Cessna Single Engine High Wing Maintenance

Environmental/Air Conditioning/Vacuum

Revision Record

Rev Year	Rev Number	Rev Date	Revision Details	Reference	Revised by
2016	00	5/13/2016	Original Issue	172S Maintenance Manual, Rev 21, 01OCT15	Klimek
2016	01	8/12/2016	Model 182/206 Differences added	182 & 206 Maintenance Manual Rev 19, 01OCT15	Zimmerman
2017	02	01/18/2017	182 fresh air source location corrected.	182 Maintenance Manual Rev 19, 01OCT15	Springer

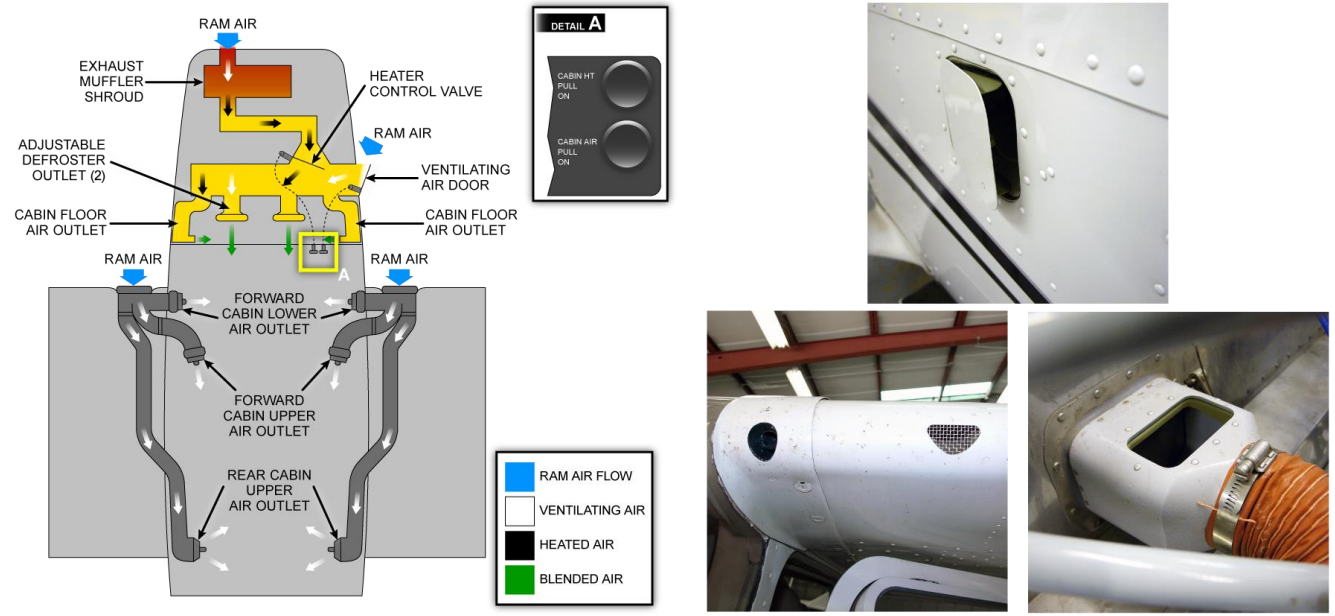
Contents

ATA21 Environmental/Air Conditioning

LESSON OBJECTIVES

- Identify safety precautions related to the environmental / air conditioning system.
- Identify maintenance practices important to the environmental / air conditioning system.
- Describe the general layout of the environmental / air conditioning system.

Environmental/Air Conditioning System Introduction



Chapter 21 of the Maintenance Manual concerns the environmental systems, which include air conditioning/ventilation and heating.

Ventilation

On the Single Engine High Wing aircraft, there is no air conditioning system. The cockpit/cabin area is ventilated with fresh air by means of external wing root openings, an adjustable air scoop, and internal ducting.

Heating

The cabin heating system operates by directing ambient airflow through an exhaust shroud where it is heated before it flows into the cabin.

Controls

Push/pull knobs in the cockpit control the amount of air and heat that is distributed in the aircraft.

Ventilation System

DESCRIPTION AND OPERATION (21-20-00)

Components of the ventilation system, which supply air to the cockpit and cabin, include:

- External vents
- An adjustable air scoop
- Internal ducting
- Adjustable internal vents

Fresh air enters the cabin from one of five sources. Four of those sources are located in the leading edge area of the wing (two left and two right) and the fifth source is located on the right side of the fuselage, between the firewall and the forward door post.

Each wing leading edge area contains two inlet scoops.

- One inlet scoop feeds an air valve located at the wing leading edge/windshield intersection;
- The other inlet scoop (located in the wing-to-fuselage fairing) feeds a pair of air valves located near the mid torso area (front seat) and overhead area (rear seat).

Fresh air may also enter by an adjustable door located on the fuselage. This air flows directly into the heated air plenum and flows through the heated air distribution system. Any of the six air valves can control the amount of fresh air entering the cabin. Rotating the air valve varies the airflow from fully closed to fully open.

CABIN AIR CONTROL

The CABIN AIR control cable controls airflow into the cabin. Pulling the control aft allows the maximum amount of fresh air to flow through the heated air distribution system. Pushing the control forward closes the door and allows no fresh air to flow through the heated distribution system.

Adjustable ventilators supply additional air:

- One near each upper corner of the windshield supplies air for the pilot and front passenger.
- Two supply air to the rear seat passengers.
- Additional ventilators located in various positions in the cockpit

Front cabin heat and ventilating air flows through outlet holes spaced across a cabin manifold just forward of the pilot's and front passenger's feet.

Rear cabin heat and airflows through two ducts from the manifold, one extending down each side of the cabin to an outlet just aft of the rudder pedals at floor level.

Windshield defrost air is supplied by two ducts leading from the cabin manifold to defroster outlets near the lower edge of the windshield. Two knobs control sliding valves in either defroster outlet to regulate defroster airflow.

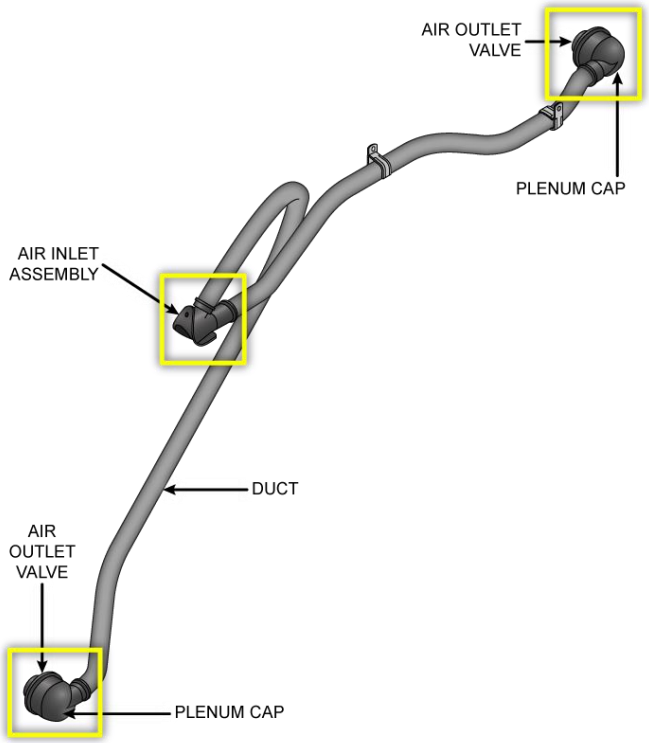
The temperature and volume of airflow into the cabin can be regulated by adjusting the push-pull CABIN HT and CABIN AIR control knobs. Both control knobs are the double button locking-type that allow intermediate control settings.

With the CABIN AIR control full aft and the CABIN HT control full forward, only ambient temperature air flows through the heated air distribution system.

For cabin ventilation, pull the CABIN AIR control knob out.

Fresh Air Distribution

MAINTENANCE PRACTICES (21-20-00)



Air outlet valve removal/installation is typical at each location.

Air Outlet Valve Removal/Installation (21-20-00)

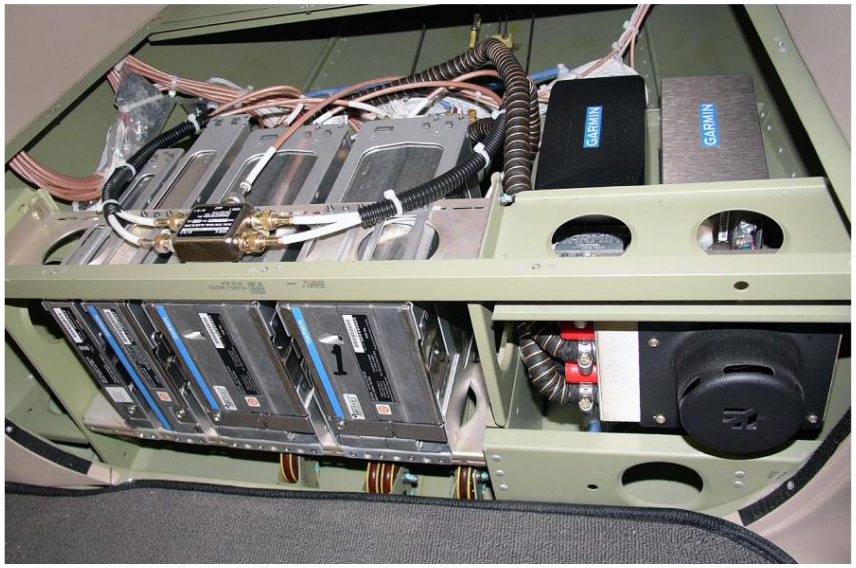
- Remove air outlet valve.
- Install air outlet valve.

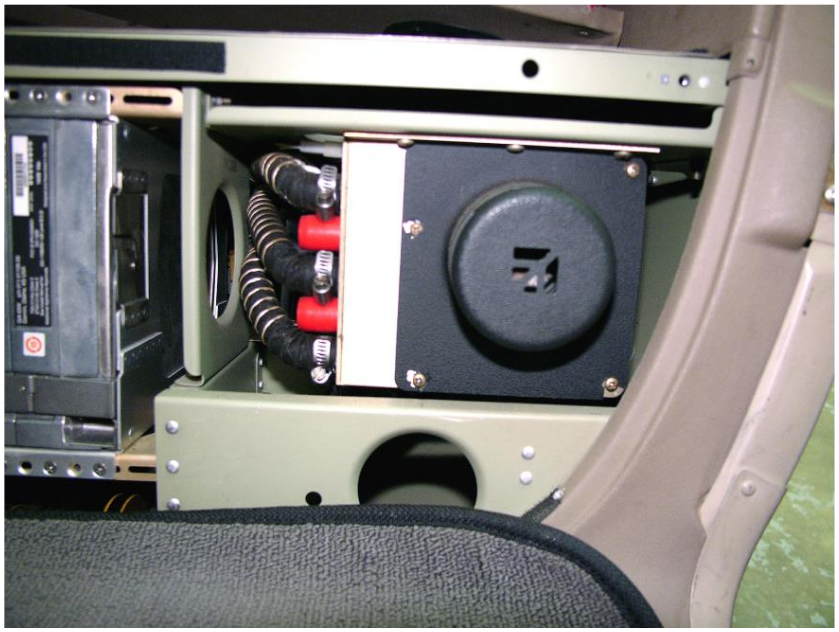
INTERNAL VENTS

Fresh air outlet valves are located in the cockpit/cabin area at upper corners of the windshield, in the sidewalls just aft of the instrument panel, and above the passenger seat.

Avionics Cooling Fan

MAINTENANCE PRACTICES (21-21-00)





The avionics cooling fan behind the instrument panel is used to cool the different components in the radio stack. Power is provided to these fans when the MASTER (BAT) switch and the AVIONICS (BUS 1 and BUS 2) switch are all ON.

Four DC electric fans supply forced air and ambient air circulation cooling for the G1000 avionics equipment.

A single fan in the tailcone supplies forced air cooling to the integrated avionics units and to the transponder.

AVIONICS COOLING FAN - MAINTENANCE PRACTICES (21-21-00)

A fan located forward of the instrument panel removes air from between the firewall bulkhead and instrument panel, directing the warm air to the inside of the windshield.

