CHARGING

Charging is the process of calculating and then introducing the correct amounts of oil and refrigerant into any given air conditioning system. It is imperative that the proper amounts of refrigerant and oil are calculated and introduced into the system. Only one set of equipment is required – best practice is to charge and test one side of dual system at a time to assure proper hose and electrical hook-up.

A system overcharged with refrigerant operates with high head pressure which will damage components, especially the compressor.
A system undercharged with refrigerant will result in poor system cooling and partially starve the compressor of needed oil.
A system undercharged with oil will result in reduced compressor life due to lack of lubrication.
A system overcharged with oil will experience poor system cooling due to reduced thermal transfer capabilities, and could introduce liquid back to the compressor causing damage or failure.

Calculations for determining the proper oil and refrigeration charge are based on component volumes and hose lengths as indicated on the Trans/Air charging chart, P/N 501264. Accurate charge levels will result in optimum, system performance and insure the continued reliability of the system components.

Proper Refrigerant Charge R134A - Accurate charge levels will result in optimum system performance and insure the longevity of the system components. The charge should be carefully controlled using a refrigerant scale and then double checked using calculated and measured pressures. Too little refrigerant will degrade the system cooling capability and too much will increase the pressures and result in non-compressible liquid and damage to the compressor.

Proper Oil Charge - Accurate charge levels of oil with the refrigerant are also critical to proper performance and component longevity. Too little oil may starve the compressor and cause damage and component failure. Too much oil will degrade system performance. It is preferable to add oil downstream of the compressor. Trans/Air systems use 1.5 ounces of oil per pound of R134A refrigerant.

Liquid charging - The practice of charging liquid refrigerant into the suction side with the compressor running may damage or destroy the compressor as the liquid is not compressible. Liquid charging on the low side is never allowed as flashing liquid will damage the compressor valves. Liquid charging may be done on the high side port in a vacuum state. Best practice is a gas charging on the low side.

Lubrication Type - It is important to use the lubrication type specified by the compressor manufacturer. Using oil other than the specified oil can result in reduced performance or degradation of component life. Under no conditions should PAG oil be mixed with POE (Ester) oil.

Sight Glass - The sight glass is used by Trans/Air only as a moisture indicator. The color code for the particular site glass is on the component itself. A fully charged system should indicate a dry condition. If the sight glass still shows wet, the evacuation was not sufficient to boil off the moisture. Moisture in the system will lead to acid formation and system component damage. Never use the sight glass for adjusting the charge level for R134A. Charge level should be verified and adjusted only by checking with the charge table using actual temperature and pressures.
1. **Manifold Gauge Set** - provides access and monitors pressures within the system. Normal connection configuration – Red = High side port; Blue = Low side port; Yellow = Vacuum pump ---- T/A P/N 816116

2. **134A Low Side Coupler** - connects air conditioning system low (suction) side access port to the manifold gauge low side hose ---- T/A P/N 816052

3. **134A High Side Coupler** - connects air conditioning system high (discharge) side access port to the manifold gauge high side hose ---- T/A P/N 816053

4. **134A Coupler Adapters** - connects 134A couplers to manifold gauge set – T/A P/N 816120 (2 required)

5. **Heat Blanket** - used to increase internal temperature of the refrigerant cylinder, greatly increasing the transfer of refrigerant to the air conditioning system ---- T/A P/N 816095

6. **Oil Injector** - used to add additional amounts of oil to a closed system ---- T/A P/N 816028

7. **Refrigerant Cylinder** – storage tank for R134a ---- T/A P/N 816113

8. **Ball Valve Adapter** - used in oil and refrigerant charging. It connects the 4-way Manifold Gauge Set to the 3/8” high side charging hose ---- T/A P/N 816121

9. **Refrigerant Scale** - Accurately weighs the transfer of refrigerant into the air conditioning system ---- T/A P/N 816118

To correctly charge the air conditioning system, follow the step by step instructions of a typical set-up below (equipment list numbers are noted for each step):

*Caution: Always use safety glasses when working with any refrigerant.*

*Caution: Federal law requires that personnel handling air conditioning refrigerant be certified*

*Caution: Never operate the air conditioning system prior to the completion of a fully charged and functioning system. Operation will cause the oil to collect in the “low point” of the system and starve the compressor of lubrication.*

*Note: Set-up will vary based on equipment available.*

1. Calculate the oil and refrigerant charge using Trans/air’s charging chart P/N 501264. Refer to the example on the charging chart to insure correct calculation.

