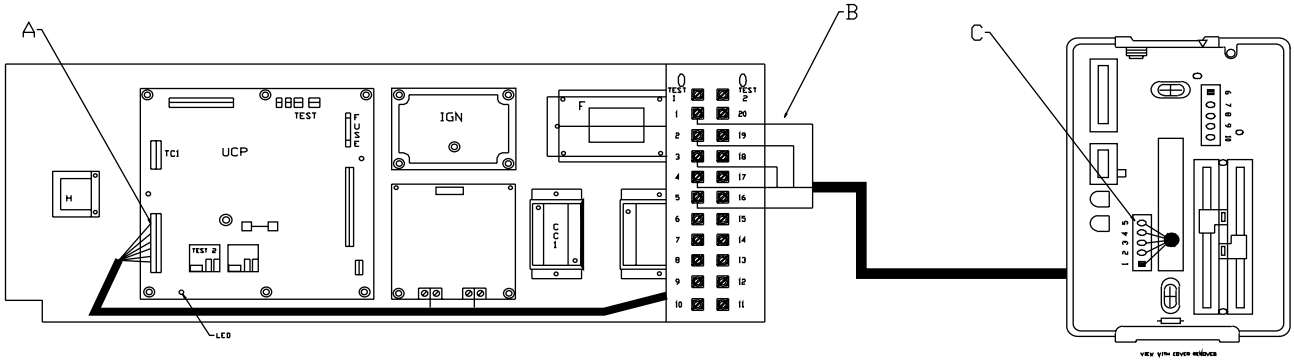
Section 4

24. Testing the Unitary Control Processor (UCP)

24.1. Test Mode Functions Properly but Erratic Normal Operation

A situation arises where the equipment functions properly in the Test mode, yet fails to operate properly (or at all) during normal operation (not in the Test mode). If the equipment operates properly in the Test mode and not during normal operation, an input problem is present. The equipment will function properly during normal operation as long as it is provided with valid inputs. Check for diagnostics at the Zone Sensor Module (ZSM) or Low Voltage Terminal Board (LTB). If any diagnostics are present, locate and resolve the problem. **Note:** Always check for diagnostics prior to initiating the Test mode, or all diagnostics will be lost.

The Test mode bypasses (ignores) all inputs (even the ZSM), the Test mode will function without a Zone Sensor Module present, simulating normal operation. This verifies most of the UCP software, hardware, and all off board components are functional.



A Problem Exists Somewhere between Point "A" And Point "C".

24.2. Constant Volume 3-50 Ton

The Zone Sensor Module (ZSM) is the primary input, which actually consists of four separate inputs. The four separate inputs are: Cooling Set Point (CSP), Heating Set Point (HSP), Mode, and Zone Temperature (ZTEMP). The Zone Temperature (ZTEMP) is the most critical input, the equipment cannot operate without this input.

Knowing how the Test mode operates, an input problem could be any one of the following:

1. The ZSM has failed.
2. The ZSM is mis-wired, check field low voltage wiring and rewire properly if necessary.
3. The ZSM field wiring has conductor(s) open, shorted to each other, or grounded to conduit etc. Check field wiring with an ohmmeter, repair or replace as necessary.
4. Induced AC voltage on ZSM field wiring. If the ZSM is installed in conduit with line voltage wiring it must be removed. Disconnect wires at both ends (at the unit and the sensor), check for AC voltage from each conductor to ground. if more than 6 volts AC is present, locate problem source and isolate from control wiring.
5. Factory wiring error between the Low Voltage Terminal Board (LTB) and the J7 plug on the Unitary Control Processor (UCP). Remove LTB, check and verify unit wiring against schematic wiring diagram, correct if necessary.

24.3. Variable Air Volume (VAV) 27.5-50 Ton

VAV units minimally require a jumper across LTB1-2 & 4 for supply air cooling operation, occupied mode only. If occupied heat (DWU) is required, a BAYSENS021B may be used. If unoccupied or MWU heating is desired, a short across LTB1-11 & 12 will put the unit in an unoccupied mode as long as the BAYSENS021B is used. A BAYSENS020B programmable ZSM provides all needed inputs for heating and cooling, occupied and unoccupied modes.

24.4. Forcing Condenser Fan Cycling (12.5-25 Ton Only)

Condenser fan cycling on dual condenser fan units (12.5-25 Tons), can be tested by taking control of the Outdoor Air Sensor (OAS). **Note:** If an economizer is installed, it must be disconnected at the polarized plugs prior to performing this test.

Electrically remove the Outdoor Air Sensor (OAS) from the circuit, by cutting the wires at the splices in the lower right hand corner of the control box. Insert a 1/4-watt resistive value in place of the OAS to simulate a low ambient condition (33K-75K Ohms). This will simulate an outdoor air temperature between 5° F. and 32° F. Place the unit in the cooling mode, and set the cooling set point to 50° F. Outdoor Motor two (ODM2) will be cycled off, based on the outdoor ambient temperature seen by the UCP, after controlling the Outdoor Air Sensor (OAS) input. ODM2 will be "OFF" when the Outdoor Air temperature falls below 60° (+/- 2° F)., and "ON" if the temperature rises above 65° (+/- 2° F).

24.5. Forcing Condenser Fan Cycling (27.5-50 Ton)

Condenser fan cycling on multiple condenser fan units (27.5-50 Tons), can be tested by taking control of the Outdoor Air Sensor (OAS). **Note:** If an economizer is installed, it must be electrically disconnected prior to performing this test.

Electrically remove the Outdoor Air Sensor (OAS) from the circuit. Using a decade box or similar tool, simulate a low ambient condition to simulate the desired outdoor air temperature. Place the unit in the cooling mode, and set the cooling set point to 50° F. Reference 10.1.2. for Condenser Fan On and Off Temperatures.

24.6. Forcing Evaporator Defrost Control (EDC) Cycle (3-25 Ton)

The Evaporator Defrost Control (EDC) can also be tested by taking control of the OAS.
Note: If an economizer is installed, it must be disconnected at the polarized plugs prior to performing this test.

Electrically remove the Outdoor Air Sensor (OAS) from the circuit, by cutting the wires, at the splices in the lower right hand corner of the control box. Insert a 1/4 watt resistive value in place of the OAS to simulate a low ambient condition (33K-75K Ohms). This will simulate an outdoor air temperature between 5° F. and 32° F. Place the unit in the cooling mode, and set the cooling set point to 50° F. Evaporator Defrost Control (EDC) will now be activated, and the compressor run time counter will begin counting and accumulating compressor run time. On 12 1/2 through 25 ton units, Outdoor Motor two (ODM2) will be turned "OFF" since the UCP is sensing a low ambient condition. After approximately 10 minutes, a defrost cycle will be initiated.

24.7. Forcing Economizer Operation

The function of economizer operation can also be tested by taking control the Outdoor Air Sensor (OAS).
Note: Do not disconnect the economizer for this test.

Electrically remove the Outdoor Air Sensor (OAS) from the circuit. Insert a 1/4 watt resistive value in place of the OAS to simulate a low ambient condition (33K-75K Ohms). This will simulate an outdoor air temperature between 5° F. and 32° F. Place the unit in the cooling mode, and set the cooling set point to 50° F. Compressor(s) may run during extended test periods. If it is warm outside, the outside air damper will probably be fully open, and a 50-55° F. supply air temperature will be attempted to be maintained.
If a power exhaust accessory is present, it will be energized whenever the economizer damper is at a position greater than 25% of the actuator stroke (3-25 ton) .

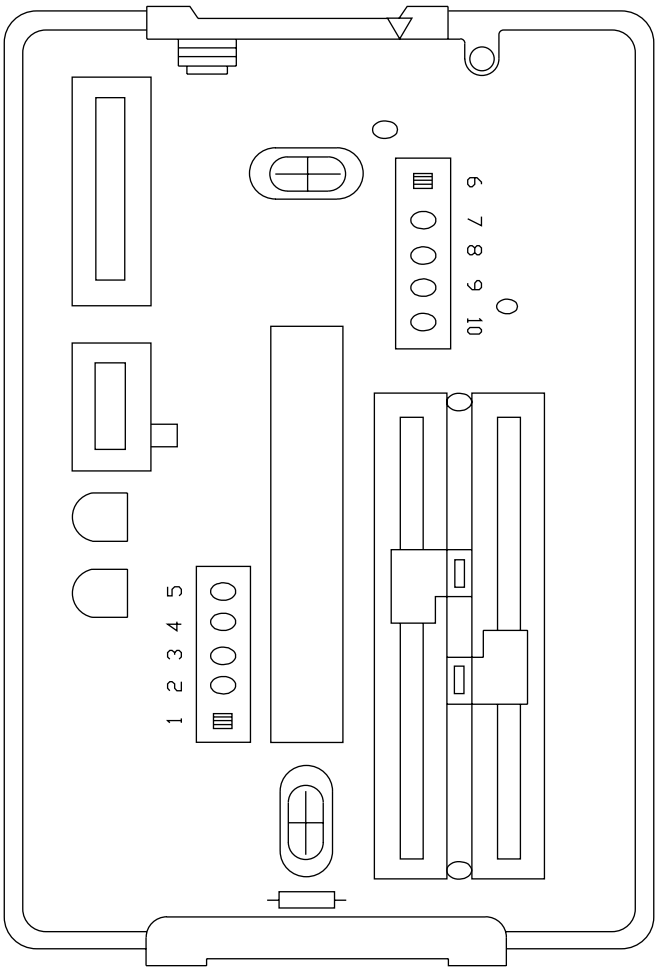
Voyager III Notes: The power exhaust set point determines at which point the power exhaust fan(s) are energized (0-100%).

25. Testing Zone Sensor Module (ZSM)

Note: These first 4 tests are not for programmable models, and are conducted with the ZSM electrically removed from the system, unless otherwise noted.

25.1. ZSM Terminal Identification

Terminal #	Terminal I.D.	Terminal #	Terminal I.D.
1	ZTEMP	6	LED COMMON
2	SIGNAL COMMON	7	HEAT LED
3	CSP	8	COOL LED
4	MODE	9	SYS ON LED
5	HSP	10	SERVICE LED



VIEW WITH COVER REMOVED

25.2. Test 1: UCP Zone Temperature Input Test

Voltages are measured with power applied to the equipment and the ZSM wired into the circuit. Voltages may be measured at the Low Voltage Terminal Board (LTB) on the unit, or at the ZSM in the space.

Zone Temperature (ZTEMP) is measured between terminals 1 & 2 at the ZSM (LTB-1 & LTB-2 at the unit).

The resistance values (OHMs) are measured with the ZSM disconnected and isolated from the Unitary Control Processor (UCP). The resistance may be measured at the ZSM, or the unit LTB, with the J7 plug disconnected on the UCP. The electrical values below, directly correspond with a zone temperature, that is interpreted by the UCP.

ZTEMP °F	OHMs Rx1K	Volts DC +/-5%	ZTEMP °F	OHMs Rx1K	Volts DC +/-5%	ZTEMP °F	OHMs Rx1K	Volts DC +/-5%
50	19.96	3.125	64	13.83	2.676	78	9.759	2.246
51	19.43	3.105	65	13.49	2.656	79	9.525	2.227
52	18.92	3.066	66	13.15	2.617	80	9.297	2.188
53	18.42	3.027	67	12.82	2.598	81	9.076	2.168
54	17.94	3.008	68	12.50	2.559	82	8.860	2.129
55	17.47	2.969	69	12.19	2.520	83	8.650	2.109
56	17.02	2.930	70	11.89	2.500	84	8.446	2.070
57	16.58	2.910	71	11.60	2.461	85	8.247	2.051
58	16.15	2.871	72	11.31	2.441	86	8.054	2.012
59	15.74	2.852	73	11.03	2.402	87	7.866	1.992
60	15.33	2.813	74	10.76	2.363	88	7.682	1.953
61	14.94	2.773	75	10.50	2.344	89	7.504	1.934
62	14.56	2.754	76	10.25	2.305	90	7.330	1.914
63	14.19	2.715	77	10.00	2.285			

25.3. Test 2: UCP Cooling and Heating Set point Input Test

Voltages are measured with power applied to the equipment and the ZSM wired into the circuit. Voltages may be measured at the Low Voltage Terminal Board (LTB) on the unit, or at the ZSM in the space.

Cooling Set point (CSP) is measured between terminals 2 and 3 at the ZSM (LTB-2 & LTB-3 at the unit), and Heating set point (HSP) is measured between terminals 2 and 5 at the ZSM (LTB-2 & LTB-5 at the unit).

The resistance values (OHMs) are measured with the ZSM disconnected and isolated from the Unitary Control Processor (UCP). The resistance may be measured at the ZSM, or the unit LTB, with the J7 plug disconnected from the UCP. The electrical values below, directly correspond with a set point temperature, that is interpreted by the UCP.

Voyager III Note: For VAV set point panel inputs see section 32.7.

CSP or HSP °F	OHMs Rx1	Volts DC +/-5%	CSP or HSP °F	OHMs Rx1	Volts DC +/-5%	CSP or HSP °F	OHMs Rx1	Volts DC +/-5%
50	889	2.34	64	617	1.90	78	344	1.27
51	870	2.31	65	597	1.86	79	325	1.22
52	850	2.29	66	578	1.82	80	305	1.16
53	831	2.26	67	558	1.78	81	286	1.10
54	812	2.23	68	539	1.74	82	266	1.04
55	792	2.20	69	519	1.70	83	247	0.98
56	773	2.17	70	500	1.65	84	227	0.92
57	753	2.14	71	481	1.61	85	208	0.85
58	734	2.10	72	461	1.57	86	188	0.78
59	714	2.07	73	442	1.52	87	169	0.72
60	695	2.04	74	422	1.47	88	150	0.64
61	675	2.00	75	403	1.42	89	130	0.57
62	656	1.97	76	383	1.37	90	111	0.49
63	636	1.93	77	364	1.32			

25.4. Test 3: UCP Mode Input Test

Voltages are measured with power applied to the equipment and the ZSM wired into the circuit. Voltages may be measured at the Low Voltage Terminal Board (LTB) on the unit, or at the ZSM in the space.

MODE is measured between terminals 2 and 4 at the ZSM (LTB-2 & LTB-4 at the unit).

The resistance values (OHMs) are measured with the ZSM disconnected and isolated from the Unitary Control Processor (UCP). The resistance may be measured at the ZSM, or the unit LTB, with the J7 plug disconnected from the UCP. The electrical values below, directly correspond with a MODE that is interpreted by the UCP.