Two additional fans blow air directly onto the heat sinks located on the forward sides of the PFD and MFD.

Maintenance on the system includes removal and installation of the cooling fan and related ducts.

COOLING FANS

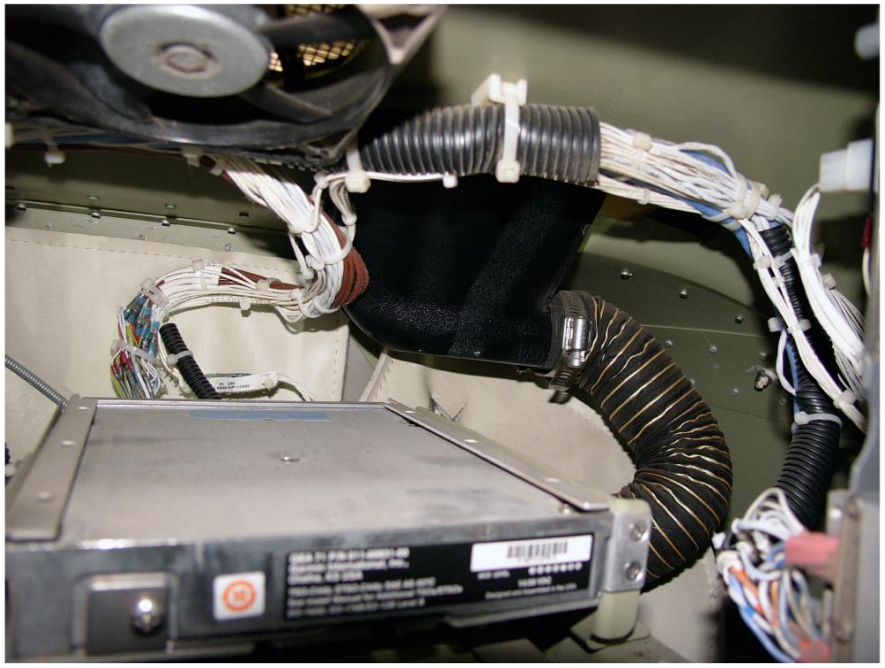
None of the cooling fans operate when the essential bus avionics equipment is being powered by the standby battery.

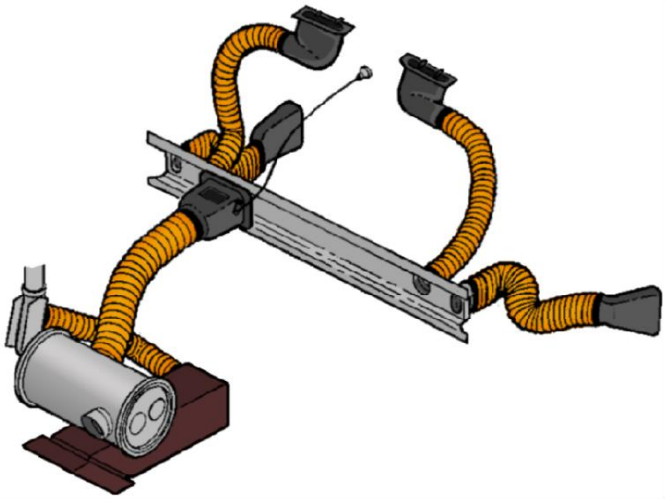
TAILCONE STAND

If the engine is removed, make sure there is a tailcone stand in position before you get inside the tailcone.

Heating and Defrosting

HEATING AND DEFROSTING - DESCRIPTION AND OPERATION (21-40-00)





The heating and defrosting system includes:

- The heat exchange section of the exhaust muffler
- A shut-off valve mounted on the firewall
- A push-pull control on the instrument panel
- Outlets
- Flexible ducting connecting the system

HEATING AND DEFROSTING - DESCRIPTION AND OPERATION (21-40-00)

The cabin heater system operates by letting ambient airflow through an exhaust shroud where it is heated before it flows into the cabin. A crack in the exhaust pipe in the area surrounded by the shroud could cause an exhaust leak, which would let exhaust fumes mix with the heated ambient air flowing into the cabin. Thus, if anyone in the cabin smells exhaust fumes, experiences any symptoms, or the CO LVL HIGH warning annunciation comes on when using the cabin heater, immediately turn off the cabin heater.

Heating and Defrosting Operation

Ram air enters the engine compartment through cowling inlets located aft of the propeller. A portion of this air flows toward an exit point in the rear engine baffle. This air flows through ducting to the heat exchange section of the exhaust muffler. As air passes into the heat exchanger and around the exhaust muffler, it picks up heat from the engine exhaust. This heated air exits the heat exchange and flows through ducting to a firewall shutoff valve.

The shutoff valve is cable controlled from the cockpit. The valve controls the amount of heated air entering the cockpit area distribution plenum. From the plenum, various ducts distribute the heated air to floorboard and defroster outlets.

FRESH AIR

The cockpit area distribution plenum allows outside fresh air to enter from the right hand external air scoop (door). This arrangement allows a combination of fresh air and heated air to mix and distribute throughout the system.

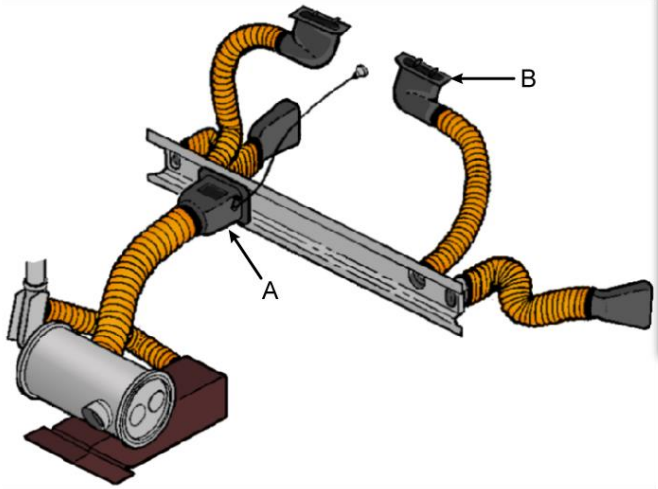
Front cabin heat and ventilating air flows through outlet holes spaced across a cabin manifold just forward of the pilot's and front passenger's feet.

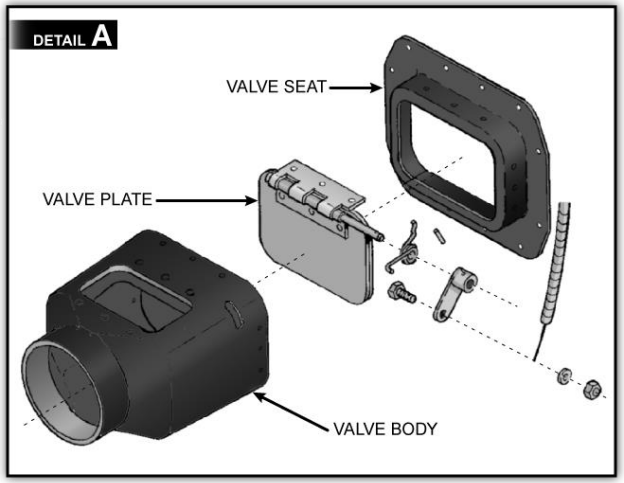
Rear cabin heat and airflows through two ducts from the manifold, one extending down each side of the cabin to an outlet just aft of the rudder pedals at floor level.

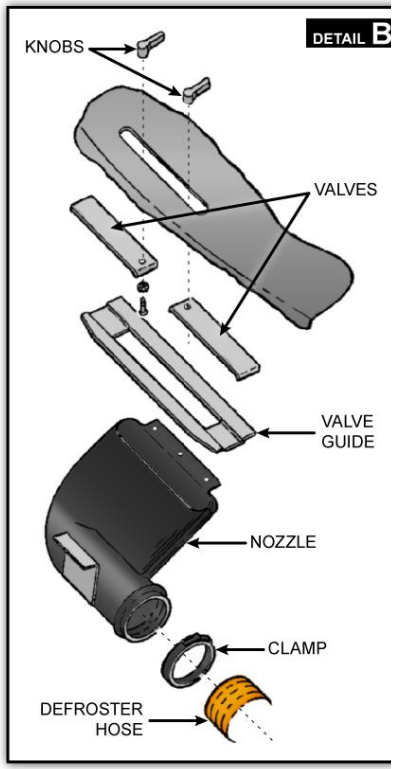
Two ducts leading from the cabin manifold to defroster outlets near the lower edge of the windshield supply windshield defrost air.

Two knobs control sliding valves in either defroster outlet to permit regulation of defroster airflow.

HEATING AND DEFROSTING MAINTENANCE PRACTICES (21-40-00)







HEATING AND DEFROSTING MAINTENANCE PRACTICES (21-40-00)

HEAT EXCHANGER

Anytime the heat exchanger is removed from around the muffler, the muffler should be carefully examined and inspected for leaks or cracks.

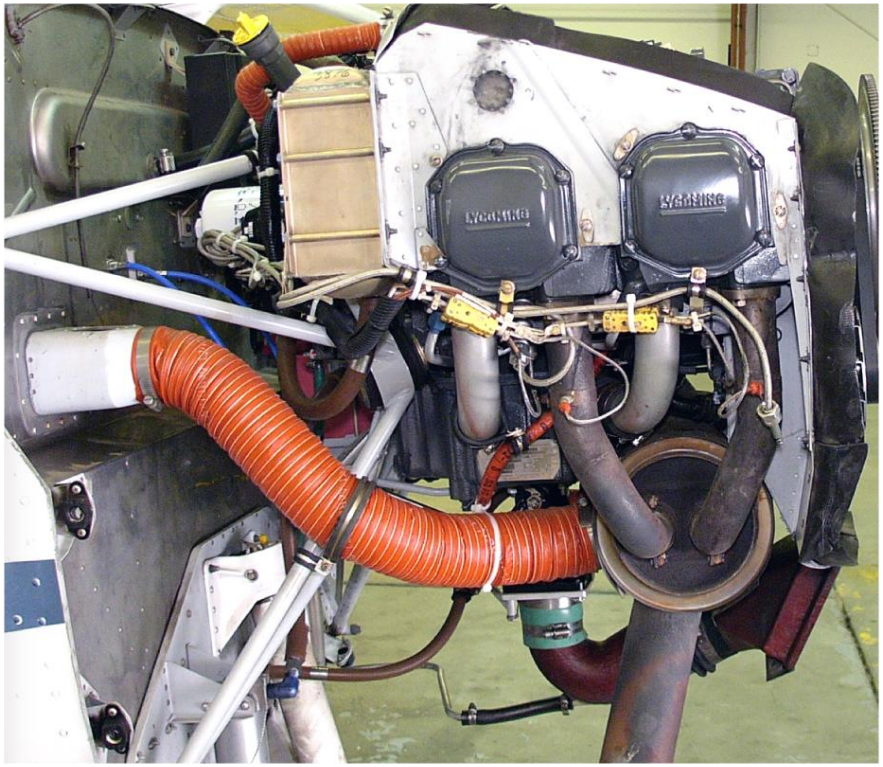
If fumes are detected in the cabin, do a thorough inspection of the exhaust system. Holes or cracks in the exhaust system may let exhaust fumes enter the cabin.

The operator must replace defective parts because fumes cause extreme danger for crew and passengers.

