Armstrong
Machine Works

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EHU-500 SERIES HUMIDIFIER TROUBLESHOOTING

WARNING: ONLY AUTHORIZED PERSONNEL AND/OR LICENSED ELECTRICIANS SHOULD REMOVE THE LEFT BULKHEAD COVER TO PROVIDE SERVICE INDICATED IN THIS MANUAL.

No.	Problem Experienced
1.	Unit will not fill - no water in tank(s) - fill light not on.
2.	Unit will not fill, but fill light is on.
3.	Manual drain doesn't work.
4.	Unit doesn't drain when over current exists.
5.	Drain timer does not drain unit.
6.	Demand meter reading is 0% continuously.
7.	Demand meter reading 100% continuously or RH excessive amount above set point.
8.	High limit stat does not stop fill with over humidity in duct.
9.	Interlock or sail switch does not stop fill and drain steam generator(s) when activated.
10.	Unit fills and drains at same time.
11.	Unit fills until water touches plates and fill stops or continuously fills and drains in short cycles.
12.	Unit fills until water levels 3" from top of steam generator - current draw very low - tank light may be on.
13.	Tank light on - little or no water in steam generator.
14.	Fill cup overflows during fill cycle.
15.	Arcing inside steam generator.
16.	Steam generators of two-tank unit running at different water levels.
17.	Unit will not load up to full capacity (low current draw).
18.	Unit fills until internal contactors open or water overflows the fill cup.

(Continued)

19. Unit fills until main line circuit breakers or fuses open.

20. Fill light flashes.

21. Contactor will not close.

22. Secondary fuses blow.

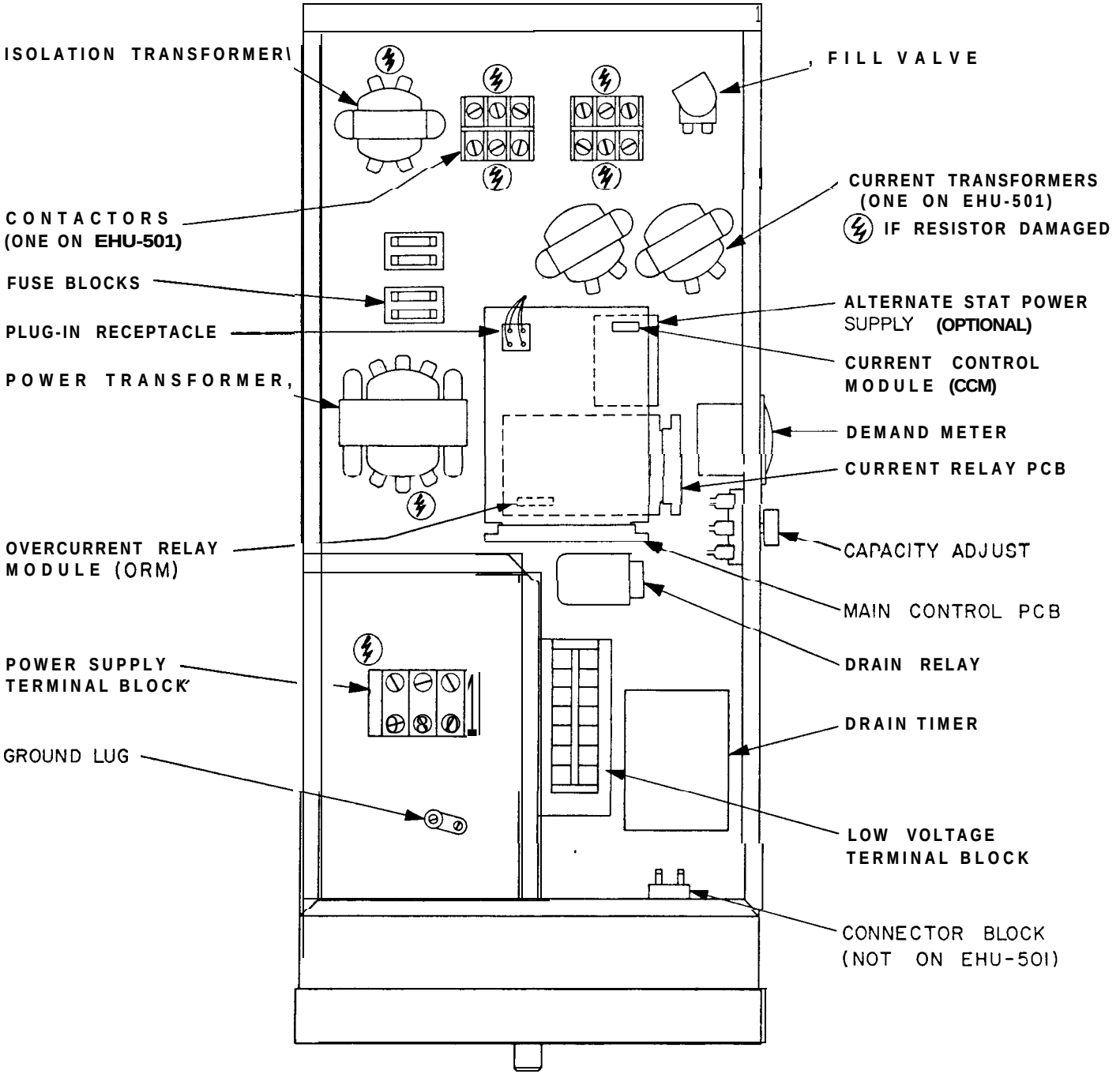
NOTICE:

This troubleshooting guide is offered to aid in servicing the EHU-500 Series Humidifiers. It is intended for *use* by electricians and technical service personnel familiar with electrical and electronic equipment.

Many steps in the troubleshooting procedures require measurements of high voltages and involve working near exposed live parts. KNOW WHERE THE HIGH VOLTAGE PARTS ARE, AND KEEP HANDS AND METAL TOOLS AWAY FROM THEM.

FIGURE 1

ELECTRICAL COMPONENT IDENTIFICATION



INDICATES AREAS WHERE HIGH VOLTAGES ARE PRESENT WHEN POWER IS TURNED ON. TO AVOID DANGER OF ELECTRICAL SHOCK, KEEP HANDS AND TOOLS AWAY FROM THESE AREAS.

PROBLEM #1 - UNIT WILL NOT FILL -- NO WATER IN TANK(S) -- FILL LIGHT NOT ON.

l-1. Is the water supply to unit turned on?
Be sure water is being supplied to unit.

l-2. Is electrical power on? All 3 phases if 3 phase unit?
Check unit to be sure. Check across each combination of terminals.

l-3. IS contactor closed?
Press "Reset/Power On" switch. Contactor should pull in. If it doesn't, see Problem 21 - Contactors will not close.

l-4. Is the interlock(s) or sail switch(s) circuit open?
To be sure interlock is open, disconnect leads at #45 and 46 on low voltage terminal block. If unit fills, interlock or sail switch maybe defective or wiring to interlock may be shorted.

l-5. Are the high limit stat(s) contacts open?
To be sure high limit is open, disconnect lead #28 and 42 at low voltage terminal block. If unit fills, high limit stat may be defective or wiring to stat may be shorted.

l-6. Is the overcurrent relay PCB blocking the fill?
Disconnect lead #75 from terminal 42 at the low voltage terminal block. If unit fills, overcurrent relay circuit may not have been reset (see step l-3) or overcurrent relay PCB may be defective.

l-7. IS tank light on? Remove high water probe lead(s) at tank(s).
If unit fills, clean steam generators. A salt bridge (electrically conductive) between electrodes and high water probe will complete circuit and cause this problem. Clean top of generators very thoroughly. Check for burned out tank light if it wasn't on.

l-8. Is the jumper wire on sensor controller connected to the proper pin?
Be sure jumper wire is connected.

l-9. Is the CCM on control PCB in place?
Be sure the CCM is installed.

l-10. Is the ORM on overcurrent relay PCB in place?
Be sure the ORM is installed.

l-11. Is plug containing leads 57, 58, 59 and 60 plugged into control P.C. Board socket?
Plug must be inserted into socket on control P.C. board. If not, do so. (See Fig. 3)

l-12. Is demand meter reading at least 20%?
If demand is too low, unit will not fill.

l-13. Where is the capacity adjustment set?
If set too low, unit will not fill. Do not set below 20% (particularly with low demand). Increase adjustment to 100%.

l-14. If demand meter reading is below 20%, remove sensing element from sensor controller (LEAVE SENSING ELEMENT OUT FOR STEPS 1-15 THRU l-26).
Demand meter reading should go to 100% and unit should fill. If demand goes to 100% and unit doesn't fill, proceed with checks that follow. If demand doesn't go to l00%, see Problem #6 on Demand Meter Reading is 0% Continuously.

l-15. Check D.C. voltage between fill valve terminals 13 and 14.
If reading is 8-12 volts D.C. and if fill valve does not open, replace valve. (Fill circuit must be energized.)

l-16. Check capacity adjustment potentiometer resistance with plug containing 57, 58, 59 & 60 removed from control P.C.B. (See Fig. 3)
Resistance between 59 and 60 should be approximately 1500 ohms. Resistance between 57 and 60 should be 1500 ohms with capacity adjustment set at 0%, and 0 ohms with capacity adjustment set at 100%. If resistance not proper , replace potentiometer.

l-17. Conduct continuity tests #57, #59, and #60 - Table C with POWER OFF.
If open circuits are detected, repair.

l-18. Check D.C. voltage between lead #13 at fill valve and humidifier frame.
Should read 16-21 volts D.C. If not, go to Step l-21. If reading is 16-21 volts D.C., proceed with steps l-19 and l-20.

