

# COOLING SYSTEM

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## DESCRIPTION AND OPERATION

### COOLING SYSTEM AND WATER PUMP

The cooling system is of the conventional pressurized type. A centrifugal pump arranged in timing case serves to circulate the coolant.

When the thermostat is closed, the coolant will return to the pump via a by-pass for swift and uniform warming up of the engine the coolant circulates through the radiator, only when the engine has reached normal operating temperature.

The heater system branches off the cooling system ahead of thermostat in flow direction so that the heater is in operation before engine has reached full operating temperature.

## MAINTENANCE AND ADJUSTMENTS

### Checking and Filling Cooling System

The coolant level should be checked only when the engine is cold and only enough coolant should be added to bring the level halfway between core and

tank top. It is unnecessary and undesirable to remove the radiator cap and check the coolant level each time the car stops at a filling station for gasoline or oil, since the engine is usually hot at such times.

**WARNING:** Never remove the radiator cap quickly when engine is HOT Sudden release of cooling system pressure may cause the coolant to boil and some of it may be ejected from the radiator filler neck, resulting in injury to persons or damage to the car finish.

If it is necessary at any time to remove the radiator cap when engine is hot, rotate the cap counterclockwise until first stop is reached. Leave cap in this position until all pressure in cooling system has been released, then turn cap past the first stop and remove it.

### Draining and Flushing Cooling System

The cooling system should be completely drained and the recommended coolant installed every two (2) years.

To drain the cooling system, remove radiator cap, remove lower radiator hose from the lower tank and

remove drain plug on **right side** of cylinder block. Set heater temperature control valve at full heat position. After the cooling system is drained, and plugs reinstalled, fill the system with clean water. Run the engine long enough to open the thermostat for complete circulation through the system, then completely drain the cooling system before sediment has a chance to settle.

#### Conditioning the Cooling System

"Rust Inhibitor and Stop Leak", or equivalent listed under Group 8.800 is recommended for use in the cooling system, particularly when preparing for installation of anti-freeze solution. This material stops small seepage leaks, has rust preventive properties and its soluble oil is effective in eliminating a squealing noise which sometimes develops at the water pump seal washer. Instructions for its application are printed on the conditioner bottle.

It is very important to make certain that the cooling system is properly prepared before an anti-freeze solution is installed, otherwise loss of solution through leakage may occur or seepage may result in damage to the engine. The cooling system should be drained and flushed as described under Draining and Flushing Cooling System. All joints should be checked for leakage and corrected, and the conditioner described above should be added with the anti-freeze solution.

Inspect the water pump, radiator core, heater and defroster cores, water jacket plugs, and edge of cylinder head gaskets for evidence of water leaks. Tighten all hose clamps in the cooling and heating systems and replace any deteriorated hoses.

#### Using and Testing Anti-Freeze Solutions

Inhibited year around (ethylene glycol type) engine coolant solution which is formulated to withstand two full calendar years of normal operation without draining or adding inhibitors should be used at all times. Freeze protection should be provided to protect against corrosion. When adding solution due to loss of coolant for any reason or in areas where temperatures lower than minus 20 degrees F. may be encountered, a sufficient amount of any of the several brands of year around coolant (Ethylene Glycol base) compatible to GM Specification 1899-M available on the market should be used. Water or alcohol base coolants are not recommended for this vehicle at any time.

If for any reason water only is used as a coolant in an emergency, it is extremely important that Buick Heavy Duty Cooling System Protector and Water Pump Lubricant or equivalent be added to the cooling system as soon as possible. If any other cooling System protector is used, be certain it is labeled to

indicate that it meets General Motors Specification GM 1894-M. It should be recognized that this is only a temporary measure. The manufacture intends that permanent type coolant solution be used year around in the cooling system.

The cooling system should be completely drained and the recommended coolant installed every two (2) years.

It is advisable to test the anti-freeze solution at intervals during the winter to make certain that the solution has not been weakened. Use only hydrometers which are calibrated to read both the specific gravity and the temperature, and have a table or other means of converting the freezing point at various temperatures of solution. Disregarding the temperature of the solution when making the test may cause an error as large as 30 degrees F. Care must be exercised to use the correct float or table for the particular type of anti-freeze being tested.

#### Fan Belt Adjustment or Replacement

A tight fan belt will cause rapid wear of the alternator and water pump bearings. A loose belt will slip and wear excessively and will cause noise, engine over-heating, and unsteady alternator output. A fan belt which is cracked or frayed, or which is worn so that it bottoms in the pulleys should be replaced. The fan belt may be replaced by loosening the alternator brace at alternator, slightly loosening the alternator mounting bolts and moving alternator inward to provide maximum slack in the belt.