Heat Exchanger Removal/Installation

- Remove exchanger
- Install exchanger

HEATING AND DEFROSTING MAINTENANCE PRACTICES (21-40-00)

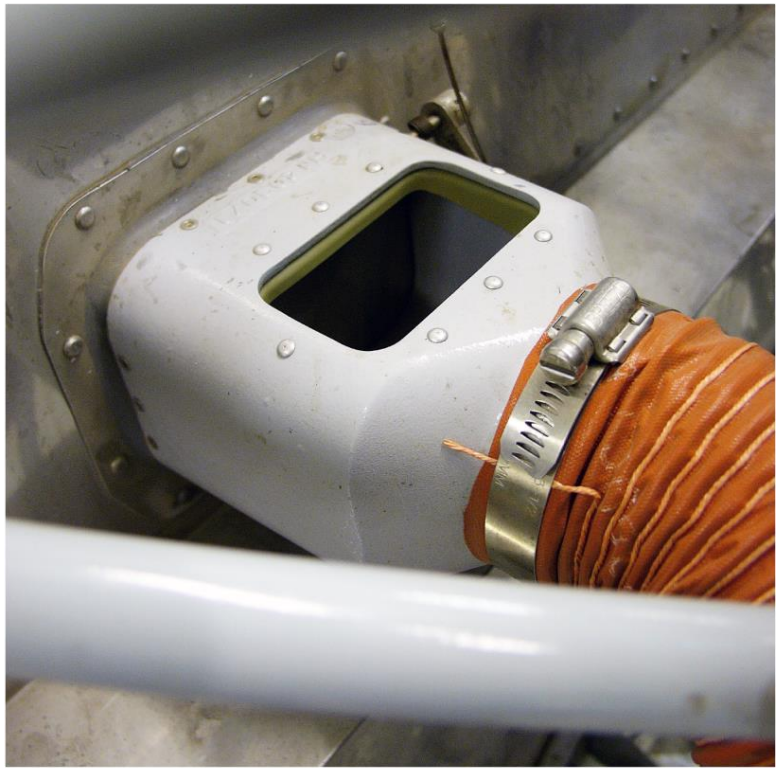


Distribution System Components Removal/Installation

Most heated air distribution system components are riveted to the airframe and do not require replacement during normal maintenance. Ducts are secured to these components with C-clamps. If ducts become damaged or worn, they should be replaced with new hose of equal length.

Ducts are typically attached to various outlets using Type II sealant.

HEATING AND DEFROSTING MAINTENANCE PRACTICES (21-40-00)



Shutoff Valve Removal/Installation

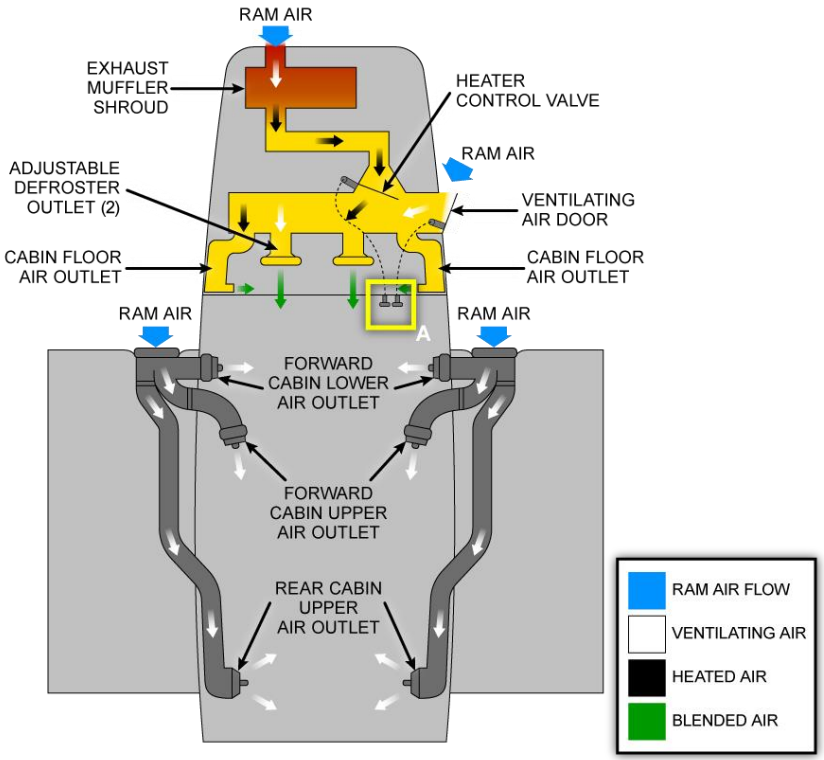
The shutoff valve is riveted to the firewall and is not removed from the airplane during normal maintenance. If valve is replaced, firewall should be sealed using Type IV sealant upon reattachment of shutoff valve to firewall.

Control Cable Removal/Installation

- Remove control cable
- Install control cable

If ducts become damaged or worn, they should be replaced with new hose of equal length.

Environmental System Review



Model Differences

182/206 DIFFERENCES - FRESH AIR DISTRIBUTION (21-20-00)

182 Distribution

Fresh air enters the cabin from one of three sources.

- Two are located on the leading edge of the wing (one left and one right)
- The other source is located on the left side of the fuselage, between the firewall and the forward door post.

Fresh air from the leading edge inlets is distributed through a series of ducts to adjustable air outlet valves (Wemacs). Each wing feeds three Wemacs, with a total of six Wemacs located throughout the cabin. Wemacs are located:

- At the upper corner of the windshield, between the instrument panel and forward doorpost,
- Overhead in the rear passenger area.

Fresh air entering from the right side of the fuselage is controlled by a scoop (door), which can be placed in any position. This air is ducted directly into the heated air plenum and is distributed throughout the cabin.

182/206 DIFFERENCES - FRESH AIR DISTRIBUTION (21-20-00)

For the 182 fresh air is distributed through ducts from two inlet openings.

- There is one in each wing leading edge, to air outlet valves located in the cockpit/cabin area at the wing roots by the upper corners of the windshield, in the side walls just aft of the instrument panel, and above the passenger seat.
- Air outlet valve removal/installation is typical at each location.
- A door assembly, located on the right side of the fuselage between the firewall and door post, also allows fresh air to be routed into the heat ducts.
- The door is operated by a control on the instrument panel labeled CABIN AIR.

206 Distribution

- Four of those sources are located on the leading edge of the wing (two left and two right).
    - The outboard scoop on each wing supplies air to the cockpit area
    - The two inboard scoops supply air to the cabin area.
- The other two sources are located on the left and right side of the fuselage, just aft of the firewall.

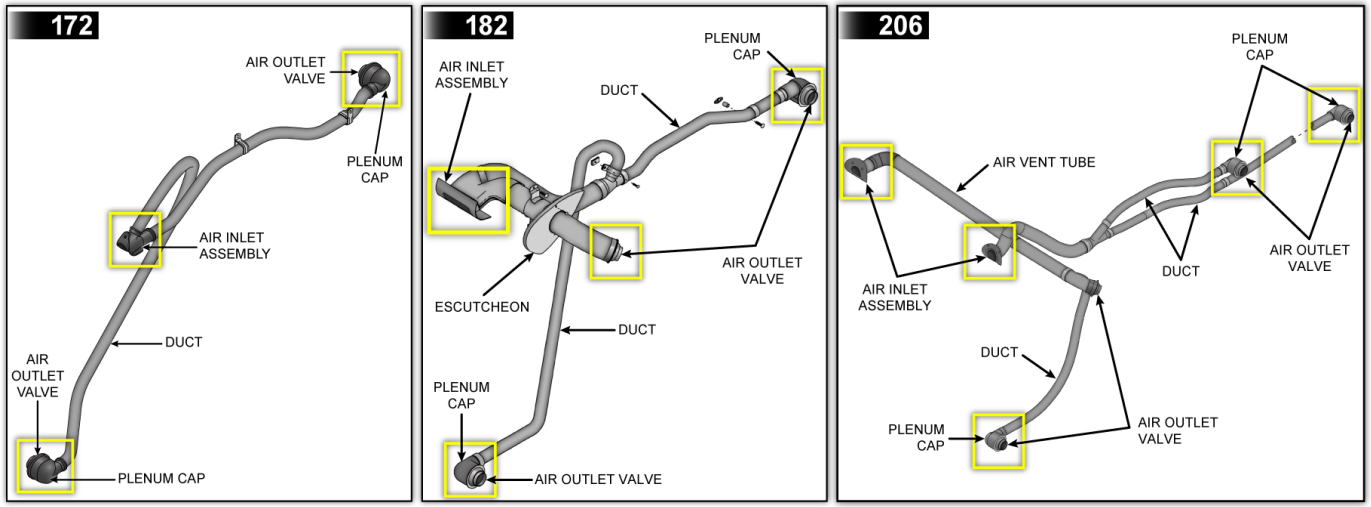
Fresh air from the outboard leading edge scoops is distributed through tubes to adjustable air outlet valves (Wemacs) located at the upper corner of the windshield and between the instrument panel and forward doorpost. The inboard scoops on each wing distribute fresh air through ducts to adjustable air outlet valves (Wemacs), two on each side, located on the overhead in the rear cabin area.

Fresh air entering from the left and right sides of the fuselage is controlled by scoops (doors) , which can be placed in any position. This air is ducted directly into the heated air plenum and is distributed throughout the cabin.

Air outlet valve removal/installation is typical at each location.

Door assemblies, located on the left side and right side of the fuselage just aft of the firewall, also allow fresh air to be routed into the heat ducts. The doors are operated by a control on the instrument panel labeled CABIN AIR.

182/206 DIFFERENCES - FRESH AIR DISTRIBUTION (21-20-00)



182 Distribution

Fresh air enters the cabin from one of three sources.

- Two are located on the leading edge of the wing (one left and one right)
- The other source is located on the right and left sides of the fuselage, between the firewall and the forward door post.

206 Distribution

Fresh air enters the cabin **from six sources**.

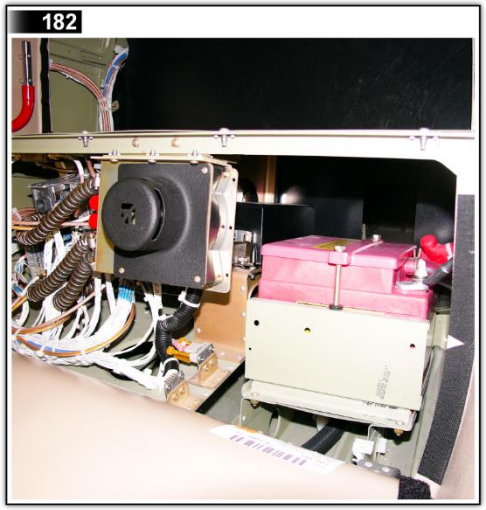
- Four of those sources are located on the leading edge of the wing (two left and two right).
  - The outboard scoop on each wing supplies air to the cockpit area
  - The two inboard scoops supply air to the cabin area.
- The other two sources are located on the left and right side of the fuselage, just aft of the firewall.

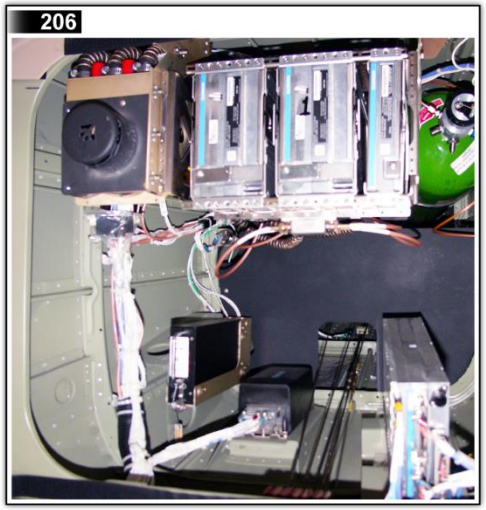
182/206 DIFFERENCES - REMOTE AVIONICS COOLING FAN - (21-21-00)

The 182 and 206 have an avionics cooling fan in the same location as the 172: behind the instrument panel. The fan cools the components in the radio stack.

Airplanes with the Garmin G1000 avionics systems have four DC-electric fans to supply forced air and ambient air circulation cooling for G1000 avionics equipment.

Two installed behind the instrument panel to help cool each Control Display Unit (Garmin Display Unit).



