GRUMMAN AMERICAN

Models
AA-1, AA-1A & AA-1B

THIS MANUAL SUPERSEDES ALL PREVIOUS AA-1, AA-1A & AA-1B MANUALS

WHERE THIS MANUAL REFERS TO A SPECIFIC MODEL IT WILL BE DESIGNATED AS FOLLOWS:

AA-1 DESIGNATES THE YANKEE
AA-1A DESIGNATES THE TRAINER (1971)
AA-1A DESIGNATES THE TRAINER AND THE TR-2 (1972)
AA-1B DESIGNATES THE TRAINER AND THE TR-2 (1973 & ON)

SERVICE MANUAL

SEPTEMBER 1975

GRUMMAN AMERICAN AVIATION CORPORATION
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GRUMMAN AMERICAN

SERVICE MANUAL

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GENERAL

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1 GENERAL

1-00 INTRODUCTION

This manual contains service information to be used by qualified service personnel in the service and maintenance of the Grumman American Aviation Model AA-1, AA-1A and AA-1B. The information contained in this manual supplements AC 43.13-1, "Aircraft Inspection and Repair Manual," published by the Federal Aviation Administration (formerly Civil Aeronautics Manual 18).

1-10 GENERAL DESCRIPTION

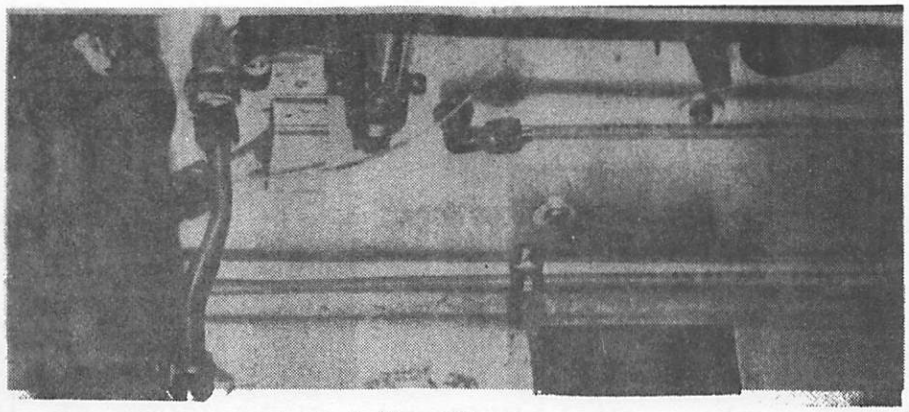
The AA-1, AA-1A and AA-1B are single-engine, low wing, tricycle gear, two place aircraft. They feature horizontally opposed, air-cooled, 108 horsepower Lycoming engines and all-metal bonded construction. The fuselages are one piece bonded aluminum assemblies using 1/2" thick aluminum honeycomb panels in the cabin area for maximum strength. All major airframe components are bonded assemblies which are bolted to the fuselage to provide easy servicing. A sliding plexiglas canopy provides easy access and good visibility.

CROSS REFERENCE

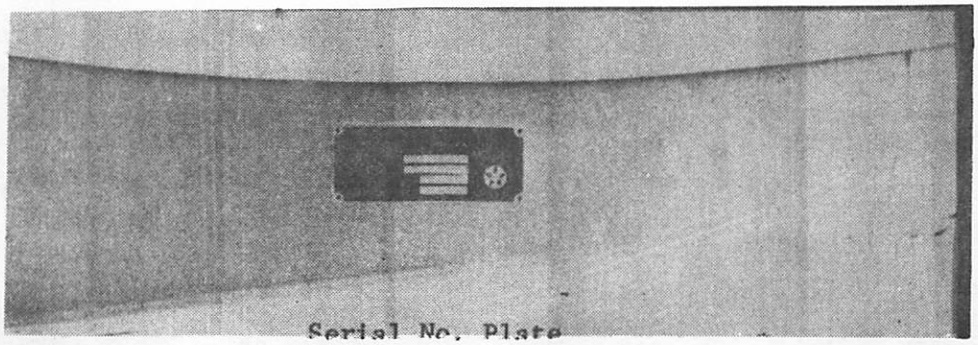
NAME, MODEL DESIGNATION AND EFFECTIVE SERIAL RANGES

Grumman American Aviation aircraft are certified under model number designations. For marketing purposes, each model is also given a name. The aircraft model number is used in this publication except where the name is necessary to differentiate between versions of the same basic model. The following table contains a listing of name, model year, model number, and serial range.

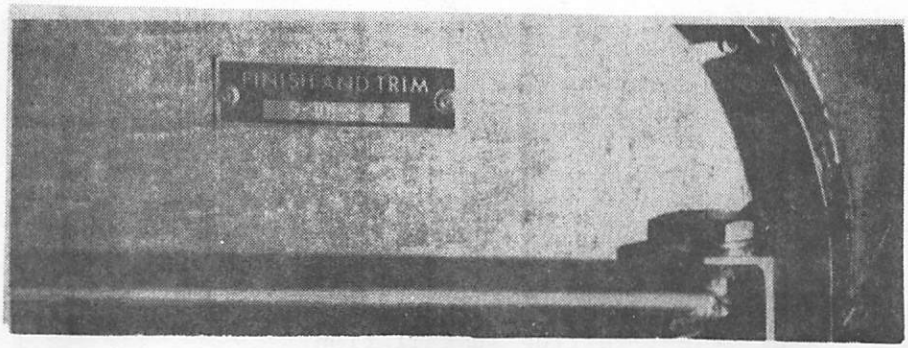
POPULAR NAME	MODEL YEAR	MODEL	SERIALS BEGINNING	SERIALS ENDING
YANKEE	1969	AA-1	AA1-0001	AA1-0175
YANKEE	1970	AA-1	AA1-0176	AA1-0432
YANKEE	1971	AA-1	AA1-0433	AA1-0458
YANKEE	1972	AA-1	AA1-0459	AA1-0459
TRAINER	1971	AA-1A	AA1A-0001	AA1A-0245
TRAINER or TR-2	1972	AA-1A	AA1A-0246	AA1A-0470
TRAINER or TR-2	1973	AA-1B	AA1B-0001	AA1B-0237
TRAINER or TR-2	1974	AA-1B	AA1B-0238	AA1B-0445
TRAINER or TR-2	1975	AA-1B	AA1B-0446	AA1B-0550
TRAINER or TR-2	1976	AA-1B	AA1B-0551	



Serial No. Plate
Located under rug in front of left seat in cabin
AA-1, AA-1A and AA-1B thru AA1B-0069



Located under left horizontal stabilizer on fuselage side
AA1B-0070 and on.



Trim Plate
Located on upper left corner of firewall

NOTE: On early models, the trim plate is located adjacent to the serial no. plate. Always give aircraft serial number and trim number when contacting the factory relative to parts or service.

1-20 SPECIFICATIONS

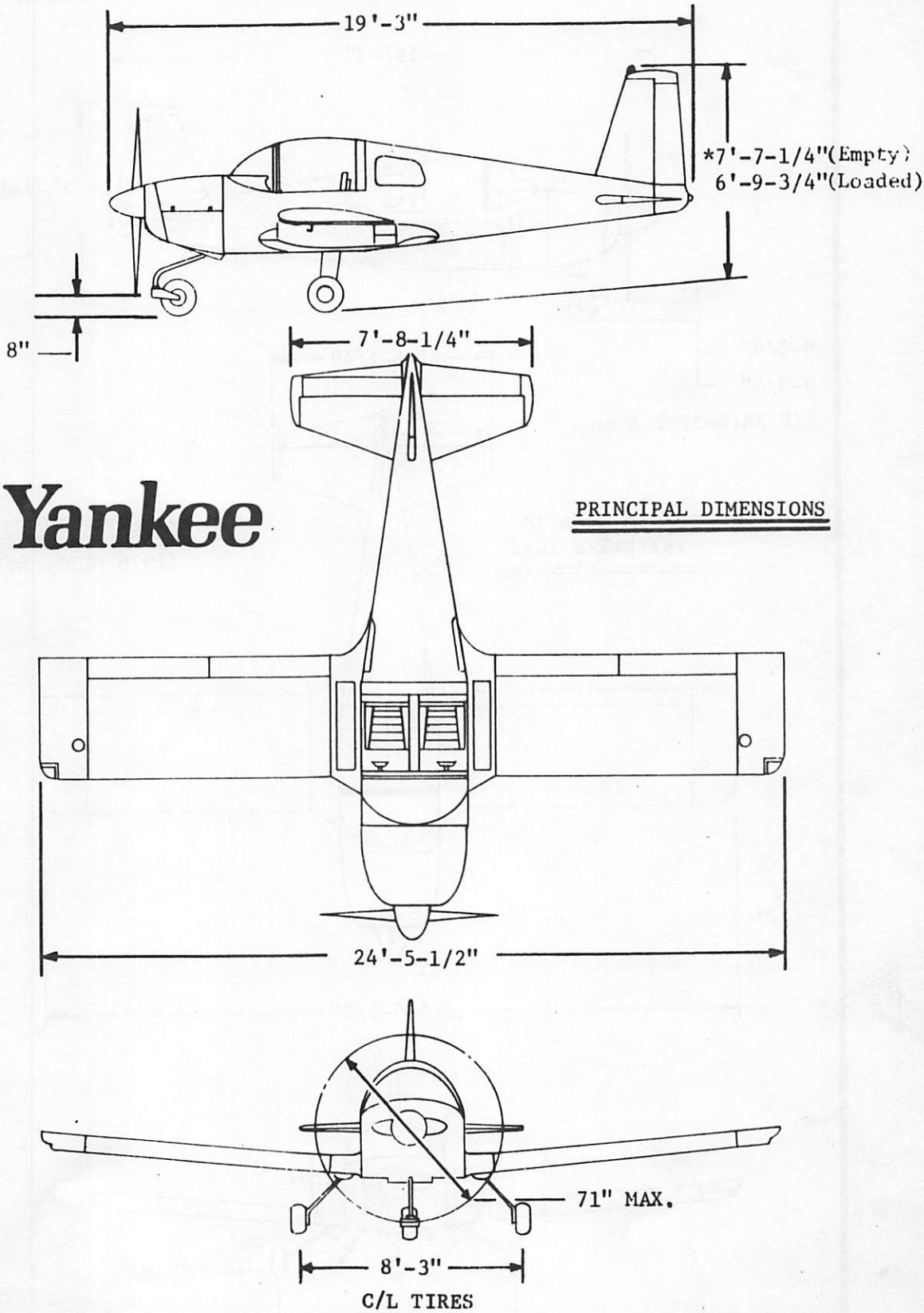
	AA-1	AA-1A	AA-1B
FAA Type Certificate	A11EA	A11EA	A11EA
Gross Weight(Normal Cat.)	1500 lbs.	1500 lbs.	———
Gross Weight(Utility Cat.)	1430 lbs.	1430 lbs.	1560 lbs.
Fuel Capacity	24 gals.	24 gals.	24 gals.
Oil Capacity	6 qts.	6 qts.	6 qts.
Engine	Lycoming O-235-C2C	Lycoming O-235-C2C	Lycoming O-235-C2C
Propeller(Fixed Pitch)	71" McCauley	71" McCauley	71" McCauley
Length	19'-3"	19'-3"	19'-3"
*Height(w/Flashing Beacon)	7'-7-1/4"(Empty)	7'-7-1/4"(Empty)	7'-7-1/4"(Empty)
	6'-9-3/4"(Loaded)	6'-9-3/4"(Loaded)	6'-9-3/4"(Loaded)
Height(w/o Flashing Beacon)	7'-5-1/4"(Empty)	7'-5-1/4"(Empty)	7'-5-1/4"(Empty)
	6'-7-3/4"(Loaded)	6'-7-3/4"(Loaded)	6'-7-3/4"(Loaded)
Wings			
Span	24'-5-1/2"	24'-5-1/2"	24'-5-1/2"
Dihedral	5°	5°	5°
Incidence	3-1/2°	1° 25'	1° 25'
Aileron Travel (Up)	25° ± 2°	25° ± 2°	25° ± 2°
Aileron Travel (Dn)	20° ± 2°	20° ± 2°	20° ± 2°
Flap Travel	0°-30° (± 2°)	0°-30° (± 2°)	0°-30° (± 2°)
Empennage			
Horizontal Tail Incidence	-3°	-3°	-3°
Vertical Tail Offset	0°	0°	0°
Elevator Travel (Up)	25° ± 2°	25° ± 2°	25° ± 2°
Elevator Travel (Dn)	15° ± 2°	15° ± 2°	15° ± 2°
Rudder Travel(Left & Right)	25° ± 2°	25° ± 2°	25° ± 2°
Trim Tab Travel (Up)	21.5° ± 2°	14.5° ± 2°	14.5° ± 2°
Trim Tab Travel (Dn)	11° ± 2°	18° ± 2°	18° ± 2°
Large Main Wheel Tires(19 Psi)	*6.00-6	6.00-6	6.00-6
	4-ply rating	4-ply rating	4-ply rating
Small Main Wheel Tires(26 Psi)	15 x 6.00-6	15 x 6.00-6	*15 x 6.00-6
	4-ply rating	4-ply rating	4-ply rating
Nose Wheel Tire(22 Psi)	5.00-5	5.00-5	5.00-5
	4-ply rating	4-ply rating	4-ply rating

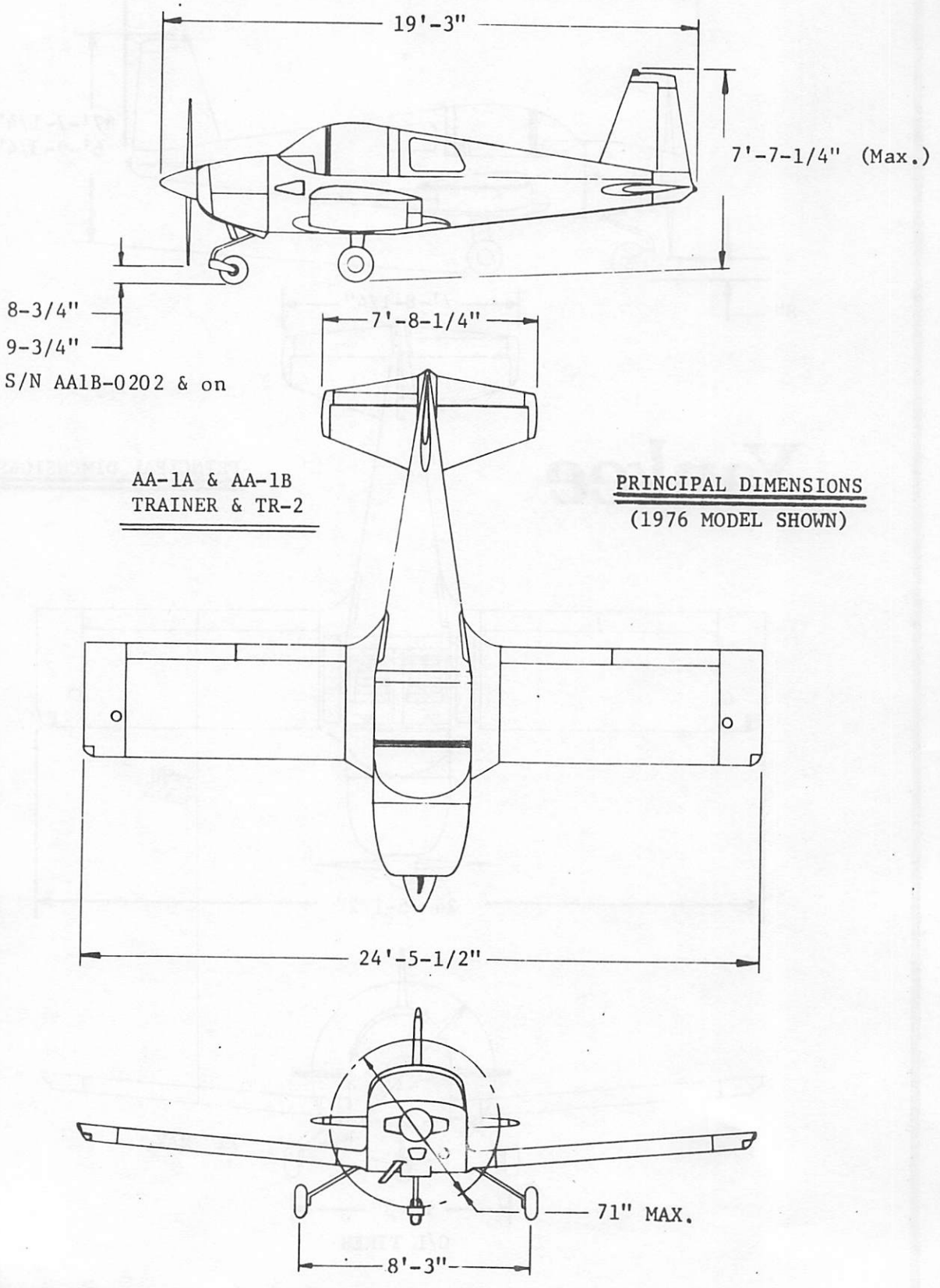
NOTE: Small main tires and standard nose gear fork, Part No. 702052-501 or -503, required for small wheel fairing installation.

*Not original equipment.

Yankee

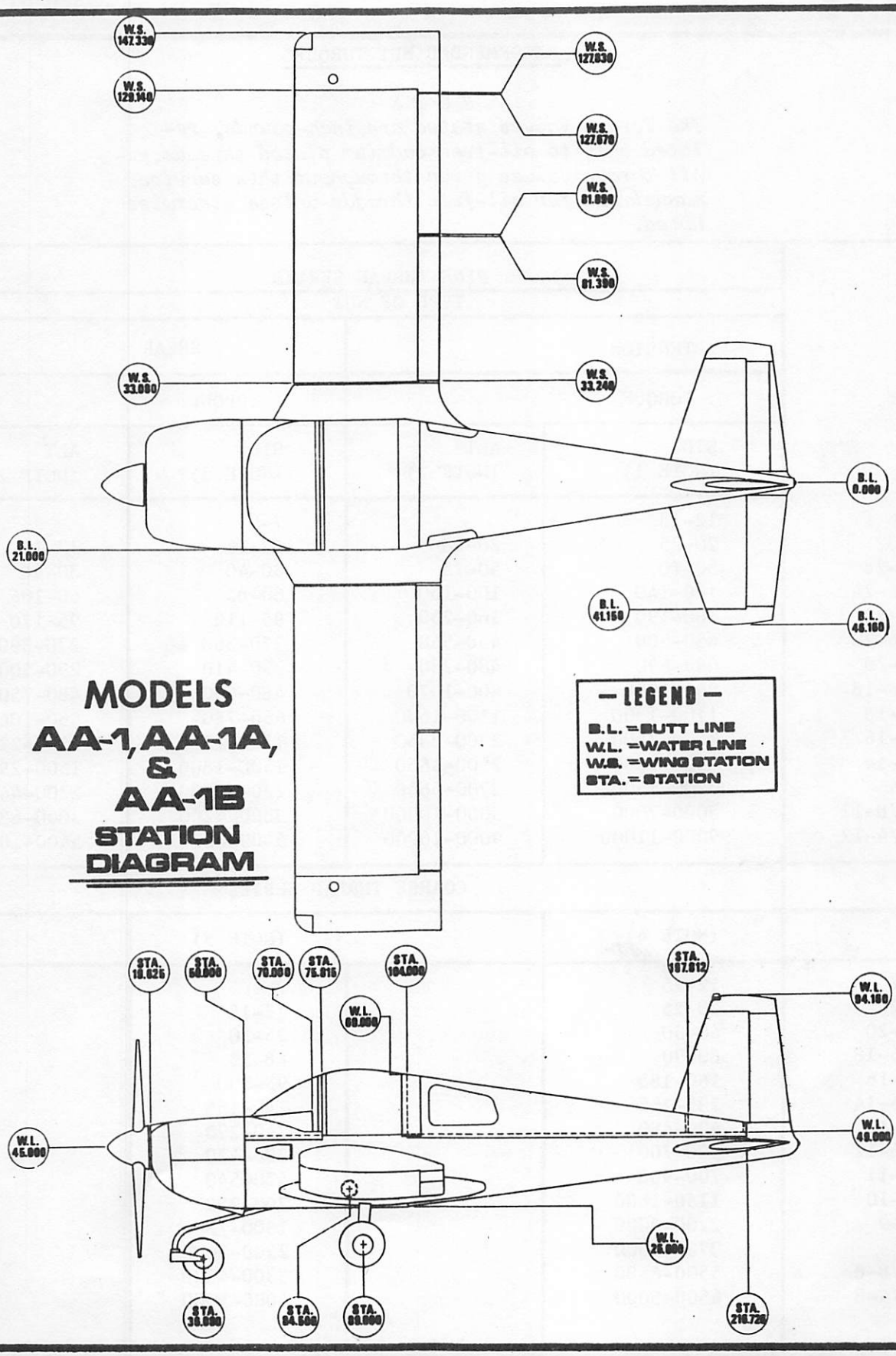
PRINCIPAL DIMENSIONS





AA-1A & AA-1B
TRAINER & TR-2

PRINCIPAL DIMENSIONS
(1976 MODEL SHOWN)



MODELS AA-1, AA-1A, & AA-1B STATION DIAGRAM

— LEGEND —

B.L. = BUTT LINE
W.L. = WATER LINE
W.S. = WING STATION
STA. = STATION

RECOMMENDED NUT TORQUES

N O T E

The Torque Values stated are inch-pounds, related only to oil-free cadmium plated threads. All torque values given throughout this service manual are for oil-free threads unless otherwise noted.

TAP SIZE	FINE THREAD SERIES			
	TYPE OF NUT			
	TENSION		SHEAR	
	TORQUE		TORQUE	
	STD (NOTE 1)	ALT (NOTE 2)	STD (NOTE 3)	ALT (NOTE 2)
8-36	12-15		7-9	
10-32	20-25	20-28	12-15	12-19
1/4-28	50-70	50-75	30-40	30-48
5/16-24	100-140	100-150	60-85	60-106
3/8-24	160-190	160-260	95-110	95-170
7/16-20	450-500	450-560	270-300	270-390
1/2-20	480-690	480-730	290-410	290-500
9/16-18	800-1000	800-1070	480-600	480-750
5/8-18	1100-1300	1100-1600	660-780	660-1060
3/4-16	2300-2500	2300-3350	1300-1500	1300-2200
7/8-14	2500-3000	2500-4650	1500-1800	1500-2900
1-14	3700-5500	3700-6650	2200-3300	2200-4400
1-1/8-12	5000-7000	5000-10000	3000-4200	3000-6300
1-1/4-12	9000-11000	9000-16700	5400-6600	5400-10000
	COARSE THREAD SERIES			
	(NOTE 4)		(NOTE 5)	
8-32	12-15		7-9	
10-24	20-25		12-15	
1/4-20	40-50		25-30	
5/16-18	80-90		48-55	
3/8-16	160-185		95-100	
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	
1-8	3700-5000		2200-3000	
1-1/8-8	5500-6500		3300-4000	
1-1/4-8	6500-8000		4000-5000	

NOTES

1. Covers AN310, AN315, AN345, AN363, AN366, MS20365, "1452", "EB", "UWN", "Z1200", and other self-locking nuts.

2. When using AN310 or AN320 castellated nuts where alignment between bolt and cotter pin is not reached using normal torque values, use alternate torque values or replace nut.

3. Covers AN316, AN320, AN7502 and MS20364.

4. Covers AN310, AN340, AN366, MS20365, and other self-locking anchor nuts.

5. Covers AN316, AN320 and MS20364.

The above values are recommended for all installation procedures contained in this manual except where other values are stipulated. They are not to be used for checking tightness of installed parts during service.

SECTION II

SERVICING

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2 SERVICING

2-10 GROUND HANDLING

Ground handling of the aircraft should be accomplished with the use of a tow bar as shown in Figure 2-1.

C A U T I O N

Using the propeller for ground handling could result in serious damage, especially if pressure is exerted on the outer ends. Do not attempt to push the airplane backward without the aid of a tow bar. This action could result in the nose wheel pivoting abruptly and damaging the nose wheel stops.

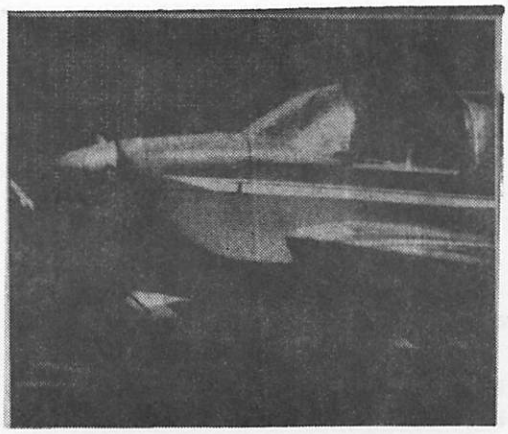


Figure 2-1. Towing

2-20 LEVELING

Lateral leveling of the aircraft should be accomplished with a four-foot carpenter's level or equivalent. Place the level across the canopy tracks as shown in Figure 2-2.

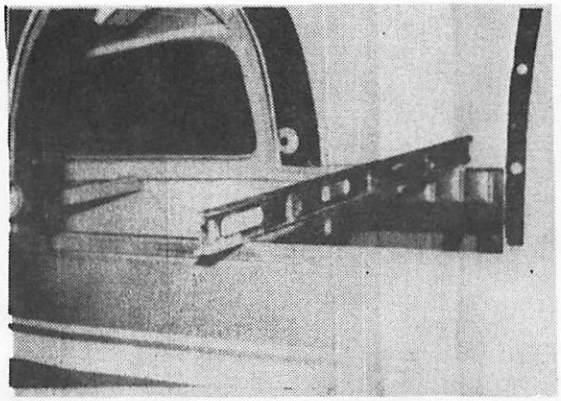


Figure 2-2. Lateral Leveling

For longitudinal leveling, place a level along side the canopy track, as shown in Figure 2-3.

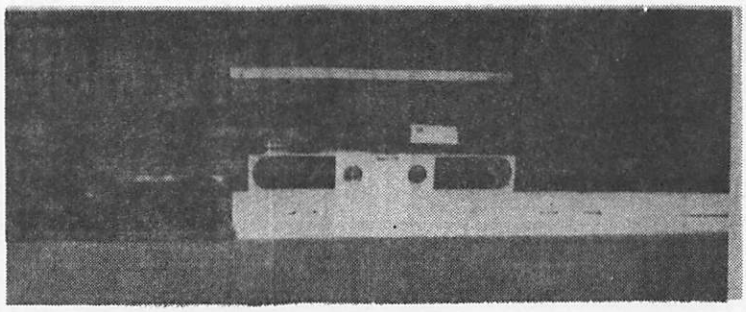


Figure 2-3. Longitudinal Leveling

2-30. WEIGHING

Refer to the original weight and balance data sheet. The aircraft can be weighed with the use of three platform scales. The aircraft must be weighed in a level position with full or empty fuel and oil (with correct compensations), with the seats in the center position, with the canopy closed and with the control surfaces in the neutral position. All measurements can be taken from the forward face of the firewall (Sta. 50.0).

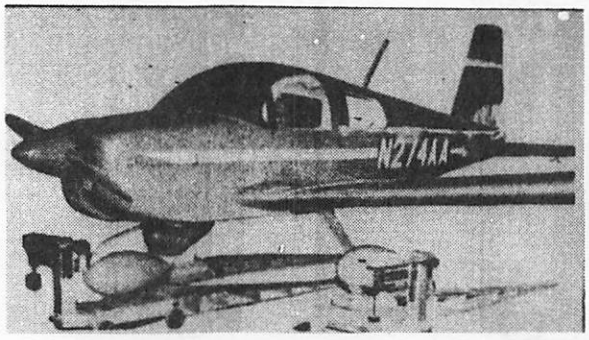


Figure 2-4. Weighing

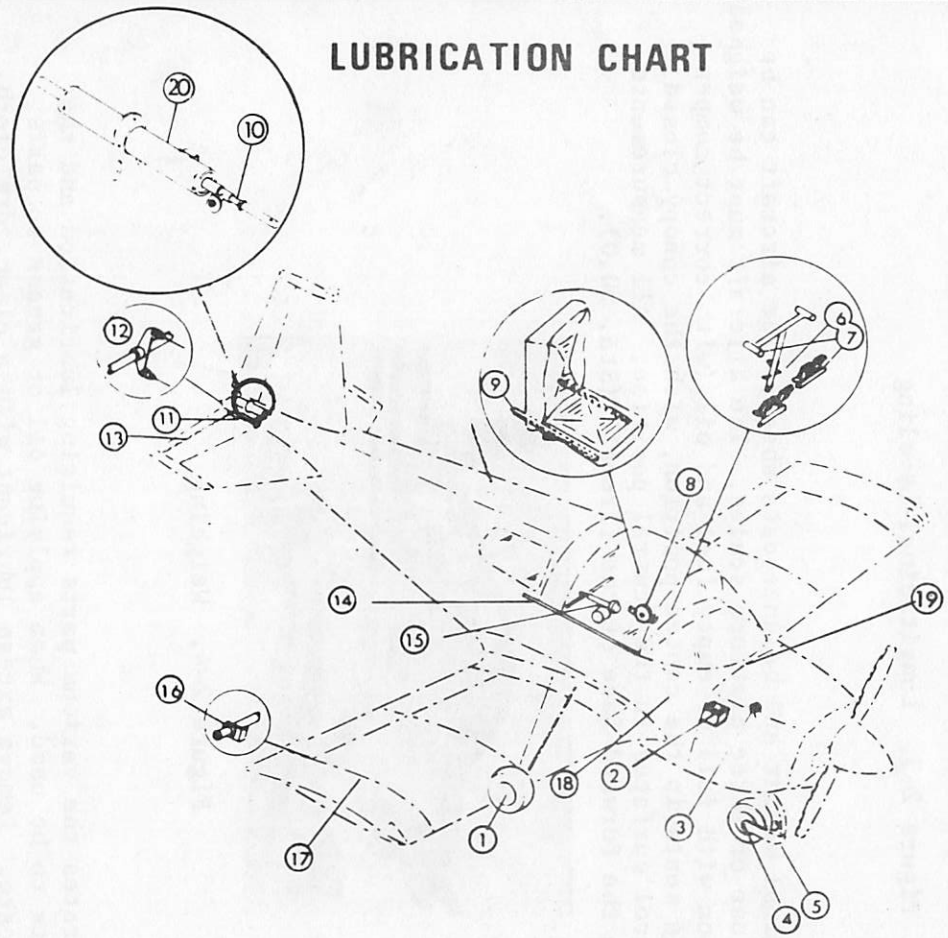
2-40. LUBRICATION

Figure 2-5 illustrates the various parts requiring lubrication and the types of lubricants to be used. When applying oil or grease to parts, do not over-lubricate. Remove excess lubricant with a clean, dry cloth.

2-50. MOORING

The airplane is equipped with a tie-down ring on the underside of each wing and under the tail. When securing the airplane, set the parking brake and install the control gust lock (See Figure 2-6). In moderate wind conditions, after setting the parking brakes and installing the control gust lock, "chock" both main landing gear wheels to prevent possible weather vaning and striking adjacent aircraft.

LUBRICATION CHART



MAIN WHEEL BEARINGS LEFT AND RIGHT GREASE MIL-G-25760 EVERY 100 HOURS OR AS REQUIRED — 1	TRIM ACTUATOR DRIVE JACKSCREW GREASE GENERAL PURPOSE MIL-G-7711 AS REQUIRED — 10
BATTERY TERMINALS PETROLATUM VV-P-236 AS REQUIRED — 2	TRIM TAB BELLCRANK OIL GENERAL PURPOSE MIL-L-7870 AS REQUIRED — 11
ENGINE OIL OIL SAE GRADE (SEE NOTE 1) EVERY 50 HOURS — 3	RUDDER AND ELEVATOR BELLCRANK CLEVIS PINS OIL GENERAL PURPOSE MIL-L-7870 AS REQUIRED — 12
NOSE WHEEL BEARINGS GREASE MIL-G-25760 EVERY 100 HOURS OR AS REQUIRED — 4	TRIM TAB HINGE OIL GENERAL PURPOSE MIL-L-7870 (SEE NOTE 3) — 13
NOSE FORK SWIVEL AND BELLVILLE WASHERS GREASE MIL-G-7711 EVERY 100 HOURS — 5	CANOPY SLIDES SPRAY LUBRICANT E-Z-FREE AS REQUIRED — 14
T-COLUMN NEEDLE BEARING GREASE GENERAL PURPOSE MIL-G-7711 AS REQUIRED — 6	FLAP ACTUATOR SCREW JACK GREASE GENERAL PURPOSE MIL-G-7711 AS REQUIRED (SEE NOTE 2) — 15
T-COLUMN AND RUDDER PEDAL TORQUE TUBE OILITE BEARINGS OIL GENERAL PURPOSE MIL-L-7870 AS REQUIRED — 7	ALL CONTROL SURFACE BEARINGS GREASE AEROSHELL GREASE #6 AS REQUIRED — 16
TRIM WHEEL GEARS GREASE GENERAL PURPOSE MIL-G-7711 EVERY 100 HOURS — 8	BUNGEE HOUSING SURFACE MOLYBDENUM DISULFIDE DRY LUBE SPRAY McLUBE #1708 OR EQUIVALENT AS REQUIRED — 20
	UPPER COWL TO FIREWALL MOLYBDENUM DISULFIDE DRY LUBE SPRAY McLUBE #1708 OR EQUIVALENT AS REQUIRED — 19
	FUEL SELECTOR VALVE AND FUEL CAP GASKET GREASE MIL-G-6032A AS REQUIRED — 17
SEAT TRACKS GREASE GENERAL PURPOSE MIL-L-7711 EVERY 100 HOURS — 9	CANOPY CABLE/PULLEY SYSTEM SPRAY LUBRICANT E-Z-FREE AS REQUIRED — 18

NOTES:
1. REFER TO SECTION 6-90 FOR RECOMMENDED SEASONAL GRADES
2. CARE SHOULD BE TAKEN TO AVOID GREASE CONTACTING OUTER SURFACE OF NYLON NUT
3. ACCEPTABLE SUBSTITUTE IS POWDERED GRAPHITE MIL-G-6711

Figure 2-5. Lubrication Chart

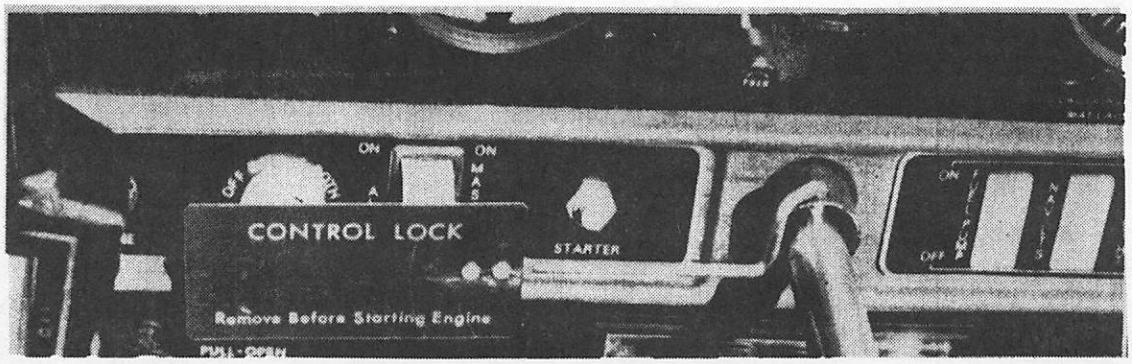


Figure 2-6. Control Gust Lock

2-60. CLEANING

It is important to maintain the airplane in a clean condition. Not only does the airplane look nicer, but it is more enjoyable to fly and also simplifies inspection and maintenance.

2-60-01 ENGINE CLEANING

Cleansing of the engine can be accomplished with a suitable solvent and drying thoroughly.

N O T E

Use extreme care to prevent solvent entering the magnetos, alternator, starter, vacuum pump, and openings in the engine. Keep the amount of solvent contacting wiring to a minimum.

2-60-02 EXTERIOR

The outside surface of the airplane will require little attention other than an occasional washing and polishing. Wash the airplane with clean water and mild detergent.

N O T E

Application of a heavy coating of wax on the leading edge surfaces is recommended to reduce abrasion on those areas.

Exterior paint touch-up may be accomplished by use of aerosol spray paint available through the Customer Service Department.

2-60-03 WINDSHIELD, CANOPY AND WINDOWS

All plexiglas on the airplane should be cleaned with clean water and mild detergent. Stubborn spots or cakes of dirt should be rubbed and loosened with the hand and not a rag. Use only a soft cloth, sponge or chamois when applying a cleaner or drying the plexiglas. **Cleaning is to be done in a straight line motion and <u>not</u> in a circular motion.**

C A U T I O N

Do not use gasoline, alcohol, benzine, acetone, carbon tetrachloride, or glass window cleanser. The fluids can damage the plexiglas.

2-60-04 INTERIOR AND UPHOLSTERY

The interior of the airplane should be cleaned with a damp cloth. Spots or stains may be removed with a household spot remover, used sparingly.

2-60-05 PROPELLER

The propeller should be wiped occasionally with an oily cloth to remove stains. This will also aid in corrosion-proofing the propeller. In coastal regions, the propeller should be wiped with an oily cloth more often.

2-70 PAINT REMOVAL

It is extremely important that all persons involved in removing paint from the aircraft be aware that fully cured adhesives used in the construction of Grumman American Aircraft are resistant to the more common solvents. However, certain chlorinated solvents, particularly *Methlene chloride*, a constituent of several commercial paint removers, can be detrimental to the strength of bonded joints. Methyl Ethyl Ketone or Acetone can be safely used in lieu of commercial paint remover. Questions relative to the use of specific commercial paint removers should be directed to the Customer Service Department of Grumman American. See Section 10 for special instructions on Polyurethane paint removal.

C A U T I O N

Unless specific prior approval has been obtained from the factory, no commercial paint removers are to be used on any airframe component.

2-80 JACKING

To remove the weight from the landing gear, support the aircraft as shown in Figure 2-7A. The forward jacks should be located just aft of the cowling. The aft support can be the cradle type.

C A U T I O N

A rubber pad and wooden block should be positioned between the airframe and the jack.

To support the aircraft for main wheel removal, either place the jack arrangement at the edge of the fuselage, beside the gear strut, or use the optional jack supports as shown in Figure 2-7B.

Figure 2-7A Jacking Arrangement

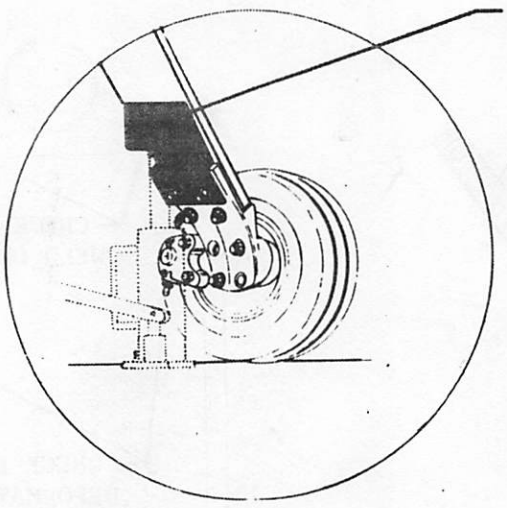


Figure 2-7B Optional Jack Supports

2-90 INSPECTIONS FOLLOWING A HARD OR OVERWEIGHT LANDING

2-90-00 GENERAL

The airframe and landing gear have undergone extensive structural testing and will withstand all normal landings without permanent set or damage. However, if a hard or overweight landing has been experienced, it is good practice to perform a thorough 100 hour inspection to look for evidence of secondary damage in addition to paying careful attention to the areas described below.

2-90-01 TAIL TIE DOWN RING

Inspect the Tail Tie Down Ring and attachment to fuselage for evidence of damage or bond separation of aft bulkhead to fuselage side and bottom attachment. Repair in this area may be accomplished in accordance with AC43.13-1 or with data obtainable from the Customer Service Department.

2-90-02 NOSE LANDING GEAR

a. Inspect the nose gear fork assembly and axle rod for deformation or cracks as shown in Figure 2-8. This damage normally results from landing at a relatively flat attitude with a high vertical velocity. Any evidence of deformation or cracks is cause for rejection of the fork assembly and/or axle rod.

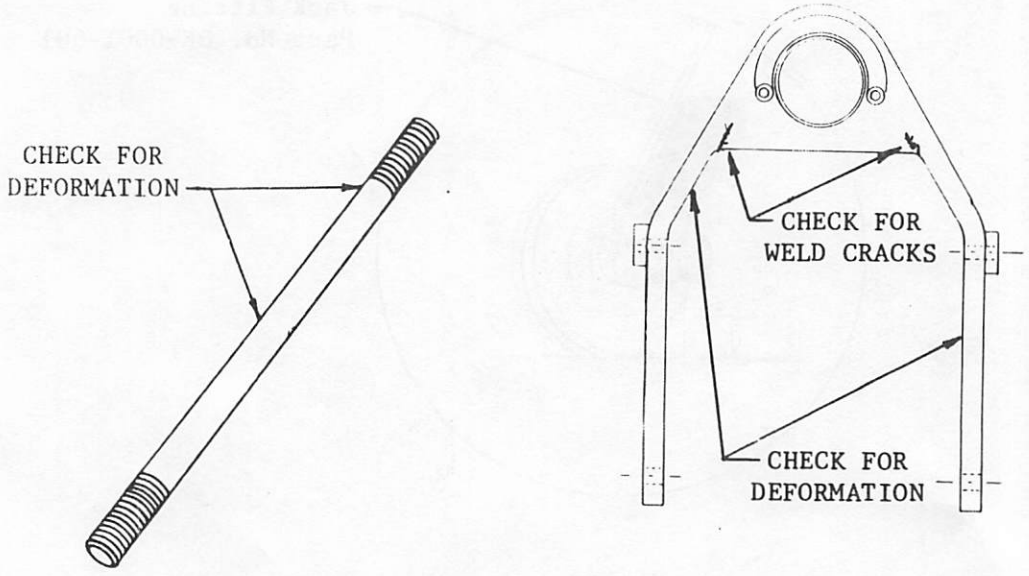


Figure 2-8. Nose Gear Axle Rod and Fork Assembly

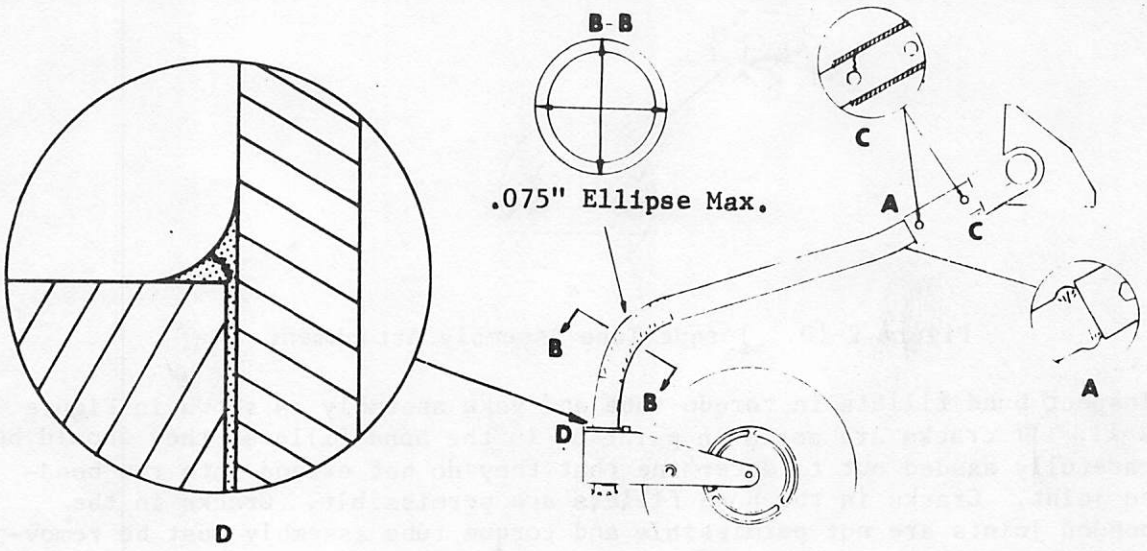


Figure 2-9. Nose Gear Strut

b. Deformation shown in area A, is the result of landing in a relatively flat attitude with high vertical velocity. Replace strut if deformed.

c. Inspect the curved area of the strut for flattened condition as shown in Section B, Figure 2-9. An elliptical shaped cross section exceeding .075" is cause for rejection of the strut.

d. With the weight removed from the nose landing gear, check the fit of the strut assembly into the torque tube yoke assembly by moving the strut up and down in the torque tube T. If looseness is noted, the cause for looseness must be determined. If the bolts that attach the strut to the torque tube yoke are worn, they should be replaced with NAS464-P6A28 bolts. If new bolts do not satisfactorily eliminate play, ream and install next larger size NAS bolt (NAS464-P7 maximum).

e. With strut removed, inspect bolt hole areas at strut to torque tube attach point for evidence of elongation or cracking.

f. Inspect the nose fork bearing cup to nose strut bond joint per Section 4-10-01(c). See Figure 2-9, Area D.

2-90-03 TORQUE TUBE AND YOKE ASSEMBLY ATTACHMENT

a. Inspect torque tube assembly attachment to fuselage side panels as shown in Figure 2-10. Remove snap plugs and check location of attach bolts. If bolts have shifted and are not exactly in the center of the counterbored holes in the fuselage sides, damage may have occurred to the lower engine mount/fuselage area. A very close inspection of this area should be accomplished. Check that attach bolts are torqued to 300-350 in. lbs.

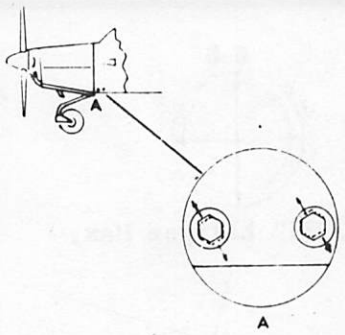


Figure 2-10. Torque Tube Assembly Attachment

b. Inspect bond fillets in torque tube and yoke assembly as shown in Figure 2-11. If cracks are noted in paint or in the bond fillets, they should be carefully sanded out to determine that they do not extend into the bonded joint. Cracks in the bond fillets are permissible. Cracks in the bonded joints are not permissible and torque tube assembly must be removed from service.

c. In cases of severe overload, the bond joints may actually fail in the outboard end of the torque tube and yoke assembly, allowing one or both of the torque tubes to rotate in the end fittings.

d. Inspect the torque tubes for longitutional cracks, as shown in Figure 2-11.

e. Inspect cabin floor and firewall where torque tube center bearing support brackets attach for evidence of deformed honeycomb. Inspect torque tube center bearing support brackets for deformation. If torque tube center bearing support brackets are deformed, the entire torque tube assembly must be replaced. Check that center bearing support bracket bolts are torqued to 185-195 in. lbs.

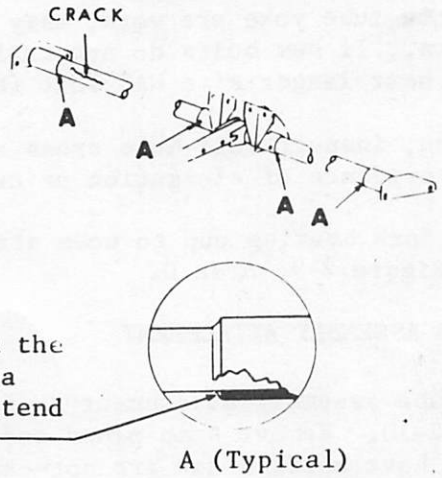


Figure 2-11. Torque Tube & Yoke Assembly.

2-90-04 MAIN LANDING GEAR

a. Main Gear Strut

1. Inspect the laminated fiberglass main gear struts for evidence of cracks or delamination, as shown in Figure 2-12. Minor surface delamination is acceptable, providing they do not extend more than 1 ply (.010") into the surface of the strut. Corner delaminations (slivers) are acceptable if they are smaller than 1/16" x 1/16" size throughout their length.

2. Minor imperfections may be repaired as outlined in Section 4-10. Struts with other than minor imperfections, must be replaced.

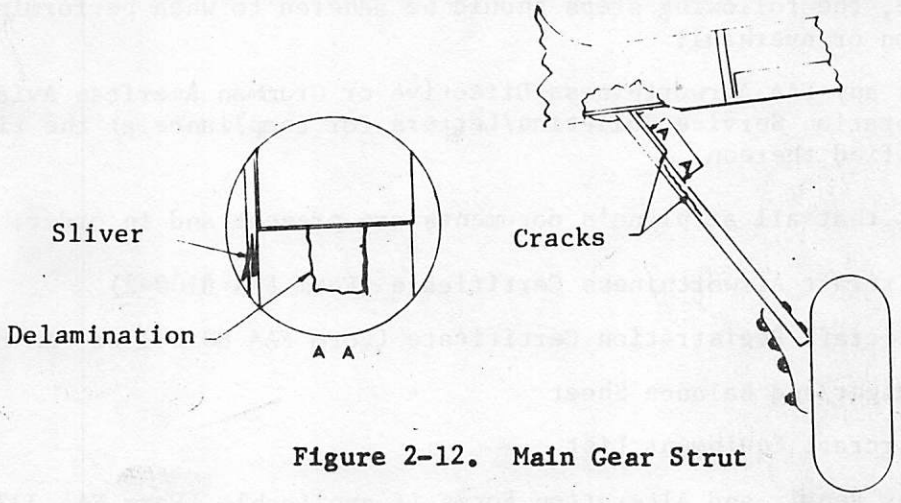


Figure 2-12. Main Gear Strut

b. Main Gear Attach Brackets

1. Inspect brackets for deformation, proper bolt torque and evidence of movement on the spar. If spring plate (AA-1B only) between brackets and strut is bent, it must be replaced.(Ref. Fig. 4-2,34).

2-90-05 ENGINE/PROPELLER

a. Engine

1. Inspect engine mount welded assembly for deformation. Inspect engine attach fittings at fuselage for deformation and security of attachment to fuselage.

b. Propeller

1. Inspect the tips of the propeller for evidence of ground contact. Replace a bent or damaged propeller.

2-90-06 FUSELAGE TAILCONE

a. Inspect the tailcone structure for damage. Buckled tailcone flanges can normally be repaired using the procedures from AC 43.

2-100 INSPECTION

2-100-00 GENERAL

As an aid in performing inspections, a Service Guide has been included in this section. Perform each function which has an "x" marked in its appropriate inspection column. Also, a comprehensive "Annual or 100 Hour Inspection Procedure" has been provided to assist the individual mechanic.

2-100-01 INSPECTION DETAILS

In addition to the Service Guide and Annual or 100 Hour Inspection Procedure, the following steps should be adhered to when performing any inspection or overhaul:

1. Check any FAA Airworthiness Directive or Grumman American Aviation Corporation Service Bulletins/Letters for compliance at the time specified thereon.

2. Check that all airplane's documents are present and in order:

   Aircraft Airworthiness Certificate (Form FAA 8100-2)

   Aircraft Registration Certificate (Form FAA 8050-1 or FAA 8050-3)

   Weight and Balance Sheet

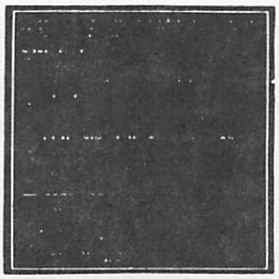
   Aircraft Equipment List

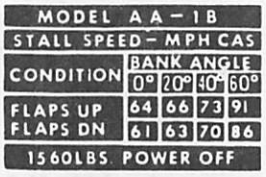
   Any Repair and Alteration Forms if applicable (Form FAA 337)

   Aircraft Radio Station License if applicable (Form FCC 556 or FCC 453B)

   Aircraft and Engine Log Books

3. Check that Operating Limitations placards are displayed. Model AA-1B placards are shown below:





N O T E

All of the above items except the log books must be carried in the airplane at all times. Form FAA 8100-2, FAA 8050-3 and FCC 556 (FCC 453-B) must be visually displayed.

2-100-01 INSPECTION DETAILS (Continued)

4. Just prior to beginning the inspection, perform an engine run-up to facilitate oil drainage and to observe the following, noting any discrepancies:

Oil and Fuel Pressures	Suction Gauge
Magneto RPM Drop	Fuel Selector (Check operation in all positions)
Static RPM	Carburetor Heat Control
Idling Speed	Engine response to change in power
Ammeter	Idle cut-off

5. After completion of the inspection, another engine run-up should be performed to assure that all discrepancies have been eliminated and no new ones have been introduced.

C A U T I O N

Be sure that the oil supply has been replenished prior to post inspection run-up.

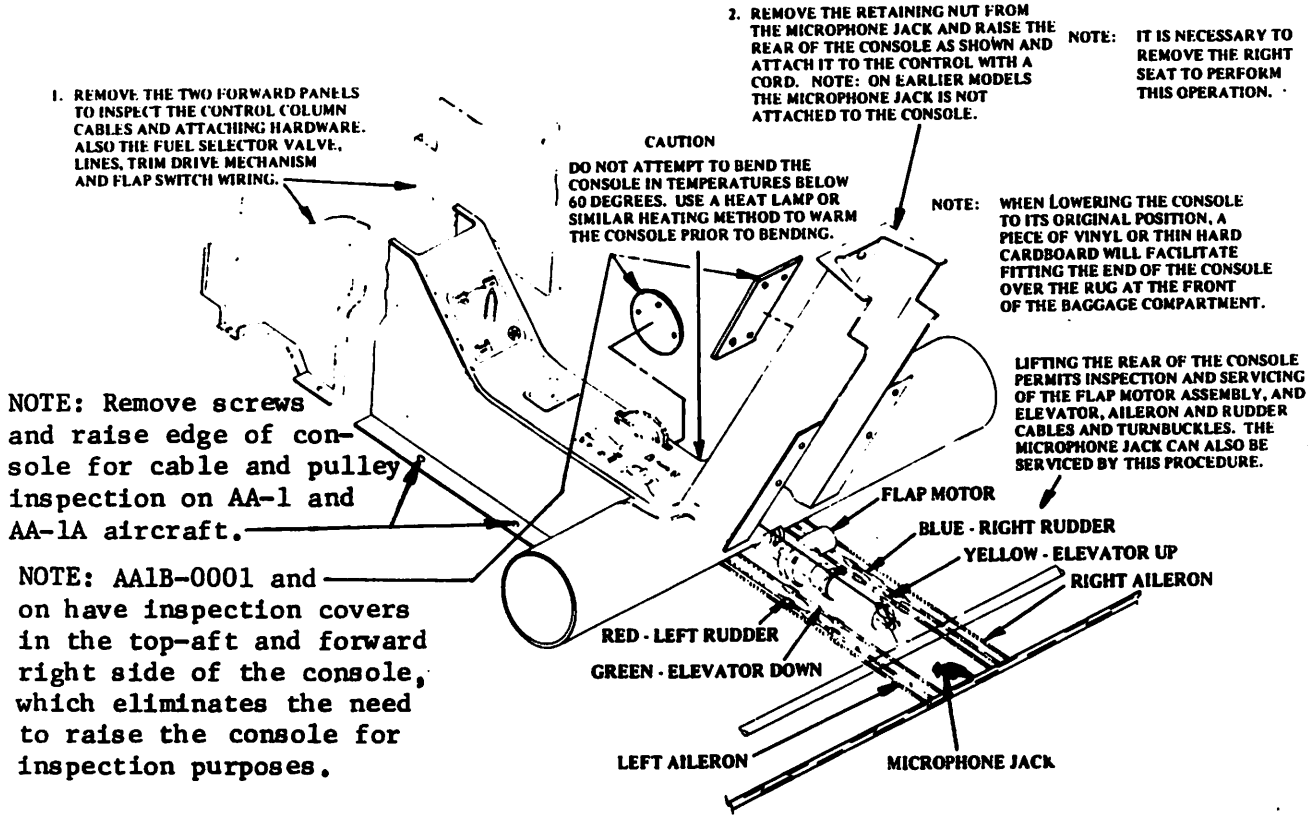


Figure 2-13. Method of Providing Access for Under Console Inspection

2-100-02 BONDLINE DAMAGE, INSPECTION PROCEDURES AND REPAIR

a. Typical Types of Bondline Damage

(1) Physical Damage

The most common type of bondline damage is physical damage along the trailing edges of the flaps, ailerons, elevators and rudder. This is caused by persons stepping on the inboard trailing edges of the flaps and general "hangar rash" on the other control surfaces. This type of damage is usually readily visible in the form of joint separation.

(2) Corrosion Damage

A less common type of bondline damage is damage caused by metal corrosion. This type of damage is usually restricted to edges of unfilleted bondlines, such as found on the rear spar to skin joints on the trailing edges of wings and stabilizers, particularly if these edges are not well protected by paint. This type of damage is more likely in tropical and subtropical climates, particularly where an aircraft is located close to the coast.

b. Most Commonly Damaged Areas

(1) Areas which should be given particular attention include: flanges of wing and stabilizer rear spars, trailing edges of control surfaces, the side lap joint between the tailcone and forward cabin section, the joint between the tailcone top and side skin, and the aft tailcone bulkhead joints.

(2) Inside edges and internal joints which have an undisturbed bondline fillet are generally not affected.

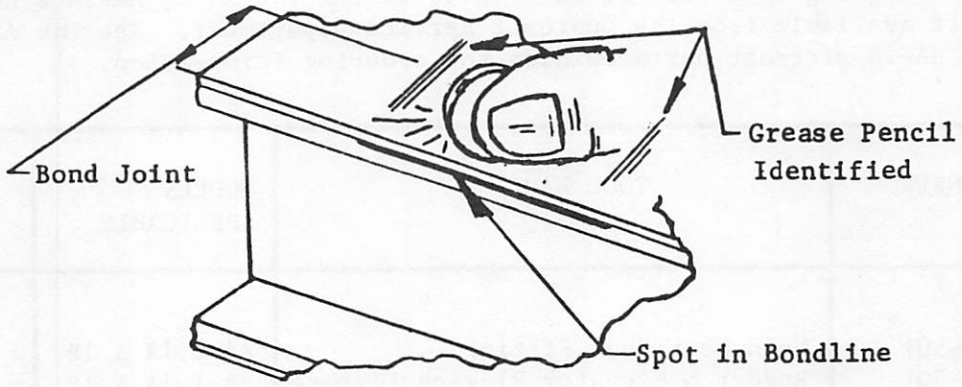
c. Inspection Procedures

The three steps to the inspection procedure are listed below. They should be performed in the listed order. Step "1" is the initial identification of a suspect area. Steps "2" and "3" are verification procedures.

(1) Visual Scanning

Carefully scan the edges of all joints in a well lighted hangar or outside in daylight to determine the existence of hairline cracks between two layers of bonded metal. The figure on the following page shows the appearance of this condition. Identify the location of any crack with a grease pencil as shown.

2-100-02 BONDLINE DAMAGE, INSPECTION PROCEDURES AND REPAIR (Continued)



Identifying Suspect Areas

(2) Tapping

Gently tap the bondline with a coin or similar metal object to verify the existence of a bondline separation. Slowly move along the bondline, while tapping, and listen for a change in tone as the suspect area is traversed. A bondline separation will produce a flat or hollow sound when "tapped" directly in the damaged area.

(3) Separation

If the results of "2" are questionable, attempt to insert a .004" to .006" feeler gauge into the bondline to verify that a separation exists.

d. Repair

If the results of inspection steps "2" and "3" are negative, the hairline should be wiped with MEK and sealed with paint. Additionally, any bare bondline edges should be sealed with paint. If the results of either "2" or "3" are positive, order Service Kit No. SK-125 from the Customer Service Department and make the repairs accordingly.

2-110 SERVICE TOOLS

The following is a list of service tools for the AA-1, AA-1A & AA-1B aircraft available from the Customer Service Department. See the AA-1, AA-1A and AA-1B aircraft parts catalog for ordering information.

TOOL NUMBER	TOOL NAME	MODELS APPLICABLE	FIGURE SHOWN
DE-0001-501	Main Gear Jack Fitting	AA-1,1A & 1B	2-7B
DE-0002-501	Rudder & Elevator Rigging Fixture	AA-1,1A & 1B	5-3 & 5-4
DE-0003-501	Aileron & Flap Rigging Fixture	AA-1,1A & 1B	5-2 & 5-5
DE-5005-501	Control Wheel Rigging Fixture	AA-1,1A & 1B	5-3
DE-5006-1	Bearing Sizing Tool	AA-1,1A & 1B	———
ST 1064	Canopy Track Sizing Tool	AA-1,1A & 1B	3-3
ST 1074	Canopy Track Drilling Tool	AA-1,1A & 1B	———
719-40 MRP	Spring Scale-Chatillon Gauge R, (0-40 Lb. Range) Catl. 719-40	AA-1,1A & 1B	4-4

10/6: Rivet Cowl crack

SERVICE GUIDE				
	50	100	1000	NOTE
AIRFRAME				
1. Clean aircraft.		X	X	
2. Aircraft structure (especially the spar around the wing lock shoulder bolts, gear attachments, and fuselage attach collars).		X	X	
3. Windows, windshield and canopy.	X	X	X	
4. Seats, console, interior and seat belts.	X	X	X	
5. Instrument panel, instruments and placards.		X	X	
6. Baggage compartment and cargo tie downs.		X	X	
7. Radio antennas.		X	X	
8. Nose gear torque tube assembly.		X	X	
9. Control T-column and bearings.		X	X	
10. Forward empennage attachments.	X	X	X	
LANDING GEAR				
1. Main gear strut and upper and lower strut brackets.		X	X	
2. Nose gear strut, fork and boot assy.		X	X	a
3. Nose and main wheel bearing lubrication.				b
4. Nose fork swivel lubrication.		X	X	
5. Brake linings and discs.		X	X	
6. Wheel fairings scraper adjustment.		X	X	
7. Main and nose tires pressure.	X	X	X	
CONTROL SYSTEMS Lube all in this section				
1. Cables, turnbuckles, pulleys, guards and terminals.		X	X	k
2. Rudder pedals and springs.		X	X	j
3. Flaps, flap actuator, flap actuator jack screw, flap push-pull rods, flap torque tubes, torque tube bearings, bearing supports and position indicator.		X	X	
4. All control stops.		X	X	

SERVICE GUIDE (CONT'D)				
	50	100	1000	NOTE
CONTROL SYSTEMS (Continued)				
5. Trim wheel, assembly, indicator, bungee, and actuator shaft drive screw.		X	X	
6. Ailerons, aileron torque tubes, aileron balance weights, bearings and bearing brackets.		X	X	
POWERPLANT				
1. Oil change.	X	X	X	
2. Oil screens.	X	X	X	
3. Replace oil filter if external filter is used.		X	X	
4. Spark plugs.		X	X	
5. Ignition harness.	X	X	X	
6. Magneto timing.				c
7. Exhaust system.	X	X	X	
8. Throttle, carburetor heat and mixture controls operation.	X	X	X	L
9. Engine baffles.	X	X	X	
10. Air filter.	X	X	X	
11. Engine mount.	X	X	X	
12. Oil breather vent.	X	X	X	
13. All lines, flex ducts and connections.	X	X	X	d
14. Oil and fuel pressures.	X	X	X	
15. Propeller and spinner.	X	X	X	
16. Alternator belt.	X	X	X	
17. Cylinders, crankcase, accessory section, front crankshaft seal.	X	X	X	
18. Engine overhaul.				e

SERVICE GUIDE (CONT'D)				
	50	100	1000	NOTE
FUEL SYSTEM				
✓ 1. Electric fuel pump filter.	X	X	X	
2. Fuel cap gaskets.	X	X	X	
3. Fuel overboard vents.	X	X	X	
4. Fuel tanks and quick drains (2).		X	X	
5. Fuel gauges, fuel tank selector and placard.		X	X	
6. Fuel tank outlet screens.				i
7. All hoses and lines.	X	X	X	d
✓ 8. Fuel primer.		X	X	
UTILITY SYSTEMS				
? 1. Master cylinder fluid level.	X	X	X	
2. Parking brake operation.		X	X	
3. All hoses, lines, and connections.		X	X	
4. Pitot and static systems.		X	X	
? 5. Pitot line drain.		X	X	
? 6. Vacuum regulator and filter.		X	X	f
7. Flexible ducts for heating system.		X	X	
8. Cabin heat control operation.		X	X	
✓ 9. Compass check. + UOR			X	g
10. Vacuum pump.			X	h
ELECTRICAL SYSTEM				
1. Battery fluid level.	X	X	X	
2. Battery hydrometer check.		X	X	
3. All connections.		X	X	
4. All lights for operation.	X	X	X	

SERVICE GUIDE (CONT'D)				
	50	100	1000	NOTE
ELECTRICAL SYSTEM (Continued)				
5. All wiring harnesses and wires.		X	X	
6. Stall warning	X	X	X	
7. Electric flap motor.		X	X	
8. Voltage regulator adjustment(AA-1 & AA-1A only).		X	X	

NOTES:

a. Remove nose gear strut from torque tube yoke and inspect for corrosion of the faying surfaces every 12 calender months. Remove corrosion, paint surfaces with zinc chromate primer and reassemble wet. Seal strut to yoke connection with RTV-102 by Dow-Corning.

b. Clean and repack wheel bearings at first 100 hours. Inspect wheel bearing grease for contamination and solidification at each annual or 100 hour inspection. Do not exceed 500 wheel miles between repacking internals.

c. Maximum time between magneto timing checks 100 hours. Magneto replacement recommended after 900 hours of service.

d. Recommend replacement of all flexible pressure lines at engine overhaul or every five years, whichever comes first.

e. Maximum engine overhaul time ~~2000~~ hours. 2400

f. Replace gyros central air filter each 400 hours. Replace vacuum relief valve filter each 1000 hours. For operation in dusty climates replace filters more frequently.

g. Check accuracy of compass every 1000 hours or at each time that an item of equipment is installed or removed that could effect the accuracy of the unit.

h. Recommend replacement at 1000 hours.

i. Remove and clean every 1000 hours.

j. Replace rudder springs every 1000 hours.

k. Thoroughly clean all control cables where they pass under the pulley group forward of the center section spar. Inspect all cables in accordance with AC43.13-1, Par. 105, paying close attention to the rudder cables. Acceptable wire strand breakage limits are a maximum of four (4) wires per cable. Cables with more than the acceptable number of broken wires must be removed from service. Inorder to adequately inspect the cables, it will be necessary to actuate the controls to the full extent of travel to expose the cabel/pulley contact area for examination.

l. Replace mixture control wire every 500 hours.

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

ANNUAL OR 100 HOUR INSPECTION PROCEDURE GUIDELINE

FAR 43.15 (C) (1) states; "Each person performing an annual or 100 hour inspection shall use a check list while performing the inspection. The check list may be of the person's own design, one provided by the manufacturer of the equipment being inspected, or one obtained from another source. This check list must include the scope and detail of the items contained in appendix D to this part and paragraph (b) of this section." The following pages contain a comprehensive annual or 100 hour inspection procedure check list. This check list has been prepared to assist a mechanic in performing a detailed inspection of such scope and detail that when the inspection is completed, the mechanic is absolutely sure that he has not overlooked any areas, even though he may not have previous experience on this particular model aircraft. Once a mechanic becomes familiar with this aircraft, he may wish to prepare his own check list, which must be within the scope of appendix D of FAR part 43.

OWNER'S NAME		STREET ADDRESS	
	CITY	STATE	ZIP CODE
IDENTIFICATION NUMBER	SERIAL NUMBER	HOURS	DATE INSPECTION COMPLETED
SERVICING AGENCY	CITY	STATE	

Check for conformity with FAA Specifications, Airworthiness Directives and Grumman American Aviation Corporation and Supplier's Service Bulletins and Letters.

N O T E

It is recommended that reference be made to the applicable maintenance handbook, service bulletins, letters, installation instructions, and vendor specifications for torque values, clearances, settings, tolerances and other specification data.

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

PRE-INSPECTION ENGINE RUN UP Prior to beginning the annual or 100 hour inspection, an engine run-up is to be made to facilitate oil drainage and to observe the following, noting any discrepancies:	MECH.	INSP.
1. Fuel Pressure (0.5 to 8 PSI) Electric Pump only prior to engine start up _____ Engine Pump only after engine start up _____ Both _____		
2. Oil Pressure (60 to 90 PSI) (Approx. 25 PSI idling) Actual _____ Actual _____		
3. Magneto RPM Drop (175 RPM maximum drop on either magneto no more than 50 RPM difference between magnetos). Actual Drop Left _____ Right _____		
4. Static RPM: Cruise Prop (71-57) - 2150-2300 Actual _____ Climb Prop (71-53) or (71-54) - 2250-2400 Actual _____		
5. Idling Speed (600 to 650 RPM) Actual _____		
6. Ammeter (Shows alt. output on AA-1 & AA-1A; Battery net on AA-1B)		
7. Suction Gauge (4.6 to 5.4 In. Hg.)		
8. Fuel Selector (check operation in all positions)		
9. Carburetor Heat Control		
10. Engine Response to change in power		
11. Idle cut-off.		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

A. PROPELLER GROUP	MECH.	INSP.
1. Remove spinner and check for cracks		
2. Inspect blades for erosion, scratches, nicks and cracks. Dress out nicks as required		
3. Inspect spinner back plate for cracks and secure mounting		
4. Check front crankshaft seal for oil leaks		
5. Check propeller mounting bolt torque to 280 to 320 in. lbs. and resafety		
6. Reinstall spinner. Check spinner run out		
B. ENGINE GROUP	**MECH.**	**INSP.**
1. Remove engine cowl. Clean and check for cracks, wear, distortion, loose or missing fasteners and landing light attachment		
2. Drain oil sump. Remove oil screens, clean and inspect for metal particles. Reinstall and resafety		
3. Check oil temperature sending unit, oil lines and fittings for leaks, chafing, and secure mounting		
4. Fill engine with oil per lubrication chart		
5. Clean engine		
6. Check engine cylinder compression #1.____ #2.____ #3.____ #4.____		
7. Clean and regap or replace spark plugs as required (See latest revision of Lycoming Service Instructions No. 1042).		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

B. ENGINE GROUP (Continued)	MECH.	INSP.
8. Check ignition harnesses. Clean and inspect insulators		
9. Check magnetos to engine timing, oil seal leakage, and distributor block for cracks, burned areas and corrosion		
10. Remove, clean, inspect, and oil carburetor air filter. Inspect carburetor heat control valve plate, shaft, valve plate to shaft screws and bearings for signs of wear and security. Replace filter and/or gasket if damaged or defective. Reinstall carburetor air filter		
11. Check induction air intake seals for leaks, deterioration and hardness. Check flex ducts for broken or loose strings, loose or displaced supporting wire and general overall condition for signs of wear or perforation		
12. Drain carburetor bowl. Reinstall drain plug. Remove and clean carburetor fuel inlet screen with acetone. Reinstall screen ..		
13. Remove and clean electric fuel pump filter. Reinstall and resafety		
14. Check fuel pump for proper operation and secure mounting. Pressure fuel system with electric pump and inspect fuel system and lines for leaks. Check fuel primer for operation and line leaks.		
15. Check starter for secure mounting		
16. Check security of throttle arm on carburetor. Check throttle, carburetor heat, and carburetor mixture controls for proper travel, security, operating condition and control cushion. Replace mixture control wire every 500 hours		
17. Remove exhaust shroud and check muffler tailpipe, risers, clamps, gaskets, exhaust system and tailpipe brace (If installed) for cracks, leaks and secure mounting. Reinstall shroud		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

B. ENGINE GROUP (CONTINUED)	MECH.	INSP.
18. Check breather tube for obstructions and secure mounting		
19. Inspect cylinders for evidence of excessive heat indicated by burned paint on the cylinder. Check for cracks, loose bolts, oil leaks and general condition		
20. Check valve rocker clearance - .007" to .009" cold..... (See latest revision of Lycoming Service Instruction No. 1068).		
21. Inspect engine mount for cracks, secure mounting and proper safety wiring. Check rubber vibration dampeners for signs of deterioration. Replace as required		
22. Check all baffles for cracks, loose or missing screws and deteriorated seal material		
23. Check alternator for secure mounting and lugs and brackets for cracks. Check condition and tension of alternator drive belt. Replace if required (Adjust belt tension to yield a 5/16" deflection at the center of the belt when applying a pressure equivalent to 14 pounds for new belts and 10 pounds for used belts)		
24. Check battery electrolyte level and specific gravity. Clean and tighten battery terminals. Check battery box drains and vents for condition and drainage clear of aircraft structure...		
25. Inspect vacuum system components (if installed) for secure mounting. Check vacuum pump drive for evidence of seal leakage. Replace seal and pump if required. Check all interconnecting lines and fittings for leaks, deterioration and damage. Replace as required		
26. Check ground straps for condition and secure attachment		
27. Check electrical wiring for condition and secure connections including shielded cable ground connections		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

B. ENGINE GROUP (Continued)	MECH.	INSP.
28. Check voltage regulator, starter relay and master switch relay for secure mounting and proper operation		
29. Install cowl, checking for proper engagement of air intake duct and cowl latches		
C. CABIN GROUP	**MECH.**	**INSP.**
1. Remove and inspect seats (AA-1 and AA-1A only), roll up baggage floor covering, remove inspection covers and fold up aft section of console (remove console inspection covers on AA-1B). Leave in this position until flap, aileron, rudder and elevator inspection and adjustments are completed		
2. Check windshield, windows and canopy for cracks and secure mounting. Clean and lubricate canopy rails. Clean and lubricate canopy cables and pulleys (AA1B-0551 & On). Check canopy operation and locking devices		
3. Check seat belts and shoulder harnesses for condition, secure mounting and latch operation		
4. Check elevator trim control for condition, secure mounting, proper operation and indication		
5. Check rudder pedal and brake system for proper operation and condition. Check brake fluid level. Replace rudder pedal springs at 1000 hours		
6. Check control "T" for secure mounting and adequate clearance from other equipment		
7. Check cables, pulleys, turn buckles and cable ends for condition, secure attachment and safeties. Check cables at pulleys for fraying while actuating controls through full travel. (Max. of 4 broken wires acceptable).....		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

C. CABIN GROUP (Continued)	MECH.	INSP.
8. Check cable tension (at the average temperature for aircraft operation)		
9. Check all controls for clearance and proper operation		
10. Check all interior bond lines for any indications of damage, peeling, corrosion or cracking		
11. Check nose gear torque tubes, mounting brackets and bond joints for cracks and secure mounting. Check torque on mounting bolts - center bearing bracket bolts 185-195 in. lbs. and end plate bolts 300-350 in. lbs.....		
12. Check flap actuator, push rods, limit switches and indicator for proper operation and secure mounting		
13. Lubricate flap actuator per lubrication chart (Figure 2-5) ...		
14. Check all plumbing in cabin for leaks and condition		
15. Disassemble, clean, lubricate and reassemble fuel selector valve every 500 hours. See Fuel System section for details		
16. Check gyro system filters (if installed), replace if necessary.		
17. Check instruments for condition, secure mounting and legible markings		
18. Check electrical wiring, switches, lights and electronic equipment for condition and security		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

C. CABIN GROUP (Continued)	MECH.	INSP.
19. Inspect baggage compartment and cargo tie-downs		
20. Inspect all placards in cabin for condition and legibility ..		
21. Reinstall baggage floor inspection covers, console and seats.		
22. Check fresh air vents for proper operation		
D. FUSELAGE AND EMPENNAGE GROUP	MECH.	INSP.
1. Remove tailcone and empennage covers		
2. Inspect emergency locator transmitter for security, operation and battery expiration date (See 11-140-01.) (if installed)...		
3. Inspect exterior surfaces for condition and damage. Check all drain holes in the fuselage bottom for obstructions		
4. Inspect bond lines for any indication of damage, peeling, corrosion or cracks		
5. Check horizontal and vertical stabilizers for damage and secure mounting. Insure that horizontal stabilizer and elevator drain holes are open.....		
6. Check elevators, elevator tips, elevator bearings and stops, rudder, rudder tip, rudder bearings and stops, tab hinges and bellcranks for damage, travel and proper operation. Maximum allowable torque tube wear limit at bearing supports is .030" reduction in wall thickness		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

D. FUSELAGE AND EMPENNAGE GROUP (Continued)	MECH.	INSP.
7. Check elevator trim and bungee mechanism for damage, secure mounting and proper operation. Check outside of bungee housing for correct lubrication and wear (max. .016 deep). Check shear link rivets for security. (Replace with soft rivets only (MS20470A3-5)		
8. Check rudder and elevator cables and pulleys for damage, proper operation and safeties. Check bellcrank attaching bolts for wear		
9. Lubricate per lubrication chart. (Figure 2-5)		
10. Inspect antenna mountings, wiring and electronic installations.		
11. Check position and anti-collision lights for secure mounting .		
12. Check static system lines and the alternate air source valve (if so equipped). Drain any accumulated moisture from system drain		
13. Reinstall inspection covers		
E. WING GROUP	MECH.	INSP.
1. Remove wing tips and access panels. Inspect surfaces, skins, ribs and tips for damage. Check position and anti-collision (if equipped) lights for secure mounting		
2. Visually inspect interior and exterior bond lines for any indication of damage, peeling, corrosion or cracks		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

E. WING GROUP (Continued)	MECH.	INSP.
3. Check ailerons, aileron bearings and stops, flaps, and flap bearings for secure mounting, damage, proper travel and wear. Maximum allowable aileron torque tube wear limit at bearing supports is .030" reduction in wall thickness. Check that aileron and flap drain holes are open		
4. Check fuel vents and connecting lines for damage and restrictions		
5. Check fuel tank outboard end plates for leaks and secure mounting		
6. Check fuel cap gaskets for air tight seal		
7. Check wing attaching bolts. See Sec. 3-20-03 for torque values.		
8. Check fuel block lines and spar for evidence of leakage at the wing root opening		
9. Inspect fuel tank placards		
10. Check pitot heating element for proper operation (if installed).		
11. Check pitot tube opening and lines. Drain accumulated moisture.		
12. Check for interior corrosion of skin indicated by a white flaking ash		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

F. MAIN LANDING GEAR GROUP	MECH.	INSP.
1. Remove wheels and check for cracks. Check condition of brake linings, wheel cylinders, torque plates and mounting pins. Pack wheel bearings, reinstall wheels and key axle nuts at first 100 hours and each 500 hours thereafter. Inspect wheel bearing grease for contamination and solidification at each annual or 100 hour inspection. Do not exceed 500 wheel miles between repacking intervals. For operation in dusty areas or areas of high humidity, repack every 100 hours. Perform a complete wheel inspection when tires are replaced		
2. Check tires for approved type, wear and proper inflation		
3. Check brake lines for leaks and secure attachment		
4. Check struts for secure mounting. Inspect for cracks, delamination and nicks		
5. Inspect the upper main mounting brackets and spar attaching supports (center spar to fuselage) for wear, cracks and loose bolts		
6. Inspect wheel fairings for damage and secure mounting (if installed)		
G. NOSE GEAR GROUP	MECH.	INSP.
1. Check nose gear strut for secure mounting, deformation, damage and cracks		
2. Remove nose gear strut from torque yoke and inspect for corrosion of the faying surfaces every 12 calendar months. Remove corrosion, if present, paint surfaces with zinc-chromate and reassemble wet. Seal strut to yoke connection with RTV-102 by DOW-CORNING		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

G. NOSE GEAR GROUP (Continued)	MECH.	INSP.
3. Remove and check nose gear fork for deformation, wear and cracks. Maximum fork to strut bearing clearance is .035"		
4. Grease fork and friction dampener, assemble to strut and tighten to 10-13 lb. drag at axle		
5. Remove nose wheel, check for cracks, clean, inspect and repack bearings, reinstall wheel and safety axle at first 100 hours and each 500 hours thereafter. Inspect wheel bearing grease for contamination and solidification at each annual or 100 hour inspection. Do not exceed 500 wheel miles between repacking intervals. For operation in dusty areas or areas of high humidity, repack every 100 hours. Perform a complete wheel inspection when tire is replaced		
6. Inspect nose wheel for cracks, corrosion and loose or broken bolts		
7. Check tire for approved type, wear and proper inflation		
8. Check wheel fairing for damage and secure mounting (if installed)		
H. OPERATIONAL INSPECTION	**MECH.**	**INSP.**
1. Check brake operation (including parking brake)		
2. Check fuel primer operation and lines for leaks		
3. Check booster pump operation		
4. Check fuel pressure		
5. Check starter for proper operation		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 - HOUR INSPECTION PROCEDURE

H. OPERATIONAL INSPECTION (Continued)	MECH.	INSP.
6. Check oil pressure and temperature		
7. Check engine controls for proper operation. Check throttle and mixture controls for proper cushion		
8. Check magneto operation; both on, left off, both on, right off, both on. (Maximum magneto drop 175 RPM with 50 RPM maximum difference between magnetos). With engine at idle, turn switch to "off" position momentarily to check magneto grounding		
9. Check engine static RPM; cruise prop (2150-2300), climb prop (2250-2400)		
10. Check carburetor heater for proper operation and cushion		
11. Check alternator output		
12. Check suction gauge and vacuum system output (4.6 to 5.4 in. Hg.)		
13. Check fuel selector valve operation and indexing		
14. Check heating, defrosting and ventilating system for proper operation		
15. Check radio for proper operation		
16. Check engine idle speed (600 to 650 RPM) and mixture setting..		
17. Check idle cut-off on carburetor for proper operation		
18. Check ailerons for proper operation		

MODEL AA-1, AA-1A & AA-1B
ANNUAL OR 100 HOUR INSPECTION PROCEDURE

H. OPERATIONAL INSPECTION (Continued)	MECH.	INSP.
19. Check elevators and trim tab for proper operation		
20. Check flaps for proper operation		
21. Check fuel quantity gauges for condition and proper operation.		
22. Check interior lights for proper operation and adjustment		
23. Check navigation and anti-collision lights for proper operation and landing lights for proper operation and adjustment		
24. Check pitot heat for proper operation		
25. Check stall warning device for operation		
26. Inspect engine after ground run-up. Flight test and inspect for oil leaks and secure mounting of all components		
I. GENERAL	**MECH.**	**INSP.**
1. Aircraft cleaned and serviced		
2. Aircraft conforms to FAA Specifications		
3. All FAA Airworthiness Directives complied with		
4. All manufacturer's Service Letters and Bulletins complied with.		
5. Checked for proper flight manual		
6. Aircraft papers in proper order. Make log book entry		

"END OF INSPECTION

SECTION III

AIRFRAME

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3 AIRFRAME

3-00 GENERAL

The airframe consists of all metal bonded construction with one-half inch thick honeycomb surrounding the cabin area. The wing, and tail assemblies employ high-strength adhesive bonding of aluminum sheets to ribs or bulkheads and are bolted to the fuselage to provide easy servicing. A sliding plexiglas canopy provides easy access and good visibility. The following sub-headings describe the various airframe components and contain instructions for removal and installation. For information on structural repair, refer to Chapter X. "STRUCTURAL REPAIR".

