

MANUAL 2100-065



**AIR SOURCE HEAT PUMP
TROUBLESHOOTING TABLE**

**REFRIGERATION, HEATING AND
AIR CONDITIONING**

BARD MANUFACTURING CO. • BRYAN, OHIO 43506

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I. COMPLAINT: NO HEAT. A. FAULT: HEAT PUMP AND AUXILIARY HEAT FAIL TO HEAT.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat setting.	a. Thermostat switch to off or cool.	Switch to heat.
		b. Thermostat set too low.	Turn thermostat up.
2 Power	Check main disconnect, disconnect to heat pump and auxiliary heat disconnect.	a. Disconnect switch open.	Close disconnect switch.
		b. Blown fuse or tripped breaker.	Replace fuse or reset breaker. Check for cause of overload.
3 Transformer	Check voltage at low voltage transformer (should be 24 volts). If there is no voltage or less than 22 volts, check primary side of transformer.	a. 24 volt fuse blown.	Replace fuse.
		b. Low voltage - less than 22 volts.	If primary voltage is low, call power company. If secondary is low, replace the transformer.
		c. Faulty transformer.	Replace the transformer.
4 Thermostat	Check sub-base connections with jumper wire to determine if power is reaching thermostat.	a. Faulty thermostat or sub-base.	Replace thermostat and/or sub-base.
		b. Broken wire, loose connections, or bad splices in wiring to transformer.	Replace wire or repair connections and splices.

II. COMPLAINT: NOT ENOUGH HEAT. A. FAULT: AUXILIARY HEAT MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat. Check for second stage operation.	a. Heat anticipator set too low.	Correct heat anticipator setting.
		b. Thermostat not level.	Level thermostat.
		c. Vibration at thermostat.	Correct source of vibration.
		d. Thermostat in warm air draft.	Shield thermostat from draft or relocate.
		e. Thermostat on warm wall or near heat producing appliance.	Remove cause of heat or relocate thermostat.
2 Outdoor Thermostat	Check outdoor thermostat. Observe outdoor thermostat setting so dial may be adjusted to proper setting.	a. Temperature setting too low.	Turn up thermostat.
		b. Contacts fail to close on outdoor thermostat.	Replace outdoor thermostat.
		c. Sensing bulb in sunlight.	Relocate sensing bulb.
3 Power	Check voltage at unit high voltage terminals. If voltage is less than designed voltage (more than 10% under designed voltage) or fluctuates, then fault is in power source. Recheck voltage at power source.	a. Loose wiring connection.	Locate and secure connection.
		b. Low or fluctuating line voltage.	Call power company.
		c. Open sub-fuses or circuit breakers within unit.	Replace fuses or reset breakers. Determine cause of overload.
4 Air Filter	Check air filter in unit. (NOTE) <i>If everything checks out up to this point, it is obvious that one of the elements is malfunctioning. With the unit operating, clamp an amprobe around one power lead of each element individually. This will indicate which element is malfunctioning. Always check the elements in numerical sequence, i.e., element number one first, number two second, etc.</i>	a. Dirty or clogged filter.	Replace or clean filter.

(CONTINUED) II. COMPLAINT: NOT ENOUGH HEAT. A. FAULT: AUXILIARY HEAT MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
5 Heat Element	Run continuity check on element.	a. Element shorted.	Replace element.
		b. Open element.	Replace thermal fuse or element.
6 Heat Relays	Run continuity checks on heat relays.	a. Bad relay coil.	Replace coil or relay.
		b. Broken or loose wiring.	Repair wiring.
		c. Burned or welded contacts.	Replace relays.
7 Limit Control	Check return air filter, blower operation and limit control.	a. Dirty air filter.	Replace or clean filter.
		b. Faulty limit control.	Run continuity check on limit control.
		c. Unit cycling on limit control.	Proceed to following causes. Limit functioning properly.
		d. Blower running too slowly.	Check temperature rise.
		e. Blower wheel clogged with grease, lint, and dirt.	Clean with odorless solvent.
		f. Blower wheel in backwards.	Reverse blower wheel on shaft.
		g. Wrong motor rotation.	Replace with motor of correct rotation.
		h. Blower motor seized or burned out.	Replace the blower motor.
		i. Blower bearing seized or frozen.	Replace bearings and shaft.
		j. Restrictions in return air system.	Correct cause of restriction.
		k. Restrictions in supply air system.	Correct cause of restriction.
l. Unit still cycling on limit.	Faulty limit control. Replace limit control.		