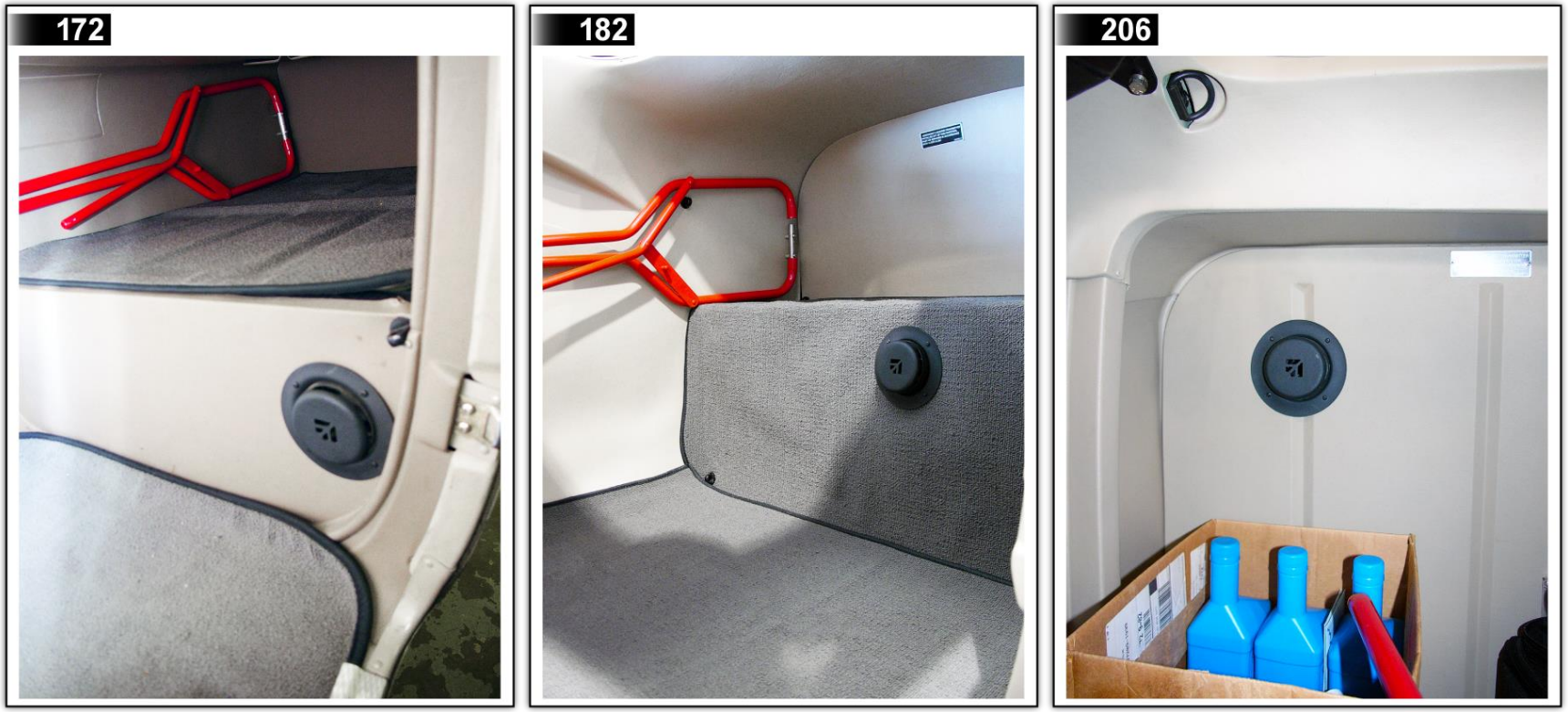


- One installed in the deck skin to pull hot air out from the forward side of the instrument panel
- One installed in the tailcone next to the avionics supplies forced air cooling to the integrated avionics units and to the transponder.
- Power is provided to these fans when the MASTER (BAT) switch and the AVIONICS (BUS 1 and BUS 2) switch are all ON.

COOLING FANS

Cooling fans will NOT operate when the essential bus avionics equipment is being powered by the standby battery.

182/206 DIFFERENCES - REMOTE AVIONICS COOLING FAN - (21-21-00)



The tailcone cooling fans are in different locations on all three aircraft.

182/206 DIFFERENCES - HEATING AND DEFROSTING - (21-40-00)

172 has 2 controls for the heat/air system.

182 has three controls.

206 has 4 controls for the heat/air system.

182 Push-Pull Controls

- Both the 172 and 182 have vertically-stacked push-pull control knobs for cabin heat and air.
- The temperature and volume of airflow into the cabin can be regulated by manipulation of the push-pull CABIN HT and CABIN AIR controls.
- Both controls are the double button locking-type and permit intermediate settings.
- For cabin ventilation, pull the CABIN AIR knob out.
- To raise the air temperature, pull the CABIN HT knob out approximately 1/4 to 1/2 inch for a small amount of cabin heat.
- Additional heat is available by pulling the knob out farther; maximum heat is available with the CABIN HT knob pulled out and the CABIN AIR knob pushed full in.
- When no heat is desired in the cabin, the CABIN HT knob is pushed full in.
- Front cabin heat and ventilating air is supplied by outlet holes spaced across a cabin manifold just forward of the pilot's and front passenger's feet.

182/206 DIFFERENCES - HEATING AND DEFROSTING - (21-40-00)

- Rear cabin heat and air is supplied by two ducts from the manifold, one extending down each side of the cabin to an outlet just aft of the rudder pedals at floor level.
- Windshield defrost air is also supplied by two ducts from the cabin manifold outlet on top of the glareshield; therefore, the temperature of the defrosting air is the same as heated cabin air.
- A rotating control knob, labeled DEFROST, regulates the volume of air to the windshield. Turn the knob clockwise to ON and counterclockwise to OFF.

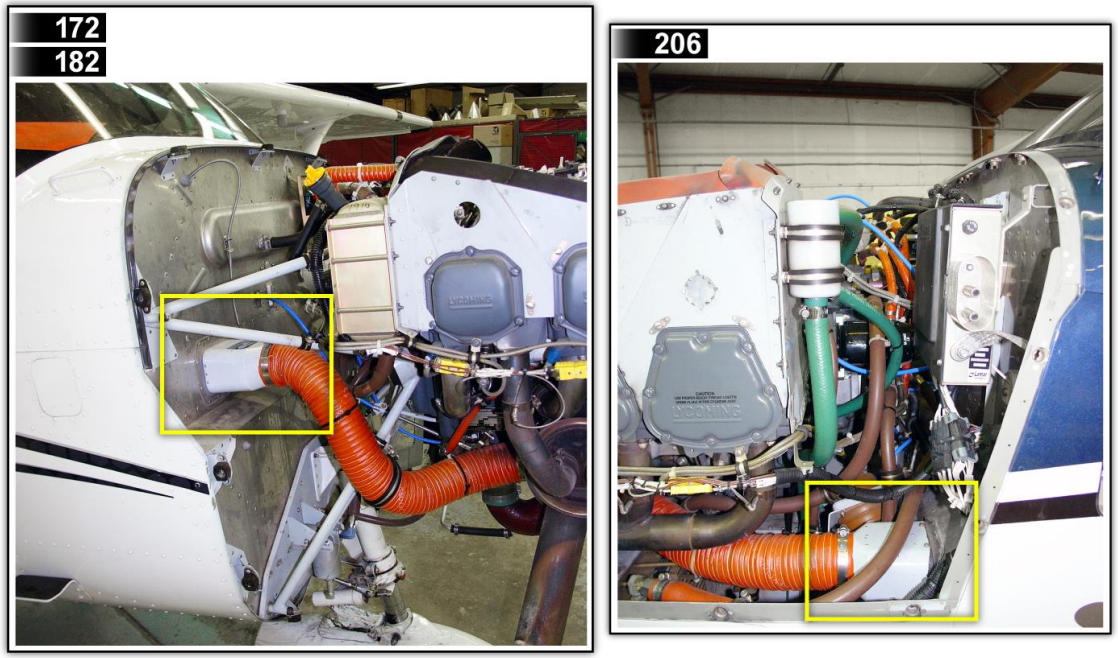
206 Push-Pull Controls

- On the 206, the push-pull knobs for heat control and cabin air are side-by-side.
- To the right of the cabin air knob, there is also an Aux Cabin air control knob.
- Above the cabin heat push-pull knob, the Defrost knob gives windshield defrosting.
- The temperature and volume of airflow into the cabin can be regulated by manipulation of the push-pull CABIN HEAT, CABIN AIR and AUX CABIN AIR controls.
- When partial cabin heat is desired, blending warm and cold air will result in improved ventilation and heat distribution throughout the cabin.
- Additional outside air for summer ventilation is provided through the heat and vent system by operation of the push-pull AUX CABIN AIR control knob.
- All three control knobs are the double button locking-type and permit intermediate settings.
- Front cabin heat and ventilating air is supplied by outlet holes spaced across a cabin manifold just forward of the pilot's and front passenger's feet.
- Rear cabin heat and air is supplied by three ducts from the manifold, one outlet at each front doorpost area at floor level and one extending under the center of the cabin floor to an outlet in the floor behind the pilot and front passenger's seats.

182/206 DIFFERENCES - HEATING AND DEFROSTING - (21-40-00)

- The cabin floor outlet is flush mounted, with a removable airflow diverter.
- Windshield defrost air is also supplied by a duct from the cabin manifold to an outlet on top of the glareshield; therefore, the temperature of the defrosting air is the same as heated cabin air.
- A push-pull control knob, labeled DEFROST, regulates the volume of air to the windshield.
- Pull the DEFROST knob out to direct air towards the windshield and push the knob in to direct air away from the windshield. Human Factors of the heating system .
- Carbon monoxide (CO) is a colorless, odorless, tasteless product of an internal combustion engine and is always present in exhaust fumes.
- Even minute quantities of carbon monoxide breathed over a long period of time may lead to dire consequences.
- The symptoms of carbon monoxide poisoning are difficult to detect by the person affected and may include blurred thinking, a feeling of uneasiness, dizziness, headache, and loss of consciousness.
- The cabin heater system operates by allowing ambient air to flow through an exhaust shroud where it is heated before being ducted into the cabin.
- If an exhaust leak, caused by a crack in the exhaust pipe, occurs in the area surrounded by this shroud it would allow exhaust fumes to mix with the heated ambient air being ducted into the cabin.
- If anyone in the cabin smells exhaust fumes, experiences any of the symptoms mentioned above, or the CO LVL HIGH warning annunciation comes on when using the cabin heater, immediately turn off the cabin heater.

182/206 DIFFERENCES - HEATING AND DEFROSTING - (21-40-00)



Valve Body Differences

- The 206 valve body of the heat plenum attaches to the firewall on the aircraft LEFT side.
- For the 172 and 182 aircraft, the valve body attaches to the firewall on the aircraft RIGHT side.

The cockpit area distribution plenum is bolted to the firewall, and the other components of the heated air distribution system are connected to the cockpit area distribution plenum by ducts, which are connected by clamps. The heated air distribution system components do not require replacement during normal maintenance. If the ducts become damaged or worn, they must be replaced with new ducting.

The shutoff valve is attached to the firewall and is not removed from the airplane during normal maintenance. To replace the valve, seal the firewall with Type IV sealant when the shutoff valve is attached to the firewall . (21-40-00)

182/206 DIFFERENCES - HEATING AND DEFROSTING - (21-40-00)

182

- Ram air enters the engine compartment through cowling inlets located aft of the propeller.
- A portion of this air is directed toward an exit point in the rear engine baffle.
- This air is directed, via ducting, to the heat exchange section around the left exhaust muffler.
- As air passes into the heat shroud and around the exhaust muffler, it picks up heat from the engine exhaust.
- The heated air is then directed to the right exhaust heat shroud.
- Heated air exits the right heat shroud and is directed, to a firewall shutoff valve.
- The shutoff valve is cable controlled from the cockpit, and controls the amount of heated air entering the cockpit area distribution plenum.
- From the plenum, various ducts distribute the heated air to floorboard and defroster outlets.

182 COCKPIT-AREA DISTRIBUTION PLENUM

- The cockpit area distribution plenum is also plumbed to receive outside fresh air from the right external air scoop (door).
- This arrangement allows a combination of fresh air and heated air to be mixed and distributed throughout the system.

