in order to reduce RPM drop on single ignition. NEVER ADVANCE TIMING BEYOND SPECIFICATIONS IN ORDER TO REDUCE RPM DROP. Too much importance is being attached to RPM drop in single ignition. RPM drop on single ignition is a natural characteristic of dual ignition design. The purpose of the following magneto check is to determine that all cylinders are firing. If all cylinders are not firing, the engine will run extremely rough and cause for investigation will be quite apparent. The amount of RPM drop is not necessarily significant and will be influenced by ambient air temperature, humidity, airport altitude, etc. In fact, absence of RPM drop should be cause for suspicion that the magneto timing has been bumped up and is set in advance of the setting specified. Magneto checks should be performed on a comparative basis between individual right and left magneto performance.
- a. Start and run engine until the oil and cylinder head temperatures are in normal operating ranges.
  - b. Advance engine speed to 1700 RPM.
  - c. Turn the ignition switch to the "R" position and note the RPM drop, then return the switch to the "BOTH" position to clear the opposite set of plugs.
  - d. Turn the switch to the "L" position and note the RPM drop, then return the switch to the "BOTH" position.
  - e. The RPM drop should not exceed 125 RPM on either magneto or show greater than 50 RPM differential between magnetos. A smooth RPM drop-off past normal is usually a sign of a too lean or too rich mixture. A sharp RPM drop-off past normal is usually a sign of a fouled plug, a defective harness lead or out of time. If there is doubt concerning operation of the ignition system, RPM checks at a leaner mixture setting or a higher engine speeds will usually confirm whether a deficiency exists.

### NOTE

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system, a disconnected ground lead at magneto or possibly the magneto timing is set too far in advance.

- 11-60. **MAINTENANCE.** Magneto-to-engine timing should be checked at the first 50 hours, first 100 hours, and thereafter at each 200 hours. If timing to the engine is not within plus zero degrees and minus two degrees, the magneto should be timed to the engine.

### NOTE

If ignition trouble should develop, spark plugs and ignition wiring should be checked first. If the trouble appears definitely to be associated with a magneto, the following may be used to help disclose the source of trouble.

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- a. Remove high-tension outlet plate and check distributor block for moisture.
- b. If any moisture is evident, lightly wipe with a soft, dry, lint-free cloth. Reinstall outlet plate.

### NOTE

Since these magnetos MUST NOT BE DISASSEMBLED, new magnetos should be installed if the moisture check does not remedy the trouble.

### 11-60A. AIRCRAFT MAGNETOS (TYPE 4281).

11-60B. DESCRIPTION. Beginning with Serials 15284028 and A1520915, a lightweight Slick 4281 magneto is used on the engine. This magneto is designed for use with light aircraft engines and is a completely self-contained assembly. The rotor revolves on two ball bearings positioned on either side of the rotating magnet. The rotor and bearing assembly is contained within the drive end frame, with bearing preloading determined by a loading spring, eliminating the need for selective shimming. Other components contained within the drive end frame are a high tension coil, retained by wedge-shaped keys, and the contact breaker assembly, secured with two screws to the inboard bearing plate. A two-lobe replaceable cam is fitted to the anti-drive end of the rotor shaft, and a two-pole magnet turns at crankshaft speed, producing four sparks through 720 degrees of engine crankshaft rotation. The distributor housing contains the distributor gear and electrode assembly, distributor block, bearing bar, and condenser. Spark retarding, to assist engine starting, is provided by an impulse coupling mounted on the drive shaft. At engine cranking speed, counterweighted spring-loaded pawls engage a stop pin located in the drive end frame mounting flange. Pawl engagement with the pin retards rotor rotation through 90 degrees, at which point the pawl is released by a cam on the impulse shell. Once the engine starts and accelerates beyond cranking speed, the pawl counterweights move outward, preventing any further engagement between the pin and pawls. The magnetos can be disassembled for inspection and maintenance in the field.

### 11-60C. MAINTENANCE PROCEDURES.

### NOTE

For internal timing procedures, refer to Slick 4200/6200 Series Aircraft Magnetos Maintenance and Overhaul Instructions.

### 11-60D. MAGNETO-TO-ENGINE TIMING. After 100 hours of operation and every 100 hours thereafter, or at annual inspection, whichever comes first, the magneto-to-engine timing should be checked. This is accomplished in the following manner.

### WARNING

Be sure switch is in "OFF" position and the "P" lead is grounded.

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- a. Turn the engine crankshaft in the normal direction of rotation until the No. 1 cylinder is in the full-advance firing position, following the engine manufacturer's procedure for timing of magnetos.
- b. Loosen the magneto mounting bolts, and connect a standard timing light between engine ground and the magneto condenser terminal.

### NOTE

Switch must be "ON".

- c. Rotate the complete magneto opposite normal rotation of the magneto on the engine mounting, until the timing light indicates the contact breaker points are just opening. Secure the magneto in this position.

### WARNING

During all magneto maintenance, always take proper precautions to make sure the engine can not fire or start when the propeller is moved. TURN SWITCH "OFF".

- 11-60E. MAGNETO REMOVAL. Remove high-tension outlet plate, disconnect primary lead, and remove nuts and washers securing magneto to the engine. Note the approximate angular position at which the magneto is installed, then remove the magneto.
- 11-60F. DISASSEMBLY. Refer to Slick 4200/6200 Series Aircraft Magnetos Maintenance and Overhaul Instructions Bulletin, and all revisions and supplements thereto, for disassembly instructions.
- 11-60G. CHECKING CONTACT ASSEMBLIES. At 500 hour intervals, the contact assemblies should be checked for burning or wear.
- 11-60H. POINTS. If the points are not discolored and have a white frosty surface around the edges, the points are functioning properly and should not be touched. Apply M-1827 cam grease sparingly to each lobe of the cam before reassembly. If the points are blue (indicating excessive arcing) or pitted, they should be discarded. Replace both condenser and damaged points.
- 11-60I. CARBON BRUSH. At 500 hour inspections, it is necessary to check the carbon brush in the distributor gear for wear, cracks and chipping. Measure carbon brush length from distributor gear shaft to end of brush. Minimum acceptable length is 1/32 inch. If worn, cracked or chipped, the distributor gear must be replaced. Put a drop of SAE #20 non-detergent machine oil in each oilite bearing in the distributor block and bearing bar.
- 11-60J. HIGH TENSION LEAD. Inspect the high tension lead from the coil to make sure it makes contact with the carbon brush on the distributor gear shaft.
- 11-60K. IMPULSE COUPLING SHELL & HUB. At 500 hour inspection, visually inspect the impulse coupling shell and hub for cracks, loose rivets or rounded pawls that may slip when latching up on the pin. If any of these conditions are evident, the coupling should be replaced.
- 11-60L. CLEANING AND INSPECTION.
  - a. Inspect internal and external threads of all threaded hardware. Damaged or worn parts must be replaced.

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- b. Inspect the bearing plate for excessive wear and damage. (Maximum bearing bore I.D. to be 1.5752 inch.)
- c. Check the rotor for damaged or worn keyway. Check the rotor bearing surfaces for wear. (Minimum O.D. to be 0.8690 inch.)
- d. Inspect the magneto frame and distributor housing for cracks or other damage. Check the bearing bore in the drive end frame for wear. (Maximum I.D. to be 1.5741 inch.)
- e. Clean all parts thoroughly with a grease solvent before reassembly.

### NOTE

No structural repairs are permissible. Replace all items showing wear or damage, or that are not within the tolerances specified.

11-60M. REASSEMBLY. Refer to Slick 4200/6200 Series Aircraft Magnetos Maintenance and Overhaul Instructions Bulletin, and all revisions and supplements thereto, for reassembly instructions.

11-61. SPARK PLUGS. Spark plugs should be rotated from top to bottom on a 25 hour basis and serviced on a 100 hour basis. Depending on the lead content of the fuel and the type of operation, more frequent cleaning of the spark plugs may be necessary.

### NOTE

At each 100 hour inspection, remove, clean, inspect and regap all spark plugs. Install lower spark plugs in upper portion of cylinders and install upper spark plugs in lower portion of cylinders. Since deterioration of lower spark plugs is usually more rapid than that of the upper spark plugs, rotating helps prolong spark plug life.

If excessive spark plug lead fouling occurs, the selection of a hotter plug, from the approved list in Avco Lycoming Service Instruction No. 1042 may be necessary; however, depending on the type of lead deposit formed, a colder plug from the approved list may better resolve the problem. Where the majority of operation is at lower power, such as patrol, a hotter plug would be advantageous. Where the majority of operation is at high cruise powers, a colder plug is recommended.

The problem of lead fouling arises when low operating temperatures coupled with rich mixture prevent complete vaporization of tetraethyl lead (TEL) in aviation fuels. The following operating and maintenance recommendations are made to reduce spark plug lead fouling:

- a. Use 100 Low Lead (100LL) fuel in lieu of 100 grade fuel whenever possible.
- b. Swap top and bottom plugs every 25 hours at minimum.
- c. Use spark plug recommendation charts. Do not simply replace existing plugs.
- d. Do not accept over-rich carburetor mixture. Adjust as required.
- e. Keep engine operating in temperatures in normal, not lower operating range.
- f. Use oil cooler baffles to keep oil temperatures up in winter.
- g. After a flooded start, slowly advance engine to high power to burn off harmful lead deposits, then reduce to normal power.

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### 11-62. ENGINE CONTROLS.

11-63. DESCRIPTION. The throttle, mixture and carburetor heat controls are of the push-pull type. The mixture control is equipped to lock in any position desired. To move the control, the spring-loaded button, located in the end of the control knob, must be depressed. When the button is released, the control is locked. The mixture control also has a vernier adjustment. Turning the knob in either direction will change the control setting. The vernier is primarily for precision control setting. The throttle control has neither a locking button nor a vernier advancement, but contains a knurled friction knob which is rotated for more or less friction as desired. The friction knob prevents vibration induced "creeping" of the control. The carburetor heat control has no locking device. Beginning with serials 15282032 & On and A1520809 & On, the throttle, mixture, and propeller control cable ends that utilize a ball bearing-type rod end, are being secured to the engine with a pre-drilled AN bolt, washers, castellated nut, and a cotter pin. (See figure 11-4A.)

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### NOTE

Larger washer (2) (7/8" x .890 I.D.) is mounted between bolt head and rod end bearing.

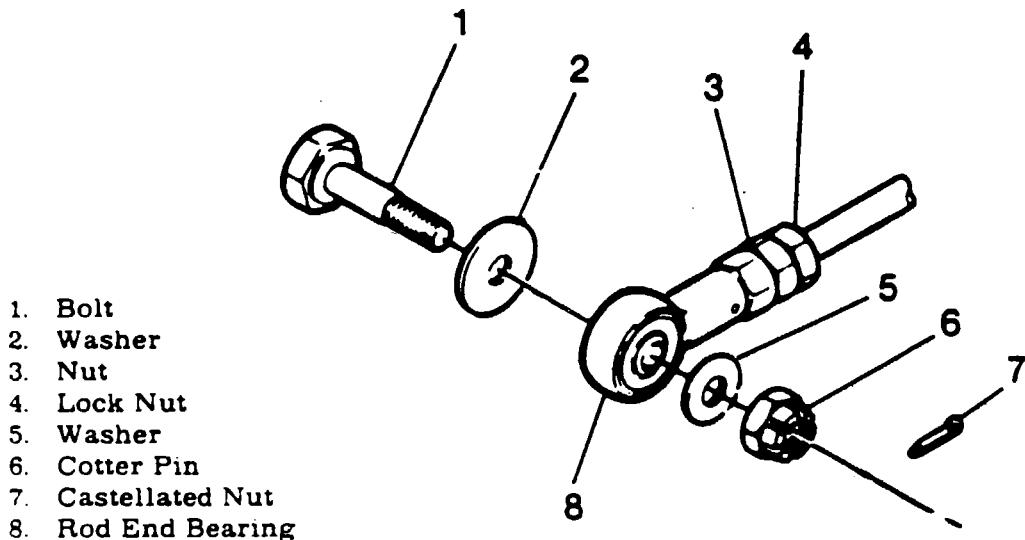


Figure 11-4A. Control Cable Ends

### NOTE

Some controls have intricate parts that will fall out and possibly be lost if the control is pulled from housing while the control is disconnected.

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 are not to be used in this application.

- 11-64. **RIGGING.** When adjusting any engine control, it is important to check that the control slides smoothly throughout its full range of travel, that it locks securely if equipped with a locking device, and the arm or lever which it operates moves through its full arc of travel.

### CAUTION

Whenever engine controls are disconnected, note the exact quantity, position, size and direction of all attaching hardware and ensure that all attaching parts and hardware are reinstalled as noted.

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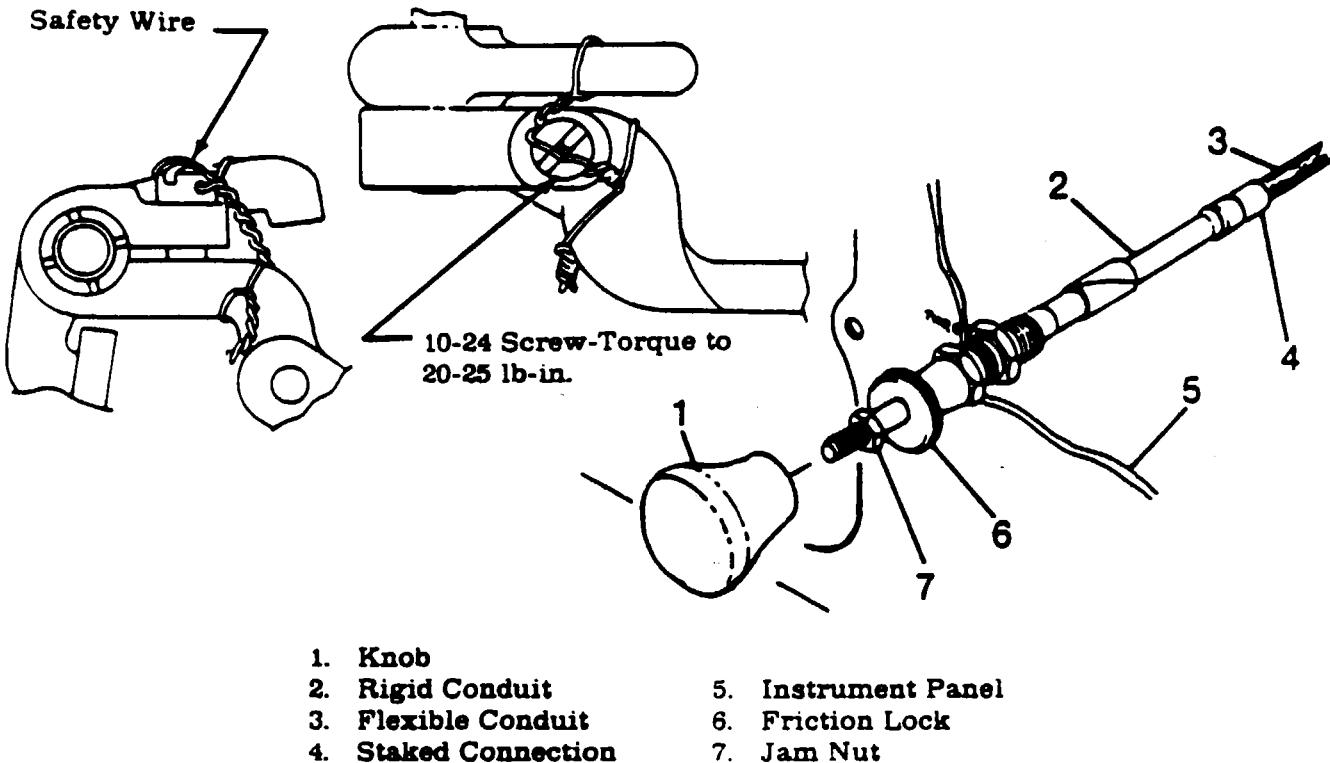


Figure 11-5. Throttle Control

### 11-65. THROTTLE CONTROL.

#### NOTE

Before rigging throttle control shown in figure 11-5, check that staked connection between rigid conduit and flexible conduit is secure. If any indication of looseness or breakage is apparent, install new throttle control before continuing rigging procedure.

- a. Pull throttle control out (idle position) and remove throttle control knob.
- b. Screw jam nut all the way down (clockwise) and install throttle knob. Screw knob securely against the jam nut. Do not back jam nut out. This will prevent bottoming and possible damage to the staked connection.
- c. Disconnect throttle control at the carburetor throttle arm. Push throttle control in until jam nut contacts friction lock. While the friction lock is loose, then pull control out approximately 1/8 inch for cushion. Note position of larger washer at carburetor end of control. Install washer in same position when connecting control to arm.

## MODEL 152 SERIES SERVICE MANUAL

- d. Tighten friction lock, being careful not to change position of the throttle.
- e. Move throttle arm on the carburetor to full open, adjust rod end at end of throttle control to fit, and connect to arm on carburetor.
- f. Release friction lock and check full travel of arm on carburetor. If further adjustment is required, make all adjustments at the carburetor end of control. DO NOT change jam nut setting.
- g. Tighten rod end locknuts at carburetor end of control. Be sure to maintain sufficient thread engagement between rod end and control.

### NOTE

Refer to the Inspection Chart in Section 2 for inspection, lubrication and/or replacement interval for the throttle control.

#### 11-66. MIXTURE CONTROL.

- a. Push mixture control full in (RICH), unlock then pull it out approximately 1/8 inch for cushion.
- b. Loosen clamp securing the control housing to the engine.
- c. Shift the control housing in the clamp so that the mixture arm on the carburetor is in full open (RICH). Tighten clamp in this position.
- d. Unlock and pull mixture control full out. Check that mixture arm on carburetor is full closed (IDLE CUT-OFF).
- e. Check that bolt and nut at the mixture arm on the carburetor secures the control wire and that the bolt will swivel in the arm.
- f. Bend control wire tip 90 degrees to prevent it from being withdrawn if the attaching nut should become loose.
- g. When installing a new control assembly, it may be necessary to shorten the wire and/or control housing.
- h. The mixture arm on the carburetor must contact the stops in each direction, and the control should have approximately 1/8 inch cushion when pushed full in (RICH).

### NOTE

Refer to the Inspection Chart in Section 2 for inspection, lubrication and/or replacement interval for the mixture control.

#### 11-67. CARBURETOR HEAT CONTROL.

- a. Loosen clamp securing the control to the bracket on the airbox.
- b. Push control full in, then pull it out approximately 1/8 inch from panel for cushion.
- c. Shift the control housing in its clamp so that the valve lever is full forward, with valve seating inside airbox. Tighten clamp in this position.
- d. Pull out on the control and check that the air valve inside the airbox seats in the opposite direction.
- e. Check that bolt and nut on the air throttle lever secures the control wire and that the bolt will swivel in the lever.
- f. Bend the wire tip 90 degrees to prevent it from becoming withdrawn if the attaching nut should become loose.

### NOTE

Refer to the Inspection Chart in Section 2 for inspection, lubrication and/or replacement interval for the carburetor heat control.

## MODEL 152 SERIES SERVICE MANUAL

### 11-68. STARTING SYSTEM.

11-69. DESCRIPTION. The starting system employs an electrical starter motor mounted at the front (propeller end) lower left side of the engine. Beginning with Aircraft 15283092 & on, and A1520853 & on, a Prestolite Slower Turning starter is installed. A starter solenoid is activated by the ignition switch on the instrument panel. When the solenoid is activated, its contacts close and electrical current energizes the starter motor. Initial rotation of the starter motor engages the starter through an overrunning clutch in the starter adapter.

### 11-70. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
STARTER WILL NOT OPERATE.	Defective master switch or circuit.	Install new switch or wires.
	Defective starter switch or switch circuit.	Install new switch or wires.
	Defective starter motor.	Remove, repair or install new starter motor.
STARTER MOTOR RUNS, BUT DOES NOT TURN CRANKSHAFT.	Defective overrunning clutch or drive.	Install new starter adapter.
	Starter motor shaft broken.	Install new starter motor.
STARTER MOTOR DRAGS.	Low battery.	Charge or install new battery.
	Starter switch or relay contacts burned or dirty.	Install serviceable unit.
	Defective starter motor power cable.	Install new cable.
	Loose or dirty connections.	Remove, clean and tighten all terminal connections.
	Defective starter motor.	Check starter motor brushes, brush spring tension, thrown solder on brush cover. Repair or install new starter motor.
	Dirty or worn commutator.	Clean and turn commutator.

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### 11-71. REMOVAL AND INSTALLATION.

- a. Remove cowling as required for access.

#### CAUTION

When disconnecting or connecting the starter cable, do not permit starter terminal bolt to rotate. Rotation of the terminal bolt could break the conductor between terminal and field coils causing the starter motor to be inoperative.

- b. Disconnect starter power cable at starter. Insulate terminal on power cable to prevent accidental shorting.
- c. Remove three nuts and washers and one bolt securing starter to crankcase. Work starter from engine.
- d. To install starter, position starter on mounting pad, aligning dowel pins in starter mounting pad with holes in mounting pad on engine.
- e. Secure starter with washer, lockwasher and nut in three places and install bolt and washers.
- f. Tighten nuts and bolt evenly to a torque value of 150 lb-in.
- g. Connect electrical cable to starter terminal and install engine cowling.

### 11-72. PRIMARY MAINTENANCE.

The starting circuit should be inspected at regular intervals, the frequency of which should be determined by the amount of service and conditions under which the equipment is operated. Inspect the battery and wiring. Check battery for fully charged condition, proper electrolyte level with approved water and terminals for cleanliness. Inspect wiring to see that all connections are clean and tight and that the wiring insulation is sound. Check that the brushes slide freely in their holders and make full contact on the commutator. When brushes are worn to one-half of their original length, install new brushes (compare with new brushes). Check the commutator for uneven wear, excessive glazing or evidence of excessive arcing. If the commutator is only slightly dirty, glazed, or discolored, it may be cleaned with a strip of No. 00 or No. 000 sandpaper. If the commutator is rough or worn, it should be turned in a lathe and the mica undercut. Inspect the armature shaft for rough bearing surfaces. New brushes should be properly seated when installing by wrapping a strip of No. 00 sandpaper around the commutator (with sanding side out) 1-1/4 to 1-1/2 times maximum. Drop brushes on sandpaper covered commutator and turn armature slowly in the direction of normal rotation. Clean sanding dust from motor after sanding operations.

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- 11-73. EXHAUST SYSTEM.
- 11-74. DESCRIPTION. The exhaust system consists of an exhaust pipe from each cylinder to the muffler located beneath the engine. The muffler assembly is enclosed in a shroud which captures ram air to be heated by the exhaust gases in the muffler. This heated air is used to heat the aircraft cabin. Through 1979 models, the muffler also furnishes heated air for carburetor heat at the engine intake system. Beginning with 1980 models, a shroud is fitted to the number 4 cylinder exhaust pipe to supply heated air for carburetor heat. A tail pipe from the muffler routes exhaust gases overboard through the lower cowling.
- 11-75. REMOVAL.
- Remove engine cowling as required for access.
  - Disconnect flexible ducts from shrouds on muffler assembly.
  - Remove optional EGT probe (if installed) per Section 15.
  - Disconnect braces from muffler and tail pipe assemblies.
  - Remove nuts and washers securing the exhaust stack assemblies to the cylinders.
  - Remove exhaust stack assembly.
- 11-76. INSPECTION. Inspection of the exhaust system shall be thorough because the cabin heating system uses air heated by the heat exchangers of the exhaust system. Since exhaust systems of this type are subject to burning, cracking, and general deterioration from alternate thermal stresses and vibration, inspection is very important and should be accomplished every 100-hours of operation. In addition, an inspection of the exhaust system shall be performed anytime exhaust fumes are detected in the cabin area.
- Remove engine cowling, and loosen or remove shrouds so that ALL surfaces of the exhaust system can be visually inspected. Especially check areas adjacent to welds. Look for exhaust gas deposits in surrounding areas, indicating that exhaust gas is escaping through a crack or hole.
  - For a more thorough inspection, or if fumes have been detected in the cabin, the following inspection is recommended:
    - Remove exhaust pipe and muffler.
    - Use rubber expansion plugs to seal openings.
    - Using a manometer or gage, apply approximately 1-1/2 psi (3 inches of mercury) air pressure while the muffler and each exhaust pipe is submerged in water. All leaks will appear as bubbles and can be readily detected.
    - It is recommended that any exhaust pipe or muffler found defective be replaced with a new part before the next flight.
  - Install exhaust system.
- 11-77. INSTALLATION. Reverse procedure outlined in paragraph 11-75 to install exhaust system. Be sure there is one new copper-asbestos gasket between each exhaust pipe and its mounting pad on the cylinder. Make sure clamps attaching muffler to exhaust pipes are tight and all air ducts are installed.

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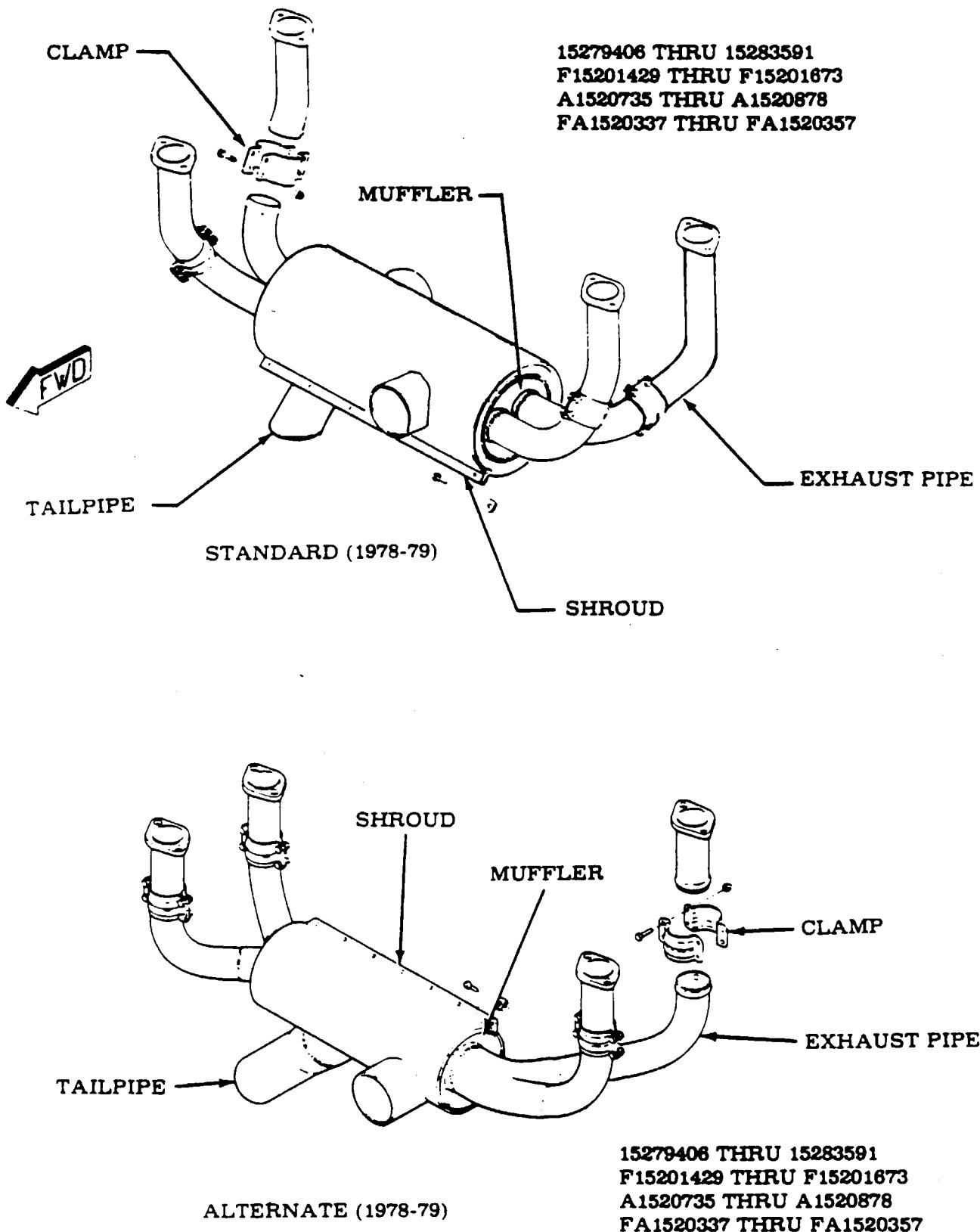


Figure 11-6. Exhaust System (Sheet 1 of 3)

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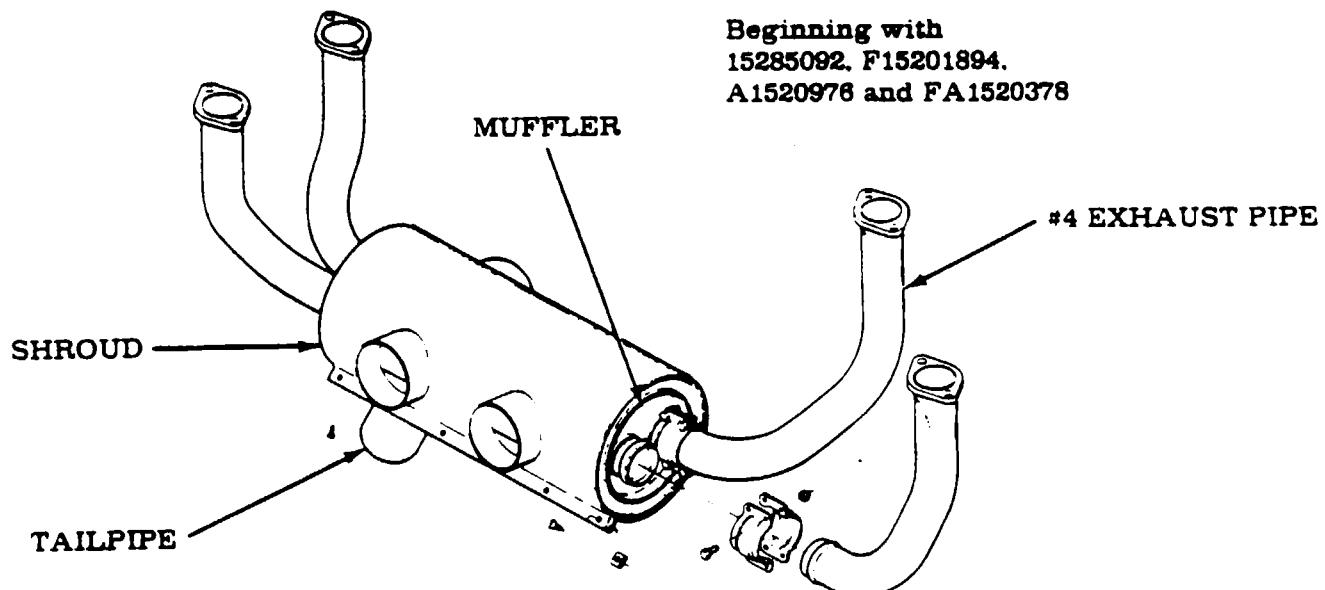
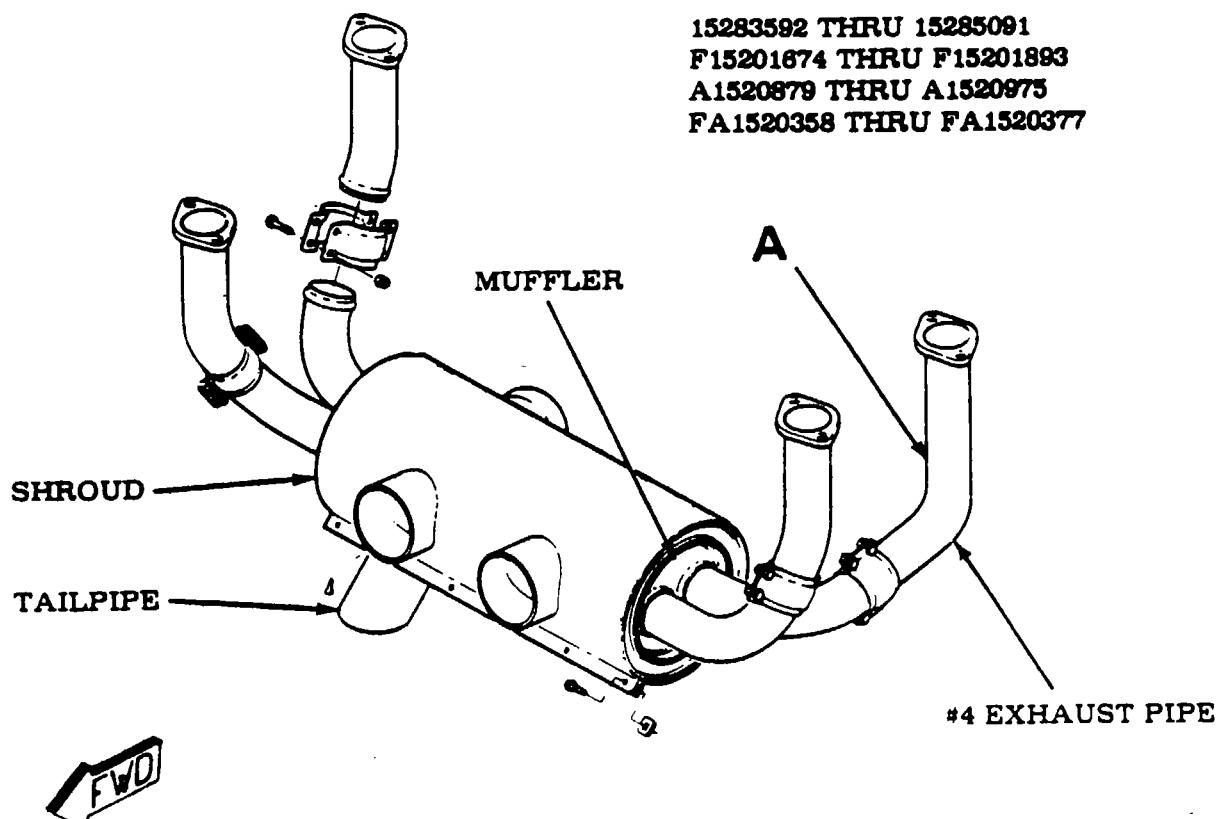
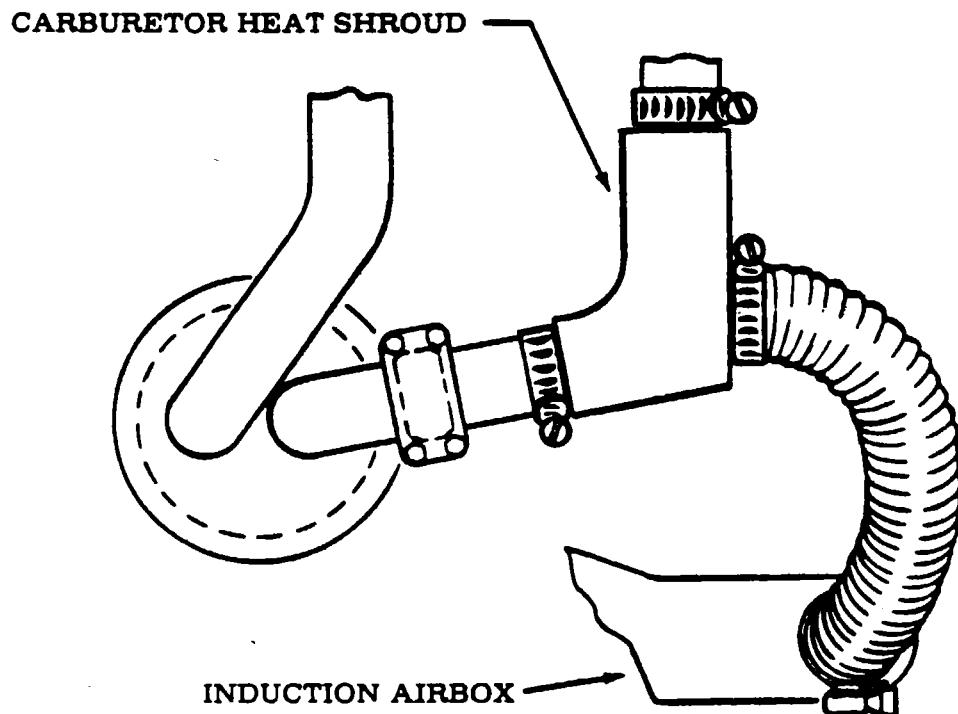


Figure 11-6. Exhaust System (Sheet 2 of 3)

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Detail A



Beginning with  
15284899, F15201894,  
A1520971 and FA1520378

Figure 11-6. Exhaust System (Sheet 3 of 3)

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### 11-78. EXTREME WEATHER MAINTENANCE.

#### NOTE

Refer to the appropriate Pilot's Operating Handbook for approved starting procedures.

- 11-79. COLD WEATHER. Cold weather starting is made easier with the installation of the engine primer system and ground service receptacle. The primer system is a manually operated type. Fuel is supplied by a line from the fuel strainer to the plunger type primer. Operating the primer plunger in the cabin forces fuel to the engine. With the ground service receptacle installed, an external power source may be connected to assist in cold weather or low battery starting. Refer to Section 16 for use of the ground service receptacle.

The following may also be used to assist engine starting in extreme cold weather. After the last flight of the day, drain the engine oil into a clean strainer so the oil can be preheated. Cover the engine to prevent ice or snow from collecting inside the cowling. When preparing the aircraft for flight or engine run-up after these conditions have been followed, preheat the drained oil.

#### WARNING

Do not heat oil above 121°C (250°F). A flash fire may result. Before pulling the propeller through, ascertain that magneto switch is in OFF position to prevent the engine from firing.

After preheating the oil, gasoline may be mixed with the heated oil in a ratio of 1 part gasoline to 12 parts oil before pouring into the engine oil sump. If the free air temperature is below -29°C (-20°F), the engine compartment should be preheated with a ground heater. Preheating the engine compartment is accomplished by inducing heated air up through the nose gear opening, thus heating both the oil and cylinders. After the engine compartment has been preheated, inspect all engine drain and vent lines for presence of ice. After this procedure has been complied with, pull propeller through several revolutions by hand before starting the engine.

#### CAUTION

Due to the desludging effect of the diluted oil, engine operation should be observed closely during the initial warm up of the engine. Engines that have accumulated a considerable amount of operational hours since their last dilution period may be seriously affected by the dilution process. This is caused by the diluted oil dislodging sludge and carbon deposits within the engine. This residue will collect in the oil sump and possibly clog the screened inlet to the oil pump. Small deposits may enter the oil pump and be trapped by the pressure oil filter screen. Partial or, in some cases, complete loss of engine

## MODEL 152 SERIES SERVICE MANUAL

lubrication may result from either condition. If these conditions are anticipated after oil dilution, the engine should be operated for several minutes at normal operating temperatures and then stopped and inspected for evidence of sludge and carbon deposits in the oil sump and oil filter screen. Future occurrence of this condition can be prevented by diluting the oil prior to each oil change. This will prevent the build-up accumulation of the sludge and carbon deposits within the engine.

- 11-80. **DUSTY CONDITIONS.** Dust inducted into the intake system of the engine is probably the greatest single cause of early engine wear. When operating under high dust conditions, the induction air filter should be serviced daily as outlined in Section 2.
- 11-81. **SEACOAST AND HUMID AREAS.** In salt water areas, special care should be taken to keep the engine and accessories clean to prevent oxidation. In humid areas, fuel and oil should be checked frequently and drained of condensed moisture.

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## SECTION 12

### FUEL SYSTEM

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#### 12-1. FUEL SYSTEM.

- 12-2. DESCRIPTION. Fuel is gravity fed from the metal wing tanks, through a shutoff valve and a fuel strainer, to the carburetor. Positive ventilation is provided by a vent line and a check valve assembly located in the left wing tank, a crossover line connecting the two tanks together, and a vented fuel cap on the right hand tank. The vent line from the check valve assembly extends overboard through the lower wing skin adjacent to the left wing strut. A fuel drain is located between the shutoff valve and the strainer.
- 12-3. PRECAUTIONS. Common sense as well as certain general precautions should be followed when working on or around fuel systems. Some of these precautions are:
- Always GROUND the aircraft to a suitable ground stake to prevent electrostatic build up.
  - Use drip pans to prevent accumulation of drainage from lines, hoses, and fittings, because accumulation increases the fire hazard.
  - Cap or cover all open lines or connections to prevent damage to threads and entrance of foreign materials.

#### NOTE

Use NS-40 (RAS-4) (Snap-On-Tools Corp., Kenosha, Wisc.), MIL-T-5544 (Thread Compound Antiseize, Graphite Petrolatum), USP Petrolatum or engine oil as a thread lubricant, and to seal fittings. Apply sparingly to male threads, and avoid stringing across openings. Make sure no foreign material can enter the fuel system.

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### 12-4. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
NO FUEL TO CARBURETOR.	Fuel shutoff valve not turned on.	Turn valve on. (Safety in ON position.)
	Fuel tanks empty.	Service with proper grade and amount of fuel.
	Plugged fuel strainer.	Remove and clean strainer and screen.
	Fuel line plugged.	Clean out or replace fuel line.
	Fuel tank outlet strainers plugged.	Remove and clean strainers and flush out fuel tanks.
	Inlet elbow or inlet screen in carburetor plugged.	Clean and/or replace.
	Fuel line disconnected or broken.	Connect or repair fuel lines.
	Defective fuel shutoff valve.	Replace shutoff valve.
	Partial fuel flow from the preceding causes.	Use the preceding remedies.
	Plugged fuel vent.	See paragraph 12-11.
FUEL STARVATION AFTER STARTING.	Water in fuel.	Drain fuel tank sumps, fuel lines and fuel strainer.
	Fuel tanks empty.	Service with proper grade and amount of fuel.
	Blown fuse.	Replace blown fuse.
	Loose connections or open circuit.	Tighten connections; repair or replace wiring. Refer to Section 19.
NO FUEL QUANTITY INDICATION.	Defective fuel quantity indicator or transmitter.	Refer to Section 15.
	Plugged bleed hole in fuel vent.	Check per paragraph 12-11.
PRESSURIZED FUEL TANK.		

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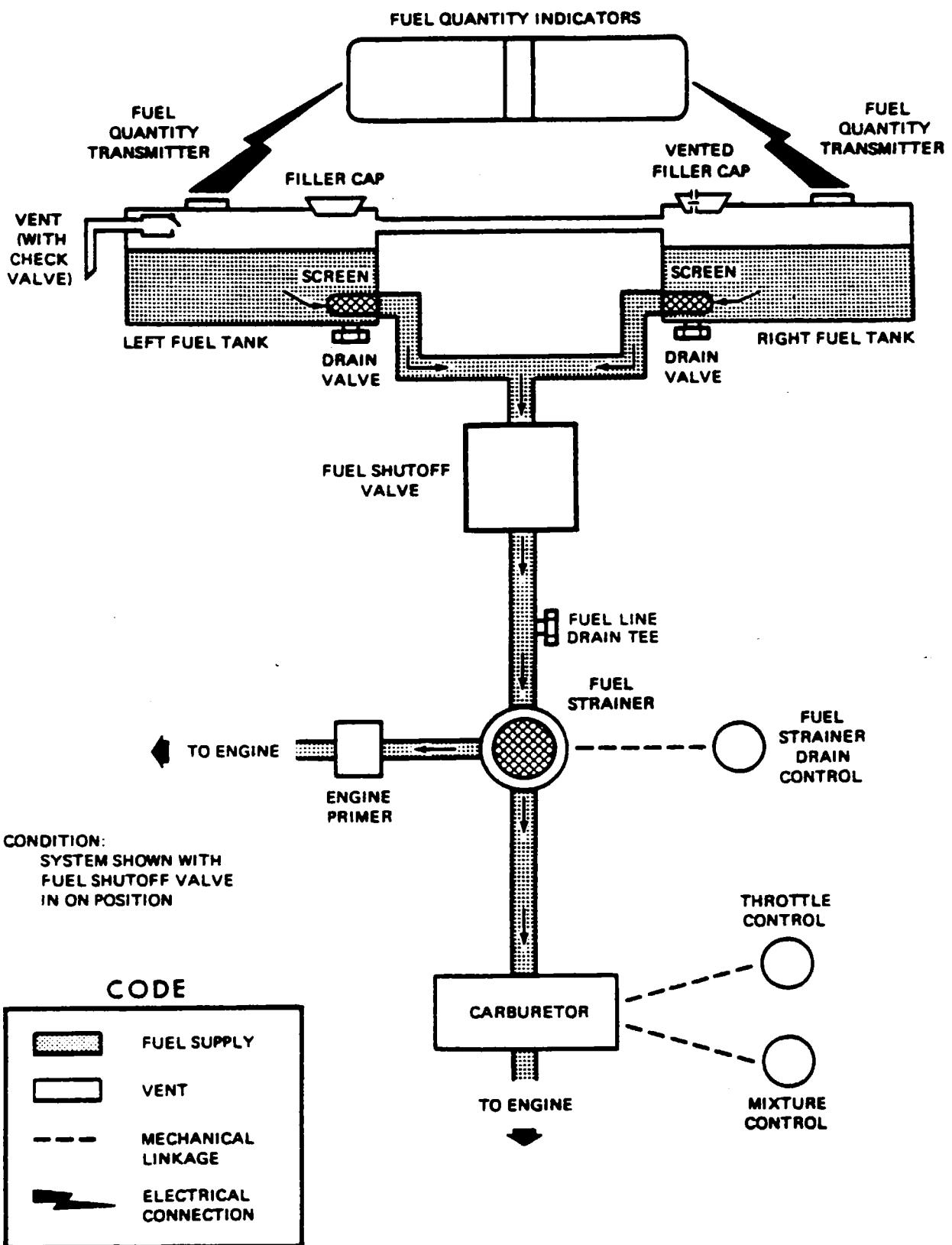
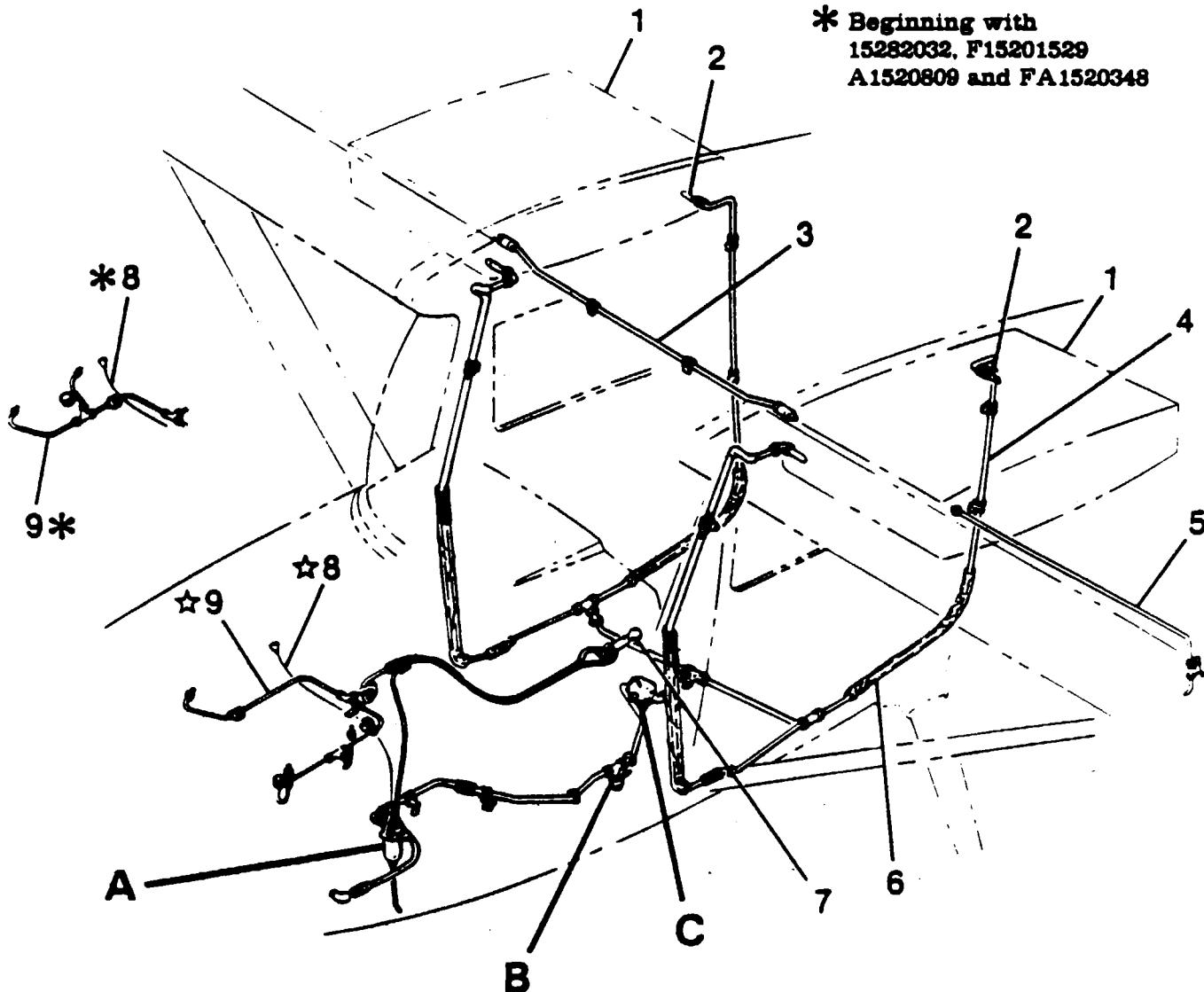


Figure 12-1. Fuel System Schematic

# MODEL 152 SERIES SERVICE MANUAL

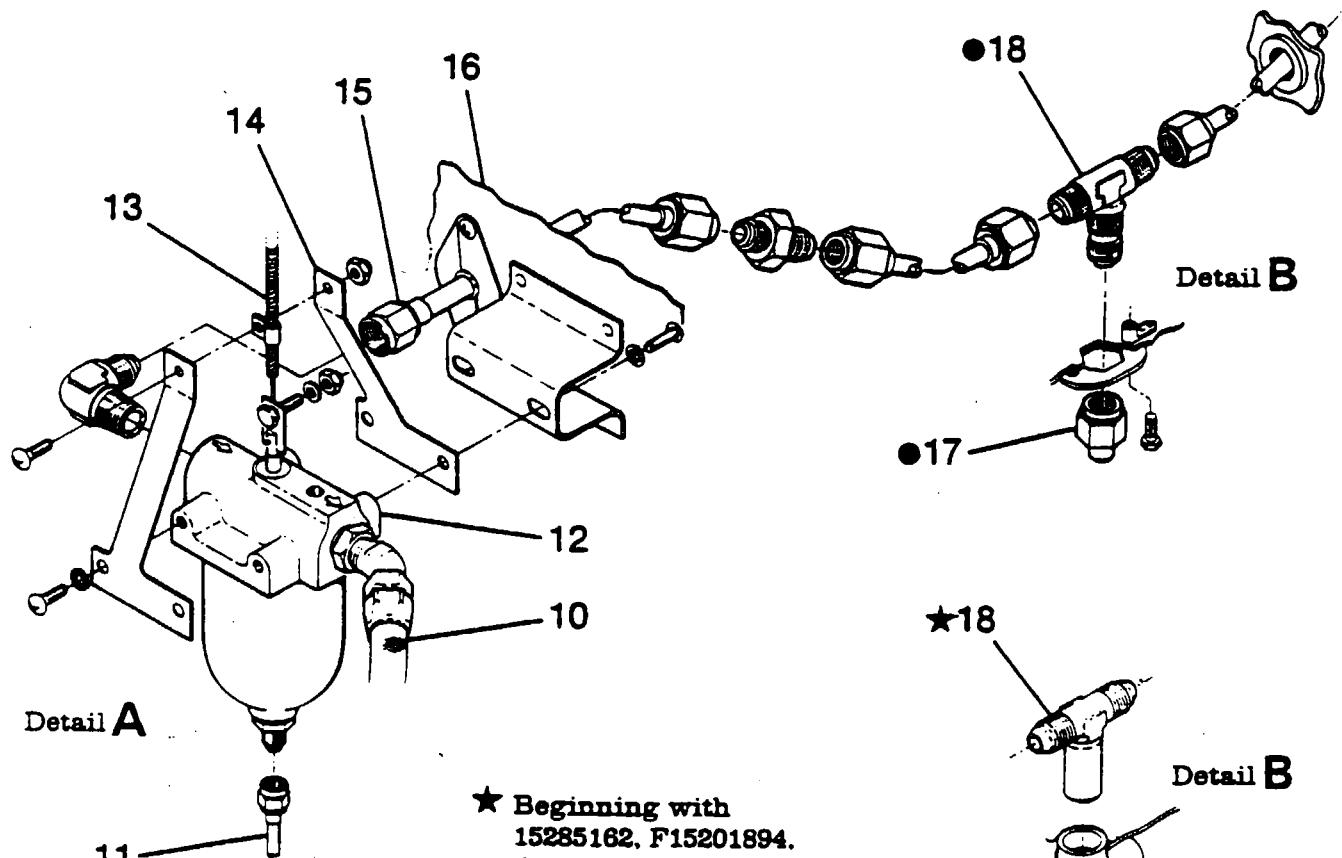


- 1. Fuel Tank
  - 2. Tank Outlet (Screen)
  - 3. Vent Crossover Line
  - 4. Fuel Supply Line
  - 5. Vent Line (Overboard)
  - 6. Sleeve
  - 7. Primer
  - 8. Strainer Drain Control
  - 9. Primer Delivery Line
  - 10. Strainer to Engine Hose
  - 11. Strainer Drain Line
  - 12. Strainer
  - 13. Strainer Drain Control
  - 14. Bracket
  - 15. Shield
  - 16. Firewall
  - 17. Cap
  - 18. Fuel Line Drain Tee
  - 19. Handle
  - 20. Shutoff Valve
  - 21. Packing
  - 22. "B" Nut
  - 23. Elbow
- ★ 15279406 THRU 15282031  
F15201429 THRU F15201528  
A1520735 THRU A1520808  
FA1520337 THRU FA1520347

Figure 12-2. Fuel System (Sheet 1 of 2)

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- 15279406 THRU 15285161
- F15201429 THRU F15201893
- A1520735 THRU A1520983
- FA1520337 THRU F1520377



- \*\* Quick drain valve installed on airplanes  
15279406 thru 15285161  
A1520735 thru A1520983  
F15201429 thru F15201893  
FA1520337 thru FA1520377  
incorporating SK152-13 and production  
aircraft thereafter.

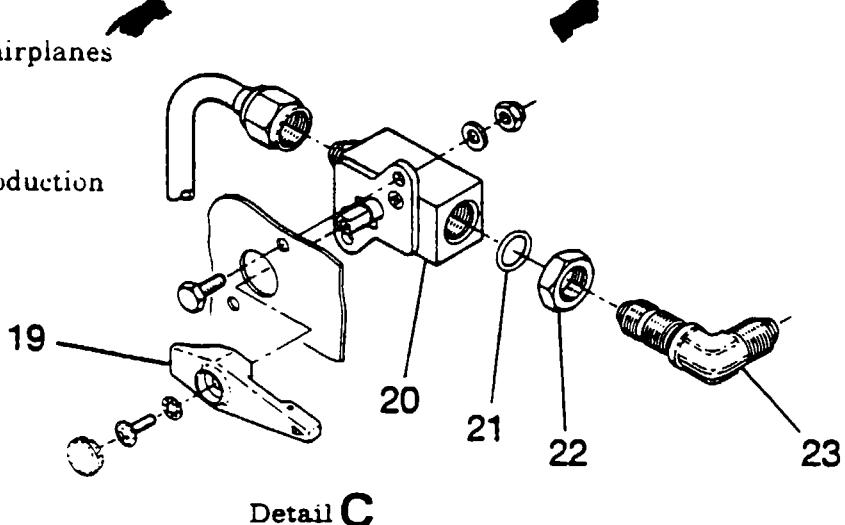


Figure 12-2. Fuel System (Sheet 2 of 2)

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1. Cap
2. Gasket
3. Chain
4. Gasket
5. Fuel Tank
6. Strap
7. Vent Crossover Connection
8. Outlet
9. Tank Drain
10. Ground Strap
11. Fuel Quantity Transmitter
12. Adapter
13. Gasket
14. Screw
- 14A. Upper Wing Skin

### NOTES

Standard range tank shown. Long range tank is similar except for capacity.

\* Thru serials 15279629, F15201528, A1520741, and FA1520347.

\* Beginning with serials 15279630, F15201529, A1520742, and FA1520348, the left hand cap is non-vented. The right hand cap is vented.

When installing a fuel transmitter (11), install a new gasket (13) at the same time. Torque screws (14) to 20 in-lbs (once only) using a cross-pattern sequence.

Additional drain valves installed on airplanes 15279406 thru 15286033  
A1520735 thru A1521049  
F15201429 thru F15201980  
FA1520337 thru FA1520425  
incorporating SK152-18 and production aircraft thereafter.

\*\*\*\* Ensure that word "hinge" is located at top on vent valve (15) and is installed as shown.

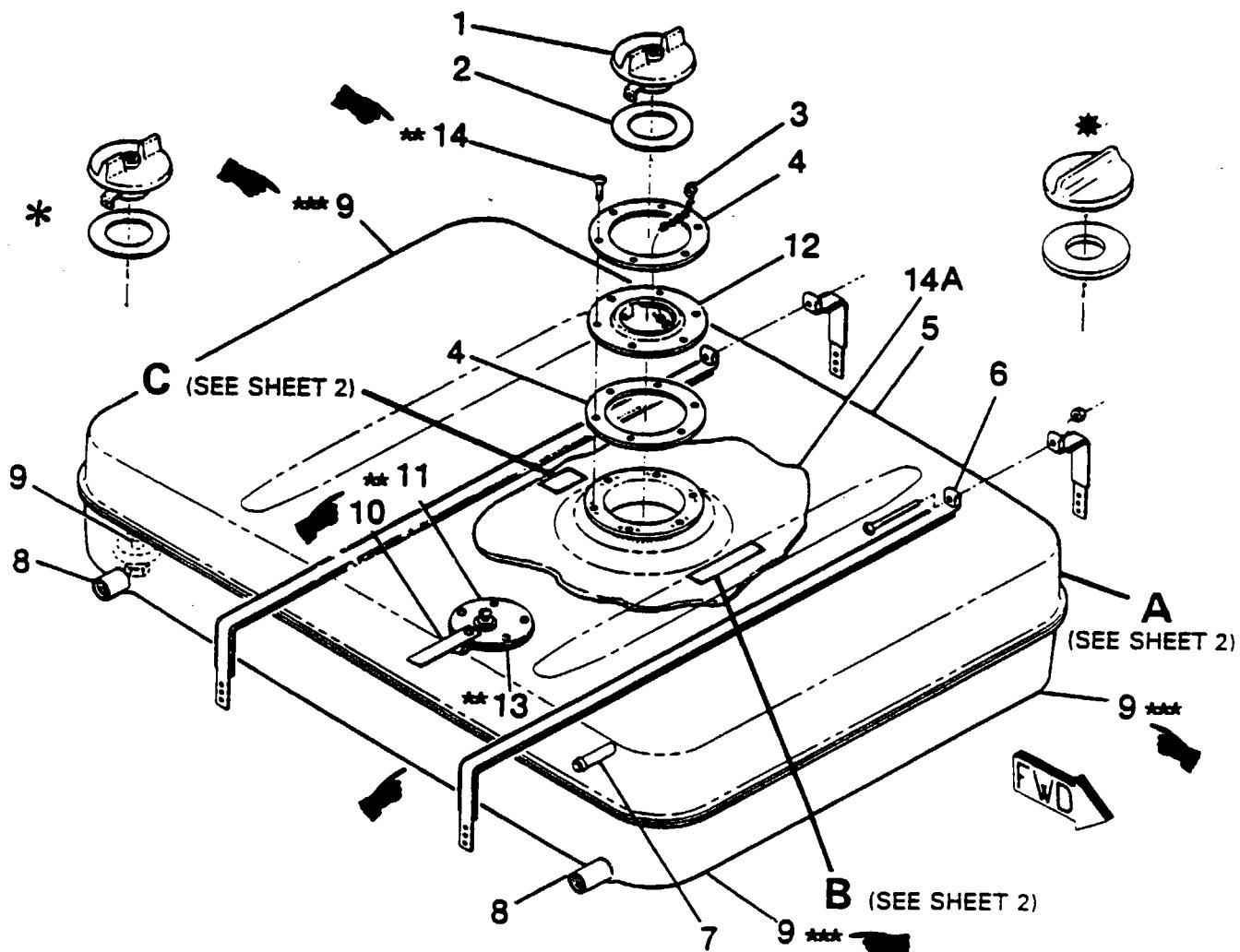
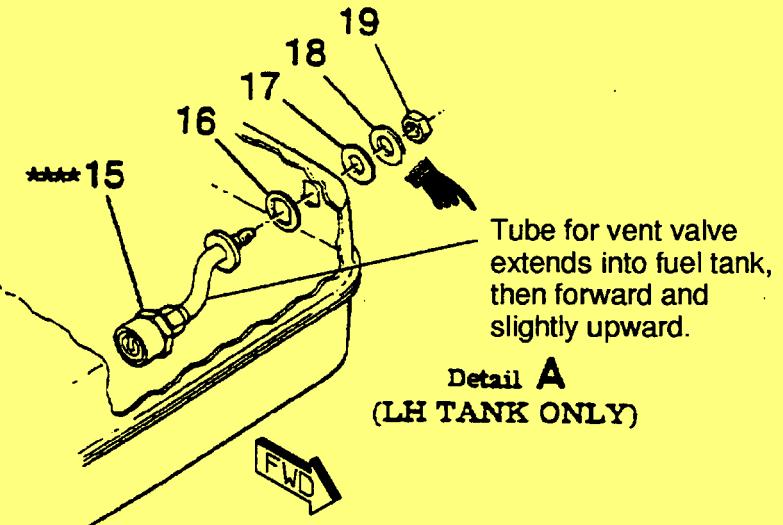


Figure 12-3. Fuel Tank, Cap, and Placards (Sheet 1 of 2)

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B1488

- 15. Vent Valve
- 16. Gasket-Inner
- 17. Gasket-Outer
- 18. Washer
- 19. Nut



Detail A  
(LH TANK ONLY)

FUEL  
100LL/100 MIN. GRADE AVIATION GASOLINE  
CAP. 13 U.S. GAL.

Placard, Fuel Quantity - Standard Tanks

FUEL  
100LL/100 MIN. GRADE AVIATION GASOLINE  
CAP. 19.5 U.S. GAL.  
CAP 13.0 U.S. GAL TO BOTTOM OF FILLER COLLAR

Placard, Fuel Quantity - Long-Range Tanks

Detail B



Placard - Fuel Type

Detail C

## **MODEL 152 SERIES SERVICE MANUAL**

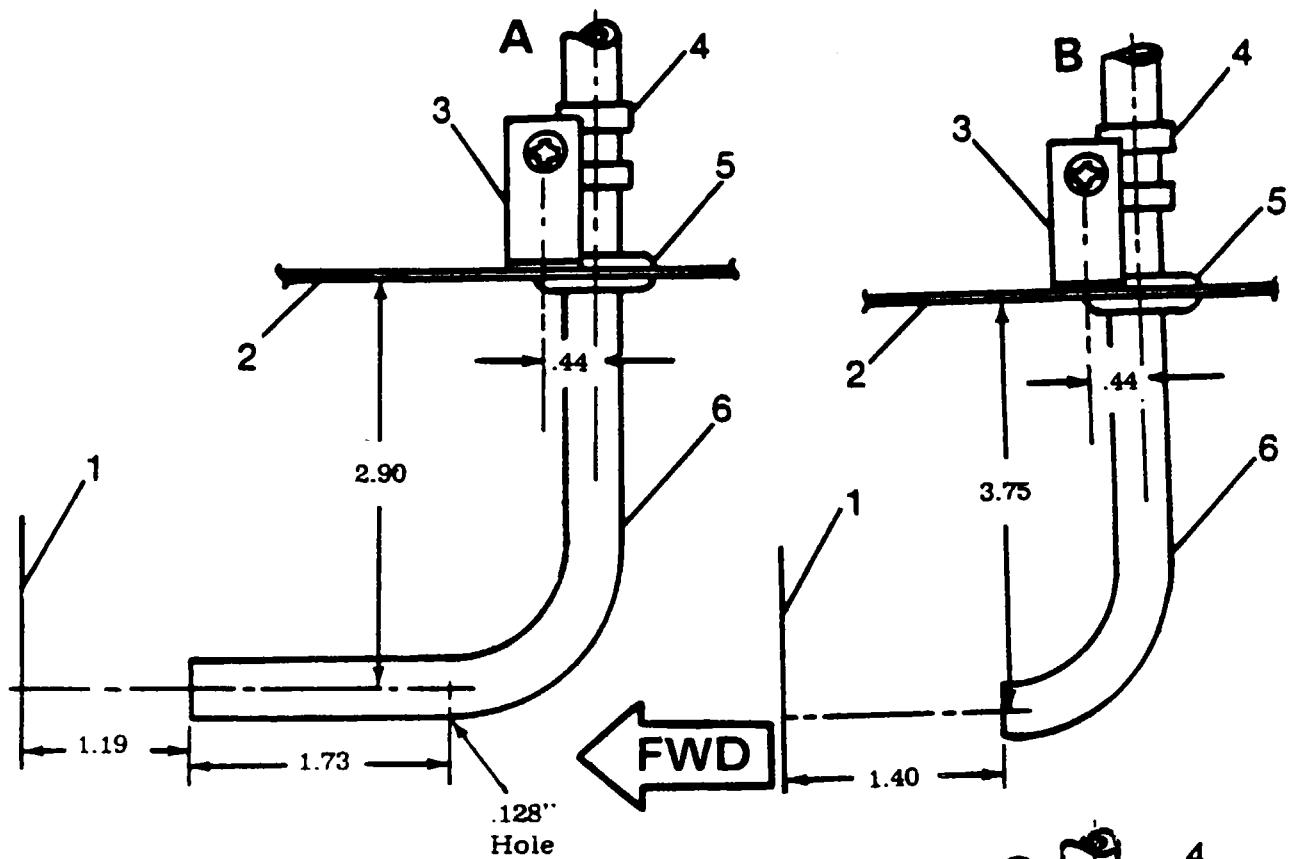
- 12-5. **FUEL TANKS.**
- 12-6. **DESCRIPTION.** A rigid metal tank is installed in the inboard panel of each wing. The standard range tank is shown (see figure 12-3). The long range tank is similar except in capacity. Sump drain plugs or valves, one in each tank, are provided for draining trapped water and sediment.
- 12-7. **REMOVAL AND INSTALLATION.**
  - a. Remove sump drain plug or valve and drain fuel from applicable tank. (Observe precautions outlined in paragraph 12-3.)
  - b. Remove fuel tank cover by removing attaching screws.
  - c. Remove wing root fairings.
  - d. Disconnect and plug or cap all fuel and vent lines from tank. Remove fittings as necessary for clearance when removing tank.
  - e. Disconnect electrical lead and ground strap from fuel quantity transmitter.
  - f. Disconnect straps securing fuel tank and remove tank. Use care to avoid damage to protruding fittings and hose connections when removing the tank.
  - g. To install tank, reverse the preceding steps. Be sure grounding is secure in accordance with figure 12-3.
- 12-8. **FUEL QUANTITY TRANSMITTERS.** Fuel quantity transmitters are installed in the top of fuel tanks. A complete description, along with procedures for removal, installation and adjustment are contained in Section 15.
- 12-9. **FUEL VENTS.**
- 12-10. **DESCRIPTION.** A vent line is installed in the outboard end of the left fuel cell and extends overboard down through the lower wing skin. The inboard end of the vent line extends into the fuel tank, then forward and slightly upward. A vent valve is installed on the inboard end of the vent line inside the fuel tank, and a crossover vent line connects the two tanks for positive ventilation.

### **WARNING**

Upon installation of vent valve, ensure word "hinge" is at the top on vent valve (15). Shown in figure 12-3. Detail A.

- 12-11. **CHECKING.** Venting of the fuel system is necessary to allow normal fuel flow or pressure venting as fuel evaporates. Stoppage of any type can have disastrous results, therefore, the following procedures should be used to ensure operability of vent system.
  - a. Slip a rubber tube over the vent line located beneath the left wing. Be certain it covers the .128" hole in the vent tube on the 152 and F152 Models.
  - b. Blow into tube to slightly pressurize the tanks. If air can be blown into tanks, vent line is open.
  - c. After tank is slightly pressurized, insert end of rubber tube into a container of water and watch for a continuous stream of bubbles, which indicates the bleed hole in valve assembly is open and relieving pressure.

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1. Wing Strut
2. Wing Skin
3. Bracket
4. Clamp
5. Grommet
6. Vent Tube

VENT LINE MUST BE PARALLEL  
TO WING CHORD LINE. TOLER-  
ANCE UP 5°, DOWN 0°.

**A** 152 AND F152 (STD.)

**B** A152 AND FA152

**C** 152 AND F152 (LONG RANGE)

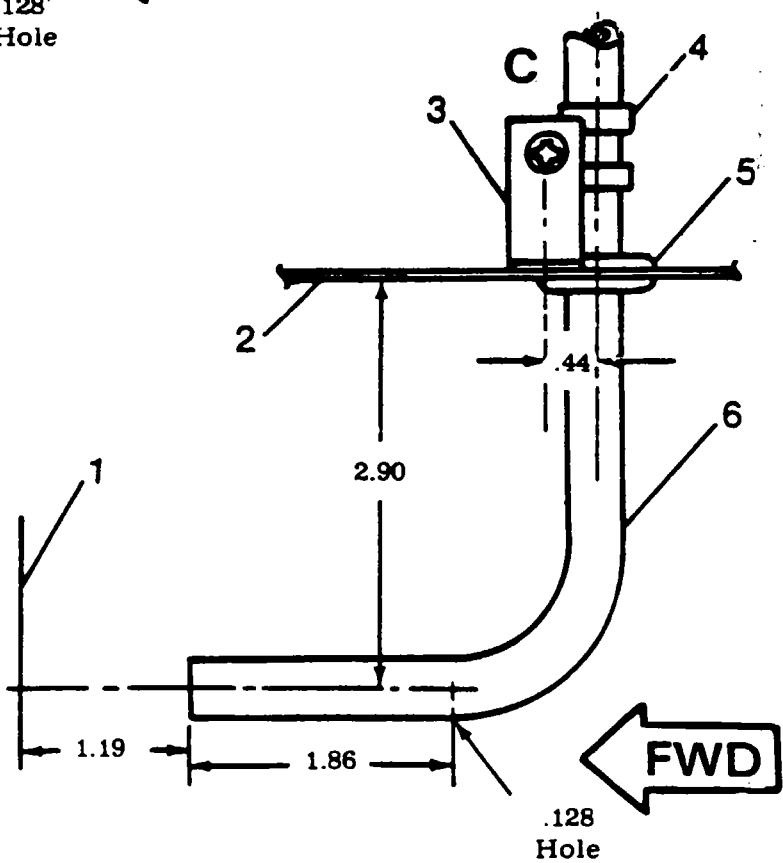


Figure 12-4. Fuel Vent Location

## MODEL 152 SERIES SERVICE MANUAL

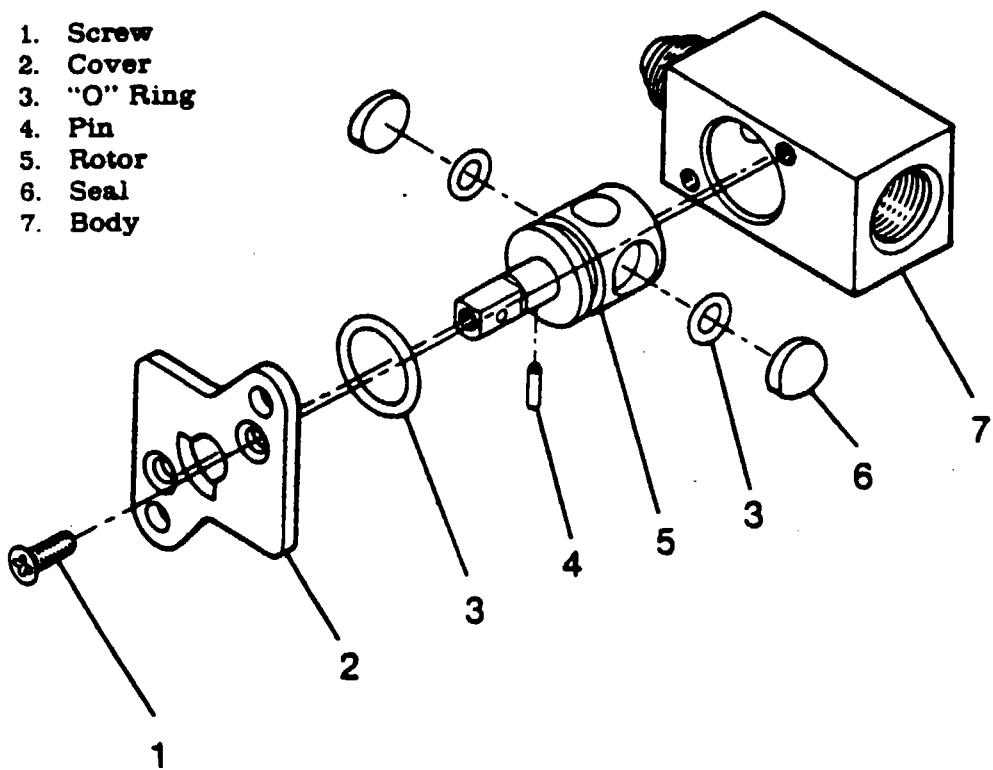


Figure 12-5. Fuel Shutoff Valve

## MODEL 152 SERIES SERVICE MANUAL

- d. After completion of step "c", blow into tube again to slightly pressurize the tank, and loosen, but do not remove filler cap on opposite wing to check tank crossover line. If pressure escapes from filler cap, crossover line is open.

### NOTE

A plugged vent line or bleed hole can cause fuel starvation or fuel tank collapse as fuel is drawn out of tank. Pressurization of tank (possible rupturing) is possible due to fuel expansion.

- e. Any fuel vent found plugged or restricted must be corrected prior to returning aircraft to service.

### WARNING

The fuel vent line protruding beneath the wing near the wing strut must be correctly aligned to avoid possible icing of the vent tube. Dimensions are shown in figure 12-4.

#### 12-12. FUEL SHUTOFF VALVE. (See figure 12-5.)

12-13. DESCRIPTION. The fuel shutoff valve is a two-position ON-OFF valve, located in the floor area between the pilot and copilot seats. The handle is safety wired in the "ON" position with .018" diameter mild steel wire (tag wire), which will break easily if the handle must be turned "OFF" in an emergency. The manufacturer recommends replacement instead of repair or damaged, worn, or inoperative valves.

#### 12-14. REMOVAL AND INSTALLATION.

- Completely drain all fuel from wing tanks, fuel lines, strainer, and shutoff valve. (Observe the precautions in paragraph 12-3.)
- Remove shutoff valve handle.
- Remove copilot's seat and access plate under seat.
- Disconnect and cap all fuel lines at shutoff valve.
- Remove bolts attaching shutoff valve and remove valve.
- Reverse the preceding steps for installation. Safety wire valve handle in "ON" position.

#### 12-15. FUEL STRAINER. (See figure 12-6.)

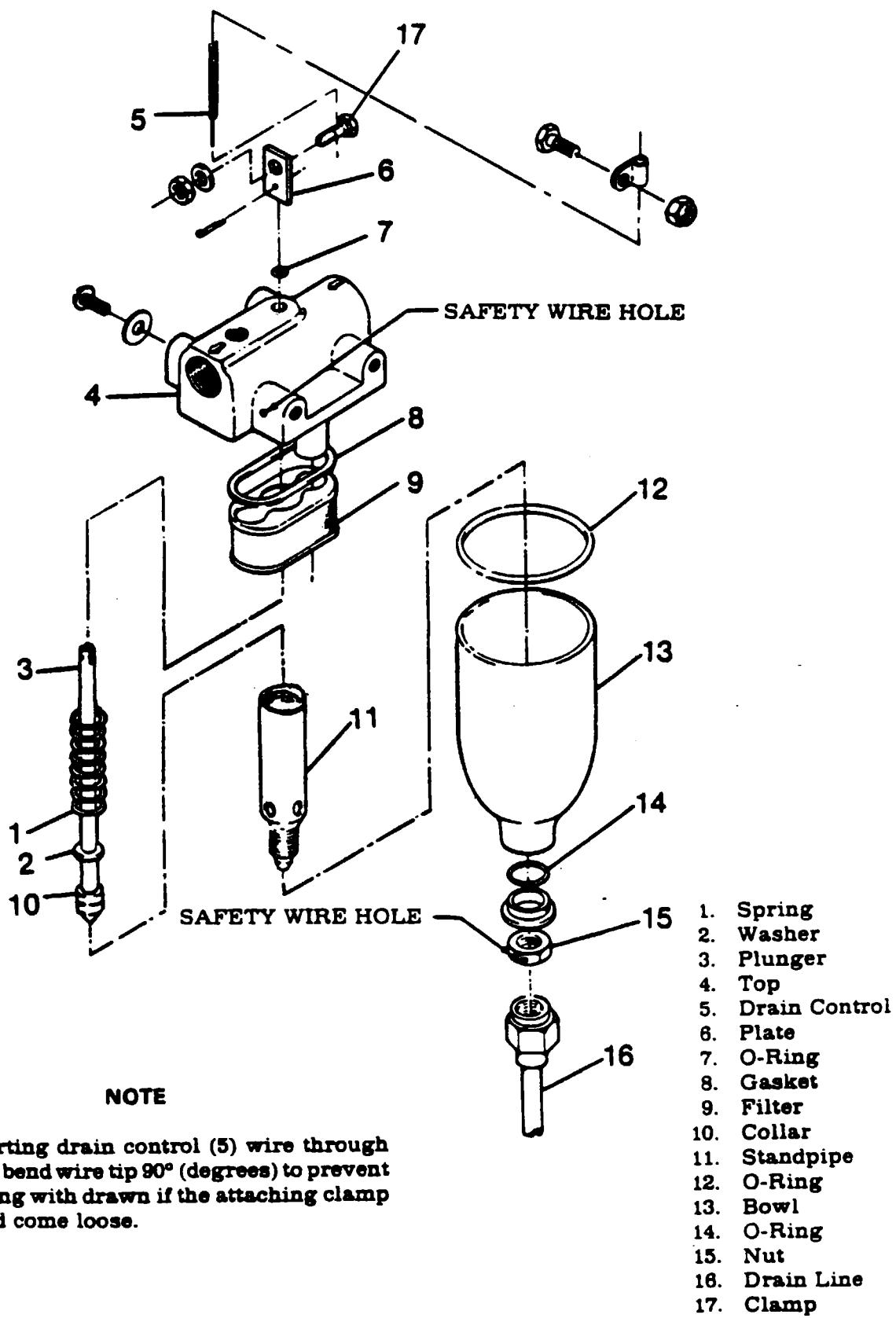
12-16. DESCRIPTION. The fuel strainer is mounted at the firewall in the lower engine compartment. The strainer is equipped with a quick-drain valve which provides a means of draining trapped water and sediment from the fuel system. The quick-drain control is located adjacent to the oil dipstick and is accessible through the oil dipstick door.

### NOTE

The fuel strainer can be disassembled, cleaned and reassembled without removing the assembly from the aircraft.

#### 12-17. DISASSEMBLY AND ASSEMBLY. (See figure 12-6.)

## MODEL 152 SERIES SERVICE MANUAL



**Figure 12-6. Fuel Strainer**

## MODEL 152 SERIES SERVICE MANUAL

- a. Remove drain tube, safety wire, nut and washer at bottom of filter bowl, and remove bowl.
- b. Carefully unscrew standpipe and remove.
- c. Remove filter screen and gasket. Wash filter screen and bowl with solvent (Federal Specification P-S-661, or equivalent) and dry with compressed air.
- d. Using a new gasket between filter screen and top assembly, install screen and standpipe. Tighten standpipe only finger tight.
- e. Using all new O-rings, install bowl. Note that step-washer at bottom of bowl is installed so that step seats against O-ring.
- f. Turn shutoff valve to "ON" position, check for leaks and proper operation, and safety wire.
- g. Torque bottom nut (15) to 25-30 lb-in., and safety wire to top assembly of strainer. Wire must have right-hand wrap, at least 45 degrees.
- h. Connect drain tube.

12-18. PRIMING SYSTEM. (See figure 12-2.)

12-19. DESCRIPTION. The priming system is comprised of a manually-operated pump located on the instrument panel, and lines to all engine cylinders. Operation of the pump plunger forces fuel directly into the engine cylinders.

12-20. REMOVAL. (See figure 12-7.)

### NOTE

Removal of primer from instrument panel entails disassembly of primer.

- a. Place fuel shutoff valve in the OFF position.
- b. Spread drip cloth under left-hand instrument panel.
- c. Disconnect and cap or plug primer lines at primer.
- d. Unlock primer knob and pull aft to clear packing nut (5).
- e. Unscrew packing nut (5).
- f. Withdraw primer knob and piston rod from instrument panel.
- g. The primer barrel can now be worked free from the instrument panel on the firewall side of the panel.

12-21. INSPECTION. Visually inspect primer lines for crushed, kinked or broken condition. Ensure proper clamping to prevent fatigue due to vibration or chafing. Ensure barrel's (9) cylinder wall is free of signs of pitting, corrosion, or scoring and that O-rings (3) are in good condition.

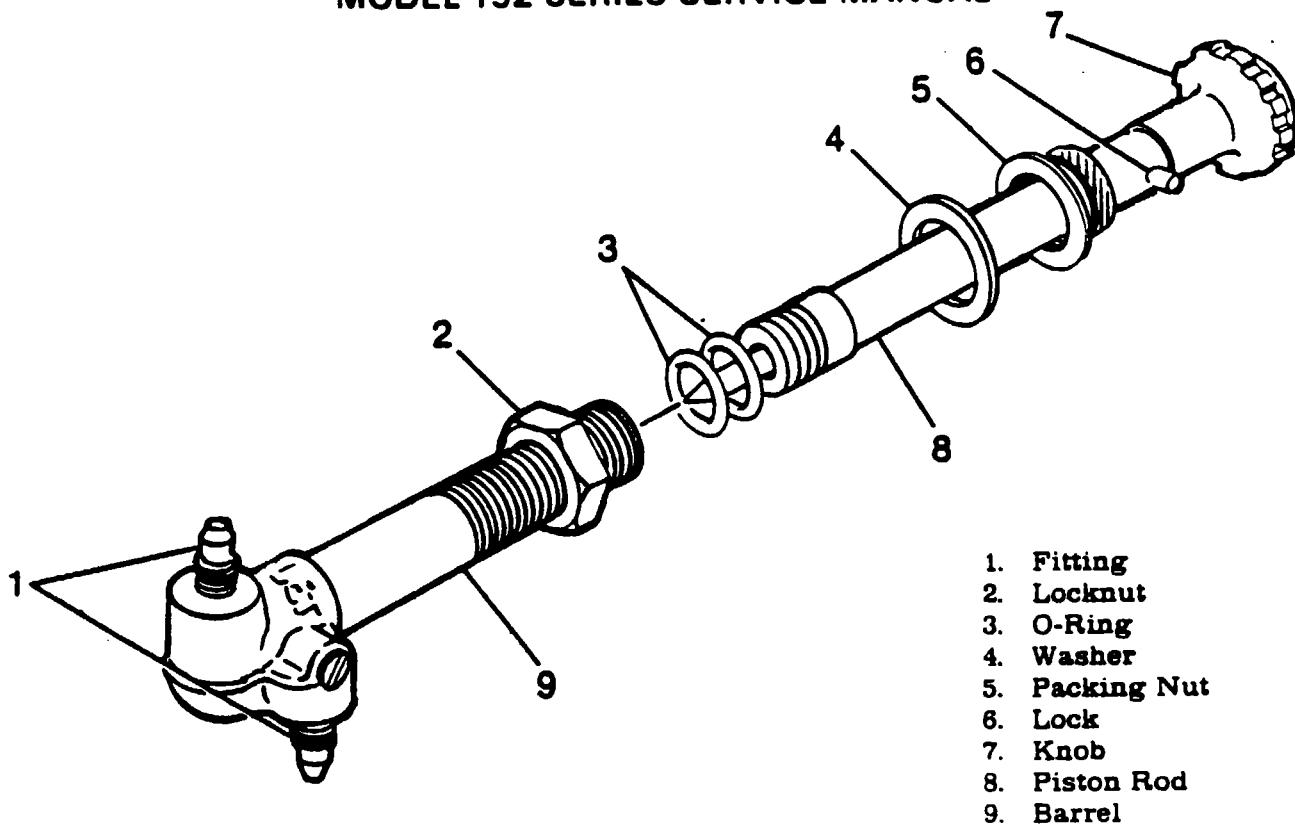
### NOTE

To remove O-rings (3) from piston rod (8), squeeze O-rings in grooves of piston rod with thumb and index finger. Work O-rings over end of piston rod. O-rings can be refitted to their grooves on piston rod (8) in a like manner.

### CAUTION

Do not damage O-rings (3).

## MODEL 152 SERIES SERVICE MANUAL



**Figure 12-7. Primer Assembly**

### **12-22. INSTALLATION. (See figure 12-7.)**

- a. From the firewall side of the instrument panel, insert barrel assembly (9) through hole in panel. Ensure that washer (4) is installed on barrel between locknut (2) and the firewall side of the panel.

#### **CAUTION**

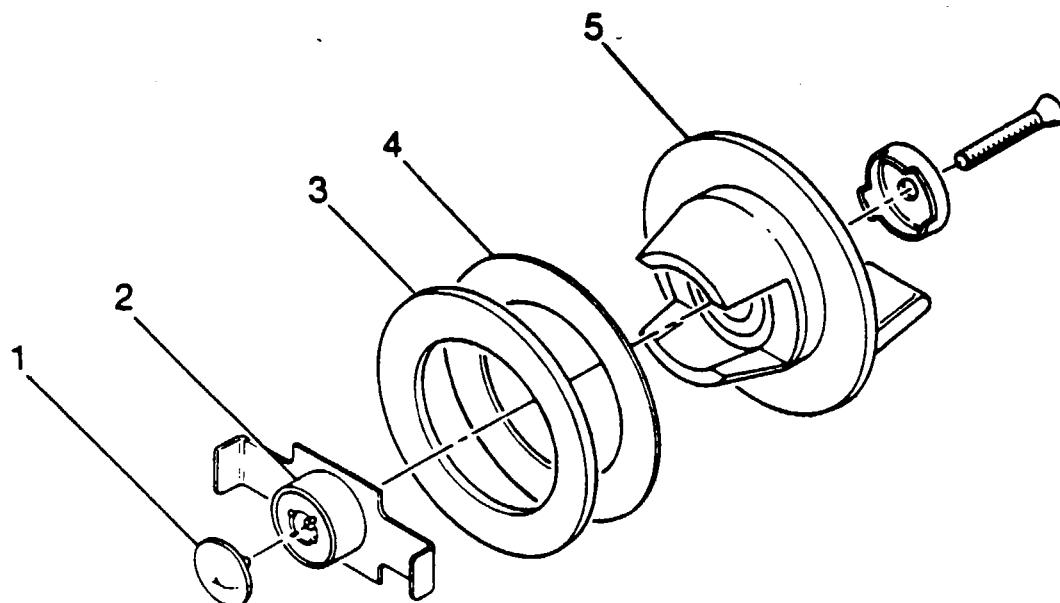
**Do not damage O-rings (3) during step "b".**

- b. While holding barrel assembly (9) firmly in place, insert piston rod assembly (8) into barrel.
- c. The distance the barrel protrudes through hole in panel can be adjusted by turning locknut (2).
- d. Tighten packing nut (5) against panel.
- e. Unplug or uncap fittings on primer lines and attach to primer fittings (1).
- f. Turn fuel shutoff valve to the ON position and safety wire in place.
- g. Check primer for proper pumping action and positive fuel shutoff in the locked position.

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- 12-23. VENTED FUEL FILLER CAP. (See figure 12-8.)
- 12-24. DESCRIPTION. The RIGHT-HAND fuel filler cap incorporates a vent and safety valve that provides both vacuum and positive pressure relief.
- 12-25. INSPECTION, CLEANING AND REPAIR.
  - a. Remove RIGHT-HAND fuel filler cap from the adapter assembly.
  - b. Disconnect the safety chain from the cap and cover or plug the tank opening to keep out foreign matter.
  - c. Check condition of gasket and frictionless washer, replace as required.
  - d. Using cotton swabs and Stoddard solvent or equivalent, gently lift edges of rubber umbrella and clean seat and umbrella removing all contaminates. Using a second swab wipe seat and umbrella thoroughly, removing all cotton fibers. Repeat until swabs show no discoloration.
  - e. If the umbrella continues to leak or is deteriorated, remove and replace. To remove the umbrella, lubricate the umbrella stem with (MIL-H-5606) hydraulic fluid to prevent tearing the stem. When installing the new umbrella, lubricate the stem with (MIL-H-5606) hydraulic fluid and use a small blunt tool to insert the retaining knob on the umbrella, into the check valve body.
  - f. Connect fuel cap to safety chain and reinstall cap in the adapter assembly.

1. Umbrella Rubber
2. Check Valve (Vent)
3. Gasket
4. Frictionless Washer
5. Fuel Cap Body



### NOTE

Check valve (2) shall open at or before 4.0 inches of water vacuum pressure, and be able to hold .5 PSI positive pressure without leakage.

Figure 12-8. Vented Fuel Filler Cap

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## SECTION 13 PROPELLER

### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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Installation .....	2A21/13-2

- 13-1. PROPELLER.
- 13-2. DESCRIPTION. An all-metal, fixed-pitch propeller, equipped with a spinner, is used on the aircraft.
- 13-3. REPAIR. Repair of metal propeller first involves evaluating the damage and determining whether the repair is to be a major or minor one. Federal Aviation Regulations, Part 43 (FAR 43), and Federal Aviation Agency Advisory Circular No. 43.13 (FAA AC No. 43.13), define major and minor repairs, alterations, and who may accomplish them. When making repairs or alterations to a propeller, FAR 43, FAR AC No. 43.13, and the propeller manufacturer's instructions must be observed. The propeller manufacturer's Service Manual may be obtained from Cessna Parts Distribution (CPD 2) through a Cessna Service Station.
- 13-4. REMOVAL. (See figure 13-1.)

### WARNING

Be sure that magneto is grounded before turning propeller, or connecting external power.

- a. Remove spinner (1).
- b. Remove safety wire from mounting bolt heads (3).
- c. Remove bolts and washers and remove forward bulkhead (5).

### NOTE

The aft spinner bulkhead (7) is installed between propeller (6) and crankshaft flange (8), and is removed as the propeller is removed.

## MODEL 152 SERIES SERVICE MANUAL

### 13-5. INSTALLATION.

- a. Clean mating surfaces of propeller, crankshaft flange and spinner bulkheads.

#### WARNING

Be sure that magneto is grounded before turning propeller, or connecting external power.

#### NOTE

Ensure that nose cap is installed prior to completing following steps.

- b. Position aft spinner bulkhead between propeller and crankshaft flange.
- c. Align propeller blade with t.c. mark on aft side of ring gear, and rotate propeller clockwise, as viewed from the front, to first bolt hole.
- d. Install forward spinner bulkhead and propeller bolts.
- e. Tighten bolts evenly, then torque to 300-320 lb.-in. or 25-26 lb-ft.
- f. Safety wire propeller mount bolts, ensuring that safety wire is around bolt heads not over top.
- g. Install spinner.

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1. Spinner
2. Screw
3. Bolt
4. Washer
5. Forward Spinner Bulkhead
6. Propeller
7. Rear Spinner Bulkhead
8. Crankshaft (With Ring Gear)

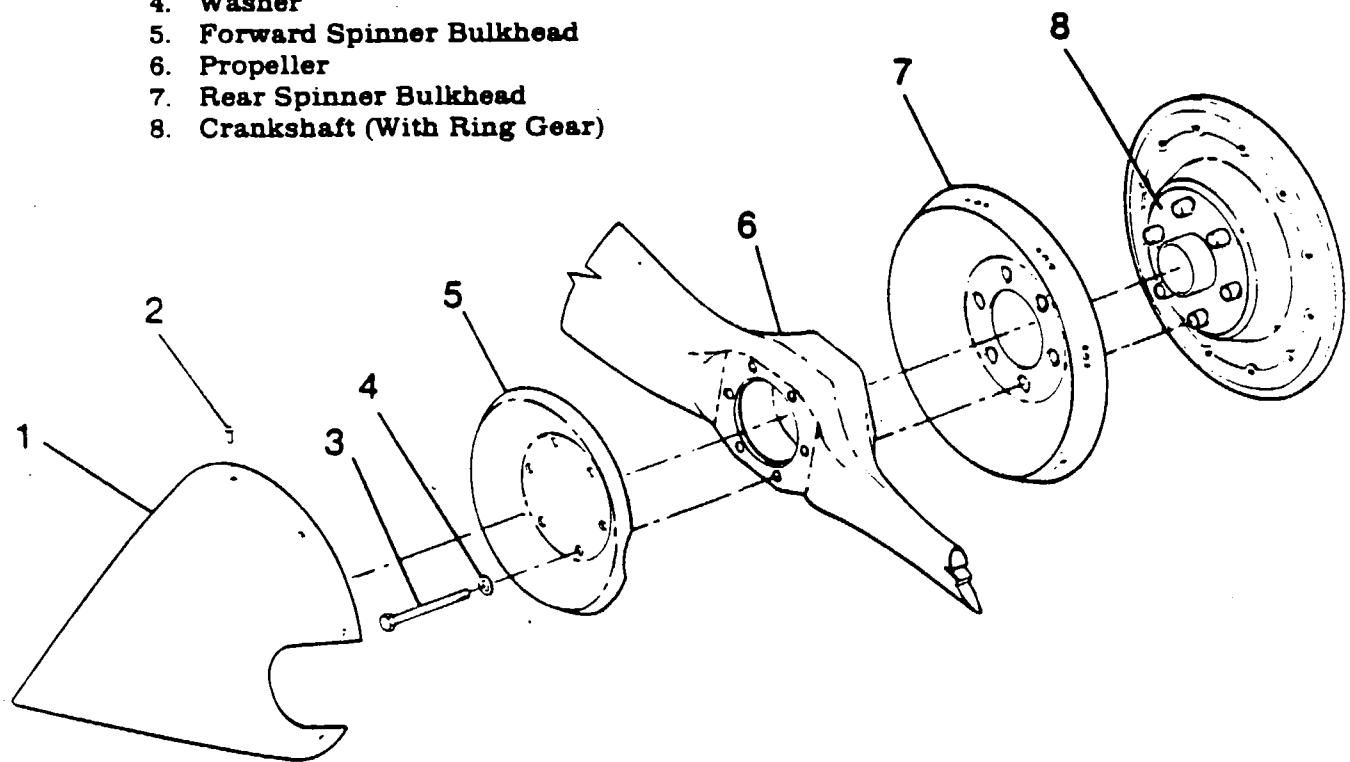


Figure 13-1. Propeller and Spinner Installation

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 14

### UTILITY SYSTEMS

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#### 14-1. UTILITY SYSTEMS.

##### HEATING SYSTEM.

- 14-3. DESCRIPTION. The heating system is comprised of the heat exchange section of the exhaust muffler, a shut-off valve mounted on the right forward side of the firewall, a push-pull control on the instrument panel, outlets and flexible ducting connecting the system.
- 14-4. OPERATION. Ram air is ducted through an engine baffle inlet and heat exchange section of the exhaust muffler, to the shut-off valve at the firewall. The heated air flows from the shut-off valve into a duct across the aft side of the firewall, where it is distributed into the cabin. The shut-off valve, operated by a push-pull control marked "CABIN HT", located on the instrument panel, regulates the volume of heated air entering the system. Pulling the control full out, supplies maximum flow and pushing control in, gradually decreases flow, shutting off flow completely when the control is pushed full in.
- 14-5. TROUBLE SHOOTING. 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. (Refer to Section 2 of this manual for lubrication information.) Damaged or broken parts must be repaired or replaced. When checking controls, ensure valves respond freely to control movement, that they move in the correct direction, 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. If fumes are detected in the cabin, a thorough inspection of the exhaust system should be accomplished. Refer to applicable paragraph in Section 11 for this inspection. 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. Seal any gaps in the shutoff valves at the firewall with Pro-Seal #700 (Coast Pro-Seal Co., Los Angeles, California) compound, or equivalent compound.
- 14-6. REMOVAL, REPAIR AND INSTALLATION. Figure 14-1 illustrates the heating, defrosting ventilating systems, and may be used as a guide during removal, repair and installation of system components. Burned, frayed or crushed hose must be replaced with new hose, cut to

## MODEL 152 SERIES SERVICE MANUAL

length and installed in the original routing. Trim hose winding shorter than the hose to allow clamps to be fitted. Defective air valves must be repaired or replaced. Check for proper operation of valves and their controls after repair or replacement.