III. COMPLAINT: TOO MUCH HEAT. A. FAULT: AUXILIARY HEAT CYCLES TOO LONG.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat.	a. Thermostat set too high.	Set thermostat at correct temperature.
		b. Thermostat not level.	Level thermostat.
		c. Heat anticipator set too high.	Correct heat anticipator setting.
		d. Thermostat in cold draft.	Correct cause of draft.
		e. Thermostat on cold wall.	Relocate thermostat.
		f. Thermostat out of calibration.	Recalibrate or replace thermostat.

III. COMPLAINT: TOO MUCH HEAT. B. FAULT: AUXILIARY HEAT RUNS CONTINUOUSLY.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat. Disconnect wires at heat relay. If element turns off, fault is in thermostat circuit.	a. Thermostat set too high.	Set thermostat at correct temperature.
		b. Thermostat not level.	Level thermostat.
		c. Shorted or welded thermostat contacts.	Repair or replace thermostat.
		d. Stuck thermostat bi-metal.	Clear obstruction or replace thermostat.
		e. Shorted thermostat wires.	Repair short or replace wires.
		f. Thermostat out of calibration.	Recalibrate or replace thermostat.
		g. Thermostat in cold draft.	Correct cause of draft or relocate thermostat.
2 Heating Relay	Check heating relay and heating element contacts for proper operation.	a. Contacts welded close.	Replace relay or contacts.
		b. Control circuit shorted.	Trace source of trouble.

III. COMPLAINT: TOO MUCH HEAT. C. FAULT: HEAT PUMPS RUNS CONTINUOUSLY.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat. Disconnect thermostat wires at heating relay. If element turns off, fault is in thermostat circuit.	a. Thermostat set too high.	Set thermostat at correct temperature.
		b. Thermostat not level.	Level thermostat.
		c. Shorted or welded thermostat contacts.	Repair or replace thermostat.
		d. Stuck thermostat bi-metal.	Clear obstruction or replace thermostat.
		e. Shorted thermostat wires.	Repair short or replace wires.
		f. Thermostat out of calibration.	Recalibrate or replace thermostat.
		g. Thermostat in cold draft.	Correct cause of draft.
2 Compressor Contactor	Remove 24 volt wire from compressor contactor control. If compressor continues to run, contactor is defective.	a. Stuck or welded compressor contactor.	Replace contactor.

IV. COMPLAINT: NO COOLING. A. FAULT: HEAT PUMP FAILS TO COOL.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat setting.	a. Thermostat set on heat or off.	Switch thermostat to cool.
		b. Thermostat set too high.	Set thermostat at desired temperature.
2 Power	Check main disconnect, heat pump disconnect and indoor unit disconnect.	a. Disconnect switch open.	Close disconnect switch.
		b. Blown fuse or tripped breaker.	Replace fuse or reset breakers. Check for cause of overload.
3 Indoor Blower	Check air filter and indoor blower for proper operation.	a. Dirty air filter.	Replace or clean filter.
		b. Broken belt.	Replace belt.
		c. Loose pulley.	Tighten pulley.
		d. Blower bearing seized.	Replace bearing and shaft.
		e. Blower motor seized or burned out.	Replace the motor.

(CONTINUED) IV. COMPLAINT: NO COOLING. A. FAULT: HEAT PUMP FAILS TO COOL.

