1982 Turbocharging Systems

SAAB 900

900 Turbo

DESCRIPTION

Saab uses the Garret Turbocharger, with turbine and compressor impellers (wheels). *See Fig. 1* Exhaust gases drive the turbine, which turns the compressor forwarding air under pressure to the throttle valve.

Excessive pressures are prevented by a charge pressure regulator (boost pressure control valve or wastegate). A back-up safety device, a pressure switch, prevents engine damage in case there is failure of the charge pressure regulator.

The Saab Turbo is designed to operate at low engine speeds to provide increased torque at typical vehicle driving speeds. The turbine shaft, which is delicately balanced, is mounted in a floating, sliding-contact bearing having a high oil flow. The shaft actually floats on oil during operation.

Lubrication is supplied by the engine lubrication system. The shaft is sealed against bearing housings with sealing rings installed in shaft grooves.

OPERATION

As engine operation begins, exhaust gases flow through the turbocharger's turbine impeller, causing it to rotate. Gases are expelled through the turbine to the exhaust pipe. As the turbine spins, its shaft turns the compressor impeller, compressing the intake air.

At idle speeds the air compression has little effect upon its operation. However, as engine speed is increased (partial load), the pressurized air enters the system faster, and exhaust gases are expelled faster. The more exhaust gases passing over the turbine impeller, the faster it turns, and the more pressurized air is delivered to the engine.

At full load, the throttle valve is fully open and charge pressure increases. At 6.4-7.8 psi (.45-.55 kg/cm^2), the valve in the charge pressure regulator opens permitting exhaust gases to flow directly to the exhaust pipe, bypassing the turbine impeller.

In the event the valve sticks and does not open, charge pressure increases to 8.6-11.4 psi (.6-.8 kg/cm^2). This causes a pressure switch to break current flow to the fuel pump, thereby preventing engine damage.

The charge pressure regulator is located on the exhaust side of the engine and its valve is held closed by a spring-loaded diaphragm.

CAUTION: Never increase the preset charge pressure regulator limit.

TESTING

CHARGE PRESSURE REGULATOR

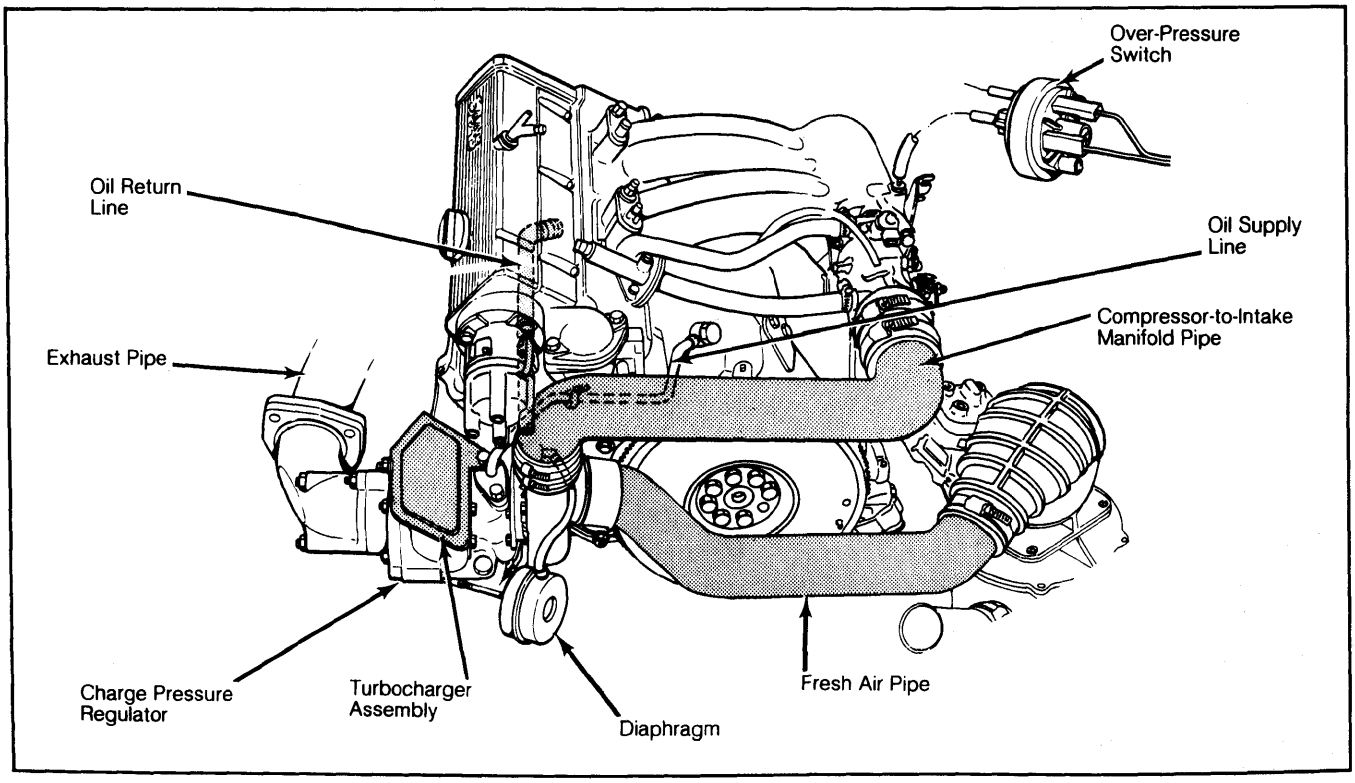
1) Connect a pressure gauge (83 92 813) between nipple on inlet manifold and line to pressure switch. Run hose into passenger compartment and place gauge on left hand corner of instrument panel.

