Section 3

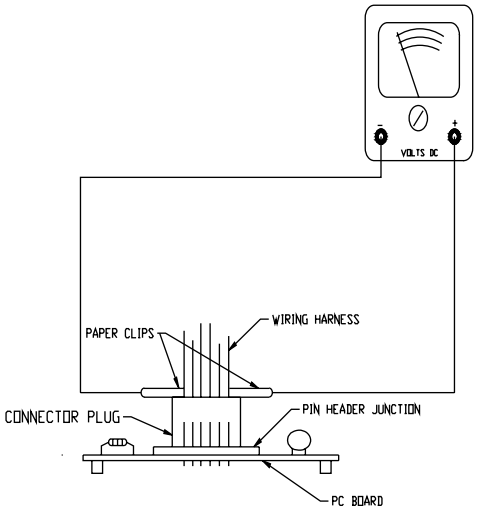
18. Electrical Measurements

18.1. With Plugs Connected

While trouble shooting the microcontrol units, there will be times when it is necessary to make electrical measurements with the system powered up and operating. There are several different methods of accomplishing. Electronic meter lead accessory kits are commercially available for this purpose, and make the servicer's job easier.

An alternative to this is to utilize two small paper clips, with one end straightened. These are small enough to be slid into the connector along side the wire, and make contact with the internal terminal, without causing any damage. A multimeter can now be connected to the two paper clips, allowing the electrical measurements to be made.

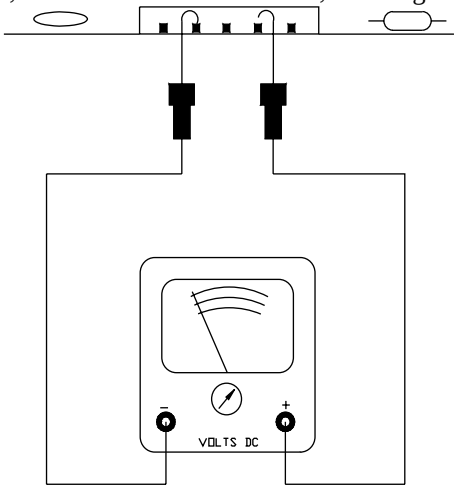
Note: Do not puncture the wire insulation with meter leads to make electrical measurements.



18.2. With Plugs Disconnected

While trouble shooting the microcontrol units, there will be times when it is necessary to make board level electrical measurements. The proper test clip leads are the "Mini Grabber / Plunger Type" test clips. These leads must be capable of grabbing a 0.045" square terminal, with a center to center terminal distance of 0.156".

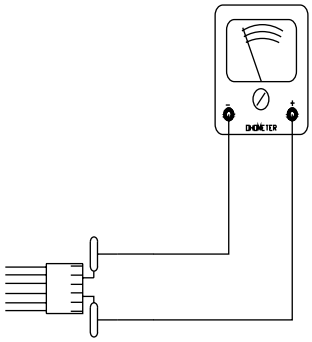
The Mini Grabber/Plunger Type test clips can effectively be clipped to the UCP board terminals. Do not attempt to utilize alligator test clips, or any general purpose test clips to accomplish this type of measurement. Test clips other than Mini Grabbers do not have the proper clearance capabilities, and short circuits will occur, resulting in P.C. board failures.



18.3. At Disconnected Plug Ends

While trouble shooting the microcontrol units, there will be times when it is necessary to make electrical measurements, and test the terminal integrity at the disconnected plug ends. Electronic meter lead accessory kits are available for this purpose.

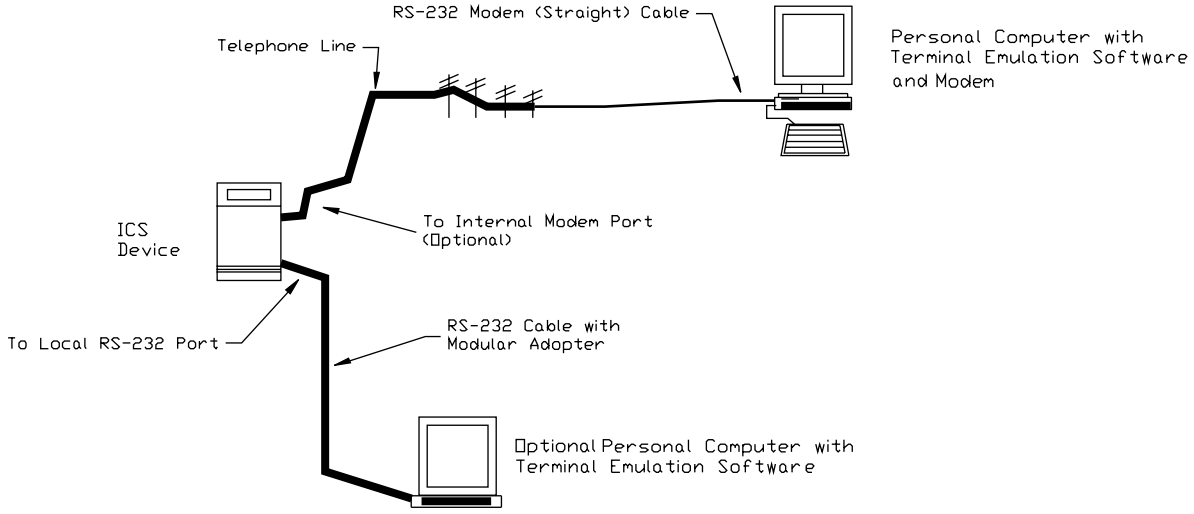
An alternative to these kits is to utilize two small paper clips, with one end straightened. Paper clips are small enough that they can be slid into the plug end of the connector, and make contact with the internal terminal, without causing any damage. If the internal terminal grips the paper clip, without the clip falling out, the terminal is usually okay. A multimeter can now be connected to the two paper clips, allowing the electrical measurements to be made. Do not force the probe end of a standard meter lead into the plug end of the connector to make electrical measurements. This will damage the terminals, causing loss of contact, and leave you with more problems than you had originally.