182/206 DIFFERENCES - HEATING AND DEFROSTING - (21-40-00)

206

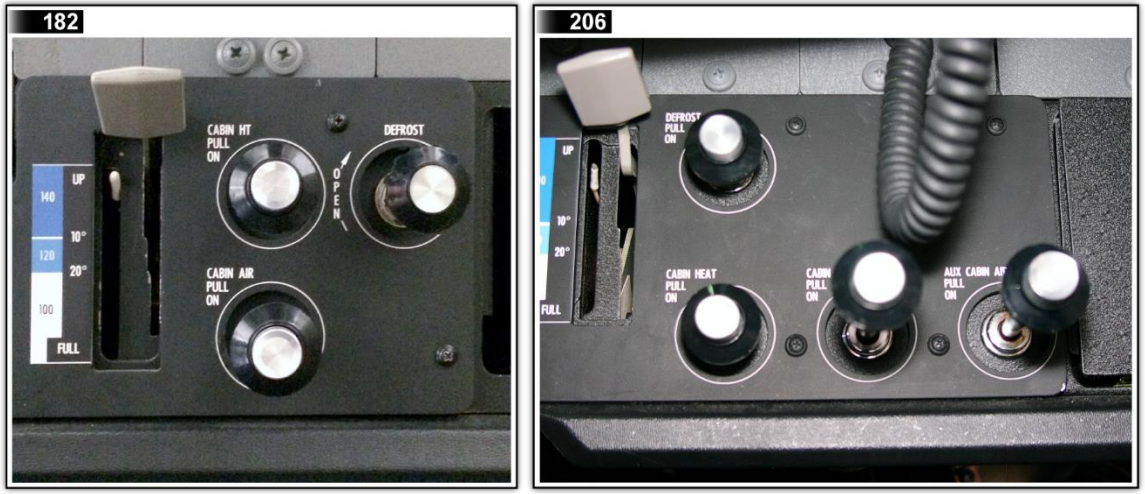
- Ram air enters the engine compartment through the forward baffle inlet found aft of the propeller.
- This air goes through ducting to the heat exchange heater shroud around the exhaust interconnect tube on the forward end of the engine.
- As air passes into the heat shroud and around the exhaust interconnect tube, it gets heat from the engine exhaust.
- The heated air goes through ducting, to a firewall shutoff valve.
- The shutoff valve is cable-controlled from the cockpit and controls the flow of heated air that enters the cockpit area distribution plenum.
- From the plenum, several ducts supply the heated air to floorboard and defroster outlets.

206 COCKPIT-AREA DISTRIBUTION PLENUM

The cockpit-area distribution plenum is also set to receive outside fresh air from the left and right external air scoops (doors). This arrangement lets a combination of fresh air and heated air to be mixed and supplied to the entire system. For maximum heating of the airplane cabin, all valves must be fully open. This includes the valves that control the fresh air flow from the left and right external air scoops.

182/206 DIFFERENCES - HEATING AND VENTILATION CONTROL CABLE SERVICING (12-21-05)

All housed, pull-type, push-pull, or vernier controls should have each outer housing lightly lubricated internally with VV-L-700 General Purpose Lube Oil.



NOTE

VV-L-700 GENERAL PURPOSE LUBE OIL

- On VV-L-800 this preservative oil should not be used to protect the fuel system and combustion chamber of engines.
- On VV-L-800 this material contains a carboxylic acid which could react with certain metals present in the fuel system, forming soaps which could contribute to fuel filter plugging

ATA30 - Ice and Rain Protection

Overview

LESSON OBJECTIVES

- Identify safety precautions related to ATA Chapter 30
- Identify maintenance practices important to ATA Chapter 30
- Describe the general layout of ATA Chapter 30
- Describe normal system operations
- Interpret system indications
- Identify special tooling and test equipment used with ATA Chapter 30
- Perform system and component functional checks
- Correlate information for fault diagnosis and rectification decisions
- Describe procedures for replacement of unique components

Propeller Heat

DESCRIPTION AND OPERATION (30-60-00)

PROP HEAT CONTROLS

CAUTION ALERTS (T182, T206, AND 206 WITH PROP DE-ICE ONLY)

ANNUNCIATION WINDOW TEXT	AUDIO ALERT
PROP HEAT	Single Aural Tone

SAFE OPERATING ANNUNCIATION (T182, T206, AND 206 WITH PROP DE-ICE ONLY)

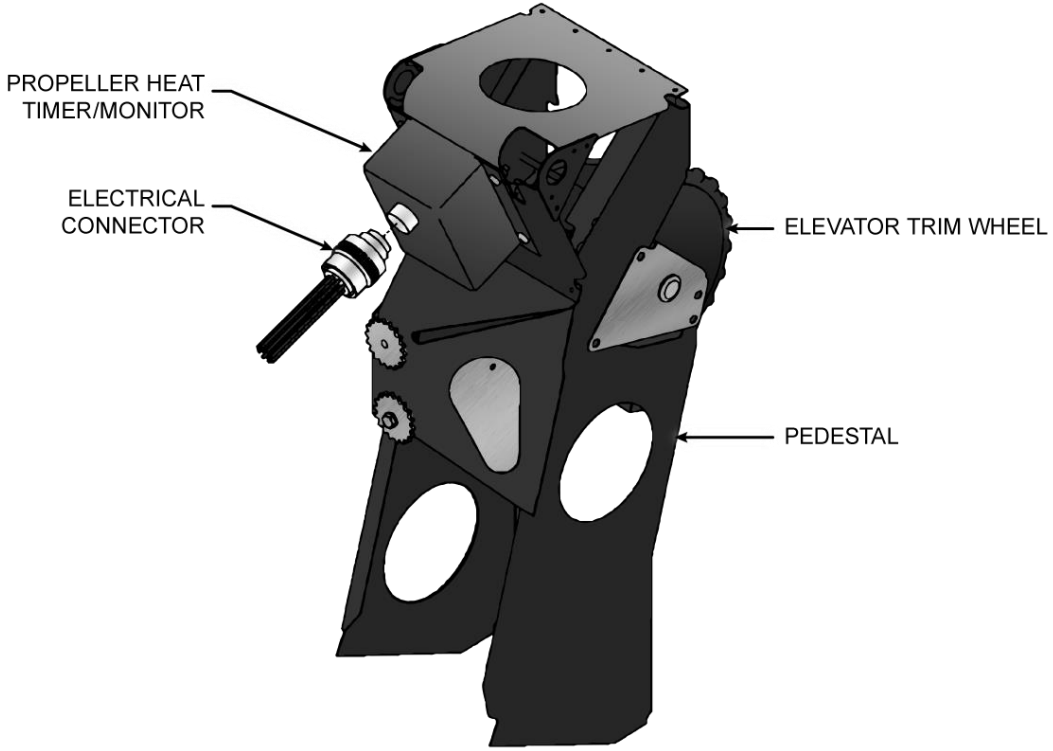
ANNUNCIATION WINDOW TEXT	AUDIO ALERT
PROP HEAT	No Tone

The ice and rain protection system is of an electrothermal type. It has electrically heated boots bonded to each propeller blade. There is a slip ring assembly for power distribution to the propeller boots and a brush block assembly to transfer electrical power to the rotating slip ring. A propeller heat timer/monitor cycles electrical power to the boots in the correct sequence and monitors the boot's heater current. There is a propeller heat indication for either correct or failed system operation. A toggle switch labeled PROP HEAT controls the engine propeller heat system.

182/206 PROPELLER HEAT - DESCRIPTION AND OPERATION (30-60-00)

- The propeller heat system also includes a larger alternator for additional current capacity. It has a higher Amp/Hour Battery to support the additional current load required by the propeller heat system.
- The propeller heat system applies heat to the surfaces of the propeller blades where ice would normally adhere. This heat, plus centrifugal force and the blast from the airstream, removes accumulated ice.
- When the PROP HEAT switch is in the ON position, the timer controls electrical power through the brush block and slip ring to the three propeller heat boots in intervals of 90 seconds on and 90 seconds off.
- The propeller heat system is off when the switch is in the OFF position.
- Check the operation of the propeller heat system through the propeller heat annunciation.
- If the correct amount of current does not flow to all three elements, the timer/monitor recognizes the condition, removes current flow to all heating boots, and turns on the amber PROP HEAT annunciation. The green PROP HEAT annunciation is on during the correct operation of the propeller heat system.

182/206 PROPELLER HEAT - MAINTENANCE PRACTICES (30-60-00) PROPELLER HEAT TIMER/MONITOR



The Propeller Heat Maintenance Practices include:

- Propeller Heat Timer/Monitor Removal/Installation
- Deice Boots Removal/Installation
- Brush Length Inspection
- Brush Block Removal/Installation
- Brush Block to Slip Ring Alignment
- Propeller Heat Timer/Monitor Removal/Installation

182/206 PROPELLER HEAT - MAINTENANCE PRACTICES (30-60-00) DEICE BOOTS REMOVAL/INSTALLATION

Deice Boots Removal/Installation – refer to the McCauley Electrothermal De-Ice Systems, Service, Parts and Installation Manual.

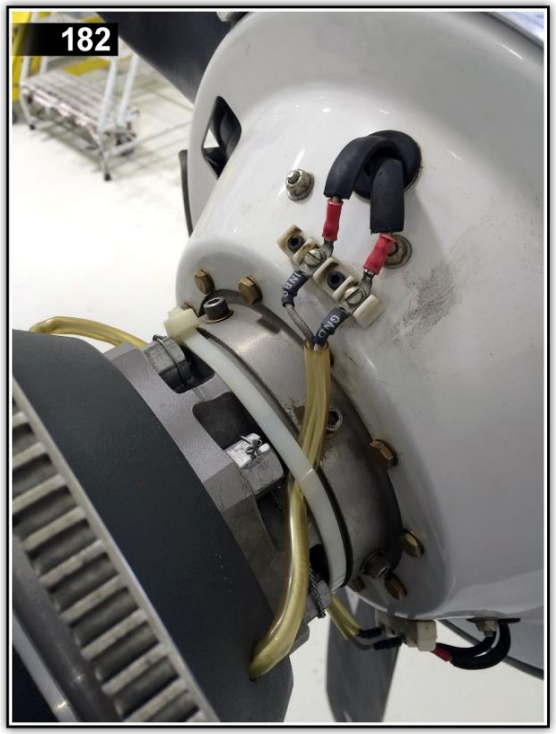
NOTE

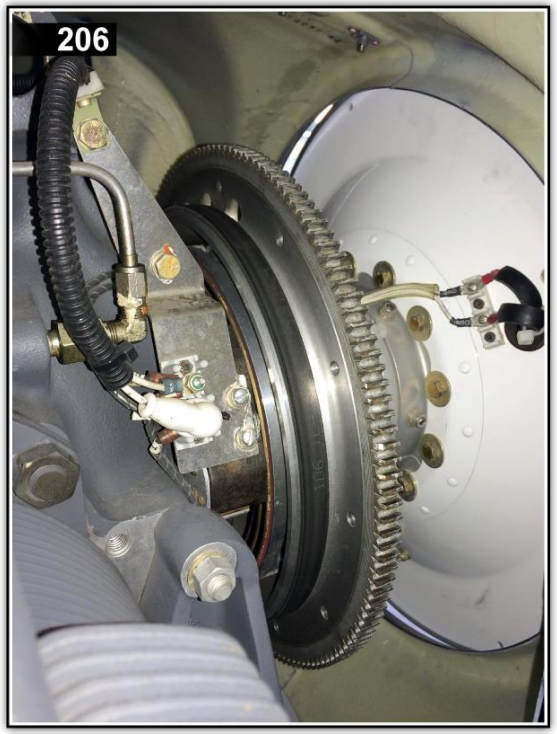
PROPELLER HEAT SYSTEM

Operation of the propeller heat system for longer than 60 seconds without the propeller rotation can cause damage to the de-icing boots.

182/206 PROPELLER HEAT - MAINTENANCE PRACTICES (30-60-00)

- Brush Length Inspection
- Brush Block Removal/Installation
- Brush Block to Slip Ring Alignment





ELECTRICAL POWER

MAKE SURE ALL ELECTRICAL POWER IS REMOVED FROM THE AIRPLANE WHEN WORK IS DONE NEAR THE PROPELLER.