- 14-7. **DEFROSTER SYSTEM.**
- 14-8. **DESCRIPTION.** The defrosting system is comprised of the duct across the aft side of the firewall, a defroster outlet, mounted on the left side of the cowl deck, immediately aft of the windshield, and flexible ducting connecting the system.
- 14-9. **OPERATION.** Air from the duct across the aft side of the firewall flows through a flexible duct to the defroster outlet. The temperature and volume of this air is controlled by the settings of the heater system control.
- 14-10. **TROUBLE SHOOTING.** Since the defrosting system depends on proper operation of the heating system, refer to paragraph 14-5 for trouble shooting the heating and defrosting systems.
- 14-11. **REMOVAL, REPAIR AND INSTALLATION.** Figure 14-1 may be used as a guide during removal, repair and installation of defrosting system components. Cut hoses to length and install in the original routing. Trim hose winding shorter than the hose to allow clamps to be fitted. A defective defroster outlet must be repaired or replaced.
- 14-12. **VENTILATING SYSTEM.**
- 14-13. **DESCRIPTION.** The ventilating system is comprised of an airscoop mounted in the inboard leading edge of each wing, an adjustable ventilator mounted on each side of the cabin near the upper corners of the windshield, a fresh air scoop door mounted on the right side of the fuselage, a control knob on the instrument panel, and flexible ducting connecting the system.
- 14-14. **OPERATION.** Air received from scoops mounted in the inboard leading edges of the wings is ducted to the adjustable ventilators mounted on each side of the cabin near the upper corners of the windshield. Forward cabin ventilation is provided by a fresh air scoop door, mounted on the right side of the fuselage, just forward of the copilot seat. The scoop door is operated by a control in the instrument panel marked "CABIN AIR." Fresh air from the scoop door is routed to the duct across the aft side of the firewall, where it is distributed into the cabin. As long as the "CABIN HEAT" control is pushed in, no heated air can enter the firewall duct; therefore, when the "CABIN AIR" control is pulled out, only fresh air from the scoop will flow through the duct into the cabin. As the "CABIN HT" control is gradually pulled out, more and more heated air will blend with the fresh air from the scoop and be distributed into the cabin. Either one, or both of the controls may be set at any position from full open to full closed.
- 14-15. **TROUBLE SHOOTING.** Most of the operational troubles in the ventilating system are caused by sticking or binding of the inlet scoop door or its control. Check filter element in the inlet scoop door. The element may be removed and cleaned or replaced. Since air passing through the filter is emitted into the cabin, do not use a cleaning solution which would contaminate cabin air. The filter may be removed to increase air flow. However, the removal will cause a slight increase in noise level.
- 14-16. **REMOVAL, REPAIR AND INSTALLATION.** Figure 14-1 may be used as a guide for removal, repair and installation of ventilating system components. A defective ventilator or scoop door must be repaired or replaced. Check for proper operation of ventilating controls after installation & r repair.

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● 15279406 thru 15284923  
 F15201429 thru F15201893  
 A1520735 thru A1520971  
 FA1520337 thru FA1520377

\*15284924 & On  
 F15201894 & On  
 A1520972 & On  
 FA1520378 & On

## NOTE

Insert (38) is cemented to knob (1) with EC1300L (3M Co., St. Paul, Minn. 55101). Beginning with 15285751 and A15201022, insert (42) is retained by screw (43).

- |                                 |                         |
|---------------------------------|-------------------------|
| 1. Knob                         | 27. Spring              |
| 2. Washer                       | 28. Arm Assembly        |
| 3. Cap                          | 29. Roll Pin            |
| 4. Seal                         | 30. Clamp               |
| 5. Spacer                       | 31. Cup                 |
| 6. Outlet Assembly              | 32. Pin                 |
| 7. Seal                         | 33. Clamp Bolt          |
| 8. Bullet Catch                 | 34. Nut                 |
| 9. Screw                        | 35. Cold Air Inlet Door |
| 10. Felt Washer                 | 36. Fuselage Skin       |
| 11. Seal                        | 37. Air Valve Duct      |
| 12. Tube Assembly               | 38. Insert              |
| 13. Elbow Assembly              | 39. O-Ring              |
| 14. Tinnerman Nut               | 40. Outer Tube          |
| 15. Cabin Heat Control          | 41. Inner Tube          |
| 16. Cabin Air Control           | 42. Insert              |
| 17. Heater Valve-to-Shroud Hose | 43. Screw               |
| 18. Defroster Nozzle            |                         |
| 19. Clamp                       |                         |
| 20. Defroster Hose              |                         |
| 21. Defroster Spout             |                         |
| 22. Spout Insert                |                         |
| 23. Distributor Assembly        |                         |
| 24. Deflector                   |                         |
| 25. Firewall                    |                         |
| 26. Heater Valve Assembly       |                         |

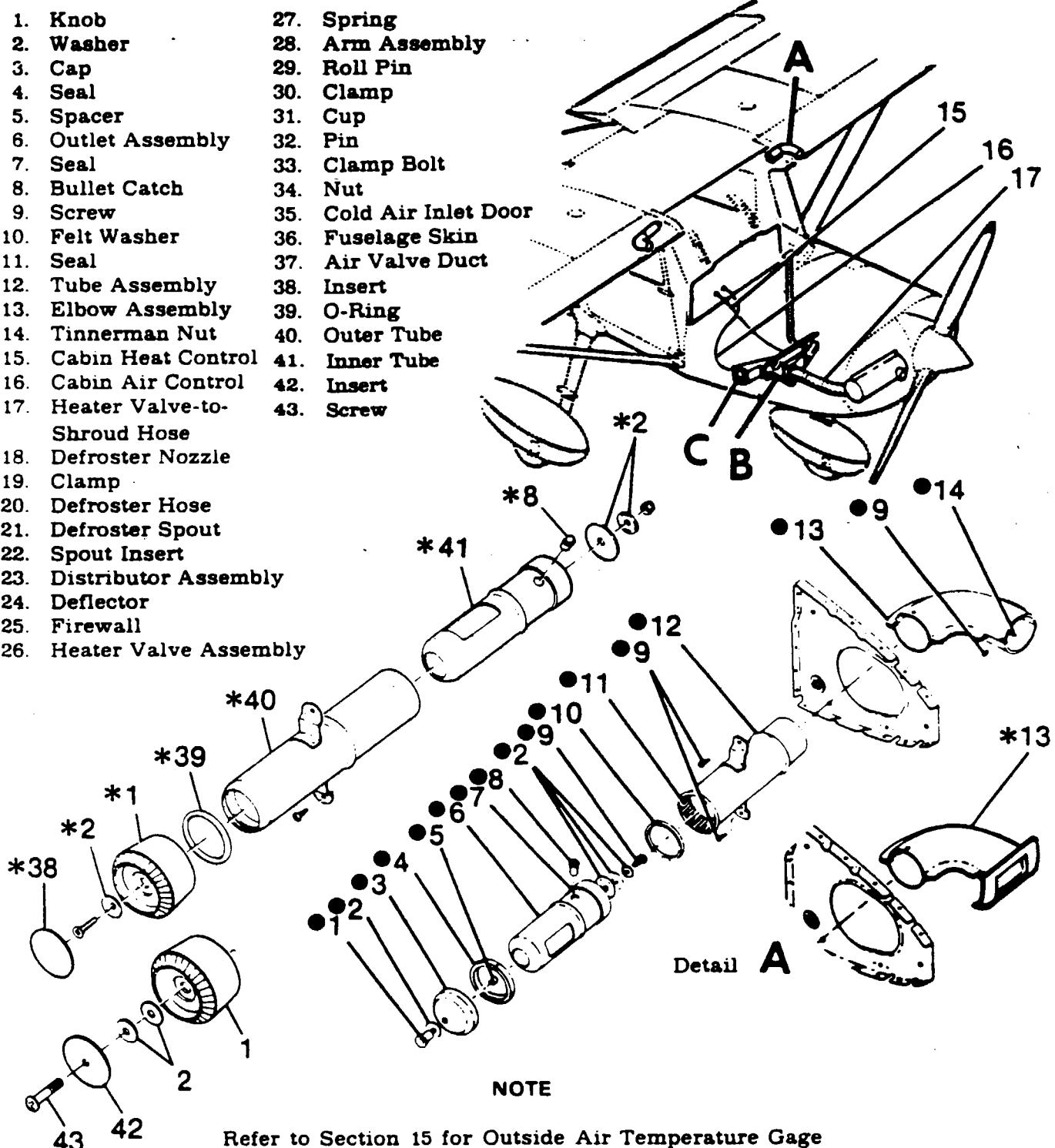


Figure 14-1. Heating Defrosting and Ventilating Systems (Sheet 1 of 2)

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## NOTE

Refer to Section 2 for hinge point lubrication information.

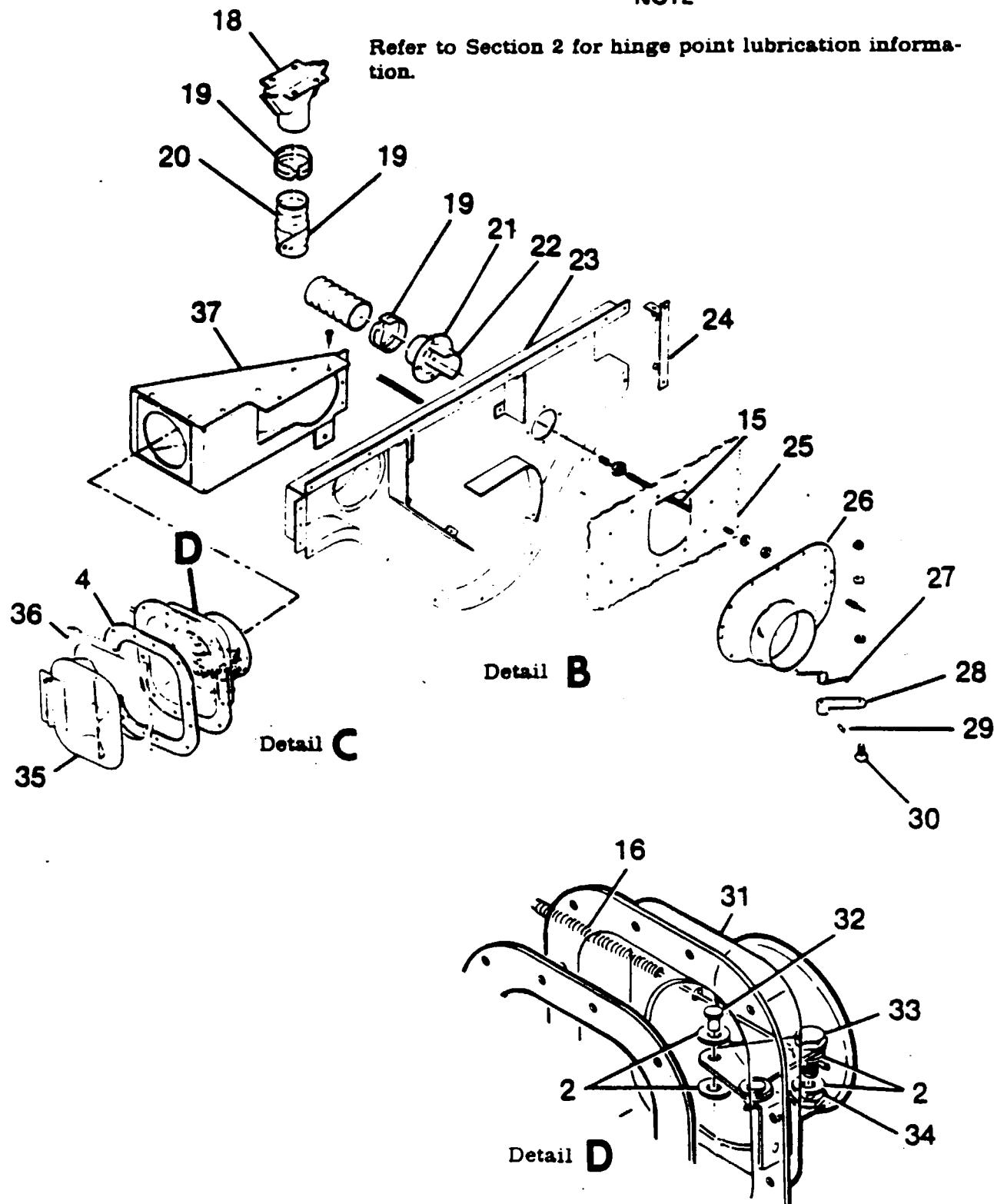


Figure 14-1. Heating, Defrosting and Ventilating Systems (Sheet 2 of 2)

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● 15283592 thru 15285380  
 F15201874 thru F15201908  
 A1520879 thru A1520995  
 FA1520358 thru FA1520387

\* 15285381 & On  
 F15201909 & On  
 A1520996 & On  
 FA1520388 & On

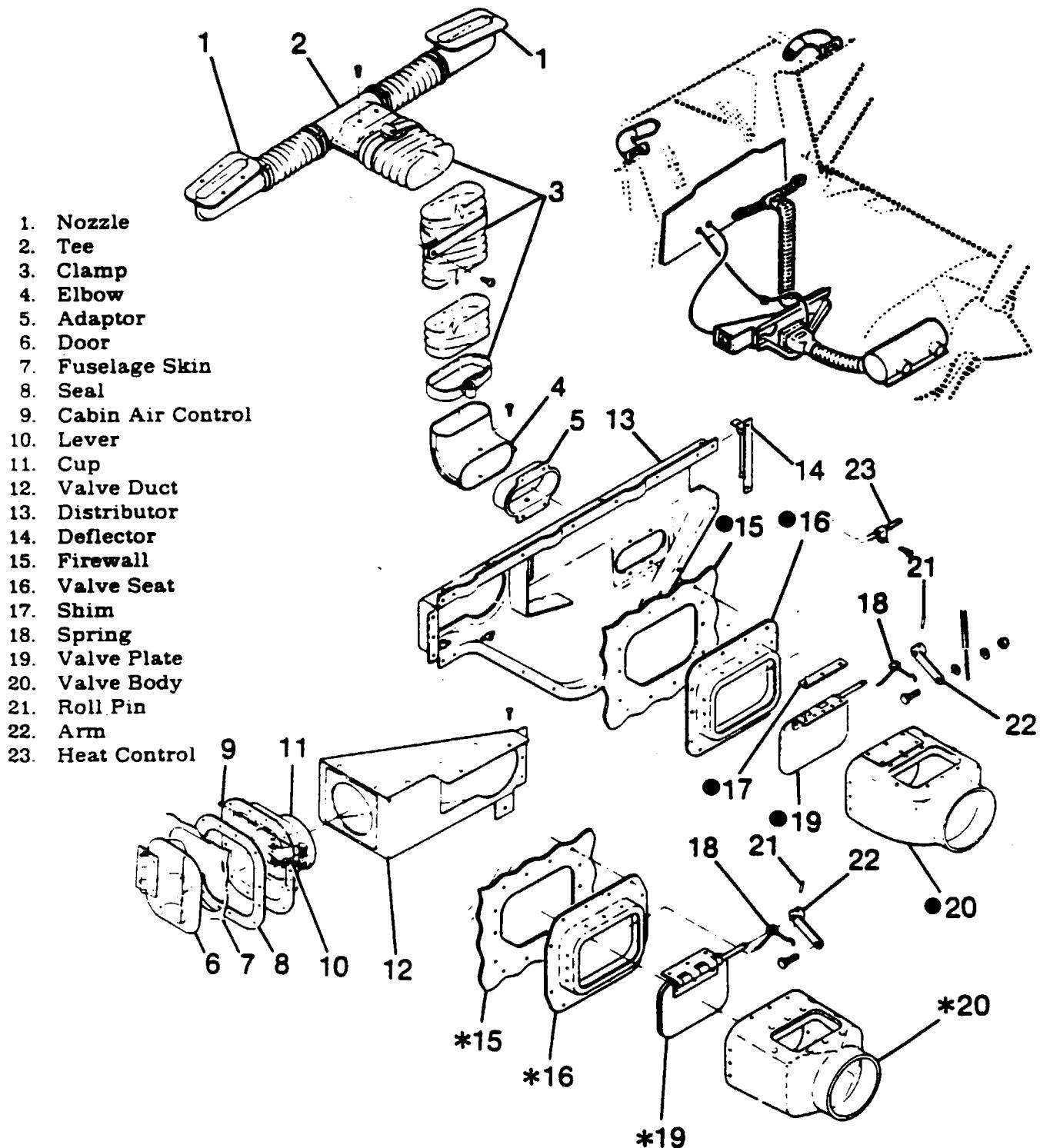


Figure 14-2. Dual Defrosting System

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## SECTION 15

### INSTRUMENTS AND INSTRUMENT SYSTEMS

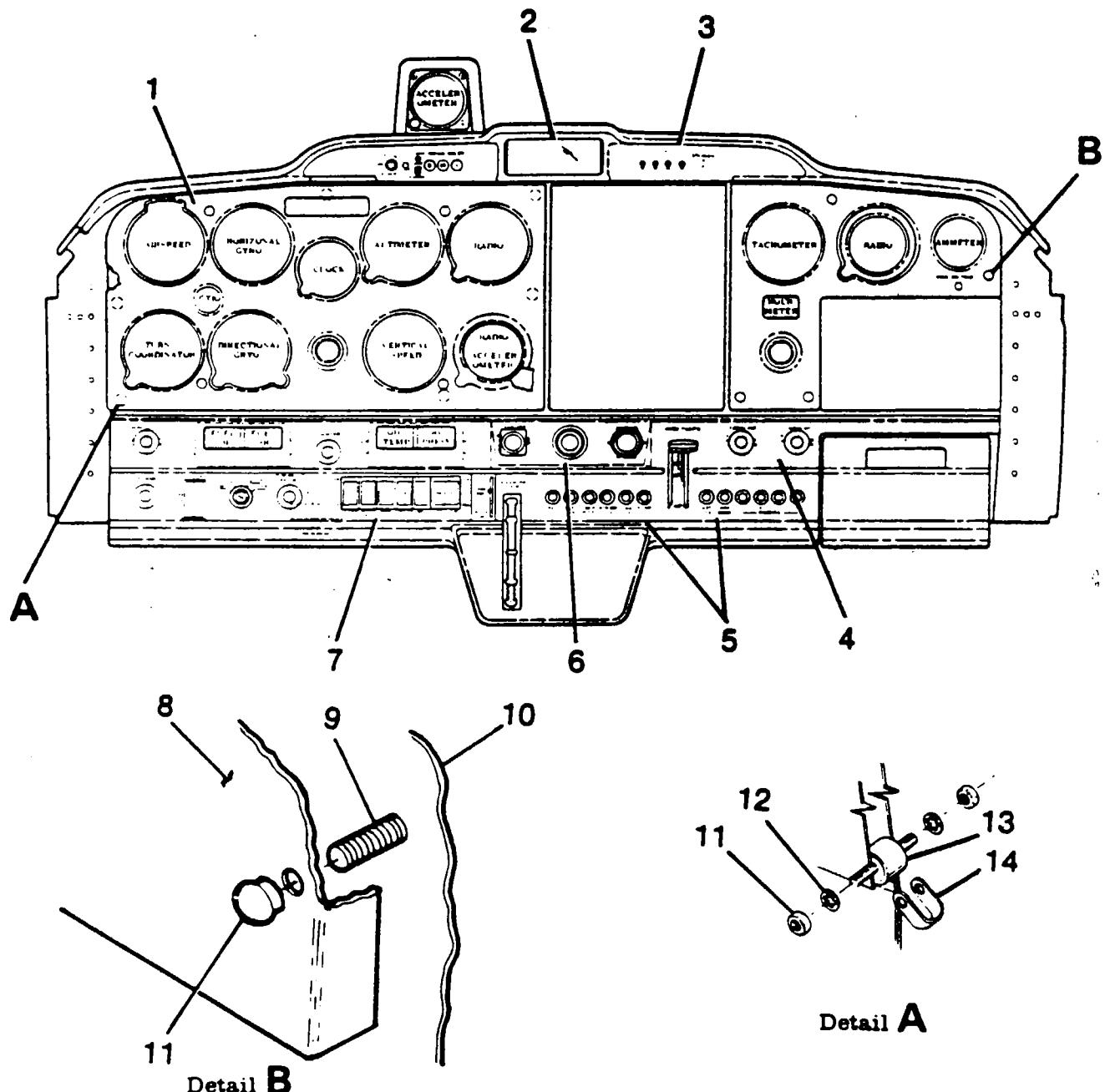
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- 15-1. INSTRUMENTS AND INSTRUMENT SYSTEMS.
- 15-2. GENERAL. This section describes typical instrument installations and their respective operating systems. Emphasis is placed on trouble shooting and corrective measures only. It does NOT deal with specific instrument repairs since this usually requires special equipment and data and should be handled by instrument specialists. Federal Aviation Regulations require malfunctioning instruments be sent to an approved instrument overhaul and repair station or returned to manufacturer for servicing. Our concern here is with preventive maintenance on various instrument systems and correction of system faults which result in instrument malfunctions. The descriptive material, maintenance and trouble shooting information in this section is intended to help the mechanic determine malfunctions and correct them, up to the defective instrument itself, at which point an instrument technician should be called in. Some instruments, such as fuel quantity and oil pressure gages, are so simple and inexpensive, repairs usually will be more costly than a new instrument. On the other hand, aneroid and gyro instruments usually are well worth repairing. The words "replace instrument" in the text, therefore, should be taken only in the sense of physical replacement in aircraft. Whether replacement is to be with a new instrument, an exchange one, or original instrument is to be repaired must be decided on basis of individual circumstances.
- 15-3. INSTRUMENT PANEL.
- 15-4. DESCRIPTION. The instrument panel assembly consists of a stationary panel and shock-mounted panel. The stationary panel contains fuel and engine instruments which are NOT sensitive to vibration. The shock-mounted panel contains major flight instruments such as horizontal and directional gyros which ARE affected by vibration. Most of the instruments are screw-mounted on the panel backs.
- 15-5. REMOVAL AND INSTALLATION. (See figure 15-1.) The stationary panel is secured to engine stringers and a forward fuselage bulkhead and ordinarily is not considered removable. The shock-mounted panel is secured to stationary panel with rubber shock-mounted assemblies. To remove shock-mounted panel proceed as follows:
  - a. Unscrew threaded buttons securing decorative cover to panel and remove cover.
  - b. Remove nuts from shock-mounts, tag and disconnect instrument wiring and plumbing and pull panel straight back.
  - c. Reverse preceding steps for installation. Ensure ground strap is properly installed.
- 15-6. SHOCK-MOUNTS. Service life of instruments is directly related to adequate shock-mounting of the panel. If removal of panel is necessary, check mounts for deterioration.
- 15-7. INSTRUMENTS.
- 15-8. REMOVAL. (See figure 15-1.) Most instruments are secured to the panel with screws inserted through panel face. To remove an instrument, remove decorative cover, disconnect wiring or plumbing to instrument, remove mounting screws and take instruments out from behind, or in some cases, from front of panel. Instrument clusters are installed as units and are secured by a screw at each end. A cluster must be removed from panel to replace an individual gage. In all cases when an instrument is removed, disconnected lines or wires should be protected. Cap open lines and cover pressure connections on instrument to prevent thread damage and entrance of foreign matter. Wire terminals should be insulated or tied up so accidental grounding or short-circuiting.

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THRU 1978 MODELS

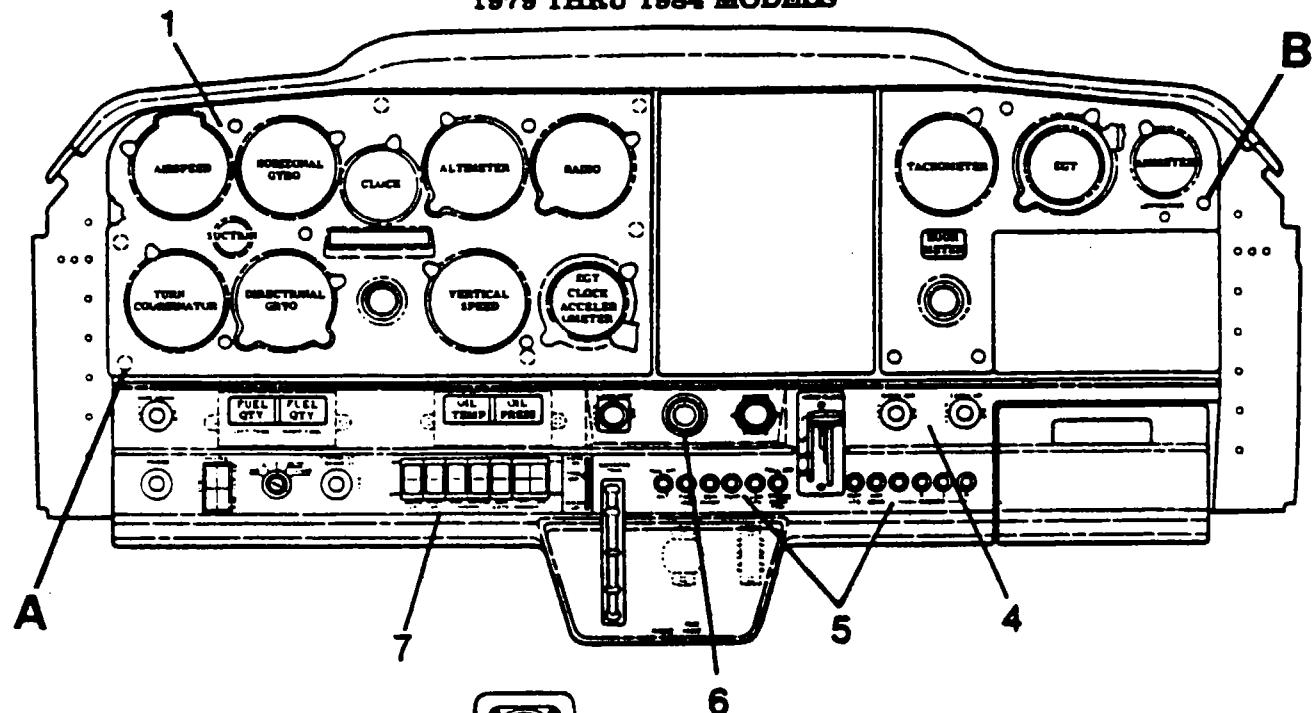


- |                                     |                      |                  |
|-------------------------------------|----------------------|------------------|
| 1. Shock Mounted Panel              | 6. Engine Controls   | 11. Nut          |
| 2. Rear View Mirror                 | 7. Switch Panel      | 12. Washer       |
| 3. Radio Switch Panel               | 8. Decorative Cover  | 13. Shock Mount  |
| 4. Heating and Ventilation Controls | 9. Stud              | 14. Ground Strap |
| 5. Circuit Breaker Panel            | 10. Instrument Panel |                  |

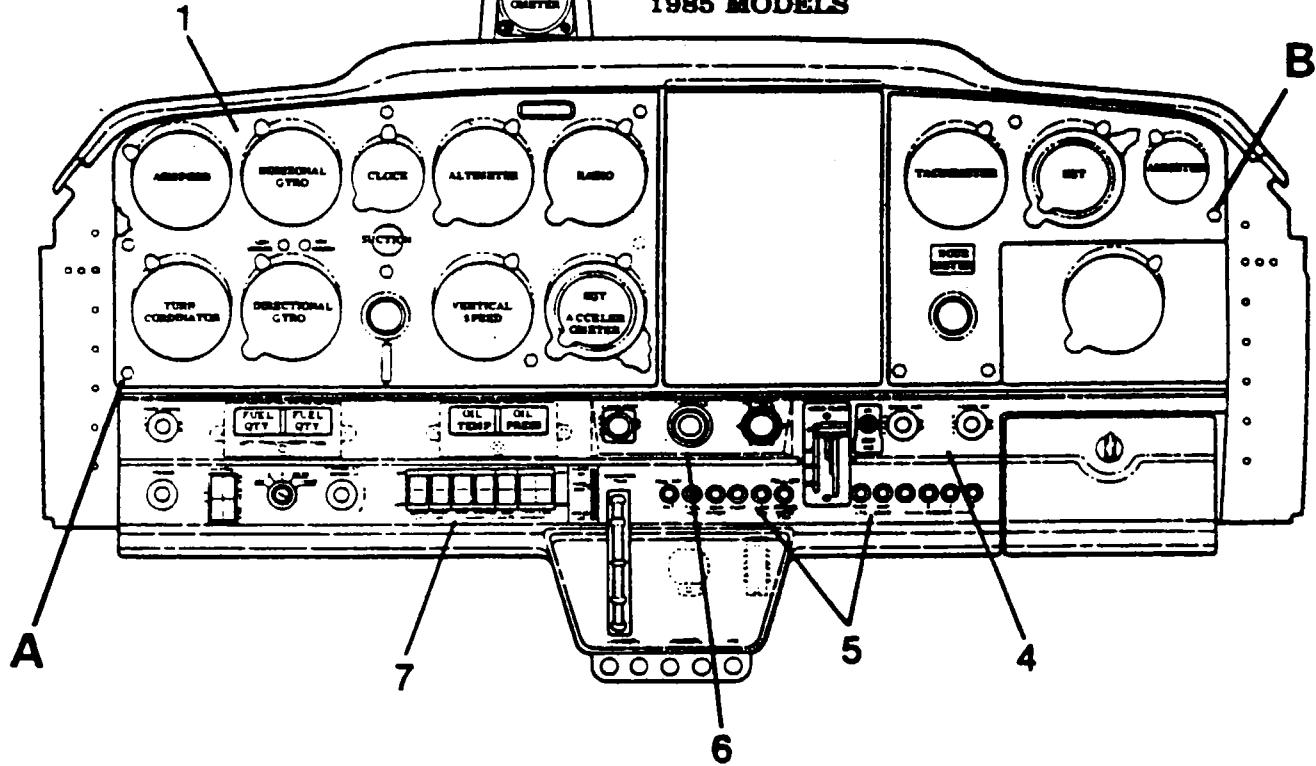
Figure 15-1. Typical Instrument Panel (Sheet 1 of 2)

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**1979 THRU 1984 MODELS**



**1985 MODELS**



- 1. Shock Mounted Panel
- 4. Heating and Ventilation Controls
- 5. Circuit Breaker Panel
- 6. Engine Controls
- 7. Switch Panel

**Figure 15-1. Typical Instrument Panel (Sheet 2 of 2)**

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- 15-9. **INSTALLATION.** Generally, installation procedure is the reverse of removal procedure. Ensure mounting screw nuts are tightened firmly, but do not over-tighten, particularly on instruments having plastic cases. The same rule applies to connecting plumbing and wiring.

### NOTE

All instruments (gages and indicators), requiring a thread seal or lubricant, shall be installed using teflon tape on male fittings only. This tape is available through the Cessna Supply Division.

When replacing an electrical gage in an instrument cluster assembly, avoid bending pointer or dial plate. Distortion of dial or back plate could change calibration of gages.

15-10. **PITOT AND STATIC SYSTEMS.**

- 15-11. **DESCRIPTION.** (See figure 15-2.) The pitot system conveys ram air pressure to the airspeed indicator. The static system vents 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 source button to collect condensation in static system. A pitot tube heater may be installed. The heating element is controlled by a switch at the instrument panel and powered by the electrical system.
- 15-12. **MAINTENANCE.** Proper maintenance of pitot and static system is essential for proper operation of altimeter, vertical speed and airspeed indicators. Leaks, moisture and obstructions in pitot system will result in false airspeed indications, while static system malfunctions will affect readings of all three instruments. Under instrument flight conditions, these instrument errors could be hazardous. Cleanliness and security are the principal rules for system maintenance. The pitot tube and static ports MUST be kept clean and unobstructed.

15-13. **STATIC PRESSURE SYSTEM INSPECTION AND LEAKAGE TEST.** The following procedure outlines inspection and testing of static pressure system, assuming altimeter has been tested and inspected in accordance with current Federal Aviation Regulations.

- a. Ensure static system is free from entrapped moisture and restrictions.
- b. Ensure no alterations or deformations of airframe surface have been made which would affect the relationship between air pressure in static pressure system and true ambient static air pressure for any flight configuration.
- c. Attach a source of suction to static pressure source opening. Figure 15-3 shows one method of obtaining suction.
- d. Slowly apply suction until altimeter indicates a 1000-foot increase in altitude.

### CAUTION

When applying or releasing suction, do not exceed range of vertical speed indicator or airspeed indicator.

- e. Cut off suction source to maintain a "closed" system for one minute. Leakage shall not exceed 100 feet of altitude loss as indicated on altimeter.
- f. If leakage rate is within tolerance, slowly release suction source.

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### NOTE

If leakage rate exceeds the maximum allowable, first tighten all connections, then repeat leakage test. If leakage rate still exceeds maximum allowable, use following procedure.

- g. Disconnect static pressure lines from airspeed indicator and vertical speed indicator. Use suitable fittings to connect lines together so altimeter is the only instrument still connected into static pressure system.
- h. Repeat leakage test to check whether static pressure system or the bypassed instruments are cause of leakage. If instruments are at fault, they must be repaired by an "appropriately rated repair station" or replaced. If static pressure system is at fault, use following procedure to locate leakage.
- i. Attach a source of positive pressure to static source opening. Figure 15-3 shows one method of obtaining positive pressure.

### CAUTION

Do not apply positive pressure with airspeed indicator or vertical speed indicator connected to static pressure system.

- j. Slowly apply positive pressure until altimeter indicates a 500-foot decrease in altitude and maintain this altimeter indication while checking for leaks. Coat line connections and static source flange with solution of mild soap and water, watching for bubbles to locate leaks.
- k. Tighten leaking connections. Repair or replace parts found defective.
- l. Reconnect airspeed and vertical speed indicators into static pressure system and repeat leakage test per steps "c" thru "f".

### NOTE

Air bulb with check valves may be obtained locally from a surgical supply company. This is the type used in measuring blood pressure.

- 15-14. PITOT SYSTEM INSPECTION AND LEAKAGE TEST. To check pitot system for leaks, place a piece of tape over small hole in lower aft end of pitot tube, fasten a piece of rubber or plastic tubing over pitot tube, close opposite end of tubing and slowly roll up tube until airspeed indicator registers in cruise range. Secure tube and after a few minutes recheck airspeed indicator. Any leakage will have reduced the pressure in system, resulting in a lower airspeed indication. Slowly unroll tubing before removing it, so pressure is reduced gradually. Otherwise instrument may be damaged. If test reveals a leak in system, check all connections for tightness.
- 15-15. BLOWING OUT LINES. Although the pitot system is designed to drain down to pitot tube opening, condensation may collect at other points in system and produce a partial obstruction. To clear the line, disconnect it at airspeed indicator. Using low pressure air, blow from indicator end of line toward the pitot tube.

### CAUTION

Never blow through pitot or static lines toward the instruments.

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Like the pitot lines, static pressure lines must be kept clear and connections tight. All models have a static source sump which collects moisture and keeps system clear. However, when necessary, disconnect static line at first instrument to which it is connected, then blow line clear with low-pressure air. Check all static pressure line connections for tightness. If hose or hose connections are used, check for general condition and clamps for security. Replace hose which have cracked, hardened or show other signs of deterioration.

- 15-16. **REMOVAL AND INSTALLATION OF COMPONENTS.** (See figure 15-2.) To remove pitot mast, remove four mounting screws on side of connector (17) and pull mast out of connector far enough to disconnect pitot line (14). Electrical connections to heater assembly (if installed) may be disconnected through wing access opening just inboard of mast. Pitot and static lines are removed in the usual manner, after removing wing access plates, lower wing fairing strip and upholstery as required. Installation of tubing will be simpler if a guide wire is drawn in as tubing is removed from wing. The tubing may be removed intact by drawing it out through cabin and right door. When replacing fittings of pitot and static pressure lines, use anti-seize compound sparingly on male threads of both metal and plastic connections. Avoid excess compound which might enter lines. Tighten connections firmly, but avoid overtightening and distorting fittings. If twisting of plastic tubing is encountered when tightening fittings, VV-P-236 (USP Petrolatum), may be applied sparingly between tubing and fittings.

### NOTE

Do not overtighten screws (6) and do not lubricate any parts.

Use spacers (10) as required for adequate friction on ring assembly (8).

### 15-17. TROUBLE SHOOTING--PITOT STATIC SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
LOW OR SLUGGISH AIR-SPEED INDICATION. (Normal altimeter and vertical speed.)	Pitot tube obstructed, leak or obstruction in pitot line.	Test pitot tube and line for leaks or obstructions. Blow out tube and line, repair or replace damaged line.
INCORRECT OR SLUGGISH RESPONSE. (All three instruments.)	Leaks or obstruction in static line.	Test line for leaks and obstructions. Repair or replace line, blow out obstructed line.

- 15-18. **TRUE AIRSPEED INDICATOR.** A true airspeed indicator may be installed. This indicator, equipped with a conversion ring, may be rotated until pressure altitude is aligned with outside air temperature, then airspeed indicated on the instrument is read as true airspeed on the adjustable ring. Refer to figure 15-2 for removal and installation. Upon installation, before tightening mounting screws (6), calibrate instrument as follows: Rotate ring (8) until 105K on the adjustable ring aligns with 105K on indicator. Holding this setting, move retainer (7) until 60°F aligns with zero pressure altitude, then tighten mounting screws (6) and replace decorative cover (5).

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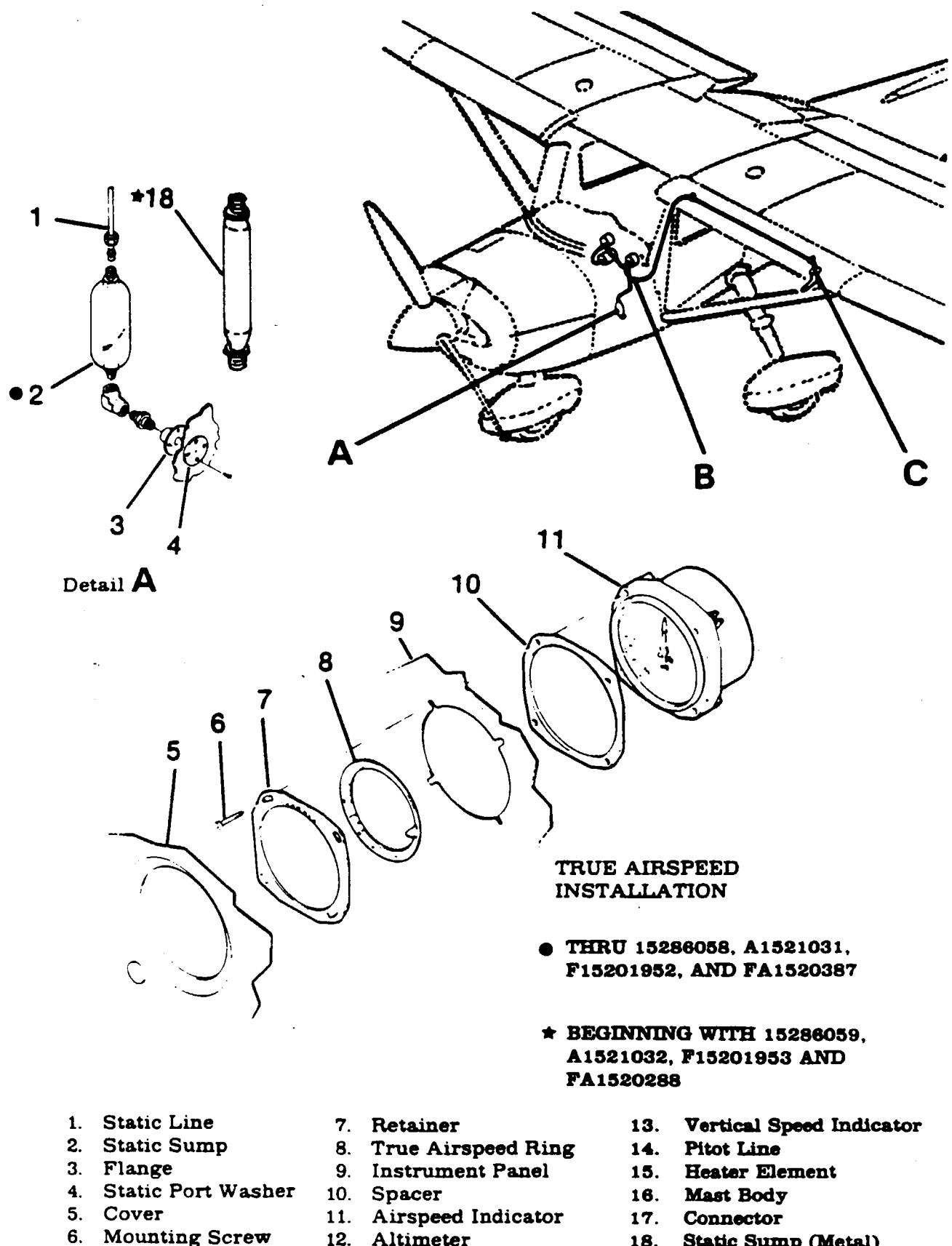
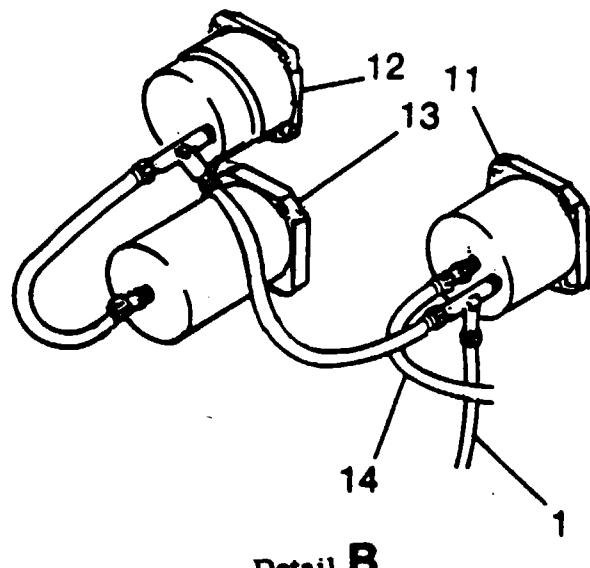
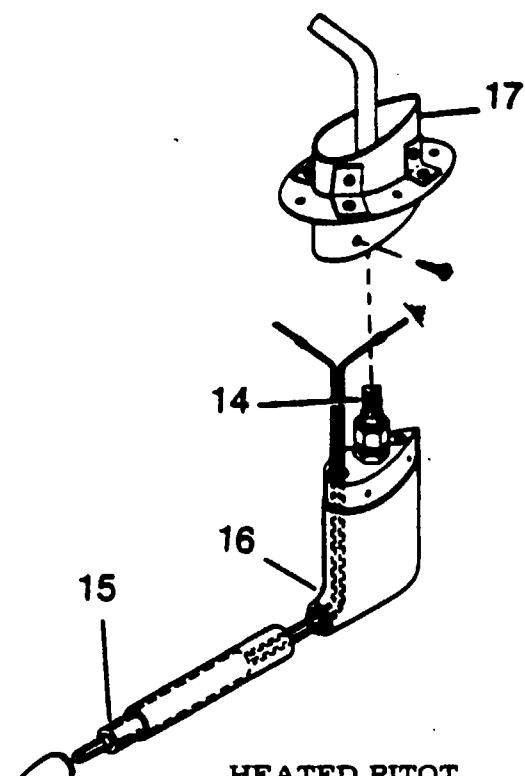


Figure 15-2. Pitot-Static Systems (Sheet 1 of 2)

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**Detail B**



**Detail C**

**Figure 15-2. Pitot-Static Systems (Sheet 2 of 2)**

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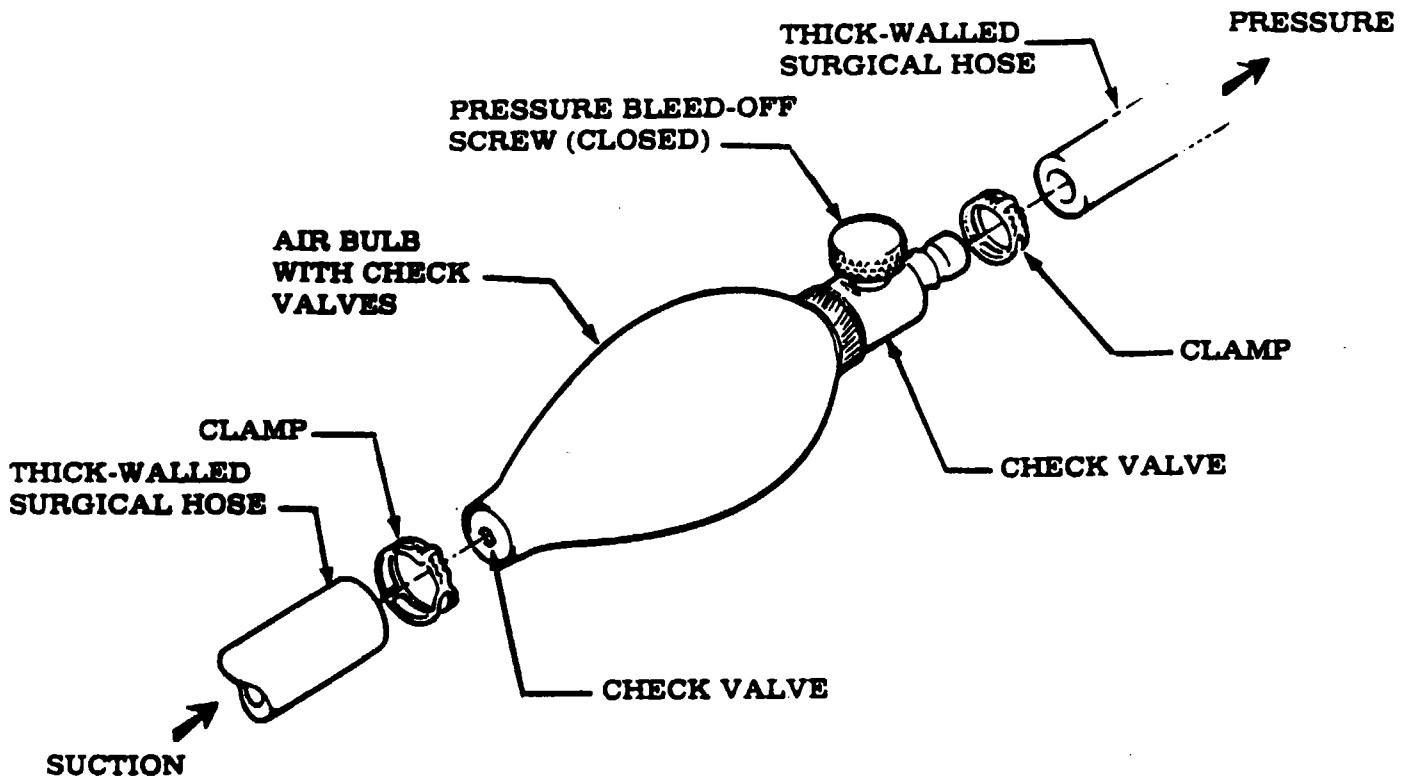
### 15-19. TROUBLE SHOOTING--AIRSPEED INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
HAND FAILS TO RESPOND.	Pitot pressure connection not properly connected to pressure line from pitot tube.	Test line and connection for leaks. Repair or replace damaged line, tighten connections.
	Pitot or static lines clogged.	Check line for obstructions. Blow out lines.
INCORRECT INDICATION OR HAND OSCILLATES.	Leak in pitot or static lines.	Test lines and connections for leaks. Repair or replace damaged lines, tighten connections.
	Defective mechanism or leaking diaphragm.	Substitute known good indicator and check reading. Replace instrument.
HAND VIBRATES.	Excessive vibration.	Check panel shock mounts. Replace defective shock mounts.
	Excessive tubing vibration.	Check clamps and line connections for security. Tighten clamps and connections, replace tubing with flexible hose.

### 15-20. TROUBLE SHOOTING--ALTIMETER.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Check line for obstructions. Blow out lines.
	Defective mechanism.	Substitute known-good altimeter and check reading. Replace instrument.
INCORRECT INDICATION.	Hands not carefully set.	Reset hands with knob.
	Leaking diaphragm.	Substitute known-good altimeter and check reading. Replace instrument.
	Pointers out of calibration.	Compare reading with known-good altimeter. Replace instrument.

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### TO APPLY SUCTION:

1. Squeeze air bulb to expel as much air as possible.
2. Hold suction hose firmly against static pressure source opening.
3. Slowly release air bulb to obtain desired suction, then pinch hose shut tightly to trap suction in system.
4. After leak test, release suction slowly by intermittently allowing a small amount of air to enter static system. To do this, tilt end of suction hose away from opening, then immediately tilt it back against opening. Wait until vertical speed indicator approaches zero, then repeat. Continue to admit this small amount of air intermittently until all suction is released, then remove test equipment.

### TO APPLY PRESSURE:

#### CAUTION

Do not apply positive pressure with airspeed indicator or vertical speed indicator connected into static system.

1. Hold pressure hose firmly against static pressure source opening.
2. Slowly squeeze air bulb to apply desired pressure to static system. Desired pressure may be maintained by repeatedly squeezing bulb to replace any air escaping through leaks.
3. Release pressure by slowly opening pressure bleed-off screw, then remove test equipment.

Figure 15-3. Static Test Equipment

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### 15-20. TROUBLE SHOOTING -- ALTIMETER.

TROUBLE	PROBABLE CAUSE	REMEDY
HAND OSCILLATES.	Static pressure irregular.	Check lines for obstruction or leaks. Blow out lines, tighten connections.
	Leak in airspeed or vertical speed indicator installations.	Check other instruments and system plumbing for leaks. Blow out lines, tighten connections.

### 15-21. TROUBLE SHOOTING--VERTICAL SPEED INDICATOR.

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT FAILS TO OPERATE.	Static line plugged.	Check line for obstructions. Blow out lines.
	Static line broken.	Check line for damage, connections for security. Repair or replace damaged line, tighten connections.
INCORRECT INDICATION.	Partially plugged static line.	Check line for obstructions. Blow out lines.
	Ruptured diaphragm.	Substitute known-good indicator and check reading. Replace instrument.
	Pointer off zero.	Reset pointer to zero.
POINTER OSCILLATES.	Partially plugged static line.	Check line for obstructions. Blow out lines.
	Test lines and connections for leaks. Repair or replace damaged lines, tighten connections.	
	Leak in instrument case.	Substitute know-good indicator and check reading. Replace instrument.

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### 15-21. TROUBLE SHOOTING--VERTICAL SPEED INDICATOR (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
HAND VIBRATES.	Excessive vibration. Defective diaphragm.	Check shock mounts. Replace defective shock mounts. Substitute known-good indicator and check for vibration. Replace instrument.

### 15-22. TROUBLE SHOOTING--PITOT TUBE HEATER.

TROUBLE	PROBABLE CAUSE	REMEDY
TUBE DOES NOT HEAT OR CLEAR ICE.	Switch turned "OFF." Open circuit breaker.	Turn switch "ON." Reset circuit breaker.
	Break in wiring.	Test for open circuit. Repair wiring.
	Heating element burned out.	Check resistance of heating element. Replace element.

### 15-23. VACUUM SYSTEM.

15-24. DESCRIPTION. Suction to operate the gyros is provided by a dry-type engine-driven vacuum pump, gear-driven through a spline-type coupling. A suction relief valve, to control system pressure, is connected between the pump inlet and the instruments. In the cabin, the vacuum line is routed from gyro instruments to the relief valve at the firewall. A throw away type central air filter is utilized. The unit is installed with one bolt for quick change capability. The reading of the suction gage indicates net difference in suction before and after air passes through a gyro. This differential pressure will gradually decrease as the central air filter becomes dirty, causing a lower reading on the suction gage.

#### NOTE

The Airborne Vacuum System Test Kit, Part No. 343, is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station. The kit comes with regulators, ejectors, gages, fittings, and instructions to help field maintenance personnel pinpoint vacuum system malfunctions.

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### 15-25. TROUBLE SHOOTING -- VACUUM SYSTEM (Cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
HIGH SUCTION GAGE READINGS.	Gyros function normally-- relief valve screen clogged, relief valve malfunction.	Check screen, then valve. Compare gage readings with new gage. Clean screen; reset valve. Replace gage.
NORMAL SUCTION GAGE READING, SLUGGISH OR ERRATIC GYRO RESPONSE.	Instrument air filters clogged.	Check filter. Replace if required.
ONE OR MORE GYROS WILL NOT OPERATE.	Defective gyro or clogged air filters or hoses.	Replace gyro, air filter, or hoses. Clear plugged substances from air filter or hose.
FREQUENT VACUUM PUMP REPLACEMENT.	Incorrect pump for application. Kinked or plugged line, hose, or filter. Vacuum pressure misset. Deice control malfunction. Defective gyro or clogged air filters or hoses.	Replace with correct pump. Remove line, hose, or filter obstruction. Reset vacuum pressure or deice control valve.
NO VACUUM.	Defective pump or suction gage. Stuck relief valve. Plugged hose or line.	Replace pump or suction gage. Adjust or replace relief valve. Locate and remove plugged substance from hose or line.
LOW SUCTION GAGE READINGS.	Leaks or restriction between instruments and relief valve, relief valve out of adjustment, defective pump.	Check lines for leaks, disconnect, and test pump. Repair or replace lines, adjust or replace lines, adjust or replace relief valve, repair or replace pump.
SUCTION GAGE FLUCTUATES.	Central air filter dirty.	Check filter. Replace if required.
GYRO GAGE FOLLOWS ENGINE RPM.	Defective gage or sticking relief valve. Panel or plumbing vibration.	Check suction with test gage. Replace gage. Clean sticking valve with Stoddard solvent. Blow dry and test. If valve sticks after cleaning, replace valve. Eliminate vibration.
	Blocked relief valve seat area. Defective relief valve.	Remove adjustment screw on relief valve and use clean shop air to blow seat area off. Readjust and/or replace relief valve.

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### 15-25. TROUBLE SHOOTING -- VACUUM SYSTEM. (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
LOW SUCTION GAGE READINGS.	Leaks or restriction between instruments and relief valve. relief valve out of adjustment, defective pump.	Check lines for leaks, disconnect and test pump. Repair or replace lines, adjust or replace relief valve, repair or replace pump.
SUCTION GAGE FLUCTUATES.	Central air filter dirty. Defective gage or sticking relief valve.	Check filter. Replace if required. Check suction with test gage. Replace gage. Clean sticking valve with Stoddard solvent. Blow dry and test. If valve sticks after cleaning, replace valve.

### 15-26. TROUBLE SHOOTING--GYROS.

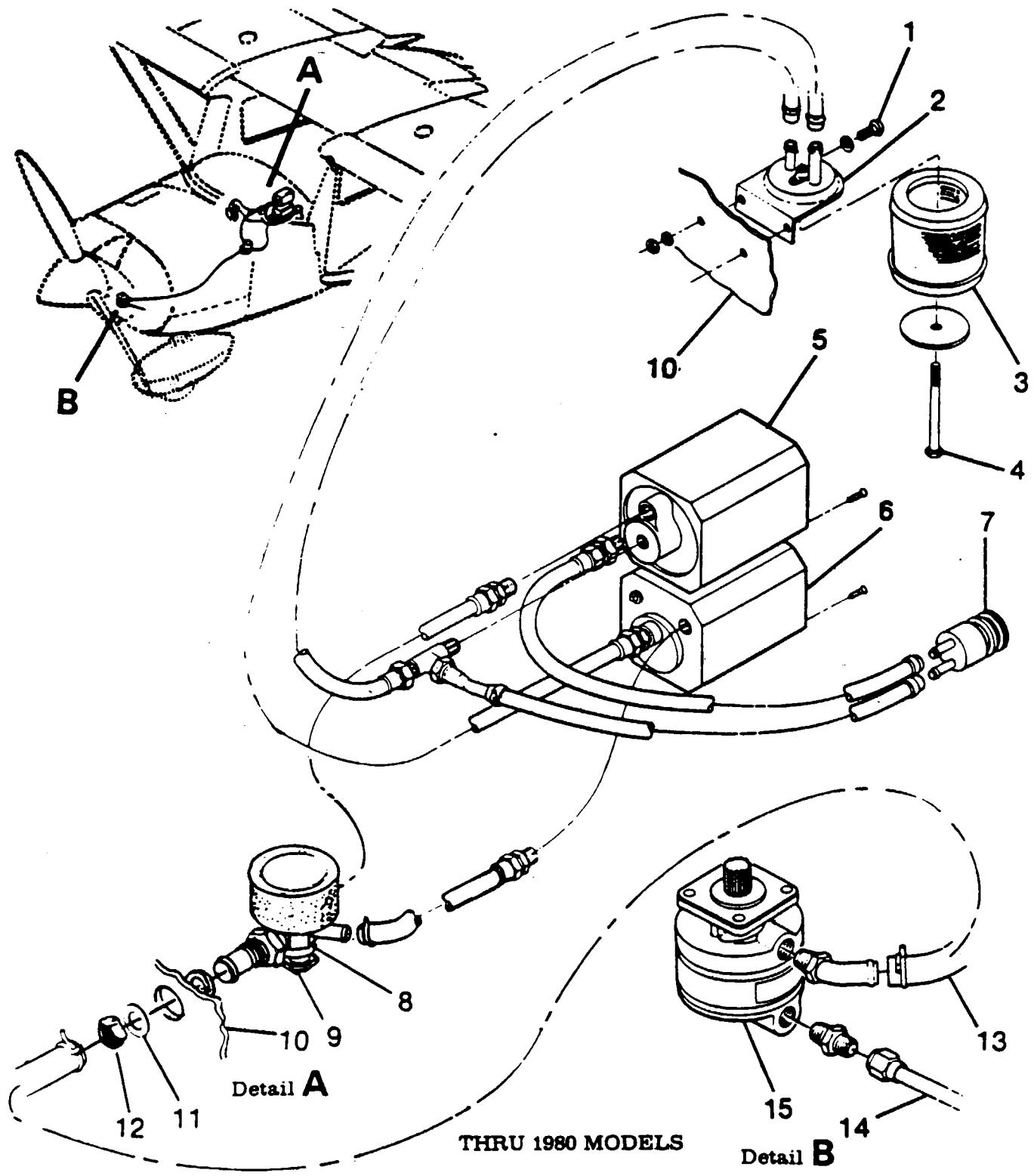
TROUBLE	PROBABLE CAUSE	REMEDY
HORIZON BAR FAILS TO RESPOND.	Central filter dirty. Suction relief valve improperly adjusted.	Check filter. Replace if required. Adjust or replace relief valve.
HORIZON BAR DOES NOT SETTLE.	Faulty suction gage. Vacuum pump failure. Vacuum line kinked or leaking. Defective mechanism. Insufficient vacuum or leaking gyro. Excessive vibration.	Substitute known-good suction gage and check gyro response. Replace suction gage. Check pump. Replace pump. Check lines for damage and leaks. Repair or replace damaged lines, tighten connections. Substitute known-good gyro and check indication. Replace instrument. Adjust or replace relief valve. Tape seal horizon gyro case. Check panel shock-mounts. Replace defective shock-mounts.

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### 15-26. TROUBLE SHOOTING--GYROS. (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
HORIZON BAR OSCILATES OR VIBRATES EXCESSIVELY.	Central filter dirty.	Check filter. Replace if required.
	Suction relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Substitute known-good suction gage and check gyro indication. Replace suction gage.
	Defective mechanism.	Substitute known-good gyro and check indication. Replace instrument.
	Excessive vibration.	Check panel shock-mounts. Replace defective shock-mounts.
EXCESSIVE DRIFT IN EITHER DIRECTION.	Central air filter dirty.	Check filter. Replace if required.
	Low vacuum, relief valve improperly adjusted.	Adjust or replace relief valve.
	Faulty suction gage.	Substitute known-good suction gage and check gyro indication. Replace suction gage.
	Vacuum pump failure.	Check pump. Replace pump.
	Vacuum line kinked or leaking.	Check lines for damage and leaks. Repair or replace damaged lines. tighten connections.
DIAL SPINS IN ONE DIRECTION CONTINUOUSLY.	Operating limits have been exceeded.	Replace instrument.
	Defective mechanism.	Substitute known-good gyro and check indication. Replace instrument.

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- |                   |                     |                    |
|-------------------|---------------------|--------------------|
| 1. Screw          | 6. Directional Gyro | 11. Washer         |
| 2. Filter Bracket | 7. Suction Gage     | 12. Nut            |
| 3. Filter         | 8. Relief Valve     | 13. Hose (To Pump) |
| 4. Bolt           | 9. Adjustment Screw | 14. Overboard Line |
| 5. Gyro Horizon   | 10. Firewall        | 15. Vacuum Pump    |

Figure 15-4. Vacuum System (Sheet 1 of 2)

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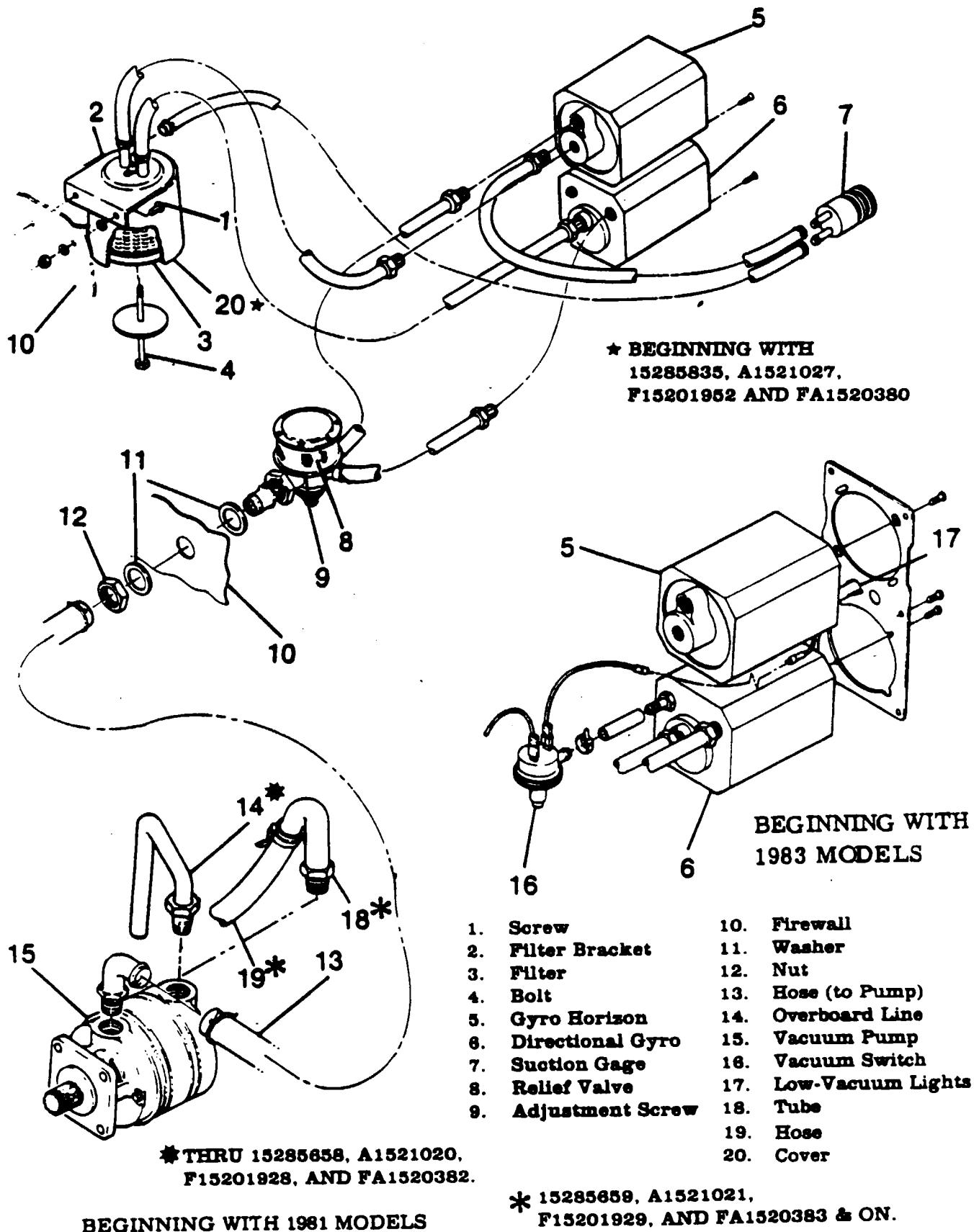


Figure 15-4. Vacuum System (Sheet 2 of 2)

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### 15-27. TROUBLE SHOOTING--VACUUM PUMP.

TROUBLE	PROBABLE CAUSE	REMEDY
OIL IN DISCHARGE.	Damaged engine drive seal.	Replace gasket.
HIGH SUCTION.	Suction relief valve filter clogged.	Check filter for obstructions. Clean or replace filter.
LOW SUCTION.	Relief valve leaking.	Replace relief valve.
	Vacuum pump failure.	Substitute known-good pump and check pump suction. Replace vacuum pump.
LOW PRESSURE.	Safety valve leaking. Vacuum pump failure.	Replace safety valve. Substitute known-good pump and check pump pressure. Replace vacuum pump.

### 15-28. MAINTENANCE PRACTICES.

#### NOTE

When replacing a vacuum system component, ensure all connections are made correctly to avoid damage to gyro system. When a component is removed, cap off and identify all open lines, hoses, and fittings to prevent dirt from entering system, and to ensure proper reinstallation. Upon component replacement, check all hoses carefully to be sure they are clean and free of debris, oil, solvent, collapsed inner liners, and external damage. Replace old, hard, cracked, or brittle hoses, particularly on pump inlet, to avoid possible pump damage. On vacuum pump, where hose clearance is tight, making it difficult to reinstall hoses, apply a light film of petrolatum to the fitting. Install hoses by pushing them straight on, and do not wiggle hoses from side to side as this could cause particles to be cut from inside of hose, allowing particles to enter system.

#### CAUTION

Do not use teflon tape, pipe dope, or thread lubricants of any type on fitting threads, and avoid over-tightening of connections. All filters in vacuum system must be changed when installing a new pump. Failure to do so will void pump warranty. DO NOT CONNECT A PUMP BACKWARDS. Since the manifold check valve provides no pressure relief, the pump will be destroyed within a matter of seconds after starting the engine.

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### 15-28A. REMOVAL OF VACUUM PUMP.

- a. Remove upper engine cowling in accordance with procedures in Section 11.
- b. Disconnect, cap off and identify hose on inlet side of vacuum pump.
- c. Identify and disconnect hose on outlet side of vacuum pump.
- d. Remove nuts, lockwashers, and flat washers securing vacuum pump to engine.
- e. Remove vacuum pump from mounting studs on engine.
- f. Remove elbow from pump and retain if it is reusable.

#### NOTE

Discard any twisted fittings or nuts with rounded corners.

### 15-28B. MOUNTING PAD INSPECTION.

- a. Check condition of the AND 20000 pad seal. If the seal shows any signs of oil leakage, replace the seal. Replace seal if there is any doubt as to its serviceability.

### 15-28C. INSTALLATION OF VACUUM PUMP.

- a. Before installing a new vacuum pump, purge all lines in system to remove carbon particles or other pump components that may have been deposited in lines by previous pump.

#### NOTE

Before installing vacuum pump on engine, ensure that mating surfaces are clean and free of any old gasket material.

- b. Consult the applicable Parts Catalog, the pump vendor's application list, or the PMA label on the pump box to verify that the pump is the correct model for the engine and/or system.
- c. Position vacuum pump in a jaw-protected vise, with drive coupling downward.

#### CAUTION

Pump housing should never be placed directly in a vise, since clamping across center housing will cause an internal failure of carbon rotor. Protect pump mounting flange with soft metal or wood. NEVER install a vacuum pump that has been dropped.

#### NOTE

Do not use teflon tape, pipe dope, or thread lubricants of any type, and avoid over-tightening of connections.

- d. Install elbow in pump; hand-tighten only.

#### NOTE

Use only a box wrench to tighten fittings to desired position. Do not make more than one and one half (1-1/2) turns beyond hand-tighten position.

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- e. Position new mounting pad gasket on mounting studs on engine.
- f. Position vacuum pump on mounting studs.
- g. Secure pump to engine with flat washers, new lockwashers, and nuts.

### CAUTION

Always replace all lockwashers with new one when installing a new vacuum pump. Tighten all four mounting nuts (4) to 50 to 70 pound-inches.

- h. Connect hose to inlet side of vacuum pump.

### NOTE

When installing hoses, do not wiggle from side to side. This practice can cause particles to be cut from inside hose that could damage pump.

- i. Install upper engine cowling in accordance with procedures in Section 11.

**15-28D. CLEANING.** In general, low pressure, dry compressed air should be used in cleaning vacuum system components. Suction relief valve should be washed with Stoddard solvent, then dried with low-pressure air blast.

### CAUTION

Never apply compressed air to lines or components installed in aircraft. The excessive pressures will damage gyros. If an obstructed line is to be blown out, disconnect at both ends and blow from instrument panel out.

**15-28E. LOW-VACUUM WARNING LIGHT.** A red low-vacuum warning light is installed on the instrument panel. The light is controlled by a vacuum switch mounted on the back of the gyro horizon. The switch contacts are normally closed. The light may be checked by turning ON the master switch. With the engine running the light should illuminate when the vacuum drops below  $3 \pm .5$  inches Hg.

**15-29. VACUUM RELIEF VALVE ADJUSTMENT.** A suction gage reading of 5.3 inches of mercury is desirable for gyro instruments. However, a range of 4.6 to 5.4 inches of mercury is acceptable. To adjust relief valve, remove central air filter, run engine to 1900 RPM on ground and adjust relief valve to  $5.3 \pm .1$  inches of mercury.

### CAUTION

Do not exceed maximum engine temperature.

Be sure filter element is clean before installing. If reading drops noticeably, install new filter element.

**15-30. STANDBY VACUUM SYSTEM.**

**15-30A. DESCRIPTION.** A standby vacuum system may be installed in the airplane. The system consists of a vacuum pump, driven by an electric motor, mounted on the aft side of the firewall and associated hoses. One hose is the vacuum pump vent hose and the other connects to a manifold with the engine driven vacuum pump, just prior to the system relief valve. A two position circuit breaker switch, mounted adjacent to the cabin air control on the instrument panel, controls and protects the system.

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### ■ 15-30B. TROUBLE SHOOTING - STANDBY VACUUM SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
NO SUCTION GAGE READING.	Circuit breaker switch has opened.	Reset circuit breaker switch. If switch reopens, check wire from switch to bus bar for short. Repair or replace wire.
	Defective motor.	Check voltage input wire and ground wire. Repair or replace wires.
	Defective pump.	Check pump operation. Replace pump.
LOW SUCTION GAGE READING.	Leak or restriction between pump and suction gage.	Check hoses and connections for leaks and obstructions. Install new clamps at connection, clear or replace hoses.
	Relief valve not properly adjusted.	Adjust relief valve.
	Defective pump.	Check pump. Replace pump.
Central air filter dirty.	Central air filter dirty.	Replace central air filter.

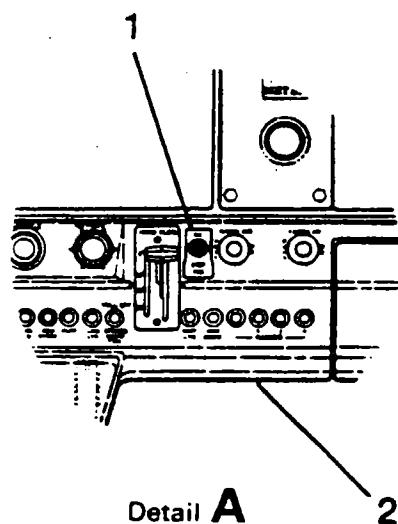
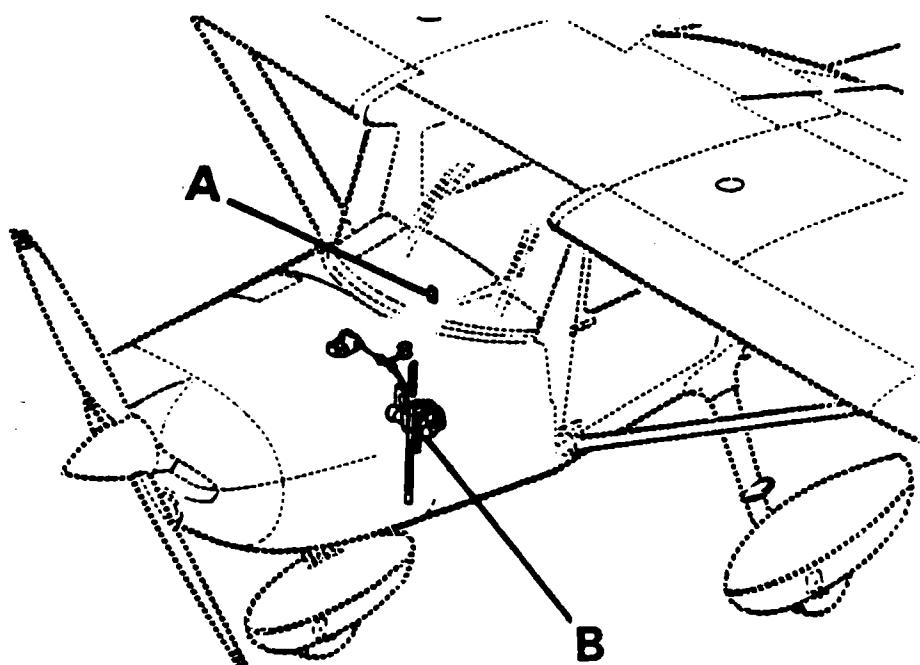
### ■ 15-30C. REMOVAL. (See figure 15-4A.)

- Release clamps securing hoses (12) and (13) to pump (15).
- Cap hoses (12), (13) and pump fittings (14) so dirt cannot enter system.
- Make sure circuit breaker switch (1) and battery switch are off.
- Disconnect motor voltage input wire 919) and ground wire (21).
- Remove safety from bolts (9).
- Support pump and motor assembly and remove bolts (9).
- If pump is to be removed from motor, remove nuts (16) and washers (17).

### ■ 15-30D. INSTALLATION. (See figure 15-4A.)

- If removed, install pump (15) on motor (18) drive studs and install washers (17) and nuts (16).
- Position pump and motor assembly up against bracket (22) and install bolts (9).
- Safety-wire bolts (9).
- Connect motor voltage input wire (19) and ground wire (21).
- (See figure 15-4B.) For improved wire security, install ties (4) (6) around motor (5), nipples (8), and motor wires (3), pull red motor lead tight, and seal grommet (7) with RTV sealer.
- Remove caps from hoses (12), (13), and fittings (14) then install hoses and clamps.
- Turn on battery switch and close circuit breaker (1), then check suction gage to see that system is operating properly. Then turn off switches.

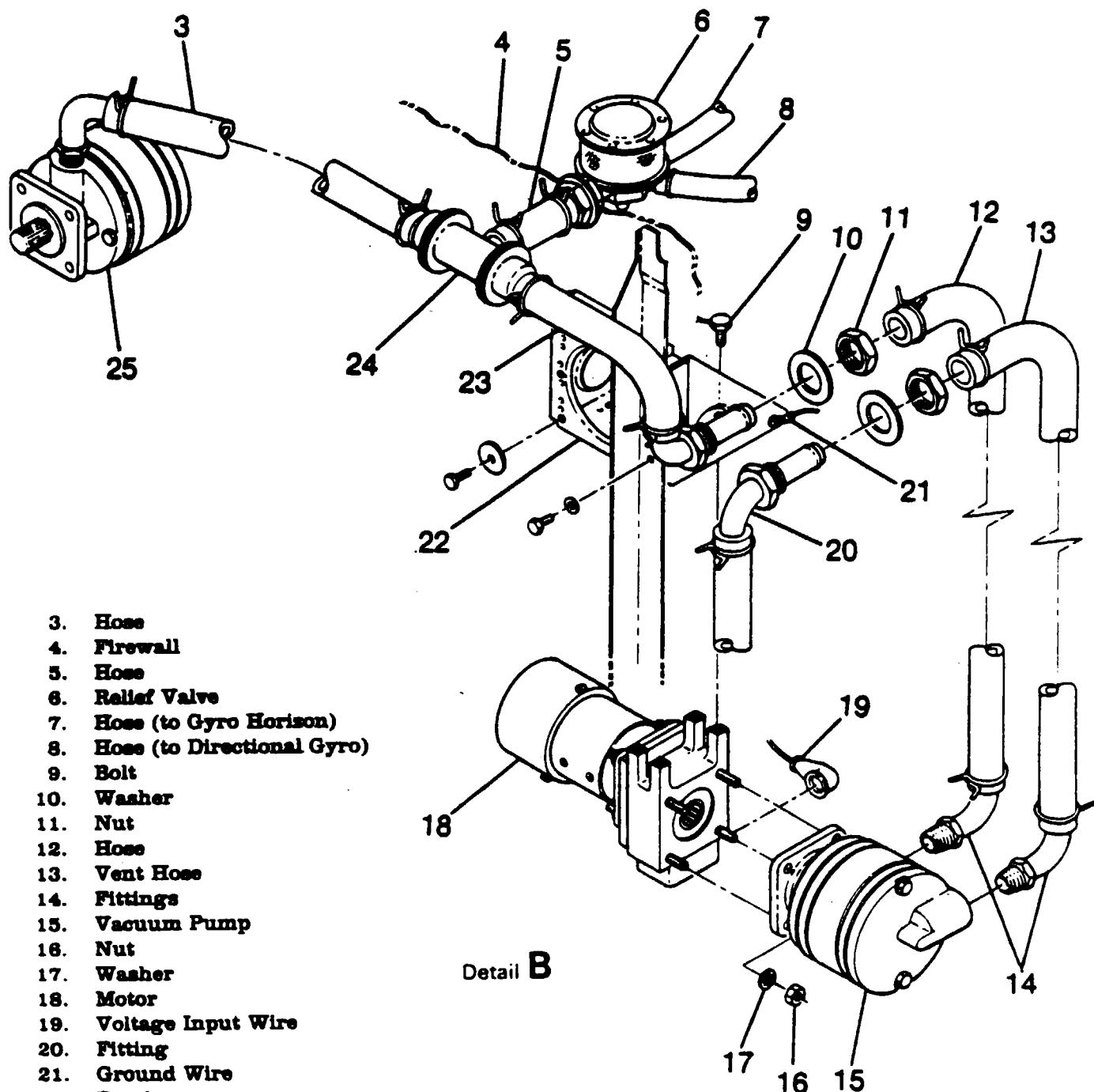
## MODEL 152 SERIES SERVICE MANUAL



1. Circuit Breaker Switch
2. Instrument Panel

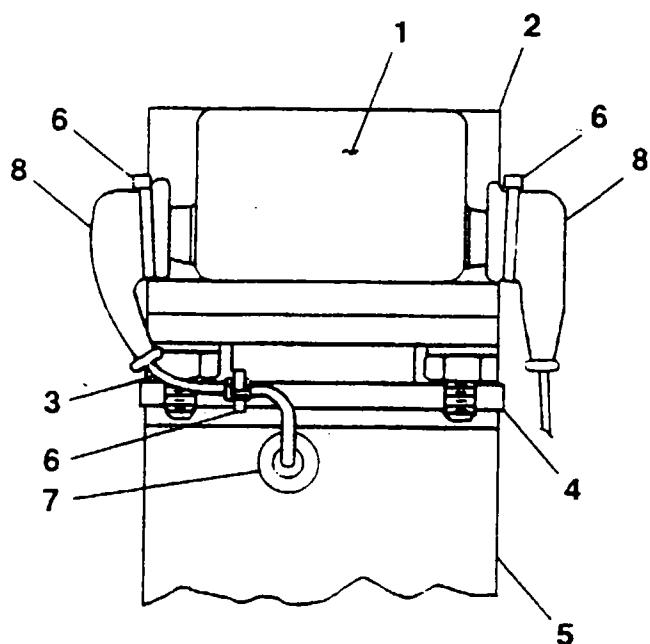
Figure 15-4A. Standby Vacuum System Installation (Sheet 1 of 2)

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**Figure 15-4A. Standby Vacuum System Installation (Sheet 2 of 2)**

## MODEL 152 SERIES SERVICE MANUAL



1. Filter
2. Gearbox
3. Red Motor Wire
4. S-2209-3 Tie
5. Motor
6. S-2209-1 Tie
7. Grommet
8. Nipple

Figure 15-4B. Standby Vacuum Pump Motor Wire Security

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- 15-31. ENGINE INDICATORS.
- 15-32. TACHOMETER.
- 15-33. DESCRIPTION. The tachometer is a mechanical indicator driven at half crankshaft speed by a flexible shaft. Most tachometer difficulties will be found in the drive-shaft. To function properly, the shaft housing must be free of kinks, dents and sharp bends. There should be no bend on a radius shorter than six inches and no bend within three inches of either terminal. If a tachometer is noisy or pointer oscillates, check cable housing for kinks, sharp bends and damage. Disconnect cable at tachometer and pull it out of housing. Check cable for worn spots, breaks and kinks.

### NOTE

Before replacing a tachometer cable in housing, coat lower two thirds with AC Type ST-640 speedometer cable grease or Lubriplate No. 110. Insert cable in housing as far as possible, then slowly rotate to make sure it is seated in the engine fitting. Insert cable in tachometer, making sure it is seated in drive shaft, then hand tighten shaft nut, then torque 1/4 turn.

- 15-34. OIL PRESSURE GAGE.
- 15-35. DESCRIPTION. On some airplanes, a Bourbon tube-type oil pressure gage is installed. This is a direct-reading instrument, operated by a pressure pickup line connected to the engine main oil gallery. The oil pressure line from the instrument to the engine should be filled with kerosene, especially during cold weather operation, to obtain immediate oil indication. Electrically actuated gages are installed on some airplanes which utilize a pressure sending bulb.
- 15-36. TROUBLE SHOOTING -- OIL PRESSURE GAGE (DIRECT READING)

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE DOES NOT REGISTER.	Pressure line clogged.	Check line for obstructions. Clean line.
	Pressure line broken.	Check line for leaks and damage. Repair or replace damaged line.
	Fractured Bourdon tube.	Replace instrument.
	Gage pointer loose on staff.	Replace instrument.
	Damaged gage movement.	Replace instrument.
	Foreign matter in line.	Check line for obstructions. Clean line.
GAGE POINTER FAILS TO RETURN TO ZERO.	Foreign matter in Bourdon tube.	Replace instrument.
	Bourdon tube stretched.	Replace instrument.

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### 15-36. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE DOES NOT REGISTER PROPERLY.	Faulty mechanism.	Replace instrument.
GAGE HAS ERRATIC OPERATION.	Worn or bent movement. Foreign matter in Bourdon tube.	Replace instrument.
	Dirty or corroded movement.	Replace instrument.
	Pointer bent and rubbing on dial, dial screw or glass.	Replace instrument.
	Leak in pressure line.	Check line for leaks and damage. Repair or replace damaged line.

### 15-37. OIL TEMPERATURE GAGE.

15-38. DESCRIPTION. The oil temperature gage is an electrically operated indicator mounted in the instrument cluster with the oil pressure gage. One electrical lead is routed from the indicator to the sending unit installed in the engine. The other lead supplies power from the bus bar to the indicator. Refer to Table 1 on page 15-25 when trouble shooting the oil temperature gage. ■

#### 15-38A. ECONOMY MIXTURE INDICATOR (EGT) (BEGINNING WITH 1979 MODELS.)

15-38B. DESCRIPTION. The economy mixture indicator is an exhaust gas temperature (EGT) sensing device which is used to aid the pilot in selecting the most desirable fuel-air mixture for cruising flight at less than 75% power. Exhaust gas temperature (EGT) varies with ratio of fuel-to-air mixture entering the engine cylinders. Refer to the Pilot's Operating Handbook for operating procedure of the system.

15-38C. CALIBRATION. A potentiometer adjustment screw is provided behind the plastic cap at the back of the instrument for calibration. This adjustment is used to position the pointer over the reference increment line (4/5 of scale) at peak EGT. Establish level flight below 10000 ft. altitude with the throttle control advanced to 75% of full throttle, then carefully lean the mixture to peak EGT. After the pointer has peaked, using the adjustment screw, position pointer over reference increment line (4/5 scale).

#### NOTE

This setting will provide selective temperature indications for normal cruise power settings within range of the instrument.

Turning the screw clockwise increases the meter reading and counterclockwise decreases the meter reading. There is a stop in each direction and damage can occur if too much torque is applied against stops. Approximately 600°F total adjustment is provided. The adjustable pointer on the face of the instrument is a reference pointer only.

## MODEL 152 SERIES SERVICE MANUAL

### 15-38D. REMOVAL AND INSTALLATION. (See figure 15-4A.)

- a. Indicator.
  1. Remove instrument panel decorative cover.
  2. Disconnect EGT indicator leads.
  3. Remove screws, nuts and washers securing indicator and remove indicator.
  4. To install reverse the preceding steps.
- b. Probe.
  1. Disconnect probe leads.
  2. Remove clamp and probe assembly.
  3. When installing probe, tighten clamp to 30-35 lb-in.
  4. Coil or fold excess lead and tie in a convenient out of the way location.

### 15-38E. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
GAGE INOPERATIVE	Defective gage, probe or circuit	Repair or replace defective part.
INCORRECT READING	Indicator needs calibrating	Calibrate indicator in accordance with paragraph 15-38C.
FLUCTUATING READING	Loose, frayed or broken lead, permitting alternate make and break of circuit.	Tighten connection and repair or replace defective leads.

### 15-39. FUEL QUANTITY INDICATING SYSTEM.

15-40. DESCRIPTION. The magnetic type fuel quantity indicators are used in conjunction with a float-operated variable-resistance transmitter in each fuel tank. The full position of float produces a minimum resistance through transmitter, permitting maximum current flow through the fuel quantity indicator and maximum pointer deflection. As fuel level is lowered, resistance in the transmitter is increased, producing a decreased current flow through fuel quantity indicator and a smaller pointer deflection.

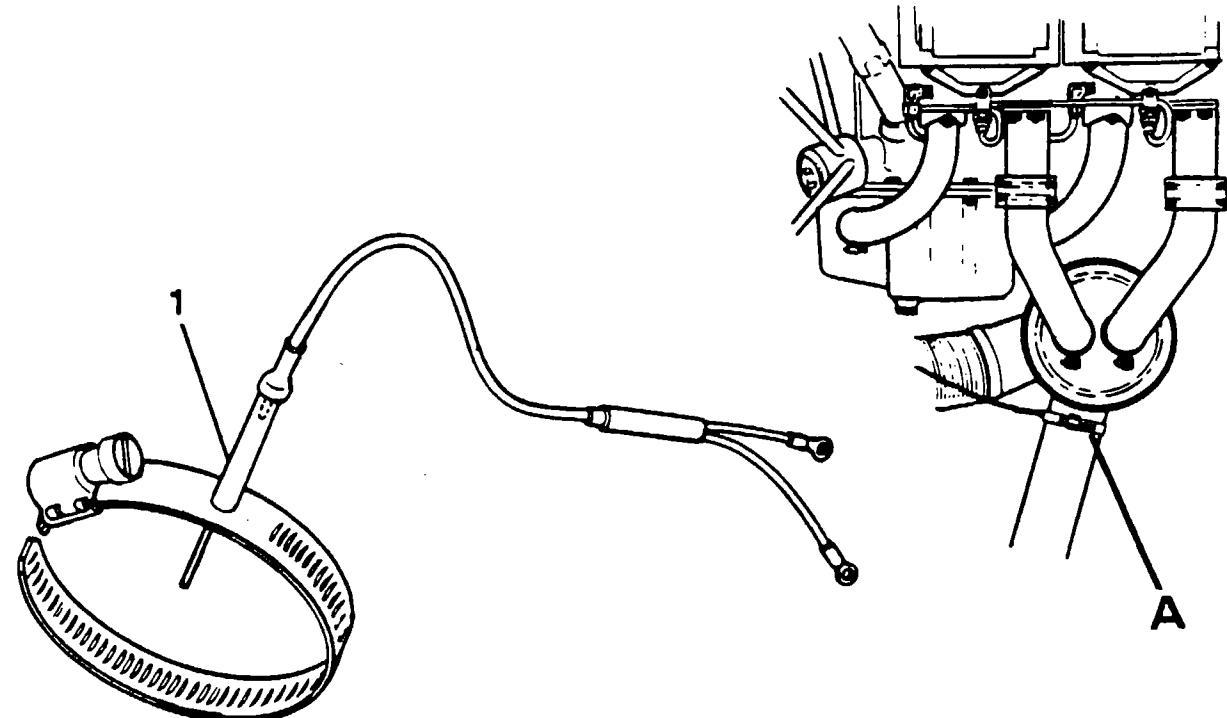
### 15-41. REMOVAL AND INSTALLATION OF FUEL QUANTITY TRANSMITTER.

- a. Drain fuel from tank. (Observe precautions in Section 12.)
- b. Remove access plate above fuel tank for access to transmitter.
- c. Disconnect electrical lead and ground strap from transmitter.
- d. Remove screws attaching transmitter and carefully work transmitter from tank. DO NOT BEND FLOAT ARM.
- e. Install transmitter by reversing preceding steps, using new gaskets around opening in fuel tank and under screw heads. Be sure to tighten screws evenly.
- f. Service fuel tanks. Check for leaks and correct quantity indication.

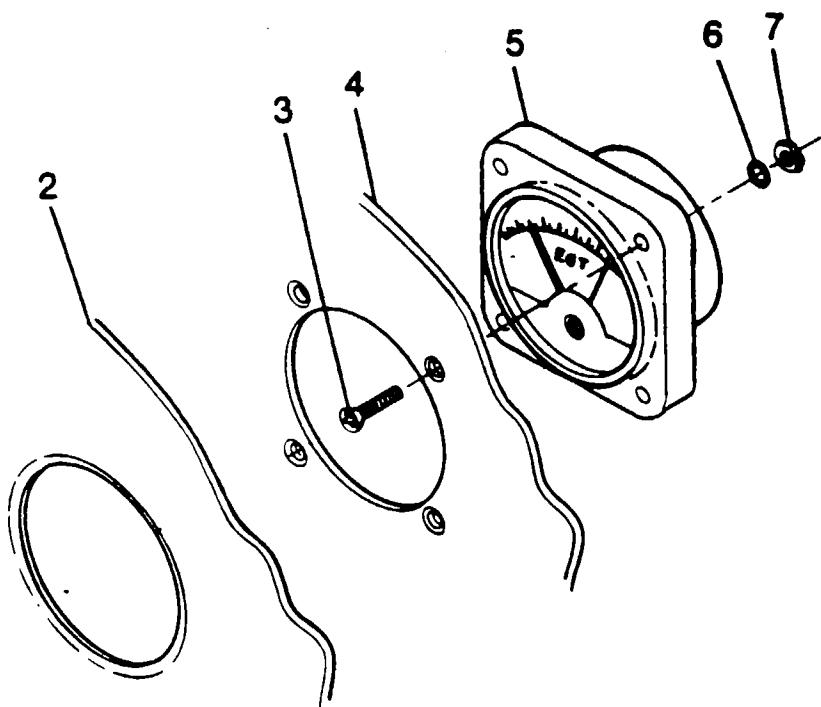
#### NOTE

Ensure transmitter is properly grounded in accordance with Section 12.

# MODEL 152 SERIES SERVICE MANUAL



Detail A



- 1. Probe
- 2. Panel Cover
- 3. Screw
- 4. Instrument Panel
- 5. Indicator
- 6. Lockwasher
- 7. Nut

15-4A. Economy Mixture Indicating System E.G.T

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### 15-42. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
FAILURE TO INDICATE.	No power to indicator or transmitter. (Pointer stays below E.)	Check fuse and inspect for open circuit. Replace fuse, repair or replace defective wire.
	Grounded wire. (Pointer stays above F.)	Check for partial ground between transmitter and gage. Repair or replace defective wire.
	Low voltage.	Check voltage at indicator. Correct voltage.
	Defective indicator.	Substitute known-good indicator. Replace indicator.
OFF CALIBRATION.	Defective indicator.	Substitute known-good transmitter. Recalibrate or replace.
	Low or high voltage.	Check voltage at indicator. Correct voltage.
STICKY OR SLUGGISH INDICATOR OPERATION.	Defective indicator.	Substitute known-good indicator. Replace indicator.
	Low voltage.	Check voltage at indicator. Correct voltage.
ERRATIC READINGS.	Loose or broken wiring on indicator or transmitter.	Inspect circuit wiring. Repair or replace defective wire.
	Defective indicator or transmitter.	Substitute known-good component. Replace indicator or transmitter.
	Defective master switch.	Replace switch.

## MODEL 152 SERIES SERVICE MANUAL

### 15-43. TRANSMITTER ADJUSTMENT.

#### WARNING

Using the following fuel transmitter calibration procedure on components other than the originally installed (Stewart Warner) components will result in a faulty fuel quantity reading.

15-43A. STEWART WARNER GAGE TRANSMITTER CALIBRATION. Chances of transmitter calibration changing in normal service is remote; however, it is possible that float arm or float arm stops may become bent if transmitter is removed from cell. Transmitter calibration is obtained by adjusting float travel. Float travel is limited by float arm stops.

#### WARNING

Use extreme caution while working with electrical components of the fuel system. The possibility of electrical sparks around an "empty" fuel cell creates a hazardous situation and could potentially cause an explosion.

Before installing transmitter, attach electrical wires and place master switch in "ON" position. Allow float arm to rest against lower float arm stop and read indicator. The pointer should be on E (empty) position. Adjust the float arm against lower stop so pointer indicator is on E. Raise float until arm is against upper stop and adjust upper stop to permit indicator pointer to be on F (full). Install transmitter in accordance with paragraph 15-41.

15-43B. ROCHESTER GAGE TRANSMITTER. Do not attempt to adjust float arm or stop. No adjustment is allowed.

Table 1

#### NOTE

Select the oil temperature sending unit part number that is used in your aircraft from the left column and the temperature from the column headings. Read the ohms value under the appropriate temperature column.

Part Number	Type	72°F	120°F	165°F	220°F	250°F
S1630-1	Oil Temp				46.4	
S1630-3	Oil Temp		620.0			52.4
S1630-4	Oil Temp		620.0			52.4
S1630-5	Oil Temp			192.0		
S2335-1	Oil Temp	990.0				34.0

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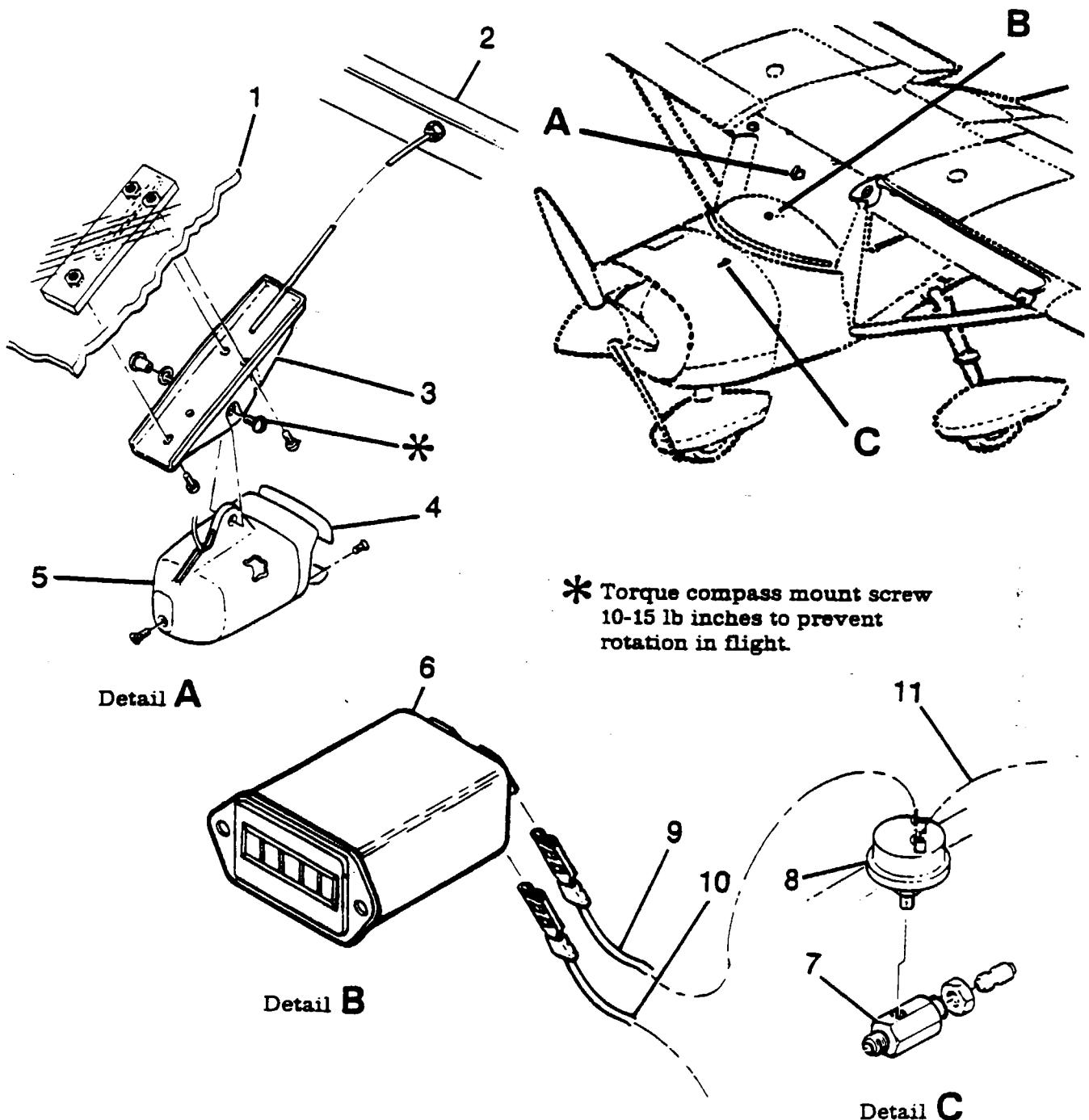
- 15-44. HOURMETER.
- 15-45. DESCRIPTION. The hourmeter is electrically operated instrument and is actuated by a pressure switch in the oil pressure gage line. Electrical power is supplied through a one-amp fuse from the electrical clock circuit and therefore, will operate independent of the master switch.

### NOTE

When installing the hourmeter, the positive (red) wire must be connected to the white + terminal. Connecting wires incorrectly will damage the meter.

- 15-46. MAGNETIC COMPASS. (See figure 15-5A.)
- 15-47. DESCRIPTION. The magnetic compass is liquid-filled, with expansion provisions to compensate for temperature changes. It is equipped with compensating mount of case. The compass is internally lighted, controlled by the panel lights rheostat. No maintenance is required on the compass except for a check on a compass rose each 200 hours for adjustment.
- 15-48. ACCELEROMETER.
- 15-49. DESCRIPTION. The Aerobat offers an accelerometer to assist pilot in performing precision aerobatics. The accelerometer continuously indicates G forces being imposed on aircraft. The dial display utilizes three pointers; one pointer indicates instantaneous acceleration, another records maximum positive acceleration and the third records maximum negative acceleration. Maximum instrument markings range from 10G to 5G. A "PUSH TO SET" knob, located on lower left corner of instrument, is used to reset "Maximum Positive" and "Maximum Negative" pointers. If dual Nav/Coms are installed, the accelerometer is installed in an upper radio compartment housing above instrument panel on pilot's side. When aircraft is equipped with single Nav/Com, accelerometer is installed in the vacant Omni indicator instrument space.

