

CUSTOM AIR CONDITIONER

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DESCRIPTION AND OPERATION

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GENERAL DESCRIPTION

Both the heating and cooling functions are performed by the Firebird Air Conditioning system. Air entering the vehicle must pass through the cooling unit (evaporator) and through (or around) the heating unit, in that order, and the system is thus referred to as a reheat system.

The evaporator provides maximum cooling of the air passing through the core when the air conditioning system is calling for cooling. The control valve acts in the system only to control the evaporator pressure so that minimum possible temperature is achieved without core freeze-up. The valve is pre-set, has no manual control, is automatically altitude compensated, and non-repairable.

The heater core will be hot at all times since no water valve is present in the system.

System operation is as follows (see Fig. 1B-1): Either outside air or recirculated air enters the system and is forced through the system by the blower. As the air passes through the evaporator core, it receives maximum cooling if the air conditioning controls are calling for cooling. After leaving the evaporator, the air enters the Heater case where, by means of manually operated diverter doors, it is caused to pass through or to by-pass the heater core in the proportions necessary to provide the desired outlet temperature. Conditioned airflow then enters the vehicle through either the floor distributor duct or the dash outlets. The heater core is hot at all times. When, during cooling operations, the air is

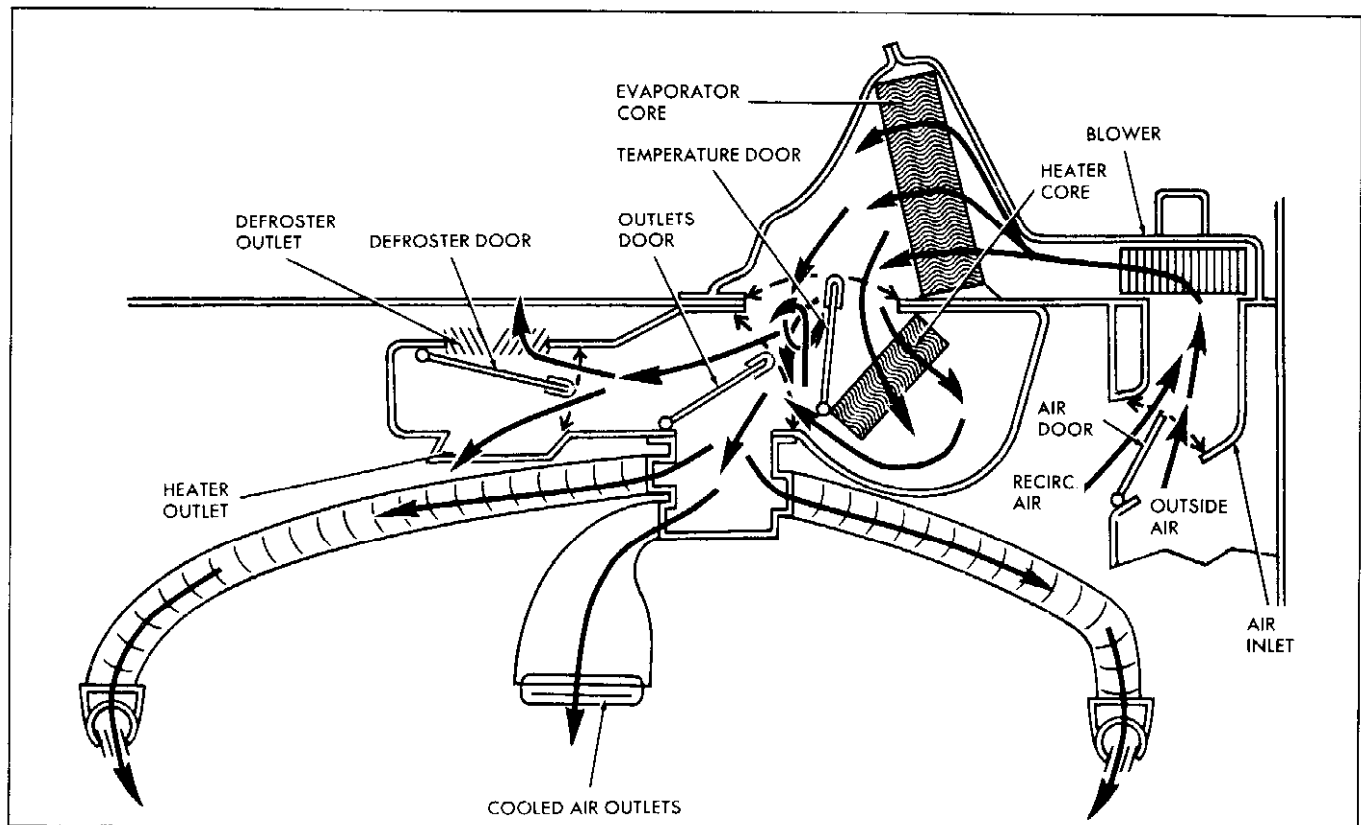


Fig. 1B-1 Air Flow Schematic

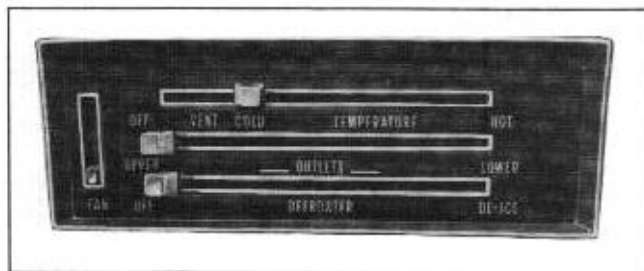


Fig. 1B-2 Custom Air Controls

cooled by the evaporator to below comfort level, it is then warmed by the heater to the desired temperature; during HEATING only operations the evaporator will not be in operation and ambient air will be warmed to the desired level in the same manner. The side dash outlets may be rotated to provide either soft, diffused airflow or spot cooling. Rotate half way to shut off airflow. The barrel type outlet in the center of the dash directs air up or down or, if desired, may shut it off.

