

OPERATION
&
MAINTENANCE
MANUAL

AC790

Refrigerant Management Center

(Convertible For Use With R12 or R134a)

MAC Tools, Inc.

4635 Hilton Corporate Drive
Columbus, Ohio 32942

Manual P/N 035-80289-02

CONVERTIBLE
RECYCLING MACHINE

This Recycling Machine was manufactured in compliance with all applicable Underwriters Laboratories (UL) and Society of Automotive Engineers (SAE) Standards and Specifications for Refrigerant Recycling Equipment.

Your machine was configured to recycle R12 or R134a.

A Retrofit Kit is available for field conversion of this machine to recycle the alternate refrigerant for which it is now configured. This kit includes complete instructions, labels, filters, DPS Switch, hoses with service couplers, and special tools required to make the conversion.

Once converted by an Authorized Representative, a new Serial Label (included in the kit) will be affixed to the machine. This Serial Label will certify that the machine is then in compliance with all SAE and UL Standards and Specifications for Equipment to recycle the alternate refrigerant.

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CONGRATULATIONS: You have purchased one of the finest Recovery, Recycling, and Charging Machines available at any price.

Fill out and return the Warranty Card within 90 days to activate warranty and free lifetime technical support.

BEFORE USING THE AC790

Check for any shipping damage. Place a claim with carrier if damage is discovered.

DO NOT USE A DAMAGED UNIT.

Complete and return the Warranty Card to activate technical support service and warranty coverage.

Warranty claims can not be honored without this warranty card on file.

The AC790 should not be operated or serviced by any person who has not read all the contents of this manual. Failure to read and comply with these instructions or any one of the limitations noted herein can result in serious injury and/or property damage.

These general instructions describe normal operation and maintenance situations encountered with the AC790. The instructions should not be interpreted to anticipate every possible contingency.

It is the responsibility of the owner/user to operate the AC790 in accordance with all specifications and laws which may apply.

The following pages contain rules for safe operation of the AC790. Taking precedence over any specified rule listed herein, however, is the most important rule of all:

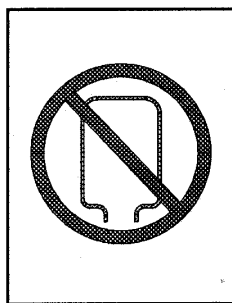
"USE COMMON SENSE"

A few minutes spent reading these instructions can make an operator aware of dangerous practices to avoid and precautions to take for his own safety and the safety of others.

A regular schedule of inspection of the AC790 should be established and records maintained with special attention given to Hoses, Compressor Oil Level, Moisture Indicator, and Filters.

SAFETY PRECAUTIONS

- Recover, Recycle, and Charge only the refrigerant for which the machine is configured.
- Wear safety glasses and protective gloves. Refrigerant has a very low boiling point and can cause frostbite.
- Follow the AC790 operating procedures sequentially to avoid prematurely disconnecting hoses or opening valves which may release refrigerant to the atmosphere.
- Do not expose the AC790 to moisture or operate in wet areas.
- Use the AC790 in locations with mechanical ventilation that provides at least four air changes per hour.
- Hoses used with the AC790 must have shutoff devices within 12 inches of the connection point to the system being serviced to minimize the introduction of Non-condensable Gas (Air) into the AC790 and the release of refrigerant when being disconnected.
- Disconnect power before performing any maintenance or service on the AC790.
- Avoid using an extension cord with the AC790. If necessary, use a good condition, UL listed, 3-wire grounded, #14 AWG extension cord of the shortest possible length.
- Connect the AC790 to a properly protected, grounded receptacle. Do not over load the circuit.
- Do not allow the AC790 to remain unattended in the Charge Mode with power On. The Internal Cylinder Heater will be energized creating a high pressure condition.



NEVER TURN THE CYLINDER UP-SIDE-DOWN.

DO NOT CONNECT THE AC790 TO THE LIQUID SIDE OF ANY A/C SYSTEM WITH A CAPACITY GREATER THAN 4 LBS.

REFRIGERANT IN A/C SYSTEMS HAVING LARGER CAPACITIES MUST BE RECOVERED FROM THE VAPOR SIDE ONLY.

NEVER CONNECT THE AC790 TO THE LIQUID PORT OF A CYLINDER OF REFRIGERANT TO FILL THE AC790 INTERNAL CYLINDER.

FAILURE TO FOLLOW THE ABOVE MAY CAUSE THE AC790 COMPRESSOR TO FAIL AND VOID THE WARRANTY.

 **CAUTION** 

Avoid breathing refrigerant or lubricant vapor or mist.

Exposure may irritate eyes, nose and throat.

If accidental system discharge occurs, ventilate work area before resuming service.

Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.