## MODEL 152 SERIES SERVICE MANUAL



- |                       |                             |
|-----------------------|-----------------------------|
| 1. Windshield         | 7. Adapter                  |
| 2. Fuselage Structure | 8. Pressure Switch          |
| 3. Compass Mount      | 9. Positive Wire            |
| 4. Correction Card    | 10. Ground Wire             |
| 5. Compass            | 11. Wire from Clock Circuit |
| 6. Hourmeter          |                             |

Figure 15-5A. Magnetic Compass and Hourmeter Installation

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### 15-50. STALL WARNING SYSTEM. (See figure 15-6.)

15-51. DESCRIPTION. The system is composed of an adjustable plate on left wing leading edge, connected to a reed type horn by means of plastic tubing. The horn is actuated approximately 5 to 10 knots above stalling speed as a negative air pressure area at wing leading edge causes a reverse flow of air through horn. By moving adjustable plate (6) up, actuation of horn will occur at a higher speed and moving plate down causes actuation to occur at a slower speed. Center adjustable plate opening in wing leading edge upon installation, then flight test aircraft, observing horn actuation during stall. Readjust plate to obtain desired results if necessary. Approximately 3/32 inch adjustment of plate will change speed at which horn actuation occurs by 5 knots To test horn operation, cover opening in plate (6) with a clean cloth, such as a handkerchief and apply a slight suction by mouth to draw air through horn.

### 15-52. TURN-AND-SLIP INDICATOR.

15-53. DESCRIPTION. The turn-and-slip indicator is an electrically operated instrument powered by the aircraft electrical system, therefore, operating only when the master switch is ON.

### 15-54. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR POINTER FAILS TO RESPOND.	Internal fuse blown.	Check wiring for continuity. check voltage at indicator. Replace fuse, if fuse still blows, replace instrument.
	Master switch "OFF" or switch defective.	Check switch "ON." Replace defective switch.
	Broken or grounded lead to indicator.	Check circuit wiring. Repair or replace defective wiring.
	Indicator not grounded.	Check ground wire. Repair or replace defective wire.
	Defective mechanism.	Replace instrument.
HAND SLUGGISH IN RETURNING TO ZERO.	Defective mechanism.	Replace instrument.
	Low voltage.	Check voltage at indicator. Correct voltage.
POINTER DOES NOT INDICATE PROPER TURN.	Defective mechanism.	Replace instrument.
HAND DOES NOT SIT ON ZERO.	Gimbal and rotor out of balance.	Replace instrument.
	Hand incorrectly sits on rod. Sensitivity spring adjustment pulls hand off zero.	Replace instrument Replace instrument.

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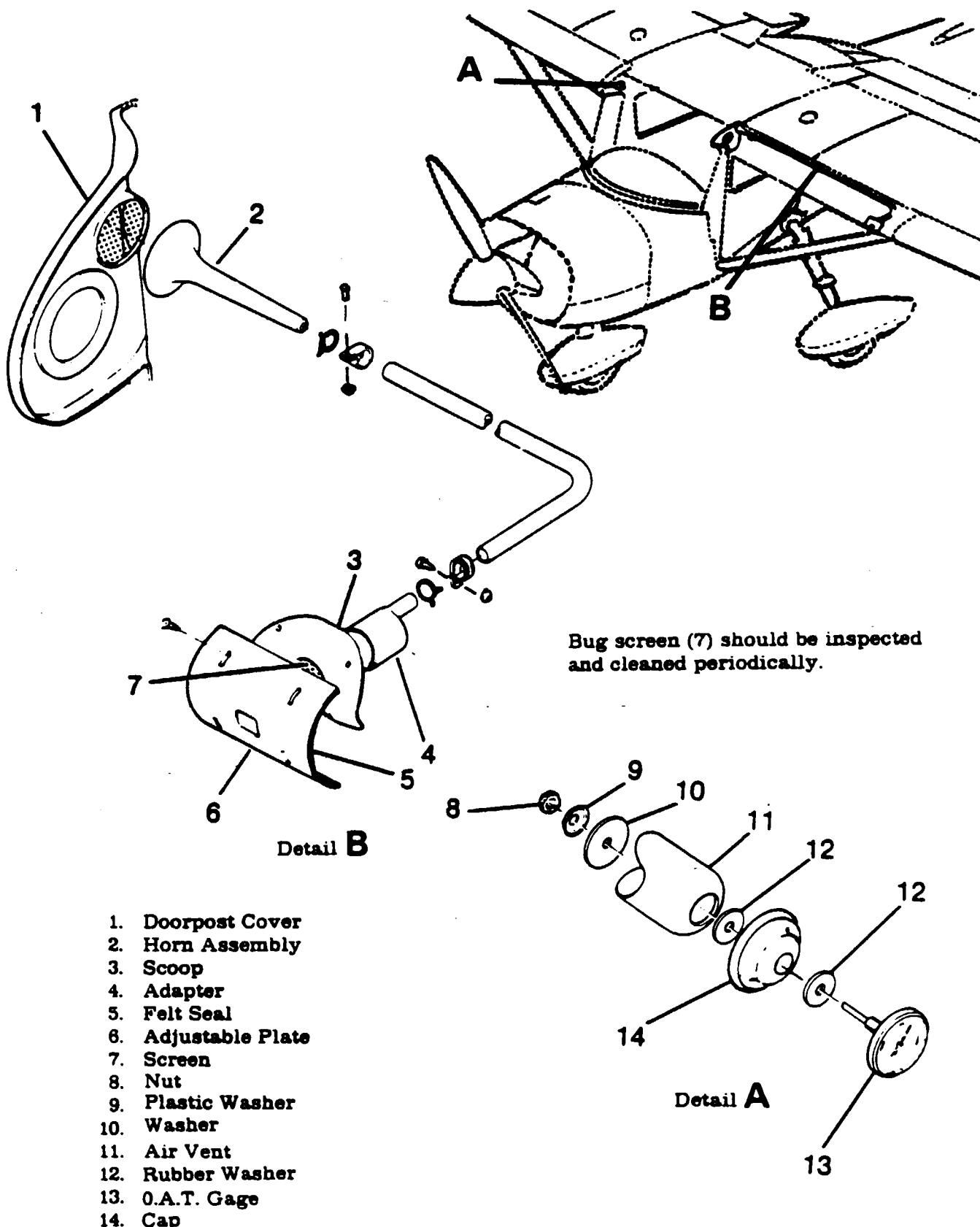


Figure 15-6. Stall Warning System and O.A.T. Gage Installation

## MODEL 152 SERIES SERVICE MANUAL

### 15-54. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
IN COLD TEMPERATURES, HAND FAILS TO RESPOND OR IS SLUGGISH.	Oil in indicator becomes too thick.	Replace instrument.
	Insufficient bearing end play.	Replace instrument.
	Low voltage.	Check voltage at indicator. Correct voltage.
NOISY GYRO.	High voltage.	Check voltage at indicator. Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

### 15-55. TURN COORDINATOR.

15-56. DESCRIPTION. The turn coordinator is an electrically operated, gyroscopic, roll-rate turn indicator. Its gyro simultaneously senses rate of motion roll and yaw axis which is projected on a single indicator. The gyro is a non-tumbling type requiring no caging mechanism and incorporates an a.c. brushless spin motor with a solid state inverter.

### 15-57. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
INDICATOR DOES NOT RETURN TO CENTER.	Friction cause by contamination in the indicator dampening.	Replace instrument.
DOES NOT INDICATE A STANDARD RATE TURN (TOO SLOW).	Friction in gimbal assembly.	Replace instrument.
	Low voltage.	Correct voltage.
NOISY MOTOR.	Inverter frequency changed.	Replace instrument.
	Faulty bearings.	Replace instrument.
ROTOR DOES NOT START.	Faulty electrical connection.	Correct voltage or replace faulty wire.
	Inverter malfunctioning.	Replace instrument.
	Motor shorted.	Replace instrument.
	Bearings frozen.	Replace instrument.

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### 15-57. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
IN COLD TEMPERATURES, HAND FAILS TO RESPOND OR IS SLUGGISH.	Oil indicator becomes too thick.	Replace instrument.
	Insufficient bearing end play.	Replace instrument.
	Low voltage.	Correct voltage.
NOISY GYRO.	High voltage.	Check voltage to instrument. Correct voltage.
	Loose or defective rotor bearings.	Replace instrument.

### 15-58. OUTSIDE AIR TEMPERATURE GAGE. (Refer to figure 15-8.)

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## SECTION 16

### ELECTRICAL SYSTEMS

#### WARNING

When performing any inspection or maintenance that requires turning on the master switch, installing a battery, or pulling the propeller through by hand, treat the propeller as if the ignition switch were ON. Do not stand, nor allow anyone else to stand, within the arc of the propeller, since a loose or broken wire, or a component malfunction, could cause the propeller to rotate.

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### **16-1. ELECTRICAL SYSTEMS.**

**16-2. GENERAL.** This section contains service information necessary to maintain the Aircraft Electrical Power Supply System, Battery and External Power Supply System, Alternator Power System, Aircraft Lighting System, Pitot Heater, Stall Warning, Cigar Lighter and Electrical Load Analysis.

### **16-3. ELECTRICAL POWER SUPPLY SYSTEM.**

**16-4. DESCRIPTION.** Electrical energy for the aircraft is supplied by a 28-volt, direct-current, single wire, negative ground electrical system. A 24-volt battery supplies power for starting and furnishes a reserve source of power in the event of alternator failure. An engine-driven alternator is the normal source of power during flight and maintains a battery charge controlled by a voltage regulator/alternator control unit. An external power source receptacle is offered as optional equipment to supplement the battery alternator system for starting and ground operation.

### **16-5. BUS BAR.**

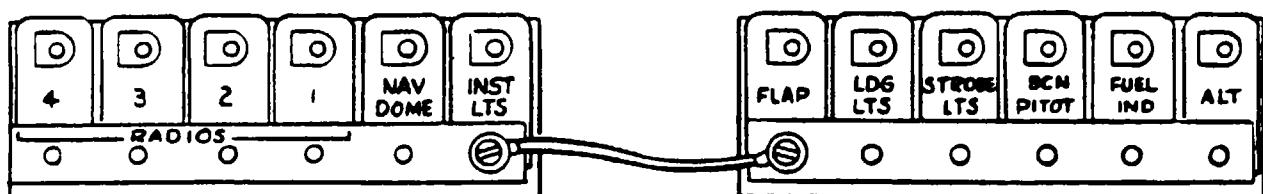
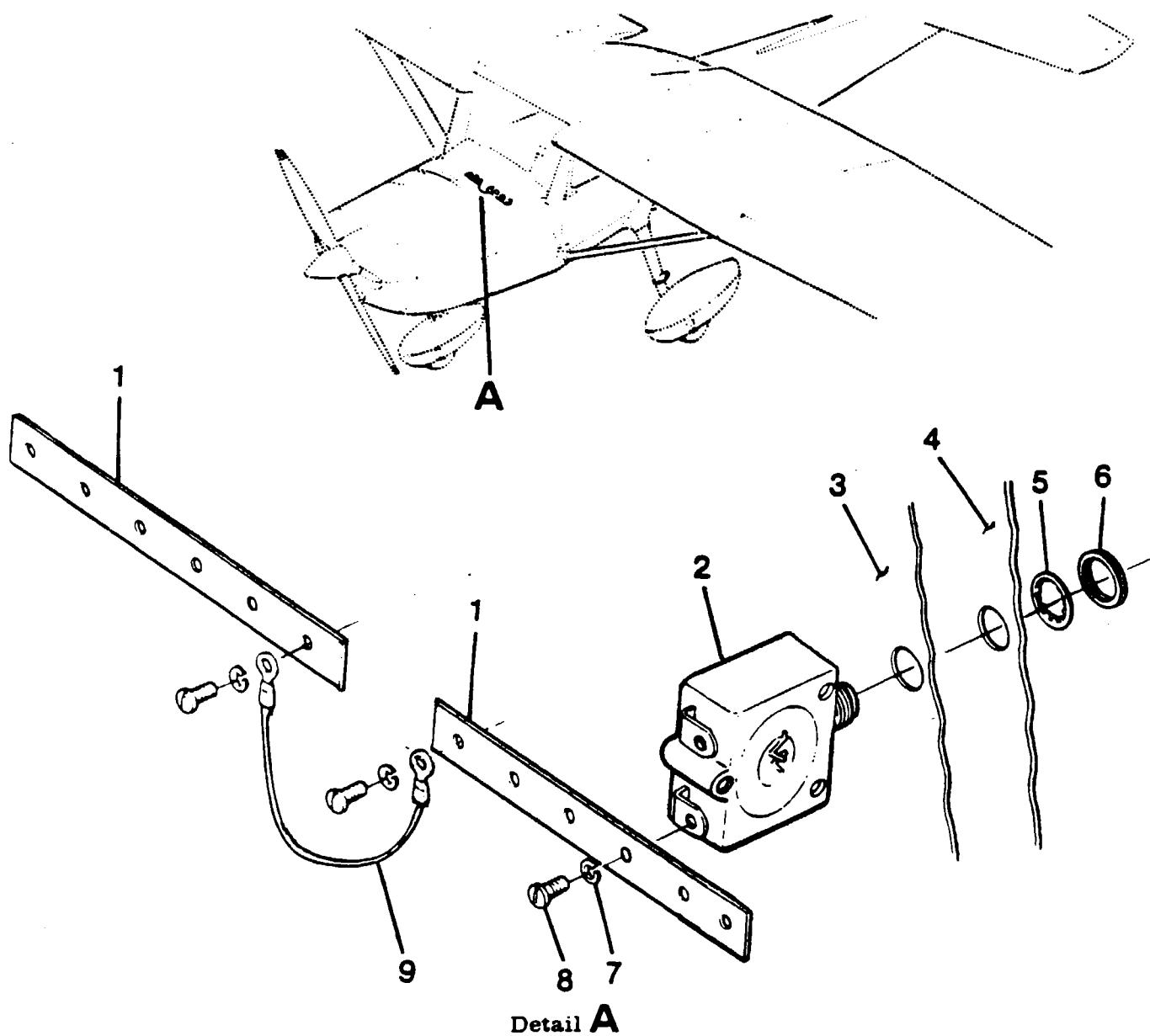
**16-6. DESCRIPTION.** Electrical power for electrical equipment and electronic installations is supplied through the split bus bar. The bus bar is interconnected by a jumper wire and attached to the circuit breaker on the lower, center of the instrument panel.

### **16-7. REMOVAL AND INSTALLATION. (See figure 16-1.)**

### **16-8. MASTER SWITCH.**

**16-9. DESCRIPTION.** The master switch controls the operation of the battery and alternator systems. The switch is an interlocking split rocker with the battery mode on the right hand side and the alternator mode on the left hand side. This arrangement allows the battery to be on the line without the alternator, however, operation of the alternator without the battery on the line is not possible. The switch is labeled "BAT" and "ALT" below the switch and is located on the left-hand side of the switch panel.

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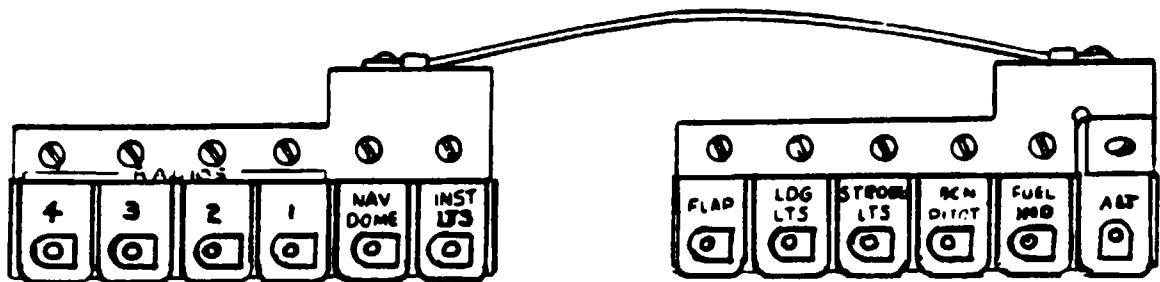


**THRU 1978 MODELS**

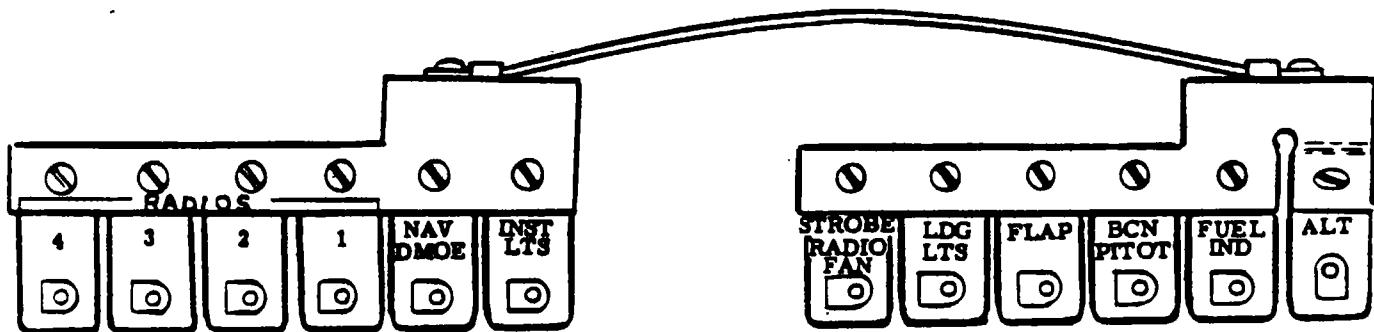
- |                     |                     |                |
|---------------------|---------------------|----------------|
| 1. Bus Bar          | 4. Decorative Panel | 7. Lockwasher  |
| 2. Circuit Breaker  | 5. Lockwasher       | 8. Screw       |
| 3. Instrument Panel | 6. Nut              | 9. Jumper Wire |

**Figure 16-1. Bus Bar Installation (Sheet 1 of 2)**

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1978 - 1980 MODELS



BEGINNING WITH 1981 MODELS

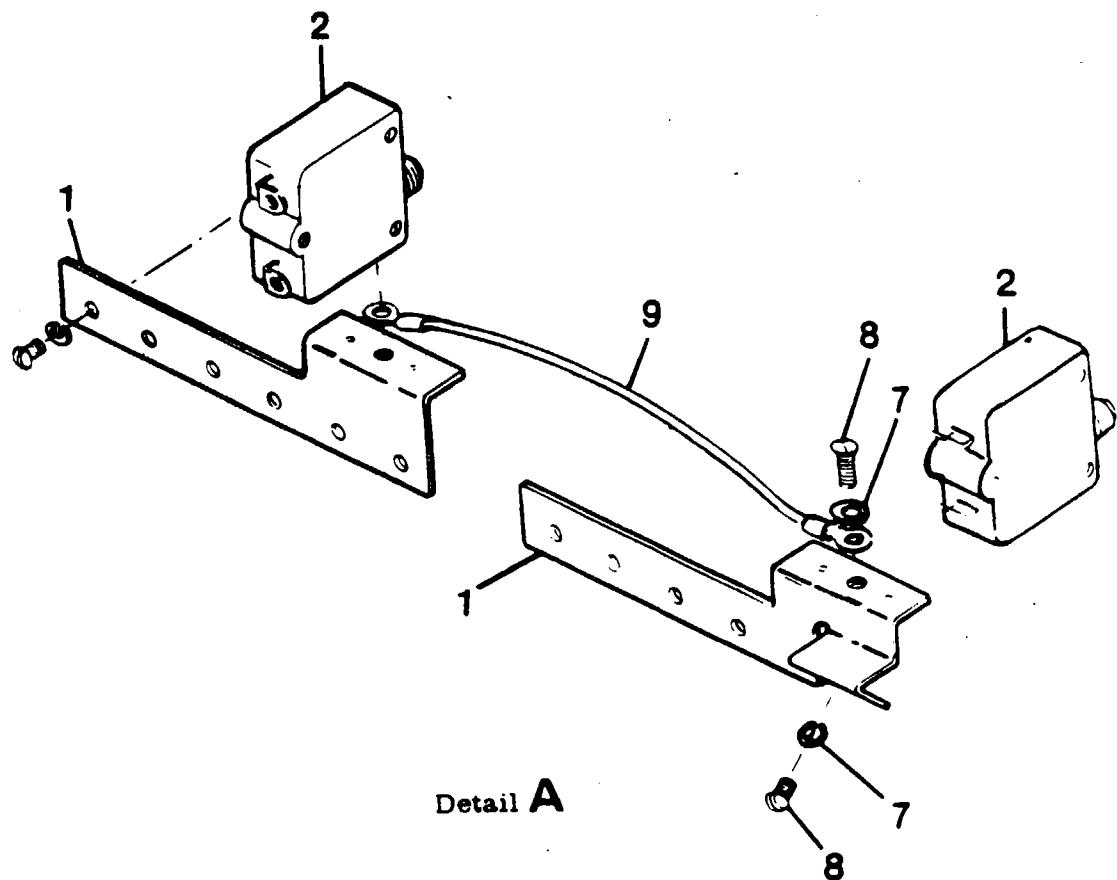


Figure 16-1. Bus Bar Installation (Sheet 2 of 2)

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### 16-10. AMMETER.

16-11. **DESCRIPTION.** The ammeter is connected between the battery contactor and the bus bar. The meter indicates the amount of current flowing either to or from the battery. With a low battery and the engine operating at cruise speed the ammeter will show the full alternator output when all electrical equipment is off. When the battery is fully charged and cruise RPM is maintained with all electrical equipment off, the ammeter will show a minimum charging rate. The ammeter is located on the right hand side of the instrument panel.

### 16-12. BATTERY POWER SYSTEM.

### 16-13. TROUBLE SHOOTING THE BATTERY POWER SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE.	Battery discharged.	<ol style="list-style-type: none"><li>1. Measure voltage at "BAT" terminal of battery contactor with master switch and a suitable load such as a taxi light turned on. Normal battery will indicate 23 volts or more. If voltage is low, proceed to step 2. If voltage is normal, proceed to step 3.</li><li>2. Check fluid level in cells and charge battery at 28-volts for approximately 30 minutes or until the battery voltage rises to 28-volts. Check battery with a load type tester. If tester indicates a good battery, the malfunction may be assumed to be a discharged battery. If the tester indicates a faulty battery, replace the battery.</li><li>3. Measure voltage at master switch terminal (smallest) on contactor with master switch closed. Normal indication is zero volts. If voltage reads zero, proceed to step 4. If a voltage reading is obtained check wiring between contactor and master switch. Also check master switch.</li></ol>
	Battery faulty.	
	Faulty contactor or wiring between contactor or master switch.	

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### 16-13. TROUBLE SHOOTING THE BATTERY POWER SYSTEM. (CONT).

TROUBLE	PROBABLE CAUSE	REMEDY
BATTERY WILL NOT SUPPLY POWER TO BUS OR IS INCAPABLE OF CRANKING ENGINE. (CONT).	Open coil on contactor.	4. Check continuity between "BAT" terminal and master switch terminal of contactor. Normal indication is 50 to 70 ohms (Master switch open). If ohmmeter indicates an open coil, replace contactor. If ohmmeter indicates a good coil, proceed to step 5.
	Faulty contactor contacts.	5. Check voltage on "BUS" side of contactor 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 contactor and bus.	6. Inspect wiring between contactor and bus. Repair or replace wiring.

### 16-14. BATTERY.

16-15. DESCRIPTION. The battery is 24 volts and thru 15280459, A1522759 and FA1520346 a 14 ampere-hour capacity battery is installed as standard, a 17 ampere-hour capacity battery is optional. Beginning with 15280460, A1522760 and FA1520347 the battery is 24 volts with a 12.75 ampere-hour capacity as standard and a 15.5 ampere-hour capacity battery as optional. The battery is mounted on the forward side of the firewall and is equipped with non-spill caps.

### 16-16. REMOVAL AND INSTALLATION OF. (See figure 16-2.)

#### CAUTION

When installing or removing battery always observe the proper polarity with the aircraft electrical system (negative to ground). Reversing the polarity, even momentarily, may result in failure of semiconductor devices (alternator diodes, radio protection diodes and radio transistors).

Always remove the battery ground cable first and replace it last to prevent accidental short circuits.

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- a. Thru 1979 Models.
    1. Remove top half of cowl.
    2. Remove the battery box cover and side panel.
    3. Disconnect the ground cable from the negative battery terminal.
    4. Disconnect the cable from the positive terminal of the battery.
    5. Lift the battery out of the battery box.
    6. To replace the battery, reverse this procedure.
  
  - b. Beginning with 1980 Models.
    1. Remove engine cowl.
    2. Cut sta-straps and remove terminal cover.
    3. Disconnect drain tube.
    4. Disconnect negative and positive cables.
    5. Remove battery mounting bolts and remove battery.
    6. To install reverse the preceding steps using new sta-straps to install terminal covers.
- 16-17. **CLEANING THE BATTERY.** For maximum efficiency the battery and connections should be kept clean at all times.
- a. Remove the battery and connections in accordance with the preceding paragraph.
  - b. Remove battery vent plugs and check electrolyte levels in each cell. It is important that electrolyte level be no lower than top of separator plates but not higher than bottom of split ring.
  - c. Replace vent plugs and secure tightly in place, making sure a rubber gasket is used between each vent plug and battery.

### NOTE

A good seal is necessary so electrolyte levels cannot leak out of seals and create an acid path which can lead to self-discharge. The application of a silicone grease will improve seal effectiveness.

- d. Tighten battery cell filler caps to prevent the cleaning solution from entering the cells.
- e. Wipe battery cable ends, battery terminals, and entire surface of the battery with a clean cloth moistened with a solution of bicarbonate of soda (baking soda) and water.
- f. Rinse with clear water, wipe off excess water, and thoroughly dry.
- g. Brighten up cable ends and battery terminals with emery cloth or a wire brush.
- h. Install the battery according to the preceding paragraphs.
- i. Coat the battery terminals with petroleum jelly or an ignition spray product to reduce corrosion.

- 16-18. **ADDING ELECTROLYTE OR WATER TO THE BATTERY.** A battery being charged and discharged with use will decompose the water from the electrolyte by electrolysis. When the water is decomposed, hydrogen and oxygen gases are formed which escape into the atmosphere through the battery vent system. The acid in the solution chemically combines with the plates of the battery during discharge or is suspended in the electrolyte solution during charge. Unless the electrolyte has been spilled from a battery, acid should not be added to the solution. The water, however will decompose into gases and should be replaced regularly. Add distilled water as necessary to maintain the electrolyte level with the horizontal baffle plate or the split ring on the filler neck inside the battery. When "dry charged" batteries are put into service, fill as directed with electrolyte. When the electrolyte level falls below normal with use, add only distilled water to maintain the proper level. On Aircraft Serials 15279406 thru 15280459, A15200735 thru A15200759, F1521429 thru F1521538 and FA1520337 thru FA1520346 refer to Cessna Single-engine Service Letter, SE78-6 Dated February 13, 1978 when filling the battery. The battery electrolyte contains approximately 25% sulphuric acid by volume. Any change in this volume will hamper the proper operation of the battery.

## MODEL 152 SERIES SERVICE MANUAL

### CAUTION

Do not add any type of "battery rejuvenator" to the electrolyte. When acid has been spilled from a battery, the acid balance may be adjusted by following instructions published by the Association of American Battery Manufacturers.

- 16-19. **TESTING THE BATTERY.** The specific gravity of the battery may be measured with a hydrometer to determine the state of battery charge. If the hydrometer reading is low, slow-charge the battery and retest. Hydrometer readings of the electrolyte must be compensated for the temperature of the electrolyte. Some hydrometers have a built-in thermometer and conversion chart. The following chart shows the battery condition for various hydrometer readings with an electrolyte temperature of 80° Fahrenheit.

### BATTERY HYDROMETER READINGS

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	Practically Dead

### NOTE

All readings shown are for an electrolyte temperature of 80° Fahrenheit. For higher temperatures the readings will be slightly lower. For cooler temperatures the readings will be slightly higher. Some hydrometers will have a built-in temperature compensation chart and a thermometer. If this type tester is used, disregard this chart.

If the specific gravity reading indicates the battery is not fully charged, the battery should be charged at approximately 28 volts for 30 minutes, or until the battery voltage rises to 28 volts. Refer to paragraph 16-20 for battery charging instructions for a completely discharged battery. After charging, a load type tester will give more meaningful results. A specific gravity check can be used after charging but the check cannot spot cells which short under load, broken connectors between plates of a cell, etc.

- 16-20. **CHARGING THE BATTERY.** When the battery is to be charged, the level of electrolyte should be checked and adjusted by adding distilled water to cover the tops of the internal battery plates. Remove the battery from the aircraft and place in a well ventilated area for charging.

### WARNING

When a battery is being charged, hydrogen and oxygen gases are generated. Accumulation of these gases can create a hazardous explosive condition. Always keep sparks and open flame away from the battery. Allow unrestricted ventilation of the battery area during charging.

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Because the battery is 24 volts, there are 12 cells connected in series as opposed to only 6 cells in 12 volt units. There is a greater chance for cell damage to occur if the battery is completely discharged by leaving some electrical system on. If this should occur, the battery must be removed from the aircraft, placed in a well ventilated area during charging, and given a supplemental charge. Charge at a constant current rate of 1.5 amps until the terminal charge voltage remains constant for at least three consecutive hours. If a constant current charger is not available, a constant potential charger with voltage adjustment capabilities can be used. With an ammeter in series, manually adjust voltage of charger so that approximately 1.5 amps are flowing at all times. Frequent adjustment may be necessary for the first part of charge. A second alternative of a constant potential charge of 28.8 volts could be used; however, the charging time under this system must be 48 to 72 hours. This long, slow charge will tend to equalize all cells and bring the battery back to a useful state. Failure to utilize this charge can leave the battery with one or more weak cells which will drastically reduce service life.

### **WARNING**

The main points of consideration during a battery charge are excessive battery temperature and violent gassing. Cell temperature should not rise over 115°F. Reduce charging rate if this occurs. Under a reasonable rate of charge gassing should not be so violent that acid is blown from vents.

When activating new dry charged batteries, ensure that the proper strength of electrolyte is used. The specific gravity of this electrolyte must be  $1.285 \pm 0.005$  when measured at  $80^{\circ}\text{F} \pm 5^{\circ}\text{F}$ . The battery should then be charged as stated on the installation instructions supplied with the battery. When installing the new battery into the aircraft, the cleaning procedure outlined below should be followed.

While Cessna aircraft batteries are manufactured with lower percentage antimony grids than that used in the past, the phenomenon of "local action" or self-discharge still occurs in these newer batteries. This is normal and should be expected in any wet lead acid battery. To maintain a battery if it is left unused in or out of the aircraft for a period of 30 days, the maintenance charge should be equivalent to that charge defined above for a discharged battery. If an aircraft is to be setting for periods of time exceeding 30 days, the battery should be removed, stored in a cool, dry place, and given the maintenance charge at intervals not exceeding 30 days.

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- 16-21. **BATTERY BOX. (THRU 1979 MODELS.)**
- 16-22. **DESCRIPTION.** The battery box is constructed of metal and painted inside and out with acid-proof paint. The box is attached to the right hand side of the firewall. A vent tube is attached to the bottom of the box and extends below the firewall to allow gases and spilled acid to be vented overboard.
- 16-23. **REMOVAL AND INSTALLATION.** (See figure 16-2) The battery box is not considered as a removable item except for replacement purposes. The box is riveted to mounting brackets on the firewall. Should the battery box be removed, on installation of the box or a new box, all rivets and scratches should be painted with acid-proof lacquer, available from Pratt and Lambert United - Performance Coatings Division, P. O. Box 2153, Wichita, KS 67201.
- 16-24. **MAINTENANCE.** The battery box should be inspected and cleaned periodically. The box and cover should be cleaned with a strong solution of bicarbonate of soda (baking soda) and water. Hard deposits may be removed with a wire brush. When all corrosive deposits have been removed from the box, flush it thoroughly with clean water.

### **WARNING**

Do not allow acid deposits to come in contact with skin or clothing. Serious acid burns may result unless the affected area is washed immediately with soap and water. Clothing will be ruined upon contact with battery acid.

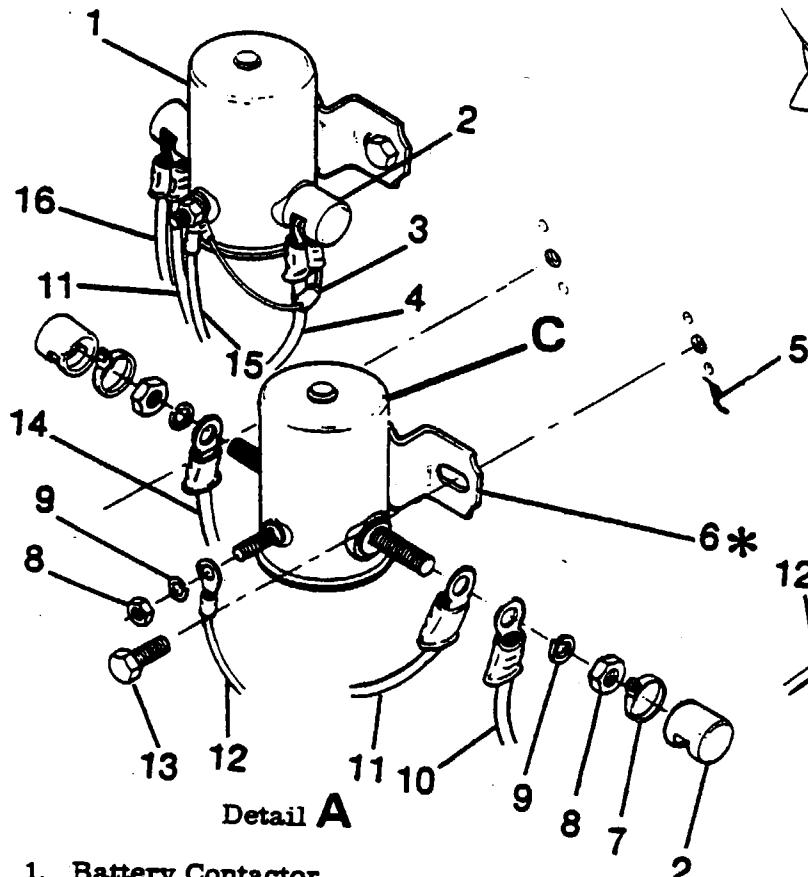
Inspect the cleaned box and cover for physical damage and for areas lacking proper acid proofing. A badly damaged or corroded box should be replaced. If the box or lid require acid proofing, paint the area with acid proof lacquer, available from Pratt and Lambert United - Performance Coatings Division, P. O. Box 2153, Wichita, KS 67201.

- 16-25. **BATTERY CONTACTOR.**
- 16-26. **DESCRIPTION.** The battery contactor is a plunger type and is actuated by turning on the master switch. The contactor is bolted to the left hand side of the firewall. A silicon diode is installed to eliminate spiking of transistorized radio equipment when the contactor is closed. Nylon covers are installed on the terminals to prevent accidental short circuits.
- 16-27. **REMOVAL AND INSTALLATION. (See figure 16-2.)**
  - a. Place master switch in the OFF position.
  - b. Thru 1979 Models, open battery box and disconnect ground cable from negative battery terminal. Pull cable clear of battery box.
  - c. Beginning with 1980 Models, disconnect negative battery cable.
  - d. Cut sta-straps and remove nylon covers from terminals on contactor.
  - e. Remove nuts, lockwashers and plain washers securing the battery cables to the contactor.
  - f. Remove nut, lockwasher and plain washers securing master switch wire to contactor.
  - g. Remove nuts, washers, and bolts securing the contactor to the firewall and remove contactor.
  - h. To install battery contactor, reverse the preceding steps.

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\* THRU 15283591, A1520878, F15201673  
AND FA1520357

\* BEGINNING WITH  
15283592, A1520879,  
F15201674 AND  
FA1520358



1. Battery Contactor
2. Cover
3. Diode Assembly
4. Cable (To Battery)
5. Firewall
6. Starter Contactor
7. Sta-Strap
8. Nut
9. Washer
10. Wire (To Ammeter)
11. Jumper Cable
12. Wire (To Ignition Switch)
13. Bolt
14. Cable (To Starter)
15. Wire (To Master Switch)
16. Cable (To Ground Service)

THRU 15283591, A1520878,  
F15201828 AND FA1520372

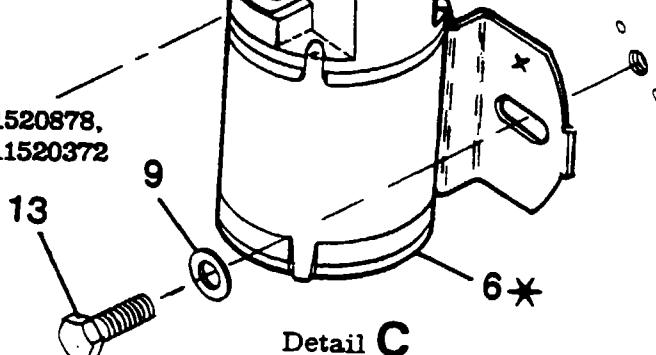
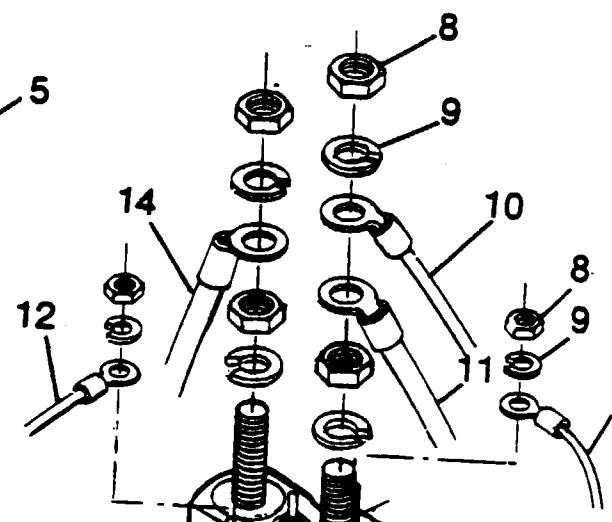
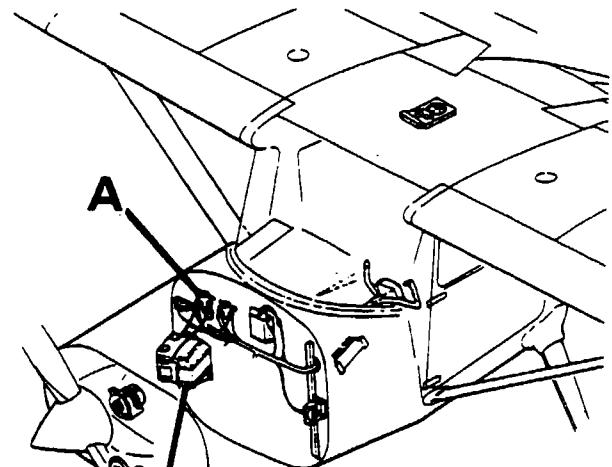
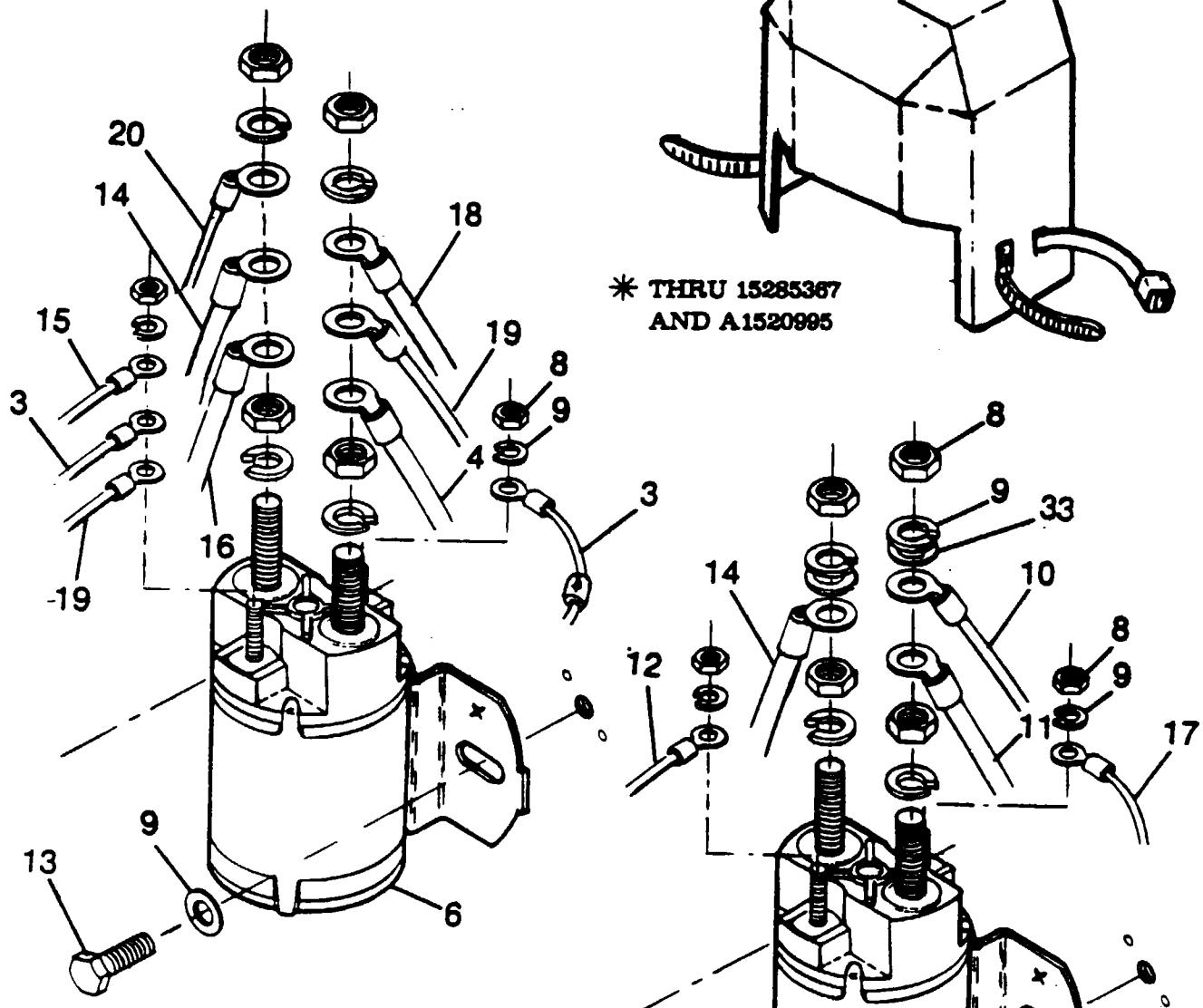


Figure 16-2. Battery, Battery Box and Battery Contactor Installation (Sheet 1 of 4)

## MODEL 152 SERIES SERVICE MANUAL

\* Used on starter contactor beginning with 15283592, A1520879, F15201874 and FA1520358. And on Battery contactor beginning with 15283592, A1520879, F15201829 and FA1520373.

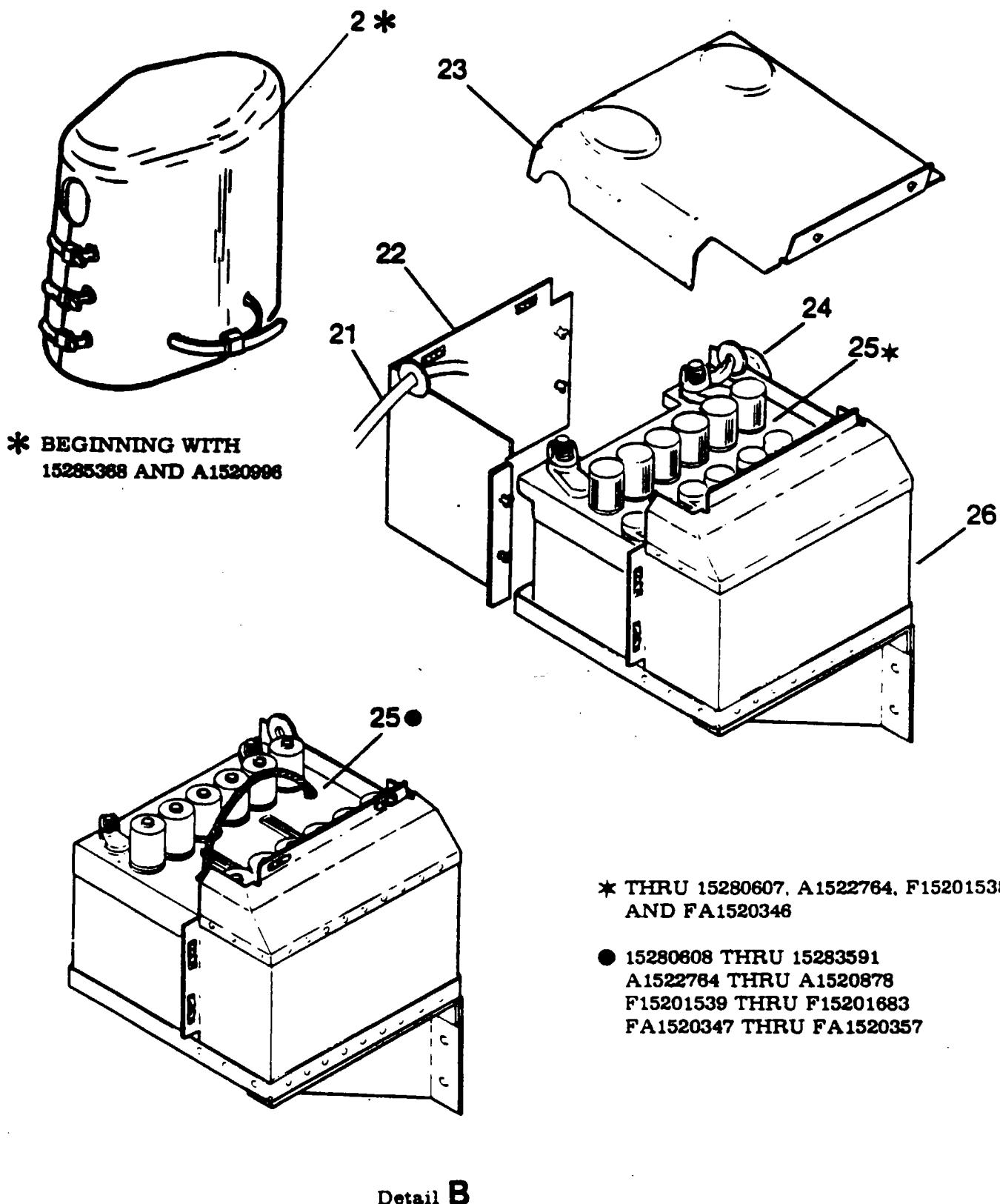


- 17. Wire (To Ground)
- 18. Wire (To Fuse)
- 19. Jumper Wire
- 20. Wire (To Diode)
- 21. Positive Battery Cable
- 22. Side Panel
- 23. Battery Box Cover
- 24. Ground Strap
- 25. Battery
- 26. Battery Box
- 27. Clamp
- 28. Pan
- 29. Drain Tube
- 30. Elbow
- 31. Terminal Cover
- 32. Battery Cover
- 33. Washer

BEGINNING WITH 15283592, A1520879,  
F15201829 AND FA1520373

Figure 16-2. Battery, Battery Box and Battery Contactor Installation (Sheet 2 of 4)

## MODEL 152 SERIES SERVICE MANUAL



**Figure 16-2. Battery, Battery Box and Battery Contactor Installation (Sheet 3 of 4)**

## MODEL 152 SERIES SERVICE MANUAL

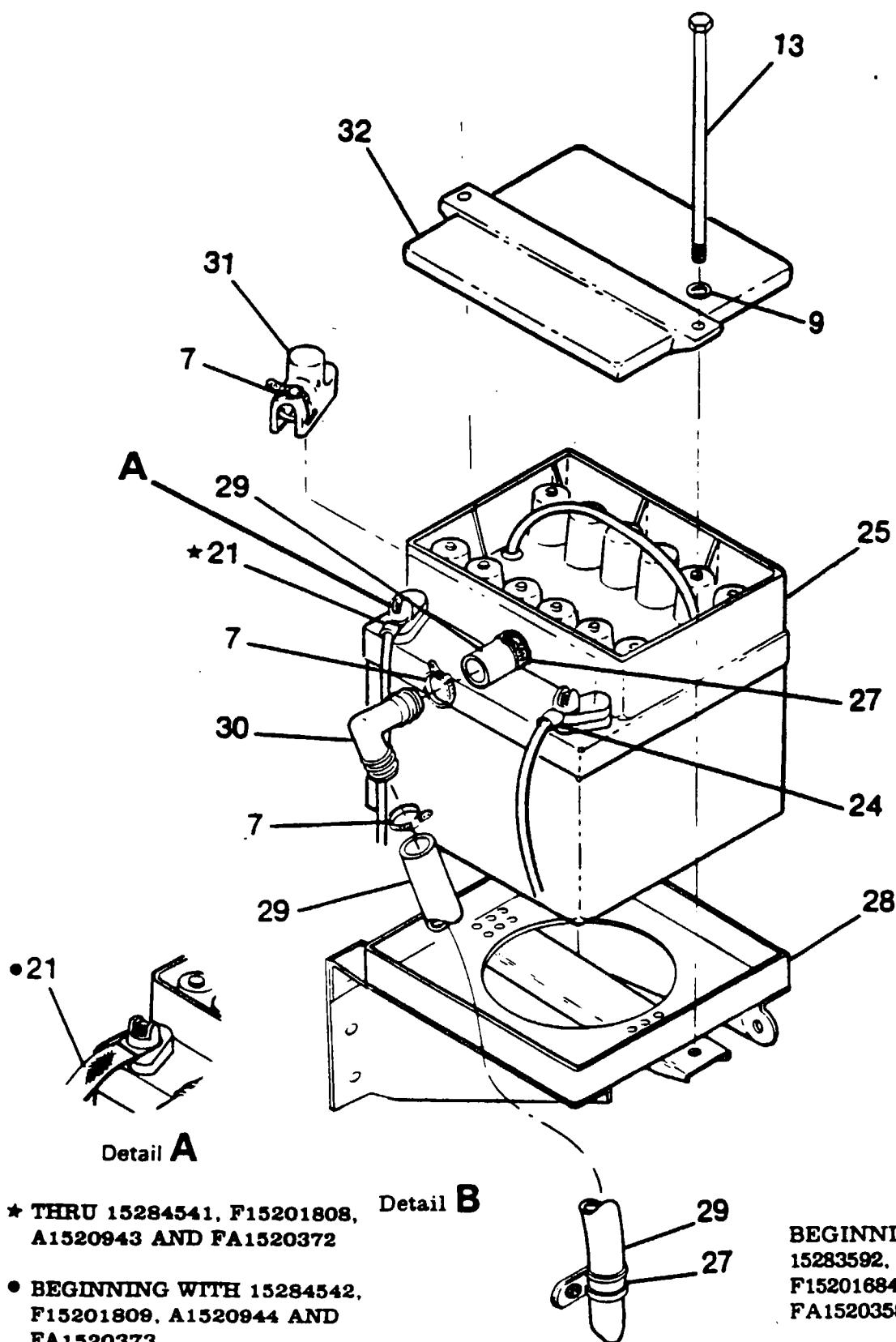


Figure 16-2. Battery, Battery Box and Battery Contactor Installation (Sheet 4 of 4)

## MODEL 152 SERIES SERVICE MANUAL

- 16-28. **BATTERY CONTACTOR CLOSING CIRCUIT.** The battery contactor closing circuit consists of a 5-amp fuse, a resistor and a diode installed across the battery contactor. This serves to shunt a small charge around the battery contactor when the battery is too dead to energize the contactor by itself.
- 16-29. **GROUND SERVICE RECEPTACLE.**
- 16-30. **DESCRIPTION.** A ground service receptacle may be installed to permit the use of external power for cold weather starting or when performing lengthy electrical maintenance. The receptacle is mounted on the left hand side of the firewall with an access door in the engine cowl.

### NOTE

Before connecting an external power source, it is important that the master switch be turned "ON". This will close the battery contactor and enable the battery to absorb transient voltages which otherwise might damage the electronic equipment. It will also provide excitation of the alternator field in the event that the battery is completely dead.

### NOTE

On Aircraft Serials 15279406 thru 15280898 and A1520001 thru A1520771 refer to Cessna Single-engine Service Letter SE78-19, dated March 27, 1978.

- 16-31. **REMOVAL AND INSTALLATION. (See figure 16-3.)**
  - a. Remove engine cowl in accordance with Section 11.
  - b. Thru 1979 Models, open the battery box and disconnect the ground cable from the negative terminal of the battery and pull cable from the battery box.
  - c. Beginning with 1980 Models, disconnect negative battery cable.
  - d. Remove the nuts, washers and ground strap from the terminals of the receptacle and remove the battery cable.
  - e. Remove the screws and nuts securing the receptacle to the mounting bracket. Remove receptacle.
  - f. To install ground service receptacle, reverse the preceding steps. Be sure to place the ground strap on the negative stud of the receptacle.

## 16-32. ALTERNATOR POWER SYSTEM.

- 16-33. **DESCRIPTION.** The alternator system consists of a belt-driven alternator, a voltage regulator/alternator control unit mounted on the left hand side of the firewall and circuit breaker located on the instrument panel. The system is controlled by the left hand portion of the split rocker, master switch labeled "ALT." Thru 1978 models an over-voltage sensor switch and red warning light labeled "HIGH VOLTAGE" are incorporated to protect the system. Beginning with 1979 models, over-voltage and under-voltage switches are contained within the alternator control unit and a red warning light labeled "LOW VOLTAGE" is installed on the instrument panel (refer to paragraph 16-40). The aircraft battery supplies the source of power for excitation of the alternator.

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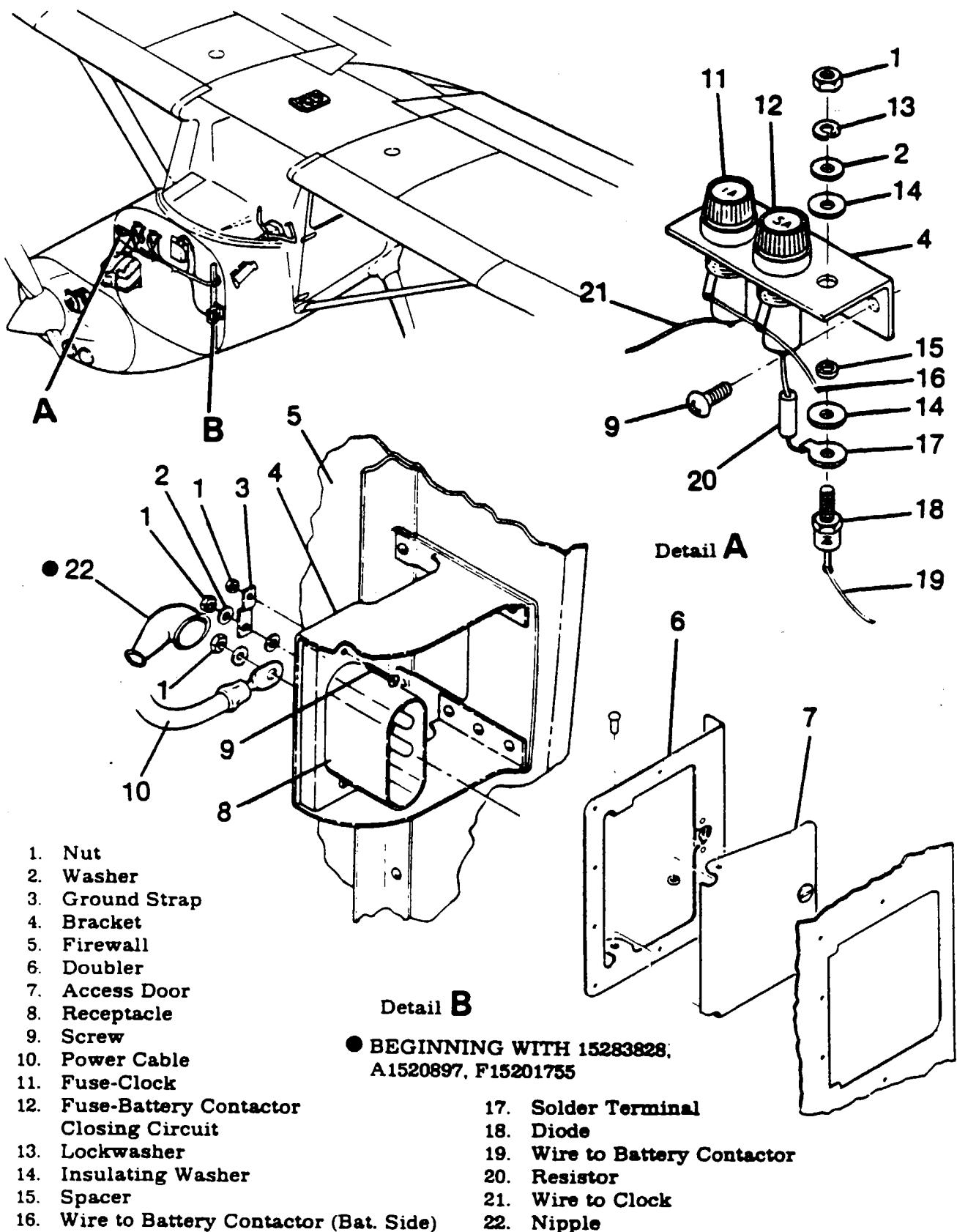


Figure 16-3. Ground Service Receptacle and Battery Contactor Closing Circuit Installation

## MODEL 152 SERIES SERVICE MANUAL

### 16-34. ALTERNATOR.

16-35. **DESCRIPTION.** The alternator is three phase, delta connected with integral silicon diode rectifiers. The alternator is rated at 28 volts at 60 amperes continuous output. The moving center part of the alternator (rotor) consists of an axial winding with radial interlocking poles which surround the winding. With excitation applied to the winding through slip rings the pole pieces assume magnetic polarity. The rotor is mounted in bearings and rotates inside the stator which contains the windings in which ac is generated. The stator windings are three-phase, each of which contains three silicon diodes. The diode plates are connected to accomplish full-wave rectification of ac. The resulting dc output is applied to the aircraft bus and sensed by the voltage regulator. The regulator controls the excitation applied to the alternator field thus controlling the output of the alternator.

### 16-36. REMOVAL AND INSTALLATION. (See figure 16-4.)

- a. Ensure that master switch is off and the negative lead is disconnected from the battery.
- b. Remove propeller in accordance with Section 13.
- c. Remove nose cap in accordance with Section 11.
- d. Remove wiring from alternator and label.
- e. Remove safety wire from lower adjustment bolt and remove bolt.
- f. Remove the locknut from the alternator mounting bolt.
- g. Remove the alternator drive belt and the alternator mounting bolt, the alternator will then be free for removal.
- h. To replace the alternator, reverse this procedure.
- i. Apply a torque wrench to the nut on alternator pulley and adjust the belt tension so the belt slips when torque is applied. see figure 16-4.

### 16-37. ALTERNATOR FIELD PROTECTION.

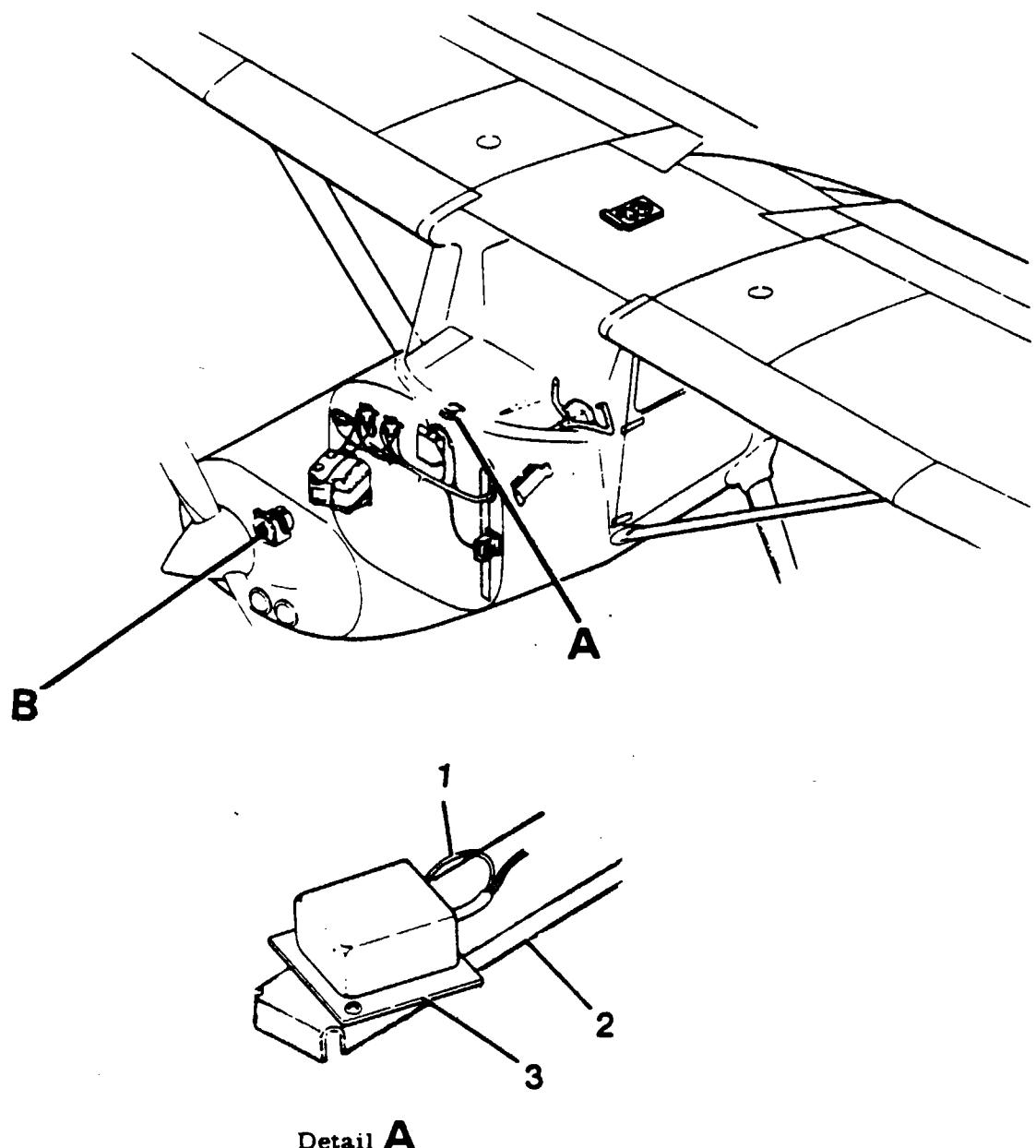
16-38. **DESCRIPTION.** A 5-amp automatic resetting circuit breaker located on the left hand, stationary instrument panel stiffner, is provided to protect the alternator field circuit.

16-39. **ALTERNATOR REVERSE VOLTAGE DAMAGE.** The alternator is very susceptible to reverse polarity current because of the silicon diodes. The diodes, having a very high resistance to reverse current flow, are used without any cutout relay such as used on a generator system. The alternator diodes are arranged with their cathodes connected to the aircraft bus bar which is positive and no back current will flow. If the polarity of the battery is reversed, the diodes will offer no resistance to the current flow. The current rating of the diodes is exceeded and diode failure may result.

### 16-40. OVER-VOLTAGE WARNING SYSTEM.

16-41. **DESCRIPTION.** Thru 1978 Models the over-voltage system consists of an over-voltage sensor switch and red warning light labeled "HIGH VOLTAGE". The over-voltage sensor is attached to the wire bundle behind the instrument panel and the light is located on the right hand side of the instrument panel. When an over-voltage tripoff occurs the over-voltage sensor turns off the alternator system and the red warning light comes on. The ammeter will show a discharge. Turn off both sections of the master switch to recycle the over-voltage sensor. If the over-voltage condition was transient, the normal alternator charging will resume and no further action is necessary. If the over-voltage tripoff recurs, then a generating system malfunction has occurred such that the electrical accessories must be

## MODEL 152 SERIES SERVICE MANUAL

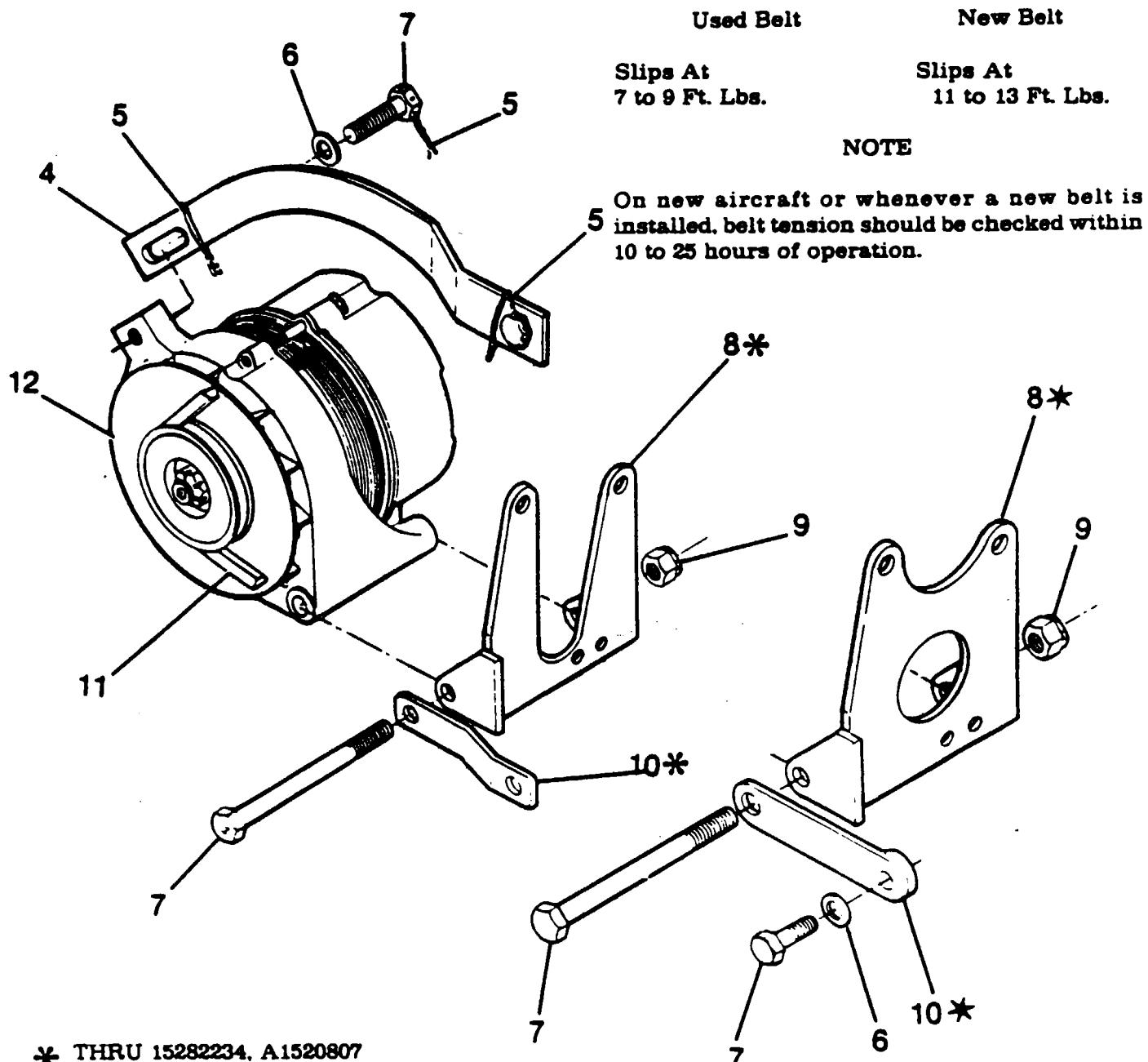


- |                        |                     |
|------------------------|---------------------|
| 1. Ground Wire         | 7. Bolt             |
| 2. Panel Bracket       | 8. Bracket Assembly |
| 3. Over-Voltage Sensor | 9. Nut              |
| 4. Adjustment Arm      | 10. Bracket         |
| 5. Safety Wire         | 11. Drive Belt      |
| 6. Washer              | 12. Alternator      |

Figure 16-4. Alternator Installation (Sheet 1 of 2)

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## TORQUE VALUES FOR CHECKING ALTERNATOR BELT TENSION



\* THRU 15282234, A1520807  
F15201578 AND FA1520361

\* BEGINNING WITH 15282235,  
A1520808, F15201579 AND  
FA1520362

Detail B

Figure 18-4. Alternator Installation (Sheet 2 of 2)

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operated from the aircraft battery only. Conservation of electrical energy must be practiced until the flight can be terminated. The over-voltage light filament may be tested at any time by turning off the "Alternator" portion of the master switch and leaving the battery portion on. This test does not induce an over-voltage condition on the electrical system.

### NOTE

The over-voltage sensor switch contains solid state devices. Observe proper polarity before supplying power. Grounding the orange lead or interconnecting orange and black leads will destroy the device. When removal is required for replacement, identify (tag) wiring and follow the wiring diagram in Section 19 for rewiring.

Beginning with 1979 Models the over-voltage sensor is contained within the alternator control unit. The unit also contains a low-voltage sensor. A red warning light labeled "LOW VOLTAGE" is installed on the instrument panel. When an over-voltage condition occurs the over-voltage sensor turns off the alternator and the voltage in the system drops. When system voltage drops below 24.5 volts the low-voltage sensor turns on the low-voltage light indicating a drain on the battery and the ammeter will show a discharge. Turn off both sections of the master switch to recycle the over-voltage sensor. If the over-voltage condition was transient, the normal alternator charging will resume and no further action is necessary. If the over-voltage tripoff recurs, then a generating system malfunction has occurred such that the electrical accessories must be operated from the aircraft battery only. Conservation of electrical energy must be practiced until the flight can be terminated. The over-voltage light filament may be tested at any time by turning off the "Alternator" portion of the master switch and leaving the battery portion on. This test does not induce an over-voltage condition on the electrical system.

### NOTE

To support the newer alternator control unit (ACU), Cessna has designed an Alternator Charging System Test Box Assembly, Part No. 9870005-1, that provides capability to perform all on-aircraft checks of malfunctioning alternator/ACU systems. This new test box, available from Cessna Parts Distribution (CPI) 2) through a Cessna Service Station, is complete and features:

- a. Isolation of six separate malfunctions:
  1. No aircraft battery power to the ACU.
  2. Shorted regulator (over-voltage condition) in the ACU.
  3. Open regulator (no alternator output) in the ACU.
  4. Shorted alternator field winding or wiring.
  5. Open alternator field winding or wiring.
  6. Inoperative low voltage circuit in the ACU.
- b. Quick and simple set-up.
- c. System checks without running the engine.

## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (THRU 1978 MODELS)

a. ENGINE NOT RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
AMMETER INDICATES HEAVY DISCHARGE OR ALTERNATOR CIRCUIT BREAKER OPENS. (Battery Switch ON, Alternator Switch OFF, all other electrical switches OFF.)	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON.	Short in Over-Voltage sensor.	Disconnect Over-Voltage Sensor plug and recheck. If circuit breaker stays in, replace Over-Voltage Sensor.
	Short in alternator voltage regulator.	Disconnect regulator plug and recheck. If circuit breaker stays in, replace regulator.
	Short in alternator field.	Disconnect "F" terminal wire and recheck. If circuit breaker stays in, replace alternator.
b. ENGINE RUNNING.		
ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, OVER-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, OVER-VOLTAGE LIGHT DOES NOT COME ON.	Shorted field in alternator.	Check resistance from "F" terminal of alternator to alternator case, if resistance is less than 5 ohms repair/replace.

## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING THE ALTERNATOR SYSTEM. (CONT). b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
<b>CAUTION</b>		
	This malfunction frequently causes a shorted regulator which will result in an over-voltage condition when system is again operated.	
ALTERNATOR MAKES ABNORMAL WHINING NOISE.	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
OVER-VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON.	Shorted regulator.	Replace regulator.
	Defective over-voltage sensor.	Replace sensor.
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES.	Regulator faulty or high resistance in field circuit.	With engine not running turn off all electrical loads and turn on battery and alternator switches. Measure bus voltage to ground, then measure voltage from terminal of alternator to ground. If there is more than 2 volts difference check field circuit wiring shown on alternator system wiring diagram in Section 19. Clean all contacts. Replace components until there is less than 2 volts difference between bus voltage and field voltage.

## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING THE ALTERNATOR SYSTEM (CONT).

#### b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
	NOTE	
Also refer to battery power system trouble shooting chart.		
ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED.	Alternator belt slipping. Alternator output voltage insufficient.	<ol style="list-style-type: none"><li>1. Check belt tension per chart in figure. 16-4.</li><li>2. Connect voltmeter between D.C. Bus and ground. Turn off all electrical loads. Turn on Battery Switch, start engine and adjust for 1500 RPM, voltage should read approximately 24 volts. Turn on alternator switch, voltage should read between 27.4 and 28.0 volts. Ammeter should indicate a heavy charge rate which should taper off in 1-3 minutes. If charge rate tapers off very quickly and voltage is normal, check battery for malfunction. If ammeter shows a low charge rate or any discharge rate, and voltage does not rise when alternator switch is turned on proceed to Step 2.</li><li>3. Stop engine, turn off all switches. Connect voltmeter between "F" terminal of alternator and ground. Do NOT start engine. Turn on battery switch and alternator switch. Battery voltage should be present at "F" terminal, less 1 volt drop thru regulator, if not refer to Step 3.</li></ol>

## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (CONT).

TROUBLE	PROBABLE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BAT- TERY CHARGED. (Cont.).	Alternator output voltage insufficient (cont).	4. Starting at "F" terminal of alternator trace circuit to voltage regulator, at "B" terminal of regulator trace circuit to over-voltage sen- sor, to master switch, to Bus Bar. Replace component which does not have voltage present at output. Refer to alternator system wiring diagram in Section 19.
	Alternator field winding open.	1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alterna- tor to alternator case, turn- ing alternator shaft during measurement. Normal indica- tion is 12-20 ohms. If resist- ance is high or low, repair or replace alternator. If ok refer to step 2.  2. Check resistance from case of alternator to airframe ground. Normal indication is very low resistance. If read- ing indicates no. or poor con- tinuity, repair or replace alternator ground wiring.
FLUCTUATING ALTERNATOR OUTPUT (NERVOUS OR FLICKERING AMMETER)	Decrease in incoming voltage to regulator causing output voltage increase. Loose or bad connection in regulator or field circuit. Excessive resistance across alternator contacts of "alternator/ master" switch or alternator field circuit breaker.	1. Check and tighten alternator, regulator, and/or circuit breaker connections as required.  2. Check resistance across alternator contacts. If a new voltage regulator, over-voltage sensor, and/or alternator does not eliminate excessive resistance, try replacing the "alternator/master" switch and/or alternator field circuit breaker.

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### 16-42. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (BEGINNING 1979 MODELS).

#### a. ENGINE NOT RUNNING.

TROUBLE	PROBABLE CAUSE	REMEDY
AMMETER INDICATES HEAVY DISCHARGE OR ALTERNATOR CIRCUIT BREAKER OPENS. (Battery Switch ON, Alternator Switch OFF, all other electrical switches OFF.)	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in at least one direction, repair or replace alternator.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON.	Short in alternator control unit.	Disconnect Over-Voltage Sensor plug and recheck. If circuit breaker stays in replace Over-Voltage Sensor.
	Short in alternator field.	Disconnect control unit plug and recheck. If circuit breaker stays in, replace alternator control unit.
	Short in alternator field.	Disconnect "F" terminal wire and recheck. If circuit breaker stays in, replace alternator.
b. ENGINE RUNNING.		
ALTERNATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, LOW-VOLTAGE LIGHT DOES NOT COME ON.	Defective circuit breaker.	Replace circuit breaker.
ALTERNATOR REGULATOR CIRCUIT BREAKER OPENS WHEN BATTERY AND ALTERNATOR SWITCHES ARE TURNED ON, LOW-VOLTAGE LIGHT MAY OR MAY NOT COME ON.	Shorted field in alternator.	Check resistance from "F" terminal of alternator to alternator case, if resistance is less than 5 ohms repair/replace.

## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (Cont).

#### b. ENGINE RUNNING (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
<b>CAUTION</b>		
	This malfunction may cause a shorted alternator control unit which will result in an over-voltage condition when system is again operated.	
ALTERNATOR MAKES ABNORMAL WHINING NOISE.	Shorted diode in alternator.	Turn off Battery Switch and remove "B" Lead from alternator. Check resistance from "B" Terminal of alternator to alternator case. Reverse leads and check again. Resistance reading may show continuity in one direction but should show an infinite reading in the other direction. If an infinite reading is not obtained in one direction, repair or replace alternator.
LOW-VOLTAGE LIGHT DOES NOT GO OUT WHEN ALTERNATOR AND BATTERY SWITCHES ARE TURNED ON.	Shorted alternator control unit  Defective low-voltage sensor.	Replace alternator control unit.  Replace alternator control unit.
AFTER ENGINE START WITH ALL ELECTRICAL EQUIPMENT TURNED OFF CHARGE RATE DOES NOT TAPER OFF IN 1-3 MINUTES.	Alternator control unit faulty or high resistance in field circuit.	With engine not running turn off all electrical loads and turn on battery and alternator switches. Measure bus voltage to ground, then measure voltage from terminal of alternator to ground. If there is more than 2 volts difference check field circuit wiring shown on alternator system wiring diagram in Section 19. Clean all contacts. Replace components until there is less than 2 volts difference between bus voltage and field voltage.

## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
LOW VOLTAGE LIGHT COMES ON WHEN A COM-RADIO TRANSMITTER IS KEYED (Generally limited to 1979 - 1982 aircraft)	Voltage induced by the COM coax cable may activate protective circuit when COM radio is keyed.	<ol style="list-style-type: none"><li>1. Inspect COM coax connectors at radios and antennas for security and proper installation. Replace as required.</li><li>2. Ensure COM coax shielding is properly grounded.</li><li>3. Inspect COM coax routing. Reroute as required to provide separation from alternator winding.</li><li>4. Inspect alternator control unit (ACU) for loose or improperly installed contacts. Replace or repair as required.</li><li>5. Inspect COM coax cables for damage where tie wraps used. Replace deformed or crushed coax cables.</li></ol>

#### NOTE

Also refer to battery power system trouble shooting chart.

ALTERNATOR SYSTEM WILL NOT KEEP BATTERY CHARGED.	Alternator output voltage insufficient.	<ol style="list-style-type: none"><li>1. Connect voltmeter between D.C. Bus and ground. Turn off all electrical loads. Turn on Battery Switch. start engine and adjust for 1500 RPM. voltage should read approximately 24 volts. Turn on alternator switch. voltage should read between 28.4 and 28.9 volts. Ammeter should indicate a heavy charge rate which should taper off in 1-3 minutes. If charge rate tapers off very quickly and voltage is normal. check battery for malfunction. If ammeter shows a low charge rate or any discharge rate. and voltage does not rise when alternator switch is turned on proceed to Step 2.</li></ol>
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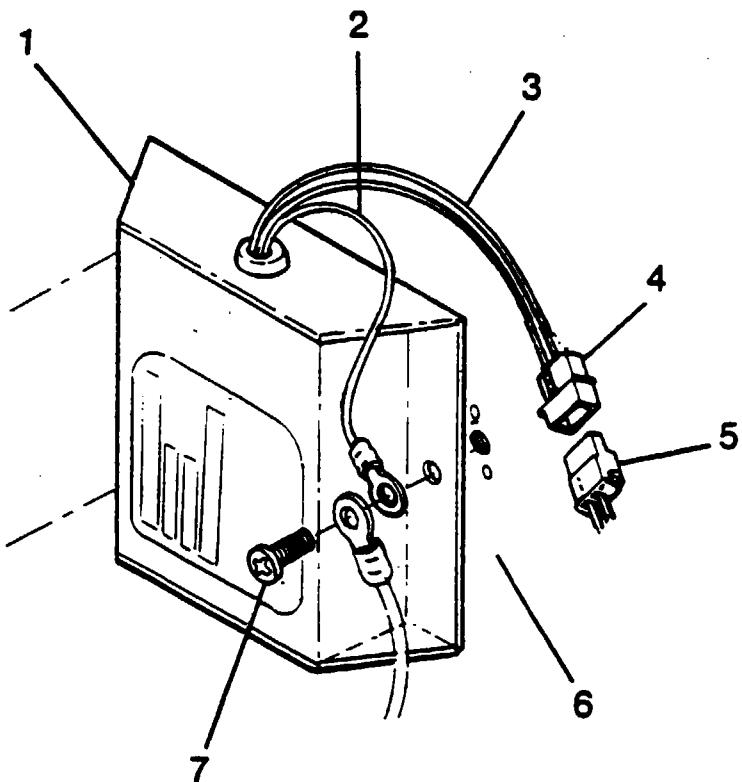
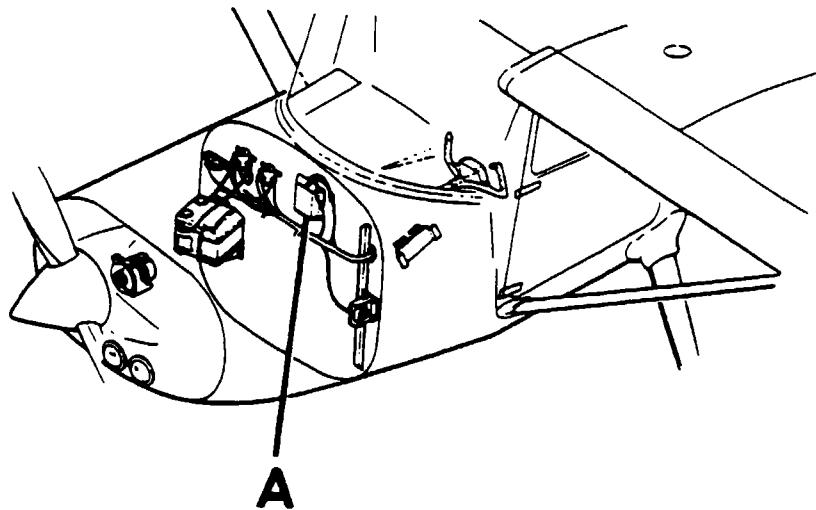
## MODEL 152 SERIES SERVICE MANUAL

### 16-42. TROUBLE SHOOTING -- ALTERNATOR SYSTEM (Cont.).

#### b. ENGINE RUNNING (Cont.).

TROUBLE	PROBABLE CAUSE	REMEDY
ALTERNATOR SYSTEM WILL NOT KEEP BAT- TERY CHARGED. (Cont.)	Alternator output voltage insufficient (cont).	<ol style="list-style-type: none"><li>2. Stop engine, turn off all switches. Connect voltmeter between "F" terminal of alternator and ground. Do NOT start engine. Turn on battery switch and alternator switch. Battery voltage should be present at "F" terminal, less 1 volt drop thru regulator, if not refer to Step 3.</li><li>3. Starting at "F" terminal of alternator, trace circuit to alternator control unit at Pin 1 (Blue Wire). Trace circuit from Pin 3 (Red Wire) to master switch, to Bus Bar. Trace circuit from alternator control unit Pin 2 (Orange Wire) to alternator "BAT" terminal. Check connections and replace component which does not have voltage present at output. Refer to alternator system wiring diagram in Section 19.</li></ol>
	Alternator field winding open.	<ol style="list-style-type: none"><li>1. If voltage is present turn off alternator and battery switches. Check resistance from "F" terminal of alternator to alternator case, turning alternator shaft during measurement. Normal indication is 12-20 ohms. If resistance is high or low, repair or replace alternator. If ok refer to Step 2.</li><li>2. Check resistance from case of alternator to air-frame ground. Normal indication is very low resistance. If reading indicates no, or poor continuity, repair or replace alternator ground wiring.</li></ol>

## MODEL 152 SERIES SERVICE MANUAL



1. Voltage Regulator
2. Ground Wire
3. Electrical Leads
4. Housing Cap
5. Housing Plug
6. Firewall
7. Screw
8. Alternator Control Unit
9. Washer

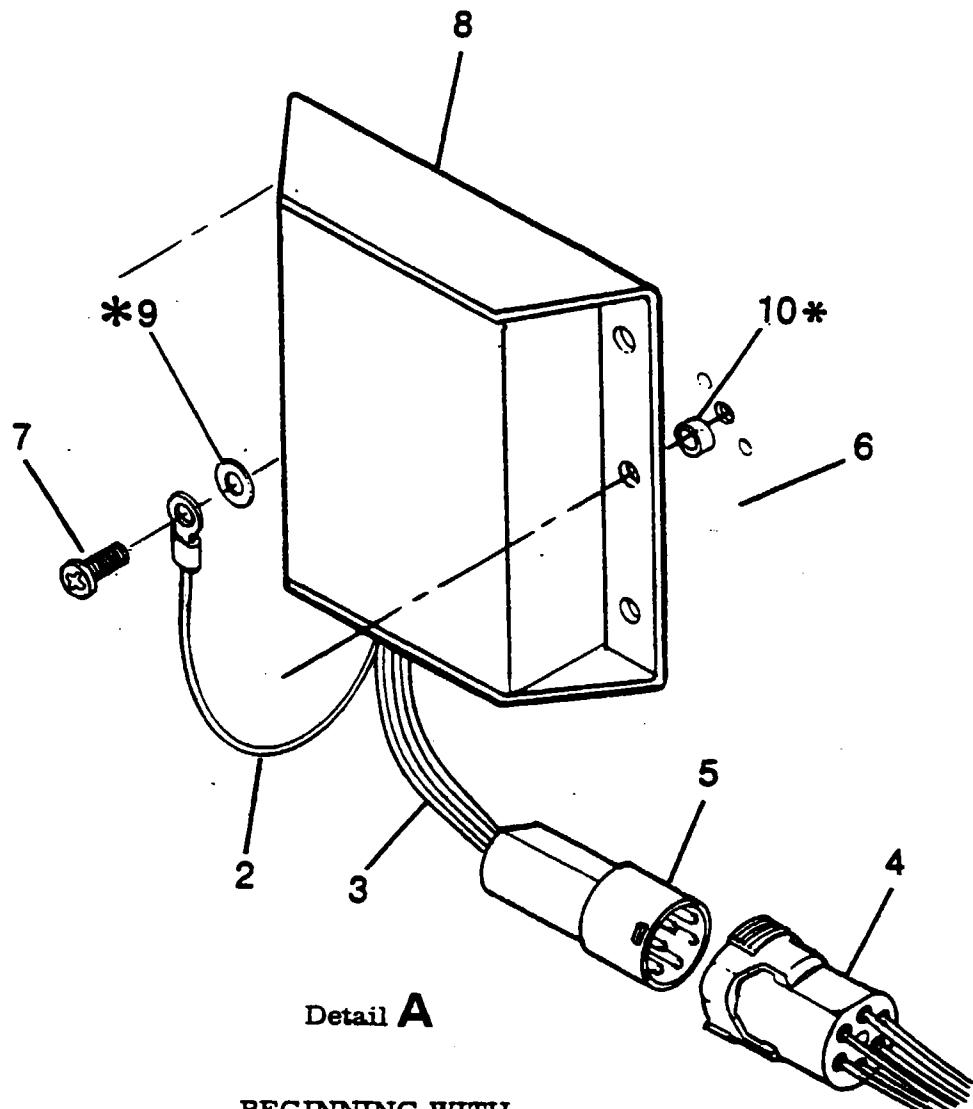
Detail A

THRU 1978 MODELS

Figure 16-5. Voltage Regulator Installation (Sheet 1 of 2)

# MODEL 152 SERIES SERVICE MANUAL

\*BEGINNING WITH 1979 MODELS



BEGINNING WITH  
1979 MODELS

\* BEGINNING WITH 15285853,  
A1521027, F15201952 AND  
FA1520388

2. Ground Wire
3. Electrical Leads
4. Housing Cap
5. Housing Plug
6. Firewall
7. Bolt
8. Alternator Control Unit
9. Washer
10. Spacer

Figure 16-5. Voltage Regulator Installation (Sheet 2 of 2)

## MODEL 152 SERIES SERVICE MANUAL

- 16-43. VOLTAGE REGULATOR.
- 16-44. DESCRIPTION. The voltage regulator is a solid state regulator. The regulator is a remove and replace item and not repairable in the field. For adjustment, refer to the Cessna Alternator Charging Service/Parts Manual.
- 16-45. ALTERNATOR CONTROL UNIT.
- 16-46. DESCRIPTION. The alternator control unit is a solid state voltage regulator with an over-voltage sensor and low-voltage sensor incorporated in the unit. The control unit is not adjustable and is a remove-and-replace item. A Cessna Alternator Charging System Test Box assembly (PA9870005-1) is available from Cessna Parts Distribution (CPD 2) through a Cessna Service Station for use in isolating failures in the 28-volt alternator control units (C611005-0101 and C611005-0102) and the 28-volt alternator.

### NOTE

On 1979 thru 1982 models, if the alternator low voltage light comes on when a COM radio transmitter is keyed, refer to Cessna Single Engine Customer Care Services Information Letter SE82-17 dated April 30, 1982. Refer also to Trouble Shooting, paragraph 16-42.

- 16-47. REMOVAL AND INSTALLATION. (See figure 16-5).
  - a. Remove upper half of engine cowl.
  - b. Make sure the master switch is in the "OFF" position.
  - c. Disconnect the negative lead from the battery and pull lead free of the battery box.
  - d. Disconnect housing plug from the regulator/alternator control unit.
  - e. Remove screws securing the regulator/alternator control unit to the firewall.
  - f. To install regulator/alternator control unit, reverse the preceding steps. Be sure the connections for grounding are clean and bright before assembly. Otherwise faulty voltage regulation and/or excessive radio noise may result.
- 16-48. AIRCRAFT LIGHTING SYSTEM.
- 16-49. DESCRIPTION. The aircraft lighting systems consists of landing and taxi lights, navigation lights, anti-collision strobe lights, flashing beacon light, dome and instrument lights, control wheel map light, compass and radio dial lights.
- 16-50. TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING AND TAXI LIGHT(S) OUT.	Short circuit in wiring.	1. Inspect circuit breaker. If open, proceed to Step 2. If ok, proceed to Step 3.
	Defective wiring.	2. Test each circuit separately until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at lights with master and landing and taxi light switches ON. Should read battery voltage. Replace switch.

## MODEL 152 SERIES SERVICE MANUAL

### 16-50. TROUBLE SHOOTING (CONT.).

TROUBLE	PROBABLE CAUSE	REMEDY
LANDING AND/OR TAXI LIGHT OUT.	Lamp burned out.	1. Test lamp with ohmmeter or new lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.
FLASHING BEACON DOES NOT LIGHT.	Short circuit in wiring.	1. Inspect circuit breaker. If open, proceed to Step 2. If ok, proceed to Step 3.
	Defective wiring.	2. Test circuit until short is located. Repair or replace wiring.
FLASHING BEACON CONSTANTLY LIT.	Lamp burned out.	3. Test lamp with ohmmeter or a new lamp. Replace lamp. If lamp is good, proceed to Step 4.
	Open circuit in wiring.	4. Test circuit from lamp to flasher for continuity. If no continuity is present, repair or replace wiring. If continuity is present, proceed to Step 5.
ALL NAV LIGHTS OUT.	Defective switch.	5. Check voltage at flasher with master and beacon switch on. Should read battery voltage. Replace switch. If voltage is present, proceed to Step 6.
	Defective flasher.	6. Install new flasher.
	Defective flasher.	1. Install new flasher.
	Short circuit in wiring.	1. Inspect circuit breaker. If open, proceed to Step 2. If ok, proceed to Step 3.
	Defective wiring.	2. Isolate and test each nav light circuit until short is located. Repair or replace wiring.
	Defective switch.	3. Check voltage at nav light with master and nav light switches on. Should read battery voltage. Replace switch.

## MODEL 152 SERIES SERVICE MANUAL

### 16-50. TROUBLE SHOOTING (CONT).

TROUBLE	PROBABLE CAUSE	REMEDY
ONE NAV LIGHT OUT.	Lamp burned out.	1. Inspect lamp. Replace lamp.
	Open circuit in wiring.	2. Test wiring for continuity. Repair or replace wiring.

### WARNING

The anti-collision system is a high voltage device. Do not remove or touch tube assembly while in operation. Wait at least 5 minutes after turning off power before starting work.

BOTH ANTI-COLLISION STROBE LIGHTS WILL NOT LIGHT.	Open circuit breaker.	1. Check, if open reset. If circuit breaker continues to open proceed to Step 2.  2. Disconnect red wire between aircraft power supply (battery/external power) and strobe power supplies, one at a time. If circuit breaker opens on one strobe power supply. If circuit breaker opens on both strobe power supplies proceed to Step 3. If circuit breaker does not open proceed to Step 4.  3. Check aircraft wiring. Repair or replace as necessary.  4. Inspect strobe power supply ground wire for contact with wing structure.
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### CAUTION

Extreme care should be taken when exchanging flash tube. The tube is fragile and can easily be cracked in a place where it will not be obvious visually. Make sure the tube is seated properly on the base of the nav light assembly and is centered in the dome.

## MODEL 152 SERIES SERVICE MANUAL

### 16-50. TROUBLE SHOOTING (CONT.).

TROUBLE	PROBABLE CAUSE	REMEDY
NOTE		
When checking defective power supply and flash tube, units from opposite wing may be used. Be sure power leads are protected properly when unit is removed to prevent short circuit.		
ONE ANTI-COLLISION STROBE LIGHT WILL NOT LIGHT.	Defective Strobe Power Supply, or flash tube.	<ol style="list-style-type: none"> <li>1. Connect voltmeter to red lead between aircraft power supply (battery/external power) and strobe power supply, connecting negative lead to wing structure. Check for 24 volts. If ok proceed to Step 2. If not, check aircraft power supply (battery/external power).</li> <li>2. Replace flash tube with known good flash tube. If system still does not work, replace strobe power-supply.</li> </ol>
DOME LIGHT TROUBLE.	<p>Short circuit in wiring.</p> <p>Defective wiring.</p> <p>Lamp burned out.</p> <p>Defective switch.</p>	<ol style="list-style-type: none"> <li>1. Inspect circuit breaker. If circuit breaker is open, proceed to Step 2. If circuit breaker is ok, proceed to Step 3.</li> <li>2. Test circuit until short is located. Repair or replace wiring.</li> <li>3. Test for open circuit. Repair or replace wiring. If no short or open circuit is found, proceed to Step 4.</li> <li>4. Test lamp with ohmmeter or new lamp. Replace lamp.</li> <li>5. Check for voltage at dome light with master and dome light switch on. Should read battery voltage. Replace switch.</li> </ol>
INSTRUMENT LIGHTS WILL NOT LIGHT OR DIM CORRECTLY.	Short circuit in wiring.	<ol style="list-style-type: none"> <li>1. Inspect circuit breaker. If open, proceed to Step 2. If ok, proceed to Step 3.</li> </ol>

## MODEL 152 SERIES SERVICE MANUAL

### 16-50. TROUBLE SHOOTING (CONT.)

TROUBLE	PROBABLE CAUSE	REMEDY
INSTRUMENT LIGHTS WILL NOT LIGHT (Cont.)	Defective wiring.	<ol style="list-style-type: none"><li>2. Test circuit until short is located. Repair or replace wiring.</li></ol>
	Defective rheostat.	<ol style="list-style-type: none"><li>3. Test for open circuit. Repair or replace wiring. If no short or open circuit is found, proceed to Step 4.</li></ol>
	Lamp burned out.	<ol style="list-style-type: none"><li>4. Check voltage at instrument light with master switch on. Should read battery voltage with rheostat turned full clockwise and voltage should decrease as rheostat is turned counterclockwise. If no voltage is present or voltage has a sudden drop before rheostat has been turned full counterclockwise, replace rheostat.</li></ol>
	Defective transistor or open short circuits between transistor and heat sink.	<ol style="list-style-type: none"><li>5. Test lamp with ohmmeter or new lamp. Replace lamp.</li><li>6. Check for opens or shorts at transistor sockets or between transistor and its heat sink. Heat sink should not ground transistor. If light will not dim, check transistor. Defective or partially shorted transistor can burn out rheostat. Replacement rheostats will continue to burn out until transistor problem is corrected. Replace transistor or insulator as required.</li></ol>

## MODEL 152 SERIES SERVICE MANUAL

CONTROL WHEEL MAP  
LIGHT WILL NOT LIGHT.

Nav light switch turned off.

1. Nav light switch has to  
be ON before map light will  
light.

Short circuit in wiring.

2. Check lamp fuse on ter-  
minal board located on back  
of stationary panel with ohm-  
meter. If fuse is open, proceed  
to Step 3. If fuse is ok, pro-  
ceed to Step 4.

Defective wiring.

3. Test circuit until short  
is located. Repair or  
replace wiring.

Defective map light  
assembly.

4. Test for open circuit.  
Repair or replace wiring.  
If a short or open circuit  
is not found, proceed to  
Step 5.

5. Check voltage at map  
light assembly with master  
and nav switches on. If bat-  
tery voltage is present, re-  
place map light assembly.

## MODEL 152 SERIES SERVICE MANUAL

- 16-51. LANDING AND TAXI LIGHT (THRU 15285834, A1521024, F15201943, and FA1520387).
- 16-52. DESCRIPTION. The landing and taxi light is mounted in the lower half of the engine cowl. This position facilitates the use of one lamp or both a landing and taxi light. A light cover provides weather protection for the lamp. The landing and taxi light is controlled by a rocker type switch located on the instrument panel. A circuit breaker is used to protect the landing and taxi light circuit.

### NOTE

With the aircraft parked 3 feet from a wall or any suitable light reflecting surface (3 feet as measured between landing light and wall), and with nose gear shock strut extended 2 inches, the center of the landing light beam on the wall should be 30-7/8 inches above the floor. Adjustment screws (7) are used for this adjustment, be sure screws (8) are tight after adjustment is made.