1-19. Is fill valve coil resistance about 17 ohms? (POWER OFF)
If fill valve coil resistance not proper, replace valve.

l-20. Perform continuity tests, Table C, Test #ll and #14.
If open circuit, repair; if not, replace control P.C.B.

1-21. Is fill valve coil resistance about 17 ohms? (POWER OFF)
If fill valve coil resistance not proper, replace valve. Proceed.

l-22. Check for 24 to 28 volt AC between fuse block terminals (19-31 to 20-23 and 80 to 72-79)
If 24-28 volts is not obtained, check fuses and jumper leads from transformer, and measure voltage at transformer secondary terminals. If transformer output is not 24-28 volts AC, check primary voltage and hook-up (See Table A of wiring diagram). If primary voltage and hook-up are OK, replace transformer.

l-23. Check **for 12 to 14 volts AC between** fuseblock terminals and transformer centertap (56-17).
If 12-14 volts is not obtained, check fuses and jumper leads from transformer. If not done previously, check transformer output. Check continuity of transformer secondary coil. (See Table D)

l-24. Check for 24-28 volts AC between 10 and llatP.C. Board Receptacle. (Leads 22 & 33)
If no voltage, perform test #19, 29, 33, 20, 21 and 22 of Table C. (POWER OFF)

l-25. Check for 12 to 14 volts AC between 11 and 12 and between 10 and 12 on P.C. Board Receptacle.
If no voltage, perform test #17 of Table C. (POWER OFF)

l-26. Check for 8 to 12 volts DC at P.C. Board Receptacle between 15 and 17. (Leads 11 and 12)
8-12 volts D.C. is correct reading. If not obtained, replace control P.C.B.

l-27. Check for 8 to 12 volts DC at fill light terminal between 12-13 and 11-14.
8-12 volts D.C. is correct. If light not on, replace. For no voltage - Test #11 and 12 - Table C. (POWER OFF)

l-28. Perform test #13 and 14, Table C. (POWER OFF)
If open circuit, repair.

PROBLEM #2 - UNIT WILL NOT FILL, BUT FILL LIGHT IS ON

2-1. Is the water supply to unit turned on?
Be sure water is being supplied to unit.

2-2. Check DC voltage between fill valve terminals 13 and 14.
If reading is 8-12 volts D.C. and if fill valve does not open, replace fill valve.

2-3. Conduct continuity tests **#13** and 14, Table C. (POWER OFF)
Repair any open circuits.

2-4. Is the fill valve inlet screen clear?
If water pressure is OK and valve can be heard to operate but no water goes through, screen may be plugged. Clean the screen or replace the valve.

PROBLEM #3 -- MANUAL DRAIN DOESN'T WORK

3-l. Is electrical power on? All 3 phases if 3 phase unit?
Check at unit to be sure. Check across each combination of terminals.

3-2. Are drain lines and screen in bottom of steam generator open?
If they are stopped up, clean before proceeding.

3-3. Check for 24-28 volts AC between fuse block terminals 20-23 and 19-31.
If 24-28 volts AC is not obtained, check fuses for continuity (POWER OFF). If fuses are OK, check fuse clips and jumper leads from transformer, and measure voltage at transformer secondary terminals. If transformer output is not 24-28 volts AC, check primary voltage and hook-up (see Table A of wiring diagram). If primary voltage and hook-up are OK, replace transformer.

3-4. Was a fuse blown?
If you replace fuses proceed but do not turn power back on until other checks in this section are completed.

3-5. Check drain valve(s) coil resistance. (POWER OFF)
This resistance should be 5 ohms. If

valve(s) are okay, proceed with other checks. If not, replace valve(s). When power is turned back on, drain timer will energize drain valve(s) and drain light for drain duration set on timer. When this cycle is completed, recheck manual drain.

3-6. Remove lead 19-29 and 36-37 from manual drain switch, conduct continuity test with switch depressed. (POWER OFF)

If reading doesn't indicate continuity, replace manual drain switch.

3-7. If drain light came on when manual drain switch was depressed, conduct continuity test Table C, 135, 36, 23 and 54. For two-tank units, also conduct tests #52, 53, 62 and 63. (POWER OFF)

If open circuit is detected, repair.

3-8. If drain light did not come on when manual drain switch was depressed, check for 70 ohms resistance across drain light. Conduct continuity tests, Table C, #19, 20, and 37, plus tests in Step 3-7. (POWER OFF)

If drain light shows open circuit, replace light. If any other open circuits are detected, repair.

3-9. After completing the above steps, check AC voltage at drain valve across terminals of drain valve(s) with manual drain switch depressed.

Voltage should be 24-28 volts AC. If it is and valve(s) does not open, replace valve(s).

PROBLEM #4 -- UNIT DOESN'T DRAIN WHEN OVER CURRENT EXISTS

4-l. Depress manual drain switch. Does drain light come on and unit drain?

If is doesn't, see Problem #3 - Manual Drain Doesn't Work.

4-2. WITH POWER OFF, remove lead #39 (and #65 if EHU-502) from current transformer and lead #23-54 from drain timer. Turn power on and read primary circuit current (one lead of steam generator) with ammeter. Allow unit to fill until current exceeds maximum rating (See Fig. 4) by 10 to 15%.

TURN POWER OFF, reconnect lead #39 and #65 on current transformer. Turn power on and read DC voltage between leads #15 and #16 at drain relay coil. If reading is 12-15 volts DC and drain valves don't open, replace drain relay.

4-3. Check DC voltage at control PCB receptacle between #13 and #14 (leads 16 and 15). See Figure 3.
If reading is 12-15 volts DC, conduct test #15 and #16, Table C. (POWER OFF). If open circuit is detected, repair. If 12-15 volts DC is not shown, proceed with following steps. Reconnect lead #23-54.

4-4. With power on and unit operating normally, measure AC voltage across output terminals of current transformer(s).
Voltage should be 4 millivolts per amp of primary circuit current (measured on lead #3 or #6 of steam generator). If not, check coil resistance of current transformer and replace if necessary.

4-5. Measure AC voltage from terminal #l of main PCB (lead #38) to ground.
Voltage should be about half of the largest voltage read in Step 4-4. If it is, replace main PCB.

4-6. With power off, conduct continuity tests #38, 39, 65, 67 and 68.
If open circuits are detected, repair. If all circuits are OK, replace overcurrent relay PCB.

PROBLEM #5 -- DRAIN TIMER DOES NOT DRAIN UNIT

5-1. Depress manual drain switch. Does drain light come on and unit drain?
If it doesn't, see Problem #3 - Manual Drain Doesn't Work.

5-2. Conduct continuity test #34 and 31, Table C. (POWER OFF)
If open circuit is detected, repair.

5-3. Read AC voltage between leads #23-54 and #30 at drain timer. (POWER ON)
With power back on, should be 24 to 28 volts AC and timer should go into drain mode and drain again after pre-set interval. If it doesn't, replace timer.

5-4. If no voltage in Step 5-3, conduct test #30, Table C. (POWER OFF)
If open circuits are detected, repair.

PROBLEM #6 -- DEMAND METER READING IS 0% CONTINUOUSLY

6-1. Is electrical power on? All 3 phases, if 3 phase unit?
Check at unit to be sure. Check across each combination of terminals.

6-2. Is jumper wire on humidistat P.C. Board attached to proper pin?
Be sure jumper wire is attached to pin.

6-3. Is plug containing leads #57, 58, 59, and 60 plugged into Control P.C. Board socket? See Figure 3.
Plug must be inserted into plug socket on control P.C. Board. If not, do so.

6-4. Are #25, #26 and #27 atlowvoltageterminalblock wired to #25, #26 and #27 on humidistat?
Check to be sure; disconnect humidistat before conducting continuity tests #90, #91, and #92, Table C. Sensing element can be destroyed by applying DC voltage. NOTE: As a quick check, remove leads #25, 26, and 27 at low voltage terminal block; demand should increase to 100%.