25.4.1. Constant Volume 3-50 Ton

System Switch	Fan Switch	OHMs Rx1K	Volts DC +5%	System Switch	Fan Switch	OHMs Rx1K	Volts DC +5%
Short to Common		0	0.00	AUTO	ON	16.13	2.349
OFF	AUTO	2.32	0.565	HEAT	AUTO	19.48	2.585
COOL	AUTO	4.87	1.056	HEAT	ON	27.93	3.028
AUTO	AUTO	7.68	1.484	EM HEAT	AUTO	35.00	3.289
OFF	ON	10.77	1.859	EM HEAT	ON	43.45	3.524
COOL	ON	13.32	2.113	Open Circuit		8	5.000

25.4.2. Variable Air Volume 27.5-50 Ton

System Switch	OHMs Rx1K	Volts DC +5%
Auto	7.68	1.484
Off	2.32	0.565

Voyager III Notes: On VAV units the fan runs continuously in the occupied mode.

25.5. Test 4: LED Indicator Test

If an LED fails it will have no effect on system operation. Replacing the ZSM is optional.

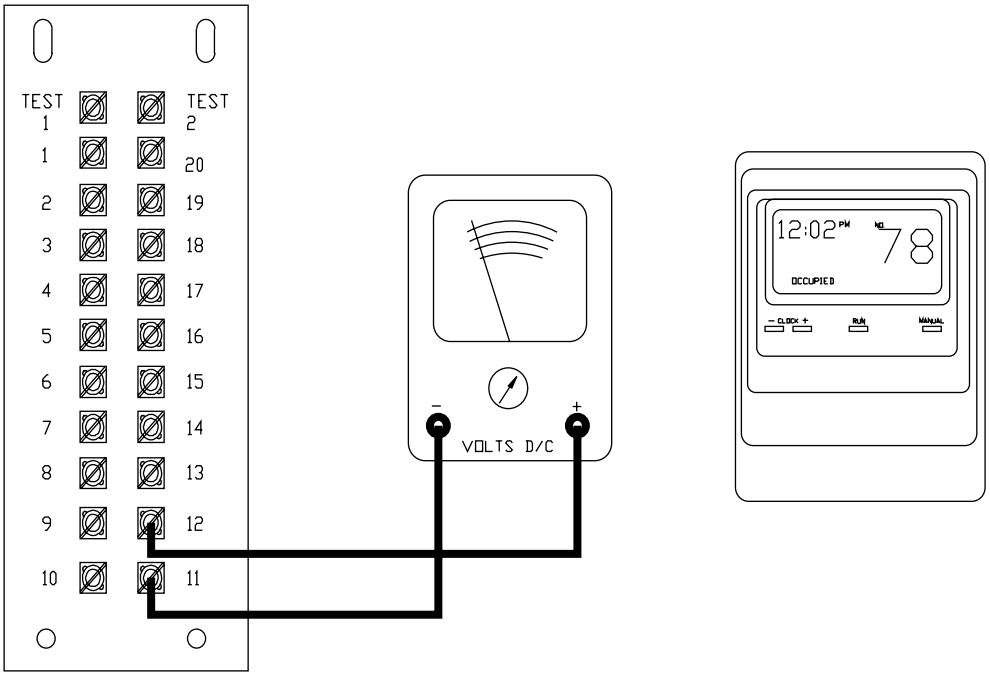
Method 1: Test LEDs with ZSM connected and wired to the unit. Test voltages at LED terminals on ZSM. A measurement of 32 VDC, across an un-lit LED, means the LED has failed.

Method 2: Test the LED with an analog ohmmeter. Connect ohmmeter across LED in one direction, then reverse the leads for the opposite direction. The LED should have at least 100 times more resistance in reverse direction, as compared with the forward direction.

If high resistance is indicated in both directions, the LED is open. If low resistance is indicated in both directions, the LED is shorted.

26. Testing Programmable Zone Sensor Modules (ZSMs)

This section applies to BAYSENS012A, 018A, 019A/B, 020A/B, 023A; ASYSTAT666A, 667A except as indicated.



Step 1. Disconnect wires from LTB-11 (-) and LTB-12 (+), measure voltage between LTB-11 (-) and LTB-12 (+) , should be approximately 32 VDC. If no voltage is measured check wiring between UCP and LTB.
Note: 24 VAC should be present between LTB-14 (LTB 15 on units built prior to 6/93) and LTB-11.

Step 2. Re-connect wires to terminals LTB-11 (-) and LTB-12 (+), measure voltage again between LTB-11 (-) and LTB-12 (+). Voltage should flash high and low every 0.5 seconds. The voltage on the low end will measure approximately 22 VDC, while the voltage on the high end will measure approximately 22 to 42 VDC.

Step 3. Verify all modes of operation by running the unit through the Test Mode.

Step 4. After verifying proper unit operation, exit the test mode. Turn the fan on continuously at the ZSM, by pressing the button with the fan symbol, or turning the fan switch "ON" (whichever is applicable). If the fan comes on and runs continuously the ZSM is good. If you are not able to turn the fan on, the ZSM is possibly defective and may need replacing. See notes below and specific information for the sensor (following pages) before condemning.

Note for BAYSENS019B: This sensor will not communicate if it is set to the wrong baud rate. The baud rate may need to changed to 1024 if being used on a unit built prior to 1/96. See section 26.2

Note for BAYSENS019A, BAYSENS020A, BAYSENS023A, or ASYSTAT666A or ASYSTAT667A: Prior to condemning the ZSM, it should be re-initialized by activating its self-test feature. The self-test is initiated by pressing the "RUN", "MANUAL" and "DAY" buttons simultaneously. The ZSM program will be cleared and the sensor will have to be re-programmed. Upon completion of the test, a "P" for pass or "F" for fail will appear in the upper left-hand corner of the display, along with the software version number. Press the "CLEAR" button and the sensor will test all of the LED's and LCD pixels, at the conclusion of the LED/LCD test press "CLEAR" again. The sensor may now be re-programmed.

26.1. BAYSENS012A, 018A DIP switch & set-up

Dip switch #1 controls the selection of 12 hour or 24-hour clock display. When switch #1 is "OFF" 12-hour clock is displayed, when "ON" 24 hour clock is displayed.

Dip switch #2 controls the selection of Fahrenheit or Centigrade temperature display. When switch #2 is "OFF", temperature is displayed in degrees Fahrenheit, when "ON" Centigrade is displayed.

Dip switch #3 enables the Computed Recovery feature, when enabled by turning zone sensor dip switch #3 "ON", this allows the zone to be at the occupied temperature at the selected occupied time. As opposed to being in the process of recovering from night set back.

Dip switch #4 enables Unoccupied Functions, activated by turning zone sensor dip switch #4 "ON", this forces the economizer minimum position to zero during the unoccupied mode.

Dip switch #5 selects Warm Up, or ("Unoccupied functions terminate at 2° F. from occupied temperature set point") enabled by turning dip switch #5 "ON". When changing from unoccupied to occupied mode, this keeps the outside air damper closed until the zone temperature is within 2° F. of the occupied set point.

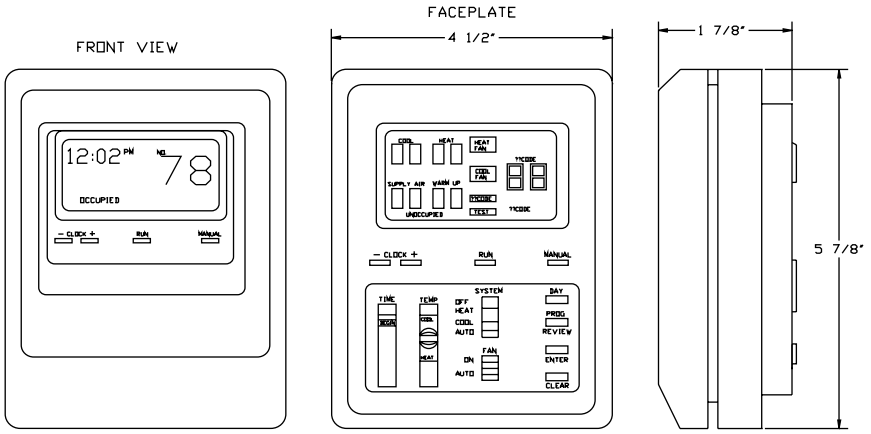
Dip switch #6 controls the Smart Fan option, when switch #6 is turned "ON" the fan mode is forced to the AUTO mode when the equipment is in the unoccupied heating or cooling mode.

Dip switch #7 cons the sensor for Heat Pump or Heat/Cool operation. When switch #7 is turned "ON", the sensor is configured for Heat/Cool operation, when turned "OFF" Emergency Heat operation is enabled.

Dip switch #8 enables and disables key pad lock out. When switch #8 is turned "OFF" the key pad operates normally, when turned "ON" the programming functions are disabled. Reference publication THER-IN-43 for programming and / or additional information.

Note for BAYSENS012A: This ZSM requires 2 wires from the sensor to the unit. The replacement, BAYSENS019B, requires a minimum of 3 wires.

26.2. BAYSENSO19A/023A DIP switches & setup



Zone Temperature Calibration: Set SYSTEM switch to "OFF", press ENTER & CLEAR simultaneously until the FIELD CAL icon appears, press "+" & "-" until displayed temperature agrees with calibration instrument. Once calibration is complete, move the SYSTEM switch to the desired position to exit the calibration mode.
Zone Temperature Lockout: If the RUN button is pressed once the room temperature will not be displayed. To display the room temperature press RUN again.
Key Pad Lockout: Locks out the programming functions by pressing and holding the "+" & "-" buttons simultaneously until the display blanks and returns to normal. To unlock the key pad, repeat the procedure.
Adjustable Check Filter Interval (from 10 hours to 59 weeks): This is done by moving the SYSTEM switch to "OFF", then press and continue to hold the CLEAR button, next move the FAN switch to "ON" and then back to AUTO (the CHECK FILTER icon and "0000" hours will appear. Adjust the interval by pressing the "+" or "-" buttons, once completed release the CLEAR button and move the SYSTEM and FAN switches to the desired positions.
Intelligent Copy: Allows the program to be copied from one day to another during the initial programming.

Dip switch #1 enables Morning Warm-up; when turned "ON" this will keep the outside air damper closed until zone temperature is within 2° F. of the occupied heating set point.

Dip switch #2 overrides Minimum Position; when turned "ON" the outside air damper is closed during the unoccupied mode.

Dip switch #3 selects Fahrenheit or Celsius temperature display; when turned "OFF" Fahrenheit is displayed.

Dip switch #4 enables Supply Air Tempering; when turned "ON" supply air temperature is maintained within $+10^{o}$ F. of the heating set point, when in heat mode and not actively heating.

Dip switch #5 selects internal or remote zone temperature sensing; when turned "OFF" internal sensor is used.

Dip switch #6 selects 12 or 24 hour time, when turned "OFF" 12 hour time is displayed.

Dip switch #7 enables the Smart Fan option; when turned "ON" the fan mode is forced to the AUTO mode when the equipment is in the unoccupied heating or cooling mode.

Dip switch #8 enables Intelligent Temperature Recovery; when turned "ON" the zone will be at occupied temperature at the occupied time, instead of being in the process of recovering from night set back.

Dip switch #9 is for configuration. Reference installer's guide for specific instructions (SENS-IN-1, 2, or 3).

26.3. Programmable Troubleshooting Chart for Baysens019A/020A/023A

Problem	Probable Cause
Display does not come on.	Check for power at terminals LTB-11 and LTB-14 (24 VAC). Make sure sensor is properly mounted to sub-base.
No communications with unit.	Check position of dip switch 9. This selects unit type. Test voltage between LTB-11 and LTB-12 (range = 22 - 42 VDC).
Displayed zone temperature is different from actual temperature.	Follow instructions for zone temperature calibration. Be sure sensor has had time to adapt from extreme temperatures.
Displayed zone temperature is 0° F. (0° C.) and a COOL FAIL is present.	Check position of dip switch 5. This selects local or remote sensor. If remote sensor is installed, check wiring for an open circuit condition between terminals S1 & S2. If local sensing is selected, the onboard thermistor is open, replace zone sensor module.
Displayed zone temperature is 99° F. (38° C.) and a COOL FAIL is present.	Check position of dip switch 5. This selects local or remote sensor. If remote sensor is installed, check wiring for a short circuit condition between terminals S1 & S2. If local sensing is selected, the onboard thermistor is shorted, replace zone sensor module.
Zone temperature is not displayed.	Zone temperature lockout is enabled. Press RUN button to display temperature.
Unit won't respond to switches & slides.	Keypad lockout is enabled. See installation instructions to disable.
Clock must be reset after power outage.	The BAYSENS019A/020A requires 3 hours to fully charge the clock's backup energy supply (super capacitor). If the sensor was removed from the sub-base, the clock and day must be reset.
RUN and MANUAL LEDs are flashing, or are not lit. (BAYSENS019A/020A only)	If the optional status indicators are wired, the RUN LED will be "OFF" when unit power is "OFF", or when the unit is in the TEST mode. The MANUAL LED will flash when the zone sensor is in temporary override, and is "OFF" when the zone sensor is in program run mode.
Clock flashes "0:00" at initial power up.	Check position of dip switch 6, which selects 12 Hour or 24 Hour time display.
FAN switch is in "ON" position but fan off.	Check position of dip switch 7. This selects Smart Fan option, this problem would is indicate the system is in the unoccupied mode.
System is operating before programmed start time (Constant Volume and Heat Pump units only).	Check position of dip switch 8 which selects computed recovery.

26.4. BAYSENS019B Options Menu

Note: To access the options menu; simultaneously depress and hold the Mode and Program buttons for 4 seconds.

