

OPERATING INSTRUCTIONS



LV5

**REFRIGERANT RECOVERY UNIT
NATIONAL REFRIGERATION PRODUCTS**

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MODEL LV5 REFRIGERANT RECOVERY UNIT

This unit is designed to recover both liquid and vapor refrigerant in a one-step process.

For use with Category III, IV, V Refrigerants

Including but not limited to R12, R22, R500, R502, 134A, and R410A

230V, 2 HP, 60 Hz, 20 AMPS

PRECAUTIONS

- DO NOT OPERATE THE LV5 UNIT BEFORE READING THE OPERATING INSTRUCTIONS COMPLETELY.
- ALWAYS WEAR RUBBER GLOVES AND SAFETY GOGGLES WHEN TRANSFERING REFRIGERANT.
- EVACUATE THE LV5 BEFORE EACH REFRIGERANT RECOVERY PROCESS BY OPERATING IN "PUMP OUT" MODE WITH THE INLET VALVE CLOSED AND THE OUTLET VALVE OPEN TO THE ATMOSPHERE. PLEASE REFER TO PUMP OUT PROCEDURES ON PAGE 6.
- EVACUATE CYLINDERS AND REFRIGERANT HOSES PRIOR TO THE REFRIGERANT RECOVERY PROCESS TO 1000 MICRONS.
- BEFORE EACH REFRIGERANT RECOVERY PROCESS ALWAYS USE A NEW FILTER-DRIER AT THE INLET OF LV5 TO PROTECT THE COMPRESSOR, PRESSURE REGULATOR, AND SOLENOID VALVES. CHANGE OUT OFTEN WHEN NECESSITATED - BURNOUTS, DIFFERENT REFRIGERANTS, ETC.
- IT IS VERY IMPORTANT THAT THE OIL LEVEL IN THE COMPRESSOR BE CHECKED BEFORE EACH USE AND CLOSELY MONITORED DURING EXTENDED PERIODS OF OPERATION. OIL SHOULD BE CHANGED AFTER EACH REFRIGERANT RECOVERY PROCESS OR WHEN NECESSITATED- BURNOUTS, DIFFERENT REFRIGERANTS, AND ETC UNIT REQUIRES 34OZ. OF POE OIL.
- REMOVE AND CLEAN THE INLET MESH STRAINER AFTER 20 HOURS OF OPERATION. IT IS LOCATED ABOVE THE SIGHT GLASS ON THE INLET LINE.
- WHEN NOT IN USE KEEP ALL VALVES IN THE CLOSED POSITION. THE LV5 IS JUST LIKE A REFRIGERATION UNIT AND MUST NOT BE OPENED TO THE AIR SINCE MOISTURE WILL DAMAGE THE COMPRESSOR.
- ALWAYS USE A PROPERLY GROUNDED 230 VOLT, SINGLE PHASE, 60Hz OUTLET. DO NOT USE AN EXTENSION CORD LONGER THAN 25 FEET. THE AMPERAGE DROP MAY DAMAGE THE MOTOR.
- REFRIGERATION HOSES SHOULD NOT EXCEED 20 FEET IN LENGTH. ALWAYS USE 3/8" OR 1/2" DIAMETER HOSES FOR MAXIMUM REFRIGERANT FLOW.
- HIGH VOLTAGE IS PRESENT IN THE CONTROL COMPARTMENT AND UNDER NO CIRCUMSTANCES SHOULD SERVICE BE ATTEMPTED ON THE LV5 WITHOUT FIRST DISCONNECTING THE PLUG. FAILURE TO DO SO COULD RESULT IN SEVERE INJURY OR DEATH.

OVERVIEW- LV5 OPERATION

The LV5 removes both liquid and vapor refrigerant without resetting the unit. LV5 will transfer refrigerant liquid directly at a rate of about 10 lbs. /min. It draws liquid refrigerant into the receiver which is on the suction side of the LV5 compressor while discharging high pressure vapor into the other receiver. Before the suction receiver gets full, solenoid valves switch the discharge through the LV5 condenser and into the recovery cylinder. The solenoid valves switch the refrigerant path in sequence so each receiver fills with refrigerant then empties into the recovery cylinder. The switching of the solenoid valves is controlled by floats (installed inside the receivers) and a latching relay.