3-10 WING TIP

3-10-00 DESCRIPTION

The wing tips are the outermost part of the wing assembly. They are constructed of fiberglass and blend the wing leading edge and trailing edge into a single unit. The wing tips house the aileron balance weight assemblies, contain the navigation lights and the fuel tank filler assembly.

3-10-01 WING TIP REMOVAL

a. Remove the 4 mounting screws which hold the scupper assembly to the wing tip.

b. Remove the 24 screws which attach the wing tip to the wing.

c. Remove the scupper drain tube from the bottom of the tip.

d. Drop the tip a few inches away from the wing in order to reach inside and disconnect the navigation light wires.

3-10-02 WING TIP INSTALLATION

Check condition and location of all clip nuts and install the wing tip in reverse of the removal procedure. Check for positive clearance of the aileron balance weight.

3-20 WING

3-20-00 GENERAL

The wing construction is a one piece bonded assembly utilizing a tubular main wing spar and a formed U-channel rear wing spar. Aluminum ribs are bonded directly to both spars with the wing skin bonded directly to the wing ribs and rear spar.

3-20-00 WING - GENERAL (Continued)

The tubular main wing spar also serves as a fuel tank utilizing aluminum castings at the inboard and outboard ends of the spar. The inboard fuel tank casting is located just outboard of the wing attach joint. The outboard casting, which incorporates the filler neck, is located at the outboard end of the main wing spar. A fuel tank baffle system is bolted to the outboard casting and spans the length of the tank.

3-20-01 WING INTERCHANGEABILITY

Wings are interchangeable only as follows:

a. Model AA-1 "Yankee" wings are interchangeable only on Model AA-1 "Yankees".

b. Model AA-1A "Trainer" wings have a different airfoil than the Model AA-1 "Yankee" and are interchangeable only on Model AA-1A "Trainers".

c. Model AA-1B "Trainer" wings are identical to Model AA-1A "Trainer" wings except that a stronger spar material is utilized in the AA-1B wing (AA-1B is a heavier gross weight and an all utility category aircraft). Therefore Model AA-1B wings can be used on both the Model AA-1A and AA-1B "Trainer" but Model AA-1A "Trainer" wings can not be used on AA-1B's.

3-20-02 WING REMOVAL

a. Remove the inspection cover from under the wing root. Late Model AA-1B wings are equipped with lock bolt inspection covers. Remove these covers, if installed.

b. Disconnect the airspeed pitot line located in the wing root (left wing only).

c. Disconnect the main fuel line and the fuel measurement gauge line located in the wing root.

N O T E

Be sure the tank has been completely drained before attempting to disconnect the fuel lines.

d. Disconnect all wiring in the wing root.

e. Raise the baggage compartment carpet and remove the inspection plate from the compartment floor.

f. Remove the nut and bolt securing the aileron bellcrank to the torque tube and remove it from the torque tube by rotating and sliding from the end of the tube.

N O T E

Do not disturb cable turnbuckles or control surface rigging.

3-20-02 WING REMOVAL (Continued)

g. Remove the two bolts securing the flap bellcrank to the flap torque tube and rotate bellcrank out of way.

N O T E

Do not disturb control system rigging.

h. Through the wing root or lock bolt access opening, remove the two wing lock bolts.

i. Use three men; one at the wing tip to support weight and pull; one at the leading edge and one at the rear edge to rotate wing slightly, clockwise and counter-clockwise, until the wing is free of the spar.

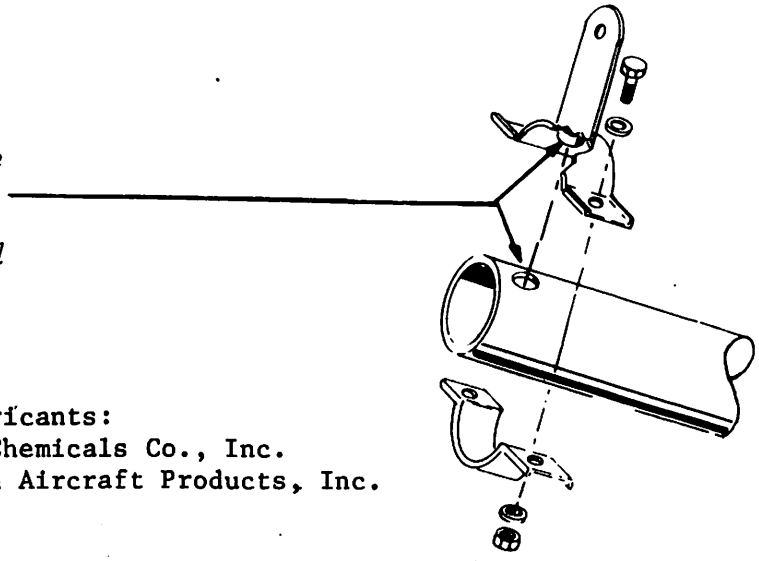
3-20-03 WING INSTALLATION

a. Install the wing assembly in reverse order after thoroughly cleaning the joint and then spraying the spar mating surfaces with a solid film lubricant* and rubbing general purpose lubricating oil over the fuselage carry-through spar.

b. Torque the wing attaching (straight 3/8" diameter) bolts to 95 to 110 in. lbs. (AA1-0001 through AA1-0154). Torque the wing attaching shoulder bolts to 60 to 85 in. lbs. (AA1-0155 and on).

C A U T I O N

When installing the flap bellcrank horn, be sure the pin is engaged in the flap torque tube hole. This is essential for proper flap operation and rigging.



*Approved solid film lubricants:
McLube 1708 by McGee Chemicals Co., Inc.
Lube-Lok 5396 by Allen Aircraft Products, Inc.

N O T E

If the original wing is replaced by a new or remanufactured wing, the stall strip should be taped in place (see Figures 3-1 and 3-2 for locations) and the aircraft test flown to "fine tune" the wing. Perform a series of stalls at half throttle and move the stall strip slightly up or down (max. 1/8"), as required, to obtain a straight ahead stall and rivet in place.

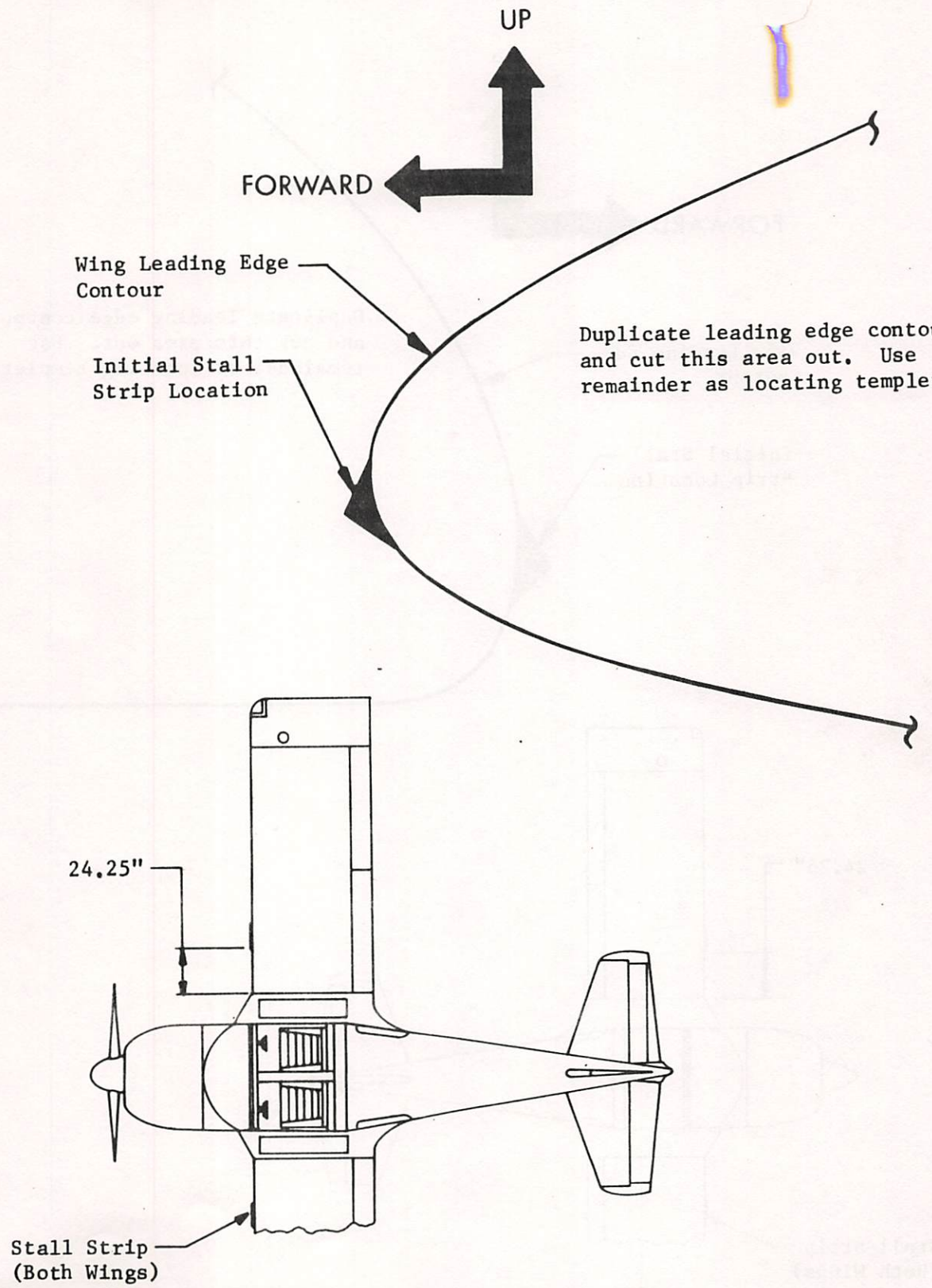


Figure 3-1. Model AA-1 Initial Stall Strip Location

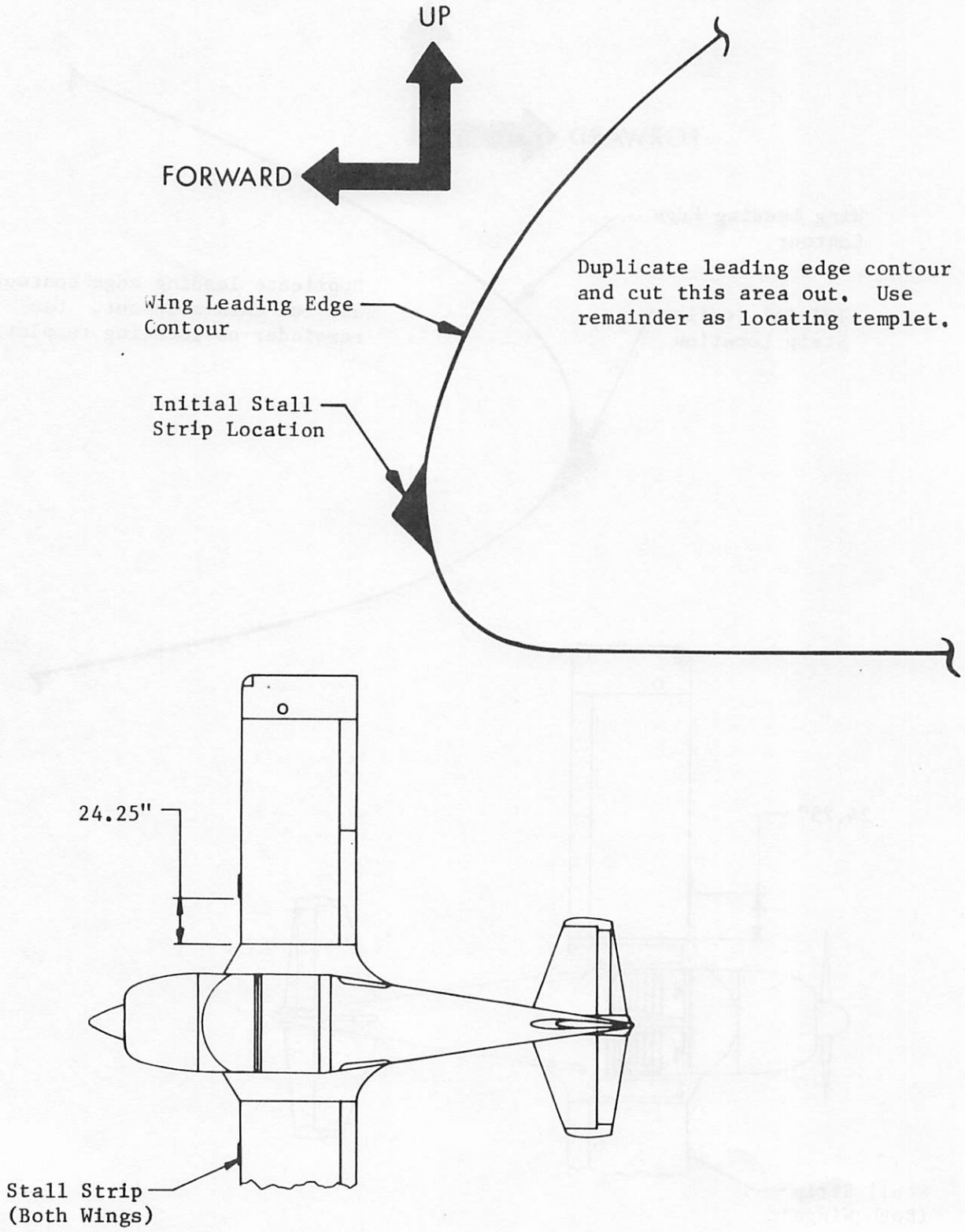


Figure 3-2. Model AA-1A/AA-1B Initial Stall Strip Location

3-20-04 WING SPAR FIT

If looseness (vertical movement) is noted at the wing tip, perform an inspection of the center spar/wing spar joint. The clearance between the center spar and the wing spar must be checked with the wing attaching shoulder bolts in place. The clearance allowable between the center spar and the wing spar is as follows: The sum of the clearance on any diameter (180° across) shall not exceed .022". (Use a wire type feeler gauge for accurate readings). Normal maximum clearance occurs at the top and bottom of the joint. If the clearance exceeds the above limits the joint must be shimmed as follows:

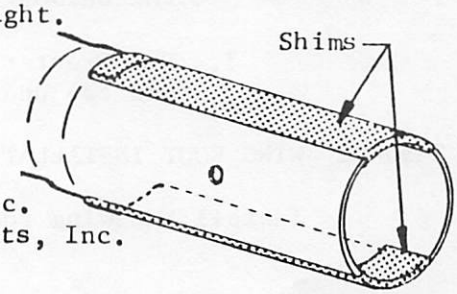
a. Determine the shim thickness and location (the top and/or the bottom of the joint) from feeler gauge readings. Different thickness shims may be used on the top and bottom of the joint as required to fill the gap.

b. Remove the wing per 3-20-02.

c. Inspect the wing lock bolt holes in the wing spar for any signs of elongation or wear. Maximum hole diameter is .377". If the hole diameter is larger than this it must be reamed to a larger diameter and a steel bushing installed. Contact the Customer Service Department for details.

d. Obtain the correct thickness aluminum (2024-T3 alclad or 6061-T6) shim stock and cut a shim 4" wide x 15" long. The edges of the shim must be sanded down to remove the sharp corners and the surfaces spray coated with a solid film lubricant*.

e. Place the shim (shims) on the top and/or bottom of the inboard spar, as required, and bend approximately 2" of the outboard ends of the shim (shims) over the end and inside of the inboard spar. This will hold the shim (shims) in place during and after assembly. Bend over the inboard end (ends) of the shim (shims) 12" from the end so that this portion will wrap over the end of the outboard (wing) spar when the wing is fully installed. This locks the shim (shims) in place. See illustration at right.



f. Install the wing per 3-20-03.

*Approved Solid Film Lubricants:

McLube 1708 by McGee Chemicals Co., Inc.
Lube-Lok 5396 by Allen Aircraft Products, Inc.

3-30 WING ROOT FAIRING

3-30-00 GENERAL

The fiberglass wing root is located between the wing and the fuselage and provides a smooth fusing of the wing assembly to the fuselage. The wing root encloses the upper main landing gear attaching brackets and lines from the fuel tanks.

3-30-01 WING ROOT REMOVAL

a. Remove the access panel from the underside of the wing root.

b. Remove the wing as instructed in 3-20-02.

c. From inside the wing root, disconnect the flexible line connecting the fuel vent to the fuel gauge vent line.

d. Up to and including serial number AA1-0067, the wing root is removed as follows:

1. From the inside face of the fuselage side, remove the 6 bolts which attach the wing root supporting structure.

2. From the exterior of the aircraft, remove the 6 screws which attach the wing root to the fuselage.

e. On serial numbers AA1-0068 and up, the wing root ribs are separate and not required to be removed unless necessary for repair. The wing root is removed as follows:

1. Remove the 6 screws which attach the wing root to the wing root to the fuselage.

2. Remove the 2 screws which attach the wing root to the rear rib. One is located under the wing root and the other at the outboard end.

3. The front rib is secured by 4 screws, two in the outboard end and two underneath. Remove these screws.

3-30-02 WING ROOT INSTALLATION

Install the wing root in reverse of the removal procedure.

3-40 COWLING

3-40-00 GENERAL

The cowling consists of 3 major assemblies; the upper cowl, the lower cowl and the forward cowl. The upper and lower cowl assemblies are aluminum while the forward cowl assembly is fiberglass. The forward cowl contains the engine cooling inlets, the engine induction system inlet and the landing light assembly. The forward cowl is attached to the lower cowl assembly which in turn is attached to the fuselage with screws. The upper cowl includes a small oil access door and is easily removable for maintenance.

3-40-01 COWLING REMOVAL AND INSTALLATION

a. Unlatch the four cowl latches which join the upper and lower cowl.

b. Loosen the two quarter turn fasteners which attach the upper cowl to the forward cowl.

c. Pull cowl gently forward and upward and remove.

N O T E

Adjust cowl latches to provide only enough tension to hold upper cowl securely. Overtightening can create excessive stresses and cracking of the cowl skin in the latch area.

N O T E

The above two steps describe the procedures for the removal of the upper cowl only.

d. Remove the screws which attach the lower cowl to the forward cowl and to the fuselage.

N O T E

Completion of Step 4 allows easy removal of the lower cowl. To remove the forward cowl, it will be necessary to remove the spinner and propeller.

e. Reassemble in the reverse order.

3-50 TAILCONE

3-50-00 DESCRIPTION

The tailcone assembly is attached directly to the aft fuselage bulkhead and houses the tail light assembly, the elevator and rudder connections and the elevator trim drive and bungee assembly.

3-50 TAILCONE (Continued)

3-50-01 TAILCONE REMOVAL AND INSTALLATION

a. Remove the 7 mounting screws which attach the tailcone to the fuselage.

b. Disconnect the tail light wires at the aft bulkhead.

c. Reassemble in the reverse order.

3-60 HORIZONTAL STABILIZER ASSEMBLY

3-60-00 DESCRIPTION

The horizontal stabilizer assembly consists of the stabilizers, elevators, and trim assembly. The horizontal stabilizer is fixed and provides horizontal stability for the airplane. The elevators are hinged to the stabilizer and control the "Pitch" or "lateral" axis. The trim tab assembly is hinged to the trailing edge of the right hand elevator and used to minimize elevator control pressures. The trim assembly is controlled by a trim wheel located in the cabin console.

3-60-01 HORIZONTAL STABILIZER REMOVAL AND INSTALLATION

a. Remove the tailcone.

b. Remove the inspection covers at the base of the vertical stabilizer.

c. Remove the elevator as described in Section 5.

d. Remove the bolt attaching the forward stabilizer support to the fuselage bulkhead.

e. Remove the four bolts attaching the rear stabilizer spar to the aft fuselage bulkhead and slide the stabilizer outboard to remove.

f. Reassemble in the reverse order.

N O T E

After repair and/or painting of any control surface, it is necessary to check and adjust the mass balance weight as required to bring it within tolerance. Tolerance for each elevator and the rudder is 0 to +32 inch-ounces. Refer to Section 5-70 for balancing information and procedure.

3-70 VERTICAL STABILIZER ASSEMBLY

3-70-00 DESCRIPTION

The vertical stabilizer assembly consists of a vertical fin and the rudder. The vertical fin provides directional stability and a streamline structure for mounting the rudder. The rudder is the movable control surface that controls rotation around the "Yaw" axis. The rudder

3-70 VERTICAL STABILIZER ASSEMBLY (Continued)

3-70-00 DESCRIPTION

is controlled by the pilot's feet on the rudder pedals located on the cabin floor.

The rudder, on aircraft not equipped with a flashing beacon, contains a mass balance weight. On aircraft equipped with a flashing beacon, a smaller mass balance weight is used.

3-70-01 VERTICAL STABILIZER ASSEMBLY REMOVAL AND INSTALLATION

a. Remove the tailcone.

b. Remove the inspection covers at the base of the vertical stabilizer.

c. Tie off the rudder cables to prevent them from entering the fuselage (they are spring loaded) and disconnect them.

d. Remove the navigation antenna cable, the ELT antenna cable (if installed) and the flashing beacon lead wires (if installed).

e. Remove the bolt attaching the forward stabilizer support to the fuselage bulkhead.

f. Remove the four bolts attaching the rear stabilizer spar to the aft fuselage and remove the stabilizer.

g. Reassemble in the reverse order.

3-80 CANOPY

3-80-00 DESCRIPTION

These aircraft employ a Plexiglas and aluminum canopy assembly which slides on teflon runners and provides easy access to and from the cockpit.

3-80-01 CANOPY MAINTENANCE

Field experience has shown that after extended operation, the canopy may become difficult to open and close. The following suggestions are provided to aid in maintaining satisfactory freedom of operation of the canopy:

1. DO NOT use the canopy as a hand hold during entry to and exit from the aircraft as bending of the inner tracks can result.

2. The inner canopy tracks must be perfectly straight. If the tracks are bent, they should be straightened or replaced.

3-80-01 CANOPY MAINTENANCE (Continued)

3. The sliding surfaces of the canopy inner tracks and the teflon runners in the canopy outer tracks must be kept clean and lightly lubricated. Smoother operation may be achieved by cleaning the sliding surfaces with isopropyl alcohol and a small brush and then injecting a small amount of spray lubricant into the sliding surfaces. Production aircraft canopy tracks are lubricated with E-Z Free lubricant which is available in 6 or 16 oz. spray cans from the Customer Service Department or from XIM Products, Inc., 1169 Bassett Road, Westlake, Ohio 44145.

4. If external cleaning and lubricating does not satisfactorily eliminate canopy stocking or binding, the canopy should be removed from the tracks (ref. 3-80-02) and the tracks slid completely out of the airplane. All sliding surfaces should then be carefully cleaned with isopropyl alcohol and re-lubricated with a very thin film of lubricant. If the teflon runners are galled or severely worn, they should be replaced. The teflon runners are secured in the outer tracks with roll pins Esna part number 52-012-062-0500, inserted at the forward end of each channel.

5. A canopy track sizing tool, Part No. ST-1064, is available which may be used to resize the teflon runners when the tracks are removed for cleaning or when the teflon runners are replaced in the field. This tool is simply inserted into the outer track in place of the sliding inner track and forced through the entire length of the outer track to force the teflon runners tightly into the retaining channels (See Figure 3-3). Properly installed teflon runners allow a 1/32" to 1/16" vertical clearance between the inner canopy track and the runners. This clearance can be checked with the canopy installed by moving it up and down and measuring the inner track movement. Clean, lubricated teflon runners installed with the correct clearance are essential for smooth, free canopy operation.

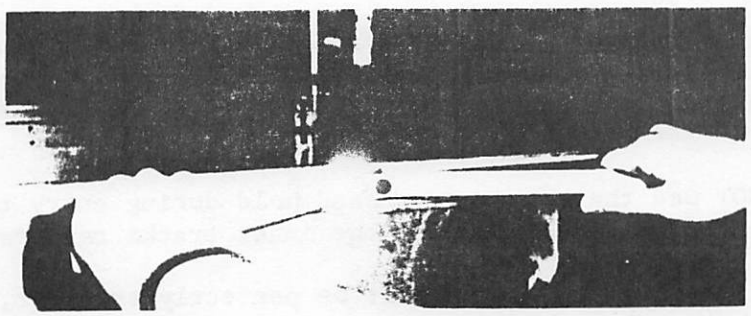
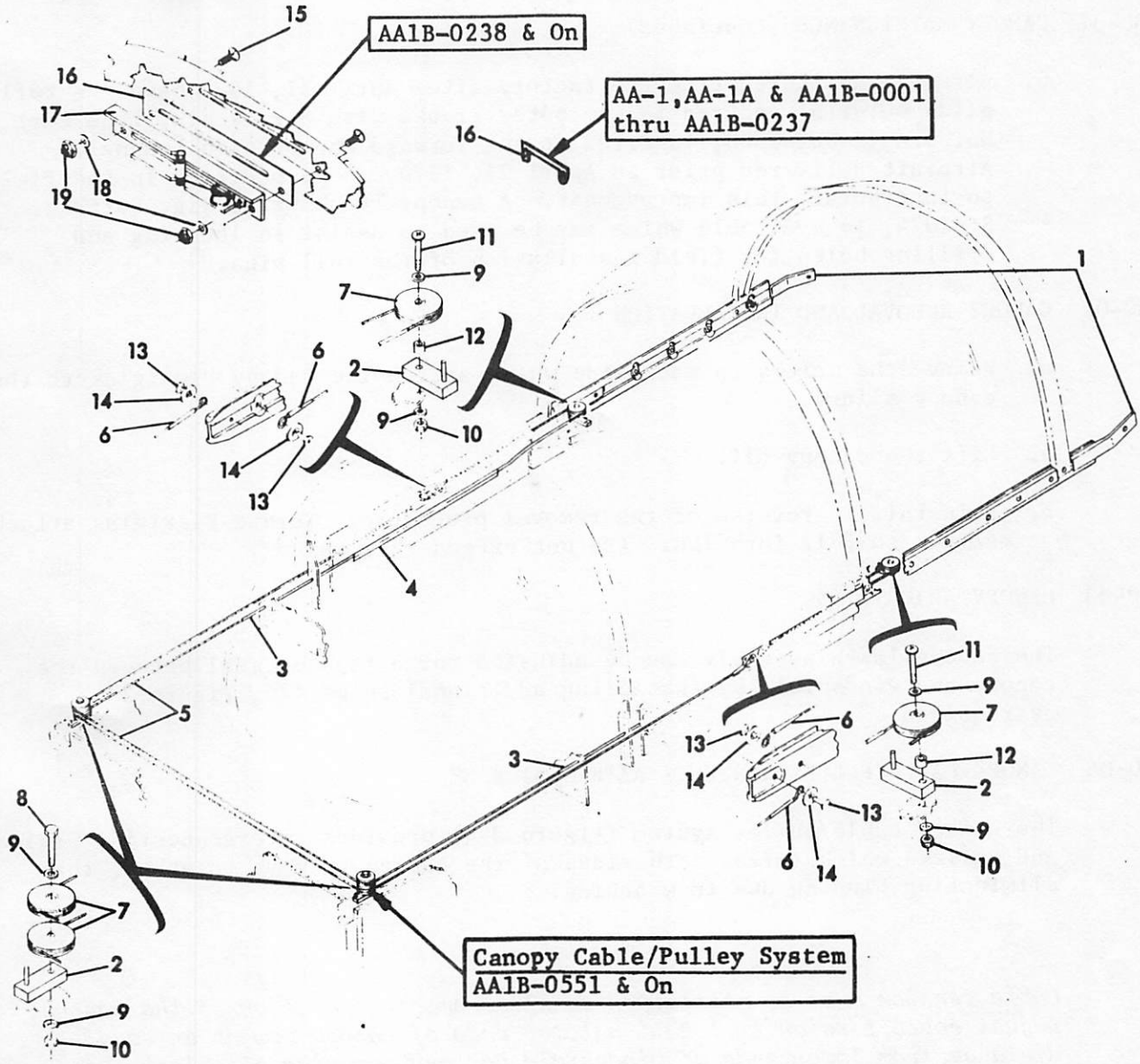


Figure 3-3. Canopy Track Sizing Tool



1. Inner track assembly
2. Spacer assembly
3. Housing
4. Duct tape
5. Cable
6. Shrink tubing
7. Pulley
8. Bolt
9. Washer
10. Nut
11. Screw
12. Spacer
13. Screw
14. Washer
15. Screw
16. Shim
17. Bearing block
18. Washer
19. Nut

Figure 3-4. Canopy Adjustment

3-80-01 CANOPY MAINTENANCE (Continued)

6. Aircraft delivered from the factory after April 21, 1970 have the teflon glide material secured in the outer tracks with a roll pin, Esna Part No. 52-012-062-0500, inserted at the forward end of each channel. Aircraft delivered prior to April 21, 1970 can be modified in the field to incorporate this improvement. A Canopy Track Drill Jig, Part No. St-1074, is available which may be used to assist in locating and drilling holes for field installation of the roll pins.

3-80-02 CANOPY REMOVAL AND INSTALLATION

a. Remove the screws on each side which attach the canopy Plexiglas to the canopy slides.

b. Lift the canopy off.

c. Reinstall in reverse of the removal procedure. Torque Plexiglas attach screws to 8-12 inch lbs. (Do not exceed this value).

3-80-03 CANOPY ADJUSTMENT

The canopy latch assembly can be adjusted for a tighter seal between the canopy and windshield by installing additional shims (16, Figure 3-4), as required.

3-80-04 CANOPY CABLE/PULLEY SYSTEM AA1B-0551 & ON

The canopy cable/pulley system (Figure 3-4) provides interconnecting cables and pulleys which forces both sides of the canopy to move together, thus eliminating binding due to wracking.

N O T E

Cable tension must be maintained to allow smooth operation of the canopy. Adjust cable tension by locating lower ends of canopy bow at an equal distance from lower ends of windshield bow and removing all slack from system at both outboard cable attach screws (13, Figure 3-4). If a cable is removed, install cable and rerig system as follows:

a. Wrap cable counterclockwise around inboard cable attach screw (13, Figure 3-4) and tighten screw. Looped end of cable to be approximately 2.25 inches from screw. Secure end with shrink tubing.

b. Install inner canopy track (1) and route cable aft around pulley, then forward through housing (3). If cable is being routed through left housing, position cable around upper forward pulleys; if cable is being routed through right housing, position cable around lower forward pulleys.

c. Install canopy.

3-80-04 CANOPY CABLE/PULLEY SYSTEM - AA1B-0551 & ON (Continued)

d. Wrap cable counterclockwise around outboard cable attach screw (13) and tighten screw after removing all slack from system and insuring squareness of canopy to windshield. Looped end of cable to be approximately 2.25 inches from screw. Secure end with shrink tubing.

3-90 WINDSHIELD

3-90-00 GENERAL

The Plexiglas windshield is sealed and bolted into the forward fuselage windshield lip along the lower edge and bolted (Bonded-1974 and on) to a support bow along the aft edge.

3-90-01 WINDSHIELD REMOVAL

a. Remove the cowl deck.

b. Remove the 12 screws which attach the windshield to the windshield bow. (Remove bonded bow with windshield on 1974 and on models).

c. Remove the 5 screws which attach the windshield to the windshield fairing.

d. Carefully pull the windshield out from under fairing, cleaning away the sealant as required.

3-90-02 WINDSHIELD INSTALLATION

a. Thoroughly clean all adhesive, sealant, dirt and grease, from the inner surface of the windshield fairing.

b. Repeat step (a) to the windshield.

c. Repeat step (a) to the windshield bow. (Not required with bonded bow).

d. Apply a 1.00 inch by .063 inch vinyl foam tape (3M Company Y-9132D) or an equivalent to the windshield along the windshield bow mating surface. (Not required with bonded bow).

e. Apply a 1.00 inch by .063 inch vinyl foam tape (3M Company Y-9132A) or an equivalent along the windshield on the windshield fairing mating surface.

f. Locate the windshield or windshield and bow assembly in its proper position.

g. Insert sealant* between the windshield and the windshield fairing.

3-90-02 WINDSHIELD INSTALLATION (Continued)

h. Install the 5 fasteners to the windshield fairing and the 12 fasteners (not required on bonded assemblies - 1974 and on) into the windshield bow. Torque Plexiglas attach screws to 8-12 inch lbs. (Do not exceed this value).

C A U T I O N

Be sure all fastener holes are aligned prior to tightening to avoid cracking the windshield.

*Approved sealants:

576.1 by Presstite Engineering Co.
EC 1239 and EC 1675 by EM Company.
3201 by Chemical Seal Corporation of America.
567 by Coast Pro-Seal.

3-100 SEATS

3-100-00 GENERAL

The seats are independently mounted on brackets located on the spar and aft cabin bulkhead at the front and rear of the seats respectively. Early model aircraft seats have rigidly mounted backs while later model aircraft feature folding seat backs and all have folding seat cushions.

3-100-01 SEAT REMOVAL AND INSTALLATION

a. Lift the seat cushion to expose the seat tracks.

b. Remove the bolts which fasten the seat tracks to the spar mounting brackets.

c. Remove the spring which is attached to the seat adjustment lever.

d. Remove the seat adjustment boost springs which are connected to the bottom of the seat and to a bracket mounted on the carry-through spar.

e. Remove the bolts which fasten the seat tracks to the mounting brackets on the bulkhead behind the seat.

N O T E

On the later models of the AA-1 and all AA-1A and AA-1B, the aft mounting brackets are slotted in order to remove the seat without having to remove the rear mounting bolts.

f. Reassemble in the reverse order.

3-110 CONSOLE

3-110-00 DESCRIPTION

The royalite console assembly is located between the front seats and consists of a main body and two forward side panels. The console assembly contains the fuel selector valve, ash tray, trim wheel, trim indicator, flap switch, flap position indicator and microphone mount. The console assembly also covers the control cable pulley group, the control cables and the flap drive motor.

N O T E

Limited inspection of components under the console can be accomplished by removing the ash tray and using a hand mirror. On the Model AA-1 "Yankee" and the Model AA-1A "Trainer" the aft part of the console must be raised up for maintenance under the console aft of the spar.

Model AA-1B "Trainer" aircraft (1973 and on) have inspection covers located on the aft top and the forward right hand sides of the console for inspection and minor maintenance purposes.

3-110-01 CONSOLE REMOVAL AND INSTALLATION

a. Remove the seats.

b. Remove the microphone.

c. Remove the fuel valve handle.

d. Remove the two screws located along side the flap position indicator.

e. Remove the six screws attaching the console to the floor.

f. Remove the six screws attaching the center console to the forward console.

g. Spread the sides of the console aft of the spar, and lift up. Repeat this process to the sides of the console forward of the spar.

h. To remove the forward section of the console, remove the two additional screws from the floor and withdraw.

i. Reassemble in the reverse order.

C A U T I O N

Be sure console aft of the spar is outside of all control cables on reassembly.

SECTION IV

LANDING GEAR

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4 LANDING GEAR

4-00 GENERAL

The landing gear is a tricycle type. The main gear consists of fiberglass struts attached to forged brackets which mount to the carry-through spar. Forgings attached to the lower end of each strut serve as the wheel axles and attaching brackets. The nose gear is the castering type and consists of a tubular strut attached to torque tubes mounted in the fuselage.

4-10 VISUAL INSPECTION

4-10-00 GENERAL

A thorough inspection of the landing gear attach brackets and struts should be made at each 100 hour inspection. Examine the brackets for signs of cracks or other damage. Refer to Chapter 2, for jacking instructions if the wheels or main gear are being removed.

4-10-01 NOSE GEAR STRUT VISUAL INSPECTION

a. Inspection - Inspect the steel tube nose gear strut for evidence of nicks, rust or damage to the protective paint coating from propeller blast or abrasion.

N O T E

Nicks more than .030 inches deep or any cracks are cause for immediate rejection of the strut.

b. Corrective Action - Smooth out and blend in minor nicks. Remove all rust and smooth out damaged paint by sanding with No. 150 Tri-Mite. Finish sand with No. 320 sandpaper. Clean strut with wax and grease remover and prime with two light coats of Zinc Chromate Primer per MIL-P-8585. Paint strut to match aircraft color.

c. Inspect the nose fork bearing cup to strut fillet for the following conditions: cracks; corrosion; deterioration; damage (see area D, Figure 2-9). If any discrepancies are found, place a 150 ft. lb. torque load on cup (suitably protecting the bearing surface), preferably around the stop plate. Any detectable rotation is reason for strut replacement. After testing, replace fillet as follows:

(1) Hand abrasive remove cup to strut fillet, rust and paint on strut up 1.5 inches minimum from cup stop plate.

(2) Apply Loctite 290 Adhesive/Sealant (wicking), Loctite Corporation, to any cracks remaining in cup to strut bondline.

4-10-01 NOSE GEAR STRUT VISUAL INSPECTION (Continued)

(3) Apply a uniform .12 inch radius fillet of sealant* to replace fillet removed. Also apply sealant on strut up 1.5 inches minimum from cup stop plate.

(4) After sealant has cured, prime area with two light coats of Zinc Chromate Primer and paint strut to match aircraft color.

*Approved Sealants (PR-1422, Class B-1/2 is available through the Customer Service Department):

EC-1675B, Class B-1/2, B-2 or B-4 with EC-1675A accelerator, 3M Company.
890, Class B-2 or B-4 with 890A curing agent, Coast Pro-Seal Company.
PR-1422, Class B-1/2 or B-2 with accelerator, Products Research and Chemical Corporation.
PR-1436G, Class B-1/2, B-2 or B-4 with accelerator, Products Research and Chemical Corporation.

4-10-02 MAIN GEAR STRUT VISUAL INSPECTION

a. Inspection - Inspect the laminated fiberglass main gear struts for evidence of nicks, cracks, delamination and deterioration of the protective paint coating.

N O T E

Minor surface delaminations are acceptable providing they do not extend more than one ply into the surface of the strut. Corner delaminations (slivers) are acceptable if they are smaller than 1/16 X 1/16 inch in size throughout their length. If airworthiness of a damaged fiberglass strut is in question, close-up photographs of the damaged area may be submitted to the Customer Service Department for analysis and recommendations.

b. Corrective Action - Remove delaminated material. Smooth out minor paint chips or stone bruises with No. 150 Tri-Mite. Clean unpainted areas thoroughly with Methyl Ethyl Keystone. Seal minor surface or corner delaminations with a two-part epoxy adhesive to seal out moisture from the damaged area. Clean strut with wax and grease remover and prime with two light coats of Zinc Chromate Primer per MIL-P-8585 and paint to match aircraft color.

N O T E

Epoxy adhesive is available from the Customer Service Department or may be purchased locally.

Figure 4-1. Main Landing Gear Assembly

4-20 MAIN LANDING GEAR

4-20-00 DESCRIPTION

The main landing gear consists of the main wheels, brakes, struts, and attaching brackets and hardware. The strut is laminated fiberglass and is attached to the spar with two forged aluminum brackets (or heat treated welded steel on early aircraft) and one extruded aluminum bracket. On the lower end of the strut is a forging which serves as the wheel axle and is attached directly to the strut without additional bracketry.

N O T E

On AA1-0001 through AA1-0149 the main landing gear strut attaching brackets are heat treated steel weldments. If they are found cracked or damaged they must be replaced as they cannot be welded. Serial No. AA1-0150 and up have forged aluminum brackets. Serial No. AA1B-0001 and up have an additional steel spring plate bolted into the upper landing gear strut attachment assembly to provide added strength for the increased gross weight of that aircraft.

4-20-01 MAIN LANDING GEAR REMOVAL

a. Remove the wing and wing root.

N O T E

Beginning with Serial No. AA1-0011 & on, removal of wing and wing root is not necessary, although it would simplify gear removal.

b. Support the airframe as shown in Section 2-7A.

c. Bleed the fluid from the brake system and disconnect the brake line at the fuselage side.

d. Remove the six bolts which attach the brackets to the carry-through spar.

e. Remove the three remaining bolts attaching the strut brackets to the spar mounting bracket.

f. Remove the six bolts which connect the upper end of the strut to the brackets.

g. The strut may be removed from the lower bracket by removing the four attaching bolts.

N O T E

Inspect each individual bracket for signs of cracking or hole elongation. Replace where necessary.

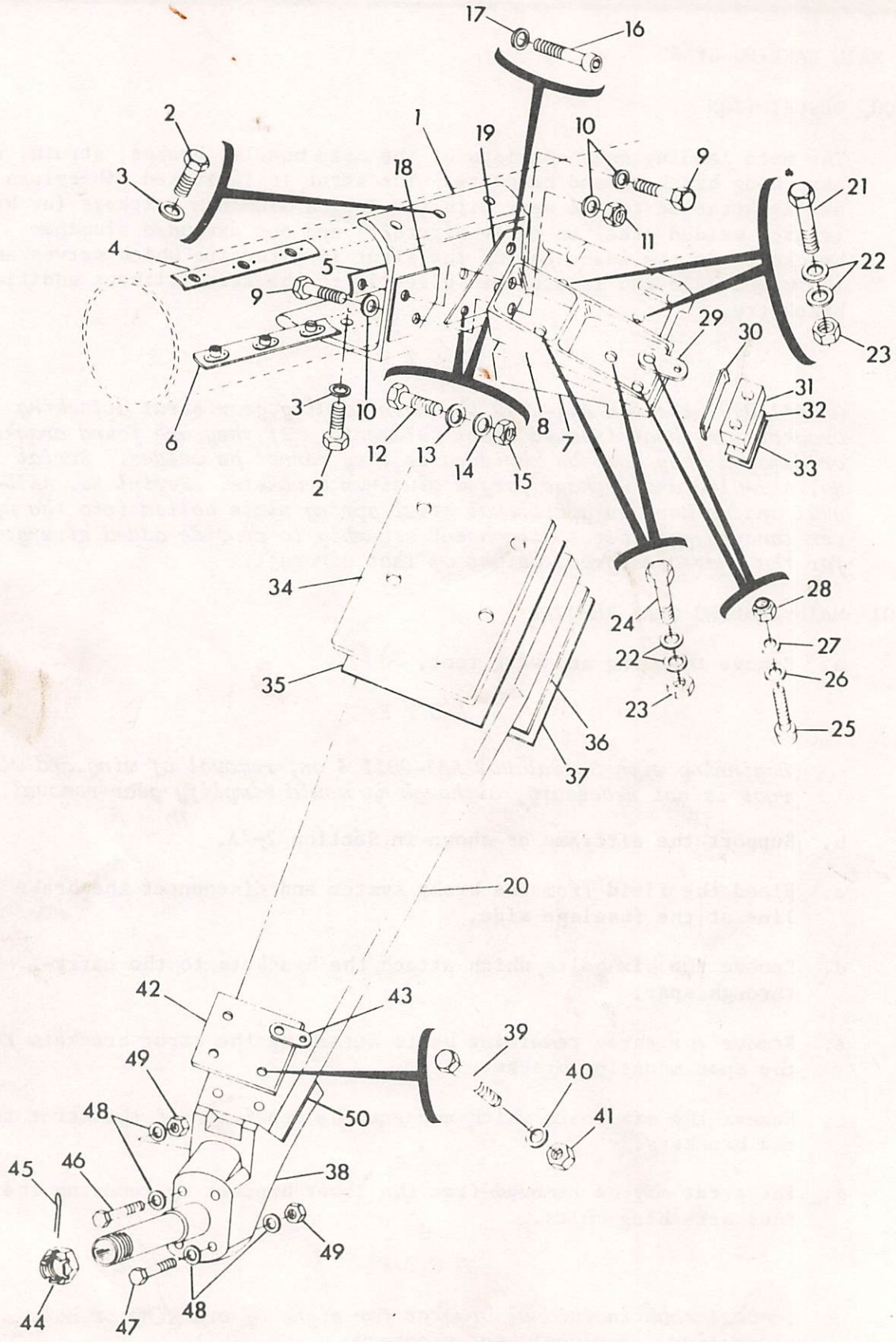


Figure 4-2. Main Landing Gear, exploded view
(AA-1B shown)

1. Bracket assembly (L.H.)
2. Bolt
3. Washer
4. Retainer assembly
5. Retainer assembly
6. Retainer assembly
7. Bracket
8. Bracket
9. Bolt
10. Washer
11. Nut
12. Bolt
13. Washer
14. Washer
15. Nut
16. Bolt
17. Washer
18. Shim
19. Shim
20. Strut
21. Bolt
22. Washer
23. Nut
24. Bolt
25. Bolt
26. Washer
27. Washer
28. Nut
29. Bracket
30. Shim
31. Spacer
32. Shim
33. Shim
34. Spring plate (AA-1B only)
35. Shim
36. Shim
37. Shim
38. Axle
39. Bolt
40. Washer
41. Nut
42. Reinforcement plate
43. Bracket
44. Nut
45. Cotter pin
46. Bolt
47. Bolt
48. Washer
49. Nut
50. Shim

Figure 4-2. Main Landing Gear, exploded view (Cont'd.)

4-20-02 MAIN LANDING GEAR INSTALLATION

a. Reassemble in the reverse order. Shim as required, to assure a tight fit.

N O T E

Be sure to place the phenolic spacer against the strut to prevent damage to the fiberglass.

N O T E

Apply a solid film lubricant to the mating surfaces of the carry-through spar and spar mounting bracket.*

b. Torque values for the main landing gear bracketry hardware is shown below.

1/2-inch bolts	650-750 inch-lbs.
3/8-inch bolts	250-300 inch-lbs.
5/16-inch bolts	200-225 inch-lbs.

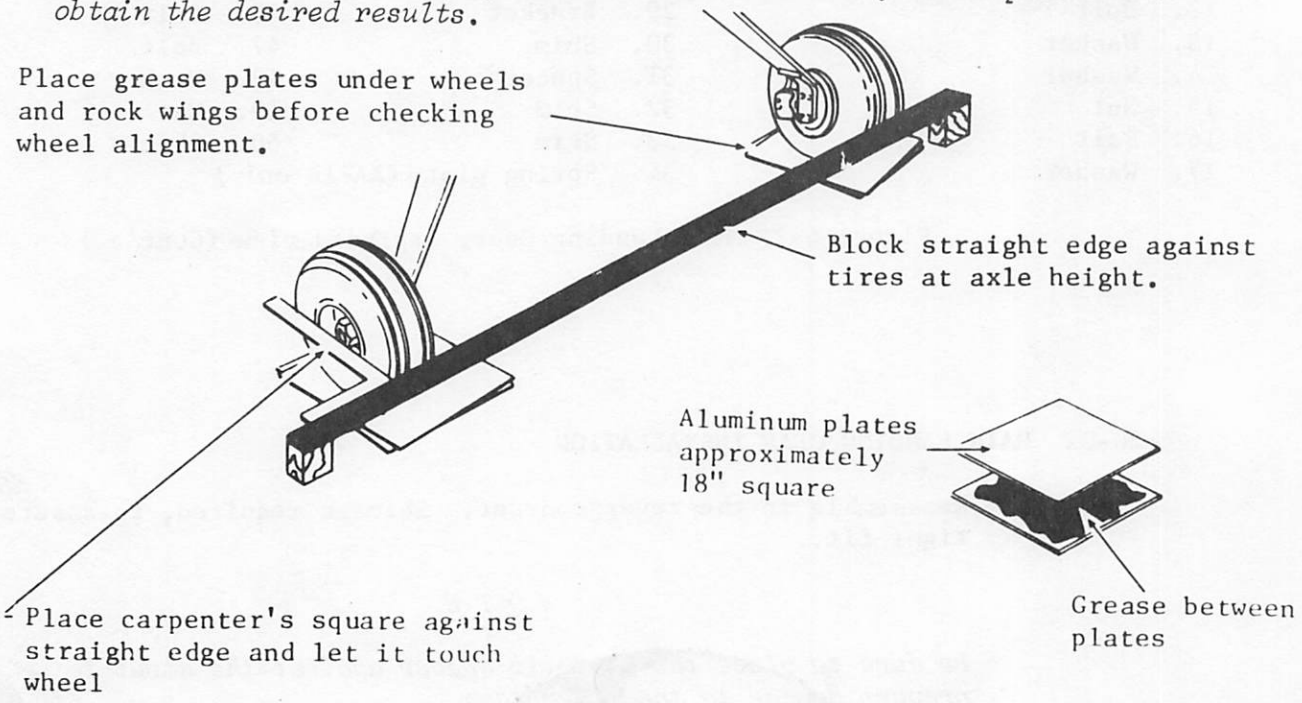
*Approved solid film lubricants.

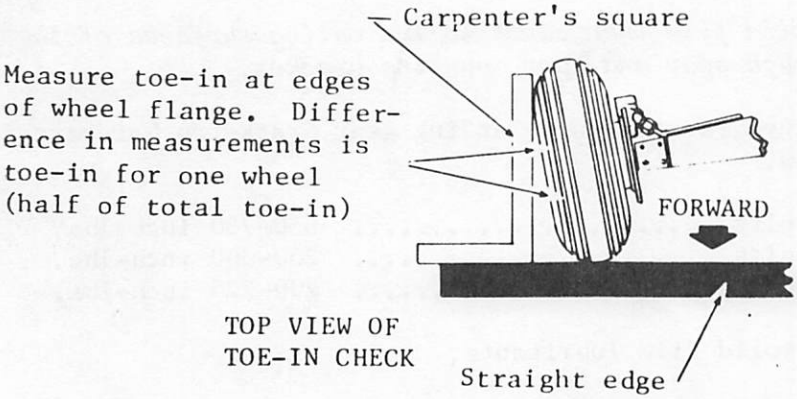
McLube 1708 by McGee Chemicals Co., Inc.
Lube-Lok 5396 by Allen Aircraft Prod., Inc.

4-30 MAIN LANDING GEAR ALIGNMENT

N O T E

Setting tow-in within these tolerances while the cabin and fuel tanks are empty will give approximately zero toe-in at gross weight. Ideal setting is zero toe-in at normal operating weight. Therefore, if normally operated at less than gross weight and abnormal tire wear occurs, realign the wheels to obtain the ideal setting for the load conditions under which the airplane normally operates. Refer to the following page for shims available and their usage. Always use the least number of shims possible to obtain the desired results.





TOE-IN/OUT LIMIT (EACH WHEEL) ±30 MINUTES
MAXIMUM DIFFERENCE BETWEEN WHEELS = 30 MINUTES

4-30-00 TOE-IN/OUT AND CAMBER ADJUSTMENTS

Toe in/out and camber adjustments are made at the factory to the following specifications and should be checked periodically to prevent excessive tire wear.

a. Toe in/out limit (each wheel) ±30 minutes. Maximum difference (between wheels) is 30 minutes.

b. Camber to be within +2° at empty weight and -2° at gross weight.

c. Toe in/out shims are available from the factory under the following part numbers:

Part Number	Shim Angle	Amount of toe-in out change
701068-1	0°-30 min. Ref.	15 minutes
701068-2	0°-45 min. Ref.	23 minutes
701068-3	1°-0 min. Ref.	30 minutes

N O T E

Changing the toe-in/out on aircraft serials AA1-0001 through AA1-0064 can result in a camber change. A camber shim (Part No. 701072-1) is available and has an angle of 3°. The use of this shim requires replacement of the two lower bolts with AN6-21A bolts.

4-40 NOSE LANDING GEAR

4-40-00 DESCRIPTION

The nose landing gear consists of a fuselage mounted torque tube connected to a non-steerable strut with a castering nose wheel mounted on the forward end. Normal servicing of the nose wheel includes the application of grease to the nose fork swivel and adjustment of the belleville washers.

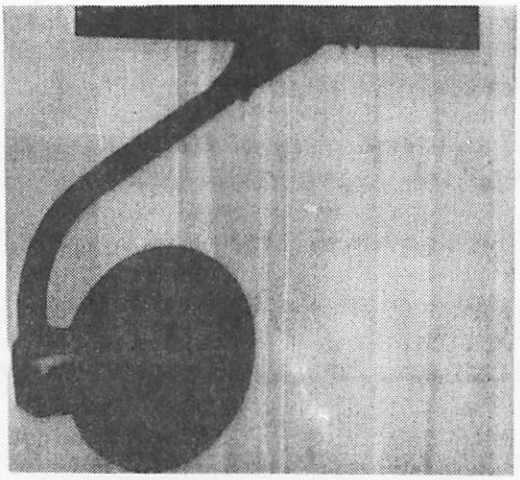


Figure 4-3. Nose Landing Gear Assembly

4-40-01 NOSE LANDING GEAR REMOVAL

N O T E

If excessive looseness is noted between the strut to torque tube yoke with the weight off nose wheel, remove the bolts and inspect for wear. If bolts are worn, replace with new close-tolerance bolts (NAS 464P6A28) of the same size. If looseness still exists, ream out the holes to next larger size and install next larger size bolts (NAS 464P7 maximum). For any additional information contact the Customer Service Department.

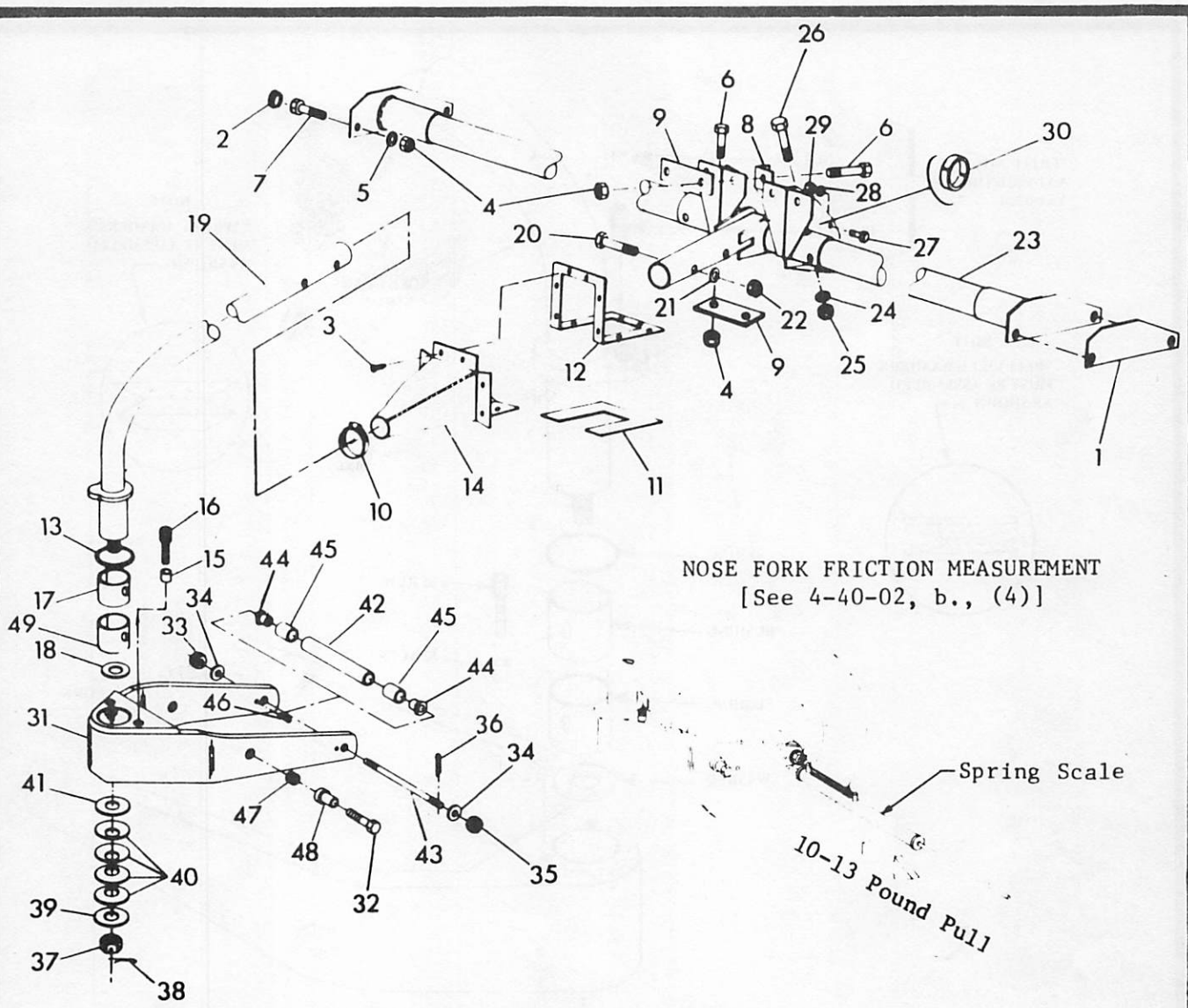
a. Nose Wheel Fork and Strut Removal

(1) Remove the weight from the nose gear by either tying down the tail or placing a suitable support under the front of the fuselage.

(2) Remove the cotter pin, (38, Figure 4-4), nut (37) washers (39, 40 & 41), and nose fork (31) from the strut (19).

(3) Remove the nose gear boot clamp (10), boot to fuselage attaching bracket (12), and slide boot (14) down nose gear strut (19).

(4) Remove the attaching bolts (20) and slide the strut (19) from the torque tube and yoke assembly (23).



1. Shim
2. Plug button
3. Screw
4. Nut
5. Washer
6. Bolt
7. Bolt
8. Clip
9. Doubler
10. Clamp
11. Doubler
12. Plate, nose gear boot
13. O-ring
14. Boot assembly
15. Spacer
16. Screw
17. Split bushing
18. Thrust bearing
19. Strut assembly
20. Bolt
21. Washer
22. Nut
23. Torque tube & yoke ass'y
24. Washer
25. Nut
26. Bolt
27. Bolt
28. Washer
29. Nut
30. Split bearing
31. Fork assembly
32. Bolt
33. Nut
34. Washer
35. Nut
36. Cotter pin
37. Nut
38. Cotter pin
39. Washer
40. Belleville/spring washer
41. Washer
42. Axle
43. Axle rod
44. Plug
45. Spacer
46. Roll pin
47. Insert (Heli-coil)
48. Spacer
49. Split bushing

Figure 4-4. Nose Landing Gear Assembly, exploded view

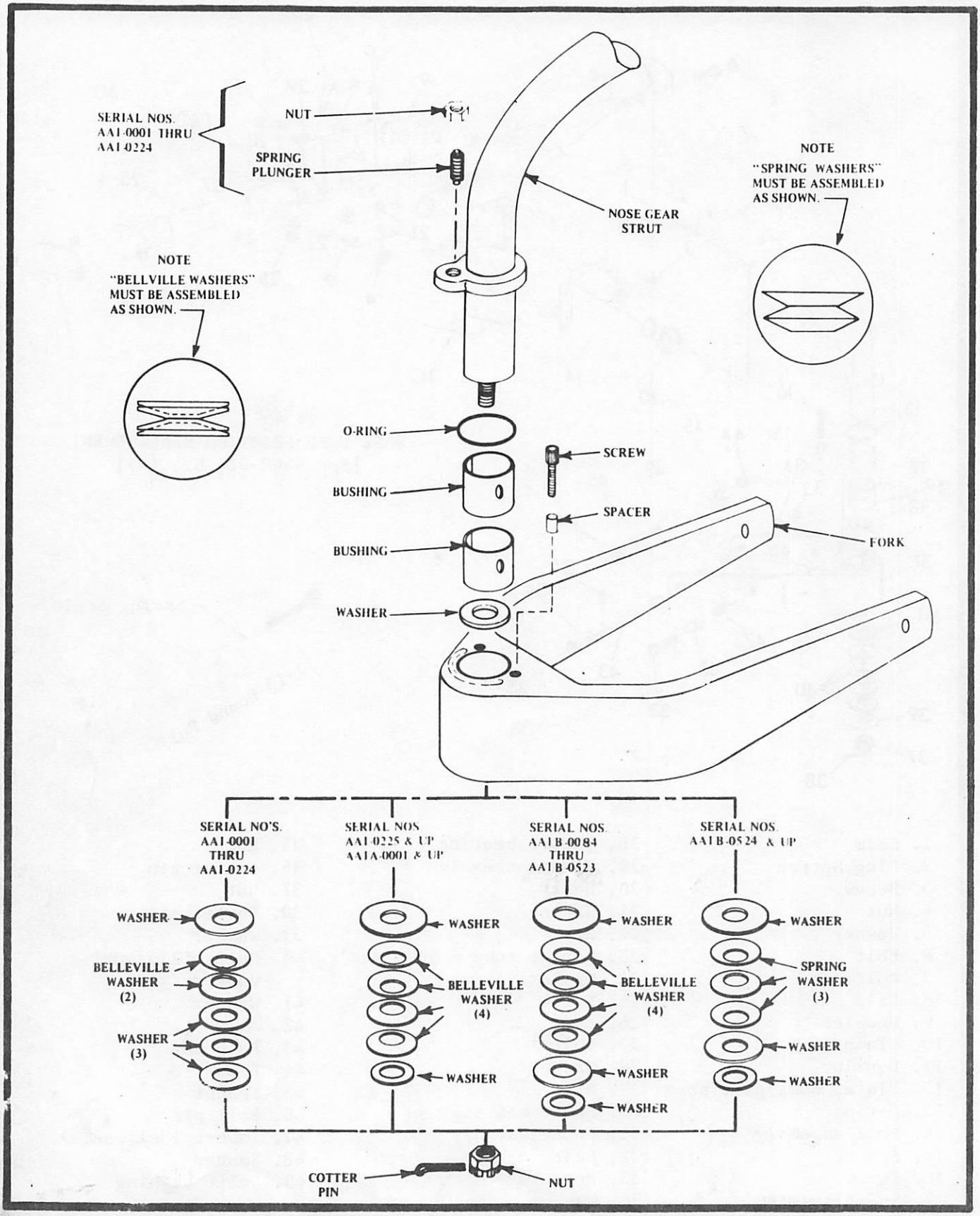


Figure 4-4A. Nose Landing Gear Fork Assembly

4-40-01 NOSE LANDING GEAR REMOVAL (Continued)

b. Torque Tube Assembly Removal

(1) Remove the seats (See Section 3-100).

(2) Remove the left hand and right hand forward console panels. The panels may be easily removed by grasping the forward edge at the firewall and bending the panels out 90 degrees and parallel with the firewall. Then slide the panels forward far enough so that they slip out from behind the aft portion of the console. Remove the left side fresh air box assembly.

(3) Remove the fuel gauge moldings and the upholstery side panels and fiberglass insulating material from the left and right hand forward inside panels by removing the sheet metal screws that attach these parts to the side panels. Do not disconnect any wiring from the fuel gauge covers; simply drape the covers over the outside of the fuselage protecting the wing root surface from scratching with a suitable cloth.

(4) Remove the upper and lower cowling (See Section 3-40-01).

(5) Disconnect the rudder return springs by unbolting the eye bolts from the forward face of the firewall. Note that additional washers are used under the left hand eye bolt for proper rudder pedal centering and rudder trim.

(6) Remove the nuts that secure the right forward rudder bar attach bracket to the floor. Lift the rudder bar up and aft to provide clearance for removing left brake cylinder attach bracket on co-pilot's side from the floor.

(7) Remove the nuts that attach the brake cylinder brackets to the floor. Lift brake cylinders free from the floor and allow pedals to rotate aft.

(8) Remove clevis pins from left and right brake cylinder attachment to rudder pedals on pilot's side.

(9) Disconnect one end of the parking brake chain by cutting the wire which attaches it to the link on the master cylinder (pilot's side).

(10) Move the left and right master cylinders on the pilot's side up as high as possible and against the firewall and secure them temporarily in this position.

(11) Remove the screws and nuts which attach the throttle cable clamps to the instrument panel brace.

(12) Remove the nuts that attach the T-column support to the floor. Lift the T-column and support assembly from the studs which protrude through the floor and allow the assembly to come as far aft as possible.

(13) Remove the bolts (6, Figure 4-4) that secure the center torque tube assembly bearing supports to the floor and firewall.

4-40-01 NOSE LANDING GEAR REMOVAL (Continued)

(14) Remove the four snap plugs (2) on the outside of the lower forward fuselage and the four bolts (7) which secure the outer ends of the torque tube assembly to the fuselage side panels.

(15) Remove the torque tube assembly (23) from the fuselage by working the assembly up and aft, left end first, so that the assembly is withdrawn from the pilot's side of the instrument panel. Care should be taken not to wedge the torque tube assembly into the fuselage panels as damage to the honeycomb skin may result.

4-40-02 NOSE LANDING GEAR INSTALLATION

a. Torque Tube Installation

All operations described in the removal procedure are repeated in the reverse order. However, installation may be simplified by noting the following items:

(1) After the torque tube (23, Figure 4-4) is installed in the fuselage, but before the mounting bolts (6 & 7) are installed, slide the torque tube assembly (23) to one side of the fuselage and note the clearance between the other end of the torque tube assembly and the inside of the lower engine mount extrusion. The torque tube fit is to be adjusted by using one of the various thickness shims (1). Shim as required to arrive at a minimum clearance between the torque tube end fittings and the lower engine mount extrusions.

(2) Torque the center torque tube bearing support bolts (6) at the firewall and the cabin floor to 185-195 inch pounds and torque the bolts (7) that attach the ends of the torque tube assembly to the fuselage sides to 300-350 inch pounds.

(3) Install the lefthand brake cylinder attach bracket on the co-pilot's side before installing the forward rudder bar or sufficient clearance will not be available under the rudder bar to install the brake cylinder bracket rear retaining nut and washer.

(4) Attach the left and right brake cylinder, on the pilot's side, to the floor, then attach the parking brake chain to the parking brake link on the master cylinder. Use .032-inch stainless steel safety wire and make a double loop through the link and through the chain. Install the two clevis pins which attach the left and right rudder pedals on the pilot's side to the master cylinders.

(5) If the upholstery side panels and fiberglass insulation have been removed from the forward cabin area, the fiberglass insulation may be recemented to the fuselage side skin with Uniroyal 6306 adhesive or equivalent. This adhesive may also be used to recement the floor covering to the fuselage floor where it has been pulled loose forward of the rudder bars.

4-40-02 NOSE LANDING GEAR INSTALLATION (Continued)

a. Torque Tube Installation

(6) When reinstalling the manometer covers, be sure that the insulation on all electrical connections under the covers has not been disturbed while the covers were removed and hanging over the outside of the fuselage.

(7) Be sure that the clear plastic seat-belt protectors are slid all the way down the seat belts before the seats are installed.

(8) Reseal fresh air box to fuselage inlet duct on reinstallation.

b. Nose Wheel Strut and Fork Installation

(1) Install the nose wheel strut and fork in reverse of the removal instructions (See Section 4-40-01, a.).

(2) Torque the bolts (20) that attach the nose gear strut to the torque tube assembly (19) to 95-110 inch pounds.

N O T E

DO THIS* *Apply sealant around strut to torque tube connection and around bolt heads and nuts.*

(3) When installing the nose gear boot (14), apply sealant* to all mating surfaces of the boot assembly, honeycomb and firewall.

(4) Refer to Figure 4-4A for proper installation of Belleville/spring washers when attaching the nose wheel fork to the strut. Tighten nut (37) until a 10-13 pound drag is attained at the axle centerline when the fork is rotated. See Figure 4-4 inset. The cotter pin (38) must be in place for this measurement.

ORDER THESE →

N O T E

Step 4 is extremely important since it will alleviate any tendency toward nose wheel shimmy. Apply grease per MIL-G-7711 to the strut swivel and Belleville/spring washers before assembling nose fork. Apply general purpose lubricating oil to the detent grove. (Early Models only; later Models have no detent).

*Approved firewall sealants:
Pro-Seal 700 by Coast Pro-Seal and 93-004 by Dow Corning.

*Approved strut sealants:
RTV 102 by General Electric and 732 RTV by Dow Corning.

4-50 WHEELS, TIRES AND BRAKES

4-50-00 DESCRIPTION

The Model AA-1 and AA-1A are equipped with either 15 x 6.00 x 6 (small) or 6.00 x 6 (large) 4 ply tube type tires on the main landing gear and 5.00 x 5 4 ply tube type on the nose gear. The Model AA-1B is equipped with 6.00 x 6 4 ply tube-type tires on the main landing gear and 5.00 x 5 4 ply on the nose gear. Tires should be rotated periodically to obtain maximum tire life. All wheels are of the split-wheel design for easy servicing and each main wheel has an independent disc-type hydraulic brake system. For information and instructions covering the entire brake system, refer to Section 8-10.

4-50-01 MAIN WHEEL REMOVAL

a. Remove the two bolts (28, Figure 4-5) and washers (29) which attach the brake pressure plate (21) and backplate (19) to the brake assembly (18).

b. Remove the wheel from the axle (38, Figure 4-2) by removing the cotter pin (45) and the axle nut (44).

c. Deflate the tire by removing the valve core.

d. Break the tire bead loose.

N O T E

Care should be taken to prevent damage to the wheel halves when breaking the beads loose.

4-50-02 MAIN WHEEL DISASSEMBLY

a. Separate the halves (3 & 5) by removing the nuts (17), washers (16) and bolts (15).

C A U T I O N

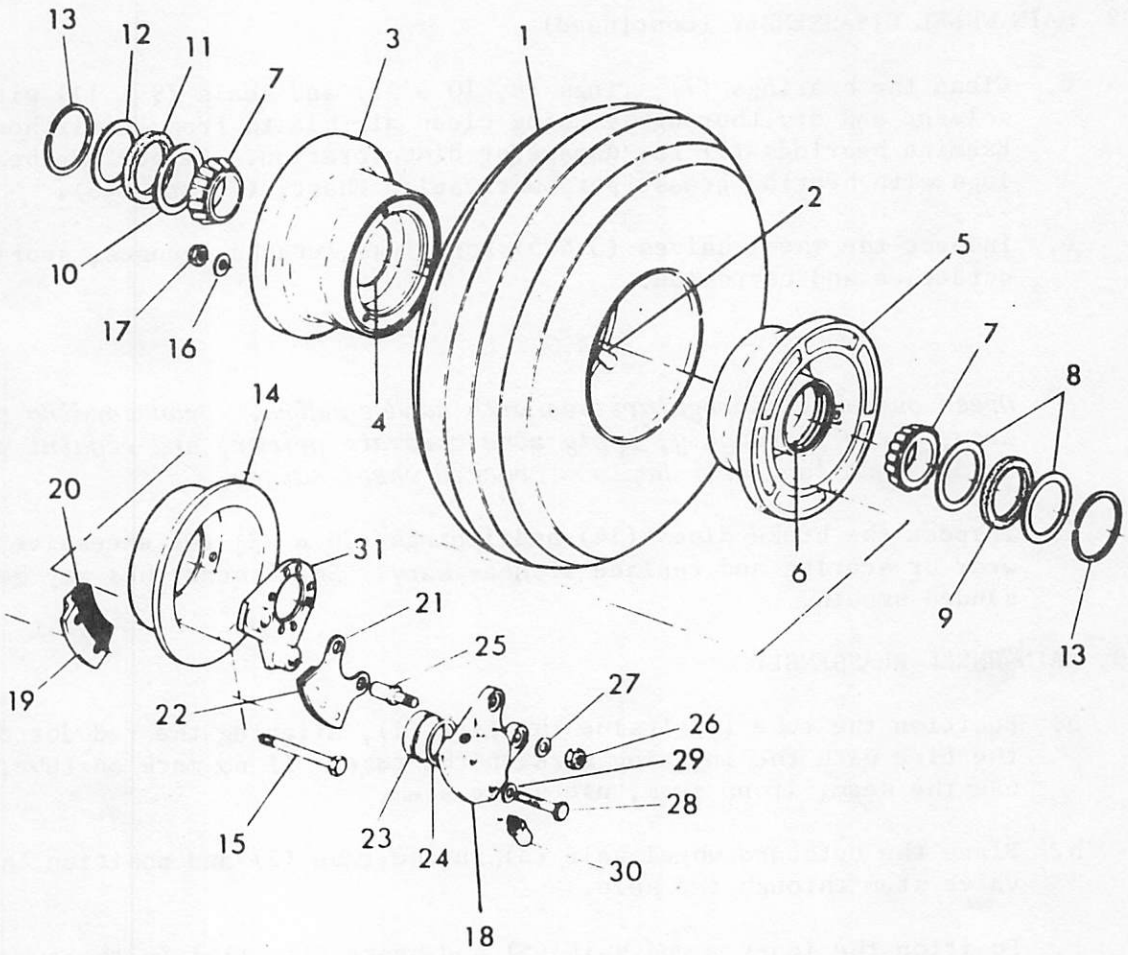
Do not attempt to separate the wheel halves with the tire under pressure. Serious injury could result, plus damage to the wheel halves.

b. Remove the snap rings (13), grease seal rings (8 & 12), felt grease seal (9 & 11), grease seal ring (10) and the cone bearings (7) from both wheel halves (3 & 5).

c. Inspect the bearing cups (4 & 6) for nicks and discolorations, and replace if necessary.