CONTROLS

Full control of the Custom Air Conditioning System is obtained through the use of a single control panel (Fig. 1B-2). The control knobs make use of bowden cables to activate the various doors and switches necessary for system operation. Therefore, control adjustment is a matter of properly setting these bowden cables. The following paragraphs explain each control.

TEMPERATURE LEVER

The TEMPERATURE lever controls temperature door position, compressor operation, and air selector door position. When the lever is in the OFF position, the blower can still be utilized, and the compressor is off. In the VENT position, the air selector door is in the OUTSIDE AIR position and the blower is powered at low speed. At any lever position other than OFF, the blower will be powered at low; however, blower speed may be increased by moving the FAN switch. When the lever is above and slightly left of the COLD position, the compressor is on, the

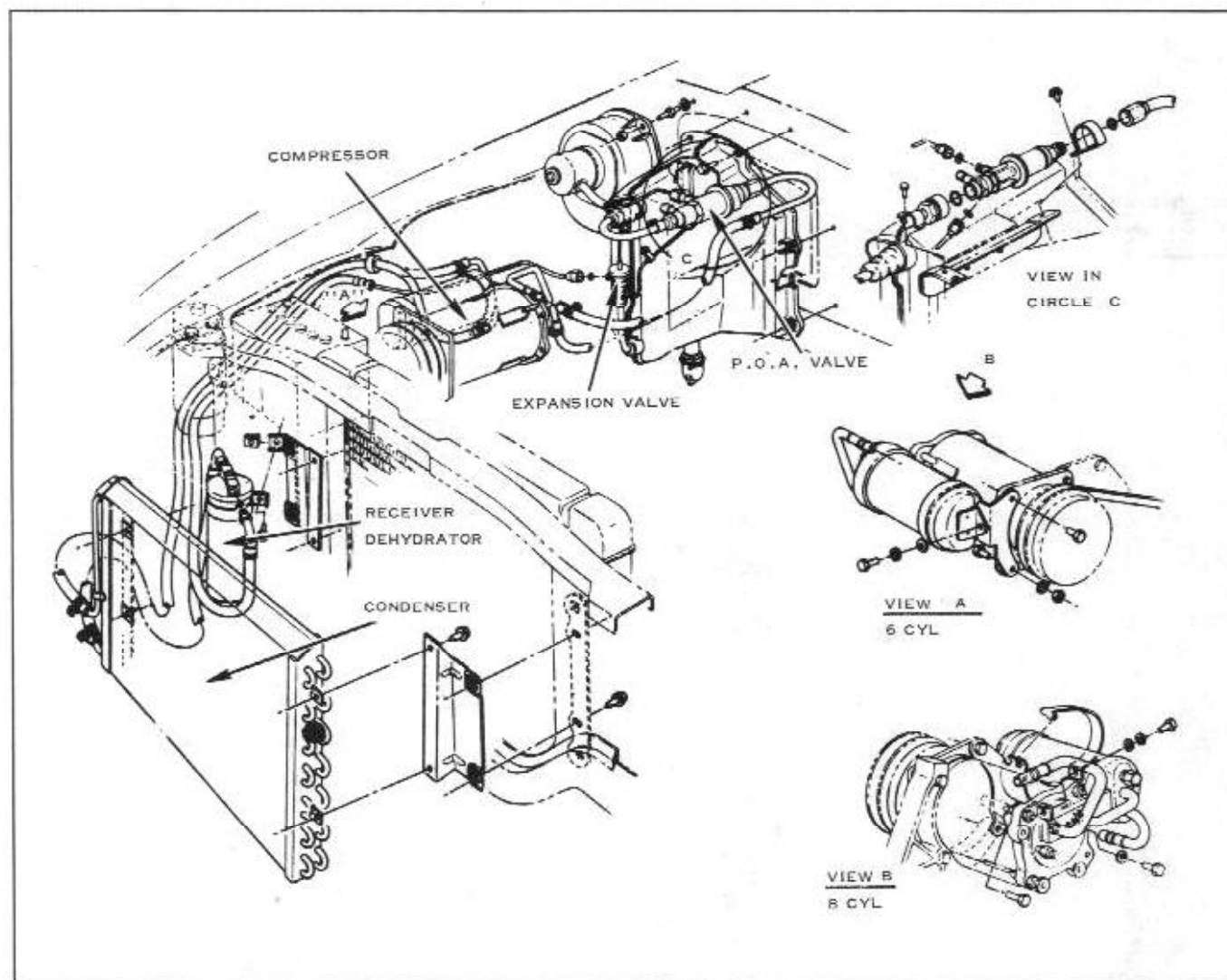


Fig. 1B-3 Custom Air System Components

air selector door is in the recirculation position, the temperature door is in the fully cold position, and the blower is operating. Moving the lever slightly to the right of COLD moves the air selector door to the full outside air position while temperature door, compressor, and blower functions remain the same as in the recirculating — COLD system operation.

Moving the TEMPERATURE lever further to the right moves the temperature door which channels some air through the heater core. At a point about midway between COLD and HOT, the compressor clutch switch opens and the system is operating as a heater only with untreated outside air (passing through the inoperative evaporator core) mixing with heated outside air. With the lever in the HOT position, all air (outside air) passes through the heater core for full heat output.