SOURCE	PROCEDURE	CAUSES	CORRECTION
4 Transformer	Check voltage at low voltage transformer.	a. 24 volt fuse blown (fused transformer).	Replace fuse.
		b. Low voltage (less than 22 volts).	If primary voltage is low, call power company. If secondary is low, replace transformer.
		c. Faulty transformer.	Replace transformer.
5 Compressor Contactor	Check voltage across contactor coil terminals.	a. Shorted or open coil.	Replace contactor.
		b. Loose or faulty wiring.	Repair wiring.
		c. Burned contacts or contacts stuck open.	Replace contactor.
6 Thermostat	Jumper voltage and compressor contactor sub-base terminals to determine if power is reaching thermostat.	a. Faulty thermostat or sub-base.	Replace thermostat and/or sub-base.
		b. Broken wire, loose connections or bad splices.	Replace wire or repair connections and splices.
7 Low Ambient Thermostat	Check low ambient thermostat.	a. Defective contacts in low ambient thermostat.	Replace thermostat.
8 Compressor	Turn off power to compressor. Check compressor windings and internal overload.	a. Compressor windings burned out.	Replace compressor.
		b. Internal overload defective.	Replace compressor.
9 Low Pressure Switch	Check low pressure switch.	a. Loss of charge.	Charge unit.
		b. Defective switch.	Replace switch.
10 High Pressure Switch	Check high pressure switch.	a. Overcharged unit.	Check and adjust charge.
		b. Plugged outdoor coil.	Clean outdoor coil.
		c. Inoperative outdoor coil fan.	Repair or replace fan.
		d. Recirculation of outdoor coil air.	Remove cause of recirculation.
		e. Reversed rotation of outdoor coil fan.	Correct rotation.
		f. Defective switch.	Replace switch.
11 External Overloads	Check external overloads.	a. External overloads open.	Replace overloads and determine cause of failure.
12 Start Capacitor And Potential Relay	Check start capacitor and potential relay.	a. Shorted or open start capacitor.	Replace start capacitor. Check potential relay.
		b. Open coil or welded contacts in potential relay.	Replace potential relay. Check start capacitor.
13 Run Capacitor	Check run capacitor.	a. Shorted or open run capacitor.	Replace run capacitor.
14 Reversing Valve	Check reversing valve.	a. Defective solenoid coil.	Replace solenoid coil.

V. COMPLAINT: NOT ENOUGH COOLING. A. FAULT: HEAT PUMP MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat.	a. Thermostat set too high.	Correct setting.
		b. Thermostat not level.	Level thermostat.
		c. Vibration at thermostat.	Correct source of vibration.
		d. Thermostat in cool draft.	Shield thermostat from draft or relocate.
		e. Thermostat on cool wall.	Relocate thermostat.

(CONTINUED) COMPLAINT: NOT ENOUGH COOLING. A. FAULT: HEAT PUMP MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
2 Indoor Air Volume	Check air volume over indoor coil.	a. Dirty filter.	Replace or clean filter.
		b. Plugged indoor coil.	Clean coil.
		c. Fan speed too low.	Adjust fan speed.
		d. Blower belt or pulleys slipping	Adjust for proper operation.
		e. Reversed blower rotation.	Reverse rotation.
		f. Blocked supply or return air opening.	Remove cause of blockage.
		g. Dirty blower wheel.	Clean blower wheel.
		h. Blocked supply outlet.	Remove cause of blockage.
3 Capillary Tube	Check capillary tube.	a. Plugged or restricted.	Replace capillary tube.
4 Outdoor Unit	Check outdoor unit.	a. Refrigerant charge incorrect.	Check and correct charge.
		b. Plugged or clogged outdoor coil.	Clean coil.
		c. Recirculation of air through outdoor coil.	Correct cause of recirculation.
		d. Reversing valve leaking.	Repair or replace reversing valve.
		e. Restriction in refrigerant system.	Remove restrictions in system.
		f. Noncondensable trapped in system.	Remove noncondensables from system.
		g. Leaking check valve.	Replace check valve.
5 Compressor Valves	Pump down unit.	a. Leaky discharge or suction valves.	Replace compressor.

VI. COMPLAINT: TOO MUCH COOLING. A. FAULT: HEAT PUMP RUNS CONTINUOUSLY.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat.	a. Set too low.	Correct thermostat setting.
		b. Thermostat in warm draft.	Relocate thermostat.
		c. Shorted thermostat wiring.	Repair short.
		d. Thermostat on warm wall.	Relocate or insulate thermostat.
		e. Thermostat not level.	Level thermostat.
2 Compressor Contactor	Check compressor contactor.	a. Contacts welded or stuck.	Replace contactor or contacts.

