

**Table V**

**Troubleshooting Checklist for Refrigeration Systems**

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE MEASURE</b>
<b>High condensing pressure.</b>	Air or non-condensable gas in system.	Purge air from condenser.
	Inlet water warm.	Increase quantity of condensing water.
	Insufficient water flowing through condenser	Increase quantity of water.
	Condenser tubes clogged or scaled	Clean condenser water tubes.
	Too much liquid in receiver, condenser tubes submerged in liquid refrigerant.	Draw off liquid into service cylinder.
	Insufficient cooling of air-cooled condenser	Check fan operation, cleanliness of condenser, and for adequate source of air flow
	<b>Low condensing pressure.</b>	Too much water flowing through condenser
Water too cold.		Reduce quantity of water
Liquid refrigerant flooding back from evaporator.		Change expansion valve adjustment, examine fastening of thermal bulb.
Leaky discharge valve		Remove head, examine valves. Replace any found defective.
<b>High suction pressure.</b>	Overfeeding of expansion valve.	Regulate expansion valve, check bulb attachment.
	Leaky suction valve.	Remove head, examine valve and replace if worn.
<b>Low suction pressure.</b>	Restricted liquid line and expansion valve or suction screens.	Pump down, remove, examine and clean screens.
	Insufficient refrigerant in system.	Check for refrigerant storage.
	Too much oil circulating in system.	Check for too much oil in circulation. Remove oil.
	Improper adjustment of expansion valves.	Adjust valve to give more flow.
	Expansion valve power element dead or weak.	Replace expansion valve power element
	Low refrigerant charge.	Locate and repair leaks. Charge refrigerant.

**Table V**

**Troubleshooting Checklist for Refrigeration Systems (Continued)**

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE MEASURE</b>
<b>Compressor short cycles on low-pressure control.</b>	Thermal expansion valve not feeding properly.  1. Dirty strainers. 2. Moisture frozen in orifice or orifice plugged with dirt. 3. Power element dead or weak.	Adjust, repair, or replace thermal expansion valve.  1. Clean strainers. 2. Remove moisture or dirt (Use system dehydrator). 3. Replace power element.
<b>Compressor short cycles on low-pressure control (continued)..</b>	Water flow through evaporators restricted or stopped. Evaporator coils plugged, dirty, or clogged with frost	Remove restriction. Check water flow. Clean coils or tubes.
	Defective low-pressure control switch.	Repair or replace low-pressure control switch.
<b>Compressor runs continuously.</b>	Shortage of refrigerant.	Repair leak and recharge system.
	Leaking discharge valves.	Replace discharge valves.
<b>Compressor short cycles on high-pressure control switch.</b>	Insufficient water flowing through condenser, clogged condenser.	Determine if water has been turned off. Check for scaled or fouled condenser.
	Defective high-pressure control switch.	Repair or replace high-pressure control switch.

**Table V**

**Troubleshooting Checklist for Refrigeration Systems (Continued)**

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE MEASURE</b>
<b>Compressor will not run.</b>	Seized compressor.	Repair or replace compressor.
	<p>Cut-in point of low-pressure control switch too high. High-pressure control switch does not cut-in.</p> <ol style="list-style-type: none"> <li>1. Defective switch.</li> <li>2. Electric power cut off.</li> <li>3. Service or disconnect switch open.</li> <li>4. Fuses blown.</li> <li>5. Overload relays tripped.</li> <li>6. Low voltage.</li> <li>7. Electrical motor in trouble.</li> <li>8. Trouble in starting switch or control circuit.</li> <li>9. Compressor motor stopped by oil-pressure differential switch.</li> </ol>	<p>Set L.P. control switch to cut-in at correct pressure. Check discharge pressure and reset H.P. control switch.</p> <ol style="list-style-type: none"> <li>1. Repair or replace switch.</li> <li>2. Check power supply.</li> <li>3. Close switches.</li> <li>4. Test fuses and renew if necessary.</li> <li>5. Reset relays and find cause of overload.</li> <li>6. Check voltage (should be within 10 percent of nameplate rating).</li> <li>7. Repair or replace motor.</li> <li>8. Close switch manually to test power supply. If OK check control circuit including temperature and pressure controls.</li> <li>9. Check oil levels in crankcase. Check oil pressure.</li> </ol>
<b>Sudden loss of oil from crankcase.</b>	Liquid refrigerant slugging back to compressor crankcase.	Adjust or replace expansion valve.