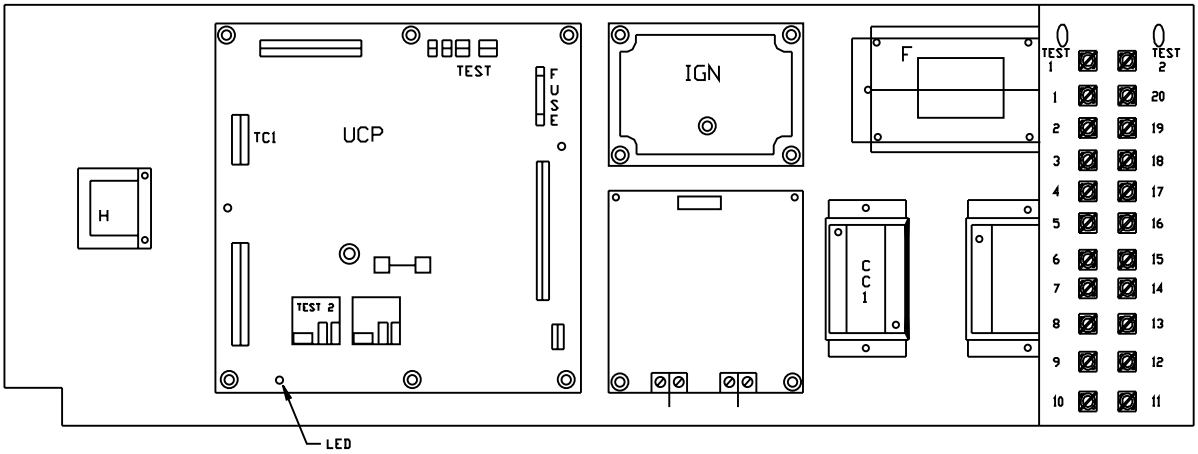
19. Trouble Shooting from an Integrated Comfort System (ICS) Device

An ICS device like: Tracer, Tracker and VariTrac CCP (CV only), are effective tools of locating the source of a problem. There are 46 or more Binary and Analog values, some standard and some accessory achieved, on a microcontrol unit that can be accessed on site or remotely. This allows diversity in being able to diagnose and trouble shoot, or checking system status on several pieces of equipment from just one location.

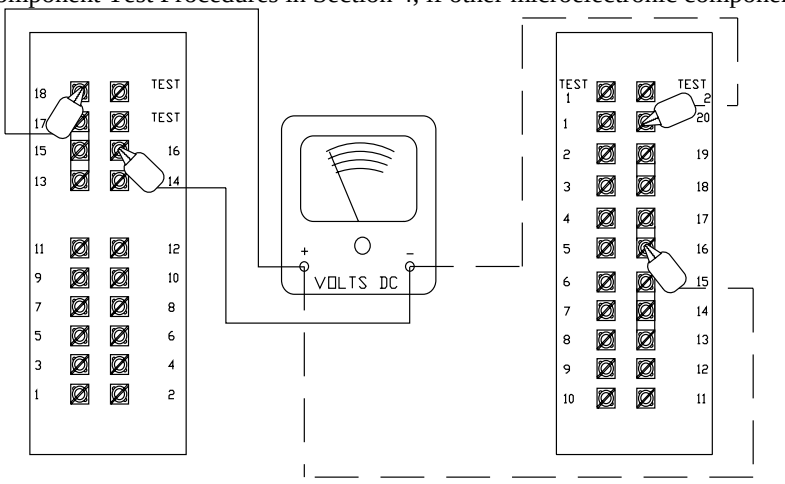
Several of the values will alarm the ICS device in the event of a failure, and through custom alarming, those that do not may be enabled to do so. Trend logs can be set up to monitor most of these points at regular intervals, so that suspect problem occurrences can be captured and viewed, without having to continuously monitor system status. If a modem is installed in the ICS device, countless hours of manpower can be saved in travel, trouble shooting can begin immediately after an alarm or telephone call is received. Consult the respective ICS device Installation / Operation / Programming (IOP) manual for information on programming and set up.



20. Recommended Steps for Trouble Shooting



Step 1. Do Not kill unit power with disconnect switch, or diagnostic & failure status information will be lost.
Step 2. Utilizing the hole in the lower left hand corner of the control box dead front panel, verify that the LED on the UCP is burning continuously. If LED is lit, go to Step 4.
Step 3. If LED is not lit, verify presence of 24 VAC between LTB-16 and LTB-20 (Note: LTB-16 and LTB-18 before 06/93). If 24 VAC is present, proceed to Step 4. If 24 VAC is not present, test unit primary voltage, test transformer (TNS1) and fuse or internal circuit breaker, test fuse (F1) in upper right hand corner of UCP. Proceed to Step 4 if necessary.
Step 4. Utilizing the Failure Status Diagnostics at the end of this section, test the following: System status, Heating status, and Cooling status. If a Heating failure, a Cooling failure, or both are indicated, follow instructions in Failure Status Diagnostics section. If a System failure is indicated, proceed to Step 5. If no failures are indicated, proceed to Step 6.
Step 5. If a System failure is indicated, re-check Steps 2 and 3. If the LED is not lit in Step 2, and 24 VAC is present in Step 3, the UCP has failed. Replace UCP.
Step 6. If no failures are indicated, place the system in the test mode, utilizing the Test Mode Feature in Section 2. This procedure will allow you to test all of the UCPs on board outputs, and all of the off board controls (relays, contactors, etc.) that the UCP outputs energize, for each respective mode. Proceed to Step 7.
Step 7. Step the system through all of the available modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to one hour while troubleshooting. refer to sequence of operations for each mode, to assist in verifying proper operation. Make repairs if necessary, and proceed to Steps 8, and 9.
Step 8. If no abnormal operating conditions appear in the test mode, exit by cycling unit power at the service disconnect. This verifies that all of the UCPs on board outputs, and all of the controls the UCPs outputs energize are operational.
Step 9. Refer to Individual Component Test Procedures in Section 4, if other microelectronic components are suspect.



Prior to 6/93 **Since 6/93**

21. Trouble Shooting Chart "Problem Descriptions and Causes"

Note: Always verify the unit is operating in the proper "MODE" when troubleshooting.

