OPERATION

&

MAINTENANCE

MANUAL

TC2770

Refrigerant Management Center

RTI TECHNOLOGIES, INC.

4075 East Market Street
York, PA 17402

Manual P/N 035-80347-02

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TC2770

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.

START-UP INSTRUCTIONS

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 TC2770 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 TC2770. The instructions should not be interpreted to anticipate every possible contingency.

It is the responsibility of the owner/user to operate the TC2770 in accordance with all specifications and laws which may apply.

The following pages contain rules for safe operation of the TC2770. Taking precedence over any specified rule listed herein, however, is the most important rule of all:

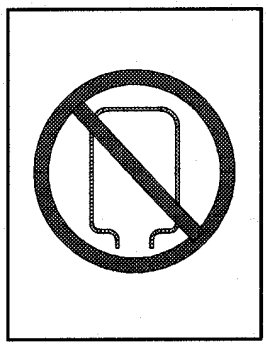
"USE COMMON SENSE"

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 TC2770 should be established and records maintained with special attention given to Hoses, Compressor Oil Levels, Moisture Indicators, 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 TC2770 operating procedures sequentially to avoid prematurely disconnecting hoses or opening valves which may release refrigerant to the atmosphere.
- Do not expose the TC2770 to moisture or operate in wet areas.
- Use the TC2770 in locations with mechanical ventilation that provides at least four air changes per hour.
- Hoses used with the TC2770 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 TC2770 and the release of refrigerant when being disconnected.
- Disconnect power before performing any maintenance or service on the TC2770.
- **Avoid using an extension cord with the TC2770. If necessary, use a good condition, UL listed, 3-wire grounded, #14 AWG extension cord of the shortest possible length.**
- Connect the TC2770 to a properly protected, grounded receptacle. Do not over load the circuit.
- Do not allow the TC2770 to remain unattended in the Charge Mode with power On. The Charging Cylinder Heater will be energized creating a high pressure condition.



NEVER TURN THE CYLINDER UP-SIDE-DOWN.

DO NOT CONNECT THE TC2770 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 TC2770 TO THE LIQUID PORT OF A CYLINDER OF REFRIGERANT TO FILL THE TC2770 CHARGING CYLINDER.

FAILURE TO FOLLOW THE ABOVE MAY CAUSE THE TC2770 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, 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.

TC2770 - A MULTIPLE FUNCTION MACHINE

The TC2770 is a "Refrigerant Management Center" since all the refrigerant handling tools for complete automotive A/C system servicing are included in one machine. The Technician can perform the following service functions with the TC2770 without additional tools:

- Recover and Recycle R12 or R134a to SAE Purity Standards
- Diagnose A/C System with built-in Manifold Gauges
- Perform a Deep Vacuum Dehydration on the A/C System
- Charge R12 or R134a

The TC2770 was designed for intuitive operation. Several safety circuits built into the TC2770 prevent mixing or accidental discharge of R12 or R134a. This manual should be studied by all technicians **before** operating the TC2770 to provide a maximum level of service to Customer's A/C Systems.

The TC2770 has two separate recovery, recycling and charging circuits in one cabinet. R12 and R134a never flow through "common" tubes, filters or other devices. SAE specified fittings on the front of the TC2770 are 1/4 Flare for R12 and 0.500 ACME for R134a. The only common connection is at the vacuum pump, where solenoids and pressure switches ensure that refrigerants are not mixed or vented while performing a deep vacuum dehydration.

Charging Cylinder Sight Glasses are visible through slots on either side of the TC2770. Convenient slide indicators on the sight glasses are used to indicate charge level during a charge procedure. Moisture Indicators are visible through cut-outs in the lower front section of the TC2770 cabinet.

As refrigerant is processed by the TC2770, 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 TC2770 it may not all be seen in the 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.