Special Considerations with R134a

R134a has been shown to be nonflammable at ambient temperature and atmospheric pressure. However, recent tests under controlled conditions have indicated that, at pressures above atmospheric and with air concentrations greater than 60% by volume, R134a can form combustible mixtures.

While it is recognized that an ignition source is also required for combustion to occur, the presence of combustible mixtures is a potentially dangerous situation and should be avoided.

Under no circumstances should any equipment be pressure tested or leak tested with Air/R134a mixtures. Do not use compressed air (shop air) for leak detection in R134a systems.

PRE-CHARGING THE AC790

A/C Systems requiring service often do not have a full charge of refrigerant. To avoid unnecessary repositioning of hoses it is recommended that the AC790 be pre-charged until about 3 pounds of liquid refrigerant can be seen in the Internal Cylinder Sight Glass. The Sight Glass is visible through a slotted opening on the right side of the AC790.

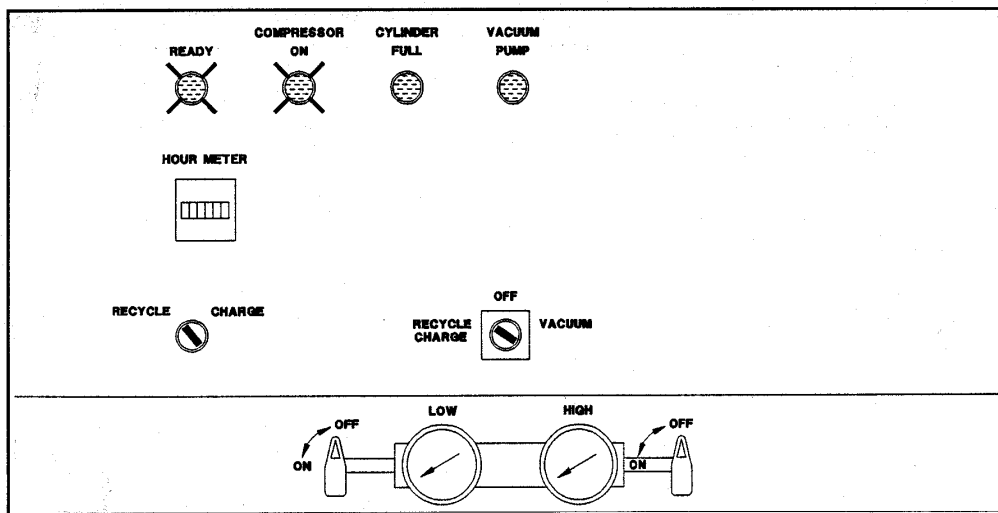


Figure 1 Pre-charging

To pre-charge the AC790, refer to Figure 1 and follow these steps:

1. Turn the Main Power Switch to Off.
2. Connect the yellow hose from the **VAPOR** port of a cylinder of refrigerant to the AC790 Access Port on the rear of the machine.

Observe that the embossed marking on the cylinder knob says **VAPOR** or **GAS**. Do not rely on color coding of valve knobs.



DO NOT TURN THE CYLINDER UP-SIDE-DOWN.

INTRODUCTION OF LIQUID INTO THE AC790 MAY DAMAGE THE COMPRESSOR AND VOID THE WARRANTY.

4. Set Mode Selector to RECYCLE.
5. Turn Main Power Switch to RECYCLE/CHARGE.

The Compressor-On Light will illuminate and the AC790 will recover and recycle refrigerant into the Internal Cylinder. Observe the liquid refrigerant level rise in the Internal Cylinder Sight Glass and when at approximately 3 lbs. close the Vapor Valve on the refrigerant cylinder.

HINT: Heating of the cylinder of refrigerant with a Heat Belt will speed the recovery process.

Allow the AC790 to continue running until the Compressor-On Light goes off. This will evacuate the Yellow Hose.

6. When the Compressor-On Light goes off, turn the Main Power Switch OFF.

... NOTE ...

As refrigerant is processed by the AC790, temperature variations can cause vapor to change to liquid which may temporarily settle in various internal components.

If a known amount of refrigerant has been introduced into the AC790 it may not all be seen in the Internal Charging Cylinder Sight Glass.

This is normal and nothing to be concerned about. Refrigerant has not been lost.

The sight glass does not indicate the amount of refrigerant recovered. It is only accurate for determining the amount of refrigerant charged out to the vehicle A/C System while in the Charge Mode of operation.

