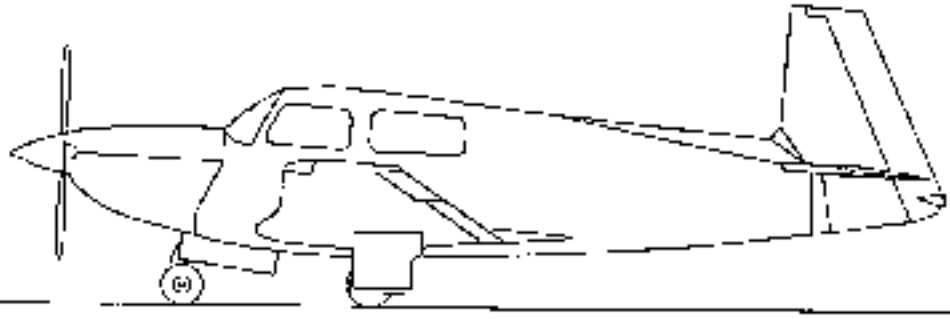
Mooney M20J

SERVICE AND MAINTENANCE MANUAL



MOONEY AIRCRAFT CORPORATION
LOUIS SCHREINER FIELD, KERRVILLE, TEXAS. 78028

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LOG OF REVISIONS

Always destroy superseded pages when you insert revised pages.

DATE OF REVISION	SECTIONS AFFECTED	DATE OF REVISION	SECTIONS AFFECTED

NOTE:

A list of effective pages will appear at the beginning of each chapter.

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A list of effective pages will appear at the beginning of each chapter.

There will be black, vertical lines on the edge of the pages for data that has been changed or added for the current page revision.

The Electrical Equipment List in Section 91 has been updated to reflect the current configuration status and there will be added electrical schematics to cover current model year M20J aircraft.

Each page will be noted with applicable revision date at the bottom-center of the page.

INTRODUCTION

This manual provides servicing and maintenance information for the Mooney Model M20J, Serial Numbers 24-0001 and ON. Maintenance actions that refer to a limited number of aircraft will be designated by serial number of applicable airplanes. The Part Numbers of replacement or repair parts should be identified using the Illustrated Parts Catalog (IPC) applicable to Model & Serial Number of aircraft being worked on. Part Numbers can be ordered through any Mooney Marketing Center (MMC). See Section 91 for identification of electrical components.

The format and contents of this manual are prepared in accordance with GENERAL AVIATION MANUFACTURER'S ASSOCIATION (GAMA) Specification No. 2. This manual is supplemented with wiring schematics for the various model year airplanes, as necessary. These are located in envelopes at the back of the manual texts pages.

NOTE

Revisions of this manual are not automatically provided to manual holders. Holders of these and other Mooney Technical Publications should complete information on YELLOW CARDS located at the front of the Title Page and send to Mooney Aircraft Corporation, Louis Schriener Field, Kerrville, TX., 78028, Attn: Service Parts Department.

Notification is sent to known manual holders when any new manual is prepared to replace the subscription manual and advises that no more revisions will be sent out. **The new issue manual will require a new subscription service.** If additional Technical Publications are desired, contact the Service Parts Department at Mooney Aircraft Corporation at (830) 896-6000, ext 2092 (direct line (830) 792-2092).

Correspondence concerning maintenance or part numbers on an airplane should contain the aircraft model number and serial number. The serial number appears on the identification placard located on the aft end, left hand side of the tailcone below the horizontal stabilizer.

ASSIGNMENT OF SUBJECT MATERIAL

The content of this publication is organized at four levels;

Group
System/Chapter
Subsystem/Section
Unit/Subject

GROUP

These are primary divisions of the manual that enable broad separation of content, ie., Airframe systems VS Powerplant systems. These groups are identified by tabs.

The various groups contain major systems information such as flight controls, landing gear, etc. The systems are arranged numerically per GAMA recommended number assignment. It is suggested, for example, that "Fuel" be identified with the System/Chapter number "28". The sequence of numbers, 28-00-00, refers to General Information of the Fuel Systems.

SUB-SYSTEM/SECTION

The major systems of an aircraft are broken down into sub-systems. These sub-systems are identified by the second element of the sequence of numbers, SECTION, ie., 28-20-00. The element -20- indicates the distribution portion of the fuel system.

UNIT/SUBJECT

The individual units within a sub-system may be identified by a third element of the sequence of numbers, SUBJECT, ie., 28-20-01. This number is assigned by the manufacturer and may or may not be used depending upon the complexity of the maintenance action recommended.

APPLICATION OF NUMBERING SYSTEM

Mooney Aircraft Corporation is in the process of revising all applicable technical publications to the GAMA format. When this effort is completed any publication concerning maintenance of aircraft will conform to this basic numbering system. Any person wishing information concerning the Fuel Distribution System would refer to the pages identified as, 28-20-00, in any maintenance oriented publication. These pages will be numbered sequentially within each system breakdown in the current Mooney series of aircraft. As Mooney aircraft models become more complex the page numbers may be sequentially numbered within sub-systems.

The table of contents in the front of each Chapter will provide a list of sub-systems covered in the Chapter. For example;

28-00	General
28-10	Storage (Tanks, vents, repair, etc.)
28-20	Distribution (Boost pumps, fuel lines, etc.)
28-40	Indicating (Sender Units, quantity gauges, etc.)

If there is a reason to distinguish between LEFT HAND or RIGHT HAND fuel quantity sending units then the number would be expanded to 28-40-01 (Left Hand) and 28-40-02 (Right Hand). This concept will apply to any expanded information throughout the publications.

SUPPLEMENTARY PUBLICATIONS

The following list of Manufacturers and/or publications can provide servicing and maintenance information on components of the Mooney - 201, 201LM, 205, ATS, MSE, Allegro (Model M20J). No avionics equipment Manufacturers or publications are listed due to the many configurations that can be installed in the aircraft. These can be obtained from the repair stations for a particular avionics manufacturer.

Publications available from Mooney Aircraft Corporation are listed in the Parts Price List and are available through any Mooney Marketing/Service Center.

As publications on various components become available, they will be added to the list below.

VENDOR ADDRESSES or PUBLICATIONS

ENGINE

The following maintenance publications can be obtained through TEXTRON Lycoming Division, Williamsport, PA., 17701.

Overhaul Manual for TEXTRON Lycoming Aircraft Engines, Direct Drive Models, Manual No. 60294-7.

Illustrated Parts Catalog - Manual No. PC-206 for TEXTRON Lycoming IO-360 , AIO-360, HIO-360, LIO-360 and TIO-360 series aircraft engines.

Operators Manual - No. 60297-12, for TEXTRON Lycoming O-360, HO-360, IO-360, AIO-360, LIO-360 and TIO-360 aircraft engines.

Service Bulletins - Specify model of engine for which maintenance data is desired.

PROPELLER

McCauley Propellers - Obtain publications from McCauley Accessories Division, Cessna Aircraft Company, 3535 McCauley Drive, Vandalia, OH.,45377.

Service Manual - No. 790630 for McCauley C200 series constant speed propellers.

Hartzell Propellers - Obtain publications from Hartzell Propeller, Inc. 350 Washington Avenue, Piqua, OH., 45356.

Blade Specification - Manual No. 133-A.

Overhaul Instructions - Manual No. 113-B.

MAGNETO

Bendix Scintilla Magneto - Obtain Service data for Bendix Series 2000 or 3000 magnetos from Bendix Corporation, Electrical Components Division, Jacksonville, FL. 32245-7680.

FUEL INJECTOR

Fuel Injector - Obtain service data for fuel injectors from Precision Airmotive, 3220-100th Street, S.W. #E, Everett, WA 98204

VACUUM PUMP

Airborne Division, Parker Hannifin Corporation, 711 Taylor Street, PO Box 4032, Elyria, OH, 44036, USA, Tel. (216) 284-6300, Fax. (216) 322-6094

STAND-BY VACUUM PUMP SYSTEMS

AERO-SAFE, 10160 Buffalo Grove Rd., Fort Worth, TX 76101, (800) 433-5669

ELECTRO-MECH, 2600 So. Custer, Wichita, KS 67217, (316) 942-3271

SPEED BRAKES

Precise Flight, Inc., 63128 Powell Butte Rd. Bend, OR, 97701, USA, Tel. (800) 547-2558.

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CHAPTER 5

TIME LIMITS/MAINTENANCE CHECKS

CHAPTER 5

TIME LIMITS/MAINTENANCE CHECKS

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CHAPTER 5

TIME LIMITS/MAINTENANCE CHECKS

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5-00-00 - GENERAL

AIRCRAFT DESCRIPTION. The M20J series of aircraft are four place high-performance single-engine low-wing monoplanes. The all-metal airframe has a tubular-steel cabin frame covered with nonstructural aluminum skins, a semi-monocoque tailcone, and a full-cantilever laminar-flow wing. Control surfaces have structural spar construction with stressed skins riveted to the spars and ribs. Dual control wheels accompany the conventional flight controls. The pilot's rudder pedals have toe brakes linked to individual hydraulic cylinders that supply pressure to the hydraulic disc brakes on each main gear wheel. Removable co-pilot rudder pedals are standard equipment. The tricycle landing gear, having a steerable nose wheel controlled by rudder pedal action, is fully retractable. The wide-span trailing-edge wing flaps are electrically operated. For stabilizer trim, the entire empennage pivots vertically about its attaching points.

5-00-01 - LANDING GEAR SYSTEM

The electric landing gear system has a steerable nose wheel. Single disc self-adjusting hydraulic brakes are featured on the main gear. Gear position lights, a warning horn and a gear position indicator on the floorboard are standard equipment. Bungee springs that preload the retraction mechanism in an over-center position lock the gear down. An air pressure actuated safety switch in the pitot system or a squat switch in the electrical system prevents electric gear retraction on takeoff until a safe flying speed is attained. A gear throttle warning sounds when the manifold pressure is less than a pre-set value with the landing gear up. The electric gear retraction system has a manual extension system connected to the gear actuator that permits manual lowering of the gear in the event of an electrical malfunction.

5-00-02 - FLIGHT CONTROL SYSTEMS

The dual flight control systems can be operated from either the pilot or co-pilot seat. All flight controls are conventional in operation, using pushpull tubes to link the control surfaces to the control wheels and rudder pedals. Formica guide blocks maintain control tube alignment and dampen vibration. An interconnect spring mechanism links the aileron and rudder systems to assist in control coordination. The standard co-pilot's rudder pedals are removable. The trim system sets the stabilizer angle of attack.

5-00-03 - WING FLAP SYSTEM

Wing flaps are electrically actuated and are controlled by a spring loaded "up-off-down" switch on the center console.

5-00-04 - ELECTRIC POWER SYSTEM

1. The master switch and power relay control the electrical power system, comprised of a 60 amp, 14 volt alternator, a voltage regulator and a 12V, 35 AMP HR battery (24-0001 thru 24-2999), or a 70 amp, 28 volt alternator, a voltage regulator and a 24V, 10 AMP HR battery — (24-3000 thru 24-TBA). The alternator system has an overvoltage protective relay and an overvoltage annunciator light. Circuit breakers or circuit breaker switches protect the electrical wiring and equipment from overloads. Standard electrical equipment includes: 1-250 watt landing light(24-0001 thru 24-3153)(2-100 watt landing, 2-100 watt taxi lights S/N 24-3154 thru 24-TBA), navigation lights, interior lights, gear and stall warning system, an electrical fuel boost pump, an electric starter, an electric gear retraction system with manual extension override, an electrical flap system and an electric cowl flap actuating system.

5-00-05 - INSTRUMENTS

All flight instruments are in the shock-mounted flight panel. Engine instruments are in the co-pilot's panel. The pitot system provides air pressure to operate the airspeed indicator. The instrument static pressure system has two static air pickup ports—one on each side of the tailcone—that open to the atmosphere. An alternate static source is provided on lower flight instrument panel. The instrument panel lighting system has manual dimming mechanisms.

5-00-06 - CABIN HEATING & VENTILATING SYSTEMS

The heater muff encasing the exhaust system is the cabin heat source. Hot air from the heater muff mixed with ambient air controls cabin temperature. Air routed from the main heater duct system to nozzles at the windshield base defrosts the windshield.

An optional defrost blower motor system is available for 24-3000 thru 24-TBA and for retrofit on earlier aircraft.

5-00-07 - FUEL SYSTEM

The fuel system has sealed, integral wing tanks in the forward, inboard section of each wing. Vents at the aft, outboard top corner of each tank vent through the lower wing surface. Fuel sump drains are at the lowest point in each tank. The electric fuel pump is in the bottom left forward section of the fuselage just aft of the firewall. The engine-driven fuel pump mounts on the engine crankcase. Two fuel quantity transmitters in each tank are wired to fuel quantity gauges in the engine cluster gauge. The master switch, left side of the pilot's panel, turns on the fuel quantity indicating systems. Optional visual sight gauges are available for wing tanks on aircraft 24-0001 thru 24-TBA.

NOTE

A low fuel warning annunciator light for each tank is activated when usable fuel quantity goes below 2 1/2 gallons.

5-10-00 - TIME LIMIT COMPONENTS

It is recommended that overhaul or replacement of components should be accomplished not later than the specified period of operation for that component or in accordance with manufacturers service data or airworthiness directives, whichever allows longest operation.

The specified overhaul time limits, if applicable to a component, do not constitute a guarantee that the component will reach that time limit without requiring maintenance.

NOTE

"ON CONDITION" items are to be repaired, replaced or overhauled when inspection or performance reveals an unserviceable condition.

5-10-01 - OVERHAUL AND REPLACEMENT SCHEDULE

ITEM	RECOMMENDED OVERHAUL OR REPLACEMENT TIME LIMITS
LANDING GEAR	
Actuator No-Back Spring	1000 Hours
All other Components	On Condition
POWERPLANT	
Engine	Refer to Lycoming SI 1009AJ (or current revision)
Propeller	Refer to Mfg's. Maintenance data
Magneto -Bendix	O/H every 4 years or @ Engine O/H - Ref. TCM SB #SB643 & Manual X42003 (current revision).
- Slick	@ Engine O/H or on Condition
Induction Air Filters (Paper)	500 Hours
All other Components	On Condition
FUEL & OIL SYSTEM	
Fuel Selector Valve (Anderson-Brass) *	500 Hours *
Fuel Selector Valve (other than above mfgr.)	On Condition or 500 Hrs.
Flexible Hoses (ALL Except as Below & Teflon)	7 years or Engine O/H, whichever occurs first.
Aeroquip 601 Fuel Hoses	24 Months
Teflon Hoses	On Condition
All other Components	On Condition
INSTRUMENTS	
Vacuum Regulator Garter Filter	100 Hours
Filters - Vacuum Pump	500 Hours or once a year
CV1J4 Filter	On Condition
Filters - Gyro Instrument	500 Hours or once a year
Other Components	On Condition
ELECTRICAL COMPONENTS	
All Components	On Condition
FLIGHT CONTROLS	
All Components	On Condition
MISCELLANEOUS SYSTEMS	
Vacuum Pump, Primary	On Condition or 500 Hours &@ Engine O/H (TBO)
Stand-by Vacuum Pump	Inspect @ 500 Hours
E.L.T. Battery	2 years or 1 Hour total use time
Oxygen Cylinders	
Lt. Wt. Steel Cylinders	24 years or 10,000 recharge cycles
Composite Cylinders	15 years or 10,000 recharge cycles
All other Components (excluding Avionics)	On Condition
AVIONICS (General Systems)	Refer to Manufacturers Publications
Bendix-King Systems	King Service Memo No. 292

* Applicable on S/N's 24-0084, 24-0378 thru 24-1176 only.

NOTE
Components should be inspected and serviced at regular intervals per the servicing, lubrication and inspection chart at the end of this SECTION of this Manual

5-20-00 - SCHEDULED MAINTENANCE CHECKS

Inspection intervals. Perform 25, 50, or 100-hour inspections of the aircraft and engine at recommended intervals as outlined in the following paragraphs.

NOTE
Aircraft operated in salt air environment are considered high risk for corrosion damage, and should be cleaned and inspected at more frequent intervals. Refer to AC 43-4.

5-20-01 - INSPECTION CHECK POINTS

The general points to be covered during inspection are grouped in accordance with the nature and function of the items discussed.

1. Moving Parts shall be inspected and checked as applicable for: proper operation, security of attachment, sealing, cleanliness, lubrication, servicing safetying, adjustment, tension, travel, condition of hinges, binding, excessive wear, cracking, corrosion, deformation, and any other apparent damage.

2. Metal Parts shall be inspected and checked as applicable for: security of attachment, condition of finish and sealant, distortion, fatigue cracks, welding cracks, corrosion, and any other apparent damage.

3. Fuel, air and hydraulic oil lines and hoses shall be inspected as applicable for: cracks, dents, kinks, deterioration, obstruction, chafting, improper bend radius, and insecure installation. Hose clamp installations on fuel and hydraulic systems between systems or between systems and the engine shall be torqued to 25 inch pounds. Hose clamp installations on blast tubes, air ducts, vacuum lines, drain and vent lines shall be torqued to 15 inch pounds.

4. Pipe Threads - Tightening and Torque procedures. Lubricate pipe threads as follows.

Oxygen Lines - Use only MIL-T-5542 thread compound or Teflon thread seal tape on threads of valves, connectors, fittings, parts or assemblies which might come in contact with oxygen. The thread compound must be applied sparingly to the first three threads of the male fitting only. No compound is to be used on the coupling sleeves or on the outside of the tube flares. Extreme care should be exercised to prevent the contamination of the thread compound or teflon tape with oil, grease or other lubricant.

Fuel, Hydraulic, Air, Oil Lines - Use "Parker Thread Lube" or equivalent on male fittings only. Apply lubricant, omitting the first two threads, sparingly and carefully.

Engine Fittings - Use only aircraft engine oil to lubricate fittings threaded directly to engine

Vacuum Lines - No lubrication is to be used. Check manufacturers instructions when installing components. Refer to Section 37 for maintenance procedures on vacuum system.

Tapered Threads - Use Teflon Threadseal Tape.

(1) Continue to tighten until fitting is correctly positioned but do not overrun or backoff.

(2) If leaks are detected, tighten one full turn more.

3) If leaks persist, the parts should be disconnected and rejected; replace with new components.

5. Electrical wiring shall be checked as applicable for: loose, corroded, or broken terminals; chaffed, broken, or worn insulation; insecure installation; heat deterioration; and any other apparent damage.

6. Bolts and nuts in critical areas shall be checked for: fretting, wear, damage, stretch, proper torque, (Figure 5-2) and safetying.

7. Filters and screens shall be removed, cleaned and inspected for contamination or damage that would require replacement.

Torque Values - See following pages.

TORQUE VALUES

FLARE NUT TORQUE VALUES- Tighten to minimum torque value for appropriate size as shown (Figure 5-1).

FITTING SIZE	ALUMINUM TUBING		STEEL TUBING	
	TORQUE - IN. LBS.			
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
-3			30	70
-4	40	65	50	90
-5	60	80	70	120
-6	75	125	90	150
-8	150	250	155	250
-10	200	350	300	400
-12	300	500	430	575
-16	500	700	550	750
-20	600	900		
-24	600	900		

FLARE NUT TORQUE - FIGURE 5-1

BOLT - NUT TORQUE VALUES

METRIC BOLTS, SCREWS & NUTS

Failure of threaded fasteners due to over-tightening can occur by bolt shank fracture or by stripping of the nut and/or bolts thread. A bolt or screw assembled with a nut of the appropriate class is intended to provide an assembly capable of being tightened to the bolt proof load without thread stripping occurring.
The torque value to be set for a particular size of screw is dependent upon.

1) Material of the screw.

2) Parent material (steel, non-ferrous metal or plastic).

3) Whether the screw is untreated or plated.

4) Whether the screw is dry or lubricated.

5) The depth of the thread.

TIGHTENING TORQUES - Untreated Screw(Black Finish) - *Friction Coefficient 0.14*

NOMINAL DIAMETER (Coarse Thread)	PROPERTY CLASS TORQUE Ma			
	5.8 Nm/ft.lbs	8.8 Nm/ft.lb.	10.9 Nm/ft.lb.	12.9 Nm/ft.lb.
M 3	0.60/0.44	1.37/1.01	1.92/1.42	2.30/1.70
M 4	1.37/1.01	3.10/2.29	4.40/3.25	5.25/3.87
M 5	2.70/1.99	6.15/4.54	8.65/6.38	10.4/7.6
M 6	4.6/3.3	10.5/7.7	15/11	18/13
M7	7.6/5.6	17.5/12.8	25/18.4	29/21.3
M8	11/8.1	26/19	36/26	43/31
M10	22/16	51/37	72/53	87/64
M12	39/28	89/65	125/92	150/110
M14	62/45	141/103	198/145	240/177
M16	95/70	215/158	305/224	365/269
M18	130/95	295/217	420/303	500/368
M20	184/135	420/309	590/435	710/523
M22	250/184	570/420	800/590	960/700
M24	315/232	725/534	1020/752	1220/899
M27	470/346	1070/789	1510/1113	1810/1334
M30	635/468	1450/1069	2050/1511	2450/1806
M33	865/637	1970/1452	2770/2042	3330/2455
M36	1111/819	2530/1865	3560/2625	4280/3156
M39	1440/1062	3290/2426	4620/3407	5550/4093

(METRIC TORQUE TABLES CONTINUED)

NOMINAL DIAMETER (Fine Thread)	PROPERTY CLASS TORQUE Ma			
	8.8 Nm/ft.lb		10.9 Nm/ft.lb.	12.9 Nm/ft.lb.
M8 x 1	27/19		38/28	45/33
M10 x 1.25	52/38		73/53	88/64
M12 x 1.25	95/70		135/99	160/118
M14 x 1.5	150/110		210/154	250/184
M16 x 1.5	225/165		319/232	380/280
M18 x 1.5	325/239		460/339	550/405
M20 x 1.5	460/339		640/472	770/567
M22 x 1.5	610/449		860/634	1050/774
M24 x 2	780/575		1100/811	1300/958

TIGHTENING TORQUES - Electrically Zinc Plated - *Friction Coefficient 0.125*

DIAMETER (Coarse Thread)	PROPERTY CLASS TORQUE Ma			
	5.6 Nm/ft.lb.	8.8 Nm/ft.lb.	10.9 Nm/ft.lb	12.9 Nm/ft.lb.
M3	0.56/0.41	1.28/0.94	1.80/1.33	2.15/1.59
M4	1.28/0.94	2.90/2.14	4.10/3.02	4.95/3.65
M5	2.50/1.84	5.75/4.24	8.10/5.97	9.70/7.15
M6	4.3/3.1	9.9/7.3	14/10.3	16.5/12.1
M7	7.1/5.2	16.5/12.1	23/16.9	27/19.9
M8	10.5/7.7	24/17.7	34/25	40/29
M10	21/15	46/35	67/48	81/59
M12	38/28	83/61	117/86.2	140/103
M14	58/42	132/97	185/136	220/162
M16	88/64	200/147	285/210	340/250
M18	121/89	29/202	380/287	470/346
M20	171/126	390/287	550/405	660/486
M22	230/169	520/390	745/549	890/656
M24	295/217	675/497	960/708	1140/840
M27	435/320	995/733	1400/1032	1680/1239
M30	590/435	1350/995	1900/1401	2280/1091
M33	800/590	1830/1349	2580/1902	3090/2278
M36	1030/759	2360/1740	3310/2441	3980/2935
M39	1340/985	3050/2249	4290/3163	5150/3798

NOMINAL DIAMETER (Fine Thread)	PROPERTY CLASS TORQUE Ma		
	8.8 Nm/ft.lb.	10.9 Nm/ft.lb.	12.9 Nm/ft.lb.
M8 x 1	25/18	35/25	42/30
M10 x 1.25	49/36	66/50	82/60
M12 x 1.25	88/64	125/92	150/110
M14 x 1.25	140/103	195/143	235/173
M16 x 1.5	210/154	295/217	360/258
M18 x 1.5	305/224	426/313	510/376
M20 x 1.5	425/313	600/442	720/531
M22 x 1.5	570/420	800/589	960/708
M24 x 2	720/531	1000/737	1200/885

METRIC CONVERSION FACTOR: One Nm(Newton Meter) = .7375 Foot Pound;
One Foot Pound = 1.355818 Nm

AN/MS STANDARD BOLTS, NUTS TORQUE TABLES

TORQUE VALUES
(Units are Inch-pounds)

NUT BOLT SIZE	TENSION-type AN( ) BOLTS; AN-365/AN-310 NUTS	SHEAR-type AN( ) BOLTS; AN-364/AN320 NUTS	TENSION-type NAS( ) BOLTS AN-365/AN310 NUTS	SHEAR-type NAS( ) BOLTS; AN-364/AN320 NUTS
FINE - THREAD SERIES				
6-36	12-15	7-9		
10-32	20-25	12-15	25-30	15-20
1/4-28	50-70	30-40	60-100	50-60
5/16-24	100-140	60-85	120-145	70-90
3/8-24	160-190	95-110	200-250	120-150
7/16-20	450-500	270-300	520-630	300-400
1/2-20	480-660	290-410	770-950	450-550
9/16-18	800-1000	480-600	1100-1300	650-800
5/8-18	1100-1300	600-780	1250-1550	750-950
3/4-16	2300-2500	1300-1500	2650-3200	1600-1900
7/8-14	2500-3000	1500-1800	3550-4350	2100-2600
1-14	3700-5500	2200-3300	4500-5500	2700-3300
1 1/8-12	5000-7000	3000-4200	6000-7300	3600-4400
1 1/4-12	9000-11000	5400-6600	11000-13000	6600-8000
-COARSE - THREAD SERIES				
6-32	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	95-100		
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		

Figure 5-2

Reference: Federal Aviation Agency Advisory Circular No. 43.13-1(*) (*=current rev.)

Recommended Torque Values for Nut-Bolt combination

1. Be sure nut and/or bolt threads are clean and dry(unless Mfg. states otherwise).
2. Run bolt down near contact with washer or bearing surface and check "friction drag torque" required to turn bolt/nut.
3. Add "friction drag torque" to the recommended torque value from Figure 5-2. This value is considered "Final Torque Value".

(FRICTION DRAG TORQUE + REC'MD TORQUE = FINAL TORQUE).

CAUTION
DO NOT REUSE LOCKNUTS IF THEY CAN BE RUN UP FINGER TIGHT.

CAUTION
These torque values are derived from oil-free cadmium-plated threads.

CAUTION
DO NOT REUSE LOCKNUTS IF THEY CAN BE RUN UP FINGER TIGHT.

5-20-02 - AIRCRAFT FILE INSPECTION

Aircraft 100-hour and annual inspections cover, in addition to examining the aircraft proper, a review of the status of compliance with current Federal Aviation Regulations. This review includes inspection of the Airplane Flight Manual, Aircraft Log Book, Engine Log Book, Registration Certificate, Airworthiness Certificate, Weight & Balance Record, Lycoming Service Information, Aircraft Radio Station License (if applicable), FAA Airworthiness Directives, and Mooney service documents.

5-20-03 - ENGINE FUNCTIONAL CHECK

Prior to a scheduled 100-hour or annual inspection, and/or 25 hours after installation of new or overhauled engine, wash down the engine and engine components. Then perform an engine runup in accord with procedure recommended in the Airplane Flight Manual. Make a record of all malfunctions and abnormalities. After the engine runup, complete a differential (hot engine) compression check. To verify correction of malfunctions and abnormalities, perform a second engine runup and a flight test after completing the inspection.

5-20-04 - FIRST 25 HOURS - INSPECTION

The one time 25-hour inspection consists of a visual inspection of:—propeller, engine and aircraft general condition, including a preflight inspection as outlined in the Flight Manual. The inspection does not require removal of access panels or disassembly of all components; however, it should include completion of all lubrication and service requirements. Inspection should be extensive enough to detect any damage or condition which might jeopardize flight safety. After the first 25 hours of new or overhauled engine operation, refer to paragraph 5-20-05 for the recommended engine inspection.

1. Visually inspect propeller, spinner, and cowling; remove cowling.

2. Inspect and clean induction air filter if aircraft has been operating under dusty conditions. Check operation of alternate air door. Check Ram air door operation S/N 24-0001 thru 24-3153.

3. Inspect engine compartment for evidence of fuel, oil or exhaust leaks.

4. Check security and condition of equipment installed on engine.

5. Inspect fuselage, wing and empennage for external evidence of damage. Pay particular attention to scratches and dents.

6. Inspect windshields and windows for crazing, cracks, and scratches.

7. Check control systems for binding, excessive freeplay, and damage.

8. Check pitot and static systems for obstructions.

9. Inspect aircraft exterior for security of bolts, screws, etc.

10. Check and service battery.

5-20-05 - 50 HOUR INSPECTION

The 50-hour inspection includes all requirements for the 25-hour inspection, plus the necessary removal of inspection doors, panels, or fairings. After the first 25 hours of operating time, a new, remanufactured, or newly overhauled engine should be given a 50-hour inspection including replacement of the lubricating oil.

1. ENGINE

A. Drain engine oil sump.

B. Remove and clean suction oil strainer; reinstall strainer and plug. Safety wire strainer plug.

C. Remove and replace the full-flow oil filter cartridge.

D. Drain and clean fuel strainer.

E. Remove and clean fuel injector fuel strainer.

F. Service engine oil sump with proper type, grade, and amount of lubricating oil.

G. Inspect engine intake and exhaust systems for evidence of leakage and looseness.

H. Check spark plug elbows and shielding nuts for security

I. Check cylinders for evidence of overheating.

J. Check baffles for secure anchorage, close fit around cylinders, and freedom from cracks.

K. Check engine controls for full travel, freedom of movement, and security.

L. Visually check fuel and oil lines for security of connections and evidence of leakage or damage.

M. Visually inspect induction air system; check operation of alternate-air door (refer to paragraph 71-60-01).

N. Inspect engine mount & bolts for security and condition. Inspect engine mount tubes (bolt attach tubes) at firewall for moisture accumulation and corrosion.

2. PROPELLER

A. Check propeller and spinner for general condition, looseness, and oil leakage.

B. Inspect blades for nicks and cracks. Repair prior to next flight.

3. CABIN

A. Check brake and parking brake control systems for proper operation and fluid level.

B. Check trim system and indicator for free operation and travel.

C. Check cabin and baggage doors for damage, proper operation, and sealing.

D. Check cabin, instrument, position, anticollision, and landing light.

E. Check fuel selector valve, gascolator, and boost pump for proper operation.

F. Check oxygen system (if installed).

4. LANDING GEAR

A. Check tires for cuts, blisters, wear, and inflation.

B. Check shock discs for proper extension at aircraft static weight per Section 32-61-00.

C. Check hydraulic brakes for wear, warpage and proper installation.

5. WINGS

A. Check surfaces and tips for damage.

B. Check ailerons, aileron attachments, and bellcranks for damage and proper operation.

C. Check flaps and attachments for damage and proper operation.

D. Lubricate controls if necessary.

6. FUSELAGE and EMPENNAGE

A. Check stabilizer, elevators, fin, and rudder for damage and proper attachment.

B. Lubricate controls if necessary.

7. Lights

A. Check operation of exterior and interior lights.

8. See Section 5-20-07 for repetitive 50 Hour inspections and servicing of components information.

5-20-08 - 100 HOUR INSPECTION (or ANNUAL) (REF. FIG. 5-4)

The 100-hour (or annual) inspection is a thorough, searching inspection of the entire aircraft. Preparation for the inspection includes the thorough cleaning of exterior and engine compartment, removal of fuselage, wing, and empennage inspection doors, cover plates, and fairings at all systems attach, hinge, and bearing locations (including wing and empennage to fuselage mating points). Operating limit replacement and special testing of components is to be included at this interval when applicable. Comply with applicable FAA Directives, AD Notes, and applicable Mooney and Vendor mandatory Service Bulletins and Instructions. Check for aircraft conformance to FAA Specification 2A3. Recommended 100-hour and special inspection requirements are outlined in the following paragraphs.

1. **ENGINE INSPECTION.** Prior to the inspection, remove the engine cowling and propeller spinner. Wash down the engine and engine compartment. Then perform an engine runup in accord with the procedure recommended in the Lycoming Operators Manual. To verify correction of malfunctions and abnormalities, perform a second engine runup and flight test after the 100-hour inspection engine set-up check.

A. Complete a differential (hot engine) compression check; clean and gap or replace spark plugs if necessary. Repair discrepancies found.

B. Inspect engine for evidence of excessive fuel or oil leakage. Inspect oil cooler and oil hoses for condition. Repair as needed.

C. Drain engine oil sump; remove, inspect and clean oil suction screens; reinstall and safety. Remove full-flow oil filter cartridge; replace with new cartridge and safety. Check crank case breather hoses for obstruction. Safety wire oil filter installation.

D. Refill engine oil sump with the proper type, grade, and quantity of lubricating oil.

E. Inspect fuel injector and all fuel line connections for security and condition.

F. Remove, inspect and clean fuel selector valve or gascolator strainer, reinstall strainer, lubricate detent track, ball and spring disc. Inspect fuel lines and connections; pressure check fuel system with mixture control at IDLE CUTOFF and BOOST PUMP ON.

G. Inspect all air ducting and connections in the heating and induction air systems for leaks. Remove and clean induction air filter; replace at 500 Hrs.

H. Leak check all exhaust manifold connections, engine exhaust manifolds and muffler connections. Inspect for proper attachment.

I. Inspect **alternate air door** for condition and proper preload. To inspect for preload, remove lower cowling and PUSH on alternate air door seal bolt with an appropriate spring scale. A preload of 3 to 4 pounds should be required to start door to open. Add or delete AN960-416L washers under bolt head to obtain proper tension. Replace all components removed. Coat Seal with TEFLON spray/lubricant.

CAUTION
CHECK SECURITY of seal to Induction Box Door. If necessary use (3M) EC1403 cement to secure seal to door.

J. Check magnetos for grounding and synchronization; check magneto points for condition, clearance, and timing. Inspect distributor block for erosion and cracks. Check cam follower felt for proper lubrication, and remove excessive oil from breaker compartment. Repair or replace components if required, per Bendix SB No. 612 at 500 Hrs. for routine maintenance.

K. Check baffles for secure anchorage, cracks, holes, deformation, and for close fit around cylinders. Check cylinders for burned paint and cracked or broken fins. Check baffle sealant.

L. Check engine and propeller controls for free operation, proper security of cable at housing swage, full travel, and security of attachment.

NOTE
Cable Craft control cables are lubricated for the life of the control cable. DO NOT remove seals or lubricate control cable.

M. Inspect Propeller Governor for security in mounting and unrestricted operation of governor control. Check for proper operation during post inspection flight.

N. Inspect tubular engine mount for cracks, damage or corrosion; check all bolts and rubber mounts for security and condition.

O. Check battery cables, electrical wiring, and ignition harness for condition, secure anchorage, loose terminals, and burned or chaffed insulation.

P. Inspect battery, battery box, and vent system for condition and corrosion. Check blast tube for obstruction. Flush battery box and battery case if necessary.

Q. Inspect accessory case, vacuum pump, hose, firewall and fittings for security or damage.

R. Check alternator and mounting bracket for security and drive belt for condition and proper tension. Check starter installation for security. Check starter drive and drive gear condition. Lubricate drive if necessary.

S. Inspect studs, nuts, bolts, etc. for damage & proper torque.

T. Inspect Exhaust System for leaks or cracks & proper clearance from other components. Repair any discrepancies. Replace or repair muffler if any internal damage is found. Inspect for proper attachment.

U. Inspect and reinstall cowling. Check cowl flaps for operation condition, proper opening and cowl flap position indication (24-3000 thru 24-TBA).

V. Inspect landing light for security and condition (24-0001 thru 24-3153).

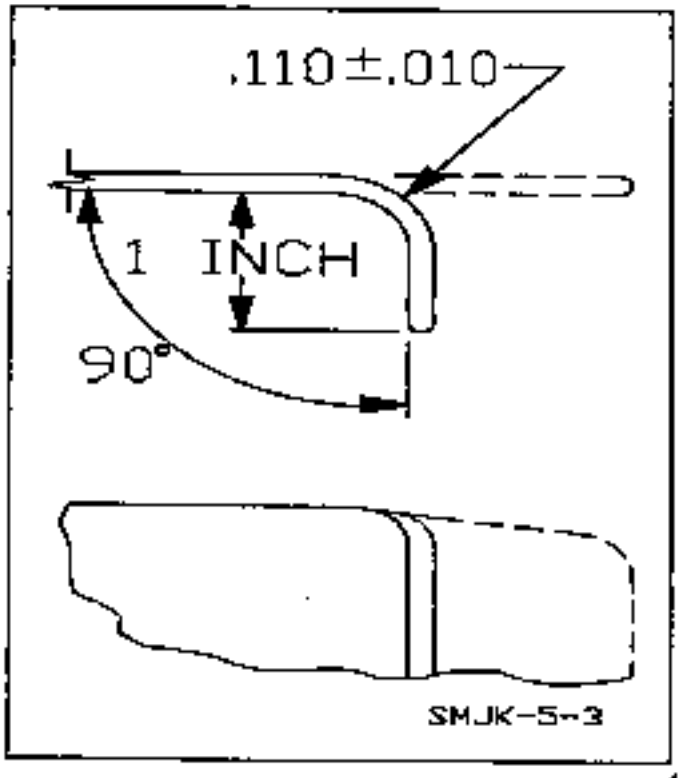
2. **PROPELLER INSPECTION.**

A. Remove spinner (if not already removed).

B. Check security of propeller installation.

C. Check hub bolts for security and damage.

D. Inspect hub parts and blades for cracks and nicks. Repair prior to next flight.



E. Q-tip blade inspection and repair. The tip of the blade is formed at the factory with a bend of 90 degrees toward the blade face (aft). The material thickness in the radius of bend is closely controlled such that the cold bend allowance is not exceeded. A sketch of the "Q" tip is shown below (Figure 5-3).

F. Check for oil leaks, loss of grease, and lubricate as required by appropriate manufacturers handbook.

INSPECTION: Inspect "Q-Tip" for stone nicks and scratches using the same procedure as on the complete blade. Inspect for evidence of the bend being deformed by assuring that the bend edge is 90 degrees. Also inspect for deformed waviness of the bend. REPAIR: Material in the bend area (.110 plus or minus .010) may be removed for repair of nicks and scratches to a minimum blade thickness of .065. Correspondingly, reduce the very tip region, when required, to a minimum of .010 less than the resulting thickness of the bend area. The bend may be reduced in length for repair from the one inch dimension to approximately .75 inches. The 90 degree bend that has been deformed by 20 degrees or less may be straightened by using a rubber mallet and block assuring that no waviness or other damage results from the straightening process; inspect for cracks. The chord length may be reduced for repair similar to the procedure of a standard blade assuring that all blades are the same so that the aerodynamic balance of the propeller will not be affected.

G. DELETED PROCEDURE

H. Inspect anti-icing boots for proper operation and for obvious defects.

I. Inspect spinner and bulkhead for cracks and condition.

J. Check spinner bulkhead for correct interference fit with prop cylinder. (Use Teflon Tape to obtain correct fit.) (See Section 61-00-20, para. 10)

3. **LANDING GEAR and RETRACTION SYSTEM INSPECTION.**

A. Check tires for proper inflation, cuts, blisters, slippage, and heavy wear.

B. Check wheels for cracks, distortion, misalignment, corrosion, bolt failure. Check condition of felt seals and bearings; repack bearings at 250 hour intervals.

C. Check brake pads & discs for warping and wear.

D. Check hydraulic reservoir for proper fluid level.

E. Check hydraulic brake lines and hoses for leakage, dents, cracks chafing, kinks, and security of anchorage.

F. Check parking brake system for proper engagement and release.

G. Check nose gear for cleanliness and damage. Check nose gear retraction tube bungees for sheared or broken roll pins. Check shock disc gap per Section 32-61-00.

NOTE
Maximum allowable towing damage on leg assembly is 1/32 inch dent.

H. Check nose wheel steering mechanism for adjustment, alignment, corrosion, and lubrication.

I. Check main gear for cleanliness or damage. Check shock disc gap per Section 32-81-00.

J. Jack aircraft as recommended in paragraph 7-10-00.

K. Check landing gear retraction linkage, bellcranks, pivots, and bearings for wear, damage, distortion, misalignment, corrosion, cleanliness, and lubrication.

L. Check the landing gear actuator for security of mounting, cleanliness, and indication of overheating or damage. Inspect brushes in motor for wear.

S/N 24-0001 - 24-0377 with Dukes Actuator

Lubricate actuator ball screw with recommended lubricant for Dukes actuator only per procedures below.

(1) After 500 hours of operation and each 200 hours thereafter.

(a) Remove the actuator from the aircraft.

(b) Remove the end cap and wipe excess grease from gears.

(c) Visually inspect gears for wear as follows: With open end of actuator toward you, rotate jack screw shaft counter clockwise to remove all slack from ring and worm gears. Make an index mark on one gear tooth and on the inside of housing. Turn jack screw shaft clockwise until ring gear contacts worm gear and check index marks. Visible wear or backlash of 1/2 tooth or more requires immediate replacement of gears.

Reference SECTION 32-30-04, S/N 24-0001 thru 24-0377, for additional inspection and rigging procedures.

ALTERNATE PROCEDURE:

(Dukes actuator's) Measure backlash by using a .025" diameter wire of .025" thick shim as a feeler gauge. If feeler can be inserted between gear teeth, replace gears.
Repeat above procedure after rotating the ring gear thru 90 degrees; 180 degrees; and 270 degrees.

(d) Repack gear box with recommended lubricant.

(e) Reinstall end cap and resafety.

(f) Refer to Section 32-30-02 for proper actuator adjustment and reinstallation instructions.

M. Perform landing gear operational check per Section 32-30-01.

4. **FUEL SYSTEM** INSPECTION.

A. Inspect fuel tank exterior for evidence of fuel seepage and stain.

B. Drain tank and inspect tank interior when seepage is evident.

C. Check fuel tank drains for leakage, sediment, and water contamination.

D. Check fuel-tank vents for obstruction.

E. Check fuel selector valve for proper tank selection, smooth operation, and leakage in OFF position.

F. Check gascolator for leakage; check sump for sediment, water or other contamination. Inspect fuel filter, clean or replace.

G. Check boost pump for leaks, security of mounting, adequate fuel pressure, switch operation, and condition of wiring and electrical connections.

H. Check fuel quantity gauges and transmitters for security of mounting and condition of wiring and electrical connections.

I. Check fuel tank filler caps for O'ring condition, cleanliness, security and condition of servicing placards (Ref. 28-00-01).

5. **EXTERIOR INSPECTION.**

A. Thoroughly clean aircraft exterior.

B. Inspect fuselage exterior surfaces for corrosion, damage, loose or popped rivets, dents, cans, scratches, cracks, and deteriorated paint.

C. Inspect windshields and windows for cracks, crazing, scratches, condition of seals, and security of installation.

D. Inspect wings, flaps, and ailerons for corrosion, damage, loose or popped rivets, dents, scratches, cracks, condition of attaching points, lubrication, freedom of operation, free-play, travel, and balance weight attachment.

E. Inspect empennage for corrosion, damage, loose or popped rivets, free-play, dents, scratches, cracks, condition and lubrication of hinge points, attachment of balance weights, and freedom of operation.

F. Inspect cabin door and door frames for damage, corrosion, nicks, dents, hinge security, and lubrication.

G. Inspect cabin door lock mechanism for lubrication and proper engagement. See Section 52-11-00 for rigging procedures.

H. Inspect baggage door and baggage compartment for damage, corrosion, warpage, hinge security, condition to door frame and door seals, condition and operation of door locking mechanism, and condition of cargo tiedowns.

I. Inspect ventilating system drain line for obstruction.

J. Inspect the alignment and lubrication of overhead vent push-pull cable for smooth operation (S/N 24-0001 thru 24-0377).

K. Inspect Landing/Taxi lights for security, condition and proper adjustment. See Section 33-43-00 for adjustment procedures.

6. **INTERIOR INSPECTION.**

A. Inspect seats, seat tracks, and upholstery for cleanliness and mounting security; check seats for condition and operation of position locks; inspect seat structure for cracks, deformation, corrosion, and mechanism lubrication.

B. Inspect safety belts, harnesses and attaching brackets for cleanliness, condition, latch operation, and security of attachment.

C. Inspect for loose equipment that might restrict control movement.

D. Inspect Oxygen System (if installed) per Chapter 35.

7. INTERNAL INSPECTION.

A. Open access panels and inspection doors, and remove fairings as required.

B. Inspect wing/fuselage attaching bolts for proper torque and safetying and evidence of damage or corrosion.

C. Inspect forward side of firewall for damage.

D. Inspect tubular structure for corrosion or damage (interior panels and insulation may require removal).

E. Check wires, lines, and ducts for security, damage, interference, chaffing, and bonding.

F. Inspect wing ribs and stringers for cracks and evidence of damage or corrosion.

G. Inspect wing spars for damage, distortion, cracks, or corrosion.

H. Inspect wing interior for foreign material, corrosion, and evidence of fuel leakage.

I. Inspect Baggage Compartment floorboard assembly, stringers and doublers.

J. Inspect empennage attachment brackets and hardware for corrosion.

NOTE
Seal all receptacles and plugs outside cabin environment with Dow Corning #4.

8. FLIGHT CONTROL INSPECTION.

A. Inspect control column and control wheels for full travel, proper rigging, free-play, binding, security of mounting, proper lubrication, and direction of control surface movement with relation to control movement.

CAUTION
All flight control components should be checked to verify that all moisture drain holes are free of obstructions.

B. Inspect elevator system for rigging, travel, stop adjustment, condition of all bearings, bellcranks,and hinges, security of mounting, damage, corrosion, lubrication and proper relations to control movement.

C. Inspect aileron system for damage, corrosion, lubrication, rigging, travel, stop adjustment, condition of hinges, bellcranks, pivots and rod end bearings, and link bolt security.

D. Inspect rudder system linkage for damage, corrosion, lubrication, security of link bolts, rod end bearings and proper relationship to control movements. Check for free movement of toe-brake pedals and proper rudder and nose wheel travel.

E. Inspect stabilizer trim control system for security and proper adjustment, shaft and stop nuts for proper rigging, trim control wheel for smooth operation, universal joints for free-play and good working order, actuator threads for lubrication, linkage for corrosion, and guide blocks for looseness or excessive wear. See Section 27-42-00 for Electric Pitch Trim Inspection.

F. Inspect flap system for rigging, travel, and stop adjustment; flap position indicator for proper operation; actuator, push-pull tubes, interconnects, bellcranks & hinges for corrosion, security, and lubrication.

NOTE
All control rigging checks should be made with the aircraft jacked and leveled and with the landing gear retracted.

NOTE
Some elevator trim tubes have poly tape wrapped at bulkhead penetrations. If tape shows signs of wear, rerap (1/2 lap) tube with 2" wide Y9265 polyurethane tape. Trim tubes, without tape, which show signs of abrading grommet should be wrapped. See SB M20-185. Maximum tube wear is .007 in. per wall or .014 In. diameter reduction.

9. INSTRUMENT/AVIONICS INSPECTION.

A. Inspect all instrument wiring and plumbing for condition and proper connections.

B. Clean and inspect vacuum filter. Replace garter filter on vacuum regulator.

C. Check vacuum regulator at vacuum manifold. Check operation of high-and low-vacuum warning lights or vacuum gauges.

D. Inspect all instruments for proper pointer indication, range and limit markings, condition of indicator markings, cracked or loose glass, slippage marks, and security of installation.

E. Check compass for proper lighting, compensation, security of mounting, liquid leakage, and discoloration. Swing compass at annual inspection and after any new equipment has been installed.

F. Inspect altimeter for scale error, discolored markings, proper pointer readings, setting knob freedom, and synchronization of barometric scale with reference markers.

G. Inspect flight panel for security of mounting, condition of shock mounts, freedom from interference with structure, and condition of ground straps.

H. Inspect Avionics Equipment for proper operation & security.

I. Inspect Avionics antennas, wiring & shielding for obvious damage or defects.

J. Inspect pitot head for port obstruction; check lines for cracks, dents, kinks, proper bend radius, and security of attachment. Drain system and check for leaks.

K. Inspect static ports for obstruction and aerodynamic smoothness at port installations. Inspect lines for bends, cracks, dents, kinks, and security of attachment. Drain system and check for leaks. Check alternate static pressure source located on left flight panel.

10. ELECTRICAL FUNCTIONAL TEST

A. Check operation of navigation lights.

B. Check operation of landing light or landing/taxi lights.

C. Check operation of dome lights and cigar lighter

D. Check operation of anticollision lights.

E. Check operation of instrument and placard lights. Check rheostat.

F. Check operation of pitot head heater.

G. Check operation of cluster gauge.

H. Check operation of fuel gauges.

I. Check operation of annunciator light press-to-test switch.

J. Check operation of ignition switch, and starter solenoid.

K. Flight check operation of landing gear position lights and warning horn.

L. Flight check operation of stall warning horn.

M. Check operation of "Prop De-Ice" (if installed). Push switch "ON", observe prop de-ice ammeter for: (1) needle in green arc (8 to 12 AMPS -24-0001 thru 24-2999) and (2) fluctuation every 90 seconds as heating elements are switched.

Observe aircraft ammeter on S/N 24-3000 thru 24-TBA for fluctuation as each boot cycles (8 AMPS -24-3000 thru 24-TBA).

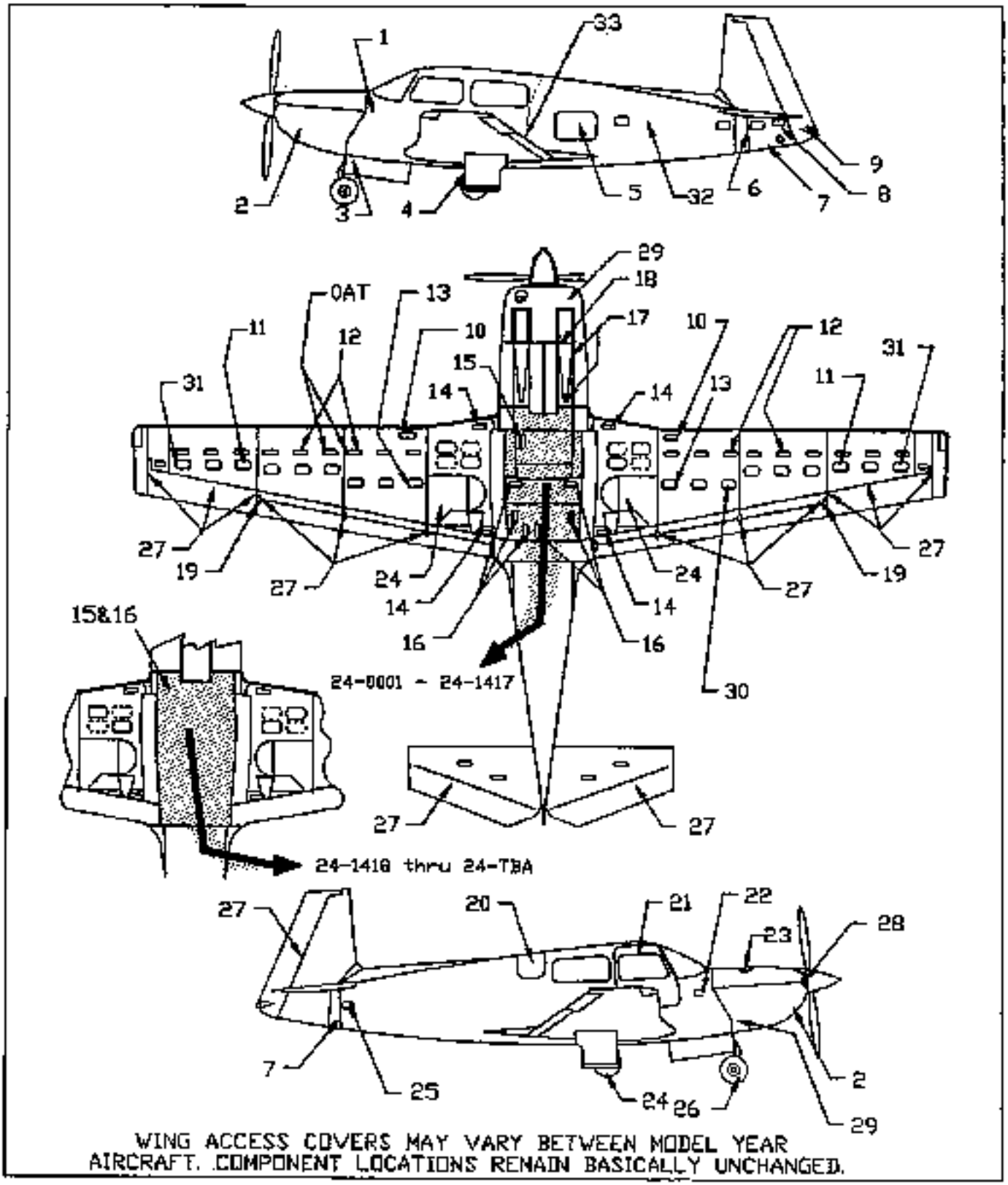
N. Inspect battery & battery connections for proper installation and cleanliness.

11. MISCELLANEOUS/OPTIONAL EQUIPMENT

Inspect any installed equipment not covered by previous paragraphs for proper operation, attachment or obvious defects.

12. POST INSPECTION FLIGHT TEST

Flight test the aircraft to verify correction of all malfunctions and abnormalities. Make proper entries in aircraft log book.



ACCESS COVER IDENTIFICATION, LUBRICATION & SERVICE GUIDE

FIGURE 5-4

NOTE

Access covers riveted in place during production need not be removed for routine inspections.

5-20-07 - ACCESS COVER IDENTIFICATION, LUBRICATION AND SERVICE GUIDE

ITEM NO.	ITEM DESCRIPTION	LUBRICATION SYMBOL *	INTERVAL (HRS)
1	Flight Instruments		
	Vacuum Regulator		500 **
	Turn Coordinator	ū	100
	Vacuum System Filters—Replace at		500 **
	Control System Adjustments:		
	Control Column Bearing Ball	ψ	100
	Rod End Bearings	ψ	100
	Universal Joints	Σ	100
	Bellcranks	Σ	100
2	Engine Cowling	Ω	100
	Vacuum Pump	ū	500
	Alternate Air Door Seals	ψ	50
3	Nose Gear Grease Fittings	Ω	100
	Retraction Tube Rod End Bearings	ψ	100
	Bellcranks	Σ	100
	Bungees	ψ	100
	Gear Door Rod End Bearings	ψ	50
4	Main Gear Grease Fittings	Ω	100
	Retraction Tube Rod End Bearings	ψ	100
	Bellcranks	Σ	100
	Bungees	Σ	100
	Gear Door Rod End Bearings	ψ	50
	Electric Gear Actuator Gear Box	ē/Ω	AR/AR ***
	Electric Gear Actuator Ball Screw	ē	100
	Electric Gear Actuator No-back Spring		1000 ****
5	Elevator & Rudder Controls:		
	Control Tube Rod End Bearings	ψ	100
	Bellcranks	Σ	100
	Battery, Battery Relay	ū	100
	Stabilizer Trim Control Shaft:		
	Universal Joints	Σ	100
	Guide Blocks	Δ	100
	Hydraulic Reservoir	β	50
	Oxygen, High Pressure Fittings	@	50
	ELT Transmitter (14 Volt)	ē	100
6	Elevator & Rudder Controls:		
	Control Tube Rod End Bearings	ψ	100
	Bellcranks	Σ	100
	Stabilizer Trim Jack Screw/Actuator	ψ	100
	Tail Strobe Light Power Supply	ū	100

* See last page of section for lubrication symbol legends.
** Change garter filter on vacuum regulator every 100 hours. Change instrument filters at 500 hours, clean every 100 hrs.
*** No periodic lubricant on Avionics Products #102000-1/-2. If necessary to relubricate, use Aeroshell 22, Mobil 28 or MIL-G-81322 ONLY.
**** Replace No-back spring in Avionics Products (Ref. SI M20-52B) & Plessy Actuators (Ref. SI M20-92)

ITEM NO.	ITEM DESCRIPTION	LUBRICATION SYMBOL *	INTERVAL (HRS)
7	Empennage Attach Points.	ū	100
	Stabilizer Trim Attach Point	ū	100
8	Elevator & Rudder controls:		
	Control Tube Rod End Bearings	Ψ	100
	Trim Assist Bungee Attach Point	Σ	100
9	Elevator & Rudder Controls:		
	Control Tube Rod End Bearings	Ψ	100
	Trim Assist Bungees	Σ	100
10	Aileron Control Tube Guide Blocks	Δ	100
11	Aileron Controls:		
	Control Tube Rod End-Bearings	Ψ	100
	Bell Cranks	Σ	100
12	Aileron Control Tube Guide Blocks	Δ	100
13	Main Gear Retraction Spring/Bellcranks	Σ	100
14	Wing Attach Points	ū	100
	Control Tube Guide Blocks	Δ	100
15	Stabilizer Trim Screw & Stops.	Φ	100
	Indicator Adjustment Point		
	Stabilizer Trim Chain & Gear	Φ	100
16	Elevator & Rudder Controls:		
	Control Tube Rod End Bearings	Ψ	100
	Bellcranks	Σ	100
	Guide Blocks	ΣΔ	100
	Flap Indicator Cable	ΣΔ	100
	Electric Flap Actuator Gear Box (Lube gearbox and ballscrew)	Ω	500
	Electric Flap Actuator Ball Screw	ē	100
	Baggage Compartment Floorboard Assy	ē	100
17	Electric Boost Pump		
	Gascolator.	Σ	50
	Fuel Selector Valve	Σ	100
18	Control Systems:		
	Control Tube Rod End Bearings	Ψ	100
	Control Yoke (Lower Section)	Σ	100
	Nose Gear Steering Link	ΣΨ	100
	Rudder Pedal Cross Shaft	ΣΨ	100
	Rudder-Aileron Bungee	Σ	100
	Hydraulic Brake Cylinder Pedal Linkage	Σ	100
19	Aileron Control Tube Rod End Bearings	Ψ	100
	Outboard Flap Stops	Ω	100

ITEM NO.	ITEM DESCRIPTION, SYMBOL *	LUBRICATION (HRS)	INTERVAL
20	Baggage Compartment Door:		
	Hinges	Σ	100
	Latches	Ω	100
	Seals	Ψ	100
	Lock	δ	-
21	Cabin Door:		
	Hinges	Σ	100
	Latches	Ω	100
	Seals	Ψ	100
	Hold-Open Arm	Ψ	100
	Lock	δ	-
22	Engine Instruments		
	Radios		
23	Oil Dip Stick, Oil Filler Tube	∇	AR
24	Wheels & Brakes:		
	Wheel Bearings	Ψ	250
	Brake Pressure Plates Anchor Bolts	Ψ	50
	Shock Discs	□	50
25	Elevator & Rudder Control Stops	□	
26	Nose Wheel:		
	Wheel Bearings	Ψ	250
	Shock Absorber	□	100
	Shock Discs	□	50
27	Control Surface Hinges	Σ	100
28	Propeller	□	100
	Starter Drive	Σ/ψ	20
	Alternator Drive Belt	□	Each Flight
29	Cowl Flap Motor and Indicator Cable	□	100
30	Remote Compass Sender	□	100
31	Strobe Light Power Supply	□	100
32	ELT Transmitter (26 Volt)	□	100
33	Speedbrake Cartridges	□	1000

LUBRICATION SYMBOL LEGEND

SYMBOL	MIL. SPEC. NO	DESCRIPTION
Σ	MIL-L-7870	Low Temperature Oil (General Purpose)
Ω	MIL-G-81322	Grease (Avionics Products)
Ψ	MIL-L-3545	Grease (High Temperature)
β	MIL-H-5606	Hydraulic Fluid (Red)
Δ	MIL-G-23827	Graphite & MIL-G-3278 Grease or MIL-G-23827
δ		Powdered Graphite
ψ		Teflon Spray (Tri-flow) or equivalent

SYMBOL	MIL. SPEC. NO	DESCRIPTION
ç		Stick Lubricant (Door Ease or Equivalent)
ð		Lubriplate 630AA (10% by Volume Molybdenum Disulfide Mixture Permissible)
é		Seal Dressing
ù		Inspect
v		TEXTRON-Lycoming Spec-No. 301F. Mineral Oil per MIL-L-6082 or Compounded Oil per MIL-L-22851 are approved when used per following Viscosity Chart below. (See Lycoming SLL229A, for Mobil AV1 approval)
Γ		Graphite and Kerosene, Lubriplate 797
Φ		Aeroshell Grease NO. 7 (On jackscrew and inside Actuator Bearing Housing)
Θ	MIL-T-27730	TAPE. Tetra fluoroethylene (Permacel Tape Corp)
é	MIL-G-23827, MOBIL # 27	GREASE (Dukes)

VISCOSITY CHART

Average Ambient Air Temperature	MIL-L-6082 or SAEJ 1966	MIL-22851
All Temperature		SAE 15W50 or SAE 20W50
Above 80 Deg. F	SAE 60	SAE 60
Above 60 Deg. F	SAE 50	SAE 40 or SAE 50
30 Deg. to 90 Deg. F	SAE 40	SAE 40
0 Deg. to 70 Deg. F	SAE 30	SAE 30, SAE 40 or SAE 20W-40
0 Deg. to 90 Deg. F	SAE 20W-50	SAE 20W50 or SAE 15W50
Below 10 Deg. F	SAE 20	SAE 30 or SAE 20W-30

NOTE

Mooney Aircraft are delivered with the proper break-in oil; MIL-L-6082. Oil and filter should be changed after 25 hours. Continue to use mineral oil for 50 operating hours or after oil consumption has stabilized then change to oil conforming to Lycoming Specification 301F. Multi-viscosity oil, both Mineral and Additive, is recommended.

NOTE

Refer to **Textron Lycoming Service Instruction No. 1014 (*)** for lubricating oil recommendations.

(*) = current revision or subsequent revisions.

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CHAPTER 6

DIMENSIONS AND AREAS

CHAPTER 6

DIMENSIONS AND AREAS

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6-00-01 - AIRCRAFT SPECIFICATIONS

ENGINE

	STANDARD	METRIC/OPT/MISC
Engine Mfgr.	TEXTRON-Lycoming	
Engine Model	IO-360-A1B6D or IO-360-A3B6D or IO-360-A3B6	
No. Cylinders	4	
Rated Horsepower	200 @ Sea Level	
RPM	2700	
Min. Fuel Octane	100/130 or 100 LL	
Fuel Capacity/Total	66.5 U.S. Gal.	(251.8 Liters) (55.4 IMP Gal.)
Useable	64.0 U.S. Gal	(242.4 Liters) (53.3 IMP Gal.)
[1] Oil Specification	Lycoming Spec. No. 301F	
Oil Grade/Viscosity - Above		
60 Deg.F	SAE 50	SAE 40 or 50
30 to 90 Deg. F.	SAE 40	SAE 40
0 to 70 Deg. F.	SAE 30	20W-40
Oil Grade/Viscosity - Below		
10 Deg. F.	SAE 20 W	SAE 20W-30
Oil Capacity	8 qts	7.57 Liters
Minimum Safe Oil Level	2 qts.	(LEVEL FLIGHT ONLY)

NOTE

Approved Multiviscosity oil is recommended, especially during cold weather operations.

INLET OIL TEMP @ AMBIENT AIR TEMP:	STANDARD	MAXIMUM
Above 60 Deg. F.	180 Deg. F.	245 Deg. F.
30 to 90 Deg. F.	180 Deg. F.	245 Deg. F.
0 to 70 Deg. F.	170 Deg. F.	225 Deg. F.
Below 10 Deg. F.	160 Deg F.	210 Deg. F.
Oil Pressure		
Normal Operation	60-90 P.S.I.	
Idle, Minimum	25 P.S.I.	
Max. Allowable (cold oil) Start & Warm up	100 P.S.I.	
Cylinder Head Temperature (CHT)		
Max. Allowable	475° F.	246° C.
Recm'd Cruise	300 to 450° F.	149 to 232° C.

PROPELLER	STANDARD	OPTIONAL
Propeller Mfg.	McCauley	Hartzell (Optional)
Type	Constant Speed	Constant Speed
Model	B2D34C214 [2]	HC-C2YK-1BF

1 First 50 hours of operation - mineral (nur-detergent) oil or equivalent corresponding to MIL-L-6082.

2 REPLACEMENT FOR B2D34C212/78C DA-4

PROPELLER (cont.)	STANDARD	OPTIONAL
Blade	90DHB-16E	F7666A-3Q
Pitch Angle (High) Deg.	33(+/-)0.5Deg. @ 30 IN. STA.[	29.3 Deg. to31.3
Pitch Angle (Low)	13.9(+/-) 0.2Deg.	14.1(+/-) .1 Deg.
Diameter	74.0 In. Max/73 In. Min.	73 Inches
Governor	McCauley(C290D5/T17) High- 27.5 (+/-) 0.2Deg. Low- 14.0(+/-) 0.2Deg. High-29.5 (+/-) 0.5Deg.- (Eff. after C/W S.B. #198)	McCauley

AIRFRAME

WTS & LOADINGS.	STANDARD	METRIC/OPT/MISC
A. Approximate Empty Weight	1700 lb.	771 kg.
B. Gross Weight	2740 lb./2900 lb. *	1243 kg./ 1315kg *
C. Useful Load	1040 lb./ 1200 lb.*	471.7 kg./544.3 kg. *
D. Wing Loading	16.4 lb./sq. ft [3] /16.59 lb./sq.ft*	78.58 kg/m²/81.02 Kg/m²*
E. Power Loading	13.7 lb/hp/14.5 lb./HP *	6.22kg/HP/6.58 kg/HP*

WINGS:

A. Airfoil At Root	NACA$_{63_2}$215
B. Airfoil At Tip	NACA$_{64_1}$412
C. Mean Aerodynamic Chord @ Wing Sta. 93.83	59.18 Inches
D. CG Range	13.4 to 28.7%
E. Geometric Twist (DEG)	-1.5 Degree
F. Incidence Angle (DEG) From Sta 20. to Wing Tip	2.5 Degree
G. Dihedral angle (DEG)	5.5 Degree
H. Aspect Ratio	7.336
I. Taper Ratio (CS/CT)	1.935

* S/N 24-3201, 24-3218 thru 24-TBA & 24-1688 thru 24-3200, 24-3202 thru 24-3217 when C/W SL91-2 and MAC drawing 940071 is incorporated.

FUSELAGE:

A. Cabin Dimensions:		
(1) Height	44.5"	113.03 cm
(2) Width	43.5"	110.49 cm
(3) Length	114"	289.56 cm
(4) Cabin Door Width	29"	73.66 cm
(5) Cabin Door Height	35"	88.9 cm

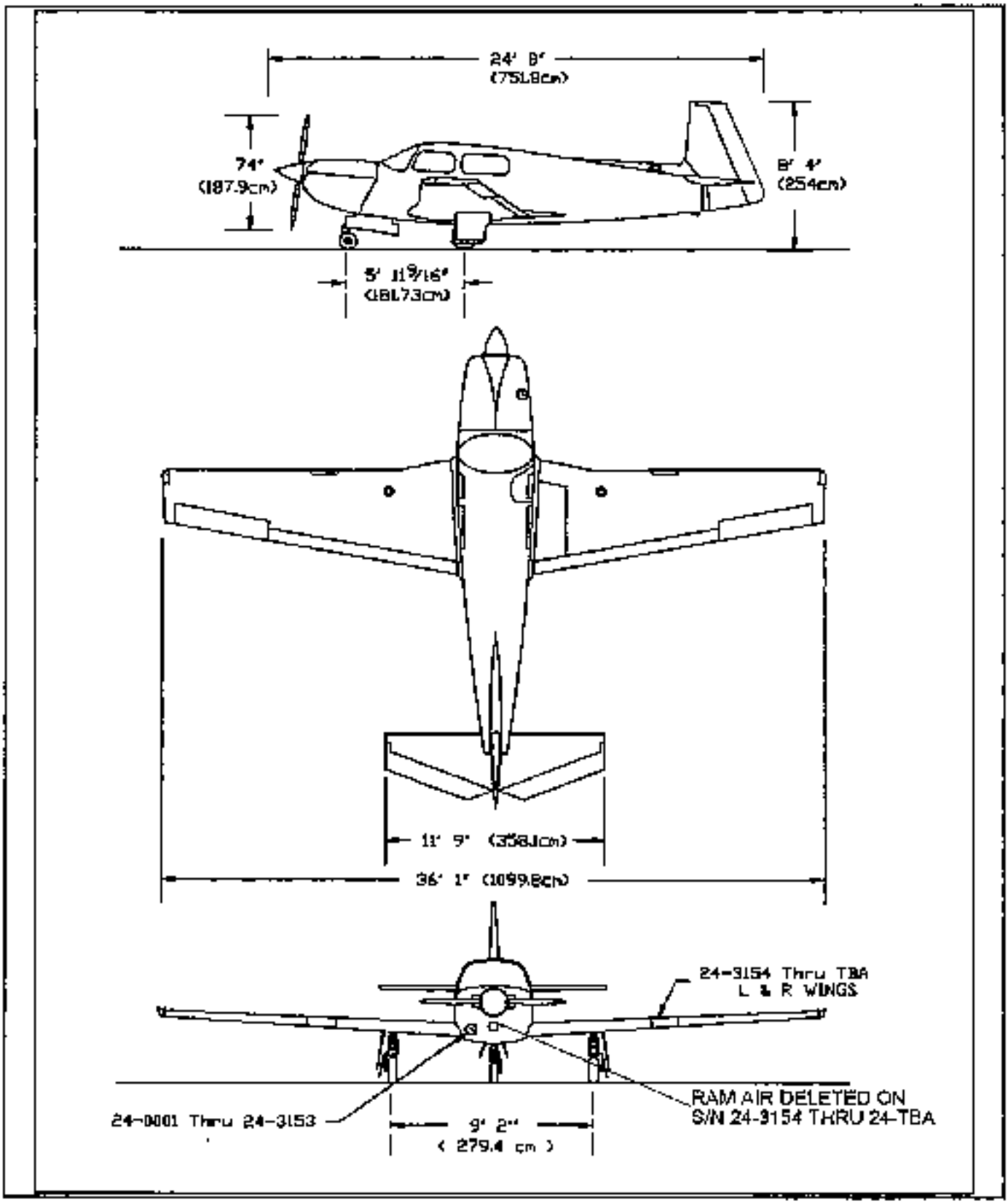
3 15.86 lb/sq ft. (S/N 24-1038 thru 24-3200, 24-3202 thru 24-3217)

WTS & LOADINGS: (cont.)	STANDARD	METRIC/OPT/MISC
B. Baggage Compartment:		
(1) MAX. Loading	120 lbs	54.43 kg
(2) Baggage Space	17.0 Cu. Ft. (24-0001 thru 24-3153)	0.476 Cu. M.
	15.3 Cu. Ft. (24-3154 thru 24-TBA)	0.433 Cu M
(3) Baggage Door Width	17"	43.18 cm
(4) Baggage Door Height	20.5"	52.07 cm
(5) Hat Rack Capacity	10 lbs	4.54 kg
C. Landing Gear:		
(1) Type	Tricycle Retractable	
(2) Operation	Electrical	
(3) Wheel Track	9' 2"	279.4 cm
(4) Wheel Base	5'11 9/16"	181.73 cm
(5) Tire Size— Nose (6-Ply Rating	5.00 x 5	(TYPE III)
(6) Tire Size— Main (6-Ply Rating)	6.00 x 6	(TYPE III)
(7) Tire Pressure—	Nose - 49 lbs/sq. in.	
(8) Tire Pressure—	Main - 30 lbs/sq. in.	

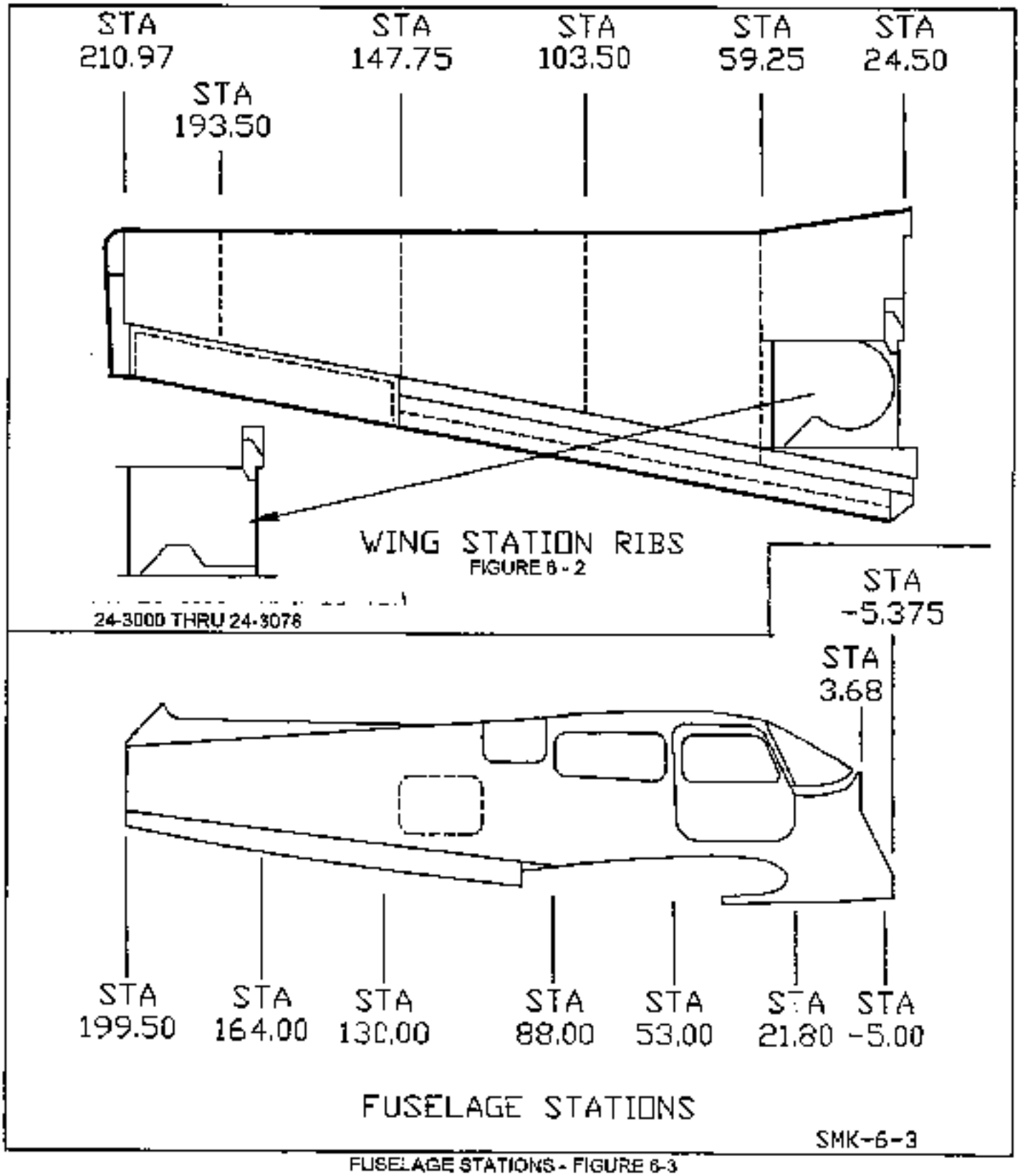
6-00-02 - AIRCRAFT DIMENSIONS

DIMENSIONS		
A. Wing Span	36'1" [4]	10.998 meters
B. Fuselage Length	24'8"	7.52 meters
C. Tail Height	8'4"	1.321 meters
D. Stabilizer Span	11'9"	3.581 meters
AREAS:		
A. Wing	174.789 sq. Ft.	16.238 sq. meters
B. Allerons	11.4 sq. ft.	1.059 sq. meters
C. Flaps	17.9 sq. ft.	1.663 sq. meters
D. Vertical Fin	7.9 sq. ft.	0.725 sq. meters
E. Rudder	6.25 sq. ft.	0.518 sq. meters
F. Horizontal Stabilizer	21.5 sq. ft.	1.900 sq. meters
G. Elevators	13.0 sq. ft.	1.208 sq. meters

4 Prior to S/N 24-1038—35'0"

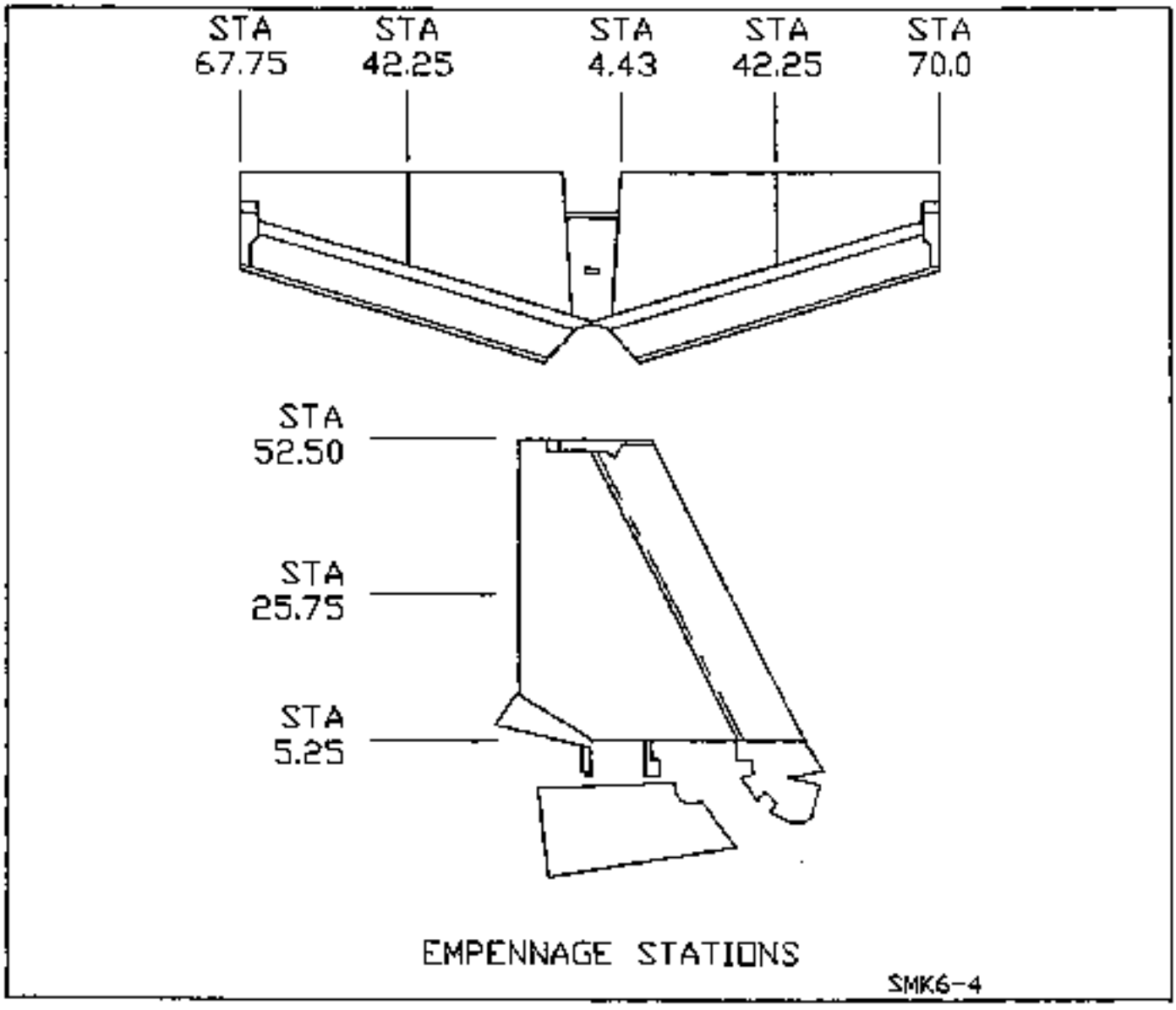


PRINCIPAL AIRCRAFT DIMENSIONS - FIGURE 6-1



FUSELAGE STATIONS - FIGURE 6-3

NOTE
The datum line station 0.0 is 5 inches aft of the nose gear trunnion pivot point. (Reference Figure 6-1.)



EMPENNAGE STATIONS - FIGURE 6-4

CHAPTER 7

LIFTING AND SHORING

CHAPTER 7

LIFTING AND SHORING

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7-10-00 - JACKING

When it is necessary to raise the aircraft off the ground:

CAUTION
Do not raise the aircraft on jacks out of doors when wind velocity is over 10 MPH. Jacks should be on hard surface.

CAUTION
Do not place jack directly on propeller de-icing boots. Cushion with a layer of 3/8 inch thick hard rubber or equivalent.

1. Install jack points in tiedown mounting holes outboard of each main gear.

2. Use standard aircraft jacks at both wing hoist points (wing tiedown eyebolt receptacles) outboard of the main gears. While holding jack point in place, raise jack to firmly contact jack point.

3. Use a yoke-frame jack under propeller to lift the nose.

4. Raise aircraft, keeping wings as nearly level as possible.

5. Secure safety locks on each jack.

CAUTION
When lowering aircraft on jacks, bleed off pressure on all jacks simultaneously and evenly to keep aircraft level as it is lowered.

CAUTION
Individual wheels may be raised without raising the entire aircraft. Wheels not being raised should be chocked fore and aft.

NOTE
It is not recommended to use tail-tie down fitting during jacking process to lift nose wheel off ground.

CAUTION
Do not leave aircraft on jacks for extended periods of time with a tail stand in place. The wing jack may bleed down, putting excessive loads on the front jack point and tail cone.

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CHAPTER 8

LEVELING AND WEIGHING

CHAPTER 6

LEVELING AND WEIGHING

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8-00-00 - LEVELING

Place a spirit level on the skin splice or levelling screws above the tailcone access door when leveling the aircraft longitudinally. Level the aircraft by increasing or decreasing air pressure in the nose wheel tire.

Level aircraft laterally (wing tip to wing tip by placing Spirit Level on center seat tracks in front of spar.

Front seats must be in the full forward position when weighing. (Use skin splice S/N 24-0001 thru 24-0063, 24-0065 thru 24-0900 and levelling screws S/N 24-0054, 24-0901 & ON.) (See FIGURE 8-1)

8-00-01 - WEIGHT AND BALANCE

To weigh the aircraft select a level and draft free work area, then:

1. Check for installation of all equipment as listed in the Weight and Balance Record.

2. Ground aircraft and drain fuel tanks per Section 12-10-02, 2.

3. Add unusable fuel to each tank, (see applicable Pilot's Operating Handbook for aircraft being serviced for proper quantity of unusable fuel).

4. Fill oil to capacity (8 quarts).

5. Position a 2000-pound capacity scale under each of the three wheels.

6. Level aircraft as described in Section 8-00-00 and center nose wheel.

7. Weigh the aircraft.

8. Find reference point by dropping a plumb-bob from center of nose gear trunion (retracting pivot axis) to the floor. Mark the point of intersection.

9. Locate centerline of the main wheel axles in the same manner.

10. Measure the horizontal distance from the reference point to main wheel axle center line. Measure horizontal distance from center line of nose wheel axle to center line of main wheel axles.

11. Record weights and measurements and compute basic weight and CG as follows:

$L_{C/G} = L_{M/R} - 5 - L_M$

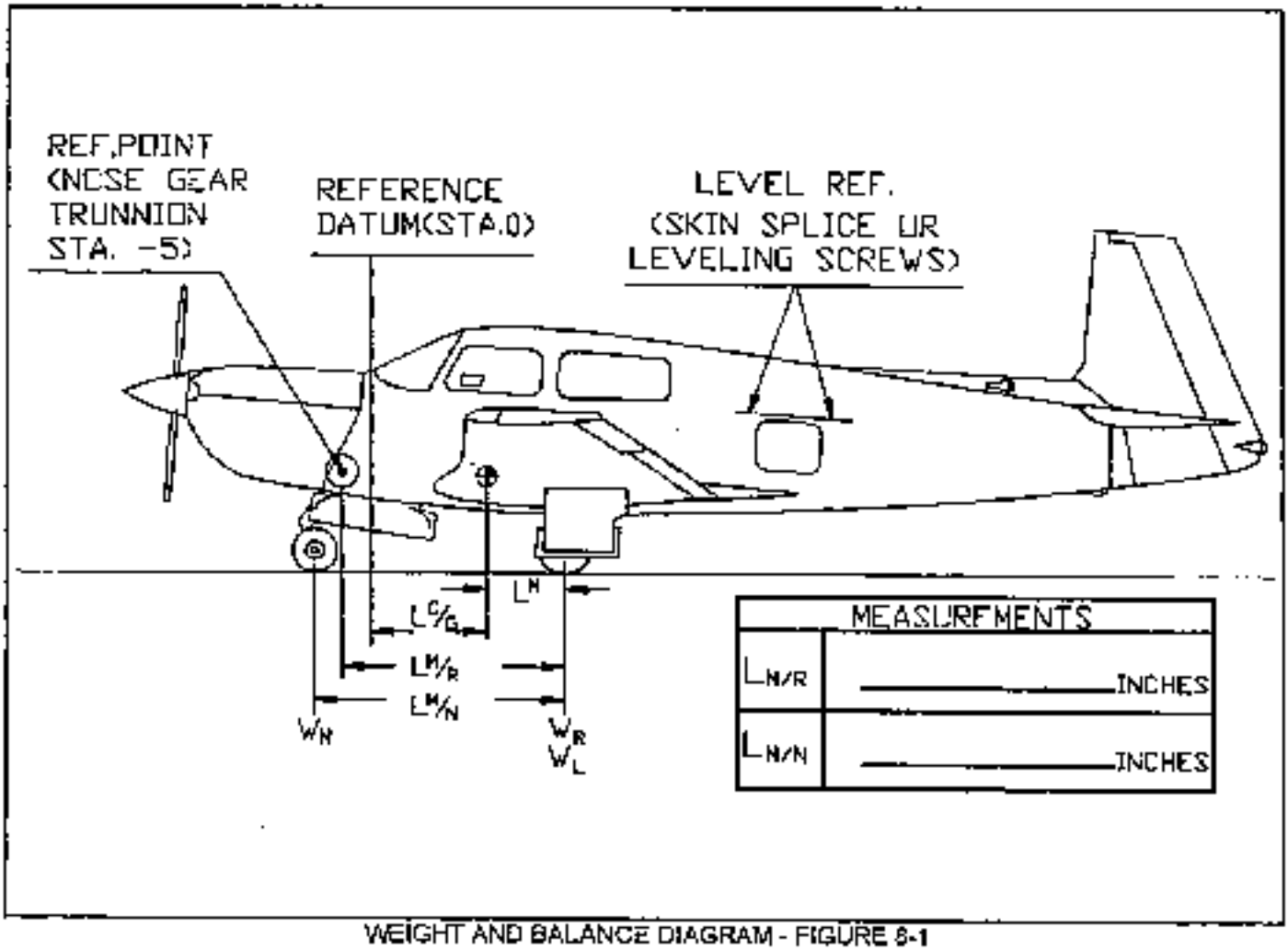
a. CG Forward of Main Wheels

_____LBS	X	_____IN.	-:-	_____LBS.	=	_____IN.
Weight of Nose (WN)		Distance Between Main and Nose Wheel Axle Centers (LM/N)		Total Weight of Aircraft (WT)		CG Forward of Main Wheels (LM)

b. CG Aft of Datum (Station 0).

_____IN.	—	_____5_____IN.	—	_____IN.	=	_____IN.
Distance from Center Nose Gear Trunion to Center of Main Wheel Axles (Horizontal) (LM/R)		Distance from Nose Gear Trunion to Datum CONSTANT		Result of Computation Above (a.) (LM)		CG (FUS STA) Distance Aft of Datum (Empty Weight CG) (LC/G)

NOTE: Empty weight includes unusable fuel and full oil and is computed with gear down and flaps up.



WEIGHT AND BALANCE DIAGRAM - FIGURE 8-1

CHAPTER 9

TOWING AND TAXIING

CHAPTER 9

TOWING AND TAXIING

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9-00-00 - GROUND HANDLING

9-10-00 - TOWING

Use a towbar for moving the aircraft. The towbar attaches to the nose gear crossbar. One man can move the aircraft providing the ground surface is relatively smooth and the tires are properly inflated. When no towbar is available, or when assistance in moving the aircraft is required, push by hand: (1) on the wing leading edges, and (2) on the inboard portion of propeller blades adjacent to the propeller hub. Towing by tractor or other powered equipment is not recommended.

CAUTION

Exercise care not to turn the nose wheel past its normal swivel angle of 14 degrees either side of center. Exceeding the turn limits shown on the turn indicator may cause structural damage. Maximum allowable damage to nose gear leg assembly is 1/32 inch dent.

9-20-00 - WARMUP AND TAXIING

Before attempting to warmup or taxi the aircraft, ground personnel should be checked out by qualified pilots or other responsible personnel.

1. Start and warmup engine. (Refer to Pilots Operating Handbook)

2. Taxi forward a few feet and check brake effectiveness.

3. While taxiing, make shallow turns to test nose gear steering.

4. Check operation of gyro instruments and turn coordinator during turns.

5. Check engine instruments for sluggish response to engine control movements.

9-30-00 - EMERGENCY PROCEDURES

1. Engine Fire During Starting.

A. Continue cranking engine with starter.

B. Set mixture control at IDLE CUTOFF.

C. Turn fuel selector handle to OFF.

D. Open throttle to FULL.

E. Turn MASTER switch OFF.

F. Push cabin heat control to OFF.

G. Close cowl flaps.

H. If fire is not extinguished, proceed as follows;

(1) Turn electrical switches OFF.

(2) Discharge fire extinguisher into engine compartment through nose cowl openings and through cowl flap openings.

(3) Call for fire-fighting equipment.

2. Fuselage or Wheel Well Fire. In case of fire in wheel well (or in the cabin or fuselage area), turn all fuel, electrical, and ignition controls to the OFF position before evacuating the aircraft to extinguish the flames.

3. Electrical Fire. Circuit breakers (or circuit-breaker switches), that automatically interrupt the flow of power when an overload or short circuit occurs, protect all electrical circuits (except the ignition-starter circuits). In the event of an electrical fire, immediately turn off the master/alternator field switch. Make sure that only a fire extinguisher approved for electrical fires is used.

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CHAPTER 10

PARKING AND MOORING

CHAPTER 10

PARKING AND MOORING

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10-00-00 - GENERAL

The parking brakes are set by applying the brakes and pulling out on the parking brake knob. Release the brakes by pushing in on the parking brake control knob.

NOTE
There is no need to depress the brake pedals to relieve the pressure in the lines during release of parking brake control.

There are three tiedown points on the aircraft, one on each wing outboard of main gear (tiedown rings are to be threaded into built in receptacles) and the tail skid/tiedown fitting on the aft end of the tailcone.

10-10-00 - PARKING

When parking the aircraft, place wheel chocks fore and aft of the main wheels. The parking brakes may be used for short-duration parking.

CAUTION
Do not set parking brakes when they are overheated or when cold weather could freeze moisture and slush accumulation in the brake mechanism. Do not set parking brakes when aircraft is tied down. For maximum protection, hangar the aircraft during severe weather and high winds.

10-10-01 - STORAGE (FLYABLE)

Outdoor storage requires adequate mooring and tiedown facilities. The following precautionary measures are recommended for keeping the aircraft serviceable and ready-to-fly.

1. Refer to paragraph 10-20-00 for mooring instructions.

2. Maintain an oil film on internal engine parts, frequently pull the propeller through. Run engine for 15 minutes at 1500 RPM (or until oil temperature normalizes) once every seven days.

3. After engine run, pressurize the fuel system (turn electric fuel boost pump on), push mixture control to RICH, and open throttle half way to fill the fuel injector with fuel.

4. Keep fuel tanks filled at least one-half full to minimize moisture condensation. Keep battery fully charged.

5. Install protective covers over pitot head, engine cowl openings, static ports, etc.

6. Maintain a good wax finish on all exterior surfaces.

10-10-02 - STORAGE (PROLONGED)

If the aircraft is to be stored for an extended period of time, the following steps are recommended for protection:

1. Refer to paragraph 10-20-00 for mooring instructions.

2. Run engine (minimum of 15 minutes at 1500 RPM) until oil temperature reaches normal operating range.

3. Drain engine oil sump and refill the sump with a preservative oil (Socony Aurex 901 or equivlent) preheated between 200 and 220 degrees F.

4. Start engine and run at 1000 RPM for five minutes.

5. Shut engine down and remove spark plugs.

6. While motoring engine with starter, spray each cylinder (through spark plug holes) with approximately 2 oz. of hot preservative oil.

CAUTION
Do not exceed starter operating limits when motoring engine.

7. When all cylinders have been sprayed, position propeller horizontally and respray each cylinder without moving propeller.

8. Attach a warning tag to one of the blades stating that propeller is not to be rotated.

9. Install dehydrator plugs in spark plug holes.

10. Cap ignition harness leads.

11. Drain preservative oil from sump.

12. Attach a warning tag to the throttle control in cockpit stating that engine has no lubricating oil.

13. Drain all fuel from fuel injector; then, pump oil into the fuel injector at five PSI until injector is full. do not drain the injector after flushing.

14. Lubricate aircraft in accordance with instructions given in the Lubrication Guide.

15. Tape or cover all openings.

16. Remove battery, charge fully, and store in a cool place.

17. Raise aircraft to remove weight from the tires, and block up the wheels.

CAUTION
If weight is not removed from tires, rotate wheels to a new position at least once each 30 days to prevent flat-spotting the tires.

18. See appropriate TEXTRON-LYCOMING Service Bulletin for engine preservation. Attach warning placards if preservation procedures make engine inoperable.

10-10-03 - RETURNING TO SERVICE

If the aircraft has been stored for an extended period of time, it is advisable to perform a 50-hour periodic inspection after completion of the following preliminary steps:

1. Remove blocks from wheels. Check tire inflation.
2. Check and install battery.
3. Remove tape and covers from openings.
4. Remove warning placards (if any).
5. Replace engine oil filter.
6. Clean engine oil suction and pressure screens.
7. Clean and check oil pressure relief valve.
8. Clean and check oil temperature bypass valve.
9. Fill engine sump with proper grade of lubricating oil.
10. Clean and reinstall engine air-inlet filter.
11. Check ignition harness.
12. Remove dehydrator plugs and install spark plugs.
13. Check and clean fuel injector nozzles and screens. Drain oil from fuel injector.
14. Check fuel tank vents for obstruction, and drain sumps to remove moisture and sediment.
15. Complete 50-hour and preflight inspections.
16. See appropriate TEXTRON-Lycoming Service Bulletin for servicing of the engine.

10-20-00 - MOORING

When mooring the aircraft out of doors:

1. Head aircraft into the wind.
2. Place chocks fore and aft of each main wheel.
3. Drive stakes in ground approximately three feet outboard of each main gear and to either side of tailskid.
4. Install tiedown rings in wing receptacles outboard of each main gear. Tie a 800-pound tensile strength rope to each wing tiedown ring and anchor to ground stake. Allow a little slack in each tiedown rope.
5. Tie the center of a rope to tail skid tiedown ring and anchor rope ends to ground stakes at either side of tail.
6. For additional security, attach a rope to the nose gear and anchor to a ground stake.
7. Lock controls by looping right front seat safety belt through the control wheel and drawing belt snug.

CHAPTER 11

PLACARDS AND MARKINGS

CHAPTER 11

PLACARDS AND MARKINGS

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11-00-00 - GENERAL

FAA required placards and markings.

NOTE

All placards should be inspected for proper location, readability and security during maintenance actions. When an airplane has been painted inspect all placards to assure that they are not obscured by paint.

11-10-00 - MARKINGS

The exterior paint schemes for the various model year aircraft are depicted in the M20J Illustrated Parts Catalog.

11-20/30-00 - PLACARDS, EXTERIOR/INTERIOR

All required placards and their locations, both interior and exterior, are listed in Section II of the FAA Approved Flight Manual and Pilot's Operating Handbook.

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CHAPTER 12

SERVICING

CHAPTER 12

SERVICING

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12-20-05	6	12-98
12-20-06	7	5-93
12-20-06	8	5-93

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12-00-00 - SERVICING

12-00-01 - SERVICING INTERVALS

The specified intervals (refer to Chapter 5) are considered adequate to meet average requirements under normal operating conditions. It is advisable, however, to shorten service and maintenance intervals when operating under abnormal environmental conditions, such as extreme temperature ranges, dusty atmospheric conditions, high humidity and moisture, unimproved airport facilities, or unusual operating requirements.

12-10-00 - REPLENISHING

12-10-01 - FUEL TANKS

Keep fuel tanks at least half filled to minimize condensation and moisture accumulation in tanks. (Fuel capacity is given in SECTION 6.)

WARNING
Ground the aircraft and fuel service vehicle. Ground servicing nozzle to wing. Permit no smoking or open flame within 50 feet of aircraft or vehicle.

WARNING
Each fuel tank is vented to the atmosphere at its outboard aft corner; vent openings are on the lower wing surface. Check vents for obstruction before each flight.

12-10-02 - FUEL DRAINS

A fuel-drain valve is located in the aft inboard corner of each tank to provide for drainage of moisture and sediment. Use the small plastic cup furnished with the flyaway kit to drain the fuel sumps. Drain wing tank and selector valve sumps or gascolator before the first flight of the day and after each fuel service to inspect for water and/or contamination. Continue draining until free of water or contamination.

WARNING
After servicing the aircraft with fuel, wait at least five minutes for moisture and sediment to settle before draining and checking both the fuel tank sumps and the fuel selector valve drain.

1. Fuel Selector Drain. The fuel gascolator is at the lowest point in the fuel system and has a drain valve operated by a control on the floor in the cabin. To drain the fuel selector valve:

A. Switch fuel selector valve handle to L and pull fuel drain valve control ring for 10 seconds.

B. Switch fuel selector valve handle to R and pull fuel drain valve control ring for 10 seconds.

C. After draining, be sure fuel drain valve control is returned to the closed position and the valve is not leaking outside the aircraft.

WARNING
During cold weather operation, frequently check fuel selector drain for ice formation by repeating procedures 1., A, B and C above.

NOTE
Isopropyl Alcohol may be added to fuel tanks. It is extremely important to thoroughly BLEND the isopropyl alcohol in with the fuel supply in quantities not to exceed 1% of the total by volume.

2. Defueling. Fuel tanks may be drained by pumping fuel out with the electric fuel boost pump, siphoning fuel through the filler ports, or removing tank quick drain valves.

WARNING
Allow no smoking or open flame within 50 feet of the defueling area. Ground the aircraft and fuel container during all defueling operations.

A. To defuel the aircraft using fuel boost pump:

(1) Disconnect fuel line from electric boost pump outlet at the fitting forward of the firewall.

(2) Connect to output fitting a flexible line that will reach fuel receptacle.

(3) Turn fuel selector valve to the tank to be drained, and remove filler cap from fuel filler port.

(4) Turn on fuel boost pump until tank is empty. Repeat steps (3) and (4) to drain other tank.

(5) To completely drain fuel system also drain wing sumps and the fuel gascolator valve sump until fuel stops running.

NOTE
When defueling using removable tank quick drains it is only necessary to remove the drains and to operate the gascolator drain.

NOTE
S/N 24-0378 & ON. The gascolator (fuel drain) is separate from the fuel selector. The fuel selector is located aft of the console on the floor and the gascolator is located to the left of the fuel selector. Separation of the gascolator and the selector does not change fuel drain procedures.

12-10-03 - ENGINE OIL

Check engine oil level after engine has been stopped long enough for oil to drain back into sump. The oil filler cap access door is located in the top cowling. Any lubricating oil, either straight mineral (MIL-L-6082) or compounded (TEXTRON Lycoming Spec. No. 301F) or MIL-L-22851are acceptable for use after break-in period. Approved products and engine oil viscosity requirements are shown in Chapter 5-20-07.

CAUTION

The terms "detergent", "additive", and "compounded" used in this manual are intended to refer to a class of aviation engine lubricating oils to which certain substances have been added to improve them for aircraft use. These terms do not refer to such materials commonly known as "top cylinder lubricant", "dopes" and "carbon remover" which are sometimes added to fuel or oil. These products may damage the engine and therefore, should not be used. Under no circumstances should automotive oil be used, since such oils could cause engine damage.

Oil Recommendations for New-Engine or Newly Overhauled Engine Break-in.

New or newly overhauled engines should be operated on aviation grade straight mineral oil during the first 50 hours of operation or until oil consumption has stabilized. The aircraft is delivered from Mooney with proper break-in oil (MIL-L-6082) or SAE 20W-50 Type I).

OIL CHANGING RECOMMENDATIONS.

The oil sump is equipped with a quick drain fitting. On aircraft equipped with either an internal or external oil filter, the recommended engine oil change intervals is at 50-HOUR FLIGHT OPERATION INTERVALS.

If an engine has been operating on straight mineral oil for several hundred hours, a change to additive oil should be undertaken with caution. If the engine is in an extremely dirty condition, the switch to additive oil should be deferred until after engine has been overhauled.

When changing from straight mineral oil to additive or compounded oil, after several hundred hours of operation on straight mineral oil, take the following precautionary steps:

1. Do not mix additive oil and straight mineral oil. Drain straight mineral oil from engine, change filter and fill with additive oil.

2. Do not operate engine longer than five hours before again changing oil.

3. Check oil filter for evidence of sludge.

Change oil and replace oil filter element every 10 HOURS if sludge is evident. Resume normal oil drain periods after sludge conditions improve.

NOTE

During periods of prolonged operation in dusty areas or in cold climates, or when flights have been of short duration with prolonged idling time, change oil and filter element each 25 HOURS, or more often when conditions warrant.

12-10-04 - OXYGEN SYSTEM (OPTIONAL)

The oxygen cylinder, when fully charged, contains approximately 76 cubic feet of aviators breathing oxygen (Specifications No. MIL-O-27210). Recharging of this oxygen cylinder should be accomplished by using the appropriate Scott recharging fittings to the pressure shown on (Figure 12-1), Pressure vs. Temperature Table.

WARNING

Oil, grease or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided when handling oxygen equipment.

AMBIENT TEMPERATURE DEGREES F	FILLING PRESSURE PSIG	AMBIENT TEMPERATURE DEGREES F	FILLING PRESSURE PSIG
0	1650	50	1875
10	1700	60	1925
20	1725	70	1975
30	1775	80	2000
40	1825	90	2050

OXYGEN PRESSURE VS TEMPERATURE TABLE
FIGURE 12-1

NOTE

The oxygen cylinder should not be run down to less than 100 p.s.i. Below this pressure atmospheric contamination of the cylinder may occur, requiring valve removal and cylinder cleaning and inspection at an FAA approved repair stations.

NOTE

Refer to Section 35-00-00 for periodic bottle pressure check.Any time fittings are disconnected on the oxygen system the threads should be treated with tetrafluoroethylene tape (MIL-T-17720). Prior to reconnection the system should be checked for leaks with leak testing compound (MIL-L-25567). If no leaks are found wipe the system clean and dry.

12-20-00 - SCHEDULED SERVICING

12-20-01 - INDUCTION AIR FILTER

The importance of keeping the induction air filter clean cannot be overemphasized. A clean filter promotes fuel economy and longer engine life. The dry-type filter can usually be washed six to eight times within 500 hours or one year before replacement is necessary.

To clean the dry-type induction air filter:

1. Remove filter element.

2. Direct a jet of air against down or clean side of filter (opposite to normal airflow). Keep air nozzle at least two inches from filter element. Cover entire filter area with air jet.

CAUTION

Do not use a compressor unit with a nozzle pressure greater than 100 p.s.i.

3. After cleaning, inspect filter and gasket for damage. Discard a ruptured filter or broken gasket.

NOTE

If filter shows an accumulation of carbon, soot, or oil, continue with cleaning steps 4 through 7.

4. Soak filter in nonsudsing detergent for 15 minutes; then agitate filter back and forth for two to five minutes to free filter element of deposits.

5. Rinse filter element with a stream of clean water until rinse water is clean.

6. Dry filter thoroughly. Do not use light or air above 180 deg. F. for filter drying.

7. Inspect for damage or ruptures by holding before a light. If damage is evident, replace filter with new one.

8. Check induction air door through lower front cowling opening for good working order, and check alternate air door inside the lower cowling at the induction air box for proper operation. The alternate air should just start to open when a force of 3-4 pounds is applied

9. Reinstall filter in aircraft making sure of proper sealing and security.

12-20-02 - BATTERY

Service the battery with distilled water to maintain electrolyte above plates. After adding water in freezing weather, charge battery long enough to mix electrolyte and water. Keep battery electrolyte above a specific gravity of 1.225 to avoid freezing. To service the battery

1. Remove battery box cover. Check electrolyte and service battery as required.

CAUTION

Battery gases may be explosive.

2. Check battery box for corrosion and spilled electrolyte. To clean cables, terminals, and battery box, use a solution of bicarbonate of soda and clean water to neutralize corrosion and spilled electrolyte.

CAUTION

When cleaning, do not allow bicarbonate of soda to enter battery cells - permanent damage will result if soda mixes with electrolyte.

3. Rinse battery with clean water, and wipe clean with a dry cloth.

4. To retard corrosion, coat terminals with petroleum jelly after cleaning and tightening them.

5. Check battery ram air and vent for obstruction, line kinks, etc.

12-20-03 - TIRES AND WHEELS

Keep the tires at recommended air pressure. (Refer to Chapter 6-00-01.

1. Check tires for wear, cuts, and bruises.

2. Check valve stems for evidence of tire slippage or pulling.

3 Check wheels for damage.

4 Check wheel bearings for condition and lubrication.

12-20-04 - BRAKE RESERVOIR

Frequently check the brake reservoir for proper fluid level. See Chapter 12-20-05 for locations.

CAUTION

Do not fill reservoir while parking brake is set.

Use only hydraulic fluid (red), per specification MIL-H-5606. Do not fill reservoir above two inches below filler port.

12-20-05 - HYDRAULIC BRAKE (Bleeding)

CAUTION
Fluid in the wheel cylinders may be under high pressure due to expansion. Therefore, be sure parking brakes are released prior to beginning hydraulic system servicing.

For best results, use a hydraulic pressure service unit (pressure pot) to back bleed the system through the wheel cylinder bleeder valves. Allow pressurized pot to set 10-12 hours to dissapate air from fluid prior to bleeding brake lines.

1. Remove hydraulic fluid reservoir filler plug, and install a suitable fitting for attaching a flexible drain line to the reservoir filler port.

2. Immerse open end of drain line in a hydraulic fluid container.

3. Attach pressurized hydraulic fluid service unit to wheel cylinder bleeder valve and open valve. On aircraft with dual brakes and shuttle valves, depress pilot's brake pedals to reposition shuttle valve while being bled.

Fluid in hydraulic service unit should be free of air prior to servicing aircraft system.

4. Feed fluid from service unit into brake system. Check for air bubbles at end of drain line immersed in fluid. On aircraft with dual brakes, depress co-pilot's brake pedals to reposition brake shuttle valve, then proceed with bleeding this side.

5. When fluid flow is clear of air bubbles, close wheel cylinder bleeder valve and remove service line.

NOTE
Brake pedal may need to be pulled back in order for fluid to bleed back into reservoir.

6. To bleed opposite brake, repeat steps 3 through 5.

7. Remove drain line from reservoir.

8. Lower fluid level in reservoir to two inches below filler port.

9. Reinstall filler plug

10. Check brake linings for excessive wear and proper installation. Refer to Section 32-40-04 for Brake Removal and Inspection Procedures.

11. Depress brake pedals to check for sponginess. Resistance should be solid and even when brake pedals are depressed.

12-20-05 - CLEANING

Cleanliness is a major prerequisite to adequate inspection and maintenance of an aircraft. Cleanliness enhances the appearance of an aircraft and reduces the probability of corrosion.

1. EXTERIOR

A. Before washing aircraft exterior, cover brake discs, pitot head, and static ports.

B. Flush away loose dirt and mud.

C. Wash exterior with a mild aircraft detergent in cool water, and a soft cleaning cloth or chamois. Rinse away soap film.

CAUTION
Do not use so called "mild" household detergents to wash aircraft exterior. Such detergents may damage finish and corrode aluminum components.

CAUTION
Do not apply wax or use pre-wax cleaners during initial paint curing period. Use only mild aircraft detergent and cool water when washing exterior during the first 90 days after repainting.

D. To remove heavy oxidation film, use a pre-wax cleaner.

E. Apply an exterior-finish wax recommended for protection of urethane enamel. Apply a heavy coating of wax to leading edges of wings, empennage, and nose section to reduce drag and abrasion.

CAUTION
When fuel, hydraulic fluid, or other fluid containing dye is spilled on painted surfaces, remove it at once to prevent staining. Flush away spilled battery electrolyte immediately with water. Treat the area with bicarbonate of soda solution followed by thorough washing with a mild aircraft detergent solution.

2. WINDSHIELDS, WINDOWS AND DOORS

A. Flush windshield and windows with water prior to wiping. Never wipe while dry.

B. Remove grease or oil with a soft cloth saturated in kerosene.

CAUTION
Never use gasoline, benezene, carbon tetrachloride, acetone, fire extinguisher fluid, de-icer fluid, lacquer thinner, or household window cleaning sprays on windows or windshields. Such solvents will soften or craze the plexiglas surface.

C. Clean windows and windshields with an antistatic plexiglas cleaner.

D. Check door seals for damage that could cause leakage.

E. Check cabin and baggage door mechanism for good working order.

NOTE
Minor scratches or abrasions may be polished out by using plexiglas resurfacing kits, ie, Micro-Mesh, available from aircraft accessory suppliers.

3. ENGINE COMPARTMENT

Accumulation of dirt and oil within the engine compartment creates a fire hazard and hampers inspection.

A. Wash down engine cowling and engine compartment using a nonflammable solvent.

B. Dry engine cowling and engine compartment after washing.

4. CABIN INTERIOR

Use normal household cleaning practices for routine interior care.

A. Frequently vacuum seats, rugs, upholstery panels, and headliners to remove surface dust and dirt.

B. Clean leather or vinyl upholstery and panels with a mild aircraft detergent. Clean with a slight damp cloth, and dry with a soft cloth.

NOTE

Foam-type shampoos and cleaners for vinyl, leather, and plastic materials can be used to remove stains and to condition the entire interior. Spray-on dry cleaners are also recommended.

CAUTION

Never apply furniture polish to interior furnishings. Most polishes contain solvents harmful to vinyl. Do not use alcohol or strong solvents on interior plastics. When using commercial cleaning and finishing compounds, carefully follow the manufacturer's instructions. Never saturate fabrics with solution which could damage the backing and padding materials. To minimize wetting of carpets, keep foam as dry as possible and rub in circles. Use a vacuum cleaner to remove foam. Do not allow carpets to remain damp; dry them thoroughly.

BLANK

CHAPTER 20

STANDARD PRACTICES - AIRFRAME

CHAPTER 20

STANDARD PRACTICES - AIRFRAME

LIST OF EFFECTIVE PAGES

TABLE OF CONTENTS

20-00-00 - GENERAL

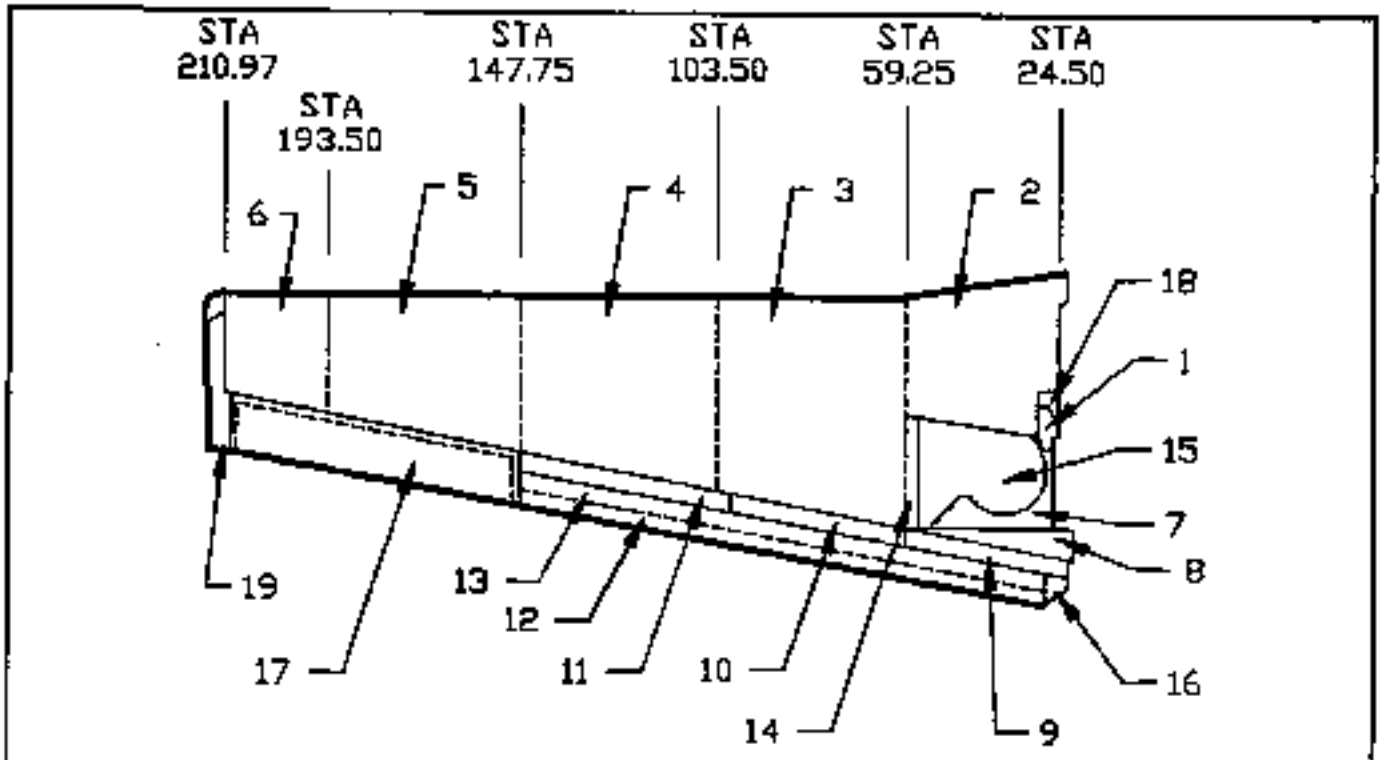
This chapter of the manual discusses treatment of metal surfaces for corrosion control and the identification of skin panels for replacement purposes. Those who inspect or repair aircraft should consult FAR 43, Maintenance, Preventive Maintenance, Rebuilding and Alteration and Sub Parts A, D and E of FAR 65, Certification.

Advisory Circular 43.13-1(*) outlines inspection and repair practices acceptable to the F.A.A. Administrator. Torque values are shown in SECTION 5-20-01.

NOTE
Refer to FAA AC 43-4 for CORROSION TREATMENT.

(* = current revision)

20-00-01 - SKIN SPECIFICATIONS

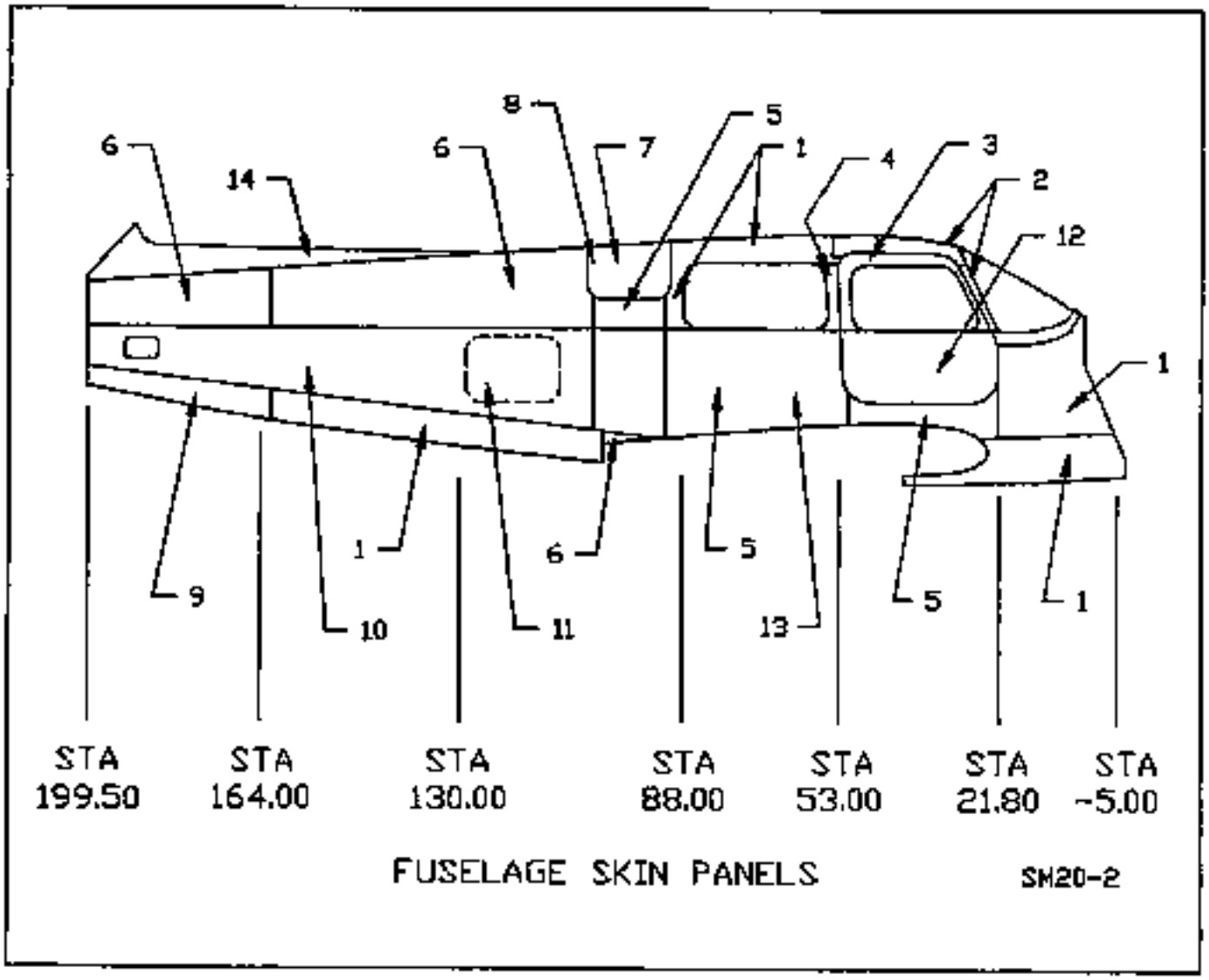


WING SKIN PANELS

INDEX NO.	SKIN THICKNESS	MATERIAL
1.	0.063	2024 T-3 CLAD
2.	0.050	2024 T-3 CLAD
3.	0.040	2024 T-3 CLAD
4.	0.032	2024 T-3 CLAD
5.	0.025	2024 T-3 CLAD
6.	0.025	2024 T-3 CLAD
7.	0.032	2024 T-3 CLAD
8	0.040	2024 T-3 CLAD
9.	0.025	2024 T-3 CLAD
10.	0.025	2024 T-3 CLAD
11.	0.025	2024 T-3 CLAD
12.	0.025 (c)	2024 T-3 CLAD
13.	0.020 (a)	2024 T-3 CLAD
14.	0.032	2024 T-3 CLAD
15.	0.040 (b)	2024 T-3 CLAD
16.	0.040 (d)	2024 T-3 CLAD
17.	0.016 (a)	2024 T-3 CLAD
18.	0.050 (b)	2024 T-3 CLAD
19.		Polyester Glass-Fiber Reinforced

(a) Same thickness on top and bottom
(b) Top of wing only.
(c) Top aft flap skin (hat section)
(d) Top inboard flap skin

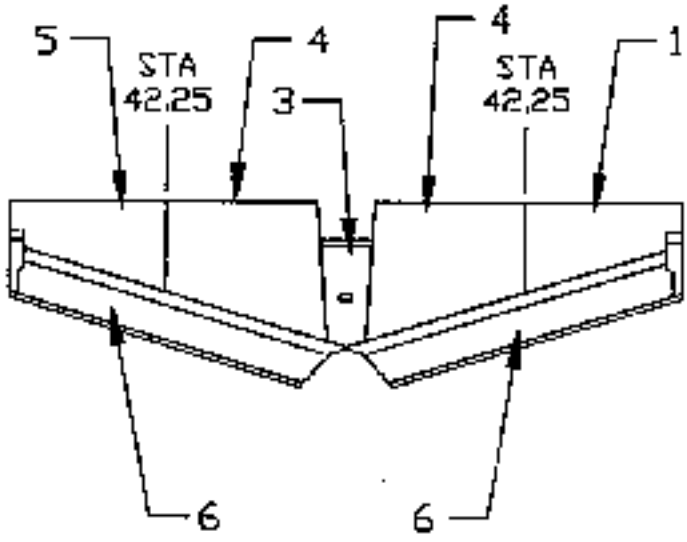
WING SKIN PANELS
FIGURE 20-1

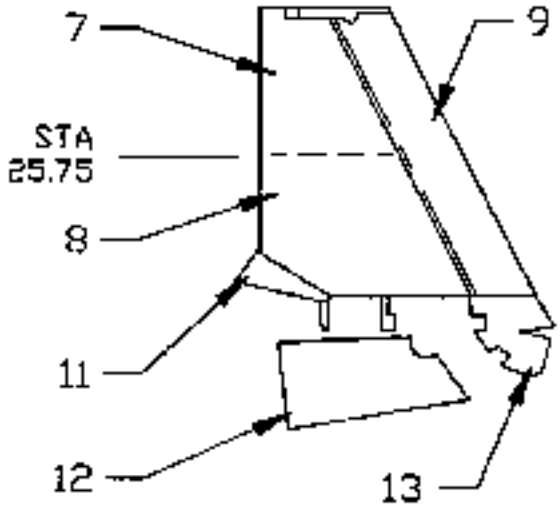


INDEX NO.	SKIN THICKNESS	MATERIAL
1.	0.025	2024 T-3 CLAD
2.	0.040(d)	2024 -0 CLAD
3.	0.025(c)(b)	2024 T-4 CLAD
4.	0.025	2024 T-3 CLAD
5.	0.025(b)	2024 T-3 CLAD
6.	0.020	2024 T-3 CLAD
7.	0.025	2024 T-3 CLAD
8.	0.032(d)(e)	2024-0 CLAD
9.	0.025	2024 T-3 CLAD
10.	0.032	2024 T-3 CLAD
11.	0.032(a)	2024 T-3 CLAD
12.	0.032	2024 T-3 CLAD
13.	0.025(a)	2024 T-3 CLAD
14.	Polyester Glass-Fiber Reinforced	

(a) Left side only
(b) Right side only.
(c) 0.032 can be used
(d) Heat treated to T-42 condition after forming.
(e) Shell.

FUSELAGE SKIN PANELS
FIGURE 20-2





EMPENNAGE SKIN PANELS

INDEX NO.	SKIN THICKNESS	MATERIAL
1.	0.025	2024 T-3 CLAD
2.	0.025	2024 T-3 CLAD
3.	0.025	2024 T-3 CLAD
4.	0.025	2024 T-3 CLAD
5.	0.025	2024 T-3 CLAD
6.	0.020	2024 T-3 CLAD
7.	0.025	2024 T-3 CLAD
8.	0.025	2024 T-3 CLAD
9.	0.020	2024 T-3 CLAD
10.	0.032	2024 T-3 CLAD
11.		Polyester Glass-Fiber Reinforced,
12.	0.020	2024 T-3 CLAD
13.	0.025(a)	2024 T-3 CLAD

(a) Heat treated to T-42 condition.

EMPENNAGE SKIN PANELS
FIGURE 20-3

20-00-02 - CORROSION DETECTION & PREVENTION

Most metallic fabrication materials are susceptible to corrosion. Corrosion may occur on aircraft in any climate, but it will be a problem more often in climates where the aircraft is exposed to salt air or high humidity, or where there are industrial contaminants in the atmosphere. The aircraft should be inspected frequently to detect and correct corrosion before serious damage occurs.

Any form of corrosion should be removed at once. If it is necessary to remove paint, only an approved aircraft paint remover such as Eldorado PR-3400, (Eldorado Chemical Co., Inc., 6700 Lookout Road, P.O. Box 32101, San Antonio, TX. 78216) should be used. Paint removing substances left in metal crevices will cause further corrosion. Turco 2662C or 3002 will remove corrosion from aluminum and treat the metal surface in one application.

This paragraph discusses corrosion types and their prevention along with suggested procedures for priming internal airframe surfaces.

1. Types of Corrosion. Corrosion normally appears in one or more of four forms. Each type of corrosion can be precluded or controlled by a preventative maintenance program.

A. Chemical corrosion. Chemical corrosion normally occurs where battery acid or exhaust gases come in contact with metal surfaces. A few simple precautions will prevent chemical corrosion.

(1) Be sure battery vent is free from obstruction at all times.

(2) Repaint all scratches and worn spots found in areas painted with acid-resistant paint.

(3) If acid is spilled on metal surfaces, flush entire area with sodium bicarbonate and water. The solution should be rinsed away at once and the area dried by driving all water from crevices with an air hose before wiping surface dry with a clean cloth.

(4) Frequently clean exhaust gas deposits from metal surfaces.

B. Local-Cell Corrosion. On bare metal surfaces, in an early stage development, local-cell corrosion appears as a light, whitish powder deposit. Surface pits warn of advanced local-cell corrosion. On painted surfaces, the first indication of corrosion will be evidenced by paint blistering.

(1) Intergranular Corrosion - Selective attack along grain boundaries of metal alloys is referred to as intergranular corrosion. Aluminum alloys 2024 and 7075 are vulnerable to this type of attack. Aluminum extrusions may contain nonuniform areas, which in turn may result in galvanic attack along grain boundaries. This type of corrosion is difficult to detect in its original stages. When the attack is well advanced, the metal is usually blistered or delaminated. This is referred to as "exfoliation". It is very difficult to completely remove and stop this type of corrosion, and replacement of the affected part is recommended wherever possible.

C. Concentration Cell Corrosion. Corrosion forming under rivet heads, along faying surfaces, at skin to longeron contact surfaces and other similar areas is called concentration cell corrosion. Detection requires close inspection. Rivets must be removed and skin laps must be separated to remove concentration cell corrosion. Use aluminum wool soaked in solvent such as methyl-ethyl-ketone to scour corrosion deposits from the surface before painting both faying surfaces with zinc chromate or epoxy-polymide primer and reassembling.

D. Galvanic Corrosion - Dissimilar metals, such as stainless steel and aluminum, in contact with each other sometimes develop galvanic corrosions. To remedy this form of corrosion, separate the parts, remove the corrosion, and paint both surfaces with Epoxy-Polymide primer or equivalent before reassembling.

2. Corrosion Prevention

A. Thoroughly examine unpainted metal surfaces at inspections, and check corrosion when found. Carefully examine seams, lap joints, and crevices where moisture or dirt can collect. Areas exposed to exhaust gases require frequent inspection and cleaning.

B. Corrosion may attack metal even though the surface is painted. Inspect painted areas for a blistered or scaly appearance that warns of corrosion below the paint layer.

C. Use only liquid (non-alkaline) soap to wash the exterior airframe. Cover vent scoops when the aircraft is being washed. Rinse aircraft exterior after exposure to salt air or industrial fallout.

D. Since moisture promotes corrosion, thoroughly and frequently inspect areas where water is apt to collect. Use an air hose to drive water from crevices before wiping the exterior surface dry after washdown.

E. Hangar the aircraft when not in use.

F. If battery acid is spilled on any part of the aircraft, immediately wash the area with a solution of sodium bicarbonate in water. Rinse with water and dry with clean towels.

NOTE

ACF-50 or equivalent can be fogged into fuselage empennage or wing skin areas. It is recommended that electrical connections and electrical components be protected during fogging.

NOTE

FAA Advisory Circular 43-4 addresses corrosion problems and treatment.

3. Surface Protection. Surface protection of internal airframe surfaces will not eliminate the necessity for periodic inspections. The most likely areas for corrosion to begin are in hidden crevices such as skin laps, under rivet heads or any opening where moisture can collect. Periodic inspection of these areas is most important so that any corrosion which may be present can be detected and treated in its very earliest stages.

When corrosion is detected, it should be treated as follows:

A. Remove all corrosion product (usually white or grey-white powder on aluminum) from the corroded area down to sound metal.

(1) If the base metal is aluminum, clean off the corrosion product by scrubbing with aluminum wool or a nonmetallic scouring pad such as the nylon pads made by the Carborundum Company, P.O. Box 277, Niagara Falls, N.Y. 14302.

(2) If the base metal is steel, remove the corrosion product with emery cloth (320 grit or finer) or steel wool.

(3) If the corrosion is too advanced to remove by the light mechanical cleaning methods of (1) and (2), refer to Advisory Circulars 43.13-1(*) and/or 43-4 for alternate methods of cleanup and repair. (* = current revision)

(4) Chemical cleaning solutions should be used with extreme caution on both aluminum and steel parts. Such solutions are not recommended for use in areas where they cannot be easily and completely neutralized.

B. Wash all areas to be primed with a cleaning solvent such as methylethylketone (MEK), Turco T-657 (Turco Products, Inc., 6135 South Central Ave., Los Angeles, California), lacquer thinner, #3094 wash thinner (Pratt & Lambert, Inc., 25th and N.Y. Avenue, Wichita, Kansas) or similar solvents.

(1) To get a good clean surface for priming use a clean cloth or piece of cheesecloth and apply one of the solvents noted above. The surface should be wiped dry with a second piece of clean cloth. Do not allow the solvent to dry on the cleaned area as it will redeposit dissolved soil and grime upon evaporation.

CAUTION
Wipe solvents are generally flammable and toxic and should not be used without adequate ventilation and fire precautions.

C. Apply Epoxy-Polymide primer or equivalent to cleaned area by spray or brush. Area needs to be painted within 24 hours of primer coat.

20-00-03 - PAINTING

The exterior is painted with urethane enamel. When exposed to humid salt air or to an atmosphere having corrosive fallout, the aircraft should be hangared when not in use.

1. Paint Repairs.

A. Materials.

(1) Aluminum wool, nylon scouring pads, 320 grit or finer emery cloth or steel wool.

(2) Tack rags.

(3) Wipe solvents such as: Methyl ethyl ketone, T-657 — Turco Products, Inc., #3094 wash thinner — Pratt & Lambert, Inc., lacquer thinner or equivalent solvents.

(4) Body putty or aerodynamic filler such as: Flex-Bond — Taylor & Art Plastics, Flex — 3M Co.,or Cuz polyester body filler #6372 — NAPA (Martin Senour Paints).

(5) Compatible paints for the item (such as steel tubular structure or exterior skin) and for the year and model being repainted. (Refer to Mooney Parts Manual).

(6) Thinners which are compatible with the paints being used both for paint thinning and for burn-down thinners.

B. Cleaning Procedures.

NOTE
Fiberglass components are attacked and deteriorated by products containing the following chemicals: Ketone, aliphatic esters, chlorinated hydrocarbons and slightly softened by aromatic hydrocarbons.

NOTE
Fuel Servicing Decal Removal:
1. Cover the decal with a hot, wet towel for approximately 2 minutes.
2. Lift one corner of the decal and slowly remove.

(1) Remove all old loose paint by one of the following methods:

(a) On aluminum - for uniformity of finish appearance, the entire skin panel should be prepared for repainting. If the paint is in very bad condition or if a filler is to be used, remove all of the paint by use of lacquer thinner, MEK or similar solvent. Careful application of approved paint stripper is acceptable. The solvent should be wiped on and wiped off before it evaporates. If the solvent is allowed to evaporate, it will redeposit the soils and paint that were being carried. Any scouring required should be done at this point. Scouring with nylon pads or aluminum wool may be done dry or wet with one of the wipe solvents listed above. After the old paint, grime, etc. has been loosened and removed, the scoured area should be wiped with a tack rag, and again cleaned with fresh wipe solvent. The part should now be ready for priming and painting.

(b) On steel - Remove all grease, grime, loose paint, etc. by wiping with a wipe solvent and rags. Do not allow the wipe solvent to evaporate. Wipe it dry! Steel parts may be cleaned to bare metal by sanding with emery cloth or steel wool. If the parts are removable, they can be cleaned by sandblasting. Regardless of the scouring method, all parts should be wiped with a tack rag and cleaned with fresh wipe solvent. The part should now be ready for priming and painting.

C. Priming and Painting.

(1) On aluminum - Cleaned and dried surfaces to be painted should be coated with a wash primer conforming to MIL-C-8514 or MIL-P-15328. Read and follow the manufacturer's instructions carefully. The wash primer should be applied to attain a dry film thickness of 0.3 to 0.4 mils (a transparent film).

A good wash primer coating is a must since the top coating can be only as good as the primer coat. As a general rule the wash primer should dry from .05 to 1.5 hours but not more than 2 hours before application of the top or intermediate primer coat. When an intermediate epoxy primer coat is applied, it should be mixed very carefully per the manufacturer's instructions. It should be thinned per manufacturer's instructions and applied to a dry film thickness of 0.8 to 1.0 MILS. The intermediate primer should be allowed to dry a minimum of 0.5 to 1.5 hours depending upon the application temperature and relative humidity. Follow manufacturer's instructions. The intermediate primer coat can be dry-scuffed lightly with No. 400 to No. 600 sandpaper prior to top coat application and give a higher gloss finish. As many coats of paint as desired may be applied. A higher gloss will be attained if the surface is scuffed lightly and tack rage cleaned between each coat.

(2) On steel - The same general procedure used on aluminum can be applied to steel. However, MIL-P-8585 primer or epoxy primer is recommended for the steel coat. If epoxy primer is used, it should have a wash primer (MIL-C-8514) pre-treatment.

D. Painting.

(1) Apply three coats of white base and/or color finish allowing three to five minutes between coats depending upon weather conditions. Allow five to ten minutes between coats in cold, dry weather; in humid weather, allow fifteen minutes between coats.

(2) Use a small round watercolor brush trimmed to a point for application of undiluted touch-up paint to small scratches and bare spots. Do not thin acid resistant black paint or exterior finish touch-up paint for brush-on application.

NOTE

M20J aircraft are painted with Enflex III urethane enamel. Inquiries concerning application of this finish should be directed to: Pratt & Lambert, P.O. Box 2153, Wichita, KS. 67201.

CAUTION

Any flight control surface that is to be repainted should be stripped of all paint prior to repainting. It is required that repainted control surfaces be removed and rebalanced prior to flight per paragraph 27-91-00.

NOTE

Never use abrasive polish compounds or harsh soaps and detergents on urethane finishes. Once the surface gloss is damaged it cannot be restored by polishing.

CHAPTER 21

ENVIRONMENTAL SYSTEMS

CHAPTER 21

ENVIRONMENTAL SYSTEMS

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21-00-00 - CABIN VENTILATION SYSTEM

The cabin environmental system consist of three ventilating systems that supply heated or fresh air as the pilot or passengers prefer. CABIN AIR, CABIN HEAT and OVERHEAD VENTILATION. The cabin air and heat system controls and vents are located on the console between the pilot and co-pilot seats. Individual fresh air outlets are located on each side of the cabin side panels just forward of the pilots and co-pilots knees. The overhead ventilation system consists of individual outlets (Wemac valves) located above each seat position.

S/N 24-0901 & later aircraft have a regulator system with the control knob located above the pilots head. The systems are basically trouble free but inspection should be made at regular intervals to ensure proper operation.

S/N 24-0001 thru 24-0757 aircraft have an overhead airscoop operated by rotating the knob above the pilots seat to extend or retract as desired, to control air flow or to prevent air-buffeting at high cruise speeds. Small overhead vent deflectors, with inner knob volume controls, distribute incoming air as individually desired.

21-40-00 - HEATING

Heat is supplied to the cabin through flexible hoses connected to a heat distribution box assembly and shroud assemblies located on the exhaust manifold on the engine. It is recommended that the condition of these items be checked each time the cowling is removed. This will provide a continuing check for the prevention of carbon monoxide in the cabin. Any deteriorated flexible ducts should be replaced. Heat shrouds should be inspected for cracks or other deteriorations and repaired or replaced promptly. Inspect the exhaust system for any leaks or cracks and replace or repair as needed.

BLANK

CHAPTER 24

ELECTRICAL POWER

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ELECTRICAL POWER

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ELECTRICAL POWER

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24-00-00 - GENERAL

(24-0001 thru 24-2999)

A 14 volt alternator with a transistorized voltage regulator and an overvoltage relay supplies electric power. A 12 volt, 35 ampere-hour storage battery is installed in the tailcone. The alternator, during normal operation, supplies power in conjunction with the battery when the master switch is on. The circuit breaker panel is on the right subpanel. The electrical system is capable of supplying current for simultaneous operation of multiple radios, an anticollision beacon, and navigation lights. A shunt type ammeter mounts in the power plant instrument cluster.

(Similar system-24-3079 thru 24-TBA ,except 28 volts)

(24-3000 thru 24-3078)

A 28 volt, 70 AMP alternator utilizing a transistorized voltage regulator/over voltage control supplies electrical power. A 24 volt, 10 AMP HR storage battery is installed in the tailcone. The alternator, during normal operation, will supply power in conjuction with the battery when the master switch and alternator field switch is ON. The circuit breaker panel is on the right subpanel. The electrical system is capable of supplying current for simultaneous operation of multiple radios, anticollision lights and navigation lights. A shunt type combination gauge gives alternator output and line load in % of rated capacity plus bus voltage.

24-30-00 - D.C. GENERATION

24-31-01 - ALTERNATOR CHARGING SYSTEM MAINTENANCE

1. Alternator System Servicing

(24-0001 thru 24-2999, 24-3079 thru 24-TBA)

When the ammeter shows a discharge at higher engine speeds, a charging system component (alternator, voltage regulator, drive belt, circuit breaker, or wiring) is malfunctioning.

(24-3000 thru 24-3078)

When the loadmeter shows a higher % than the alternator output at higher RPM, a charging system component is malfunctioning.

On-the-plane testing should indicate which component is faulty and needs to be removed from the aircraft for bench testing and repair or replacement.

The alternator charging system requires no special attention; however, improper maintenance procedures can damage the alternator and wiring. There are several precautions that must be observed when servicing the alternator system:

A. Be sure the master switch is OFF when repairing the alternator or voltage regulator.

B. When the battery is removed from the aircraft for charging, be sure that the charger is correctly connected. Use the correct charging rate, refer to battery manufacturers procedures. It is possible to reverse the polarity of a battery by connecting a charger backwards.

C. Be sure to check battery polarity by using a voltmeter prior to reinstallation in the aircraft.

D. Do not leave the master switch ON when the aircraft is parked.

E. Use an auxiliary ground power unit when trouble shooting electrical accessory equipment or when performing electrical landing gear maintenance and retraction system testing.

2. Alternator System Inspection.

A. Check alternator circuit breaker on the main circuit breaker panel. Reset breaker if open.

B. Check alternator field circuit breaker on main circuit breaker panel. Reset if open.

C. Inspect battery for corroded cable connections; remove and clean cable if corrosion is found.

D. Check drive belt for proper tension and excessive glazing.

E. Check charging system wiring connectors to be sure they are clean and tight.

F. Inspect alternator, voltage regulator, and wiring for damage.

CAUTION

Do not attempt to polarize alternator. Alternator is polarized every time master switch is turned on.

3. Alternator Removal and Installation.

A. Alternator Removal.

(1) Turn master switch **OFF** before disconnecting alternator wiring.

(2) Remove attaching hardware and slip drive belt from pulley.

NOTE

If replacement alternator has a cooling fan or a blast tube housing, they MUST BE REMOVED prior to installation. Replace cooling fan with Lycoming spacer (LW-15403) which was already on alternator when aircraft was delivered from Mooney. Reinstall pulley after spacer is installed and torque pulley retaining nut to 35-40 ft. lbs.

B. Alternator Installation.

(1) Be sure master switch is turned **OFF**. Do not turn master switch **ON** until all wiring connections have been secured.

(2) Install attaching hardware; place drive belt on pulley and adjust belt tension.

(3) Connect alternator wiring and check wiring connectors throughout system.

CAUTION

Do not attempt to polarize alternator. Alternator is polarized every time master switch is turned on.

24-31-02 - VOLTAGE REGULATOR MAINTENANCE

The battery charging rate depends upon the battery condition and the voltage regulator setting. With all equipment turned off and the engine running at 2000 RPM or faster, the normal battery charging rate will be 5 to 35 amperes.

1. Excessively High Charging Rate. Check the following:

A. Fly aircraft for 15 to 20 minutes; charging rate should slowly drop to 10 amperes or less. A very low battery will take longer to show a drop in charging current.

B. Measure voltage with a voltmeter connected to the bus. At 80 degree F., voltage should be 13.75 to 14.0. An excessively high voltage regulator setting will cause excessive battery heating and water loss.

2. Excessively Low Charging Rate. Check battery charging rate (normal rate is not to exceed four amperes). The regulator should not be considered defective because of a low charging rate until:

A. A voltmeter check indicates that voltage at the bus is below requirements.

B. A battery hydrometer check indicates that battery is not fully charged.

3. Hydrometer Reading. If battery electrolyte temperature is below 80 degree F., subtract four points from hydrometer reading for every 10 degrees F. below 80 degrees F. If battery acid temperature is above 80 degrees F., add four points to hydrometer reading for every 10 degrees F. above 80 degrees F. Example:

Hydrometer reading = 1.260
Battery electrolyte temperature = 30 degree F.
80 degrees - 30 degrees = 50 degrees
5 x 4 = 20 points
Corrected reading 1.260 - 20 = 1.240

HYDROMETER READING	PERCENT OF CHARGE
1.280	100
1.250	75
1.220	50
1.190	25
1.130 or below	Very little useful capacity—Discharged.

"HI" or Overvolt Adjustment at Regulator - Bench Adjustment. (Electro-Delta)
Connect a variable voltage power supply to the regulator, positive (+) to pin "A" or "1" and negative to pin "C" or "3" (24-0001 thru 24- 2999); positive to pin 5 & negative to pin 9 for (24-3000 thru 24-TBA). Connect a voltmeter to the regulator (+) to pin "D" or "4" and (-) to pin "C" or "3" (24-0001 thru 24-2999); (pin 6 and pin 9 for 24-3000 thru 24- TBA). Adjust voltage to 16 volts +/- .1 volt (24-0001 thru 24-2999);(28.7 volts for 24-3000 thru 24-TBA). Adjust trim pot (accessable through hole in case marked "OV") to relay trip point as indicated by voltage indication on test voltmeter. Decrease voltage until relay closes and note voltage. Readjust as necessary until a trip point of 16 +/- .1 volts is attained(24-0001 thru 24-2999); 31.6 (+/-).3 volts for 24-3000 thru 24-TBA).

Regulator Adjustment (Electro-Delta)
Connect an accurate voltmeter to the aircraft bus. Turn off all electrical equipment and start engine. Run engine at moderate RPM (1500-1800) until ammeter drops to low charge rate. Increase RPM to 2000 and adjust trim pot (accessable through hole in case marked "REG") for a voltage reading of between 13.75 and 14.0 volts (24-0001 thru 24-2999);(28.6 and 28.8 volts for 24-3000 thru 24-TBA). Increase throttle to full RPM and observe that voltage does not exceed 14 volts (24-0001 thru 24-2999);(30 volts for 24-3000 thru 24-TBA).

Low Voltage Warning should occur on Annunciator at approximately 12.5/12.75 Volt output from regulator. Electro-Delta Volt. Reg. are adjustable for HI & LOW volts.

NOTE
Use bushings provided with replacement VR-415F voltage regulator to mount in location of old regulators.

NOTE
No field adjustment authorized for Mooney Voltage regulators. Max. voltage for 14 volt system is 14.2+.2/-0. — 28 volt system is 28.3 +.2/-0.

24-31-03 - AUXILIARY POWER SYSTEM

An auxiliary power plug and related circuitry is installed to provide an outside source of electrical power to the aircraft, to charge the battery, or to start the engine. The Auxiliary Power Plug guide pin must have A+ voltage connected to it in order to activate the Auxiliary Power Relay. The battery can be charged using the approved Auxiliary Power Cable connected to a charge cart capable of regulating the charging current. To prevent battery damage, the charging current should be low (3 - 4 amps) to begin and then increased as the battery voltage capacity is increased. The MASTER SWITCH is not required to be ON for the auxiliary power source to charge the battery.

A. When auxiliary power or a booster battery is used, be sure cables are connected correctly—positive to positive and negative to negative. DO NOT by-pass battery when using an auxiliary power source.

B. See paragraph 24-34-00, A for additional information.

NOTE
It is recommended that the approved Auxiliary Power Cable be connected to boostor battery, then the plug inserted into auxiliary power receptacle.

24-32-00 - BATTERY MAINTENANCE

CAUTION
Battery gases are explosive.

1. Battery Removal.

A. Turn master switch off.

B. Remove tailcone access cover and battery box lid.

C. Disconnect battery cables, negative lead first, remove battery from aircraft.

D. Install battery in reverse sequence of removal. Use a voltmeter to check battery polarity before installation.

2. Battery Cleaning and Corrosion Removal.

A. Mix one pound of baking soda in one gallon of water.

B. Wash battery box and flush battery with the mixture. Do not allow soda water to enter battery cells; permanent damage will result if soda mixes with electrolyte.

C. Rinse thoroughly with clear water and dry the area.

D. Test each cell with a temperature corrected hydrometer. Specific gravity should be 1.265 to 1.280 for a fully charged battery.

E. Check electrolyte level and maintain at split ring.

F. Clean battery terminals with emery cloth, reinstall and tighten cables. Coat terminals and connectors with petroleum jelly to retard corrosion.

24-33-00 - WARNING CIRCUITS

1. Landing gear position lights and warning horn. RED and GREEN landing gear position lights are in the annunciator panel. The gear-down limit switch controls the GREEN gear-down light. Both limit switches control the RED gear unsafe light. The throttle control operates landing gear warning horn (intermittent tone) when the power setting is reduced below 10 IN. Hg. with the gear up. Check gear warning system during flight for proper operation.

2. Prestall Warning Circuit. The prestall warning horn has a high frequency continuous tone that sounds when airspeed drops to 5 to 10 MPH IAS (4.3 to 8.7 KIAS) above stalling speed. A vane in the left wing leading edge actuates the prestall warning horn switch. (This vane is made of heat treated steel, and any attempt to adjust switch operation by bending the vane will damage the switch). Refer to Section 27-93-00 for adjustment procedures.

3. High and Low Vacuum Warning Circuit. A switch in the vacuum system controls the vacuum warning light on the instrument panel or annunciator panel. Vacuum below 4.25 IN. Hg causes the vacuum warning light to flash. Vacuum above 5.5 IN. Hg. trips the high-vacuum switch causing the vacuum warning light to illuminate steadily. (S/N 24-0001 thru 24-0083 and 24-0085 thru 24-0377 have a vacuum gauge mounted above the radio panel).

4. Low Fuel Warning Circuit. The low fuel indicators will illuminate when a minimum of 2 1/2 gallons usable fuel remains in either left or right hand tank. When it becomes necessary to replace the annunciator panel for any reason other than "low fuel" warning malfunction, the following procedure should be used to set the "low fuel" warning circuits. The calibration transfer standard, I.A.I. P/N 500D0045 (24-0001 thru 24-3153) or I.A.I. P/N 9500324000 (24-3154 thru 24-TBA) is required for this procedure. Adapters can be ordered through Mooney Marketing or Service Centers.

A. Calibration Procedures using I.A.I. P/N 500D0045 or P/N 9500324000.

(1) Remove glareshield, disconnect plug from rear of annunciator, remove annunciator front panel, and place "Norm-Cal" switch in "Cal" position.

(2) Plug appropriate calibration transfer standard on rear of old annunciator and reconnect harness plug.

(3) Turn on master switch and turn right hand variable resistor on transfer standard slowly counter clockwise until right "low fuel" light just turns on. (If necessary turn variable resistor clockwise to extinguish "low fuel" light). (Do not adjust annunciator calibration screws). Repeat for left "low fuel".

(4) Turn off master switch and remove old annunciator assembly after disconnection of harness and transfer standard unit.

(5) Install new annunciator and connect calibration transfer standard to annunciator panel and harness plug. Remove front plate and legend on new annunciator panel to expose the Norm-Cal switch and the Left and Right trim potentiometers. (Switch must be in "Cal" position).

(6) Adjust left and right annunciator fuel calibration screws clockwise (not the adapter variable resistors) until "low fuel" lights just turn on. (If necessary turn annunciator calibration screw counter clockwise to extinguish "low fuel" light).

(7) Remove calibration transfer standard, reconnect plug to annunciator panel, set switch to "Normal" position, install annunciator front panel and install glareshield.

B. Alternate method for calibration without I.A.I. unit.

If calibration transfer standard, P/N 500D0045 or 9500324000, is not available use the following method to calibrate "low fuel" warning:

(1) Remove glareshield and remove annunciator assembly.

(2) Install and connect new annunciator assembly leaving off front panel. (Set switch to "Cal").

(3) Drain fuel from tanks and replace with unusable fuel plus 2 1/2 gallons in both tanks.

(4) Turn on master switch and adjust calibration pots to position where "low fuel" lamps just turn on for left and right tanks.

(5) Turn OFF master switch, set annunciator "Cal" switch to "Norm" position, install annunciator front and install glareshield.

(6) Refuel aircraft.

5. RAM Air Light Warning Circuit - Annunciator Panel.

The light illuminates on the annunciator panel when the RAM air door is open and the gear is extended.

6. Hi/Low Voltage Warning Circuit - Annunciator Panel. Remove annunciator top cover. Connect a voltmeter to the aircraft bus. Start engine and run at idle. Add load to bus until "Low Volt" light starts to flash. Adjust RPM to obtain a bus voltage of 12.5 volts (24-0001 thru 24-2999); 26.5 volts (24-3000 thru 24-TBA). Adjust trim pot (located at center, rear of circuit board till flashing light just comes on.

NOTE

It may be necessary to adjust trim pot to turn out light at 12.5 volts (24-0001 thru 24-2999); 26.5 volts (24-3000 thru 24-TBA) first. Increase RPM until light goes out and note voltage. Decrease RPM until light flashes on and note voltage. Light should come on at a voltage between 12.4 and 12.6 volts (24-0001 thru 24-2999); 26.4 to 26.6 volts (24-3000 thru 24-TBA).

24-34-00 - POWER PLANT CIRCUITS

1. Starter-Ignition Circuit. The starter-ignition switch has five positions; OFF, R (right), L (left), BOTH, and START. In the OFF position both magnetos are grounded. At the R position the left magneto grounds. At the L position the right magneto grounds. At the BOTH position both magnetos are HOT and the ignition system is ON. Turning the ignition switch to start and pushing in, closes the starter solenoid, engages the starter and allows the impulse coupling to automatically retard the magneto until the engine is also at its retard firing position. The spring action of the impulse coupling is then released to spin the rotating magnet and produce the spark to fire the engine. After the engine starts, the impulse coupling flyweights do not engage due to centrifugal action. The coupling then acts as a straight drive and the magneto fires at the normal firing position of the engine. The starter-ignition switch is spring loaded to return from START to the BOTH position when released.

CAUTION

Do not operate the starter in excess of 15 seconds or re-engage the starter without allowing it time to cool.

A. Low Battery starting procedures

Batteries that have been discharged to the point where they will not turn the engine but have sufficient power remaining for other equipment; should NOT be jumped with another power source for two major reasons:

(1) The discharged aircraft battery is not airworthy because it will not have the necessary reserve capacity required to operate the aircraft electrical system and avionics in the event of the failure of the generating system during flight.

(2) Active material on the positive plate expands when the battery is discharged and the fast recharge from the higher potential source, battery, alternator, generator, rectifier, etc.. will severly damage the battery and will result in premature battery failure. A slow charge is recommended prior to flight.

WARNING

Do not turn the propeller when the magnetos are not grounded. Ground the magneto points before removing switch wires or electrical connectors. All spark plug leads can be removed as an alternate safety measure.

2. Oil and Cylinder Head Temperature Gauge Circuits. Both the oil and cylinder head temperature indicators operate electrically. The oil temperature gauge circuit has a resistance bulb in the oil sump. Changes in resistance caused by changes in oil temperature alter current flow rate, thereby varying the magnetic field in the indicator coils. The cylinder head temperature indicator connects to a tip sensitive resistance bulb in a cylinder head. Increase or decrease in temperature causes an increase or decrease in bulb resistance, varying the magnetic field in the indicator coils.

3. Fuel Pressure Gauge. The Fuel Pressure Gauge is an electrically operated gauge located in the cluster. The Manifold Pressure Gauge is a simple direct reading instrument.

4. Exhaust Gas Temperature Indicator. Exhaust Gas Temperature Gauge is combined with the Outside Air Temperature Gauge in a single instrument.

5. The oil pressure instrument circuit contains an electrical instrument used as a reference, and a transducer which varies resistance with pressure.

6. Fuel Flow (if installed) is indicated on either an electrical instrument using a pressure transducer which varies resistance with pressure or with an electrical instrument which counts electrical pulses produced by a turbine flow transducer.

24-35-00 - LIGHTING CIRCUITS

1. Navigation Lights. A circuit breaker switch on the flight panel controls navigation lights. GEAR DN, GREEN, annunciator light is dimmed when navigation lights are ON.

2. Landing Light. A circuit breaker switch on flight panel controls landing light in the lower engine nacelle on S/N 24-0001 thru 24-3153.

Landing/Taxi Lights. S/N 24-3154 thru 24-TBA uses a split switch on Flight panel to control wing mounted lights.

3. Cabin Lights. A three-position (Bright, Off, Dim) rocker switch adjacent to door, in headliner, controls cabin lights.

CAUTION

On S/N 24-0001 thru 24-3153 this light switch is connected directly to battery. The switch MUST BE TURNED OFF to keep from discharging battery.

Aircraft 24-3154 thru 24-3200 may have a door switch/timer mechanism that illuminate forward set of interior lights while cabin door is open. After door is closed, if rocker switch is left ON, forward interior lights will remain ON for approximately 2 minutes.
The rocker switch is connected through MASTER Switch on these aircraft and forward interior lights will go OFF when MASTER switch is turned OFF if door is closed.

4. Anti-Collision Lights. A circuit breaker switch controls the white anti-collision strobe lights.

5. Instrument and Radio Lights. Rheostats control the glareshield, and radio lights. The flight panel instrument light rheostat controls the compass light. Lighting loads are controlled by transistors biased with manually controlled rheostats. The transistors can be checked by the following methods:

A. Connect ohmeter between the emitter and the collector; should be infinite ohms.

B. Short base to collector; should be a direct short, zero ohms.

NOTE

If readings are incorrect reverse the loads.

CAUTION

Care must be exercised to prevent shorting light wires when installing or replacing instruments. Shorted wires will cause blown fuses or burned out transistors in the control box.

6. Baggage Compartment Lights. A three-position (Bright, Off, Dim) rocker switch in headliner controls this dome light

CAUTION

On 24-0001 thru 24-3153 this light switch is connected directly to battery. The switch MUST BE TURNED OFF to keep from discharging battery.

Aircraft 24-3154 thru 24-3200 may have a door switch/timer mechanism that illuminate aft set of interior lights while baggage door is open. After door is closed, if rocker switch is left ON, aft interior lights will remain ON for approximately 2 minutes.
The rocker switch is connected through MASTER Switch on these aircraft and aft interior lights will go OFF when MASTER switch is turned OFF if door is closed.

7. Map Light. A push button switch on top of control wheel center section controls map light. Co-pilots map light is optional.

24-36-00 - LANDING GEAR CIRCUITS

1. Limit switches and relays operate the landing gear actuator, a reversible motor [14 volt DC (S/N 24-0001 thru 24-2999) or 28 volt DC (S/N 24-3000 thru 24-TBA)]. A landing gear safety system, actuated by a pitot air pressure switch or a squat switch (24-0001 thru 24-0237) prevents landing gear retraction until safe flying speed is attained.

The landing gear control switch operates actuator motor through one of these safety switches and relays. When landing gear control switch is UP and safe flying speed has been attained, the safety switch closes to activate the control relay, starting the actuator. As the gear reaches the up and locked position, a mechanical stop opens limit switch and the actuator stops. When landing gear control switch is placed in down position, the gear motor down-relay closes and actuator starts. When gear reaches down-and-locked position, the mechanical stop opens limit switch and actuator stops. Later models have a red light for gear unsafe; no lights illuminate when gear is up. See Section 32 for squat switch information.