The unit has two sight glasses. The first sight glass is installed after the inlet valve and is for monitoring the state (liquid/vapor) of the incoming refrigerant. The second sight glass is installed in the suction line near the compressor and is to alert operators if liquid flows to the compressor. **If this occurs the operation of the unit must be stopped.**

When all liquid is removed from the serviced system (the sight glass after inlet valve shows no liquid coming in) the LV5 unit will recover vapor at a rate of about 1.2 lbs/min. The last portion of liquid, entering the LV5 unit, will not activate the floats (inside the receivers) and switch the refrigerant path. This liquid will boil off gradually while the compressor pulls vapor.

If the receiver containing the liquid becomes frozen and the recovery rate decreases **press and release** the push button marked "LIQUID OUT" on the side corresponding to the frozen receiver. This will increase the recovery rate.

NOTE: DO NOT DEPRESS BOTH PUSH-BUTTONS LABELED 'LIQUID OUT' AT THE SAME TIME. WHEN UTILIZING DEPRESS AND RELEASE THE 'LIQUID OUT' BUTTON IMMEDIATELY, HOLDING BUTTON IN MAY DAMAGE COMPRESSOR

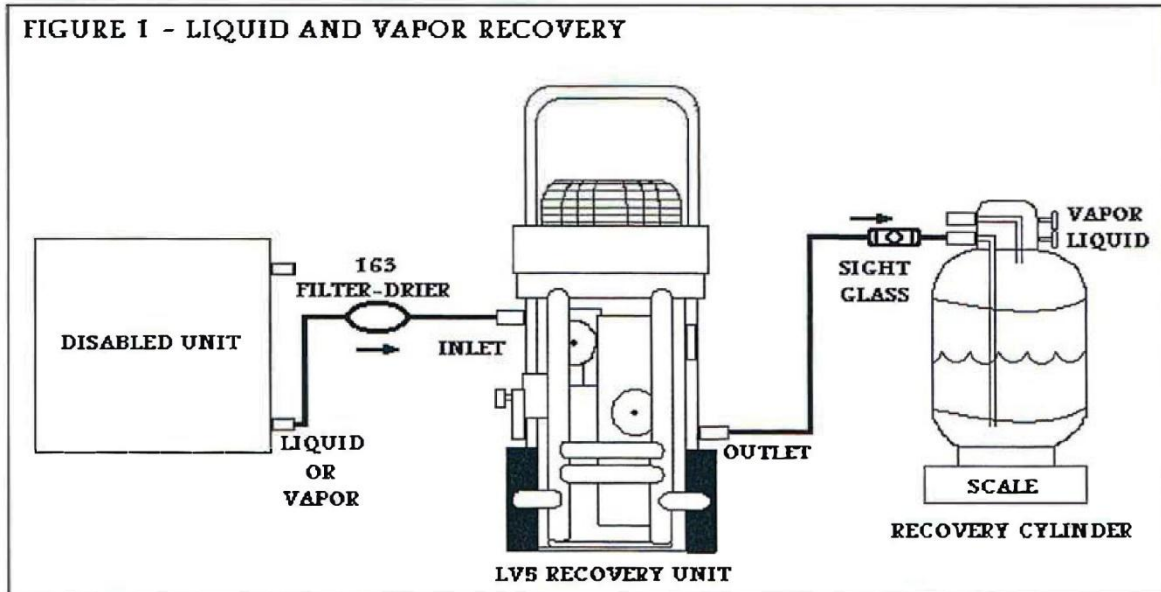
The LV5 unit has a cylinder overfill protection feature. When using recovery cylinders with an automatic shut-off (such as NRP# NC50U) turn the switch labeled ("AUTO-MAN") to "AUTO" and connect the yellow cord to the recovery cylinder. The LV5 will shut-off automatically at 80% of the cylinders capacity. When using a recovery cylinder without the automatic shut-off feature turn the ("AUTO-MAN") switch to "MAN". Use a scale to determine the weight of recovered refrigerant.