RECYCLE MODE

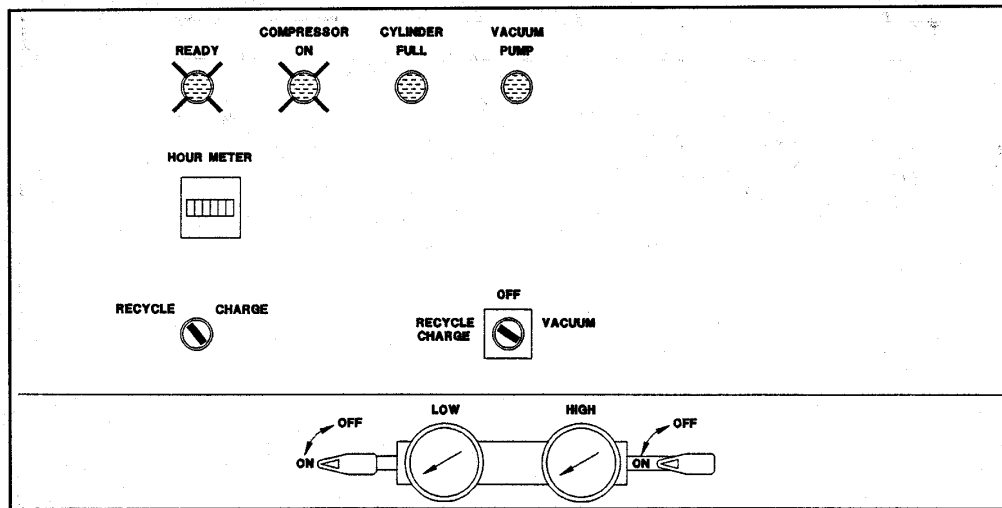


Figure 2 Recycle

To Recycle, refer to Figure 2 and follow these steps:

1. Attach Red and Blue Hoses to the A/C system per the vehicle manufacturer's instructions.

Note For R134a Machines

Field Service Couplings on the ends of Service Hoses are of a special design.

The valves have **LEFT HAND** threads which makes operation opposite to that of others.

To Close... Turn Counter-clockwise

To Open... Turn Clockwise

The valves **MUST BE CLOSED** before connecting or disconnecting Field Service Couplings.

2. Open Red and Blue Hose Valves.
3. **SLOWLY** open High and Low Gauge Valves.
4. Set Mode Selector to RECYCLE.

5. Turn Main Power Switch to RECYCLE/CHARGE.

The Ready Light and Compressor-On light will illuminate. The Compressor and Condenser Fan will be heard operating as refrigerant is recovered from the A/C System.

The AC790 will recover refrigerant from the A/C System until a vacuum is sensed. The Compressor will turn off and the Compressor-On Light will turn off.

● **DO NOT TURN THE AC790 OFF OR DISCONNECT HOSES** ●

A small quantity of Liquid refrigerant will probably still remain in the A/C System. This liquid will vaporize (boil up) and increase the pressure in the system as the components again warm to ambient temperature. This can be detected by observing an increasing pressure reading on the Low Side Gauge.

If pressure increases to a preset level, the AC790 will again start to recover refrigerant. The Compressor will turn on and the Compressor-On Light will illuminate.

Allow this sequence to repeat until the Compressor-On Light remains off continuously for at least 2 minutes.

... NOTE ...

Several audible changes may be heard during the recovery and recycling process.

Refrigerant flow through check valves causes a "sizzle-type" sound.

These changing "noises" are normal and nothing to be concerned about.

6. Close Red and Blue Hose Valves.

7. Close High and Low Gauge Valves.

8. Turn Main Power Switch to OFF.

9. Press and hold Oil Drain Pressurization Button (Located below the Pressure Gauge on side of unit) about 10 seconds. This creates a positive pressure in the Oil Drain Reservoir to enhance the draining of oil in the next step.

10. Slowly open the Oil Drain Valve (Located at the lower left side of the AC790 as viewed from the rear) to drain any oil which may have been removed from the A/C system. Press and hold the Oil Drain Pressurization Button for 5 to 8 seconds to clear out the remaining oil, if any.
11. Close the Oil Drain Valve.
12. Press and hold Oil Drain Pressurization Button for approximately 10 seconds to prime the AC790 for the next job.

Unless the A/C system had been overfilled, the AC790 will not remove enough oil to make replenishment necessary.

CYLINDER FULL LIGHT: The Cylinder Full Light will illuminate if the Internal or External Cylinder has been filled to capacity.

DEEP VACUUM & DEHYDRATION

If the A/C System is "opened" for replacing components, it is important to draw a deep vacuum on the system before recharging with refrigerant. This vacuuming process not only removes air from the system, but just as importantly, will remove any moisture in the system.