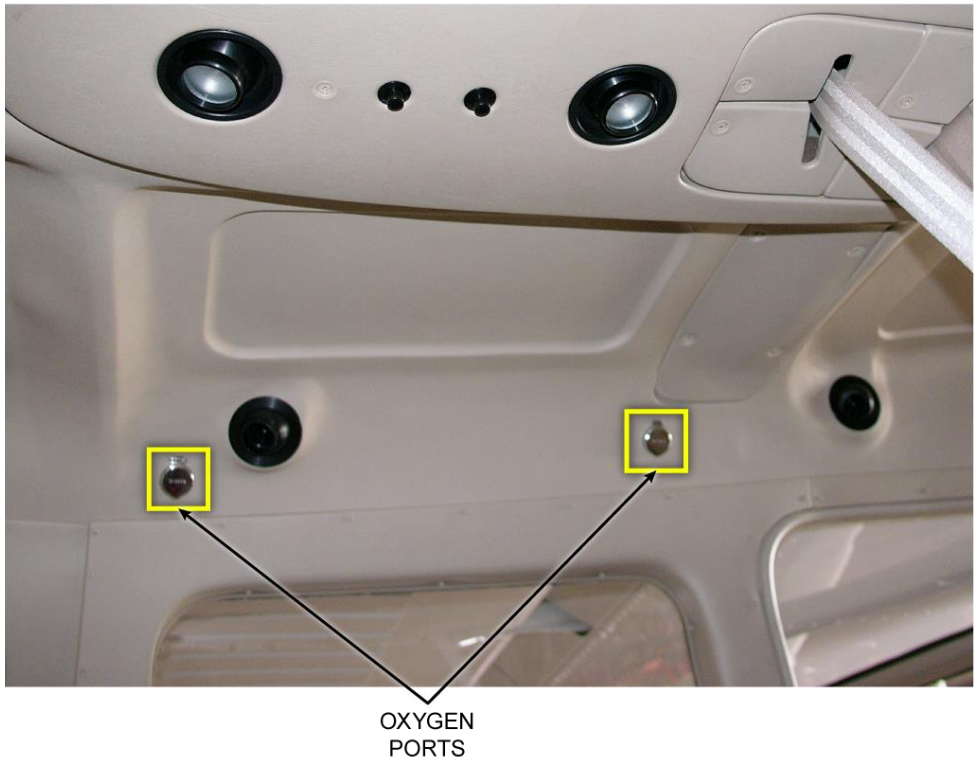
ATA35 Oxygen System

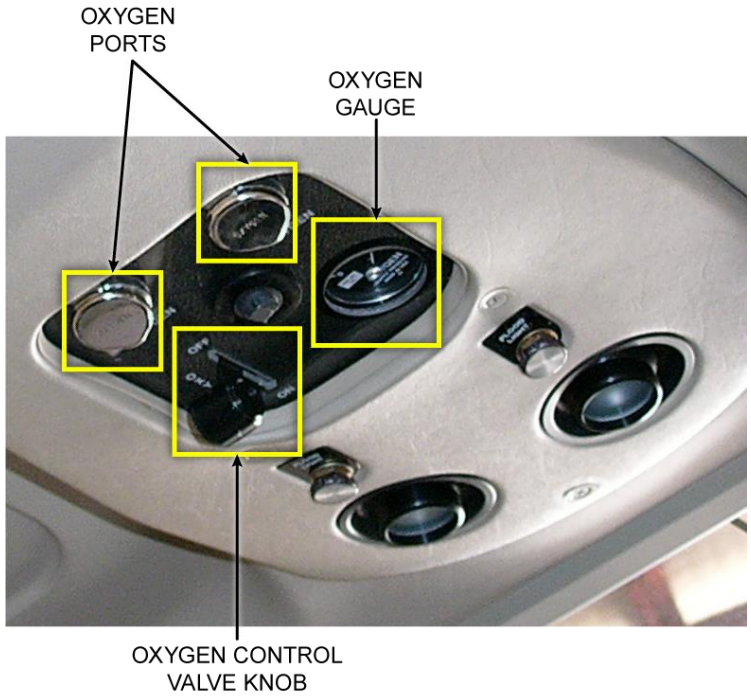
Overview

LESSON OBJECTIVES

- Identify safety precautions related to ATA Chapter 35
- Identify maintenance practices important to ATA Chapter 35
- Describe the general layout of ATA Chapter 35
- Describe normal system operations
- Interpret system indications
- Identify special tooling and test equipment used with ATA Chapter 35
- Perform system and component functional checks
- Correlate information for fault diagnosis and rectification decisions
- Describe procedures for replacement of unique components

OXYGEN SYSTEM - DESCRIPTION AND OPERATION (35-01-00)





Unlike the 172, the 182 and 206 have an oxygen system, which has the following components:

- An oxygen cylinder and regulator assembly
- Filler valve Pressure gage
- Pressure lines
- Outlets Mask assemblies

The oxygen cylinder is aft of the baggage compartment. The filler valve is on the left side of the tailcone.

OXYGEN SYSTEM - DESCRIPTION AND OPERATION (35-01-00)

The pilot's mask supply line gives a larger flow of oxygen than the passenger mask supply lines. The pilot's mask has a microphone, keyed by a switch button on the pilot's control wheel.

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- A four-place oxygen system provides the supplementary oxygen necessary for continuous flight at high altitude.
- In this system, a 50 cubic foot oxygen cylinder, located in the fuselage tailcone, supplies oxygen.
- Four oxygen outlets are provided; two in the overhead oxygen console and two in the cabin ceiling just above the side windows (one at each of the rear seating positions).

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- A six-place oxygen system provides the supplementary oxygen necessary for continuous flight at high altitude.
- In this system, a 76 cubic foot oxygen cylinder, located in the fuselage tailcone, supplies oxygen.
- Six oxygen outlets are provided; two in the overhead oxygen console and four in the cabin ceiling just above the side windows (one at each of the rear seating positions).

OXYGEN CONTROL VALVE KNOB

DO NOT LET OIL, GREASE, OR OTHER LUBRICANTS NEAR HIGH-PRESSURE OXYGEN BECAUSE IT CAN CAUSE A FIRE. DO NOT SMOKE OR HAVE AN OPEN FLAME IN OR NEAR THE AIRPLANE WHILE YOU WORK ON THE OXYGEN SYSTEM.

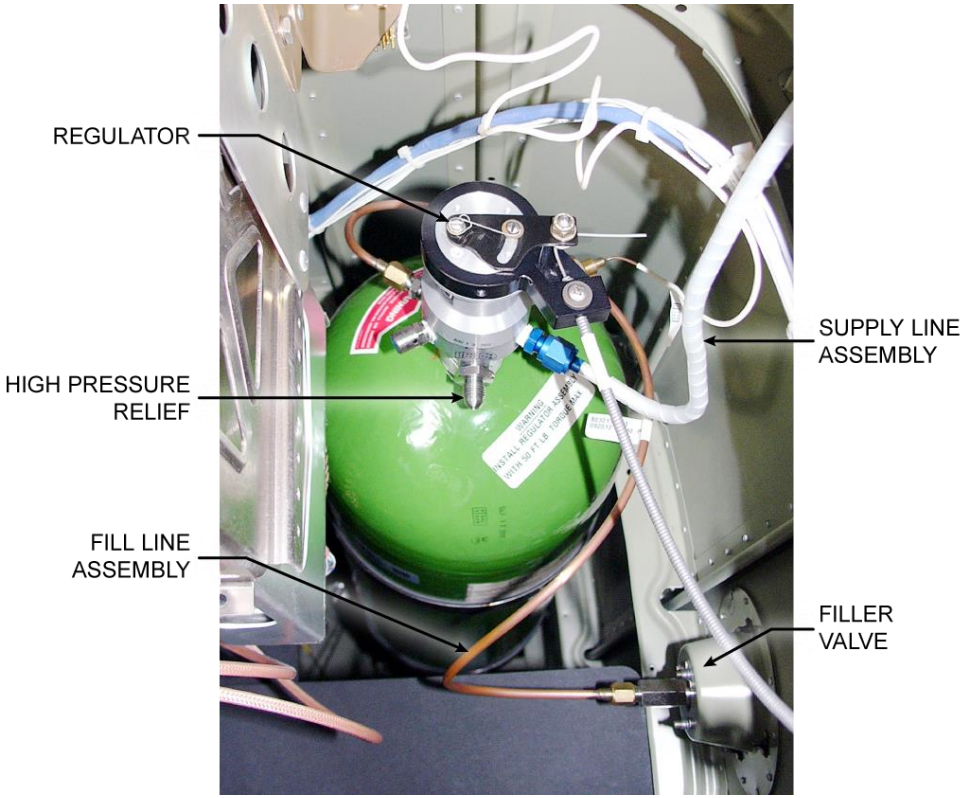
OXYGEN SYSTEM - DESCRIPTION AND OPERATION (35-01-00)

Oxygen flow to the outlet ports starts when the oxygen control valve knob, located in the overhead console, is put in the ON position and mask hoses are connected to the overhead oxygen ports.

OXYGEN PORT

Each oxygen port has a spring-loaded valve which prevents the flow of oxygen until a mask hose is connected. Each mask hose has an Oxygen Flow Indicator for visual proof of oxygen flow.

OXYGEN SYSTEM - DESCRIPTION AND OPERATION (35-01-00)



206

The oxygen cylinder has the following information on the shoulder, neck, or top head of the cylinder to help in correct identification.

1. Cylinder specification followed by service pressure. For example, ICC or DOT-E8162.
2. Cylinder serial number. This is found below or directly after the cylinder specification. The symbol of the purchaser, user, or maker, if registered with the Bureau of Explosives, can be found directly below the serial number. The cylinder serial number can possibly be found in an alternative location on the cylinder top head.

OXYGEN SYSTEM - DESCRIPTION AND OPERATION (35-01-00)

3. Inspector's official mark. This is found near the serial number.
4. Date of manufacture. This is the date of the first hydrostatic test. For example, 6-98 for June 1998. The dash between the month and the year figures can be replaced with the mark of the inspection agency or agency doing the test. For example, 6L98.
5. Hydrostatic test date. The dates of subsequent hydrostatic tests must be steel-stamped (month and year) directly below the original manufacturer date. The dash between the month and year figures can be replaced with the mark of the testing agency.
6. A Cessna identification placard. This is found near the center of the cylinder body.
7. Halogen test stamp (if applicable). The phrase "Halogen Tested," the date of the test (month, day, and year), and the inspector's mark is found below the Cessna identification card.

A 76 cubic foot oxygen cylinder, located in the fuselage tailcone, supplies the oxygen.

Cylinder pressure is reduced to an operating pressure of 70 PSI by a pressure regulator attached to the cylinder.

A shutoff valve is included as part of the regulator assembly.

An oxygen cylinder filler valve is located on the left side of the fuselage tailcone under a cover plate.

Cylinder pressure is indicated by a pressure gage located in the overhead oxygen console above the pilot's and front passenger’s seats.

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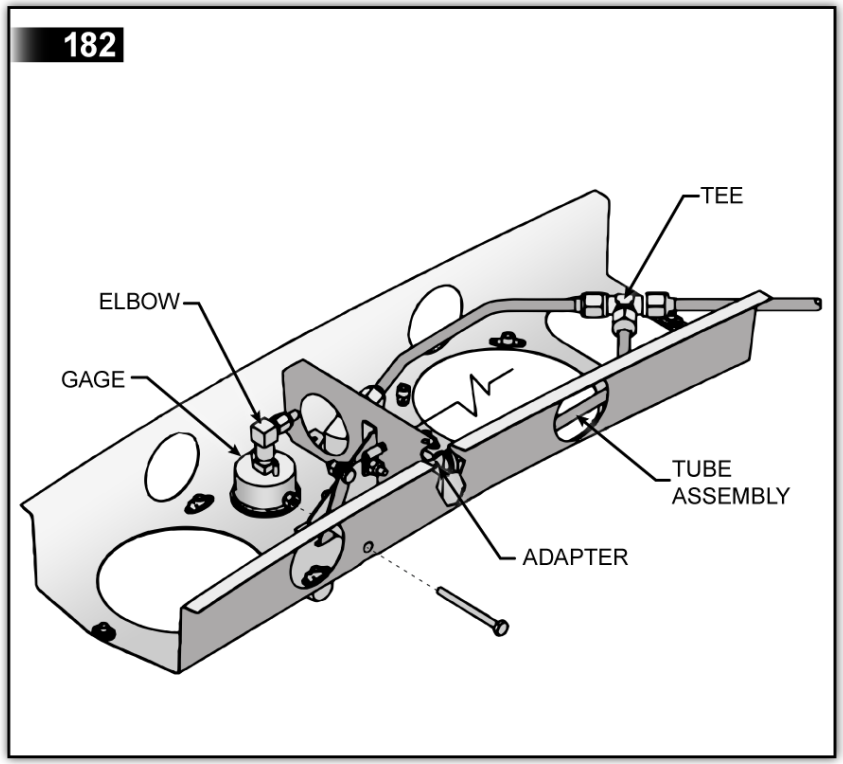
A 50 cubic foot oxygen cylinder, located in the fuselage tailcone.