1. Morning Warm-up: This option (when enabled) will activate the heat and close the outside air damper if the zone temperature is below Heating Set Point, whenever the system is switched from unoccupied to occupied mode.
2. Economizer Minimum Position Override: This option (when enabled) will override the minimum position in unoccupied mode and close the economizer damper**.**
3. Temperature Scale: This option changes temperature scale from degrees F to degrees C.
4. Supply Air Tempering: When in the heating mode but not actively heating, if the Supply Air Temperature reaches 10 degrees below the Heating Set Point; heat will be enabled, until the Supply Air Temperature reaches 10 degrees above the Heating Set Point. Then, heat will be off.
5. Time Clock: An option for 12 hour or 24 hour time.
6. Smart Fan: When enabled puts the fan in Auto Mode during unoccupied periods regardless of the fan switch position.
7. Intelligent Temperature Recovery: This option (when enabled) automatically turns on the unit so that occupied set points are reached by the start of the occupied period.
8. Programmable Days/Weeks: This option allows the user to select the days of the week for programming.
9. Programmable Periods/Day: This option allows the user to choose the number of events per day.
10. Programmable Fan Operation: This option (when enabled) allows the user to program the fan mode for each event/period.
Note: This overrides Smart Fan Option 6.
11. Remote Sensor: This option should be enabled whenever using an optional remote sensor.
12. Check Filter Interval: This option allows the user to set an interval to check the filters on a regular schedule.
(Check: filter icon will alarm after the set amount of run hours, reset the alarm fan timer by pressing ERASE key)
13. Display Zone Temperature: This option allows the user to display the current zone temperature.
14. Keypad Lockout: This option allows the user to enable the keypad lockout function.
(Lockout keypad by pressing "+" and "-" keys simultaneously for 4 seconds)
15. Initial Time Setting in Temporary Override: This option allows the user to have a preset time when initial override is started.
16. Buzzer Option: This option enables the buzzer alarm for the different settings.
(Settings: Check Filter, System Failures)
17. Zone Temperature Calibration: This option allows the user to calibrate the zone temperature with any offsets.
(Hold the +/- key for 2 seconds to change temperature setting.)
Note: Each time the key is pressed, the temperature changes 0.1 degree. The key must be pressed 10 times for a full degree change.
18. Baud Rate: This option is the communication speed.
Note: For ***units/UCP's*** built before ***1/96*** change this option to ***0.***
19. CV or HP Operation: Changes the sensor to a Heat Pump sensor.
(CV =Gas or Electric. HP =Heat Pump.)
20. Default Cooling Set point: If the program is erased or not programmed, the unit will default to this set point.
21. Default Heating Set point: If the program is erased or not programmed, the unit will default to this set point.
22. Minimum Cooling Set point: This option limits the Cooling Set point to this minimum setting.
23. Maximum Heating Set point: This option limits the Heating Set point to this maximum setting.

26.5. BAYSENS020B Options Menu

Note: To access the options menu; simultaneously depress and hold the Mode and Program buttons for 4 seconds.

1. Morning Warm-up: This option (when enabled) will activate the heat if the zone temperature is 3° below Warm-Up set point whenever the system changes from unoccupied to occupied mode.
2. Economizer Minimum Position Override: This is an option (when enabled) that will override the minimum position in the unoccupied mode and close the economizer damper**.**
3. Temperature Scale: This is an option that changes temperature scale from degrees F to degrees C.
4. Heat Installed: Set to yes if Electric or Gas Heat is installed.
5. Time Clock: This is an option for 12 hour or 24 hour time.
6. Modulated Heat: Not used. Leave setting to "0".
7. Daytime Warm-up: This option (when enabled) will activate heat during occupied mode whenever zone temperature drops 3° below Warm-Up set point.
8. Programmable Days/Weeks: This option allows the user to select the days of the week for programming.
9. Programmable Periods/Day: This option allows the user to choose the number of events per day.
10. Remote Sensor: This option should be enabled whenever using an optional remote sensor.
11. Check Filter Interval: This option allows the user to set an interval to check the filters on a regular schedule.
(Check filter icon, on the sensor, will alarm after the set amount of run hours. Reset *the alarm and timer by pressing ERASE key*)
12. Display Zone Temperature: This option allows the user to display the current zone temperature.
13. Keypad Lockout: This option allows the user to enable the keypad lockout function.
(Lockout keypad by pressing + and - keys simultaneously for 4 seconds)
14. Default Time Setting in Temporary Override: This option sets the default override time in hours.
15. Buzzer Option: This option enables the buzzer alarm for different settings.
(Settings: Key press only, Check Filter, System Failures)
16. Zone Temperature Calibration: This option allows the user to calibrate the zone temperature with any offsets. (Hold the +/- key for 2 sec. to change temperature setting.)
Note: Each time the key is pressed, the temperature changes 0.1 degree. The key must be pressed 10 times for a full degree change.
17. Default Unoccupied Cooling Set point: If the unoccupied cooling setpoint is erased or not programmed, the unit will default to this setpoint.
18. Default Unoccupied Heating Set point: If the unoccupied heating set point is erased or not programmed, the unit will default to this set point.
19. Default Supply Air Cooling Setpoint: If the occupied supply air set point is erased or not programmed, the unit will default to this set point.
20. Default Supply Air Heat: This option does not apply to Voyager.
21. Default Warm-up Setpoint: If the warm-up set point is erased or not programmed, the unit will default to this set point.
22. Minimum Unoccupied Cooling Set point: This option limits the unoccupied Cooling Set Point.
23. Maximum Unoccupied Heating Set point: This option limits the unoccupied Heating Set Point.
24. Minimum Supply Air Cool: This option limits the Supply Air Cooling Setpoint to a minimum setting.
25. Maximum Supply Air Heat: This option does not apply to Voyager.
26. Maximum Warm-up Setpoint: This option limits Warm-Up Setpoint to a maximum setting.

Occupied Cooling note: The unit provides cooling capacity in order to maintain the desired supply air setpoint.

Unoccupied Cooling note: The unit will operate in a constant volume (CV) mode while cooling, providing cooling capacity in order to maintain the *unoccupied zone temperature* setpoint.

Heating note: The unit will operate in a constant volume (CV) mode during heating, providing 100% airflow. The occupied setpoint, also called Daytime Warmup Setpoint, is 3 degrees below the "Warm-Up" setpoint.

26.6. Programmable Troubleshooting Chart for BAYSENS019B/020B

TROUBLESHOOTING GUIDE

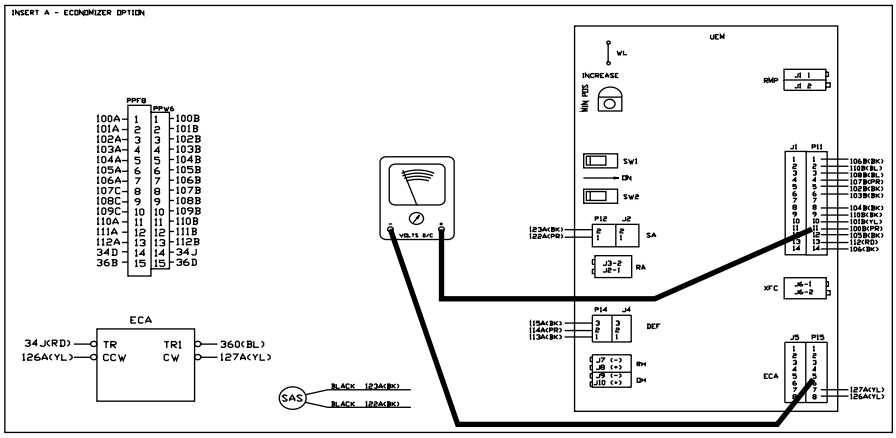
Problem	Solution
Display does not come on.	Check for power at terminals 11 and 14 (nominal 24 VAC). Be sure that the terminal block is properly mounted on its pins.
No communications to UCM.	1. Check for voltage between terminals 11 and 12 (range is 22-42 Vdc). Check wiring to UCM if voltage is not present.
Displays COOL FAIL	No communication between terminals 11 and 12. Verify changing voltage.
Displayed zone temperature reads Sh and a COOL FAIL is displayed solid.	1. Check option 11 to see if remote sensor is installed. If remote sensor is installed, check the wiring from terminals S1 and S2 to the remote sensor for a short circuit condition.
	2. If option 11 has 0 value, then a local sensor is selected and the on-board thermistor is shorted and then sensor should be replaced.
Displayed zone temperature oP and a COOL FAIL is displayed solid.	1. Check option 11 to see if remote sensor is installed. If remote sensor is installed, check the wiring from terminals S1 and S2 to the remote sensor for an open circuit condition.
	2. If option 11 has 0 value, then a local sensor is selected and the on-board thermistor is open and the sensor should be replaced.
Zone temperature is not displayed.	Display zone temperature option has been accessed and locked out. Check option 13. The option value should be 1.
ZSM is not responding to pushbuttons.	The ZSM is in keypad lockout mode.
The clock requires reprogramming after a short power interruption.	Replace the battery.
Fan switch is ON position but fan is not running.	Check option 6 in the Option Menu. Smart fan overrides the last part of an unoccupied period.
System is operating before programmed start time.	Check option 7 in the Option Menu. Computed recovery overrides the last part of an unoccupied period to obtain the occupied settings in time.
Buzzer indicates System failure or service required.	Press ERASE to acknowledge buzzer until noon the next day.

27. Testing Unitary Economizer Module (UEM)

This series of tests will allow you to diagnose, and determine where, and if a problem exists in the system economizer operation. **Test 1** determines if the problem is in the UCP communicating with the UEM. **Test 2** will determine if the problem is in the UEM or ECA. **Test 3** is for the UEMs minimum position potentiometer. **Test 4** tests sensor inputs and exhaust fan output. **Test 5** shows how to test the sensors. Conduct tests in numerical order until the problem is found.

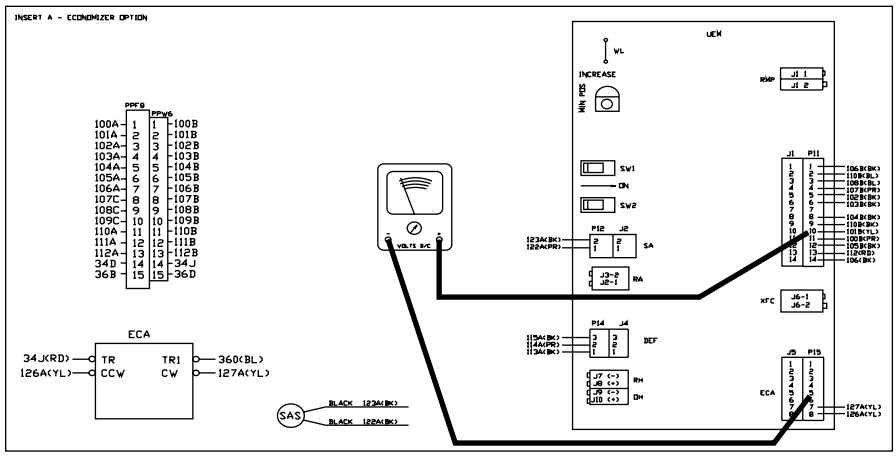
27.1. Test 1: Verifying UCP Communication with UEM

Step 1: Using the Test Mode, step the unit into the economizer mode. Verify that the ECA drives fully open (approximately 90 seconds). The LED on the UEM burns continuously when the ECA drives open or closed.
Step 2: If the ECA is not driving the dampers in Step 1, measure the DC voltage output from the UCP between the UEM connectors J1-11 and J5-5. The voltage measured while the ECA is driving open should be approximately 1.7 VDC. When the 90 seconds have elapsed, and the dampers should be fully open, the voltage will change to approximately 5.0 VDC.



Step 3: Using the Test Mode, step the unit into the Cool 1 mode. The ECA should drive fully closed (approximately 90 seconds), then open to the preset minimum position. The LED on the UEM is on continuously when the ECA drives.
Step 4: If the ECA is not driving the dampers in Step 3, measure the DC voltage output from the UCP between UEM connectors J1-10 and J5-5. The voltage measured while the ECA is driving closed should be approximately 1.7 VDC. When the 90 seconds have elapsed, and the dampers should be fully closed, the voltage will change to approximately 5.0 VDC.

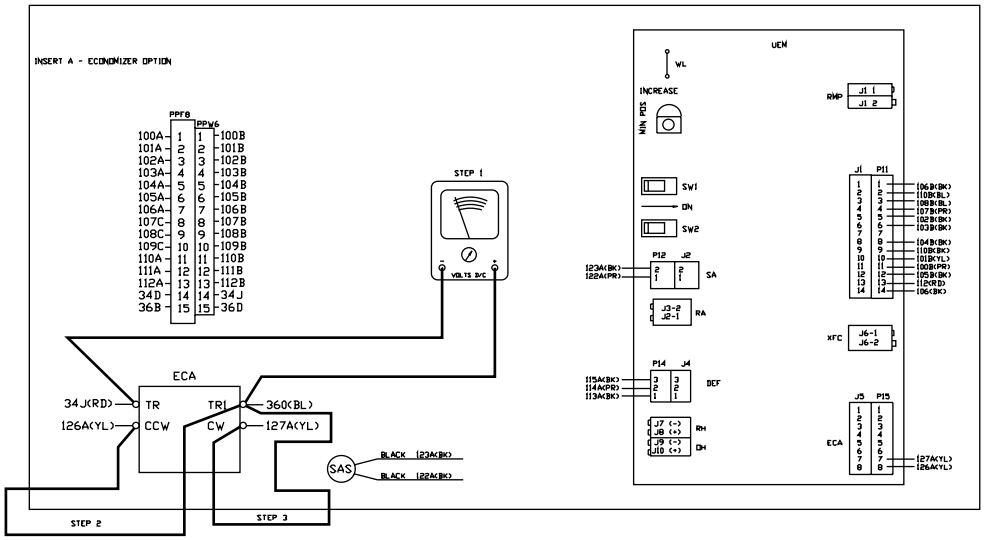
If the voltages in Test 1 are present, the UCP is operating properly. If the ECA will not drive, the problem is in the UEM or ECA, continue to Test 2. If voltages are not present a wire, terminal, or UCP failure has occurred.



27.2. Test 2: Verifying That The ECA Is Functional

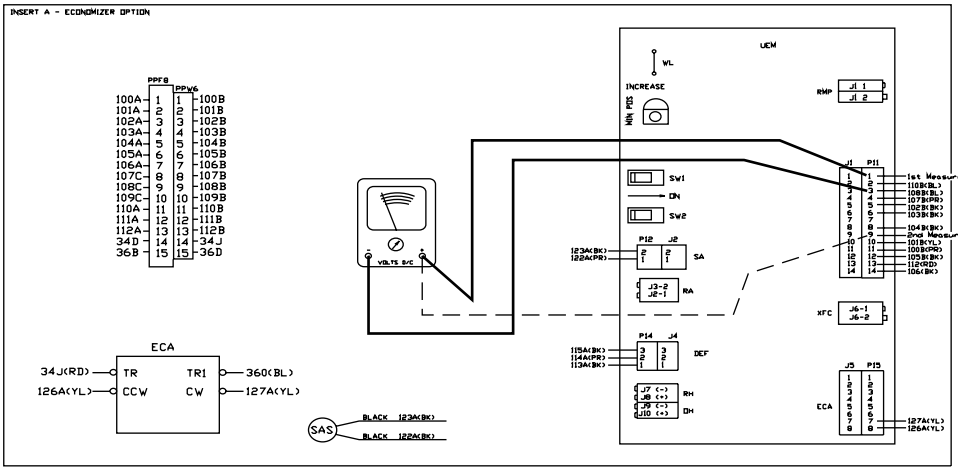
Step 1: With power applied to the system, in any mode, verify presence of 24 VAC between ECA terminals TR and TR1. If 24 VAC is not present, a wiring or terminal problem is present.
Step 2: Jumper terminal TR1 to terminal CCW, the ECA should begin to drive open. The dampers should be in the fully open position after approximately 90 seconds. Remove jumper from CCW terminal.
Step 3: Jumper terminal TR1 to terminal CW, the ECA should begin to drive closed. The dampers should be in the fully closed position after approximately 90 seconds. Remove jumper from both terminals.