**Table V**

**Troubleshooting Checklist for Refrigeration Systems (Continued)**

<b>TROUBLE</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE MEASURE</b>
<b>Capacity reduction system fails</b>	Hand-operating stem of capacity control valve not turned to automatic position.	Set hand-operating stem to automatic position.
<b>Compressor continues to operate at full or partial load.</b>	Pressure-regulating valve not opening.	Adjust or repair pressure-regulating valve.
<b>Capacity reduction system fails to load cylinders.</b>	Broken or leaking oil tube between pump and power element.	Repair leak.
<b>Compressor continues to operate unloaded.</b>	Pressure regulating valve not closing.	Adjust or repair pressure regulating valve.

**Table W**

**Troubleshooting Industrial Refrigeration**

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY</b>
Compressor will not start	No power to motor	Check power to and from fuses; replace fuses if necessary Check starter contacts, connections, overloads, and timer (if part winding start). Reset or repair as necessary. Check power at motor terminals. Repair wiring, if damaged.
	Control circuit is open	Safety switches are holding circuit open. Check high pressure, oil failure, and low-pressure switches. Also check oil filter pressure differential switch is supplied. Thermostat is satisfied. Check control circuit fuses if blown; replace. Check wiring for open circuit.
Motor "hums" but does not start	Low voltage to motor	Check incoming power for correct voltage. Call power company or inspect/repair power wiring. Check at motor terminals. Repair or replace as necessary.
	Motor shorted	Check at motor terminals. Repair or replace as necessary
	Single-phase failure in the three-phase power supply	Check power wiring circuit for component or fuse failure.
	Compressor is seized due to damage or liquid	Remove belts or coupling. Manually turn crankshaft to check compressor.
	Compressor is not unloaded	Check unloader system.
Compressor starts but motor cycles off on overloads	Compressor has liquid or oil in cylinders	Check compressor crankcase temperature. Throttle suction stop valve on compressor to clear cylinders and act to prevent recurrence of liquid accumulation.
	Suction pressure is too high	Unload compressor when starting. Use internal unloaders if present. Install external bypass unloader.
	Motor control	Motor control located in hot ambient. Low voltage. Motor overloads may be defective or weak. Check motor control relay. Adjust circuit breaker setting to full load amps.
	Bearings are "tight"	Check motor and compressor bearings for temperature. Lubricate motor bearings.
	Motor is running on single-phase power	Check power lines, fuses, starter, motor, etc., to determine where open circuit has occurred.
Compressor starts but short cycles automatically	Low refrigerant charge	Check and add if necessary.
	Driers plugged or saturated with moisture	Replace cores.

**Table W**

**Troubleshooting Industrial Refrigeration (Continued)**

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY OR COMMENT</b>
Compressor starts but short cycles automatically (continued).	Refrigerant feed control is defective	Repair or replace
	No load	To prevent short cycling, if objectionable, install pump-down circuit, anti-recycle timer or false load system.
	Unit is too large for load	Reduce compressor speed. Install false load system.
	Suction strainer blocked or restricted	Check and clean or replace as necessary.
Motor is noisy or erratic	Motor bearing failure or winding failure	Check and repair as needed.
	If electric starter, check calibration on control elements	Adjust as necessary
Compressor runs continuously but does not keep up with the load	Load is too high	Speed up compressor or add compressor capacity. Reduce load.
	Refrigerant metering device is underfeeding, causing compressor to run at too low a suction pressure	Check and repair liquid feed problems. Check discharge pressure and increase if low.
	Faulty control circuit, may be low pressure control or capacity controls	Check and repair.
	Compressor may have broken valve plates.	Check compressor for condition of parts. This condition can usually be detected by checking compressor discharge temperature.
	Thermostat control is defective and keeps unit running	Check temperatures of product or space and compare with thermostat control. Replace or readjust thermostat.
	Defrost system on evaporator not working properly	Check and repair as needed.
	Suction bags in strainers are dirty and restrict gas flow	Clean or remove.
	Hot gas bypass or false load valve stuck	Check and repair or replace.
Compressor loses excessive amount of oil	High suction superheat causes oil to vaporize	Insulate suction lines. Adjust expansion valves to proper superheat. Install liquid injection (suction line desuperheating).
	Too low of an operating level in chiller will keep oil in vessel	Raise liquid level in flooded evaporator (R-12 systems only).
	Oil not returning from compressor	Make sure all valves are open Check float mechanism and clean orifice. Check and clean return line.