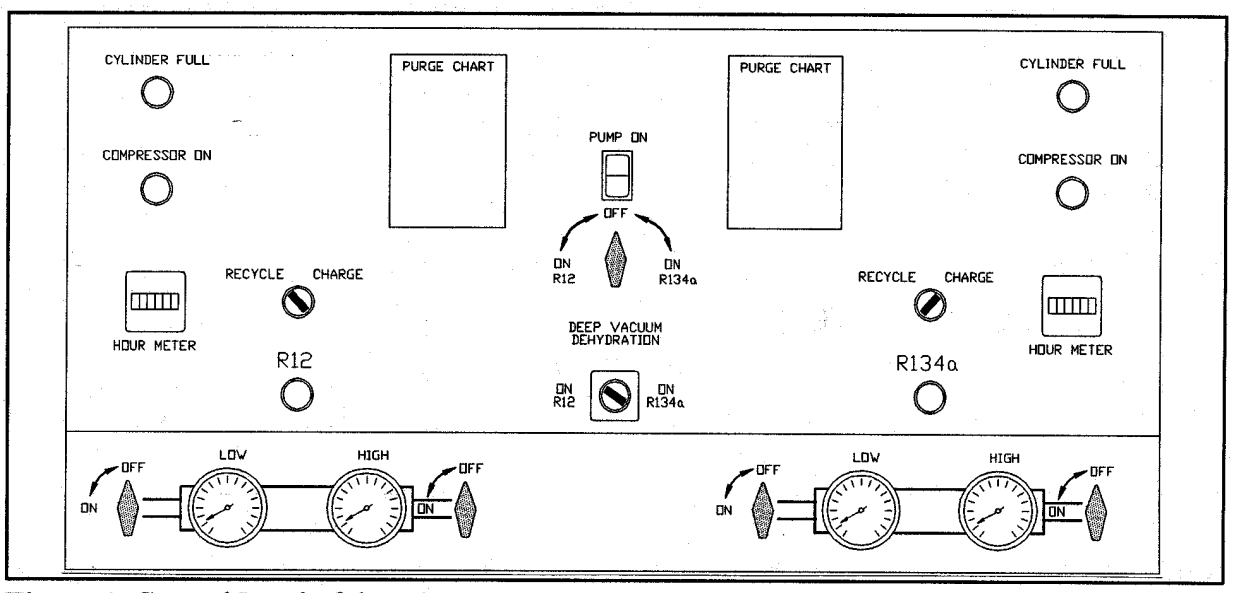


Figure 1 Control Panel of the TC2770

Figure 1 illustrates the TC2770 control panel. There are basically four areas on the control panel which correspond to the main functions of the machine. The lower center section controls power to either the R12 (left side) or R134a (right side). The left side controls recycling, purging non-condensables (AIR), and charging R12 while the right side controls the recycling, purging non-condensables, and charging of R134a. The upper center section controls Deep Vacuum Dehydration for either R12 or R134a.

A platform on the rear of the TC2770 provides convenient storage space for cylinders of new refrigerant. These cylinders can be connected to ports on the rear of the TC2770. The TC2770 Charging Cylinders can be filled directly from these external cylinders.

NEVER turn either cylinder of new refrigerant up-side-down. This will introduce liquid into the TC2770 which will cause the machine to malfunction and may damage the compressor and void the warranty.

Always keep valves closed on cylinders of refrigerant stored on the rear of the TC2770 when not filling the TC2770 charging cylinder.

A platform on the rear of the TC2770 (See Figure 2) provides convenient storage space for cylinders of new refrigerant. These cylinders can be connected to ports on the rear of the TC2770. The TC2770 Charging Cylinder can be filled directly from these external cylinders the same as described for recovering refrigerant from an A/C System.

NEVER turn either cylinder of refrigerant up-side-down. This would introduce liquid into the TC2770 which will cause the machine to malfunction and may damage the compressor and void the warranty.