2. Gear Safety By-Pass Switch. Gear will not retract if airspeed above set limit has not been attained when gear handle is placed in UP position. Warning horn will sound and both "GEAR DOWN" and " GEAR UNSFE" lights will illuminate PUSH and HOLD red button switch beside landing gear handle until gear is UP and both lights go out. Pull circuit breaker "GEAR CONT" or "GEAR RELAY" to stop warning horn. Reset circuit breaker prior to extending gear.

24-37-00 - FUEL SYSTEM CIRCUITS

The fuel system has an electric auxiliary fuel pump. The fuel quantity indicating system is comprised of two transmitters in each fuel tank and two fuel quantity gauges on instrument panel.

1. Fuel Pump Circuits. A single auxiliary fuel pump is controlled by a switch located on the instrument panel.

2. Fuel Quantity Gauge Circuits. Fuel level changes vary fuel quantity transmitter resistance that operates fuel quantity gauges. Master Switch activates fuel quantity indicating system. Refer to Section 28-43-00 for Adjustment Procedures.

24-38-00 - MISCELLANEOUS CIRCUITS.

1. Turn Coordinator Circuit. The turn coordinator is a flight instrument which operates from an electrical power source.

2. Heated Pitot Tube. A circuit breaker switch controls the pitot tube heater.

3. Hour Meter (Optional). The hour meter operates directly from the alternator "Aux." terminal through a fused wire. S/N 24-1418 and later models hour meter operates from the electric tachometer. A Hobbs meter may be installed as an option.

4. Cigar Lighter. A cigar lighter is mounted in the right instrument panel.

24-39-00 - TROUBLE SHOOTING CHARTS

24-39-01 - ALTERNATOR TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Alternator overcharges battery; battery uses excessive water.	Regulator faulty.	Check bus voltage with engine running. Observe aircraft ammeter. Ammeter should indicate near zero after ten minutes of engine operation. Replace voltage regulator if defective.
ALT FIELD circuit breaker trips.	Circuit shorted in wiring.	Disconnect lead from pin A or 1 of regulator,* and reset circuit breaker. If circuit breaker trips, check wiring. Repair as required. If breaker does not trip, replace regulator. Reconnect lead to regulator. Set MASTER switch to ON and check for 12V at pin A or 1 of regulator.** Repair wiring if no voltage is present.

*(24-0001 thru 24-2999); Pin 5 for 24-3000 THRU 24-TBA.

**(24-0001 thru 24-2999); Set alternator field & Master switch to ON & check for 24 volts at Pin 5 of regulator for S/N (24-3000 thru 24-TBA).

ALT circuit breaker trips.	Short circuit in wiring.	Disconnect lead from + post of alternator, and reset ALT circuit breaker. If circuit breaker trips, check wiring between alternator and circuit breaker.
	Short circuit in alternator.	Reconnect lead to + post of alternator. **WARNING: ENSURE THAT MAGNETO SWITCH IS OFF WHEN TURNING PROPELLER.** Rotate propeller by hand to rotate alternator through 360 degrees of travel. If circuit breaker trips replace alternator.
Alternator will not keep battery charged.	Battery malfunction.	1. Start engine and adjust for 1500 RPM. Ammeter should indicate a heavy charge rate with all electrical equipment turned off. Rate should taper off in 1 - 3 minutes. A voltage check at the bus should indicate a reading of 13.75 to 14.0 volts. ***If charge rate tapers off very quickly and voltage is normal, check battery for malfunction.

***24-0001 thru 24-2999; 28.6 to 28.8 volts for 24-3000 thru 24-TBA.

If ammeter shows a low charge rate or any discharge rate, and voltage is low, proceed to step 3.

TROUBLE (cont.)	PROBABLE CAUSE	REMEDY
	Defective wiring.	2. Check voltage at A or 1 terminal of regulator with master switch ON.**** Meter should indicate bus voltage. If voltage is not present, check wiring between regulator and bus.
	Regulator faulty.	3. Remove connector from regulator and start engine. Momentarily jump A & B or 1 and 2 pins***** together on the plug. Aircraft ammeter should show heavy rate of charge. If heavy charge rate is observed, replace regulator. If heavy rate is not observed, proceed to step 5.

****24-0001 thru 24-2999;
...@ terminal 5 for 24-3000 thru 24-TBA, with Alt. Fld. & Master switch ON.

*****24-0001 thru 24-2999; pins 5 & 7 for 24-3000 & ON

CAUTION: Pull alternator field C/B. Start engine; while at idle RPM reset C/B. Slowly increase RPM while monitoring bus voltage. DO NOT EXCEED 14 volts for 24-0001 - 24-2999; or 28 volts for 24-3000 thru 24-TBA.

	Defective wiring regulator to alternator.	4. Check resistance from F2 terminal + of alternator to pin B or 2 ++ of reg. plug. Normal indication is a very low resistance. If reading indicates no, or poor continuity, repair or replace wiring from regulator to alternator.
	Defective alternator.	5. Check resistance from F2 to F1 term.+++ of alternator. Normal indication is 3 - 4 ohms. If resistance is high or low, repair or replace alternator.
		6. Check resistance from F2 terminal of alternator to alternator case. Normal indication is high. If resistance is low, repair or replace alternator. (24-0001 thru 24-2999)

+ 24-0001 thru 24-2999, field terminal for 24-3000 thru 24-TBA
++ 24-0001 thru 24-2999; Pin 7 on 24-3000 thru 24-TBA

+++ 24-0001 thru 24-2999; case to field on 24-3000 thru 24-TBA

24-39-02 - RESERVED

24-39-03 - BATTERY TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Discharged battery.	Battery worn out.	Replace battery.
	Improper charging rate setting.	Reset charging rate.
	Excessive discharging.	Turn off some equipment when alternator is not charging. Decrease starter usage by using external power whenever possible.
	Standing too long.	Remove and recharge battery.
	Equipment accidentally left on.	Remove and recharge battery.
	Impure electrolyte.	Replace battery.
	Short circuit (ground) in wiring.	Check wiring.
	Low charging rate.	Adjust voltage regulator.
Cracked cell jars.	Loose hold-down bracket.	Replace battery and secure firmly.
	Frozen battery.	Replace battery.
Compound on top of battery melts.	Charging rate too high.	Reduce charging rate by adjusting voltage regulator.
Electrolyte runs out of vent plugs.	Too much water added to battery and charging rate too high.	Drain battery and keep at proper level; adjust voltage regulator.
Excessive corrosion inside container.	Spillage from overfilling.	Flush container with baking soda solution.
	Leaking or clogged vent lines.	Repair or clean vent lines.
	Charging rate too high.	Adjust voltage regulator.
Battery freezes.	Discharged battery.	Replace battery.
	Water added and battery not charged	Always recharge battery for 1/2 hour following addition of water in freezing weather.
Leaking battery case.	Frozen electrolyte.	Replace battery.
Reversed battery polarity.	Cables connected backwards on battery or charger.	Battery should be slowly discharged completely, then charged correctly and tested.
Excessive water consumption in all cells.	Charging rate too high.	Correct charging rate.
Excessive water consumption in one cell only.	Cracked jar.	Replace battery.

24-39-04 - STARTER TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Motor fails to operate.	Low battery.	Check and recharge battery if necessary.
	Defective, improper, or loose wire connections.	Refer to electrical wiring diagram and check all wiring.
	Binding, worn, or improperly seated brushes; brushes have excessive side play.	Brushes should fit free in brush boxes without excessive side play. Clean brushes and brush boxes with varsol moistened cloth. New brushes should be run-in until at least 50 percent seated; however, if facilities are not available for running in brushes, seat brush by inserting strip of No. 0000 sandpaper between brush and commutator with sanded side next to brush. Pull sandpaper in direction of rotation, being careful to keep it in same contours as commutator.
	Dirty commutator	If commutator is rough or dirty, smooth and polish with No. 0000 sandpaper. If too rough and pitted, remove commutator and turn on lathe. Blow out all foreign material.
CAUTION: Do not use coarse sand-paper or emery cloth. After seating, thoroughly clean brushes and commutator to prevent excessive wear. Keep motor bearing free from sand or metal particles.	Shorted, grounded, or open armature.	Remove and replace with an armature known to be in good working order.
	Grounded or open field circuit.	Test and repair circuit if possible or replace with new parts.
	Defective master switch or circuit.	Check and repair.
	Defective solenoid switch.	Check and repair.
	Defective starter.	Remove and repair or replace.
Slow cranking speed.	Worn, rough, or improperly lubricated motor or starter.	Disassemble, clean, inspect & relubricate components, replace ball bearing if worn.
	Same causes as listed with "Motor fails to operate."	Same remedies.
Starter motor runs but will not crank engine.	Damaged pinion gear or crankshaft gear.	Remove and replace
	Dirty starter drive.	Clean and lubricate with graphite & kerosene.
Starter drags.	Low battery charge.	Check and recharge.
	Relay or solenoid contacts burned or dirty.	Remove and replace.
	Defective power cable.	Remove and replace.
	Worn or dirty commutator.	Turn down commutator.
Excessive motor brush arcing.	Binding, worn, or improperly seated brush or brushes have excessive side play.	Repair as outlined above.
	Dirty, rough, pitted, or scored commutator.	Clean as outlined.

- STARTER TROUBLE SHOOTING (con't.)

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive motor brush wear / arcing.	Rough or scored commutator	Remove and turn down commutator on lathe.
	Armature assembly not concentric.	Reface commutator.
Noisy starter.	Worn starter drive pinion.	Remove and replace starter drive.
	Worn or broken teeth on crankshaft gear.	Check teeth and replace gear if damaged.

24-30-05 - ANNUNCIATOR TROUBLE SHOOTING (24-0001 thru 24-3153)

The following is a brief failure/cause analysis which pertains to the annunciator (IAI P/N 500D0061) on the Mooney M20J. Each cause is listed in probable order. All designator references are made from IAI drawings 710D0125A, 900D0134 and 900D0135.

1. The "gear-down" lamp will not light during "TEST" but will light with the gear-down.
   CR1 (Assy A2) open
2. The "gear-down" lamp will not light during "TEST" or with the landing gear-down.
   Filament of DS1 (Assy A2) open
3. The "gear-down" lamp is dim when the position lights are off.
   CR24 (Assy A1) open
4. The "gear-unsafe" lamp will not light during "TEST" but does light when the gear is in transit.
   CR3 (Assy A2) open
5. The "gear-unsafe" lamp will light during "TEST" but not when gear is in transit.
   CR2 (Assy A2) open
6. The "gear-unsafe" lamp will not light during "TEST" or when the gear is in transit.
   Filament of DS2 (Assy A2) open
   CR2 (Assy A2) and CR3 (Assy A2) open
7. The "left low fuel" lamp will not light during "TEST" or in a left low fuel situation.
   Filament of DS3 (Assy A2) open
   Q2 (Assy A1) defective
   U1 (Assy A1) defective
   Wire from P1-7 (Assy A1) to left fuel gauge open
8. The "left low fuel" channel functions properly but the lamp is always dim.
   CR22 (Assy A2) open
9. The "left low fuel" lamp flickers on and off.
   Switch S1 (Assy A1) is in the "Cal" position instead of the "NORM" position.
   Intermittent ground on the wire from P1-7 (Assy A1) to the left fuel gauge.
   C2 (Assy A1) defective
10. The "left low fuel" will not light during "TEST" only when the left fuel tank is full.
    R10 (Assy A1) should be replaced with a 47K, 1/4 watt, 5% resistor
11. The "right low fuel" lamp will not light during "TEST" or in a right low fuel situation.
    Filament of DS4 (Assy A2) open
    Q6 (Assy A1) defective
    U1 defective
    The wire from P1-8 to the right fuel gauge is open
12. The "right low fuel" channel functions properly but the lamp is always dim.
    CR23 (Assy A2) open
13. The "right low fuel" lamp flickers on and off during flight.
    S1 (Assy A1) is in the "Cal" position instead of the "Norm" position
    An intermittent ground on the wire from P1-8 (Assy A1) to the gauge
    C3 (Assy A1) defective
14. The "right low fuel" will not light during "TEST only when the right fuel tank is full.
    R10 (Assy A1) should be replaced with a 47K, 1/4 watt, 5% resistor
15. The "right low fuel" or the "left low fuel" lamps light before a low fuel situation has occured.
    Recalibrate the appropriate channel CR1 (Assy A1) open.

- ANNUNCIATOR TROUBLE SHOOTING (24-0001 thru 24-3163) (con't.)

16. Both the "left low fuel" and the "right low fuel" channels stay dim when they annunciate a low fuel situation or during "TEST".
    - Q3 (Assy A1) defective
    - Q5 (Assy A1) defective
    - U2 (Assy A1) defective
    - Q4 (Assy A1) defective
    - CR22 (Assy A1) and CR23 (Assy A1) open
17. Neither the "left low fuel" nor the "right low fuel" lights during "TEST".
    - CR1 (Assy A1) shorted
    - U1 (Assy A1) defective
18. The "high low vac" lamp will not light during "TEST" but does annunciate a high or low vacuum situation.
    - CR14 (Assy A1) open
19. The "high low vac" lamp will not light during "TEST" or in a high or low vacuum situation.
    - Filament of DS5 (Assy A2) open
    - Q7 (Assy A1) defective
20. The "high low vac" lamp will not light in a low vacuum situation but does light in a high vacuum situation.
    - Q8 (Assy A1) defective
    - CR12 and/or CR13 (Assy A1) open
21. In a low vacuum situation the "high low vac" lamp lights but does not flash.
    - CR16 (Assy A1) open
    - Q6 (Assy A1) defective
    - U2 (Assy A1) defective
    - CR1 (Assy A1) shorted
22. The "high low volts" lamp will not light during "TEST" or in a high or low voltage situation.
    - Filament of DS6 (Assy A2) open
    - Q10 (Assy A1) defective
    - Q9 (Assy A1) defective
23. The "high low volts" lamp will not "TEST" but does annunciate a low or high voltage situation.
    - CR20 (Assy A1) open
24. The "high low volts" lamp lights but does not flash in a low voltage situation.
    - CR17 (Assy A1) open
    - Q8 (Assy A1) defective
    - U2 (Assy A1) defective
25. The "high low volts" lamp will not light in a over voltage situation.
    - CR21 (Assy A1) open
26. The "high low volts" lamp flashes before a low voltage situation has occured.
    - R60 (Assy A1) out of calibration
    - U2 (Assy A1) defective
    - CR1 (Assy A1) open
27. The "high low volt" will not light in a low voltage situation.
    - R60 (Assy A1) out of calibration
    - U2 (Assy A1) defective
    - CR19 (Assy A1) open
    - Q8 (Assy A1) defective
    - CR1 (Assy A1) shorted
28. The "RAM air" will not light during "TEST" or in normal operation.
    - Filament of DS8 (Assy A2) open
    - CR6 and CR7 (Assy A2) open
29. The "RAM air" will not light during "TEST" but does in normal operation.
    - CR7 (Assy A2) open
30. The "RAM air" will light during "TEST" but not during normal operation.
    - CR6 (Assy A2) open
31. The "START POWER ON" light does not illuminate when "TEST" switch is pushed.
    - This is normal operation; all circuits OK.
32. Once dimmed the "low fuels" cannot be reset to bright by momentarily depressing the "TEST" switch.
    - CR11 (Assy A1) open.

- ANNUNCIATOR TROUBLE SHOOTING (24-0001 THRU 24-3153) (cont'd.)

33. Neither the "high low vac" or the "high low volts" will flash when low vacuum and/or low voltage occurs.
    Q8 (Assy A1) defective
    U2 (Assy A1) defective
    CR1 (Assy A1) not suppling +5 VDC
    C5 (Assy A1) defective

24-39-06 ANNUNCIATOR TROUBLE SHOOTING (24-3154 thru 24-TBA)

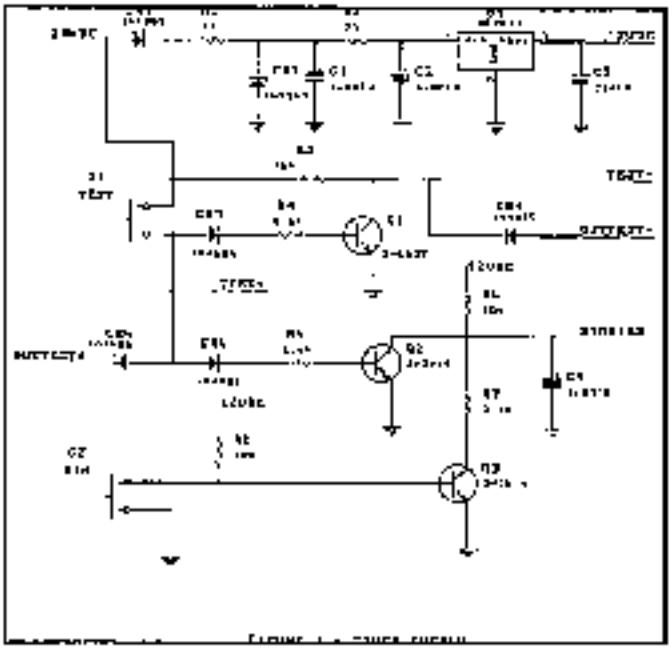
The following is a brief operational analysis which pertains to the I.A.I. annunciator on the Mooney M20J S/N 24-3154 thru 24-TBA..

1.0 GENERAL

This document is intended to be a guide to assist a service technician in understanding the theory and operation of International Avionics, Inc. (IAI) Part Numbers, 9500326000 & 9500326001 annunciators. It is not intended to serve as a bench service aid in that reference designators in various Figures are not consistent with those found in actual annunciators. Service literature is available from International Avionics, Incorporated (IAI), 1611 N. I-35, Suite 428, Carrollton, TX 75006, telephone number (214) 446-1165, to identify location of a particular component and exact manner in which components are interconnected.

The following sections address nine (9) basic circuits which, used singularly or in multiple combinations, comprise the annunciators. These sections are as follows:

Section 2	Power Supply, with Test and Dim Switches
Section 3	Flasher
Section 4	Landing Gear Indicators
Section 5	Left and Right Low Fuel
Section 6	Hi/Lo Vac
Section 7	Alternator/Low Volts/Over Volt
Section 8	NOT USED
Section 9	Typical Positive Apply W/Dim
Section 10	Typical Positive Apply W/O/Dim.



2.0 POWER SUPPLY

The Power Supply, shown in Figure 1, provides 12 VDC, reverse voltage protection by means of CR1, spike and overvoltage filtering by means of the low pass network of R1, R2, C1 and C2 with spike clamping provided by CR2. The actual power supply is a 12 VDC, integrated circuit regulator. Output filtering is provided by C2. The Test Switch, S1, switches unfiltered aircraft 28 VDC to the internal test line, identified with the mnemonic TEST+. This signal, diode isolated by CR5, is also supplied as OUTTEST+. Additionally TEST+ is applied to the inverter to supply the internal test line, TEST-, and the diode isolated OUTTEST-. The dimmer circuit, applicable to certain channels, requires a bias source, DIMBIAS, with a magnitude of 12 VDC to dim the applicable ACTIVE channels, approximately 3 VDC to maintain the dim level of those channels previously dimmed, and near 0 VDC to reset the dimmed channels to a bright condition. The channels having the capability of being dimmed by the above circuitry are channels x, x, x, x, x, x, and x. Channel 1, Landing Gear, dims by means of a separate circuit and is discussed in Section 4.0 below. With both the Dim Switch and Test Switch relaxed, transistor Q3 is in saturation and Q2 is off, giving DIMBIAS a value of approximately 9 VDC. When the Dim Switch is depressed Q3 comes out of saturation and DIMBIAS rises to 12 VDC, and when the Test Switch is depressed Q2 saturates and DIMBIAS drops to near 0 VDC. In the event that both switches are depressed simultaneously, the 0 VDC value of DIMBIAS will prevail and the dimmed channels, with the exception of Channel 1, are reset to a bright condition.

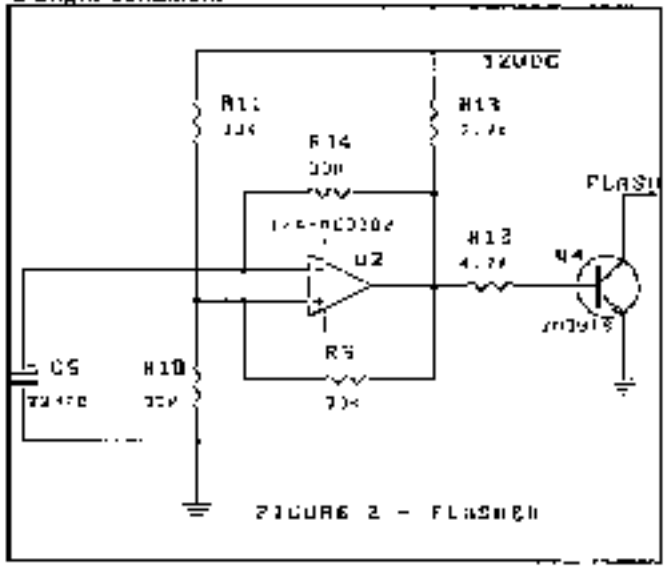


FIGURE 2 - FLASHER

3.0 FLASHER

The Flasher, shown in Figure 2, provides the circuit to flash the outputs of the left and right alternator warnings, the low voltage warning and the low vacuum warning. The flasher consists of an astable oscillator driving an NPN common emitter connected transistor, Q4. This allows the open collector of Q4, identified as FLASH, to sink the drive from the output amplifiers of the appropriate warning channels.

4.0 LANDING GEAR INDICATORS

The Landing Gear Indicators, shown in Figure 3, provide the status of the landing gear position, that is, whether the landing gear is Down or not and whether the landing gear is safe or unsafe, unsafe being in transit. The circuit shown is the identical circuit that has been used for many years in the IAI annunciators used on Mooney aircraft. The GEAR DOWN channel is dimmed for night operation; however, in the interest of reliability, the dimming circuit is separate from the dimming technique used on the other dimmed channels. The gear down signal, +28 VDC, is applied through isolation diode CR7, to the INPOS1 input and CH1RET is returned to the Nav Light bus. When +28 VDC is applied to INPOS1 and the Nav Lights are off, the impedance of this point is very low due to the low filament resistance of the Nav Light bulbs, and GEAR DOWN illuminates at near full brilliance. When the Nav Lights are on, however, CH1RET is also +28 VDC and CR9 switches this return path off, the return path for the GEAR DOWN lamp being through R15 to Ground and GEAR DOWN now illuminates at reduced brilliance. The GEAR UNSAFE channel accepts +28 VDC. INPOS2, through isolation diode CR10, illuminates at full brilliance and does not dim. A test signal, TEST+ is applied to both GEAR DOWN and GEAR UNSAFE through CR8 and CR11 respectively.

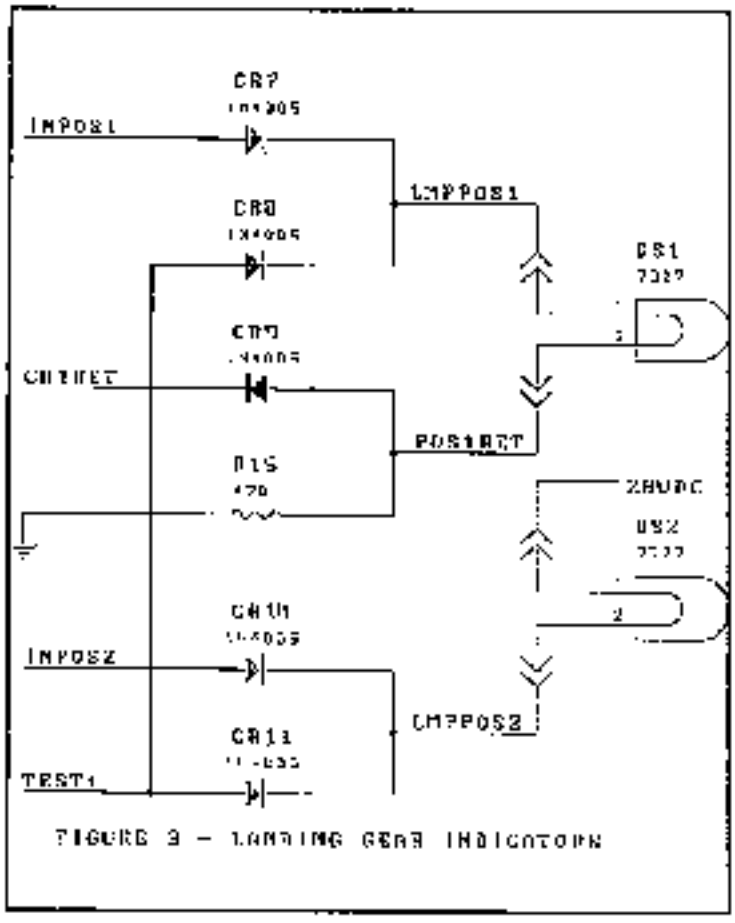
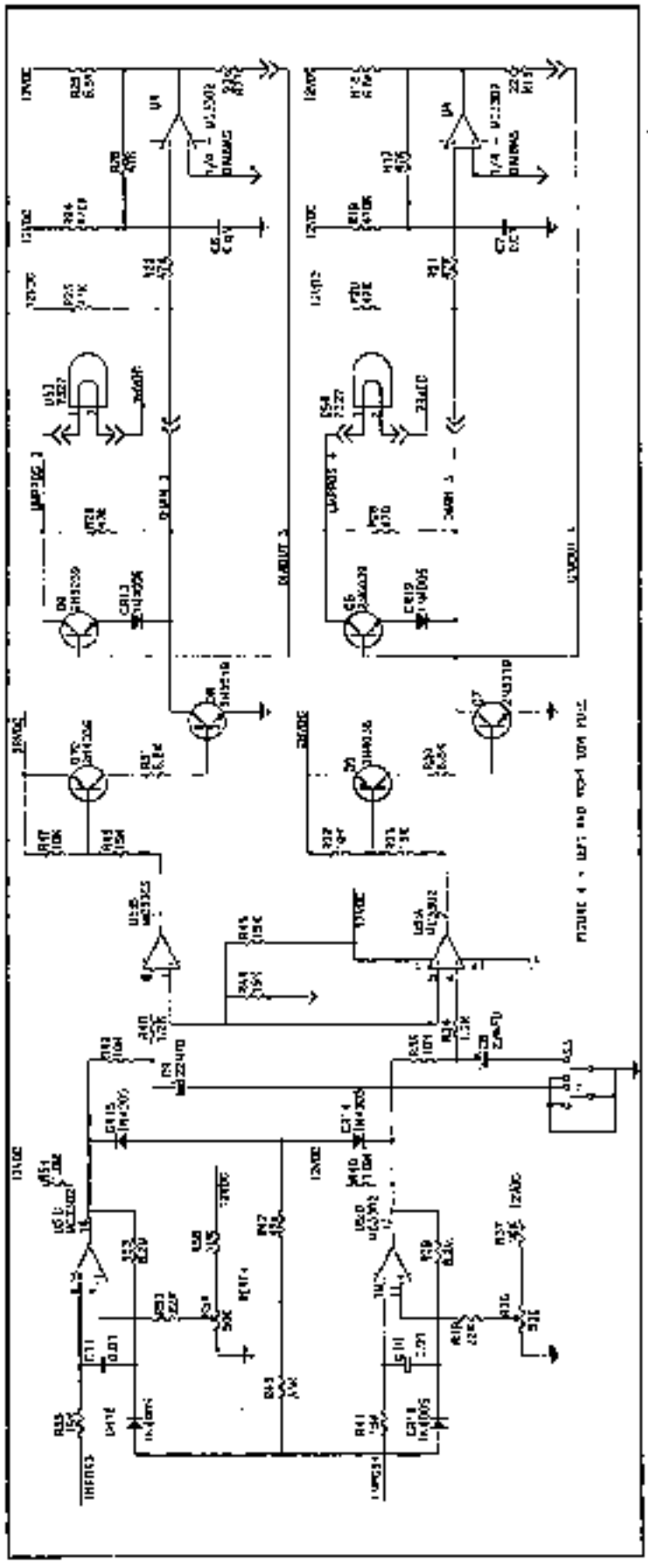


FIGURE 3 – LANDING GEAR INDICATORIN

5.0 LEFT AND RIGHT LOW FUEL

The Left and Right Low Fuel circuits are shown in Figure 4. The left and the right channels are similar, and only the left channel will be discussed herein. Signals from the junction of the left and right fuel transducers and the left and right fuel quantity gauges are applied, respectively, to each of the inputs INPOS3 and INPOS4. This signal is an analog signal that indicates the quantity of fuel measured, the typical low fuel point being on the order of 0.1 volt. The low fuel circuits can, however, annunciate an input up to approximately 0.7 volt. The input, INPOS3, is applied through an isolation resistor R55 to the inverting input of open collector comparator U5:C. The input is compared with the set point effected by the setting of R51, accessible through the front of the annunciator, and, when the input is less than the set point, the comparator's output is allowed to rise by means of the pull-up resistor R54 and the network R48, R49, and C9. Feedback resistor R53 provides a small amount of hysteresis to preclude oscillation at the transition point. The exponentially rising output of U5:C is applied to the inverting input of open collector comparator U5:B and is compared with a reference voltage of approximately 6 VDC. When U5:B switches its output to ground Q10 conducts and drives Q8 into saturation to light the L LOW FUEL channel lamp, DS3. The Q10 - Q8 network is required to provide the transition between the internal 12 VDC and aircraft +28 VDC. The delay provided by the charge of C9 through R48 and R49 provides filtering to preclude false annunciation in rough air. When the fuel level rises, due to sloshing in the tank and U5:C switches to a low output state, C9 is discharged rapidly through R49. The delay time of the charging network provides a delay in low fuel annunciation of approximately 20 seconds. A test of the functioning of the low fuel channel is accomplished by applying TEST+ through R43 - CR18 to the input of U5:C to switch U5:C and applying TEST+ through R42 - CR15 to accelerate the charging rate of the filter C9, thus reducing the delay to approximately 2 seconds. In order to calibrate the low fuel channel the set point, R51, is adjusted with the screwdriver adjustment accessible through the front of the annunciator while there is a preset number of gallons in the tank. The time delay must be removed from the circuit by moving S3, accessible through the front of the annunciator, from the NORMAL position to the CALIBRATE position. This opens the return for capacitor C9 and the indication on the L LOW FUEL channel will not be delayed. After calibration is accomplished, restore the time delay by moving S3 from the CALIBRATE position back to the NORMAL position. The position S3 can be determined without removing the front of the annunciator. When the TEST switch is depressed observe the indication of L LOW FUEL and R LOW FUEL. With S3 in the NORMAL position there is a delay of approximately 2 seconds in illumination, but with S3 in the CALIBRATE position there is no delay in illumination.



Up to this point the circuits used to annunciate low fuel are the same circuits that have been used for many years in IAI annunciators used on Mooney aircraft. The method of dimming, however, has been changed and expanded from what has been used in the past. In the past only the low fuel channels dimmed, excluding GEAR DOWN discussed above, while now the dimming has been expanded to include additional 5 channels. From the perspective of the pilot the operation is the same, depress the DIM switch and active channels dim, depress the TEST switch and active dimmed channels return to bright. When a dimmed channel is extinguished and then reactivates it will reactivate bright. The method to accomplish this, however, is considerably different from the past. Each channel to be dimmed is driven by a transistor, in this case Q8 which returns the lamp to ground through two parallel paths. The path to provide a dim indication is through resistor R29 which reduces the brilliance of the lamp. In the bright mode R29 is shorted by Q6 and CR13 which provide a low impedance path to ground. Transistor Q8 is controlled in conduction by a latch composed of U3 and its associated resistors R22, R23, R24, R25, R26 and R27 as well as the signals DIMBIAS and DIMIN3. If the channel is active DIMIN3 will be near ground and with DIMBIAS near 3 VDC, the output of U3 will be high, thus driving Q6 into conduction. When the DIM Switch is depressed momentarily, DIMBIAS goes high to 12 VDC and U3 switches its output low and latches through R26. This low output removes the drive from Q8 and DS3 dims. When the TEST Switch is depressed momentarily, DIMBIAS goes low and U3 switches its output high, latches through R26, and drives Q6 into conduction. When the channel deactivates, Q8 opens the return to ground and DIMIN3 rises which returns latch U3 to a high output state.

6.0 HI/LO VAC

The High/Low Vacuum circuits are shown in Figure 5. This channel is designed to accept two +28 VDC signals, one from a low vacuum sensor and one from a high vacuum sensor. When low vacuum is detected the annunciator will flash and when high vacuum is detected the annunciator will illuminate steady. A +28 VDC signal applied to LOW VAC INPUT will drive Q11 into conduction through the bias network R56, R57, CR17, and CR22, thus illuminating DS9. The signal FLASH will, however, remove this drive signal as the flasher cycles, thus flashing DS9. A +28 VDC signal applied to HIGH VAC OVERRIDE will bypass the above network and drive Q11 into conduction regardless of the state of LOW VAC INPUT. Similarly TEST+ will drive Q11 into conduction regardless of the state of LOW VAC INPUT. The channel High/Low Vac does not dim.

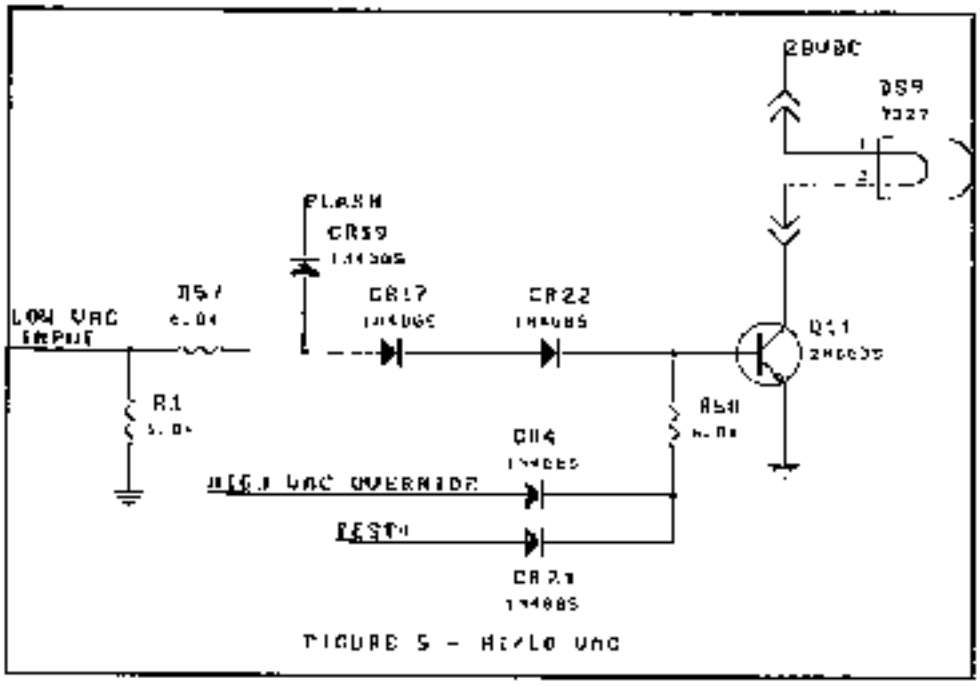


FIGURE 5 – HI/LO VAC

Indicates that the aircraft bus voltage is less than 26.5 VDC. When low voltage is detected internally or when low current is detected the annunciator channel flashes, and when overvoltage tripped is detected the annunciator channel illuminates steady. Comparator U5 monitors the aircraft 28 VDC by comparing the voltage at the arm of R58 with the regulated voltage at the junction of R64 and R65. The output of U5, an open collector comparator is normally low. When low voltage is detected the output of U5 rises and drives Q12 into conduction through the bias network R60, CR24, and CR28, thus illuminating DS10. In a manner similar to the HI/Lo Vac channel, the signal FLASH will remove this drive signal as the flasher cycles, thus flashing DS10. A +28 VDC signal applied to LOVERRIDE will bypass the above network and drive Q12 into conduction regardless of the state of the comparator U6. Similarly TEST+ will drive Q12 into conduction regardless of the state of the comparator U6. A +28 VDC signal applied to LOVERRIDE also drives Q12 into conduction regardless of the states of either comparator U6 or U7. Similarly TEST+ will drive Q12 into conduction regardless of the states of either comparator U5 or U7. The channel Left Alternator/Low Volts/Over Volt does not dim.

7.0 ALTERNATOR/LOW VOLTS/OVER VOLT

The Alternator/Low Volts/Over Volts circuits are shown in Figure 6. This channel is designed to accept two signals, the +28 VDC signal LOVERRIDE from the overvoltage tripped output on the left alternator regulator, and one signal derived internally that

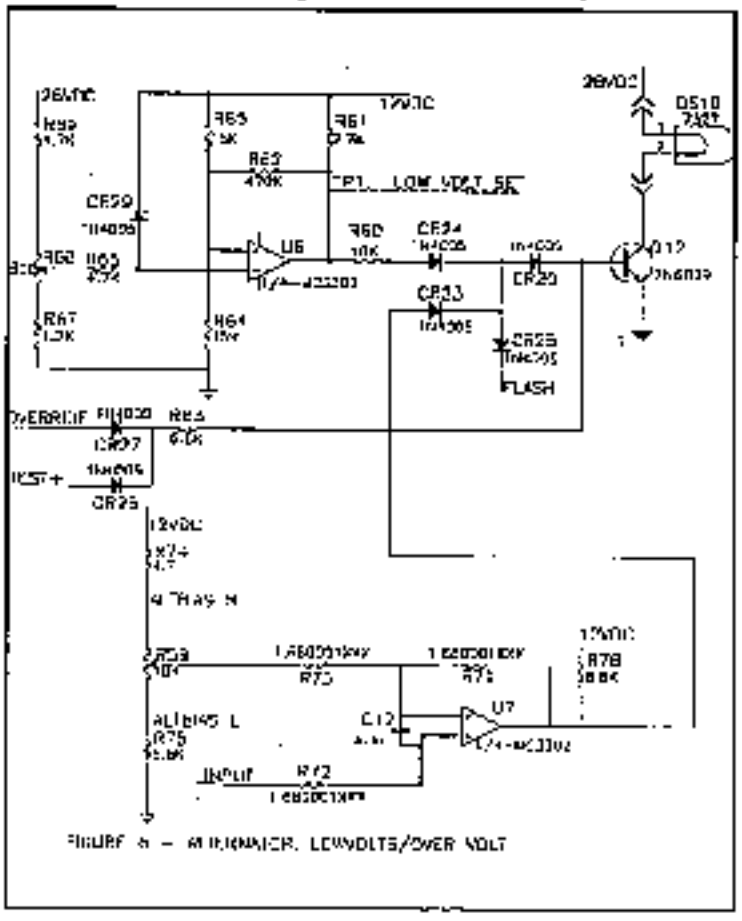


FIGURE 6 – ALTERNATOR, LOWVOLTS/OVER VOLT

8.0 NOT USED

(FIGURE 7 NOT USED)

9.0 TYPICAL POSITIVE APPLY W/DIM

A typical Positive Apply, Dimmable circuit is shown in Figure 8. This channel is designed to accept a +28 VDC signal to illuminate an indicator channel and provide for dimming of that channel, as well. Dimming is accomplished in a manner similar to that described for low fuel channel above. The input, XINPUT, is applied through CR35 and R84 to drive Q15 into saturation and light DS-X. TEST+ is applied through CR36 and R84 to also drive Q15 into saturation and light DS-X. These 5 channels may be dimmed by depressing the DIM switch to dim the active channels. Depressing the TEST switch returns the active dimmed channels to bright. When a dimmed channel is extinguished and then reactivates it will reactivate bright. Each channel to be dimmed is driven by a transistor, in this case Q15 which returns the lamp to ground through two parallel paths. The path to provide a dim indication is through resistor R85 which reduces the brilliance of the lamp. In the bright mode R85 is shorted by Q14 and CR34 which provide a low impedance path to ground. Transistor Q14 is controlled in conduction by a latch composed of U9 and its associated resistors R86, R87, R88, R89, R90 and R91 as well as the signals DIMBIAS and DIMINPUT. If the channel is active DIMINPUT will be near ground and with DIMBIAS near 3 VDC,

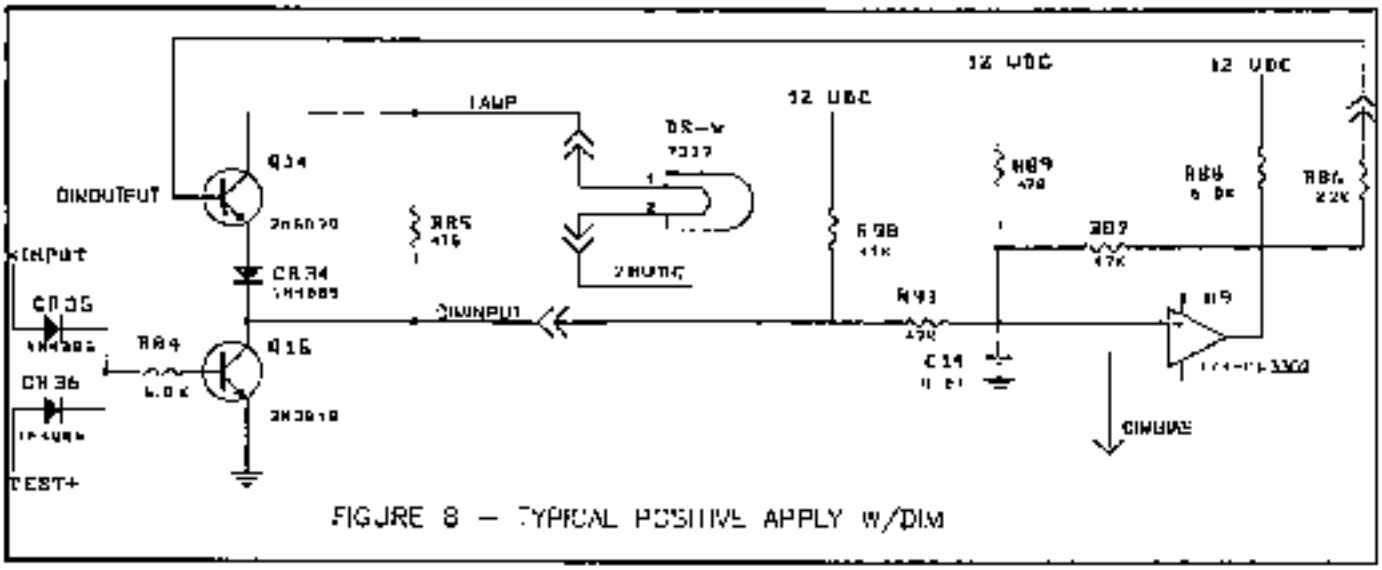


FIGURE 8 — TYPICAL POSITIVE APPLY W/DIM

the output of U9 will be high, thus driving Q14 into conduction. When the DIM Switch is depressed momentarily, DIMBIAS goes high to 12 VDC and U9 switches its output low and latches through R87. This low output removes the drive from Q14 and DS-X dims. When the TEST Switch is depressed momentarily, DIMBIAS goes low and U9 switches its output high, latches through R87, and drives Q14 into conduction. When the channel deactivates, Q15 opens the return to ground and DIMINPUT rises which returns latch U9 to a high output state.

10.0 TYPICAL POSITIVE APPLY W/O/DIM

A typical Positive Apply, Non-Dimmable circuit is shown in Figure 9. This channel is designed to accept a +28 VDC signal to illuminate an indicator channel, but does not provide for dimming of that channel. The input, YINPUT, is applied through CR36 to light DS-Y. TEST+ is applied through CR37 to also light DS-Y.

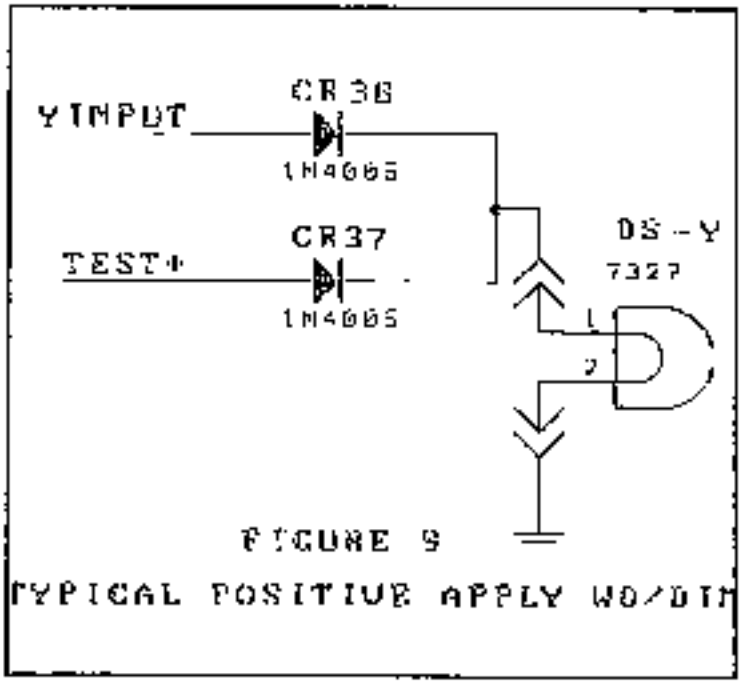


FIGURE 9

TYPICAL POSITIVE APPLY W/O/DIM

24-50-00 - ELECTRICAL LOAD DISTRIBUTION

24-51-00 - POWER DISTRIBUTION SYSTEM

The power bus distributes direct current power to the electrical system from the alternator and from the battery through the battery relay. The negative battery lead attaches to a structural ground on the airframe. The master switch "ON" closes the relay and supplies power to the aircraft electrical system.

CAUTION

Do not reset a circuit breaker after it has tripped a second time. If necessary to do so to locate the malfunction, be alert for a possible electrical fire. Breakers are "Trip Free" type and cannot be held in the closed position.

CHAPTER 25

SEATS

CURRENTLY NOT BEING USED

INTENTIONALLY

LEFT

BLANK

CHAPTER 27

FLIGHT CONTROLS

CHAPTER 27

FLIGHT CONTROLS

LIST OF EFFECTIVE PAGES

FLIGHT CONTROLS

TABLE OF CONTENTS

27-00-00 - GENERAL

The aircraft has dual flight controls and can be flown from either the pilot or co-pilot seat. Dual pairs of foot pedals control the rudder and nose wheel steering mechanisms. The co-pilot pedals are removable if optional dual brakes are not installed. Push pull tubes actuate the all-metal flight control surfaces. Rod-end bearings are used throughout the flight control systems. These bearings are simple and require little maintenance other than occasional lubrication. Specially designed aluminum-alloy extrusions, that permit flush skin attachment, form the leading edges of the rudder and elevators. Electrically actuated wing flap systems are installed on all models. Longitudinal pitch trim is achieved through a trim control system that pivots the entire empennage around the fatcone attachment points.

27-10-00 - AILERON SYSTEM

1. Ailerons.

The ailerons are of all-metal construction with beveled trailing edges. Three hinges of machined, extruded aluminum attach the ailerons to the aft wing spar outboard of the wing flaps. The ailerons link to the control wheel through push-pull tubes and bellcranks. Lead counter-weights static balance the ailerons.

2. Aileron Removal and Installation.

A. Remove control tube attaching bolt, nut, and washer at aileron horn.

B. Remove bolts, nuts, and washers from the three attaching hinges.

C. Remove aileron by pulling it straight aft until hinges are clear; rotate inboard portion down and forward to allow aileron balance weights to clear wing tip (if configured).

D. Reinstall aileron in reverse sequence of removal.

E. Recheck bolts for security and safety.

3. Aileron Rigging and Control Adjustment (S/N 24-0001 thru 24-1424).

A. Use a straight edge (A), (Figure 27-1) to align control wheels in accordance with step B.

B. Adjust control tube (B) linking control wheel shaft (C) at rod ends (5). Clamp or otherwise secure control wheels in the level position until steps C thru E are completed.

C. Adjust control tube (D) at rod end (2) so that aileron center bellcrank (E) is 1/16 inch left of center facing forward, FIGURE 27-1.

D. Adjust aileron control tubes (F) by removing bolt, nut and washer (4) (Figure 27-1) and loosening locknut (6) (Figure 27-2). The aileron control tube (F) can then be rotated clockwise or counterclockwise so that the center of the outboard bolt (K), (Figure 27-2), is 4.3 inches from spar web (M). Replace bolt, nut and washer (4), (Figure 27-1), and recheck 4.3 inch dimension

E. Adjust aileron push-pull tube (J) (Figure 27-2) at rod end (7) (Figure 27-2) so that aileron (in neutral position) is 0° to -2° down (with no additional tolerance) as measured with travel board at wing station indicated on travel board GSE 030009.

NOTE

Wing station 147.75 is located at skin splice line between flap outboard end and aileron inboard end.

F. Remove clamps from control wheels, then adjust aileron stops (8), (Figure 27-2) so the down travel is 8° +/- 1°. Aileron up travel may vary from $12\text{-}1/2^{\circ}$ to 17° (with no additional tolerance), ($12\text{-}1/2^{\circ}$ to $14\text{-}1/2^{\circ}$ S/N 24-1038 and ON).

NOTE

The above aileron rigging and adjustment instructions apply to both the left and right ailerons.

G. Rotate the left control wheel clockwise until the ailerons contact the aileron stops (8) (Figure 27-2). Adjust control tube (B) at rod ends (1) and (5) (Figure 27-1) by loosening the lock nut and turning tube clockwise or counterclockwise to attain .020 maximum clearance using feeler gauge (N), (Figure 27-1). Secure locknuts (1) and (5) and recheck .020 dimension. Repeat the operation on right control wheel by turning wheel counterclockwise until ailerons contact the stops, then proceed as described for the left control wheel. Rigging is now complete.

4. Aileron Rigging (S/N 24-1426 & ON).

A. Level control wheels - (Reference 27-10-00, 3, B Procedures).

B. Install 3/16 dia. rig-pins at:

(1) Jackshaft (C) (Figure 27-1)

(2) Bellcrank (E) (Figure 27-1)

(3) Bellcranks (8) (Figure 27-2) (Both L.H. and R.H.)

C. Adjust control tubes (F) (Figure 27-2) (L.H. and R.H.) to position ailerons at 0 degrees to 2 degrees down.

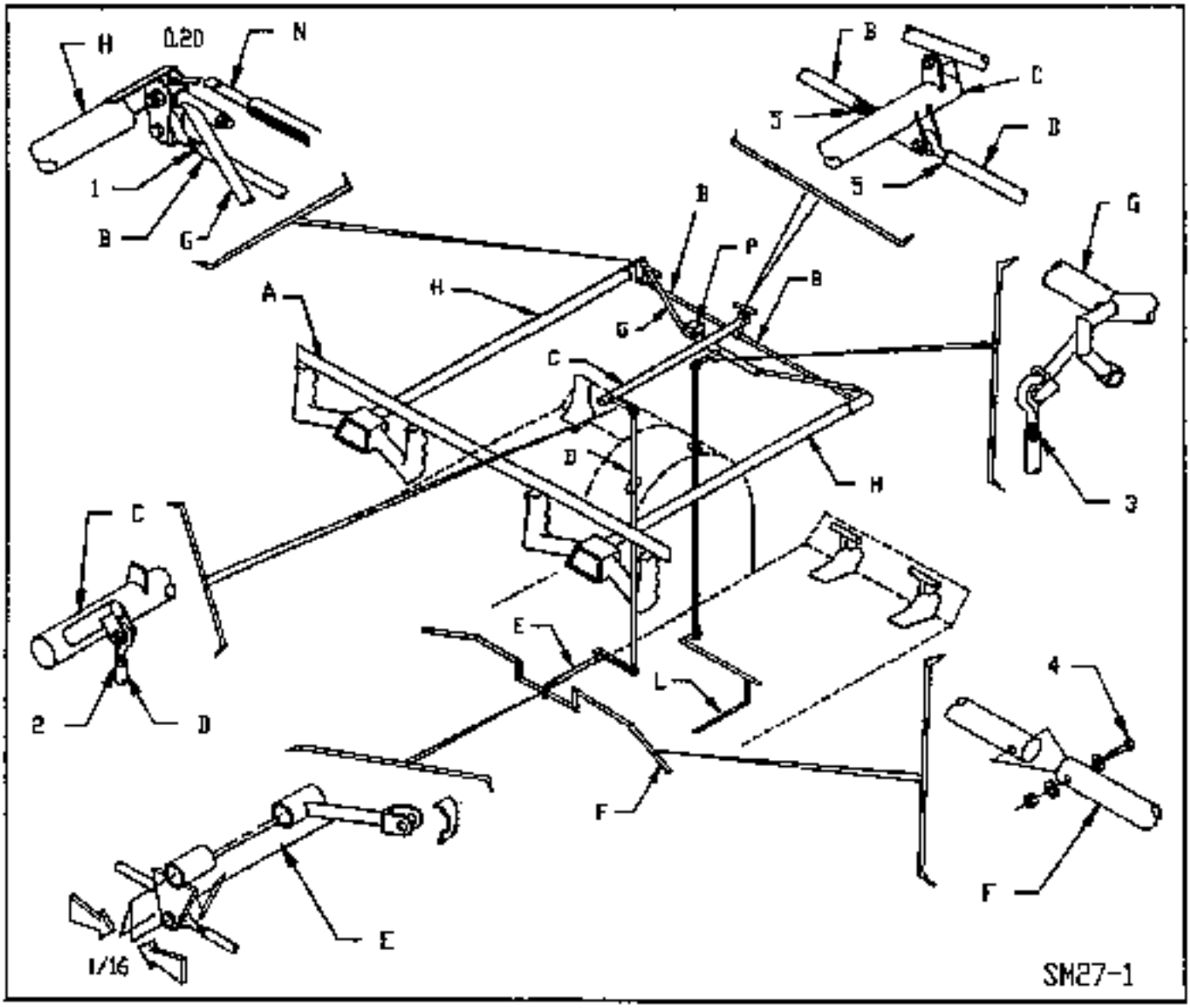
D. Adjust remaining control tubes (F), (B), (D), (Figure 27-1) (L.H. and R.H., if applicable) in order to freely attach to the bellcranks and jackshaft.

E. Remove rig-pins.

F. Adjust aileron stops (Reference Figure 27-2) per paragraph 27-10-00, 3, G. Tolerances are specified in paragraph 27-10-00, 3, F.

NOTE

Refer to SECTION 27-60-00 for Aileron/Rudder Interconnect System Rigging Procedures



AILERON & ELEVATOR CONTROL WHEEL RIGGING - FIGURE 27-1

27-20-00 - RUDDER AND STEERING SYSTEM

1. **Rudder.** The rudder attaches to the aft vertical fin spar at four hinge points. Push-pull tubes and bellcranks link the rudder to the rudder pedals.

2. **Rudder Removal and Installation.**

A. Detach rudder push-pull tube from rudder horn.

B. Remove attaching hardware at rudder hinges.

C. Remove rudder by pulling it straight aft.

D. Install rudder in reverse sequence of removal. Recheck attaching bolts for security and safety.

3. **Rudder Rigging and Adjustment.**

A. Raise aircraft nose. (A propeller yoke jack may be used.)

B. Set stabilizer trim control in neutral position (stabilizer parallel with aircraft center line).

C. Clamp pilots rudder pedals (A), (Figure 27-3), in neutral position.

D. Adjust Rod End bearing (B)(Fig. 27-3) approximately 9-11 turns out to start.

E. Adjust rudder control tube (C) at rear tailcone bulkhead bellcrank, (Figure 27-5), approximately 6 turns out at starting point.

F. Adjust rudder control tube (D), (Figure 27-6), rod end bearing (at 2) 11 turns out to start.

NOTE
Rudder bellcrank, aft tailcone, should be modified per SI-M20-44.

G. Adjust Rod End Bearing (B) (Fig. 27-3) to position Rudder 1° to the right.

H. Unclamp rudder pedals.

I. Adjust rudder stops (paddles) (M), (Figure 27-8), so that rudder travel is 23 degrees (+1,-0 degrees) right and left.

J. Rudder stop limiter (R), (Fig. 27-8), may be bent to obtain clearances and contact with stops (M).

NOTE

On aircraft S/N 24-1464 & ON steering stops (3) should be adjusted so .020 clearance exists between adjustment stop (3) and gear truss assembly (4) (Figure 27-4) when rudder is at extreme left and right travel position.

K. After setting NLG steering stops, retighten all jam nuts, bolts and secure; recheck all travel limits.

NOTE

Measure rudder travel with travel board on rivet line at station indicated on travel board GSE 030005, and with longitudinal trim (stabilizer) set in the 0 degree position. (Sta. 28.50 is located at skin splice on vertical fin).

L. Adjust nose wheel steering by removing nut, washer & bolt (1), (Figure 27-4), and adjusting steering idler linkage at (2). Bolts, nuts and washers at (5) & (6) must be installed from rear to front.

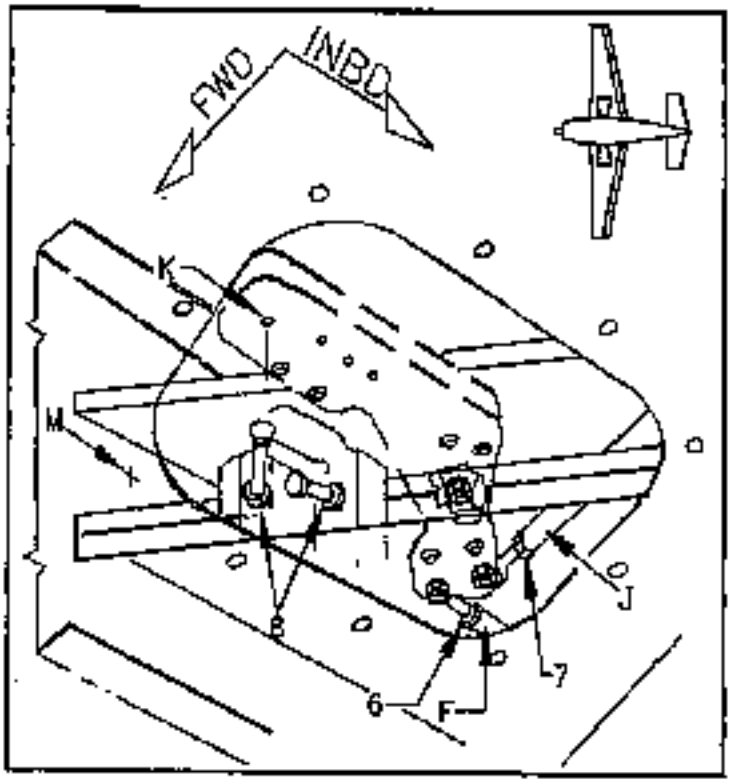
4. **Allowable Free-Play Limits at RUDDER** - VERTICAL MOVEMENT

A. Maximum vertical movement allowable at rudder trailing edge - .08 inches.

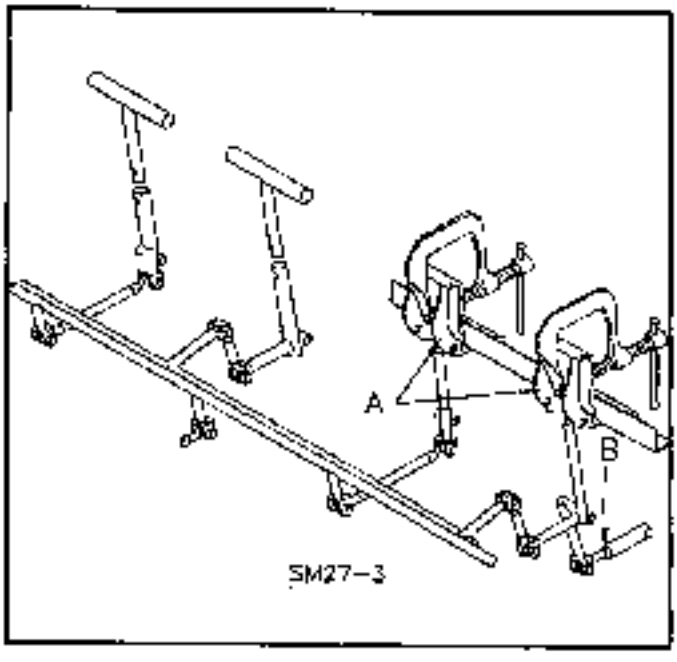
(1) If excessive free-play exists check the following areas for wear:

(a) Trim screw jackshaft,

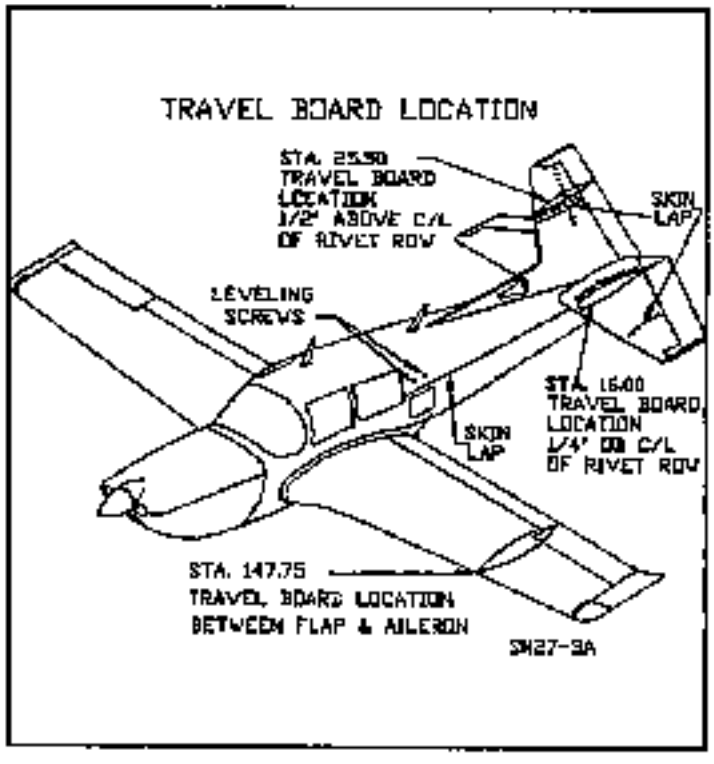
(b) Trim link connecting empennage to trim screw.



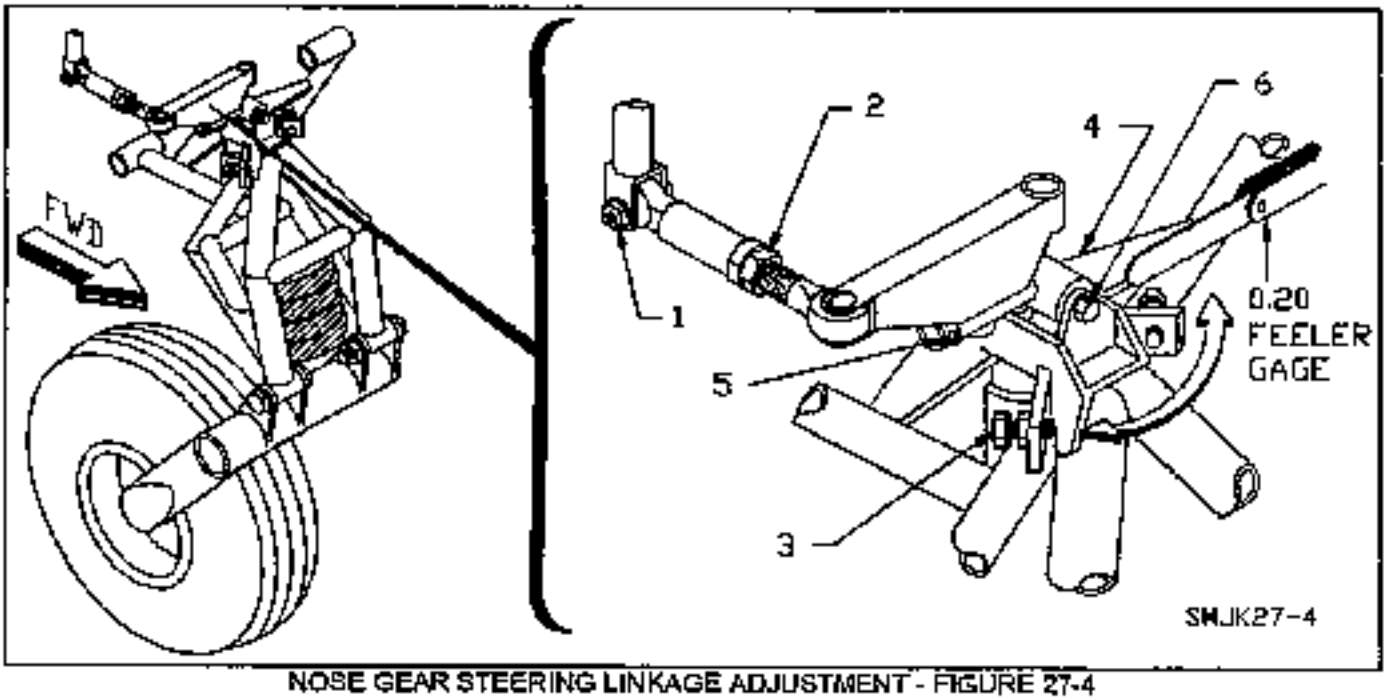
AILERON STOP ADJUSTMENT - FIGURE 27-2



RUDDER PEDAL ADJUSTMENTS - FIGURE 27-3



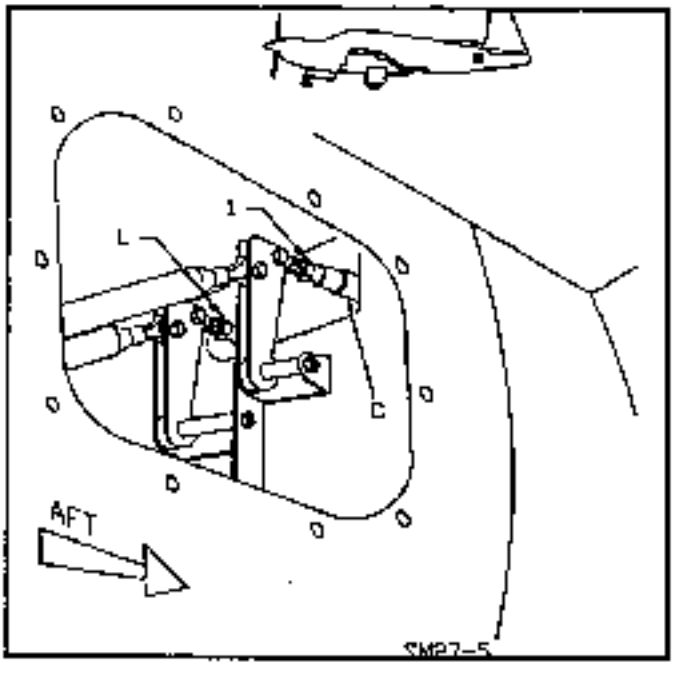
TRAVEL BOARD LOCATIONS - FIGURE 27-3A



NOSE GEAR STEERING LINKAGE ADJUSTMENT - FIGURE 27-4

(c) Bolts and brackets attaching empennage to fuselage.

5. **Rudder Torque Tube Removal.** The rudder torque tube should be inspected thoroughly and replaced if any damage is found. Remove shield from front of cabin floorboard that covers torque tube. Remove attaching hardware from hinges and rudder pedal control rods. Carefully remove torque tube by sliding out toward the right side of cabin and through cabin door.

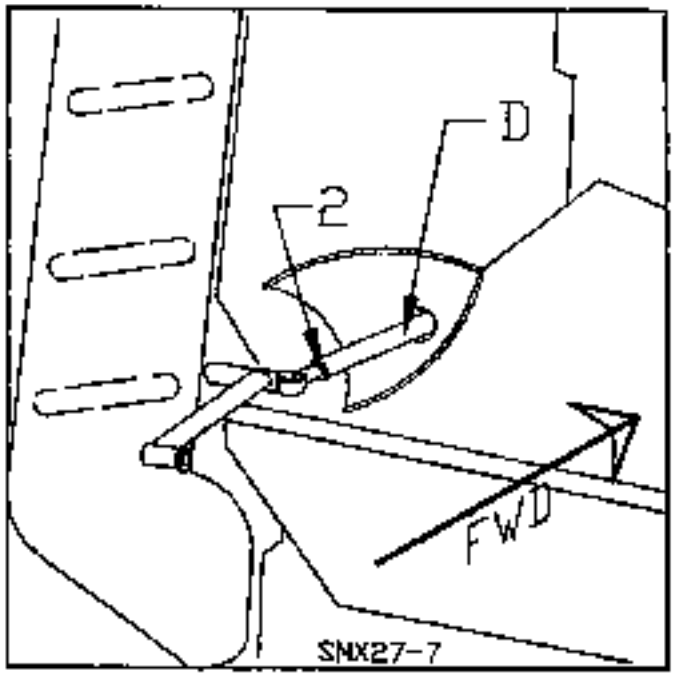


RUDDER & ELEVATOR TRAVEL ADJUSTMENT
FIGURE 27-5

NOTE
Control tube wear allowables. If any portion of the control tube exceeds .007 wear per wall or .014 in reduction in diameter, the tube must be replaced.

27-30-00 **- ELEVATOR SYSTEM**

1. Elevators. Elevator construction is essentially the same as that of the ailerons. Both elevators attach to



RUDDER HORN ADJUSTMENT - FIGURE 27-6

the stabilizer at four hinge points. Push-pull tubes, walking beams and bellcranks link both elevators to the control yoke. Both elevators are connected by control tubes to a common bellcrank in empennage. Lead counterweights static balance both elevators.

2. Elevator Removal and Installation.

A. Remove push-pull control tubes from elevator control horns by taking off all attaching bolts, nuts, and washer.

B. Remove bolts, nuts, and washers from the four attaching hinges.

C. Remove elevator to the rear.

D. Install elevators in reverse sequence of removal. Recheck attaching bolts for security and safety.

3. Elevator Rigging and Adjustment

A. Adjust rod end bearing (3), (Figure 27-1), at control yoke (G) for control shaft (H) clearance from firewall and control yoke (G) clearance from fuselage structure.

B. Level aircraft and set control column in neutral with stabilizer parallel to center line of aircraft.

NOTE
Measure elevator travel from 0 degrees stabilizer thrust line with travel board positioned at stabilizer station indicated on travel board GSE 030004 and with stabilizer at 0 degrees aircraft thrust line . (See Figure 27-3A & 27-11)

NOTE
Elevator bellcrank, aft tailcone, should be modified per SI-M20-44.

C. Adjust rod end bearings of control tube (L), (Figure 27-5), at rear tailcone bulkhead out approximately 5 turns to start.

D. Adjust elevator horn rod end (9), (Figure 27-7) out 7 or 8 turns to start.

E. Main spar adjustable rod end bearing is turned out approximately 6 turns to start. To obtain additional elevator travel, adjust as required.

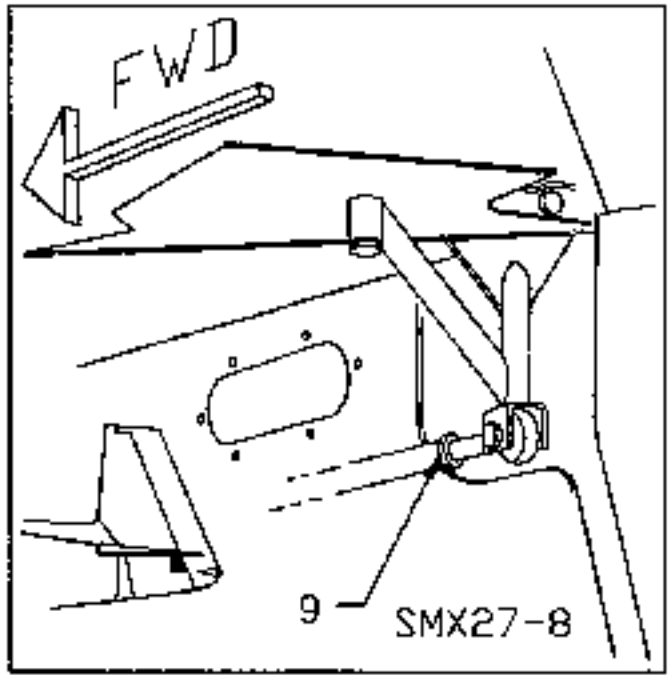
F. Set elevator stops (P), (Figure 27-6), in empennage stinger for elevator uptravel 22 +/- 2 degrees and downtravel of 22 +/- 2 degrees.

G. After elevator stops (P) are set, rotate elevators thru full range of travel to assure solid contact with stops and that nuts and bolt heads clear stop limiter. Elevator stop limiter (E) may be bent to obtain clearances and positive contact with (P) (Figure 27-6).

H. Rotate stabilizer trim full down to check clearance of bellcrank at wing stub spar. Adjust rod end bearing at rear tailcone bulkhead (C)(Fig. 27-5), if needed, for clearance. Recheck elevator up and down travel.

I. Rotate elevator trim full up; check that Elevator up stop (P) makes solid contact on elevator stop limiter (E).

J. Retighten all jam nuts, attach bolts and secure as necessary; recheck all control tube clearances and travel limits.



ELEVATOR HORN ADJUSTMENT- FIGURE 27-7

27-30-03 - EMPENNAGE FREE PLAY LIMITS

Allowable free-play movement of the empennage assembly on the tailcone of the airplane, with the tailcone fixed at the tail skid:

Horizontal stabilizer @ Tip:
0.12 inch max. –Fore & Aft
0.10 inch max. – Up & Down

Rudder @ Lower trailing edge:
0.08 inch max. – Up & Down

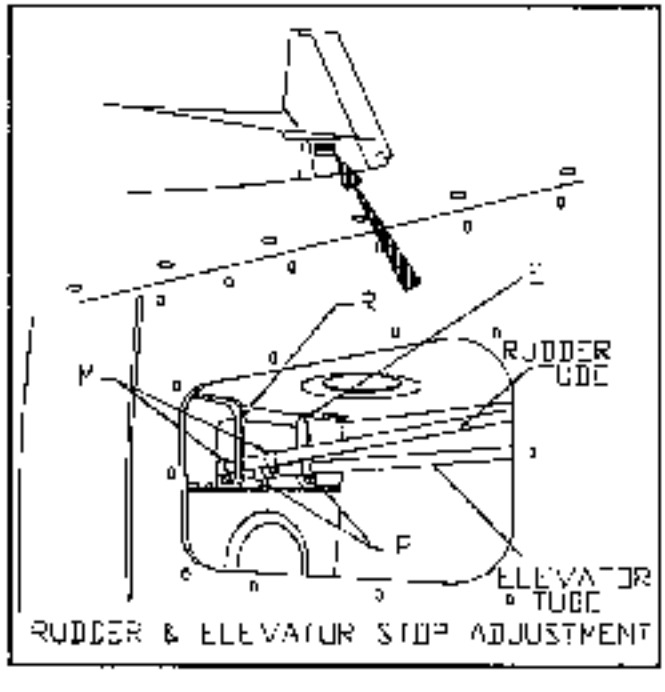


FIGURE 27-6

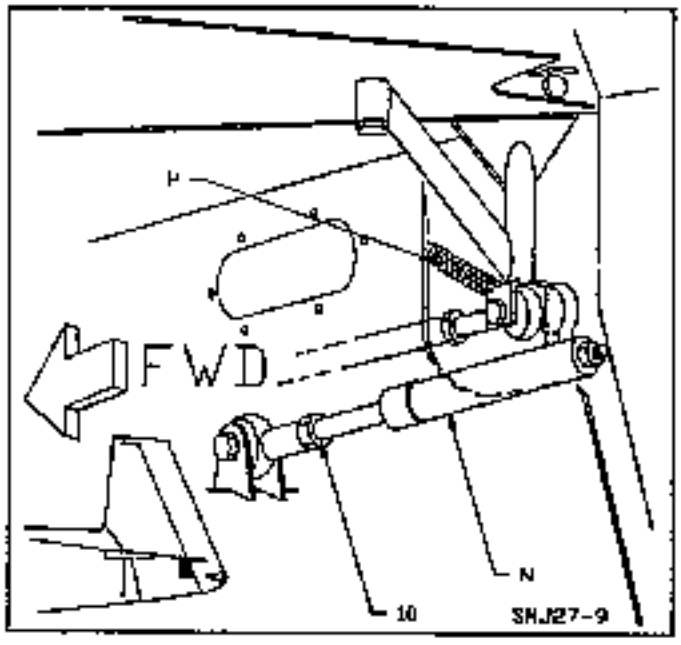
27-31-00 - TRIM ASSIST BUNGEE RIGGING

Bungee units in the elevator control systems assist in stabilizer trim adjustment.

NOTE
Negative stabilizer (- degrees) settings mean that stabilizer leading edge is moved down relative to the thrust line.

A. Set stabilizer to -3 degrees position.

B. Adjust trim bungees (N), Figure 27-9 at rod-end bearing (10) for elevator up angle of 19 degrees + 1 degree.



TRIM ASSIST BUNGEE RIGGING - FIGURE 27-8

NOTE
Rig trim assist bungees before installation of elevator extension springs (P), Figure 27-9.

27-40-00 - STABILIZER TRIM SYSTEM

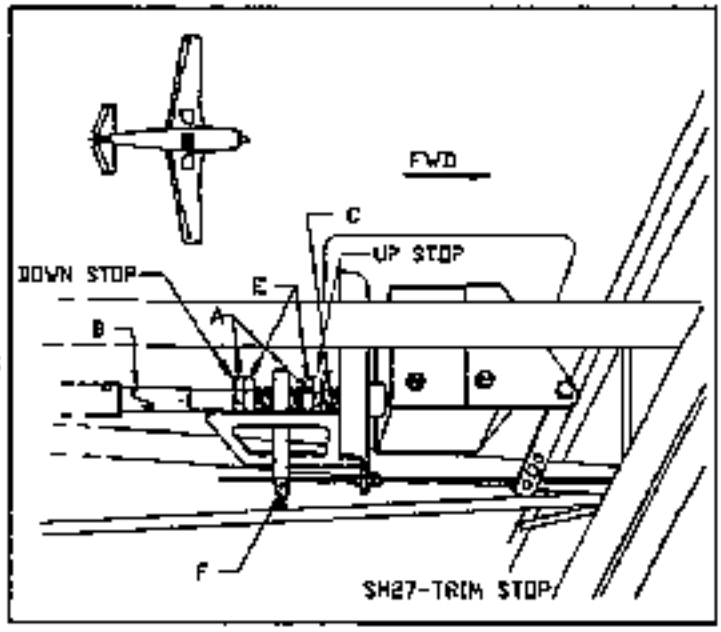
To provide pitch trim control, the entire empennage pivots around its main hinge points. The system consists of a manually operated actuator that operates a series of torque tubes and universal joints connected to a jack screw on the aft tailcone bulkhead.

NOTE
A "stepped stop nut", with a "jam nut" configuration has been incorporated. This can be retrofitted to all M20J aircraft if desired. This allows trim screw nut (F) to contact stepped portion of these two nuts and not bind.

Basic rigging, for either configuration, is identical to procedures below except that stepped nut and jam nut require being torqued together, with two wrenches, prior to jam nut set screw tightened against threaded trim screw (C). Stepped nuts are required at the nose up and nose down positions, facing trim screw nut (F).

1. **Nose Up Stabilizer** Trim Control Rigging and Adjustment.

A. Loosen setscrew in up stop/jamnut (A) (Figure 27-10), break torque on jam nut/stepped nut (if installed) and turn stop (A) or jamnut/stepped nut (A&E) clockwise or counterclockwise to align forward edge of UP stop or stepped nut, with front thread of trimscrew (C) (Figure 27-10). Tighten setscrew and turn trim control wheel to full NOSE UP position (trim screw nut (F) against UP stop or stepped nut (E).



TRIM ASSIST BUNGEE RIGGING - FIGURE 27-9

B. Disconnect torque shaft (B) from trim screw (C), (Figure 27-10). Rotate trim screw nut (F) against UP stop or nut (E); full nose up position.

C. Turn disconnected torque shaft (B) clockwise or counterclockwise until horizontal stabilizer as measured, using the travel board, P/N 030004-503, as shown by (Figure 27-11), is within the following limits, -5.5 degrees leading edge down, (Approx. 4.5 inches measured).

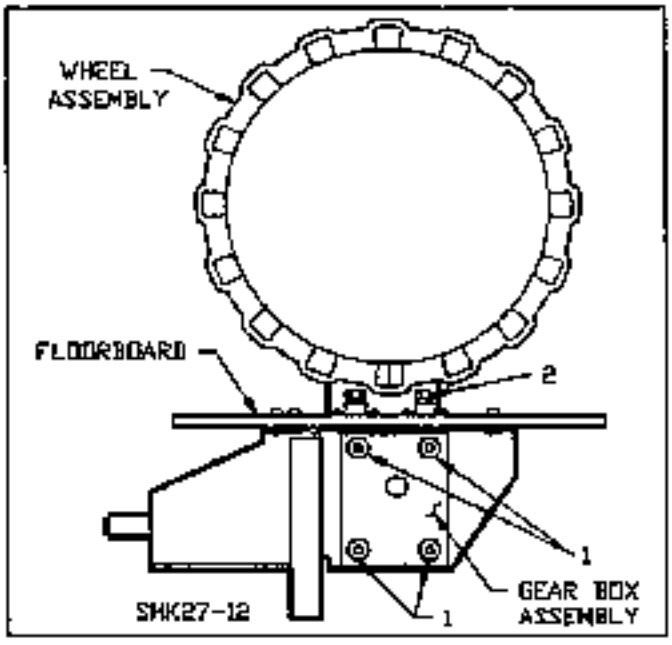
NOTE
Negative (- degrees) stabilizer degrees mean that stabilizer leading edge is moved down relative to thrust line.

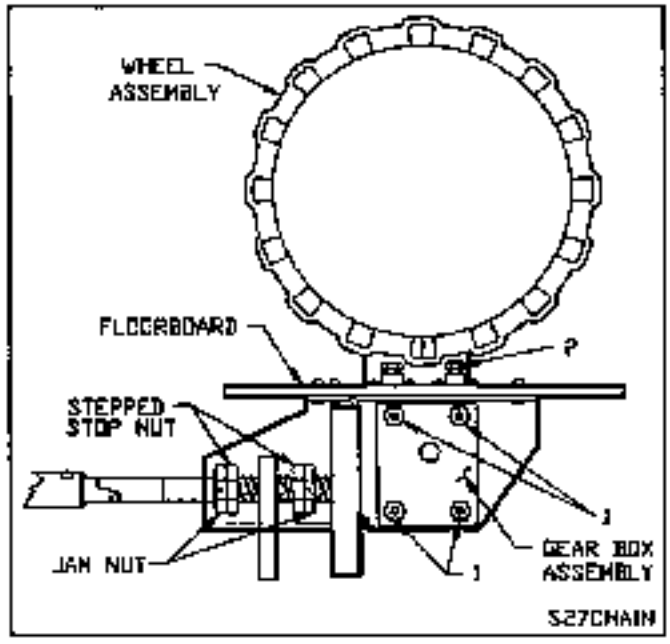
D. Connect torque shaft (B) to trim screw (C) (Figure 27-10). NOSE UP stabilizer trim control rigging is now complete.

2. **Nose Down Stabilizer** Trim Control Rigging and Adjustment.

A. Loosen setscrew in down stop or jamnut (A) and turn stop(s) on threaded shaft to move it toward Aft. Turn trim control wheel toward NOSE DOWN position until horizontal stabilizer is within the following limits: +.75 degrees leading edge up (Approx. 2.75 inch measurement).

NOTE
Positive stabilizer (+degree) settings mean that stabilizer leading edge is moved up relative to thrust line.





STD. STOP NUTS — STABILIZER TRIM CHAIN ADJUSTMENT - FIGURE 27-12 — STEPPED STOP NUTS

torque tube.

3. Carrier bearing can now be inspected. If carrier bearing or torque tube sleeve show evidence of scoring or wear, replace damaged items with new parts. Bendix-King P/N's are:

BEARING BLOCK ASSY. - 047-04143-000
TORQUE TUBE SLEEVE - 076-00971-000
ROLL PIN (for torque tube sleeve) - 090-00052-0022

When scoring or wear is not present, clean any dried grease and/or dirt from bearing and torque tube sleeve. Relubricate, using MIL-G-23827 or MIL-G-81322 grease. Use a grease needle or other suitable tool to apply grease.

4. Reinstall carrier bearing to aft side of electric pitch trim servo bracket. Re-tension drive chain.

5. Clean any dirt and grease from placard location on forward side of tailcone bulkhead. Install annual service placard (057-05747-0001) on forward, vertical portion of bulkhead, @ fuselage Sta. 142.

6. If bearing block assembly replacement is required, refer to following procedures:

Trim torque tube/pitch trim servo assembly should be removed from aircraft to replace bearing block, therefore manual trim wheel and electric trim switch should be flagged so inadvertent movement will not occur.

A. Disconnect universal joint located between tailcone bulkhead, Sta. 142, and pitch trim servo assembly mounting brackets.

B. Disconnect electrical wiring, to servo motor, at connector.

C. Disconnect ELT harness from connector and any other wiring that may interfere with the removal of torque tube assembly from tailcone.

D. Remove nuts, washers, bolts/screws from upper and lower pitch trim servo brackets holding brackets to bulkhead.

E. Carefully lift torque tube/pitch trim servo assembly up and pull aft and of torque tube from trim actuator socket on aft tailcone bulkhead. Support aft end of torque tube if needed.

F. Pull torque tube/trim servo assembly from tailcone through access cover on left side of tailcone.

G. Place torque tube/pitch trim servo assembly on work bench for removal and replacement of bearing block.

H. Remove components carefully until access to bearing block is obtained. Install new bearing block and assemble in reverse sequence.

I. Reinstall torque tube/pitch trim servo assembly into tailcone.

J. After reinstallation and reconnection of all components, electrical and mechanical, it will be essential to check stabilizer pitch trim system rigging in accordance with Section 27-40-01.

27-50-00 - WING FLAP SYSTEM

Wing Flaps - General

Push-pull tubes and bellcranks interconnect the flaps. The flaps are operated by an electrical motor driven actuator (1) connected to a jack shaft (2) (Figure 27-13). The jack shaft is connected to actuator bracket (3) (Figure 27-13) on each flap just outboard of hinges (4) by a push-pull rod end bearing (5) and hardware. Each flap pivots about four hinges. Travel is controlled by limit switches (6) and (7) and stops located at O.B. hinges (Figure 27-13). Flap position is indicated in the cockpit through a cable link system (8) connected to the jack shaft actuator horn (9).

B. Rotate stop (A), (Figure 27-10) clockwise or counterclockwise to make contact with trim screw nut (F). Tighten setscrew. NOSE DOWN stabilizer trim control rigging is now complete.

3. **Stabilizer Trim Indicator** Rigging. The indicator is geared to the trim control wheel and indicates stabilizer position relative to the aircraft thrust line. Set horizontal stabilizer to an angle of incidence of minus 2 degrees 00 minutes to minus 2 degrees 30 minutes. Adjust trim indicator cable at (F) (Figure 27-10) to set indicator in the cabin to the center of the takeoff range mark.

A. MAXIMUM HORIZONTAL STABILIZER ALLOWABLE FREE PLAY LIMITS -

(1) Fore and aft movement at stabilizer tip:

0.12 inches.

(2) Vertical movement at stabilizer tip:

0.10 inches.

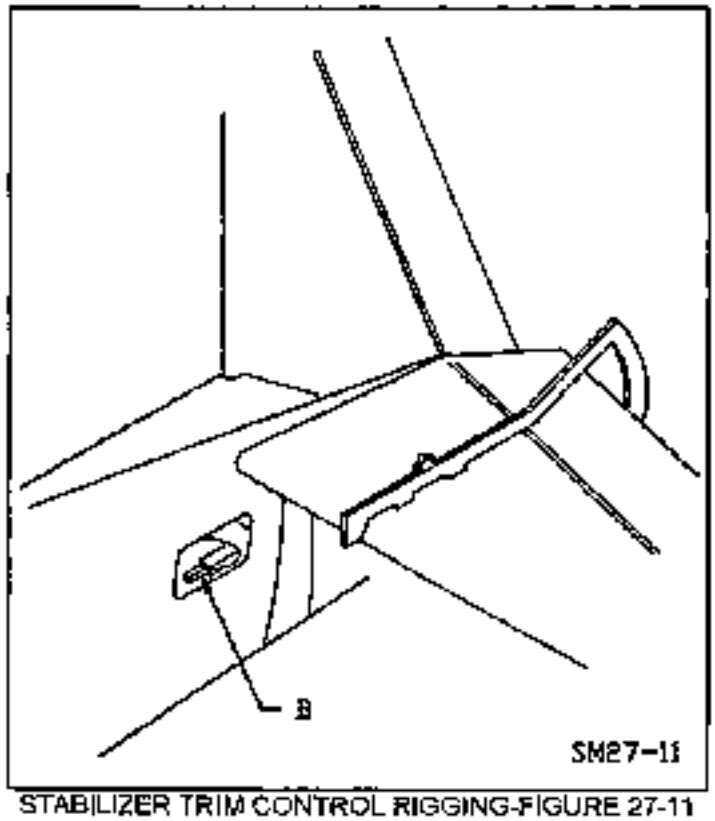
NOTE

When removing trim screw from empennage use a block of wood cut to fit opening between tailcone and empennage to prop empennage up when trim screw is removed.

4. **Electric Trim.**

A. The clutch torque for the electric trim system should be checked and adjusted by an Avionics shop for the following settings to operate the autopilot systems properly:

(1) KFC 200	— 21 +/- 2 inch lbs.
(2) KAP 100	— 21 +/- 2 inch lbs.
(3) KFC 150	— 21 +/- 2 inch lbs.
(4) EDO AIRE Systems	— 18 inch lbs.
(5) S-TEC	— 30 inch lbs.



STABILIZER TRIM CONTROL RIGGING-FIGURE 27-11

5. **Stabilizer Trim Chain Adjustment.**

(Reference Figure 27-12).

A. With the four mounting bolts (1) slack, adjust the two NAS428-3-4 bolts (2) to obtain maximum tension on chain without causing binding.

27-40-01 - TRIM SYSTEM TROUBLESHOOTING

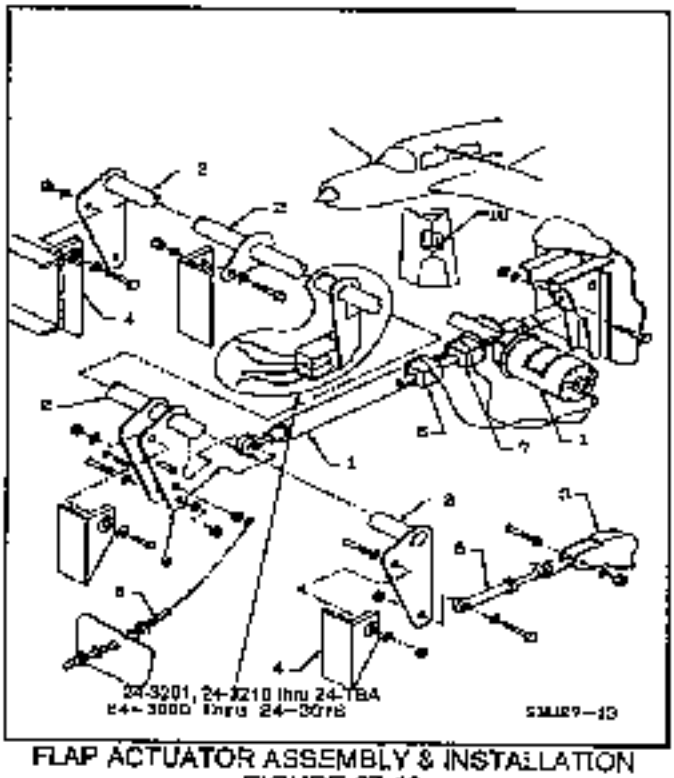
BINDING	CHECK control tubes at bulkhead grommets for rub marks. Check Trim Actuator threads for galling or not lubricated; lube per Section 5.
ELECTRIC CLUTCH SLIPPING	Check BINDING symptoms above. Check for proper clutch settings. Confirm full bus voltage is available at trim motor.

27-42-00 - ELECTRIC PITCH TRIM SYSTEM MAINTENANCE

If installed, the AlliedSignal (Bendix-King) Electric Pitch Trim System requires periodic maintenance at each annual inspection for carrier bearing added to existing aircraft pitch trim torque tube. If not already installed, an annual service placard, 057-05747-0001, (available from AlliedSignal) MUST be added to the Electric Pitch Trim servo bracket area to call attention to the annual maintenance requirement. Carrier bearing assembly must be inspected and lubricated per the following procedures:

1. Gain access to area by removing electrical bay access cover from left hand side of tailcone. Locate Electric Pitch Trim servo system, just aft of Fuselage Sta. 142 bulkhead. Carrier bearing is located around existing pitch trim torque tube, aft of lower chain sprocket, on aft side of electric pitch trim servo bracket and below electric pitch trim servo motor.

2. Loosen electric pitch trim servo drive chain. Remove four lock nuts which secure carrier bearing block to aft side of electric pitch trim servo bracket. Slide bearing block aft until it is clear of stainless steel sleeve which is secured to existing airplane pitch trim



FLAP ACTUATOR ASSEMBLY & INSTALLATION
FIGURE 27-13

On S/N 24-0001 thru 24-2999 the flap switch (10) is self centering from the down position and located on the console adjacent to the flap position indicator. The flaps can be retracted completely by placing the switch in the UP position or to any setting between 0 and 33 degrees by placing in UP position to setting desired and then centering to stop the actuator.

On S/N 24-3000 thru 24-3078 and 24-3201 and 24-3218 thru 24-TBA, the flap system incorporates a flap preselect feature which allows the flaps to be positioned as desired: UP, TAKEOFF or DOWN.

Lubricate the flap actuator gear box and ball screw at required intervals and with lubricants prescribed in Chapter 5.

1. Wing Flap Removal and Installation.

A. Remove wing flap hinge fairing to expose flap push-pull tube.

B. Remove bolt, nut, and washer from flap-actuating attachment.

C. Remove bolts, nuts, and washers at flap hinge points.

D. Remove flap by pulling it down and aft.

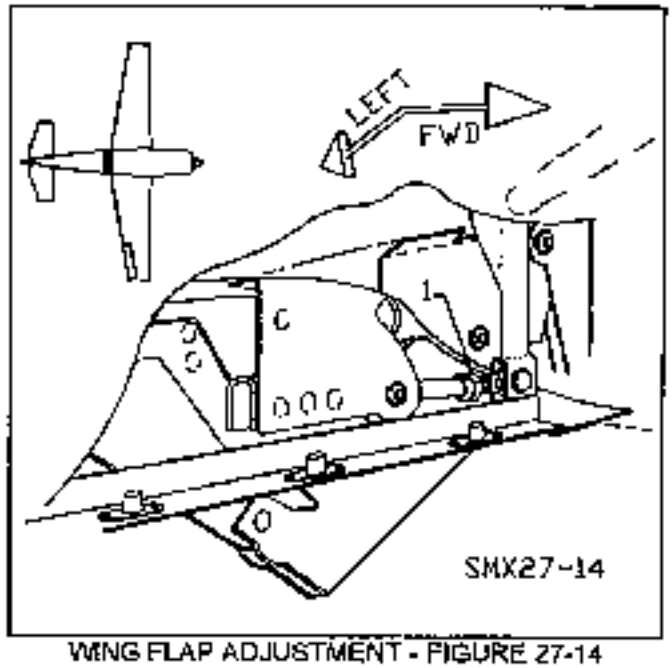
E. Install wing flaps in reverse sequence of removal. Recheck security and safety of attaching bolts.

2. Wing Flap Rigging and Adjustment.

NOTE
Flap deflections are to be measured with travel board GSE 030003 at the station indicated on the travel board. (See SECTION 27-10-00, Figure 27-3A)

POSITION ADJUSTMENT
S/N 24-0001 thru 24-2999, 24-3079 thru 24-3200, 24-3202 thru 24-3217

A. Adjust right and left inboard linkage at rod end bearing (1), (**Figure 27-14**) to obtain a flap deflection of 33° (+0/-2°). Retract flaps to 0° +/- 2°. Set flap outboard travel stops (not illustrated) so that flaps align with aileron while in neutral position.



WING FLAP ADJUSTMENT - FIGURE 27-14

B. Retract flaps to 15° (+/-1°), and set flap position indicator cable (B) at attachment screw (7), (**Figure 27-15**), to TAKEOFF position as shown on flap position indicator in cabin. This indicates the degree of flap deflection from 0° to 33°, with a 15° takeoff setting.

C. The limit switches, #3, (Figure 27-15) should be adjusted so that under flight loads the actuator over run will not allow the flaps to exceed either up or down positions.

NOTE
The flaps may be rigged asymetrically (within tolerances) to facilitate aircraft rigging or to compensate for any rolloff during flap operation.

POSITION ADJUSTMENT
S/N 24-3000 thru 24-3078, 24-3201, 24-3218 thru 24-TBA

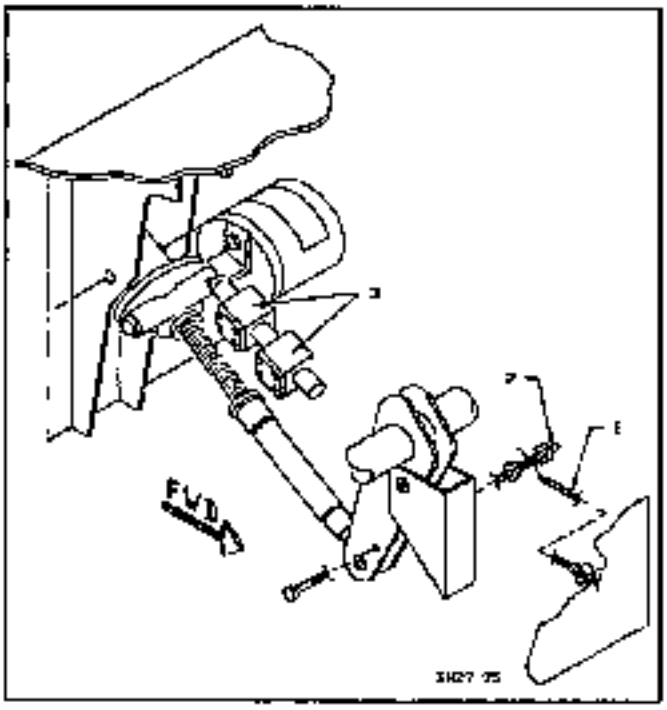
Before rigging take-off position, verify flap travel is correct for full UP and DOWN.

Micro-Switches must strike tang on flap jack properly. Lower switch roller should make contact in the cut-out area; top switch roller should make contact with the non-cut-out area. Adjust switches to accomplish this.

A. Rig flaps per para. 2., A. & B. above.

B. Extend flaps to TAKEOFF position (15° +/-1°)

C. Adjust switch stack until bottom Micro-Switch just opens.



WING FLAP INDICATOR ADJUSTMENT
(NON-PRESELECT) - FIGURE 27-15

D. Top switch will be automatically adjusted.

E. Cycle flaps UP, TAKEOFF & DOWN; verify proper setting at TAKEOFF while flaps are going down.

27-60-00 - AILERON/RUDDER INTERCONNECT SYSTEM

1. With controls in neutral position, locate 110002-101 bracket, on aileron control tube, so the end of 110002-005 bellcrank assembly will be 2.25 in. AFT of 310020 fuselage former.

2. Holding both, rudder and aileron, controls in neutral position, install two springs, P/N 110003-007, on -005 bellcrank and on 110002-025 and -027 brackets and position -025 and -027 brackets on rudder control tube so the installed length of each spring is 4.90 in. Clamp brackets in place and drill through brackets and into control tube for AN530-4R6 PK screws.

3. Make sure PK screws are in place to secure all three brackets.

27-90-00 - MISCELLANEOUS

27-91-00 - CONTROL SURFACE STATIC BALANCING

Control surface balance must be checked when control surfaces is repaired, altered or repainted. It is recommended that control surfaces be stripped prior to repainting. The control surface balance limits shown in Figure 27-17 apply to a complete painted control surface only. Complete control surfaces include (as applicable) balance weight, control attachment horn and attaching hardware, static wicks (when installed as optional equipment), and rudder taillight and/or strobe light assembly installed.

Control surfaces must be rebalanced in accordance with the procedures in Section 27-93-00.

CAUTION
All control surfaces should be stripped prior to repainting.

27-92-00 - BALANCING EQUIPMENT - STATIC

The design of the balancing fixture is not critical provided the requirements of this section are met.

1. Obtain or otherwise fabricate two (2) knife edge supports approximately one (1) foot in height so that they can be placed on a table and be stabilized to prevent tipping (See Fig. 27-16). The knife edge hinge supports MUST be LEVEL and PERPENDICULAR to the hinge axis of the control surface.

2. Weight Scales:
Scales used to record weights must be accurate within 0.02 lbs or 1/2 oz.

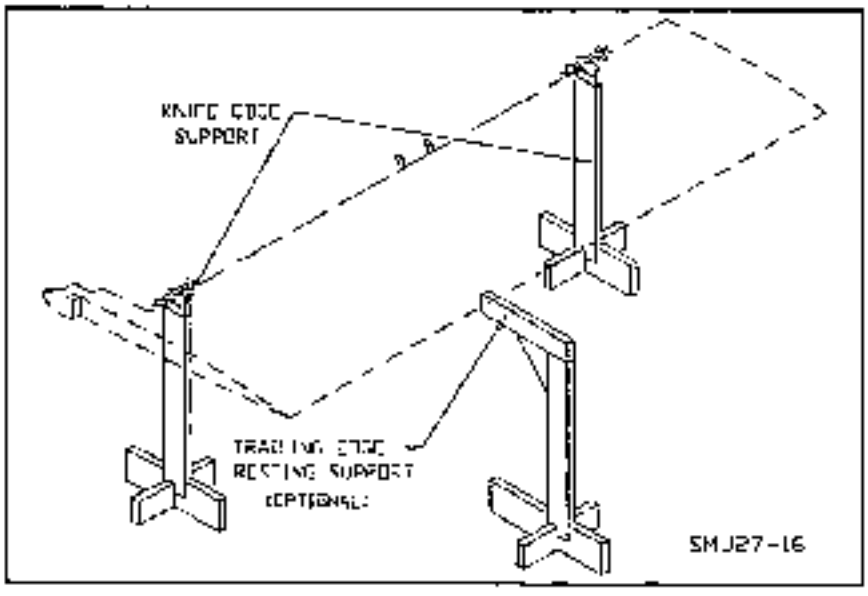
27-93-00 - BALANCING PROCEDURE

27-93-01 - DETAIL PROCEDURES - STATIC BALANCING

1. A line drawn through the hinge line support points must be level and perpendicular to the supporting knife edges.

2. The supporting knife edges must be horizontal and parallel to each other within the requirements of Step 1. above.

3. Elevators and rudders are balanced with the "Control Horn" pointing upward. Allerons are balanced UPSIDE DOWN. (See Fig. 27-16)



CONTROL SURFACE STATIC BALANCE SUPPORTS
FIGURE 27-16

4. All control surfaces are balanced with the hinge center line and the tip rib chord line level. Two tooling holes are located in the tip ribs and are on the rib chord line (rib center line). Chordwise level can be obtained by using a spirit level and pins inserted into these tooling holes.

5. Install a 1/4 inch bolt or pin through the inboard and outboard AILERON hinge bracket. Install a No. 10 bolt or pin through inboard and outboard ELEVATOR hinge bearing, and top and bottom RUDDER hinge bearing.

6. Position and level the control surface on the knife edge hinge supports.

7. Accurately measure control surface load at a measured distance from the hinge axis as far from the hinge axis as possible (Figure 27-18). Measurements should be taken in a draft free environment. Calculate the moment (arm times weight) and compare the results with Figure 27-17

8. Control surfaces MUST BE RECHECKED for balance after any painting, stripping, repair or alteration.

SURFACE DESCRIPTION	AIRCRAFT EFFECTIVITY	BALANCE MOMENT LIMITS *
430026-001 & -002 ELEVATOR	24-0001 THRU 24-1543 24-1545 THRU 24-1551 24-3000 THRU 24-3038	UNDERBALANCE 16.75 IN. # TO 14.00 IN. #
	24-1544, 24-1552 THRU 24-2999, 24-3039 THRU 24-TBA	UNDERBALANCE 16.75 IN. # TO 11.00 IN. #
430043-000 RUDDER	24-0001 THRU 24-1543, 24-1545 THRU 24-1551 24-3000 THRU 24-3038	UNDERBALANCE 18.00 IN. # TO 13.00 IN. #
	24-1544, 24-1552 THRU 24-2999 24-3039 THRU 24-3200 24-3202 THRU 24-3217	UNDERBALANCE 18.00 IN. # TO 12.50 IN. #
	24-3201, 24-3218 THRU 24-TBA	UNDERBALANCE 15.50 IN. # TO 12.50 IN. #
	NOTE: A/C S/N 24-1688 THRU 24-3200, 24-3202 THRU 24-3217 MAY BE IN COMPLIANCE WITH KIT DWG 940071 (2900 LB. GROSS WT.) IF SO, USE UNDERBALANCE MOMENT LISTED IN COLUMN TO THE RIGHT.	UNDERBALANCE 15.50 IN. # TO 12.50 IN. #
230015-503 & -504 AILERON	24-0001 THRU 24-0942	UNDERBALANCE 6.00 IN. # TO 5.25 IN. #
	24-0943 THRU 24-1037	UNDERBALANCE 7.23 IN. # TO 5.25 IN. #
230015-505 & -506 AILERON	24-1038 THRU 24-1543 24-1545 THRU 24-1551	UNDERBALANCE 7.10 IN # TO 5.25 IN #
	24-1544, 24-1552 THRU 24-1621 24-3000 THRU 24-3038	UNDERBALANCE 6.23 IN. # TO 0.00 IN #
230015-507 & -508 AILERON	24-1622 THRU 24-2999 24-3039 THRU 24-3110	UNDERBALANCE 6.23 IN. # TO 0.00 IN. #
	24-3111 TO 24-TBD	UNDERBALANCE 5.30 IN. # TO 0.00 IN. #
230015-511 & -512 AILERON	24-TBD TO 24-TBA	UNDERBALANCE 5.30 IN. # TO 0.00 IN #

* UNDERBALANCE = TRAILING EDGE HEAVY

M20J FLIGHT CONTROL SURFACE BALANCE LIMITS - FIGURE 27-17

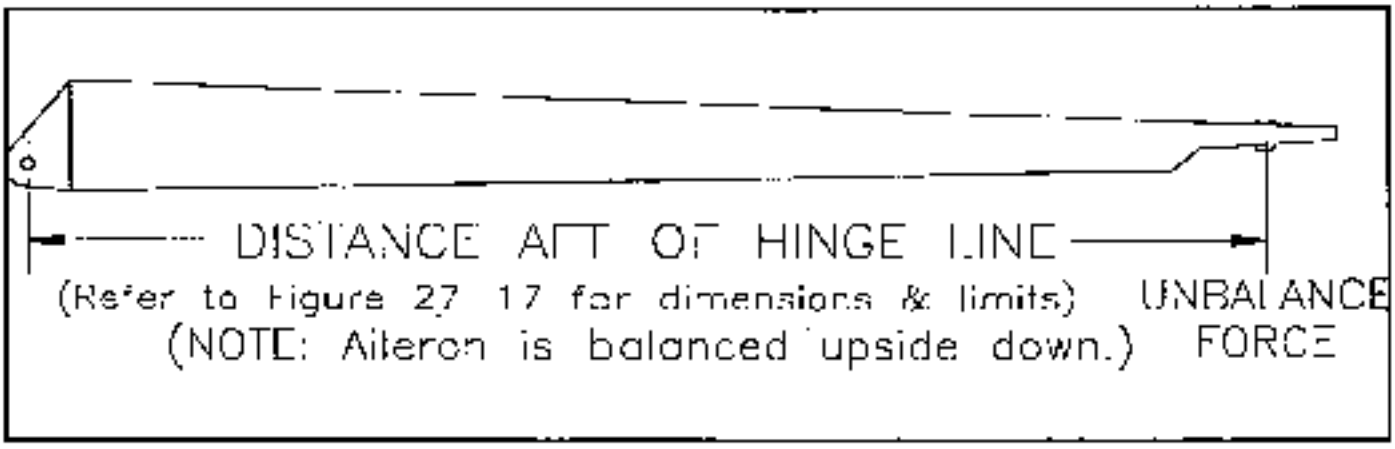


FIGURE 27-18 - DISTANCE FROM HINGE POINT TO UNBALANCE POINT

NOTE

If specified moments cannot be met (reference Figure 27-17), heavier balance weights can be obtained through a Mooney Service Center. This approach should be examined before reworking any repair or restripping and repainting the affected control surface. A lighter weight can be produced by shaving existing balance weight.

FIGURE 27-19 NOT USED.

27-94-00 - CONTROL SURFACE TRAILING EDGE

NOTE

Verify flight control rigging is correct before bending trailing edge.

1. Trimming. A pair of widenose (2.0 - 3.0 in.) ViceGrip style pliers may to used to bend the trailing edges as necessary (See Figure 27-20).

NOTE

Glue 1/16 in. thick rubber strips to inside of jaws of ViceGrip pliers to reduce possibility of damage to trailing edges.

A. Aileron. To correct for a left wing-heavy condition, bend right aileron trailing edge down; to correct for a right wing-heavy condition, bend left aileron trailing edge down.

NOTE

The aileron trailing edge MUST NOT BE BENT UP under any circumstance. Any deformed rivets must be replaced after trimming aileron or rudder trailing edge.

B. Rudder. The rudder trailing edge may be trimmed right or left as required.

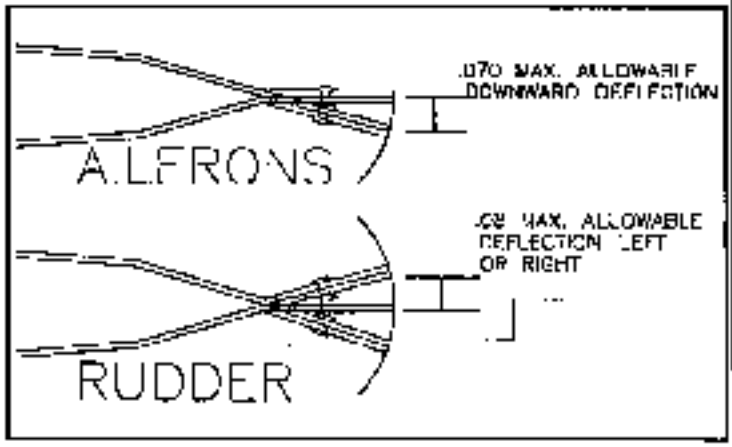
27-95-00 - STALL WARNING - MAINTENANCE PRACTICES

1. Stall Warning Switch Removal.

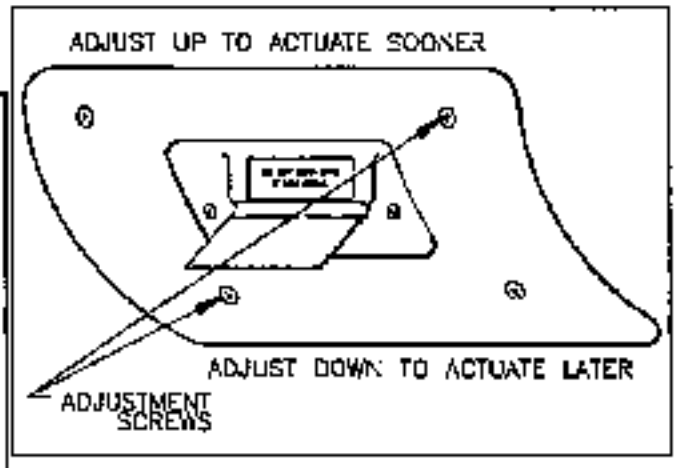
A. Remove screws or rivets attaching the access cover aft of stall switch on lower wing surface.

B. Remove two screws which secure switch to wing leading edge.

C. Disconnect two wires from the switch.



TRAILING EDGE TRIMMING - FIGURE 27-20



STALL VANE ADJUSTMENT - FIGURE 27-21A

S/N 24-0001 THRU 24-3153

2. Stall Warning Switch Installation.

A. Connect electrical wires to switch connections.

B. Position switch in opening on lower wing leading edge, install two attach screws.

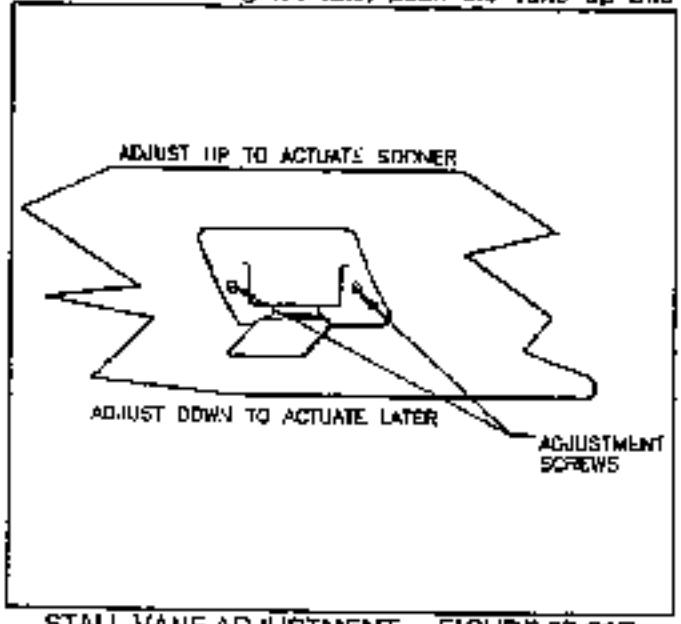
C. Replace the access cover securely.

D. Adjust the switch. See **STALL WARNING SWITCH ADJUSTMENT** (Para. 3 or 4 below).

The stall warning switch is adjusted when the airplane is last flown at the factory. Should it require readjusting, proceed as follows (Para. 3 or 4):

3. Stall Warning Switch (Vane) Adjustment
S/N 24-0001 thru 24-3153 (Figure 27-21A)

Locate the stall switch on the lower surface of the left wing leading edge and loosen the two phillips head screws, one on either side of the vane (See Fig. 27-21A). If the stall warning has been activating too early, pull the vane back and down. If the stall warning has been activating too late, push the vane up and forward. Moving the vane with the phillips head screws loosened moves the entire unit up or down inside the wing, causing the switch to be closed earlier or later. Retighten the screws after making each adjustment.



STALL VANE ADJUSTMENT - FIGURE 27-21B
S/N 24-3154 THRU 24-TBA

NOTE
NEVER TRY TO ADJUST THE SWITCH BY BENDING THE VANE. This part has been heat treated and cannot be bent without damaging or breaking the vane or switch.

4. Stall Warning Switch (Vane) Adjustment
S/N 24-3154 thru 24-TBA (Figure 27-21B)

Locate the stall switch on the lower surface of the left wing leading edge and loosen the two screws on both sides of the wing leading edge cutout (See Fig. 27-21B). If the stall warning has been activating too early, pull the vane back and down. If the stall warning has been activating too late, push the vane up and forward. Moving the vane with the phillips head screws loosened moves the entire unit up or down inside the wing, causing the switch to be closed earlier or later. Retighten the screws after making each adjustment.

GENERAL

As a rule of thumb, moving the vane tip 1/4 inch will change the time the stall warning acurates by about 5 MPH of indicated air speed. The only way to test the accuracy of the setting is to fly the airplane into a stall, noting the speed at which the warning horn comes ON and the speed at which the FULL stall occurs. The stall must be made in various configurations, clean, gear and flaps down and power on and power off. It may be necessary to make several alternate adjustments and test flights before the desired setting can be reached. The stall warning should actuate at no less than 5 KTS. nor more than 10 KTS. preceding the stall and shall continue until the stall occurs in power off configuration. The rate of speed reduction shall not exceed one knot per second with the airplane trimmed to 1.5 times the stall speed. The switch setting should be checked and adjusted as necessary whenever a wing or wing leading edge is replaced or extensively repaired, or if a new switch is installed. The switch should require no adjustment in normal service.

27-95-01 - TROUBLE SHOOTING - STALL WARNING SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Warning system inoperative.	Warning circuit breaker tripped.	If circuit breaker persist in tripping, check for grounded circuit.
	Open circuit.	Check for continuity.
	Defective warning horn switch.	Replace switch.
	Defective warning horn.	Replace horn.
Horn continues to blow	Defective warning horn switch.	Replace switch.

27-96-00 - SPEED BRAKE SYSTEM

A Speed Brake System is currently optional equipment installed on some M20J aircraft. The manufacturer, Precise Flight, Inc. can provide detail parts and maintenance information for the cartridge assemblies. Some of the electrical circuitry, wiring, relays, circuit breakers, etc. are installed by Mooney production drawings. Components for these are available through your Mooney Service Center.

The relay for the electric Speed Brake System is located under the rear seat area, on the LH bulkhead. The schematic, located in the envelope, and the electrical parts list, SECTION 91, of this S & M covers the electrical system component identification.

27-96-01 - MAINTENANCE - SPEED BRAKE SYSTEM

1. ELECTRIC OR VACUUM SYSTEMS

@ Every 1000 hours:

A. Remove the speedbrake cartridges from wing:

(1) Remove access cover from bottom of wing beneath the Speed Brake cartridge.

(2) Remove the single screw from bottom of wing which secures the strap strip of the cartridge.

(3) Disconnect vacuum or electrical connection from Speedbrake cartridge.

(4) Remove Speedbrake cartridge from wing by removing screws from top of wing from around the Speedbrake cartridge and remove the cartridge through the bottom access hole.

B. Inspect removed cartridge, mounting area and related components for the following:

(1) Visually check doubler and mounting hardware for structural integrity.

(2) Visually inspect for chafing on all moving parts.

(3) Manually operate the speedbrake doors and feel for smooth operation.

(4) Inspect cable (on vacuum units) especially around pulleys for fraying.

C. Report any deficiencies of cartridge (if any) to Precise Flight, Inc.

D. Repair any defects found. If no deficiencies of the cartridges exist, reinstall speedbrake cartridges and connections. Cycle to verify proper operation.

2. REPLACEMENT OF MALFUNCTIONING CARTRIDGES.

A. When replacement of a malfunctioning Speedbrake Cartridge with a new cartridge is necessary, the following procedures may be required to install the new cartridge:

NOTE

There is no left or right hand configuration on the electrical units. The speedbrake doors are not located in the center of the cartridge. The side of the cartridge that has the narrowest flange goes forward.

Therefore, the motor/gear assembly will be outboard on the left hand wing side and inboard on the right hand wing side.

(1) On some replacement cartridges a drain hole, (0.27 in.) is required in the aft, inboard corner of Speedbrake cartridge bottom. The drain tube from the old cartridge is to be secured in place in this hole with silicone adhesive used as sealant.

On later configuration cartridges, the drain hole already exists in the bottom of each end of the cartridge. Install drain tube in inboard hole. Some drain tubes have a heat formed flange and mounting plates to mount the tube to the hole which already exists in the new cartridge. These do not require any silicone sealant to seal the tube, however, the drain holes in the outboard end of the cartridge must be sealed with silicone sealant prior to installation of cartridge into wing.

Route drain tube through hole in bottom of access cover.

(2) The bottom, mounting strap strip from the old cartridge will require relocating to the new cartridge. After the cartridge is secured in place with the top screws, position the strap strip over the single mounting hole in the wing bottom skin. Mark the location for the two holes in the bottom of the cartridge housing. Drill proper hole (#30 drill) to install CherryMax CR3243-4-2 rivets (2 ea.) to attach strap strip to cartridge bottom housing.

(3) Door caps may need to be installed on some replacement cartridge doors in accordance with the following:

a. Mark rivet locations on flange legs of all cap strips to be installed. One is located 2.0 inches from the angled end of cap strip and another is located 5.0 inches from the angled end.

CAUTION

Be certain of which cap strip goes on which door and that the angled end of cap strip matches up with angled edge of each door. (Reference existing cartridge to determine which cap strip is to be installed on a new cartridge door.)

b. Place correct door cap strips on speedbrake doors (while speedbrakes are retracted into cartridge) until flush with top of wing skin surface. Line angled end of cap strip up with angled end of speedbrake door.

c. Cycle speedbrake doors to verify sufficient clearance exists (0.0625 in.) between cap strip and wing skin and doublers.

d. Extend doors to continue with cap strip installation.

e. Drill #40 holes in cap strips and door at the locations marked in (3) a. Countersink holes on both sides of cap strips. Flush rivet in place with AN426A-3-7 rivets.

3. FINAL OPERATIONAL CHECK AND CLOSE-UP

A. After verification of proper operation, reinstall access cover plate on each wing.

CHAPTER 28

FUEL

CHAPTER 28

FUEL

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CHAPTER 28

FUEL

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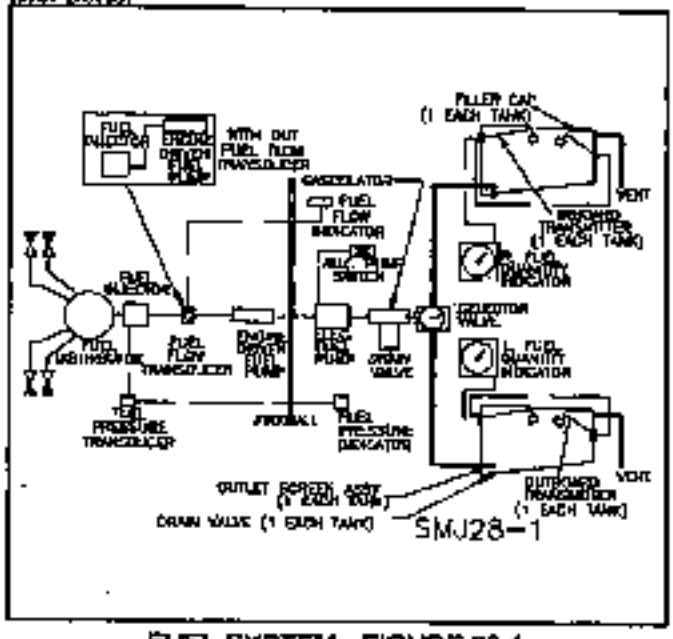
28-00-00 - GENERAL

Internally sealed, integral fuel tanks are in the forward inboard sections of the wings. Fuel feeds from either tank to a selector valve thru a gascolator, (integral with selector valve, 24-0001 thru 24-0377), with a low-point drain, through the emergency pump to the engine-driven fuel pump and to the fuel injector system on the engine. Fuel quantity indicators are electrically operated with 2 transmitters located in each tank (1 inboard & 1 outboard). Fuel level indicator tabs, at the 25-gallon level, in each tank, can be seen through the filler ports.



FUEL SYSTEM - FIGURE 28-1

Optional, visual fuel quantity gauges are located in each wing tank and are to be used only for partial fuel loading as desired. The dial is held in position by RTV #108 sealant.

Occasionally the dial may require changing due to weather fading or other damage. After documenting dial orientation on wing, pry dial from cavity. Clean cavity and secure correct, new dial into proper position with RTV #108. The float assembly which activates the magnetic portion of the dial needle as fuel level changes in the tank, can be replaced by removing the access cover that the float assembly is attached to on top side of wing and replace the float assembly.

28-00-01 - FUEL FILLER CAP ASSEMBLY MAINTENANCE

Fuel filler port cap assemblies should be checked periodically for proper sealing and should be serviced occasionally to prevent hard to open or close conditions.

1. The o'ring seal (1) (Figure 28-2) around the cap assembly should be kept clean and free of dirt or grit that might cause abrasive action on seal or mating flange. Occasional lubrication with petroleum jelly or Tri-Flow will keep the o'ring soft and pliable.

2. The shaft (2) running through the center of the cap housing, that actuates the rotating lock plate (3) should be lubricated occasionally with Tri-Flow, or equivalent, to prevent binding while opening or closing the cap assembly. This should also lubricate the o'ring (4) that seals this shaft.

WARNING
Water can enter the fuel tank through a loose fitting or damaged cap. This should be corrected as soon as possible.

3. The sealing capability of each cap assembly should be checked periodically and at each annual inspection.

This can be accomplished per the following procedures:

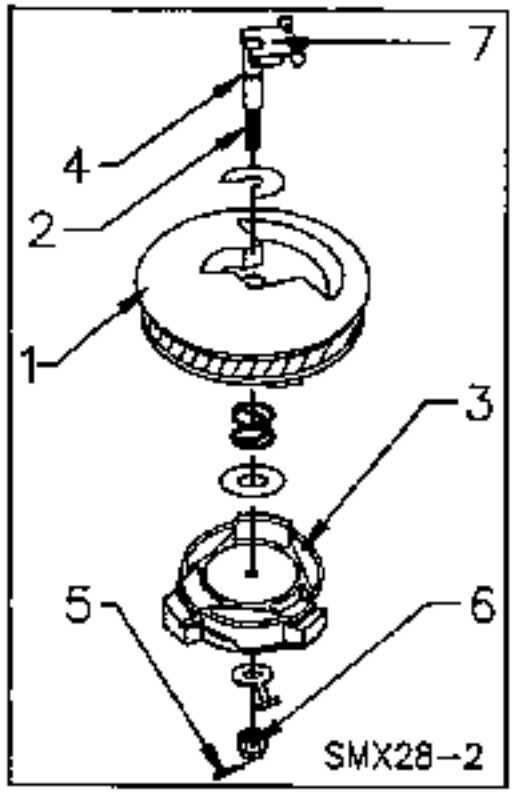
A. Remove cap assembly from wing filler port and inspect o'ring (1) for any damage or brittleness. Remove and replace if needed.

B. Adjust tension of shaft (2) and rotating lock plate (3) by removing cotter pin (5) from nut (6) on threaded portion of shaft (2). Tighten nut (6) so cap assembly handle (7) can be opened, turned and shut with hand pressure and still provide the necessary seal of cap assembly to keep water from entering fuel tank.

NOTE
Fuel selector should be in the OFF position before proceeding with paragraph C. to pressurize the fuel tanks.

C. Connect rubber hose to each tank's vent line. Apply only one-half pound (1/2 lb.) air pressure. Check for fuel cap leaks by soaping circumference of filler cap assembly and observing bubbles. Replace o'ring if bubbles are observed and adjustment of the nut does not stop the leak.

CAUTION Use only one-half (1/2) pound of air pressure in tank.



FUEL FILLER CAP ASSEMBLY MAINTENANCE - FIGURE 28-2

28-10-00 - STORAGE

28-11-00 - FUEL TANK FIELD REPAIR

This paragraph outlines the procedures recommended for repair of the integral fuel tanks. Tank repairs should not be attempted until these instructions are fully understood. Refer to Service Bulletin M20-230 during resealing of the tanks for drain holes to be left open.

1. Approved Materials.

A. Sealants.

WARNING

Sealants are safe only when handled with reasonable care. Avoid ingestion and all contact with the body, especially with open breaks in the skin. Wash hands before eating or smoking. If accelerator contacts the skin, flush area with warm water.

(1) Brush sealant - PR1422-A-1/2 or A-2 or CS3204 A-1/2, A-2 (MIL-S-8802D Class A).

(2) Filleting Compound - PR1422 B-1/2, B-2 or CS3204 B-1/2, B-2 (MIL-S-8802D Class B).

(3) Removable access panel sealant - PR1403-G-B2, PR1428 or CS3330.

(4) Protective sealant - PR1005-L (MIL-S-4383B).

B. Gloves — Polyethylene

C. Metal cleaning solvent - Turco 857 wipe solvent.

D. Cheese cloth.

E. Turco leak detector or bubble fluid.

F. Methyl ethyl keytone (MEK) (thinner for PR 1005-L).

NOTE

Approved materials may be obtained from your local Mooney Marketing or Service Center. Sealants may also be obtained from Products Research Co., 5454 San Fernando Road, Glendale, CA 91209; or Chem Seal Corp., 11120 Sherman Way, Sun Valley, CA 91352.

2. Handling and Mixing Sealants.

A. Sealant Material Characteristics.

(1) Application life is the time that the mixed compound remains suitable for application. Application life ratings are always based on standard conditions of 75 degrees F. and 50 percent relative humidity. For every 10 degree F. rise in temperature, application life and cure time is reduced by half; for every 10 degree F. drop in temperature, application life and cure time is doubled. High humidity at the time of mixing slightly reduces the sealant application life.

(2) Maximum unopened container life, with sealant at 80 degree F., is six months.

(3) Sealant application life, tack-free curing time, and curing rates are as follows:

a) - Brushable Type Sealant

CLASS A	Tack-Free Time (HOURS)	Cure Rate (HOURS)	Application Life (HOURS)
PR1422 A-1/2	10	30	1/2
PR1422 A-2	36	72	2
CS3204 A-1/2	8	30	1/2
CS3204 A-2	24	72	2
PRO-SEAL 890-A1/2	10	30	1/2
PRO-SEAL 890-A2	36	72	2

(b) Filleting Compound (and on wing walk access panel)

CLASS B	Tack-Free Time (HOURS)	Cure Rate (HOURS)	Application Life (HOURS)
PR1422 B-1/2	10	45	1/2
PR1422 B-2	36	72	2
CS3204 B-1/2	8	30	1/2
CS3204 B-2	24	72	2
CS3204 B-4	36	76	4

Follow procedures accompaning sealant to properly seal fuel tanks.

(c) Access Door Sealant (except on wing walk access panel)

CLASS B	Tack-Free Time (HOURS)	Cure Rate (HOURS)	Application Life (HOURS)
CS-3330-B	8	16	2
PR1403-G-B2	10	48	2
PR1428-B	8	16	2

(d) Brushable Top Coat Protective Sealant

	Tack-Free Time (HOURS)	Cure Rate (HOURS)	Application Life (HOURS)
PR1005L	1/3	4	—
CS3600	—	—	—

Allow 24 hours cure time prior to refueling tanks.

B. Sealant Mixing

(1) For best results, use kits with proper proportions of base compound and accelerator.

(2) To avoid excessive air entrapment, slowly stir accelerator into base compound. Continue mixing for SEVEN to TEN MINUTES. Scrape sides and bottom of container to include all compound in mixture and to insure uniform blending. Scrape mixing paddle on edge of container to remove unmixed compound. Be sure to use all of the accelerator.

(3) Place a small amount of mixture on a clean strip of aluminum and spread sealant. Visually examine sealant film to determine whether accelerator is visible in particle form. If particles of accelerator are visible, continue mixing operation. If coarse particles of accelerator persist after mixing thoroughly, reject the mixed batch.

NOTE

Sealant in tube form have mixing instructions on each tube. Read and comply with these mixing instructions prior to sealant application.

3. Cleaning Surfaces to be Sealed.

A. Clean metal surfaces to be sealed with Turco 657 Wipe Solvent or Methyl Ethyl Ketone. Wipe surface dry with a clean cloth.Do not allow solvent to evaporate.

B. Allow cleaned surface to dry five to ten minutes before sealant application.

NOTE

Apply sealant as soon as possible after cleaning. Store and handle parts in a manner that will prevent finger prints, dust, dirt, or other foreign substances from accumulating on surfaces to be sealed.

NOTE

Refer to Mooney SB M20-230 for proper application and drain holes to be left open.

4. Sealant Application. Old sealant must be removed. Use a sharp non-metallic scraper (formica or lexan). When sealant has been removed, clean area thoroughly and reseal tank as follows:

A. Fillet Sealing.

(1) Be certain that the surface to be sealed is totally clean and free from oil, grime, finger prints, etc.

(2) Refer to (Figure 28-3) for typical fillet size.

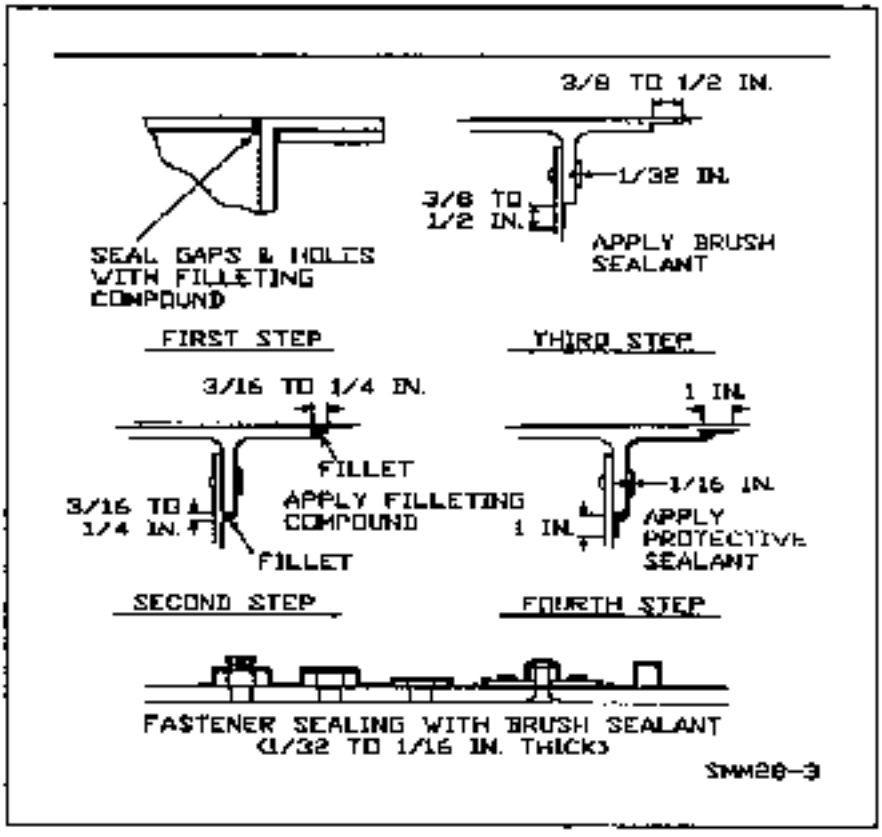
(3) Join fillets laid on intersection joints to produce a continuous fillet.

(4) Seal all difficult and hard-to-reach areas first to preclude the possibility of their being overlooked or improperly sealed.

B. Filleting Compound Application - (PR1422 B-2)

(1) Use a spatula or an extrusion gun with a 1/8 - to 1/4 - inch nozzle opening for laying fillets at edges of all seams. When using an extrusion gun, hold gun perpendicular to seam so that extruded sealant will pack tightly.

(2) Use a spatula to pack sealant firmly in place while working out air pockets. Shape each fillet evenly.



FUEL TANK SEALING - FIGURE 28-3

C. Brush Sealing.

(1) Brush sealant (PR1422-A-1/2, A-2 or CS3204 A-1/2, A-(2) over all seams, rivets, nuts, and bolts. A one inch stiffbristle brush is recommended for sealant application. Force sealant into all gaps with brush strokes parallel to seams. Use a circular brush action to deposit an even coating of sealant around rivets, nuts, and bolts. Coating should be approximately 1/32-inch thick. Use considerable brush action to force sealant into all small crevices and to obtain good adhesion. Air pockets under the sealant, that will open up in the form of holes or voids soon after application, will result from improper application. To repair holes or voids, press sealant in place using a spatula.

(2) When the edge of a flange protrudes 0.040 inch or less, or where the seam cannot be clearly defined, apply two 1/32-inch brush coats. Allow the first coat to cure about four hours or until it becomes rubbery before applying the second coat. The second coat should overlap the edges of the first coat by about 1/4 inch.

D. Protective Sealant.

(1) Using short, even strokes, brush on a smooth and continuous coat of PR1005-L over sealant. The protective sealant coat should extend one inch beyond edge of the filleting compound.

(2) Allow the first protective coat to cure 20 minutes at 75 degree F., or until tack-free; then apply a second brush coat of PR1005-L. Make every effort to obtain a completely bubble-free, continuous top coat. DO NOT REBRUSH over areas, as doing so will only cause dragging and will break coating continuity.

E. Upper Wing Tank Access Panel Sealing.

(1) Apply a coat of access door sealant (CS3330, PR1428 or PR1403-G-B2) to either faying surface using a short stiff bristle brush, spatula, or extrusion gun. If an extrusion gun is used, smooth the sealant with a brush or spatula. Cover the entire faying surface with a sealant coat of sufficient thickness (1/32 to 1/16 inch) to assure extrusion along the edges of the faying surface when the mating parts are assembled. Access panels in wing walk area should be sealed with PR1422, Class B filleting compound.

(2) Assemble parts immediately after application of sealant and tighten screws to obtain as near as possible a metal-to-metal contact.

(3) Remove the extruded sealant from the wing surface after installing the fasteners.

28-12-00 - FUEL TANK LEAK REPAIR

1. Leak Description. It is necessary to periodically inspect the fuel tanks. Inspection is particularly important in confined areas of the aircraft that are not exposed to the airstream. Identification and classification of fuel leaks that occur in both confined and open areas is necessary to differentiate between those leaks that require repair before flight and those which do not constitute a flight hazard. The size of the wetted area around a leak is an indication of the leak intensity. All fuel leaks must be recorded by describing the location and intensity of the leak in the aircraft log book.

2. Classification of leaks as to Intensity and Location. (Refer to Figure 28-4).

A. Intensity Classification.

(1) Stain—A slow fuel leak that tends to evaporate as soon as it is exposed to air.

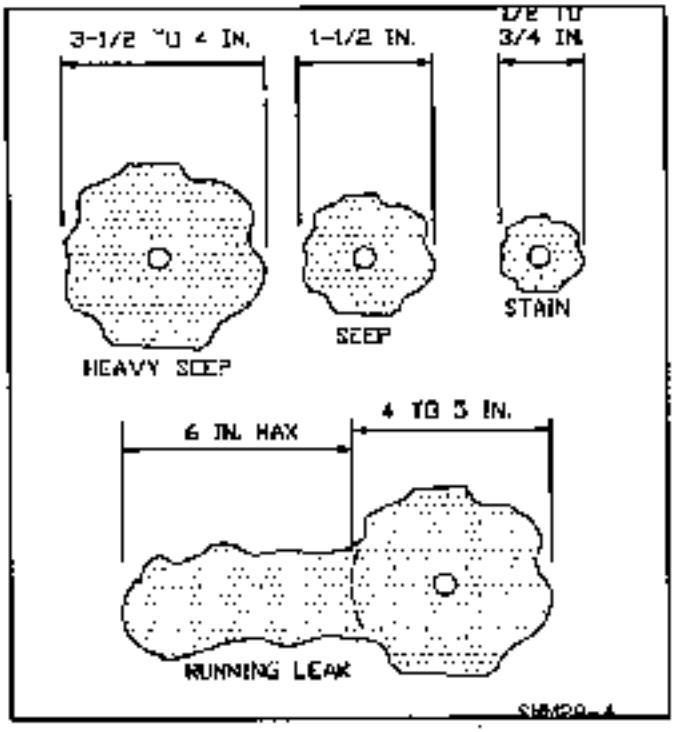
(2) Seep—A fuel leak that reappears shortly after area is wiped clean.

(3) Heavy Seep—A fuel leak that reappears immediately after area is wiped clean.

(4) Running Leak—A fuel leak that flows steadily.

B. Location Classification.

(1) Slow-to-heavy seeps occuring in open areas, such as wing surfaces exposed to the airstream, are leaks which do not constitute a flight hazard and need not be repaired prior to flight, providing the condition causing the leak cannot result in a leak of greater intensity during flight. Seeps considered permissible for flight must be frequently inspected to insure that no increase in intensity has occured.



FUEL LEAK CLASSIFICATION - FIGURE 28-4

(2) A running leak and any leak in a confined area that is not exposed to the airstream should be repaired before the next flight.

3. Leak Detection.

A. External Leak Detection After Refueling. To be able to trace a leak from where it appears on an outer tank or wing skin to its true source inside the tank, the exact point where fuel is escaping from tank, must be determined.

(1) Use compressed air to blow and evaporate fuel from seams and crevices of leak area. Attempt to define exact point where fuel is escaping from tank.

(2) Small seep leaks can be traced with raw edges of torn paper. The fuzzy edge absorbs fluid and gives a good visual indication of fuel presence when brought in contact with suspected leak points.

(3) After tracing leak to its exterior source, mark location and drain fuel tank.

B. Internal Leak Detection. To make a permanent repair, it is mandatory that the true source of the interior leak be located. The fuel tank is a network of seams, and fuel may flow through or along a seam or from one seam to another. Fuel may channel a few inches or several feet to where it appears on external skin surface.

(1) Enter tank through inspection access panels and inspect sealant in general area of outside leak point. Look first for bare seams, rivets, and bolts in difficult-to-seal areas. Inspect sealant for blisters, pin holes, cracks, splits, and loss of adhesion. Mark all suspected flaws with masking tape.

(2) Test each suspected flaw from inside tank using compressed filtered air at 20 to 30 PSI. Hold air nozzle against flaw and closely check outside leak point for evidence of fuel.

(3) After testing each suspected flaw from inside tank as outlined above, and if no leak source can be discovered, apply soapless bubble fluid to exterior and again apply air pressure to flaws from inside tank.

(4) If above tests fail to locate leak source, apply air pressure (10 PSI MAX) to external leak point after removing all traces of fuel from tank and applying soapless bubble fluid to tank interior seams per Section 28-13-00.

4. Leak Repair.

A. Temporary Repair of Fastener Leaks. Generally, all leaks in enclosed areas and running leaks in open areas constitute a flight hazard. Fastener leaks of this category may be temporarily repaired by applying a sealant fillet over fastener head on fuel tank exterior. For a temporary repair to be satisfactory, structural integrity must be retained in leak area. To make a temporary fastener-leak repair:

(1) Remove enough fuel from tank to drop fuel level below leaking fasteners.

(2) Clean fastener head and adjacent surface with Turco B57 Wipe Solvent or MEK and dry thoroughly. Fastener head and adjacent metal must be entirely free from paint, dirt, and oil.

(3) Apply a 1/8 inch thick coat of PR1422 (or CS3204) B-1/2 or B-2 over head and around fastener.

(4) Allow sealant to cure until firm and rubbery.

(5) Refill tank and examine repair periodically. If leak recurs, sealant must be removed and area recleaned prior to making another temporary repair.

B. Permanent Leak repair. If leak source is found to be around a rivet or threaded fastener the repair procedure shall be to restrike rivet or retorque fastener to maximum permitted torque value. ANY ONE RIVET MAY BE RESTRUCK ONLY ONE TIME. If leak continues, replace the rivet.

(1) Repair any sealant damage due to restriking or retorqueing a fastener.

(2) Remove sealant in immediate area of leak source using a sharp, non-metallic tool. A chisel-shaped formica tool is recommended. Scarf or taper ends of existing sealant so that new sealant can form a continuous and smooth overlap.

(3) Thoroughly clean repair area using Turco 657 Wipe Solvent or MEK. Wash one small area at a time. To prevent redeposit of oil and dirt on surface, dry with a clean cloth before solvent evaporates.

NOTE

Always pour solvent onto wash cloth to prevent contamination of solvent supply; do not dip cloth into solvent.

(4) Thoroughly dry clean area by flowing filtered air over immediate area until there is no possibility of solvent or fuel entrapment under adjacent sealant.

(5) Apply sealant as required for repair (See Figure 28-3). Repaired fillets must be blended into existing fillets with a spatula or an appropriate tool.

(6) Allow all repaired sealant to cure tack-free and apply two brush coats of PR1005-L to repair area (Refer to paragraph 28-11-00.4.D.).

28-13-00 - SOAPLESS BUBBLE FLUID FORMULA PREPARATION FOR LEAK CHECK

1. Materials.

A. Three ounces of either sodium bichromate, potassium chromate, or potassium dichromate.

B. Three and one-quarter ounces Thickening Wax (Carbo Wax 1500).

C. Thirteen ounces Alkaryl Sufonate wetting agent.

D. Distilled water.

2. Solution Preparation.

A. Mix one of the compounds listed in item (A) above with one cup distilled water.

B. Mix item (B) above with one cup distilled water.

C. Mix item (C) above with four to four and one half gallons distilled water until wetting agent dissolves completely.

D. Mix the three ingredients (A), (B) and (C) together and add enough distilled water to make five gallons of solution.

NOTE

Amount of each ingredient may be reduced for a smaller quantity of solution. Solution life is about one week.

CAUTION

Soapless bubble fluid is slightly corrosive and must be completely removed by washing freely with water followed by scrubbing.

CAUTION

S/N 24-1038 and later model aircraft: When removing lower inboard access panels, caution should be exercised during removal so fuel outlet tubes will not be damaged or bent.

28-14-00 - FUEL ADDITIVES

Under certain conditions of temperature and humidity, water can be present in the fuel in sufficient quantities to create ice formations within the fuel system.

To prevent this, add ISO-PROPYL Alcohol to the fuel supply in quantities not to exceed 1% of total fuel volume per tank.

CAUTION

Ethylene glycol monomethyl ether (EGME) or other additives are not recommended due to potential deteriorating effects within the fuel system.

28-20-00 - DISTRIBUTION

The fuel system includes of two fuel pumps, an engine driven pump and an electrically driven auxiliary boost pump. The boost pump is connected to a switch on the instrument panel.

28-21-00 - FUEL BOOST PUMP REMOVAL AND INSTALLATION

1. Auxiliary Electric Boost Pump Removal.

A. Remove electrical leads.

B. Turn fuel selector valve OFF.

C. Disconnect inlet and outlet fuel lines.

D. Remove fuel pump.

2. Reverse the removal procedure for reinstallation.

CAUTION

Do not run pump dry for more than 15 seconds.

NOTE

Refer to S.B. M20-222 (latest revision) when replacing fuel boost pump. (Ref. A.D. 80-13-03)

CAUTION

Mixture control should be in IDLE CUTOFF position to check operating pressure, however do not operate the boost pump for more than a few seconds to prevent excessive flooding of the engine.

NOTE

When the aircraft will not be flown for a period of time, refer to Section 10-10-01 thru 10-10-03.

28-22-00 - SELECTOR VALVE AND GASCOLATOR SCREEN CLEANING

1. Fuel selector and drain valve screen or gascolator screen should be cleaned every 50 hours. Both valves are safety wired, (notice should be taken of exact wiring technique before removal) and upon completion, rewiring should be identical to original installation.
To clean fuel selector screen,

(a) Remove left hand exhaust cavity,

(b) Turn selector valve to off position,

(c) Remove AN-3 bolt from center of bottom of valve,

(d) Remove bowl and clean, (e) Reverse process to re-install taking care not to damage o-rings seal. (Torque AN-3 bolt 15 to 20 inch pounds per Service Bulletin M20-200).

2. S/N 24-0378 & On: Gascolator screen removal and cleaning: Remove belly skin just aft of nose wheelwell; turn selector valve to off position; remove safety wire on bottom nut and remove nut; remove sump and screen by pulling down; clean screen and reverse process to reinstall (take care not to damage O-rings); lubricate O-rings with clean engine oil before installing. Torque 15 to 20 inch pounds per Service Bulletin M20-200.

28-23-00 - FUEL INJECTION SYSTEM

The Bendix RSA-5AD1 fuel injection system measures airflow and uses an airflow signal in a stem-type regulator to convert the air pressure into a fuel pressure. This fuel pressure (fuel pressure differential), when applied across the fuel metering section of the fuel injector (jetting system), makes fuel flow proportional to airflow. The injection system is comprised of the injector, flow divider, air-bleed nozzles, and associated lines and fittings.

CAUTION

Fluid can easily enter the air section of the injector through the impact tubes or the annular groove around the venturi. For this reason, a protective covering should be installed on the induction air intake when performing engine maintenance, such as washing down the engine and induction air ducts or when injecting preservative oil into the engine and fuel injector prior to storing or shipping.

28-24-00 - ENGINE PRIMING

The Lycoming fuel injection controls do not include an engine primer. Fuel will be sprayed into the intake manifolds whenever there is pressure in the fuel system and the mixture control is open. It is necessary, therefore, to exercise caution when operating the boost pump to be sure that the mixture control is in the IDLE CUTOFF position.

28-25-00 - FUEL SELECTOR VALVE REMOVAL & INSTALLATION

1. (For S/N 24-0001 thru 24-0377) The fuel selector valve is below the left floorboard just aft of the firewall.

A. Disconnect right and left inlet lines at valve body.

B. Disconnect outlet line at valve body.

C. Remove clevis pin from valve control linkage.

D. Loosen set screw on fuel valve drain control.

E. Remove bolts from supporting bracket at floorboard and beam.

F. Reverse the selector valve removal procedure for reinstallation. Pressure check fuel system for leaks after installation.

2. (For 24-0378 thru 24-TBA) The fuel selector valve is located aft of the console below the floorboard.

A. Drain both fuel tanks.

B. Disconnect right and left inlet lines at valve body.

C. Disconnect outlet line at valve body.

D. Remove handle above floorboard in fuel selector pan.

E. Remove screws mounting valve to the tubular structure

F. Remove valve.

G. Reverse the selector valve removal procedure for reinstallation. Pressure check fuel system for leaks after installation.

NOTE
It is recommended that the fuel selector valve be replaced each 500 hours of operation or if the valve becomes difficult to operate. (Anderson-Brass Valve only)

28-26-00 - FUEL FILTER

Fuel filter should be inspected, cleaned or replaced at each annual or 100 hour inspection. (See TroubleShooting Chart)

28-30-00 - DUMP

The fuel tanks can be emptied for maintenance purposes by:

(1) removing the sump drains in the lower panel of each fuel tank and allowing fuel to drain into suitable container or

(2) disconnect the fuel line at outlet of the fuel pump; use boost pump to transfer fuel from both tanks into a suitable storage container.

28-31-00 - FUEL SYSTEM DRAINS

Fuel drains are installed in the inboard corners of the wing tanks and at the fuel selector valve or gascolator, the lowest point in the fuel system. The engine manifold and engine-driven fuel pump drains join at a juncture on the right side of the engine. A single drain line dumps fuel overboard below the cowling. Tank drains are recessed and spring loaded. An O-ring at the lower flange seals the valve seat.

28-32-00 - FUEL VENTS

The fuel tanks are vented from the outboard upper edge. This vent is routed outboard and is vented overboard through a NACA vent on lower wing surface. To check fuel tank vents:

1. Block entire fuel tank vent by slipping a short length of rubber hose over tube and projecting below wing lower surface.

2. Remove fuel tank filler cap; blow gently into rubber hose. Air should be felt coming out of filler port.

3. If stoppage is found, clear vent prior to flight since fuel starvation could result from vent stoppage.

NOTE
It is important that the fuel tank vent tube protrude only enough to be flush with lower wing skins.

28-40-00 - INDICATING

28-41-00 - FUEL QUANTITY INDICATING TRANSMITTERS

The fuel quantity indicating system has two fuel quantity transmitters in each wing tank, one on I/B wing tank rib and one on O/B wing tank rib. The transmitters are electrically connected to the fuel gauges in the cluster gauge and work in series with each other.

1. Fuel Quantity Transmitter Removal.
Drain fuel from tank. Reference 28-30-00.

A. I/B Transmitter removal

(1) Remove Pilot or Co-Pilot seat as needed.

(2) Remove Interior panel, LH or RH as needed.

(3) Locate & remove transmitter wires.

(4) Remove six screws attaching transmitter to rib doubler.

(5) Remove transmitter from rib.

B. O/B Transmitter removal

(1) Gain access through lower access cover outside of tank area.

(2) Locate & remove transmitter wires.

(3) Remove six screws attaching transmitter to rib doubler.

(4) Remove transmitter from rib.

2. For REINSTALLATION, reverse the fuel quantity transmitter removal procedure.

A. A calibrated, certified torque application devise must be used to install the fuel quantity transmitters.

B. Snug each screw, then **TORQUE each screw to 20-25 INCH LBS. in a cross flange-random order.**

C. The torque and screw clamp load will naturally relax as the gasket flows to a normal condition. NEVER RETORQUE JUST TO RESTORE THE 20-25 INCH LBS.

"DO NOT OVER TORQUE"
— DO NOT RETORQUE UNLESS LEAKING —

D. Excessive torque or retorquing may warp or distort the transmitter mounting flange and cause a malfunction.

E. Make certain wire from outboard transmitter goes under head of insulating sleeve against the inboard transmitter flange and not under the mounting screw head.

F. System voltage should NOT BE APPLIED to the transmitter terminal. The exicitation from the fuel quantity indicator must be current and voltage limited and incapable of causing ignition of fuel vapor if transmitter wire is inadvertently shorted to ground.

G. Care must be taken to insure that the bottom nut on the terminal stud is not disturbed when the electrical connection is made. This bottom terminal stud nut torque is factory set to provide the correct terminal stud seal preload.

H. Other nuts on the electrical terminals should be tightened as follows:

#6 - 6 in. lbs./ #8 - 12 in. Lbs./ #10 - 14 in. lbs.

28-42-00 - FUEL QUANTITY INDICATOR

Two fuel quantity gauges are in the instrument cluster gauge. These gauges indicate pounds or gallons of fuel remaining. Each gauge operates by the change in resistance of two transmitters located in the fuel tanks.

28-43-00 - FUEL QUANTITY ADJUSTMENT PROCEDURE

28-43-01 - FUEL TANK TRANSMITTER ADJUSTMENT

AIRCRAFT MUST BE LEVEL TO CALIBRATE FUEL GAUGES

NOTE
See Section 24-33-00 for low fuel calibration.

(PRIOR TO S/N 24-1050 - approximately)

1. Fuel tanks-EMPTY.

2. Add unusable fuel (1.3 Gal.). Indicator should read "E" to 1/2 needle width below "E". Inboard floats may be adjusted by holding arm near transmitter and bending outer arm, (do not bend by forcing arm against stops).

3. Add 2 1/2 to 3 gal. (part of additional 8 gal. required for 1/4 gauge reading). Adjust low fuel warning trimmer in annunciator panel so that warning light just comes on (see Section 24-33-00, 4. A and B).

4. Continue calibration by adding fuel in 8 gal. increments, (-1, +2 gal.) for 1/4, 1/2, and 3/4 gauge readings. Gauge to read within 1/2 needle width. Outboard float may be adjusted if required for 1/2 and 3/4 gauge readings.

5. Finish filling tank and verify total quantity less unusable fuel.

28-43-02 - FUEL QUANTITY GAUGE ADJUSTMENT (Approx. S/N 24-1051 THRU 24-TBA)

Cluster gauges installed on MID 1981 aircraft and any spare units installed on earlier aircraft have this adjustment.

1. Remove plastic plugs from holes in top left of cluster gauge case. With "unusable" fuel in tanks, adjust pot marked "null" so gauge reads "E". If intermediate or "F" indications are out of tolerance as tank is filled, adjust pot marked "gain" for correct calibration.

28-90-00 - MISCELLANEOUS

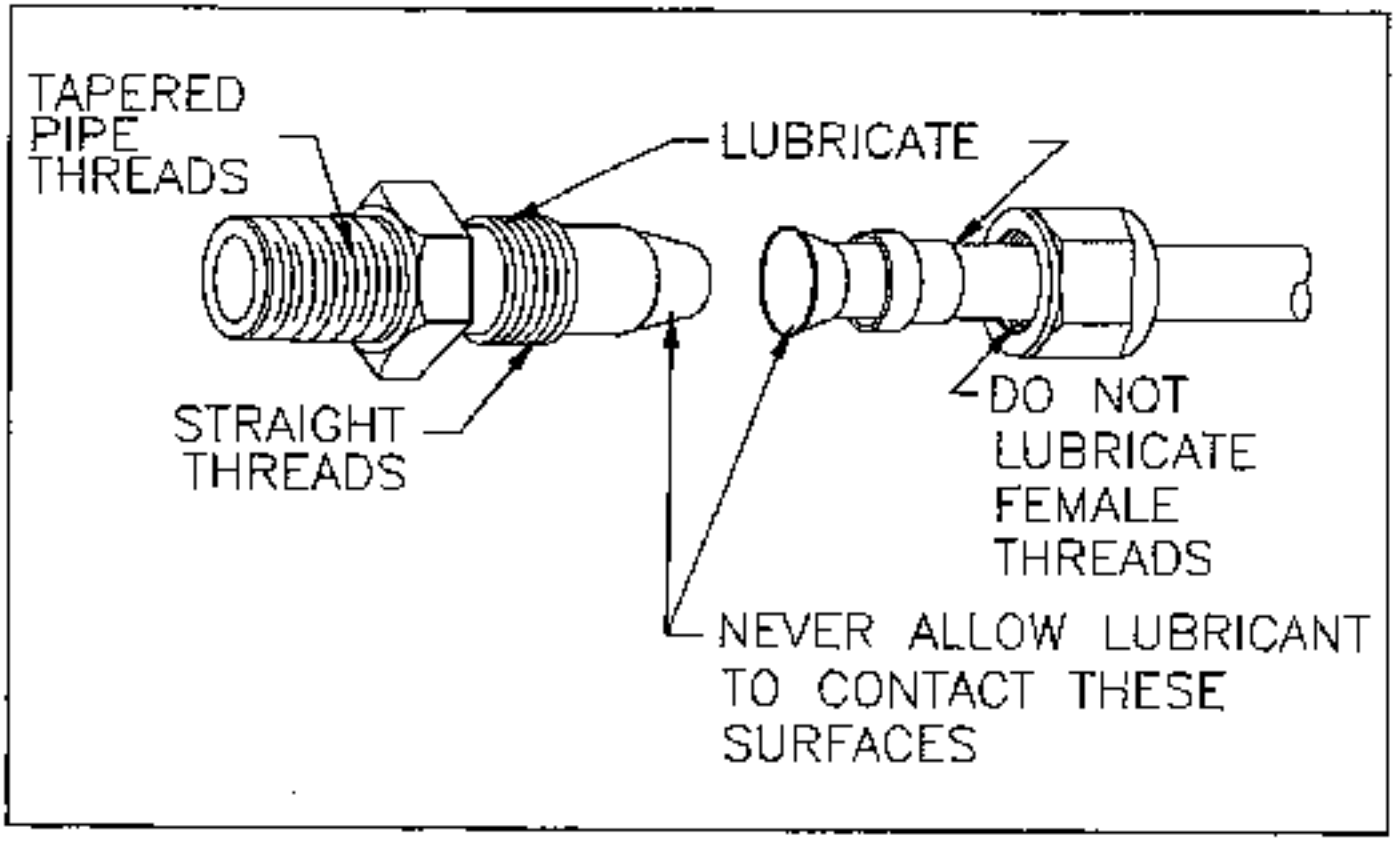
28-91-00 - TROUBLE SHOOTING

When trouble shooting, check from the power supply to the suspect item. If trouble is not located, proceed to check the item itself. If necessary, remove the item and install an identical unit tested and known to be in good operational condition.

