

AA-5 SERIES
MAINTENANCE MANUAL

CHAPTER 37

VACUUM SYSTEM

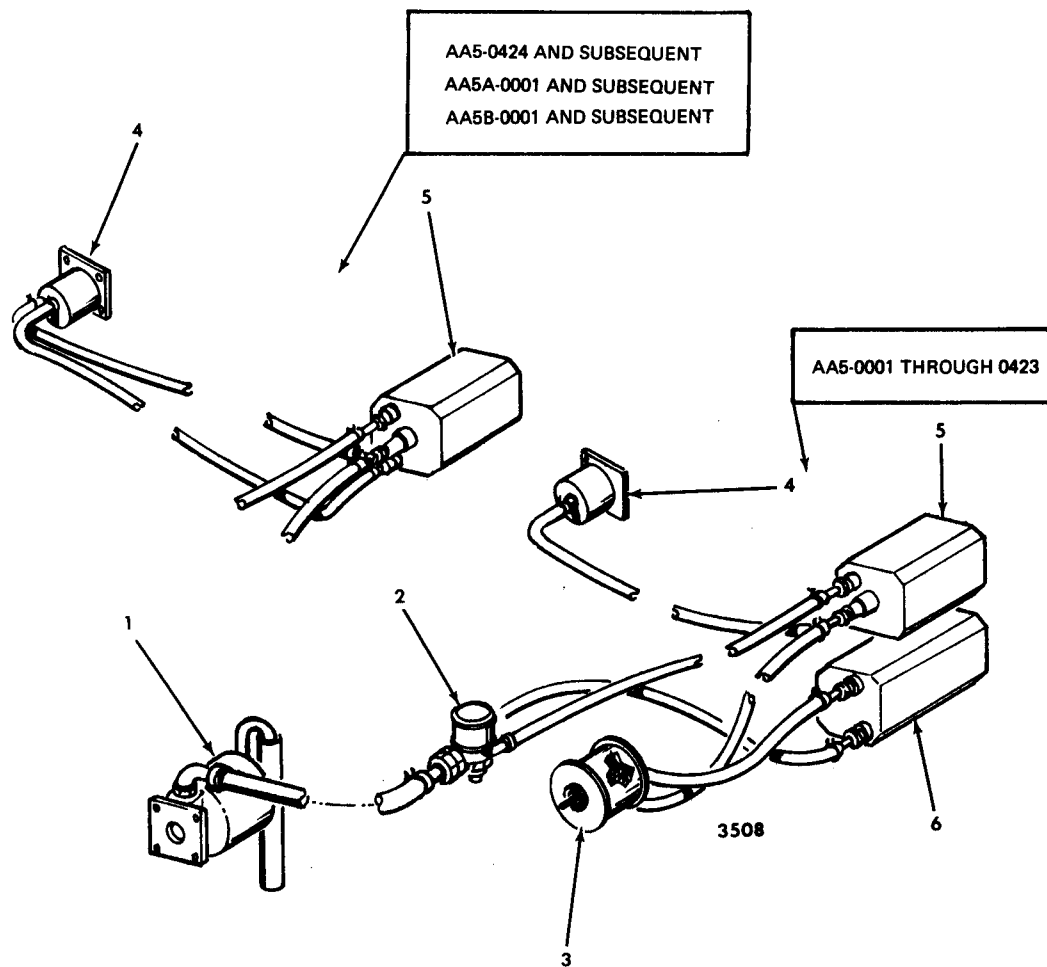
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VACUUM SYSTEM-DESCRIPTION/OPERATION

1. General (See Figure 1.)

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

Vacuum System
Figure 1

VACUUM SYSTEM-TROUBLESHOOTING

1. Vacuum System Troubleshooting

Troubleshoot the vacuum system as follows:

TROUBLE	PROBABLE CAUSE	REMEDY
No Vacuum	Pump Inoperative Gauge Inoperative Totally Plugged Central Filter Collapsed Suction Hose	Replace Replace Replace Replace
Low Vacuum	Partially Plugged Central Filter Partially Collapsed Suction Hose Improperly Set Regulators	Replace Replace Adjust
Erratic Vacuum	Oil in Pump Engine Oil Seal Defective	Replace Replace
High Vacuum	Improperly Set Regulators	Adjust
Gyro Gauge Follows Engine RPM	Foreign Material on Regulator Seat Regulators Inoperative	Release Tension on regulator, Adjust Screw, Remove Material, Reset. Replace
Gauge Reading O. K. Gyros won't Erect	Plugged Filters (Non-Differ- ential Vac. Gauge System) Gyros Inoperative	Replace Filters Replace Gyros
Gauge Reading O. K. Gyros Tumble/Precess	Plugged Filters (Non-Differ- ential Vac. Gauge System) Gyro(s) Defective	Replace Filters Replace Gyro(s)
Gyro Gauge Indicates Frequent Need for Regulator Adjustment	Central Filters Nearly Plugged (Differential Vac System)	Replace Filters Readjust Regulators
Frequent Pump Replacement	Partially Restricted Pump Discharge or Restricted (Kinked) Suction Hose . Incorrect Pump for Engine or System	Replace Hose Check Rotation (Direction) Applications List (Catalog)
Pump Oily	Defective Engine Drive Seal	Replace Seal
No Vacuum at Low RPM- Vacuum O. K. High RPM	Oil in Pump Suction Hose Cut (Crimped)	Replace Pump Replace Hose

VACUUM SYSTEM – MAINTENANCE PRACTICES

1. Adjustment/Test

A. Operational Test

NOTE: It is necessary to operate the aircraft engine in order to operationally test the vacuum system.

WARNING: ENSURE THAT PROPELLER AREA IS CLEAR PRIOR TO STARTING ENGINE.

- (1) Start engine in accordance with Pilot's Operating Handbook.
- (2) Set engine speed to 2100 rpm.
- (3) Check that suction gauge indicates between 4.6 and 5.4 inch Hg., and that vacuum-driven gyro instruments (directional gyro and artificial horizon) operate properly.
- (4) Vary engine speed between 2100 and 2400 rpm.
- (5) Check that suction gauge indicates between 4.6 and 5.4 inches Hg. for all power settings.
- (6) Shut down engine in accordance with Pilot's Operating Handbook.

DISTRIBUTION SYSTEM – DESCRIPTION/OPERATION

1. General

The distribution system consists of the engine driven vacuum pump, the vacuum regulator, the vacuum filter, and the lines necessary to route the vacuum to the instruments being driven.

- A. When installing a dry air pump, fitting installation or removal should be accomplished with a few good mechanical practices:
 - (1) Always be sure lines and hoses are clean and free of any debris, oils, or solvents.
 - (2) Replace any hard or brittle hose, particularly on the pump inlet, as sections of the inner layers may come off and will cause a pump failure.
 - (3) If thread compounds are used, always omit the first two lead threads. One recommended compound is spray silicone on the fitting threads.
 - (4) Never over-torque the fittings while installing. Install fittings hand tight, then with a box wrench tighten to desired position a maximum of 1-1/2 turns beyond hand tight.
 - (5) Never place pump directly into a vise. Clamp across the mounting flange with the drive coupling down to remove fittings. Use suitable protection between flange and vise jaws. Never clamp rotor housing in a vise.
- B. When installing a dry air pump, always use a new mounting gasket. Always torque the four pump mounting nuts to 40-50 inch pounds even if it means removing an adjacent appliance. The larger the pump the more important this function becomes. Never use a pump that has been dropped.
- C. Always verify that the pump is the correct one for the engine and/or system. Consult the airframe manufacturer's current parts manual, Airborne Applications List and the PMA label on the pump box. If improper application is suspected or questions arise, check with the dealer's service department.
- D. In the pressure system, always change the inline filter each 500 hours of service, or sooner if environmental conditions are adverse. The inline filters are also to be changed each time that a pump is changed as sharp pieces of carbon rotor or vanes may have been discharged from the previous pump. These particles can cut through the paper filters and cause operational problems with valves, gyros, etc.
- E. Never attempt modifications to systems components. Unauthorized alterations may cause additional problems and void any warranty.
- F. Do not add items in a pneumatic system unless it is an approved change.
- G. Where applicable, Airborne Lo-Loss fittings are recommended for all straight and elbow connections to minimize pressure drop in the system.
- H. Consult service instructions for specific settings or adjustments.

DISTRIBUTION SYSTEM – MAINTENANCE PRACTICES

1. Servicing

A. Regulator Filter

Refer to Chapter 12 for regulator filter servicing.

B. System Filter

Refer to Chapter 12 for system filter servicing.