A Vacuum Pump in the AC790 provides the capability of performing this "Deep Vacuum and Dehydration". The following steps should be followed:

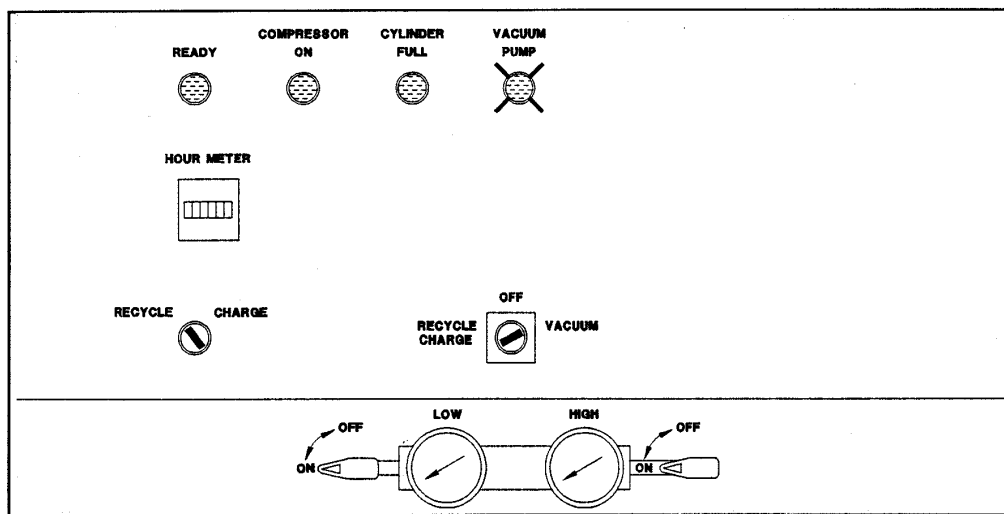


Figure 3 Deep Vacuum & Dehydration Control Settings

Refer to Figure 3 for the following description of operation.

1. Connect Red and Blue Hoses to the high and low sides of the A/C System.
2. Open Low and High Gauge Valves.
3. Open Red and Blue Hose Valves.
4. Turn Main Power Switch to VACUUM.
5. The Vacuum Pump Light will illuminate and the AC790 will start drawing a vacuum which will be indicated by a dropping pressure on the Low Gauge.

NOTE... If pressure is sensed at the Red and Blue Hoses on the AC790, the Vacuum Pump will not start, as this would result in venting of refrigerant. The Vacuum Pump Light will not be illuminated to indicate this situation.

If this occurs, turn the Main Power Switch to RECYCLE/CHARGE and the Mode Selector to RECYCLE to recover the refrigerant.

HOSE EVACUATION PROCEDURE

It's important that Air not be introduced into the A/C System during a Charging procedure. If a Deep Vacuum and Dehydration procedure was performed previously, the following Hose Evacuation Procedure is not required. If the service valves on the hoses have been open, the following procedure must be performed:

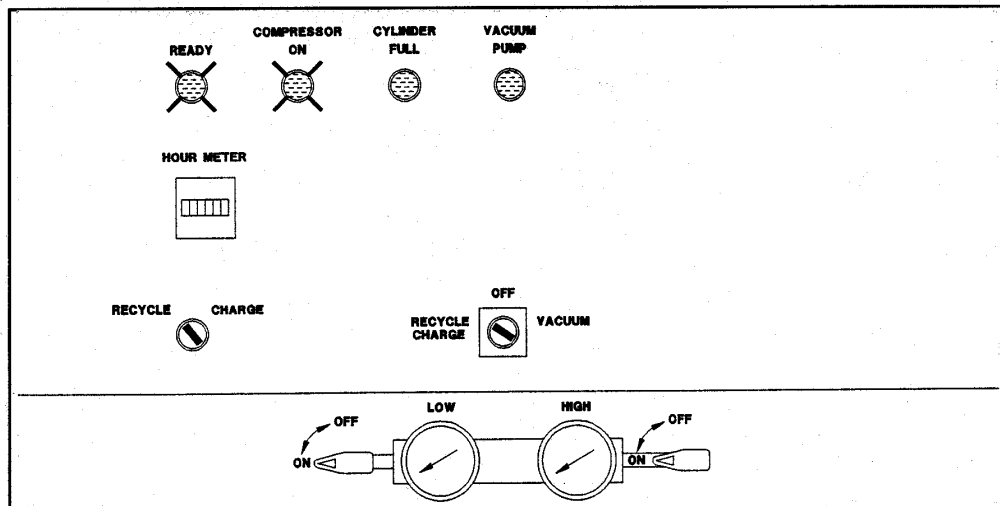


Figure 4 Hose Evacuation Control Settings

Refer to Figure 4 for the following description of operation.

1. Close Red and Blue Hose Valves.
2. Open High and Low Gauge Valves.
3. Turn Mode Selector Switch to RECYCLE.
4. Turn Main Power Switch to RECYCLE/CHARGE. The COMPRESSOR ON Light will illuminate.
5. Let the AC790 run until the COMPRESSOR ON Light goes off.
6. Turn Low and High Gauge Valves to OFF.
7. Turn Main Power Switch to OFF. All Air has now been removed from the Hoses.