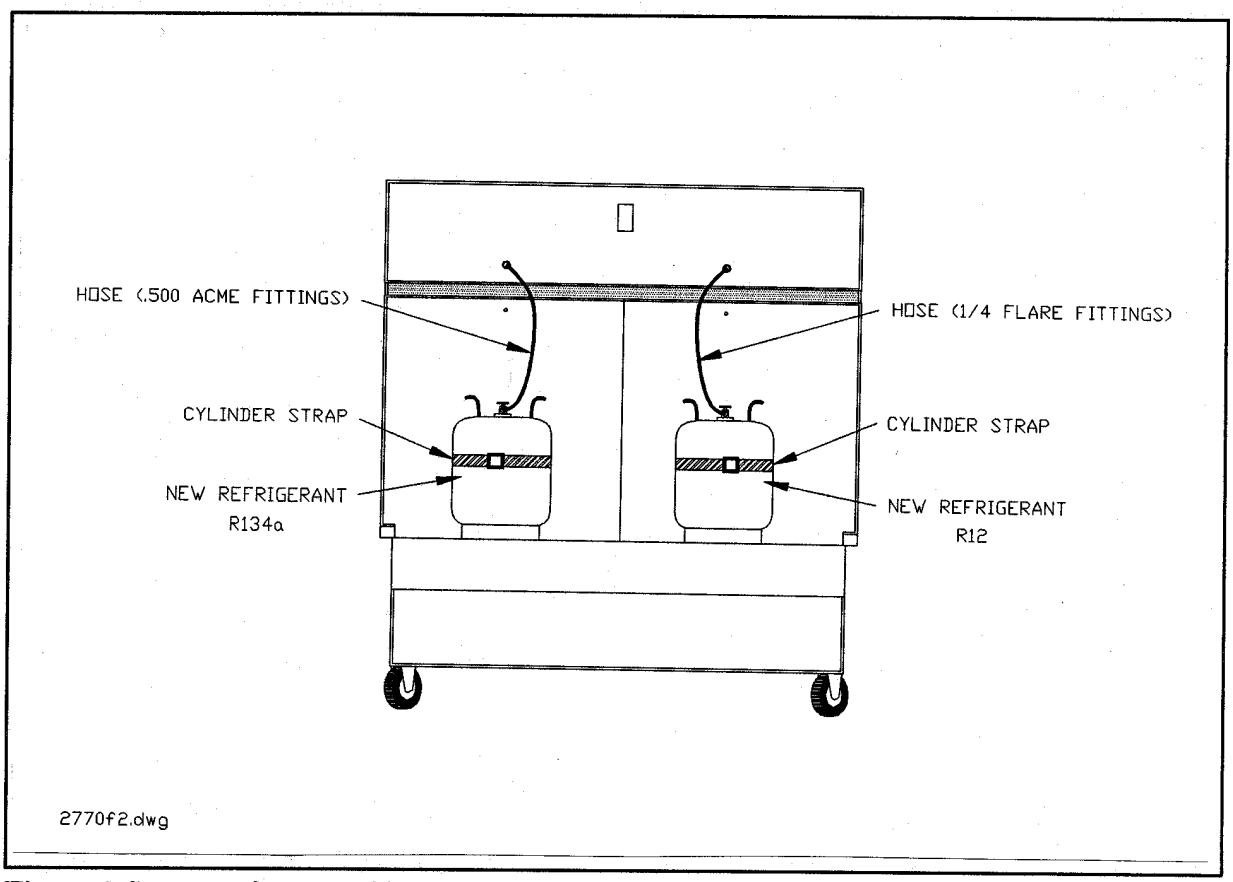


Figure 2 Storage of New Refrigerant

Always keep valves on cylinders of refrigerant stored on the rear of the TC2770 closed when not filling the Charging Cylinder.

Another possible configuration of cylinders on the rear platform is shown in Figure 3. DOT Cylinders are shown connected to the rear ports of the TC2770. This configuration allows charging refrigerant from the TC2770 Charging Cylinder into the DOT Cylinder for temporary storage. This stored refrigerant can later be recovered back into the Charging Cylinder as needed.

ALWAYS connect the hose to the VAPOR VALVE of the DOT cylinders. Do not depend on knob color, but rather observe the embossed marking on the knob. Connecting the hose to the liquid valve will cause the machine to malfunction and may damage the compressor and void the warranty.

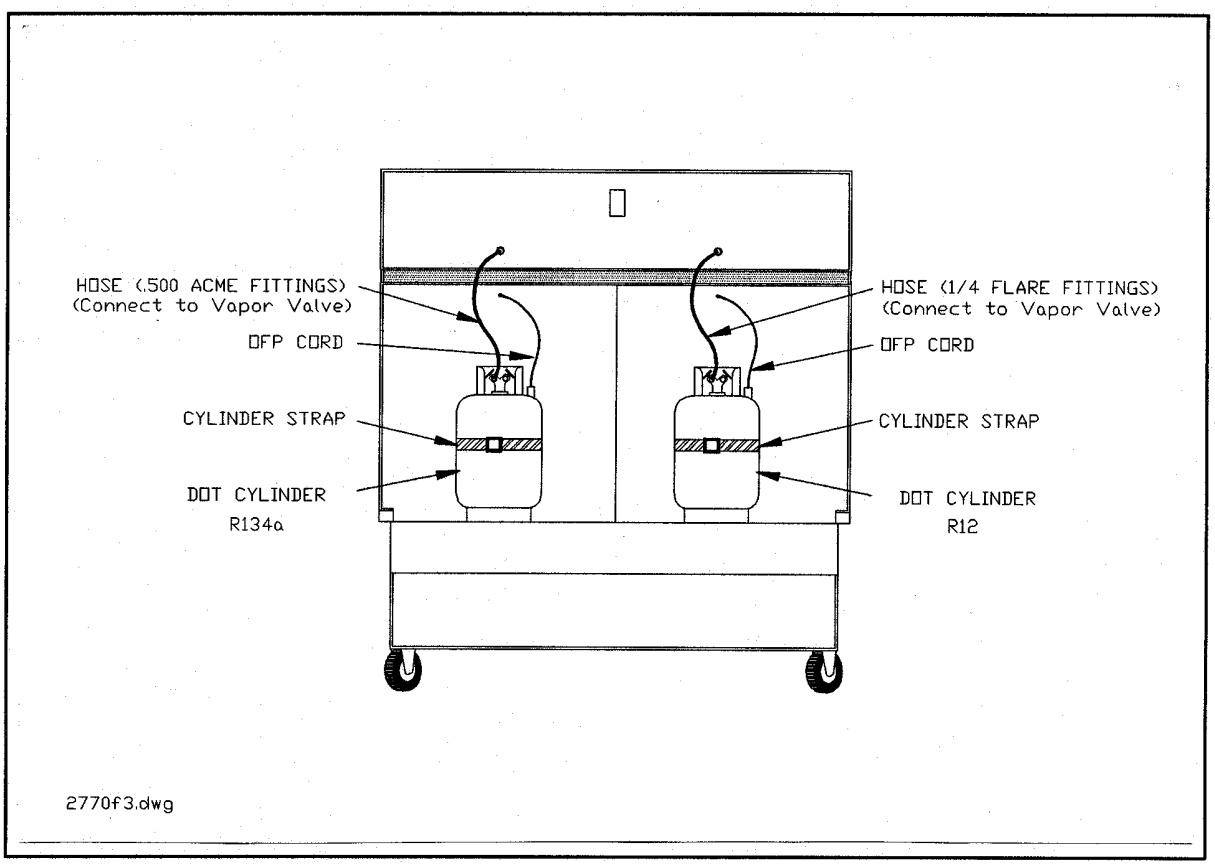


Figure 3 Storage of Refrigerant in DOT Cylinders

Optional Overfill Protection (OFP) devices must be added to prevent overfilling the DOT Cylinders attached to the TC2770. These devices consist of a float switch mounted in the DOT Cylinder. The TC2770 will automatically stop charging refrigerant from the Charging Cylinder when the DOT Cylinder is 80 percent full.