OUTLETS AND DEFROSTER LEVERS

While the TEMPERATURE lever is in any operating position, the OUTLETS and DEFROSTER levers may be operated as desired. The OUTLETS lever directs the air to either the heater outlet, both heater and dash outlets, or to the dash outlets only. The DEFROSTER lever directs air (which is flowing to the heater outlet) up to the defroster outlets. With the DEFROSTER lever, in the OFF position, a fixed bleed permits a small quantity of air to flow to the defroster outlets while the major volume of air flows from the heater floor distributor. In the DEFROST position, airflow is split between the heater and defroster outlets. In the DE-ICE position, all air is diverted to the defroster outlets. Since the air must be in the heater duct in order to be directed by the defroster door, the OUTLETS lever must be in LOWER position which causes air to flow out the lower outlets. If the OUTLETS lever is in the UPPER position, defroster door movement will have no effect on the system.

FAN SWITCH

The fan switch controls the operation of the three-speed blower motor. It is located on the left side of the control panel.

REFRIGERATION CIRCUIT

The components comprising the refrigeration circuit of the Firebird are basically the same as those utilized on Pontiac and Tempest systems. They are arranged differently, however, to conform to engine compartment configuration, (see Fig. 1B-3) thus their appearance may be slightly different.

For a description of the expansion valve, evaporator, P.O.A. valve, compressor, condenser and receiver dehydrator assembly, see the 1967 Pontiac Service Manual.

ELECTRICAL AND VACUUM CIRCUITS

The electrical and vacuum circuits utilized in the Firebird custom air conditioning system are shown schematically on Fig. 1B-4. The installation of the

wiring harness assembly is shown on Fig. 1B-5. The dotted line in the center of the page is representative of the vehicle dash panel. Components to the left of this panel are located in the engine compartment and to the right in the passenger compartment. In the following discussion, the operation of the fan, temperature control lever and the compressor are discussed.

FAN SPEEDS

The Firebird fan speed selector switch allows the passenger to utilize three fan speeds as well as an OFF position. Off may be overridden if the temperature lever is in any position but off. In this instance the fan operates on low speed.

LOW

In the low position current is available from the ALT (+) terminal on V-8, and the BAT terminal on starter solenoid on six cylinder to the ignition switch panel, fan speed switch. From the switch, the circuit is completed through B to L to R1 of the resistor block. Current then travels from R1, to the relay assembly, the blower motor and finally to ground.

MEDIUM

Medium fan speed is achieved by using R1 and R2 in parallel. From the switch one component of current passes from B to L, through R1, and to the relay, blower motor, and to ground respectively. The other component of current passes B to M through R2, the relay, blower motor and finally to ground. R1 and R2 in parallel yield a smaller resistance than R1, and hence a higher fan speed.

HIGH

In high speed a circuit is completed from B to L and H, current from H passes through the relay coil pulling the relay arm to the left. This creates a path for current from the BAT alternator positive terminal (V-8) or the BAT terminal on starter solenoid (six cylinder) directly to the blower motor and to ground respectively. Since both R1 and R2 are by-passed, the highest fan speed is realized.

OPERATION

TEMPERATURE CONTROL LEVER

Moving the temperature control lever operates the vacuum switch which connects the vacuum source (engine) to various vacuum diaphragms for door operation. The chart on the lower left hand portion of Fig. 1B-4 shows the position of the blower switch contacts, the vacuum switch connections, the compressor switch contacts and the type of air the blower is utilizing. These items are listed for various control lever positions. When outside air is utilized by the system the upper plenum valve is