SYMPTOM	PROBABLE CAUSE	RECOMMENDED ACTION
A. 3-25 Ton - Unit will not operate in the TEST MODE - no fan, cool or heat.	**1.** No power to the Unit. **2.** No power to the UCP. **3.** UCP fuse (F1) is defective.	**1.** Check line voltage to the unit. **2.** Check for 24 VAC from bottom of F1 fuse to system. **3.** Check for 24 VAC from top of F1 fuse to system ground. If 24 VAC is not present, fuse is bad.
B. Goes into TEST MODE, runs for 15-40 seconds, then stops:	**1.** Unit has entered AFF mode **2.** A TCI is installed and its High-Temp input is open w/DIP sw.#1 ON. **3.** Heat pump only - fan runs 15 sec & stops **4.** Goes into TEST MODE (UCP's LED blinks) but still won't run.	**1.** See Section 23.7 & 23.8. Check IDM, belt. (Nothing runs) **2.** Close input or turn switch to OFF if not used. (Nothing runs) **3.** Polarized plugs not configured correctly - see Section 35.5. (Nothing runs) **4.** Each output - cool 1 & 2, heat - is locked out. Troubleshoot each circuit individually. (Only fan runs)
C. 27.5 - 50 Ton - Unit will not operate in the TEST MODE No fan, cool or heat	**1.** See test 1-3 in "A" above **2.** Auto Stop input is open	**1.** See above **2.** Close Auto Stop input; after 5 seconds system will run
D. Goes into TEST MODE, runs for 40 seconds, then stops.	**1.** FFS failed to close after 40 seconds. **2.** A TCI is installed and its High Temp input is open w/ DIP sw.#1 ON.	**1.** See Section 23.7, 23.8. Check belt, IDM **2.** Close input or turn switch to OFF if not used. For additional troubleshooting information on V3 see IOM.
E. Unit will not heat or cool but the fan switch operates.	**1.** ZSM is defective. **2.** Problem in ZSM wiring.	**1.** Refer to Zone Sensor Module troubleshooting, Sections 26 & 27. **2.** Verify wiring connections between LTB and ZSM.
F. Unit heats and cools, but will not control to setpoint.	**1.** ZSM is defective. **2.** Unit is over/undersized. **3.** ZSM location poor.	**1.** Refer to Zone Sensor Module Troubleshooting, Sections 26 & 27. **2.** Look at Section 40 for more information. **3.** Look at Section 40.1 for more information.
G. CPR1 will not operate, ODM runs.	**1.** Compressor failure. **2.** CC1 contator or wiring failure.	**1.** Test compressor - replace if necessary. **2.** Check wires, terminals and CC1. Replace if necessary.
H. CPR1 operates, ODM1 will not operate.	**1.** ODM has failed. **2.** ODM capacitor(s) has failed.	**1.** Check wires, terminals and CC1. Repair / replace if necessary. **2.** Repair connection / replace as needed.
I. CPR1 & ODM1 operates, but ODM2 will not.	**1.** OAS is out of range. **2.** ODM / capacitor has failed.	**1.** Test Outdoor Air Sensor - see Section 28.5. **2.** Repair / replace as needed.
J. CPR1 and ODM1 will not operate, even in the TEST MODE, but fan runs OK.	**1.** CC1 Circuit open. **2.** LPC1 circuit open. **3.** UCP is defective	**1.** Check wiring, terminals and applicable controls (CCB1, HPC1, & WTL1) see Section 53 "Snubber Circuits". **2.** Verify 24 VAC input at J2-2 - voltage should always be present. **3.** Cycle power off, then on, & try TEST MODE again. If compressor runs, it was in a Cool Fail mode. See Section 23.3. If compressor still will not run, UCP must be replaced.

SYMPTOM	PROBABLE CAUSE	RECOMMENDED ACTION
K. ODM 3 and/or 4 will not cycle.	**1.** OAS	**1.** Perform OAS Resistance/Temperature check. Replace if necessary.
	2. ODM3 and/or 4 capacitor has failed.	**2.** Check ODM capacitor, replace if necessary.
	3. Wiring, terminal, or CC2 contactor failure.	**3.** Check wires, terminals, and CC2. Repair or replace if necessary.
	4. ODM3 and/or 4 has failed.	**4.** Check ODM, replace if necessary.
	5. UCP is defective.	**5.** Replace UCP module
	6. ODF2 has failed.	**6.** Check for proper voltage and contact closure. ODF2 relay has a 24 VDC holding coil. If voltage is present, replace relay.
L. CPR2 and 3 (if applicable) will not operate.	**1.** No power to CC2 and/or 3 coil. Cool Failure Possible.	**1.** Check wiring, terminals and applicable controls (CCB2, CCB3, HPC2, LPC2, WTL2, WTL3)
	2. CC2 and/or 3 coil defective. Cool Failure Indicated.	**2.** Verify integrity of CC2 and/or 3 coil windings. If open or shorted replace CC2 and/or CC3.
	3. CC2 and/or 3 contacts defective.	**3.** If 24 VAC is present at CC2 and/or 3 coil, replace relay.
	4. UCP is defective.	**4.** 24 VAC is not present at CC2 and/or 3 coil. Reset the Cool Failure by cycling the service disconnect. Place the unit into Cool Stage 2 Mode, step 4 for constant Volume or step 6 for variable air volume, to ensure CPR2 and 3 Compressor operation. Check input devices in #1 & #2 above, if no controls have opened, and CC2 and/or 3 will not close, replace UCP.
M. Indoor motor (IDM) will not operate	**1.** IDM has failed.	**1.** Check IDM, replace if necessary.
	2. Wiring, terminal, or contactor failure.	**2.** Check wiring, terminals and F contactor. Repair or replace terminals, or fan contactor F.
	3. ZSM is defective.	**3.** Place unit in test mode. If the fan operates in the test mode, test ZSM using the appropriate test.
	4. UCP is defective.	**4.** Check the UCP fan output. Locate P2 connector, which is connected to J2 on the UCP. Find wire 64A (Black) and measure voltage to ground. If 24 VAC is not present on a call for fan, replace the UCP.
	5. Supply Fan Proving (SFP) switch has opened	**5.** Check SFP and belts, repair or replace if necessary.
N. No Heat (YC's CFM will not run, IP warms up, GV is energized,	**1.** CFM has failed.	**1.** Check CFM, replace if necessary.
	2. CFM capacitor has failed.	**2.** Disconnect BROWN wires from capacitor, test, and replace if necessary.
	3. Wiring, or terminal failure.	**3.** Check wiring, and terminals. Repair, or replace if necessary.
	4. Heat relay H has failed.	**4.** Check for line voltage between terminals 1 & 3 on heat relay. If voltage is present, contacts are open. Check for 24 VAC at H coil, replace H if 24 VAC is present.
	5. TNS2 and/or 3 has failed. (460/575 V units only)	**5.** Check for 230 VAC at TNS2 and/or 3 secondary, between Y1 and Y2. If 230 VAC is not present, replace TNS2 and/or 3.
O. No Heat (YC's only) CFM runs, GV energizes, IP does not warm up.	**1.** TNS2 and/or 3 has failed.	**1.** Check for 115 VAC at TNS2 and/or 3 secondary, between X1 and X2. If 115 VAC is not present, replace TNS2 an/or 3.
	2. Wiring or terminal failure.	**2.** Check wiring, and terminals. Repair, or replace if necessary.
	3. IGN has failed.	**3.** Verify presence of 115 VAC at IGN L1 and L2. Check for 115 VAC between terminals PPM4-1 and PPM4-2, and PPM5-1 and PPM5-2 (if applicable) in the gas section. If 115 VAC is present for IP warmup, IGN is OK. If 115 VAC is not present, replace IGN.
	4. IP has failed.	**4.** With 115 VAC applied to IP, warm up should take place. Cold resistance of IP should be a minimum of 50 Ohms. Nominal current should be 2.5 to 3.0 Amps.