RECYCLE MODE

The first step in operating the TC2700 is to determine the type of refrigerant in the A/C System being serviced. A label on the A/C Compressor or on the vehicle fire wall should indicate either R12 or R134a. Access ports on the system are another indicator of refrigerant type; R12 will have 1/4 Flare Fittings while R134a will have larger special fittings.

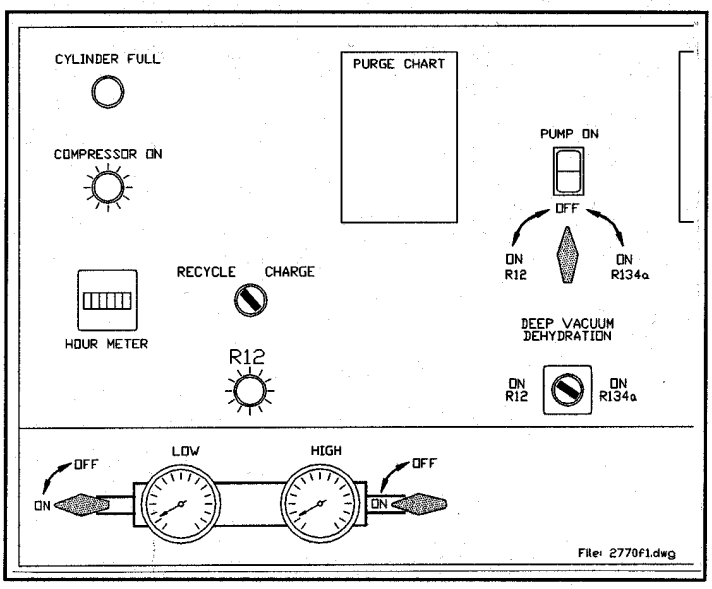


Figure 4 Recycle

Refer to Figure 4 for the following description of operation. For this discussion, it is assumed that the refrigerant being recovered is R12.

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 High and Low Gauge Valves on the TC2770.

3. Open Valves on the ends of the Red and Blue Hoses.

4. Turn Recycle/Charge Selector Switch to RECYCLE.

5. Turn the Power Switch to the ON-R12 position. The Yellow Light will illuminate to indicate that the R12 circuit is active. The green COMPRESSOR ON Light will illuminate.

   The TC2770 will recover refrigerant from the A/C System until a vacuum is sensed. The COMPRESSOR ON Light will go off.

   • **DO NOT TURN THE TC2770 OFF OR DISCONNECT HOSES** •

   A small quantity of Liquid refrigerant will probably still remain in the A/C System. This can be detected by observing an increasing pressure reading on the Low Side Gauge.

   As pressure increases to a preset level, the TC2770 will again start to recover refrigerant.

   Allow this sequence to repeat until the vacuum level remains constant for at least 2 minutes.

5. Close Red and Blue Hose Valves.

6. Close High and Low Gauge Valves on the TC2770.

7. Turn the Power Switch to DEEP VACUUM/DEHYDRATION. The A/C System can now be serviced as required.

CYLINDER FULL LIGHT:

This light will illuminate if the Charging Cylinder has filled to capacity. It is necessary to charge some refrigerant out before the TC2770 can continue recovering. Refer to the sections in this manual on Air Purge and Charge Mode.

OIL DRAIN & RTI RAPID AIR PURGE SYSTEM PROCEDURE

Oil and Non-condensable Gas (Air) are separated from the recovered refrigerant and **MUST** be removed following **EACH** recycling procedure as follows:

1. **MOMENTARILY** press and hold the Purge Button (Side of the TC2770 - Facing front of unit, left side for R12 or right side for R134a) until the pressure reading on the Pressure Gauge above this button drops approximately 10 PSIG.

2. **SLOWLY** open the Oil Drain Valve (Facing rear of unit, lower left for R134a or lower right for R12) to vent Non-condensable Gas and drain any oil which may have been removed from the A/C System. A plastic cup is provided to collect and measure the oil.

   Unless the A/C System had previously been overfilled, the TC2770 will typically not remove enough oil to make replenishment necessary.

   Leave the Oil Drain Valve open.

3. Determine the room temperature.

4. Locate the pressure (PSIG) corresponding to this room temperature (^{0}F) in the chart on the top of the TC2770. This chart is reproduced at the right.

   If the pressure indicated on the gauge is greater than that determined from the chart...

   Press and hold the Purge Button until the gauge pressure equals that shown in the chart. Any Non-condensable Gas will be vented through the Oil Drain Valve.

5. Close the Oil Drain Valve.

6. Press and hold the Purge Button for approximately 5 seconds. This permits any residual Non-condensable Gas to be recirculated for reprocessing during the next recycle procedure.

^{0}F	R12	R134a
30	42	40
32	44	42
34	46	44
36	48	46
38	50	49
40	52	51
42	54	54
44	57	56
46	59	59
48	61	61
50	64	64
52	66	67
54	69	70
56	72	72
58	74	76
60	77	78
62	80	82
64	83	85
66	85	88
68	88	92
70	92	95
72	95	97
74	98	104
76	102	107
78	105	110
80	108	114
82	112	118
84	115	123
86	118	127
88	123	130
90	127	135
92	130	140
94	135	145
96	138	148
98	143	153
100	147	157
102	150	163
104	155	167
106	160	173
108	165	180
110	168	185
112	173	190
114	178	195
116	183	200
118	188	207
120	193	213

Purge Chart

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 TC2770 provides the capability of performing this "Deep Vacuum and Dehydration".

