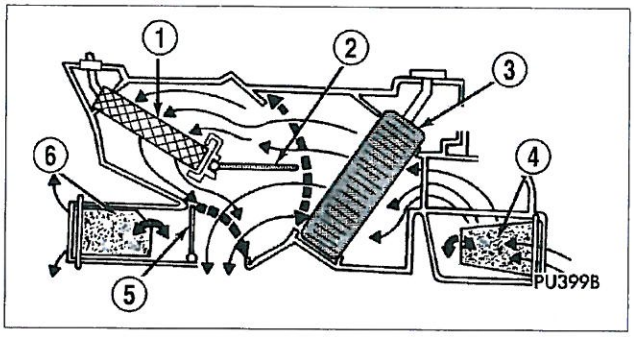
- **Side Window Demister Outlets** - There are two side window demister outlets, one is located at each outboard end of the instrument panel top cover, near the belt line at the A-pillars.
- **Panel Outlets** - There are four panel outlets in the instrument panel, one located near each outboard end of the instrument panel facing the rear of the vehicle and one located on each side of the instrument panel center bezel.
- **Floor Outlets** - There is one floor outlet located above each side of the floor panel center tunnel near the dash panel. There is also one outlet located under each front seat.
- **Console Outlets** - There are two console outlets located at the back of the center floor console facing the rear of the vehicle.

OPERATION

Both the manual temperature control (MTC) and the automatic temperature control (ATC) heating-A/C system are blend-air type systems. In a blend-air system, a blend-air door controls the amount of conditioned air that is allowed to flow through, or around, the heater core. In the available dual zone system, two blend-air doors are used to provide completely independent side-to-side temperature control of the discharge air. The temperature control(s) determines the discharge air temperature(s) by operating the blend door actuator(s), which move the blend-air door(s). This design allows almost immediate control of output air temperature(s).

The heating-A/C system pulls outside (ambient) air through the cowl opening at the base of the windshield, then into the air inlet housing and through the A/C evaporator (3). Air flow can be directed either through or around the heater core (1). This is done by adjusting the blend-air door(s) (2) with the temperature control(s) located on the A/C-heater control in the instrument panel. The air flow can then be directed from the panel, floor and defrost outlets in various combinations using the mode control located on the A/C-heater control. Air flow velocity can be adjusted with the blower speed control located on the A/C-heater control.



The outside (fresh) air intake can be shut off by selecting the Recirculation Mode with the mode control. This will operate an electrically actuated recirculation-air door (4) that closes off the fresh air intake and recirculates the air that is already inside the vehicle.

The A/C compressor can be engaged in any mode by pressing the snowflake, A/C on/off button. It can also be engaged by placing the mode control in the mix to defrost positions. This will remove heat and humidity from the air before it is directed through or around the heater core. The mode control on the A/C-heater control is used to also direct the conditioned air to the selected system outlets. The mode control uses an electric actuator to control the mode-air doors (5 and 6).

The two slot-type defroster outlets receive airflow from the HVAC housing through the molded plastic defroster ducts, which connect to the HVAC housing defroster outlets. The airflow from the defroster outlets is directed by fixed vanes in the defroster outlet grilles and cannot be adjusted. The defroster outlet grilles are integral to the instrument panel top cover.

The side window demister outlets receive airflow from the HVAC housing through the molded plastic demister ducts. The demisters direct air from the HVAC housing through the outlets located on the top corners of the instrument panel. The airflow from the side window demister outlets is directed by fixed vanes in the demister outlet grilles and cannot be adjusted. The side window demister outlet grilles are serviceable from the instrument panel. The demisters operate when the controls are set in Heat, Bi-level, Mix and Defrost modes.

The four instrument panel outlets receive airflow from the HVAC housing through two molded plastic main panel ducts. One duct directs air flow out of the right side instrument panel outlets, while the other duct delivers air flow to the left side outlets. Each of these outlets can be individually adjusted to direct the flow of air.