N O T E

To remove the bearing cups, heat the wheel halves for 15 minutes in boiling water. With an arbor press, press out the damaged bearing cups and press in the new ones while the wheel is still hot.



1. Tire
2. Tube
3. Outer wheel half ass'y
4. Cup, bearing
5. Inner wheel half ass'y
6. Cup, bearing
7. Cone, bearing
8. Ring, grease seal
9. Felt, grease seal
10. Ring, grease seal
11. Felt, grease seal
12. Ring, grease seal
13. Snap ring
14. Disc ass'y - brake
15. Bolt
16. Washer
17. Nut
18. Cylinder ass'y
19. Backplate ass'y
20. Lining
21. Pressure plate ass'y
22. Lining
23. Piston ass'y
24. O-ring
25. Bolt, anchor
26. Nut
27. Washer
28. Bolt
29. Washer
30. Bleeder ass'y
31. Torque plate ass'y

Figure 4-5. Main Wheel and Brake Assembly

4-50-02 MAIN WHEEL DISASSEMBLY (Continued)

d. Clean the bearings (7), rings (8, 10 & 12) and seals (9 & 11) with solvent and dry thoroughly using clean air blasts from an air hose. Examine bearings (7) for damage or discoloration. Repack the bearings with bearing grease per Lubrication Chart, (Figure 2-5).

e. Inspect the wheel halves (3 & 5) for nicks, cracks, gouges, scoring scratches and corrosion.

N O T E

Dress out small irregularities with hand sanding. Upon sanding an area, clean thoroughly, apply zinc chromate primer, and repaint with an aluminum lacquer. Replace cracked wheel halves.

f. Inspect the brake discs (14) and linings (20 & 22) for excessive wear or scoring and replace if necessary. Small scratches may be sanded smooth.

4-50-03 MAIN WHEEL REASSEMBLY

a. Position the tube (2) inside the tire (1), aligning the red dot on the tire with the indexing mark on the tube. If no mark on tube, use the seam, if no seam, use valve stem.

b. Place the outboard wheel half (3) in the tube (2) and position the valve stem through the hole.

c. Position the inner wheel half (5) and brake disc (14) in the tube (2) and secure the bolts (15).

N O T E

Care should be taken not to pinch the tube between the wheel halves.

d. Torque the bolts (15) to the value marked on the wheel, (150 in.-lbs.).

e. Install the bearings (7), grease seal rings (8, 10 & 12), felt grease seals (9 & 11) and snap rings (13).

f. Inflate the tire to the prescribed pressure (24 psi).

4-50-04 MAIN WHEEL INSTALLATION

a. Position the wheel on the axle (38, Figure 4-2) and assemble the brake lining.

N O T E

When installing wheels, check brake anchor bolt (25, Figure 4-5) for freedom of movement in torque plate assembly (31) and for adequate lubricant.

4-50-04 MAIN WHEEL INSTALLATION (Continued)

b. Install the axle nut (44) and tighten until a slight drag is evident when rotating the wheel. Back off the nut to the next castellation and install the cotter pin (45).

c. Install brake back plate assembly and torque mounting bolts to 90 inch pounds.

d. Install the wheel cover.

4-50-05 NOSE WHEEL REMOVAL

a. Remove the nut (35, Figure 4-4) attaching the axle (43) to the nose fork (31).

b. Withdraw the axle rod (43) and wheel from the nose fork (31).

c. Deflate the tire by removing the valve core.

d. Break the tire beads loose.

N O T E

Care should be taken to prevent damage to the wheel halves when breaking the beads loose.

4-50-06 NOSE WHEEL DISASSEMBLY

a. Separate the wheel halves (3 & 5, Figure 4-6) by removing the nuts (13), washers (12) and bolts (11).

C A U T I O N

Do not attempt to separate the halves with the tire under pressure. Serious injury could result plus damage to the wheel halves.

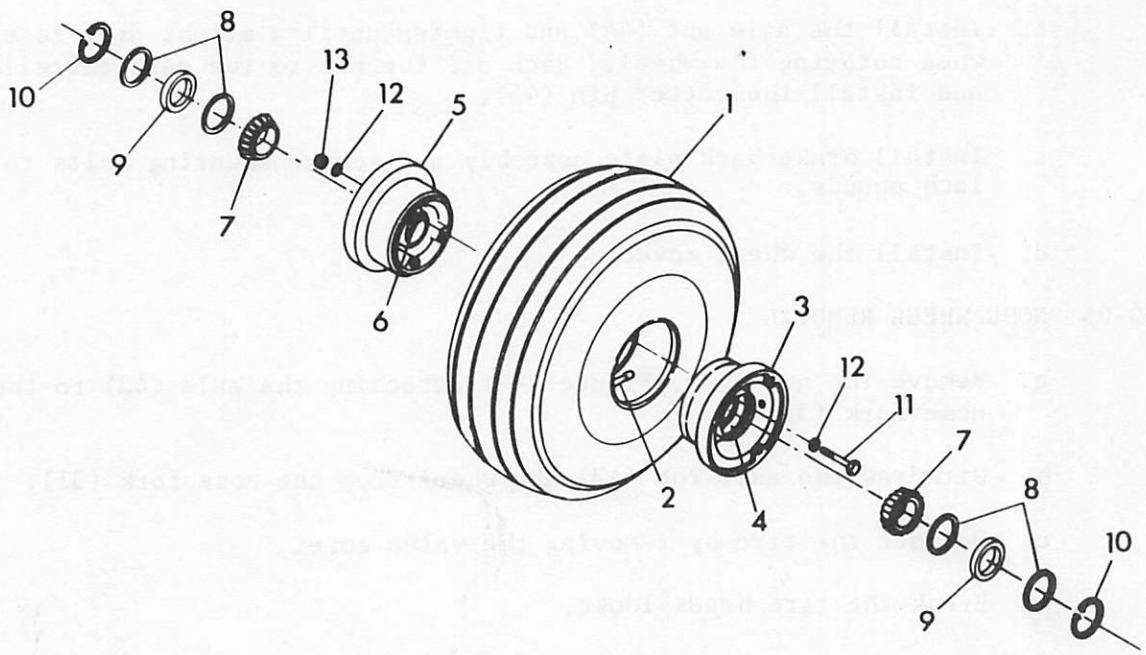
b. Remove the snap ring (10), felt grease seals (9), grease seal rings (8) and cone bearings (7).

Inspection and repair of the nose wheel:

c. Inspect the bearing cups (4 & 6) for nicks and discoloration and replace if necessary.

N O T E

To remove the bearing cups, heat the wheel halves for 15 minutes in boiling water. With an arbor press, press out the damaged bearing cups and press in the new ones while the wheel is still hot.



1.	Tire	8.	Ring, grease seal
2.	Tube	9.	Felt, grease seal
3.	Outer wheel half ass'y	10.	Ring, snap
4.	Cup, bearing	11.	Bolt
5.	Inner wheel half ass'y	12.	Washer
6.	Cup, bearing	13.	Nut
7.	Cone, bearing		

Figure 4-6. Nose Wheel Assembly

4-50-06 NOSE WHEEL DISASSEMBLY (Continued)

d. Clean the bearings (7), rings (8) and seals (9) with solvent and dry thoroughly using clean air blasts from an air hose.

e. Inspect the wheel halves (3 & 5) for nicks, cracks, gouges, scoring and scratches or corrosion.

N O T E

Dress out small irregularities by hand sanding. Upon sanding an area, clean the area thoroughly, apply zinc chromate primer, and repaint with an aluminum lacquer. Replace cracked wheel halves.

f. Examine the bearings (7) for damage or discoloration. Repack the bearings with bearing grease per lubrication chart (Figure 2-5).

4-50-07 NOSE WHEEL REASSEMBLY

a. Position the tube (2) inside the tire (1), aligning the red dot on the tire with the indexing mark on the tube. If no mark on tube, use the seam, if no seam, use valve stem.

b. Position the tire and tube on the wheel half (3) and insert the valve stem through the hole.

c. Position the other wheel half (5) and secure the bolts (11).

N O T E

Care should be taken not to pinch the tube between the wheel halves.

d. Torque the bolts (11) to the value marked on the wheel, 90 inch pounds.

C A U T I O N

Improper or uneven torque values may result in wheel failure.

e. Install the bearings (7), grease seal rings (8), felt grease seal (9), and snap ring (10).

f. Inflate the tire to the prescribed pressure (21 psi).

g. Assemble the axle assembly through the wheel.

4-50-08 NOSE WHEEL INSTALLATION

a. Position the nose wheel in the nose fork (31, Figure 4-4) and insert the axle rod (43).

b. Install the nut (35) and tighten until a very slight drag is evident when the wheel is rotated. Install cotter pin (36).

N O T E

All wheels and tires are balanced to within 5 in. ozs. at the factory. It is recommended that replacement tires be balanced to this specification to prevent excessive vibrations in the landing gear assemblies. This operation is accomplished with a static "bubble balancer".

4-60 WHEEL FAIRINGS

4-60-00 DESCRIPTION.

The aircraft may be furnished at the customer's option, with fiberglass wheel fairings for both the main wheels and the nose wheel. All three fairings are equipped with an adjustable scraper which prevents stones and large deposits of mud or slush from entering the fairing cavity. Frequent checks of the fairing cavity should be made to determine that wheel rotation is not endangered by dirt accumulation.

N O T E

Aircraft operation with wheel fairings installed in snow, ice, mud, or extreme rough field conditions or with tires out of balance, is detrimental to the life of the fairings and must be avoided.

When a fairing is removed or disturbed, the scraper adjustment should be checked for the proper clearance of 1/2-inch.

Two types of fairings are in service. Fairings designed for use with small (15 x 6.00 x 6) main gear tires are solid mounted. Fairings (1973 and on) designed for use with large (6.00 x 6) main gear tires are shock mounted and balanced about the shock mount pivot point. The shock mounting essentially "un-couples" the fairing from the wheel assembly and provides a more durable installation which is less sensitive to main gear tire out of balance and out of roundness. A service kit is available which provides all of the parts necessary to convert solid mounted main gear wheel fairings to shock mounted wheel fairings. This kit is recommended for aircraft operating from non-hard surfaced runways.

4-60-01 MAIN WHEEL FAIRING REMOVAL AND INSTALLATION

a. Remove the plug button from the outboard side.

b. Remove the bolt which attaches the fairing to the axle.

c. Remove the screws from the inboard side of the fairing. (upper and lower)

4-60-01 MAIN WHEEL FAIRING REMOVAL AND INSTALLATION (Continued)

d. Remove the fairing by rotating up and forward.

e. Reassemble in the reverse order.

4-60-02 NOSE WHEEL FAIRING REMOVAL AND INSTALLATION

a. Remove the plug buttons from both sides.

b. Remove the tow bar bolts.

c. Remove the axle nuts and withdraw the axle.

d. Remove the cotter pin and nut which attaches the strut to the nose fork.

e. Withdraw the fairing, fork and wheel from the strut and individually remove the wheel and fork.

f. Reassemble in the reverse order.

4-70 WHEEL VIBRATION

4-70-00 DECRIPTION

Most wheel vibration is caused by tire out of roundness, tire out of balance, loose bearings, loose gear attachment, loose fairing attachment, anti-shimmy device out of adjustment, improper wheel alignment or any combination of these. Normal good maintenance practices will eliminate most causes of wheel vibration or shimmy.

4-70-01 NOSE WHEEL VIBRATION AND SHIMMY

Typical nose wheel vibrations can be placed in two categories, as listed below:

1. True shimmy is a side-to-side motion of the nose wheel and fork assembly, which is caused by improper adjustment of the shimmy dampener washers located at the strut/fork attach point. The fork attaching nut should be tightened until a 10-13 pound friction drag is attained when the fork is rotated. The friction measuring device should always be applied along the axle center line. Refer to Section 4-40-02b (4) and Figure 4-4 for the proper procedure.

N O T E

Model AA-1 and AA-1A, and AA1B-0001 thru AA1B-0523 aircraft may be modified by installation of an improved anti-shimmy washer. See Service Letter No. 75-1.

4-70-01 NOSE WHEEL VIBRATION AND SHIMMY (Continued)

2. Vertical bounce or vertical tramping, which can feel like shimmy in the cockpit, but is actually an up and down motion of the nose wheel and tire assembly. This is caused by either nose tire out-of-round or tire and wheel assembly out-of-balance. The tire and wheel assemblies are all balanced to within 5 inch ounces at the factory and this balance should be maintained on in-service aircraft.

Additional checks should be made on aircraft that have experienced nose wheel vibration/shimmy to determine that the nose gear torque tube attach plates, center bearing support attach brackets and nose gear strut attach points are tight. Looseness at any of these connections can contribute to wheel vibration or shimmy.

4-70-02 MAIN GEAR WHEEL VIBRATION

Sometimes, what feels like nose gear shimmy in the cockpit can be traced to main gear vibration. The primary causes for main gear vibration are main wheel tire out-of-roundness or out of balance and main gear misalignment. This condition is amplified with the installation of wheel fairings and tire out-of-roundness and out of balance are more critical. See note in Seciton 4-50-08.

SECTION V

CONTROL SYSTEM

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5 CONTROL SYSTEMS

5-00 GENERAL

The following list of instructions describes the procedures to remove, install and rig the various control systems. Removal of the center console is necessary in order to rig any control system except the ailerons. Raising the baggage compartment rug and removing the access panels is necessary for rigging the ailerons. Normal servicing of the control systems should include the inspection of all turnbuckles, pulleys, fairleads, end fittings, and bearings. Also to be included is the addition of grease to the T-column and rudder torque tubes. Servicing of these bearings has no periodic requirement, but should be lubricated as necessary.

N O T E

Apply grease (MIL-G-7711) to the rudder and elevator bearings to the aileron and flap torque tube bearings and the flap actuator jackscrew as required.

C A U T I O N

Care should be taken to avoid grease contacting the outer surface of the nylon nut, since the nylon nut relies on friction to operate properly.

N O T E

All aircraft are rigged at the factory for slight left wing heaviness with one person. This results in slight right wing heaviness for two people. The aircraft can be rigged to suit individual requirements by adjusting the trim tabs on the ailerons. Do not exceed 45° as it will not contribute any more toward trim.

5-10 AILERONS

5-10-00 DESCRIPTION

The ailerons are located on the outboard trailing edges of the wings. They are the control surfaces which rotate the aircraft around the "ROLL" axis. The ailerons are cable connected to the control wheel as shown on Figure 5-2.

5-10-01 AILERON REMOVAL

a. Remove the wing tip as instructed in Section 3-10-01.

b. Remove the baggage compartment floor covering and access covers.

c. Remove the nut and bolt securing the aileron horn to the torque tube and remove it from the torque tube by rotating and sliding from the end of the tube.

5-10-01 AILERON REMOVAL (Continued)

N O T E

Do not disturb cable turnbuckles or control surface rigging.

d. Remove the fasteners from the outboard aileron torque tube support bearing.

e. Withdraw the aileron, torque tube, and support bearing by pulling the entire assembly outboard.

N O T E

Keep all torque tube bearing spacers together as removed to aid reassembly.

5-10-02 AILERON INSTALLATION

a. Refer to Section 5-70 for balancing information and procedure.

b. Install the aileron assembly by reversing the removal procedure.

N O T E

Shim bearings as required to provide .020" to .060" aileron end play. (Bearing support brackets must be square to aileron torque tube.) Lubricate the aileron bearings, as required, with aeroshell grease #6 or equivalent per MIL-G-7711.

N O T E

After repair and/or repainting of any control surface, it is necessary to check and adjust the mass balance weight as required to bring it within tolerance. Tolerances for the ailerons are -16 to +20 inch ounces.

5-10-03 AILERON RIGGING

a. Secure the control wheels in the neutral position by installing the control wheel lock.

b. Adjust the turnbuckles, located beneath the baggage compartment, until the ailerons are positioned at 0° as indicated on an aileron rigging fixture. (See Figure 5-2).

c. Check the carry-through pulley cable tension at 25 ± 5 lbs. (At the average temperature for the aircraft operation area).

d. Check the control column cable tensions at 25 ± 5 lbs. (At the average temperature for the aircraft operation area).

e. Remove the control wheel lock and check the aileron travel to 25 ± 2 up travel and 20 ± 2 down travel.

f. Recheck the cable tensions. Safety turnbuckles.

5-20 ELEVATORS

5-20-00 DESCRIPTION

The elevators are located aft of, and hinge-mounted to the horizontal stabilizer. The elevators are the control surfaces that control the "PITCH" or "LATERAL" axis of the aircraft. The elevators are cable connected to the T-column and move up and down when the control wheel is pulled back or pushed forward. (See Figure 5-3).

5-20-01 ELEVATOR REMOVAL AND INSTALLATION

a. Remove the twelve mounting screws from the elevator tip.

b. Remove the tailcone as described in Section 3.

c. Remove the bolt which connects the elevator torque tube to the bellcrank assembly.

d. Pertaining to the right elevator only, remove the fastener connecting the trim tab servo-arm to the trim bungee bellcrank.

e. Remove the fasteners from the elevator torque tube support which is located at the tips.

f. Remove the control surface by sliding the torque tube out of the inner support bearing.

N O T E

Keep all torque tube bearing spacers together as removed to aid reassembly.

N O T E

After repair and/or repainting of any control surface, it is necessary to check and adjust the mass balance weight as required to bring it within tolerance. Tolerance for the elevators is 0 to +32 inch ounces.

g. Reassemble in the reverse order.

N O T E

Shim bearings as required to provide a maximum of .030" elevator end play. (Bearing support brackets must be square to elevator torque tube.) Lubricate the elevator bearings, as required, with aeroshell grease #6 or equivalent per MIL-G-7711.

5-20-02 ELEVATOR RIGGING

a. Secure the control wheel in the neutral position by installing the control wheel lock in the forward control wheel hole on aircraft with two holes in this shaft. On aircraft with only one hole in the control wheel shaft, a fixture (Part No. DE 5005-501) must be used for this purpose.

b. Adjust the elevator turnbuckles, located under the aft end of the console, until the elevator is located at 0° ±2° as indicated by an elevator rigging fixture (See Figure 5-3).

c. Check the elevator cable tension and adjust the turnbuckles to obtain 35 +0 -5 pounds tension. (At the average temperature for the aircraft operation area).

d. Recheck the 0° position of the elevator surface.

e. Remove the control wheel lock (or the rigging fixture), the tailcone and set the elevator stops, located on the aft bulkhead, to limit the elevator travel to 25 ± 2° up, and 15° ± 2° down.

f. Recheck travel and cable tensions. Safety turnbuckles.

g. Recheck trim tab travel per 5-60-01. Install tailcone.

5-30 RUDDER

5-30-00 DESCRIPTION

The rudder is mounted aft of, and hinged to the vertical stabilizer. The rudder is the control surface responsible for rotation of the aircraft around the "YAW" axis. The movement of the rudder is right and left and is cable connected to the rudder pedals as shown on Figure 5-4.

5-30-01 RUDDER REMOVAL AND INSTALLATION

a. Remove the twelve mounting screws from the rudder tip. If the aircraft is equipped with a flashing beacon, disconnect the wires at the quick disconnect or by cutting them directly by the butt connector. When reassembling, use quick connect fasteners and cover the terminals with heat shrink tubing or its equivalent.

b. Remove the bolt which connects the rudder torque tube to the bellcrank assembly.

c. Remove the fasteners from the rudder torque tube support which is located at the tip.

d. Remove the control surface by sliding the torque tube out of the inner support bearing.

e. Reassemble in the reverse order.

5-30-01 RUDDER REMOVAL AND INSTALLATION (Continued)

N O T E

Prior to installation of the rudder bellcrank, check the clearance between the rudder tip and fin. Minimum clearance is 0.10 inch. If clearance is less than 0.10 inch, install shims Part Number 902014-2 as required. Lubricate the rudder bearings, as required, with Aeroshell grease #6 or equivalent per MIL-G-7711.

5-30-02 RUDDER RIGGING

a. Position the rudder 4°R as indicated by a rudder rigging fixture. Secure the rudder in this position, (Figure 5-1 shows one method).

b. Adjust the rudder turnbuckles, located beneath the aft end of the console, until the left rudder hinge pin is located 7.50 inches aft of the firewall and the right rudder pedal hinge pin is located 7.75 inches aft of the firewall (fiberglass sound-proofing material compressed). Refer to Figure 5-4.

c. Return the rudder surface to free movement and check the neutral position. 0° to 5° right rudder (4° right rudder optimum).

d. Remove the tailcone. Adjust the rudder stops, located on the aft bulkhead to limit the rudder travel to 25° ± 2° left and right.

e. Safety turnbuckles, recheck the rudder travel and neutral position and install the tailcone.

5-40 FLAPS

5-40-00 DESCRIPTION

The flaps are located on the inboard trailing edge of each wing and actuated by the flap motor. The flaps, when lowered, provide a nose-down attitude and a slower landing speed. The flaps are controlled by a flap switch mounted on the center console. The flaps are limited in the full up position by a limit switch mounted adjacent to and activated by the flap linkage (Figure 5-5).

5-40-01 FLAP REMOVAL AND INSTALLATION

a. Remove the aileron as described above.

b. Disconnect the flap drive linkage from the flap torque tube horn assembly located under the baggage compartment.

c. Remove the horn assembly from the torque tube.

d. Remove the fasteners from the inboard aileron torque tube bearing support.

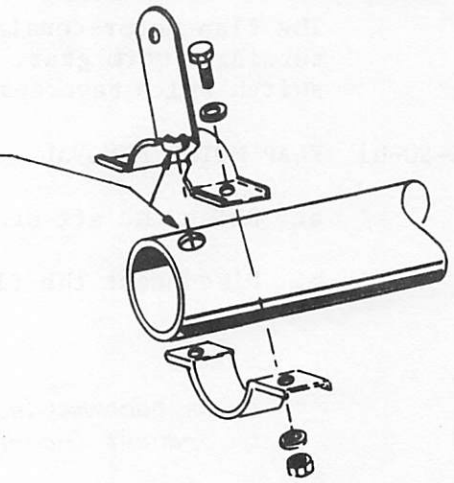
5-40-01 FLAP REMOVAL AND INSTALLATION (Continued)

e. Withdraw the flap and flap torque tube by pulling the entire assembly outboard.

f. Reassemble in the reverse order.

C A U T I O N

When installing the flap bellcrank horn, be sure the pin is engaged in the flap torque tube hole. This is essential for proper flap operation and rigging.



N O T E

The flap torque tube may be disassembled from the flap by removing the nut and sealant from the attachment at the inboard flap rib. When reassembling, be sure to reapply sealant to the faying surfaces to prevent water from reaching the inner walls of the torque tube. Lubricate the flap bearings, as required, with Aeroshell Grease #6 or equivalant per MIL-G-7711.*

5-40-02 FLAP RIGGING

a. Lower the flaps to 30° ± 2° as indicated by a flap rigging fixture. Any required adjustment should be made to the clevis on the flap linkage, located behind the seats (See Figure 5-5).

b. Raise the flaps to the 0° ± 2° position and adjust the limit switch so the button is depressed to within 1/16-inch of its full travel. Secure the switch.

c. Set the up stop on the actuator drive shaft approximately one-half turn beyond the point where the limit switch opens the electrical circuit.

d. Position the flap indicator .08 ± .06 inches from the forward end of the slot with flaps in the 0° position. Adjustments should be made by rotating the formed link which attaches the indicator rod to the actuator.

e. Recheck the flap travel.

*Approved sealants:

RTV725 by Dow-Corning
EC1239 and EC1675 by 3M Company
3201 by Chemical Seal Corp. of America
567 by Coast Pro-Seal

5-50 FLAP MOTOR

5-50-00 DESCRIPTION

The flap motor consists of a 12-volt series wound lifetime lubricated motor turning a worm gear. Its direction of rotation is controlled by the flap switch which reverses the magnetic field in the motor.

5-50-01 FLAP MOTOR REMOVAL

a. Raise the aft section of the console.

b. Disconnect the flap motor wiring at the quick disconnects.

N O T E

It is recommended that the wires be labeled prior to disconnecting to prevent incorrect installation.

c. Remove the nut, washers, bolt, bushing and position cable drive clip, and disconnect the actuator assembly from the flap drive tube assembly.

d. Remove the nut, washer, flap motor ground connection, bolt and sleeve securing the flap motor assembly to the flap motor bracket. Lift out the flap motor assembly.

5-50-02 FLAP MOTOR DRIVE LUBRICATION

a. The flap motor jack screw drive requires only a light film of general purpose grease (MIL-G-7711) under normal operating conditions.

C A U T I O N

Care should be taken to avoid grease contacting the outer surface of the nylon nut, since the nylon nut relies on friction to operate properly.

5-50-03 FLAP MOTOR INSTALLATION

a. Install the flap motor assembly in reverse of the removal instructions (Section 5-50-01).

b. Refer to Section 5-40-02 for rigging instructions.

5-60 TRIM AND BUNGEE CONTROL

5-60-00 DESCRIPTION

The trim tab is mounted on the trailing edge of the right hand elevator and controlled by the trim wheel on the console. The trim tab is adjustable from 0° to 11° $\pm$2° down on the Model AA-1 and from 0° to 18° $\pm$2° down on the Model AA-1A and the Model AA-1B, with respect to the elevator surface

5-60-00 DESCRIPTION (Continued)

and provides a method of trimming the aircraft for level flight. The trim tab linkage is actuated through an adjustable spring loaded self centering elevator bungee. The bungee always tends to return the elevator to the trim set center position, thus providing an additional stabilizing feature. The trim tab also acts as an anti-servo device by providing additional elevator force aerodynamically which is felt at the control wheel by the pilot during flight.

5-60-01 TRIM TAB REMOVAL AND INSTALLATION

a. Remove the elevator tip.

b. Remove the tailcone as described in Section 3-50-01.

c. Remove the two fasteners connecting the trim tab servo-arm to the elevator and the trim tab bungee bellcrank.

d. Remove the hinge pin and withdraw the trim tab.

e. Reassemble in the reverse order.

5-60-02 BUNGEE AND TRIM TAB RIGGING

N O T E

Elevator rigging should always be checked prior to checking or changing trim tab rigging.

a. New bungee installation:

If a new bungee is being installed, the first step in rigging the trim system is to secure the elevator in its neutral position and place the trim tab 3° down with respect to the elevator. Match drill a #10 hole through the elevator bellcrank connecting link using the existing hole in the elevator bellcrank as the guide.

b. Bungee rigging:

1. Position the elevator at 0° ± 2° as indicated on an elevator rigging fixture. Install the control wheel lock or lock fixture.

2. Rotate the trim wheel to give a full nose up trim position.

3. Check the trim tab position at 11° ± 2° down on the AA-1 and 18° ± 2° down on the AA-1A and the AA-1B with respect to the elevator surface. To measure the angle, a "bubble protractor" should be used (See Figure 5-6).

4. If the trim tab is not properly positioned, disengage the gears of the trim wheel and the flexible shaft by loosening or removing the trim wheel.

b. Bungee rigging: (Continued)

5. Rotate the trim shaft by hand until the trim tab indicates $11^{o} \pm 2^{o}$ down on the AA-1 and $18^{o} \pm 2^{o}$ down on the AA-1A and the AA-1B.

6. Replace the trim wheel and secure.

7. Remove the control lock and check the system for freedom of movement.

8. Check the trim indicator position during take-off and hand bend as required to bring within the green arc.

N O T E

Rigging fixtures may be procured through the Customer Service Department by the following Part Numbers:

DE-0002-501 Elevator and Rudder Fixture
DE-0003-501 Flap and Aileron Fixture
DE-5005-501 Control Wheel Rigging Fixture

N O T E

For replacement of the shear-link rivets, see Figure 5-6, Trim System.

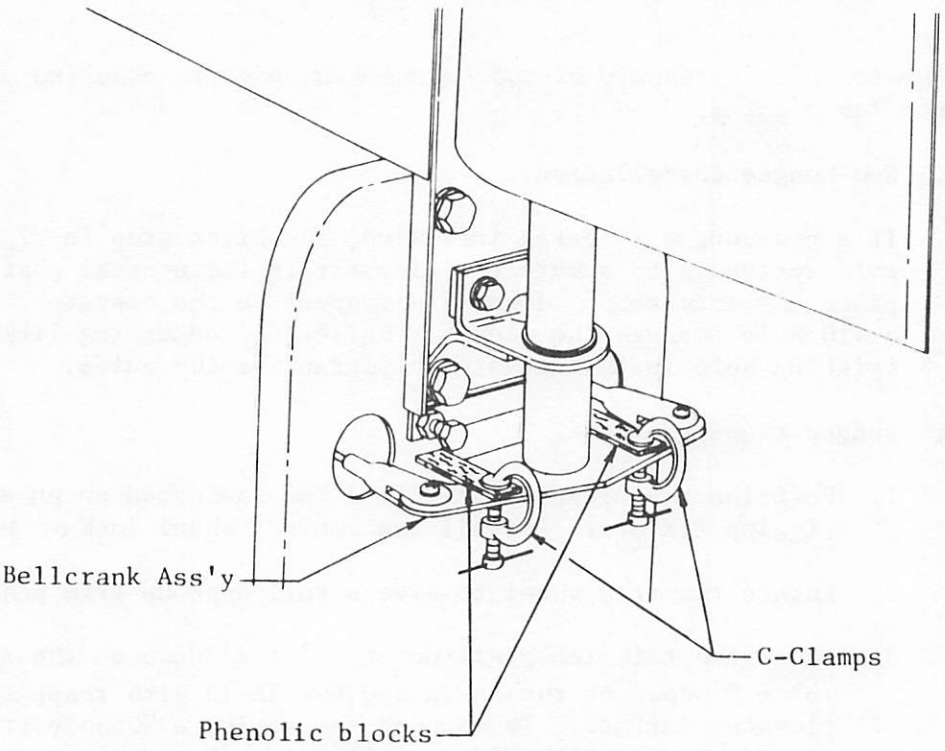
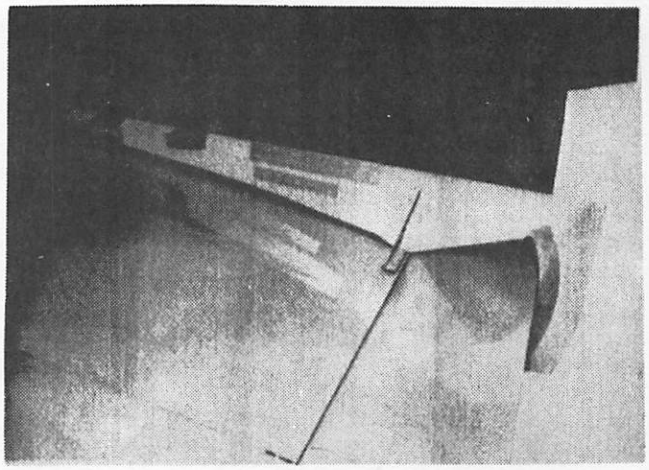


Figure 5-1. Rudder Rigging



AILERON RIGGING FIXTURE
DE-0003-501

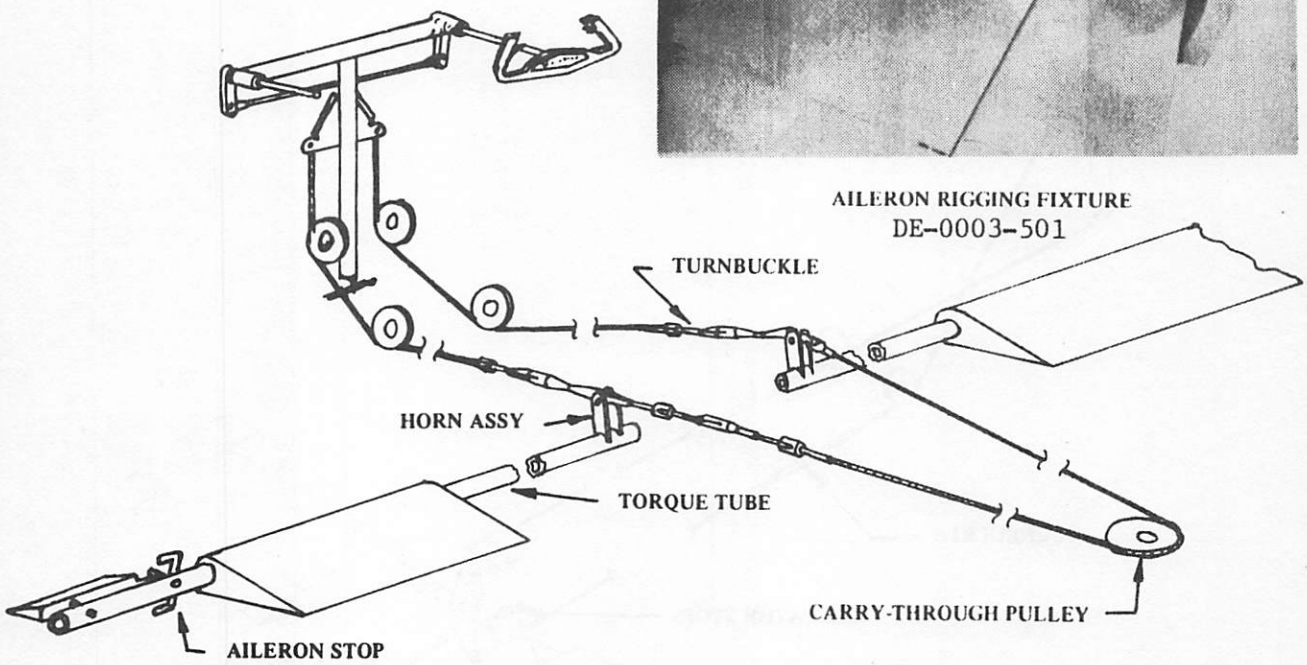
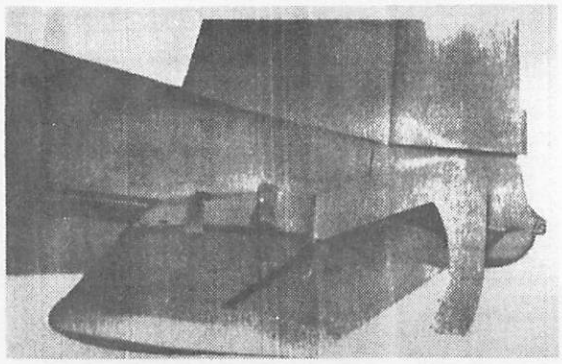
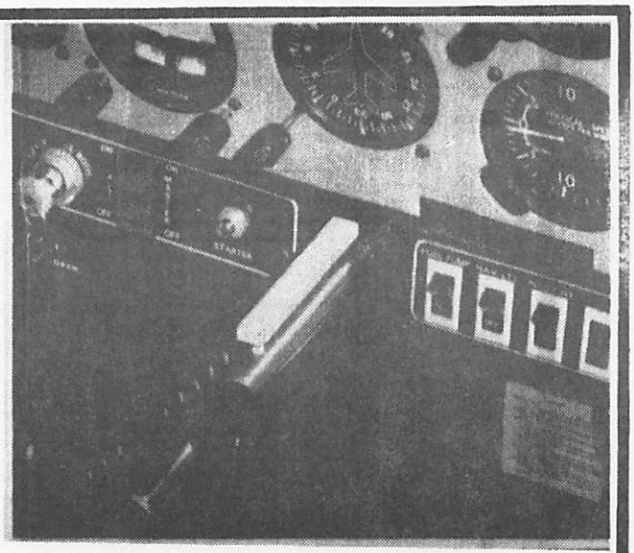


Figure 5-2 Aileron System



Elevator Rigging Fixture
Part Number DE-0002-501



Control Wheel/Elevator Rigging Fixture
Part Number DE-5005-501

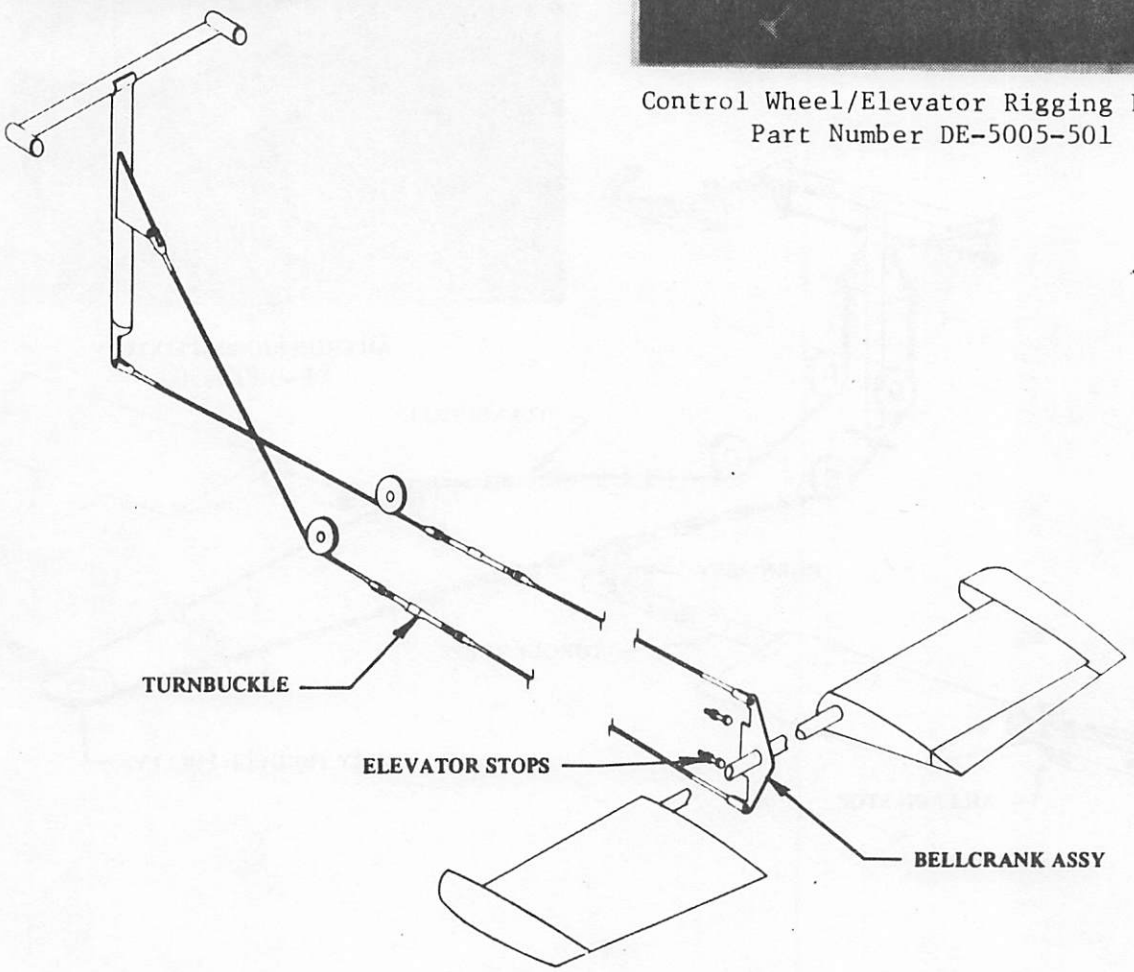
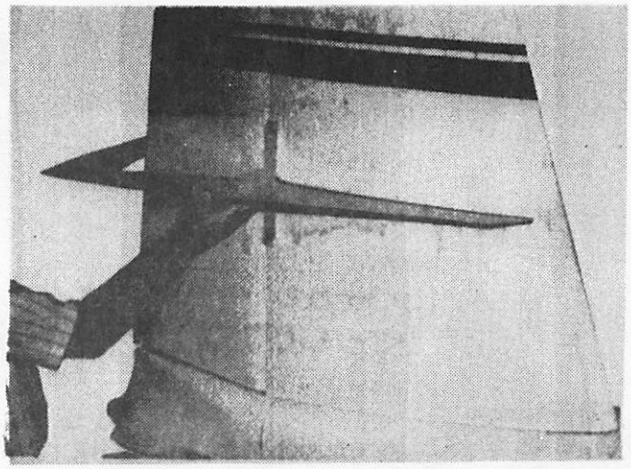


Figure 5-3 Elevator System



RUDDER RIGGING FIXTURE
DE-0002-501

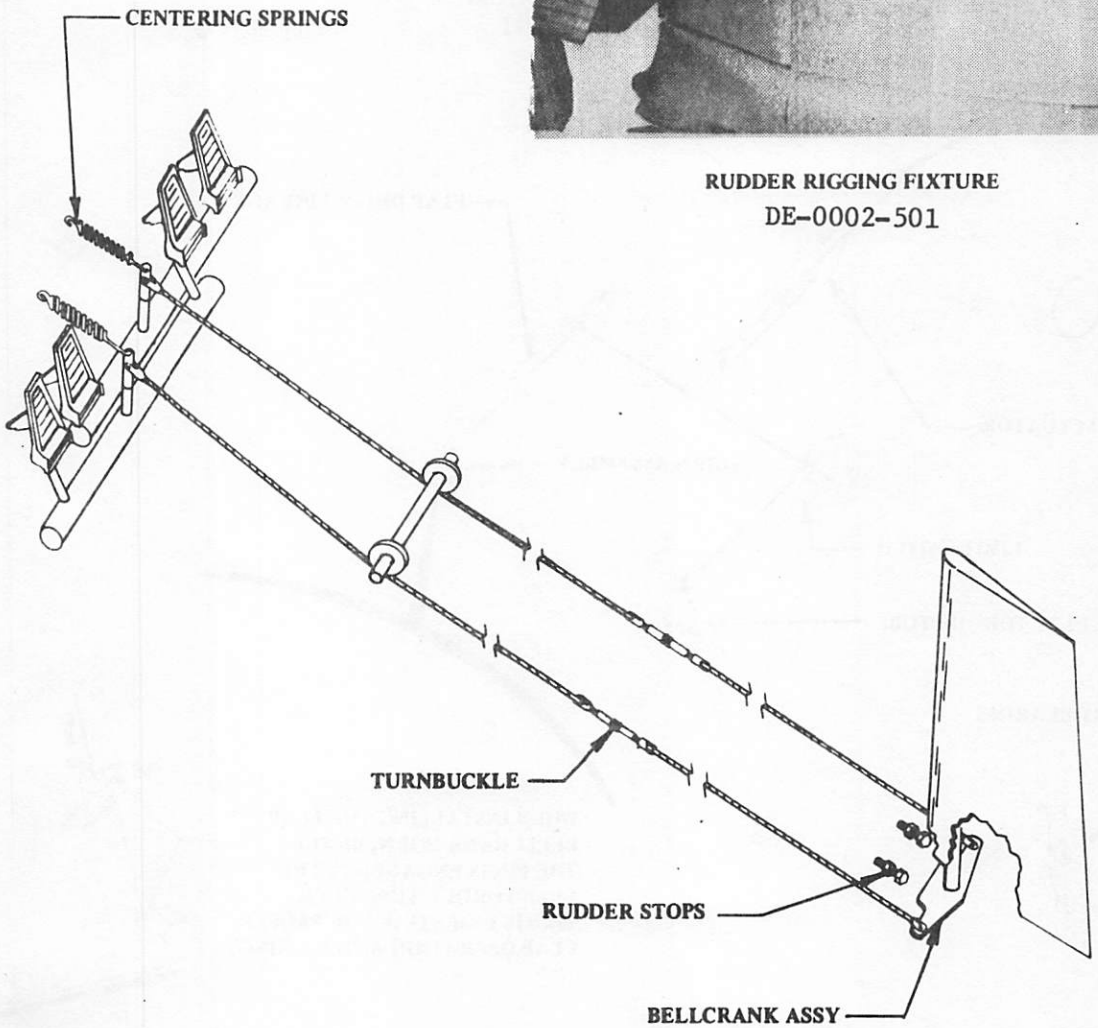
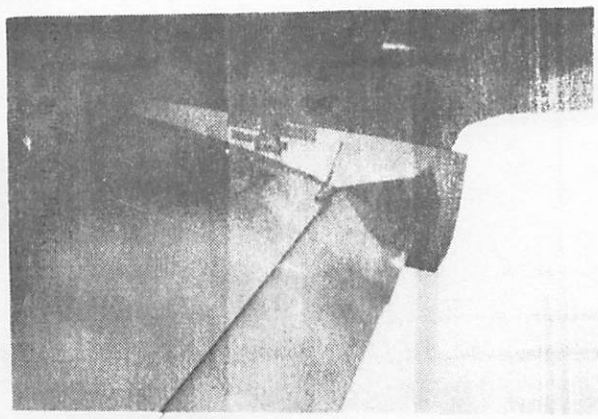
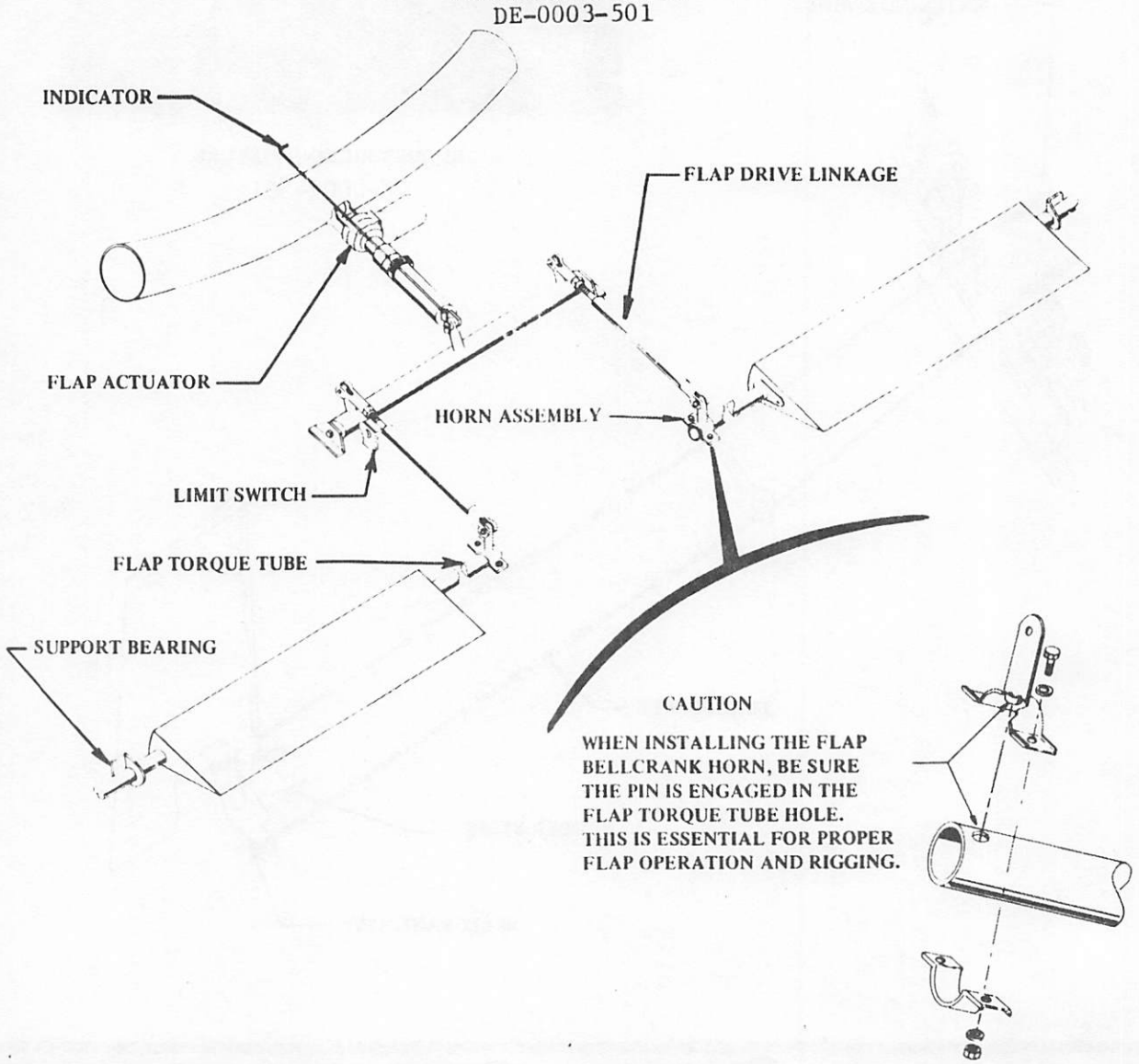


Figure 5-4 Rudder System



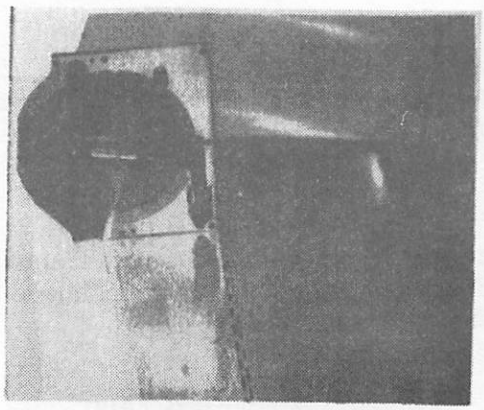
FLAP RIGGING FIXTURE
DE-0003-501



CAUTION

WHEN INSTALLING THE FLAP BELLCRANK HORN, BE SURE THE PIN IS ENGAGED IN THE FLAP TORQUE TUBE HOLE. THIS IS ESSENTIAL FOR PROPER FLAP OPERATION AND RIGGING.

Figure 5-5 Flap System



TRIM TAB RIGGING

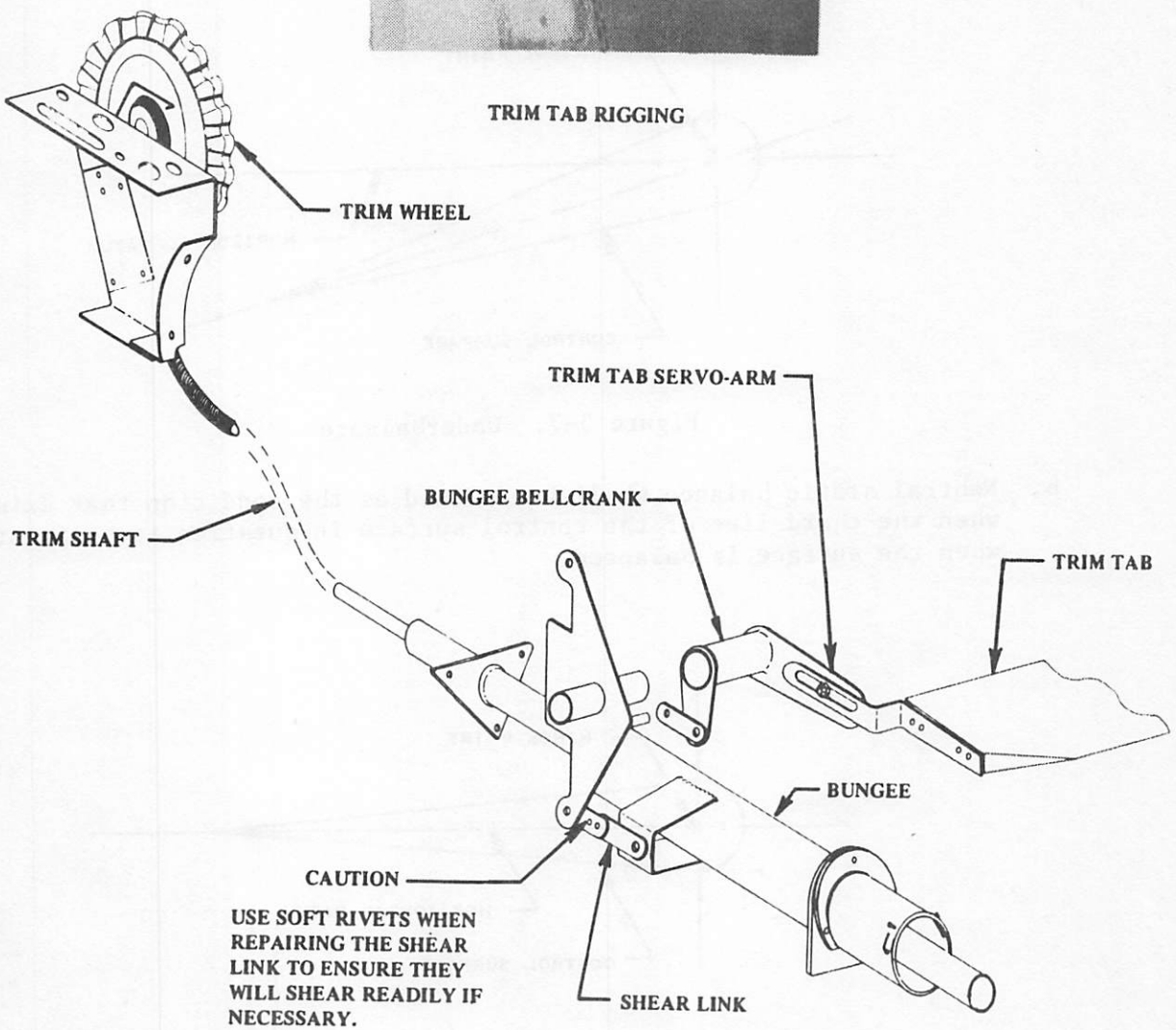


Figure 5-6 Trim System

5-70 BALANCING OF CONTROL SURFACES

5-70-00 GENERAL

This information is for the purpose of clarifying and facilitating the balancing of moveable control surfaces. Procedures for actual balancing methods are covered.

5-70-01 DEFINITIONS

a. Underbalance shall be defined as the condition that exists when the control surface in question is trailing edge heavy and shall be symbolized by the plus (+) sign.

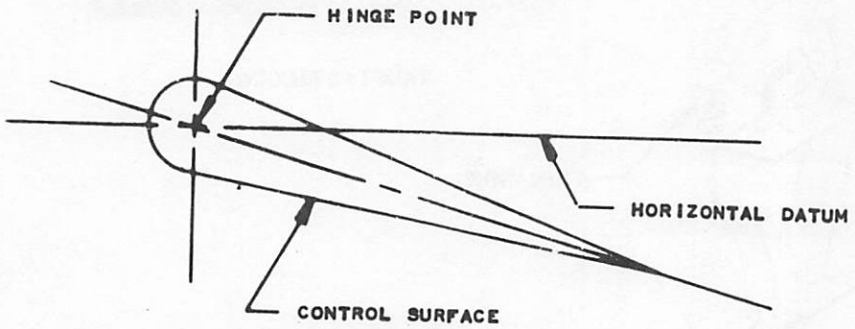


Figure 5-7. Underbalance

b. Neutral static balance shall be defined as the condition that exists when the chord line of the control surface in question is horizontal when the surface is balanced.

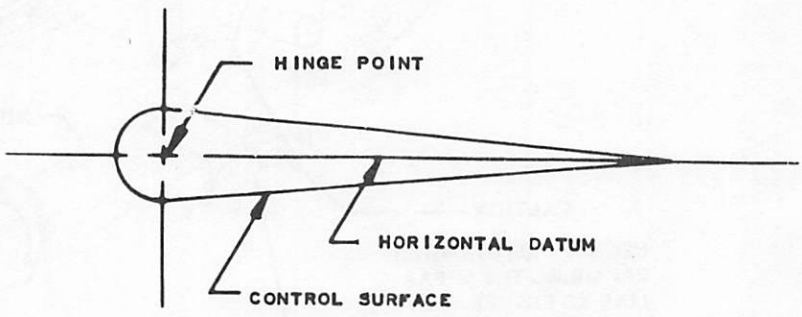


Figure 5-8. Neutral Static Balance

5-70-01 DEFINITIONS (Continued)

c. Overbalance shall be defined as the condition that exists when the control surface in question is leading edge heavy and shall be symbolized by the minus (-) sign.

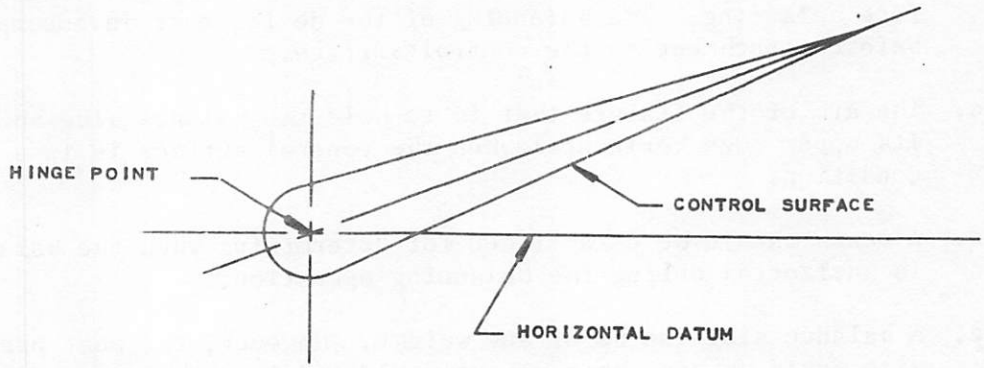


Figure 5-9. Overbalance

5-70-02 CONTROL SURFACE TOLERANCES - AA-1, AA-1A & AA-1B (After painting)

Elevator	0 to +32 in. oz.
Rudder	0 to +32 in. oz.
Ailerons	-16 to +20 in. oz.

5-70-03 ELEVATOR

When balancing elevators, each shall be balanced separately and the actuating pylon shall be attached to each, in turn, to provide a pivot point.

5-70-04 RUDDER

*Same procedure as used for elevators.

5-70-05 AILERON

5-70-06 BALANCING DEVICE

The balancing device can be constructed in any manner or shape, so long as the following requirements are fulfilled.

*For rudder with flashing beacon no lead weight is used. The flashing beacon acts as the main balancing weight with any additional adjustment achieved by adding or removing 804001-2 washer plate weights on the inside of the tip directly under the beacon. These are held in place by the beacon mount screws.

5-70-06 BALANCING DEVICE (Continued)

a. The balancing device must hold the control surface in the attitude as denoted.

b. The device must balance perfectly about a point within itself, (Figures 5-10 & 11) which will lie in a vertical line through the hinge line of the control surface when it is engaged with the surface balancing. The balancing of the device must be accomplished before attachment to the control surface.

c. The arm of the fixture that is to hold the balance slug shall have its upper edge horizontal when the control surface is in a balanced condition.

d. A means should be established for determining when the balance arm is horizontal during the balancing operation.

e. A balance slug can be of any weight. However, the most practical size would be one whose weight would require a balance arm of from 6 to 16 inches to properly balance the control surface. Refer to examples on Figures 5-10 and 5-11.

f. The balancing device should have two lines scribed on the balance arm to denote the limits within which the balance slug can be moved to balance the control surface and remain within the tolerance prescribed for each control surface.

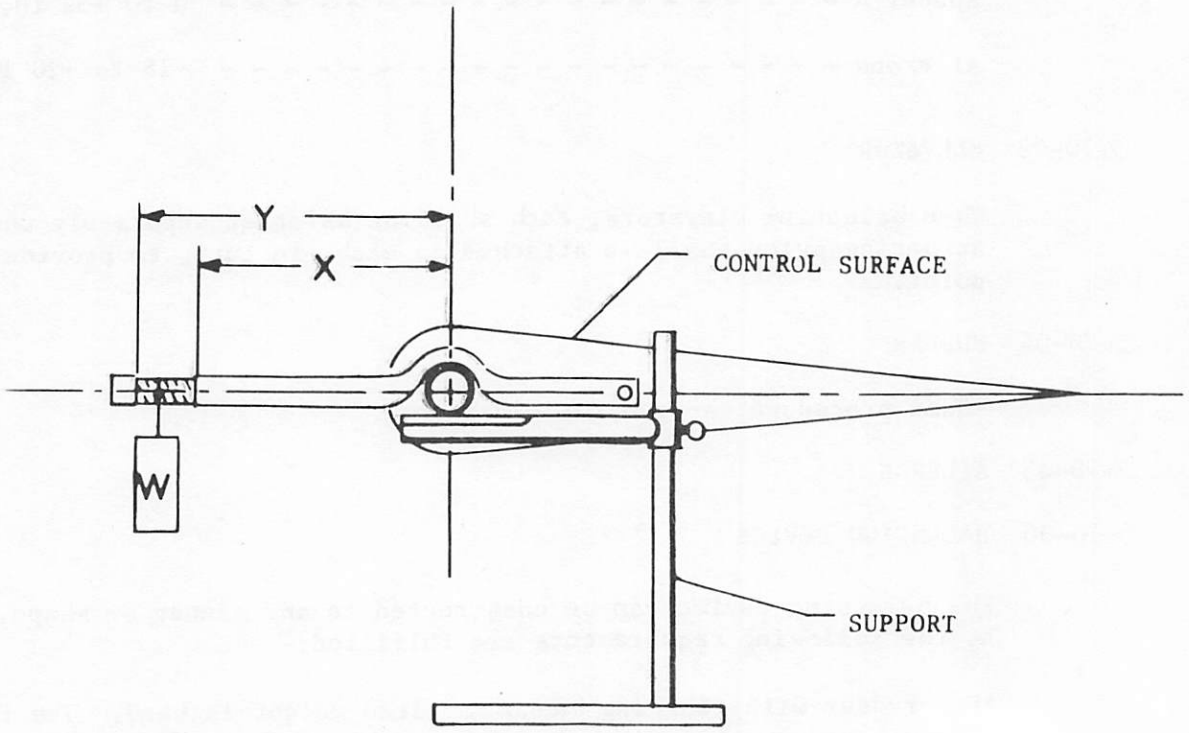


Figure 5-10. Control Surface Balancing Device

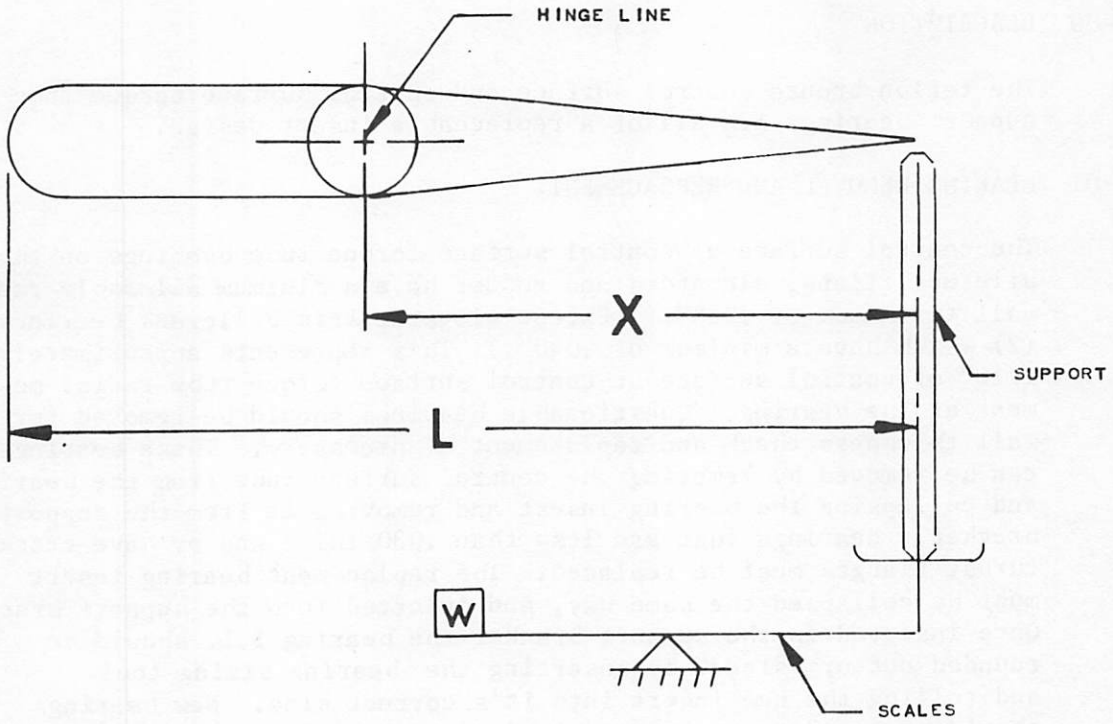


Figure 5-11. Control Surface Balancing

5-80 CONTROL SURFACE BEARINGS

5-80-00 DESCRIPTION

The teflon bronze control surface and control surface torque tube support bearings are all of a replaceable insert design.

5-80-01 BEARING REMOVAL AND REPLACEMENT

The control surface or control surface torque tube bearings on the ailerons, flaps, elevators and rudder have a minimum allowable radial wall thickness of .030". (Except elevator trim bellcrank bearings (2) which have a minimum of .040".) This represents approximately 1/16" of control surface or control surface torque tube radial movement at the bearing. Questionable bearings should be removed for a wall thickness check and replacement if necessary. These bearings can be removed by removing the control surface tube from the bearing and collapsing the bearing insert and removing it from the support bracket. Bearings that are less than .030 thick and or have cracked thrust flanges must be replaced. The replacement bearing insert must be collapsed the same way, and inserted into the support bracket. Once inserted in the support bracket the bearing I.D. should be rounded out or "sized" by inserting the bearing sizing tool and rolling the new insert into it's correct size. New bearings should be sized to prevent control system stiffness. See Par. 2-110, for bearing sizing tool part number. Lightly grease bearings when re-installing control surfaces using a very light amount of grease per the lubrication chart in Figure 2-5.

N O T E

Maximum control surface, or control surface torque tube wear is .030 wall thickness reduction. Wear greater than this requires replacement of the control surface. Service Kit No. SK-121, Control Surface Torque Tube Repair Kit, is available from the Customer Service Department for worn torque tubes that have not exceeded the maximum wear limits.

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POWER PLANT

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6 POWERPLANT

6-00 GENERAL

The AA-1, AA-1A & AA-1B are powered by 108 H.P. Lycoming, 4 cylinder, horizontally opposed, air-cooled engines. The propellers are McCauley fixed pitch Models 1A105/SCM 7157 (Cruise), 1A105/SCM 7153 (Climb) and 1A105/SCM 7154 (Climb).

N O T E

For repair and overhaul of the engine, refer to applicable manuals, bulletins and other documents published by the engine manufacturer.

6-10-01 SPECIFICATIONS

Engine	O-235-C2C
BHP	108 @ 2600 RPM
Displacement (cubic inches)	233.3
Stroke (inches)	3.875
Bore (inches)	4.375
Firing Order	1-3-2-4
Compression Ratio	6.75:1
Left Magneto (plus impulse coupling)	#4051 Fires @ 25° BTC
Right Magneto	#4050 Fires @ 25° BTC
Spark Plug Gap	.018 to .022*
Valve Rocker Clearance (cold)	.007 to .009
Oil Capacity	6 QTS.
Propeller Drive Ratio	1:1
Propeller Drive Rotation (viewed from rear)	Clockwise
Dry Weight (includes magnetos, plugs, carburetor, starter, alternator and ignition harness)	248.0 LBS
Fuel Pressure	Minimum 1/2 psi
	Normal 3-5 psi
	Maximum 8 psi
Oil Pressure	Minimum Idling 25 psi
	Normal 60-90 psi
	Start-Warmup 100 psi
Oil Temperature	Maximum 245° F
Cylinder Head Temperature	Maximum 500°

*See latest revision of Lycoming Service Instruction No. 1042 for gap on specific plug being used.

6-10-02 ENGINE REMOVAL

N O T E

Prior to removal of the engine, place a support under the tail of the aircraft to prevent damage to the empennage. Tag or label all wiring and cables prior to removal from the engine for reference on installation.

6-10-02 ENGINE REMOVAL (Continued)

a. Remove the propeller and spinner.

b. Remove the cowling (Chapter 3).

c. Disconnect the throttle, mixture, and carburetor heat controls.

d. Disconnect the fuel and oil pressure lines.

e. Disconnect the main fuel line at the inlet to the engine driven fuel pump.

f. Disconnect the tachometer cable.

g. Disconnect the tailpipe support (if used).

h. Disconnect the vacuum pump hose at the pump.

i. Disconnect the fuel primer line.

j. Disconnect all wiring from the engine.

k. Disconnect the heater duct at the muffler.

l. Attach a suitable lifting device to engine and remove the engine mounting bolts.

6-10-03 ENGINE INSTALLATION

a. Position the engine to the engine mount and install the mounting bolts. Torque mounting bolts to 40 in. lbs. on aircraft AA1-0001 through AA1-0432 except AA1-0348. On aircraft AA1-0348 and AA1-0433 and on torque mounting bolts to 200 to 250 in. lbs.

N O T E

Inspect the engine rubber mounting bushings for wear and deterioration. Replace as required.

b. Connect the heater duct to the muffler.

c. Connect all wiring to the engine.

d. Connect the fuel primer lines.

e. Connect the vacuum pump hose at the pump.

f. Connect the tachometer cable.

g. Connect the main fuel line at the inlet to the engine driven fuel pump.

6-10-03 ENGINE INSTALLATION (Continued)

h. Connect the fuel and oil pressure lines.

i. Connect the throttle, mixture, and carburetor heat controls.

N O T E

Refer to Section 6-40-03 for proper rigging of the carburetor throttle control.

N O T E

Maintain a minimum 4-1/2 inch bend radius on all carburetor controls.

j. Install the cowling (Chapter 3).

k. Install the propeller, torque bolts to 300 in. lbs., resafety bolts and install spinner.

6-20 RECOMMENDED INSPECTION & MAINTENANCE PROCEDURES - FLEXIBLE FLUID HOSES

6-20-00 GENERAL

In order to assure the continued safety and reliability of flexible fluid hose installations in the engine compartment, the following inspection procedures are recommended each 50 hours of operation.

6-20-01 INSPECTION AND MAINTENANCE

a. All aircraft have an auxiliary fuel pump and the flexible fuel lines should be pressurized with the fuel boost pump. When accomplishing this test, the mixture control should be in the idle cutoff position when examining for leakage.

b. Examine the flexible hose exterior for evidence of leakage or wetness.

c. Inspect for color bleaching of the end fittings or severe discoloration of the hoses.

d. Check fuel and oil hoses for evidence of stiffness.

N O T E

Avoid excessive flexing and sharp bends when examining hoses for stiffness.

e. Flexible hoses which are found leaking or showing a notable amount of stiffness are to be replaced. It is suggested that all flexible fluid carrying hoses in the engine compartment be replaced at engine overhaul or every five years, whichever comes first.

f. Operate engine primer and check for leaks at lines and fittings.

6-20-01 INSPECTION AND MAINTENANCE (Continued)

g. After pressure testing fuel hoses and operating primer, allow sufficient time for excess fuel to drain overboard from the engine manifold before attempting an engine start.

N O T E

During installation of flexible hoses, observe the following recommendations.

1. *The hose must not be twisted. High pressures applied to a twisted hose may cause failure or loosening of the nut.*

2. *Provide as large a bend radius as possible.*

3. *Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set may result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to original position. Route hoses away from areas of intense heat such as engine exhaust.*

4. *AC 43.13-1, Chapter 10, also covers installation procedures for flexible hose assemblies.*

6-30 ENGINE CONTROLS

6-30-00 GENERAL

The engine controls consist of the throttle, mixture, and carburetor heat controls. Each control is adjusted at the factory for proper engine operation. However, field maintenance may require subsequent adjustment of these controls. Removal, installation and adjustment procedures are given in Sections 6-40 through 6-60.

6-40 ENGINE THROTTLE CONTROL

6-40-00 DESCRIPTION

The engine throttle control is located in the lower center of the instrument panel and controls the manifold pressure of the engine.

6-40-01 ENGINE THROTTLE CONTROL REMOVAL (Figure 6-1A)

a. Disconnect the ball joint (5, Figure 6-1A) from the carburetor throttle arm (6).

b. Remove the retainer(s) which secures the throttle plunger housing (10) to the support bracket (4) or remove the forward nut and lockwasher which secures the throttle cable housing to the firewall (Figure 6-1) depending on the throttle cable design of the aircraft being worked on.

6-40-01 ENGINE THROTTLE CONTROL REMOVAL (Continued)

c. Loosen the jam nut (9) and remove the ball joint (5) and jam nut (9) from the throttle plunger housing (10). Remove the two rubber boots from the plunger housing (10).

d. Remove the clamps which secure the throttle cable and carburetor heat control cable to the instrument panel support. (Located between instrument panel and firewall).

e. Remove the throttle housing retainer nut from behind the instrument panel and carefully pull the throttle cable through the firewall and instrument panel.

6-40-02 ENGINE THROTTLE CONTROL INSTALLATION (Figure 6-1A)

a. Pass the end of the throttle control cable through the instrument panel and slide the housing retainer nut over the end of the cable.

b. Route cable through the firewall to the carburetor.

c. Install and tighten the nut on the throttle housing behind the instrument panel.

d. Position the throttle plunger housing (10) in the slot in the support bracket (4) and install the retainer(s) or install the lockwasher and nut which secures the throttle cable housing to the firewall (Figure 6-1), depending on the throttle cable design of the aircraft being worked on.

e. Position the throttle cable to provide a minimum 4-1/2 inch bend radii and install the clamps which secure the throttle cable and carburetor heat cable to the instrument panel support. (Located between the instrument panel and firewall).

f. Install the jam nut (11) and ball joint (5) on the throttle plunger (8) loosely.

N O T E

The remaining instructions for throttle control installation are covered in Section 6-40-03 "ENGINE THROTTLE CONTROL RIGGING"

6-40-03 ENGINE THROTTLE CONTROL RIGGING - AA1-0001 thru AA1-0432 except AA1-0123, AA1-0140, AA1-0291 & AA1-0348. (Figure 6-1)

a. The throttle control is attached to the carburetor throttle arm through the middle hole by a ball joint quick disconnect fitting.

b. Check throttle arm position (1, figure 6-1). This must be 42° ± 5° forward of vertical when the throttle is wide open.

6-40-03 ENGINE THROTTLE CONTROL RIGGING (Continued)

c. Check that throttle arm is positioned inboard tightly against stop (2).

d. Torque throttle arm clamp screw (3) to 26-28 in./lb.

e. See that clamping action has not closed gap (4) in throttle arm.

f. Safety wire throttle arm clamp screw to the throttle stop (5). (Per Figure 6-1B)

g. Check security of lock nuts (6) that attach the control cable housing to the instrument panel and to the firewall.

h. Loosen throttle knob (7), turn jam nut (8) all the way down (clockwise), and tighten the throttle knob against the jam nut. Do not clamp or mar the throttle plunger.

i. Disconnect the throttle control from the carburetor by releasing the ball joint connector (9). Push the throttle control in until the jam nut hits the friction lock (friction lock (10) 1/4 turn loose) and pull the throttle control 1/16 to 1/8 inch for control cushion.

j. Tighten the friction lock (10) being careful not to change the throttle position.

k. Adjust ball joint connector (9) to obtain full open throttle.

l. Reconnect ball joint to carburetor arm (1), tighten jam nut (11), then check threaded push rod for 3/16 inch minimum thread engagement via inspection hole in ball joint connector (9).

m. If further adjustment is required, make all adjustments either at the firewall or the carburetor. If slight repositioning of the throttle arm is required, the lockscrew (3) must be loosened, the arm repositioned, the screw (3) retorqued to 26-28 in./lbs. and resafetied to the throttle stop (12).

n. Release the friction lock (10) and check for full control movement noting that 1/16 to 1/8 inch maximum cushion exists.

N O T E

Check the static RPM of the engine. With the prevailing wind from the left this should be:

Cruise prop. (2150-2300)
Climb prop. (2250-2400)

Weather conditions and field altitude will have a slight effect on the static RPM. Mixture should be leaned at altitude to get proper static RPM.

6-40-03 ENGINE THROTTLE CONTROL RIGGING (Continued)

N O T E

On friction style throttle arms the clamp screw must be torqued to 26-28 in. lbs. and safety wired to throttle arm and stop as shown on Figure 6-1B. It is also important that this be complied with on any replacement carburetor or engine. Install serrated style arms per Figure 6-1C.

6-40-04 THROTTLE CONTROL RIGGING - AA1-0123, AA1-0140, AA1-0291, AA1-0348, AA1-0433 and up. AA1A-0001 and up. AA1B-0001 and up. (Figure 6-1A)

a. Screw throttle knob (1, fig. 6-1A) and jam nut (2) all the way down and tighten jam nut (2) against throttle knob.

b. Place a 0.125 in. spacer between throttle knob jam nut (2) and friction lock (3) with friction lock partially loose.

c. Attach cable to throttle support bracket (4) at carburetor.

d. Check throttle arm position. This should be 55° ± 2° forward of vertical when the throttle is full open.

e. Adjust threaded ball joint (5) so carburetor throttle arm (6) is against the full open stop. Check through inspection hole (7) that ball joint (5) and push rod (8) have 0.19 inch minimum thread engagement and secure with jam nut (9).

f. If thread engagement in step 4 above is less than 0.19 inch, the throttle knob (1) may be threaded out to a minimum of 0.19 inch engagement and step 4 above repeated.