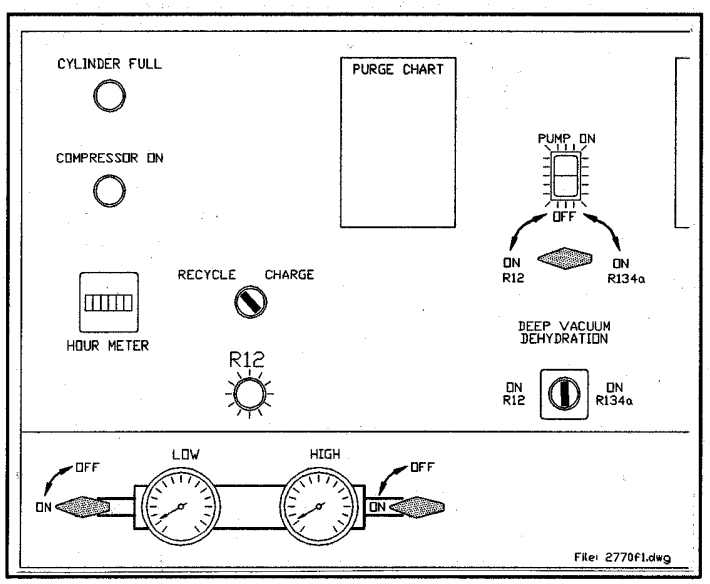


Figure 5 Vacuum

Refer to Figure 5 for the following description of operation. For this discussion, it is assumed that the A/C System being serviced is R12.

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 the Deep Vacuum Dehydration Valve to the R12/ON position.

5. Turn the Power Switch to DEEP VACUUM & DEHYDRATION.

6. Press the top of the PUMP ON Switch. The Vacuum Pump will start and the TC2770 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 TC2770, the Vacuum Pump will not start, as this would result in venting of refrigerant. If this occurs, perform the recycle operation described earlier.

ALSO... It may be necessary to momentarily loosen the Blue Hose to break the vacuum and allow the pump to start if its operation has been interrupted.

HOSE EVACUATION PROCEDURE

It's important that Air not be introduced into the A/C System during a Charging procedure. If an Evacuation 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:

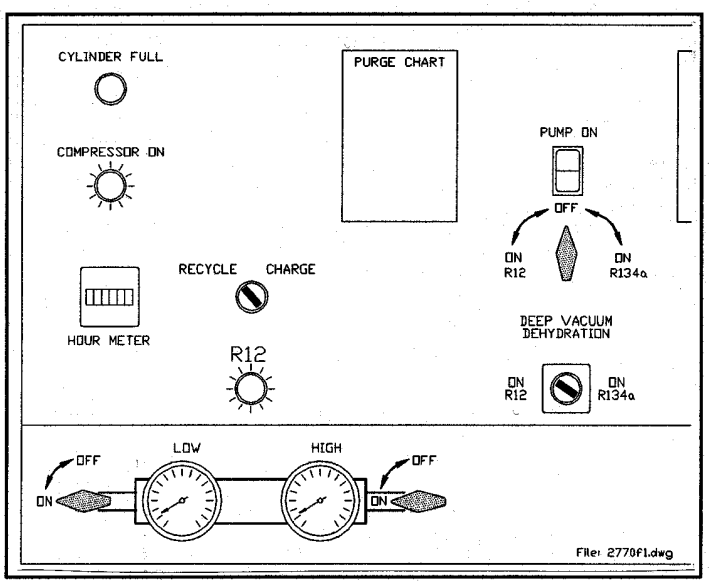


Figure 6 Hose Evacuation

Refer to Figure 6 for the following description of operation. For this discussion, it is assumed that the A/C System being serviced is R12.

1. Close Red and Blue Hose Valves.

2. Open High and Low Gauge Valves on the TC2770.

3. Turn RECYCLE/CHARGE Selector to RECYCLE.

4. Turn the Power Switch to the ON-R12 position. The Yellow Light will illuminate to indicate that the R12 circuit is active. The green COMPRESSOR ON Light will illuminate.

5. Let the TC2770 run until the COMPRESSOR ON Light goes OFF.

6. Turn High and Low Gauge Valves to OFF.

7. Turn the Power Switch to VACUUM & DEHYDRATION. All Air has now been removed from the Hoses.

8. Vent any Non-condensable Gas as described in the previous section.

FILLING THE CHARGING CYLINDER

The Charging Cylinder will often times require addition of new refrigerant. Inlet Ports on the rear of the TC2770 provide a simple method of putting refrigerant into the TC2770 without disconnecting and reconnecting hoses.

The TC2770 rear ports are connected internally to the same point as the Service Hose Inlets on the front of the TC2770. Follow the RECOVER/RECYCLE PROCEDURE earlier in this manual. The only difference will be that the LOW and HIGH Gauge Manifold Valves on the Control Panel will remain in the OFF position. Instead, the refrigerant will flow into the Charging Cylinder from the rear ports.

Always keep valves on all cylinders on the rear of the TC2770 closed when not transferring refrigerant from or to the Charging Cylinder.