NOTE: NEVER OVERFILL CYLINDERS (THE MAXIMUM IS 80% OF CYLINDERS RATED CAPACITY

When the transfer of refrigerant is completed, from the serviced unit to the cylinder(s), the LV5 can pump out any residual refrigerant left in its receivers or condenser. Since this procedure involves the transfer of refrigerant directly into a recovery cylinder, without the benefit of a condenser, it is necessary to discharge refrigerant into an evacuated cylinder.

NOTE: DISCHARGING HIGH PRESSURE REFRIGERANT INTO A WARM OR NEARLY FULL CYLINDER MAY RESULT IN VERY HIGH PRESSURE WHICH CAN DAMAGE THE COMPRESSOR.

Liquid and Vapor Recovery Method



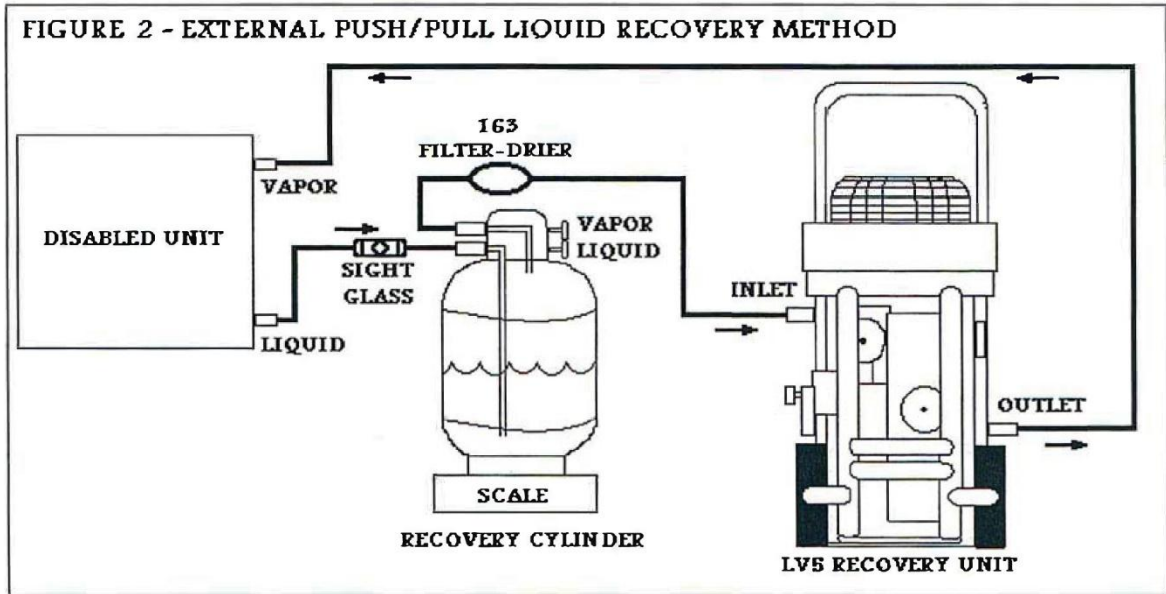
1. Check the compressor oil level of the LV5 (it should cover half of the sight glass).
2. Make sure the inlet and outlet valves on the LV5 are closed.
3. Connect one side of a hose or manifold to the unit being serviced. Connect the other side to the valve labeled "REFRIGERANT IN" on the LV5.
4. Connect a hose from the valve labeled "REFRIGERANT OUT" on the LV5 to the liquid valve of your recovery cylinder.
5. Purge all the hoses.
6. Open the valve labeled "REFRIGERANT OUT" on the LV5. Open the liquid valve of the recovery cylinder.
7. Plug in the unit to a 230-1-60 Hz outlet and switch to recovery mode.

NOTE: If you are recovering for the first time after pump-out or evacuation, slightly open the valve labeled "REFRIGERANT IN" to break the vacuum inside the LV5. Close the valve labeled "REFRIGERANT IN". Wait ten (10) seconds. Go to the next step.