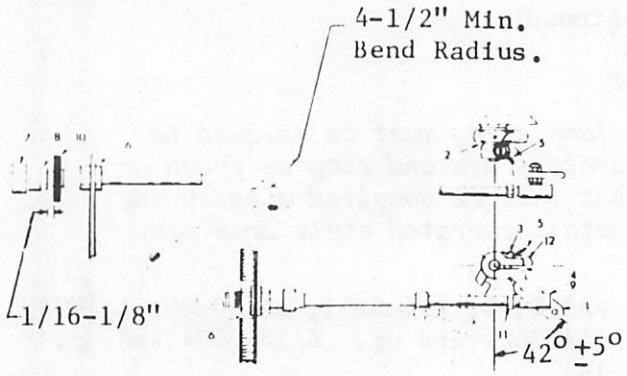
g. Space between plunger housing (10) and jam nut (11) at ball joint (5), with throttle closed, must be 0.12-0.25 inch minimum.

h. Space between throttle knob jam nut (2) and friction lock (3), with throttle open and friction lock partially loose, must be 0.12-0.25 inch maximum.

i. Torque throttle arm clamp screw (12) to 26-28 in. lbs.

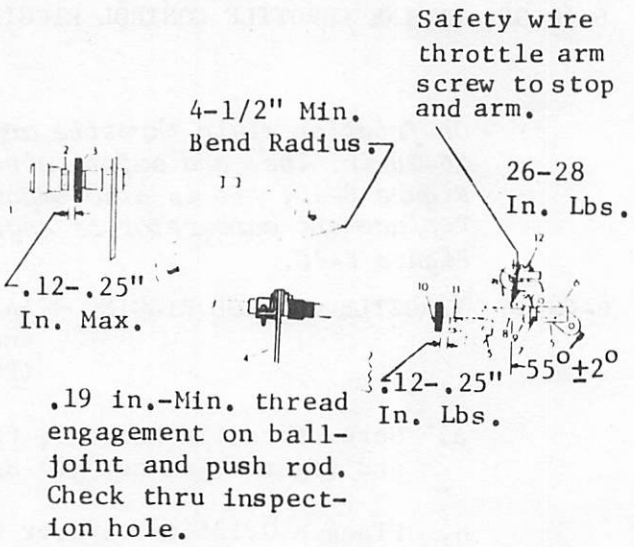
j. Safety wire throttle arm and screw to throttle stop and arm as shown on Figure 6-1B.

k. Check all attachments, jam nuts, safety wire and bend radii (minimum 4-1/2 inches) for correct installation and security. Check throttle for smoothness of operation.



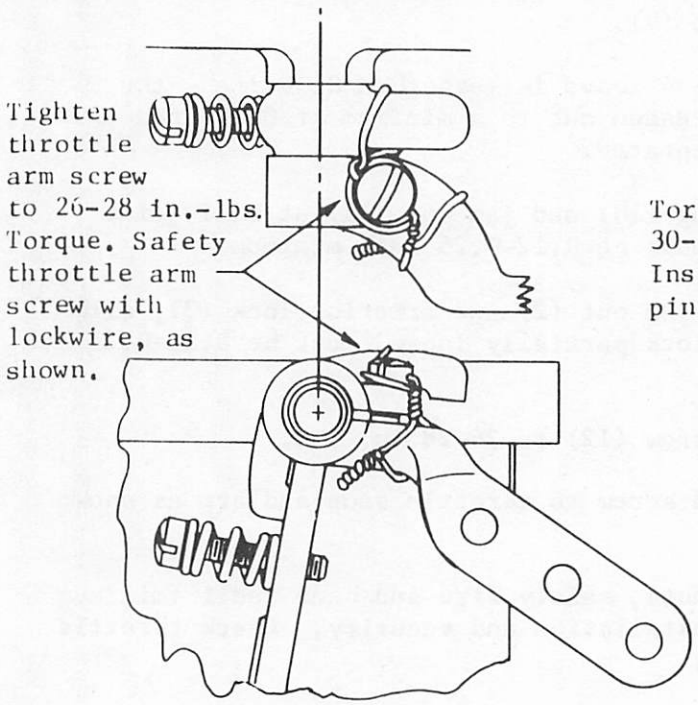
Carburetor Throttle Arm and Cable Rigging (AA1-0001 thru AA1-0432, except AA1-0123, AA1-0140, AA1-0291 and AA1-0348).

Figure 6-1.



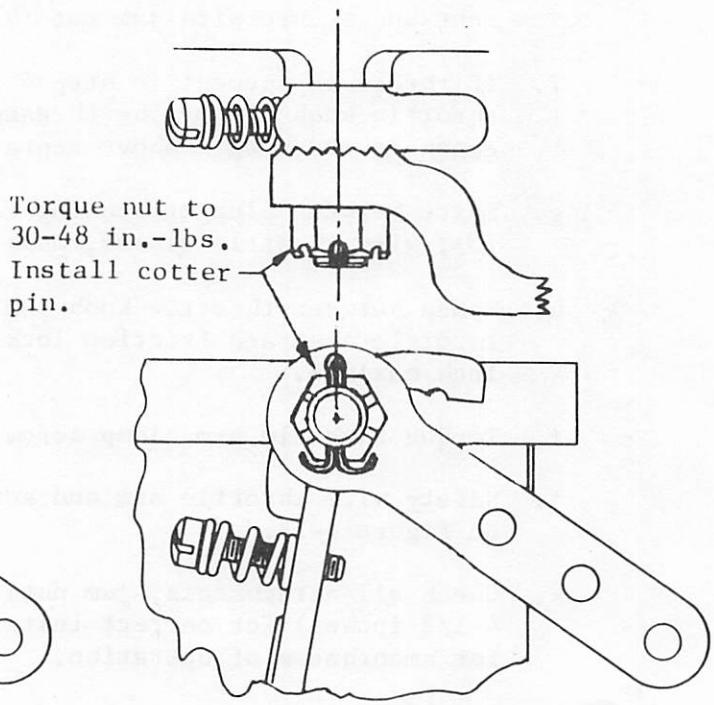
Carburetor Throttle Arm and Cable Rigging (AA1-0123, AA1-0140, AA1-0291, AA1-0348, AA1-0433 and up; AA1A-0001 and up).

Figure 6-1A.



View of Carburetor Throttle Arm showing method of tying lockwire.(Friction Clamp Design)

Figure 6-1B.



View of Carburetor Throttle Arm (Serrated Clamp Design)

Figure 6-1C.

6-40-04 THROTTLE CONTROL RIGGING (Continued)

N O T E

Check the static rpm of the engine. This should be

Cruise prop. (2150-2300)
Climb prop. (2250-2400)

Weather conditions and field altitude will have a slight effect on the static RPM. Mixture should be leaned at altitude to get proper static RPM.

N O T E

On friction style throttle arms the clamp screw must be torqued to 26-28 in. lbs. and safety wired to throttle arm and stop as shown on Figure 6-1B. It is also important that this be complied with on any replacement carburetor or engine. Install serrated style arms per Figure 6-1C.

6-50 MIXTURE CONTROL

6-50-00 DESCRIPTION

The mixture control is located on the instrument panel adjacent to the throttle control. This control meters the amount of fuel that passes through the carburetor main jet, and is used to regulate fuel economy at a given power setting and cruising altitude.

N O T E

Replace mixture control wire every 500 hours (reference latest revision to Service Bulletin No. 144).

6-50-01 MIXTURE CONTROL REMOVAL

a. At the carburetor, remove the swivel assembly. Straighten mixture control wire only enough to remove it from bolt.

b. Loosen the clamps at the firewall and instrument panel brace sufficiently to allow the housing to slide through.

c. Remove the nut securing the mixture control housing to the instrument panel and pull the control through the firewall and instrument panel.

6-50-02 MIXTURE CONTROL INSTALLATION AND RIGGING

a. Pass the end of the mixture control through the instrument panel opening and slide the nut over the end of the control and secure housing to instrument panel.

b. Continue the control through the firewall, being sure it passes through the clamps on the instrument panel brace and on the forward side of the firewall.

c. Loosely attach control wire to swivel assembly.

N O T E

Do not bend wire or tighten nut at this time.

N O T E

See Item 3 on Service Letter No. 74-4 for aircraft not equipped with swivel assembly illustrated in Figure 6-3.

d. Position the mixture control arm completely against the full rich stop. Place a 1/8 inch spacer between control knob and faceplate. (See Figure 6-2).

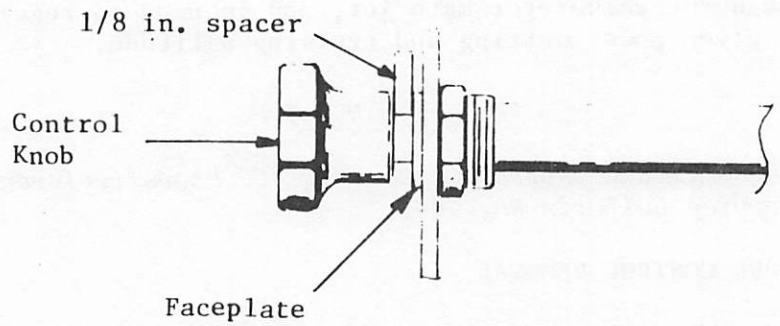


Figure 6-2. Typical Control Knob Rigging

e. With the mixture control arm against the full rich stop, and the control knob against the spacer, tighten the swivel assembly nut and the cable clamps at the instrument panel brace and firewall. Remove the spacer from control knob and check mixture control operation.

N O T E

The firewall cable clamp must direct the control housing at right angles to the firewall. Adjust to achieve this condition.

6-50-02 MIXTURE CONTROL INSTALLATION AND RIGGING (Continued)

f. Bend mixture control wire as shown on Figure 6-3 and install the cotter pin. Check swivel freedom in arm.

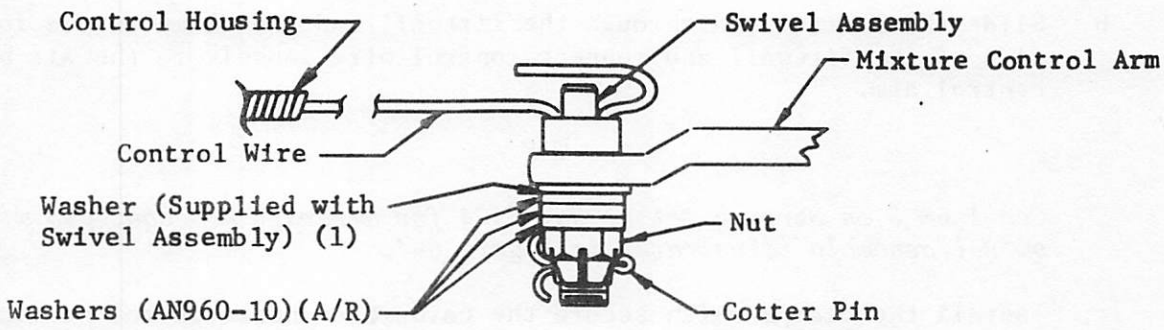


Figure 6-3. Mixture Control Installation

g. Check operation of mixture control. Control should have no more than 1/8 inch travel remaining with mixture control arm in full rich position. Control cable should have 4-1/2 inch minimum bend radius.

6-60 CARBURETOR HEAT CONTROL

6-60-00 DESCRIPTION

The carburetor heat control is located on the instrument panel adjacent to the throttle control. The carburetor heat control opens and closes a valve in the carburetor air box. When the control is in the "OFF" position, air is drawn from outside through ducting to the carburetor. In the "ON" position, the valve shuts off the outside air source and warm air from a shroud around No. 4 exhaust pipe is directed to the carburetor.

6-60-01 CARBURETOR HEAT CONTROL REMOVAL

a. Loosen the control wire clamp bolt assembly or swivel assembly and disconnect the carburetor heat control wire from the air box control arm.

b. Loosen the clamp around the control housing at the firewall.

c. Remove the clamp which secures the carburetor heat control housing to the instrument panel support.

d. Remove the nut behind the instrument panel that secures the carburetor heat control.

e. Remove the control by pulling it through the instrument panel and firewall.

6-60-02 CARBURETOR HEAT CONTROL INSTALLATION AND RIGGING

a. Pass the end of the control through the instrument panel and install the nut securing the control to the instrument panel.

b. Slide the control end through the firewall and the clamp on the forward side of the firewall and connect control wire loosely to the air box control arm.

N O T E

See Item 3 on Service Letter No. 74-4 for aircraft not equipped with swivel assembly illustrated in Figure 6-4.

c. Install the clamps which secure the carburetor heat control housing to the instrument panel support.

d. Adjust the control housing to provide a minimum 4-1/2 inch radius and tighten the clamps on the instrument panel brace and the clamp on the forward side of the firewall.

e. Position the carburetor heat control arm in the completely closed position (full forward). Place a 1/8 inch spacer between carburetor heat control knob and faceplate (See Figure 6-2).

f. With the carburetor heat control in the fully closed position, and the control knob against the spacer, tighten the control housing clamp at the firewall and the control arm attaching swivel assembly. Remove the spacer from control knob and check carburetor heat control operation.

g. Bend carburetor heat control wire as shown on Figure 6-4, tighten clamp and install the cotter pin. Check swivel freedom in arm.

h. Check operation of the carburetor heat control. Control should have 1/8 inch travel remaining with the control arm in fully closed position. Control housing should have 4-1/2 inch minimum bend radius.

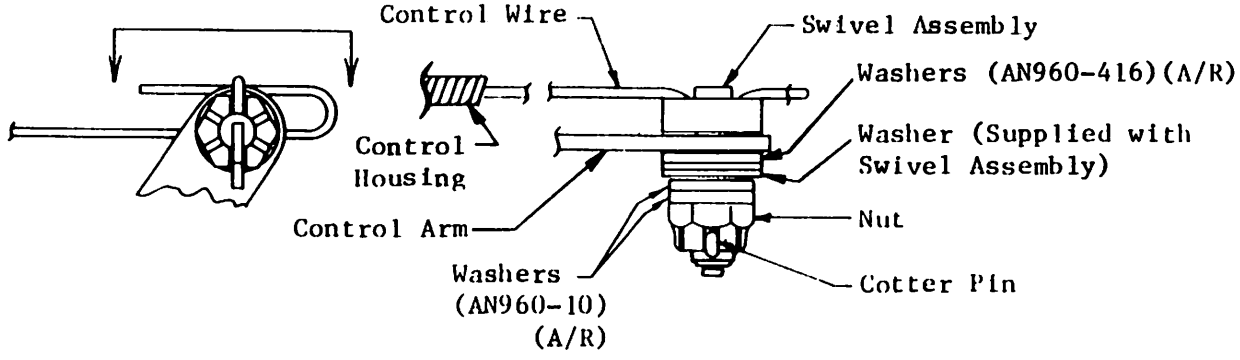


Figure 6-4. Carburetor Heat Control Installation

6-70 INDUCTION SYSTEM

6-70-00 GENERAL

The induction system consists of an air inlet housing and filter assembly. The inlet housing aligns with an opening in the nose cowl which permits filtered outside air to enter the carburetor.

Air entering the induction inlet passes through an oil saturated filter which collects dust and abrasives that may be harmful to the engine. Periodic cleaning and re-oiling of the filter is necessary for proper engine operation.

The induction system also includes an alternate hot air source, which is controlled from the instrument panel. When carburetor icing conditions exist, the carburetor heat control can be pulled out to provide hot air to the carburetor intake.

N O T E

Limited operation of the carburetor heat control is recommended since no filter is incorporated in the hot air source.

When operating the aircraft under extreme dusty conditions, frequent servicing of the filter will extend the useful life of the engine.

6-70-01 INDUCTION SYSTEM REMOVAL

a. Remove the lower cowl assembly.

b. Loosen the clamp and disconnect the carburetor heat hose from the air box assembly.

c. Disconnect the carburetor heat control from the air box assembly.

d. Remove the bolts and lower the air box assembly from the carburetor.

6-70-02 INDUCTION SYSTEM DISASSEMBLY AND FILTER SERVICING

a. Remove the screws attaching the adapter assembly, air filter and air box assembly together.

b. Thoroughly wash the filter in petroleum solvent. Make certain all dirt is removed and filter is in serviceable condition. If filter has flocking worn from screen wire, replace filter.

c. Dry the filter at room temperature. Filter must be completely dry before proceeding with next step. If the filter is not dry, the solvent will prevent oil from adhering to the filter, thereby reducing the filter efficiency.

d. Immerse the filter in the grade oil called for on the filter. If none is called out, use engine preservative oil per MIL-L-21260.

6-70-02 INDUCTION SYSTEM DISASSEMBLY AND FILTER SERVICING (Continued)

e. After removing the filter from the oil, allow it to drain thoroughly before installing in the aircraft.

6-70-03 INDUCTION SYSTEM REASSEMBLY

a. Inspect the gasket between the air filter and air box, if damaged or otherwise defective, replace with a new gasket.

b. Position the air box assembly, filter, and adapter together and install the screws.

6-70-04 INDUCTION SYSTEM INSTALLATION

a. Position the air box assembly to the carburetor and forward cowl, and install the bolts being sure to install the left rear bolt with a washer to prevent it from bottoming out in the carburetor.

b. Connect the carburetor heat control to the air box assembly, (Refer to Section 6-60-02).

c. Install the carburetor heat inlet hose and clamp to the air box assembly.

d. Install the lower cowl.

N O T E

Make sure the air duct is properly fitted over and attached with a screw to the scoop in the forward cowl. Failure to do this could result in an inadequate air supply.

6-80 EXHAUST SYSTEM

6-80-00 DESCRIPTION

The exhaust system consists of an integral muffler and exhaust pipe, risers and clamp assemblies. The muffler is surrounded by a heat exchanger which is connected through tubing to the cabin and serves as a cabin heater. The carburetor heat hose is attached to a shroud around the exhaust pipe from #4 cylinder and supplies heat to the carburetor when the carburetor heat control is opened.

6-80-01 EXHAUST SYSTEM REMOVAL

a. Remove the lower cowl.

b. Remove the carburetor air induction system (Section 6-70-01)

c. Loosen the clamp and disconnect the cabin heater hose from the muffler heat exchanger.

6-80-01 EXHAUST SYSTEM REMOVAL (Continued)

d. Loosen the clamp and disconnect the fresh air inlet hose from the muffler heat exchanger.

e. Remove the clamps from the riser-muffler connections and lower the muffler assembly from the engine.

f. Remove the nuts securing the risers to the cylinder heads and remove the risers and gaskets.

6-80-02 EXHAUST SYSTEM INSPECTION

a. Exhaust systems are subject to burning, cracking and general deterioration from alternate thermal stresses and vibration. Consequently, it is extremely important that the system be inspected every 100 hours or at any time exhaust fumes or carbon monoxide are detected in the cabin.

b. In order to properly inspect the exhaust system, components must be clean and free of oil, grease, etc. If required, spray engine exhaust system components with a suitable solvent (such as Stoddard solvent), allow to drain and then wipe dry with a clean cloth.

W A R N I N G

Do not use highly flammable solvents on engine exhaust system. Never use a wire brush or abrasives to clean exhaust systems or mark the system with lead pencils.

c. Inspect core through tail pipe opening and shake the muffler to determine if baffles are loose.

d. Large flakes of scale and rust from the interior of the muffler are an indication of deterioration and the muffler should be replaced.

N O T E

Especially check the area adjacent to welds. Look for exhaust gas deposits in surrounding areas, indicating that exhaust gases are escaping through a crack or hole. If thorough inspection is not possible, pressure test for leaks in accordance with AC 43.13-1, Chapter 14, Section 3, paragraph 387B. If cracks are found in the muffler or tail pipe, repairs must be in accordance with AC 43.13-1, Chapter 14, Section 3, paragraph 388.

e. Inspect the engine exhaust flanges for smooth seating surfaces. Also check the header flanges for warpage.

f. Check fit of risers in muffler pipes. If loose, swage out the risers for tight fit.

6-80-02 EXHAUST SYSTEM INSPECTION (Continued)

g. Exhaust System Air Leak Test

(1) Plug all openings in the muffler and heat exchanger and attach the pressure side of an industrial vacuum cleaner (capable of producing a pressure rise of at least 2 inches Hq. above atmospheric pressure) to the tail pipe opening, using a rubber plug or other suitable means of effecting a suitable seal.

N O T E

The inside of the vacuum cleaner hose should be free of any contamination that might be blown into the system.

(2) With the vacuum cleaner operating, all joints, welds and the cabin heat exchanger can be checked for leaks by applying a soapy water solution to all areas and watching for air bubbles.

Minor leaks will appear as bubbles while major leaks will tend to blow the solution away from the joint.

(3) Any leakage (minor or major) must be corrected.

6-80-03 EXHAUST SYSTEM INSTALLATION

a. Using new gaskets, position the risers on the engine and install the nuts loosely.

b. Position the muffler assembly on the risers; apply sealant* around riser to muffler joints and install clamps loosely.

c. Tighten the exhaust flange nuts to 110-130 inch pounds torque using new lock washers. Position clamps such that subsequent leakage will not direct exhaust gases on intake pipes and tighten clamp bolts.

d. Connect the cabin heater hose to the muffler heat exchanger and install the clamp.

e. Install the carburetor air induction system (Section 6-70-04).

f. Install the lower cowl.

*Approved Sealant: Walker Acousti-Seal 5160.

6-90 ENGINE LUBRICATION SYSTEM

6-90-00 DESCRIPTION

The engine lubrication system is of the pressure wet sump type with an oil sump capacity of six (6) quarts. Minimum safe quantity in sump is two (2) quarts, however, it is recommended the engine never be operated continuously below four (4) quarts. Table 1 lists recommended grades of oil to be used.

6-90 ENGINE LUBRICATION SYSTEM (Continued)

TABLE I. RECOMMENDED GRADE OIL*		
Average Ambient Air	Straight Mineral	Ashless Dispersant
Above 60° F.	SAE 50	SAE 40 or SAE 50
30° to 90° F.	SAE 40	SAE 40
0° to 70° F.	SAE 30	SAE 40 or SAE 30
Below 10° F.	SAE 20	SAE 30
Oil Sump Capacity		6 U.S. Quarts
Minimum Safe Quantity in Sump		2 U.S. Quarts

*Refer to latest revision of Lycoming Service Instruction No. 1014.

A relief valve, located behind the oil filler neck, maintains oil pressure within prescribed limits, 60-90 P.S.I. normal, 25 P.S.I. at idle speed. This valve is not adjustable, however, the oil pressure can be controlled by the addition of washers, Lycoming part number STD-425 (Maximum of nine).

To prevent excessive pressures from building up in the crankcase, the engine is equipped with a breather vent. The vent tube should be inspected periodically for obstructions.

The engine oil pressure is shown on the oil pressure gauge, located in the instrument panel. The line attaching the pressure gauge to the engine incorporates a .040" orifice to prevent a large oil loss due to a line or gauge failure.

Periodic maintenance of the engine lubrication system should include an oil change and removal and inspection of the oil suction and oil pressure screens.

N O T E

When inspecting the oil screens, check for the presence of metal particles which is indicative of internal engine failure. If engine is equipped with a paper throw-away type oil filter, it should be cut apart and inspected for accumulations of metal chips and evidence of internal engine failure.

N O T E

During the initial 50 hours operation of a new or overhauled engine, use straight mineral oil (non-detergent). Detergent or additive oils should only be used after consulting Lycoming Service Instruction No. 1014.

6-100 ENGINE PRIMING SYSTEM

6-100-00 DESCRIPTION

The engine is equipped with a four cylinder priming system. Fuel is injected directly into the cylinder intake system by a hand pump, located on the instrument panel. Fuel into the hand pump is obtained from a connection in the bottom of the right fuel measurement gauge. If a manifold pressure gauge is desirable, the priming system can be converted to a three cylinder system, and number three or number four cylinder used for the manifold pressure gauge connection.

6-100-01 ENGINE PRIMING SYSTEM REMOVAL

a. Remove the lower cowl.

b. Remove the clamps securing the primer lines to the engine intake pipes and remove the primer lines from the engine.

c. Remove the line between the tee at rear of engine and the primer.

N O T E

Do not disconnect the line from the connection at the bottom of the right fuel measurement gauge unless damaged. If the line must be removed for repair or replacement, drain the right fuel tank.

d. Remove the knurled nut on the front of the instrument panel securing the primer.

N O T E

The primer knob, plunger, spacer and knurled nut are removed as an assembly from the front of the instrument panel. The primer body is removed from the rear of the instrument panel.

6-100-02 ENGINE PRIMING SYSTEM INSTALLATION

Install the engine priming system in reverse of the removal procedure (Section 6-100-01). Actuate primer and inspect system for leaks.

6-110 ENGINE IGNITION SYSTEM

6-110-00 DESCRIPTION

The engine dual ignition system consists of the magnetos, shielded harness, spark plugs and the ignition switch. The magnetos are a sealed, lightweight type requiring no internal adjustments.

6-110-00 ENGINE IGNITION SYSTEM (Continued)

N O T E

If problems are known to exist in the ignition system, inspection of the harness and spark plugs should be accomplished first. To determine if the harness is defective, examine the leads and ceramics for corrosion and deposits. This condition is caused by dirty spark plugs, dirty connector ends, or leaky spark plugs. If this condition exists, clean the leads and ceramics with a dry cloth moistened with methy-ethyl ketone.

a. Tag or otherwise mark each lead for reference at installation.

b. Remove the clamps securing the harness to the cylinder head.

c. Remove the magneto caps and harness as an assembly.

6-110-02 IGNITION HARNESS DISASSEMBLY AND REASSEMBLY

a. Refer to Figure 6-5 Magneto lead, exploded view, for part location.

b. Refer to Slick Electro, Inc.* pamphlet (Form No. 1009 5M 8-68) for assembly instructions and tool requirements.

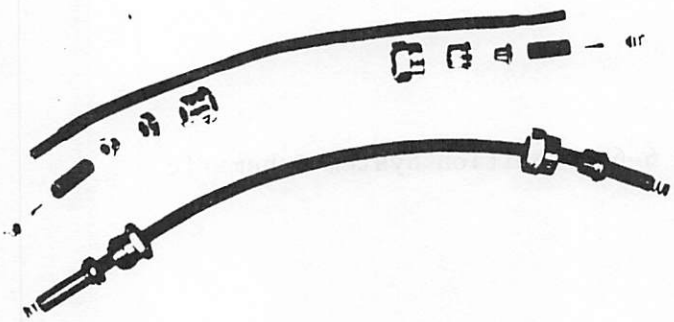


Figure 6-5. Magneto Lead Exploded View

*Slick Electro, Inc.
530 Blackhawk Park Ave.
Rockford, Illinois 61101

6-110-03 IGNITION HARNESS INSTALLATION

Install the engine harness in reverse of the removal procedure. Refer to Figure 6-6 for wiring diagram.

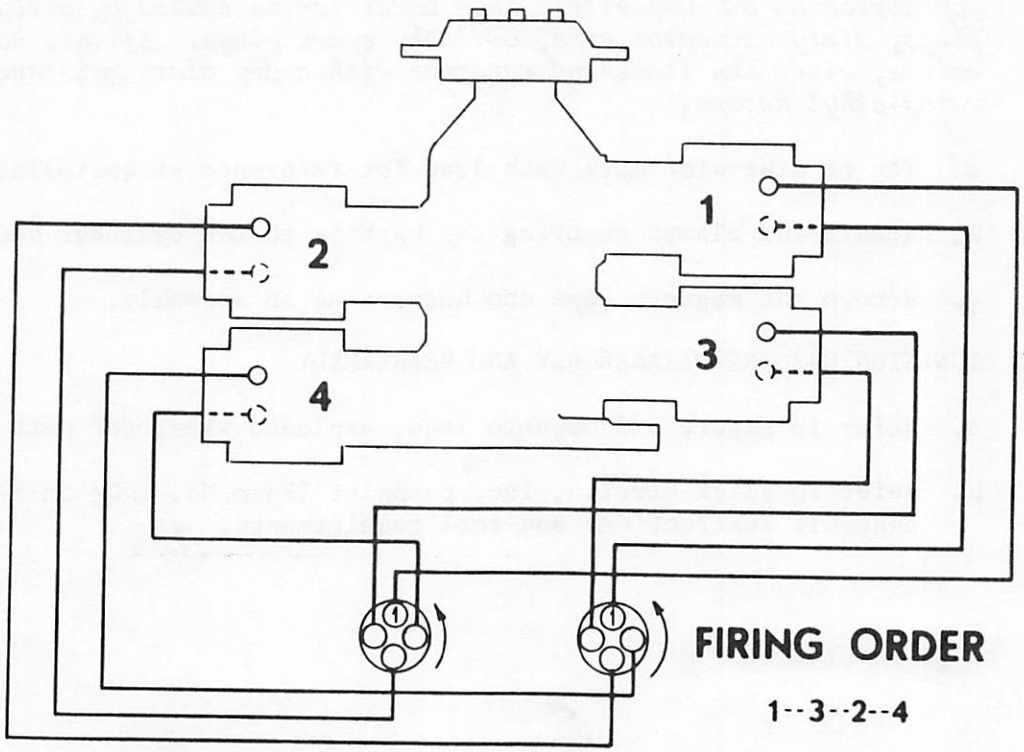


Figure 6-6. Ignition System Schematic

6-110-04 MAGNETO REMOVAL

W A R N I N G

During all magneto maintenance, always take proper precautions to make sure the engine cannot fire or start when the propeller is moved.

6-110-04 MAGNETO REMOVAL (Continued)

a. Disconnect the magneto ground wire and shielding terminal.

b. Remove the distributor cap assembly.

c. Remove the mounting lugs and withdraw the magneto.

N O T E

Make a note of the approximate angle the magneto makes with the engine center line as an aid in its subsequent installation.

6-110-05 MAGNETO INSTALLATION

a. Rotate the propeller in the normal direction of rotation until #1 cylinder enters its compression cycle.

N O T E

To determine if the #1 cylinder is in the compression cycle, remove the top plug from the #1 cylinder and place thumb over the port. As the piston approaches the end of the compression stroke a positive pressure will try to force the thumb off the port.

b. Continue turning the propeller in the normal direction of rotation until the 25° advanced timing mark on the forward face of the starter ring becomes aligned with the small hole drilled in the head of the starter motor. Alternate method is to align the 25° advance mark on the back of the flywheel with the crankcase parting line. At this point, the engine is ready to receive the magnetos. (See Figure 6-7).

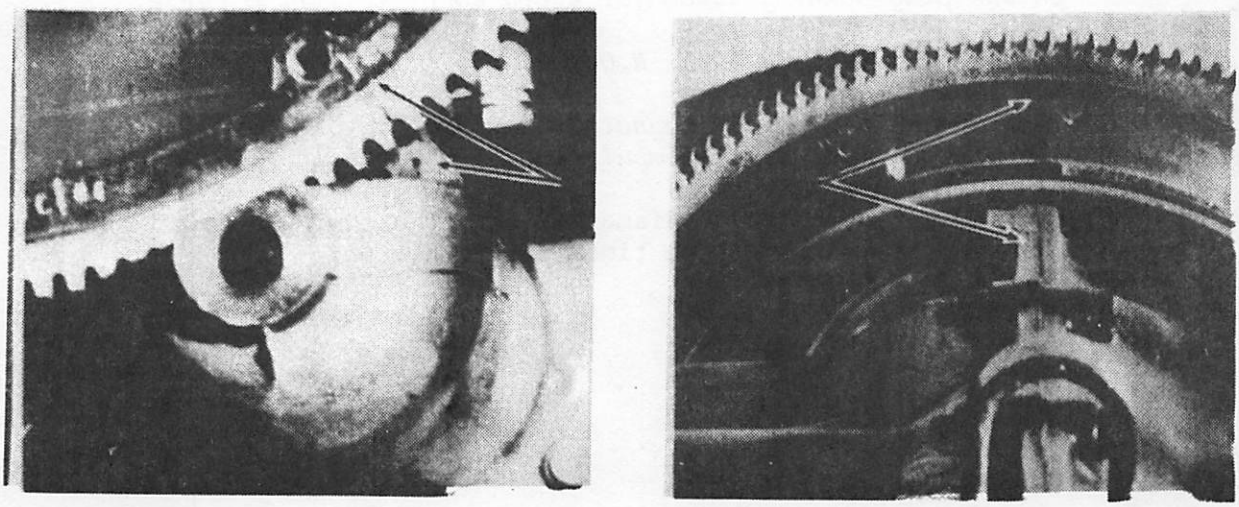


Figure 6-7. Advance Timing Alignment

6-110-05 MAGNETO INSTALLATION (Continued)

c. Remove the plug from the bottom of the magneto. (See Figure 6-8).

d. Rotate the magneto shaft until a spark occurs from number one lead (hold screw driver close to #1 lead while turning the shaft). As soon as the spark occurs, slowly reverse direction until the timing hole in the rotor is centered in the plug opening.

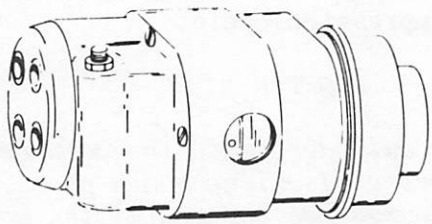


Figure 6-8. Magneto Timing Hole

N O T E

Failure to spark check the number one position leaves the possibility of the magneto being 180° out of phase. The timing hole appears in the plug opening twice for every complete firing cycle.

N O T E

In order to rotate the magneto incorporating an impulse coupling, depress the pawl on the impulse coupling with the finger.

e. Insert a pin (.093" diameter) into the timing hole in order to keep the rotor in the timed position.

6-110-05 MAGNETO INSTALLATION (Continued)

f. Position the magneto into the crankcase at the approximate angle noted on removal. Be sure gasket is installed behind the magneto mounting flange.

g. Install the attach clip over the magneto mounting flange and tighten the nuts finger-tight.

N O T E

Install the magneto with the impulse coupling on the left side.

h. Install the second magneto in the same manner as described in steps c. through g. above.

C A U T I O N

Be sure not to rotate the propeller with the pin still installed in the magneto timing hole.

i. Final timing should be accomplished with a timing light. Using a battery powered timing light, attach the positive leads to the magneto ground terminal, and the negative leads to any unpainted portion of the engine.

j. Remove the pins from the magnetos.

k. Rotate the magneto in its mounting flange until the light comes on. Slowly turn the magneto in the opposite direction until the light goes off. Bring the magneto back slowly until the light just comes on.

l. Repeat this process for the other magneto.

m. Upon timing both magnetos, check to ascertain that both magnetos will fire simultaneously.

N O T E

To check the simultaneous firing of both magnetos, back off on the propeller a few degrees (timing light should go out). Bring the propeller back slowly in the direction of normal rotation until the 25° advanced timing mark aligns with the hole in the starter motor. At this point, both lights should go on simultaneously.

6-110-05 MAGNETO INSTALLATION (Continued)

n. Tighten the magneto mounting nuts and torque to 150 inch pounds and install magneto ground wire and shielding terminal. When the magneto shows an excessive rpm loss or has reached a total of 900 hours, whichever comes first, the magneto should be returned to either the aircraft or magneto manufacturer for exchange. No attempt should be made to repair the magneto in the field since disassembly of the magneto will void its warranty.

N O T E

If the drive shaft nut has been removed from the magneto incorporating the impulse coupling, care should be exercised when reassembling, not to overtighten. The recommended torque is 156 inch pounds. Torque may be increased to line up hole with slot in nut.

The timing of the magneto to the engine should be checked every 100 hours. Maximum allowable limits are plus or minus 2 degrees. If the magneto exceeds these limits, it will be necessary to time the magneto until it falls within the above tolerance. (Refer to magneto installation in this section for timing procedure).

6-120 SPARK PLUGS

Spark plugs should be cleaned and regapped every 100 hours. Normal plug gap is .017" to .021". See latest revision of Lycoming Service Instruction Number 1042 for gap on specific plug being used. The torque value for reinstalling the spark plugs is 360-420 inch pounds. Application of anti-seize compound to all but the first two threads on the plug is recommended.

N O T E

It is recommended that the lower and upper spark plugs be reversed every 100 hours to prolong the spark plug service life.

6-130 COOLING SYSTEM

The cooling system consists of ram air being conducted over and around the cylinders by use of baffles. Since defective baffles can decrease the cooling, and decreased cooling results in increased engine wear and damaged parts, baffles should be carefully inspected and any cracks or deformation corrected.

6-140 PROPELLER

The propeller should be included in every preflight inspection and should receive special attention during 25, 50 and 100 hour inspections. Visually inspect the entire propeller for damage or defects, and any necessary repair should strictly adhere to AC43.13-1 aircraft inspection and repair manual or manual and bulletins published by the propeller manufacturer.

6-140-01 PROPELLER REMOVAL

a. Remove the spinner.

b. Cut the safety wire and remove the six propeller mounting bolts. Remove the propeller.

6-140-02 PROPELLER CLEANING

a. Clean propeller and all attaching parts in a mixture consisting of 1/3 lubricating oil, Specification MIL-L-6082, Grade 1065, and 2/3 solvent, Federal Specification P-S-661. Remove heavy and tightly adhering deposits with a soft bristle brush.

C A U T I O N

Do not use a steel, or other metal, or hard bristle brush, or a tool of any type to remove deposits.

b. After cleaning allow parts to air dry, or use a gentle stream of clean dry compressed air to remove excess mixture.

6-140-03 INSPECTION

a. Visually inspect all parts for damage or defects. Check all threads for rough edges and irregularities. Check that surface finish (anodizing or plating) is not broken, chipped or peeled (if peeled, look for corrosion). Staining and slight surface markings (not perceptible to fingernail) are normal and not alone cause for rejection or replacement.

b. If scratches or suspected cracks are found, determine their extent by use of the penetrant inspection method, Military Specification MIL-I-6866. The fluorescent method, "Zyglow" (Magnaflux Corp., Chicago, Ill.), is preferred; however, a non-fluorescent method, "Dy-check" (Turco Products Co., Los Angeles, Calif.), may also be used.

6-140-04 PROPELLER MAINTENANCE

Check entire blade area, especially leading edge and thrust side for signs of erosion, scratches, nicks, cracks, etc. Damaged areas act as stress-risers and should be removed immediately by filing and polishing. Remove metal and smoothly finish surfaces as specified in applicable propeller service manual or FAA Advisory Circular AC43.13-1. This work can

6-140-04 PROPELLER MAINTENANCE (Continued)

normally be performed without removing propeller from engine. However, if propeller has extensive damage, it should be reconditioned by an FAA approved repair station.

6-140-05 DEFINITIONS OF DEFECTS

Types of damage and defects which may be observed on parts of this assembly are defined as follows:

Burr- A small, thin section of metal extending beyond a regular surface, usually located at a corner or on the edge of a bore or hole.

Corrosion- Loss of metal from the surface by chemical or electrochemical action. The corrosion products generally are easily removed by mechanical means. Iron rust is an example of corrosion.

Crack- A physical separation of two adjacent portions of metal, evidenced by a fine or thin line across the surface, caused by excessive stress at that point. It may extend inward from the surface from a few thousandths inch to completely through the section thickness.

Cut- Loss of metal, usually to an appreciable depth over a relatively long and narrow area, by mechanical means, as would occur with the use of a saw blade, chisel or sharp-edged stone striking a glancing blow.

Dent- Identification in a metal surface produced by an object striking with force. The surface surrounding the indentation will usually be slightly upset.

Erosion- Loss of metal from the surface by mechanical action of foreign objects, such as grit of fine sand. The eroded area will be rough and may be lined in the direction in which the foreign material moved relative to the surface.

Fretting- Breakdown or deterioration of metal surface by vibratory or "chattering" action. Usually no loss of metal or cracking of surface but generally showing similar appearance.

Gouge- Grooves in, or breakdown of, metal surface from contact of foreign material under heavy pressure. Usually indicates metal loss but may be largely displacement of material.

Inclusion- Presence of foreign or extraneous material wholly within a portion of metal. Such material is introduced during the manufacture of rod, bar or tubing by folling or forging.

Nick- Local break or notch on edge. Usually displacement of metal rather than loss.

Pitting- Sharp, localized breakdown (small, deep cavity) of metal surface, usually with defined edges.

Scratch- Slight tear or break in metal surface from light, momentary contact by foreign material.

Score- Deeper (than scratch) tear or break in metal surface from contact under pressure. May shown discoloration from temperature produced by friction.

Stain- A change in color, locally, causing a noticeably different appearance from the surrounding area.

6-140-06 PROPELLER INSTALLATION

Install the propeller in reverse of the removal procedure. Torque the propeller mounting bolts to 280-320 inch pounds. Safety bolts with .041 minimum diameter safety wire and maximum of two bolts together.

6-150 IDLE SPEED AND MIXTURE ADJUSTMENT

The following steps describe the corrective action for an engine which is running too lean or too rich, or which is not idling correctly. Correct idle adjustment should produce an idling speed of 600 to 650 rpm.

a. Perform a normal engine run-up until the oil and cylinder temperatures have stabilized.

b. Check the mag-drop prior to proceeding with the idle adjustment.

c. Set the throttle stop screw so that the engine idles at 600 to 650 rpm.

d. With a smooth and steady motion, pull the cockpit mixture control towards the idle cut-off position and observe the tachometer for any change. Return the control to the full rich position prior to the engine cutting out. An increase of more than 50 rpm while "leaning out" indicates an excessively rich idle misture. An immediate decrease in rpm indicates the idle mixture is too lean.

N O T E

Each time the idle adjustment is changed, the engine should be run up to 2000 rpm before proceeding with next rpm check.

e. Upon completing Step "d", close the throttle and check the idling speed making any final adjustment necessary.

N O T E

In case the setting does not remain stable, check the mixture control linkage for slipping.

	timed	and synchronization
	Defective spark plug terminal connectors	Replace connectors on spark plug wire
	Improper grade of fuel	Empty tank and fill with proper grade fuel
Failure of engine to develop full power	Throttle not properly adjusted	Adjust throttle lever
	Leak in the induction system	Tighten all connections and replace defective parts
	Dirty air filter	Clean or replace filter
	Restriction in air scoop	Remove restriction
	Improper grade of fuel	Empty tank and fill with proper grade fuel

6-160 ENGINE TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Engine fails to start	Lack of fuel	Open fuel selector valve. Service fuel tanks. Push mixture control to full rich position.
	Flooded or overprimed	Open throttle and unload engine by cranking.
	Underprimed	Prime with 2 to 3 strokes.
	Incorrect throttle setting	Open throttle to 1/4 position
	Defective spark plugs	Clean and regap, or replace
	Dead or weak battery	Recharge or replace

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6-160 ENGINE TROUBLE SHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Cold weather difficulties (Continued)	Overpriming	Open throttle, put mixture control in "Idle cut-off". Crank engine until it starts and immediately return mixture to "full rich" and close throttle as required.

SECTION VII

FUEL SYSTEM

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7 FUEL SYSTEM

7-00 GENERAL

Fuel is stored in each wing inside of the tubular spar. From the pickup point on the inboard end, the fuel line slopes continuously up through the fuel selector valve, to the electric fuel pump mounted on the forward side of the firewall.

7-10 FUEL SYSTEM PRECAUTIONS

7-20 FUEL TANKS

7-20-00 GENERAL

The tubular wing spar, which also serves as the fuel tank, is sealed on each end by a machined casting. This casting has an o-ring and sealant around its entire periphery for sealing purposes. There are three baffles inside of the tank which serve to retard fuel slosh in uncoordinated maneuvers.

7-20-01 DISASSEMBLY OF THE FUEL TANK COMPONENTS

a. Remove the wing tip as described in Section 3.

b. Remove the sealant from around the outboard end plate and end plate mounting bolts.

c. Remove the end plate mounting bolts.

d. Slowly withdraw the end plate housing and tank baffle components by pulling straight out from the tank. Care should be taken not to scar the inside surface of the fuel tank.

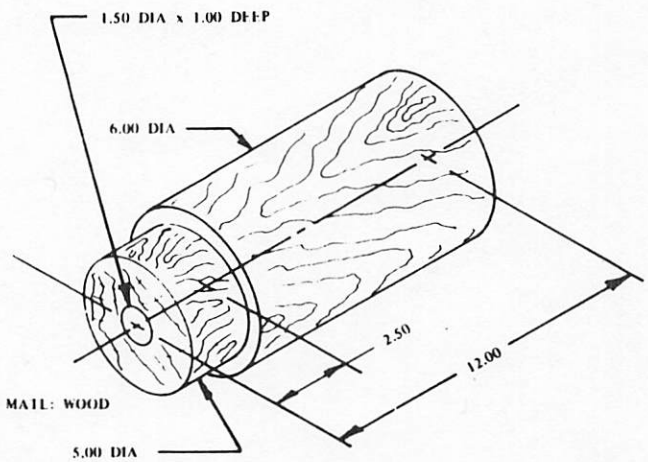

Figure 7-1. Ram-end Plate Removal

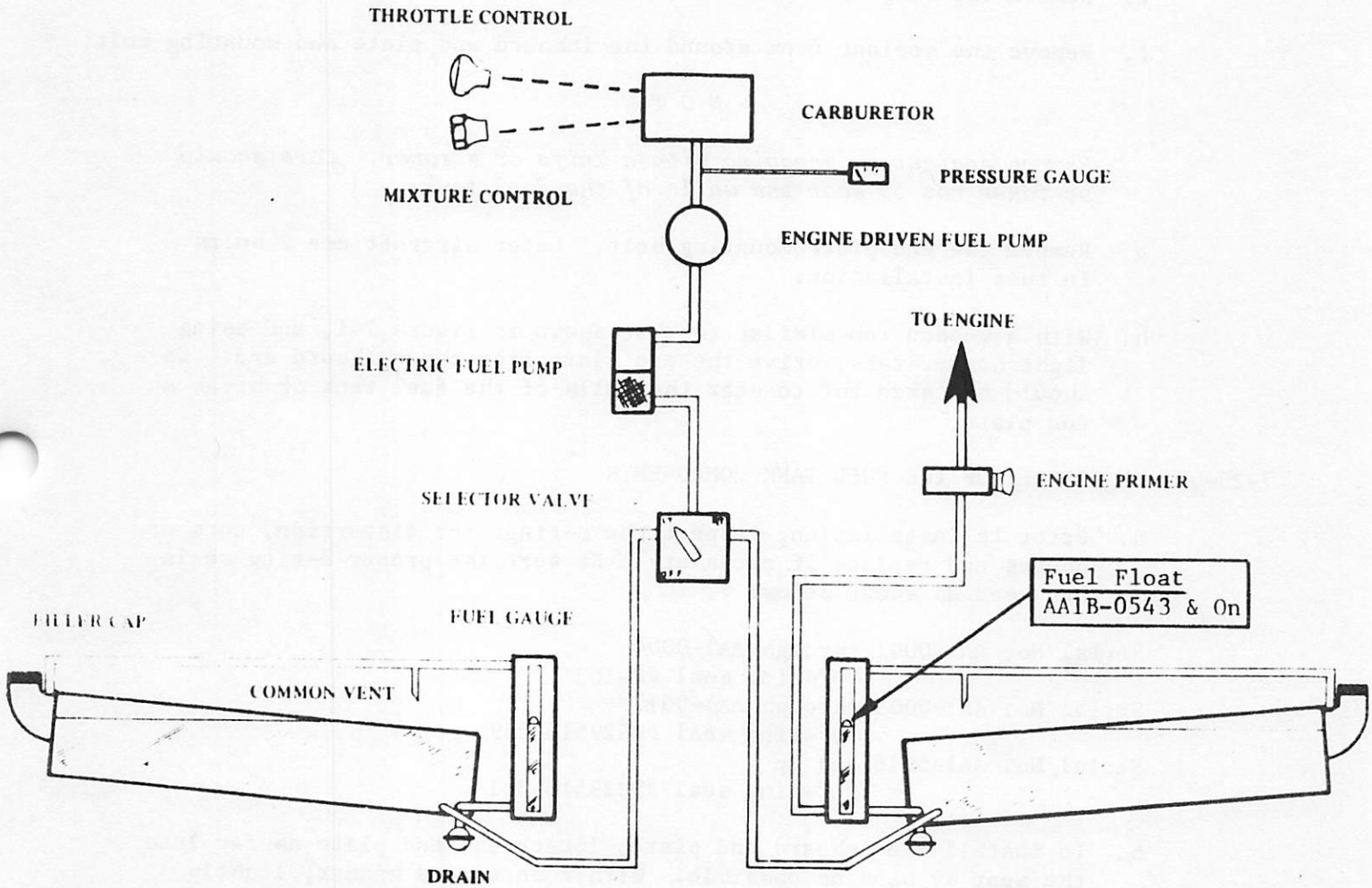

Figure 7-2. Schematic - Fuel System

7-20-01 DISASSEMBLY OF THE FUEL TANK COMPONENTS (Continued)

N O T E

To remove the inboard end plate, the following additional steps are required.

e. Remove the wing as described in Section 3.

f. Remove the sealant from around the inboard end plate and mounting bolt.

N O T E

Remove sealant by scraping with a knife or scraper. Care should be taken not to scar the walls of the fuel tank.

g. Remove the end plate mounting bolt. Later aircraft use 2 bolts in this installation.

h. With a wooden ram similar to that shown in Figure 7-1, and using light hammer taps, drive the end plate from the outboard end. Care should be taken not to scar the walls of the fuel tank or break an end plate.

7-20-02 REASSEMBLY OF THE FUEL TANK COMPONENTS

a. Prior to installation, inspect the o-rings for distortion, cuts or gouges and replace if necessary. Be sure the proper o-ring seals are used as shown below:

Serial No. AA1-0001 through AA1-0004
"O"-ring seal #2-163
Serial No. AA1-0005 through AA1-0017
"O"-ring seal #MS29513-259
Serial No. AA1-0018 and up
"O"-ring seal #MS29513-361

b. To install the inboard end plate, locate the end plate as far into the spar by hand as possible. With a board and hammer, lightly tap around the edge, slowly working the end plate into position.

c. Install the inboard end plate mounting bolt or bolts, using new stat-o-seals.

d. Apply sealant* around the entire periphery of the end plate and over the complete head of the mounting bolt.

7-20-02 REASSEMBLY OF THE FUEL TANK COMPONENTS (Continued)

N O T E

Prior to the application of sealant, thoroughly clean the area to be sealed with MEK (Methyl Ethyl Ketone) or any equivalent commercial solvent.

e. To reinstall the outboard end plate and baffle assembly, slide the entire assembly into the spar taking care not to scar the inside surface.

f. Install the outboard end plate mounting bolts.

g. Apply sealant* around the entire periphery of the end plate and over the mounting bolts and nuts.

N O T E

Prior to the application of sealant, thoroughly clean the area to be sealed with MEK (Methyl Ethyl Ketone) or any equivalent commercial solvent.

*Approved sealants:

RTV732 by Dow-Corning
EC1239 and EC1675 by 3M Company
3201 by Chemical Seal Corporation of America
567 by Coast Pro-Seal

7-30 FUEL TANK QUICK DRAINS

7-30-00 GENERAL

The fuel tank quick drains are located toward the rear and on the bottom of the wings, just outboard of the wing roots (Figure 7-3). They are spring loaded in the closed position to provide easy preflight draining. These quick-drains are connected with a line and a short length of hose to the lowest point in each fuel tank. A periodic inspection should be made of these line and hose connections for deterioration and leakage.

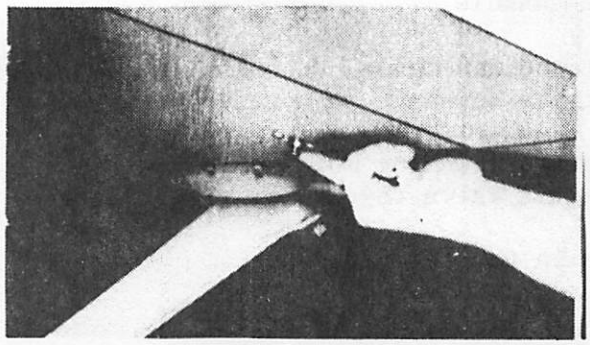

Figure 7-3 Fuel Tank Quick Drain

7-30-00 GENERAL (Continued)

N O T E

The center spar is drilled and equipped with a drain to allow any fuel to escape if the fuel tank end seals should start leaking.

If fuel leakage is noted at the center spar drain, it can be determined which tank is leaking by removing the wing root access covers and inspecting the wing spar and center spar joining surfaces. Normally a red dye will be evident on the side that is leaking. In the event the wing spar fits tightly enough in the center spar to prevent seepage at that point, inspect the landing gear to spar mounting bolts for similar indications.

7-40 FUEL TANK CAPS

7-40-00 GENERAL

The fuel caps must provide a fuel and air tight seal with the fuel filler neck. Absence of an air tight seal may produce erroneous readings in the fuel measurement system.

The fuel cap should be periodically inspected to assure that the gasket inside of the fuel cap has not deformed or deteriorated. Refer to the Parts Manual for replacement gaskets.

7-50 FUEL SELECTOR VALVE

7-50-00 GENERAL

The fuel selector valve, located in the forward portion of the console, provides for fuel tank selection and serves as the fuel supply shut-off valve.

7-50-01 REMOVAL AND REPLACEMENT OF THE FUEL SELECTOR VALVE

a. Remove the woodgrain cover and screw from the handle face and withdraw the handle from the selector valve shaft.

b. Remove the console.

c. Disconnect the fuel lines. Be sure to seal the line openings to prevent the entrance of foreign particles.

d. Remove the two mounting bolts which attach the fuel selector valve selector valve to the mounting brackets.

e. Reassemble in the reverse order.

7-60 FUEL PRESSURE GAUGE

7-60-00 GENERAL

The fuel pressure gauge, connected into the main fuel supply line at the carburetor inlet, is a direct indication of carburetor fuel pressure. The line which leads from the pick-up point to the gauge, begins with an .040-inch orifice to prevent damaging surges and excess spillage in the event of a line or gauge failure.

Normal fuel pressure readings should be approximately 3 psi with a maximum limit of 8 psi and a minimum limit of 1/2 psi.

7-70 ELECTRIC FUEL PUMP

7-70-00 DESCRIPTION

The electric fuel pump is mounted on the firewall and is used as an emergency pump. It incorporates a 40 micron filter through which all fuel flow to the engine must pass. This filter must be serviced periodically (100 hours).

7-70-01 FUEL PUMP FILTER SERVICING

a. Remove the bottom cover from the fuel pump by cutting the safety wire and turning the cover with a 5/8-inch wrench (Figure 7-4).

b. Remove the cover gasket, magnet and filter.

c. Clean the filter by rinsing in gasoline or kerosene and blowing out cleansing agent with air pressure. If filter is distorted or damaged, it should be replaced. Refer to the Parts Manual for replacement.

d. Clean the cover and gasket in the same manner as the filter.

e. Reassemble in the reverse order. Be sure to safety wire the cover to prevent its loosening during operation.

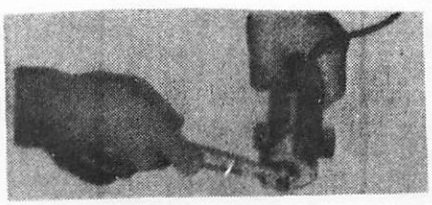

Figure 7-4. Electric Fuel Pump Disassembly

7-70-02 ELECTRIC FUEL PUMP REMOVAL AND INSTALLATION

a. Disconnect the lines from the pump inlet and outlet. Be sure to cover the openings in these lines to prevent the entrance of foreign particles.

b. Disconnect the fuel pump electrical lead.

c. Remove the two mounting bolts which attach the fuel pump to the firewall.

d. Reassemble in the reverse order. (Splice electrical lead with a butt connector or quick disconnect terminal.)

7-80 FUEL MEASUREMENT SYSTEM

7-80-00 GENERAL

The fuel measurement gauges (manometers) are interconnected with the fuel tank on both a fuel supply line and a vent line. The fluid tending to seek its own level will directly indicate the height of fuel in the tank. Damaging surges or loss of fuel by siphoning is prevented by orifices located at both ends of the gauges.

Periodic servicing of the fuel measurement system is not required except for the occasional replacement of a deteriorated vent hose. (Figure 7-5).

7-80-01 DISASSEMBLY AND REASSEMBLY OF THE FUEL MEASUREMENT GAUGES

a. Remove all side panel covers.

b. Disconnect the vent line from the top of the gauge.

c. From inside the wing root, disconnect the measurement gauge fuel supply line.

N O T E

Be sure the tank has been drained prior to disconnecting the fuel supply line.

d. Remove the two screws in each of the two clamps which mount the measurement gauge to the side panel.

e. The measurement gauge may now be disassembled on a bench and each component individually inspected. Be sure to inspect the U-cup packings for distortion, cuts or gouges, and replace if necessary.

f. Reassemble in the reverse order.

7-80-01 DISASSEMBLY OF THE FUEL MEASUREMENT GAUGES (Continued)

N O T E

To prevent damage to packings from over tightening, assemble packings to caps and press assemblies onto glass tube until they bottom. Run nuts up until contact is made with cap. Do this to both ends before final tightening. Complete assembly by turning each nut 1/4 turn tighter.

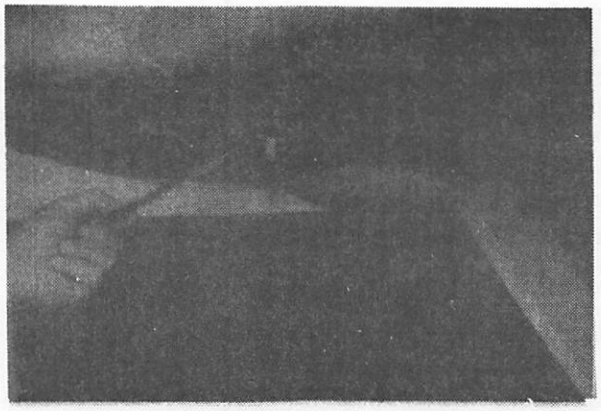

Figure 7-5. Fuel Vent

7-90 FUEL SYSTEM TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No fuel pressure (electric fuel pump turned off)	Fuel selector valve in Off position	Switch to fullest tank
	Fuel tanks empty	Service with proper grade of fuel
	Defective engine pump	Remove outlet line, crank engine several times, check for fuel flow from pump. Replace if faulty.
No fuel pressure	Dirty tank strainer	Remove and clean strainer. Flush tank clean prior to reassembly.
	Defective gauge	Replace gauge
	Obstruction in pressure gauge line	Remove all fittings and lines starting at carburetor inlet and inspect and clean as necessary.
No or low fuel pressure(electric fuel pump turned on)	Partial or no fuel flow from the preceding causes	Use the preceding remedies
	Blown fuse	Replace with fuse of appropriate rating.
	Faulty switch	Replace switch
	Defective pump	Remove outlet line from pump. Little or no fuel flow indicates bad pump. Repair or replace pump.
Low pressure or surging pressure	Obstruction in fuel lines	Starting at carburetor, remove, inspect, and clean all fuel lines.
	Fuel valve improperly positioned	Check position
	Clogged filter in electric pump	Clean filter
	Defective engine pump	Repair or replace
	Fuel line or connection	Inspect all lines and tighten connections. Use thread sealant as required.

7-90 FUEL SYSTEM TROUBLE SHOOTING (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Low pressure or surging pressure (Con't.)	Leaking o-ring in electric fuel pump	Disassemble, inspect and replace o-ring or pump.
No fuel quantity indication	Empty fuel tank	Service with proper grade
	Obstruction in fuel gauge line	Remove, inspect and clean line
	Obstruction at the fuel inlet (bottom)	Disassemble and clean gauge
	Obstruction in fuel gauge vent line	Remove, inspect and clean line
	Obstruction in fuel gauge outlet (top)	Disassemble and clean gauge
Fuel quantity indicating too high	Aircraft not level	Disregard - fuel will indicate correctly when aircraft is level.
Fuel gauge indicates too low	Aircraft not level	Disregard - fuel will indicate correctly when aircraft is level.
	Obstruction in fuel tank vent line	Remove, inspect, and clean vent line.

SECTION VIII

UTILITY SYSTEMS

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8 UTILITY SYSTEMS

8-00 GENERAL

The utility systems consist of the brake systems, cabin heating system and cabin ventilating system. The aircraft utilizes hydraulic brakes on each main landing gear which are controlled by the rudder pedals. Cabin heat is provided by air forced through a shrouded muffler. Ventilation is through air ducts from openings in the sides of the fuselage ducted to outlets below the instrument panel.

8-10 BRAKE SYSTEM

8-10-00 DESCRIPTION

The hydraulic brake system (Figure 8-4) consists of the wheel brake assemblies, two master cylinders for the single brake system, four master cylinders for the dual brake system, and a parking brake assembly. Regular inspections of the brake system should include checking the fluid level in the master cylinder reservoirs, checking for deteriorated hose assemblies, loose or damaged lines or fittings, worn brake linings, anchor bolts (5, Figure 8-5) for freedom of movement in the torque plate assembly (2), and proper parking brake adjustment.

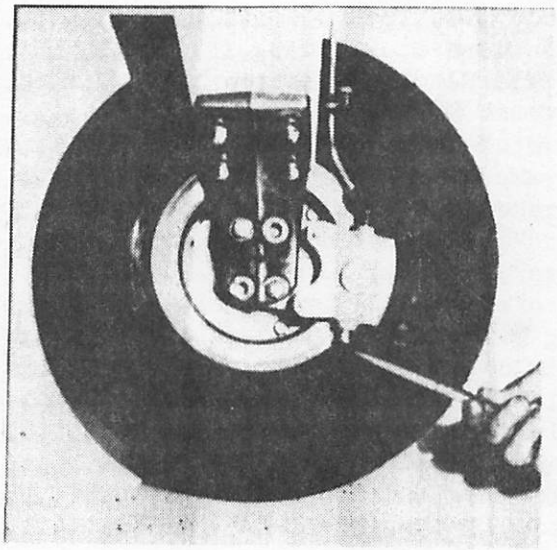


Figure 8-1. Brake Assembly Bleeder Valve

The optional dual hydraulic brake system used in these aircraft is unique in the fact it requires no additional reservoir. The system is designed for dual operation and incorporates two types of master cylinders. Pressure applied to the left master cylinder (1, Figure 8-4) passes through an

8-10-00 DESCRIPTION - BRAKE SYSTEM (CONTINUED)

integral piston by-pass port in the right master cylinder (3, Figure 8-4) and on to the left wheel brake assembly. Pressure applied to the right master cylinder (3, Figure 8-4) closes the port and applies the left wheel brake assembly. If pressure is applied to both cylinders simultaneously, the force from the left cylinder is applied to the top of the piston in the right cylinder, nearly doubling the pressure at the wheel brake assembly. Master cylinders 2 and 4 operate in the same manner.

When the brake pedals for cylinders 3 and 4 are in neutral position, the ports are open for direct flow to the brake assemblies from cylinders 1 and 2.

The standard single brake system does not use cylinders 3 and 4. However, operation is essentially the same as above, except master cylinders 1 and 2 supply hydraulic pressure directly to the wheel brake assemblies.

The parking brake assembly consists of a cable control attached to locking levers on the master cylinder shafts. These are applied by depressing the top of the pedals and pulling out the parking brake control. Releasing the parking brake is accomplished by depressing the top of the pedals and pushing the control in.

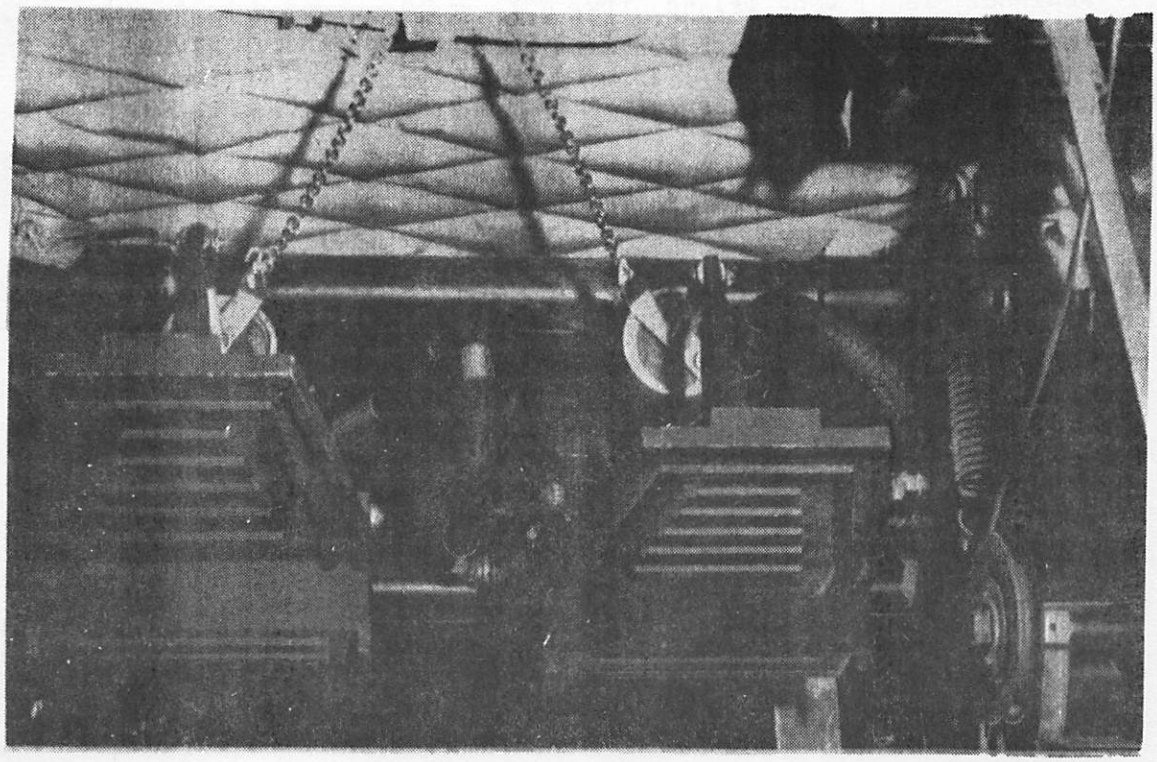


Figure 8-2. Master Cylinders and Parking Brake Assemblies - Pilot Side

8-10-01 MASTER CYLINDERS REMOVAL

a. Bleed the fluid from the brake system by removing the bleeder valve in the bottom of the brake assembly (Figure 8-1).

b. Disconnect the flexible hose assembly at the master cylinder connection.

c. Remove the cotter pin and withdraw the clevis pin which connects the clevis on the master cylinder to the rudder pedal.

d. Remove the cotter pin and withdraw the clevis pin which attaches the mounting lug of the master cylinder to the mounting bracket.

8-10-02 MASTER CYLINDER REPAIR: (NON-RESERVOIR TYPE)

Repair of the master cylinders is limited to replacement of parts, cleaning and adjustment. Figure 8-3A & B may be used as a guide during disassembly and assembly of the brake master cylinders. Use clean hydraulic fluid as a lubricant during assembly of the cylinders.

8-10-03 SPECIAL TOOLS

Special pliers are required to remove the snap ring (4, Figure 8-3A). This tool is available at local hardware stores, auto supply stores or Waldes Kohinoor, Inc., Long Island City, N.Y. and is ordered as a number 1120 Truarc Snap Ring pliers for Truarc No. N5000-68 Snap Ring.

8-10-04 DISASSEMBLY (See Figure 8-3A)

a. Remove clevis (1) and check nut (2) from shaft (3). Note distance from mounting hole in clevis (1) and mounting hole in brake cylinder housing (16) before removing clevis (1). This distance must be maintained upon reassembly.

b. Remove snap ring (4) using special pliers, see paragraph 8-10-03.

c. Remove the end cap (6).

d. Remove piston and shaft assembly. To disassemble piston (12) from shaft (3) remove snap ring (14).

N O T E

Do not attempt to remove the thrust collar from shaft (3). These parts are pressed together. If either of these parts are faulty, replace them both.

8-10-05 CLEANING

Clean all parts with cleaning solvent (ref. Federal Spec. No. P-S-661).

8-10-06 INSPECTION

a. Inspect all parts for amount of wear, cracks or amount of distortion.

b. Remove and replace all seals.

c. Check piston for deep scratches.

d. Check bore on cylinder housing for deep scratches.

e. Check valve spring (13) for a free length of 3/8" to 7/16".

f. Check return spring (15) for a free length of 2 15/16" to 3 1/16".

8-10-07 REPAIR OR REPLACEMENT

Replace all parts that do not meet specifications outlined in inspection paragraph. Replace all seals. Light scratches may be removed from cylinder housing bore with #400 paper.

8-10-08 REASSEMBLY

a. During reassembly, immerse all seals in hydraulic brake fluid (MIL-H-5606) and apply a coating of brake fluid to bore of cylinder housing (16).

b. Reassemble in reverse of disassembly.

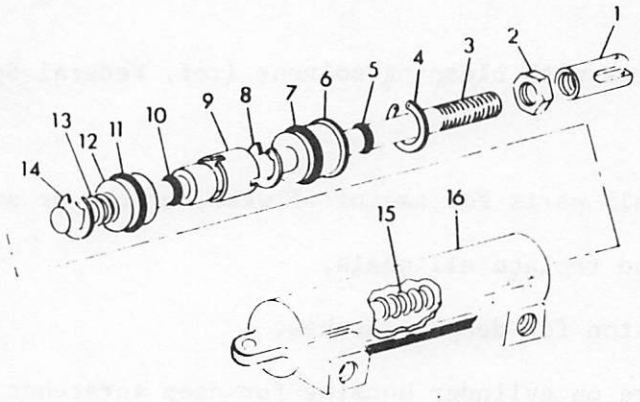
c. Be sure "O" Ring (11) is in position between thrust collar and piston (12), then install check valve spring (13) and lock assembly together with snap ring (8).

d. Engage bottom of shaft and piston assembly into small diameter of spring (15) and install into housing (16).

e. Depress shaft assembly and lock into position with snap ring (4).

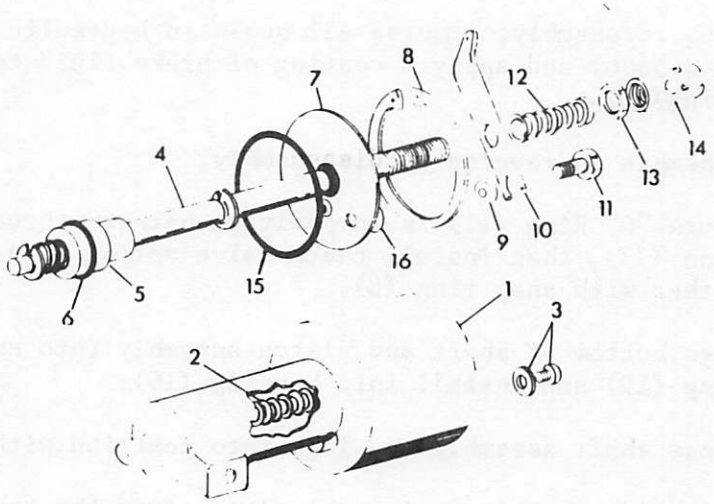
f. Use caution when inserting the piston into the housing so as not to cut or scratch the "O" ring seal.

g. After installing the end cap (6) and snap ring (4), install check nut (2) and clevis (1) and adjust to dimensions that were checked before disassembly.



1. Clevis
2. Nut
3. Shaft Assembly
4. Snap Ring
5. "O" Ring
6. End Cap & Bearing
7. "O" Ring
8. Snap Ring
9. Spacer
10. "O" Ring
11. "O" Ring
12. Piston
13. Spring
14. Snap Ring
15. Spring
16. Housing

Figure 8-3A. Master Cylinder Assembly



1. Brake Housing
2. Spring
3. Screw and washer assembly
4. Shaft Assembly
5. "O" Ring
6. "O" Ring
7. Cover Plate Assembly
8. Snap Ring
9. Spacer
10. Parking Brake Lever
11. Bolt
12. Spring
13. Lock Nut
14. Clevis
15. Square Cut Rubber Seal
16. Filler Plug

Figure 8-3B. Master Cylinder Assembly (Reservoir Type)

8-10-09 TEST PROCEDURE

a. After complete assembly, blow air through bottom port hole in cylinder housing (16) and observe air passing out through top port. This assures that the valve is opening. With air still passing through port, depress shaft approximately 1/16". This should cut off air passing through assembly and out the top port and show that the check valve is closing and sealing properly.

b. The following function and proof test should be conducted with hydraulic brake fluid (MIL-H-5606) only.

c. Bleed all air from system and pressure cylinder to 1500 P.S.I., allow 2 min. for stabilization and check for external leaks.

d. Lower pressure to 1000 P.S.I. and after a 2 min. stabilization period, check pressure drop. Pressure should remain steady. A 40 P.S.I. drop in 2 min. period is acceptable.

e. If cylinder fails to pass the above test, recycle and check again.

f. If cylinder still fails test, disassemble and check the seal (11) for cuts or scratches which might have occurred during assembly. Also check for dirt or contamination around "O" Ring (11) and "O" Ring (5).

8-10-10 MASTER CYLINDER REPAIR (RESERVOIR TYPE)

8-10-11 SPECIAL TOOLS

Special pliers are required to remove the snap ring (8, Figure 8-3B). This tool is available at local hardware stores, auto supply stores or Waldes Kohinoor, Inc., Long Island City, N.Y. and is ordered as a number 3 Truarc Snap Ring pliers for Truarc No. N5000-175 Snap Ring. A 1/8" Allen wrench by 3" long will be needed to remove the lock screw and washer(3, Figure 8-3B).

8-10-12 DISASSEMBLY (See Figure 8-3B)

Remove clevis (14) and check nut (13) from shaft (4). Note distance from mounting hole in clevis (14) and mounting hole in brake cylinder housing (1) before removing clevis (14). This distance must be maintained upon reassembly. Remove snap ring (8) using special pliers, see paragraph 8-10-11, and remove cover plate (7). To remove piston and shaft assembly remove lockscrew and washer (3) using 1/8" Allen wrench, paragraph 8-10-11. To disassemble piston (17) from shaft (13) remove snap ring (19).

N O T E

Do not attempt to remove the thrust collar from shaft (4). These parts are pressed together. If either of these parts are faulty, replace them both. Also, do not attempt to remove the bushing from cover plate (7). These parts are swaged together and should be ordered together should either part be faulty.

8-10-13 CLEANING

Clean all parts with cleaning solvent (ref. Federal Spec. No. P-S-661).

8-10-14 INSPECTION

Inspect all parts for amount of wear, cracks or amount of distortion. Remove and replace all seals. Check piston for deep scratches. Check bore on cylinder housing for deep scratches. Check valve spring for a free length of 3/8" to 7/16". Check return spring (2) for a free length of 2 3/8" to 2 1/2".

8-10-15 REPAIR OR REPLACEMENT

Replace all parts that do not meet specifications outlined in inspection paragraph. Replace all seals. Light scratches may be removed from cylinder housing bore with #400 paper.

8-10-16 REASSEMBLY

During reassembly, immerse all seals, except (15) in hydraulic brake fluid (MIL-H-5606) and apply a coating of brake fluid to bore of cylinder housing. Reassemble in reverse of disassembly. Be sure "O" Ring (5) is in position between thrust collar and piston, then install check valve spring and lock assembly together with snap ring. Engage bottom of shaft and piston assembly into small diameter of spring (2) and install into housing (1). Depress shaft assembly and lock into position with lockscrew and washer (3).

N O T E

Using a new lockscrew and washer (3) and snap ring (8), install parking lever (10) and tighten bolt (11), spacer (9) should be under parking brake lever (10) which should be free to move. Install spring (12), check nut (13) and clevis (14) and adjust to dimensions that were checked before disassembly. This dimension is approximately 8".

8-10-17 TEST PROCEDURE

a. After complete assembly, blow air through port hole in cylinder housing (1) and observe air passing out through vent in filler plug (16). With air still passing through port, depress shaft approximately 1/16". This should cut off air passing through assembly and out vent cap (16), and show that check valve is closing and sealing properly.

b. The following function and proof test should be conducted with hydraulic brake fluid (MIL-H-5606) only.

c. Bleed all air from system and pressure cylinder to 1500 P.S.I., allow 2 min. for stabilization and check for external leaks. Lower pressure to 1000 P.S.I. and after a 2 min. stabilization period, check pressure drop. Pressure should remain steady. A 20 P.S.I. drop in 2 min. period is acceptable.

8-10-17 TEST PROCEDURE (Continued)

d. If cylinder fails to pass above test, recycle and check again. If cylinder still fails test, disassemble and check "O" Ring (6) for cuts or scratches which might have occured during assembly. Also check for dirt or contamination around "O" Ring (5) and "O" Ring (15).

8-10-18 MASTER CYLINDER INSTALLATION

Install the master cylinder in reverse of the removal procedure.

N O T E

Do not overtighten the fittings in the master cylinders. Overtightening could crack the casting and cause a leak.

N O T E

Adjustment of the master cylinder for proper fit can be made by loosening the jam nut beneath the clevis and rotating the clevis.