- 16-53. REMOVAL AND INSTALLATION. (See figure 16-6).
  - a. Remove screws (8) and remove bracket (1).
  - b. Pull lamp (2) forward and disconnect electrical leads, then remove lamp and gasket (3).
  - c. To install, place gasket (3) in position.
  - d. Connect electrical leads to lamp (2) and place in position securing with bracket (1) and screws (8).
- 16-54. DUAL LANDING AND TAXI LIGHTS (THRU 15285834, A1521024, F15201943, and FA1520387).
- 16-55. DESCRIPTION. The landing and taxi lights are mounted in the nose cap of the lower half of the engine cowl. The left lamp is used for taxiing and the right for landing. The lamps are controlled by a dual switch assembly with individual operating rocker type switches located on the instrument panel.

### NOTE

With the aircraft parked 3 feet from a wall or any suitable light reflecting surface (3 feet as measured between landing light and wall), and with nose gear shock strut extended 2 inches, the center of the landing light beam, (right hand) on the wall should be 29-5/8 inches above the floor. The center of the taxi light beam, (left hand) on the wall should be 31-3/8 inches above the floor. Adjustment screws (7) are used for this adjustment, be sure screws (8) are tight after adjustment is made.

- 16-56. REMOVAL AND INSTALLATION. (See figure 16-6). Either lamp may be removed by using procedure outlined in paragraph 16-51.

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16-56A. LANDING AND TAXI LIGHTS (WING MOUNTED).  
(BEGINNING WITH 15285835, A1521025, F15201944  
AND FA1520388.)

16-56B. DESCRIPTION. The landing and taxi lights are mounted in the leading edge of the left wing. A clear plastic lens and retainer, formed to the curvature of the wing leading edge, provides weather protection for the lamps. The outboard lamp is used for taxi and the in-board lamp for landing. A shield is installed on the inboard side of the taxi light to prevent glare. A dual rocker switch assembly on the instrument panel controls the lamps. One switch is for landing and the other for taxi. Power for the lights is provided from the main bus bar through a 30-amp circuit breaker.

16-56C. REMOVAL AND INSTALLATION (See figure 16-6).

- a. Remove screws securing lens retainer (2) and remove lens and retainer assembly.
- b. Remove screws (3) securing brackets (4).
- c. Pull lamp (5) forward and disconnect electrical leads (8) and remove lamps.

### NOTE

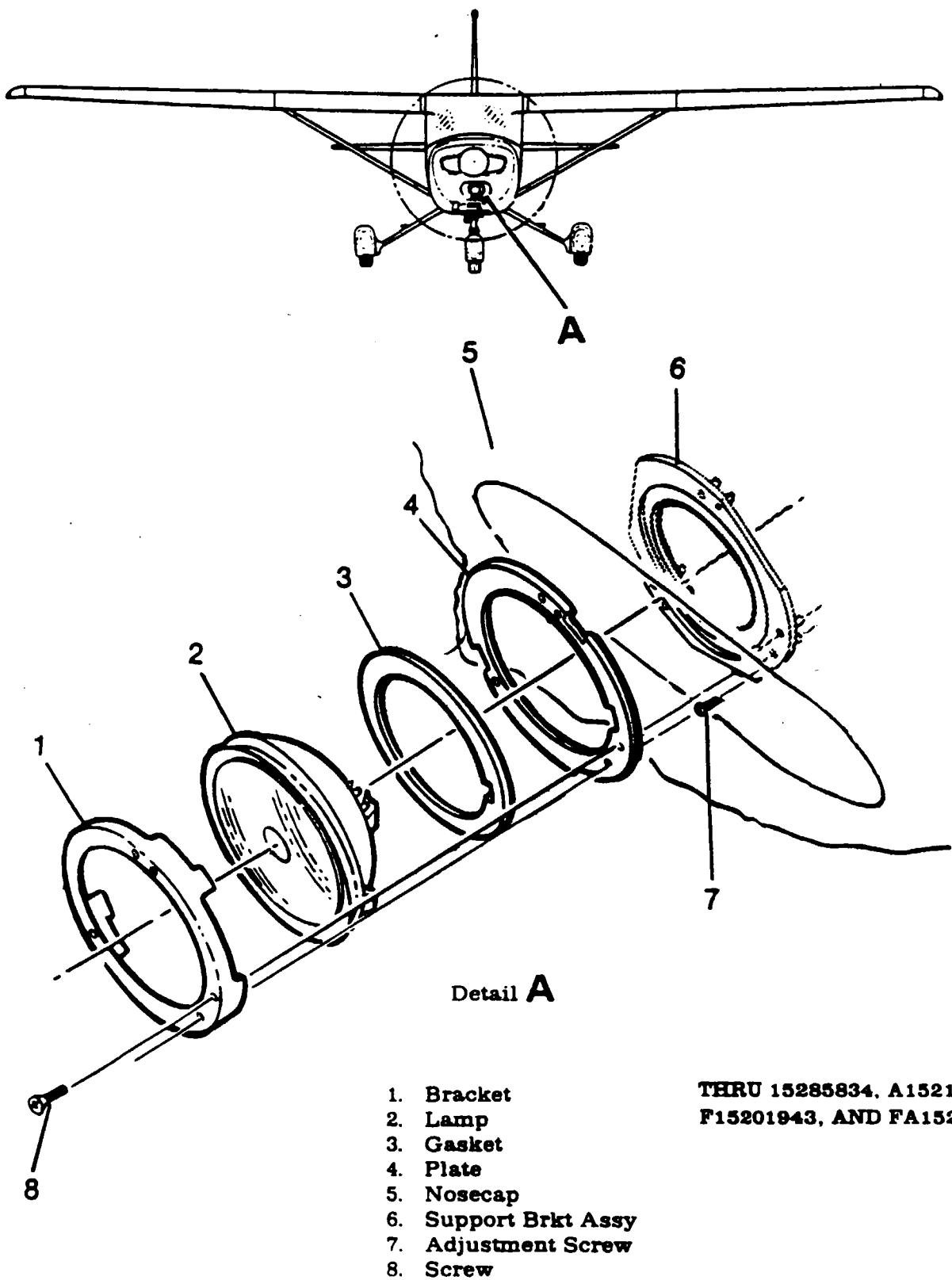
If plates (7) are not removed, it is not necessary to adjust lights after installation.

- d. Plates (7) may be removed by removing screws (6) and springs (9).
- e. Install springs (9) and plates (7) using screws (6).
- f. Connect electrical leads (8) to lamps (5), then position lamps (5) in plates (7) and install brackets (4) using screws (3).
- g. If plates (7) were removed, adjust lights in accordance with figure 16-6A.
- h. Install lens and retainer assembly.

16-57. NAVIGATION LIGHTS.

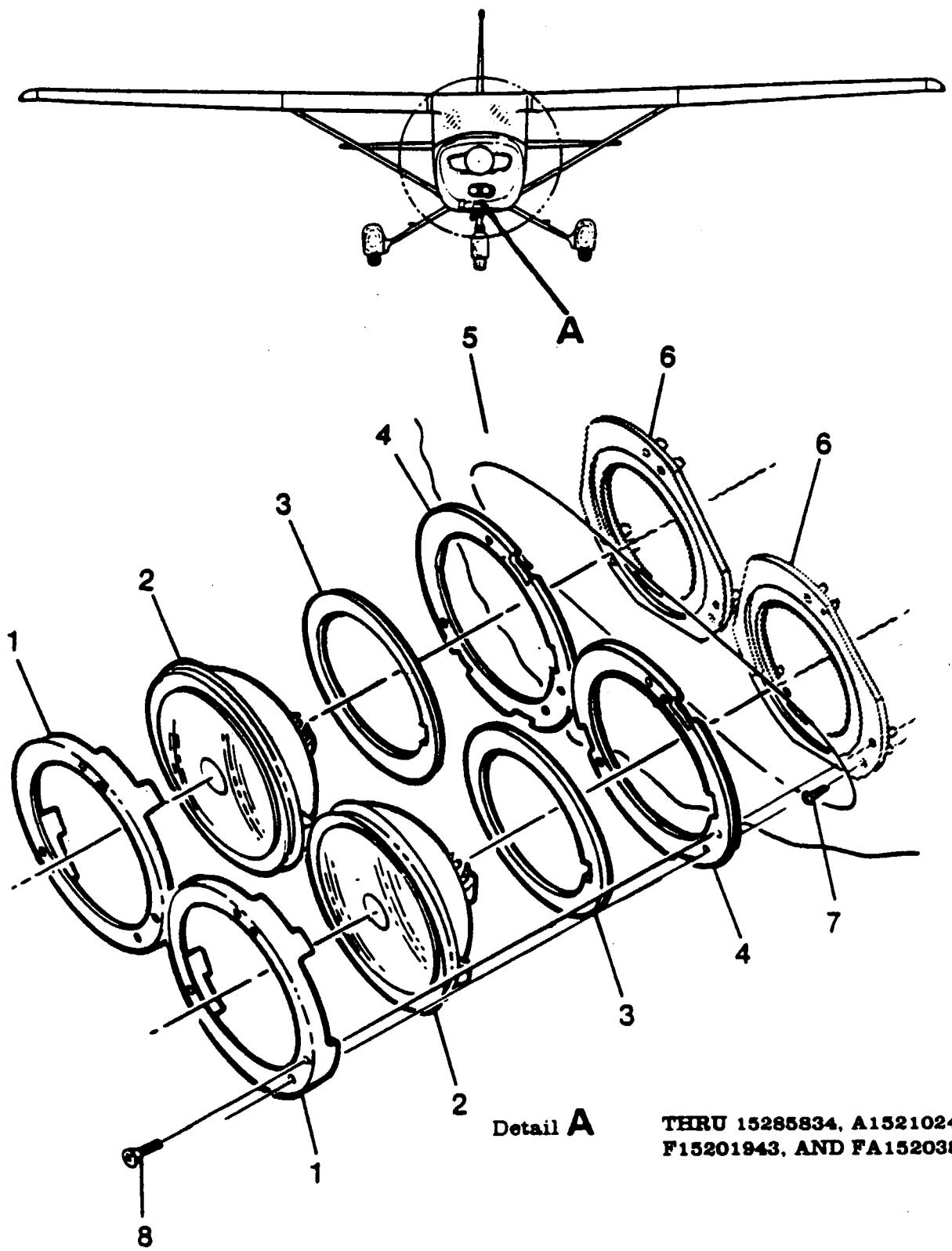
16-58. DESCRIPTION. The navigation lights are attached to the wing tips and the aft end of the vertical fin tip. The lamps are controlled by a rocker type switch located on the instrument panel. A circuit breaker is installed to protect the circuit.

**MODEL 152 SERIES SERVICE MANUAL**



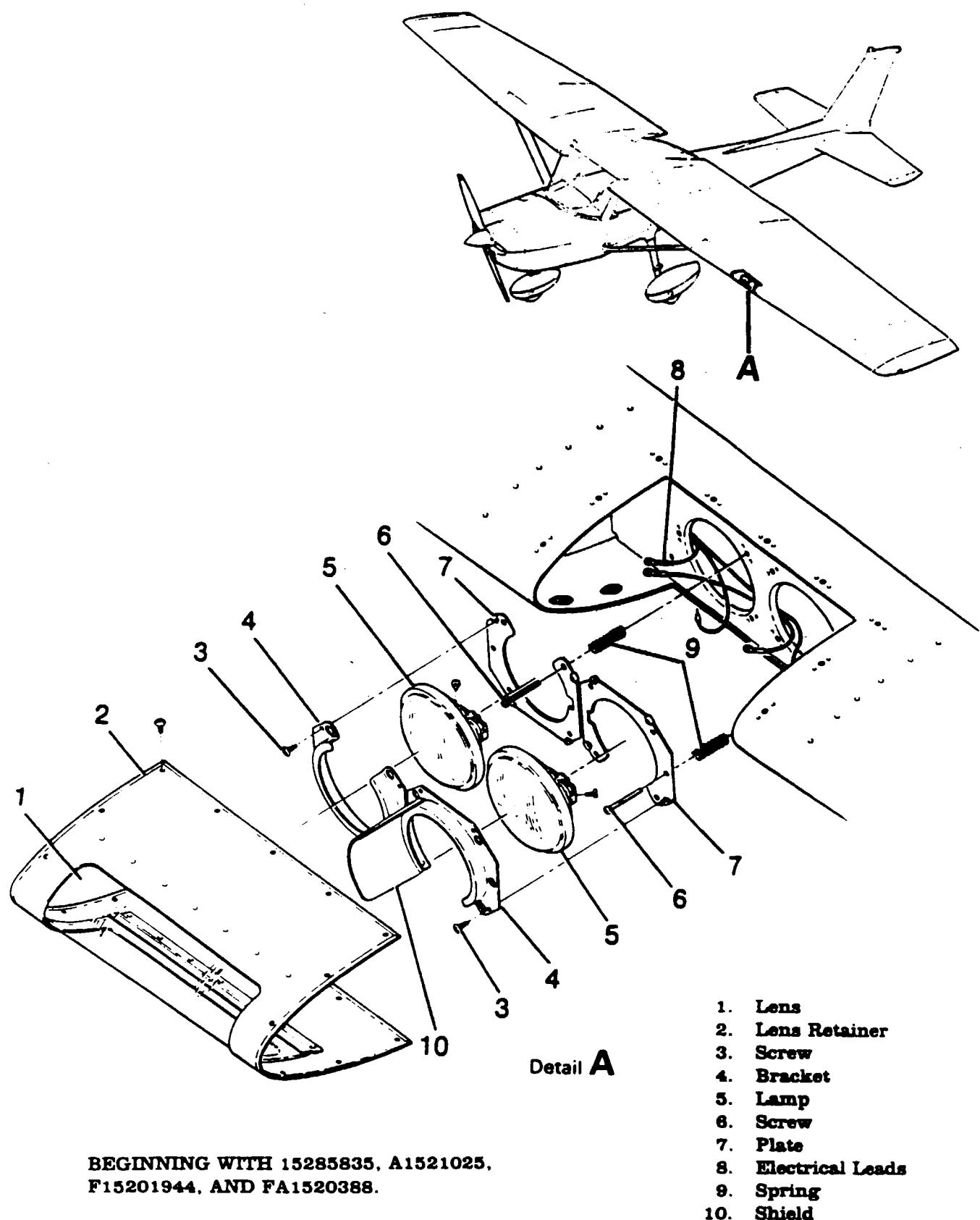
**Figure 16-6. Landing and Taxi Light Installation (Sheet 1 of 3)**

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 16-6. Landing and Taxi Light Installation (Sheet 2 of 3)**

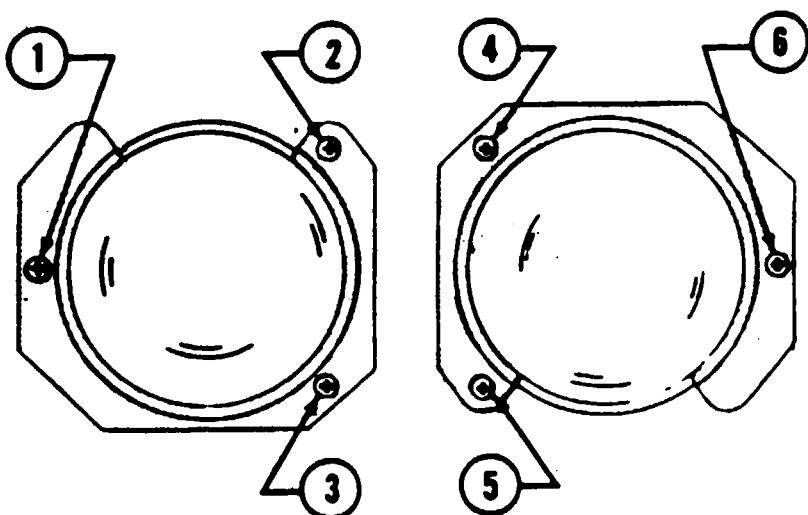
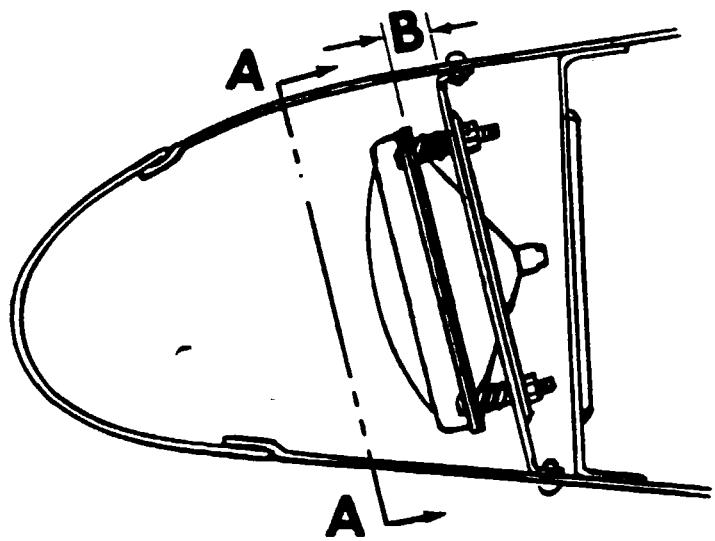
## MODEL 152 SERIES SERVICE MANUAL



BEGINNING WITH 15285835, A1521025,  
F15201944, AND FA1520388.

Figure 16-6. Landing and Taxi Light Installation (Sheet 3 of 3)

**MODEL 152 SERIES SERVICE MANUAL**



**VIEW A-A**

POSITION	B
1	.45
2	.65
3	1.15
4	.50
5	.85
6	1.25

BEGINNING WITH 15285835, A1521025, F15201944, AND FA1520388.

**Figure 16-6A. Landing and Taxi Light Adjustment**

## MODEL 152 SERIES SERVICE MANUAL

- 16-59. **REMOVAL AND INSTALLATION.** For removal and installation of the navigation lights, see figure 16-7.
- 16-60. **ANTI-COLLISION STROBE LIGHTS.**
- 16-61. **DESCRIPTION.** A white strobe light may be installed on each wing tip with the navigation lights. Strobe lights are vibration resistant and operate on the principle of a capacitor discharge into a xenon tube, producing an extremely high intensity flash. Energy is supplied to the lights from individual power supplies mounted on each wing tip rib.
- 16-62. **REMOVAL AND INSTALLATION.** For removal and installation of strobe light and power supply, see figure 16-7.

### **WARNING**

The anti-collision system is a high voltage device. Do not remove or touch tube assembly while in operation. Wait at least 5 minutes after turning off power before starting work.

- 16-63. **FLASHING BEACON.**

- 16-64. **DESCRIPTION.** The flashing beacon light is attached to the vertical fin tip. The lamp is iodine-vapor electrically switched by a solid-state flasher assembly. The flasher assembly is mounted in the aft section of the tailcone. The switching frequency of the flasher assembly operates the lamp at approximately 45 flashes per minute. A 1.5 ohm, 75 watt resistor is installed to eliminate a pulsing effect on the cabin lighting and ammeter.
- 16-65. **REMOVAL AND INSTALLATION.** (See figure 16-8.)

### **CAUTION**

When inserting lamp into socket always use handkerchief or tissue to prevent getting fingerprints on the lamp. Fingerprints on the lamp may shorten life of the lamp.

- 16-66. **INSTRUMENT AND DOME LIGHTS.**

- 16-67. **DESCRIPTION.** The instrument flood light and dome light are installed in the overhead console. The dome light consists of a frosted lens and a single bulb controlled by a rocker switch on the instrument panel. The instrument flood light consists of a red lens and a single bulb controlled by a rheostat switch located on the instrument panel below the pilots control wheel.

- 16-68. **REMOVAL AND INSTALLATION.** (See figure 16-9).

- 16-69. **INSTRUMENT POST LIGHTING.**

- 16-70. **DESCRIPTION.** Individual post lighting may be installed to provide non-glare instrument lighting. The post light consists of a cap and a clear lamp assembly with a tinted lens which fits into a socket bonded to the decorative panel covers. The intensity of the post lights is controlled by the instrument light-dimming rheostat on the instrument panel.

## MODEL 152 SERIES SERVICE MANUAL

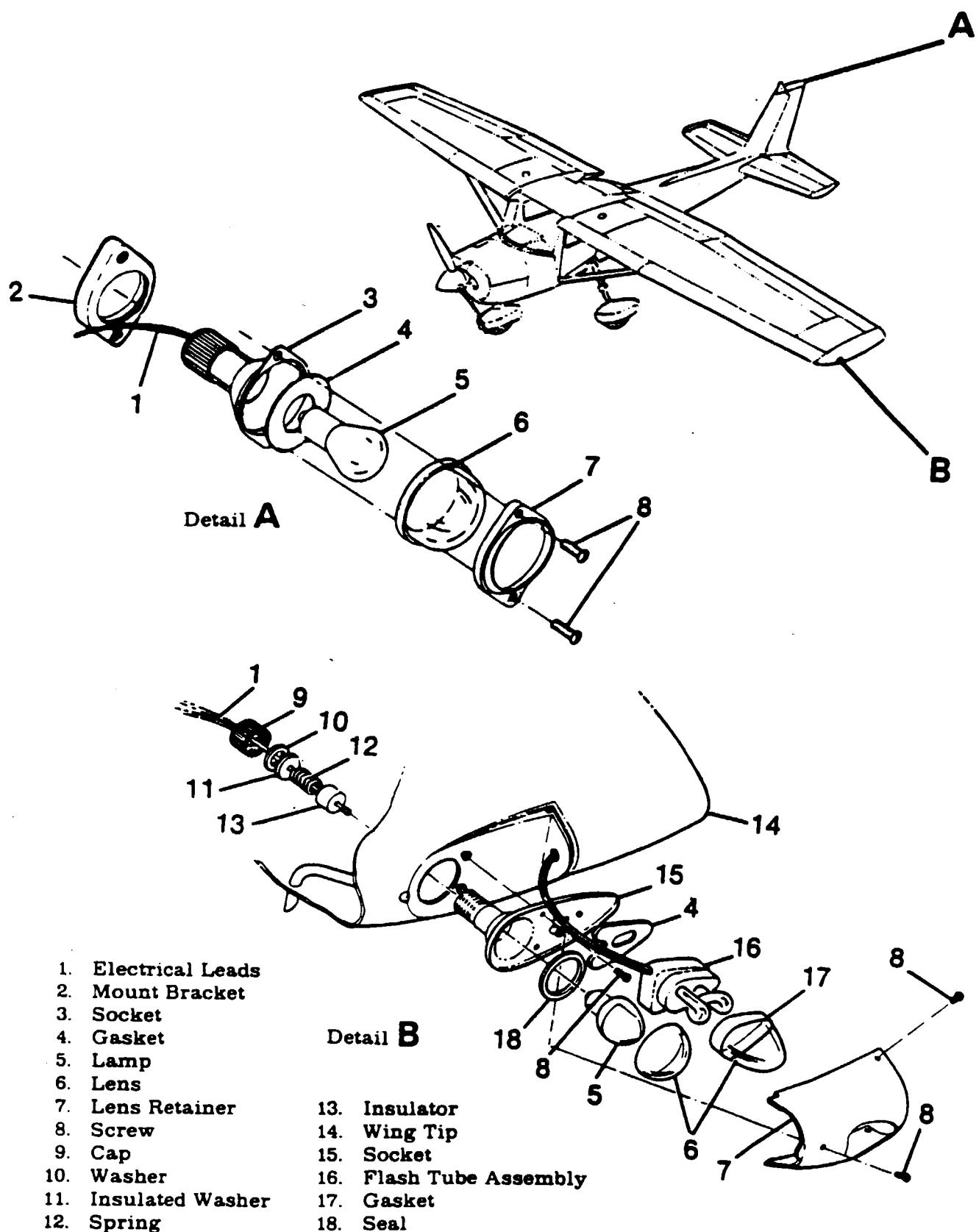
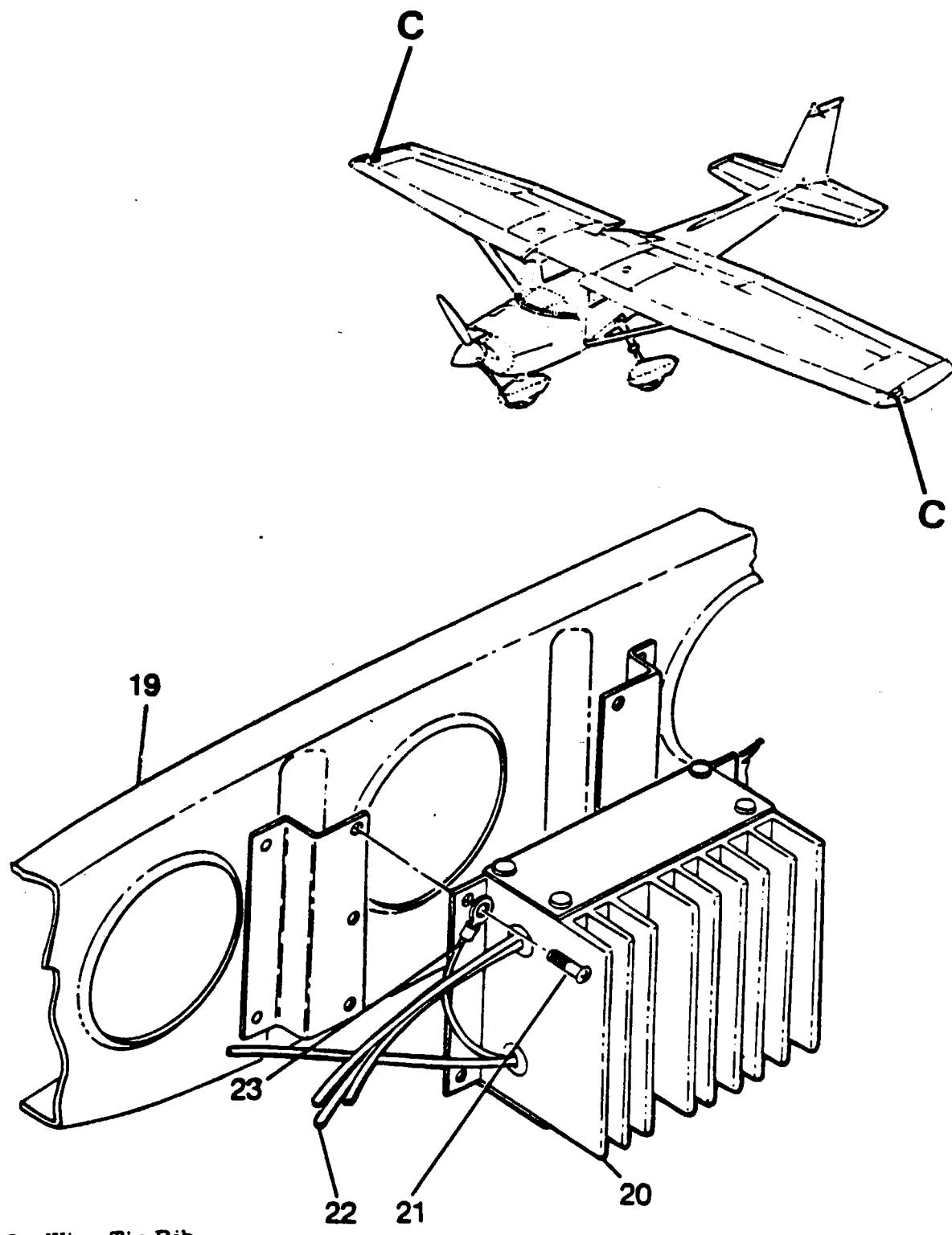


Figure 16-7. Navigation and Anti-Collision Strobe Lights Installation (Sheet 1 of 2)

**MODEL 152 SERIES SERVICE MANUAL**



- 19. Wing Tip Rib
- 20. Power Supply
- 21. Screw
- 22. Electrical Leads
- 23. Ground Wire

Detail C

**Figure 16-7. Navigation and Anti-Collision Strobe Lights Installation (Sheet 2 of 2)**

## MODEL 152 SERIES SERVICE MANUAL

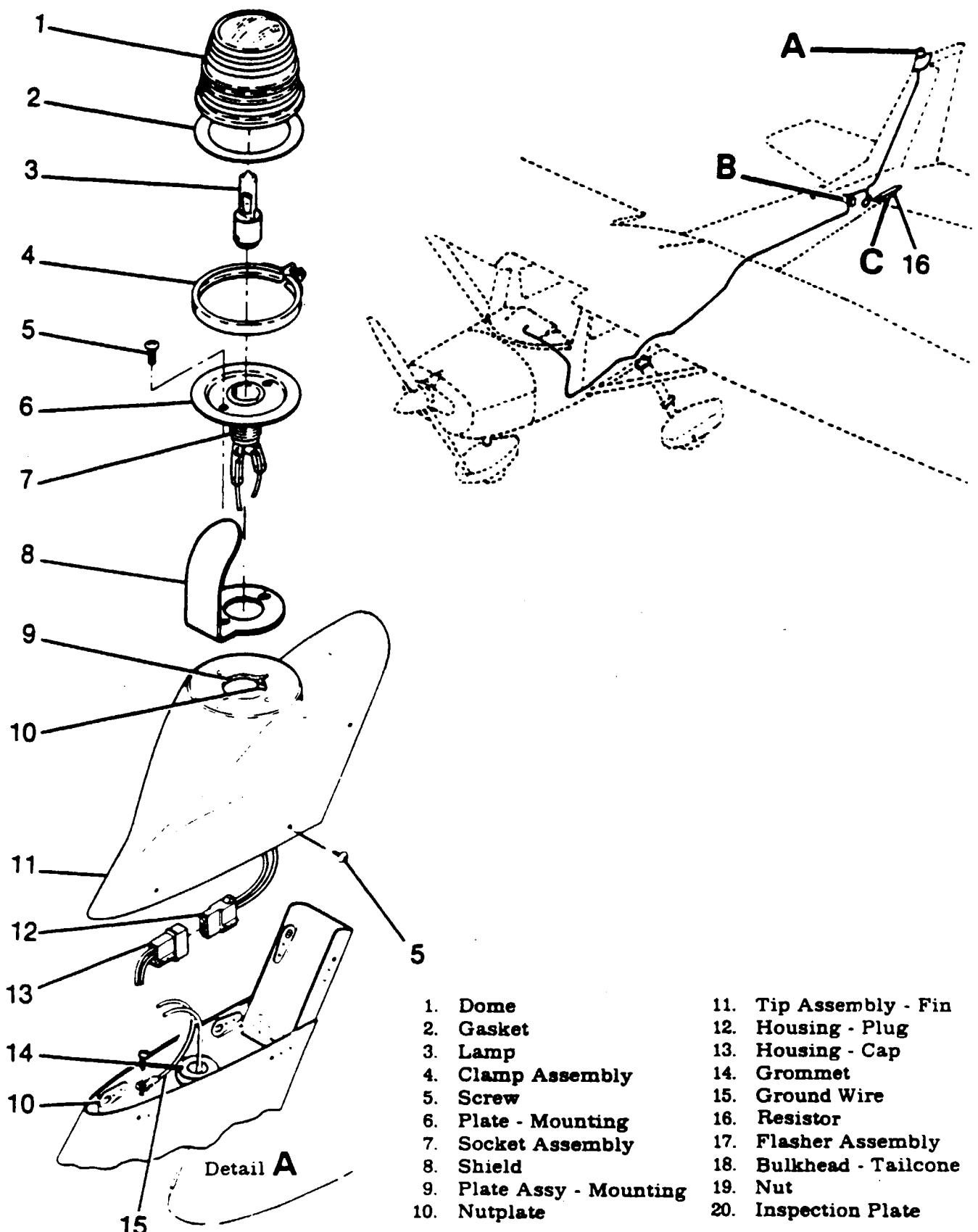
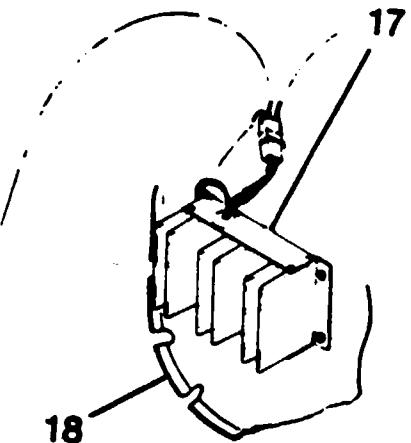
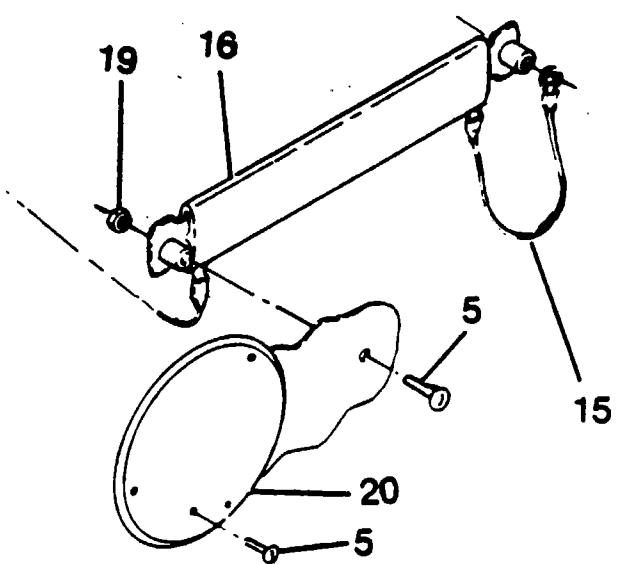


Figure 16-8. Flashing Beacon Light Installation (Sheet 1 of 3)

## MODEL 152 SERIES SERVICE MANUAL



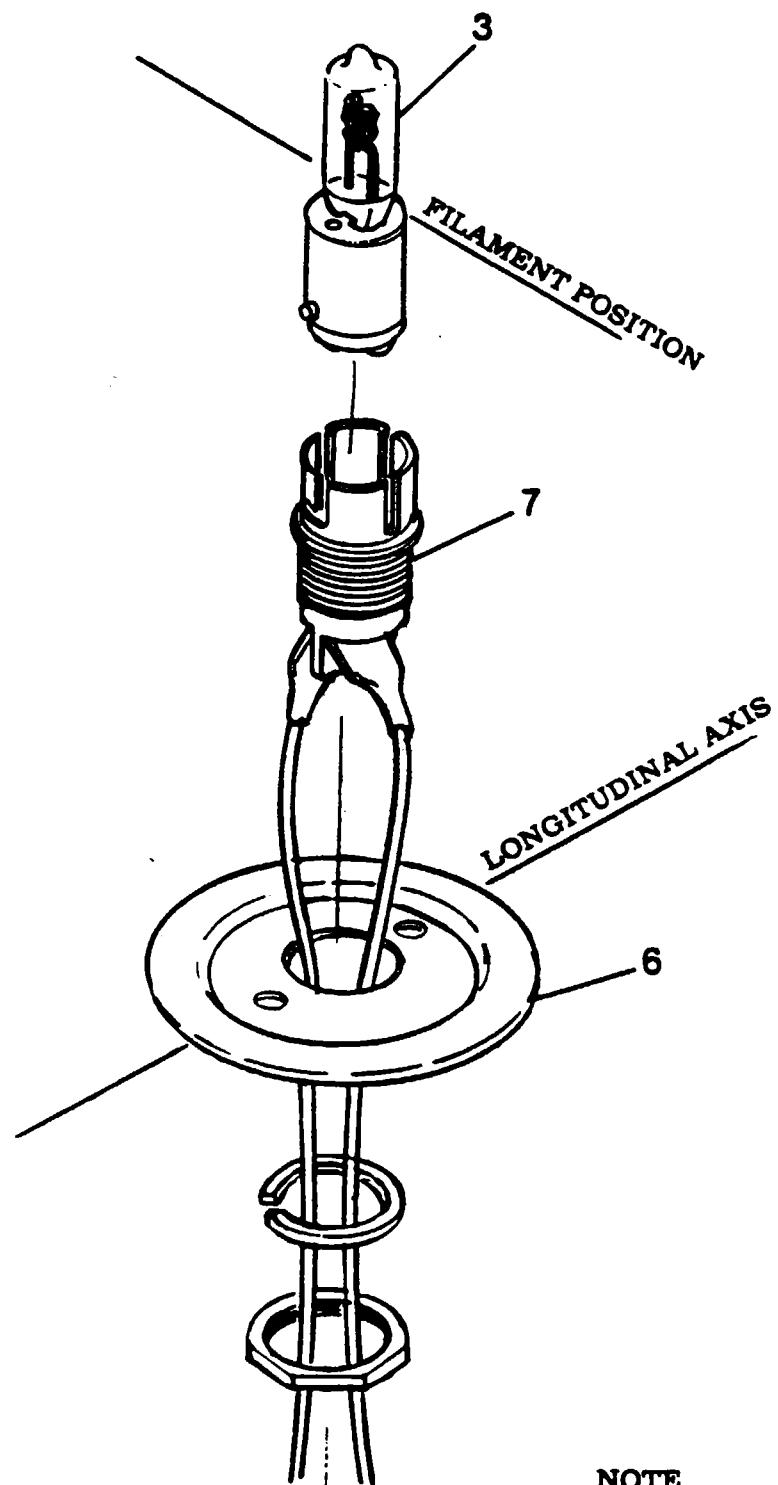
Detail B



Detail C

Figure 16-8. Flashing Beacon Light Installation (Sheet 2 of 3)

## MODEL 152 SERIES SERVICE MANUAL



### NOTE

When installing lamp be sure socket assembly is installed in mounting plate so lamp may be installed with filament perpendicular to the longitudinal axis of the aircraft.

Figure 16-8. Flashing Beacon Light Installation (Sheet 3 of 3)

## MODEL 152 SERIES SERVICE MANUAL

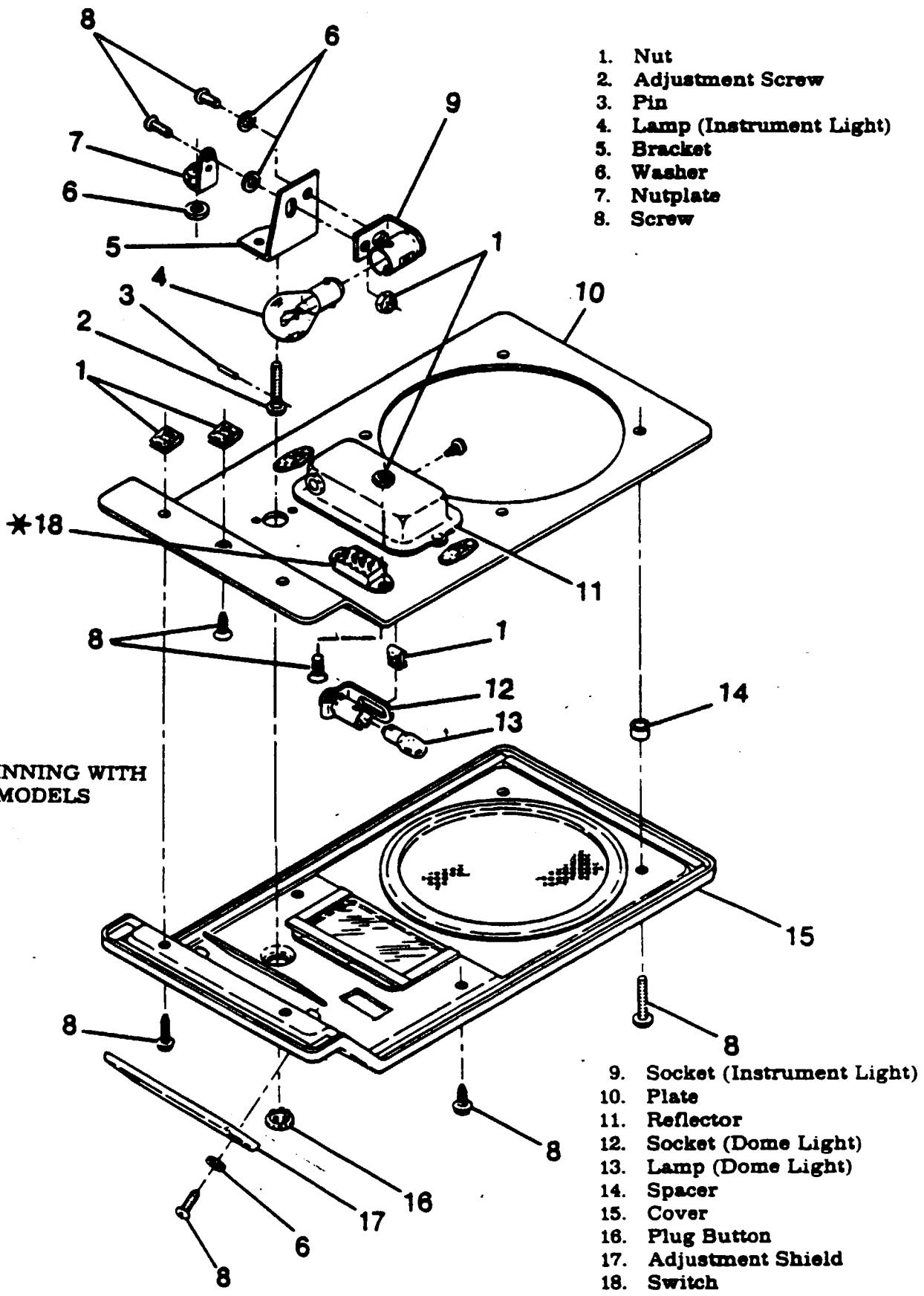
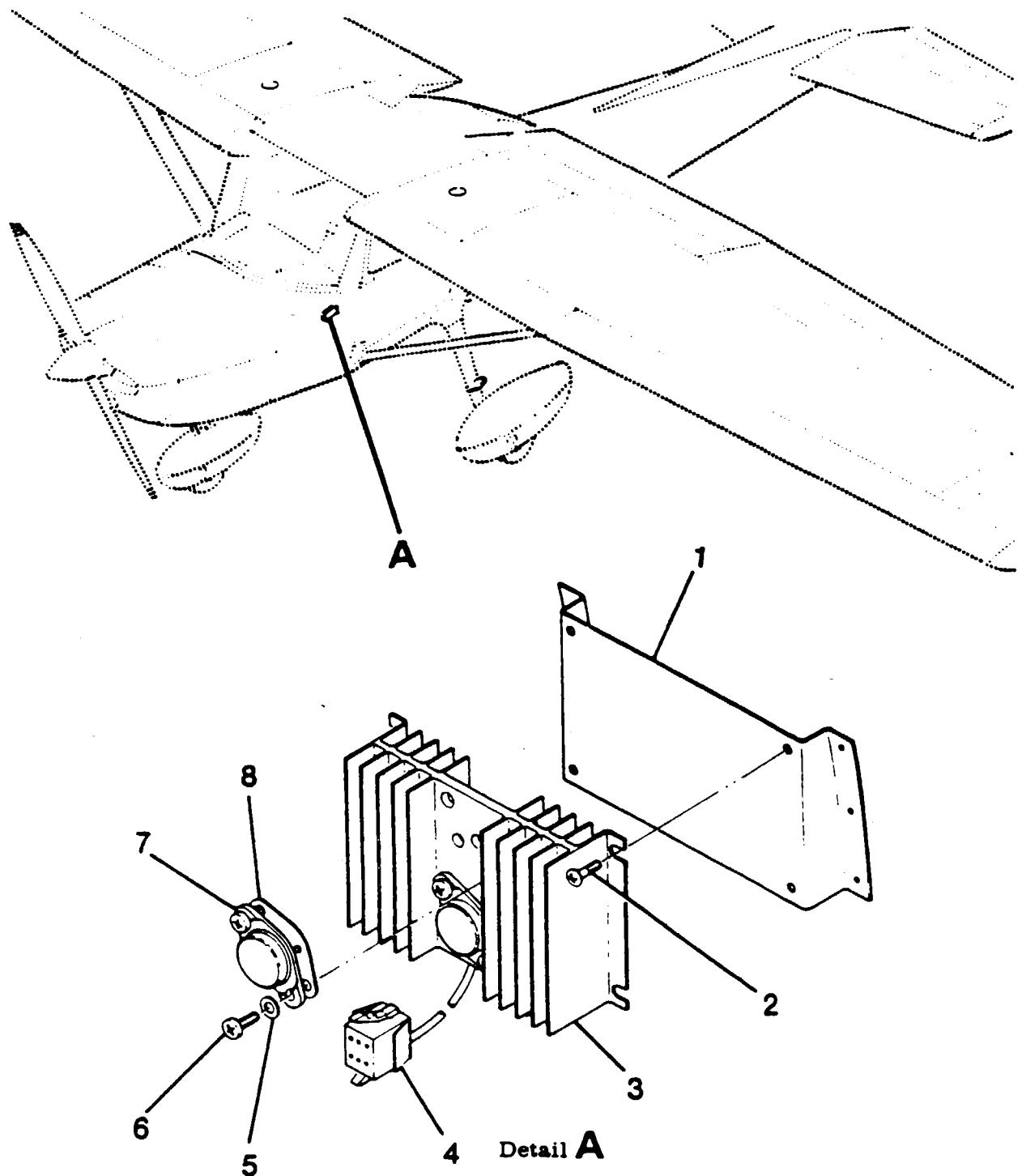


Figure 16-9. Instrument and Dome Light Console Installation

## MODEL 152 SERIES SERVICE MANUAL



- |                     |               |
|---------------------|---------------|
| 1. Mounting Bracket | 5. Washer     |
| 2. Mounting Screw   | 6. Screw      |
| 3. Heat Sink        | 7. Transistor |
| 4. Connector        | 8. Insulator  |

Figure 16-10. Transistorized Light Dimming Installation

## MODEL 152 SERIES SERVICE MANUAL

### NOTE

When installing postlight assemblies, assemblies shall be coated with RTV-102, General Electric, Waterford, New York, on forward side of panel where postlight could come in contact with sheet metal subpanel. This coating shall insulate postlight assembly from contact with airplane structure. Maximum coating thickness to be .03.

16-71. **REMOVAL AND INSTALLATION.** For removal and installation of post lamp, slide the cap and lens assembly from the socket. Slide the lamp from the cap assembly.

### 16-71A. TROUBLE SHOOTING -- POSTLIGHTING.

TROUBLE	PROBABLE CAUSE	REMEDY
LAMP WILL NOT LIGHT.	Defective lamp.	1. Test lamp with ohmmeter or replace with a new lamp. If lamp is OK, proceed to step 2.
	Defective socket or open circuit.	2. Witch switch on, test socket. If Replace socket or wiring.
ONE SECTION OF LAMPS WILL NOT LIGHT.	Defective connector.	1. Test for voltage on lamp side of connector. If voltage is not present, check opposite side of connector. If voltage is present, replace pins and sockets as necessary. If voltage is not present, check connections at terminal block.
	Defective circuit in dimming assembly.	2. Refer to paragraph 16-71B.
	Defective rheostat.	3. Check voltage at output side of rheostat with battery switch on.  Should read battery voltage with rheostat turned full clockwise. Voltage should decrease as rheostat is turned counterclockwise. If no voltage is present or voltage has a sudden drop before rheostat has been turned full counterclockwise replace rheostat.

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### 16-71A. TROUBLE SHOOTING - POSTLIGHTING. (Cont).

TROUBLE	PROBABLE CAUSE	REMEDY
ALL LAMPS OUT.	Open circuit breaker.	1. With battery switch on, check circuit breaker. Reset if open. If circuit breaker is set, check voltage at output side of breaker. If no voltage is present, replace circuit breaker.
LAMPS WILL NOT DIM.	Defective resistor or rheostat.	1. Check resistor and rheostat for continuity and resistance value. Also, check transistors for partial short. Refer to paragraph 16-71B. Replace rheostat and transistor.

16-71B. TROUBLE SHOOTING - TRANSISTOR HEAT SINK. Remove heat sink from airplane. Check transistors for opens and shorts, check transistor sockets for evidence of shorting out against heat sink, especially on the bottom side. Check that legs of transistor socket have not been bent up against heat sink. If this has happened, you may see burned spot on the socket leg. If the transistor sockets and wiring appear to be in good condition, install transistor back in heat sink and make a continuity check. Attach one lead of an ohmmeter to the heat sink then check every pin of the pigtail plug with the other lead for continuity. (These should not be continuity). If continuity is found, this will burn out transistors immediately.

### 16-72. TRANSISTORIZED LIGHT DIMMING.

16-73. DESCRIPTION. A remotely located, two-circuit transistorized dimming assembly is installed to control instrument lighting. One circuit controls the compass light, map light and instrument flood lights. The other circuit controls radio lighting. A concentric knob arrangement on a dual rheostat assembly mounted on the instrument panel.

### 16-74. REMOVAL AND INSTALLATION. (See figure 16-10.)

### 16-74A. TROUBLE SHOOTING - SEAT SINK. Refer to paragraph 16-71A.

### 16-75. COMPASS AND RADIO DIAL LIGHTING.

16-76. DESCRIPTION. The compass and radio dial lighting are contained within the individual units. The lighting intensity is controlled by a concentric knob arrangement on a dual rheostat assembly mounted on the instrument panel.

### 16-77. CONTROL WHEEL MAP LIGHT.

16-78. DESCRIPTION. The control wheel map light is mounted on the lower side of the control wheel. Light intensity is controlled by a thumb operated rheostat. For dimming the rheostat should be turned clockwise.

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### 16-79. REMOVAL AND INSTALLATION. (See figure 16-11.) (THRU 15285634 AND A1521019.)

- a. For easy access to the map light assembly, rotate the control wheel 90°.
- b. Remove screws (9), spacers (8) and shield (10).
- c. Remove screws (7), inserts (11) and shield (12).
- d. Label the map light wires at the terminal block, then remove screws securing wires to terminal block.
- e. For reassembly reverse the preceding steps.

### 16-79A. REMOVAL AND INSTALLATION. (See figure 16-11.) (BEGINNING WITH 15285635 AND A1521020.)

- a. For easy access to the map light assembly, rotate the control wheel 90°.
- b. To remove lamp, press in and rotate counterclockwise.
- c. Loosen setscrew (12) and remove knob (11).
- d. To remove rheostat, remove screws securing bracket (9).
- e. Disconnect electrical leads from rheostat (7).
- f. For reassembly, reverse this procedure.

### 16-80. MAP LIGHT.

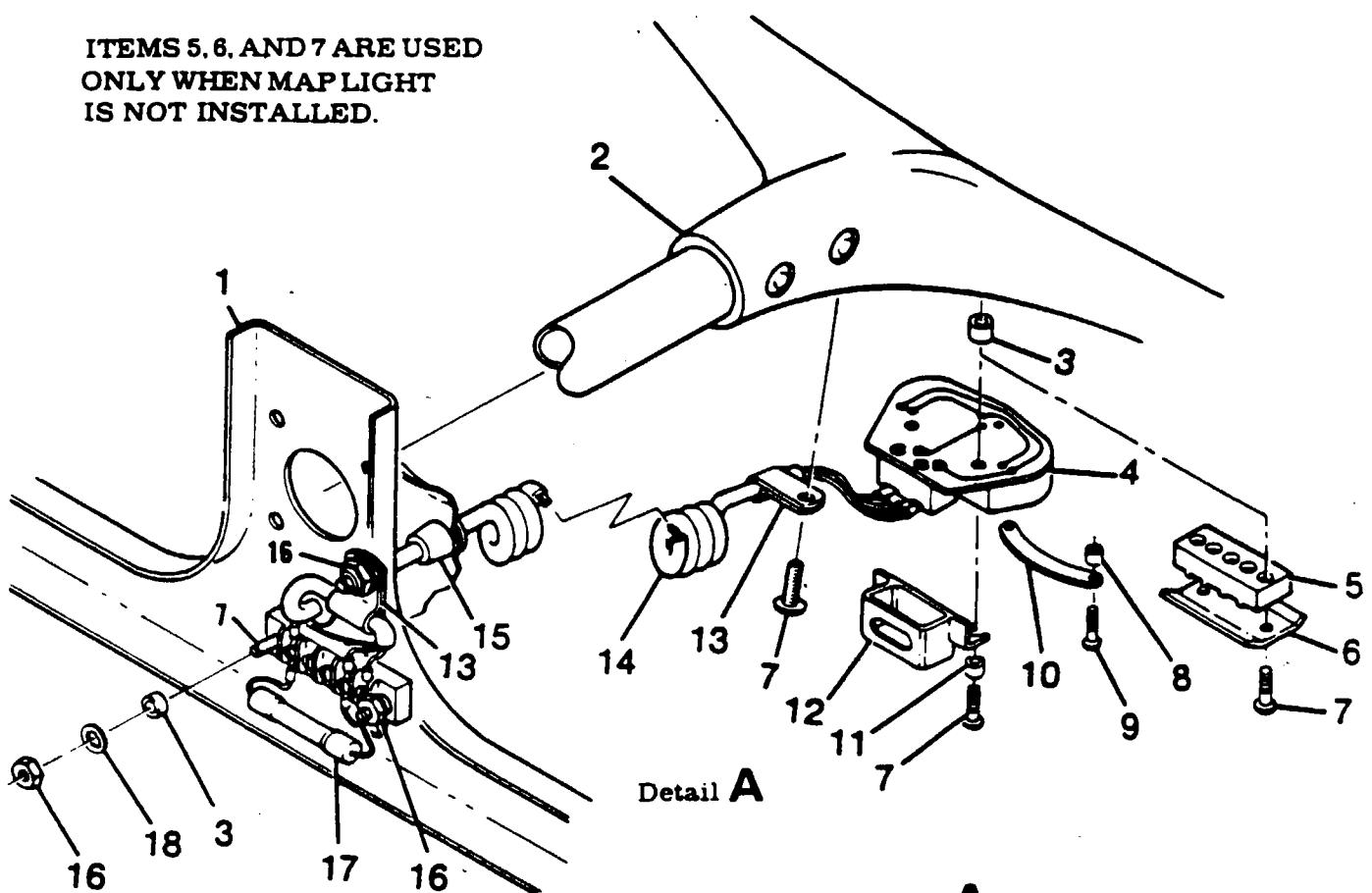
### 16-81. DESCRIPTION. White map lighting and red non-glare instrument lighting are provided by an adjustable light mounted on the upper forward part of the left door post. The switch is a three position type with red, white and off positions. The map light contains a white bulb for general purpose lighting and a red bulb for adjustable instrument lighting. The intensity of the red bulb is controlled by the dimming rheostat on the lower left side of the instrument panel.

### 16-82. REMOVAL AND INSTALLATION. (See figure 16-12.)

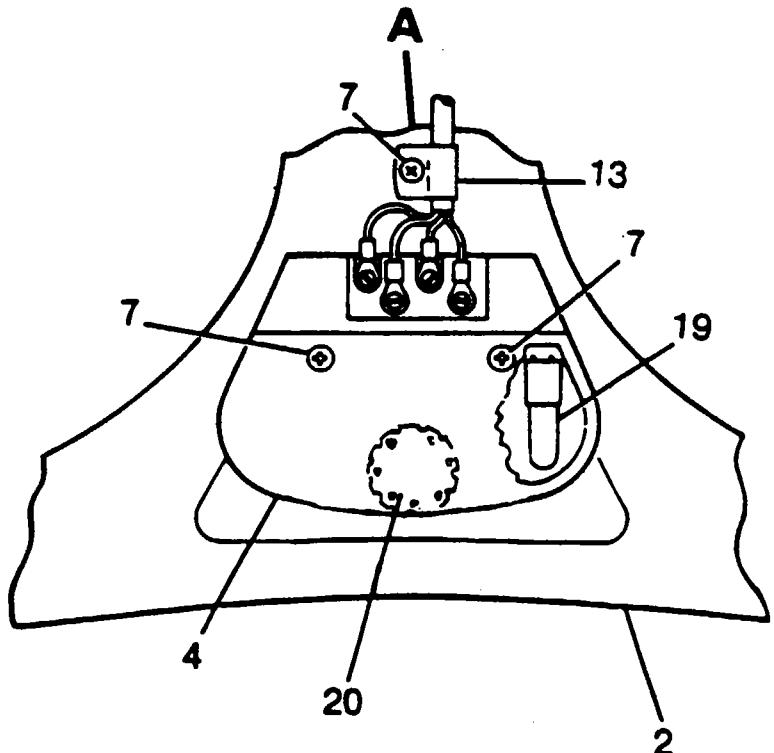
- a. For replacement of defective lamp slide the hood and lens from the map light assembly.

# MODEL 152 SERIES SERVICE MANUAL

ITEMS 5, 6, AND 7 ARE USED  
ONLY WHEN MAP LIGHT  
IS NOT INSTALLED.



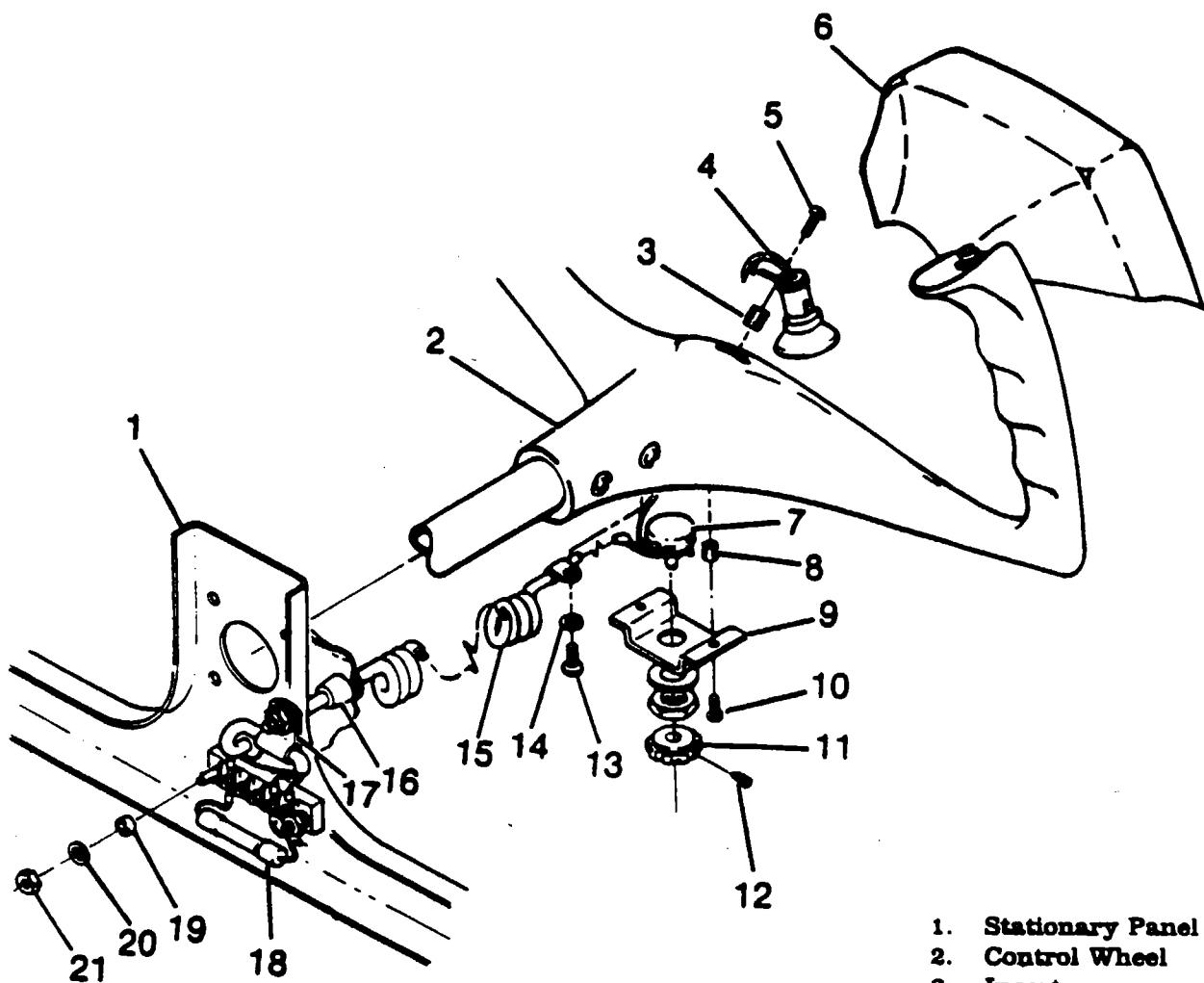
1. Stationary Panel Assembly
2. Control Wheel Assembly
3. Spacer
4. Map Light Assembly
5. Terminal Block
6. Cover
7. Screw
8. Spacer
9. Screw
10. Shield
11. Insert
12. Cover
13. Clamp
14. Cable Assembly
15. Grommet
16. Nut
17. Fuse
18. Lock Washer
19. Lamp
20. Rheostat



THRU 15285634 AND A1521019.

**Figure 16-11. Control Wheel Map Light Installation (Sheet 1 of 2)**

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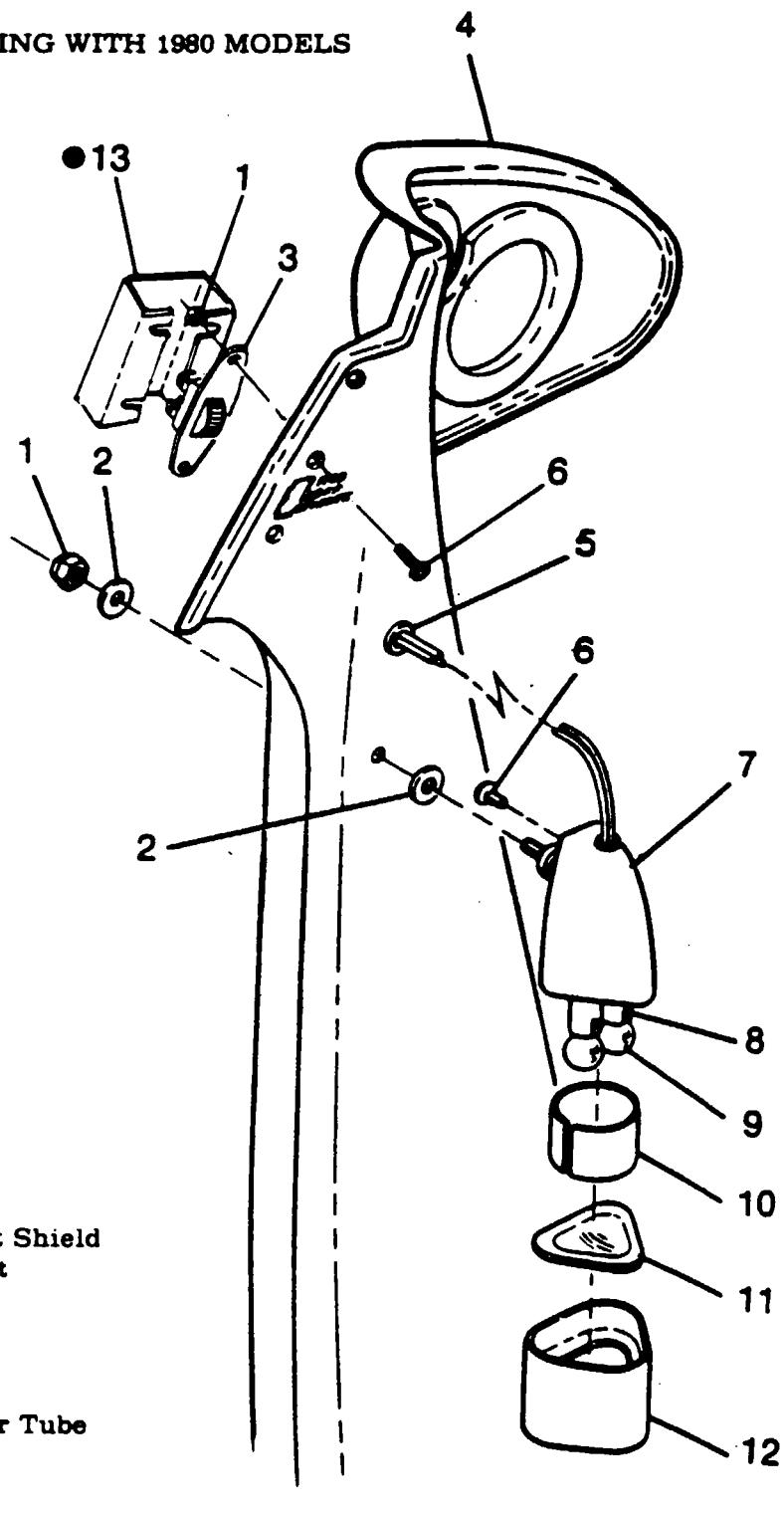
**BEGINNING WITH 15285635 AND A1521020.**

1. Stationary Panel
2. Control Wheel
3. Insert
4. Map Light Assembly
5. Screw
6. Pad
7. Rheostat
8. Insert
9. Bracket
10. Screw
11. Knob
12. Setscrew
13. Screw
14. Washer
15. Cable Assembly
16. Grommet
17. Clamp
18. Fuse
19. Spacer
20. Washer
21. Nut

**Figure 16-11. Control Wheel Map Light Installation (Sheet 2 of 2)**

## MODEL 152 SERIES SERVICE MANUAL

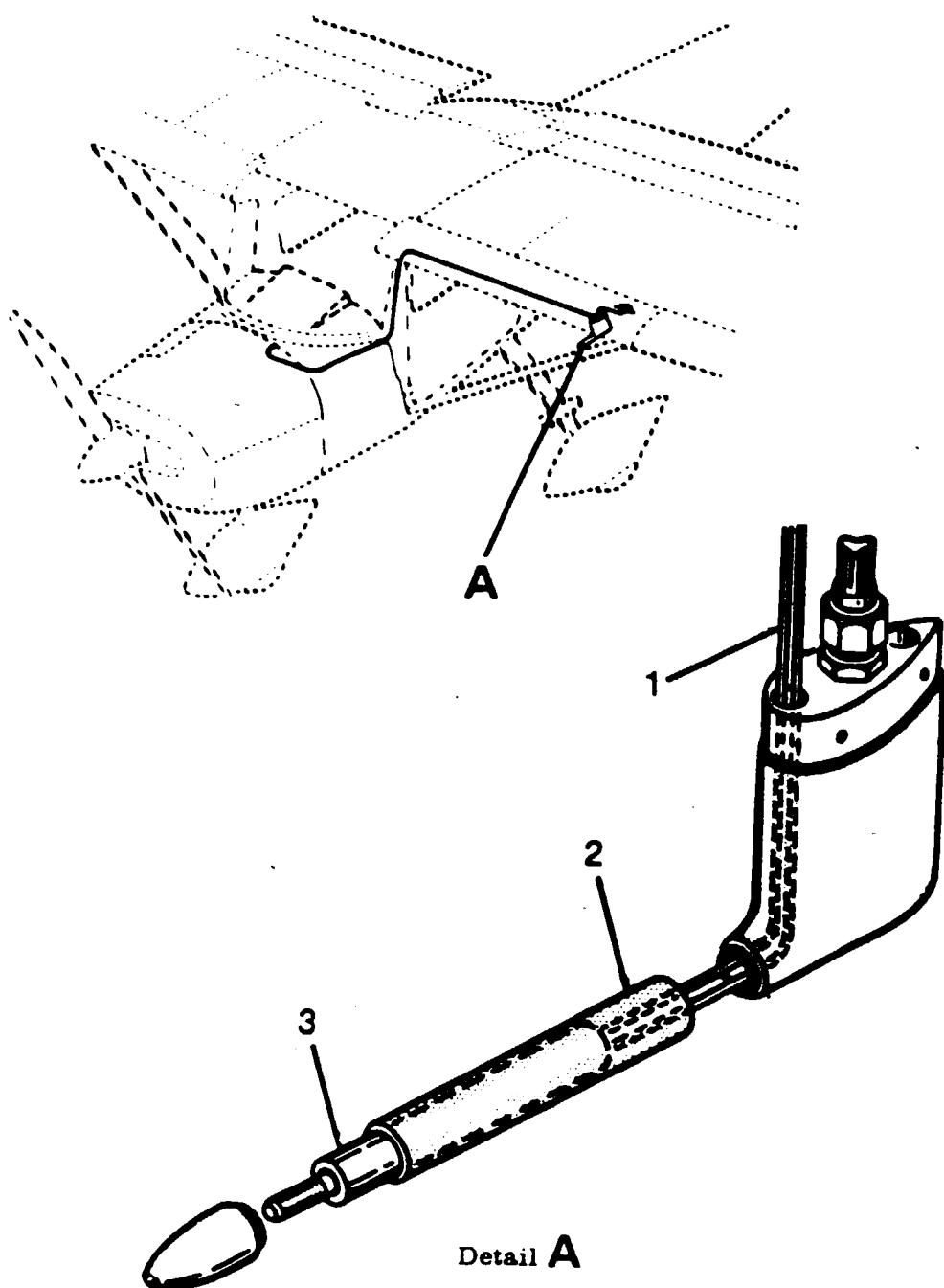
● BEGINNING WITH 1980 MODELS



BEGINNING WITH 1979 MODELS

Figure 16-11A. Map Light Installation

## MODEL 152 SERIES SERVICE MANUAL



1. Electrical Leads
2. Pitot Tube
3. Heating Element

16-12. Heated Pitot Installation

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- b. Remove lamp from socket and install new lamp.
- c. For removal of the map light assembly, remove screws securing door post shield.
- d. Detach leads at the quick disconnect fasteners.
- e. Disconnect ground wire.
- f. Remove nut and washer securing map light assembly to door post shield.

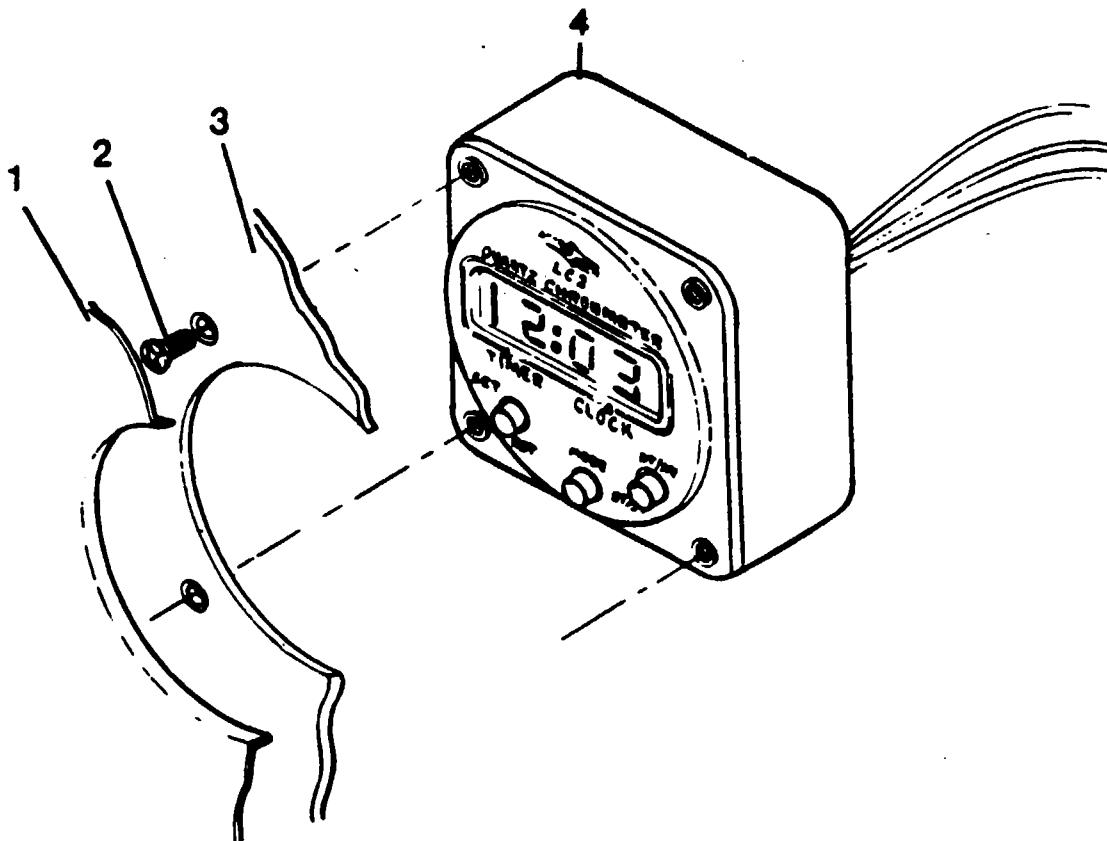
16-83. PITOT HEATER.

16-84. DESCRIPTION. An electrical heater unit may be installed in the pitot tube. The heater offsets the possibility of ice formation on the pitot tube. The heater is integrally mounted in the pitot tube and is operated by a rocker switch on the instrument panel.

16-85. REMOVAL AND INSTALLATION. (See figure 16-12.)

16-86. CIGAR LIGHTER.

16-87. DESCRIPTION. Thru 15285162, F15201894, A1520984, and FA1520378, the cigar lighter is mounted on the instrument panel below the pilots control wheel. A 7.5 amp inline fuse is installed to protect the wire from the cigar lighter to the ammeter.



1. Decorative Cover
2. Screw
3. Instrument Panel
4. Clock

Figure 16-12A. Digital Clock Installation

## MODEL 152 SERIES SERVICE MANUAL

16-88. CLOCK.

16-89. DESCRIPTION. Thru 1978 Models an electric clock may be installed in the aircraft. During the 1979 Models a digital clock may be installed. The digital clock has the capability of date and second readout as well as time. Both clocks are installed in the instrument panel in the same manner. Refer to Pilot's Operating Handbook for operating instructions. Refer to figure 16-12A.

16-90. EMERGENCY LOCATOR TRANSMITTER.

16-91. DESCRIPTION. The ELT is a self-contained, solid-state unit, having its own power supply, with an externally mounted antenna. The unit is mounted in the tailcone, aft of the baggage curtain on the right-hand side. The transmitters are designed to provide a broadcast tone that is audio-modulated in a swept manner over the range of 1600 to 300 Hz in a distinct, easily recognizable distress signal for reception by search and rescue personnel and others monitoring the emergency frequencies. The ELT exhibits line-of-sight transmission characteristics which correspond approximately to 100 miles at a search altitude of 10,000 feet.

The C589511-0103 transmitter, and the C589511-0104 transmitter on aircraft with Canadian registry, are used thru 15282031, A1520808, F15201528, and FA1520347. The C589511-0117 transmitter, and the C589511-0113 transmitter on aircraft with Canadian registry, are used 15282032 thru 15285696, A1520809 thru A1521019, F15201529 thru F15201928, and FA1520348 thru FA1520382. Beginning with 15285697, A1521020, F15201929, and FA1520383, the C589512-0103 transmitter is used on all aircraft. The C589511-0104 transmits on 121.5 MHz at 25 mw rated power output for 100 continuous hours in the temperature range of -40°F to + 131°F (-40°C to + 55°C). The C589511-0113 transmits on 121.5 MHz at 25 mw rated power output for 100 continuous hours in the temperature range of -4°F to + 131°F (-20°C to + 55°C). The C589511-0103 transmits on 121.5 and 243.0 MHz simultaneously at 75 mw rated power output for 48 continuous hours in the temperature range of -40°F to + 131°F (-40°C to + 55°C). The C589511-0117 and C589512-0103 transmits on 121.5 and 343.0 MHz at 75 mw rated power output for 48 continuous hours in the temperature range of -4°F to + 131°F (-20°C to + 55°C).

Power is supplied to the transmitter by a battery-pack. The C589511-0104 and C589511-0103 ELT's equipped with a lithium battery-pack must be modified by SK185-20 as outlined in Avionics Service Letter AV78-31, dated 20 November 1981, to incorporate alkaline battery-packs. The C589511-0114 alkaline battery-packs have the service life of the battery-pack stamped on the battery-pack, on the end of the transmitter below the switch and on top of the transmitter. The C589512-0107 alkaline battery-packs have the replacement date and date of installation on the battery-pack and the replacement date on the top of the transmitter.

16-92. OPERATION. A three position switch on the forward end of the unit controls operation. Placing the switch in the ON position will energize the unit to start transmitting emergency signals. In the OFF position, the unit is inoperative. Placing the switch in the ARM position will set the unit to start transmitting emergency signals only after the unit has received a 5g (tolerances are +2g and -0g) impact force, for a duration of 11-16 milliseconds.

### CAUTION

Do not leave the emergency locator transmitter in the ON position longer than 1 second (3 sweeps of the warble tone) or you may activate downed aircraft procedures by C.A.P., D.O.T. or F.A.A. personnel.

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### 16-93. CHECKOUT INTERVAL.

100 HOURS OR THREE MONTHS, WHICHEVER COMES FIRST.

- a. Turn aircraft master switch ON.
- b. Turn aircraft transceiver ON and set frequency on receiver to 121.5 MHz.
- c. Remove the ELT's antenna cable from the ELT unit.
- d. Place the ELT's function selector switch in the ON position for 5 seconds or less. Immediately replace the ELT function selector switch in the ARM position after testing ELT.
- e. Test should be conducted only within the time period made up of the first five minutes after any hour.

#### CAUTION

Tests with the antenna connected should be approved and confirmed by the nearest control tower. The FAA/DOT allows free space transmission tests from the aircraft any time within five minutes after each hour. The test time allowed is generally three sweeps of the warble tone, or approximately a one-second test. The control tower should be notified that a test is about to be performed.

#### NOTE

Without its antenna connected, the ELT will produce sufficient signal to reach your receiver, yet it will not disturb other communications or damage output circuitry.

#### CAUTION

Ensure that the direction of flight arrows (placarded on the transmitter) are pointing towards the nose of the aircraft.

### 16-94. REMOVAL AND INSTALLATION OF ANTENNA. (See figure 16-13.)

- a. Disconnect co-axial cable from base of antenna.
- b. Remove the nut and lockwasher attaching the antenna base to the fuselage and the antenna will be free for removal.
- c. To reinstall the antenna, reverse the preceding steps.

#### NOTE

After accumulated test or operation time equals 1 hour, battery-pack replacement is required.

- f. Check calendar date for replacement of battery-pack. This date is supplied on a sticker attached to the outside of the ELT case and to each battery.

### 16-95. REMOVAL AND INSTALLATION OF TRANSMITTER. (See figure 16-13.)

- a. Remove baggage curtain to gain access to the transmitter and antenna.
- b. Disconnect co-axial cable from end of transmitter.
- c. Remove the two #10 screws from the baseplate of the ELT and remove ELT.
- d. To reinstall transmitter, reverse preceding steps.

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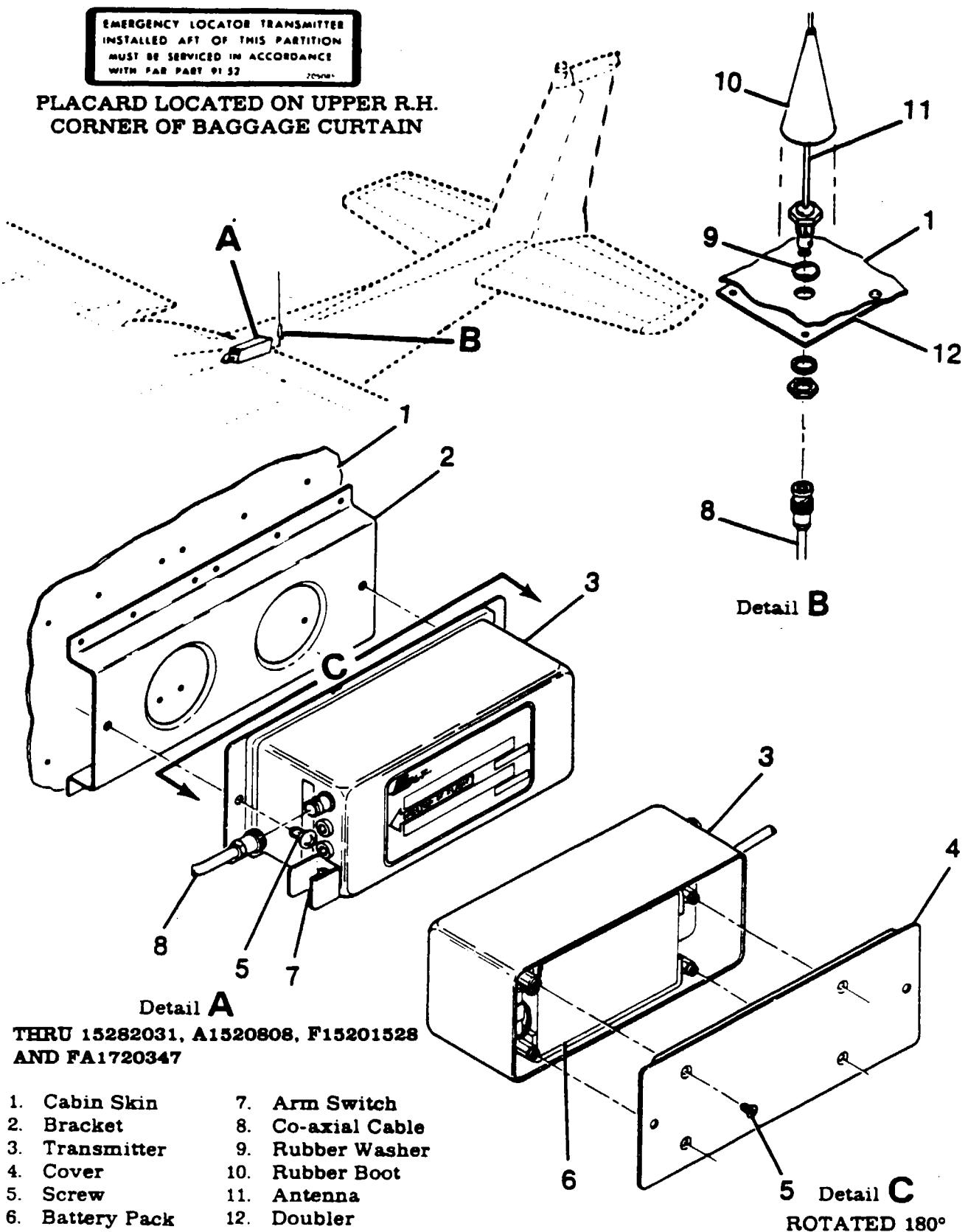


Figure 16-13. Emergency Locator Transmitter Installation (Sheet 1 of 3)

# MODEL 152 SERIES SERVICE MANUAL

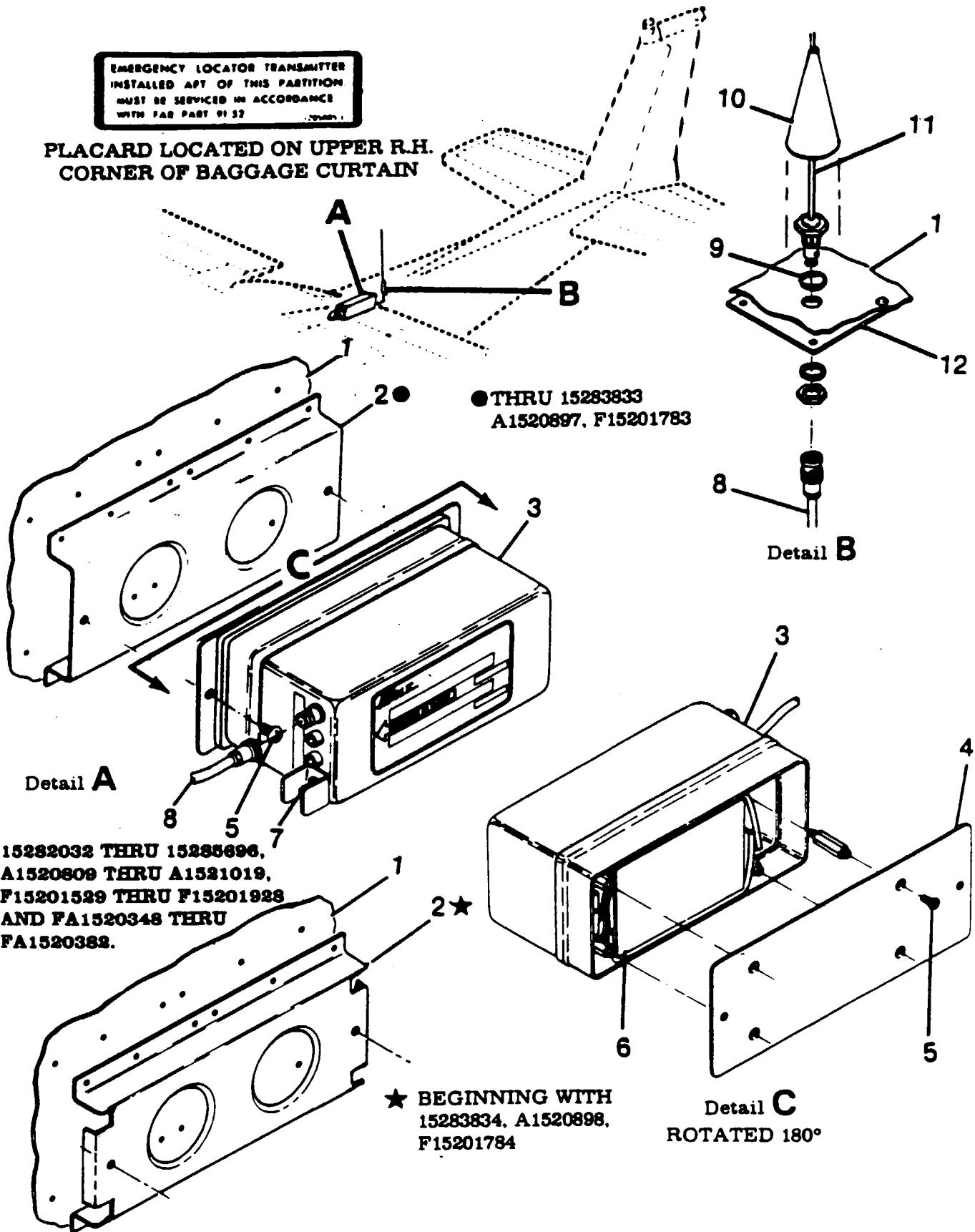


Figure 16-13. Emergency Locator Transmitter Installation (Sheet 2 of 3)

# MODEL 152 SERIES SERVICE MANUAL

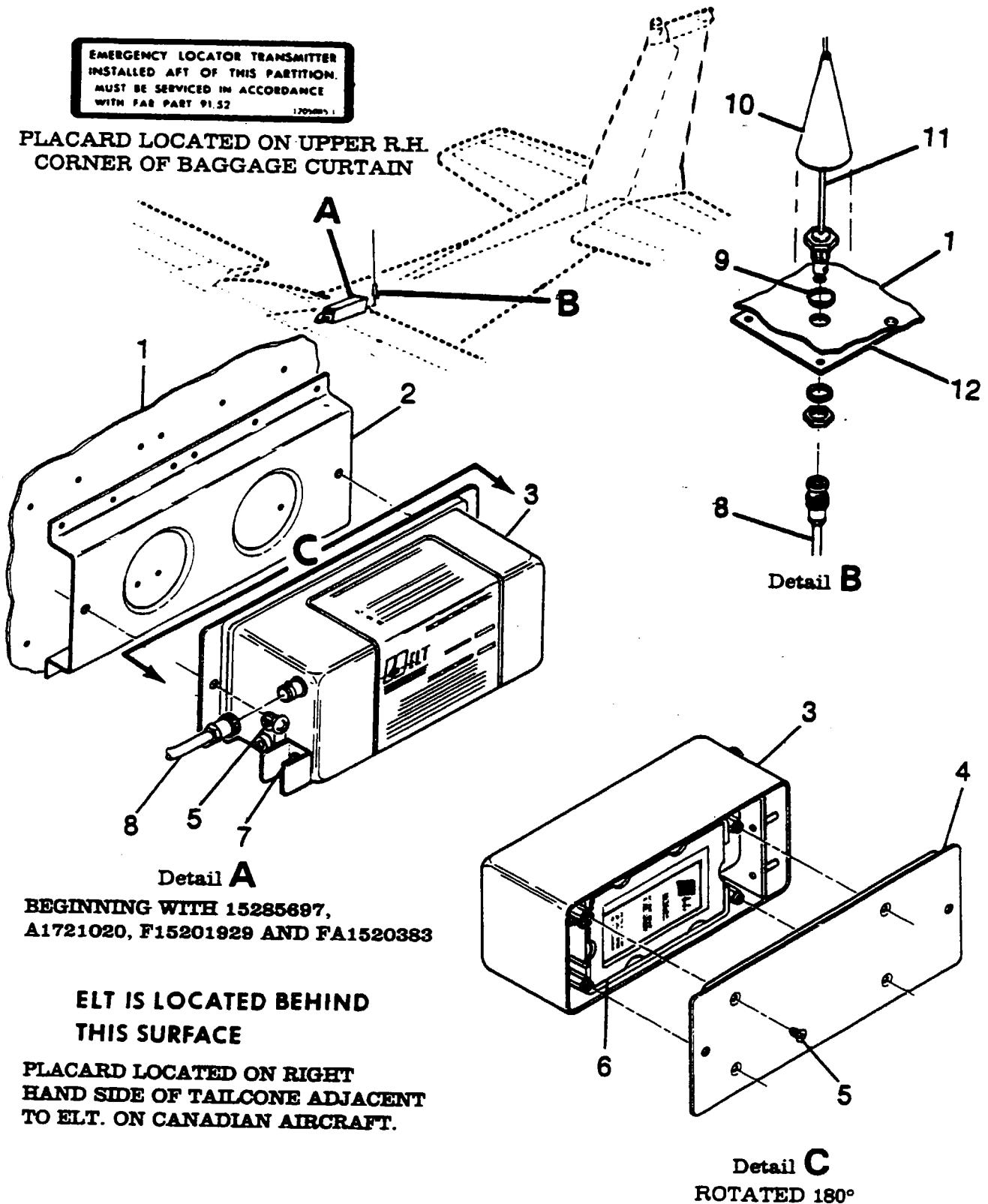


Figure 16-13. Emergency Locator Transmitter Installation (Sheet 3 of 3)

## MODEL 152 SERIES SERVICE MANUAL

### CAUTION

The C589511-0111 and C589511-0119 co-axial cable must be installed as indicated on the cable sleeve. Cable end marked "TO ANT" must be connected to the ELT antenna, and the end marked "TO ELT" must be connected to the C589511-0113/-0117 and C589511-0103/-0104 transmitters.

### NOTE

Upon reinstallation of antenna, cement rubber boot (10) using RTV102, General Electric Co. or equivalent adhesive, to antenna whip only; do not apply adhesive to fuselage skin or damage to paint may result.

## 16-96. REMOVAL AND INSTALLATION OF BATTERY PACK. (See figure 16-14).

### NOTE

Transmitters equipped with the C589511-0105 or C589511-0106 battery packs can only be replaced with C589511-0114 after modification by SK185-20 has been completed.

### CAUTION

Lithium battery pack must be replaced with alkaline battery pack per SK185-20.

### WARNING

Only Dorne and Margolin (D&M) ELT battery packs should be used as replacements in D&M ELTs. Use of inferior substitute battery packs could jeopardize crash victim's lives.

- a. After transmitter has been removed from aircraft in accordance with paragraph 16-95, place transmitter switch in the OFF position.
- b. Remove four screws attaching cover to case and then remove cover to gain access to battery pack.
- c. Disconnect battery pack electrical connector and remove battery pack.
- d. Place new battery pack in transmitter with four batteries in case as shown in figure 16-14.
- e. Connect electrical connector as shown in figure 16-14.

### NOTE

Before installing the battery pack, check to ensure that its voltage is 7.5 volts or greater.

- f. Replace the transmitter baseplate on the unit and pressing the baseplate and unit together attach baseplate with four Nylok patch screws.
- g. Stamp the new replacement date on outside of the ELT. The date should be noted on the switching nameplate on the side of unit as well as on instruction nameplate on top of unit.

### WARNING

The battery pack has pressurized contents. Do not recharge, short circuit, compact, or dispose of in fire.

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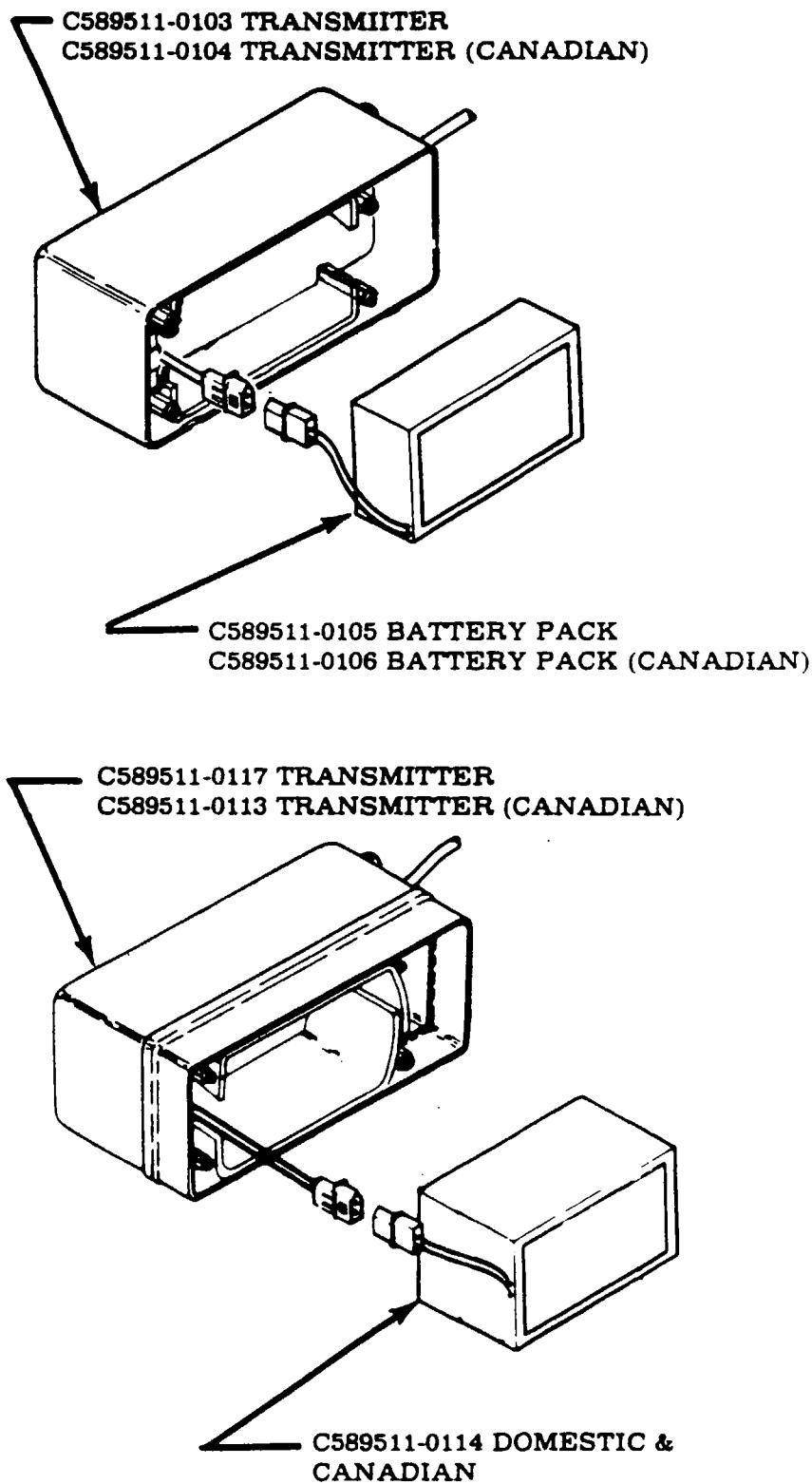


Figure 16-14. Battery Pack Installation

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### CAUTION

Be sure to enter the new battery-pack expiration date in the aircraft records. It is also recommended this date be placed in your ELT Owner's Manual for quick reference.

- 16-97. TROUBLE SHOOTING. Should your Emergency Locating Transmitter fail the 100 Hours performance checks, it is possible to a limited degree to isolate the fault to a particular area of the equipment. In performing the following trouble shooting procedures to test peak effective radiated power, you will be able to determine if battery replacement is necessary or if your unit should be returned to your dealer for repair.

TROUBLE	PROBABLE CAUSE	REMEDY
POWER LOW	Low battery voltage.	<ol style="list-style-type: none"><li>1. Set toggle switch to off.</li><li>2. Disconnect the battery-pack from the transmitter and connect a Simpson 260 model voltmeter and measure voltage. If the battery-pack transmitters is 7.5 volts or less, the battery-pack is below specification.</li></ol>
	Faulty transmitter.	<ol style="list-style-type: none"><li>3. If the battery-pack voltage meets the specifications in Step 2, the battery-pack is ok. If the battery is ok, check the transmitter as follows:<ol style="list-style-type: none"><li>a. Reconnect battery pack to the transmitter.</li><li>b. By means of E. F. Johnson 105-0303-001 jackplugs and 3 inch maximum long leads, connect a Simpson Model 1223 ammeter to the jack.</li><li>c. Set the toggle switch to AUTO and observe the ammeter current drain. If the current drain is in the 15-25 ma range, the transmitter or the co-axial cable is faulty.</li></ol></li></ol>
	Faulty co-axial antenna cable.	<ol style="list-style-type: none"><li>4. Check co-axial antenna cable for high resistance joints. If this is found to be the case, the cable should be replaced.</li></ol>

\*This test should be carried out with the co-axial cable provided with your unit.

