

When radiators boil and anti-freeze

ONE MAN we know really prepares his house for the cold winds, snows and freezing conditions of wintertime. He makes sure every door and window is weather-stripped, storm doors and windows are installed and in good condition, furnace is clean and in good repair and he generally lays in a supply of fuel which is more than adequate for the months ahead.

And yet, without a second thought, he dumps a few cans of a commercial-type anti-freeze in the radiator of his expensive, new model car and considers the cooling system of that car now completely protected against the same elements for which he took so many precautions in his home.

If he's lucky, the mistake he's making may cost him just a steady supply of anti-freeze to replace that which "seems to disappear." If he's unlucky, the car may have a cracked block before winter is over and the repair bill can be \$1000.

The most oft-heard owner complaint against their cars in wintertime concerns balky and cold starting habits but the most *troublesome* and *costly* part of a car which can be affected by weather and incorrect preparation for those weather conditions is the automobile cooling system; the radiator, water hoses, thermostat, water jackets and water pump.

If trouble lurks in any of these areas or components, cold weather will bring it out. The mere addition of anti-freeze

WINTER

won't solve the trouble and in many cases will only serve to aggravate it.

The first (by location) and largest neglected portion of your cooling system is the radiator itself. At a low to medium cruising speed the average car radiator handles over 33,000 pounds of water through the core every hour. This rapid movement of water brings about aeration and water and air combine with metal to create rust. Rust in the cooling system is a major problem and should be considered of prime importance by any car owner.

Since there is no simple system for eliminating the air-water combination, the problem of rust creation must be dealt with by use of a commercial type rust inhibitor. Most rust inhibitors for sale today are of the soluble oil type and can be easily recognized; they turn radiator water, normally clear, into a milky fluid.

During the summer one can of rust inhibitor should do an adequate job for the average size radiator. In the winter most

disappears, your car may be in for serious trouble. Now is the time to check.

owners have found that a good brand of anti-freeze contains enough rust inhibitor to prevent rust formation during those cold months. Rust inhibitors, sold as such by service stations and automobile supply stores, also help to clean out the cooling system in areas where "hard" water is used, unless an inhibitor is used constantly in those areas, hard water will leave mineral deposits in the radiator tubes, hoses, distribution tubes and the inside of the water jackets.

Remember: water and anti-freeze, once rust is formed, carry that rust along their path. When the water and coolant change direction in the water passages, the rust often settles at critical bends and turns. If you can keep your cooling system clean of rust and mineral deposits, there's little chance of any trouble from this direction—and yet, the majority of cooling system problems stem from this alone.

Next trouble spot in many cars growing a few years old, are the water hoses. Although "perfect" in appearance on the exterior, inside, the hoses may be rotten, swollen, cracked and incapable of doing the job designed for them. If a hose is cracked or rotten, the water carries particles of rubber from that location into your engine block. If the interior of the hose is swollen, the hose isn't handling as much water as it should and your system may heat up. A good spot check for radiator hose condition is by "feel." Hoses should

in your car isn't working properly, the entire cooling system will be affected by this malfunction. In many garages, mechanics check the action of a questionable thermostat by alternately submerging it in cans of hot and cold water. The temperature change, so introduced, will show whether the thermostat valve is operating and if the thermostat is opening and closing rapidly enough for efficient operation. If a thermostat is slow to open, your automobile engine may run hot for a period after the car is started. With an overheated engine, the water-anti-freeze combination in your radiator will expand and some portion of it will be lost out of the radiator overflow pipe.

The water pump is another very vulnerable item in your car's cooling system, and can account for a great deal of coolant disappearance. Water pump care is important, both summer and winter. Like any moving part on your car the water pump should be greased regularly with water pump grease only and oiled internally through use of rust inhibitor in your cooling system. Make sure that the water pump drive belt is tight. Slippage of the belt affects the pump action and the coolant doesn't circulate fast enough to give your car complete protection. Any service station has drive belt dressing which will prevent the belt from slipping. Leakage of coolant may occur at the water pump shaft. Check the seal at that

TROUBLE SPOTS IN THE COOLING SYSTEM

RADIATOR

- Dented, rusted or clogged overflow
- Bugs and dents in core
- Clogged water tubes
- Leaky core
- Tank leak
- Punctured cap
- Incorrect pressure cap
- Bad cap gasket
- Rust deposits
- Petcock leakage

WATER HOSES

- Rotten hoses
- Loose hose clamps
- Hose inoperative

FAN

- Slipping belt
- Damaged or bent fan blades
- Worn water pump shaft or bearing

WATER PUMP

- Worn water pump shaft or bearing
- Packing
- Impeller
- Seal

TARGET: COOLING SYSTEMS

BY MICHAEL STEVENS

be firm and solid to the touch. If you discover a soft spot or exterior cracks, replace the hose. Always remember to tighten the hose clamps, whether you have replaced hoses or not.

A great many motorists complain that their car cooling system loses anti-freeze despite the fact that they had installed the "permanent" type. That loss comes about through no fault in the structure of the anti-freeze but through a weakness somewhere in automobile cooling.

One of the most obvious, and yet often overlooked, opportunities for the anti-freeze to disappear is through a leak. That leak can be in the hoses, radiator core or tank, drain petcocks and gaskets. In some cases the lower radiator hose may have collapsed or quit functioning and because it is hidden from obvious sight is often not discovered.

In quite a few cases a steady loss of radiator coolant can be traced to the cooling system thermostat. If the thermostat

point and if it shows any sign of wear or deterioration, replace immediately. Also check operation of the water pump bearing, packing and impeller.