8-10-19 BRAKE SYSTEM SERVICING

The following procedure applies to both single and dual brake installations.

a. Remove the vent plugs from master cylinders (1 and 2, Figure 8-4) and replace with overflow lines. Immerse the free ends of the overflow lines in a can containing enough hydraulic fluid to cover the ends of the lines.

b. Connect a clean hydraulic pressure source to the brake assembly bleeder valve.

c. Fill the system until the overflow line in the master cylinder being filled shows no more air bubbles. Remove the overflow lines.

d. Remove the source of fluid and pressure and allow the fluid to drain back through the system until the fluid level is approximately 1/4 inch from the top of the reservoir in the master cylinder.

e. Secure the bleeder valve and replace the vent plugs.

N O T E

Do not fill the reservoir higher than 1/4 inch from the top as this will result in spillage. If fluid is accidently spilled on the rug, it can be removed with Imperial cleaner.

N O T E

In servicing the hydraulic brake system, always use an approved hydraulic fluid conforming to MIL-H-5606.

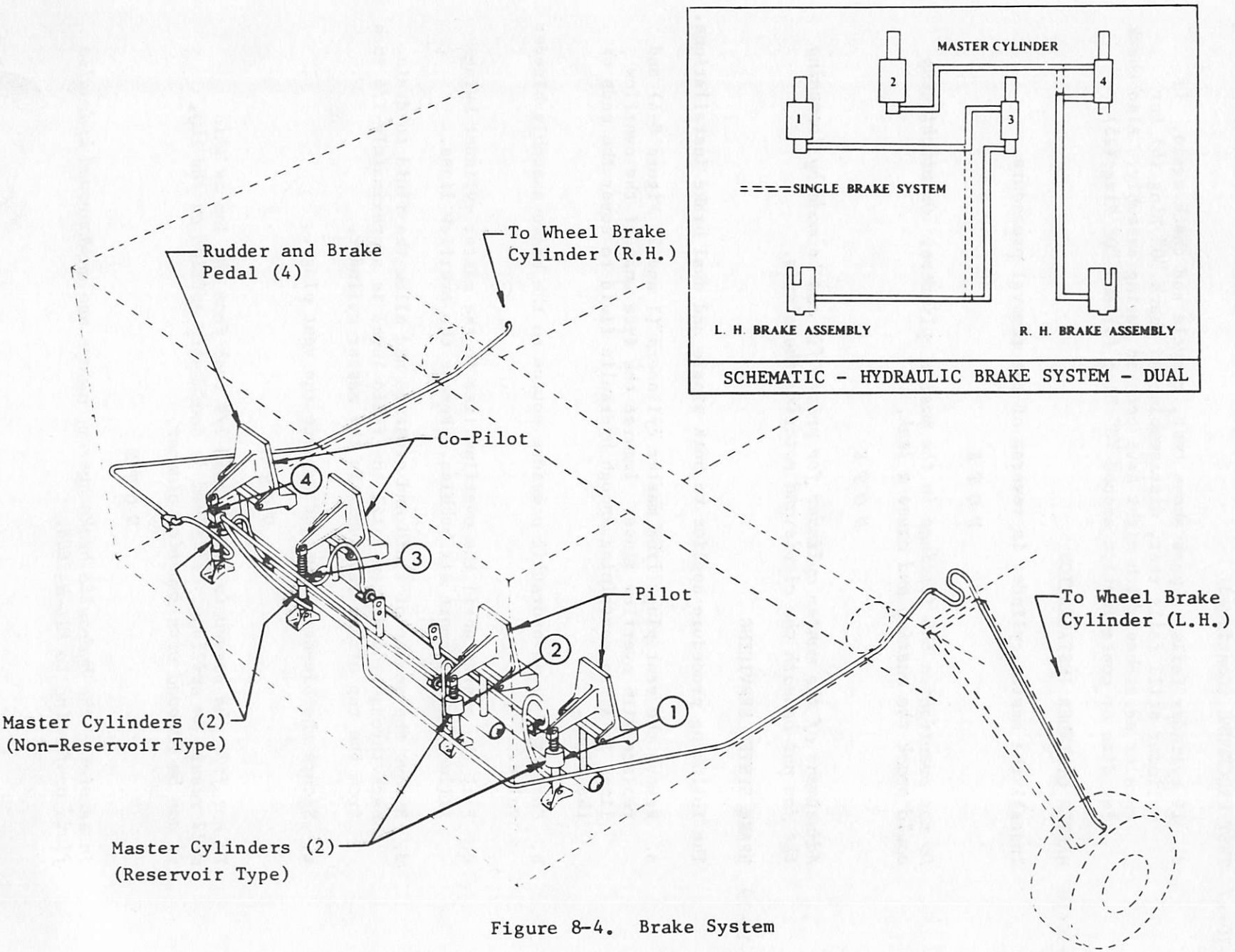


Figure 8-4. Brake System

8-10-20 PARKING BRAKE RIGGING (Figure 8-5)

a. Place the parking brake control in the off position (full in) and measure the travel at (A). This dimension should be 1.75 ± .13 inches. If necessary, adjust the "wire stop" to obtain this dimension.

b. The actuating chain should exert a straight pull on the parking brake levers. The master cylinder cover plate and lever may be rotated to achieve this condition.

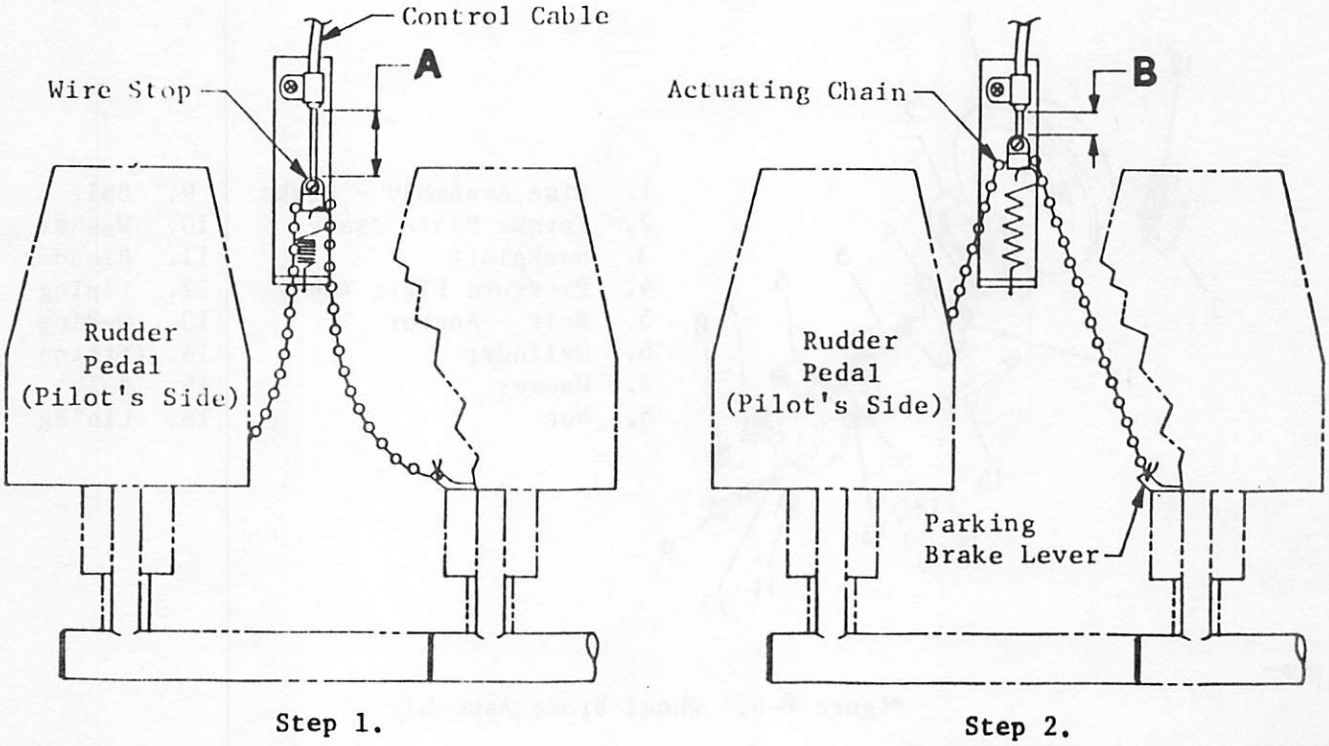


Figure 8-5. Parking Brake Rigging

c. Allow the rudder pedals to center and begin pulling out the parking brake control, until all slack is removed from the actuating chain.

N O T E

Do not permit either master cylinder parking brake lever to lift.

d. Measure the travel at (B). This dimension should be .5 ± .13 inches. If this dimension is less than specified, remove enough chain to obtain .5 ± .13 inches; if this dimension is greater than specified, the chain length will have to be increased.

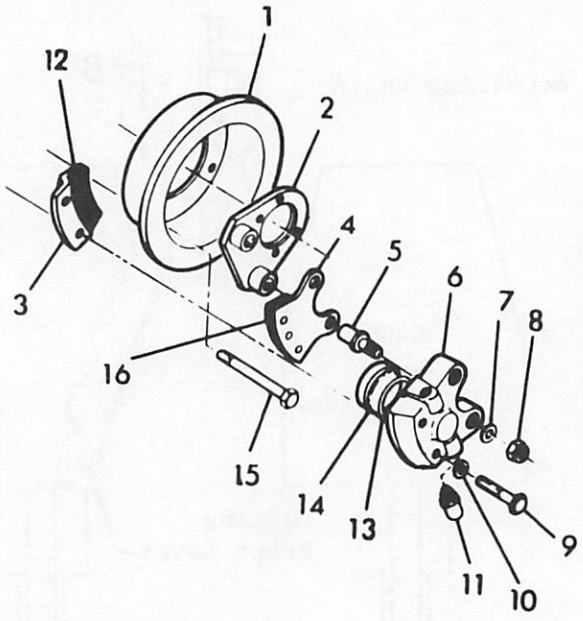
e. Check the parking brake for proper operation. After disengaging, apply full rudder pedal deflection in both directions and confirm that neither master cylinder parking brake lever is lifting.

8-10-21 WHEEL BRAKE ASSEMBLIES

The wheel brake assemblies use a disc, which is attached to the main wheel with the wheel thru-bolts, and a floating brake assembly. See Figure 8-6.

N O T E

1976 and later models utilize wheel/brake assemblies with 2 inch diameter pistons to increase braking power. These assemblies are not interchangeable. Refer to the Parts Catalog for replacement parts.



1.	Disc Assembly - Brake	9.	Bolt
2.	Torque Plate Ass'y	10.	Washer
3.	Backplate	11.	Bleeder
4.	Pressure Plate Ass'y	12.	Lining
5.	Bolt - Anchor	13.	O-Ring
6.	Cylinder	14.	Piston
7.	Washer	15.	Bolt
8.	Nut	16.	Lining

Figure 8-6. Wheel Brake Assembly

8-10-22 WHEEL BRAKES REMOVAL

Wheel brake assemblies are the floating type and can be removed after disconnecting the brake hose and removing the back plate. See Figure 8-6. The brake disc is removed after wheel removal and disassembly. To remove the torque plates, remove wheel and axle as outlined in paragraph 4-50-01.

8-10-23 WHEEL BRAKE INSPECTION AND REPAIR

a. Clean all parts except brake linings and O-rings in dry cleaning solvent and dry thoroughly.

b. New O-rings are usually installed at each overhaul. If O-ring re-use is necessary, they should be wiped with a clean cloth soaked in hydraulic fluid and inspected for damage.

N O T E

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

c. Check brake lining for deterioration and maximum permissible wear. See paragraph 8-10-26.

d. Inspect brake cylinder bore for scoring. A scored cylinder will leak or cause rapid O-ring wear, and must be replaced with a new cylinder.

e. If the anchor bolts on the brake assembly are nicked or gouged, they shall be sanded smooth to prevent binding with the pressure plate or torque plate. When new anchor bolts are to be installed, press out old bolts and drive new bolts in with a soft mallet.

f. Inspect wheel brake disc for a minimum thickness of 0.205 inch. If brake disc is below minimum thickness, install a new part.

8-10-24 WHEEL BRAKE ASSEMBLY

Lubricate parts with clean hydraulic fluid and assemble components with care to prevent damage to O-rings. Refer to Figure 8-6 during assembly of wheel brakes.

8-10-25 WHEEL BRAKE INSTALLATION

Place brake assembly in position with pressure plate in place, then install back plate. If torque plate was removed, install as the axle is installed. If the brake disc was removed from the wheel, install as wheel is assembled.

8-10-26 CHECKING BRAKE LINING

New brake lining should be installed when they are worn to a minimum thickness of 3/32-inch. Visually compare a 3/32-inch strip of material held adjacent to each lining to measure the thickness of the lining. The shank end of correct size drill bit makes an excellent tool for checking minimum thickness of the brake linings.

8-10-27 BRAKE LINING INSTALLATION (See Figure 8-6)

a. Remove bolts securing back plate and remove back plate.

b. Pull the brake cylinder out of torque plate and slide pressure plate off anchor bolts.

c. Place back plate on a table with lining side down flat. Center a 9/64-inch (or slightly smaller) punch in the rolled rivet and hit the punch sharply with a hammer. Punch out all rivets securing the linings to the back plate and pressure plate in the same manner.

N O T E

A rivet relining kit, part no. 199-00100, is available from the Customer Service Department. This kit consists of an anvil and punch.

d. Clamp the flat side of the anvil in a vise.

e. Align new lining on back plate and place brake rivet in hole with rivet head in the lining. Place the rivet head against the anvil.

f. Center the rivet setting punch on the lips of the rivet. While holding the back plate down firmly against the lining, hit the punch with a hammer to set the rivet. Repeat blows on the punch until lining is firmly against the back plate.

g. Realign the lining on the back plate and install rivets in the remaining holes.

h. Install a new lining on pressure plate in the same manner.

i. Position pressure plate on anchor bolts and place cylinder in position so that anchor bolts slide into the torque plate.

j. Install back plate with bolts and washers. **Torque bolts to 90 in. lbs.**

8-10-28 BRAKE BLEEDING

Refer to section 8-10-19 for correct bleeding procedure.

8-20 CABIN HEATING AND VENTILATING SYSTEM

8-20-00 Cabin Heating System

The cabin heating system is basically a controlled air flow in which air, entering the cockpit, passes over the muffler core. The amount of heated air is regulated by a valve mounted through the firewall. Cool air picked up by the nose cowl inlet serves two purposes, that of cooling the muffler, and providing heated air for comfort.

The valve mounted through the firewall is used to regulate the warm air by either ducting it overboard or into the cabin as desired. The amount the push-pull control is moved determines the amount of heat ducted into the cabin.

To provide for windshield defrosting a flexible duct is connected to the valve and terminated just below the sliding door located on the forward panel deck. Operation of the defroster is accomplished by pulling the push-pull control out and opening the sliding door.

8-20-01 Ventilation System: (Model AA-1)

Cabin ventilation is provided by two ventilators, one in each wing root, and two optional canopy air scoops. The wing root ventilators are controlled by sliding valves and the canopy scoops are controlled by adjustable valves for quantity and direction of air.

8-20-02 Ventilation System: (Model AA-1A & AA-1B)

Cabin ventilation is provided by two ventilators, one in each side of the fuselage. The fuselage ventilators route the air to adjustable openings under the instrument panel. Inlet air is controlled by a valve in each air box.

8-20-03 Trouble shooting

Most of the operational troubles in heating, ventilating and defrosting systems are caused by sticking or binding air valves or damaged air ducting. In most cases air valves can be freed by proper lubrication. Damaged or broken parts should be repaired or replaced. Be sure all valves move freely through the full range of travel and seal properly. Check that all heater and defroster ducting is properly attached. Replace any that are burned, frayed or crushed. If fumes are detected in the cabin, the heater shroud must be removed to allow a very careful inspection of the exhaust muffler and stack. Any holes or cracks may permit exhaust fumes to enter the cabin.

N O T E

Replacement of defective exhaust stacks or mufflers is imperative as exhaust fumes in the cabin constitute an extreme safety hazard.

8-20-04 FRESH AIR VENT ADJUSTMENT (MODEL AA-1A & AA-1B)

If required, adjustment of the air vent control is accomplished by removing the air vent assembly and reforming the actuator as shown on Figure 8-7. To remove the airbox, take out the two plug buttons located under the box, (Figure 8-7) near the front, and using a long Phillips screwdriver, remove the screws attaching the airbox to the instrument panel. On installation, reseal the airbox to the fuselage with sealant (RTV 102 by General Electric or 732 RTV by Dow-Gorning).

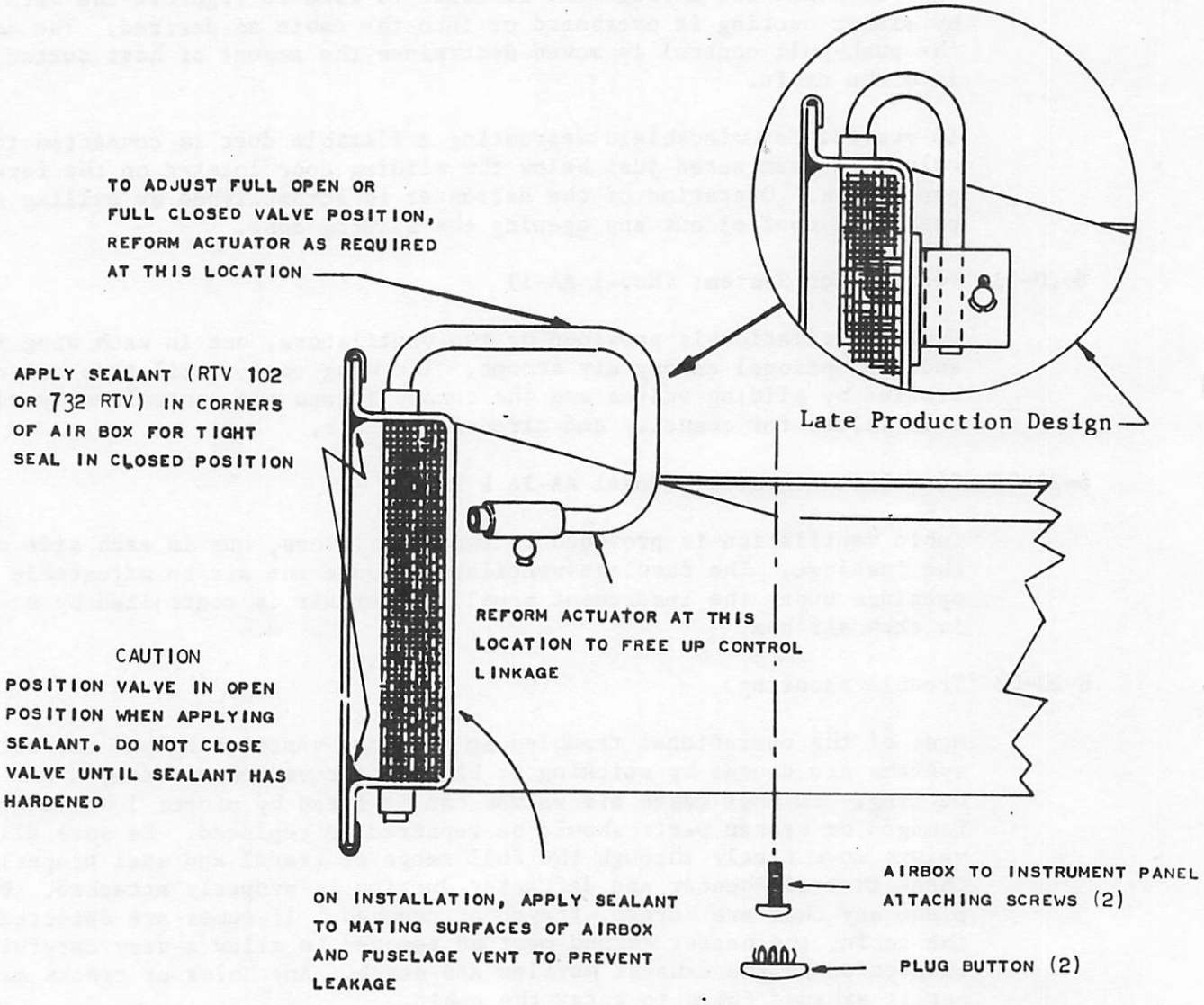


Figure 8-7. Air Vent Sealing and Adjustments
(Model AA-1A and AA-1B)

8-30 BRAKE SYSTEM TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Little or no braking	Low or no fluid	Service with proper grade hydraulic fluid
	Leak in system	Check all lines and connections
	Air in system	Bleed system
	Defective master cylinder	Repair or replace master cylinder
	Bent or dirty anchor bolts	Clean or replace anchor bolts as required
	Worn linings	Replace linings
Dragging brakes	Warped or scored brake discs	Replace brake discs (check linings)
	Defective master cylinder return spring	Disassemble master cylinder and replace spring. Check spring free length and replace if necessary
	Bent master cylinder shaft	Disassemble master cylinder and replace shaft
	Wheel cylinder piston sticking	Remove, clean or replace
	Bent line restricting movement of cylinder	Repair or replace line
	Bent or dirty anchor bolts	Clean or replace anchor bolts as required
Floor and master cylinder covered with hydraulic fluid	Master cylinders over-filled	Lower fluid level to 1/4-inch from top of reservoir
	Leaking fittings at master cylinder	Tighten or replace fittings
	Leaking o-rings in master cylinders	Remove, inspect and replace o-rings
	Cracked master cylinder casting	Replace master cylinder

8-30 BRAKE SYSTEM TROUBLE SHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Parking brake locks one brake only	Control linkage disconnected or connected incorrectly	Connect linkage correctly
Parking brakes will not release	Master cylinder shaft notched	Replace shaft
	Bent parking brake links	Replace links
	Parking brake control rigged too tight	Rerig parking brake control
Premature brake lining wear-out	Brake disc rusty	Remove rust from brake disc
Ineffective brakes with solid pedal	Torque plate seized on anchor bolts	Clean or replace anchor bolts as required

6 POWERPLANT

6-00 GENERAL

The AA-1, AA-1A & AA-1B are powered by 108 H.P. Lycoming, 4 cylinder, horizontally opposed, air-cooled engines. The propellers are McCauley fixed pitch Models 1A105/SCM 7157 (Cruise), 1A105/SCM 7153 (Climb) and 1A105/SCM 7154 (Climb).

N O T E

For repair and overhaul of the engine, refer to applicable manuals, bulletins and other documents published by the engine manufacturer.

6-10-01 SPECIFICATIONS

Engine	O-235-C2C
BHP	108 @ 2600 RPM
Displacement (cubic inches)	233.3
Stroke (inches)	3.875
Bore (inches)	4.375
Firing Order	1-3-2-4
Compression Ratio	6.75:1
Left Magneto (plus impulse coupling)	#4051 Fires @ 25° BTC
Right Magneto	#4050 Fires @ 25° BTC
Spark Plug Gap	.018 to .022*
Valve Rocker Clearance (cold)	.007 to .009
Oil Capacity	6 QTS.
Propeller Drive Ratio	1:1
Propeller Drive Rotation (viewed from rear)	Clockwise
Dry Weight (includes magnetos, plugs, carburetor, starter, alternator and ignition harness)	248.0 LBS
Fuel Pressure	Minimum 1/2 psi
	Normal 3-5 psi
	Maximum 8 psi
Oil Pressure	Minimum Idling 25 psi
	Normal 60-90 psi
	Start-Warmup 100 psi
Oil Temperature	Maximum 245° F
Cylinder Head Temperature	Maximum 500°

*See latest revision of Lycoming Service Instruction No. 1042 for gap on specific plug being used.

6-10-02 ENGINE REMOVAL

N O T E

Prior to removal of the engine, place a support under the tail of the aircraft to prevent damage to the empennage. Tag or label all wiring and cables prior to removal from the engine for reference on installation.

6-10-02 ENGINE REMOVAL (Continued)

a. Remove the propeller and spinner.

b. Remove the cowling (Chapter 3).

c. Disconnect the throttle, mixture, and carburetor heat controls.

d. Disconnect the fuel and oil pressure lines.

e. Disconnect the main fuel line at the inlet to the engine driven fuel pump.

f. Disconnect the tachometer cable.

g. Disconnect the tailpipe support (if used).

h. Disconnect the vacuum pump hose at the pump.

i. Disconnect the fuel primer line.

j. Disconnect all wiring from the engine.

k. Disconnect the heater duct at the muffler.

l. Attach a suitable lifting device to engine and remove the engine mounting bolts.

6-10-03 ENGINE INSTALLATION

a. Position the engine to the engine mount and install the mounting bolts. Torque mounting bolts to 40 in. lbs. on aircraft AA1-0001 through AA1-0432 except AA1-0348. On aircraft AA1-0348 and AA1-0433 and on torque mounting bolts to 200 to 250 in. lbs.

N O T E

Inspect the engine rubber mounting bushings for wear and deterioration. Replace as required.

b. Connect the heater duct to the muffler.

c. Connect all wiring to the engine.

d. Connect the fuel primer lines.

e. Connect the vacuum pump hose at the pump.

f. Connect the tachometer cable.

g. Connect the main fuel line at the inlet to the engine driven fuel pump.

6-10-03 ENGINE INSTALLATION (Continued)

h. Connect the fuel and oil pressure lines.

i. Connect the throttle, mixture, and carburetor heat controls.

N O T E

Refer to Section 6-40-03 for proper rigging of the carburetor throttle control.

N O T E

Maintain a minimum 4-1/2 inch bend radius on all carburetor controls.

j. Install the cowling (Chapter 3).

k. Install the propeller, torque bolts to 300 in. lbs., resafety bolts and install spinner.

6-20 RECOMMENDED INSPECTION & MAINTENANCE PROCEDURES - FLEXIBLE FLUID HOSES

6-20-00 GENERAL

In order to assure the continued safety and reliability of flexible fluid hose installations in the engine compartment, the following inspection procedures are recommended each 50 hours of operation.

6-20-01 INSPECTION AND MAINTENANCE

a. All aircraft have an auxiliary fuel pump and the flexible fuel lines should be pressurized with the fuel boost pump. When accomplishing this test, the mixture control should be in the idle cutoff position when examining for leakage.

b. Examine the flexible hose exterior for evidence of leakage or wetness.

c. Inspect for color bleaching of the end fittings or severe discoloration of the hoses.

d. Check fuel and oil hoses for evidence of stiffness.

N O T E

Avoid excessive flexing and sharp bends when examining hoses for stiffness.

e. Flexible hoses which are found leaking or showing a notable amount of stiffness are to be replaced. It is suggested that all flexible fluid carrying hoses in the engine compartment be replaced at engine overhaul or every five years, whichever comes first.

f. Operate engine primer and check for leaks at lines and fittings.

6-20-01 INSPECTION AND MAINTENANCE (Continued)

g. After pressure testing fuel hoses and operating primer, allow sufficient time for excess fuel to drain overboard from the engine manifold before attempting an engine start.

N O T E

During installation of flexible hoses, observe the following recommendations.

1. *The hose must not be twisted. High pressures applied to a twisted hose may cause failure or loosening of the nut.*

2. *Provide as large a bend radius as possible.*

3. *Rubber hoses will take a permanent set during extended use in service. Straightening a hose with a bend having a permanent set may result in hose cracking. Care should be taken during removal so that hose is not bent excessively, and during reinstallation to assure hose is returned to original position. Route hoses away from areas of intense heat such as engine exhaust.*

4. *AC 43.13-1, Chapter 10, also covers installation procedures for flexible hose assemblies.*

6-30 ENGINE CONTROLS

6-30-00 GENERAL

The engine controls consist of the throttle, mixture, and carburetor heat controls. Each control is adjusted at the factory for proper engine operation. However, field maintenance may require subsequent adjustment of these controls. Removal, installation and adjustment procedures are given in Sections 6-40 through 6-60.

6-40 ENGINE THROTTLE CONTROL

6-40-00 DESCRIPTION

The engine throttle control is located in the lower center of the instrument panel and controls the manifold pressure of the engine.

6-40-01 ENGINE THROTTLE CONTROL REMOVAL (Figure 6-1A)

a. Disconnect the ball joint (5, Figure 6-1A) from the carburetor throttle arm (6).

b. Remove the retainer(s) which secures the throttle plunger housing (10) to the support bracket (4) or remove the forward nut and lockwasher which secures the throttle cable housing to the firewall (Figure 6-1) depending on the throttle cable design of the aircraft being worked on.

6-40-01 ENGINE THROTTLE CONTROL REMOVAL (Continued)

c. Loosen the jam nut (9) and remove the ball joint (5) and jam nut (9) from the throttle plunger housing (10). Remove the two rubber boots from the plunger housing (10).

d. Remove the clamps which secure the throttle cable and carburetor heat control cable to the instrument panel support. (Located between instrument panel and firewall).

e. Remove the throttle housing retainer nut from behind the instrument panel and carefully pull the throttle cable through the firewall and instrument panel.

6-40-02 ENGINE THROTTLE CONTROL INSTALLATION (Figure 6-1A)

a. Pass the end of the throttle control cable through the instrument panel and slide the housing retainer nut over the end of the cable.

b. Route cable through the firewall to the carburetor.

c. Install and tighten the nut on the throttle housing behind the instrument panel.

d. Position the throttle plunger housing (10) in the slot in the support bracket (4) and install the retainer(s) or install the lockwasher and nut which secures the throttle cable housing to the firewall (Figure 6-1), depending on the throttle cable design of the aircraft being worked on.

e. Position the throttle cable to provide a minimum 4-1/2 inch bend radii and install the clamps which secure the throttle cable and carburetor heat cable to the instrument panel support. (Located between the instrument panel and firewall).

f. Install the jam nut (11) and ball joint (5) on the throttle plunger (8) loosely.

N O T E

The remaining instructions for throttle control installation are covered in Section 6-40-03 "ENGINE THROTTLE CONTROL RIGGING"

6-40-03 ENGINE THROTTLE CONTROL RIGGING - AA1-0001 thru AA1-0432 except AA1-0123, AA1-0140, AA1-0291 & AA1-0348. (Figure 6-1)

a. The throttle control is attached to the carburetor throttle arm through the middle hole by a ball joint quick disconnect fitting.

b. Check throttle arm position (1, figure 6-1). This must be 42° ± 5° forward of vertical when the throttle is wide open.

6-40-03 ENGINE THROTTLE CONTROL RIGGING (Continued)

c. Check that throttle arm is positioned inboard tightly against stop (2).

d. Torque throttle arm clamp screw (3) to 26-28 in./lb.

e. See that clamping action has not closed gap (4) in throttle arm.

f. Safety wire throttle arm clamp screw to the throttle stop (5). (Per Figure 6-1B)

g. Check security of lock nuts (6) that attach the control cable housing to the instrument panel and to the firewall.

h. Loosen throttle knob (7), turn jam nut (8) all the way down (clockwise), and tighten the throttle knob against the jam nut. Do not clamp or mar the throttle plunger.

i. Disconnect the throttle control from the carburetor by releasing the ball joint connector (9). Push the throttle control in until the jam nut hits the friction lock (friction lock (10) 1/4 turn loose) and pull the throttle control 1/16 to 1/8 inch for control cushion.

j. Tighten the friction lock (10) being careful not to change the throttle position.

k. Adjust ball joint connector (9) to obtain full open throttle.

l. Reconnect ball joint to carburetor arm (1), tighten jam nut (11), then check threaded push rod for 3/16 inch minimum thread engagement via inspection hole in ball joint connector (9).

m. If further adjustment is required, make all adjustments either at the firewall or the carburetor. If slight repositioning of the throttle arm is required, the lockscrew (3) must be loosened, the arm repositioned, the screw (3) retorqued to 26-28 in./lbs. and resafetied to the throttle stop (12).

n. Release the friction lock (10) and check for full control movement noting that 1/16 to 1/8 inch maximum cushion exists.

N O T E

Check the static RPM of the engine. With the prevailing wind from the left this should be:

Cruise prop. (2150-2300)
Climb prop. (2250-2400)

Weather conditions and field altitude will have a slight effect on the static RPM. Mixture should be leaned at altitude to get proper static RPM.

6-40-03 ENGINE THROTTLE CONTROL RIGGING (Continued)

N O T E

On friction style throttle arms the clamp screw must be torqued to 26-28 in. lbs. and safety wired to throttle arm and stop as shown on Figure 6-1B. It is also important that this be complied with on any replacement carburetor or engine. Install serrated style arms per Figure 6-1C.

6-40-04 THROTTLE CONTROL RIGGING - AA1-0123, AA1-0140, AA1-0291, AA1-0348, AA1-0433 and up. AA1A-0001 and up. AA1B-0001 and up. (Figure 6-1A)

a. Screw throttle knob (1, fig. 6-1A) and jam nut (2) all the way down and tighten jam nut (2) against throttle knob.

b. Place a 0.125 in. spacer between throttle knob jam nut (2) and friction lock (3) with friction lock partially loose.

c. Attach cable to throttle support bracket (4) at carburetor.

d. Check throttle arm position. This should be 55° ± 2° forward of vertical when the throttle is full open.

e. Adjust threaded ball joint (5) so carburetor throttle arm (6) is against the full open stop. Check through inspection hole (7) that ball joint (5) and push rod (8) have 0.19 inch minimum thread engagement and secure with jam nut (9).

f. If thread engagement in step 4 above is less than 0.19 inch, the throttle knob (1) may be threaded out to a minimum of 0.19 inch engagement and step 4 above repeated.

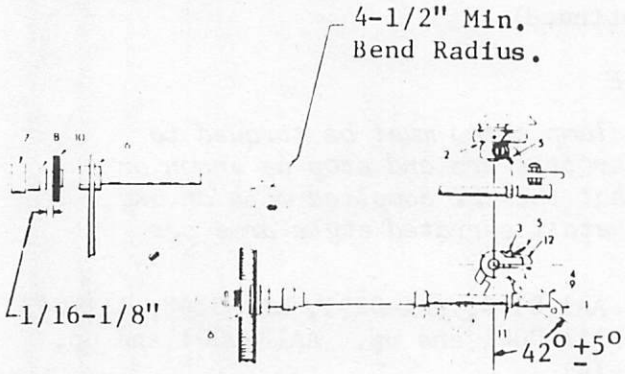
g. Space between plunger housing (10) and jam nut (11) at ball joint (5), with throttle closed, must be 0.12-0.25 inch minimum.

h. Space between throttle knob jam nut (2) and friction lock (3), with throttle open and friction lock partially loose, must be 0.12-0.25 inch maximum.

i. Torque throttle arm clamp screw (12) to 26-28 in. lbs.

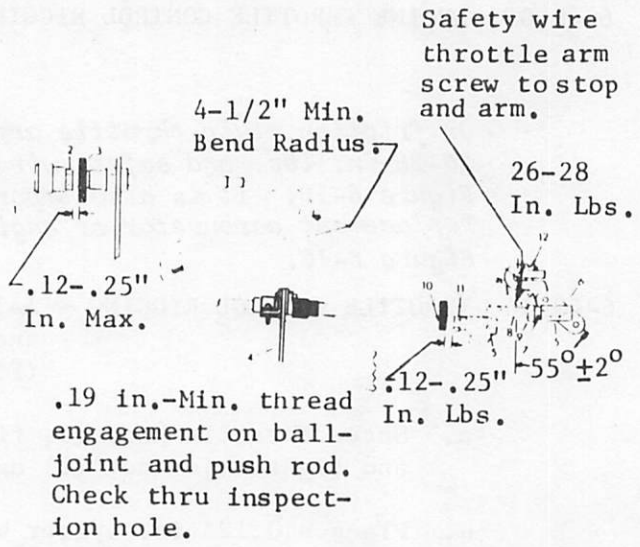
j. Safety wire throttle arm and screw to throttle stop and arm as shown on Figure 6-1B.

k. Check all attachments, jam nuts, safety wire and bend radii (minimum 4-1/2 inches) for correct installation and security. Check throttle for smoothness of operation.



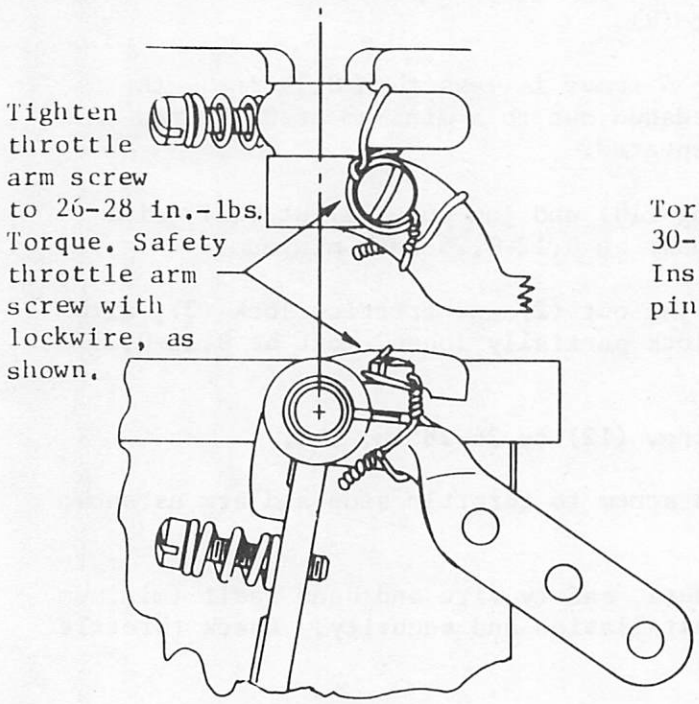
Carburetor Throttle Arm and Cable Rigging (AA1-0001 thru AA1-0432, except AA1-0123, AA1-0140, AA1-0291 and AA1-0348).

Figure 6-1.



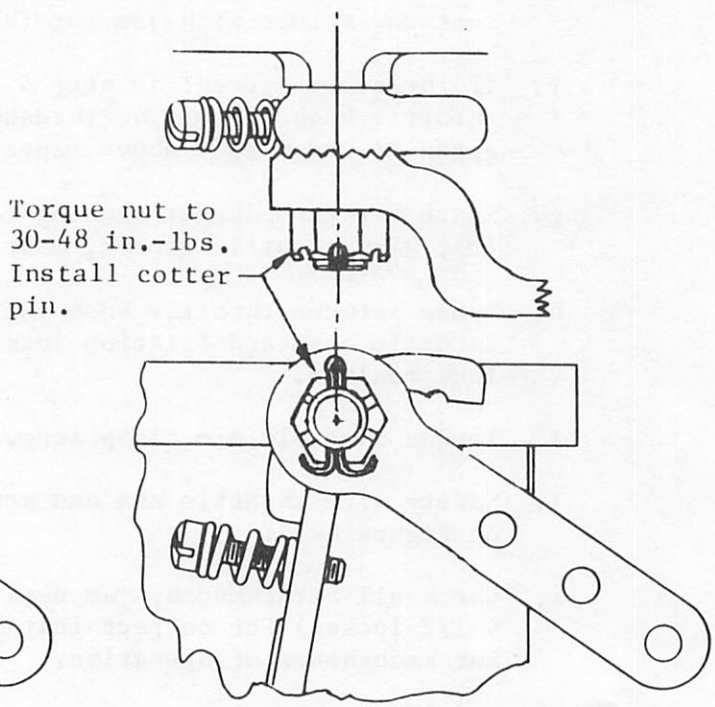
Carburetor Throttle Arm and Cable Rigging (AA1-0123, AA1-0140, AA1-0291, AA1-0348, AA1-0433 and up; AA1A-0001 and up).

Figure 6-1A.



View of Carburetor Throttle Arm showing method of tying lockwire.(Friction Clamp Design)

Figure 6-1B.



View of Carburetor Throttle Arm (Serrated Clamp Design)

Figure 6-1C.

6-40-04 THROTTLE CONTROL RIGGING (Continued)

N O T E

Check the static rpm of the engine. This should be

Cruise prop. (2150-2300)
Climb prop. (2250-2400)

Weather conditions and field altitude will have a slight effect on the static RPM. Mixture should be leaned at altitude to get proper static RPM.

N O T E

On friction style throttle arms the clamp screw must be torqued to 26-28 in. lbs. and safety wired to throttle arm and stop as shown on Figure 6-1B. It is also important that this be complied with on any replacement carburetor or engine. Install serrated style arms per Figure 6-1C.

6-50 MIXTURE CONTROL

6-50-00 DESCRIPTION

The mixture control is located on the instrument panel adjacent to the throttle control. This control meters the amount of fuel that passes through the carburetor main jet, and is used to regulate fuel economy at a given power setting and cruising altitude.

N O T E

Replace mixture control wire every 500 hours (reference latest revision to Service Bulletin No. 144).

6-50-01 MIXTURE CONTROL REMOVAL

a. At the carburetor, remove the swivel assembly. Straighten mixture control wire only enough to remove it from bolt.

b. Loosen the clamps at the firewall and instrument panel brace sufficiently to allow the housing to slide through.

c. Remove the nut securing the mixture control housing to the instrument panel and pull the control through the firewall and instrument panel.

6-50-02 MIXTURE CONTROL INSTALLATION AND RIGGING

a. Pass the end of the mixture control through the instrument panel opening and slide the nut over the end of the control and secure housing to instrument panel.

b. Continue the control through the firewall, being sure it passes through the clamps on the instrument panel brace and on the forward side of the firewall.

c. Loosely attach control wire to swivel assembly.

N O T E

Do not bend wire or tighten nut at this time.

N O T E

See Item 3 on Service Letter No. 74-4 for aircraft not equipped with swivel assembly illustrated in Figure 6-3.

d. Position the mixture control arm completely against the full rich stop. Place a 1/8 inch spacer between control knob and faceplate. (See Figure 6-2).

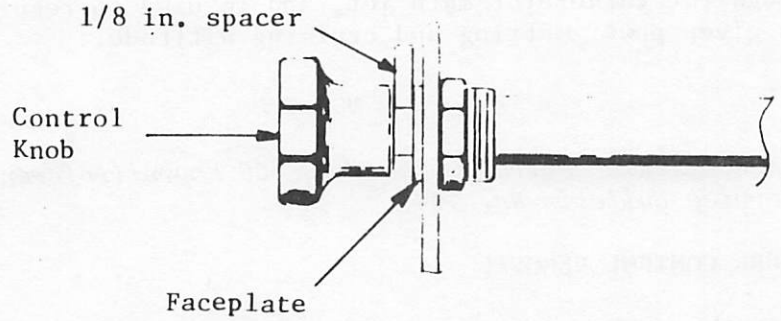


Figure 6-2. Typical Control Knob Rigging

e. With the mixture control arm against the full rich stop, and the control knob against the spacer, tighten the swivel assembly nut and the cable clamps at the instrument panel brace and firewall. Remove the spacer from control knob and check mixture control operation.

N O T E

The firewall cable clamp must direct the control housing at right angles to the firewall. Adjust to achieve this condition.

6-50-02 MIXTURE CONTROL INSTALLATION AND RIGGING (Continued)

f. Bend mixture control wire as shown on Figure 6-3 and install the cotter pin. Check swivel freedom in arm.

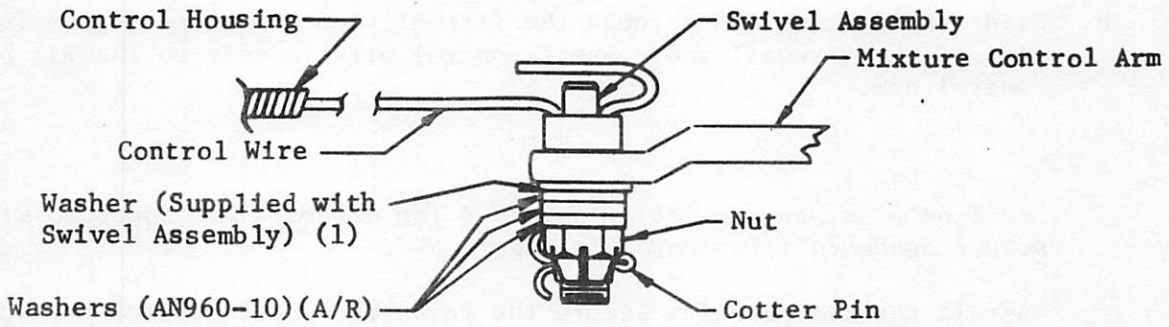


Figure 6-3. Mixture Control Installation

g. Check operation of mixture control. Control should have no more than 1/8 inch travel remaining with mixture control arm in full rich position. Control cable should have 4-1/2 inch minimum bend radius.

6-60 CARBURETOR HEAT CONTROL

6-60-00 DESCRIPTION

The carburetor heat control is located on the instrument panel adjacent to the throttle control. The carburetor heat control opens and closes a valve in the carburetor air box. When the control is in the "OFF" position, air is drawn from outside through ducting to the carburetor. In the "ON" position, the valve shuts off the outside air source and warm air from a shroud around No. 4 exhaust pipe is directed to the carburetor.

6-60-01 CARBURETOR HEAT CONTROL REMOVAL

a. Loosen the control wire clamp bolt assembly or swivel assembly and disconnect the carburetor heat control wire from the air box control arm.

b. Loosen the clamp around the control housing at the firewall.

c. Remove the clamp which secures the carburetor heat control housing to the instrument panel support.

d. Remove the nut behind the instrument panel that secures the carburetor heat control.

e. Remove the control by pulling it through the instrument panel and firewall.

6-60-02 CARBURETOR HEAT CONTROL INSTALLATION AND RIGGING

a. Pass the end of the control through the instrument panel and install the nut securing the control to the instrument panel.

b. Slide the control end through the firewall and the clamp on the forward side of the firewall and connect control wire loosely to the air box control arm.

N O T E

See Item 3 on Service Letter No. 74-4 for aircraft not equipped with swivel assembly illustrated in Figure 6-4.

c. Install the clamps which secure the carburetor heat control housing to the instrument panel support.

d. Adjust the control housing to provide a minimum 4-1/2 inch radius and tighten the clamps on the instrument panel brace and the clamp on the forward side of the firewall.

e. Position the carburetor heat control arm in the completely closed position (full forward). Place a 1/8 inch spacer between carburetor heat control knob and faceplate (See Figure 6-2).

f. With the carburetor heat control in the fully closed position, and the control knob against the spacer, tighten the control housing clamp at the firewall and the control arm attaching swivel assembly. Remove the spacer from control knob and check carburetor heat control operation.

g. Bend carburetor heat control wire as shown on Figure 6-4, tighten clamp and install the cotter pin. Check swivel freedom in arm.

h. Check operation of the carburetor heat control. Control should have 1/8 inch travel remaining with the control arm in fully closed position. Control housing should have 4-1/2 inch minimum bend radius.

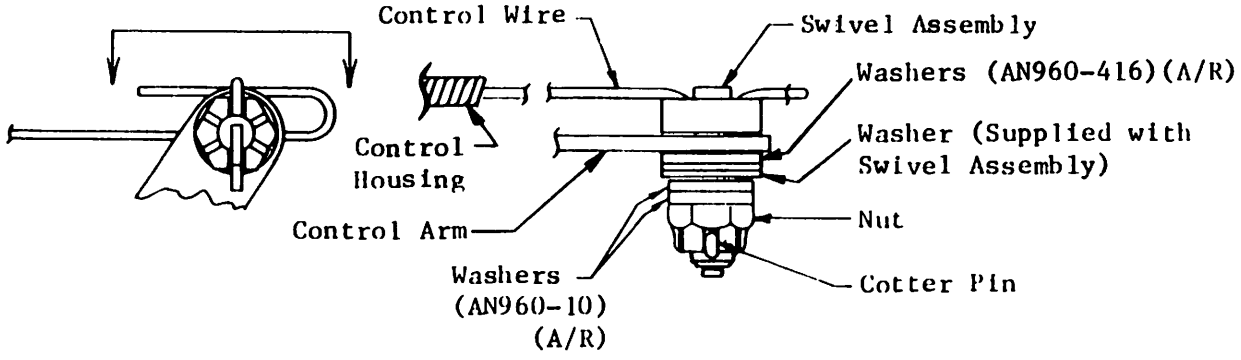


Figure 6-4. Carburetor Heat Control Installation

6-70 INDUCTION SYSTEM

6-70-00 GENERAL

The induction system consists of an air inlet housing and filter assembly. The inlet housing aligns with an opening in the nose cowl which permits filtered outside air to enter the carburetor.

Air entering the induction inlet passes through an oil saturated filter which collects dust and abrasives that may be harmful to the engine. Periodic cleaning and re-oiling of the filter is necessary for proper engine operation.

The induction system also includes an alternate hot air source, which is controlled from the instrument panel. When carburetor icing conditions exist, the carburetor heat control can be pulled out to provide hot air to the carburetor intake.

N O T E

Limited operation of the carburetor heat control is recommended since no filter is incorporated in the hot air source.

When operating the aircraft under extreme dusty conditions, frequent servicing of the filter will extend the useful life of the engine.

6-70-01 INDUCTION SYSTEM REMOVAL

a. Remove the lower cowl assembly.

b. Loosen the clamp and disconnect the carburetor heat hose from the air box assembly.

c. Disconnect the carburetor heat control from the air box assembly.

d. Remove the bolts and lower the air box assembly from the carburetor.

6-70-02 INDUCTION SYSTEM DISASSEMBLY AND FILTER SERVICING

a. Remove the screws attaching the adapter assembly, air filter and air box assembly together.

b. Thoroughly wash the filter in petroleum solvent. Make certain all dirt is removed and filter is in serviceable condition. If filter has flocking worn from screen wire, replace filter.

c. Dry the filter at room temperature. Filter must be completely dry before proceeding with next step. If the filter is not dry, the solvent will prevent oil from adhering to the filter, thereby reducing the filter efficiency.

d. Immerse the filter in the grade oil called for on the filter. If none is called out, use engine preservative oil per MIL-L-21260.

6-70-02 INDUCTION SYSTEM DISASSEMBLY AND FILTER SERVICING (Continued)

e. After removing the filter from the oil, allow it to drain thoroughly before installing in the aircraft.

6-70-03 INDUCTION SYSTEM REASSEMBLY

a. Inspect the gasket between the air filter and air box, if damaged or otherwise defective, replace with a new gasket.

b. Position the air box assembly, filter, and adapter together and install the screws.

6-70-04 INDUCTION SYSTEM INSTALLATION

a. Position the air box assembly to the carburetor and forward cowl, and install the bolts being sure to install the left rear bolt with a washer to prevent it from bottoming out in the carburetor.

b. Connect the carburetor heat control to the air box assembly, (Refer to Section 6-60-02).

c. Install the carburetor heat inlet hose and clamp to the air box assembly.

d. Install the lower cowl.

N O T E

Make sure the air duct is properly fitted over and attached with a screw to the scoop in the forward cowl. Failure to do this could result in an inadequate air supply.

6-80 EXHAUST SYSTEM

6-80-00 DESCRIPTION

The exhaust system consists of an integral muffler and exhaust pipe, risers and clamp assemblies. The muffler is surrounded by a heat exchanger which is connected through tubing to the cabin and serves as a cabin heater. The carburetor heat hose is attached to a shroud around the exhaust pipe from #4 cylinder and supplies heat to the carburetor when the carburetor heat control is opened.

6-80-01 EXHAUST SYSTEM REMOVAL

a. Remove the lower cowl.

b. Remove the carburetor air induction system (Section 6-70-01)

c. Loosen the clamp and disconnect the cabin heater hose from the muffler heat exchanger.

6-80-01 EXHAUST SYSTEM REMOVAL (Continued)

d. Loosen the clamp and disconnect the fresh air inlet hose from the muffler heat exchanger.

e. Remove the clamps from the riser-muffler connections and lower the muffler assembly from the engine.

f. Remove the nuts securing the risers to the cylinder heads and remove the risers and gaskets.

6-80-02 EXHAUST SYSTEM INSPECTION

a. Exhaust systems are subject to burning, cracking and general deterioration from alternate thermal stresses and vibration. Consequently, it is extremely important that the system be inspected every 100 hours or at any time exhaust fumes or carbon monoxide are detected in the cabin.

b. In order to properly inspect the exhaust system, components must be clean and free of oil, grease, etc. If required, spray engine exhaust system components with a suitable solvent (such as Stoddard solvent), allow to drain and then wipe dry with a clean cloth.

W A R N I N G

Do not use highly flammable solvents on engine exhaust system. Never use a wire brush or abrasives to clean exhaust systems or mark the system with lead pencils.

c. Inspect core through tail pipe opening and shake the muffler to determine if baffles are loose.

d. Large flakes of scale and rust from the interior of the muffler are an indication of deterioration and the muffler should be replaced.

N O T E

Especially check the area adjacent to welds. Look for exhaust gas deposits in surrounding areas, indicating that exhaust gases are escaping through a crack or hole. If thorough inspection is not possible, pressure test for leaks in accordance with AC 43.13-1, Chapter 14, Section 3, paragraph 387B. If cracks are found in the muffler or tail pipe, repairs must be in accordance with AC 43.13-1, Chapter 14, Section 3, paragraph 388.

e. Inspect the engine exhaust flanges for smooth seating surfaces. Also check the header flanges for warpage.

f. Check fit of risers in muffler pipes. If loose, swage out the risers for tight fit.

6-80-02 EXHAUST SYSTEM INSPECTION (Continued)

g. Exhaust System Air Leak Test

(1) Plug all openings in the muffler and heat exchanger and attach the pressure side of an industrial vacuum cleaner (capable of producing a pressure rise of at least 2 inches Hq. above atmospheric pressure) to the tail pipe opening, using a rubber plug or other suitable means of effecting a suitable seal.

N O T E

The inside of the vacuum cleaner hose should be free of any contamination that might be blown into the system.

(2) With the vacuum cleaner operating, all joints, welds and the cabin heat exchanger can be checked for leaks by applying a soapy water solution to all areas and watching for air bubbles.

Minor leaks will appear as bubbles while major leaks will tend to blow the solution away from the joint.

(3) Any leakage (minor or major) must be corrected.

6-80-03 EXHAUST SYSTEM INSTALLATION

a. Using new gaskets, position the risers on the engine and install the nuts loosely.

b. Position the muffler assembly on the risers; apply sealant* around riser to muffler joints and install clamps loosely.

c. Tighten the exhaust flange nuts to 110-130 inch pounds torque using new lock washers. Position clamps such that subsequent leakage will not direct exhaust gases on intake pipes and tighten clamp bolts.

d. Connect the cabin heater hose to the muffler heat exchanger and install the clamp.

e. Install the carburetor air induction system (Section 6-70-04).

f. Install the lower cowl.

*Approved Sealant: Walker Acousti-Seal 5160.

6-90 ENGINE LUBRICATION SYSTEM

6-90-00 DESCRIPTION

The engine lubrication system is of the pressure wet sump type with an oil sump capacity of six (6) quarts. Minimum safe quantity in sump is two (2) quarts, however, it is recommended the engine never be operated continuously below four (4) quarts. Table 1 lists recommended grades of oil to be used.

6-90 ENGINE LUBRICATION SYSTEM (Continued)

TABLE I. RECOMMENDED GRADE OIL*		
Average Ambient Air	Straight Mineral	Ashless Dispersant
Above 60° F.	SAE 50	SAE 40 or SAE 50
30° to 90° F.	SAE 40	SAE 40
0° to 70° F.	SAE 30	SAE 40 or SAE 30
Below 10° F.	SAE 20	SAE 30
Oil Sump Capacity		6 U.S. Quarts
Minimum Safe Quantity in Sump		2 U.S. Quarts

*Refer to latest revision of Lycoming Service Instruction No. 1014.

A relief valve, located behind the oil filler neck, maintains oil pressure within prescribed limits, 60-90 P.S.I. normal, 25 P.S.I. at idle speed. This valve is not adjustable, however, the oil pressure can be controlled by the addition of washers, Lycoming part number STD-425 (Maximum of nine).

To prevent excessive pressures from building up in the crankcase, the engine is equipped with a breather vent. The vent tube should be inspected periodically for obstructions.

The engine oil pressure is shown on the oil pressure gauge, located in the instrument panel. The line attaching the pressure gauge to the engine incorporates a .040" orifice to prevent a large oil loss due to a line or gauge failure.

Periodic maintenance of the engine lubrication system should include an oil change and removal and inspection of the oil suction and oil pressure screens.

N O T E

When inspecting the oil screens, check for the presence of metal particles which is indicative of internal engine failure. If engine is equipped with a paper throw-away type oil filter, it should be cut apart and inspected for accumulations of metal chips and evidence of internal engine failure.

N O T E

During the initial 50 hours operation of a new or overhauled engine, use straight mineral oil (non-detergent). Detergent or additive oils should only be used after consulting Lycoming Service Instruction No. 1014.

6-100 ENGINE PRIMING SYSTEM

6-100-00 DESCRIPTION

The engine is equipped with a four cylinder priming system. Fuel is injected directly into the cylinder intake system by a hand pump, located on the instrument panel. Fuel into the hand pump is obtained from a connection in the bottom of the right fuel measurement gauge. If a manifold pressure gauge is desirable, the priming system can be converted to a three cylinder system, and number three or number four cylinder used for the manifold pressure gauge connection.

6-100-01 ENGINE PRIMING SYSTEM REMOVAL

a. Remove the lower cowl.

b. Remove the clamps securing the primer lines to the engine intake pipes and remove the primer lines from the engine.

c. Remove the line between the tee at rear of engine and the primer.

N O T E

Do not disconnect the line from the connection at the bottom of the right fuel measurement gauge unless damaged. If the line must be removed for repair or replacement, drain the right fuel tank.

d. Remove the knurled nut on the front of the instrument panel securing the primer.

N O T E

The primer knob, plunger, spacer and knurled nut are removed as an assembly from the front of the instrument panel. The primer body is removed from the rear of the instrument panel.

6-100-02 ENGINE PRIMING SYSTEM INSTALLATION

Install the engine priming system in reverse of the removal procedure (Section 6-100-01). Actuate primer and inspect system for leaks.

6-110 ENGINE IGNITION SYSTEM

6-110-00 DESCRIPTION

The engine dual ignition system consists of the magnetos, shielded harness, spark plugs and the ignition switch. The magnetos are a sealed, lightweight type requiring no internal adjustments.

6-110-00 ENGINE IGNITION SYSTEM (Continued)

N O T E

If problems are known to exist in the ignition system, inspection of the harness and spark plugs should be accomplished first. To determine if the harness is defective, examine the leads and ceramics for corrosion and deposits. This condition is caused by dirty spark plugs, dirty connector ends, or leaky spark plugs. If this condition exists, clean the leads and ceramics with a dry cloth moistened with methy-ethyl ketone.

a. Tag or otherwise mark each lead for reference at installation.

b. Remove the clamps securing the harness to the cylinder head.

c. Remove the magneto caps and harness as an assembly.

6-110-02 IGNITION HARNESS DISASSEMBLY AND REASSEMBLY

a. Refer to Figure 6-5 Magneto lead, exploded view, for part location.

b. Refer to Slick Electro, Inc.* pamphlet (Form No. 1009 5M 8-68) for assembly instructions and tool requirements.

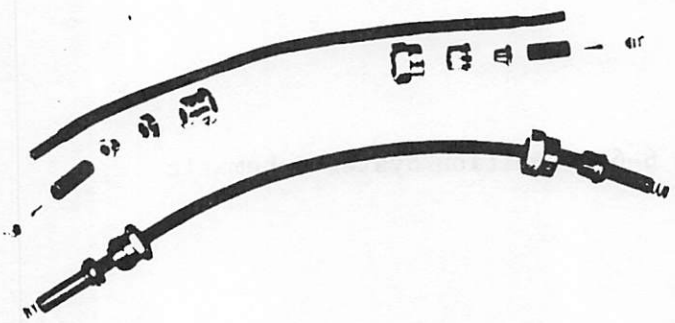


Figure 6-5. Magneto Lead Exploded View

*Slick Electro, Inc.
530 Blackhawk Park Ave.
Rockford, Illinois 61101

6-110-03 IGNITION HARNESS INSTALLATION

Install the engine harness in reverse of the removal procedure. Refer to Figure 6-6 for wiring diagram.

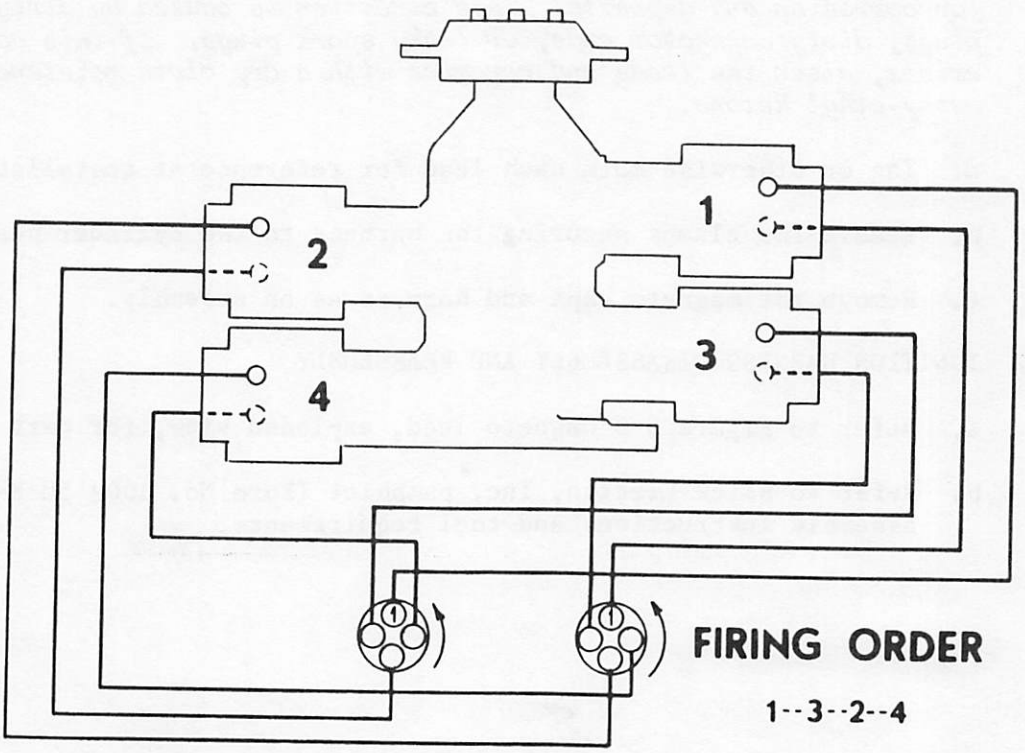


Figure 6-6. Ignition System Schematic

6-110-04 MAGNETO REMOVAL

W A R N I N G

During all magneto maintenance, always take proper precautions to make sure the engine cannot fire or start when the propeller is moved.

6-110-04 MAGNETO REMOVAL (Continued)

a. Disconnect the magneto ground wire and shielding terminal.

b. Remove the distributor cap assembly.

c. Remove the mounting lugs and withdraw the magneto.

N O T E

Make a note of the approximate angle the magneto makes with the engine center line as an aid in its subsequent installation.

6-110-05 MAGNETO INSTALLATION

a. Rotate the propeller in the normal direction of rotation until #1 cylinder enters its compression cycle.

N O T E

To determine if the #1 cylinder is in the compression cycle, remove the top plug from the #1 cylinder and place thumb over the port. As the piston approaches the end of the compression stroke a positive pressure will try to force the thumb off the port.

b. Continue turning the propeller in the normal direction of rotation until the 25° advanced timing mark on the forward face of the starter ring becomes aligned with the small hole drilled in the head of the starter motor. Alternate method is to align the 25° advance mark on the back of the flywheel with the crankcase parting line. At this point, the engine is ready to receive the magnetos. (See Figure 6-7).

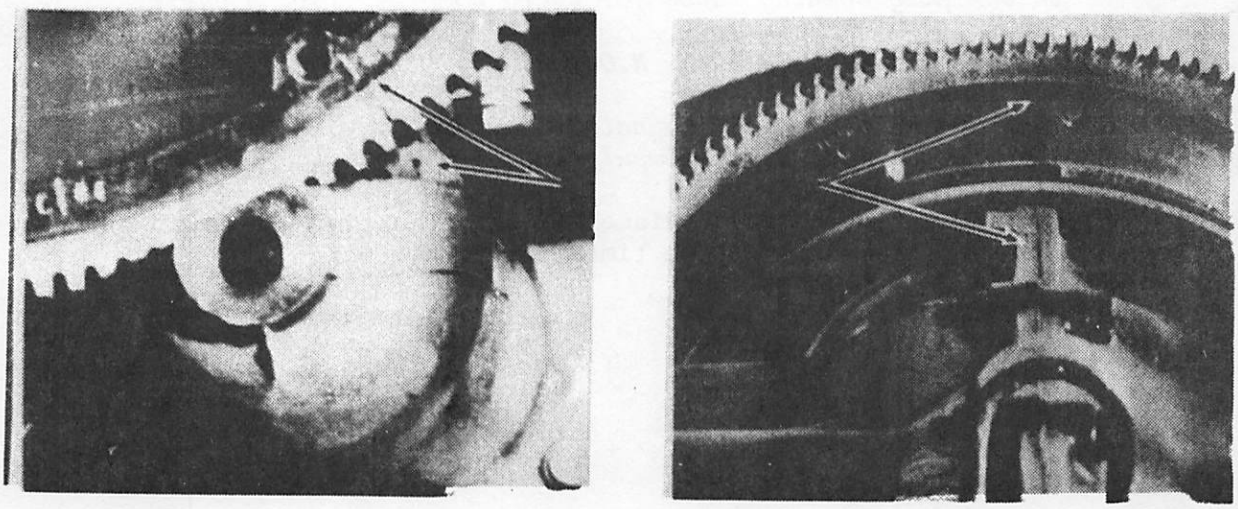


Figure 6-7. Advance Timing Alignment

6-110-05 MAGNETO INSTALLATION (Continued)

c. Remove the plug from the bottom of the magneto. (See Figure 6-8).

d. Rotate the magneto shaft until a spark occurs from number one lead (hold screw driver close to #1 lead while turning the shaft). As soon as the spark occurs, slowly reverse direction until the timing hole in the rotor is centered in the plug opening.

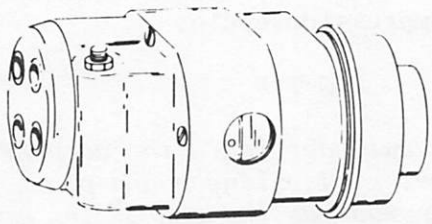


Figure 6-8. Magneto Timing Hole

N O T E

Failure to spark check the number one position leaves the possibility of the magneto being 180° out of phase. The timing hole appears in the plug opening twice for every complete firing cycle.

N O T E

In order to rotate the magneto incorporating an impulse coupling, depress the pawl on the impulse coupling with the finger.

e. Insert a pin (.093" diameter) into the timing hole in order to keep the rotor in the timed position.

6-110-05 MAGNETO INSTALLATION (Continued)

f. Position the magneto into the crankcase at the approximate angle noted on removal. Be sure gasket is installed behind the magneto mounting flange.

g. Install the attach clip over the magneto mounting flange and tighten the nuts finger-tight.

N O T E

Install the magneto with the impulse coupling on the left side.

h. Install the second magneto in the same manner as described in steps c. through g. above.

C A U T I O N

Be sure not to rotate the propeller with the pin still installed in the magneto timing hole.

i. Final timing should be accomplished with a timing light. Using a battery powered timing light, attach the positive leads to the magneto ground terminal, and the negative leads to any unpainted portion of the engine.

j. Remove the pins from the magnetos.

k. Rotate the magneto in its mounting flange until the light comes on. Slowly turn the magneto in the opposite direction until the light goes off. Bring the magneto back slowly until the light just comes on.

l. Repeat this process for the other magneto.

m. Upon timing both magnetos, check to ascertain that both magnetos will fire simultaneously.

N O T E

To check the simultaneous firing of both magnetos, back off on the propeller a few degrees (timing light should go out). Bring the propeller back slowly in the direction of normal rotation until the 25° advanced timing mark aligns with the hole in the starter motor. At this point, both lights should go on simultaneously.

6-110-05 MAGNETO INSTALLATION (Continued)

n. Tighten the magneto mounting nuts and torque to 150 inch pounds and install magneto ground wire and shielding terminal. When the magneto shows an excessive rpm loss or has reached a total of 900 hours, whichever comes first, the magneto should be returned to either the aircraft or magneto manufacturer for exchange. No attempt should be made to repair the magneto in the field since disassembly of the magneto will void its warranty.

N O T E

If the drive shaft nut has been removed from the magneto incorporating the impulse coupling, care should be exercised when reassembling, not to overtighten. The recommended torque is 156 inch pounds. Torque may be increased to line up hole with slot in nut.

The timing of the magneto to the engine should be checked every 100 hours. Maximum allowable limits are plus or minus 2 degrees. If the magneto exceeds these limits, it will be necessary to time the magneto until it falls within the above tolerance. (Refer to magneto installation in this section for timing procedure).

6-120 SPARK PLUGS

Spark plugs should be cleaned and regapped every 100 hours. Normal plug gap is .017" to .021". See latest revision of Lycoming Service Instruction Number 1042 for gap on specific plug being used. The torque value for reinstalling the spark plugs is 360-420 inch pounds. Application of anti-seize compound to all but the first two threads on the plug is recommended.

N O T E

It is recommended that the lower and upper spark plugs be reversed every 100 hours to prolong the spark plug service life.

6-130 COOLING SYSTEM

The cooling system consists of ram air being conducted over and around the cylinders by use of baffles. Since defective baffles can decrease the cooling, and decreased cooling results in increased engine wear and damaged parts, baffles should be carefully inspected and any cracks or deformation corrected.

6-140 PROPELLER

The propeller should be included in every preflight inspection and should receive special attention during 25, 50 and 100 hour inspections. Visually inspect the entire propeller for damage or defects, and any necessary repair should strictly adhere to AC43.13-1 aircraft inspection and repair manual or manual and bulletins published by the propeller manufacturer.

6-140-01 PROPELLER REMOVAL

a. Remove the spinner.

b. Cut the safety wire and remove the six propeller mounting bolts. Remove the propeller.

6-140-02 PROPELLER CLEANING

a. Clean propeller and all attaching parts in a mixture consisting of 1/3 lubricating oil, Specification MIL-L-6082, Grade 1065, and 2/3 solvent, Federal Specification P-S-661. Remove heavy and tightly adhering deposits with a soft bristle brush.

C A U T I O N

Do not use a steel, or other metal, or hard bristle brush, or a tool of any type to remove deposits.

b. After cleaning allow parts to air dry, or use a gentle stream of clean dry compressed air to remove excess mixture.

6-140-03 INSPECTION

a. Visually inspect all parts for damage or defects. Check all threads for rough edges and irregularities. Check that surface finish (anodizing or plating) is not broken, chipped or peeled (if peeled, look for corrosion). Staining and slight surface markings (not perceptible to fingernail) are normal and not alone cause for rejection or replacement.

b. If scratches or suspected cracks are found, determine their extent by use of the penetrant inspection method, Military Specification MIL-I-6866. The fluorescent method, "Zyglow" (Magnaflux Corp., Chicago, Ill.), is preferred; however, a non-fluorescent method, "Dy-check" (Turco Products Co., Los Angeles, Calif.), may also be used.

6-140-04 PROPELLER MAINTENANCE

Check entire blade area, especially leading edge and thrust side for signs of erosion, scratches, nicks, cracks, etc. Damaged areas act as stress-risers and should be removed immediately by filing and polishing. Remove metal and smoothly finish surfaces as specified in applicable propeller service manual or FAA Advisory Circular AC43.13-1. This work can

6-140-04 PROPELLER MAINTENANCE (Continued)

normally be performed without removing propeller from engine. However, if propeller has extensive damage, it should be reconditioned by an FAA approved repair station.

6-140-05 DEFINITIONS OF DEFECTS

Types of damage and defects which may be observed on parts of this assembly are defined as follows:

Burr- A small, thin section of metal extending beyond a regular surface, usually located at a corner or on the edge of a bore or hole.

Corrosion- Loss of metal from the surface by chemical or electrochemical action. The corrosion products generally are easily removed by mechanical means. Iron rust is an example of corrosion.

Crack- A physical separation of two adjacent portions of metal, evidenced by a fine or thin line across the surface, caused by excessive stress at that point. It may extend inward from the surface from a few thousandths inch to completely through the section thickness.

Cut- Loss of metal, usually to an appreciable depth over a relatively long and narrow area, by mechanical means, as would occur with the use of a saw blade, chisel or sharp-edged stone striking a glancing blow.

Dent- Identification in a metal surface produced by an object striking with force. The surface surrounding the indentation will usually be slightly upset.

Erosion- Loss of metal from the surface by mechanical action of foreign objects, such as grit of fine sand. The eroded area will be rough and may be lined in the direction in which the foreign material moved relative to the surface.

Fretting- Breakdown or deterioration of metal surface by vibratory or "chattering" action. Usually no loss of metal or cracking of surface but generally showing similar appearance.

Gouge- Grooves in, or breakdown of, metal surface from contact of foreign material under heavy pressure. Usually indicates metal loss but may be largely displacement of material.

Inclusion- Presence of foreign or extraneous material wholly within a portion of metal. Such material is introduced during the manufacture of rod, bar or tubing by folling or forging.

Nick- Local break or notch on edge. Usually displacement of metal rather than loss.

Pitting- Sharp, localized breakdown (small, deep cavity) of metal surface, usually with defined edges.

Scratch- Slight tear or break in metal surface from light, momentary contact by foreign material.

Score- Deeper (than scratch) tear or break in metal surface from contact under pressure. May shown discoloration from temperature produced by friction.

Stain- A change in color, locally, causing a noticeably different appearance from the surrounding area.

6-140-06 PROPELLER INSTALLATION

Install the propeller in reverse of the removal procedure. Torque the propeller mounting bolts to 280-320 inch pounds. Safety bolts with .041 minimum diameter safety wire and maximum of two bolts together.

6-150 IDLE SPEED AND MIXTURE ADJUSTMENT

The following steps describe the corrective action for an engine which is running too lean or too rich, or which is not idling correctly. Correct idle adjustment should produce an idling speed of 600 to 650 rpm.

a. Perform a normal engine run-up until the oil and cylinder temperatures have stabilized.

b. Check the mag-drop prior to proceeding with the idle adjustment.

c. Set the throttle stop screw so that the engine idles at 600 to 650 rpm.

d. With a smooth and steady motion, pull the cockpit mixture control towards the idle cut-off position and observe the tachometer for any change. Return the control to the full rich position prior to the engine cutting out. An increase of more than 50 rpm while "leaning out" indicates an excessively rich idle misture. An immediate decrease in rpm indicates the idle mixture is too lean.

N O T E

Each time the idle adjustment is changed, the engine should be run up to 2000 rpm before proceeding with next rpm check.

e. Upon completing Step "d", close the throttle and check the idling speed making any final adjustment necessary.

N O T E

In case the setting does not remain stable, check the mixture control linkage for slipping.

6-160 ENGINE TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Engine fails to start	Lack of fuel	Open fuel selector valve. Service fuel tanks. Push mixture control to full rich position.
	Flooded or overprimed	Open throttle and unload engine by cranking.
	Underprimed	Prime with 2 to 3 strokes.
	Incorrect throttle setting	Open throttle to 1/4 position
	Defective spark plugs	Clean and regap, or replace
	Dead or weak battery	Recharge or replace
	Defective ignition wire	Check with electric tester, and replace any defective wires
	Water in carburetor	Drain carburetor and lines
	Improper operation of magneto breaker	Clean points. Check internal timing of magnetos
	Internal failure	Check oil sump for metal particles. If found, complete overhaul is indicated.
Engine not idling properly	Incorrect carburetor idle adjustment	Adjust throttle stop to obtain correct idle
	Idle mixture	Adjust mixture
	Open primer	Lock primer in closed position
	Leak in the induction system	Tighten all connections and replace defective parts
	Uneven cylinder compression	Check condition of piston rings and valve seats and then check cylinder compression
	Insufficient fuel pressure	Check fuel pumps and filters
	Faulty ignition system	Check ignition leads, plugs, and magnetos

6-160 ENGINE TROUBLE SHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
	Dirty air filter	Clean filter
Low power and uneven running	Mixture too rich; indicated by flames and black smoke from exhaust pipe	Readjustment of carburetor by authorized personnel is indicated
	Mixture too lean; indicated by overheating or backfiring	Check fuel selector valve for proper position; check fuel lines for restrictions; readjust carburetor by authorized personnel
	Leaks in induction system	Tighten all connections and replace defective parts
	Defective spark plugs	Clean and gap or replace spark plugs
	Defective ignition wire	Replace wire
	Magnetos not properly timed	Check for proper timing and synchronization
	Defective spark plug terminal connectors	Replace connectors on spark plug wire
	Improper grade of fuel	Empty tank and fill with proper grade fuel
Failure of engine to develop full power	Throttle not properly adjusted	Adjust throttle lever
	Leak in the induction system	Tighten all connections and replace defective parts
	Dirty air filter	Clean or replace filter
	Restriction in air scoop	Remove restriction
	Improper grade of fuel	Empty tank and fill with proper grade fuel
	Faulty ignition system	Check ignition leads, plugs and magnetos
Rough running engine	Cracked engine mount	Repair or replace mount
	Lead deposit on spark plugs	Clean and regap or replace spark plugs

6-160 ENGINE TROUBLE SHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Rough running engine (Continued)	Unbalanced propeller	Remove propeller and check for balance
	Defective mounting bushings	Install new mounting bushings
	Uneven compression	Check compression
	Malfunctioning engine	Check entire engine
Low oil pressure	Insufficient oil	Check oil supply and fill as recommended
	Dirty oil strainer	Remove and clean oil strainer
	Air or dirt in relief valve	Remove and clean oil pressure relief valve
	Defective pressure gauge	Replace gauge
	Leak in pressure or suction lines	Check gasket between accessory housing and crankcase
	Stoppage in oil pump intake passage	Check line for obstruction and clean strainer
	High oil temperature	See "High oil temperature" in "Trouble" column
High oil temperature	Insufficient oil supply	Check oil supply and fill as recommended
	Insufficient cooling air	Check cowl inlet and outlet for obstructions. Check baffles
	Low grade of oil	Replace with oil conforming to specifications.
	Clogged oil lines or strainers	Remove and clean oil lines and strainers
	Defective gauge	Replace gauge(Ref. 9-90)
	Defective probe	Replace probe(Ref. 9-90)

6-160 ENGINE TROUBLE SHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
High oil temperature (Continued)	Excessive blow by	Usually caused by worn or stuck rings. Complete overhaul required.
	Bearing failure	Examine sump for metal particles. If found, complete overhaul required
Excessive oil consumption	Bearing failure	Examine sump for metal particles. If found, complete overhaul required
	Worn piston rings	Install new rings
	Incorrect installation of piston rings	Install new rings
	Low grade of oil	Replace with proper grade of oil
	External leakage	Check engine carefully for leaking gaskets and o-rings
	Failure of rings to seat (new nitrided cylinders)	Use mineral base oil, climb to cruise altitude at full power and operate at 75% cruise power setting until oil consumption stabilizes
Engine does not stop	Mixture control not correctly adjusted	Adjust mixture control
	Leaking "Idle cut-off"	Overhaul carburetor
	Faulty ignition system	Check ground wires and ignition switch
Cold weather difficulties	Cold oil	Heat oil
	Weak battery	Recharge or replace
	High oil pressure	In extreme cold weather, readings up to approximately 100 psi do not necessarily indicate malfunctioning

6-160 ENGINE TROUBLE SHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Cold weather difficulties (Continued)	Overpriming	Open throttle, put mixture control in "Idle cut-off". Crank engine until it starts and immediately return mixture to "full rich" and close throttle as required.

