

# STRAY CURRENT CORROSION IN COOLING SYSTEMS

Stray electrical current can destroy aluminium or copper/brass radiators if gone unnoticed. A good example of how radiators are so vulnerable to stray current corrosion is that many of them are attached to the vehicle by their plastic tanks, or are insulated from the vehicle chassis by rubber mounts.

In some cases electrical cooling fans are mounted directly to the radiator frame. Fans and fan motors cause lots of noise, vibration and harshness so they are insulated from the vehicle on rubber mountings. Introduce some bad electrical contacts for the fan wiring and we have set the scene for rapid electrolysis via the cooling fans.

The same fan is probably cycling more often because it can't rotate quickly enough as it has a bad earth contact. These are perfect conditions for disaster – lots of stray current, longer fan ON time and a hotter engine. A copper/brass radiator will suffer stray current damage. However, an old copper/brass radiator is usually bolted directly to the vehicle body work, providing an easy path to earth for any stray current that finds its way into the cooling system.

Plastic tanks and rubber mounts deny any stray current an easy path to ground. The environment for electrolysis in its most virulent form now exists.

Cooling fans are by no means the only cause of stray current problems. Stray current problems can occur following body repairs. The cause is over-spray. Paint does not conduct electricity. Therefore, over-spray at an earth point forces the current to find an alternative path to earth – usually via the cooling system.

Corrosion damage in the areas of a radiator, while operating within a squeaky-clean cooling system, is a pretty good indication of stray current damage.

In simple terms, stray current is a chemical/electrical process which causes an electrical current to pass through a vehicle's cooling system fluid. It can cause rapid damage to radiators and will indirectly cause problems with other engine components such as water pumps, thermostat housing etc.

It occurs when one or more electrical items, such as a cooling fan or headlights, develops a problem in its electrical circuitry. This causes an electrical current to seek out an earth path via the radiator core through the engine

## CHECK PROCEDURE:

**Note:** This check procedure is best carried out with plain water in the cooling system, since coolant may give a false reading.

1. Remove the radiator cap and run the engine to operation temperature. Do not rev the engine as this may cause the coolant to aerate.
2. Switch ON all electrical items including items.
3. Switch a multimeter to a scale of 5 volts DC or less. Ideally the meter should be capable of reading milli-volts. A digital multimeter may not be suitable for this test.
4. Place the negative lead of the multimeter on the battery negative post.
5. Dip the positive lead into the coolant without touching the filler neck or the core of the radiator.
6. A reading of more than .05 volts indicates the presence of potentially damaging stray current passing through the coolant. Ideally the voltage should be 0 volts, however it is highly possible that some voltage level will be detected.
7. If no voltage or a very low voltage is detected, carry out the same test as in point 4, but with the ignition OFF.
8. If voltage is detected, isolate the circuit by turning all electrical items OFF and switching each circuit ON individually.

**A final note of caution:** Refilling a cooling system with recommended coolant will itself generate a current that lasts approximately 12 hours.



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