6-5. Check DC voltage between #25 and #26 at low voltage terminal block.
If reading is below 1.8 volts DC, demand meter should be reading 0%, humidistat is not calling for humidity.

6-6. Remove sensing element from humidistat and check DC voltage between #25 and #26 at low voltage terminal block.
Reading should be in excess of 5 volts DC and demand meter should read 100%.
(A) If they do, check room RH at humidistat with accurate indicator. If room RH is below set point, sensing element may be defective (not a probable failure). With sensor in place, try placing jumper wire on humidistat P.C. Board at higher pin setting to see if demand meter reading will increase before replacing sensing element.
(B) If reading is in excess of 5 volts DC, but demand meter does not read lOO%, proceed with steps 6-8 to 6-10.
(C) If reading is not 5 volts DC or greater, go to step 6-11.

6-7. Sensing element should be removed from humidstat for steps 6-7 and 6-8. Read DC voltage on lead #25 and #26 at Control PCB receptacle points #2 and #4.

If no voltage conduct continuity tests #25 and #26 Table C. (POWER OFF) If reading is in excess of 5 volts DC, proceed.

6-8. Remove plug containing #57, 58, 59, and 60 from control PCB. See Figure 3. Read DC voltage between post #3 (in socket) and point #22 at control PCB receptacle. (ground)

Reading should be approximately 10 volts DC, if not, replace control PCB.

6-9. Conduct continuity test #58 and #41, Table C. (POWER OFF)

If open circuit is detected, repair. If not, replace demand meter.

6-10. Check AC voltage between 25 and 27 at low voltage terminal block.

If reading is 10-12 volts AC, replace humidistat. If not, proceed.

6-11. Check AC voltage between leads #25 and 27 at control PCB receptacle points #2 and 5.

If reading is 10-12 volts AC, conduct continuity tests #25 and 27, Table C. (POWER OFF). If not voltage, proceed.

6-12. Check for 24-28 volts AC between points #10 and 11 at control PCB receptacle (lead #22 and 33) and check for 12-14 volts AC between points #10 and 12 (leads 22 and 17) and between #11 and 12 (leads #33 and 17) at control PCB receptacle.

If these voltage readings check out, replace control PCB. If not, proceed.

6-13. Check for 24 to 28 volts AC between fuse block terminals (19-31 to 20-23 and 80 to 72-79)

If 24-28 volts AC is not obtained, check fuses and jumper leads from transformer, and measure voltage at transformer secondary terminals. If transformer output is not 24-28 volts AC, check primary voltage and hook-up (see Table A of wiring diagram). If primary voltage and hook-up are OK, replace transformer.

6-14. Check for 12 to 14 volts AC between fuseblock terminals (20-23, 72-79) and transformer center-tap (56-17).

If 12-14 volts AC is not obtained, check fuses and jumper leads from transformer. Recheck transformer output per step 6-13. Check continuity of transformer secondary coil (see Table D).

6-15. Check **for 12 to 14 volts AC between** fuseblockterminals (19-31, 80) and transformer center-tap (56-17).
Same as above.

6-16. Conduct continuity tests 117, 19, 29, 33, 20, 21, and 22, Table C. (POWER OFF)
If open circuits are detected, repair.

PROBLEM #7 -- DEMAND METER READING 100% CONTINUOUSLY OR RH EXCESSIVE AMOUNT ABOVE SET POINT.

7-l. Are leads #25, 26, 27 at low voltage terminal block wired to #25, 26, and 27 at humidistat?
Check to be sure, do not cross connect, disconnect humidistat before conducting continuity tests 90, 91, & 92, Table C (POWER OFF).

7-2. Is sensing element plugged into humidistat P.C. Board?
Check to be sure.

7-3. Check D. C. voltage at control PCB receptacle between #2 and #4 (leads 25 & 26).
(A) If voltage drops quickly and meter reading goes to 0, conduct continuity test, #26, Table C. (POWER OFF).
(B) If reading is 4 volts DC or more, conduct continuity test, #25, Table C (POWER OFF).
(C) Check room RH at sensor controller with accurate indicator. If room RH is above set point, sensing element and/or sensor controller P.C. Board may be defective. Try placing the jumper wire on sensor controller P.C. Board at lower pin setting to see if demand meter reading will decrease before replacing sensor controller.

7-4. After completing above steps, if RH at sensor controller is at least 6% above the set point, you should read less than 1.8 volts DC between #25 and #26 at low voltage terminal block. If reading is less than 1.8 volts DC but demand meter reading is not 0% remove plug containing leads 57, 58, 59, and 60 from control PCB.
If demand meter reading does not drop to 0, replace meter. If demand meter reading drops to 0, replace control PCB.

PROBLEM #8 -- HIGH LIMIT STAT DOES NOT STOP FILL WITH OVER HUMIDITY IN DUCT.

8-l. Is high limit stat(s) wired to #28 and #42 at low voltage terminal block?
Check to be sure.

8-2. Check to see if fill is interrupted when #28 and 42 are jumpered at high limit stat.
This test must be conducted when fill is on. If fill stops when jumper is connected, high limit stat is malfunctioning.

8-3. Check to see if fill is interrupted when #28 and 42 are jumpered at low voltage terminal block.
If fill is interrupted, conduct continuity test #93 and #94, Table C. (POWER OFF)

8-4. Check to see if fill is interrupted when #25 and 42 are jumpered at low voltage terminal block.
If this stops fill, repair open circuit in lead #28 (jumper wire at low voltage terminal block).

8-5. Check to see if fill is interrupted when point 2 and 6 at control PCB receptacle (leads #25 and 42) are jumpered.
If fill is interrupted, conduct continuity tests #25 and #42, Table C. (POWER OFF). If fill is not interrupted replace control PCB.

PROBLEM #9 -- INTERLOCK OR SAIL SWITCH DOES NOT STOP FILL AND DRAIN STEAM GENERATOR(S) WHEN ACTIVATED.

9-1. Is interlock(s) wired to #45 and #46 at low voltage terminal block?
Check to be sure.

9-2. Disconnect CCM on control PCB.
Unit should interrupt fill and open drain. If it doesn't, see sections on Drain Malfunction.

9-3. Reconnect CCM on control PCB then place jumpers across 45 and 46 at interlock or sail switch.
If fill is interrupted and unit drains steam generator(s), interlock and sail switch is defective.

9-4. Place jumpers across 45 and 46 at low voltage terminal block.

If fill is interrupted and unit drains, conduct continuity test #95 and #96, Table C. (POWER OFF)

9-5. Place jumper across point 2 and 18 at control PCB receptacle (lead 25 and 46).

If fill is interrupted and unit drains, conduct continuity tests #25, 28, 45, and 46, Table C. (POWER OFF) If fill is not interrupted and unit does not drain, replace control PCB.

PROBLEM #l0 -- UNIT FILLS AND DRAINS AT SAME TIME.

10-l. Be sure unit is not in automatic drain cycle.

Drain and fill is normal during the drain cycle. Wait at least the length of drain duration that is set on the timer to determine if the unit is in the drain cycle.

10-2. Check DC voltage between leads #13 and #14 at fill valve.

If voltage is 8-12 volts DC, fill valve is okay. If no voltage and valve open, replace fill valve.

10-3. Check AC voltage between leads #54 and #55 at drain valve (at connecting block for a multi-tank unit).

If reading is 24-28 volts AC, drain valve(s) is okay. If no voltage, replace drain valve(s).

10-4. Disconnect lead 36-37 at manual drain switch.

If drain valve closes, replace drain switch.

10-5. Disconnect lead 35-55 at electronic timer.

If drain valve closes, the timer is either in the drain cycle or faulty. Reconnect lead 35-55, if drain does not stop after time duration set on timer, replace timer.

10-6. Disconnect lead 35-36 at drain relay.

If drain valve closes, either drain relay or main control PCB is defective. Continue.

10-7. Check DC voltage between drain relay coil leads 15 and 16.

If 12 to 14 volts DC appears at this point, the control P.C. Board is defective. If no voltage, check drain relay contacts. They should be open, but may have failed in closed position. Reconnect lead 35-36.

PROBLEM #11 -- UNIT FILLS UNTIL WATER TOUCHES PLATES AND FILL STOPS OR CONTINUOUSLY FILLS AND DRAINS IN SHORT CYCLES.

11-1. Disconnect leads from high limit stat(s) #28 and #42 at low voltage terminal block.

If unit resumes normal operation, high limit stat is probably defective.

11-2. Disconnect leads #45 and #46 from interlock or sail switch(s) at low voltage terminal block.

If unit resumes normal operation, interlock or sail switch is probably defective.

11-3. Is demand meter reading at least 20%?

If demand is too low, unit will fill until water touches plates and fill will stop.

11-4. Where is the capacity adjustment set?

If set too low, unit will not fill (particularly with low demand). Increase adjustment to 100%.