CHARGE MODE

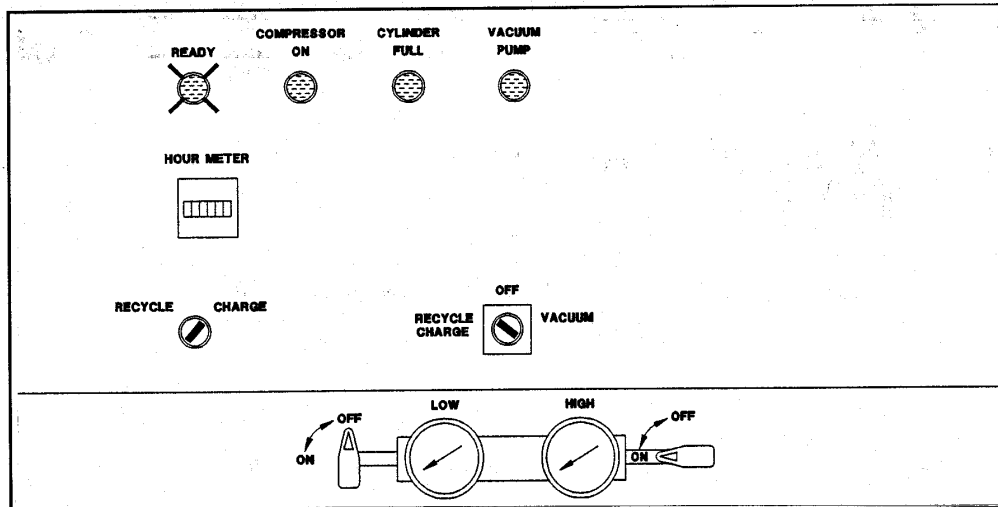


Figure 5 Charge Mode Control Settings

Refer to Figure 5 for the following description of operation:

1. Perform Hose Evacuation Procedure described previously.
2. Connect Red Hose to the A/C System per the vehicle manufacturer's instructions. Do not open the hose valve.
3. Set Mode Selector to CHARGE.
4. Turn Main Power Switch to RECYCLE/CHARGE. The Internal Charging Cylinder will now be heating to develop pressure for charging.
5. Open High Gauge Valve. The Low Gauge Valve and both Hose Valves should be closed.
6. Determine the refrigerant capacity of the A/C system to be charged. This data is usually printed on a tag located on the accumulator or under the hood of the vehicle. Convert this quantity to tenths of a pound or pounds and ounces, if necessary, for setting the AC790 charge indicator.

The following will determine where to set the indicator prior to starting the charge mode:

$$(\text{AC790 Liquid Level}) - (\text{A/C System Capacity}) = \text{Indicator Setting}$$

EXAMPLE: The level of liquid visible in the AC790 Internal Cylinder Sight Glass is 7.4 lbs. and the A/C system capacity is 3.2 lbs. The following calculation results...

$$(7.4) - (3.2) = 4.2$$

Therefore, the sliding indicator should be set at 4.2 lbs. in this example. When the liquid level lowers to the 4.2 lb. mark, a charge of 3.2 lbs. will have been delivered

NOTE... The Sight Glass on the Charging Cylinder has markings for both R12 and R134a. Always use the correct scale for accurate charging.

7. Open Red Hose Valve. **Do not start the Vehicle's Engine.** Refrigerant will flow into the high side of the A/C System. Closely monitor the liquid level as it lowers in the Internal Cylinder Sight Glass.
8. Turn Main Power Switch to OFF as soon as the refrigerant level drops to the sliding indicator.
9. Close High Gauge Valve.
10. Close Red Hose Valve.

Evacuate the hose per the preceding section "Hose Evacuation Procedure"

The vehicle can now be started and the A/C system checked by monitoring Gauge pressures.

Close all valves before disconnecting hoses.

NOTE: The preceding is the recommended method of charging with the AC790.

Some vehicle manufacturers may specify connecting only to the Low Side of the A/C System. Always follow their procedures. The above instructions would have to be modified accordingly.

SCHEDULED MAINTENANCE

BEFORE EACH USE...

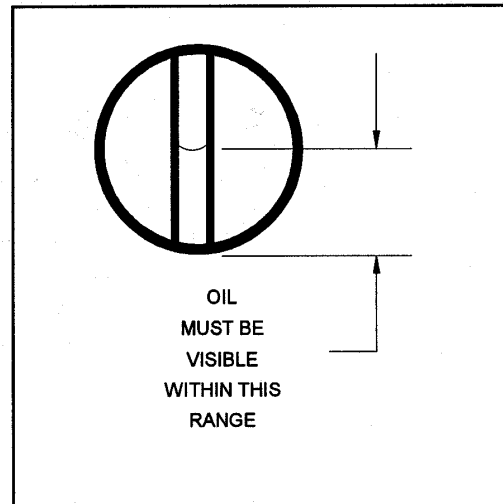
Check the oil level in the Compressor *DAILY* while using the AC790 in the Recycle Mode.