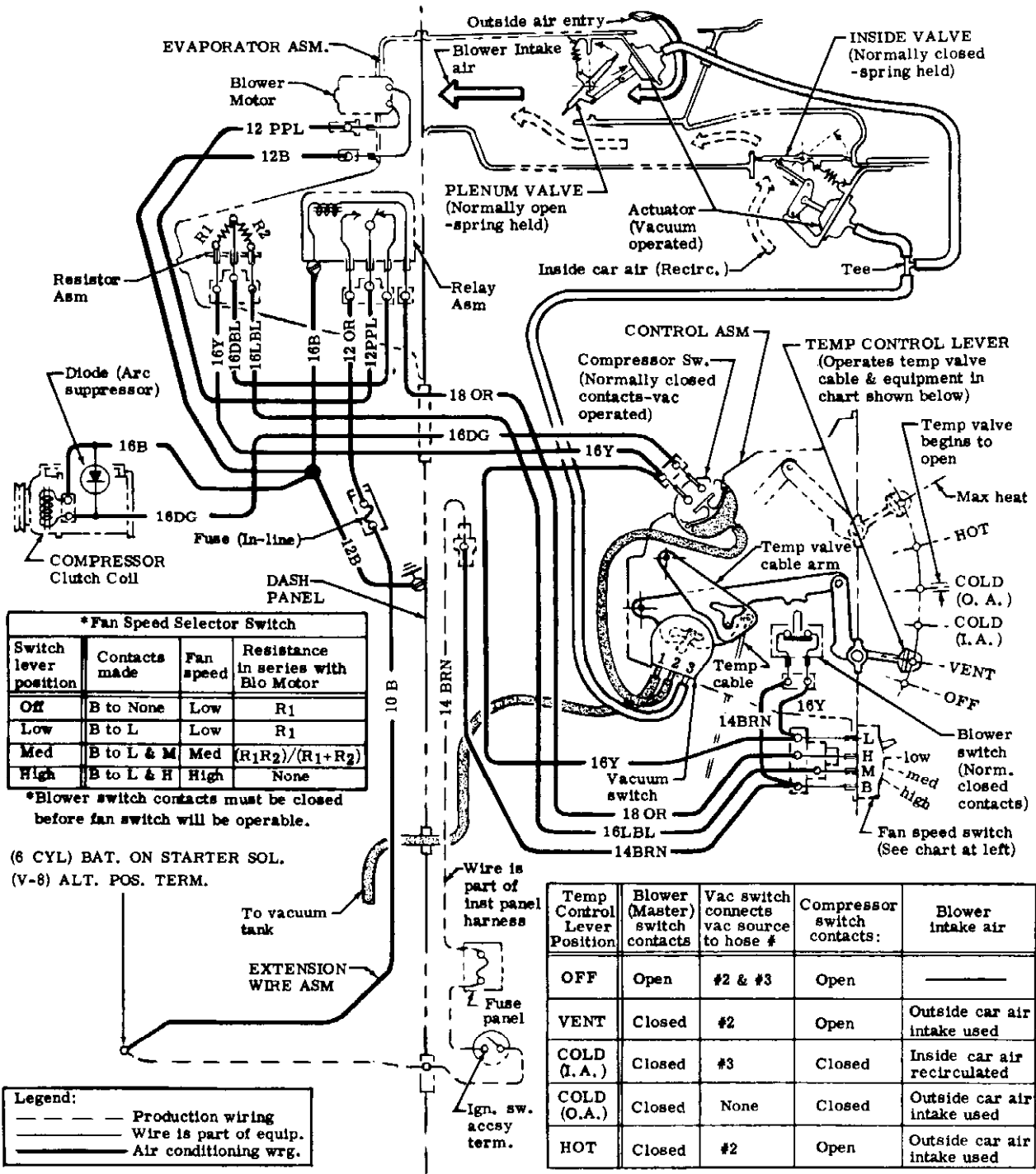


Fig. 1B-4 Wiring and Vacuum Schematic

open and when inside air is recirculated the lower inside valve is open.

COMPRESSOR SWITCH

The compressor switch, located on the control panel, is operated by vacuum. In either the cold inside air (I.A.) or outside air (O.A.) vacuum is not directed to hose No. 2 on the vacuum switch. This closes the Compressor switch and makes current

available through the switch to the compressor clutch coil for clutch engagement.

SPECIAL TOOLS

Special tools required for servicing the Firebird air conditioning system are contained in the group utilized for Pontiac and Tempest Air Conditioning Package. See Fig. 1A-10 in the 1967 Pontiac Service Manual.

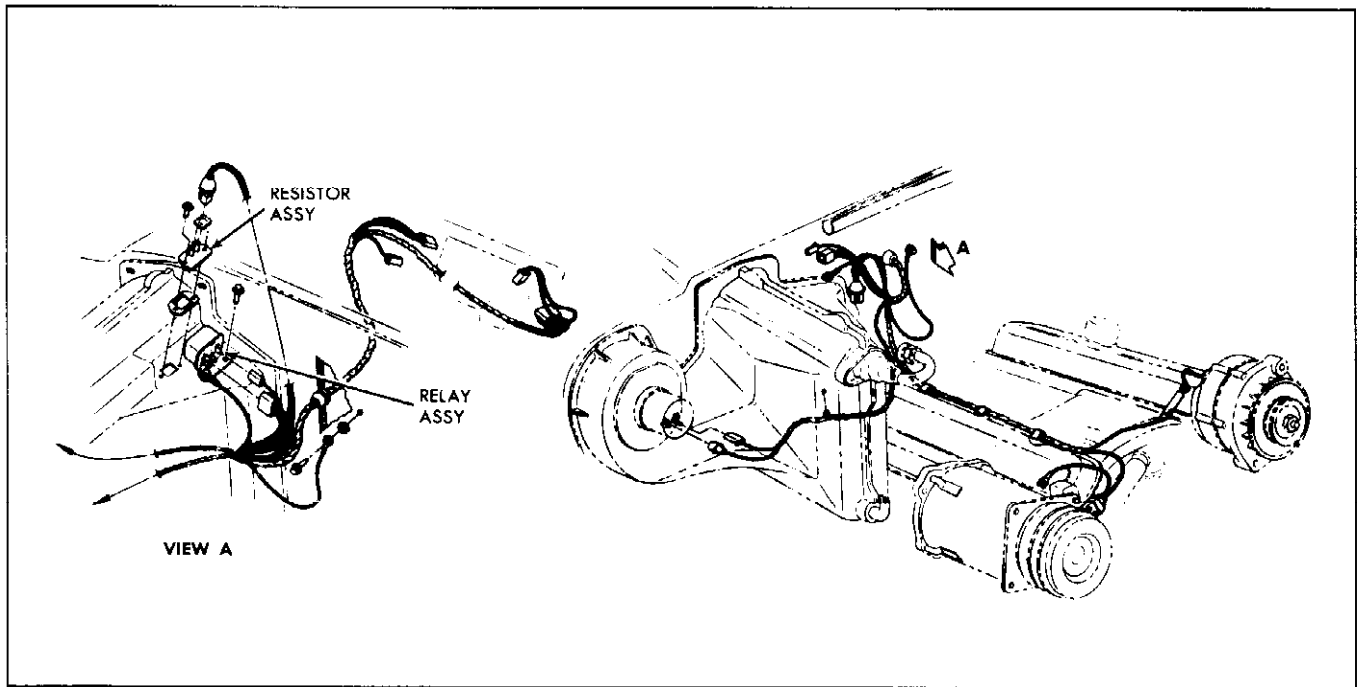


Fig. 1B-5 Typical A/C Harness Installation

PERIODIC SERVICES

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PERIODIC SERVICE AND ADJUSTMENTS ON CAR

Periodic Services covered in the 1967 Service Manual are applicable with the following addition: Do not periodically operate the air conditioning system during winter months for the purpose of keeping the seals lubricated. A new type carbon seal is used on some of the compressors. When the compressor is operated at or below 26° the life expectancy of the carbon seal is considerably reduced.