11-5. Remove sensing element from the humidistat.

Demand meter reading should go to 100%. If it doesn't, see Problem #6 - Demand Meter Reading 0% Continuously.

11-6. Check current flow to steam generator.

If current is near maximum current rating for the unit and fluctuating, the steam generator(s) probably need to be cleaned. Check to be sure unit is being supplied with potable water, not brackish or contaminated water.

Check drain timer operation by turning off power to unit for 15 seconds. When power is turned back on, the unit should automatically drain for duration set on timer. It should drain again after interval set on timer. If it does not, see Problem #5 - Drain Timer Does Not Drain Unit.

If current is low (2 to 6 amps), proceed.

11-7. TURN POWER OFF. With leads #39-65 and #67 removed, check resistance of current transformer coil. On two-tank units also check second current transformer with leads 65 and 68 removed.

Resistance should be 15 ohms ±5% between outside terminals, and 166 ohms ±10% between center test tap and each outside terminal. If not, replace current transformer.

11-8. If above steps have not corrected problem, control PCB may be defective.

Replace control PCB.

PROBLEM #12 -- UNIT FILLS UNTIL WATER LEVELS 3" FROM TOP OF STEAM GENERATOR - CURRENT DRAW VERY LOW - TANK LIGHT MAY BE ON.

12-l. Is electrical power on? All 3 phases if 3 phase unit?

Check at unit to be sure. Loss of power on one phase of a 3 phase system can cause this problem.

12-2. Water may be exceptionally mineral free and have low conductivity.

Drain timer should be set for 2 or 4 seconds drain at 16 hour intervals, if 3 phase unit electrodes should be set in position #l (closest together). Check water hardness and conductivity; consult factory for further help.

12-3. Are the elecrodes corroded or covered with mineral build-up?

If electrodes are corroded away, check drain timer (Problem #5) and also check settings on drain timer. (See also Problem #15). If electrodes are covered with "lime", clean or replace them.

PROBLEM #13 -- TANK LIGHT ON - LITTLE OR NO WATER IN STEAM GENERATOR.

13-l. Remove high water probe lead(s) from connection on steam generator(s).

If tank light goes off and unit fills, steam generator(s) need cleaning. A salt bridge (electrically conductive) between electrodes and high water probe will complete circuit and cause this problem. Clean top of generator(s) very thoroughly. If tank light doesn't go off and unit doesn't fill, replace control PCB.

PROBLEM #14 -- FILL CUP OVERFLOWS DURING FILL CYCLE.

14-l. Is vent tube in fill cup in place?
Check to be sure the U shaped vertical tube is in,place.

14-2. Is fill line to tank blocked?
This is a clear plastic line and can be checked visually. Clean if required.

14-3. Is tank adaptor or screen in steam generator blocked?
Remove tank and clean if necessary.

14-4. Is duct pressure too high? (5" water guage maximum)
Reduce duct pressure. Refer to factory for further help.

PROBLEM #15 -- ARCING INSIDE STEAM GENERATOR.

15-l. Check water supply to unit.
Unit should be operated on potable water, **not** brackish or contaminated water.

15-2. Is automatic drain timer functioning?
Turn power to humidifier off for 15 seconds. When power is reapplied, unit should drain for duration set on timer and drain again after interval set on timer. If it doesn't, see Problem #5 - Drain Timer Doesn't Drain Unit.

15-3. Check the time unit has been in operation.
If tank has been in service for sufficient period of time it probably needs cleaning.

15-4. What are the drain timer settings? If 3 phase unit, what is setting (spacing) of plates?
Drain timer should be set on .15 hour intervals and 64 or 128 second duration (enough time to get complete drainage on each cycle). On 3 phase unit, electrodes should be in position #3 (farthest apart). If problem is not corrected by above steps, check water hardness and conductivity and then consult factory.

PROBLEM #16 -- STEAM GENERATORS OF TWO-TANK UNIT RUNNING AT DIFFERENT WATER LEVELS.

16-1. Is humidifier supplying steam to two ducts at different duct pressures?

This can cause steam generators to run at different water levels, but they should balance out between drain cycles.

16-2. What is the pressure of the water supply to the unit?

Insufficient water supply pressure at unit can cause unequal water levels between steam generators.

16-3. Do steam generators drain at same rate? Add water to fill cup of steam generator running at low water level until both generators are at same level. Depress manual drain switch.

If one or both of the steam generators do not drain, see Problem #3 -- Manual Drain Doesn't Work.

If steamgenerators do not drain at same rate, check for partially blocked screen in bottom of steam generator, drain hose, drain fitting, or external drain piping of steam generator(s) with slow drain rate.

16-4. If humidifier is 3 phase unit are plates set at same spacing in all generators?

Check to be sure, this could be causing the problem.

16-5. Do drain valves leak? With one electrical lead disconnected for each drain valve, remove hose between drain valve and drain fitting or remove external drain piping.

If drain valve(s) leak, replace.

16-6. Do the steam generators fill at the same rate? Drain the generators with manual drain switch and allow to refill. NOTE: If demand is too low, sensing element of controlling statmayhavetobe removed to force unit to refill.

If steam generators do not fill to same water level, check the generator with low level for plugged flow washer in fill manifold nozzle. Also check for partially plugged screen in fill valve inlet. If the fill cup(s) overflowed during the fill, see Problem #14 - Fill Cup Overflows During Fill Cycle.

PROBLEM #17 -- UNIT WILL NOT LOAD UP TO FULL CAPACITY (LOW CURRENT DRAW).

17-1. Is demand meter reading 0 or very low?
See section on Demand Meter Reading 0% Continuously (Problem #6).

17-2. Is capacity adjustment set at l00%?
If not, set at desired level.

17-3. Is demand meter reading l00%?
If not, humidistat is not calling for unit's full capacity. If RH at sensor controller is 6-8% below set point and demand is not l00%, see Problem #6 -- Demand Meter Reading is 0%.

17-4. Is the tank light on?
The high water probe circuit can **limit** unit's output. See applicable sections - Problems 12 or 13.

17-5. If humidifier is 3 phase unit, are all 3 phases energized?
Check at unit to be sure.

17-6. Is the high limit stat limiting output? Remove leads from high limit stat at #28 and #42 on low voltage terminal block.
If units output increases to full capacity, check for duct RH at high limit stat set point, check for defective stat or short in wiring to stat. See Table **E** for average current for particular Current Control Module (CCM).

17-7. Is the interlock or sail switch limiting the units operation? Remove leads at #45 and #46 on low voltage terminal block.
If unit's output increases to full capacity, check for defective interlock or sail switch, or short in wiring to interlock or sail switch.

17-8. On a two-tank unit, are both tanks at the same water level?
Iftheyare not at the samelevel,seeProblem #16 -- **Steam** Generators Running At Different Levels.

17-9. Is the unit receiving sufficient water supply? Observe water flow into fill cup(s) when fill valve is open.

If no water flowing or flowing at very low rate into fill cup(s); check external water supply to unit, check for blocked fill valve inlet screen, and check for blocked flow washer(s) in fill manifold nozzles (two-tank units only).

17-10. Is the PCB equipped with the proper CCM?

This could be limiting unit's output. See Table E for proper CCM for particular voltage and phase.

17-11. TURN POWER OFF. With leads #39-65 and #67 removed, check resistance of current transformer coil. On two-tank units also check second current transformer with leads #65 and #68 removed.

Resistance should be 15 ohms ±5% between outside terminals, and 166 ohms ±10% between center test tap and each outside terminal. If no, replace current transformer.

17-12. If the above steps have not solved problem, the control PCB is probably defective.

Replace control PCB.

PROBLEM #18 -- UNIT FILLS UNTIL INTERNAL CONTACTORS OPEN OR WATER OVERFLOWS THE FILL CUP.

18-1. If unit is 3 phase model, are all 3 phases energized?

Check at unit to be sure. Check across each combination of terminals.

18-2. If unit is two-tank model, are the steam generators both filling to same water level?

If not, see Problem #16 -- Steam Generators Running At Different Water Levels.

18-3. If water is overflowing fill cup, check electrical leads and connectors at steam generator.

Lead mark "T" must be connected to steam generator terminal marked "T" to allow high water probe circuit to function.

18-4. If water is overflowing fill cup and water level is at the top of the generator and tank light is not on, check isolation transformer circuit.

Disconnect high water probe leads (47, 48, 49) at each tank and jumper to Ll, L2, or L3. Tank light should come on and fill should stop. If not check AC voltage between #40 and **#56** at isolation transformer with generator full of water. Reading should be 2 volts AC or greater. Turn Power Off, conduct continuity test 47, 48, and 61, Table C (POWER OFF). If open circuits are detected, repair. If circuits are good, check isolation transformer coil **resistanc** (Table D) and replace transformer if necessary.