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## ELECTRICAL LOAD ANALYSIS CHART ALL MODELS

STANDARD EQUIPMENT (Running Load)	AMPS REQD							
	1978	1979	1980	1981	1982	1983	1984	1985
Battery Contactor .....	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fuel Indicators .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Flashing Beacon Light .....	6.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0
Instrument Lights .....	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Position Lights .....	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Turn Coordinator .....	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
<b>OPTIONAL EQUIPMENT (Running Load)</b>								
Post Lights .....					0.6	0.6	0.6	0.6
Heated Pitot .....	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Strobe Lights .....	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0
Cessna 300 Nav/Com (RT-385A) .....					1.0*	1.0*	1.0*	1.0*
Cessna 300 ADF (Type R-546E) .....	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cessna 300 Transceiver (Type RT-385A) .....	1.0*	1.0*	1.0*	1.0*				
Cessna 300 Transponder (Type RT-359A) .....	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Cessna 300 N(C (ARC Type RT-328T) .....	0.5							
Cessna 400 Glide Slope (Type R-443B) (40-Channel) .....	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cessna 400 Marker Beacon (Type R-402A or R-402B) .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cessna 400 Encoding Altimeter (Type EA-401A) .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cessna 400 Transponder (RT-459A) .....	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Altitude Encoder (Blind) .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Turn & Bank Indicator .....	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Interphone System .....				†	†	†	†	†
Avionics Fan .....					1.0		0.6	1.0
<b>ITEMS NOT CONSIDERED PART OF RUNNING LOAD</b>								
Cigar Lighter .....	7.0	7.0	7.0	7.0				
Clock .....	†	†	†	†	†	†	†	†
Dome Light .....	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Flap Motor .....	8.5	8.5	8.5	8.5	8.5	8.5	8.5	1.8
Landing Lights (Cowl Mounted) .....	8.9	8.9	8.9	8.9	8.9	8.9	8.9	
Landing and Taxi Lights (Dual Cowl Mounted) .....	7.2	7.2	7.2	7.2	7.2	7.2	7.2	
Landing Light (Wing-Mounted) .....							8.9	8.9
Taxi Light (Wing-Mounted) .....							8.9	8.9
Map Light on Control Wheel .....	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Map Light on Door Post .....	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Standby Vacuum Pump .....							13.0	

† Negligible.

\* 2.3 AMPS for XMIT.

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## SECTION 17 STRUCTURAL REPAIR

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### 17-1. STRUCTURAL REPAIR.

17-2. REPAIR CRITERIA. Although this section outlines repair permissible on structure of the aircraft, the decision of whether to repair or replace a major unit of structure will be influenced by such factors as time and labor available, and by a comparison of labor costs with the price of replacement assemblies. Past experience indicates that replacement, in many cases, is less costly than major repair. Certainly, when the aircraft must be restored to its airworthy condition in a limited length of time, replacement is preferable. Restoration of a damaged aircraft to its original design strength, shape, and alignment involves careful evaluation of the damage, followed by exacting workmanship in performing the repairs. This section suggests the extent of structural repair practicable on the aircraft, and supplements Federal Aviation Regulation, Part 43. Consult the factory when in doubt about a repair not specifically mentioned here.

### 17-3. EQUIPMENT AND TOOLS.

17-4. SUPPORT STANDS. Padded, reinforced sawhorse or tripod type support stands, sturdy enough to support any assembly placed upon them, must be used to store a removed wing or tailcone. Plans for local fabrication of support stands are contained in figure 17-1. The fuselage assembly, from the tailcone to the firewall, must NOT be supported from the underside, since the skin bulkheads are not designed for this purpose. Adapt support stands to fasten to the wing attach points or landing gear attach points when supporting a fuselage.

17-5. FUSELAGE REPAIR JIGS. Whenever a repair is to be made which could affect structural alignment, suitable jigs must be used to assure correct alignment of major attach points, such as fuselage, firewall, wing and landing gear. These fuselage repair jigs are obtainable from the factory.

17-6. WING JIGS. These jigs serve as a holding fixture during extensive repair of a damaged wing, and locates the root rib, leading edge and tip rib of the wing. These jigs are also obtainable from the factory.

### 17-7. WING TWIST AND STABILIZER ANGLE-OF-INCIDENCE.

17-8. Wing twist (washout) and horizontal stabilizer angle of incidence are shown below. Stabilizers do not have twist. Wings have no twist from the root to the lift strut station. All twist in the wing panel occurs between this station and the tip rib. Refer to figure 17-2 for wing twist measurement.

WING  
Twist (Washout)      1°

STABILIZER  
Angle of Incidence      -3°

17-9. REPAIR MATERIALS. Thickness of a material on which a repair is to be made can easily be determined by measuring with a micrometer. In general, material used in Cessna aircraft covered in this manual is made from 2024 aluminum alloy, heat treated to a -T3, -T4, or -T42 condition. If the type of material cannot readily be determined, 2024-T3 may be used in making repairs, since the strength of -T3 is greater than -T4 or -T42 (-T4 and -T42 may be used interchangeably, but they may not be substituted for -T3). When necessary to form a part

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with a smaller bend radius than the standard cold bending radius for 2024-T4, use 2024-O and heat treat to 2024-T42 after forming. The repair material used in making a repair must equal the gauge of the material being replaced unless otherwise noted. It is often practical to cut repair pieces from service parts listed in the Parts Catalog. A few components (empennage tips, for example) are fabricated from thermo-formed plastic or glass-fiber constructed material.

- 17-10. **WING.**
- 17-11. **DESCRIPTION.** The wing assemblies are a semicantilever type employing semimonocoque type of structure. Basically, the internal structure consists of built-up front and rear spar assemblies, a formed auxiliary spar assembly and formed sheet metal nose, intermediate, and trailing edge ribs. Stressed skin, riveted to the rib and spar structures, completes the rigid structure. Access openings (hand holes with removable cover plates) are located in the underside of the wing between the wing root and tip section. These openings afford access to aileron bellcranks, flap bellcranks, electrical wiring, strut attach fittings, control cables and pulleys, and control disconnect points.
- 17-12. **WING SKIN.**
- 17-13. **NEGLIGIBLE DAMAGE.** Any smooth dents in the wing skin that are free from cracks, abrasions and sharp corners, which are not stress wrinkles and do not interfere with any internal structure or mechanism, may be considered as negligible damage. In areas of low stress intensity, cracks, deep scratches, or deep, sharp dents, which after trimming or stop-drilling can be enclosed by a two-inch circle, can be considered negligible if the damage area is at least one diameter of the enclosing circle away from all existing rivet lines and material edges. Stop drilling is considered a temporary repair and a permanent repair must be made as soon as practicable.
- 17-14. **REPAIRABLE DAMAGE.** Figure 17-4 outlines typical repair to be employed in patching skin. Before installing a patch, trim the damaged area to form a rectangular pattern, leaving at least a one-half inch radius at each corner, and de-burr. The sides of the hole should lie span-wise or chord-wise. A circular patch may also be used. If the patch is in an area where flush rivets are used, make a flush patch type of repair; if in an area where flush rivets are not used, make an overlapping type of repair. Where optimum appearance and airflow are desired, the flush patch may be used. Careful workmanship will eliminate gaps at butt-joints; however, an epoxy type filler may be used at such joints.
- 17-15. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** If a skin is badly damaged, repair must be made by replacing an entire skin panel, from one structural member to the next. Repair seams must be made to lie along structural members and each seam must be made exactly the same in regard to rivet size, spacing and pattern as the manufactured seams at the edges of the original sheet. If the manufactured seams are different, the stronger must be copied. If the repair ends at a structural member where no seam is used, enough repair panel must be used to allow an extra row of staggered rivets, with sufficient edge margin, to be installed.
- 17-16. **WING STRINGERS.**
- 17-17. **NEGLIGIBLE DAMAGE.** (Refer to paragraph 17-13.)
- 17-18. **REPAIRABLE DAMAGE.** Figure 17-5 outlines a typical wing stringer repair. Two such repairs may be used to splice a new section of stringer material in position, without the filler material.

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- 17-19. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If a stringer is so badly damaged that more than one section must be spliced, replacement is recommended.
- 17-20. WING AUXILIARY SPARS.
- 17-21. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)
- 17-22. REPAIRABLE DAMAGE. Figure 17-8 illustrates a typical auxiliary spar repair.
- 17-23. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If damage to an auxiliary spar would require a repair which could not be made between adjacent ribs, the auxiliary spar must be replaced.
- 17-24. WING RIBS.
- 17-25. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)
- 17-26. REPAIRABLE DAMAGE. Figure 17-8 illustrates a typical wing rib repair.
- 17-27. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Leading and trailing edge ribs that are extensively damaged can be replaced. However, due to the necessity of unfastening an excessive amount of skin in order to replace the rib, they should be repaired if practicable. Center ribs, between the front and rear spar should always be repaired if practicable.
- 17-28. WING SPARS.
- 17-29. NEGLIGIBLE DAMAGE. Due to the stress which wing spars encounter, very little damage can be considered negligible. All cracks, stress wrinkles, deep scratches, and sharp dents must be repaired. Smooth dents, light scratches and abrasions may be considered negligible.
- 17-30. REPAIRABLE DAMAGE. Figure 17-7, illustrates typical spar repairs. It is often practical to cut repair pieces from service parts listed in the Parts Catalog. Service Kits are available for certain types of spar repairs.
- 17-31. DAMAGE NECESSITATING REPLACEMENT OF PARTS. Damage so extensive that repair is not practicable requires replacement of a complete wing spar. Also refer to paragraph 17-2.
- 17-32. AILERONS.
- 17-33. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)
- 17-34. REPAIRABLE DAMAGE. The repair shown in figure 17-9 may be used to repair damage to aileron leading edge skins. Figure 17-4 may be used to repair damage to flat surface between corrugations, when damaged area includes corrugations refer to figure 17-13A. It is recommended that material used for repair be cut from spare parts of the same gauge and corrugation spacing. Following repair the aileron must be balanced. Refer to paragraph 17-36 and figure 17-3 for balancing the aileron. If damage would require a repair which could not be made between adjacent ribs, see the following paragraph.
- 17-35. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If the damage would require a repair which could not be made between adjacent ribs, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where extensive damage has occurred, replacement of the aileron assembly is recommended. After repair and/or replacement, balance aileron in accordance with paragraph 17-36 and figure 17-3.

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### 17-33A. CRACKS IN CORRUGATED AILERON SKINS (Continued from page 17-4)

1. It is permissible to stop drill crack(s) that originate at the trailing edge of the control surface provided the crack is not more than 2 inches in length.
2. Stop drill crack using a #30 (.128 inch) drill.
3. A crack may only be stop drilled once.

**NOTE:** A crack that passes through a trailing edge rivet and does not extend to the trailing edge of the skin may be stop drilled at both ends of the crack.

4. Any control surface that has a crack that progresses past a stop drilled hole shall be repaired. Refer to paragraphs 17-33, -34, and -35 as applicable for repair information.
5. A control surface that has any of the following conditions shall have a repair made as soon as practicable:
  - A. A crack that is longer than 2 inches.
  - B. A crack that does not originate from the trailing edge or a trailing edge rivet.
  - C. Cracks in more than six trailing edge rivet locations per skin.

Refer to paragraphs 17-33, -34, and -35 as applicable for repair information.

6. Affected control surfaces with corrugated skins and having a stop drilled crack that does not extend past the stop drilled hole, may remain in service without additional repair.

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repair and/or replacement, balance aileron in accordance with paragraph 17-36 and figure 17-3.

- 17-36. **AILERON BALANCING.** Following repair, replacement or painting, the aileron must be balanced. A flight control surface balancing kit is available (P/N 5180002-1). See figure 17-3 for procedures pertaining to the use of this kit.
- 17-37. **WING FLAPS.**
- 17-38. **NEGLIGIBLE DAMAGE.** (Refer to paragraph 17-13.)
- 17-39. **REPAIRABLE DAMAGE.** Flap repairs should be similar to aileron repairs discussed in paragraph 17-34. A flap leading edge repair is shown in figure 17-10. If an overlapping patch is to be used, be sure it will not interfere with the wing during flap operation.
- 17-40. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** Flap repairs which require replacement of parts should be similar to aileron repairs discussed in paragraph 17-35. Since the flap is not considered a movable control surface, no balancing is required.
- 17-41. **WING LEADING EDGE.**
- 17-42. **NEGLIGIBLE DAMAGE.** (Refer to paragraph 17-13.)
- 17-43. **REPAIRABLE DAMAGE.** A typical leading edge skin repair is shown in figure 17-9. An epoxy-type filler may be used to fill gaps at butt-joints. To facilitate repair, extra access holes may be installed in locations noted in figure 17-11. If the damage would require a repair which could not be made between adjacent ribs, refer to the following paragraph.
- 17-44. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** For extensive damage, complete leading edge skin panels must be replaced. To facilitate replacement, extra access holes may be installed in the locations noted in figure 17-11.
- 17-45. **ELEVATORS AND RUDDER.**
- 17-46. **NEGLIGIBLE DAMAGE.** Refer to paragraph 17-13. The exception to negligible damage on the elevator surfaces is the front spar, where a crack appearing in the web at the hinge fittings or in the structure which supports the overhanging balance weight is not considered negligible. Cracks in the overhanging tip rib, in the area at the front spar intersection with the web of the rib, also cannot be considered negligible.
- 17-47. **REPAIRABLE DAMAGE.** Skin patches illustrated in figure 17-4 may be used to repair skin damage between corrugations. For skin damage which includes corrugations, refer to figure 17-4. Following repair, the elevator/rudder must be balanced. Refer to figure 17-3 for balancing. If damage would require a repair which could not be made between adjacent ribs, see the following paragraph.
- 17-48. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** If the damaged area would require a repair which could not be made between adjacent ribs, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where extensive damage has occurred, replacement of the entire assembly is recommended. After repair and/or replacement, balance elevators and rudder in accordance with paragraph 17-49 and figure 17-3.
- 17-49. **ELEVATOR AND RUDDER BALANCING.** Following repair, replacement or painting, the

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### 17-38A. CRACKS IN CORRUGATED FLAP SKINS (Continued from page 17-5)

1. It is permissible to stop drill crack(s) that originate at the trailing edge of the control surface provided the crack is not more than 2 inches in length.
2. Stop drill crack using a #30 (.128 inch) drill.
3. A crack may only be stop drilled once.

**NOTE:** A crack that passes through a trailing edge rivet and does not extend to the trailing edge of the skin may be stop drilled at both ends of the crack.

4. Any control surface that has a crack that progresses past a stop drilled hole shall be repaired. Refer to paragraphs 17-38, -39, and -40 as applicable for repair information.
5. A control surface that has any of the following conditions shall have a repair made as soon as practicable:
  - A. A crack that is longer than 2 inches.
  - B. A crack that does not originate from the trailing edge or a trailing edge rivet.
  - C. Cracks in more than six trailing edge rivet locations per skin.

Refer to paragraphs 17-38, -39, and -40 as applicable for repair information.

6. Affected control surfaces with corrugated skins and having a stop drilled crack that does not extend past the stop drilled hole, may remain in service without additional repair.

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elevators and rudder must be balanced. A flight control surface balancing kit is available (P/N 5180002-1). See figure 17-3 for procedures pertaining to the use of this kit.

- 17-50. FIN AND STABILIZER.
- 17-51. NEGLIGIBLE DAMAGE. (Refer to paragraph 17-13.)
- 17-52. REPAIRABLE DAMAGE. Skin patches illustrated in figure 17-4 may be used to repair skin damage. Access to the dorsal area of the fin may be gained by removing the horizontal closing rib at the bottom of the fin. Access to the internal fin structure is best gained by removing skin attaching rivets on one side of the rear spar and ribs, and springing back the skin. Access to the stabilizer structure may be gained by removing skin attaching rivets on one side of the rear spar and ribs, and springing back the skin. If the damaged area would require a repair which could not be made between adjacent ribs, or a repair would be located in an area with compound curves, see the following paragraph.
- 17-53. DAMAGE NECESSITATING REPLACEMENT OF PARTS. If the damaged area would require a repair which could not be made between adjacent ribs, or the repair would be located in an area with compound curves, complete skin panels must be replaced. Ribs and spars may be repaired, but replacement is generally preferable. Where damage is extensive, replacement of the entire assembly is recommended.
- 17-54. FUSELAGE.
- 17-55. DESCRIPTION. The fuselage is of semimonocoque construction, consisting of formed bulkheads, longitudinal stringers, reinforcing channels, and skin panels.
- 17-56. NEGLIGIBLE DAMAGE. Refer to paragraph 17-13. Mild corrosion appearing upon alclad surfaces does not necessarily indicate incipient failure of the base metal. However, corrosion of all types must be carefully considered, and approved remedial action taken. Small cans appear in the skin structure of all metal aircraft. It is strongly recommended however, that wrinkles which appear to have originated from other sources, or which do not follow the general appearance of the remainder of the skin panels, be thoroughly investigated. Except in the landing gear bulkhead areas, wrinkles occurring over stringers which disappear when the rivet pattern is removed, may be considered negligible. However, the stringer rivet holes may not align perfectly with the skin holes because of a permanent "set" in the stringer. If this is apparent, replacement of the stringer will usually restore the original strength characteristics of the area.

### NOTE

Wrinkles occurring in the skin of the main landing gear bulkhead areas must not be considered negligible. The skin panel must be opened sufficiently to permit thorough examination of the lower portion of the landing gear bulkhead and its tie-in structure.

Wrinkles occurring in open areas which disappear when the rivets at the edge of the sheet are removed, or a wrinkle which is hand removable, may often be repaired by the addition of a  $1\frac{1}{2} \times 1\frac{1}{2} \times .060$  inch 2024-T4 extruded angle, riveted over the wrinkle and extended to within  $\frac{1}{16}$  to  $\frac{1}{8}$  inch of the nearest structural members. Rivet pattern should be identical to existing manufactured seam at edge of sheet. Negligible damage to stringers, formed skin flanges, bulkhead channels, and like parts is similar to that for the wing skin, given in paragraph 17-13.

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- 17-57. **REPAIRABLE DAMAGE.** Fuselage skin repairs may be accomplished in the same manner as wing skin repairs outlined in paragraph 17-14. Stringers, formed skin flanges, bulkhead channels and similar parts may be repaired as shown in figure 17-5.
- 17-58. **DAMAGE NECESSITATING REPLACEMENT OF PARTS.** Fuselage skin major repairs may be accomplished in the same manner as the wing repairs outlined in paragraph 17-15. Damaged fittings must be replaced. Seat rails serve as structural parts of the fuselage and must be replaced if damaged.
- 17-59. **BONDED DOORS.**
- 17-60. **REPAIRABLE DAMAGE.** Bonded doors may be repaired by the same methods used for riveted structure. Rivets are a satisfactory substitute for bonded seams on these assemblies. The strength of the bonded seams in doors may be replaced by a single 3/32, 2117-AD rivet per running inch of bond seam. The standard repair procedures outlined in AC43.13-1 are also applicable to bonded doors.
- 17-61. **BULKHEADS.**
- 17-62. **LANDING GEAR BULKHEADS.** Since these bulkheads are highly stressed members, irregularly formed to provide clearance for control cables, fuel lines, etc., the patch-type repairs will be, for the most part, impractical. Minor damage, consisting of small nicks or scratches, may be repaired by dressing out the damaged area, or by replacement of rivets. Any other damage must be repaired by replacing the landing gear support assembly as an aligned unit.
- 17-63. **REPAIR AFTER HARD LANDING.** Buckled skin or floorboards, and loose or sheared rivets in the area of the main gear support will give evidence of damage to the structure from an extremely hard landing. When such evidence is present, the entire support structure must be examined, and all support forgings must be checked for cracks, using a dye penetrant and proper magnification. Bulkheads in the damaged area must be checked for alignment, and deformation of the bulkhead webs must be determined with the aid of a straightedge. Damaged support structure, buckled floorboards and skins, and damaged or questionable forgings must be replaced.
- 17-64. **FIREWALL DAMAGE.** Firewall sheets may be repaired by removing the damaged material (.018-inch Aluminized iron sheet or 301, 302, 321 or 347 stainless steel), and splicing in a new section. The new portion must be lapped over the old material, sealed with Pro-Seal No. 700 (Coast Pro-Seal Co., Chemical Division, 2235 Beverly Blvd., Los Angeles, California), compound or equivalent, and secured with steel (MS20450) rivets. The firewall is attached to the firewall with MS20470 rivets. Nutplates are attached to the firewall with MS20426 rivets.
- 17-65. **FASTENERS.** Fasteners used in the aircraft are generally solid aluminum rivets, blind rivets, and steel-threaded fasteners. Usage of each is primarily a function of the loads to be carried, accessibility, and frequency of removal. Rivets used in aircraft construction are usually fabricated from aluminum alloys. In special cases, monel, corrosion-resistant steel and mild steel, copper, and iron rivets are used.

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17-65A. RIVETS. Standard solid-shank MS rivets are those generally used in aircraft construction. They are fabricated in the following head types: roundhead, flathead, countersunk head, and brazier head. Flathead rivets are generally used in the aircraft interior where head clearance is required. MS20426 countersunk head rivets are used on the exterior surfaces of the aircraft to minimize turbulent airflow. MS20470 brazier head rivets are used on the exterior surfaces of the aircraft where strength requirements necessitate a stronger rivet head than that of the countersunk head rivet. Both the brazier head and the countersunk head rivets are used on the exterior of the aircraft where head clearance is required. Hi-shear rivets are special, patented rivets having a hi-shear strength equivalent to that of standard AN bolts. They are used in special cases in locations where hi-shear loads are present, such as in spars, wings, and in heavy bulkhead ribs. This rivet consists of a cadmium-plated pin of alloy steel. Some have a collar of aluminum alloy. Some of these rivets can be readily identified by the presence of the attached collar in place of the formed head on standard rivets. Blind rivets are used, where strength requirements permit, where one side of the structure is inaccessible, making it impossible or impractical to drive standard solid-shank rivets.

17-65B. REPLACEMENT OF HI-SHEAR RIVETS. Replacement of hi-shear rivets with close-tolerance bolts or other commercial fasteners of equivalent strength properties is permissible. Holes must not be elongated, and the hi-shear substitute must be a smooth, push-fit. Field replacement of main landing gear forgings on bulkheads may be accomplished by using the following fasteners.

- a. NAS484P-\* bolt, MS21042-\* nut and AN960-\* washer in place of Hi-shear rivets for forgings with machined flat surfaces around attachment holes.
- b. NAS484P-\* bolt, ESNA2935-\* mating base washer and ESNA RM52LH2935-\* self-aligning nut for forgings (with draft angle of up to a maximum of 8°) without machined flat surfaces around attachment holes.

\*Dash numbers to be determined according to the size of the holes and the grip lengths required. Bolt grip length should be chosen so that no threads remain in the bearing area.

### 17-65C. SUBSTITUTION OF RIVETS.

- a. Solid-shank rivets (MS20426AD and MS20470AD). When placing rivets in installations which require raised head rivets, it is desirable to use rivets identical to the type of rivet removed. Countersunk-head rivets (MS20426) are to be replaced by rivets of the same type and degree of countersink. When rivet holes become enlarged, deformed, or otherwise damaged, use the next larger size rivet as a replacement. Replacement shall not be made with rivets of lower strength material.
- b. Hi-shear Rivets. When hi-shear rivets are not available, replacement of sizes 3/16-inch or greater rivets shall be made with bolts of equal or greater strength than the rivet being replaced, and with self-locking nuts of the same diameter
- c. The following pages contain approved solid-shank and hi-shear rivet substitutions.

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Replace	In thickness (or thicker)	With
MS20470AD3	.025 .020	NAS1398B4, NAS1398D4 NAS1738B4, NAS1738D4, NAS1768D4, CR3213-4, CR3243-4
MS20470AD4	.050 .040 .032 .025	NAS1398B4, NAS1398D4 NAS1398B5, NAS1398D5, NAS1738B4, NAS1738E4, NAS1768D4, CR3213-4 NAS1738B5, NAS1738E5, NAS1768D5, CR3213-5, CR3243-4 CR3243-5
MS20470AD5	.063 .050 .040 .032	NAS1398B5, NAS1398D5 NAS1398B6, NAS1398D6, NAS1398B5, NAS1738E5, CR3213-5 NAS1738B6, NAS1738E6, NAS1768D5, CR3213-6, CR3243-5 CR3243-6
MS20470AD6	.080 .071 .063 .050	NAS1398B6 NAS1398D6 NAS1738B6, NAS1738D6, NAS1768D6, CR3213-6 CR3243-6
MS20426AD3 (Countersunk)	.063 .040	NAS1399B4, NAS1399D4 NAS1769D4, CR3212-4
(See Note 1)	.025	NAS1769B4, NAS1739E4, CR3242-4
MS20426AD4 (Countersunk)	.080 .063 .050 .040	NAS1399B4, NAS1399D4 NAS1739B4, NAS1739D4, CR3212-4 NAS1769D4 CR3242-4
(See Note 1)	.050 .040 .032	CR3212-5 NAS1739B5, NAS1739D5, NAS1769D4 CR3242-5
MS20426AD4 (Dimpled)	.063	NAS1739B4, NAS1739D4

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Replace	In thickness (or thicker)	With
MS20426AD5 (Countersunk)	.090	NAS1399B5, NAS1399D5
	.080	CR3212-5
	.071	NAS1739B5, NAS1739E5
	.063	NAS1769D5
	.050	CR3242-5
(See Note 1)	.063	NAS1739B6, NAS1739D6, NAS1769D6, CR3212-6
	.040	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD5 (Dimpled)	.071	NAS1739B5, NAS1739D5
MS20426AD6 (Countersunk)	.090	NAS1739B6, NAS1739D6, CR3212-6
	.071	NAS1769D6
	.063	CR3242-6
	.032	AN509-10 Screw with MS20365 Nut
MS20426AD6 (Dimpled)	.090	NAS1739B6, NAS1739D6
	.032	AN509-10 Screw with MS20365 Nut

NOTE 1: Rework required. Countersink oversize to accommodate oversize rivet.

NOTE 2: Do not use blind rivets in high-vibration areas or to pull heavy sheets or extrusions together.  
 High vibration areas include the nacelle or engine compartment including the firewall. Heavy  
 sheets or extrusions include spar caps..

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REPLACE		DIAMETER	WITH	
Fastener	Collar		Fastener	Collar
● NAS178	NAS179	(See Note 1) (See Note 1)  (See Note 1) (See Notes 1 and 2) (See Note 1) (See Note 1)	● NAS1054 ● NAS14XX  ● NAS529 ★ NAS1446 ★ NAS7034 □ NAS464 □ NAS1103 □ NAS1303 □ NAS6203 □ AN173	NAS179, NAS528 NAS1080C, NAS1080E, NAS1080G  NAS524A NAS1080C, NAS1080A6 NAS1080K AN364, MS20364, MS21042  AN305, MS20305, MS21044, MS21045
● NAS1054	NAS179, NAS528	(See Note 2)	● NAS14XX ● NAS529 ★ NAS1446 ★ NAS7034 □ NAS464 □ NAS1103 □ NAS1305 □ NAS6203	NAS1080C, NAS1080E NAS524A NAS1080C, NAS1080A6 NAS1080K AN364, MS20304, MS21042
● NAS14XX	NAS1080C NAS1080E NAS1080G		● NAS529 ★ NAS1446 ★ NAS7034 □ NAS464 □ NAS1103 □ NAS1303 □ NAS6203	NAS524A NAS1080C, NAS1080A6 NAS1080K AN364, MS20364, MS21042
● NAS529	NAS524A	(See Note 3)	□ NAS1446	NAS1080C, NAS1080A6

NOTE 1: See appropriate tables for nominal diameters available.

NOTE 2: Available in oversize for repair of elongated holes. Ream holes to provide a .001 inch interference fit.

NOTE 3: NAS1446 oversize only permitted as a replacement for NAS529.

- Steel shank fastener designed for drive-on collars.
- ★ Steel shank fastener designed for squeeze-on collars. Installation requires sufficient space for the tool and extended shank of the fastener.
- Threaded fastener.

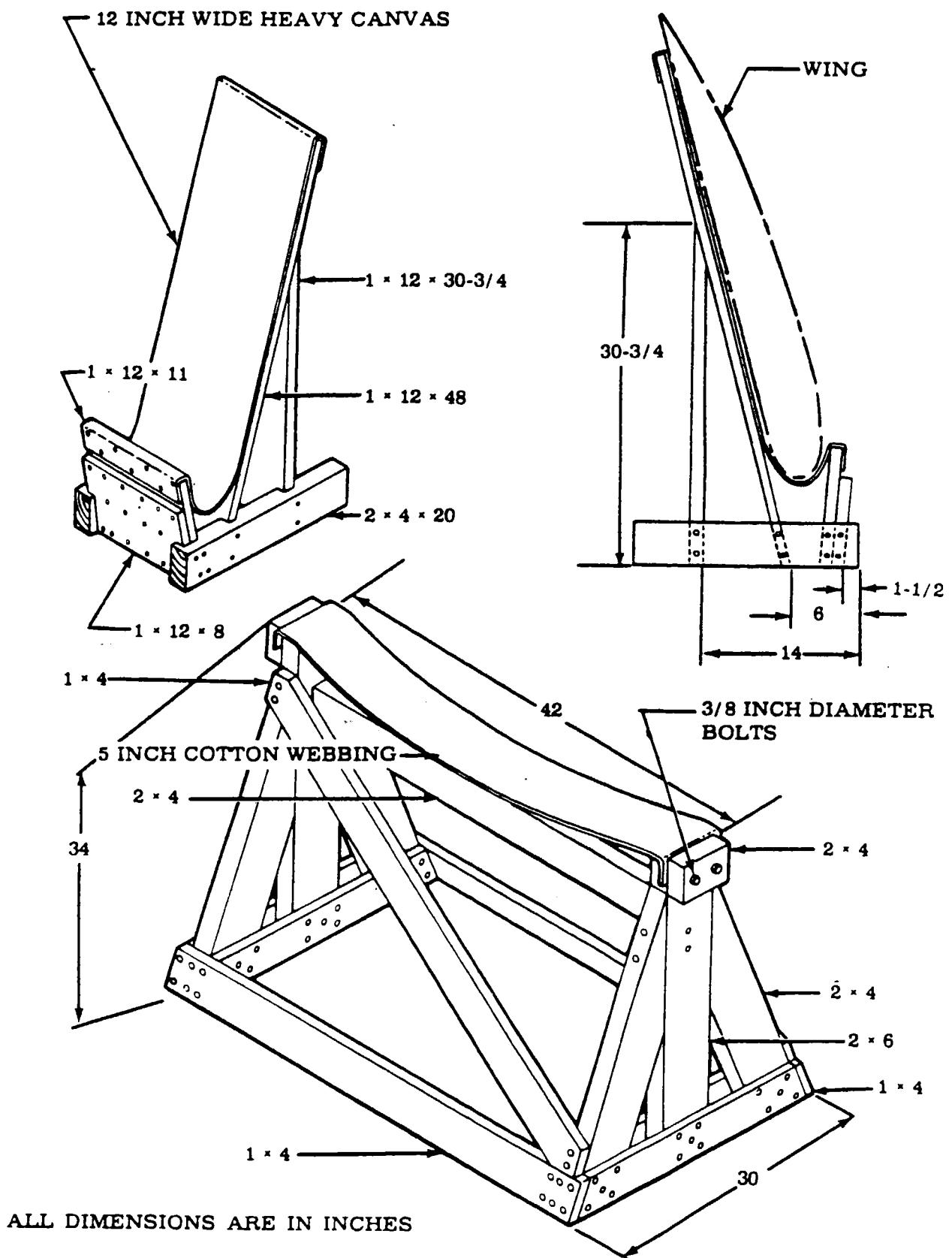
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- 17-66. **ENGINE MOUNT.**
- 17-67. **DESCRIPTION.** The "dynafocal" type engine mount is constructed of chrome-molybdenum steel tubing. The nose gear shock strut is secured to the tubular engine mount. Refer to Section 18 of this manual for engine mount painting procedures following repair.
- 17-68. **GENERAL CONSIDERATIONS.** All welding on the engine mount must be of the highest quality since the tendency of vibration is to accentuate any minor defect present and cause fatigue cracks. Engine mount members are preferably repaired by using a larger diameter replacement tube, telescoped over the stub of the original member using fishmouth and rosette-type welds. However, reinforced 30-degree scarf welds in place of the fishmouth welds are considered satisfactory for engine mount work. Refer to Section 18 for engine mount painting.
- 17-69. **ENGINE MOUNT RADIAL SUPPORT DAMAGE.** Minor damage such as a crack adjacent to an engine attaching lug may be repaired by rewelding the support tube and extending a gusset past the damaged area. Extensively damaged parts must be replaced.
- 17-70. **DAMAGE INVOLVING ENGINE MOUNTING LUGS AND ENGINE MOUNT TO FUSELAGE ATTACHING FITTINGS.** Engine mounting lugs and engine mount-to-fuselage attaching fittings should not be repaired but must be replaced.
- 17-71. **BAFFLES.** Baffles ordinarily require replacement if damaged or cracked. However, small plate reinforcements riveted to the baffle will often prove satisfactory both to the strength and cooling requirements of the unit.
- 17-72. **ENGINE COWLING.**
- 17-73. **REPAIR OF COWLING SKINS.** If extensively damaged, complete sections of cowling must be replaced. Standard insert-type skin patches, however, may be used if repair parts are formed to fit. Small cracks may be stop-drilled and dents straightened if they are reinforced on the inner side with a doubler of the same material. Bonded cowling may be repaired by the same methods used for riveted structure. Rivets are a satisfactory substitute for bonded seams on these assemblies. The strength of the bonded seams in cowling may be replaced by a single 3/32, 2117-AD rivet per running inch of bond seam. The standard repair procedures outlined in AC43.13-1 are also applicable to cowling.
- 17-74. **REPAIR OF REINFORCEMENT ANGLES.** Cow reinforcement angles, if damaged, must be replaced. Due to their small size, they are easier to replace than to repair.
- 17-75. **REPAIR OF GLASS-FIBER CONSTRUCTED COMPONENTS.** Glass-fiber constructed components on the aircraft may be repaired as stipulated in instructions furnished in Service Kit SK182-12. Observe the resin manufacturer's recommendations concerning mixing and application of the resin. Epoxy resins are preferable for making repairs, since epoxy compounds are usually more stable and predictable than polyester and, in addition, give better adhesion. In addition, repair kits are also available for the repair of cracks in ABS, PBC, PVPC, graphite and fiberglass material. These kits P/N's 51543 thru 51548, are available from Cessna Supply Division.
- 17-76. **CORROSION AND CORROSION CONTROL.**

### NOTE

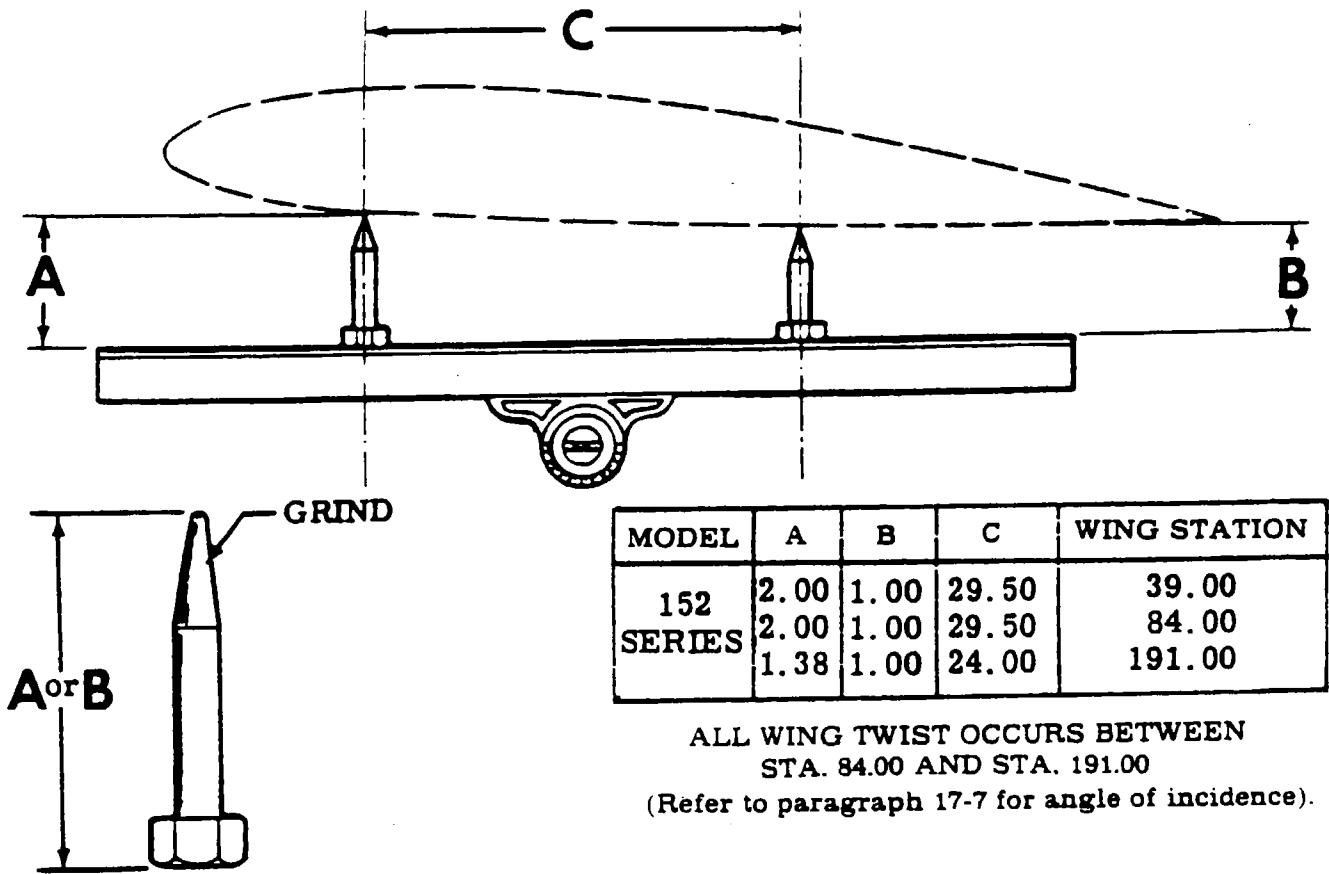
For information on corrosion and corrosion control for aircraft, refer to FAA Advisory Circular AC43-4.

# MODEL 152 SERIES SERVICE MANUAL



**Figure 17-1.Wing and Fuselage Support Stands**

## MODEL 152 SERIES SERVICE MANUAL



### MEASURING WING TWIST

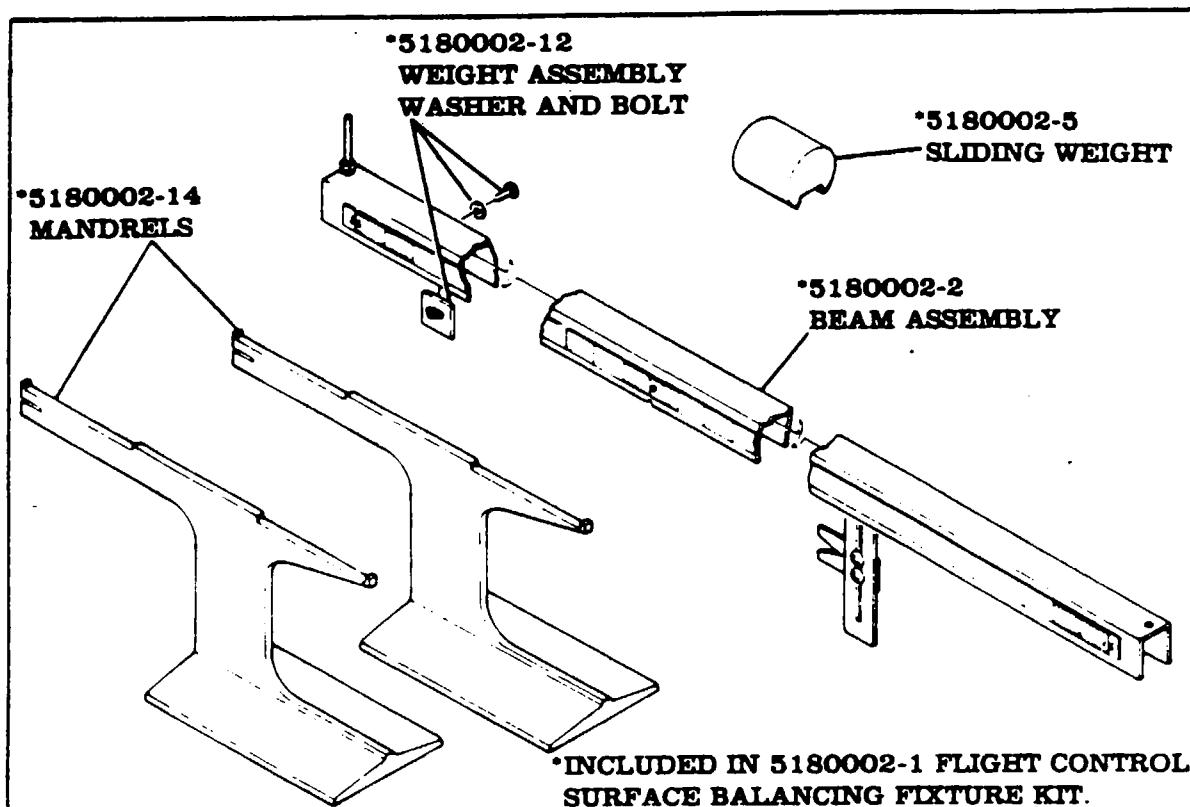
If damage has occurred to a wing, it is advisable to check the twist. The following method can be used with a minimum of equipment, which includes a straightedge (32" minimum length of angle or equivalent), three modified bolts for a specific wing, and a protractor head with level.

1. Check chart for applicable dimension for bolt length (A or B).
2. Grind bolt shanks to a rounded point as illustrated, checking length periodically.
3. Tape two bolts to straightedge according to dimension C.
4. Locate inboard wing station to be checked and make a pencil mark approximately one-half inch aft of the lateral row of rivets in the wing leading edge spar flange.
5. Holding straightedge parallel to wing station (staying as clear as possible from "cans"), place longer bolt on pencil mark and set protractor head against lower edge of straightedge.
6. Set bubble in level to center and lock protractor to hold this reading.
7. Omitting step 6, repeat procedure for each wing station, using dimensions specified in chart. Check to see that protractor bubble is still centered.
8. Proper twist is present in wing if protractor readings are the same (parallel). Forward or aft bolt may be lowered from wing .10 inch maximum to attain parallelism.

Figure 17-2. Checking Wing Twist

# MODEL 152 SERIES SERVICE MANUAL

## FLIGHT CONTROL SURFACE BALANCING FIXTURE KIT (PART NUMBER 5180002-1)



### GENERAL NOTES

1. Balance control surfaces in a draft-free area.
2. Place hinge bolts through control surface hinges and position on knife edge balancing mandrels. Be sure hinge bolt shank rests on knife edge.
3. Make sure all control surfaces are in their approved flight configurations: painted (if applicable), trim tabs installed, all foreign matter removed from inside of control surface, elevator trim tab push-pull rod installed and all tips installed.
4. Place balancing mandrels on a table or other suitable flat surface.
5. Adjust trailing edge support to fit control surface being balanced while center of balancing beam is directly over hinge line. Remove balancing beam and balance the beam itself by moving the adjustable weight (fastened by bolt and washer). Fine balance may be accomplished by use of washers at long screw on end of beam.
6. When positioning balancing beam on control surface, avoid rivets to provide a smooth surface for the beam and keep the beam 90° to the hinge line of the control surface.

Figure 17-3. Control Surface Balancing (Sheet 1 of 5)

## MODEL 152 SERIES SERVICE MANUAL

7. Paint is a considerable weight factor. In order to keep balance weight to a minimum, it is recommended that existing paint be removed before adding paint to a control surface. Increase in balance weight will also be limited by the amount of space available and clearance with adjacent parts. Good workmanship and standard repair practices should not result in unreasonable balance weight.
8. The approximate amount of weight needed may be determined by taping loose weight at the balance weight area.
9. Lighten balance weight by drilling off part of weight.
10. Make balance weight heavier by fusing bar stock solder to weight after removal from control surface. The ailerons should have balance weight increased by ordering additional weight and gang channel, listed in applicable Parts Catalog and installing next to existing inboard weight the minimum length necessary for correct balance. If necessary, lighten new weight or existing weights for correct balance.

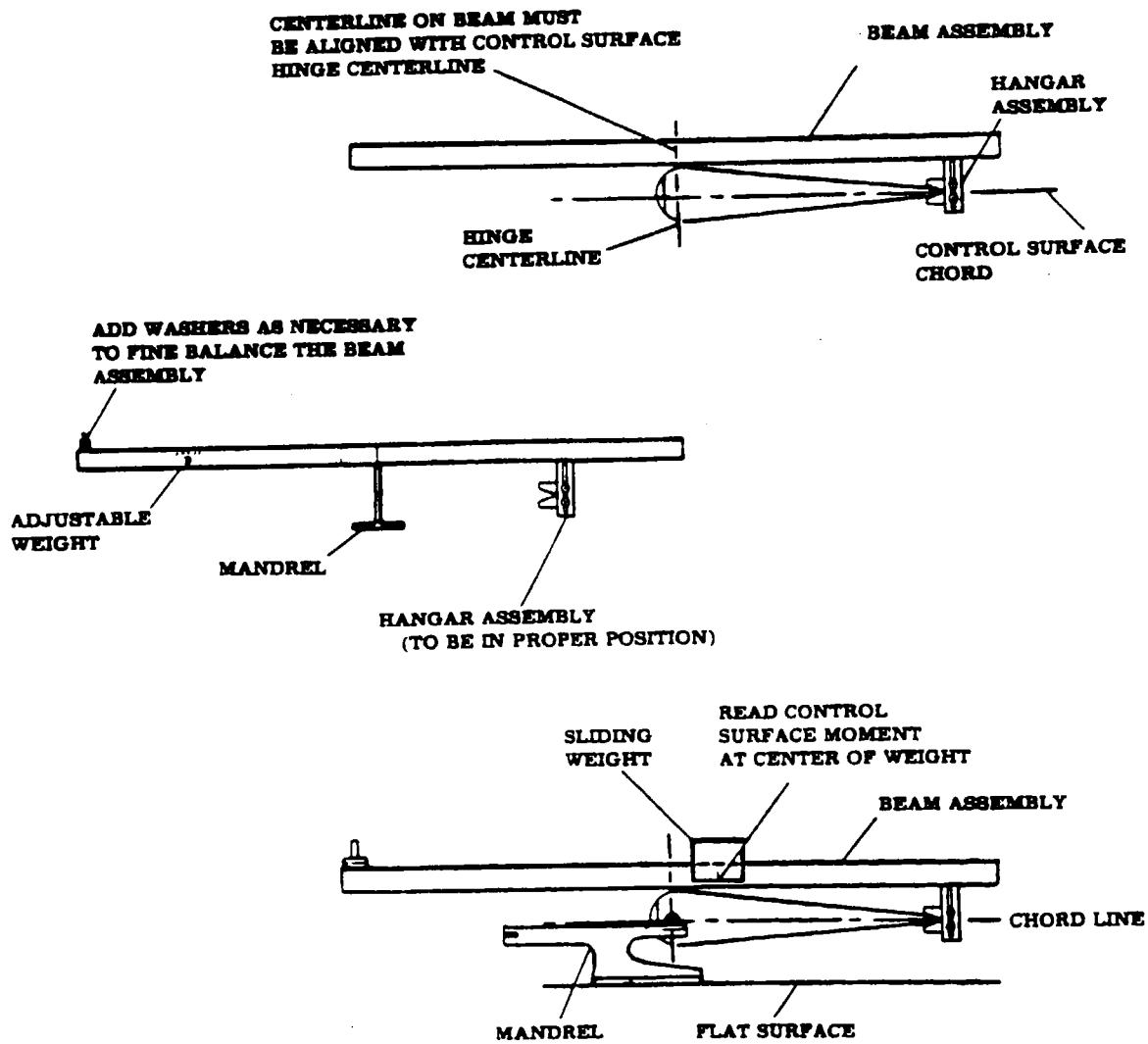


Figure 17-3. Control Surface Balancing (Sheet 2 of 5)

## MODEL 152 SERIES SERVICE MANUAL

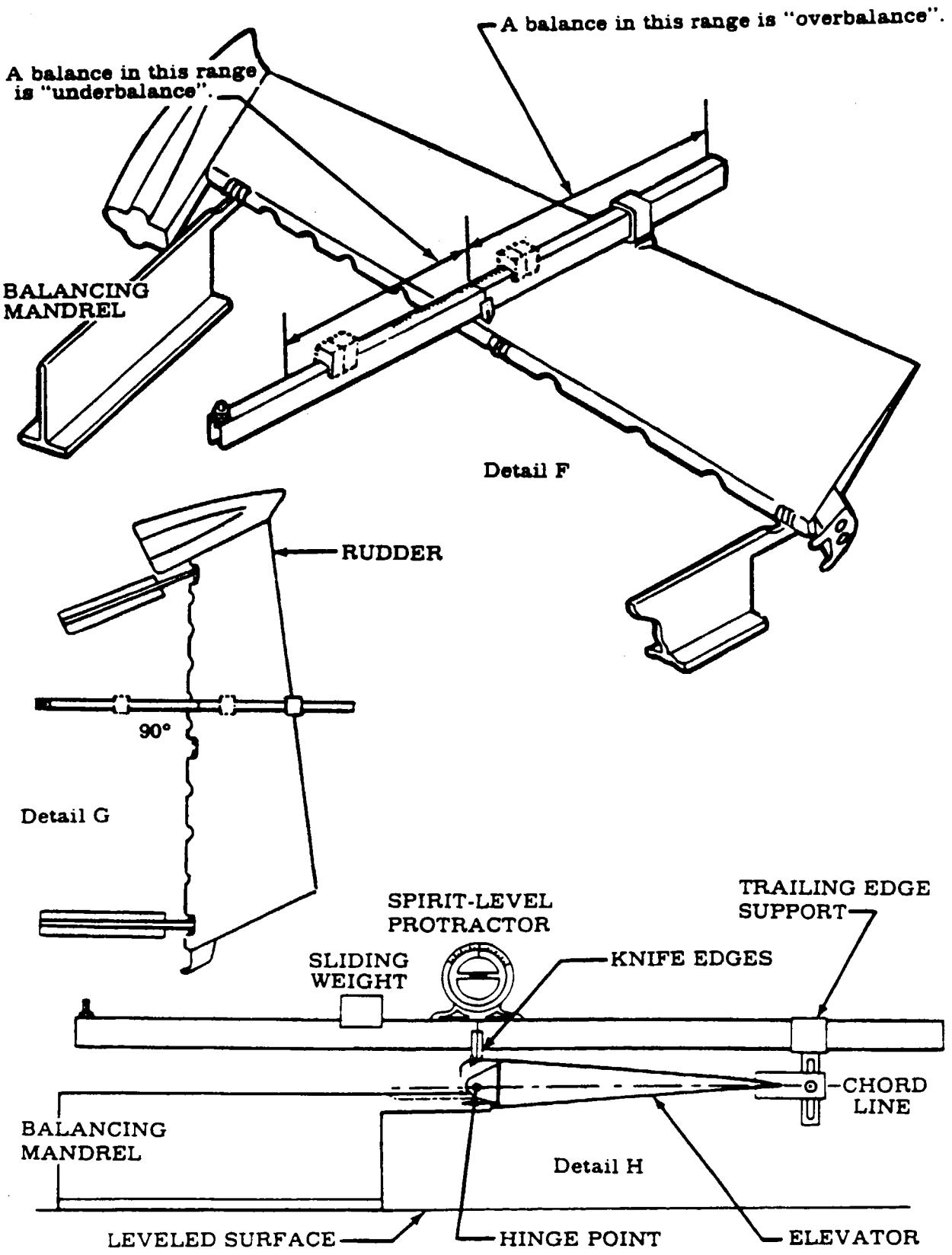
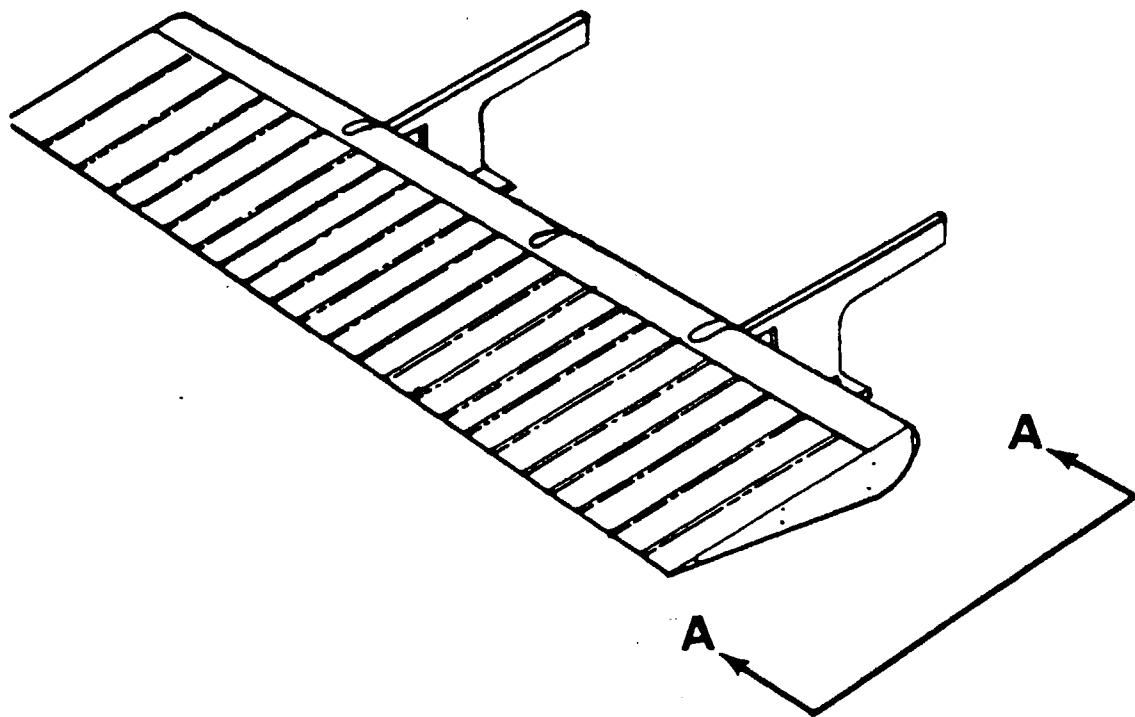


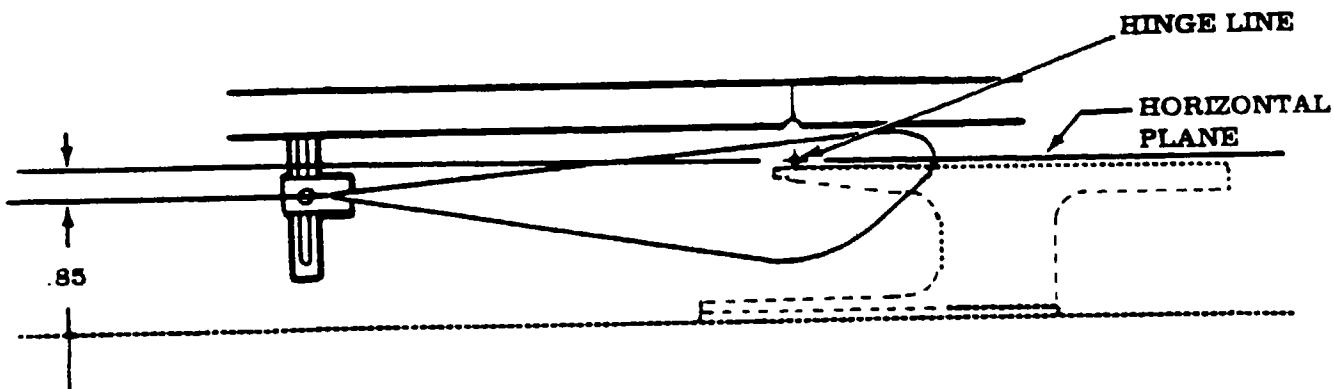
Figure 17-3. Control Surface Balancing (Sheet 3 of 5)

# MODEL 152 SERIES SERVICE MANUAL

## AILERONS



DETAIL A-A



Balance aileron inverted, with trailing edge at point opposite cut-out for middle hinge .85" below hinge line horizontal plane.

Figure 17-3. Control Surface Balancing (Sheet 4 of 5)

# MODEL 152 SERIES SERVICE MANUAL

## CONTROL SURFACE BALANCE REQUIREMENTS

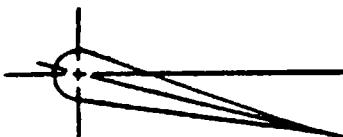
### NOTE

Balance limits for control surfaces are expressed for "Approved Flight" configuration. "Approved Flight" configuration is that condition of the control surface as prepared for flight of the airplane whether it be painted or unpainted.

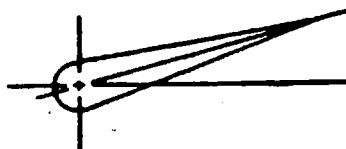
"Approved Flight" limits must never be exceeded when the surface is in its final configuration for flight.

### DEFINITIONS:

**UNDERBALANCE** is defined as the condition that exists when surface is trailing edge heavy and is defined by a symbol (+). If the balance beam sliding weight must be on the leading edge side of the hinge line (to balance the control surface), the control surface is considered to be underbalanced.



**OVERBALANCE** is defined as the condition that exists when surface is leading edge heavy and is defined by a symbol (-). If the balance beam sliding weight must be on the trailing edge side of the hinge line (to balance the control surface), the control surface is considered to be overbalanced.



CONTROL SURFACE	APPROVED FLIGHT CONFIGURATION BALANCE LIMITS (Inch-Pounds)
AILERON	0.0 to +11.31
RUDDER	0.0 to +10.68
RIGHT ELEVATOR	0.0 to +19.52
LEFT ELEVATOR	0.0 to +19.52

Figure 17-3. Control Surface Balancing (Sheet 5 of 5)

## MODEL 152 SERIES SERVICE MANUAL

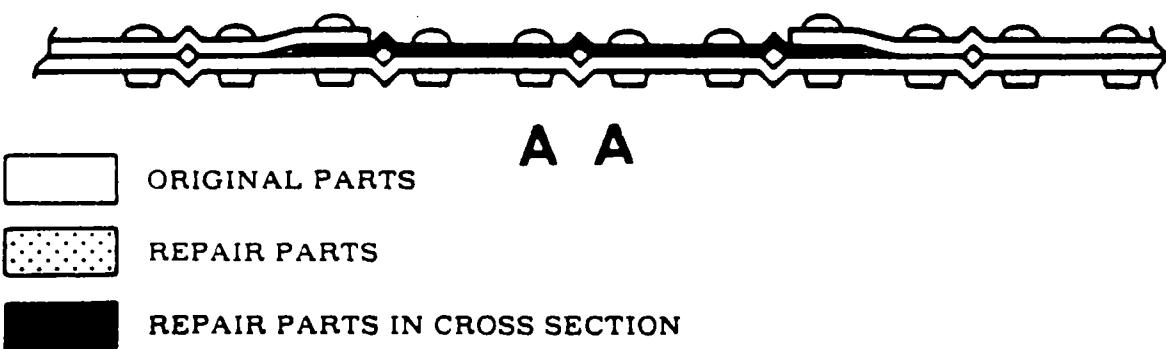
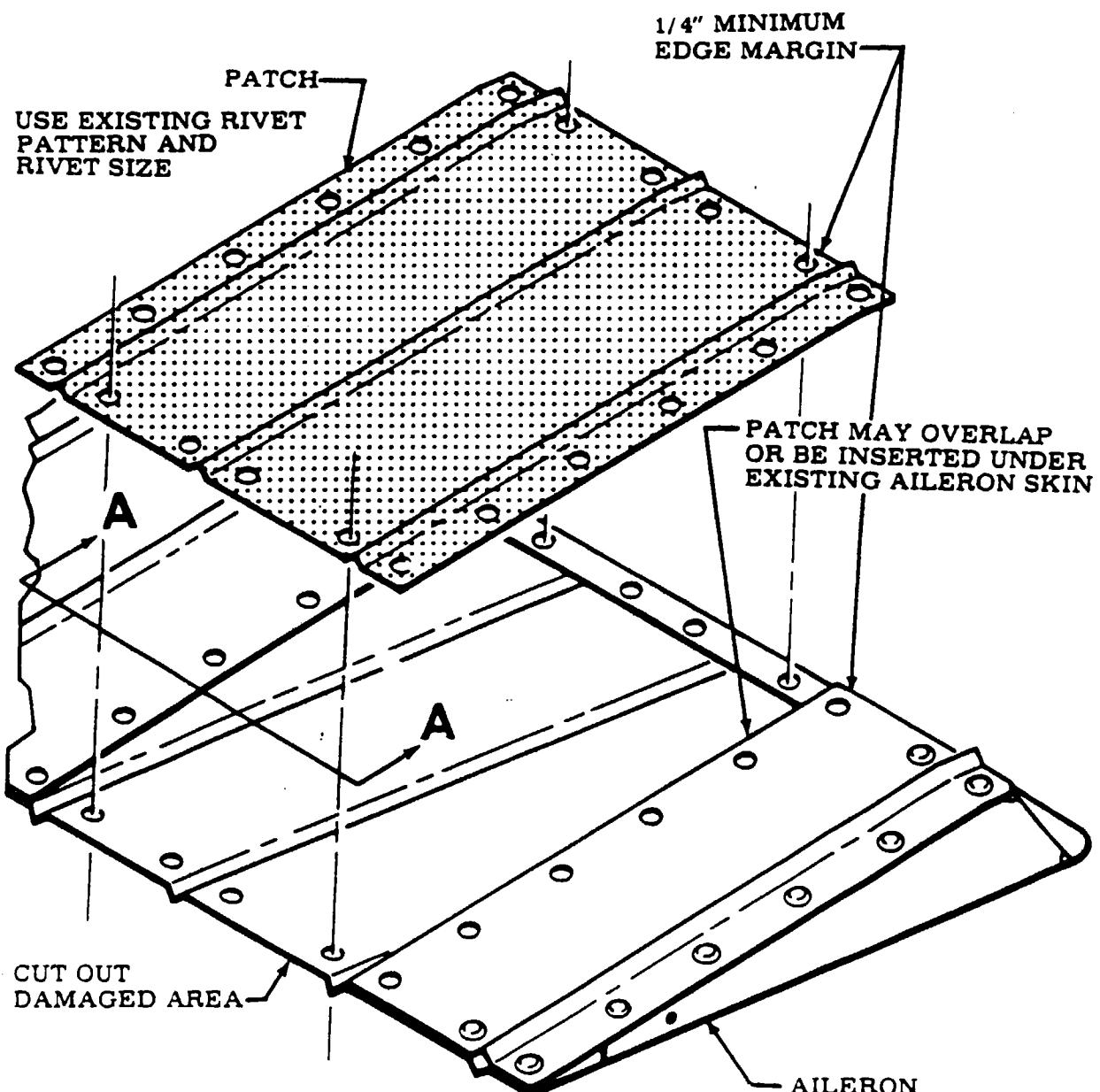


Figure 17-3A. Corrugated Skin Repair

# MODEL 152 SERIES SERVICE MANUAL

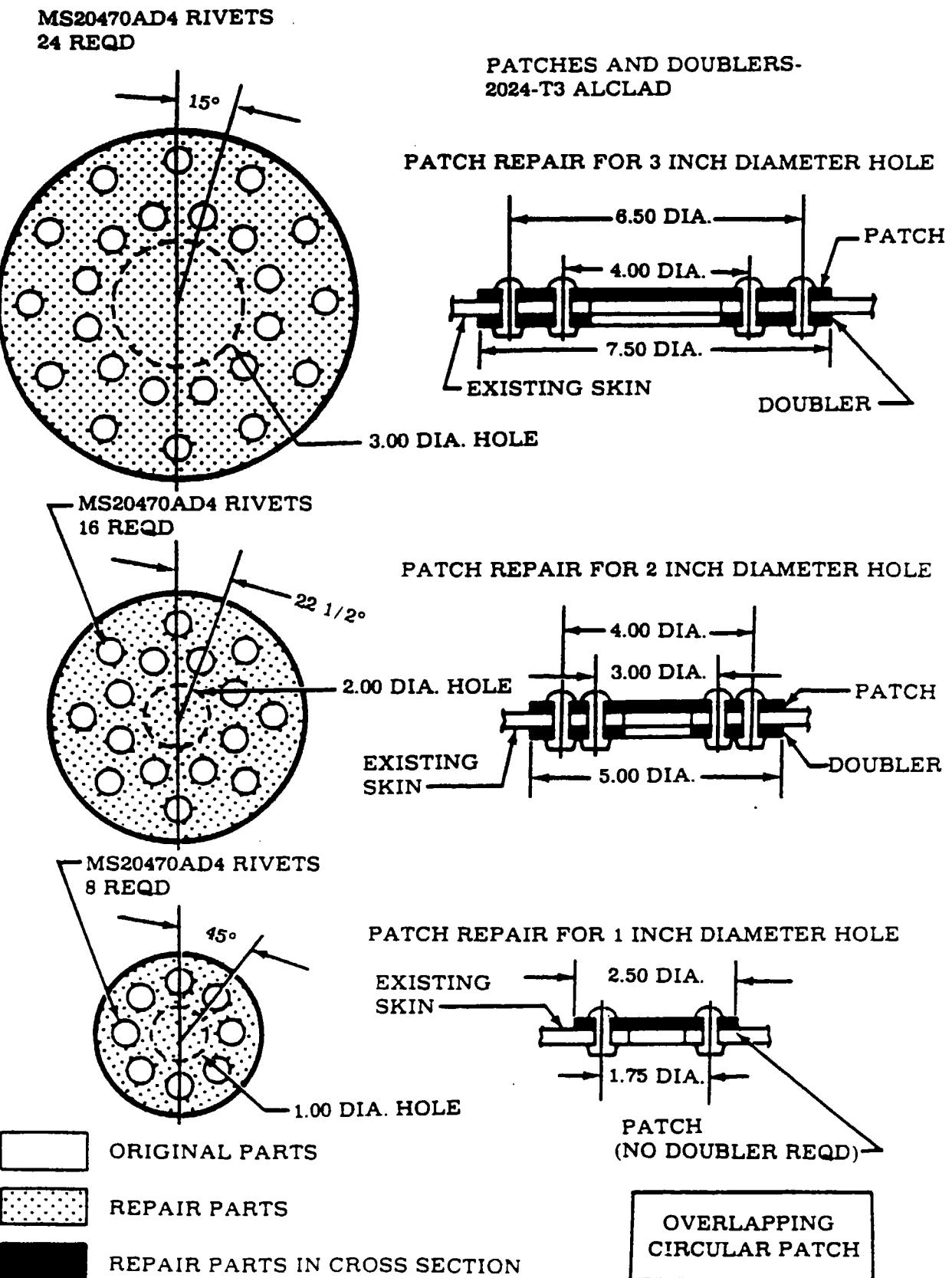


Figure 17-4. Skin Repair (Sheet 1 of 6)

MODEL 152 SERIES SERVICE MANUAL

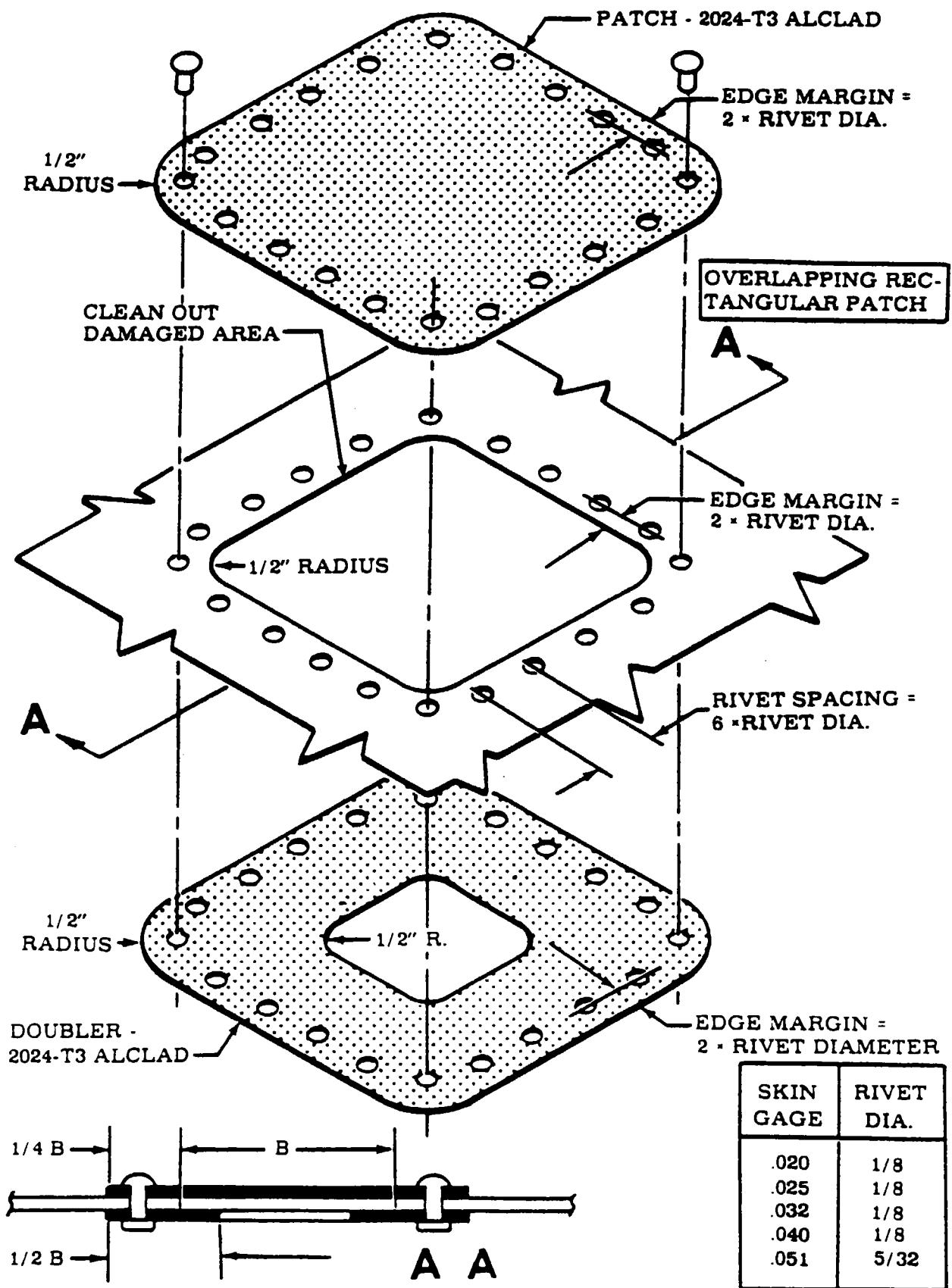


Figure 17-4. Skin Repair (Sheet 2 of 6)

# MODEL 152 SERIES SERVICE MANUAL

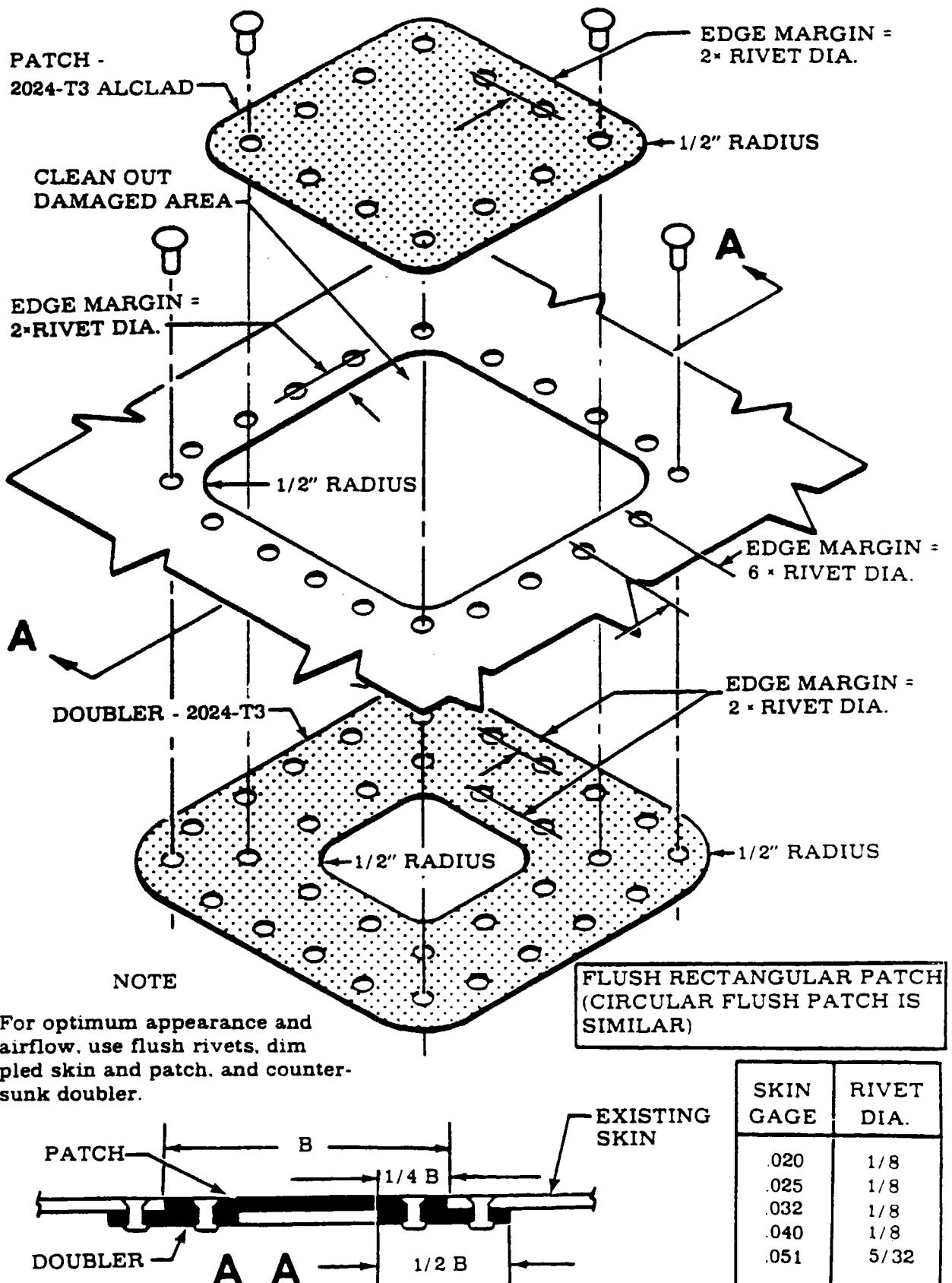


Figure 17-4. Skin Repair (Sheet 3 of 6)

# MODEL 152 SERIES SERVICE MANUAL

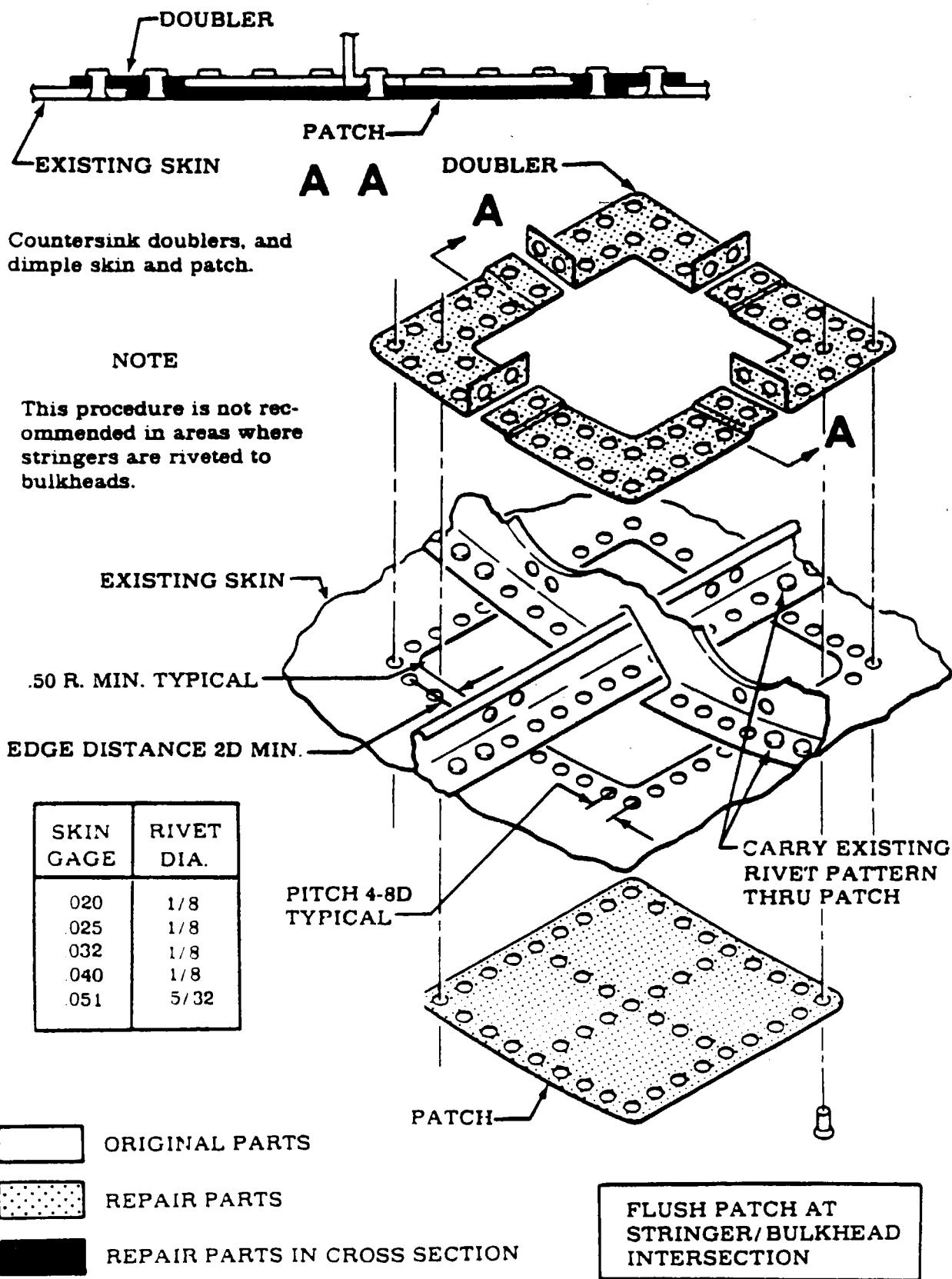


Figure 17-4. Skin Repair (Sheet 4 of 6)

**MODEL 152 SERIES SERVICE MANUAL**

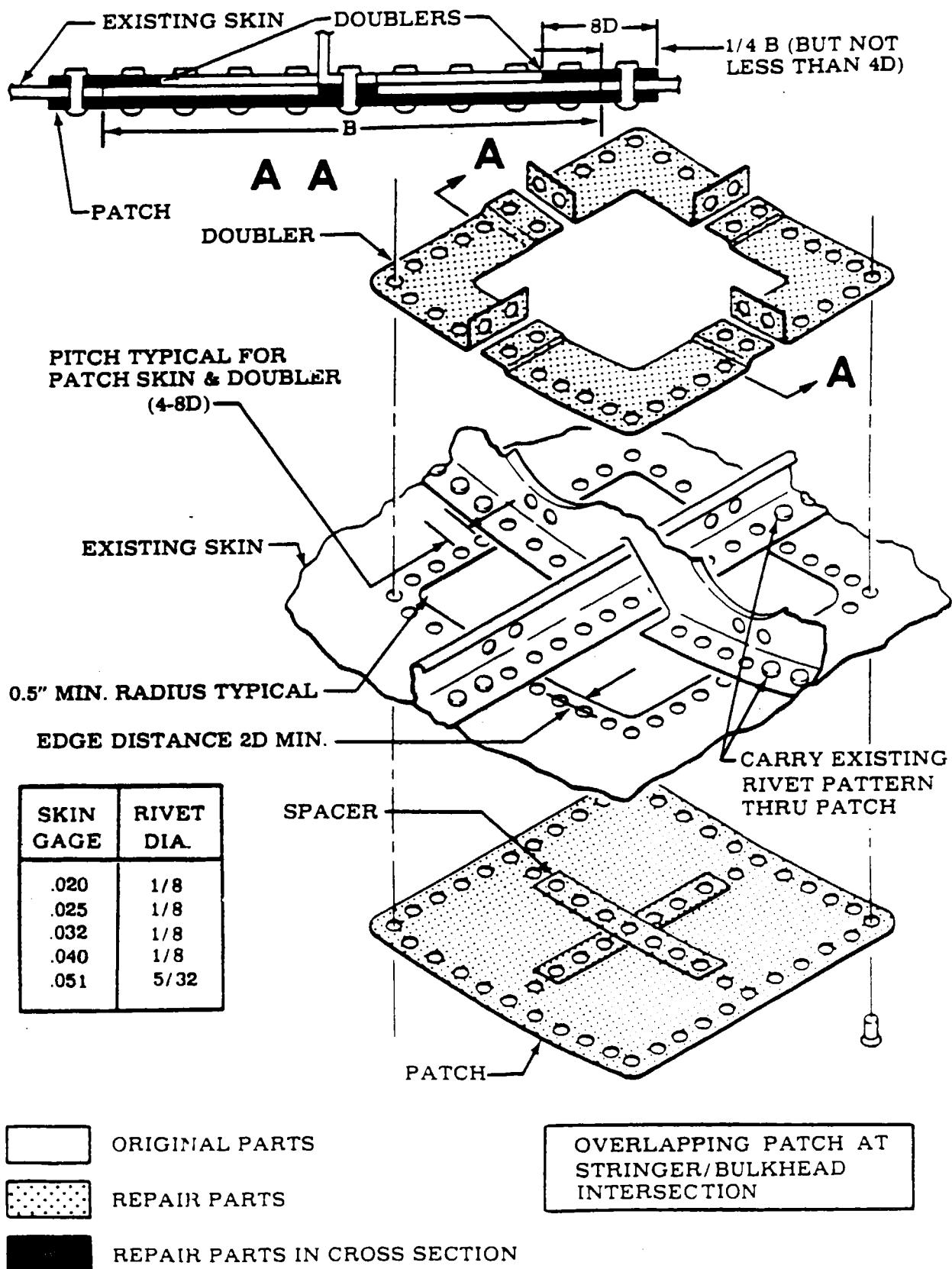
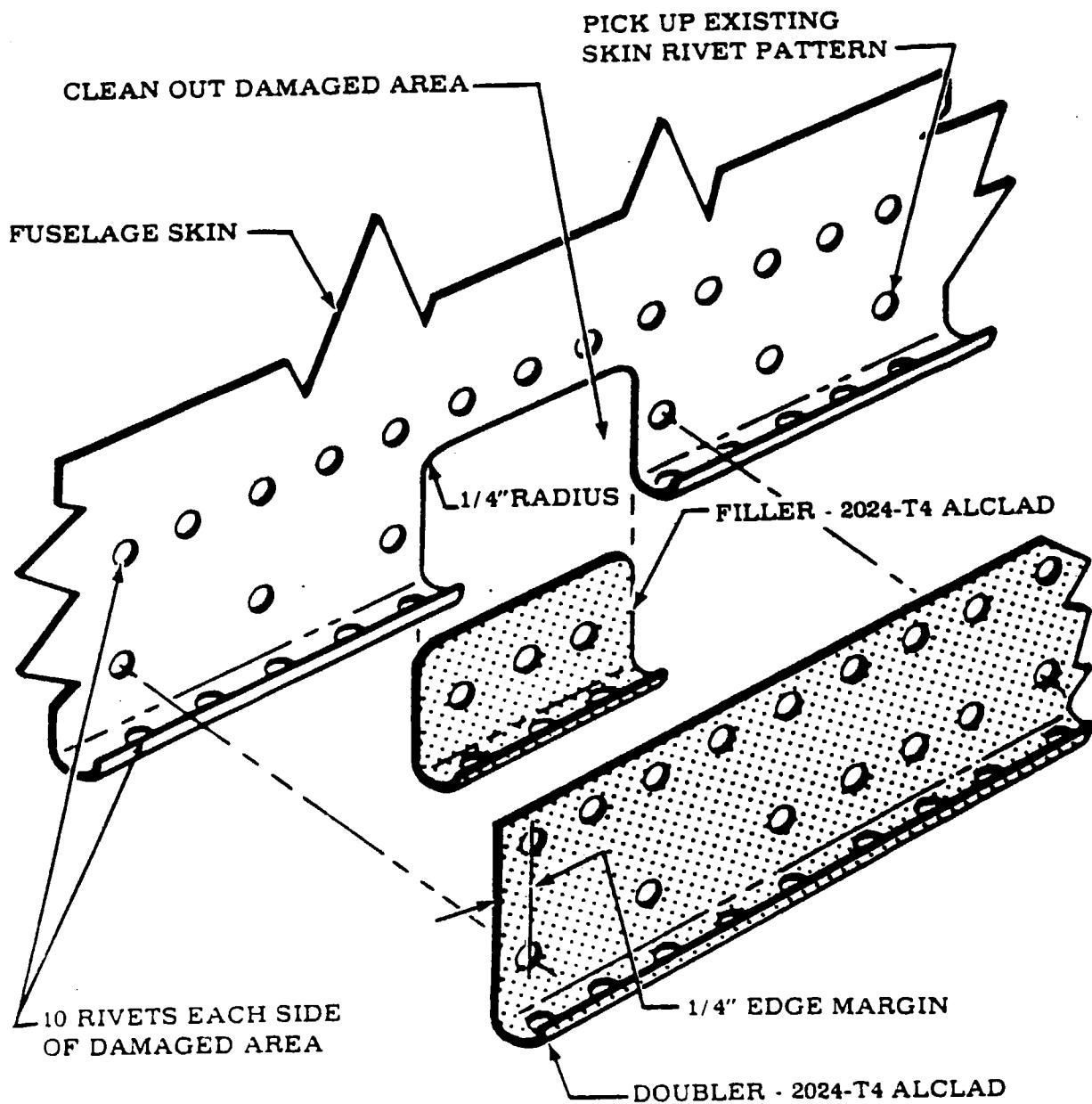
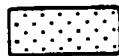


Figure 17-4. Skin Repair (Sheet 5 of 6)

## MODEL 152 SERIES SERVICE MANUAL



ORIGINAL PARTS



REPAIR PARTS



REPAIR PARTS IN CROSS SECTION

**Figure 17-4. Skin Repair (Sheet 6 of 6)**

MODEL 152 SERIES SERVICE MANUAL

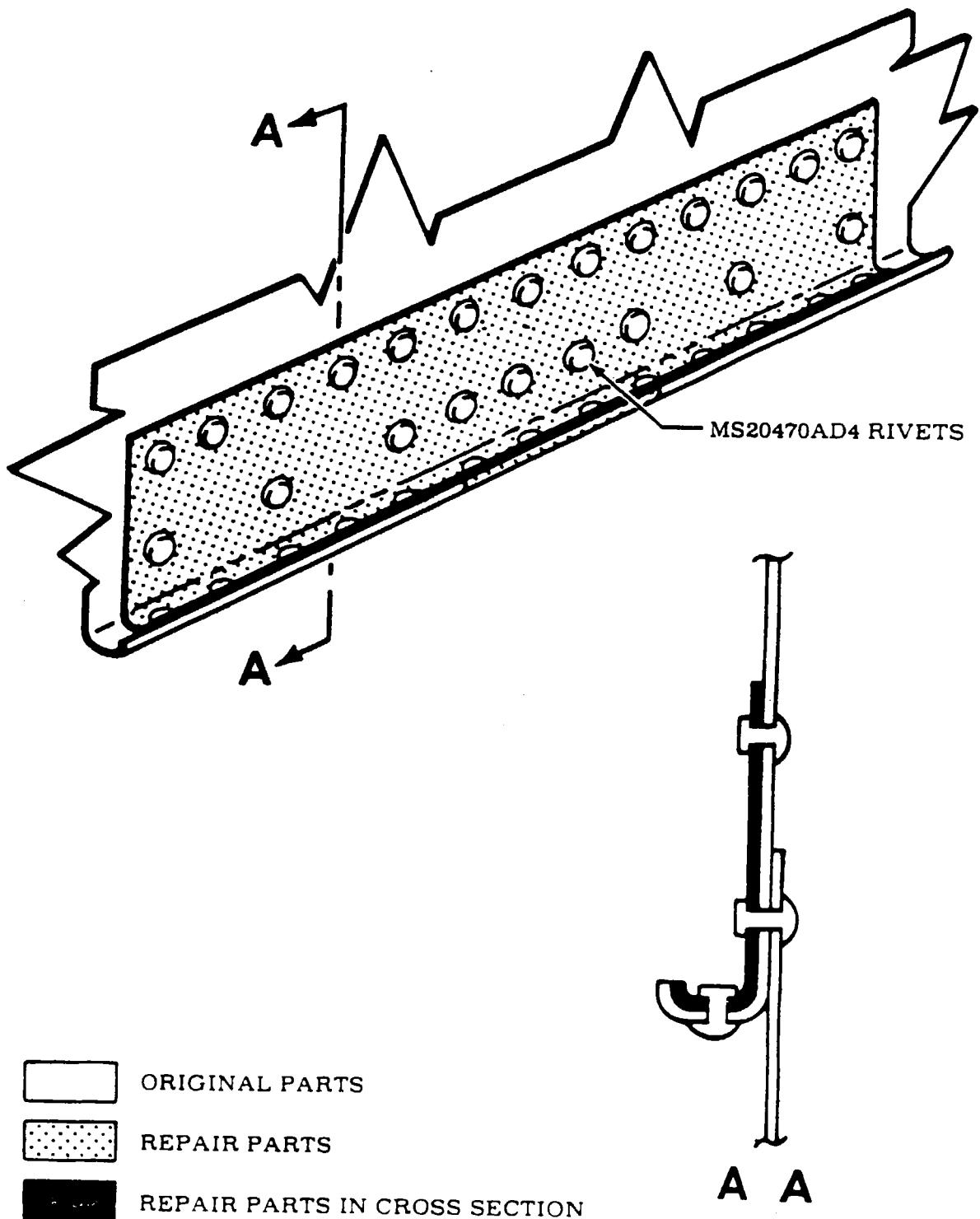


Figure 17-4. Skin Repair (Sheet 6 of 6 continued)

## MODEL 152 SERIES SERVICE MANUAL

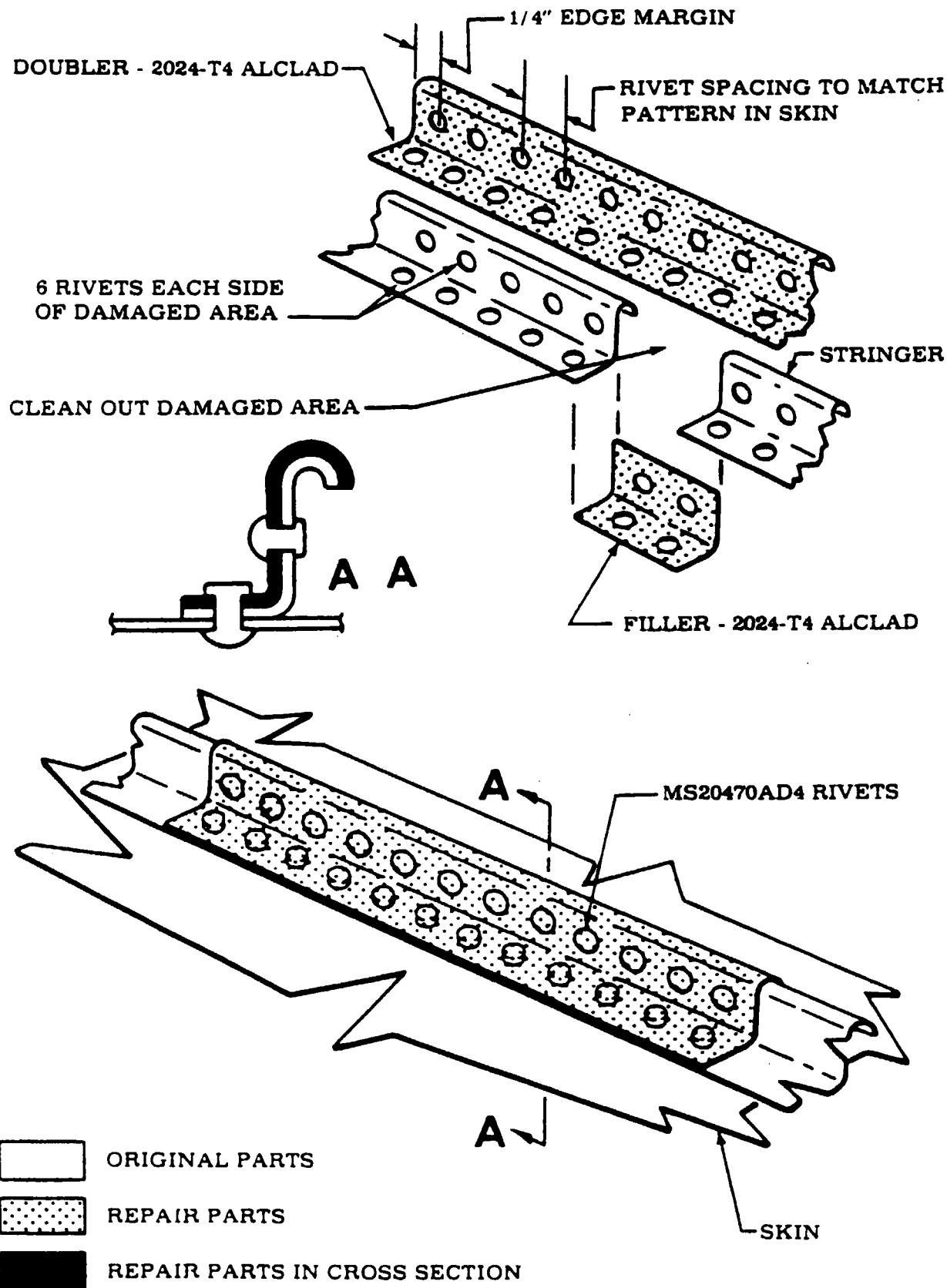


Figure 17-5.Stringer and Channel Repair (Sheet 1 of 4)

## MODEL 152 SERIES SERVICE MANUAL

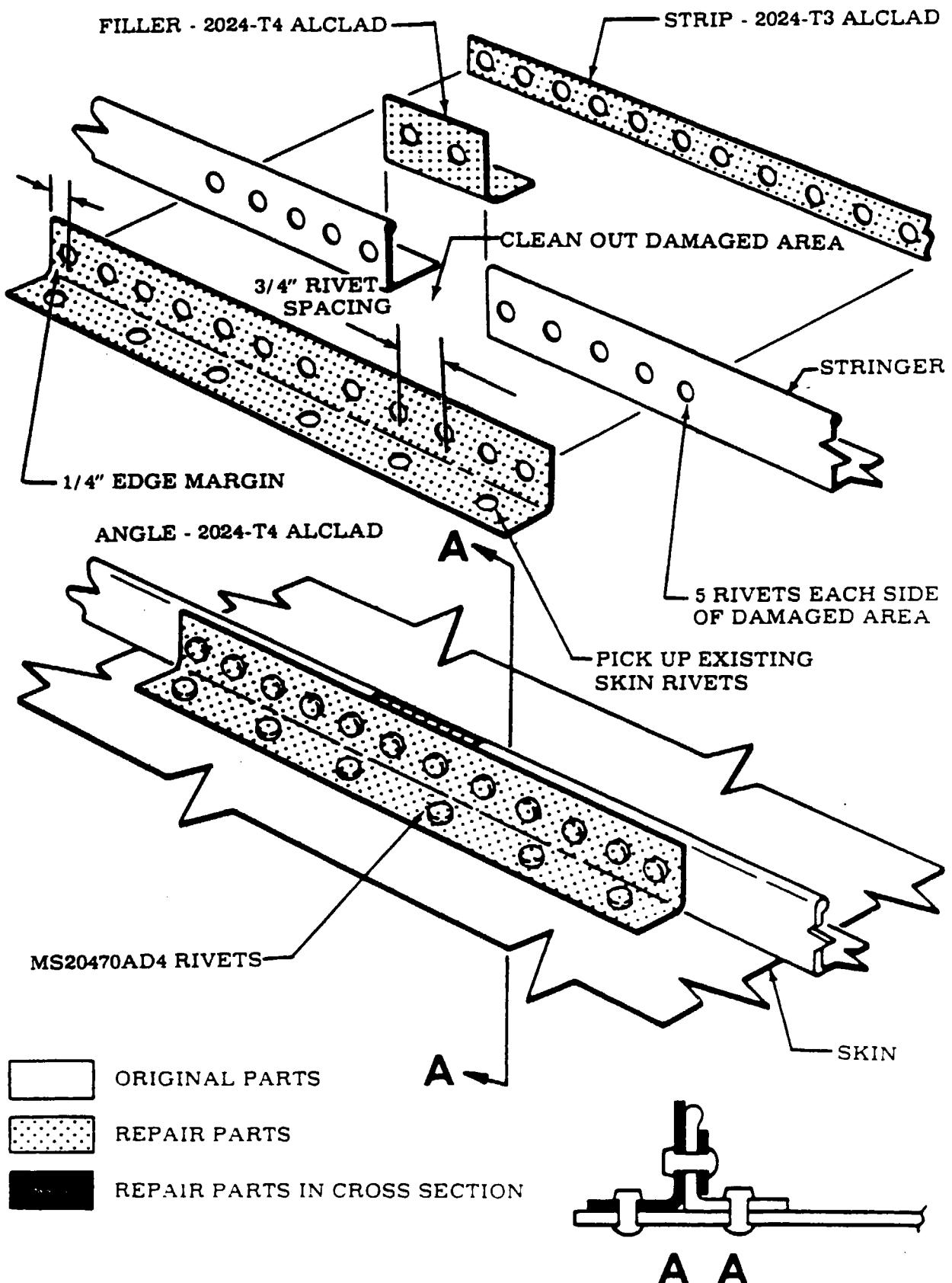


Figure 17-5. Stringer and Channel Repair (Sheet 2 of 4)