The Oil Level Sight Tube is visible through a cut-out in the left side of the black Compressor Cover at the bottom of the AC790.

The oil level should be visible in the cut-out and within the range indicated in the illustration.

If oil is not visible or is above the middle of the cut-out call the Technical Support Number:

800-468-2321



The oil in the Compressor should be **changed yearly** (or after approximately 50 hours use in a high volume shop). The best time to schedule this procedure is at the end of the peak season, just prior to "storing" the AC790.

Contact the manufacturer at 800-468-2321 for a special Oil Change Kit and Instructions.

An Oil Drain Fitting is provided on the rear of the unit for draining the Compressor oil.

VACUUM PUMP OIL

Vacuum Pump Oil should be changed at least yearly. Consistently deeper vacuums will be achieved if the Oil is changed every 90 days.

It's recommended that Vacuum Pump Oil always be changed at the end of the peak season, just prior to "storing" the AC790.

Contact the manufacturer at 800-468-2321 for an Oil Change Kit and Instructions.

CONDENSER

Periodically clean the Condenser to maintain high efficiency performance of the AC790. Disconnect power and remove the Compressor Compartment Cover and blow compressed air through the cooling fins of the Condenser to remove any debris. It may be necessary to use a soft brush if the fins are excessively dirty.

Do not bend the fins on the Condenser coil. Air flow will be restricted and cause damage to the AC790. Replace the Compressor Compartment Cover before applying power to the AC790.

COMBO FILTER & FILTER-DRIER

Replace the Combo Filter and Filter-Drier after 75 Hours of operation (indicated on Hour Meter), or when the Moisture Indicator (lower front section of machine) stays "Bright Pink" after 20 Hours of operation.

To replace the Filters:

1. Disconnect the AC790 from Power.
2. Remove the Main Cabinet Cover.
3. Locate the Filters mounted on a bracket on the left side of the machine. The Filter-Drier has black insulation wrapped around it.
 - 3.1 Disconnect Flare Fittings at top and/or bottom of Filters.
 - 3.2 Remove mounting hardware and remove Filters.
 - 3.3 Remove the black insulation and install on new Filter-Drier.
 - 3.4 Install new Filters using hardware removed earlier.
 - 3.5 Connect Flare Fittings to top and/or bottom of Filters.
4. Check for leaks and repair as required.
5. Replace Main Cabinet Cover.

PROBLEMS & SOLUTIONS

On rare occasion the AC790 may seem to be performing differently or not at all. Experience has shown that varying operating conditions can affect the performance characteristics of the AC790. The temperature of the vehicle A/C System will affect how the AC790 performs.

Following are typical problems with explanations of the possible cause and solution.

PROBLEM: My AC790 worked fine all last Summer. I got it out today for the first service job this Spring and it is very slow in evacuating the system.

SOLUTION: Today's Spring temperature may be much lower than the average temperatures during the summer months. Maybe the vehicle was brought in from outside where the temperature is very low.

The refrigerant in the vehicle will not be under as high a pressure at lower temperatures and the AC790 will take longer to draw a vacuum. More cycles may be required to completely recover the refrigerant.

PROBLEM: I put 5 lbs. of refrigerant into the AC790 using the Recycle Mode. When I checked the sight glass on the Internal Cylinder, there was less than 5 lbs. I lost Refrigerant. The unit must leak.

SOLUTION: Due to temperature changes, some refrigerant may condense into liquid form and stay in tubes and other components in the circuit preceding the Internal Cylinder. This is normal and will explain why all refrigerant is not visible in the sight glass.

PROBLEM: I can not get the AC790 to draw a vacuum as indicated on the Low Side Gauge.

SOLUTION: Check Hoses for restrictions.

PROBLEM: When I try to fill the Internal Cylinder from an auxiliary cylinder of clean refrigerant, the AC790 is really slow or shuts down.

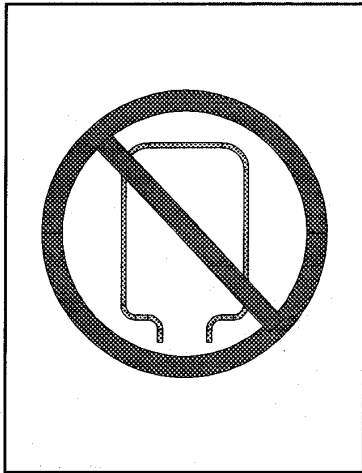
SOLUTION: The auxiliary cylinder will cool due to the vaporization of refrigerant. This causes the pressure to decrease.