TROUBLE	PROBABLE CAUSE	REMEDY
Fuel gauge not indicating	Broken wire.	Check and Repair.
	Faulty transmitting unit.	Replace.
	Open circuit breaker.	Check and reset.
Fuel gauge indicates full when tanks are not full.	Incomplete ground.	Check ground connection at transmitter.
	Broken wire.	Check and repair.
No fuel pressure indication (calibrated test gauges connected.	Tank empty.	Check and service tank.
	Defective fuel pump.	Check pump for proper pressure buildup. Check for obstruction in boost pump screen. Check engine fuel pump and check valve.
	Fuel Filter Clogged	Clean or replace Fuel Filter
	Open fuel line.	Repair or replace line.
	Fuel selector in "OFF" position.	Select proper position.
Fuel pressure low or surging (calibrated test gauges connected.)	Obstruction in inlet side of pump.	Check and clear fuel lines. Replace or rebuild pump.
	Faulty engine pump.	Check fuel lines and connection for leakage or damage.
	Fuel Filter partially clogged.	Clean or replace fuel filter.
	Fuel selector not in proper position.	Select proper position.
	Air leak in system.	Repair leak.

28-92-00 - FLARED FITTINGS

When installing flared fittings and hoses, make sure the threads are properly lubricated with VV-P-236 petrolatum per (Figure 28-5). When previously installed fittings are removed, they should be wiped clean and relubricated before they are reinstalled. Torque all fittings in accordance with flare fitting torque chart, Chapter 5, Figure 5-1.



LUBRICATION OF FLARED FITTINGS - FIGURE 28-5

BLANK

CHAPTER 30

ICE PROTECTION

CHAPTER 30

ICE PROTECTION

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CHAPTER 30

ICE PROTECTION

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30-00-00 - GENERAL

The M20J aircraft incorporates an alternate air system that is designed to open automatically any time the air intake system becomes blocked.

This aircraft includes as standard equipment a heated pitot tube assembly and may also include an optional electrically operated propeller de-ice system.

30-30-00 - PITOT, DESCRIPTION AND OPERATION

A standard heated pitot tube is located on the left wing at Wing Station No. 145. The pitot heat circuit breaker switch located on the panel in front of the pilots right knee supplies power to the pitot tube heating element.

30-60-00 - PROPELLERS, DESCRIPTION AND OPERATION

Propeller ice removal is accomplished by optional electrically heated de-ice boots bonded to each propeller blade.

The system uses the airplanes electrical power to heat portions of the de-ice boots in cycles controlled by a timer. The ON-OFF switch is located on the switch panel in front of the pilots right knee. A current flow is depicted,(8 to 12 Amps, 24-0001 thru 24-2999) (8 Amps, 24-3000 thru 24-TBA) on the ammeter located in front of the co-pilot at the top of the radio panel. A slight deflection of the ammeter needle may be noticed approximately every 90 seconds; this is due to the cycling action of current flow to the circuits within the boot as controlled by the timer. This is normal operation. The timer is located on the circuit breaker panel side tray above the co-pilots right knee. De-icer boot replacement should be done per B.F. Goodrich Report No. 59-728J which is supplied with the kits for replacement boots.

30-60-01 - PROPELLER DE-ICE

30-61-00 - SERVICE GUIDE

INTRODUCTION. Whether in flight or during ground testing, the ammeter can be used to determine the general nature of most electrical problems. The Trouble Shooting Chart is based, primarily, on the use of the ammeter and it is assumed that the user understands all normal operating modes of the system, (See Section IX of P.O.H.). Read all of the "Trouble" entries to locate the one matching the conditions of the system being checked. The "Probable Cause" and "Remedy" entries pertinent to each trouble are arranged in the recommended checking sequence. B.F. Goodrich maintenance Manual Report No. 66-04-712B will be required for complete maintenance actions.

30-61-01 - HELPFUL TIPS

1. Normal current is shown as a shaded range on the ammeter for each propeller De-Icer system with engine running. The ammeter reading will be slightly lower when the system is operated on battery voltage.

2. Use the "heat test" (30-64-00) and "ammeter test" (30-62-00) to determine which De-Icers are not operating. Use wiring schematic to trace circuits.

3. Excess current reading on the ammeter always indicates a power lead is shorted to ground. Thus, when trouble of this nature is found, it is vital that the grounded power lead be located and corrected.

4. A considerable number of timers have been returned for repair which proved, on test, to be fully operable. Before concluding that the timer is faulty, test it per "De-Icer Timer Check" (30-63-00).

5. For insulation resistance tests, use a "megger" ("Meg" type insulation tester, James G. Biddle Company, Plymouth Meeting, PA.) or other tester having a 500 VDC, 1000 megohm capacity.

6. Defective wiring in propeller mounted components may be indicated by normal current readings in ground checkouts (propellers not rotating) but low current with propellers rotating at cruise RPM.

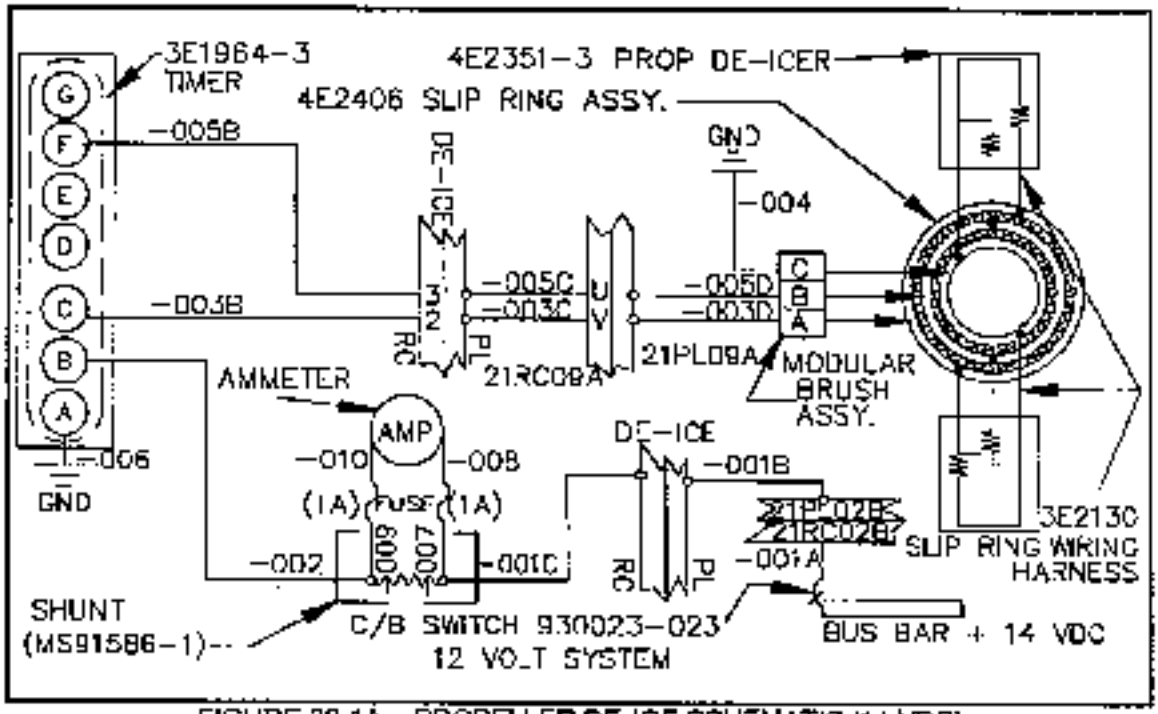


FIGURE 30-1A - PROPELLER DE-ICE SCHEMATIC (14 VDC)

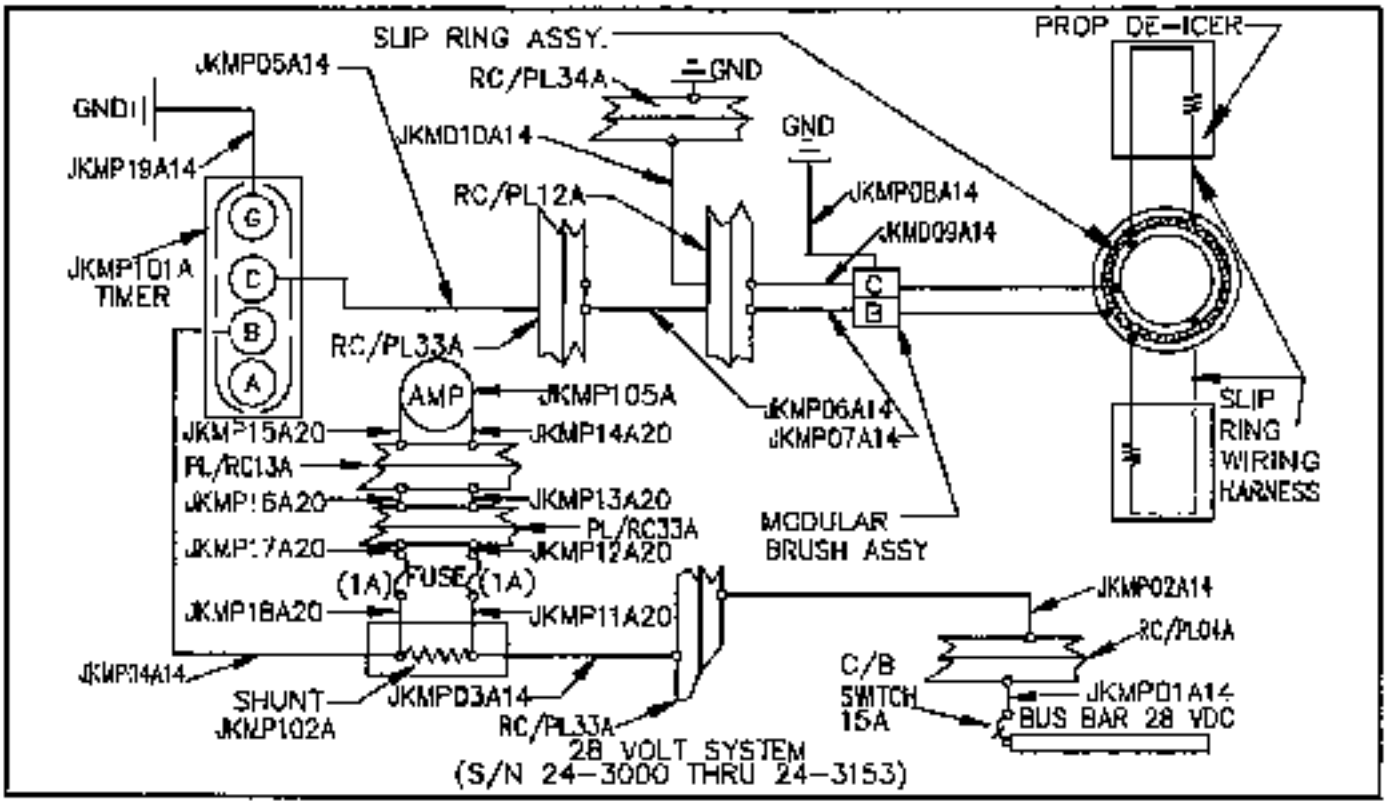


FIGURE 30-1B PROPELLER DE-ICE SCHEMATIC (28 VDC)

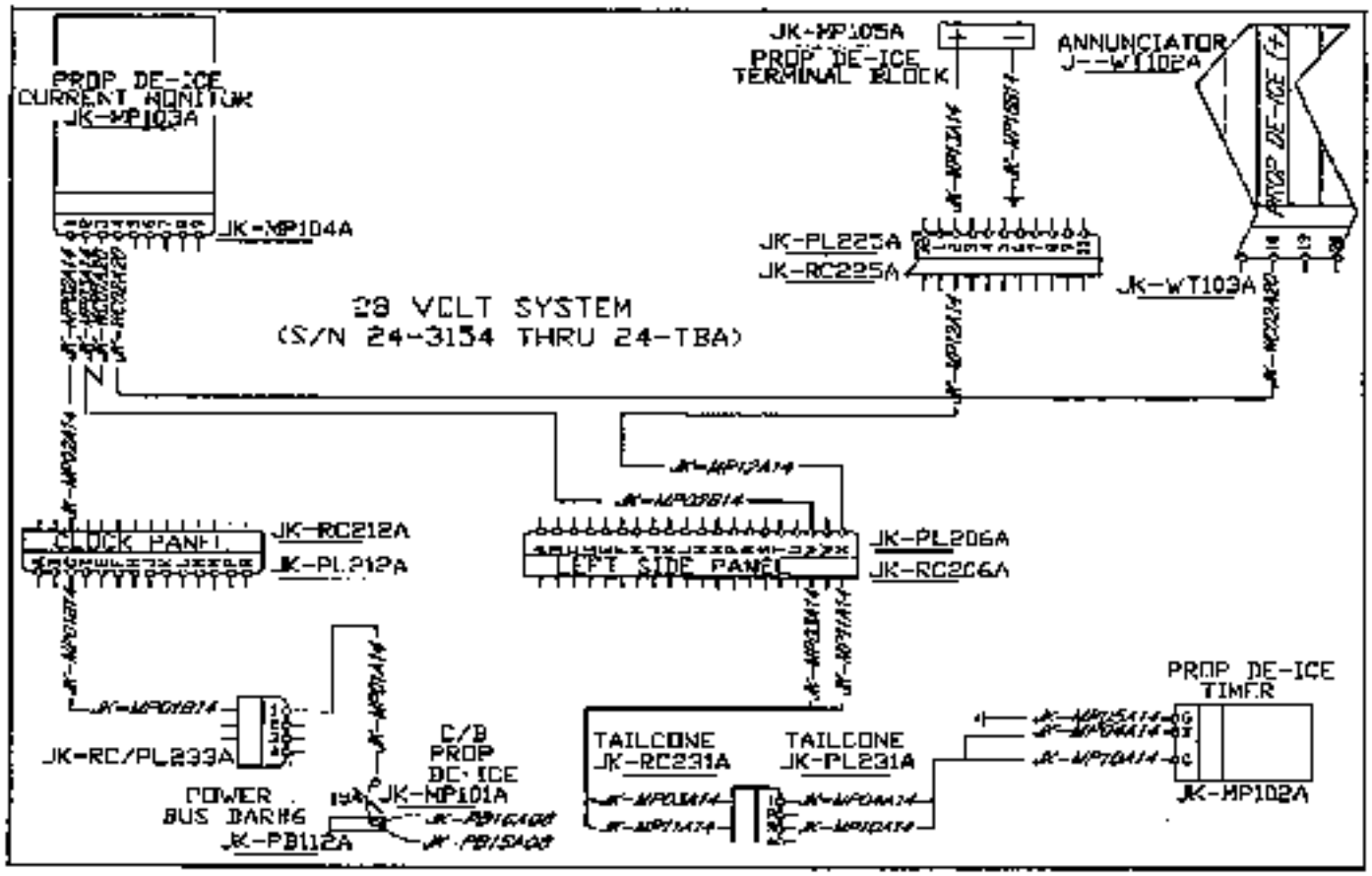


FIGURE 30-1C PROPELLER DE-ICE SCHEMATIC (28 VDC)

POWER REQUIREMENTS FOR 14 VDC SYSTEM

TIME CYCLE	ELEMENT HEATED	TIME (IN SEC'S.)	LOAD (AMPS)
D	OUTBOARD	90	8 TO 12
F	INBD	90	8 TO 12

TOTAL CYCLE TIME = 3 MINUTES

POWER REQUIREMENTS FOR 28 VDC SYSTEM

TIME CYCLE	ELEMENT HEATED	TIME (IN SEC'S.)	LOAD (AMPS)
D	ALTERNATING BLADES	90	8

TOTAL CYCLE TIME = 3 MINUTES

RECOMMENDED WIRE SIZE CHART

LOCATION	AWG SIZE	MAX LENGTH
BUSS BAR TO TIMER	#14	15 ft.
TIMER TO GROUND	#18	5 ft.
TIMER TO BRUSH MODULE BRUSH MODULE TO GROUND	#14	15 ft.
SHUNT LEADS	#20	5 ft.

30-61-02 - TROUBLESHOOTING CHART-PROPELLER DE-ICE

TROUBLE	PROBABLE CAUSE	REMEDY
Ammeter reads 0 current all phases of the timer cycle.	-No power from aircraft	If no voltage into circuit breaker, locate and correct open.
	-Tripped circuit breaker.	Locate and correct short before resetting circuit breaker.
	-Circuit breaker or switch faulty	If no voltage at circuit breaker output with voltage at input and circuit breaker does not reset, replace circuit breaker. If voltage is OK at output, check switch in same manner. If voltage is OK at switch output, go to "Ammeter Faulty".
	-Ammeter Faulty.	Test ammeter per Section 30-62-00.
	-Open in ammeter to timer circuit.	Disconnect harness at timer and check for appropriate voltage at harness Pin B,12V,Terminal C,28V to ground. If none, locate and correct open.
	-Open in timer to brush assembly(ies) circuit.	Disconnect wire harness at brush assembly and check voltage to ground from pins or leads. (See de-icing system wiring schematic for power and ground lead and pin identification.) If low or no voltage,locate and correct open or high resistance in wire harness.

TROUBLE (cont.)	PROBABLE CAUSE	REMEDY
		Check continuity from appropriate pin or lead to ground; if high resistance is indicated, check ground wire for breakage and ground connections for correctness and tightness. Correct as required
	-Open circuit to De-Icer Boot, De-Icer wire harness or slip ring assembly leads.	Disconnect De-Icer leads and check resistance per B.F. Goodrich Report No. 59-728. If not OK, replace faulty De-Icer. If OK, check for (and fix) open in slip rings leads. See Section 5-4.5, B.F. Goodrich Report No 68-04-712B. Ohmmeter needle must not flicker when leads are stretched or flexed. Replace as required.
Ammeter reads normal current part of cycle, zero current rest of cycle.	-Open circuit in wiring between timer and brush block assembly or brush assembly.	See "Open Timer to Brush Assembly" above.
	-Open in De-Icer boot or slip ring assembly lead circuits.	See "Open in De-Icer" above.
	-Timer faulty.	Test timer per Section 30-03-00.
Ammeter reads normal current part of cycle, low current rest of cycle.	-Inner and outer De-Icer Boot elements heating same phase (in series), should be in parallel..	Locate and repair incorrect lead connections. See wiring schematic.(24-0001 - 24-2999)
	-Open circuit or high resistance in De-Icer Boots, slip ring assembly leads or wire harness.	See "Open in De-Icer" above
	-High resistance in circuit with low current.	Check contact of brushes to slip rings per Section 30-66-00 or B.F. Goodrich Report No. 68-04-714; correct as indicated; check wiring from timer to De-Icers for loose or corroded connections or partially broken wiring. Correct as required.
	-Worn or dirty brushes and/or slip rings.	Inspect & clean brushes or slip ring.
Ammeter reads low current over entire cycle.	-Aircraft voltage low under normal operating conditions.	Check voltage into switch.
	-Ammeter, switch,or circuit breaker faulty.	Check voltage up to and out of ammeter, switch, and circuit breaker. Test ammeter per Section 30-52-00. Report No. 68-04-712B. If low output and input OK, replace defective component.
	-High contact resistance up to timer.	Check for partially broken wire, or loose or corroded connection in wiring between aircraft supply and timer input. Correct as required.
	-High contact resistance in timer.	Test timer per Section 3-2.4 B.F. Goodrich Report No. 68-04-712B.

TROUBLE (cont.)	PROBABLE CAUSE	REMEDY
	-One De-Icer Boot element (or wiring connections to De-Icer) in each cycle open.	Perform a heat test on each De-Icer. Turn De-Icer switch ON, and, after locating the De-Icer section being heated, follow the heating cycle, feeling each section for heating in turn. Replace defective components.
Ammeter reads excess current over entire cycle.	-Power lead shorted to ground.	Check power leads from ammeter to timer and then to De-Icers for evidence of damage or arcing. With de- icing system switch OFF and timer harness disconnected, check insulation resistance (use "Megger") to ground from timer harness Pin B. 12V, Terminal C, 24V. Disconnect harness at brush assembly and repeat check for applicable brush assembly harness connections. (See wiring schematic Section 30-60-01) If ground is indicated, locate and correct it.
	-Ammeter faulty.	Test ammeter per Section 30-62-00.
Ammeter reads normal current part of cycle, excess current rest of cycle.(24-0001 thru 24-2999) (12V)	-Short to ground or short between adjacent circuits, timer to brush block.	Disconnect leads at brush assembly and timer. With "Megger", check insulation resistance from power leads to ground and between adjacent circuits. If ground or short is indicated, locate and correct.
	-Short to ground or between adjacent timer circuits in brush block.	Electrically isolate brush assembly and test per Section 4-6, B.F. Goodrich Report No. 66-04-7123.
	-Short to propeller or short between two adjacent circuits - slip rings to De-Icers.	Isolate brush assembly. With "Megger", check insulation resistance from one ring of slip ring assembly to bare prop. Reading should be at least .5 megohms after one minute. If not OK, disconnect the slip ring leads one set at a time to trace short. If OK, disconnect slip ring leads and check insulation resistance between slip rings; reading should be at least .5 megohms after one minute. If not OK, clean assembly thoroughly with standard solvent and wipe clean with MEK and retest. Replace as required.
	-Timer faulty.	Test timer per Section 30-63-00.
Ammeter does not "cycle" each 90 seconds.	-Timer ground open; timer not cycling.	Disconnect harness at timer and check ground connection with ohmmeter from Pin A,12V; Terminal G,24V.
	-Timer contacts welded together (caused by short in electrical system).	Test timer per Section 30-63-00. If timer is faulty, repair or replace it but insure that short causing original failure has been located and corrected.
Ammeter flicks between 90 second phase periods.	-Loose connection between aircraft power supply and timer input	Trace wiring from power source to timer input. Insure that good electrical contacts are made at each connection in circuit.

TROUBLE (cont.)	PROBABLE CAUSE	REMEDY
	-Loose or poor connection; timer to De-Icers.	If trouble occurs only part of the cycle, determine which De-Icer is effected and check for rough or dirty slip rings causing brush to skip. Also, check circuits for loose or poor connections.
	-Timer cycles erratically.	Test timer per Section 30-63-00.
Radio noise or interference with De-Icers Boots ON.	-Brushes arcing.	Check brush alignment per B.F. Goodrich Report No.68-04-714. Check for dirty or rough slip rings. If so, clean, machine or replace slip ring assembly. (See B.F. Goodrich Report No. 68-04-712B, Section 5-4.)
		Check slip ring alignment per Section 4-5, B. F. Goodrich Report No. 68-04-712B.
	-Loose connection.	See 4-3.8,a. and b., B.F. Goodrich Report No. 68-04-712B.
	-Switch or circuit breaker faulty.	Place jumper wire across switch or circuit breaker; if radio noise disappears replace switch or circuit breaker.
	-Wiring too close to radio equipment or associated wiring.	Relocate De-Icer wiring at least 8" from radio equipment and wiring.
Cycling sequence not correct.	-Crossed connections between timer and De-Icers.	Check system wiring against circuit diagram.
Rapid brush wear or frequent breakage.	-Brush block out of alignment.	Check brush alignment per B. F. Goodrich Report No. 68-04-714. Correct as Required.
	-Slip ring wobbles.	Check slip ring alignment with dial indicator per Section 30-68-00.
	-Rough slip rings.	Refinish per Section 5-4, B.F. Goodrich Report No. 68-04-712B.

30-62-00 - AMMETER TEST

At some convenient point between bus bar and ammeter, connect a volt ohmmeter with an ammeter scale or a standard ammeter into the circuit and, with the De-Icer switch ON, check the amperage being used by the De-Icer system. The reading of the standard ammeter should closely agree with the reading obtained from the De-Icer ammeter. Turn De-Icer switch OFF and remove volt-ohmmeter or standard ammeter from circuit. If ammeter readings were significantly different and rest of de-icing system checks out satisfactorily, see Ammeter Checkout, Section 4-7 of B.F. Goodrich Report No. 68-04-712B.

30-63-00 - DE-ICER TIMER CHECK

Experience in the field has indicated that often the timer is considered defective when the source of the trouble lies elsewhere. For this reason, the following test should be performed before the timer is removed as defective.

1. With the wiring harness disconnected from Terminal B at the timer and the deicer switch in the ON position, check the voltage from Pin B(12V);from wire from shunt (28V) of the harness to ground. If no voltage is present, the timer is NOT at fault; however, if system voltage is present, check the circuit from harness Pin A (12V); from Terminal G (28V)to ground with an ohmmeter. If no circuit is indicated, the fault is in the ground lead rather than the timer. If ground connection is open, the timer step switch will not change position.

2. After the ground and power circuits have been checked, connect a jumper wire between pin B of the timer receptacle and terminal B of the connector plug and from pin A of the timer receptacle to ground. With the de-icing system switch ON, check the voltage to ground from pin B of the timer. The voltmeter should indicate approximately 12 volts (24-0001 thru 24-2999) or 24 volts (24-3000 thru 24-TBA) when the aircraft battery supply is being used. Next, check the DC voltage to ground from Pins D and F (12V); Pin C (24V), the points at which the system voltage is impressed in sequence to cycle power to the propeller de-icers. Each of the plugs should read 12 volts (24-0001 thru 24-2999), 24 volts (24-3000 thru 24-TBA) in sequence of cycle.

TIMING SEQUENCE	TIME ON	AREAS OF PROP DE-ICERS HEATED
Pin D	90 sec.	Outboard Section - (24-0001
Pin F	90 sec.	Inboard Section - thru 24-2999) (12 Volt A/C)
Pin C	90 sec.	Both blades ON/OFF(24 Volt A/C)

NOTE

Timer does not reposition itself to start at Pin D when system is turned off, but will begin cycling from same position as it was when turned off. Cycling will then proceed as before (24-0001 thru 24-2999).

After a voltage reading of 12 volts DC (24-0001 thru 24-2999) or 24 volts (24-3000 thru 24-TBA) is obtained, hold the voltmeter probe on the pin until the voltage drops to zero before moving the probe on to the next pin in the sequence noted above. After the cycling sequence has been established, turn the de-icing system switch OFF at the beginning of one of the "on-time" periods and record the letter of the pin at which the voltage supply is present to facilitate performance of the following test.

30-64-00 - HEAT TEST

Before this test can be performed, the jumper wire installed in paragraph 30-63-00, 2, for the timer test must be removed so that the connector plug can be replaced in the timer receptacle. Two men are required to perform this test, one in the pilot's compartment to monitor the ammeter while the other checks the De-Icer boots. The man in the pilot's compartment turns the De-Icer system circuit breaker switch ON while the man outside feels the De-Icer boots to see if they are heating properly. The man in the pilot's compartment observes the ammeter for the proper readings (8 to 12 amps)(24-0001 thru 24-2999), (8 amps)(24-3000 thru 24-TBA) throughout the timing sequence. The ammeter needle should deflect every 90 seconds in response to the switching action of the timer. Each time this occurs, the man in the pilot's compartment must notify the man inspecting the propeller De- Icer boots so that the latter can change the position of his hands to check the proper heating sequence of the propeller De-Icer areas. If any irregularities are detected, a continuity check should be performed on the wiring from the timer to the brush block holders and the propeller De-Icer terminal connections.

CAUTION

Stand clear of propeller, verify magnetos OFF. Use extreme caution during this test procedure.

30-65-00 - CONTINUITY TEST

After removing the plug from the timer, use an ohmmeter to check continuity from:

1. Pin D of the plug(12V),Terminal C (24V) to the outboard terminal of one prop boot.

2. Pin F of the plug(12V) to the outboard terminal of one prop boot.

3. Pin A of the plug(12V),Terminal G (24V) to the airframe ground.

4. Ground terminal of one prop boot to ground.

30-66-00 - BRUSH TO SLIP RING RESISTANCE TEST

To check for incorrect resistance or the presence of a short or open circuit at the brush-to-slip ring contact, disconnect the harness at the timer and check the resistance from each De-Icer circuit lead (pins D and F of the harness plug) to ground with a low range ohmmeter. If the resultant readings are not 1.55 to 1.78 ohms, disconnect the De-Icer lead straps to measure heater resistance individually. Individual boot resistance should measure between 4.58 and 5.26 ohms. If the readings in the first check are not within the accepted limits but those in the second check are, the trouble is probably in the brush-to-slip ring area. If the readings in the second check are also off, the De-Icer concerned is damaged and must be replaced.

30-67-00 - BRUSH ASSEMBLY RESISTANCE CHECK

To check for an open circuit, a short, or high resistance in the brush assembly, measure the resistance from the face of the brush to its terminal studs with a low range ohmmeter. If this resistance measures over 0.013 ohms, locate and repair the cause of excessive resistance. If the resistance is infinite, locate and correct the open circuit or ground, or else replace the brush assembly. Check the resistance between the three terminal studs. This resistance should not be less than 5 megohms.

30-68-00 - BRUSH REPLACEMENT

The propeller De-Icer brush module should be replaced when a minimum of 1/4 inch of brush material remains. It is good practice, however, to replace the modules when 3/8 inch of the brush material still remains.

(24 Volt system has only 2 modules stacked)

30-68-01 - BRUSH (MODULE) REPLACEMENT (See Figure 30-3).

1. Measure brush wear as shown (Figure 30-2); X-dimension (inches) given indicates when modules MUST be replaced.

2. Brushes are not offered, individually, as replacements. When a brush wears out, the module containing it should be replaced as follows:

A. Dismount modular brush assembly from aircraft by removing attaching hardware, and disconnect engine wire harness.

B. Remove assembly screws and separate modules and spacers.

C. The part number of each module is etched into the surface of the plastic housing; replace with the same part number module.

D. Restack modules and spacers as shown (FIGURE 30-2). Check A/B/C (12V),A/B (24V) stacking arrangement and location of spacers. If there is interference between adjacent ring terminals, reorient center module as shown (Figure 30-4).

E. On 3E2042 series assemblies, make sure flat washer is positioned between star washer and housing. Make sure that assembly is square, then tighten screws.

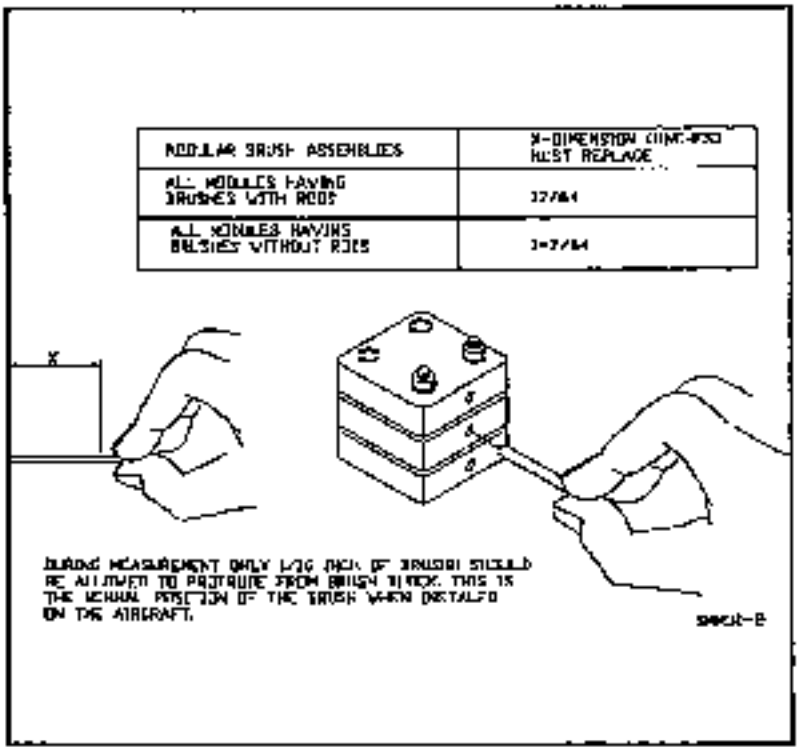
F. Reconnect aircraft wire harness to applicable "A","B",or "C" terminals of modules insure that adjacent ring terminals are not touching.

G. Install assembly on aircraft with attaching hardware removed.

H. Check assembly for proper alignment.

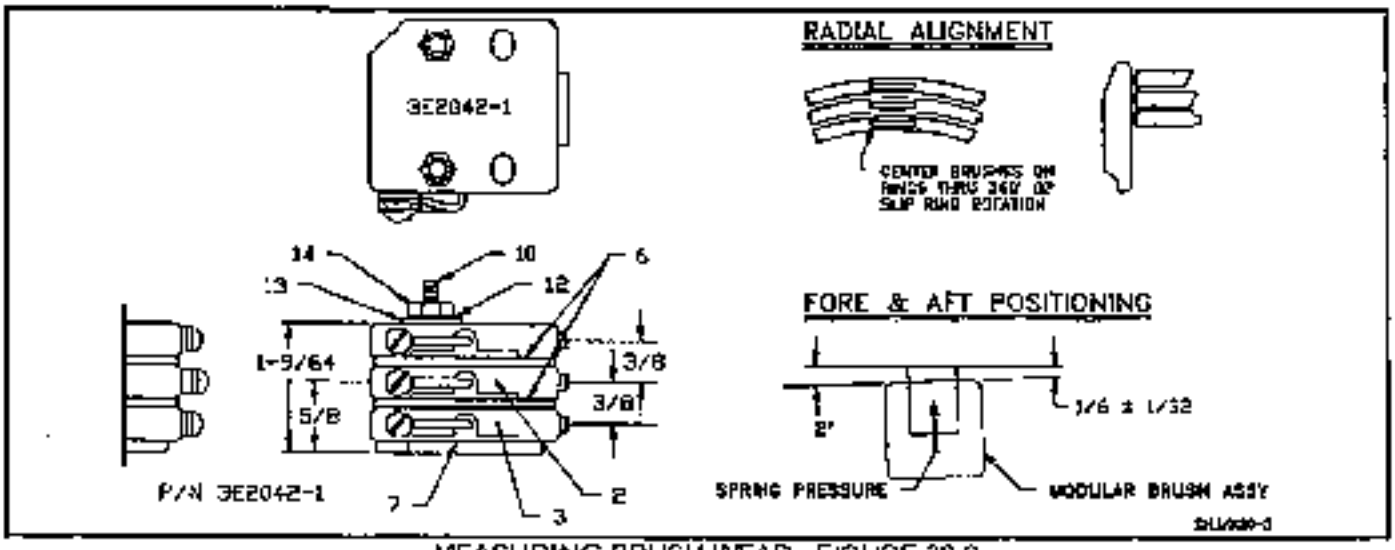
I. Refer to B.F. Goodrich Report No. 68-04-712(B) for complete maintenance information.

REFERENCE FIGURE 30-3

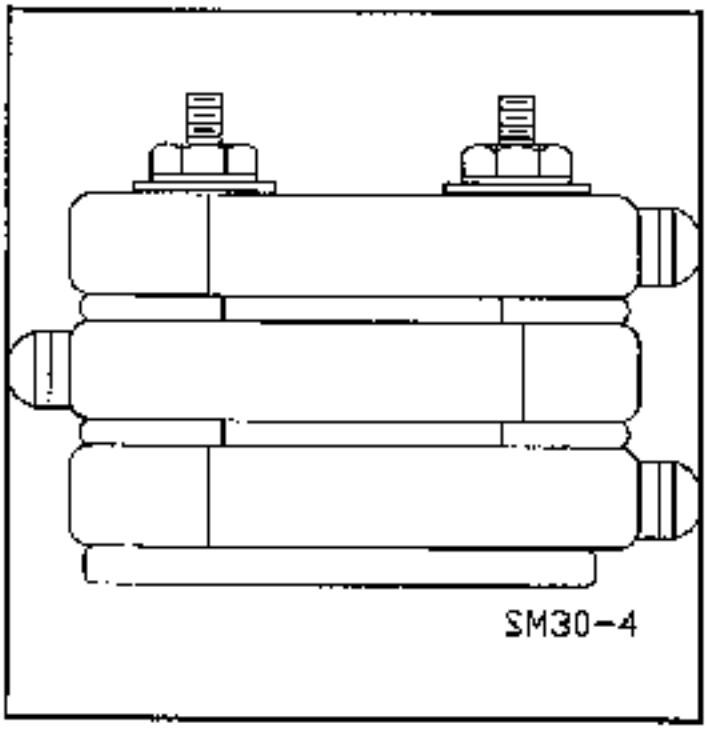


MEASURING BRUSH WEAR - FIGURE 30-2

1. Brush Assy. 3E2011-1
2. Brush Assy. 3E2011-1
3. Brush Assy. 3E2011-1
6. Spacer 4E2218-3
7. Spacer 4E2218-1
10. Screw MS24693-S35 (6-32 x 1-3/8)
12. Washer AN960C6
13. Lockwasher MS35333-7
14. Nut MS35649-262



MEASURING BRUSH WEAR - FIGURE 30-2



ALTERNATE MODULE STACKING ARRANGEMENT
FIGURE 30-2

(Only 2 modules for 24 volt systems)

30-69-00 - ALIGNMENT OF SLIP RING

To check alignment of slip ring assembly, securely attach a dial indicator to the engine and place the pointer on a slip ring (see Figure 30-5) Grasp the propeller blade and rotate it slowly, noting the deviation of the slip ring from a true plane as indicated on the gauge. Check that the total run-out does not exceed 0.010 inch (+/- 0.0025 inch) for reciprocating engines within any 4 inches of slip ring travel.

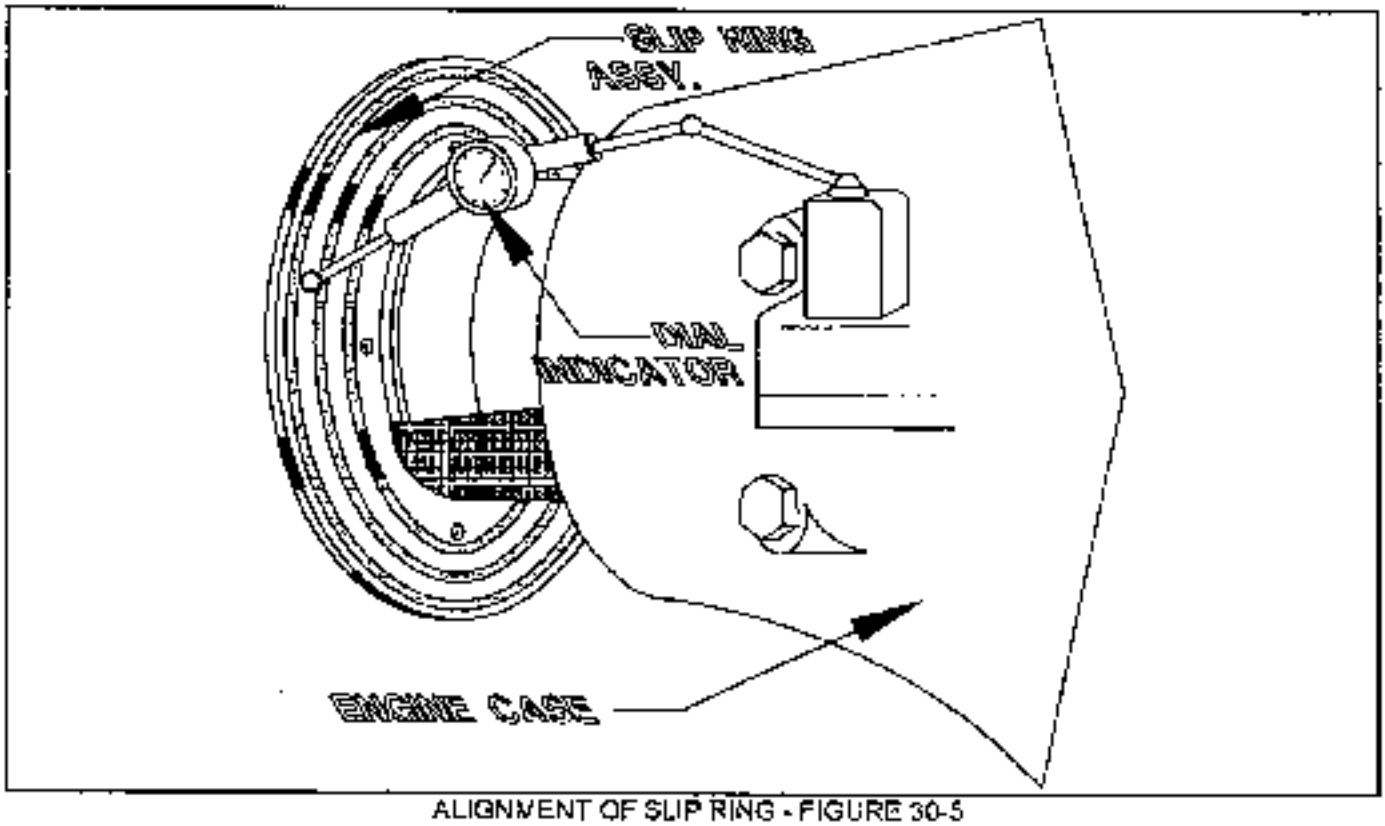
CAUTION

Due to the loose fit of some propeller thrust bearings, a considerable error may be induced in the readings by pushing in or pulling out on the propeller while rotating it. Care must be taken to exert a uniform push or pull on the propeller to hold this error to a minimum.

If the slip ring run-out is within the limits specified, no corrective action is required. If it is not within the limits, check for dirt on the ring gear mounting surfaces, clean, and recheck alignment. If run-out is still out of tolerance, return the slip ring assembly to the B.F. Goodrich Co.

30-70-00 - SERVICING/CLEANING

Thoroughly cleaning the slip ring area with MEK or standard engine degreaser on a routine basis is recommended. Keeping the brushes free of dirt, oil, grease and carbon build-up will prevent those contaminants from being transferred to the slip ring.



ALIGNMENT OF SLIP RING - FIGURE 30-5

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CHAPTER 32

LANDING GEAR

CHAPTER 32

LANDING GEAR

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CHAPTER 32

LANDING GEAR

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32-00-00 - GENERAL

The landing gear is operated by an electrical motor driven actuator. The travel during the extend and retract cycle is controlled by down and up limit switches located beneath the floorboard under the pilots seat. Power is supplied to the actuator through a set of relays actuated by the gear selection switch. The gear selection switch is located at the top of the instrument panel in front of the pilot. The actuator worm gear ball nut is connected to the retract bellcrank which is connected to push-pull retract tubes and bellcranks throughout the entire retraction system. An airspeed safety switch (24-0084, 24-0236 and on) is mounted to the back of the airspeed indicator and incorporated into the landing gear electrical circuit to prevent landing gear retraction while on the ground until a safe takeoff speed is reached. A squat switch is located on the left main landing gear leg (S/N 24-0001 thru 24-0237, except 24-0084). A by-pass switch is installed adjacent to the gear selection switch in order to override the safety switch circuitry if the gear does not retract.

The gear legs are constructed of welded chrome-molybdenum tubular steel, heat treated for greater strength and wear resistance. Main gear attaching points have bushings installed in the gear mounting box attached to the wing spar. The steerable nose gear mounts to the cabin tubular steel frame.

NOTE

Heat treated components should NOT be repaired; replace them.

The main gear wheels have hydraulic disc brakes with a parking brake valve incorporated into the system. Rubber discs in the gear leg assemblies absorb the shock of landing and taxiing.

MANUAL-EMERGENCY LANDING GEAR SYSTEM. Emergency gear extension is available through a manual override system. This system is built into the actuator unit. Refer to Section 32-31-05 and 32-30-03.

LANDING GEAR WARNING SYSTEM. The landing gear warning system provides the pilot with an audible warning that the landing gear is not down and locked when the throttle is retarded to within 1/4 to 3/8 in. throttle position. When the landing gear is down and locked the electrical circuit is opened and the intermittent horn is stopped. This warning switch is mounted on the throttle housing forward of the instrument panel (24-0378 & ON) and can be adjusted for the proper setting by loosening the screw and repositioning the switch. This switch is located inside the throttle quadrant (24-0001 thru 24-0377) and operated by a cam when throttle was retarded. Adjustment procedures are similar.

BRAKE SYSTEM. The brake system is hydraulically operated by depressing the brake pedals mounted on the pilots rudder pedals. (Dual brake system is optional for co-pilot). Individual wheel brakes are available by depressing either left or right pedal. Parking brakes are actuated by depressing both brake pedals and pulling the parking brake control cable knob. This cable actuates a lever on the parking brake valve and traps the hydraulic fluid from the valve to the wheel cylinders thus holding the pucks to the discs. Release the parking brakes by pushing the parking brake knob in. This releases hydraulic pressure at the wheel cylinders and therefore releases the brake discs.

32-10-00 - MAIN LANDING GEAR AND DOORS

32-10-01 - MAIN GEAR REMOVAL

(S/N 24-0001 thru 24-2999, 24-3079 thru 24-TBA)

1. Raise aircraft on jacks.

2. For S/N 24-0084, 24-0378 and ON partially retract gear as described in Section 32-60-01.

For S/N 24-0001 thru 24-0377, except 24-0084) Partially retract gear by operating the emergency gear extension mechanism in reverse.

CAUTION

ON S/N 24-0001 THRU 24-0377, except 24-0084 DO NOT fully retract gear using emergency gear extension system. Partial retraction using emergency extension system is permissible only during gear rigging. DO NOT operate gear electrically with emergency extension system engaged.

3. Disconnect gear door links and brake lines. Cap all lines and fittings.

4. Remove gear door and mud guard (if desired).

5. Detach main gear retracting tube (V), (**Figure 32-9**) from retracting truss (G), and remove bolts (H) from retracting truss mounting block.

NOTE

Steps 7 thru 9 apply to 24-0001 thru 24-2999 and 24-3079 thru 24-TBA only.

6. Remove grease fittings from forward gear support trunnion-shaft bearing.

7. Retract the gear by hand until a 2 inch thick wood block (C), (**Figure 32-1**), can be inserted, as shown, to hold gear in retracted position.

A. Remove cotter key and nut at spring connecting link (F), (Figure 32-1).

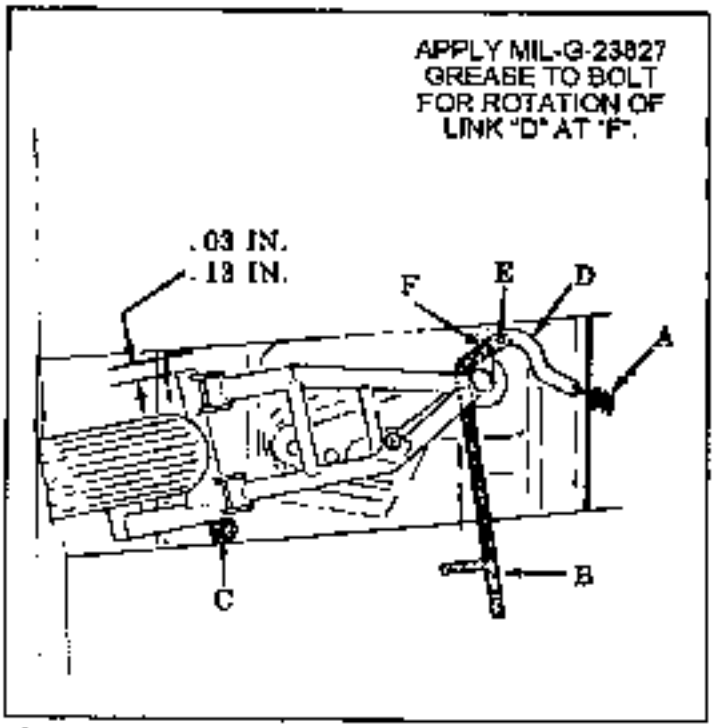
B. Remove gear retraction spring (A) at (F), (Figure 32-1), by attaching spring installation tool (B). P/N GSE 030012, (old P/N was 8186) using an AN3-12A bolt (E). Remove grease fitting prior to using tool.

NOTE

Apply MIL-G-23827 grease to bolt at (F) for better rotation of Link (D).

8. Extend gear three to four inches from down-lock position and secure.

9. Remove six mounting bolts from rear gear trunnion shaft mounting block assembly at stub spar.



GEAR RETRACTION SPRING REMOVAL
FIGURE 32-1

10. Slide out aft bearing block.

11. Slide front bearing block aft and remove.

12. Slide gear assembly aft until clear of front bearing, and carefully remove gear assembly from wing.

13. Identify all components removed, and **DO NOT** intermix right and left gear components.

14. **DO NOT** attempt to repair any heat treated component of main landing gear assembly.

32-10-02 -MAIN GEAR INSTALLATION

1. Lubricate wheel bearings, retraction linkage, and fore and aft trunnion bearings prior to installation (refer to Section 5-20-07 for recommended lubricants).

2. Installation of main gear is the exact reversal of the main gear removal procedure.

3. Check fore and aft movement of gear in bearing blocks. Maximum allowable movement is .020. Shim excess by inserting shims at rear block (maximum of any 2 shims).

4. Temporarily attach gear door link rods to gear leg brackets.

5. Retract gear while checking for binding in door linkage and proper contact of gear door edges with wing. **DO NOT** make final gear door adjustments until gear has been rigged (Ref. 32-30-02).

32-10-03 - MAIN GEAR DOOR RIGGING

(24-0001 thru 24-2999 and 24-3079 thru 24-TBA)

1. Raise aircraft on jacks.

NOTE

Gear system must be properly rigged prior to gear door rigging, see Section 32-30-01.

2. Check main gear up against bumper pads.

3. Normally once the doors are installed at the factory no further adjustment should be required. However, should the inboard doors be removed for any reason the following rigging procedure should be used when reinstalling them:

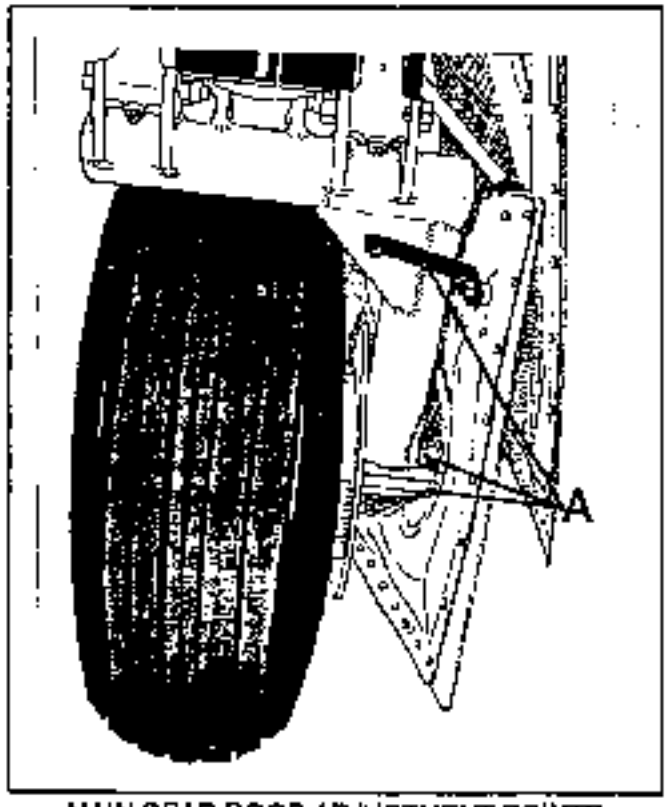
A. Disconnect outboard gear doors at the forward and aft linkages (B) (Fig. 32-2).

B. Raise gear electrically to the full up position.

C. Forward leading edge and aft trailing edge of the inboard gear door should be tight against the wing skin and fair with the aft bubble fairing. Spacers (A) (Figure 32-2) should be added or removed as required to obtain a good fit with no binding or distortion with the gear in the UP position. AN960-10 washers may be used as spacers.

4. Reconnect outboard gear doors and check that the forward edge of outboard gear doors are faired with wing skin/wheel well opening and that there is no binding or distortion where links attach to door.

5. If adjustments are required, adjust outboard gear door rod ends (B)(Fig 32-2) at forward or aft linkages as required. Extend gear to adjust links, then retract to check adjustment.



MAIN GEAR DOOR ADJUSTMENT POINTS
FIGURE 32-2

(S/N 24-0001 THRU 24-2999 & 24-3079 THRU 24-TBA)

32-10-04 - MAIN GEAR DOOR RIGGING

(24-3000 thru 24-3078)

1. Raise aircraft on jacks.

NOTE
Gear system must be properly rigged prior to gear door rigging, see Section 32-30-01.

2. Normally once the doors are installed at the factory no further adjustment should be required. However, should Mid-Gear doors be removed for any reason the following rigging procedures should be used when reinstalling them:

A. Disconnect outboard doors at forward and aft linkages (B) (Fig. 32-2A).

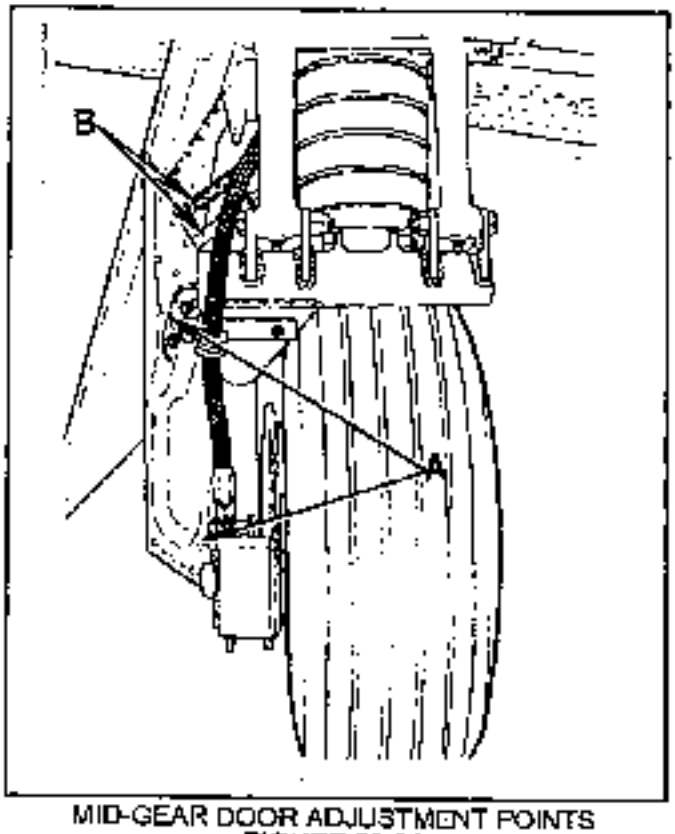
B. Disconnect inboard doors at the forward linkage and springs (A) (Fig. 32-2B).

C. Raise gear electrically to the full UP position.

D. Forward leading edge and aft trailing edge of Mid-Gear Door should be tight against the wing skin. Spacers (A) (Figure 32-2A) should be added or removed as required to obtain a good fit with no binding or distortion with the gear in the UP position. AN960-10 or AN970-3 washers may be used as spacers.

3. Reconnect outboard and Mid-Gear doors and check that the doors are faired with wing skin/wheel well opening and that there is no binding or distortion where links attach to door. Adjust linkage if required (Fig. 32-2A). Extend gear to adjust, then retract to check adjustment.

4. Check main gear overcenter preload torque for proper values. Re-rig entire LDG system, if necessary.



MID-GEAR DOOR ADJUSTMENT POINTS
FIGURE 32-2A

(24-3000 THRU 24-3078)

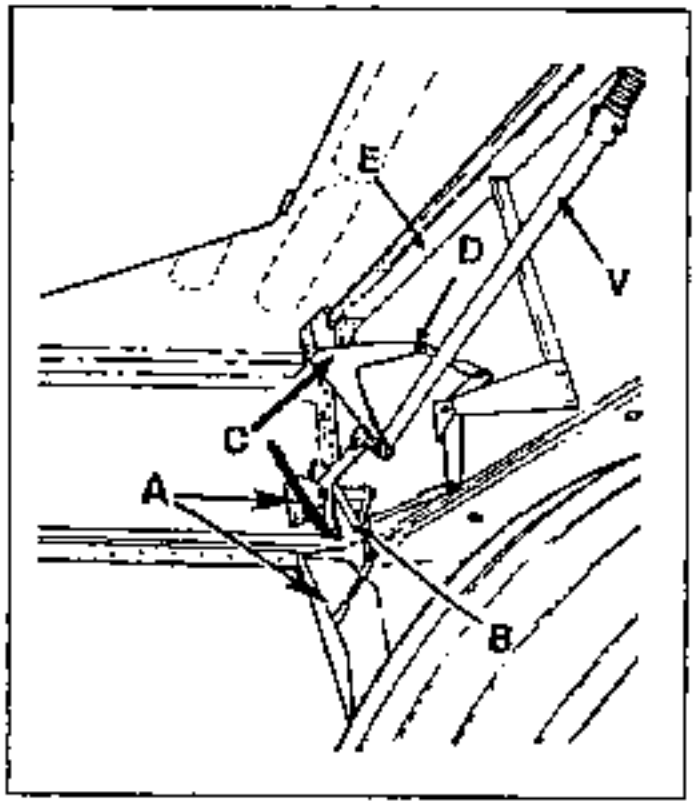
32-10-05 - INBOARD GEAR DOOR RIGGING

(24-3000 thru 24-3078)

1. Adjust inboard door link to close doors with "0" gap. Doors must be closed with gear extended and retracted. If door is not closed in both positions refer to landing gear rigging procedures in Section 32-31-03.

Any adjustment to rod end on retract tube (L) Fig 32-5) and rod end on retraction tube (V) (Fig. 32-9) is at a 2 to 1 ratio, respectively; this adjustment will change rigging values. Recheck preload values.
EXAMPLE: (1) The door is open a small amount when gear is DOWN, but closed when gear is UP. Adjust by turning retract tube (V) rod end **IN** 1/2 turn, and retract tube (L)(Fig. 32-5) rod end **OUT** 1 turn.

EXAMPLE: (2) The door is closed when gear down, but open a small amount when gear is UP. Adjust by turning retract tube (V) rod end **OUT** 1/2 turn, and retract tube (L) (Fig. 32-5) rod end **IN** 1 turn.
2. Tighten jamb nuts and connect springs on inboard gear door bellcranks (A) (Fig. 32-2B).



MAIN GEAR DOOR RIGGING - FIGURE 32-2B

(24-3000 THRU 24-3078)

NOTE
Do not rig doors shut more than necessary as this may result in higher actuator loads.

3. Adjust outboard door link to close gap at leading edge of door. If the door is rigged too tight, the skin will be under stress (concave) at the point where the linkage is attached to the door. It could also cause the mid and inboard doors to gap open.

4. Cycle gear manually and electrically while inspecting for clearances Re-check MLG system rigging values.

5. Remove aircraft from jacks.

6. Return aircraft to service.

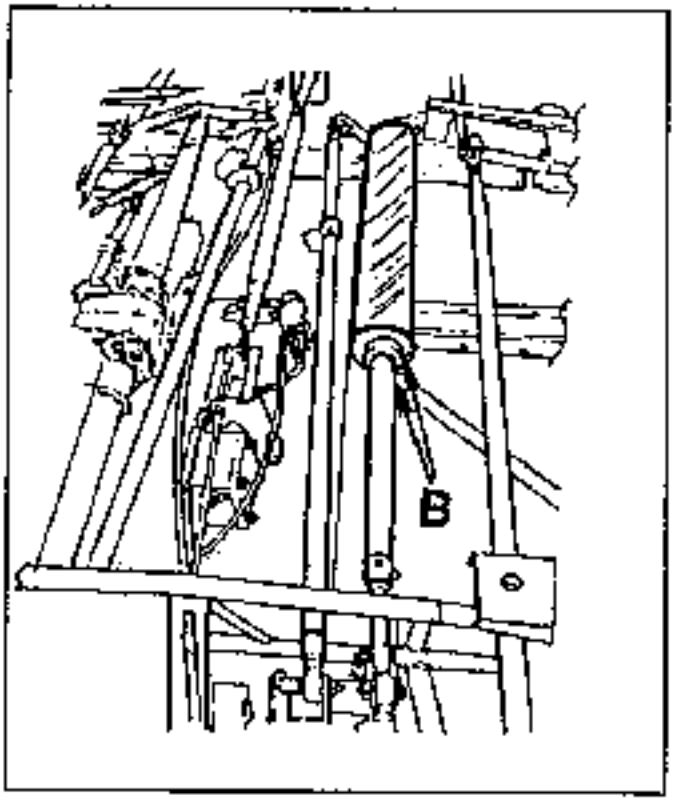
NOTE
To remove INBOARD GEAR DOORS use a sharpened punch less than .093 dia. or a short piece of hinge pin to open the crimped hinge assembly pin hole.

32-10-06 INSTALLING ASSIST BUNGEE (560213-501)

(24-3000 THRU 24-3078)

1. Retract gear.

2. Pull gear down with emergency extension until main retract bellcrank and rod end bungee line up. Install AN3 bolt, washers & nut through Heim rod end bearing and AN4 bolt, washers & nut through block. Torque and safety.



ASSIST BUNGEE - FIGURE 32-2C

(24-3000 THRU 24-3078)

CAUTION
Bump gear up, CAREFULLY, just to take the load off the 3/16 in. installation pin at (B). Remove pin from (B) (Fig. 32-2C).

3. With bungee installed recheck preload per steps 30 thru 34 of Section 32-31-03.

32-20-00 - NOSE GEAR AND DOORS

32-20-01 - NOSE GEAR REMOVAL.

1. Raise aircraft on jacks.

2. Remove exhaust cavity fairings.

3. Partially retract gear as described by Section 32-60-10.

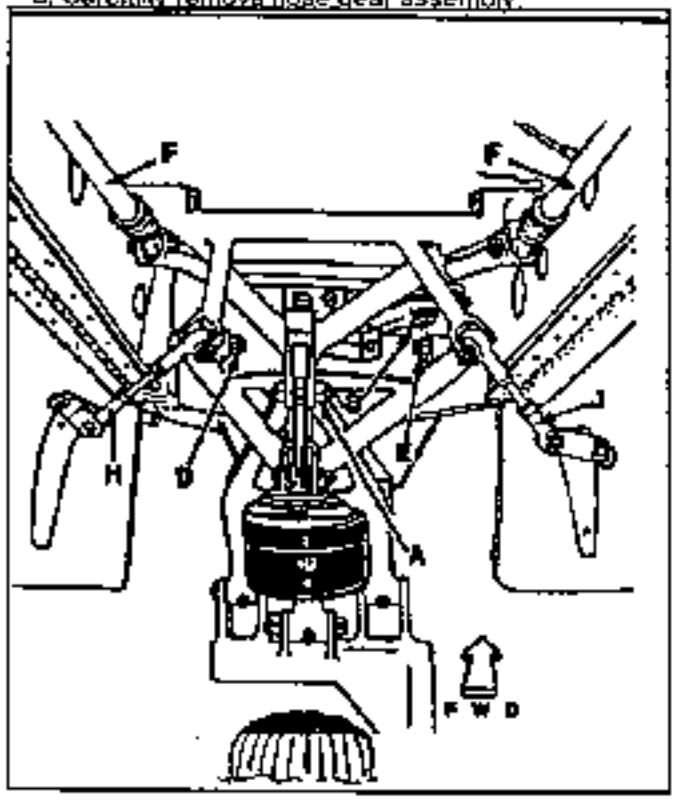
4. Remove firewall nose gear box (if needed) to gain access to bolts

5. Disconnect link (A) on nose gear truss assy. (Figure 32-3).

6. Disconnect nose gear steering horn link (B) (Figure 32-3).

7. Remove left and right gear mounting bolts (D) and (E)(Fig 32-3) from tubular structure and nose gear truss assembly.

8. Carefully remove nose gear assembly.



NOSE GEAR RETRACTION TUBE ADJUSTMENT POINTS - FIGURE 32-3

9. DO NOT attempt to repair any heat treated component of nose landing gear assembly.

32-20-02 - NOSE GEAR INSTALLATION

1. Lubricate wheel bearings, retraction linkage and left and right mount bearings.

2. Install gear in reverse order of removal procedure.

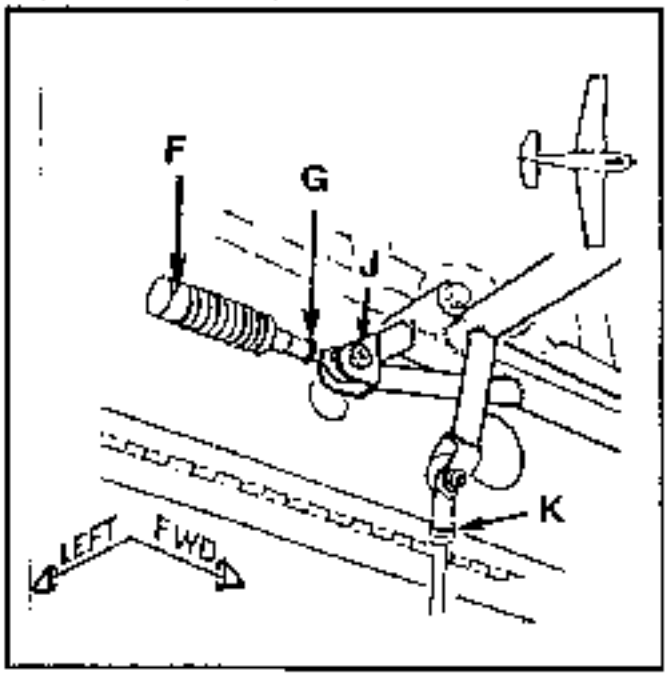
32-20-03 - NOSE GEAR DOOR RIGGING

1. Raise aircraft on jacks. (Refer to Section 7-10-00.)

NOTE
Gear system must be properly rigged prior to gear door rigging, see Section 32-30-03.

2. Adjust gear door link rods (H) and (J) (Fig 32-3) to obtain proper door fit when closed.

3. To increase or decrease nose gear-up travel in wheel well, adjust both eccentrics on trunnion bearings (J) (Figure 32-4) as required.



NOSE GEAR RETRACTION TUBE & DOOR ADJUSTMENT POINTS - FIG. 32-4

NOTE
Eccentrics permit nose wheel to move quicker to clear nose gear doors & also will allow nose wheel to be positioned further or less further into nose wheel well.

CAUTION
Nose gear overcenter preload must be rechecked after any adjustment to nose wheel eccentrics.

4. Readjust nose gear door linkage (K) as required after eccentrics have been adjusted. (Fig 32-4).

32-30-00 - EXTENSION AND RETRACTION

32-30-01 - GEAR SYSTEM OPERATIONAL CHECK

(S/N 24-0084, 24-0238 thru 24-TBA)

1. Raise aircraft on jacks. (See Section 7-10-00).

2. With Master Switch ON and gear switch in UP position apply pressure to pitot tube (see Section 32-60-01). Verify gear retraction occurs at 69 MPH +/- 5 MPH (60 +/- 5 KIAS). Allow gear to retract completely. Check for any tire interference as tire enters wheelwell.

3. Close throttle and confirm gear horn sounds.

4. Inspect gear doors for proper closing. Reference Section 32-10—03, 3C., 32-10-04, 2,D, or 32-10-05, 1. Lower gear to fully extended position.

5. With zero airspeed place gear switch in UP position. Gear horn should sound regardless of throttle position, both gear position lights and safety by-pass switch will illuminate.

6. Push RED gear safety by-pass switch and hold IN to partially retract gear.

7. Pull "GEAR ACT" circuit breaker.

8. Check nose gear overcenter preload as follows:

A. Measure nose gear bungees (Figure 32-6).

B. Extend gear manually (See Section 32-30-04) stopping extension the moment the GREEN Gear Down Light comes ON. Gear switch in down position.

C. Measure nose gear bungee springs. Deflection from zero load condition in (A) above must be .030 to .070 inches for each bungee (Fig 32-6). (.010 to .030 inch for M20J with Dukes Actuator P/N 1057-00-56).

D. If spring deflection is not within prescribed limits, adjust tube rod ends (F) (Fig 32-4) @ (G) in increments of 1/2 turns as required.

9. Check main gear overcenter preload as follows:

A. Place rigging tool (T) P/N GBE030007 (Fig 32-9) on retraction truss. Hold tool stationary by placing thumb on rear end of tool at (S) and press forward.

B. Place 10" torque wrench (R) on rigging tool. Place thumb on wing bottom; apply force until joint (4) breaks open slightly insert shim stock (.005 to .008 in. thickness) between link and truss at (P). Release force on wrench.

C. With fingers on torque wrench and thumb on wing bottom apply force on wrench while maintaining a pulling force on shim stock. Read torque value on wrench at the exact moment the shim stock pulls loose. Torque value should be 250 to 280 inch pounds.

D. Repeat on other main gear.

E. If preload is not within prescribed limits proceed to applicable S/N main landing gear rigging procedures in Section 32-31-03.

F. If main gear preload needs re-adjusting, the nose gear bungees should be re-checked per 8.(C) above. On S/N 24-3000 thru 24-3078 proceed to Section 32-30-03 for nose gear rigging procedures.

NOTE
When gear overcenter preload check is completed, electrically extend the gear and check the nose gear tube bungee springs to assure they have not compressed completely resulting in no remaining deflection. This would indicate excessive preload or weak bungees.

SQUAT SWITCH OPERATIONAL CHECK (24-0001 thru 24-0237,Except 24-0084)

A squat switch is incorporated on the left main landing gear assembly of above listed Serial Numbered Aircraft. The following operational check should be made:

1. Raise aircraft on jacks (see Section 7-10-00).

2. With master switch ON place gear switch in UP position. Gear should retract normally.

3. Extend gear to down and locked.

4. Refer to Section 32-60-04 for squat switch adjustment procedures.

32-30-02 - MAIN LANDING GEAR SYSTEM RIGGING

32-30-03 - (AVIONICS PRODUCTS - 24-0378 thru 24-2999 & 24-3079 thru 24-TBA)

1. Raise aircraft on jacks and remove 3 belly access panels located consecutively just aft of nose wheel well or the one piece belly access effective 24-1418 and later aircraft. DISCONNECT ALL GEAR DOORS.

2. Disconnect electrical power from landing gear actuator by pulling actuator circuit breaker. Make sure landing gear warning light circuit breaker is pushed IN.

3. Disconnect main gear retraction tubes (L) (Figure 32-5) at inboard bellcranks (M). Loosen locknuts (E). Disconnect nose gear retraction tubes (F) (Fig 32-3) at main retraction bullcrank (A) (Fig 32-10B). Loosen locknuts (G) (Fig 32-4). Disconnect rod end bearing on barrel nut (D) from bellcrank (A) at N (Fig 32-10B).

NOTE
Do not loosen Heim rod end bearing from barrel nut (D) on Avionics Products actuator.

Disconnect nose and main gear door links. Check gear for binding at pivot points while moving gear legs by hand. Lubricate retraction system as indicated in Section 5-20-07.

4. Position retraction bellcrank (A) (Fig 32-10B) so that center of forward hole in left outboard arm of the bellcrank is 1.56 * IN. (approximately) from forward face of truss at Fuselage Station 33. (See Fig 32-10B).

*** NOTE**
This is a starting point only. This dimension may vary to permit retraction tubes to connect with zero preload.

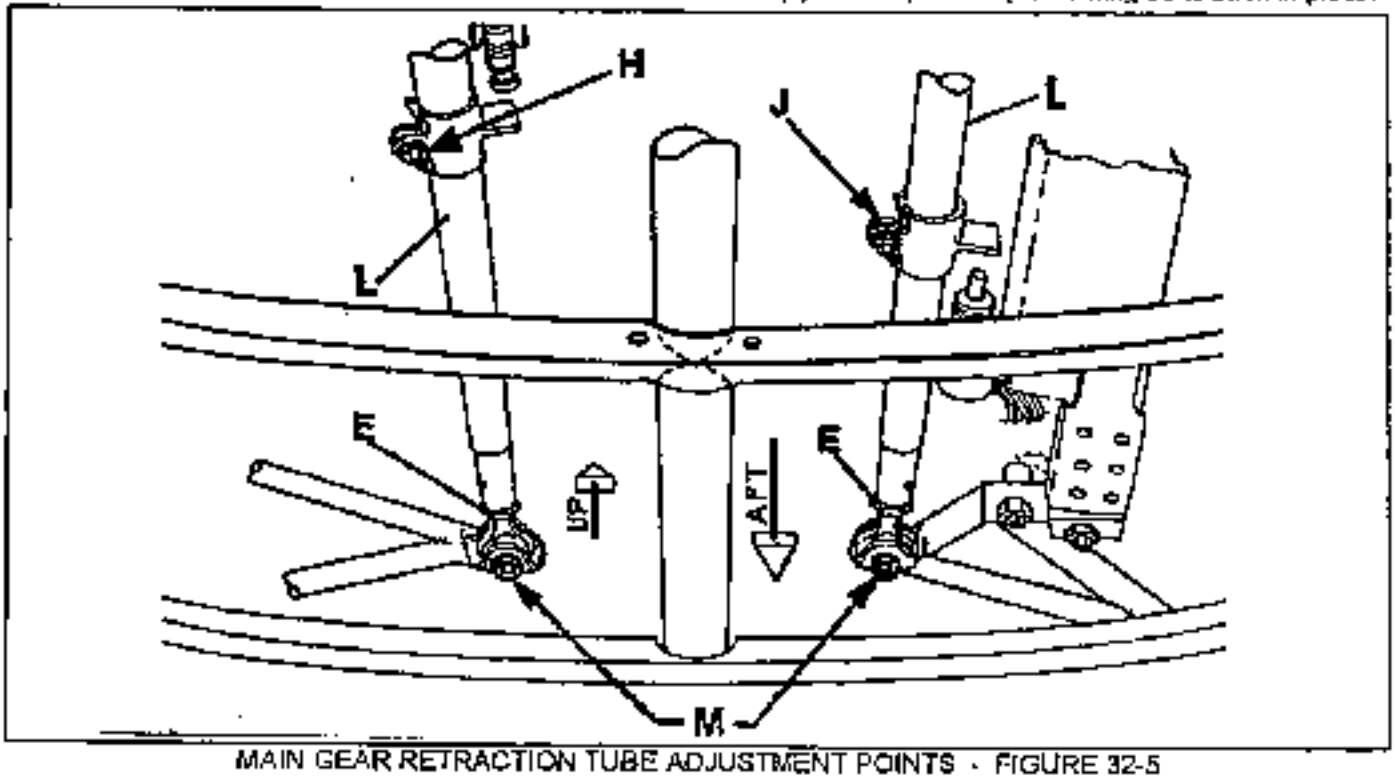
5. With the bellcrank (A) (Fig 32-10B) in position, turn barrel nut (D) on actuator until Heim bearing aligns with hole in bellcrank at (N). Install connection bolt.

NOTE
LH & RH adjustable retraction tubes should be approximately same length to start rigging procedures.

6. With bellcrank in position and all gears fully extended, adjust main and nose gear retraction tubes so that tubes can be slipped in place with zero preload.

7. With bellcrank, retraction tubes, and the gear positioned as indicated in step 4, set down-limit switch striker arm (J) so that gear down light switch is just closed and GREEN gear-down light is ON. Secure striker arm in position.

8. Reset actuator circuit breaker and partially retract gear (use Master Switch to control motor). Screw rod end (E) (Fig. 32-5), on aft end of each main gear retracting tube, OUT two (2) full turns, screw each nose gear retraction tube rod end (G) (Fig. 32-4) IN one (1) full turn, then slip attaching bolts back in place.



MAIN GEAR RETRACTION TUBE ADJUSTMENT POINTS - FIGURE 32-5

9. Check nose and main gear overcenter preload described in Section 32-30-01, steps 8 and 9. Adjust as instructed.

10. Complete operational check described in 32-30-01 steps 2, 3, 5 & 6. Reset landing gear system circuit breaker and fully extend gear.

11. When step 10 is complete, the retraction system is rigged for the gear-down-and-locked position with allowance for actuator overrun after cutoff.

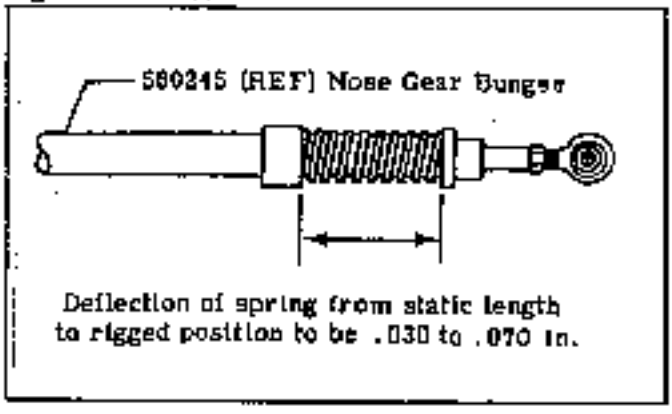
12. Disengage manual system.

13. Leave all gear doors disconnected, and run gear-up electrically until main gears are .03 inches minimum from bumper pads (.06 in. thk. rubber strips installed on W.S. 43.50 false rib). Position gear-up limit switch striker arm (H) (Fig. 32-5) so that switch is just closed, and RED gear unsafe light is OFF. Secure striker arm in position. The gear is now properly rigged in the gear-up position with allowance for actuator overrun after cutoff.

Recheck Nose Gear Bungee Springs per 32-30-01, para. 8.C.

14. Electrically extend gear to down-and-locked position. Connect and adjust gear doors (refer to Main Door and Nose Gear Door Rigging Procedures in Section 32-10-03, Main, and 32-20-03, Nose).

15. Adjust the mechanical down stop, on actuator housing, and up stop, per the following instructions and Fig. 32-7 & 32-8.



NOSE GEAR BUNGEE SPRING - FIGURE 32-6

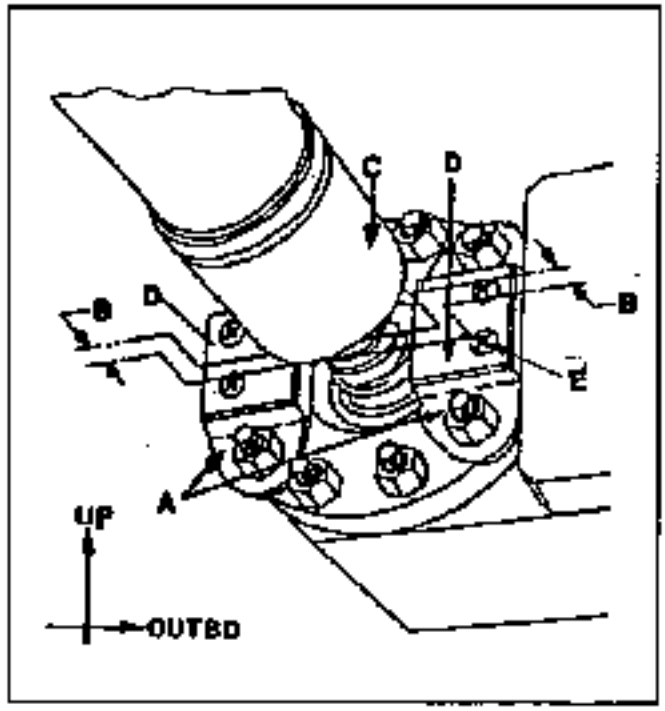
MECHANICAL DOWN STOPS

A. 560252-001	Fixed Stops	Use one dn/stop on each side as required (Use existing hdw). (use -011 shim)
560252-003	Fixed Stops	
560252-005	Fixed Stops	
560252-007	Fixed Stops	
560252-009	Adjustable Stop	

NOTE
Tube assemblies are allowed .010 in. per foot bend allowance.

B. With gear fully extended, select down stop of proper thickness to give .050 - .100 clearance @ (B) between down-stop and end of barrel nut (C) (Fig 32-7).

NOTE
Use 1 to 4 , 560252-11 shims with 560252-009



MECHANICAL DOWN STOP - FIGURE 32-7

stop to achieve proper clearance as an alternate for 560252-001, -003, -005, or -007.

C. Actuator ball nut (C)(Fig. 32-7).

D. 560252-011 shim (use with 560252-009 only, maximum of 4).

E. AN515-6R screw*

AN936A8 Lock Washer

(Typ. 2 plc.) (use with 560252-009 only).

*Use .063 longer screws with each additional shim. (Secure screw with Blue Locktite #83-31 grade C).

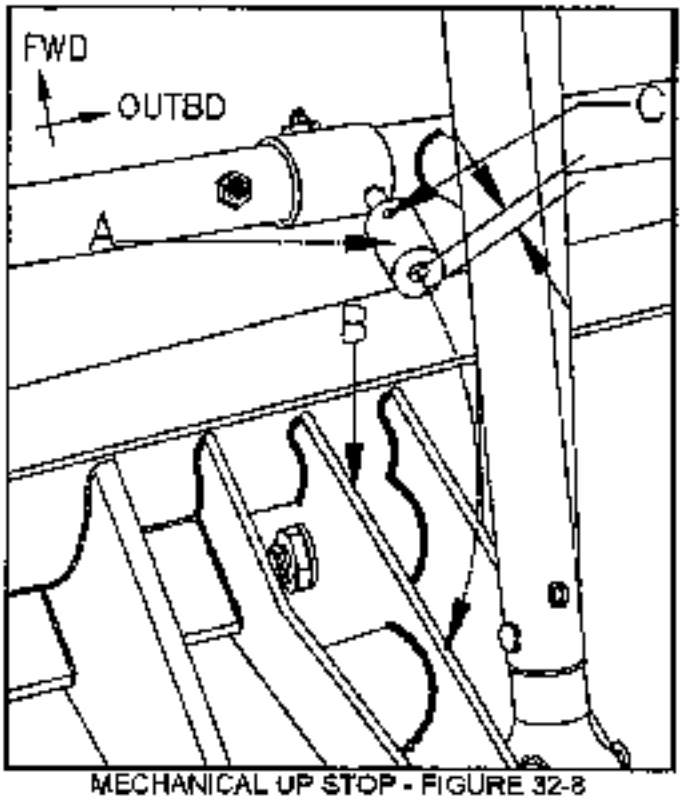
MECHANICAL UP STOP

With gear fully retracted, adjust stop for .050 - .070 clearance between UP STOP (A) (Figure 32-8) and retracting truss (B), then tighten set screw (C).

NOTE
The main gear preload torque should not exceed 325 inch lb. using the torque wrench/shim stock procedure after electrical extension.

32-30-04 (NON-AVIONICS PRODUCTS ACTUATOR) 24-0001 thru 24-0377)

1. Raise aircraft on jacks (refer to Section 7-10-00, and remove belly access panels.



MECHANICAL UP STOP - FIGURE 32-8

2. Partially retract gear (Refer to Section 32-10-01). Disconnect main gear retraction tubes (L)(Fig 32-5) at inboard bellcranks (M). Loosen locknuts (E).

Disconnect nose gear retraction tubes (F)(Fig 32-3) at the retraction bellcrank (A) (Fig 32-10A). Disconnect nose gear and main gear door links. Check gear for binding at pivot points while moving gear legs by hand. Lubricate retraction system as indicated in Section 5.

3. Adjust Heim end bearing on actuator stud so that the Heim threaded end at (E) is 7.50 inches +.125 inch from the far end of ball nut (C)(Fig 32-10A).

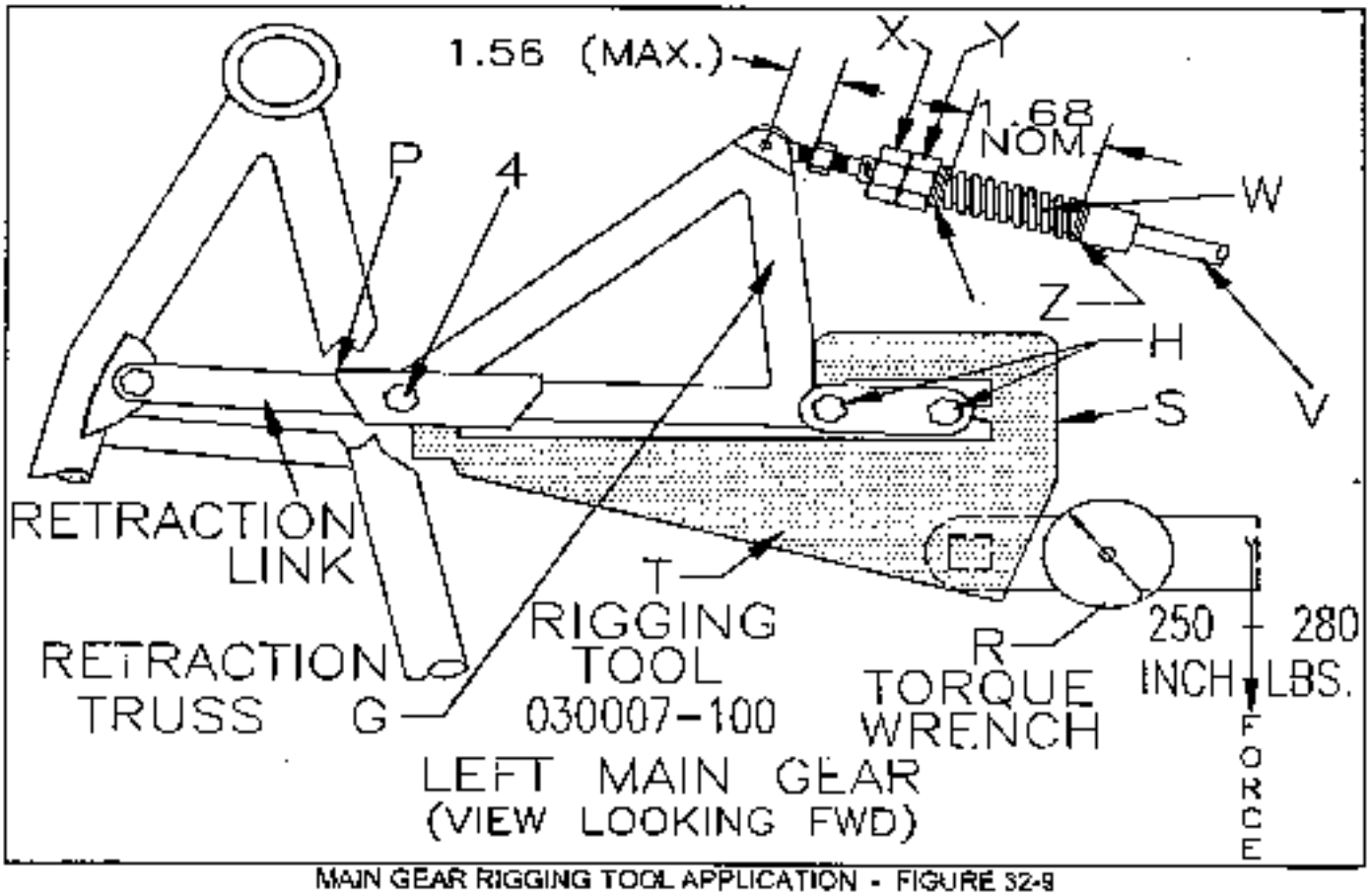
NOTE

Heim bearing is locked in position with a set screw extending into a slot in the actuator stud. Set screw must be removed prior to making any adjustment (non-Avionics Prod. or Plessey).

CAUTION

Adjust Heim end only - Do not loosen actuator set screw or locknut and attempt to adjust actuator stud.

Check distance from the Heim bearing centerline to the face of the actuator. Dimension must not exceed 2.35 inches, readjust making sure that 7.50 dimension is within the +.125 tolerance. Align slot in actuator stud with setscrew in Heim bearing shank. Loctite Heim bearing setscrew and secure. Tighten locknut. Rotate actuator barrel until ball return (or returns) on ball nut



MAIN GEAR RIGGING TOOL APPLICATION - FIGURE 32-9

(C) is facing actuator motor. Reattach Heim to bellcrank.

NOTE

When installing heim bearing end in the bellcrank, position it freely so there will be no lateral bind on the jack screw. Place ONE AN960-716L washer NEXT TO THE BALL JOINT, (can be placed on either side) and shim remaining space with AN960-616 washers. This installation will prevent heim bearing from twisting too far, yet provide adequate movement.

NOTE

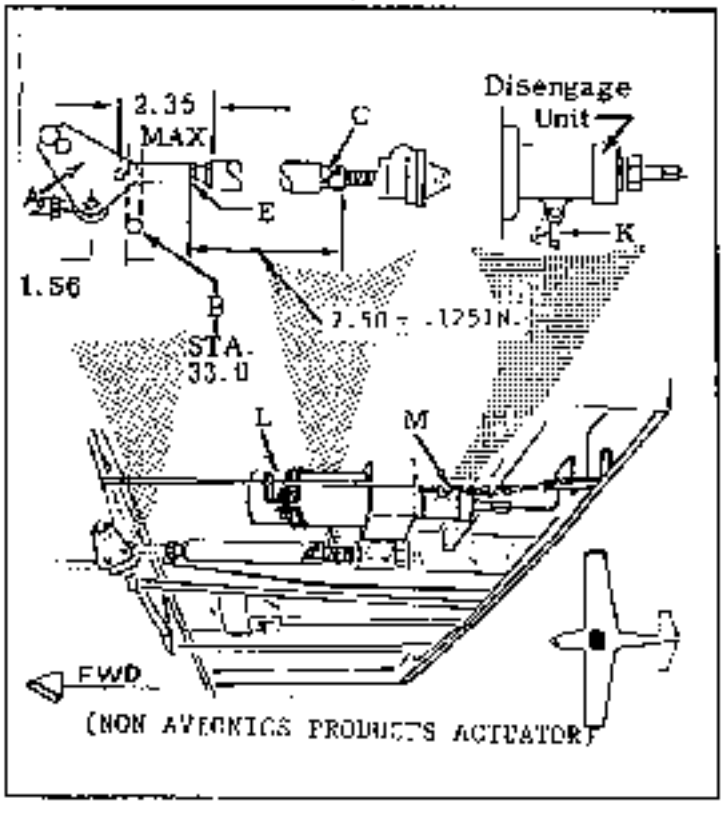
Previous installation may have contained one large AN960-916 washer next to the ball joint. This washer MUST NOT be reinstalled, the AN960-716L smaller and thinner washer described above is used as a replacement.

4. Position retraction bellcrank (A) (**Fig 32-10A**) so that center of forward hole in left outboard arm of bellcrank is 1.56 * inches from forward face of truss (B) at FUS. STA. 33.0 (**Fig 32-10A**). This can be accomplished by engaging the emergency gear extension system hand crank and turning to position the bellcrank.

See SI M20-89B for Dukes Actuator Drive Coupling Inspection.

*** NOTE**

This is a starting point only. This dimension may vary to permit retraction tubes to convert with zero preload.



MAIN GEAR RIGGING - FIGURE 32-10A

5. With bellcrank in position and gear fully extended and overcenter, adjust main gear retraction tube rod ends (E) (**Fig 32-5**) and nose gear retraction tube at rod ends (F) (**Fig 32-4**) so that tubes can be slipped in place with zero preload. Reattach ends of retraction tubes at the bellcrank and slip bolts in place.

6. Disconnect electrical power from landing gear actuator by pulling circuit breaker. Make sure landing gear warning light circuit breaker is pushed in.

7. With bellcrank, retraction tubes, and the gear positioned as indicated in step 5, set down-limit switch striker arm (J) (**Fig 32-5**) so that gear-down light switch is just closed and green gear-down light is on. Secure striker arm in position.

8. Use manual crank to partially retract gear. Screw rod end (E) (**Fig 32-5**) on aft end of each main gear retracting tube, out two full turns, then slip attaching bolts back in place.

9. Manually extend gear; stop extension just as green gear-down light comes on.

10. CHECK PRELOAD TORQUE on each main gear per Section 32-30-01.

CAUTION

Check that bungee springs are not "bottomed" out. Torque difference between each gear should not be more than 25 IN. LBS. If torque is not within limits, repeat steps 8 and 9 to adjust rod ends one-half turn in or out as required.

11. Partially retract gear with manual crank, screw in each nose gear retraction tube rod end one full turn, then slip attaching bolts back in place.

12. Check length of nose gear bungee spring in each tube and then extend gear manually, stopping just as green gear-down light comes on.

13. Check length of nose gear bungee springs in gear-extended position. Nose gear bungee spring deflection from zero load condition (step 12) must be .030 to .070 inch for each bungee (**Fig 32-6**). (.010 to .030 inch for M20J with Dukes Actuator, P/N 1057-00-5G). Recheck main gear preload torque value. If nose gear bungee spring deflection and/or main gear preload torque is not within prescribed limits, adjust retraction tube rod ends in increments of 1/2 turn as required. Use manual crank during readjustment, and stop extension just as gear-down light comes on. (When step 15 is complete, the retraction system is rigged for the gear-down-and-locked position with allowance for actuator overrun after cutoff.)

14. Disengage manual crank and reconnect landing gear system circuit breaker.

15. Leave all gear doors disconnected, and run gear up electrically (ref. Section 32-00-01) until main gear each side is .13 to .03 inches from bumper pads (see **Fig 32-1**). Position gear-up limit switch striker arm (H) (**Fig 32-5**) so that the switch is just closed and the red intransit light goes out. Secure striker arm in position. The gear is now properly rigged in the gear-up position with allowance for overrun after cutoff.

Extend gear to down-and locked position. Adjust gear doors. (Ref. Section 32-10-03 and 32-20-03 for rigging gear doors.)

16. Cycle the retraction system electrically through at least five trouble-free test operations. Manually extend gear, stop extension just as green light comes on, and check main gear preload torque and nose gear bungee deflection for limits specified in steps 10 and 13. If values are within limits specified, the retraction system is properly rigged and ready for use. If preload and/or deflection is not within limits, readjust retraction tube rod ends as required, and repeat test operations.

NOTE

Check main gear preload torque and/or nose gear bungee deflection after extending the gear manually and stopping just as the gear-down light comes on. Gear preload, after electric extension, may vary due to inconsistency in actuator overrun; therefore, the gear must be only manually extended during all rigging checks. Rigging values after electric extension may exceed the values obtained after manual extension.

17. When gear rigging is completed, check over center locks on all gears to ascertain that none of the down lock bungee springs have compressed to solid height and have no remaining deflection. If any bungee has reached solid height, readjust system and/or replace bungee springs.

WARNING

Lack of compliance with Mooney mandatory Service Bulletin No. M20-177 may result in unsatisfactory electrical extension of the electric gear.

32-30-05 (S/N 24-3000 thru 24-3078)

1. Raise the aircraft on jacks and remove one place belly access panel.

2. **Assist Bungee Assy. Removal.** Retract landing gear until rigging pin hole lines up on bungee assembly and insert 3/16 in. pin.

CAREFULLY BUMP the gear UP with the gear safety bypass switch until there is zero load on bungee assy rod end. Remove AN3 bolt/hardware at rod end and AN4 bolt/hardware at block and remove bungee assy.

3. Pull the landing gear actuator circuit breaker OUT.

4. Loosen jam nuts (E) on the main retraction tubes (L) (Fig 32-5); disconnect the tubes at the inboard bellcranks (M).

5. In nose gear well, loosen jam nuts (G) (Fig 32-4) on nose gear retraction tubes (F) (Fig 32-3 & 32-4).

6. At main retraction bellcrank (A) (Fig 32-10B) disconnect actuator barrel nut at (N) (Fig 32-10B) and nose gear retraction tubes (F).

7. On Avionics Products actuator, verify dimension from rod end center to end of barrel nut housing on actuator; it should be 1.25 + 000/-.010. Adjust rod end bearing, if necessary and secure with set screw and jam nut. Plessey actuators are not adjsutable.

8. Disconnect nose gear doors, outboard main gear doors, and inboard door links. On outboard main gear doors disconnect springs. On inboard door bellcranks, disconnect springs. Loosen jamb nut (X) on retraction tube (V) (Fig 32-9) and back off pressure on spring by loosening adjustment nut (Y). Disconnect retraction tube (V) from bellcrank (C) (Fig. 32-2B)

9. Position main retraction bellcrank (A) so that center of forward hole in the left outboard arm of bellcrank is 1.56 *** inches from forward face of fuselage truss at F.S. 33 (Fig 32-10B, detail A).

NOTE

This dimension* may vary to permit connection of the retraction tubes with zero preload at bolt hole.**

10. With main retraction bellcrank (A) held in position, turn actuator barrel nut until rod end bearing aligns with hole in bellcrank; install connection bolt at (N) (Fig. 32-10B).

11. Position bellcrank (C) (Fig. 32-2B), so center of attach pin (D) in top leg is 1.35 inches from bottom side of spar cap (E). This will be the starting position when landing gear is in down and locked over center, with out any preload set.

12. Adjust retraction tube (V) (Fig 32-9), at rod end, until it will connect to bellcrank (C) (Fig 32-2B) with zero preload. Install connection bolt/hardware, leave loose.

13. Adjust rod end on retraction tube (L) (Fig 32-5) so attach hole is aligned with inboard bellcrank at (*M*). Install connection bolt/hardware.

14. Disconnect retraction tube (V) at bellcrank (C) rod end; position disconnected gear full down and locked over center. **Both LH and RH landing gear should be in this configuration at this time.**

15. PUSH landing gear actuator C/B - IN.

16. Turn Master Switch - ON.

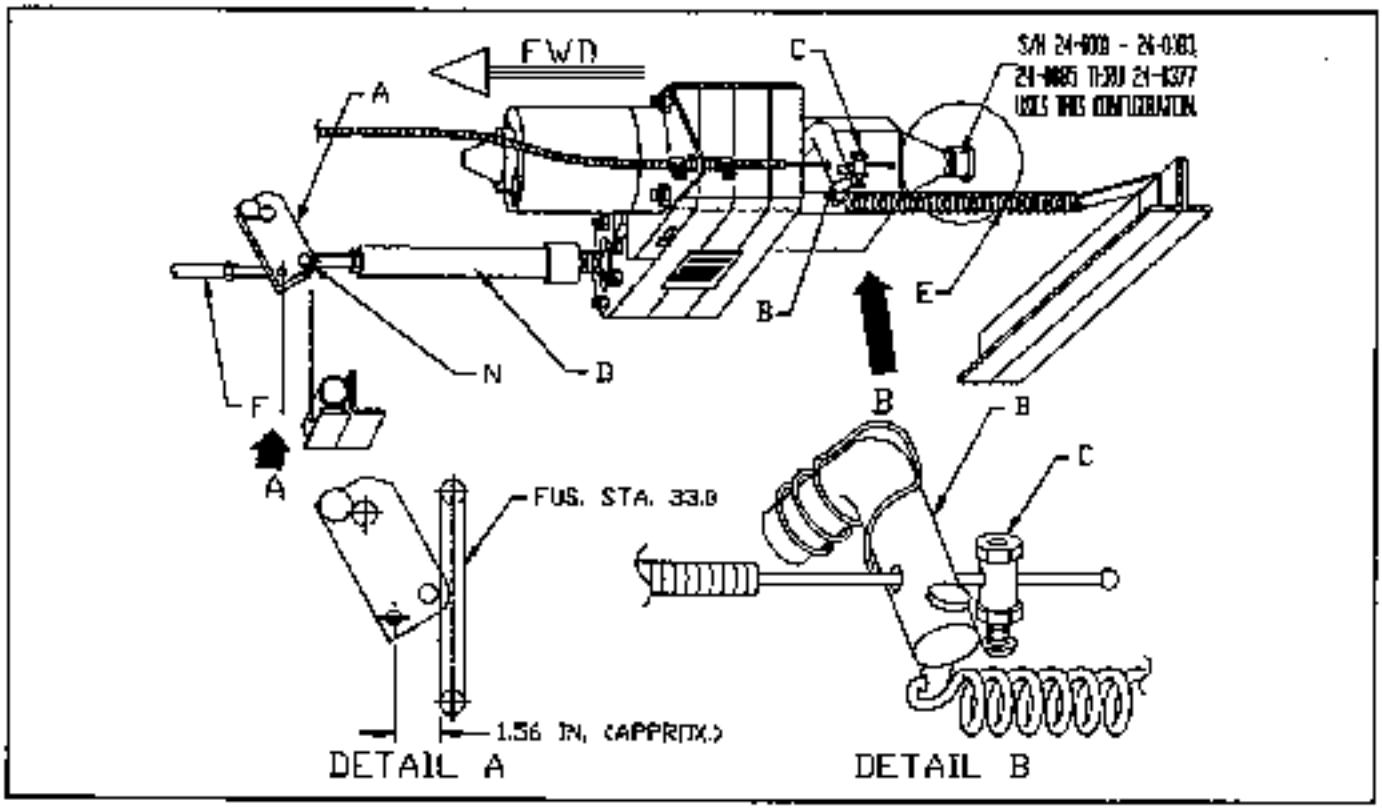
17. Extend main gear actuator to fully extended position. Make certain lugs on main retract bellcrank do no contact fuselage tube, floorboard or actuator barrel nut if there is any contact, run actuator back up slightly.

18. There should be .050 to .100 inch clearance (B) obtained between actuator barrel (C) (Fig 32-7) and mechanical down stop (A). Shims (D) (.050 thk.) (Fig 32-7) may be added or deleted to mechanical downstop (A) (4 max).

19. Cycle landing gear UP. Run actuator down and recheck retraction bellcrank clearance at F.S. 33. Check clearance of bellcranks (M) (Fig 32-5) and center section.

20. Reconnect retraction tubes (V) (Fig 32-9). With main gear fully extended, if necessary, adjust main gear retraction tubes (L)(Fig 32-5) so they can be re-connected with zero preload.

21. Adjust nut (Y) (Fig 32-9) until main gear is preloaded. Preload is correct when a "CLEAN BREAK" can be felt when pushing up on retraction link at (P) (Fig 32-9).



LANDING GEAR ACTUATOR ADJUSTMENTS - FIGURE 32-10B

22. NOSE GEAR RETRACTION TUBES ARE TO REMAIN DISCONNECTED at the main retraction bellcrank (A) (Fig 32-10B) during remainder of procedure.

23. Place landing gear switch in UP position.

24. Push RED gear safety by-pass switch IN INTERMITTENTLY to "BUMP UP" (retract) landing gear until left main tire just contacts bumper bracket which covers bulb stringer in wheel well. Make certain actuator barrel does not contact main retract bellcrank in the UP position.

25. Set UP limit switch striker arm (H) (Fig.32-5) so GEAR UP limit switch is just CLOSED and RED "GEAR UNSAFE" light is - OFF. Secure striker arm in position.

26. Loosen set screw (C) Figure 32-8. Adjust mechanical up-stop (A) (Fig. 32-8) for a clearance of .050 to .070 inches at main retraction truss (B); tighten set screw (C).

27. Reinstall assist bungee per Section 32-10-05.

28. Using emergency gear extension, move gear down until GREEN, gear down light JUST illuminates.

29. Turn Master Switch - OFF.

30. Place rigging tool (T) (Fig.32-9), P/N 030007-100, on retraction truss assembly (G). Hold tool stationary by pushing at point (S) toward main gear leg.

NOTE

The left main gear truss will probably lock over center first. Continue to slowly lower the gear manually while monitoring the compression of bungee spring on retraction tubes (V)(Fig.32-9). If the spring coils (W) are fully compressed, retract tube (V) must be removed from aircraft for modification. Dismantle the bungee portion of tube (V); remove one spacer washer (Z) and reassemble. Reinstall the modified retraction tube and complete above overcenter requirement. Removal of additional spacer washers may be required prior to obtaining the final configuration for the retraction tube (V).

31. Place 10 inch torque wrench (R) on rigging tool (T) as shown in Fig.32-9 and apply an unlocking force to retraction truss.

32. When joint at (4) breaks open slightly, insert shim stock (.005 to .008 in. thickness) between retraction link and truss at (P), release force on torque wrench.

33. While applying a pulling force on the shim stock exert an increasing unlocking force with torque wrench.

34. Read torque wrench value at the EXACT moment shim stock pulls loose.

35 Repeat steps 30 through 34 on the other main landing gear leg.

36. Use adjusting nuts (Y) (Fig. 32-9) on retract tubes (V) to equalize breakaway torque values within 10.0 inch lbs. Adjust the torque to 250 to 280 inch pounds.

37. Turn Master Switch ON.

38. RUN GEAR DOWN ELECTRICALLY AND CHECK THAT TORQUE VALUES DO NOT EXCEED 325 INCH POUNDS USING THE TORQUE WRENCH/SHIM STOCK METHOD.

LANDING GEAR WARNING ADJUSTMENT

1. Check that landing gear warning light circuit breaker is pushed IN.

2. Check that landing gear actuator circuit breaker is pulled OUT.

3. Turn Master Switch - ON.

4. Set DOWN limit switch striker arm (J) (**Fig 32-5**) so that gear down limit switch is just CLOSED and the GREEN, GEAR DOWN light is ON. Secure striker arm in position.

5. Turn Master Switch - OFF.

NOTE
The main gear preload torque should not exceed 325 inch lb. using the torque wrench/shim stock procedure after electrical extension.

32-31-01 - NOSE LANDING GEAR RIGGING PROCEDURE (24-3000 thru 24-3078)

1. Check eccentric bushings (J) (**Fig 32-4**) on gear truss assembly to be installed with bolt hole in upper forward position.

2. Adjust nose gear retraction tubes (F) (**Fig 32-3**), so they can be reconnected to the main retraction bellcrank with zero preload.

NOTE
The eccentric bushings may require rotation to a new position in order to meet the zero preload condition.

3. Measure nose gear bungees dimension (P) (**Fig 32-6**) and record for future reference.

4. Push landing gear actuator C/B - IN.

5. Place landing gear switch in UP position.

6. Turn Master Switch - ON.

7. Push RED, GEAR SAFETY BYPASS SWITCH - IN and hold it to partially retract landing gear; release switch.

8. Turn Master Switch - OFF.

9. Pull landing gear actuator C/B - OUT.

10. Screw each nose gear retraction tube (F) (**Fig 32-3**) IN (clockwise looking forward from front of aircraft) one (1) full turn, then re-attach to main retraction bellcrank.

11. Place landing gear switch in DOWN position.

12. Push latch (5) (**Fig 32-11**) FORWARD on manual emergency extension controls (on floorboard).

13. Pull RED lever (1) (**Fig 32-11**) back and upward to engage manual emergency gear extension system.

14. Pull "T" handle (2) UP (slowly until engaged) and return it to its original position. Continue this procedure, stopping when the gear down light JUST illuminates.

15. Measure nose gear bungee assemblies, dimension "P", as shown in **Fig 32-6**. If the springs have deflected less than .030 inches or more than .070 inches from the static dimension (as recorded in Step 2) adjust length of bungee assemblies to bring deflection within tolerance.

32-31-02 - EMERGENCY GEAR EXTENSION SYSTEM RIGGING.

DISENGAGE RIGGING:

(24-0064, S/N 24-0378 & ON)

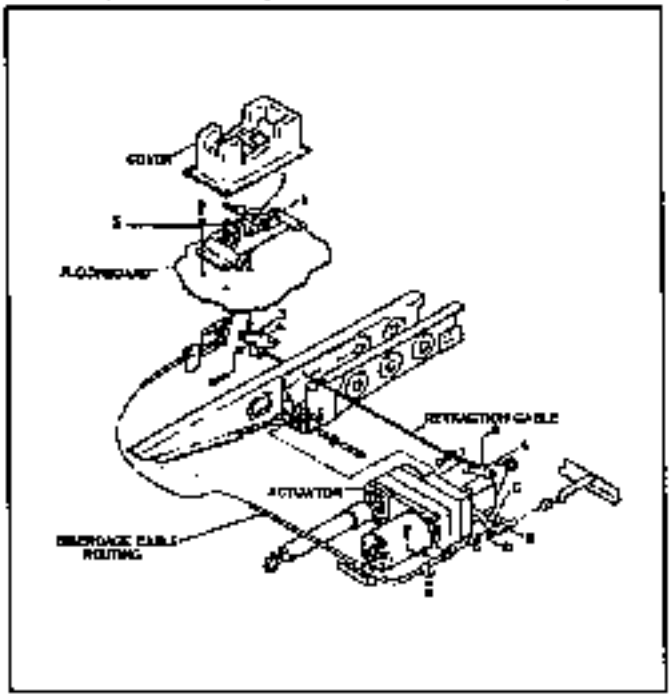
1. Insert cable thru hole in actuator disengage arm, (B) (**Fig 32-10B**).

2. With red lever (1) (**Fig 32-11A**) in full disengaged position (down and latched) push actuator disengage arm (B) to full forward position and apply approximately 5 lbs. pull to cable to remove slack.

3. Install D222 wire stop, (C) tighten nut and connect spring (E) to clevis pin, (D).

4. Lift RED lever and pull "T" handle (2) (**Fig 32-11A**) aside; re-engage RED lever. Check manual extension system to verify that it is fully disengaged by pulling "T" handle; no resistance should be felt. If a resistance is felt, check cable routing through pulleys 3 and 4 (**Fig 32-11A**) to verify if it is cable routing or actuator resistance.

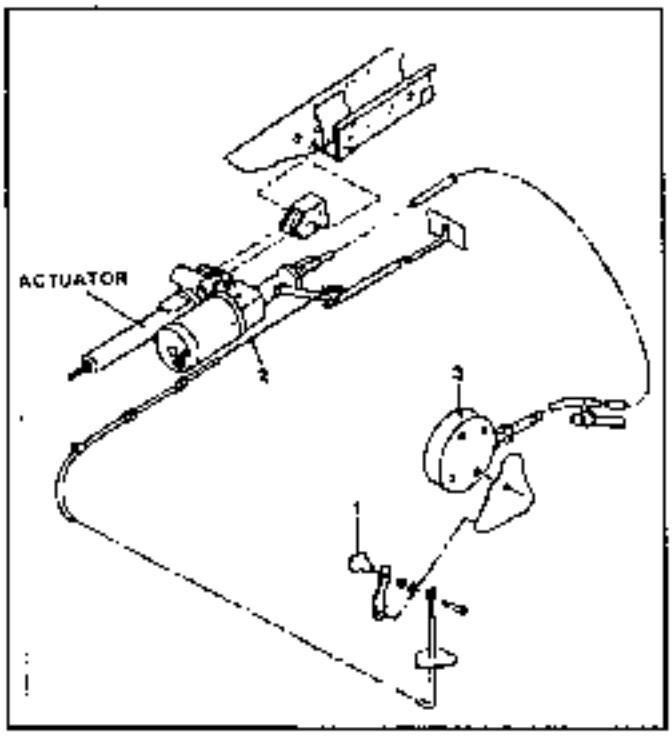
AVIONICS PRODUCTS ACTUATOR
(S/N 24-0064, 24-0378 THRU 24-TBA)



EMERGENCY GEAR SYSTEM - FIGURE 32-11A

5. Move RED lever to full UP position; pull "T" handle slowly to verify manual extension system is engaged. Resistance should be felt at once.

6. Replace "T" handle under RED lever and return RED lever to disengage position, (down and latched) Manual extension system is now rigged.



EMERGENCY GEAR SYSTEM - FIGURE 32-11B

DISENGAGE RIGGING:

(S/N 24-0001 thru 24-0377, Except 24-0084) (Other than Avionic Products or Plessey Actuator)

Rigging of Manual Emergency Landing Gear Disengage Unit as Follows (Ref. **Fig 32-10A and 32-11B**):

1. With aircraft on jacks, insure that disengage operating handle (1)(**Fig 32-11B**) in the cabin is in the full forward position and that the cable (2)(Fig 32-11B) is inserted thru hole in existing bolt attached at (K)(**Fig 32-10A**).

2. With unit (K) in full engaged position (K full aft) and existing bolt (M) inserted thru disengage arm, apply approximately 5 lbs. pull to cable to remove slack.

3. Tighten nut (M), readjust wire stops (L) and connect spring.

4. Turn crank (3) (**Fig 32-11B**) to assure full engagement.

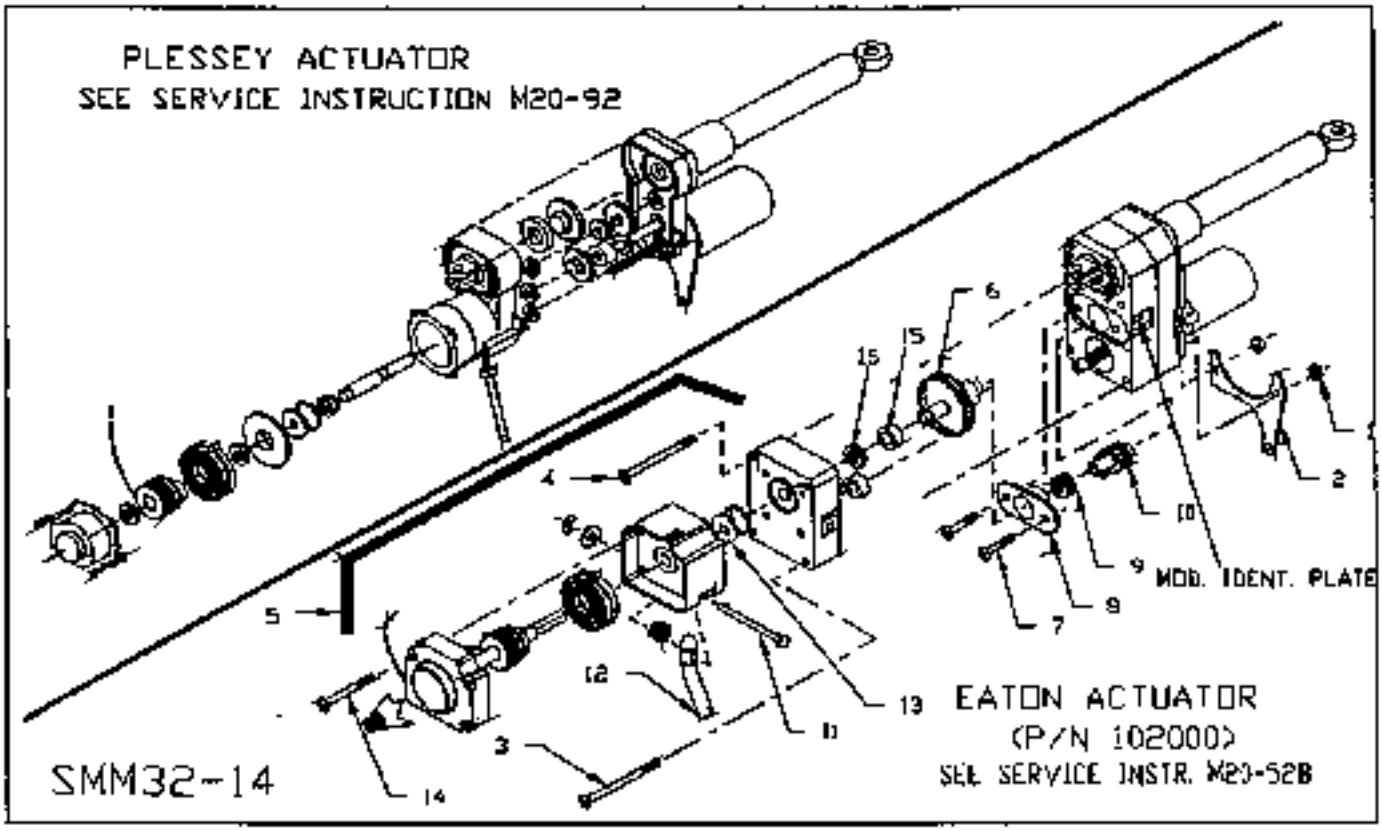
5. Move disengage operating handle (1) to full aft position and operate hand crank (3) to assure full disengagement. Return handle (1) to full forward position.

6. Rigging is now complete.

(S/N 24-0001 THRU 24-0377, EXCEPT 24-0084)

NOTE

During 200 hour gear inspection,6-20-08,3,L,(1), inspect rubber drive coupling between motor/gearbox and jackshaft/gearbox for signs of deterioration, hardness or wear. Loosen and remove 2 nuts/washers/bolts from bracket connecting the two components. Separate motor assy. from jackshaft assy. Remove rubber coupling from which ever shaft it remains on and inspect. Replace if damaged or deteriorated. Reassemble motor assy. to jackshaft assy. and secure all



LANDING GEAR ACTUATOR(S) [EXPLODED VIEWS] - FIGURE 32-12

components. Complete gear inspection per Section 5-20-06,3,L,(1).

See SI M20-89B for Dukes Actuator Drive Coupling Inspection.

NOTE

Plessey Actuators should be lubricated every 2000 cycles w/ MIL-G-81322 grease. Run actuator to mechanical "extend", fill tube cavity with grease thru MS15001-1 grease fitting until old grease is purged from screw assy. Remove old grease from & relube exposed screw threads. Run actuator to within approx. 0.5 inch of mechanical "retract" & remove major excess grease extruded from ball nut assembly during this retraction step.

32-31-03 - LANDING GEAR ACTUATOR, P/N 102000(*), CLUTCH SPRING REPLACEMENT, (* currently -1, -2, -3, -4, & ON)

KIT No. A10-95.

Landing gear actuator clutch spring replacement is mandatory at each 1000 hours of aircraft operation.

DISSASEMBLY - (P/N 102000(*)

1. Remove two nuts, item (1). Note position of cable support bracket, item (2), and remove (Figure 32-12).

2. Remove manual extension system disengage cable from actuator disengage arm.

3. Remove two long screws, item (3).

4. Remove two short screws, item (4).

5. Remove recoiler assembly, item (5).

6. Remove gear assembly, item (6), from clutch housing, item (8), by rotating gear and pulling with slight to moderate pressure.

7. Remove two screws, item (7), and remove housing, item (8), clutch spring, item (9), and gear assembly, item (10) from actuator body.

8. Remove clutch spring, item (9), from housing using gear assembly, item (6), as removal tool. Insert,item (6), into spring from flanged end of housing; rotate CCW and pull slightly. After disassembly, clean clutch gear thoroughly. Discard removed screws (3) & (4).

CAUTION

Use extreme care to prevent ball bearing from dropping out of recoiler assembly, avoid damage to gear and do not allow dirt to enter clutch housing bore.

9. See 32-30-06 procedure prior to reassembly for additional maintenance if needed.

ASSEMBLY - P/N 102000(*)

1. Lubricate gear and new clutch spring thoroughly with lube (MIL-G-81322) poly-lube.

2. Using gear to rotate spring, insert clutch spring into bore until fully seated.

NOTE

Be sure spring is all the way in and seated around cam.

3. Reinstall recoiler assembly make sure to fully seat gear, bearing, and gear tang into manual drive slot of recoiler assembly.

4. Apply Loctite Grade A (Catalog Number 88-31, not supplied in kit) to four new screws supplied and install; take care to use the two longest screws in bottom holes of item (5).

NOTE

Torque to approximately 10 - 12 inch pounds.

5. Reinstall cable support bracket and retaining nuts.

6. Retest unit for proper electrical and mechanical operation.

7. Install modification plate adjacent to I.D. plate (first 1000 hours only). Mark the first block of modification plate with the figure "1" using metal stamp or etching tool. Mark plate at each succeeding clutch spring replacement with the next consecutive number.

32-31-04 - LANDING GEAR ACTUATOR, P/N 102000-(*), RECOILER SPRINGS / CABLE AND DRUM ASSEMBLY REPLACEMENT

1. Carefully separate pulley housing from recoiler assembly (5) by removing screws (14). Retain pulley on shaft.

* All dash no's applicable for P/N 102000(*) actuator

2. Slide pulley drum and cable off shaft.

3. Remove the two (2) recoiler springs, and two (2) of the three (3) spring spacers leaving the third spacer in housing. Be certain that spacer is in place before installation of two (2) new recoiler springs and previously removed spacers.

4. Install new recoiler springs placing a spacer between each spring and over top spring.
IMPORTANT - Recheck proper installation of springs.

NOTE

When looking at recoiler assembly with shaft end toward you, the spring tabs in the housing slot should curve to the right as shown (Figure 32-12).

5. Inspect cable for sheathing damage. Replace cable if sheathing is cut or stripped. Measure overall cable length prior to reassembly. Cable length should be 31 1/2" +/- 1/2" long.

6. Slide drum onto shaft; be certain that spring detent on drum engages both recoiler springs by slightly rocking drum end.

7. When full engagement is obtained, wrap cable around drum in a clockwise direction-leaving 2" to 5" of cable free of drum.

8. Align slot in pulley housing with cable and slide pulley housing over cable and drum assembly.

9. Holding the housings together, pull properly aligned cable several times to ensure the absence of binding conditions. Measure cable length from side of housing. At full extend, the length of cable should be 29" minimum. In retracted position, cable length should be 5" to 8" long.

NOTE

Cable length in retract position may be adjusted shorter or longer by holding clutch with the finger of one hand (to prevent shaft rotation), and then with the other hand, rotating pulley housing one full turn CW (to shorten) or CCW (to lengthen). Retention of clutch with finger will not allow pretensioning of springs. Slight spring tension should be noted starting at 8" to 10".

10. Bronze clutch (13) should be inspected for damage or wear at slot where gear assemble engages during manual extension of the landing gear.

11. If damaged or worn, remove pin (11) from disengage arm (12) and slide disengage arm out so bronze clutch (13) can be pulled from its driveshaft.

12. Replace bronze clutch and reassemble disengage arm into recoiler assembly.

13. Attach clutch recoiler assembly to actuator gear housing with the four (4) screws removed in 32-30-05 (supplied in clutch spring kit).

32-31-06 - MANUAL EMERGENCY GEAR EXTENSION SYSTEM (T-HANDLE)

(S/N 24-0084, 24-0378 THRU 24-TBA)

The manual emergency gear extension system is used to extend the gear only. The controls are on floorboard aft and between the front seats. To manually extend the gear:

1. Pull landing gear actuator circuit breaker.

2. Move landing gear control switch to DOWN position.

3. Push latch forward with right thumb.

4. Pull lever back and upward (engaging manual emergency gear).

5. Pull "T" handle UP, (slowly to engage gears) then RETURN to original position; continue until GREEN GEAR DOWN indicator light is ON and/or the lines on the visual gear position indicator on floorboard aft of console are aligned when viewed from directly above the indicator (this will normally take 12 to 20 pulls).

CAUTION

DO NOT operate landing gear electrically with manual extension system engaged. Landing gear circuit breaker will trip.

CAUTION

DO NOT continue to pull T-Handle after GEAR DOWN light is ON. Actuator barrel nut may bind on DOWN STOPS.

- MANUAL EMERGENCY GEAR EXTENSION SYSTEM (CRANKDOWN SYSTEM)

(S/N 24-0001 thru 24-0377, Except 24-0084)

The emergency manual override system may be used to extend the gear. The override system has a flexible shaft geared to the landing gear actuator driven by a hand crank on the left side of the cabin panel. To manually extend the gear:

1. Pull landing gear circuit breaker.

2. Move landing gear control switch to DOWN position.

3. Push crank engage handle forward to engage drive mechanism.

4. Crank handle clockwise to lower gear. The gear is down and locked when green down-gear indicator light is on and when the lines on the visual gear position indicator on the floorboard are aligned.

CAUTION

DO NOT retract gear manually; use electrical system to retract gear. DO NOT operate gear electrically with hand crank engaged.

CAUTION

To prevent partial engagement and subsequent damage to drive spline or flexible shaft, check disengage arm (K), Figure 32-10A. This is covered under disengage rigging. (Section 32-30-04).

32-31-06 FINAL CHECKS (24-3000 thru 24-3078)

1. Raise and lower the landing gear through five complete cycles, pausing after each cycle to check required tolerances and dimensions and annunciator light indications. Make certain that no bungee springs are compressed to a solid height and that nose gear tire clears lip of wheel well a minimum of .25 in. when landing gear is retracted.

Make adjustments per the above procedures, as required, to correct any discrepancies.

2. Re-torque all jam nuts.

3. Reattach main and nose landing gear door links. Check to see that nose and main landing gear doors are still rigged per paragraph 32-10-04.

32-32-00 - TROUBLE SHOOTING - LANDING GEAR SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Incomplete retraction. Gear retracts to an intermediate position and stops short.	-Bind in gear retraction system because gear is out of rig. Malfunction in gear electrical circuit, inoperative actuating motor, or weak battery.	Refer to landing gear rigging procedure. Examine all movable parts for proper lubrication and freedom from binding. Check for actuator jackscrew binding and lubricate as needed. Any malfunction can cause the landing gear circuit breaker to trip, therefore check electric circuit for loose connection, broken wires, or defective relay switches. Recharge battery if necessary.
	-Oversize/stretched tire will not go into wheelwell properly.	Replace with smaller diameter tire.
Gear will not retract at 70 to 80 MPH IAS.	-Insufficient air-speed, pressure switch inoperative, circuit breaker tripped or actuator ball nut binding on DOWN STOPS.	Check pitot tube and line for obstructions. Examine pressure switch for proper adjustment and operation. Reset circuit breaker.
		Does gear retract using override; check systems operation. Gear may have been extended manually & ball nut is tight against STOPS; use wrench on ball nut flat to loosen.
	-Squat switch not properly rigged. Cold weather.	Adjust and check squat switch operation. - Ref.SB-M20-196
Gear will not retract & Landing Gear Actuator C/B trips.	-Manual engage handle in engaged position	Disengage Manual System.
Aircraft does not Track or steer properly.	-Nose wheel location improper	See Section 32-50-02.
Gear will extend; green indicator-light (press-to-test) will not illuminate.	-Lamp burned out in green indicator-light circuit. Down-limit switch is inoperative.	Replace burned out lamp. Check indicator-light circuit and/or down-limit switch.
Actuating motor extends gear to an intermediate position.	-Same causes as listed with "In complete Retraction" above.	Same remedies as listed with "Incomplete Retraction" above.
Gear will extend manually, but green indicator light will not illuminate.	-Gear switch is not in DOWN position. -Lamp burned out in green indicator light.	Place gear switch in DOWN position. Replace burned out lamp
Manual system will not lower gear.	-Avionic Products Actuator internal clutch spring broken.	Replace spring.
	-Manual engage arm improperly rigged.	Rig manual engage arm.
Manual system will not lower gear. (con't.)	-Sheared female spline in drive connector.	Replace drive connector assembly if female spline is stripped.
	-Drive connector is out of rig.	Adjust control cable tension at drive connector.
LDG actuator will not retract or will not extend gear.	-Any of the above or Brushes in motor worn	Applicable remedy listed above or replace motor or brushes.

32-40-00 - WHEELS AND BRAKES

32-40-01 - MAIN WHEELS

The main wheels have standard brand, 6:00 x 6, six-ply rated tires with standard tubes. To remove main wheels from aircraft:

1. Remove either IB or MID gear door.
2. Detach dust shield. Remove three screws and washers.
3. Remove 2 bolts from brake caliper.
4. Remove wheel by removing cotter key and nut from axle. (See Fig 32-13).
5. Slide wheel off axle.

32-40-02 - MAIN WHEEL DISASSEMBLY - ASSEMBLY

1. Remove snap ring, (10) grease seal rings, (8) and felt seals (9). (See Fig 32-14).
2. Remove bearings (7).
3. Completely deflate tire.

WARNING
Do not loosen wheel half retaining nuts before tire is completely deflated. Failure to observe this warning may result in bodily injury.

4. Remove nuts, washers, and wheel half retaining bolts, (5); separate halves, (3, 4) and remove tire and tube.

NOTE
Bearing cups are shrink fitted; do not remove them unless necessary for replacement.

5. Clean all wheel parts thoroughly in cleaning fluid (Federal Specification PS-661). Exercise special care in cleaning bearing cones and felt rings to insure thorough cleaning.
6. Inspect all parts for cracks, corrosion, or evidence of wear.
7. Inspect bearing cups and replace if cups are damaged or worn. If necessary to remove bearing cups, heat wheel in boiling water for at least 30 minutes. Then remove cup by tapping evenly. To install cup, heat wheel half again; cool cup with dry ice. Position cup and tap lightly to insure proper seating.
8. Polish small burrs or nicks out of wheel halves with No. 400 grit sandpaper, clean thoroughly, and refinish protective coating as required.
9. Replace bearing cones that show signs of wear or bearing fretting.
10. Repack wheel bearings and lubricate seals with grease. Install bearings, closure rings, and felt seals in wheel halves. Secure with snap rings.
11. Position tire and tube on one wheel half; then position other wheel half on tire.
12. Install brake disc (2) and wheel half retaining bolts, washers, and nuts (Fig. 32-14).
13. Tighten nuts evenly and torque to 150 inch pounds.

CAUTION
Uneven or improper torque may cause bolt or wheel failure.

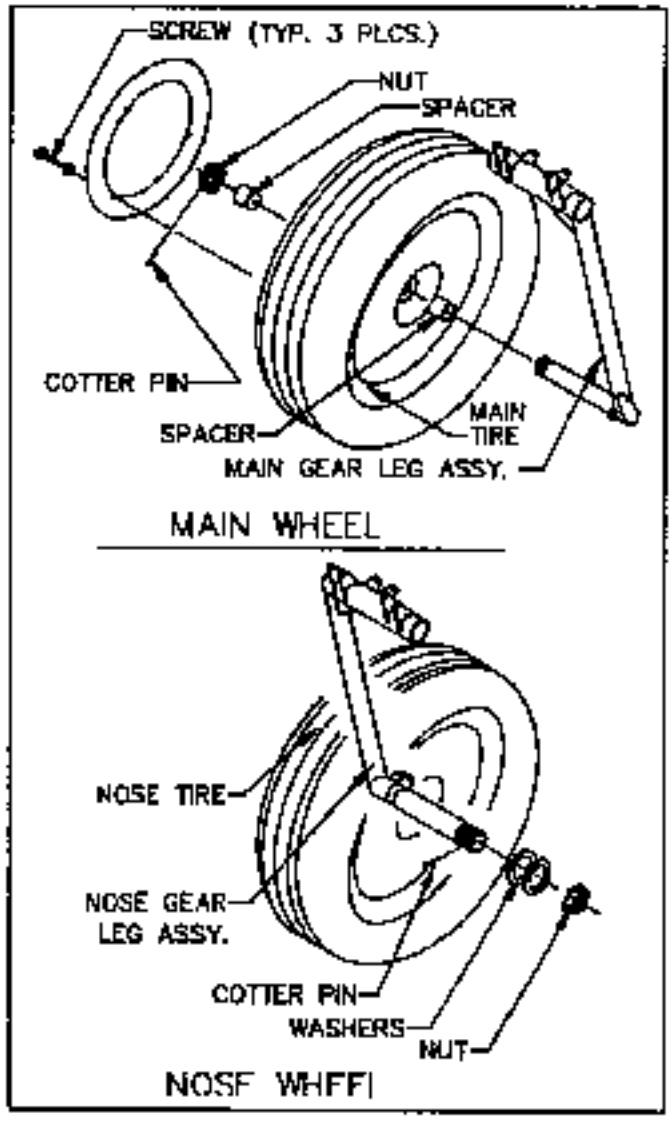
14. Inflate tire to 30 PSI.
15. Install wheel assembly, washer, and axle nut. Tighten axle nut until bearing binds slightly, back nut off to nearest castellation, and install cotter pin.

NOTE
Position Spacers as needed to position Brake Disc .12 inches away from MLG leg assembly.

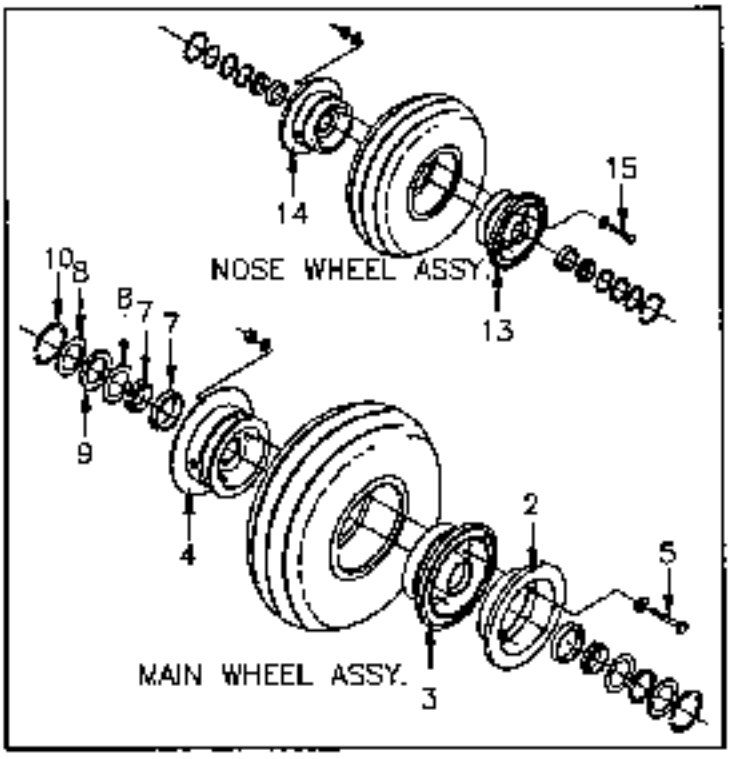
NOTE
When properly installed, wheel will turn with a slight resistance.

16. Install dust shield and IB/MID gear door.
17. Reinstall brake caliper & safety.

CAUTION
Conduct a retraction/extension check (5 cycles) to verify tire enters and exits wheelwell without interference. [Ref. AC 43.13-1(*)]
(* = current revision).



LANDING GEAR WHEEL REMOVAL - FIGURE 32-13



WHEEL ASSEMBLIES - FIGURE 32-14

C. Visually inspect linings for wear and brake disc for warpage. Brake linings should be replaced when they are worn to a minimum thickness of 1/8 inch. If lining replacement is necessary proceed with steps D thru O. Otherwise reassemble in reverse sequence of disassembly.

CAUTION
Brake disc should be replaced if width is .205 inch or less.

D. Disconnect and cap hydraulic line (4) at brake cylinder assembly. Remove nuts from anchor bolts.

E. Remove pressure plate assembly (**Fig 32-15**) (5) sliding it off the anchor bolts (8). Note the condition of the anchor bolts. If they are nicked or gouged they should be sanded smooth to prevent binding with the pressure plate (5) or torque plate(8) . When the anchor bolts are replaced they should be pressed out. New ones can be installed by tapping them in place with a soft hammer.

F. Drill out rivets (9) attaching linings (7) to back lining plate (2) and the pressure plate (5). Remove piston assembly (10) and "O"ring (11). It is permissible to use compressed air applied to the brake line fitting to remove the piston (10) from the brake cylinder.

G. Clean parts in cleaning solvent (Federal Specification **PS-661** or equivalent) and dry with oil-free compressed air.

18. Remove aircraft from jacks.

32-40-03 - NOSE WHEEL DISASSEMBLY-ASSEMBLY

The standard brand, tube-type, 5:00 x 5 nose wheel tire is six-ply rated.

1. **Nose wheel removal.**

A. Remove cotter key, nut, and washer from axle (Figure 32-13).

B. Remove nose wheel

2. Installation is in reverse sequence of removal.

3. Nose wheel disassembly.

A. Completely deflate tire by removing valve core.

B. Remove nuts, washers, and wheel half retaining bolts (15) from wheel. **(Fig 32-14).**

C. Separate wheel halves, **(13 and 14)** and remove tire and tube. Refer to Section 32-40-02 steps 5 thru 10 for wheel inspection.

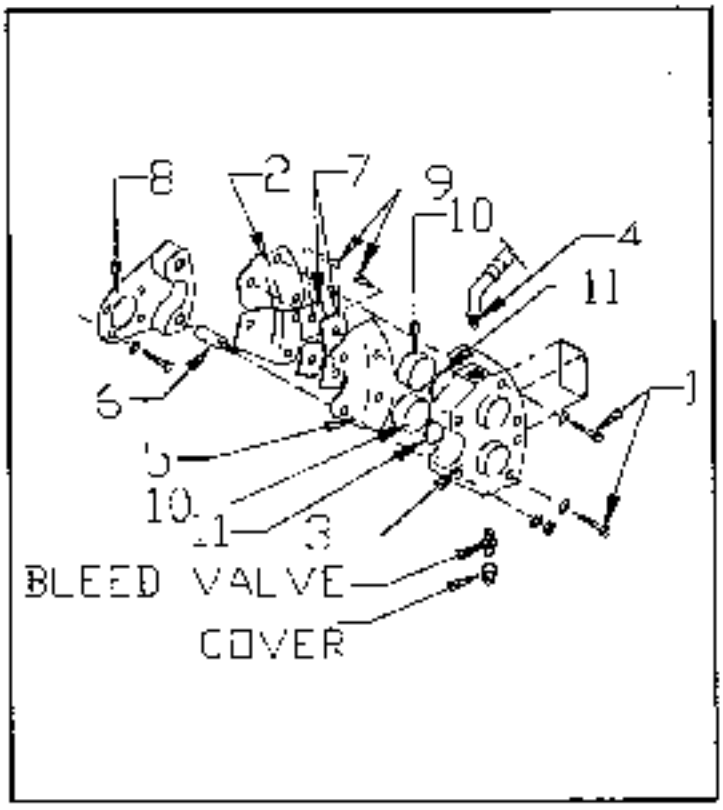
D. Reassemble nose wheel in reverse sequence of disassembly. Tighten retaining bolt nuts evenly and torque to 90 inch-pounds. Inflate tire to 49 PSI.

32-40-04 - BRAKE SYSTEM

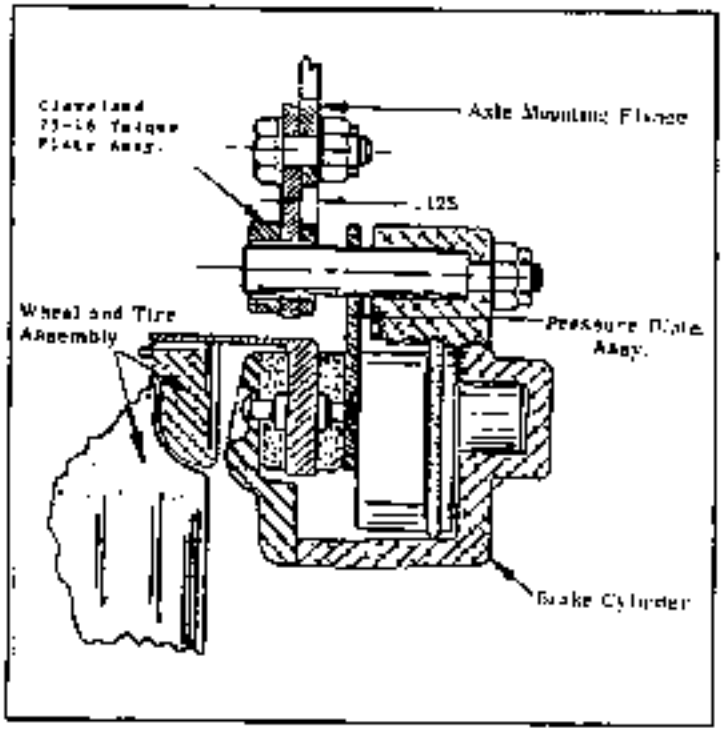
1. **BRAKE REMOVAL AND INSTALLATION:** Lining inspection and/or replacement or cylinder repair.

A. Place aircraft on jacks.

B. Remove inboard or mid gear doors. Remove safety wire and two AN4H17A bolts (1) attaching back lining plate assembly (2) to brake cylinder assembly **(Fig. 32-15)**.



BRAKE ASSEMBLY - FIGURE 32-15



TORQUE PLATE ASSY. INSTALLED RELATIVE TO CYL
FIGURE 32-16

H. Replace linings with Cleveland 66-30 linings using Cleveland #561-2 rivets. Rivets must be rolled to obtain proper fit between rivet shank and hole.

I. Inspect brake cylinder bore for scoring. A scored cylinder may cause the "O" ring to leak or cause rapid wear of the "O" ring. A scored brake cylinder should be replaced.

J. Replace AN6230-2 "O" ring (11) with a new one. Do not reuse the old "O" ring.

K. Lubricate cylinder and piston with MIL-H-5606 red hydraulic fluid and assemble components with care to prevent damage to the "O" ring.

L. Service and inspect main wheels as described in Section 32-40-02. Inspect torque plate assembly making sure the .125 thickness is toward brake cylinder assembly (outboard). If thicker .250 protrusion is outboard, remove torque plate from axle mounting flange and install as shown (Figure 32-16).

M. Reassembly brake cylinder assembly and back lining plate assembly onto the airplane in the reverse sequence of disassembly.

N. Bleed hydraulic system as described in Section 12-20-05.

O. Remove aircraft from jacks.

NOTE

Brake pad conditioning is required to properly cure the resins binding the asbestos lining composition together. Excessive heat created prior to conditioning will carburize the lining material and prevent the attainment of maximum braking coefficient.

2. BRAKES - BREAK IN PROCEDURES

Proper conditioning may be accomplished as follows:

A. Perform a minimum of six (6) light pedal effort braking applications and two (2) hard stops from 25 to 40 MPH (21 to 35 KIAS). Allow the brake discs to partially cool between stops.

The procedure will generate sufficient heat to cure the resins in the lining, but will not cause the material to become carburized due to excessive heat.

3. **MASTER CYLINDER**
24-0001 thru 24-3200, 24-3202 thru 24-3217
REMOVAL, DISASSEMBLY AND REASSEMBLY.

A. Remove left hand exhaust cavity.

B. Disconnect hydraulic cylinder from pedal linkage.

C. Disconnect and cap hydraulic lines.

D. Disconnect hydraulic cylinder from bracket; remove cylinder.

E. To disassemble master cylinder, (Gerdes or Parker-Hannifin) (Reference Fig 32-17A).

(1) Unscrew and remove rod end clevis and nut from piston rod (9).

(2) Remove snap ring (13) and lift out complete piston rod assembly, item 3 thru 12.

(3) Remove spacer (11) and O-ring packings, (10 and 12) from piston and assembly.

(4) Disassemble piston rod assembly by removing roll pin (4), (spring guide (3) will be pushed out by spring (5) when roll pin is removed), spring (5) and piston (7).

(5) Remove O-ring packing (6) from piston.

(6) Remove slat-o-seal (8) from piston rod.

(7) Clean all parts with cleaning solvent (Federal Specification No. PS-661).

(8) Inspect cylinder for cracks, scoring, or grooves in bore.

(9) Inspect piston (7) for damage,check for nicks and scratches.

(10) Inspect spacer (11) for damage.

(11) Inspect push rod for scoring, grooves, nicks and scratches.

(12) Inspect piston return springs (2) for permanent set and proper length (3.670 in. min., 4.05 in. max.).

(13) Replace all faulty parts and all O-rings.

(14) Reassemble in reverse sequence of disassembly. Immerse all parts in hydraulic brake fluid prior to reassembly.

F. Reinstall master cylinder in reverse sequence of removal.

G. Bleed brake system (refer Section 12-20-05).

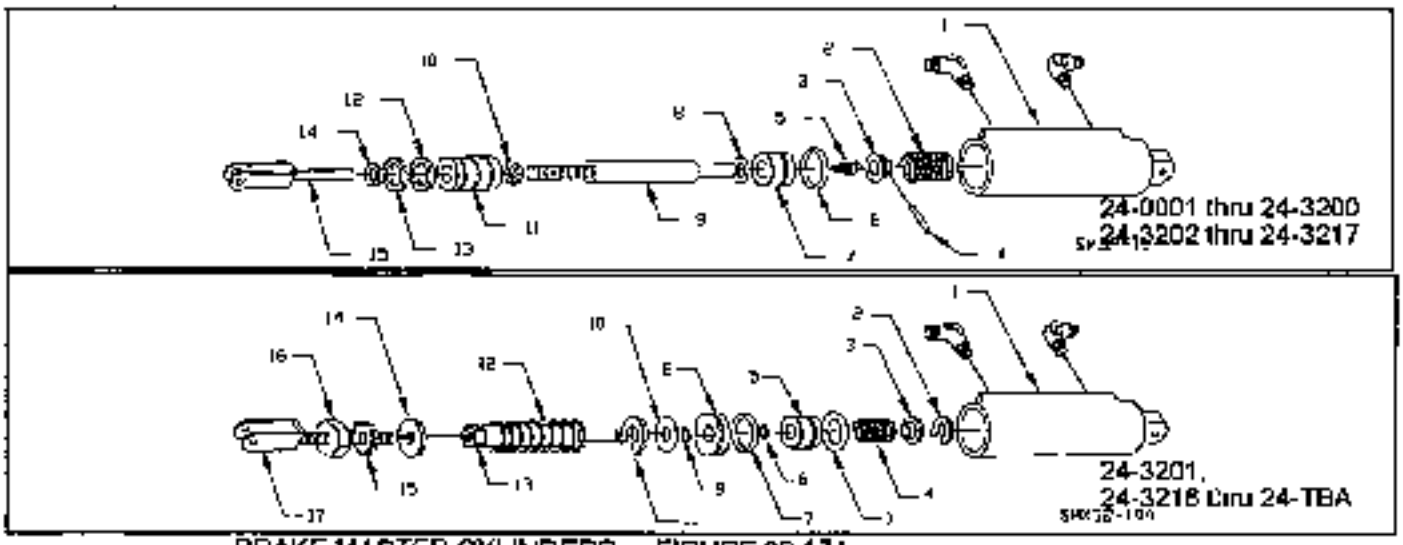
NOTE

S/N 24-3201, 24-3218 thru 24-TBA have larger capacity Master Cylinders (P/N 10-24D) installed.

REMOVAL, DISSASSEMBLY AND ASSEMBLY

(24-3201, 24-3218 THRU 24-TBA)

A. Remove left hand, lower fuselage skin aft of firewall and exhaust cavity.



BRAKE MASTER CYLINDERS - FIGURE 32-17A

B. Disconnect hydraulic cylinder from pedal linkage.

C. Disconnect and cap hydraulic lines.

D. Disconnect hydraulic cylinder from bracket and remove cylinder.

E. To disassemble master cylinder; (Gerdes or Parker-Hannifin) (Reference Fig 32-17A, 24-3201, 24-3218 thru 24-TBA).

(1) Unscrew and remove rod end clevis (17), nut (16) and washers (14 & 15) from piston rod (12).

(2) Remove snap ring (11) from cylinder housing assembly; lift out complete piston rod assembly, items 2 thru 12. Spring (13) can be removed at this time.

(3) Remove snap ring (2) from end of piston rod assembly.

(4) Remove bushing (3) and spring (4) from end of piston rod.

(5) Remove piston assembly (5) and o'ring (7) from piston assembly and o'ring (8) from piston rod shaft

(6) Remove end cap (6) and o'rings (9) [ID] and (7) [OD] from end cap assembly.

(7) Clean all parts with cleaning solvent (Fed. Specification No. PS-661).

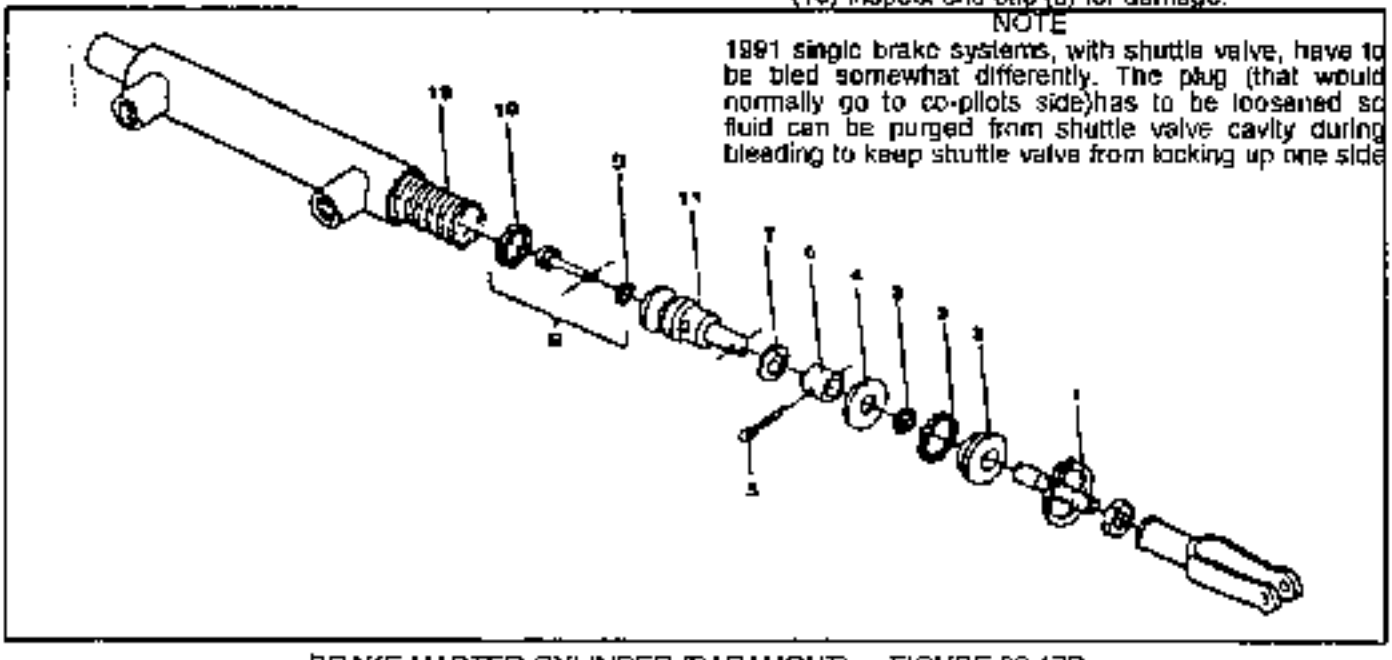
(8) Inspect cylinder for cracks, scoring or grooves in bore.

(9) Inspect piston (5) for damage; check for nicks and scratches.

(10) Inspect end cap (6) for damage.

NOTE

1991 single brake systems, with shuttle valve, have to be bled somewhat differently. The plug (that would normally go to co-pilots side)has to be loosened so fluid can be purged from shuttle valve cavity during bleeding to keep shuttle valve from locking up one side



BRAKE MASTER CYLINDER (PARAMONT) - FIGURE 32-17B

(11) Inspect push rod for scoring, grooves, nicks and scratches.

(12) Inspect spring (4) for free height - .500 in. +/- .030

(13) Replace all faulty parts and all o'rings.

(14) Reassemble in reverse sequence of disassembly. Immerse all parts in hydraulic brake fluid prior to reassembly.

(15) Check piston rod and return spring (13) for proper compression during stroke (9 lbs. (@ start of stroke) to 32 lbs. (@ 3/4 stroke).

F. Reinstall master cylinder in reverse sequence of removal.

G. Bleed brake system (refer to Section 12-20-05).

PARAMOUNT MASTER CYLINDER

A. To disassemble Paramount master cylinder (Reference Fig. 32-17B),

(1) Unscrew and remove rod end bearing and nut from piston rod.

(2) Remove snap ring (1) and lift out complete piston rod assembly.

(3) Remove piston top (2), o'ring packings (3), and brass washer (4) from piston rod assembly.

(4) Disassemble piston rod assembly by removing cotter pin (5), valve stop (6), and spring washer (7). Valve assembly (8) will fall out when cotter pin is removed.

NOTE

DO NOT attempt to remove O-ring packing (9) under valve head. If valve or packing is faulty, replace the valve assembly.

(5) Remove o'ring packing (10) from piston (11). Do not unscrew piston from push rod. Replace entire piston rod assembly if faulty.

(6) Remove spring (12) from cylinder.

(7) Clean all parts with cleaning solvent (Federal Specification No. PS-661).

(8) Inspect cylinder for cracks, scoring, or grooves in bore.

(9) Inspect piston for damaged valve seat, nicks and scratches.

(10) Inspect valve assembly for damage.

(11) Inspect push rod for scoring, grooves, nicks and scratches.

(12) Inspect piston return spring for permanent set and proper length (3-3/16 IN. MIN.: 3-5/16 IN. MAX).

(13) Replace all faulty parts.

(14) Reassemble in reverse sequence of disassembly. Immerse all parts in hydraulic brake fluid prior to reassembly.

B. Reinstall master cylinder in reverse sequence of removal.

C. Bleed brake system (refer Section 12-20-06).

4. **PARKING BRAKE VALVE -**
Removal.

A. Remove left hand exhaust cavity.

B. Disconnect parking brake control at parking brake valve arm.

C. Disconnect and cap hydraulic lines.

D. Remove parking brake valve.

Disassembly & assembly parking brake valve:

(S/N 24-0758 THRU 24-TBA;

Refer **Figure 32-18 A).**

A. Remove both fittings (1) from valve housing (7), springs (8) will come out with the fittings.

B. Remove poppet valves (2) and pins (3), from housing by bumping on table top.

C. Remove both fittings (4) from end of housing.

D. Remove snap ring (5) from end of camshaft assembly (6).

E. Carefully remove camshaft assembly (6) from housing.

F. Inspect all components for damage, nicks, grooves, etc.

G. Clean all parts with cleaning solvent (Federal Specification No. PS-661).

H. Replace all o'rings (9).

I. Reassemble parking brake valve in reverse sequence of disassembly.

J. Connect valve assembly to the hydraulic lines.

K. Bleed system and service hydraulic reservoir with hydraulic fluid as described in Section 12-20-04.

Disassembly & assembly parking brake valve.

(S/N 24-0001 thru 24-0757;

Refer to **Figure 32-18 B).**

A. Remove rivets or screws (1) attaching valve arm (2) to valve body (3) and stem (4).

B. Remove end plug (5) and square cut gasket (6).

C. Withdraw valve stem assembly (7) and remove o'ring packings (8 & 9) from valve body.

D. Clean all parts with cleaning solvent (Federal Specification No. PS-661).

E. Inspect valve stem (4) for nicks, scratches, burrs, and grooves.

F. Inspect valve seal for nicks, scratches, and scoring.

G. Inspect all threads for damage.

H. Replace o'ring packings.

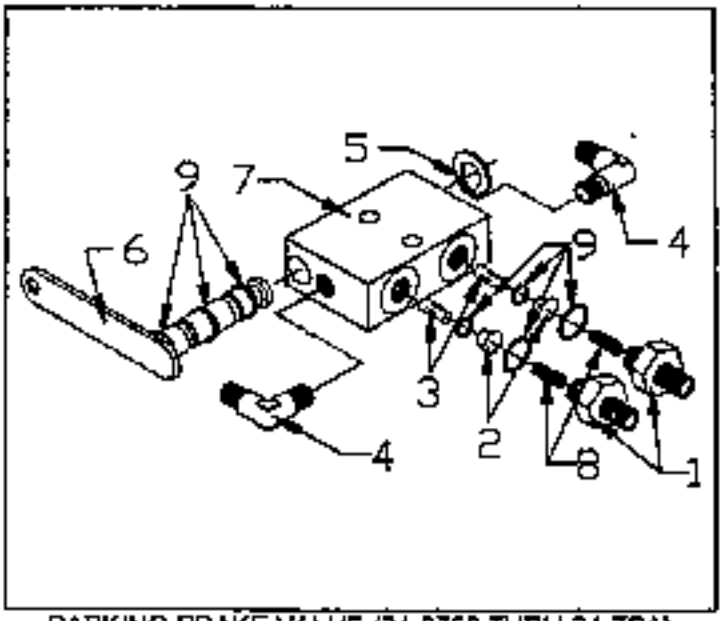
I. Replace end plug gasket (6).