**MODEL 152 SERIES SERVICE MANUAL**

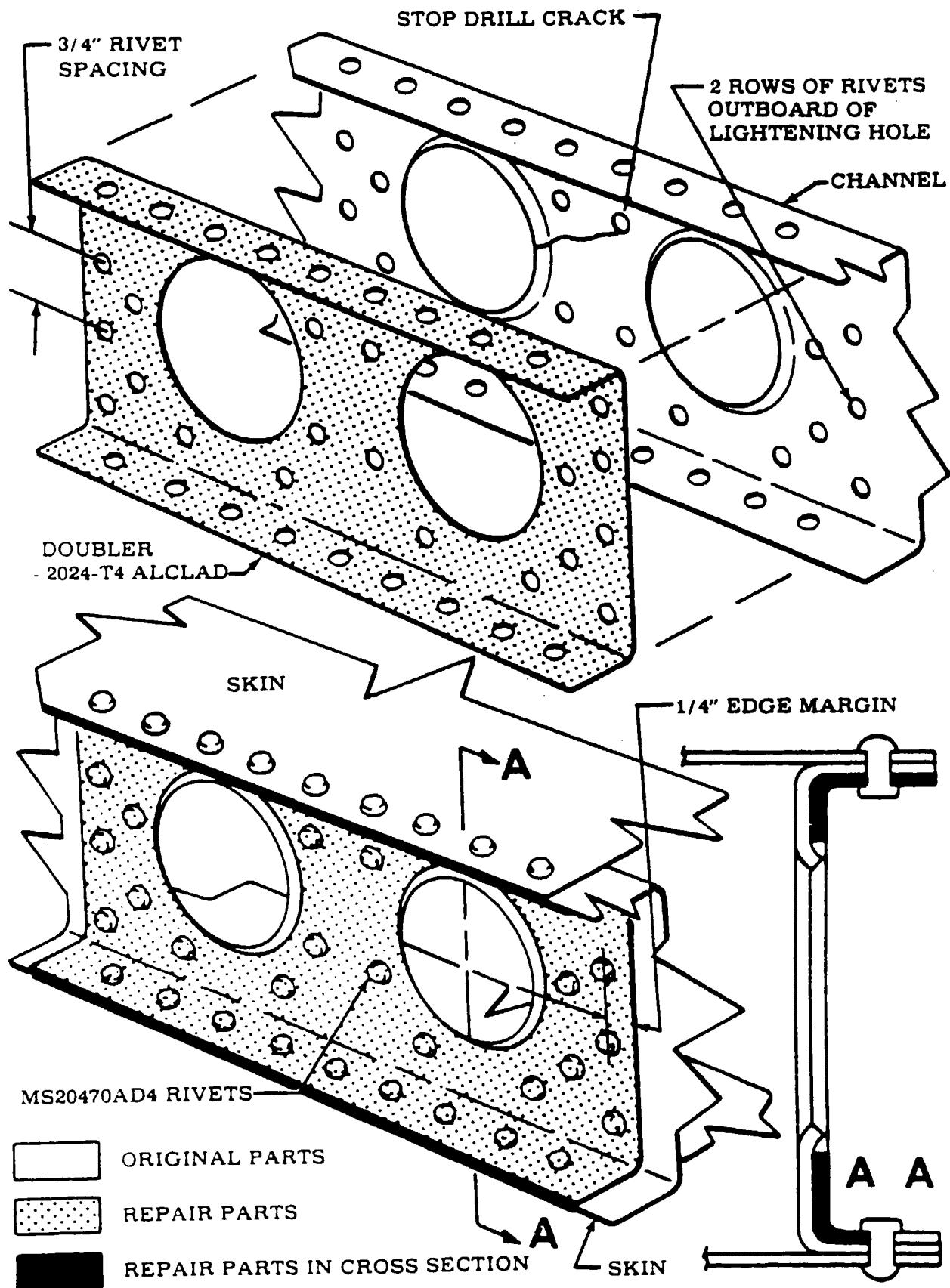
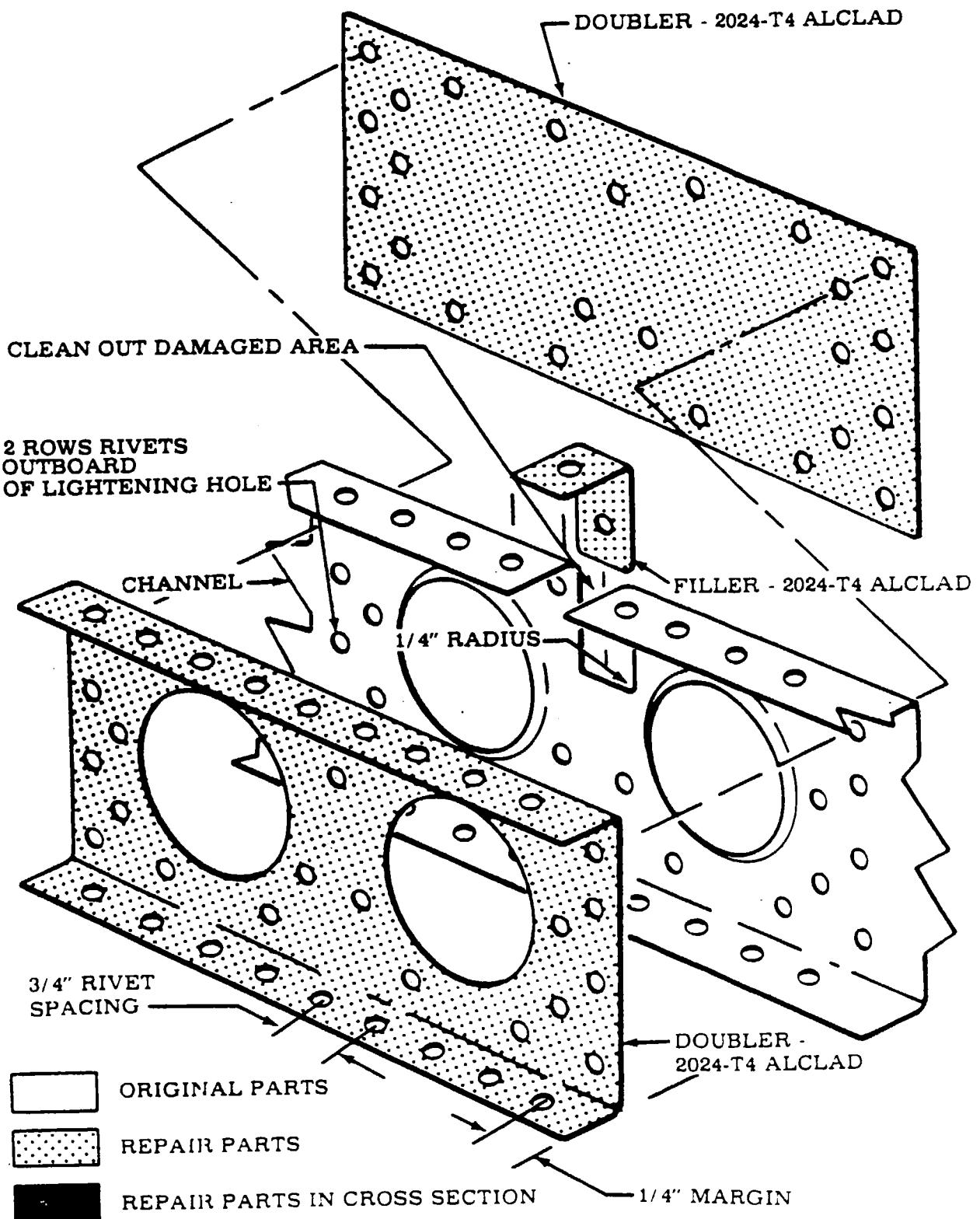


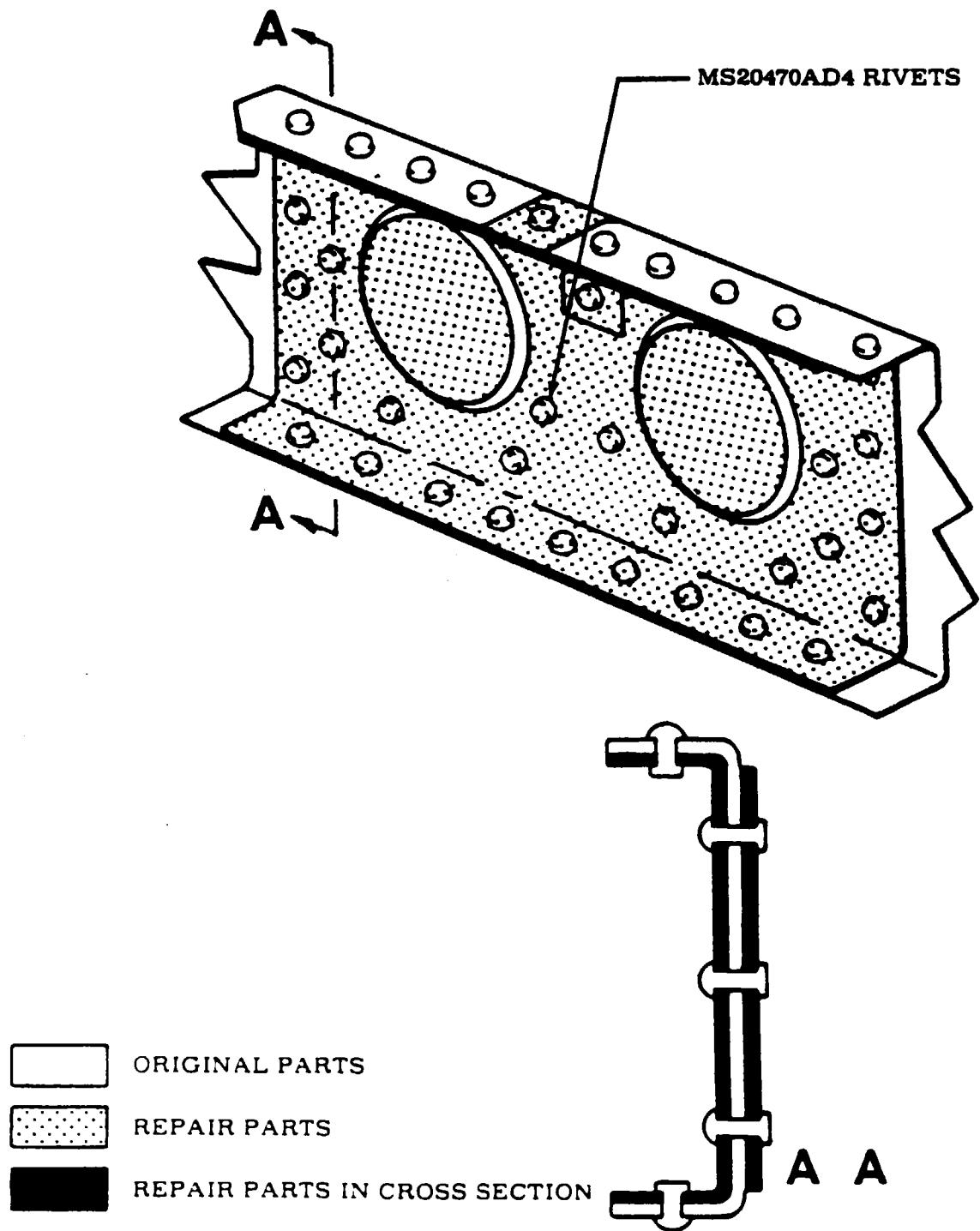
Figure 17-5. Stringer and Channel Repair (Sheet 3 of 4)

**MODEL 152 SERIES SERVICE MANUAL**



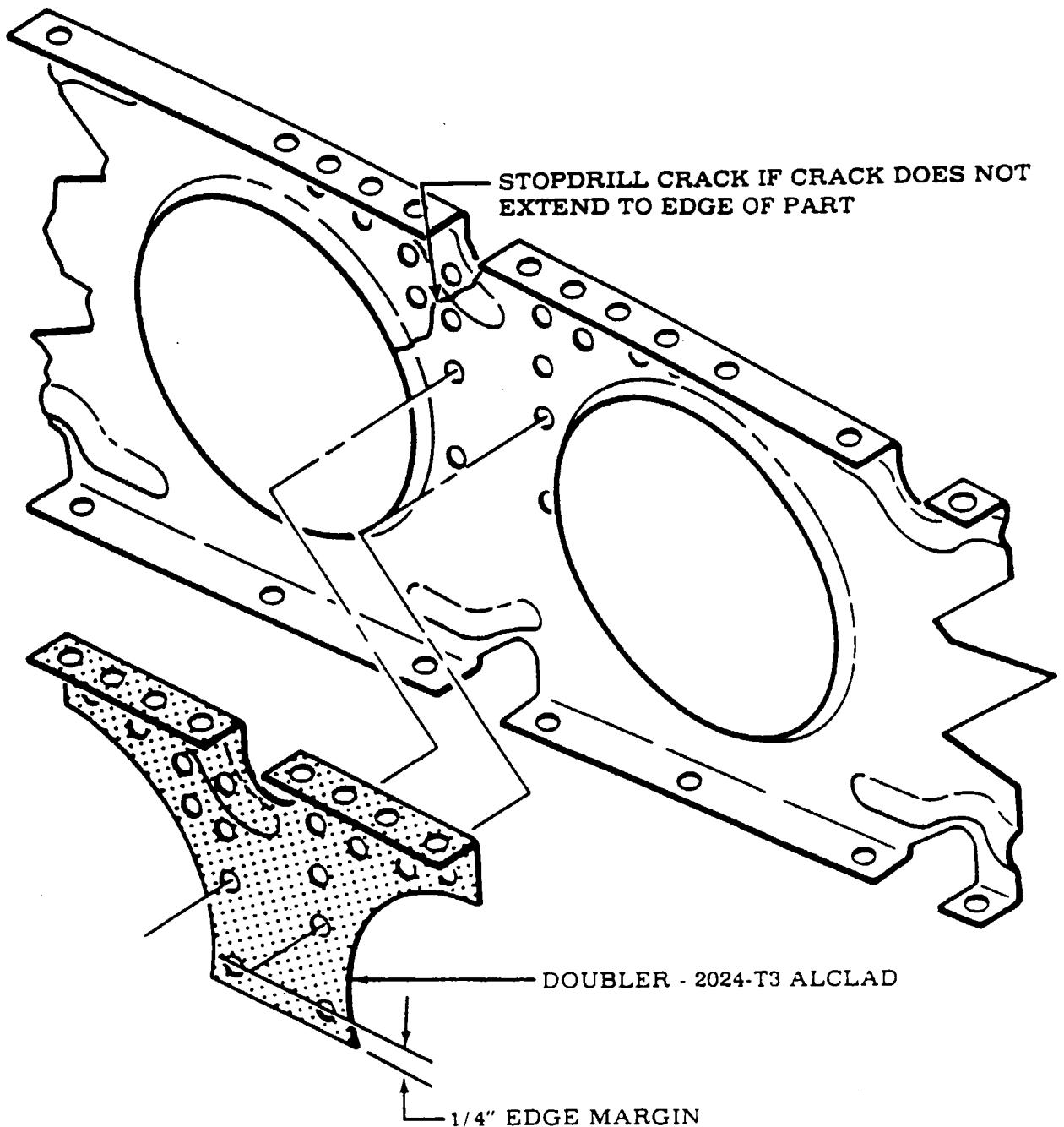
**Figure 17-5.Stringer and Channel Repair (Sheet 4 of 4)**

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 17-5. Stringer and Channel Repair (Sheet 4 of 4 continued)**

MODEL 152 SERIES SERVICE MANUAL



ORIGINAL PARTS



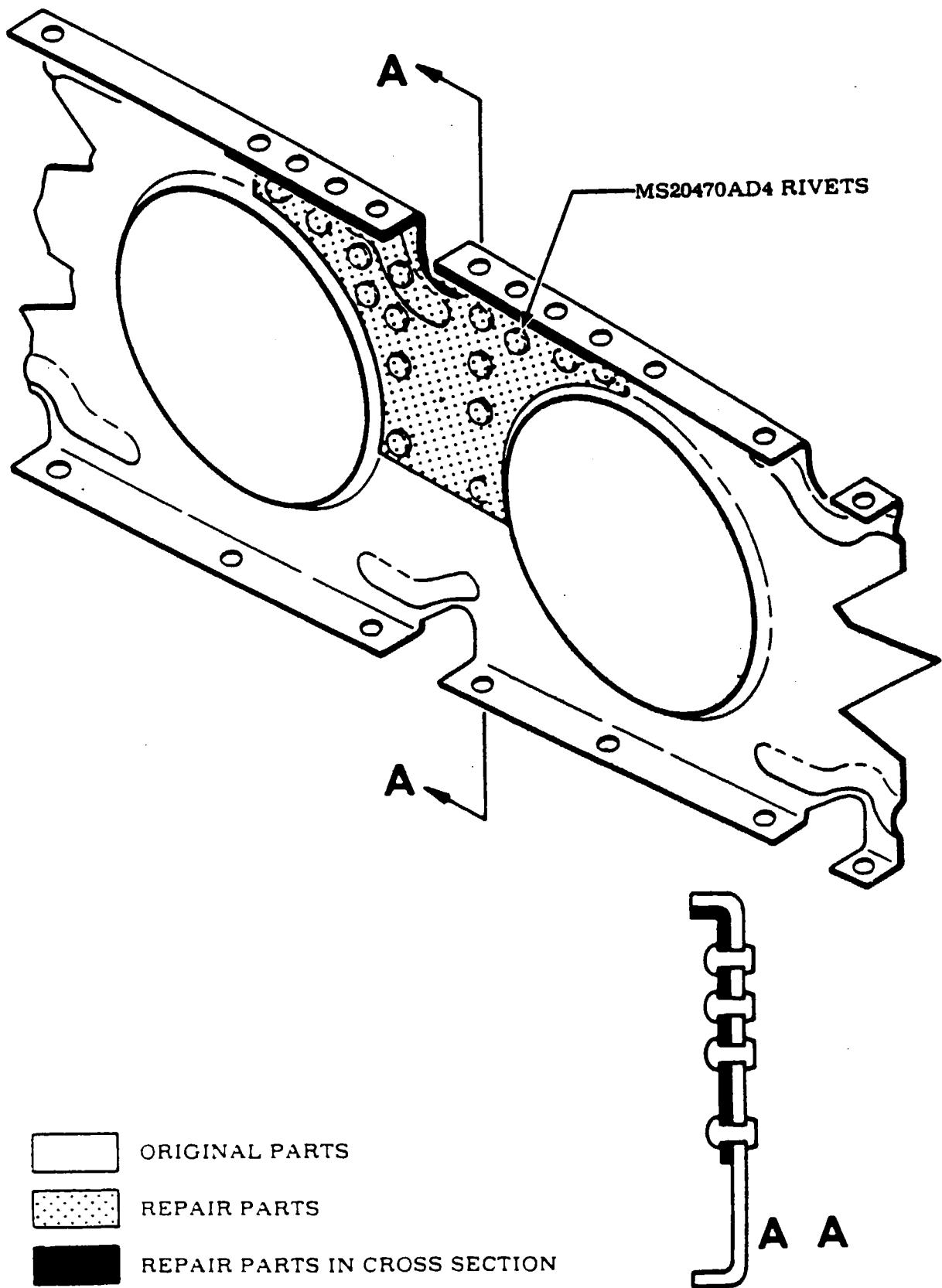
REPAIR PARTS



REPAIR PARTS IN CROSS SECTION

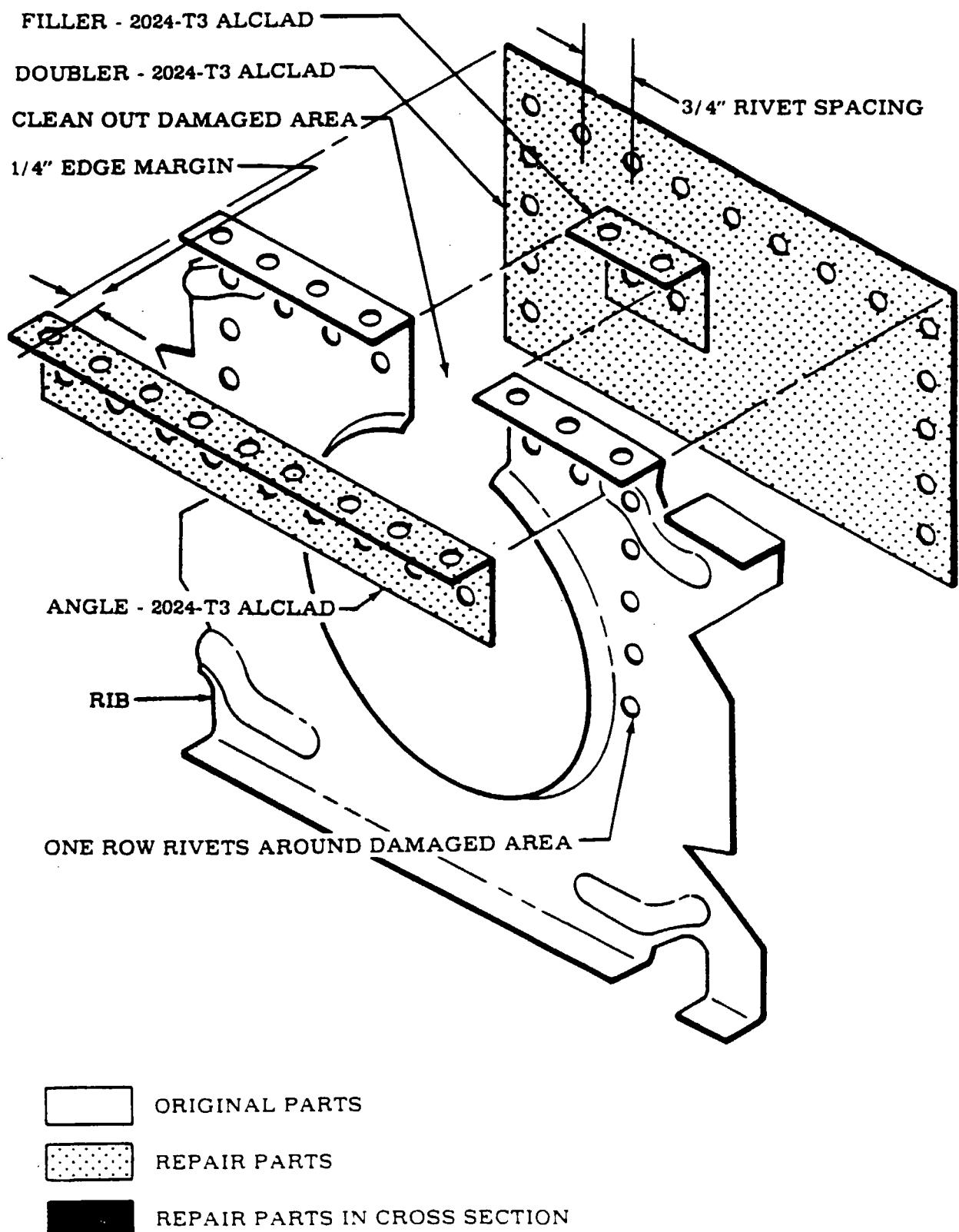
Figure 17-6. Rib Repair (Sheet 1 of 2)

**MODEL 152 SERIES SERVICE MANUAL**



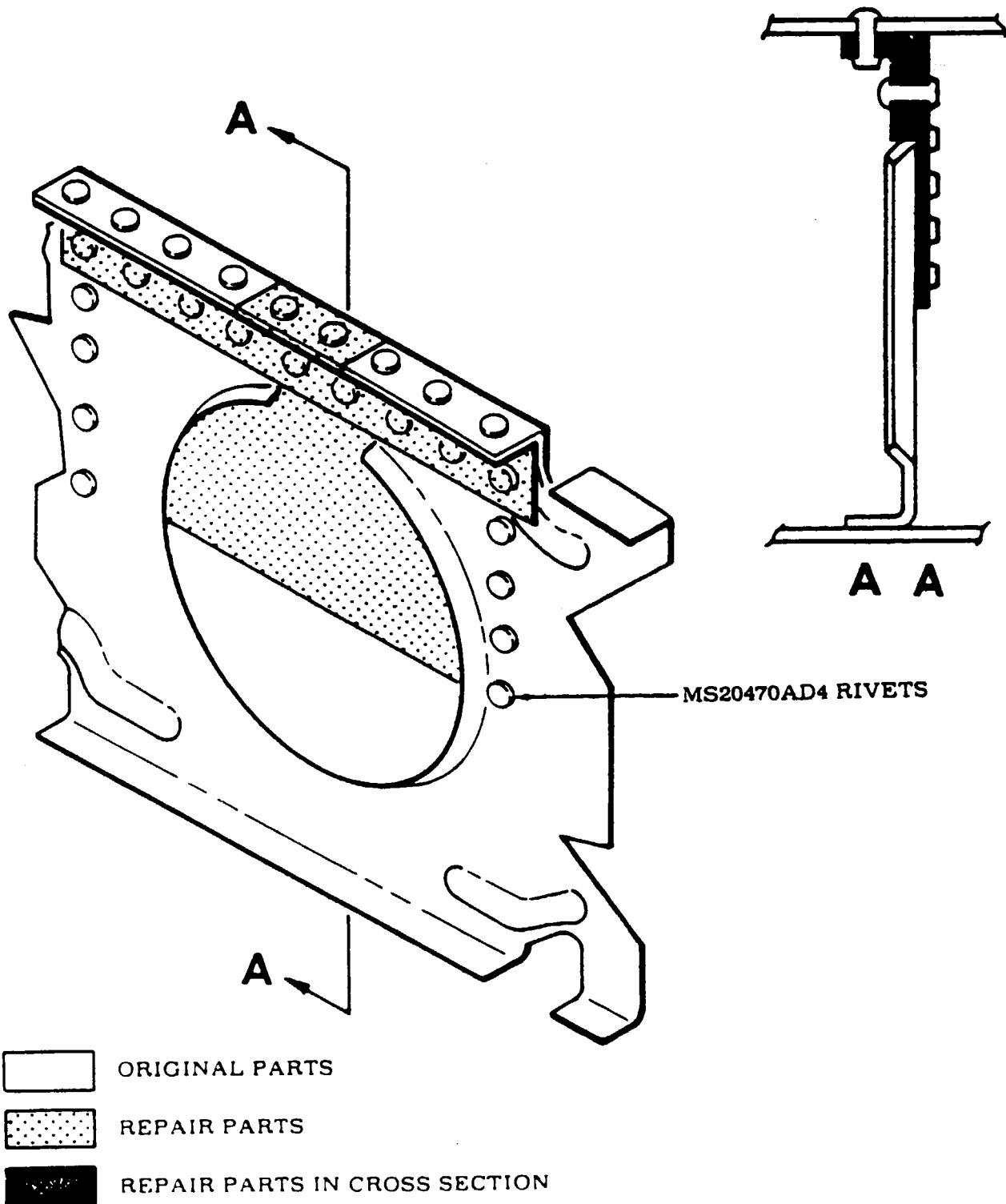
**Figure 17-6. Rib Repair (Sheet 1 of 2 continued)**

## MODEL 152 SERIES SERVICE MANUAL



**Figure 17-6.Rib Repair (Sheet 2 of 2)**

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 17-6. Rib Repair (Sheet 2 of 2 continued)**

MODEL 152 SERIES SERVICE MANUAL

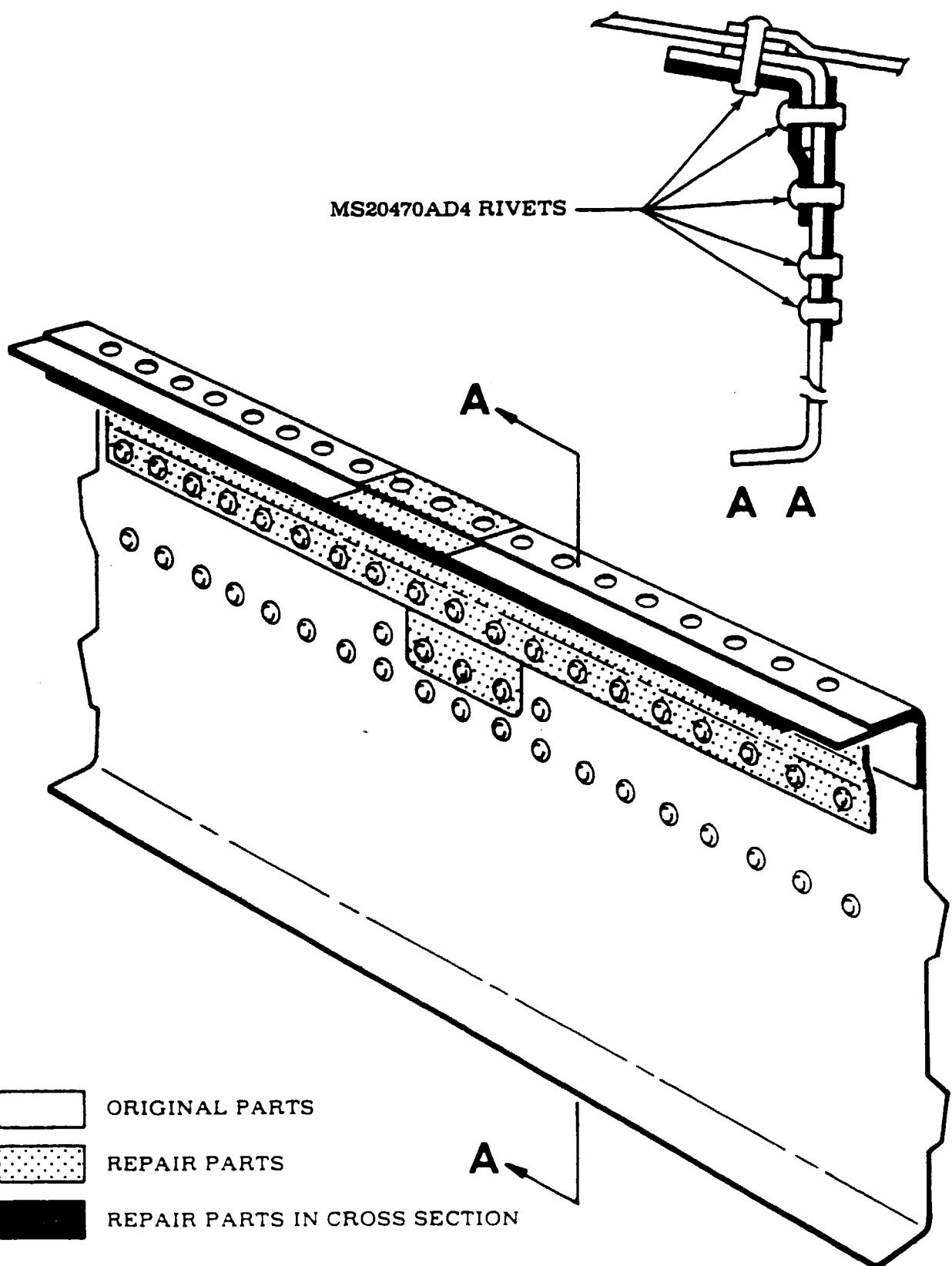
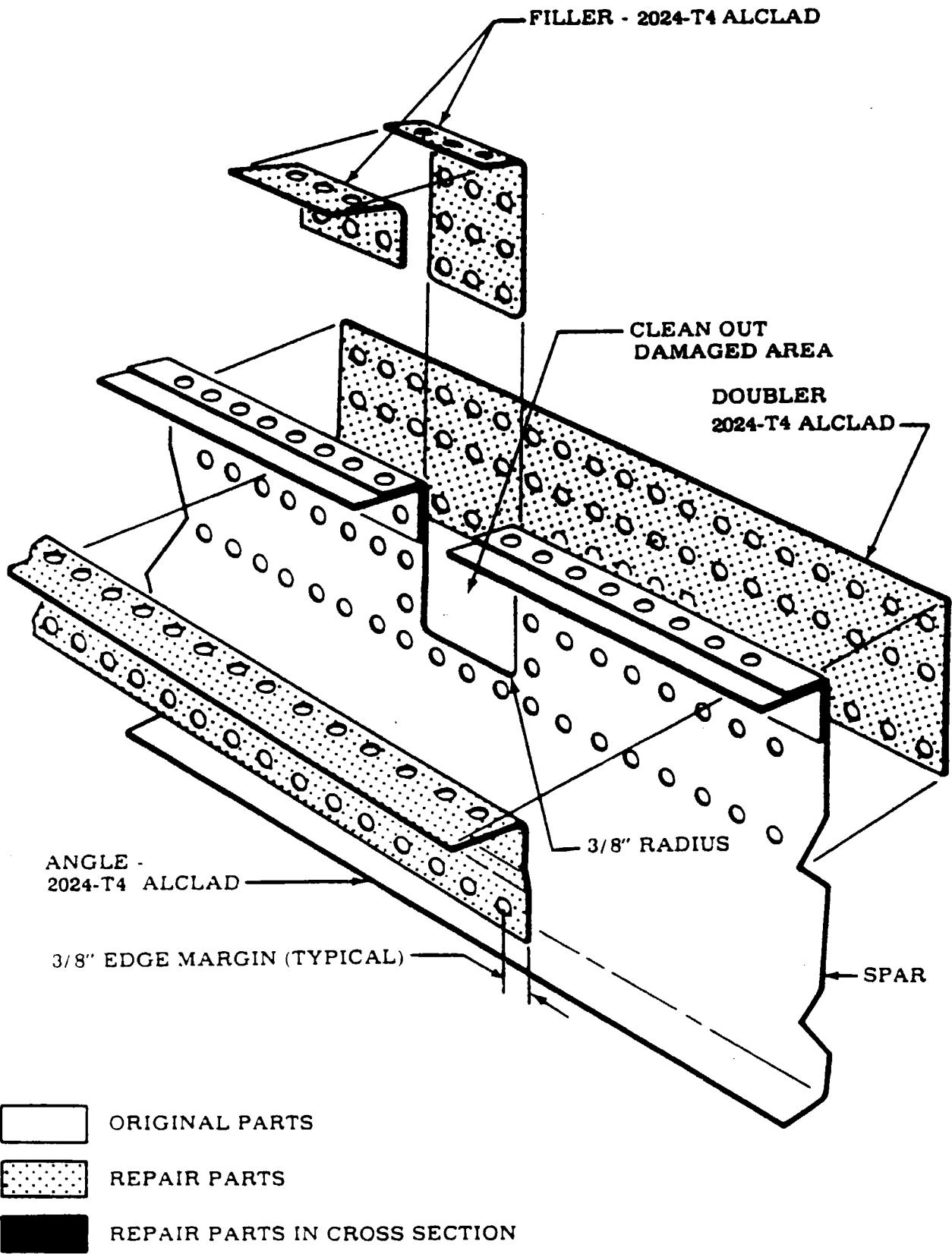


Figure 17-7. Wing Spar Repair (Sheet 1 of 4)

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 17-7. Wing Spar Repair (Sheet 1 of 4 continued)**

# MODEL 152 SERIES SERVICE MANUAL

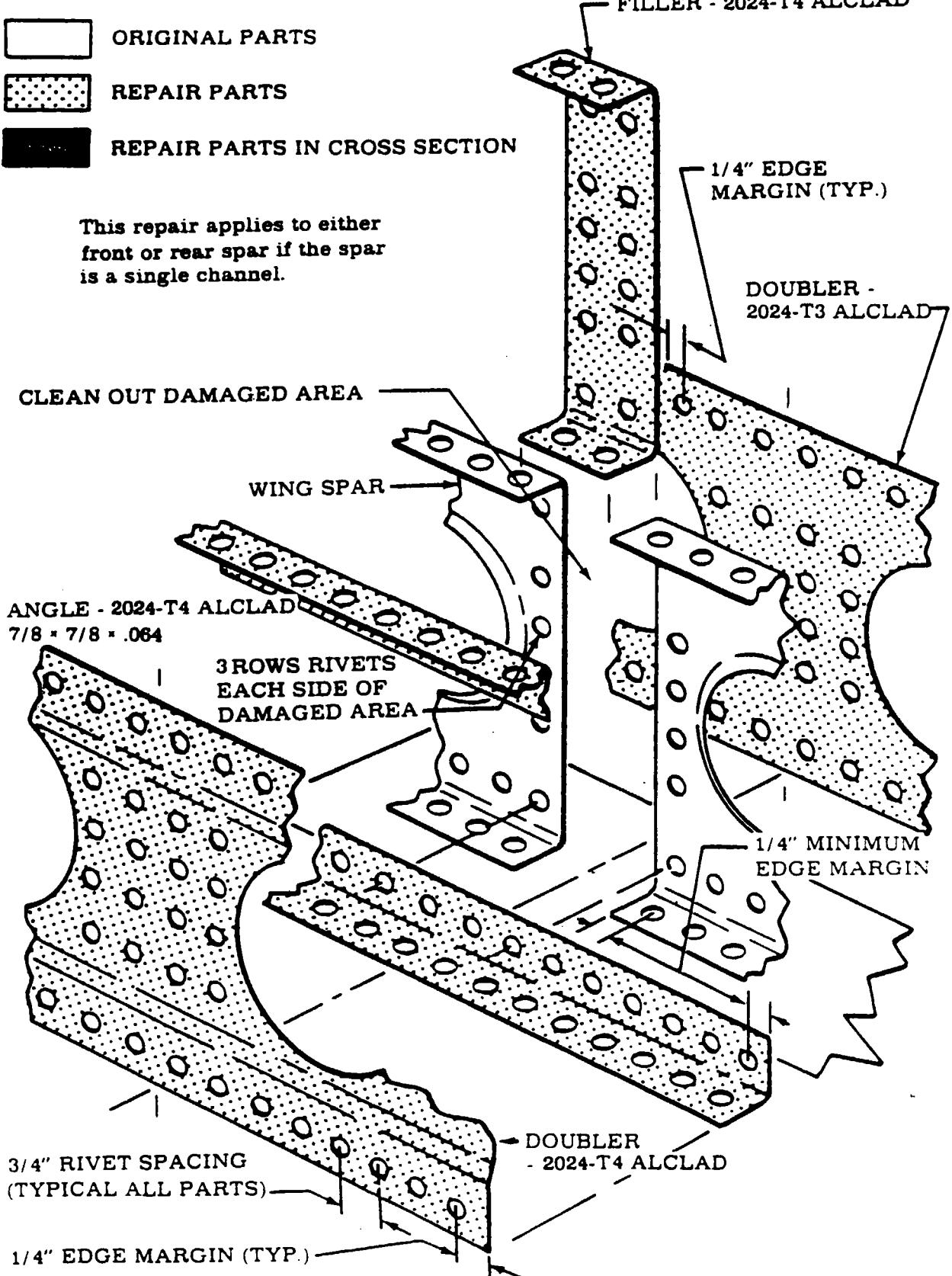


Figure 17-7.Wing Spar Repair (Sheet 2 of 4)

MODEL 152 SERIES SERVICE MANUAL

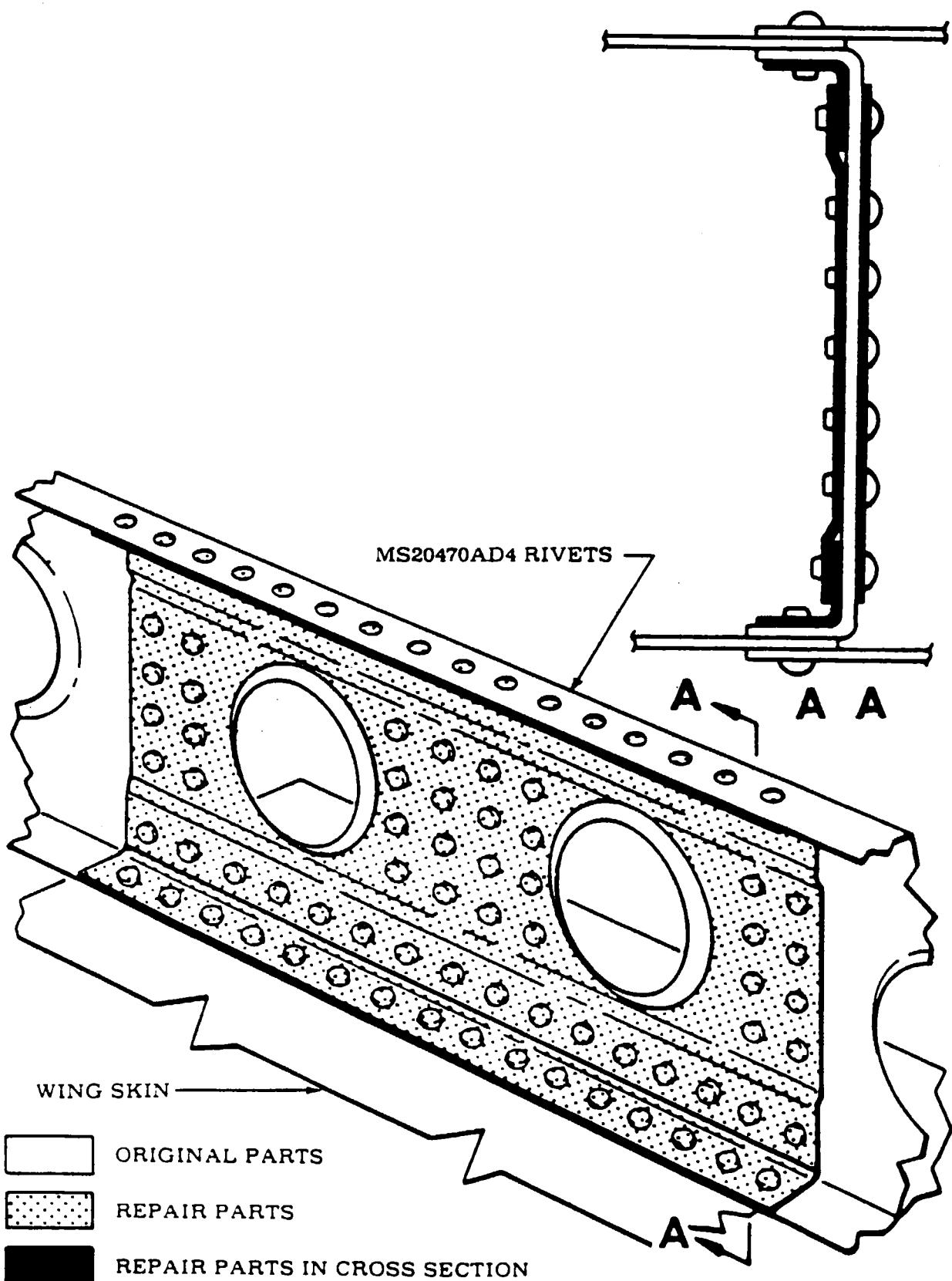


Figure 17-7. Wing Spar Repair (Sheet 2 of 4 continued)

## MODEL 152 SERIES SERVICE MANUAL

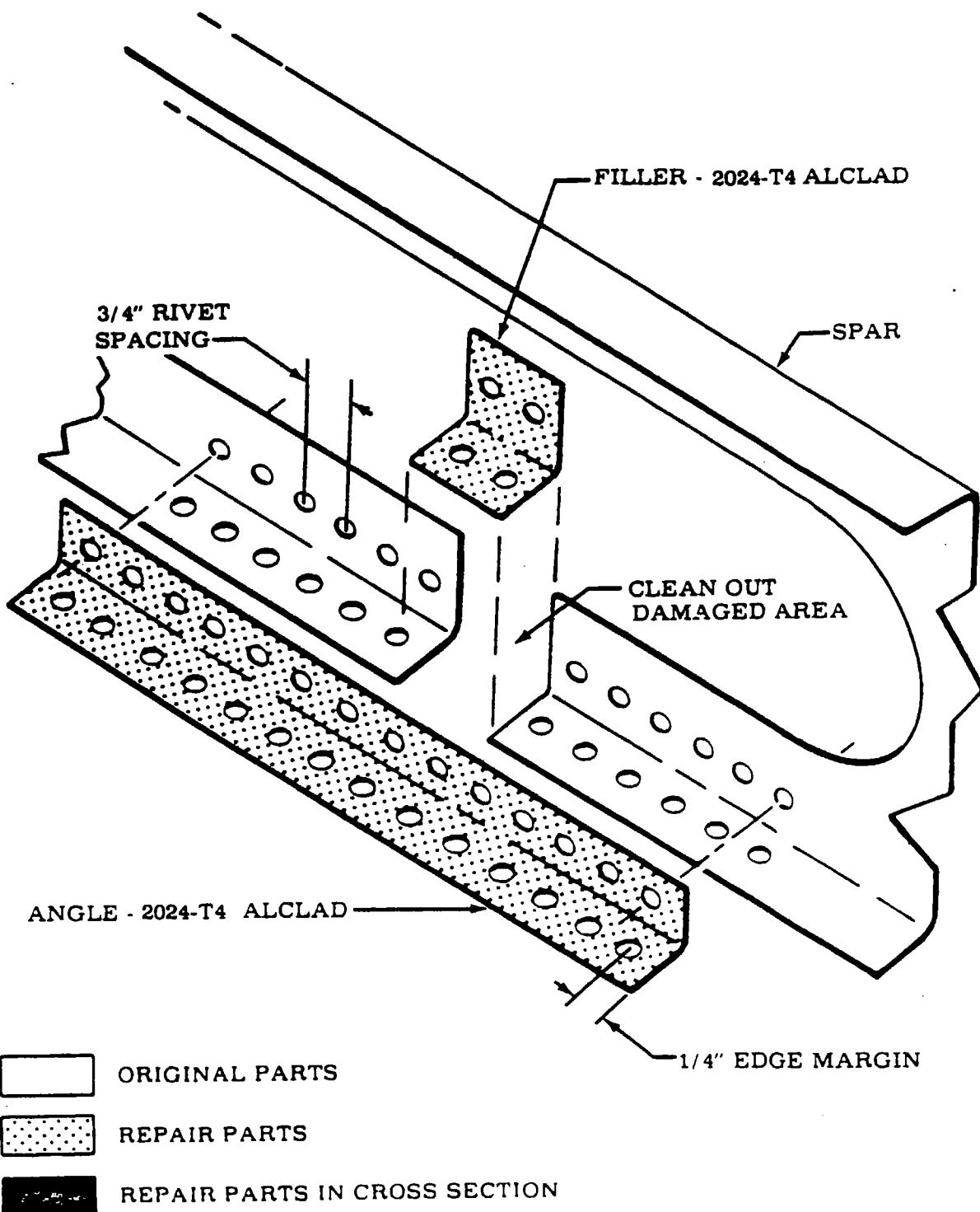
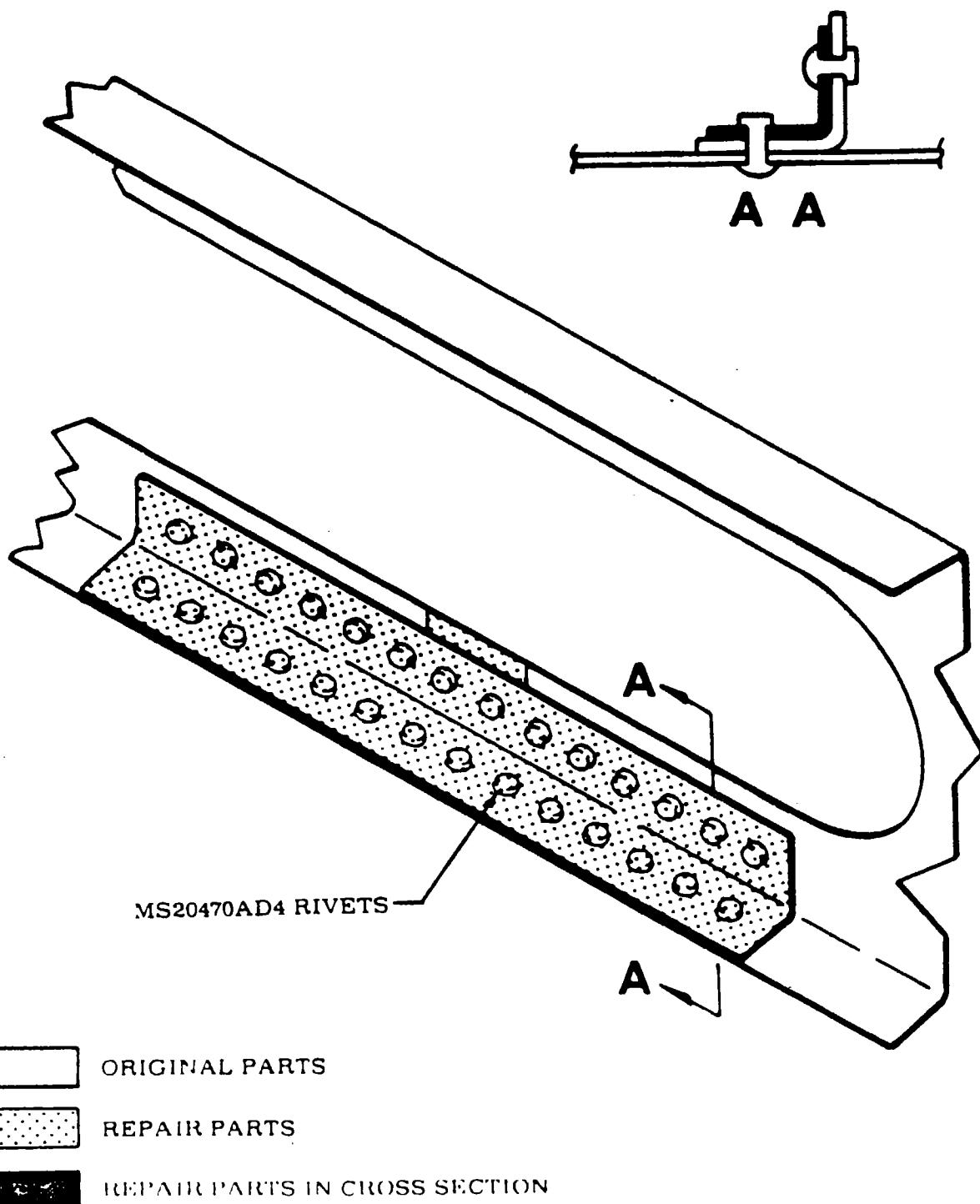


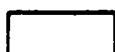
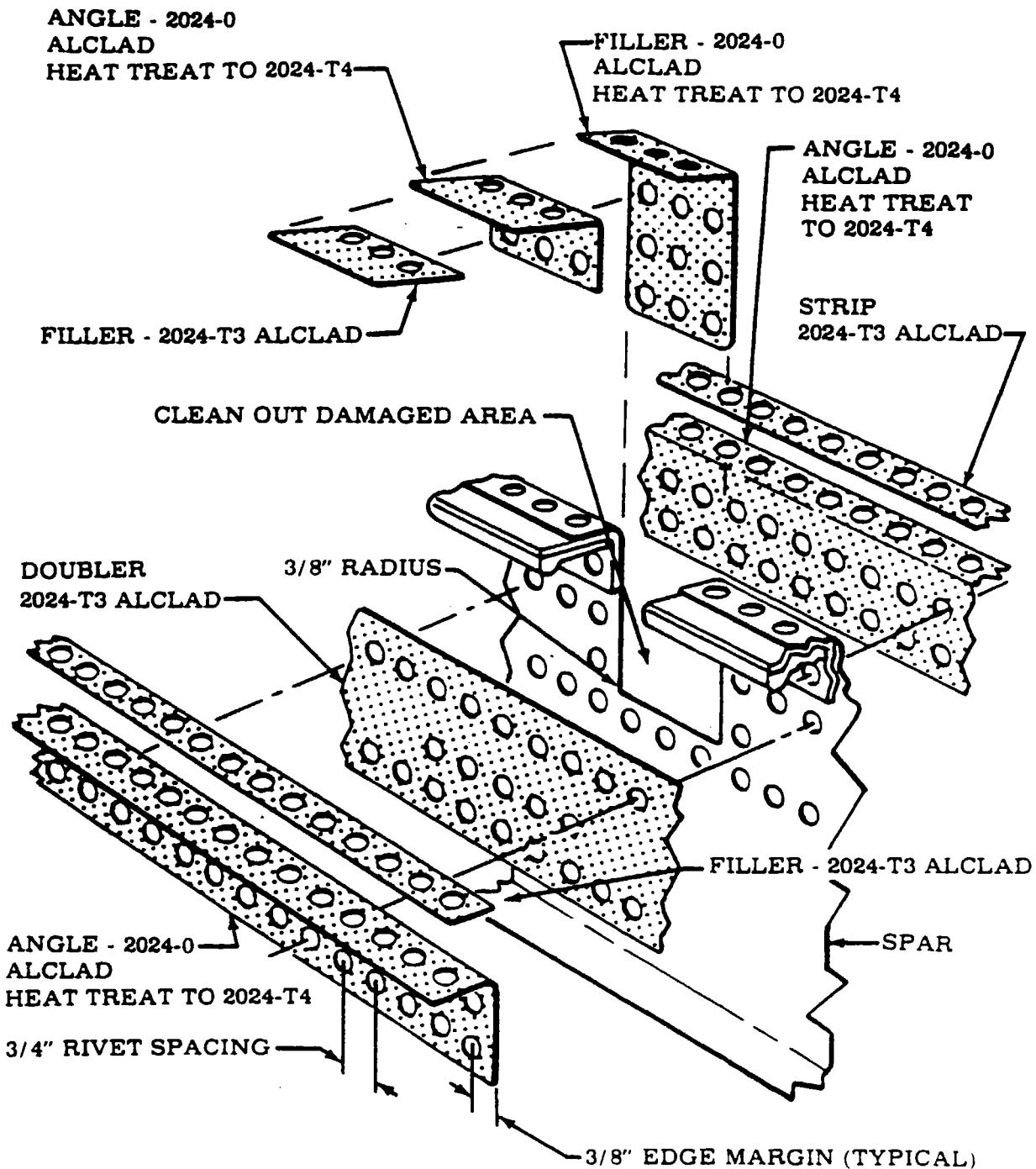
Figure 17-7. Wing Spar Repair (Sheet 3 of 4)

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 17-7. Wing Spar Repair (Sheet 3 of 4 continued)**

## MODEL 152 SERIES SERVICE MANUAL



ORIGINAL PARTS



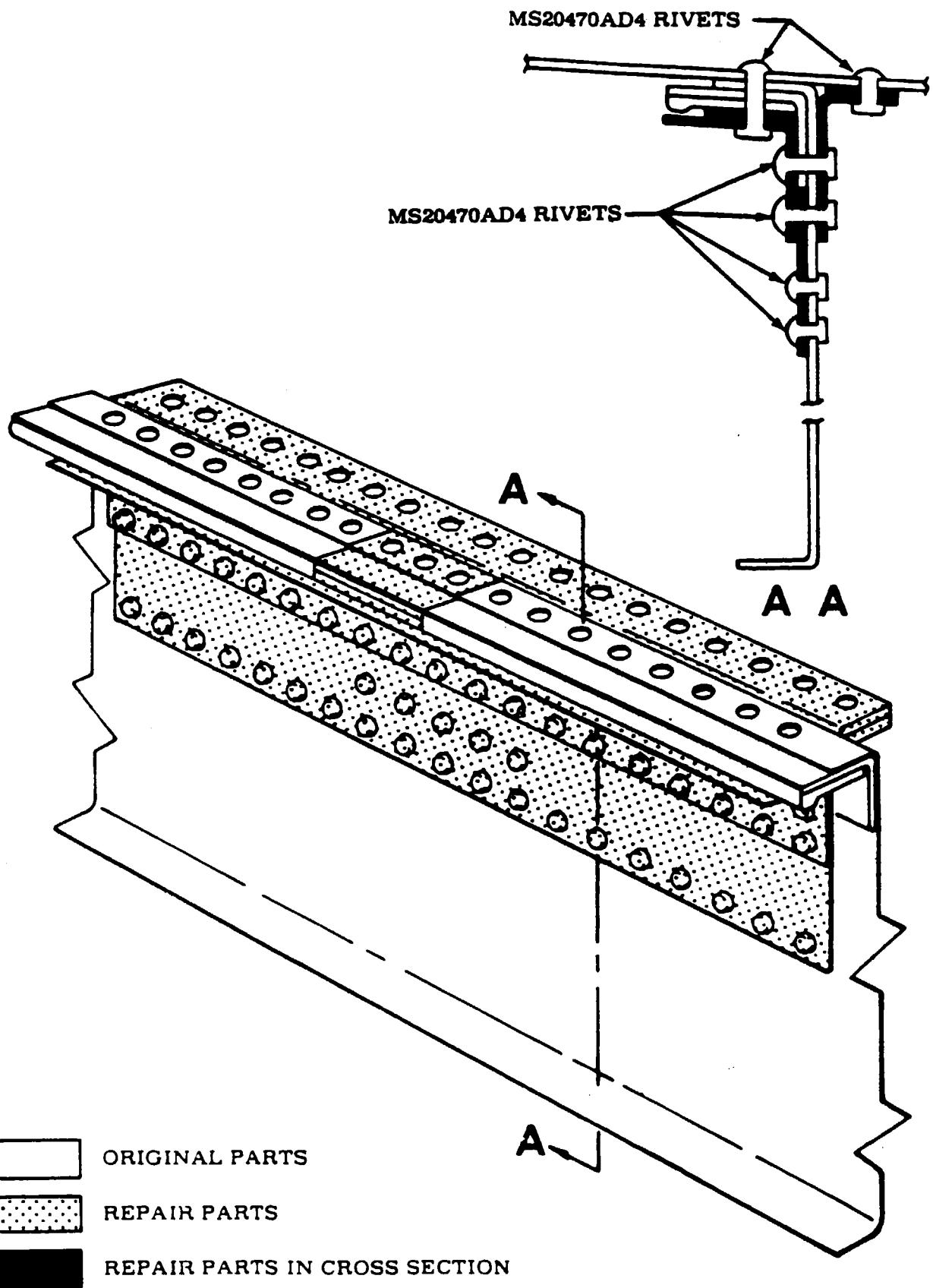
REPAIR PARTS



REPAIR PARTS IN CROSS SECTION

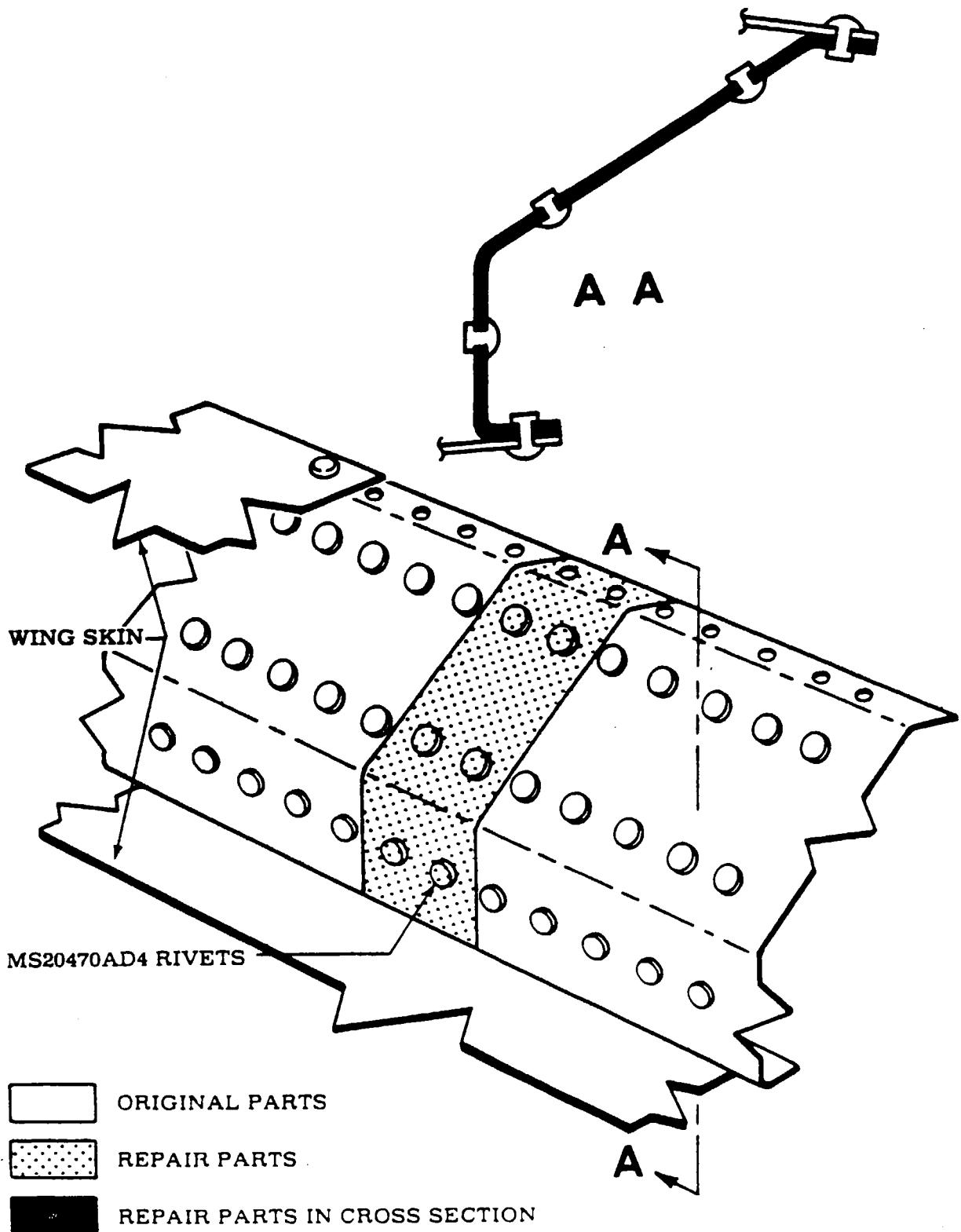
Figure 17-7.Wing Spar Repair (Sheet 4 of 4)

**MODEL 152 SERIES SERVICE MANUAL**



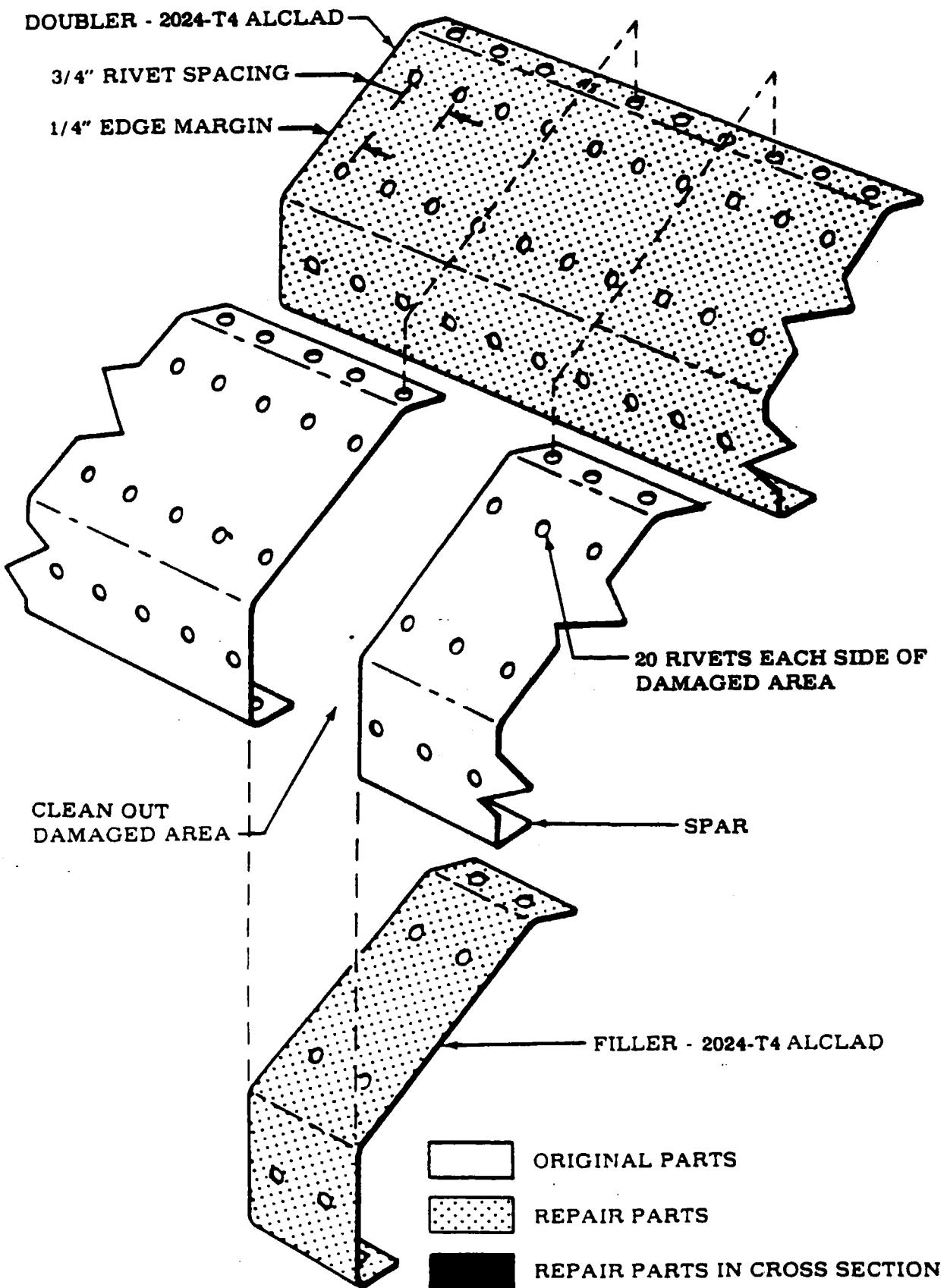
**Figure 17-7. Wing Spar Repair (Sheet 4 of 4 continued)**

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 17-8.Auxiliary Spar Repair**

**MODEL 152 SERIES SERVICE MANUAL**



**Figure 17-8. Auxiliary Spar Repair (continued)**

## MODEL 152 SERIES SERVICE MANUAL

### NOTES:

1. Dimple leading edge skin and filler material; countersink the doubler.
2. Use MS20426AD4 rivets to install doubler.
3. Use MS20426AD4 rivets to install filler, except where bucking is impossible. Use CR162-4 Cherry (blind) rivets where regular rivets cannot be bucked.
4. Contour must be maintained; after repair has been completed, use epoxy filler as necessary and sand smooth before painting.
5. Vertical size is limited by ability to install doubler clear of front spar.
6. Lateral size is limited to seven inches across trimmed out area.
7. Number of repairs is limited to one in each bay.

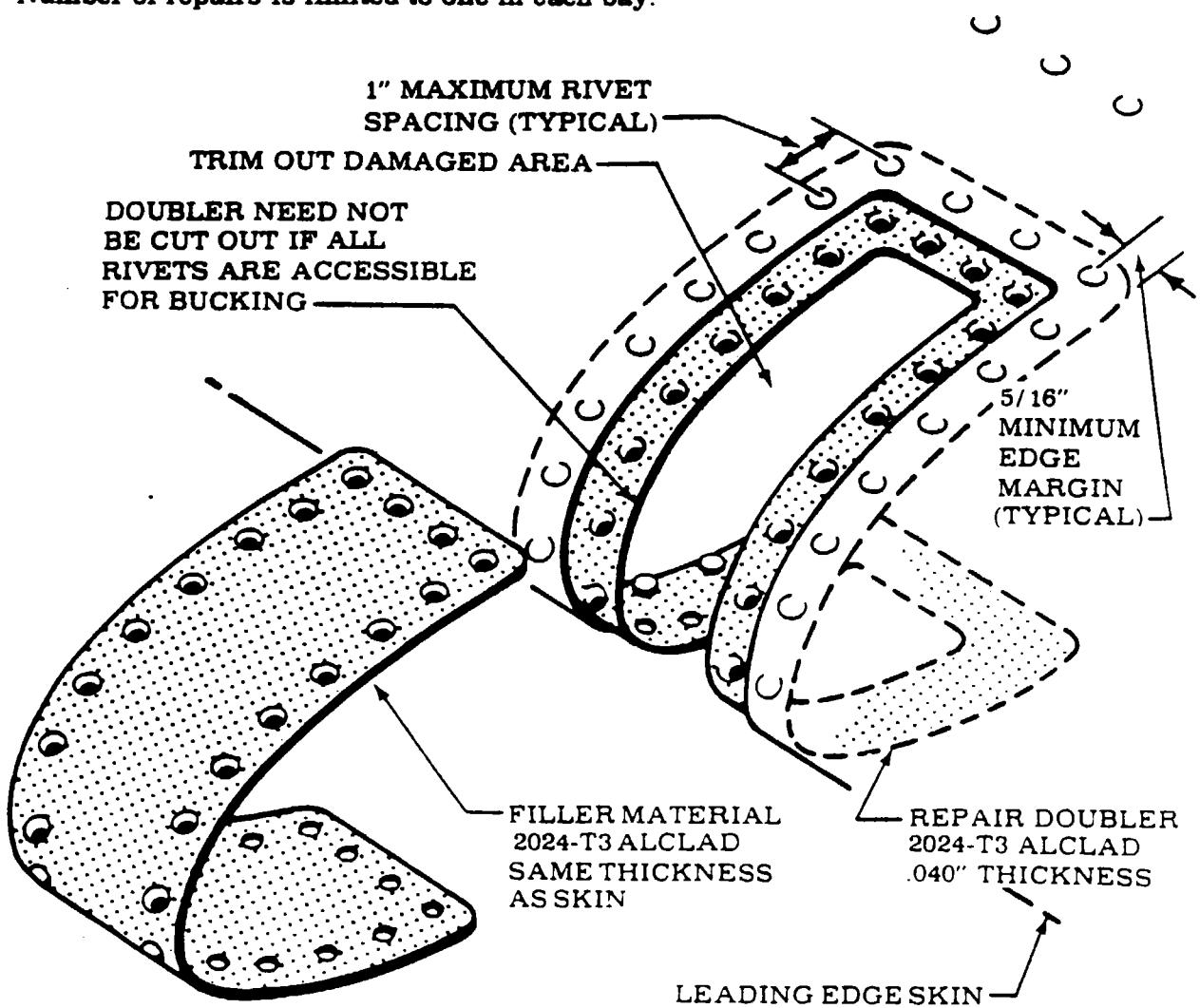


Figure 17-9. Leading Edge Repair

## MODEL 152 SERIES SERVICE MANUAL

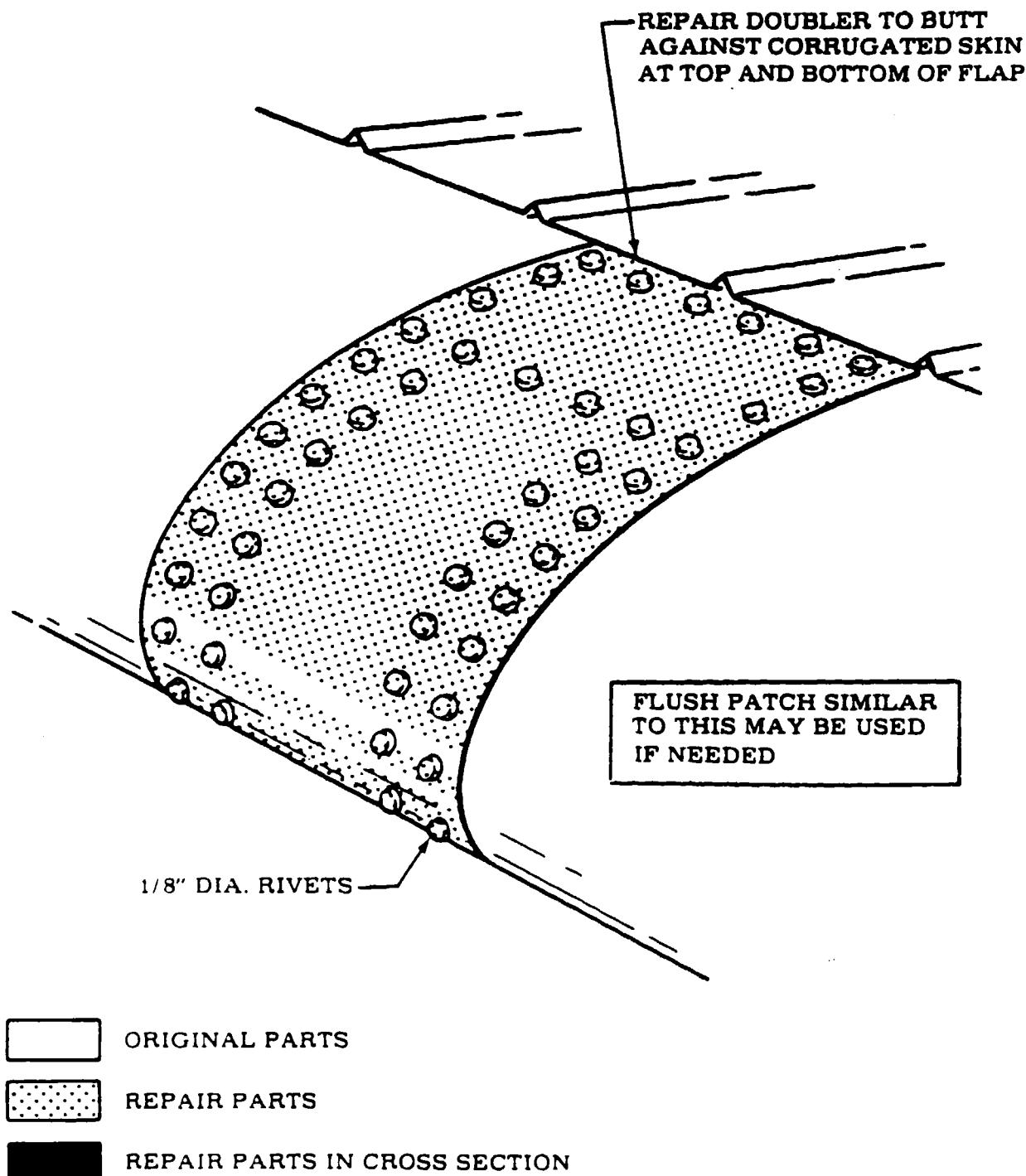


Figure 17-10. Flap Leading Edge Repair

MODEL 152 SERIES SERVICE MANUAL

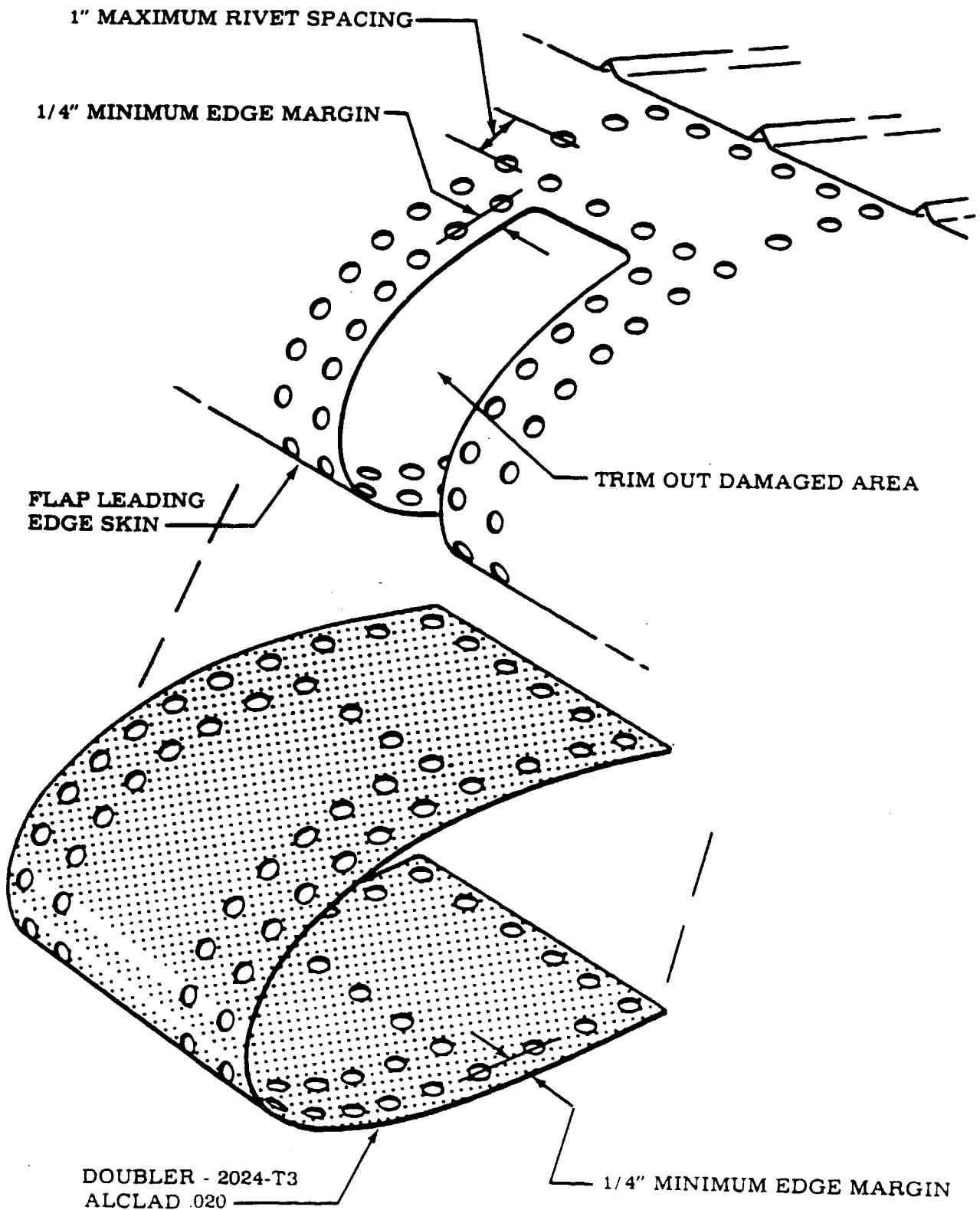


Figure 17-10. Flap Leading Edge Repair (continued)

## MODEL 152 SERIES SERVICE MANUAL

Establish exact location  
for inspection cover and  
inscribe centerlines.

Determine position of  
doubler on wing skin  
and center over  
centerlines. Mark the  
ten rivet hole locations  
and drill to size shown.

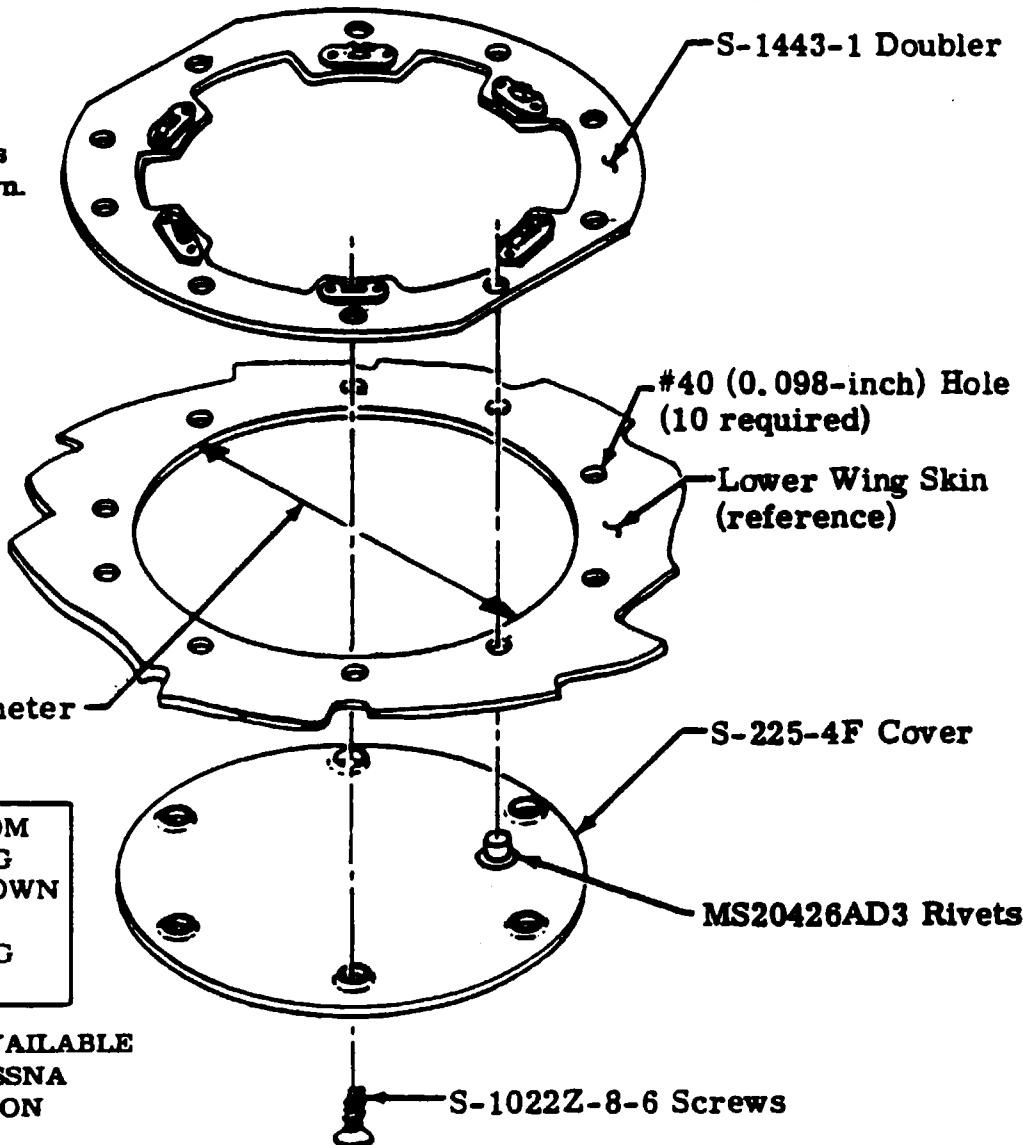
Cut out access hole,  
using dimensions  
shown.

Flex doubler and  
insert through  
access hole, and  
rivet in place.

Position cover and  
secure, using screws  
as shown.

**VIEWED FROM  
INSIDE WING  
LOOKING DOWN  
AT TOP OF  
LOWER WING  
SKIN.**

**PARTS ARE AVAILABLE  
FROM THE CESSNA  
SUPPLY DIVISION**



1. Add the minimum number of access holes necessary.
2. Any circular or rectangular access hole which is used with approved optional equipment installations may be added in lieu of the access hole illustrated.
3. Use landing light installations instead of adding access holes where possible. Do not add access holes at outboard end of wing; remove wing tip instead.
4. Do not add an access hole in the same bay where one is already located.
5. Locate new access holes near the center of a bay (spanwise).
6. Locate new access holes forward of the front spar as close to the front spar as practicable.
7. Locate new access holes aft of the front spar between the first and second stringers aft of the spar. When installing the doubler, rotate it so the two straight edges are closest to the stringers.
8. Alternate bays, with new access holes staggered forward and aft of the front spar, are preferable.
9. A maximum of five new access holes in each wing is permissible; if more is required, contact the Cessna Service Department.
10. When a complete leading edge skin is being replaced, the wing should be supported in such a manner so that wing alignment is maintained.

**Figure 17-11. Access Hole Installation**

MODEL 152 SERIES SERVICE MANUAL

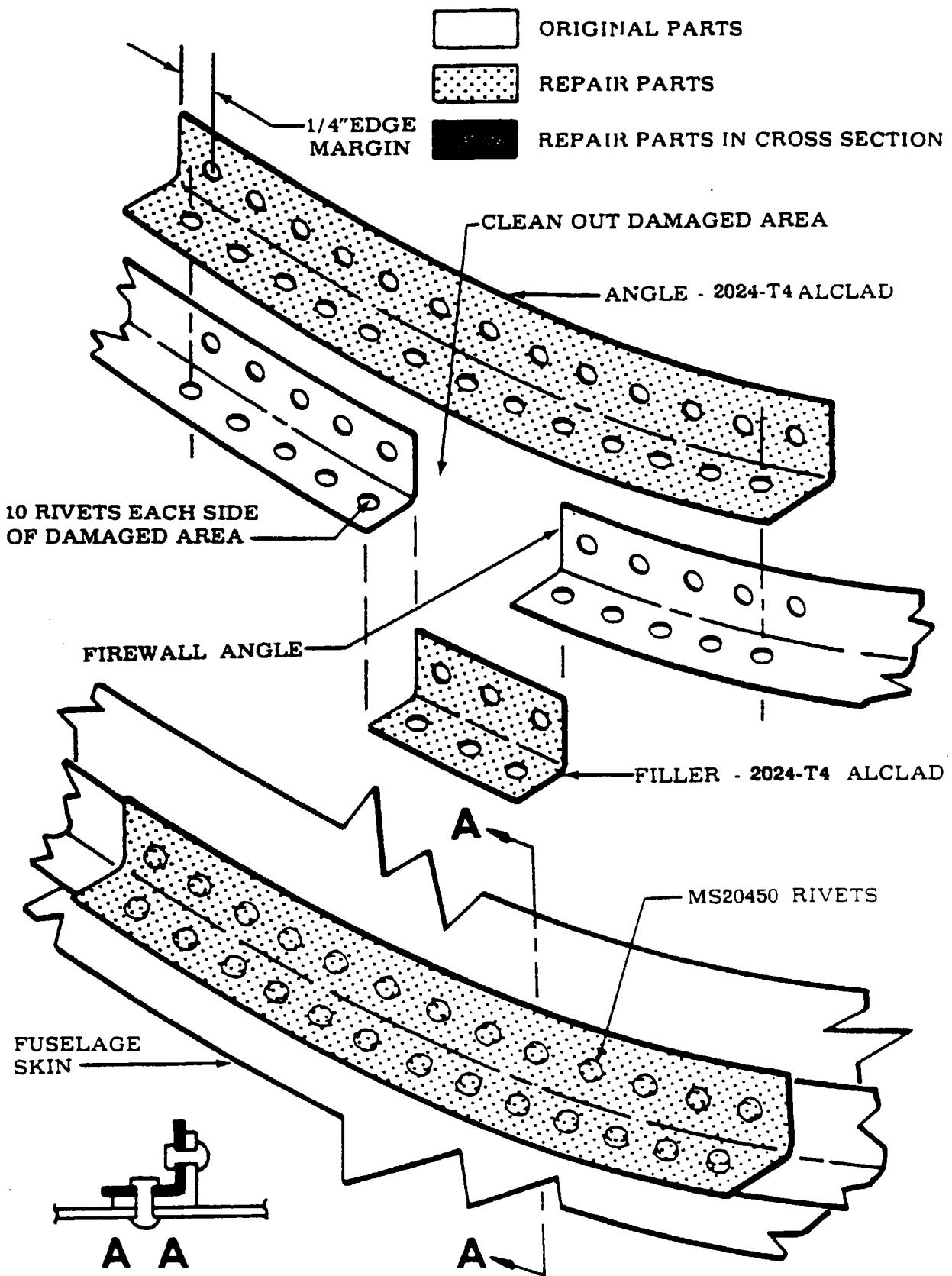


Figure 17-12. Firewall Angle Repair

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 18

### PAINT

TABLE OF CONTENTS	Page No.
Aerofiche/ Manual	
<b>MATERIALS</b>	2I22/18-2
Painting ABS	2I22/18-2
Interior Parts	2I22/18-2
Exterior Parts	2I23/18-3
Engine Mounts	2I24/18-4
<b>MATERIALS</b>	2I24/18-4
Facility	2J1/18-5
Clean-Up	2J1/18-5
Prepriming	2J2/18-6
Priming	2J2/18-6
Prepainting	2J3/18-7
Painting	2J3/18-7
Masking	2J3/18-7
Touch Up	2J4/18-8
Repair of Dents	2J4/18-8

#### NOTE

This section contains a listing of standard factory materials and areas of application. For paint number and color, refer to Aircraft Trim Plate and Parts Catalog. In all cases determine the type of paint on the airplane, because some types of paint are not compatible. Contact Cessna Parts Distribution (CPD 2) or a Cessna Service Station for materials acquisition information.

#### NOTE

Do not paint pitot tube, fuel caps, aileron gap seals nor antenna covers that were not painted at the factory.

#### NOTE

Control surfaces, except for wing flaps, require balancing after painting. Refer to Section 17 for balancing procedures.

## MODEL 152 SERIES SERVICE MANUAL

MATERIAL	NO/TYPE	DOMESTIC	FRENCH	AREA OF APPLICATION
PAINT	* ACRYLIC LACQUER	X		NOTE 1
	LACQUER		X	
	CES-1054-215 Heat Resistant Enamel	X	X	NOTE 6
PRIMER	P60G2 WITH R7K44 REDUCER	X	X	NOTE 2
	EX-ER-7 WITH T-ER-4 REDUCER	X	X	
THINNER	T-8402A	X		NOTE 4
	T-6094A	X	X	NOTE 3
SOLVENT	Methyl Ethyl Ketone (MEK)	X	X	NOTE 5

### NOTES

1. Used on aircraft exterior.
2. Used with lacquer or acrylic lacquer on aircraft exterior.
3. Used to thin lacquer and for burndown.
4. Used to thin acrylic lacquer and for burndown.
5. Used to clean aircraft exterior prior to priming.
6. Used on Engine mount.

\* THRU SERIALS 15280431, 15280434, 15280438,  
15280439, 15280447 and A1520759

### NOTE

When stripping paint from aircraft, do not allow stripper to contact ABS parts. Contact of stripper or thinners with ABS parts can cause damage.

- 18-1. PAINTING OF FORMED ABS PLASTIC PARTS. The following procedures outline some basic steps which are useful during touch up or painting of formed ABS plastic parts.
- 18-2. INTERIOR PARTS (Finish Coat of Lacquer).
  - a. Painting of Spare Parts.
    1. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

## MODEL 152 SERIES SERVICE MANUAL

### CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

2. After the part is thoroughly dry it is ready for the lacquer topcoat. Paint must be thinned with lacquer thinner and applied as a wet coat to ensure adhesion.
- b. Touch Up of Previously Painted Parts.
  1. Light sanding is acceptable to remove scratches and repair the surface but care must be exercised to maintain the surface texture or grain.
  2. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

### CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

3. After the part is thoroughly dry it is ready for the lacquer topcoat. Paint must be thinned with lacquer thinner and applied as a wet coat to ensure adhesion.

### NOTE

Lacquer paints can be successfully spotted in.

#### 18-3. EXTERIOR PARTS (Acrylic Topcoat).

- a. Painting of Spare Parts.
  1. Light scuff sand to remove scratches and improve adhesion.
  2. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

### CAUTION

Do not use strong solvents such as Xylol, Toluol or Lacquer Thinner since prolonged exposure can soften or embrittle ABS.

3. After the part is thoroughly dry it is ready for the topcoat. Paint must be thinned with appropriate acrylic thinner and applied as a wet coat to ensure adhesion.
- b. Touch Up of Previously Painted Parts.
  1. Lightly scuff sand to remove scratches and improve adhesion.
  2. Ensure a clean surface by wiping with Naphtha to remove surface contamination.

### CAUTION

Do not use strong solvents such as Xylol, Toluol or lacquer Thinner since prolonged exposure can soften or embrittle ABS.

3. Apply a compatible primer - surfacer and sealer.

## MODEL 152 SERIES SERVICE MANUAL

4. After the part is thoroughly dry it is ready for the topcoat. Paint must be thinned and applied as a wet coat to ensure adhesion.

### NOTE

Acrylic topcoats can be successfully spotted in.

- 18-4. **REFINISHING ENGINE MOUNTS.** After completing a repair as directed in Section 17, refinish with P/N CES 1054-215 Heat Resistant Enamel, Black. Degrease and scuff sand or grit blast entire area to bare metal. Spray enamel to a dry film thickness of 0.001" to 0.0013". and cure at 250°F for 15 minutes. Part can be handled as soon as cool to touch.

### NOTE

BEGINNING SERIALS 15280432, 15280433, 15280435, 15280436, 15280437, 15280440 THRU 15280448, and A1520760.

### IMRON MODIFIED URETHANE

MATERIAL	NO/TYPE	AREA OF APPLICATION
PRIMER	WASH PRIMER P60G2	Used to prime aircraft for Imron Enamel
REDUCER	Catalyst Reducer R7K44	Used to reduce P60G2
PAINT	Imron Enamel	Used as corrosion proof topcoat
	IMRON 192S Activator	Catalyst for Imron Enamel
THINNER	IMRON Y8485S Reducer	Used to thin Imron Enamel

### NOTE

Do not paint pitot tube, gas caps, or aileron gap seals.  
Also do not paint antenna covers which were not painted at the factory.

## MODEL 152 SERIES SERVICE MANUAL

### REQUIRED MATERIALS

MATERIAL	NO/TYPE	AREA OF APPLICATION
STRIPPER	Strypeeze Stripper	Used to strip primer overspray
CLEANER	DX440 Wax and Grease Remover	Used to clean aircraft exterior
	Imperial Cleaner	Used to remove grease, bug stains, etc.
	Klad Polish	Used to clean aluminum finish
	808 Polishing Compound	Used to rub out overspray
SOLVENT	(MEK) Methyl Ethyl Ketone	Used to clean aircraft prior to topcoat
CLOTH	HEX Wiping Cloth	Used to clean aircraft exterior
FILLER	White Streak	Used to fill small dents
MASKING	Class A Solvent Proof Paper	Used to mask areas not to be painted
	Tape Y218	Used for masking small areas
	Tape Y231	Used for masking small areas

- 18-5. **FACILITY.** Painting facilities must include the ability to maintain environmental control to a minimum temperature of 65°F., and a positive pressure inside to preclude the possibility of foreign material damage. All paint equipment must be clean, and accurate measuring containers available for mixing protective coatings. Modified Urethane has a pot life of four to eight hours, depending on ambient temperature and relative humidity. Use of approved respirators while painting is a must, for personal safety. All solvent containers should be grounded to prevent static build-up. 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., but lower than 90°F. Storage at 90°F. is allowable for no more than sixty days providing it is returned to room temperature for mixing and use. Modified urethane paint requires a minimum of seven days to cure under normal conditions, if humidity and temperature is lower, curing time will be extended to a maximum of 14 days. During the curing period, indiscriminate use of masking tape, abrasive polishes, or cleaners can cause damage to finish. Desirable curing temperature for modified urethane is 60°F. for a resulting satisfactory finish.

- 18-6. **CLEAN UP.**
- Inspect airplane for any surface defects, such as dents or unsatisfactory previous repairs, and correct according to Paragraph 18-13.

## MODEL 152 SERIES SERVICE MANUAL

- b. Wipe excess sealer from around windows and skin laps. Mask windows, ABS parts, and any other areas not to be primed, with 3M tape and Class A Solvent Proof Paper. Care must be exercised to avoid cuts, scratches or gouges by metal objects to all plexiglass surfaces, because cuts and scratches may contribute to crazing and failure of plexiglass windows.
- c. Methyl Ethyl Ketone (MEK) solvent should be used for final cleaning of airplanes prior to painting. The wiping cloths shall be contaminant and lint free HEX. Saturate cloth in the solvent and wring out so it does not drip. Wipe the airplane surface with the solvent saturated cloth in one hand, and immediately dry with a clean cloth in the other hand. It is important to wipe dry solvent before it evaporates.

When an airplane has paint or zinc chromate overspray on the exterior, stripper may be used to remove the overspray. The stripper may be applied by brush and will require a few minutes to soften the overspray. Heavy coatings may require more than one application of the stripper. Use extreme care to prevent stripper from running into faying surfaces on corrosion proofed airplanes. After removal of the overspray, clean the airplane with Methyl Ethyl Ketone (MEK) solvent in the prescribed manner.

### NOTE

It is imperative that clean solvent be used in cleaning airplanes. Dispose of contaminated solvent immediately. Fresh solvent should be used on each airplane.

### WARNING

Use explosion proof containers for storing wash solvents and other flammable materials.

#### 18-7. PRE-PRIMING.

- a. For all standard aircraft, P60G2 primer shall be mixed one part primer to one and one half parts R7K44 catalyst by volume, mix only in stainless steel or lined containers. After mixing, allow primer to set for thirty minutes before spraying. Pot life of the mixed primer is six hours. All mixed material should be discarded if not used within this time. Pot pressure during spray operation should be approximately  $10 \pm 1$  psi. Air pressure should be 40 to 50 psi at the gun. Blow loose contaminant off the airplane with a jet of clean, dry air. Cover the flap tracks, nose gear strut tube, wheels, and shimmy dampener rod ends. ABS parts and other pre-primed parts do not receive wash primer.

### WARNING

AIRCRAFT SHOULD BE GROUNDED PRIOR TO PAINTING TO PREVENT STATIC ELECTRICITY BUILD-UP AND DISCHARGE.

#### 18-8. PRIMING.

- a. Apply primer in one wet even coat. Dry film thickness to be .0003 to .0005 inches. Do not topcoat until sufficiently cured. When scratching with firm pressure of the fingernail does not penetrate the coating, the primer is cured. Primer should be topcoated within four hours after application.

## MODEL 152 SERIES SERVICE MANUAL

### 18-9. PREPAINTING.

- a. On standard aircraft mix the required amount of Imron with Imron 192S Activator in a 3 to 1 ratio. Mix thoroughly (no induction time required before spraying). Imron shall be thinned with Y8485S Imron Reducer to obtain a spraying viscosity of 18 to 22 seconds on a No. 2 Zahn Cup. Viscosity should be checked after 4 hours and adjusted if necessary.
- b. When applying modified urethane finishes, the painter should wear an approved respirator, which has a dust filter and organic vapor cartridge, or an air supplied respirator. All modified urethane finishes contain some isocyanate, which may cause irritation to the respiratory tract or an allergic reaction. Individuals may become sensitized to isocyanates.
- c. The pot life of the mixture is approximately 6-8 hours at 75°F. Pot pressure should be approximately 12 psi during application. Air pressure at the gun should be 40 to 50 psi.
- d. Scuff sand the primer only where runs or dirt particles are evident. Minor roughness or grit may be removed by rubbing the surface with brown Kraft paper which has been thoroughly wrinkled. Unmask ABS and other preprimed parts and check tapes. Clean surface with a jet of low pressure-dry air.

### 18-10. PAINTING ALL-OVER WHITE OR COLOR.

- a. Complete painting of the plane should be done with 2 or 3 wet, even coats. Dry coats will not reflow, and will leave a grainy appearance.
- b. Allow 5 minute period for the finish to flash off before moving aircraft to the oven.
- c. Move to the force dry oven and dry for approximately 1 1/2 hours at 120°F to 140°F.
- d. Dry film thickness of the overall color should be approximately 2.0 mils. Films in excess of 3.0 mils are not desirable.