If after completing Test 1, and the ECA functions in Test 2, the UEM has failed. Replace UEM. If 24 VAC is present in Step 1, and ECA did not drive as specified in Steps 2 and 3, the ECA is defective. Replace ECA.



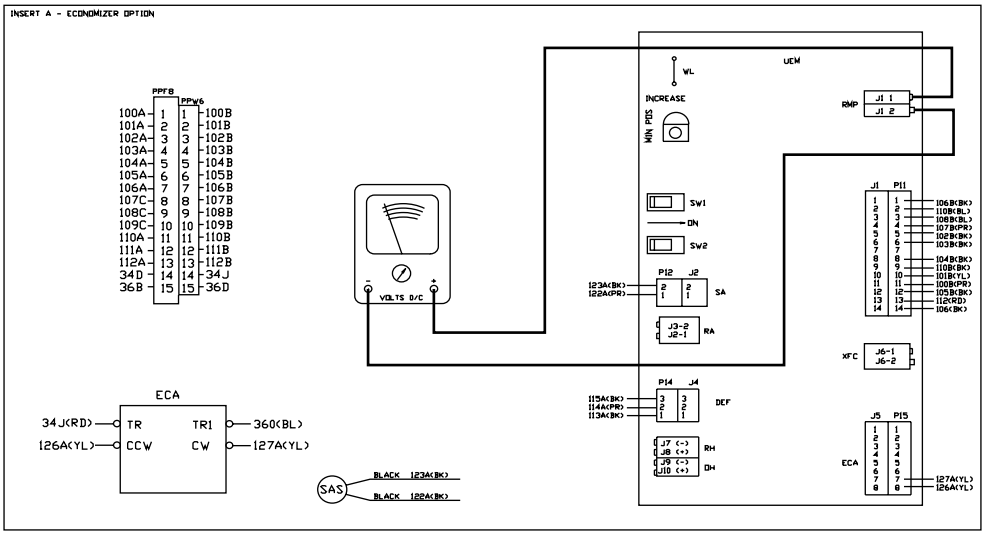
27.3. Test 3: Testing the UEM Minimum Position Potentiometer

Step 1: With power applied to the system, in any mode, verify the presence of 5.0 VDC at the following two points. Voltage is measured at connector J1 on the UEM. Measure between J1-1 and J1-3, then measure between J1-3 and J1-9.
If 5.0 (+ 0.25) VDC is not present at these two points, a wire, terminal, or UCP failure has occurred. Check integrity of wiring and terminals, repair or replace if necessary. If no wiring problems are present, replace UCP.



Step 2: After verifying the voltage presence in Step 1, turn the minimum position potentiometer fully counter clockwise. Measure the DC voltage between UEM terminals J11(+) and J12(-), should be approximately 0.47 VDC. If 5VDC is measured at these pins, the potentiometer is open or the WL resistor has been cut.
Step 3: Turn the minimum position potentiometer one half turn clock wise, so that the screw driver slot is straight up and down. Measured voltage should be approximately 1.18 VDC.
Step 4: Turn the minimum position potentiometer fully clockwise. Measured voltage should be approximately 1.70 VDC.

If correct voltages are measured in Steps 1, 2, 3, and 4, UCP, UEM potentiometer and circuitry are good. If correct voltage is measured in Step 1, and not in Steps 2 through 4, replace UEM. Continue to Test 4 if necessary.

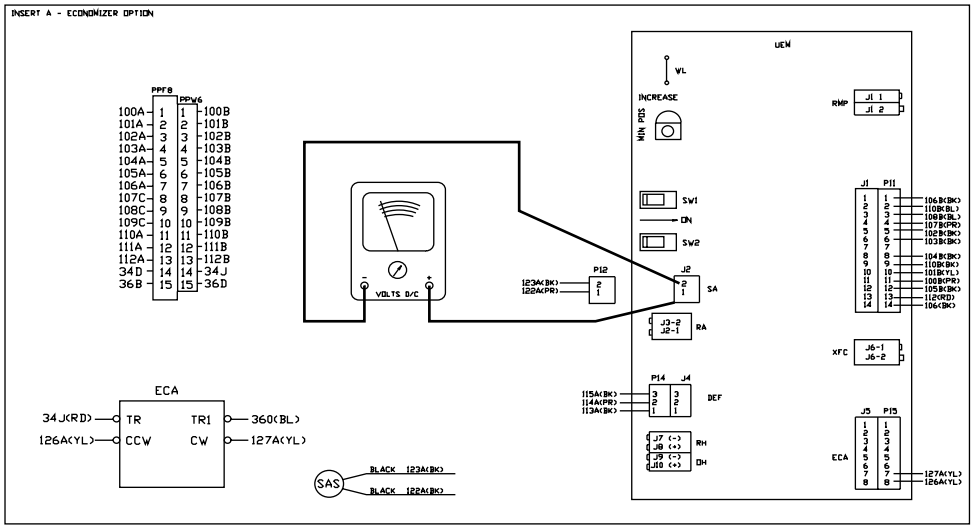


27.4. Test 4: Testing Sensor Inputs and Exhaust Fan Output

Step 1: With power applied to the system, turn the ZSM mode switch OFF, and the ZSM fan switch ON. Verify the DC voltages in the following steps.

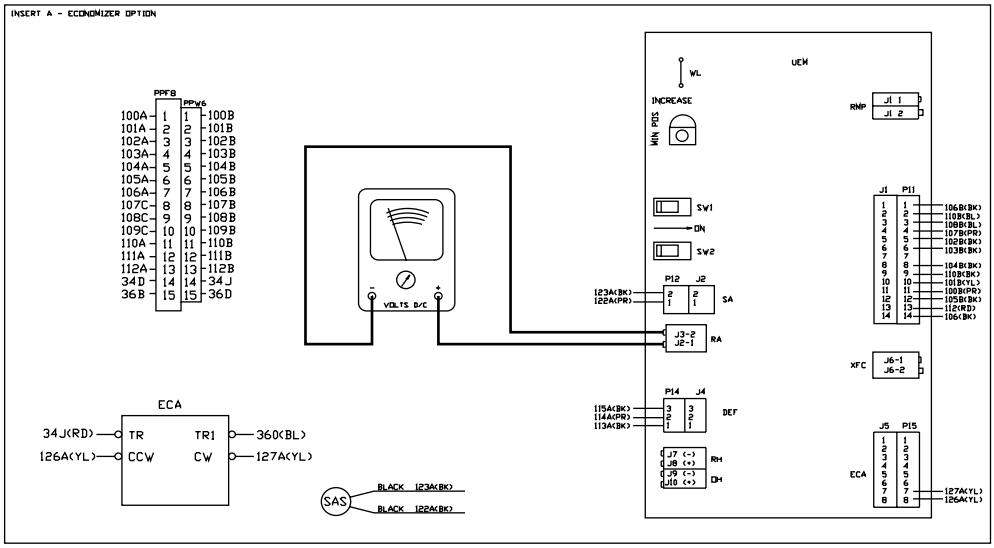
Step 2: Testing Supply Air Sensor Input. Remove connector J2 on UEM, marked SA on the side of the UEM board. Measure voltage between pins J2-1 and J2-2, voltage should measure 5.0 (+ 0.25) VDC.

If correct voltages are measured in Tests 1 through 3, and voltage in Test 4, Step 2 is out of range, replace UEM.



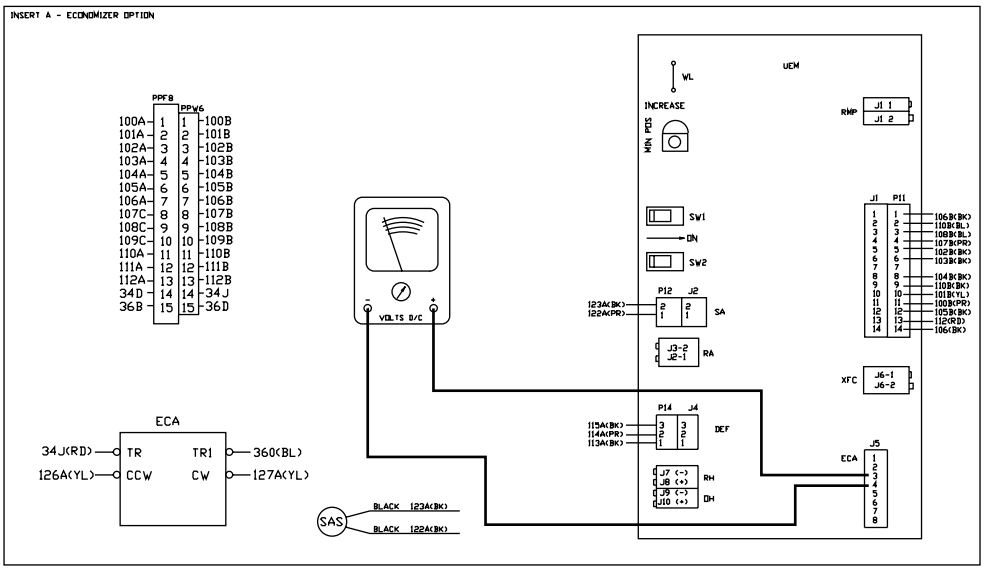
Step 3: Testing Return Air Sensor Input. Remove connector J3 on UEM (if installed), marked RA on the side of the UEM board. Measure voltage between pins J3-1 and J3-2. Voltage should measure 5.0 (+ 0.25) VDC.

If correct voltages are measured in Tests 1 through 3, and voltage in Test 4, Step 3 is out of range, replace UEM.



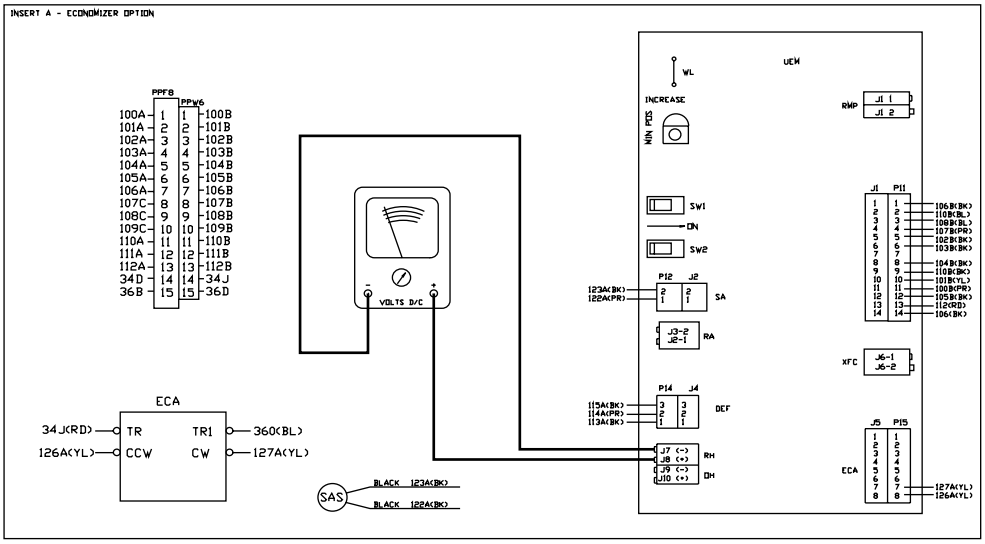
Step 4: Testing Active Fan Failure Input. Remove connector J5 on UEM, marked ECA on the side of the UEM board. Measure voltage between pins J5-3 and J5-4. Voltage should measure 5.0 (+ 0.25) VDC.

If correct voltages are measured in Tests 1 through 3, and voltage in Test 4, Step 4 is out of range, replace UEM.



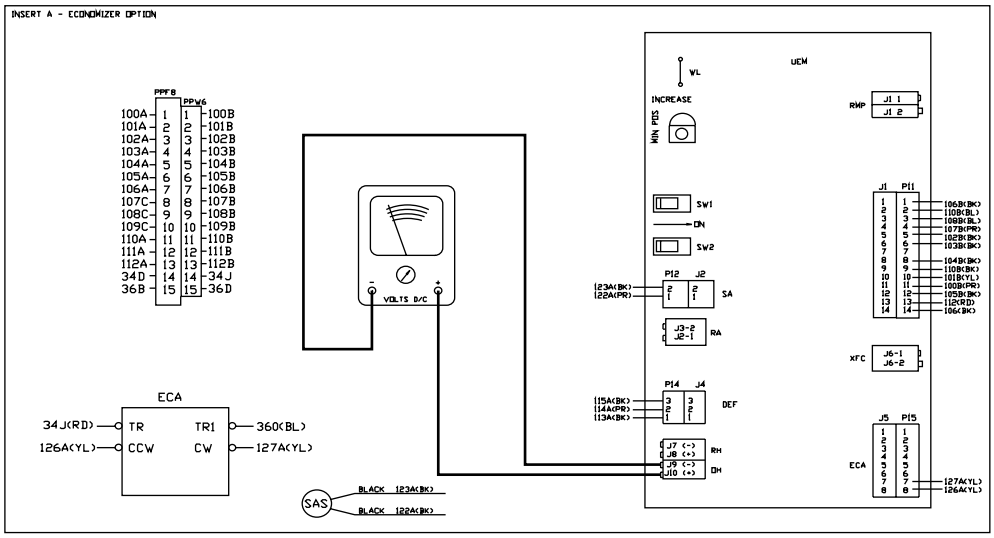
Step 5: Testing Return Humidity Sensor Input. Remove wires (if installed) from terminals J7 (-) and J8 (+) on UEM, marked RH on the side of the UEM board. Measure voltage at terminals J7 (-) and J8 (+). Voltage should measure approximately 20 VDC.

If correct voltages are measured in Tests 1 through 3, and voltage in Test 4, Step 5 is out of range, replace UEM.