SECTION IX

INSTRUMENTATION

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9 INSTRUMENTATION

9-00 GENERAL

For extensive servicing behind the instrument panel, the upper deck and glareshield may be removed for easy access. Individual instruments may be removed for replacement or repair by removing the mounting screws through the face of the panel.

N O T E

Repair of any instrument should be accomplished by an FAA approved instrument repair station.

9-10 MAGNETIC COMPASS

The magnetic compass is the liquid-filled, compensating type, incorporating two adjustable magnets. No maintenance is required for the magnetic compass except to occasionally swing it on a compass rose. Adjustments may be made to the instrument by the two screws located on the front face using a non-magnetic screwdriver (brass, aluminum or non-magnetic stainless steel).

9-20 CLUSTER ASSEMBLY

The cluster assembly consists of the fuel and oil pressure gauges, oil temperature gauge and ammeter. Defective gauges should be replaced.

9-30 FUEL GAUGES

The fuel gauges are located in the cabin side panels. The gauges indicate the fuel quantity in each tank and are direct reading requiring a minimum of maintenance. See Section 7-80.

9-30-01 FUEL GAUGE REMOVAL

See Section 7-80-01

9-30-02 FUEL GAUGE CALIBRATION

No fuel gauge calibration is required as the system has no moving parts. See Section 7-80.

9-40 TURN AND BANK INDICATOR

The turn and bank indicator or turn coordinator is an electrically-driven gyro which requires no normal maintenance. Since the turn and bank indicator is electrically-driven, it will only operate when the master switch is on.

9-50 HOURMETER

The hourmeter is controlled by a pressure-operated switch, installed in the oil pressure gauge circuit. As soon as the engine oil pressure builds up to 15 psi, the switch is activated completing the electrical circuit through the hourmeter. This reading is indicative of the true engine time.

9-60 TACHOMETER

The tachometer is connected directly to the engine by a flexible shaft. The tachometer indicates the engine speed and includes an odometer for recording the time of engine operation.

9-70 TURN AND BANK INDICATOR TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer fails to respond or indicate correctly	Blown fuse	Replace with properly rated fuse
	Defective wiring	Isolate with ohmmeter, check and repair or replace defective wires
	Defective mechanism	Replace instrument
	Low voltage	Check for proper voltage and adjust accordingly
	Oil too thick in indicator	Replace instrument
	Excessive friction in gimbal bearings	Replace instrument
Noisy gyro	Voltage too high	Check voltage and adjust accordingly
	Loose or defective rotor bearings	Replace instrument

9-80 OIL PRESSURE GAUGE TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No indication	Insufficient oil	Check oil supply and fill as recommended
	Obstruction in pressure line	Remove all fittings and lines, starting at engine and inspect and clean as required
	Defective gauge	Replace gauge
High or low indication	Defective gauge	Replace gauge
	Oil pressure relief valve out of adjustment	Check engine pressure with a calibrated gauge and correct pressure setting as required

9-90 OIL TEMPERATURE GAUGE TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No indication	Blown fuse	Replace with properly rated fuse
No indication, high or low indication	Gauge not grounded	Check gauge ground connection and perform necessary repairs
	Defective wiring	Check system with ohmmeter and perform necessary repairs
	Defective gauge	Temporarily substitute a 28.5 ohm resistance for the probe. If gauge does not read 245°F (Red Line), replace gauge.
	Defective gauge	Replace gauge
	Defective probe	Replace probe
Low indication	Low voltage	Check voltage and adjust accordingly

9-100 HOURMETER TROUBLE SHOOTING

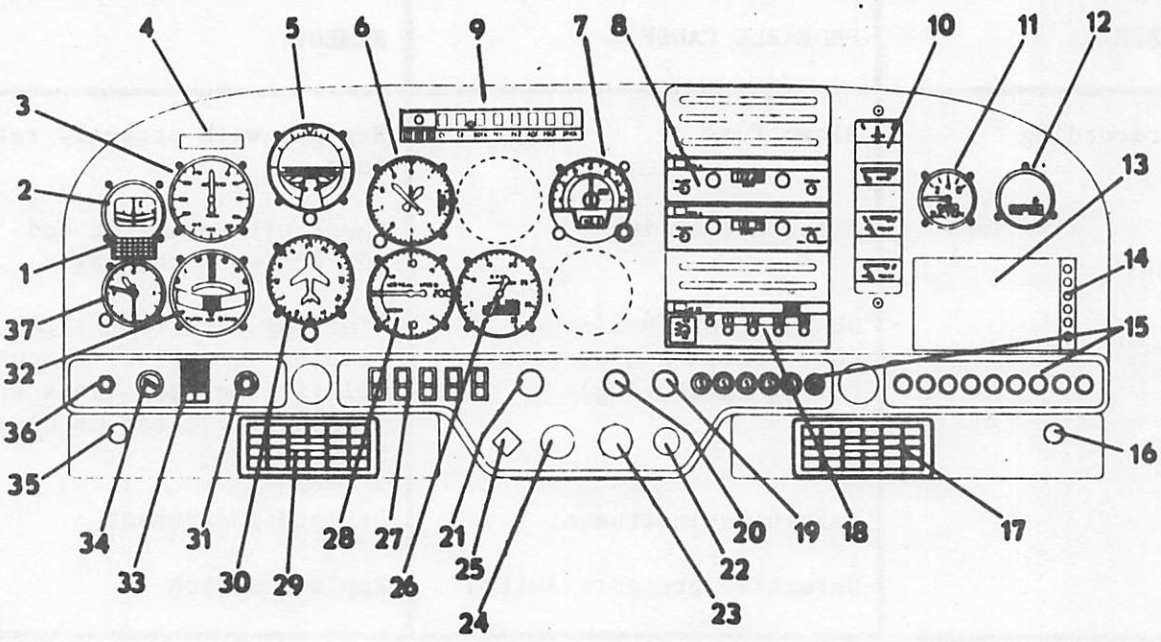
TROUBLE	PROBABLE CAUSE	REMEDY
Not recording	Blown fuse	Replace with properly rated fuse
	Defective wiring	Check with ohmmeter and correct as necessary
	Obstruction in line (oil pressure gauge will not be indicating)	Starting with restrictor fitting in engine, remove all fittings and lines and inspect and clean as necessary
	Defective instrument	Replace instrument
	Defective pressure switch	Replace switch

9-110 MAGNETIC COMPASS TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive error	Compass not compensated	Compensate instrument
	External interference	Locate interference and eliminate or shield

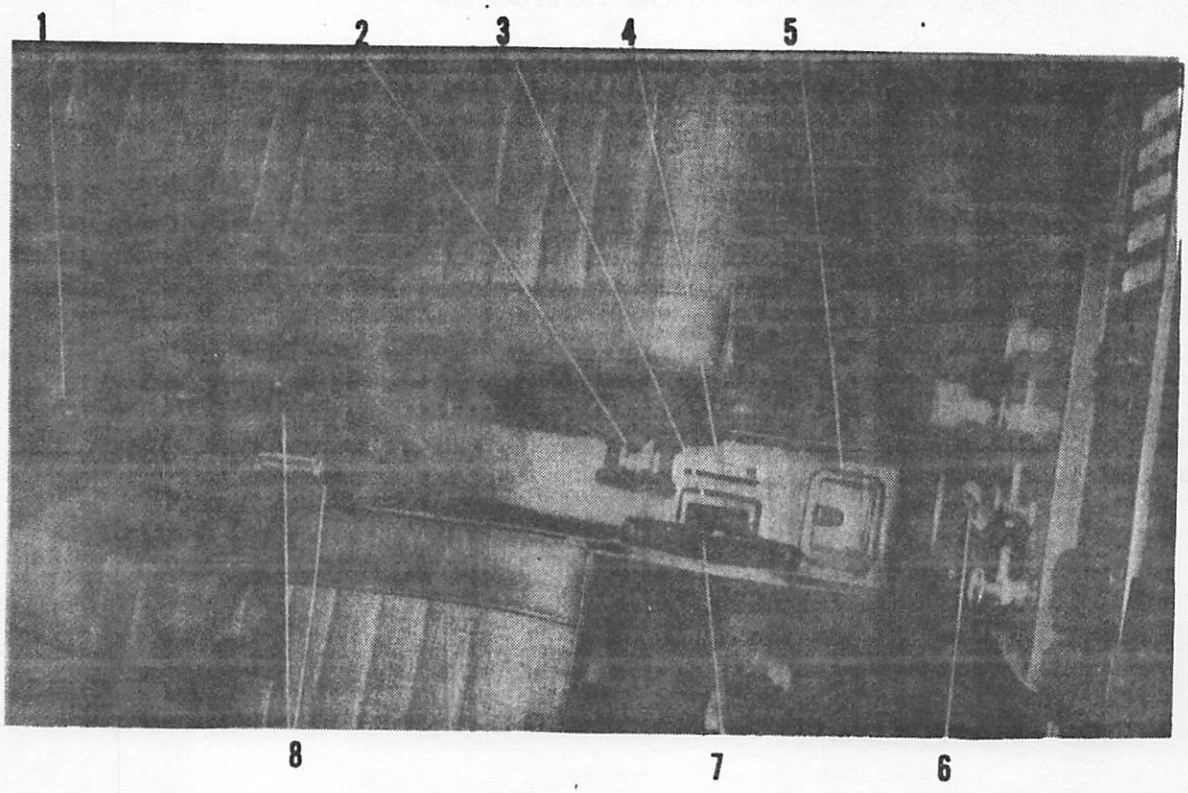
9-120 TACHOMETER TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer not moving	Defective instrument	Replace instrument
	Broken drive shaft	Replace flexible drive shaft
Pointer fluctuates excessively	Dirt in instrument	Replace instrument
	Severely bent or broken drive shaft	Replace drive shaft
	Defective instrument	Replace instrument
Odometer not recording	Defective instrument	Replace instrument



1. Compass Correction Card
2. Compass
3. Airspeed Indicator
4. Aircraft Registration Number
5. Horizon Gyro (opt.)
6. Altimeter
7. Omni Head (opt.)
8. Radios (opt.)
9. Radio Selector Switches (opt.)
10. Instrument Cluster
11. Suction Gauge (opt.)
12. Hourmeter (opt.)
13. Map Compartment
14. Spare Fuses
15. Fuses & Circuit Breakers
16. Vent Control (RH)
17. Vent Louver (RH)
18. Transponder (opt.)
19. Parking Brake Control
20. Cabin Heat Control
21. Instrument Light Rheostat
22. Engine Primer
23. Mixture Control
24. Throttle Control
25. Carb Heat Control
26. Tachometer
27. Individual Circuit Controls
28. Vertical Speed Indicator (opt.)
29. Vent Louver (LH)
30. Directional Gyro (opt.)
31. Starter Button
32. Turn & Bank Indicator (opt.)
33. Master Switch
34. Ignition Switch
35. Vent Control (LH)
36. Head Phone Jack
37. Clock (opt.)

Figure 9-1. Instrument Panel (AA-1B shown)



1. Microphone Jack
2. Flap Switch
3. Elevator Trim Tab Position Indicator
4. Flap Position Indicator
5. Ash Tray
6. Fuel Selector
7. Elevator Trim Wheel
8. Seat Belt Holders

Figure 9-2 Console (AA-1 shown)

9-130 PITOT AND STATIC SYSTEM

The pitot and static systems consist of metal and plastic tubing which convey ram air pressure and atmospheric pressure to the airspeed indicator, vertical speed indicator and altimeter.

Ram air pressure is picked up by the pitot tube, located under the left wing tip. From the pitot tube, a line runs along the leading edge of the wing to the wing root and then to the instruments.

The pitot line should periodically be disconnected inside of the wing root in order to drain any moisture accumulation.

The static system, consisting of a static port on each side of the aft fuselage, conducts atmospheric pressure to the instruments. The line which runs from the ports to the instruments incorporates a moisture trap located behind the left rear seat upholstery side panel.

It is recommended the moisture trap drain be serviced at each static system test, or more often, if fluctuations are observed in instruments connected to the static system, or if moisture is noted inside the cover glass of the air speed indicator.

9-130-01 PITOT SYSTEM LEAKAGE TEST

a. Insert a rubber hose over the pitot tube.

b. Apply pressure by closing the opposite end of the tubing and slowly rolling it up until the airspeed indicator registers between 120-150 mph.

c. Secure the hose.

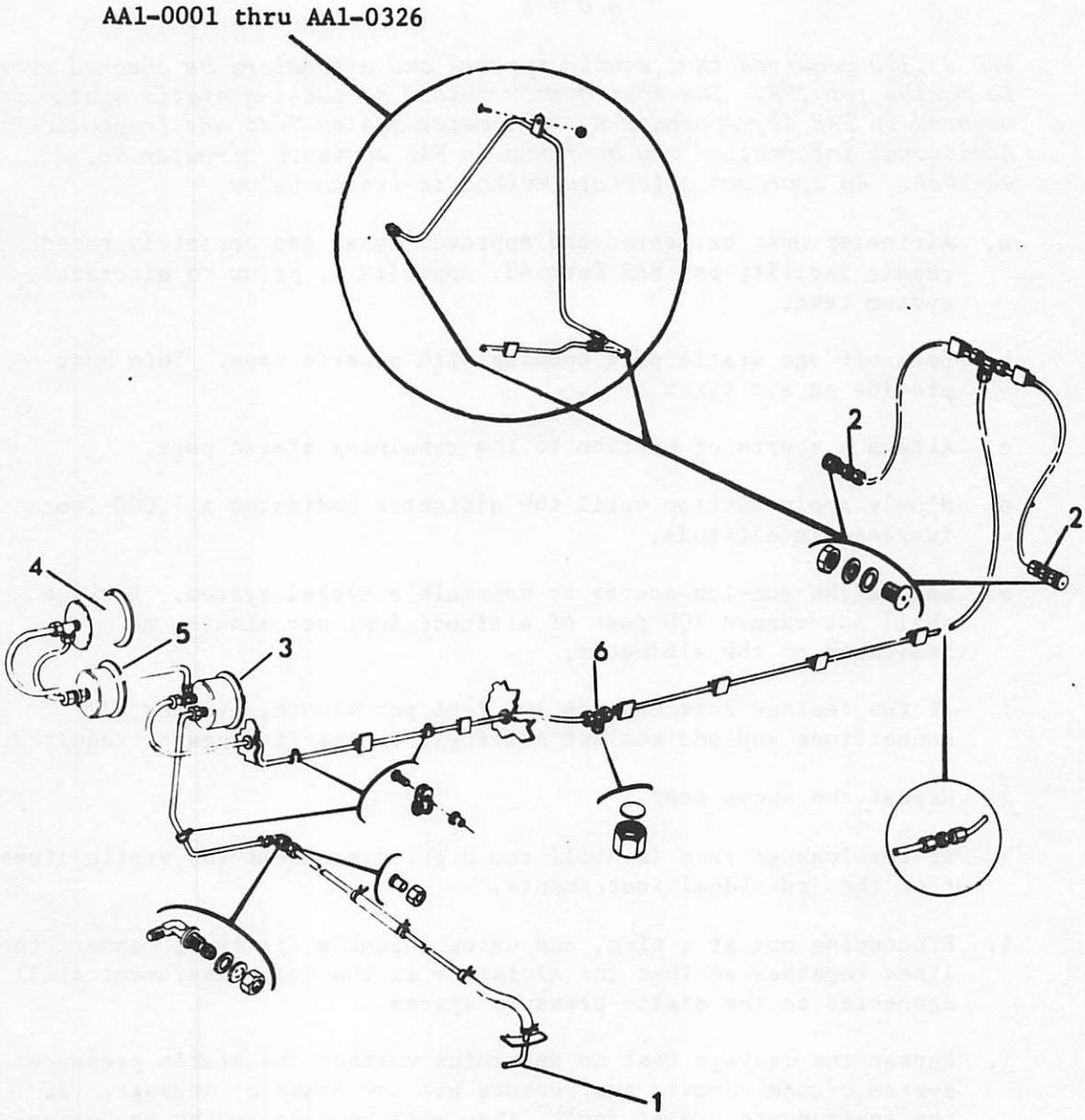
d. After two to three minutes, recheck the airspeed indicator. Any leakage in the system will result in a lower airspeed indication. If the reading has decreased more than 1 mph per minute, an undesirable leak exists somewhere in the system.

e. If a leak does exist, recheck and retighten all the fittings in the system and apply thread sealant sparingly as required. Take special notice of the pitot line in the wing root and replace the hose if it appears to be deteriorated.

f. Repeat the above test.

C A U T I O N

Never apply suction to the pitot tube unless the airspeed indicator is disconnected.



AA1-0327 & On.
AA1A-0001 & On.
AA1B-0001 & On.

1. Pitot
2. Static Ports
3. Airspeed Indicator
4. Altimeter
5. Vertical Speed Indicator
6. Moisture Trap Drain

Figure 9-3. Pitot and Static System

9-130-02 STATIC SYSTEM LEAKAGE TEST

N O T E

FAR 91.170 requires that static systems and altimeters be checked every 24 months for IFR. The most common method of testing static system is covered in FAR 43, Appendix E, "Altimeter System Test and Inspection". Additional information may be found in FAA Advisory Circular No. AC 43-203A. An approved alterrate method is listed below.

a. Altimeter must be tested and approved by an appropriately rated repair facility per FAR Part 43, Appendix E, prior to aircraft system test.

b. Seal off one static port opening with plastic tape. This must provide an air tight seal.

c. Attach a source of suction to the remaining static port.

d. Slowly apply suction until the altimeter indicates a 1,000-foot increase in altitude.

e. Secure the suction source to maintain a closed system. Leakage shall not exceed 100 feet of altitude lost per minute, as indicated on the altimeter.

f. If the leakage rate exceeds 100 feet per minute, tighten all connections and add sealant sparingly to the fittings as required.

g. Repeat the above test.

h. If the leakage rate is still too high, disconnect the static lines from the individual instruments.

i. Proceeding one at a time, and using suitable fittings, connect the lines together so that the altimeter is the only instrument still connected to the static pressure system.

j. Repeat the leakage test to determine whether the static pressure system or the removed instruments are the cause of leakage. If the instruments are at fault, they must be repaired by an "appropriately rated repair station" or replaced. If the static pressure system is at fault, use the above procedure given in a. through e.

C A U T I O N

Never apply positive pressure to the static system unless all instruments are disconnected.

Figure 9-4A and 9-4B shows an outline of the wing contour and a series of parallel lines. To check the proper alignment of the pitot tube, make a template conforming to the lines shown. The pitot tube is properly aligned when parallel to one of the lines $\pm 7^{o}$.

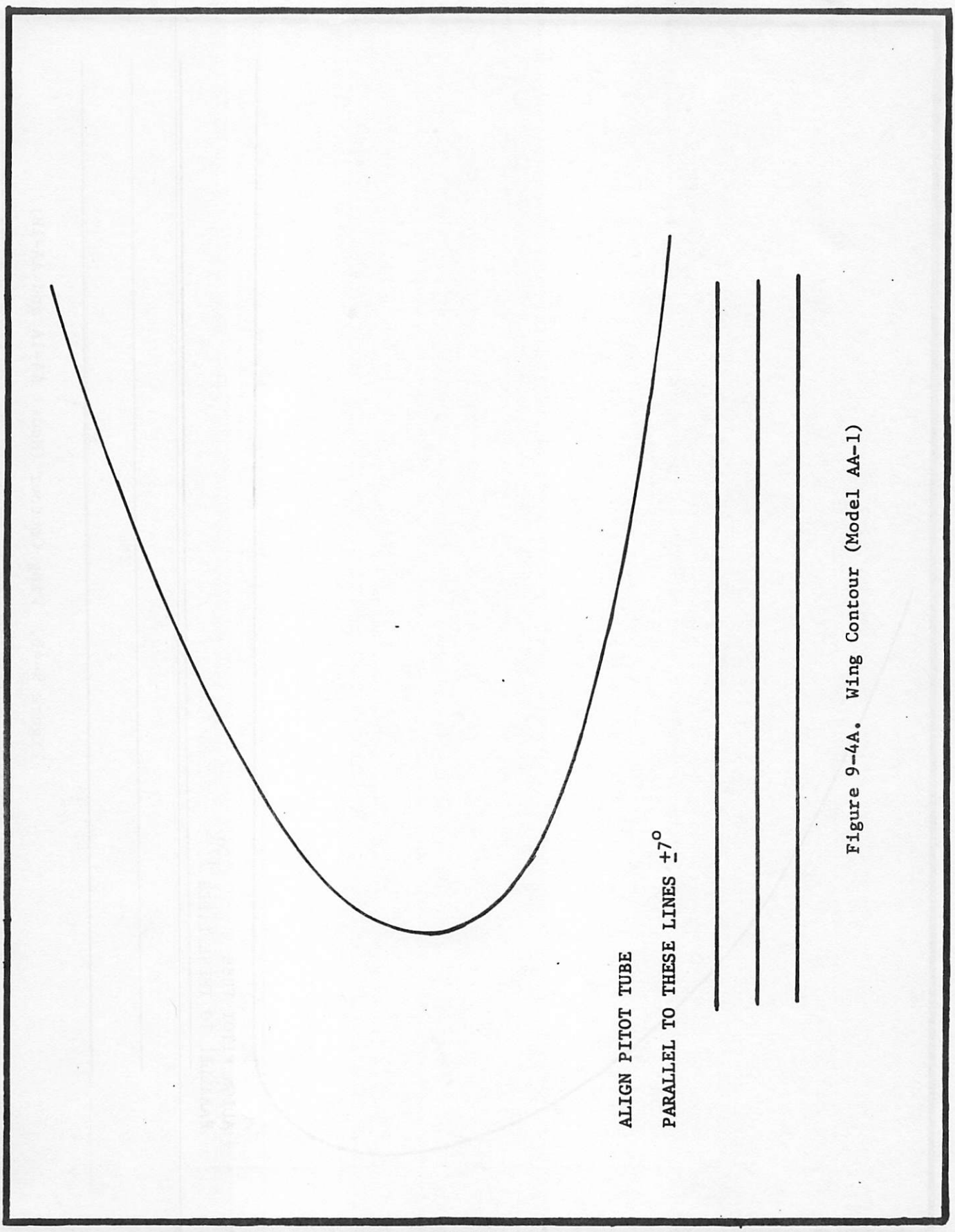


Figure 9-4A. Wing Contour (Model AA-1)

Figure 9-4A.

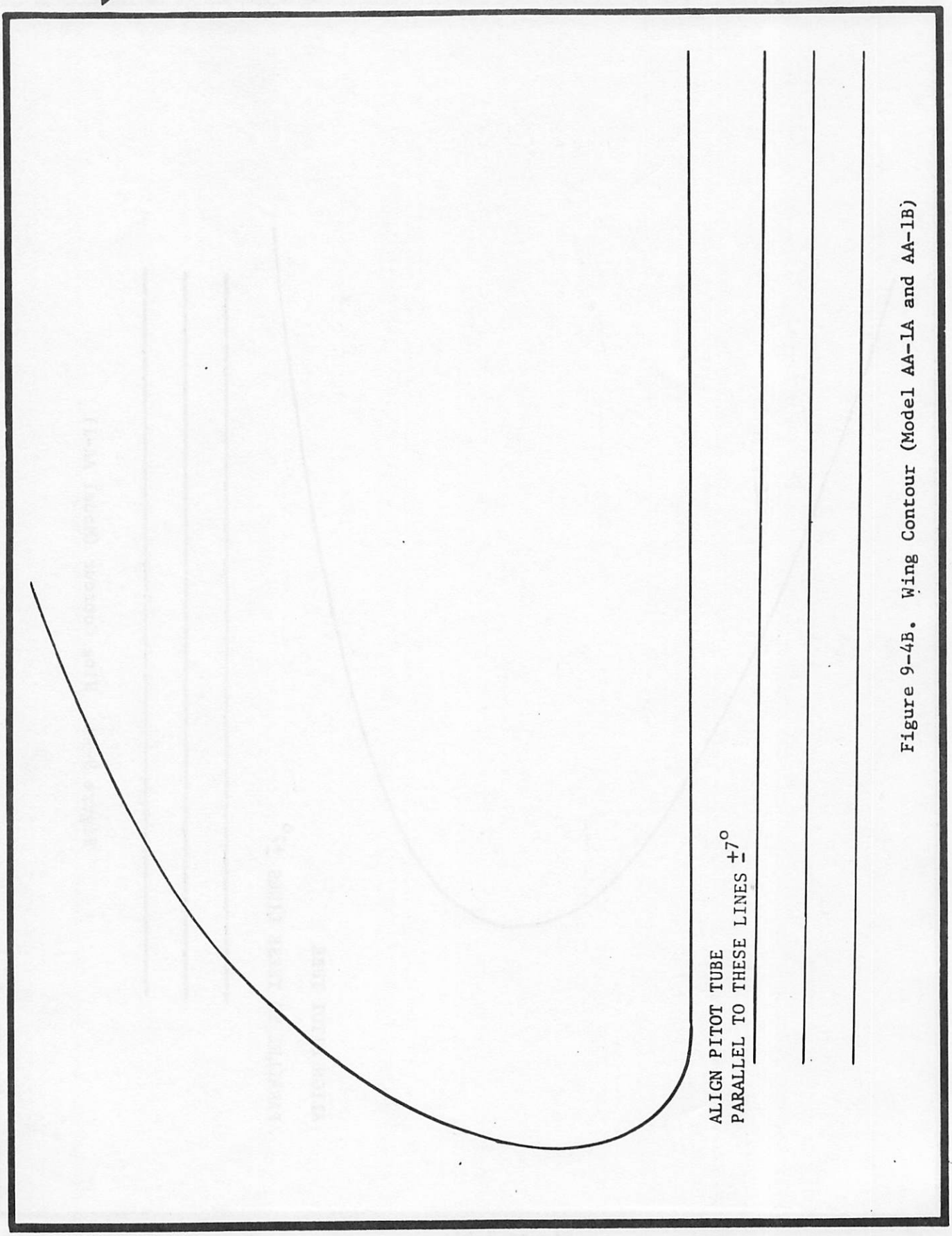


Figure 9-4B. Wing Contour (Model AA-1A and AA-1B)

Figure 9-4B.

9-140 PITOT AND STATIC SYSTEMS TROUBLE SHOOTING

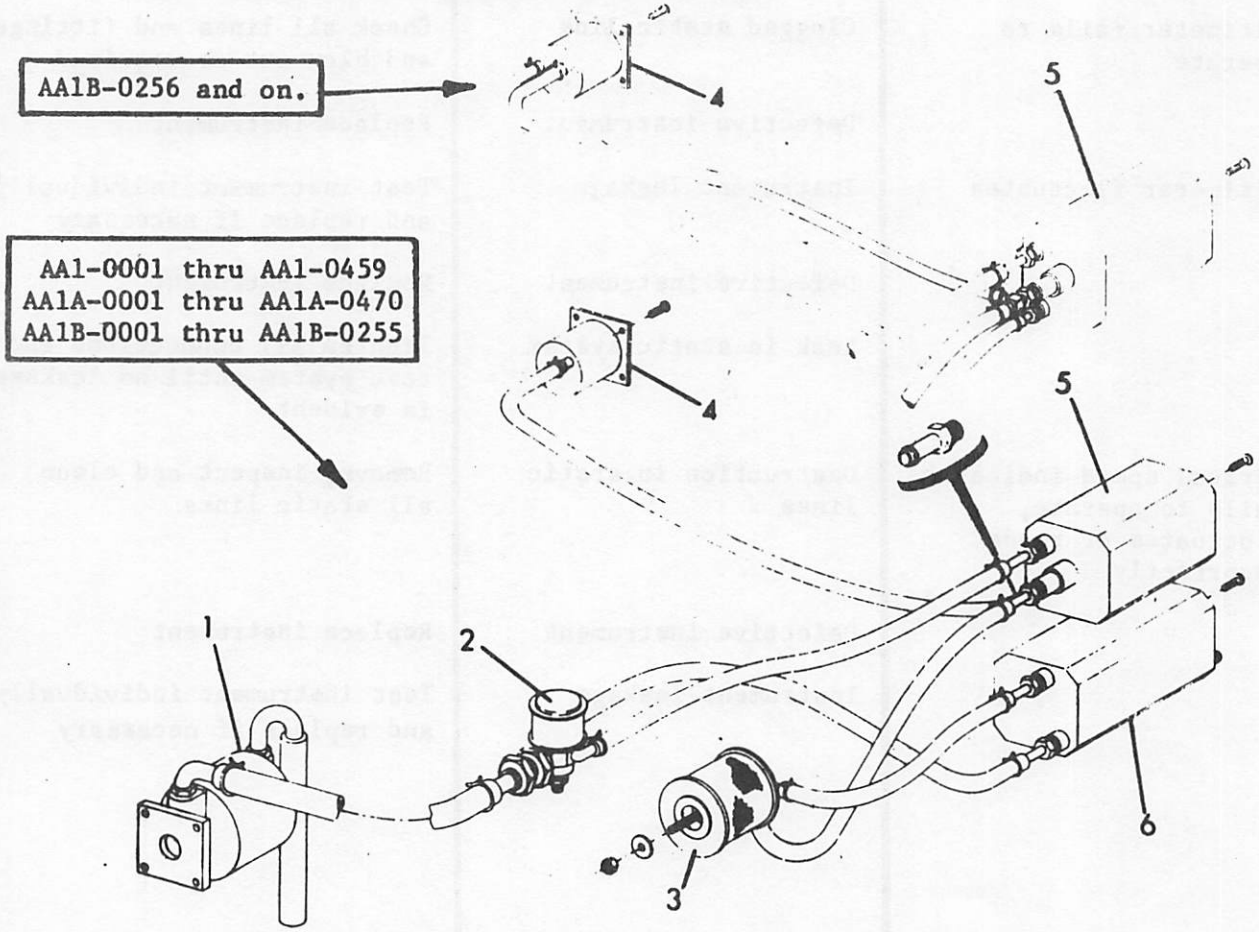
TROUBLE	PROBABLE CAUSE	REMEDY
Airspeed indicator fails to indicate	Obstruction in pitot or static lines	Check all lines and fittings for obstruction and clean as necessary
	Pitot line kinked or disconnected	Check all pitot lines and repair as required
Airspeed indicator fluctuates or indicates incorrectly	Leak in pitot or static systems	Tighten all connections and test system until no leakage is evident
	Defective instrument	Replace instrument
	Instrument leakage	Test instrument individually and replace if necessary
Altimeter fails to operate	Clogged static line	Check all lines and fittings and blow out as required
	Defective instrument	Replace instrument
Altimeter fluctuates	Instrument leakage	Test instrument individually and replace if necessary
	Defective instrument	Replace instrument
	Leak in static system	Tighten all connections and test system until no leakage is evident
Verical speed indicator fails to operate, fluctuates or reads incorrectly	Obstruction in static lines	Remove, inspect and clean all static lines
	Defective instrument	Replace instrument
	Instrument leakage	Test instrument individually and replace if necessary

9-150 HEATED PITOT TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pitot fails to heat	Blown fuse	Replace with properly rated fuse
	Defective wiring	Check with ohmmeter and repair as necessary
	Heater element burned out	Replace element

9-160 VACUUM SYSTEM

The vacuum system consists of an engine driven vacuum pump, vacuum regulator, filter, directional gyro, horizon gyro and a suction gauge, plus necessary tubing and fittings. Since the vacuum pump is of the dry type, no oil separator is required.



1. Engine Driven Vacuum Pump
2. Vacuum Regulator
3. Vacuum Filter
4. Suction Gauge
5. Horizon Gyro
6. Directional Gyro

Figure 9-5. Vacuum System (Optional)

9-160 VACUUM SYSTEM (CONTINUED)

The amount of vacuum being pulled through the instruments is determined by the vacuum regulator. Located behind the instrument panel, the vacuum regulator should be adjusted to indicate 4.6 - 5.4 inches of mercury. This pressure is indicated on the suction gauge which is connected to the horizon gyro.

N O T E

To obtain proper adjustment of the vacuum, adjust with the engine running at 2100 - 2400 rpm.

The vacuum filter is also located behind the instrument panel. It should be checked periodically and the media replaced if necessary. To replace the media, simply remove the filter from the airplane, remove the nut and lock washer, and withdraw the filter element.

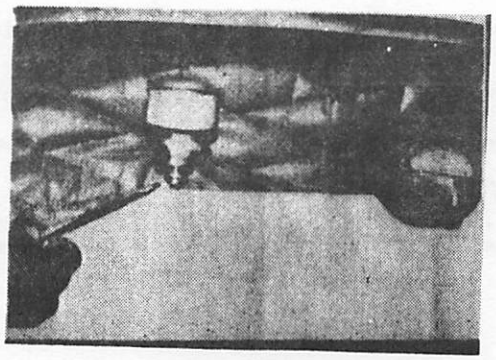


Figure 9-6. Vacuum Filter and Regulator

9-170 VACUUM SYSTEM TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Suction gauge reading excessively high	Regulator not properly adjusted	Adjust vacuum regulator
Suction gauge fails to indicate	Disconnected line somewhere in system	Check all lines for proper and secure connections
	Regulator adjusted to closed position	Adjust vacuum regulator
	Defective gauge	Replace instrument
Gyros sluggish or fail to operate	Disconnected line or leakage somewhere in system	Check all lines for proper and secure connections
Directional gyro precesses excessively	Low vacuum	Adjust vacuum regulator
	Dirty filter	Replace filter element
	Defective instrument	Replace instrument
	Defective pump	Replace pump

9-180 FUEL GAUGE TROUBLE SHOOTING

SEE SECTION 7 - FUEL SYSTEM TROUBLE SHOOTING

9-190 LIMITATIONS AND OPERATING RANGES OF INSTRUMENTS

INSTRUMENT	AA-1	AA-1A	AA-1B
Airspeed Indicator			
Maximum Glide or Dive, Smooth Air	195	195	195
Caution Range	144-195	144-195	144-195
Normal Range	69-144	63-144	64-144
Flap Operating Range	66-100	60-115	61-115
Maneuvering Speed -			
Normal Category	125	120	N.A.
Utility Category	132	127	135
Maximum Canopy Partially Open	130	130	130
Ammeter			
Normal Operating Range	Steady Chg.	Steady Chg.	No Steady Discharge
Oil Temperature			
Normal Operating Range	Green Arc	Green Arc	Green Arc
Maximum Allowable	245°(Red Line)	245°(Red Line)	245°(Red Line)
Oil Pressure			
Minimum Idling	25 PSI	25 PSI	25 PSI
Normal Operating Range	60-90 PSI	60-90 PSI	60-90 PSI
Maximum Allowable(Operating)	90 PSI	90 PSI	90 PSI
Start and Warm-up Maximum	100 PSI	100 PSI	100 PSI
Fuel Pressure			
Normal Operating Range	0.5-8 PSI	0.5-8 PSI	0.5-8 PSI
Suction			
Normal Operating Range	4.6-5.4 In.Hg.	4.6-5.4 In.Hg.	4.6-5.4 In.Hg.
Tachometer			
Normal Operating Range	2000-2600 RPM	2000-2600 RPM	2000-2600 RPM
Idling	600-650 RPM	600-650 RPM	600-650 RPM

SECTION X

STRUCTURAL REPAIR

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10 STRUCTURAL REPAIR

10-00 GENERAL

This information should be used in conjunction with the AC 43.13-1, "Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair". Information contained herein is applicable to repair of damage where replacement of the damaged assembly is considered either unnecessary or impractical. If some doubt exists relative to repair not specifically covered, consult the Customer Service Department.

Field repairs of bonded structures can be made using rivets. Flush riveted repairs can be made in both sheet metal and honeycomb areas. These repairs are normally covered with an epoxy filler to maintain surface contour and smoothness. Bonded repair shall be performed per approved Grumman American Aviation Corporation Specifications.

N O T E

See Section 2-100-02, "Bondline Damage, Inspection Procedures & Repair", for normal maintenance of bondlines.

10-20 TOOLS, JIGS, AND FIXTURES

Very few special tools are required for normal maintenance on these aircraft. Standard shop tools (including a torque wrench and micrometer) are adequate. Required special tools, jigs, and fixtures may be procured through the Grumman American Customer Service Department. A listing of these special tools is in Section 2-Servicing.

10-30 MATERIALS

Structural repairs should be accomplished using identical material to that being repaired (i.e., .032 2024-T3 Clad Aluminum). Figure 10-14 shows the various materials utilized and should be used in determining type of material for all repair work. If material shortages make substitution necessary, 2024-T3 in most cases can be substituted for any other aluminum alloys. However, it is important that the 2024-T3 aluminum contain an aluminum coating (designated as "Alclad") for corrosion protection.

10-40 SERVICE KITS

Available through the Customer Service Department is Service Kit #SK-102, which is a potting kit and includes REN RP-4032A* Resin and REN RP-4032A Hardener plus instructions for proper preparation and application. Also available is Service Kit No. SK-125, which is a bondline repair kit and includes the materials (except distilled water, MEK, alcohol, and metal conditioner), for the repair of delaminated metal to metal bond joints. See Section 2-100-02 for proper application of SK-125.

***REN RP-4032A available through:**
REN Plastics Inc.
Lansing, Michigan 48909

10-50 SHEET METAL REPAIRS - RIVETED

Damage to skin, ribs, and frame areas can generally be repaired during normal sheet metal repair techniques. These are covered in AC 43.13-1. Several typical repairs are also shown in Figures 10-1 and 10-2. Complete fuselage sections can be replaced using standard rivet practices as shown in Figures 10-12 through 10-15, 10-18 and 10-19.

Local wing skin damage can be satisfactorily repaired using rivets. However, if extensive wing skin damage exists, it is recommended that the complete skin panel be replaced. This operation can be accomplished by the factory. The Customer Service Department should be contacted for additional information.

10-60 HONEYCOMB PANEL REPAIRS - RIVETED

Damage to honeycomb panels can be repaired by removal of the material, sealing any exposed honeycomb core with sealant* and splicing in of new repair parts. The splice can be installed with rivets and can be made flush with the external surface if desired. Representative repairs for damaged honeycomb panels are shown in Figures 10-3 through 10-11.

Minor damage to one face sheet of a honeycomb panel which is confined to an area of 1.0 inch or less in diameter, and located in a non-critical area, can be repaired by smoothing sharp edges in the damaged area, sealing any exposed honeycomb core with sealant* and filling with an epoxy filler.

Minor damage to a critical area which is equal to or less than 1.0 inch in diameter can be repaired by removal of the damaged face sheet, sealing any exposed honeycomb core with sealant*, application of resin filler, and installation of a doubler plate. Service Kit #SK-102 includes an acceptable resin filler with resin, hardener, and instructions for preparation and application. It is available through the Customer Service Department. A representative repair is shown in Figure 10-3.

Damaged areas greater than 1.0 inch in diameter or including punctures through both face sheets will require removal of the damaged area and insertion of a honeycomb repair section. Typical repairs are shown in Figures 10-4, 10-5, and 10-6.

Extensive honeycomb panel damage, such as nose gear attachment failure can be repaired by splicing in new honeycomb repair assemblies supplied by the Customer Service Department. Figures 10-7 and 10-10 include an example of such a repair.

When making honeycomb panel repairs which require splicing of the bonding strap angles located at the lower corners of the fuselage, the splice must be so designed to maintain the continuity of the angles from the original panel into the repair panel. This can be achieved with angles riveted over the bonding strap angles across the splice. This is shown in Figure 10-8. The length of the external splice angle can be increased as required for appearance purposes.

* PR1436GB-2 Inhibited Sealant is approved and is available through Products Research and Chemical Corporation, 2919 Empire Avenue, Burbank, California or through the Customer Service Department.

10-60 HONEYCOMB PANEL REPAIRS - RIVETED (Continued)

All riveted honeycomb repairs must include some means of sealing the repair joint from external moisture. This protection is provided by PR1436GB-2 Inhibited Sealant*. Epoxy filler may be used to smooth the repair prior to painting.

All honeycomb edges and repair faying surfaces should be coated with sealant*. Also, all rivets should be dipped in sealant* prior to installation. After completion of the repair, the repaired area should be coated with Zinc Chromate Primer.

10-70 REPAIR OF FORMED THERMO-PLASTIC PARTS

Repair of punctures may be accomplished by cutting out the damaged area, removing the paint and installing an overlapping or flush patch of identical material. A doubler may be added behind the patch if additional strength is required. The bonding agent can be Methy Ethyl Ketone (MEK) or any commercial solvent. Cracks or voids may be repaired by applying a filler composed of solvent and material shavings. Upon completion of the repair, sand the area smooth and repaint.

Extensively damaged parts should be replaced.

10-80 ENGINE MOUNT REPAIR

Engine mount repairs should be accomplished in strict accordance with Part 43 of the Federal Aviation Regulations.

10-90 CONTROL SURFACE REPAIR

After repair and/or repainting of any control surface, it is necessary to check the balance and adjust the mass balance weight as required to bring it within tolerances as follows:

Elevator	0 to +32 in.-oz.
Rudder	0 to +32 in.-oz.
Ailerons	-16 to +20 in.-oz.

A control surface which is leading edge heavy is referred to as "overbalanced" and referred to by (-). Refer to Section 5 for Control System Balancing and Rigging.

10-100 NON REPAIRABLE PARTS

The following parts are not repairable and must be replaced if damaged:

a. Center Spar
b. Wing Spar
c. Main Gear Leg (If damage exceeds allowable per section 4-10-02.

*PR1436GB-2 Inhibited Sealant is approved and is available through Products Research and Chemical Corporation, 2919 Empire Avenue, Burbank, California or through the Customer Service Department.

10-100 NON REPAIRABLE PARTS (Continued)

d. Nose Strut
e. Nose Gear Torque Tubes

10-105 RIVET SUBSTITUTION

Rivets of higher strength than those called out may be used on any structural repair.

10-110 PRIMARY STRUCTURES

The following portions of the aircraft are primary structures.

A. Fuselage

1. Engine Mount
2. Engine Mount Extrusions
3. Lower Fuselage Honeycomb Corners (4" of floor and 4" of side panels)
4. Upper 4" of Fuselage Honeycomb Side Panels
5. Center Spar
6. Center Spar Attach Collars
7. Nose Gear Assembly
8. Main Gear Assembly
9. Aft Fuselage W.L. 49.00 Stiffener Flanges
10. Aft Fuselage Lower Corner Flanges
11. Aft Fuselage Bulkhead (Stabilizer Spar Attach)
12. Horizontal and Vertical Stabilizer Forward Attach Fuselage Bulkheads
13. Forward Turtleback Bulkhead
14. Aft Fuselage/Cabin Honeycomb Side and Bottom Bond Joints

B. Control System

1. All Components

C. Wing

1. Wing Main Spar
2. Wing Main Spar Doublers

D. Empennage

1. Stabilizer Rear Spars
2. Stabilizer Front Spars

E. Control Surfaces

1. Support Brackets
2. Balance Weight Supports
3. Torque Tubes

GENERAL NOTES

1. Use 1/8 inch diameter countersunk Cherry rivets (CR162) or equivalent. Use bucked rivets with caution to prevent nearby bond damage.
2. Surface contour must be maintained. Upon completion of the repair, use an epoxy filler as necessary and sand smooth.
3. This repair can be completed in the area of wing ribs by installing the doubler in two pieces, one on each side of the rib flange.

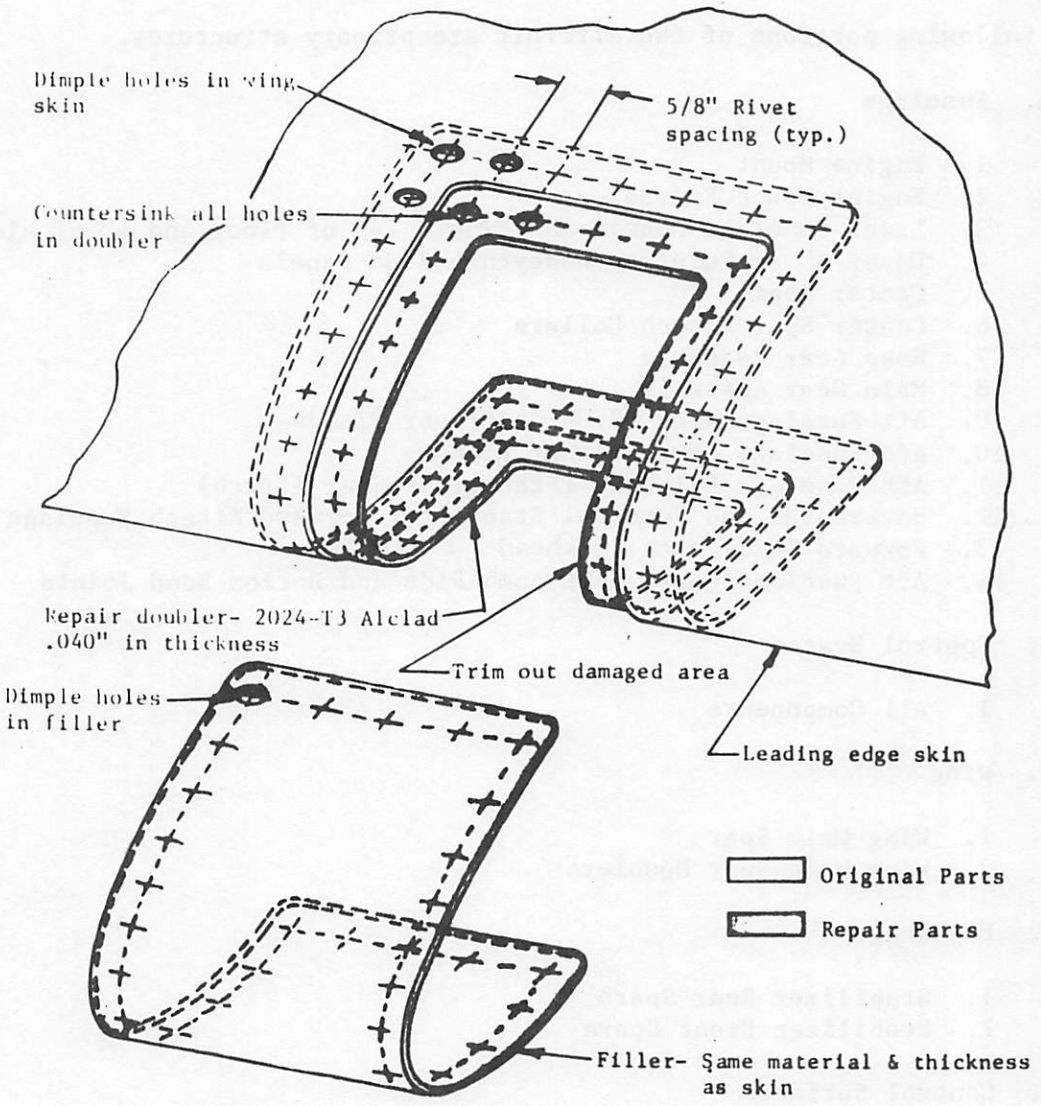


Figure 10-1. Leading Edge Repair (Riveted)

GENERAL NOTES

1. Use 1/8" diameter Cherry rivets (CR162, CR163) or equivalent. Use bucked rivets with caution to prevent nearby bond damage.
2. Repair parts shall be 6061-T6 or equivalent. Doubler thickness shall be .032" (Spar collar thickness is .040").
3. Install all rivets with wet zinc chromate primer.
4. After completion of the repair, the repaired area should be coated with zinc chromate primer.

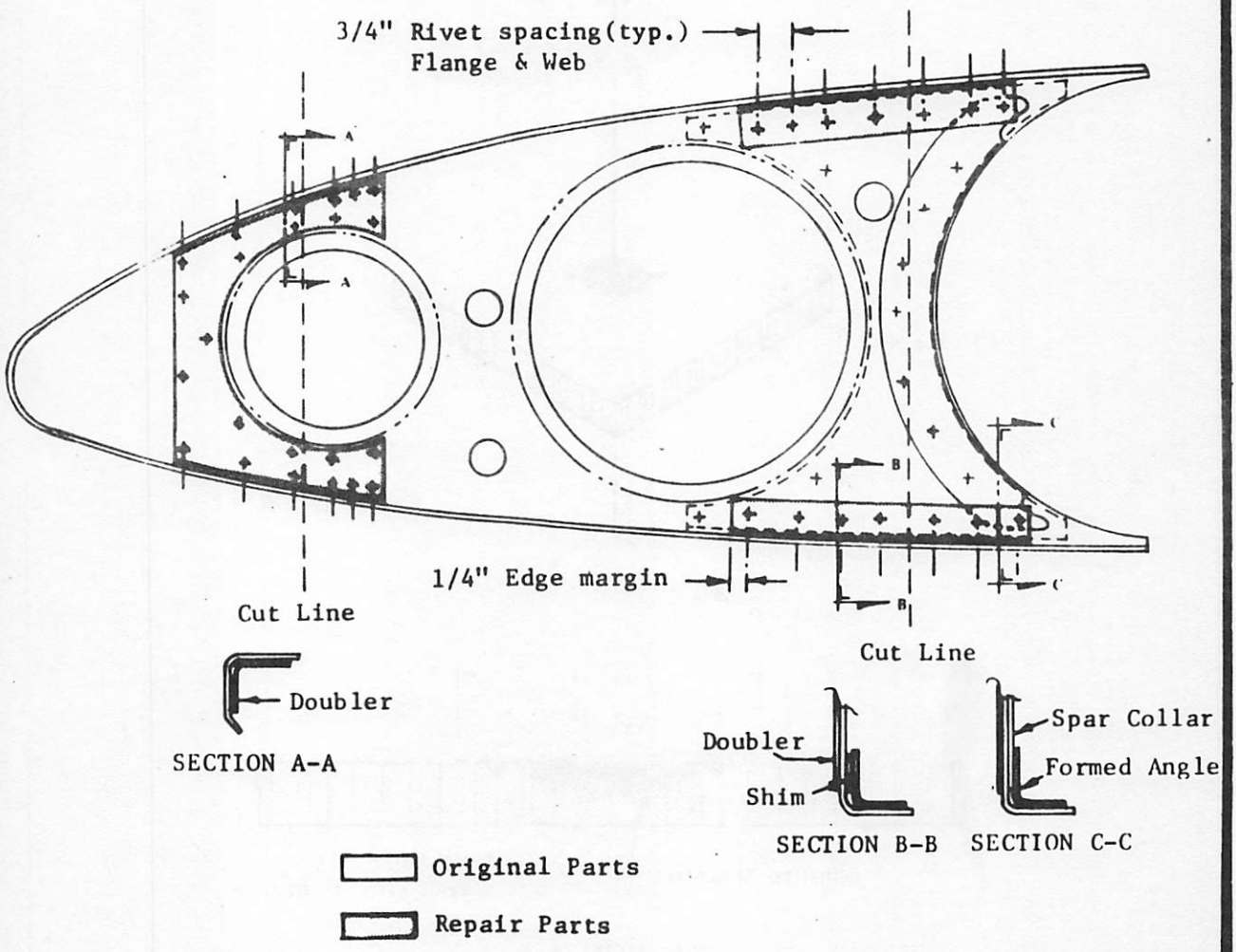
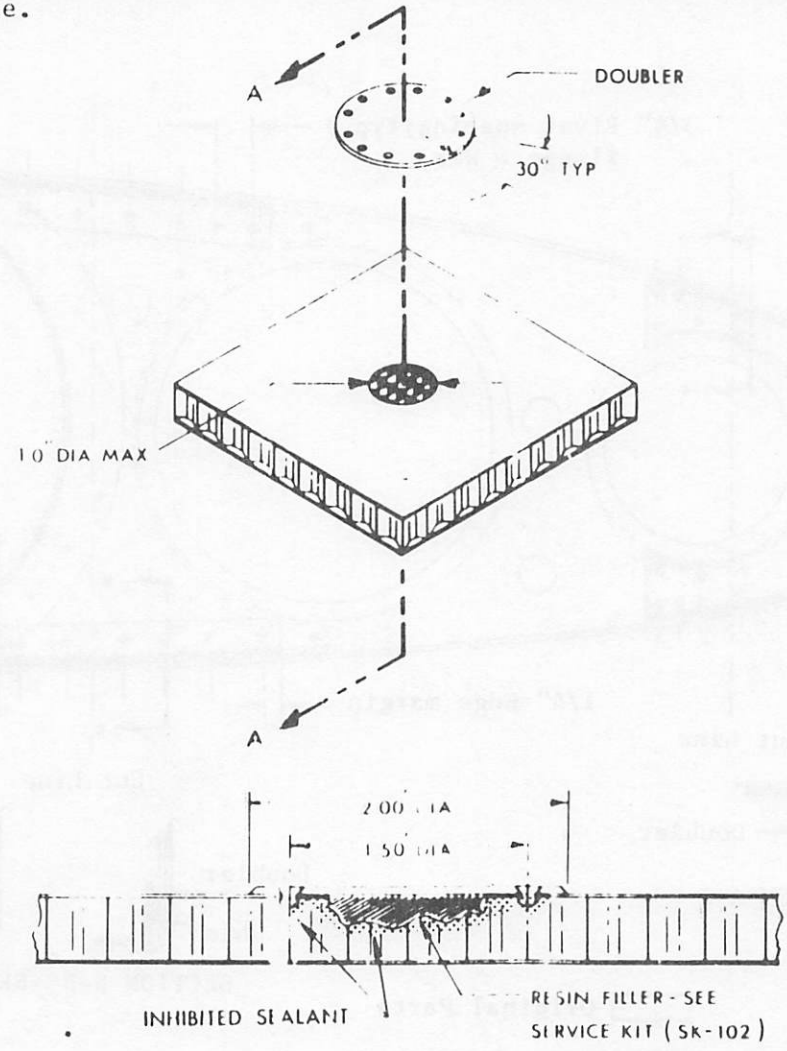


Figure 10-2. Wing Rib Repair (Riveted)

GENERAL NOTES

1. Use 1/8 inch diameter Cherry rivets (CR162 and CR163) or equivalent.
2. Refer to AC 43.13-1, Figure 2.22 for doubler and rivet pattern dimensions. Doublers for riveted repairs shall be .040 2024-T3 alclad aluminum.
3. Seal any exposed honeycomb core with PR1436GB-2 Inhibited Sealant.
4. Coat all parts with zinc chromate primer.
5. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
6. After completion of the repair, the repaired area should be coated with zinc chromate primer.
7. Fair external doubler periphery with epoxy filler to maintain a smooth surface.

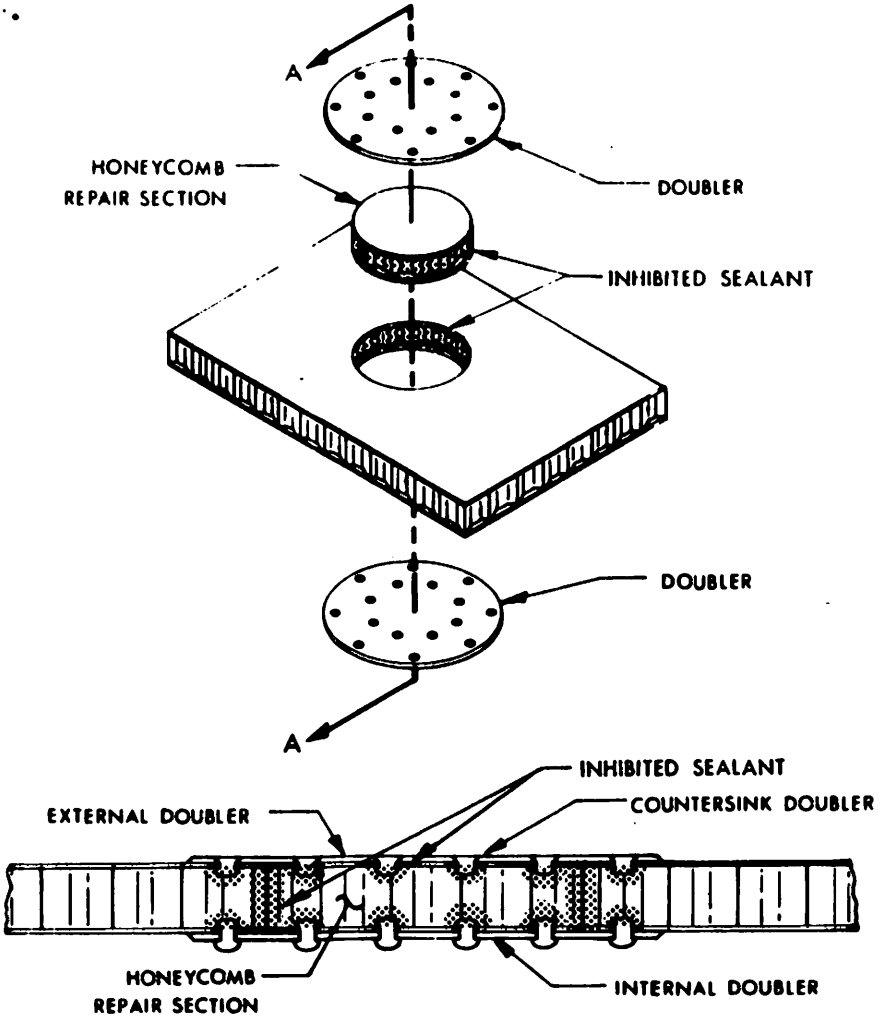


SECTION A-A

Figure 10-3. Honeycomb Repair, External Doubler (Riveted)

GENERAL NOTES

1. Use 1/8 inch diameter Cherry rivets (CR162 and CR163) or equivalent.
2. Rivets should be installed through the doubler and repair section (both sides) such that maximum distance between any two rivets is 1.5 inches.
3. Refer to AC 43.13-1, Figure 2.22 for hole diameter limitations and corresponding rivet patterns. Doublers for riveted repairs shall be .040 2024-T3 alclad aluminum.
4. Seal any exposed honeycomb core with PR1436GB-2 Inhibited Sealant.
5. Coat all parts with zinc chromate primer.
6. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
7. After completion of the repair, the repaired area should be coated with zinc chromate primer.
8. Fair external doubler periphery with epoxy filler to maintain a smooth surface.



SECTION A-A

Figure 10-4. Honeycomb Repair, External Doubler (Riveted)

GENERAL NOTES

1. Use 1/8 inch diameter Cherry rivets (CR162 and CR163) or equivalent.
2. This repair is satisfactory for most honeycomb repairs which require new panel sections to be spliced into existing structure.
3. External doubler shall be .040 2024-T3 alclad aluminum or equivalent and internal doubler shall be .032 2024-T3 alclad aluminum or equivalent.
4. Seal any exposed honeycomb core with PR1436GB-2 Inhibited Sealant.
5. Coat all parts with zinc chromate primer.
6. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
7. After completion of the repair, the repaired area should be coated with zinc chromate primer.
8. Fair external doubler periphery with epoxy filler to maintain a smooth surface.
9. Dimensions are typical for most honeycomb repairs using external doublers.

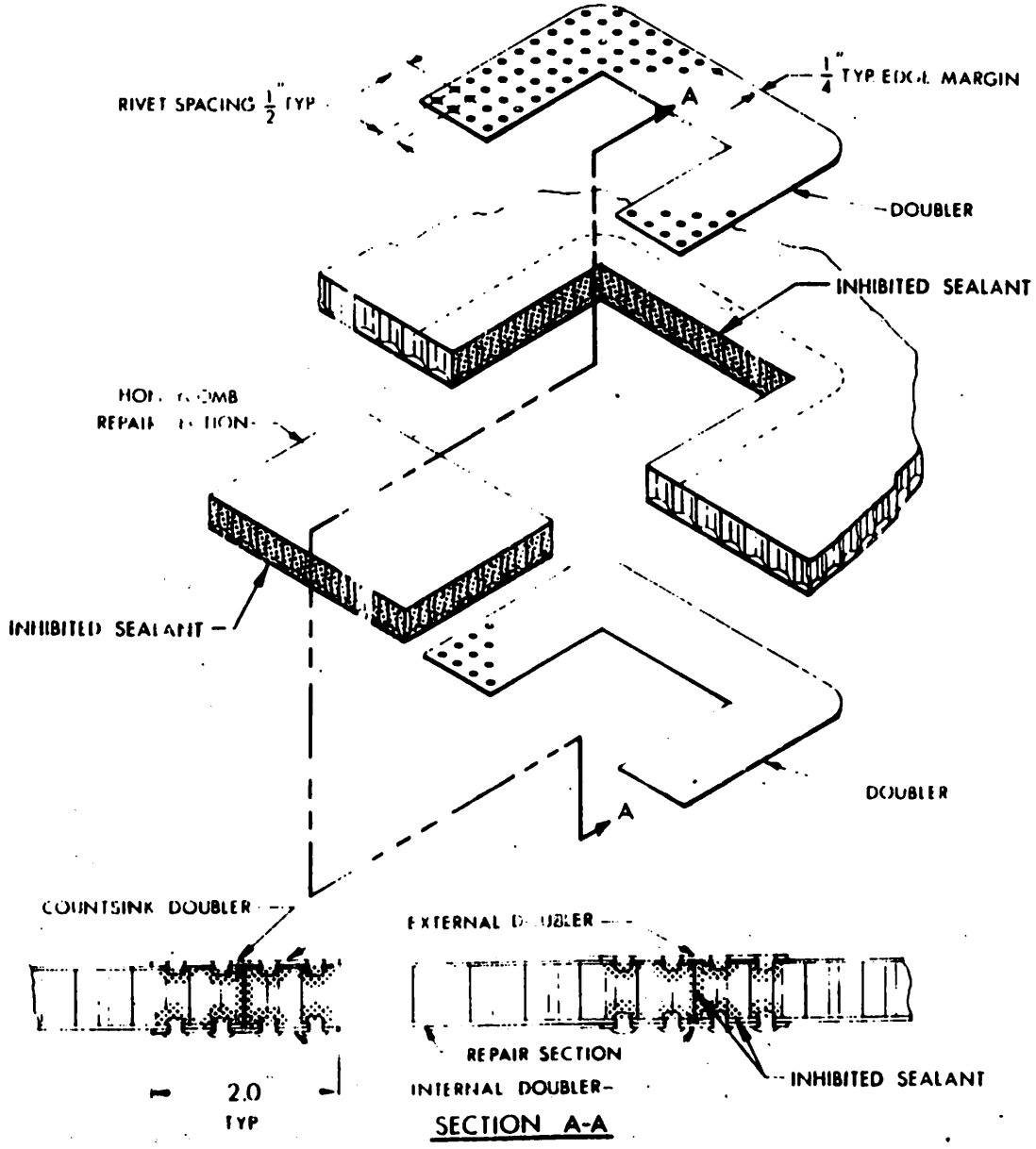


Figure 10-5. Honeycomb Repair, External Doubler (Riveted)

GENERAL NOTES

1. Use 1/8 inch diameter Cherry rivets (CR162 and CR163) or equivalent.
2. Remove damaged portion of external face sheet, and 1.0 inch of honeycomb core and internal face sheet around periphery of hole in external face sheet.
3. In general, repairs of this type are not restricted as to size or shape; however, rectangular, circular, or oval shapes with generous corner radii (1/2 inch minimum) are desirable for ease of installation.
4. Obtain repair section material with .040 face sheet through Customer Service Department.
5. Seal any exposed honeycomb core with PR1436GB-2 Inhibited Sealant.
6. Coat all parts with zinc chromate primer.
7. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
8. After completion of the repair, the repaired area should be coated with zinc chromate primer.
9. Fill external surface with epoxy filler and sand to maintain smooth surface.

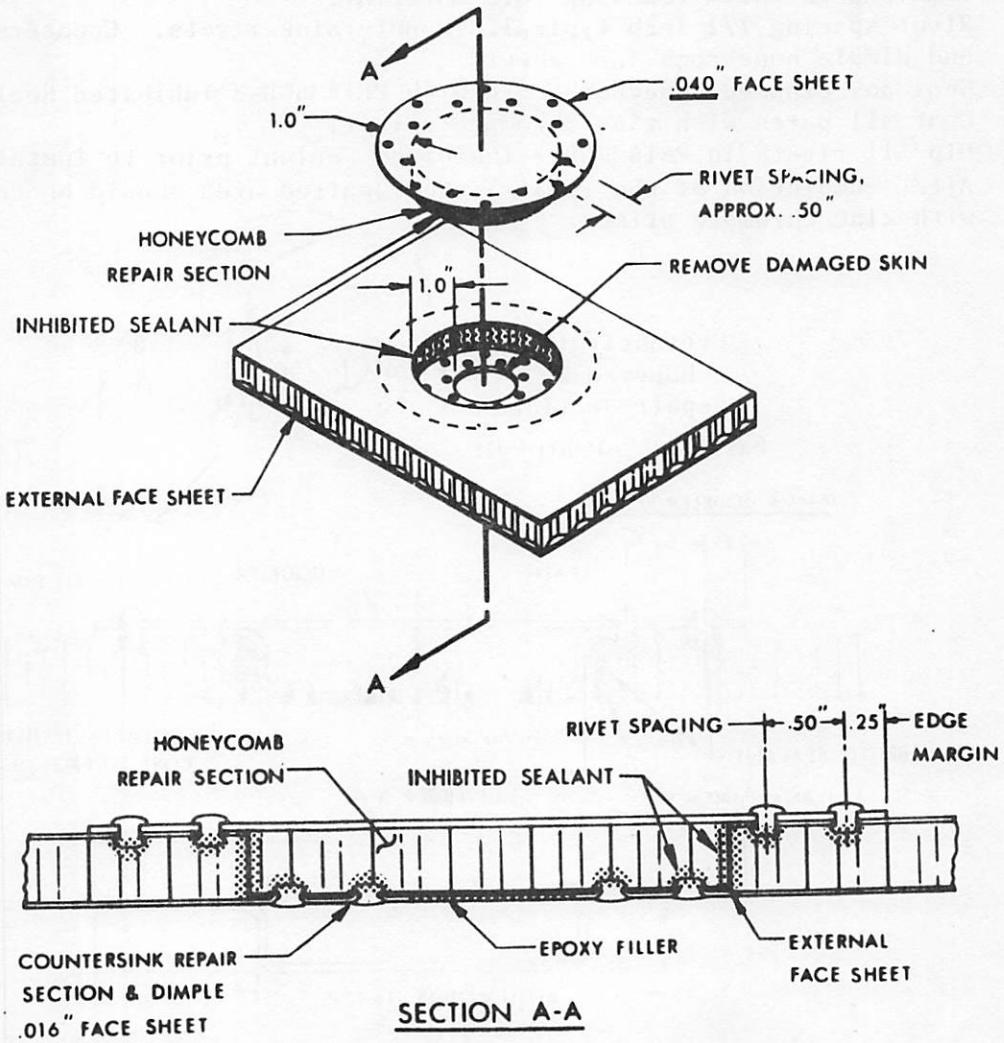
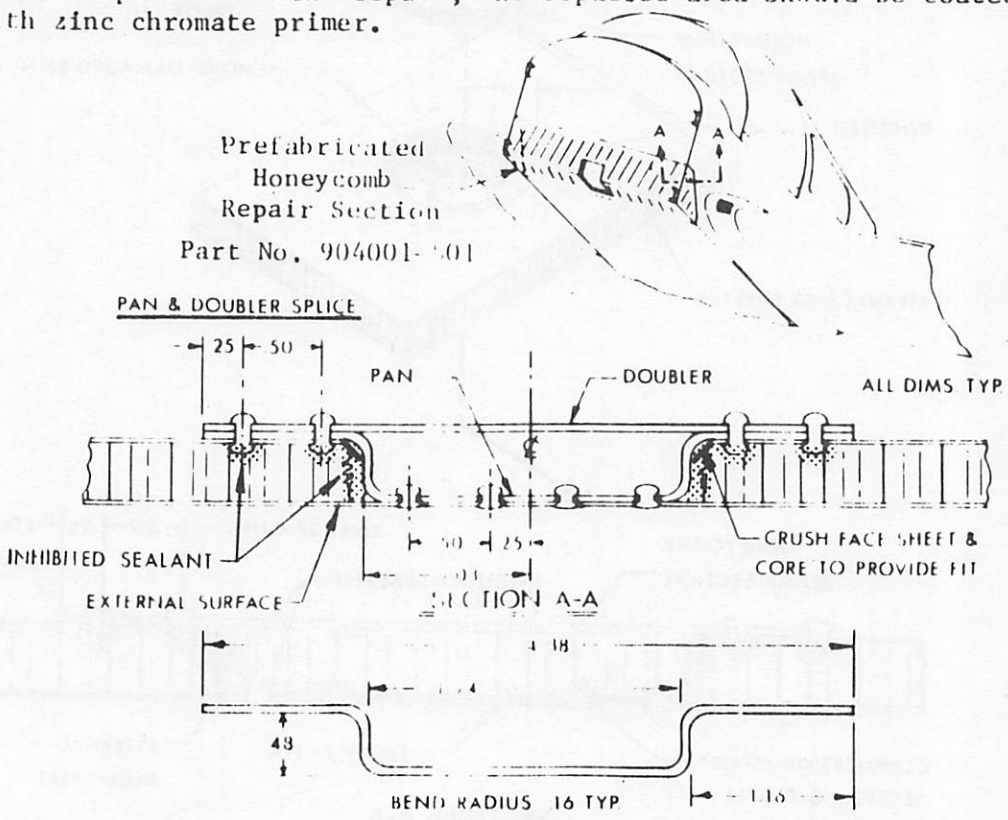


Figure 10-6. Honeycomb Repair, Flush (Riveted)

GENERAL NOTES

1. Use 1/8 inch diameter Cherry rivets (CR162 and CR163) or equivalent. Use bucked rivets with caution to prevent adjacent bond damage.
2. This repair can be made using (a) external doublers as shown in Figure 5, (b) rectangular sections of honeycomb the length of the repair splice similar to section A-A of Figure 6, or (c) the sheet metal pan and doubler method as shown below.
3. The external doublers are recommended for repair splices in the firewall and floor honeycomb panels. This allows the honeycomb panels to be butted enhancing ease of repair. The decision on whether to use an external or flush repair on the fuselage side panel depends on individual preference.
4. Pan and doubler material will be .063 2024-T3 alclad aluminum or equivalent. Preformed pan sections can be obtained through the Customer Service Department.
5. To prevent distortion, carefully support outer face sheets of honeycomb panels while removing core material.
6. Rivet spacing 1/2 inch typical. Countersink rivets. Countersink pan and dimple honeycomb face sheet.
7. Seal any exposed honeycomb core with PR1436GB-2 Inhibited Sealant.
8. Coat all parts with zinc chromate primer.
9. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
10. After completion of the repair, the repaired area should be coated with zinc chromate primer.

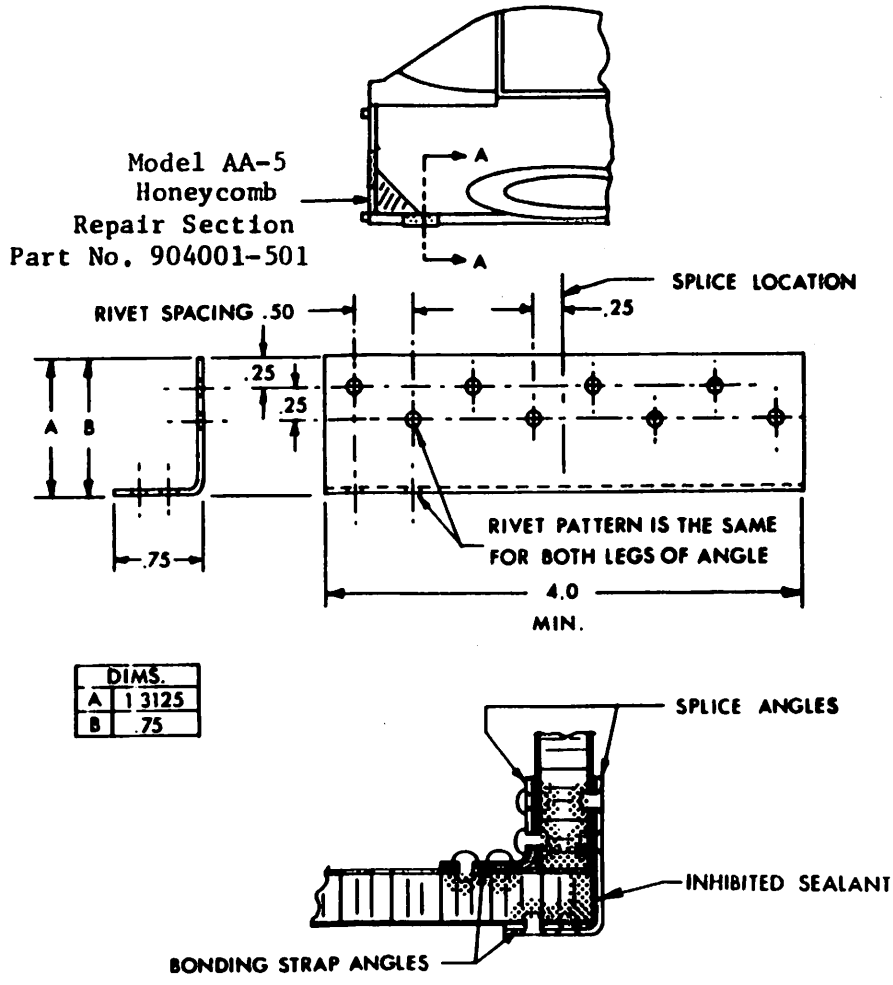


PAN (.063 2024-T3 ALCLAD ALUM SHEET)

Figure 10-7. Honeycomb Repair - Forward Fuselage Section (Flush Riveted)

GENERAL NOTES

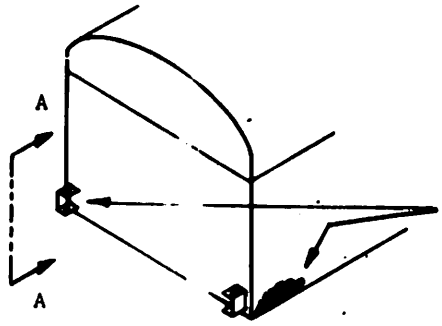
1. Use 1/8 inch diameter Cherry rivets (CR162 and CR163) or equivalent.
2. Splice angle material shall be 2024-T3 alclad aluminum. Where countersunk rivets are to be installed, angle thickness shall be .040 inch. Otherwise, .032 inch thick material is satisfactory.
3. Form splice angles as shown in diagram below.
4. Seal any exposed honeycomb core with PR1436GB-2 Inhibited Sealant.
5. Coat all parts with zinc chromate primer.
6. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
7. Install a minimum of 8 rivets on each side of splice.
8. If splice angle length is increased, rivet spacing may be increased proportionately up to 1.0 inch maximum.
9. After completion of the repair, the repaired area should be coated with zinc chromate primer.



