

# **Chapter 5**

## **Air System**





# Chapter 5 Air System

The air system is comprised of an air compressor, air governor, air dryer, air reservoir tanks, safety, over pressure, and check valves, and the tubing, hoses and fittings necessary to connect all components.

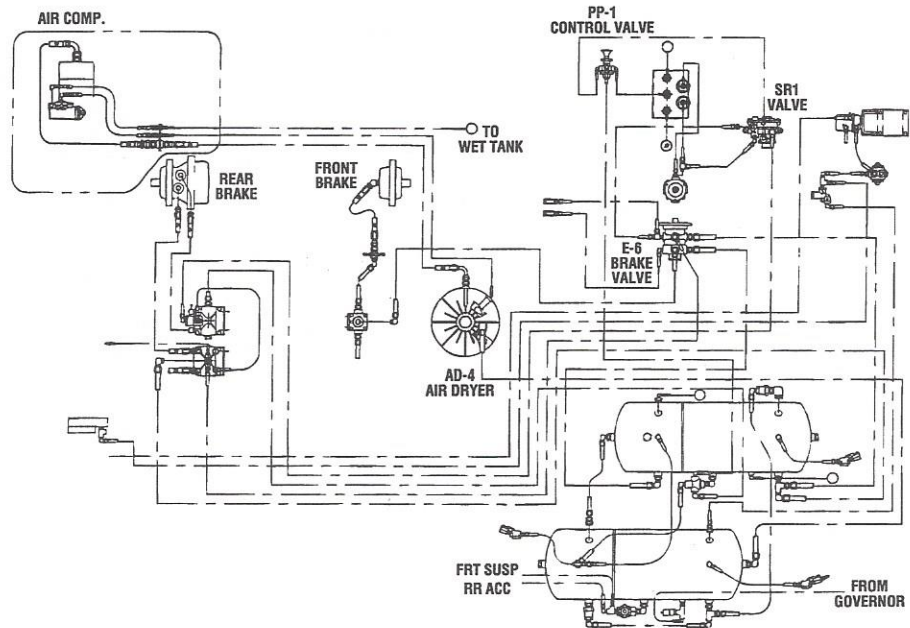


Figure 5.1. Air System Schematic

## AIR COMPRESSOR

On the Caterpillar 3116 engine, the air compressor is mounted on the upper left rear corner of the engine (Figure 5.2). It is lubricated by oil from the engine lubrication system and cooled by coolant from the engine cooling system. An air governor is mounted on the compressor to control the flow of compressed air. The governor is set to maintain air system pressure between 105 and 125 PSI.

The air compressor operates whenever the engine is running. It is always capable of compressing air. The air governor uses a system of internal valves to cause the compressor to compress air and send it into the reservoirs or to simply pass the air between the compressor cylinders.

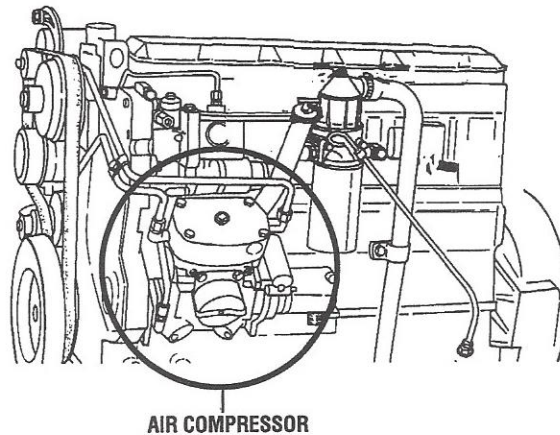


Figure 5.2. Air Compressor

## AIR DRYER

Compressed air is delivered to the air dryer (Figure 5.1) where moisture is removed. Accumulated moisture is regularly expelled from the air dryer onto the ground beneath the coach, accounting for the occasional air discharge heard. To protect the system from over-pressurization caused by failure of the governor, the air dryer has an internal valve system to prevent pressure in excess of 150 psi.

### Air Dryer Inspection

The air dryer should be checked every 6,000 miles or at least every six months. This is done by checking for moisture in the air brake system by opening reservoirs, drain cocks, or valves and looking for the presence of water. If moisture is present, the desiccant cartridge may require replacement. Replacement should be done by an experienced heavy-vehicle service facility.

The following conditions can also cause water accumulation and should be considered before replacing the desiccant cartridge:

1. An outside air source has been used to charge the system and the air did not pass through the drying bed.

2. Exceptionally high air usage. This may be due to accessory air demands or some unusual air requirement that does not allow the compressor to load and unload in normal fashion. Check for high air system leakage.
3. In areas where more than a 30°F range of temperature occurs in one day, small amounts of water can accumulate in the air brake system due to condensation. Under these conditions, the presence of small amounts of moisture is normal.
4. Check mounting bolts for tightness. Retorque to 25 ft-lb.
5. Check the operation of the check valve in the end cover.
6. Check for excessive leakage at the purge valve by coating the exhaust with a soap solution while the compressor is loaded (compressing air).
7. Check the operation of the safety valve by pulling the exposed stem while the compressor is loaded. There must be an exhaust of air while the stem is held and the valve should reseat when the stem is released.
8. Check all lines and fittings leading to and from the air dryer for leakage and integrity.