SYMPTOM	PROBABLE CAUSE	RECOMMENDED ACTION
P. No Heat (YC's only) GV does not energize, CFM runs, IP warms up	**1.** Wiring or terminal failure. **2.** IGN has failed **3.** GV has failed.	**1.** Verify presence of 24 VAC between IGN PWR terminal to ground, if not present, check wiring and terminals. Repair or replace if necessary. **2.** Verify presence of 24 VAC between IGN VALVE terminal to ground, if not present replace IGN. **3.** Measure voltage between TH and TR on the gas valve (GV). If 24 VAC is present and the GV will not open, replace the GV.
Q. Low Heat Capacity Intermittant Heat. (YC's only) CFM runs in LO or HI speed only, or may not operate at all in one speed or the other.	**1.** CFM has failed. **2.** UCP is defective.	**1.** Check CFM, test LO and HI speed windings. **2.** Check UCP K5 relay. Check for K5 coil voltage at solder joints CR16 above K5 on the UCP. Nominal voltage at the coil is 28 VDC. If 28 VDC is present, COM. & N.O. contacts should be closed, energizing CFM HI speed windings. If 28 VDC is not present, LO speed should be energized through K5 COM. & N.C. contacts. If voltage contradicts operation, UCP has failed.
R. No Heat (YC's only) "Fan" selection switch on the ZSM is in the "AUTO" position and the fan runs continuously.	**1.** TCO2 has opened. Heat Failure Indicated.	**1.** System Status Failure Diagnostic Place the unit in the HeatingTest Mode, steps 6 & 7 for constant volume or step 8 & 9 for variable air volume and check the complete heating system for failure. Make necessary repairs or adjustments to the unit.
S. No Heat (TE's only) Electric heat will not operate.	**1.** Heater contactor(s) have failed. **2.** Heater element temperature limit(s) is open. **3.** Wiring or terminal failure. **4.** Heater Element(s) has failed. **5.** UCP is defective.	**1.** Check for 24 VAC at AH, BH,CH, and DH contactor coils. If 24 VAC is present on a call for heat, and the contacts do not close, the contactor has failed. **2.** Check line voltage between the element temperature limit terminals located in heat section. If line voltage is present, the limit is open. Repair heating unit, or replace limit(s) as needed. **3.** Check for wiring, or terminal failure in control and power circuit. Repair or replace if necessary. **4.** Check element and circuit integrity. Repair or replace as necessary. Replace open elements. **5.** Check UCP heat outputs. "First stage", locate P1 connector, connected to J1 on the UCP. Locate wire 65E at terminal P1-22, measure between 65E and ground. If 24 VAC is present, repeat #3 above. If 24 VAC is not present, the UCP has failed. "Second stage", Check UCP K5 relay. Measure from the common terminal on the relay to ground, 24 VAC should be present, if not repeat #3 above. If present, measure from the N.O. terminal on the relay to ground. If 24 VAC is not present, the UCP has failed.
T. Evaporator coil freezes up during low ambient operation.	**1.** System low on refrigerant charge. **2.** System low on air flow. **3.** Outdoor Air Sensor (OAS) has Failed. **4.** Frostat™ has Failed	**1.** Leak check, repair, evacuate, and recharge system as necessary. **2.** Check return air for obstruction or dirty filters. Check fan wheels, motors, and belts. **3.** Check OAS at connector P1 by disconnecting P1 from J1 on the UCP. Check resistance between P1-15 and P1-16, refer to the Resistance versus Temperature chart. Replace sensor if necessary. **4.** Check Frostat Switch

22. Component Failure and Response Chart

COMPONENT	FAILURE RESPONSE	NORMAL RANGE	DIAGNOSTIC
(OAS) Outdoor Air Sensor	1. Economizer in minimum position. Will not modulate.	^-55 to 175 F ^680K to 1.2K	*NONE* Check at UCP connector P1, between P1-15 & P1-16.
	2. ODM3 will not cycle off (runs continuously)	^-55 to 175 F 680K to 1.2K	*NONE* Check at UCP connector for CV or check at UVM for VAV
(RAS) Return Air Sensor	1. Economizer operates using Reference Enthalpy	0 to 209 F 90K to 7.1K	*NONE* Check at UEM connector P13, between P13-1 & P13-2.
(SAS) Supply Air Sensor	1. Economizer in minimum position, will not modulate.	0 to 209 F 90K to 7.1K	CV *NONE* VAV Cool Fail
(OHS) Outdoor Humidity Sensor	1. Uses Dry Bulb operation and economizes if below 60 F DB.	4 to 20 mA 90 to 10% RH Honeywell C7600A.	*NONE* Check at UEM J9(-) and J10(+) by measuring current draw.
(RHS) Return Humidity Sensor	1. Economizer operates using Referance Enthalpy.	4 to 20 mA 90 to 10% RH Honeywell C7600A.	*NONE* Check at UEM J7(-) and J8(+) by measuring current draw.
Minimum position Potentiometer	1. Economizer modulates but minimum posiotion stays at zero.	UEM onboard potentiometer range 50 to 200 Ohms.	*NONE* Check resistance at UEM J11 and J12 50 to 200 Ohms.
Cooling Setpoint (CSP) for CV ZSM slide potentiometer	1. Uses HSP and CSP CSP= HSP + 4 F or use UCP Default Mode.	100 to 900 Ohms Use ZSM Test Procedures.	*NONE* Check at terminals 2 and 3 on ZSM
Heating Setpoint (HSP) for CV ZSM slide potentiometer	1. Uses CSP and HSP HSP= CSP - 4 F.	100 to 900 Ohms Use ZSM Test Procedures.	*NONE* Check at terminals 2 and 5 on ZSM.
HSP and CSP for CV are both lost.	1. Cannot control at ZSM, unit using UCP Default Mode	100 to 900 Ohms approx. Use ZSM Test Procedures.	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED Blinks at ZSM