CHARGE MODE

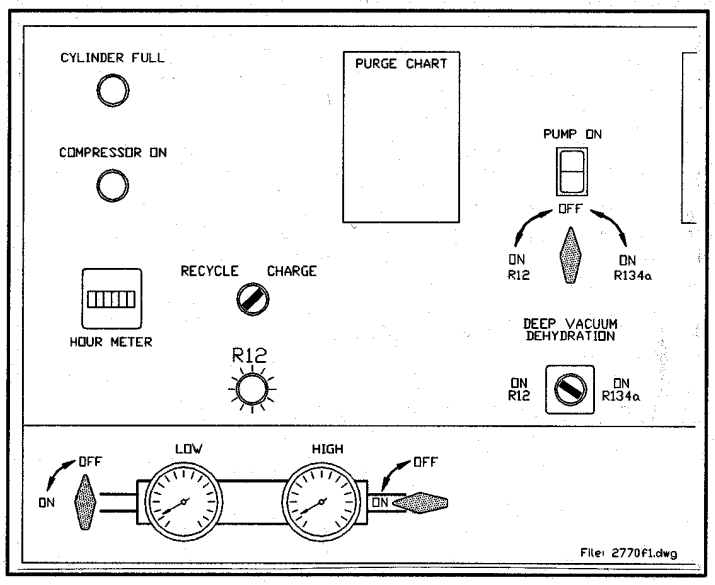


Figure 7 Charge

Refer to Figure 7 for the following description of operation. For this discussion, it is assumed that the A/C System being serviced is R12.

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 the RECYCLE/CHARGE Selector to CHARGE.

4. Turn the Power Switch to the R12 position. The Yellow Light will illuminate to indicate that the R12 circuit is active. The Charging Cylinder will now be heating to develop pressure for charging.

5. Open the High Gauge Valve on the TC2770. 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 for setting the TC2770 charge indicator.

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

   (TC2770 Liquid Level) - (A/C System Capacity) = Indicator Setting

EXAMPLE: The level of liquid visible in the TC2770 Charging 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 Charging Cylinder Sight Glass.

8. Close High Gauge Valve as soon as the refrigerant level drops to the sliding indicator.

9. Turn the Power Switch to DEEP VACUUM/DEHYDRATION.

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

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

Always close all valves before disconnecting hoses.

NOTE: The preceding is the recommended method of charging with the TC2770.

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

SCHEDULED MAINTENANCE

COMPRESSOR OIL LEVEL

Check the Compressor oil level after every 50 hours of operation as follows: 1) Locate the small tube at the bottom of the Compressor body and the fill port near the center of the Compressor body, 2) Unscrew both safety caps, 3) Relieve pressure by pushing in on the Schrader Valve in the fill port near the center of the Compressor body (*Not the small tube on the bottom*), 4) Remove Schrader Valve from the small tube on the bottom and look for the oil level in the tube.

If oil is not visible in the tube, then oil must be added so that the level is such that it just runs out of the small tube on the bottom. To add oil, remove the Schrader Valve from the fill fitting near the center of the Compressor body. After adding oil, reinstall both Schrader Valves and screw on the safety caps. The process is similar to checking/adding oil to a manual transmission or differential. Schrader Valves along with the safety caps are present to insure against leaks. The recommended oil is 3GS refrigerant compressor oil, available from any HVAC commercial refrigeration supply distributor or from RTI and/or most RTI Distributors. Call RTI Technical Support for assistance at 800-468-2321 if needed.

CONDENSER

Periodically clean the Condenser to maintain high efficiency performance of the TC2770. Blow compressed air through the cooling fins of the Condenser to remove any debris.

COMBO FILTER MAINTENANCE

Monitor the Moisture Indicators (Visible through cut-outs on the lower front of the TC2700) for a color change from BLUE to PINK. When the TC2700 is new and immediately after changing Combo Filters, the Moisture Indicator may show PINK. This is due to the exposure to air and does not indicate inadequate filter performance. Only after ten hours of operation (after each filter change) should the Moisture Indicators be used to monitor the performance.

Combo Filters (two for R12 and two for R134a) are located behind the access panels on the front of the TC2700.

The OUTLET Combo Filters can be identified by the presence of insulation around the outside. The Outlet Combo Filters must be changed after 50 hours operation **OR** when the Moisture Indicator shows "Wet" after 20 hours of operation. Hours are indicated on the Hour Meter.

The INLET Combo Filters do not have insulation around the outside. Inlet Combo Filters must be changed after 25 hours operation **OR** when the Moisture Indicator shows "Wet" after 20 hours of operation. Hours are indicated on the Hour Meter.

CHANGING THE COMBO FILTERS...

Remove front panels to access the Combo Filters.

Disconnect Flare Adaptor Fittings at top and bottom of Filters.

Remove the mounting nuts and remove Filters.

Remove the black insulation from the one filter and re-install on the new Filter.

Install new Filters using the hardware removed earlier.

Connect Flare Adaptor Fittings to top and bottom of Filters.

Check for leaks and repair as required.

Replace front panels.

IMPORTANT NOTE: Only the Outlet Combo Filters have a copper tube connected to the bottom fitting. Remove the Schrader Valve from this bottom fitting of the Outlet Combo Filter.