## AIR TANKS

Dry air is delivered to three air reservoirs contained in two tanks (Figure 5.1). First, air goes to the governor reservoir and from there is delivered simultaneously to the primary and secondary reservoirs. The primary reservoir (green air hoses) supplies air for the rear brakes. The secondary reservoir (red air hoses) provides air to the front brake.

The two air tanks (primary and secondary/governor) are mounted one above the other: at the front of the chassis on the passenger side, between the main frame rails, parallel to the front axles: secondary/governor tank in front of the axle, the primary tank behind the front axle.

Each tank is fitted with a manual drain valve mounted near the body skirts by the coach builder. The coach builder may install automatic drain valves in place of Gillig's manual valves. Each tank should be drained of moisture, if any, daily. Each reservoir has a check valve at the supply port to maintain pressure in that reservoir in case failure occurs in another reservoir.

One or more gauges will be found in the driver's console to monitor pressure in the primary and secondary tanks.

## AIR LINE COLOR CODE

The following system of color coding is used with air lines to make trouble shooting and routine maintenance easier.

<b>Green</b>	Primary Brakes (rear)
<b>Red</b>	Secondary Brakes (front)
<b>Brown</b>	Parking Brakes
<b>Orange</b>	Air Governor
<b>Grey</b>	Throttle
<b>Black</b>	Accessories and air bags

## ACCESSORY AIR SYSTEM

A secondary function of the air system is to operate the throttle, transmission shifter, and suspension systems.

Air pressure for the suspension is provided from the governor reservoir. As is normal for air systems, there are regulator valves in the suspension system to control air pressure and to prevent pressure loss to the brake system in the event of an air spring failure. The pressure protection valve is a one-way, pressure controlled check valve. This valve closes, trapping air in the reservoir, when the reservoir pressure drops to approximately 65 PSI. This feature prevents parking brake lock-up if an air spring is punctured, allows the motor home to be driven to a repair facility, and prevents loss of the service brakes.

The chassis is manufactured with an air-operated throttle system, including a fast idle feature. In this system a control valve, a regulator valve, and a slave cylinder take the place of the direct mechanical or cable linkage found in automobiles or front engine truck type chassis. The accelerator pedal is an air regulator. Application of pressure to the accelerator allows air pressure to be applied to a slave cylinder mounted near the engine in the engine compartment. The cylinder piston regulates the throttle position and thus, the speed of the engine. A spring is used to return the cylinder to the engine idle position. A transmission modulator is activated simultaneously with the accelerator slave cylinder.

The final function operated by the air system is the transmission shifter. The troubleshooting of the shifter is covered in Chapter 2 (Transmission). The shifter, like the other accessory systems, is operated by air pressure from the governor reservoir. If the system loses pressure, the transmission cannot be shifted. See Chapter 2 for procedure to shift the transmission when pressure to the air system has been lost.



The accessory air system and its components are subject to the same care and maintenance considerations as the brake system. The fittings and hoses should be checked regularly for leaks, chafing, or other damage and deterioration.

If leakage should occur while traveling, the pressure protection valve will prevent the governor tank from dropping below 65 PSI.

### Air Brake Sending Switches

The air system includes five switches mounted on a plate at the front of the driver's platform. The switches are identified with abbreviations as follows:

- FLAS** Front Low Air Switch (Secondary)
- FBLS** Front Brake Light Switch
- PBS** Parking Brake Switch
- RBLS** Rear Brake Light Switch
- RLAS** Rear Low Air Switch (Primary)