### 18-11. MASKING FOR STRIPES.

- a. Remove airplane from the oven. Allow airplane to cool to room temperature before masking.
- b. Mask stripe area using 3M Tape Y231 or 3M Tape Y218 and Class A solvent proof paper. Double tape all skin laps to prevent blow by.
- c. Airplanes which will have a stripe only configuration shall be masked, cleaned, and primed, in stripe area only.
- d. If the base coat is not over 72 hours old, the stripe area does not require sanding. If sanding is necessary because of age or to remove surface defects, use #400 or #600 sandpaper. Coarse paper will leave sand marks which will decrease gloss and depth of gloss of the finish. The use of power sanders should be held to a minimum, if used, exercise care to preclude sanding through the white base coat. Wipe surface to be striped with a tack cloth and check all tapes.
- e. Stripe color will be the same as the base coat, mix as outlined in paragraph 18-9.
- f. Painting of the stripe should be done with 2 or 3 wet, even coats. Dry coats will not reflow, and will leave a grainy appearance. Stripes may be force dried or air dried. Film thickness of a stripe is approximately 1.5 mil to 2.0 mils.
- g. Do not remove masking tape and paper until the paint has dried to a "dry to touch" condition. Care should be exercised in removal of the masking to prevent damage to the finish.
- h. Modified urethane finishes are sensitive to moisture and, therefore, should be stored out of rain until cured.

## MODEL 152 SERIES SERVICE MANUAL

### 18-12. TOUCH-UP.

When necessary to touch up or refinish an area, the defect should be sanded with #400 and followed by #600 sandpaper. Avoid, if possible, sanding through the primer. If the primer is penetrated over an area 1/2 inch square or larger, repriming is necessary. Avoid spraying primer on the adjacent paint as much as possible. Since urethane finishes cannot be "spotted in" repairs should be in sections extending to skin lap or stripe lines.

- a. Dry overspray and rough areas may be compounded out with DuPont #808 rubbing compound.
- b. Grease, bug stains, etc., may be removed from painted surfaces with DX440 Wax and Grease Remover or Imperial Cleaner. Klad Polish may be used on bare aluminum to remove stains, oxides, etc.
- c. Rework areas, where paint or primer removal is required, may be stripped with Strypeeze Paint Remover. All traces of stripper must be removed before refinishing.

### 18-13. REPAIR OF DENTS.

- a. To repair dents use White Streak Filler or equivalent. Mix White Streak in the correct proportion as recommended by the manufacturer.
- b. Do not apply White Streak Filler over paint. All paint shall be removed in the repair area and the aluminum surface sanded lightly to increase adhesion. Apply the White Streak to a level slightly above the surrounding skin. After drying for 10-15 minutes, sand the filler flush with the skin surface, using care to feather the edges.

#### NOTE

Application of a top coat thickness in excess of 5.0 mils.  
requires a control surface balance check.

# MODEL 152 SERIES SERVICE MANUAL

## SECTION 19 WIRING DIAGRAMS

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# MODEL 152 SERIES SERVICE MANUAL

## CIRCUIT FUNCTION AND SPECIFIC CIRCUIT CODE LETTERS

A - Armament	LB - Instrument
B - Photographic	LC - Landing
C - Control Surface	LD - Navigation
CA - Automatic Pilot	LE - Taxi
CC - Wing Flaps	LF - Rotating Beacon
CD - Elevator Trim	LG - Radio
D - Instrument (Other Than Flight or Engine Instrument)	LH - De-ice
DA - Ammeter	LJ - Fuel Selector
DB - Flap Position Indicator	LK - Tail Floodlight
DC - Clock	M - Miscellaneous
DD - Voltmeter	MA - Cowl Flaps
DE - Outside Air Temperature	MB - Electrically Operated Seats
DF - Flight Hour Meter	MC - Smoke Generator
E - Engine Instrument	MD - Spray Equipment
EA - Carburetor Air Temperature	ME - Cabin Pressurization Equipment
EB - Fuel Quantity Gage and Transmitter	MF - Chem O <sub>2</sub> - Indicator
EC - Cylinder Head Temperature	P - D.C. Power
ED - Oil Pressure	PA - Battery Circuit
EE - Oil Temperature	PB - Generator Circuits
EF - Fuel Pressure	PC - External Power Source
EG - Tachometer	Q - Fuel and Oil
EH - Torque Indicator	QA - Auxiliary Fuel Pump
EJ - Instrument Cluster	QB - Oil Dilution
F - Flight Instrument	QC - Engine Primer
FA - Bank and Turn	QD - Main Fuel Pumps
FB - Pitot Static Tube Heater and Stall Warning Heater	QE - Fuel Valves
FC - Stall Warning	R - Radio (Navigation and Communication)
FD - Speed Control System	RA - Instrument Landing
FE - Indicator Lights	RB - Command
G - Landing Gear	RC - Radio Direction Finding
GA - Actuator	RD - VHF
GB - Retraction	RE - Homing
GC - Warning Device (Horn)	RF - Marker Beacon
GD - Light Switches	RG - Navigation
GE - Indicator Lights	RH - High Frequency
H - Heating, Ventilating and De-Icing	RJ - Interphone
HA - Anti-icing	RK - UHF
HB - Cabin Heater	RL - Low Frequency
HC - Cigar Lighter	RM - Frequency Modulation
HD - De-ice	RP - Audio System and Audio Amplifier
HE - Air Conditioners	RR - Distance Measuring Equipment (DME)
HF - Cabin Ventilation	RS - Airborne Public Address System
J - Ignition	S - Radar
JA - Magneto	U - Miscellaneous Electronic
K - Engine Control	UA - Identification - Friend or Foe
KA - Starter Control	W - Warning and Emergency
KB - Propeller Synchronizer	WA - Flare Release
L - Lighting	WB - Chip Detector
LA - Cabin	WC - Fire Detection System
	X - A.C. Power

## MODEL 152 SERIES SERVICE MANUAL

FUNCTION CIRCUITS	GAUGE	BASE COLOR (or solid)	STRIPE COLOR
A + Power	16	Red	None
	16	Red	None
	18	Red	Black
A - Power		Red	White
	20	Red	Green
	22	Red	Yellow
Ground	16	Black	None
	18	Black	White
Mike Ground	22	Black	None
Radio Lights Dim	18	Yellow	None
Mike Audio	22	Tan	None
		Tan (Shielded)	None
Mike Key	22	White	Black
Radio Speaker	20	Green	None
Headphones	22	Blue	None
Dev + •	22	Gray	Red
Dev - •	22	Gray	Green

- "Dev+" and "Dev-" circuits are for use in Nav-o-matic 300 autopilots and any associated omni indicator circuit to which it connects.

### NOTE

All other color coded wires are for general use in multi-conductor radio and autopilot harness assemblies.

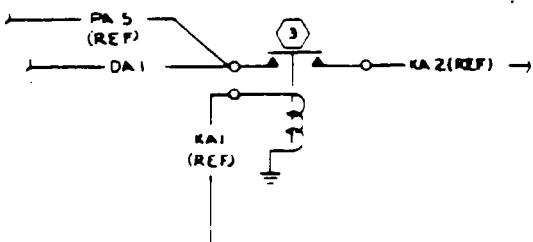
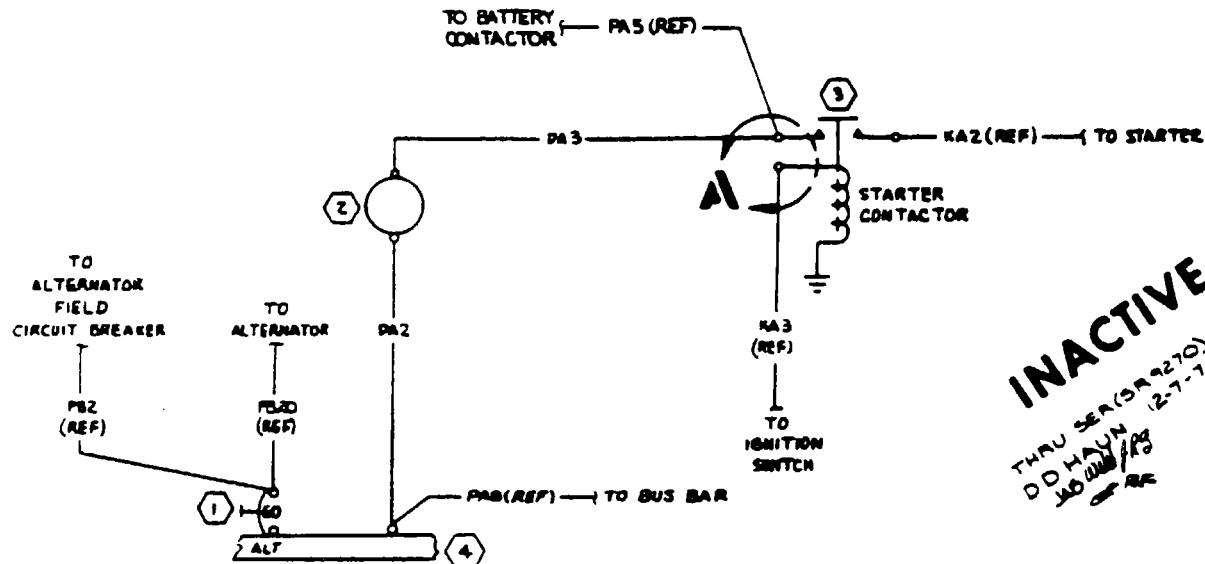
## MODEL 152 SERIES SERVICE MANUAL

### CROSS REFERENCE LISTING OF SERIAL REQUEST NUMBERS LISTED ON DIAGRAMS VS. AIRCRAFT SERIAL NUMBERS.

SR NO.	AIRCRAFT SERIAL NO.	SR NO.	AIRCRAFT SERIAL NO.
SR8450	15279406	SR9101	15283592
SR8451	A1520735	SR9102	A1520879
SR8452	FA1520337	SR9103	FA1520358
SR8689	15280170, A1520754, F15201429 & FA1520337	SR9195	15282532 & A1520831
SR8770	15282032 & F15201529	SR9270	15283592, A1520879, F15201674 & FA1520358
SR8771	A1520809	SR9621	15284542
SR8772	FA1520347	SR9622	A1520944
SR8861	15280460, A1522760, FA1520347 & F15201539	SR9742	15284599, A1520948, F15201809 & FA1520373
SR8921	15281187, A1520778, F15201529 & FA1520347	SR10056	15285182, A1520984, F15201894 & FA1520378
SR9014	15283131, A1520805, F15201529 & FA1520347	SR10411	15285940, A1521027, F1521953 & FA1520388

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: S1707-60 WAS S1596-60L (SR8450)(SR8451)(SR8452)	GDS 1-14-77	JAD 1044 REF
B	BY REV: SER OUT DA1; SER IN DA3; KA3 (REF) WAS KAI(REF); ADD DETAIL "A" (SR8920)	GDS 7-12-77	JAD 2-18 REF
C	BY REV: ADD PA3(REF), DA2 WIRE WAS CONN TO ALT Ckt BKR AT BUS BAR, ADD OCT0423 (SR8770)(SR8771)(SR8772)	C.R.S 10-27-77	JAD 1044 REF
D	BY REV: S1232-60 WAS S1707-60 <del>WICHITA CONVENTION</del>	KM LEW 10-5-78	JAD 1044 REF
E	BY REV: S1707-60 WAS S1232-60 DELETE (SR9101) (SR9102)(SR9103) INACT DWG (SR9270)	DO HAUN 12-7-78	JAD 1044 REF



DETAIL A  
THRU SER (SR8920)

4	0470423	BUS BAR
3	S1577-1	CONTACTOR
2	S1320-5	AMMETER
1	S 707-60	CIRCUIT BREAKER
	PART NO.	DESCRIPTION

## EQUIPMENT TABLE

CDS-1000 IS APPLICABLE  
VENDOR CODES PER S-4000  
CDS-KUDON-CESSNA SPEC. NO.  
S-4000 OR CDS-KUDON-CESSNA  
STD. NO.

SUPERVISOR: 0470401 P4.1  
SUPERVISOR BY: 0470406 P4.6

WIRE TABLE					
CONTRACT NO:					
DESIGNER: LHM/DS/001	NAME: J.C. SMITH	DATE: 8-27-76			COMMERCIAL AIRCRAFT DIV. KODIAK AIRCRAFT CO. 3800 E. PAWNEE WICHITA, KANSAS
GROUP: 0470400	DRAWN: 8-29-76				
CHECK: J. YOUNG	STRESS: 0-50-76				
SIZE: GA	MATERIAL: LG	TERMINALS:			SERIALS:

## WIRE TABLE

Cessna, AIRCRAFT CO.

TITLE: WIRING DIAGRAM — AMMETER 60 AMP		
SIZE: C	CODE IDENT. NO.: 71379	DRW. NO. 0470406
SCALE: NONE	PAGE: 4.1	

(SR8450)(SR8451)(SR8452)

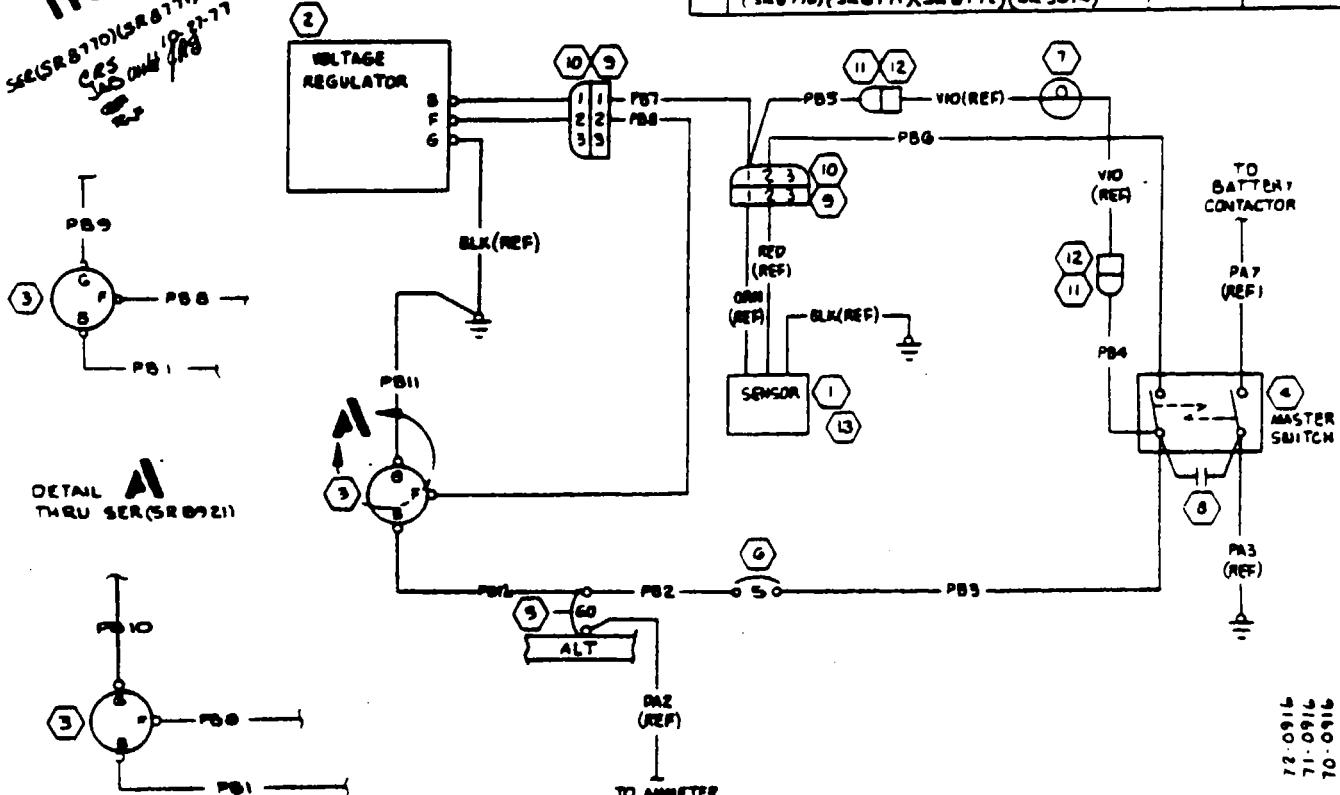
# MODEL 152 SERIES SERVICE MANUAL

D	BY REV: ADDED C593003-0103 OVERVOLT SENSOR (ALT); C611004-0102 4-12-76 WAS C611004-0101 (SR8940) (SR8969)	TPS SERIAL NO. REF	JAD 244/1
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REVISION			
REV	DESCRIPTION	DATE	APPRO
A	BY REV C611004-0101 WAS C611005-0105, CAS WAS CAZ (SR8450)(SR8451)(SR8452)	6-05 1-18-77	X-100 X-100
B	BY REV: SER OUT PB9; SER IN PB10; PA7(REF) WAS PA2(REF); ADD DETAIL "A" (SR8921)	6-05 7-12-77	JAD 244/1 REF
C	BY REV: ADDED PB11 AND PB12. DETAIL A & SERIAL . SERIALIZED OUT PB1 AND PB10, S-1707-LOL WAS S-1896-LOL, S1867-4-8/PB2. WAS S1867-4-10 DUE BECOMES INACT (SR8770)(SR8771)(SR8772)(SR8914)	6-05 10-21-77	JAD 244/1 REF

**INACTIVE**

SER(SR8770)(SR8771)(SR8772)  
C611004-0102 (SR8969)  
REF



PB12 8	S-1962-8-9	S-1967-4-8	SR9014 (ON ALL SPARES)
PB1 8	S-1962-8-9	S-1967-4-8	SR9014 (ON ALL SPARES)
PB10 8	S-1962-8-9	S-1967-4-8	SEE (SR8921) THRU (SR9014)
PB9 8	S-1962-8-9	S-1967-4-8	THRU SER (SR8921)
PB8 22		S-1967-4-8	
PB7 22		S-1967-4-8	
PB6		S-1967-4-8	
PB5		S-1967-4-8	
PB4		S-1967-4-8	
PB3 22		S-1967-4-8	
PB2 8	S-1962-8-9	S-1967-4-8	
PB1 8	S-1962-8-9	S-1967-4-8	THRU SER (SR9014)
WIRE NO.	GA	MATERIAL	TERMINALS
G	12	REF	SERIALS

13	C593003-0103	OVERVOLT SENSOR (ALT)
12	S1637-2	HOUSING
11	S1637-1	HOUSING
10	S1638-2	HOUSING
9	S1638-1	HOUSING
8	TVA1315	CAPACITOR
7	S235-2	LAMP ASSY
6	CAS	CIRCUIT BREAKER
5	S-1707-60	CIRCUIT BREAKER
4	S1994-1-1	SWITCH
3	C611003-0102	ALTERNATOR
2	C611004-0102	VOLTAGE REGULATOR
1	C593003-0101	OVERVOLT SENSOR



### EQUIPMENT TABLE

C611003 IS APPLICABLE  
VENDOR CODES PER S-1400  
C611004-CESSNA SPEC. NO.  
S-1400 OR C611004-CESSNA  
STD. NO.

SUPERSEDED  
0470401 PG.2

SUPERSEDED BY:  
0470406 PG.4.5

### CONTRACT NO:

DESIGN	G. WATSON	DATE
GROUP	01	9-776
DRAWN	J.C. SMITH	8-23-76
CHECKED	J. YOUNG	8-26-76

STREWD

OTHER

**Cessna**, AIRCRAFT CO.

COMMERCIAL AIRCRAFT DIV.  
5600 E. PAWNEE  
WICHITA, KANSAS

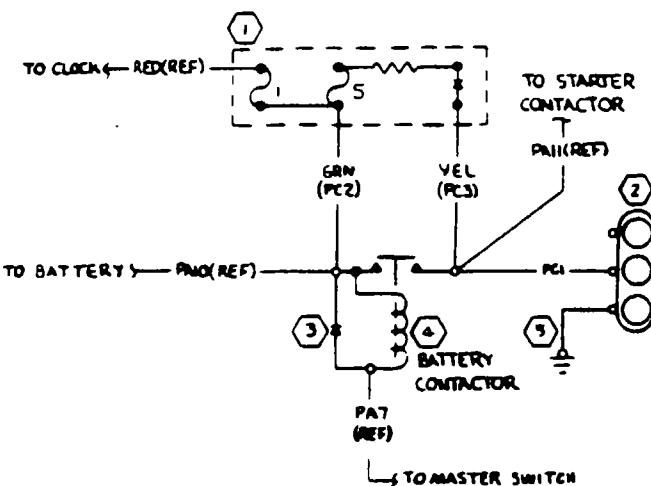
TITLE

### WIRING DIAGRAM — ALTERNATOR SYSTEM, 60 AMP

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C	CODE IDENT. NO. <b>71379</b>	0470406
SCALE: NONE		PAGES: 4.2

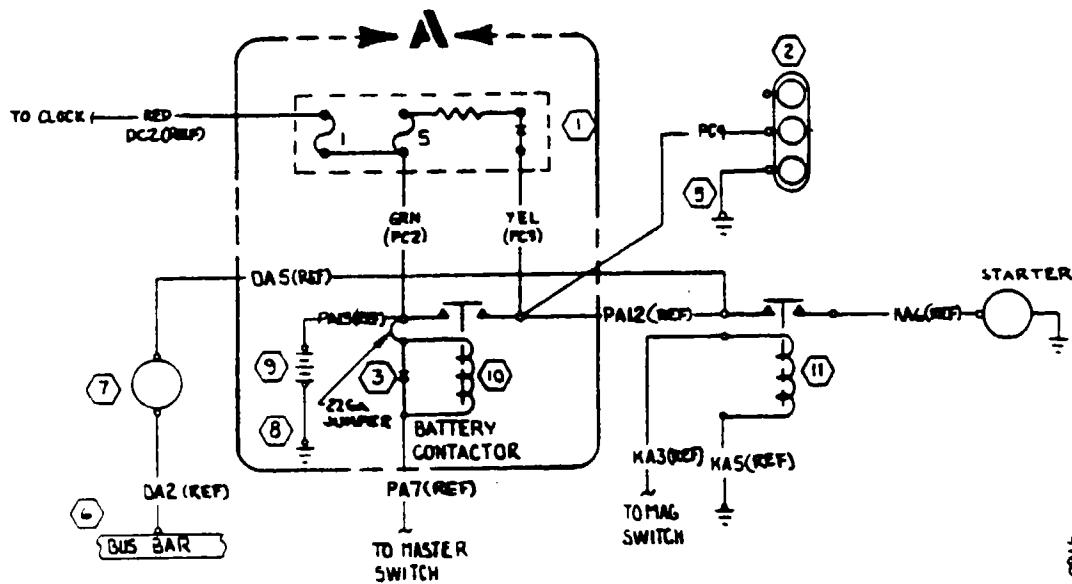
(SR8920)(SR8921)(SR8922)

# MODEL 152 SERIES SERVICE MANUAL



REVISION			
REV.	DESCRIPTION	DATE	APPRO
A	BY REV: ADD DETAIL "A"; SEE OUT PC1; ADD PCA (SR9621)(SR9622)	VTL 11-8-73	CON. BY 1/P3 RF

**DETAIL A**  
THRU SER (SR9621)(SR9622)



PART NO.	DESCRIPTION	CODE NO.			MATERIAL	LQ	TERMINALS	SERIALS
		CODE	NO.	GA				
11 S2443-1	STARTER CONTACTOR							
10 S2475-1	BATT CONTACTOR							
7 C619002-0101	BATTERY	YEL(REF)	22	-22-4	SI367-1-13	SOLDER		
8 0412007	GROUND STRAP	GRN(REF)	22	-22-5	SOLDER	SI367-1-13		
7 S-1320-5	AMMETER	PC1	4	S-1562-4-9	SI367-6-16 SI367-6-13			THRU(SR9621)(SR9622)
- 0470423	BUS BAR ASSY	CODE NO.	GA	MATERIAL	LQ	TERMINALS		SERIALS
5 0312155	GROUND STRAP							
4 S1580-1	CONTACTOR							
3 0710728	DIODE ASSY							
2 M93506-4	RECEPTACLE							
1 0712031	FUSE & DIODE ASSY							

WIRE TABLE			COMMERCIAL AIRCRAFT DIV. 8800 E. PAWNEE WICHITA, KANSAS		
CONTRACT NO:			TITLE		
	NAME	DATE	WIRING DIAGRAM — GROUND SERVICE RECEPTACLE (OPTIONAL)		
PROJ	G WHITSON	8-27-76	Cessna, AIRCRAFT CO.		
GROUP	0	4-17-76			
DRAWN	J.C. SMITH	8-26-76			
CHECK	J. YOUNG	8-26-76			
STRESD					
SIZE	CODE IDENT.	DRNG NO.			
C	71379	0470406			
SCALE: NONE			PAGE: 4.3		

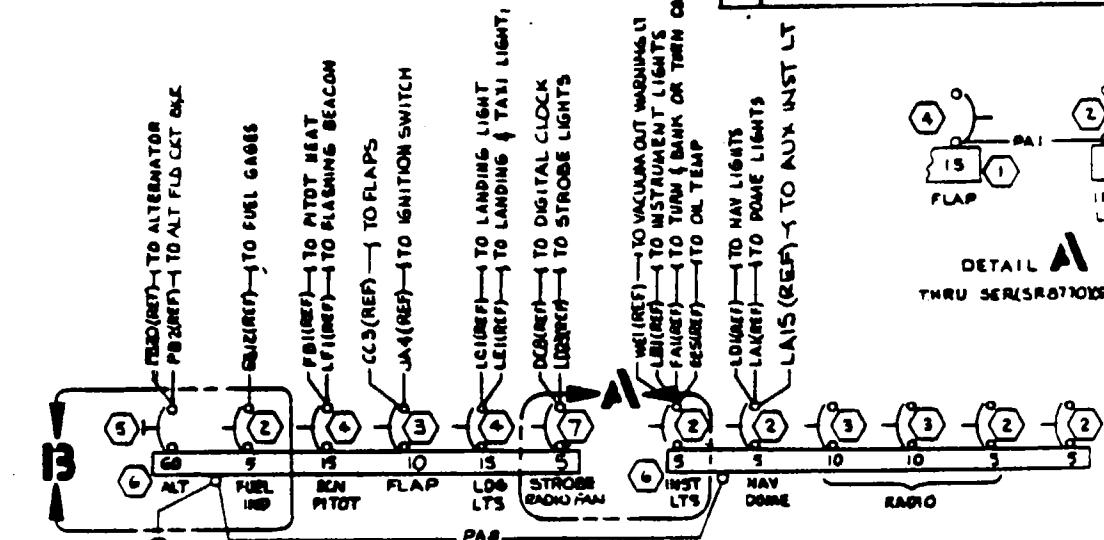
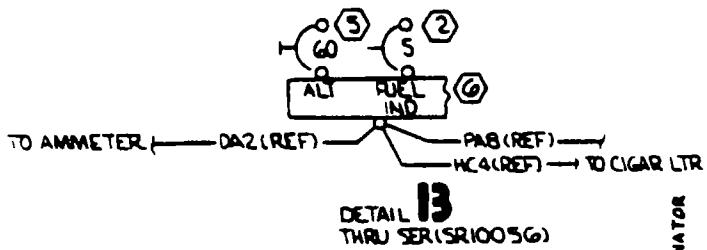
(SR9620)(SR9621)(SR9622)

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-1000-CESNA SPEC. NO.  
S-1000 OR C1000-CESNA  
STD. NO.

SUPERSEDED:  
0470401 PG.4  
SUPERSEDED BY:  
OTHER

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LIST	DESCRIPTION	DATE	APPRO
G	BY REV: ADD DETAIL 'B' (SR10056)	GW 1-12-81	JAB 005 REF
H	BY REV: 'STROBE' WAS 'STROBE-RADIO FAN'; 'STROBE-RADIO FAN' CIRCUIT BREAKER WAS S1232-5 (SR10091)	GW 1-8-81	PAB E 005
J	BY REV: ADD WE (REF) (SR10091)	GW 10-14-81	SRB 005 REF
K	BY REV: DELETE REV 'H' CHANGES (SR10091)(REF)	GW 1-7-82	JAB 005



PART NO.	DESCRIPTION	WIRE TABLE					
		CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
7 S-1232-5	CIRCUIT BREAKER						
6 0470423	BUS BAR						
5 S-1232-60	CIRCUIT BREAKER						
4 S1360-1SL							
3 S1360-1OL							
2 S1360-5L	CIRCUIT BREAKER						
1 1270704	BUS BAR						
<b>EQUIPMENT TABLE</b>							
CDS-4000 IS APPLICABLE VENDOR CODES PER S-4000 CDS-NOM-CRASHA SPEC. NO. S-4000 OR CRASHA-CRASHA STD. NO.		SUPERSEDED: 0470401	PAB	PROJ: 9-20-76	SIZE: C	CODE IDENT. 71379	OWNO: 0470406
SUPERSEDED BY:				APPO: 10-27-77			
OTHER:					SCALE: NONE		PAGE: 4-4

COMMERCIAL AIRCRAFT DIV.  
3600 E. PAWNCE  
WICHITA, KANSAS

*Cessna, Aircraft Co.*

**WIRING DIAGRAM —**  
**BUS BAR**  
**CIRCUIT BREAKER**

(SR8770)(SR8771)(SR8772)

# MODEL 152 SERIES SERVICE MANUAL

**NOTES**

- CAPACITOR INSTALLED AS PART OF BASIC AVIONICS KIT (OPT)
- TERMINATE VENDOR FURNISHED WIRES WITH S-K636-1 PIN

LET	DESCRIPTION	DATE	REVISION
			APPRO
A	BY REV: DELETE PB12 ; ADD PB19, PB20; O570314 ADD C611005-0102(ALT) (S61103) (S6111) (S6112)	DL-P	JAB 000 JAB REF
B	BY REV: S-1943-2 WAS S-1943-1 (SR8710)(SR8711)(SR8772)	RLY	JAB 000 JAB REF
C	BY REV: S-1362-60 WAS S-1707-60; ADD DETAIL "A" & NOTE 2.(SR9101) (SR9102) (SR9103) (SR 9429)	RML/ERH	JAB 000 JAB REF
D	BY REV: S-1943-2 WAS S-1943-2/PB21 (SR9429)	RLY	STAN REF
E	BY REV: 206A WAS 22GA/PB13,PB14, PB15,PB17; 16GA WAS 22GA/PB16 S-2099-8 WAS S-2099-6, S-1367-2-10 WAS S-1367-1-10  (NOW SHOP PRACTICE) TEL(PB13) WAS PB13, RED(PB14) WAS PB14, ORANGE(PB15) WAS PB15, BLU(PB16) WAS PB16 (USE EXISTING STOCK)	RLK HHG	JAB 000 JAB REF
F	BY REV: O570315 WAS O570314, ADD DETAIL "B" , PB22 , & PB23 (SR 9788)	SEB	W/ ADD 1/13 331-80 OCS 'm'

PART NO.	DESCRIPTION	WIRE CODE NO.	GA	MATERIAL	LQ	TERMINALS	SERIALS	WB	WIRE TABLE
14 C611005-0102	ALT CONTROL UNIT(ALT)	ORANGE(PB15)	20	-20-3				S-2099-6-1367-1-10	
13 O570315	TERMINAL BOARD	RED(PB14)	20	-20-2				S-2099-6-1367-1-10	
12 CAS	CRT BKR	TEL(PB13)	20	-20-4				S-2099-6-1367-1-10	
11 S-1915-1	CAPACITOR	WB	8	S-1562-8-9				S-1943-2-1943-2 THRU SER (SR 9785)	
10 C611503-0102	ALTERNATOR ASSY	PB11	8	S-1562-8-9				S-1943-2-1367-60 THRU SER (SR9429)	
9 S-1994-1-1	SWITCH	PB 3	22					S-1367-1-8-1367-6-8	
8 S-1362-60	CIRCUIT BREAKER	PB 2	8	S-1562-8-9					
7 S-1360-5L	CIRCUIT BREAKER	WIRE CODE NO.	GA	MATERIAL	LQ	TERMINALS			
6 S-2135-2	LAMP ASSY	WB							
5 S-1637-2	HOUSING	WB							
4 S-1637-1	HOUSING	WB							
3 S-2373-2	CONNECTOR	WB							
2 S-2373-1	CONNECTOR	WB							
1 C611005-0101	ALT CONTROL UNIT	WB							
<b>EQUIPMENT TABLE</b>									
C611000 IS APPLICABLE VENDOR CODES PER S-4000 C611000-CESSNA SPEC. NO. S-XXX OR CXXX-CCESSNA STD. NO.		SUPERSEDES: 0470406 P 4.2		PROJ	R.FIFE	10-6-77	SIZE	CODE IDENT NO	DRWG NO
		SUPERSEDED BY:		APPO	QF		C	71379	Q470406
		OTHER		SCALE	None				PAGE: 4.5

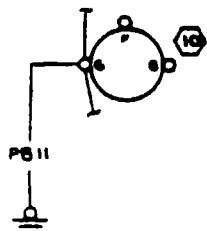
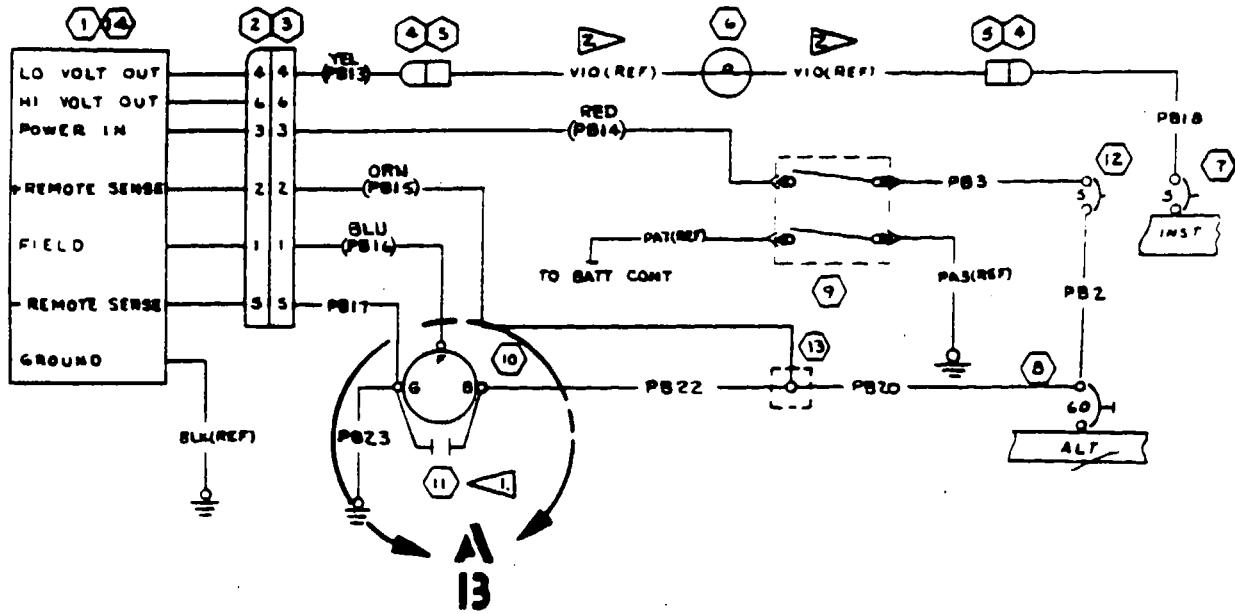
*Cessna Aircraft Co.*

**WIRING DIAGRAM —  
ALTERNATOR SYSTEM  
60 AMP**

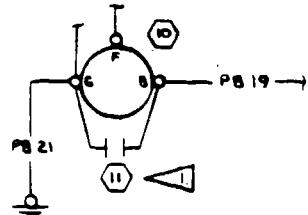
108770XSR8771XSR8772

Alternator System 60 AMP (Sheet 1 of 2)

# MODEL 152 SERIES SERVICE MANUAL



DETAIL A  
THRU SER(SR 9429)



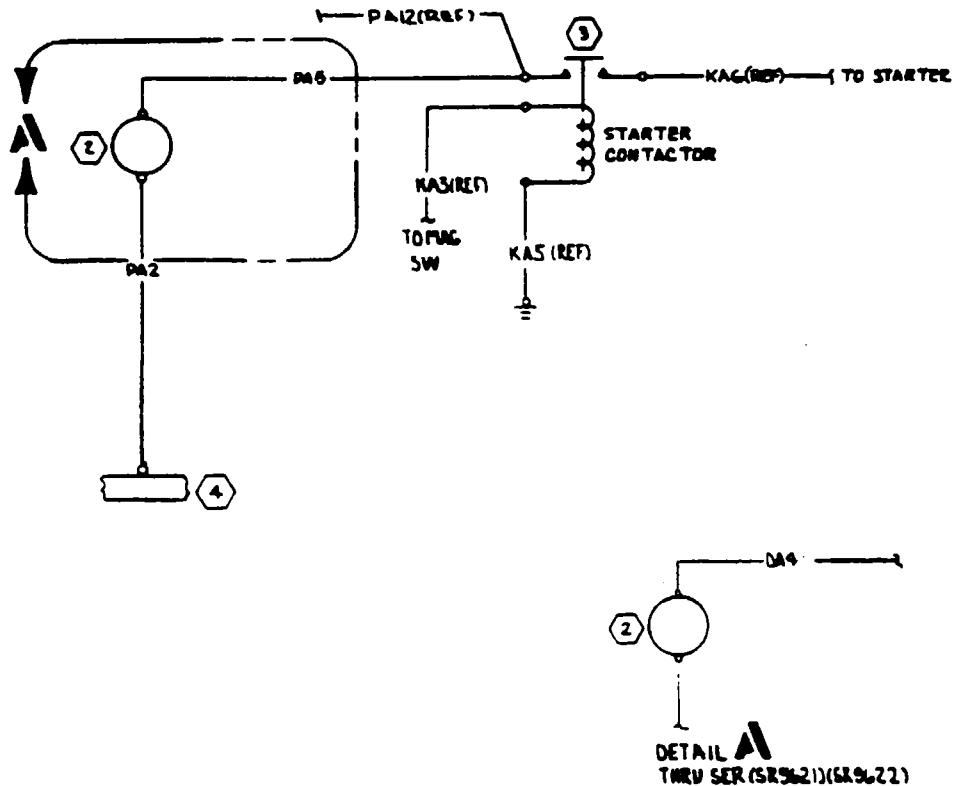
DETAIL B  
THRU SER(SR 9705)

CONTRACT NO.			TITLE		
DEPT	NAME	DATE	FAIRBANE DIVISION 3000 E. FAIRBANE WICHITA, KANSAS		
WHITSON		11-3-77	CESSNA AIRCRAFT CO.		
GROUP		12-4-77	WIRING DIAGRAM -		
DRAWN	C SHAFER	10-27-77	ALTERNATOR SYSTEM		
CHECK	BORLESKE	11-1-77	60 AMP		
STRESS			SIZE	CODE IDENT.	DRAW NO.
PROJ	R FIRE	12-6-77	C	71379	Q470406
APPO	QF		SCALE: NONE PAGE: 4.5		
OTHER			(SR 8770)(SR 8771)(SR 8772)		

Alternator System 60 AMP (Sheet 2 of 2)

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: ADD DETAIL "A" & DAS, SEE OUT DAS (SR9-21)(SR9-622)	NTL 11-8-79	600-200 1/13 8P



22-0916

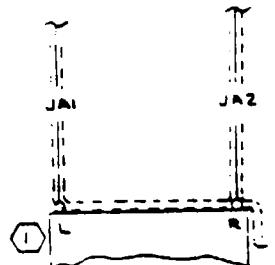
DA 5	B	S-1562-B-9	S-2447-B S-1367-10	SER(SR762) (SR622) ON	
DA 4	B	S-1562-B-4	S1367-4-0 S-2447-B	THRU SER(SR762) (SR622)	
DA 2	B	S-1562-B-9	S1367-4-0 S1367-4-10		
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
<b>WIRE TABLE</b>					
CONTRACT NO:			COMMERCIAL AIRCRAFT DIV CESSNA AIRCRAFT CO. 8800 E. PAWNEE WICHITA, KANSAS		
	NAME	DATE			
DESIGN	WHITSON	12-15-78	TITLE		
GROUP	<u>W</u> H	12-14-78	WIRING DIAGRAM —		
DRAWN	DDHAUN	12-7-78	AMMETER		
CHECK	DOLESKE	12-12-78	60 AMP		
STRESS					
PROJ	E FREE	12-10-78	SIZE	CODE IDENT.	DRWG NO
APPRO	<u>MS</u>		NO	C 71379	0470406
OTHER					
SCALE: NONE			SR 9270		PAGE: 4.6

# MODEL 152 SERIES SERVICE MANUAL

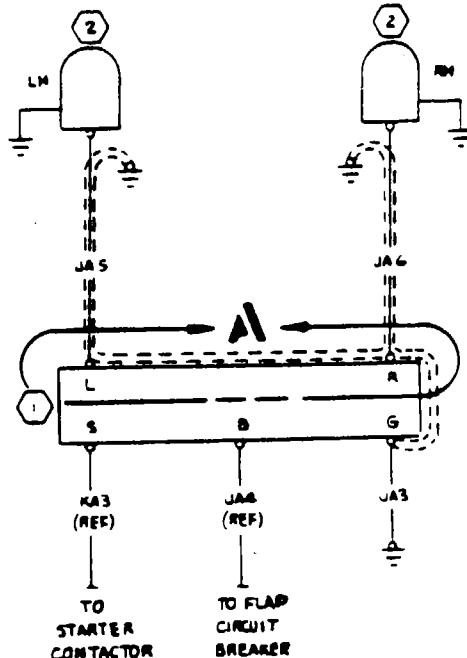
**NOTES:**

- TERMINATE CENTER CONDUCTOR WITH S1367-1-0;  
TERMINATE SHIELDS WITH S1367-2-G

REVISION			
LIST	DESCRIPTION	DATE	APPROVED
A	BY REV SER OUT JAI/JAZ, SERIN JAS/JAL KA3/REFI WAS KARREFI; ADD DETAIL A (SRB921)	WDS 7-2-77	ADS 48 — SF



DETAIL A  
THRU SER (SRB921)



50-0016  
9-15-06  
9-15-06  
9-15-06

CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
JAS	185				SER (SRB921) 4 ON
JAS	185				SER (SRB921) 4 ON
JA3	18			SI367-1-G SI367-1-B	
JA2	185				THRU SER (SRB921)
JAI	185				THRU SER (SRB921)

**WIRE TABLE**

CONTRACT NO.:		
DESIGN	G NM1150M	6-27-76
GROUP	Old Handout	4-1-76
DRAWN	J.C. SMITH	6-25-76
CHECK	J. YOUNG	6-26-76
STRESS		

COMMERCIAL AIRCRAFT DIV.  
3800 E. PAWNEE  
WICHITA, KANSAS

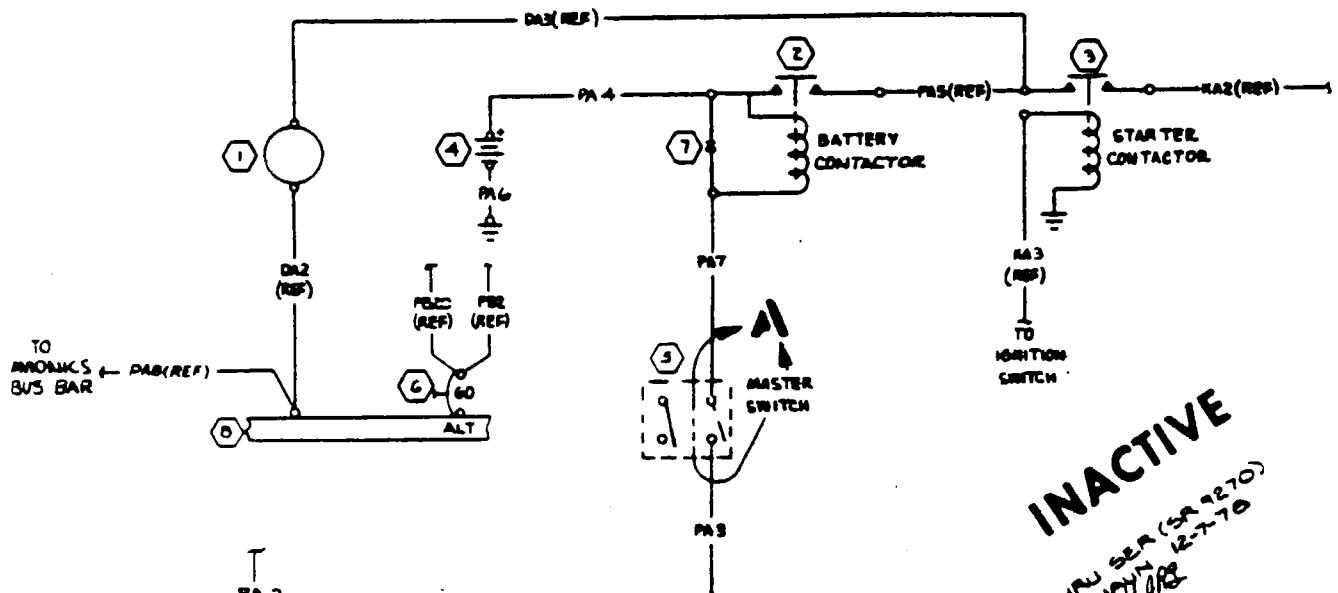
**WIRING DIAGRAM —  
MAGNETOS**

Z 447	MAGNETO	TITLE		
1 C292901-0105	IGNITION SWITCH	Cessna AIRCRAFT CO.		
PART NO. DESCRIPTION		WIRE TABLE		
<b>EQUIPMENT TABLE</b>				
CES-1000 IS APPLICABLE VENDOR CODES PER S-1000 CES-XXX-CESSNA SPEC. NO. S-1000 OR CESSNA-CESSNA STD. NO.	SUPERSEDED: 0470401 PS.1	PROJ	9-20-76	SIZE CODE IDENT. NO. DWG NO.
	SUPERSEDED BY:	APPRO	105	C 71379 0470406
	OTHER			SCALE: NOR E PAGE: 3.1

(SRB921(SA845)) (SRB922)

# MODEL 152 SERIES SERVICE MANUAL

F	BY REV: ADD C614002-001, PA9, PA10 & DETAIL "B"; SER OUT PA4 & PA6; S1707-60 WAS 515%-60% (NOW SHOP PRACTICE); S1232-60 WAS S1707-60 <i>(SR 9103)</i>	RM/LENR 10-5-70	MOD/REF PA5 PA6	REVISION		
				REV	DESCRIPTION	DATE
A	BY REV: ADD PA6; S1994-111 WAS S1994-111; DELETE 0412007 (SR 8770)(SR 8771)(SR 8772)			GDS	PA5 PA6	1-12-77
B	BY REV: C614001-0101 WAS C614001-0101 (SR 8770)	DD HAWAII 12-7-78	PA5 PA6 PA7	GDS	PA5 PA6	5-10-77
C	BY REV: SER OUT PA2; SER IN PA7; PA3 (REF) WAS DA2 (REF); PA3 (REF) WAS MA3 (REF) ADD DETAIL "A" (SR 8771)			GDS	PA5 PA6	7-12-77
D	BY REV: DA2 (REF) WIRE WAS COMM TO ALT CRT BKR AT BUS BAR; ADD PA8 (REF) (SR 8770)(SR 8771)(SR 8772)			CPS	PA5 PA6 PA8	1-12-77
E	BY REV: C614001-0105 WAS C614001-0101 (SR 9149)			RLY	PA5 PA6 PA8	5-23-78

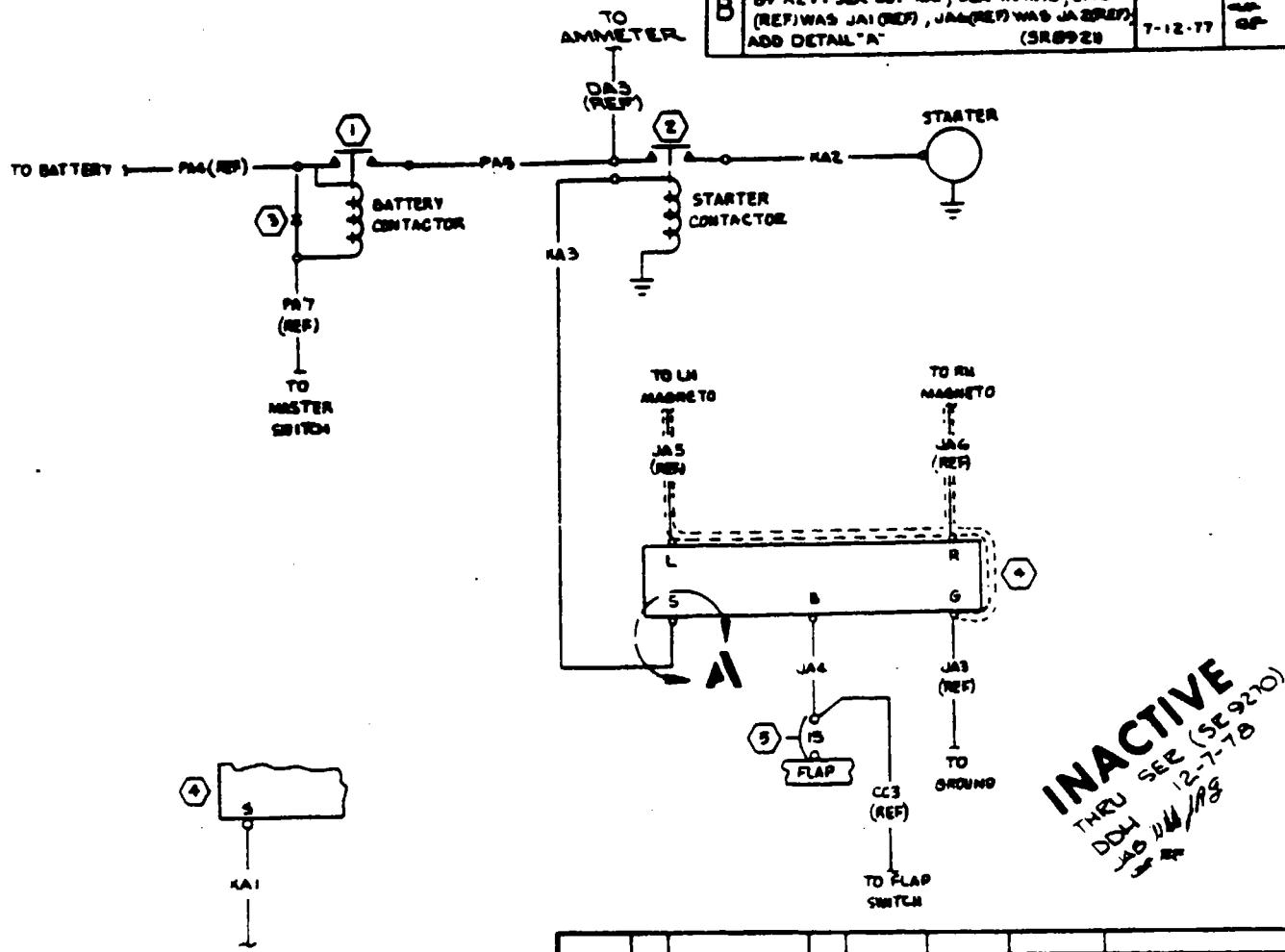


DETAIL A  
THRU SCR (SR 8771)

PART NO.	DESCRIPTION	WIRE TABLE		
		CONTRACT NO:	NAME	DATE
8 0470423	BUS BAR			
7 0770728	DIODE ASSY	WIRE CODE NO: GA	MATERIAL: LG	TERMINALS: SIGNALS
6 S-1707-60	CIRCUIT BREAKER			
5 S-1994-111	SWITCH			
4 C614001-0105	BATTERY ASSY			
3 S1577-1	STARTER CONTACTOR			
2 S1580-1	BATTERY CONTACTOR			
1 S1320-5	AMMETER			
<b>EQUIPMENT TABLE</b>		Cessna, AIRCRAFT CO.	COMMERCIAL AIRCRAFT DIV. 3800 E. PAWNEE WICHITA, KANSAS	
CESSNA IS APPLICABLE VENDOR CODES PER S-400 CES-XXXX-CESSNA SPEC. NO. S-XXXX OR CESSNA-CESSNA STD. NO.		CONTRACT NO: PROJ: 0470406 PG.1 SUPERSEDED BY: 0470406 PG.3	SIZE: C CODE IDENT: 71379 DRAWN: J.C. SMITH 6-23-76 CHECK: J. YOUNG 6-25-76 STRESS: OTHER	DRW NO: 0470406 (SR 8450)(SR 8451)(SR 8452)

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: S1360-4SL WAS S1360-4OL (SER450)(SER451)(SER452)	REC 3-25-77	SER 150 SER 151 SER 152
B	BY REV: SER OUT KAI; SER IN KAS; JAS (REF)WAS JAI(REF), JAI(REF)WAS JA2(REF); ADD DETAIL "A" (SER920)	GDS 7-12-77	JAC 10/11 REF SER



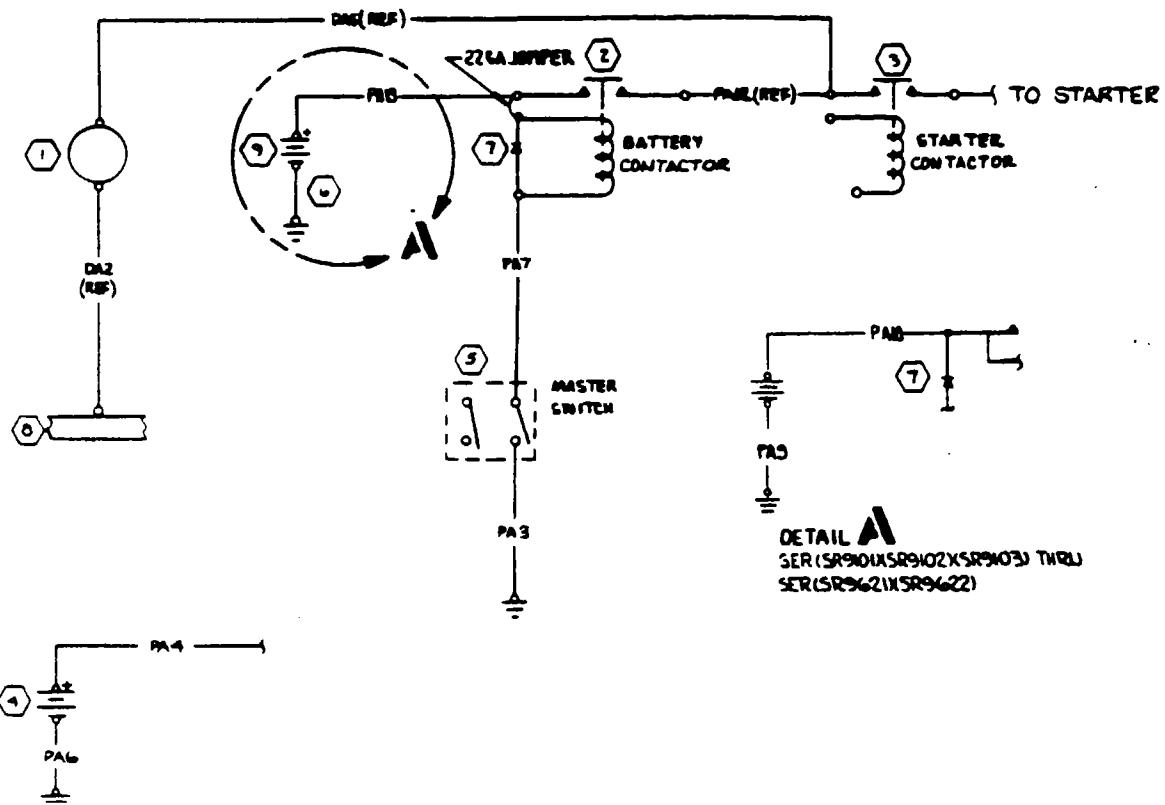
**INACTIVE**  
THRU SER (SC 9210)  
001 12-7-18  
YES MM/AS  
R

KA3	16		S1367-1-10	S1367-1-10		SER (SRB921) 1 ON
PAS	4		S1367-G-13	S1367-G-13		
JAA	16		S1367-1-6	S1367-1-10		
KA2	4		S1367-G-13	S1367-G-13		
KAI	16		S1367-1-10	S1367-1-10		THRU SER (SRB921)
WIRE	GA	MATERIAL	LA	TERMINALS		SIGNALS

CODE NO.				WIRE TABLE			COMMERCIAL AIRCRAFT DIV. 3800 E. PAWNEE WICHITA, KANSAS			
6				CONTRACT NO:						
5	SIMCO-1SL	CIRCUIT BREAKER								
4	CZ9501-0103	IGNITION SWITCH								
3	0710120	DIODE ASSY								
2	SISTI-1	STARTER CONTACTOR								
1	SISB0-1	BATTERY CONTACTOR								
	PART NO.	DESCRIPTION								
		EQUIPMENT TABLE								
CIB-1000 IS APPLICABLE VENDOR CODES PER S-1400 CIB-K100-C100A SPEC. NO. STD. NO.			SUPERVISOR 0470401 P.G.2	PROJ	0470406	T-1076	SIZE C	CODE IDENT 71379	DRAWN NO 0470406	
SUPERVISOR BY 0470406 P 6.4			APPRO P.G.2							
OTHER									SCALE: NONE	
									PAGE: G.2	

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPRO
A	BY REV: ADD C614002-0101, PA9, PA10 & DETAIL 'A'; SEE OUT PA4 & PA6;  (SR9101) (SR9102) (SR9103)	O HAUN 12-7-78	JAC 400 10/23 CSP RAF
B	BY REV: S24754 UMS 51580-1, ADD PA13, PA12, PA07 & SECOND DETAIL 'K'; SEE OUT PA9 & PA10  (SR9621) (SR9622)	MTL 11-8-79	CSP 400 10/23 RAF



DETAIL A  
THRU SEE SECTION SEPARATION

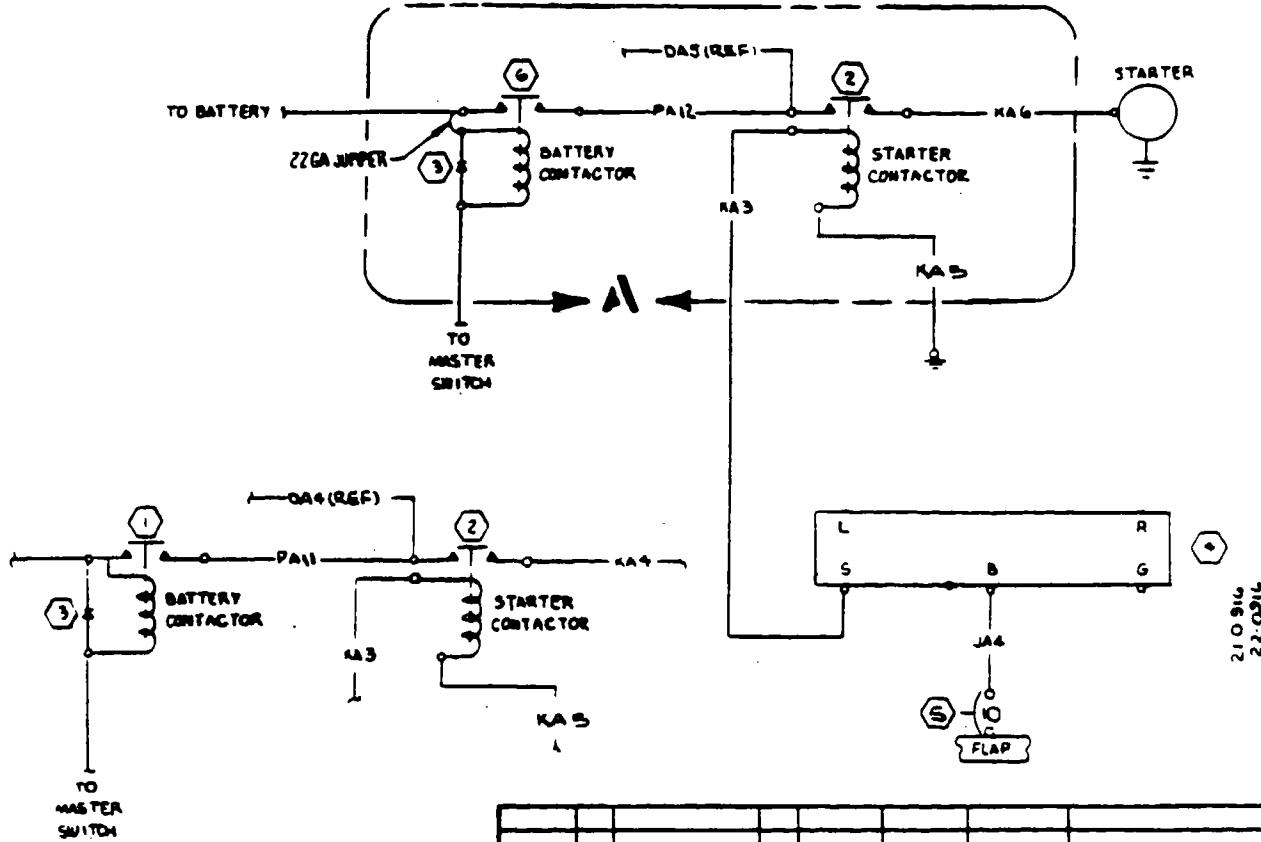
PA13	4	S-1562-4-9	81	S-2447-4	S-2447-4	<del>S-1562-4-9(S-2447-4)ON</del>
PA10	4	S-1562-4-9		S-2447-4	S-1567-6-15	SER(SR9101)XSR9102XSR9103THEPAP10XOC122
PA9	4	S-1562-4-9		S-1567-6-10	SER(SR9101)XSR9102XSR9103THEPAP10XOC127	
PA7	22			S-1567-6-10	SER(SR9101)XSR9102XSR9103THEPAP10XOC127	

9	C41002-0101	BATTERY ASSY
8	0470423	BUS BAR
7	0770728	DIODE ASSY
6	0412007	GROUND STRAP
5	S-994-1-1	SWITCH
4	C41001-0105	BATTERY ASSY
3	S-2443-1	STARTER CONTACTOR
2	S-2475-1	BATTERY CONTACTOR
1	S1320-5	AMMETER
PART NO.		DESCRIPTION
<b>EQUIPMENT TABLE</b>		
CDS-1000 IS APPLICABLE		SUPERSEDED:
VENDOR CODES PER S-4100		0410406
CDS-1000C1000A SPEC. NO.		

PA 3	4	S-1562-4-9	31	S-2447-4	S-2447-4	[SERIAL 2] X [SERIAL 22] (LW)
PA 10	4	S-1562-4-9		S-2447-4	S-2447-4	SER (SR9101) X SER9102 X SER9103 THRU SER9104
PA 9	4	S-1562-4-9		S-1367-6-13	S-1367-6-10	SER (SR9101) X SER9102 X SER9103 THRU SER9104
PA 7	22			S-1367-1-10	S-1367-1-1	
PA 6	4	S-1562-4-9		S-1367-6-13	S-1367-6-10	THRU SER (SR9101) X SR9102) & (SR9103)
PA 4	4	S-1562-4-9		S-1367-6-13	S-1367-6-10	THRU SER (SR9101) X SR9102) & (SR9103)
PA 3	22			S-1367-1-1	S-1367-1-8	
WIRE CODE NO.	QA	MATERIAL	LG	TERMINALS		SERIALS
<b>WIRE TABLE</b>						
CONTRACT NO:				COMMERCIAL AIRCRAFT DIV. CESSNA, AIRCRAFT CO. 3600 E. PAWNEE WICHITA, KANSAS		
	NAME	DATE	TITLE			
DESIGN	WHITSON	12-15-78				
GROUP	KO	12-4-78				
DRAWN	DD MAUN	12-7-78				
CHECK	BORLESKE	12-12-78				
STREETS						
PROJ	R PIPE	12-20-78				
APPO	GP					
OTHER						
SIZE	CODE	IDENT	OWN NO			
C	71379		0470406			
SCALE: NONE	(SA 9270)		PAGE: 6.5			

# MODEL 152 SERIES SERVICE MANUAL

LIT.	DESCRIPTION	REVISION	
		DATE	APPRO
A	BY REV: S-360-10L WAS S136010L (SR9101)(SR9102)(SR9103)	12LY 3-9-79	217 (100) PRO E
B	BY REV: ADD DETAIL 'A', KAG & PN2; SEE OUT KAG & PN11 (SR9621)(SR9622)	NTL 1-8-79	218 (100) PRO E
C	BY REV: S1367-L-13/KAG WAS S2447-4 (SR9621)(REF)(SR9622)(REF)	DFS 8-10-80	219 (100) PRO E



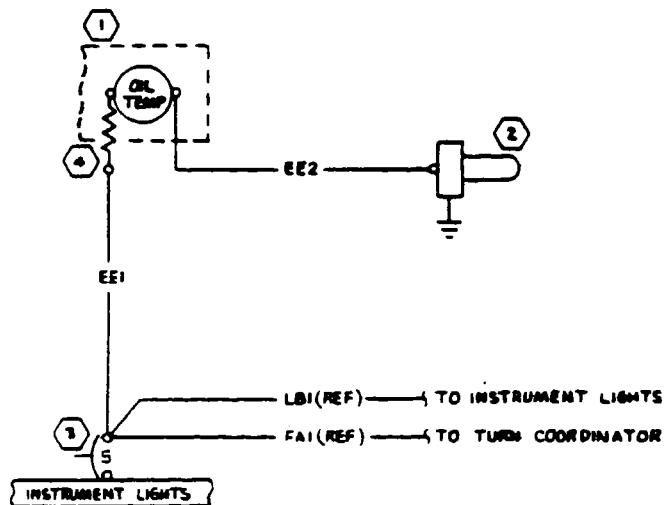
DETAIL A  
TRU SER (SR9621) & (SR9622)

WIRE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
PA12	4	S-362-4-9	17	S-367-4 S-367-4	SR9621(SR9622)SON
KAG	4	S-1562-4-9	49	S-367-4 S-367-4	(SR9621)(SR9622)SON
KAS	16			S-367-1-10 S-367-1-10	
KA3	16			S-367-1-10 S-367-1-10	
PA11	4	S-1562-4-9	49	S-367-4 S-367-4	THRU(SR9621)(SR9622)
JAG	16			S-367-1-6 S-367-1-6	
KAB	4	S-1562-4-9	54	S-367-4 S-367-4	THRU(SR9621)(SR9622)

PART NO.	DESCRIPTION	WIRE TABLE			TITLE	COMMERCIAL AIRCRAFT DIV. 3800 E. PAWNEE WICHITA, KANSAS
		NAME	DATE	CONTRACT NO.		
6 S2475-1	BATTERY CONTACTOR	DESENEN WHITSON	12-15-78			
9 S1360-10L	CIRCUIT BREAKER	GROUP	12-14-78			
4 C292501-0105	IGNITION SWITCH	DRAWN OMAHAN	12-7-78			
3 0710128	DIODE ASSY	CHECK DOLESKE	12-12-78			
2 S2443-1	STARTER CONTACTOR	STRESS				
1 S1580-1	BATTERY CONTACTOR	PROJ	2 PIPE	12-20-78		
		APPRO	100% CDF			
		SUPPLIED BY:	OTHER		0470406	
				CODE IDENT. NO.	C 71379	
				DRAW NO.		
				SCALE: NONE	(SR9270)	PAGE: G.4

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV: S-1630-1 WAS S-1573-1 (SR0450)(SR0451)(SR0452)	REG 3-29-77	R&L 1000 1/3 RF



**INACTIVE**

THRU SER(8901)5902)(S9103)  
HHS 0-5-78  
YAG 1/23 RFB  
2F

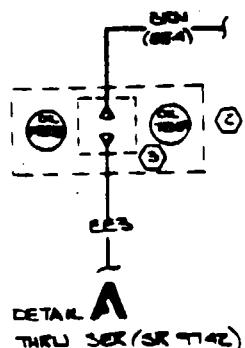
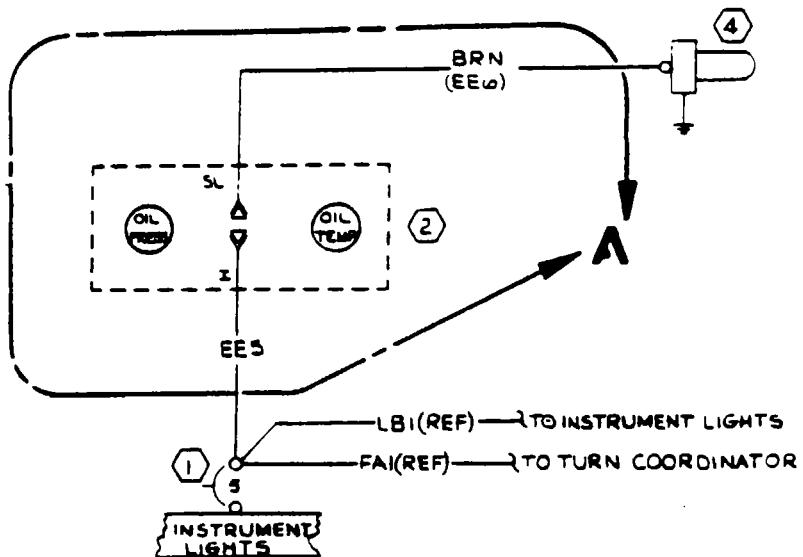
WIRE TABLE					
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
EE2	22			S1367-4-0	S1367-1-10
EE1	22			S1367-1-G	S1367-1-10
COMMERCIAL AIRCRAFT DIV. CESSNA AIRCRAFT CO. 8800 E. PAWNIX WICHITA, KANSAS					
CONTRACT NO.:			TITLE		
DESIGNER	G. WRIGHTON	DATE	WIRING DIAGRAM — OIL TEMPERATURE		
GROUP	W	7-7-76			
DRAWN	J.C. SMITH	8-25-76			
CHECK	J. YOUNG	8-25-76			
STRESS					
PROJ	FA-74	7-20-76	SIZE	CODE IDENT.	OWG NO
APPO	JKC	1	NO.	C 71379	0470406
OTHER			SCALE: NONE		PAGE: 1,1

# MODEL 152 SERIES SERVICE MANUAL

## NOTES:

- 1> MATERIAL : S ALPHA 3857-7 OR BELDEN 83009-1
- 2> COVER S 1498-1 TERMINAL WITH S K44-6-10  
HEAT SHIELD TUBING TERMINAL DESIGNATIONS  
(SL, I, ) TO BE STAMPED ON TUBING WITH  
WHITE INK.

REVISION			
REF	DESCRIPTION	DATE	APPROV
A	BY REV: ADD DETAIL "A" & SEE BRN(EE5) EES & NOTE 2 (SR 9742)	WAG 1-10-80	REL 10-10-80
B	BY REV: SL WAS "S" /NOTE 2 & INST CLUSTER (SR 9742)	GW 9-10-80	JAB 10-10-80



WIRE NO.	GA	MATERIAL	LG	TERMINALS		SERIALS
				1	2	
EE5	18	S-1367-1-0				SR (SR 9742) X ON
EE5	20	S-1367-1-0				SR (SR 9742) X ON
BRN(EE5)	18	S-2376-1	S-1367-1-0			THRU SER (SR 9742)
EE3	22	S-1367-1-0	S-2376-1			THRU SER (SR 9742)

WIRE TABLE

PART NO.	DESCRIPTION	CONTRACT NO.		TITLE		
		DESIGN	NAME	DATE		
4 S1630-5	OIL TEMP SENSOR	AVH104		10-20-78		
3 2963164	CONNECTOR					
2 C669535-001	INST CLUSTER	WU144		10-20-78		
1 S-360-5L	CIRCUIT BREAKER					
		DRAWN	HIGHAZARIAN	10-5-78		
		CHECK	BOLESKE	10-9-78		
		STRECH				
	EQUIPMENT TABLE					
CDS-1000 IS APPLICABLE VENDOR CODES PER SH400 CDS-X00-CESSNA SPEC. NO. SH400 OR CESSNA-CESSNA STD. NO.		SUPERSEDES: 0470406 P 7.1	PROJ: R. F. EG	10-26-78	CODE IDENT. NO. C 71379	0470406
SUPERSEDED BY:		APPROV: JAS	OTHER		SCALE: NONE	(SR 9742) (SR 9742)   PAGE: 7.2 (SR 9742)

Cessna, AIRCRAFT CO.

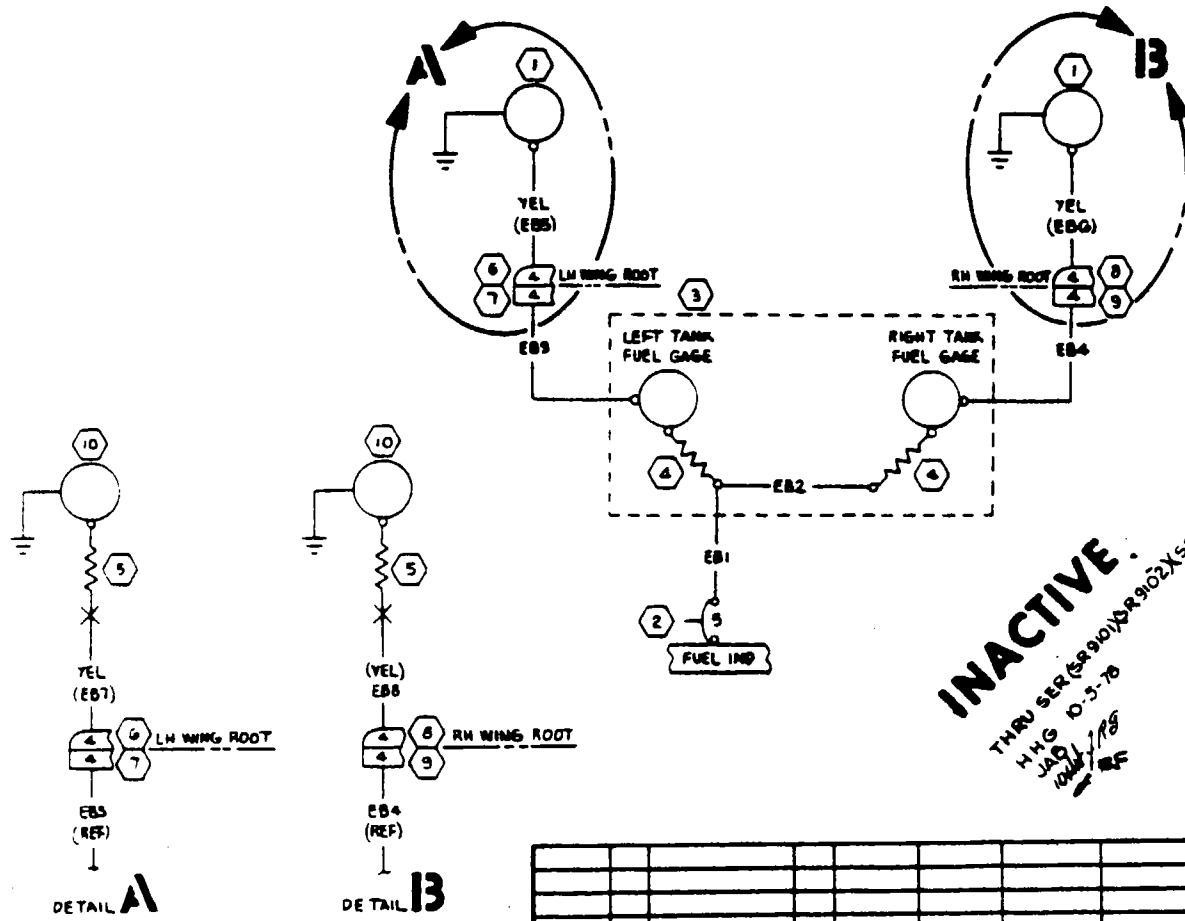
WIRING DIAGRAM—  
OIL TEMPERATURE

PASSENGER DIVISION  
1600 E. PAWNEE  
WICHITA, KANSAS

CODE IDENT. NO. C 71379	0470406
SCALE: NONE	(SR 9742) (SR 9742)   PAGE: 7.2 (SR 9742)

# MODEL 152 SERIES SERVICE MANUAL

REVISION		DATE	APPRO
LET	DESCRIPTION		
A	BY REV: C668002-0301 WAS 0426517; ADD C668002-0302 (SR8450)(SR8451)(SR8452)	CRS 8-15-77	JAB UMM RF



OPTIONAL LONG RANGE WINGS		WIRE TABLE					
PART NO.	DESCRIPTION	WIRE CODE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
1 C668002-0302	XMTR - FUEL LEVEL	TEL(EB6)	20	-20-4	S1370-1	S1635-1	(OPT)
9 S1641-9	HOUSING	TEL(EB7)	1	-20-4	S1370-1	S1635-1	(OPT)
8 S1640-9	HOUSING	TEL(EB6)	20	-20-4	S1367-1-10	S1635-1	
7 S1641-G	HOUSING	TEL(EB7)	1	-20-4	S1367-1-10	S1635-1	
6 S1640-G	HOUSING	EB4	1		S1636-1	S1367-1-10	
5 20Ω SW	RESISTOR	EB3	20		S1636-1	S1367-1-10	
4 B19210	RESISTOR ASSY	EB2	22		S1367-1-10	S1367-1-10	
3 C669311-0101	PANEL ASSY	EB1	22		S1367-1-10	S1367-1-10	
2 S1360-5L	CIRCUIT BREAKER	WIRE CODE NO.	GA.	MATERIAL	LG.	TERMINALS	SERIALS
1 C668002-0301	XMTR - FUEL LEVEL						

EQUIPMENT TABLE

CIB-1000 IS APPLICABLE VENDOR CODES PER S-400 CIB-XXXX-CIBNA SPEC. NO. S-XXX OR CMXXX-CIBNA STD. NO.		SUPERSEDES:	PROJ:	9-26-76	SIZE	CODE IDENT.	DWG NO
		0470401 P.B.I					
		SUPERSEDED BY:					

OTHER

STRESS

CROSSHAIR AIRCRAFT CO.

COMMERCIAL AIRCRAFT DIV  
3800 E. PAWNEE  
WICHITA, KANSAS

TITLE: WIRING DIAGRAM —  
FUEL INDICATOR &  
TRANSMITTER

C 71379 0470406

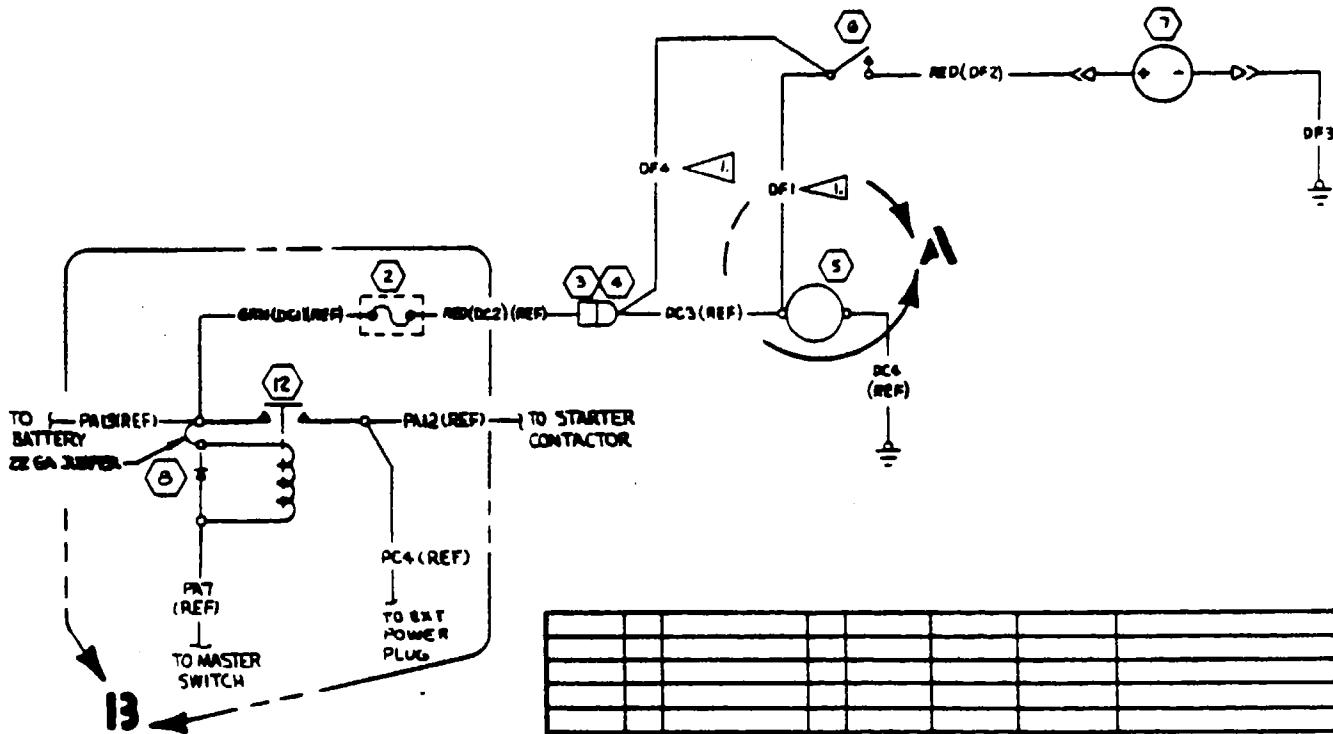
SCALE: NONE (SR8450)(SR8451) PAGE: 8.1  
(SR8452)

# MODEL 152 SERIES SERVICE MANUAL

**NOTES:**

- 1) WIRING DIAGRAM SHOWN IS FOR USE WHEN AN OPTIONAL ELECTRIC CLOCK IS INSTALLED. WHEN ELECTRIC CLOCK IS NOT INSTALLED DPA REPLACES DFA.
- 2) WIRING SHOWN WHEN AN OPTIONAL DIGITAL ELECTRIC CLOCK IS INSTALLED. WHEN DIGITAL ELECTRIC CLOCK IS NOT INSTALLED DFA REPLACES DPA.

LET	DESCRIPTION	DATE	REVISION
			APD
A	BY REV. S1635-1 WAS SOLDIER UP4 (SRB-SOMER-B4-5U GRB-4-2)	GOS 1-18-77	Y1000 1000
B	BY REV: CG64503-0101 WAS CG64502 -0101; ADD DETAIL A, NOTE 2, RED (DF5), CG64511-0101, S1660-8L + PG 8.2.1 (SRB20X (REF X SRB-2))	CMK 7-13-78	JAC 1000 1000
C	BY REV: STROBE CTS CKT DF2 WAS "PIROT HEAT" CKT DF2 (NOW SHOP PRACTICE)	ELY 3-9-79	AMW/MF 1000 1000
D	BY REV: ADD DETAIL B & C PC4 (REF); PA12 (REF) WAS PAS (REF) PINS (REF) WAS PA12 (REF) & PA12 (REF) WAS PA20 (REF), PA20 (REF) WAS PA20 (REF) (SRB-2) (SRB-22)	HHG NTL 11-9-78	GA 000 1000 1000
E	BY REV: S1667-8/DF1, DF2, DF4 & DFS WAS S167-1-6 (NOW SHOP PRACTICE) (MER 15260967)	GW 7-8-82	DT 000 1000 1000



12 S-2479-1 BATTERY CONTACTOR

11 CG64511-0102 DIGITAL CLOCK

10 CG64511-0101 DIGITAL CLOCK

9 S-1360-8L CIRCUIT BREAKER

8 071072B DIODE ASSY

7 CG64503-0101 HOURMETER

6 S1677-1 OIL PRESSURE SWITCH

5 CG64508-0101 CLOCK

4 S1637-1 HOUSING

3 S1637-2 HOUSING

2 0710831 FUSE ASSY

1 S1580-1 BATTERY CONTACTOR

PART NO. DESCRIPTION

EQUIPMENT TABLE

REF ID: 572-22-2

DFA 22

DF3

RED(DF5)

DF1 22

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1637-2 GA MATERIAL LG TERMINALS

0710831 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1637-2 GA MATERIAL LG TERMINALS

0710831 GA MATERIAL LG TERMINALS

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CG64511 GA MATERIAL LG TERMINALS

S1635-1 GA MATERIAL LG TERMINALS

S1637-1 GA MATERIAL LG TERMINALS

S1660-8L GA MATERIAL LG TERMINALS

S1677-1 GA MATERIAL LG TERMINALS

S1680-1 GA MATERIAL LG TERMINALS

REF ID: 572-22-2

CG64503 GA MATERIAL LG TERMINALS

CONTRACT NO:

DESEN: G WHITSON 8-27-76

GROUP: 110000 6-10-76

DRAWN: J.C. SMITH 8-29-76

CHECK: T. YOUNG 8-26-76

APD: 0470401 P.B.2

SUPT. APPROVED BY: OTHER

COMMERCIAL AIRCRAFT DIV.  
8800 E. PAWNEE  
WICHITA, KANSAS

WIRING DIAGRAM —

HOURMETER

(OPT)

SIZE: NONE

CODE IDENT. NO.: C 71379

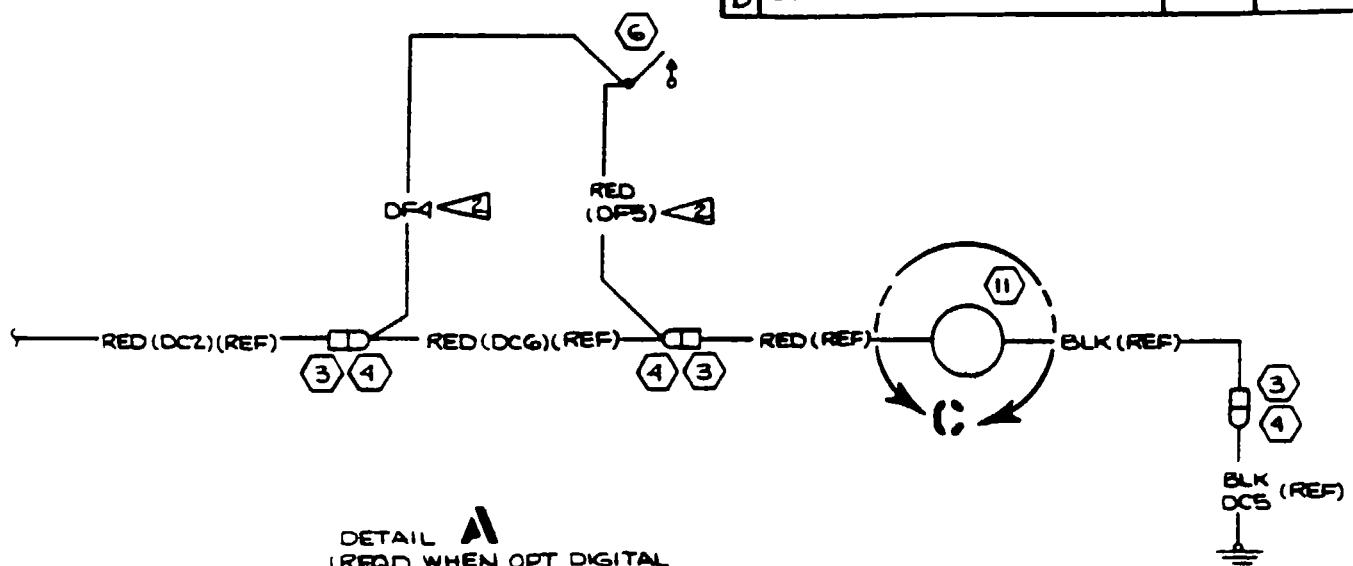
DRW. NO.: 0470406

PAGE: 8-2-0

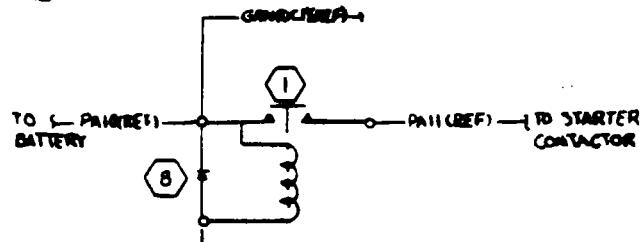
(SRB450K/SRB451K/SRB452)

# MODEL 152 SERIES SERVICE MANUAL

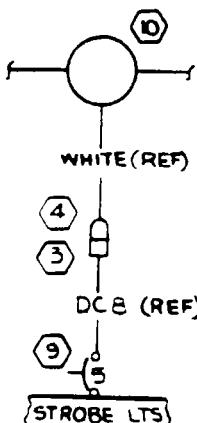
REVISION			
LIST	DESCRIPTION	DATE	APPRO
D	SEE PG.B.Z.O FOR REVISION		



DETAIL A  
(REQD WHEN OPT DIGITAL CLOCK IS INSTALLED)



DETAIL B  
THRU SER(SR95621)(SR95622)



DETAIL C  
THRU SER(SR9563)

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
<b>WIRE TABLE</b>					
CONTRACT NO.:					PARKER DIVISION 3000 E. PARKER WICHITA, KANSAS
DESIGNER	NAME	DATE			Cessna, AIRCRAFT CO.
G STAMM	7-19-78				
GROUP	MS	7-19-78			
DRAWN	C KING	7-15-78			
CHECK	BORLESKE	7-15-78			
STROBE					
<b>WIRING DIAGRAM —</b>					
HOURMETER (OPT)					
PROJ	2152	7-28-78	SEQ	CODE IDENT.	PROG NO.
				C 71379	0470406
SUPERSEDED BY:	OTHER		SCALE: NONE	(SR95187)	PAGE: 8.2.1

PART NO.	DESCRIPTION
<b>EQUIPMENT TABLE</b>	
CES-1000 IS APPLICABLE	SUPERSEDES:
VENOOR CODES PER S-1400	PROJ
CES-1200-CESNA SPEC. NO.	2152
S-XXXX OR CA1200-CESNA	DATE
STD. NO.	7-28-78
	APPRO
	OTHER

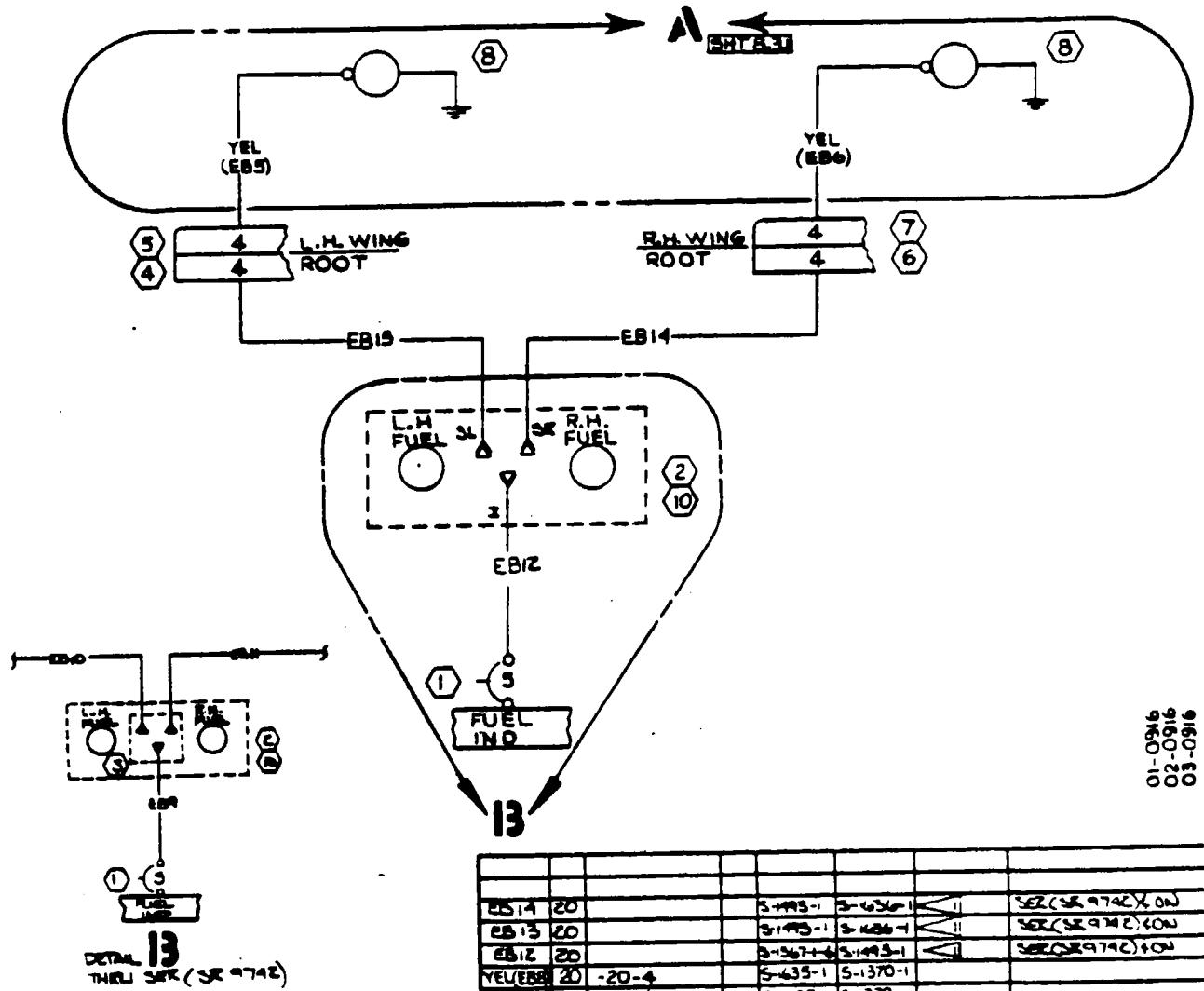
21-0916  
09-09-02  
ER

# MODEL 152 SERIES SERVICE MANUAL

**NOTES:**

□ COVER S-1493-1 TERMINAL WITH S K-94-G-1.0 HEAT SHRINK TUBING. TERMINAL DESIGNATIONS (SL SEC. I) TO BE STAMPED ON TUBING WITH WHITE INK.