J. Reassemble brake valve in reverse sequence of disassembly.

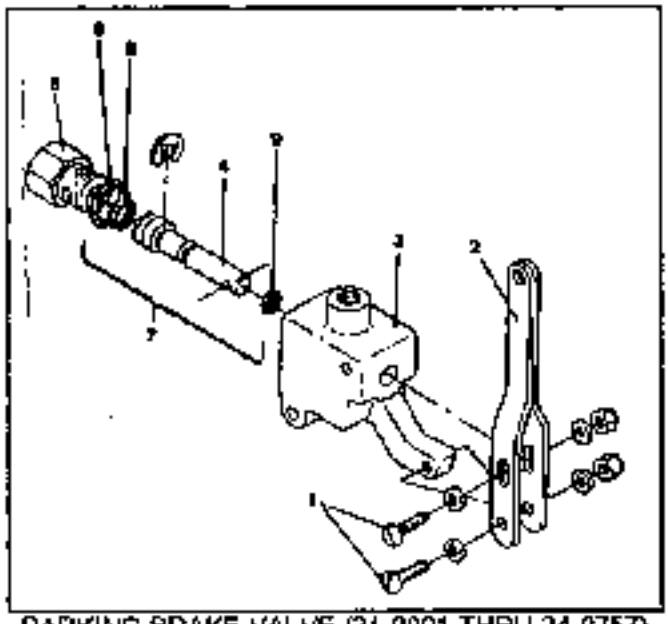
K. Install brake valve on hydraulic reservoir.

L. Reinstall hydraulic reservoir and connect lines and brake control.

M. Bleed system and service hydraulic reservoir with hydraulic fluid as described in Section 12-20-04.



PARKING BRAKE VALVE (24-0758 THRU 24-78A)
FIGURE 32-18A



PARKING BRAKE VALVE (24-0001 THRU 24-0757)
FIGURE 32-18B

32-41-00 - TROUBLE SHOOTING - BRAKE SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Solid pedal and no brakes.	-Brake lining worn beyond allowable limit.	Replace lining.
Spongy brake.	-Air in system.	Bleed brake system per 12-20-05.
Pressure will not hold.	-Leak in brake system.	Visually check entire system for evidence of leaks.
Parking brake will not hold.	-Air in system or leak in system (downstream of parking brake valve).	See remedies above.
	-Defective parking brake valve.	Repair or replace the valve.
Brake grabs.	-Warped or bent disc.	Replace disc.
	-Foreign matter locking disc.	Clean disc and lining.
Brake pedal will not return to neutral position.	-Master cylinder shaft or linkage misaligned.	Check that shaft travels in straight line & not binding in linkage.

32-41-01 - SHUTTLE VALVE

S/N 24-0001 thru 24-0763 (If Installed)

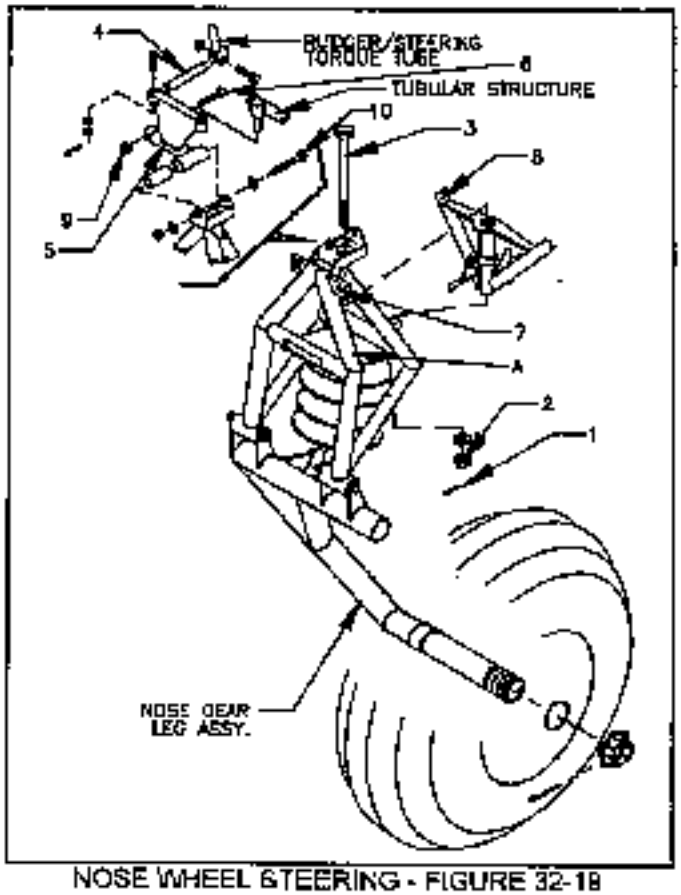
Shuttle valve removal and testing (optional dual brake system.)

1. Disconnect inlet lines from master cylinders and cap line ends.
2. Disconnect outlet line leading to brake cylinder and cap line end.
3. To test valve operation, seat shuttle valve by applying 1500 PSI hydraulic pressure to one inlet port with outlet plugged.
4. Apply pressure to opposite port. Shuttle valve should unseat at 15 to 50 PSI.
5. Repeat step C and D to test opposite port.
6. Reinstall shuttle valve in reverse sequence of removal.
7. Bleed brake system per 12-20-05.

32-50-00 - STEERING

32-50-01 - NOSE GEAR STEERING SYSTEM

The nose gear steering system consists of a steering horn on gear leg linked to the rudder pedals by push-pull tubes and bellcranks. Gear retraction automatically disengages steering mechanism from nose wheel.



NOSE WHEEL STEERING - FIGURE 32-18

(Section 27-20-00 outlines the nose gear steering rigging.) A centering cam aligns the nose wheel for entry into wheel well.

NOTE
Check nose gear leg assy. for towing damage. Replace if any dent exceeds 1/32 inch.

NOTE
Aircraft S/N 24-1464 & ON have twin limiter pads and adjustable stops (7) (Figure 32-19) installed on the nose gear leg assembly (A) that will prevent turning damage to leg assembly.

1. Every 100 hours remove cotter pin (1)(Fig 32-19) and retorque nut (2) to 450-500 inch lbs. Check holes in leg assembly where pivot bolt (3) is located for any wear. If holes are worn, replace leg assembly.

NOTE
Shock absorber (6) and related attaching hardware may be removed from all Mooney M20J aircraft if desired. (Ref 840052 Dwg.)

CAUTION
Bolt, washer, nut (9) and (10) (Figure 32-19) must be installed as shown, from rear to front.

2. Rod end bearing (4) (Figure 32-19) should be inspected at least every 100 hours for any damage or bending.

3. Check steering horn assembly (5) collars and spacers for looseness. Replace any bushings or spacers that are worn.

4. Adjust turn limiter stop bolts (7) to contact cross member (8) of truss assembly (.020 gap permissible) when rudder is at its extreme left and right travel position.

32-50-02 - NOSE GEAR STEERING AND TRACKING

1. Level aircraft as described in Chapter 6.

2. Center nose wheel.

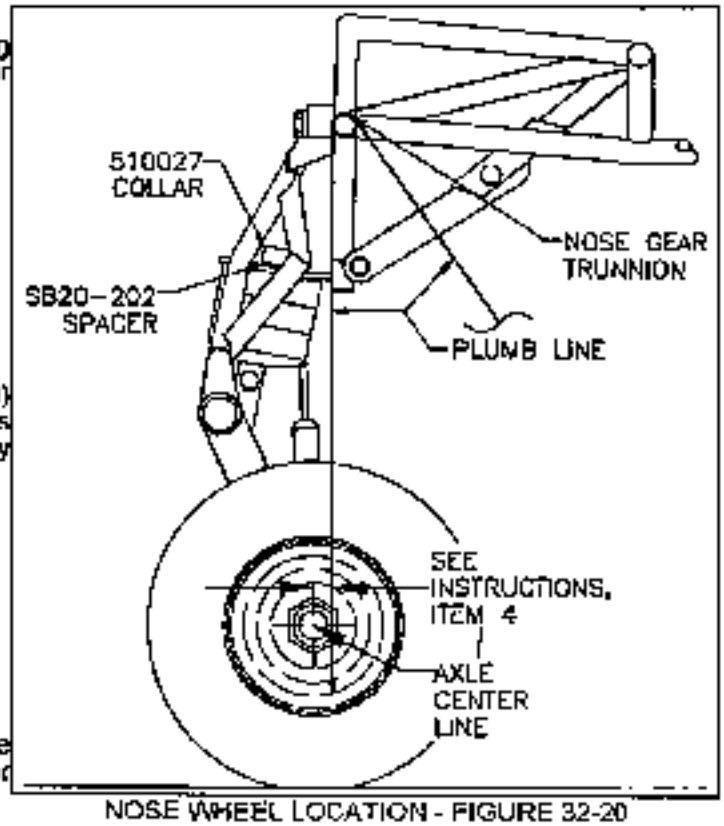
3. Place plumb line over and forward of nose gear trunnion (see **Figure 32-20**) part number 540001-503

4. Measure forward from aft edge of plumb line to axle center line. Modification relocating nose wheel should be accomplished if axle position, forward of plumb line, exceeds .06.

5. Add SB M20-202-3 spacer under collar to reposition the axle if required.

NOTE
Some collars have holes drilled off center and may be turned over to change axle position.

6. Run gear through up/down cycle. Check nose gear door and wheel well tire clearances. Re-rig if required.



NOSE WHEEL LOCATION - FIGURE 32-20

32-60-00 - POSITION AND WARNING

32-60-01 - ELECTRIC GEAR SAFETY DEVICES

The gear switch operates the landing gear actuator relays. Pulling wheel-shaped knob out and moving it to upper detent raises gear. However, an airspeed safety switch or a squat switch is incorporated in the electrical system to prevent landing gear retraction while on the ground. On aircraft equipped with airspeed safety switch to allow gear retraction with the aircraft on jacks; attach a 12-inch length of 3/8 inch pliable rubber hose (surgical tubing) over pitot head, and pinch open end with a larger cotter pin; roll the tubing with the cotter pin until compressed air within the twisted tube actuates airspeed pressure switch. Maintain pressure on the switch until retraction is complete. To adjust airspeed switch refer to Section 32-60-03. To adjust the squat switch refer to Section 32-60-04.

The up-limit switch will stop the gear in its retracted position. Moving control knob to its lower detent lowers landing gear. The down limit switch will stop gear actuating motor when the proper force is exerted to hold landing gear in down-and-locked position. Refer to Section 32-30-02,6. for proper limit switch rig ging. The gear down-and-locked position is indicated by:

1. Illumination of the GREEN gear down annunciator light. GEAR DOWN annunciator light is dimmed when NAV Light switch is ON.

2. The warning horn will not sound with the throttle retarded to within 1/4 - 3/8 in. of panel.

3. The indicator marks will be aligned on the visual gear-position indicator.

CAUTION

When running gear up or down electrically DO NOT use circuit breaker as a switch.

Partial retraction or extension may be accomplished electrically as follows.

1. Place Master Switch in OFF position.

2. Move gear switch to GEAR UP or GEAR DOWN as desired.

3. Momentarily actuate master switch until gear is in desired position.

32-60-02 - LANDING GEAR WARNING SYSTEM

The landing gear warning system consists of:

1. Landing gear position lights: (GEAR DOWN-white indicator light on floor and green light on annunciator; GEAR IN TRANSIT - up or down - red unsafe on annunciator; GEAR UP - no lights).

2. A warning horn in cabin is actuated by throttle control when gear control switch handle is up and the throttle is retarded to within 1/4-3/8 in of panel. Check warning horn for volume in flight periodically. Horn will sound if gear is not DOWN and LOCKED even if switch is in DOWN position or if airspeed is below 60 KIAS & gear switch is in UP position.

32-60-03 - AIRSPEED SAFETY SWITCH ADJUSTMENT (24-0064, 24-0238 & ON)

The airspeed safety switch, located inside cabin is mounted behind airspeed indicator. An airspeed safety switch is incorporated into electrical system to prevent landing gear retraction while on the ground and at airspeeds below 69 +/- 5 MPH (60 +/-5 KTS). Additionally the RED gear unsafe light comes on and warning horn is sounded when gear control handle is placed in gear-up position below 69 +/- 5 MPH (60 +/-5 KTS).

NOTE

Whitman-General switches can be adjusted using the following procedures:

1. Using a water manometer to measure pressure, gradually apply air pressure to inlet at cap.

2. Connect an ohmmeter between microswitch leads.

3. Gradually increase pressure to 2.775 inches of water until diaphram movement closes microswitch.

4. Slowly decrease pressure until microswitch opens.

5. Adjust knurled body until switch closes at an increasing pressure of 2.775 +.384/-.359 in. water (69 +/- 5 MPH or 60 +/-5 KTS).

6. Secure set screw and repeat step (5), five times.

V.E.P. switches can be adjusted using the following procedures:

V.E.P. manufactured switches are field adjustable. They should close at 2 8 +/- 4 inches water. Adjust slotted screw head on center of switch to obtain correct settings.

CAUTION

The airspeed safety switch is designed to operate within a specified range during increasing airspeed only. Due to hysteresis of the switch/diaphram assembly the switch MAY NOT deactivate the landing gear circuitry until approximately 57 MPH (49.5 KTS). This could allow the landing gear to retract if the gear switch is inadvertently placed in the UP position during the landing roll.

WARNING

Do not turn knurled knob on back of switch housing (Whitmal-General Switches) when disconnecting switch from electrical connections. This is airspeed adjustment knob.

NOTE

Refer to proper electrical schematic when replacing with switches from another manufacturer.

CAUTION

During Pitot-Static System Inspection, compensating pressure MUST be applied to pitot side of A/S Safety switch diaphram when "static presssure" is applied. Failure to equalize pressure on diaphram could cause it to rupture.

32-60-04 - SQUAT SWITCH ADJUSTMENT

(24-0001 THRU 24-0237 except 24-0084)

The squat switch, located on the left main gear, is incorporated into the electrical system to prevent landing gear retraction while aircraft is on ground. Adjustment of squat switch is accomplished as follows:

1. Raise aircraft on jacks.

2. Remove safety wire from adjustment nuts on switch.

3. Adjust switch body until switch just closes.

4. Check switch by slowly lowering aircraft to ground. Switch should now be open.

5. Resafety adjustment nuts.

32-80-00 - MISCELLANEOUS

32-81-00 - LANDING GEAR SHOCK DISC INSPECTION

1. Aircraft with full fuel load and weight on landing gear.

A. Main gear shock discs. (See Fig 32-21).

(1) Check gap between retaining collar (A) (Fig. 32-21) and top retaining plate (B). Allowable gap is 0.00 to 0.60 inches.

(2) Replace discs when gap exceeds tolerance. Use shock disc replacement tool (C), P/N GSE 030011, (old P/N ME 121), to remove and install main gear shock discs. Use removable pad from tool as a gride on top of shock link to align discs as they are being compressed.

(3) Careful application of the shock disc replacment tool is recommended during replacement of main gear shock disc to keep from damaging grease fittings.

NOTE

Shock disc retention collar should be installed with the chamfer facing down and forward.

B. Nose Gear Shock Discs. (See Fig 32-22)

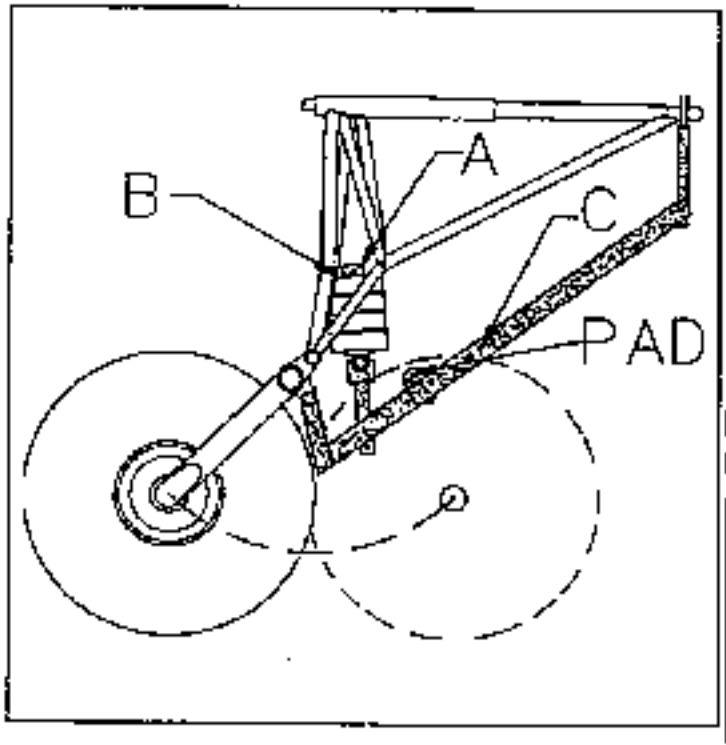
(1) Check for gap between retaining collar (D), (Figure 32-22) and top retaining plate (E). Top retaining plate must be in contact with retaining collar.

(2) Replace shock discs if gap is found. Use shock disc replacement tool (F), P/N GSE 030010, (old P/N ME120), to remove and install nose gear shock discs. Use removable pad from tool as a gride on top of shock link to align discs as they are being compressed.

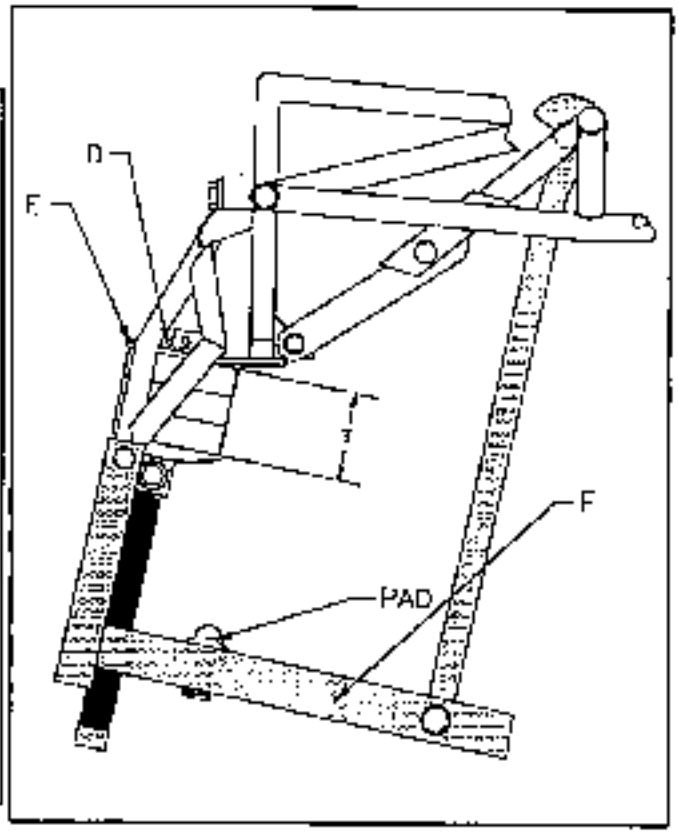
NOTE

Dimension (T), (Figure 32-22), is critical to properly locate nose wheel position. The leg assemblies can vary, due to manufacturers tolerances.

The dimension (T) in a no load fully extended position should be approximately 3.0 inches. Add spacer under collar (D) per SB M20-202, as needed. See (Figure 32-20), paragraph 30-60-02, for proper steering/tracking rigging.



MAIN GEAR SHOCK DISC REPLACEMENT TOOL APPLICATION – FIG 32-21



NOSE GEAR SHOCK DISC REPLACEMENT/TOOL FIGURE 32-22

2. Raise aircraft on jacks - shocks fully extended.

A. Inspect nose and main gear shocks for evidence of gap between retaining collar and retaining plate. The disc preload must be great enough to maintain complete wheel extension during retraction.

B. Replace shock discs that have lost resilience.

C. Inspect retaining collar and bolt for deformation, wear, and cracks.

D. Replace defective bolt and collar.

CAUTION

Both collar and bolt must be replaced when one or the other is defective.

E. Inspect nose gear snubber (shock absorber)(if installed) for proper shock absorbing action. Replace snubber when effectiveness is impaired--the unit is sealed and cannot be repaired.

NOTE

Shock absorbers may be removed if desired. Refer to Drawing 940052.

...

NOTE

For Nose Gear Steering/Tracking see Section 32-50-02, (Figure 32-20).

32-62-00 - RECOMMENDED HARD LANDING INSPECTIONS

The following are areas recommended to be inspected when a "hard landing" has occured. Since a 'hard landing' is a relative term, it is up to the owner/operator to advise maintenance personnel when the inspections are to be accomplished.

1. Mud Shield missing or damaged on either or both main landing gear.

2. Main landing gear shock bisquits condition, compressed or extruded rubber.

3. Tail skid damage or damage to bulkhead that attaches tail skid.

4. Propeller strike/marks or other visual damage.

5. Engine or engine mount damage.

6. Nose landing gear leg assembly damage near steering lugs.

7. Pilot/Co-Pilot's seat adjustment supports/tubes bent from excessive G-loads.

If any evidence of damage or abnormal visual observations are found, it is recommended that a thorough inspection of all the above areas be done and repairs be made as necessary. Contact FAA personnel for incident report requirements.

CHAPTER 33

LIGHTS

CHAPTER 33

LIGHTS

LIST OF EFFECTIVE PAGES

CHAPTER 33

LIGHTS

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33-00-00 - GENERAL - DESCRIPTION AND OPERATION

High intensity strobe lights are standard equipment on M20J aircraft. The lights are located adjacent to the wing tip navigation lights and incorporated in the taillight assembly. Separate power supplies are utilized for each strobe light and are located in each wing outboard section, mounted on inspection cover, and inside the tailcone adjacent to the left rear inspection cover. The system is actuated by a circuit breaker/switch located on the instrument panel in front of the pilot. S/N 24-0001 thru 24-1037 have a combined Nav-Strobe light assembly on each wing tip and has no strobe light on the rudder, only a navigation light.

Navigation lights are located on each wing tip and rudder trailing edge (24-0001 thru 24-2999). (24-3000 thru 24-TBA) A/C have the aft facing navigation light (clear) located on each fiberglass wing tip trailing edge. The lights are activated by a circuit breaker/switch located on the instrument panel in front of the pilot.

S/N 24-0001 thru 24-3153
The landing light is located in lower engine cowling.

One 290,000 candle power sealed beam bulb is incorporated and mounted in a housing designed to isolate the bulb from engine heat and vibration. The light is activated by a circuit breaker/switch located on the instrument panel in front of the pilot.

S/N 24-3154 thru 24-TBA
Two 110,000 candle power sealed beam bulbs are located in LH & RH side of wing.

Two interior lights are located on the overhead panel (S/N 24-0768 thru 24-3373). The forward cabin overhead lights are located between the pilot and co-pilot seats and are actuated by a three position switch, (dim, off, bright) adjacent to the light near the co-pilots head. The passenger compartment lights are located above the rear seats in the overhead panel and are activated by a similar three position switch located adjacent to the light. The rear cabin light is accessible from the baggage compartment door also.

S/N 24-0001 thru 24-0767 - A switch in the dome light base controls the overhead dome light.

CAUTION
S/N 24-0001 thru 24-3153 cabin lights are connected directly to battery through their switches and WILL ILLUMINATE WITHOUT MASTER SWITCH ON.

LAMP BULB REPLACEMENT CHART

APPLICATIONS		BULB PART NUMBER 14 VOLT	28 VOLT
Glareshield Lights		GE 330	GE 327
Post Lights		GE 330	GE 327
Map Light		GE 330	GE 327
Cabin Interior Lights		GE 1816	GE 1818
Trim & Flap Indicator	(S/N 24-0084, 24-0378 thru 24-1168)	WI-7046	N/A
	(S/N 24-1169 & ON)	GE 370	GE 327
Gear Down Light	(Floorboard Indicator)	GE 327	GE 327
Tail Position Light	(Whelen/SDI)	34-0212030-85 *	34-0226030-85 *
Wing Tip Position Light			
-(24-0001 thru 24-1425)	(Grimes)	A-7512-12	
-(24-1426 thru 24-1708,	(Whelen)	W1290-14 A508-14	
24-3000 thru 24-TBA)	(Whelen)		W1290-28
Landing Light			
-(24-0001 thru 24-3153)	(GE)	GE 4522	GE 4593
-(24-3154 thru 24-TBA)	(GE)		GE 4596
Recognition Light	(Whelen)	01-0770303-00	Use same light assy. but dropping resistor RH-50-7.5 req'd.

* Use S.D.I. Tool No. 203541 to remove lamp.

33-20-00 - INTERIOR LIGHTS - MAINTENANCE PRACTICES

33-21-00 - CABIN LIGHTS - OVERHEAD LIGHTS

33-21-01 - LIGHT BULB REPLACEMENT (S/N 24-0768 thru 24-3373)

1. Remove light cover panel (2) (Figure 33-1) from the headliner assembly (1) by removing screws (3).

NOTE
The front and rear light bulbs are replaced in the same manner.

2. Remove and replace the bulbs and check for proper operation.

- LIGHT BULB REPLACEMENT (S/N 24-3374 thru 24-TBA)

1. Carefully slide smooth, flat sharp blade under lip of light assembly flange and pop light assembly out of mounting hole. (Ref. Figure 33-1A)

2. Disconnect blade terminals from light assembly.

3. Hold light assembly body and rotate bulb holder counter-clock-wise to remove.

4. Pull bulb from bulb holder, replace with new bulb Reinstall bulb holder.

5. Re-assemble light assembly into mounting hole.

6. Check for proper operation.

33-21-02 - CABIN LIGHT SWITCH REPLACEMENT

(S/N 24-0768 thru 24-3373)

1. Remove cover (4) from headliner assembly (1) by removing screws (3) holding panel in place (Figure 33-1).

NOTE

S/N 24-0901 and ON have a butterfly shut-off valve for the overhead ventilation that must be freed from the panel prior to removal.

2. Switch (5) is a press and snap in fit and may require bending of spring tabs to release for removal.

3. Disconnect wire connections and replace with new switch. Check for proper operation.

4. Reassemble panels, and ventilation control, if applicable, to headliner.

CABIN LIGHT SWITCH REPLACEMENT (24-3374 thru 24-TBA)

PILOT'S & REAR SEAT PASSENGER'S LIGHTS

1. Remove cover from arm rest assembly by removing 2 screws holding cover to arm rest.

2. Switches are snap-fit and may be removed by pressing snap tabs and pushing switch through cover.

3. Disconnect wire terminals and replace with new switch. Check for proper operation.

4. Re-assemble switch assembly into cover by snapping in from top side. Re-install cover into arm rest, secure with 2 screws.

CO-PILOT'S SWITCH

1. Co-pilot's cabin light switch is located in front of cabin door hinge above co-pilot's right knee.

2. Remove 1 screw above switch. Remove door frame cap. Pull panel from velcro fastners to access switch.

3. Press snap tab & push from panel to remove.

4. Re-assemble in reverse sequence when maintenance action completed.

BAGGAGE COMPARTMENT SWITCH

1. Switch is located at rear of baggage door at front, top of hat rack opening (Figure 33-1A)

2. Remove 1 screw inboard of switch. Pull door frame down slightly from velcro fastners to access baggage compartment light switch.

3. Press snap tabs; PUSH switch through panel.

4. Disconnect terminals; replace switch.

5. Re-assemble in reverse order.

33-22-00 - INSTRUMENT/FLIGHT PANEL AND GLARESHIELD LIGHTS

33-22-01 - LIGHT BULB REPLACEMENT

1. Instrument panel lights.

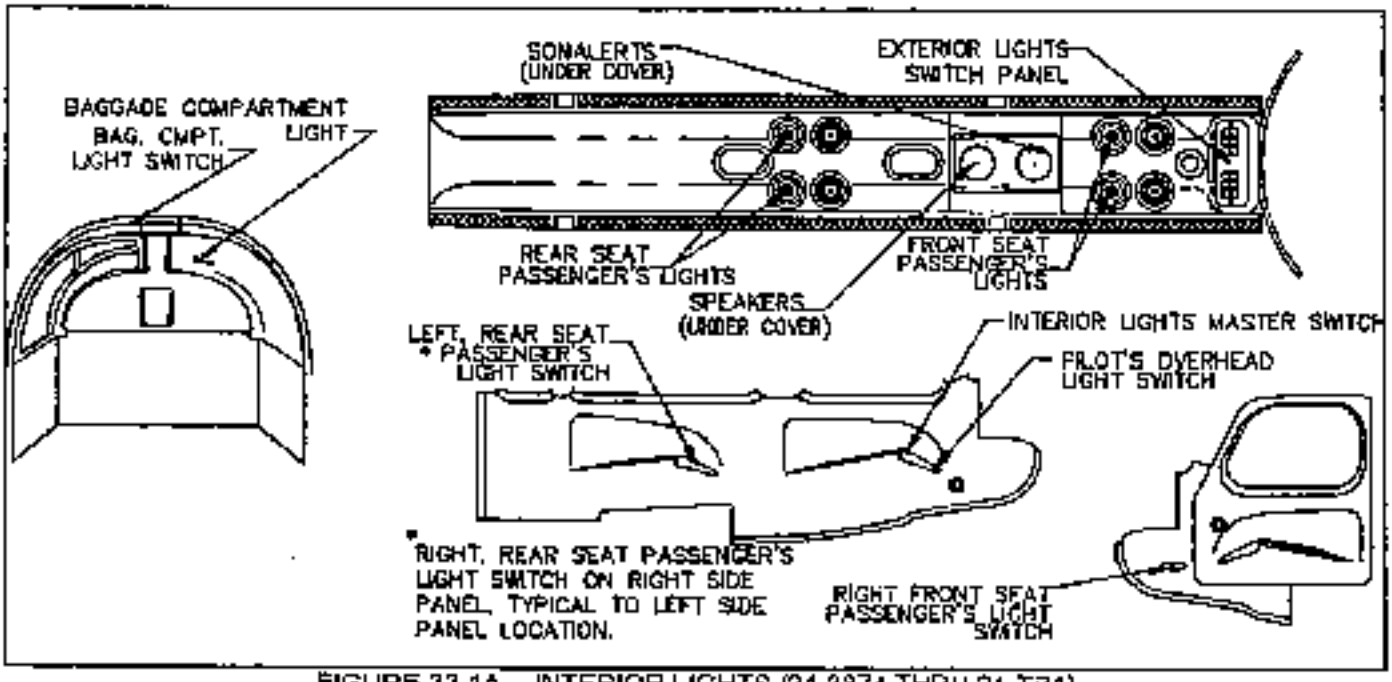
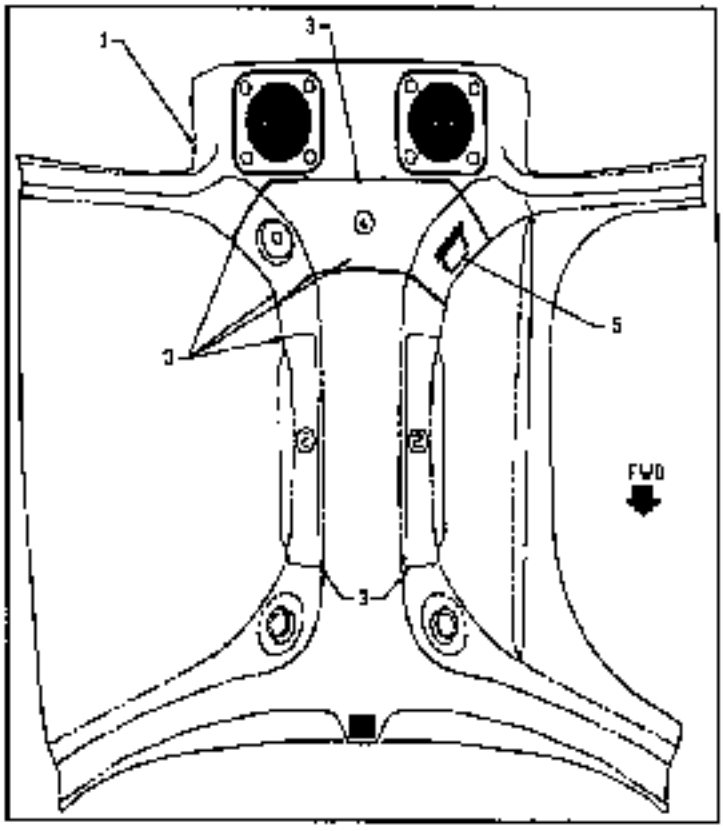


FIGURE 33-1A – INTERIOR LIGHTS (24-3974 THRU 24-TBA)



INTERIOR LIGHTS FIGURE 33-1
S/N 24-0001 THRU 24-3373

A. Internally lit instruments are not being considered in this information.

B. Post light bulbs are replaced by pulling hood straight out from post light base and then pulling bulb from this hooded portion.

C. Insert new bulb into hood and push hood back onto post light base.

D. Check for proper operation and hood orientation.

2. Glareshield lights.

A. Remove outer housing by unscrewing from light assembly base.

B. Remove bulb and insert new bulb.

C. Screw outer housing back onto base.

D. Check for proper operation.

3. Trim/Flap Indicator Light

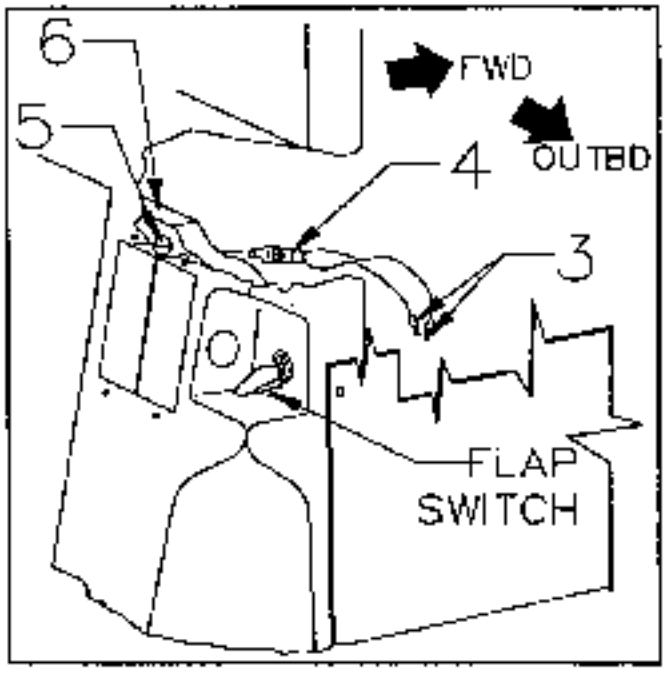
A. Gain access to light assembly (1) (Figure 33-2) by reaching in over console side panel (2) from co-pilots side of cabin.

B. Disconnect wires at knife disconnects (3) and carefully unscrew socket portion (4) from light assembly lens (5). The lens is glued to trim/flap indicator reflector (6).

C. Bulb will come out with socket portion of light assembly; bulb is bayonet type, push, twist and pull to remove. Insert new bulb.

D. Carefully screw socket back into lens.

E. Connect the knife connections and ty-rap securely.



TRIM/FLAP INDICATOR LIGHT - FIGURE 33-2
(S/N 24-0084, 24-0378 thru 24-1168)

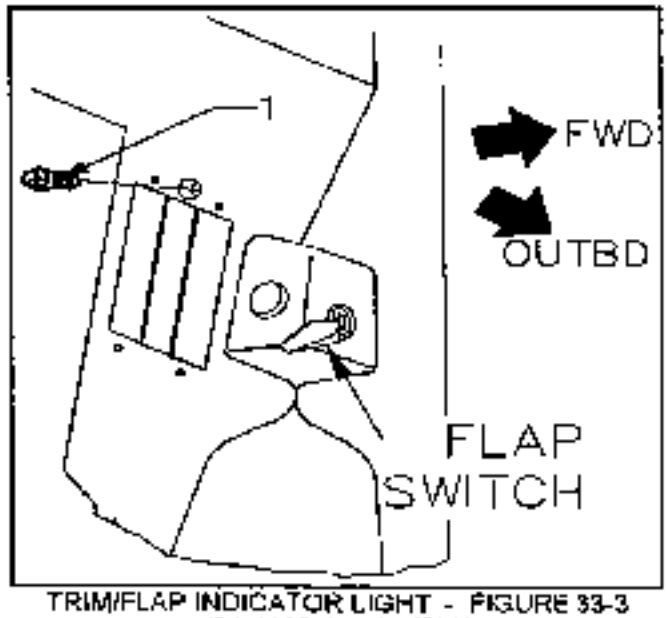
F. Check for proper operation.

A. Unscrew the black knurled button (1) (Figure 33-3) to gain access to the bulb.

B. Bulb is a friction fit type in button; remove and replace with new bulb.

C. Replace knurled button with new bulb installed into console.

D. Check for proper operation.



TRIM/FLAP INDICATOR LIGHT - FIGURE 33-3
(24-1169 thru 24-TBA)

33-23-00 - GEAR DOWN INDICATOR LIGHT (FLOORBOARD)

33-23-01 - LIGHT BULB REPLACEMENT

1. Remove lower belly panel to gain access to light assembly.
2. Remove and replace bulb.
3. Check for proper operation.
4. Reinstall belly panel

33-40-00 - EXTERIOR LIGHTS - MAINTENANCE PRACTICES
33-40-01 - TROUBLE SHOOTING EXTERIOR LIGHTS

TROUBLE	PROBABLE CAUSE	REMEDY
	STROBE LIGHTS	
Lights inoperative.	-Circuit breaker/switch tripped.	Check for short circuit. Reset circuit breaker.
	-Loose connection.	Check and tighten electrical connections.
	-Battery defective.	Replace battery or use external power.
	-Circuit breaker/switch defective.	Check continuity through switch; replace if necessary.
	-Faulty power supply.	Disconnect synch wires to identify faulty power supply.
One bulb does not light.	-Bulb burned out	Replace bulb.
	-Power supply inoperative.	Replace.
	-Fixture not grounded.	Check for good bonding between fixture and structure. Tighten mounting screws.
	-Loose connection.	Check all connections in circuit.
	-Defective fixture	Replace fixture.
	LANDING/TAXI LIGHTS, NAVIGATION LIGHTS AND TAILLIGHT	
Lamp fails to light.	-Circuit breaker/switch tripped.	Check for short circuit. Reset circuit breaker
	-Lamp burned out.	Replace lamp.
	-Loose connection or defective wire.	Tighten connections and check wire circuit continuity. Replace or repair wire if necessary.
	-Circuit breaker/switch defective.	Check continuity through switch. Replace if necessary.

33-41-00 - HIGH INTENSITY, STROBE LIGHTS - MAINTENANCE

The strobe light power supply requires a 14 VDC (24-0001 thru 24-2999); 28 VDC (24-3000 thru 24-TBA) input across the red and black wires. Red is positive and black is negative, or common. The voltage for the strobe light is supplied through Pin 1 and 3 of the power supply connector with Pin 2 as the trigger pulse. The strobe light assembly is a potted assembly and cannot be repaired.

The power supplies may be synchronized by connecting each yellow wire together between all power supplies (Hoskins only).

TROUBLE SHOOTING AIDS

When no lights are flashing:

1. Check circuit breaker/switch.

2. To determine power supply or flashtube problems, first check the input voltage to the power supply. The red and black line should have 14 VDC (24-0001 thru 24-2999); 28 VDC (24-3000 thru 24-TBA). If no voltage is present check for shorted power leads or tripped circuit breaker. If input voltage is present, then disconnect the yellow sync wires. This will allow unaffected units to flash. Determine defective light and proceed to "one light not flashing" below.

When one light not flashing:

1. To determine power supply or flashtube problems, first check the input voltage to the power supply. The red and black line should have 14 VDC (24-0001 thru 24-2999); 28 VDC (24-3000 thru 24-TBA). If no voltage is present then check for shorted power leads, blown inline fuses, or circuit breaker. If input voltage is present, then disconnect the connector to the flashtube. 400V-500VDC should be present across Pin 1 and 3 of the power supply. If not, the power supply has no output and is defective. Turn off master switch.

2. If voltage is present across Pin 1 and 3 of the power supply, connect a known good flashtube to the power supply. If good flashtube fails to operate, power supply is defective. If good flashtube operates, the flashtube is defective. Replace flashtube.

3. Be sure yellow sync wire is insulated and not grounded

33-41-01 - POWER SUPPLY UNIT - REMOVAL OR REPLACEMENT

1. Wing tip strobe power supply.

A. Gain access to wing tip power supply through bottom inspection cover (1) near wing tip (See Figure 33-4). Power supply (2) is physically attached to this inspection cover.

B. Disconnect wiring connections between switch and power supply.

WARNING

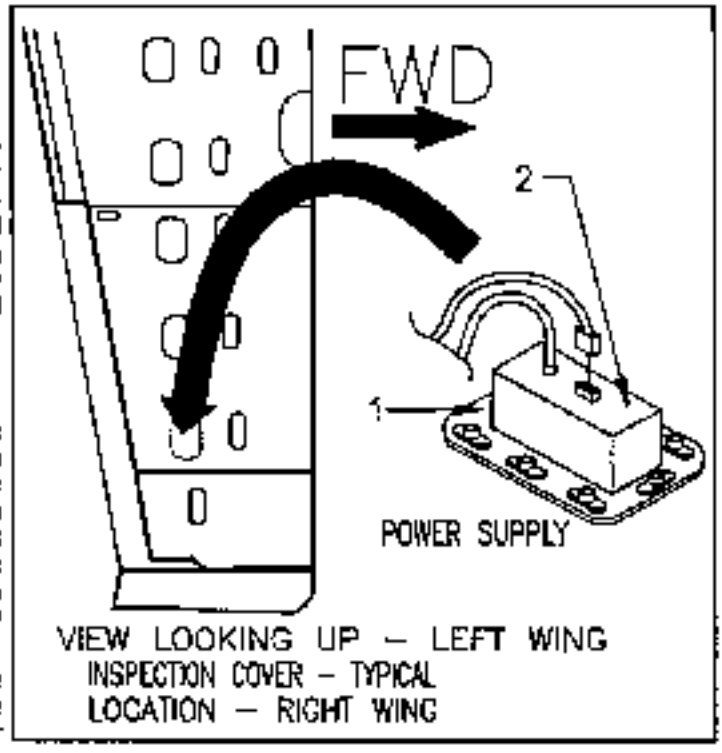
High voltage is involved in the circuit between the power supply and strobe light assemblies. Although a bleed-off resistor is incorporated in the power supply circuit, turn the control switch for the strobe lights OFF and allow at least 20 minutes to elapse prior to disconnecting the cables at the power supply or strobe light assemblies before handling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

C. Disconnect wiring harness between power supply and strobe light. (See warning above).

D. Remove the screws securing the power supply to the inspection panel and remove the unit.

2. Tail strobe light power supply (S/N 24-1036 and on).

A. Gain access to this unit through the inspection cover on the aft, left hand side of the tailcone. The power supply is physically mounted to this inspection cover.



STROBE LIGHT POWER SUPPLY - FIGURE 33-4

B. Disconnect the wiring connections between the switch and the power supply.

C. Steps B thru D, and Warning of paragraph 33-41-01, 1. apply for removal of this power supply unit.

33-41-02 - POWER SUPPLY UNIT INSTALLATION

The installation of any of the power supplies is a reverse sequence of the removal procedures.

CAUTION

STROBE LIGHT WIRING - An incorrect hook-up of the wires at either the power input or between the strobe light assemblies and the power supply unit will cause a reversal of polarity that results in serious component damage and failure. Care must be taken to ensure that the red wire is connected to positive power and the black wire to ground.

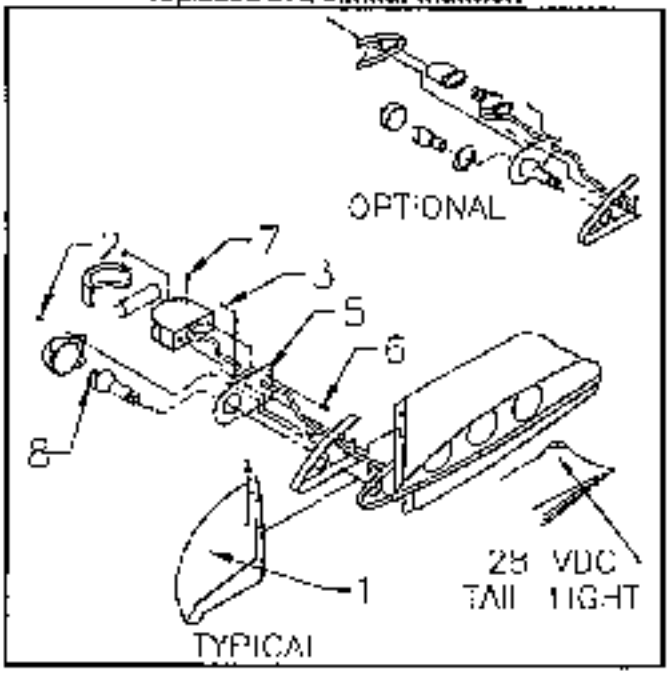
33-41-03 - STROBE LIGHT REPLACEMENT

1. WING TIP STROBE LIGHT. (24-1036 THRU 24-TBA)

A. Remove the wing tip lens (1) (**Figure 33-5**) to gain access to malfunctioning strobe light.

B. Remove the two screws holding the navigation/position light lens (2) and the one screw (3) below the flashtube assembly. This will allow the light assembly (4) and mounting plate (5) to be pulled away from tip rib.

NOTE
The Whelen Strobe-Nav light assembly is installed slightly different but is removed and replaced in a similar manner.



WING TIP STROBE LIGHTS FIGURE 33-5

C. Remove the two screws (6) from the back side of the mounting plate.

WARNING
High voltage is involved in the circuit between the power supply and strobe light assemblies. Although a bleed-off resistor is incorporated in the power supply circuit, turn the control switch for the strobe lights OFF and allow at least 20 minutes to elapse prior to disconnecting the cables at the power supply or strobe light assemblies and before handling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

D. Disconnect the wiring harness plug and remove the flashtube assembly.

NOTE
On some aircraft the plug may not come through the wire routing holes. Remove the pins from the plug and pull individual wires through the holes to allow the flashtube assembly to come free.

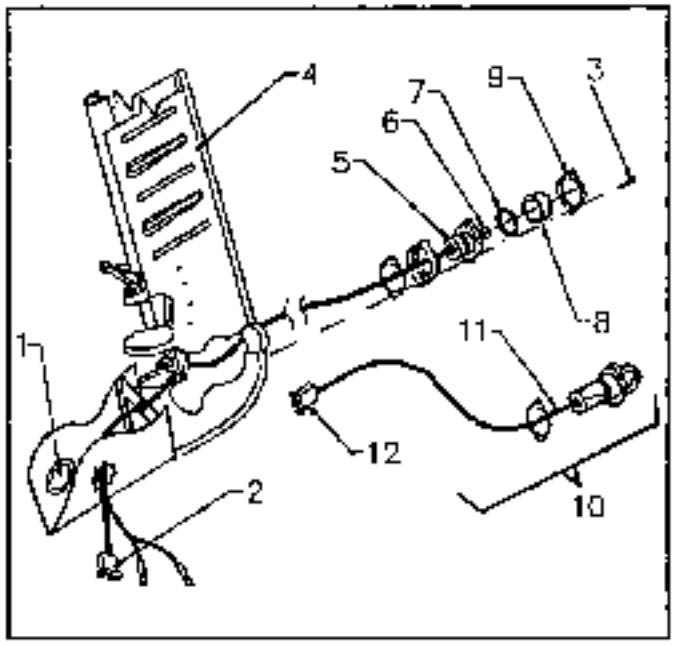
E. The flashtube assembly must be replaced if determined to be bad; the flashtube is soldered in place and is not readily removeable from the assembly.

F. If required, the clear lens can be removed from the flashtube assembly by removing the two lens retaining screws (7) and pulling the lens free for replacement or cleaning.

G. Install the new strobe light assembly in reverse sequence of removal.

2. TAIL STROBE/NAVIGATION LIGHT REMOVAL. (S/N 24-1038 thru 24-2999). S/N 24-3000 thru 24-TBA have only a strobe light assembly located on the rudder. Removal is same as combination NAV/STROBE light assembly.

A. To gain access to the wire harness and connections from the power supply rotate the round access cover (1) on the lower left side of the empennage stinger (**Figure 33-6**).



TAILLIGHT ASSEMBLY FIGURE 33-6

(24-1038 thru 24-2999)

(24-3000 thru 24-TBA has only strobe light assembly in rudder)

B. Disconnect strobe wiring harness connector from strobe power supply harness and disconnect the connectors for taillight assembly.

C. Remove the connector plug (2) from the strobe light wiring harness leaving the pins connected to individual wires.

D. Tie and tape a strong, small diameter cord, 4 to 5 feet long, to the entire wire harness after plug has been removed.

E. Remove the two screws (9) that secure strobe/taillight assembly to rudder (4) and pull the light assembly out so it clears the mounting hole. The wire harness will be stretched tight at this point.

F. Carefully begin working the wire harness through the empennage and rudder bulkheads until the wire harness can be pulled through the light mounting hole in the rudder. The rubber grommets at each bulkhead will require removal from bulkhead but leave attached to wire harness. See (Figure 33-6) for this detail.

G. Pull light assembly and entire wire harness through mounting hole in rudder. DO NOT PULL THE STRONG CORD ALL THE WAY THROUGH ACCESS PANEL HOLE. You will need this to pull the new wire harness back in place during installation. Remove cord from wire harness.

H. Replace complete flashtube/base assembly (5) if strobe light portion is malfunctioning. The flashtube is not a replaceable component.

I. Place bulkhead grommets at rotative positions on new harness, after plug (2) is removed from new harness.

J. Tie and tape cord to new harness and carefully begin to feed wire and grommets back to their positions.

K. Place all grommets in the bulkheads. Reinstall plug (2) on new harness and secure the strobe/navigation light assembly to the rudder.

L. Connect the completed harness and plug from the strobe light assembly to the harness socket from the strobe power supply.

M. Check for proper operation.

N. S/N 24-1418 and LATER aircraft have a new style strobe light installation. There is sufficient wire available, when ty-raps are cut from coiled harness at (1), to pull this strobe light assembly out the rudder light mounting hole. See item (10) (Figure 33-6). Disconnect light assembly pigtail (11) from connector at (12) and replace assembly if needed. Secure light assembly, coil harness @ (1) and ty-rap harness coils.

33-42-00 - NAVIGATION/POSITION LIGHTS

33-42-01 - POSITION LIGHT - REPLACEMENT/SERVICE

1. WING TIP POSITION LIGHTS (S/N 20-1038 THRU 24-TBA).

A. Remove the wing tip lens (1) (Figure 33-5).

B. Remove the two screws (2) holding the position light lens in place.

C. Pull the lens (red or green) from mounting plate (5) and remove the lamp (6).

D. Install new lamp into base.

E. Reassemble the light assembly in reverse sequence.

2. TAIL POSITION LIGHT (24-0001 thru 24-2999).

A. Remove two screws (3) (Figure 33-6) from the taillight housing that secures the light assembly (5) to the rudder (4).

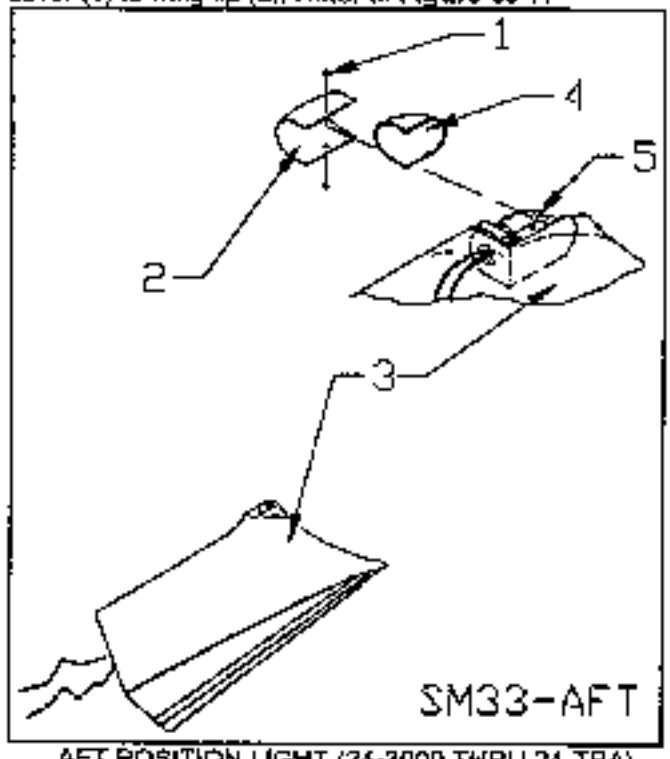
B. Remove the clear lens (8), mounting ring (9) and gasket (7) to gain access to position light lamp (6).

C. Remove lamp (6) with S.D.I. special tool no. 203541 or equivalent.

D. Replace with new lamp and reassemble taillight assembly in reverse sequence.

3. AFT POSITION LIGHT (24-3000 thru 24-TBA)

A. Remove two screws that secure aluminum cover (1) to wing tip (2). Refer to Figure 33-7.



AFT POSITION LIGHT (24-3000 THRU 24-TBA)
FIGURE 33-7

B. Remove clear lens (3) & gasket to gain access to light bulb (4).

C. Pull light bulb (with special puller if needed)

D. Replace with new lamp & reassemble light assy. in reverse sequence of removal.

33-43-00 - LANDING/TAXI LIGHTS

33-43-01 - LANDING/TAXI LIGHT ADJUSTMENT PROCEDURES

(WING MOUNTED LANDING/TAXI LIGHTS ONLY)

1. Position aircraft to face a vertical wall with front of nose wheel 7 ft. 6 in. from wall. Position L/H and R/H main landing gear at exact distance from vertical wall, IE. parallel to wall.

2. Place four target crosses (+) on vertical wall at the following positions:

A. 38.5 inches up vertical wall from same ground plane aircraft is resting on.

B. 9.85 feet left and right of nose wheel center line.

C. 12.375 inches further outboard on both left and right side of Step B. target position.

3. Remove access cover behind each landing/taxi light location on with lower surface.

4. Turn taxi lights ON, exit aircraft, turn adjusting screws until light beams are centered on outboard target crosses (+), left and right.

5. Repeat Step 4 for landing lights, except center light beams on inboard target crosses (+), left and right.

6. Turn lights OFF, reinstall access covers.

CHAPTER 34

NAVIGATION AND PITOT STATIC

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NAVIGATION AND PITOT STATIC

TABLE OF CONTENTS

34-00-00 - GENERAL

All flight instruments are grouped on the shock mounted panel directly in front of the pilot. Flight instruments are operated by: (1) barometric pressure or barometric impact air pressure differences, (2) variations in electric current due to mechanically varied resistance, (3) reference to the earths magnetic field or (4) aircraft electrical power.

The glareshield must be removed and wiring or plumbing disconnected on many of the flight instruments before they can be removed. Remove glareshield attaching screws, center post cover screws and carefully lift center post cover and glareshield from the panel. Disconnect the glareshield lights. Reinstall the glareshield in reverse sequence.

34-10-00 - PITOT & STATIC AIR PRESSURE SYSTEM

Static pressure instruments are extremely sensitive to pressure changes; therefore, the pitot and static system must be kept free from moisture and obstructions. Drain the pitot and static systems after humid or wet weather. If instrument operation is erratic or inoperative after draining, perform the following:

1. Pitot system leak test. (Make sure Master switch is OFF and Gear Control is in DOWN position.)

A. Slip end of a short rubber hose over pitot tube.

B. Close open end of hose; slowly roll up hose until airspeed indicator reads 150 KIAS.

C. Clamp hose and hold for one minute.

D. If airspeed indicator falls more than 10 KIAS, within one minute, check system for leaks and tighten line fittings.

E. Repeat steps B, C, and D until obtaining less than a 10 KIAS indicator reading drop.

CAUTION

Release the air pressure slowly by unrolling the rubber tubing, a sudden release of the air pressure may damage the airspeed indicator.

2. Pitot system hose inspections. After the pitot system is checked for leaks, inspect the hose sections for signs of deterioration. Check all tubing for brittleness, checks or cracks particularly at the bends or connecting points. When new hose is installed, recheck the system for leaks using the PITOT SYSTEM LEAK TEST procedure above.

3. Static system cleaning. Blow low air pressure (10-25 PSI), through the lines from the disconnected line at the airspeed indicator to the static ports. Cover each static port separately when blowing to insure that each line is clear. Instrument error or possible damage may result if even one port is clogged with dirt or foreign matter.

CAUTION

NEVER BLOW AIR through the line TOWARD the INSTRUMENT panel; to do so will seriously damage the instruments. When blowing back through the line from the instrument panel, make sure that no air is blown into the instruments.

4. Static system leak test. The static system should be checked for leaks in accordance with the instructions in Federal Aviation Regulation 91.411.

CAUTION

To avoid damaging either the airspeed indicator or the landing gear airspeed safety switch an equal pressure should be applied to the pitot side of the indicator while leak testing the static system.

5. Alternate static source. An alternate static source valve is provided to change the static air source from outside the aircraft to inside the cabin. The valve is located on the lower panel immediately to the left of the pilots control column. Airspeed indicator and altimeter readings will be slightly effected when using the alternate static source.

34-10-01 - HEATED PITOT TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Tube does not heat or clear itself of ice with switch on.	Switch circuit breaker tripped.	Reset circuit breaker.
	Open circuit.	Repair.
	Excessive voltage drop between battery and pitot head.	Check voltage at pitot head.
	Heating element burned out.	Replace pitot head.

34-11-00 - AIRSPEED INDICATOR

Registers airspeed in knots. Air pressure difference between impact air, pitot tube, and static air (static ports on each side of the aircraft tailcone) operates the airspeed indicator. An electrically heated pitot head prevents ice obstruction in flight.

The airspeed indicator dial markings are as follows:

Radial Red Line	195 KIAS
Yellow Arc	174-195 KIAS
Green Arc	64-174 KIAS
White Arc	57-110 KIAS

NOTE — See Section 27-95-00 for stall warning systems.

34-11-01 - AIRSPEED INDICATOR TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Instrument pointer does not indicate properly.	-Leak in instrument	Check for leak and seal case or in static lines lines.
	-Obstruction in pitot tube.	Clean out obstruction.
Instrument pointer oscillates.	-Leak in instrument case or in pitot lines.	Check for leak and seal lines.

34-12-00 - VERTICAL SPEED INDICATOR

Converts barometric pressure changes within the static port lines to aircraft ascent or descent rate; readings are in feet per minute.

This instrument has a single needle and two adjoining scales that read from 0 to 2000 feet per minute, top side for ascent rate and bottom side for descent rate. The recessed, slotted screw at the lower left of the instrument case is used to "zero" the indicator when the aircraft is on the ground.

34-12-01 - RATE-OF-CLIMB INDICATOR TROUBLE SHOOTING. (VERTICAL SPEED INDICATOR).

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer does not set on zero.	-Aging of diaphragm.	Turn setting screw to reset pointer at zero. Tap instrument while resetting.
Pointer fails to respond.	-Obstruction in static line. (Includes water)	Disconnect static line from instruments. Apply low pressure air (10-25 PSI max.) to instrument end of static line. Check both static ports for air flow. Depress static drain valve and check for water. Keep depressed until air is free of moisture. Reconnect static line to instruments and leak check.
Pointer oscillates.	-Leaks in static line.	Disconnect all instruments connected to the static line. Check individual instruments and test installation for leaks.
	-Defective mechanism.	Replace instrument.

34-13-00 - ALTIMETER

The altimeter operates by absolute pressure, and converts barometric pressure to altitude; reading is in feet above mean sea level. The altimeter has a fixed dial with three pointers to indicate hundreds, thousands, and tens of thousands of feet. Barometric pressure is sensed through the static vents. A knob adjusts a movable dial behind a small window in the face of the main dial to indicate local barometric pressure. This corrects the altimeter reading for prevailing conditions.

34-13-01 - ALTIMETER TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excess scale error.	-Improper calibration adjustment.	Replace instrument.
Excessive pointer oscillation	-Defective mechanism.	Replace instrument.
High reading.	-Static pressure system leak.	Eliminate leak in static pressure system.
Setting knob is hard to turn.	-Wrong lubricant or lack of lubrication.	Replace instrument.
Inner reference marker fails to move when setting knob is rotated.	-Marker out of engagement.	Replace instrument.
Setting knob set-screw is loose or missing.	-Excessive vibration.	Tighten instrument screw if loose. Replace instrument if screw is missing.
Cracked or loose cover glass.	-Excessive vibration.	Replace instrument.
Dull or discolored luminous markings.	-Age.	Replace instrument.
Barometric scale and reference markers are out of synchronization with pointers.	-Shift in mechanism.	Reset pointers.
Barometric scale and reference markers are out of synchronization.	-Slippage of mating parts.	Replace instrument.

34-20-00 - DIRECTIONAL GYRO COMPASS

This vacuum-operated instrument indicates the heading reference. The directional gyro rotor is air driven and rotates with its spin axis horizontal. The knob is used to reset basic directional heading. Vacuum pressure for satisfactory operation is 4.25 +/- .2 to 5.5 +0.0/-0.2. The vacuum system filters should be changed each 500 hours or at one year intervals, whichever occurs first. (See Trouble Shooting Chart, for maintenance instructions.)

34-20-01 - DIRECTIONAL GYRO TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive drift in either direction.	-Dirty air filter (high vacuum indication).	Inspect filter. Replace if necessary.
	-Excessive vibration.	Test with vibrometer. If vibration amplitude is more than .004 inch, examine shock mountings to see if connections are restricting instrument.
	-Insufficient vacuum.	
If vacuum indication is below 4.25 IN. Hg, check as follows:		
	1. Vacuum regulating valve improperly adjusted.	1. Adjust vacuum regulating valve
	2. Pump failure.	2. Repair or replace pump.
	3. Vacuum line kinked, leaking or too long for its diameter.	3. Locate and if deffective, replace or repair vacuum line. Check for collasped inner wall of flexible hose.
Instrument is sluggish.	-Defective mechanism (worn or dirty pivots and bearings.)	Replace instrument.
Dial spins continuously in one direction.	-Operating limits have been exceeded	Reset the instrument with the aircraft in level flight.
Defective mechanism.		Replace instrument.

34-21-00 - TURN COORDINATOR

A gyro instrument that indicates control coordination and rate of turn. This instrument is electrically driven.

34-21-01 - TURN COORDINATOR TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer fails to respond.	-Foreign matter lodged in instrument.	Replace instrument.
	-No electric current.	Check voltage at instrument.
Bar does not set level.	-Gimbal and rotor assembly out of balance.	Replace instrument.
	-Pitted or worn pivots or bearings.	Replace instrument.
In low temperature, bar fails to respond or responds sluggishly and with insufficient deflection.	-Oil has become too thick.	Replace instrument.
	-Insufficient bearing clearance.	Replace instrument.
Bar sluggish in returning to level and does not set on level when stationary.	-Oil or dirt between damping pistons and cylinders.	Replace instrument.
	-Excessive clearance between rotor and rotor pivots.	Replace instrument.

34-22-00 - MAGNETIC COMPASS

The magnetic compass dial, graduated in five-degree increments, is encased in a liquid filled glass and metal case. The unit mounts on the stainless steel windshield center post above the glareshield. The compass should be swung and compensated at each annual inspection and whenever new equipment is installed. To compensate for N-S deviation, adjust left screw; to compensate for E-W deviation, adjust right screw.

Degausing of the tubular structure may be required if compass cannot be compensated within limits. Carefully go over the entire steel structure with degauser to remove residual magnetism. Recommend Armature Growler to degause steel structure.

NOTE
Refer to S.B. M20-160A, Instruction III, for degausing procedures.

NOTE
Check for outside magnetic influences if excessive compensation is required.

34-22-01 -MAGNETIC COMPASS TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	- REMEDY
Excessive card error.	-Compass not properly compensated.	Compensate instrument.
	-External magnetic interference	Locate magnetic interference and eliminate if possible.
Excessive card oscillation.	-Improper instrument mounting.	Align instrument.
	Insufficient liquid.	Replace instrument.

TROUBLE (cont.)	PROBABLE CAUSE	REMEDY
Sluggish card.	-Weak card magnets.	Replace instrument.
	-Excessive pivot friction or broken jewel.	Replace instrument.
	-Instrument too heavily compensated.	Correct excess compensation.
Liquid leakage.	-Loose bezel screws.	Tighten screws.
	-Broken cover glass.	Replace instrument.
	-Defective sealing gaskets.	Replace instrument.
Discolored luminous markings or discolored damping liquid.	-Age	Replace instrument
Defective light.	-Burned out lamp or broken circuit.	Check lamp or wiring continuity.

34-23-00 - ARTIFICIAL HORIZON

The vacuum-powered artificial horizon gyro indicates aircraft attitude relative to straight and level flight. Maintenance is similar to that required for the directional gyro compass.

34-23-01 - GYRO-HORIZON TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Horizon bar does not respond.	-Dirty air filter (high vacuum) indication.	Examine filter and clean or replace instrument, if necessary.
	-Insufficient vacuum resulting from the following:	Correct insufficient vacuum as follows:
1. Vacuum regulating valve improperly adjusted.		1. Adjust valve.
2. Pump failure.		2. Repair or replace pump.
3. Vacuum line kink, leaking or too long for its diameter.		3. Locate and repair. Check for collapsed inner wall of flexible hose.
Horizon bar does not settle.	-Defective mechanism.	Replace instrument.
	-Excessive vibration.	Test with vibrometer. If amplitude is more than .004 inch, examine installation to determine whether connections are restricting movement of instrument.
	-Shock mounted panel is contacting structure (inadequate clearance).	Examine shock mountings and replace if necessary.
Horizon bar oscillates or vibrates excessively.	-Excessive vacuum resulting from the following:	Correct for excessive vacuum as follows:
1. Dirty air filter.		1. Examine filter and clean or replace if necessary.
2. Vacuum regulating valve improperly adjusted.		2. Adjust valve.
3. Defective mechanism.		3. Replace instrument.
4. Excessive vibration.		4. Test with vibrometer. If amplitude is more than .004 inch, examine installation to determine whether connections are restricting movement of instrument.
5. Shock mounted panel is contacting structure (inadequate clearance).		5. Examine shock mountings and replace if necessary.

34-90-00 - MISCELLANEOUS INSTRUMENTS

34-90-01 - CLOCK

Various clock options are available. The standard clock is mounted in the left side of the instrument panel.

34-90-02 - OUTSIDE AIR TEMPERATURE

Provides the pilot with the free stream outside air temperature in degrees centigrade.

CHAPTER 35

OXYGEN

CHAPTER 35

OXYGEN

LIST OF EFFECTIVE PAGES

CONTENTS

35-00-00 - GENERAL

The oxygen system is an optional installation for serial number 24-0001 and ON. The system consists of a 76 (metal), 77.1 (composite) or 115.7 (composite) cubic ft. cylinder located in the tailcone immediately aft of the baggage compartment bulkhead. A reducing valve and an altitude compensating valve are connected to the cylinder to regulate the oxygen flow for a given altitude. Lines connected to the altitude compensating valve distribute aviators oxygen to the pilot and passengers. The system is activated by either the control handle being pushed forward (S/N 24-0001 thru 24-1417) or the control knob rotated (24-1418 & ON) to open the reducing valve. A gauge, located on the pilots arm rest adjacent to the control, indicates the pressure of the cylinder. When the cylinder is full the pressure will indicate 1850 P.S.I. at 21 degree C. (70 degree F.). The system is serviced through an access opening located aft of the baggage compartment door. Standard refill fittings are required to fill the cylinder with aviators oxygen. (Spec. No. MIL-O-27210).

WARNING

Proper safety measures must be employed while oxygen system maintenance is being performed or a serious fire hazard will be created. Avoid making sparks and keep all burning cigarettes or fire away from the vicinity of oxygen. Make sure that your hands, tools, and clothing are clean, particularly with respect to oil or grease, for these will IGNITE upon contact with pure oxygen under pressure.

35-00-01 - RECHARGING PROCEDURES

WARNING

Oil, grease or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided when handling oxygen equipment.

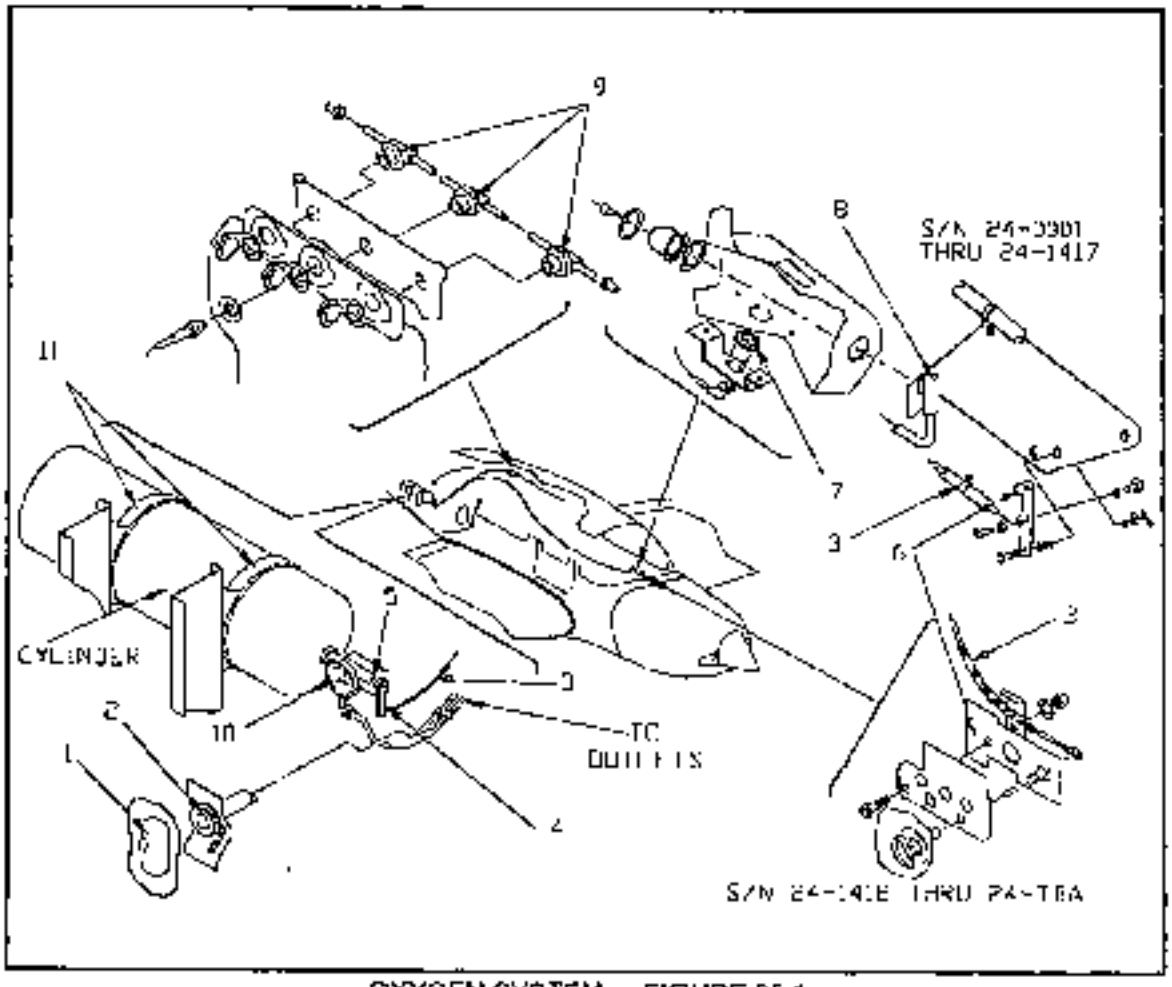
WARNING

NO SMOKING when refilling oxygen cylinder.

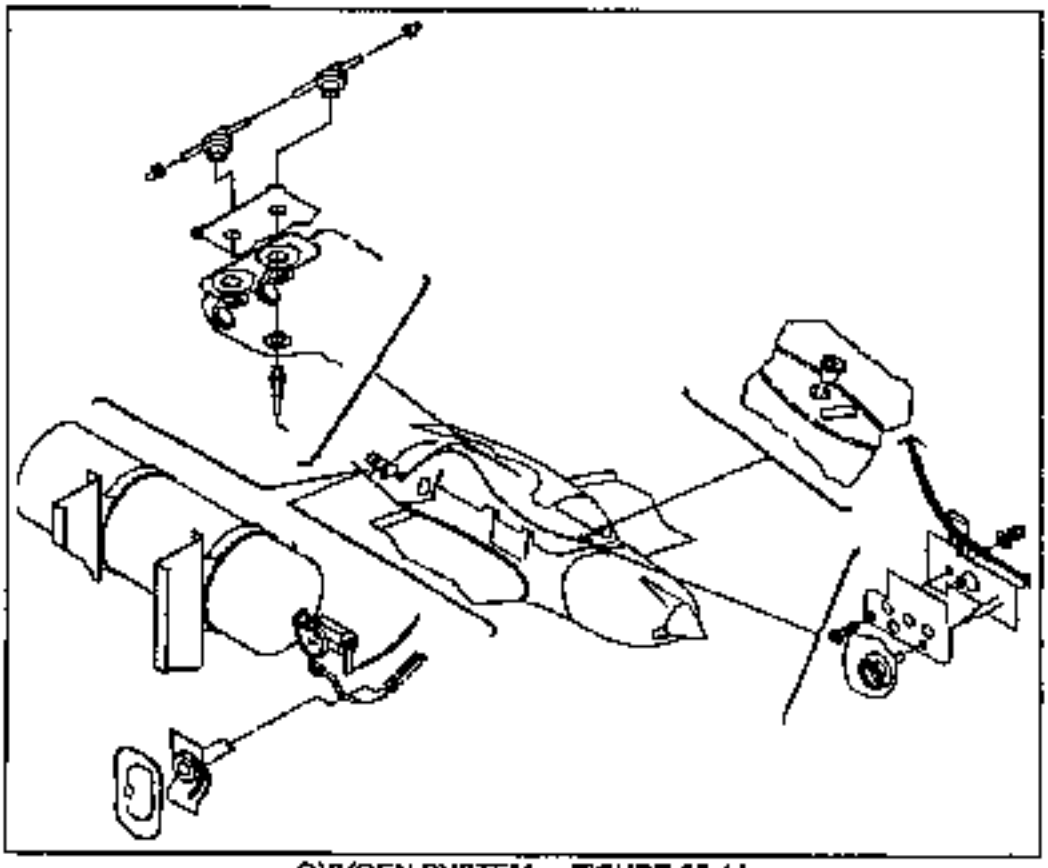
1. The oxygen cylinder should not be used to less than 100 P.S.I.; contamination may occur to the cylinder and valve. The valve must be removed and the cylinder cleaned and inspected if this happens.

2. Refill the cylinder with aviators oxygen Specification No. MIL-O-27210, through the Oxygen Servicing Access Door (1) (**Figure 35-1**). No special fittings are required for this servicing, however several types of standard oxygen fittings are in use and a compatible fitting for the Scott Recharging Valve (2) must be used. Mooney **P/N 870025-501** oxygen recharge hose assembly is recommended.

3. The cylinder contains **1850** P.S.I. at 21 degree C. (70 degree F.) when fully charged. Temperature has an affect on the correct charging pressure: See (Figure 35 - 2) for pressure vs. temperature charging pressure.



OXYGEN SYSTEM FIGURE 35-1



OXYGEN SYSTEM FIGURE 35-1A
S/N 24-3373 THRU 24-TBA

35-00-02 - MAINTENANCE PRACTICES

(Ref: AC 43.13-1(*) (* = current revison)

1. The control cable (3) (Fig. 35-1) is attached to an actuating arm (4) on reducing valve (5). This cable is routed through various bulkheads along the left side panel to the control (6) at pilots position. The control is a push-pull cable assembly that is activated by a control lever assembly for S/N 24-0001 thru 24-1417 and a rotating knob assembly for S/N 24-1418 & ON. The supply gauge (7) located adjacent to this control indicates the pressure of oxygen available in the system.

2. The pilots outlet (8) and passenger outlets (9) should be inspected for damage and cleanliness during servicing.

3. Inspect the individual oxygen masks, and fittings for damage.

4. Oxygen system test procedures. Remove oxygen line from the regulator and plug the line. Cap open regulator port with a clean plastic cap to prevent contamination of the regulator. Conduct the low pressure system leak test using a 70 +/- 10 PSI oxygen supply plugged into one of the cabin outlets and a test gauge plugged into another outlet. Apply 70 +/- 10 PSI to the system, allow 2 minutes for the system to stabilize, remove oxygen supply. The drop in pressure after 15 minutes shall not exceed five PSIG. Remove temporary plug and ensure that the cylinder is charged to capacity. Conduct high pressure test using cylinder pressure. Using the supply gauge on the pilot's side wall, note cylinder pressure. There shall be no pressure loss after 30 minutes. If leakage exists apply MIL-L-25567, leak test solution to suspected areas. After test, wipe clean and dry. Make necessary repairs and retest.

5. Oxygen system purging. Offensive odors may be removed from the oxygen system by purging. The system should also be purged any time the lines are left open and subject to contamination. Purging is accomplished by connecting a recharging cart into the system and permitting oxygen to flow through the lines and outlets until any offensive odors have been carried away.

WARNING
Avoid making sparks and keep all burning cigarettes or fire away from the vicinity of the airplane when the outlets are in use. Inspect the filler connection for cleanliness before attaching it to the filler valve. Make sure that your hands, tools, and clothing are clean, particularly from grease and oil stains, for these contaminants will IGNITE upon contact with oxygen.

The following procedures are recommended to purge the system:

A. Connect a recharge cart to the filler valve. Set the cart pressure regulator to deliver 50 PSI to the system.

B. Plug in an oxygen mask at each outlet in the cabin.

C. Open the cabin door and place the control knob in the half open position.

D. Allow the system to purge for one hour. If an offensive odor still lingers, continue purging the system for an additional hour. If such odors still remain, replace the supply cylinder. After the system has been adequately purged, remove the masks from the outlets, place the control knob in the closed position and service the system as described in 35-00-01.

6. Oxygen cylinder removal. The oxygen cylinder is located in the tailcone aft of the baggage compartment bulkhead. Access to the cylinder is obtained thru the radio compartment access door or the left side of the aircraft behind left wing post.

WARNING
Keep fire, cigarettes and sparks away from the vicinity of the oxygen cylinder. Oil and grease will IGNITE upon contact with oxygen under pressure.

A. Place pilots control lever/knob in the closed position.

B. Gain access to the cylinder through the large radio compartment door.

C. Slowly loosen the supply line fittings at the cylinder valves, (reference Figure 35-1), to relieve any pressure that may exist in the supply lines. After presure is relieved, remove the lines.

D. Disconnect the control cable (3) from the arm (4) on reducing valve (5).

E. Cap all open lines and regulator openings with clean metal caps.

F. Note relative position of regulator valves and control arm prior to removal.

G. Loosen the clamps (11) retaining the cylinder, while supporting the cylinder, and carefully remove cylinder and regulators from its position.

7. Oxygen cylinder installation.

A. Place new cylinder and regulators into position in clamps and secure. The new cylinder should bepositioned with regulator valves and control arm in the same position as the removed cylinder assembly components.

B. Remove caps from lines and carefully inspect all connections for damage or any foreign substance before connection to the new cylinder and valves.

C. Connect all lines to proper fitting and connect the control cable (3) to the arm (4) on reducer valve (5).

D. Charge the cylinder, if required, to the correct pressure, see recharging table on (**Figure 35-2**).

E. Place the pilots contol lever/knob to the open position and plug on oxygen mask into the pilots outlet to check for proper system operation.

F. Repeat this checkout procedure for all outlets.

G. Test the system for leaks per leak test check, paragraph 35-00-02, D.

H. Reinstall the radio compartment access door.

NOTE
Oxygen cylinders must be hydrostatic tested in accordance with DOT Code of Federal Regulations,Title 49,chap.1,para. 173.34.

CAUTION
All oxygen cylinders MUST be replaced every 10,000 recharge cycles.

NOTE
Maximum life for composite oxygen cylinders is 15 years.

NOTE
Maximum life for light weight steel oxygen cylinders is 24 years.

Filling pressures will vary due to ambient temperature in the filling area and the rise of temperature resulting from compression of the oxygen. Because of this merely filling to 1850 PSIG will not result in a properly filled cylinder. Fill to pressures indicated on FIGURE 35-2 for ambient temperatures.

AMBIENT TEMPERATURE -°F	FILLING PRESSURE -PSIG	AMBIENT TEMPERATURE -°F	FILLING PRESSURE -PSIG
0	1650	50	1875
10	1700	60	1925
20	1725	70	1975
30	1775	80	2000
40	1825	90	2050

OXYGEN FILLING PRESSURES VS TEMPERATURE

FIGURE 35-2

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CHAPTER 37

VACUUM

CHAPTER 37

VACUUM

LIST OF EFFECTIVE PAGES

CHAPTER 37

VACUUM

LIST OF EFFECTIVE PAGES

37-00-00 - GENERAL

An engine driven dry air vacuum pump supplies suction for the vacuum operated gyroscopic flight instruments, Directional Gyro and Artificial Horizon. The air is passed through several filters before entering the instruments. A vacuum regulator valve is incorporated to maintain the required operating vacuum throughout the engine power range. Idle RPM settings will normally not provide adequate vacuum to satisfactorily operate the instruments.

A vacuum annunciator light will illuminate and flash when vacuum drops below the setting required to operate the instruments.

A standby vacuum system kit is available for the M20J aircraft. This kit can be installed by the factory or in the field. The standby vacuum system should be activated manually when "low vac" light flashes on regular engine driven system. Refer to Vendor Manual for standby vacuum system repair; also refer to Section 37-41-00).

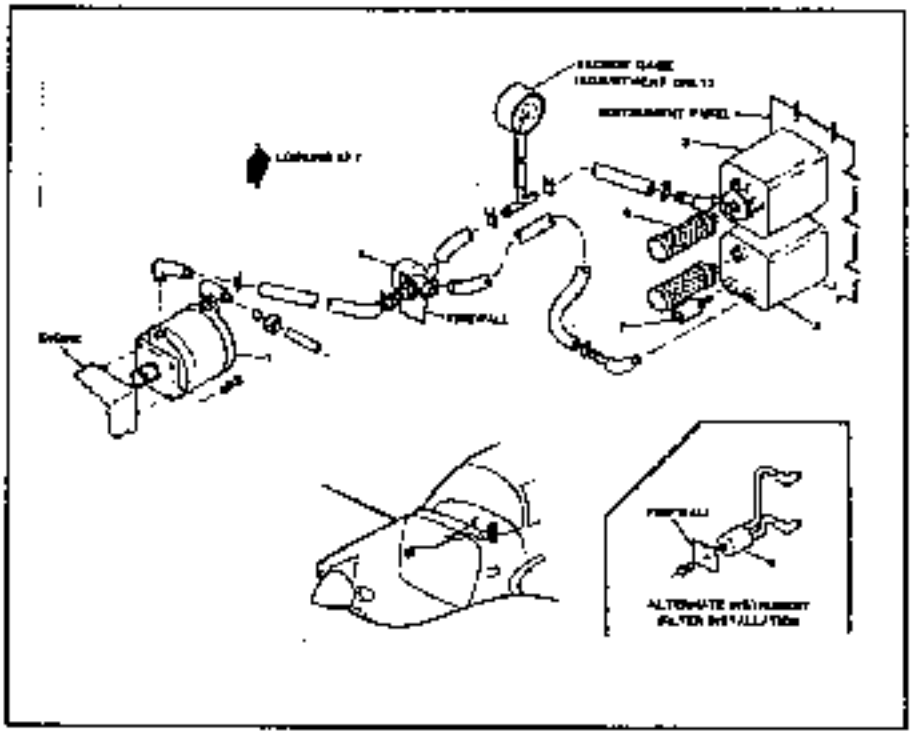
37-10-00 - DISTRIBUTION

37-11-00 - DRY AIR PUMP

A dry air pump (1) (Figure 37-1) requires no maintenance between replacement. Replacement is recommended at 500 Hrs. & engine overhaul.

NOTE
Always replace inoperative pump with new air pump.

NOTE
Aircraft with optional radar use vacuum pump (outlet) pressure side to pressurize RTA compartment in right wing.



VACUUM SYSTEM FIGURE 37-1

37-11-01 - MAINTENANCE PRACTICES

Protection of pneumatic dry air pump when cleaning the engine compartment is very important.

WARNING
Failure to protect the dry air pump from contamination by engine cleaning solvents may result in failure of the dry air pump within a short period of operation.

Prior to washing down engine compartment, the following precautions must be taken for better service life of the pneumatic dry air pump.

1. Dry air pump coupling.

CAUTION
Do not blast the air pump coupling area or other pneumatic system components with cleaning solvent under high pressure.

Protect coupling area between the pump mounting flange and the pump housing by wrapping a protective covering around that area during engine cleaning.

CAUTION
Do not allow protective covering around the coupling or filters to become saturated with solvent.

The seals in the front frame of the housing behind the coupling are designed to keep out foreign material such as dirt, dust and light fluid. However, fluid under high pressure can be forced by the seals and enter the pump.

2. Dry air pump fittings. Before washing the engine off, check pump fittings for looseness of the threaded fittings. Fluid can seep through loose threads and enter the pump.

3. Dry air pump discharge hose (vacuum instrument system) Plug the end of the hose or the fitting and flag it with a red "Remove Before Running Engine" tag, then clean the engine.

CAUTION
Remove plug prior to running engine.

NOTE
Vacuum pump exhaust tube assembly, retrofit kit 940054, should be installed, if not installed at time of manufacture.

4. Replace vacuum relief valve filter after cleaning the engine compartment BEFORE starting engine.

37-11-02 - SERVICING

The dry air pump requires no servicing. The internal parts are self-lubricating and require NO ADDITIONAL lubricating.

37-11-03 - REMOVAL

1. Disconnect hoses from dry air pump.

2. Remove air pump from engine and discard old mounting gasket and locking hardware.

3. Remove fittings from pump. Retain fittings if they are serviceable and clean thoroughly before reusing. Discard twisted fittings and nuts with rounded corners.

4. Pad Inspection. Check the 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.

37-11-04 - INSTALLATION OF NEW PUMP

CAUTION
Never install a pump that has been dropped.

1. Consult the airframe manufacturer's current parts manual, Airborne'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.

2. Place the pump mounting flange in a jaw-protected vise, with the drive coupling downward. Protect the pump mounting flange with soft metal or wood.

CAUTION
Pump housing should never be placed directly in a vise, since clamping across the center housing will cause an internal failure of the carbon rotor.

3. Spray the fitting threads with silicone and LET DRY. DO NOT use teflon tape, pipe dope or thread lube.

4. Install fittings in the pump. Hand tighten.

5. 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-tight position.

6. Install new pump mounting gasket (supplied with new pump).

7. Always replace ALL locking washers when installing a new pump. Tighten all four (4) mounting nuts - 80 to 110 in. lbs.

8. Prior to reconnecting hoses, inspect the inside of the hose carefully to make sure it is clean and free of all debris, oils or solvents. Use vacuum or air pressure to clean the lines. Remove the hoses from the aircraft if necessary.

When hose clearance is tight, making it difficult to reinstall onto the pump fitting, spray the fitting at the hose end with silicone, LET DRY, then install hose by pushing it straight on.

CAUTION
Do not wiggle hose from side to side. This could cause particles to be cut from hose ID. These particles WILL damage the pump.

CAUTION
Change all the filters in the system. This MUST BE DONE or pump warranty may be voided.

37-12-00 - VACUUM REGULATOR

The vacuum regulator (2) (Figure 37-1) is a spring-controlled diaphragm valve for regulating vacuum for the aircraft pneumatic instrument system. The vacuum regulator is located on the left firewall inside the cabin, just under glareshield. Adjust vacuum regulator valve according to Section 37-12-05.

37-12-01 - MAINTENANCE PRACTICES

Check general condition of regulator to insure it is secure and in airworthy condition.

37-12-02 - SERVICING

No servicing is required to the regulator other than filter replacement per Section 5. See Section 37-13-00 for detail procedures.

37-12-03 - REMOVAL

1. Underneath the instrument panel, remove both instrument lines from vacuum regulator; cap to prevent foreign objects from entering them.

2. Engine compartment, remove hose from vacuum regulator; cap to prevent foreign objects from entering.

3. Loosen and remove large nut at firewall on vacuum regulator.

4. Pull regulator aft to remove from aircraft.

37-12-04 - INSTALLATION

1. Inside aircraft, insert the vacuum regulator through the mounting hole in the firewall.

2. Install large nut on regulator and tighten.

3. Engine compartment, install hose from pump to regulator and secure.

4. Inside aircraft, install both instrument lines to regulator and secure.

37-12-05 - ADJUSTMENT

1. Tee a calibrated vacuum gauge into the system upstream of the regulator, (see Figure 37-1).

2. Operate engine at a minimum of 1700 engine RPM. If the vacuum regulator is not set at 4.75 +/- 0.25 In. Hg., then bend locking tab away from thumb adjustment screw. Turning screw in, will increase vacuum; turning screw out, will decrease vacuum. Set vacuum to read 4.75 +/- .25 In. Hg.

NOTE
After setting regulator, rebend tab back to lock adjusting screw.

37-13-00 - FILTERS

All filters, except the vacuum regulator filter are of paper-pleated material design. The vacuum regulator filter is a foam-garter design.

37-13-01 - MAINTENANCE PRACTICES

1. Air filter replacement intervals:

A. Vacuum regulator, garter filter (2), every 100 hours.

B. Instrument filters (5) every 500 hours or at least once a year, Ref. SECTION 5-10-01.

2. All filters require routine inspection of condition of element and security of filter in system.

3. ***ALL FILTERS MUST BE CHANGED WHEN A NEW PUMP IS INSTALLED.***

37-13-02 - SERVICING

All filters require no service except routine inspections. Replace with new current configuration filters.

The alternate instrument filter installation (6) (Figure 37-1) should follow the same cleaning and replacement schedule.

37-13-03 - REMOVAL

1. Vacuum regulator garter filter is removed by stretching it over and off the regulator frame.

2. Individual gyro instrument filters unscrew from the back of the instruments. Some installations have one main gyro filter in a manifold line.

37-13-04 - INSTALLATION

1. Prior to installing a new vacuum regulator filter, check the regulator to insure that it is clean from any foreign material.

2 Reinstall new gyro filters into instrument boss and tighten securely.

CAUTION
Don't over tighten; overtightening will crack the rear housing.

37-14-00 - HOSES

The hoses are of the aircraft MIL-H-type.

37-14-01 - MAINTENANCE PRACTICES

During engine cleaning, protect the discharge hose:

1. Plug the end of the hose and flag it with a red 'Remove Before Running Engine' tag, then clean the engine.

CAUTION
Remove plug prior to running engine. Periodic check of all clamps for security is recommended.

37-14-02 - SERVICING

Inspect the inside of the hose carefully to make sure it is clean and free of all debris, oils or solvents.

Use vacuum or air pressure to clean the lines. Remove the hoses from the aircraft if necessary.

37-14-03 - REMOVAL

Replace old, hard, cracked or brittle hose, particularly on the pump inlet. Sections of the inner layers may separate, causing a pump failure.

37-14-04 - INSTALLATION

Where hose clearance is tight, making it difficult to reinstall it onto the pump fitting, spray the fitting at the hose end with silicone. **LET DRY**, then install hose by pushing it straight on.

NOTE
Do not wiggle hose from side to side. This could cause particles to be cut from hose ID. These particles WILL damage the pump.

Make cedain hoses are connected to the correct fittings. Incorrect installation will cause damage to the gyro system. Install clamps and secure.

37-20-00 - INDICATING

The indicating system contains a low vacuum light which illuminates (flashes) when the vacuum is below 4.25 +/- .2 In. Hg. and a high vacuum light which illuminates (steady) when the vacuum goes 5 5 (+.2-.0) In. Hg. or above.

37-21-00 - VACUUM SWITCH

The vacuum switch (7), Fig. 37-1, is located on either the Artificial Horizon (3) or Directional Gyro (4). The illuminating low and high light adjustments are done on the switch, not on the annunciator panel.

37-21-01 - DESCRIPTION

The switch is a low and high vacuum sensing adjustable unit.

37-21-02 - MAINTENANCE PRACTICES

Check for switch security in instrument and all wires secure at switch.

37-21-03 - REMOVAL

Disconnect wires and unscrew from aft instrument housing.

37-21-04 - INSTALLATION

Install switch in housing and tighten. Reconnect wires.

CAUTION
Do not over tighten. Over tightening will cause cracking of the aft instrument housing.

37-21-05 - ADJUSTMENT

1. Remove switch from instrument. Reinstall wires if removed. Attach poly-vinyl hose, "T" fitting and calibrated gauge to vacuum switch. Connect other end of hose to a vacuum source.

2. Turn aircraft power on. The "HIGH/LOW VAC" light should flash.

3. Apply vacuum and adjust source to 4.25 (+/- .2) In. Hg. Adjust Low setting screw (connector end of switch) to illuminate the low vacuum circuit on the annunciator panel.

4. Increase vacuum source to 5.5 (+.2-.0) In. Hg. Punch a small jewelers screw driver through the poly-vinyl tube and into the fitting where the high setting screw is located and adjust until the "HIGH/LOW VAC" light on annunciator is illuminated.

5. After you have completed switch adjustment turn aircraft power off.

6. Remove switch from hose and gauge.

7. Reinstall switch in Gyro. Reconnect wires.

CAUTION
Crossing the electrical wires on vacuum switch will cause the annunciator lights to act in reverse.

37-30-00 - DRY AIR PUMP REPAIR/ REPLACEMENT

37-30-01 - COUPLING INSPECTION AND REPLACEMENT

1. Remove vacuum pump from engine in accordance with maintenance manual, Section 37-11-03).

2. If coupling (1) has sheared, remove engine coupling drive gear (2) from engine gear housing and see Section 37-30-20 below.

3. Use a screwdriver or similar tool, remove pump drive coupling (1) from engine coupling drive gear (2) and pump drive gear (3) being careful not to damage drive pins.

4. Push new drive coupling (1) into place on pump drive gear (3).

5. Push engine coupling drive gear (2) into place on pump drive coupling(1).

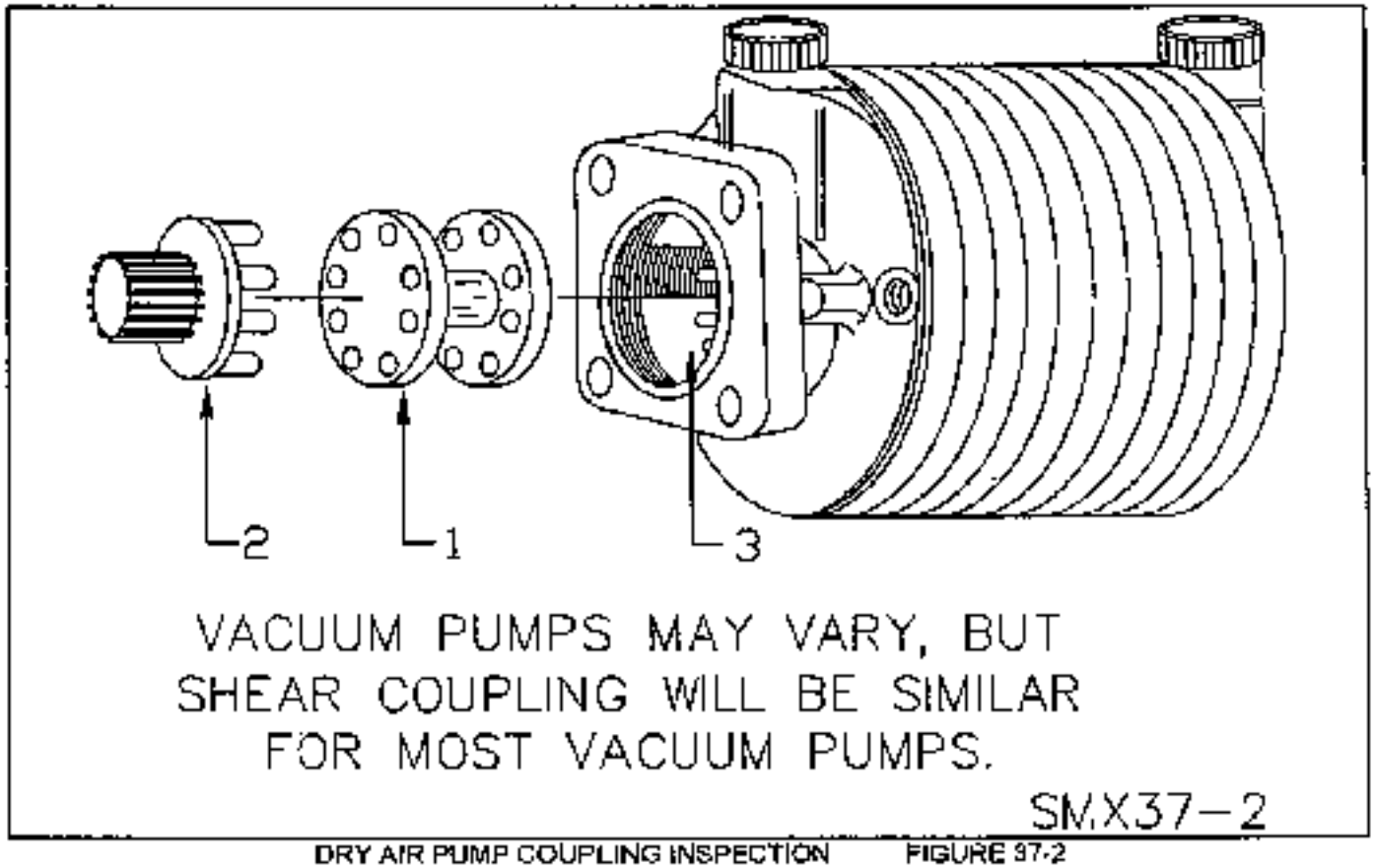
6. Turn by hand, check for rotation of pump.

7. Reinstall pump on engine and test run, refer to Section 37-11-04.

8. Make log book entry.

37-30-02 - DRY AIR PUMP INSPECTION

VACUUM PUMPS ARE A NON-REPAIRABLE UNIT. Remove malfunctioning pump and replace with new pump.



DRY AIR PUMP COUPLING INSPECTION FIGURE 37-2

NOTE
After installation if regulator valve requires adjustment refer to Section 37-12-05.

37-40-00 - STAND BY VACUUM SYSTEM (OPTIONAL)

37-40-01 - SERVICING

Refer to manufacturers service and maintenance data for the particular unit installed.

If no specific maintenance information is available from the manufacturer the following is recommended:

1. Inspect to verify hoses and wires are clear of any obstruction or interference with other components that may chafe hoses or wires.

2. Inspect hose clamps on all fittings to verify tight and secure.

3. Every 100 hour/annual inspection - Inspect set screws in motor/air pump coupling for tightness and security.

4. A dry air pump requires no maintenance between replacement. Replacement is recommended at 500 hours operating time. It is recommended that stand-by vacuum system operating time be documented.

5. It is recommended that if the Stand-by Vacuum System is not used regularly, that every 90 days (approximately) the Stand-by Vacuum System should be turned on, in flight, for 20 - 30 minutes to get the pump and drive motor warm enough to dry out any condensation that may have accumulated. The exhaust port of the dry air pump is routed into the housing of the electric motor to assist in purging moisture and debri from the motor assembly.

37-41-00 - OPERATIONAL PROCEDURES

The Optional Stand-by Vacuum pump for the M20J is located in the tailcone. Its location is standard, but can vary slightly depending on optional equipment installed on aircraft.

The Stand-by pump is to be used only as needed when the main Vacuum pump malfunctions. The VAC annunciator light will illuminate (RED) either flashing (low vacuum) or steady (high vacuum) when this situation occurs. If annunciator light is flashing RED, push STBY VAC switch ON and annunciator light should extinguish as stand-by vacuum system takes over for all instrument operations. If annunciator is steady RED, monitor flight instruments with non-vacuum gauges and continue with flight if feasible, or land and have vacuum sytem inspected and repaired.

It is recommended that prior to aircraft engine start, the stand-by vacuum pump be turned ON to verify that the vacuum gauge (if equipped) indicates normal operating vacuum and that the gyros spin up and erect. When the engine starts the check valve closes and the stand-by vacuum pump system will not produce enough additional vacuum for any indication on the gauge (if equipped) to be noticeable.

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CHAPTER 39

ELECTRICAL PANELS AND COMPONENTS

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ELECTRICAL PANELS AND COMPONENTS

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CHAPTER 39

ELECTRICAL PANELS AND COMPONENTS

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39-00-00 - GENERAL

The instrument panel is divided into three basic groupings:

1. Flight Instruments,
2. Avionics/Radio Panel.
3. Engine Instruments and Circuit Breaker Panel.

The flight instrument panel is shock mounted. The radio/avionics panel generally, has individual racks for the components and are of the quick removal type. The engine instruments and circuit breaker panel are located in a quick removal panel which is slanted toward the pilot.

The circuit breaker/switches for the standard and/or optional accessories and equipment are located at the bottom of the flight instrument panel on either side of the pilots control column.

The cluster gauge containing fuel quantity and engine operating gauges is located at the top of the flight instrument panel.

The annunciator is located at the top of the avionics panel.

The avionics panel has two configurations: Serial Numbers 24-0001 thru 24-0900 has a tubular structure configuration that will not accept the radar installation; Serial Number 24-0901 and ON aircraft have a re-located steel tubular structure that will allow the radar indicator to be installed.

The panel illustration depicted in Figure 39-1 shows phantom lines for some installations. Model year improvements, technical improvements or various avionics installations dictate which instrument will be installed in a given location.

See Section 91 for Electrical System Hardware Charts and Schematics.

39-10-00 - INSTRUMENT AND CONTROL PANELS

39-10-01 - FLIGHT INSTRUMENTS

1. Glareshield/Instrument Removal.

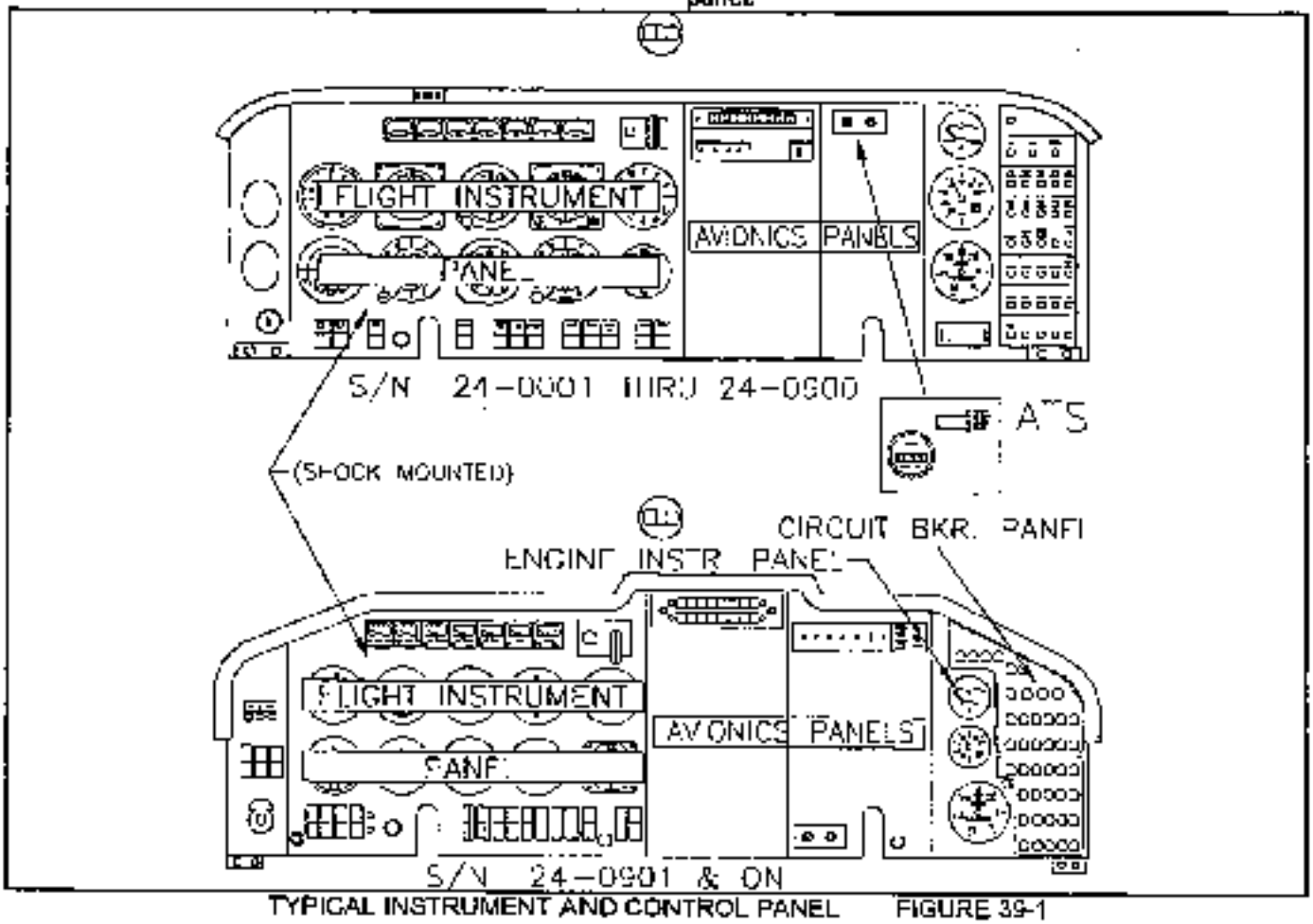
A. Remove the screws attaching the glareshield and cover plate and carefully lift glareshield to expose the disconnects for the glareshield lights. Disconnect the wires and lift the glareshield off.

B. Disconnect the plumbing and/or electrical connections from the flight instruments to be removed.

C. Disconnect and remove any post lights.

D. Remove the mounting screws securing the instrument to the panel.

E. Remove the instrument by sliding it aft from the panel.



TYPICAL INSTRUMENT AND CONTROL PANEL FIGURE 39-1

2. Installation.

A. Place instrument into the proper location on panel.

B. Insert and secure mounting screws to hold instrument to panel.

C. Connect the post lights.

D. Connect all plumbing and/or electrical connections to the instrument; perform pitot/static leak check.

E. Position the glareshield so electrical connections can be made and secured.

F. Secure glareshield and cover plate with screws.

39-10-02 - AVIONICS EQUIPMENT

Each avionics package installed is basically a customized package to meet the requirements of the customer. Wiring harness, any associated plumbing or mechanical mechanisms required for a particular avionics installation are well secured to prevent any interference with other components. Removal of these avionics components will require evaluation of each installation to determine the proper procedure or sequence to follow.

1. Removal. Most individual avionics components are mounted in slide out chassis racks. Loosen the screw on the face of the component and slide the unit straight aft to remove.

Some components are not mounted in slide out chassis. Removal of these units will require the same sequence as removal of flight instruments in Section 39-10-01.

CAUTION
Radio panel must be stacked from the bottom to the top.

2. Installation. Install the repaired or new unit in reverse sequence of removal.

39-10-03 - ENGINE INSTRUMENTS AND CIRCUIT BREAKERS

The engine instruments and circuit breaker panel is an assembly that can be pulled out as a unit for removal of any instrument or circuit breaker.

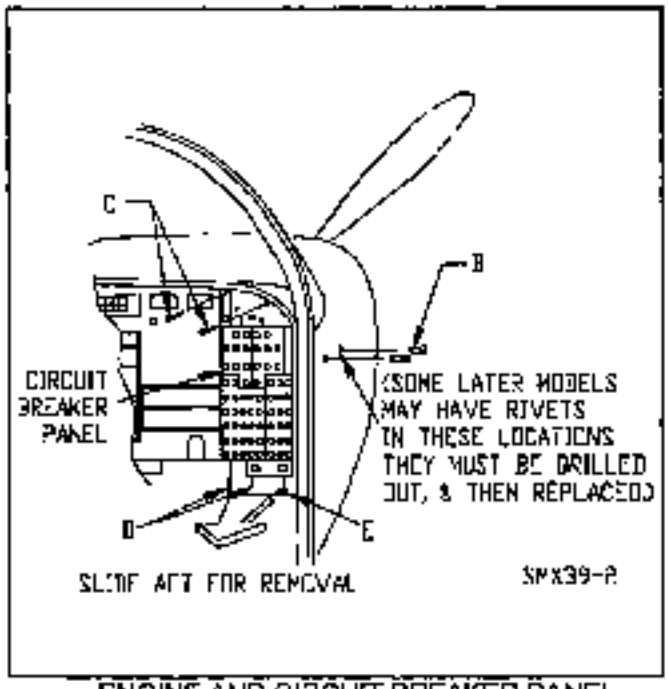
1. Removal.

A. Remove the glareshield per Section 39-10-01.

B. Remove two flat head screws (B) on outside of the airplane (Fig. 39-2). These are located forward of the cabin door hinge and above the cabin air inlet scoop approximately 4 inches below the windshield.

C. Remove two screws from the face of the panel at the upper left corner (C) (Figure 39-2).

D. Remove two screws (D) from underneath, near the edge of the panel face.



ENGINE AND CIRCUIT BREAKER PANEL
FIGURE 39-2

E. Remove the NAS21918DG clamp (E) from the steel structure cross brace, underneath the panel, forward section, see (Figure 39-2).

F. The panel should now be free to slide aft approximately 4-5 inches. This will allow access to the plumbing and electrical connections.

G. Remove the plumbing or the electrical connections from the instrument or component that will be removed.

NOTE
In some instances instruments, other than the one to be removed, must be removed or at least some wiring, or plumbing disconnected to gain access to the desired one.

H. Remove thin lexan glass insulation strip if required when removing components.

I. Remove the instrument by removing any post lights and mounting screws which secure instrument to the panel and pull forward. Remove the circuit breakers by unscrewing nut from stem on each circuit breaker and push the breaker through the panel.

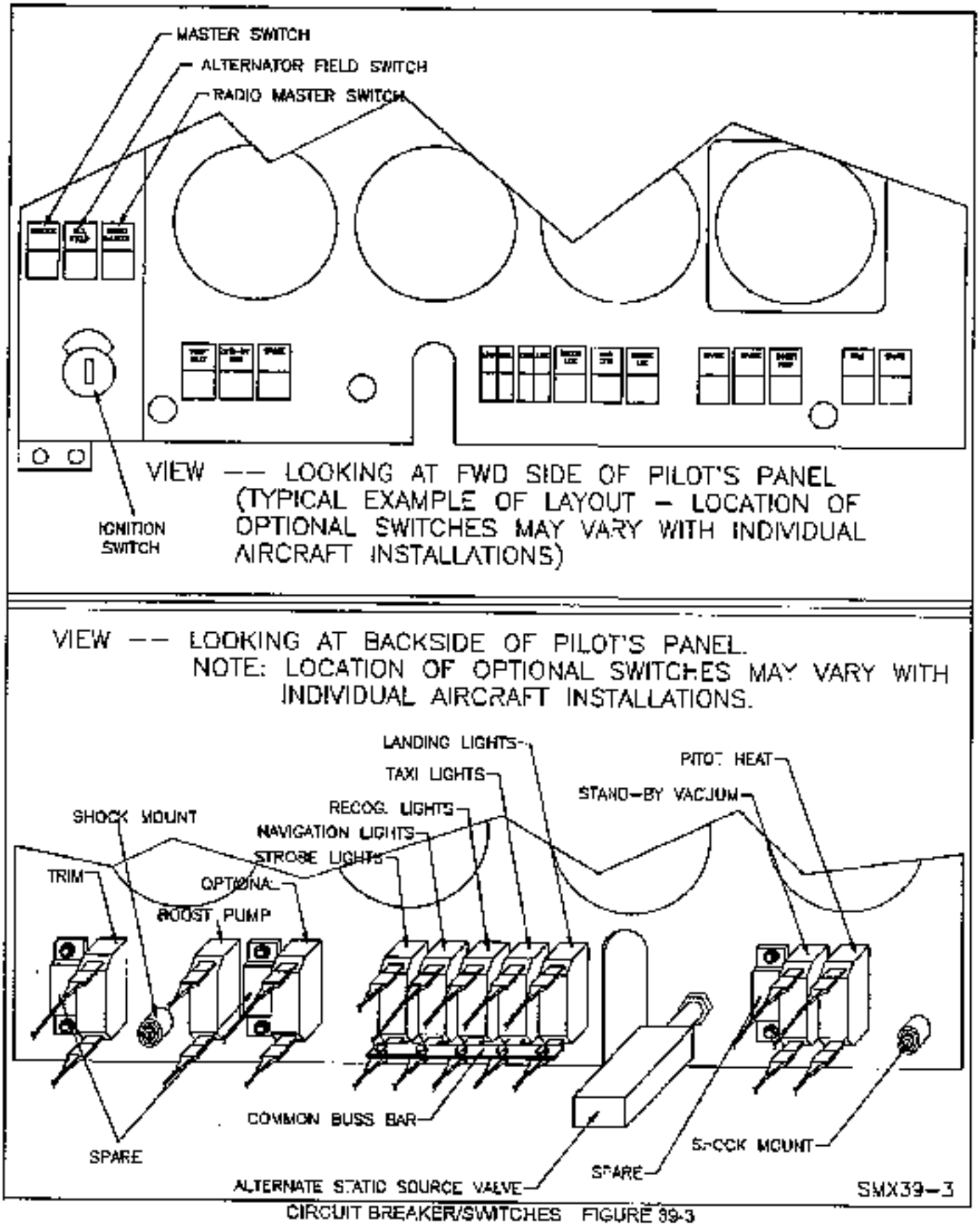
2. Installation.

A. Installation of new instrument or circuit breaker into the panel is accomplished in reverse sequence of removal.

B. Insert the lexan insulator sheet in proper location to prevent any short circuits.

39-11-00 - FLIGHT INSTRUMENT PANEL

The flight instrument panel is a shock mounted panel containing various flight instruments for a particular installation group. These instruments vary slightly



CIRCUIT BREAKER/SWITCHES FIGURE 39-3

depending upon the avionics package installed. The panel contains a row of circuit breaker/switches, along with the master switch, which control most of the systems of the airplane. Refer to Figure 39-3).

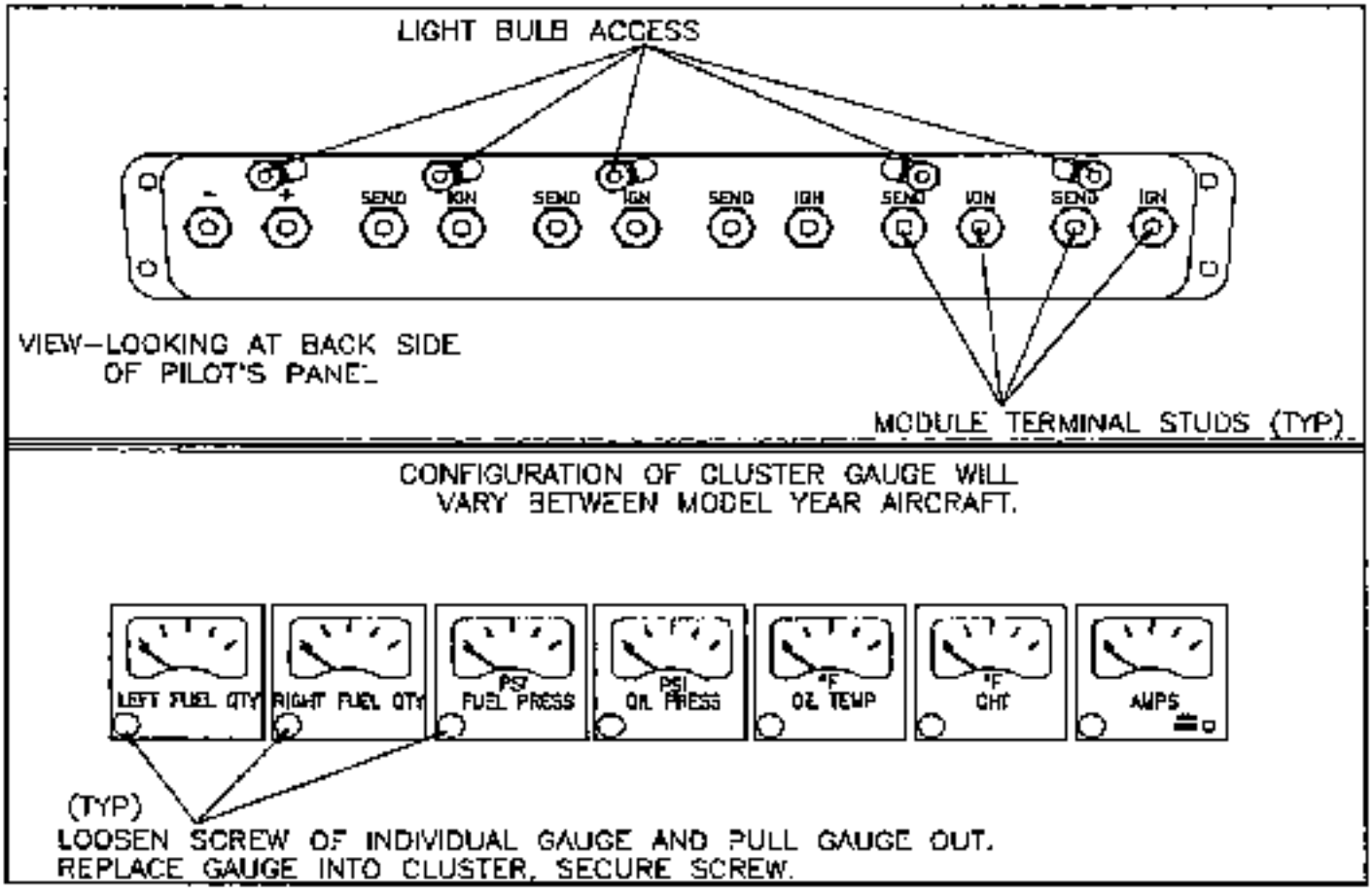
Access for maintenance of the switches or related wiring is obtained by removing the two attachment screws and pushing the switch through the panel. There is a common bus bar on some of the switches that will require loosening or removal for switch replacement.

CAUTION
Care should be exercised when replacing wiring or switches to ensure proper alignment of terminal connections to prevent shorting between switches.

39-11-01 - CLUSTER GAUGE

The cluster gauge is located at the top of the flight panel. Access is obtained by removing the glareshield per section 39-10-01. Cluster gauges have the capability of individual module replacement.

One some configurations the entire cluster gauge will require removal from the panel to allow room to pull modules out. The nuts on terminal studs need to be removed so wire terminals can be pulled from studs to remove the modules from the cluster gauge chassis. Remove and replace the defective module. Some configurations have individually removeable gauges. Loosen screw in lower LH corner, remove gauge by pulling from pilot's side of instrument panel. Replace by carefully pushing gauge in & securing screw.



CLUSTER GAUGE FIGURE 39-4

TROUBLE SHOOTING GUIDE FOR CLUSTERS

PRESSURE INSTRUMENTS

GAUGE CONDITION	CHECK FOR THESE POSSIBILITIES
Gauge reads full scale with engine shut down.	Wire between sender and gauge disconnected or open. Faulty sender. Faulty gauge.

Gauge reads zero when engine is running.	Wire between sender and gauge grounded. Faulty sender. Faulty gauge

TEMPERATURE INSTRUMENTS

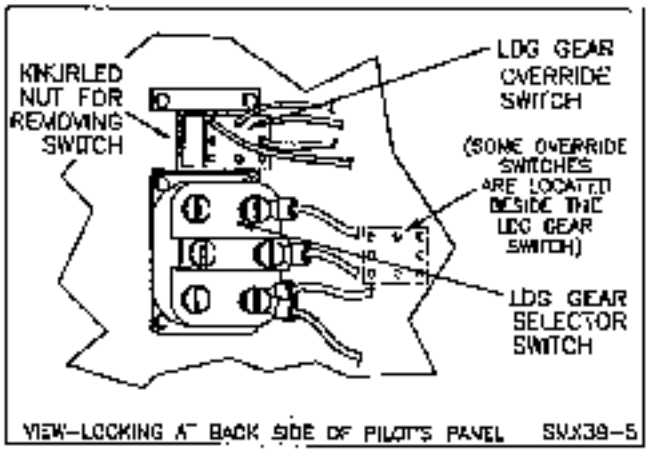
Gauge reads full scale with engine cool or cold.	Wire between sender and gauge grounded. Defective gauge. Defective sender.
Gauge reads zero when engine is hot.	Wire between sender and gauge is open or disconnected. Defective gauge Defective sender.

FUEL SYSTEM

GAUGE CONDITION	CHECK FOR THESE POSSIBILITIES
Gauge indicates empty in the tank.	Grounded wire between sender and gauge. Defective sender. Inoperative gauge.
Gauge indicates past full when tank is less than full.	Open sender lead Open sender (open resistance element). Sender not properly grounded to airframe. Gauge off calibration.Note: Some clusters are equipped with fuel gauges that have trim pots and may need re-calibration.
Gauge indicates 1/2 when tank is full.	On dual sender systems, the isolated sender may be grounded. The lead between the isolated sender and the grounded sender grounded. Either sender defective. Gauge off calibration.

39-11-02 - LANDING GEAR SWITCH

The landing gear switch is a two position switch located at the top right side of the flight instrument panel. The wheel shaped knob must be pulled aft prior to raising or lowering the switch to activate the landing gear actuator.



LDG GR SWITCH & LDG GR SAFETY OVERRIDE
FIGURE 39-5

1. The glareshield will require removal to gain access to switch for maintenance action (refer to Section 39-10-01).

2. Remove the wire connections from the back of the landing gear switch, (Figure 39-5).

3. Turn the wheel shaped knob counterclockwise to remove from stem.

4. Remove the nut and washer from the face of the switch and push switch through the panel.

39-11-03 - LANDING GEAR SAFETY OVERRIDE SWITCH

(S/N 24-0084, 24-0238 thru 24-TBA)

Landing gear safety override switch is located adjacent to landing gear switch. Proper operation of landing gear safety system will not allow gear to retract below 85 +7/-4 KIAS.

CAUTION

Activation of the gear safety override switch while the aircraft is on the ground may cause the landing gear to retract.

1. The landing gear switch or cluster gauge will require removal to gain access for the removal of the override switch.

2. Disconnect wire connectors, approximately 6 inches from the switch, by cutting with wire cutters or opening the knife disconnects.

3. Loosen the nut on the stem and hold the nut located inside the mounting bracket. The red lens may need to be removed to fully remove the switch from the panel and bracket.

4. The light bulb (GE 330) can be replaced after the glareshield is removed by bending a nail or similar rod (approximately 3/32" diameter) and pushing the red lens off to the front of the panel. Use a small vacuum tube puller or soft nosed instrument to pull the bulb from the socket.

39-12-00 - AVIONICS/RADIO PANEL

The avionics/radio panel contains equipment installed per sales order by Mooney Aircraft and other equipment installed by other sources as the owner desires. The maintenance information contained in this Service and Maintenance Manual describes the Mooney factory installation only.

The avionics/radio components are removed and installed according to Section 39-10-02, 1 and 2.

39-12-01 - ANNUNCIATOR PANEL

The annunciator panel is located at the top of the center-most avionics/radio panel and is not mounted with a slide in type chassis. Remove this component by removing the two screws holding cover plate in position. Remove the glareshield and disconnect the electrical harness from back side of the unit. Remove the screws holding unit in place on the panel and remove from the back side of the panel.

LOW FUEL WARNING CIRCUIT CALIBRATION. Refer to Section 24-33-00 paragraph 4.

39-12-02 - EMERGENCY LOCATOR TRANSMITTER (ELT) SWITCH

The remote ELT switch is located at the top of the avionics panel. The ELT is located in the tailcone and is accessible by removing the radio access panel on the left side of the aircraft fuselage. The ELT antenna is located on top of the tailcone underneath the fiberglass dorsal fin. The unit has a three position switch "ON", "OFF" and "ARM". The correct position of this switch is "ARM". The remote switch is connected in parallel to the ELT circuit and will operate correctly either in the "ARM" mode or the "ON" mode. Normal operation is in the "ARM" position. Place the remote switch in the "ON" position and tune the communication radio to 121.5 Mhz to verify that a warbling tone is heard. Place the remote switch back to "ARM" position for normal operation.

CAUTION
Testing of ELT should be conducted only during the first five (5) minutes after any hour and no longer than three (3) audible sweeps.

1. If the warbling tone is not heard, replacement of the ELT battery or the unit may be necessary. Follow ELT manufactures instructions for battery replacement

2. If ELT unit is found to be operating properly and the system still will not work correctly through the remote ELT switch, repair or replacement of the switch or wiring will be required.

A. To gain access to the remote switch and wiring the glareshield will require removal (refer to section 39-10-01).

B. Remove the switch retaining nut and washer and push switch through face of panel. Disconnect wires, remove and replace defective switch.

C. Reconnect wires and test switch for proper operation.

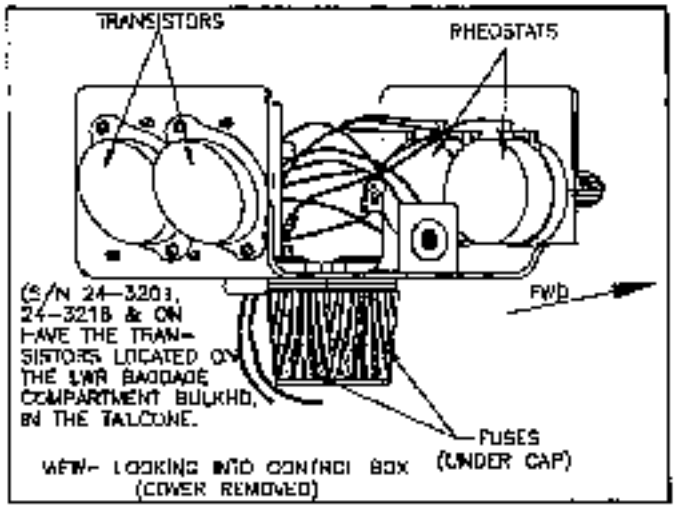
D. Reinstall glareshield.

NOTE
Other switches located in the ELT placard area of avionics panel can be removed and replaced in similar manner.

39-12-03 - INSTRUMENT AND RADIO LIGHT CONTROL BOX

The control box for the instrument, radio and glareshield lights consists of two variable rheostat switches, two transistors, two fuses and miscellaneous wiring contained in a metal box assembly. The transistors installed in M20J aircraft, prior to 24-1214, are P/N 2N2016 and are no longer being manufactured.

Check appropriate schematics for proper wiring.



INSTRUMENT & RADIO LIGHT CONTROL BOX
FIGURE 39-6
(S/N 24-1214 THRU 24-TBA)

The replacement transistors are included in a spares modification kit, P/N 819009-907, which includes a transistor, resistor, and instruction sheet describing the modification procedures. The kit will modify one circuit only, two kits are required for both circuits.

M20J aircraft, S/N 24-1214 thru 24-2999, have a different light control assembly (12V) using a different transistor and circuitry. (See Figure 39-6).

NOTE
A retrofit kit is available to use the latest light control assembly on any 12V aircraft (940013-511 Kit).

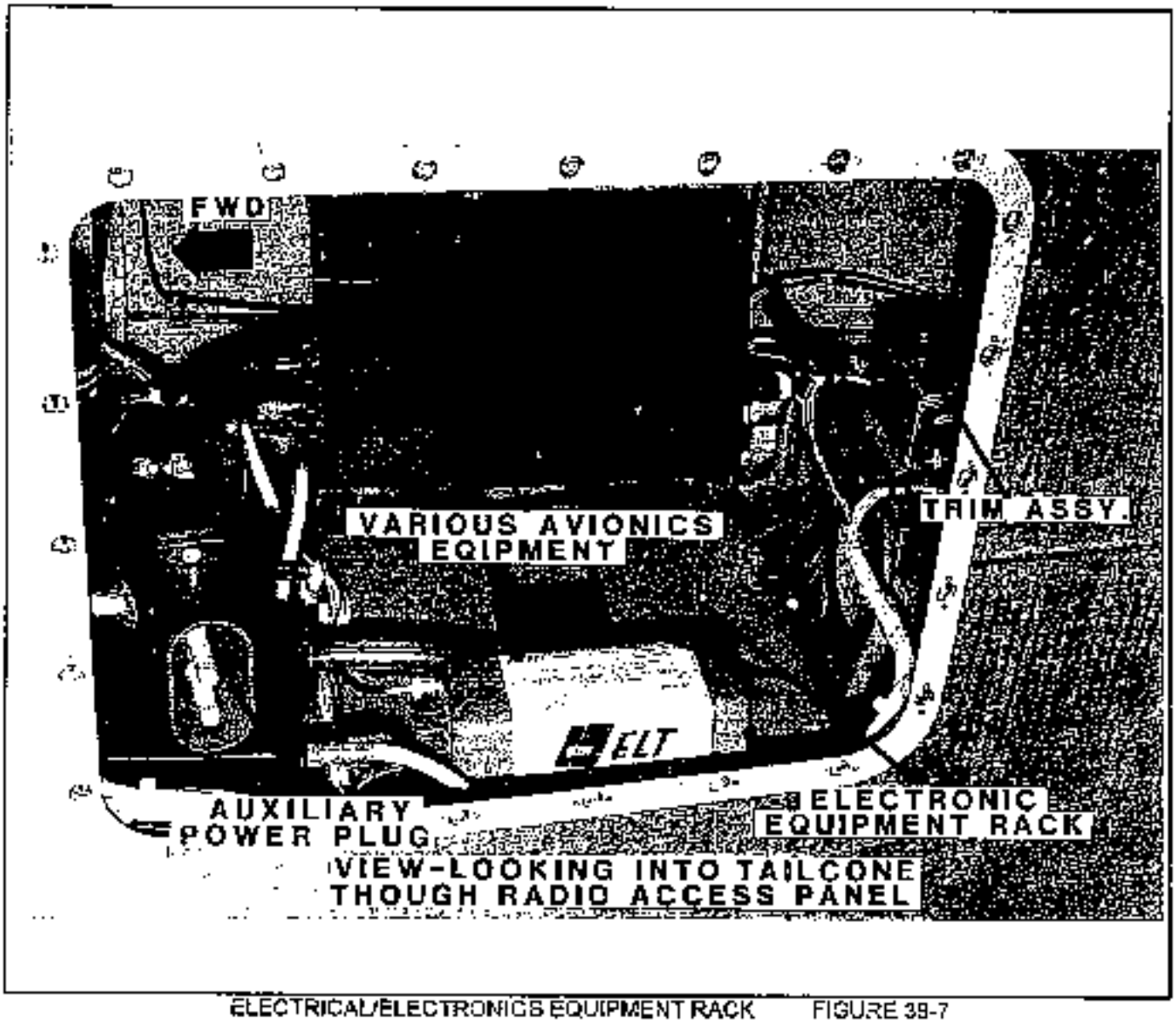
39-12-04 - CIGAR LIGHTER

The cigar lighter is located at the bottom of the radio panel immediately to the right of the co-pilots control column shaft. It is a standard cigar lighter similar to automotive type.

39-20-00 - ELECTRICAL/ELECTRONIC EQUIPMENT RACK

The electrical equipment rack for the M20 series aircraft is located in the tailcone just aft of the baggage compartment bulkhead. Access is gained through the large access door on the tailcone aft of the left wing trailing edge. The battery and battery box, auxiliary power plug receptacle (if installed), ELT and the various avionics black boxes are mounted on the electrical equipment rack (See Figure 39-7), (12V A/C only). 24V A/C have the ELT mounted on an accessory rack further aft in the tailcone. Access is gained through a panel aft of avionics bay access panel. The ELT antenna is located under the dorsal fin.

(FIGURE 39-7 REPRESENTS 12 VOLT AIRCRAFT ONLY)



ELECTRICAL/ELECTRONICS EQUIPMENT RACK FIGURE 39-7

39-21-00 - MISCELLANEOUS MAINTENANCE

39-21-01 - EQUIPMENT MAINTENANCE

Refer to SECTION 27-42-00 for Electric Pitch Trim System Maintenance.

CHAPTER 51

STRUCTURES

CHAPTER 51

STRUCTURES

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CHAPTER 51

STRUCTURES

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51-00-00 - GENERAL

The Mooney M20J is an all metal, low wing airplane. The fuselage cabin area is constructed of a welded 4130 chrome-molybdenum steel tubular structure. The steel tubular structure is covered with non-structural aluminum skins fastened to the tubular structure by rivets, bolts and screws.

The tailcone is of semi-monocoque type construction and is fastened to the tubular structure with structural bolts.

The wing is a tapered, laminar flow, one piece wing. It is constructed with a one piece, full length main spar. The spar is constructed from tapered cap strips (7075 aluminum) bolted (huck bolts) to webs (2024 aluminum). Aluminum ribs connect the main spar to the aft stub spar and the rear spar. Extruded stringers run the full length of the wing, spaced chordwise for strength and skin reinforcement. The skins are stretch formed, wrap around, 2024-T3 aluminum ranging in thickness from .025 at the tip to .050 at the fuel tanks.

The completed wing assembly is mated to the fuselage tubular structure during final assembly at the Mooney facility. Removal of the wing from the fuselage structure is required for most over land type transportation.

The empennage is of similar construction to the wing. A main spar spans the length of the stabilizer. Ribs connect the main spar to the stub and rear spar. A stretch formed skin wraps around the leading edge ribs and attaches to the rear spar on top and bottom. The elevators are constructed of formed aluminum skins fastened to a spar extrusion at the leading edge and riveted together at the trailing edge.

The vertical stabilizer is constructed around a fabricated main spar assembly with ribs connecting the main and rear spar. A stretch formed, aluminum skin wraps around the leading edge ribs and is riveted to the rear spar on both sides. The rudder is constructed of formed aluminum skins fastened to a spar extrusion at the leading edge and riveted together at the trailing edge.

Belly skins are connected to fuselage bulkheads (S/N 24-0001 thru 24-1417) and are removable for access to various components and controls located between the firewall and the rear spar. These skins contribute to the strength of the aircraft and security of each panel is mandatory. Aircraft S/N 24-1418 and later have a one piece composite belly skin that covers the underside of the aircraft from the exhaust cavity aft to the tailcone.

The front seats are installed on rails which are attached to the floorboard and structure beneath the floorboard. The rear seat, 2 place, is built into the top of the wing center section from the main spar aft to the rear spar. Aircraft S/N 24-0001 thru 24-1213 contain a bench type seat with a one piece non-reclining back rest. S/N 24-1214 and ON contain a split type seat, using seat

cushions in molded wells over the wing spars and individually reclining rear seat backs.

51-10-00 - STRUCTURAL REPAIR - GENERAL

This section outlines structural repair procedures for the M20J airplane. It is intended to supplement FAA Advisory AC 43.13-1(*) by showing repair methods specific to Mooney Airplanes. (* = current revision)
All structural repair must be: In compliance with AC 43.13-1(*), unless specific Mooney factory repairs are recommended, or with the specific approval of a Federal Aviation Administration representative which is the final authority in all repairs. This manual is for general guidance and has no authorized approval status. The Customer Support Department, Mooney Aircraft Corporation, Kerrville, Texas, (830) 792-1904 (830) 896-6000 (switchboard), should be consulted for special repair procedures when repair of damaged structure is not covered by published instructions.

51-10-01 - FASTENER REPLACEMENT

1. HUCKBOLT INSTALLATION. The Huck Lockbolt is an interference fit fastener used in a rigid joint structure. A loose or slip fit Huckbolt is unacceptable. The recommended limits for Huckbolt holes are:

HUCK FASTNER	PRE-DRILLED SIZE	DRILL SIZE	HOLE LIMITS
2LPH-T5	No. 28 (.147 IN.)	No. 20 (.161 IN.)	.161 TO .1635 IN
ALPPH-T6	No. 18 (.1695 IN)	No. 13 (.185 IN.)	.185 TO .187 IN.
R3001-T6	No. 18 (.1695 IN)	No. 13 (.185)	.185 TO .187 IN.
2LA426H-T5	No. 28 (.147 IN.)	No. 20 (.161 IN.)	.161 TO .1635 IN.
R3007-T6	3/16 (.187 IN.)	No. 7 (201 IN)	.2005 TO .2025 IN

H-lok fastners may be substitited for Huck fastners of same diameter and grip.

A. When the Huckbolt is enlarged beyond the above limits but is straight and round, the hole may be considered acceptable, provided that the Huckbolt cannot be pressed into the hole, with normal hand pressure, to a depth more then 50 percent of the heaviest material being secured. Check enlarged hole size at both ends. Select-fit Huckbolts to the oversize holes.

B. Oversize Huckbolt holes may be repaired by replacing 2LPH-T5 Huckbolts with ALPPH-T6 Huckbolts or NAS 623-2 screws and NAS 1021 No. 6 Hex-lock nuts (or equivalent), provided the pitch distance is greater then .56 inches and the edge distance is greater than .33 inches. Huckbolts ALPPH-T6 and R3001-T6 may be replaced with R3007-T6 Huckbolts as necessary. Consult the Customer Support Department, Mooney Aircraft Corporation, Kerrville, Texas, (830) 896-6000 for factory recommendations when the preceding instructions are inadequate to accomplish the repair.

To compensate for material thickness tolerances, Huckbolt length may be increased by one dash number from the prescribed length. When a Huckbolt pin of the proper length is not available, use a pin of the next longer length. To adjust the grip length, install a cadmium-plated steel washer .065 inch thick (or a combination of not more than two washers .065 inch and .032 inch thick) under the Huckbolt collar.

The combined thickness of any two washers shall not exceed .098 inch. Huckbolts or conical Keystone Lock blind rivet heads may be cocked no more than .004 inch. Not more than 20 percent of the fasteners in any pat-tern, nor more than three fasteners in succession, may be cocked.

NOTE
Where access is limited or for replacement/repair the following substitution is permissible.

2. RIVET REMOVAL AND REPLACEMENT.

HUCKBOLT P/N	SUBSTITUTE P/N (VENDOR)	DESCRIPTION
NAS1465 or R3001-T5	HL20-5 PIN (HI-LOCK) HL86-5 COLLAR	PIN-PROTRUDING TENSION 160 KSI Ftu
NAS1466 or R3001-T6	HL20-6 PIN (HI-LOCK) HL86-6 COLLAR	PIN-PROTRUDING TENSION 160 KSI Ftu
NAS1475 or R3014-T5	HL19-5 PIN (HI-LOCK) HL94-5 COLLAR	PIN-100 D. FLUSH SHEAR - 95 KSI Fsu
NAS1476 or R3014-T6	HL19-6 PIN (HI-LOCK) HL94-6 COLLAR	PIN-100 D. FLUSH SHEAR - 95 KSI Fsu

[PART NUMBER CODE]

HL20 - 5 - 8

- 8 — Grip in 1/16ths" (8/16 = .500) MAX
- 5 — Nominal Dia. in 1/32nds" (5/32 = .156)
- HL20 — Pin Part Number

A. REPLACEMENT-STANDARD SIZE RIVETS, HOLE OVERSIZE. This repair applies only to original aluminum alloy, steel, or monel rivets of 1/16, 3/32, 1/8, and 5/32 inch diameters. Such rivets may be replaced as noted and limited below and in the General Limitations, when the hole only is oversize.

(1) Protruding Head Joint. If the edge distance is a minimum of two times the diameter of the original rivet, it will be permissible to drill for and install the next standard size larger diameter rivet of the same type and material as the original rivet.

(2) Machine Countersink Joint, Method I. If the edge distance is a minimum of two times the diameter of the next standard size larger diameter rivet and the sheet thickness involved are within the limits specified for machine countersinking for the next standard size larger diameter rivet, it will be permissible to drill and countersink for and install the next size rivet of the same type and material as the original rivet.

The following are limits for machine countersinking:

RIVET SIZE	MIN. GAUGE
3/32	.025
1/8	.032
5/32	.040

(3) Machine Countersink Joint, Method II. If the edge distance is a minimum of two times the diameter of the original rivet, it will be permissible to drill for and install the next standard size larger diameter rivet of the same type and material as the original rivet. Do not remachine the countersink. After installation, mill the excess head height flush with the surface.

(4) Dimpled Joint. If the edge distance is a minimum of two times the diameter of the original rivet, it will be permissible to drill for and install the next standard size larger diameter rivet of the same type and material as the original rivet. Do not redimple. After installation, mill the excess head height flush with the surface. This method is subject to the same limitations as paragraph 2, A (3).

B. REPLACEMENT-STANDARD SIZE RIVETS, HOLE AND COUNTERSINK OR DIMPLE OVERSIZE. This repair applies only to original countersunk head aluminum alloy rivets of 1/16, 3/32, 1/8, and 5/32 inch diameters. Such rivets may be replaced (as noted and

limited below) when the hole and countersink or dimple is oversize.

(1) Machine Countersink Joint. If the edge distance is a minimum of two times the diameter of the next standard size larger diameter rivet and the countersink depth is not beyond the thickness of the countersunk sheet, it will be permissible to rework according to paragraph 2, A (3).

(2) Dimpled Joint. If the edge distance is a minimum of two times the diameter of the next standard size diameter rivet and all the parts are dimpled, it will be permissible to rework the smaller dimples to a size to match the oversize dimple and install Dimples in 75S-T6 must be hot formed when reworked.

(3) Combined Countersink and Dimpled Joint. If the edge distance is a minimum of two times the diameter of the next standard size larger diameter rivet, it will be permissible to rework the smaller countersink or dimple to a size to match the oversize dimple or countersink and install the next standard size larger rivet according to paragraph 2, A (4). Dimples in 75S-T6 must be hot formed when reworked.

C. RIVET HEAD TOLERANCE.

(1) A rivet head will be considered open if .001 feeler gauge can be inserted between the head of the flush or protruding head rivet and the top skin. The top of a flush head rivet must not be below the skin in which it is installed by a dimension of more than .004.

D. RIVET HOLE TOLERANCE.

(1) An enlarged hole is defined as having an internal diametric dimension in any direction which exceeds the sum of the drill diameter normally used plus ten percent of the diameter of the rivet shank.

(2) The following table specifies the maximum acceptable diametric dimensions for the various rivet sizes that occur in multiple layer assemblies which are "drilled on assembly".

RIVET SIZE	NOMINAL DRILL SIZE	AX. ACCEPTABLE DIAMETRIC DIMENSION
AN470AD3 or AN426AD3	#40 (.098 dia.)	.108 IN.
AN470AD4 or AN426AD4	#30 (.1285 dia.)	.141 IN.

(3) When a hole becomes enlarged beyond the acceptable diametric limit and the prescribed rivet cannot be used, the next larger diameter rivet may be used if (a) four-diameter (4D) rivet spacing is maintained and if (b) two-diameter (2D) edge distance is maintained.

3. BLIND RIVET INSTALLATION. Ordinarily, where rivet bucking is impossible, CherryLock (CR-2246 and CR-2249) rivets may be substituted for AD rivets to repair skins and structural members. However, consult the Customer Support Department or a representative of the Federal Aviation Administration before using blind-type or hollow rivets in primary structure.

CAUTION

The use of blind rivets normally require more frequent inspection of the area where used. Inspect for evidence of loosening of the rivet(s) or crack development that may cause deterioration of structural integrity. Solid rivet replacement of blind rivets is recommended at earliest possible maintenance.

Check existing rivet hole size before installing blind rivets. When hole is marginal, use the next larger size rivet to assure firm attachment.

4. AN- BOLT, NUT AND WASHER INSTALLATION. To compensate for material thickness tolerances, the length of AN bolts may be increased or decreased by one dash number from prescribed length. AN960 regular washers and AN960L thin washers may be used interchangeably for proper bolt and nut installation.

One regular washer or one thin washer may be added to any bolt installation. Washers may be used under the bolt head and/or under the nut. AN365 and AN363 nuts may be used interchangeably. The AN363 nut is acceptable for higher operating temperature installations.

5. HI-SHEAR RIVET INSTALLATION. When a hi-shear rivet pin of the prescribed length is not available, the next longer length pin may be used with cadmium-plated steel washers to adjust the pin grip length. The combined washer thickness shall not exceed .096 inch.

6. MS 20470-AD4 of MS20426-AD4 rivets may replace spotwelds, (1) per spot, head side & double flush requirements determined by form, fit & function of assembly unless alternate fasteners are specified.

51-11-00 - RESERVED

51-12-00 - FUSELAGE REPAIR

51-12-01 - TUBULAR STRUCTURE REPAIR

Check tubular structure annually for corrosion and damage. Interior panels may require removal to gain access to areas which are different to inspect.

Refer to AC 43.13-1(*) (*= current revision letter of AC43.13-1) for ALL tubular frame repair procedures. Warped or bent tube members can often be straightened; however, all surrounding welds should be dye checked for cracks after tube straightening. Use proper material when making weld repairs. Welding rod meeting the requirement of specification MIL-R-5632, class 2, is recommended for oxyacetylene welding. Electrodes meeting the requirement of specification MIL-F-5632-A, class 2, (MIL-E-23765/1C, (Type MIL-70S-2)or AWS A5.18-69, class E705-2 (Linde 65, Linde CMS-32 or Page AS-35) are recommended for non-heated area, inert-gas shielded-arc welding (Heliarc). Use AISI 4130 condition N steel for replacement and repair of tubes, and for making repair sleeves.

Replacing a member or subassembly is often advantageous and more feasible than repair. All detail

tubes or assemblies needed for replacement can be purchased from Service Parts Department, Mooney Aircraft Corporation, Louis Schriener Field, Kerrville, Texas, 78028, tele. (830) 792-2092.

1. WELDED PATCH REPAIR OF LOCAL DAMAGE. Use a welded patch to repair dents, small holes, and cracks no longer than the outside diameter of the tube and covering a maximum of 1/4 of the tube circumference. Drill out the crack, smooth the hole edges, weld the hole or dent, and file the repaired surface smooth.

Form a patch that will cover twice the diameter of the tube around the edge of the damaged area and twice the circumferential area of damage as shown in (**Figure 51-1**). Weld patch in place.

2. INNER SLEEVE SPLICING.

Use an inner sleeve splice to partially replace a tube without increasing the outside diameter (see **Figure 51-2**).

A. Make a 30-degree cut to remove the damaged portion of the tube; then, remove the burr from the remaining end.

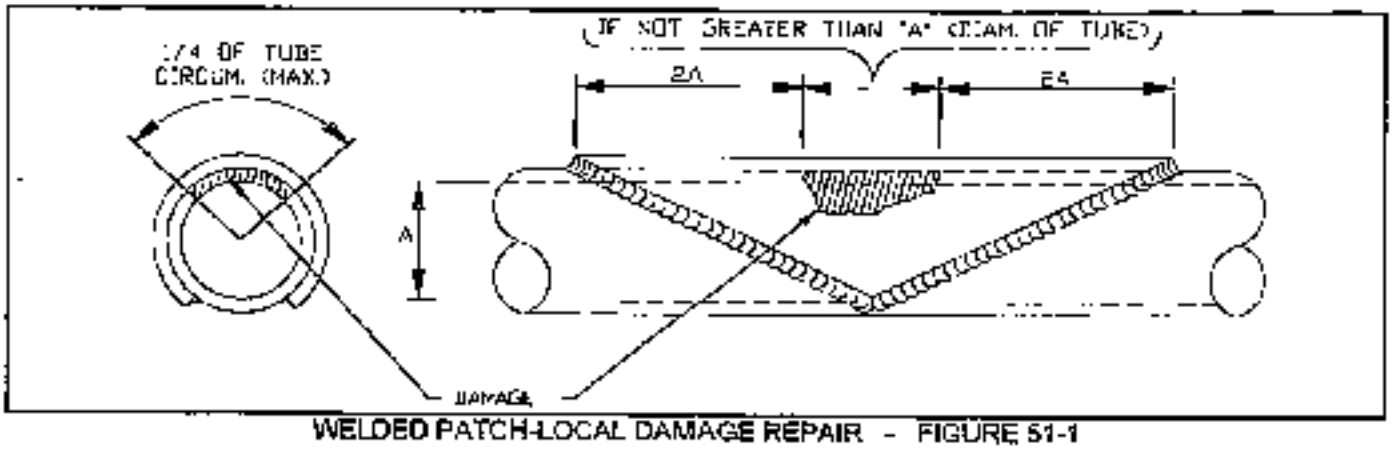
B. Cut a replacement tube of the same material (AISI 4130 steel, condition N), same diameter and the same wall thickness as the original tube.

C. Select a tube with an outer diameter equal to the inner diameter of the tube to be repaired and with the same wall thickness.

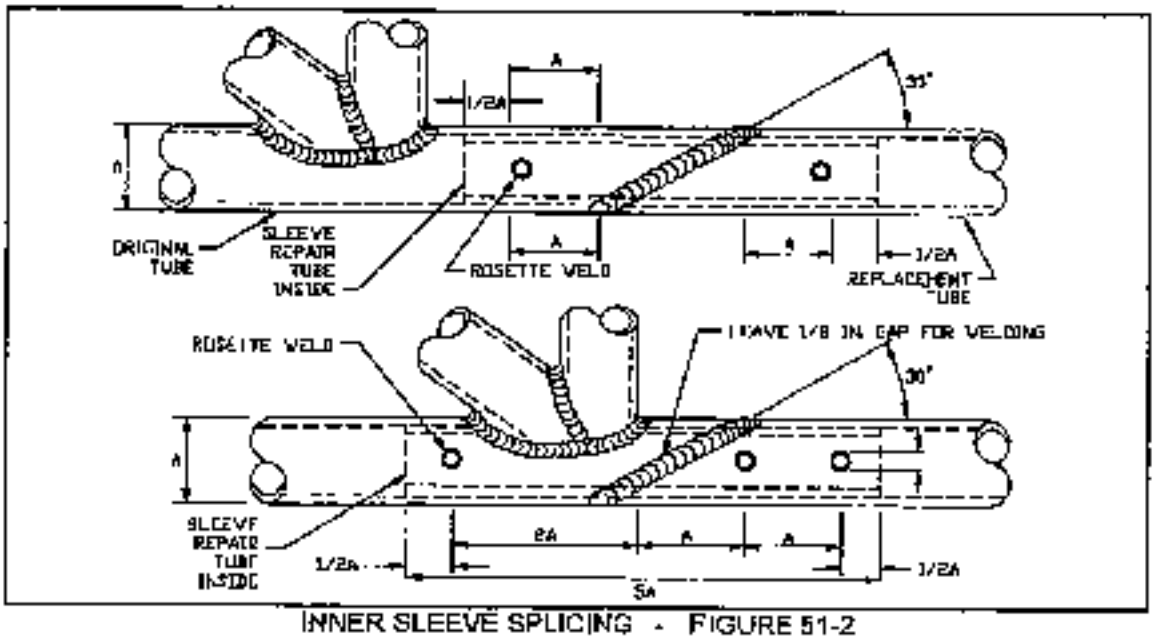
D. Cut tube to a length five times the outer diameter of the tube to be spliced.

E. Install inner sleeve in tube to be repaired so that its outer end is one and one-half of the original tube diameter from the nearest end of the diagonal cut; secure in position with a rosette weld on each side at one-half the original tube diameter from the inner-sleeve end.

F. Install replacement tube over the inner sleeve allowing a 1/8 inch gap for welding between the original and replacement tubes.



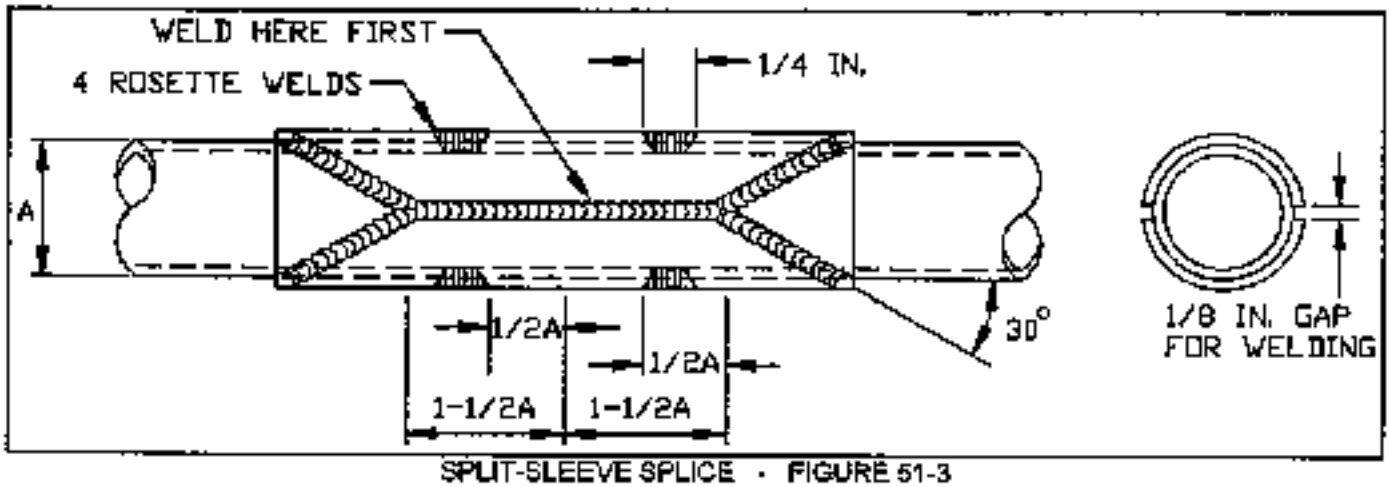
WELDED PATCH-LOCAL DAMAGE REPAIR - FIGURE 51-1



INNER SLEEVE SPLICING - FIGURE 51-2

G. Weld the inner sleeve to the tube stubs through the 1/8 inch gap, forming an overlaid bead across the gap.

H. Rosette weld the replacement tube to the inner sleeve in two or more places.



SPLIT-SLEEVE SPLICE - FIGURE 51-3

3. SPLIT-SLEEVE SPLICING. Use the split-sleeve splice to repair a damaged tube when the parts on each side of the damage cannot be separated to insert an inner sleeve (see Figure 51-3).

A. Form the split sleeve from steel tube or sheet steel when outside diameter of original tube is less than one inch.

B. Form the split sleeve from sheet steel when outside diameter of the original tube is one inch or more.

C. Form the split sleeve from the same material (AISI 4130 steel, condition N) with at least the same gauge as the original tube.

D. Allow a 1/8 inch gap between sleeve halves for welding.

E. Weld parallel edges of sleeve to original tube through 1/8 inch gaps.

F. Weld center of each sleeve half to original tube with two rosette welds spaced one original tube diameter apart.

4. TENSION FITTING REPLACEMENT (see Figure 51-4).

A. Cut A and B tubes loose from tension fitting 340034-7, -8 at welds.

B. Cut C tube at a 30 degree angle seven inches from bottom of tension fitting.

C. Cut a replacement C tube at a 30 degree angle and at an appropriate length to position the tension fitting. Weld tension fitting in proper position.

D. Drill four 1/4 inch holes for rosette welds 1.9 inches from center of 30 degree cut.

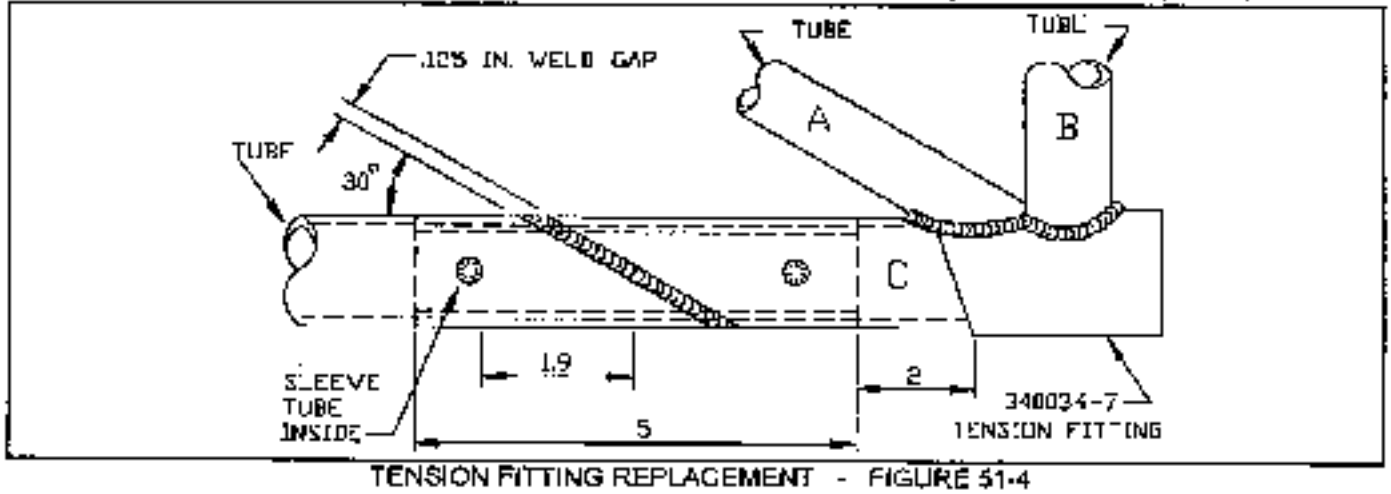
E. Make an inner sleeve five inches long from 4130 steel tube, condition N, with outside diameter to match inside diameter of tube C and with a .085 inch wall thickness.