8. Slowly open the valve labeled "REFRIGERANT IN".
9. Operate LV5 until all the refrigerant is recovered.
10. Turn off the LV5 and close all valves.

To achieve a deep vacuum (20" Hg or deeper) connect an evacuated recovery cylinder to the valve labeled "REFRIGERANT OUT" on the LV5 unit at the end of the recovery process.

External Push/Pull Liquid Recovery Method



Liquid refrigerant is transferred directly from the disabled unit to the recovery cylinder at a maximum rate of 27 pounds per minute.

The LV5 pulls vapor from the top of the recovery cylinder. It compresses the vapor and pumps it into the disabled unit. This maintains a lower pressure in the cylinder than in the disabled unit, which pulls the liquid refrigerant into the cylinder.

1. Connect the disabled unit, cylinder, and recovery unit as shown in above Figure 2.
2. Purge all hoses.
3. Open both valves on the cylinder and both valves on the recovery unit.
4. Push the power switch into "RECOVERY" mode.
5. Refrigerant liquid can be seen through the sight glass connected to the liquid side of the recovery cylinder.
6. When liquid transfer is complete or the cylinder is 80% full, turn off the recovery unit and close the valves on the cylinder and the recovery unit.

NOTE: In some cases it may not be possible to recover the refrigerant in liquid form. There may not be much liquid refrigerant or it has migrated to another part of the system. In this case the refrigerant will have to be recovered in vapor form.

REFRIGERANT PUMP-OUT PROCEDURES

NOTE: NEVER OPERATE THE LV5 UNIT IN PUMP OUT MODE WITH IN THE INLET VALVE OPEN. AFTER THE PUMP-OUT IS COMPLETED A SMALL AMOUNT OF HIGH PRESSURE REFRIGERANT WILL REMAIN IN THE DISCHARGE LINE.

To “PUMP OUT” the LV5 unit:

1. Close both the valve labeled “REFRIGERANT IN” and the valve labeled “REFRIGERANT OUT”.
2. Connect a hose from the valve labeled “REFRIGERANT OUT” to the vapor valve of your recovery cylinder.
3. Open the valve labeled “REFRIGERANT OUT”.
4. Push the switch into the “PUMP OUT” position.
5. “PUMP OUT” is finished when the necessary vacuum is achieved.
6. Push the power switch into the “OFF” position. Close the valves on the recovery cylinder. Close the valves on the LV5. Remove hoses. A small amount of high pressure refrigerant will remain in the discharge line of the LV5.
7. The LV5 is prepared for the next transfer job. A total evacuation of the unit can only be obtained by using a vacuum pump.

If, by mistake, “PUMP OUT” mode was started instead of recovery and the inlet valve was opened:

1. Turn off the LV5 unit and close inlet valve as soon as possible.
2. Close the outlet valve.
3. Obtain an empty, evacuated cylinder and connect it to the outlet valve.
4. Open the outlet valve and discharge refrigerant into the cylinder.
5. Start normal recovery procedure.

CHANGING OR ADDING OIL

Always change the oil in the compressor and the oil separator after recovery from a burn-out system.

1. Evacuate the unit by operating it in the "PUMP-OUT" mode
2. Turn off the unit and close all the valves.
3. Disconnect the unit from the recovery cylinder.
4. Open the discharge valve and turn the switch to "PUMP-OUT" for two seconds (DO NOT STAND INFRONT OF THE DISCHARGE VALVE).
5. Disconnect the 1/4" flare (cap and core) from the (tee) on the left side of the compressor (over the sight glass).
6. Place a container under the compressor oil drain fitting located on the left side of the compressor crankcase.
7. Remove the 1/4" flare cap and valve core, drain the oil, and replace the core tap.
8. Connect a hose to the tee on the left side of the compressor (over the sight glass) and place the other end into a container with fresh refrigeration oil (500 viscosity NATIONAL 500). Run the compressor until there is a slight vacuum showing on the suction gauge. Allow the oil to flow into the compressor until one quarter of the sight glass is full. Remove the hose from the oil and allow its content to be drawn into the compressor. Repeat if necessary. DO NOT OVERFILL!
9. Install the 1/4 " flare cap and core in the tee at the left side of the compressor (over the sight glass)
10. Evacuate the unit by operating it in the "PUMP-OUT" mode with the outlet valve open to the atmosphere.
11. Close the refrigerant outlet valve.