BELT TENSION

Belt tension specifications for each engine configuration should be as follows:

135-150 lbs. tension (initial adjustment on new belt)

100-105 lbs. tension (for any adjustment required thereafter)

CONTROL CABLES

Three control cables are utilized in the Firebird air conditioning system. From the control panel these cables are attached to the defrost door, the outlet door, and the temperature door. Cable adjustments are not necessary on the Firebird. Figure 1B-6 shows control cable attachment.

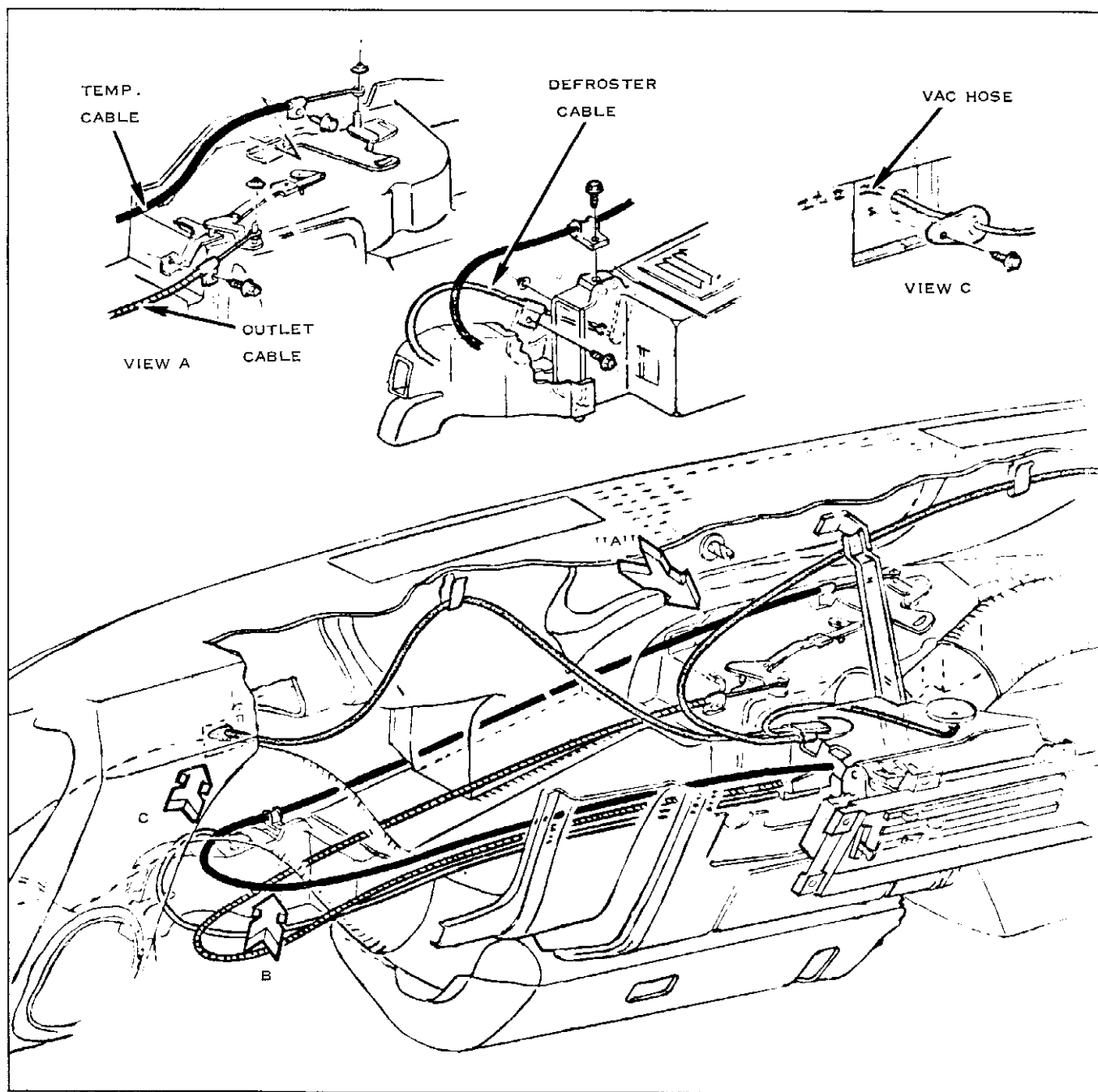


Fig. 1B-6 Control Cable Attachment

SERVICE AND REPAIRS MECHANICAL

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The following repairs and services concern parts of the air conditioning system which can be serviced without opening the refrigeration system. Before attempting any repairs which require opening refrigerant connections, see Minor Services and Repairs - Refrigeration in the 1967 Pontiac Service Manual.

AIR DISTRIBUTION SYSTEM

The air distribution system, which includes the defroster duct, heater outlet, lower distribution duct, center air duct and outlet upper and the right and left hand nozzles, is shown on figure 1B-7. This assembly drawing can be utilized to remove the various components of the system.

BLOWER MOTOR REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove fender brace, battery and tray.
3. Remove hood (after scribing alignment marks).
4. Remove the right front fender and skirt as an assembly.
5. Disconnect the motor wire at the flange connector.
6. Disconnect the rubber motor cooling tube from the motor.
7. Remove the motor to case attaching screws and remove the blower assembly.
8. Remove the impeller from the motor shaft.
9. To install, reverse removal procedure.