2) Warm up engine, and drive vehicle in 3rd gear at an engine speed lower than 1500 RPM. Then accelerate at full throttle by pressing pedal to the floor. As engine speed approaches 3000 RPM, apply brakes while still keeping accelerator pedal pressed down.

3) Note maximum pressure indicated with vehicle under full load at 3000 RPM. Charge pressure should be 6.7-7.8 psi (.46-.55 kg/cm^2).

4) To adjust charge pressure, remove wire seal and circlip from charger regulator control arm and

Fig. 1: Components of Saab Turbocharging System



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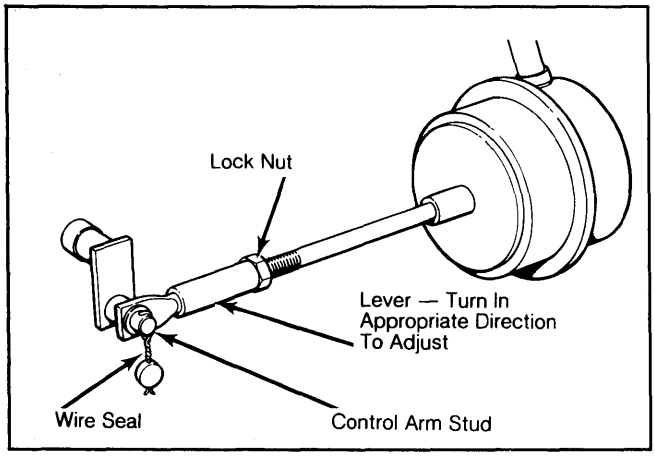
SAAB 900 (Cont.)

detach diaphragm lever. Loosen lock nut on lever and rotate lever end in appropriate direction, according to chart below.

Fig. 2: Adjusting Charge Pressure Regulator



CHARGE PRESSURE ADJUSTMENT

Gauge Reading While Driving — psi (kg/cm²)	Rotate Lever
5.51 (.38)	3 Clockwise
5.80 (.40)	2.5 Clockwise
6.09 (.42)	2 Clockwise
6.38 (.44)	1.5 Clockwise
6.67-7.83 (.46-.55)	Correct Setting
8.12 (.57)	1.5 Counterclockwise
8.41 (.59)	2 Counterclockwise
8.70 (.61)	2.5 Counterclockwise
8.99 (.63)	3 Counterclockwise

PRESSURE SWITCH

1) Start engine and run at idle. Disconnect hose from pressure switch at inlet manifold. Connect pressure gauge and suitable pump (cooling system tester) to pressure switch hose.

2) Increase pressure with pump and check pressure at which engine cuts out. Reading should be 8.6-11.4 psi (.6-.8 kg/cm²). If not, replace pressure switch.

TURBO PRESSURE GAUGE

To check the pressure gauge on the instrument panel, use the same procedure as for the pressure switch. At maximum charge pressure, the needle should be within the wide Orange range. At pressure switch actuating pressure, the needle should be in front of the limit between the Orange and Red zones. If not, replace gauge.

REMOVAL & INSTALLATION

TURBOCHARGER

Removal

1) Disconnect battery cables. Remove air intake and pressure connections from compressor. Loosen pre-heating hose. Remove exhaust elbow between exhaust manifold and compressor.

2) Disconnect oil supply and return lines at turbocharger. Remove bolts securing turbocharger to exhaust manifold and remove turbocharger. Plug all holes in turbocharger.

Installation

1) Attach turbocharger to intake manifold, using new gasket. Attach oil return pipe to turbocharger, using new gasket.

2) Fill oil feed channel with engine oil and attach oil pressure pipe, using new gasket. Install exhaust elbow and exhaust manifold. Install air intake and pressure connections to compressor.

3) With distributor disconnected, crank starter for approximately 30 seconds so turbocharger is primed with oil before engine operation.