2. Vacuum Pump Removal/Installation

A. Pump Removal (See Figure 201.)

- (1) Using a clamp removal tool, remove spring clamp from vacuum line at pump.
- (2) Remove vacuum line from pump.
- (3) Remove four nuts and washers securing pump to engine accessory pad.
- (4) Pull pump from engine.
- (5) Cover opening in accessory pad to prevent foreign material from entering engine.

B. Pump Installation

- (1) Inspect pump gasket to ensure that it is clean and undamaged.
- (2) Position pump and gasket on engine accessory pad as shown in Figure 201. Rotate pump slightly so that its splined shaft mates with female spline in engine.
- (3) Slide pump on to its mounting studs on engine accessory pad. Secure pump to engine with four nuts and washers. Torque to 40-50 inch pounds.
- (4) Install line on vacuum pump and secure with hose clamp.

3. Regulator Removal/Installation

A. Regulator Removal (See Figure 202.)

- (1) Using a clamp removal tool, remove spring clamps from three hoses on regulator.
- (2) Remove hoses from regulator.
- (3) While holding regulator to prevent it from turning, use a one inch open end wrench to remove nut securing regulator on firewall.
- (4) Remove regulator from inside aircraft.

B. Regulator Installation

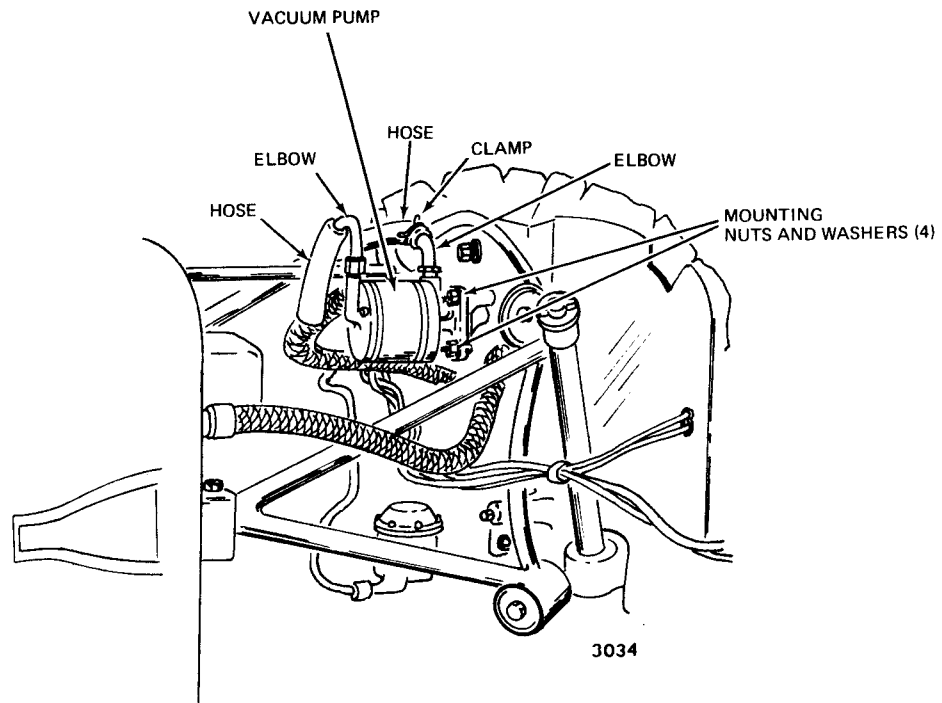
- (1) Position regulator as shown in Figure 202.
- (2) Install nut on firewall side and torque to standard value. Refer to Chapter 91.
- (3) Install three hoses and secure with spring clamps.

4. Filter Assembly Removal/Installation

A. Filter Assembly Removal (See Figure 202.)

- (1) Using a clamp removal tool, remove spring clamps from two hoses on filter assembly.

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Vacuum Pump Removal/Installation
Figure 201

- (2) Remove hoses from the filter assembly.
- (3) While holding filter to prevent its turning, use a 7/16 inch wrench to remove nut securing filter to firewall.
- (4) Remove filter assembly from inside aircraft.

B. Filter Assembly Installation

- (1) Position filter assembly as shown in Figure 202.
- (2) While holding filter to prevent its turning, install nut and washers on bolt securing it to firewall. Torque nut to standard value. Refer to Chapter 91.
- (3) Install hoses on filter assembly and secure clamps.