CONTROL PANEL REMOVAL AND INSTALLATION

1. Disconnect battery.
2. Remove screws retaining lower portion of trim plate to instrument panel. Remove trim plate.
3. Remove distribution duct.
4. Remove radio.
5. Remove retaining screws and remove control panel.

6. Lower control panel from instrument panel and remove cables, vacuum hoses and wire connectors.

7. To replace reverse removal procedure.

BLOWER SWITCH REMOVAL AND INSTALLATION

1. Remove cold air distributor duct.
2. Remove instrument panel trim plate.
3. Remove ash tray bracket and radio.
4. Remove blower switch attaching screws.
5. Remove wire connector and switch.
6. To replace, reverse removal procedure.

COMPRESSOR SWITCH REMOVAL AND INSTALLATION

1. Remove glove compartment.
2. Remove vacuum hose and wire connector.
3. Remove switch from control panel.
4. To replace reverse removal procedure.

FAN SPEED SWITCH REMOVAL AND INSTALLATION

1. Remove cold air distribution duct.
2. Remove instrument panel trim plate.
3. Remove ash tray bracket and radio.
4. Remove screws attaching control panel to instrument panel.
5. Lower control panel and remove screws retaining fan speed switch.
6. Remove wire connector, then switch.
7. To replace, reverse removal procedure.

INSIDE AIR VALVE AND DIAPHRAGM REMOVAL AND INSTALLATION

Removal and installation of the inside air valve and diaphragm can be achieved by utilizing Fig. 1B-8.

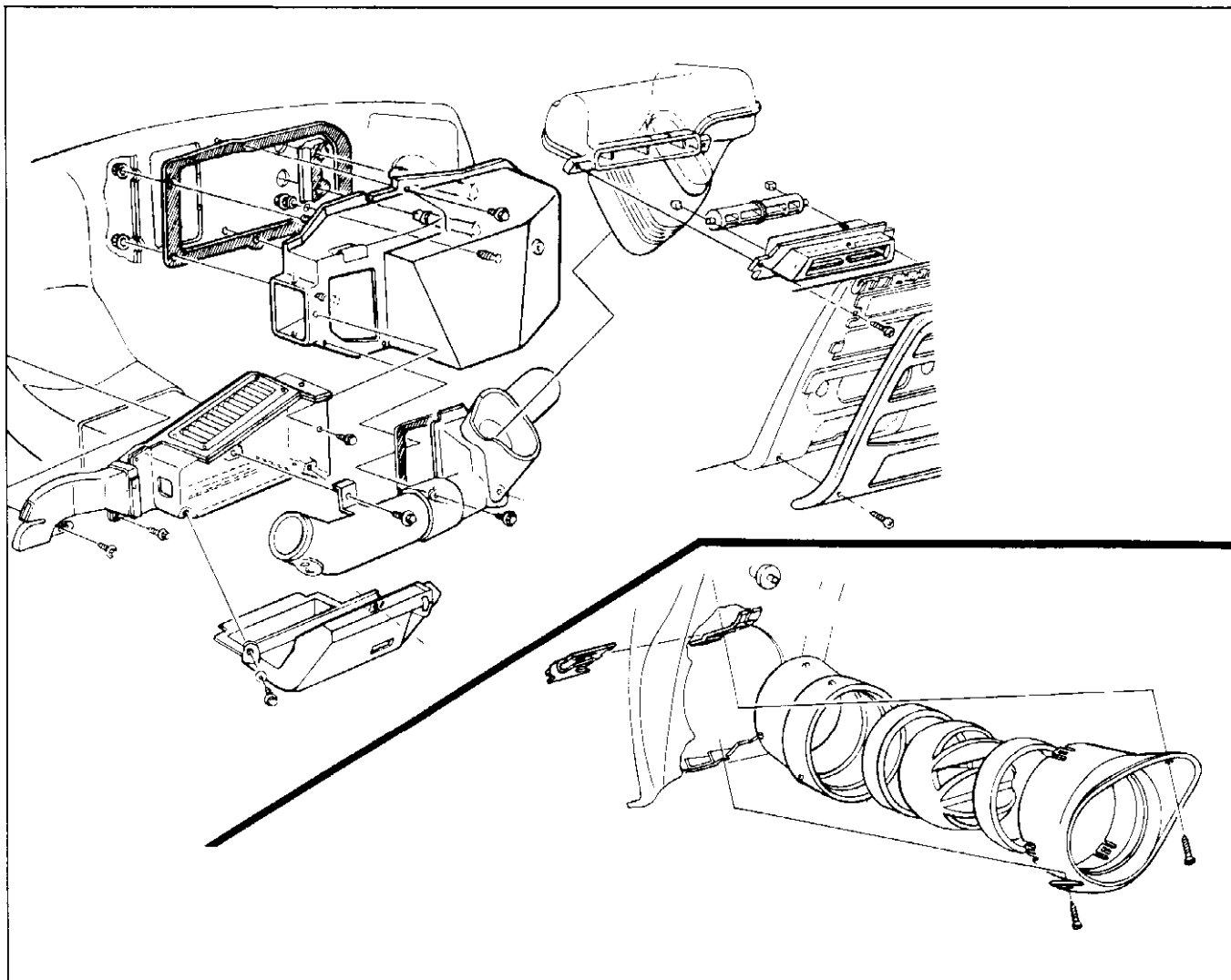


Fig. 1B-7 Custom Air Ducts

PLENUM AIR VALVE AND DIAPHRAGM REMOVAL AND INSTALLATION

Removal and installation of the plenum air valve and diaphragm, located beneath the hood on the passenger side of the vehicle, can be performed by referring to Fig. 1B-9.