VII. COMPLAINT: NOISE. A. FAULT: MECHANICAL NOISE.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Blower	Remove blower compartment door. Start blower by disconnecting power and check for noise source. (OBSERVATION:) <i>Inspect blower wheel and check for end-play and side-play of shaft.</i>	a. Blower bearing loose allowing side-play.	Secure bearing.
		b. Blower thrust collar set too far out on shaft, allowing end-play.	Reset thrust collar to eliminate end-play of blower shaft.
		c. Blower bearing dry and squeaking.	Inspect bearing. If bearing is undamaged, then add lubrication.
		d. Blower bearing damaged.	Replace bearing. Inspect shaft for scoring or undercuts.
		e. Blower wheel touching scroll.	Center blower wheel in scroll.
		f. Loose blower wheel.	Check alignment and tighten set screws.
		g. Cutoff plate loose.	Tighten cutoff plate.
		h. Blower wheel out of balance.	Balance or replace wheel.
		i. Loose running gear cushion mounts.	Remove debris.
		2 Running Gear	Inspect running gear. Move it back and forth by hand to check for loose connections.
b. Worn or damaged blower belt.	Replace belt.		
c. Belt too loose causing slippage.	Correctly tighten belt.		
d. Motor and blower pulleys out of alignment.	Align pulleys.		
e. Loose blower or motor pulley.	Tighten set screws.		
3 Blower Motor	Remove blower compartment door, start blower and listen for source of noise.	a. Damaged and noisy motor bearings.	Replace motor.
		b. Loose or defective motor cushion mounts.	Tighten mounts or replace.
		c. Loose and rattling (Greenfield) armored cable to motor.	Isolate or secure Greenfield cable.
		d. AC motor hum.	Check resilient mountings.
		e. Regenerative motor braking (capacitor motor).	Replace capacitor or replace motor and capacitor.
4 Air Filter	Check filter assembly.	a. Filter loose in mounting rails.	Secure filter mounting.
		b. Filter screen contacting blower or running gear.	Bend screen or reposition filter to clear blower and running gear.
5 Controls	Listen for source of noisy control and check control. (OBSERVATION:) <i>Check contactors, relays and transformer. Some contactors and controls may make a loud buzz or clacking noise when operated below their designed voltage.</i>	a. Low voltage to relay coil. More than 10% below rated voltage.	Check transformer primary or replace transformer.
		b. Loose relay mounting.	Tighten mounting or isolate relay from direct metal to metal contact.
		c. Defective relay.	Replace relay.
		d. Low voltage to contactor coil. More than 10% below rated voltage.	Correct cause of low voltage or replace the transformer.
		e. Stuck or defective contactor.	Replace contactor.
		f. Noisy contactor.	Replace contactor.
		g. Loose transformer mounting.	Tighten mounting.
		h. Noisy humming transformer (loose windings on core).	Replace transformer.

(CONTINUED) VII. COMPLAINT: NOISE. A. FAULT: MECHANICAL NOISE.

SOURCE	PROCEDURE	CAUSES	CORRECTION
6 Cabinet And Duct	Listen for source of noise and relate it to furnace operation. <i>(OBSERVATION:)</i> Check furnace with elements heating and blower running.	a. Loose access door panels or casing panels.	Properly seat panel, secure at point of engagement or provide a pad at that point.
		b. Element rattling against cabinet or duct.	Isolate element from contact with cabinet or duct.
		c. Thermal expansion of metal causing "oil canning" or popping noise.	Determine point of "oil canning" and fasten panels to that point.
		d. Loose blower or running gear causing noise transmission to cabinet or duct.	Check blower bearings, pulleys, blower wheels, mount and belts.
		e. Loose duct work, duct hangers, unit hangers or connectors.	Properly seat joints, seams and hangers. Isolate hangers or pads.
		f. "Oil canning" of metal due to air pressure change when blower starts. It may be in either discharge side or return air side.	Determine point of "oil canning" and fasten panel at that point.
		g. Broken spot welded joint.	Secure joint with sheet metal screw.
7 Reversing Valve	Cycle reversing valve. Listen for source of noise.	a. Equalization of refrigerant pressure in valve.	Normal operation, no repairs needed.
		b. Loose solenoid coil.	Tighten solenoid coil.