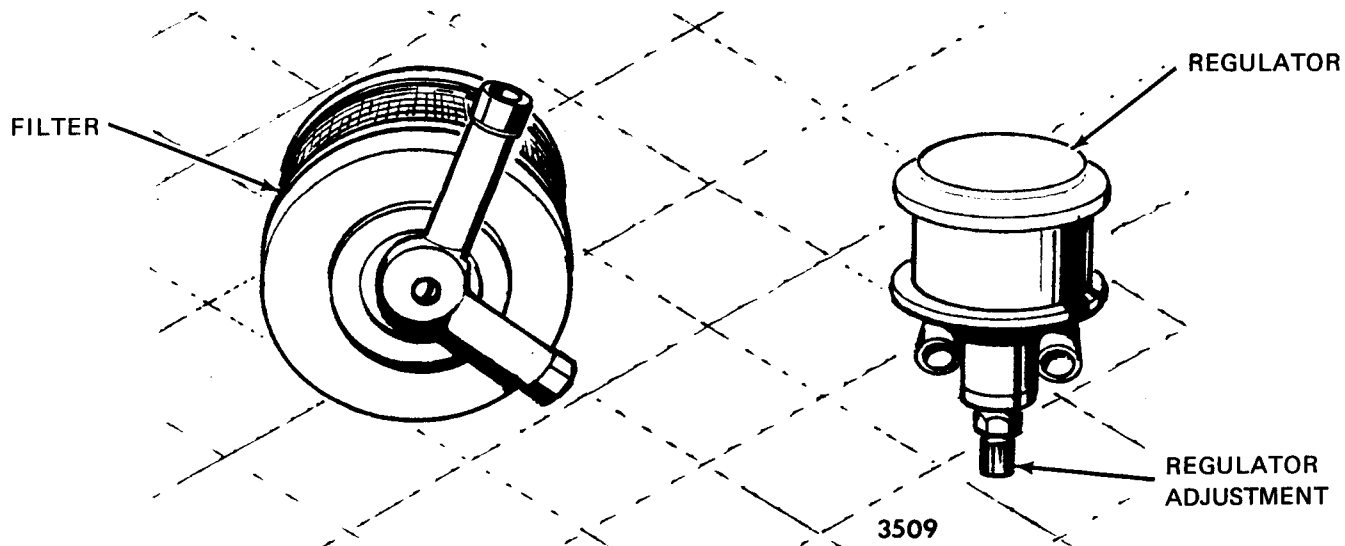
5. Adjustment/Test

A. Regulator Adjustment

NOTE: It is necessary to operate the aircraft engine in order to adjust the regulator.

WARNING: ENSURE THAT PROPELLER AREA IS CLEAR PRIOR TO STARTING ENGINE.

- (1) Start engine in accordance with Pilot's Operating Handbook.
- (2) Adjust engine speed to 2200 rpm.
- (3) Adjust regulator adjustment (Figure 202) for an indication of 5.0 inches Hg. on suction gauge.
- (4) Vary engine speed from 2100 rpm to 2400 rpm and ensure that suction gauge indication remains between 4.6 and 5.4 inches Hg. If necessary, readjust regulator adjustment to ensure that proper range of vacuum is obtained.
- (5) Bend locking tabs or safety wire to secure regulator adjustment.
- (6) Shut down engine in accordance with Pilot's Operating Handbook.



Regulator and Filter Removal and Installation
Figure 202

INDICATING SYSTEM – DESCRIPTION/OPERATION

1. General

The indicating system consists of the suction gauge and the lines attaching it to the other vacuum system components.

INDICATING SYSTEM – MAINTENANCE PRACTICES

1. Suction Gauge Removal/Installation

A. Suction Gauge Removal

- (1) Remove glareshield/deck as described in Chapter 25.
- (2) Using a clamp removal tool, remove spring clamp from vacuum line(s) attached to suction gauge.
- (3) Remove two Phillips screws securing suction gauge.
- (4) Remove suction gauge from aircraft.
- (5) Cap all open lines.

B. Suction Gauge Installation

- (1) Install gauge in instrument panel and secure with two Phillips screws.
- (2) Install hose(s) on rear of suction gauge, and secure with spring clamp(s).
- (3) Reinstall glareshield/deck as described in Chapter 25.