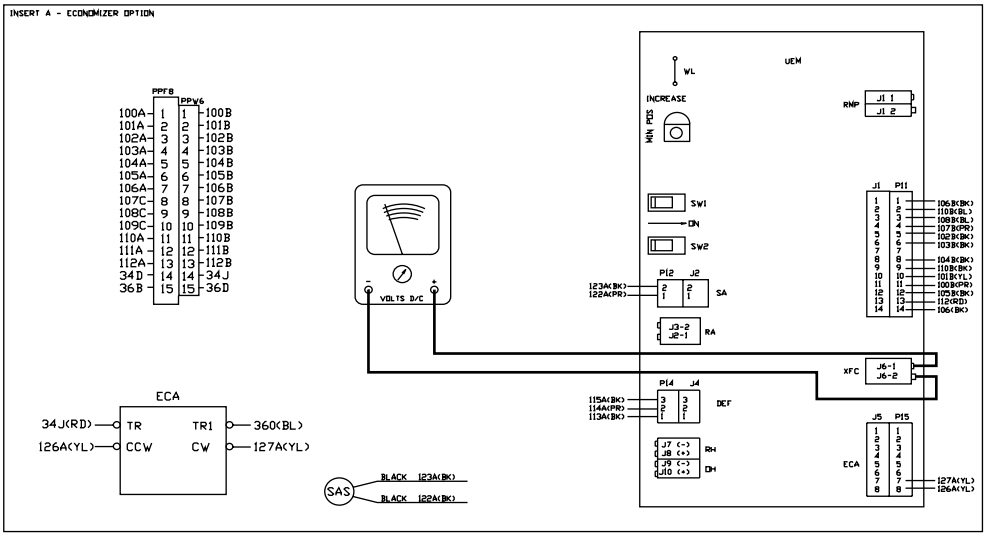
Step 6: Testing Outdoor Humidity Sensor Input. Remove wires (if installed) from terminals J9 (-) and J10 (+) on UEM, marked OH on the side of the UEM board. Measure voltage between terminals J9 (-) and J10 (+). Voltage should measure approximately 20 VDC.

If correct voltages are measured in Tests 1 through 3, and voltage in Test 4, Step 6 is out of range, replace UEM.



Step 7: **Testing Exhaust Fan Contactor Output.** Remove connector (if installed) from J6 on UEM, marked XFC on the side of the UEM board. With the indoor blower running, turn minimum position potentiometer fully counter clock wise. Measure DC voltage between J6-1 and J6-2, should be 0 VDC. Turn minimum position potentiometer fully clock wise. After about 25 seconds, voltage should measure approximately 30 VDC.

If after completing tests 1 through 4, if any of the voltages specified in Test 4 were not present or were out of range, the UEM has failed. Replace UEM.



27.5. Test 5: Testing the Sensors

Step 1: Test UCP Outdoor Air Sensor Input. The voltages listed below are measured with power applied to the unit and the Outdoor Air Sensor (OAS) wired into the circuit. Voltages may be measured at the Unitary Control Processor (UCP), or at the connectors nearest the sensor. The OAS is measured between UCP terminals J1-15 & J1-16.

The resistance values (OHMs) are measured with the sensor disconnected and isolated from the UCP. The resistance may be measured at the connectors nearest the sensor, or in the respective plug near the printed circuit board. The electrical values measured, directly correspond with an outdoor temperature, that is interpreted by the UCP.

Voyager III VAV Note: This test is done at the UVM on terminals J2-1 and J2-2, instead of the UCP board.

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
-40	346.1	4.648	-39	333.5	4.468	-38	321.5	4.629
-37	310.0	4.609	-36	298.9	4.609	-35	288.3	4.590
-34	278.1	4.570	-33	268.3	4.570	-32	258.9	4.551
-31	249.9	4.531	-30	241.1	4.531	-29	232.7	4.512
-28	224.6	4.492	-27	216.8	4.473	-26	209.4	4.453
-25	202.2	4.434	-24	195.2	4.434	-23	188.6	4.414
-22	182.3	4.395	-21	176.0	4.375	-20	170.1	4.355
-19	164.4	4.336	-18	158.9	4.316	-17	153.6	4.297
-16	148.5	4.277	-15	143.5	4.258	-14	138.8	4.219
-13	134.2	4.199	-12	129.8	4.180	-11	125.5	4.160
-10	121.4	4.141	-9	117.4	4.121	-8	113.6	4.082
-7	109.9	4.063	-6	106.4	4.043	-5	103.0	4.023
-4	99.66	3.984	-3	96.48	3.965	-2	93.40	3.945
-1	90.43	3.906	0	87.56	3.887	1	84.80	3.848
2	82.13	3.828	3	79.50	3.789	4	77.06	3.770
5	74.65	3.730	6	72.33	3.711	7	70.09	3.672
8	67.92	3.652	9	65.82	3.613	10	63.80	3.594
11	61.85	3.555	12	59.96	3.516	13	58.13	3.496
14	56.37	3.457	15	54.66	3.418	16	53.01	3.398
17	51.41	3.359	18	49.87	3.320	19	48.38	3.281

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
20	46.94	3.262	21	45.54	3.223	22	44.19	3.184
23	42.88	3.145	24	41.62	3.125	25	40.40	3.086
26	39.21	3.047	27	38.07	3.008	28	36.96	2.969
29	35.89	2.930	30	34.85	2.910	31	33.84	2.871
32	32.87	2.832	33	31.94	2.793	34	31.04	2.754
35	30.18	2.734	36	29.33	2.695	37	28.52	2.656
38	27.73	2.617	39	26.97	2.578	40	26.22	2.559
41	25.51	2.520	42	24.81	2.480	43	24.14	2.441
44	23.48	2.422	45	22.85	2.383	46	22.23	2.344
47	21.64	2.305	48	21.06	2.285	49	20.50	2.246
50	19.96	2.207	51	19.43	2.188	52	18.92	2.148
53	18.42	2.109	54	17.94	2.090	55	17.47	2.051
56	17.02	2.012	57	16.58	1.992	58	16.15	1.953
59	15.74	1.934	60	15.33	1.895	61	14.94	1.855
62	14.56	1.836	63	14.19	1.797	64	13.83	1.777
65	13.49	1.738	66	13.15	1.719	67	12.82	1.680
68	12.50	1.660	69	12.19	1.641	70	11.89	1.602
71	11.60	1.582	72	11.31	1.543	73	11.03	1.523
74	10.76	1.504	75	10.50	1.465	76	10.25	1.445
77	10.00	1.426	78	9.759	1.406	79	9.525	1.367
80	9.297	1.348	81	9.076	1.328	82	8.860	1.309
83	8.650	1.289	84	8.446	1.250	85	8.247	1.230
86	8.054	1.211	87	7.866	1.191	88	7.682	1.172
89	7.504	1.152	90	7.330	1.133	91	7.161	1.113
92	6.996	1.094	93	6.836	1.074	94	6.680	1.055

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
95	6.528	1.035	96	6.380	1.016	97	6.235	0.996
98	6.095	0.977	99	5.958	0.957	100	5.824	0.938
101	5.694	0.918	102	5.567	0.898	103	5.444	0.898
104	5.323	0.879	105	5.206	0.859	106	5.091	0.840
107	4.980	0.820	108	4.871	0.801	109	4.765	0.801
110	4.662	0.781	111	4.561	0.762	112	4.462	0.762
113	4.366	0.742	114	4.273	0.723	115	4.181	0.703
116	4.092	0.703	117	4.005	0.684	118	3.921	0.664
119	3.838	0.664	120	3.757	0.645	121	3.678	0.645
122	3.601	0.625	123	3.526	0.605	124	3.453	0.605
125	3.381	0.586	126	3.312	0.586	127	3.244	0.566
128	3.177	0.566	129	3.112	0.547	130	3.049	0.547
131	2.987	0.527	132	2.926	0.527	133	2.867	0.508
134	2.809	0.508	135	2.753	0.488	136	2.698	0.488
137	2.644	0.469	138	2.591	0.469	139	2.540	0.449
140	2.489	0.449	141	2.440	0.449	142	2.392	0.430
143	2.345	0.430	144	2.300	0.410	145	2.255	0.410
146	2.211	0.410	147	2.168	0.391	148	2.126	0.391
149	2.085	0.371	150	2.045	0.371	151	2.006	0.371
152	1.968	0.352	153	1.930	0.352	154	1.894	0.352
155	1.858	0.332	156	1.823	0.332	157	1.789	0.332
158	1.755	0.332						

Step 2: Test Supply Air Sensor and Return Air Sensor Inputs. The voltages listed below are measured with power applied to the unit and the Supply Air Sensor (SAS) or Return Air Sensor (RAS) wired into the circuit. Voltages may be measured at the UEM, or at the connectors nearest the respective sensor. SAS is measured between UEM terminals J2-1 & J2-2, RAS is measured between UEM terminals J3-1 & J3-2.

The resistance values (OHMs) are measured with the sensor disconnected and isolated from the UEM. The resistance may be measured at the connectors nearest the sensor, or in the respective plug near the printed circuit board. The electrical values measured, directly correspond with a supply or return air temperature that is interpreted by the UCP.

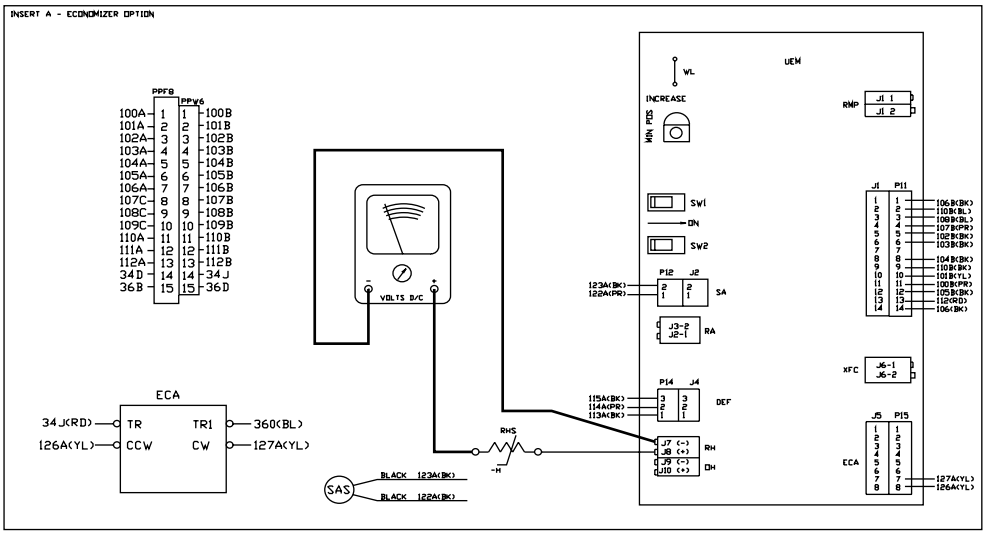
Voyager III VAV Note: This supply air sensor test is done at the UCP on terminals J7-11 and J7-16 (common).

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
30	34.85	3.613	31	33.84	3.574	32	32.87	3.555
33	31.94	3.516	34	31.04	3.496	35	30.18	3.457
36	29.33	3.418	37	28.52	3.398	38	27.73	3.359
39	26.97	3.340	40	26.22	3.301	41	25.51	3.281
42	24.81	3.242	43	24.14	3.203	44	23.48	3.184
45	22.85	3.145	46	22.23	3.105	47	21.64	3.086
48	21.06	3.047	49	20.50	3.027	50	19.96	2.988
51	19.43	2.949	52	18.92	2.930	53	18.42	2.891
54	17.94	2.852	55	17.47	2.832	56	17.02	2.793
57	16.58	2.754	58	16.15	2.734	59	15.74	2.695
60	15.33	2.656	61	14.94	2.637	62	14.56	2.598
63	14.19	2.559	64	13.83	2.539	65	13.49	2.500
66	13.15	2.480	67	12.82	2.441	68	12.50	2.402
69	12.19	2.383	70	11.89	2.344	71	11.60	2.324
72	11.31	2.285	73	11.03	2.246	74	10.76	2.227
75	10.50	2.188	76	10.25	2.168	77	10.00	2.129
78	9.759	2.109	79	9.525	2.070	80	9.297	2.051
81	9.076	2.012	82	8.860	1.992	83	8.650	1.953
84	8.446	1.934	85	8.247	1.895	86	8.054	1.875
87	7.866	1.855	88	7.682	1.816	89	7.504	1.797
90	7.330	1.758	91	7.161	1.738	92	6.996	1.719

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
93	6.836	1.680	94	6.680	1.660	95	6.528	1.641
96	6.380	1.602	97	6.235	1.582	98	6.095	1.563
99	5.958	1.543	100	5.824	1.504	101	5.694	1.484
102	5.567	1.465	103	5.444	1.445	104	5.323	1.426
105	5.206	1.406	106	5.091	1.367	107	4.980	1.348
108	4.871	1.328	109	4.765	1.309	110	4.662	1.289
111	4.561	1.270	112	4.462	1.250	113	4.366	1.230
114	4.273	1.211	115	4.181	1.191	116	4.092	1.172
117	4.005	1.152	118	3.921	1.133	119	3.838	1.113
120	3.757	1.094	121	3.678	1.074	122	3.601	1.055
123	3.526	1.035	124	3.453	1.016	125	3.381	1.016
126	3.312	0.996	127	3.244	0.977	128	3.177	0.957
129	3.112	0.938	130	3.049	0.918	131	2.987	0.918
132	2.926	0.898	133	2.867	0.879	134	2.809	0.859
135	2.753	0.859	136	2.698	0.840	137	2.644	0.820
138	2.591	0.820	139	2.540	0.801	140	2.489	0.781
141	2.440	0.762	142	2.392	0.762	143	2.345	0.742
144	2.300	0.742	145	2.255	0.723	146	2.211	0.703
147	2.168	0.703	148	2.126	0.684	149	2.085	0.684
150	2.045	0.664	151	2.006	0.645	152	1.968	0.645
153	1.930	0.625	154	1.894	0.625	155	1.858	0.605
156	1.823	0.605	157	1.789	0.586	158	1.755	0.586
159	1.722	0.566	160	1.690	0.566	161	1.659	0.547
162	1.628	0.547	163	1.598	0.527	164	1.568	0.527
165	1.539	0.508	166	1.511	0.508	167	1.484	0.508
168	1.457	0.488	169	1.430	0.488	170	1.404	0.469

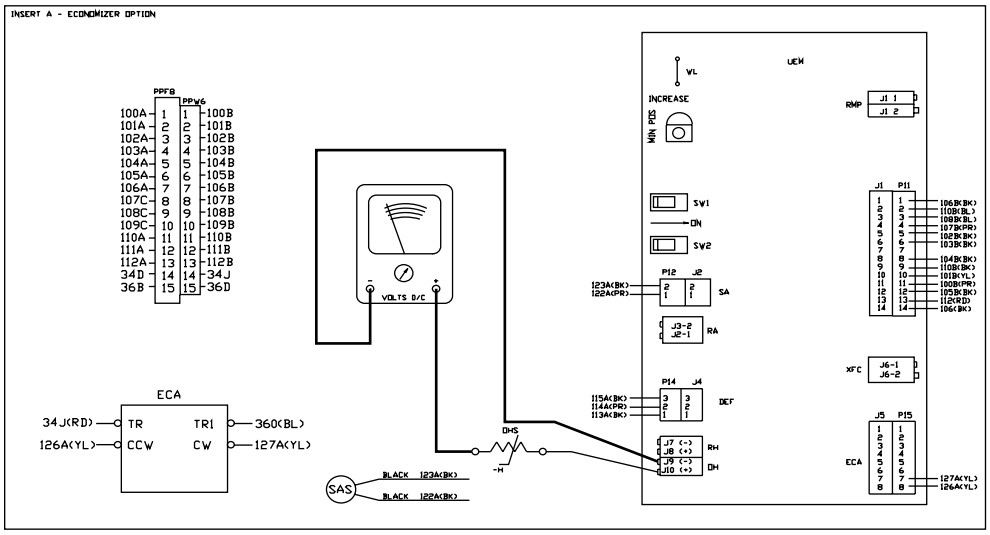
Step 3: Testing the Return Humidity Sensor (RHS). Locate terminals J7 (-) and J8 (+) on the UEM, marked RH on the side of the UEM board. Leave the sensor (if installed) connected to the UEM, and measure the operating current. The normal range for operating current is 4 to 20 mA (milliamps). Replace sensor if not within range (+/- 10 %).