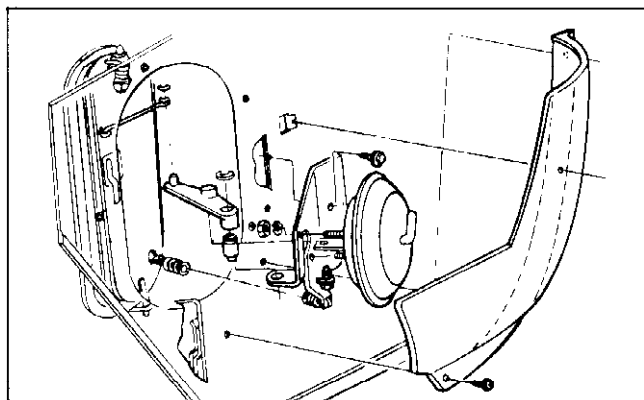


Fig. 1B-8 Inside Air Valve

HEATER HOSES

The installation of heater hoses is shown in Fig. 1B-10.

LOWER HOSE REMOVAL AND INSTALLATION

1. Drain coolant.

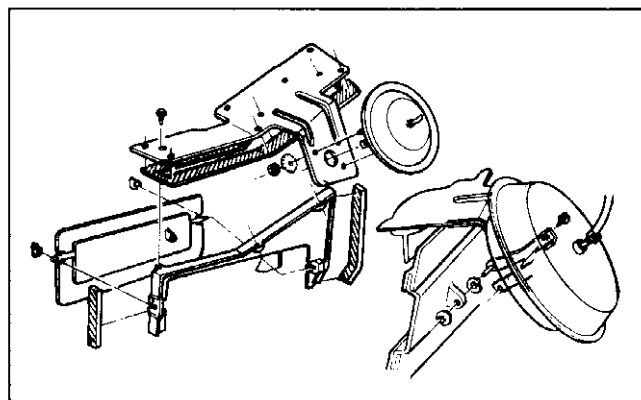


Fig. 1B-9 Plenum Air Valve

2. Remove rocker moulding at front fender.
3. Remove lower fender bolts.
4. Remove sufficient skirt to support and skirt to fender retaining bolts to allow prying of skirt from dash to allow access to lower hose clamp.
5. Proceed with hose removal.
6. To relace, reverse removal procedure.

HEATER CASE AND/OR CORE

REMOVAL

1. Drain radiator.
2. Disconnect heater hoses at core tubes as described earlier.
3. Remove nuts from three studs on engine side of dash.
4. Inside car, remove distributor ducts and kick pad diaphragm.
5. Remove glove box.

6. Remove two bolts retaining heater case to passenger side of dash.

7. Pull heater case from dash and remove defroster extension, cables and wire connector.

8. With heater case removed from car, scribe location of plate retaining temperature door pivot and remove pivot.

9. Remove screws retaining casting to case.

10. Remove core tube seal and then core from casting.

NOTE: Be sure the core to case sealer is intact before replacing core. Replace with new sealer if necessary.

INSTALLATION

To install, reverse removal procedure.