VII. COMPLAINT: NOISE B. FAULT: AIR NOISE.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Blower	Inspect blower and blower compartment for air obstruction or restriction. Turn blower on and listen for source of air noise.	a. Loose or improperly positioned blower cutoff plate.	Secure or reposition cutoff plate.
		b. Blower running too fast.	Slow blower down. Adjust for proper air volume.
		c. Extremely dirty or blocked air filters causing blower to stall.	Clean or change filters or remove source of blockage.
		d. Out of center blower wheel too close to cutoff plate.	Check blower running gear mount and repair or reposition them to bring blower wheel back to center.
		e. Loose debris in blower housing causing air whistles.	Remove debris.
2 Air Duct System	Turn blower on and listen for source of noise along duct system and at registers.	a. Air leaks in cabinet joints or duct system.	Secure joint or cover opening in duct work.
		b. Sharp metal obstruction in air stream causing whistle.	Remove obstruction.
		c. Joint edge facing into air stream.	Cover edge of joint.
		d. Discharge system overly restricted. Dampers closed. Outlets closed or covered. Causes blower to stall.	Remove restrictions, check air volume.
		e. Return air grille close to blower compartment inlet.	Line inlet duct with acoustical material.

VIII. COMPLAINT: ODOR

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Air System	Check furnace compartment, filters and duct system for dirt, oily films, debris and moisture.	a. Accumulated dirt and debris.	Clean debris and vacuum duct system.
		b. Oily film in and around blower or in duct system.	Remove film and correct cause of film.
		c. Water or moisture.	Locate and correct cause of water or moisture.
		d. Humidifier stagnant water or slush.	Clean humidifier and check operation.
		e. Dirty filter.	Clean or replace filters.
		f. Moisture trapped in drain pan. Pan clogged.	Clean out drain pan.
2 Control Transformer	Check transformer.	a. Shorted winding.	Replace transformer.
3 Wiring	Check wiring for hot spots.	a. Overheated wiring.	Check for source of short, replace wiring.
4 Relays	Check relay.	a. Shorted or burned relay.	Replace relay.

IX. COMPLAINT: COST OF OPERATION. A. FAULT: AUXILIARY HEAT CYCLES TOO LONG.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat.	a. Thermostat set too high.	Set thermostat at correct temperature.
		b. Thermostat not level.	Level thermostat.
		c. Thermostat in cold draft.	Correct cause of draft.
		d. Thermostat on cold wall.	Relocate thermostat.
		e. Thermostat out of calibration.	Recalibrate or replace thermostat.
2 Outdoor Thermostat	Check outdoor thermostat or thermostats.	e. Thermostat set too high.	Set thermostat at correct temperature.
		b. Stuck contacts in thermostat.	Repair or replace thermostat.
		c. Thermostat out of calibration.	Recalibrate or replace thermostat.

IX. COMPLAINT: COST OF OPERATION. B. FAULT: AUXILIARY HEAT RUNS CONTINUOUSLY.

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat. Disconnect wires from heat relay. If element turns off, fault is in thermostat circuit.	a. Thermostat set too high.	Set at correct temperature.
		b. Thermostat not level.	Level thermostat.
		c. Shorted or welded thermostat contacts.	Repair or replace thermostat.
		d. Stuck thermostat bi-metal.	Clear obstruction or replace thermostat.
		e. Shorted second stage thermostat wires.	Repair short or replace wires.
		f. Thermostat out of calibration.	Recalibrate or replace thermostat.
		g. Thermostat in cold draft.	Correct cause of draft or relocate thermostat.
2 Heating Relay	Check heating relay and heating element contact for proper operation.	a. Contacts welded closed.	Replace relay or contact.
		b. Control circuit shorted.	Trace circuit and repair short.

IX. COMPLAINT: COST OF OPERATION. C. FAULT: HEAT PUMP MALFUNCTIONING

SOURCE	PROCEDURE	CAUSES	CORRECTION
1 Thermostat	Check thermostat.	a. Open first stage bulb. b. Loose terminal or broken wire.	Repair or replace thermostat. Repair wiring.
2 Power	Check heat pump disconnect.	a. Disconnect switch open. b. Blown fuse or tripped breaker.	Close disconnect switch. Replace fuse or reset breakers. Check for cause of overload.
3 Indoor Blower	Check air filter and indoor blower for proper operation.	a. Dirty air filter. b. Loose belt. c. Loose pulley. d. Dirty indoor coil. e. Low air volume.	Replace or clean filter. Tighten belt. Tighten pulley. Clean indoor coil. Adjust blower for proper air volume.