PROBLEMS & SOLUTIONS

On rare occasion the TC2770 may seem to be performing differently or not at all. Experience has shown that varying operating conditions can affect the performance characteristics of the TC2770. The temperature of the vehicle A/C System will affect how the TC2770 performs.

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

PROBLEM: My TC2770 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 TC2770 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 TC2770 using the Recycle Mode. When I checked the sight glass on the Charging 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 Charging Cylinder. This is normal and will explain why all refrigerant is not visible in the sight glass.

PROBLEM: I can not get the TC2770 to draw a vacuum as indicated on the Low Side Gauge.

SOLUTION: Check Hoses for restrictions.

PROBLEM: When I try to fill the Charging Cylinder from an auxiliary cylinder of clean refrigerant, the TC2770 is really slow or shuts down.

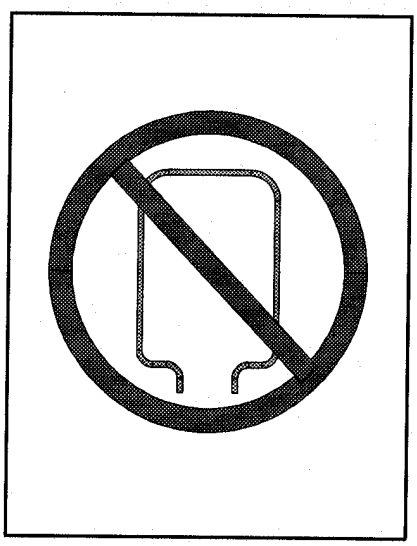
SOLUTION: The auxiliary cylinder will cool due to the vaporization of refrigerant. This causes the pressure to decrease.

Use a heat belt to increase the speed of recycling by the TC2770.

PROBLEM: I turned a 30 lb. cylinder of new refrigerant up-side-down to fill the Charging Cylinder. The Charging Cylinder didn't fill and now the TC2770 won't recover from an A/C system.

SOLUTION: The TC2770 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 TC2770 WILL OVERFILL WITH LIQUID REFRIGERANT. THIS OVER FILLS THE SUCTION ACCUMULATOR WITH LIQUID.

FROST ON THE OIL DRAIN ON THE REAR OF THE TC2770 IS A GOOD INDICATION OF THIS OCCURRENCE.

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

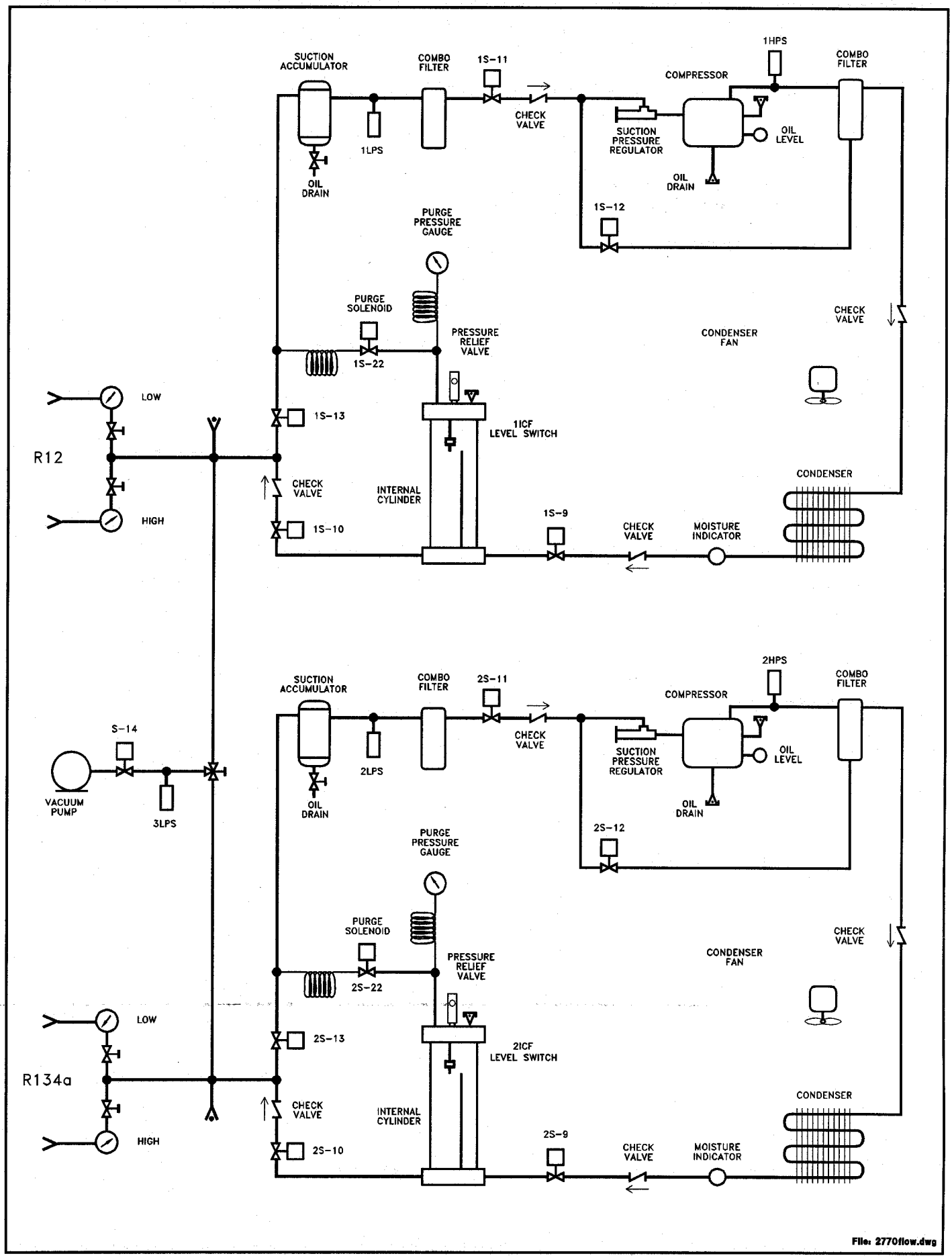
THIS CAN DESTROY THE COMPRESSOR AND WILL VOID THE WARRANTY.