18-5. Remove lead #14 from fill valve. Does fill stop?

If not, replace fill valve.

18-6. Is control PCB equipped with proper CCM? Is overcurrent relay PCB equipped with proper ORB?

See Tables F and **E** for proper modules for specific voltage, phase and desired capacity.

18-7. If water is overflowing fill cup and isolation transformer output is 2 volts AC or more, check AC voltage at main PCB terminals 8 and 12 (leads #40 and **#17).**

If voltage reading at main PCB terminals 8 and 12 is not 2 volts AC or more (same as at isolation transformer leads #40 and #56), do continuity tests 17, 40 and 56 (Table C), POWER OFF. Repair any open circuits. If voltage at main PCB terminals 8 and 12 is 2 volts AC or more, replace main PCB.

18-8. Is humidifier drawing more than 110% or nominal current rating? See Table E.

Unit can draw up to 110% of nominal current during normal operation. If current is exceeding this value, proceed.

18-9. TURN POWER OFF. With leads #39-65 and **#67** removed, check resistance of current transformer coil. On two-tank units also check second current transformer with leads 65 and 68 removed.

Resistance should be 15 ohms ±5% between outside terminals, and 166 ohms ±10% between center test tap and each outside terminal. If not, replace current transformer

PROBLEM #19 -- UNIT FILLS UNTIL MAIN LINE CIRCUIT BREAKERS OR FUSES OPEN.

19-1. If unit is 3 phase model, are all 3 phases energized?
Check at unit to be sure. Check across combination of terminals.

19-2. Is the circuit breaker or fuse the size recommended on the unit nameplate?
Do not select the circuit breaker or fuse according to the "nominal" amp rating of the unit. Use the "recommended" size as marked.

19-3. Is the proper ORM installed on the overcurrent relay PCB?
See Table E for correct ORM for the particular current rating or voltage and phase.

19-4. Does the unit drain when overcurrent exists?
Measure primary current. If it is 110% or more or maximum current rating and unit doesn't drain, see Problem #4 -- Unit Doesn't Drain When Overcurrent Exists.

19-5. Does the contactor open when power is turned off?
Turn power off and observe mechanical action of contactor. Check continuity across contactor power terminals (should be open circuit). If contacts are closed, replace contactor.

19-6. If no problems are found in above steps, overcurrent relay PCB is probably defective.
Replace overcurrent relay PCB.

PROBLEM #20 -- FILL LIGHT FLASHES

20-l. Is drain timer functioning properly?
Turn primary power off for 3 to 5 minutes. When power is re-applied, unit should automatically go into drain cycle for duration set on timer and drain again after interval set on timer. If it doesn't, see Problem #5 - Drain Timer Does Not Drain Unit.

20-2. Check water supply to humidifier.
Unit should be operated on potable water, not brackish or contaminated water.

20-3. Has unit been in service for extended period of time?
If it has, remove and clean steam generator.

20-4. Does humidifier resume normal operation if high limit stat leads are disconnected at low voltage terminal block (#28 and #42)?
If it does, high limit is detective or there is an intermittent short in the stat wiring.

20-5. Does unit resume normal operation if interlock or sail switch is disconnected at low voltage terminal block (145 and #46)?
If it does, interlock or sail switch is defective or there is an intermittent short in the wiring to the switch.

20-6. Check for loose connections or broken wires.
Conduct continuity tests #ll, 12, 13, 14, 25, 26, 27, 28, 42, 45, 46, 90, 91, and 92, Table C and check for loose connections. (POWER OFF)

20-7. If unit is not operating properly after above steps have been completed, the control PCB is probably defective.
Replace control PCB.

PROBLEM #21 - CONTACTOR WILL NOT CLOSE

21-1. Was the reset switch pressed?
This must be done to reset and latch the contactor holding circuit.

21-2. Does the contactor pull in and then drop out immediately?
If there is water in the tank, there may be an overcurrent condition. Press the manual drain switch to drain the tank and try again. See also Problem No. 4 -- unit doesn't drain when overcurrent exists.

21-3. Check for 24-28 volts AC between fuse block terminals (leads 80 and 72-79).
If fuse is blown, check for approximately 3 ohms coil resistance at contactor and verify free mechanical operation of contactor. Replace contactor if necessary.

If contactor coil resistance is OK and it is not mechanically stuck, check for shorts in current relay PCB (unlikely) or shorts to ground in wiring (leads 80, 79, 72, 76, 73, and 77).

If fuses are OK but voltage is not 24-28 volts AC, check output voltage of transformer and repair transformer or wires from transformer to fuse blocks as necessary.

21-4. Check for 24-28 volts AC at contactor coil terminals.
If 24-28 volts AC is obtained, check for approximately 3 ohms coil resistance at contactor and verify free mechanical operation of contactor.

21-5. Check for 24-28 volts AC at current relay PCB receptacle, terminals 1 and 2 (leads 79 and 80).
If no voltage, do continuity tests 79 and 80 (POWER OFF). Repair any open circuits.

21-6. Check continuity of reset switch with button depressed; also do continuity checks 70 and 71 (POWER OFF).
Replace reset switch or repair open circuits as necessary. If switch and wiring are OK, replace current relay PCB.

PROBLEM #22 - SECONDARY FUSES BLOW

22-l. Helpful Hint - check the drain valve coil resistance first (See Table D).

This is the most common cause of blown fuses. If the coil resistance is low, replace the valve and fuse. Also, find out if there is a reason for the drain valve failure. If the drain valve operates frequently and/or for long times, there is a problem in the control system and/or the main control PCB.

IF THE DRAIN VALVE IS OK, REFER TO FIGURE 2 AND CONTINUE

22-2. Fuse Fl or F3 blows.

Check coil resistance of the contactor, verify that the contactor is not stuck open, check for shorts to ground in leads 72, 73, 76, 77, 79, and 80. Check input resistance of current relay PCB (terminals 1 to 2). If shorts are found, repair the wiring or replace defective components.

22-3. Fuse F2 or F4 blows; drain valve coil resistance is OK

Check resistance of power on light and drain light. Check input resistance of main control PCB (terminals 10 and 11) and electronic timer PCB (spade terminals marked 30 and 23). Check for shorts to ground in secondary power circuits fed by fuses F2 and F4. Check also for any field modifications to the unit, such as remote indicator lights, control relays, etc.

22-4. All components check out OK, and there are no apparent shorts in the wiring.

Check for wires which may be installed in the wrong places or to the wrong component. Especially check out leads 12, 13, 15 and 44 for wrong connections or shorts to ground.

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TABLE C

CONTINUITY TESTS AND WIRE ROUTING

1. Turn power off at fuse box or circuit breaker for all continuity tests.
2. Remove main control PC board and overcurrent relay PC board, and disconnect drain timer.
3. If open circuit is detected, repair or replace component in question.

Test No.	Lead No.	From	To
Ll	Ll	Terminal block	Power transformer
L2	L2	Terminal block	Power transformer
L3	L3	Terminal block	Power transformer
Tl	l/T1	Contactor	Steam generator
T2	2/T2	Contactor	Steam generator
T3	3/T3	Contactor	Steam generator
T4	4/T4	Contactor	Steam generator
T5	5/T5	Contactor	Steam generator
T6	6/T6	Contactor	Steam generator
1	1	Terminal block	Contactor
2	2	Terminal block	Contactor
3	3	Terminal block	Contactor
4	4	Terminal block	Contactor
5	5	Terminal block	Contactor
6	6	Terminal block	Contactor
11	11	Pin 17, main PCB	Fill light
12	12	Pin 15, main PCB	Fill light
13	13	Fill light	Fill valve
14	14	Fill light	Fill valve
15	15	Pin 14, main PCB	Drain relay
16	16	Pin 13, main PCB	Drain relay
17	17	Pin 12, main PCB	Power transformer
19	19	Fuse block	Drain switch
20	20	Fuse block	Drain light
21	21	Drain light	Power on light
22	22	Power on light	Pin 10, main PCB
23	23	Fuse block	Drain timer
25	25	Pin 2, main PCB	#25, L.V. term. block