PROCEDURE AFTER TRANSFERRING REFRIGERANT FROM A "BURN-OUT"

1. Drain the LV5 compressor and oil separator and replace with the appropriate amount of fresh refrigeration oil. Remember to fill the LV5 with oil to proper level on sight glass.
2. Replace the filter-drier in the suction line.
3. Evacuate the LV5 recovery unit and hoses.

PROCEDURE TO FOLLOW BEFORE TRANSFERRING A DIFFERENT REFRIGERANT

1. Drain the LV5 compressor and oil separator and replace with appropriate amount of fresh refrigerant oil.
2. Replace the filter-drier in the suction line.
3. Evacuate the LV5 recovery unit and hoses.

PROCEDURE TO FOLLOW BEFORE TRANSFERRING A DIFFERENT REFRIGERANT

1. To avoid mixing different refrigerants in recovery cylinders always pump out the recovery unit at the end of each transfer operation. This "PUMP OUT" operation will remove the refrigerant from the condenser, receivers and internal piping of the recovery unit.
2. Replace the filter-drier in the suction line before recovering a different refrigerant.
3. Evacuate the recovery unit with a vacuum pump for 15 minutes or to 1000 microns. This evacuation will remove any refrigerant left in the recovery unit.
4. To evacuate the recovery unit turn the "AUTO-MAN" switch to "AUTO". Open the discharge valve (DO NOT STAND INFRONT OF THE DISCHARGE VALVE). Turn the power switch to the "PUMP OUT" mode. This will release a small amount of high pressure refrigerant through the discharge valve to the atmosphere. Connect a vacuum pump to the discharge valve and evacuate is complete.
5. Mark the refrigerant number on each recovery cylinder at the time of recovery.
6. Remember that mixed refrigerants cannot be separated and that it is expensive to dispose of mixtures.