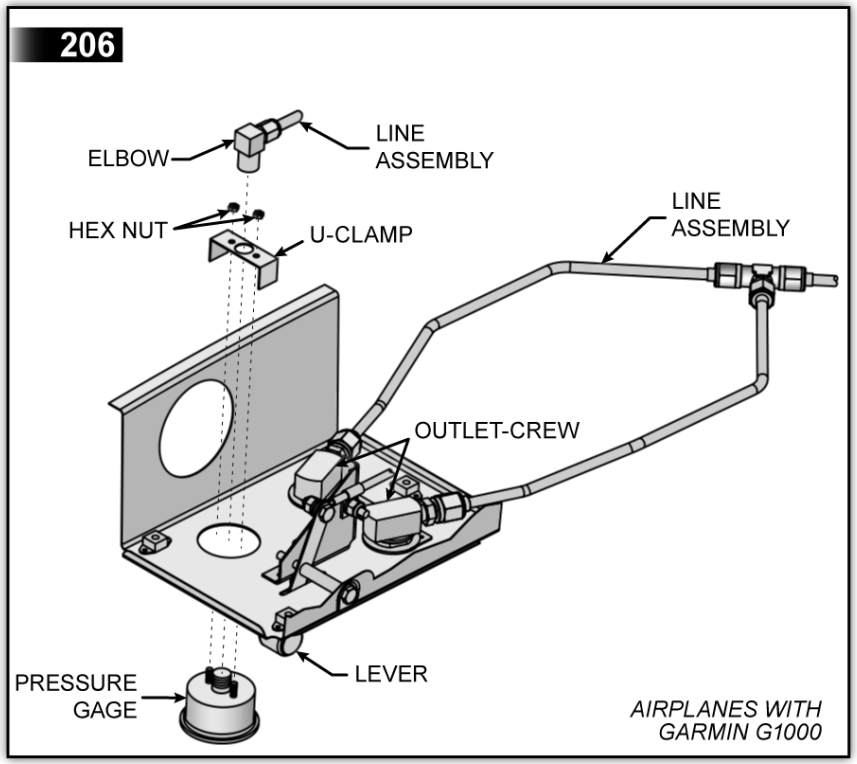
OXYGEN SYSTEM - DESCRIPTION AND OPERATION (35-01-00)

206/182 Oxygen Service Door

- Located on left tail section of the aircraft.

OXYGEN- MAINTENANCE PRACTICES (35-01-00)





Maintenance Practices for the Oxygen System include:

- Replacement of Components
  - Filler Valve Removal
  - Filler Valve Installation
- Oxygen Release Indicator Disc
- Oxygen Cylinder Inspection Requirements
- Oxygen Mask and/or Cannula Inspection
- Oxygen Mask and/or Cannula Maintenance
- Precise Flight Oxygen Flow Meter Antistatic Treatment
- Oxygen System Functional Testing System Leak Test
- Oxygen System Charging

OXYGEN- MAINTENANCE PRACTICES (35-01-00)

When the oxygen system is turned on, oxygen will flow continuously at the proper rate of flow for any altitude without any manual adjustments.

Precautions

FLAMMABLE

DO NOT SMOKE OR HAVE AN OPEN FLAME NEAR THE AIRPLANE WHILE YOU DO MAINTENANCE ON THE OXYGEN SYSTEM. MAKE SURE ALL ELECTRICAL POWER IS DISCONNECTED AND THAT THE AIRPLANE IS CORRECTLY GROUNDED. OILS, GREASE, AND SOLVENTS CAN BURN OR EXPLODE WHEN NEAR TO OXYGEN UNDER PRESSURE.

AIR COMPRESSOR

MOST AIR COMPRESSORS ARE LUBRICATED WITH OIL, AND A MINIMUM AMOUNT OF OIL CAN BE CARRIED BY THE AIRSTREAM INTO THE SYSTEM. USE A WATER-LUBRICATED COMPRESSOR TO BLOW TUBING CLEAN ONLY WHEN NITROGEN OR ARGON IS NOT AVAILABLE. THE AIR MUST BE CLEAN, DRY, AND FILTERED.

PRECAUTIONS

SPARKS

DO NOT USE TOOLS THAT CAN CAUSE SPARKS.

OXYGEN BOTTLE

WITH OXYGEN BOTTLE CHARGED, DO NOT PUT THE CONTROL IN THE ON POSITION WITH OUTLET PORTS (LOW PRESSURE) OPEN TO THE ATMOSPHERE. DAMAGE TO THE REGULATOR METERING POPPET CAN OCCUR.

OXYGEN SYSTEM

WHEN A COMPONENT OF THE OXYGEN SYSTEM HAS BEEN REMOVED, INSTALLED, REPLACED, OR THE SYSTEM HAS BEEN DISASSEMBLED IN ANY WAY, THE OXYGEN SYSTEM MUST BE PURGED AND A CHECK FOR LEAKS MUST BE DONE.

REPLACEMENT OF COMPONENTS

CAP LINES

CAP ALL LINES IMMEDIATELY.

OXYGEN CYLINDER AND REGULATOR ASSEMBLIES

Oxygen cylinder and regulator assemblies cannot always be installed in the field exactly as illustrated in Figure 201 of section 35-01-00, which shows factory installation.

HIGH PRESSURE FITTINGS

THE PRESSURE REGULATOR, PRESSURE GAGE AND LINE, AND FILLER VALVE MUST BE REMOVED AND REPLACED ONLY BY PERSONNEL FAMILIAR WITH HIGH-PRESSURE FITTINGS. OBEY ALL MAINTENANCE PRECAUTIONS.

OXYGEN RELEASE INDICATOR DISC

A Scott Aviation approved service center must do the overhaul. Contact Scott Aviation at (716) 686-1666 to find an approved service center.

INDICATOR DISC

- Airplanes T18208309 and On do not have an emergency release indicator disc installed. These airplanes have a vent found in the tailcone for emergency oxygen release.
- The oxygen cylinder and regulator are removed and installed together as one assembly.

Precise Flight Oxygen Flow Meter Antistatic Treatment

Note: The Precise Flight Oxygen Flow Meter can become static charged because of friction. This charge does not let the ball move freely inside the flow meter. This treatment will remove the static charge.

System Leak Test

CONNECTIONS

DO NOT TRY TO TIGHTEN THE CONNECTIONS WHILE THE SYSTEM IS CHARGED.

OXYGEN SYSTEM CHARGING

GROUND

BE SURE TO GROUND THE AIRCRAFT AND THE EQUIPMENT USED TO SERVICE THE SYSTEM BEFORE YOU CHARGE THE OXYGEN SYSTEM.

CONTAMINATION

A CYLINDER WHICH IS EMPTY CAN BE CONTAMINATED. THE REGULATOR AND CYLINDER ASSEMBLY MUST THEN BE DISASSEMBLED, INSPECTED, AND CLEANED BY AN FAA APPROVED FACILITY BEFORE FILLING. CONTAMINATION, AS USED HERE, MEANS DIRT, DUST, OR FOREIGN MATERIAL, OR AIR IN LARGE QUANTITIES. IF A GAGE LINE OR FILLER LINE IS DISCONNECTED AND YOU PUT CAPS ON ALL OF THE FITTINGS IMMEDIATELY, NO CONTAMINATION OF THE CYLINDER WILL OCCUR UNLESS TEMPERATURE VARIATION HAS CAUSED A SUCTION IN THE CYLINDER. AIR CONTAINS WATER VAPOR WHICH CAN CONDENSE AND FREEZE. SINCE THERE ARE VERY SMALL ORIFICES IN THE SYSTEM, IT IS VERY IMPORTANT THAT THIS CONDITION NOT OCCUR.

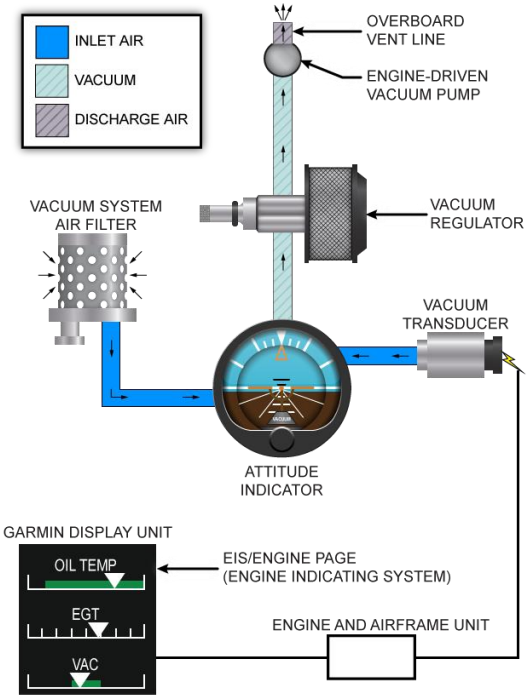
ATA37 Vacuum System

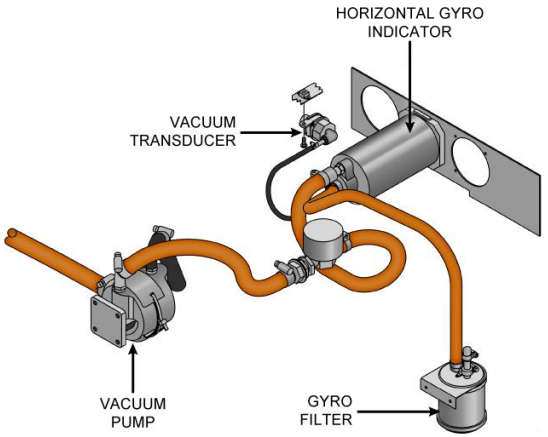
Overview

LESSON OBJECTIVES

- Identify safety precautions related to the vacuum system.
- Identify maintenance practices important to the vacuum system.
- Describe the general layout of the vacuum system.

VACUUM SYSTEM DESCRIPTION AND OPERATION (37-00-00)





The vacuum system includes one engine-driven vacuum pump, a vacuum regulator, the standby attitude indicator, a vacuum system air filter, and a vacuum transducer. On airplanes with Garmin G1000, the source of vacuum air is in the cabin and is pulled through the system by the engine-driven vacuum pump.

The vacuum system supplies the vacuum necessary to operate the standby attitude indicator.

The vacuum transducer provides a signal to the engine display that is processed and displayed as vacuum on the EIS ENGINE page.

If available vacuum from the engine-driven vacuum pump drops below 3.5 in. hg, the **LOW VACUUM** annunciator displays in amber on the PFD.

VACUUM SYSTEM DESCRIPTION AND OPERATION (37-00-00)

ATTITUDE INDICATOR

The standby attitude indicator is a vacuum-powered gyroscopic instrument, found on the center instrument panel below the MFD. The attitude indicator includes a low-vacuum warning flag (GYRO) that comes into view when the vacuum is below the level necessary for reliable gyroscope operation.