NONE = No LED indication

COMPONENT	FAILURE RESPONSE	NORMAL RANGE	DIAGNOSTIC
(ZTEMP) Zone Temperature Sensor CV or VAV during Unoccupied mode.	1. No Heating or ZTS "Fan" selection switch operates IDM during Unoccupied	-40 TO 150 F 346K to 2.1K	CV Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED Blinks at ZSM
(TCO1 or TC03) High Limit Cutout	Heat goes off	Normally Closed Temperature varies by unit.	*NONE*
(TCO2) Fan Failure Limit	Heat goes off, IDM runs continuously.	Normally Closed Open 135 F Reset 105 F.	Heat Failure Output at LTB1-7 to LTB1-6 "HEAT" LED Blinks at
(LPC1) Low Pressure Control	Compressor CPR1 will not operate.	Open 7 PSIG Close 22 PSIG.	Possible Cool Failure at J2-2 to Ground, 0 "COOL" LED Blinks at ZSM.
(LPC2) Low Pressure Control Dual Circuits Only	Compressor CPR2 will not operate.	Open 7 PSIG Close 22 PSIG.	Possible Cool Failure at J2-3 to Ground, 0 "COOL" LED blinks at ZSM.
(CCB1)	Compressor CPR1 will not operate.	Normally Closed range varies by unit.	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(CCB2 or CCB3) Compressor Overload	Compressor CPR2 or CPR3 will not operate.	Normally Closed range varies by unit	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(HPC1) High Pressure Control	Compressor CPR1 will not operate.	Open 425 psig Close 325 psig	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(HPC2) High Pressure Control	Compressor CPR2 or CPR3 will not operate.	Open 425 psig Close 325 psig	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(WTL1) Winding Temperature Limit	Compressor CPR1 will not operate.	Normally Closed	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(WTL2 or WTL3) Winding Temperature Limit	Compressor CPR2 or CPR3 will not operate.	Normally Closed	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(CC1) Compressor Contactor 24 VAC coil	Compressor CPR1 will not operate.	Varies by unit	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.
(CC2 or CC3) Compressor Contactor 24 VAC coil	Compressor CPR2 or CPR3 will not operate.	Varies by unit	Cool Failure Output at LTB1-8 to LTB1-6 "COOL" LED blinks at ZSM.

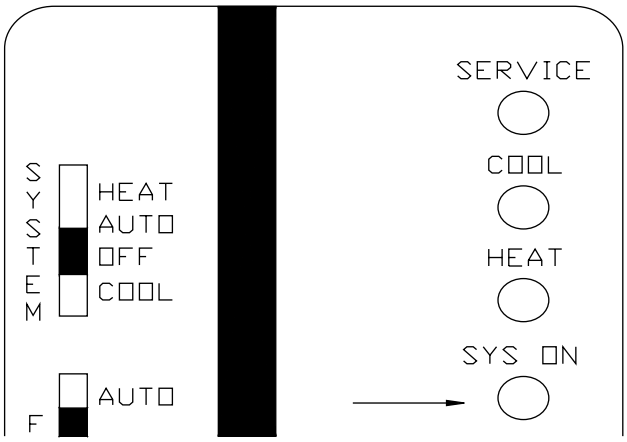
NONE = No LED indication

COMPONENT	FAILURE RESPONSE	NORMAL RANGE	DIAGNOSTIC
(CFS) Clogged Filter Switch (Any Generic Normally Open Switch)	This input is for "indication" only and does not effect the normal operation of the unit.	Normal operation = 0 VAC measured between terminals J5-1 and Ground.	SERVICE LED comes on, 24 VAC measured between UCP J5-1 and Ground
Supply Fan Proving Switch (27.5-50)	Unit will not operate in any mode.	0.05" W.G. Normally Closed	Service Failure Output at LTB-6 to LTB-10 "SERVICE" LED blinks at ZSM
Static Pressure Transducer (VAV)	IGV will not open	0.25 - 4 VDC between J8 and J9 on VAV	Heat and Cool Failure Output at LTB-7 to LTB-6 & LTB-8 to LTB-6 "HEAT" and "COOL" LED's blink at ZSM
MWU (VAV)	Cannot control from unit Disable MWU & DWU	0 - 1000 ohms Approx.	*NONE*
Reset Set point	Cannot control from unit Disable Reset	0 - 1000 ohms Approx.	*NONE*
Reset Amount (VAV)	Cannot control from unit Disable Reset	50 - 750 ohms Approx.	*NONE*
SA Press Set point (VAV	Cannot control from unit Uses Default	80 - 780 ohms Approx	*NONE*
SA Press Deband (VAV)	Cannot control from unit Uses Default	0 - 1000 ohms Approx.	*NONE*
XFSP (27.5-50)	Cannot control from unit Uses Default of 25%	100 - 900 ohms Approx.	*NONE*

NONE = No LED indication

23. Failure Status Diagnostics

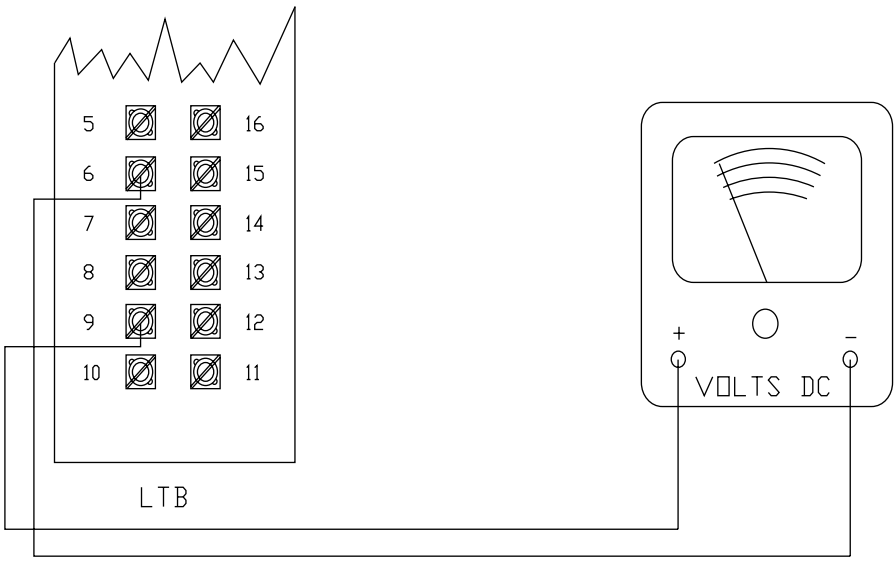
23.1. System Failure Status Diagnostics with LED Indicators



ON-Indicates that the UCP is powered up, also indicates that the software/computer program is intact and functional, and is lit continuously during normal operation.
BLINKING -Indicates that the UCP is in the TEST mode.
OFF -Indicates that no power is going to the UCP, or that the software/computer program has failed. See "Recommended Steps for Trouble Shooting".

