May 22, 2006

Title: **MACS Recommended Air Conditioning Inspection and Preventive Maintenance Procedures**

The Mobile Air Conditioning Society (MACS) Worldwide recommends that motorists have their air conditioning systems inspected annually (or whenever a problem is first noticed) using the following inspection points and procedures, and have required preventive maintenance performed. Proper and regular preventive maintenance for the A/C system contributes to effective and efficient operation and helps to prolong component life, possibly helping consumers to avoid future failures and more costly repairs.

1. Inspect the compressor drive belt for fraying, cracks, glazing, etc.

2. Inspect the flexible hoses and metal lines for signs of leakage or damage.

3. Inspect the compressor for signs of possible shaft seal leakage.

4. Inspect and clean the front of the condenser. The debris that builds up between the fins can raise the head pressures, create engine-overheating problems and that not only affects performance but also can cause slipping of the A/C compressor clutch. If the vehicle has a minimal grille inlet and obtains the cooling air from the ground below the vehicle, raise it on a lift and inspect underneath. Check air dams and seals for integrity and proper operation. If there's through-the-grille breathing, look between the grille bars with a flashlight. Note that you may have to remove the grille for access. If there's a gap between the condenser and radiator, it may have a road-film buildup and even leaves and grass between the parts. Washing that out can be very helpful. Oil stains on the condenser core may indicate the presence of a leak and will require further inspection.

5. Check operation of all fans in accordance with manufacturer specifications.

6. Test the travel from cold to hot of the blend-air or temperature door operation to assure that the door is properly traveling and seals at both hot and cold end of travel.

7. If the system has a heater control valve, check that it is functioning properly.

8. Check to make sure that the air selection door moves to both the outside air and recirculation (max) travel positions.

9. If the vehicle has a cabin air filter, check to see if it requires replacement.

10. Check to see that both the A/C system service valve caps are installed. These are the primary seals to seal the refrigerant system and a new SAE standard specifies that the caps be tethered to the service valve. In the meantime, everything out there doesn’t have the tethers, so check and replace, if missing.

11. Check engine idle speed stability. Poor idle conditions can be the result of such things as plugs, wires, air filter, exhaust gas recirculation valve, etc. If the idle remains rough, determine the cause. The engine power train computer may disable the A/C when idle is rough or falls below a specified RPM. Also, if a "Check Engine" light is illuminated, this should be diagnosed prior to A/C system service.

12. At both idle and high engine RPM, turn on the A/C and see if the clutch engages smartly. If it doesn't, follow the recommended diagnostic procedures.

13. a. Identify refrigerant purity within the system. Air contamination or refrigerant cross-contamination may greatly affect system operation and performance.

b. Do an A/C performance test. The correct procedures vary slightly; so if you plan to use the vehicle maker's specifications, follow the procedure to the letter.

14. The importance of proper refrigerant charge and how to determine it is as critical to the expected life of the compressor as it is to the comfort of the vehicle occupants.

Since the lubricant is carried by the refrigerant, it is important that the proper refrigerant and lubricant charges are in the system. A low refrigerant charge resulting in inadequate lubricant flow affects the compressor because it may be starved for lubricant, but the problem might not be immediately evident to the owner. Eventually they may notice a decline in cooling, but by that time the compressor may be damaged.

15. Establishing System Refrigerant Charge

Orifice Tube System

In the case of an orifice tube system, a general indication of normal system refrigerant charge can be obtained by measuring the evaporator inlet (after orifice tube) and outlet pipes.

A completely charged orifice tube (a.k.a. flooded evaporator) system should have the same temperature — or not more than a few-degree difference — at the inlet of the evaporator (behind the orifice tube) and the outlet of the evaporator (between the evaporator and before the accumulator). To make this test valid, the system should be stabilized and under significant load: high blower, windows open and a Max Cold setting. (It should be noted that on some systems, this does not assure proper refrigerant charge due to refrigerant distribution problems within the evaporator core under high cooling loads.)

If the temperature differential across the evaporator inlet and outlet pipe is excessive (varies more than two degrees), professional service is required.

In today's A/C systems, the correct refrigerant charge is more important than ever. System pressures readings do not identify the amount of refrigerant in the system. Simply adding refrigerant to a system ("topping off") is not acceptable.

If it is determined that the system is undercharged or empty, the correct professional servicing practice is to remove the refrigerant with recovery equipment and charge the correct amount of refrigerant into the system.

Expansion Valve System

This evaporator inlet and outlet pipe temperature procedure does not apply to systems that use an expansion valve (TXV) since the purpose of the valve is to control super heat settings in the cooling coil. Therefore, temperature of the evaporator inlet and outlet pipes will vary.