SECTION A-A

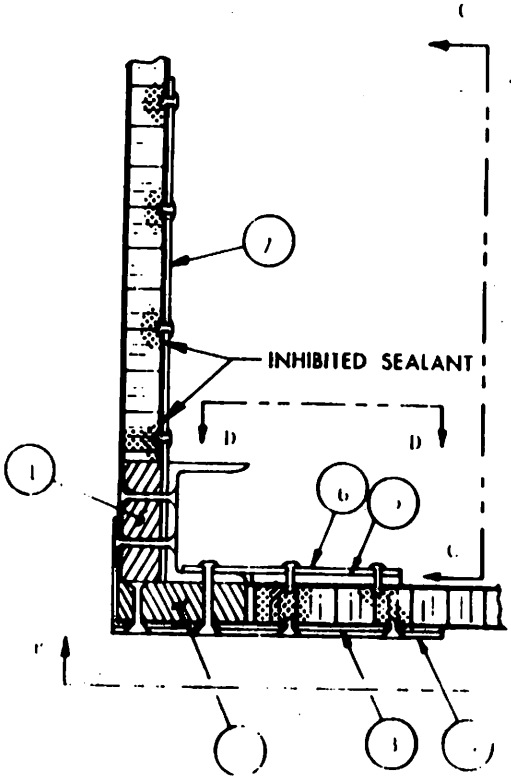
Figure 10-8. Bonding Strap Angle Splice (Riveted)

FIELD REPAIR NOTES



Honeycomb crushed & torn in this area.

PURPOSE: This data specifies the repair details for the repair of damaged honeycomb in the area adjacent to the two lower engine mount extrusions.



ITEM NO.	DESCRIPTION	MATERIAL
1.	Block .484 x 1.5 x 9.6	2014-T6 or 2024-T3
2	Block .484 x 1.7 x 9.6	2014-T6 or 2024-T3
3.	Spacer t = .025, trim to fit under item 4.	2024-T3 Alclad
4.	Splice See Section B-B	2024-T3 Alclad
5.	Spacer t = .090, trim to fit under item 6.	2024-T3 Alclad
6.	Splice See Section D-D	2024-T3 Alclad
7.	Reinforcement t = .080 See Section C-C	2024-T3 Alclad

View B-B, C-C, & D-D on following page.

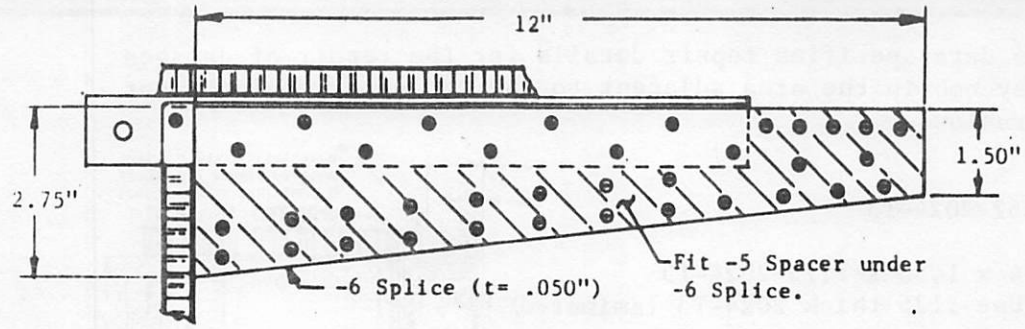
NOTE:
Nose gear torque tube not shown.

SECTION A-A Looking Aft (Firewall Removed)

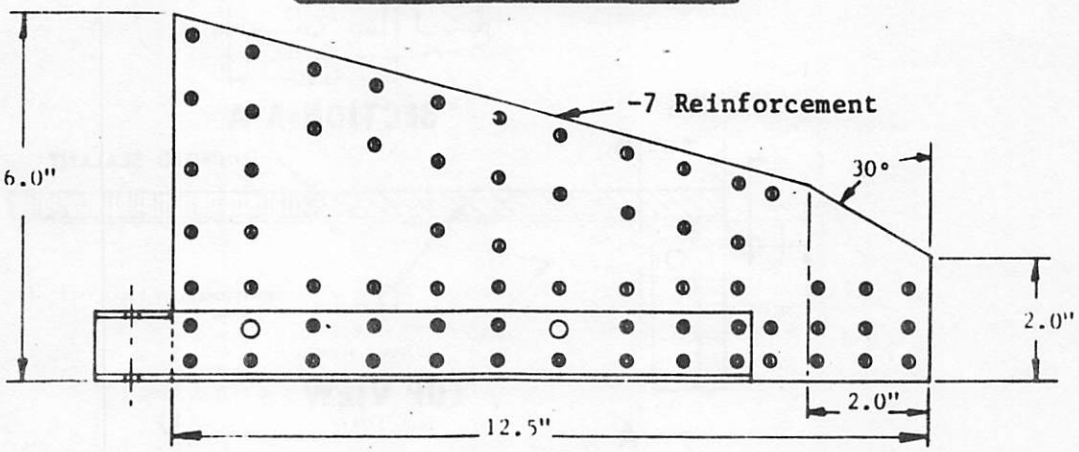
GENERAL NOTES:

1. Coat all parts with zinc chromate primer.
2. Seal any exposed bondlines and honeycomb core with PR1436GB-2 Inhibited Sealant.
3. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
4. New engine mount extrusions are required.
5. Fill over rivet heads on exterior areas with filler and smooth before painting.
6. Carefully clean away all remaining adhesive before riveting in repair sections. Use fine grain sand paper. Coat any remaining exposed bondlines with PR1436GB-2 Inhibited Sealant.
7. After completion of the repair, the repaired area should be coated with zinc chromate primer.

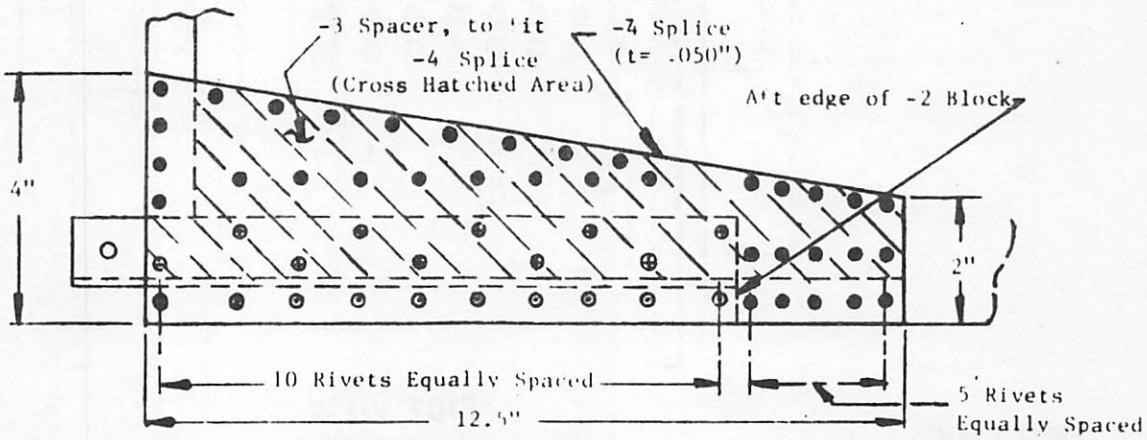
Figure 10-9. Honeycomb Repair, Lower Engine Mount Area



SECTION D-D View Looking Down



SECTION C-C View Looking Outboard



SECTION B-B View Looking Up

- ⊙ MS426AD4-14 Double Countersunk as shown, page 1.
- ● CR2248-4-2 Located as shown 34 req'd.
- ● MS426AD4-16 10 req'd.
- ⊖ CR2249-4-3 27 req'd.
- ● MS426AD4-12 18 req'd.
- ● CR2249-4-2 48 req'd.

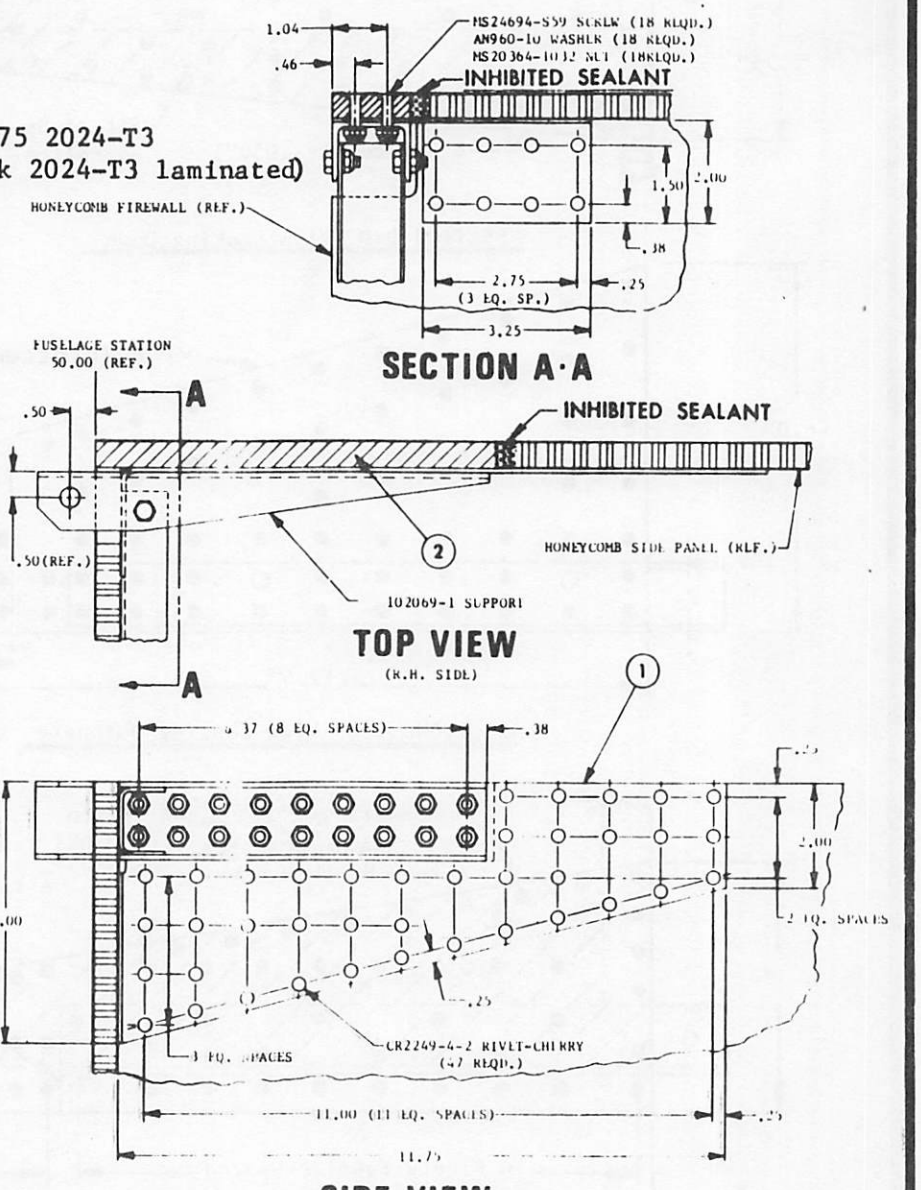
Figure 10-9. Honeycomb Repair, Lower Engine Mount Area (Continued)

PURPOSE: This data specifies repair details for the repair of damaged honeycomb in the area adjacent to the two upper engine mount extrusions.

ITEM

1. Doubler .062 2024-T3

2. Filler .484 x 1.50 x 7.75 2024-T3
   (Alternate-Use .125 thick 2024-T3 laminated)

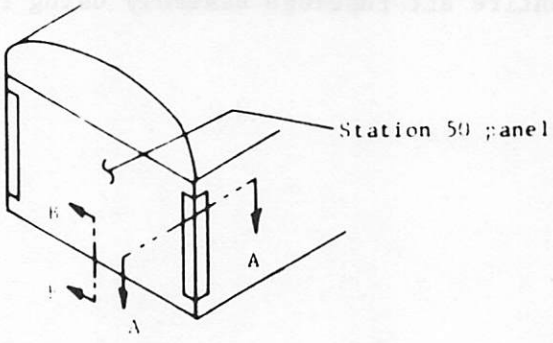


GENERAL NOTES

1. Carefully clean away all remaining adhesive with fine sandpaper before riveting in repair sections. Coat any remaining exposed bondlines with PR1436GB-2 Inhibited Sealant.
2. Coat all parts with zinc chromate primer.
3. Seal any exposed bondlines and honeycomb core with PR1436GB-2 Inhibited Sealant.
4. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
5. New engine mount extrusions are required.
6. Fill over exterior bolt heads with filler and smooth before painting.
7. Drill new engine mount holes in extrusions.
8. After completion of the repair, the repaired area should be coated with zinc chromate primer.

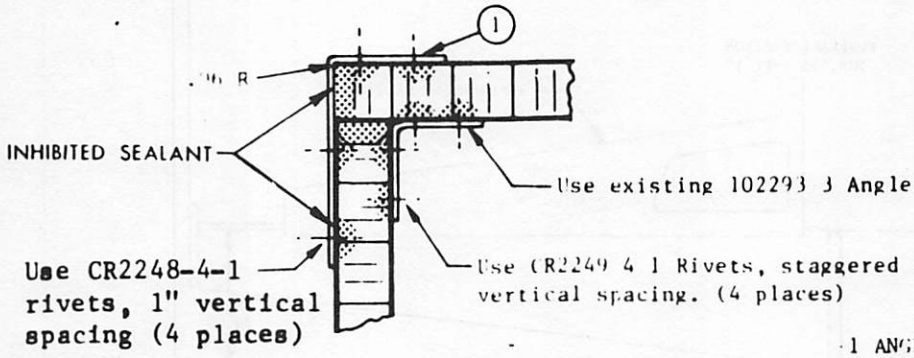
Figure 10-10. Honeycomb Repair, Upper Engine Mount Area

FIELD REPAIR NOTES



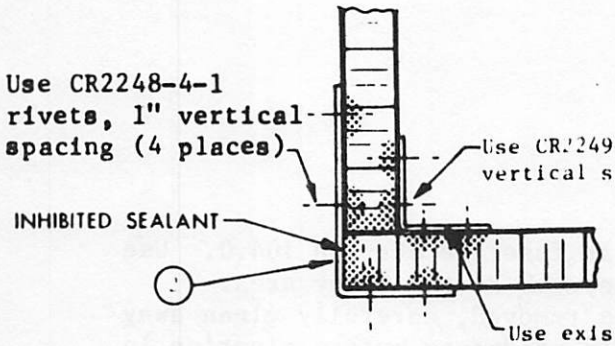
PURPOSE

To replace the forward fuselage (Station 50) honeycomb panel.



SECTION A-A Top View

-1 ANGLE 1"x 1.5", Make from 2024 T3 Alclad t = .040", L = 21.77"



-2 ANGLE 1"x 1.5", Make from 2024 T3 Alclad t = .040", L = 17.89"

× × ×

× × ×

VERTICAL

STAGGERED VERTICAL

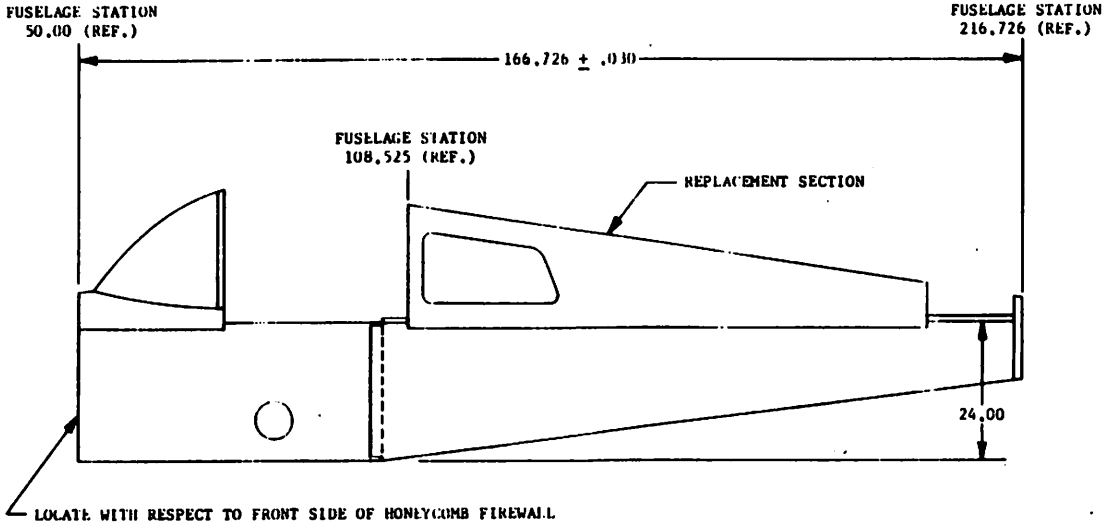
SECTION B-B Side View

GENERAL NOTES

1. Carefully clean away all remaining adhesive before riveting in repair section. Use fine grain sandpaper. Coat any remaining exposed bondlines with PR1436GB-2 Inhibited Sealant.
2. Seal any exposed bondlines and honeycomb core with PR1436GB-2 Inhibited Sealant.
3. Coat all parts with zinc chromate primer.
4. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
5. After completion of the repair, the repaired area should be coated with zinc chromate primer.
6. Fill over exterior rivets with filler and smooth before painting.

Figure 10-11, Honeycomb Panel Replacement (Station 50.0)

PURPOSE: To replace the entire aft fuselage assembly using rivets.

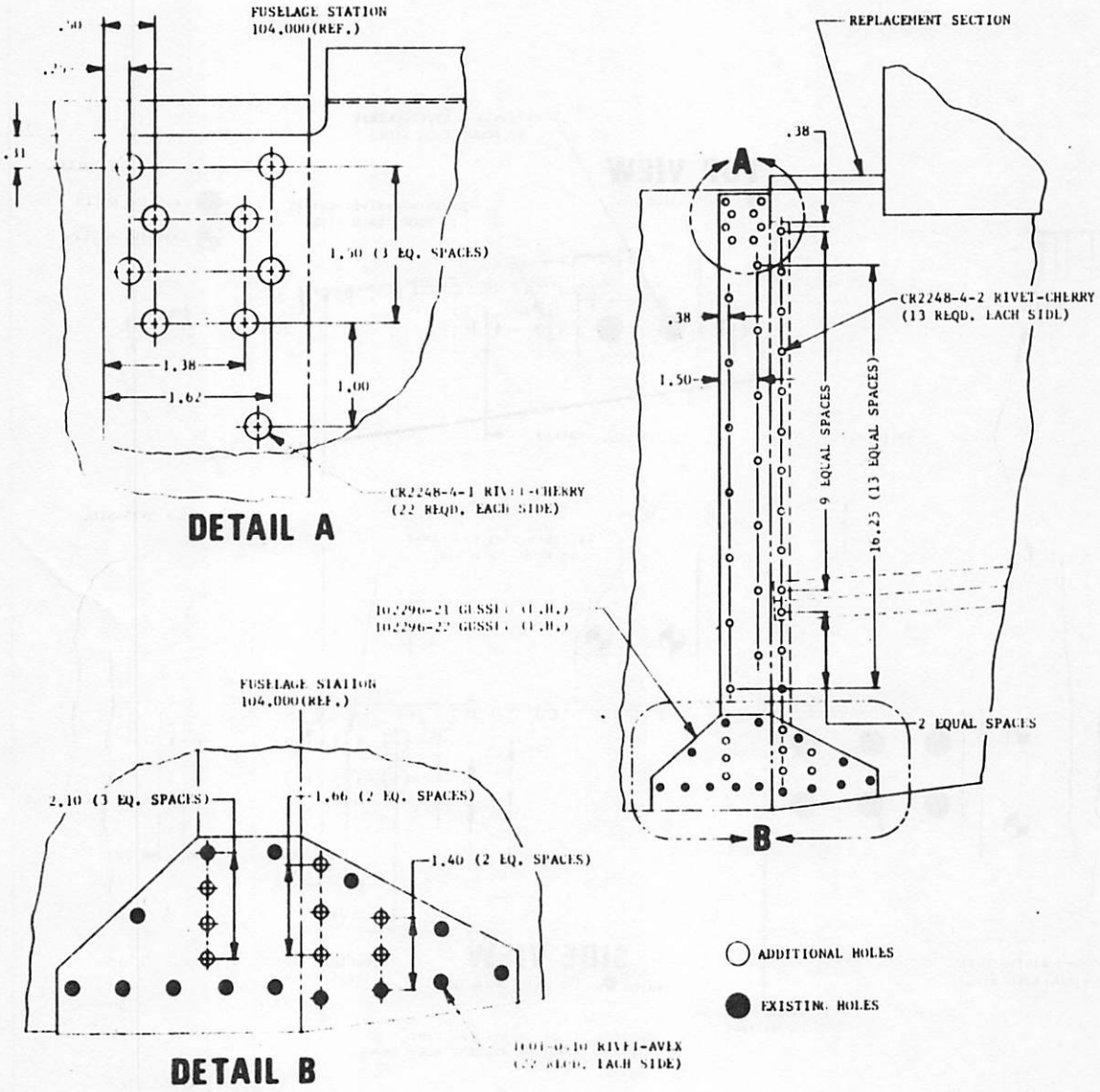


GENERAL NOTES

1. Remove damaged aft fuselage section at fuselage station 104.0. Use caution to prevent damage to the honeycomb at the joint area.
2. After damaged aft fuselage section is removed, carefully clean away all remaining adhesive with fine grain sandpaper before riveting in the repair section. Coat any remaining exposed bondlines with PR1436GB-2 Inhibited Sealant.
3. Coat all parts with Zinc Chromate Primer.
4. Seal any exposed bondlines and honeycomb core with PR1436GB-2 Inhibited Sealant.
5. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
6. Fill over exterior rivets with filler and smooth before painting.
7. After completion of the repair, the repaired area should be coated with Zinc Chromate Primer.

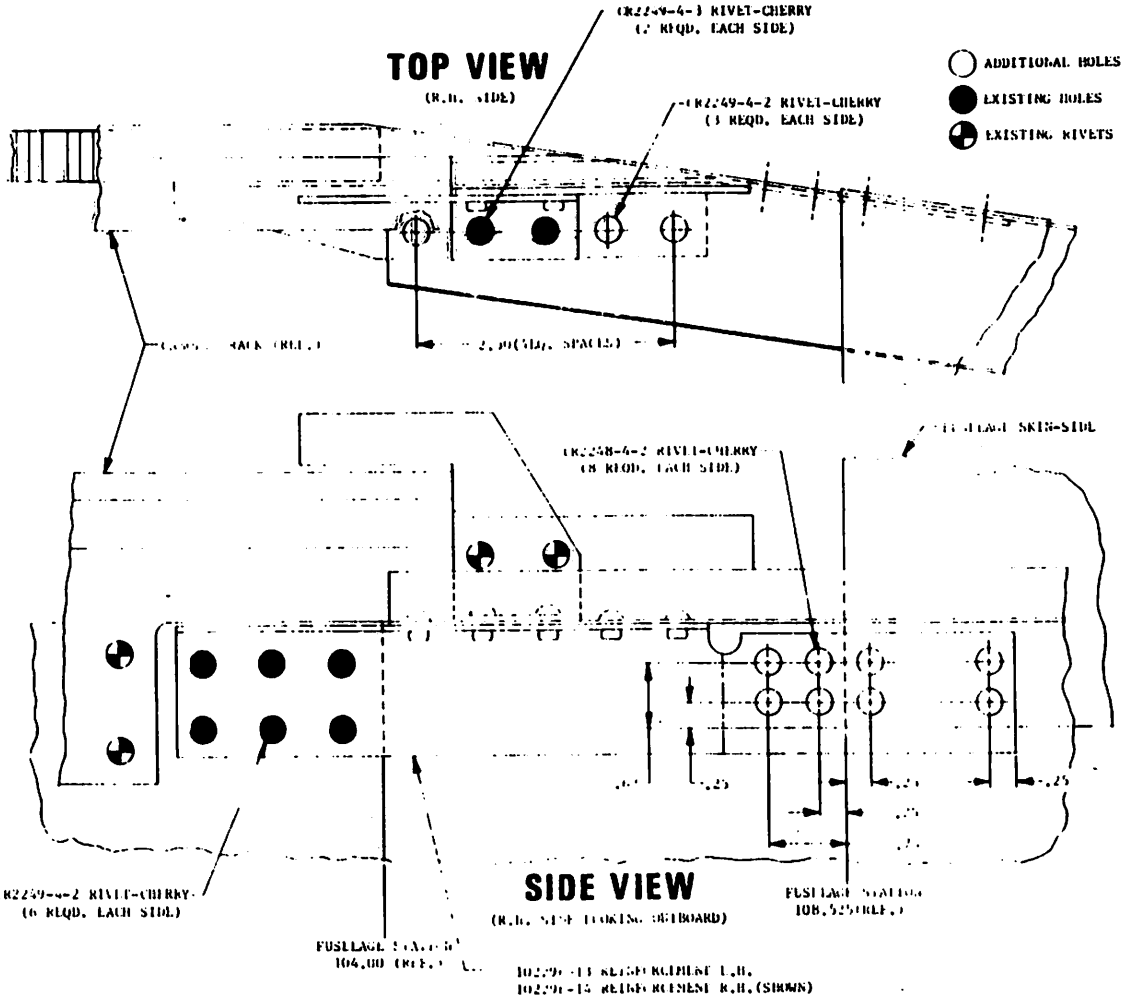
OVERALL FUSELAGE DIMENSIONS

Figure 10-12. Aft Fuselage Replacement Riveted (Page 1 of 4)



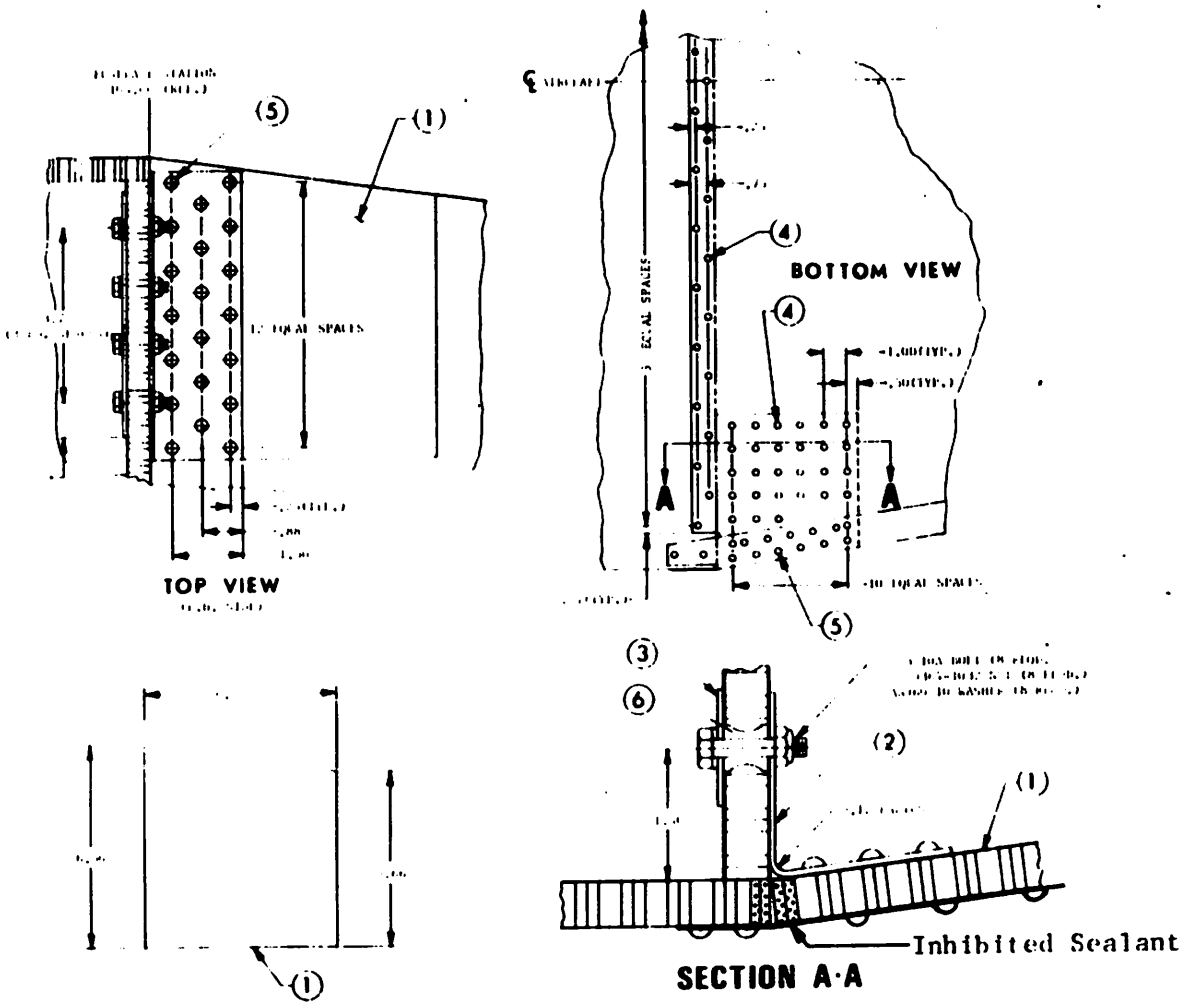
FUSELAGE SIDE ATTACHMENT DETAILS
VIEW SHOWING L.H. SIDE

Figure 10-13. Aft Fuselage-Replacement-Riveted (Page 2 of 4)



FUSELAGE SIDE-INSIDE REINFORCEMENT INSTALLATION DETAILS

Figure 10-14. Af[illegible]lage-Replacement-Riveted (Page 3 of 4)



ITEM

1. DOUBLER-HONEYCOMB SANDWICH MATL.
   (2 reqd.) .50 thk with .016 face sheets

2. ANGLE - 2.00 x [illegible] x 6.25 x .062 thk.
   (2 reqd.) Matl. 2024-T3 or equiv.

3. DOUBLER - 1.25 x [illegible].25 x .062 thk.
   (2 reqd.) Matl. 2024-T3 or equiv.

4. CR 2249-4-1 Rivet-Cherry (89 reqd.)

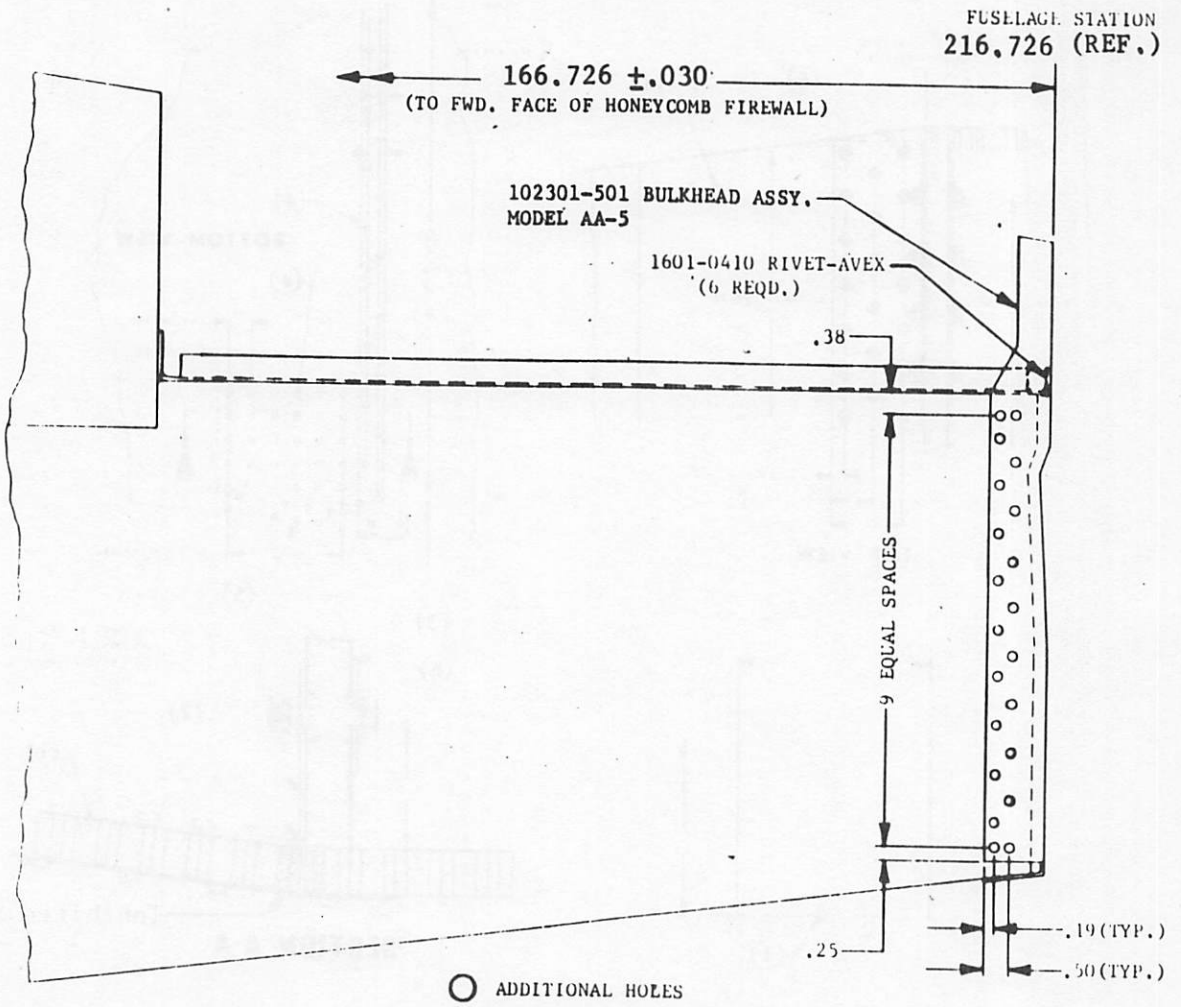
5. CR 2249-4-2 Rivet-Cherry (66 reqd.)

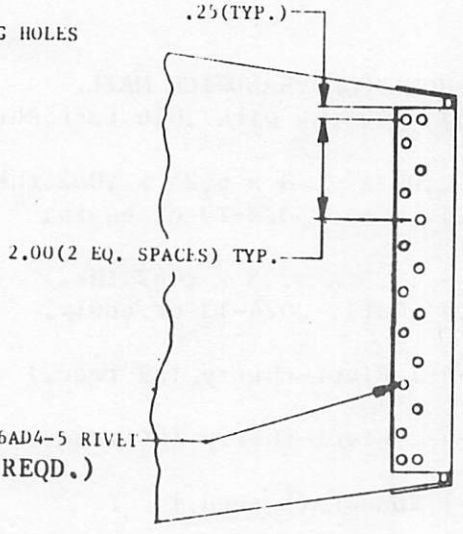
6. AES 201-1 Spacer (8 reqd.)

FUSELAGE BOTTOM-INSIDE DOUBLERS AND ANGLE INSTALLATION DETAILS

Figure 10-15. Aft Fuselage Replacement-Riveted (Page 4 of 4)

PURPOSE: To replace the entire aft fuselage bulkhead, using rivets.





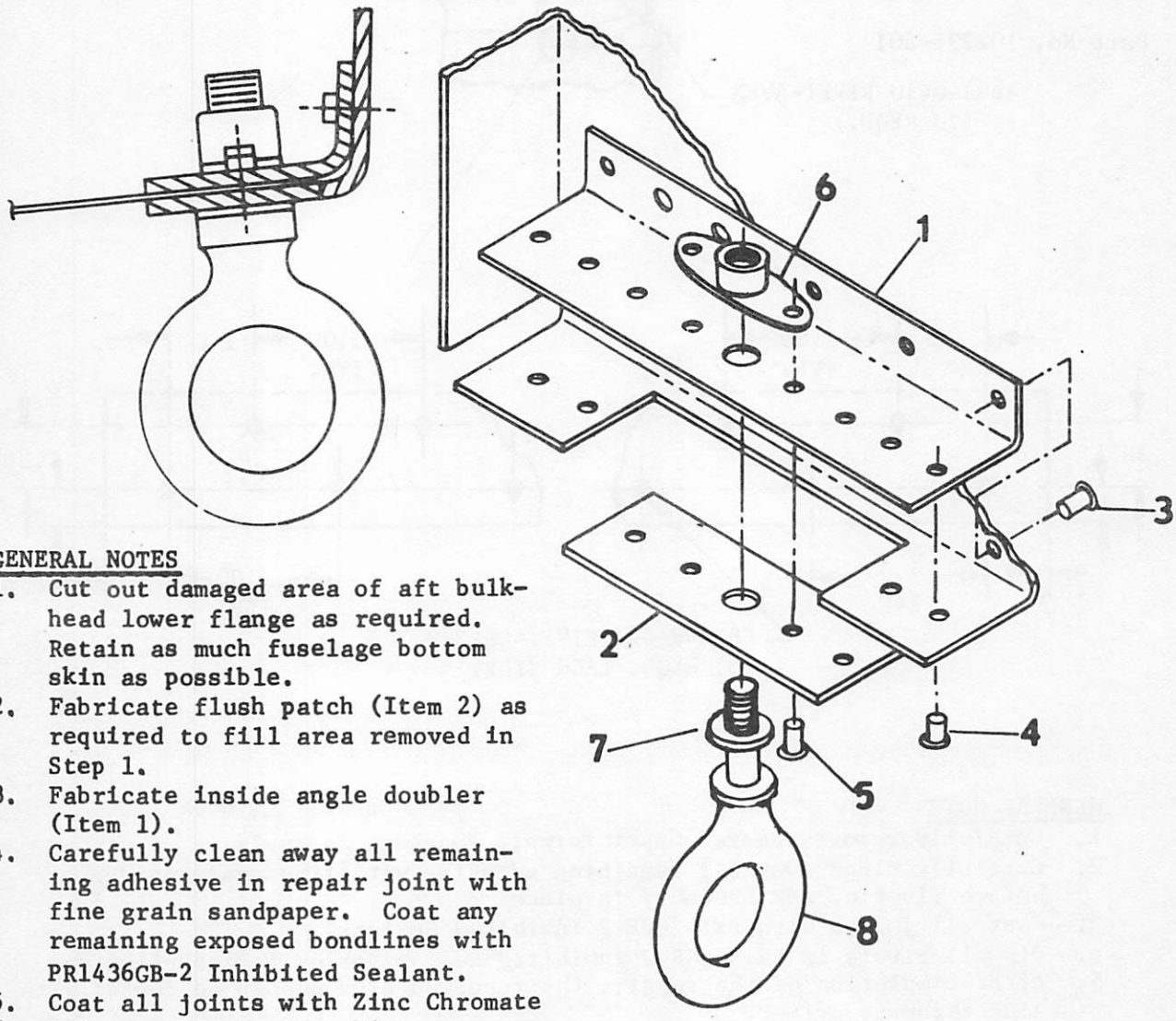
GENERAL NOTES

1. Carefully remove damaged aft fuselage bulkhead.
2. Carefully clean away all remaining adhesive with fine grain sandpaper before riveting new bulkhead in place.
3. Coat all joints with zinc chromate primer prior to assembly.
4. Install all rivets with wet zinc chromate primer.
5. Fill over exterior rivets with filler and smooth.
6. After completion of the repair, the repaired area should be coated with zinc chromate primer.

Figure 10-16. Aft Fuselage Bulkhead Replacement - Riveted

PURPOSE: To replace a torn out tail tie-down ring.

ITEM NO.	DESCRIPTION	MATERIAL
1.	Angle Doubler 1.16 x .65 x 6.00 x .090 thk.	2024-T3
2.	Flush Patch 1.00 x 3.00 x .090 thk.	2024-T3
3.	MLS100B4-3 Huck Rivet (4 Req'd.)	
4.	MLS100B4-4 Huck Rivet (6 Req'd.)	
5.	MLS100B4-5 Huck Rivet (2 Req'd.)	
6.	NAS680-A5 Nut Plate	
7.	AN960-516L Washer	
8.	901033-1 Tie-Down Ring	

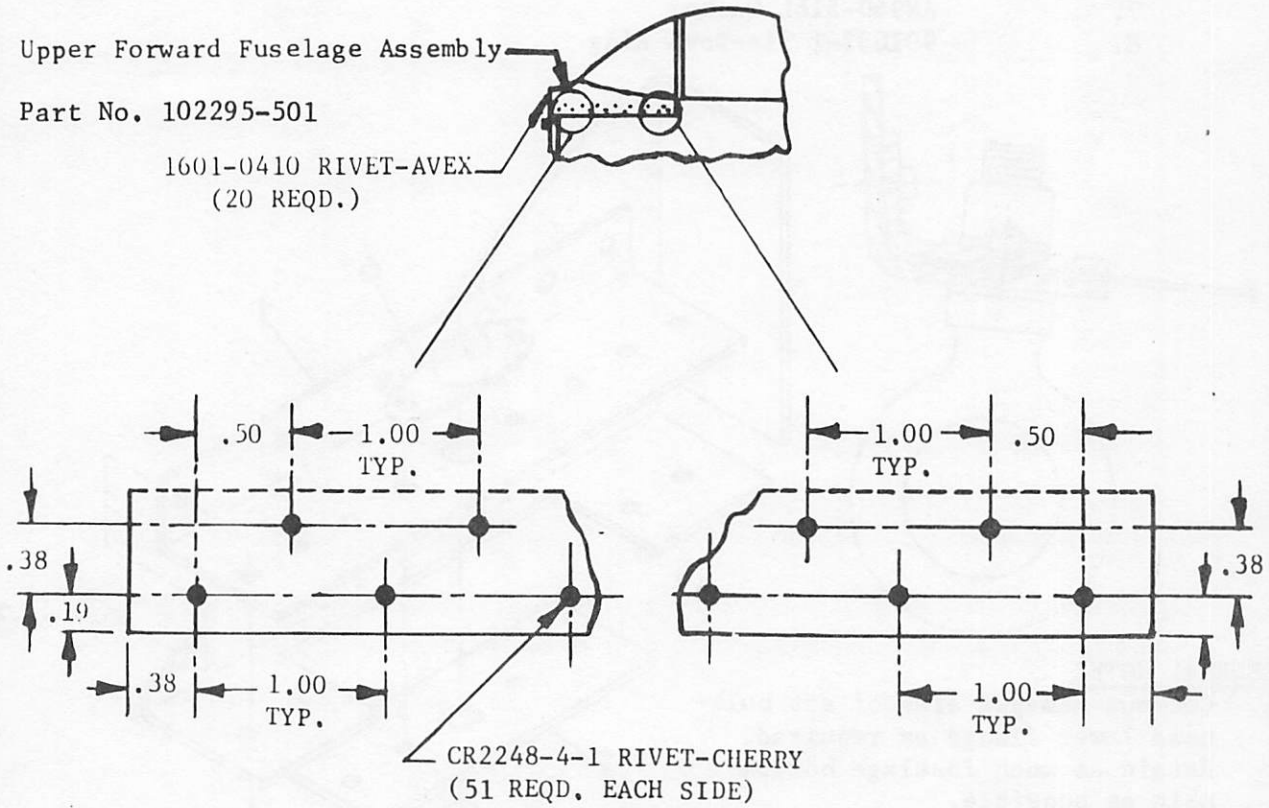


GENERAL NOTES

1. Cut out damaged area of aft bulkhead lower flange as required. Retain as much fuselage bottom skin as possible.
2. Fabricate flush patch (Item 2) as required to fill area removed in Step 1.
3. Fabricate inside angle doubler (Item 1).
4. Carefully clean away all remaining adhesive in repair joint with fine grain sandpaper. Coat any remaining exposed bondlines with PR1436GB-2 Inhibited Sealant.
5. Coat all joints with Zinc Chromate Primer prior to assembly.
6. Install all rivets with wet Zinc Chromate Primer.
7. After completion of the repair, the repaired area should be coated with Zinc Chromate Primer.

Figure 10-17. Damaged Tail Tie-Down Ring Replacement

PURPOSE: To replace the entire upper forward fuselage assembly using rivets.

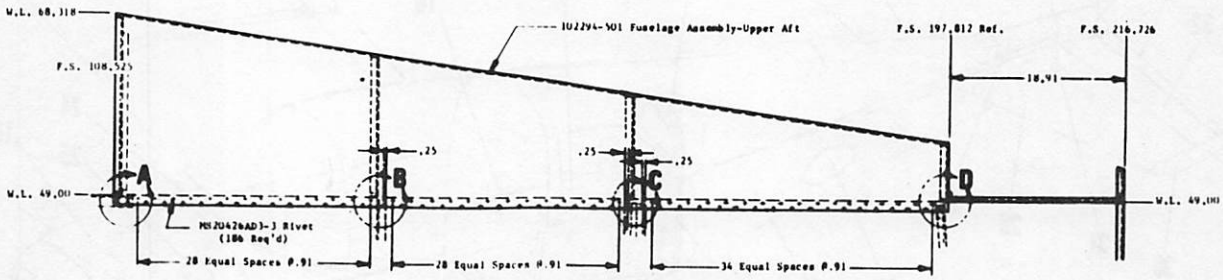


GENERAL NOTES

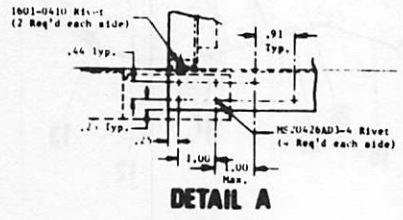
1. Carefully remove damaged upper forward Fuselage Assembly.
2. Carefully clean away all remaining adhesive with fine grain sandpaper before riveting new assembly in place.
3. Coat all joints with PR1436GB-2 Inhibited Sealant.
4. Dip all rivets in PR1436GB-2 Inhibited Sealant prior to installation.
5. After completion of the repair, the repaired area should be coated with zinc chromate primer.
6. Fill over exterior rivets with filler and smooth before painting.

Figure 10-18. Upper Forward Fuselage Assembly Replacement - Riveted

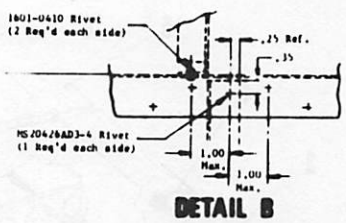
PURPOSE: To replace the entire upper aft fuselage assembly, using rivets.



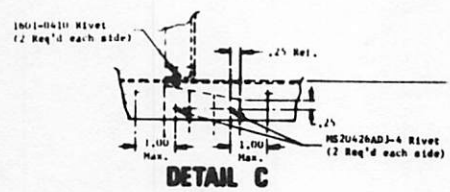
SIDE VIEW



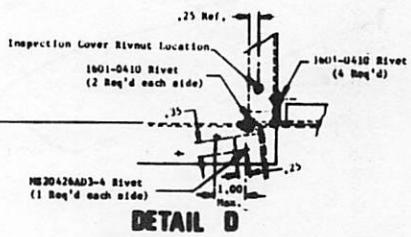
DETAIL A



DETAIL B



DETAIL C

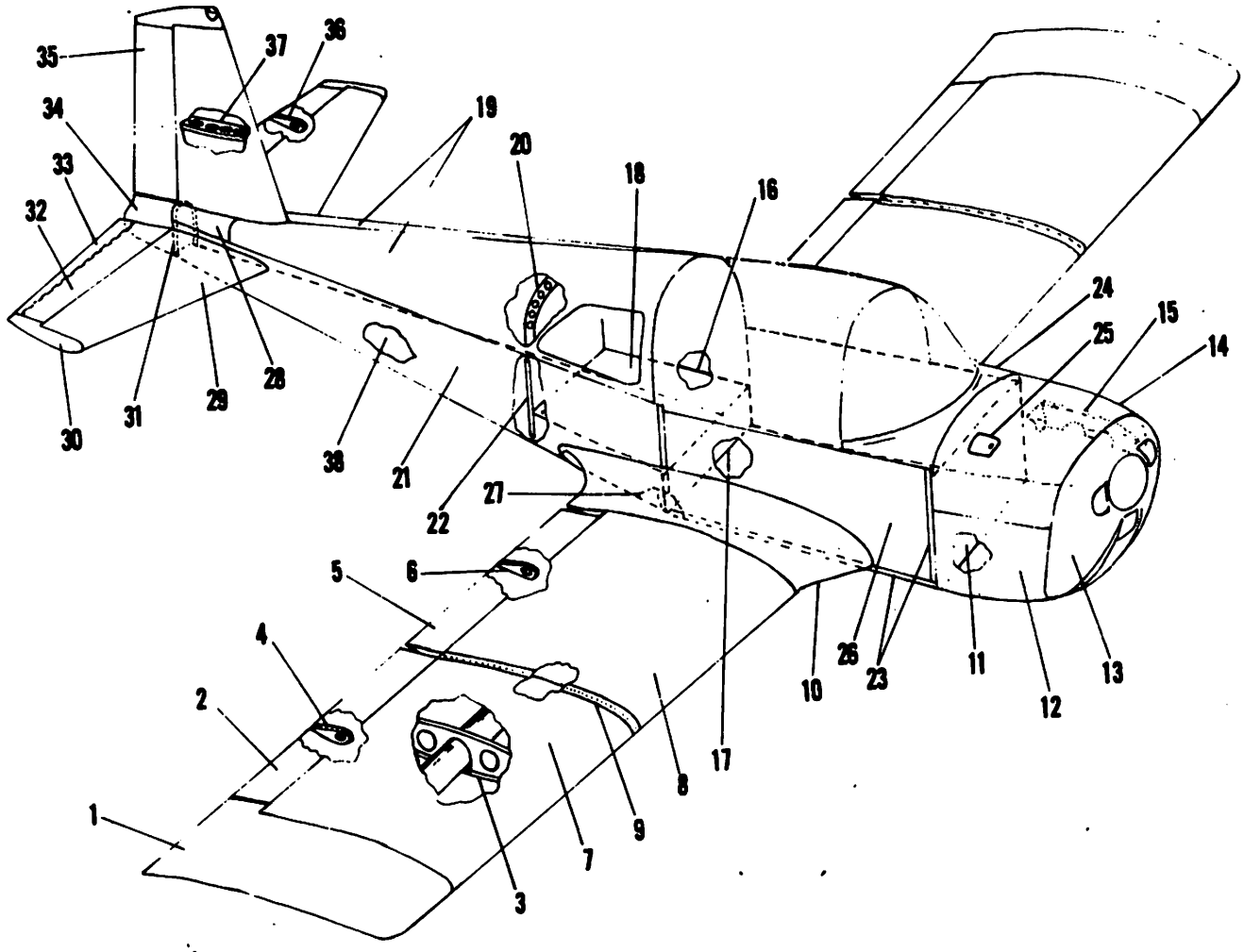


DETAIL D

GENERAL NOTES

1. Carefully remove damaged upper aft fuselage assembly.
2. Carefully clean away all remaining adhesive with fine grain sandpaper before riveting new assembly in place.
3. Coat all joints with PR1436GB-2 Inhibited Sealant.
4. Position new assembly per above dimensions and rivet in place. Install rivets with wet Zinc Chromate Primer.
5. Fill over exterior rivets with filler and smooth before painting.
6. After completion of the repair, the repaired area should be coated with Zinc Chromate Primer.

Figure 10-19. Upper Aft Fuselage Assembly Replacement-Riveted



ITEM NO.	DESCRIPTION	MATERIAL	ITEM NO.	DESCRIPTION	MATERIAL
1	WING TIP	FIBERGLASS	20	BULKHEAD	.025" 2024-T42 ALCLAD
2	AILERON SKIN	.020" 2024-T3 ALCLAD	21	SKIN	.032" 2024-T3 ALCLAD
3	WING RIB	.025" 6061-T6	22	STIFFENER	.032" 2024-T3 ALCLAD
4	AILERON RIB	.50" HONEYCOMB	23	ANGLES	.025" 2024-T3 ALCLAD
5	FLAP SKIN	.020" 2024-T3 ALCLAD	24	SKIN	.025" 6061-T4
6	FLAP RIB	.50" HONEYCOMB	25	ACCESS DOOR	.063" 6061-T4
7	WING SKIN	.020" 2024-T3 ALCLAD	26	FUSELAGE PANELS	.50" HONEYCOMB
8	WING SKIN	.020" 2024-T3 ALCLAD	27	GUSSET	.040" 2024-T42 ALCLAD
9	DOUBLER	.020" 2024-T3 ALCLAD	28	COVER	.020" 2024-T3 ALCLAD
10	WING ROOT FAIRING	FIBERGLASS	29	STABILIZER SKIN	.020" 2024-T3 ALCLAD
11	FIREWALL	.018" ALUMINIZED STEEL	30	STABILIZER TIP	THERMO-PLASTIC
12	LOWER COWL	.040" 6061-T4	?	BULKHEAD	.090" 2024-T42 ALCLAD
13	NOSE COWL	FIBERGLASS	?	SKIN	.016" 2024-T3 ALCLAD
14	UPPER COWL	.032" 6061-T4	33	TRIM TAB SKIN	.016" 2024-T3 ALCLAD
15	BAFFLE	.032" 5052-H32	34	TAILCONE	THERMO-PLASTIC
16	BAGGAGE FLOOR	.032" 2024-T3 ALCLAD	35	SKIN	.016" 2024-T3 ALCLAD
17	BULKHEAD	.50" HONEYCOMB	36	RIB	.50" HONEYCOMB
18	BULKHEAD	.032" 2024-T3 ALCLAD	37	STABILIZER RIB	.025" 2024-T42 ALCLAD
19	SKIN	.020" 2024-T3 ALCLAD	38	BOTTOM SKIN	.025" 2024-T3 ALCLAD

Figure 10-20. Airframe Materials Chart

10-120 POLYURETHANE COATED AIRCRAFT STRIPPING

10-120-00 GENERAL

These directions are intended to establish procedures for stripping polyurethane paint. The requirements shall apply to all polyurethane coated aircraft manufactured by the Grumman American Aviation Corporation. Any deviation from or modification of these directions shall be approved by the Customer Service Department.

Because paint strippers are formulated to remove a synthetic substance, it must be understood that they are detrimental to all substances of the synthetic family. For this reason, the following procedure has been prepared and must be carefully followed to insure against damage to synthetic components on the aircraft.

10-120-01 REFERENCE SPECIFICATIONS

MIL-R-25134B - Paint and Lacquer, Solvent Type Remover.
APS-1057 (GAAC) - Application of Protective and Decorative Coatings.

10-120-02 MATERIAL

Polyurethane stripper per MIL-R-25134B (see Acceptable Sources Section)
Aluminum tape (2 inch wide) 3M Company #425
Aluminum foil
Tap Water
Metal Conditioner (see Acceptable Sources Section)

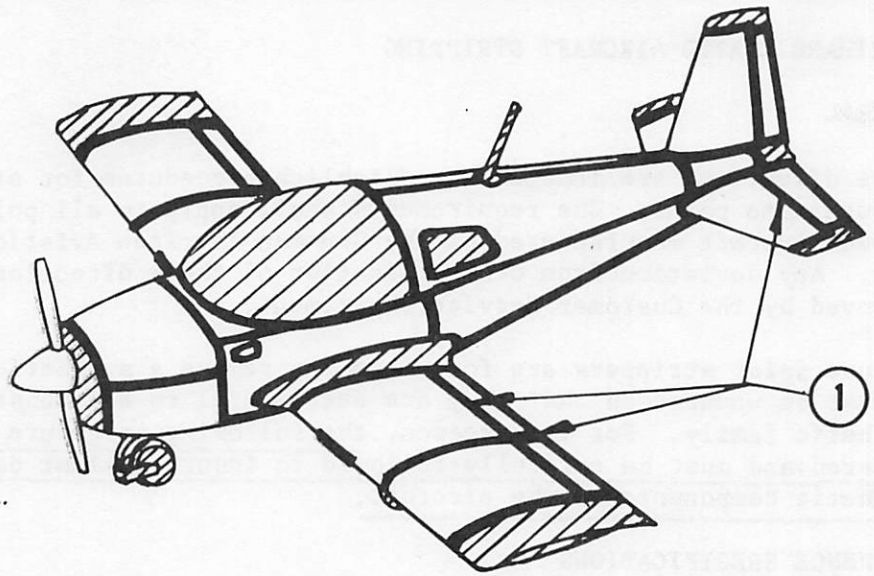
10-120-03 STRIPPING PROCEDURE

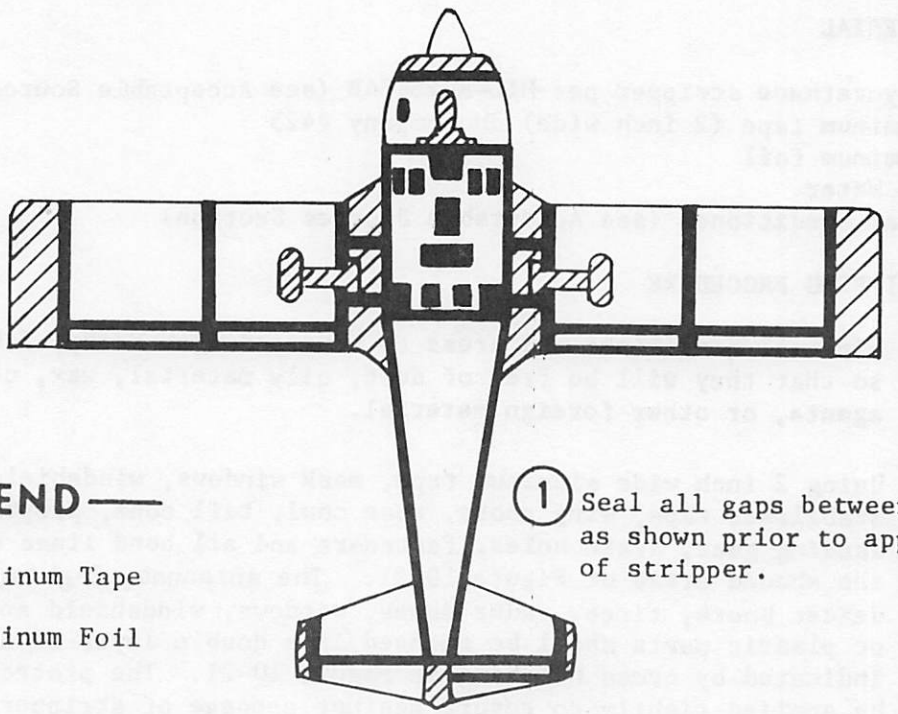
a. Wipe all bond lines and areas to be taped with Methyl Ethyl Ketone so that they will be free of dust, oily material, wax, cleaning agents, or other foreign material.

b. Using 2 inch wide aluminum tape, mask windows, windshield, wing tips, stabilizer tips, wing roots, nose cowl, tail cone, propeller, main landing gear, drain holes, fasteners and all bond lines as shown in the shaded areas of Figure 10-21. The antennas, lights, beacons, deicer boots, tires, radar domes, windows, windshield and all fiberglas or plastic parts shall be encased in a double layer of aluminum foil as indicated by cross hatching in Figure 10-21. The protective tape must be applied tightly to ensure against seepage of stripper into the areas mentioned above.

C A U T I O N

Long term exposure of bond joints to paint strippers will affect the integrity of the bond strength. All areas must be completely sealed to prevent the stripper from contacting bond joints or getting into internal areas of the aircraft. If stripper does inadvertently contact the bond joint, flush thoroughly with tap water within 1-1/2 hours.





—LEGEND—

Aluminum Tape

Aluminum Foil

1 Seal all gaps between surfaces as shown prior to application of stripper.

BOTTOM VIEW

Models AA-1, AA-1A & AA-1B

Figure 10-21. Aircraft Paint Stripping Masking

c. Apply an approved polyurethane stripper (MIL-R-25134B) with a suitable paint brush with slow easy strokes so as not to apply stripper on any undesired areas. Allow the stripper to work for 5 to 15 minutes.

d. Flush removed paint and excess stripper with tap water, using a pressure nozzle, being sure that all stripper residue is thoroughly removed.

e. Remove the aluminum tape and protective foil from all areas. Inspect these areas carefully to be sure all stripper residue has been removed.

f. After removing the tape and protective foil, sand and feather the paint edge in all areas which had been protected from the stripper.

N O T E

It is permissible to sand the paint completely from the bond lines; however, for best bond line protection, it is recommended that these areas be lightly sanded.

10-120-04 METAL CONDITIONER APPLICATION

a. Prepare metal conditioner solution using manufacturer's instructions.

b. Apply the conditioner by wiping or brushing the solution on all surfaces to be painted. This compound is safe for use on bond joints. Do not allow conditioner to contact the windshield or windows.

c. Allow the conditioner to work for 2 to 10 minutes depending on the degree of surface cleanliness.

d. Remove the conditioner per manufacturer's instructions.

10-120-05 PRIME AND REPAINT AIRCRAFT

Prime and repaint aircraft using normal techniques.

10-120-06 ACCEPTABLE MATERIAL SOURCES

a. Polyurethane Strippers per MIL-R-25134B

1. Strip-prep No. 66
Amchem Products, Incorporated
2300 Gainsboro
Ferndale, Michigan 48220

2. Methylene Chloride Based Paint Stripper No. 3403
W. M. Barr and Company
2336 S. Lauderdale
Memphis, Tennessee 38106

b. Metal Conditioners

1. Magnus No. 852 (wipe off) Metal Conditioner
   Economics Laboratory, Incorporated
   Magnus Division
   Osborn Building
   St. Paul, Minnesota 55102

2. DuPont 222 Metal Conditioner

SECTION XI

ELECTRICAL SYSTEMS

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ELECTRICAL SYSTEMS
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11 ELECTRICAL SYSTEMS

11-00 GENERAL

Power for the Model AA-1, AA-1A and AA-1B electrical systems is derived from a battery and alternator combination. Power for normal operations is delivered by the alternator, whereas the battery supplies starting power and, in the event of alternator failure, will provide emergency power. On the AA-1B a split rocker type master switch is used which performs two functions. One side energizes the battery circuit for engine starting and operating electrical systems with the engine off. The other side energizes the alternator field circuit which produces the electrical field in the alternator. With the electrical field energized, the operating alternator will produce output as required by the electrical system loads.

11-10 BATTERY

11-10-00 DESCRIPTION

The battery is a 12-volt, 25-ampere hour, dry-charge type. Used primarily to provide engine starting power, the battery is also utilized as an emergency supply in the event of alternator failure. The battery requires periodic inspections to determine its condition. Items to check for are: corroded terminals, low water level, plugged vents and low specific gravity. Corroded terminals should be cleaned using a solution of water and bicarbonate of soda (baking soda) and scrubbed with a stiff brush.

N O T E

It is recommended when replacing terminals, to apply a heavy-body mineral grease or petrolatum to the terminal.

The low water level is caused by decomposition of water from the electrolyte. Distilled water should be added as required. A battery using excessive water is an indication of overcharging and adjustments to the voltage regulator are required. (The AA-1B voltage regulator is sealed solid state non-adjustable unit which must be replaced if defective.) The specific gravity should be periodically checked with a hydrometer to determine the condition of the battery. A reading of 1.260 indicates a fully charged battery, whereas a reading of 1.225 or below indicates that the battery should be recharged.

C A U T I O N

Always recharge a battery with the battery caps removed and in an open, well-ventilated area due to explosive gases being generated during the charging process.

11-10-01 BATTERY REMOVAL AND INSTALLATION

a. Remove the upper cowl.

b. Remove the two wing nuts, and withdraw the battery hold-down bracket.

c. Remove the battery box lid.

d. Disconnect the cables.

N O T E

Remove the ground cable first, and connect it last to prevent accidental short circuiting during installation.

e. Remove the battery heat shield.

f. Remove the battery and battery box by sliding forward.

g. Reassemble in the reverse order.

N O T E

When installing the battery, be sure to check for the correct polarity (negative to ground) to prevent damage to the electrical system, especially to any semi-conductors.

11-20 ALTERNATOR

11-20-00 DESCRIPTION

The AA-1 and AA-1A have 40 ampere alternators. The AA-1B has a 60 ampere alternator. The 60 ampere alternator is three-phase, delta connected with integral silicon diode rectifiers. It is rated at 14 volts at 60 amperes continuous output. The rotor consists of an axial winding with radial interlocking poles which surround the winding. The stator windings are three-phase, delta connected and are attached to two diode plates, each of which contain three silicon diodes.

The diode plates are connected to accomplish full-wave rectification of AC. The resulting DC output is applied to the bus and sensed by the voltage regulator. The regulator controls the excitation applied to the alternator field thus controlling the output of the alternator.

11-20-01 ALTERNATOR FIELD CIRCUIT PROTECTION (AA1A-0332 thru AA1A-0470; AA1B-0001 and on)

The 5 amp circuit breaker located on the instrument panel is provided to protect the alternator field circuit.

11-20-02 ALTERNATOR REVERSE VOLTAGE DAMAGE

The alternator is susceptible to reverse polarity current because of the silicon diodes. The diodes, having a very high resistance to reverse current flow, are used without a cutout relay such as used on a generator system. The alternator diodes are arranged with their cathodes connected to the bus bar, which is positive, and no back current will flow. If the polarity of the battery is reversed, the diodes will offer no resistance to current flow. If the current rating of the diodes is exceeded, diode failure may result.

11-20-03 ALTERNATOR OVERVOLTAGE PROTECTION (AA-1B only)

A special purpose device has been shunted across the load side of the field circuit protector which will automatically disengage the field circuit breaker should an over-voltage condition arise. This over-voltage protector can not be activated by voltage transients of the type found on this aircraft. Activation of the protector as indicated by the protrusion of the field circuit breaker clearly indicates a shorted wire from the field circuit breaker or a component failure in the charging system which has caused an over-voltage condition.

It will not be possible to reactivate the aircraft charging system until the fault has been found and corrected. It will then be necessary to replace the expended (Part No. 5402012-501) over-voltage protector with a new one. This protector is located on the back of the field circuit protector on the lower right hand side of the instrument panel.

11-20-04 ALTERNATOR REMOVAL AND INSTALLATION

a. Remove upper cowl and lower cowl. (See 3-40-01).

b. Disconnect the heater inlet hose from forward cowl to provide access to the alternator.

c. Cut the safety wire and remove the bolt attaching the alternator to the adjustment link.

d. Remove all lead wires from alternator.

e. Remove the two cotter pins, nuts and bolts in the alternator support bracket and slide the alternator from its mount, at the same time removing the drive belt.

f. Install the alternator in reverse of the removal procedure.

g. Adjust the belt tension to yield a 3/8 inch deflection at the center of the belt when applying a pressure equivalent to 12 pounds.

11-20-04 ALTERNATOR REMOVAL AND INSTALLATION (Continued)

N O T E

When a new belt has been installed, recheck the belt tension within 10 to 20 hours operation.

N O T E

Service work performed on the alternator should be in accordance with any manuals or bulletins published by the alternator manufacturer.

11-30 VOLTAGE REGULATOR

11-30-00 DESCRIPTION

The voltage regulator is transistorized and temperature compensating for increased charging during cold weather conditions. On the Model AA-1 and AA-1A adjustments can be made by removing the plastic cap, and with a Phillips screwdriver, turn the screw in a clockwise direction to increase the voltage. Voltage setting should yield a nominal 14.0 + .3 -.2 volts. The AA-1B regulator is a sealed unit and must be replaced if defective.

11-30-01 VOLTAGE REGULATOR REMOVAL AND INSTALLATION

N O T E

The voltage regulator is a sealed unit, therefore, no field adjustments are possible.

a. Remove the upper cowl.

b. Disconnect leads from under voltage regulator or at the quick disconnect and tag for reference at installation.

c. Remove bolts securing the regulator to the firewall and remove regulator.

d. Install the regulator in reverse of the removal procedure. Be sure that the connections for grounding the alternator, wiring shields and the base of the regulator are clean and bright before installation, to eliminate the possibility of poor voltage regulation and/or excessive radio noise.

11-40 AMMETER

11-40-00 DESCRIPTION

a. AA-1 and AA-1A

The ammeter on the AA-1 and AA-1A is connected in series with the

11-40-00 DESCRIPTION (Continued)

a. AA-1 and AA-1A

alternator A + lead. It indicates the amount of current required from the alternator, but does not indicate a discharge. With the battery completely charged and all extra electrical equipment turned off, the ammeter will show a minimum rate of charge (near 0 reading).

b. AA-1B

The ammeter on the AA-1B is connected in series with the positive battery lead. It indicates the amount of current flowing into or out of the battery. With the battery completely charged, the ammeter will show a zero charge rate.

11-50 FLAP MOTOR

11-50-00 DESCRIPTION

The flap motor consists of a 12-volt series wound motor turning a worm gear. Its direction of rotation is controlled by a toggle switch which reverses the magnetic field in the motor.

11-50-01 FLAP MOTOR REMOVAL AND INSTALLATION

a. Refer to 5-50-01 and 5-50-03.

11-60 LANDING LIGHT

11-60-00 DESCRIPTION

The landing light serves the dual purpose of landing light and taxi light. Adjustment to the landing light can be made by removing the upper cowl and adjusting the mounting screws as required. (See Figure 11-2).

11-60-01 LANDING LIGHT REMOVAL AND INSTALLATION

a. Gain access to the landing light by removing the upper cowl on pre 1976 models, or by removing the lamp shield on 1976 and later models.

b. Remove the three mounting screws and withdraw the lamp and bracket.

c. Disconnect the wires at the light terminals.

d. Reassemble in the reverse order.

N O T E

Proper adjustment of the light can be determined as shown in Figure 11-2.

11-70 NAVIGATION LIGHTS

11-70-00 DESCRIPTION

The navigation lights consist of the two wing-tip lights, and the tail light mounted in the tailcone.

11-70-01 WING TIP LIGHT REMOVAL AND INSTALLATION

a. Remove the screws which attach the protective lens to the wing tip.

b. Remove the one screw which holds the lamp shield.

c. Remove the lamp and replace if necessary.

N O T E

To remove the entire lamp housing, it will first be necessary to remove the wing tip and disconnect the wires before proceeding with the following steps.

d. Remove the two screws which attach the lamp housing to the wing tip.

e. Reassemble in the reverse order being careful not to overtighten the mounting screws which may cause lens cracking.

11-70-02 TAIL LIGHT REMOVAL AND INSTALLATION

a. Remove the two screws which hold the lamp retainer to the tailcone.

b. Withdraw the retainer and lens.

c. Remove the lamp.

N O T E

If removal of the complete housing is required, it is necessary to remove the tailcone and disconnect the wires. (See 3-50-01)

d. Reassemble in the reverse order.

11-80 FLASHING BEACON

11-80-00 DESCRIPTION

The flashing beacon consists of the light assembly mounted on top of the vertical fin, and the slave unit (transistorized flasher unit) which is accessible through the right side tail inspection panel. Later models incorporate a load resistor that is connected to the unused side of the slave unit.

11-80-01 LIGHT REMOVAL AND INSTALLATION

a. Remove the clamp.

b. Withdraw the lens, shield and lamp.

C A U T I O N

Do not handle lamp by glass. Insert into socket by base. Always wipe lamp off with tissue.

c. If it is necessary to remove the light socket, removal of the rudder tip is required in order to accomplish the following steps.

d. Disconnect the wires.

e. Remove the two nuts and bolts which attach the socket to the tip.

f. Reassemble in reverse order. Be sure wires have slack or the base of the socket may be pulled away from the bulb.

11-80-02 SLAVE UNIT REMOVAL AND INSTALLATION

a. Remove the tail inspection cover.

b. Disconnect the wires.

c. Remove the four screws which attach the unit beneath the horizontal bulkhead.

d. Reassemble in reverse order.

11-90 INSTRUMENT LIGHTS

11-90-00 DESCRIPTION

The total instrument lighting system consists of three lights mounted in the glareshield, two fuel gauge lights and two lights mounted forward of the windshield bow. All seven lights are identical in components.

11-90-01 GLARESHIELD INSTRUMENT LIGHTS REMOVAL AND INSTALLATION

a. Removal of the screws from the glareshield lower lip will separate the two halves and expose the light assembly.

b. Remove the bulb and replace as required.

11-90-02 REMOVAL AND INSTALLATION OF THE LIGHTS MOUNTED FORWARD OF THE WINDSHIELD BOW

a. Remove the thermoplastic cover.

11-90-02 REMOVAL AND INSTALLATION OF THE LIGHTS MOUNTED FORWARD OF THE WINDSHIELD BOW (Continued)

b. The light assembly is attached to the back of this cover. Remove the bulb and replace as required.

c. Install the thermoplastic cover.

11-90-03 FUEL MEASUREMENT GAUGE LIGHT REMOVAL AND INSTALLATION

a. Remove the thermoplastic fuel measurement gauge cover.

b. Remove the screw which mounts the lamp socket to the fuselage side panel.

c. Remove the bulb and replace as required.

d. Reassemble in reverse order.

11-100 DOME LIGHT

11-100-00 DESCRIPTION

The dome light and switch are contained in the speaker housing located above and behind the pilot. Electrical power is supplied directly to the switch from the battery in order to make use of the light without first activating the ship's electrical system. On early models the dome light is protected by an in-line fuse which is located in the main wire bundle forward of the firewall and near to the battery relay. On later models the dome light is protected by a fuse mounted on the battery box tray.

11-100-01 DOME LIGHT REPLACEMENT

a. Remove the screws which attach the thermoplastic speaker and dome light housing to the forward turtleback bulkhead.

b. Remove the bulb and replace as required.

c. Reassemble in reverse order.

11-110 STALL WARNING HORN

11-110-00 DESCRIPTION

The stall warning system consists of a switch located on the leading edge of the right wing, and a stall horn and stall horn controller located in front of the instrument panel on the left honeycomb panel.

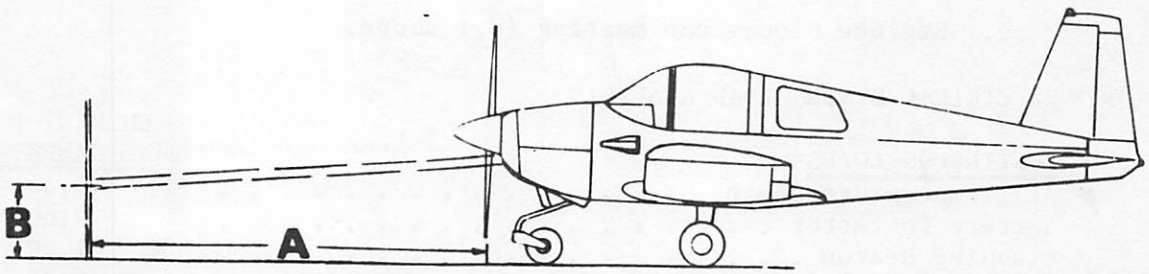
11-110-01 STALL WARNING SYSTEM REPAIR

Repair of the stall warning system is limited to replacement of defective wiring or components. If the system is suspected of being inoperative, it can be checked manually on the ground by turning on the master switch and raising the switch on the right wing.

N O T E

On aircraft AA1-0433 and on, all AA-1A's and all AA-1B's the stall horn controller delays the signal from the switch approximately .9 second after the switch is actuated.

NOTE: Landing light should not be adjusted beyond the point where it does not have a good seal around outer flange.



A	6 Ft.	10 Ft.
B	29 In.	26 In.

NOTE:
Light beam to parallel center line.

Trailing Edge Of Prop

Figure 11-2. Landing Light Adjustment

11-120 D.C. SYSTEM DIODES

11-120-00 DESCRIPTION

Diodes are used in the aircraft electrical system across some solenoids and switches to dissipate back EMF and provide extended contactor life. These solenoids and switches will function with defective diodes but contactor life will be shortened. Whenever, a solenoid or switch, that uses a diode, is replaced the corresponding diode should be checked per Par. 11-120-01. See DC power distribution diagram in the appendix for diode placement.

11-120-01 TESTING DIODES

Diodes can be tested as follows:

a. Obtain an ohmmeter and set up on OHMS.

b. Position the test leads across the diode and record the ohmic reading.

c. Reverse the test leads and again record the ohmic reading.

d. The first reading must be ten times greater or less than the second reading.

e. Replace diodes not meeting (d.) above.