F. Insert the inner sleeve in C tube and weld in place as shown (Figure 51-4).

5. REPAIRS FOR WELDED ASSEMBLIES - General. This section does not apply to any control system tubing or assemblies, engine mounts or heat treated steel components (except as stated below).

A. Small holes up to a #20 drill may be closed by welding with the inert gas shielded arc method.

B. Nicks and drill marks that are no longer than 1/8" and do not exceed four percent of wall thickness in depth after cleanup may be smoothed out and reprimed. Nicks, holes, and cracks that will clean up with a #20 drill may be drilled and repaired per item A.



TENSION FITTING REPLACEMENT - FIGURE 51-4

C. The repair of weld beads on heat-treated assemblies may be accomplished without reheat treatment within the following limits.

(1) The repair bead will not exceed .375 in length or 1/3 of total length of weld, whichever is the lesser.

(2) Only one repair per weld bead is allowed.

6. REPAIR OF SPOT WELDS. Failed spot welds on aluminum may be repaired by installing an AD470-4 rivet through the weld if the damaged area will clean up with a #30 drill.

7. DENTS. Small dents which do not exceed five percent of the diameter of the tube in depth and are no longer than one-half the tube diameter are acceptable.

51-12-02 - TAILCONE REPAIRS

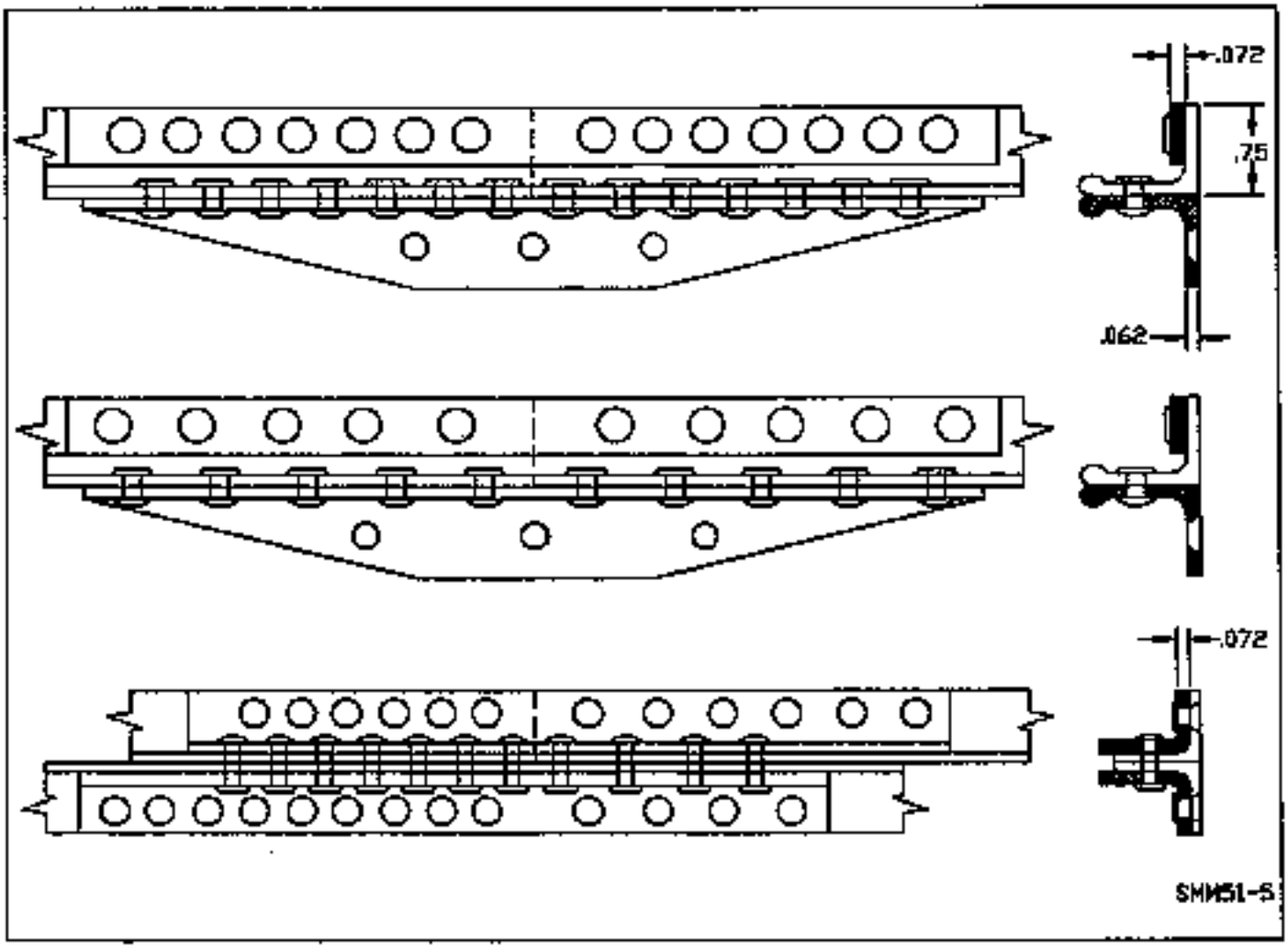
1. LONGERON SPLICING. Use procedure outlined in current AC 43.13-1(*) (*=current revision) for repairing and splicing tailcone longerons. (Figure 51-5) shows acceptable methods for splicing longerons. Consult AC 43.13-1(*), figures 2.28, 2.29 and 2.30 for fastener requirements.

2. TAILCONE STRUCTURAL SKIN REPAIR. Repair minor tailcone skin damage as shown in current AC 43.13-1(*). Figure 2.24. The rivet pattern for stressed skin repairs shall be the same as the rivet pattern in the skin joint immediately forward of the damaged area. Replace severely damaged structural skin panels. Install new skin panels to exactly match the original skin installation.

3. NON STRUCTURAL SKIN REPAIR. The skin covering the M20J aircraft tubular fuselage structure is considered nonstructural. Patches in nonstructural skin are not restricted as to size or shape; however, appearance and possible vibration damage should be considered. Either a flush patch, a plate patch, or a plug patch may be used.

51-12-03 - LANDING GEAR & RETRACTION SYSTEM REPAIR

Replace any damaged landing gear or retraction system component with a new part. Repairing landing gear or retraction system components is not recommended. After installing new components, check gear and retraction system rigging as outlined in Section 32-20-02. Before returning the aircraft to service, perform a retraction test and operational check of the landing gear and retraction system per Section 32-30-01.



LONGERON SPLICING - FIGURE 51-5

51-12-04 - FLIGHT CONTROL SYSTEM REPAIR

Replace any damaged primary control system component with a new part. Repairing primary control system components is not recommended. Use only new hardware when installing new parts. After installation of new parts, check control system travel and rigging as outlined in Chapter 27. Before returning the aircraft to service, flight test the aircraft for proper control system rigging.

51-13-00 - WING REPAIR

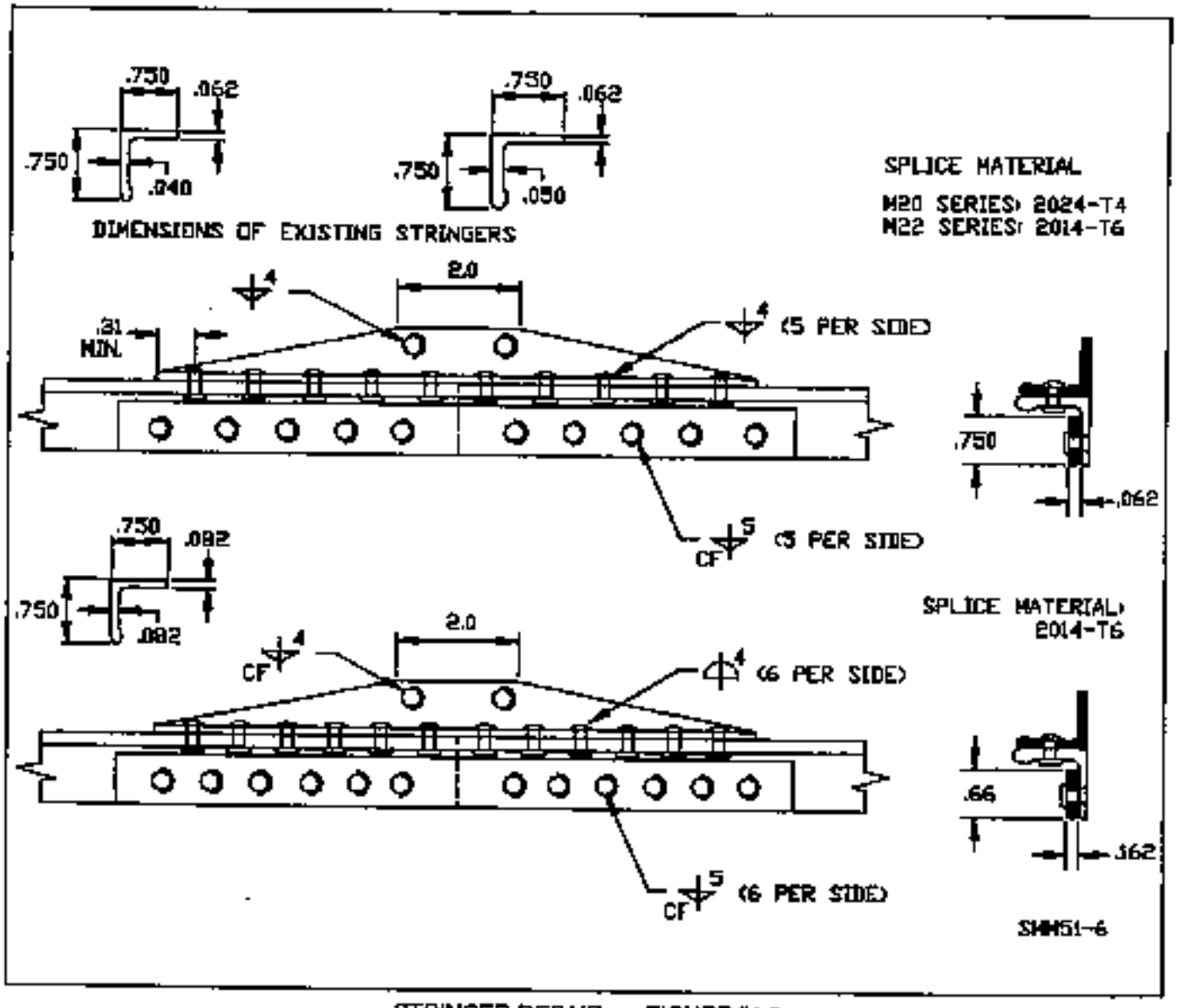
51-13-01 - STRINGER REPAIR

Stringer splicing may require drilling new holes and adding rivets between existing rivets to obtain the required total number of rivets. Add extra rivets where the distance between existing rivets is the greatest. The pitch and edge distance must conform to AC 43.13-1(*) (*=current revision) requirements (see Figure 51-6).

51-13-02 - MAIN SPAR REPAIR

The spar caps inboard of BTA 103 are made of 7075 high-strength material. Replacement of the spar cap is preferable to repair. However, if a spar cap repair is thought necessary, an exact description of the damage showing location and extent should be sent to the Customer Service Department, Mooney Aircraft Corporation, to obtain factory recommendations prior to beginning the repair.

1. SPAR CAP REPLACEMENT. To replace a spar cap, remove the skin covering the area to be repaired. Before removing a large area of wing skin, attach temporary jigs or holding fixtures to the wing to prevent wing warpage. When attaching a new spar cap, assure proper interference fit of the replaced huckbolts.



STRINGER REPAIR - FIGURE 51-6

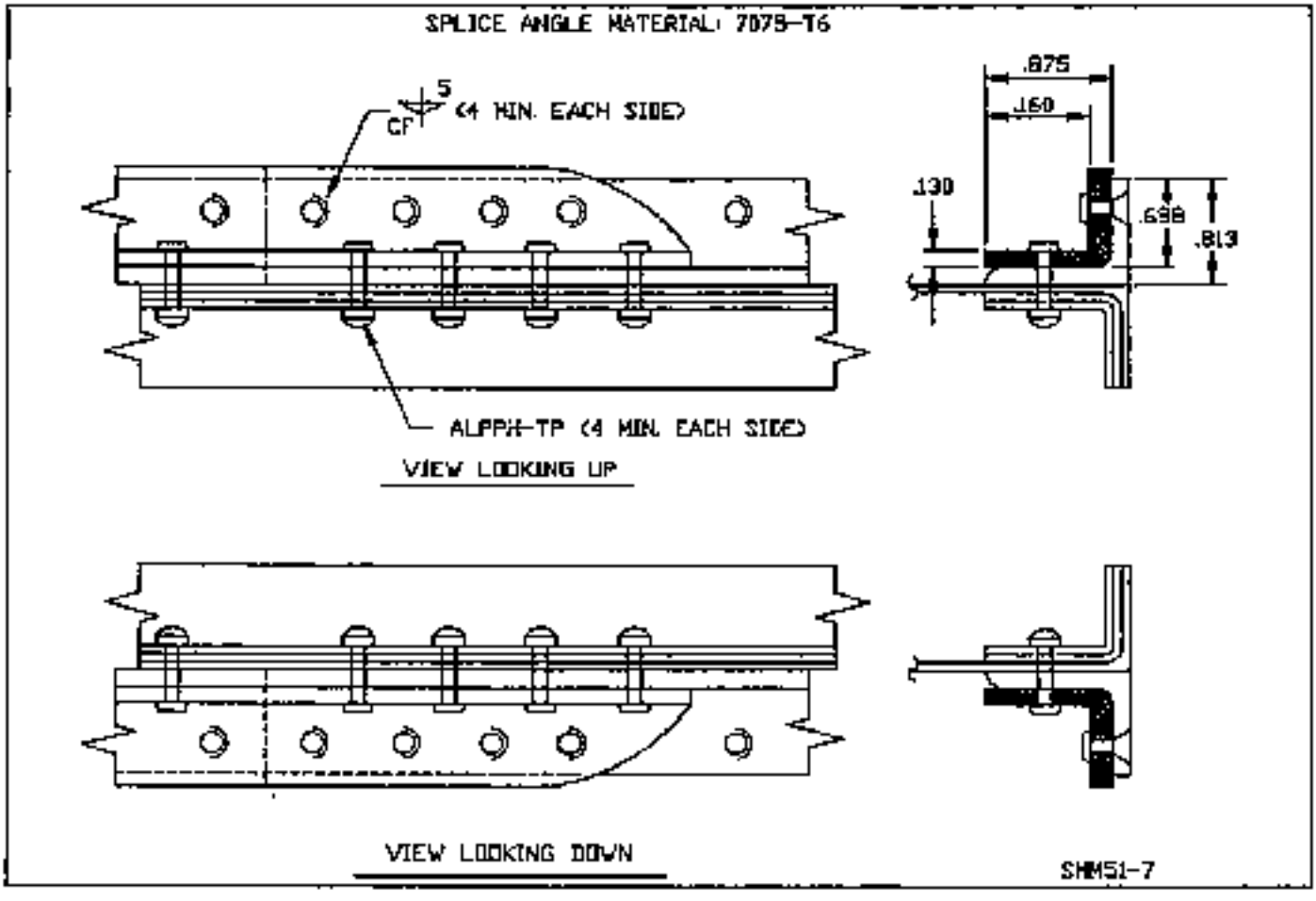
During installation of the new spar cap, all holes damaged by improper drilling or reaming should be reamed to the hole size recommended for oversize huckbolt installation. When installing oversize huckbolts, consult the Huck Fastener Standards Manual for proper tolerances. Use proper length huckbolts. If the bolt is too long, the collar will not swage properly; if the bolt is too short, the shank will not completely fill the hole.

Repair scratches on spar caps that are not deeper than .003 inch by sanding with No. 400 abrasive paper. Remove no more than .005 inch of material. Inspect the sanded area; use dye penetrant to be sure that the scratch is completely removed. Clean and prime area where the protective coating has been removed.

2. SPAR CAP REPAIR. Spar caps outboard of STA 103 consist of sheet metal angles backed up with aluminum extrusions from STA 103 to near STA 150. Replace or repair damaged extrusions. Do not allow splices in a repaired extrusion to coincide with a spar-web splice when avoidable. Splice sheet-metal angles with an extrusion of equal area, picking up existing fasteners. Add extra fasteners to bring the minimum number of fasteners to six AD-5 rivets per side in the vertical flange, and nine AD-4 (or six AD-5) rivets per side in the horizontal flange. (See **Figure 51-7**).

RIVET CODE FOR STRUCTURAL REPAIRS

⌂ 4	MS20470AD4-XX
⌂ 5	MS20470AD5-XX
▽ 4	MS2046AD4-XX
▽ 5	MS2046AD5-XX
▽ BP	CR516-XX



SPAR CAP REPAIR - FIGURE 51-7

3. SPAR WEB REPAIR. Repair all damage to spar webs in accordance with AC 43.13-1(*). If there is extensive damage to a web that cannot be repaired as outlined in AC 43.13-1(*) (*=current revision), consult the Customer Service Department giving exact location and extent of damage.

51-13-03 - STUB SPAR REPAIR

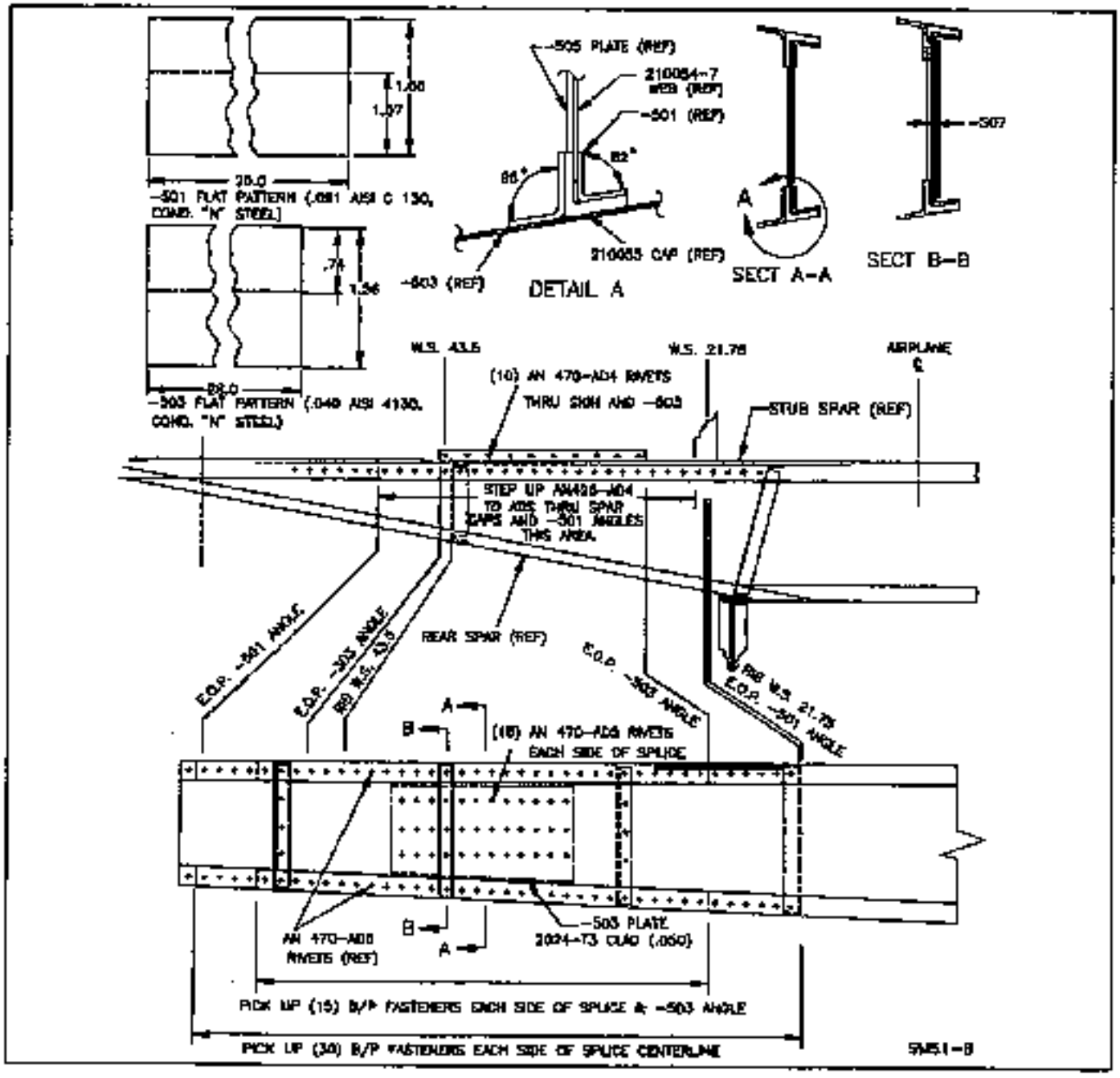
(Stub spar splice at wing STA 34.5 +/- 3.0) (See Figure 51-8).

1. Cut the stub spar halfway between existing rivets as required by the damage incurred.

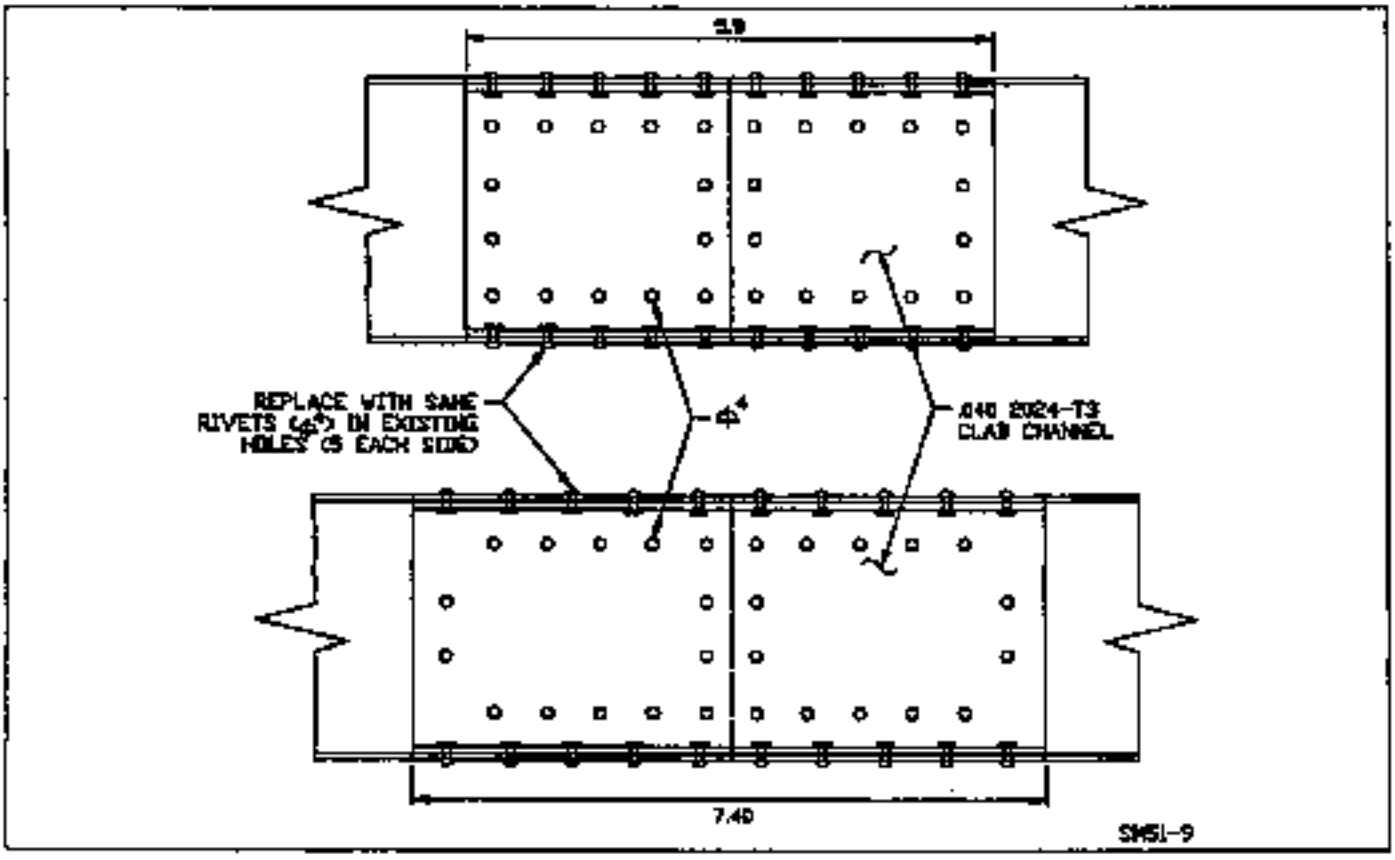
2. Smooth all rough or sharp edges, and prime area to be spliced.

3. Locate new outboard section and trim splice to fit with a maximum gap of .020 inch.

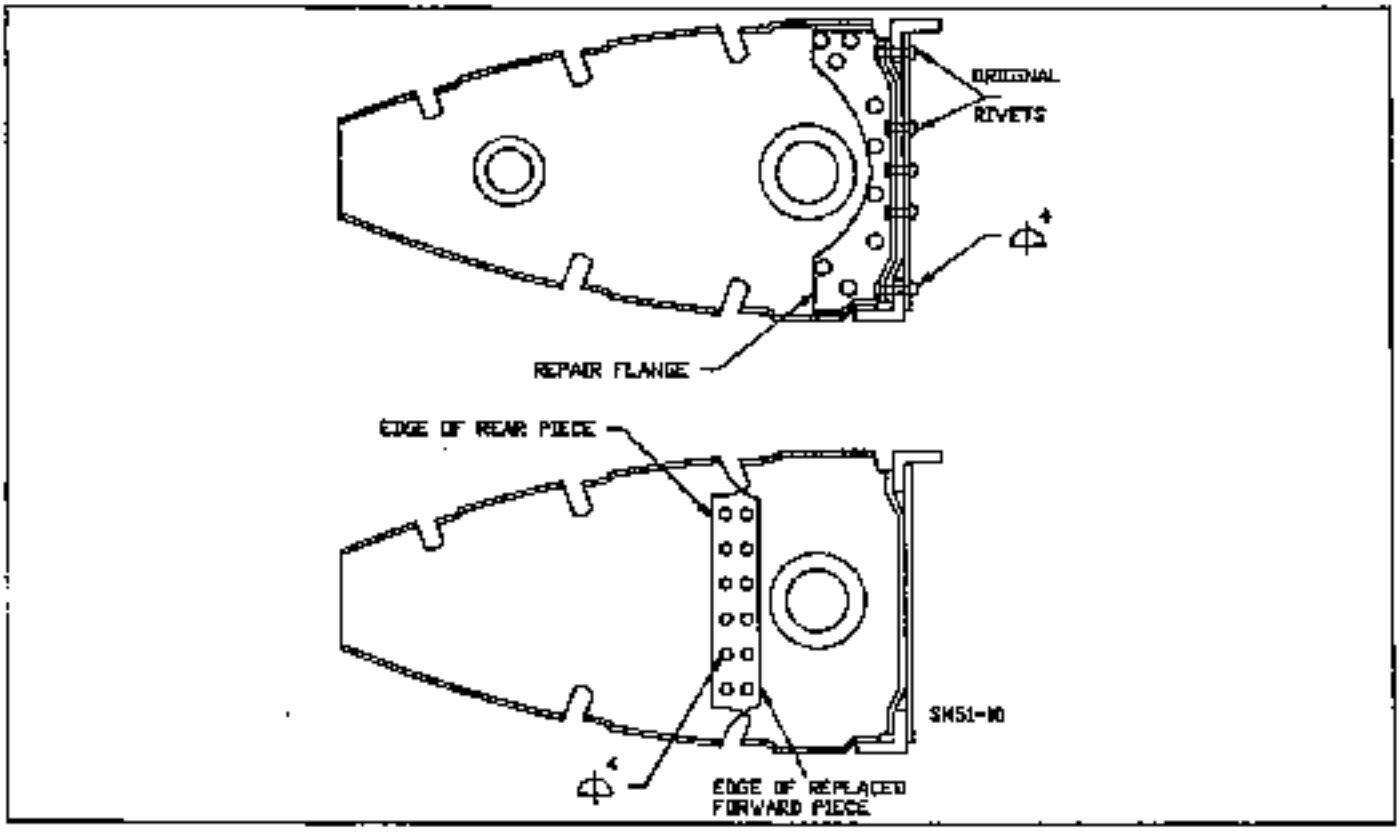
4. Fabricate -501 angles to pick up 30 existing fastener holes (30 recommended, but 22 minimum), -503 angles to pick up 15 existing fastener holes (12 minimum), and -505 plate and -507 spacer. (See Figure 51-8). Prime angles, plate, and spacer. Rivet parts together using wet primer on all rivets.



STUB SPAR REPAIR - FIGURE 51-8



REAR SPAR REPAIR - FIGURE 51-9



RIB REPAIR - FIGURE 51-10

51-13-04 - REAR SPAR REPAIR

The rear spar may be spliced between ribs in accordance with AC 43.13-1(*) (*=current revision) (see Figure 51-9).

51-13-05 - RIB REPAIR

Replace ribs that are severely damaged. Minor damage may be repaired as shown (Figure 51-10).

51-13-06 - OUTBOARD WING TIP ASSEMBLY REPAIR

To repair severe damage to the wing tip outboard of STA 193.5, it is advisable to replace the entire tip skin and rib.

1. Locate the new tip rib in the exact original tip rib position to prevent wing tip twisting. Use a temporary support or locator pins to maintain correct wing tip position.

2. Rivet new tip rib to main and rear spars.

3. Locate new skin, and drill rivet holes through skin to match existing holes in ribs and stringers.

4. Rivet skin to rib at STA 193.5.

5. Roll skin back on lower wing surface to gain access to stringers for rivet bucking. Rivet skin to upper stringers.

6. Rivet skin to tip rib starting at leading edge. Buck rivets as far back as possible.

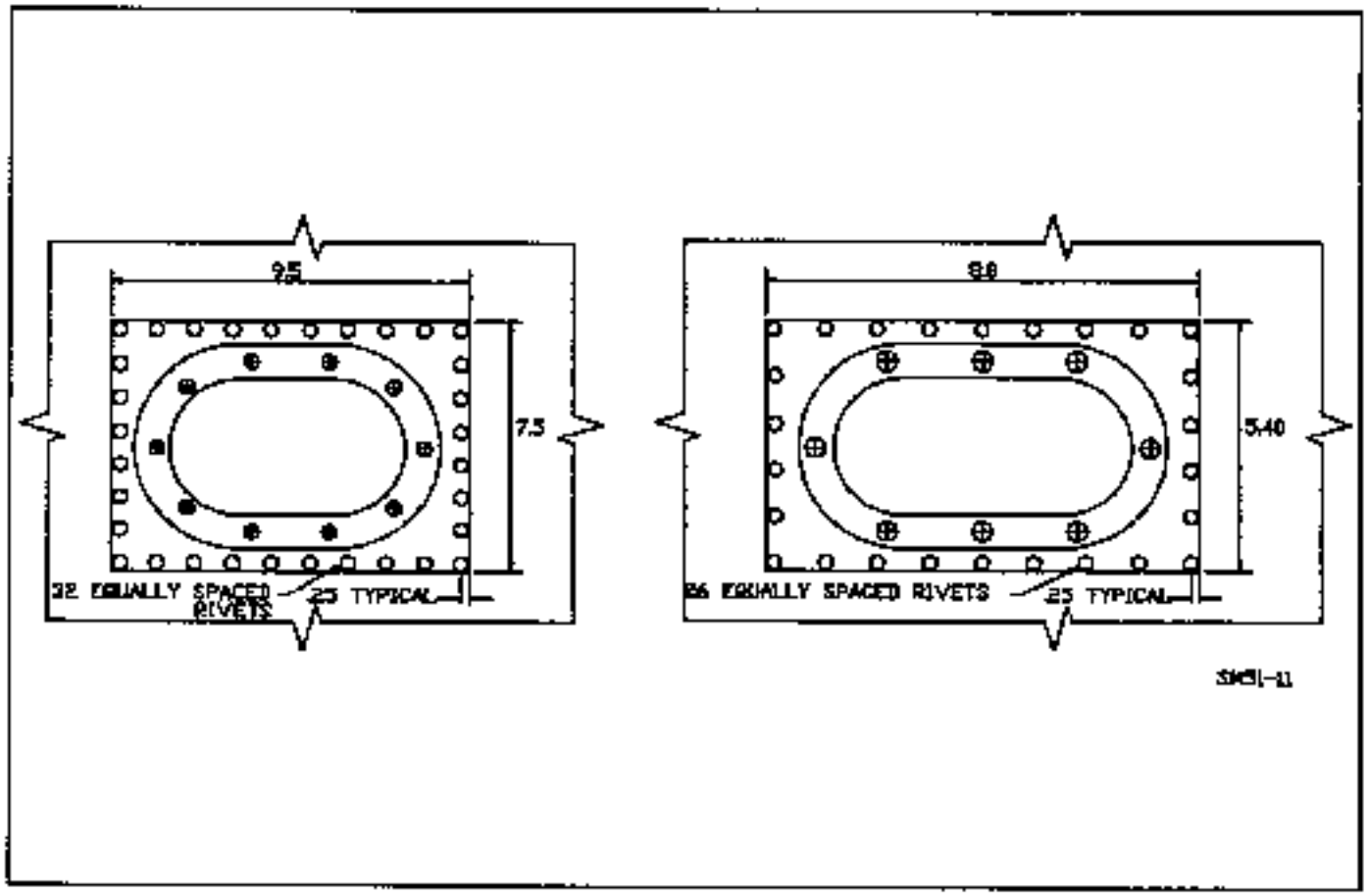
7. Install cherrylock (CR-2248) blind rivets in places inaccessible for rivet bucking. Add one extra countersunk blind rivet between every other pair of cherrylock rivets.

51-13-07 - WING SKIN PANEL REPAIR

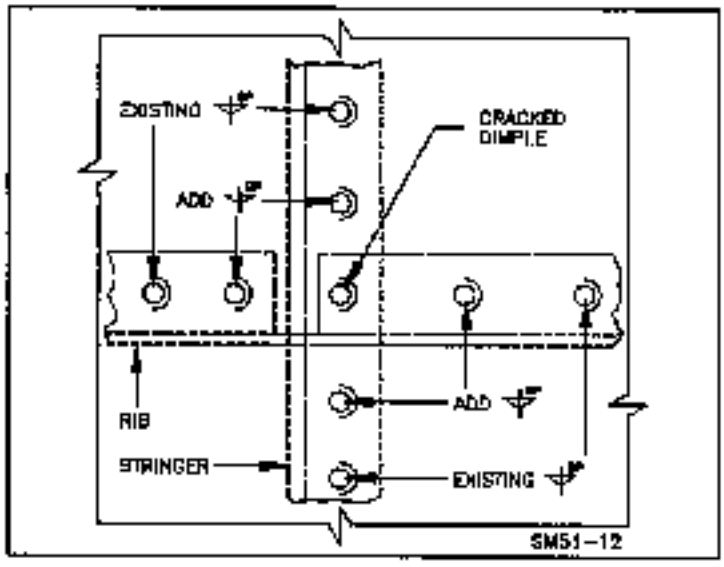
Repair wing skin panels as prescribed in AC 43.13-1(*) (*=current revision), unless an entire skin panel is to be replaced. Install new skin panels to exactly match the original skin installation. Preformed skin panels may be obtained from the Mooney Service and Marketing Centers.

1. Damaged Dimple Repair Around Inspection Holes. Repair damaged dimples around inspection holes when (a) there are three or more cracked adjacent dimples, (b) the crack in one or more of the dimples extends beyond the radius of the dimple into the skin, and (c) when there are four or more cracked dimples around an inspection hole (see Figure 51-11).

To repair damaged dimples (a) cut a doubler from the same material and gauge as the skin to be repaired, (b) drill and countersink 100-degree fastener holes in the doubler to match dimpled fastener holes in skin, and (c) install doubler around inspection hole. Use AN426-AD4 rivets when material is .040 inch thick or greater. Drill holes using a No. 30 (.128 IN.) drill as shown in the above illustration. Use AN426-AD3 rivets when material is .032 inch thick or less. Drill holes using a No. 40 (.098 IN.) drill.



ACCESS COVER - FIGURE 51-11



DIMPLE CRACKS REPAIR - FIGURE 51-12

2. Repair of Cracks Wholly Within Dimple Radius. Surface cracks on inside (bearing) face of a dimple that do not extend through the material can be repaired by sanding out the crack. Cracks in dimples which do not extend beyond the dimple radius can be repaired by (a) stop drilling the crack with a No. 60 drill and (b) by adding rivets, the same size as those in the original pattern, to each side of the cracked dimple. Maintain four-diameter (4D) spacing and two-diameter (2D) edge distances. When original rivet pattern has rivets on only one or two sides of a dimple, only one or two rivets need be added (see Figure 51-12).

3. Repair of Cracks Extending Beyond Dimple Radius. Cracks that extend through the face of the dimple into the surrounding skin can be repaired as follows; (see **Figure 51-13**).

A. Stop drill crack with No. 60 bit.

B. Cut a doubler from the same material as the skin to be repaired. Allow for six rivets at four-diameter rivet spacings with two-diameter edge distances in a circular pattern around the cracked dimple.

C. Round the corners of the doubler, and scarf the sandwiched edges to about .010 inch by .250 inch.

D. Drill holes for six rivets (same size as those in the original rivet pattern), and drill and countersink 100 degree dimples in doubler. E. Prime area to be repaired and install doubler with wet primer.

4. Repair of Circumferentially Cracked Dimples. Circumferentially cracked dimples (dimples with cracks that appear as an annular mark around the dimple) can be repaired by installing a conical washer.

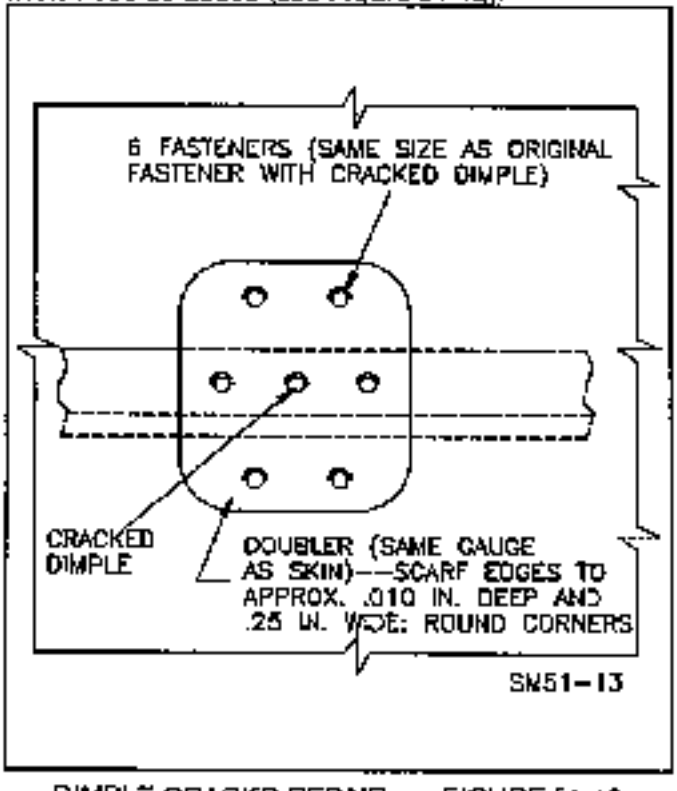
A. Drill through dimple using a drill large enough to remove the damaged area.

B. Install doubler as shown in **Figure 51-14**. Wet prime prior to assembly.

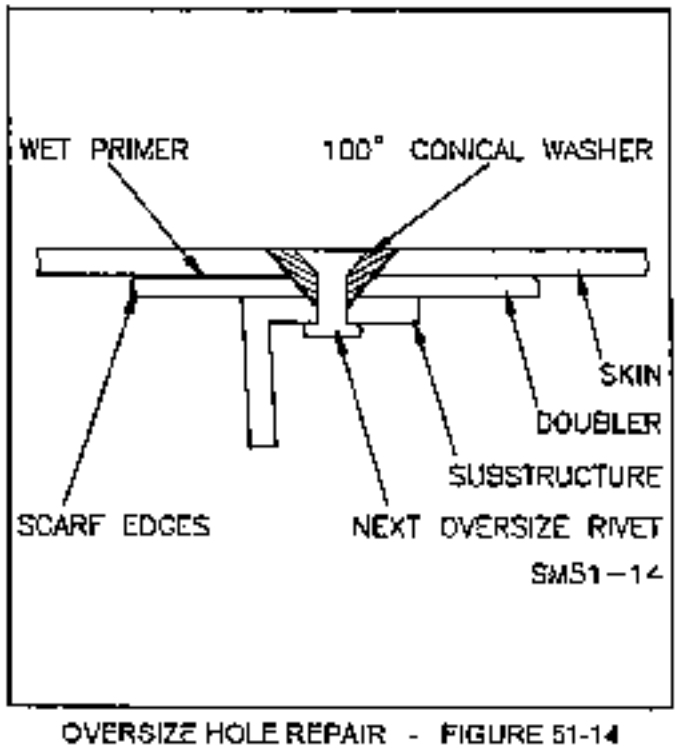
C. Countersink dimple hole in skin allowing the countersink to extend into substructure.

D. Install conical washer, use next oversize rivet size. Wet prime washer and adjacent skin and doubler surfaces prior to assembly.

E. Drill remainder of the hole to allow installation of next larger diameter rivet than the rivets in the original pattern.



DIMPLE CRACKS REPAIR - FIGURE 51-13



OVERSIZE HOLE REPAIR - FIGURE 51-14

51-14-00 - HORIZONTAL STABILIZER & VERTICAL FIN REPAIR

51-14-01 - LEADING EDGE SKIN REPAIR

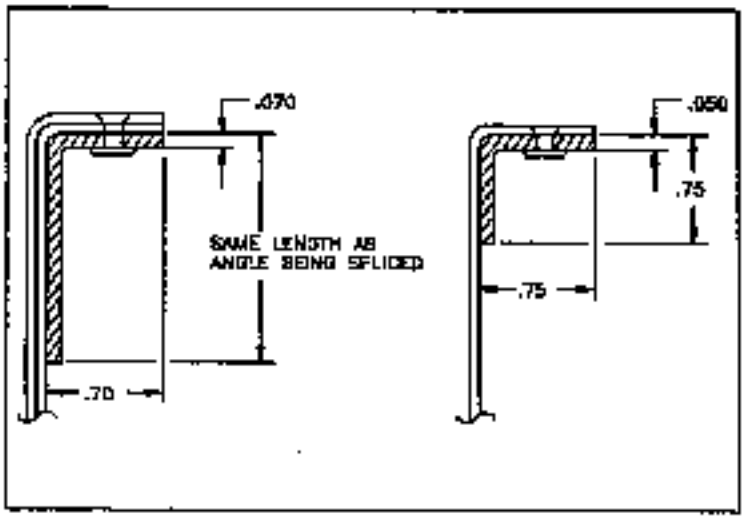
The horizontal stabilizer and vertical fin leading edge interiors are inaccessible near the tailcone. To repair damage in these areas, cut a standard (3.0 inches by 6.5 inches) access hole in the lower side of the stabilizer leading edge and close the access hole by installing inspection cover P/N 613000-501.

51-14-02 - MAIN SPAR REPAIR OUTBOARD OF STA. 9.00

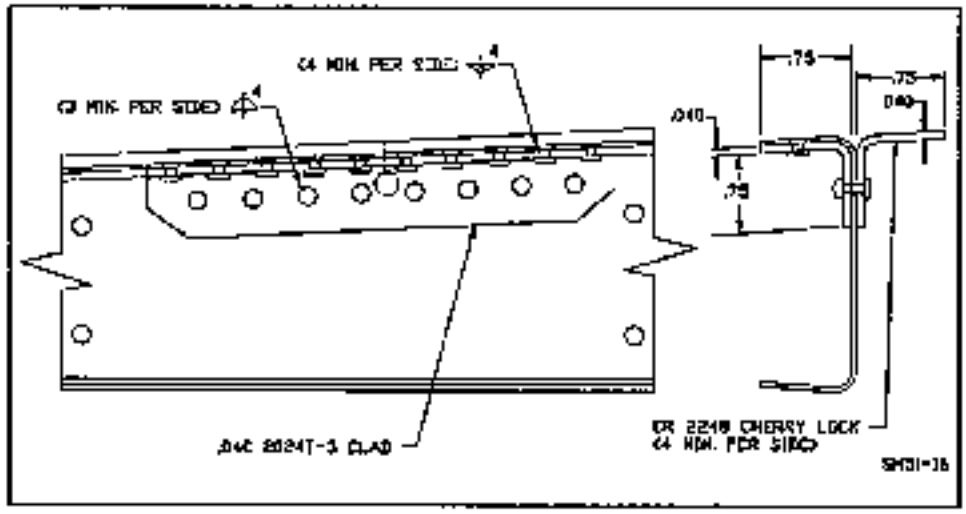
Repair damage to the horizontal stabilizer main spar by straightening the damaged area and inspecting it carefully for cracks. If cracks are formed, stop drill or remove cracked area.

1. Repair damage between STA 9.00 and STA 34.0 on the spar upper flange, and between STA 9.00 and STA 40.0 on the spar lower flange with a splice angle formed from .070 AISI 4130 steel, condition N. The splice angle flanges must be as wide as the original spar flanges. The splice angle must be long enough to install 11 AD4 rivets through the skin and 11 rivets through the spar web on each side of the damaged area (see Figure 51-15 , VIEW A).

Prime splice angle before riveting it to spar. Pick up five existing rivet holes and drill six new holes between existing rivet holes in the skin at each side of the damaged area. Install 22 AD4 rivets through splice angle and skin, and 22 AD4 rivets through splice angle and spar web. (See Figure 51-15, VIEW A).



SPAR REPAIR (BETWEEN STA. 9.0 & 34.0)
FIGURE 51-15



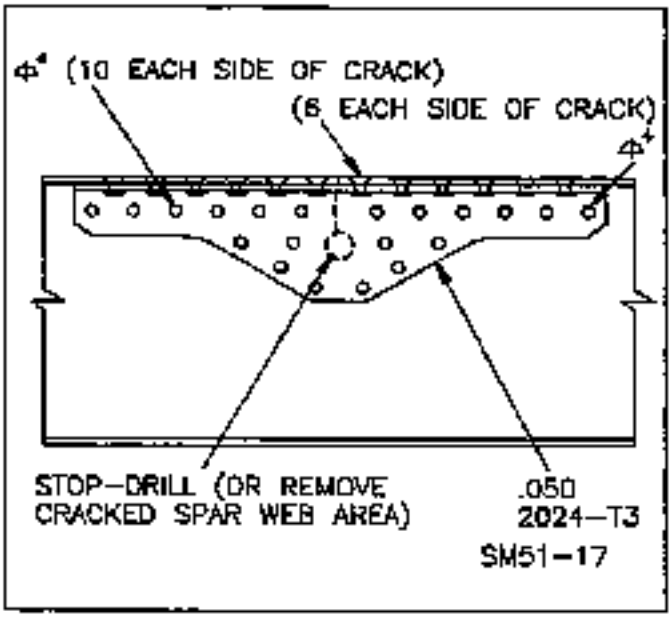
SPAR REPAIR (STA. 48.5 Approx.) - FIGURE 51-16

2. Repair main spar cap damage between STA 34 and STA 48.5 by forming a splice angle from 3/4 inch by 3/4 inch .050 2024-T3 sheet aluminum. Pick up five existing holes and drill six new rivet holes between existing holes in the skin on each side of damaged area. Install 11 AD4 rivets through angle and skin and 10 AD4 rivets through angle and web on each side of the damaged area. (See Figure 51-15, VIEW B).

3. Repair main spar damage from STA 48.5 outboard by installing splice angles made from .040 2024-T3 material on both side of web using 12 AD4 rivets (6 through skin and 6 through web on each side of damaged area). Pick up three existing holes and drill three new holes between existing holes on each side of damaged area. (See Figure 51-16) .

4. Repair main spar web damage outboard of STA 34.0, top flange, and STA 48.5, lower flange by forming a splice angle from .050 2024-T3 aluminum. The splice angle web flange should be cut to allow sufficient coverage of the damaged area of existing web and long enough to install 6 AD4 rivets on the flange on each side of the damaged area. Pick up 3 existing rivet holes on flange of spar and drill 3 new rivet holes between existing holes. Drill 10 rivet holes through splice angle and web on each side of the damaged web area. The damaged web should be stop drilled or cracked area removed prior to splice angle installation. Prime splice angle and deburr spar web and flange before installing splice (see Figure 51-17).

5. Spar webs outboard of STA 48.5 cracked more than 50% of the web height may be repaired (see Figure 51-18). Form a splice plate from .050 2024-T3 aluminum to fit the inside dimensions of the web and flange at the damaged area. Pick up 3 existing rivet holes on top and bottom flange on each side of damaged area and drill 2 new AD4 rivet holes between these existing holes. Pick up all rivet holes on web under splice plate and drill new rivet holes on equal spacing around the damaged area similar to that on Figure 51-18 rivets on each side of damaged area.



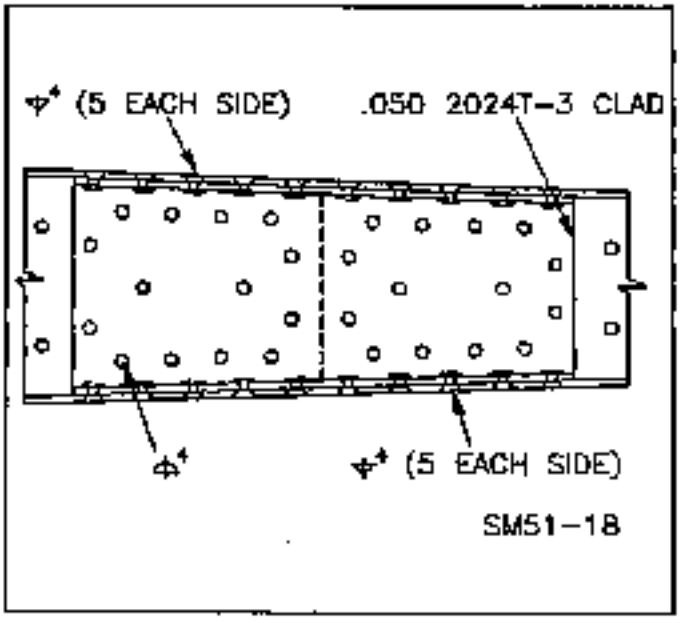
SPAR REPAIR (O/B of STA. 34.0) - FIGURE 51-17

51-14-03 - RIB REPAIR

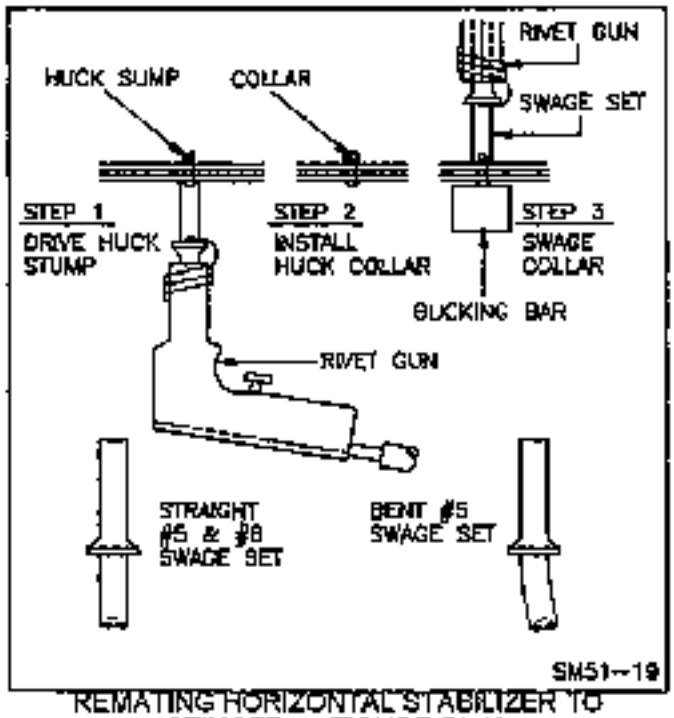
The repair of damaged stabilizer and fin ribs is not feasible in most cases. Damaged ribs should be replaced with new parts.

51-14-04 - REMATING HORIZONTAL STABILIZER TO STINGER

When stabilizer repair necessitates removal from the stinger, remating can be facilitated by using huckbolt substitution information contained in Section 51-10-01. When mating stabilizer to stinger use bent rivet swage set #5 (see Figure 51-19).



SPAR REPAIR - FIGURE 51-18



REMATING HORIZONTAL STABILIZER TO STINGER FIGURE 51-19

51-15-00 - FIBERGLASS LAMINATES, REPAIR PROCEDURES

Despite the fact that fiberglass laminates are designed to withstand considerable abuse, occasional repairs will be necessary. It is difficult to cover all the various repair techniques due to such limiting factors as accessibility and the extent of damage. The following steps outline those procedures which are used to make repairs for the more common type damage to a fiberglass laminate.

1. Materials used for repairs shall be as specified below and compatible with the basic resin used in the fiberglass laminate.

Resin - Aerospace Adhesive EA934 Part A
Hysol Division
The Dexter Corporation
Catalyst - Aerospace Adhesive EA934 Part B
Hysol Division
The Dexter Corporation
Alternates
Resin - Epoxical #606 Patching Adhesive Resin
United States Gypsum
Catalyst - Epoxical #606 Patching Adhesive Hardner
United States Gypsum
OR
Resin - Ren Epoxy CG 1304
Ren Plastics company
Lansing, Michigan
Catalyst - Ren Hardener CG 1304
Ren Plastics company
Lansing, Michigan

Fire retardation- Antimony Trioxide for fire retardation, 5% minimum, 10% maximum by Weight of Resin Content. Must be added to the base resin (cowling and air intake assembly only).
The manufacturer's bulletins shall be followed for all mixing ratios and preparation prior to application.

2. General.

A. The configuration of repairs are shown for flat surface areas; for simplicity; however, the same techniques can be used for contoured surfaces. Contoured repairs will require additional considerations and the proper shaping of the backup plates used for clamping the laminates together during the curing cycle.

B. The degree of laminate chamfer and size will vary based on accessibility, shape of part and the extent of damage.

51-18-01 - CRACKS, IN SURFACE AREAS

1. Stop drill all cracks per standard aircraft procedure.

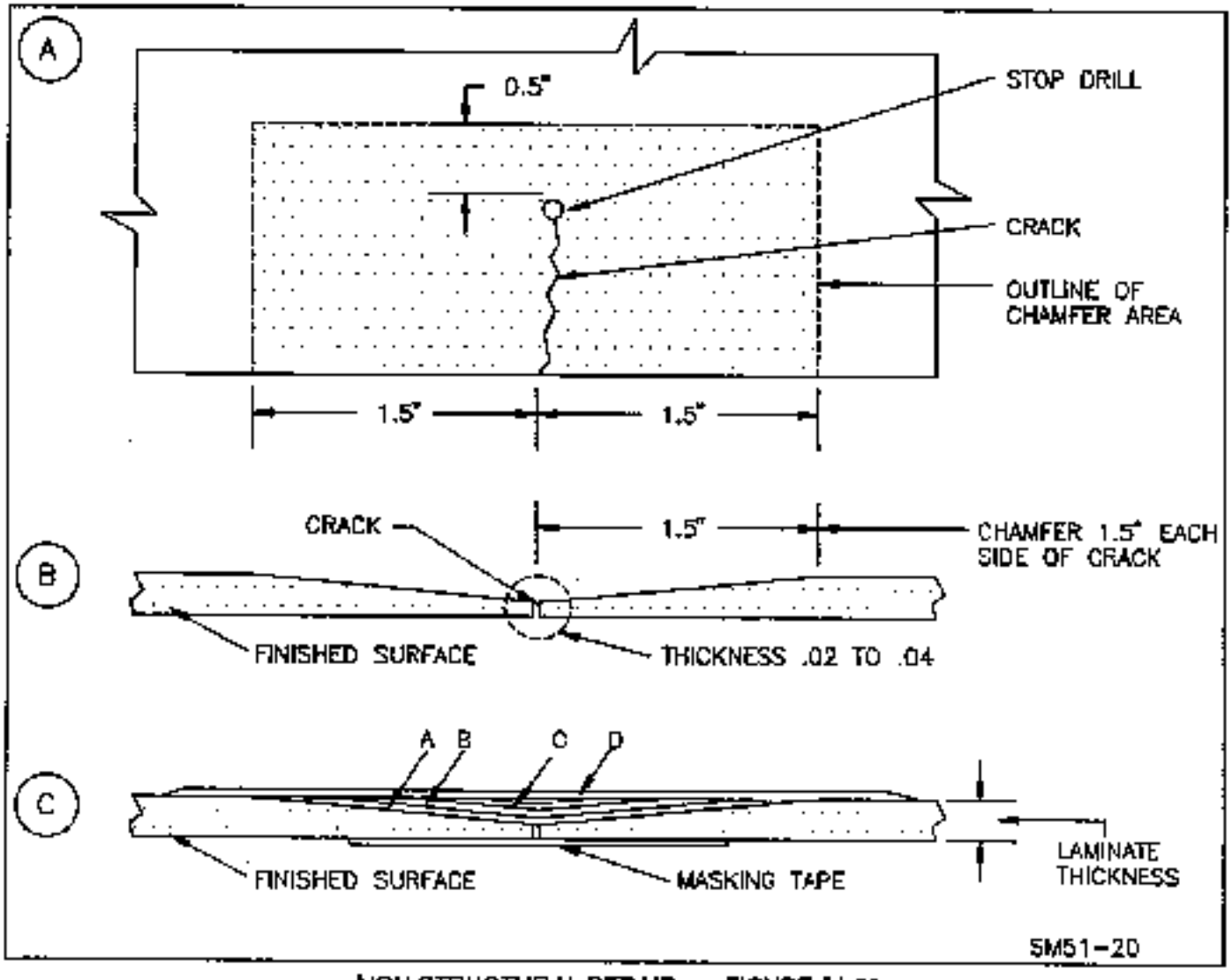
2. Remove any loose particles and frayed fiberglass strands from the cracked portion.

3. Prepare surface for repair as shown in (**Figure 51-20, Figure 51-21, and Figure 51-22**).

4. Prior to continuing the repair, all surfaces in the area of the repair must be cleaned of all contaminates by wiping the area with a clean cloth saturated with Methyl-Ethyl Ketone.

CAUTION
Methyl-Ethyl-Ketone (M.E.K.) is a flammable liquid and should be used with proper ventilation and the prescribed safety equipment.

CAUTION
Fiberglass components are attacked and deteriorated by the following products: Ketone, aliphatic esters, chlorinated hydrocarbons, and slightly softened by aromatic hydrocarbons.



NON-STRUCTURAL REPAIR - FIGURE 51-20

51-15-02 - NON-STRUCTURAL REPAIR

1. Apply masking tape over crack on finished surface side.

2. Apply wet coat of catalyzed epoxy resin to chamfered surface.

3. Apply one layer of #181 fiberglass cloth saturated with catalyzed epoxy resin.

4. Add additional plys of #181 fiberglass cloth, saturated with epoxy resin to attain original laminate thickness.

5. Apply one additional ply of #181 cloth bridging the total repaired area and bond in place.

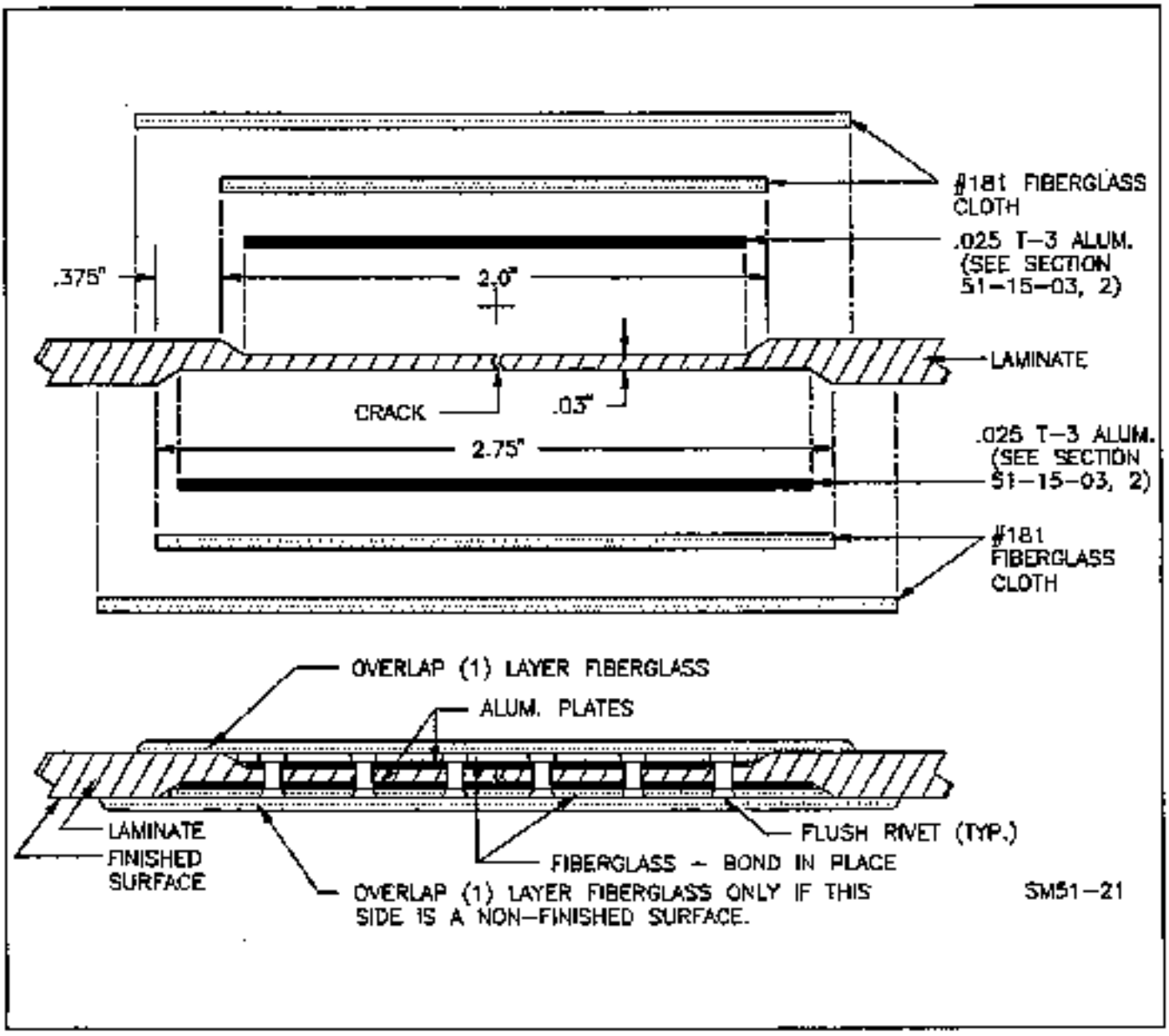
51-15-03 - COMMON STRUCTURAL LAMINATE REPAIR

1. Cut away laminate per sketch, roughen repair area with 240 sandpaper, clean repair area with M.E.K. - apply a wet coat of catalyzed epoxy resin to surfaces. Then IMMEDIATELY perform Steps 2. thru 5.

2. Install chemically cleaned .025 T-3 aluminum straps, perforated with #40 holes approximately .35 on center all directions.

3. Apply wet coat of epoxy resin to aluminum straps and apply one or more layers of resin saturated #181 fiberglass cloth to equal the thickness of the original laminate.

4. Lay wax paper over both sides of the repaired area while still wet. This prevents adhesion to the pressure clamp application (paragraph 5).



COMMON STRUCTURAL LAMINATE REPAIR(METAL INSERT)-FIGURE 51-21

5. Place rigid aluminum plates on both sides of repair area and clamp into place with "C" clamps. Permit laminated repair to cure.

6. After the fiberglass repair has cured, remove the clamps and install #3 AN426A rivets. Flush head to be on the finished surface side. The number of rivets and spacing will be determined by the size of the repair.

7. Apply one additional overlapping layer of #181 fiberglass cloth on the non-finished surface and bond in place. Should the opposite side be a non-finished surface, an additional layer of fiberglass should be applied to this side.

8. Upon completion of steps 1 thru 7, permit the repair to cure before attempting further treatment of appearance surfaces, if required.

9. Appearance surfaces will normally require the application of a filler-sealer coating. The appearance area is to be wiped clean, using a clean cloth saturated with M.E.K. prior to applying a filler-sealer coating.

10. Mix epoxy resin and catalyst per manufacturers specifications and apply to the appearance surface area. Care should be taken to assure as smooth as possible surface in this particular operation. Permit this surfacing coat to cure prior to any additional applications or further rework.

11. Using #240 sandpaper, sand and blend the repaired area to match the surrounding surface. Steps 10 and 11 may be repeated to acquire a satisfactory surface finish.

51-15-04 - COMMON STRUCTURAL LAMINATE REPAIR (FIBERGLASS-RESIN COMBINATION)

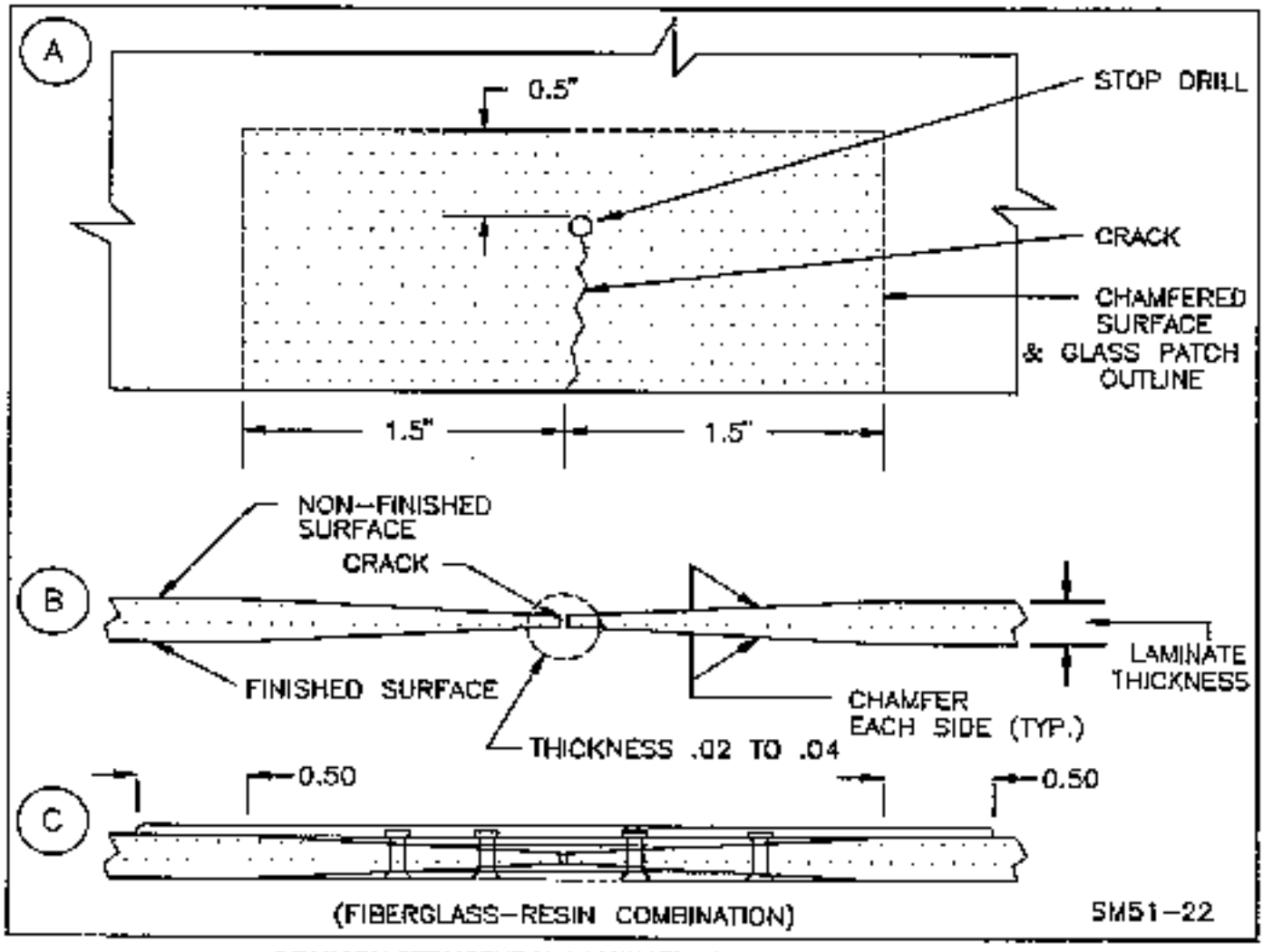
1. Apply wet coat of catalyzed epoxy resin to chamfered surface.

2. Apply one layer of #181 fiberglass cloth saturated with catalyzed epoxy resin.

3. Add additional plys of #181 fiberglass cloth saturated with epoxy resin to attain original laminate thickness.

4. Apply one layer of #181 fiberglass cloth to the non-finished side of laminate, extending 1/2" each side of the chamfer and bond in place.

5. Lay wax paper over both sides of the repaired area while still wet. This prevents adhesion to the pressure clamp application (paragraph 6).



COMMON STRUCTURAL LAMINATE REPAIR - FIGURE 51-22

6. Place rigid aluminum plates on both sides of repair area and clamp into place with "C" clamps. Permit laminate repair to cure.

7. After fiberglass repair has cured, remove clamps and install #3 AN426 rivets. Flush head to be on finished surface side. The number of rivets and spacing will be determined by the size of the repair.

8. Upon completion of steps 1 thru 7, allow the repair to cure before attempting further treatment of the appearance surface.

9. Appearance surfaces will normally require the application of a filler-sealer coating. The appearance area is to be wiped clean, using a clean cloth saturated with M.E.K. prior to applying a filler-sealer coating.

10. Mix epoxy resin and catalyst per manufacturer's specifications and apply to the appearance surface area. Care should be taken to assure as smooth as possible surface in this particular operation.

Permit this surfacing coat to cure prior to any additional application or further rework.

11. Using #240 sandpaper, sand and blend repaired area to match surrounding surface. Steps 10 and 11 may be repeated to acquire a satisfactory surface finish.

51-15-05 - FIBERGLASS DELAMINATION REPAIR

1. Delamination or ply separation of a fiberglass product is usually a result of poor bonding of fiberglass layers. Generally, this condition is localized and can be readily repaired by carefully spreading apart the plys in the delamination, and removing loose particles by blowing clean compressed air into damaged area.

2. Proceed by inserting catalyzed epoxy resin into the delamination and then immediately clamp the delamination together. Permit the repair to cure a minimum of 8 hours before removing clamps.

3 Extensive delamination of a part will be reason for total rejection of the part and shall be scrapped per standard practices.

51-16-00 - MISCELLANEOUS

1. Protective Coatings.

A. Parts with protective coatings (such as Conversion Coated or zinc primer) on which the coating is scratched, spotfaced, drilled, or in any way removed must be recoated with zinc chromate primer. EXAMPLE: Part is Conversion Coated as detail part. During replacement the part is spotfaced to receive bolt and washer. This part must be primed after spotfacing.

2. Low Pressure, Plastic, or Rubber Line Splices. Static system lines may be lengthened, shortened, or spliced to allow the replacement of sections of damaged lines. The fittings are called out in the Parts Catalog text pages following the illustration depicting the assembly or component in question.

If splices are made, the system must be checked for leaks.

3. Shortening and Lengthening of Tubing, Hoses, and Flexible Ducting. Mooney manufactured assemblies of plumbing, tubing, hoses, and flexible ducting may be modified to allow the use of longer parts of the same size and material to be cut and used as replacements. When the manufactured ends of flexible ducting are removed, the raw edge must be taped with 3M aluminum foil tape.

CHAPTER 52

DOORS

CHAPTER 52

DOORS

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52-00-00 - GENERAL

The cabin door is constructed of an inner and outer aluminum shell fastened together by rivets. It is provided with a dual latching mechanism, 1) a lock pin extends into a mating receptacle in the lower door frame and 2) a jaw type latch clamps a special designed nut in the upper door frame to hold door securely in place. The door is hinged at the forward edge by an extruded aluminum hinge. The inner handle and the outer handle are interconnected by adjustable push pull tubes. This mechanism is spring loaded to an over center position in the latched position for positive security. Adjustment for each push pull tube is provided to accurately rig the latching pin and the jaw type latch. Adjustment to the special nut at the top of the door frame can be made for proper closure.

The baggage compartment door is constructed of an inner and outer aluminum shell fastened together by rivets. It has dual pin latches that extend into receptacle fittings on both sides of the door frame when the exterior handle is closed properly.

The auxiliary exit handle is located on the inside of the baggage door. This handle can be operated only from the inside even if the outer handle is locked. A cam mechanism allows a clevis pin to bypass the outer handle latch groove and open the two latching pins which hold the baggage door closed. (Refer to AFM/POH Section III for specific procedures to operate auxiliary exit handle.) This door is hinged at the top with an extruded piano type hinge.

A hold open arm is attached on both doors to assist in holding the door open when desired.

A door lock is provided for both doors. A single key will operate either door lock. The interior panels require removal if the door locks are to be removed and replaced.

52-10-00 - CABIN DOOR - MAINTENANCE PRACTICES

1. Removal. The cabin door may be removed to replace or repair the door or to replace a damaged hinge.

A. Remove the interior panel around the door frame.

B. Remove the hold open arm at the door frame. Remove the cotter pin and washers from the hold open arm shaft. Pull the shaft up from the doubler plate and clear of the door frame.

C. Remove the eight (8) screws from outside the airplane that hold the front portion of the hinge in place. There are also three (3) flush rivets that will require removal at this location.

D. Carefully drill center of rivet head with a 1/8th inch drill bit until head pops off and rivet stem can be punched out.

The original door assembly, with hinge attached, is assembled to the door frame prior to installation of the outer skin. The door is placed into position and the hinge held in place on its mounting plate by sealant and locator rivets or bolts. (The number of locator fastners may vary). These fastners will be underneath the outer skin. After removal of the outer rivets and/or screws work a putty knife or a thin piece of aluminum between the outer skin and the hinge and between the hinge and the mounting plate from the inside in order to break the sealant bond. During this procedure determination can be made where the locator fastners are positioned. If rivets, locate these rivets from the inside and drill the bucked head carefully. DO NOT DRILL THROUGH THE OUTER SKIN. Attempt to move the door and hinge aft and away from the attach point after each rivet stem is drilled out. The door and hinge should come free when all sealant bond and rivets are removed.

2. Door Repair.

A. The door should be repaired, if applicable, according to standard procedures in AC 43.13-1(*).

B. Remove the interior door panel if necessary to repair the door assembly.

3. Installation. The old door can be relocated by using the existing holes. The mounting plate should be thoroughly cleaned of all sealant and foreign material before reinstallation of the door.

A new door or hinge will require proper positioning of the door to obtain proper sealing.

A. Place door, with new hinge installed, into position between the outer skin and the mounting plate.

B. When door is properly positioned mark the new hinge for mounting using existing holes, either from the outer skin locations or from the hinge mounting plate inside the cabin.

C. Drill the new holes in hinge carefully while door is securely in place.

D. Remove the door - deburr holes and clean the shavings from the area.

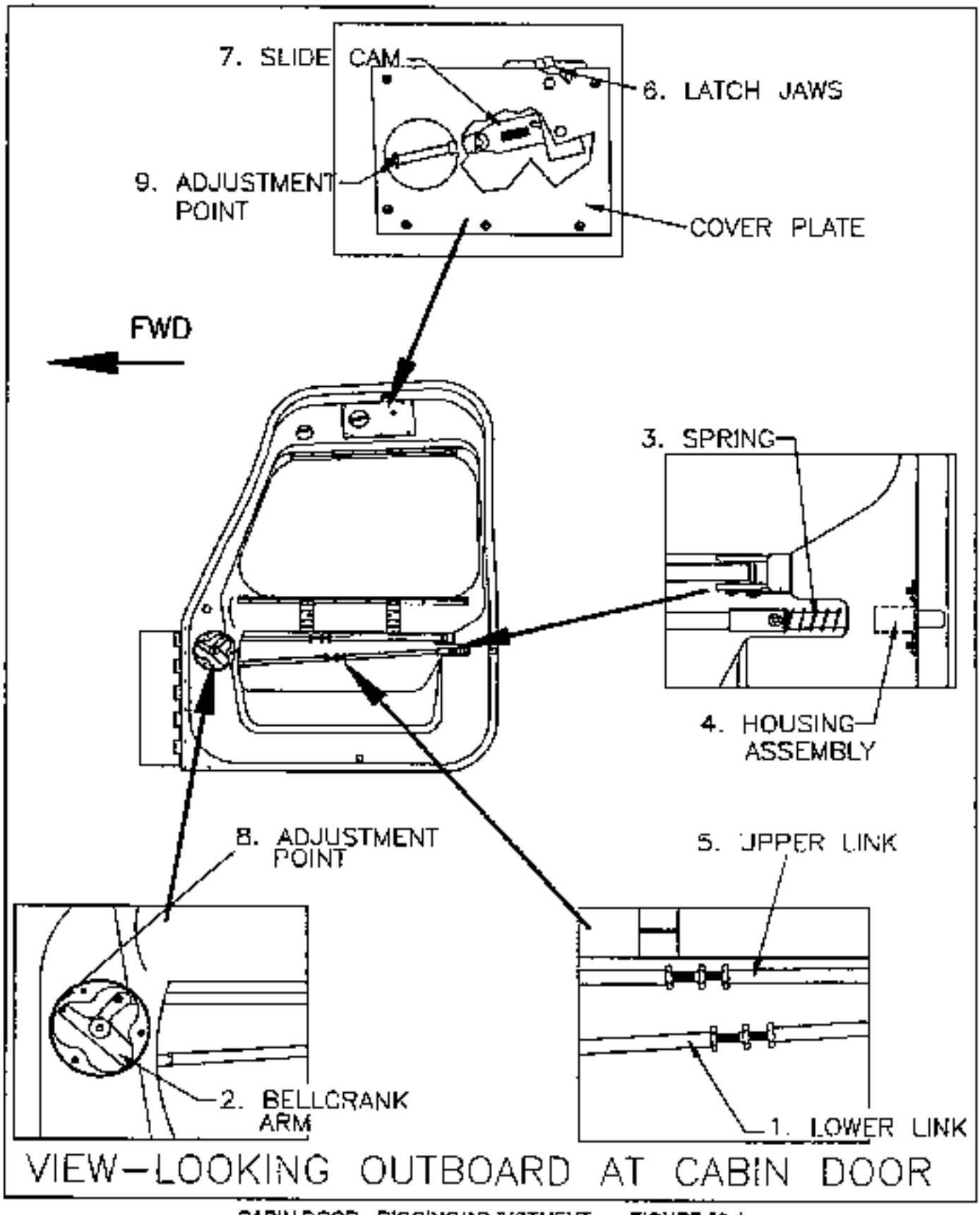
NOTE

The rivets and rivet holes originally used as locators do not have to be utilized when installing a new door or hinge if proper alignment can be obtained using another method.

E. Apply sealant, PRC 1321-B2, or equivalent, between outer skin and hinge support plate on tubular structure.

F. Reinstall door hinge to mounting plate using the eight (8) flat head screws removed earlier and three (3) flat head AD4 standard (AD5 oversize) rivets.

G. Adjust door latching mechanism so door closes and seals during flight. (See door rigging procedures paragraph 52-11-00).



CABIN DOOR - RIGGING/ADJUSTMENT - FIGURE 52-1

H. Reinstall the hold open arm with new cotter pin.

I. Reinstall interior panels and interior trim to door and cabin.

J. Paint door to match airplane.

52-11-00 - CABIN DOOR RIGGING/ADJUSTMENT PROCEDURES

The cabin door latching mechanism has several adjustment points that may be utilized to obtain proper rigging. (See Figure 52-1.) Removal of the interior door panel will be required to gain access to the adjustment points.

. Adjust cabin door linkage to satisfy requirements listed below.

A. Latching pin must contact striker plate on door frame the full circumference of pin when mechanism is in full latched position.

B. Latching pin must clear striker plate when opening or closing the door with latching mechanism in full open position.

C. As the lower link (1) and bellcrank arm (2), (Fig. 52-1) travel over center, the spring (3), is to be compressed to 1.000 +/- .030.

NOTE

Washers may be added between spring and link or 310294-501 housing assembly (4) to comply with items B and C.

D. The lower link (1) and bellcrank arm (2), in full locked position, should be overcenter a minimum of .3 inches. (Figure 52-1).

NOTE

It is not necessary that the lower link (1) contact the upper link (5), (Figure 52-1).

E. The outside handle is to be flush with outside skin when mechanism is in full latched position.

F. In full latched position, the upper latch jaws (6) must be closed and the latch slide cam (7) at the end of its full travel. See adjustment points (8) and (9).

G. In full open position the upper latch jaws must be open and slide cam at the end of its full travel.

NOTE

Slide cam (7) moves 1.13 from the full latched to full open position.

52-12-00 - CABIN DOOR SEAL

The cabin door seal is an extruded rubber seal filled with a soft foam. Unless deformed or torn, the seal will provide adequate sealing around the periphery of the door during flight conditions.

1. Cabin door seal replacement.

A. The seal is held to inner door frame with adhesive.

B. Remove the door inner trim panel to gain access to the door seal.

C. Pull the seal from the door frame.

D. Clean the area with lacquer thinner to help soften the remaining adhesive. Remove excess adhesive.

CAUTION

Care should be exercised to keep the lacquer thinner from dripping on the wing or any other portion of the airplane.

E. Coat cleaned door frame with adhesive (St. Clair #4587).

F. Coat bond area of new seal with adhesive (St. Clair #4587).

G. Let both applications dry until tacky.

H. Carefully place end of seal into position at bottom of door and continue around the door until the seal is firmly attached. Do not pull tight around corners. Cut off any excess seal.

I. When seal is properly attached the door should close with little effort.

NOTE

Door contour can be altered slightly to conform with cabin contour, if needed, for proper fit and sealing.

52-30-00 - BAGGAGE COMPARTMENT DOOR - MAINTENANCE PRACTICES

1. Removal. The baggage compartment door may be removed to replace or repair the door or to replace a damaged hinge.

A. Remove the coat hanger and headliner panel located inside and directly under the baggage door hinge area.

B. Pull insulation back to clear rivet shanks.

C. Center punch rivet heads holding the hinge half to the fuselage.

D. Carefully drill rivet heads and punch rivets from holes.

E. Work a putty knife or thin piece of aluminum between outer skin and hinge and inner skin frame and hinge to break sealant bond.

F. Remove hinge and baggage door assembly carefully.

G. Clean hinge and hinge mounting area thoroughly of all sealant or foreign material.

2. Repair. The baggage door may be repaired per standard repair procedures in accordance with AC 43.13-1( ). Repairs may be made to the baggage door on the airplane if feasible.

NOTE
If repairs are to be made the interior trim panel may require removal.

3. Installation.

OLD HINGE

A. Place repaired baggage door with old hinge into position and cleco securely to assure fit of door; check latching operations.

B. Remove door - assure attachment area is clean of old sealant.

C. Apply sealant, PR 1403-G-B2 or equivalent, to hinge attachment area between outer skin and inner frame.

D. Reinstall door assembly with old hinge and cleco hinge for proper placement.

E. Install rivets (AD4 standard, AD5 oversize) in all holes.

NEW HINGE

A. Place old door assembly with new hinge or new door assembly and new hinge into position and latch the door in place.

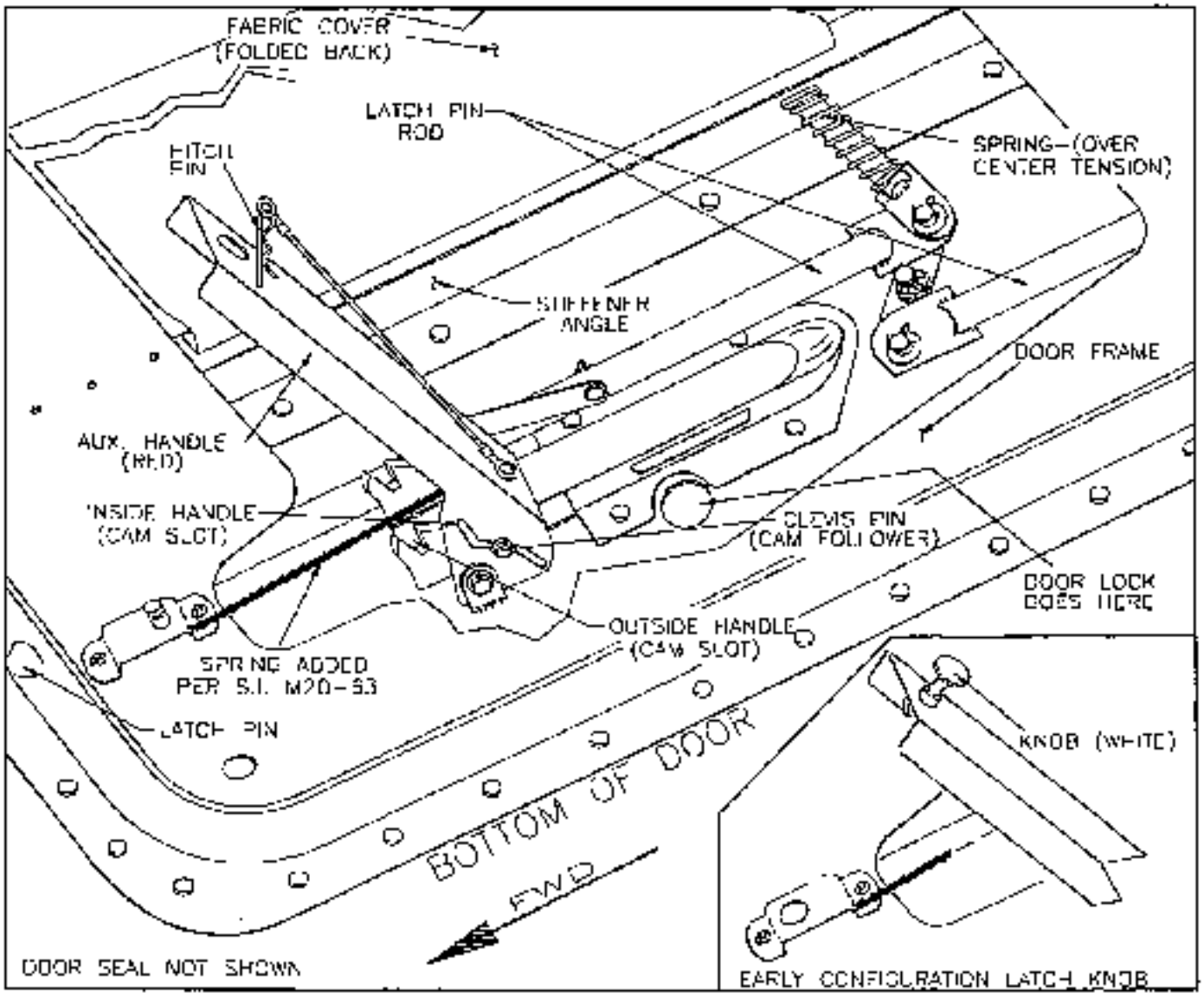
NOTE
Hinge mounting area should be clean of old sealant and debris.

B. Push in on door assembly at top, while door is in the latched position to properly locate the door and seal in the door frame.

C. While door is held in place mark holes in new hinge using holes in outer skin as locators.

D. Verify correct position of door prior to drilling holes in hinge.

E. Center punch all holes and carefully drill the two end holes. Fasten clecoes in these and recheck door assembly fit, if satisfactory continue drilling all holes.



BAGGAGE DOOR LATCH MECHANISM - FIGURE 52-2

F. Remove door assembly. Deburr and clean the area completely prior to reinstallation of door assembly.

G. Apply sealant, PR 1403-G-B2 or equivalent, to hinge mounting are between outer skin and door frame.

H. Reinstall door assembly and deco securely in place.

I. Install rivets, (AD4 standard, AD5 oversize) in all holes. Remove clecoes as rivets are being installed to keep door aligned.

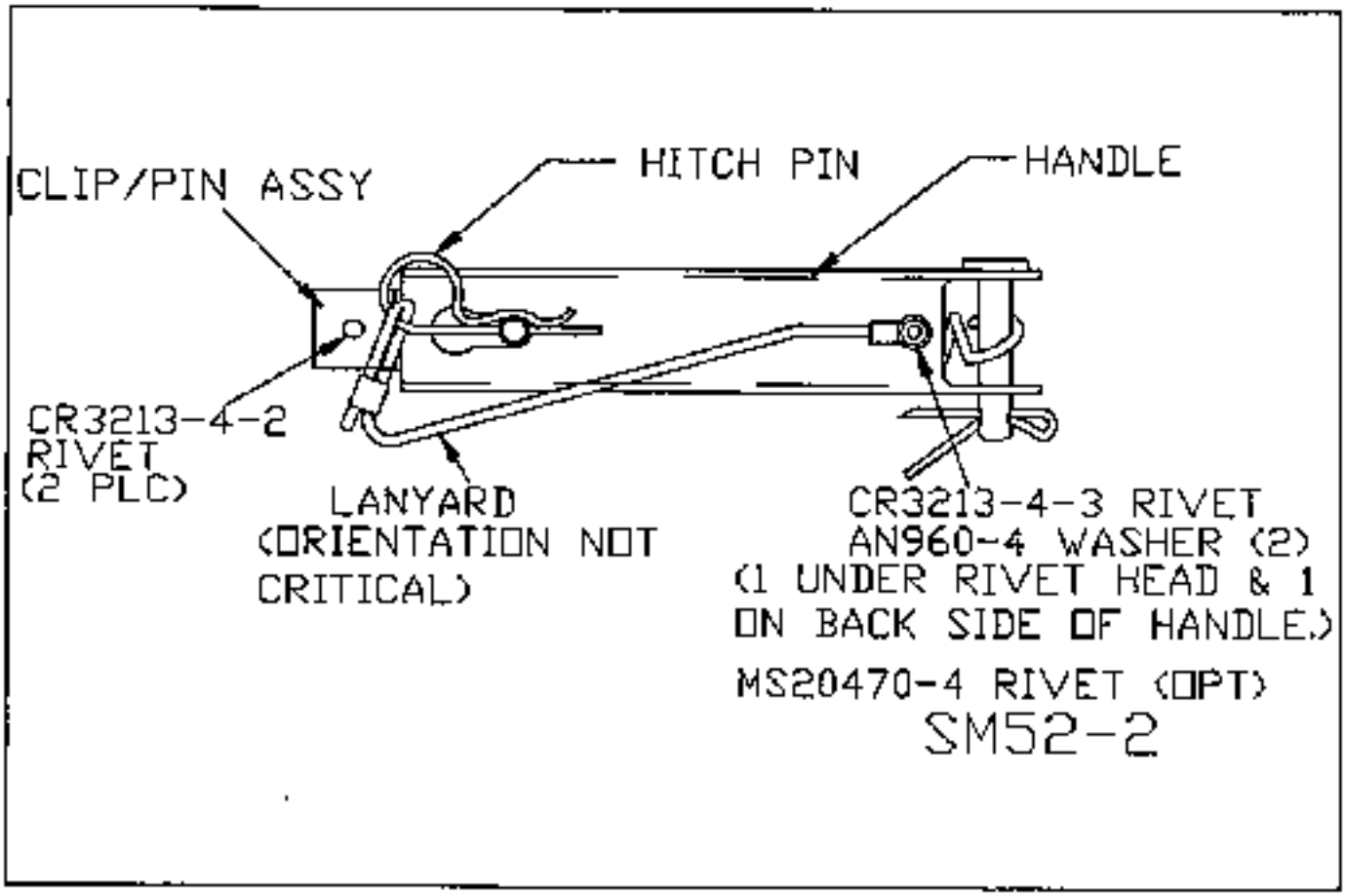
52-31-00 - BAGGAGE COMPARTMENT DOOR - LATCHING MECHANISM

The baggage compartment door has a direct non-adjustable latching linkage that inserts two pins into hard points in the door frame. This latching mechanism can be locked from the outside. An auxiliary exit mechanism is incorporated into this latching mechanism which allows the door to be opened, in an emergency, from the inside even if outside handle is locked.

The outside handle has to be unlatched and fully opened to correctly re-engage the latching mechanism after use of the inside auxiliary exit handle. (See Figure 52-2).

S/N 24-0001 thru 24-1381 were manufactured without the spring attached to the clevis pin to actuate the latch pin linkage. Mooney Service Instruction M20-63 dated April, 1983 adds this modification to these aircraft. This ensures a positive reengagement of the clevis pin into the cam slot of outside handle for proper actuation of the outside latching mechanism (see Figure 52-2).
See Mooney Service Bulletin M20-239 for retrofit configuration of auxiliary exit handle, inside latching mechanism (See Figure 52-3).

NOTE
Follow the procedures in the Airplane Flight Manual - Pilots Operating Handbook (AFM/POH) for reengagement of the mechanism for proper outside handle operation.



AUXILIARY EXIT LATCH RETROFIT (C/W SB M20-239)-FIGURE 52-3

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CHAPTER 53

FUSELAGE

CHAPTER 53

FUSELAGE

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53-00-00 - GENERAL

The Mooney M20J forward fuselage is constructed from 4130 chromomolybdenum tubular steel. The tubular steel sub-assemblies are heliarc welded in fixtures, inspected and then assembled into the main cabin fixture and heliarc welded into a cabin enclosure. The assembled steel structure is sand blasted and dipped in zinc chromate primer for corrosion protection.

The tailcone bulkheads, formers, etc., are formed from sheet aluminum on a hydro press or drop hammer at Mooney Aircraft Corporation. These components, along with stringers, clips, brackets, etc., are assembled together on a fixture and built into the aft fuselage assembly. All air ducts, control brackets, electrical harnesses and antennas are assembled into the tailcone during this manufacturing stage.

The forward cabin enclosure and the tailcone are mated and this fuselage assembly advances down the production line to the point of mating with the wing assembly.

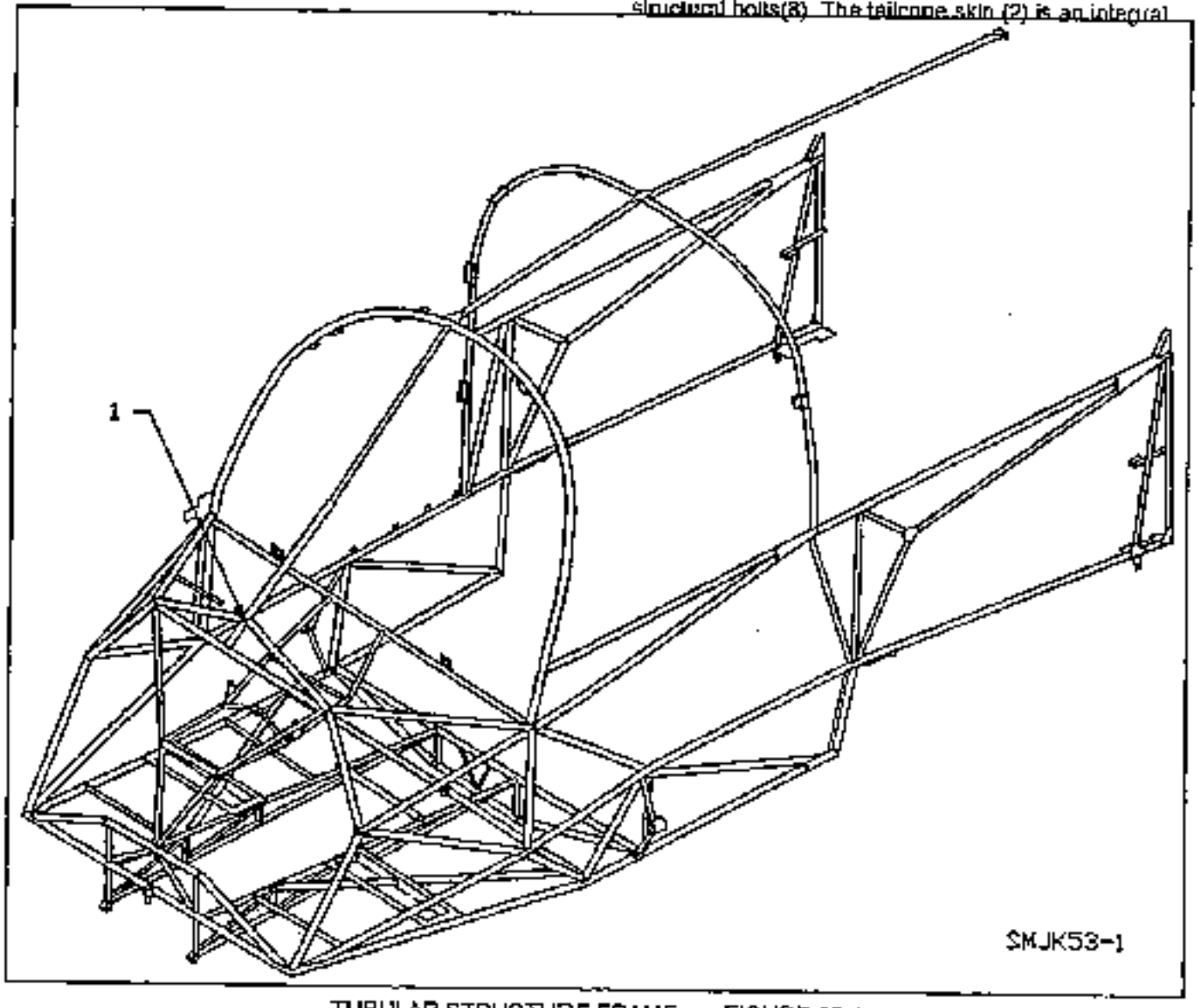
53-10-00 - MAIN FRAME

53-10-01 - TUBULAR STRUCTURE FRAME

The basic cabin enclosure is shown in (Figure 53-1). Serial No. 24-0001 thru 24-0900 have a windshield frame that will not accept the radar display unit. S/N 24-0901 and ON have had the wishbone subassembly (1) changed to allow this unit to be installed.

53-10-02 - TAILCONE STRUCTURE

The tailcone is of semi-monocoque construction. The internal structure is shown on (Figure 53-2). The forward cabin structure (1) is bolted to the tailcone with structural bolts(8). The tailcone skin (2) is an integral

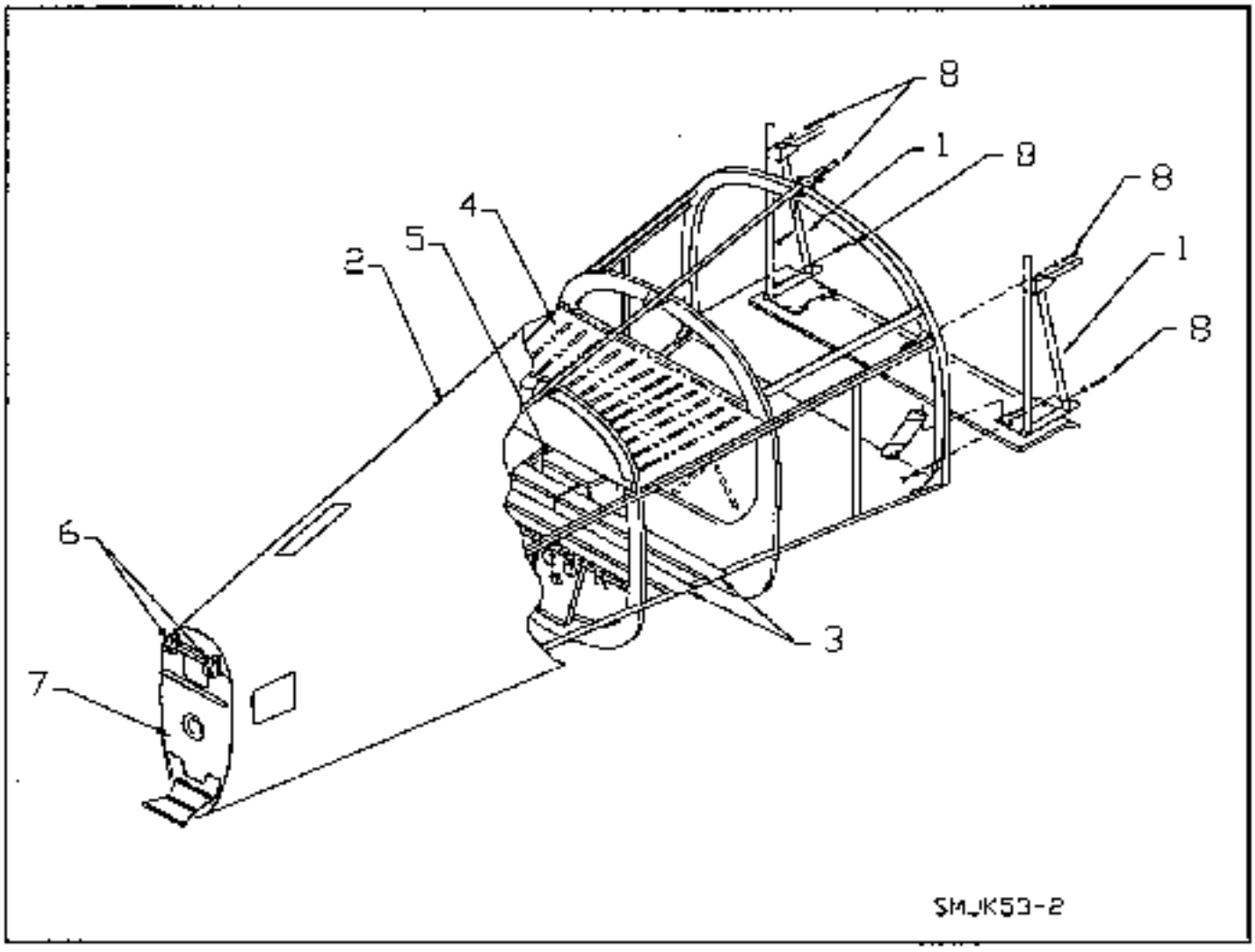


TUBULAR STRUCTURE FRAME - FIGURE 53-1

load bearing portion of the assembly. The avionics equipment shelf (3) spans the tailcone width to provide rigidity and space for avionics components. The battery box (5) and battery are located in this area also. The hat rack shelf (4) provides rigidity as well as storage space.

The empennage attach points (6) are attached to the rear bulkhead (7) with tabs extending forward and attached to the tailcone structure.

NOTE
Refer to Mooney Service Instruction M20-78 for sealing of tailcone and smooth belly skin.



TAILCONE STRUCTURE - FIGURE 53-2

53-30-00 - PLATES/SKINS

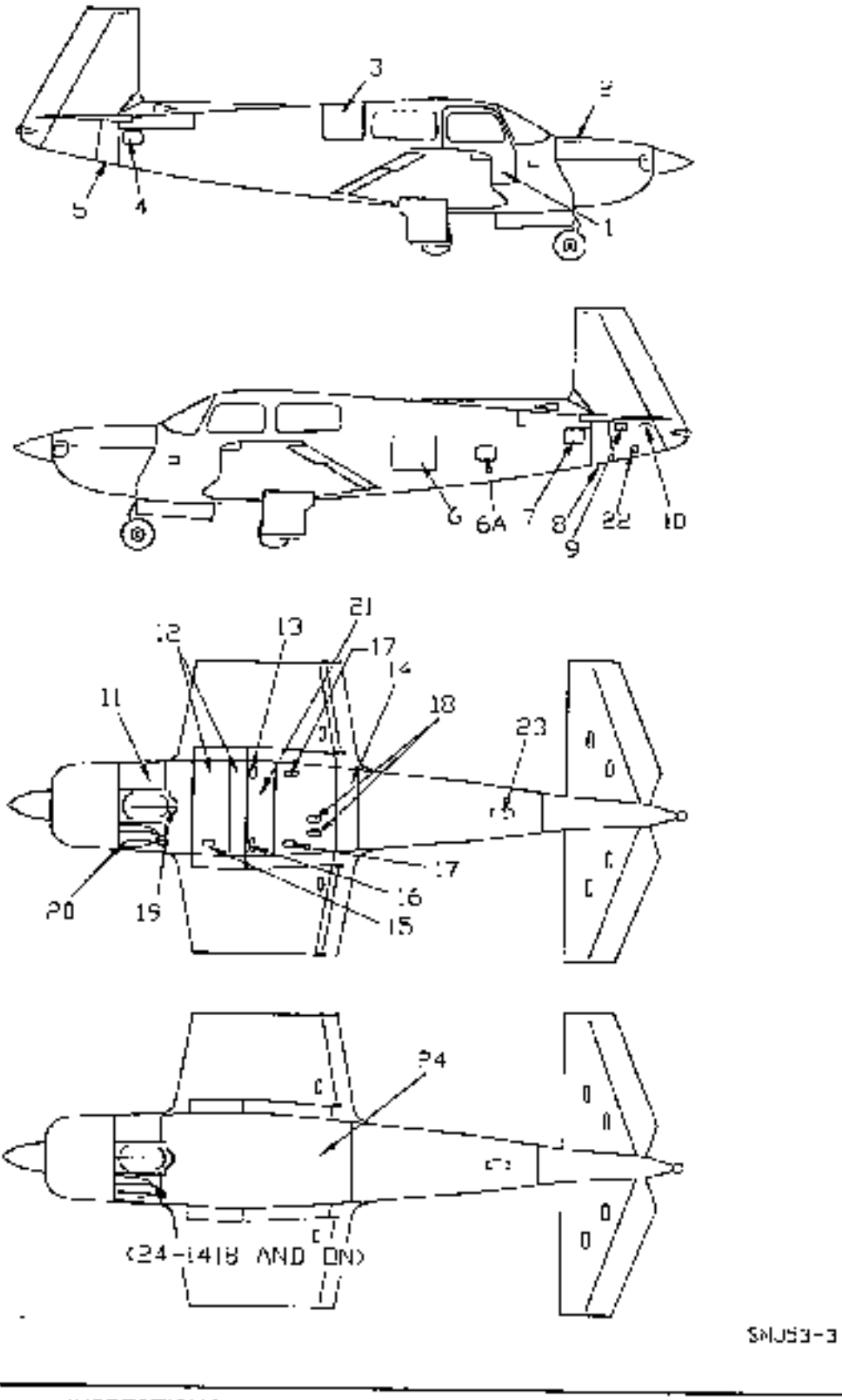
The fuselage tubular structure is covered with aluminum skins after mating to the tailcone. The skins are riveted and bolted to support angles, formers and brackets. These skins are non structural coverings to form the outside contour of the forward fuselage section.

The skins covering the tailcone are an integral part of the structure. Repair or replacement of these skins should be according to AC 43.13-1(*) (*=current rev.) SECTION 3.

The fuselage assembly and tailcone have panels, covers or doors at various locations to provide access to the interior for inspection or maintenance purposes. (See Figure 53-3).

The belly skins are removable to provide access to all components and control systems located below the floorboard. See (Figure 53-3) and table following for component location and identification. S/N 24-1418 and later aircraft have a one piece fiberglass belly skin.

NOTE
PR-1768-B2 sealant should be used on all fuselage skin laps to provide a good electrical ground plane.



INSPECTION PANEL AND COVERS - FIGURE 53-3

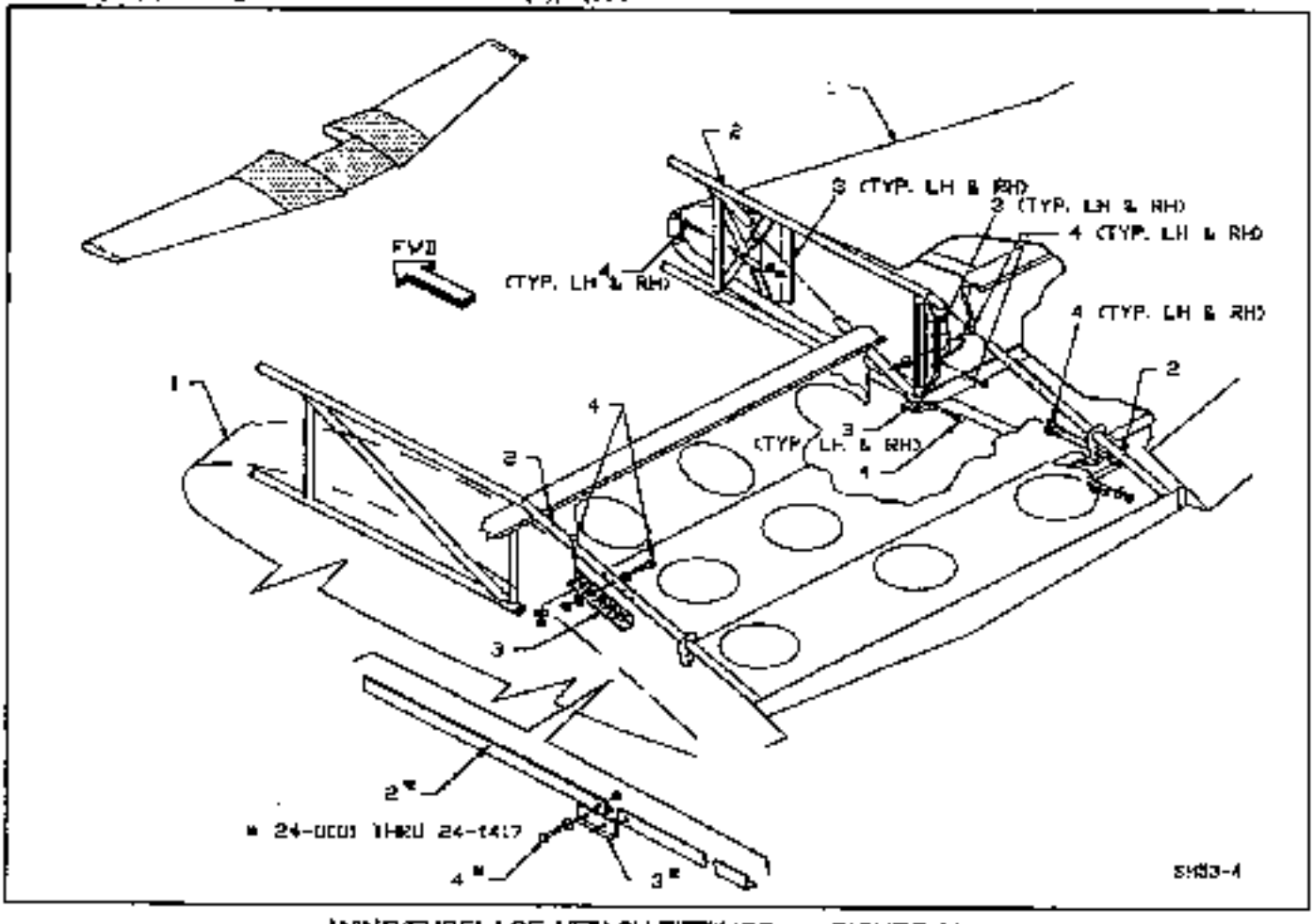
TABLE FOR FIGURE 53-3 - COMPONENT IDENTIFICATION

1. Cabin Door.
2. Engine Compartment ,Oil access
3. Baggage Door.
4. Elevator/Rudder Control Stops.
5. Empennage Attachment.
6. Avionics Blackboxes, Batteries.
6A. E.L.T. access.
7. Stabilizer Trim Jack Screw.
8. Empennage Attachment.
9. Elevator/Rudder Controls, Rod End Bearings & Travel Stops.
10. Rudder Controls, Elevators & Rudder Bellcranks.
11. Brake Master Cylinders, Rudder Torque Tube, Electric Fuel Pump.
12. Landing Gear Actuator, Gascolator, Fuel Selector Valve.
13. Landing Gear Retract Tubes, Flap Indicator Cable.
14. Electric Flap Actuator.
15. Stabilizer Trim Screw and Stops.
16, 17, 18. Elevator/Rudder/Aileron Control System, Bellcranks, Rod End Bearings.
19. Nose Wheel Steering System, Cowl Flap Controls.
20. Rudder Torque Tube.
21. Landing Gear Retraction Tubes.
22 Tail-Light Harness Connections.
23. Empennage Attachment, Trim Jack Screw.
24. All components (12-18, 21).

53-40-00 - ATTACH FITTINGS

53-40-01 - WING ATTACH FITTINGS

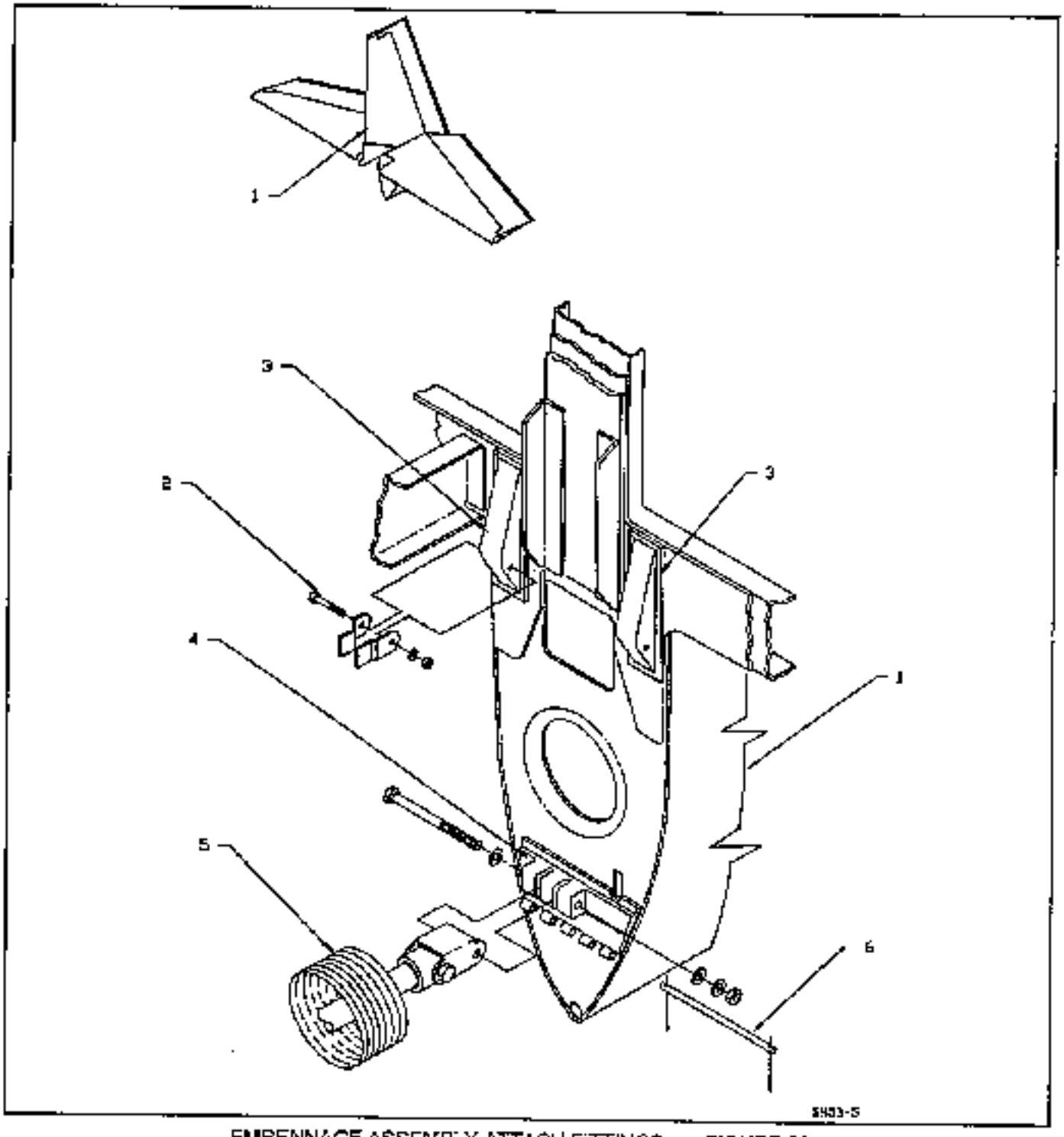
The wing assembly (1) is attached to the fuselage assembly (2) using structural hardware (4); (see Figure 53-4 for locations) Various type of fittings (3) are used to properly distribute the load between the wing and the fuselage.



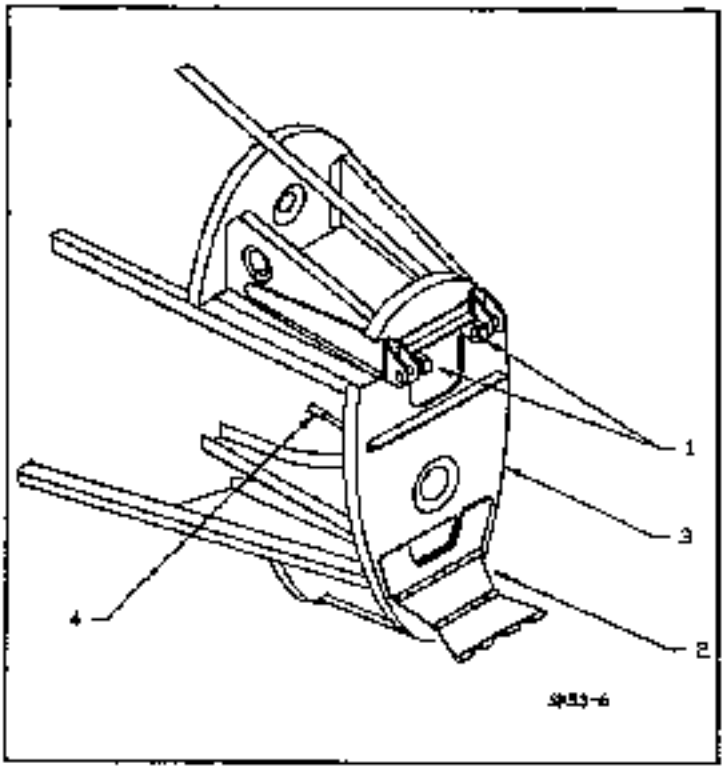
WING/FUSELAGE ATTACH FITTINGS - FIGURE 53-4

53-40-02 - EMPENNAGE ATTACH FITTINGS

The empennage assembly is manufactured as a unit (1), (Figure 53-5) with the vertical fin and the horizontal stabilizer using common components. This unit attaches to the tailcone empennage attach points (1) (Figure 53-6), using two structural bolts (2) (Figure 53-5) passing through two top hinges (3) (Figure 53-5). The bottom attach point (4) (Figure 53-5) on the empennage assembly secures the stabilizer trim jack screw (5) (Figure 53-5) and (4) (Figure 53-6). Lateral stability of the empennage assembly is controlled with an articulated hinge assembly (2) (Figure 53-6) attached to the rear bulkhead (3) (Figure 53-6) of the tailcone. The hinge attach pin (6) (Figure 53-5) is held in place with a cotter pin at each end.



EMPENNAGE ASSEMBLY ATTACH FITTINGS - FIGURE 53-5



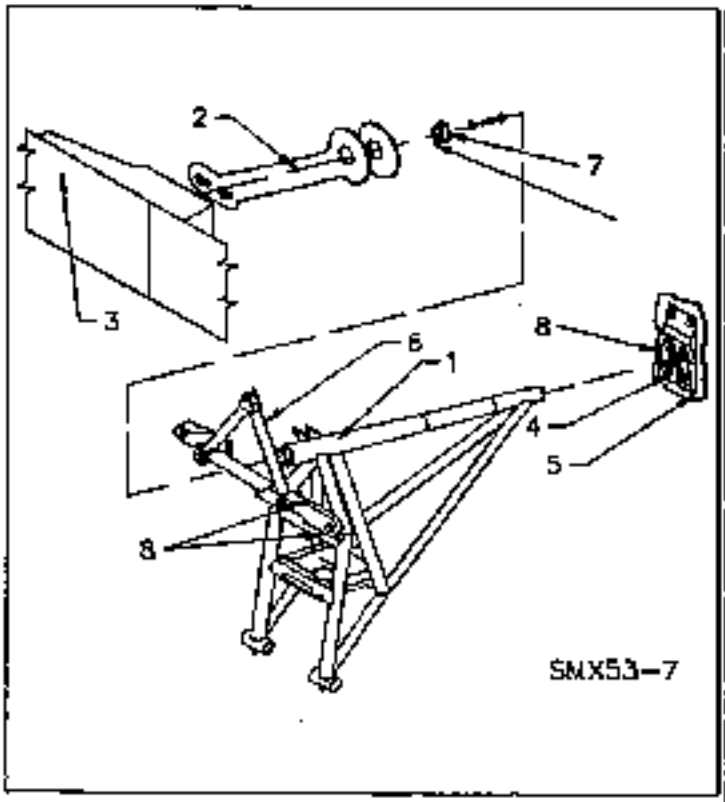
TAILCONE-EMPENNAGE ATTACH POINTS
FIGURE 53-6

53-40-03 - MAIN LANDING GEAR ATTACH POINTS

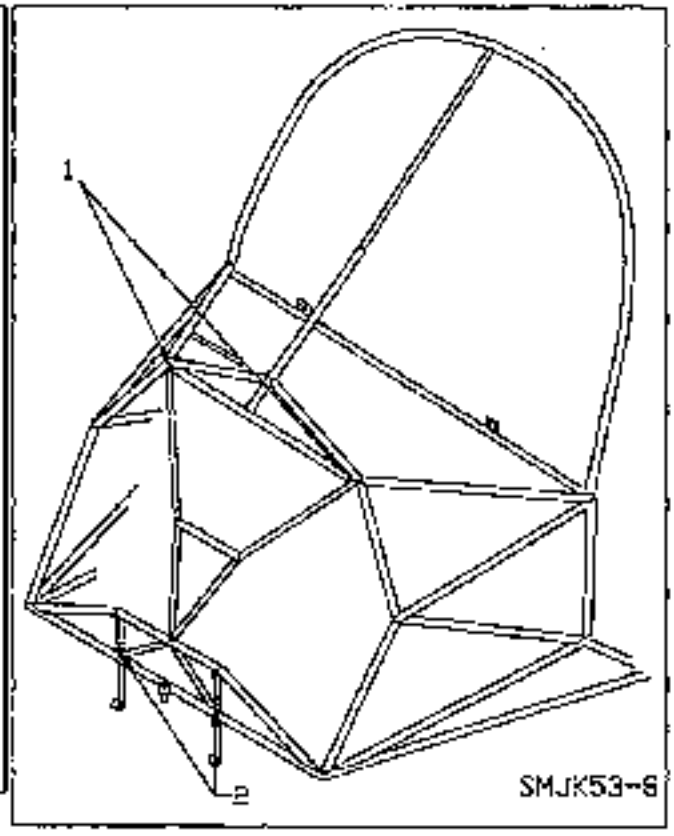
The main landing gear assembly is a welded heat treated 4130 chromemolybdenum steel assembly. The leg assembly (1) is supported at the forward end by the torsion strap fitting (2) attached to the wing main spar assembly (3) (Figure 53-7) and provides one of the hard points for the main landing gear assembly. The leg assembly (1) is supported at the rear by a bracket (4) attached to the stub spar assembly (5). This is the rear hard point. The main landing gear truss assembly (6) also attaches to the tension strap fitting (2) on the main spar. The brass bearing (7) should be inspected at any scheduled maintenance action for wear. Grease fittings (8) are installed at pivot points of the main landing gear assembly for lubrication per Section 5. (Reference Figure 53-7).

53-40-04 - ENGINE MOUNT ATTACH POINTS

The engine mount is attached to hard points built into the forward portion of the tubular structure.
The upper hard points (1) (Figure 53-8) are for NAS1304 bolts installed for tension loads. The lower hard points (2) are for fittings outside the firewall which allow a clevis on each side of the engine mount to be attached for shear loads. AN4 bolts are used for this application.



MAIN LANDING GEAR ASSEMBLY ATTACH POINTS
FIGURE 53-7



ENGINE MOUNT ATTACH POINT - FIGURE 53-8

CHAPTER 55

STABILIZERS

CHAPTER 55

STABILIZERS

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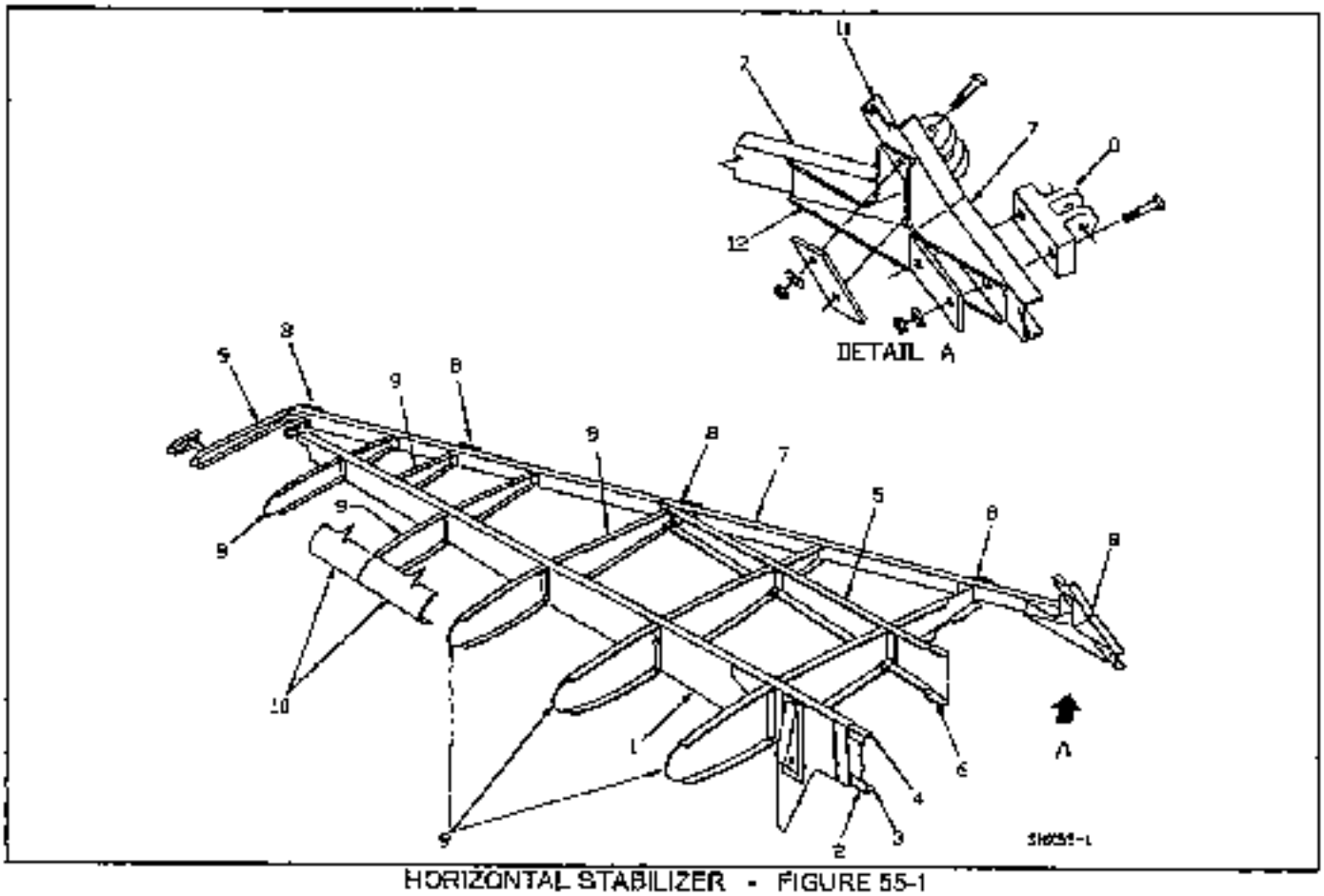
55-00-00 - GENERAL

The M20J empennage assembly is a variable incidence tail-plane consisting of a horizontal and vertical stabilizer built as a unit. (Refer to Chapter 53 for the attachment of the empennage to the fuselage.)
The horizontal and vertical stabilizer are constructed of formed sheet metal ribs attached to a forward and aft spar assembly covered with stretch formed skins. The horizontal stabilizer has a stub spar that spans a portion of the stabilizer.
The elevator and rudder are constructed from an extruded leading edge spar assembly covered with formed skins.
The elevators and the rudder have balance weights permanently installed for stabilization during flight.

55-10-00 - HORIZONTAL STABILIZER

The main spar assembly (1) (Fig. 55-1) is formed from aluminum sheet into a channel. Angle doublers (2, 3 and 4) are formed and riveted to the spar through the web section. The stub spar (5) is a channel formed from aluminum sheet reinforced with a jogged channel (6) at the center section. The rear spar (7) is an extrusion attaching to the aft end of the ribs and contains the hinge fittings (8) for the elevators.
The ribs (9) are assembled in sections to the front and rear face of each spar assembly to form the air foil. Stretch formed skins (10) are fastened to the ribs, spars and doublers to form the complete horizontal stabilizer structure.
The aft vertical fin spar (11) is attached to the horizontal stabilizer structure through a bracket (12) which is fastened securely to the stabilizer rear spar assembly (7). (Reference Figure 55-1).



HORIZONTAL STABILIZER - FIGURE 55-1

55-10-01 - HORIZONTAL STABILIZER - REMOVAL

The fairing located on the tailcone, covering the gap between the tailcone and empennage assembly, will require removal to gain access to empennage attaching hardware. Section 53-40-02 describes the attaching points for the empennage assembly. Refer to this section for the removal of the empennage assembly from the airplane.

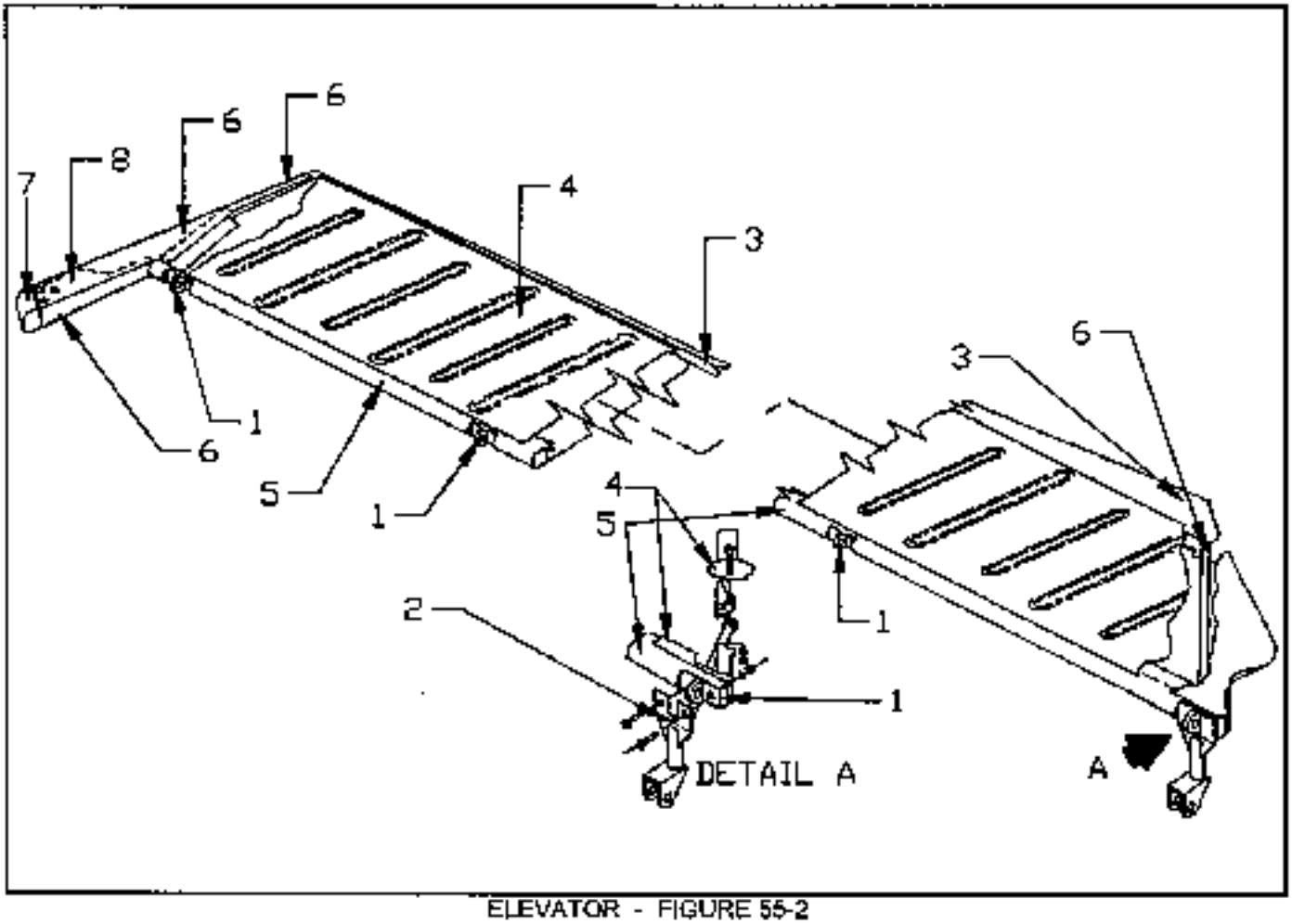
55-10-02 - HORIZONTAL STABILIZER - INSTALLATION

Refer to Section 53-40-02 for installation.

55-20-00 - ELEVATOR

The elevators on the M20J consist of a left and right hand assembly attached through ball bearing fittings (1) to the rear spar of the horizontal stabilizer (reference **Figure 55-2**).

The elevator control horn (2) is connected to the inboard leading edge of each elevator (R.H. and L.H.). Both control horns are then connected to the elevator flight control bellcrank.



ELEVATOR - FIGURE 55-2

The elevator skins (4) are stretch formed for the upper and lower surface of the elevator. There are no ribs in the elevator between the inboard and the outboard ribs. The skins are attached to the leading edge extrusion (5) and the ribs (6) with blind rivets. Each formed corrogation is matched on top and bottom skins and rivets are installed for strength and rigidity through each corrogation.

A lead balance weight (7) is installed in each elevator tip with iron rivets (8). (Reference Figure 55-2). See Section 27-91-00 for balancing procedures on the elevators.

55-20-01 - ELEVATOR - REMOVAL

Remove the AN3 bolts from each control horn and push-pull tube bearing, then remove the AN3 bolts and hardware from each hinge fitting on both elevators.

55-20-02 - ELEVATOR - INSTALLATION

WARNING

Each new, repaired or repainted elevator should be checked for balance per Section 27-91-00. The elevators are installed in reverse order of removal. Nominal torque values for AN3 bolts are to be used (see section 5-20-01 for torque table.)

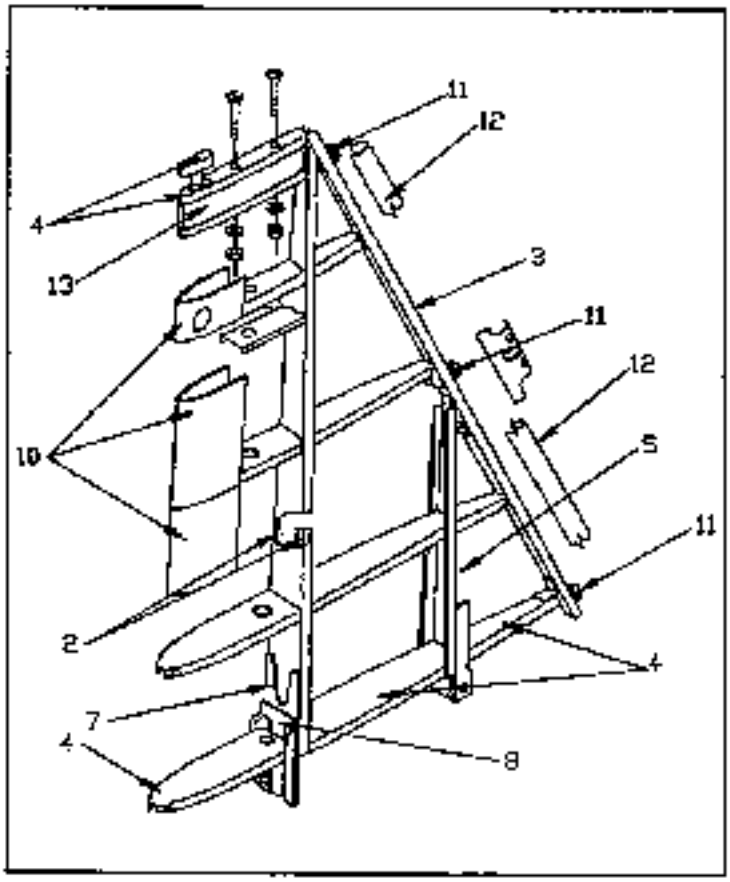
55-30-00 - VERTICAL STABILIZER

The main spar assembly (1) (Ref. Fig. 55-3) is formed from aluminum sheet. Formed angle doublers (2) are nested inside the main spar channel and riveted to the web. The rear spar (3) is an extrusion used to attach the aft end of the sectioned ribs (4). The stub spar (5) is also formed from sheet aluminum. A doubler channel (6) is attached to the vertical stabilizer stub and the stub spar of the horizontal stabilizer. This attach channel is securely bolted to stinger bulkhead brackets.

The main spar doublers and angles 7, 8 and 9 provide attach points for the stinger and the horizontal stabilizer spar. (Refer to **Figure 55-3**).
The skins (10) are stretch formed in 2 sections and riveted to the ribs and spar.
The three rudder attach fittings (11) are mounted to the rear spar extrusion.

55-30-01 - VERTICAL STABILIZER - REMOVAL

The vertical and horizontal stabilizer are removed as a unit with the stinger assembly. Remove the fairing located on the tailcone which covers the gap between tailcone and empennage. Section 53-40-02 describes the attaching points for the complete empennage assembly. Refer to this section for removal of the empennage assembly from the airplane.



VERTICAL STABILIZER ASSEMBLY - FIGURE 55-3

55-30-02 - VERTICAL STABILIZER - INSTALLATION

Refer to Section 53-40-02 for installation.

55-40-00 - RUDDER

The rudder on the M20J is constructed the same as the elevator with stretch formed skins (1) (Ref. Fig. 55-4) riveted to an extruded leading edge (2) and riveted together at the trailing edge. The rudder lower skins (3) are drop hammer formed left and right halves riveted to the upper skins, a rib assembly (4) and at the leading and trailing edge. A stiffener (5) is to support the lower rudder bail bearing hinge fitting (6). A weather seal (7) is included in the assembly.
The rudder control horn (8) is attached with the center hinge fitting (9) to the rear flange of the front spar at the junction of the lower rib assembly (10). A brace arm on the horn assembly is attached to a fitting (11) on the lower rib (10). The upper hinge fitting (12) is attached to the rear flange of the front spar just under the top rib assembly (13) and the balance weight (14), (refer to **Figure 55-4**).
The balance weight (14) is installed with four iron rivets (15). See section 27-91-00 for balancing procedures on the rudder.

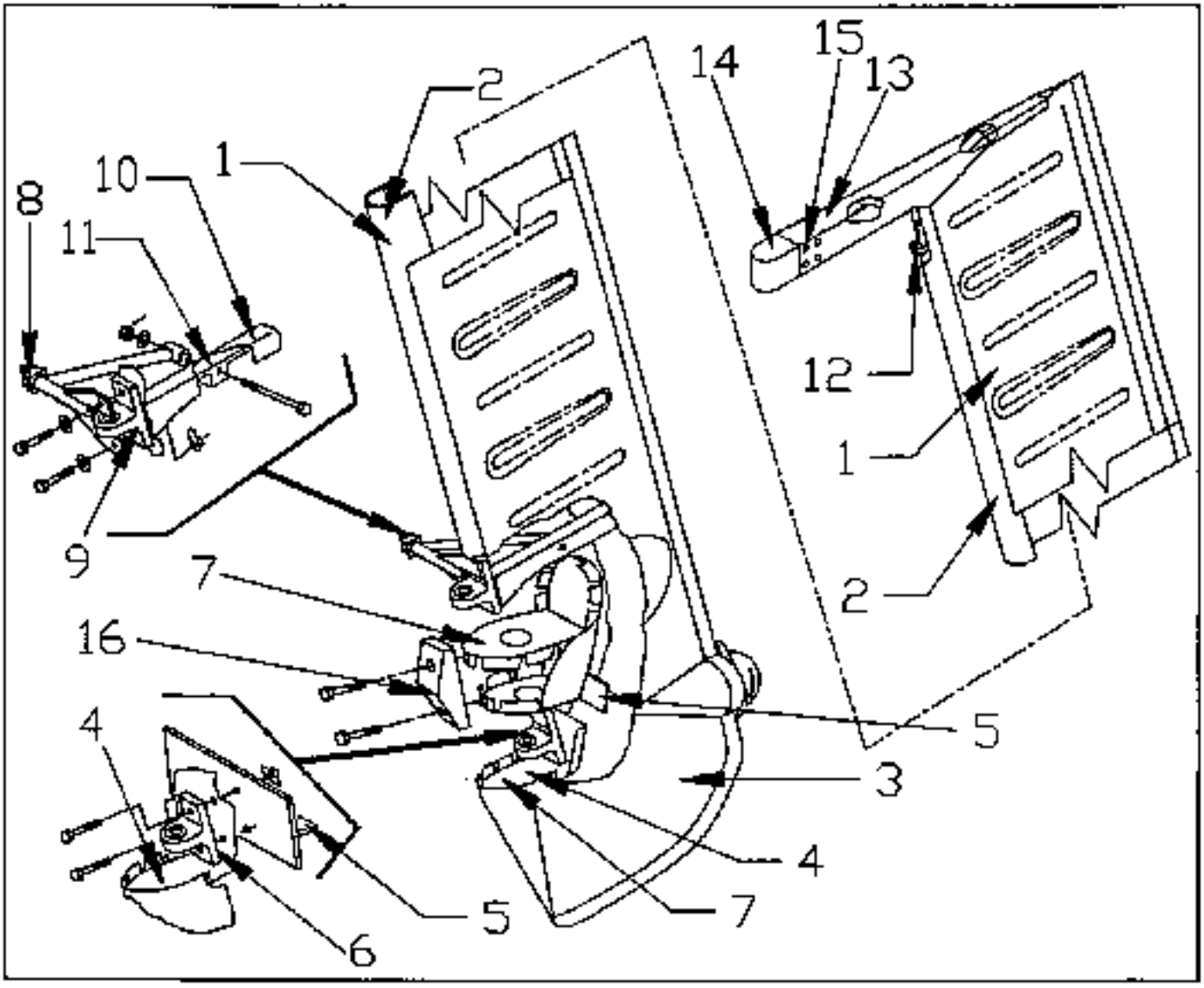
55-40-01 - RUDDER - REMOVAL

Remove the AN3 bolt from the control horn and push-pull tube bearing, then remove the three AN3 bolts and hardware from each hinge fitting. Disconnect electrical connections per paragraph 33-41-03.2,A thru E.

55-40-02 - RUDDER INSTALLATION

WARNING
Each new, repaired or repainted rudder should be checked for balance per section 27-91-00 prior to installation.

The rudder is installed in reverse order of removal. Nominal torque valves for AN3 bolts are to be used. (See Section 5-20-01 for torque table).



RUDDER ASSEMBLY - FIGURE 55-4

CHAPTER 56

WINDOWS

CHAPTER 56

WINDOWS

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56-00-00 - GENERAL

The windshield for the M20J is .187 inch thick acrylic heat formed to contour. The pilots side window is also .187 inch thick acrylic with a hole cut out to accommodate the .312 inch thick storm window. The storm window is milled to fit the hole and to be flush with outside of pilots window surface when closed. The other three side windows are .125 inch thick acrylic. Serial Number 24-0001 thru 24-1213 and 24-1418 and ON have single pane side windows installed. Serial Number 24-1214 thru 24-1417 have a double panel cabin door window. The inner pane is a .060 inch thick acrylic fitted to clips and brackets on the door frame.
All the windows are heated in an auto-clave to approximately 300 degrees F. and placed on a plaster mold to cool while maintaining the correct shape.
The windows are tinted green or gray for visual comfort, ultra-violet filteration and cooling effect for the cabin.
The windows are all sealed to the outside skin with PR1403-G-B2 or equivalent sealant. Retainers and clips are used on the frame to hold the windows in place.

56-00-01 - CLEANING ACRYLIC

A commercial cleaning solution manufactured for acrylic may be used to clean routine grit and grime from the windows. Follow the instructions on the commercial cleaner used.
If no commercial cleaner is available these procedures should be followed:

1. Flush windows with water prior to wiping with a clean, soft cloth soaked in kerosene.

CAUTION
Never wipe windows when dry.

2. Flush with water after cleaning with kerosene.

CAUTION
Never use gasoline, benezene, carbon tetrachloride, acetone, lacquer thinner, deicer fluid, house hold cleaning fluid or any other questionable fluid to clean acrylic windows. These solvents will soften or craze the surface.

NOTE
Minor scratches or abrasions may be polished out by using acrylic resurfacing kits, ie., Micro-Mesh, available from aviation accessory suppliers.

56-20-00 - WINDSHIELD AND CABIN WINDOWS

The removal and installation of windshield and windows are accomplished in the following paragraphs.

56-21-00 - WINDSHIELD

56-21-01 - WINDSHIELD - REMOVAL

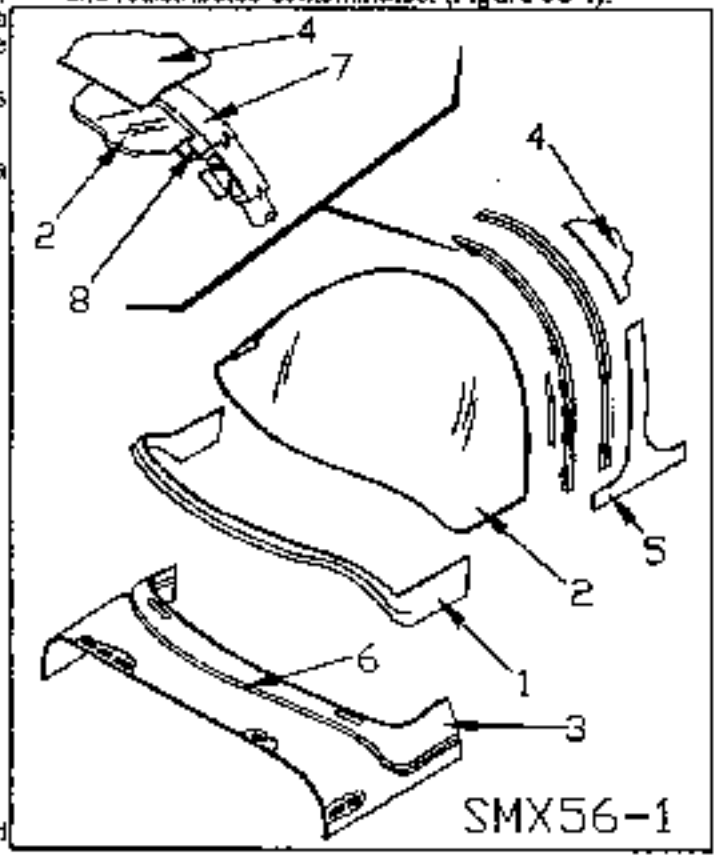
1. The aluminum retainer (1) at bottom of windshield (2) must be removed by drilling out the rivets attaching it to the cowl deck (3), (reference Figure 56-1).
A putty knife or thin aluminum strip will be necessary to work underneath the top skin (4) and the side post skin (5) to break the sealant bond between the acrylic and the skins.

CAUTION
Exercise care during this operation to avoid scratching the acrylic. Considerable effort may be required to break the bond.

2. Carefully pull the windshield away from its location starting at the lower portion and work it loose as the sealant bond is broken around the edge of acrylic.
When windshield is removed, all residual sealant must be removed prior to installation of the replacement windshield. Careful scraping with putty knife and the application of M.E.K. will assist in removing the excess sealant.

56-21-02 - WINDSHIELD - INSTALLATION

When old sealant is removed brush M.E.K. or equivalent cleaning solvent in the cavity (8) where new windshield will be located. Wipe solvent before it dries and redistributes contaminates. (Figure 56-1).



WINDSHIELD INSTALLATION - FIGURE 56-1

NOTE
Exercise care with application of these solvents. Damage may result if drops of solvents come in contact with either the exterior paint, interior trim or plexiglass.

1. Apply sealant, PR1403-G-B2 or PRC1321-B-2, into the cavity (6) until approximately half filled. Apply a bead of sealant along the recessed joggle (6) of the cowl deck (3), (reference Figure 56-1).
The new windshield being forced into the cavity between the outer skin (4) and the interior retainer (7) will extrude excess sealant. After the windshield is in place wipe the excess sealant off with a damp clean cloth.
Prior to riveting the aluminum retainer (1) into position coat retainer with a uniform thickness of either sealant. A positive bond will be made as the retainer is riveted into place. Use CR3212-5-2 cherry rivets to reattach the retainer (1) to cowl deck (3), (reference Figure 56-1).
After the sealant cures the excess may be removed with a sharp razor knife.

2. Check for water leaks.

3. Repaint retainer and rivets to match aircraft.

56-22-00 - CABIN WINDOWS

56-22-01 - CABIN WINDOWS - REMOVAL

1. Remove interior trim from the window (1) to be replaced. Remove the retainers (2) or clips (3) which hold the window in position from the inside, (reference Figure 56-2).

NOTE
Some retainers are held in place with screws (4) and some with rivets. Drill out rivets carefully.

The window will be bonded to the outside skin with sealant. Considerable effort may be required to break the bond between the acrylic and the outer skin. Care should be exercised to keep window from twisting and possibly cracking.

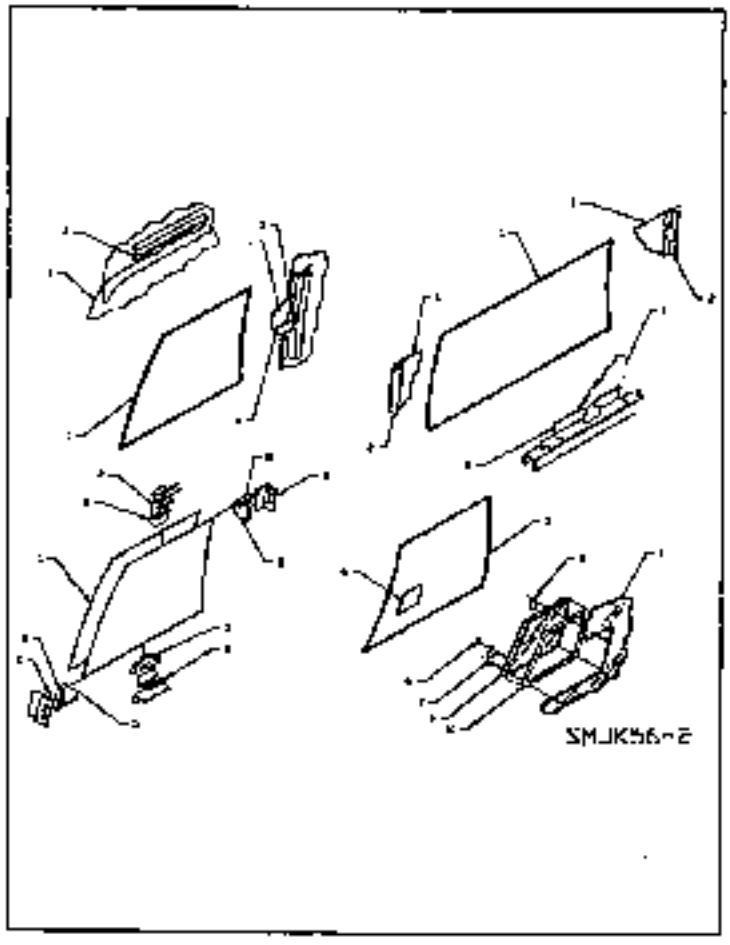
1. Remove the window and clean all remaining sealant from the skin. Use M.E.K. and a scraper to remove the sealant.

Aircraft S/N 24-1214 thru 24-1417 have an inner (5) and outer window (1) installation on the cabin door window. Removal is basically the same procedure as single window installations.

56-22-02 - CABIN WINDOWS - INSTALLATION

1. Remove all old sealant and clean skin area with M.E.K. Place window (1) into position to assure proper fit. Trim if necessary; refer to Figure 56-2.

2. Apply a uniform thickness of PR1403-GB2 or PRC1321-B sealant to the skin and window area where window (1) will be located. Sufficient sealant should be used so that excess sealant is extruded from all edges of windows, both inside and outside, (approximately 5 tubes (3.5 oz.) for 4 side windows).



WINDOW INSTALLATION - FIGURE 56-2

3. Force window (1) into place with retainers (2) or clips (3) and secure with Avex 1601-410 blind rivets or existing screws and hardware (4). The sealant will be forced out and seal the window to the outside skin. Carefully wipe excess sealant off acrylic before it sets up. After sealant cures the excess can be cut off with a sharp razor knife, (reference Figure 56-2).

4 Check replaced window for leaks.

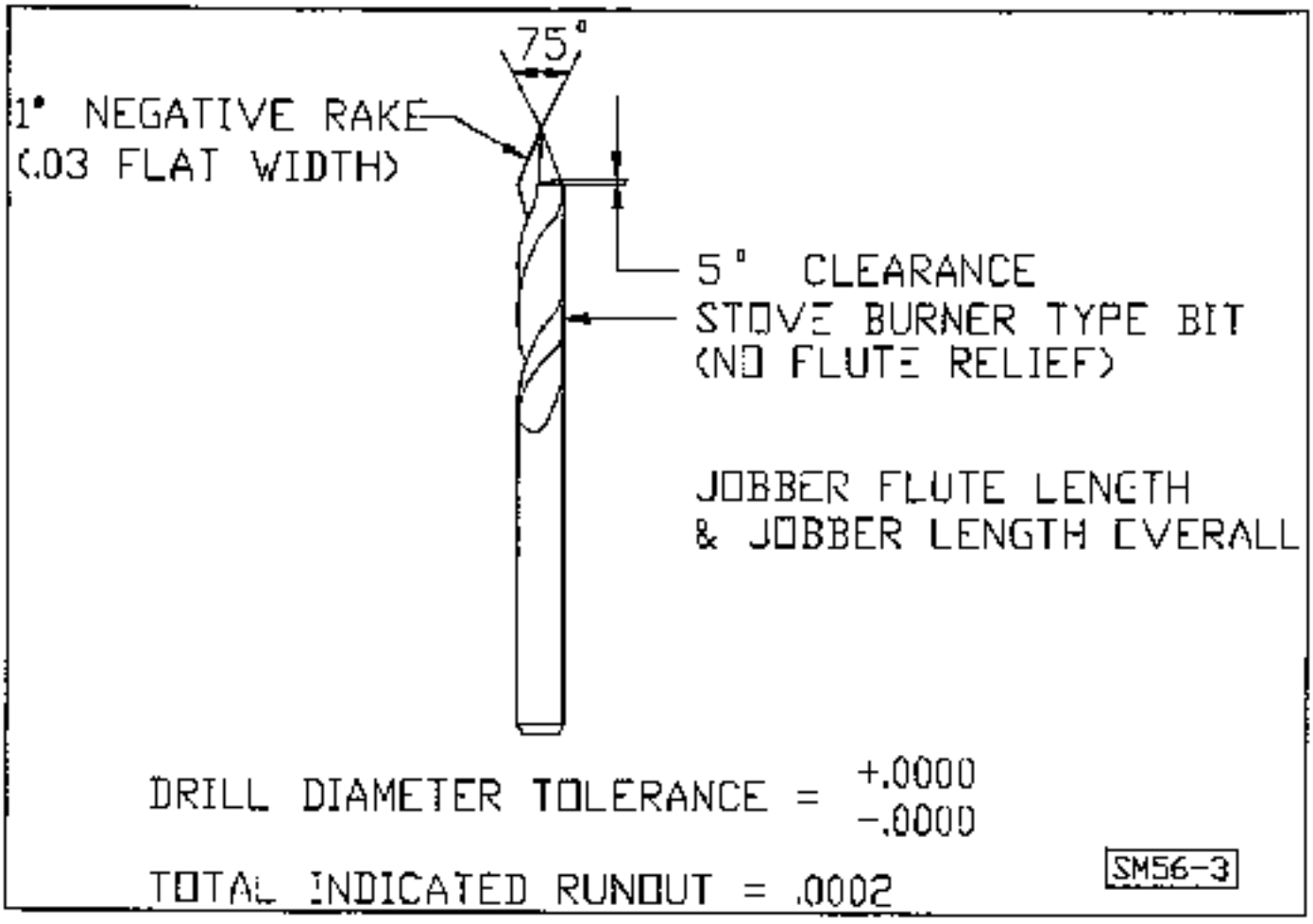
5. Reinstall interior trim panels.