23.2. System Failure Status Diagnostics without LED Indicators

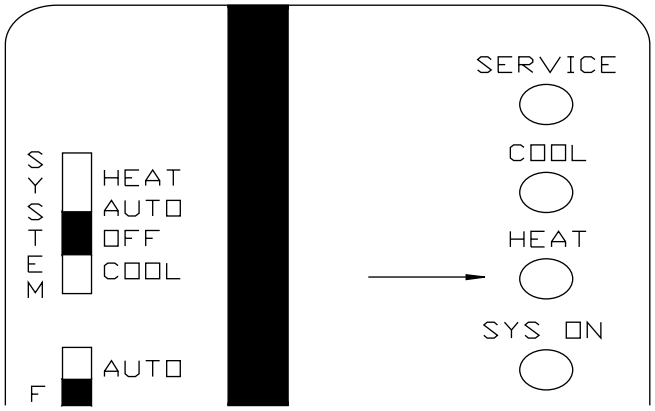
System ON = Measure DC volts between terminals LTB-6 & LTB-9



Normal Operation = Approximately 32 VDC.
System Failure = Less than 1 VDC, approximately 0.75 VDC. Indicates that no power is going to the UCP, or that the software/computer program has failed. See "Recommended Steps for Trouble Shooting".

23.3. Heat Failure Status Diagnostics with LED Indicators

Test Mode = Alternates between 32 VDC & 0.75 VDC. 23.3. Heat Failure Status Diagnostics with LED Indicators

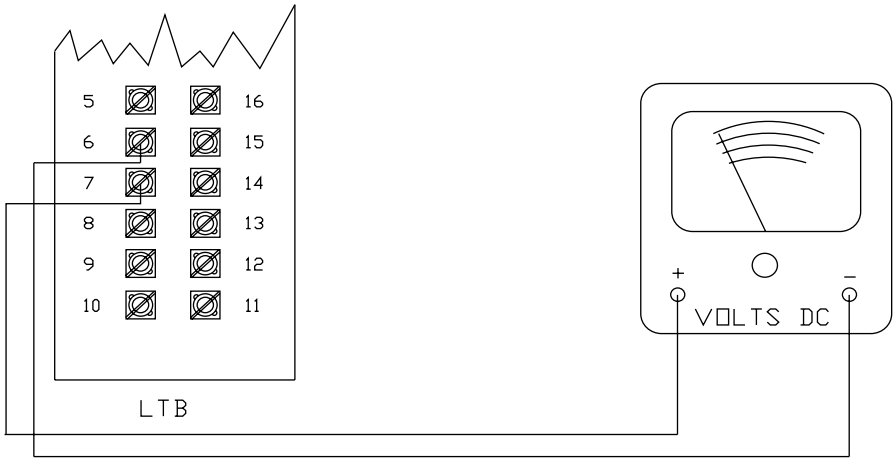


ON-Indicates unit is in the heat mode, and actively heating.
BLINKING-Indicates a Heating Failure has occurred.
OFF- Indicates that the unit is "not" actively heating.

Heating Failure Causes:
1. TCO2 has opened (YCs only) / TC03 (V3 27.5-50 tons).
2. ZSM mode switch is in Emergency Heat position (WCs only).

23.4. Heat Failure Status Diagnostics without LED Indicators

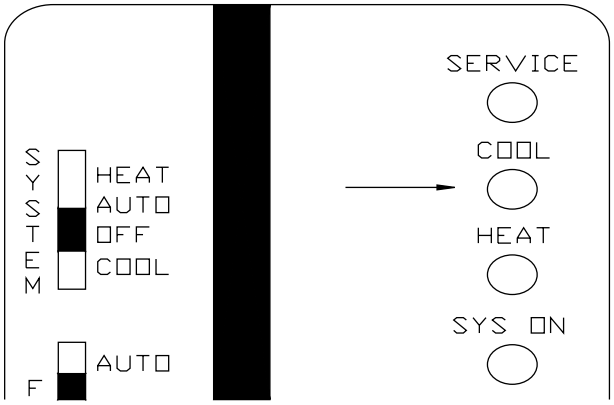
HEAT = Measure DC volts between terminals LTB-6 & LTB-7.



Heat Operating = Approximately 32 VDC.
Heat Off = Less than 1 VDC, approximately 0.75 VDC.
Heating Failure = Alternates between 32 VDC & 0.75 VDC.

Heating Failure Causes
1. TCO2 has opened (YCs only) / TCO3 (V3 27.5-50 Ton).
2. ZSM mode switch is in Emergency Heat position (WCs only).

23.5. Cool Failure Status Diagnostics with LED Indicators

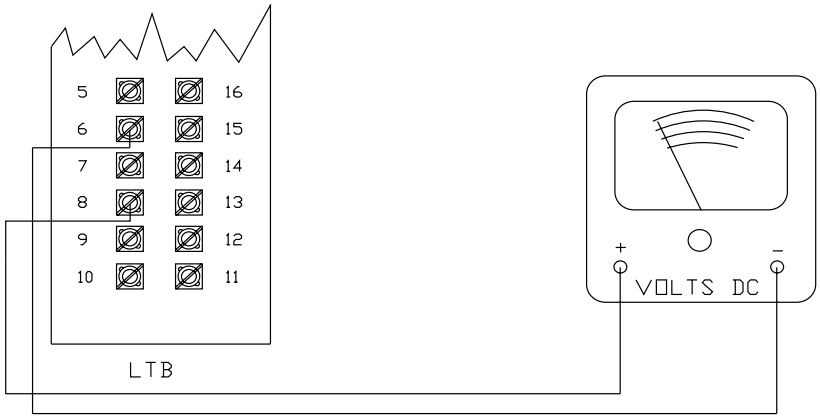


ON-Indicates unit is in the cool mode, and actively cooling, economizer or mechanical cooling.
BLINKING-Indicates a cooling failure has occurred.
OFF-Indicates that the unit is "not" actively cooling.