Use a heat belt to increase the speed of recycling by the AC790.

PROBLEM: I turned a 30 lb. cylinder of new refrigerant up-side-down to pre-charge the Internal Cylinder with liquid. The Internal Cylinder didn't fill and now the AC790 won't recover from an A/C system.

SOLUTION: The AC790 has been overloaded with liquid refrigerant (See Safety Precaution Section at the beginning of this manual).

... WARNING ...



IF A CYLINDER IS TURNED UP-SIDE-DOWN, THE AC790 WILL OVERFILL WITH LIQUID REFRIGERANT. THIS OVER FILLS THE SUCTION ACCUMULATOR WITH LIQUID.

FROST ON THE OIL DRAIN ON THE REAR OF THE AC790 IS A GOOD INDICATION OF THIS OCCURRENCE.

THIS SYMPTOM IS CAUSE FOR CONCERN AS LIQUID REFRIGERANT WILL BE FORCED INTO THE COMPRESSOR.

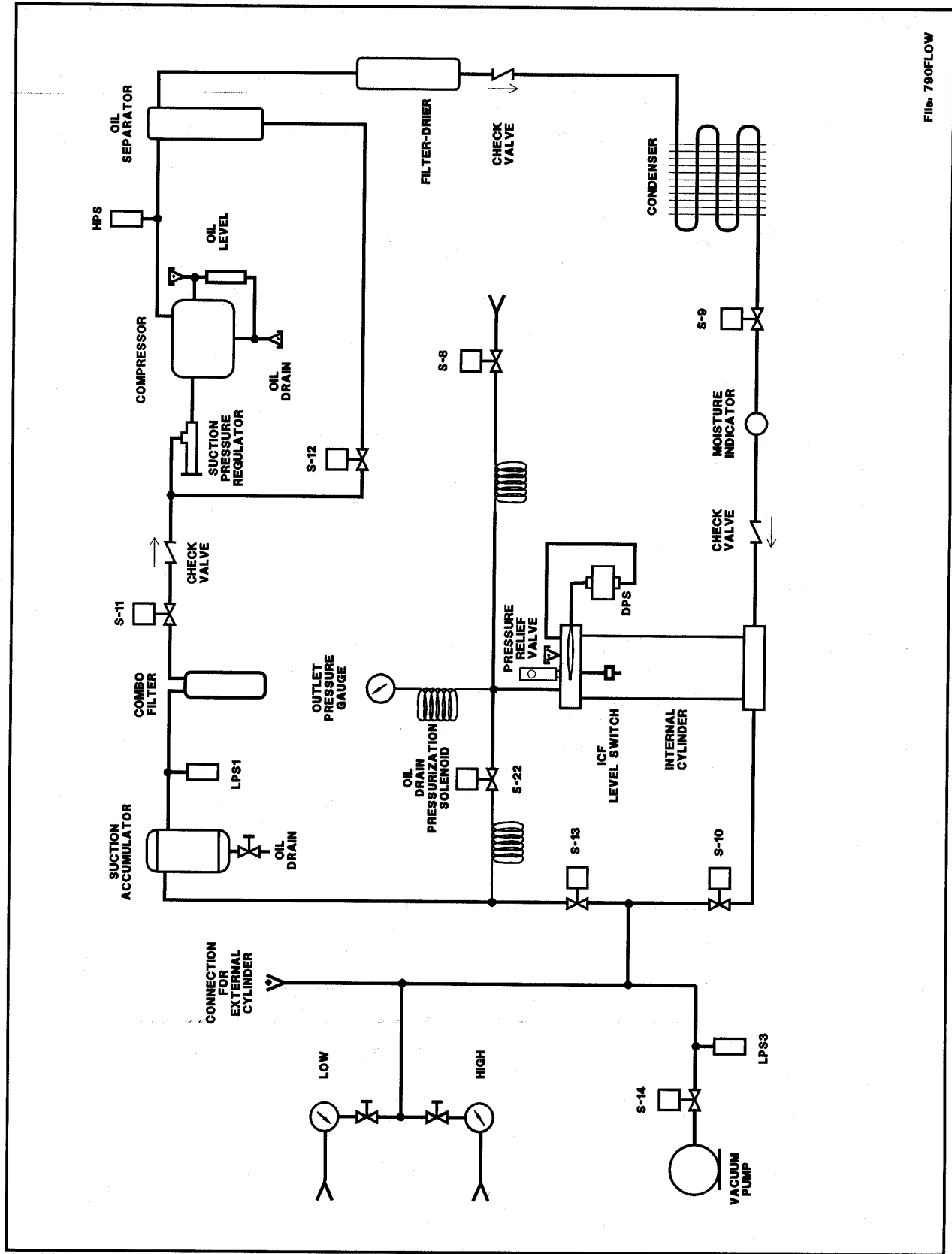
THIS CAN DESTROY THE COMPRESSOR.