Note: The RHS is polarity sensitive, verify polarity is correct before condemning the sensor. Reversing polarity will not damage any of the controls, but the RHS will not work if the polarity is reversed.



Step 4: Testing the Outdoor Humidity Sensor (OHS). Locate terminals J9 (-) and J10 (+) on the UEM, marked OH on the side of the UEM board. Leave the sensor (if installed) connected to the UEM, and measure the operating current. The normal range for operating current is 4 to 20 mA (milliamps). Replace sensor if not within range (+ 10 %).

Note: The OHS is polarity sensitive, verify polarity is correct before condemning the sensor. Reversing polarity will not damage any of the controls, but the OHS will not work if the polarity is reversed.



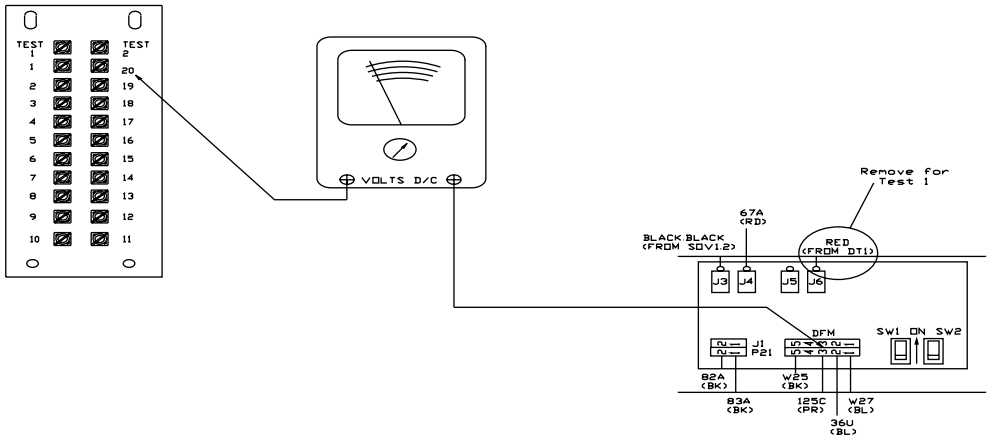
28. Testing the Defrost Module (10-20 Ton Heat Pumps only)

This series of tests can be conducted in any mode, as long as the UCP is powered up. **Test 1** simulates an open Defrost Termination Switch (DT), and verifies the integrity of the time interval switching circuit input. **Test 2** simulates a closed DT, and also verifies the integrity of the time interval switching circuit input. **Test 3** verifies the integrity of the Switch Over Valve (SOV) relay circuit.

28.1. Test 1: Simulates an open Defrost Termination Switch (DT)

Remove the (RED) wire from terminal number J6 on the DFM, to simulate an open DT condition. Measure the DC voltage between pin J2-3 and LTB-20 (Note: On equipment manufactured before 06/93 substitute LTB-16 for LTB-20), with the switches (SW1 and SW2) set in the positions below.

SW1	SW2	DT	Expected DC Volts	DC Volts Measured
OFF	OFF	OPEN	0.56 (+/- 5 %)	
ON	OFF	OPEN	0.54 (+/- 5 %)	
OFF	ON	OPEN	0.52 (+/- 5 %)	
ON	ON	OPEN	0.41 (+/- 5 %)	



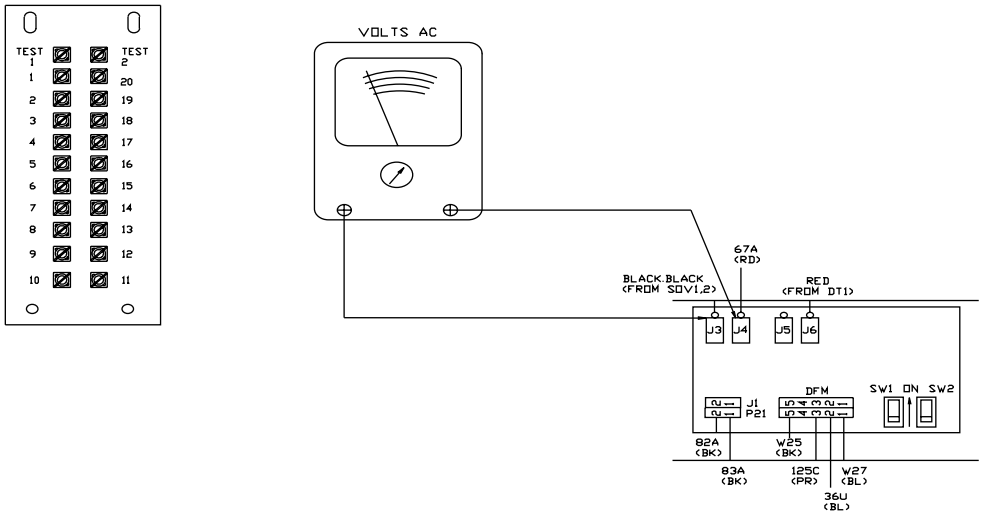
28.2. Test 2: Simulates a closed Defrost Termination Switch (DT)

Reconnect the (RED) wire to terminal number J6 on the DFM. Install a jumper from terminal J6 to LTB-17 **(Note**: On equipment manufactured before 06/93 substitute LTB-18 for LTB-17), to simulate a closed DT condition. Measure the DC voltage between pin J2-3 and LTB-20 (**Note:** On equipment manufactured before 06/93 substitute LTB-16 for LTB-20), with the switches (SW1 and SW2) set in the positions below.

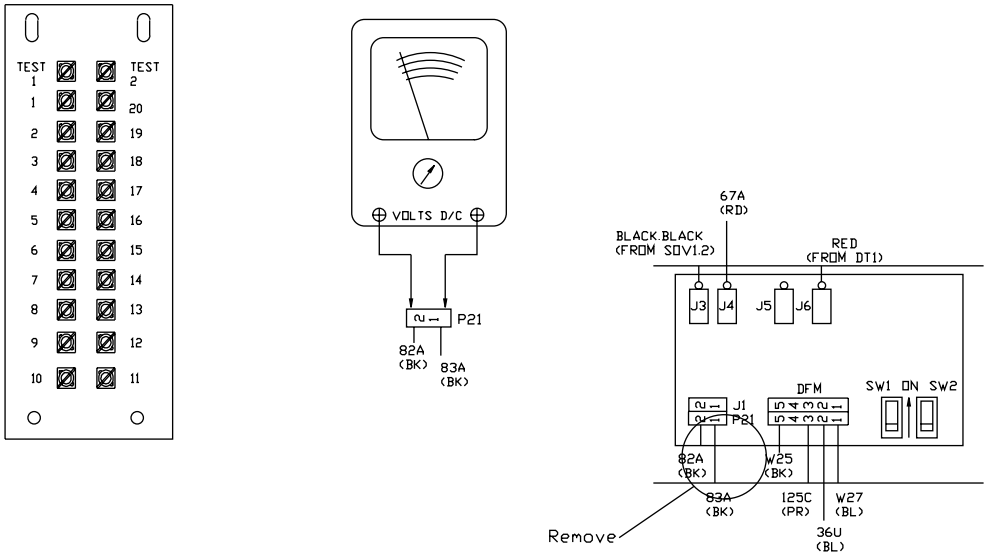
SW1	SW2	DT	Expected DC Volts	DC Volts Measured
OFF	OFF	CLOSED	3.34 (+/- 5 %)	
ON	OFF	CLOSED	2.88 (+/- 5 %)	
OFF	ON	CLOSED	2.39 (+/- 5 %)	
ON	ON	CLOSED	1.08 (+/- 5 %)	

28.3. Test 3: Testing the SOV Relay Circuit

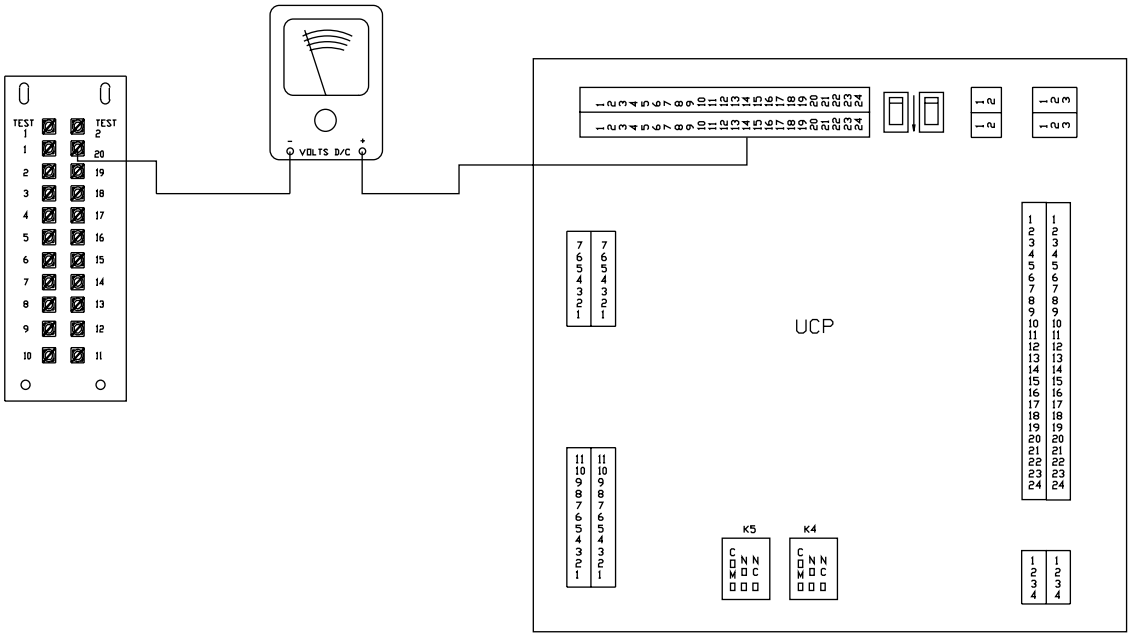
Step 1: Place the unit in the Cooling or Defrost mode, so that the SOVs should be energized. Test for 24 VAC, with wires in place, between DFM terminals J3 and J4. If 24 VAC is not present, contacts should be closed, and SOVs should be energized. If SOVs are not energized test TNS3 transformer, a transformer failure may have occurred. If 24 VAC is present, K1 contacts are not closed, and SOVs will not be energized. Proceed to Step 2.



Step 2: Test for K1 relay coil voltage, remove J1 on DFM. Test the J1 connector terminals for nominal 28 VDC. If voltage is present and K1 contacts were not closed in Step 1, DFM is defective, replace DFM. If 28 VDC is not present proceed to Step 3.



Step 3: If 28 VDC was not present in Step 2, open unit disconnect switch. Locate J1 on the UCP. Connect positive meter lead to terminal J1-14, wire number 83A (BLACK). Connect negative meter lead to LTB- 20 (**Note:** On equipment manufactured before 06/93 substitute LTB-16 for LTB-20) screw terminal. Close the unit disconnect switch, and place the unit in the Cooling or Defrost mode so that the SOVs should be energized. Measure DC voltage between LTB-20 (**Note:** On equipment manufactured before 06/93 substitute LTB-16 for LTB-20) and J1-14. If 28 VDC is present, a wiring or terminal problem exists. If 28 VDC is not present, the UCP is defective, replace UCP.



29. Testing the Coil Temperature Sensor (Heat Pump 3-7.5 Ton)

The voltages listed below are measured with power applied to the unit and the Coil Temperature Sensor (CTS) wired into the circuit**.**

If there is no economizer measure the voltages at the Unitary Control Processor (UCP) terminals J2-15 & J2-17
If an economizer is installed measure the voltage at the Unitary Economizer Module (UEM) terminals J4-2 & J4-3

The resistance values (OHMs) are measured with the sensor disconnected and isolated from the UCP. The resistance may be measured at the connectors nearest the sensor, or in the respective plug near the printed circuit board. The electrical values measured directly correspond to the coil temperature interpreted by the UCP.