**Table W**

**Troubleshooting Industrial Refrigeration (Continued)**

<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>REMEDY OR COMMENT</b>
Compressor loses excessive amount of oil (continued).	Oil separator is too small	Check selection.
	Broken valves cause excessive heat in compressor and vaporization of oil.	Repair compressor.
	"Slugging" of compressor with liquid refrigerant that causes excessive foam in the crankcase	"Dry up" suction gas to compressor by repairing evaporator. Refrigerant feed controls are overfeeding. Check suction trap level controls. Install a refrigerant liquid transfer system to return liquid to high side.
Noisy compressor operation	Loose flywheel or coupling	Tighten.
	Coupling not properly aligned	Check and align if required.
	Loose belts	Align and tighten per specs. Check sheave grooves.
	Poor foundation or mounting	Tighten mounting bolts, grout base, or install heavier foundation.
	Check compressor with stethoscope if noise is internal	Open, inspect, and repair as necessary.
	Check for liquid or oil slugging	Eliminate liquid from suction mains. Check crankcase oil level.
Low evaporator capacity	Inadequate refrigerant feed to evaporators	Clean strainers and driers. Check expansion valve superheat setting. Check for excessive pressure drop due to change in elevation, too small of lines (suction and liquid lines). A heat exchanger may correct this. Check expansion valve size.
	Expansion valve bulb in a trap	Change piping or bulb location to correct.
	Oil in evaporator	Warm the evaporator, drain oil, and install an oil trap to collect oil.
	Evaporator surface fouled	Clean.
	Air or product velocity is too low	Increase to rated velocity. Coil not properly defrosting. Check defrost time. Check method of defrost.
	Brine flow through evaporator may be restricted	Chiller may be fouled or plugged. Check recirculating pumps. Check process piping for restriction.
Discharge pressure too high	Air in condenser	Purge noncondensibles.
	Condenser tubes fouled	Clean.
	Water flow is inadequate	Check water supply and pump.

Table W

Troubleshooting Industrial Refrigeration (Continued)

PROBLEM	POSSIBLE CAUSE	REMEDY OR COMMENT
Discharge pressure too high (continued).	Water flow is inadequate (continued).	Check control valve. Check water temperature.
	Airflow is restricted	Check and clean: Coils. Eliminators. Dampers.
	Liquid refrigerant backed up in condenser	Find source of restriction and clear. If system is overcharged, remove refrigerant as required. Check to make sure equalizer (vent) line is properly installed and sized.
	Spray nozzles on condensers plugged	Clean.
Discharge pressure too low	Ambient air is too cold	Install a fan cycling control system.
	Water quantity not being regulated properly through condenser	Install or repair water regulating valve.
	Refrigerant level low	Check for liquid seal, add refrigerant if necessary
	Evap condenser fan and water switches are improperly set	Reset condenser controls.
Suction pressure too low	Light load condition	Shut off some compressors. Unload compressors. Slow down RPM of compressor. Check process flows.
	Short of refrigerant	Add if necessary
	Evaporators not getting enough refrigerant	Discharge pressure too low. Increase to maintain adequate refrigerant flow. Check liquid feed lines for adequate refrigerant supply. Check liquid line driers.
	Refrigerant metering controls are too small	Check superheat or liquid level and correct as indicated.
Suction pressure too high	Low compressor capacity	Check compressors for possible internal damage Check system load. Add more compressor capacity.

