

FREON AIR CONDITIONING - DESCRIPTION AND OPERATION

(Airplanes 20800112 and On, and 208B0214 and On)

1. General

- A. The air conditioning system is used to provide cool air for cockpit and cabin area. The system uses one compressor in conjunction with three evaporators to distribute freon cooled air through overhead ducts.
 - (1) The compressor is mounted on the engine accessory section and driven by a V-belt from a drive unit assembly.
 - (2) Two evaporator units with integral blowers are located in the wing root areas (left and right). The third evaporator unit is located in the tailcone behind the aft cabin bulkhead.
- B. An air conditioning schematic is provided to aid maintenance technicians in system understanding. Refer to Figure 1.

2. Description

- A. Component Descriptions are as follows:
 - (1) Compressor - The air conditioning compressor is a automotive type unit mounted on the aft left side of the engine and driven by a V-belt from a drive unit mounted on the engine accessory section. Service valves are located on the suction and discharge ports on the compressor. The compressor has a dual function. First, it is a means of moving refrigerant through the system, and second, it compresses the gaseous refrigerant, raising the pressure and temperature simultaneously. The temperature rise is the actual desired outcome and is accomplished with a corresponding rise in pressure.
 - (2) Compressor Drive Unit - A compressor drive unit is installed on an accessory pad located on the aft left side of the engine. The drive unit is driven by the engine which in turn drives the air conditioning compressor by means of a pulley and V-belt. A drain hose is installed on the unit and routed from the underside of the drive unit to an outlet in the lower right cowl. The forward support assembly of the drive unit also provides for the attachment of the air conditioning compressor along with a clevis-turnbuckle arrangement which provides V-belt tension adjustment.
 - (3) Compressor Drive Belt - The air conditioning compressor is driven by a V-belt from the drive unit pulley to the pulley on the compressor.
 - (4) Condenser - The condenser is a flat tube fin coil located in the lower left section of the engine compartment. The condenser is interfaced with louvers in the lower left cowl by means of an inlet duct. The inlet duct extends from the condenser to the forward cowl opening, and a series of four seals are connected to the bottom of the condenser and extend downward to meet the aft opening in the cowl. The condenser and inlet duct are attached to the engine mount with clamps and hardware and to the firewall by means of a support bracket and attaching hardware. The condenser receives hot, high pressure gaseous refrigerant and converts it to a cooler, high pressure liquid. Ambient air, which is cooler than the super heated refrigerant, is blown across the condenser coil. Heat from the hot gas passes into the cooler air stream, and in the process, changes the state of the refrigerant back to a liquid. The liquid refrigerant is routed to the receiver/dryer for recycling.
 - (5) Receiver/Dryer - The receiver/dryer is a canister type using a desiccant to remove moisture and a filter to remove larger particles of impurities and hold the desiccant in place. The unit also stores liquid refrigerant during the operation cycle. The receiver/dryer is installed in the lower right side of the engine compartment.
 - (6) Pressure Switch - A high pressure safety is located in the lower right engine compartment just forward of the receiver/dryer. The switch disengages the compressor clutch and stops system operation in the event the system becomes overloaded. The system will cycle on again when the pressure reduces.
 - (7) Air Conditioning Plumbing - Refrigerant lines in the engine compartment, under floorboards and fuselage side walls, interconnect the compressor, condenser, receiver/dryer and evaporators.
 - (8) Wing Mounted Evaporator - Two evaporator units with integral blowers are located, one each in the left and right wing bays just outboard of the wing root rib. The evaporator units both contain an evaporator coil with an expansion valve, a shroud, and a scroll and blower assembly. Cabin air is drawn through each evaporator coil and conditioned air is routed into the distribution ducts and cabin area. The blower motors are dual speed and circulate conditioned air or ventilation air into the cabin.
 - (9) Overhead Distribution Ducts - The two wing mounted evaporator units utilize existing fresh air distribution ducts for freon-cooled air. For a complete description of how fresh air is distributed through the cabin and cockpit area, refer to Fresh Air Distribution - Maintenance Practices.
 - (10) Tailcone Mounted Evaporator - The tailcone mounted evaporator is mounted aft of the aft cabin bulkhead on the left side. The evaporator unit consists of an evaporator coil with an expansion valve, a shroud, a scroll and blower

assembly. Cabin air is drawn through the evaporator coil and the conditioned air is routed through the distribution ducts into the aft cabin area. The blower motor is dual speed.

- (11) Aft Evaporator Distribution and Return Air System - The distribution and return air system consists of two return air grills mounted on the upper portion of the aft cabin bulkhead, two elbow assemblies and two ducts routed to the duct assembly mounted on the forward side of the evaporator. A duct connected to the evaporator blower assembly and routed to a Wye-duct, which is connected to two distribution ducts mounted in the aft cabin overhead and directs cooled air into the aft cabin area. Louver assemblies in the distribution ducts control the direction and amount of cooled air into the aft cabin area.
- (12) Check Valve - A check valve is installed in the fuselage root rib and ties into the ducting feeding into the wing mounted evaporators. The check valve allows air to exit the cabin for recirculation over the evaporator, but prevents air from entering the cabin through the return air duct and forces all air into the plenum distribution system.