56-23-00 - STORM WINDOW

The storm window (6) is mounted with two aluminum hinges (7), attaching hardware (8) and held closed by a latch (9). A gasket (10) is bonded to the storm window for sealing purposes when closed, (reference Figure 56-2).

56-50-00 - ACRYLIC DRILLING

Drill bits for acrylic should be ground per (Figure 56-3). A slow turning drill bit with light pressures is desirable.



ACRYLIC PLASTIC DRILL BIT - FIGURE 56-3

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CHAPTER 57

WINGS

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WINGS

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57-00-00 - GENERAL

The all metal wing is a one piece assembly attached to the fuselage at structural hard points with structural hardware. (See Section 53-40-01). The full span main spar assembly is connected to the stub spar and rear spar assembly by ribs, doublers and skins. The main landing gear forward attach assembly is an integral part of the main spar and the rear fitting is bolted to the stub spar assembly. The spar caps are 7075-T6 aluminum and the webs, ribs and doublers are 2024-T3, T4 or T42 aluminum. Repair of these components is covered in Section 51-13-00.
Molded wing tips (S/N 24-1038 and ON) are fabricated from composites and house the navigation and strobe lights.
The fuel is contained in wet wing type fuel cells between the main spar and baffles forward of the spar. The tanks are sealed during manufacturing with current state of the art technology sealant. (See Section 28 for fuel system details).

57-00-01 - WING REMOVAL AND INSTALLATION

The major subassemblies of the wing may be removed individually, or the wing may be removed as a unit. To remove a wing, a fuselage supporting cradle is needed.

1. Wing removal:

A. Remove wing-root fairings and bottom fuselage access panels.

B. Drain all fuel from tanks.

C. Drain brake lines and reservoir. Disconnect hydraulic lines at wing main spar.

D. Remove front and rear seats. Remove the two inspection plates under rear seat area.

E. Jack aircraft.

F. Attach A-frame hoist to propeller, or support with a propeller jack.

G. Disconnect or remove the following:

(1) Two landing gear assist springs.

(2) Aileron control tubes at inboard bellcranks

(3) Trim control tube at station 59.3 and 84.5.

(4) Main gear retraction tubes.

(5) Rudder control tubes.

(6) Elevator control tube.

(7) Elevator and rudder push-pull tubes.

(8) Floorboards at rear attach points.

(9) Belly skin stringer splice angles.

(10) Airspeed indicator line, pitot lines, and pitot heater wires (if installed).

(11) Hardware shown in (**Figure 57-1**).

CAUTION
Have a suitable cradle ready to carry the fuselage before removing all mating hardware.

2. Wing installation: Installation of the wing assembly is direct reversal of removal.

57-00-02 - STALL STRIP INSTALLATION

1. Position stall strip on wing leading edge so that during stall recovery normal use of controls would prevent:

A. More than 15 degree roll.

B. More than 15 degree yaw.

C. More than 30 degree pitch below flight level.

2. Place stall strips on leading edge at stations shown on **Figure 57-2**, attach securely with duct tape for test flights. Re-position stall strips, up or down, until aircraft flies to criteria in paragraph 57-00-02, 1, A, B and C. Secure stall strip per installation instructions in (Figure 57-2).

57-10-00 - MAIN FRAME

The integral fuel cells, shaded area (1) start at wing station 24.5 and continue to the rib at station 74.0 on both wings. (Reference **Figure 57-3**). Sealer is applied to all joints on ribs, spar and baffle plates. (See section 28 for resealing procedures).
The wing is manufactured in three sections; the center section (2), the left outboard section (3) and an opposite right outboard section (not shown) (Figure 57-3). These three sections are then assembled into one full span wing assembly as the skins are installed.
A spares, outboard wing tip assembly is available which includes completed section from wing station 118.25 and outboard. The assembly includes the stringers (4) required to complete the splice to the old center section.

57-20-00 - AUXILIARY STRUCTURES

57-20-01 - JACK POINTS

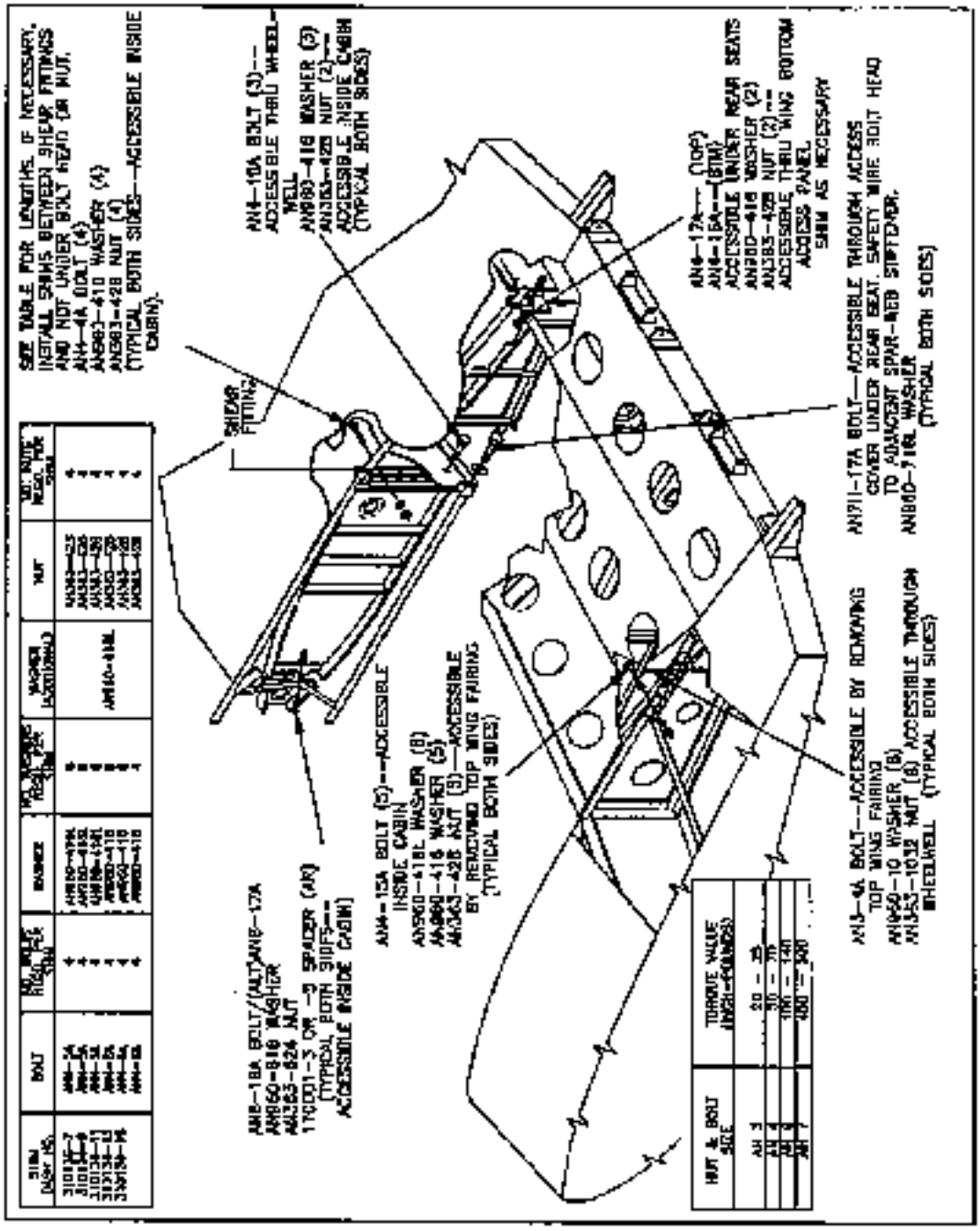
The jack points are located on the under side of the wing. The threaded wing tie down eyebolt fittings are designed to accept the non threaded jack points. These are located outboard of each main gear. See Section 7-10-00 for complete jacking procedures.

57-20-02 - FIBERGLASS WING TIPS (S/N 24-1038 and on)

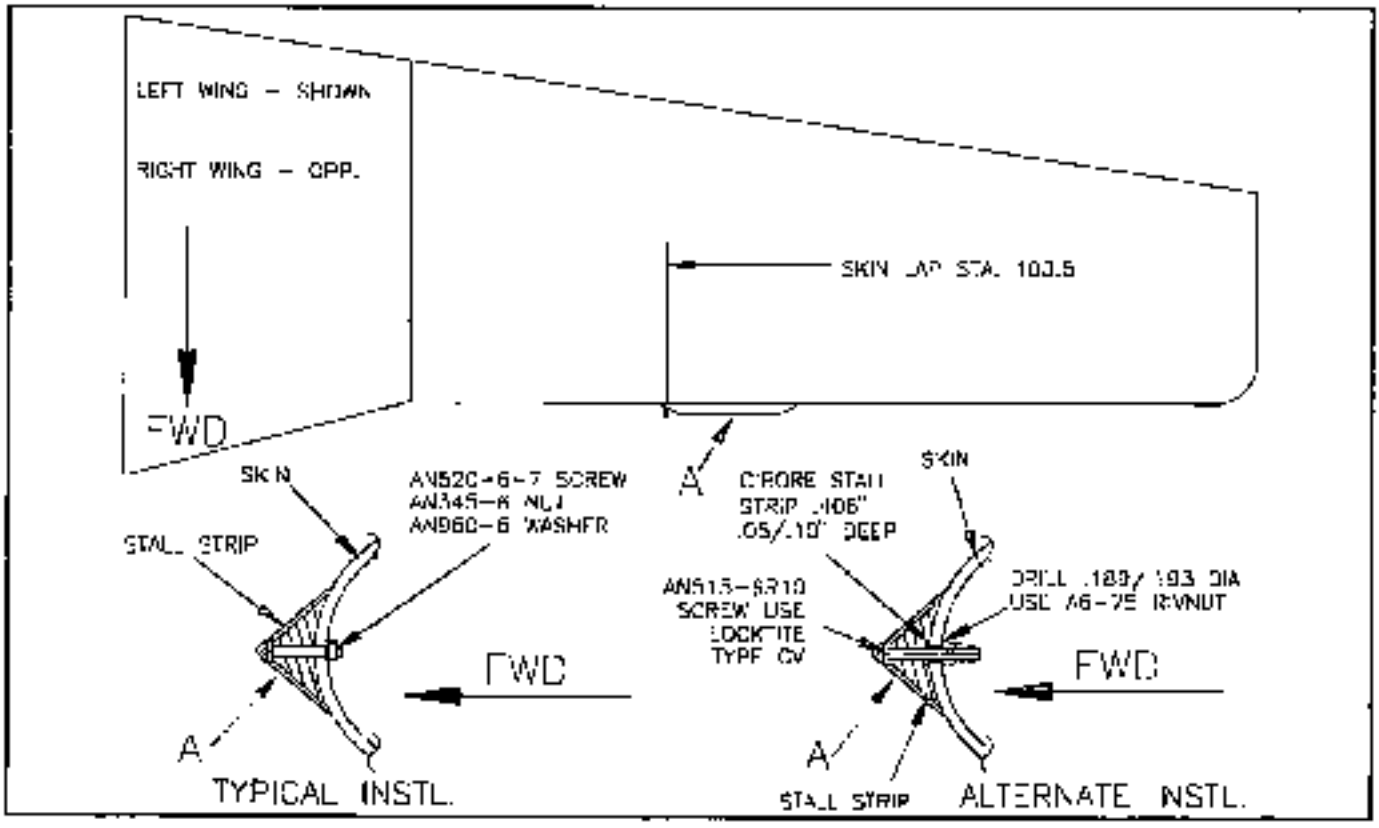
The M20J wing tips are non-structural fiberglass components. They are riveted to the upper and lower wing skins during final assembly of the wing structure.

1. Wing tip removal.

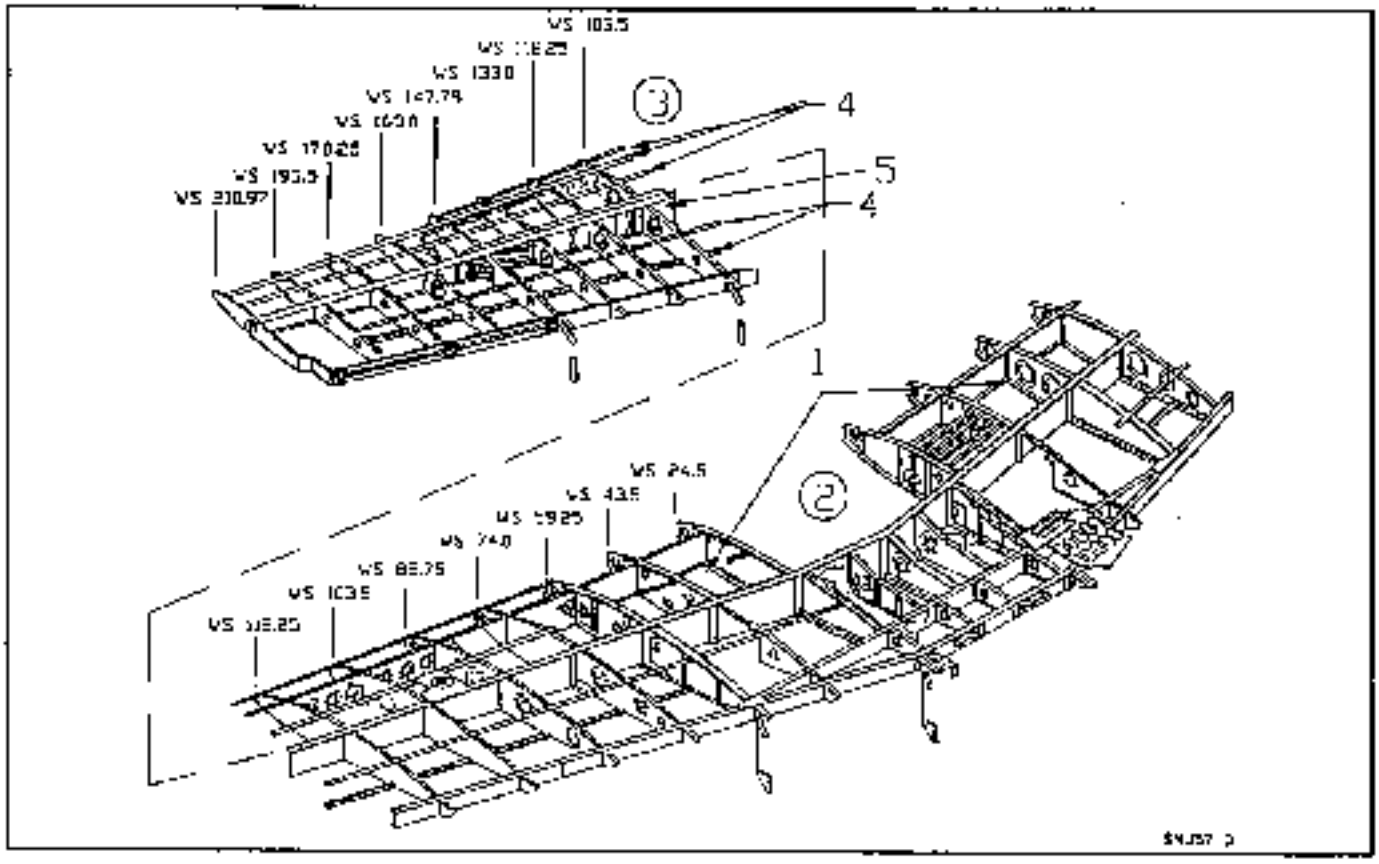
A. Remove the navigation strobe light lens (1) by removing 4 screws and washers (2) that retain the lens to wing tip (3) (24-0001 thru 24-2999). S/N 24-3000 thru 24-TBA - Disconnect aft position light connections. Refer to **Figure 57-4**).



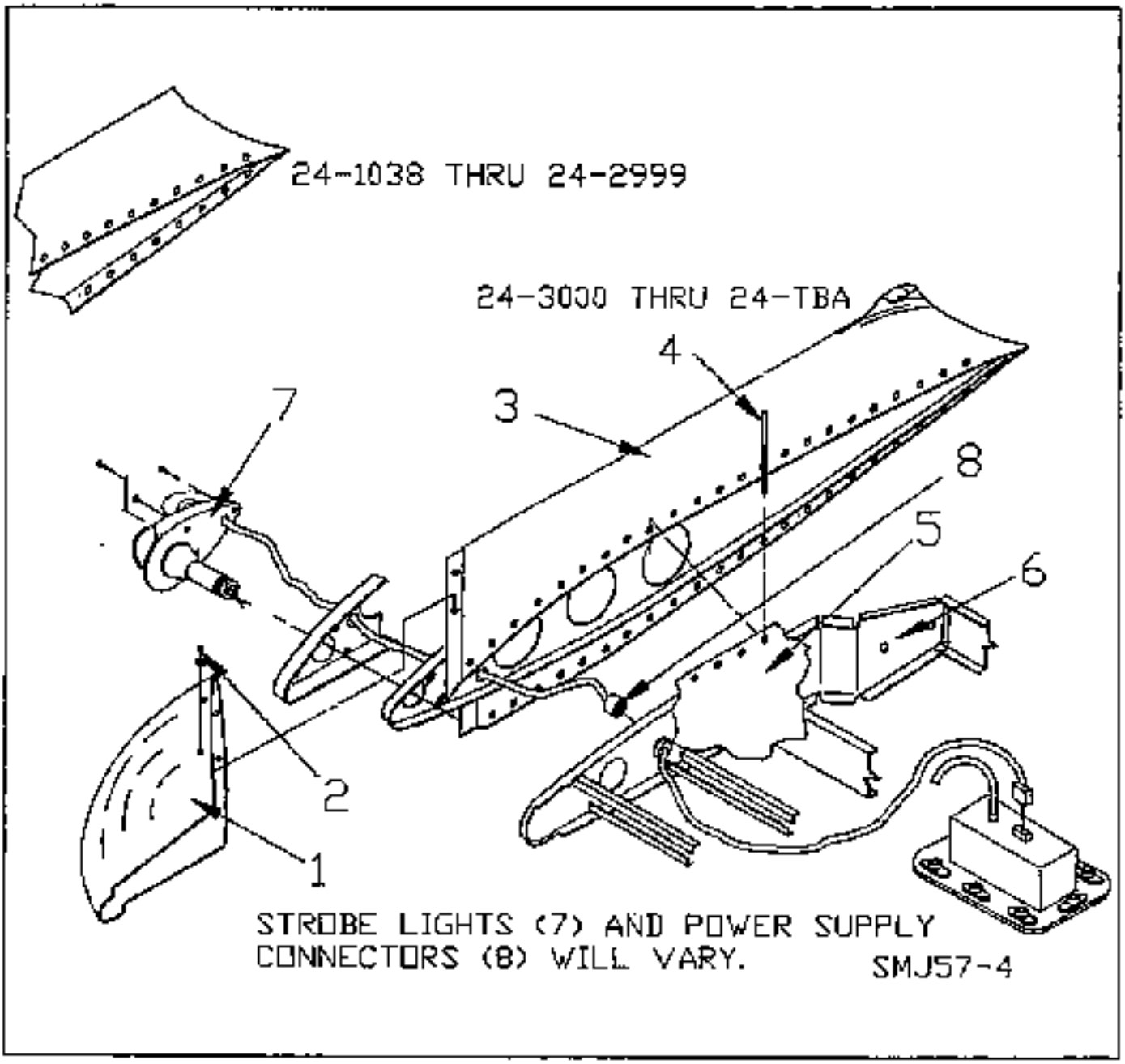
WING ATTACHING HARDWARE - FIGURE 57-1



STALL STRIP INSTALLATION - FIGURE 57-2



WING STRUCTURE - FIGURE 57-3



WING TIP ASSEMBLY (24-1038 THRU 24-TBA) . - FIGURE 57-4

B. Drill out rivets (4) holding tip to upper and lower wing skins (5). Remove all rivet shanks with a punch.

C. Carefully pull wing tip away from wing rib (6) and skins (5). Disconnect the strobe and navigation light harnesses at the quick disconnect plug (8) prior to completely removing the tip.

NOTE

The strobe or navigation lights can be removed from wing tip either before or after its removal from wing.

2. Wing tip installation.

A. Place the new or repaired wing tip in place.

CAUTION

Be sure aileron and aileron balance weights are not restricted in movement either direction.

B. Secure wing tip and drill holes to match wing skins. Cleco as holes are drilled into tip. When all holes are drilled remove wing tip assembly and deburr.

NOTE

Connect strobe and navigation light connectors (8) prior to final attachment of the tip.

C. Use Avex 1604-0412 blind rivets to attach the wing tip to the top and bottom skins.

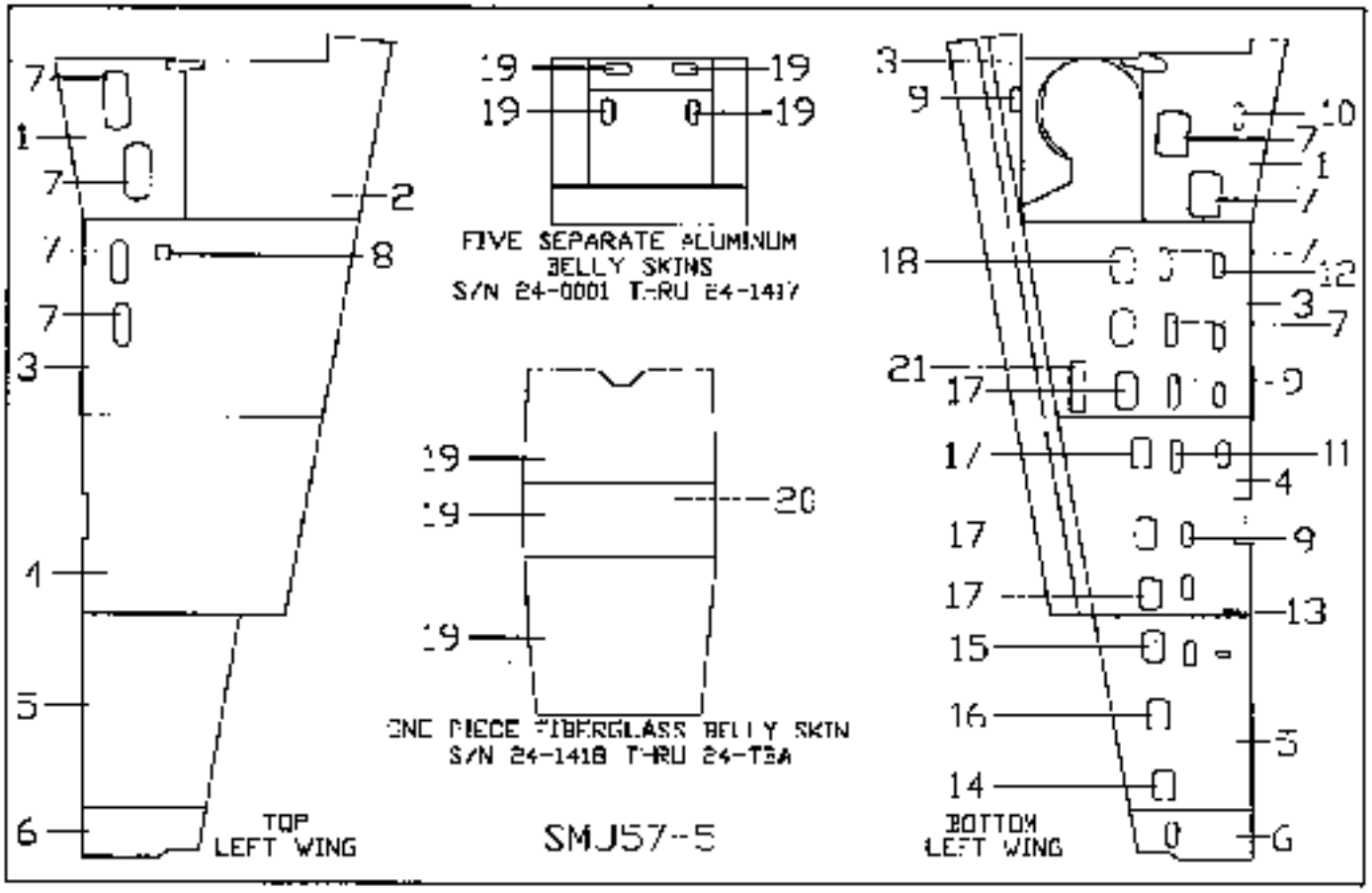
D. Repaint to match the aircraft.

57-30-00 - PLATES - SKIN

The wing access and inspection covers shown in (Figure 57-5) provide maintenance access to components, plumbing and control bellcranks enclosed within the wing.

They are flush mounted covers and when installed continue the aerodynamic contour of the wing. S/N 24-1418 and ON have a one piece fiberglass skin that can be removed to gain access to component located in that area.

NOTE
One piece belly skin panel on 24-1418 & ON



WING SKINS AND INSPECTION COVERS - FIGURE 57-5

LEGEND FOR FIGURE 57-5.

1. Wing skin - .050 thickness. (fuel tank)
2. Wing skin - .040 thickness. (fuel tank)
3. Wing skin - .040 thickness.
4. Wing skin - .032 thickness.
5. Wing skin - .025 thickness.
6. Wing skin - .025 thickness.
7. Fuel tank access.
8. Fuel tank filler.
9. Control tube guide blocks.
10. Wing - fuselage attach points.
11. OAT probe, right wing only.
12. Control tube guide blocks and flight timer.
13. Pitot post - left wing only.
14. Strobe light power supply.
15. Aileron bellcrank and control rods.
16. Auto pilot servos.
17. Gyro compass flux valve (one of these, depending on installed equipment), (left wing only).
18. Main landing gear retraction spring.
19. Elevator and rudder controls - rod end bearings, bellcranks.
20. Retraction Bungee Spring (205 only)
21. Speed Brakes (if equipped)

S/N 24-1418 & ON have a one piece fiberglass belly skin. remove for access.

NOTE

Access covers on bottom of wing that require removal for inspection intervals are secured with screws. Any access covers that are riveted in place are required for manufacturing only and NOT for routine inspections.

57-40-00 - ATTACH FITTINGS

Refer to Section 57-00-01 for wing fuselage attachment.

57-50-00 - FLIGHT SURFACES

Refer to Section 27-90-00 for flight control surfaces balancing procedures.

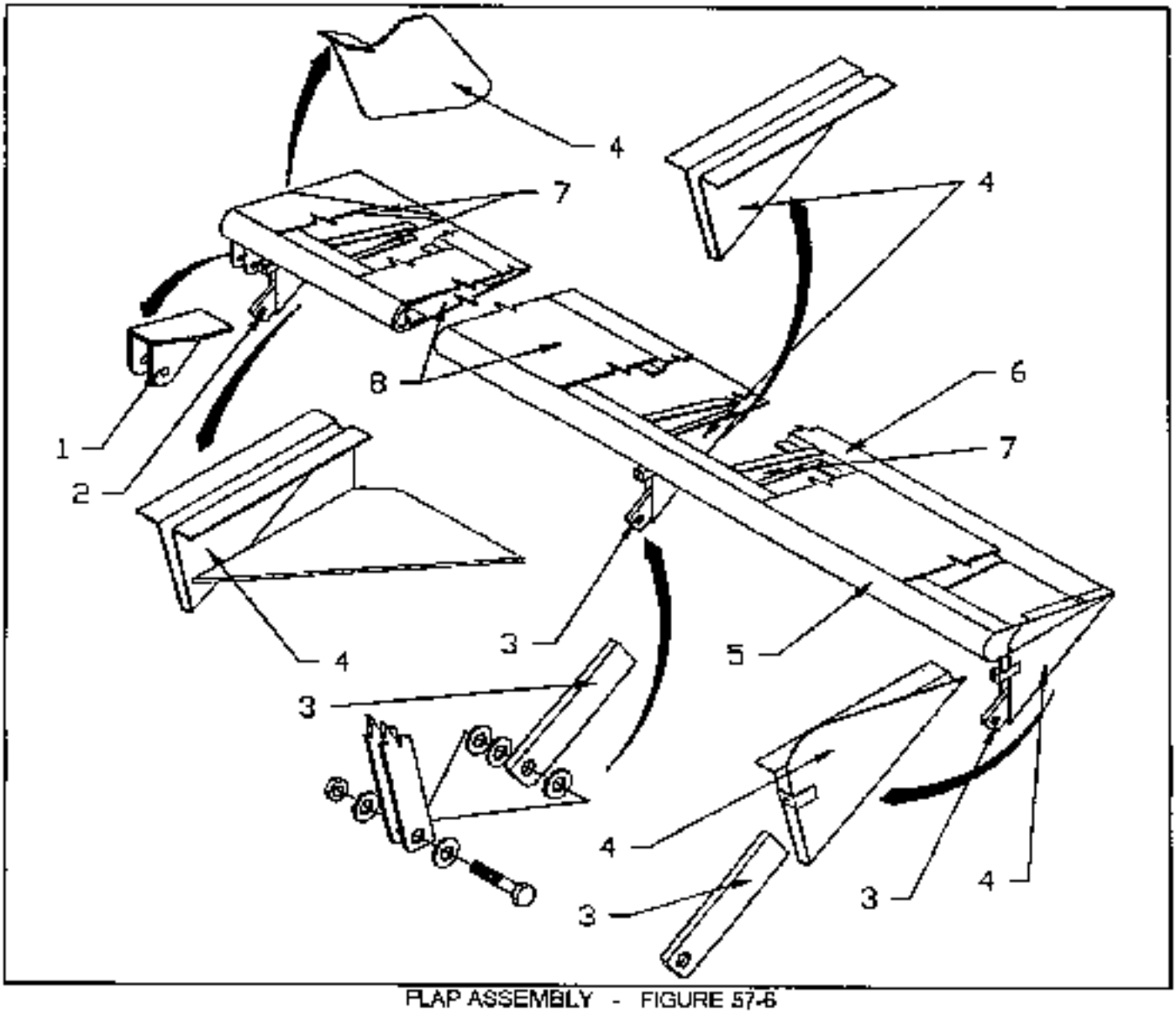
57-50-10 - FLAPS

Refer to Section 27-50-00 for maintenance and rigging procedures.

The flap actuator jack shaft is connected by a push-pull rod and bearing to the actuator bracket (1) (Figure 57-6) located just inboard of the inboard hinge (2). All four hinges (2) and (3) are faired (4) to reduce drag. The internal structure of the flaps consists of a leading edge extrusion (5) trailing edge stiffener (6), ribs (7) and top and bottom skins (8). These components are riveted together into a left hand and right hand assembly.

57-50-11 - FLAP REMOVAL AND INSTALLATION

Refer to Section 27-50-00 for removal and installation procedures.



FLAP ASSEMBLY - FIGURE 57-6

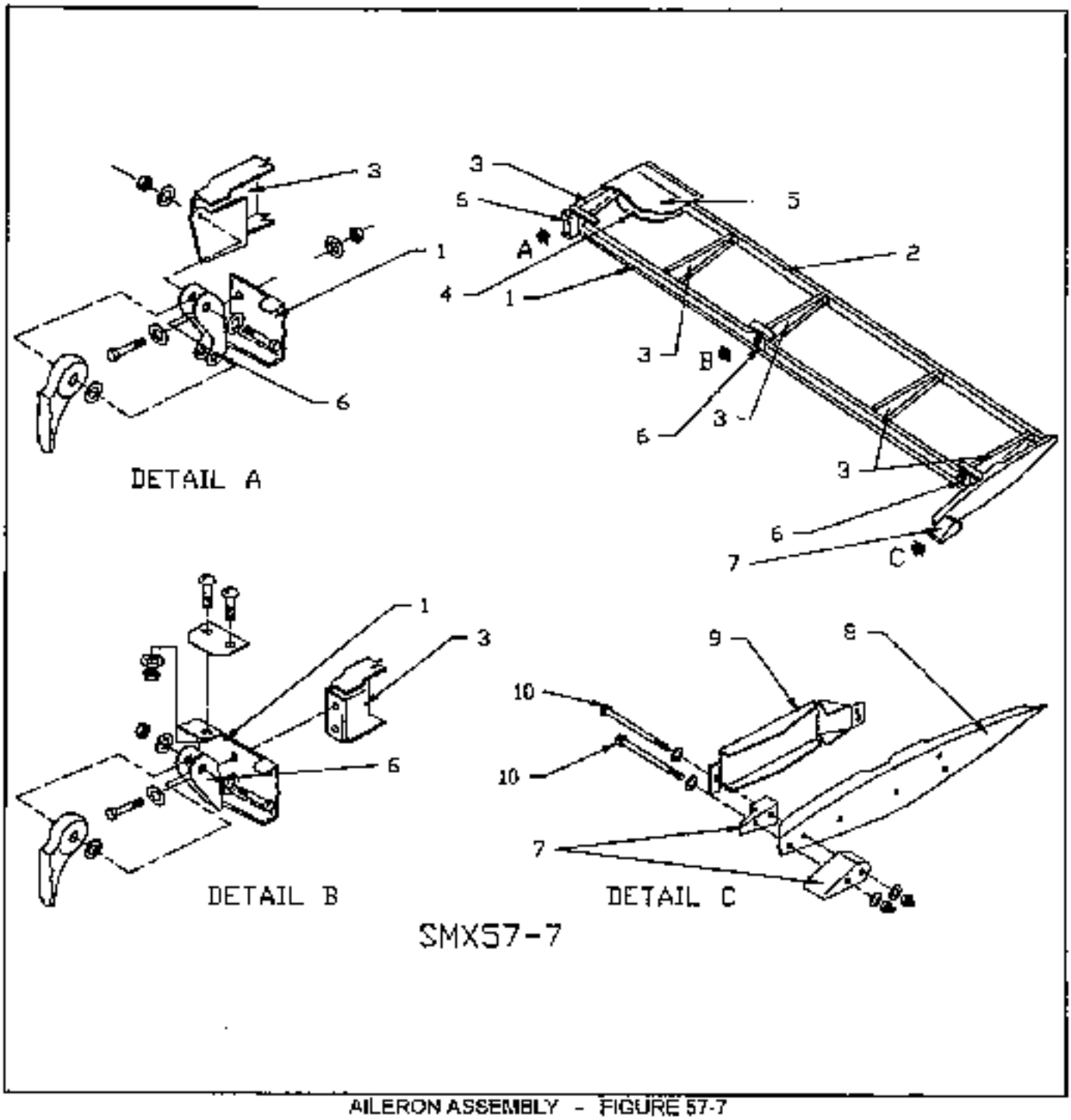
57-50-20 - AILERONS

Refer to Section 27-10-00 for maintenance and rigging procedures.

The ailerons are of all metal construction. The main spar (1), (Figure 57-7), is attached to the rear spar (2) through ribs (3). These components are riveted together and a top and bottom skin (4) and (5) riveted to this sub-assembly. To complete the control surface, hinges (6) and balance weights (7) are installed. The weights (7) are bolted (10) through an outboard rib (8) and bracket (9) on each aileron assembly.

57-50-21 - AILERON REMOVAL AND INSTALLATION

Refer to Section 27-10-00 for removal and installation procedures.



AILERON ASSEMBLY - FIGURE 57-7

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CHAPTER 60

STANDARD PRACTICES - PROPELLER

CHAPTER 60

STANDARD PRACTICES - PROPELLER

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60-00-00 - GENERAL

The standard M20J aircraft has a McCauley Propeller, controlled by a governor for constant RPM settings at the pilots discretion.

An option for the M20J is a Hartzell Propeller with Q-Tip blades.

Each propeller has its own matching spinner assembly. Repairs may be made to metal propellers in accordance with AC 43.13-1(*), and in conjunction with the definitions of FAR 43.

CAUTION

Refer to Textron-Lycoming maintenance publications for engine inspection procedures after a propeller strike.

* Current issue of AC 43.13

CHAPTER 61

PROPELLERS

CHAPTER 61

PROPELLERS

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61-00-00 - GENERAL

The propeller is a constant speed type which operates by oil pressure opposing natural centrifugal twisting moment of rotating blades and force of a spring (in McCauley propellers) to obtain correct pitch for the selected engine load. Engine lubricating oil is supplied to a power piston in propeller hub through the propeller shaft. The amount and pressure of oil supplied (0-300 PSI) is controlled by an engine driven governor. Governor oil pressure acting on a piston (and spring) increase propeller blade pitch, thus decreasing engine RPM. As governor oil pressure is reduced, centrifugal twisting moments and spring force on propeller blades decrease propeller blade pitch and increase RPM.

Propeller overhaul shall coincide with engine overhaul, but interval between overhauls shall not exceed 1500 hours (McCauley) or 2000 hours (Hartzell). Refer to propeller manufacturers' overhaul manual for complete maintenance action and time limits.

NOTE

Approved propeller shops only are authorized for overhaul or major repairs to these propellers. Refer to Federal Aviation Regulations, Part 43, (FAR 43) and Federal Aviation Agency Advisory Circular No. 43.13 (*) for the definition of major or minor repairs or alternations and who may accomplish them. (See Textron Lycoming Service and Maintenance Instructions).

61-00-10 - SPINNER DOME AND PROPELLER REMOVAL

1. Spinner dome removal (if necessary).(See **Figure 61-1**)

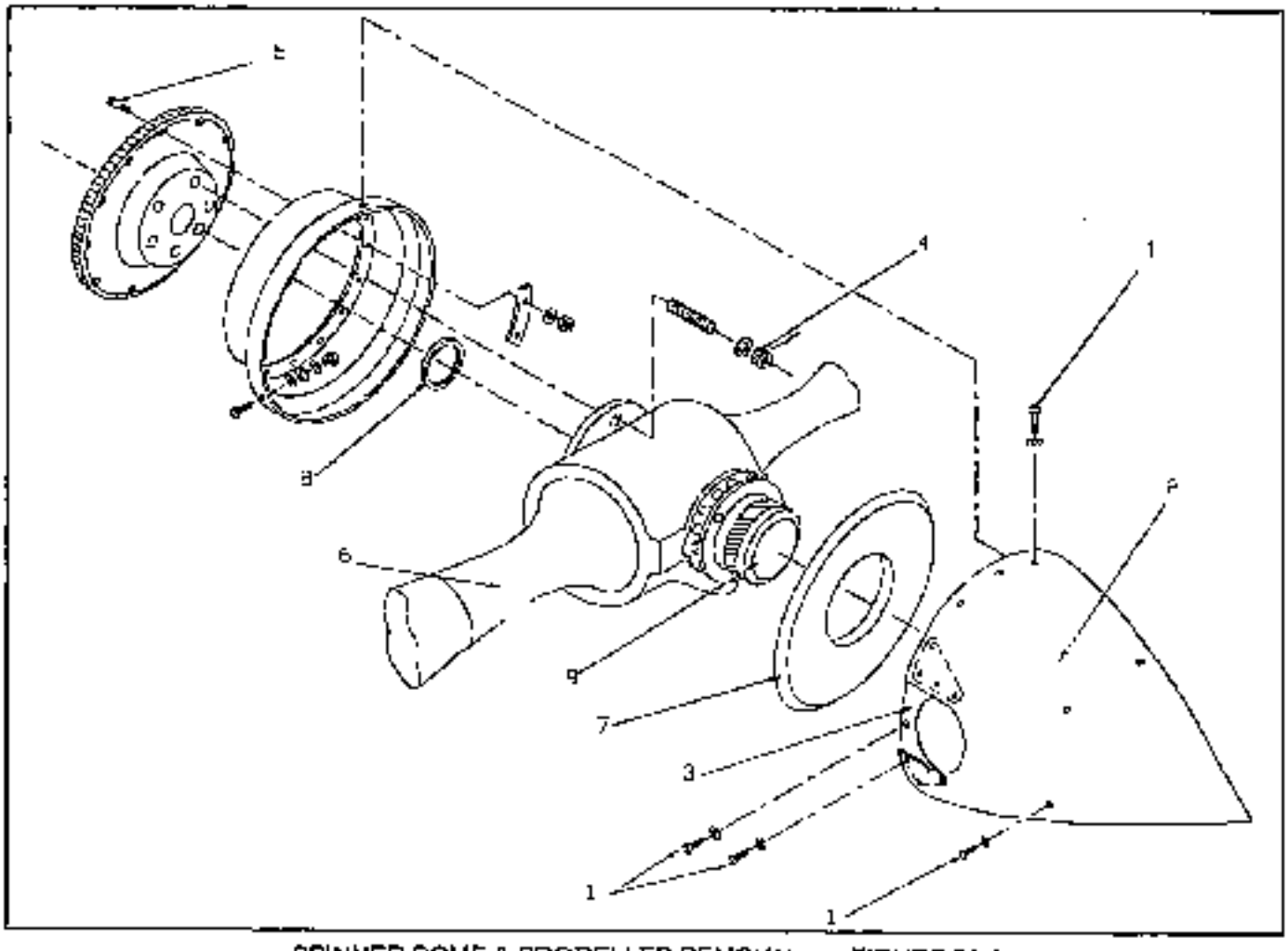
NOTE

It is not necessary to remove spinner when removing propeller assembly.

A. Remove screws (1) from spinner (2).

B. Remove doubler plates (3).

C. Remove spinner dome (2).



SPINNER DOME & PROPELLER REMOVAL - FIGURE 61-1

D. Remove safety wire and loosen bolts (4) attaching propeller to engine crankshaft, about 1/4 inch and pull propeller forward.

NOTE

Bolts (4) will have to be backed out evenly so that propeller may be pulled forward (approximately 1/4 inch at a time) until all bolts are disengaged from the engine crankshaft flange. As the propeller is separated from the engine crankshaft, oil will drain from the propeller and engine crankshaft cavities.

E. Pull propeller from engine crankshaft.

F. If necessary to remove the aft spinner bulkhead, remove bolts, washers and nuts (5) attaching bulkheads to the starter ring gear support.

NOTE

After removal of the propeller, the starter ring gear support assembly may be removed from the engine crankshaft to allow easier access of the aft spinner bulkhead attaching bolts. Loosen alternator adjusting arm and disengage alternator drive pulley belt from pulley on aft face of starter ring gear support assembly.

61-00-20 - PROPELLER INSTALLATION

1. If aft spinner bulkhead was removed, re-install on ring gear support, using bolts, nuts and washers in the reverse order of removal.

2. If starter ring gear support and aft spinner bulkhead were removed, clean mating surfaces of support assembly and engine crankshaft flange.

3. Place alternator drive belt in the pulley groove of the starter ring gear support. Fit starter ring gear over propeller flange bushings on crankshaft.

NOTE

Make sure the bushing hole in the ring gear support, that bears the identification "O", is assembled at the "O" identified crankshaft flange bushing. This bushing is marked "O" by an etching on the crankshaft flange next to the bushing. The starter ring gear must be located correctly to assure proper alignment of the timing marks on the ring gear.

CAUTION

Remove all rags or plugs placed in crankshaft or hub during propeller removal.

4. Clean propeller hub cavity and mating surfaces of propeller hub and ring gear support.

5. Lightly lubricate a new O-ring (6) (Figure 61-1) and the crankshaft pilot with clean engine oil and install O-ring in the propeller hub.

6. Align propeller mounting bolts (4) with proper holes in engine crankshaft flange and slide propeller carefully over crankshaft pilot until bolts can be started in crankshaft flange bushing.

7. Tighten bolts evenly and work propeller aft on crankshaft flange. Tighten bolts to 55-65 FT-LBS on McCauley propellers and 60-70 FT-LBS on Hartzell propellers.

8. INSTALL SAFETY WIRE THROUGH ROLL PINS SAFETYING BOLTS IN PAIRS.

9. Adjust alternator drive belt tension as outlined in Section 24-31-01.

10 Install spinner dome (5) making sure fiber washers are installed under all screws.

NOTE

The teflon tape (9) on hub (6) should be checked for smoothness of tape layers and that inner bulkhead (7) fits snug as spinner dome is being installed.

11. Conduct operational and leak check on propeller installation prior to flight.

61-10-00 - PROPELLER ASSEMBLY

No external lubrication is required on M20J propellers. Preflight inspection should be accomplished prior to each flight to determine if blades have been damaged, if any abnormal loosness is evident between hub and blades or if there is any evidence of oil leakage.

61-10-10 -MINOR PROPELLER BLADE REPAIR

1. Minor nicks, dents and gouges may be dressed out by approved personnel. Blend any nicks or gouges into the leading edge with smooth curves or generous radii as shown in (Figure 61-2). Repaint area to reduce corrosive action.

61-20-00 - PROPELLER CONTROLLING

61-20-10 -GOVERNOR INSTALLATION

1. Clean mounting pad and bottom of governor.

2. Coat new gasket w/ DOW Corning 7 compound release agent or equivalent before installation.

3. Install new gasket on mounting studs. Insure gasket has raised surface of the gasket screen toward the governor.

4. Position governor on mounting studs, aligning the governor splines and the splines of the accessory drive.

5. Install all mounting hardware. Torque nuts.

6. Connect governor control to governor and rig.

NOTE

All rigging to match governor arm loction. Do not adjust govrnor high RPM stop to match the rigging.

61-20-20 - PROPELLER GOVERNOR CONTROL RIGGING

1. Disconnect propeller governor control rod.

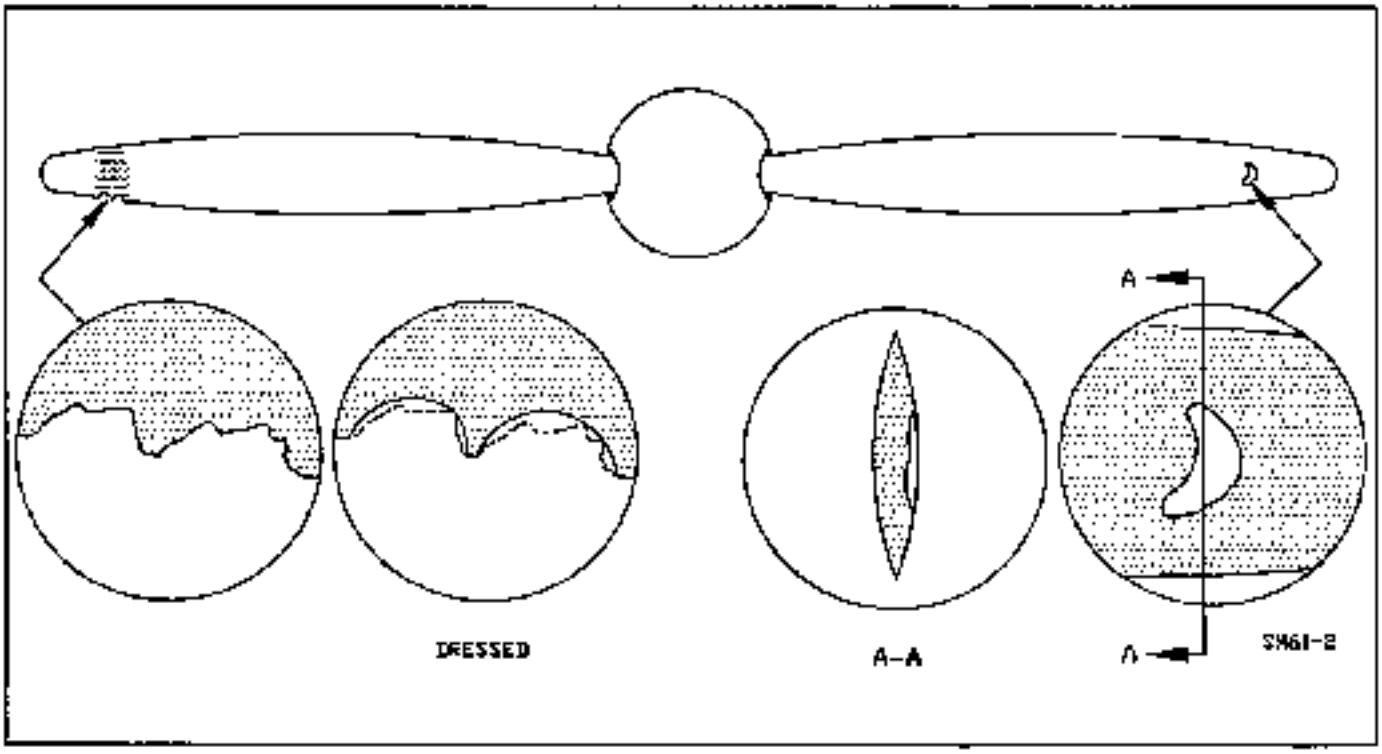
A. Remove cotter pin, nut, bolt and washers from rod end at propeller governor control arm.

B. Remove bracket installed with propeller governor mounting bolts.

C. Disconnect control rod from governor control arm.

2. Adjust control arm spring to minimum tension which will return control arm to maximum RPM.

3. Push propeller control in cockpit full forward. Pull control back approximately 1/8 inch and lock in this position.



MINOR PROPELLER BLADE REPAIR - FIGURE 61-2

4. Place governor control arm against high RPM stop screw (325 degrees from governor centerline).

5. Adjust propeller control rod end to coincide with the governor arm position.

6. Attach control rod end to governor arm and secure.

7. Operate the propeller control from cockpit to verify full travel of control arm in both directions, high RPM to minimum RPM stop.

NOTE

When propeller control rigging is complete, check controls in cockpit to be sure there is 1/8 inch cushion between control knob and adjustment nut on instrument panel. The control should not bottom out when pushed full forward.

CAUTION

Recheck safety wire, security and thread engagement on all engine controls after adjustment rigging or assembly.

NOTE

Vernier controls friction can be adjusted by loosening the lock nut on back side of panel and either tighten the nut on front of panel to increase friction or loosen the nut to decrease friction. Retighten the lock nut on back side to secure cable to the panel.

NOTE

Takeoff RPM should not exceed 2700 RPM. (Static RPM may be 50 RPM less than 2700).

61-20-30 - PROPELLER GOVERNOR ADJUSTMENT

1. Fly aircraft an drecord max. RPM at T/O or cruise flight at full power.

NOTE

No adjustment can be done before a test flight to obtain max. governor RPM.

2. Remove upper engine cowl for access to governor.

3. Loosen high RPM screw jam nut.

4. Turn screw in (CW) or out (CCW) to match RPM recorded during governor test flight. One (1) full turn of the screw equals approximately 25 RPM.

5. Tighten jam nut an make propeller control linkage adjustments as necessary to maintain full travel

6. Re-rig disconnectaed controls and reinstall cowling.

7. Perform propeller and governor operational tests. Fly aircraft and repeat governor test flight and record max. RPM in flight at max power. Repeat this process until the proper max. RPM setting is achieved.

NOTE

When installing a governor, insure the oil system is purged of all air by cycling the propeller seveal times before flight.

TROUBLE	PROBABLE CAUSE	REMEDY
Leakage: Between control shaft and head.	-Damaged O-Ring.	Replace with new O-Ring.
Between head and body.	-Damaged head and body gasket.	Replace gasket
Between relief valve plug and body.	-Damaged relief valve plug gasket.	Replace gasket.
Between body and base.	-Damaged body and base gasket.	Replace gasket.
Between governor base and engine mounting pad.	-Damaged governor mounting gasket.	Replace gasket.
	-Loose governor attaching nuts.	Retighten nuts.
	-Warped engine mounting pad.	Consult engine manual.
Inability to attain takeoff RPM during flight.	-Wrong high-RPM governor setting.	Reset governor external high RPM adjustment screw.
	-Incorrect system rigging.	Adjust control system.
	-Low engine power	Consult engine manual.
	-Erroneous reading tachometer.	Calibrate or replace instrument.
	-Sticky pilot valve.	Remove head and clean pilot valve with crocus cloth. Maintain sharp pilot valve land corners. Check for straightness of pilot valve; if bent, replace valve.
RPM fluctuates. The RPM can fluctuate +/-30 RPM.	-Sludge in governor pilot valve or relief valve.	Disassemble and clean
	-Burrs on pilot valve lands.	Disassemble and clean with crocus cloth.
	-Backlash in governor control system.	Rerig or adjust control system.
	-Sticky relief valve.	Inspect for burrs, and clean.
	-Erroneous reading tachometer	Calibrate or replace instrument.
	-Excessive oil leakage in propeller shaft transfer bearing.	Refer to engine manual.
High propeller friction.		Refer to propeller overhaul manual.
Governor function upset by malfunctioning engine.		Repair engine for smooth operation.
	-Air trapped in propeller.	Cycle Power Lever from MIN to MAX several times to purge air.
	-Sticky pilot valve.	Remove head and pilot valve. Clean away sludge and varnish. Check speeder spring ends for proper settings.
	-Bent pilot valve.	Remove head and replace pilot valve.
	-Excessive internal leakage in governor.	Check rigging and make necessary part replacements.

TROUBLE (CONT.)	PROBABLE CAUSE	REMEDY
Excessive over-speeding.	-Wrong governor setting.	Reset governor. Use test rig if available.
	-Damaged or wrong gasket between governor base and engine mounting pad.	Install correct new gasket.
	-Sticky governor pilot or relief valve.	Disassemble, clean, and check for burrs.Replace bent pilot valves.
	-Erroneous reading tachometer.	Calibrate or replace instrument.
Inability to attain positive high RPM.	-High-RPM screw adjusted too far IN, causing restricted arm travel.	Remove control arm and rotate one serration clockwise. Back out high-RPM screw to required maximum RPM.(One turn equals 27 RPM.)
Surging.	-Excessive propeller bladeseat friction	Examine propeller hub for cause of friction.

61-40-00 - PROPELLER BALANCING

Balancing of the propeller by means of an approved system is recommended to provide smoother operation. The vendor system used should be an approved system and the procedures followed very carefully. The propeller may have been balanced with another vendor system previoulsy and may require removal of old balance weights and /or other means of balancing.

Log book entries must be made when the propeller is dynamically or statically balanced

CAUTION

Place weights, washers, or whatever balance weights are specified at the locations specified by the balancing procedures. Be careful placing weights on spinner dome.

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CHAPTER 71

POWERPLANT

CHAPTER 71

POWERPLANT

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CHAPTER 71

POWERPLANT

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71-00-00 - GENERAL

The M20J S/N 24-0001 and ON has either a TEXTRON-Lycoming IO-360-A1B6D, IO-360-A3B6D or IO-360-A3B6 series engine installed. These are four cylinder, 200 H.P., fuel injected engines.

71-00-01 - ENGINE DATA

AIRCRAFT MODEL	M20J
ENGINE MANUFACTURER	TEXTRON LYCOMING
ENGINE MODEL	IO-360-A3B6D***/****
BHP (rated MAX)	200
RPM	2700
NO. CYLINDERS	4
DISPLACEMENT (Cu. In.)	361.0
BORE (Inches)	5.125
STROKE (Inches)	4.375
COMPRESSION RATIO	8.7:1
MAGNETOS	
Manufacturer	Bendix - Scintilla****
Model	D4LN-2021
	D4LN-3021
ADVANCE BTC**	25 Degrees**
VALVE ROCKER CLEARANCE (Hydraulic Tappets Collapsed)	.028 to .080
RIGHT MAG FIRES	
Top Plugs	R bank
Bottom Plugs	L bank
LEFT MAG FIRES	
Top Plugs	L bank
Bottom Plugs	R bank
FIRING ORDER	1-3-2-4
FUEL INJECTOR	
Manufacturer	BENDIX
Model	RSA-5ADI
OIL CAPACITY (QTS)	8

OIL VISCOSITY RECOMMENDATIONS	AVERAGE AMBIENT AIR TEMPERATURE	SINGLE VISCOSITY GRADES *	MULTI-VISCOSITY GRADES *
NOTE-Multi-viscosity oil is recommended for all operations.	Above 60 Deg. F	SAE 50	SAE 40 or 50
	30 Deg to 90 Deg. F	SAE 40	SAE 40
	0 Deg. to 70 Deg. F	SAE 30,SAE 40	SAE 20W-40
	Below 10 Deg. F	SAE 20, SAE 30	SAE 20W-30

ALTERNATOR	PRESTOLITE
	(24-0001 thru 24-2999) 14V, 60 AMP
	(24-3000 thru 24-TBA) 28V, 70 AMP
STARTER	(24-0001 thru 24-2999) 12V
	(24-3000 thru 24-TBA) 24V
SPARK PLUG GAP	
Fine Wire	.015 to .018
Massive	.018 to .022
MAX CYLINDER HEAD TEMP	475 Degrees F.

* Refer to latest edition of Lycoming Service Instruction No. 1014

** Refer to latest edition of Lycoming Instruction No. 1325.

*** Engine Model IO-360-A1B6D (Effective 24-0377 and earlier M20J) can be converted to an IO-360-A3B6D engine with SB M20-206 compliance.

**** S/N 24-3374 thru 24-TBA have IO-360-A3B6 engine configuration installed. This configuration utilizes two Slick Magnetos.

71-00-01 - ENGINE DATA (CON'T.)

START & WARMUP OIL PRESSURE	
Maximum	100 PSI
Minimum	25 PSI
NORMAL OIL PRESSURE	
Maximum	90 PSI
Minimum	60 PSI

71-00-10 - ENGINE REMOVAL

To assist in installation, identify and tag each part as it is removed. Plug or cap all lines, hoses, and fittings as they are disconnected.

1. Make sure that all cockpit switches are OFF.
2. Turn fuel selector valve OFF.
3. Remove engine cowling and baffles (See Section 71-10).
4. Disconnect battery ground cable
5. Remove propeller (refer to section 61-00-10).
6. Drain engine oil sump.
7. Disconnect the following:
   A. Vacuum line.
   B. Cabin heat ducts (at engine).
   C. Fuel vent lines (at firewall).
   D. Tachometer drive shaft (if installed).
   E. Oil temperature bulb.
   F. Oil pressure line.
   G. Manifold pressure line.
   H. Cylinder head temperature bulb.
   I. Breather hose.
8. Disconnect the following control linkage:
   A. Throttle control.
   B. Propeller governor control
   C. Mixture control.
   D. Alternate Air.
9. Disconnect ignition switch wires from magnetos.

WARNING
Ground magneto breaker points.

10. Disconnect engine ground strap.
11. Disconnect voltage regulator wires (opt.).
12. Disconnect alternator and starter wires.
13. Disconnect heater muff and exhaust tail pipe.
14. Disconnect fuel line at engine fuel pump.
15. Shore up fuselage at tail skid using shoring stand to prevent tail from dropping.
16. Attach hoist to lifting eye at top of crankcase. Slightly lift engine to relieve weight from engine mounts.

— Remove engine mounting bolts. —

NOTE
IDENTIFY AND MARK SEQUENCE OF WASHERS ON RUBBER BISQUITS AS WELL AS THE ORIENTATION OF THE BISQUITS FOR EACH MOUNTING POSITION.

17. Slowly raise engine. Be sure that all lines, hoses, and wires are free.

71-00-20 - ENGINE INSPECTION & REPAIR

For specific engine inspection and overhaul instructions, consult engine manufacturer's overhaul manual and service instructions. Refer to Bendix Maintenance procedures for magnetos

71-00-30 - ENGINE INSTALLATION

Reverse the engine removal procedure for installation.

1. Engine installation torque values are as follows:
   A. Spark plugs-360 to 420 Inch Lbs.
   B. Hose clamps-10 to 20 Inch Lbs.
   C. Engine shock mount bolts-450 to 500 Inch Lbs.
   D. 1/4 Inch upper engine mount to fuselage bolts—50 to 70 in-lbs.
   E. #10-32 lower engine mount attach block to fuselage-20 to 25 Inch Lbs.

NOTE
Make sure the J7763-1 Lord mounts (load bearing) are positioned aft on upper ring and forward on lower. (Gold—load bearing, Silver—non-load bearing).

2. Reinspect to see that:
   A. Propeller and spinner are properly torqued.
   B. Engine mounting bolts are properly torqued.

NOTE
Position washers same sequence as when removed.

   C. Engine controls are properly rigged and safetied. (Recheck rod-ends for proper threadgrip length.)
   D. Oil drain plugs are tightened and safetied.
   E. Oil sump is filled to eight quarts.

F. Spark plugs are tight and ignition harness is properly installed.

G. Magneto ground wires are properly installed and secured.

H. Alternator drive belt(s) tight.

I. Oil temperature bulb is tight and safetied.

J. Oil pressure relief valve plug is safetied.

K. Cylinder head temperature connection is secure.

L. Tachometer drive is secure (if installed).

M. Starter cable connection is secure.

N. Alternator(s) wiring is secure.

O. Exhaust system is secure.

P. Vacuum lines and connections are secure.

Q. Fuel connections are tight and pressure checked.

R. Manifold pressure lines are tight.

S. Oil pressure lines are tight and pressure checked.

T. Oil pressure transducer is positioned correctly so no interference with any part of engine installation.

U. Fuel injection lines are tight and pressure checked.

V. Oil filter is installed and secure.

W. Induction manifolds are secure.

X. All lines, hoses, and wires are properly anchored.

Y. Induction air filter; installed and secure.

Z. Ram Air opening between cowling and air induction duct is aligned.

AA. Heat shrouds and baffling are installed and secure.

BB. Engine area is free of loose objects, tools, etc.

CC. Cowling is instaled and secure (See Section 71-11).

DD. Cowl flap control rods are connected.

71-00-40 - ENGINE GROUND OPERATION CHECKOUT

1. Prestarting procedure (with aircraft headed into wind):

A. Turn ignition switch OFF.

B. Check magneto ground connections.

C. Check engine oil level.

D. Check fuel quantity.

E. Operate all controls through full range to check for binding.

F. Check baffles and cowling for security.

G. Open cowl flaps; check operation.

H. Drain fuel sumps, fuel selector drain or gascolator. Check for sediment and water.

I. Place wheel chocks and set parking brake.

2. Starting procedure:

A. Set propeller governor control: FULL FWD (HIGH RPM).

B. Turn fuel valve ON.

C. Set mixture control at: IDLE-CUTOFF.

D. Turn boost pump ON.

E. Open throttle 1/4. Push mixture control toward FULL RICH for 3 to 5 seconds; then return to IDLE-CUTOFF.

F. Boost pump OFF.

G. Clear propeller area.

H. Engage starter switch. When engine starts, advance mixture to FULL RICH.

I. Start engine. Check oil pressure. If no oil pressure is indicated within 30 seconds, shutdown engine and trouble shoot oil system. Refer to AVCO LYCOMING maintenance publications for procedures.

J. Set throttle for 900 to 1000 RPM for one minute; then, advance throttle slowly to 1200 RPM for engine warmup.

3. Ground run and warmup. Always head the aircraft into the wind during warmup. Always select HIGH RPM blade-angle setting when ground running the engine. NEVER idle for extended periods at LOW RPM (LOW RPM WILL FOUL SPARK PLUGS). Always operate with the mixture control at FULL RICH, and maintain RPM in the 1000 to 1200 RPM range during warmup and ground run.

A. Warm up engine until temperature indications are normal. Monitor cylinder head and oil temperature instruments for overtemperature.

B. Check magnetos at 1900-2000 RPM with propeller at HIGH RPM blade angle. Switch ignition-starter switch from BOTH to LEFT to check magneto drop. Switch back to BOTH until RPM returns to normal. Switch from BOTH to RIGHT and check magneto drop. Return switch to BOTH. magneto drop should not exceed 175 RPM on either magneto (drop should be within 50 RPM of each other). A smooth drop off past normal is usually a sign of too lean or too rich mixture. If no drop in RPM, check for open or broken P-leads.

71-00-60 - FUEL INJECTION SYSTEM MAINTENANCE

For injection system inspection and overhaul instructions, consult engine manufacturer's overhaul manual and service instructions.

The fuel injection system consists of the following major components:
(1) the fuel injector assembly comprised of the servo regulator, fuel control, and airflow sensing system; (2) the flow divider; and (3) the four air bleed nozzles. The fuel injection system operates by measuring airflow through the throttle body of the servo valve regulator control and using this measurement to operate a servo valve within the control. This regulated pressure controls the distributor valve which schedules fuel flow in proportion to airflow.

71-00-61 - FUEL INJECTOR IDLE SPEED & MIXTURE ADJUSTMENT

1. For operation in normal or low ambient temperature conditions, adjust idle and mixture as follows:

A. Start engine and warm up in the usual manner until oil and cylinder head temperatures are normal.

B. Check magnetos. If magneto drop is normal, proceed with idle adjustment.

C. Close throttle to IDLE, approximately 600 RPM. If RPM changes appreciably after making idle mixture adjustment during succeeding steps, readjust idle speed to desired RPM.

NOTE
Idle mixture must be adjusted with fuel boost pump on.

D. When idling speed has stabilized, pull mixture control smoothly and steadily toward idle cutoff, and observe tachometer for an RPM change during leaning process. Care must be exercised to return the mixture control to full rich before RPM can drop to where engine cuts out. An increase of more than 50 RPM while leaning indicates an excessively rich mixture. An immediate decrease in RPM (if not preceded by a momentary increase) indicates idle mixture is too lean.

E. If above check indicates that mixture is too lean or too rich, turn idle mixture adjustment in direction required for correction.

F. Repeat step D. to check new position.

G. Make additional adjustments and checks as required.

NOTE
Each time idle speed mixture adjustment is changed, Runup to 2000 RPM to clear engine before proceeding with step D. Allowance should be made for weather and field altitude when adjusting idle mixture.

NOTE
If above procedures do not result in stabilized idle speed, check idle linkage for looseness.

2. For operation in high ambient temperature conditions, adjust idle and mixture as follows:

A. Adjust idle to 700-750 RPM, or as high as practical.

B. In the cool of the morning, adjust mixture to provide a 50 RPM rise when the mixture control is slowly pulled to idle cutoff.

C. Maintain cooling airflow by keeping engine RPM as high as practical during ground runup.

71-00-70 - STARTER SYSTEM MAINTENANCE

Refer to Section 80 for starter system maintenance procedures.

CAUTION
Do not operate starter in excess of 30 seconds; allow cooling time before re-engaging.

71-00-80 - ENGINE MIXTURE CONTROL RIGGING

1. Disconnect mixture control.

A. Remove cotter key.

B. Remove nut, bolt, and two washers from clevis and mixture control arm.

2. Reconnect mixture control.

A. Reverse disconnect procedure to reconnect mixture control.

3. Adjustment of mixture control arm.

A. Loosen locknut on control rod end and adjust control arm rod as required.

B. Check for full travel.

C. Check for proper thread grip.

D. Secure locknut.

71-00-90 - TROUBLE SHOOTING

71-00-91 - STARTER TROUBLE SHOOTING

See Section 24-39-04 for procedure. TEXTRON-LYCOMING OPERATORS MANUAL should be consulted.

71-00-92 - ENGINE TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Engine will not start.	-No fuel.	Check fuel system for leaks. Fill fuel tanks. Clean lines, strainers, and fuel valves.
	-Incorrect throttle setting.	Open throttle 1/4.
	-Defective spark plugs.	Clean and adjust or replace spark plugs.
	-Defective ignition wire.	Check with tester and replace defective wires.

TROUBLE	PROBABLE CAUSE	REMEDY
	-Improper magneto operation.	Clean points. Check timing.
	Internal failure.	Check oil screens for metal particles; if found, remove foreign material and overhaul engine.
Engine does not idle properly.	-Incorrect idle mixture.	Adjust mixture control.
	-Incorrect idle speed.	Adjust idle speed.
	-Induction system leak.	Tighten all connections and replace any defective parts. Clean injector nozzles.
Low power and uneven running.	-Mixture too rich as indicated by black exhaust stacks. (Extremely rich mixtures are indicated by black exhaust smoke.)	Readjust fuel injector.
	-Mixture too lean as indicated by overheating and backfiring.	Check fuel lines for restrictions. Readjust mixture. Clean injector nozzles.
	-Leak in induction system.	Tighten all connections and replace defective parts.
	-Defective spark plugs.	Clean and gap or replace spark plugs.
	-Improper fuel.	Drain and fill tanks with recommended grade of fuel.
	-Magneto breaker points not working properly	Clean points and check timing.
	-Defective ignition wire.	Check with tester and replace defective wires.
	-Defective spark plug terminal connectors.	Check and replace connectors if required.
Engine does not develop full power.	-Leak in induction system.	Tighten all connections and replace defective parts.
	-Partial clogging of injector nozzle or fuel screens.	Clean nozzle or fuel screens.
	-Throttle lever out of adjustment.	Check throttle linkage travel.
Improper fuel flow.		Check strainers. Check flow at fuel injector.
	-Restriction in air scoop.	Examine air scoop and remove obstruction.
	-Faulty ignition.	Check ignition system.
Rough running engine.	-Cracked engine mount.	Replace or repair mount.
	-Partial clogging of injector nozzles or fuel screens.	Clean nozzles or fuel screens.
	-Defective mount bushing.	Replace bushing.
	-Uneven compression.	Check compression.
	-Damaged, out of track, or unbalanced propeller.	Check propeller, track, and balance.
Low oil pressure.	-Insufficient oil.	Fill sump with oil and inspect screen and filter for metal particles after running engine. If particles are found, overhaul engine.
	-Stuck relief valve.	Check and replace if necessary.

TROUBLE	PROBABLE CAUSE	REMEDY
	-Air lock or dirt in relief valve.	Remove and clean oil relief valve.
	-Dirty oil strainers	Remove and clean strainers.
	-High oil temperature.	See "High Oil Temperature" in Trouble column below.
	-Defective pressure gauge.	Replace gauge.
	-Obstruction in oil pump intake passage.	Check for obstruction.
	-Defective pressure transducer.	Replace transducer. (Do not over torque fittings).
High oil temperature.	-Insufficient oil supply.	Fill sump with oil of recommended grade and inspect engine for metal particles in screen and filter after running engine. If particles found overhaul engine.
	-Low grade of oil.	Drain and fill sump with oil conforming to specifications.
	-Stuck thermostatic valve.	Check and replace as necessary.
	-Clogged oil lines or strainers.	Clean oil lines and strainers.
Excessive blow-by.		Check compression. Check for worn or stuck rings.
	-Oil cooler restriction.	Check and replace.
	-Failing bearings.	Check oil strainers for metal particles; if found, remove foreign material and overhaul engine.
	-Defective temperature gauge.	Replace gauge.
Excessive oil consumption.	-Low grade of oil.	Drain and fill sump with oil conforming to specifications.
	-Failing bearings.	Check sump for metal particles.
	-Worn rings.	Install new rings.
	-Improper piston ring installation.	Install new rings.
	-Failure of rings to seat.	Use mineral-base oil. Climb to cruise altitude at full power; operate at 75 percent power or higher until oil consumption stabilizes.

71-10-00 - ENGINE COWLING

The engine cowling is in two sections. The lower cowl (S/N 24-0001 thru 24-3153) contains the ram-air inlet, landing light and cowl flaps. S/N 24-3154 thru 24-TBA contain only the cowl flaps. Quick-disconnect fasteners attach the cowling panels. The oil filler access door is in the top cowling section.

71-10-01 - ENGINE COWLING CLEANING, INSPECTION & REPAIR

Clean cowl by spraying with solvent (PS-661 or equivalent) and wiping clean. After cleaning, inspect cowling for dents, cracks, and loose fasteners. Repair defects.

71-11-00 - COWLING REMOVAL

71-11-01 - TOP COWLING

1. Remove two (2) screws from top cowling on each inboard side of engine cooling air intakes.

2. Remove (1) screw from each side of top cowling, forward and outboard. Then unlatch cam locks on each side.

3. Unlatch cam locks on the aft edge of the top cowling just ahead of windshield.

4. Carefully lift top cowling off.

71-11-02 - BOTTOM COWLING

1. Disconnect landing light wiring connectors near firewall. (24-0001 thru 24-3153)

A. Cut ty-raps securing insulating tubes over knife disconnects.

B. Slide insulating tubes up wire harness toward firewall.

C. Disconnect knife disconnects and slide insulating tube back over disconnect.

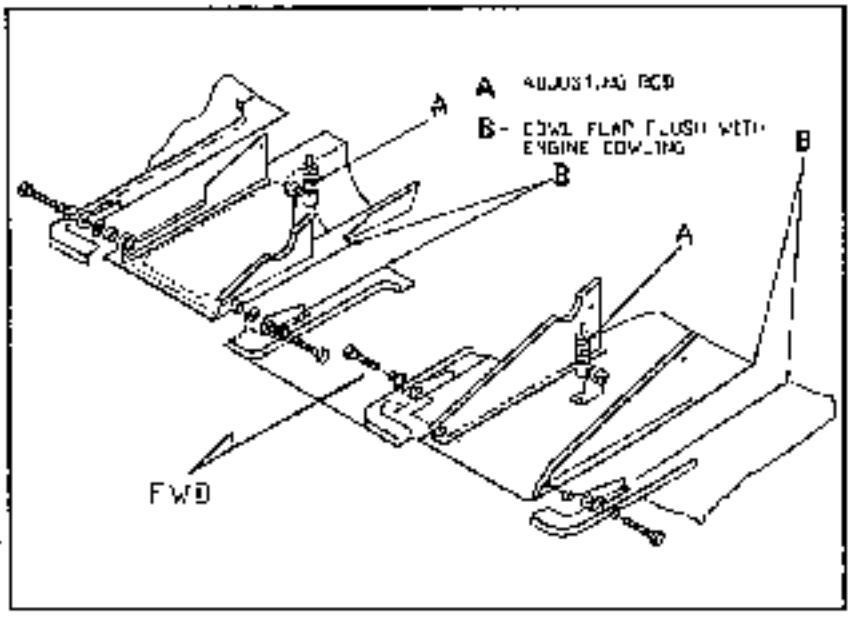
2. Disconnect cowl flap control rod ends at the quick disconnects located on the cowl flap brackets. See Figure 71-1.

NOTE
Reach up through the cowl flap opening to disconnect cowl flap control rods.

3. Unlatch cam locks located on bottom of cowling between or around the cowl flaps.

4. Unlatch the remaining cam locks on bottom cowling while supporting the cowl.

5. Carefully lower cowling clear of spinner and remove from aircraft.



COWL FLAP RIGGING (24-0001 THRU 24-2999) FIGURE 71-1

71-12-00 - COWLING INSTALLATION

NOTE
Check condition of tape on firewall flange where cowling rests. It is recommended that vinyl tape be replaced with polyethylene tape,(3M tape, P/N 5421, (UHMW) 1" wide). This will decrease the streaking during wet weather.

71-12-01 - BOTTOM COWLING

1. The bottom cowling is installed first in reverse sequence of removal.

CAUTION
Be sure landing lights and cowl flaps are connected prior to installation of top cowling. (24-0001 thru 24-3153)

71-12-02 - TOP COWLING

1. The top cowling is installed in reverse sequence of removal.

71-13-00 - ENGINE COWL FLAPS

71-13-01 - COWL FLAP RIGGING

(24-0001 thru 24-2999)

1. Adjust both the left and right cowl flaps so that in the closed position the outboard trailing edges are flush with the lower engine cowling, (Figure 71-1) (B) Maintain .06 - .12 in. "cushion" on cowl flap control at the instrument panel when cowl flaps are closed. The scissors should be in an overcenter position when cowl flaps are closed.

NOTE
For improved cooling during summer months or above normal temperature operations, cowl flaps may be rigged to have a .25 max inch gap at "B" when at the closed position.

71-13-02 - COWL FLAP RIGGING

(24-3000 thru 24-TBA)

The cowl flaps are activated UP and DOWN by an idler arm connected, by a push-pull rod, to the actuator arm on a geared motor. A cowl flap switch, located on the cockpit console directly under the mixture control, activates the geared motor. The switch has three positions: a center (OFF), an up (CLOSED) and a down (OPEN) position. The cowl flaps may be positioned to any angle by selecting the switch either UP or DOWN until the desired position, as shown on the position indicator, has been reached. Then return the switch to the center (OFF) position. Limit switches, which are not adjustable, prevent the cowl flaps from exceeding the full open or full closed position.

A cowl flap position indicator is located on the cockpit console adjacent to the flap switch. The indicator is operated by a cable connected to the actuator arm and routed to the indicator on the console (24-0001 thru 24-3410). A potentiometer electrically controls the LED indicator for 24-3411 thru 24-TBA).

The cowl flaps are rigged for a flush contour between the cowl flaps trailing edges and cowling, when in the closed position. Adjust per following procedures:

1. With the cowl flaps open, adjust the linkage rods from the idler arm to the cowl flaps to their maximum length.

2. Close the cowl flaps and measure the distance between the cowl flaps trailing edges and cowling.

3. Open the cowl flaps and readjust the linkage rods, decreasing the length by the measured amount.

4. Close the cowl flaps and ensure that cowl flaps are not outside the cowling contour or that the cowl flaps are not preloaded against the nose gear box.

Readjust as required.

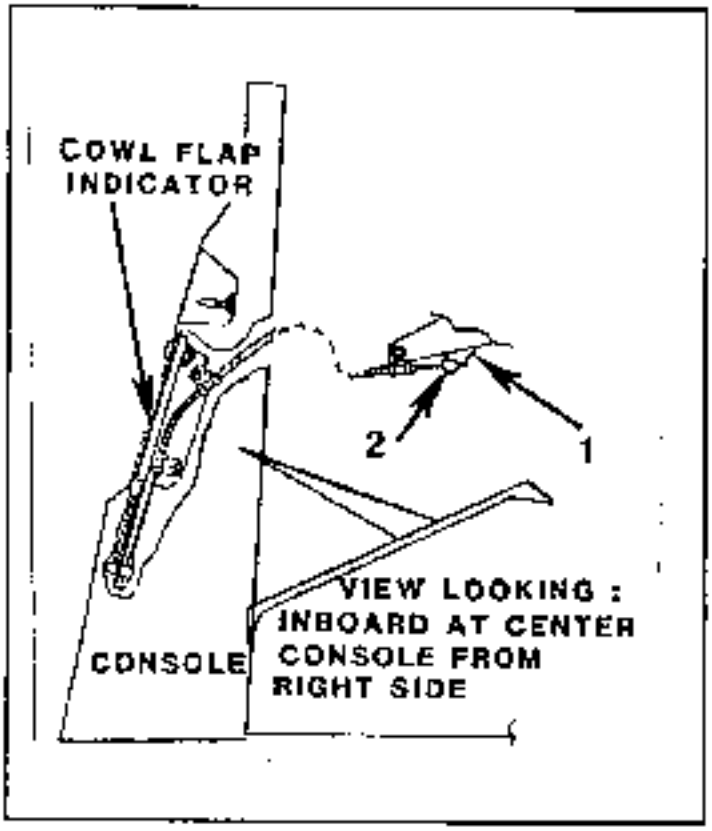
71-13-03 - COWL FLAP INDICATOR ADJUSTMENT (24-3000 THRU 24-3410)

1. Position the actuator and indicator in the down position.

2. Insert cable thru drilled bolt (2) in actuator arm (1) and tighten. Reference Fig. 71-2.

3. Cycle cowl flaps actuation system a minimum of five times to insure free movement of the indicator.

4. Readjust push-pull cable wire at actuator arm, as required, for proper indicator travel and secure.



COWL FLAP INDICATOR RIGGING - FIGURE 71-2 (24-0001 THRU 24-3410)

71-13-04 - COWL FLAP INDICATOR ADJUSTMENT (24-3411 THRU 24-TBA)

1. Position cowl flaps in closed position.

2. Adjust cowl flap potentiometer on aircraft, to illuminate top bar in display.

3. Position cowl flaps to OPEN position.

4. Adjust R1 on A/D board, if necessary, to illuminate bottom bar on display.

5. Repeat steps 2 through 4, until no further adjusment is required.

6. Cycle cowl flap system to verify proper movement of indicator.

71-30-00 - FIRESEALS

Firewall fireseals and grommets, if removed and replaced for any reason, should be sealed after routing the cable or wire assembly from the engine compartment into the cockpit area. After installation cover cable or wire and grommet underneath the fireseal with Coast Pro-Seal 700 on engine side of firewall.

71-50-00 - AIR INTAKES

The engine cooling air intakes and exits are calculated for optimum cooling requirements and minimum drag. Normal engine operating temperatures are at the optimum to facilitate engine efficiency.

The engine induction air intake is an aluminum duct that picks up impact air and routes it through the air filter to the engine injector assembly. The air intake system includes a RAM AIR intake system that is manually operated (24-0001 thru 24-3153).

71-50-01 - ENGINE INDUCTION SYSTEM MAINTENANCE -

Ram air enters through a port in the lower cowling and is ducted to the fuel injector. On S/N 24-0001 thru 24-3153 a Ram Air control moves a two-position door in the ram-air duct to permit the selection of filtered or unfiltered direct ram air.

A spring-loaded valve in the induction system intake duct permits alternate air to enter the engine from within the engine cowling. The alternate air door should be inspected for proper preload and condition per 100 hour inspection in SECTION 5-20-06, 1, G.

CAUTION
Check security of seal to induction box door. Use EC1403 or EC1300L adhesive to secure seal to door.

A dry-type, panel, air filter mounts in the air intake duct. Filter maintenance is directly related to engine wear; therefore, the filter should be removed and cleaned every 25 hours or more frequently under dry and dusty operating conditions. Replace the filter after 500 operating hours or once each year, whichever occurs first.

1. Clean the dry-type induction air filter with compressed air. (Ref. to Section 12-20-01). Replace the filter if it has a damaged housing, torn element, or damaged gaskets.

2. Reverse the air filter removal procedure for reinstallation. Make certain that the filter is tightly sealed and securely fastened in place.

71-51-00 - AIR INTAKE DUCT REPLACEMENT

When the air induction duct must be replaced it is essential that the duct be positioned exactly as the original installation to prevent any interference with the cowling.

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ENGINE

CHAPTER 72

ENGINE

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72-00-00 - GENERAL

Refer to TEXTRON-Lycoming Operators Manual No. 60297-12 and Overhaul and Maintenance Manual No. 60294-7 for detailed information on above topics.

72-50-00 - ENGINE LUBRICATION SYSTEM MAINTENANCE.

The engine lubrication system is a full-pressure, wet-sump system with a gear-driven pump. An oil cooler attaches to the firewall on the M20J model. The oil filter is located at the rear end of the oil sump. (Oil pressure: 60 PSI MIN, 90 PSI MAX, 25 PSI at IDLE, 100 PSI MAX during engine warmup).

1. Filter Servicing.

A. Oil Filter Removal and Installation.

(1). Remove old filter and replace with new filter after light film of oil has been spread on gasket. Tighten to a torque of 18 - 20 ft. Lbs.

2. Oil Pressure Relief Valve. The oil pressure relief valve maintains oil pressure within specified limits. The valve is not adjustable; however, the addition of a maximum of three (TEXTRON-Lycoming P/N STD 425) washers under the cap will increase pressure. Using a spacer (Lycoming P/N 73629 or 73630) under the cap decreases pressure. The oil relief valve should be disassembled, inspected, and cleaned when excessive fluctuations in oil pressure are noted.

3. Oil Cooler Thermostatic Bypass Valve. The oil cooler thermostatic bypass valve or vernatherm valve is not adjustable. This valve allows oil to bypass the oil cooler when the cooler becomes obstructed or when oil congeals in the cooler due to low ambient temperatures.

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CHAPTER 73

ENGINE FUEL SYSTEMS

CHAPTER 73

ENGINE FUEL SYSTEMS

LIST OF EFFECTIVE PAGES

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73-00-00 - GENERAL

The engine and its accessories are certificated under TEXTRON-Lycoming Type Certificate. Refer to Lycoming Operators or Overhaul Manual for specific instructions.

73-30-00 - INDICATING

73-31-00 - FUEL FLOW SYSTEM - GENERAL SYSTEM DESCRIPTION

The Fuel Flow totalizer system utilizes the latest in microcomputer technology products. The fuel flow system is designed to maximize the efficiency of fuel system management by displaying the fuel consumption rate (fuel flow) of the engine and the precise amount of fuel the engine has consumed. This information is displayed in one of the following formats, US Gallons, Pounds,Liters or Imperial Gallons (Alcor) depending on internal switch arrangement, see (Figures 73-1 and 73-2).

The system consists of a panel mounted instrument and a fuel flow transducer which is installed in the aircraft fuel line.

The system is designed for use in all single engine fuel injected aircraft having no more than 60 GAL/HR continuous consumption or 78 GAL/HR intermittent consumption, (Take Off power).

73-31-01 - PANEL MOUNTED INSTRUMENT

The panel mounted instrument contains all system electronics and may be divided into four groups.

FT-101 (SYMBOLIC DISPLAYS- SDI)

1. DISPLAY - The display uses one mini lamp and four seven segment incandescent digits that are fully sunlight readable and dim automatically during night and low light flight conditions.

2. MICROPROCESSOR - The microprocessor in the FT-101 contains a crystal controlled oscillator that controls all timing and computing functions for precise fuel flow and totalizing computations.

3. POWER SUPPLY - The FT-101 power supply is a high speed switching regulator type for optimum efficiency and the lowest possible power drain on the aircraft electrical system.

4. MEMORY - The FT-101 microprocessor continuously stores and updates the totalized fuel quantity in a random access memory chip. The Total Fuel Used quantity is retained during aircraft shut down by connecting the FT-101 memory wire to the aircraft battery through a memory switch. The drain on the aircraft battery is small due to the low power CMOS memory chip which uses only 0.7 milliamps at 12 VDC.

5. INTERNAL SWITCH ARRANGEMENT - The programming switch block (see Figure 73-2) located inside the FT-101 panel mounted unit has several arrangements to change data readout if desired. Switches S1 and S2 (see Figure 73-1) should not be changed unless the transducer "K" factor of a replacement transducer differs from the original unit's "K" factor (see Section 73-31-02, 3, for "K" factor description).

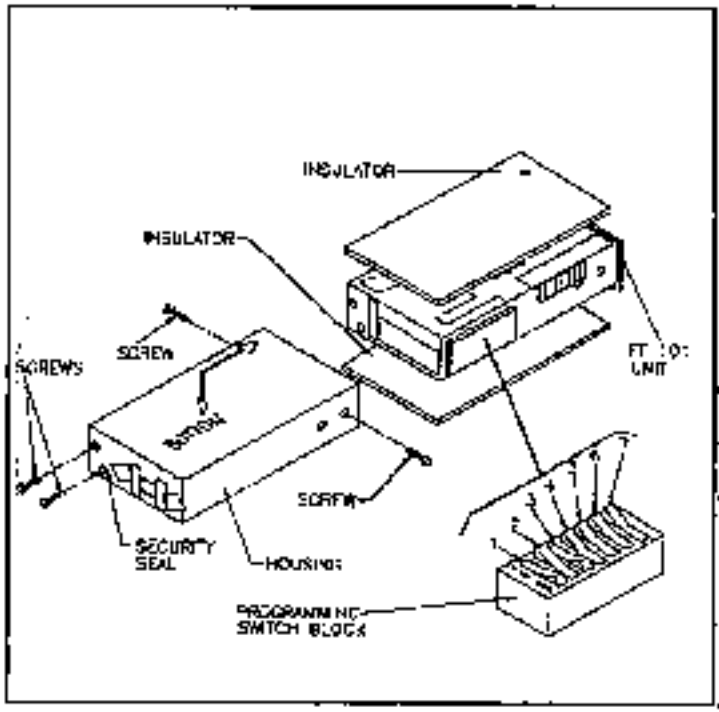
S3 thru S7 can be positioned in various arrangements to change fuel flow readout to gallons, pounds or liters as the situation may require, (see Figure 73-1).

FT-101 SWITCH ARRANGEMENT

K-FACTOR	SWITCH ARRANGEMENT S1	S2
L	ON	ON
M	ON	OFF
H	OFF	ON
HH	OFF	OFF

FUNCTION	SWITCH ARRANGEMENT S3	S4	S5	S6	S7
GALLONS	ON	OFF	OFF	NA	NA
POUNDS	OFF	ON	OFF	NA	NA
LITERS	OFF	OFF	ON	NA	NA

FT-101 TRUTH TABLES
FIGURE 73-1



FT-101 SWITCH ARRANGEMENT - FIGURE 73-2

TRU FLOW 1 (ALCOR)

1. DISPLAY - The unit features a liquid crystal display (LCD) to indicate fuel flow and total fuel used simultaneously. The display is back lighted and features automatic dimming through a photo sensor.

2. ELECTRONICS - The TRU FLOW 1 amplification system is located in the indicator away from the engine environment. The TRU FLOW 1 operates on a low power requirement and is protected against voltage surges.

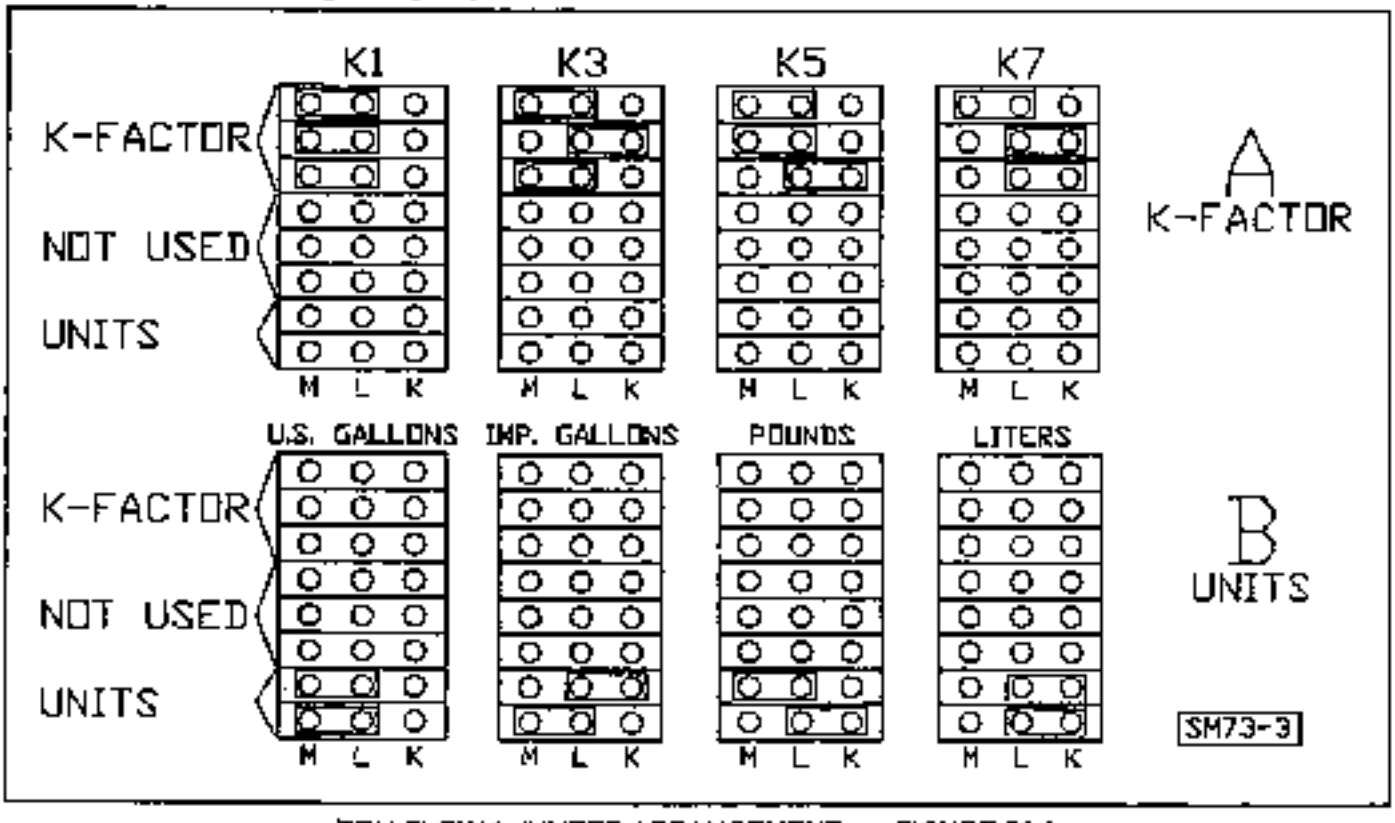
3. MEMORY - The TRU FLOW 1 microprocesser continously updates and stores the total fuel used quantity. The total fuel used quantity is retained during aircraft shutdown through a low power drain memory circuit connected to the battery.

4. INTERNAL CONTACT ARRANGEMENT - The configuration selection block, located inside the TRU FLOW 1 indicator has several arrangements to change data readout if desired. Jumpers should not be changed unless the K-factor of the transducer has changed due to replacement. (See Section 73-31-02, 3, for K-factor description). Refer to Figure 73-3 for Alcor contact arrangement.

CAUTION

Some components in the indicator can be damaged by static electricity. Dissassemble the indicator at a static controlled workstation. DO NOT LEAVE THE INDICATOR UNTIL IT HAS BEEN REASSEMBLED.

STEP 1. Remove 4 screws (2 on rear of indicator, which also removes connector latch, and 2 on side). Then remove electronic assembly by simultaneously pushing on rear connector and pulling on front bezel. DO NOT BEND THE BOARD CONNECTOR PINS.



TRU-FLOW 1 JUMPER ARRANGEMENT - FIGURE 73-3

STEP 2. Remove front bezel assembly from main assembly by grasping edges and slowly pulling bezel from main assembly.

STEP 3. Remove one of the two screws holding the main assy. boards to the standoff. Separate the boards by grasping the edges and pulling them apart. DO NOT BEND THE PINS.

STEP 4. Locate the circuit board and the CONFIGURATION SELECTION BLOCK inside the indicator.

STEP 5. Determine the K-factor to be selected to match the K-factor of the Flowscan 201-B transducer. Use one of the following K-factors to match:

Flowscan Transducer Code		Alcor K-Factor Code
L	EQUATES TO	K7
M	"	K5
H	"	K3
HH	"	K1

Arrange the jumpers according to Figure 73-3, part A

STEP 6. Determine the desired unit of measurement. Reposition the jumpers according to the examples in Figure 73-3, part B.

STEP 7. Print the K-factor and unit of measurement on the dot label located on the back of the indicator case.

STEP 8. After repositioning the jumpers, reassemble the indicator in the reverse order of disassembly. CAREFULLY LINE UP THE PINS.

STEP 9 After reassembly, power up indicator and check configuration. For approximately 2 seconds the right side of the indicator display will depict numbers that indentify the configurations of units.(Figure 73-5).

STEP 10. If fuel flow or quantity used totals do not match actual values after several hours of flying contact the manufacturer (Alcor) for trouble shooting procedures.

NOTE

Reposition the jumpers by grasping with needle nose pliers and pulling straight up to remove them, then reinsert to select the appropriate K-factors and units.

SHADIN SYSTEM

SHADIN SYSTEM MEMORY

System includes a non-volatile memory for retaining basic settings and Fuel Remaining and Fuel Used during power shut down.

TEST FUNCTIONS AND ERROR MESSAGES

Press "TEST" button. Program checks hardware and display. If test is successful, "good" is displayed; if not "bad" is displayed and system is to be considered unserviceable until corrective action is taken.

When "test routine" is completed, system will display the following:

1. Software basic # and revision level.

2. K factor setting in flow window (pulse count per gallon). This number MUST match pulse count stamped on fuel flow transducer, otherwise errors will occur.

3. Display units (Gal., LB 5.8), part of checking internal settings.

4. Loran-C (GPS) distances as shown on Loran-C (GPS) receiver to check Data Interface Integrity. If system is not capable of reading Loran-C (GPS) data, the word "LbAd" will be displayed.

REPLACEMENT OF SHADIN SYSTEM COMPONENTS

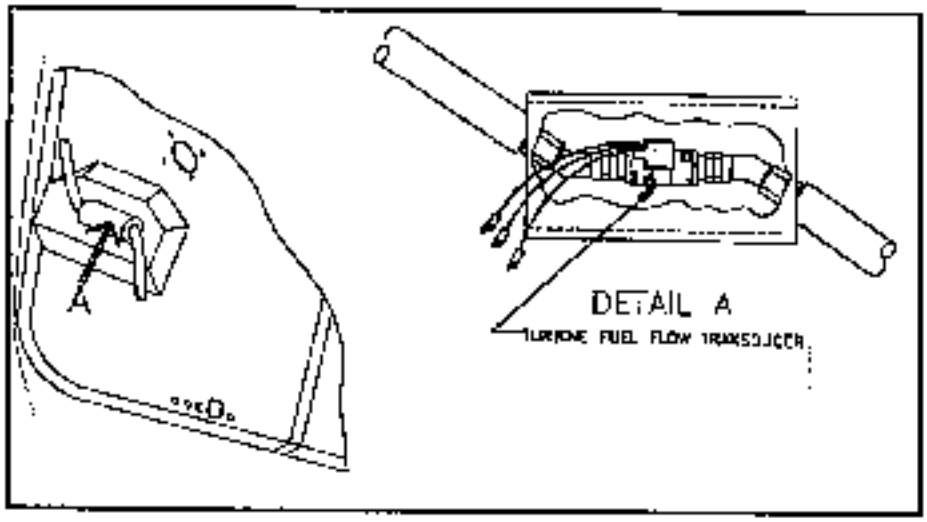
Replacement of either flow flow transducer or display unit must have new units set to same K- factor as old unit. Transducers are pre-set by manufacturer and display unit must be set to agree with transducer setting. Refer to table below:

Transducer Configuration	K-Factor	Indicator Setting
Aerosonic Transducer	3 (85000 pulses/gal.)	3 or 85000
Floscan Transducer	L	82000
	M	85000
	H	87000

To change K-Factor in Shadin Miniflo display unit:

1. Remove can from Indicator
2. Locate switch "0". (Ref. Figure 73-6)
3. Set switch to one of the following positions:

K-Factor	Sw. #	Display will read	K-Factor	Sw. #	Display will read
K-0	B	88.0	K-5	6	83.0
K-1	A	87.0	K-6	5	82.0
K-2	9	86.0	K-7	4	81.0
K-3	8	85.0	K-8	3	80.0
K-4	7	84.0	K-9	2	79.0



TURBINE FUEL FLOW TRANSDUCER - FIGURE 73-4

NOTE

Transducers are categorized by the number of pulses per second output for a given GPH flow rate ("K Factor)". This will be noted as: L, M, H, or HH scribed on the end of the serial no. For accurate readings, replacement transducers should have the same "K" factor as the units being replaced. Specify "K" factor code when ordering new transducers.

4. Fuel flow transducer removal.

A. Remove top and bottom cowling from aircraft. See Section 71-10-00 for procedures

B. Cut and remove ty-raps from insulator sleeves on knife disconnects of electrical wires.

C. Slide insulation sleeving up on electrical wire harness.

D. Disconnect the knife disconnects.

E. Remove safety wire from firesleeve around turbine transducer and unwrap firesleeve to expose the transducer.

F. Loosen and remove nuts, washers and bolts from transducer and bracket. Pull transducer and hoses away from engine as far as possible.

G. Disconnect the hose nuts from transducer fittings. The transducer should now be free for removal. Note position of fittings on old transducer.

H. Cap all lines to prevent contamination.

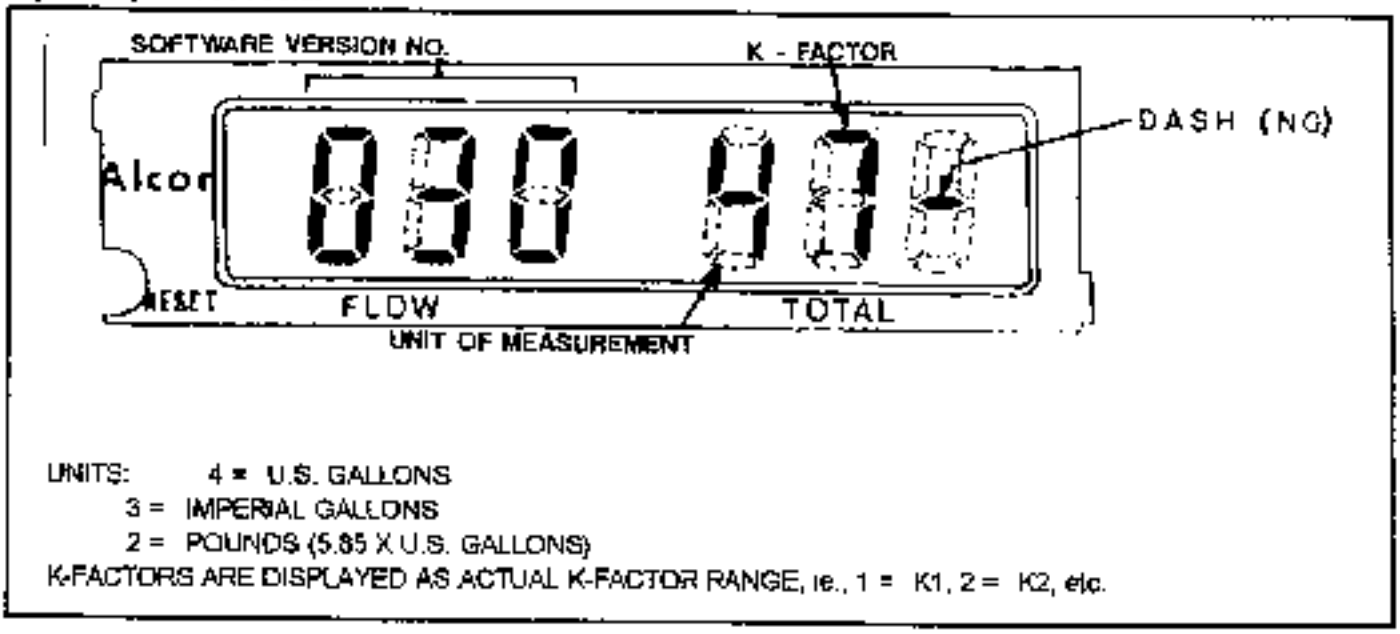
5. Fuel flow transducer (replacement) installation.

73-31-02 - FUEL FLOW TRANSDUCER

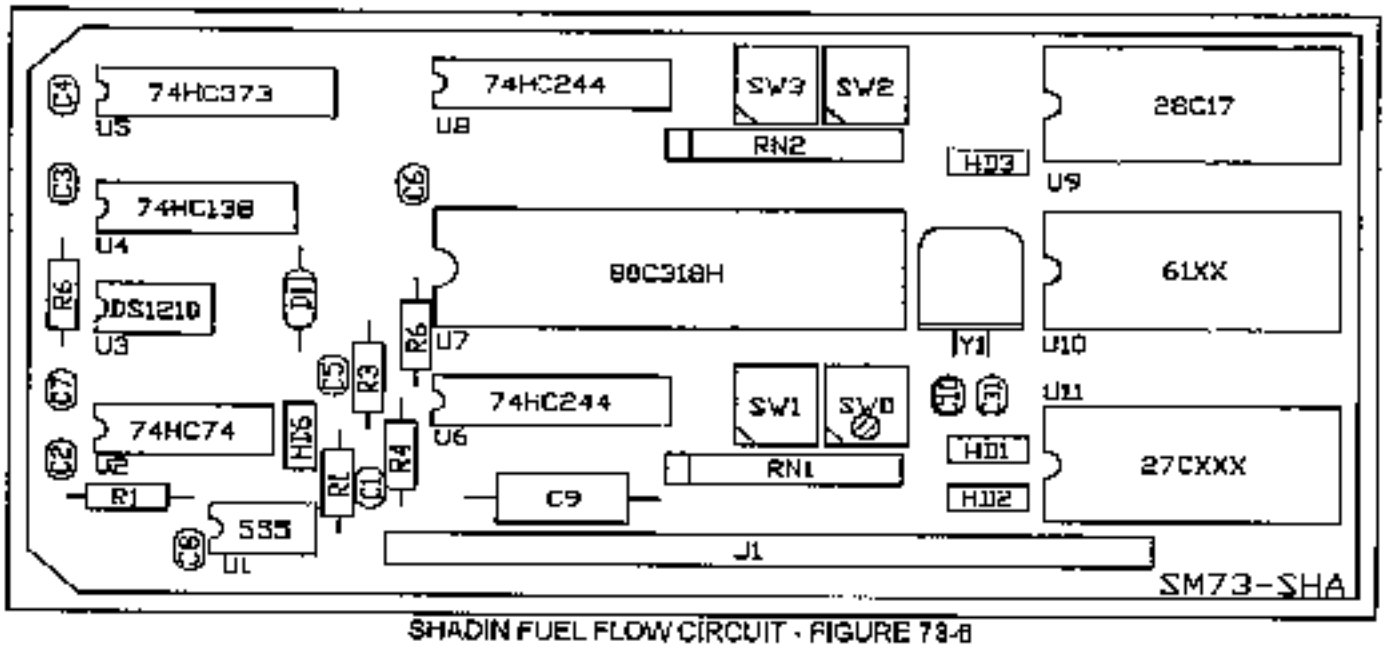
1. The turbine flow transducer, mounted in the engine fuel line, measures flow of fuel. The transducer is rated for a continuous operation to 60 gallons per hour. In addition, the transducer is accurate down to 0.6 gallons per hour.

2. The transducer supplies the fuel flow indicator with a pulse signal from a self contained opto-electronic pickup. A neutrally buoyant rotor spins with the liquid between V-jewel bearings. The rotor movement is sensed when notches in the rotor interrupt an infra-red light beam between a light emitting diode and a photo-transistor.

3. The transducer design is fail safe; complete rotor blockage cannot interrupt fuel flow. The transducer life expectancy is 1500 hours.



TRU-FLOW 1 CONFIGURATION - FIGURE 73-5



SHADIN FUEL FLOW CIRCUIT - FIGURE 73-6

NOTE

The "K" factor of the replacement transducer should match the "K" factor of the replaced unit. Refer to "NOTE" following Section 73-31-02, paragrapn 3 for detailed explanation.

A. Note the position of fittings on old transducer and place them in similar position on the new transducer.

B. Connect hose nuts to transducer fittings, tighten.

C. Connect the new transducer to bracket using bolts, washers and nuts.

CAUTION

Make sure the hoses are not being put into a bind or twist when securing the transducer to the bracket.

D. Tighten all nuts on fuel hoses and bolts to secure the transducer.

E. Connect the knife disconnects and slide insulating sleeving over connections. Secure sleeving with ty-raps.

F. Leak check all fuel connections by pressurizing the fuel lines with boost pump. Correct any leaks or discrepancies.

G. Wrap firesleeving over transducer and secure into position with safety wire.

NOTE

Installation of the new transducer may affect the engine fuel flow adjustment. It is recommended that the procedures of Section 71-00-00 be followed to assure engine is set up for proper operation.

H. When all adjustments have been made and all connections checked for security, install the cowling per Section 71-12-00.

73-31-03

- GENERAL OPERATING PROCEDURES

1. Turn on the aircraft master switch. On activating the aircraft electrical system, the FT-101 display will flash zeros (000.0). This flashing is a reminder for the pilot to reset or check the fuel used number by pressing either the RESET or USED/TEST buttons. Once the RESET or USED/TEST button is depressed, the display will stop flashing and read fuel flow.
The TRU FLOW 1 will display the configuration unit and K-factor on the right side of display window (Refer to Figure 73-5).
After starting the aircraft engine, the FT-101 will continuously display fuel flow. Total Fuel Used may be displayed by pressing and holding the USED/TEST button on the right of the instrument. Total Fuel Used will be displayed as long as the USED/TEST button is depressed (or for 2 seconds), whichever comes first. This number may be reset to zero (0.0) by depressing and holding the RESET button for at least 1 second. The TRU FLOW 1 displays both functions simultaneously.

2. The totalizer function in both systems be used as a single flight totalizer or as a long term totalizer. Both methods are explained below.

A. SINGLE FLIGHT TOTALIZER. The aircraft should be topped with fuel before each flight so the total usable fuel will be known. Turn on the aircraft master switch. On activating the aircraft electrical system, the FT-101 will flash zero (000.0) fuel flow. Push and hold the reset button, located on the left of either instrument, for at least 1 second. The RESET button has a one half second delay to prevent accidental reset.
On starting the engine, the FT-101 will begin displaying fuel flow. Total fuel used may be checked by depressing the USED/TEST button.

B. LONG TERM TOTALIZER. Turn on the aircraft master switch. On activating the aircraft electrical system, the FT-101 will flash zero (000.0) fuel flow. Depress and hold the USED/TEST button; the FT-101 will display the total fuel used from previous flights. DO NOT push the RESET button! On starting the engine, the FT-101 will display fuel flow and continue counting fuel used up to 999.9 gallons, 9999 pounds, or 9999 liters depending on the model. The Alcor unit will display fuel flow and total used from past flights.

73-31-04 - TEST FUNCTION

A test function is provided in the FT-101, so the pilot may verify that all digits are functioning prior to each flight. To use the test function, depress and hold the USED/TEST button two times within one second and the FT-101 will display all eights (888.8).

73-31-05 - TROUBLESHOOTING FT-101 FUEL MANAGEMENT SYSTEMS

Troubleshooting the FT-101 fuel management system should be approached in a systematic manner. All problems can be put in one of five categories;

- Improper operation due to lack of knowledge about the system.
- Inoperative computer or main instrument.
- Inoperative transducer.
- Improper wiring.
- Improper transducer installation.

1. MEMORY LOSS -

A. Loses memory when "MASTER" switch is turned OFF.

(1) Check "Fuel Flow Memory" switch ON.

(2) If switch is ON, check clock for operation.

(3) If clock inoperative, replace fuse at battery.

(4) If no problem found, remove connector from unit, check Pin 9 for buss voltage.

(5) If voltage present, replace FT-101.

B. Memory scrambles when engine starts. Exchange FT-101 for modified unit.

2. DOES NOT INDICATE

A. No display.

(1) Remove connector from indicator. Check Pin 1 of harness connector for bus voltage. Check Pin 8 for airframe ground. If OK, change indicator.

B. Displays zeros (with engine running)

(1) Remove cowling for access to transducer. Remove insulating sleeving from connections on all wires. Check BLACK wire for A/F ground. Check RED wire for bus voltage. Check WHITE wire for 2-3 volts with no fuel flow and increasing to near bus voltage at full flow.

(2) If no increase in voltage is seen on WHITE wire as flow increases or if too high a voltage indication is seen with no flow, change transducer.

(3) If RED wire does not have bus voltage, check wiring from transducer to Pin 3 of indicator.

(4) If BLACK wire is not grounded, check wiring from transducer to Pin 6 of indicator.

3. ERRATIC INDICATIONS

A. Check wiring for loose connections.

B. Check wiring for intermittent shorts.

C. Check transducer for foreign particles.

D. If all checks OK, replace transducer.

4. INACCURATE READINGS

A. Check transducer K-factor. The letter "L","M","H", or "HH" inscribed after the serial number.

B. Remove indicator from instrument panel and case. Check switch settings and correct to match transducer.

NOTE

Each switch setting changes reading by approximately 2 %. If settings are OK, replace transducer.

CAUTION

Whenever transducer or indicator is replaced, care must be taken to set indicator switches to match transducer.

If after making these checks you still do not isolate the problem or do not find a problem, contact the Product Support Department of Mooney Aircraft Company for further assistance.

73-31-06 - TROUBLESHOOTING THE TRU FLOW 1 (ALCOR) FUEL MANAGEMENT SYSTEM

If problem is determined to be in the indicator and all transducer and wiring checks have been made, contact Alcor, Inc., 10130 Jones-Maltsberger Road,

PO Box 32516, San Antonio, Tx. 78284, telephone (210) 349-3771 for further assistance.

73-50-00 - DRUCK TRANSDUCER TEST PROCEDURE

Refer to Section 79-40-00

CHAPTER 74

IGNITION

CHAPTER 74

IGNITION

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74-00-00 - GENERAL

The Lycoming IO-360-A1B6D or IO-360-A3B6D series engines are equipped with Bendix 2000 or 3000 Series magnetos. The magneto incorporates an impulse coupling that retards the spark for starting. When the engine starts, counter weights hold the impulse coupling latch pawls away from stop pins. The magneto then will fire at its advanced firing position.

The magneto/starter switch combines both ignition and starting functions. Turn the key clockwise through R, L and BOTH to START position; push forward on key while in START and the starter relay is energized. Release of the key, after engine starts, will return the switch to the BOTH position where both magnetos are operative.

In the OFF position both magnetos are grounded. At the R position the left magneto is grounded and at the L position the right magneto is grounded.

NOTE

Mooney Service Instruction M20-69A, or later revision, should be complied with for improved starting.

74-10-00 - ELECTRICAL POWER

74-10-01 - MAGNETO INSPECTION, MAINTENANCE, INSTALLATION & TIMING

Refer to engine and magneto manufacturers Service Manual for magneto inspection, maintenance, installation and timing

74-10-02 - IGNITION SYSTEM TROUBLE SHOOTING

1. Hard starting.

   A. Assure that the impulse coupling is operating.

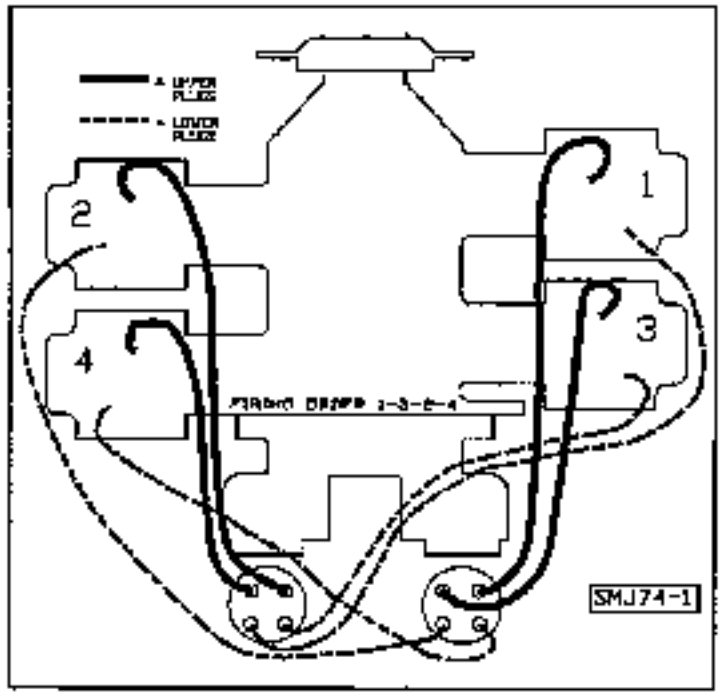
   B. Check magneto timing to engine.

2. Engine Roughness.

   A. Install new spark plugs.

   B. Check plug leads for deterioration.

   C. Check magneto contact points for burning and dirt accumulation.



ENGINE FIRING ORDER - FIGURE 74 -1

3. Magneto Drop Out of Limits.

   A. Check magneto-to-engine timing.

   B. Inspect contact breaker points for proper clearances.

   C. Check spark plugs and leads.

NOTE

Service ignition system per TEXTRON-Lycoming Service Manual Section 4.

74-20-00 - ENGINE FIRING ORDER

74-30-00 - SWITCHING

The Magneto/Starter switch is connected to the magneto grounding wires ("P" leads) of both magnetos. Turning this switch from "BOTH" to "OFF" or from "R" to "L" to "OFF" will ground out both or either magneto. (See SECTION 74-00-00 for grounding sequence.)

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ENGINE CONTROLS

CURRENTLY NOT BEING USED

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ENGINE INDICATING

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ENGINE INDICATING

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77-00-00 - GENERAL

Engine indicating instruments and their sending units, transducers, probes, etc., must be operating properly to prevent engine damage. It is recommended that all engine indicating components be checked at each 100 hour or annual inspection to verify proper operation. Calibrated instruments may be "Tee'd" into the particular systems for a comparison check between them and the aircraft's instruments.

77-00-01 - RANGES

Power plant instruments operate electrically through variations in resistance caused by pressure or temperature changes, by variations in current output caused by varying engine RPM or alternator output, or by pressure from engine induction system.

1. Ammeter.
   A. Range—+60 to -60 AMPS - 24-0001 thru 24-2999
   B. Range—+70 to -70 AMPS - 24-3000 thru 24-T8A
   C. Tolerance—1.2 AMPS.
2. Fuel pressure gauge.
   A. Green arc—14.0 PSI to 30 PSI.
   B. Red line—14 MIN, 30 PSI MAX.
3. Oil temperature gauge.
   A. Green arc—150 degrees to 245 degrees F.
   B. Red line—245 degrees F.
   C. Tolerance—3 degrees F.
4. Oil pressure gauge.
   A. Green arc—60 to 90 PSI.
   B. Yellow arc—
      (1) Idle range—25 to 60 PSI.
      (2) Starting & warmup range—90 to 100 PSI.
   C. Red line—25 PSI MIN, 100 PSI MAX.

NOTE
The oil pressure relief valve may be honed to improve low idle oil pressure.

5. Tachometer.
   A. Green arc—1950 to 2700.
   B. Red line—2700.
   C. Yellow arc—1500 to 1950 RPM (1800-1950 S/N 24-0001 thru 24-0377 except 24-0064).
6. Cylinder head temperature gauge.
   A. Green arc—300 to 450 degrees F.
   B. Red line—475 degrees F.
7. Manifold Pressure Gauge
   A. Normal operating range 10.0 to 35.0 In. Hg.

77-10-00 - POWER INDICATING

77-10-01 - TACHOMETER

(S/N 24-0001 thru 24-1417)

These aircraft have a mechanical tachometer installation.

The electric tachometer (24-0001 thru 24-2999) counts ignition pulses from the magneto to indicate engine speed in revolutions per minute (RPM). The tachometer is connected to the "L" and "R" terminals on the Magneto/Starter switch and senses the magneto impulses through this wire connection. Two 15K ohm resistors are in series between the "L" and "R" terminals and the connection of these two wires and the single wire going to the tachometer. These two resistors, located immediately adjacent to the Magneto/Starter switch inside the insulating sleeve, protect the magnetos from grounding out if a short develops in the tachometer.
The electric tachometer on S/N 24-3000 thru 24-T8A gets its signal from a second set of breaker points in the magneto. The tachometer counts the impulse and records the correct RPM.

TACHOMETER TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
No permanent or intermittent indicator reading.	-Broken shaft.	Replace shaft.
	-C/B out (IGN/CIG LTR)	Reset C/B.
	-Broken wire	Check & repair wiring.
	-Faulty instrument.	Replace instrument.
Pointer Oscillates excessively.	-Rough spot on, or sharp bend in shaft.	Repair or replace shaft.
	-Excessive friction in instrument	Replace instrument.
	-Magneto timing too wide between mags.	Retime magnetos
	-Isolation resistors at mag. sw. increased in resistance value	Replace resistors.

TROUBLE (con't.)	PROBABLE CAUSE	REMEDY
Pointer Oscillates excessively (con't)	-Wiring connections bad.	Locate and repair

77-10-02 - MANIFOLD PRESSURE

Manifold pressure is an indication of engine power affected primarily by throttle setting. The instrument is calibrated in inches of mercury (Hg) and indicates the pressure in the induction air manifold. Manifold pressure varies somewhat with pitch attitude in flight and therefore small oscillations may occur in flight, particularly in turbulent air.

MANIFOLD PRESSURE TROUBLE SHOOTING.

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive error at existing barometric pressure.	Pointer shifted.	Replace instrument.
Excessive error when engine is running.	Line leaking.	Tighten line connection.
Sluggish or jerky pointer movement.	Improper damping adjustment.	Adjust damping screw.
Broken or loose cover glass.	Vibration or excessive pressure.	Replace glass and reseat case.
Dull or discolored luminous markings.	Age.	Replace instrument.
Incorrect reading.	Moisture or oil in line.	Disconnect lines and purge with air.

77-10-03 - FUEL FLOW INDICATING SYSTEM

Refer to Section 73-30-00 for this data.

77-20-00 - TEMPERATURE INDICATING

77-20-01 - EXHAUST GAS TEMPERATURE (EGT) INSTRUMENT

A thermocouple, attached to the exhaust stack or all exhaust stacks (optional) sends an electrical signal to the E.G.T. instrument. As the exhaust gas temperature rises, the thermocouple sends an electrical current through the field coils of the instrument, moving the pointer to indicate temperature rise.

Aircraft with a combination EGT/OAT gauge utilize a non-grounded EGT probe. An ohmmeter connected between either lead and the probe case should indicate high resistance. If zero or low resistance is indicated the probe has shorted and should be replaced.

77-20-02 - CYLINDER HEAD TEMPERATURE

The cylinder head temperature (CHT) instrument provides the operator with an indication of how hot or cool the cylinders are operating during flight. A resistance type temperature probe is installed in the number 3 cylinder (standard configuration). An optional system provides a probe in each cylinder to provide monitoring of each cylinders temperature.

CHAPTER 78

EXHAUST

CHAPTER 78

EXHAUST

LIST OF EFFECTIVE PAGES

CHAPTER SECTION SUBJECT	PAGE	DATE
78-EFF/CONTENTS	1/2BLANK	12-98
78-00-00	3	12-98
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78-00-00 - GENERAL

The exhaust system's headers and exhaust pipes are made from 321 CRES steel. They are designed to optimally scavenge the cylinders exhaust gases during normal engine operation. Inspections for cracks, burns, etc. are required during each maintenance activity and recommended before each flight.

78-10-00 - EXHAUST SYSTEM INSTALLATION

1. EXHAUST PIPE HEADERS TO ENGINE.

A. Place new exhaust gaskets in position on the LH & RH engine exhaust flange studs.

B. Place either LH or RH header pipes into position on engine cylinder's exhaust flanges. Be careful during this procedure to ensure that exhaust gaskets remain in proper position on each cylinder exhaust flange.

NOTE

Attach new headers with existing exhaust flange stud nuts. (If nuts have been damaged, replace them with new nuts

Leave exhaust flange stud nuts loose so header pipes are movable.

C. Lubricate outside of inner and inside of outer slip joints on headers and inside of muffler pipe flanges with Hi-temp anti-seize compound, C5-A (Fel-Pro) or equivalent.

D. Have someone assist with the placement of the muffler assembly into the already installed headers.

E. Assemble muffler assembly into the not installed header pipes; position headers onto the aircraft engine exhaust flanges. Be careful during this procedure to ensure that the exhaust gaskets remain in proper position on each cylinder exhaust flange.

F. When muffler and headers are attached to engine, flange nuts snug but not torqued, check that the muffler is free to move laterally, left to right, with moderate push/pull force. This insures that header and muffler pipes are aligned properly.

NOTE

Proper lateral movement may be obtained by loosening cylinder exhaust stud/flange nuts and gently re-positioning header pipes (at the upper flanges) inboard or outboard as the situation requires. The stud/flange nuts can then be re-tightened and the lateral muffler movement checked again.

G. When free movement of muffler is obtained, torque exhaust flange stud nuts — 100 to 110 inch lbs. Recheck for freedom of movement after nuts have been torqued.

H. Attach tailpipe to exhaust pipe ball joint flange (3 bolts/springs/nuts at ball joint flange) with existing or new hardware.

I. Orientate tailpipe and muffler exhaust pipe so the continuing plane is approximately parallel to the ball joint connection. Verify tailpipe exhaust end is 1.5 +/- 0.5 inches from nose gear door assembly and the exhaust opening is not pointed toward nose gear door.

J. Tighten bolts/nuts on ball joint flange. Spring will begin to compress prior to castellation on nuts reaching cotter pin hole in bolt. Continue tightening until any one of the nut castellations reach the complete hole in bolt. Install cotter pins in all bolts & nuts.

K. Hang tailpipe with hanger assembly attached to firewall or exhaust cavity supports.

L. Verify all hardware is secure on header pipes, muffler and tailpipe.

3. EGT PROBE INSTALLATION/SECURITY

A. EGT probe clamp assembly should be safety wired after positioning and tightening of clamp to prevent possible loosening due to engine operation.

78-30-00 - EXHAUST SYSTEM SERVICING

1. CLEANING

To properly inspect exhaust system, components must be clean and free of oil, grease, etc. Clean as follows:

A. Spray engine exhaust system components with a suitable solvent (Stoddard Solvent), allow to drain and wipe dry with clean cloth.

WARNING

Never use highly flammable solvents on engine exhaust systems.

WARNING

Never use a wire brush or abrasives to clean exhaust systems or mark on system with lead pencils.

2. VISUAL INSPECTION OF COMPLETE SYSTEM

A thorough inspection of engine exhaust system will detect any breaks or cracks causing leaks which might result in loss of efficiency, loss of engine power or engine compartment fire. Inspect per following procedures:

NOTE

This inspection should be conducted when engine is cool.

Remove all muffler shrouds/shields to permit full visual inspection.

A. LOOK FOR LEAKS - Examine surfaces adjacent to exhaust system components for signs of exhaust soot. Look for gray, red or black gas stains at welds, clamps, flanges, etc. Inspect exhaust system for chaffing by cowling, engine mount, cables or any airframe components.
Inspect exhaust stacks for burned areas, cracks and looseness.

B. LOOSE CONNECTIONS - Inspect exhaust clamps for cracks, looseness and proper security.

NOTE

During inspection, particular attention should be given to condition and security of flanges, spot welds, slip joints, and welded areas.

C. INTERNAL EROSION - Examine bends and low spots for thinning or pitting.

D. STANDOFFS (PINS) AND HEAT TRANSFER FINS - Look for missing or damaged heat transfer pins or fins. Look for holes at these locations.

E. METAL FATIQUE - Inspect all surfaces for bulging and distortion , and for groups of small cracks.

CAUTION

DO NOT mark any surface with lead pencils or any carbon-containing markers.

F. BAFFLE BREAKDOWN - Look inside muffler for broken baffles or tubes. These can restrict the outlet, causing power loss.

G. HIDDEN DAMAGE - Carefully inspect all internal surfaces that lie hidden under external gussets, stiffeners, etc. (A boroscope is recommended)

H. INSTALLATION TIPS - Install only correct parts. DO NOT FORCE FIT any component. Properly align connecting components.
Do not reuse gaskets.
Insure that attach bolts are properly torqued. Exhaust flange stud nuts are to be torqued to 100-110 inch lbs.

78-40-00 - PERIODIC REPLACEMENT COMPONENTS

It is recommended that all exhaust system components, pipes, clamps and miscellaneous mounting hardware be replaced at engine overhaul time (2000 Hours). However, thorough inspection of all components should be made any time exhaust system is removed from engine for component replacement. The inspection should be made in the interest of preventive maintenance.

CHAPTER 79

OIL

CHAPTER 79

OIL

LIST OF EFFECTIVE PAGES

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79-00-00 - GENERAL

The oil system is a wet sump, pressure type system. The engine sump has an 8 quart (U.S.) capacity. Servicing of the oil quantity is provided through an access door located on top of the engine cowling.
The aircraft is delivered with the proper weight, non-detergent, mineral oil (MIL-L-6082). This oil should be replaced at 50 hours or when oil consumption has stabilized. The replacement oil should conform to Lycoming Specification 301F. The routine oil change interval is 100 hours, however if operating in a dusty environment the interval should be more often.

NOTE
A new, remanufactured or newly overhauled engine should be operated on straight mineral oil for a minimum of 50 hours or until oil consumption has stabilized. Change to a TEXTRON - Lycoming approved additive oil and begin the 100 hour oil change interval.

NOTE
Refer to Section 5-20-07 or to Lycoming Operator's Manual for approved oil products and servicing information.

79-00-01 - OIL FILTER REMOVAL

The engine oil filter should be replaced each 50 hours and at every oil change.

1. Remove top and bottom cowling (see Section 71-10-00).
2. Cut and remove safety wire on filter.
3. Loosen the spin off oil filter and remove.

79-00-02 - OIL FILTER INSTALLATION

1. Position new filter on adapter.
2. Tighten per instructions on filter.
3. Safety wire filter.
4. Perform leak check prior to flight.
5. Reinstall lower and upper cowling (see Section 71-11-00).
6. Connect and secure all electrical and mechanical connections.

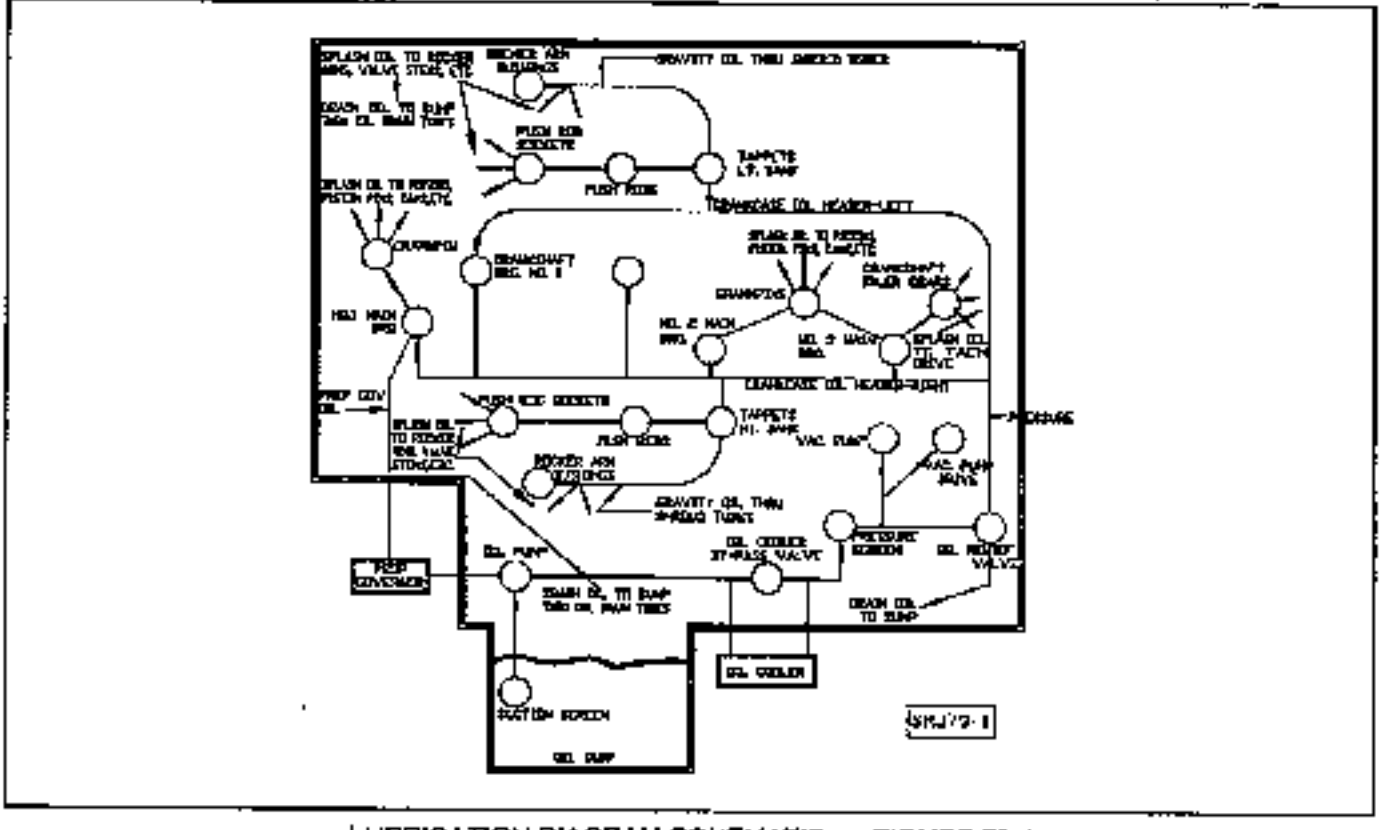
79-20-00 - DISTRIBUTION

Reference - FIGURE 79-1

79-30-00 - INDICATING

79-30-01 - OIL PRESSURE

Oil pressure indicating is provided through a pressure transducer plumbed into the engine oil system. Pressure variations change the resistance within the transducer and this signal drives the oil pressure gauge located within the cluster gauge.



LUBRICATION DIAGRAM SCHEMATIC - FIGURE 79-1

78-30-02 - OIL TEMPERATURE

The oil temperature gauge is an electric unit receiving its signal from a temperature bulb in the engine case, located between the oil cooler and the case. The probe resistance changes as the oil temperature changes and this varies the readout on the instrument.

78-40-00 -DRUCK TRANSDUCER TEST PROCEDURE

The Druck Transducer Test Box, GSE 030036, can be used to simulate fuel and oil pressure in Mooney M20J models that have the Druck pressure transducer installed.

To use the unit for troubleshooting, the box is connected to the aircraft harness in the engine compartment, by disconnecting the appropriate Druck transducer electrical connector and connecting the test box in its place.

Turn aircraft Master Switch ON (insure engine gauge circuit breakers are in) and adjust box to approximate pressure desired. The engine gauge should read this approximate pressure.

If pressure reading is correct:

1. Verify Oil/Fuel pressure to Druck transducer with mechanical pressure gauge.

A. If correct—probable failure is Druck transducer.

B. If incorrect—troubleshoot oil/fuel system.

If pressure reading is incorrect; zero or pegged condition:

1. **ROCHESTER** gauge (S/N 24-0001 thru 24-3153)

A. Move transducer test box to connector on the input of appropriate pressure amplifier (located behind instrument panel, right side). Check pressure reading on Rochester gauge to see if it approximately agrees with test box. If it does, repair wire harness from pressure gauge amplifier, to the engine compartment. If pressure reading is incorrect go to step (b).

B. At the appropriate Rochester gauge WIPER lug read the following voltages to ground. (digital multimeter or 20K ohms/volt multimeter)

201/205 Fuel	14 PSI	4.4 to 4.7 volts.
201/205 Oil	60 PSI	5.3 to 5.5 volts

1. If correct, probable failure in Rochester gauge module.

2. If incorrect, probable failure in pressure gauge amplifier.

2. **SIGMA-TEK** gauge (S/N 24-3154 thru 24-TBA)

A. Check wiring for continuity between engine compartment connector and Sigma Tek cluster. If wiring is correct go to (b).

B. Probable failure in Sigma-Tek gauge module or cluster.

CHAPTER 80

STARTING

CHAPTER 80

STARTING

LIST OF EFFECTIVE PAGES

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80-Effectivity/Contents	1/2BLANK	10-95
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80-00-00 - GENERAL

The airplane is equipped with a 12 volt starter (24-0001 thru 24-2999), 24 volt (24-3000 thru 24-TBA), supplied with the engine package. (NOTE: Some M20J ATS aircraft may be equipped with 24 volt electrical systems). The starter is located on the front of the engine. The drive ratio of the starter drive pinion to the crankshaft is 16.556:1.
When the ignition switch is placed in the "START" position, current is supplied through the main bus to energize the starter solenoid which in turn connects the battery to the starter. Electrical power is automatically cut off from the radios when the starter current is engaged.

80-00-01 - STARTER TROUBLESHOOTING

1. Refer to Section 24-39-04 for Starter TroubleShooting Chart

80-00-02 - STARTER MAINTENANCE

1. Inspect and service starter per Lycoming Maintenance Instructions Overhaul Manual.

2. Lubrication - No lubrication is required on starter or starter drive except at overhaul.

3. Check electrical leads for security and condition of wire.

CAUTION
Do not clean the starter in any degreasing tank or grease dissolving solvents. Avoid excessive lubrication. Use only kerosene or Varsol.

80-00-03 - STARTER REMOVAL

1. Remove upper and lower cowling.

2. Remove (4) bolts between AIR INTAKE BOOT and fuel injector pad.

3. Remove (2) screws on outer end of air intake duct.

4. Remove bolt at front of air intake duct. Carefully remove the duct.

5. Disconnect electrical wiring from starter terminals and tag wiring for ID.

6. Remove (3) nuts and (1) 5/16 inch bolt from starter mounting pad.

7. Remove starter and starter drive assembly.

80-00-04 STARTER INSTALLATION

1. Before installation, clean any rust corrosion or dirt from the starter motor.

2. Check all connections for tightness

3. Reverse the starter removal procedure for reinstallation.

4. Recheck torque, security and safetying

5. Install cowling.

80-00-05 - STARTER BRUSHES

The starter brushes should slide freely in the holder and make full contact on the commutator. The brushes should be replaced when they have worn to 1/2 of original length. Brush tension should be 32 to 40 ounces as measured with a spring scale hooked under the brush spring and pulled in a straight line opposite the force exerted by the spring. Read the tension just as the spring leaves the brush.

80-10-00 - CRANKING

The starter solenoid is located on the cabin side of the firewall. The solenoid is energized by placing the ignition/magneto switch in the start position. Battery current is then directed to the starter. Aircraft serial number 24-1214 and ON are equipped with a "START POWER ON" annunciator light. This light illuminates when the starter switch is in start position or when the starter switch or starter solenoid has malfunctioned and the starter is engaged while the engine is running. This malfunction should be corrected before the engine is started again.

CAUTION
Do not operate starter in excess of 30 seconds without allowing cooling time before re-engaging

BLANK

CHAPTER 81

TURBINES

CURRENTLY NOT BEING USED

INTENTIONALLY

LEFT

BLANK

CHAPTER 91

ELECTRICAL WIRING DIAGRAMS

CHAPTER 91

ELECTRICAL WIRING DIAGRAMS

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CHAPTER 91

ELECTRICAL WIRING DIAGRAMS

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91-00-00 - GENERAL

The electrical system hardware lists and related schematics are sequenced in this section by serial number effectivity. The chapter is divided into the following sections;

-Electrical Systems Schematic Notes

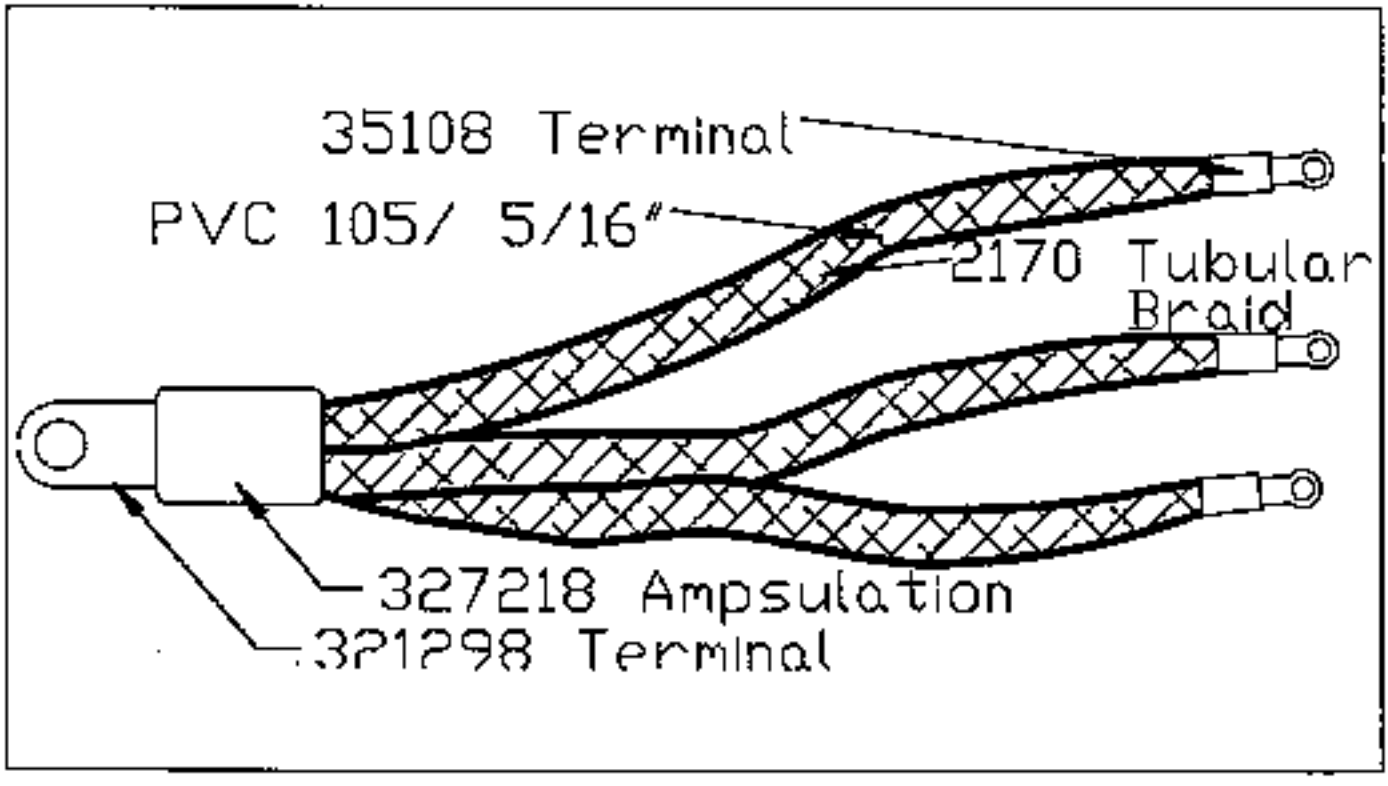
-Wiring Identification System

-Electrical System Hardware Charts (By Effectivity)

-Electrical Schematics (By Effectivity)

91-00-01 - ELECTRICAL SYSTEMS SCHEMATICS NOTES

1. All electrical wiring, assemblies, and installations must be in accord with FAR 43 and AC 43.13-1(*).
2. All splices must be "AMP" disconnect or equivalent.
3. All circuit breakers are trip-free.
4. All terminals are Spec. MS25036 (or equivalent or they must be soldered.)
5. All terminals must be preinsulated or must be insulated with "Ampsulation" (or equivalent).
6. Wires without dash numbers are furnished by the manufacturer and are included with the equipment.
7. The symbol "- -" indicates a knife disconnect.
8. Optional equipment may be installed as required.
9. Wires denoted by ≡≡≡ ≡≡≡ ≡≡≡ symbols to be twisted counter clockwise with a minimum of three (3) wraps per foot.
10. "F" denotes ground through frame (no wires).
11. All knife disconnect splices to be insulated with PVC105 and securely string tied with airtex no. 417 cord.
12. All wire sizes are minimum sizes acceptable.
13. Use 913127 bus bars as necessary for various configuration changes and manufacture interconnecting bus using no. 2170 tubular braid covered with PVC105/5/16" (both Alpha Wire Co.) and terminated with AMP terminals of appropriate sizes. (* = current revision of AC 43.13-1)



EXAMPLE - FIGURE 91-1

91-00-02 - WIRING IDENTIFICATION SYSTEM

The Mooney Aircraft Corporation wiring/electrical system, originally depicted a typical electrical component identification number as 21 PA03A18 or JK- DJ102A22 . This 7 or 9 character number is composed of four functional groups, each of which communicates certain specific information. The 5th functional group is the wire size of the wire connecting the various components. These functional groups are as follows.

(Functional Group No.)	Functional Group	Description of Identifiers
(1)	21 - first two numerals (24-0001 thru 24-1685).	- Aircraft Type (14V) (Not ATS)
(1)	JKL- first three letters (24-3000 thru 24-TBA) ("-" is used if not applicable to a model)	- Aircraft Type (28V)
(1)	14- - first two numerals (24-1686-14 thru 24-2998-14)	-Aircraft Type (14V) (ATS)
(2)	PA - first (or second) two letters	- Circuit Function
(3)	03 or 102- second set of numerals	- Wire Sequence
(4)	A - single letter in the series	-Configuration
(5)	18 - last two numerals in the series. (does not appear for components; just wires)	- Wire Size

CIRCUIT FUNCTION LEGEND
DWG. NO's 800330/800350

CB Defroster Blower
CC Cowl Flap
CD PC Dump
CF Wing Flaps - Electric
CT Trim - Stabilizer
CV Stand-by Vacuum

DA Instruments - Ammeter
DB Instruments - Turn Coordinator
DC Instruments - Cylinder Head Temperature
DD Instruments - Outside Air Temperature
DE Instruments - Carburetor Air Temperature
DF Instruments - Fuel Quantity
DG Instruments - Cluster Gauge
DH Instruments - Oil Temperature
DJ Instruments - Oil Pressure
DK Instruments - Fuel Pressure
DL Instruments - Tachometer
DM Instruments - Hour Meter
DN Instruments - Pressurization
DP Instruments - Pitot Heat
DR Instruments - Turbine Inlet Temperature
DS Instruments - Compressor Discharge Temperature
DT Instruments - Exhaust Gas Temperature
DU Instruments - Manifold Pressure
DV Instruments - Fuel Flow
DW Instruments - VSI

EG Electric Gear - Gear Controls
EL Lighting - Electroluminescence
ELT Emergency Locator Transmitter

FON Phones

IM Ignition - Magneto
LB Lighting - Rotating Beacon (Anticollision Light)
LC Lighting - Cabin Lights
LL Lighting - Landing Lights
LN Lighting - Navigation Lights
LP Lighting - Instrument & Placard Lights
LR Lighting - Recognition Lights
LS Lighting - Instrument & Strobe/Navigation Lights
LT Lighting - Taxi Lights

MA Miscellaneous - Auxiliary Power Plug
MB Miscellaneous - Radio Circuits
MC Miscellaneous - Cigar Lighter
MD Miscellaneous - Clock Light
ME Miscellaneous - Electric Clock
MIC Miscellaneous - Microphone
MM Miscellaneous - Marker Beacon
MP Miscellaneous - Propeller De-Ice

NF Fuel - Fuel Pump
NP Fuel - Primer

PA Power - Alternator (output & Control)
PB Power - Battery (Output & Control)
PG Power - Generator (Output & Control)
PS Power - Starter (Input & Control)

RB Radio Blower

SPK Speaker

VB Vent Air Blower

WA Warning System - Alternator - Voltage Warning
WB Warning - Engine Boost
WE Warning System - Gear Position Warning (Electric)
WF Warning System - Fuel Pressure
WL Warning System - Landing Light
WM Warning System - Gear Position Warning (Manual)
WN Warning System - Pressurization
WS Warning System - Stall Warning
WT Warning System - Press-to-Test
WV Warning System - Vacuum Warning
WW Warning System - Alternate Air
WD Warning System - Starter Power

The Mooney Aircraft Corporation wiring/electrical equipment identification system used in current production aircraft deletes the Model Number annotation. The purpose of this is to standardize the identification of a system function/component for all model of aircraft. The functional groups are basically the same as earlier identification numbers. These new functional groups apply to schematic drawing 800304. The new functional groups are as follows:

CR	—	First two/three leters	—	Circuit Function
04	—	First set of numerals	—	Wire Sequence
A	—	Single letter in series	—	Configuration
20	—	Last two numerals in series	—	Wire size

CODE/COMPONENT or SYSTEM (CIRCUIT FUNCTION) - 800304 ( ) SCHEMATIC DRAWING

ACT/SWITCH ACTUATOR
BS/RELAY BASE
BUS/BUSS BARS
C/CAPACITORS
CB/DEFROSTER BLOWER
CC/COWL FLAPS
CL/CLAMPS
CM/CURRENT MONITOR
CR/RUDDER TRIM
CT/STABILIZER TRIM
CV/STANDBY VACUUM
D/DIODES
DA/AMMETER
DB/TURN COORDINATOR
DC/CHT
DD/OAT
DG/ENGINE INSTRUMENTS
DH/OIL TEMPERATURE
DJ/OIL PRESSURE
DK/FUEL PRESSURE
DL/ELECTRIC TACHOMETER
DM/HOUR METER
DP/PITOT HEAT
DR/TIT
DT/FUEL FLOW
DG/LANDING GEAR, ELEC.
ELT/ELT
F/FUSES
FH/FUSEHOLDER
FON/PHONE
JM/IGNITION, MAGNETO
L/LIGHT BULBS
LB/BEACON
LENS/ANNUNCIATOR LENS
LH/LAMP HOLDER
LL/LANDING LIGHTS
LP/PANEL LIGHTS
LR/RECOGNITION LIGHTS
LS/STROBE LIGHTS
LT/TAXI LIGHTS
MA/AUXILIARY POWER
MB/AVIONICS MASTER
MC/CIGAR LIGHTER
ME/CLOCK
MP/PROPELLER DE-ICE
NF/BOOST PUMP
PA/ALTERNATOR POWER
PB/BATTERY POWER
PL/PLUGS, ELECTRICAL
PS/START POWER
R/RESISTORS
RB/RADIO BLOWER
RC/RECEPTACLES, ELECTRICAL
RL/RELAYS
SP/SPEEDBRAKE
SW/SWITCHES
VR/VARISTOR
WS/STALL WARNING
WT/STANNUNCIATOR WARNING

CODE/COMPONENT or SYSTEM (CIRCUIT FUNCTION) - 800383 ( ) SCHEMATIC DRAWING

AC AIR CONDITIONER
AH ARTIFICIAL HORIZON
AT ACTUATOR, SWITCH
AV AVIONICS

BR CIRCUIT BREAKERS
BS RELAY BASE
BU BUS BARS

CA CAPACITORS
CB DEFROSTER BLOWER
CC COWL FLAPS
CD PC DUMP
CF WING FLAPS
CL CLAMPS
CR RUDDER TRIM
CT ELEVATOR TRIM
CV STAND-BY VACUUM

DA INSTRUMENTS - AMMETER
DB INSTRUMENTS - TURN COORDINATOR
DC INSTRUMENTS - CYLINDER HEAD TEMPERATURE
DD INSTRUMENTS - OUTSIDE AIR TEMPERATURE
DE INSTRUMENTS - CARBURETOR AIR TEMPERATURE
DF INSTRUMENTS - FUEL QUANTITY
DG INSTRUMENTS - ENGINE
DH INSTRUMENTS - OIL TEMPERATURE
DI DIODES
DJ INSTRUMENTS - OIL PRESSURE
DK INSTRUMENTS - FUEL PRESSURE
DL INSTRUMENTS - TACHOMETER, ELECTRIC
DM INSTRUMENTS - HOUR METER
DN INSTRUMENTS - PRESSURIZATION
DP INSTRUMENTS - PITOT HEAT

CODE/COMPONENT or SYSTEM (CIRCUIT FUNCTION) - 800383 ( ) SCHEMATIC DRAWING (con't.)

DR	INSTRUMENTS - TURBINE INLET TEMPERATURE
DS	INSTRUMENTS - COMPRESSOR DISCHARGE TEMPERATURE
DT	INSTRUMENTS - EXHAUST GAS TEMPERATURE
DU	INSTRUMENTS - MANIFOLD PRESSURE
DV	INSTRUMENTS - FUEL FLOW
DW	INSTRUMENTS - ENGINE VACUUM
EG	GEAR, ELECTRIC
EL	ELECTROLUMINESCENCE
ET	EMERGENCY LOCATOR BEACON
FA	ALT-EMER (FRENCH)
FH	FUSE HOLDERS
FN	PHONES
FU	FUSES
FW	ALT-EMER FIELD (FRENCH)
GD	GROUND
HS	HORIZONTAL SITUATION INDICATOR
IE	IGNITION, ELECTONIC
IM	IGNITION, MAGNETO
IV	IGNITION, VIKBRATOR
LA	LIGHT BULBS
LB	BEACON, ROTATING
LC	LIGHT, CABIN
LE	LENS, ANNUNCIATOR
LG	LIGHTS, LOGO
LH	LAMP HOLDER
LI	LIGHT, ICE
LL	LIGHT, LANDING
LN	LIGHTS, NAVIGATION
LP	LIGHTS, PANEL
LR	LIGHTS, RECOGNITION
LS	LIGHTS, STROBE
LT	LIGHTS, TAXI
MA	AUXILIARY POWER
MB	RADIO, MASTER
MC	CIGAR LIGHTER
ME	CLOCK, ELECTRIC
MH	MISCELLANEOUS, ANTI-ICE
MJ	MISCELLANEOUS, JUNCTION BOX
MK	MICROPHONE
MM	MISCELLANEOUS, MARKER BEACON
MO	PROP OVERSPEED
MP	PROP DE-ICE
MS	MISCELLANEOUS, RADIO-SPEAKER
MW	MISCELLANEOUS, RADIO-WARNING
NE	FURL ENRICHMENT
NF	FUEL PUMP
NP	FUEL PRIMER
NS	FUEL COLD START
PA	POWER, ALTERNATOR
PB	POWER, BATTERY
PG	POWER, GENERATION (OUTPUT & CONTROL)
PL	PLUGS
PS	POWER, START
RB	BLOWER, RADIO
RC	RECEPTACLES
RL	RELAYS
RS	RESISTORS
SA	STAND-BY ALTERNATOR
SB	SPEEDBRAKE
SP	SPEAKER
SW	SWITCHES
VB	VENT, AIR BLOWER
VC	VOLTAGE CONVERTER
VR	VARISTOR
WA	WARNING, ALTERNATOR
WB	WARNING, BOOST PUMP
WC	WARNING, PROP DE-ICE
WD	WARNING, POWER START
WE	WARNING, ELECTRIC GEAR
WF	WARNING, FUEL QUANTITY
WG	WARNING, TACHOMETER
WH	WARNING, CHIP DETECTOR
WJ	WARNING, TRIM FAIL
WK	WARNING, FUEL PRESSURE
WL	WARNING, CANOPY LOCK
WM	WARNING, MASTER
WN	WARNING, PRESSURIZATION
WP	WARNING, PITOT HEAT
WS	WARNING, STALL
WT	WARNING, ANNUNCITOR
WV	WARNING, VACUUM
WW	WARNING, ALTERNATE AIR
YD	YAW DAMPER

91-00-03 - ABBREVIATIONS - EQUIPMENT LIST

The abbreviations to the electrical system hardware charts are necessary due to space limitations in the fields of the computer.

Airspeed - A/S	Placard - Plcd
Alternate - Altn	Radio - Rad
Circuit Breaker - Ckt. Bkr. or C/B	Receptacle - Recpt
Console - Cnsl	Regulator - Regltr
Control - Cntrl	Remote - Rem
Coordinator - Coordtr	Resistor - Res
Cylinder - Cyl	Rheostat - Rheo
Down - Dn	Right - R

ABBREVIATIONS - EQUIPMENT LIST (con't.)

Electric - Elec	Safety - Sfty
Flight - Flt	Selector - Sel
Glareshield - Glrshld	Supply - Sply
Landing - Ldg	Switch - Sw
Left - L	Transducer - XDCR
Lights - Lts	Transmitter - XMTR
Panel - Pnl	Transistor - XSTR
Pilot - Plt	Warning - Wrn

91-20-00 - ELECTRICAL SYSTEM HARDWARE CHART

Refer to the Electrical Schematic (located in the envelopes at the back of this manual) that depicts the Serial Number configuration of the aircraft being serviced. The S/N's vs. Schematic's are shown below:

A/C SERIAL NUMBER	DRAWING/SCHEMATIC NUMBER
(14 VOLT AIRCRAFT)	
24-0001 thru 24-0237, except 24-0084	SCI-800269L-3
24-0238 thru 24-0377	SCI-800269L-3A
24-0378 thru 24-0757, includes 24-0084	800330 E1
24-0758 thru 24-0900	800330 E2
24-0901 thru 24-0942	800330 E3
24-0943 thru 24-1037	800330 E4
24-1038 thru 24-1213	800330 E5
24-1214 thru 24-1417	800330 E6
24-1418 thru 24-1499	800330 E7
24-1500 thru 24-1528	800330 E8
24-1529 thru 24-1685	800330 E9
24-1686-14 thru 24-2999-14 (ATS)	800268 J2
(28 VOLT AIRCRAFT)	
24-3000 thru 24-3078	800350 J1
24-3079 thru 24-3153	800350 J2
24-3154 thru 24-3200, 24-3202 thru 24-3217	800268 J1
24-3201, 24-3218 thru 24-3270	800304 J1 (SHT1) (REV. F) (SHT 2) (REV. H)
24-3271 thru 24-3350	800304 J2 (REV. W) (SHEET 1 of 2; 2 of 2)
24-3351 thru 24-3373	800304 J3 (REV. W) (SHEET 1 of 1)
24-3374 thru 24-3377	800304 J4 (REV. W) (SHEET 1 of 1)
24-3378 thru 24-3383	800304 J5 (REV. Y) (SHEET 1 of 1)
24-3384 thru 24-3392	800304 J6 (REV. Z) (SHEET 1 of 1)
24-3393 thru 24-3404	800304 J7 (REV. Z) (SHEET 1 of 1)
24-3405 thru 24-3410	800304 J8 (REV. AA) (SHEET 1 of 1)
24-3411 thru 24-3420	800383 J1 (REV. G) (SHEET 1 of 1)
24-3421 thru 24-3431	800383 J2 (REV. H) (SHEET 1 of 1)

CAUTION

These schematics address different serial numbered aircraft. Make sure the applicable schematic is being used for the aircraft being serviced.

The Vendor and Part Number will be depicted where the applicable electrical equipment identifier is shown on the following hardware charts: Order replacement or repair part numbers for electrical components from the following electrical system hardware charts that are applicable to the aircraft model and S/N being worked on.

91-20-01 - ELECTRICAL SYSTEM HARDWARE CHART - 24-0001 thru 24-1685 (14 VOLT), DRAWING NUMBER SCI - 800299L-3,-3A & 800330

91-20-02 - ELECTRICAL SYSTEM HARDWARE CHART - 24-3000 thru 24-3153 (28 VOLT), DRAWING NUMBER - 800350

91-20-03 - ELECTRICAL SYSTEM HARDWARE CHART - 24-3154 thru 24-3200, 24-3202 thru 24-3217 (28 VOLT), DRAWING NUMBER - 800263 (E), 24-1686-14 thru 24-2999-14 common components, (28V & 14 V) - (See 91-20-04 for 14 Volt peculiar components).