Table 14-30.—Electrical Troubleshooting Loads

## ELECTRICAL TROUBLESHOOTING LOADS

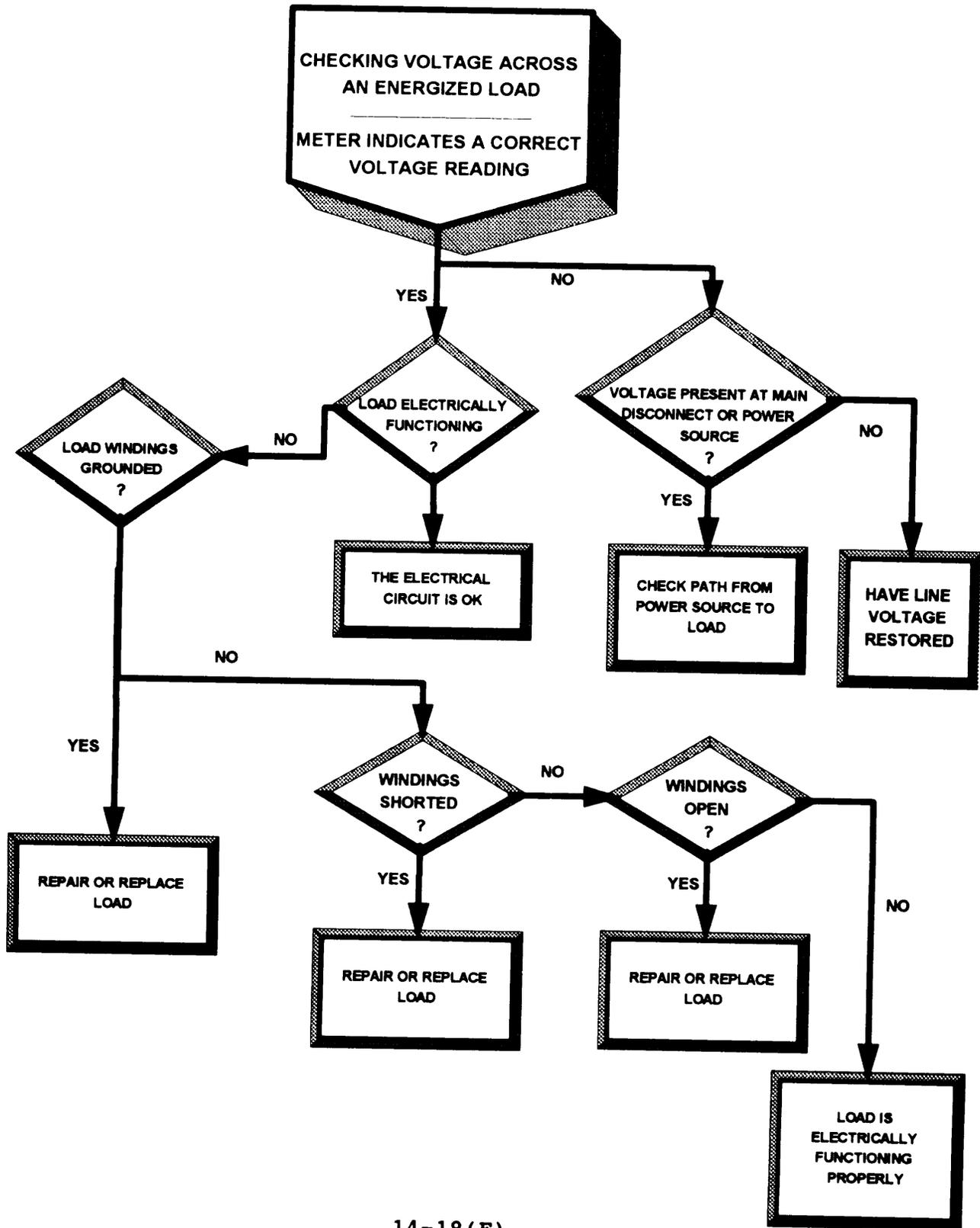
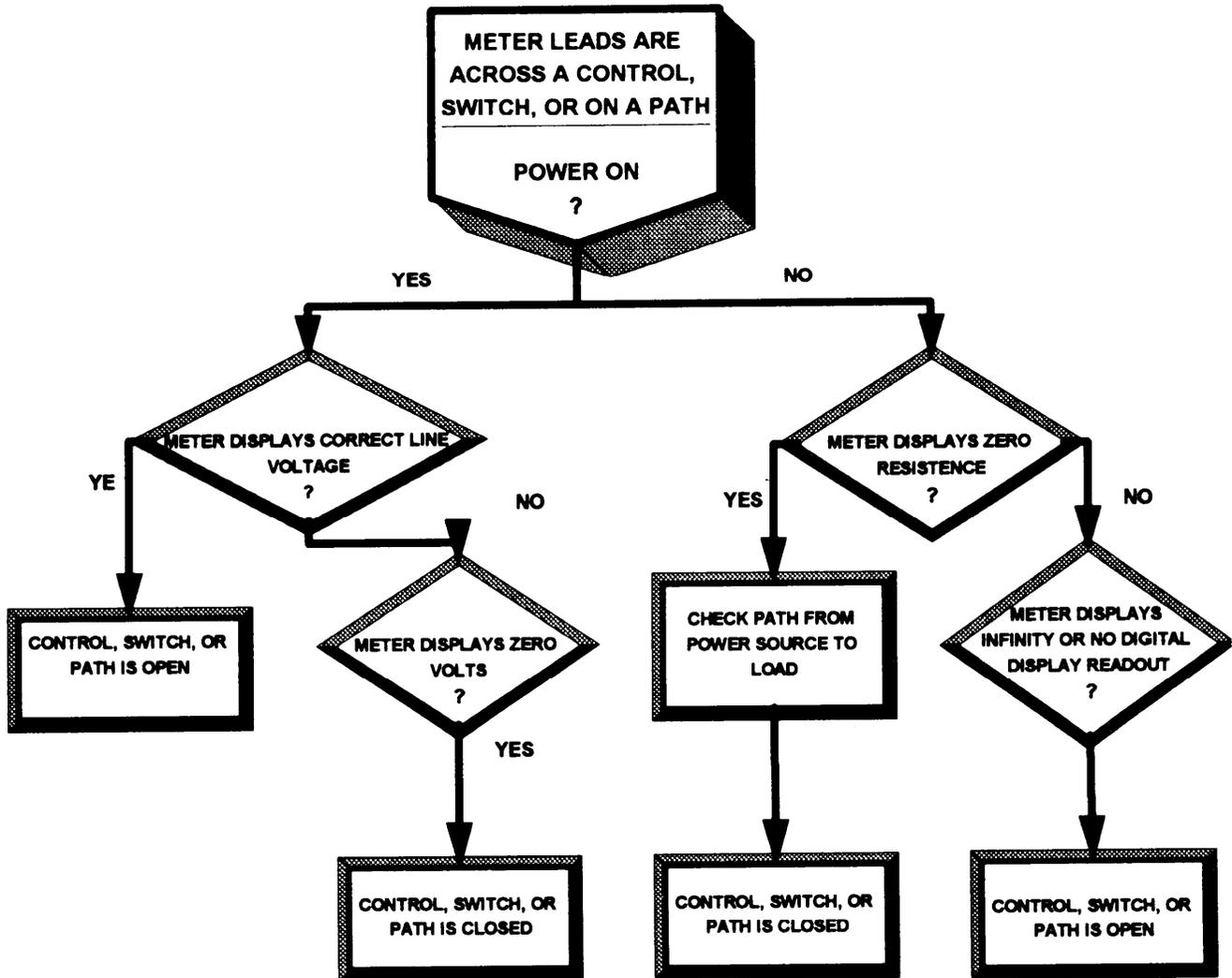


Table 14-30(B).—Testing Controls and Paths

## ELECTRICAL TROUBLESHOOTING TESTING CONTROLS AND PATHS



TABLES 14-30(A) AND 14-30(B) DO NOT COVER EVERY ELECTRICAL TROUBLESHOOTING PROCEDURE YOU WILL INCUR. THE TABLES ARE PRESENTED TO HELP YOU UNDERSTAND ELECTRICAL TROUBLESHOOTING.