11-130 ELECTRICAL SYSTEM LOAD ANALYSIS

	CURRENT DRAIN AMPS
CONTINUOUS LOADS	
Oil Temperature Gauge	0.50
Battery Contactor	0.60
Flashing Beacon	11.00
Pitot Heat	6.50
Navigation Lights	4.52
Instrument Lights	2.31
Turn and Bank Indicator	0.30
Fuel Meter	0.50
TOTAL	26.23
SHORT TERM LOADS	
Stall Warning System	0.40
Electric Fuel Pump	0.65
Electric Flap Motor	9.80
Dome Light	.33
Cigar Lighter	6.50
Landing Light	7.30
TOTAL	24.98

11-130 ELECTRICAL SYSTEM LOAD ANALYSIS (Continued)

AVIONICS EQUIPMENT

Genave	REC	TRANS
Alpha-200 Transceiver	2.10	2.82
Alpha-200A Transceiver	2.10	2.82
Alpha-300 Transceiver	2.10	2.82
Alpha-360 Transceiver	1.18	3.10
Theta-100/200 ILS Conv.	0.43	--
Beta-4096 Transponder	1.40	2.40
TAU-81 Audio Amp	1.00	--
Delta-202 Marker Rec.	0.08	--
PHI-20 Glide Slope Rec.	0.15	--
King		
KX-170 Transceiver	1.00	3.00
KX-170A Transceiver	0.65	4.50
KX-170B Transceiver	0.70	4.50
KX-170BE Transceiver	0.70	4.50
KX-175 Transceiver	0.65	4.50
KX-175B Transceiver	0.70	4.50
KX-175BE Transceiver	0.70	4.50
KI-201C Omni Conv.	0.10	--
KI-211C ILS System	0.20	--
KI-214 ILS Conv.	0.22	--
KR-85 ADF Rec.	1.00	--
KI-225 ADF Ind.	0.16	--
KT-76 Transponder	1.30	1.30
KT-78 Transponder	1.30	1.30
Narco		
Mark 3	6.50	9.00
Mark 8	5.20	6.20
Mark 12	5.20	9.50
Mark 12A & B	4.60	7.90
Mark 16	0.72	4.82

Narco (Cont'd.)	REC	TRANS
Escort-110 Transceiver	2.10	2.80
Com-10 Transceiver	0.66	2.16
Com-10A Transceiver	0.96	2.66
Nav-10 Rec./Conv.	0.82	--
Com-11 Transceiver	0.96	2.16
Com-11A Transceiver	0.96	2.66
Nav-11 Rec./Conv.	0.62	--
Nav-12 Rec./Conv./ILS	0.62	--
Nav-14 Rec.	0.20	--
DGO-10 DG/ILS Conv.	1.20	--
ADF-31 ADF Rec./Ind.	0.64	--
PDF-35 ADF Rec./Ind.	0.90	--
ADF-140 ADF Rec./Ind.	1.38	--
UGR-2A Glide Slope Rec.	0.23	--
UGR-3 Glide Slope Rec.	0.23	--
MBT-12 M. B. Rec.	0.19	--
AT-50 Transponder	1.20	1.20
AT-50A Transponder	1.60	1.60
Com-110 Transceiver	0.96	2.50
Nav-110 Rec./Conv.	0.32	--
Com-111 Transceiver	0.96	2.50
Nav-111 Rec./Conv.	0.62	--
Nav-112 Rec./Conv./ILS	0.62	--
Nav-114 Rec.	0.92	--
DME-190	3.00	3.00

11-140 EMERGENCY LOCATOR TRANSMITTER (If Installed)

11-140-00 DESCRIPTION

The emergency locator transmitter (ELT) is a self contained battery powered radio transmitter which emits a signal (121.5/243.0 MHZ) to assist in locating a downed aircraft. The ELT consists of a transmitter located in the aft fuselage section under the vertical stabilizer and a transmitting antenna mounted on the leading edge of the vertical stabilizer or on top of the aft fuselage on later models. The ELT has self-contained batteries and is completely independant of the aircraft electrical system. The ELT is activated automatically by a deceleration of 5 G's along the flight axis of the aircraft or manually by removing the left side empennage inspection cover and moving the transmitter control switch to the "on" position.

11-140-01 EMERGENCY LOCATOR TRANSMITTER CHECKOUT

The emergency locator transmitter is designed to remain in a ready condition in the "arm" mode for more than one year, however, it is advisable to check operation at 100 hour inspections as follows:

N O T E

This information should be used in conjunction with AC 00-35A Emergency Locator Transmitters - Operational and Maintenance Practices.

1. Obtain permission to test the ELT from the local control tower or controlling agency.

2. Turn on and tune the aircraft radio to 121.5 MHZ.

3. Remove left side empennage inspection cover and momentarily move the transmitter mode switch to the "on" position at which time the aircraft emergency signal should be heard loud and clear. The "on" time should be held to an absolute minimum.

4. If no signal is heard, move transmitter mode switch to "off" replace battery pack and repeat steps 1 through 3.

5. When test is completed, return mode switch to "arm" and replace inspection cover.

N O T E

The emergency transmitter locator battery pack must be serviced or replaced per the ELT manufacturer's instructions.

11-150 ELECTRICAL SYSTEM TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
System not energized when master switch turned on	Dead battery	Recharge or replace
	Defective wiring	With master switch off, check entire D.C. power system for an open circuit with a continuity tester
	Defective battery relay	Connect subsequently a voltmeter from each battery relay terminal voltage with master switch on. If no voltage is indicated from either terminal, replace relay
	Defective master switch	Remove switch from airplane and check with continuity tester. Replace defective switch.
Battery discharged	Equipment left on	Recharge
	Short circuit	Check system with ohmmeter and repair.
	Charging rate too low	Adjust voltage regulator on AA-1 and AA-1A. Replace on AA-1B.
	Battery left standing too long	Recharge or replace
	Impurities in electrolyte	Replace battery
	Cell separators broken	Replace battery
	Loose or broken alternator belt	Tighten or replace belt
	Corroded or loose battery connections	Clean and tighten
Short battery life	Low charging rate	Adjust voltage regulator

11-150 ELECTRICAL SYSTEM TROUBLE SHOOTING (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
	Impurities in electrolyte	Replace battery
	Battery left standing too long	Recharge or replace
Battery freezes	Undercharged or discharged battery	Replace battery
Battery uses excess amount of water	Charging rate too high	Adjust voltage regulator on AA-1 and AA-1A. Replace on AA-1B
	Shorted cell	Replace battery
Starter motor inoperative	Low battery	Recharge or replace
	Defective wiring	Check wiring with ohmmeter and repair as required
	Defective starter relay	Replace relay
	Defective starter switch	With master switch off, conduct continuity test across starter switch. If circuit is open when button is depressed, replace switch.
	Defective starter motor	Repair or replace
Starter motor sluggish	Low battery	Recharge or replace
	Dirty contacts on starter switch or starter relay	Replace
	Defective starter	Repair or replace
	Dirty commutator	Clean and turn down if required

11-150 ELECTRICAL SYSTEM TROUBLE SHOOTING (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Ammeter fails to indicate with engine operating (AA-1 and AA-1A only)	Alternator belt loose or broken	Tighten or replace belt
	Open circuit between ammeter feeder and bus bar	Check wiring for clean secure connections and repair as necessary
	Defective ammeter	Replace gauge
	Defective voltage regulator	Replace voltage regulator
	Tripped circuit breaker	Reset
Ammeter pointer fluctuates excessively	Flashing beacon	Verify and disregard
	Worn slip rings	Repair or replace alternator
	Loose connection in wiring	Locate and secure
Landing light fails to operate	Blown fuse	Replace fuse
	Lamp burned out	Replace lamp
	Defective switch	Replace switch
	Defective wiring	Check circuit with ohmmeter and repair as necessary
Flashing beacon fails to operate	Blown fuse	Replace fuse
	Defective wiring	Check circuit with ohmmeter and repair as necessary
	Defective switch	Replace switch
	Lamp burned out	Replace lamp
	Defective flasher unit	Replace flasher unit
One Navlight out	Lamp burned out	Replace lamp

11-150 ELECTRICAL SYSTEM TROUBLE SHOOTING (Continued)

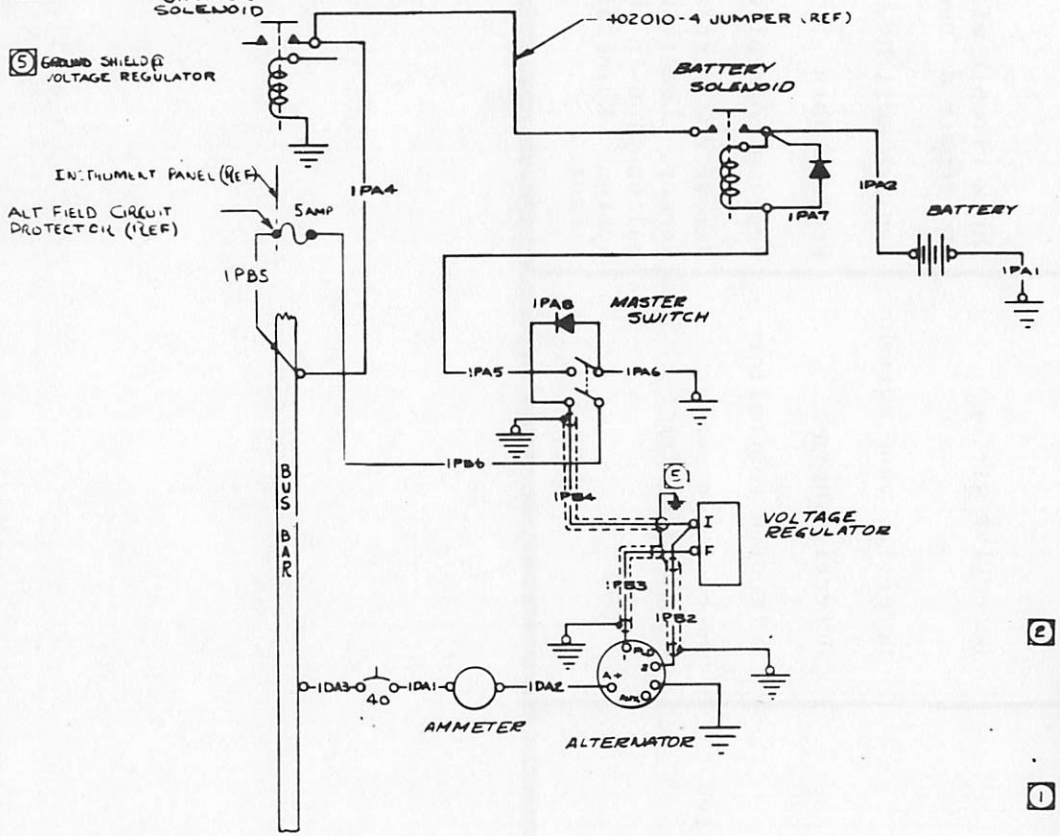
TROUBLE	PROBABLE CAUSE	REMEDY
	Defective wiring	Check circuit with ohmmeter and repair as necessary
All Navlights out	Blown fuse	Replace fuse
	Defective switch	Replace switch
	Defective wiring	Check circuit with ohmmeter and repair as necessary
One instrument light out	Lamp burned out	Replace lamp
All instrument lights out	Blown fuse	Replace fuse
	Defective wiring	Check circuit with ohmmeter and repair as necessary
	Defective rheostat	Replace rheostat
Dome light out	Blown fuse	Replace fuse
	Lamp burned out	Replace lamp
	Defective switch	Replace switch
	Defective wiring	Check circuit with ohmmeter and repair as necessary
Flap motor fails to operate	Blown fuse	Replace fuse
	Defective wiring	Check circuit with ohmmeter and repair as necessary
	Defective switch	Replace switch
	Worn brushes	Replace brushes
	Annealed brush springs	Replace brushes
	Dirty commutator	Clean and turn down if required
	Defective flap motor	Replace flap motor
Flap motor operation sluggish	Worn brushes	Replace brushes

11-150 ELECTRICAL SYSTEM TROUBLE SHOOTING (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
	Dirty commutator	Clean and turn down if required
Flap motor fails to shut off automatically in up position	Limit switch not correctly adjusted	Adjust limit switch
	Defective limit switch	Replace limit switch
	Up stop not positioned correctly	Reposition up stop so that circuit is opened by limit switch prior to contact with up stop.
Stall warning fails to operate	Blown fuse	Replace fuse
	Defective wiring	Check circuit with ohmmeter and repair as necessary
	Defective vane switch	Replace switch
	Defective horn	Replace horn
	Defective controller	Replace controller
Alternator inoperative (AA-1B only)	Overvoltage sensor disabled system	Remove and discard expended sensor. Locate and correct malfunction in the charging system. Reinstall new sensor.

NOTES

1. 1PA8 TO BE MADE FROM F2 DIODE (SARKES-TARZIAN OR EQUIV)
2. 1PA7 TO BE MADE FROM F4 DIODE (SARKES-TARZIAN OR EQUIV)
3. WIRE CODE IDENTIFICATION PER APS-1100
4. 1PB5 MAY BE USED FOR 1PB6 TO DEPLETE EXISTING STOCK



LTR	AUTHORITY	DESCRIPTION	BY	DATE
A		1PA5 & 1PA6 ADDED & CHANGED; 1PA5 WAS 10 AWG, 1PB2-1PB4 WAS 20 AWG. 6-10-68		
B		1PA7 WAS 1PA5, DELETED TERMINAL BLOCK, NOTE 3 WAS; 1PA5 TO BE-; 6-25-68		
C	AAI-0308 & ON	402010-4 WAS 1PA3, DELETED FROM WIRE TABLE: 1PA3, E, 321600 & 321600, INC DCN 1, ADDED NOTE 4 G-375-14 WAS 321600 AT TERM. #1 T DONNELLY 9-29-69		
D	AAI-0440 & ON, AAIA-0332 & ON	REDESIGNED ALT FIELD CIRCUIT & ADDED 1PB6. 1PB5 WAS 42599-2 TERM 2. NOTE 3 WAS ON 4 WIRE ADDED NOTE 4 T Donnelly 11/5/71	11/5/71	

AA-1 & AA-1A

E	1PA7	—		31886	31895	AMP	
	1DA3	10		35109	35109	AMP	
	1DA2	10		35109	35110	AMP	
	1DA1	10		35109	35109	AMP	
	1PB5	20		42599-2	SOLDER	AMP	
	1PB4	20S		31891	42599-2	AMP	
	1PB3	20S		31891	31891	AMP	
	1PB2	20S		31891	31891	AMP	
1	1PA8	—		—	—		
	1PB6	20		SOLDER	AA-5140	ETC	
	1PA6	20		42599-2	31886	AMP	
	1PA5	20		42599-2	31886	AMP	
	1PA4	10		35112	35109	AMP	
	1PA2	2		321600	321600	AMP	
	1PA1	2		G-375-14	321600	AMP	
	WIRE CODE IDENTIFICATION	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN		8-2-68
CHKD		5-17-68
GROUP		5-12-68
STRESS		5-10-68
PROJ		5-11-68

TITLE: WIRING DIAGRAM D.C. POWER SYSTEM

AMERICAN AVIATION CORPORATION

DWG NO 13-402009

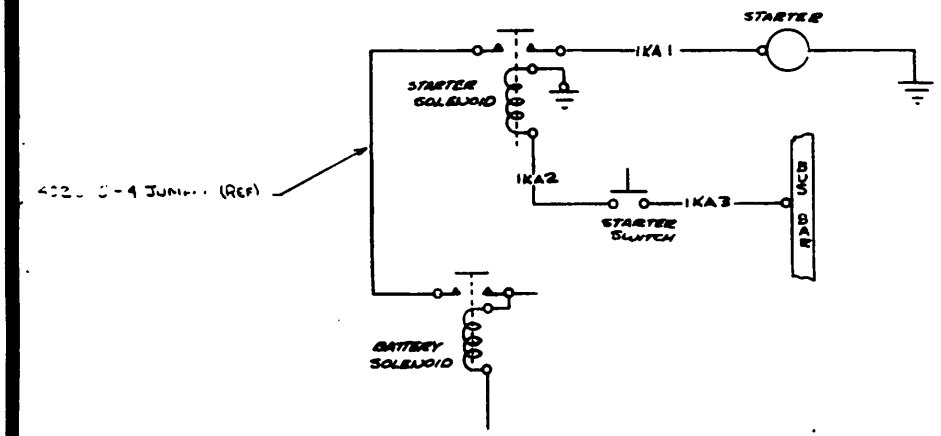
SCALE — SHEET 1 OF —

GRUMMAN AMERICAN SERVICE MANUAL

NOTES:

1. WIRE CODE IDENTIFICATION PER APS-1100

CHG LTR	AUTHORITY	REVISION DESCRIPTION	BY DATE	CHECKED APPROVED
A		DELETED IKA5, REVISED WIRE TABLE 6-25-68	5-17-68	
B	AAI-8300 ECN	ADDED 4 REF WAB PAS REF PC SCH 1 T. Connelly 9/11/69	9-11-69	



AA-1 & AA-1A

IKA3	20		31886	31891	AMP	
IKA2	20		31886	31886	AMP	
IKA1	2		321600	321600	AMP	
WIRE CODE	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

NAME	DATE
DRAWN	5-8-68
CHKD	5-17-68
GROUP	5-17-68
STRESS	
PROJ	

TITLE: WIRING DIAGRAM STARTER SYSTEM

AMERICAN AVIATION CORPORATION

DWG NO 13-402009

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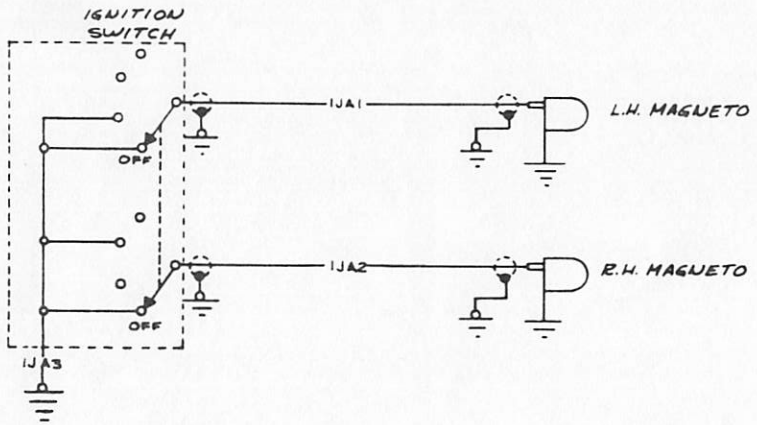


AA-1 & AA-1A

WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS
IJA3	16		31903	31902	AMP	
IJA2	16S		31902 31902	31903 31902	AMP	
IJA1	16S		31902 31902	31903 31902	AMP	

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

	NAME	DATE
DRAWN	OPSTRUP	11-16
CHKD		5-17-68
GROUP		5-17-68
STRESS		
PROJ		

TITLE: WIRING DIAGRAM IGNITION SYSTEM

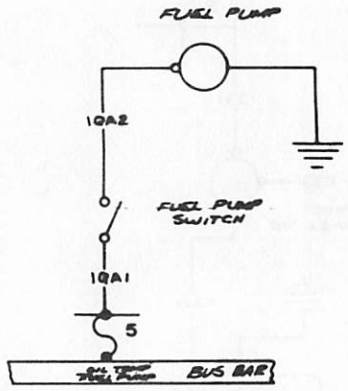
AVIATION CORPORA

13-402009

SHEET 3

WEIGHT | SUPERSEDES | SCALE

REVISION				
CHG LTR	AUTHORITY	DESCRIPTION	BY / DATE	CHECKED / APPROVED
A		1QA1 WAS 1QA2, ADDED LENGTHS TO WIRE TABLE. ECO 6-2548		



AA-1 & AA-1A

WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS
1QA2	16	400	42332-2	320562	AMP	
1QA1	16	24.5	SOLDER	42332-2	AMP	

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

	NAME	DATE
DRAWN	J. PSITURK	4-4-68
CHKD		5-17-68
GROUP		5-17-68
STRESS		
PROJ		

TITLE: WIRING DIAGRAM FUEL PUMP SYSTEM

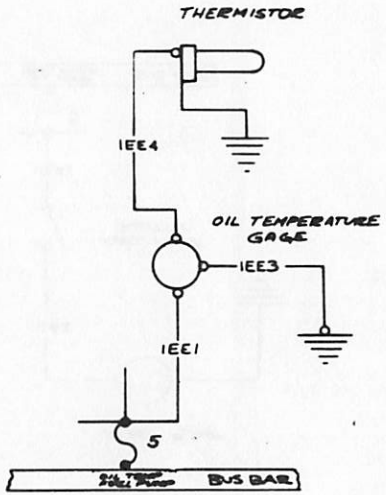
AMERICAN AVIATION CORPORATION

DWG NO: 13-402009

WEIGHT | SUPERSEDES | SCALE | SHEET 4 OF —

NOTES:
1. WIRE CODE IDENTIFICATION PER APS 1100

REVISION				
CHG LTR	AUTHORITY	DESCRIPTION	BY DATE	CHECKED APPROVED
A		REVISED WIRE TABLE, ADDED & MISC AND ADDITIONAL TERMINALS TO IEE2 Cancelled 8-6-68	8-6-68	
B		REVISED WIRE TABLE, REMOVED 20 AWG WIRE & TERMINALS ADDED IEE4 WAS IEE2, INC DCN 1 T Donnelly 4-26-69	4-26-69	T Donnelly 4-26-69



AA-1 & AA-1A

IEE3	20		SOLDER	31886	AMP	
IEE4	20		31891	31891	AMP	
IEE1	20		SOLDER	31891	AMP	
WIRE CODE NUMBERS	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN	[illegible]	4-4-68
CHKD	[illegible]	5-17-68
GROUP	[illegible]	5-17-68
STRESS	[illegible]	5-17-68
PROJ	[illegible]	5-17-68

TITLE: WIRING DIAGRAM OIL TEMP. SYSTEM

WEIGHT | SUPERSEDES | SCALE

AMERICAN AVIATION CORPORATION

DWG NO. 13-402009

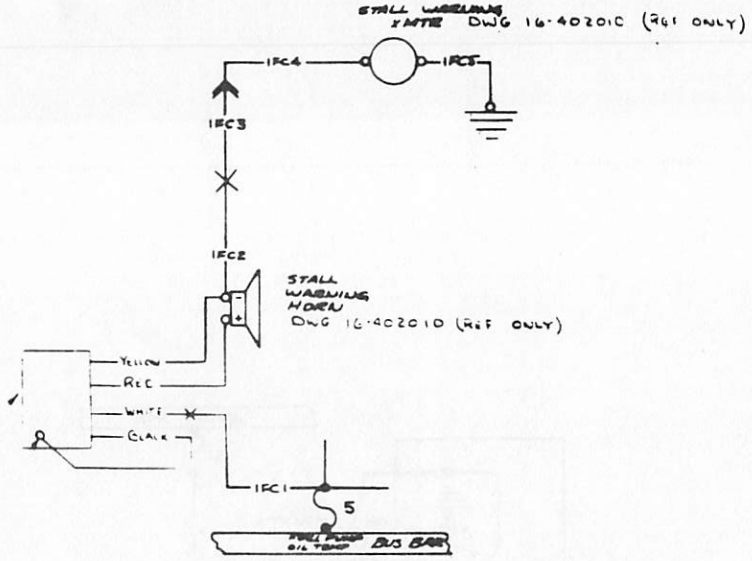
SHEET 5 OF —

GRUMMAN AMERICAN SERVICE MANUAL

NOTES

1 WIRE CODE IDENTIFICATION PER APS 1100

2 CONNECT IFC5 TO THE NORM - OPEN TERMINAL OF LIFT DETECTOR TO GROUND



LTR	ASR/ECO	DESCRIPTION	BY	DATE
A		ADDED WIRE TABLE, 6-25-68		
B	AAI-0348 AAI-0433 & ON	IFC1 WAS 31886 TERM 2 AMP ADDED 14-802034 CONTROLLER ASSY, DWG 16-402010 (REF ONLY) BLACK, RED, YELLOW & WHITE WIRE CODE TO L/M'S T Donnelly 4-14-70	4/14/70	T LANE
C	AAIA-0001 & ON, AAI-0456	DELETED TERMINAL BOARD, DELETED 42593-2 MACH TERM & IFC2 ADDED IN TERM #1 IFC3 WAS 42593-2 ADDED SKUNK (UP TO IFC2 (IFC3 CALGATE 10/3/70 Dykstra	11/2/70	T LANE
D	X	ADDED NOTE 2 T Donnelly 11/6/71		

AA-1 & AA-1A

BLACK	20			AA-B32-08	ETC	AAI-0348, AAI-0433 & ON
RED	20			AA-B32-08	ETC	
YELLOW	20			AA-B32-08	ETC	
WHITE	20		AN-542		ETC	AAI-0348, AAI-0433 & ON
IFC5	20		31886	31891	AMP	
IFC4	20		A-23	31886	T/B / AMP	
IFC3	20		AN542	A-23	AMP / T/B	AAIA-0001 & ON
IFC2	20		31886	—	AMP	AAIA-0001 & ON
IFC1	20		SOLDER			
WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

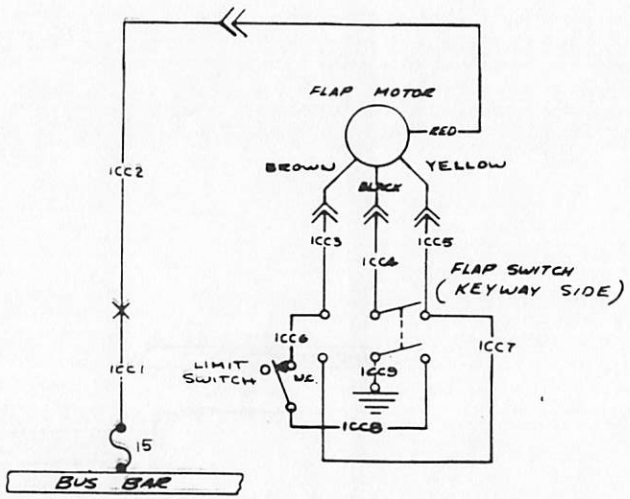
WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO			AMERICAN AVIATION CORPORATION
NAME	DATE	TITLE	
DRAWN DiPietrace	4-8-68	WIRING DIAGRAM STALL WARNING SYSTEM	DWG NO 13-402009
CHKD	5-17-68		
GROUP	5-17-68		
STRESS			
PROJ			SHEET 6 OF —
WEIGHT	SPECIFICATION	SCALE	

GRUMMAN AMERICAN SERVICE MANUAL

NOTES:
1. COLORED WIRES ARE LEADS PROTRUDING FROM MOTOR
2. WIRE CODE IDENTIFICATION PER APS-100

CHG LTR	AUTHORITY	DESCRIPTION	BY DATE	CHECKED APPROVED
A		REVISED WIRE TABLE, ADDED NOTES 1 & 2, ADDED INLINE SPLICE	7-22-68	
			8-25-68	
B		DELETED NOTE 1, INLINE SPLICE FROM E/D,	10-7-68	
			10-9-68	
		REVISED WIRE TABLE FOR WIRE ICC2		
	AAIA-0001 & ON, AS MODIFIED	DELETED TERMINAL BLOCK, DELETED 42332-2 CABLET FROM ICC2, BW543 WAS ICC2 ADDED SPLICE CONDUITS TO	12/10	
			10/24/70	



AA-1 & AA-1A

RED			—	320559	AMP	
BLACK			—	B23	T&B	
YELLOW			—	B23	T&B	
BROWN			—	B23	T&B	
ICC9	16		42332-2	31903	AMP	
ICC8	16		31902	42332-2	AMP	
ICC7	16		42332-2	42332-2	AMP	
ICC6	16		42332-2	31902	AMP	
ICC5	16		B-23	42332-2	AMP/T&B	
ICC4	16		B-23	42332-2	AMP/T&B	
ICC3	16		B-23	42332-2	AMP/T&B	
ICC2	16		—	—	AMP	AAIA-0001 & UP
ICC1	16		SOLDER	BW543	AMP	AAIA-0001 & UP
WIRE CODE IDENTIFICATION	AWG	LG	TERM #1	TERM #2	VENDOR	REMARKS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN		4-9-68
CHKD		5-17-68
ENGR		5-17-68
STRESS		5-17-68
PROJ		5-17-68

TITLE: WIRING DIAGRAM FLAP DRIVE SYSTEM

AMERICAN AVIATION CORPORATION

DWG NO. 13-402009

SHEET 7 OF —

SCALE

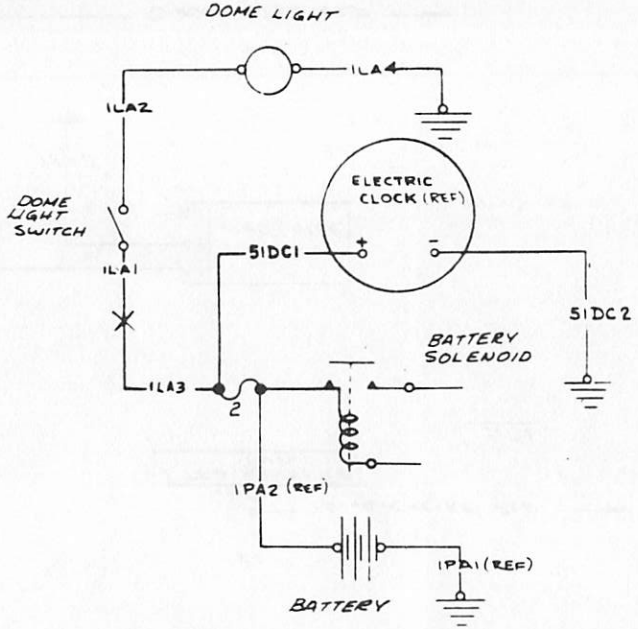
GRUMMAN AMERICAN SERVICE MANUAL

NOTES

(1) WIRE ASSY TO CONSIST OF HHJ FUSE HOLDER & AGC-2 FUSE. VENDOR IS BUSS

2. WIRE CODE IDENTIFICATION PER AGS 10.

		DESCRIPTION	BY	CHECKED APPROVED
A		ADDED NOTE (1) ADDED FUSE, ADDED 320539 TO ILA1 COLUMN 6-10-68		
B		ADDED TERMINAL BLOCK REVISED WIRE TABLE 6-25-68		
C	AA1A-0001 & ON, AA 04561-P	DELETED TERMINAL BLOCK DELETED 42599-2 FOR 1A3 AND TAB FOR 1A3 WAS 42599-2 ADDED FOR 1A3 INCORPORATED DCN-0	11/2/70	
D	AA1A-0448 & ON	ADDED 5 DC1 & 5 DC2 SELECT CLOCK (REF) CHANGED 5 DC1 M		



AA-1 & AA-1A

	WIRE CODE IDENT	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS
5IDC2	22		MA 827-06	AA 827-06	ETC		
5IDC1	22		SOLDER	AA-827-06	ETC		
1LA1	20		AWG22	42599-2	AMP	AA1A-0001 & ON	
1LA4	20		SOLDER	31891	AMP		
1LA2	20		42599-2	SOLDER	AMP		
(1) 1LA3	20		320539 31A32	—	AMP	AA1A-0001 & ON	

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO			AMERICAN AVIATION CORPORATION
DRAWN DPETTUK 12-10-68	TITLE WIRING DIAGRAM DOME LIGHT		DWG NO 13-402009
CHKD 12-17-68			
GROUP 12-17-68			
SPEC'S 12-19-68			
PROJ			
WEIGHT	SUPERSEDES	SCALE	SHEET 8 OF —

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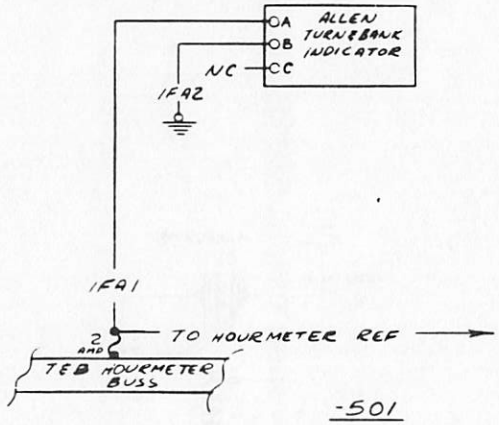
SERVICE MANUAL

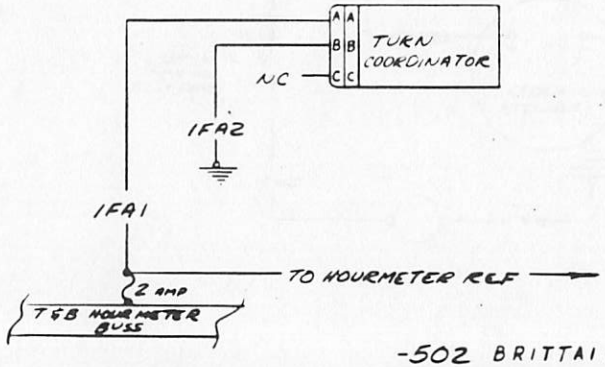
(1) THIS CONNECTOR ARRANGEMENT TO BE USED ON 13-804009-501 ASSY
(2) THIS CONNECTOR ARRANGEMENT TO BE USED ON 13-804009-502 ASSY & REQUIRES MS3106-10SL-3S PLUG
3 WIRE CODE IDENTIFICATION PER APS 1100

CHG LTR	AUTHORITY	DESCRIPTION	BY / DATE	CHECKED / APPROVED
A		REDREW TEB INDICATOR WIRING ADDED -502 BRITTAIN TURN COORDINATOR INCORPORATED DCN #1	JAI 5/28/69	W. LAUE [illegible]
B		ADDED -503 R.C. ALLEN, MOD BRITTAIN TO -502 REMOVED BRITTAIN FROM TURN COORDINATOR MG 7.1.69	7.1.69	W. LAUE [illegible]



-501

AA-1 & AA-1A



-502 BRITTAIN
-503 R.C. ALLEN

(2)	IFA2	20		SOLDER	SOLDER		
	IFA1	20		SOLDER	SOLDER		
(1)	IFA2	20		31891	31891	AMP	
	IFA1	20		SOLDER	31891	AMP	
	WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	GENERAL

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

	NAME	DATE
DRAWN	[illegible]	4-4-68
CHKD	L. Emmons	5-7-68
GROUP	T. Vesely	5-7-68
STRESS	[illegible]	5-7-68
PROJ	[illegible]	5-7-68
WEIGHT		

TITLE: WIRING DIAGRAM TURN AND BANK INDICATOR SYSTEM

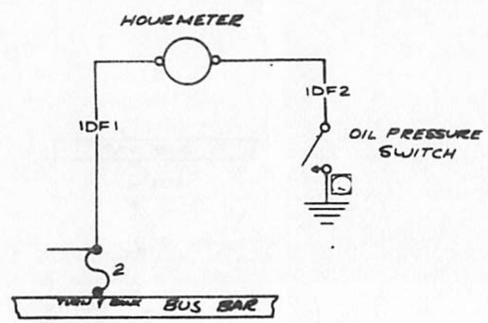
AMERICAN AVIATION CORPORATION

DWG NO 13-402009

SHEET 9 OF —

NOTES
1 WIRE CODE IDENTIFICATION PER APS-1100
[2] INSURE CONTINUITY FROM SHELL OF PRESSURE SW TO GRD

SYM	AUTHORITY	DESCRIPTION	DATE	APPROVED
A		REMOVED [1] IDF1 TERM #2 WAS BLANK; IDF2 TERM 1 WAS BLANK W/ ... NOTE [1] WAS ... WAS SUPPLIED WITH METER ...		
B		ADDED NOTE [2] T Donnelly	9/12/70	



AA-1 & AA-1A

IDF2	—	—	AA8140	31891	AMP/ETC	
IDF1	—	—	SOLDER	AA8140	ETC	
WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

AMERICAN AVIATION CORPORATION

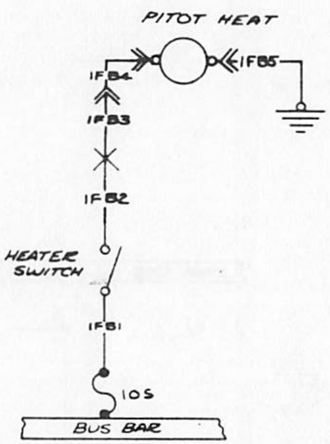
TITLE: WIRING DIAGRAM HOURMETER SYSTEM

DWG NO 13-402009

SHEET 10 OF —

NOTES
1. PITOT SUPPLIED WITH QUICK DISCONNECT SOLDER PINS
2. WIRE CODE IDENTIFICATION PER APS-1100

REVISION				
CHG LTR	AUTHORITY	DESCRIPTION	BY / DATE	CHECKED / APPROVED
A		REVISED WIRE TABLE BLOCK. [illegible] 6-25-68	6-25-68	[illegible]
B		CHANGED FUSE RATING FROM 10 TO 10S INC [illegible] T. DONNELLY [illegible]	[illegible]	T. DONNELLY [illegible]
C	AA1A-0001 & ON, AA-[illegible]	DELETED TERMINAL BOARD DELETED 42332-2 FROM TERM #2 FOR FB2 BW543 FOR FB3 TERM #1 WAS 42332-2 [illegible]	[illegible]	T. LANE [illegible]



AA-1 & AA-1A

WIRE TABLE

WIRE CODE	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS
1FB5	16		SOLDER	31903	AMP	
1FB4 (1)	16		B23	SOLDER	T&B	
1FB3 (1)	16		BW543	B23	AMP / T&B	AA1A-0001 & ON
1FB2	16		42332-2	—	AMP	AA1A-0001 & ON
1FB1	16		SOLDER	42332-2	AMP	

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

	NAME	DATE
DRAWN	DESITUK	4-3-68
CHKD	[illegible]	5-17-68
GROUP	T. [illegible]	5-12-68
STRESS		
PROJ	[illegible]	[illegible]

TITLE: WIRING DIAGRAM PITOT HEAT SYSTEM

AMERICAN AVIATION CORPORATION

DWG NO 13-402009

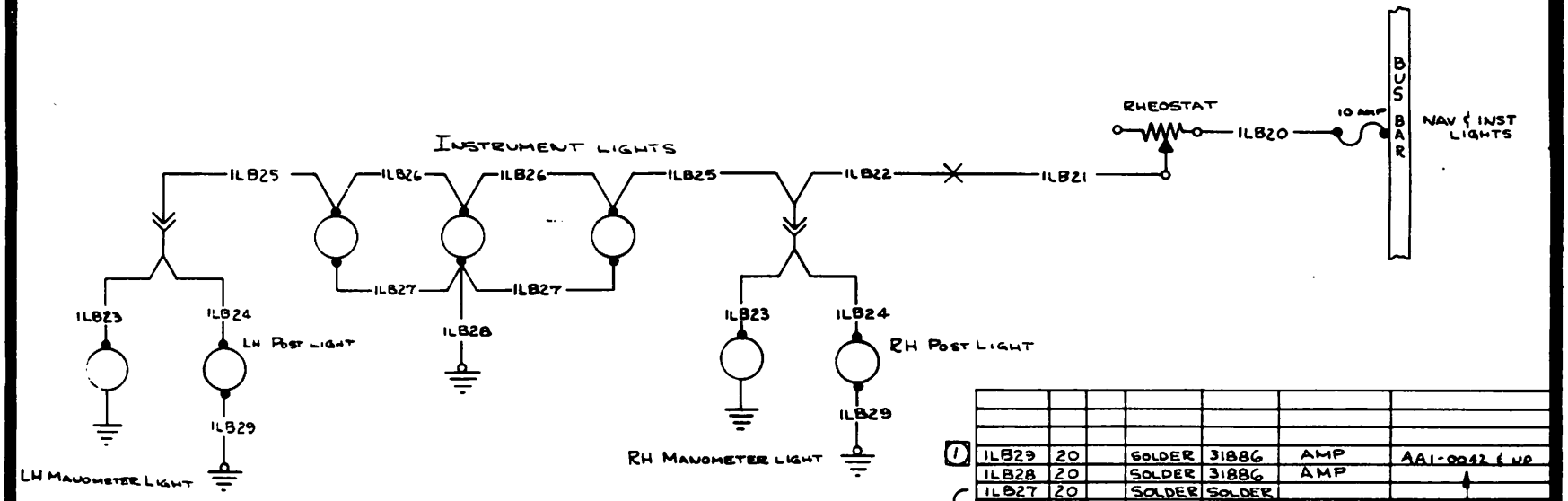
SHEET 11 OF —

WEIGHT | SUPERSEDES | SCALE

NOTES
1. INSTALLATION REQUIRES TWO EACH OF THESE WIRES
2. WIRE CODE IDENTIFICATION PER APS-1100

CHG LTR	AUTHORITY	DESCRIPTION	BY DATE	CHECKED APPROVED
A	AA1A-0001 & ON, AA1-0042 & UP	DELETED TERMINAL BLOCK. DELETED 42530-1 CABLE FROM TERM #1. ADDED ILB22. AWG42 TO ILB21 CABLE ASSY. 42530-2. ADDED SK 1169 & UP TO ILB21 & ILB22 CABLE ASSY INCORPORATED DCN #1	11/5/71	T LANE 12 JAN 72

AA-1 & AA-1A



1	ILB29	20		SOLDER	31886	AMP	AA1-0042 & UP
	ILB28	20		SOLDER	31886	AMP	
1	ILB27	20		SOLDER	SOLDER		
	ILB26	20		SOLDER	SOLDER		
	ILB25	20		A-23	SOLDER	T&B	
	ILB24	20		SOLDER	SOLDER		
	ILB23	20		A-23	SOLDER	T&B	AA-0042 & UP
	ILB22	20		—	SOLDER	AMP	AA1A-0001 & ON
	ILB21	20		31886	AW542	AMP	AA1A-0001 & ON
	ILB20	16		SOLDER	31886	AMP	AA1-0042 & UP
WIRE CODE NUMBER		AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

AMERICAN AVIATION CORPORATION

	NAME	DATE
DRAWN		12/
CHKD	T LANE	12 20/69
GROUP		
STRESS		
PROJ		

TITLE: WIRING DIAGRAM INSTRUMENT LIGHTING SYSTEM

DWG NO 13-402009

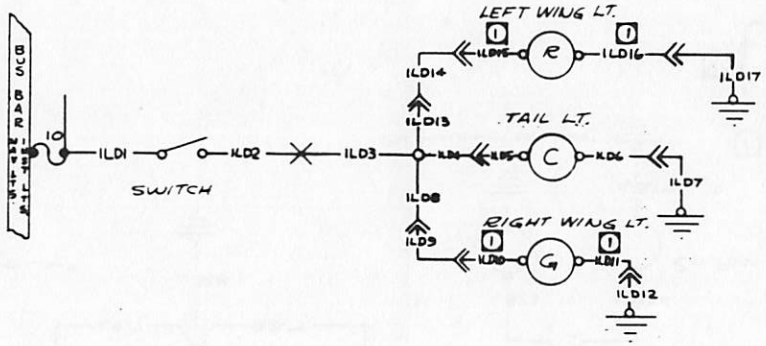
WEIGHT | SHEET 18 | SCALE —

SHEET 18 OF

NOTES

1. REMOVE TERMINALS SUPPLIED WITH LIGHT ASSEMBLIES
2. ETC TERMINAL AA-B 37 MAY BE SUBSTITUTED FOR HOLLINGSWORTH TERMINAL SO 8054
3. WIRE CODE IDENTIFICATION PER ABS-1100

CHG LTR	AUTHORITY	DESCRIPTION	BY / DATE	CHECKED / APPROVED
A		DELETED TERMINAL BLOCK & REVISED WIRE TABLE	6-25-68	
B		ADDED NOTE 2	12-26-68	
C	AAIA-0001 & ON, AA1045 & UP	INCORPORATED DCN 1 DELETED TERMINAL BOARD DELETED 42332-2 CALLOUT FOR ILD2 TERM #2 BW543 TERM #1 ILD3 WAS 42332-2 11/2/70	11/2/70	



AA-1 & AA-1A

ILD17	20		S08054	31891	AMP	
ILD16	20		320559	S08054	AMP	
ILD15	20		S08054	320559	AMP	
ILD14	20		A-23	S08054	TIB	
ILD13	20		—	A-23	TIB	
ILD12	20		S08054	31891	AMP	
ILD11	20		320559	S08054	AMP	
ILD10	20		S08054	320559	AMP	
ILD9	20		A-23	S08054	TIB	
ILD8	20		—	A-23	TIB	
ILD7	20		S08054	31891	AMP	
ILD6	20		SOLDER	S08054		
ILD5	20		S08054	SOLDER		
ILD4	20		—	S08054		
ILD3	16		BW543	320562	AMP	AAIA-0001 & ON
ILD2	16		42332-2	—	AMP	AAIA-0001 & ON
ILD1	16		SOLDER	42332-2	AMP	
WIRE CODE IDENTIFICATION	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN		10-8-68
CHKD		5-17-68
GROUP		5-17-68
STRESS		
PROJ		5-17-68
WEIGHT		

TITLE: WIRING DIAGRAM WING AND TAIL LIGHTS

SUPERSEDES | SCALE

AMERICAN AVIATION CORPORATION

DWG NO 13-402009

SHEET 13 OF —

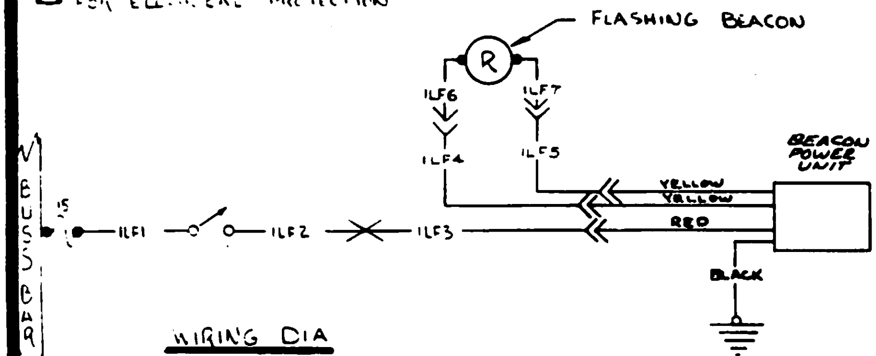
GRUMMAN AMERICAN SERVICE MANUAL

NOTES

1. COLORED WIRES ARE INTEGRAL PART OF BEACON POWER UNIT
2. WIRE CODE IDENTIFICATION PER APS-1100

5. FLASHER WIRING & CONNECTORS AS SHOWN SUPPLIED BY MFG
6. 1-480303-0 HOUSING MUST BE ATTACHED FOR ELECTRICAL PROTECTION

CHG LTR	[illegible]	DESCRIPTION	BY / DATE	CHECKED / APPROVED
A	[illegible]	ADDED CALLOUTS FOR ILF4, ILF5, YELLOW, YELLOW & RED, REVISED WIRE TABLE, ADDED NOTE 1, DELETED CONNECTOR UNIT. [illegible] 6-25-68	6-25-68	[illegible]
B		ADDED ILF6 & ILF7 TO F/D & C/M, ILF4 & ILF5 TERM #1 WAS 320562 [illegible] INC DCN #1	[illegible]	T. Donnelly T. LANE
C	AA1A-0001 & ON, [illegible]	DELETED TERMINAL BLOCK, DELETED 42332-2 FROM TERM #2 ILF2, BW 543 TERM #1 ILF3 WAS 42332-2 11/2/70	11/2/70	T. LANE [illegible]
D	AA1-0459 & ON, AA1A-0180, AA1A-0246 & ON	ADDED 3 AND CHANGED F/D TO SHOW STROBE POWER SUPPLY ADDED RED & BLACK [illegible] B-23/AA [illegible] CONNECTION [illegible] 10/8/71 T. Donnelly	10/[illegible]	[illegible]
E	AA1A-0435 & ON	ADDED A1EB POWER SUPPLY 5 [illegible] ILF3, ILF4 & ILF5 WAS B23 DELETED [illegible] 6 [illegible]	[illegible]	T. D. [illegible]

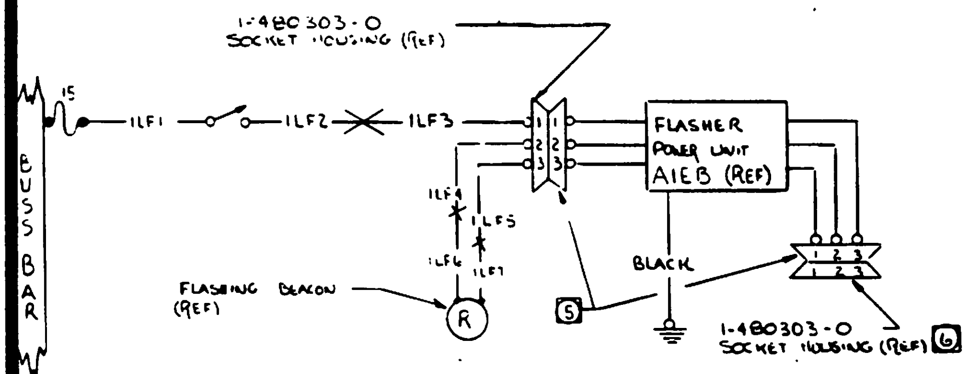


WIRING DIA

AA1-0001 thru AA1-0459
AA1A-0001 thru AA1A-0434

AA-1 & AA-1A

13-402009	F



WIRING DIA

AA1A-0435 thru AA1A-0470

	WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS
AR	ILF7	16		B-23	SOLDER	T&B	
AR	ILF6	16		B-23	SOLDER	T&B	
1	YELLOW			—	B23	T&B	AA1/AA1A TO AA1A-0434
1	YELLOW			—	B23	T&B	AA1/AA1A TO AA1A-0434
1	RED			—	B23	T&B	AA1/AA1A TO AA1A-0434
	ILF5	16		60619-1	B23	AMP/T&B	AA1A-0435 & ON
	ILF4	16		60619-1	B23	AMP/T&B	AA1A-0435 & ON
	ILF3	16		BW543	60619-1	AMP/T&B	AA1A-0001 & ON
	ILF2	16		42332-2	—	AMP	AA1A-0001 & ON
	ILF1	16		SOLDER	42332-2	AMP	

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN	[illegible]	4-9-68
CHKD	[illegible]	5-17-68
GROUP	T. [illegible]	5-17-68
STRESS	[illegible]	
PROJ	[illegible]	5-17-68

TITLE: WIRING DIAGRAM FLASHING BEACON SYSTEM

AMERICAN AVIATION CORPORATION

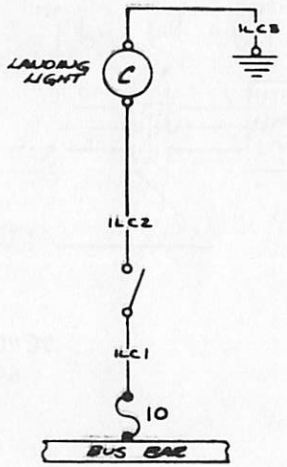
DWG NO. 13-402009

WEIGHT: SCALE: SHEET 14 OF —

GRUMMAN AMERICAN

SERVICE MANUAL

REVISION				
CHG LTR	AUTHORITY	DESCRIPTION	BY DATE	CHECKED APPROVED
A		DELETES ILC4 & ILC5, ILC3 WAS ILC5, REVISED WIRE TABLE. Ops Spec 6-25-68		



AA-1 & AA-1A

WIRE CODE NO.	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS
ILC3	16		31903	31902	AMP	
ILC2	16		42332-2	31902	AMP	
ILC1	16		SOLDER	42332-2	AMP	

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN	[illegible]	4-3-68
CHKD	[illegible]	5-17-68
GROUP	[illegible]	5-17-68
STRESS		
PROJ	[illegible]	5-17-68
WEIGHT		

TITLE: WIRING DIAGRAM LANDING LIGHT SYSTEM

AMERICAN AVIATION CORPORATION

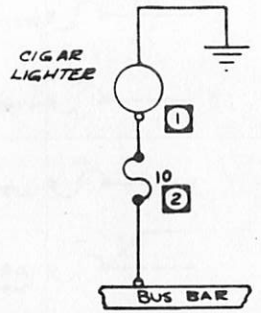
DWG NO 13-402009

SHEET 15 OF —

NOTES

1. THIS WIRE SUPPLIED BY VENDOR - REMOVE EXISTING TERMINAL
2. FUSE IS INTEGRAL PART OF WIRE, FUSE HOLDER P/N HHJ (BUSS) & AGC-10 FUSE (BUSS)

REVISION				
CHG LTR	AUTHORITY	DESCRIPTION	BY DATE	CHECKED APPROVED
A		REVISED NOTE 2		



AA-1 & AA-1A

1	1HC1			320559	31891	AMP	
	WIRE CODE NUMBER	AWG	LG	TERM #1	TERM #2	VENDOR	SERIALS

WIRE TABLE

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN	DPETRUK	4-3-68
CHKD	[illegible]	5-17-68
ENGR	T Vooden	5-17-68
STRESS		
PROJ	[illegible]	5-17-68
WEIGHT		SUPERSEDES	SCALE

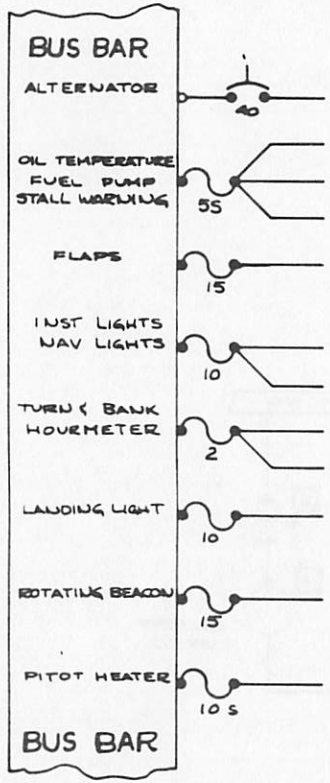
TITLE: WIRING DIAGRAM CIGAR LIGHTER

AMERICAN AVIATION CORPORATION

DWG NO 13-402009

SHEET 16 OF —

GRUMMAN AMERICAN SERVICE MANUAL



AA-1 & AA-1A

CHG LTR	AUTHORITY	REVISION DESCRIPTION	BY / DATE	APPD / DATE

AMERICAN AVIATION CORPORATION CLEVELAND OHIO

	NAME	DATE
DRAWN		5-16-68
CHKD		5-17-68
GROUP		5-16-68
STRESS		
PROJ		5/17/68
WEIGHT		

TITLE: WIRING DIAGRAM
FUSE LOCATION

SUPERSEDES

SCALE —

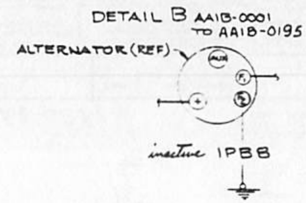
AMERICAN AVIATION CORPORATION

DWG NO 13-402009

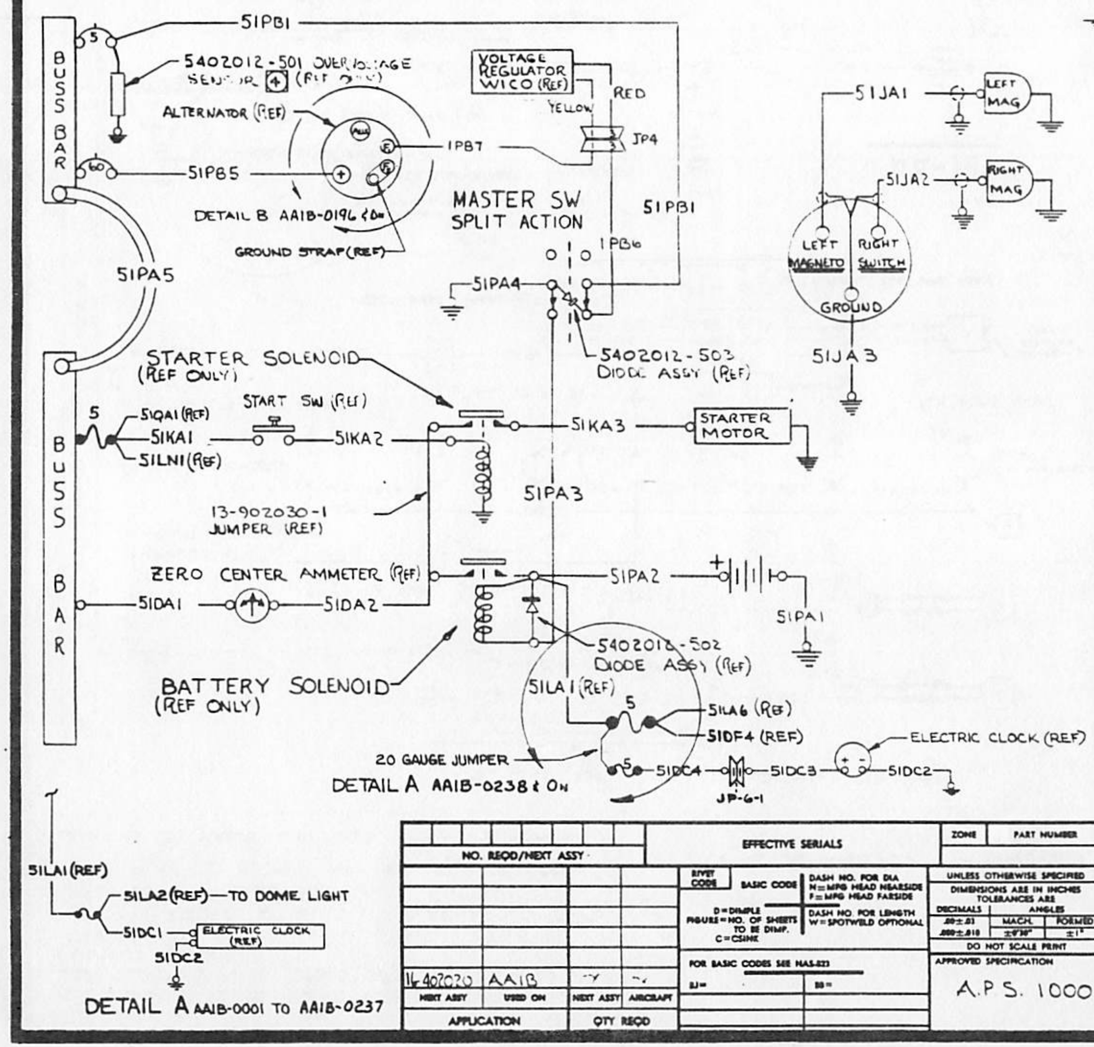
SHEET 17 OF —

NOTES:
1. ALL GROUNDS TO BE CLEAN AND FREE FROM PAINT
2. USE INACTIVE WIRE CODES A/R TO DEPLETE EXISTING STOCK
3. THE 60620-1 EQUIV TO 61118-1 THE 60619-1 EQUIV TO 61117-1 PURCHASING OPT.
4. AN OVERVOLTAGE WILL CAUSE SENSOR TO FAIL, THIS WILL OPEN THE FIELD CIRCUIT BREAKER AS WARNING CLEAR FAULT & REPLACE SENSOR.
5. MAGNETO SHIELDS TO GROUND (3) TERMINALS REQD
6. REFER TO 16-402020 FOR INSTL DETAILS

CHG LTR	AUTHORITY	REVISION DESCRIPTION	DATE	BY / CHECKED / APPROVED
A	~	ADDED TERMINAL CONNECTORS TO ... WAS 13-902030-1 JUMPER WAS ...		
B	AA1B-0238 & ON	ADDED DETAIL A & 51DC3, 51DC4 51LN1(REF) WAS 51DF1(REF) C. COOK 2/26/73	2-28-73	
C	AA1B-0196 & ON	INACTIVATED 1PB8 ADDED DETAIL B	7-16-73	



AA-1B



WIRE CODE	AWG	LG	TERMINAL #1	TERMINAL #2	VENDOR	
51DC4	20		SOLDER	60619-1	AMP	AA1B-0238 & ON
RED	~		60620-1	N/A		
YELLOW	~		60620-1	N/A		
N/A	(5)		AA832-08	N/A	ETC	
51JA3	20S		AA-832-08	AA-821-10	ETC	
51JA2	20S		AA-832-08	AA-821-10	ETC	
51JA1	20S		AA832-08	AA-821-10	ETC	
51PB1	20		AA832-08	AA8140	ETC	
1PB6	20		AA8140	60619-1	ETC /AMP	
1PB7	20		AA832-08	60619-1	ETC /AMP	
1PB8	20		AA832-08	AA821-10	ETC	INACTIVE AA1B-0001 TO AA1B-0195
51PB5	8		D-750-10	D-750-14	ETC	
51KA3	2		G-375-38	G-375-38	ETC	
51KA2	20		AA832-06	AA821-10	ETC	
51KA1	20		SOLDER	AA832-08	ETC	
51PA5	8		D-750-10	D-750-10	ETC	
51PA4	20		AA-8140	AA821-10	ETC	
51PA3	20		AA-8140	AA877-56	ETC	
51PA1	2		G-375-14	G-375-38	ETC	
51PA2	2		G-375-38	G-375-38	ETC	
51DC2	20		AA-832-06	AA-832-08	ETC	
51DC1	20		SOLDER	AA-832-06	ETC	INACTIVE AA1B-0001 TO AA1B-0237
51DC3	20		60620-1	AA-832-06	AMP/ETC	AA1B-0238 & ON
51DA2	8		D-750-10	D-751-38	ETC	
51DA1	8		D-750-10	D-750-10	ETC	

13-402017 C

LIST OF MATERIAL

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

TITLE: WIRING DIAGRAM D.C. POWER DISTRIBUTION

DRAWN 5/22/72 · CHKD 6/3/72 · GROUP 6/1/72 · PROJ 6/5/72

APPROVED SPECIFICATION: A.P.S. 1000

APPLICATION: 16-402020 AA1B

DWG NO. 13-402017

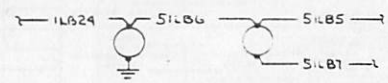
AMERICAN AVIATION CORPORATION

GRUMMAN AMERICAN

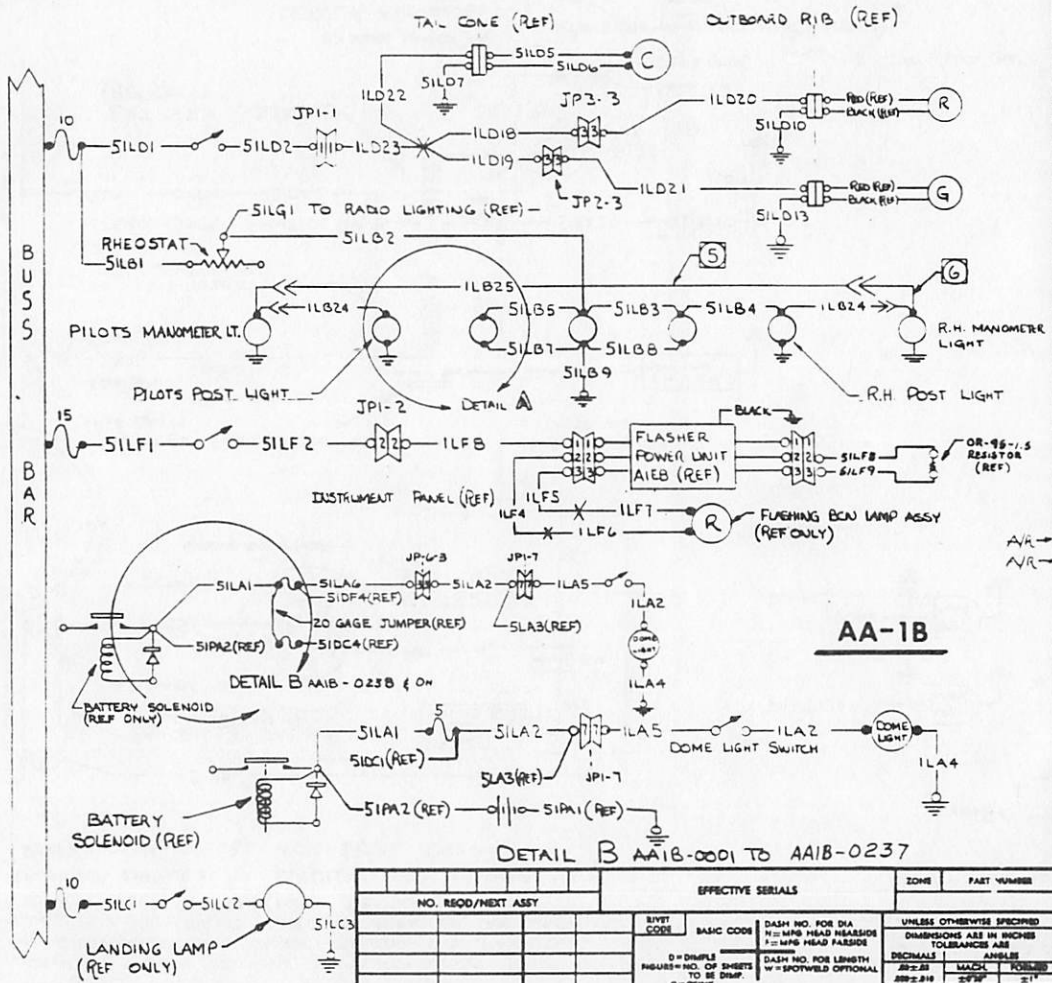
SERVICE MANUAL

NOTES:
1. ALL GROUNDS TO BE CLEAN & FREE FROM PAINT
2. USE INACTIVE WIRE CODES A/R TO DEPLETE EXISTING STOCK
3. THE 60620-1 EQUIV TO 61118-1 THE 60619-1 EQUIV TO 61117-1 PURCHASING OPT.
4. REFER TO 16-402020 FOR INSTL DETAILS
5. ILB25 MUST BE ROUTED AFT OF CENTER SPAR
6. JUMPERS (2) PLACES WITH B-23 TERMINALS ATTACHED

CHG LTR	AUTHORITY	DESCRIPTION	BY DATE	CHECKED APPROVED
A	AAIB-0119 & ON	OBSOLETED 51LB6 ADDED ILB25		
B	AAIB-0238 & ON	ADDED DETAIL B, 5 LA, 51A2 WAS SOLDER TERMINAL C-6000A 2-27-73	3-28-73	
C	AAIB-0335 & ON	ADDED 51LF9 & 51LF8 TO F/D & L/M, ADDED OR-95-1.5 RESISTOR TO F/D (REF) C COOK 11-16-73	11-19-73	



DETAIL A AAIB-0001 TO AA13-0118



51LF9	16		60619-1	BB8141	AMP/ETC	AAIB-0335 & ON
51LF8	16		60619-1	BB8141	AMP/ETC	AAIB-0335 & ON
51LA6	20		SOLDER	60619-1	AMP	AAIB-0238 & ON
ILB25	20		B-23	B-23	AMP	
ILB24	20		SOLDER	B-23	AMP	
51LB9	20		SOLDER	AA-832-08	ETC	
51LB8	20		SOLDER	SOLDER	"	
51LB7	20		SOLDER	SOLDER	"	
51LB6	20		SOLDER	SOLDER	"	OBSOLETE AAIB-0119 & ON
51LB5	20		SOLDER	SOLDER	"	
51LB4	20		SOLDER	SOLDER	"	
51LB3	20		SOLDER	SOLDER	"	
51LB2	20		BB-8141	SOLDER	ETC	
51LB1	20		SOLDER	BB-8141	ETC	
51LD13	20		AA-8137	AA-821-10	ETC	
51LD10	20		AA-8137	AA-821-10	ETC	
ILD21	20		60620-1	AA-8137	AMP ETC	
ILD20	20		60620-1	AA-8137	AMP/ETC	
ILD19	20		"	60619-1	AMP	
ILD18	20		"	60619-1	AMP	
51LD7	20		AA-8137	AA-821-10	ETC	
51LD6	20		SOLDER	AA-8137	ETC	
51LD5	20		AA-8137	SOLDER	ETC	
ILD22	20		"	AA-8137	ETC	16-402018 LC
ILD23	20		60620-1	BW-543	AMP ETC	
51LD2	16		BB-8141	60619-1	ETC/AMP	
51LD1	16		SOLDER	BB-8141	ETC	
A/R ILF7	16		BW-543	SOLDER	ETC	
A/R ILF6	16		BW-543	SOLDER	ETC	
ILF5	16		60619-1	"	AMP	
ILF4	16		60619-1	"	AMP	
ILF8	16		60620-1	60619-1	AMP	
51LF2	16		BB-8141	60619-1	ETC/AMP	
51LF1	16		SOLDER	BB-8141	ETC	
ILA4	20		SOLDER	AA-832-08	ETC	
ILA2	20		BB-8141	SOLDER	ETC	
ILA5	20		60620-1	BB-814	AMP/ETC	
51LA3	20		"	PROTECT		
51LA2	20		60620-1	60619-1	AMP	
51LA	20		AA-832-56	SOLDER	ETC	
51LC3	16		BB-8141	AA-832-56	ETC	
51LC2	16		BB-8141	BB-8141	ETC	
51LC1	16		SOLDER	BB-814	ETC	

WIRE CODE	AWG	LG	FRM #	TO #	VENDOR

NO. REQD/NEXT ASSY	EFFECTIVE SERIALS

ZONE	PART NUMBER	DESCRIPTION	DIA	THICK	WIDE	LG	MATERIAL	HEAT TREAT	FINISH	REV

LIST OF MATERIAL

16-402020	AA1B	X	X
NEXT ASSY	USED ON	NEXT ASSY	AIRCRAFT
APPLICATION		QTY REQD	

RIVET CODE — BASIC CODE — DASH NO. FOR DIA (N=MPG HEAD M&ARSIOS F=MPG HEAD FARSIDE) — D=DIMPLE — FIGURE=NO. OF SHEETS TO BE DIMP. — C=COSINE — DASH NO. FOR LENGTH W=SPOTWELD OPTIONAL — FOR BASIC CODES SEE MAS-823

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE DECIMALS ANGLES .XX±.03 .XXX±.010 MACH ±0°30' FORGED ±1° DO NOT SCALE PRINT

APPROVED SPECIFICATION A.P.S. 1000

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN	[illegible]	5-3-72
CHKD	[illegible]	6/13/72
GROUP	[illegible]	5-3-72
STRESS	X	
PROJ	[illegible]	6/3/72

TITLE: WIRING DIAGRAM AIRCRAFT LIGHTING

WEIGHT: — SUPERSEDES: 14-402020 — SCALE: X

AMERICAN AVIATION CORPORATION

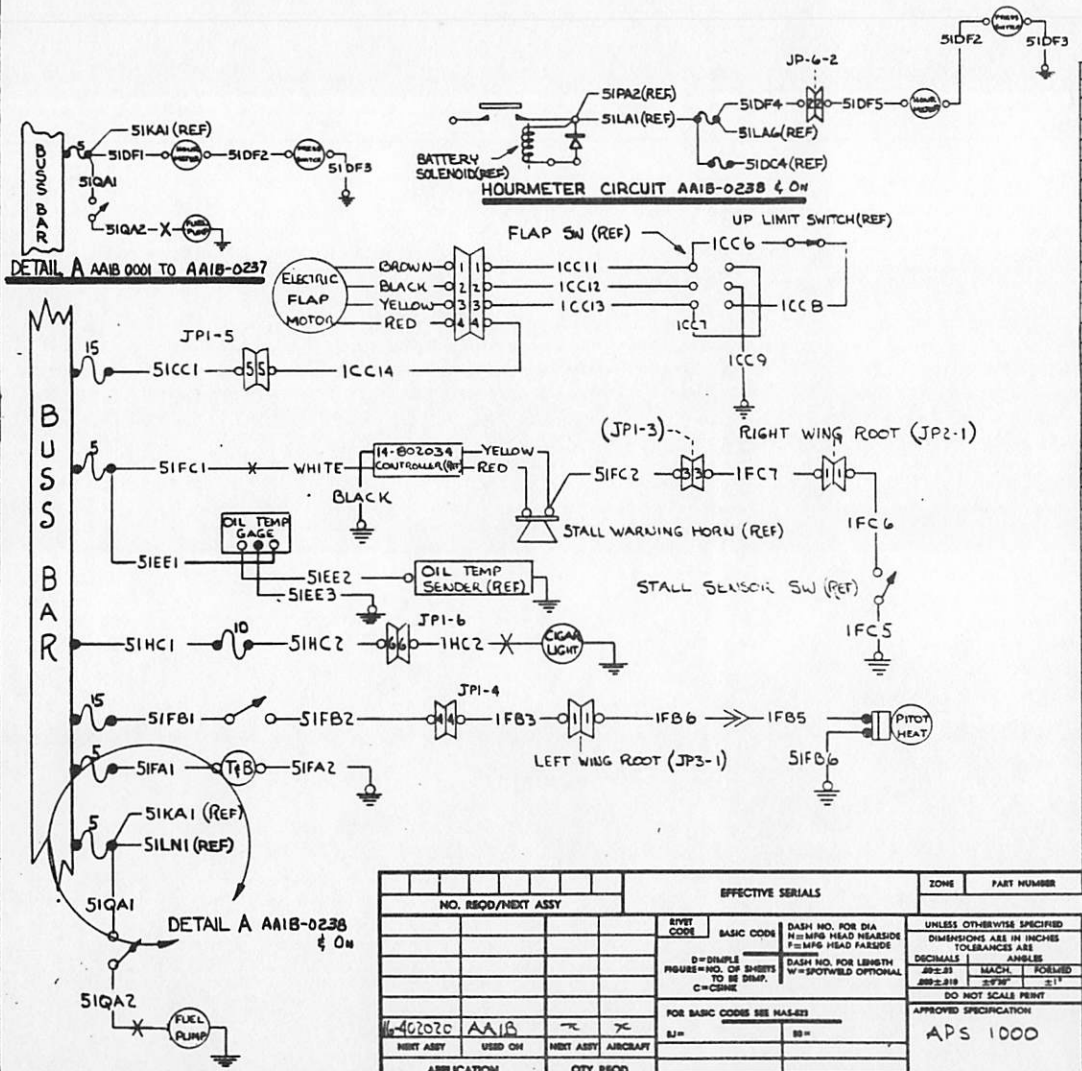
DWG NO. 13-402018

SHEET — OF

NOTES:
1. ALL GROUNDS TO BE CLEAN & FREE FROM PAINT
2. USE INACTIVE WIRE CODES A/R TO DEPLETE EXISTING STOCK
3. THE 60620-1 EQUIV TO 6111B-1 THE 60619-1 EQUIV TO 6111T-1 PURCHASING OPT.
4. REFER TO 16-402020 FOR INSTL DETAILS

REVISION				
CHG LTR	AUTHORITY	DESCRIPTION	BY / DATE	CHECKED / APPROVED
A	AA1B-0238 & ON	ADDED DETAIL A AA1B-0001 TO AA1B-0237 51DF1 INACTIVE ADDED 51DF4 51DF5 ADDED HOURMETER CIRCUIT SR-1332 & UP TO F/D. C. COOK 2/27/72	2-28-72	

AA-1B



51DF5	20		60620-1	BB-8141	AMP/ETC	AA1B-0238 & ON
51DF4	20		SOLDER	60619-1	AMP	AA1B-0238 & ON
BROWN	"		60620-1	"	AMP	
BLACK	"		60620-1	"	AMP	
YELLOW	"		60620-1	"	AMP	
RED	"		60620-1	"	AMP	
1CC12	16		60619-1	BB-8141	AMP/ETC	
1CC11	16		60619-1	BB-8141	AMP/ETC	
1CC6	16		"	BB-837-04	ETC	
1CC8	16		BB-8141	BB-837-04	ETC	
1CC9	16		BB-8141	AA821-10	ETC	
1CC7	16		BB-8141	BB-8141	ETC	
1CC13	16		60619-1	BB-8141	AMP/ETC	
1CC14	16		60620-1	60619-1	AMP	
51CC1	16		SOLDER	60619-1	AMP	
1FC5	20		AA832-08	AA821-10	ETC	
1FC6	20		60620-1	AA832-08	AMP/ETC	
1FC7	20		60620-1	60619-1	ETC	
51FC2	20		AA832-08	60619-1	ETC/AMP	
51FC1	20		SOLDER	AW-542	ETC	14-402019 A
51EE3	20		SOLDER	AA821-10	ETC	
51EE2	20		AA821-10	AA821-10	ETC	
51EE1	20		SOLDER	AA821-10	ETC	
1HC2	16		60620-1	BW543	AMP/ETC	
51HC2	16		SOLDER	60619-1	AMP	
51HC1	16		SOLDER	SOLDER	"	
51FB6	16		SOLDER	AA821-10	ETC	
1FB5	16		B-23	SOLDER	AMP	
1FB6	16		60620-1	B-23	AMP	
1FB3	16		60620-1	60619-1	AMP	
51FB2	16		BB8141	60619-1	ETC/AMP	
51FB1	16		SOLDER	BB8141	ETC	
51FA2	20		AA821-10	AA821-10	ETC	
51FA1	20		SOLDER	AA821-10	ETC	
51DF3	20		AA832-08	AA832-08	ETC	
51DF2	20		BB8141	AA832-08	ETC	
51DF1	20		SOLDER	BB8141	ETC	INACTIVE AA1B-0238 & ON
51QA2	20		BB-8141	AW542	ETC	
51QA1	20		SOLDER	BB8141	ETC	
WIRE CODE	AWG	LG	TERMINAL #1	TERMINAL #2	VENDOR	

NO. REQD/NEXT ASSY				EFFECTIVE SERIALS
16-402020	AA1B	"	"	
NEXT ASSY	USED ON	NEXT ASSY	AIRCRAFT	
APPLICATION		QTY REQD		

RIVET CODE — BASIC CODE — DASH NO. FOR DIA N=MFR HEAD NEARSIDE F=MFR HEAD FARSIDE
D=DIMPLE FIGURE=NO. OF SHEETS TO BE DIMP. C=CSINK — DASH NO. FOR LENGTH W=SPOTWELD OPTIONAL
FOR BASIC CODES SEE MAS-623 — BJ= — BB=

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE
DECIMALS .09±.03, .009±.010 — ANGLES MACH. ±4°30', FORMED ±1°
DO NOT SCALE PRINT
APPROVED SPECIFICATION: APS 1000

ZONE | PART NUMBER | DESCRIPTION | DIA | THICK | WIDE | LG | MATERIAL | HEAT TREAT | FINISH | REV

LIST OF MATERIAL

AMERICAN AVIATION CORPORATION CLEVELAND, OHIO

	NAME	DATE
DRAWN	DANELY	5/31/72
CHKD		6/1/72
GROUP		6/1/72
STRESS	X	
PROJ		6/3/72

TITLE: WIRING DIAGRAM AIRCRAFT ACCESSORIES

WEIGHT: — SUPERSEDES: 14-402009 *1→17 — SCALE: NONE

AMERICAN AVIATION CORPORATION

DWG NO. 13-402019

SHEET 1 OF 1