2. Add oil as dictated by the formula on the charging chart.

*All PAG oils are not the same composition or viscosity. Use only the type of oil specified type on the charging chart that matches the compressor used in the installation..*
PAG oils are highly hydroscopic, meaning they absorb moisture from the air very quickly. Always keep PAG oil containers tightly sealed when not in use. It is recommended that the oil be purchased in containers small enough for the smallest possible number of installations.

3. Continuing charging of the final equipment setup from the evacuation procedure.

4. Fill oil injector with calculated additional oil. Valve must be in the closed position.

5. Remove Ball Valve Adapter from refrigerant tank and attach to the oil injector.

6. Open high side valve (red) on the manifold gauge set.

7. Open high side charging valve (yellow) on the manifold gauge set.

8. Open valve on ball Valve adapter.

9. Open valve on the oil injector and add required oil to the system.

10. Close valve on oil injector when calculated oil charge is met.

11. Close ball valve adapter.

12. Close high side charging valve (yellow) on the manifold gauge set.

13. Attach ball valve adapter to refrigerant cylinder “liquid” valve.

   When using a non-refillable refrigerant cylinder, attach the ball valve adapter to the cylinder valve. Refrigerant cylinder must be inverted in order to transfer liquid refrigerant.

   Caution: Never add liquid refrigerant to the low (suction) side of an air conditioning system. Liquid refrigerant could be drawn into the compressor cylinders and compressor damage may result.

14. Install heat blanket around the refrigerant cylinder and plug in. This will aid in the transfer of refrigerant from the cylinder to the air conditioning system.

15. Turn on refrigerant scale and place the refrigerant cylinder on the scale.

   Refer to manufacturer’s instructions on the scale to obtain an accurate refrigerant charge.


17. Open ball valve adapter. Purge hoses at the manifold connection prior to step 18.

18. Open high side charging valve (yellow) on the manifold gauge set.

19. Open high side charging valve (red) on the manifold gauge set.

20. Monitor transfer of liquid refrigerant from the cylinder into the air conditioning system.

21. When the calculated refrigerant charge has been met, close both high side valves (red / yellow) on the manifold gauge set.
22. Close ball valve adapter

23. Close liquid valve on refrigerant cylinder

24. Unplug and remove heat blanket from the refrigerant cylinder.

Caution: Make sure all the components of the system are operating and wired properly before starting the vehicle. This is obtained by turning the vehicle ignition switch to the on position and then turn on the Trans/Air air conditioning switch. All components should operate properly. If not, refer to the system wiring diagram to locate where the problem might be, and repair before starting the vehicle and further operating the air conditioning system.

25. Start the vehicle and turn on the air conditioning system

26. Observe the pressure readings on the manifold gauge set after 5 minutes of operation --- Low side pressure (blue) and high side pressure (red)

27. Use Trans/air pressure / temperature chart (P/N 501264) to determine if the system is operating to Trans/Air specifications.

This chart is only used for determining high side pressure, as low side pressure will vary with the type of system and engine speed

28. If the system is operating properly proceed to step 29. If the system is not operating properly, diagnose the problem, repair, and proceed.

29. Remove refrigerant cylinder from the refrigerant scale and turn off the scale.

30. Close the 134A high side coupler

31. Open the low side (blue) and high side (red) valves as well as the high side charging valve (yellow) on the manifold gauge set until the high side pressure gauge (red) equals the pressure showing on the low side pressure gauge (blue).

32. Close all valves on the manifolds gauge set

33. Close the 134A low side coupler

34. Turn air conditioning and vehicle off.

35. Remove the low side and high side couplers from the access service ports

36. Test the service port valves for leaks using a soap solution / spray. If bubbles exist tighten the valve and retest.

37. When valve leak test is completed, install seal caps on the ports.

38. Upon completion of charging you must identify the system’s oil type and total amount of compressor oil added plus the type and amount of refrigerant in the system. This information must be transferred to the charging label. (T/A P/N 916023) provided with the piping kit. The label must then be located where it can
be referenced in the future by a service technician, usually in the area of the service ports in the engine compartment.

Figure 1