REVISION			
LIST	DESCRIPTION	DATE	APD
A	BY REV: ADD DETAIL A & SMT B.3.1 (SR9101)(REF)(SR9102)(REF)(SR9103)(REF)	HHG 6-14-79	JAN 1980 1/12/80
B	BY REV: ADD DETAIL "B" & SMT ED 12, ED 13 & ED 14, NOTE ← (SR9101)	WAG 1-19-80	JAN 1980 1/19/80



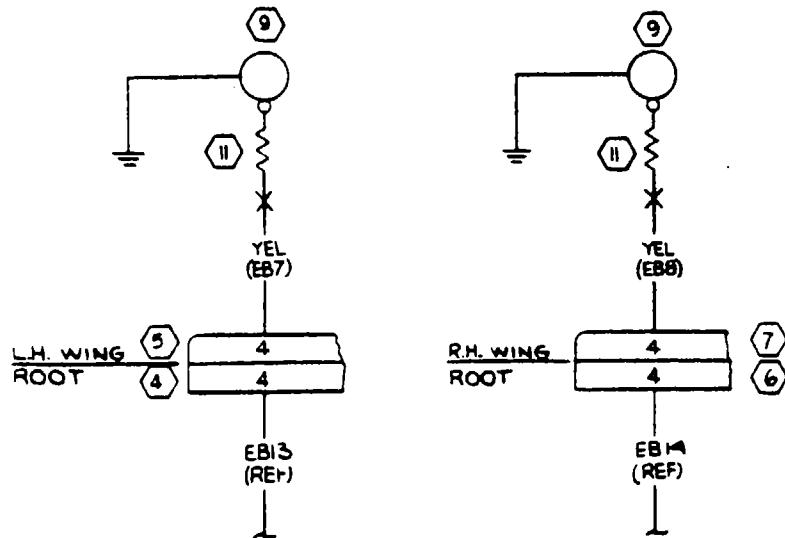
11	20 OHM 5W RESISTOR	
10	C669537-0105 FUEL GAGE LONG RANGE	
9	C668002-030 XMTR-FUEL (LONG RANGE)	
8	C668002-030 XMTR-FUEL (ST RANGE)	
7	S-1640-6 HOUSING	
6	S-1641-6	
5	S-1640-6	
4	S-1641-6 HOUSING	
3	270681404 CONNECTOR	
2	C669537-0104 FUEL GAGE (ST RANGE)	
1	S-1360-5L CIRCUIT BREAKER	
	PART NO. DESCRIPTION	
	EQUIPMENT TABLE	
CDS-1000 IS APPLICABLE		
VENDOR CODES PER S-1400		
CDS-1000-CDS-1000A SPEC. NO. S-1400 OR CDS-1000-CDS-1000A STD. NO.		
SUPERSEDED BY: 0470406 P.B.I		
SUPERSEDED BY:		

WIRE TABLE		
CONTRACT NO.		
ITEM	NAME	DATE
DRAWN	WHITTON	6-20-78
GROUP	1044	6-20-78
DRAWN	H.GHAZARIAN	10-5-78
CHECK	GORLESKE	10-9-78
STRESS		
PROJ	R.F. 08	10-26-78
APD	WAG	
SIZE	CODE IDENT.	QWS NO.
C	71379	0470406
SCALE	VONE	(SR9101)(SR9102) PAGE A-10 (SR9103)

## WIRING DIAGRAM — FUEL INDICATOR & TRANSMITTER

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LOT	DESCRIPTION	DATE	APPRO
B	SEE SHT 1 FOR REVISION		

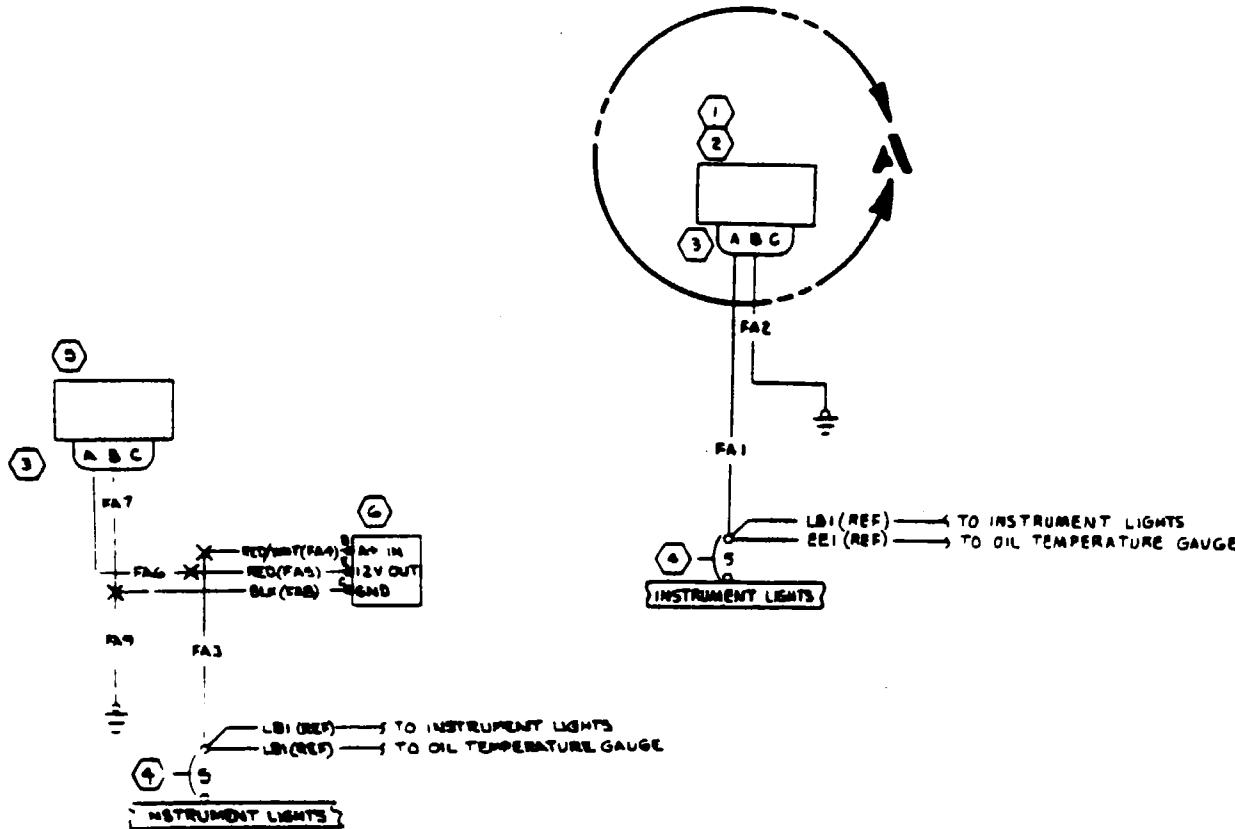


DETAIL A ~~SHT 1~~  
(OPTIONAL LONG RANGE WING)

CONTRACT NO.:			PAWNEE DIVISION 2800 E. PAWNEE WICHITA, KANSAS		
NAME	DATE	TITLE			
DRAWN BY: WAITZMAN	6-16-79	WIRING DIAGRAM			
GROUP: 10	6-16-79	FUEL INDICATOR &			
DRAWN: H.GHAZARIAN	6-14-79	TRANSMITTER			
CHECKED: BORLESKE	6-14-79	REF.	CODE IDENT.	DRW. NO.	
STREWN:			NO.		
PROJ. # F156	6-16-79	C	71379	0470406	
APPRO: J.M.		SCALE: NONE	SR9101(SR9102)	PAGE: 8.3.1	(SR9103)
OTHER:					

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
REV	DESCRIPTION	DATE	APPRO
A	BY REV: ADD DETAIL A SR8450(SR8451)(SR8452)	CP 9-20-77	100% 100%



9-20-0  
5-1370-1  
5-1367-4  
5-1367-11-G

DETAIL A  
(APPLIES WITH 10V TURN  
COORD IN 20V SYSTEM ONLY)

FA9	20		SEE FA7	5-1367-4-G (ALT)	
YAN	20-20-0		SOLDER SEE FA7	(ALT)	
FA7	20		SOLDER	5-1370-1 (ALT)	
FA6	20		SEE FA8	SOLDER (ALT)	
YAN	20-20-0		SOLDER	5-1370-1 (ALT)	
YAN	20-20-0		SEE FA3	SOLDER (ALT)	
FA3	20			5-1367-4 5-1370-1 (ALT)	
FA2	22		SOLDER	5-1367-11-B	
FA1	22			5-1367-11-G SOLDER	
WIRE CABLE NO.	GA	MATERIAL	LO	TERMINALS	SERIALS

## EQUIPMENT TABLE

6	MC 7812CP	VOLTAGE REGULATOR ASSY
5	C661003-0504	TURN COORDINATOR
4	S1360-5L	CIRCUIT BREAKER
3	ASS30GAI0SL-35	CONNECTOR
2	C661003-0505	TURN COORDINATOR
1	S1303-2	TURN & BANK INDICATOR
	PART NO.	DESCRIPTION

WIRE TABLE		COMMERCIAL AIRCRAFT DIV. CESSNA AIRCRAFT CO. WICHITA, KANSAS	
CONTRACT		TITLE	
DESIGN	DATE	GROUP	WIRING DIAGRAM —
104	8-27-76	4-B-76	TURN COORDINATOR (OPT)
DRAWN	J.C. SMITH	OTHER	TURN & BANK INDICATOR (OPT)
CHECK	W. YOUNG		
STRESS			
SIZE	CODE IDENT	OWNG NO	
C	71379	0470406	
SCALE: NONE		PAGE: 3.1	

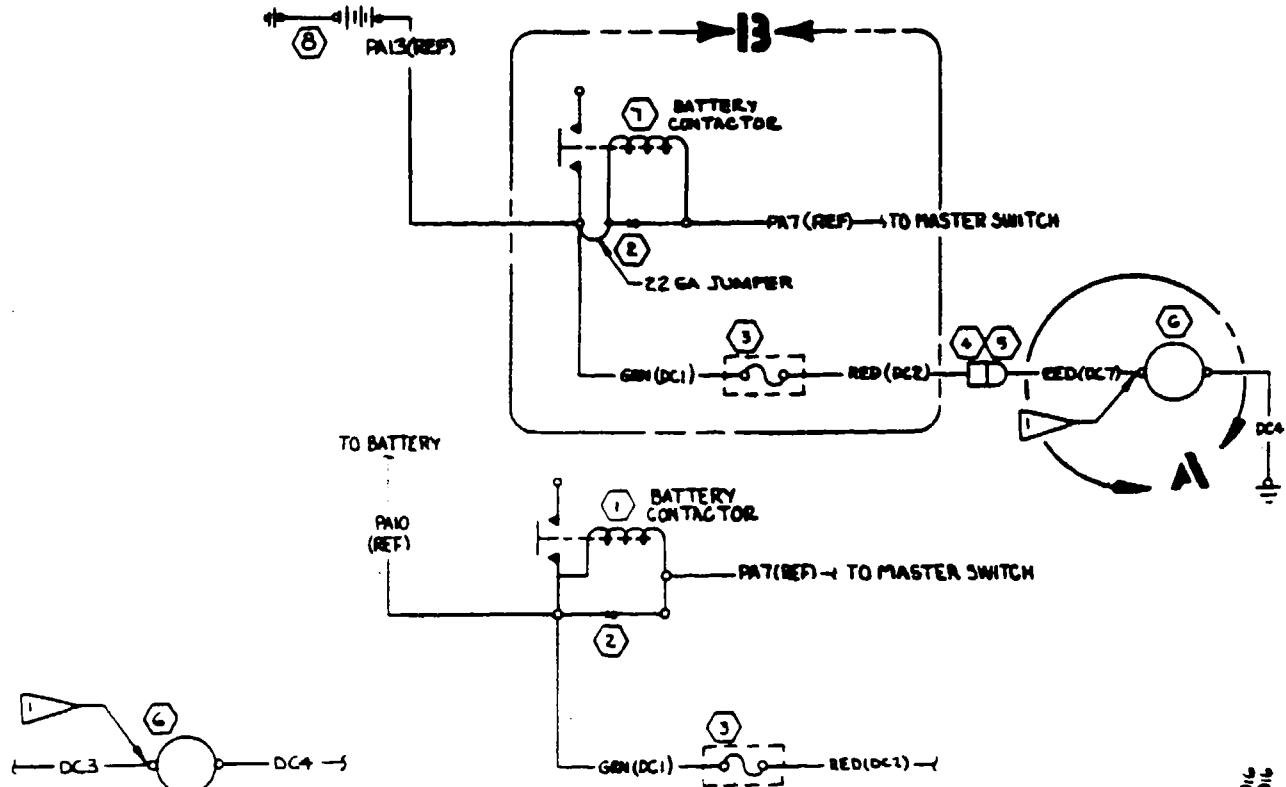
(SR8450)(SR8451)(SR8452)

# MODEL 152 SERIES SERVICE MANUAL

## NOTES:

**CAUTION: POWER WIRE MUST BE CONNECTED TO "BATT" TERMINAL OF CLOCK OTHERWISE INTERNAL DAMAGE TO UNIT WILL RESULT**

REF.	DESCRIPTION	REVISION	
		DATE	APPROD
A	BY REV: S1367-1-13 WAS S1367-1-6/GRND(GND) (SR3621)(SR3622)	CDS 1-18-77	X-000 145-001
B	BY REV: C664508-0102 WAS C664508-0101; ADD NOTE 1; ADD DETAIL 'A' & SEE RED (DC5) WIRE (SR9195)(REF)	B&K 10-6-78	JACOBSON 145-002
C	BY REV: RED(DC7) WAS RED(DC5) (SR3621)(REF)	PDM 2-18-79	DET 10 145-003
D	BY REV: ADD 6042001, 0412007 & DETAIL 'B'	NTL 11-13-79	DET 10 145-004



DETAIL A  
THRU SER (SR9195)

8 0412007 BATTERY GROUND

7 52475-1 CONTACTOR

6 C664508-0102 CLOCK ASSY

5 S1637-1 HOUSING

4 S1637-2 HOUSING

3 0712031 FUSE ASSY

2 0710720 DIODE ASSY

1 91580-1 CONTACTOR

PART NO. DESCRIPTION

EQUIPMENT TABLE

CDS-000 IS APPLICABLE  
VENDOR CODES PER S-400  
CDS-XXXX-CESSNA SPEC. NO.  
S-XXXX OR CXXXX-CESSNA  
STD. NO.

SUPERSEDED:  
0470401 P10.1

SUPERSEDED BY:

CONTRACT NO.	NAME	DATE	WIRE TABLE	COMMERCIAL AIRCRAFT DIV. CESSNA, AIRCRAFT CO. WICHITA, KANSAS
DRAWN: G. WHITTON	GROUP: W. W. H. L.	8-27-76	TITLE: WIRING DIAGRAM —	
DRAWN: J.C. SMITH	GROUP: W. W. H. L.	8-25-76	CLOCK (OPT)	
CHECK: J. YOUNG	GROUP: W. W. H. L.	8-26-76	SCALE: NONE	
STRENG: J. YOUNG	GROUP: W. W. H. L.	8-26-76	CODE IDENT. NO.: C 71379	DRW. NO.: 0470406
			CODE IDENT. NO.: C 71379	PAGE: 10.1

(SR9195)(SR9195)(SR9195)

# **MODEL 152 SERIES SERVICE MANUAL**

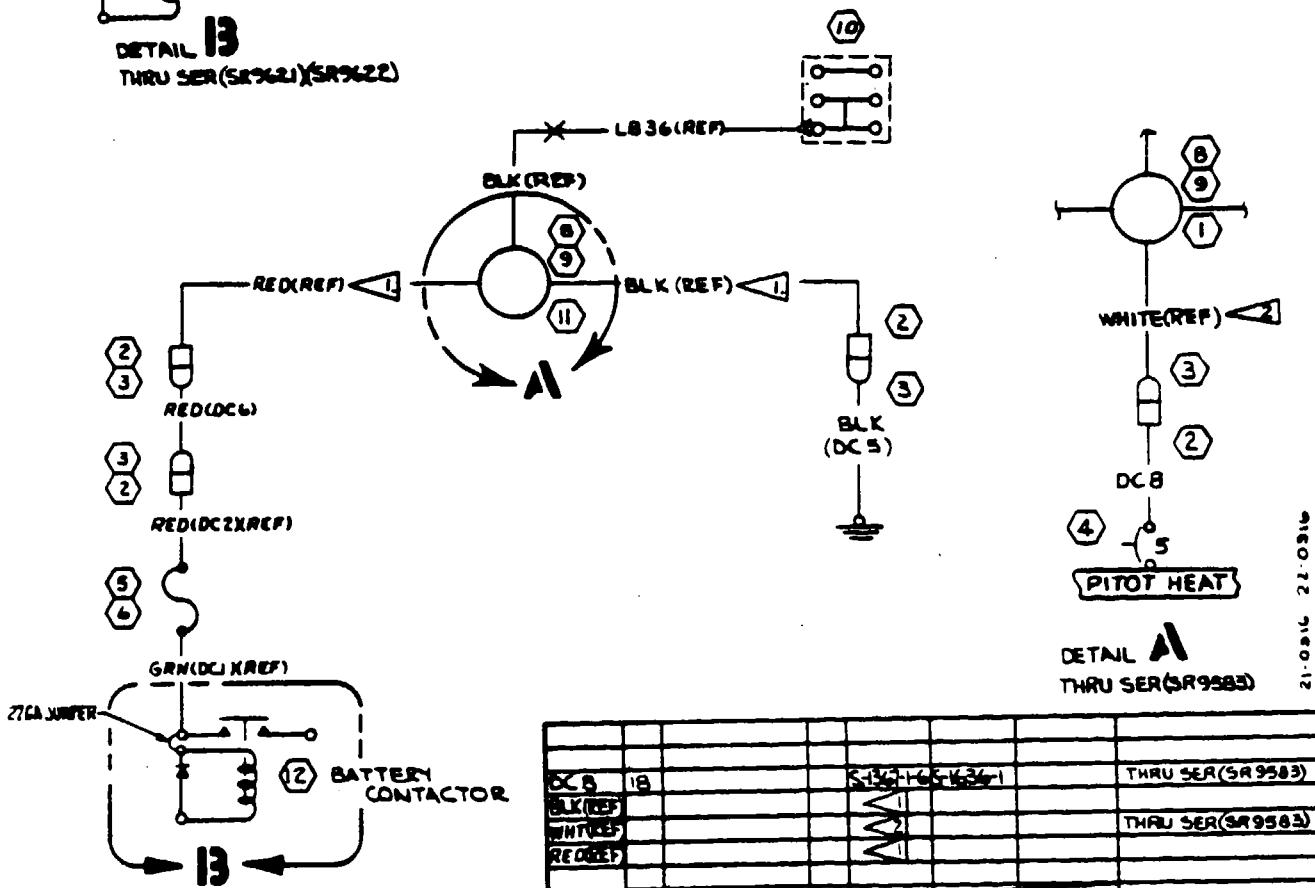
## **NOTES :**

- INSTALL S-1636-1 ON VENDOR WIRE
  - INSTALL S-1635-1 ON VENDOR WIRE



**DETAIL 13**  
THRU SER(SR9621)(SR9622)

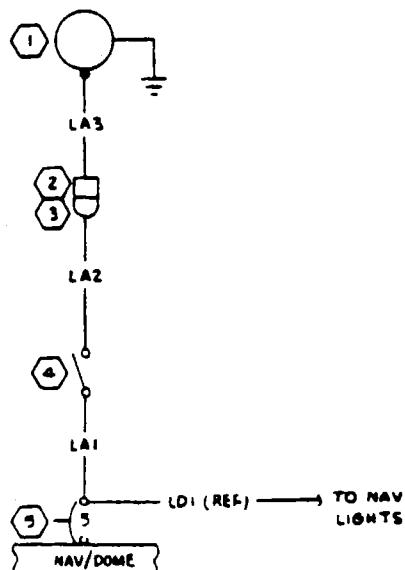
REVISION			
LINE	DESCRIPTION	DATE	APPROD
A	BY REV: ADD MS 28231-1B19, S-2413-1, 34003-617, L836(REF), RED(DC2)(REF), S-1637-1, S-1637-2; RED(REF) WAS BLU(REF), WHT(REF) WAS RED(REF); S-1635-1/DC6 WAS SOLDER; DELETE DC1 (SR9187)	CS 7-15-78	1409 AM MS
B	BY REV: STRONG LTS WHT PROT WHT (NOW SHOP PRACTICE)	FAM 2-15-79	1409 AM MS
C	BY REV: ADD DETAIL A/C6604H-002; ADD DETAIL "E" & S-2474-1 (SR 9183) (SR 9182)(SR 9132)	MHS 11-13-77	1409 AM MS



PART NO.	DESCRIPTION
12 S-2A75-1	CONTACTOR
11 C664511-0102	DIGITAL CLOCK
10 34003-817	TERMINAL BLOCK
9 S-2413-1	SOCKET
8 M925231-1819	LIGHT
7 S-1580-1	CONTACTOR
6 S-1691-1	FUSE
5 S-1690-22	FUSEHOLDER
4 S-1660-5L	CIRCUIT BREAKER
3 S-1637-1	HOUSING
2 S-1637-2	HOUSING
1 C664511-0101	DIGITAL CLOCK
	
<b>EQUIPMENT TABLE</b>	
CDS-1000 IS APPLICABLE	
VENDOR CODES PER S-1400	
CDS-1000-CDS-1000A SPEC. NO.	
S-1400 OR CDS-1000-CDS-1000A	
STD. NO.	
SUPERSEDED BY:	
SUPERSEDED BY:	

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPO



2-0916

	S1360-5L	CIRCUIT BREAKER
4	S2160..	SWITCH
3	S1637-1	HOUSING
2	S1637-2	HOUSING
1	MS25231-313	LAMP
PART NO.	DESCRIPTION	
 TIA REC		
EQUIPMENT TABLE		
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXX-CESSNA SPEC. NO. S-XXX OR CESSNA-CESSNA STD. NO.		SUPERSEDES: 0670401 P.L.I.
		SUPERSEDED BY:

SEARCHED 200

**NAME** **PATH**

**COMMERCIAL AIRCRAFT DIV.**  
**3600 E. PAWNEE**  
**MINNEAPOLIS, MINNESOTA**

**Cessna. AIRCRAFT CO.**

## **WIRING DIAGRAM — DOME LIGHT**

SIZE <b>C</b>	CODE IDENT. NO. <b>71379</b>	DWG NO <b>0470406</b>
SCALE: NONE		PAGE: 11.1

(SR8450) (SR8451) (SR8452)

# MODEL 152 SERIES SERVICE MANUAL

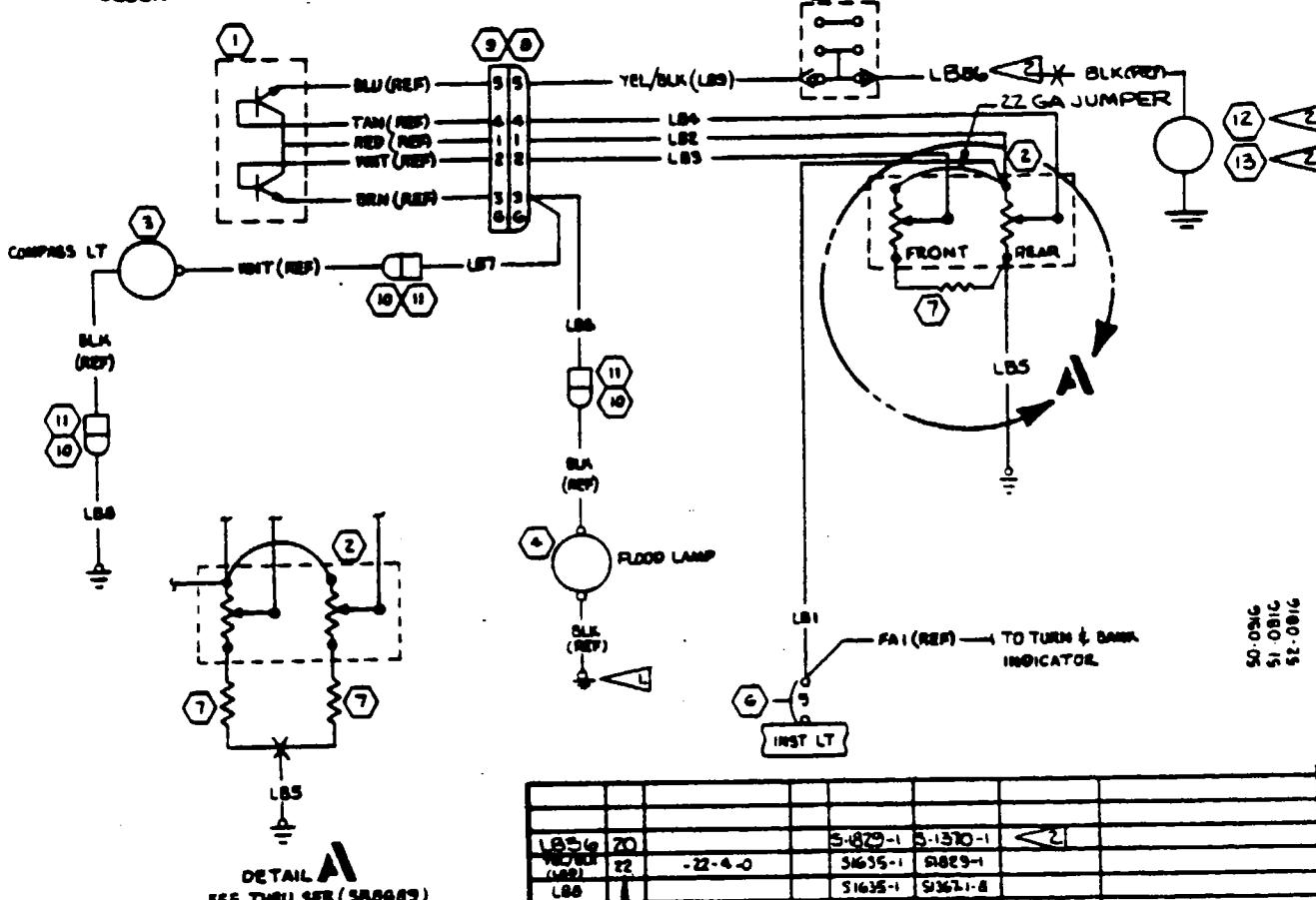
C	BY REV: ADD NOTE 2, LB5, M62523-1 1819-5-2913-1 (SRG187)	CMK 7-13-78	LB5 REF
D	BY REV: DELETE 22 GA JUMPER/S2000C20IJ ADD FRONT/REAR CALLOUTS; SOLDER/LB5 WIRE WAS S1370-1 (NOW SHOP PRACTICE)	NTL 10-16-79	JAS, JAS REF

REVISION			
REV	DESCRIPTION	DATE	INFO
A	BY REV: ADD DETAIL "A" & SER: S2000B271J WAS S2000B270J (SAB609)(SAB6450)(SAB6451)(SAB6452)	JCS 11-3-78	SY 10000 REF
B	BY REV: S-2000C20IJ WAS S-2000B271J (SR8968)	C.R.S 10-3-77	JAS 00000 REF

NOTES:

1) TERMINATE WITH S1367-1-B

2) REQ'D ONLY WHEN OPTIONAL DIGITAL  
CLOCK CG645II IS INSTALLED



PART NO.	DESCRIPTION	WIRE TABLE			SERIALS
		CODE NO.	GA	MATERIAL	
13 S-2913-1	SOCKET	2	LBG		
12 NO25734-1819	LIGHT	2	LBS	SOLDER	S1367-1-G
11 S1637-2	HOUSING		LBA	S1635-1	
10 S1637-1	HOUSING		LBS	S1635-1	S1367-1-B
9 S1641-6	HOUSING		LBT	S1636-1	
8 S1640-6	HOUSING		LBI	S1635-2	S1367-1
7 S-2000C20IJ	RESISTOR		22	S1635-1	
6 S1360-SL	CIRCUIT BREAKER			S1635-1	
5 34003-817	TERMINAL BLOCK			S1635-1	
4 M615984-16	LAMP			S1635-1	
3 CG60501-0102	COMPASS ASSY			S1635-1	
2 S2091-1	POTENTIOMETER ASSY			S1635-1	
1 1570166	DIMMING ASSY			S1635-1	
EQUIPMENT TABLE		CONTRACT NO:			COMMERCIAL AIRCRAFT DIV. 8800 E. PAWNIX WICHITA, KANSAS
CBB-1000 IS APPLICABLE VENDOR CODES PER D-4000 CBB-1000-CERIMA SPEC. NO. S-1000 OR C-1000-CERIMA STD. NO.		PROJ:	G WHITSON	DATE	TITLE: CESSNA, AIRCRAFT CO.
SUPERSEDED: 0470401 PILZ		APPROD:	10/1/78	7-78-76	WIRING DIAGRAM -
SUP. OVERLIDED BY:		OTHER:			COMPASS & INSTRUMENT LIGHTS
		SCALE: NONE			SIZE: CODE IDENT. NO. 0470406
					DATE: 10-3-77
					PAGE: II.2

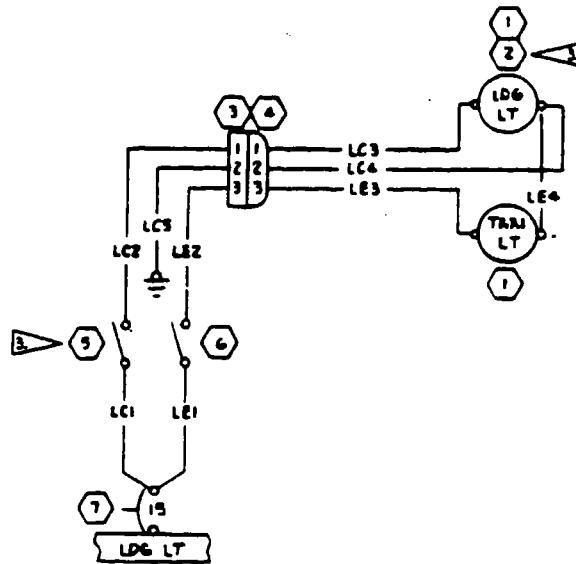
SRC-050 SAB601 SAB602

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
REV	DESCRIPTION	DATE	APPROVED
A	BY REV. REVISE NOTE 1. S1635-2 WAS S1493-2/LC4 (SR8450)(SR8451)(SR8452)	GDS 1-8-77	JAS SF

**NOTES**

1. LANDING LIGHT WIRING IS STANDARD EQUIPMENT FOR DOMESTIC AIRCRAFT; TAXI LIGHT WIRING IS OPTIONAL FOR DOMESTIC AIRCRAFT. LANDING AND TAXI LIGHT WIRING IS STANDARD EQUIPMENT FOR FRENCH AIRCRAFT.
2. LE NUMBERED WIRING USED ON DUAL INSTL ONLY  
3 USE ON SINGLE LIGHT INSTL ONLY



S-1635-2  
S1635-2  
S1635-2

LE4	16	S1367-2-8	S1367-2-8	
LE3		S1635-2	S1367-2-8	
LE2		S1493-2	S1636-2	
LE1		S1367-2-6	S1493-2	
LC5		S1636-2	S1367-2-8	
LC6		S1367-2-8	S1635-2	
LC3		S1635-2	S1367-2-8	
LC2		S1493-2	S1636-2	
LC1	16	S1367-2-6	S1493-2	

PART NO.	DESCRIPTION	WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS		SERIALS
						NAME	DATE	
<b>WIRE TABLE</b>								
1	S1360-15L	CIRCUIT BREAKER						
6	S2160-4	SWITCH						
5	S2160-5	SWITCH						
4	S1638-2	HOUSING						
3	S1638-1	HOUSING						
2	4596	LAMP - 250W						
1	4591	LAMP - 100W						
<b>EQUIPMENT TABLE</b>								
CIES-1000 IS APPLICABLE VENDOR CODES PER S-4000 CIES-XXX-CESSNA SPEC. NO. S-1000 OR CIES-XXX-CESSNA STD. NO.		SUPERSEDED BY:	0470401 PIIS	PROJ	J. YOUNG	9-10-76	SIZE	CODE IDENT.
		SUPERSEDED BY:		APPO	J. MCCLURE		DWG NO	C 71379
		OTHER					SCALE	NONE
							PAGE	11.3

COMMERCIAL AIRCRAFT DIV.  
5600 E. PAWNEE  
WICHITA, KANSAS

*Cessna Aircraft Co.*

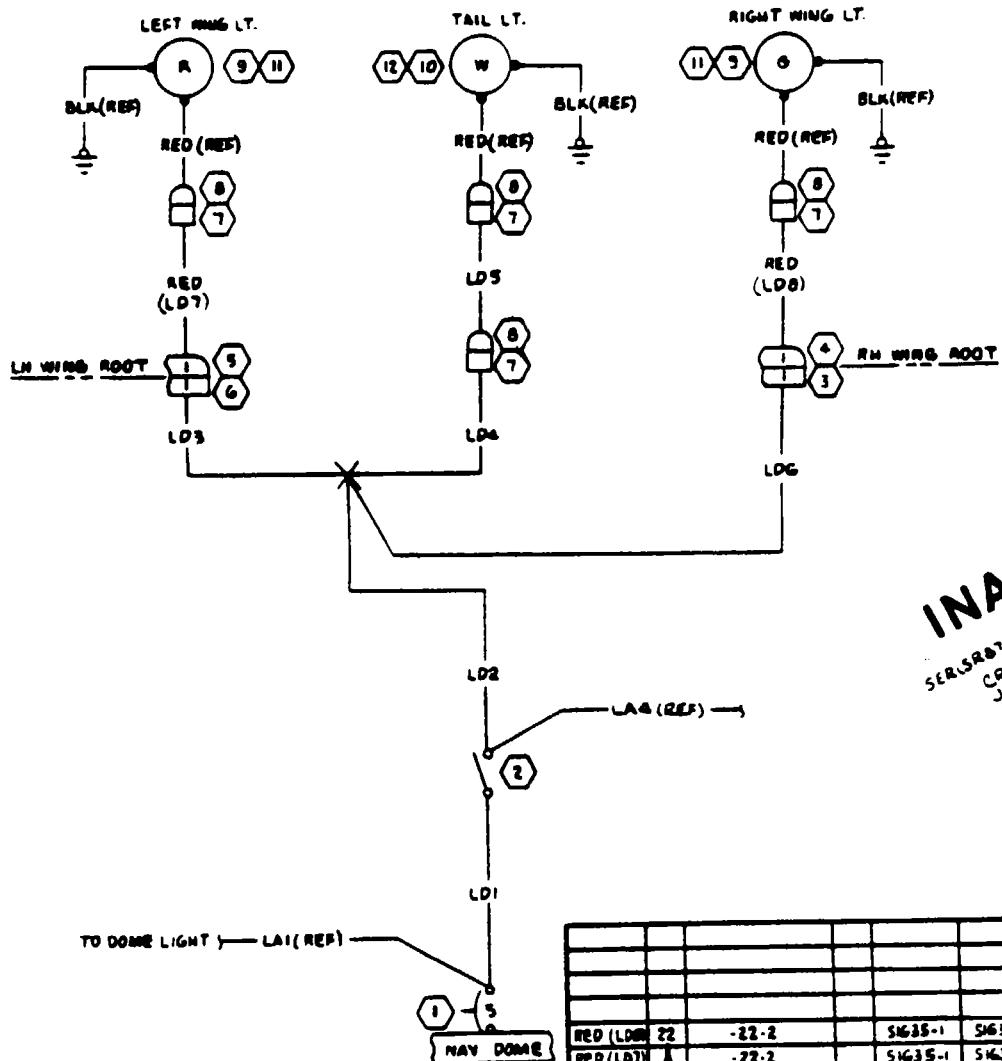
**WIRING DIAGRAM —**  
**LANDING & TAXI LIGHTS**

(SR8450)(SR8451)(SR8452)

0470406

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPROVED
A	REV C 00222-01020 NAS 10C-100222-01020 (SRM450) (SRB#452)	GD3 1-16-77	5000 JL



**INACTIVE**  
SERIALS 87105A 8711XSR 8711L  
CRS 10 21 71  
JAP UNT /PS  
JUL 1987

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WIRE	GA.	MATERIAL	LG.	TERMINALS	SERIALS
RED (LD2)	22	-22-2		SI635-1	SI636-1
RED (LD7)	1	-22-2		SI635-1	SI636-1
LD6			SEE LD2	SI636-1	
LD5				SI635-1	SI636-1
LD4			SEE LD2	SI636-1	
LD3			SEE LD2	SI636-1	
LD2				SI693-1	SI670-2
LD1	22		SEE LD2	SI636-1	SI693-1
				SI667-1-G	

12	M353470-307	LAMP
11	M353309-751E	LAMP
10	CG22001-0102	TAIL LIGHT ASSY
9	CG22001-0202	LIGHT ASSY
8	SIG37-1	HOUSING
7	SIG37-2	HOUSING
6	SIG41-G	HOUSING
5	SIG40-G	HOUSING
4	SIG40-9	HOUSING
3	SIG41-B	HOUSING
2	S2160-1	SWITCH
1	S160-9L	CIRCUIT BREAKER

## **WIRE TABLE**

**COMMERCIAL AIRCRAFT DIV.  
1900 E. PAWNEE  
WICHITA, KANSAS**

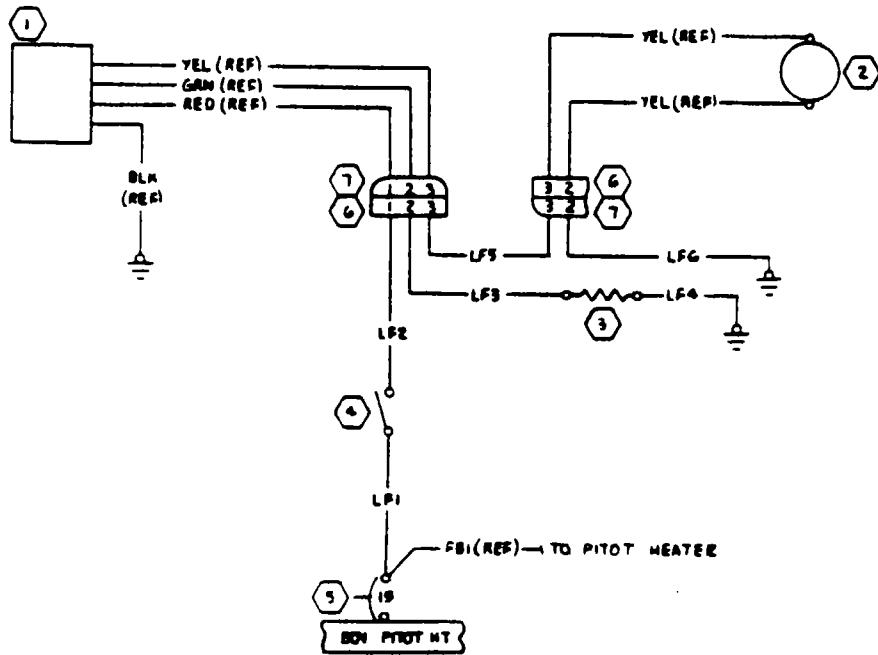
## **WIRING DIAGRAM— NAVIGATION LIGHTS**

PART NO.	DESCRIPTION	CHECK	J. YOUNG	0-2-76	
EQUIPMENT TABLE		STRESS			
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESIMA SPEC. NO. S-1400 OR CXXXX-CESIMA STD. NO.	SUPERSEDED: 0470401 PII.6	PROJ	2046	9-28-76	SIZE
	SUPERSEDING BY: 0470406 PG 11.10	APPO	46		CODE IDENT NO.
		OTHER			C 71379
				SCALE: NONE	DWG NO
					0470406
					PAGE: 11.4

(S80050)(S80051)(S80052)

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APPO



50-086

LF6	16		S1636-1	S1367-1-8			
LF5	16		S1636-1	S1635-1			
LF4	16		S1493-1	S1367-1-8			
LF3	16		S1636-1	S1493-1			
LF2	16		S1493-2	S1636-2			
LF1	16		S1367-2-6	S1493-2			

	SIG38-2	HOUSING	WIRE CODE NO.	CA	MATERIAL	LG	TERMINALS	SERIALS
0	SIG38-1	HOUSING	WIRE TABLE					
3	S1360-15L	CIRCUIT BREAKER	CONTRACT NO.					
4	S2160-1	SWITCH						
3	OR95-6	RESISTOR						
2	CG21001-0102	LIGHT ASSY	DESIGN	G WHITSON	E 27-76	TITLE		
1	CG594502-0102	FLASHER ASSY	GROUP	10	18-76			
	PART NO.	DESCRIPTION	DRAWN	J.C. SMITH	B-25-76			
	EQUIPMENT TABLE		CHECK	J. YOUNG	B-26-76			
			STRESS					
CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-XXXX-CESSNA SPEC. NO. S-XXXX OR CMXXX-CESSNA STD. NO.			PROJ	0470401 PII.5	9 20-76	SIZE	CODE IDENT.	DWG NO
SUPERSEDED BY:			APPO	TRG		C	71379	0470406
			OTHER			SCALE: NONE	PAGE: 115	

**CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-XXXX-CESSNA SPEC. NO.  
S-KX OR CMXXXX-CESSNA  
STD. NO.**

SUPERSEDES:  
0470401 PII.

**SUPERSEDED BY:** \_\_\_\_\_ **OTHER** \_\_\_\_\_

Cessna. AIRCRAFT CO.

COMMERCIAL AIRCRAFT DIV.  
3600 E. PAWNEE  
WICHITA, KANSAS

**WIRING DIAGRAM —**  
**LIGHT - FLASHING BEACON**  
**(OPTIONAL)**

CODE IDENT. DWG NO  
NO. - 0470406

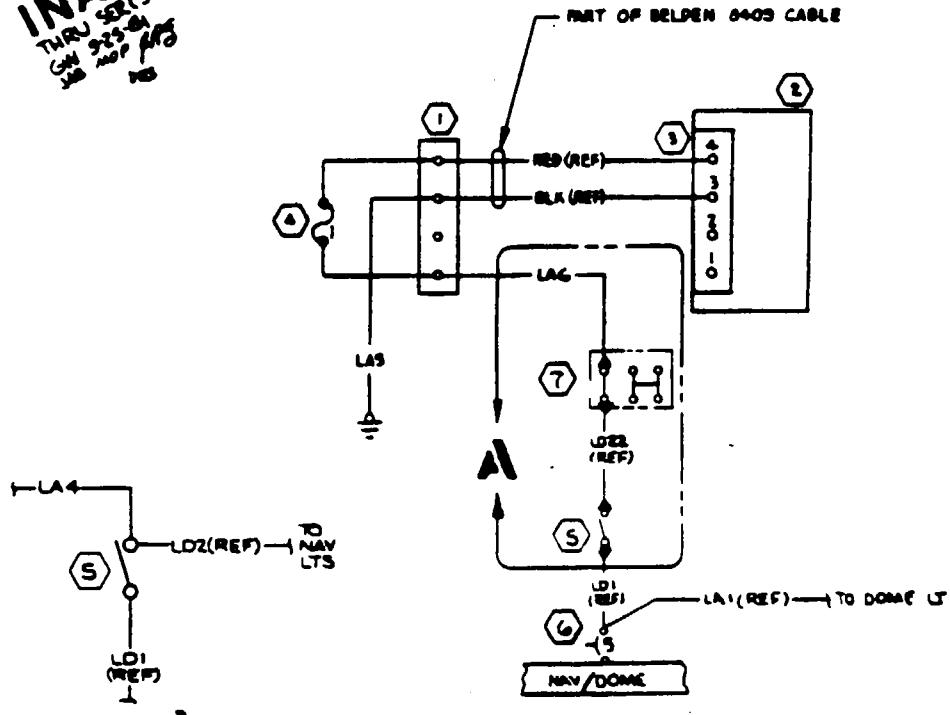
NONE

(SR8450) (SR8451) (SR8452)

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
LET	DESCRIPTION	DATE	APFO
A	BY REV: ADD 34003-817, DETAIL A • SERIAL (SATTIX)SATTIX(SATTIX)	CES 10-27-77	WS 20 WS 52

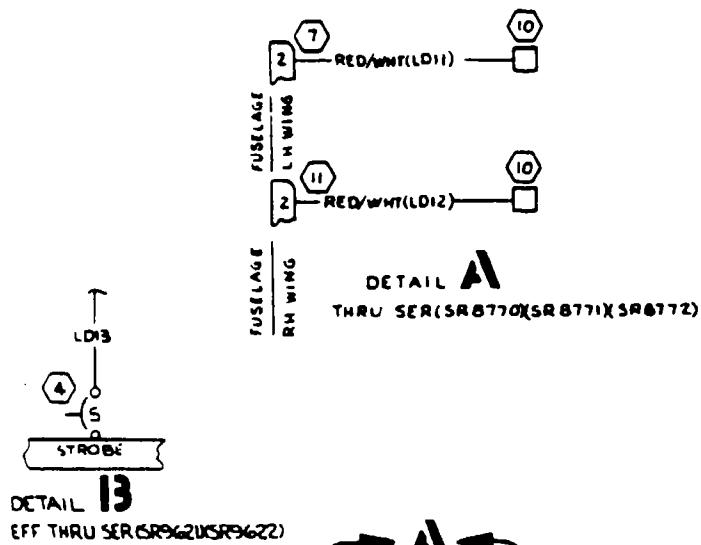
**INACTIVE**  
THRU SECSRIOBSS  
GEM SEC. 24  
NOV 1973  
10



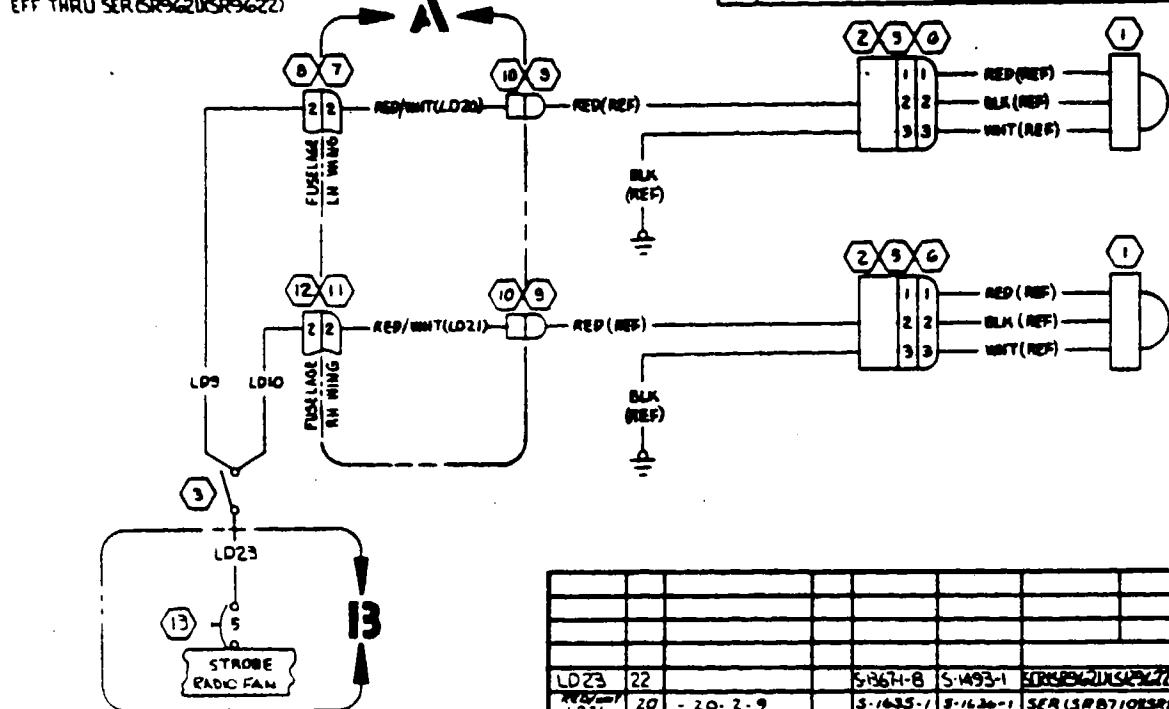
			LAS	22	S1483-1	32963G	TYPE CERTIFICATE NUMBER (H-8772)
7	34003-817	TERM BLOCK	SIZE	GA	MATERIAL	LG	TERMINALS
6	51360-5L	CIRCUIT BREAKER	CODE NO.	GA			SIGNALS
5	5260-1	SWITCH	WIRE TABLE				COMMERCIAL AIRCRAFT DIV.
4	1570161	FUSE ASSY					Cessna, AIRCRAFT CO.
3	520-4	TERMINAL BLOCK					3800 E. PARKES WICHITA, KANSAS
2	0570088	MAPLIGHT ASSY	NAME	DATE	TITLE		
1	351-11-03-001	TERMINAL BLOCK	DREBEM	6-27-76	WIRING DIAGRAM —		
	PART NO.	DESCRIPTION	GROUP	4-076	MAPLIGHT - CONTROL WHEEL		
			DRAWN	J. C. SMITH	(OPTIONAL)		
			CHECK	→ YAMS			
			STRENGTH				
<b>EQUIPMENT TABLE</b>							
CBR-1000 IS APPLICABLE VENDOR CODES PER S-4000 CBR-1000-CBRA SPEC. NO. S-4000 OR CBRA-CBRA STD. NO.		SUPERSEDED BY:	PROJ	9-20-76	SIZE	CODE IDENT. NO.	DWS NO
		0470401 PILG	APP'D	7/14/76			
		SUPERSEDED BY:	OTHER		C	71379	0470406
		1920299			SCALE: NONE		PAGE: 116

(SR8490)(SR8491)(SR8492)

# MODEL 152 SERIES SERVICE MANUAL



LIST	DESCRIPTION	DATE	REVISION
			APPRO
A	BY REV: C622006-0101 WAS C622007-0101 (SR8450)(SR8451)(SR8452)	CDS	1-18-77
B	BY REV: S1640-9 WAS S1640-6, S1641-9 WAS S1641-6 AT RH WING ROOT (SR8450)(SR8451)(SR8452)	REQ	3-23-77
C	BY REV: ADD DETAIL A & SER. ADD LD20 & LD21 - SER (SR8770)(SR8771)(SR8772)	CRS	10-27-77
D	BY REV: C622006-0101 WAS C622006-0101; DELETE PIGTAIL LEADS FROM C622006-0102; (SR8595)(REF)	CRS	7-8-78
F	BY REV: ADD DETAIL B & SER. ADD LD23 & S1232-5 (SR9621)(SR9622)	GW	1-6-80
G	BY REV: CIRCUIT BREAKER NOMENCLATURE WAS STROBE-RADIO FAN; ADD DETAIL 'B' & SER'S (SR10091)	GW	9-8-81
H	BY REV: DELETE REV 'G' CHANGES (SR10091)(REF)	GW	1-7-82



ITEM	REF ID	DESCRIPTION	CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
3	S1232-5	CIRCUIT BREAKER						
12	S1641-9	HOUSING						
11	S1640-9	HOUSING						
10	S1637-2	HOUSING						
9	S1637-1	HOUSING						
8	S1641-6	HOUSING						
7	S1640-6	HOUSING						
6	S1638-2	HOUSING						
5	S1638-1	HOUSING						
4	S1660-5L	CIRCUIT BREAKER						

WIRE TABLE			
CONTRACT NO:	NAME	DATE	
GROUP	GROUP	DATE	TITLE
DRAWN	J.C. SMITH	8-15-76	COMMERCIAL AIRCRAFT DIV. CESSNA AIRCRAFT CO. EDDIE E. PAWNEE WICHITA, KANSAS
CHECK	J. YOUNG	8-26-76	
STROBE			
ITEM	REF ID	CODE IDENT.	DRNG NO
1	CG22006-0102	0470406	0470406
2	CG22006-0107	0470406	0470406
3	S1637-1	0470406	0470406
4	S1637-2	0470406	0470406
5	S1640-6	0470406	0470406
6	S1641-6	0470406	0470406
7	S1641-9	0470406	0470406
8	S1660-5L	0470406	0470406
9	S1638-1	0470406	0470406
10	S1638-2	0470406	0470406
11	S1640-9	0470406	0470406
12	S1641-9	0470406	0470406
13	S1641-9	0470406	0470406
14	S1640-6	0470406	0470406
15	S1637-2	0470406	0470406
16	S1637-1	0470406	0470406
17	S1638-2	0470406	0470406
18	S1638-1	0470406	0470406
19	S1640-6	0470406	0470406
20	S1641-6	0470406	0470406
21	S1641-9	0470406	0470406
22	S1640-9	0470406	0470406
23	S1637-1	0470406	0470406
24	S1637-2	0470406	0470406
25	S1660-5L	0470406	0470406
26	S1641-9	0470406	0470406
27	S1640-6	0470406	0470406
28	S1638-2	0470406	0470406
29	S1638-1	0470406	0470406
30	S1640-6	0470406	0470406
31	S1641-6	0470406	0470406
32	S1641-9	0470406	0470406
33	S1640-9	0470406	0470406
34	S1637-1	0470406	0470406
35	S1637-2	0470406	0470406
36	S1660-5L	0470406	0470406
37	S1641-9	0470406	0470406
38	S1640-6	0470406	0470406
39	S1638-2	0470406	0470406
40	S1638-1	0470406	0470406
41	S1640-6	0470406	0470406
42	S1641-6	0470406	0470406
43	S1641-9	0470406	0470406
44	S1640-9	0470406	0470406
45	S1637-1	0470406	0470406
46	S1637-2	0470406	0470406
47	S1660-5L	0470406	0470406
48	S1641-9	0470406	0470406
49	S1640-6	0470406	0470406
50	S1638-2	0470406	0470406
51	S1638-1	0470406	0470406
52	S1640-6	0470406	0470406
53	S1641-6	0470406	0470406
54	S1641-9	0470406	0470406
55	S1640-9	0470406	0470406
56	S1637-1	0470406	0470406
57	S1637-2	0470406	0470406
58	S1660-5L	0470406	0470406
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63	S1640-6	0470406	0470406
64	S1641-6	0470406	0470406
65	S1641-9	0470406	0470406
66	S1640-9	0470406	0470406
67	S1637-1	0470406	0470406
68	S1637-2	0470406	0470406
69	S1660-5L	0470406	0470406
70	S1641-9	0470406	0470406
71	S1640-6	0470406	0470406
72	S1638-2	0470406	0470406
73	S1638-1	0470406	0470406
74	S1640-6	0470406	0470406
75	S1641-6	0470406	0470406
76	S1641-9	0470406	0470406
77	S1640-9	0470406	0470406
78	S1637-1	0470406	0470406
79	S1637-2	0470406	0470406
80	S1660-5L	0470406	0470406
81	S1641-9	0470406	0470406
82	S1640-6	0470406	0470406
83	S1638-2	0470406	0470406
84	S1638-1	0470406	0470406
85	S1640-6	0470406	0470406
86	S1641-6	0470406	0470406
87	S1641-9	0470406	0470406
88	S1640-9	0470406	0470406
89	S1637-1	0470406	0470406
90	S1637-2	0470406	0470406
91	S1660-5L	0470406	0470406
92	S1641-9	0470406	0470406
93	S1640-6	0470406	0470406
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97	S1641-6	0470406	0470406
98	S1641-9	0470406	0470406
99	S1640-9	0470406	0470406
100	S1637-1	0470406	0470406
101	S1637-2	0470406	0470406
102	S1660-5L	0470406	0470406
103	S1641-9	0470406	0470406
104	S1640-6	0470406	0470406
105	S1638-2	0470406	0470406
106	S1638-1	0470406	0470406
107	S1640-6	0470406	0470406
108	S1641-6	0470406	0470406
109	S1641-9	0470406	0470406
110	S1640-9	0470406	0470406
111	S1637-1	0470406	0470406
112	S1637-2	0470406	0470406
113	S1660-5L	0470406	0470406
114	S1641-9	0470406	0470406
115	S1640-6	0470406	0470406
116	S1638-2	0470406	0470406
117	S1638-1	0470406	0470406
118	S1640-6	0470406	0470406
119	S1641-6	0470406	0470406
120	S1641-9	0470406	0470406
121	S1640-9	0470406	0470406
122	S1637-1	0470406	0470406
123	S1637-2	0470406	0470406
124	S1660-5L	0470406	0470406
125	S1641-9	0470406	0470406
126	S1640-6	0470406	0470406
127	S1638-2	0470406	0470406
128	S1638-1	0470406	0470406
129	S1640-6	0470406	0470406
130	S1641-6	0470406	0470406
131	S1641-9	0470406	0470406
132	S1640-9	0470406	0470406
133	S1637-1	0470406	0470406
134	S1637-2	0470406	0470406
135	S1660-5L	0470406	0470406
136	S1641-9	0470406	0470406
137	S1640-6	0470406	0470406
138	S1638-2	0470406	0470406
139	S1638-1	0470406	0470406
140	S1640-6	0470406	0470406
141	S1641-6	0470406	0470406
142	S1641-9	0470406	0470406
143	S1640-9	0470406	0470406
144	S1637-1	0470406	0470406
145	S1637-2	0470406	0470406
146	S1660-5L	0470406	0470406
147	S1641-9	0470406	0470406
148	S1640-6	0470406	0470406
149	S1638-2	0470406	0470406
150	S1638-1	0470406	0470406
151	S1640-6	0470406	0470406
152	S1641-6	0470406	0470406
153	S1641-9	0470406	0470406
154	S1640-9	0470406	0470406
155	S1637-1	0470406	0470406
156	S1637-2	0470406	0470406
157	S1660-5L	0470406	0470406
158	S1641-9	0470406	0470406
159	S1640-6	0470406	0470406
160	S1638-2	0470406	0470406
161	S1638-1	0470406	0470406
162	S1640-6	0470406	0470406
163	S1641-6	0470406	0470406
164	S1641-9	0470406	0470406
165	S1640-9	0470406	0470406
166	S1637-1	0470406	0470406
167	S1637-2	0470406	0470406
168	S1660-5L	0470406	0470406
169	S1641-9	0470406	0470406
170	S1640-6	0470406	0470406
171	S1638-2	0470406	0470406
172	S1638-1	0470406	0470406
173	S1640-6	0470406	0470406
174	S1641-6	0470406	0470406
175	S1641-9	0470406	0470406
176	S1640-9	0470406	0470406
177	S1637-1	0470406	0470406
178	S1637-2	0470406	0470406
179	S1660-5L	0470406	0470406
180	S1641-9	0470406	0470406
181	S1640-6	0470406	0470406
182	S1638-2	0470406	0470406
183	S1638-1	0470406	0470406
184	S1640-6	0470406	0470406
185	S1641-6	0470406	0470406
186	S1641-9	0470406	0470406
187	S1640-9	0470406	0470406
188	S1637-1	0470406	0470406

# **MODEL 152 SERIES SERVICE MANUAL**

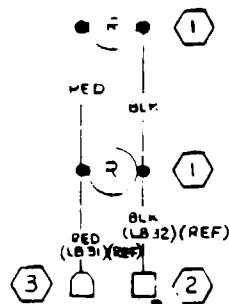
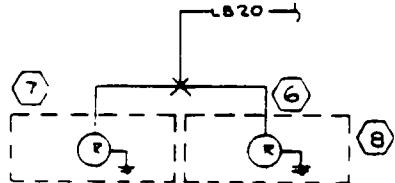
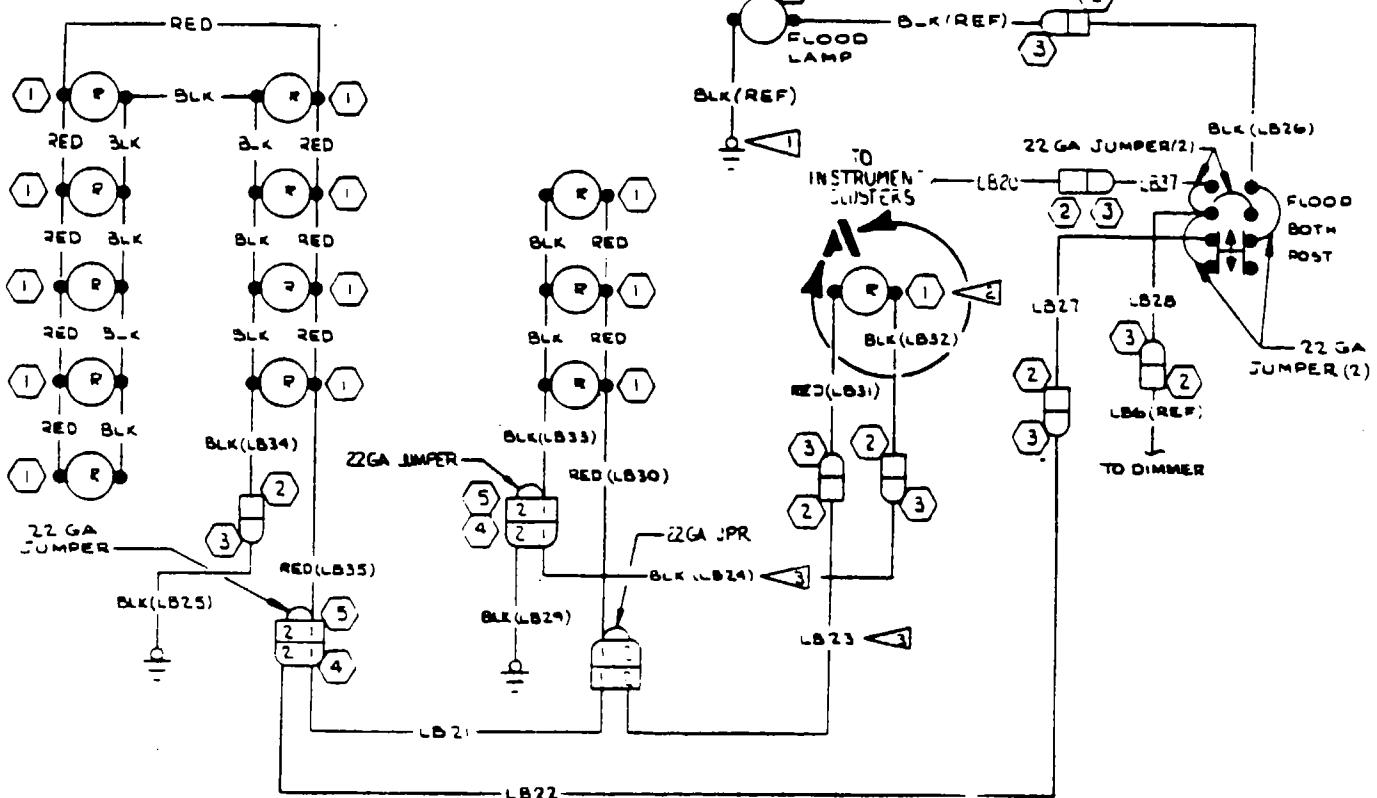
C BY REV: ADD LS57; S-1650-1 WAS SOLDER/LB200 (NOW SHOT PRACTICE) 8-8-81			NTL 041357 S-1650-1	041357 S-1650-1	REVISION
LET	DESCRIPTION	DATE	APD		
A	BY REV: LB 20 WAS TO S-2033-1 HORNBUCKY ADD 22-LA JUMPER TO SWITCH; LAMP C/W WAS CW. C-69511-0101 & C-69512-0102 WAS C-69536-0101 & C-69535-0101 (S-1650-1 IS NOTLY S-1650-2)	4-CM 11-7-77	JAD IRS P.P.		
B	BY REV: ADD DETAIL "A" (SR910)(SR9103)(SR9103)	4-MG 9-1-78	JAD IRS P.P.		

**NOTES:**

- TERMINATE WITH S1367-1-B
  - THIS LAMP ASSY NOT READ. WITH 0413577-1  
POST LIGHT INSTL
  - REMOVE EXISTING TERMINALS FROM LB23 & LB24  
TERMINATE WITH S1557-1 CAP & STOW WHEN  
0413577-1 POST LIGHT INSTL IS INSTALLED

**Post Lights "(Sheet 1 of 2)"**

# **MODEL 152 SERIES SERVICE MANUAL**



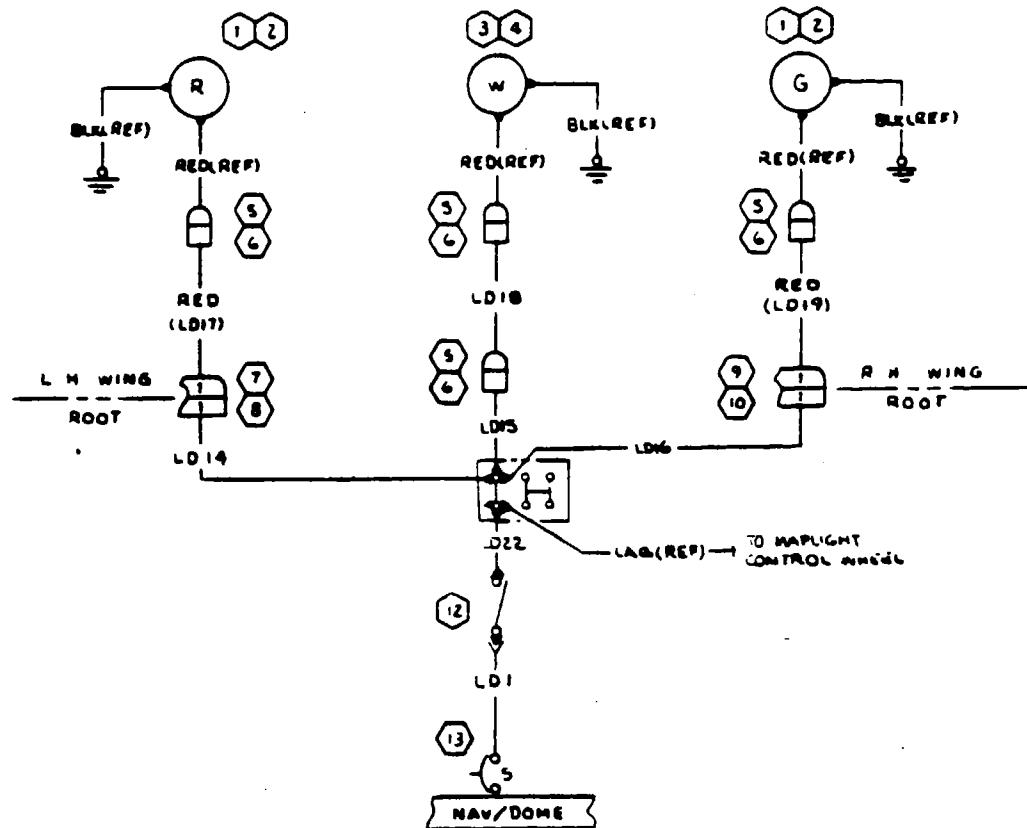
(APPLIES WITH ALTEGTAACCEL)

CONTRACT NO:			PAWNEE DIVISION 3400 E. PAWNEE WICHITA, KANSAS		
	NAME	DATE	<i>Cessna</i> AIRCRAFT CO.		
DESIGN	WHITSON	8-27-77	TITLE		
GROUP	<i>Whitson</i>	11-7-77			
DRAWN	J. BLISS	8-22-77	WIRING DIAGRAM —		
CHECK	BORLESKE	8-23-77	POST LIGHTS		
STRESS					
PROJ	R. FIFE	9-19-77	SIZE	CODE IDENT.	DRWG NO
APPO	<i>YPS</i>	—	C	71379	0470406
OTHER			SCALE: NONE 1/2 F152 A157 FA152 PAGE: 11.0		

**Post Lights "(Sheet 2 of 2)"**

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LET	DESCRIPTION	DATE	APD



5-11-1  
 72-09-0  
 71-00-9  
 71-71-0

PART NO.	DESCRIPTION	WIRE TABLE			SERIALS
		CODE	GA	MATERIAL	
13 S-1560-5L	CKT BK	LD22	22	S-1493-1	S-14829-1
12 S-2160-1	SWITCH	LD18	20	S-1635-1	S-1636-1
11 34003-817	TERM BLOCK	LD16	22	S-1635-1	
10 S-1641-9	HOUSING	LD15	22	S-1629-1	
9 S-1640-9	HOUSING	LD14	22	S-1629-1	S-1636-1
8 S-1641-6	HOUSING	D1	22	S-162716	S-1493-1
7 S-1640-6	HOUSING	CODE	SO	GA	MATERIAL
6 S-1637-2	HOUSING				LG
5 S-1637-1	HOUSING				TERMINALS
4 MS35478-307	LAMP				SERIALS
3 C622001-0102	TAIL LIGHT ASSY				
2 MS25309-7512	LAMP				
1 C622001-0202	LIGHT ASSY				
<b>EQUIPMENT TABLE</b>		<b>WIRE TABLE</b>			
CDS-1000 IS APPLICABLE VENDOR CODES PER S-1400 CDS-XXXX-CESSNA SPEC. NO. S-XXXX OR CDSXXXX-CESSNA STD. NO.		SUPERSEDES: 0470-406 PG 11-4	PROJ:	R FIFE	1/6/77
SUPERSEDED BY:		OTHER	SIZE	CODE IDENT	OWG NO
			C	71379	0470406
			SCALE:	NONE	PAGE: 11-10
(SR8770XSR8771)(SR8772)					

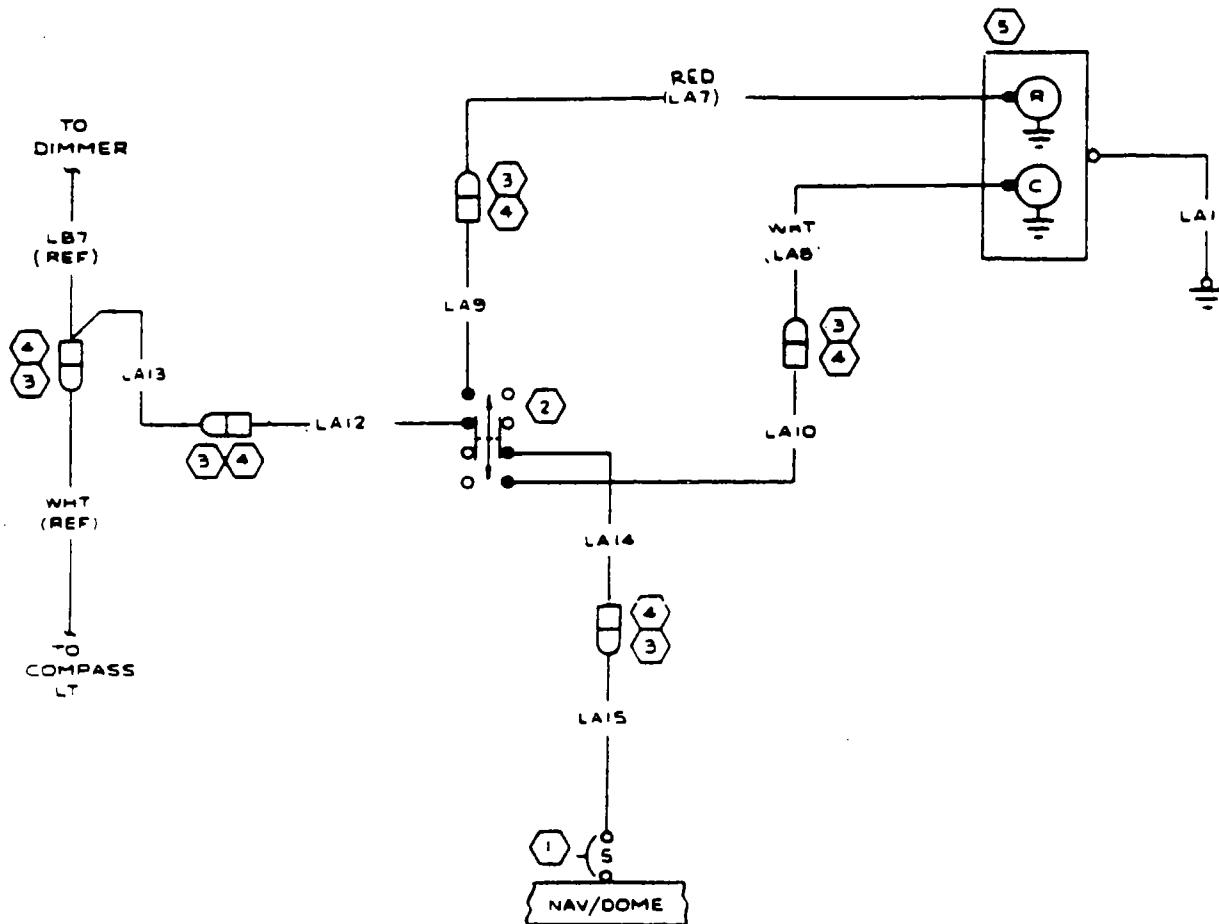
CESSNA AIRCRAFT CO.

PAWNEE DIVISION  
3000 E PAWNEE  
WICHITA KANSAS

## WIRING DIAGRAM — NAVIGATION LIGHTS

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LOT	DESCRIPTION	DATE	APPROV.



ITEM NO.	QTY	DESCRIPTION	SIZE	CODE IDENT.	DRAWING NO.
LA15	22	S-1637-1 S-1635-1			
LA14	8	S-1636-1 SOLDER			
LA13		S-1635-1 S-1636-1			
LA12		S-1636-1 SOLDER			
LA11		S-1637-10 S-1637-10			
LA10		SOLDER S-1636-1			
LA9		SOLDER S-1636-1			
WHT	1	-22-2		S-1635-1 SOLDER	
RED	1	-22-2		S-1635-1 SOLDER	
WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS

ITEM NO.	DESCRIPTION	EQUIPMENT TABLE	
		PART NO.	DESCRIPTION
5 470089	LIGHT ASSY		
4 S-1637-2	HOUSING		
3 S-1637-1	HOUSING		
2 S-1501-1	SWITCH		
1 S-1360 SL	CKT 3KR		

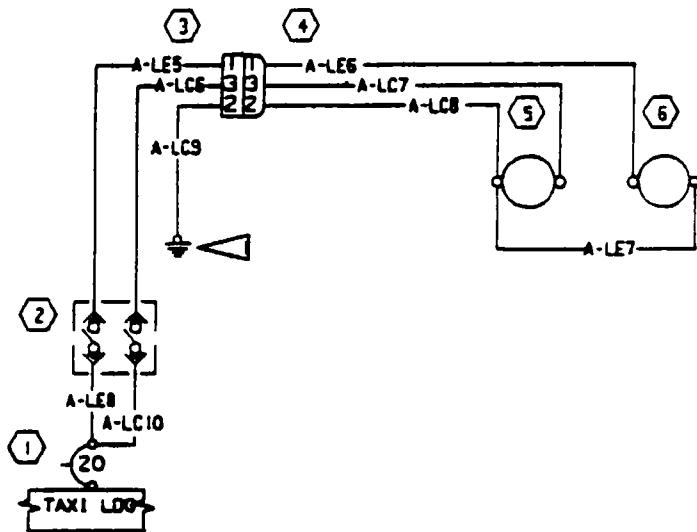
CEC-1000 IS APPLICABLE  
VENOR CODES PER S-1400  
CEC-XXX-CESSNA SPEC. NO.  
S-XXX OR CMXXX-CESSNA  
STD. NO.

WIRE TABLE		COMMERCIAL AIRCRAFT DIV 3800 E. PAWNEE WICHITA, KANSAS	
CONTRACT NO:		Cessna AIRCRAFT CO.	
DESIGN	WHITESON 3-6-78	TITLE	WIRING DIAGRAM —
GROUP	1048 3-78		MAP & AUX INSTRUMENT
DRAWN	PAPE 2-28-78		LIGHT (OPT)
CHECK	BORLESKE 3-1-78		
STRESS			
SUPERSEDES:	PROJ R.FIRE 3-207A	SIZE	CODE IDENT. DRAWING NO.
SUPERSEDED BY:	APPO 1048	C	71379 0470406
	OTHER	SCALE: NONE	(SR9052) PAGE: 11.11

# MODEL 152 SERIES SERVICE MANUAL

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

NOTES:  
 1) GROUND AT ACU MOUNTING  
 BOLT (REF 036 040/040)



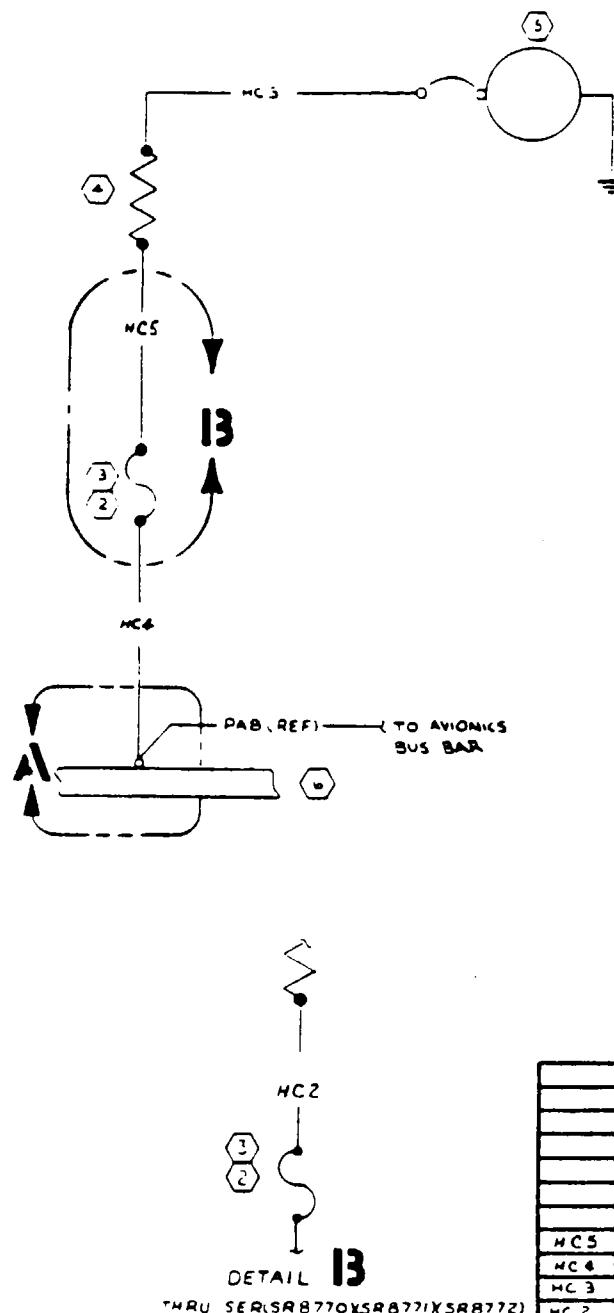
A-LES	14 -14-0	S-1367-2-12	S-1493-2		
A-LE7	14 -14-0	S-1367-2-8	S-1367-2-8		
A-LE6	14 -14-0	S-1635-2	S-1367-2-8		
A-LES	14 -14-0	S-1493-2	S-1636-2		
A-LC9	14 -14-0	S-1635-2	S-1367-1-8		
A-LC8	14 -14-0	S-1635-2	S-1367-2-8		
A-LC7	14 -14-0	S-1635-2	S-1367-2-8		
A-LC6	14 -14-0	S-1493-2	S-1636-2		
A-LC10	14 -14-0	S-1367-2-12	S-1493-2		

WIRE CODE      GA      MATERIAL      TERMINALS      SERIALS

PART NO.	DESCRIPTION	WIRE TABLE			TITLE
		DESIGN	NAME	DATE	
4587	TAXI LIGHT				
4596	LANDING LIGHT				
4 S-1367-2	HOUSING	C	HARDEN	6-20-83	Powers Aircraft Division
3 S-1636-2	HOUSING	G	HARDEN	6-20-83	Cessna Aircraft Company
2 S-1635-2	SWITCH	H	G. STAMM	6/16/83	Wichita, Kansas
1 S-1360-201	CIRCUIT BREAKER	I	MCGUIGAN	6-16-83	
	OPTION	J	FICKEL	6-24-83	
	EQUIPMENT TABLE	K	JRG		
CES-000 IS APPLICABLE	SUPERSEDES:	L			
VENOR CODES PER S-400	PG 11.3	M			
CES-XMM-CESSNA SPEC NO.		N			
S-XMM OR CESSNA-CESSNA	SUPERSEDES SV:	O			
STD NO.	OTHER	P			

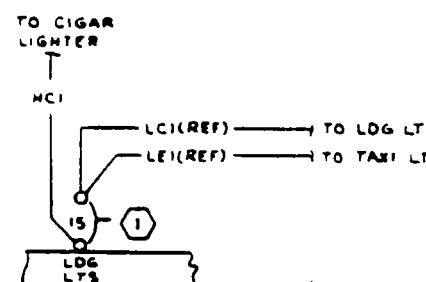
SIZE      CODE IDENT      DWS NO.  
 C 71379      0470406  
 SCALE      NAME      IN      LS (10686)      PAGE      1112

# **MODEL 152 SERIES SERVICE MANUAL**



REVISION			
LET	DESCRIPTION	DATE	APPO
A	BY REV: REVISED REDRAWN ADD HC2 HC3, MMH-A 52041-501-6 SFE 75; 0513032 WAS 9910220-1 TITLE WAS CIGAR LIGHTER (OPTIONAL) (SRB450)(SRB451)(SRB452)	CDS 10-8-77	SD-10 MMH ZF
B	BY REV: ADD DETAIL A & SER. ADD HC4; PAR(REF). ADD 0470423 (SRB770)(SRB771)(SRB772)	CRS 10-27-77	JAD UNIT 109 ZF
C	BY REV: ADD DETAIL B & SER. SER OUT HC2; & SER IN HC3; ADD G MAIL/HC4 (SRB770)(REF)(SRB771)(REF)(SRB772)(REF)	CRS 10-4-79	GD-10 MMH ZF

**INACTIVE**  
THRU SER 5/10/81  
GW 1-1281  
JAN 1981  
1981 D3



DETAIL A  
THRU SER(SA 8770)(SA 8771)(SA 8772)

PART NO.		DESCRIPTION
<b>EQUIPMENT TABLE</b>		
1	0470423	BUS BAR
5	053052	LIGHTER ASSY
4	S2041-50146	RESISTOR
3	S-2375-73	FUSE
2	S-2379-75	FUSEHOLDER
1	S-1360-5L	CKT BAR
<b>ITEM NO.</b>		<b>SUPERSEDES:</b>
		<b>SUPERSEDED BY:</b>

MC 1	16	
WORK CODE NO.	GA	MATERIAL
CONTRACT NO.:		
	NAME	DATE
DESIGN	G WHITSON	8-30-70
GROUP	WH HARDEN	7-1-70
DRAWN	J.C. SMITH	8-25-70
CHECK	J. VOUEL	8-26-70
STRESS		

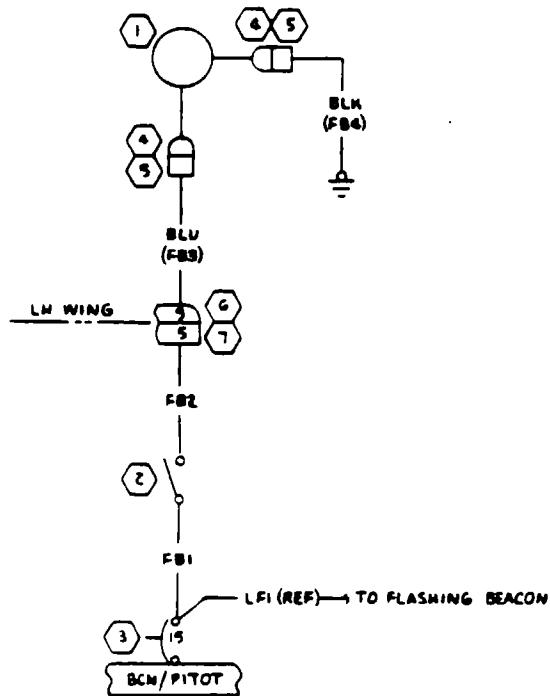
Cessna, AIRCRAFT CO.

## **WIRING DIAGRAM — CIGAR LIGHTER**

SIZE <b>C</b>	CODE IDENT. <b>71379</b>	DWG NO <b>0470406</b>
SCALE: <b>NONE</b>	PAGE: <b>13</b>	

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
REF.	DESCRIPTION	DATE	APPO



50-0916  
51-0916  
52-0916

7	SIG41-G	HOUSING
6	SIG40-G	HOUSING
5	SIG37-2	HOUSING
4	SIG37-1	HOUSING
3	SIG30-1SL	CIRCUIT BREAKER
2	SIG0-1	SWITCH
1	0721105	PITOT HEATER

**EQUIPMENT TABLE**

CES-1000 IS APPLICABLE  
VENDOR CODES PER S-1400  
CES-KXXX-CESSNA SPEC. NO.  
S-KXX OR CMXKX-CESSNA  
STD. NO.

SUPERSEDES:  
0470401 P13.2

SUPERSEDED BY:

WIRE CODE NO.	GA	MATERIAL	LG	TERMINALS	SERIALS
BLK(FB4)	16	-16-0		S1636-1	S1637-1-8
BLU(FB3)	16	-16-6		S1635-2	S1636-2 (STD)
FB2	16			S1693-2	S1636-2
FB1	16			S1367-2-6	S1693-2

## WIRE TABLE

CONTRACT NO.:		
DESIGN	NAME	DATE
0470401 P13.2	J.C. SMITH	8-25-76
APPD	J. YOUNG	8-26-76
STRESS		

*W* TITLE  
*Cessna*, AIRCRAFT CO.

COMMERCIAL AIRCRAFT DIV.  
3800 E. PAWNEE  
WICHITA, KANSAS

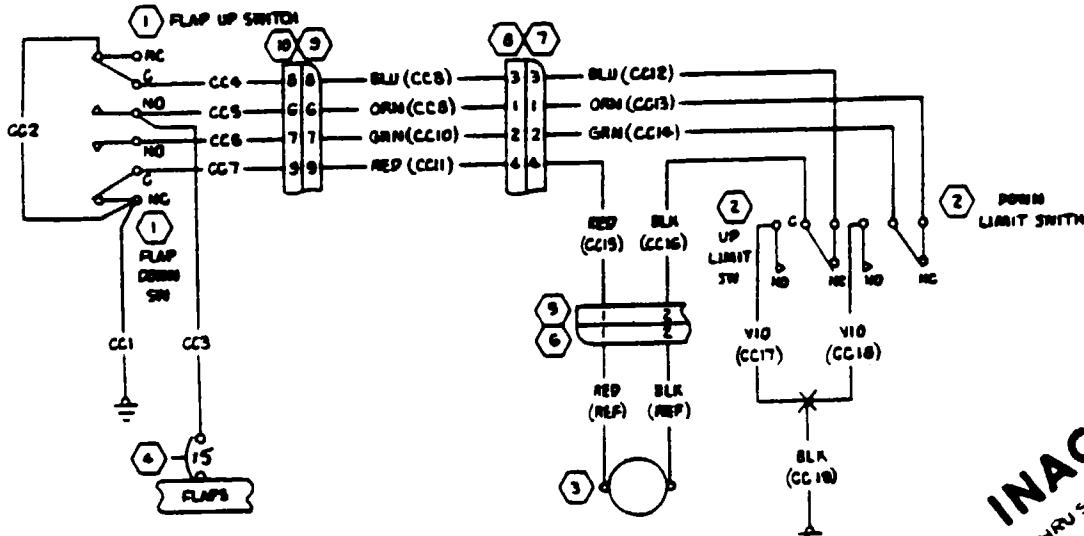
## WIRING DIAGRAM— PITOT HEAT (OPTIONAL)

SIZE	CODE IDENT.	DRAW NO.
C	71379	0470406
SCALE: NONE		PAGE: 132

(SR8450)(SR8451)(SR8452)

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LIST	DESCRIPTION	DATE	APPROV.
A	BY REV: S-1560-15L WAS S-1560-10L, CCL WIRE THRU BLK (CC14) WIRE WAS 18 GA; CHANGE TERMINALS TO AGREE WITH WIRE GAGE (W84902804)(S88992)	PM 11-17-76	JST 1000 PPB RPF
B	BY REV: CORRECT V3-1-D9 WIRING (NOW SHOP PRACT)	TP3 8-7-76	AC 1000 PPB RPF



**INACTIVE**  
THRU SER(S-1560-15L)(S-9103)  
(S-9103)  
3-25-73

HMG  
JUL 15  
RPF

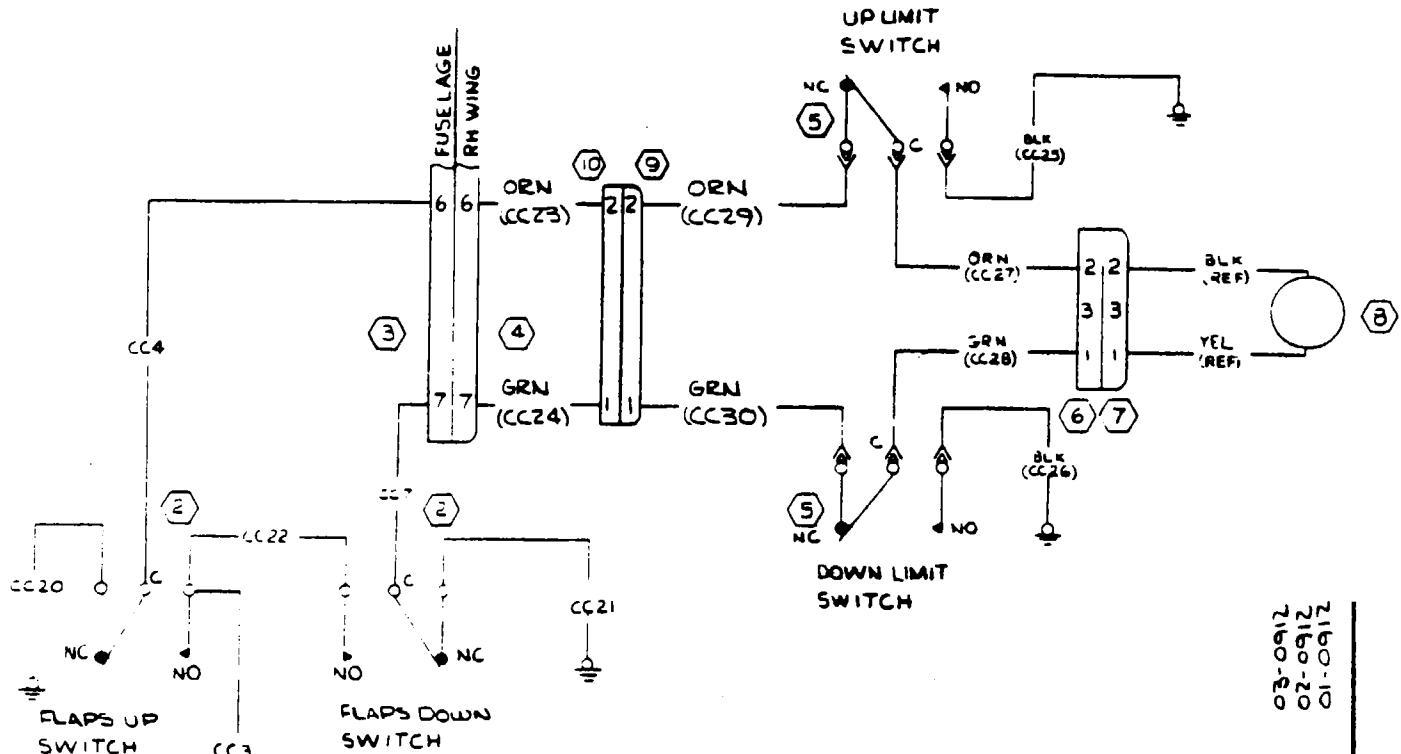
03-09-6  
03-09-6  
03-09-6

BLK(CC1)	16	-16-0	S1493-2	S1493-2-0	
VIO(CC8)	1	-16-7	S1493-2	S1493-2	
VIO(CC11)		-16-7	S1493-2	S1493-2	
BLK(CC4)		-16-0	S1493-2	S1493-2	
RDY(CC9)		-16-2	S1493-2	S1493-2	
GRN(CC8)		-16-5	S1493-2	S1493-2	
GRN(CC11)		-16-3	S1493-2	S1493-2	
BLK(CC2)		-16-6	S1493-2	S1493-2	
RDY(CC11)		-16-2	S1493-2	S1493-2	
GRN(CC11)		-16-9	S1493-2	S1493-2	
GRN(CC8)		-16-8	S1493-2	S1493-2	
BLK(CC8)		-16-6	S1493-2	S1493-2	
CC1			S1493-2-0	S1493-2-0	
CC2	1		S1493-2-0	S1493-2-0	
CC1	16		S1493-2-0	S1493-2-0	
CODE NO.	GA	MATERIAL	LO	TERMINALS	SERIALS

		WIRE TABLE			COMMERCIAL AIRCRAFT DIV. 3000 E. PAWNEE WICHITA, KANSAS	
		CONTRACT NO:			TITLE	
		NAME	DATE	Cessna, AIRCRAFT CO.		
10	S1641-9	HOUSING		DESIGNER: G. MITSON	8-20-76	
3	S1640-9	HOUSING		GROUP: 104	8-20-76	
8	S1641-6	HOUSING		DRAWR: J.C. SMITH	8-25-76	
7	S1640-6	HOUSING		CHECK: J. YOUNG	8-27-76	
6	S1638-2	HOUSING		STRESS: -		
5	S1638-1	HOUSING		STRENG: -		
4	S1560-15L	CIRCUIT BREAKER		PROJ: 24-1	7-20-76	
3	C1000R-0102	ACTUATOR ASSY		APPO: 1/2	-	
2	V3-1-D9	SWITCH		OTHER: -		
1	S1906-1	SWITCH				
ITEM	PART NO.	DESCRIPTION				
		EQUIPMENT TABLE			WIRING DIAGRAM — WING FLAPS - ELECTRIC	
CDS-1000 IS APPLICABLE VENDOR CODES PER S-1400 CDS-CROSSREFS/Spec. No. S-1400 OR CROSSREFS/Spec. STD. NO.		SUPERSEDED: 0470406 P14.2	PROJ: 24-1	7-20-76	SIZE: C	CODE IDENT: 71379
SUPERSEDED BY: 0470406 P14.2		APPO: 1/2			DRWG NO: 0470406	PAGE: 10.1
					SCALE: NONE	(S88992)(S88993)(S88994)

# MODEL 152 SERIES SERVICE MANUAL

REVISION			
LIST	DESCRIPTION	DATE	APPRO
A	BY REV: ADD CC29, CC30, S-2035-1, S-2035-2, S-1636-2/CC23 & CC24 WAS S-14932 (SR9101)(SR9102)(SR9103)	2-7 3-9-79	2-7-79 2-7-79 2-7-79



CC30	16-16-5	S-14932-S-14932
CC29	16-16-3	S-14932-S-14932
GRN(CC24)	16-16-5	S-14932-S-1636-2
GRN(CC27)	-16-3	S-14932-S-1636-2
BLK(CC24)	-16-0	S-14932-S-1636-2
BLK(CC25)	-16-0	S-14932-S-1636-2
GRN(CC29)	-16-5	S-1636-2-S-1636-2
GRN(CC28)	-16-3	S-1636-2-S-1636-2
CC22		S-1636-2-S-1636-2
CC21		S-1636-2-S-1636-2
CC20		S-1636-2-S-1636-2
CC7		S-1636-2-S-1636-2
CC4		S-1636-2-S-1636-2
CC3	16	S-1636-2-S-1636-2

0	S-2035-2	HOUSING
3	S-2035-1	HOUSING
8	S-3010G2-0108	ACTUATOR ASSY
7	S-1638-2	HOUSING
6	S-1638-1	HOUSING
5	S-1906-2	SWITCH
4	S-1640-9	HOUSING
3	S-1641-9	HOUSING
2	S-1906-1	SWITCH
1	S-1360-0L	CIRCUIT BREAKER

WIRE TABLE					
CONTRACT NO.:					
DESIGNER	W. H. TROTTER	DATE	10-26-78		
GROUP	04 HAROLD		10-26-78		
DRAWN BY	H. GHAZARIAN		9-1-78		
CHECKED	BORLESKE		9-5-78		
STRIKES					

PART NO.	DESCRIPTION	EQUIPMENT TABLE	
		ITEM NO.	DESCRIPTION

CES-1000 IS APPLICABLE VENDOR CODES PER S-1400 CES-KXXX-CESSNA SPEC. NO. S-KXX OR CAKER-CESSNA STD. NO.	SUPERSEDES: 0470406 PG 14.1
	SUPERSEDED BY:

PROJ	2 PIPE	10-26-78	SIZE	CODE IDENT.	DRW NO
APPRO	16-0		NO	C 71379	0470406
OTHER					
SCALE	NONE		(SR 9101)	PAGE	14.2

(SR 9102)  
(SR 9103)

**CESSNA AIRCRAFT CO.**

PAWNEE DIVISION  
3600 E. PAWNEE  
WICHITA, KANSAS

TITLE

WIRING DIAGRAM —

ELECTRIC WING FLAPS

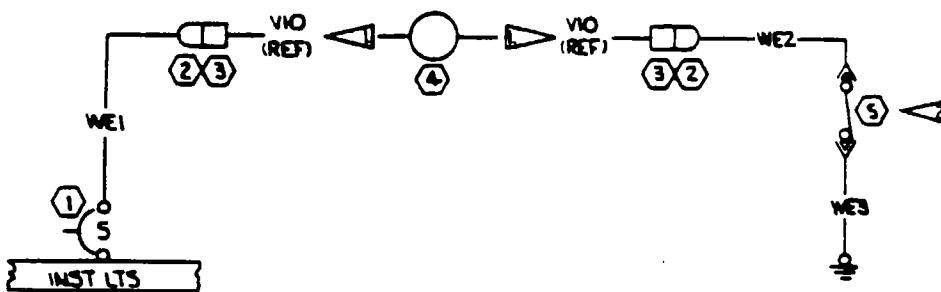
Z-0612  
02-0612  
0-0612

# **MODEL 152 SERIES SERVICE MANUAL**

REVISION			
REV	DESCRIPTION	DATE	APPROVED

**NOTES:**

- TERMINATE VENDOR SUPPLIED LEAD WITH S1636-1 TERMINAL
  - VACUUM SWITCH CONTACTS ARE NORMALLY CLOSED;  
CONTACTS OPEN AT 33±1 INCHES OF MERCURY  
VACUUM



1000

ITEM	CODE	NO.	GA	MATERIAL	LB	TERMINALS	SERIALS
WE3	22	-22-0				S1493-1	S1367-1-B
WE2	22	-22-0				S1635-1	S1493-1
WE1	22	-22-0				S1367-1-C	S1635-1

5	S2571-1	VACUUM SWITCH		CONTRACT NO:		WIRE TABLE	PAWNEE DIVISION 2000 E. PAWNEE WICHITA, KANSAS		
4	S2519-2	LAMP ASSY		NAME	DATE				
3	SIG37-2	HOUSING		DESIGNER	14-24-N.E.	10-10-61	Cessna, AIRCRAFT CO.		
2	SIG37-1	HOUSING		GROUP	M PAINT	10-10-61	TITLE		
1	S1360-5L	C.RCUIT BREAKER		DRAWN	WHITSON	10-10-61	WIRING DIAGRAM—		
PART NO.		DESCRIPTION		CHECK	REMAN	10-10-61	VACUUM OUT WARNING		
<b>EQUIPMENT TABLE</b>				STRENGTH			SYSTEM		
CER4000 IS APPLICABLE VENDOR CODES PER S-4000 CER-EXD-CEMRA SPEC. NO. S-4000 OR CER-EXD-CEMRA STD. NO.		SUPERSEDED BY:		PROJ	D. S. PIPES	6-20-61	SIZE	CODE IDENT.	DRW NO
				APP'D	/68		C	71379	0470406
		SUPERSEDED BY:		OTHER			UPN	NONE	(S21009)
							PAGE	151	

Cessna, AIRCRAFT CO.

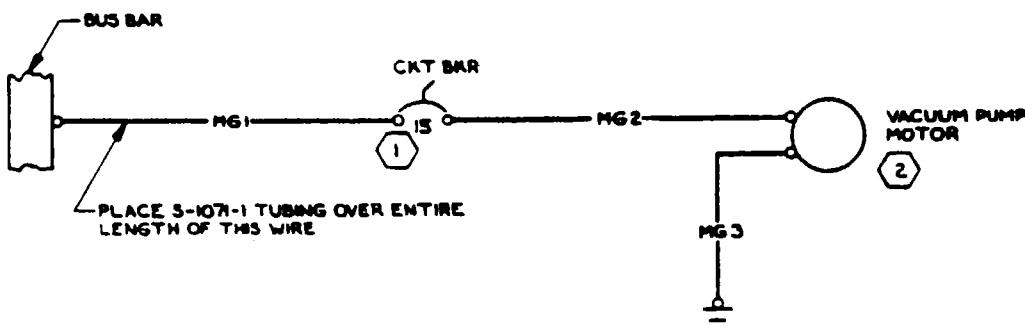
**TITLE**      **WIRING DIAGRAM —**  
**VACUUM OUT WARNING  
SYSTEM**

SIZE CODE IDENT. OWN NO

C	NO 71379	0470406
- - - NONE		(S210091) Page: 151

# MODEL 152 SERIES SERVICE MANUAL

REVISIONS			
LIST	DESCRIPTION	DATE	APPROVED



11-00916

WIRE TABLE					
PART NO.	DESCRIPTION	MATERIAL	LEN.	TERMINALS	
				TERMINAL NO.	TERMINAL
MG 3 16	S-2589			5-1367-2-05-1367-2-6	
MG 2 16	S-2589			5-1367-2-05-1367-2-6	
MG 1 16	S-2589			5-1367-2-05-1367-2-6	

WIRE TABLE

CONTRACT NO:			PASSENGER DIVISION 3000 S. PEPPER WICHITA, KANSAS		
Cessna, AIRCRAFT CO.			TITLE		
Cessna, AIRCRAFT CO.			WIRING DIAGRAM— STANDBY VACUUM PUMP MODEL 152		
EQUIPMENT TABLE			SIZE CODE IDENT. CHASSIS NO. C 71379 0470406		
CDS-1000 IS APPLICABLE VENDOR CODES PER S-1400 CDS-XXXX-CESSNA SPEC. NO. S-100 OR CDSXXXX-CESSNA STD. NO.		SUPERSEDED BY:		OTHER	

EQUIPMENT TABLE	
PART NO.	DESCRIPTION
2 C165008-0101	VACUUM PUMP
1 CM3589-15	CKT BKR

CDS-1000 IS APPLICABLE VENDOR CODES PER S-1400 CDS-XXXX-CESSNA SPEC. NO. S-100 OR CDSXXXX-CESSNA STD. NO.	SUPERSEDED BY:	OTHER	SIZE	CODE IDENT.	CHASSIS NO.
			C 71379	0470406	(SR 10-411) Trace 16.1