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 TC2770 as follows:

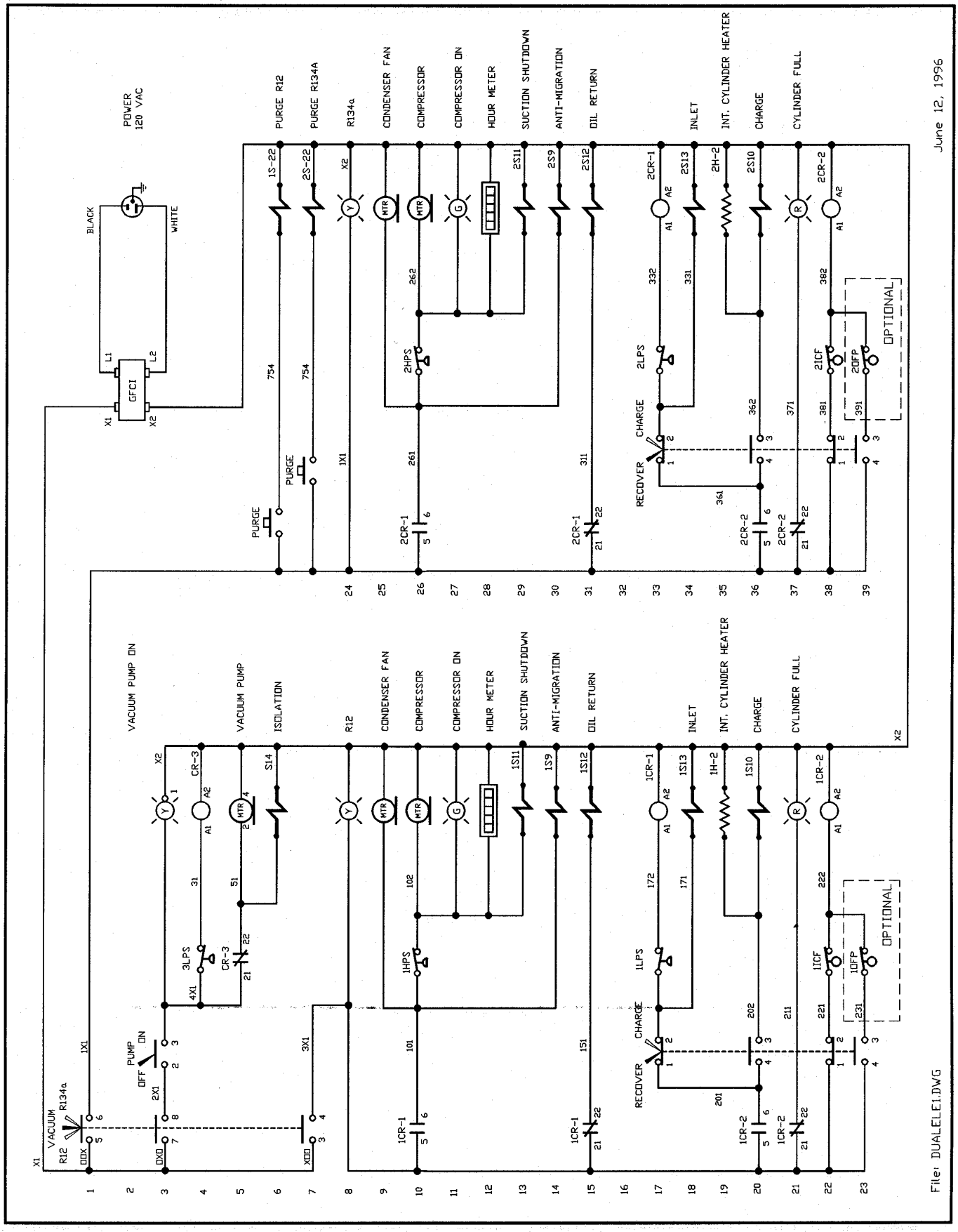
Draw a deep vacuum (25 to 29 In. Hg.) on an empty cylinder and connect it to the Oil Drain Valve. Open the cylinder valve and the Oil Drain valve.

Close the valves and disconnect the cylinder after the liquid has been drawn into the cylinder. This refrigerant can now be recycled by the TC2770 following normal recycling procedures.

If the above suggested solutions do not solve the problem, call 800-468-2321 and one of our technicians will help diagnose the cause. Please have the Serial Number available for reference.



FLOW DIAGRAM - TC2770



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