While looking for leakage also check the expansion plugs in the block, the head studs, head gaskets and the coolant drain petcocks on the engine. Signs of leakage at any of these spots can mean trouble.

Many engineers feel that a properly cared-for cooling system should never need flushing but more than a few car owners will find that they've allowed corrosion, rust and deterioration to spread to the point where only a good radiator and engine flush can get the cooling system back to top operating condition. Flushing requires specialized tools and instruments and should be done by an expert. Flushing the radiator alone may not solve the trouble for the block passages

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THERMOSTAT

- Inoperative
- Slow opening
- Incorrect heat range for your car

BLOCK

- Leak at head studs
- Exhaust gas leaking into system
- Leak at inside or outside of head gasket
- Water in cylinders
- Deep rust deposits on head
- Damaged valve areas due to overheating
- Rust on valves
- Petcock leak
- Rust in passages
- Rust in water jacket
- Clogged distribution pipe
- Expansion plug corrosion

wear, adjustment, and fluid level. There's been a rash of accidents lately traced to cheap brake fluids that are flooding the market; they have a low boiling point, and under severe braking conditions the heat may boil the fluid in the lines and cause sudden, complete brake failure. Use only reliable, established brands when adding brake fluid. Same deal with some cheap linings. Their friction coefficient drops off at a lower temperature than the established brands, so you can run into serious fade under only moderately severe braking conditions. Saving a buck or two on brake work may prove to be poor economy!

To the home-builder who is working up his own sports car for fast road work, I would re-emphasize the importance of *brake cooling*. When building your own car it's not much of a job to provide for some ventilation around the brakes. Scoops and ventilating holes in the backing plates are good. And in regard to the important brake balancing, you might experiment with greater braking force on the rear than the Detroit version has, since your weight distribution and weight transfer will be a lot different.

And that about covers—or at least skirts—the brake story. *Heat* is the big bug. If we can control it—and balance the braking work somewhere near evenly between the four wheels—our troubles are over. Ettore Bugatti once joked that he built his cars to go, not stop . . . but when you're threading down a crowded highway these days with 200 hp iron going in all directions, it's kind of nice to know you can pull your neck in when you want to!! •

WINTER TARGET

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may be clogged. Both should be flushed to get complete value out of the operation. If your car has a hot water heater make sure it is flushed and reverse flushed as well. A clogged heater might very well be the weak spot in the cooling system.

Once you're satisfied that the system is in good operating condition, select the anti-freeze you've decided to use this winter. A great percentage of drivers who live in areas where cold weather is unpredictable, always select the permanent type anti-freeze for its dependability. Run the engine of your car until the temperature is higher than sufficient to open the thermostat. At this stage, drain the system completely by opening the drain petcocks at the radiator bottom and the engine sides. (NOTE: Be sure to turn off the engine before draining.) Either measure the amount of liquid you have drained (providing the system was full) or check your car's owner's manual to learn the capacity of the cooling system. Close the

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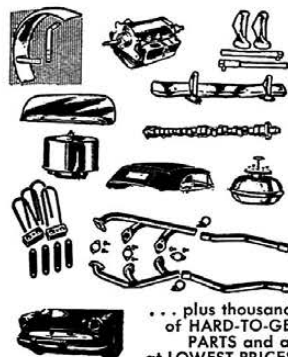
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drains and fill the system about one-fourth of the way with water and then add the amount of anti-freeze you believe necessary for your locale, based on manufacturers' recommendations. Start the engine again and fill the system to completion with water. Warning: most automobiles are filled with too much water. Water level should never reach higher than one inch below the very top of the overflow pipe which is just inside the filler neck.

All automobile manufacturers frown on the use of petroleum-based, salt-based, calcium-type and magnesium-type anti-freeze additives which have proven destructive to late model cars. Your best bet is the permanent base anti-freeze additive. If the locale in which you drive receives fairly mild winters, an alcohol-base anti-freeze may be sufficient. Check your anti-freeze supplier and find out which type he sells most and which type is used by the local trucking companies and taxicab concerns.

After your cooling system is "set" for winter, check it at least once a week. Service station attendants, in most locales, will gladly check the strength of the anti-freeze solution in your car and by referring to charts supplied by the anti-freeze manufacturers, can tell you if the cooling system is safe and to what temperature degree. If the solution appears weak at any time, replenish it—for the weather is unpredictable and the temperature could drop 15 degrees overnight. Your car might not be prepared for that sudden drop. If it isn't, the weather may damage the entire engine. The gamble isn't worth the few cents saved by not being doubly insured.

Finally, if you've gone through all of the procedures above and your car still overheats or loses the contents from the radiator, check other parts of the car for malfunction. Strangely enough, the car may be overheating because of late timing, brake drag, transmission and clutch trouble. Any incorrect procedure which may make your engine work harder than normal, can throw extra weight on the cooling system—and the cooling system displays trouble symptoms but may not be at fault.

Your car's cooling system is important. Without it, the heat generated inside the modern day internal combustion engine reaches temperatures high enough to fuse the metal inside. Engineers have designed this system into your car to do the most efficient and capable job for that engine. It is up to the car owner to take proper care of the cooling system.

A list of potential cooling system trouble spots appears in this article. If your car shows one or more of the listed symptoms, better check further and remedy the trouble if you're planning on trouble-free winter driving ahead. •



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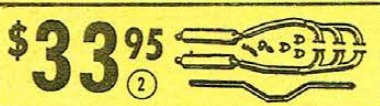
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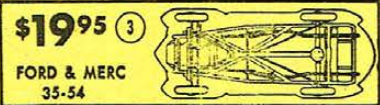
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