The safest method to remove the excess liquid which has collected in the Suction Accumulator is to drain it from the Oil Drain on the back of the AC790 as follows:

Draw a deep vacuum (25 to 29 In. Hg.) on an empty cylinder and connect it to the Oil Drain Valve. Open the cylinder valve and the Oil Drain valve.

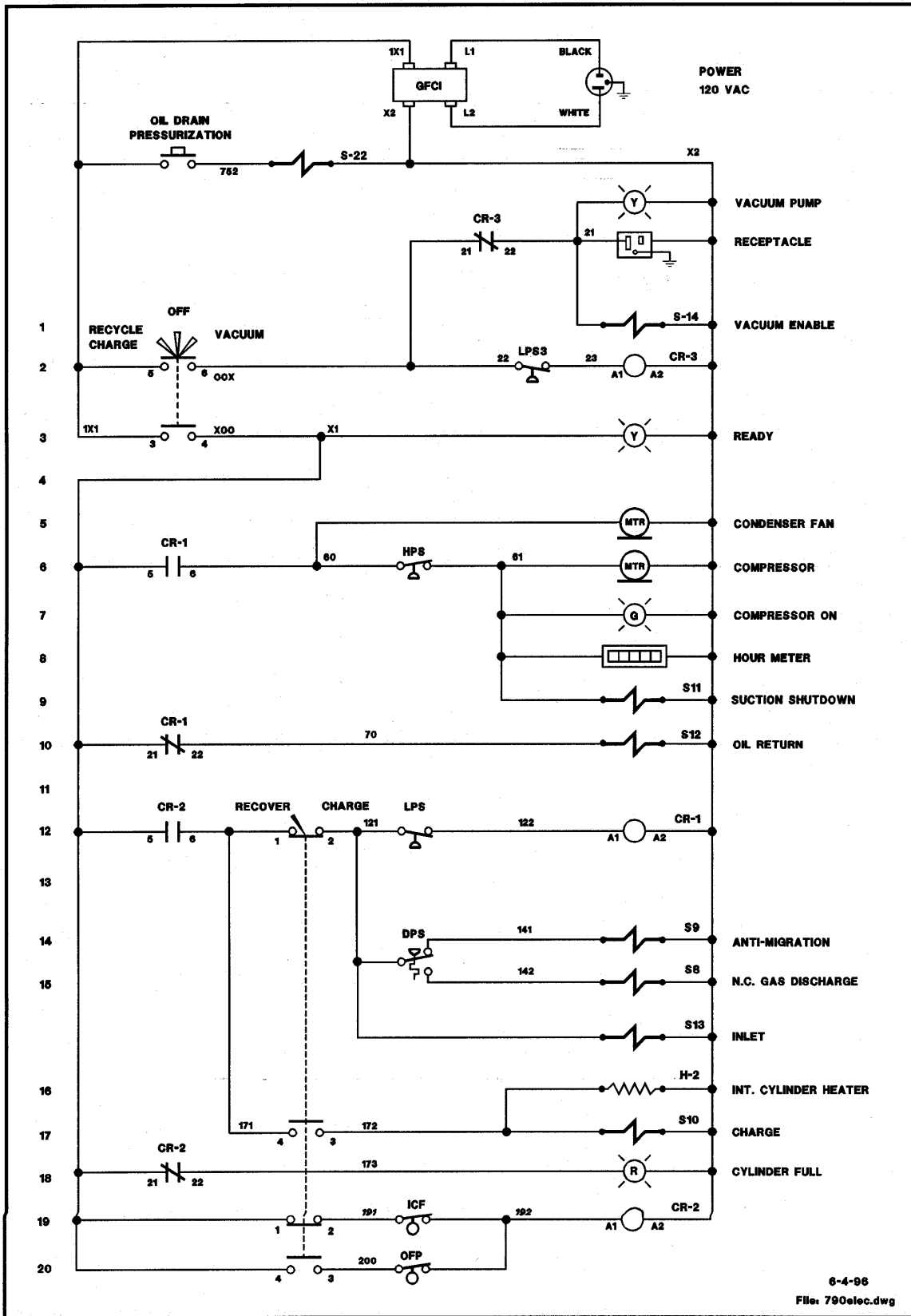
Close the valves and disconnect the cylinder after the liquid has been drawn into the cylinder. This refrigerant can now be recycled by the AC790 following normal recycling procedures.

If the above suggested solutions do not solve the problem, call 800-848-6500 and one of our technicians will help diagnose the cause. Please have the Serial Number and hour meter reading available for reference.



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FLOW DIAGRAM - MODEL 790



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SCHMATIC - MODEL AC790