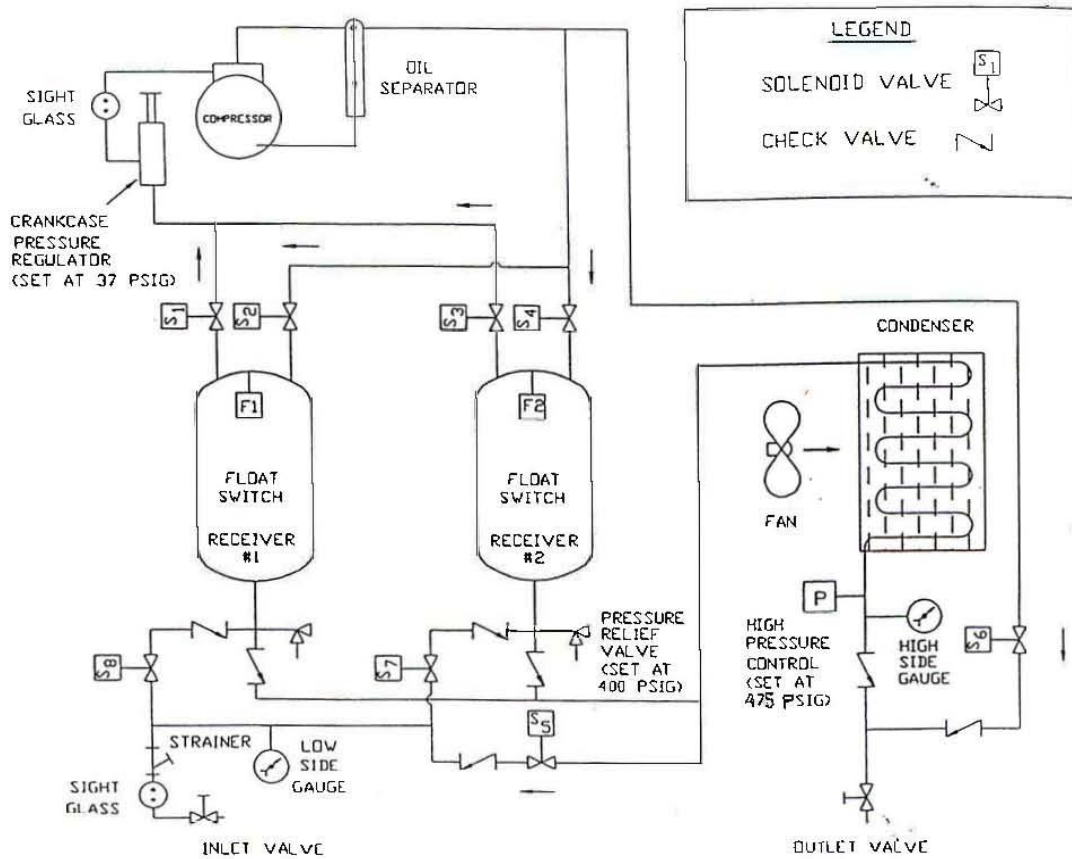
WARRANTY

National Refrigeration Products (NRP) Recovery Equipment is warranted to be free from manufacturing defects. NRP will repair or give credit for repair, at NRP's choice, if any NRP Recovery units or accessories have manufacturing defects. Any of the invoice. In no event shall NRP be liable for the cost of the labor charges, lost profits, injury to good will, or any other special or consequential damages for defective goods, late delivery, or non-delivery. There are no warranties which extend beyond the description on the face hereof, and NRP makes no warranty of merchantability or fitness for specific purpose. Warranty does not cover damage by improper operation or abuse.

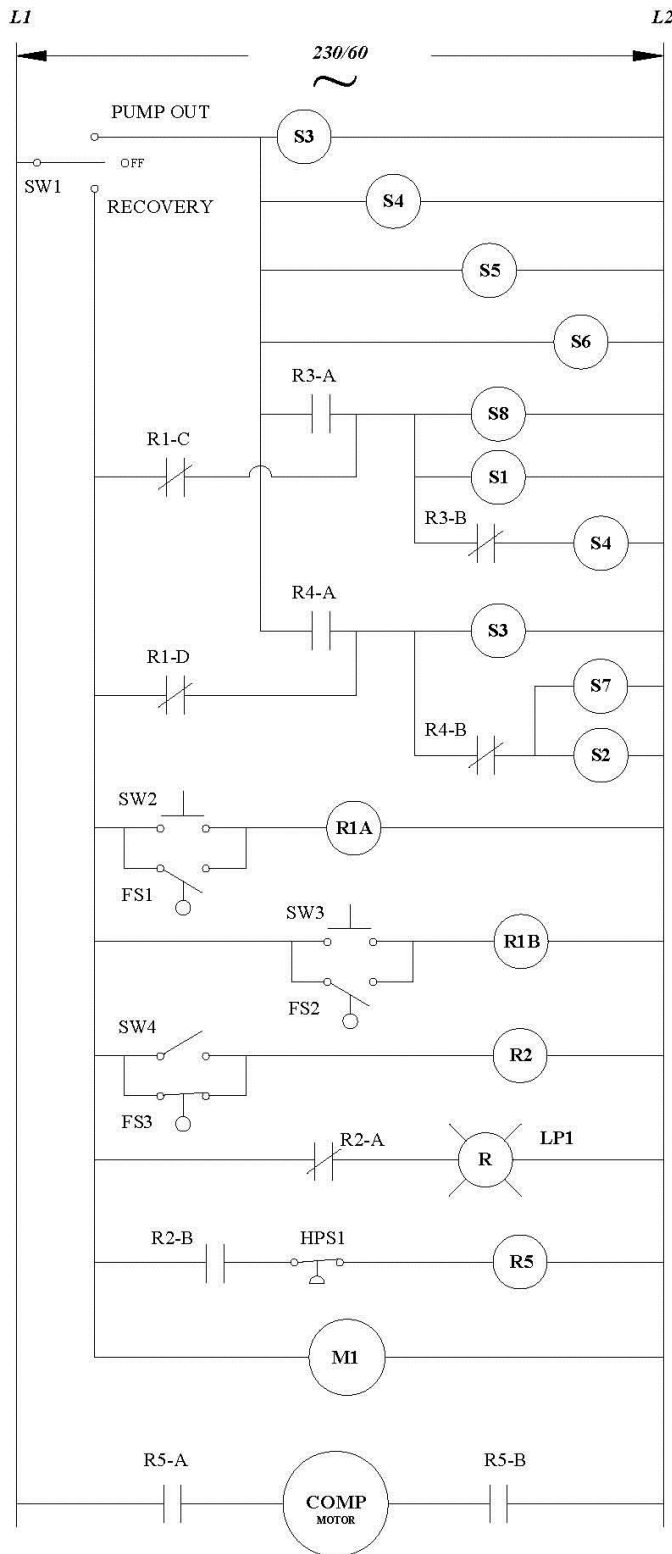
LV5 (PIPING DIAGRAM)