1. Cooling and heating set point (slide pots) on ZSM have failed. See "Testing the ZSM."
2. Zone temperature thermistor ZTEMP on ZSM failed. See "Testing the ZSM.
3. CC1 or CC2 24 VAC control circuit has opened, Check CC1 & CC2 coils, and any applicable control(s) (CCB1, CCB2,COL1, COL2, DTL1, DTL2, HPC1, HPC2, WTL1, WTL2).
4. CPR1 or CPR2 DISABLE circuit (LPC) opened, during 3 minute minimum ON time, on 4 consecutive compressor starts.
5. Open circuit on programmable sensor terminal 12 at LTB.

23.6. Cool Failure Status Diagnostics without LED Indicators

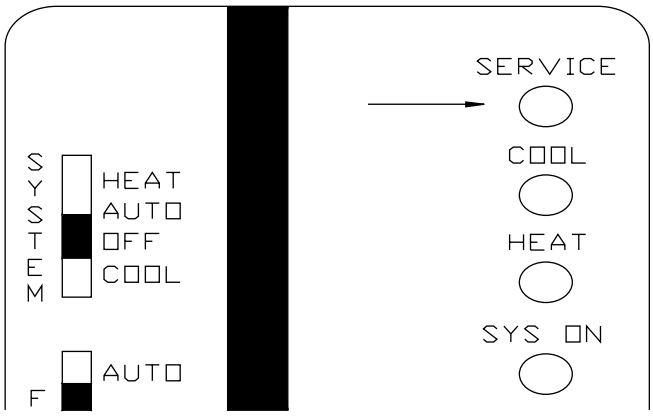
COOL = Measure DC volts between terminals LTB-6 & LTB-8.



Cool Operating = Approximately 32 VDC.
Cool Off = Less than 1 VDC, approximately 0.75 VDC.
Cooling Failure = Alternates between 32 VDC & 0.75 VDC.

Cooling Failure Causes:
1. Cooling and heating set point (slide pots) on ZSM have failed. See "Testing the ZSM".
2. Zone temperature thermistor ZTEMP on ZSM failed. See "Testing the ZSM".
3. CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below applying to this unit (COL1, COL2, HPC1, HPC2, DTL1, DTL2, WTL1, WTL2).
4. CPR1 or CPR2 DISABLE circuit (LPC) opened, during 3 minute minimum ON time, on 4 consecutive compressor starts.
5. Open circuit on programmable sensor terminal 12 at LTB.

23.7. Service Failure Status Diagnostics with LED Indicators

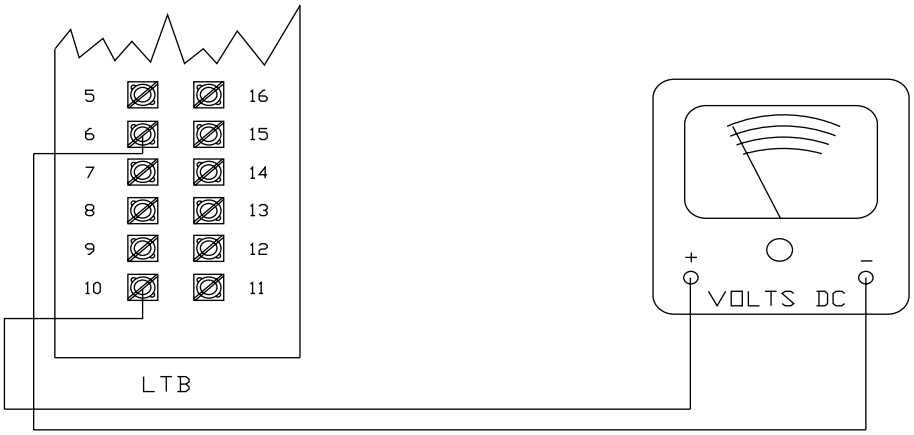


ON-Indicates Clogged Filter (CFS) or Fan Failure (FFS) (3-25 ton only), indication only.
BLINKING-Indicates Active Fan Failure (AFF) (3-25) or Fan Failure (FFS) (27.5-50 ton only), unit shuts down.
OFF-Neither of the above have occurred, or not being used.

Note: SERVICE LED can be used as a generic indicator. Field modifications are necessary.

23.8. Service Failure Status Diagnostics without LED Indicators

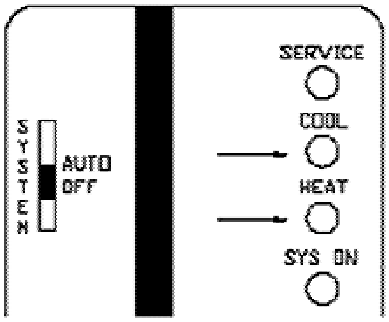
SERVICE = Measure DC volts between terminals LTB-6 & LTB-10.



Clogged Filter (CFS)/Fan Failure (FFS) (3-25 only) = Approximately 32 VDC. Indication only.
Normal Operation = Less than 1 VDC, approximately 0.75 VDC.
Active Fan Failure (AFF) (3-25), Fan Failure (FFS) (27.5-50) = Alternates between 32VDC & 0.75VDC. Unit will not run.

Note: SERVICE LED can be used as a generic indicator. Field modifications are necessary.

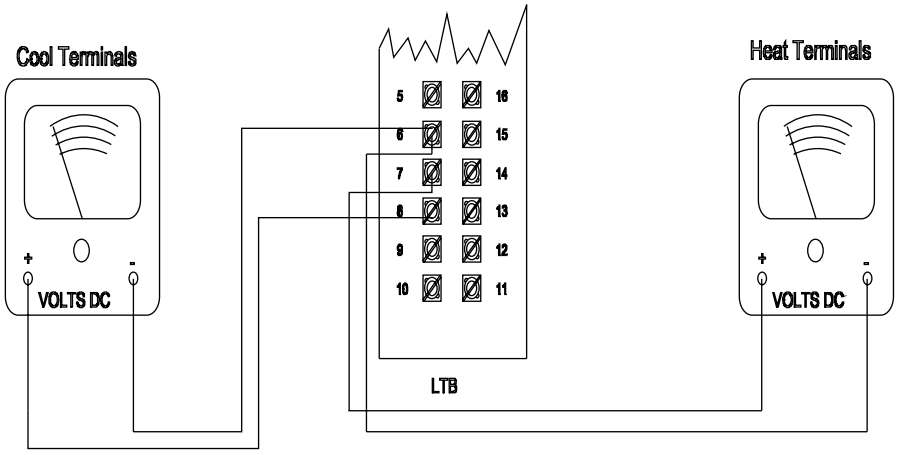
23.9. Heat Pump/External Auto Stop Status Diagnostic with LED Indicators