**NOTICE**  
The brake light switches have two electrical terminals; all other switches have only one terminal.

### CRUISE CONTROL

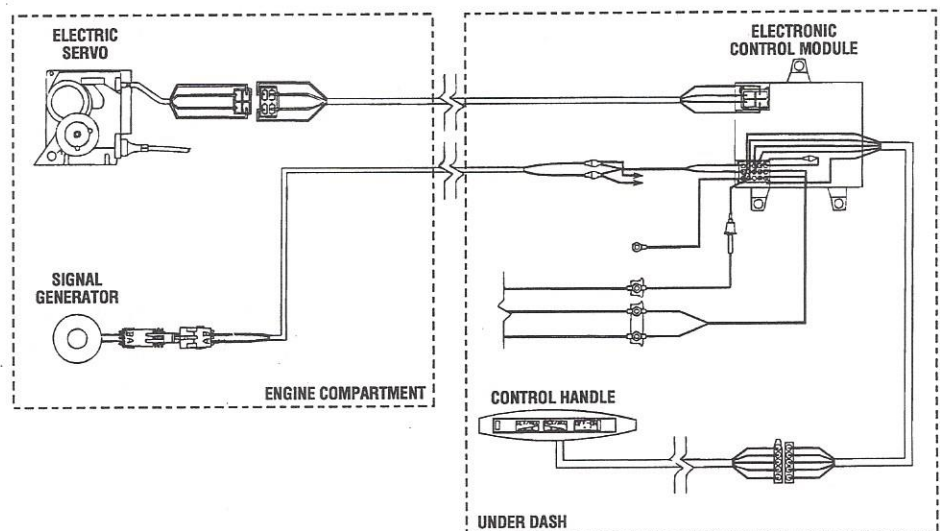


Figure 5.3. Cruise Control System

CA-05-026

Your motor home is equipped with a cruise control system which allows operation at a set speed without accelerator pedal pressure. Although the system is relatively simple, it does interface with the brakes and brake lights, the throttle, and the chassis electrical system. If problems occur which cannot be corrected using the adjustment procedures or diagnostics testing, assistance is available through authorized service facilities or directly from the Service Department of The Gillig Corporation.

### **Cruise Control Operation**

The cruise control can be turned on at any time, however, vehicle speed must be greater than 25 mph before the speed can be set.

The vehicle speed is set by depressing and quickly releasing the SET/ACC button on the control module. The control module then remembers the speed and causes the throttle to adjust to maintain the set speed. An indicator lamp located next to the SET/ACC button signifies cruise engagement when illuminated.

To increase the set speed, depress the SET/ACC button for 1 second to engage the cruise control. The vehicle will accelerate at a smooth, constant rate. When the button is released, the vehicle will stop accelerating and maintain the present speed.

The RES/DEC button is used to resume the last set speed or to decrease acceleration. After the cruise control has been engaged and then disengaged, resume the previously set speed by pressing the RES/DEC button.

After the cruise control is engaged, the SET/ACC and RES/DEC buttons can be used to accelerate or decrease acceleration. Tapping the SET/ACC button causes the set speed to be bumped up by increments of approximately 1/2 mph per tap; tapping the RES/DEC button causes the speed to decrease by the same amount. The cruise control has a memory which records the number of taps given and adjusts the vehicle speed accordingly.

The cruise control is disengaged by tapping the brake pedal, switching the ON/OFF switch to "Off", or by turning off the ignition. If the ignition has been shut off, the cruise setting has been interrupted and must be reset.

The cruise control will also disengage if the brake fuse blows, the brake lights burn out, or any of the connectors become separated. If, for any reason, the cruise control fails to disconnect, the ignition switch should be turned off to disengage the system.

**CAUTION**  
*Never operate the cruise control in congested traffic or on wet or slippery roads.*



## Cruise Control Testing

### Operational Test

1. Remove the rubber switch cover on the electronics module. Set the switch to "FLYWL" on the Flywheel tach sensor.
2. Turn the ignition and cruise control switches to ON.
3. Check the LED under the rubber switch cover in the electronics module. It should illuminate whenever the clutch is depressed to indicate proper clutch switch connections. Replace the rubber switch cover.
4. Start the engine and bring engine speed up to 1000-1200 rpm. Press the ACC/SET button. The engage LED should illuminate and the engine should rev-up. Immediately depress the brake or slide the ON/OFF key to off to disengage the cruise control.

The cruise control is now ready to perform the road test and adjustment.

### Road Test and Adjustment

It is recommended that any problem be confirmed by performing a road test to minimize the possibility of unnecessary work being performed.

The cruise control comes preadjusted from the factory. To determine if adjustment is necessary, the following road test should be performed.

1. Slide the ON/OFF switch to the "ON" position.
2. Use the throttle to accelerate the vehicle to 50 mph and maintain a steady speed. Press the SET/ACC button and SLOWLY release your foot from the throttle. The cruise control should engage smoothly and maintain a stable vehicle speed.

The sensitivity adjustment is performed by turning the small common screw located at the top edge of the electronics module. Remove the rubber boot cover to access the screw. Sensitivity adjustment must be performed during the first 5 seconds of operation.

If, during the first 5 seconds of operation, the cruise control loses speed when engaged or is sluggish, increase the cruise sensitivity adjustment by turning the adjustment screw clockwise. If the cruise control gains speed, acts erratic, or seems too responsive and sensitive, decrease the sensitivity by turning the adjustment screw counter clockwise.

If adjustments are necessary, note the factory setting and make small adjustments from this point until the control function properly.

### **Cruise Control Troubleshooting**

Troubleshooting of this cruise control is performed using a Zemco AP230 Tester. Follow manufacturers instructions supplied with the tester to attach the tester interface plugs directly to the chassis wiring harness. This tester performs complete diagnostic testing on the cruise control and, used in conjunction with the troubleshooting guide provided with the tester, will pin point problems within the cruise control system.