Test No.	Lead No.	From.	To
26	26	Pin 4, main PCB	#26, L.V. term. block
27	27	Pin 5, main PCB	#27, L.V. term. block
28	28	#25, L.V. term. block	#28, L.V. term. block
29	29	Drain switch	Power on light
30	30	Drain timer PCB	Drain timer PCB
31	31	Fuse block	Drain relay
33	33	Power on light	Pin 11, main PCB
34	34	Drain relay	Drain timer PCB
35	35	Drain relay	Drain timer PCB
36	36	Drain switch	Drain relay
37	37	Drain switch	Drain light
38	38	Pin 1, main PCB	Current relay PCB
39	39	Pin 3, main PCB	Current trans. #l
40	40	Pin 8, main PCB	Isolation trans.
41	41	Pin 20, main PCB	Demand meter
42	42	Pin 6, main PCB	#42, L.V. term. block
43	43	Pin 7, main PCB	Tank light
44	44	Pin 16, main PCB	Tank light
45	45	#28, L.V. term. block	#45, L.V. term. block
46	46	Pin 18, main PCB	#46, L.B. term. block
47	47	Steam gen. #l	Isolation trans.
48	48	Steam gen. #2	Isolation trans. (502 only)
52	52	Connector block	Drain valve (502 only)
53	53	Connector block	Drain valve (502 only)
54	54	Drain timer	Drain valve (501) or Connector block (502)
55	55	Drain timer	Drain valve (501) or Connector block (502)
56	56	Power transformer	Isolation trans.
57	57	Pin 1, main PCB plug	Capacity adj. pot. wiper
58	58	Pin 3, main PCB plug	Demand meter
59	59	Pin 4, main PCB plug	Capacity adj. pot. end
60	60	Pin 2, main PCB plug	Capacity adj. pot. end
61	61	Power trans. prim.	Isolation trans.
62	62	Connector block	Drain valve (502 only)
63	63	Connector block	Drain valve (502 only)
64	64	Pin 22, main PCB	Chassis ground
65	65	Current trans. #l	Current trans. #2 (502 only)
67	67	Pin 6, current relay PCB	Current trans. #l
68	68	Pin 7, current relay PCB	Current trans. #2 (502 only)
70	70	Pin 9, current relay PCB	Reset switch

Test No.	Lead No.	From	To
71	71	Pin 10, current relay PCB	Reset switch
72	72	Fuse block	Contactor coil #l
73	73	Contactor coil #l	Contactor coil #2 (502 only)
75	75	Pin 11, current relay PCB	#42, L.V. term. block
76	76	Pin 12, current relay PCB	Contactor coil #l
77	77	Contactor coil #l	Contactor coil #2 (502 only)
79	79	Fuse block	Pin 1, current relay PCB
80	80	Fuse block	Pin 2, current relay PCB
81	81	Pin 4, current relay PCB	Chassis ground
90	(25)	#25, L.V. term. block	Controlling stat
91	(26)	#26, L.V. term. block	Controlling stat
92	(27)	#27, L.V. term. block	Controlling stat
93	(28)	#28, L.V. term. block	High limit stat
94	(42)	#42, L.V. term. block	High limit stat
95	(45)	#45, L.V. term. block	Sail switch/interlock
96	(46)	#46, L.V. term. block	Sail switch/interlock

Table D

Resistance Values of Components

Resistance Values (Ohms)	Primary				Secondary		
	H_1-H_2	H_1-H_3	H_4-H_5	H_4-H_6	7-8	8-9	7-9
Power Transformer 208/240/480 volt	13	16	15	18	.2	.2	.4
Power Transformer 380/600 volt	25	48			.2	.2	.4
Isolation Transformer	47, 48 or 49 to 61				56 to 40		
	Approx. 530 Ohms				Approx. 45 Ohms		

Fill Valve Coil .....Approx. 17 Ohms

Drain Valve Coil.....Approx. 5 Ohms

Drain Relay Coil.....Approx. 120 Ohms

Potentiometer - Cap. Adjust.....Approx. 1500 Ohms (End to End)

Current Transformer..... { 15 Ohms ± 5% Between Outside Terminals; 166 Ohms ± 10% Outside Terminal to center test trap

Fill and Tank Light.....Approx. 30 Ohms

Drain & Power On Light.....Approx. 70 Ohms

Contactor Coil.....Approx. 3 Ohms

Printed Circuit Boards:

Main Control PCB (power input terminals 10 & 11)
Current relay PCB (power input terminals 1 & 2)
Drain timer PCB (power input terminals 30 & 23)
Drain timer PCB (switched terminals 34 & 55-35)

} Very high -- over 20,000 Ohms

Table E

EHU-500 Electrical Specifications

Amp Ratings per Tank					Recommended Branch Circuit			
					EHU-501		EHU-502	
Nominal Rating	Average Operating Amps	CCM Module Used	Internal Overcurrent Trip Amps	ORM Module Used	Wire	Fuse	Wire	Fuse
48	40	CCM-11	60	ORM-11	6	70	--	--
42	35	CCM-12	50	ORM-12	6	60	2	125
35	29	CCM-13	42	ORM-13	8	50	3	100
27	23	CCM-14	34	ORM-14	8	40	4	80
20	17	CCM-15	25	ORM-15	8	30	6	60

Table F

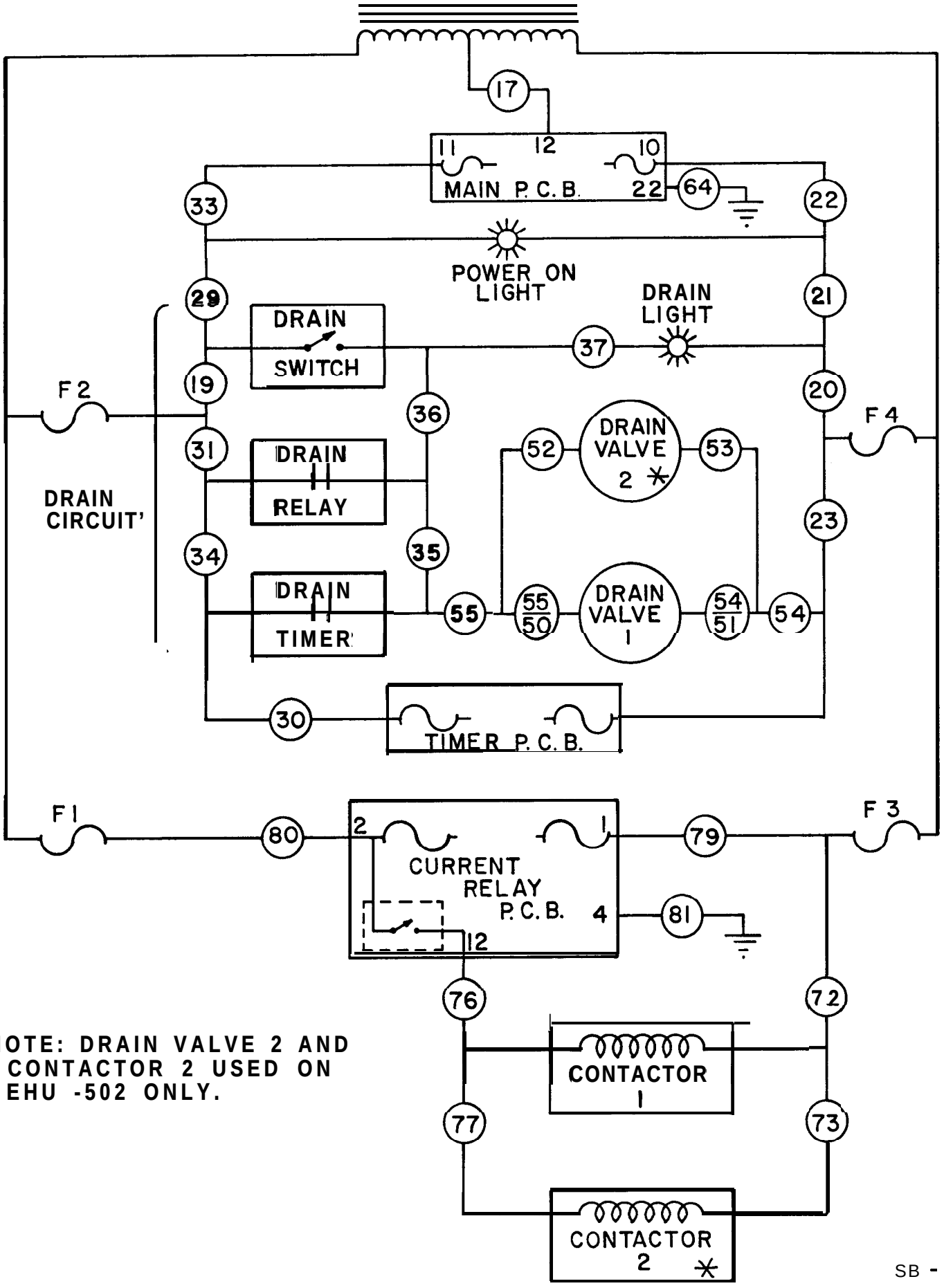
EHU-500 Humidity Output Specifications

Nominal Amp Rating PER TANK	Humidity output lb/hr per tank, at voltage shown								
	Single Phase			Three Phase					
	208	220	240	208	240	380	416	480	600
48	24	26	28	42	48	76	83	96	---
42	21	22	24	36	42	66	73	84	---
35	18	19	20	30	35	55	61	70	88
27	14	15	16	23	27	43	47	54	68
20	10	11	12	17	20	32	35	40	50