3. Operation

- A. The evaporator units direct cooled air through the cabin air ventilation system to the cabin air outlets. The condenser, located in the lower left section of the engine compartment, is provided with an inlet and an outlet in the lower left side of the engine cowling to supply cooling airflow through the condenser. A receiver/dryer is installed in the lower right side of the engine compartment. A sight glass, used to determine when the system has been properly charged, is installed in the high pressure line near the Schrader valve. Two Schrader valves are installed, one in the high pressure line and one in the low pressure line, for servicing. The sight glass and service valves are located beneath the floorboard inspection covers between the pilot and copilot seats. Refrigerant lines run under the fuselage floorboards and interconnect system components with each other.
- B. Controls for the air conditioning system consist of a three-position toggle air conditioning switch and three two-position toggle fan switches. The controls are located at the lower edge of the instrument panel directly above the control pedestal, and two ventilation system controls are located in the overhead console. Placing the three-position switch, labeled OFF, VENTILATE, COOL, from the OFF position to the COOL position starts the compressor and evaporator fans. Placing the switch in the VENTILATE position activates only the evaporator fans, producing uncooled vent air to the cabin. The three two-position switches, all labeled AC FANS, provide separate HIGH or LOW speed control of each evaporator fan. System electrical protection is provided by four 15-ampere "pull-off" type circuit breakers, labeled LEFT VENT BLWR, RIGHT VENT BLWR, AFT VENT BLWR and AIR COND CONT. The circuit breakers are located on the left side wall circuit breaker panel.
- C. When the air conditioning system is operating, cooled air is supplied to the cabin through 16 overhead adjustable outlets (two each above the pilot and front passenger, one above each rear passenger seat and two directing air forward and one directing air downward from the aft cabin bulkhead area). The pilot's and front passenger outlets are the swivel type for optimum positioning. Airflow volume is controlled by rotating the outlet nozzle which controls an internal valve. The eight rear passenger seat outlets and three aft cabin outlets are directionally adjustable. Each rear passenger outlet has a separate rotary type control beside the outlet, with positions labeled AIR ON and AIR OFF, to control airflow volume through the outlet.

Figure 1 : Sheet 1 : Air Conditioning System Schematic

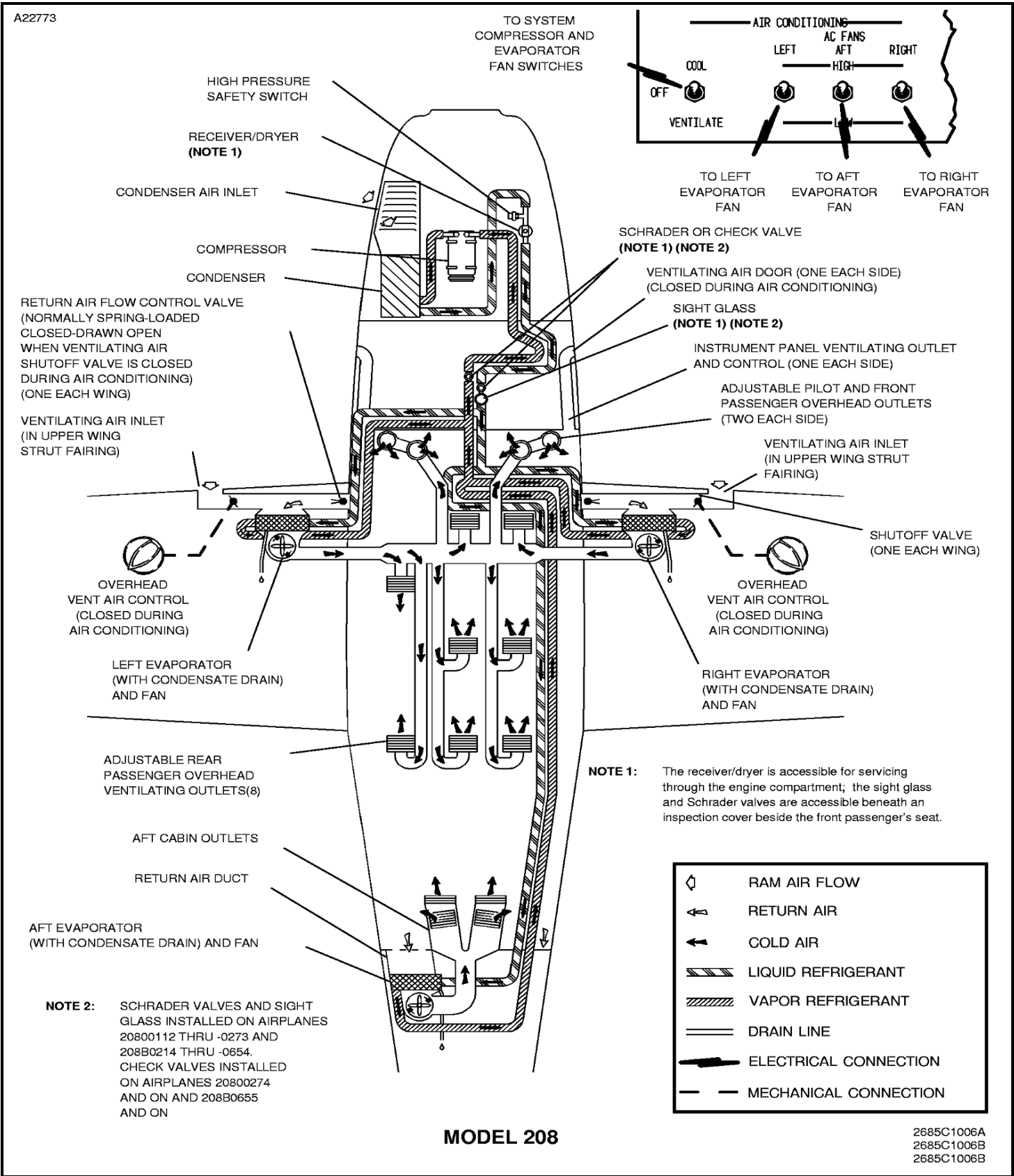


Figure 1 : Sheet 2 : Air Conditioning System Schematic