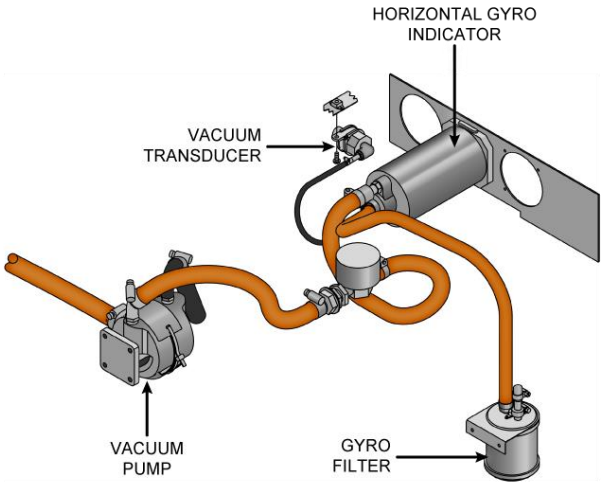
VACUUM INDICATOR

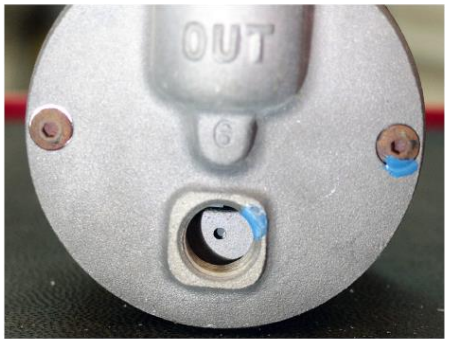
The vacuum indicator is on the EIS ENGINE page, found along the left side of the PFD during engine start or the left edge of the MFD during normal operation. During reversionary operation, the EIS bar appears along the left side of the operational display.

LOW VACUUM ANNUNCIATION

An amber **LOW VACUUM** annunciator comes on in a low vacuum condition.

Vacuum System Troubleshooting (37-10-00)





If the engine-driven vacuum pump fails in flight, the standby attitude indicator is not accurate. The pilot must then rely on the attitude and heading information (from the AHRS) shown on the PFD indicators.

With valid HDG or GPS/NAV inputs, autopilot operation is not affected.

If the AHRS unit fails in flight (red X's shown through the PFD attitude and heading indicators), the pilot must rely on the standby attitude indicator and non-stabilized magnetic compass for attitude and heading information.

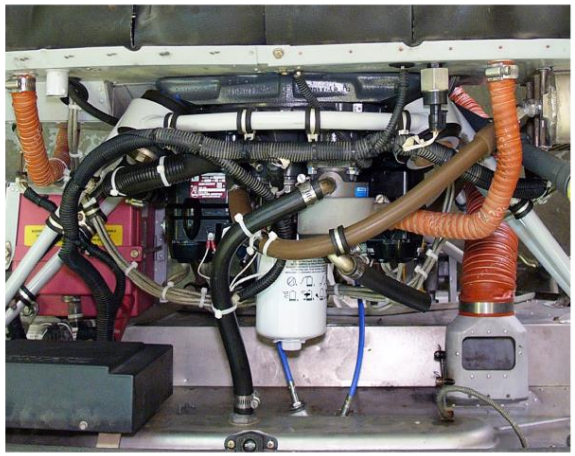
The autopilot does not operate if the AHRS unit fails. The pilot must manually fly the airplane without AHRS input.

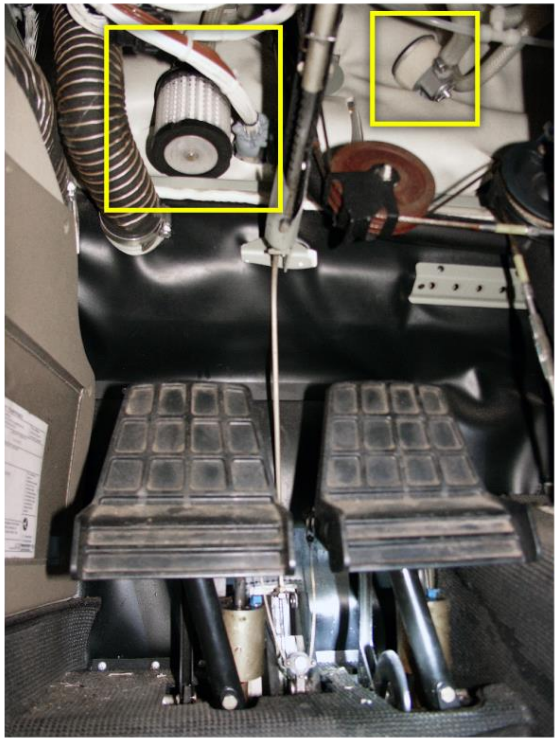
VACUUM SYSTEM TROUBLESHOOTING (37-10-00)

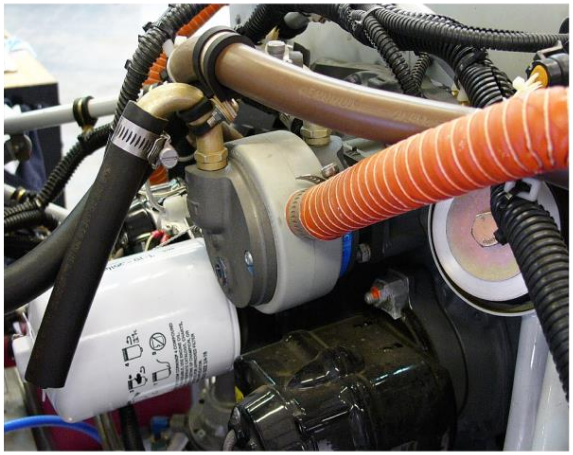
Trouble:

- Oil in discharge
- High suction
- Low suction
- Low pressure

Vacuum System Maintenance Practices (37-10-00)







VACUUM PUMP

Removal/installation is typical for the vacuum pump.

VACUUM SYSTEM MAINTENANCE PRACTICES (37-10-00)

Vacuum pump removal/installation

- Remove the vacuum pump.
- Install the vacuum pump.

VACUUM PUMP

Do not install a vacuum pump that has been dropped or shows that it was incorrectly held in a vise.

GASKETS

Do not use any cork-type gaskets when the vacuum pump is installed.

VACUUM SYSTEM MAINTENANCE PRACTICES (37-10-00)

FOD

Make sure all unwanted material is removed from the system. Foreign object debris (FOD) will cause damage to the vacuum system components.

VISE

If a vise is used, hold the pump housing by the flange and protect the flange with soft material such as aluminum, copper or wood. The pump housing must never be set in a vise with pressure applied across the center of the housing. The pressure will cause damage to the carbon rotor.

TEFLON TAPE

Do not use Teflon tape, pipe dope, or thread lubricants of any type. Foreign object debris will cause damage to the vacuum system components.

VACUUM SYSTEM MAINTENANCE PRACTICES (37-10-00)

GARMIN G1000

Airplanes with Garmin G1000 do not have vacuum manifolds.

Regulator valve filter removal/installation

- Remove the regulator valve filter.
- Install the regulator valve filter.

Gyro filter removal/installation

- Remove the gyro filter.
- Install the gyro filter.

VACUUM SYSTEM MAINTENANCE PRACTICES (37-10-00)

GARMIN G1000

Airplanes with Garmin G1000 do not have a vacuum gage.

Vacuum transducer removal/installation

- Remove the vacuum transducer.
- Install the vacuum transducer.

Vacuum pressure adjustment/test

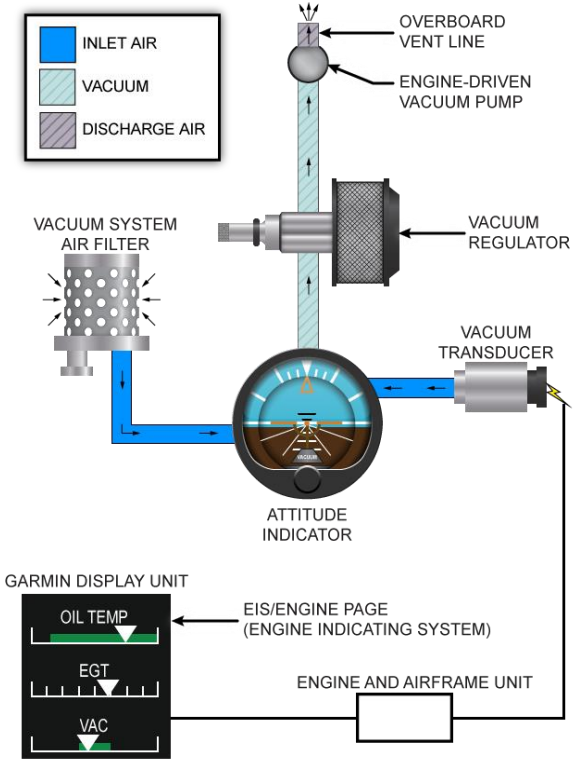
VACUUM SYSTEM MAINTENANCE PRACTICES (37-10-00)

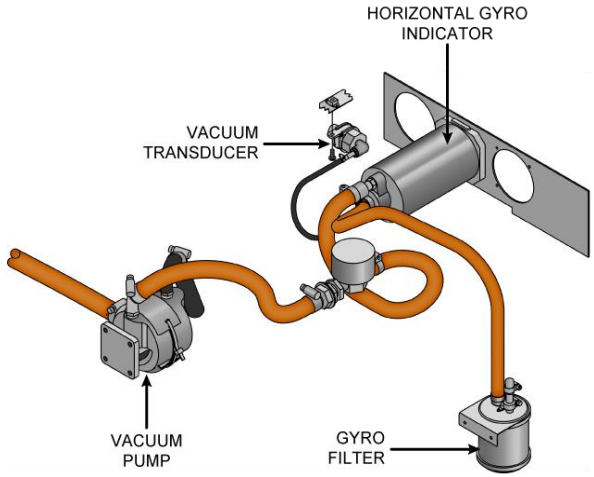
INSPECT/TEST FOR LEAKS

Before the adjustment procedure, the entire pneumatic system must be inspected and tested for leaks, restrictions, and unserviceable components. Failure to correct all system anomalies will lead to reduced dry air pump service life.

Vacuum System Review

VACUUM SYSTEM SUMMARY (37-00-00)



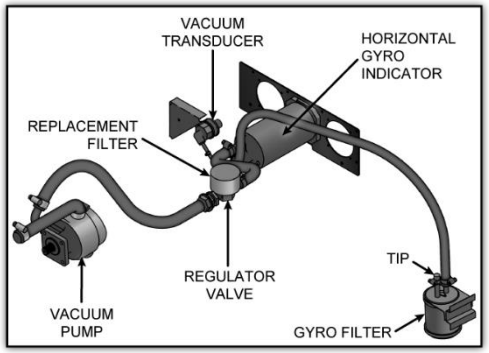


Model Differences

182/206 DIFFERENCES - VACUUM SYSTEMS (37-10-00)

The vacuum systems have a filter, standby vacuum instruments, regulator valve, low vacuum annunciator switch, engine-driven vacuum pump and related plumbing.

- On airplanes with Garmin G1000, the source of vacuum air is in the cabin and is pulled through the system by the engine-driven vacuum pump.
- The vacuum pressure is measured by a vacuum transducer.
- The air goes through the gyro filter at the cabin inlet source before it is goes through the horizon gyro indicator.
- The vacuum is controlled by the regulator valve.



- The regulator valve and the vacuum transducer are on the aft side of the firewall.

VACUUM SYSTEM AND INSTRUMENTS

The vacuum system provides the vacuum necessary to operate the standby attitude indicator.

The system consists of:

- One engine driven vacuum pump
- A vacuum regulator
- the standby attitude indicator
- A vacuum system air filter
- A vacuum transducer
- The vacuum transducer provides a signal to the engine display that is processed and displayed as vacuum on the EIS SYSTEM (Engine Indicating System) page.
- If vacuum from the engine-driven vacuum pump drops below 3.5In.Hg (Mercury)., the LOW VACUUM annunciator will display in amber on the PFD (Primary Flight Display).

ATTITUDE INDICATOR

- The standby attitude indicator is a vacuum-powered gyroscopic instrument found on the center instrument panel below the MFD (Multi-Function Display).
- The attitude indicator includes a low-vacuum warning flag (GYRO) that comes into view when the vacuum is below the level necessary for reliable gyroscope operation.

VACUUM INDICATOR

- The vacuum indicator is incorporated on the EIS SYSTEM page, found along the left side of the PFD during engine start or the left edge of the MFD during normal operation.
- During reversionary operation, the EIS bar appears along the left side of the operational display.

LOW VACUUM ANNUNCIATION

- A low vacuum condition is annunciated along the right side of the PFD by a amber LOW VACUUM annunciator.