Table G

A[redacted]g Solid-State Humidistat Sensor Elements

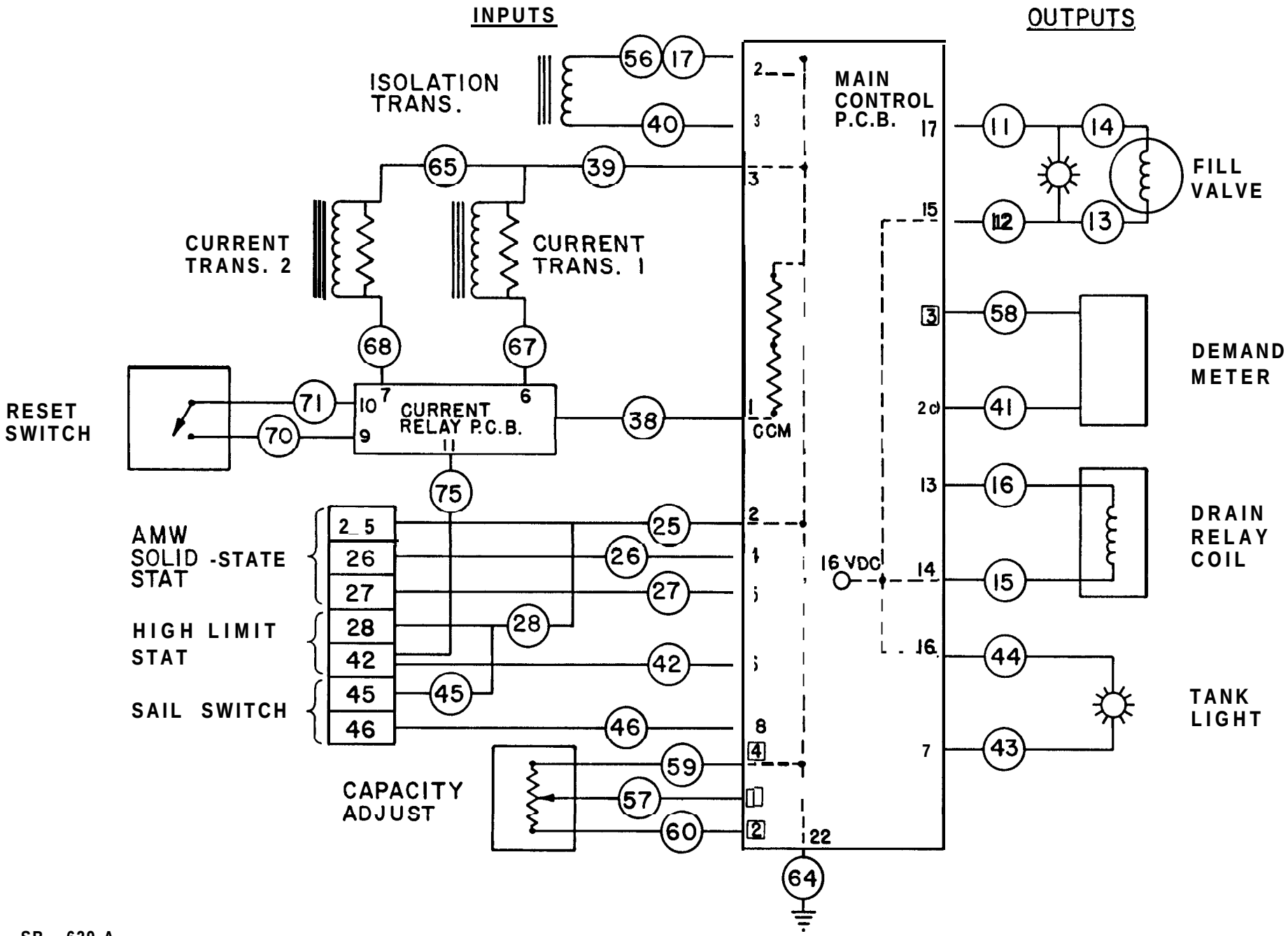
Color	Number	Relative Humidity Range %
Brown	L15-1209	15-31
orange	L15-1214	30-46
Yellow	L15-1215	45-61
Green	L15-1217	60-76
Blue	15-1219	75-91
Violet	15-1223	90-100



*NOTE: DRAIN VALVE 2 AND CONTACTOR 2 USED ON EHU -502 ONLY.

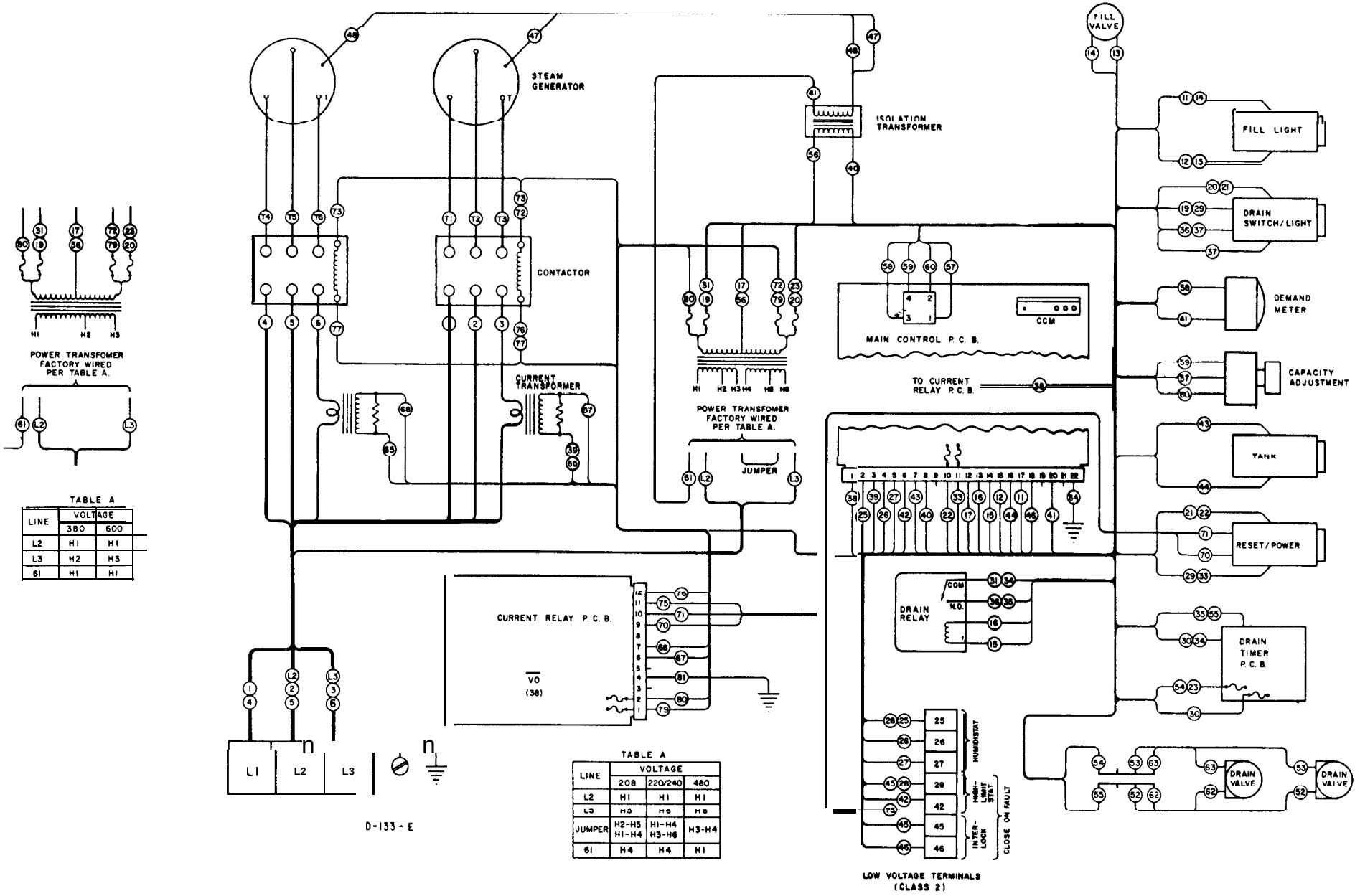
SB - 629-B

FIGURE 2 SECONDARY POWER CIRCUITS



SB -629-A

FIGURE 3 - SECONDARY CONTROL & SIGNAL CIRCUITS



POWER TRANSFOMER FACTORY WIRED PER TABLE A.