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
-40	346.1	4.648	-39	333.5	4.468	-38	321.5	4.629
-37	310.0	4.609	-36	298.9	4.609	-35	288.3	4.590
-34	278.1	4.570	-33	268.3	4.570	-32	258.9	4.551
-31	249.9	4.531	-30	241.1	4.531	-29	232.7	4.512
-28	224.6	4.492	-27	216.8	4.473	-26	209.4	4.453
-25	202.2	4.434	-24	195.2	4.434	-23	188.6	4.414
-22	182.3	4.395	-21	176.0	4.375	-20	170.1	4.355
-19	164.4	4.336	-18	158.9	4.316	-17	153.6	4.297
-16	148.5	4.277	-15	143.5	4.258	-14	138.8	4.219
-13	134.2	4.199	-12	129.8	4.180	-11	125.5	4.160
-10	121.4	4.141	-9	117.4	4.121	-8	113.6	4.082
-7	109.9	4.063	-6	106.4	4.043	-5	103.0	4.023
-4	99.66	3.984	-3	96.48	3.965	-2	93.40	3.945
-1	90.43	3.906	0	87.56	3.887	1	84.80	3.848
2	82.13	3.828	3	79.50	3.789	4	77.06	3.770
5	74.65	3.730	6	72.33	3.711	7	70.09	3.672
8	67.92	3.652	9	65.82	3.613	10	63.80	3.594
11	61.85	3.555	12	59.96	3.516	13	58.13	3.496
14	56.37	3.457	15	54.66	3.418	16	53.01	3.398
17	51.41	3.359	18	49.87	3.320	19	48.38	3.281

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
20	46.94	3.262	21	45.54	3.223	22	44.19	3.184
23	42.88	3.145	24	41.62	3.125	25	40.40	3.086
26	39.21	3.047	27	38.07	3.008	28	36.96	2.969
29	35.89	2.930	30	34.85	2.910	31	33.84	2.871
32	32.87	2.832	33	31.94	2.793	34	31.04	2.754
35	30.18	2.734	36	29.33	2.695	37	28.52	2.656
38	27.73	2.617	39	26.97	2.578	40	26.22	2.559
41	25.51	2.520	42	24.81	2.480	43	24.14	2.441
44	23.48	2.422	45	22.85	2.383	46	22.23	2.344
47	21.64	2.305	48	21.06	2.285	49	20.50	2.246
50	19.96	2.207	51	19.43	2.188	52	18.92	2.148
53	18.42	2.109	54	17.94	2.090	55	17.47	2.051
56	17.02	2.012	57	16.58	1.992	58	16.15	1.953
59	15.74	1.934	60	15.33	1.895	61	14.94	1.855
62	14.56	1.836	63	14.19	1.797	64	13.83	1.777
65	13.49	1.738	66	13.15	1.719	67	12.82	1.680
68	12.50	1.660	69	12.19	1.641	70	11.89	1.602
71	11.60	1.582	72	11.31	1.543	73	11.03	1.523
74	10.76	1.504	75	10.50	1.465	76	10.25	1.445
77	10.00	1.426	78	9.759	1.406	79	9.525	1.367
80	9.297	1.348	81	9.076	1.328	82	8.860	1.309
83	8.650	1.289	84	8.446	1.250	85	8.247	1.230
86	8.054	1.211	87	7.866	1.191	88	7.682	1.172
89	7.504	1.152	90	7.330	1.133	91	7.161	1.113
92	6.996	1.094	93	6.836	1.074	94	6.680	1.055

TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%	TEMP °F	OHMs Rx1K	Volts DC +/-5%
95	6.528	1.035	96	6.380	1.016	97	6.235	0.996
98	6.095	0.977	99	5.958	0.957	100	5.824	0.938
101	5.694	0.918	102	5.567	0.898	103	5.444	0.898
104	5.323	0.879	105	5.206	0.859	106	5.091	0.840
107	4.980	0.820	108	4.871	0.801	109	4.765	0.801
110	4.662	0.781	111	4.561	0.762	112	4.462	0.762
113	4.366	0.742	114	4.273	0.723	115	4.181	0.703
116	4.092	0.703	117	4.005	0.684	118	3.921	0.664
119	3.838	0.664	120	3.757	0.645	121	3.678	0.645
122	3.601	0.625	123	3.526	0.605	124	3.453	0.605
125	3.381	0.586	126	3.312	0.586	127	3.244	0.566
128	3.177	0.566	129	3.112	0.547	130	3.049	0.547
131	2.987	0.527	132	2.926	0.527	133	2.867	0.508
134	2.809	0.508	135	2.753	0.488	136	2.698	0.488
137	2.644	0.469	138	2.591	0.469	139	2.540	0.449
140	2.489	0.449	141	2.440	0.449	142	2.392	0.430
143	2.345	0.430	144	2.300	0.410	145	2.255	0.410
146	2.211	0.410	147	2.168	0.391	148	2.126	0.391
149	2.085	0.371	150	2.045	0.371	151	2.006	0.371
152	1.968	0.352	153	1.930	0.352	154	1.894	0.352
155	1.858	0.332	156	1.823	0.332	157	1.789	0.332
158	1.755	0.332						

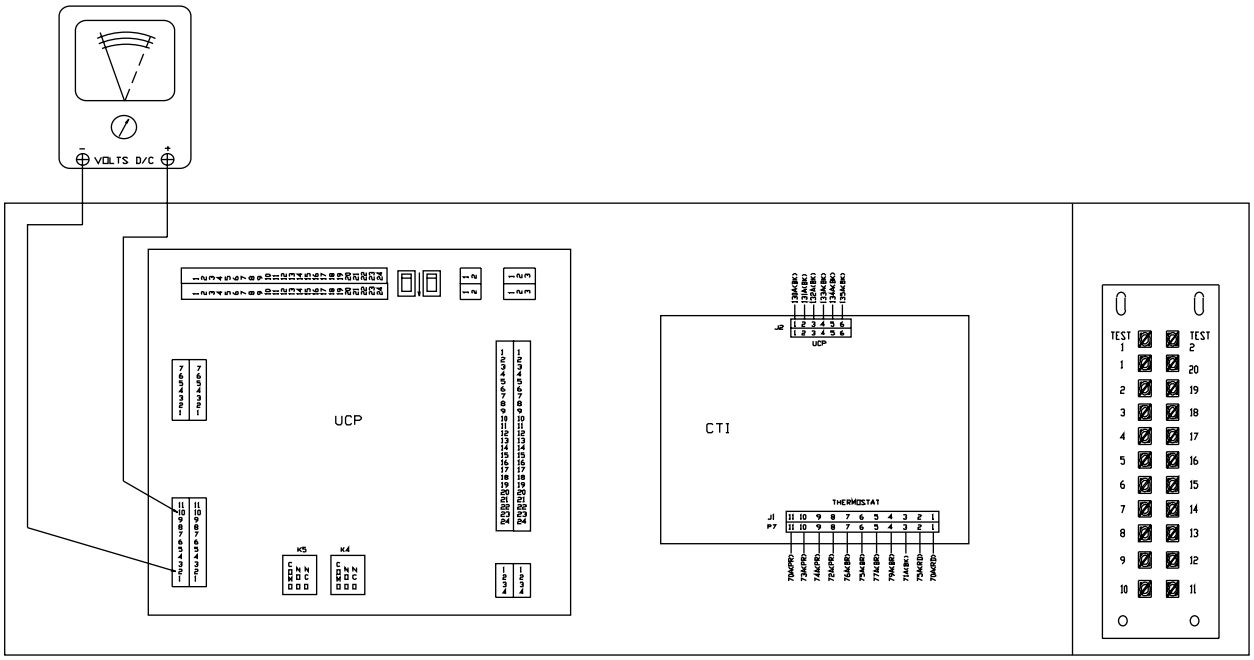
30. Testing The CTI (3-50 Ton CV only)

Important: The 27.5-50 Ton VAV units can not be operated with a CTI.

This series of tests allows you to verify CTI output to the UCP. **Test 1** verifies communication. **Test 2** will verify the Y1 & Y2 (cooling) outputs. T**est 3** will verify the W1, W2 &W (heating) outputs. **Test 4** will verify G & O (fan & reversing valve) outputs. Conduct the tests in numerical order until the problem is found.

30.1. Test 1: Testing UCP - CTI Communication

Step 1: After checking the Room Thermostat, kill the unit power at the service disconnect, and remove the thermostat wires at the Low Voltage Terminal Board (LTB) on the unit.
Step 2: Locate connector J7 on the UCP. Install meter leads between connector terminals J7-2 and J7-10. Reapply power, then measure the DC voltage. The DC voltage measured should flash approximately every 0.5 seconds. The voltage level should measure less than 0.8 VDC at the low end of the cycle, and greater than 2.5 VDC at the high end of the cycle. If voltage does not flash, the CTI has failed; replace CTI.

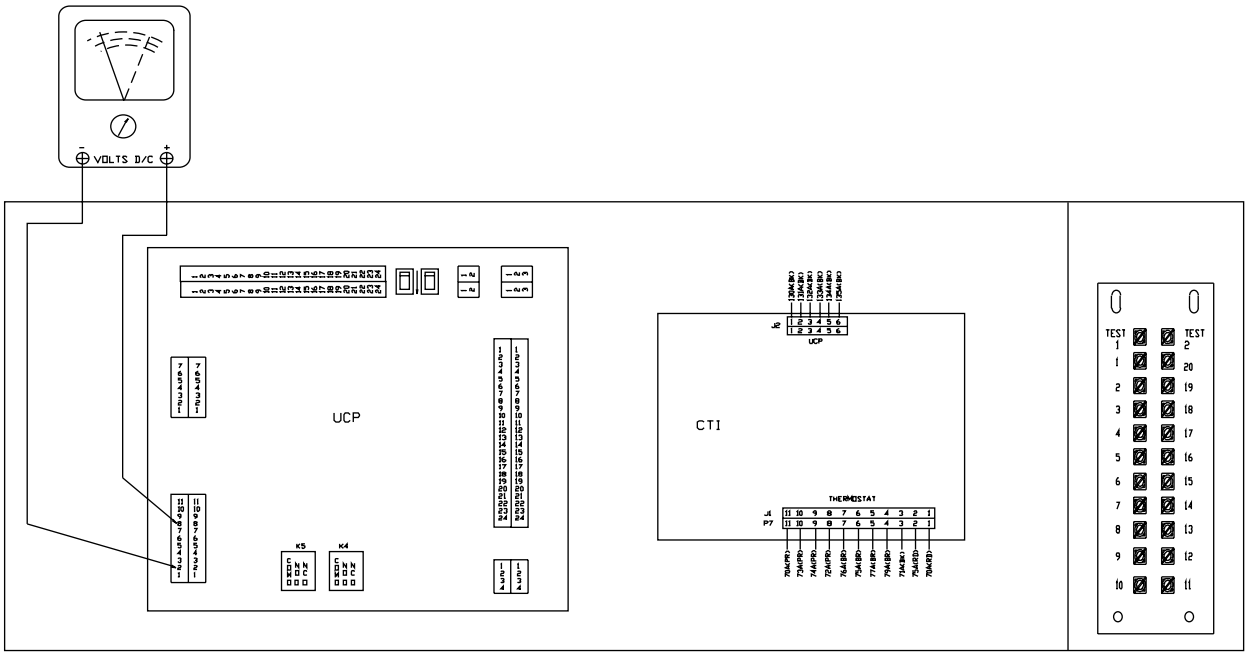


30.2. Test 2: Testing the Compressor Stages Output

Step 1: Kill the unit power at the service disconnect.
Step 2: Locate connector J7 on the UCP. Install meter leads between connector terminals J7-2 and J7-8. Reapply power, and jumper LTB terminals as shown below to measure DC voltages. Note: If measured voltage is out of range, replace the CTI

Terminals Jumpered		Expected DC Volts	DC Volts Measured
NONE		5.00 (+/- 5 %)	
LTB-14 to LTB-1	(Y1*)	3.71 (+/- 5 %)	
LTB-14 to LTB-4	(Y2*)	3.14 (+/- 5 %)	
LTB-14 to LTB-1 & 4	(Y1 + Y2)	2.58 (+/- 5 %)	

* On 2 compressor heat pumps in the heating mode, Y1 energizes both compressors (1st stage heating). In the cooling mode, Y1 energizes compressor #1, Y2 energizes compressor #2.
Note: On equipment manufactured before 06/93 substitute LTB-15 for LTB-14.

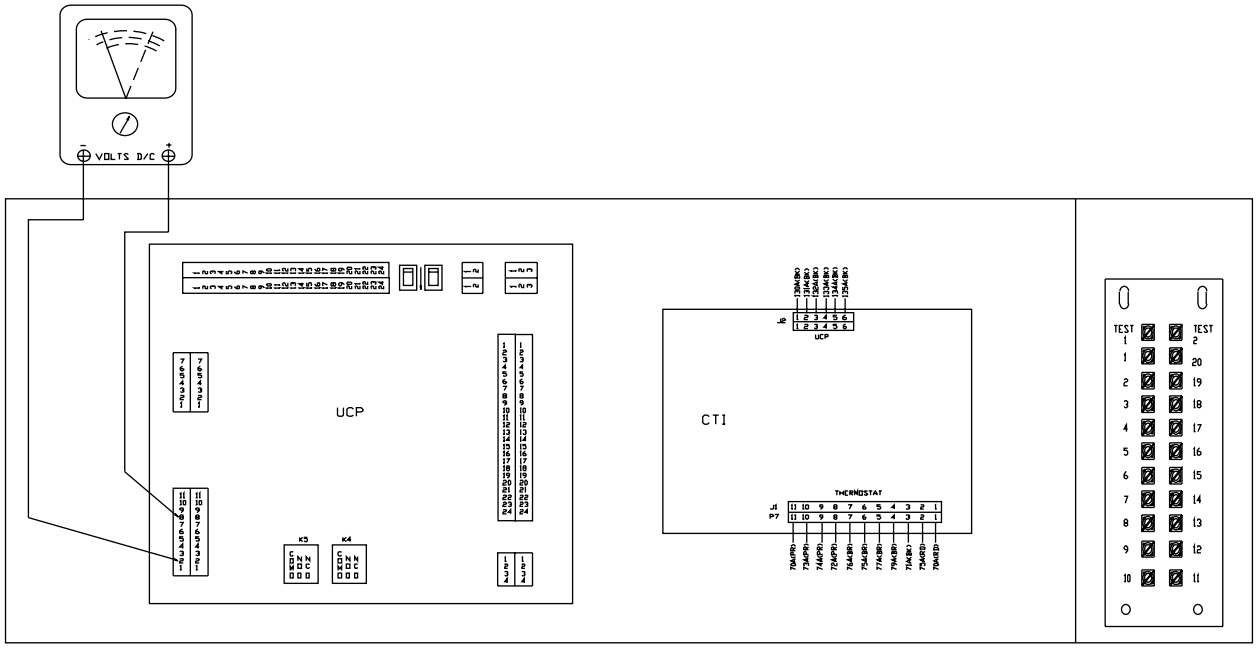


30.3. Test 3: Testing Heat Stages Output

Step 1: Kill the unit power at the service disconnect.
Step 2: Locate connector J7 on the UCP. Install meter leads between connector terminals J7-2 and J7--9. Reapply power, and jumper LTB terminals as shown below and measure DC voltages. If measured voltage is out of range, replace the CTI.