(CONTINUED) IX. COMPLAINT: COST OF OPERATION. C. FAULT: HEAT PUMP MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
4 Compressor Contactor	Turn power off. Perform continuity check on contactor coil and contacts.	a. Shorted or open coil. b. Loose or faulty wiring. c. Burned contacts or contacts stuck open.	Replace contactor. Repair wiring. Replace contactor.
5 Low Ambient Thermostat	Perform continuity check on low ambient thermostat contacts.	a. Defective contacts in low ambient thermostat. b. Thermostat set too high. c. Thermostat out of calibration.	Replace thermostat. Reset to proper temperature. Recalibrate or replace thermostat.
6 Compressor	Turn off power to compressor. Perform continuity check on compressor windings and internal overload. See page 131.	a. Compressor winding open or shorted. b. Internal overload defective.	Replace compressor. Replace compressor.
7 Low Pressure Switch	Check low pressure switch. Turn off power. Run continuity check.	a. Loss of charge. b. Defective switch.	Charge unit. Replace switch.
8 High Pressure Switch	Check high pressure switch. Turn off power. Run continuity check.	a. Overcharged unit. b. Plugged indoor coil. c. Dirty air filter. d. Indoor air volume too low or indoor fan speed too low. e. Reversed rotation of indoor coil fan. f. Dirty blower wheel. g. Blocked supply or return air openings.	Check and adjust charge. Clean indoor coil. Replace or clean filter. Increase air volume to proper level. Reverse rotation. Clean blower wheel. Remove cause of blockage.
9 External Overload	Check external overload. Perform continuity check.	a. External overload open.	Replace overload and determine cause of failure.

(CONTINUED) IX. COST OF OPERATION. C. FAULT: HEAT PUMP MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
10 Start Capacitor And Potential Relay	Check start capacitor and potential relay.	a. Shorted or open start capacitor.	Replace start capacitor and check potential relay for burned contacts.
		b. Open coil or welded contacts in potential relay.	Replace potential relay and check start capacitor.
11 Run Capacitor	Check run capacitor.	a. Shorted or open run capacitor.	Replace run capacitor.
12 Capillary Tube	Check capillary tube.	a. Plugged or restricted.	Replace capillary tube.
13 Compressor Valve	Pump down unit.	a. Leaking discharge or suction valve.	Replace compressor.
		b. Internal pressure relief valve open.	Allow time for system to equalize pressure then reset.
14 Outdoor Unit Air Volume	Check volume of air over the outdoor coil.	a. Blocked air flow or plugged coil.	Clean coil or remove cause of blockage.
		b. Ice on coil.	Check defrost cycle.
		c. Defective fan motor.	Replace fan motor.
		d. Open or shorted fan motor capacitor.	Replace capacitor.
		e. Reversed fan motor rotation.	Reverse rotation.
15 Outdoor Fan Defrost Relay	Check contacts in outdoor fan and defrost relay.	a. Open contact in relay.	Replace relay.
16 Reversing Valve	Check reversing valve.	a. Reversing valve coil energized.	Check wiring and control setting.
		b. Reversing valve stuck or leaking.	Replace reversing valve.

(CONTINUED) IX. COST OF OPERATION. C. FAULT: HEAT PUMP MALFUNCTIONING.

SOURCE	PROCEDURE	CAUSES	CORRECTION
17 Check Valve	Check the check valves.	a. Leaking check valve.	Repair or replace check valve.
18 Defrost Cycle	Check defrost cycle components for proper operation and calibration.	a. Will not defrost.	1. Check defrost therm. 2. Check defrost relay. 3. Check reversing valve. 4. Check timer. Replace defective component.
		b. Defrost cycles are too long.	1. Check defrost therm. 2. Check defrost timer (7-min. max defrost length). 3. Check refrig. charge. Replace if defective.
		c. Rapid cycling on defrost.	1. Check defrost timer. Replace if defective.
		d. Defrost cycle will not terminate.	1. Check defrost timer. Replace if defective.