TABLE A

LINE	VOLTAGE	
	380	600
L2	H1	H1
L3	H2	H3
61	H1	H1

TABLE A

LINE	VOLTAGE		
	208	220/240	480
L2	H1	H1	H1
L3	H2	H2	H2
JUMPER	H2-H5 H1-H4	H1-H4 H3-H6	H3-H4
61	H4	H4	H1

Fig. 4 - Three-phase unit schematics

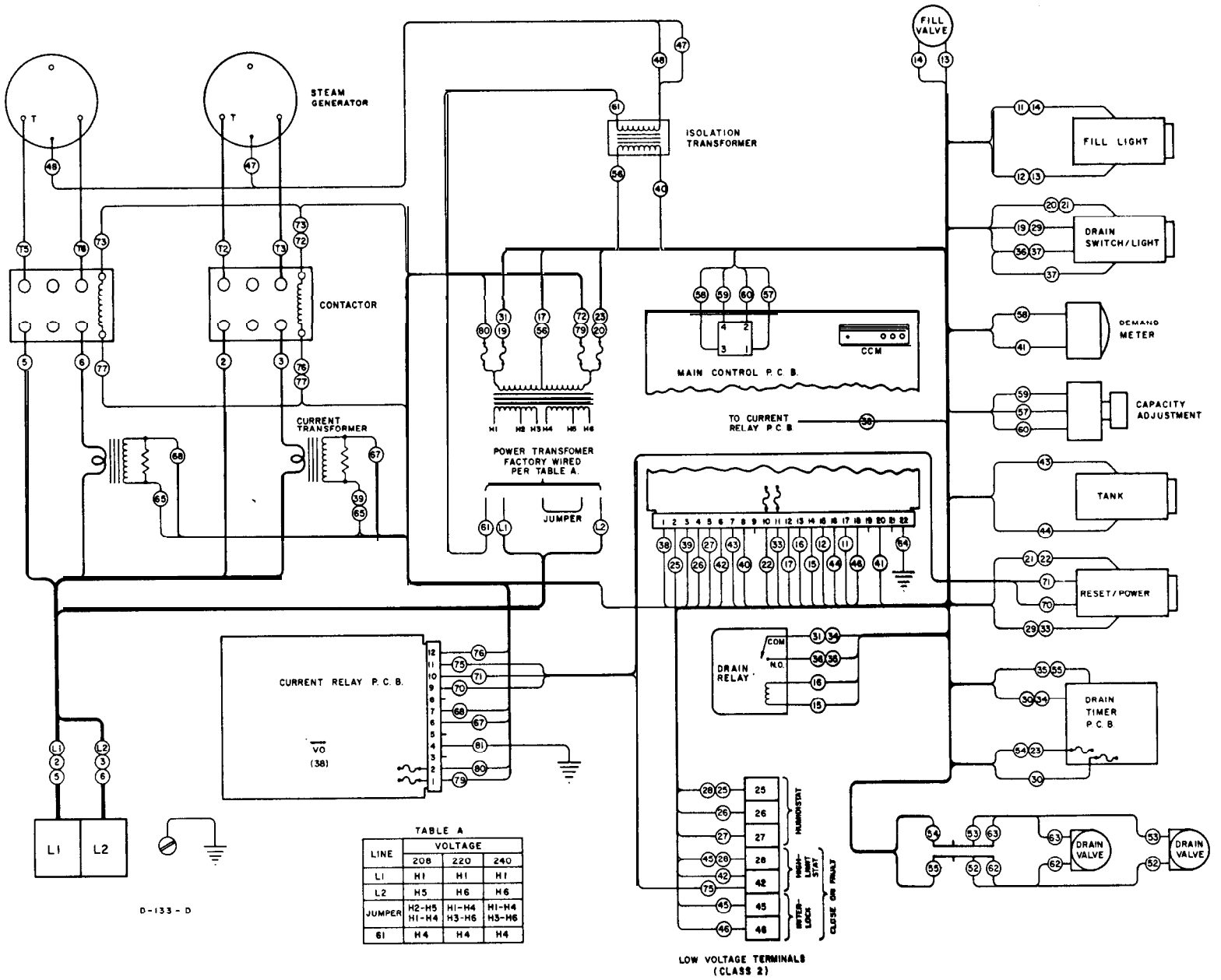


TABLE A

LINE	VOLTAGE		
	208	220	240
L1	H1	H1	H1
L2	H5	H6	H6
JUMPER	H2-H5 H1-H4	H1-H4 H3-H6	H1-H4 H3-H6
61	H4	H4	H4

Fig. 5- Single-phase unit schematic

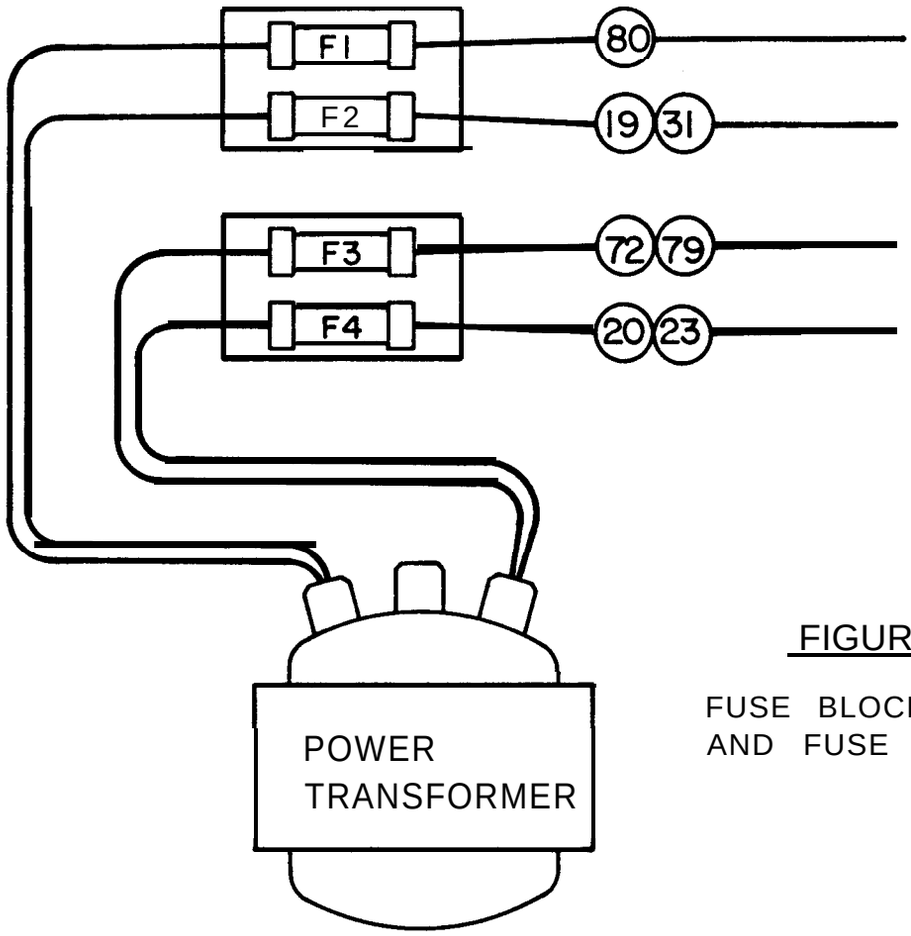


FIGURE 6

FUSE BLOCK CONNECTIONS
AND FUSE DESIGNATIONS

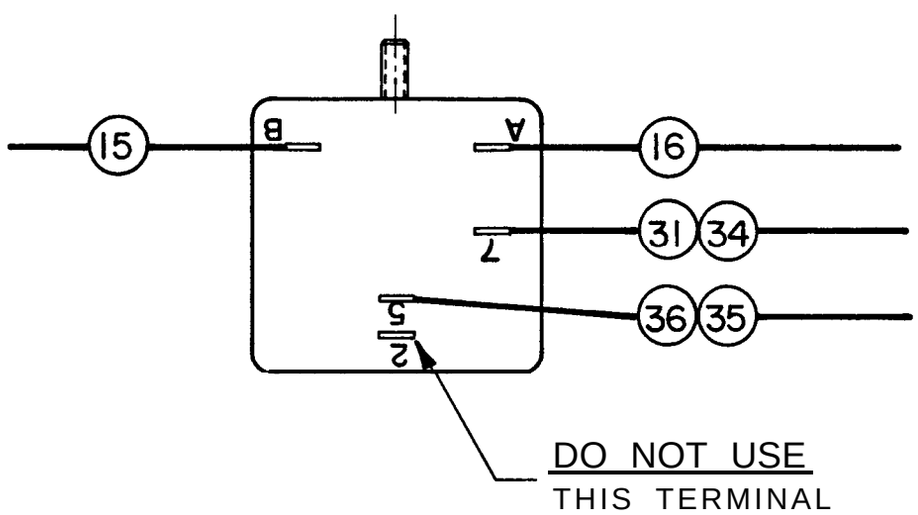


FIGURE 7

DRAIN RELAY CONNECTIONS