The floor outlets receive airflow from the HVAC housing through the floor distribution ducts which are integral to the rear cover of the HVAC air distribution housing. Two plastic rear distribution ducts and one center console duct attach to the rear cover and provide conditioned air to the rear seating positions. The two console outlets can be individually adjusted to direct the flow of air, but the floor outlets cannot be adjusted.

Note: It is important to keep the HVAC air intake opening clear of debris. Leaf particles and other debris that is small enough to pass through the cowl opening screen can accumulate within the HVAC housing. The closed, warm, damp and dark environment created within the housing is ideal for the growth of certain molds, mildews and other fungi. Any accumulation of decaying plant matter provides an additional food source for fungal spores, which enter the housing with the fresh intake-air. Excess debris, as well as objectionable odors created by decaying plant matter and growing fungi can be discharged into the passenger compartment during heater-A/C operation if the air intake opening is not kept clear of debris.

The A/C system is designed for the use of non-CFC, R-134a refrigerant and uses an A/C expansion valve to meter the flow of refrigerant to the A/C evaporator. The A/C evaporator cools and dehumidifies the incoming air prior to blending it with the heated air. To maintain minimum evaporator temperatures and prevent evaporator freezing, an evaporator temperature sensor is used. The sensor is located downstream of the evaporator and supplies an evaporator temperature signal to the A/C-heater control. For the ATC system, the A/C-heater control broadcasts the A/C request on the controller area network (CAN) B bus, where it is read and processed by the front control module (FCM), which in turn broadcasts it on the CAN C bus, where it is read and processed by the powertrain control module (PCM). For the MTC system, the A/C-heater control sends the request for A/C to the CCN via a dedicated mux circuit. The CCN then broadcasts the A/C request on the CAN B bus, where it is read and processed by the FCM, which in turn broadcasts it on the CAN C bus, where it is read and processed by the PCM.

DIAGNOSIS AND TESTING

HEATING AND A/C SYSTEMS

SETTING FAULTS - MTC AND ATC SYSTEMS

Both the automatic temperature control (ATC) and the manual temperature control (MTC) systems are controlled by the A/C-heater control located on the center bezel of the instrument panel. The ATC system communicates on the controller area network (CAN) B bus and is fully addressable with a scan tool. The MTC system is NOT connected to the CAN bus and is NOT addressable with a scan tool. The A/C-heater control for both heating-A/C systems continuously monitors various internal parameters during normal system operation. If the control detects a fault, both an active and a stored diagnostic trouble code (DTC) will set for that parameter. When the offending parameter returns to an acceptable value, the control automatically clears the active DTC. However, the stored DTC remains until cleared (either manually or automatically). Note that DTCs will not set or clear if supply voltage is low.

The setting and resetting of some active DTCs requires a wait time. Both the MTC and the ATC A/C-heater controls use two independent wait times for setting faults and one for resetting faults. The three different wait times are as follows:

- **Start Up Wait Time** - This is only used immediately after an ignition transition from low to high. It defines how long the system waits after the ignition line has gone high before setting any active DTCs. The duration of the Start Up Wait Time is 1.0 second.
- **Set Wait Time** - This is used at the conclusion of the Start Up Wait Time. It defines the duration a monitored parameter must remain continuously outside of the acceptable range before an active DTC will set. The duration of the Set Wait Time is 1.5 seconds.
- **Reset Wait Time** - It defines the duration a monitored parameter must remain continuously within the acceptable range before an active DTC resets. The duration of the Reset Wait Time is 1.5 seconds.

STORING FAULTS - MTC AND ATC SYSTEMS

The A/C-heater control for both the MTC and ATC systems stores the most recent fault by code number in data record number 1. For each new fault, the data records push up one level. After recording eight faults, the system deletes the oldest from the stack. If a fault clears in the middle of the stack due to key cycles, all of the faults below move up one level. To prevent a single fault from filling up the record, the system will only capture an active fault once upon its first detection. However, the system will record an active fault again if is clears and then reoccurs, such as in the case of an intermittent failure condition.

DISPLAYING FAULTS AND READING FAULTS - ATC SYSTEM

Use a scan tool to display DTCs stored in the A/C-heater control of the ATC system (Refer to 24 - HVAC - Electrical Diagnostics for more information).