91-20-04 - ELECTRICAL SYSTEM HARDWARE CHART - 24-1686-14 thru 24-2999-14 (ATS ONLY) (14 VOLT SYSTEMS), DRAWING NUMBER - 800263 (E)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3201, 24-3218 THRU 24-3270, DRAWING NO - 800304 - (J1) (REV. F SHT 1/ REV. H SHT 2)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3271 THRU 24-3350 DRAWING NO - 800304 - (J2) (REV. W) (2 sheets)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3351 THRU 24-3373 DRAWING NO - 800304 - (J3) (REV. W) (1 sheet)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3374 thru 24-3377 DRAWING NO - 800304 - (J4) (REV. W) (1 sheet)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3378 thru 24-3383 DRAWING NO - 800304 - (J5) (REV. Y) (1 sheet)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3384 thru 24-3392 DRAWING NO - 800304 - (J6) (REV. Z) (1 sheet)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3393 thru 24-3404 DRAWING NO - 800304 - (J7) (REV. Z) (1 sheet)

91-20-05 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3405 thru 24-3410 DRAWING NO - 800304 - (J8) (REV. AA) (1 sheet)

91-20-06 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3411 thru 24-3420 DRAWING NO - 800383 - (J1) (REV. G) (1 sheet)

91-20-06 -ELECTRICAL EQUIPMENT HARDWARE CHART - S/N 24-3421 thru 24-3431 DRAWING NO - 800383 - (J2) (REV. H) (1 sheet)

91-20-01 - ELECTRICAL SYSTEM HARDWARE CHART - 14 VOLT

S/N's 24-0001 THRU 24-1685, MOONEY DRAWING NO.'S 5CI-600269L-3, -3A & 600330 (CP)

	CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
21	CB101A	C/B DEFROSTER BLOWER	KLIXON	7277-2-2	
21	CD01A	SOLENOID-PC DUMP	BRITTIAN	4085	
21	CD02A	SW-PILOTS DUMP	MICRO	111SM1-T	
21	CD02B	SW-PILOTS DUMP	C-H	SA31SDT12-2	
21	CD03A	SW-CO-PILOTS DUMP	MICRO	111SM1-T	
		SW-P.C. ON-OFF (ALT)	ALCO	MST215-N	
21	CF01B	C/B FLAP ACT	MERIDEN or EQUIV.	AHW4-15	
21	CF02A	RELAY-LEFT	MAGNECRAFT	W97CSX-1	
21	CF03A	RELAY-RT	MAGNECRAFT	W97CSX-1	
21	CF04A	ACTUATOR, FLAP	COMM. A/C PROD MOONEY	D14500-36 (750105-501)	
21	CF05A	SWITCH, LIMIT, DOWN	MICRO	V3-1	
——		ACTUATOR	MICRO	JV-5	
21	CF06A	SWITCH, LIMIT, UP	MICRO	V3-1	
——		ACTUATOR	MICRO	JV-5	
21	CF07A	SWITCH, LIMIT, DOWN	MICRO	V3-1	
——		ACTUATOR	MICRO	JV-5	
21	CF08A	SWITCH, LIMIT, UP	MICRO	V3-1	
——		ACTUATOR	MICRO	JV-5	
21	CF09A	SWITCH, CONTROL	MICRO	2TL75-10	
21	CF09B	SWITCH, CONTROL, FLAP	C-H	8908K3149	
21	CT01A	C/B, ELECTRIC TRIM	MOONEY	930023-009	
21	CT01B	C/B, ELECTRIC TRIM	MOONEY	930023-109	
21	CT01D	C/B, ELECTRIC TRIM	MOONEY	930023-209	
21	DA01A	SHUNT	EMPRO or EQUIV.	MLA-60-50	
21	DA01B	SHUNT	STEWART-WARNER	SW-813489	
21	DA01C	SHUNT	EMPRO	MLA-60-100	
21	DA01D	SHUNT	EMPRO	MLA-70-100	
21	DA02A	FUSE	LITTEL	312010	
——		RETAINER	LITTEL	155020	
21	DA02B	FUSE	McGRAW-EDISON	FM01-5A	
——		RETAINER	McGRAW-EDISON	FHN42W	
21	DA03A	FUSE	LITTEL	311010	
		RETAINER	LITTEL	155202	
21	DA03B	FUSE	McGRAW-EDISON	FM01-5A	
——		RETAINER	McGRAW-EDISON	FHN42W	
21	DA04A	AMMETER	MOONEY	640281-509	
——		BULB	ROCHESTER	0153500003	
21	DB01A	C/B, TURN COORD	MERIDAN OR EQUIV	AHW4-2	
21	DB01B	C/B TURN COORD	KLIXON	7277-2-5	
21	DB02A	TURN CO-ORDINATOR	BRITTIAN	604-200-200	23/24
		TURN CO-ORDINATOR	AEROSONIC (ALT)	ANS50M	23/24
21	DB02B	TURN CO-ORDINATOR	AEROSONIC	ANS50ML	23/24
21	DB03A	PLUG, TURN COORD		MS3106A-10SL-3S	
——		CLAMP		MS3057-4A or-4B	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	DB50A	T/C	UNITED INST	9551B CODE N.541	
21	DC01A	PROBE, CYL HD TEMP	STEWART-WARNER	SW-333-B	
21	DC01B	PROBE, CHT	ROCHESTER	3080-00014	
			MOONEY	(880010-501)	
21	DC01C	PROBE, CHT	MOONEY	880010-503	
21	DD01A	GAUGE, OUTSIDE AIR TEMP	GARWIN	22-295	
21	DD01B	GAUGE, OAT	INSTR.& FLT RES.	IFR-11A	
21	DD01C	GAUGE, OAT/EGT	B&D INSTRUMENT	C203-005	
			MOONEY	880010-501	
21	DD01E	GAUGE, OAT/EGT(LIGHTED)	MOONEY	880001-505	
21	DD01F	GAUGE, OAT (LIGHTED)	MOONEY	880023-505	
21	DD02A	PLUG -GAUGE		MS3106A-14S-2S	
——		CLAMP		MS3057-6B	
21	DD02C	PLUG,OAT/EGT	AMP	205838-1	
——		CLAMP	AMP	206062-1	
21	DD02D	PLUG,OAT		MS3106A-14S-2S	
——		CLAMP		MS3057-6A	
21	DD03A	PROBE, OAT		MS2803403	
21	DD03B	PROBE, OAT	WESTBERG	399W	
21	DD03C	PROBE, OAT	B&D INSTR	0203-100	
			MOONEY	880004-501	
21	DD04A	C/B, OAT/EGT	KLIXON	7277-2-2	
21	DE01A	GAUGE, CARB AIR TEMP	MOONEY	680014-005	
			GARWIN	22-995-04	
21	DE02A	PLUG, GAUGE		MS3106A-14S-1S	
——		CLAMP		MS3057-6B	
21	DE02B	PLUG, GAUGE		MS3106B-14S12S	
——		CLAMP		MS3057-6B	
21	DE03A	PROBE, CARB AIR TEMP	RICHTER AERO	8-5	
21	DF01A	XMTR, FUEL QTY, LT, IB	MOONEY	610242-001	
21	DF01B	XMTR, FUEL QTY, LT, IB	MOONEY	610242-003	
21	DF02A	XMTR, FUEL QTY, LT, OB	MOONEY	610243-003	
21	DF03A	XMTR, FUEL QTY, RT, IB	MOONEY	610242-001	
21	DF03B	XMTR, FUEL QTY, RT, IB	MOONEY	610242-003	
21	DF04A	XMTR, FUEL QTY, RT, OB	MOONEY	610243-001	
21	DG01A	C/B, CLUSTER GAUGE	MERIDEN	AHW4-2	
21	DG01B	C/B, CLUSTER GAUGE	KLIXON	7277-2-2	
21	DG02A	GAUGE, CLUSTER	MOONEY	640281-503	
		FUEL QTY, LH	MOONEY	640281-105	
		FUEL QTY, RH	MOONEY	640281-107	
		AMMETER	MOONEY	640281-115	
		OIL PRESS	MOONEY	640281-117	
		OIL TEMP	MOONEY	640281-149	
		CYL HEAD TEMP	MOONEY	640281-111	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	DG02G	GAUGE, CLUSTER	MOONEY	640281-507	
		FUEL QTY, LH	MOONEY	640281-105	
		FUEL QTY, RH	MOONEY	640281-107	
		FUEL PRESS	MOONEY	640281-119	
21	DG02G	OIL PRESS	MOONEY	640281-121	
		OIL TEMP	MOONEY	640281-149	
		CYL HEAD TEMP	MOONEY	640281-511	
	(ALT)	GAUGE, CLUSTER	MOONEY	640281-511	
		FUEL QTY, LH	MOONEY	640281-125	
		FUEL QTY, RH	MOONEY	640281-127	
		FUEL PRESS	MOONEY	640281-131	
		OIL PRESS	MOONEY	640281-129	
		OIL TEMP	MOONEY	640281-133	
		OIL TEMP (ALT)	MOONEY	640281-155	33
		CYL HEAD TEMP	MOONEY	640281-135	
		CYL HEAD TEMP (ALT)	MOONEY	640281-157	
21	DG02H	GAUGE, CLUSTER	MOONEY	640281-513	
		FUEL QTY, LH	MOONEY	640281-147	
		FUEL QTY, RH	MOONEY	640281-145	
		AMMETER	MOONEY	640281-137	
		OIL PRESS	MOONEY	640281-141	
		OIL TEMP	MOONEY	640281-139	
		CYL HEAD TEMP	MOONEY	640281-143	
	(ALT)	GAUGE, CLUSTER	MOONEY	640281-515	32
		FUEL QTY, LH	MOONEY	640281-153	
		FUEL QTY, RH	MOONEY	640281-151	
		AMMETER	MOONEY	640281-137	
		OIL PRESS	MOONEY	640281-141	
		OIL TEMP	MOONEY	640281-139	
		OIL TEMP (ALT)	MOONEY	640281-159	34
		CYL HEAD TEMP	MOONEY	640281-143	
		CYL HEAD TEMP (ALT)	MOONEY	640281-161	34
21	DG02J	GAUGE, CLUSTER	MOONEY	640281-519	
		FUEL QTY, LH	MOONEY	640281-163	
		FUEL QTY, RH	MOONEY	640281-165	
		FUEL PRESS	MOONEY	640281-171	
		OIL PRESS	MOONEY	640281-133	
		OIL TEMP	MOONEY	640281-155	
		CYL HEAD TEMP	MOONEY	640281-135	
21	DG02K	GAUGE, CLUSTER	MOONEY	640281-521	
		FUEL QTY, LH	MOONEY	640281-153	
		FUEL QTY, RH	MOONEY	640281-151	
		AMMETER	MOONEY	640281-137	
		OIL PRESS	MOONEY	640281-169	
		OIL TEMP	MOONEY	640281-139	
		CYL HEAD TEMP	MOONEY	40281-143	
21	DH01A	PROBE, OIL TEMP	STEWART-WARNER	362-CR	
21	DH01B	PROBE, OIL TEMP	ROCHESTER	3080-37	
			MOONEY	880009-501	
———		WASHER		AN900-10	
———	(ALT)			MS35769-11	
21	DJ01A	XDUCR, OIL PRESS	ROCHESTER	3080-37	
			MOONEY	880009-501	
21	DJ01B	XDCR, OIL PRESS	MOONEY	880046-501	
21	DJ02A	PLUG, XDCR, OIL PRESS		MS3106A10SL-3S	
———		CLAMP		MS3057-4A/B	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	DJ175A	XDCER, OIL PRESS	DRUCK	PDCR821-0862-100	
21	DJ177A	AMPLIFIER, OIL PRESS	IAI	950D0311-002	
21	DJ178A	PLUG, OIL PRESS, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	DJ179A	RECPT, OIL PRESS, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
21	DJ180A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	DJ181A	RECPT, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
21	DK01A	XDUCR, FUEL PRESS	ROCHESTER	3060-17	
			MOONEY	880007-501	
21	DK01C/D	XDUCR, F/F(OPT)	MOONEY	880030-501	
21	DK01D	XDUCR, FUEL PRESS	MOONEY	880045-501	
21	DK01E	XDUCR, FF	MOONEY	880030-503	
21	DK01F	XDUCR, FUEL FLOW	MOONEY	880030-505	
21	DK02B	GAUGE, FF/MP	MOONEY	880031-501	
		GAUGE, FF/MP, LIGHTED (OPT)	MOONEY	880031-503	
21	DK02D/E	GAUGE, FF (OPT)	MOONEY	880034-501	25
21	DK02F	GAUGE, (GALS/HR)	MOONEY	880034-513	
21	DK03A	PLUG, FF/MP GAUGE	BENDIX	PT06A-10-98S(SR)	
21	DK03B	PLUG, FF	BENDIX	PT06A-15-15S(SR)	
21	DK03C/D	PLUG, FF	ITT CANNON	DE-9S	
21	DK03E/F	PLUG, FF (OPT)	CANNON	DE-9S	
21	DK04A	C/B, FF	KLIXON	7277-2-2	
21	DK05A	SWITCH, MEMORY, FF (OPT)	ALCO	MST215N	
21	DK06A	PLUG, FF, XDCR		MS3106A10SL-3S	
——		CLAMP		MS3057-4A	
21	DK175A	XDUCR, FUEL PRESS	DRUCK	PDCR821-0862-30	
21	DK176A	AMPLIFIER, FUEL PRESS	IAI	950D0311-031	
21	DK177A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	DK178A	RECPT, 4 PIN	AMP	280153-1	
——		CLAMP	AMP	206062-1	
21	DK179A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	DK180A	RECPT, 4 PIN	AMP	280153-1	
——		CLAMP	AMP	206062-1	
21	DL01A	TACH, ELEC	MOONEY	880002-501	3
21	DL01B	TACH, ELEC	MOONEY	880039-503	
21	DL01C	TACH, ELEC	MOONEY	880002-503	
21	DL01D	TACH, ELEC	MOONEY	880039-501	
21	DL01E	TACH, ELEC	MOONEY	880039-507	
21	DL01F	TACH, ELEC, (LIGHTED)	MOONEY	880039-505	
21	DL02A	PLUG, TACH		MS3106A-14S-5S	
		CLAMP		MS3057-6A	
21	DL03A	RESISTOR, L	OHMITE	OL1535	
21	DL04A	RESISTOR, L	OHMITE	OL1535	
21	DL05A	CABLE ASSY	MOONEY	880003-501	
21	DM01A/B	HOUR METER	MOONEY	880035-501	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	DP01A	C/B, PITOT HEAT	MOONEY	930023-005	
21	DP01B	C/B, PITOT HEAT	MOONEY	930023-105	
21	DP01D	C/B, PITOT HEAT	MOONEY	930023-205	
21	DP02A	HEATED PITOT	AEL or EQUIV	425936	
21	DP02B	PITOT, HEATED	AERO INST	PH502-24	
		(ALT)		AN5812-1	
21	DP03B	PLUG, PITOT HEAT		AN3115-1	
		SOCKETS		AN3116-1	
21	DR01A	C/B, TIT/CDT	KLIXON	7277-2-2	
21	DR01B	GAUGE, TIT/CDT, LIGHTED	MOONEY	880000-503	
21	DR02A	PLUG, TIT/CDT INDICATOR	AMP	205838-1	
21	DR03A	PROBE, TIT	MOONEY	880005-501	
21	DR04A	C/B, TIT/CDT	KLIXON	7277-2-2	
21	DS01A	PROBE, CDT	MOONEY	880006-501	
21	DT01A	PROBE, EGT	B&D INSTR	0204-100	
			MOONEY	880005-501	
21	EG01A	C/B, ELEC. GEAR	MERIDEN or EQUIV	AHW4-15	
21	EG01B	C/B, ELEC. GEAR	KLIXON	7277-2-15	
21	EG01C	C/B, ELEC. GEAR CONTROL	KLIXON	7277-2-5	
21	EG02A	SWITCH, CONTROL	MICRO	2TL149-3D	
21	EG02B	SWITCH, GEAR UP/DN	C-H	8906K2875	
21	EG03A	SWITCH, LIMIT	MICRO	DT-2R-A7	
—		ACTUATOR	MICRO	MCD-2711	
21	EG04A	ACTUATOR, GEAR, ELEC	ITT	LA11C21101	
21	EG04B	ACTUATOR, GEAR, ELEC	DUKES	1057-00-1	
21	EG04C	ACUTATOR, GEAR, ELEC	DUKES	4196-00-1D	
21	EG04D	ACUTATOR, GEAR, ELEC	ITT	LA11C2115	
21	EG04E	ACUTATOR, GEAR, ELEC	ITT	LA11C2114	
21	EG04F	ACUTATOR, GEAR, ELEC	DUKES	1057-00-5E	
21	EG04G	ACUTATOR, GEAR, ELEC	AVIONICS PROD	102000-1	26
			MOONEY	560254-501	3
21	EG05A	RELAY, GEAR	RBM	70-111221	
21	EG05C	RELAY, GEAR UP	MAGNECRAFT	W97CSX-1	1
21	EG05D	RELAY, GEAR UP	C-H	6041H50A	1
21	EG05E	RELAY, GEAR UP	RBM	70311221	22
21	EG05F	RELAY, GEAR UP	C-H	6041H59	
			COLE-HERSEE	24401	22
21	EG06A	SQUAT SWITCH	MICRO	1CH1-6	
			MOONEY	800935-501	
21	EG06B	SWITCH, SAFETY, AIRSPEED	WHITMAN-GENERAL	SK75-IN-K3L	5
21	EG06C	SWITCH, SAFETY, AIRSPEED	MOONEY	880013-503	5
21	EG06D	SWITCH, SAFETY, AIRSPEED	MOONEY	880013-505	5
21	EG07A	SWITCH, DOWN LIMIT	MICRO	1CH1-6	
21	EG08C	RELAY, GEAR DOWN	MAGNECRAFT	W97CSX-1	
21	EG08D	RELAY, GEAR DOWN	C-H	6041H105A	
21	EG08E	RELAY, GEAR DOWN	RBM	70-311221	22
21	EG08F	RELAY, GEAR DOWN	C-H	6041H105A	
21	EG09A	C/B, GEAR ACT	MECHANICAL PROD	700-01-25	
21	EG09B	C/B, GEAR ACT	KLIXON	7277-2-15	
21	EG10A	SWITCH, GEAR OVERIDE	C-H	S8IDDX492-2	
—		LAMP	GE	388	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	EG11A	DIODE, GEAR UP RELAY	SARKES TARZIAN	F4	
21	EG12A	DIODE,GEAR DN RELAY	SARKES TARZIAN	F4	
21	EL01A	TRANSISTOR	RCA	2N2016	
21	EL02A	FUSE	McGRAW-EDISON	FM01-5A	
——		HOLDER		FHN42W	
21	EL03A	RESISTOR	OHMITE	4599	
21	EL04A	RHEOSTAT/SW	ALLEN/BRADLEY	JS1N056P251MA	
21	EL06A	PLACARD, CB	MOONEY	150082-009	
21	EL07A	PLACARD, FUEL SEL	MOONEY	150082-011	
21	EL08A	PLACARD, ANNUN	MOONEY	150082-015	
21	EL09A	PLACARD, CK. LIST	MOONEY	150082-013	
21	ELT1A	ELT	DORNE & MARGOLIN	DM-ELT-6	
		(ALT)		DM-ELT -6M	
21	ELT1B	ELT, TRANSMITTER (OPT)	DORNE & MARGOLIN	DM-ELT-6	
21	ELT2A	SWITCH, REMOTE ELT	DORNE & MARGOLIN	DM-U65-1	
		(ALT)	C & K	7101K	
21	EW01B	C/B, GEAR WARNING	KLIXON	7277-2-2	
21	JM01A	SWITCH, MAGNETO	BENDIX-SCINTILLA	10-357290-17	
——		PLACARD	BENDIX- SCINTILLA	10-187-469	
21	JM01B	SWITCH, MAGNETO	BENDIX-SCINTILLA	10-357210-91	
21	JM02A	MAGNETO, LEFT	BENDIX-SCINTILLA	S4LN200	
21	JM02B	MAGNETO, DUAL	BENDIX-SCINTILLA	D4LN2021	
21	JM02C	MAGNETO, LEFT	BENDIX	10-79020-18	
21	JM02D	MAGNETO, LEFT	SLICK	6214	
21	JM02E	MAGNETO, LEFT	SLICK	6224	
21	JM03A	MAGNETO, RIGHT	BENDIX	S4LN204	
21	JM03C	MAGNETO, RIGHT	BENDIX	10-79020-18	
21	JM03D	MAGNETO, RIGHT	SLICK	6214	
21	JM03E	MAGNETO, RIGHT	SLICK	6224	
21	JV01A	STARTING VIBRATOR	BENDIX-SCINTILLA	10-176487-121	
21	LB01A	C/B, ROTATING BEACON	MOONEY	930023-003	
21	LB01B	C/B, ROTATING BCN(SPARES)	MOONEY	930023-103	26
21	LB01D	C/B, ROTATING BEACON	MOONEY	930023-203	
21	LB02A	LIGHT, ROTATING BEACON	WHELEN	WRML-12	
———		ADAPTER	WHELEN	WRM-65	
21	LC01A	FUSEHOLDER, CLOCK, 5AMP	LITTEL FUSE	155020/155120	
——		FUSE,(5A-3AG-SLO-BLO)	LITTEL FUSE	313005	
21	LC02A	LIGHT, CABIN, OVERHEAD	LUMINATOR	20145	
——		BULB	GE	1003	
21	LC02B	LIGHT, CABIN, OVERHEAD	GRIMES	B-3550	
——		BULB	GE	89	
21	LC03A	SWITCH, CABIN LIGHT	C-H	8144(BK-09)	
21	LC03B	SWITCH, CABIN LIGHT, FWD	CARLING	TILC64-1S-WH-FN	
21	LC03C	SWITCH, CABIN LIGHT, REAR	CARLING	TILC64-1S-WH-FN	
21	LC03D	SWITCH, CABIN LIGHT, FWD	CARLING	TILC64-1S-WH-FN	
21	LC03E	SWITCH, CABIN LIGHT, REAR	CARLING	TILC64-1S-WH-FN	
21	LC04A	RESISTOR, DIM, CABIN LT	OHMITE	4561	
		(10 OHM 5W)			
21	LC04B/C	RESISTOR, DIM., CABIN LT	DALE	RH-10-5 OHM	
21	LC07A	SWITCH, MAP LT, PILOTS	C-H	5A25SCT12-3	
———		CAP		SW53AA2	
——		FACE NUT		15-1049-3	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	LC08A	LIGHT, MAP, PILOTS	SLOAN	855-S1-0-PE	
——		BULB	GE	330	
21	LC09A	SW, MAP LT, CO-PILOT	C-H	SA25SCT12-3	
——		CAP		SW53AA2	
——		FACE NUT		15-1049-3	
21	LC10A	LIGHT, MAP, CO-PILOT	SLOAN	855-S1-0-PE	
——		BULB	GE	330	
21	LC11A	LIGHT, CABIN, (F1-R)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC12A	LIGHT, CABIN, (F2-R)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC13A	LIGHT, CABIN, (F1-L)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC14A	LIGHT, CABIN, (F2-L)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC15A	LIGHT, CABIN, (R1-R)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC16A	LIGHT, CABIN, (R2-R)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC17A	LIGHT, CABIN, (R1-L)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LC18A	LIGHT, CABIN, (R2-L)	H.H. SMITH	1930	9
——		LAMP	GE	1816	
21	LL01A	C/B, LDG LT	MERIDEN	AHW4-20	
21	LL01B	C/B, LDG LT	MOONEY	930023-15	
21	LL01C/D	C/B, LDG LT	MOONEY	930023-115/-215	28
21	LL02A	RELAY, LDG LT	MAGNECRAFT	W89CQX-2	
21	LL03A	LIGHT, LDG (BULB)	GE	4522	
21	LL03B/C	LIGHT, LDG (BULB)	GE	4509	
21	LL04A	SWITCH, LDG LT	C-H	SA25SCT12-3	
——		CAP		SW53AA2	
——		FACE NUT		15-1049-3	
21	LN01A	C/B, NAV LIGHTS	MOONEY	930023-001	
21	LN01B/D	C/B, POSITION LTS	MOONEY	930023-101/-201	28
21	LN02A	LIGHT, POSITION (RED)	GRIMES	A1285-R-12	
——		BULB, POSITION (14V)		A7512-12	
			MOONEY	880022-501	
——		BULB, POSITION (14V)		W1290-14	
21	LN02B	LIGHT, POSITION,(14V) (RED)	WHELEN	W1265-PR	
21	LN03A	LIGHT, POSITION, TAIL (WHITE)	GRIMES	A2064-1777	
--		BULB, 14V, TAIL LT.		209529	
——		BULB, 14V, TAIL LT.	GRIMES	1777-266P-12.8V	
21	LN03B	LIGHT, POS, TAIL, (14V) (VERT.MT)	WHELEN	A480A	
——		BULB, POS., TAIL (14V)		A508-14	
21	LN04A	LIGHT, POS, (GREEN)	GRIMES	A1285-G-12	
——		BULB, POSITION (14V)		A7512-12	
			MOONEY	880022-503	
——		BULB, POSITION (14V)		W1290-14	
21	LN04B	LIGHT, POS, (GREEN)	WHELEN	W1265-PG	
			MOONEY	880022-503	
21	LP01A	C/B, PANEL LIGHTS	MERIDEN	AHW4-10	
21	LP01B	C/B, PANEL LIGHTS	KLIXON	7277-2-10	
21	LP01C/D	C/B, INSTR LTS	KLIXON	7277-2-10	
21	LP02A	C/B, PANEL LIGHTS	MERIDEN	AHW4-10	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	LP03A	XSTR, INSTR LIGHTS	RCA	2N2016	8
21	LP03C	XSTR, RADIO LIGHTS	RCA	2N2016	8
21	LP03B	XSTR, (ALT LP03A/C)	DELCO	2N3079	
21	LP04A	XSTR, RADIO LIGHTS	RCA	2N2016	8
21	LP05A	XSTR, RADIO LIGHTS	RCA	2N2016	8
21	LP06A	RHEOSTAT/SWITCH	ALLEN/BRADLEY	JS1N056P251MA	
21	LP06B/C	RHEOSTAT/SWITCH, RADIO	ALLEN/BRADLEY	JS1N056P251MA	
21	LP07A	RHEOSTAT/SWITCH, RADIO	ALLEN/BRADLEY	JS1N056P251MA	
21	LP08A	RHEOSTAT/SWITCH, RADIO	ALLEN/BRADLEY	JS1N056P251MA	
21	LP09A	SWITCH, RED/WHITE, LIGHT	MICRO	8H2011	
———		ROCKER	MICRO	8ZD023	
21	LP10C	C/B, INSTR LIGHTS	KLIXON	7277-2-5	
21	LP13A	FUSE, INSTR LTS	McGRAW-EDISON	FM01-5A	
———		HOLDER		FHN42W	9
21	LP14A	FUSE, INSTR LTS	McGRAW-EDISON	FM01-5A	
———		HOLDER		FHN42W	9
21	LP15A	FUSE, INSTR LTS	McGRAW-EDISON	FM01-5A	
		HOLDER		FHN42W	9
21	LP16A	LAMPS (RED)	GE	1836R	
		HOLDER (4 EA)	H.H. SMITH	1930	9
21	LP17A	LAMPS (RED)	GE	1836R	
———		HOLDER (7 EA)	H.H. SMITH	1930	9
21	LP18A	LAMPS (WHITE)	GE	1836	
———		HOLDER (4 EA)	H.H. SMITH	1930	9
21	LP18B	LAMPS	GE	1816	
———		HOLDER (10 EA)	H.H. SMITH	1930	9
21	LP18C	LAMPS	GE	1816	
———		HOLDER (9 EA)	H.H. SMITH	1930	9
21	LP18D	LAMPS	GE	1816	
		HOLDER (10 EA)	H.H. SMITH	1930	9
21	LP18E	LIGHTS, GLARESHIELD	SLOAN	8555-9-1	
			MOONEY	130265-003	
———		BULB (7 EA)	GE	330	
21	LP19A	LAMPS	GE	1836	
———		HOLDER (6 EA)	H.H. SMITH	1930	9
21	LP20A	N# LIGHT (2 EA)	KORRY	250-550-5821-008	
		BULBS	GE	327	
21	LP21A	LIGHT, COMPASS	GE	330	
21	LP22A	LIGHT-CONSOLE	WESTERN IND CO.	501-61K-11K3BP	
———		LAMP	WESTERN IND CO	WI-7046	
21	LP22B	LIGHT-CONSOLE	WESTERN IND CO	501-61K-11K3BP	
———		LAMP	WESTERN IND CO	WI-7046	
21	LP22C	LIGHT HOLDER, FLAP & TRIM	DIALIGHT	270-1930-01710702	
———		LAMP	GE	370	
21	LP24A	FUSE (5 AMP)(3AG-SLO-BLO)	LITTEL		313005
———		HOLDER	LITTEL	155020	
21	LP24B	FUSE, MAP LITE	LITTEL	313001	
———		HOLDER	LITTEL	155020 or 155120	
21	LP25A	RESISTOR		100 OHM 2W	
21	LP25B	RESISTOR, INSTR LITES	OHMITE	4599	10
21	LP25C	RESISTOR, RADIO LITES	OHMITE	4599	10
21	LP25D	RESISTOR, INSTR LITES (24-0901 THRU 24-0926)	DALE	RH-10-50 OHM	
21	LP25E	RESISTOR, INSTR LITES	DALE	RH-10-50 OHM	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	LP26A	LIGHT, POST, M/P	GRIMES	A-8970B1	
		LAMP	GE	330	
21	LP27A	LIGHT, POST,TACH	GRIMES	A-8970B1	
		LAMP	GE	330	
21	LP28A	LIGHT, POST, CLOCK	GRIMES	A-8970B1	
		LAMP	GE	330	
21	LP29A	LIGHT, POST,OAT	GRIMES	A-8970B1	
		LAMP	GE	330	
21	LP30A	HOLDER, OXYGEN LIGHT	SLOAN	855S-0-U	
		LAMP	GE	330	
21	LP31A	BUSS, RADIO LIGHT	MOONEY	800233-000	
21	LP32A	POST LIGHT	GRIMES	A-8970B1	
21	LP33A	POST LIGHT	GRIMES	A-8970B1	
21	LP34A	POST LIGHT	GRIMES	A-8970B1	
21	LP35A	POST LIGHT	GRIMES	A-8970B1	
		LAMP	GE	330	
21	LP36A	LAMP, CLUSTER #1	G/E	330(AVIATION BLUE)	
21	LP37A	LAMP, CLUSTER #2	G/E	330(AVIATION BLUE)	
21	LP38A	LAMP, CLUSTER #3	G/E	330(AVIATION BLUE)	
21	LP39A	LAMP, CLUSTER #4	G/E	330(AVIATION BLUE)	
21	LP40A	LAMP, CLUSTER #5	G/E	330(AVIATION BLUE)	
21	LP41A	CONNECTOR, MALE	DEANS	DEA 90020	
21	LP42A	CONNECTOR, FEMALE	DEANS	DEA 90020	
21	LP43A	FUSE, (1A)	LITTEL	313001	
		HOLDER	LITTEL	155020 or 155120	
21	LP44A	CONNECTOR, PLUG	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	LP45A	CONNECTOR,	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	LR01A	C/B RECOGNITION LIGHTS	MOONEY	930023-231	
21	LR02A	RECOG. LIGHT, LT	MOONEY	880044-001	
21	LR03A	PLUG, RECOG. LIGHT, LT	AMP	1-480318-0	
		SOCKETS	AMP	60619-1	
21	LR04A	RECOGNITION LIGHT, RT	MOONEY	880049-001	
21	LR05A	PLUG, RECOG. LIGHT, RT	AMP	1-480318-0	
		SOCKETS	AMP	60619-1	
21	LS01A	C/B, STROBE LIGHTS	MOONEY	930023-007	
21	LS01B/D	C/B, STROBE LIGHTS (ALT)	MOONEY	930023-107/-207	28
21	LS02A	PWR SUPPLY, STB, L/WG	WHELEN	A490, T14	31
21	LS02B	PWR SUPPLY, STB, L/WG	SDI	701295-3A	29, 32
			MOONEY	880018-501	29
21	LS02C	PWR SUPPLY, STB, L/WG	MOONEY	880028-507	30
21	LS02E	PWR SUPPLY, STB, L/WG	MOONEY	880028-505(ALT)	
21	LS02F	CABLE, PWR SUPPLY, L/WG	MOONEY	880017-503(ALT)	
21	LS03A	STROBE LITE(FLASHTUBE)	WHELEN	A429	31
21	LS03B	STROBE, LITE, L/WG	SDI	701303A	
		FLASHTUBE	MOONEY	880019-501	29
21	LS03B	STROBE LT, L/WG	SDI	702000-1	
			MOONEY	880021-501	34
21	LS03C	STROBE LT, L/WG	MOONEY	880038-501	30
21	LS03D	CABLE ASSY, STROBE, L/WG	SDI	702000-3	
			MOONEY	880017-501	29,34

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	LS03E	CABLE ASSY, STROBE, L/WG	MOONEY	880017-503	
21	LS04A	PWR SUPPLY,STROBE,R/WG	WHELEN	A490, T14	31
21	LS04B	P/S, STROBE, R/WG	SDI	701285-3A	
			MOONEY	880018-501	29, 34
21	LS04C	P/S, STROBE, R/WG	MOONEY	880028-507	30
21	LS04D	CABLE ASSY, R/WG	SDI	702000-3	
			MOONEY	880017-501	29, 34
21	LS04E	P/S, STROBE,R/WG	MOONEY	880028-505(ALT)	
21	LS04F	CABLE, P/S, R/WG	MOONEY	880017-503(ALT)	
21	LS05A	FLASHTUBE, R/WG	WHELEN	A429	31
21	LS05B	STROBE, LITE, R/WG	SDI	702000-2	34
		FLASHTUBE	MOONEY	880019-501	29
			MOONEY	880021-502	34
21	LS05C	STROBE LT, R/WG	MOONEY	880038-502	30
21	LS06A	P/S, TAIL STROBE	MOONEY	880038-501	29,34
21	LS06B	P/S,TAIL STROBE	MOONEY	880028-507	30
21	LS06C	CABLE, TAIL STROBE	MOONEY	880017-505(ALT)	
21	LS06D	CABLE, TAIL LITE	MOONEY	880017-507	29
21	LS07A	STROBE, TAIL	MOONEY	880020-501	29, 34
21	LS07B	STROBE, TAIL	MOONEY	880041-501	30
21	LS08A	PLUG, TAIL STROBE	AMP	206708-1	30
21	LS09A	RECPT, TAIL STROBE P/S	AMP	1-480305-0	
——		PINS (3 EA)	AMP	61118-1 OR 60629-1	
21	MA01A	AUX. PWR. RECEPTACLE		AN2552-3A	
21	MA02A	RELAY, AUX PWR	C-H	6041H105A	
21	MA02B	RELAY	C-H	6041H105A	
21	MA03A	DIODE, AUX PWR RELAY	SARKES TARZIAN	10H3P	
21	MA04A	DIODE		1N2483	
21	MB01A	C/B, COM 1	MERIDEN	AHW4-	11
21	MB01B	C/B, COM 1	KLIXON	7277-2-	11
21	MB02A	C/B, NAV 1	MERIDEN	AHW4-	11
21	MB02B	C/B, NAV 1	KLIXON	7277-2-	11
21	MB03A	C/B, COM 2	MERIDEN	AHW4-	11
21	MB03B	C/B, COM 2	KLIXON	7277-2-	11
21	MB04A	C/B, NAV 2	MERIDEN	AHW4-	11
21	MB04B	C/B, NAV 2	KLIXON	7277-2-	11
21	MB05A	C/B, XPN1A	MERIDEN	AHW4-	11
21	MB05B	C/B, XPN	KLIXON	7277-2-	11
21	MB06A	C/B, AUD 1	MERIDEN	AHW4-	11
21	MB06B	C/B, AUD	KLIXON	7277-2-	11
21	MB07A	C/B, ADF 1A	MERIDEN	AHW4-	11
21	MB07B	C/B, ADF	KLIXON	7277-2-	11
21	MB08A	C/B, DME 1A	MERIDEN	AHW4-	11
21	MB08B	C/B, DME	KLIXON	7277-2-	11
21	MB09A	SPEAKER, MS01A	MOONEY	810195	
21	MB09B	SPEAKER	ARA	5707001	
21	MB10A	JACK, MIC 1	SWITCHCRAFT	C-128	
——		WASHERS	SWITCHCRAFT	S-102B, S-1029	
21	MB11A	JACK, MIC 2	SWITCHCRAFT	C-128	
——		WASHERS	SWITCHCRAFT	S-102B, S-1029	
21	MB12A	MIC KEY, PILOTS	C-H	SA25SAT12-3	
——		CAP	C-H	SW53AA2	
——		FACE NUT	C-H	15-1049-3	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	MB13A	MIC KEY, COPILOT	C-H	SA25SAT12-3	
——		CAP	C-H	SW53AA2	
——		FACE NUT	C-H	15-1049-3	
21	MB14A	JACK, FONE 1	SWITCHCRAFT	C-11	
21	MB15A	JACK, FONE 2	SWITCHCRAFT	C-11	
21	MB16A/B	C/B, A/P	KLIXON	7277-2-	11
			MERIDEN	AHW4-	11
21	MB17A	SWITCH, RADIO MASTER	ALCO	MST215N	
21	MB18A/B	C/B, R-NAV	KLIXON	7277-2-	11
21	MB19A	C/B, HSI	KLIXON	7277-2-	11
21	MB20A	C/B, ENCODER	KLIXON	7277-2-	11
21	MB21A	C/B, FUEL FLOW	KLIXON	7277-2-	11
21	MB22A	C/B, TELEFONE	KLIXON	7277-2-	11
21	MB23A	C/B, VME	KLIXON	7277-2-	11
21	MB24A	C/B, TELEPHONE	KLIXON	7277-2-	11
21	MB25A	C/B, INVERTER	KLIXON	7277-2-	11
21	MB26A	C/B, RMI	KLIXON	7277-2-	11
21	MB27A	C/B, PROP DE-ICE	MOONEY	930023-023	
21	MB27B/D	C/B, PROP DE-ICE	MOONEY	930023-123/-223	11, 28
21	MB28A	C/B, WX RADAR	MOONEY	930023-021	
21	MB28B	C/B, WX RADAR	MOONEY	930023-121/-221	28
21	MB29A	BUSS, GRD 1	MOONEY	800233-000	
21	MB30A	BUSS, GRD 2	MOONEY	800233-000	
21	MB31A	BUSS, GRD 3	MOONEY	800233-000	
21	MB32A/B	C/B, WX RADAR, COLOR	MOONEY	930023-125/-225	28
21	MB33A	C/B, RADIO BLOWER	KLIXON	7277-2-	11
21	MB34A	RADIO BLOWER ASSY	KING	KA20	
21	MB35A	C/B, STEREO	KLIXON	7277-2-	11
21	MB36A	C/B, ALT. SERVO	KLIXON	7277-2-	11
21	MB37A	C/B, ALT SELECT	KLIXON	7277-2-	11
21	MB38A	C/B, CONVERTER	KLIXON	7277-2-	11
21	MB39A	C/B, LORAN	KLIXON	7277-2-	11
21	MB40A/D	C/B, STANDBY VACUUM	MOONEY	930023-127/-227	11,28
21	MB41A	C/B, STORMSCOPE	KLIXON	7277-2-	11
21	MC01A	CIGAR LIGHTER	MOONEY	800336-501	
21	MC01B	CIGAR LIGHTER	MOONEY	800336-503	
21	ME01A	CLOCK, ELECTRIC	BORG INSTR	CA-7212 or CA-7286	
21	ME01B	CLOCK (OPT)	BORG	CA7615	37
21	ME01C	CLOCK,LIGHTED)	MITCHELL	98470-1LW	37
21	NF01A	C/B, FUEL PUMP	MOONEY	930023-011	
21	NF01B	C/B, FUEL PUMP-LO	MOONEY	930023-117	28
21	NF01C	C/B, FUEL PUMP-LO	MOONEY	930023-111	
21	NF01D/F	C/B, FUEL PUMP-LO	MOONEY	930023-117/-217	
21	NF01E	C/B, BOOST PUMP	MOONEY	930023-211	
21	NF02A	FUEL PUMP	DUKES	4140-00-19A (R/B)	
				1499-00-19	
			MOONEY	610153-501	
21	NF02B	FUEL PUMP	DUKES	1499-00-19	
			MOONEY	610153-501	
21	NF03A	C/B, FUEL PUMP-HI	MOONEY	930023-019	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	NF03B/D	C/B, FUEL PUMP-HI	MOONEY	930023-119/-219	28
21	NF04A	RESISTOR	CLARSTAT	VP-50-KA	12
21	NF04B	VOLT REG, AUX PUMP	ELECTRO-DELTA	VR-436	
——	ALT		MOONEY	880047-505	
21	NF05A	RECPT, V/R	AMP	206153-1	
——		CLAMP	AMP	206062-1	
21	NF06A	PLUG, V/R	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	NF07A	RECPT, PUMP	AMP	206153-1	
——		CLAMP	AMP	206062-1	
21	NF08A	PLUG, PUMP	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	NP01A	SWITCH	CARLING	T1GK6B-1F-WH-A	
21	NP02A	SOLENOID	CONTINENTAL	642200	
21	NP03A	FUSE/HOLDER	LITTEL	311010 or 312010	
21	PA01A	C/B, ALTERNATOR, FIELD	MERIDEN	AHW4-5	
21	PA01B	C/B, ALT FIELD	KLIXON	7277-2-5	
21	PA02A	ALTERNATOR	PRESTOLITE	ALY-8403 or 8420 or ALY6420LS OR ALY9420M	
21	PA02B	ALTERNATOR	FORD	DOFF-10300J	
21	PA02C	ALTERNATOR	LYCOMING	LW 15404	
21	PA02D	ALTERNATOR	CONTINENTAL	641669	
21	PA03A	FILTER	ELPAC	27-3-99-01021	
21	PA03B	FILTER	SPRAGUE	JN-14-1356A	
21	PA03C	FILTER	CAPTOR	A2637	
21	PA03D	FILTER	CAPTOR	A2638	
21	PA04A	C/B, ALT	MECH. PROD.	1648-001-70	
21	PA04B	C/B, ALT. OUTPUT	ETA	41-3-S14-LN2-70	
21	PA05A	CAPACITOR	SANGAMO	500-1041-01	
21	PA06A/B/C	VOLTAGE REG. REPLACES OECO P/N 20082, & ELECTRO-DELTA P/N's VR414 & VR415	MOONEY	880016-501 880270-505 (SPARES)	38 13
——		ADAPTER CABLE	MOONEY	800331-721	
21	PA07A	PLUG, VOLT REG		MS3106A-18-4S	
——		CLAMP		MS3057-10B	
21	PA07B	PLUG, VOLT REG	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	PA08B	RECPT. VOLT REG	AMP	206153-1	
——		CLAMP		206062-1	
21	PB01A	BATTERY	GILL	G-35(PS6-11)	17
21	PB01B	BATTERY	PRESTOLITE	R-35	
21	PB02A	RELAY,,BATTERY,MASTER	C-H	8041H231	
21	PB02B	RELAY, MASTER	C-H	8041H105A	
21	PB03A	C/B, AUX BUSS	MERIDEN	AHW1-50	
——		(ALT)	MECHANICAL PROD	700-001-50	
21	PB03B	C/B, AUX POWER	ETA	41-3-S14-LN2-50	
21	PB04A	RELAY, RADIO	MAGNECRAFT	W89CDX-2	
21	PB04B	RELAY, RADIO MASTER	P & B	MB-4413	6
21	PB05A	SWITCH, MASTER	C-H	9811K828	
21	PB06A	C/B BUS, RADIO RELAY	MOONEY	930023-013	
21	PB06B/D	C/B, RADIO MASTER	MOONEY	930023-113/-213	28
21	PB07A	BUSS BAR, MAIN FLEX			14

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	PB07B	BUSS BAR, MAIN FLEX			14
21	PB07C	BUSS BAR, MAIN FLEX, #1			14
21	PB07D	BUSS BAR, MAIN FLEX, #2			14
21	PB07E	BUSS BAR, MAIN POWER	MOONEY		14
21	PB07F	BUSS BAR, MAIN POWER	MOONEY		14
21	PB07G	BUSS BAR, MAIN POWER	MOONEY		14
21	PB07H	BUSS BAR, MAIN #7	MOONEY		14
21	PB07J	BUSS BAR, MAIN POWER	MOONEY		14
21	PB07K	BUSS BAR	MOONEY		14
21	PB07L	BUSS BAR	MOONEY		14
21	PB08A	BUSS BAR, RADIO FLEX	MOONEY		14
21	PB09A	BUSS BAR, AUX	MOONEY	913127-009	
21	PB09B	BUSS BAR, AUX. #1	MOONEY	913127-003	
21	PB09C	BUSS BAR, AUX. #2	MOONEY	913127-009	
21	PB09D	BUSS BAR, CONN 1 & 2	MOONEY	913127-011	
21	PB09E	BUSS BAR, AUXI	MOONEY	913127-013	
21	PB09F/M	BUSS BAR, AUX	MOONEY	913127-023	
21	PB09G	BUSS BAR, AUX. #2	MOONEY	913127-025	
21	PB09H	BUSS BAR, AUX. #1	MOONEY	913127-027	
21	PB09J	BUSS BAR, AUX. #2	MOONEY	913127-029	
21	PB09K	BUSS BAR, AUX.	MOONEY	913127-113	40
21	PB09L	BUSS BAR, AUX. #2	MOONEY	913127-125	
21	PB10A	BUSS BAR MAIN #1	MOONEY	913127-005	
21	PB10B	BUSS BAR MAIN #1	MOONEY	913127-017	
21	PB10C	BUSS BAR MAIN #1	MOONEY	913127-019	
21	PB11A	BUSS BAR MAIN #2	MOONEY	913127-005	
21	PB11B	BUSS BAR MAIN #2	MOONEY	913127-019	
21	PB12A	BUSS BAR MAIN #3	MOONEY	913127-005	
21	PB12B	BUSS BAR RADIO #3	MOONEY	913127-019	
21	PB12C	BUSS BAR MAIN #3	MOONEY	913127-001	
21	PB12D	BUSS BAR RADIO #3	MOONEY	913127-009	
21	PB12E	BUSS BAR RADIO #3	MOONEY	913127-019	41
21	PB12F	BUSS BAR RADIO #2	MOONEY	913127-019	41
21	PB13A	BUSS BAR RADIO #1	MOONEY	913127-005	
21	PB13B	BUSS BAR RADIO #2	MOONEY	913127-019	
21	PB14A	BUSS BAR RADIO #2	MOONEY	913127-005	
21	PB14B	BUSS BAR RADIO #2	MOONEY	913127-019	
21	PB14C	BUSS BAR RADIO #3	MOONEY	913127-019	
21	PB15A	DIODE, RADIO MASTER	SARKES TARZIAN	F-4	
21	PB16A	BUSS BAR MAIN #1	MOONEY	913127-003	
21	PB20A	JUMPER			
21	PB21A	BUSS BAR, RADIO FLEX			15
21	PB21B	BUSS BAR, RAD, FLEX #2	MOONEY		14
21	PB21C	BUSS BAR, RAD. FLEX	MOONEY		15
21	PB21D	BUSS BAR	MOONEY		15
21	PB21E	BUSS BAR	MOONEY		15
21	PB22A	DIODE, MASTER RELAY	SARKES TARZIAN	F-4	
21	PB23A	DIODE, RADIO RELAY	SARKES TARZIAN	F-4	
21	PB24A	SHUNT, RADIO RELAY	KULKA	600RJ-2	
21	PB25A	SHUNT, RADIO RELAY	KULKA	600RJ-2	
21	PB26A	C/B, BATTERY POWER	E T A	41-3-S14-I,N2-70	
21	PB27A	BUSS BAR, MAIN POWER	MOONEY	913127-031	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	PB28A	DIODE	SARKES TARZIAN	F-4	
21	PB29A	BUSS BAR,RADIO #5	MOONEY	913127-001	
21	PB30A	BUSS BAR, RADIO #4	MOONEY	913127-001	
21	PB31A	BUSS BAR, MAIN PWR. #2	MOONEY	913127-003	
21	PB32A	BUSS BAR, RADIO #3	MOONEY	913127-005	
21	PB33A	BUSS BAR, RADIO #2	MOONEY	913127-019	
21	PB34A	BUSS BAR, MAIN PWR #3	MOONEY	913127-035	
21	PB35A	BUSS BAR, MAIN PWR #3	MOONEY	913127-035	
21	PB36A	BUSS BAR, RADIO #1	MOONEY	913127-035	
21	PB37A	BUBS BAR, MAIN #1	MOONEY	913127-037	
21	PG01A	GENERATOR, STANDBY	ELECTRO MECH	8012	
21	PG02A	FUSE HOLDER	LITTEL	155020 or 155120	
——		FUSE(15A SLO-BLO)	LITTEL	313015	
21	PG03A	PLUG, REGULATOR		MS3106A-18-1S	
——		CLAMP		MS3057-10A or -10B	
21	PG04A	VOLTAGE REGULATOR	ELECTRO MECH	2073-2	
21	PG05A	C/B, STANDBY GEN	KLIXON	7277-2-15	
21	PG06A	RELAY, BUSS SWITCHING	LEACH	JD1B	
——		SOCKET		50-1049-8309	
21	PG07A	RELAY, CONTROL	MAGNACRAFT	W67CSX-2	
——		SOCKET		70-303	
21	PG08A	LIGHT, ON	WESTERN IND	501-61K-11K3BP	
——		LAMP		WI-7046	
21	PG09A	LIGHT, O.V.	WESTERN IND	501-61K-11K3BP	
——		LAMP		WI-7046	
21	PG10A	DIODE, ON LIGHT	SARKES TARZIAN	F-4	
21	PG11A	DIODE, O.V. LIGHT	SARKES TARZIAN	F-4	
21	PG12A	RECPTACLE	AMP	206153-1	
——		CLAMP		206052-1	
21	PG13A	PLUG	AMP	206060-1	
21	PG14A	DIODE	SARKES TARZIAN	F-4	
21	PG15A	DIODE, RADIO RELAY	SARKES TARZIAN	F-4	
21	PG16A	RECEPTACLE	AMP	206705-2	
——		CLAMP	AMP	206706-1	
——		CLAMP	AMP	206062-1	
21	PL01A	PLUG, C/B PANEL	AMP	206037-1	
——		CLAMP	AMP	206070-1	
21	PL02A	PLUG, FLT PNL #1	AMP	206037-1	
—		CLAMP	AMP	206070-1	
21	PL02B	PLUG, FLT PNL #1	MOONEY	930021-505	
21	PL03A	PLUG, ELEC GEAR	AMP	206037-1	
——		CLAMP	AMP	206070-1	
21	PL03B	PLUG, ELEC GEAR	MOONEY	930021-001	
21	PL04A	PLUG, L/ WING	MP	206037-1	
——		CLAMP		206070-1	
21	PL04B	PLUG, L/ WING	MOONEY	930021-001	
21	PL05A	PLUG, L/ WG STUB	AMP	206037-1	
—		CLAMP		206070-1	
21	PL05B	PLUG, L/ WG STUB	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL05C	PLUG, L/ WG STUB	MOONEY	930021-001	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	PL06A	PLUG, SQUAT SWITCH	AMP	206060-1	
——		CLAMP	AMP	202062-1	
21	PL07A	PLUG,CONSOLE #1	AMP	206097-1	
——		CLAMP	AMP	202070-1	
21	PL07B	PLUG,CONSOLE #1	AMP	206060-1	
——		CLAMP	AMP	202062-1	
21	PL08A	PLUG, HEADLINER	AMP	206037-1	
——		CLAMP		206070-1	
21	PL08B	PLUG, HEADLINER	AMP	206708-1	
——		CLAMP		206966-1	
21	PL09A	PLUG, FIREWALL		MS3106A-22-14S	19
——		CLAMP		MS3057-12B	
21	PL10A	PLUG, L/ SIDE CABIN, MIDDLE	AMP	206060-1-001	
——		CLAMP		206062-1	
21	PL11A	PLUG, FLT PNL #2	AMP	206097-1	
——		CLAMP		206070-1	
21	PL11B	PLUG, FLT PNL #2	AMP	206708-1	
——		CLAMP		206966-1	
21	PL12A	PLUG, GLARESHIELD	AMP	206037-1	
——		CLAMP		206070-1	
21	PL12B	PLUG, ANNUNCIATOR PANEL	AMP	206060-1	
——		CLAMP		206062-1	
21	PL13A	PLUG, FIREWALL JUNC. PNL	AMP	206037-1	
——		CLAMP	AMP	206070-1	
21	PL13B	PLUG, ACCESS. PNL	AMP	206708-1	
——		CLAMP	AMP	206966-1	
21	PL14A	PLUG, L/ SIDE CABIN	AMP	206037-1	
——		CLAMP	AMP	206070-1	
21	PL14B	PLUG, L/ SIDE PANEL	MOONEY	930021-001	
21	PL15A	PLUG, ELEC. FLAPS	AMP	206037-1	
——		CLAMP	AMP	206070-1	
21	PL16A	PLUG, CONSOLE #2	AMP	206037-1	
		CLAMP	AMP	206070-1	
——		CLAMP	AMP	206966-1	
21	PL16B	PLUG, CONSOLE	AMP	206708-1	
——		CLAMP	AMP	206966-1	
21	PL17A	PLUG, RELAY PANEL	AMP	206037-1	
——		CLAMP	AMP	206070-1	
21	PL18A	PLUG, CLUSTER GAUGE	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL18B	PLUG, CLUSTER GAUGE	AMP	206708-1	
——		CLAMP	AMP	206966-1	
21	PL19A	PLUG, PILOT'S WHEEL	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	PL20A	PLUG, COPILOTS WHEEL	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	PL21A	PLUG, VAC WARN SW	AMP	206060-1	
——		CLAMP	AMP	206062-1	
21	PL22A	PLUG, RADIO PWR, C/B PNL	AMP	206070-1	
21	PL22B	PLUG, AUX PWR, C/B PNL	AMP	206037-2	
——		CLAMP	AMP	206070-1	
21	PL23A	PLUG, RADIO PWR, RELAY PNL	AMP	206037-2	
——		CLAMP	AMP	206070-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

	CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
21	PL24A	PLUG, CABIN TAIL CONE	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL24B	PLUG, CABIN TAIL CONE	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL24C	PLUG, CABIN/TAIL CONE	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL25A	PLUG, R/ WG	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL25B	PLUG, R/ WG	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL25C	PLUG, R/ WG	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL25D	PLUG, R/ WG	MOONEY	930021-001	
		CLAMP	AMP	206966-1	
21	PL26A	PLUG, R/ WG STUB	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL26B	PLUG, R/ WG NAV	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL26C	PLUG, R/ WG STUB	MOONEY	930021-001	
		CLAMP	AMP	206966-1	
21	PL27A	PLUG, TRIM POS. IND	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL28A	PLUG, PILOT'S TRIM	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL29A	PLUG, TAIL	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL29B	PLUG, EMPENNAGE	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL30A	PLUG, RADIO, C/B PNL	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL30B	PLUG, C/B PNL(OPT)	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL30C	PLUG, C/B PNL(OPT)	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL31A	PLUG, RADIO PKG CABLE	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL32A	PLUG, XSTRS, CONSOLE	AMP	206037-1	
		CLAMP	AMP	206070-1	
21	PL33A	PLUG, PWR, FLT PNL	AMP	206037-2	
		CLAMP	AMP	206070-1	
21	PL34A	PLUG, PANEL LT CONTROL	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL34B	PLUG, LT CONTROL	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL35A	PLUG, GEAR CONTROL	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL35B	PLUG, GEAR CONTROL	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL35C	PLUG, GEAR CONTROL #1	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	PL35D	PLUG, GEAR CONTROL #2	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL36A	PLUG, GEAR OVERRIDE	AMP	206060-1	
		CLAMP	AMP	206062-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

	CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
21	PL37A	PLUG, VAC WARN	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL38A	PLUG, ELT SWITCH	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL39A	PLUG, OVERHEAD LITE	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL40A	PLUG, EMERG FLD	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL41A	PLUG, GLARESHIELD	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL42A	PLUG, HOUR METER	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL43A	PLUG, FLT PNL	AMP	206708-1	
		CLAMP	AMP	206966-1	
21	PL44A	PLUG, GR SAFETY SW	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL45A	PLUG, FIREWALL #2		MS3106A-22-14S	
		CLAMP		MS3057-12B	
21	PL46A	PLUG, AVIONIC PWR	MOONEY	930021-501	
21	PL47A	PLUG, AUDIO INTERCN	AMP	205839-1	
		CLAMP	AMP	206070-1	
21	PL48A	PLUG, FLT PNL DIM	AMP	206037-1	
		CLAMP	AMP	205838-1	
		CLAMP	AMP	206062-1	
21	PL50A	PLUG, C/B DIM	AMP	206062-1	
		CLAMP	AMP	206062-1	
21	PL51A	PLUG, A/P TRIM SW RELAY	AMP	206037-1	
		CLAMP		206070-1	
21	PL52A	PLUG, A/P	AMP	206037-1	
		CLAMP		206070-1	
21	PL53A	PLUG, A/P GRND	AMP	206037-1	
		CLAMP		206070-1	
21	PL53B	PLUG, AVIONICS GRND	AMP	206839-3	
		CLAMP		206070-1	
21	PL53C	PLUG, MAIN CABLE GRND	AMP	206037-1	
		CLAMP		206070-1	
21	PL53D	PLUG, AVIONICS GRND #2	AMP	2067839-3	
		CLAMP		206070-1	
21	PL54A	PLUG, INT PWR	AMP	206708-1	
		CLAMP		206966-1	
21	PL55A	PLUG, COM/NAV POWER	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	PL57A	PLUG, ROLL SERVO CABLE	AMP	206708-1	
		CLAMP		206966-1	
21	PL58A	PLUG, AZIMUTH CABLE	AMP	206708-1	
		CLAMP	AMP	206866-1	
21	PL59A	PLUG, AVIONICS DIM	AMP	206037-1	
		CLAMP		206070-1	
21	PL60A	PLUG, K-4/C-2 NAV REC/A/P	AMP	205839-3	
		CLAMP		206070-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	PL61A	PLUG, K-14 NAV REC/A/P	AMP	205839-3	
		CLAMP		206070-1	
21	PL62A	PLUG, K-14 NAV REC/A/P	AMP	206037-1	
		CLAMP		206070-1	
21	PL63A	PLUG, A/P XFER	AMP	206037-1	
		CLAMP		206070-1	
21	PL64A	PLUG, K-2/K-3 NAV REC/A/P	AMP	205839-3	
		CLAMP		206070-1	
21	PL65A	PLUG, TRIM RELAY	AMP	205838-1	
		CLAMP		206062-1	
21	PL66A	PLUG, TRIM SW	AMP	205838-1	
		CLAMP		206062-1	
21	PL67A	PLUG, AZIMUTH	AMP	206706-1	
		CLAMP		206966-1	
21	PL68A	PLUG, ADF RMI	AMP	205838-1	
		CLAMP		206062-1	
21	PL69A	PLUG, TRIM RELAY	AMP	205838-1	
		CLAMP		206062-1	
21	PL670A	PLUG, TRIM PWR	AMP	206060-1	
		CLAMP		206062-1	
21	PL71A	PLUG, A/P RELAY	AMP	205839-3	
		CLAMP		206070-1	
21	PL72A	PLUG, VOR/GS TRANSFER	AMP	205838-1	
		CLAMP		206062-1	
21	PL73A	PLUG, MKR INVERTER	AMP	205838-1	
		CLAMP		206062-1	
21	PL74A	PLUG, NAV/REC A/P	AMP	205839-3	
		CLAMP		206070-1	
21	PL75A	PLUG, ADF/RMI		206037-1	
		CLAMP		206070-1	
21	PL76A	PLUG, GRND	AMP	205839-3	
		CLAMP		206070-1	
21	PL77A	PLUG, XPDR/ENCODER (KFC 200)	AMP	20037-1	
		CLAMP	AMP	206070-1	
21	PL78A	PLUG, RADIO PKG CABLE		206037-1	
		CLAMP		206070-1	
21	PL79A	PLUG, NAV REC/A/P, K-4/C-2		205839-3	
		CLAMP		206070-1	
21	PS01A	C/B, IGN/TACH/CIG LIGHTER	MERIDEN	AHW4-10	
21	PS01B	C/B, IGN/TACH/CIG LIGHTER	KLIXON	7277-2-10	
21	PS02A	SWITCH, STARTER	MICRO	2D72	
		HOUSING	MICRO	2M1	
		SCREEN, DISPLAY	MICRO	2J5	
		RING, GUARD	MICRO	2K8	
21	PS03A/B	RELAY	C-H	6041H105A	
			R/B MOONEY	940020-501	22
21	PS04A	STARTER	PRESTOLITE	MZ4206	
		(ALT)	PRESTOLITE	MZ4218	
		(ALT)	PRESTOLITE	MZ4222	
21	PS04B	STARTER	PRESTOLITE	MCL-6501	39
		(ALT)	LYCOMING	LW15572	
21	PS05A	DIODE	SARKES TARZIAN	F-4	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	PS06A	FUSE HOLDER	LITTEL	155020 or 155120	
——		FUSE	LITTEL	313001	
21	RC01A	RECPT, C/B PNL	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC01B	RECPT, C/B PNL	AMP	206151-1	
——		CLAMP	AMP	206138-1	
21	RC02A	RECPT, FLT PNL #1	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC02B	RECPT, FLT PNL #1	MOONEY	930021-506	
21	RC03A	RECPT, ELEC GEAR	AMP	206036-1	
——		CLAMP	AMP	206070-1	
21	RC03B	RECPT, ELEC GEAR	MOONEY	930021-002	
21	RC04A	RECPT, L/ WING	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC04B	RECPT, L/ WING	MOONEY	930021-002	
21	RC05A	RECPT, L/ WING	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC05B	RECPT, L/ WING STUB	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC05C	RECPT, L/ WING STUB	MOONEY	930021-002	
21	RC06A	RECPT, SQUAT SWITCH	AMP	206153-1	
——		CLAMP	AMP	206070-1	
21	RC07A	RECPT, CONSOLE #1	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC07B	RECPT, CONSOLE #1	AMP	206153-1	
——		CLAMP	AMP	206062-1	
21	RC08A	RECPT, HEADLINER	AMP	206036-3	19
——		CLAMP	AMP	206070-1	
21	RC08B	RECPT, HEADLINGER	AMP	206705-2	
——		CLAMP	AMP	206966-1	
21	RC09A	RECPT, FIREWALL		MS3100A22-14P	19
——		CLAMP		MS2057-12B	
21	RC10A	RECPT, L/ SIDE CABIN, MID	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC11A	RECPT, FLT PNL #2	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC11B	RECPT, FLT PNL #2	AMP	206705-2	
——		CLAMP	AMP	206966-1	
21	RC12A	RECPT, GLARESHIELD	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC13A	RECPT, FIREWALL JUNC PNL	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC13B	RECPT, ACCESS. PNT	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC14A	RECPT, L/ SIDE CABIN LOW	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC14B	RECPT, L/ SIDE PNL	MOONEY	930021-002	
21	RC14C	RECPT, L/ SIDE PNL	MOONEY	930021-502	
21	RC15A	RECPT, FLAPS, ELEC	AMP	206036-1	
——		CLAMP	AMP	206070-1	
21	RC16A	RECPT, CONSOLE #2	AMP	206036-3	
——		CLAMP	AMP	206070-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	RC16B	RECPT, CONSOLE	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC17A	RECPT, RELAY PNL	AMP	206036-1	
		CLAMP	AMP	206070-1	
21	RC18A	RECPT, CLUSTER GAUGE	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC18B	RECPT, CLUSTER GAUGE	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC19A	RECPT, PILOT'S WHEEL	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC20A	RECPT, COPILOT'S WHEEL	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC21A	RECPT, VAC WARN SW	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC22A	RECPT, RADIO PWR C/B PNL	AMP	206207-1	
		CLAMP	AMP	206070-1	
21	RC22B	RECPT, C/B PNL, AUX PWR	AMP	206036-2	
		CLAMP	AMP	206070-1	
21	RC23A	RECPT, RADIO PWR RELAY PNL	AMP	206036-1	
		CLAMP	AMP	206070-1	
21	RC24A	RECPT, CABIN TAILCONE	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC24B	RECPT, CABIN TAILCONE	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC24C	RECPT, CABIN TAILCONE	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC25A	RECPT, R/ WING	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC25B	RECPT, R/ WING	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC25C	RECPT, R/ WING	AMP	206705-1	
		CLAMP	AMP	206070-1	
21	RC25D	RECPT, R/ WING	MOONEY	930021-002	
		CLAMP	AMP	2060966-1	
21	RC26A	RECPT, R/ WIGN STUB	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC26B	RECPT, R/ WING STUB	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC26C	RECPT, R/ WING STUB	MOONEY	930021-002	
		CLAMP	AMP	206966-1	
21	RC27A	RECPT, TRIM POS IND	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC28A	RECPT, PILOT'S TRIM	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC29A	RECPT, TAIL	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC29B	RECPT, TAIL	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC30A	RECPT, RADIOS, C/B PNL	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC30B	RECPT, C/B PNL	AMP	206705-2	
		CLAMP	AMP	206966-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	RC30C	RECPT, C/B PNL (OPT)	AMP	206060-1	
		CLAMP	AMP	206062-1	
21	RC31A	RECPT, RADIO PKG CABLE	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC32A	RECPT, TRANSISTORS, CONSOLE	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC33A	RECPT, PWR FLT PNL	AMP	206207-1	
		CLAMP	AMP	206070-1	
21	RC34B	RECPT, PNL LT CONTROL	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC34B	RECPT, LIGHT CONTROL	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC35A	RECPT, GEAR CONTROL	AMP	206705-2	
		CLAMP	AMP	207006-1	
21	RC35B	RECPT, GEAR CONTROL	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC35C	RECPT, GEAR CONTROL #1	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC35D	RECPT, GEAR CONTROL #2	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC37A	RECPT, VAC WARN	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC38A	RECPT, ELT, SW	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC39A	RECPT, O/H LIGHT, AFT	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC40A	RECPT, EMERG FLD	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC41A	RECPT, BLARESHIEDL	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC42A	RECPT, HOUR METER	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC43A	RECPT, FLT PNL	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC43C	RECPT, GO AROUND/WX RADAR		206705-2	
		CLAMP	AMP	206966-1	
21	RC44A	RECPT, GR SAFETY SW	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC45A	RECPT, FIREWALL #2		MS3100A-22-14P	
		CLAMP		MS3057-12B	
21	RC46A	RECPT, AVIONICS PWR	MOONEY	830021-502	
21	RC47A	RECPT, AUDIO INTER	AMP	206152-1	
		CLAMP	AMP	206070-1	
21	RC48A	RECPT, FLT PNL GRND/DIM	AMP	206036-1	
		CLAMP	AMP	206070-1	
21	RC49A	RECPT, C/B GRND	AMP	206841-2	
		CLAMP	AMP	206062-1	
21	RC50A	RECPT, C/B DIM	AMP	206153-1	
		CLAMP	AMP	206062-1	
21	RC51A	RECPT, A/P TRIM SW RELAY	AMP	206036-3	
		CLAMP	AMP	206070-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	RC52A	RECPT, A/P PWR	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC53A	RECPT, A/P GRND	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC53B	RECPT, AVIONICS GRND #1	AMP	206152-1	
		CLAMP	AMP	206070-1	
21	RC53C	RECPT, MAIN CABLE GRND	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC53D	RECPT, AVIONICS GRND #2	AMP	206152-1	
		CLAMP	AMP	206070-1	
21	RC54A	RECPT, INTERFACE PWR	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC55A	RECPT, COMM/NAV PWR	AMP	206153-1	
		CLAMP		206062-1	
21	RC57A	RECPT, ROLL SERVO CABLE	AMP	206705-2	
		CLAMP		206966-1	
21	RC58A	RECPT, AZIMUTH CABLE	AMP	206705-2	
		CLAMP	AMP	206966-1	
21	RC59A	RECPT, AVIONICS DIM	AMP	206036-3	
		CLAMP	AMP	206070-1	
21	RC59B	A/P DIM		206153-1	
		CLAMP	AMP	206062-1	
21	RC60A	RECPT, K-4/C-2,NAVREC/A/P		206152-1	
		CLAMP	AMP	206070-1	
21	RC61A	RECPT, K-14, NAVREC/A/P		206152-1	
		CLAMP	AMP	206070-1	
21	RC62A	RECPT, K-14, NAVREC/A/P		206036-3	
		CLAMP	AMP	206070-1	
21	RC63A	RECPT, A/P TRANSFER		206036-1	
		CLAMP	AMP	206070-1	
21	RC64A	RECPT, K-2/K-3, NAVREC/A/P		206152-1	
		CLAMP	AMP	206070-1	
21	RC65A	RECPT, TRIM RELAY		205841-2	
		CLAMP	AMP	206062-1	
21	RC66A	RECPT, TRIM SW		205841-2	
		CLAMP	AMP	206062-1	
21	RC67A	RECPT, AZIMUTH		206705-2	
		CLAMP	AMP	206966-1	
21	RC68A	RECPT, ADF/RMI		205841-2	
		CLAMP	AMP	206062-1	
21	RC69A	RECPT, TRIM RELAY		205841-2	
		CLAMP	AMP	206062-1	
21	RC70A	RECPT, TRIM PWR		206153-1	
		CLAMP	AMP	206062-1	
21	RC71A	RECPT, A/P RELAY		206152-1	
		CLAMP	AMP	206070-1	
21	RC72A	RECPT, VOR/GS TRANSFER		205841-1	
		CLAMP	AMP	206062-1	
21	RC73A	RECPT, MKR INVERTER		205841-1	
		CLAMP	AMP	206062-1	
21	RC74A	RECPT, NAVREC/A/P		206152-1	
		CLAMP	AMP	206070-1	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	RC75A	RECPT, ADF/RMI		206036-3	
——		CLAMP	AMP	206070-1	
21	RC76A	RECPT, GRND	AMP	206152-1	
–		CLAMP	AMP	206070-1	
21	RC77A	RECPT, XDCR/ENCODER (KFC-200)	AMP	206036-2	
——		CLAMP	AMP	206070-1	
21	RC78A	RECPT, RADIO PKG CABLE	AMP	206036-3	
——		CLAMP	AMP	206070-1	
21	RC79A	RECPT, K-4/C-2 NAVREC/A/P	AMP	206152-1	
——		CLAMP	AMP	206070-1	
21	WA01A	LIGHT, ALT WARN	KORRY	250-650-5821-003	
——		BULB (2)	GE	330	
21	WA02A	RECTIFIER	SARKES TARZIAN	F-4	
21	WA03A	SWITCH, LO VOLT DET	ELECTRO DELTA	LV 14	
21	WA03B	SWITCH, LO VOLT DET	ELECTRO DELTA	LV-14F	
21	WE01A	C/B, GEAR WARN	MERIDEN	AHW4-2	
21	WE01B	C/B, GEAR WARN	KLIXON	7277-2-2	
21	WE02A	LIGHT, GEAR UNSAFE	KORRY	250-650-5821-006	
——		BULB		GE	330
21	WE03A	SWITCH, THROTTLE	MICRO	1SM1-T	
		ACTUATOR	MICRO	JS-221	
21	WE03B	SWITCH, THROTTLE	C-H	SS12ET10-102L3	
21	WE03C	SWITCH, THROTTLE	MICRO	V3-1	
——		ACURATOR	MICRO	JV-5	
21	WE04A	HORN, GEAR UP, WARN	MALLORY	SC628P	
21	WE05A	RECTIFIER	SARKES TARZIAN	F-4	
21	WE06A	LIGHT, GEAR POSITION	SLOAN	955S-0-U	
——		BULB (1)	GE	327	
21	WE07A	LIGHT, GEAR DOWN	KORRY	250-650-5821-007	
——		BULB (2)		GE	330
21	WE08A	DIODE, GEAR UNSAFE	SARKES TARZIAN	F-4	
21	WE09A	DIODE, GEAR DOWN	SARKES TARZIAN	F-4	
21	WE10A	DIODE, GEAR HORN	SARKES TARZIAN	F-4	
21	WE11A	RESISTOR, DIM		(50 OHM -5 WATT)	
21	WE12A	DIODE, DIM	SARKES TARZIAN	F-4	
21	WF01A	LIGHT, LOW FUEL PRESS	KORRY	250-650-5821-004	
——		BULB (2)	GE	330	
21	WF03A	RECTIFIER	SARKES TARZIAN	F-4	
21	WF04A	PLUG-SWITCH	AMPHENOL	126-223-1000	
21	WL01A	FUSEHOLDER	LITTEL	155020	
——		FUSE	LITTEL	311011	
21	WL02A	LIGHT, LANDING IND	KORRY	250650-5821-005	
——		BULBS (2)	GE	330	
21	WL03A	RECTIFIER	SARKES TARZIAN	F-4	
21	WS01A	C/B, STALL WARN HORN	MERIDEN	AHW4-2	
21	WS01B	C/B, STALL WARN HORN	KLIXON	7277-2-2	
21	WS02A	HORN, STALL WARNING	MALLORY	SC628	
21	WS03A	SWITCH, PRE-STALL WARN	SAFE FLIGHT	C46001	
21	WT01A	SWITCH, PRESS TO TEST	ALCO	MSP205R	
21	WT02A	C/B, ANNUNCIATOR	KLIXON	7277-2-2	
21	WT03A	ANNUNCIATOR	IAI	500D0024	
——		LAMPS	CHICAGO MINIATURE	CM7-7330	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
21	WT03B	ANNUNCIATOR	IAI	500D0036B	20
———		LAMPS	CHICAGO MINIATURE	CM7-7330	
21	WT03F	ANNUNCIATOR	IAI	500D0036-007	20
———		LAMPS	CHICAGO MINIATURE	CM7-7330	
21	WT03G	ANNUNCIATOR	MOONEY	880025-501	
———		LAMPS (8)	CHICAGO MINIATURE	CM7-7330	
21	WT03H	ANNUNCIATOR	MOONEY	880025-515	
21	WT03J	ANNUNCIATOR	MOONEY	880025-511	
———		LAMPS	CHICAGO MINIATURE	CM7-7330	
21	WT03K	ANNUNCIATOR	MOONEY	880025-513	
21	WT04A	PLUG, ANNUNCIATOR	MOLEX	09-50-3121	
———		PIN	MOLEX	08-50-106	
21	WV01A	C/B, VACUUM WARN	MERIDEN	AHW4-2	
21	WV01B	C/B, VACUUM WARN	KLIXON	7277-2-2	
21	WV02A	SWITCH, VACUUM WARN	MOONEY	880012-501	21
21	WV02B	SWITCH, VAC. WARN LO	WHITMAN GENERAL	P118V-IN-K5L-1	21
21	WV02C	SWITCH, VAC. WARN HI	WHITMAN GENERAL	P118V-IN-K4L-2	21
21	WV03A	LIGHT, LOW VAC	KORRY	250-650-5821-002	
———		BULB (2)	GE	330	
21	WV04A	LIGHT, HIGH VAC	KORRY	250-650-5821-001	
———		BULB (2)	GE	330	
21	WV04B	LIGHT, VAC	KORRY	250-650-5821-009	
———		BULB (2)	GE	330	
21	WV05A	RECTIFIER, LO	SARKES TARZIAN	F-4	
21	WV06A	RECTIFIER, HI	SARKES TARZIAN	F-4	
21	WV07A	SWITCH, VAC LT, FLASHER	ELECTRO DELTA	FL1	
21	WW01A	SWITCH, RAM AIR	MICRO	V3-1	
———		ACTUATOR	MICRO	JV-5	
21	WW01B	SWITCH, ALTERNATE AIR	CHERRY	E51-50B	
		LIGHT DIMMER SW	MOONEY	2800344	
		BOX RHEOSTAT	ALLEN-BRADLEY	JS1N056P02MA	
		TRANSISTOR	RCA	2N3055	
		TRANSISTOR (ALT)	RCA	2N3773	
		FUSE	McGRAW-EDISON	FM01-5A	
		RECEPTACLE	AMP	206705-2	

14 VOLT ELECTRICAL EQUIPMENT CHART

NOTES

1. Switch 8906k2876 may be used by painting black handle with white epoxy paint.
2. Alternate for V3L-3 is V3-1 switch with JV-5 actuator.
3. 0506-505 is replacement for -004; S/N 18928 & UP are modified.
4. Or equivalent
   - Sprague RB1536
   - Dale MFS-1/2(15K)
   - TWX 1/2 W (15k)
5. Set for 75 MPH (+/-5.0) (65 +7/-4 KIAS) increasing actuation. (2.775 in. H_2O, +0.384/-0.358 in.)
6. Use with socket, 27E122; spring, 206176; stand-off, (2 ea) 216212. (AN515-6R5 screw, AN936-A6 washer).
7. Alternate L110-1-N-K9L or Mooney P/N 880013-501.
8. Mounting Hardware

		RCA	KC2B
Mica Insulating Wafer	H.H. Smith	6291	
Nylon Shoulder Washer	H.H. Smith	2866	
Solder Lug	H.H. Smith	1410-10	
Metal Washer	H.H. Smith	1152	
Nut	H.H. Smith	1367	

9. Alternate Holders
   - Leecraft 07-05
   - Drake 4151-014
10. Alt. Resistors
    - Sprague 243E2015
    - Drake VC5E-200
11. Maximum circuit breaker rating is shown, amperage of installed circuit breaker is determined by particular unit installed.
12. Alternate
    - Ohmite 0561
    - Mallory 5AV10
13. Replace VR414 & 20062 with 880016-501 & 800331-721 cable.
14. Manufacture using "Alpha Wire Co." braid #2172 or #1233/2 (2 ea) & AMP terminals as necessary to connect the buss bars as shown on schematic. Cover braid with PVC 105/A tubing for insulation.
15. Same as 14 except use (1 ea) braid.
16. Ground tabs ("250" series)
    "As required"
    - AMP 41478
    - AMP 41480
17. Alternate
    - Prestolite R35
18. Replace with MS3106A-22-14P when used in conjunction with MS3450KT22-14S.
19. Replace with MS3450KT22-14S receptacle & MS3417-22-N cable clamp or Matrix #9440KT22-14S.
20. MFG Chicago Miniature Lamp Co.
21. Set switches with room temperature between 60° F and 90° F. Set low at 4.25 " Hg. +/-0.25" and high at 5.50" Hg. +0.20/-0.00" increasing vacuum. Switches may not vary more than 0.50" Hg. between 0° F and 110° F.
22. Replace with 940020-501, (Cutler-Hammer solenoid P/N 6041H53).
23. Alternate Turn Coordinators:
    - Talley Corp. (w/out lights) 1394T100-7Z
    - United Instr.(w/out lights) 9100 Code No. 6
24. Alternate Turn & Bank:
    - Talley Corp. (w/out lights) 1234T100-7TZ
    - Talley Corp. (w/out lights) 1234T100-3TZ
25. Alternate Fuel Flow Gauges:
    - Mooney (Gals/hr - lighted) 880034-501
    - Mooney (liters/hr - lighted) 880034-503/-509
    - Mooney (Imperial gals/hr - lighted) 880034-511
    - Mooney (Pounds/hr) 880034-505

14 VOLT ELECTRICAL EQUIPMENT CHART

NOTES (con't.)

26. Alternate Landing Gear:
Mooney 880037-501

27. Use buss bar 913127-029, -023 or -013 as required by installation of optional equipment.
28. Effective 25-0821 & ON (All are 930023-2xx C/B's). Effective 24-1464 & ON also.
29 Effective 25-0001 thru 25-0788 or 24-0024 thru 24-1037.
30. Effective 25-0789 & ON or 24-1426 & ON.
31. Effective 24-0001 thru 24-0023 (24-0024 thru 24-1037 use 21 LS02B, 21 LS03B, 21 LS04B & 21 LS05B)
32. Effective 25-0447 thru 25-0780 or 24-1038 thru 24-1425.
33. Standard on 24-1211 & ON.
34. Effective 25-0813 thru 25-0780.
35. Alternate Turn Coordinator (w/ lights):

United Instr	9112-Code No. 9
Astronautics	909990-113MSC
Talley	1394T100-3Z

36. Use 1 ea. MS35334-21 or MS2998 (Alan-Bradley) internal tooth lockwasher with each light if not supplied by Sloan.
37. Alternate Clock (lighted):

Mid-Continent	MD-88L
Mid-Continent	MD-88L(ET)
(w/ light tray)	BA14-24-BW2

38. Alternate Voltage Regulator:

Lamar	B-00371-6.

39. Alternate Starter (21 PS04B):

TCM	646238

40. Use buss bars 913127-123,-125 as required, by Installation of Optional Equipment.
41. CUT TO SIZE

91-20-02 - ELECTRICAL SYSTEM HARDWARE CHART - 28 VOLT SYSTEMS

SERIAL NUMBER's 24-3000 THRU 24-3153, MOONEY DRAWING NO. 800350 (AV-9)

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JKL	CB101A	C/B DEFROSTER BLOWER	KLIXON	7277-2-2	
JKL	CB102A	SWITCH, DEFROST BLOWER	CHERRY	E51-50B	
JKL	CB103A	MOTOR, DEFROSTER BLOWER	MOONEY	640317-501	
JKL	CB104A	RECPT, DEFROSTER BLOWER	AMP	1-480319-0	
———		PINS	AMP	60620-1	
JKL	CB105A	PLUG, DEFROSTER BLOWER	AMP	1-480318-0	
———		SOCKETS	AMP	60619-1	
JK-	CC101A	C/B, COWL FLAP	KLIXON	7277-2-5	
JK-	CC102A	SWITCH, COWL FLAP	MICRO	12TW1-1	
———		CAP, WHITE	MICRO	15PA90-4W	
-K-	CC103A	ACTUATOR, COWL FLAP	MOONEY	880050-501	
JK-	CC104A	SWITCH,OPEN LIMIT	MICRO	1SE1-T	
———		ACTUATOR	MICRO	JE-5	
JK-	CC105A	SWITCH, CLOSE LIMIT	MICRO	1SE1-T	
———		ACTUATOR	MICRO	JE-5	
JK-	CC106A	RECPT, 4 PIN	AMP	206158-1	
———		CLAMP	AMP	206062-1	
JK-	CC107A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	CF101A	C/B FLAP ACT	KLIXON	7277-2-5	
JKL	CF102A	SWITCH, FLAP	C-H	8906K3149	
JKL	CF103A	SWITCH, UP LIMIT	MICRO	V3-1	4
JKL	CF104A	SWITCH, DOWN LIMIT	MICRO	V3-1	4
JK-	CF106A	SWITCH, TAKEOFF, UP	MICRO	V3-1	4
JK-	CF107A	SWITCH, TAKEOFF, DOWN	MICRO	V3-1	4
———		ACTUATOR	MICRO	JV-5	4
JKL	CF105A	ACTUATOR, FLAP	MOONEY	750105-501	
JK-	CF108A	RELAY, UP	MAGNACRAFT	W67RCSX-3	
JK-	CF109A	RELAY, DN	MAGNACRAFT	W67RCSX-3	
———		BASE	MAGNACRAFT	70-303	
JK-	CF110A	SWITCH, FLAP	C-H	8906K4064	
		(ALT)	MICRO	2TL149-12L	
———		KNOB	MOONEY	917026-501	
JK-	CF111A/112A	DIODE		1N2483	
J—	CF113A	PLUG, 4 PIN	AMP	206060-1	
		CLAMP	AMP	206062-1	
J—	CF114A	RECPT, 4 PIN	AMP	206153-1	
		CLAMP	AMP	202062-1	
—L	CF150A	C/B TRIM/FLAP IND	KLIXON	7277-2-1	
—L	CF151A	INDICATOR,TRIM/FLAP	PENN AIRBORNE	9A1590	
—L	CF152A	PLUG, TRIM/FLAP IND	ITT	DA15S	
———		CLAMP	ITT	DA51210-1	
———		LOCK RETAINER	ITT	DA51220-1	
—L	CF153A	PLUG,FLAP POSITION, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
—L	CF154A	RECPT,FLAP POSITION, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	CF155A	POTENTIOMETER, FLAP POSITION	ALLEN-BRADLEY	WA2-G056S502UA	
JKL	CT101A	C/B ELECTRIC TRIM	KLIXON	7277-2-3	5
JKL	CT101A	C/B ELECTRIC TRIM	KLIXON	7277-2-5	5
—L	CT150A	POTENTIOMETER, TRIM POSITION WA2-G056S502UA		ALLEN-BRADLEY	
—L	CT151A	PLUG, TRIM POSITION, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
—L	CT152A	RECPT, TRIM POSITION, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	CV101A	C/B, STBY VAC	MOONEY	930023-245	
JK-	CV102A	CLUTCH, STBY VAC PUMP	AEROSAFE	S5112-472	
JK-	CV103A	FUSE HOLDER	LITTEL	155020 or 155120	
——		FUSE	LITTEL	313001	
JK-	CV104A	ANNUNCIATOR	MOONEY	800946-501	
JK-	CV105A	RELAY	MOONEY	830131-511	
JK-	CV106A	DIODE	- - -	1N2483	
JK-	CV107A	PLUG	AMP	1-480319-0	
- -	-	SOCKETS	AMP	60619-1	
JK-	CV108A	RECPT, 2 PIN	AMP	1-480319-0	
—	- - -	PINS	AMP	60620-1	
JK-	CV109A	RECPT, 2 PIN	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JK-	CV110A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKETS	AMP	60619-1	
JK-	DA101A	LOADMETER (SINGLE)	B & D	0326-004	
JK-	DA101B	LOADMETER (DUAL)	B & D	0326-003	
J—	DA101D	AMMETER	MOONEY	6402B1-509	
——		LIGHT BULB ASSY	ROCHESTER	0105S00004	
		BULB	GE	313	
JK-	DA102A	CONN, AMMETER	S.E.C.	PW06B12-10S	
JK-	DA102A	CONN, AMMETER (ALT)	BENDIX	PT06A-12-10S-SR	
JK-	DA103A	SWITCH, PUSH, VOLTAGE	C-H	SA31SDT12-1	
——		LIGHT BULB ASSY	ROCHESTER	0105S00003	
		(ALT)	ROCHESTER	0153S00003	
——		BULB	GE	313	
JK-	DA104A	SHUNT, AMMETER (ALT'NR #1)	EMPRO	MLA-70A-50MV	
JK-	DA104B	SHUNT, AMMETER (ALT'NR)	EMPRO	MLA-55A-50MV	
JK-	DA105A	FUSEHOLDER (+ ALT # 1)	McGRAW-EDISON	FHN42W	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
JK-	DA106A	FUSEHOLDER (- ALT # 1)	McGRAW-EDISON	FHN42W	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
JK-	DA107A	SHUNT, AMMETER, LOAD	EMPRO	MLB-210A-50MV	
JK-	DA107B	SHUNT, AMMETER, LOAD	EMPRO	MLB-165A-50MV	
JK-	DA107C	SHUNT, AMMETER, LOAD	EMPRO	MLB-105A-50MV	
JK-	DA107D	SHUNT, AMMETER, LOAD	EMPRO	MLA-60A-100MV	
JK-	DA108A	FUSEHOLDER (-LOAD)	McGRAW-EDISON	FHN42W	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
JK-	DA109A	FUSEHOLDER, (+LOAD)	McGRAW-EDISON	FHN42W	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
JK-	DA110A	AMMETER, SHUNT (ALT #2)	EMPRO	MLA-70A-50MV	
		AMMETER, SHUNT (ALT.)	EMPRO	MLA-55A-50MV	
JK-	DA111A	FUSEHOLDER (+ ALT. #2)	McGRAW-EDISON	FHN42W	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	DA112A	FUSEHOLDER (- ALT. #2)	McGRAW-EDISON	FHN42W	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
—L	DA150A	C/B VOLT/AMP IND, LT	KLIXON	7277-2-1	
—L	DA151A	C/B VOLT/AMP IND, RT	KLIXON	7277-2-1	
—L	DA152A	INDICATOR, VOLT/AMP, RT	PENN AIRBORNE	9A1570	
—L	DA153A	PLUG, VOLT/AMP IND	ITT	DA15S	
——		CLAMP	ITT	DA51210	
——		LOCK RETAINER	ITT	DA51220-1	
L	DA154A	INDICATOR, VOLT/AMP, RT	PENN AIRBORNE	9A1570	
—L	DA155A	PLUG, VOLT/AMP IND	ITT	DA15S	
——		CLAMP	ITT	DA51210	
——		LOCK RETAINER	ITT	DA51220-1	
—L	DA156A	SHUNT, LEFT LOAD	EMPRO	MLA-105A	50M/V
—L	DA157A	SHUNT, LEFT ALTERNATOR	EMPRO	MLA-70A-50MV	
—L	DA158A	SHUNT, RIGHT LOAD	EMPRO	MLA-105A	50M/V
—L	DA159A	SHUNT, RIGHT ALTERNATOR	EMPRO	MLA-70A-50MV	
—L	DA160A	FUSEHOLDER, LT LOAD SHUNT (-)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
L	DA161A	FUSEHOLDER, LT LOAD SHUNT(+)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
— L	DA162A	FUSEHOLDER, LT ALT SHUNT (+)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
—L	DA163A	FUSEHOLDER, LT ALT SHUNT (-)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
—L	DA164A	FUSEHOLDER,RT LOAD SHUNT(+)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
—L	DA165A	FUSEHOLDER, RT LOAD SHUNT (-)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
-L	DA166A	FUSEHOLDER, RT ALT SHUNT (-)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
—L	DA167A	FUSEHOLDER, RT ALT SHUNT (+)	McGRAW-EDISON	FHN42A	
——		FUSE, 5A	McGRAW-EDISON	FM01-5A	
JKL	DB101A	C/B TURN COORD	KLIXON	7277-2-2	
JK-	DB102A	TURN CO-ORDINATOR	U.I	9013CODE N 5	
JK-	DB102B	TURN CO-ORDINATOR	ASTRONAUTICS	303990-02BMSC	
JKL	DB103A	PLUG, TURN COORD		MS3106A-10SL-3S	
——		CABLE CLAMP		MS3507-4A or-4B	
—L	DB150A	TURN COORDINATOR	UI	9551B CODE N.541	
JK-	DC101A	CYL HD TEMP PROBE	MOONEY	880010-503	
—L	DC150A	C/B OIL TEMP/CHT	KLIXON	7277-2-1	
—L	DC151A	CHT/OIL TEMP IND	PENN AIRBORNE	9A1630	
—L	DC152A	PLUG, CHT/OIL TEMP	ITT	DB25S	
——		CLAMP	ITT	DB51212	
——		LOCK RETAINER	ITT	DB51221-1	
—L	DC153A	SWITCH, CHT	GRAY HILL	71AD30-02-2-AJN	
——		KNOB	RAYTHEON	50-3-1G	
—L	DC154A	PLUG, CHT, 16 PIN	AMP	206037-1	
——		CLAMP	AMP	206070-1	
—L	DC155A	RECPT, CHT, 16 PIN	AMP	206036-3	
——		CLAMP	AMP	206070-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
L	DC156A	PROBE, CHT-CYL #1		MS24482-1 **	
—L	DC157A	PROBE, CHT-CYL #2		MS24482-1 **	
–L	DC158A	PROBE, CHT-CYL #3		MS24482-1 **	
—L	DC159A	PROBE, CHT-CYL #4		MS24482-1 **	
·L	DC160A	PROBE, CHT-CYL #5		MS24482-1 **	
—L	DC161A	PROBE, CHT-CYL #6		MS24482-1 **	
——		** AN5546-1 (ALT) -EITHER REQUIRES AN4076-1 ADAPTER			
J—	DD101A	C/B, OAT/EGT	KLIXON	7277-2-2	
J—	DD102A	GAUGE, OAT/EGT	MOONEY	880001-507	
J—	DD102B	GAUGE, OAT/EGT, 4 PROBE (OPT) B & D		0230-003	
J—	DD103A	PLUG,, OAT/EGT	AMP	205838-1	
——		CLAMP, CABLE	AMP	206062-1	
JKL	DD104A	PROBE, OAT	MOONEY	880004-501	
—L	DD150A	C/B OAT IND	KLIXON	7277-2-1	
—L	DD151A	INDICATOR, OAT	PENN AIRBORNE	9A1580	
·L	DD152A	PLUG, OAT	ITT	DA15S	
——		CLAMP	ITT	DA51210	
· ·		LOCK RETAINER	ITT	DA51220-1	
J	DF101A	TRANSMTR, FUEL QTY, LT, I/B	MOONEY	610242-001	
J—	DF103A	TRANSMTR, FUEL QTY, RT, I/B	MOONEY	610242-001	
JKL	DF102A	TRANSMITTER, FUEL QTY, O/B, LT	MOONEY	610243-003	
JKL	DF104A	TRANSMITTER, FUEL QTY, O/B, RT	MOONEY	610243-001	
-KL	DF105A	TRANSMITTER, FUEL QTY, I/B, LT	MOONEY	610242-003	
-KL	DF106A	TRANSMITTER, FUEL QTY, I/B, RT	MOONEY	610242-003	
—L	DF150A	C/B FUEL QTY, LH/RH	KLIXON	7277-2-1	
—L	DF151A	FUEL QTY IND, L/R	PENN AIRBORNE	9A1620-2	
L	DF152A	PLUG, FUEL QTY, L/R	ITT	DB25S	
——		CLAMP	ITT	DB51212	
· ·		LOCK RETAINER	ITT	DB51221-1	
JK-	DG101A	C/B, CLUSTER GAUGE	KLIXON	7277-2-5	
J—	DG102A	GAUGE, CLUSTER	MOONEY	640281-523	
-K-	DG103A	GAUGE, CLUSTER	MOONEY	640281-525	
—L	DG150A	C/B INSTRUMENT DISPLAY	KLIXON	7277-2-1	
—L	DG151A	INSTRUMENT DISPLAY	PENN AIRBORNE	9A1600-2	
—L	DG152A	PLUG, INSTR. DISPLAY	ITT	DB25S	
——		CLAMP	ITT	DB51212	
——		LOCK RETAINER	ITT	DB51221-1	
—L	DG153A	C/B INSTRUMENT PTT	KLIXON	7277-2-1	
—L	DG154A	SWITCH, INSTRUMENT PTT	ALCOSWITCH	MPE108F	
——		CAP, BLACK	ALCOSWITCH	C-22	
—L	DG155A	PLUG, 9 PIN, PTT	AMP	206708-1	
—·		CLAMP	AMP	206966-1	
·· L	DG156A	RECPT, PTT, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
- L	DG157A	PLUG, GRND #7, 28 PIN	AMP	205839-3	
—·—		CLAMP	AMP	206070-1	
- L	DG158A	RECPT, GRND #7, 28 PIN	AMP	206152-1	
—·—		CLAMP	AMP	206070-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	DH101A	PROBE, OIL TEMP	MOONEY	880009-501	
———		WASHER		AN900-10 or MS35769-11	
-—L	DH150A	PROBE, OIL TEMP	PORSCHE	933.606.002.00	
JK-	DJ101A	XDUCR, OIL PRESS	MOONEY	880046-501	
JK-	DJ102A	PLUG, OIL PRESS		MS3106A10SL-3S	
———		CLAMP, CABLE		MS3057-4A/B	
—L	DJ150A	XDUCER, OIL PRESS	DRUCK	PDCR 821-0662 (100 PSIG)	
—L	DJ151A	PLUG, OIL PRESS, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
—L	DJ152A	RECPT, OIL PRESS, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
JK-	DJ175A	XDUCR, OIL PRESS	DRUCK	PDCR821-0662-100	
		(ALT)	KULITE	APT-154-1000-100PSIG	
JK-	DJ176A	AMPLIFIER, OIL PRESS	IAI	950D0311-003	
JK-	DJ178A	PLUG, 4 PIN	AMP	206060-1	
		CLAMP	AMP	206062-1	
JK-	DJ179A	RECPT, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JK-	DJ180A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	DJ181A	RECPT, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
J—	DK101A	XDUCR, FUEL PRESS	MOONEY	880045-501	
J—	DK102A	PLUG, FUEL PRESS XDUCR		MS3106A10SL-3S	
--L	DK150A	C/B FUEL/OIL PRESSURE	KLIXON	7277-2-1	
—L	DK151A	INDICATOR, FUEL/OIL PRESS	PENN AIRBORNE	9A1640	
—L	DK152A	PLUG, FUEL/OIL PRESS	ITT	DB25S	
———		CLAMP	ITT	DB61212-1	
———		LOCK RETAINER	ITT	DB51221-1	
—L	DK153A	XDUCER, FUEL PRESS	DRUCK	PDCR 821-0062 (100 PSIG)	
—L	DK154A	PLUG, FUEL PRESS, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
—L	DK155A	RECPT, FUEL PRESS, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
J	DK175A	XDUCR, FUEL PRESS	DRUCK	PDCR821-0662-30	
		(ALT)	KULITE	APT-153-1000-30PSIG	
J—	DK176A	AMPLIFIER, FUEL PRESS	IAI	950D0311-001	
J—	DK177A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
J—	DK178A	RECPT, 4 PIN	AMP	260153-1	
———		CLAMP	AMP	206062-1	
J—	DK179A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
J—	DK180A	RECPT, 4 PIN	AMP	260153-1	
———		CLAMP	AMP	206062-1	
J--	DL101A	TACHOMETER (POINTS)	MOONEY	880039-511	
-K-	DL102A	TACHOMETER	MOONEY	880039-509	
-K-	DL102B	TACHOMETER	MOONEY	880039-513	
-K-	DL102C	TACH (RPLCMT FOR - DL102B)	MOONEY	880039-517	
			B & D	0520-006	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	DL103A	PLUG-TACH		MS3106A14S-5S	
-K-	DL103A	TACH SENSOR	B & D	0402-102	
—	——	TACH SENSOR (ALT)	B & D	0402-104	
JK-	DL104A	RECPT, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	DL105A	PLUG	AMP	206060-1	
——		CLAMP	AMP	206062-1	
J--	DL107A	TACHOMETER	MOONEY	860039-507	
J—	DL108A	TACH GENERATOR	MOONEY	860053-501	
			B & D	0400-004	
J—	DL109A	CABLE ASSY	MOONEY	860003-501	
J	DL110A	TACHOMETER	MOONEY	860039-515	
			B & D	0520-003	
L	DL150A	DIODE, RPM/FUEL FLOW, LT		1N2483	
—L	DL151A	DIODE, RPM/FUEL FLOW, RT		1N2483	
—L	DL152A	INDICATOR, RPM/FUEL FLOW	PENN AIRBORNE	9A1610-2	
—L	DL153A	PLUG, RPM/FUEL FLOW	ITT	DB25S	
——		CLAMP	ITT	DB51212	
——		LOCK RETAINER	ITT	DB51221-1	
—L	DL157A	SENSOR, RPM #2, RT	PORSCHE	933.602.002.01	
—L	DL158A	SENSOR, RPM #1, LT	PORSCHE	933.602.002.01	
J—	DM101A	HOUR METER	MOONEY	860095-507	
-K-	DM102A	HOUR METER	MOONEY	860095-505	
—L	DM150A	HOUR METER	AIRPAX	K4205 ***	
				*** K4207 or KF4207 (ALT)	
—L	DM151A	RECPT, HOUR METER, 4 PIN	AMP	206153-1	
- -		CLAMP	AMP	206062-1	
—L	DM152A	PLUG, HOUR METER, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JKL	DP101A	C/B, PITOT HEAT	MOONEY	930023-205	
JK-	DP101A	C/B, PITOT HEAT (SPARES)	MOONEY	930023-241	
JKL	DP102A	PITOT, HEATED	AERO INST	PH502-24 ****	
				**** AN5812-1 (ALT)	
JKL	DP103A	PLUG, PITOT HEAT		AN3115-1	
--		SOCKETS		AN3116-1	
JK-	DP104A	BOARD ASSY	MOONEY	940002-001	
JK-	DP104B	CURRENT MONITOR (SPARES)	MOONEY	800221-501	
JK-	DP105A	FUSEHOLDER	LITTEL	155020 or 155120	
--	——	FUSE, 1A	LITTEL	313001	
JK-	DP106A	PLUG	AMP	1-480303-0	
——		SOCKETS	AMP	60619-1	
JK-	DP107A	RECPT	AMP	1-480305-0	
——		PINS	AMP	60620-1	
JK-	DP108A	LIGHT ASSY	MOONEY	800346-503	
—L	DP150A	RELAY BOX, CURRENT DETECTOR	MOONEY	800221-501	
—L	DP150B	RELAY BOX, CURRENT DETECTOR	MOONEY	800221-503	
—L	DP151A	PLUG, CUR/DECT RELAY	AMP	206060-1	
——		CLAMP	AMP	206062-1	
—L	DP152A	FUSEHOLDER	LITTEL	155020 or 155120	
——		FUSE, 5A-3AG-SLO-BLO	LITTEL	313005	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
-K-	DR101A	C/B, TIT	KLIXON	7277-2-2	
-K-	DR102A	INDICATOR, TIT	MOONEY	880051-501	
-K-	DR102B	INDICATOR, TIT/EGT	MOONEY	880051-503	
-K-	DR103A	PLUG, TIT	AMP	205636-1	
———		CLAMP	AMP	206062-1	
-K-	DR103B	PLUG, 28 PIN	AMP	205639-3	
———		CLAMP	AMP	206070-1	
-K-	DR104A	PROBE, TIT	MOONEY	880005-501	
-K-	DR104A	PROVE, TIT (ALT)	MOONEY	880005-503	
-K-	DR104B	PROBE, TIT	MOONEY	880055-501	
J—	DT101A	PROBE, EGT - CYL #1	MOONEY	880005-501	
		PROBE, EGT - CYL #1 (ALT)	MOONEY	880005-503	
		PROBE, EGT - CYL #1 (ALT)	MOONEY	880110-000	
-K-	DT101A	PROBE, EGT- CYL #1	MOONEY	880005-501	
		PROBE, EGT- CYL #1 (ALT)	MOONEY	880005-503	
-K-	DT102A	PROBE, EGT- CYL #2	MOONEY	880005-501	
		PROBE, EGT- CYL #2 (ALT)	MOONEY	880005-503	
-K-	DT103A	PROBE, EGT-CYL #3	MOONEY	880005-501	
		PROBE, EGT-CYL #3 (ALT)	MOONEY	880005-503	
-K-	DT104A	PROBE, EGT-CYL #4	MOONEY	880005-501	
		PROBE, EGT-CYL #4 (ALT)	MOONEY	880005-503	
-K-	DT105A	PROBE, EGT-CYL #5	MOONEY	880005-501	
		PROBE, EGT-CYL #5 (ALT)	MOONEY	880005-503	
-K-	DT106A	PROBE, EGT-CYL #6	MOONEY	880005-501	
		PROBE, EGT-CYL #6 (ALT)	MOONEY	880005-503	
JK-	DV101A	C/B, FUEL FLOW	KLIXON	7277-2-2	
JK-	DV102A	INDICATOR, FUEL FLOW	MOONEY	880034-501	
JK-	DV102B	INDICATOR, FUEL FLOW(OPT)	MOONEY	880034-507	
JK-	DV102C	INDICATOR, FUEL FLOW (OPT)	MOONEY	880034-513	
JK-	DV103A	PLUG, FUEL FLOW	CANNON	DE-9S	
JK-	DV104A	XDUCR, FUEL FLOW	MOONEY	880030-501	
JK-	DV104A	XDUCR, FUEL FLOW (OPT)	MOONEY	880030-503	
JK-	DV104C	XDUCR, FUEL FLOW (OPT)	MOONEY	880030-505	
JK-	DV105A	SWITCH FURE FLOW MEMORY	C & K	7101K	
—L	DV150A	XDUCER, FUEL FLOW	PORSCHE	933-110-377-02 (FUEL CONTROL)	
—L	DV151A	PLUG	PORSCHE	933-612-403-00	
———		CLAMP	PORSCHE	999-615-032-40	
———		BOOT	PORSCHE	944-612-128-00	
———		CONTACTS	PORSCHE	999-652-456-22	
—L	DW150A	INDICATOR, VERTICAL SPEED	UI	7201-2 CODE C.146	
—L	DW151A	PLUG, VSI, 3 PIN	BENDIX	PTO6E-8-3S	
—L	DW151A	PLUG, V/S (ALT)	CANNON	KPTO6E-8-3S	
L	DW151A	PLUG, VSI (ALT)		MS3116-8-3S	
———		CLAMP		MS3057-3A or -3B	
JKL	EG101A	C/B GEAR RELAY	KLIXON	7277-2-5	
JKL	EG102A	SWITCH, GEAR UP/DN	C-H	8906K2675	
JKL	EG103A	SWITCH, GEAR OVERIDE	C-H	8BIDDX492-2	
———		LOCKING RING	C-H	29-781	
———		LOCK WASHER	C-H	16-686	
———		HEX NUT (2 EA)	C-H	15-966-6	
———		LAMP (28 V)	GE	988	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JKL	EG104A	SWITCH, GEAR SAFETY(A/SPEED)	MOONEY	880013-507	
JKL	EG105A	C/B, GEAR ACTUATOR	KLIXON	7277-2-15	
JKL	EG106A	SWITCH, GEAR UP LIMIT	MICRO SWITCH	DT-2R-A7	
———		ACTUATOR	MICRO SWITCH	MCD-2711	
JKL	EG107A	SWITCH, GEAR DN LIMIT	MICRO SWITCH	ICHI-6	
JKL	EG107A	SWITCH, GEAR DN LIMIT (ALT)	SAINT SWITCH,INC	ML1116	
JKL	EG108A	RELAY, GEAR UP	C-H	604IH220	
JKL	EG109A	RELAY, GEAR DOWN	C-H	604IH220	
JKL	EG110A	ACTUATOR, LANDING GEAR	MOONEY	560254-503	
JKL	EG110A	ACTUATOR, LDG. GR (ALT)	MOONEY	880037-507	
JKL	EG111A	DIODE,GEAR UP RELAY		1N2493	
———		LOCK RETAINER	ITT	DB51221-1	
JKL	EG112A	DIODE, GEAR DOWN RELAY		1N2493	
JKL	ELT101A	SWITCH, REMOTE ELT	D & M	DM-U65-1	
JKL	ELT101A	SWITCH,REMOTE ELT (ALT)	C & K	7101K	
JKL	ELT102A	ELT TRANSMITTER	D & M	DM-ELT-8	
—L	ELT150A	PLUG, ELT	AMP	206060-1	
—	———	CLAMP	AMP	206062-1	
—L	ELT151A	RECPT, ELT	AMP	206153-1	
—	———	CLAMP	AMP	206062-1	
JK-	FON101A	PHONE-JACK	SWITCHCRAFT	C-11	
——-		WASHERS	SWITCHCRAFT	S-1026 & S-1029	
L	JE150B	C/B IGNITION, LT	KLIXON	7277-2-7.5	
--L	JE151B	C/B IGNITION, RT	KLIXON	7277-2-7.5	
--L	JE152B	IGNITION BOX, LT	PORSCHE	933.602.007.07	
—L	JE153B	IGNITION BOX, RT	PORSCHE	933.602.007.07	
—L	JE154B	PLUG, IGN BOX, LT	CANNON	CA3106A-2DA-4BS-B-03	
—L	JE154B	PLUG, IGN BOX, LT (ALT)	CANNON-GERMANY	CA3106A-2DA-4BS-B-15	
—L	JE154B	PLUG, IGN BOX, LT (ALT)	PORSCHE	933.612.440.00	
———		TINEL-LOCK ADAPTER	RAYCHEM	TXR18AB45-C2012AI	
———		ADAPTER (ALT)	SUNBANK	S2900AA1912AI-S034-000	
———		BOOT	RAYCHEM	202C621-51/164	
———		BOOT (ALT/SUPPLEMENT)	RAYCHEM	202S142-25S	
—L	JE155B	PLUG, IGN BOX, RT (ALT)	CANNON-GERMANY	CA3106A-20A-4BS-B-15	
—L	JE155B	PLUG, IGN BOX, RT (ALT)	PORSCHE	933.612.440.01	
---—		TINEL-LOCK ADAPTER	RAYCHEM	TXR18AB45-C2012AI	
-		ADAPTER (ALT)	SUNBANK	S2900AA1912AI-S034-000	
——		BOOT	RAYCHEM	202C621-51/164	
-		BOOT (ALT/SUPPLEMENT)	RAYCHEM	202S142-25S	
—L	JE156B	PLUG, IGN BOX COIL, LT (ALT)	CANNON-GERMANY	CA3106E-10SL-3P-B-14	
—L	JE156B	PLUG, IGN BOX COIL, LT (ALT)	PORSCHE	933.612.409.01	
———		TINEL-LOCK ADAPTER	RAYCHEM	TXR18AB00-C1104AI	
———		ADAPTER (ALT)	SUNBANK	S2900AS06D4AI-S034-000	
———		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
———		COUPLING	SUNBANK	S3292	
———		BOOT	RAYCHEM	202S121-25S	
—L	JE157B	PLUG, IGN BOX COIL, RT (ALT)	CANNON-GERMANY	CA3106E-10SL-3P-B-14	
—L	JE157B	PLUG, IGN BOX COIL, RT (ALT)	PORSCHE	933.612.409.01	
———		TINEL-LOCK ADAPTER	RAYCHEM	TXR18AB00-C1104AI	
———		ADAPTER (ALT)	SUNBANK	S2900AS0504AI-S034-000	
———		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
———		COUPLING	SUNBANK	S3292	
———		BOOT	RAYCHEM	202S121-25S	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	JE162B	PLUG, IGN COIL, LT	CANNON-GERMANY	CA3106E-10SL-4S-6-14	
L	JE162B	PLUG, IGN COIL, LT	PORSCHE	933.612.407.01	
——		TINEL-LOCK ADAPTER	RAYCHEM	TXR18AB00-C1104AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS0504AI-S034-000	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		COUPLING	SUNBANK	S3292	
——		BOOT	RAYCHEM	202S121-25S	
—L	JE163B	PLUG, IGN COIL, RT	CANNON-GERMANY	CA3106E-10SL-4S-6-14	
—L	JE163B	PLUG, IGN COIL, RT	PORSCHE	933.612.407.01	
——		TINEL-LOCK ADAPTER	RAYCHEM	TXR18AB00-C1104AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS0504AI-S034-000	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
-		COUPLING	SUNBANK	S3292	
——		BOOT	RAYCHEM	202S121-25S	
—L	JE164A	IGNITION COIL, LT	PORSCHE	N/A	
L	JE165A	IGNITION COIL, RT	PORSCHE	N/A	
—L	JE168A	SENSOR, TDC #1	PORSCHE	N/A	
—L	JE169A	SENSOR, TDC #2	PORSCHE	N/A	
—L	JE170C	RECPT, 3 PIN	CANNON-GERMANY	CA121001-633	
——		RECPT, 3 PIN (ALT)	PORSCHE	933-612-411-00	
——		ADAPTER	RACHEM	TXR18AB000-C1104AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS0604AI-S034-000	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
- - --		COUPLING	SUNBANK	S3292	
——		BOOT	RAYCHEM	202S121-25S	
L	JE171C	PLUG, 3 PIN	CANNON-GERMANY	CA06EH10SL3PB14	
——		PLUG, 3 PIN (ALT)	PORSCHE	933-612-412-00	
——		ADAPTER	RACHEM	TXR18AB000-C1104AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS0604AI-S034-000	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		COUPLING	SUNBANK	S3292	
——		BOOT	RAYCHEM	202S121-25S	
—L	JE172B	RECEPT, IGN, COIL, LT, 4 PIN	CANNON	MS3106K-14S-2P	
——		ADAPTER	RAYCHEM	TXR18AB000-C1404AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
------		BOOT	RAYCHEM	202S121-25S	
L	JE173B	PLUG, IGN, COIL, LT, 4 PIN	CANNON	MS3106E-14S-2S	
——		ADAPTER	RAYCHEM	TXR18AB000-C1404AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		BOOT	RAYCHEM	202S121-25S	
—L	JE174C	RECPT, 3 PIN	CANNON-GERMANY	CA121001-633	
——		RECPT, 3 PIN (ALT)	PORSCHE	933-612-411-00	
——		ADAPTER	RACHEM	TXR18AB000-C1104AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS0604AI-S034-000	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		COUPLING	SUNBANK	S3292	
——		BOOT	RAYCHEM	202S121-25S	
L	JE175C	PLUG, 3 PIN	CANNON-GERMANY	CA06EH10SL3PB14	
----		PLUG, 3 PIN (ALT)	PORSCHE	933-612-412-00	
-		ADAPTER	RACHEM	TXR18AB000-C1104AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS0604AI-S034-000	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		COUPLING	SUNBANK	S3292	
——		BOOT	RAYCHEM	202S121-25S	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	JE176B	RECPT, IGN. COIL, RT, 4 PIN		MS3100K-14S-2P	
——		ADAPTER	RAYCHEM	TXR18AB000-C1404AI	
—- -		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		BOOT	RAYCHEM	202S121-25S	
—L	JE177B	PLUG, (ALT)		MS3106E-14S-2S	
——		ADAPTER	RAYCHEM	TXR18AB000-C1404AI	
——		ADAPTER (ALT)	SUNBANK	S2900AS1004AI-S034-000	
——		BOOT	RAYCHEM	202S121-25S	
—L	JE178A	PLUG, 3 PIN	AMP	1-480303-0	
——		SOCKET	AMP	60618-1	
—L	JE179A	RECPT, C/B, 3 PIN	AMP	1-480305-0	
——		PINS	AMP	60620-1	
—L	JE180A	PLUG, 2 PIN	AMP	1-480316-0	
——		SOCKET	AMP	60619-1	
L	JE181A	RECPT, C/B, 2 PIN	AMP	1-480319-0	
——		PINS	AMP	60620-1	
L	JE182A	PLUG, TACH/FUEL FLOW	AMP	1-480316-0	
——		SOCKET	AMP	60619-1	
L	JE183A	RECPT, TACH/FUEL FLOW	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JKL	JM101A	SWITCH, IGNITION	BENDIX- SCINTILLA	10-357210-9	
——		PLACARD	BENDIX- SCINTILLA	10-187-46B	
J—	JM102A	MAGNETO	BENDIX-SCINTILLA	10-682555-1	
J—	JM102B	MAGNETO (ALT)	BENDIX-SCINTILLA	10-682555-111	
-K-	JM103A	MAGNETO, RIGHT	BENDIX-SCINTILLA	10-79020-120	
			TCM	640896-1	
-K-	JM103B	MAGNETO, RIGHT	SLICK	6224	
-K-	JM104A	MAGNETO, LEFT	BENDIX-SCINTILLA	10-79020-120	
			TCM	640896-1	
-K-	JM104B	MAGNETO, LEFT	SLICK	6224	
JK-	LB101A	C/B, ROTATING BEACON	MOONEY	930023-203	
JK-	LB101A	C/B, ROTATING BCN (SPARES)	MOONEY	930023-243	
JK-	LB102A	LIGHT, ROTATING BCN	WHELEN	WRML-24	
——		ADAPTER	WHELEN	WRM-65	
JKL	LB102B	LT, ROTATING BCN, RED (ALT)	WHELEN	90033-19	
JKL	LB102B	LT, ROTATING BCN, WTE (ALT)	WHELEN	90033-20	
JKL	LB103A	PLUG, 2 PIN	AMP	1-480316-0	
——		SOCKET	AMP	60619-1	
JKL	LB104A	RECPT, 2 PIN	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JKL	LC101A	FUSEHOLDER, CLOCK, 5AMP	LITTEL	155020/155120	
--		FUSE,(5A-3AG-SLO-BLO)	LITTEL	313005	
JKL	LC102A	SWITCH, CABIN LIGHT, FWD	CARLING	TILC64-IS-WH-FN	
JKL	LC103A	RESISTOR, CABIN LIGHT, FWD	DALE	RH-10-20 OHM	
JKL	LC104A	LIGHT, CABIN, FWD, LT	H.H. SMITH	1930	
——		LAMP	GE	1818	
JKL	LC105A	LIGHT, CABIN, FWD, RT	H.H. SMITH	1930	
——		LAMP	GE	1818	
JKL	LC106A	LIGHT, CABIN, FWD, LT	H.H. SMITH	1930	
——		LAMP	GE	1818	
JKL	LC107A	LIGHT, CABIN, FWD, RT	H.H. SMITH	1930	
——		LAMP	GE	1818	

26 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JKL	LC108A	SWITCH, CABIN LIGHT, REAR	CARLING	TILC64-1S-WH-FN	
JKL	LC109A	RESISTOR, CABIN LIGHT SW	DALE	RH-10-20 OHM	
JKL	LC110A	LIGHT, CABIN, REAR, LT	H.H. SMITH	1930	
—	——	LAMP	GE	1818	
JKL	LC111A	LIGHT, CABIN, REAR, RT	H.H. SMITH	1930	
—	——	LAMP	GE	1818	
JKL	LC112A	LIGHT, CABIN, REAR, LT	H.H SMITH	1930	
—	——	LAMP	GE	1818	
JKL	LC113A	LIGHT, CABIN, REAR, RT	H.H. SMITH	1930	
—	——	LAMP	GE	1818	
—L	LC114A	LIGHT, CABIN, REAR, LT	H.H. SMITH	1930	
—	——	LAMP	GE	1818	
—L	LC115A	LIGHT, CABIN, REAR, RT	H.H. SMITH	1930	
—	——	LAMP	GE	1818	
J—	LL101A	SWITCH, LDG LT	MOONEY	930023-235	
J—	LL102A	LANDING LIGHT	GE	4553	
JK-	LL103A	RECPT, LDG LT	AMP	206153-1	
— —		CLAMP	AMP	206062-1	
JK-	LL104A	PLUG, LDG LT	AMP	206060-1	
——		CLAMP	AMP	206062-1	
-K-	LL105A	C/B, LDG LT, LEFT	KLIXON	7277-2-10	
-K-	LL106A	LIGHT, LDG, LEFT	GE	4596	
-K-	LL107A	C/B, LDG LT, RIGHT	KLIXON	7277-2-10	
-K-	LL108A	LIGHT, LDG, RIGHT	GE	4596	
-K-	LL109A	SWITCH, LDG LT	C-H	8143-K21-E13-M50	
—L	LL150A	C/B, LANDING LIGHT, LEFT	KLIXON	7277-2-20	
——		C/B, LDG LT, LEFT (ALT)	MECHANICAL PROD	4200-002-25	
-—L	LL151A	C/B LANDING LIGHT, RIGHT	KLIXON	7277-2-20	
——		C/B, LDG LT, RIGHT (ALT)	MECHANICAL PROD	4200-002-25	
L	LL152A	SWITCH, LANDING LIGHT	C-H	8162-K22-E13-M50	
—L	LL154A	LANDING LIGHT-RT WING	GE	4596	
—L	LL155A	TAXI LIGHT-RT WING	GE	4596	
—L	LL156A	SWITCH, TAXI LIGHT	C-H	8162-K22-E13-M60	
—L	LL157A	TAXI LIGHT, LEFT WING	GE	4596	
—L	LL158A	LANDING LIGHT, LEFT WING	GE	4596	
JKL	LN101A	C/B NAV LIGHTS.	MOONEY	930023-201	
JKL	LN102A	LIGHT, TAIL, LT WING	MOONEY	800051-501	
——		BULB, 28V	WHELEN	34-0228030-85	
JKL	LN103A	LIGHT, TAIL RT WING	MOONEY	800051-501	
JKL	LN104A	PLUG, TAIL LIGHT, RT WING	AMP	1-480318-0	
——		SOCKETS	AMP	60619-1	
JKL	LN105A	RECPT, TAIL LIGHT RT WING	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JKL	LN106A	PLUG, TAIL NAV LIGHT	AMP	1-480318-0	
——		SOCKETS	AMP	60619-1	
JKL	LN107A	RECPT, TAIL NAV LIGHT	AMP	1-480319-1	
— —		PINS	AMP	60620-1	
JKL	LP101A	C/B PANEL LIGHTS	KLIXON	7277-2-5	
JKL	LP102A	C/B GLARESHIELD LIGHTS	KLIXON	7277-2-5	
JKL	LP103A	LAMP, COMPASS LIGHT	GE	AVIATION RED 327 or 327	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	LP104A	RECPT, COMPASS LT	DEANS	DEA90020MALE	
JKL	LP105A	PLUG, COMPASS LIGHT	DEANS	DEA90020FEMALE	
JKL	LP106A	LIGHTS, GLARESHIELD (14 EACH)	GE	327	
JK-	LP107A	LIGHT HOLDER, TRIM/FLAP	DIALIGHT	270-1930-0171-702	
--		LAMP	GE	327	
—	———	LAMP (ALT)	GE	385	
JK-	LP108A	LIGHT, COWL FLAP	DIALIGHT	270-1930-0171-702	
———		LAMP	GE	327	
JK-	LP109A	LIGHT, OXYGEN	SLOAN	8555-0-U	
JK-	LP109B	LIGHT, OXYGEN	SLOAN	8556-0-U	
———		LAMP	GE	327	
JK-	LP110A	LIGHT, CLUSTER	GE	327	
JK-	LP111A	LIGHT, CLUSTER	GE	327	
JK-	LP112A	LIGHT, CLUSTER	GE	327	
JK-	LP113A	LIGHT, CLUSTER	GE	327	
JK-	LP114A	LIGHT, CLUSTER	GE	327	
JK-	LP115A	LIGHT TRAY, AMMETER	B & D	0221-128	
JK-	LP116A	LIGHT TRAY, TACHOMETER	B & D	0221-128	
JK-	LP118A	LIGHT TRAY, AIRSPEED	U.I.	BA28-BW3	
JK-	LP119A	LIGHT TRAY, TURN CO-ORD	U.I.	BA28-BW3	
JK-	LP120A	LIGHT TRAY, ALTIMETER	U.I.	BA28-BW3	
JK-	LP121A	LIGHT TRAY, VERTICAL SPEED	U.I.	BA28-BW3	
JK-	LP122A	LIGHT TRAY, ARTIFICIAL HORIZON	SIGMA-TEC	IV-192-971	
JK-	LP123A	LIGHT TRAY, DIRECTIONAL GYRO	SIGMA-TEC	IV-192-971	
-K-	LP125A	LIGHT TRAY, TIT	B & D	0221-128	
JK-	LP126A	LIGHT TRAY, EGT/OAT	B & D	0221-128	
—L	LP150A	DIMMER CONTROL BOX	IAI	950D0307-000	
—L	LP151A	PLUG, DIMMER CONTROL BOX	ITT	DBM17W2S	
———		CLAMP	ITT	DB51212	
———		LOCK RETAINER	ITT	DB51221-1	
———		RECPT (2 EA)	ITT	DM53744-7	
--L	LP152A	SWITCH, PANEL LIGHTS, DIMR	C & K	7105-J1-Z-Q	
--L	LP153A	SWITCH, G/SHIELD LIGHTS, DIM	C & K	7105-J1-Z-Q	
—L	LP154A	LIGHT, FLAP SWITCH	MOONEY	130285-003	
—		LAMP	GE	327	
—L	LP155A	LIGHT, CONSOLE SWITCH, RT	MOONEY	130285-003	
———		LAMP	GE	327	
—L	LP156A	RECPT, 9 PIN	AMP	206705-2	
———		CLAMP	AMP	206966-1	
—L	LP157A	PLUG, 9 PIN	AMP	206706-1	
———		CLAMP	AMP	206966-1	
—L	LP158A	LIGHT, CONSOLE SWITCH, LT	MOONEY	130285-003	
———		LAMP	GE	327	
—L	LP159A	PLUG, 15 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
L	LP160A	RECEPT, DIMMER CONTROL BOX	AMP	206036-3	
———		CLAMP	AMP	206070-1	
JKL	LR101A	C/B RECOGNITION LIGHTS	MOONEY	990029-231	
JKL	LR102A	RECOGNITION LIGHT, LT WG	MOONEY	660049-501	
JKL	LR103A	PLUG, RECOG. LIGHT, LT WG	AMP	1-480918-0	
———		SOCKETS	AMP	60619-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JKL	LR104A	RECOGNITION LIGHT, RT	MOONEY	880049-501	
JKL	LR105A	PLUG, RECOG. LIGHT, RT	AMP	1-480318-0	
——		SOCKETS	AMP	60619-1	
JKL	LR106A	RECPT, RECOG.LIGHT, LEFT	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JKL	LR107A	PLUG, RECOG. LIGHT, LEFT	AMP	1-480318-0	
——		SOCKETS	AMP	60619-1	
JKL	LR108A	RESISTOR, RECOG. LIGHT, LEFT	DALE	RH-50-7.5 OHMS	
JKL	LR109A	RECPT, RECOG. LIGHT, RT	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JKL	LR110A	PLUG, RECOG. LIGHT, RT	AMP	1-480318-0	
——		SOCKETS	AMP	60619-1	
JKL	LR111A	RESISTOR, RECOG. LIGHT, RT	DALE	RH-50-7.5 OHMS	
JKL	LS101A	C/B STROBE LIGHTS	MOONEY	830023-207	
JKL	LS101A	C/B STROBE LIGHTS (ALT)	MOONEY	830023-287	
JKL	LS102A	POWER SUPPLY, STROBE, LT WG	WHELEN	01-0770329-00	
JKL	LS103A	RECPT, STROBE P/S, LT WG	AMP	1-480305-0	
JKL	LS104A	RECPT, STROBE P/S,LT WG	AMP	1-480305-0	
JKL	LS105A	PLUG, NAV/STROBE, LT WG	AMP	1-480303-0	
JKL	LS106A	LIGHT, NAV/STROBE, LT WG	WHELEN	A650-PR-D-M	
JKL	LS107A	STROBE PWR SUPPLY, RT WG	WHELEN	01-0770329-00	
JKL	LS108A	RECPT, STROBE PWR SUPPLY, RT	AMP	1-480305-0	
JKL	LS109A	RECPT,STROBE LIGHT P/S, RT	AMP	1-480305-0	
JKL	LS110A	PLUG,STROBE LIGHT, RT	AMP	1-480303-0	
JKL	LS111A	NAV/STROBE LIGHT RT. WING	WHELEN	A650-PG-D-M	
JKL	LS112A	POWER SUPPLY, TAIL STROBE	WHELEN	01-0770329-00	
JKL	LS113A	RECPT, TAIL STROBE PWR SUPPLY	AMP	1-480305-0	
JKL	LS114A	RECPT, TAIL STROBE PWR SUPPLY	AMP	1-480305-0	
JKL	LS115A	PLUG, TAIL STROBE	AMP	206060-1	
—	——	CLAMP	AMP	206062-1	
JKL	LS116A	RECPT, TAIL STROBE	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JKL	LS117A	PLUG, TAIL STROBE	AMP	1-480303-0	
JKL	LS118A	STROBE LIGHT, TAIL	MOONEY	470D13-501	
JK-	LS119A	RECPT	AMP	1-480305-0	
JK-	LS120A	RECPT	AMP	1-480305-0	
JK-	LS121A	RECPT	AMP	1-480305-0	
JKL	MA101A	AUX. PWR. RECEPTACLE		AN2552-3A	
JKL	MA102A	RELAY, AUX. PWR	C-H	6041H202	
		(ALT)	C-H	6041H202A	
JKL	MA103A	DIODE, AUX PWR RELAY	SARKES TARZIAN	10H3P	
JK-	MA104A	DIODE		1N2483	
JKL	MB101A	AVIONICS CONTROL RELAY	MAGNACRAFT	W67CSX-3	
——		BASE	MAGNACRAFT	70-303	
J···	MB101B	DIODE		1N2483	
JK-	MB102A	DIODE		1N2483	
J—	MB102A	DIODE		1N2483	
JKL	MB103A	DIODE		1N2483	
JK-	MB104A	RELAY, AVIONICS MASTER	P-B	MB4443	
– · ·		SOCKET	P-B	27E122	
——		SPRING	P-B	20C176	
—— ·		STANDOFF	P-B	21B212	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	MB104A	RELAY, AVIONICS MASTER (ALT)	P-B	MB4443-1	
JKL	MB107A	SWITCH, AVIONICS MASTER	C & K	7101K	
J—	MB107B	SWITCH, MASTER, AVIONICS	MOONEY	930023-213	
JKL	MB109A	C/B HSI	KLIXON	7277-2-XX(VARIES)	
JKL	MB110A	C/B COM1	KLIXON	7277-2-XX(VARIES)	
JKL	MB111A	C/B NAV1	KLIXON	7277-2-XX(VARIES)	
JKL	MB112A	C/B AUDIO	KLIXON	7277-2-XX(VARIES)	
JKL	MB113A	C/B PHONE	KLIXON	7277-2-XX(VARIES)	
JKL	MB114A	C/B ADF	KLIXON	7277-2-XX(VARIES)	
JKL	MB115A	C/B COM2	KLIXON	7277-2-XX(VARIES)	
JKL	MB116A	C/B NAV2	KLIXON	7277-2-XX(VARIES)	
JKL	MB117A	C/B TRANSPONDER	KLIXON	7277-2-XX(VARIES)	
JKL	MB118A	C/B ENCODER	KLIXON	7277-2-XX(VARIES)	
JKL	MB119A	C/B AUTOPILOT/TRIM	KLIXON	7277-2-XX(VARIES)	
JKL	MB120A	C/B RADAR	KLIXON	7277-2-XX(VARIES)	
JKL	MB121A	C/B DME	KLIXON	7277-2-XX(VARIES)	
JKL	MB122A	C/B LORAN	KLIXON	7277-2-XX(VARIES)	
JKL	MB123A	C/B STORMSCOPE	KLIXON	7277-2-XX(VARIES)	
JKL	MB124A	C/B TELEPHONE	KLIXON	7277-2-XX(VARIES)	
JKL	MB125A	C/B RMI	KLIXON	7277-2-XX(VARIES)	
JKL	MB126A	C/B R/NAV	KLIXON	7277-2-XX(VARIES)	
JKL	MB127A	C/B INVERTER	KLIXON	7277-2-XX(VARIES)	
JKL	MB128A	C/B STEREO	KLIXON	7277-2-XX(VARIES)	
JKL	MB129A	C/B PROP DE-ICE	MOONEY	930023-223	
JKL	MB131A	BUS BAR #10	MOONEY	913127-019	
JKL	MB132A	BUS BAR #11	MOONEY	913127-019	
JKL	MB133A	BUS BAR #12	MOONEY	913127-019	
JKL	MB134A	BUS BAR #13	MOONEY	913127-005	
JKL	MB135A	C/B, YAW DAMPER	KLIXON	7277-2-7.5	
JKL	MB136A	C/B, RADAR ALTIMETER	KLIXON	7277-2-7.5	
JKL	MB137A	C/B, ARTIFICIAL HORIZON	KLIXON	7277-2-5	
· L	MB150A	AVIONICS BUS BAR #1	MOONEY	913127-73	
—L	MB151A	AVIONICS BUS BAR #2	MOONEY	913127-73	
.. L	MB152A	AVIONICS BUS BAR #3	MOONEY	913127-73	
—L	MB153A	AVIONICS BUS BAR #4	MOONEY	913127-73	
· -L	MB154A	AVIONICS BUS BAR #5	MOONEY	913127-73	
—L	MB155A	AVIONICS BUS BAR #6	MOONEY	913127-73	
—L	MB156A	AVIONICS BUS BAR #7	MOONEY	913127-73	
—L	MB157A	SHUNT	MOONEY	913127-049	
—L	MB158A	AVIONICS MASTER RELAY	AROMAT	HG4-DC24V	
———		RECEPTACLE	AROMAT	HG4-SF	
—L	MB159A	DIODE		1N2483	
—L	MB160A	FUSE HOLDER	LITTEL	155020 or 155120	
———		FUSE 1A	LITTEL	313001	
—L	MB162A	DIODE, STARTER SOLENOID, LT		1N2483	
—L	MB163A	DIODE, STARTER SOLENOID		1N2483	
—L	MB164A	ARTIFICIAL HORIZ	CASTLEBERRY	300-2BL	
L	MB165A	PLUG, ART.HORIZ	AMPHENOL	126-222	
-L	MB166A	C/B, AUTOPILOT ALERT	KLIXON	7277-2-XX(VARIES)	
JKL	MC101A	CIGAR LIGHTER	MOONEY	800336-503	
—L	MC150A	C/B, CIGAR LIGHTER	KLIXON	7277-2-10	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	ME101A	CLOCK, ELECTRIC	MID-CONT.	MD-88L	
——		LIGHT TRAY		BA28-24-BW2	
JK-	ME101B	CLOCK, (OPT)	MID-CONT.	MD-88L (ET)	
——		LIGHT TRAY		BA28-24-BW2	
—L	ME150A	CLOCK, (ALT)	IAI	95D0312.000	
—L	ME150B	CLOCK, CONTROL WHEEL	PORSCHE	944.641.213.00	
—L	ME151A	RECPT, CONTROL WHEEL	AMP	206705-2	
——		CLAMP	AMP	206966-1	
—L	ME152A	PLUG, CONTROL WHEEL	AMP	206708-1	
----		CLAMP	AMP	206966-1	
JK-	MIC101A	JACK, MICROPHONE	SWITCHCRAFT	C-12B	
—	-- -	WASHERS	SWITCHCRAFT	S-1026 or S-1029	
—L	MIC102A	JACK, MICROPHONE,CONSOLE	SWITCHCRAFT	C-12B	
——		WASHERS	SWITCHCRAFT	S-1026 or S-1029	
JK-	MJ101A	JUNCTION BLOCK (GND)	BEAU	77014-52	
——		JUMPER EDGE ON	BEAU	7233-16	
JK-	MJ102A	JUNCTION BLOCK (GND)	BEAU	71106-52	
——		JUMPER EDGE ON	BEAU	7233-8	
JK-	MJ103A	JUNCTION BLOCK (DIM)	BEAU	71106-52	
-		JUMPER EDGE ON	BEAU	7233-8	
JK-	MP101A	TIMER	B.F. GOODRICH	3E1899-1	
JK-	MP102A	SHUNT	B.F. GOODRICH	MS91586-1	
JK-	MP103A	FUSE HOLDER	LITTEL	155020 or 155120	
——		FUSE, 1A	LITTEL	313001	
JK-	MP104A	FUSE HOLDER	LITTEL	155020 or 155120	
——		FUSE, 1A	LITTEL	313001	
JK-	MP105A	AMMETER	B.F. GOODRICH	3E1872-1	
JK-	MP106A	SLIP-RING BLOCK	B.F. GOODRICH	3E2062-1	
—L	MP150A	C/B-SWITCH, PROP DE-ICE (15A)	ETA	930023-223	
—L	MP151A	TIMER	B.F. GOODRICH	3E2311-4	
—L	MP152A	SLIP RING, MODULAR BRUSH ASSY		B.F. GOODRICH	3E2062-1
—L	MP153	FUSEHOLDER	LITTEL	155020 or 155120	
——		FUSE, 1A	LITTEL	313001	
—L	MP154A	RELAY BOX, CURRENT	MOONEY	800221-505	
—L	MP155A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
	MSxxx	SPEAKER	ARCHER	40-1197	
—L	NE150A	C/B FUEL ENRICH	KLIXON	7277-2-1	
L	NE151A	SWITCH, ENRICHMENT	MICRO SWITCH	1SE1-T	
——		ACTUATOR	MICRO SWITCH	JE-5	
--L	NE153A	VALVE, SOLENOID, MIXTURE ENRICHMENT	PORSCHE	933.605.012.00	
—L	NE154A	DIODE, ENRICH SW.		1N2483	
—L	NE155A	DIODE, ENRICH SW.		1N2483	
—L	NE156A	DIODE, ENRICH SW.		1N2483	
JK-	NF101A	C/B, FUEL PUMP	MOONEY	930023-211	
J—	NF102A	PUMP, FUEL	WELDON	8163B	
JK-	NF103A	PLUG, FUEL PUMP	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	NF104A	RECPT, FUEL PUMP	AMP	206153-1	
——		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
-K-	NF105A	C/B, HIGH BOOST, FUEL	MOONEY	930023-219	
-K-	NF106A	PUMP, FUEL	WELDON	10054B	
-K-	NF107A	C/B, LOW BOOST, FUEL	MOONEY	930023-217	
-K-	NF108A	REGULATOR, FUEL PUMP	ELECTRO-DELTA	VR536	
-K-	NF109A	RECPT.	AMP	206153-1	
———		CLAMP	AMP	206062-1	
-K-	NF110A	PLUG	AMP	206060-1	
———		CLAMP	AMP	206062-1	
—L	NF150A	C/B FUEL PUMP, MAIN	KLIXON	7277-2-10	
—L	NF151A	C/B FUEL PUMP, EMERGENCY	KLIXON	7277-2-10	
—L	NF152A	SW., FUELPUMP,MAIN/BOOST	C-H	8162-K22-E13-M50	
———		GUARD	MOONEY	930026-501	
—L	NF153A	SWITCH,FUEL PUMP, EMER.	C-H	8142-K21-E7-T50	
———		GUARD	MOONEY	930026-501	
—L	NF154A	RECPT, FUEL PUMP	AMP	206060-1	
———		CLAMP	AMP	206062-1	
—L	NF156A	RECPT, FUEL PUMP	AMP	206153-1	
———		CLAMP	AMP	206062-1	
—L	NF156A	C/B, BOOST PUMP	KLIXON	7277-2-10	
—L	NF157A	FUEL PUMP, BOOST	PORSCHE	933.620.001.00	
—L	NF158A	PLUG	AMP	206060-1	
—		CLAMP	AMP	206062-1	
—L	NF159A	RECPT, FUEL PUMP	AMP	206153-1	
———		CLAMP	AMP	206062-1	
—L	NF160A	FUEL PUMP, MAIN	PORSCHE	933.620.001.00	
—L	NF161A	FUEL PUMP, EMERGENCY	PORSCHE	933.620.001.00	
-K-	NP101A	FUSEHOLDER, PRIMER	LITTEL	155020 or 155120	
———		FUSE, 10A,SLO-BLO	LITTEL	313010	
-K-	NP102A	SWITCH, PRIMER	CARLING	T1GK6B-1F-WH-A	
-K-	NP103A	DIFFUSER, PRIMER	CONTINENTAL	633862-2	
—L	NS150A	SWITCH, COLD START/ENRICH	MOONEY	880052-511	
—L	NS151A	NOZZLE, COLD START	PORSCHE	933.612.401.00	
—		PLUG	PORSCHE	933.615.032.40	
———		CLAMP	PORSCHE	999.615.032.40	
——		BOOT	PORSCHE	944.612.128.00	
———		CONTACTS	PORSCHE	999.552.456.22	
—L	NS153A	DIODE, COLD START SW		1N2483	
JK-	PA101A	C/B, ALTERNATOR #1	ETA	41-3-S34-LN2-041B00	
JKL	PA102A	C/B, ALTERNATOR FIELD, #1	KLIXON	7277-2-5	
JK-	PA103A	SWITCH, ALTERNATOR FIELD	C-H	8133K-21-E13-T52	
JK-	PA104A	VOLTAGE REGULATOR, #1	ELECTRODELTA	VR-802	
JK-	PA105A	RECPT, VOLTAGE REG.	AMP	206705-2	
———		CLAMP	AMP	206966-1	
JK-	PA106A	PLUG, VOLTAGE REG.	AMP	206709-2	
—		CLAMP	AMP	206966-1	
-K-	PA107A	ALTERNATOR #1	CONTINENTAL	649280 or 646719	
—		GEAR ASSY	CONTINENTAL	649123	
JKL	PA108A	FILTER	MOONEY	880014-501	
JKL	PA109A	CAPACITOR	MALLORY	CGS302U-050R2C	
JK-	PA110A	C/B, ALTERNATOR #2	ETA	41-3-S34-LN2-041B00	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JKL	PA111A	C/B ALTERNATOR FIELD, #2	KLIXON	7277-2-5	
JK-	PA112A	VOLTAGE REGULATOR, #2	ELECTRODELTA	VR-902	
JK-	PA113A	RECPT, VOLTAGE REG.	AMP	206705-2	
——		CLAMP	AMP	206966-1	
JK-	PA114A	PLUG, VOLTAGE REG.	AMP	206708-2	
——		CLAMP	AMP	206966-1	
-K-	PA115A	ALTERNATOR #2	CONTINENTAL	649263 or 649172	
JKL	PA116A	FILTER	MOONEY	880014-501	
JKL	PA117A	CAPACITOR	MALLORY	CGS302U-050R2C	
J—	PA118A	ALTERNATOR #1 (RIGHT)	LYCOMING	LW-14367	
		ALTERNATOR (ALT)	PRESTOLITE	ALU-6421-LS	
J—	PA119A	(#2 ALTERNATOR NOT USED AT THIS TIME)			
JK-	PA120A	FUSEHOLDER	LITTEL	155020 or 155120	
——		FUSE 5A	LITTEL	313005	
JK-	PA121A	SWITCH, EMERGENCY, FIELD	C-H	SB1DDX492-2	
——		LOCKING RING	C-H	29-761	
--		LOCK WASHER	C-H	16-886	
——		NUT, HEX	C-H	15-996-6	
——		LAMP	GE	398	
JK-	PA122A	DIODE	SARKES-TARZIAN	10H3P	
JK-	PA123A	DIODE	SARKES-TARZIAN	10H3P	
JK-	PA124A	SWITCH, ALTERNATOR FIELD	C-H	880052-503	
JK-	PA125A	DIODE	SARKES-TARZIAN	10H3P	
JK-	PA126A	DIODE	SARKES-TARZIAN	10H3P	
L	PA150A	ALTERNATOR, LT	PORSCHE	933.603.004.00	
—L	PA151A	ALTERNATOR, RT	PORSCHE	933.603.004.00	
—L	PA152A	OVERVOLTAGE CONTROL, LT	ELECTRO DELTA	OS-400	
—L	PA153A	PLUG, OVERVOLTAGE CONTROL, LT	AMP	206708-1	
——		CLAMP	AMP	206966-1	
—L	PA154A	OVERVOLTAGE CONTROL, RT	ELECTRO DELTA	OS-400	
—L	PA155A	PLUG, OVERVOLTAGE CONTROL, RT	AMP	206708-1	
		CLAMP	AMP	206966-1	
—L	PA156A	SWITCH, OVERVOLTAGE RESET, LT	C-H	SB1DDX492-2	
——		LOCKING RING	C-H	29-761	
——		LOCKING WASHER	C-H	16-886	
——		NUT, HEX (2 ea)	C-H	15-966-6	
——		LAMP	GE	398	
—L	PA157A	SWITCH, OVERVOLTAGE RESET, RT	C-H	SB1DDX492-2	
——		LOCKING RING	C-H	29-761	
——		LOCKING WASHER	C-H	16-886	
——		NUT, HEX (2 ea)	C-H	15-966-6	
- -		LAMP	GE	398	
—L	PA158A	C/B ALTERNATOR, LT	ETA	41-3-S14-LN2-70A	
		C/B ALTERNATOR, LT (ALT)	ETA	41-8-S34-LN2-70A	
—L	PA159A	C/B ALTERNATOR, RT	ETA	41-3-S14-LN2-70A	
		C/B ALTERNATOR, RT (ALT)	ETA	41-3-S34-LN2-70A	
—L	PA160A	RECPT, O/VOLTAGE CONTROL, LT	AMP	206705-2	
——		CLAMP	AMP	206966-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	PA161A	RECPT,OVERVOLTAGE CONT'L,RT	AMP	206705-1	
——		CLAMP	AMP	206996-1	
JK-	PB101A	BATTERY	GILL	G-242	
JKL	PB102A	RELAY,MASTER,BATTERY,LEFT	C-H	6041H202	
		(ALT)	C-H	6041H202A	
JKL	PB103A	DIODE,LEFT BATTERY RELAY		1N2483	
JK-	PB104A	SWITCH, MASTER	C-H	980052-501	
JKL	PB105A	C/B BATTERY, LT (ALT)	ETA	41-3-S14-LN2-70A	
		C/B BATTERY, LT	ETA	41-3-S34-LN2-70A	
JKL	PB106A	C/B BUS, FLT PNL SWITCH (ALT)	ETA	41-3-S14-LN2-70A	
		C/B BUS, FLT PNL SW	ETA	41-3-S34-LN2-70A	
JK-	PB107A	BUSS BAR #1	MOONEY	913127-005	
JK-	PB108A	BUSS BAR #2	MOONEY	913127-039	
JK-	PB109A	BUSS BAR #3	MOONEY	913127-001	
JK-	PB110A	BUSS BAR #4	MOONEY	913127-019	
JK-	PB111A	BUSS BAR #5	MOONEY	913127-019	
JK-	PB112A	BUSS BAR #6	MOONEY	913127-239 *	

*BUSS BARS 913127-045,-213,-223 or -227 MAY BE USED, AS REQUIRED, BY CIRCUIT BREAKER INSTALLATION.

-K-	PB113A	BUSS BAR #7	MOONEY	913127-129	
JK-	PB114A	BUSS BAR #8	MOONEY	913127-041	
JK-	PB115A	BUSS BAR #9	MOONEY	913127-043	
JK-	PB116A	SHUNT	KULKA	600RJ-2	
—L	PB150A	BATTERY, RIGHT	GILL	G-243	
—L	PB151A	RELAY, BATTERY, RT	C-H	6041H202	
		(ALT)	C-H	6041H202A	
—L	PB152A	DIODE, BATTERY RELAY, RT		1N2483	
—L	PB153A	SWITCH, BATTERY, LT	MOONEY	980052-507	
—L	PB154A	SWITCH, BATTERY, RT	MOONEY	980052-509	
—L	PB155A	C/B BATTERY, RT	ETA	41-3-S14-LN2-70A	
—L	PB155A	C/B BATTERY, RT (ALT)	ETA	41-3-S34-LN2-70A	
—L	PB156A	BUSS BAR #1	MOONEY	913127-51	
L	PB157A	BUSS BAR #2	MOONEY	913127-51	
—L	PB158A	BUSS BAR #3	MOONEY	913127-51	
—L	PB159A	BUSS BAR #4	MOONEY	913127-51	
—L	PB160A	BUSS BAR #5	MOONEY	913127-19	
—L	PB161A	BUSS BAR #6	MOONEY	913127-19	
—L	PB162A	BUSS BAR #7	MOONEY	913127-19	
—L	PB163A	BUSS BAR #8	MOONEY	913127-19	
—L	PB164A	BUSS BAR #9	MOONEY	913127-53	
—L	PB165A	BUSS BAR #10	MOONEY	913127-53	
—L	PB166A	BUSS BAR #11	MOONEY	913127-53	
—L	PB167A	BUSS BAR #12	MOONEY	913127-TBA	
—L	PB168A	C/B EMERGENCY CROSSOVER	ETA	41-3-S14-LN2-50A	
—L	PB168A	C/B EMERGENCY			
		CROSSOVER (ALT)	ETA	41-3-S34-LN2-50A	
·——		C/B COVER PLACARD	MOONEY	150080-802	
——·		GUARD	MOONEY	800232-503	
—L	PB169A	SHUNT, AVIONICS RELAY	MOONEY	913127-047	
L	PB170A	BATTERY, LEFT	GILL	G-243	
—L	PB171A	C/B LOAD, A/C, LT	ETA	41-3-S14-LN2-60A	
L	PB171A	C/B LOAD, A/C, LT(ALT)	ETA	41-3-S34-LN2-60A	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	PB172A	C/B LOAD, A/C, RT	ETA	41-3-S14-LN2-60A	
—L	PB172A	C/B LOAD, A/C RT (ALT)	ETA	41-3-S34-LN2-60A	
—L	PB173A	BUSS BAR #13	MOONEY	913127-55	
—L	PB174A	BUSS BAR #14	MOONEY	913127-57	
—L	PB175A	BUSS BAR #15	MOONEY	913127-57	
—L	PB176A	BUSS BAR #16	MOONEY	913127-59	
—L	PB177A	BUSS BAR #17	MOONEY	913127-59	
--L	PB178A	BUSS BAR #18	MOONEY	913127-61	
—L	PB179A	BUSS BAR #19	MOONEY	913127-19	
L	PB180A	FUSEHOLDER, LEFT MASTER	LITTEL	155020 or 155120	
—	PB180A	FUSE 5AMP	LITTEL	313005	
---L	PB181A	MASTER RELAY	C-H	6041H202	
		(ALT)	C-H	6041H202A	
—L	PB182A	DIODE		1N2483	
—L	PB183A	MASTER SWITCH	MOONEY	880052-501	
—L	PB184A	RELAY, A/H PWR	MAGNACRAFT	W38GCX-3	
—L	PB185A	DIODE		1N2483	
—L	PB186A	FUSEHOLDER, A/H, RT	LITTEL	155020 or 155120	
—	PB186A	FUSE, 5AMP	LITTEL	313005	
—L	PB187A	FUSEHOLDER, MASTER, RT	LITTEL	155020 or 155120	
—	PB187A	FUSE, 5AMP	LITTEL	313005	
L	PB188A	MASTER RELAY, ENGINE BUS, RT	C-H	6041H202	
		(ALT)	C-H	6041H202A	
L	PB189A	DIODE		1N2483	
—L	PB190A	MASTER SWITCH (OPT)	C-H	B133K-21-E13-T52	
—L	PB191A	GRND/DIMMER BOX	MOONEY	B00228-501	
JKL	PL01A	PLUG, C/B PANEL #1, 37 PIN	AMP	206150-1	
		CLAMP	AMP	206135-1	
JKL	PL02A	PLUG, CONSOLE #1, 16 PIN	AMP	205837-1	
		CLAMP	AMP	206070-1	
JKL	PL02B	PLUG, CONSOLE #1, 28 PIN	AMP	205839-3	
———		CLAMP	AMP	206070-1	
JKL	PL03A	PLUG, LEFT SIDE PANEL, 20 PIN	MOONEY	930021-501	
JKL	PL04A	PLUG, FLT PNL #1, 26 PIN	MOONEY	930021-505	
JKL	PL03B	PLUG, LEFT SIDE PANEL, 26 PIN	MOONEY	930021-505	
JKL	PL04A	PLUG, FLT PNL #1, 26 PIN	MOONEY	930021-505	
JKL	PL05A	PLUG, A/S SWITCH #1, 4 PIN	AMP	206080-1	
		CLAMP	AMP	206062-1	
JKL	PL06A	PLUG, AUTOPILOT POWER, 16 PIN	AMP	206037-1	
		CLAMP	AMP	202070-1	
JKL	PL07A	PLUG, 16 PIN, CLUSTER GAUGE	AMP	206037-1	
JKL	PL08A	PLUG, FIREWALL #1, 19 PIN		MS3106A-22-14S	
———		CLAMP		MS3057-12B	
JKL	PL09A	PLUG, RT.WG, 14 PIN	MOONEY	930021-001	
JKL	PL09B	PLUG, RT. WING, 20 PIN	MOONEY	930021-501	
JKL	PL10A	PLUG, RT. WING STUB, 14 PIN	MOONEY	930021-001	
JKL	PL11A	PLUG, LEFT WING, 14 PIN	MOONEY	930021-001	
JKL	PL12B	PLUG, FIREWALL #2, 19 PIN		MS3106A-22-14S	
———		CLAMP		MS3057-12B	
JK-	PL13A	PLUG, RT RADIO PNL, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO	NOTES
JKL	PL13B	PLUG, AVIONICS MASTER, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	PL14A	PLUG, HOUR, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	PL15A	PLUG, LEFT WING STUB, 14 PIN	MOONEY	930021-001	
JKL	PL16A	PLUG, GEAR CONTROL, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JKL	PL17A	PLUG, ELECTRIC GEAR, 14 PIN	MOONEY	930021-001	
JK-	PL18A	PLUG, DIMMER, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JKL	PL19A	PLUG, A/S SWITCH #2, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	PL20A	PLUG, TAILCONE, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JKL	PL21A	PLUG, HEADLINER, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JKL	PL22A	PLUG, OVERHEAD, REAR, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	PL23A	PLUG, GRND #1, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JKL	PL24A	PLUG, GRND #2, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JK-	PL25A	PLUG, LIGHT CONTROL, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JK-	PL26A	PLUG, G/SHIELD HARNESS, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	PL27A	PLUG, FLT PNL #2, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JKL	PL27B	PLUG, FLT PNL #2, 20 PIN	MOONEY	930021-501	
JK-	PL28A	PLUG, AVIONICS POWER, 20 PIN	MOONEY	930021-501	
JK-	PL29A	PLUG, DIM, GND, 20 PIN	MOONEY	930021-501	
JK-	PL30A	PLUG, DIM, GND 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	PL31A	PLUG, STANDBY VAC, 8 PIN	AMP	205838-1	
———		CLAMP	AMP	206062-1	
JK-	PL32A	PLUG, GEAR RELAY, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	PL33A	PLUG, C/B PNL, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JKL	PL34A	PLUG, GRND BUSS, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JKL	PL34B	PLUG, GRND BUSS, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JK-	PL35A	PLUG, FLT PNL #3, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	PL36A	PLUG, CONSOLE # 2, 8 PIN	AMP	205838-1	
———		CLAMP	AMP	206062-1	
JK-	PL37A	PLUG, LT SIDE PNL, 8 PIN	AMP	206838-1	
———		CLAMP	AMP	206062-1	
JK-	PL38A	PLUG, FLAP RELAY, 8 PIN	AMP	205708-1	
———		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	PL39A	PLUG, FLAP MOTOR, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
-K-	PL40A	PLUG, THROTTLE SWITCH, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JKL	PL50A	PLUG, C/B PNL #2, 37 PIN	AMP	206150-1	
———		FLANGE	AMP	207299-4	
JKL	PL51A	RECPT, IGNITION SWITCH,26 PIN	MOONEY	930021-505	
JKL	PL52A	PLUG, ALT/STARTER, F/W	CANNON	MS3106A2B-22S	
———		CLAMP		MS3057-16	
JKL	PL55A	PLUG, EMPENNAGE, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JKL	PL56A	PLUG, GRND #4, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JKL	PL57A	PLUG,GRND #5, 14 PIN	MOONEY	930021-001	
JKL	PL58A	PLUG, DIM. #2, 16 PIN	AMP	206037-1	
———		CLAMP	AMP	206070-1	
JKL	PL59A	PLUG, GRND #6, 26 PIN	MOONEY	930021-505	
JK-	PL76A	PLUG, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JK-	PL77A	PLUG, 28 PIN	AMP	206639-3	
———		CLAMP	AMP	206070-1	
L	PL152A	PLUG, GR/STALL WARN			
		HARNESS, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	PS101A	C/B, IGN/TACH/CIG LIGHTER	KLIXON	7277-2-10	
JKL	PS102A	SOLENOID, STARTER,LT	C-H	6041H-202 or -202A	
JK-	PS103A	FUSEHOLDER	LITTEL	155020 or 155120	
———		FUSE, 1A	LITTEL	313001	
J--	PS105A	STARTER	PRESTOLITE	MHB-4016	
		(ALT)	LYCOMING	LW15572	
-K-	PS106A	STARTER	TCM	646275	
		(ALT)	TCM	637847	
JKL	PS107A	DIODE, STARTER SOLENOID,LT		1N2483	
—L	PS150A	DIODE, PWR START,LT		1N2483	
—L	PS151A	DIODE, PWR START,RT		1N2483	
—L	PS152A	SOLENOID, STARTER, RT	C-H	6041H-202 or -202A	
—L	PS153A	DIODE, STARTER SOLENOID		1N2483	
—L	PS154A	STARTER	PORSCHE	933.602.007.03	
JKL	RB101A	C/B RADIO BLOWER	KLIXON	7277-2-2	
JKL	RB102A	RADIO BLOWER	TRW	19A2790	
JKL	RB103A	FILTER, RADIO BLOWER	ARCHER	273-103	
JKL	RB103A	FILTER, RAD. BLWR, (ALT)	SPRAGUE	5J05104A	
JKL	RC01A	RECPT, C/B PNL #1, 37 PIN	AMP	206151-2	
JKL	RC02A	RECPT, CONSOLE #1, 16 PIN	AMP	206036-3	
———		CLAMP	AMP	206070-1	
JKL	RC02B	RECPT, CONSOLE #1, 26 PIN	AMP	206152-1	
———		CLAMP	AMP	206070-1	
JKL	RC03A	RECPT, LEFT SIDE PANEL, 20 PIN	MOONEY	930021-502	
JKL	RC03B	RECPT, LEFT SIDE PANEL, 26 PIN	MOONEY	930021-506	
JKL	RC04A	RECPT, FLT PNL #1, 26 PIN	MOONEY	930021-506	
JKL	RC05A	RECPT, A/S SWITCH #1, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JKL	RC06A	RECPT, A/P POWER, 16 PIN	AMP	206036-3	
		CLAMP		206070-1	
JKL	RC07A	RECPT, CLUSTER GAUGE, 16 PIN	AMP	206036-3	
		CLAMP		206070-1	
JKL	RC08A	RECPT, FIREWALL #1, 19 PIN		MS3100A22-14P	
		CLAMP		MS3057-12B	
JKL	RC08B	RECPT, FIREWALL #1, 19 PIN		MS3100K22-14P	
		(ALT)		MS3100KE22-14P	
		CLAMP		MS3057-12B or 12A	
JKL	RC09A	RECPT, RT. WG, 14 PIN	MOONEY	930021-2	
JKL	RC09B	RECPT, RT WING, 20 PIN	MOONEY	930021-502	
JKL	RC10A	RECPT, RT. WING STUB, 14 PIN	MOONEY	930021-2	
JKL	RC11A	RECPT, LT. WG., 14 PIN	MOONEY	930021-002	
JKL	RC12A	RECPT, FIREWALL #2, 19 PIN		MS3100A22-14P	
		CLAMP		MS3057-12B	
JKL	RC12B	RECPT, FIREWALL #2		MS3100K22-14P	
		(ALT)		MS3100KE22-14P	
		CLAMP		MS3057-12B or -12A	
JK	RC13A	RECPT, RT.RADIO PNL, 9 PIN	AMP	206705-1	
		CLAMP	AMP	206966-1	
JKL	RC13B	RECPT, AVIONICS MASTER, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JK-	RC14A	RECPT, HOUR METER, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JKL	RC15A	RECPT, LEFT WING STUB, 14 PIN	MOONEY	930021-002	
JKL	RC16A	RECPT, GEAR CONTROL	AMP	206705-2	
		CLAMP	AMP	206966-1	
JKL	RC17A	RECPT, ELECTRIC GEAR	MOONEY	930021-002	
JK-	RC18A	RECPT, DIMMER, 16 PIN	AMP	206036-3	
		CLAMP	AMP	206070-1	
JKL	RC18B	RECPT, PNL LT DIM#1, 14 PIN	AMP	206044-1	
		CLAMP	AMP	206070-1	
JKL	RC19A	RECPT, A/S SWITCH #2, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JKL	RC20A	RECPT, TAILCONE, 16 PIN	AMP	206036-3	
		CLAMP	AMP	206070-1	
JK-	RC21A	RECPT, TAILCONE, 16 PIN	AMP	206036-3	
		CLAMP	AMP	206062-1	
JK-	RC22A	RECPT, O/H REAR, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JK-	RC23A	RECPT, GRND #1, 16 PIN	AMP	206036-3	
		CLAMP	AMP	206070-1	
JK-	RC24A	RECPT, GRND #2, 16 PIN	AMP	206036-3	
		CLAMP	AMP	206070-1	
JKL	RC26A	RECPT, COMPASS LT HARNESS,	AMP	206153-1	
		CLAMP	AMP	206062-1	
JK-	RC27A	RECPT, FLT PNL #2,4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JKL	RC27B	RECPT, FLT PNL #2, 20 PIN	MOONEY	930021-502	
JK-	RC28A	RECPT, AVIONICS POWER, 20 PIN	MOONEY	930021-502	
JK-	RC29A	RECPT, DIM/GRND, 20 PIN	MOONEY	930021-502	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	RC30A	RECPT, DIM/GRND, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	RC31A	RECPT, STBY VAC, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JK-	RC31B	RECPT, STBY VAC, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JKL	RC32A	RECPT, GEAR RELAY, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK	RC33A	RECPT, C/B PNL #2, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
JKL	RC34B	RECPT, GRND BUSS, 16 PIN	AMP	206036-3	
——		CLAMP	AMP	206966-1	
JK-	RC35A	RECPT, FLT PNL #3, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	RC36A	RECPT, CONSOLE #2, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JK-	RC37A	RECPT, LT.SIDE PNL, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JK-	RC38A	RECPT, FLAY RELAY, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JK	RC39A	RECPT, FLAP MOTOR, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
-K-	RC40A	RECPT, THROTTLE SWITCH, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JKL	RC50A	RECPT, C/B PNL #2	AMP	206151-2	
——		CLAMP	AMP	206138-1	
JKL	RC51A	RECPT, IGNITION SWITCH	MOONEY	930021-506	
JKL	RC52A	RECPT, ALT/STARTER	CANNON	MS310DK28-2P	
		(ALT)		MS310DKE28-2P	
JKL	RC55A	RECPT, EMPENNAGE, 9 PIN	AMP	206705-2	
——		CLAMP		206966-1	
JKL	RC56A	RECPT, GRND RECPT. #4, 9 PIN	AMP	206705-2	
——		CLAMP		206966-1	
JKL	RC57A	RECPT, GRND RECPT #5, 14 PIN	MOONEY	930021-002	
JKL	RC58A	RECPT, DIM RECPT. #2, 16 PIN	AMP	206036-3	
——		CLAMP	AMP	206070-1	
—L	RC58B	RECPT, PNL LT DIM #2, 14 PIN	AMP	206044-1	
- - -		CLAMP	AMP	206070-1	
JKL	RC59A	RECPT, GRND RECPT #6, 28 PIN	MOONEY	930021-506	
JK-	RC76A	RECPT, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
JK-	RC77A	RECPT, 28 PIN	AMP	206152-1	
——		CLAMP	AMP	206070-1	
—L	RC150A	RECPT, ENGINE HARNESS, LT	CANNON-GERMANY	CA121006-518	
——		CLAMP	CANNON-GERMANY	057-8557-000	
——		FERRULE END RING	CANNON-GERMANY	304-8553-000	
		RECPT, ENGINE, LT F/WALL (ALT)	CANNON-GERMANY	CA121006-600	
—L	RC150A	RECPT, ENGINE HARNESS,LT (ALT)	PORSCHE	933.612.415.00	
——		CLAMP *	PORSCHE	933.612.417.00	
- - -		ENDBELL *	PORSCHE	933.612.425.00	

*** NOTE: ALTERNATE HIGH TEMPERATURE COMPONENTS FOR ITEMS:**

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	RC151A	RECPT, ENGINE HARNESS, RT	CANNON-GERMANY	CA121006-516	
———		CLAMP *	CANNON-GERMANY	057-8557-000	
———		FERRULE END RING *	CANNON-GERMANY	304-8553-000	
—L	RC151A	RECPT, ENGINE HARNESS, RT	PORSCHE	933.612.415.00	
———		CLAMP *	PORSCHE	933.612.417.00	
———•		ENDBELL *	PORSCHE	933.612.425.00	
		* NOTE: ALTERNATE HIGH TEMPERATURE COMPONENTS FOR ITEMS:			
—L	RC152A	RECPT, GR/STALL WARN			
		HARNESS, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
JKL	SB101A	C/B, SPEED BRAKE	KLIXON	7277-2-2	
—L	SPK101A	SPEAKER, CABIN	ARCHER	12-1703	
JK-	WA101A	LIGHT, OVERVOLTAGE	WESTERN IND	501-61K-1tK-3RP	
———		CLAMP	WESTERN IND.	WI-7049	
JK-	WA102A	DIODE		1N2483	
JK-	WA103A	DIODE		1N2483	
—L	WD150A	FUSEHOLDER, STARTER			
		SOLENOID	LITTEL	155020 or 155120	
—	-WD150A	FUSE, 1AMP	LITTEL	313001	
JKL	WE101A	C/B, GEAR WARN HORN	KLIXON	7277-2-2	
JKL	WE102A	LIGHT, GEAR DOWN	SLOAN	855S-O-U	
———		BULB	GE	327	
JK-	WE103A	SWITCH, THROTTLE	MICRO	V3-1	
———		ACTUATOR	MICRO	JV-1	
JK-	WE104A	HORN, GEAR WARNING	MALLORY	SC628P	
JKL	WE105A	DIODE		1N2483	
JKL	WE106A	DIODE		1M2483	
-K-	WE107A	SWITCH, THROTTLE	MICRO	1SE1-T	
---•		ACTUATOR	MICRO	JE-17	
—L	WE150A	SWITCH, THROTTLE	MICRO-SWITCH	1SE1-T	
—--		ACTUATOR	MICRO-SWITCH	JE-5	
—L	WE151A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
—L	WE152A	RECPT, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
JKL	WS101A	C/B STALL WARN HORN	KLIXON	7277-2-2	
JK-	WS102A	HORN, STALL WARNING	MALLORY	SC628	
JKL	WS103A	SWITCH, STALL WARN	SAFE FLIGHT	C46001	
—L	WS150A	ALERT, GR/STALL WARNING	IAI	950D-0309-000	
—L	WS151A	PLUG,GR/STL WRN ALRT, 25 PIN	ITT	DB25S	
- - ----		CLAMP	ITT	DB51212	
———•		LOCK RETAINER	ITT	DB1212-1	
L	WS152A	SPEAKER, GR/STALL WARN	ARCHER	40-1338C	
—L	WS153A	PLUG, INTER PHONE, 4 PIN	AMP	206060-1	
-----		CLAMP	AMP	206062-1	
—L	WS154A	PLUG, MATE N LOCK, 2 PIN	AMP	1-480318-0	
---—		SOCKETS	AMP	60619-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
—L	WS155A	RECPT, MATE N LOCK, 2 PIN	AMP	1-480319-0	
——		PINS	AMP	60620-1	
JK-	WT101A	C/B, ANNUNCIATOR	KLIXON	7277-2-2	
J—	WT102A	ANNUNCIATOR	MOONEY	880025-521	
——		LAMPS	CHICAGO MINIATURE	CM7827	
-K-	WT103A	ANNUNCIATOR	MOONEY	880025-523	
——		LAMPS	CHICAGO MINIATURE	CM7827	
JK-	WT104A	PLUG, ANNUNCIATOR	MOLEX	09-50-3151	
——		SOCKETS	MOLEX	08-50-0106	
—L	WT150A	C/B, ANNUNCIATOR, LT	KLIXON	7277-2-1	
—L	WT151A	C/B, ANNUNCIATOR, RT	KLIXON	7277-2-1	
—L	WT153A	ANNUNCIATOR	IAI	950D0306-000	
——		LAMPS	CHICAGO MINATURE	CM7827	
—L	WT154A	PLUG, ANNUNCIATOR	ITT	DB25S	
——		CLAMP	ITT	DB51212-1	
——		LOCK RETAINER	ITT	DB51221-1	
JK-	WV101A	C/B, VACUUM WARNING	KLIXON	7277-2-2	
JK-	WV102A	SWITCH, VACUUM WARNING	MOONEY	880012-501	
JK-	WV103A	RECPT, VAC WARN, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	WV104A	PLUG, VAC WARN, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
J—	WW101A	SWITCH, RAM AIR	MICRO	V3-1	
——		ACTUATOR	MICRO	JV-5	
-K-	WW102A	SWITCH, ALTERNATE AIR	CHERRY	E51-508	
—L	WW150A	SWITCH, ALTERNATE AIR	CHERRY	E51-508	

NOTES

1. Use 1 ea. MS35334-21 or MS2998 (Allen Bradley) internal tooth lockwasher with each light if not supplied by Sloan.
2. Maximum circuit breaker rating is shown, amperage of installed circuit breaker is determined by particular unit installed.
3. Buss bar may be shortened as required by circuit breaker installation
4. Alternate for V3-1 switch w/ JV-5 actuator is V3L-3 assembly.
5. Varies with AutoPilot System installed.