RELAY REMOVAL AND REPLACEMENT

1. Remove electrical connectors.
2. Remove retaining screws.
3. To replace, reverse removal procedure.

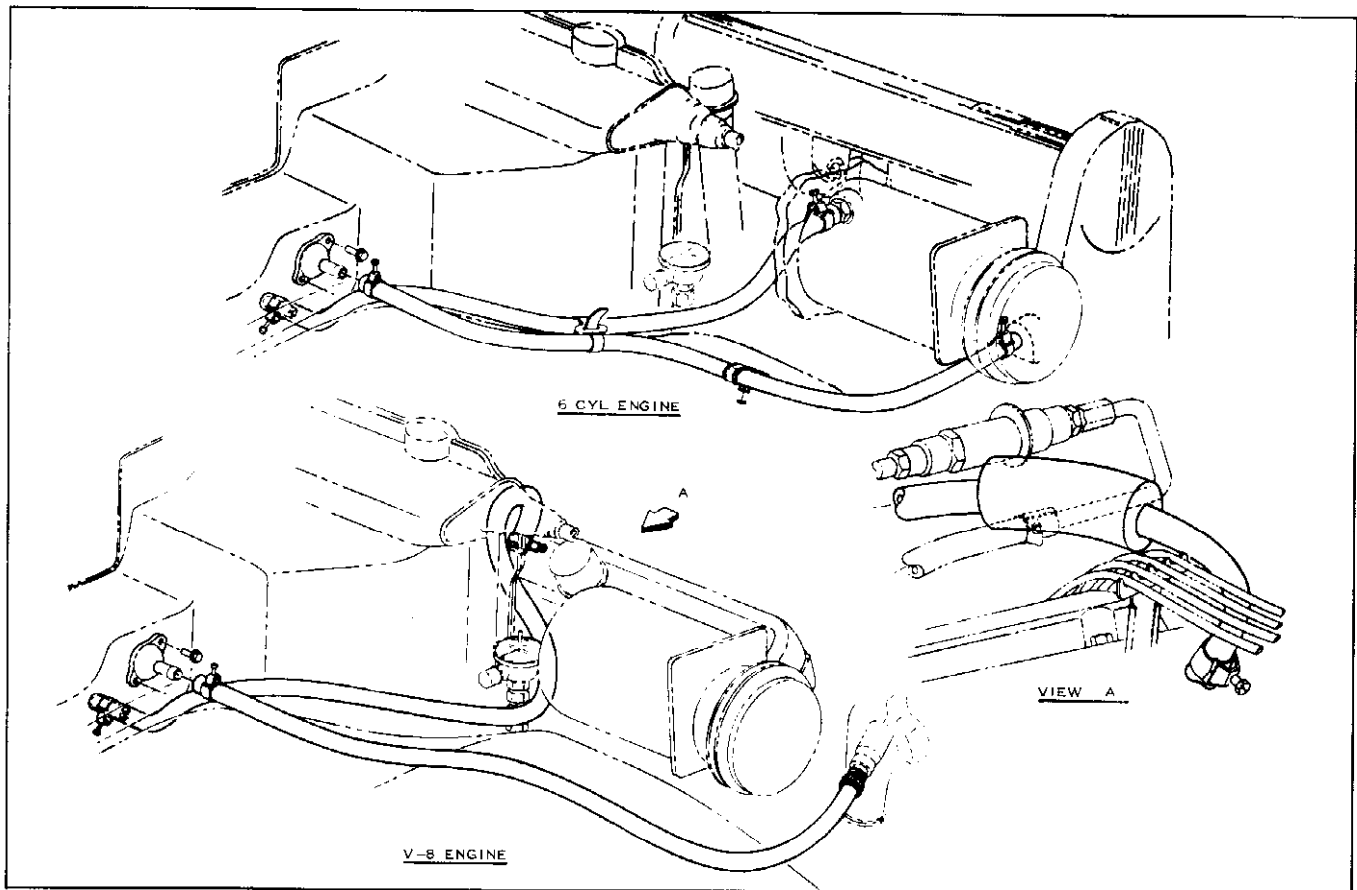


Fig. 1B-10 Heater Hose Installation

SERVICE AND REPAIRS REFRIGERATION

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Receiver Dehydrator	1B-11	Testing and Diagnosis	1B-12
Expansion Valve	1B-11	Compressor Belt	1B-12
Evaporator and Case	1B-11	Fuse	1B-12

GENERAL DESCRIPTION

Pages 1B-45 through 1B-71 in the 1967 Pontiac Service Manual apply to servicing the refrigeration components of the Firebird custom air conditioning system. The refrigerant-12 charge used in the system is the same as that used for a 1967 Tempest, or 3-3/4 lbs.

SERVICE

The removal and replacement procedure for the remainder of the refrigeration system components (Fig. 1B-3) are covered in the following section.

CONDENSER ASSEMBLY

REMOVAL

1. Depressurize system.
2. Remove the hood lock catch support, catch, and horn wire.
3. Remove right and left baffle from grille to radiator support.
4. Remove brace and battery.
5. Disconnect the inlet and outlet hose clamp connections and the condenser to radiator support attaching screws.
6. Remove the condenser from the vehicle.

NOTE: Cap or tape the inlet and outlet connections at once.

INSTALLATION

1. Install condenser, position the assembly and install the radiator support to condenser attaching screws and replace all line connections.
2. Add one fluid oz. refrigerant oil after installing a new condenser. Purge and recharge system with 3-3/4 lbs. refrigerant.

RECEIVER DEHYDRATOR

REMOVAL (RIGHT HAND)

1. Discharge refrigerant.

2. Remove baffle covering receiver dehydrator assembly.

3. Remove the receiver inlet and outlet connections and attaching screw from bracket.

4. Remove from vehicle and plug openings.

INSTALLATION

1. Replace assembly and add one fluid oz. of refrigerant oil.
2. Purge and recharge system with 3-3/4 lbs. refrigerant.

EXPANSION VALVE

REMOVAL

1. Depressurize refrigeration system.
2. Loosen compressor and tip towards engine on V-8 models.

NOTE: Bottom fitting on expansion valve is not accessible.

3. Remove inlet fitting.
4. Remove equalizer line at P.O.A. valve.
5. Remove thermo bulb from evaporator outlet.

INSTALLATION

1. Replace by reversing removal procedure taking care to properly reinsulate thermo bulb next to evaporator outlet.

2. Purge and recharge system to 3-3/4 lbs. refrigerant.

EVAPORATOR AND CASE REMOVAL AND INSTALLATION

REMOVAL

1. Depressurize system.
2. Scribe alignment marks on hood hinge and remove bolts retaining hinge to hood and remove hood.
3. Remove brace, battery and battery tray.

4. Remove front fender and inner fender skirt as an assembly.

5. Disconnect electrical connections and move wires out of way.

6. Remove upper heater hose at evaporator case and allow coolant to drain as necessary.

7. Disconnect P.O.A. outlet fitting.

8. Disconnect expansion valve inlet.

9. Plug openings.

10. Remove bolts retaining case to firewall.

11. Remove case assembly.

INSTALLATION

1. To install follow procedure for removal above in reverse order.

Evaporator Core Removal and Installation

1. Remove screws holding case together.

2. Remove core from case, disconnect P.O.A. valve and liquid bleed line.

3. Disconnect expansion valve.

4. To replace, reverse removal procedure.

P.O.A. VALVE REMOVAL AND REPLACEMENT

REMOVAL

1. Discharge refrigerant-12.

2. Disconnect fittings from equalizer and liquid bleed lines.

3. Disconnect two main line connectors.

4. Remove screw from retaining bracket.

5. Remove valve and cap openings.

REPLACEMENT

1. Replace reversing removal procedures.

2. Purge and recharge system with 3-3/4 lbs. of refrigerant.

TESTING AND DIAGNOSIS

The information contained in the Testing and Diagnosis section of the 1967 Pontiac Service Manual is applicable to the Firebird Custom Air Conditioning Systems with the exception of the following specifications:

COMPRESSOR BELT

Tension 100-105 (135-150 new)
lbs. indicated on
Burroughs Belt
Tension Gauge.

Cooling System Capacity See Section 6A.
Refrigerant-12 Capacity 3-3/4 lbs.

FUSE

In line at alternator 30 amps.
At heater terminal in fuse
block 25 amps.