The alternator must be moved outward to adjust the fan belt. After the generator brace and mounting bolts are securely tightened, the fan belt tension should be 45 lb. using Tensioner J-23600.

**WARNING: *Zfa fan blade is bent or damaged in any way, no attempt should be made to repair and reuse the damaged part. A bent or damaged fan assembly should always be replaced with a new fan assembly. It is essential that fan assemblies remain in proper balance and proper balance cannot be assured once a fan assembly has been bent or damaged. A fan assembly that is not in proper balance could fail and fly apart during subsequent use creating an extremely dangerous condition.***

#### Radiator Thermostat Inspection and Test

A sticking radiator thermostat will prevent the cooling system from functioning properly. If the thermostat sticks in the open position, the engine will warm up very slowly. If the thermostat sticks in the closed position, the engine will overheat.

The thermostat may be removed for inspection and

test by partially draining the cooling system and disconnecting the water outlet housing from the thermostat housing which is mounted on the right front side of cylinder head.

The standard thermostat valve should start to open at 189 degrees **F** and fully open at approximately 212 degrees **F**. If thermostat does not operate at specified temperatures, it should be replaced as it cannot be repaired.

## MAJOR REPAIR

### WATER PUMP REPAIRS

The water pump bearing outer race is shrunk fit into the water pump cover. For this reason the cover, shaft bearing, and hub are not repairable.

#### Water Pump Removal

Opel radiators do not have a drain plug. Drain radiator by first, loosening radiator cap, then remove lower hose from lower radiator tank.

1. Drain coolant into a clean container. Remove radiator and shroud.
2. Remove fan belt.
3. Remove fan blade and pulley on water pump shaft.
4. Disconnect inlet hose and heater hose from water pump. Remove bolts, pump assembly and gasket from timing chain cover.
5. Check pump shaft bearing for end play or roughness in operation. If bearings are not in serviceable condition, the assembly must be replaced.

#### Water Pump Installation

1. Make sure the gasket surfaces on pump and timing chain covers are clean. Install pump assembly with new gasket. Bolts must be tightened uniformly. Torque to 11 lb. ft.
2. Install radiator and shroud. Connect radiator hose to pump inlet and heater hose to nipple.
3. Install fan pulley and fan blade, tighten attaching bolts securely. Install belts and adjust for proper tension.

4. Fill cooling system and check for leaks at pump and hose joints.

## RADIATOR REMOVAL AND INSTALLATION

### Removal

1. Loosen radiator cap, then remove lower radiator hose and drain radiator coolant into suitable container.
2. On vehicles with automatic transmission, unscrew oil lines from connectors on lower radiator tank and plug lines. On GT models with automatic transmission the lines have to be disconnected at the coupling before removing from the tank. It is essential that no dirt enters the oil lines. When unscrewing oil lines, hold connectors on lower radiator tank with pliers to avoid leakages. Ensure that no dirt enters oil cooler.
3. Remove lower attaching **nut** and slide radiator upward and out of engine compartment.

### Installation

1. Install **radiator** into engine compartment and secure lower attaching nut.
2. On vehicles with automatic transmissions, fasten oil cooler lines to lower radiator tank. It is essential that no dirt enters the oil lines. When tightening oil lines, hold connectors on lower radiator tank with pliers to avoid leakages. Ensure that no dirt enters oil cooler. Torque to 1 I-15 **lbs.ft.**
3. Install lower radiator hose and add collected coolant.

All Opels are provided with a radiator initial fill of an antifreeze solution containing corrosion inhibitor. The antifreeze has either a glycol or glycerin base and protects the engine against freezing, down to minus 22 degrees **F**. (minus 30 degrees **C**.). Before the start of the cold season, coolant must be checked with a hydrometer and if necessary, brought to the necessary specific gravity by **adding** anti-freeze with a glycol or glycerin base. As the specific gravities of all anti-freeze solutions having a glycol or glycerin base are practically the same, the hydrometer can **be** used for all these types. Because of the tolerances of the hydrometer, or slight differences in specific gravity, variations of plus or minus 5 degrees can be expected. Coolant must be checked at a temperature of plus 68 degrees **F**. (plus 20 degrees **C**.)

**SPECIFICATIONS**

**1973 COOLING SYSTEM CAPACITIES**

Cooling System • Type .....	Liquid Cooling With Circulating Pump
Filler Cap Type • Pressure .....	13.2-15.2 PSI
Water Temperature Control .....	Thermostat and Bypass
Thermostat Open At .....	189 F.
Cooling System Capacity .....	6 Qts.
Fan Drive .....	Water Pump Shaft