RESERVED

91-20-03 - ELECTRICAL SYSTEM HARDWARE CHART - 28 VOLT SYSTEMS

S/N's 24-3154 THRU 24-3200, 24-3202 THRU 24-3217, MOONEY DRAWING NO. 800263 (E7), 24-1686-14 thru 24-2999-14 common components, 28V & 14V - (See 91-20-04 for 14 Volt peculiar components)

** - ACTUAL USAGE DETERMINED BY MASTER SCHEMATICS - **

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	CB101A	C/B, DEFROSTER BLOWER	KLIXON	7277-2-5	
JK-	CB102A	SWITCH, BLOWER MOTOR	CHERRY	E51-50B	
JK-	CB103A	MOTOR, BLOWER	MOONEY	640317-501	
JK-	CB103B	MOTOR, BLOWER	MOONEY	640317-503	
JK-	CB104A	PLUG, 2 PIN	AMP	1-480316-0	
———		SOCKET	AMP	60619-1	
JK-	CB105A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
———		PIN	AMP	60620-1	
JK-	CC101A	C/B, COWL FLAP	KLIXON	7277-2-5	
JK-	CC102A	SWITCH, COWL FLAP	MICRO	12TW1-1	
JK-	CC103A	ACTUATOR, COWL FLAP	MOONEY	880050-501	
JK-	CC103B	ACTUATOR, COWL FLAY	MOONEY	880050-505	
JK-	CC104A	SWITCH, OPEN LIMIT	MICRO	1SE1-T	
———		ACTUATOR	MICRO	JE-5	
JK-	CC105A	SWITCH, CLOSED LIMIT	MICRO	1SE1-T	
———		ACTUATOR	MICRO	JE-5	
JK-	CC106A	PLUG, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JK-	CC107A	RECEPTACLE, 9 PIN	AMP	206705-2	
———		CLAMP	AMP	206966-1	
JK-	CC108A	VARISTOR	GE	V47ZA05	
JK-	CF101A	C/B, FLAP ACTUATOR	KLIXON	7277-2-5	
JK-	CF103A	SWITCH, UP LIMIT	MICRO	V3-1	
———		ACTUATOR	MICRO	JV-5	
JK-	CF104A	SWITCH, DOWN LIMIT	MICRO	V3-1	
———		ACTUATOR	MICRO	JV-5	
JK-	CF105A	ACTUATOR, FLAP	MOONEY	750105-501	
JK-	CF108A	SWITCH, FLAP	CUTLER-HAMMER	8906K3149	
JK-	CV101A	C/B, STAND-BY VACUUM	MOONEY	930023-293	
JK-	CV102A	CURRENT MONITOR, STD-BY VAC	MOONEY	800221-505	
JK-	CV103A	PLUG, 9 PIN	AMP	206708-1	
———		CLAMP	AMP	206966-1	
JK-	CV104A	PLUG, 2 PIN	AMP	1-480316-0	
———		SOCKET	AMP	60619-1	
JK-	CV105A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
———		PIN	AMP	60620-1	
JK-	CV106A	PUMP, VACUUM	AEROSAFE	620904-2	
JK-	DA101A	SHUNT, LOAD	EMPRO	MLA-70A-100MV	
JK-	DA102A	FUSEHOLDER	McGRAW EDISON	FHN42W	
JK-	DA103A	FUSEHOLDER	McGRAW EDISON	FM01-5A	
JK-	DB101A	C/B, TURN COORDINATOR	KLIXON	7277-2-2	
JK-	DB102A	TURN COORDINATOR	U.I.	9013 CODE N.5	
		TURN COORDINATOR (ALT)	ASTRONAUTICS	303390-023MSC	
		TURN COORDINATOR (ALT)	ELECTRO GYRO	1394T100-3Z	
		TURN COORDINATOR (ALT)	U.I.	9114 CODE N.21	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	DB103A	PLUG		MS3106A-10SL-3S	
- - -		CABLE CLAMP		MS3507-4A	
		(ALT)		MS3507-4B	
JK-	DC101A	PROBE, CHT, (CYL. #3)		MS24462-1	1
		(ALT)		AN5546-1	1
JK-	DD101A	C/B, EGT/OAT	KLIXON	7277-2-2	
J—	DD102A	GAUGE, EGT/OAT	MOONEY	880001-507	
J—	DD102B	GAUGE (4 PROBE)	MOONEY	880001-509	
J—	DD103A	PLUG, 8 PIN	AMP	205836-1	
——		CLAMP	AMP	206062-1	
JK-	DD104A	PROBE, OAT	MOONEY	880004-501	
JK-	DD105A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	DD106A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
-----		PIN	AMP	60620-1	
JK-	DF101A	TRANSMITTER, LT IN/BD, FUEL	MOONEY	610242-003	
JK-	DF102A	TRANSMITTER, LT OUT/BD, FUEL	MOONEY	610243-003	
JK-	DF103A	TRANSMITTER, RT IN/BD, FUEL	MOONEY	610242-003	
JK-	DF104A	TRANSMITTER, RT OUT/BD, FUEL	MOONEY	610243-001	
JK-	DG101A	C/B, INSTR. MODULE #1	KLIXON	7277-2-1	
J—	DG103A	MODULE, INSTR.	MOONEY	880059-507	
JK-	DG104A	PLUG, 25 PIN	AMP	205839-3	
——		CLAMP	AMP	206070-1	
-K-	DG105A	MODULE, INSTRUMENT	MOONEY	880059-509	
J—	DH101A	PROBE, OIL TEMP	MOONEY	880061-501	
		(ALT)	LEWIS ENGRG	5683A9	
-K-	DH101A	PROBE, OIL TEMP		MS28034-1	
-K-	DH102A	PLUG, 2 PIN		MS3106A-12S-3S	
——		CLAMP		MS3057-4A	
JK-	DJ101A	TRANSDUCER, OIL PRESS	DRUCK	PDCR821-0662-100	
		(ALT)	KULITE	APT-154-1000-100PSIG	
JK-	DJ102A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	DJ103A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	DK101A	TRANSDUCER, FUEL PRESS	DRUCK	PDCR821-0662-30	
		(ALT)	KULITE	APT-153-1000-30PSIG	
JK-	DK102A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	DK103A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
J- -	DL101A	TACHOMETER	MOONEY	880039-515	
		(ALT)	B & D	0520-003	
-K-	DL101A	TACHOMETER	MOONEY	880039-517	
		(ALT)	B & D	0520-006	
JK-	DL102A	PLUG, 5 PIN		MS3106A-14S-5S	
——		CLAMP		MS3057-6A/B	
J—	DL103A	SENSOR, TACH	B & D	0400-004	
-K-	DL103A	SENSOR, TACH	B & D	0402-102	
		(ALT)	B & D	0402-104	
JK-	DL104A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	DL105A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
J—	DM101A	HOUR METER	MOONEY	880035-507	
-K-	DM101A	HOUR METER	MOONEY	880035-505	
JK-	DM102A	RECEPTACLE, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
JK-	DM103A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
J—	DM104A	FUSEHOLDER	LITTEL FUSE	155020	
		(ALT)	LITTEL	155120	
———		FUSE (5A-3AG-SLO-BLO)	LITTEL	313005	
JK-	DP101A	C/B, PITOT HEAT	MOONEY	930023-205	
JK-	DP102A	PITOT, HEATED	AERO INSTR	PH502-24	
		(ALT)		AN5812-1	
JK-	DP103A	PLUG		AN3115-1	
- ———		SOCKET		AN3116-1	
JK-	DP104A	PLUG, 2 PIN	AMP	1-480318-0	
--		SOCKET	AMP	60619-1	
JK-	DP105A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
-- - -		PIN	AMP	60620-1	
-K-	DR101A	C/B, TIT	KLIXON	7277-2-2	
-K-	DR102A	TIT INDICATOR	MOONEY	880051-501	
-K-	DR102B	TIT/EGT INDICATOR (6 PROBE)	MOONEY	880051-503	
-K-	DR103A	PLUG, 8 PIN	AMP	205838-1	
———		CLAMP	AMP	206062-1	
-K-	DR103B	PLUG, 28 PIN	AMP	205839-503	
—		CLAMP	AMP	206070-1	
-K-	DR104A	PROBE, TIT	MOONEY	880055-501	
JK-	DT101A	PROBE, EGT, (CYL #1)	MOONEY	880005-508	
		(ALT)	MOONEY	880005-501	
J—	DT101A	(ALT)	MOONEY	660110-000	
JK-	DT102A	PROBE, EGT (CYL #2)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
J—	DT102A	(ALT)	MOONEY	660110-000	
JK-	DT103A	PROBE, EGT (CYL #3)	MOONEY	880005-508	
		(ALT)	MOONEY	880005-501	
J—	DT103A	(ALT)	MOONEY	660110-000	
JK-	DT104A	PROBE, EGT (CYL #4)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
J-	DT104A	(ALT)	MOONEY	660110-000	
J—	DT105A	EGT INDICATOR	MOONEY	660109-003	
		LEAD WIRE)	ALCOR	01-005-76	
-K-	DT101A	PROBE, EGT (CYL #1)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
-K-	DT102A	PROBE, EGT (CYL #2)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
-K-	DT103A	PROBE, EGT (CYL #3)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
-K-	DT104A	PROBE, EGT (CYL #4)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
-K-	DT105A	PROBE, EGT (CYL #5)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
-K-	DT106A	PROBE, EGT (CYL #6)	MOONEY	880005-503	
		(ALT)	MOONEY	880005-501	
JK-	DV101A	C/B, FUEL FLOW	KLIXON	7277-2-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	DV102A	INDICATOR, FUEL FLOW	MOONEY	880034-501	
JK-	DV102A	(ALT)	MOONEY	880034-503	
		(ALT)	MOONEY	880034-505	
		(ALT) INDICATOR, F/F (GAL)	SHADIN	912021	
		(ALT) (LBS)	SHADIN	912023	
JK-	DV102B	INDICATOR, F/F (OPT) (GAL)	SHADIN	912041	4
		(ALT) (LBS)	SHADIN	912043	4
		(ALT) (LITER)	SHADIN	912047	4
		(ALT) (GAL)	SHADIN	912081	5
		(ALT) (LBS)	SHADIN	912083	5
		(ALT) (LITER)	SHADIN	912087	5
JK-	DV103A	PLUG, 9 PIN	ITT CANNON	DE-9S	2
——		CLAMP	ITT CANNON	DE-24657	2
——		LATCH ASSY (2 ea)	ITT CANNON	DE-51224-1	2
JK-	DV103B	PLUG, 9 PIN	ITT CANNON	DE-9S	3
——		CLAMP	ITT CANNON	DE-24657	3
——		LATCH ASSY (2 ea)	ITT CANNON	D-110278	3
JK-	DV104A	TRANSDUCER, FUEL FLOW	MOONEY	880030-501	
		(ALT)	MOONEY	880030-503	
JK-	DV104B	TRANSDUCER, FUEL FLOW	FLOSCAN	6805018	
JK-	DV105A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	DV106A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	DV107A	SWITCH, FUEL FLOW	C & K	7101K	
JK-	DV108A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	DV109A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
JK-	DW101A	VERTICAL SPEED INDICATOR	U.I.	7000 CODE C-83	
JK-	EG101A	C/B, GEAR RELAYS	KLIXON	7277-2-2	
JK-	EG102A	SWITCH, GEAR UP/DOWN	CUTLER/HAMMER	8505K2875	
JK-	EG103A	SWITCH, GEAR OVERRIDE	CUTLER/HAMMER	SB1DDX492-2	
——		RING, LOCKING	CUTLER-HAMMER	29-761	
——		WASHER, LOCK	CUTLER-HAMMER	16-886	
——		NUT, HEX (2 ea)	CUTLER-HAMMER	15-966-6	
——		LAMP (28V)	GE	334	
——		LAMP (14V)	GE	336	
		SWITCH (ALT)	NKK CORP	DBL2141-3BL	
——		BUTTON	NKK CORP	AT406	
——		LOCKING RING	NKK CORP	AT406	
——		LOCK WASHER	NKK CORP	AT508	
——		NUT, HEX (2 EA)	NKK CORP	AT503	
——		LAMP (28V)	NKK CORP	AT604-28	
JK-	EG104A	SWITCH, AIRSPEED, GEAR SAFETY	MOONEY	880013-507	
JK-	EG105A	C/B, GEAR ACTUATOR	KLIXON	7277-2-7.5	
JK-	EG106A	SWITCH, GEAR UP LIMIT	MICRO	DT-2R-A7	
——		ACTUATOR	MICRO	MCD-2711	
JK-	EG107A	SWITCH, GEAR DOWN LIMIT	MICRO	1CH116-6	
JK-	EG107B	SWITCH, GEAR DOWN LIMIT (ALT)	SAINT	ML1116	
JK-	EG108A	PLUG, 4 PIN	AMP	206060-1	
		CLAMP	AMP	206062-1	
JK-	EG109A	RECEPTACLE, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	

26 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	EG110A	RELAY, GEAR UP	CUTLER-HAMMER	6041H220	
JK-	EG111A	DIODE		1N2483	
JK-	EG112A	RELAY, GEAR DOWN	CUTLER-HAMMER	6041H220	
JK-	EG113A	DIODE		1N2483	
JK-	EG114A	ACTUATOR, GEAR	MOONEY	560254-503	
		(ALT)	MOONEY	560037-507	
JK-	ELT101A	TRANSMITTER, ELT	ARTEX	ELT110-4	
JK-	ELT101B	TRANSMITTER, ELT	DORNE & MARGOLIN	DM-ELT-8	
JK-	ELT102A	RECEPTACLE, 12 PIN	MOLEX	03-06-2122	
		PIN	MOLEX	02-062103	
JK-	ELT103A	SWITCH, REMOTE	ARTEX	110-416	
JK-	ELT103B	SWITCH, REMOTE	C & K	7101K	
JK-	ELT104A	PLUG, 8 PIN	MOLEX	03-06-2082	
		SOCKET	MOLEX	02-06-1103	
JK-	ELT105A	PLUG, 8 PIN	AMP	205936-1	
		CLAMP	AMP	206062-1	
JK-	ELT106A	RECEPTACLE, 8 PIN	AMP	205941-2	
		CLAMP	AMP	206062-1	
JK-	ELT107A	PLUG, 8 PIN	AMP	205936-1	
		CLAMP	AMP	206062-1	
JK-	ELT108A	RECEPTACLE, 8 PIN	AMP	205941-2	
		CLAMP	AMP	206062-1	
JK-	FON101A	PHONE JACK	SWITCHCRAFT	C-11	
		WASHERS	SWITCHCRAFT	S-1028	
		WASHERS (ALT)	SWITCHCRAFT	S-1029	
JK-	JM101A	SWITCH, MAGNETO	BENDIX/SCINTILLA	10-357210-9	
		PLACARD	BENDIX/SCINTILLA	10-157-466	
J—	JM102A	MAGNETO	BENDIX/SCINTILLA	D-4LN2021	
-K-	JM102A	MAGNETO, LEFT	SLICK	6224	
-K-	JM102B	MAGNETO, LEFT	BENDIX/SCINTILLA	646979-1	
		CONNECTOR	BENDIX/SCINTILLA	10-382698	
-K-	JM103A	MAGNETO, RIGHT	SLICK	6224	
-K-	JM103B	MAGNETO, RIGHT	BENDIX/SCINTILLA	646979-1	
		CONNECTOR	BENDIX/SCINTILLA	10-382698	
JK-	LB101A	C/B, BEACON, FLASHING	MOONEY	930023-243	
JK-	LB102A	LIGHT, BEACON	WHELEN	WRLM-24	
		ADAPTER	WHELEN	WRM-65	
JK-	LB102A	LIGHT,ANTI-COLLISION(WHITE)	(ALT) WHELEN	90033-20	
JK-	LB102B	LIGHT,ANTI-COLLISION(RED)	(ALT) WHELEN	90033-19	
JK-	LB103A	PLUG, 3 PIN	AMP	1-360303-0	
		SOCKET	AMP	60619-1	
JK-	LB104A	RECEPTACLE, 3 PIN	AMP	1-480305-0	
		PIN	AMP	60620-1	
JK-	LC101A	FUSEHOLDER	LITTEL	155020	
		(ALT)	LITTEL	155120	
		FUSE, 5A-3AG-SLO-BLO	LITTEL	313005	
JK-	LC102A	SWITCH, CABIN LIGHT, FRONT	CARLING	TILC64-1S-WH-FN	
JK-	LC103A	RESISTOR, DIM. (20 OHM 10W)	DALE	RH-10-20 OHM	
JK-	LC104A	LAMP HOLDER	H H SMITH	1930	
		LAMP	GE	1816	
JK-	LC105A	LAMP HOLDER	H H SMITH	1930	
		LAMP	GE	1816	
JK-	LC106A	LAMP HOLDER	H H SMITH	1930	
		LAMP	GE	1816	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	LC107A	LAMP HOLDER	H H SMITH	1930	
— --		LAMP	GE	1818	
JK-	LC108A	SWITCH, CABIN LIGHT, REAR	CARLING	TILC64-1S-WH-FN	
JK-	LC109A	RESISTOR, DIM. (20 OHM 10W)	DALE	RH-10-20 OHM	
JK-	LC110A	LAMP HOLDER	H H SMITH	1930	
——		LAMP	GE	1818	
JK-	LC111A	LAMP HOLDER	H H SMITH	1930	
——		LAMP	GE	1818	
JK-	LC112A	LAMP HOLDER	H H SMITH	1930	
——		LAMP	GE	1818	
JK-	LC113A	LAMP HOLDER	H H SMITH	1930	
——		LAMP	GE	1818	
JK-	LC117A	PLUG, 9 PIN	ITT CANNON	DE-9S	
——		CLAMP		DE24657	
- --		LATCH		DE51224-1	
JK-	LC118A	MODULE, AUTO OFF LIGHT	MOONEY	800268-501	
JK-	LC118B	RECEPTACLE, 9 PIN		DE-9P	
——		CLAMP		DE24657	
-- -		RING, LOCKING		206514-1	
JK-	LC119A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	LC120A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	LC121A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	LC122A	RECEPTACLE, 4 PIN	AMP	206153-1	
- --		CLAMP	AMP	206062-1	
JK-	LC123A	SWITCH, CABIN DOOR	NEWARK	89F5544	
JK-	LC124A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LC125A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LC126A	SWITCH, BAGGAGE DOOR	NEWARK	89F5544	
JK-	LC127	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LC128A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LL101A	C/B, LANDING LIGHT	KLIXON	7277-2-25	
JK-	LL101A	C/B, LANDING LIGHT	MOONEY	930023-215	
JK-	LL102A	SWITCH, LANDING LIGHT	MOONEY	980052-521	
JK-	LL103A	LIGHT, LANDING, RIGHT	GE	4596	
JK-	LL104A	LIGHT, LANDING, LEFT	GE	4596	
JK-	LL105A	LIGHT, LANDING (COWL)	GE	4553	
JK-	LN101A	C/B, NAV LIGHT	MOONEY	930023-201	
JK-	LN102A	LIGHT ASSY, NAV, TAIL (LT WING)	MOONEY	800051-501	
——		BULB	WHELEN	34-022-8030-85	
JK-	LN103A	LIGHT ASSY, NAV, TAIL (RT WING)	MOONEY	800051-501	
——		BULB	WHELEN	34-022-8030-85	
JK-	LN104A	PLUG, 9 PIN (RT WING)	AMP	206708-1	
——		CLAMP	AMP	206062-1	
JK-	LN105A	RECEPTACLE, 9 PIN (RT WING)	AMP	206705-1	
——		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	LN106A	PLUG, 9 PIN (LT WING)	AMP	206708-1	
——		CLAMP	AMP	206052-1	
JK-	LN107A	RECEPTACLE, 9 PIN (LT WING)	AMP	206705-1	
——		CLAMP	AMP	206052-1	
JK-	LP101A	C/B, GLARESHIELD LIGHTS	KLIXON	7277-2-5	
JK-	LP102A	C/B, PANEL LIGHTS	KLIXON	7277-2-5	
JK-	LP103A	DIMMER CONTROL BOX	MOONEY	800049-501	
JK-	LP104A	PLUG, 9 PIN	AMP	206708-1	
——		CLAMP	AMP	206956-1	
JK-	LP105A	LIGHT, CONSOLE	DIALIGHT	270-1930-0171-702	
——		LAMP (28V)	GE	327	
——		LAMP (ALT)	GE	385	
JK-	LP106A	LIGHT, CONSOLE	DIALIGHT	270-1930-0171-702	
——		LAMP (28V)	GE	327	
——		LAMP (ALT)	GE	385	
JK-	LP107A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206052-1	
JK-	LP108A	RECEPTACLE, 4 PIN	AMP	206163-1	
——		CLAMP	AMP	206052-1	
JK-	LP109A	RECEPTACLE, COMPASS LIGHT	DEANS	DEA90020MALEHALF	
JK-	LP110A	PLUG, COMPASS LIGHT	DEANS	DEA90020FEMALEHALF	
JK-	LP111A	LAMP, COMPASS LIGHT (28V)	GE	327	
		(ALT)	GE	327 (AVIATION RED)	
JK-	LP112A	LAMPS, GL/SHLD LIGHTS (14 ea)	GE	327	
JK-	LP113A	LIGHT, OXYGEN	SLOAN	655S-0-U	6
——		LAMP (28V)	GE	327	
JK-	LP114A	LIGHT, OXYGEN	SLOAN	655S-0-U	6
——		LAMP (28V)	GE	327	
JK-	LP115A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LP116A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LP117A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LP118A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LP119A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LP120A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LP121A	POST LIGHT	WHELEN	A350CN1W-BK-SH14	
——		LAMP (14V)	GE	330	
JK-	LP122A	POST LIGHT	WHELEN	A350CN1W-BK-SH14	
——		LAMP (14V)	GE	330	
JK-	LP123A	LIGHTING TRAY (RPM)	B & D	0221-128	
JK-	LP124A	LIGHTING TRAY (M/P)	UI	BA28-24-BW3	
JK-	LP125A	LIGHTING TRAP (TIT/EGT)	B & D	0221-128	
JK-	LP126A	PLUG, 20 PIN	MOONEY	930022-501	
JK-	LP127A	RECEPTACLE, 20 PIN	MOONEY	930021-502	
JK-	LP130A	RHEOSTAT, MAP LIGHT (500 OHM)	NEWARK	09F981	
——		KNOB	NEWARK	57F2368	
JK-	LP133A	RHEOSTAT, MAP LIGHT (500 OHM)	NEWARK	09F981	
——		KNOB	NEWARK	57F2368	
JK-	LP134A	MAP LIGHT	SLOAN	655S-0-U	6
JK-	LP134A	LAMP (28V)	GE	327	
——		LAMP (14V)	GE	330	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	LP135A	MAP LIGHT	SLOAN	655S-0-U	6
——		LAMP (28V)	GE	327	
		LAMP (14V)	GE	330	
JK-	LP136A	POST LIGHT	WHELEN	A350CN1W-BK-SH28	
——		LAMP (28V)	GE	327	
JK-	LP137A	POST LIGHT	WHELEN	A350CN1W-BK-SH14	
——		LAMP (14V)	GE	330	
JK-	LR101A	C/B, RECOGNITION LIGHTS	MOONEY	930023-231	
JK-	LR102A	LIGHT, RECOGNITION, LW	MOONEY	880049-501	
JK-	LR103A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LR104A	RESISTOR	DALE	RH50-7.5 OHM	
JK-	LR105A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LR106A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LR107A	LIGHT, RECOGNITION, RW	MOONEY	880049-501	
JK-	LR108A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LR109A	RESISTOR	DALE	RH50-7.5 OHM	
JK-	LR110A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
——		PIN	AMP	60620-1	
JK-	LR111A	PLUG, 2 PIN	AMP	1-480318-0	
——		SOCKET	AMP	60619-1	
JK-	LS101A	C/B, STROBE LIGHT	MOONEY	930023-237	
JK-	LS102A	POWER SUPPLY, LT WING	WHELEN	01-0770329-00	
JK-	LS103A	RECEPTACLE, POWER SUPPLY	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS104A	RECEPTACLE, POWER SUPPLY	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS105A	PLUG, STROBE LIGHT ASSY	AMP	1-480303-0	
——		SOCKET	AMP	60619-1	
JK-	LS106A	STROBE/NAV LIGHT, LT WING	WHELEN	A650-PR-D-M-28	
JK-	LS107A	POWER SUPPLY, LT WING	WHELEN	01-0770329-00	
JK-	LS108A	RECEPTACLE, POWER SUPPLY	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS109A	RECEPTACLE, POWER SUPPLY	AMP	480305-0	
——		PIN	AMP	60620-1	
JK-	LS110A	PLUG, STROBE LIGHT ASSY	AMP	1-480303-0	
——		SOCKET	AMP	60619-1	
JK-	LS111A	STROBE/NAV LIGHT, RT WING	WHELEN	A650-PR-D-M-28	
JK-	LS112A	POWER SUPPLY, TAIL	WHELEN	01-0770329-00	
JK-	LS113A	RECEPTACLE, POWER SUPPLY	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS114A	RECEPTACLE, POWER SUPPLY	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS115A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	LS116A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	LS117A	PLUG, STROBE LIGHT ASSY	AMP	1-480303-0	
——		SOCKET	AMP	60619-1	
JK-	LS118A	LIGHT ASSY, TAIL STROBE	MOONEY	470013-501	
JK-	LS119A	RECEPTACLE, 3 PIN	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS120A	RECEPTACLE, 3 PIN	AMP	1-480305-0	
——		PIN	AMP	60620-1	
JK-	LS121A	RECEPTACLE, 3 PIN	AMP	1-480305-0	
—		PIN	AMP	60620-1	
JK-	LT101A	C/B, TAXI LIGHT	KLIXON	7277-2-25	
JK-	LT102A	SWITCH, TAXI LIGHT	MOONEY	880052-523	
JK-	LT103A	BULB, TAXI, R/W (28V)	GE	4596	
JK-	LT104A	BULB, TAXI, L/W (28V)	GE	4596	
JK-	MA101A	RECEPTACLE, AUX POWER		AN2552-3A	
JK-	MA102A	RELAY, AUX POWER	CUTLER-HAMMER	6041H202	
		(ALT)	CUTLER-HAMMER	6041H202A	
JK-	MA103A	DIODE	SARKES-TARZIAN	10H3P	
JK-	MA104A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	MB101A	C/B, AVIONICS MASTER	MOONEY	930023-213	
JK-	MB102A	RELAY, AVIONICS MASTER	KISSLING	26.64.01	
JK-	MB103A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	MB104A	AVIONICS BUS BAR #1	MOONEY	913127-67	
JK-	MB105A	AVIONICS BUS BAR #2	MOONEY	913127-67	
JK-	MB106A	AVIONICS BUS BAR #3	MOONEY	913127-87	
JK-	MB107A	C/B, INTERCOM	KLIXON	7277-2-7.5	7
JK-	MB108A	C/B, COM 1	KLIXON	7277-2-10	7
JK-	MB109A	C/B, NAV 1	KLIXON	7277-2-7.5	7
JK-	MB110A	C/B, AUDIO	KLIXON	7277-2-7.5	7
JK-	MB111A	C/B, PHONE	KLIXON	7277-2-7.5	7
JK-	MB112A	C/B, ADF	KLIXON	7277-2-7.5	7
JK-	MB113A	C/B, COM 2	KLIXON	7277-2-10	7
JK-	MB114A	C/B, NAV 2	KLIXON	7277-2-7.5	7
JK-	MB115A	C/B, TRANSPONDER	KLIXON	7277-2-7.5	7
JK-	MB116A	C/B, ENCODER	KLIXON	7277-2-7.5	7
JK-	MB117A	C/B, STERO	KLIXON	7277-2-7.5	7
JK-	MB118A	C/B, DME	KLIXON	7277-2-7.5	7
JK-	MB119A	C/B, R/NAV	KLIXON	7277-2-7.5	7
JK-	MB120A	C/B, STORMSCOPE	KLIXON	7277-2-7.5	7
JK-	MB121A	C/B, LORAN	KLIXON	7277-2-7.5	7
JK-	MB122A	C/B, RMI	KLIXON	7277-2-7.5	7
JK-	MB123A	C/B, AUTOPILOT/TRIM	KLIXON	7277-2-10-	7
JK-	MB124A	C/B, A/P ALERT	KLIXON	7277-2-7.5	7
JK-	MB125A	C/B, INVERTER	KLIXON	7277-2-7.5	7
JK-	MB126A	C/B, ART. HORIZ.	KLIXON	7277-2-2	7
JK-	MB127A	C/B, HSI	KLIXON	7277-2-2	7
JK-	MB128A	C/B, YAW DAMP.	KLIXON	7277-2-7.5	7
JK-	MB129A	C/B, TELEPHONE	KLIXON	7277-2-7.5	7
JK-	MB130A	C/B, VME	KLIXON	7277-2-7.5	7
JK-	MB131A	C/B, RADIO ALT.	KLIXON	7277-2-7.5	7
JK-	MC102A	CIGAR LIGHTER	MOONEY	800336-503	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	MC102A	(ALT)	CASCO	208292	
JK-	ME101A	CLOCK	MID-CONTINENT	MD-88L	
		(OPT)	MID-CONT.	MD-88L (ET)	
——		LIGHT TRAY	MID-CONT.	BA28-24-BW2	
JK-	MIC101A	JACK, MICROPHONE	SWITCHCRAFT	C-12B	
——		WASHERS	SWITCHCRAFT	S-102B	
		WASHERS (ALT)	SWITCHCRAFT	S-1029	
JK-	MIC102A	SWITCH, MIC KEY, PILOT	CUTLER-HAMMER	SA1RV20	
JK-	MIC103A	SWITCH, MIC KEY, CO-PILOT	CUTLER-HAMMER	SA1RV20	
JK-	MP101A	C/B, PROP DE-ICE	MOONEY	930023-223	
JK-	MP102A	TIMER, PROP DE-ICE	B.F. GOODRICH	3E1899-1	
JK-	MP103A	MONITOR,CURRENT,PROP DE-ICE	MOONEY	800221-505	
JK-	MP104A	PLUG, 9 PIN	AMP	206708-1	
——		CLAMP	AMP	206966-1	
JK-	MP105A	TERMINAL BLOCK	McCAULEY	C-40521	
J—	NF101A	C/B, BOOST PUMP	MOONEY	930023-211	
J—	NF102A	PUMP, FUEL BOOST	WELDON	8163B	
		(ALT)	WELDON	AB163B	
-K-	NF102A	PUMP, BOOST	WELDON	10054B	
JK-	NF103A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	NF104A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
-K-	NF105A	C/B, HI BOOST PUMP	MOONEY	930023-219	
-K-	NF107A	C/B, LO BOOST PUMP	MOONEY	930023-217	
-K-	NF108A	REGULATOR, FUEL PUMP	ELECTRO-DELTA	VR-536	
-K-	NF108B	REGULATOR, FUEL PUMP	AMER. PROD	DGB-1	
-K-	NF109A	RECEPTACLE, 4 PIN	AMP	206153-1	
——		CLAMP	AMP	206062-1	
-K-	NF110A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
-K-	NP101A	FUSEHOLDER, PRIMER, DIFFUSER	LITTEL	155020	
		(ALT)	LITTEL	155120	
——		FUSE (10A SLO BLO)	LITTEL	313010	
-K-	NP102A	SWITCH, PRIMER	CARLING	TIGK6B-IF-WH-A	
-K-	NP103A	PRIMER, DIFFUSER	TCM	633862-2	
-K-	NP104A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	PA101A	C/B, ALTERNATOR, RT	ETA	41-3-S34-LN2-041800	
JK-	PA102A	C/B, FIELD, RT. ALT	KLIXON	7277-2-5	
JK-	PA103A	SWITCH, ALT. FLD.(OPT)	MOONEY	980052-525	
-K-	PA103B	SWITCH, ALT. FLD. (STD)	MOONEY	980052-509	
JK-	PA104A	VOLTAGE REGULATOR	MOONEY	980270-501	
		(ALT)	AUXILEC	VR-802	
		(ALT)	AM PROD	DGR-2	
JK-	PA105A	RECEPTACLE, 9 PIN	AMP	206708-1	
——		CLAMP	AMP	206966-1	
JK-	PA106A	PLUG, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
J—	PA107A	ALTERNATOR (STD)	LYCOMING	LW-14367	
		(ALT)	PRESTOLITE	ALU-6421-LS	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
-K-	PA107A	ALTERNATOR (STD)	TCM	649280	
		(ALT)	TCM	649172	
——		GEAR ASSY	TCM	649123	
JK-	PA108A	FILTER	MOONEY	880014-501	
JK-	PA109A	CAPACITOR	MALLORY	CGS302U-050R2C	
		(ALT)	MALLORY	CGS292U-050R3C	
-K-	PA110A	C/B	ETA	41-3-S34-LN2-041800	
-K-	PA111A	C/B	KLIXON	7277-2-5	
-K-	PA112A	VOLTAGE REGULATOR (DUAL)	ELECTRODELTA	VR-802	10
		(ALT)(DUAL)	AM. PROD/PREC.FLT	DGR-2	10
-K-	PA112A	REGULATOR, DUAL ALTERNATOR	MOONEY	800270-503	10
-K-	PA113A	RECEPTACLE, 9 PIN	AMP	206708-1	
——		CLAMP	AMP	206966-1	
-K-	PA114A	PLUG, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
-K-	PA115A	ALTERNATOR (OPT)	TCM	649280	
		(ALT)	TCM	649172	
——		GEAR ASSY	TCM	649123	
-K-	PA116A	FILTER	MOONEY	880014-501	
-K-	PA117A	CAPACITOR	MALLORY	CGS302U-050R2C	
		(ALT)	MALLORY	CGS292U-050R3C	
JK-	PA118A	SENSOR, CURRENT	MICRO	CSLA1GE	
——		ELEMENT, SENSOR	MICRO	SS-37126	
-K-	PA119A	SENSOR, CURRENT	MICRO	CSLA1GE	
——		ELEMENT, SENSOR	MICRO	SS-37126	
JK-	PA120A	PLUG, 9 PIN	AMP	206705-2	
		CLAMP	AMP	206966-1	
JK-	PA121A	RECEPTACLE, 9 PIN	AMP	206708-1	
—		CLAMP	AMP	206966-1	
-K-	PA122A	ADPTR, ANALOG, CUR. SENSOR	MOONEY	810068-504	
JK-	PA122A	PLUG, 16 PIN	AMP	206037-1	
——		CLAMP	AMP	206070-1	
JK-	PA123A	RECEPTACLE, 16 PIN	AMP	206036-8	
——		CLAMP	AMP	206070-1	
JK-	PA124A	DIODE		1N2483	
——		(ALT)		1N5060	
——		(ALT)	GE	3720-GE	
JK-	PB101A	BATTERY	GILL	G-243	
JK-	PB102A	RELAY, BATTERY	CUTLER-HAMMER	6041H202	
		(ALT)	CUTLER-HAMMER	6041H202A	
JK-	PB103A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT	GE	3720-GE	
JK-	PB104A	SWITCH, MASTER	MOONEY	880052-501	
JK-	PB105A	C/B, BATTERY	ETA	41-3-S34-LN2-041800	
JK-	PB106A	C/B	ETA	41-3-S34-LN2-40A	
JK-	PB107A	BUS BAR #1	MOONEY	913127-89	
JK-	PB108A	BUS BAR #2	MOONEY	913127-75	
JK-	PB109A	BUS BAR #3	MOONEY	913127-75	
JK-	PB110A	BUS BAR #4	MOONEY	913127-77	
JK-	PB111A	BUS BAR #5	MOONEY	913127-77	
JK-	PB112A	BUS BAR #6	MOONEY	913127-79	
JK-	PB113A	BUS BAR #7	MOONEY	913127-81	
JK-	PB114A	BUS BAR #8	MOONEY	913127-77	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	PB115A	BUS BAR #9	MOONEY	913127-75	
JK-	PB116A	BUS BAR #10	MOONEY	913127-83	
JK-	PB117A	BUS BAR #11	MOONEY	913127-59	
JK-	PB120A	GROUND/DIMMER BOX	MOONEY	800228-501	
J--	PB121A	PLUG, 3 PIN	AMP	206037-2	
---		CLAMP	AMP	206070-1	
J-	PB122A	RECEPTACLE, 3 PIN	AMP	206207-1	
---		CLAMP	AMP	206070-1	
JK-	PL201A	PLUG, 37 PIN	AMP	206150-1	
---		CLAMP	AMP	206138-1	
JK-	PL203A	PLUG,	AMP	206037-1	
---		CLAMP	AMP	206070-1	
JK-	PL204A	PLUG, 26 PIN	MOONEY	930021-505	
JK-	PL205A	PLUG, 28 PIN	AMP	205839-3	
---		CLAMP	AMP	206070-1	
JK-	PL206A	PLUG, 20 PIN	MOONEY	930021-501	
JK-	PL207A	PLUG, 20 PIN	MOONEY	930021-501	
JK-	PL208A	PLUG, 14 PIN	MOONEY	930021-001	
JK-	PL209A	PLUG, 9 PIN	AMP	206708-1	
---		CLAMP	AMP	206966-1	
JK-	PL210A	PLUG, 9 PIN	AMP	206708-1	
---		CLAMP	AMP	206966-1	
JK-	PL211A	PLUG, 34 PIN	MOONEY	930021-507	
JK-	PL212A	PLUG, 14 PIN	MOONEY	930021-001	
JK-	PL216A	PLUG, 16 PIN	AMP	206037-1	
---		CLAMP	AMP	206070-1	
JK-	PL217A	PLUG, 16 PIN	AMP	206037-1	
---		CLAMP	AMP	206070-1	
JK-	PL218A	PLUG, 16 PIN	AMP	206037-1	
---		CLAMP	AMP	206070-1	
JK-	PL219A	PLUG, 28 PIN	AMP	205839-3	
---		CLAMP	AMP	206070-1	
JK-	PL220A	PLUG, 4 PIN	AMP	206060-1	
---		CLAMP	AMP	206062-1	
JK-	PL221A	PLUG, 4 PIN	AMP	206060-1	
---		CLAMP	AMP	206062-1	
JK-	PL222A	PLUG, 9 PIN	AMP	206708-1	
---		CLAMP	AMP	206966-2	
JK-	PL222B	PLUG, 16 PIN	AMP	206037-1	
---		CLAMP	AMP	206070-1	
JK-	PL225A	PLUG, 32 PIN	MATRIX SCIENCE	M83723/88R2232N	8
---		CLAMP	MAT/SCI	M85049/52-1-22N	
---		SOCKET	MAT/SCI	5100-001-0012	
---		SOCKET	MAT/SCI	5100-001-0020	
JK-	PL226A	PLUG, 32 PIN	MATRIX SCIENCE	M83723/88R2232N	8
		CLAMP	MAT/SCI	M85049/52-1-22N	
---		SOCKET	MAT/SCI	5100-001-0012	
- ---		SOCKET	MAT/SCI	5100-001-0020	
JK-	PL227A	PLUG, 6 PIN	MATRIX SCIENCE	MS3106A-28-22S	8
- -		CLAMP	MAT/SCI	MS3057-16B	
		(ALT)	MAT/SCI	MS3057-16A	
- ---		SOCKET	MAT/SCI	5100-001-0012	
- ---		SOCKET	MAT/SCI	5100-001-0020	
JK-	PL228A	PLUG, 20 PIN	MOONEY	930021-501	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	PL229A	PLUG, 16 PIN	AMP	206037-1	
——		CLAMP	AMP	206070-1	
JK-	PL230A	PLUG, 14 PIN	MOONEY	930021-001	
JK-	PL231A	PLUG, 16 PIN	AMP	206037-1	
——		CLAMP	AMP	206070-1	
JK-	PL232A	PLUG, 14 PIN	MOONEY	930021-001	
JK-	PL233A	PLUG, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	PS101A	C/B, STARTER SOLENOID	KLIXON	7277-2-5	
JK-	PS102A	SOLENOID, STARTER	CUTLER-HAMMER	6041H202	
		(ALT)	CUTLER-HAMMER	6041H202A	
JK-	PS103A	DIODE		1N2483	
—·—·		(ALT)		1N5060	
---·--		(ALT)	GE	3720-GE	
J—	PS104A	STARTER	PRESTOLITE	MHB-4016	
		(ALT)	LYCOMING	LW-15572	
-K-	PS104A	STARTER	TCM	646275	
		(ALT)	TCM	637847	
JK-	RB101A	C/B, RADIO BLOWER	KLIXON	7277-2-5	
JK-	RB102A	BLOWER, RADIO	TRW	19A2790	
JK-	RB102B	BLOWER, RADIO	BENDIX-KING	KA0033-01	
JK-	RB103A	FILTER, NOISE	ARCHER	273-103	
		(ALT)	SPRAGUE	SJX5104A	
JK-	RB104A	PLUG, 2 PIN	MOLEX	03-06-1023	
—··		SOCKET	MOLEX	02-06-1103	
JK-	RC201A	RECEPTACLE, 37 PIN	AMP	206151-2	
JK-	RC203A	RECEPTACLE, 3 PIN	AMP	206036-2	
——		CLAMP	AMP	206070-1	
JK-	RC204A	RECEPTACLE, 26 PIN	MOONEY	930021-506	
JK-	RC205A	RECEPTACLE, 28 PIN	AMP	206152-1	
——		CLAMP	AMP	206070-1	
JK-	RC206A	RECEPTACLE, 20 PIN	MOONEY	930021-502	
JK-	RC207A	RECEPTACLE, 20 PIN	MOONEY	930021-502	
JK-	RC208A	RECEPTACLE, 14 PIN	MOONEY	930021-002	
JK-	RC209A	RECEPTACLE, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
JK-	RC210A	RECEPTACLE, 9 PIN	AMP	206705-2	
——		CLAMP	AMP	206966-1	
JK-	RC211A	RECEPTACLE, 34 PIN	MOONEY	930021-508	
JK-	RC212A	RECEPTACLE, 14 PIN	MOONEY	930021-002	
JK-	RC214A	RECEPTACLE, 14 PIN	AMP	206044-1	
——		CLAMP	AMP	206070-1	
JK-	RC215A	RECEPTACLE, 14 PIN	AMP	206044-1	
—·—		CLAMP	AMP	206070-1	
JK-	RC220A	RECEPTACLE, 4 PIN	AMP	206153-1	
—·—		CLAMP	AMP	206062-1	
JK-	RC221A	RECEPTACLE, 4 PIN	AMP	206153-1	
—·—		CLAMP	AMP	206062-1	
JK-	RC222A	RECEPTACLE, 4 PIN	AMP	206708-1	
——		CLAMP	AMP	206966-1	
JK-	RC222B	RECEPTACLE, 9 PIN	AMP	206037-1	
——		CLAMP	AMP	206070-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	RC225A	RECEPTACLE, 32 PIN	MATRIX SCIENCE	M83723/83K2232N	
——		CLAMP	MAT/SCI	M85049/52-1-22N	
——		PIN	MAT/SCI	5000-054-0020	
——		PIN	MAT/SCI	5000-054-0012	
——		BOOT	MAT/SCI	MS3420-14	
		(ALT)	MAT/SCI	MS3420-16	
JK-	RC226A	RECEPTACLE, 32 PIN	MAT/SCI	M83723/83K2232N	
——		CLAMP	MAT/SCI	M85049/52-1-22N	
——		PIN	MAT/SCI	5000-054-0020	
——		PIN	MAT/SCI	5000-054-0012	
——		BOOT	MAT/SCI	MS3420-14	
		(ALT)	MAT/SCI	MS3420-16	
JK-	RC227A	RECEPTACLE, 6 PIN		MS3100K-28-2P	
		(ALT)		MS3100KE-28-2P	
——		CLAMP		MS3057-16B	
		(ALT)		MS3057-16A	
JK-	RC230A	RECEPTACLE, 14 PIN	MOONEY	930021-002	
JK-	RC231A	RECEPTACLE, 16 PIN	AMP	206035-1	
——		CLAMP	AMP	206070-1	
JK-	RC232A	RECEPTACLE, 14 PIN	MOONEY	930021-002	
JK-	RC233A	RECEPTACLE, 4 PIN	AMP	206060-1	
——		CLAMP	AMP	206062-1	
JK-	RC277A	RECEPTACLE, AUDIO	AMP	206152-1	
——		CLAMP	AMP	206070-1	
JK-	SB101A	C/B, SPEED BRAKE	KLIXON	7277-2-3	
JK-	SB102A	SWITCH, SPEED BRAKE	PRECISE FLT	01285	
JK-	SB103A	PLUG, 3 PIN	AMP	1-380308-0	
——		SOCKET	AMP	60619-1	
JK-	SB104A	RECEPTACLE, 3 PIN	AMP	1-380305-0	
——		PIN	AMP	60620-1	
JK-	SB105A	RELAY, SPEED BRAKE	PRECISE FLT	01364	
JK-	SB106A	DIODE		1N2483	
——		(ALT)		1N5060	
——		(ALT)	GE	3720-GE	
JK-	SB107A	PLUG, 4 PIN	AMP	206060-1	
		(ALT)	AMP	206062-1	
JK-	SB108A	RECEPTACLE, 4 PIN	AMP	206153-1	
		CLAMP	AMP	206062-1	
JK-	SB109A	PLUG, 8 PIN	AMPM	205838-1	
		CLAMP	AMP	206062-1	
JK-	SB110A	RECEPTACLE, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JK-	SB111A	MOTOR, LEFT	PRECISE FLT	01532	
JK-	SB112A	SWITCH, DEPLOY LIMIT	PRECISE FLT	01505	
JK-	SB113A	SWITCH, RETRACT LIMIT	PRECISE FLT	01505	
JK-	SB114A	SOLENOID, CLUTCH	PRECISE FLT	01675	
JK-	SB115A	PLUG, 8 PIN	AMP	205838-1	
——		CLAMP	AMP	206062-1	
JK-	SB116A	RECEPTACLE, 8 PIN	AMP	205841-2	
——		CLAMP	AMP	206062-1	
JK-	SB117A	PLUG, 8 PIN	AMP	205838-1	
——		CLAMP	AMP	206062-1	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
JK-	SB118A	RECEPTACLE, 8 PIN	AMP	205841-2	
———		CLAMP	AMP	206062-1	
JK-	SB119A	MOTOR, RIGHT	PRECISE FLT	01532	
JK-	SB120A	SWITCH, DEPLOY LIMIT	PRECISE FLT	01505	
JK-	SB121A	SWITCH, RETRACT LIMIT	PRECISE FLT	01505	
JK-	SB122A	SOLENOID, CLUTCH	PRECISE FLT	01678	
JK-	SB123A	PLUG, 8 PIN	AMP	205936-1	
———		CLAMP	AMP	206062-1	
JK-	SB124A	RECEPTACLE, 8 PIN	AMP	205841-2	
———		CLAMP	AMP	206062-1	
JK-	SPK101A	SPEAKER, CABIN	ARCHER	12-1703	
JK-	SPK102A	PLUG, 2 PIN	AMP	1-480318-0	
———		SOCKET	AMP	60519-1	
JK-	SPK103A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
———		PIN	AMP	60620-1	
JK-	WD101A	FUSEHOLDER	LITTEL	155020	
		(ALT)	LITTEL	155120	
- -- -		FUSE, 1A	LITTEL	313001	
JK-	WE101A	C/B, GEAR WARNING	KLIXON	7277-2-1	
JK-	WE102A	LIGHT, GEAR DOWN	SLOAN	855S-0-U	
———		BULB	GE	327	
J—	WE103A	SWITCH, THROTTLE	MICRO	V3-1	
———		ACTUATOR	MICRO	JV-5	
-K-	WE103A	SWITCH, THROTTLE	MICRO	1SE1-T	
		ACTUATOR	MICRO	JE-17	
JK-	WE104A	HORN, GEAR WARNING	MALLORY	SC628P	
JK-	WE105A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	WE106A	DIODE		1N2483	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
JK-	WE107A	RESISTOR	ALLEN BRADLEY	RC42GF102J1K OHM2W	
JK-	WE108A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	WE109A	RECEPTACLE, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
JK-	WP101A	MONITOR, CURRENT, PITOT HEAT	MOONEY	800221-505	
JK-	WP102A	PLUG, 9 PIN	AMP	206705-2	
———		CLAMP	AMP	206966-1	
JK-	WP106A	FUSEHOLDER	LITTEL	155020	
		(ALT)	LITTEL	155120	
———		FUSE (5A)	LITTEL	313005	
JK-	WS101A	C/B, STALL WARNING	KLIXON	7277-2-1	
JK-	WS102A	HORN, STALL WARN	MALLORY	SC628	
JK-	WS103A	RESISTOR	ALLEN BRADLEY	RC42GF102J1K OHM2W	
JK-	WS104A	SWITCH, STALL WARN	SAFE FLIGHT	C46001	
		(ALT)	MICRO SWITCH	V3-2451-D8	9
		(ALT)	MOONEY	800364-507	
JK-	WT101A	C/B	KLIXON	7277-2-2	

28 VOLT ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
J—	WT102A	ANNUNCIATOR	MOONEY	880048-501	
		(ALT)(USA)	MOONEY	880048-601	
		(ALT)(FRANCE)	MOONEY	880048-603	
-K-	WT102A	ANNUNCIATOR	MOONEY	880048-501	
		(ALT) LEGEND (USA)	MOONEY	880048-605	
		(ALT) LEGEND (FRANCE)	MOONEY	880048-607	
JK-	WT103A	PLUG, 37 PIN		DC-37S	
——-		CLAMP, RT ANGLE		DC19977-3	
- -		LOCK RETAINER		DC51222-1	
JK-	WT104A	ANNUNCIATOR (ATS)	MOONEY	880025-521	
- -		BULB	CHICAGO MINATURE	CM-7327	
JK-	WV101A	C/B, VACUUM WARN	KLIXON	7277-2-2	
JK-	WV102A	SWITCH, VACUUM WARN	MOONEY	880012-501	
JK-	WV103A	RECEPTACLE, 4 PIN	AMP	206153-1	
———		CLAMP	AMP	206062-1	
JK-	WV104A	PLUG, 4 PIN	AMP	206060-1	
———		CLAMP	AMP	206062-1	
JK-	WW101A	SWITCH, ALTERNATE AIR	CHERRY	E51-508	

NOTES:

1. USE AN4076-1 ADAPTER.
2. USE WITH FT101/FT101A FUEL FLOW SYSTEM.
3. USE WITH SHADIN FUEL FLOW SYSTEM.
4. SHADIN MODEL NO. INTERFACE WITH II MORROW APOLLO, ARNAV AND NORTHSTAR LORAN SYSTEMS.
5. SHADIN MODEL NO. INTERFACE WITH BENDIX/KING KLN88.
6. USE 1 EACH MS35334-21 OR M2898 (ALAN BRADLEY) INTERNAL TOOTH LOCKWASHER WITH EACH LIGHT IF NOT SUPPLIED BY SLOAN.
7. MAXIMUM CIRCUIT BREAKER RATING IS SHOWN. AMPERAGE OF INSTALLED CIRCUIT BREAKER IS DETERMINED BY PARTICULAR UNIT INSTALLED.
8. USE MS3420 OR AN3420-14 OR -16 BOOT WITH CONNECTOR.
9. PART OF 800936-501 INSTALLATION.
10. 800270-503 REPLACES SINGLE UNIT VOLTAGE REGULATORS (2 EA) FOR DUAL ALTERNATOR INSTALLATIONS.

91-20-04 - ELECTRICAL SYSTEM HARDWARE CHART - 14 VOLT SYSTEMS

S/N 24-1686-14 THRU 24-2999-14 (ATS ONLY), MOONEY DRAWING NUMBER 800263 (E7)
(Peculiar 14 volt components listed here - See 91-20-03 for common components 28 volt and 14 volt)

**** -ACTUAL USAGE DETERMINED BY MASTER SCHEMATIC - ****

CODE	DESCRIPTION		VENDOR	PART NO.	NOTES
14-	CF105A	FLAP ACTUATOR	MOONEY	750105-001	
14-	CV106A	VACUUM PUMP	AEROSAFE	820904-1	
14-	DB102A	TURN CO-ORDINATOR	U.I.	9112 CODE N.9	
		(ALT)	ELEC GYRO	1394T100-3Z	
14-	DG102A	INSTUMENT MODULE	MOONEY	880059-511	
14-	DM101A	HOUR METER	HOBBS	15006	
		HOUR METER (ALT)	DATCON INSTR CO	SG-70	
14-	DP102A	PITOT, HEATED	AERO INSTR.	PH502-12	
		PITOT, HEATED (ALT)		AN5812	
14-	DT105A	INDICATOR, EGT	MOONEY	660109-003	
———		WIRE, LEAD	ALCOR	01-005-78	
14-	EG105A	C/B, ACTUATOR, GEAR	KLIXON	7277-2-15	
14-	EG110A	RELAY, GEAR UP	CUTLER-HAMMER	6041H105A	
14-	EG112A	RELAY, GEAR DOWN	CUTLER-HAMMER	6041H105A	
14-	EG114A	ACTUATOR, GEAR	MOONEY	560254-501	
		ACTUATOR, GEAR (ALT)	MOONEY	880037-501	
14-	JM102A	MAGNETO	BENDIX/SCINTILLA	D-4LN2021	
14-	LB102A	BEACON, ROTATING	WHELEN	WRML-12	
———		ADAPTER	WHELEN	WRM-65	
14-	LC103A	RESISTOR, DIMMING (5 OHM 10W)	DALE	RH-10-5 OHM	
14-	LC104A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC105A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC106A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC107A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC109A	RESISTOR, DIMMING (5 OHM 10 W)	DALE	RH-10-5 OHM	
14-	LC110A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC111A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC112A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LC113A	LAMP HOLDER	HH SMITH	1930	
———		LAMP	GE	1816	
14-	LL101A	C/B, LANDING LIGHT	MOONEY	930023-215	
14-	LL102A	LANDING LIGHT	GE	4522	
14-	LN102A	LIGHT ASSY, NAV, TAIL (LT WING)	MOONEY	800051-505	
———		BULB	WHELEN	34-021-2030-65	
14-	LN103A	LIGHT ASSY, NAV, TAIL (RT WING)	MOONEY	800051-505	
———		BULB	WHELEN	34021-2030-65	
14-	LP103A	DIMMER CONTROL BOX	MOONEY	800049-503	

14 VOLT ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION		VENDOR	PART NO.	NOTES
14-	LP105A	LIGHT, CONSOLE	DIALIGHT	270-1930-0171-702	
———		LAMP	GE	370	
14-	LP111A	LIGHT, COMPASS	GE	330	
		LIGHT, COMPASS (ALT)	GE	330 AVIATION RED	
14-	LP112A	GLARESHIELD LIGHTS (14 EA)	GE	330	
14-	LP131A	RHEOSTAT, MAP LIGHT (100 OHM)	NEWARK	09F976	
———		KNOB	NEWARK	57F2368	
14-	LP132A	RHEOSTAT, MAP LIGHT (100 OHM)	NEWARK	09F976	
———		KNOB	NEWARK	57F2368	
14-	LS106A	LIGHT ASSY, STROBE/NAV(L WG)	WHELEN	A650-PR-D-M-14	
14-	LS111A	LIGHT ASSY, STROBE/NAV(R WG)	WHELEN	A650-PR-D-M-14	
14-	MA102A	RELAY, AUX POWER	CUTLER-HAMMER	6041H105A	
14-	MB102A	RELAY, AVIONICS MASTER	KISSLING	26.64.21	
14-	ME101A	CLOCK	MID-CONT.	MD-89	
		CLOCK (ALT)	PORSCHE	944.641.213.00	
14-	ME102A	CONNECTOR, 4 PIN	MID-CONT.	6016117	
———		PINS	MID-CONT.	6016125	
		CONNECTOR, 4 PIN (ALT)	PORSCHE	944.612.217.00	
———		PINS	PORSCHE	999.652.351.12	
14-	NF102A	PUMP, BOOST	WELDON	6163A	
		PUMP, BOOST (ALT)	WELDON	A6163A	
14-	PA104A	REGULATOR, VOLTAGE (STD)	MOONEY	880016-503	
		REGULATOR, VOLTAGE (ALT)	AM. PROD/PREC.FLT	DGR-1	
		REGULATOR, VOLTAGE (ALT)	MOONEY	880270-505	
14-	PA107A	ALTERNATOR, (STD)	LYCOMING	LW-15404	
		ALTERNATOR (ALT)	PRESTOLITE	ALY-8420	
14-	PB101A	BATTERY	GILL	G-35	
14-	PB102A	RELAY, BATTERY	CUTLER-HAMMER	6041H105A	
14-	PL204B	PLUG, 14 PIN	MOONEY	930021-001	
14-	PS102A	SOLENOID, STARTER	CUTLER-HAMMER	6041H105A	
14-	PS104A	STARTER	PRESTOLITE	MZ-4206	
		STARTER (ALT)	PRESTOLITE	MZ-4218	
		STARTER (ALT)	PRESTOLITE	MZ-4222	
14-	RB102A	BLOWER, RADIO	MOONEY	810414-501	
14-	RB102B	BLOWER, RADIO	KING	KA0033-00	
14-	RC204B	RECEPTACLE	MOONEY	930021-002	
14-	WE103A	SWITCH, THROTTLE	MICRO	V3-1	
———		ACTUATOR	MICRO	JV-5	
14-	WP103A	ANNUNCIATOR	MOONEY	800346-503	
14-	WP104A	DIODE		1N2493	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
14-	WP105A	DIODE		1N2493	
		(ALT)		1N5060	
		(ALT)	GE	3720-GE	
14-	WT102B	ANNUNCIATOR	MOONEY	880025-511	
———		BULB (8 EA)	CHICAGO MINA	CM7-7330	
14-	WT103B	PLUG, 15 PIN	MOLEX	09-50-3151	
———		SOCKETS	MOLEX	08-50-0106	

RESERVED

RESERVED

91-20-05 - ELECTRICAL EQUIPMENT HARDWARE CHART

S/N 24-3201, 24-3218 THRU 24-3270 - SCHEMATIC NO. 800304-(J1) (REV. F)
S/N 24-3271 THRU 24-3350 - SCHEMATIC NO. 800304-(J2) (REV. S)
S/N 24-3251 THRU 24-3373 - SCHEMATIC NO. 800304 (J3) (REV. W)
S/N 24-3274 THRU 24-3377 - SCHEMATIC NO. 800304 (J4) (REV. W)
S/N 24-3278 THRU 24-3383 - SCHEMATIC NO. 800304 (J5) (REV. Y)
S/N 24-3284 THRU 24-3392 - SCHEMATIC NO. 800304 (J6) (REV. Z)
S/N 24-3293 THRU 24-3404 - SCHEMATIC NO. 800304 (J7) (REV. Z)
S/N 24-3405 THRU 24-3410 - SCHEMATIC NO. 800304 (J8) (REV. AA)

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
ACT1	ACTUATOR	MICRO SWITCH	JE-5	
ACT2	ACTUATOR	MICRO SWITCH	JV-5	
ACT3	ACTUATOR	MICRO SWITCH	JV-26	
ACT4	ACTUATOR	MICRO SWITCH	MCD-2711	
ACT5	ACTUATOR	MICRO SWITCH	JE-17	
ACT6	ACTUATOR	MICRO SWITCH	JV-62	
AIR101A	SWITCH, A/C	MOONEY	880067-501	
AIR102A	COMPRESSOR, A/C	MOONEY	770028-1	
AIR103A	EVAP. BLWR (FRT)	MOONEY	770002-501	
AIR103B	EVAP. BLWR, (REAR)	MOONEY	770002-503	
AIR104A	CONDENSER BLWR	MOONEY	770016-501	
AIR105A	SWITCH, A/C PRESS.	MOONEY	770029-501	
BL1	BULB	GE	1818	
	HOLDER FOR BL1	HH SMITH	1930	
BL2	BULB	GE	1816	
	HOLDER FOR BL2	HH SMITH	1930	
BL3	BULB (NAV-T/L)	WHELEN	34-022-8030-65	
BL4	BULB (NAV-T/L)	WHELEN	34-021-2030-65	
BL5	BULB (CONSOLE)	GE	327	
	(ALT)	GE	385	
BL6	BULB (COMPASS)	GE	327(AV RED)	
BL7	BULB (POST LIGHT)	GE	330	
BL8	BULB (ANNUNCIATOR)	CHI. MIN.	CM7-7730	
BL9	BULB (ANNUNCIATOR)	CHI. MIN.	CM7-7327	
BR1	CIRCUIT BREAKER (1A)	KLIXON	7277-2-1	
BR2	CIRCUIT BREAKER (2A)	KLIXON	7277-2-2	
BR3	CIRCUIT BREAKER (3A)	KLIXON	7277-2-3	
BR5	CIRCUIT BREAKER (5A)	KLIXON	7277-2-5	
BR7.5	CIRCUIT BREAKER (7.5A)	KLIXON	7277-2-7.5	
BR10	CIRCUIT BREAKER (10A)	KLIXON	7277-2-10	
BR15	CIRCUIT BREAKER (15A)	KLIXON	7277-2-15	
BR20	CIRCUIT BREAKER (20A)	MECH PROD	4200-002-20	
BR25	CIRCUIT BREAKER (25A)	MECH PROD	4200-002-25	
BR30	CIRCUIT BREAKER (30)	MECH PROD	700-001-30	
BR35	CIRCUIT BREAKER (35A)	ETA	41-2-S14-LN2-35A	
BR40	CIRCUIT BREAKER (40A)	ETA	41-3-S34-LN2-40A	
BR50	CIRCUIT BREAKER (50A)	ETA	41-2-S34-LN2-50A	
BR70	CIRCUIT BREAKER (70A)	ETA	41-3-S14-LN2-70A	
BRSW3	C/B-SWITCH	KLIXON	7270-5-3	
BRSW7.5	C/B-SWITCH	KLIXON	7270-5-7.5	
BRSW8	C/B-SWITCH	KLIXON	7270-5-8	
BRSW10	C/B-SWITCH	KLIXON	7270-5-10	
BRSW15	C/B-SWITCH	KLIXON	7270-5-15	
BRSW25	C/B-SWITCH	KLIXON	7270-5-25	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
BS1	RELAY, BASE	MAGNACRAFT	70-303	
BUS2A	BUSS BAR (2 PLC)	MOONEY	913127-033	
BUS2B	BUSS BAR (2 PLC)	MOONEY	913127-097	
BUS2C	BUSS BAR ( )	MOONEY	913127-099	
BUS3A	BUSS BAR (3 PLC)	MOONEY	913127-057	
BUS3B	BUSS BAR (3 PLC)	MOONEY	913127-059	
BUS3C	BUSS BAR (3 PLC)	MOONEY	913127-073	
BUS4A	BUSS BAR (4 PLC)	MOONEY	913127-059	
BUS4B	BUSS BAR (4 PLC)	MOONEY	913127-089	
BUS4C	BUSS BAR (4 PLC)	MOONEY	913127-005	
BUS5A	BUSS BAR (5 PLC)	MOONEY	913127-093	
BUS5B	BUSS BAR (5 PLC)	MOONEY	913127-077	
BUS5C	BUSS BAR (5 PLC)	MOONEY	913127-085	
BUS5D	BUSS BAR (5 PLC)	MOONEY	913127-019	
BUS6A	BUSS BAR (6 PLC)	MOONEY	913127-035	
BUS6B	BUSS BAR (6 PLC)	MOONEY	913127-079	
BUS7A	BUSS BAR (7 PLC)	MOONEY	913127-081	
BUS8A	BUSS BAR (8 PLC)	MOONEY	913127-095	
BUS8B	BUSS BAR (8 PLC)	MOONEY	913127-083	
C1	CAPACITOR	MALLORY	CGS302V-050R2C	
CAP1	CAP, WHITE	MICRO SW	15PA80-8W	
CAP2	CAP, BLACK	ALCO SW	C-22	
CAP3	CAP, DUST	MATRIX SCIENCE.	M83723/80-122RC	
CB101A	BLOWER, DEFROST	MOONEY	640317-503	
CC101A	MOTOR, COWL FLAP	MOONEY	880050-505	
CC102A	INDICATOR, COWL FLAP	MOONEY	880242-505	
CC103A	SWITCH, COWL FLAP	MOONEY	880052-517	
CC103B	SWITCH, COWL FLAP (M20J)	MICRO-SWITCH	12TW1-10	
CC103C	SWITCH, COWL FLAP	MOONEY	880052-117	
CF101A	ACTUATOR, FLAP	MOONEY	750105-501	
CF102A	INDICATOR, TRIM/FLAP	MOONEY	800242-501	
CF103A	INDICATOR, FLAP	MOONEY	800242-505	
CF108A	SWITCH, FLAP	C-H	8908K3149	
CL03A	CLAMP, 9/14/16/28 PIN	AMP	206070-1	
CL03B	CLAMP, 3 PIN	AMP	MS3049-41-4A	
CL03C	CLAMP, 3 PIN		MS3057-4A	
	(ALT)		MS3057-4B	
CL04A	CLAMP, 4/8 PIN	AMP	206062-1	
CL05A	CLAMP, 5 PIN		MS3057-6A/B	
CL06A	CLAMP, 6 PIN		MS3057-16A/B	
CL09A	CLAMP, 9 PIN, LT. CONTROL BOX	AMP	206966-1	
CL09B	CLAMP, 9 PIN	AMP	P/O 126-222	
CL09C	CLAMP, 9 PIN		DE-24657	
—	/LOCK RETAINER		DE-51224-1	
—	/LOCK RETAINER (ALT)		D110278	
CL09D	CLAMP, 9 PIN		DE-19977-5	
—	/LOCK, RETAINER		DE51224-1	
CL15A	CLAMP, 15 PIN		DA51210-1	
—	/LOCK, RETAINER		DA51220-1	
CL17A	CLAMP, 17 PIN		DB51212	
—	/LOCK, RETAINER		DB51221-1	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
CL25A		CLAMP, 25 PIN		DB51212	
	—	/LOCK, RETAINER		DB51221-1	
CL25B		CLAMP, 25 PIN		DB19977-2	
	—	/LOCK, RETAINER		DB51221-1	
CL25C		CLAMP, 25 PIN		DB-24659	
	---	/LOCK, RETAINER		D-20418-2	
CL32A		CLAMP, 32 PIN		M85049/52-1-22N	
CL32B		CLAMP, BOOT		MS3420-14	
		(ALT)		MS3420-16	
CL37A		CLAMP, 37 PIN		206138-1	
CL37B		CLAMP, 37 PIN		DC19977-3	
	—	/LOCK, RETAINER		DC51222-1	
CM1		CURRENT MONITOR	MOONEY	800221-505	
CR101A		SWITCH, RUDDER TRIM	MOONEY	860052-519	
CR101B		SWITCH, RUDDER TRIM	MOONEY	860052-119	
CR102A		MOTOR, RUDDER TRIM	MOONEY	860050-503	
CR103A		INDICATOR, RUDDER TRIM	MOONEY	800242-503	
CT101A		SWITCH, ELEV TRIM	MOONEY	930023-233	
CT102A		INDICATOR, ELEV TRIM	MOONEY	800242-519	
CT103A		MOTOR, ELEV TRIM	S-TEC	01165-0-T14	
CT104A		INTERFACE, TRIM	MOONEY	800313-501	
CV101A		C/B-SW, STAND-BY VACUUM	MOONEY	930023-233	
CV101B		C/B-SW, STAND-BY VAC	MOONEY	930023-343	
CV102A		PUMP, STAND-BY VACUUM	AEROSAFE	820904-2	
CV103A		PUMP, STAND-BY VACUUM	AEROSAFE	820904-1	
CV104A		C/B-SW, STAND-BY VAC	MOONEY	930023-247	
CV104B		C/B-SW, STAND-BY VAC	MOONEY	930023-344	
CV105A		PUMP/CLUTCH, STAND-BY VAC	AIRBORNE	28C214CW-2	
D1		DIODE		1N2483	
	—	(ALT)		1N5060	
	—	(ALT)	GE	3720GE	
D2		DIODE	SARKES-TARZIAN	10H3P	
	—	(ALT)	ECG	5854	
	—	(ALT)	NTE	5854	
D4		DIODE BRIDGE	FAGOR	FB5001	
D5		DIODE BRIDGE	FAGOR	FB5006	
DA101A		AMMETER SHUNT	EMPRO	MLA-70A-100MV	
		(ALT)	JANCO	8406-70	
DA101B		AMMETER SHUNT	EMPRO	MLA-150A-100MV	
	—	(ALT)	JANCO	8406-150	
DB101A		TURN COORDINATOR	UNITED INSTRUMENTS	9013 CODE N.5	
	—	TURN COORDINATOR (ALT)	ASTRONAUTICS	303990-028MSC	
	—	TURN COORDINATOR (ALT)	ELECTRO GYRO CORP	1394T100-3Z	
	—	TURN COORDINATOR (ALT)	UNITED INST.	9114 CODE N.21	
DB102A		TURN COORDINATOR	UNITED INST.	9112 CODE N.9	
DC101A		PROBE, CYLINDER #1		MS24462-1	
	—	(ALT)		AN5546-1*	
		* USE AN4076-1 ADAPTER.			
DD101A		INDICATOR, O.A.T.	MOONEY	880059-159	
DD102A		O.A.T. PROBE	MOONEY	860004-501	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
DD103A		SOCKET, 4 PIN	CINCH-JONES	S-304-CCT	
DF101A		FUEL XMTR, LH/RH I/B	MOONEY	610242-003	
DF102A		FUEL XMTR, LH O/B	MOONEY	610243-003	
DF103A		FUEL XMTR, RH O/B	MOONEY	610243-001	
DF104A		FUEL XMTR, LH/RH O/B	MOONEY	610242-005	
DG101A		IND, INSTRUMENT MODULE	MOONEY	880059-507	
DG102A		IND., INSTRUMENT, MODULE	MOONEY	880059-511	
DG103A		IND., INSTRUMENT MODULE #1	MOONEY	880059-513	
DG104A		IND., INSTRUMENT MODULE #2	MOONEY	880059-505	
DG105A		IND., INSTRUMENT MODULE	MOONEY	880059-517	
DG106A		IND., INSTRUMENT MODULE	MOONEY	880059-519	
DH101A		PROBE, OIL TEMP	MOONEY	880061-501	
DH102A		PROBE, OIL TEMP		MS28034-1	
DJ101A		TRANSDUCER, OIL PRESSURE	DRUCK	PDCR 821-0662-100	
	*	(ALT) (M20M)	KULITE	APT-201-100D-100G	
	—	(ALT) (M20J)	KULITE	APT-154-1000-100PSIG	
DK101A		TRANSDUCER, FUEL PRESSURE	DRUCK	PDCR-821-0662-30	
	—	(ALT)	KULITE	APT-153-1000-30PSIG	
DK102A		TRANSDUCER, FUEL PRESSURE		DRUCK PDCR 920-U143 50 PSID	
	—	(ALT)	KULITE	APT-155-1000-50D	
DL101A		IND., TACH	MOONEY	880039-515	
	—	(OPTIONAL)	B&D	0520-003	
DL102A		SENSOR, TACH	B&D	0400-004	
DL103A		IND., TACH	MOONEY	880039-517	
	—	(OPTIONAL)	B & D	0520-006	
DL104A		TACH SENSOR	B & D	(SLICK MAGS) 0402-102	
		TACH SENSOR	B & D	0406-003 * (NOTE 3)	
DL104B		TACH SENSOR	B & D	(BENDIX MAGS) 0402-104	
		TACH SENSOR	B & D	0406-004 * (NOTE 3)	
DL105A		INDICATOR, TACHOMETER	MOONEY	880039-519	
DL106A		INDICATOR, TACHOMETER	MOONEY	880039-523	

* INSTALLED ON IO-550 ENGINE BY TELEDYNE CONTINENTAL MOTORS.

DM101A		HOUR METER	MOONEY	880035-507	
DM102A		HOUR METER	MOONEY	880035-505	
DM103A		HOUR METER	HOBBS	15006	
		(ALT)	DATCON	SG-70	
DM104A		HOUR METER	HOBBS	85000	
	- -	(ALT)	HOBBS	15000	
DP101A		C/B, PITOT HEAT	MOONEY	930023-205	
DP101B		C/B, PITOT HEAT	MOONEY	930023-305	
DP102A		HEATED PITOT	AERO INSTR	PH502-24	
	—	(ALT)		AN5812-1	
DP103A		PITOT, HEATED	AERO INSTR	PH502-12	
	—	(ALT)		AN5812	
DP104A		PLUG, 2 PIN		AN3115-1	
DP105A		SOCKET		AN3116-1	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
DR101A	PROBE, TIT	MOONEY	880055-503	
DT101A	IND., EGT	ALCOR	46361	
DT101B	IND., EGT	ALCOR	OEM-46161	
DT102A	SWITCH, EGT, 4 POSITION	ALCOR	OEM-80825	
DT103A	PROBE, EGT	MOONEY	660110-000	
—	/ALTERNATE	ALCOR	86255	
DT104A	TRAY, LIGHT (28VDC)	ALCOR	41338	
DT105A	TRAY, LIGHT (14V)	ALCOR	41337	
DV101A	INDICATOR, FUEL FLOW	MOONEY	880034-501	
—	INDICATOR, FUEL FLOW (OPT)	MOONEY	880034-503	
—	INDICATOR, FUEL FLOW (OPT)	MOONEY	880034-505	
DV101B	INDICATOR, F/F (GALS)	SHADIN	912021	
—	INDICATOR, F/F (LBS) (OPT)	SHADIN	912023	
—	INDICATOR, F/F (GALS) (OPT)	SHADIN	912041	1
—	INDICATOR, F/F (LBS) (OPT)	SHADIN	912043	1
—	INDICATOR, F/F (LITERS) (OPT)	SHADIN	912047	1
—	INDICATOR, F/F (GALS) (OPT)	SHADIN	912081	2
DV102A	TRANSDUCER, FUEL FLOW	MOONEY	880030-501	
—	(OPTIONAL)	MOONEY	880030-503	
DV102B	TRANSDUCER, F/F	SHADIN	680501B	
EG101A	ACTUATOR, LDG GR	MOONEY	880037-507	
—	(ALT)	MOONEY	560254-503	
EG102A	ACTUATOR, LDG GR	MOONEY	880037-501	
—	(ALT)	MOONEY	560254-501	
EG103A	ACTUATOR, LDG GR	MOONEY	560254-505	
EG104A	SWITCH, LDG GR. A/S SAFETY	MOONEY	880013-507	
ELT101A	SWITCH, ELT PANEL	ARTEX	110-416	
ELT102A	TRANSMITTER, ELT	ARTEX	453-0150	
F1	FUSE, 1 AMP	LITTEL	313001	
F2	FUSE, 5 AMP-3AG-SLO-BLO	LITTEL	313005	
F3	FUSE, 10 AMP SLO-BLO	LITTEL	313010	
F4	FUSE, 5 AMP	McGRAW-EDISON	FM01-5A	
FH1	HOLDER, FUSE	LITTEL	155020	
—	(ALT)	LITTEL	155120	
FH2	HOLDER, FUSE	McGRAW-EDISON	FHN42W	
FON1	PHONE JACK	SWITCHCRAFT	C-11	
—	/WASHER	SWITCHCRAFT	S-1028	
—	/WASHER	SWITCHCRAFT	S-1029	
FON2	PHONE JACK	SWITCHCRAFT	C-112B	
—	/WASHER	SWITCHCRAFT	S-1028	
—	/WASHER	SWITCHCRAFT	S-1029	
IE101A	IGNITION CONTROL	LASAR (SLICK)	CD-1001-02	
	CABLE	LASAR	CH1001-XX	
JM101A	SWITCH, MAGNETO	BENDIX SCINTILLA	10-357210-9	
—	/PLACARD	BENDIX SCINTILLA	10-187-46B	
—	/TERMINAL LUG	BENDIX SCINTILLA	10-126656	
JM101B	SWITCH, MAG. (W/CONN.)	JANCO	97-2278-1	
JM102A	MAGNETO	BENDIX SCINTILLA	D-4LN2021	
—	(ALT)	BENDIX SCINTILLA	D4LN-3000	
—	(ALT)	LYCOMING	LW-662555-11	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
JM103A	PLUG, MAGNETO	BENDIX SCINTILLA	10-392699	
JM104A	MAGNETO	SLICK	6244	
JM105A	MAGNETO, LEFT	SLICK	6261	
JM106A	MAGNETO, RIGHT	SLICK	6260	
JM107A	SWITCH, IGNITION	TCM	10-357240-1	
JM108A	MAGNETO, LH	SLICK	6369	
JM109A	MAGNETO, RH	SLICK	6360	
JM110A	IGNITION, PULSAR	MOONEY	800315-501	
JM111A	MAGNETO, L/R	BENDIX	S6RN-25-10	
JM112A	MAGNETO, LH	SLICK (LASAR)	CD-4771	
JM112A	MAGNETO, RH	SLICK (LASAR)	CD-4770	
JM	MAGNETO, LH	SLICK (W/O LASAR)	4372 (Rev.C)	
JM	MAGNETO, RH	SLICK (W/O LASAR)	4370 (Rev.C)	
L1	BULB, 28V	GE	464-T-3 1/4	
L2	BULB, 14V	GE	189-T-3 1/4	
L3	BULB	GE	385	
L4	BULB, 14V	GE	330	
L5	BULB	CHI. MINI.	CM7-7330	
L6	BULB	CHI. MINI.	CM7-7327	
L7	BULB	GE	370	
L8	BULB	GE	1815	
L9	BULB	GE	327 (AV RED)	
L10	BULB (28V)	GE	327	
L11	BULB	GE	1818	
L12	BULB	GE	1495	
LB101A	C/B, BEACON, ROTATING	MOONEY	930023-243	
LB101B	C/B, BEACON, ROTATING	MOONEY	930023-343	
LB102A	LIGHT, ROTATING BEACON	WHELEN	WRML-24	
—	/ADAPTER	WHELEN	WRML-65	
LB102B	LIGHT, ANTI-COLLISION (RED)	WHELEN	90033-19	
LB102C	LIGHT, ANTI-COLLISION (WHITE)	WHELEN	90033-20	
LENS1	ANNUNC. LENS (US)	MOONEY	880046-613	
LENS2	ANNUNCIATOR LENS (FRAN)	MOONEY	880046-615	
LENS3	ANNUNCIATOR LENS (US)	MOONEY	880046-617	
LENS4	ANNUNCIATOR LENS (FRANCE)	MOONEY	880046-619	
LENS5	ANNUNCIATOR LENS	MOONEY	880046-621	
LENS6	ANNUNCIATOR LENS	MOONEY	880046-623	
LG101A	C/B, LOGO LIGHT	MOONEY	930023-357	
LG102A	LIGHT, LOGO	WHELEN	A730-1-28	
LH1	LAMP HOLDER	MOONEY	914083-1	
LH2	LAMP, HOLDER	DIALIGHT	270-1930-0171-702	
LH3	LAMP HOLDER	WHELEN	A-350-CN-CL-BK-SH-28	
LH4	LAMP HOLDER	SLOAN	655S-O-U	
—	/WASHER, LOCK, INT. TOOTH		MS35334-21	
—	/WASHER, LOCK, INT. TOOTH	ALLEN BRADLEY	M2898	
LH5	LAMP HOLDER	INSTRUMENTS	0211-128	
LH6	LAMP HOLDER	INSTRUMENTS	BA28-24-BW3	
LH7	LAMP HOLDER	SIGMA TEC	1V-192-971	
LH8	LAMP HOLDER	HH SMITH	1930	
—	(ALT)	LEECRAFT	7-05	
—	(ALT)	ALLIED	991-3103}	
—	(ALT)	SPC	LSL-11-128U	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
LH9	—	(ALT)	NEWARK	81N2561	
LH9		LAMP HOLDER	HH SMITH	1925	
LH10		LAMP HOLDER	WHELEN	01-0770437-00	
LH11		LAMP HOLDER, COCKPIT UTILITY)	TEK-LITE	LC-28-5	
	---	(ALT)		MS1745-51A	
LH12		LAMP HOLDER, BAGGAGE LT	WHELEN	01-077-0142-04	
LL101A		SWITCH, LANDING LT	MOONEY	880052-521	
LL101B		SWITCH, LANDING LT	MOONEY	880052-121	
LL102A		LIGHT, TAXI/LANDING, LH/RH (28V)	GE	4595	
LL103A		LIGHT, TAXI/LANDING, LH/RH (14V)	GE	4509	
LN101A		C/B, NAV LIGHTS	MOONEY	930023-251	
LN101B		C/B,NAV LIGHTS	MOONEY	930023-351	
LN102A		LIGHT ASSY, WING, NAV-TAIL	MOONEY	800051-501	
LP101A		DIMMER CONTROL BOX (28V/14v)	MOONEY (ELECT.)	800299-501	
LP102A		DIMMER CONTROL BOX (28V)	MOONEY (RHEOSTAT)	800299-503	
LP103A		DIMMER CONTROL BOX (14V)	MOONEY (RHEOSTAT)	800299-505	
LP104A		SWITCH, LIGHT ASSY	MOONEY	150085-501	
LP105A		INVERTER, PLACARD (O/H)	ERG	LPS28-3-3P	
LR101A		C/B, RECOGNITION LIGHT	MOONEY	930023-231	
LR101B		C/B, RECOGNITION LIGHT	MOONEY	930023-331	
LR102A		RECOGNITION LIGHT	MOONEY	880049-501	
LS101A		C/B, STROBE LIGHT	MOONEY	930023-237	
LS101B		C/B, LIGHTS, STROBE	MOONEY	930023-337	
LS102A		POWER SUPPLY, STROBE	WHELEN	01-0770329-00	
LS102B		POWER SUPPLY, STROBE	WHELEN	01-0770329-01	
LS103A		STROBE/NAV LIGHT ASSY (LH/WG)	WHELEN	01-0770054-12	
LS104A		STROBE/NAV LIGHT ASSY (RH/WG)	WHELEN	01-0770054-13	
LS105A		STROBE/TAIL LIGHT ASSY	MOONEY	470013-501	
LS106A		POWER SUPPLY (TAIL)	WHELEN	A413A,HDA,DF-28	
LT101A		SWITCH, TAXI LIGHT	MOONEY	880052-523	
LT101B		SWITCH, TAXI LIGHT	MOONEY	880052-123	
LT102A		TAXI LIGHT LT/RT	G.E.	4596	
MA101A		RECEPTACLE, AUX POWER		AN2552-3A	
MB101A		C/B-SWITCH, AVIONICS MASTER	MOONEY	930023-213	
MB101B		C/B-SWITCH, RADIO MASTER	MOONEY	930023-313	
MC101A		CIGAR LIGHTER	MOONEY	800336-503	
ME101A		CLOCK	MID-CONT	MD-99	
		(ALT)	PORSCHE	944.641.213.00	
ME102A		CONN, 4 PIN (ALT)	MID-CONT	6016177	
		PIN	MID-CONT	6016125	
	—	CONN, 4 PIN	PORSCHE	944.612.217.00	
		PIN	PORSCHE	999.652.951.12	
MIC1		MICROPHONE JACK	SWITCHCRAFT	C-12B	
	—	WASHER	SWITCHCRAFT	S-1029	
	—	WASHER	SWITCHCRAFT	S-1029	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
MP101A		C/B-SW, PROP DE-ICE	MOONEY	930023-245	
MP101B		C/B-SW., PROP. DE-ICE	MOONEY	930023-345	
MP102A		TIMER, PROP DE-ICE	B.F. GOODRICH	3E1899-1	
MP102B		TIMER, PROP DE-ICE	McCAULEY	B-45018	
MP103A		TERMINAL BLOCK	McCAULEY	C-40521	
NF101A		C/B-SW, LOW-BOOST PUMP	MOONEY	930023-211	
NF101B		C/B-SW , BOOST PUMP	MOONEY	930023-311	
NF102A		PUMP, BOOST	WELDON	A8163B	
	—	(ALT)	WELDON	8163B	
NF103A		PUMP, BOOST	WELDON	8163A	
	—	(ALT)	WELDON	A8163A	
NF104A		PUMP, BOOST	WELDON	10054B	
NF105A		PUMP, BOOST	WELDON	A10051D	
NF106A		PUMP, BOOST	WELDON	A8152-B	
NF108A		REGULATOR, FUEL BOOST PUMP	MASSEY	VR536	
NF109A		C/B-SW, HI-BOOST PUMP	MOONEY	930023-219	
PA101A		REGULATOR, VOLTAGE	MOONEY	800270-501	
	—	(ALT)	AMERICAN PROD	DGR-2	
		(ALT)	ELECTRODELTA	VR-802	
PA102A		SWITCH, ALT FLD (DUAL)	MOONEY	880052-525	
PA103A		SWITCH, ALT FLD (SINGLE)	MOONEY	880052-503	
PA104A		ALTERNATOR	LYCOMING	LW-14367	
	—	(ALT)	PRESTOLITE	ALU-6421-LS	
PA105A		ALTERNATOR	LYCOMING	LW15404	
	—	(ALT)	PRESTOLITE	ALY-8420	
PA106A		ALTERNATOR	TCM	649280	
	—	(ALT)	TCM	649172	
	—	\GEAR ASSEMBLY	TCM	649123	
PA107A		ALTERNATOR	ELECTRO SYSTEMS	ES 4009-LS	
	—	/INSTALL KIT (REF 600180)	LYCOMING	05K-21065	
PA108A		FILTER	MOONEY	880014-501	
	—	(ALT)	MOONEY	800307-501	
PA109A		SENSOR, CURRENT	MICRO SW	CSLA1GE	
PA110A		REGULATOR, VOLTAGE	MOONEY	800270-503	
PA111A		SENSOR, CURRENT (110 A)	KLIXON	7235-1-110	
PA111B		SENSOR, CURRENT (175 A)	KLIXON	7236-1-175	
PA112A		ALTERNATOR (100A)	TCM	649304	
PB101A		BATTERY	GILL	G-243	
PB102A		SWITCH, MASTER	MOONEY	880052-501	
PB102B		SWITCH, MASTER	MOONEY	880052-101	
PB103A		SWITCH, BATTERY SELECT	MOONEY	880052-527	
PB103B		SWITCH, BATTERY SELECT	MOONEY	880052-127	
PB105A		BATTERY	CONCORDE	RG24-11M	
PL02A		PLUG, 2 PIN	AMP	1-480318-0	
PL02B		PLUG, 2 PIN	MOLEX	03-06-1023	
PL02C		PLUG, 2 PIN(FEMALE)	DEAN	DEA900020	
PL02D		PLUG, 2 PIN		MS3106A-24-9S	
PL03A		PLUG, 3 PIN	AMP	1-390303-0	
PL03B		PLUG, 3 PIN	AMP	206037-2	
PL03C		PLUG, 3 PIN		MS3106A-10SL-3S	
PL03D		PLUG, 3 PIN		MS3106A-28-6P	
PL04A		PLUG, 4 PIN	AMP	206060-1	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
PL04B	PLUG, 4 PIN		MS3106A-32-17S	
PL05A	PLUG, 5 PIN		MS3106A-14S-5S	
PL06A	PLUG, 6 PIN	MATRIX SCIENCE	MS3106A-28-22S	
PL08A	PLUG, 8 PIN	AMP	205839-1	
PL09A	PLUG, 9 PIN	AMP	206708-1	
PL09B	PLUG, 9 PIN	AMPHENOL	126-222	
PL09C	PLUG, 9 PIN		DE-9S	
PL09D	PLUG, 9 PIN	MOLEX	03-06-2092	
PL09E	PLUG, 9 PIN	AMP	206485-1	
PL14A	PLUG, 14 PIN	MOONEY	930021-1	
PL14B	PLUG, 14 PIN	MOONEY	930021-513	
PL14C	PLUG, 14 PIN	AMP	206043-3	
PL15A	PLUG, 15 PIN		DA15S	
PL16A	PLUG, 16 PIN	AMP	206037-1	
PL17A	PLUG, 17 PIN		DBM17W2S	
PL20A	PLUG, 20 PIN	MOONEY	930021-501	
PL25A	PLUG, 25 PIN		DB25S	
PL25B	PLUT, 15 PIN	AMP	205208-1	
PL26A	PLUG, 26 PIN	MOONEY	930021-505	
PL28A	PLUG, 28 PIN	AMP	205839-3	
PL32A	PLUG, 32 PIN****	MATRIX SCIENCE	M83723/86R2232N	
	****USE MS3420-14 OR -16 BOOT WITH CONNECTOR			
PL34A	PLUG, 34 PIN	MOONEY	930021-507	
PL34B	PLUG, 34 PIN	MOONEY	930021-515	
PL37A	PLUG, 37 PIN	AMP	208150-1	
PL37B	PLUG, 37 PIN		DC37S	
PS101A	C/B, STARTER SOLENOID	KLIXON	7277-2-10	
PS102A	C/B, STARTER SOLENOID	KLIXON	7277-2-5	
PS103A	STARTER	PRESTOLITE	MHJ-4016	
—	(ALT)	LYCOMING	LW-15572	
PS104A	STARTER	TCM	645275	
	(ALT)	TCM	837647	
PS105A	STARTER	B & C SPECIALITY	BSC206-149	
R1	RESISTOR (20 OHM/10W)	DALE	RH-10-20 OHM	
R2	RESISTOR (5 OHM/10W)	DALE	RH-10-5 OHM	
R3	RESISTOR, MAPLIGHT (500 OHM)	NEWARK	919029-501	
R4	RESISTOR (100 OHM)	NEWARK	09F976	
R5	RESISTOR (7.5 OHM)	DALE	RH-50-7.5 OHM	
R6	RESISTOR (1K OHM/2W)	ALLEN-BRADLEY	RC42-GF102J	
R7	RESISTOR (5K OHM)	ALLEN BRADLEY	WA2-G056S502UA	
——	(ALT)	SELECTROL	149-11-502	
——	(ALT)	BOURNS	3862C-282-502A	
—	(ALT)	NEWARK	12F9905R 5.0K	
R8	RESISTOR (150 OHM/3W)	CLAROSTAT	VC3D	
—	(ALT)	OHMITE	23J	
R9	RESISTOR (3.9K OHM/ 1/2W)	OHMITE	N/A	
R10	RESISTOR (3.0K OHM/ 1/2W)	OHMITE	N/A	
R11	RESIBTOR (1 OHM/25W)	DALE	RH-25-1 OHM	
R12	RESISTOR (70 OHM/10W)	DALE	RH-10-70 OHM	
R13	RESISTOR (10.0K OHM/1W)	OHMITE	N/A	
RB101A	BLOWER, RADIO	KING	071-4037-01	
RC02A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
RC02C	RECEPTACLE, 2 PIN (MALE)	DEAN	DEA900020	
RC02D	RECEPTACLE, 2 PIN		MS3100-24-9P	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
RC03A		RECEPTACLE, 3 PIN	AMP	1-480305-0	
RC03B		RECEPTACLE, 3 PIN	AMP	206096-2	
RC03C		RECEPTACLE, 3 PIN	AMP	206207-1	
RC03D		RECEPTACLE, 3 PIN		MS3100-28-6S	
RC04A		RECEPTACLE, 4 PIN	AMP	206153-1	
RC04B		RECEPTACLE, 4 PIN		MS3100-32-17P	
RC06A		RECEPTACLE, 6 PIN	MATRIX SCIENCE	MS3100C-28-22P	
RC08A		RECEPTACLE, 8 PIN	AMP	206841-2	
RC09A		RECEPTACLE, 9 PIN	AMP	206705-2	
RC09B		RECEPTACLE, 9 PIN	AMP	206705-1	
RC09C		RECEPTACLE, 9 PIN		DE9P	
RC09E		RECEPTACLE, 9 PIN	AMP	205466-1	
RC12A		RECEPTACLE, 12 PIN	MOLEX	03-06-2122	
RC14A		RECEPTACLE, 14 PIN	MOONEY	930021-2	
RC14B		RECEPTACLE, 14 PIN	AMP	209540-1	
RC14C		RECEPTACLE, 14 PIN	AMP	206044-1	
RC16A		RECEPTACLE, 16 PIN	AMP	206037-1	
RC16B		RECEPTACLE, 16 PIN	AMP	206036-1	
RC20A		RECEPTACLE, 20 PIN	MOONEY	930021-502	
RC26B		RECEPTACLE, 26 PIN	MOONEY	930021-506	
RC28A		RECEPTACLE, 28 PIN	AMP	206152-1	
RC32A		RECEPTACLE, 32 PIN	MATRIX SCIENCE	M83723/89K2232N	
RC34A		RECEPTACLE, 34 PIN	MOONEY	930021-508	
RC34B		RECEPTACLE, 34 PIN	AMP	204814-1	
RC37A		RECEPTACLE, 37 PIN	AMP	206151-1	
RL1		RELAY, BATT. (28V/200A)	C-H	6041H-202	
	—	(ALT)	C-H	6041H-202A	
	—	(ALT)	KISSLING	26.57.01	
	—	(ALT)	KISSLING	26.57.02	
RL2		RELAY, BATT. (14V/200A)	C-H	6041H-105A	
RL3		RELAY	KISSLING	26.64.01	
RL4		RELAY	KISSLING	26.64.21	
RL5		RELAY, LDG. (28V/50A)	C-H	6041H-220	
		(ALT)	KISSLING	26.72.03	
	—	/BRACKET (2 EA)	MOONEY	800375-001	
RL6		RELAY (28V/100A)	C-H	6041H-53	
RL7		RELAY, (14V/200A)	C-H	6041H-105R	
RL8		RELAY	MAGNACRAFT	W67RCSX-3	
RL9		RELAY	KISSLING	26.08.01	
R10		RELAY	P & B	VF4-15-H11	
	—	SOCKET	P & B	VCF4-1002	
	—	TERMINAL	P & B	26A1348C	
SA101A		ALTERNATOR, STAND-BY	B & C	BC410-1	
	——	HOUSING, CONNECTOR	B & C	12-009	
	——	TERMINAL (1/4")	B & C	14-026	
SA102A		CONTROLLER, STBY. ALT.	B & C	BC203-2	
SB101A		C/B, SPEEDBRAKE	KLIXON	7277-2-3	
SB102A		SWITCH, CONTROL WHL	PRECISE FLT	01265	
SB103A		RELAY, SPEEDBRAKE	PRECISE FLT	01384	
SB104A		DIODE		1N2493	
	—	(ALT)		1N5060	
		(ALT)	GE	3720-GE	
SB105A		MOTOR, SPEEDBRAKE	PRECISE FLT	01532	
SB106A		SWITCH, SPEEDBRAKE	PRECISE FLT	01505	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
SB107A		SOLENOID, CLUTCH	PRECISE FLT	01678	
SB108A		INTERFACE, SPEEDBRAKE	MOONEY	800314-501	
SPK1		SPEAKER, ALERT	ARCHER	40-1333C	
SPK2		SPEAKER, CABIN	ARCHER	40-1325	
SPK3		SONALERT	MALLORY	SC628	
SW1		SWITCH	MICRO	1SE1-T	
SW2		SWITCH, DEF. BLWR.	CHERRY	E51-50B	
SW3		SWITCH, LIMIT, RUD.TRIM	MICRO	V3-1	
SW4		SWITCH,UP LIMIT, LDG	MICRO	DT-2R-47	
SW5		SWITCH, DN LIMIT, LDG	OTTO	P6-24014	
	—	(ALT)	MICRO	1CH116-6	
SW6		SWITCH, CABIN LTS	CARLING	RC911-VBBOW	
SW7		SWITCH	MOONEY	880013-507	
SW8		SWITCH, LDG	C-H	8906K2875	
SW9		SWITCH, MIC-KEY	ALCO	MPE-106F-C-22-9	
		(ALT)	C-H	SA1RV2D	
SW10		SWITCH, CHT	GRAYHILL	71AD30-02-2-AJN	
SW11		SWITCH, FLAP	C-H	8906K4731	
SW12		SWITCH, CABIN LTS(MASTER)	CARLING	RA911-VBBOW	
SW13		SWITCH (ALT)	MICRO	12TW1-10	
	—	/CAP, WHITE	MICRO	15PA90-6W	
	—	(ALT)		MS27753-36	
SW14		SWITCH, F/F MEM.	C & K	7101K	
SW15		SWITCH, LDG, OVERRIDE	NKK	DLB241-W01-L3C/ AT506M/AT503MB	
	—	/BUTTON/LOCK RING/LOCK WASHER/HEX NUT (2 EA) (NKK)			
	—	/SWITCH (ALT)	C-H	SB1DDX432-2	
	—	/LOCK RING	C-H	29-761	
	—	/LOCK WASHER	C-H	16-886	
	—	/HEX NUT (2 EA)	C-H	15-966-6	
SW16		SWITCH, VAC. HI/LO	MOONEY	880012-501	
SW17		SWITCH	CARLING	TILC64-1S-WHFN	
		SW (ALT)	TSCHUDIN	504202	
		LENS	TSCHUDIN	464415	
		BULB	TSCHUDIN	590002	
SW18		SWITCH	MOONEY	880062-501	
SW19		SWITCH	CARLING	TIGM64-1S-WHFN	
SW20		SWITCH		MS35058-22	
SW21		SWITCH, MIKE KEY	CROUZET	83-450-001	
SW22		SWITCH, SPDBRK	CROUZET	83-452-504	
SW23		SWITCH	ALCO	MPE106F	
SW25		SWITCH	NKK	MB2065SB1W01-EA	
SW35		SWITCH	NKK	MB2065SB1W01-EA	
SW101A		SWITCH, ALT. AIR DOOR (M20J)	SAINT	ZS-1009	
VR1		VARISTOR	GE	V47ZA05	
WM101A		MASTER WARNING	MICRO SWITCH	DSK-104-GYR	
WM102A		MASTER WARNING	MICRO SWITCH	DSB-11-RRRR-LR2	
WS101A		ALERT, STALL WARN/GEAR WARN	IAI	950D0309-000	
WS103A		SWITCH, STALL WARNING	MOONEY	800364-507	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
WT101A	ANNUNCIATOR	MOONEY	880048-501	
WT102A	ANNUNCIATOR	MOONEY	880048-503	
WT103A	ANNUNCIATOR	MOONEY	880048-507	
WT104A	ANNUNCIATOR	MOONEY	880048-509	

NOTES:

1. SHADIN MODEL NO. INTERFACE WITH II MORROW APOLLO, ARNAV AND NORTHSTAR LORAN SYSTEMS.
2. SHADIN MODEL NO. INTERFACE WITH BENDIX/KING KLN-88 OR KLN90 SERIES.
3. B & D TACH SENSOR'S P/N 0406-004 IS 9/16 " DIAMETER FOR BENDIX MAGNETOS. 0406-003 IS 11/16 " DIAMETER FOR SLICK MAGNETOS

RESERVED FOR FUTURE ENTRIES

RESERVED FOR FUTURE ENTRIES

91-20-06 - ELECTRICAL SYSTEM HARDWARE CHART - 28 VOLT

S/N 24-3411 THRU 24-3420, SCHEMATIC NO. 800383 (J1) (REV. G)
S/N 24-3421 THRU 24-3431, SCHEMATIC NO. 800383 (J2) (REV. H)

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
AC101A	SWITCH, AIR COND.	MOONEY	880067-501	
AC102A	COMPRESSOR, AIR COND.	MOONEY	770028-1	
AC103A	BLOWER, EVAP. (FRONT)	MOONEY	770002-501	
AC103B	BLOWER, EVAP. (REAR)	MOONEY	770002-503	
AC104A	BLOWER, CONDENSOR	MOONEY	770016-501	
AC105A	SWITCH, AIR COND. PRESS	MOONEY	770029-501	
AC106A	CONNECTOR, AIR COND	CORY COMP.	CSLT-21PA	
—	CONTACTS	CORY COMP.	CB017-5S	
AT101A	ACTUATOR, SWITCH	MICRO SWITCH	JE-5	
AT102A	ACTUATOR, SWITCH	MICRO SWITCH	JV-5	
AT103A	ACTUATOR, SWITCH	MICRO SWITCH	JV-28	
AT104A	ACTUATOR, SWITCH	MICRO SWITCH	MCD-2711	
AT105A	ACTUATOR, SWITCH	MICRO SWITCH	JE-17	
AT106A	ACTUATOR, SWITCH	MICRO SWITCH	JV-82	
BR1	CIRCUIT BREAKER (1A)	MECH PROD.	4200-002-1	
—	(ALT)	KLIXON	7277-2-1	
BR2	CIRCUIT BREAKER (2A)	MECH PROD	4200-002-2	
—	(ALT)	KLIXON	7277-2-2	
BR3	CIRCUIT BREAKER (3A)	MECH PROD.	4200-002-3	
—	(ALT)	KLIXON	7277-2-3	
BR5	CIRCUIT BREAKER (5A)	MECH PROD.	4200-002-5	
—	(ALT)	KLIXON	7277-2-5	
BR7.5	CIRCUIT BREAKER (7.5A)	MECH PROD.	4200-002-7.5	
—	(ALT)	KLIXON	7277-2-7.5	
BR10	CIRCUIT BREAKER (10A)	MECH PROD.	4200-002-10	
—	(ALT)	KLIXON	7277-2-10	
BR15	CIRCUIT BREAKER (15A)	MECH PROD.	4200-002-15	
—	(ALT)	KLIXON	7277-2-15	
BR20	CIRCUIT BREAKER (20A)	MECH PROD.	4200-002-20	
BR25	CIRCUIT BREAKER (25A)	MECH PROD.	4200-002-25	
BR30	CIRCUIT BREAKER (30A)	MECH PROD.	4200-002-30	
BR35	CIRCUIT BREAKER (35A)	ETA	41-2-S34-LN2-35A	
BR40	CIRCUIT BREAKER (40A)	ETA	41-3-S34-LN2-40A	
—	(ALT)	MECH. PROD.	700-001-40	
BR50	CIRCUIT BREAKER (50A)	ETA	41-2-S34-LN2-50A	
BR70	CIRCUIT BREAKER (70A)	ETA	41-3-S34-LN2-70A	
BS101A	BASE, RELAY	MAGNACRAFT	70-303	
BU2A	BUS BAR (2 PLC)	MOONEY	913127-33	
BU2B	BUS BAR (2 PLC)	MOONEY	913127-97	
BU2C	BUS BAR (2 PLC)	MOONEY	913127-99	
BU2D	BUS BAR (2 PLC)	MOONEY	913127-75	
BU2E	BUS BAR (2 PLC)	MOONEY	913127-65	
BU3A	BUS BAR (3 PLC)	MOONEY	913127-97	
BU3B	BUS BAR (3 PLC)	MOONEY	913127-59	
BU3C	BUS BAR (3 PLC)	MOONEY	913127-79	
BU4A	BUS BAR (4 PLC)	MOONEY	913127-69	
BU4B	BUS BAR (4 PLC)	MOONEY	913127-89	
BU4C	BUS BAR (4 PLC)	MOONEY	913127-5	
BU4D	BUS BAR (4 PLC)	MOONEY	913127-53	
BU5A	BUS BAR (5 PLC)	MOONEY	913127-93	
BU5B	BUS BAR (5 PLC)	MOONEY	913127-77	
BU5C	BUS BAR (5 PLC)	MOONEY	913127-85	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
BU5D	BUS BAR (5 PLC)	MOONEY	913127-19	
BU6A	BUS BAR (6 PLC)	MOONEY	913127-35	
BU6B	BUS BAR (6 PLC)	MOONEY	913127-79	
BU7A	BUS BAR (7 PLC)	MOONEY	913127-81	
BU8A	BUS BAR (8 PLC)	MOONEY	913127-95	
BW3	SWITCH, C/B (3A)	KLIXON	7270-5-3	
BW7.5	SWITCH, C/B (7.5A)	KLIXON	7270-5-7.5	
BW10	SWITCH, C/B (10A)	KLIXON	7270-5-10	
BW15	SWITCH, C/B (15A)	KLIXON	7270-5-15	
BW25	SWITCH, C/B (25A)	KLIXON	7270-5-25	
CA101A	CAPACITOR	MALLORY	CGS302V050R2C	
CA102A	CAPACITOR (1000 PF)	NEWARK	19F2711 TYPE 5GAD10	
CB101A	BLOWER, DEFROSTER	MOONEY	640317-503	
CC101A	MOTOR, COWL FLAP	MOONEY	880050-505	
CC102A	INDICATOR, COWL FLAP	MOONEY	800242-505	
CC103A	SWITCH, COWL FLAP	MOONEY	880052-517	
CC103B	SWITCH, COWL FLAP (J)	MOONEY	12TW1-10	
CC103C	SWITCH, COWL FLAP	MOONEY	880052-117	
CF101A	ACTUATOR, FLAP	MOONEY	750105-501	
CF102A	INDICATOR, TRIM/FLAP	MOONEY	800242-501	
CF103A	INDICATOR, TRIM/FLAP	MOONEY	800376-501	
CF104A	INDICATOR, TRIM/FLAP	MOONEY	800391-502	
CL03A	CLAMP, 3,14,16,26 PIN	AMP	206070-1	
CL03B	CLAMP, 3 PIN		M8049-41-4A	
CL03C	CLAMP, 3 PIN		MS3057-4A	
—	(ALT)		MS3057-4B	
CL04A	CLAMP, 4, 6 PIN	AMP	206062-1	
CL04D	CLAMP, 4 PIN	BENDIX	10-101971-8-3	
CL05A	CLAMP, 5 PIN		MS3057-6A	
—	(ALT)		MS3057-6B	
CL06A	CLAMP, 8 PIN		MS3057-16A	
—	(ALT)		MS3057-16B	
CL07A	CLAMP, 7 PIN		MS3057-12B	
CL09A	CLAMP, 9 PIN	AMP	206956-1	
CL09B	CLAMP, 9 PIN	AMP	P/O 126-222	
CL09C	CLAMP, 9 PIN		DE-24657	
—	RETAINER, LOCK		DE 51224-1	
—	(ALT) RET. LOCK		D110276	
—	(ALT) RET. LOCK		D-20419-16	
CL09D	CLAMP, 9 PIN		DE-19977-5	
—	RETAINER, LOCK		DE-51224-1	
CL15A	CLAMP, 15 PIN		DA51210-1	
—	LOCK RETAINER		DA51220-1	
—	CLAMP, 15 PIN (ALT)		DA19977-1	
CL17A	CLAMP, 17 PIN		DB51212	
	LOCK RETAINER		DB51221-1	
CL25A	CLAMP, 25 PIN		DB51212	
	LOCK RETAINER		DB51221-1	
CL25B	CLAMP, 25 PIN		DB19977-2	
	LOCK RETAINER		DB51221-1	
CL25C	CLAMP, 25 PIN		DB24659	
—	LOCK RETAINER		D-20418-2	
CL32A	CLAMP, 32 PIN		M85049/52-1-22N	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
CL32B		CLAMP/BOOT		MS3420-14	
	—	(ALT)		MS3420-16	
CL37A		CLAMP, 37 PIN		206138-1	
CL37B		CLAMP, 37 PIN		DC19977-3	
	—	LOCK RETAINER		DC51222-1	
CM101A		CURRENT MONITOR	MOONEY	800221-505	
CR101A		SWITCH, RUDDER TRIM (WHITE)	MOONEY	880052-519	
CR101B		SWITCH, RUDDER TRIM (BLACK)	MOONEY	880052-119	
CR102A		MOTOR, RUDDER TRIM	MOONEY	880050-503	
CR103A		INDICATOR, RUDDER	MOONEY	800242-503	
CT101A		SWITCH, TRIM	MIL-S-9419	930023-233	
CT102A		INDICATOR, ELEV. TRIM	MOONEY	800242-519	
CT103A		MOTOR, ELEV. TRIM	S-TEC	01165-0-T14	
CT104A		TRIM INTERFACE	MOONEY	800313-501	
CT105A		INDICATOR, ELEV. TRIM	MOONEY	800391-501	
CV101A		CIRCUIT BREAKER/SWITCH	MOONEY	930023-239	
CV101B		CIRCUIT BREAKER/SWITCH	MOONEY	930023-333	
CV102A		PUMP, STAND-BY VACUUM	AEROSAFE	920804-2	
CV103A		PUMP, STAND-BY VACUUM	AEROSAFE	920804-1	
CV104A		SWITCH/C-B, STAND-BY VACUUM	MOONEY	930023-247	
CV104B		SWITCH/C-B, STAND-BY VACUUM	MOONEY	930023-347	
CV105A		PUMP/CLUTCH ASSY, STDBY VAC.	AIRBORNE	28C214-CW-2	
DA101A		SHUNT, AMMETER	EMPRO	MLA-70A-100MV	
	—	(ALT)	JANCO	8406-70	
DA101B		SHUNT, AMMETER	EMPRO	MLA-150A-100MV	
	—	(ALT)	JANCO	8406-150	
DB101A		TURN COORDINATOR	UI	9013 CODE N.5	
		(ALT)	ASTRONAUTICS	303990-028MSC	
	—	(ALT)	ELEC. GYRO CORP.	1394T100-3Z	
		(ALT)	UI	9114 CODE N.21	
DB102A		TURN COORDINATOR	UI	9112 CODE N.9	
DC101A		PROBE, CHT		MS24462-1	
	—	(ALT)		AN5546-1	
	--	(ALT)	NORWICH	102-00007	
DD101A		INDICATOR, OAT	MOONEY	880059-159	
DD102A		PROBE, OAT	MOONEY	880004-501	
DD103A		SOCKET, 4 PIN	CINCH-JONES	S-304-CCT	
DF101A		XMTR, FUEL, INBD, LH/RH	MOONEY	510242-3	
DF102A		XMTR, FUEL, OUTBD, LH	MOONEY	510243-3	
DF103A		XMTR, FUEL, OUTBD, RH	MOONEY	510243-1	
DF104A		XMTR, FUEL, OUTBD, LH/RH	MOONEY	510242-5	
DF105A		XMTR, FUEL	AVAQ	9450563001	
DF106A		FLOAT/ARM, RH I/B	AVAQ	9400563102	
DF107A		FLOAT/ARM, RH O/B	AVAQ	9400563104	
DF108A		FLOAT/ARM, LH I/B	AVAQ	9400563101	
DF109A		FLOAT/ARM, LH O/B	AVAQ	9400563103	
DF110A		TRANSDUCER	AVAQ	9450563002	
DF111A		PROCESSOR	AVAQ	9450563003	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
DG101A	MODULE, INSTRUMENT	MOONEY	880059-507	
DG102A	MODULE, INSTRUMENT	MOONEY	880059-511	
DG103A	MODULE, INSTRUMENT, #1	MOONEY	880059-513	
DG104A	MODULE, INSTRUMENT, #2	MOONEY	880059-515	
DG105A	MODULE, INSTRUMENT	MOONEY	880059-517	
DG106A	MODULE, INSTRUMENT	MOONEY	880059-519	
DG107A	MODULE, INSTRUMENT, #1	MOONEY	880059-523	
DG108A	MODULE, INSTRUMENT, #2	MOONEY	880059-525	
DG109A	MODULE, INSTRUMENT	MOONEY	880059-521	
DG110A	CLUSTER, D/A	MOONEY	880093-501	
DG111A	CLUSTER, D/A	MOONEY	880093-503	
DG112A	CLUSTER, DIGITAL	MOONEY	880093-505	
DG113A	CLUSTER, DIGITAL	MOONEY	880093-507	
DG114A	CLUSTER, D/A	MOONEY	880093-509	
DG115A	CLUSTER, DIGITAL	MOONEY	880093-511	
DH101A	PROBE, OIL TEMP	MOONEY	880081-501	
DH102A	PROBE, OIL TEMP		MS28034-1	
DI101A	DIODE		1N2483/1N5060	
—	(ALT)	GE	3720-GE	
DI102A	DIODE		10H3P	
—	(ALT)	ECG	5854	
—	(ALT)	NTE	5854	
DI104A	BRIDGE, DIODE	FAGOR	FB5001	
DI105A	BRIDGE, DIODE	FAGOR	FB5006	
DJ101A	XDCR, OIL PRESS	DRUCK	PDCR 821-0662-100	
—	(ALT) (M20J)	KULITE	APT-154-1000-100PSIG	
—	(ALT)	PATRIOT	KA21-014-100G	
DJ101B	XDCR, OIL PRESS (M20M)	KULITE	APT-201-1000-100G	
DK101A	XDCR, FUEL PRESS	DRUCK	PDCR-821-0662-30	
	(ALT)	KULITE	APT-153-1000-30 PSIG	
DK102A	XDCR, FUEL PRESS	DRUCK	PDCR-920-U143-50 PSID	
—	(ALT)	KULITE	APT-155-1000-50D	
—	(ALT)	PATRIOT	KA21-016-50D	
DL101A	TACHOMETER	MOONEY	880039-515	
—	(OPTIONAL)	B&D	0520-003	
DL102A	SENSOR, TACH	B&D	0400-004	
DL103A	TACHOMETER	MOONEY	880039-517	
—	(OPTIONAL)	B&D	0520-006	
DL104A	SENSOR, TACH (SLICK)	B&D	0402-102	
DL104B	SENSOR, TACH (BENDIX)	B&D	0402-104	
DL104C	SENSOR, TACH (BENDIX)	B&D	0406-004	
DL104D	SENSOR, TACH (SLICK)	B&D	0406-003	
DL105A	TACHOMETER	MOONEY	880039-519	
DL106A	TACHOMETER	MOONEY	880039-523	
DL107A	SENSOR, TACH (SLICK)	J-P INSTR.	420809	
DL108A	SENSOR, TACH (BENDIX)	J-P INSTR.	420807	
DM101A	HOUR METER	MOONEY	880035-507	
DM102A	HOUR METER	MOONEY	880035-505	
DM103A	HOUR METER	HOBBS	15006	
	(ALT)	DATCON	SG-70	
DM104A	HOUR METER	HOBBS	85000	
—	(ALT)	HOBBS	15000	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
DP101A		C/B	MOONEY	930023-205	
DP101B		C/B	MOONEY	930023-305	
DP101C		C/B	MOONEY	930023-353	
DP102A		PITOT, HEATED	AERO INSTR	PH502-12	
	—	(ALT)		AN5812	
DP103A		PITOT, HEATED	AERO INSTR	PH502-12	
	—	(ALT)		AN5812	
DP104A		PLUG		AN3115-1	
DP105A		SOCKET		AN3116-1	
DR101A		PROBE, TIT	MOONEY	880055-503	
DR101B		PROBE, TIT	MOONEY	880055-505	
DT101A		INDICATOR, EGT	ALCOR	46361	
DT101B		INDICATOR, EGT	ALCOR	OEM-46161	
DT102A		SWITCH, EGT (4 POSITION)	ALCOR	OEM-80825	
DT103A		PROBE, EGT	MOONEY	66D110-000	
	—	(ALT)	ALCOR	86225	
DT104A		LIGHT TRAY (28V)	ALCOR	41338	
DT105A		LIGHT TRAY (14V)	ALCOR	41337	
DU105A		TRANSDUCER, MAP	KULITE	APT-231-1000-25A	
	---	(ALT)	PATRIOT	KA21-015-25A	
	---	(ALT)	PATRIOT	SP100-110-25A	
DV101A		INDICATOR, FUEL FLOW	MOONEY	880034-501	
	—	(OPTIONAL)	MOONEY	880034-503	
	—	(OPTIONAL)	MOONEY	880034-505	
DV101B		INDICATOR, FUEL FLOW	SHADIN	912041TD	1
DV102A		TRANSDUCER, FUEL FLOW	MOONEY	880030-501	
	—	(OPTIONAL)	MOONEY	880030-503	
DV102B		TRANSDUCER, FUEL FLOW	SHADIN	680501B	
EG101A		ACTUATOR, LDG	MOONEY	880037-507	
	--	(ALT)	MOONEY	560254-503	
	--	(ALT)	MOONEY	560254-507	
EG102A		ACTUATOR, LDG	MOONEY	880037-501	
	—	(ALT)	MOONEY	560254-501	
EG103A		ACTUATOR, LDG	MOONEY	560254-505	
EG104A		SWITCH, AIRSPEED	MOONEY	880013-507	
ET101A		SWITCH, ELT PANEL	ARTEX	110-416	
ET102A		TRANSMITTER, ELT	ARTEX	453-0150	
ET103A		CABLE ASSY, REMOTE	AMERI-KING	4500041	
ET104A		REMOTE UNIT ASSY	AMERI-KING	450004	
	—	(OPTIONAL)	AMERI-KING	450004-1V/-1H	
ET105A		MAIN UNIT ASSY.	AMERI-KING	AK-450	
FH101A		FUSE HOLDER	LITTEL FUSE	155020	
	—	(ALT)	LITTEL FUSE	155120	
FH102A		FUSE HOLDER	McGRAW EDISON	FHN42W	
FN101A		JACK, PHONE	SWITCHCRAFT	C-11	
	--	WASHERS	SWITCHCRAFT	S-1028/S-1029	
FN102A		JACK, PHONE	SWITCHCRAFT	C-112B	
	--	WASHERS	SWITCHCRAFT	S-1028/S-1029	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
FU101A		FUSE (1 AMP)	LITTEL	313001	
FU102A		FUSE (5 AMP - 3AG-SLO-BLO)	LITTEL	313005	
FU103A		FUSE (10 AMP, SLO-BLO)	LITTEL	313010	
FU104A		FUSE (5 AMP)	McGRAW-EDISON	FM01-5A	
FU105A		FUSE (0.5 AMP)	McGRAW-EDISON	FM01-.50A	
FU106A		FUSE (2 A MP)	LITTEL		
JE101A		CONTROL, IGNITION	LASAR (SLICK)	CD-1001-02	
JE102A		CABLE	LASAR (SLICK)	CH-1001-XX	
JE103A		MAGNETO, LEFT	SLICK (LASAR)	CD-4771	
JE104A		MAGNETO, RIGHT	SLICK (LAZAR)	CD4770	
JM101A		SWITCH, IGNITION	BENDIX SCINTILLA	10-357210-9	
	—	/PLACARD	BENDIX SCINTILLA	10-187-468	
	—	/LUG, TERMINAL	BENDIX SCINTILLA	10-126656	
JM101B		SWITCH, IGNITION (INCL CONN.)	JANCO	97-2273-1	
JM102A		MAGNETO	BENDIX SCINTILLA	D4LN2021	
	—	(ALT)	BENDIX SCINTILLA	D4LN3000	
	—	(ALT)	LYCOMING	LW-682555-11	
JM103A		PLUG, MAGNETO	BENDIX SCINTILLA	10-382698	
JM104A		MAGNETO	SLICK	6224	
JM105A		MAGNETO, LEFT	SLICK	6261	
JM106A		MAGNETO, RIGHT	SLICK	6260	
JM107A		SWITCH, IGNITION	BENDIX-SCINTILLA	10-357240-1	
JM108A		MAGNETO, LEFT	SLICK	6393	
JM109A		MAGNETO, RIGHT	SLICK	6350	
JM110A		IGNITION, PULSAR	MOONEY	800315-501	
JM111A		MAGNETO, L & R	TCM/BENDIX	10-79020-10	
JM113A		MAGNETO, L & R	TCM	640895-1	
	—	MAGNETO, L & R (OPT.)	BENDIX	10-79020-120	
LA101A		LIGHT BULB, 28V	GE	400	
LA102A		LIGHT BULB, 14V	GE	168-T-3 1/4	
LA103A		LIGHT BULB	GE	385	
LA104A		LIGHT BULB	GE	930	
LA105A		LIGHT BULB	CHICAGO MINI	CM7-7930	
LA106A		LIGHT BULB	CHICAGO MINI	CM7-7927	
LA107A		LIGHT BULB	GE	370	
LA108A		LIGHT BULB	GE	1816	
LA109A		LIGHT BULB	GE	AVIA. RED, 327	
LA110A		LIGHT BULB	GE	327	
LA111A		LIGHT BULB	GE	1818	
LA112A		LIGHT BULB	GE	1495	
LA113A		LIGHT BULB	GE	4596	
LA114A		LIGHT BULB	PACIFIC PREC. PROD	P28029	
LA115A		LED	MOUSER	351-0003	
LB101A		C/B-SW, BEACON, WHITE	MOONEY	830023-243	
LB101B		C/B-SW, BEACON, BLACK	MOONEY	830023-343	
LB102A		BEACON, ROTATING	WHELEN	WRML-28	
		/ADAPTER	WHELEN	WRML-65	
LB102B		LIGHT, ANTI-COLLISION (RED)	WHELEN	90093-19	
LB102C		LIGHT, ANTI-COLLISION (WHITE)	WHELEN	90093-20	
LC101A		CONTROL BOX, LIGHT	MOONEY	800268-509	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
LE101A		LENS, ANNUNC. (US) (M20J)	MOONEY	880049-613	
LE102A		LENS, ANNUNC. (FRANCE) (M20J)	MOONEY	880049-615	
LE103A		LENS, ANNUNC. (US) (M20M)	MOONEY	880049-617	
LE104A		LENS, ANNUNC. (FRANCE) (M20M)	MOONEY	880049-619	
LE105A		LENS, ANNUNC. (M20T)	MOONEY	880049-621	
LE106A		LENS, ANNUNC. (M20T)	MOONEY	880049-623	
LE107A		LENS, ANNUNC. (US) (M20J)	MOONEY	880044-633	
LE108A		LENS, ANNUNC. (FRANCE) (M20J)	MOONEY	880044-635	
LE109A		LENS, ANNUNC. (US) (M20R)	MOONEY	880049-625	
LE110A		LENS, ANNUNC. (FRANCE) (M20R)	MOONEY	880049-627	
LE111A		LENS, ANNUNC. (US) (M20R)	MOONEY	880049-629	
LE112A		LENS, ANNUNC. (FRANCE) (M20R)	MOONEY	880049-631	
LE113A		LENS, ANNUNC. (US) (M20K)	MOONEY	880049-605	
LE114A		LENS, ANNUNC. (US) (M20K)	MOONEY	880049-607	
LE115A		LENS, ANNUNC. (M20K)	MOONEY	880089-001	
LE116A		LENS, ANNUNC.	SLOANE	855-SE-C	
LE117A		LENS, ANNUNC. (M20J)	MOONEY	880089-003	
LE119A		LENS, MASTER WARN	MOONEY	150080-6097	
LG101A		CIRCUIT BREAKER, LOGO LIGHT	MOONEY	930023-357	
LG102A		LIGHT, LOGO	WHELEN	A730-1-28	
LH101A		LAMP HOLDER	MOONEY	914083-1	
LH102A		LAMP HOLDER	DIALIGHT	270-1930-0171-702	
LH103A		LAMP HOLDER	WHELEN	A-350-CN-CL-BK-SH-28	
LH104A		LAMP HOLDER	SLOAN	855S-O-U	2
LH105A		LAMP HOLDER	INSTRUMENTS	0211-128	
LH106A		LAMP HOLDER	INSTRUMENTS	BA28-24-BW3	
LH107A		LAMP HOLDER	SIGMA-TEC	1V-192-971	
LH108A		LAMP HOLDER	HH SMITH	1930	
	—	(ALT)	LEECRAFT	7-05	
	—	(ALT)	ALLIED	931-3103	
	—	(ALT)	SPC	LSL-11-128U	
	—	(ALT)	NEWARK	81N2561	
LH109A		LAMP HOLDER	HH SMITH	1925	
LH110A		LAMP HOLDER	WHELEN	01-0770437-00	
LH111A		LAMP HOLDER	TEK-LITE	LC-2B-5	
	—	(ALT)		MS1745-51A	
LH112A		LAMP HOLDER	WHELEN	01-077-0142-04	
LH113A		LAMP HOLDER	MOUSER	351-0003	
LL101A		SWITCH, LDG LIGHT	MOONEY	880052-521	
LL101B		SWITCH, LDG LIGHT	MOONEY	880052-121	
LL102A		BULB, LIGHT, LDG/TAXI	GE	4596	
LL103A		BULB, LIGHT, LDG/TAXI	GE	4509	
LN101A		CIRCUIT BREAKER	MOONEY	930023-251	
LN101B		C/B	MOONEY	930023-351	
LN102A		LIGHT, NAV. (TAIL)	MOONEY	800051-501	
LN102A		LIGHT, NAV. (TAIL)	MOONEY	800051-509	
LP101A		DIMMER, BOX	MOONEY	800299-501	
LP102A		DIMMER, CONTROL BOX	MOONEY	800299-503	
LP103A		DIMMER, CONTROL BOX	MOONEY	800299-505	
LP104A		SWITCH, O/H LIGHT ASSY	MOONEY	150085-005	
LP105A		INVERTER, E-L PLACARD	ERG	LPS26-3-3P	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
LR101A	C/B	MOONEY	930023-231	
LR101B	C/B	MOONEY	930023-331	
LR102A	LIGHT, RECOGNITION	MOONEY	880049-501	
LS101A	CIRCUIT BREAKER	MOONEY	930023-237	
LS101B	CIRCUIT BREAKER	MOONEY	930023-337	
LS102A	POWER SUPPLY, STROBE	WHELEN	01-0770329-00	
LS102B	POWER SUPPLY, STROBE	WHELEN	01-0770329-01	
LS103A	LIGHT, STROBE-LT WING	WHELEN	01-0770054-12	
LS104A	LIGHT, STROBE-RT WING	WHELEN	01-0770054-13	
LS105A	LIGHT, STROBE, TAIL	MOONEY	470013-501	
LS106A	LIGHT, STROBE, DUAL	WHELEN	A413A-HDA-CF	
LT101A	SWITCH, TAXI LIGHT	MOONEY	880052-529	
LT101B	SWITCH, TAXI LIGHT	MOONEY	880052-128	
LT102A	BULB, LIGHT, TAXI, LH & RH	GE	4596	
MA101A	RECEPTACLE, AUX. POWER		AN2552-3A	
—	(ALT)		MS3503-1	
MB101A	C/B-SWITCH, RADIO MASTER (WHT)	MOONEY	930023-213	
MB101B	C/B-SWITCH, RADIO MASTER (BLK)	MOONEY	930023-313	
MC101A	LIGHTER, CIGAR	MOONEY	800336-503	
MC102A	CAP & TETHER	CASCO	216550	
MC103A	LIGHTER, SOCKET	CASCO	216510	
—	(ALT) w/WIRE	CASCO	200402	
ME101A	CLOCK	MID-CONT.	MD-89	
—	(ALT)	PORSCHE	944.641.213.00	
ME102A	CONNECTOR, 4 PIN	MID-CONT	6016177	
—	PINS	MID-CONT	6016125	
—	(OPT)	PORSCHE	944.612 217.00	
—	(OPT) PINS	PORSCHE	999.652.351.12	
MK101A	JACK, MICROPHONE	SWITCHCRAFT	C-12B	
...	WASHERS	SWITCHCRAFT	S-1026	
—	WASHERS	SWITCHCRAFT	S-1029	
MP101A	C/B-SW, PROP DE-ICE (WHITE)	MOONEY	930023-245	
MP101B	C/B-SW, PROP DE-ICE (BLK)	MOONEY	930023-345	
MP102A	TIMER, PROP DE-ICE	BF GOODRICH	9E1889-1	
MP102B	TIMER, PROP DE-ICE	McCAULEY	B-45018	
MP103A	TERMINAL BLOCK	McCAULEY	C-40521	
NF101A	SW/C-B, LOW BOOST FUEL PUMP	MOONEY	930023-211	
NF101B	SW/C-B	MOONEY	930023-311	
NF102A	PUMP, FUEL BOOST	WELDON	A8163B	
—	(ALT)	WELDON	8163B	
NF103A	PUMP, FUEL BOOST	WELDON	8163A	
—	(ALT)	WELDON	A8163A	
NF104A	PUMP, FUEL BOOST (M20K)	WELDON	10054B	
NF105A	PUMP, FUEL BOOST	WELDON	A10051-D	
NF106A	PUMP, FUEL BOOST	WELDON	A8152-B	
NF108A	(ALT)	MASSEY	VR636	
NF108B	REGULATOR, FUEL PUMP	MOONEY	800270-523A	
NF109A	SW/C-B, HI-BOOST FUEL PUMP	MOONEY	930023-219	
NF110A	GUARD ASSY, HI-BOOST SW.	MOONEY	930028-501	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
PA101A	REGULATOR, VOLTAGE	MOONEY	800270-501	
—	(ALT)	AMPROD/PRECISE FLT	DGR-2	
	(ALT)	AUXILEC/ELECTODELTA	VR-502	
PA102A	SWITCH, ALT'NTR FIELD (DUAL)	MOONEY	880052-525	
PA103A	SWITCH, ALT'NTR. FIELD (SINGLE)	MOONEY	880052-503	
PA104A	ALTERNATOR	LYCOMING	LW-14367	
—	(ALT)	PRESTOLITE	ALU-5421-LS	
PA105A	ALTERNATOR	LYCOMING	LW-15404	
—	(ALT)	PRESTOLITE	ALY-8420	
PA106A	ALTERNATOR, RIGHT	TCM	649719	
—	(ALT)	TCM	649280	
—	GEAR ASSY	TCM	649123	
PA107A	ALTERNATOR	ELECTRO SYSTEMS	ES-4009-LS	
---	KIT, INSTALL (REFERENCE 600180)	LYCOMING	05K-21065	
PA108A	FILTER	MOONEY	880014-501	
—	(ALT)	MOONEY	800307-501	
PA109A	SENSOR, CURRENT	MICRO SWITCH	CSLA1GE	
PA110A	REGULATOR, VOLTAGE	MOONEY	800270-503	
PA111A	SENSOR, CURRENT (110A)	KLIXON	7235-1-110	
PA111B	SENSOR, CURRENT (175A)	KLIXON	7235-1-175	
PA112A	ALTERNATOR	TCM	649304	
PA113A	MONITOR, CURRENT	MOONEY	800267-501	
PA114A	ALTERNATOR, LEFT	TCM	649172	
—	(ALT)	TCM	649288	
PB101A	BATTERY	GILL	G-243	
PB102A	SWITCH, MASTER	MOONEY	880052-501	
PB102B	SWITCH, MASTER	MOONEY	880052-101	
PB103A	SWITCH, BAT 1-2	MOONEY	880052-527	
PB103B	SWITCH, BAT 1-2	MOONEY	880052-127	
PB105A	BATTERY, 24V	CONCORDE	RG24-11M	
PB105B	BATTERY, 24V	CONCORDE	RG24-15	
PL01A	PLUG, 1 PIN	AMP	1-480349-0	
PL02A	PLUG, 2 PIN	AMP	1-480318-0	
PL02B	PLUG, 2 PIN	MOLEX	03-06-1023	
PL02C	PLUG, 2 PIN (FEMALE)	DEAN	7021	4
PL02D	PLUG, 2 PIN		MS3106A-24-9S	
PL03A	PLUG, 3 PIN	AMP	1-380303-0	
PL03B	PLUG, 3 PIN	AMP	206037-2	
PL03C	PLUG, 3 PIN		MS3106A-10SL-3S	
PL03D	PLUG, 3 PIN		MS3106A-22-6P	
PL03E	PLUG, 3 PIN	ARRAY	PWF06F08-33B	
---	SOCKET (ALUMEL)	CDI	01-2020-245	
---	SOCKET (ALUMEL)	CDI	01-2020-244	
PL04A	PLUG, 4 PIN	AMP	206060-1	
PL04B	PLUG, 4 PIN		MS3106A-32-17S	
PL04C	PLUG, 4 PIN	AMP	1-480424-0	
PL04D	PLUG, 4 PIN	ARRAY CONN	PW06F6-4S	
PL05A	PLUG, 5 PIN		MS3106A-14S-5S	
PL05B	PLUG, 5 PIN	DEUTSCH	BVD06E0205SN	
PL06A	PLUG, 6 PIN	MATRIX SCIENT.	MS3106A-28-22S	
PL07A	PLUG, 7 PIN		MS3106A-20-15S	
—	(ALT)		MS3106R-20-15S	
PL08A	PLUG, 8 PIN	AMP	205833-1	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
PL09A	PLUG, 9 PIN	AMP	206708-1	
PL09B	PLUG, 9 PIN	AMP	126-222	
PL09C	PLUG, 9 PIN		DE9S	
PL09D	PLUG, 9 PIN	MOLEX	03-06-2092	
PL09E	PLUG, 9 PIN	AMP	206485-1	
PL14A	PLUG, 14 PIN	MOONEY	930021-1	
PL14B	PLUG, 14 PIN	MOONEY	930021-513	
PL14C	PLUG, 14 PIN	AMP	206043-3	
PL15A	PLUG, 15 PIN		DA15S	
PL16A	PLUG, 16 PIN	AMP	206037-1	
PL17A	PLUG, 17 PIN		DBM17W2S	
PL20A	PLUG, 20 PIN	MOONEY	930021-501	
PL20B	PLUG, 20 PIN	POSITRONICS	CC148-003-0.00	
PL20C	PLUG, 20 PIN	POSITRONICS	CC149-003-0.00	
PL25A	PLUG, 25 PIN		DB25S	
PL25B	PLUG, 25 PIN	AMP	205208-1	
PL26A	PLUG, 26 PIN	MOONEY	930021-505	
PL26A	PLUG, 26 PIN	AMP	205839-3	
PL32A	PLUG, 32 PIN		M83723/86R2232N	
PL34A	PLUG, 34 PIN	MOONEY	930021-507	
PL34B	PLUG, 34 PIN	MOONEY	930021-515	
PL37A	PLUG, 37 PIN	AMP	206150-1	
PL37B	PLUG, 37 PIN		DC37S	
PL50	PLUG, 50 PIN	MOONEY	930021-511	
PL104A	PLUG, 104 PIN	POSITRONICS	GMCT104F0TH000	
PS101A	C/B, START POWER	KLIXON	7277-2-10	
PS102A	C/B, START POWER	KLIXON	7277-2-5	
PS103A	STARTER (M20J)	PRESTOLITE	MHB4016	
—	(ALT)	LYCOMING	LW-15572	
PS104A	STARTER (M20K & M20R)	TCM	646275	
—	(ALT)	TCM	637647	
PS105A	STARTER (M20M)	B & C	BSC206-149	
RB101A	BLOWER, RADIO	KING	071-4037-01	
RB102A	BLOWER RADIO	GLOBE	19A2790	
RC01A	RECEPTACLE, 1 PIN	AMP	1-480351-0	
RC02A	RECEPTACLE, 2 PIN	AMP	1-480319-0	
RC02C	RECEPTACLE, 2 PIN (MALE)	DEAN	7022	4
RC02D	RECEPTACLE, 2 PIN		MS3100-24-9P	
RC02E	RECEPTACLE, 2 PIN	MOLEX	03-06-2023	
RC03A	RECEPTACLE, 3 PIN	AMP	1-480305-0	
RC03B	RECEPTACLE, 3 PIN	AMP	206036-2	
RC03C	RECEPTACLE, 3 PIN	AMP	206207-1	
RC03D	RECEPTACLE, 3 PIN		MS3100-2B-6S	
RC04A	RECEPTACLE, 4 PIN	AMP	206153-1	
RC04B	RECEPTACLE, 4 PIN		MS100-32-17P	
RC04C	RECEPTACLE, 4 PIN	AMP	1-480426-0	
RC04D	RECEPTACLE, 4 PIN	ARRAY	PW01F8-04P	
RC05B	RECEPTACLE, 5 PIN	DEUTSCH	BVD04E0205PN	
RC06A	RECEPTACLE, 6 PIN	MATRIX SCIENCE	MS3100C-28-22P	
RC08A	RECEPTACLE, 8 PIN	AMP	205941-2	
RC09A	RECEPTACLE, 9 PIN	AMP	206705-2	
RC09B	RECEPTACLE, 9 PIN	AMP	206705-1	
RC09C	RECEPTACLE, 9 PIN		DE9P	
RC09E	RECEPTACLE, 9 PIN	AMP	205486-1	
RC12A	RECEPTACLE, 12 PIN	MOLEX	03-06-2122	
RC14A	RECEPTACLE, 14 PIN	MOONEY	930021-2	

ELECTRICAL EQUIPMENT CHART

CODE		DESCRIPTION	VENDOR	PART NO.	NOTES
RC14B		RECEPTACLE, 14 PIN	AMP	203540-1	
	---	(ALT)	POSITRONIC	G14000H000-1285.0	
RC14C		RECEPTACLE, 14 PIN	AMP	206044-1	
RC16A		RECEPTACLE, 16 PIN	AMP	206036-2	
RC16B		RECEPTACLE, 16 PIN	AMP	206036-1	
RC20A		RECEPTACLE, 20 PIN	MOONEY	930021-502	
RC20B		RECEPTACLE, 20 PIN	POSITRONICS	GMCT2M0E100J0	
RC26A		RECEPTACLE, 26 PIN	MOONEY	930021-506	
RC28A		RECEPTACLE, 28 PIN	AMP	206152-1	
RC32A		RECEPTACLE, 32 PIN	MATRIX SCIENCE	M83723/83K2232N	
RC34A		RECEPTACLE, 34 PIN	MOONEY	930021-508	
RC34B		RECEPTACLE, 34 PIN	AMP	204814-1	
	—	(ALT)	POSITRONIC	SK2114	
RC37A		RECEPTACLE, 37 PIN	AMP	206151-1	
RC104A		RECEPTACLE, 104 PIN	POSITRONICS	GMCT1D4M0000Z0	
RC170A		RECEPTACLE, 170 PIN	HYPERTRONICS	NEBV23-077	
	---	SOCKETS (22GA)	HYPERTRONICS	YSK006-011	
	---	SOCKETS (20-18 GA)	HYPERTRONICS	YSK006-089	
	---	SOCKETS (20-14GA)	HYPERTRONICS	YSK015-025AH	
RL101A		RELAY, 28V/200A	KISSLING	26.57.01	
	—	(ALT)	KISSLING	26.57.02	
	—	(ALT) (OBSOLETE)	C-H	6041H-202/202A	
RL102A		RELAY, 14V/200A	C-H	6041H-105A	
RL103A		RELAY	KISSLING	26.64.01	
RL104A		RELAY	KISSLING	26.64.21	
RL105A		RELAY, 28V/60A	KISSLING	26.72.03	
	—	BRACKET (2 REQ'D.)	MOONEY	900375-1	
	---	(ALT)	C-H	6041H-220	
RL106A		RELAY, 28V/100A	C-H	6041H-53	
RL107A		RELAY 14V/200A	C-H	6041H-105R	
RL108A		RELAY	MAGNACRAFT	W67RCSX-3	
RL109A		RELAY	KISSLING	28.08.01	
RL110A		RELAY	P&B	VF4-15-H11	
	—	SOCKET	P&B	VCF4-1002	
	—	TERMINAL	P&B	28A1348C	
RS101A		RESISTOR, 20-OHM/10W	DALE	RH-10-20 OHM	
RS102A		RESISTOR, 5 OHM/10W	DALE	RH-10-5 OHM	
RS103A		RESISTOR, 500 OHM	MOONEY	919029-501	
RS104A		RESISTOR, 100 OHM	NEWARK	09F978	
RS105A		RESISTOR, 7.5-OHM	DALE	RH-50-7.5 OHM	
RS106A		RESISTOR, 1K OHM/2W	ALLEN BRADLEY	RC42-GF102J	
RS107A		RESISTOR, 5K OHM	SPECTROL	158-506502	3D
RS115A		RESISTOR	OHMITE	1.6K OHM/1/2W	
RS116A		RESISTOR	OHMITE	1.0 OHM/1/8W	
SA101A		ALTERNATOR, STAND-BY	B&C	BC410-1	
	—	HOUSING, PLASTIC CONNECTOR	B&C	12-003	
	—	TERMINAL, 1/4 INCH	B&C	14-026	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
SA102A	CONTROLLER, STBY ALTERNATOR B&C		BC203-2	
SA103A	SWITCH, STBY ALT./EMERG BUS MOONEY		880052-531	
SB101A	C/B, SPEEDBRAKE	KLIXON	7277-2-3	
SB102A	SWITCH, SPEEDBRAKE, YOKE	PRECISE FLT	01265	
SB103A	RELAY, SPEEDBRAKE	PRECISE FLT	01364	
SB104A	DIODE, SPEEDBRAKE		1N2483/1N5060	
—	(ALT)	GE	3720-GE	
SB105A	MOTOR, SPEEDBRAKE	PRECISE FLT	01532	
SB106A	SWITCH, SPEEDBRAKE	PRECISE FLT	01505	
SB107A	SOLENOID, CLUTCH, SPEEDBRK	PRECISE FLT	01678	
SB108A	S/B INTERFACE	MOONEY	800314-501	
SP101A	SPEAKER, ALERT	ARCHER	40-1333C	
SP102A	SPEAKER, CABIN	ARCHER	40-1325	
---	(ALT)	BLAUPUNKT	PCx352	
SP103A	SONALERT	MALLORY	SC628	
SW101A	SWITCH	MICRO	1SE1-T	5
---	(ALT)	SAINT	ZS-1009	
SW102A	SWITCH, DEFROSTER BLWR	CHERRY	E51-50B	
SW103A	SWITCH	MICRO	V3-1	
SW104A	SWITCH, UP-LIMIT	MICRO	DT-2R-47	
—	(ALT)	SAINT	ML-1409	
SW105A	SWITCH, DN-LIMIT	MICRO	1CH116-6	
—	(ALT)	OTTO CONT.	P6-24014	
SW106A	SWITCH	CARLING	RC911-VBBOW	
SW107A	SWITCH	MOONEY	880013-507	
SW108A	SWITCH	C-H	8906K2875	
SW109A	SWITCH	C-H	SA1RV20	
—	(ALT)	ALCO	MPE-108F-C-22-9	
SW110A	SWITCH	GRAYHILL	71AD30-02-2-AJN	
SW111A	SWITCH	C-H	8906K4731	
SW112A	SWITCH	CARLING	RA911-VBBOW	
SW113A	SWITCH	MICRO	12TW-10	
—	SWITCH, WHITE CAP	MICRO	15PA90-BW	
—	(AKT)		MS27753-3B	
SW114A	SWITCH	C & K	7101K	
SW115A	SWITCH	NKK	DLB241-W01-L3C/	
	INCLUDES - BUTTON, LOCKRING, LOCKWASHER, HEX NUT (2)		AT506M/AT503MB	
---	(ALT)	C-H	SB1DDX492-2	
	LOCK RING	C-H	29-761	
	LOCK WASHER	C-H	16-686	
	HEX NUT (2)	C-H	15-966-5	
—	(ALT)	TSCHUDIN	504102	
	LENS	TSCHUDIN	464415	
	BULB	TSCHUDIN	590002	
SW116A	SWITCH	MOONEY	880012-501	
SW117A	SWITCH	CARLING	TILC64-1S-WHFN	
SW118A	SWITCH	MOONEY	880062-501	
SW119A	SWITCH	CARLING	TIGM64-1S-WHEN	
SW120A	SWITCH		MS35058-22	
SW121A	SWITCH	CROUZET	83-450-001	
SW122A	SWITCH	CROUZET	83-452-504	
SW123A	SWITCH	ALCO	MPE108F	
SW124A	SWITCH			
SW125A	SWITCH	NKK	MB2085SB1WD1-EA	
SW126A	SWITCH	EATON	1501-11E	

ELECTRICAL EQUIPMENT CHART

CODE	DESCRIPTION	VENDOR	PART NO.	NOTES
SW127A	SWITCH, MASTER WARN	OMRON	A3BA-7011-1	
—	SW. (w/ LENS)	OMRON	A3BA-500R	
—	SW. (w/ LEGEND)	OMRON	A3BA-5202	
—	SW. (w/ BULB)	OMRON	A3B-026	
SW135A	SWITCH	NKK	MB2086SB1W01-EA	
VC101A	VOLTAGE CONVERTER, 28-14	TERRA	MLC28-5	
—	(ALT)	TERRA	C28-5	
VR101A	VARISTOR	GE	V47ZA05	
WM101A	WARNING, MASTER	MICRO	DSK-104-GYR	
WM102A	WARNING, MASTER	MICRO	DSB-11-RRRR-LR2	
WS101A	ALERT, STALL/GEAR WARN	IAI	950D309-000	
—	(ALT)	IAI	950D519-000	
WS109A	SWITCH, STALL WARN	MOONEY	800364-509	
WT101A	ANNUNCIATOR	MOONEY	880048-501	
WT101B	ANNUNCIATOR	MOONEY	880090-XXX	6
WT102A	ANNUNCIATOR	MOONEY	880048-503	
WT103A	ANNUNCIATOR	MOONEY	880048-507	
WT104A	ANNUNCIATOR	MOONEY	880048-509	

NOTES:

1. ALL P/N's ARE ACCEPTABLE. SEE VENDOR INFORMATION FOR APPLICABLE CONFIGURATION.
2. 1 EACH MS35334-21 OR M2998 (ALLEN BRADLEY) INTERNAL TOOTH LOCKWASHER, REQUIRED WITH EACH LIGHT, IF NOT SUPPIED BY SLOAN
3. SEAL BACK OF POTENTIOMETER WITH DOW CORNING #738 ELECTRICAL SEALANT AFTER WIRES ARE SOLDERED TO TERMINALS.
4. PL02C & RC02C MAY BE PURCHASED FROM DEAN AS P/N 7020.
5. SEAL BACK OF SWITCH WITH DOW CORNING #738 ELECTRICAL SEALANT AFTER WIRES ARE SOLDERED TO TERMINALS WHEN USED AS "THROTTLE SWITCH-GEAR WARNING".
6. ANNUCIATOR P/N WILL BE DETERMINED BY OPTIONS INSTALLED. REF. DRAWING # 880090.

RESERVED FOR FUTURE ENTRIES

RESERVED FOR FUTURE ENTRIES

RESERVED FOR FUTURE ENTRIES

91-30-00 - ELECTRICAL SYSTEM SCHEMATICS (SEE ENVELOPES)

CHAPTER 95

SPECIAL

EQUIPMENT

CURRENTLY NOT BEING USED

INTENTIONALLY

LEFT

BLANK