SIMULTANEOUS BLINKING –
3 - 7.5 ton heat pump – See Demand Defrost troubleshooting section 17.2
10 – 20 ton heat pump – See Defrost Module troubleshooting section 17.4
27.5 - 50 ton (all) - External Auto Stop (LTB1-16 &17) has opened

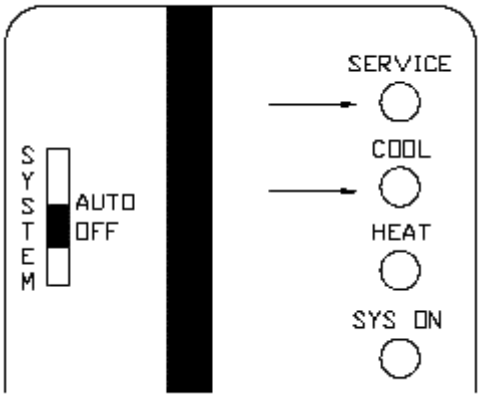
23.10. Heat Pump / External Auto Stop Status Diagnostic without LED Indicators

Measure DC volts between terminals LTB-6 & LTB-7 and terminals LTB-6 & LTB-8.



LTB-6 & LTB-8 Failure = Alternates between 32 VDC & 0.75 VDC.
LTB-6 & LTB-7 Failure = Alternates between 32 VDC & 0.75 VDC.

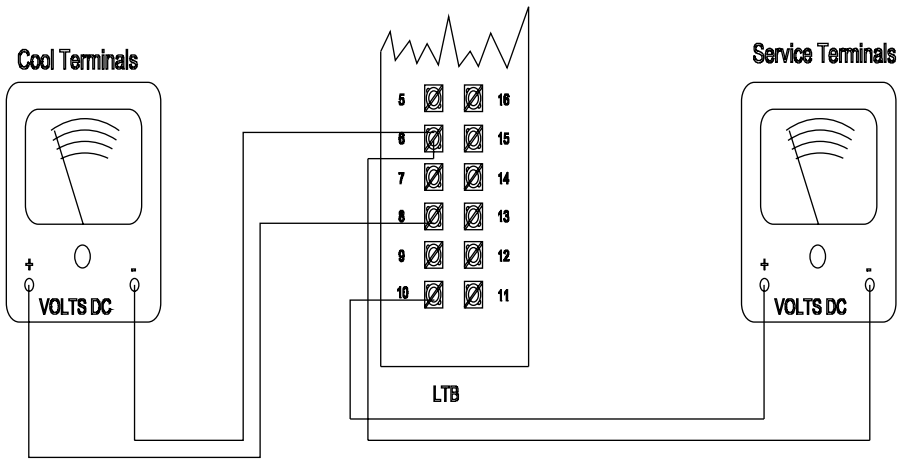
23.11. Static Pressure Transducer Status Diagnostic with LED Indicators



SIMULTANEOUS BLINKING - Static Pressure Transducer Failure (27.5-50 ton VAV only)

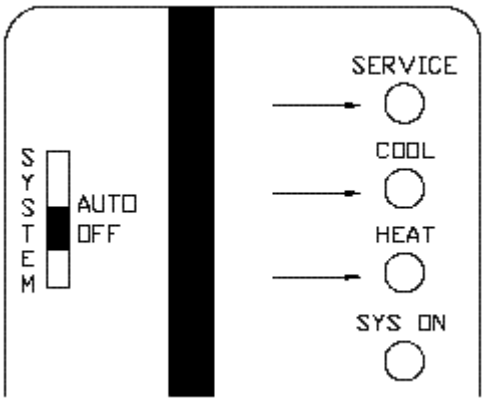
23.12. Static Pressure Transducer Status Diagnostic without LED Indicators

Static Pressure Transducer = Measure DC volts between terminals LTB-6 & LTB-10 and terminals LTB-6 & LTB-8.



LTB-6 & LTB-10 Failure = Alternates between 32 VDC & 0.75 VDC.
LTB-6 & LTB-8 Failure = Alternates between 32 VDC & 0.75 VDC.

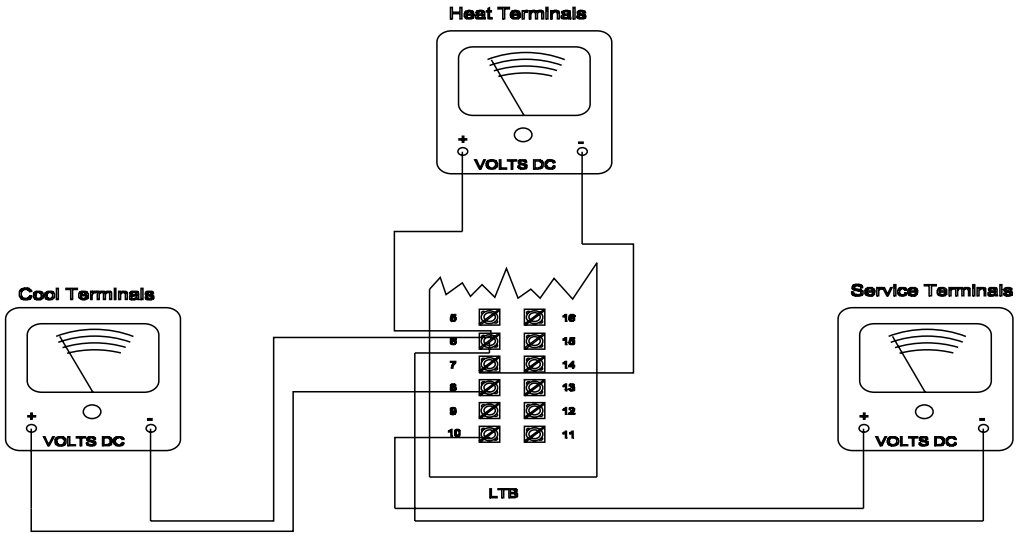
23.13. Supply Air High Limit Duct Static Status Diagnostic with LED Indicators



SIMULTANEOUS BLINKING - Supply Air High Limit Duct Static Trip. Manual Reset. (27.5-50 ton VAV only)

23.14. Supply Air High Limit Duct Static Status Diagnostic without LED Indicators

Supply Air High Limit Duct Static = Measure DC volts between terminals LTB-6 & LTB-10, terminal LTB-6 & LTB-7, and terminals LTB-6 & LTB-8.



LTB-6 & LTB-10 Failure = Alternates between 32 VDC & 0.75 VDC.
LTB-6 & LTB-8 Failure = Alternates between 32 VDC & 0.75 VDC.
LTB-6 & LTB-7 Failure = Alternates between 32 VDC & 0.75 VDC.