OPERATIONAL CYCLES

1. RECEIVER #1-PULLING IN REFRIGERANT & RECEIVER #2-PUSHING OUT REFRIGERANT; S1, S4 & S8-OPEN; S2, S3, S5, S6 & S7-CLOSED.
2. RECEIVER #2-PULLING IN REFRIGERANT & RECEIVER #1-PUSHING OUT REFRIGERANT; S2, S3 & S7-OPEN; S1, S4, S5, S6 & S8-CLOSED.
3. PUMP-OUT MODE
S1, S3, S5, S6, S8-OPEN; S2, S4, S7-CLOSED



LV5 LADDER SCHEMATIC



LEGEND:

- OMP. - COMPRESSOR
- FS1 - FLOAT SWITCH FOR RECEIVER TANK #1
- FS2 - FLOAT SWITCH FOR RECEIVER TANK #2
- FS3 - FLOAT SWITCH FOR RECOVERY TANK
- HPS1 - HIGH PRESSURE SWITCH (475 PSIG)
- L1 & L2 - LINE VOLTAGE (220 V DROP ACROSS)
- LP1 - RECOVERY CYLINDER FULL LAMP, RED
- M1 - CONDENSOR FAN MOTOR
- R1A - LATCHING RELAY COIL, CONTACTS 2 & 10
- R1B - LATCHING RELAY COIL, CONTACTS 3 & 6
- R1-C - LATCHING RELAY N. C. CONTACTS 8 & 11
- R1-D - LATCHING RELAY N. O. CONTACTS 1 & 4
- R2 - RELAY COIL, CONTROLS CYLINDER FULL LAMP
- R2-A - N. C. CONTACTS 2 & 4 ON RELAY R2
- R2-B - N. O. CONTACTS 5 & 4 ON RELAY R2
- R3 - RELAY COIL FOR RELAY R3, CONTACTS 1 & 3
- R3-A - N. C. CONTACTS 2 & 4 ON RELAY R3
- R3-B - N. O. CONTACTS 5 & 4 ON RELAY R3
- R4 - RELAY COIL FOR RELAY R4, CONTACTS 1 & 3
- R4-A - N. C. CONTACTS 2 & 4 ON RELAY R4
- R4-B - N. O. CONTACTS 5 & 4 ON RELAY R4
- R5 - CONTACT COIL
- R5-A - N. O. CONTACTS FOR L1
- R5-B - N. O. CONTACTS FOR L2
- S1 - SOLENOID COIL #1
- S2 - SOLENOID COIL #2
- S3 - SOLENOID COIL #3
- S4 - SOLENOID COIL #4
- S5 - SOLENOID COIL #5
- S6 - SOLENOID COIL #6
- S7 - SOLENOID COIL #7
- S8 - SOLENOID COIL #8
- SW1 - POWER SWITCH (ON-OFF-ON)
- SW2 - MOMENTARY SWITCH, RECEIVER #1
- SW3 - MOMENTARY SWITCH, RECEIVER #2
- SW4 - AUTO / MANUAL SWITCH