Terminals Jumpered		Expected DC Volts	DC Volts Measured
NONE		5.00 (+/- 5 %)	
LTB-14 to LTB-5	(W1)	2.80 (+/- 5 %)	
LTB-14 to LTB-3	(W2 or X2*)	3.71 (+/- 5 %)	
LTB-14 to LTB-9	(W*)	3.14 (+/- 5 %)	

* Heat pump only
Note: On equipment manufactured before 06/93 substitute LTB-15 for LTB-14.

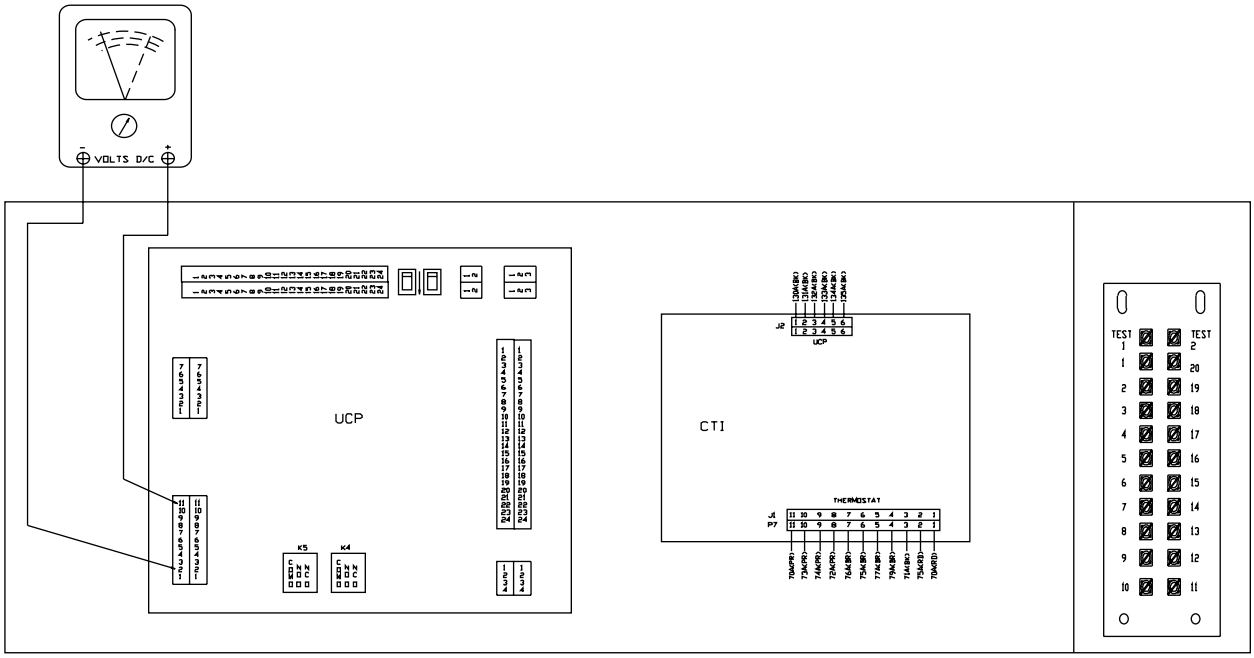


30.4. Test 4: Testing Fan & Reversing Valve* output

Step 1: Kill the unit power at the service disconnect.
Step 2: Locate connector J7 on the UCP. Install meter leads between connector terminals J7-2 and J7- 11. Reapply power, then jumper LTB terminals as shown below and measure DC voltages. If measured voltage is out of range, replace the CTI.

Terminals Jumpered		Expected DC Volts	DC Volts Measured
NONE		5.00 (+/- 5 %)	
LTB-14 to LTB-7	(G)	3.71 (+/- 5 %)	
LTB-14 to LTB-8	(O*)	3.14 (+/- 5 %)	
LTB-14 to LTB-7 & 8	(G + O*)	2.58 (+/- 5 %)	

*Heat pump only – "O" energizes the reversing valve in the cooling mode.
Note: On equipment manufactured before 06/93 substitute LTB-15 for LTB-14.



31. Testing the Exhaust Fan Set Point Panel (27.5-50 Ton)

Step 1: Disconnect the two wires connected to terminals J1 and J2 on the Exhaust Fan Set Point Panel (EFSP) and remove the Set Point Panel from the unit.

Step 2: Set the EFSP potentiometer on the panel to 50%.

Step 3: Measure the resistance between terminals J1 and J2. If not approx. 500 ohms, replace the panel.

Step 4: Reconnect wires and power unit. Read the DC voltage at J1 and J2, If voltage does not approximately match the chart below, look for a loose wiring connection between the exhaust fan set point panel and the UEM.

Exhaust Fan Setpoint

Setpoint (%)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
0	889	4.08
5	851	4.05
10	812	4.01
15	773	3.97
20	734	3.93
25	695	3.88
30	656	3.83
35	617	3.78
40	578	3.71
45	539	3.65
50	500	3.57
55	461	3.49
60	422	3.39
65	383	3.28
70	344	3.16
75	305	3.02
80	266	2.85
85	227	2.66
90	188	2.42
95	150	2.14
100	111	1.78

32. Unit Variable Air Volume Module (UVM) Test Procedures (27.5-50 Ton)

32.1. Test 1: Testing Inlet Guide Vane/Variable Frequency Drive (IGV/VFD) Output

Step 1: Using the Test Mode, step the unit to the first test. Verify that 8.5 VDC is present between terminals J5-8 and J5-5 for IGVs or 10VDC for VFDs. If SW1 DIP switch on the UVM is in the wrong position the incorrect voltage will be seen. Set the DIP switch to the proper position, recycle power, then continue.

Step 2: If the voltage is not present or is neither 8.5VDC or 10VDC, verify wires 160A and 160B are connected properly. Measure the voltage at J1-11 to ground. It should be pulsating between 5 VDC and 0VDC.

Step 3: If the voltage to the IGV/VFD is still not present, verify that the remaining wires are properly connected between the UCP and the UVM. If Step 2 and Step 3 checkout and the voltage is still not present at the IGV/VFD output, replace the UVM.

32.2. Test 2: Testing the Static Pressure Transducer Input

Step 1: With main power to the unit turned "Off", disconnect all of the tubing to the Static Pressure Transducer (SPT).

Step 2: With the system MODE "Off", apply power to the unit and measure the voltage between J10 and J8 on the UVM. The voltage should be approximately 5 VDC. If not, check the wiring between the UCP and the UVM. If the wiring checks, replace UVM.

Step 3: Measure the voltage between J9 and J8 on the UVM. The voltage should be approximately 0.25 VDC. If not, check the wiring between the UVM and the SPT. If the wiring checks replace the SPT.

Step 4: Apply 2.0" w.c. pressure to the HI port on the SPT. Measure the voltage between J8 and J9. The voltage should be 1.75 (± .14) VDC. If not, replace the SPT.

Note: The SPT plastic housing is susceptible to interference from VFDs. Make sure the SPT body is mounted on plastic standoffs and is not touching any sheet metal.

32.3. Test 3: Testing UVM Sensor Inputs

Step 1: With power applied to system, turn the ZSM MODE switch "Off".

Step 2: Testing the zone temperature sensor input. Disconnect the P23 connector from the UVM. Measure the voltage between the J3-1 terminal and ground. The voltage should measure approximately 5 VDC. Now, measure the resistance between terminal P23-1 and ground. Measure the temperature at the zone sensor location. Verify the accuracy of the SAS. Replace the sensor if it is out of range.

Step 3: Testing the outdoor air sensor LC Input. Disconnect the P22 connector from the UVM. Measure the voltage between terminals J2-1 and J2-2. The voltage should measure approximately 5 VDC. Now, measure the resistance between the two P22 terminals. Measure the temperature at the OAS location. Verify the accuracy of the OAS. Replace the sensor if it is out of range.

32.4. Test 4: Testing the VAV Set Point Input

Step 1: With power applied to the system, turn the ZSM MODE switch to "Off".

Step 2: Reset Amount Input. Disconnect the wire connected to the J7 terminal on the UVM. Measure the voltage between the J7 and J8 terminal. The voltage should measure approximately 5 VDC.

Step 3: Static Pressure Deadband. Disconnect the P25 connector on the UVM. Measure the voltage between the J5-3 and J5-4 terminal. The voltage should measure approximately 5 VDC.

Step 4: Static Pressure Set Point. Disconnect the wires connected to J11 and J12 on the UVM. Measure the voltage between the J11 and J12 terminal. The voltage should measure approximately 5 VDC.

Step 5: Morning Warm up Set Point. Disconnect the P24 connector from the UVM. Measure the voltage between the J4-3 and J4-2 terminal. The voltage should measure approximately 5 VDC.

Step 6: Reset Set Point. Disconnect the P7 connector from the UCP. Measure the voltage between the J7-9 terminal and Ground. The voltage should measure approximately 5 VDC.

32.5. Test 5: Testing the Inlet Guide Vane Actuator (IGVA)

Step 1: Using the Test Mode procedure, measure the voltage between the (+) and (-) terminals on the actuator. The voltage should be 8.5 VDC. If not, check the wiring between the UVM and the IGV actuator. If the wiring checks, return to Test 1.

Step 2: If the voltage above is present and the actuator is not opening, verify that 24 VAC is present between terminals T1 and T2. If the voltage is present, replace actuator.

Note: The IGVA can manually be driven open by shorting the (F) terminal to either the (+) or (-) terminals. The IGVA will drive closed when the short is removed.

32.6. Test 6: Testing the VFD

Step 1: Verify that the keypad in control box is powered. If not, check the power wires to the VFD and the Keypad cable.

Step 2: Using the Test Mode, verify that the fan starts and the speed increases until the SA Pressure reaches the "Set Point" on VAV Set Point panel. If the fan does not start, check for "Fault Conditions" on the VFD Keypad.

Step 3: If no "Fault Conditions" exist and the fan started but did not ramp up to speed, verify the "speed reference voltage" output from the UVM between terminals J5-8 and J5-5.

Step 4: If no "Fault Conditions" exist and the fan did not start, verify that the Fan relay is energized and the VFD "Start Command" is properly wired from the Fan relay, (24 volts on the Logic Input 2 (LI2) terminal). Verify that the jumper between +24V and the LI1 terminal is properly connected.

Step 5: Verify that 115 VAC is present from the transformer on the VFD assembly panel.

32.7. Test 7: Testing the VAV Set Point Panel

Step 1: Disconnect the wiring from the VAV Set Point Panel and Remove it from the unit.

Step 2: Supply Air Cooling Set Point. Measure the resistance between pins 1 and 2. The resistance range across the terminals is approximately 200 to 1200 ohms. At the 60° F Set Point setting, the resistance should be 695 (± 39) ohms.

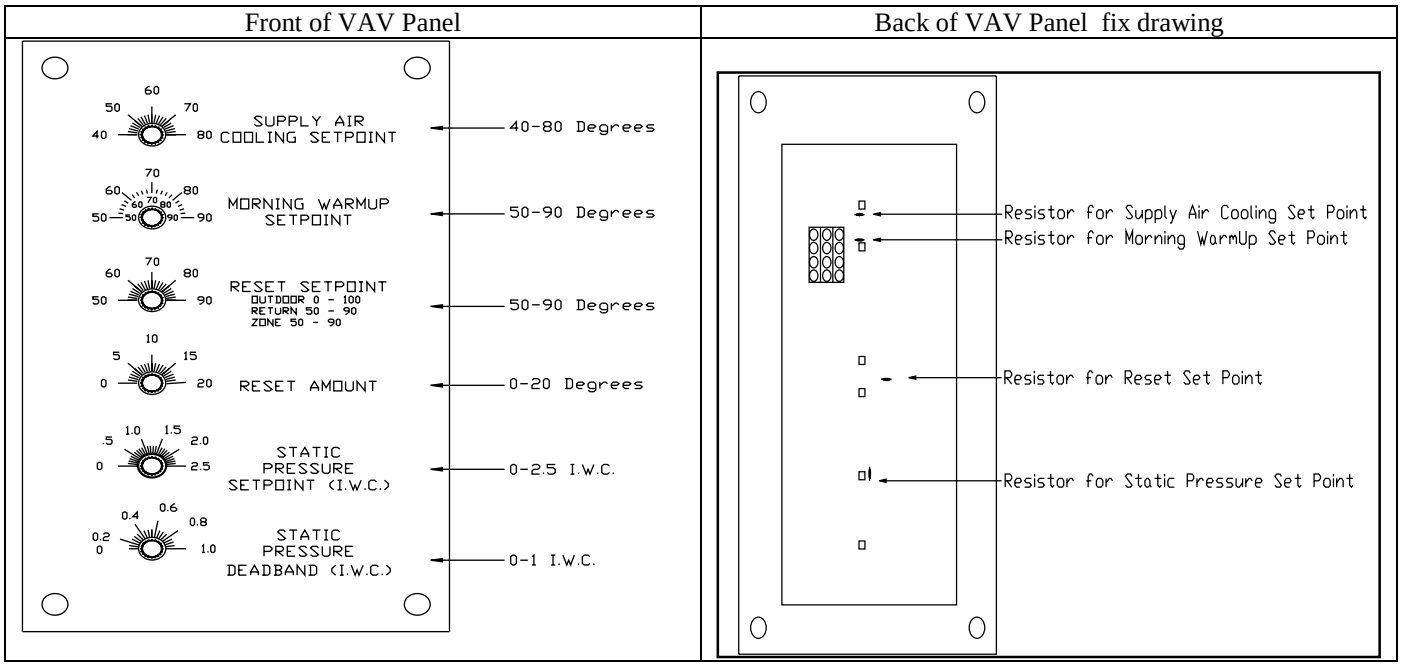
Step 3: Morning Warm-Up Set Point. Measure the resistance between pins 3 and 4. The resistance range across the terminals is approximately 000 to 1000 ohms. At the 70° F Set Point setting, the resistance should be 500 (± 39) ohms.

Step 4: Reset Set Point. Measure the resistance between pins 7 and 8. The resistance range across the terminals is approximately 000 to 1000 ohms. At the 70° F Set Point setting, the resistance should be 500 (± 39) ohms.

Step 5: Reset Amount. Measure the resistance between pins 5 and 6. a. The resistance range across the terminals is approximately 50 to 750 ohms. At the 10° F Set Point setting, the resistance should be 500 (± 39) ohms.

Step 6: Static Pressure Set Point. Measure the resistance between pins 11 and 12. The resistance range across the terminals is approximately 80 to 780 ohms. At the 1.3" w.c. Set Point setting, the resistance should be 490 (± 28) ohms.

Step 7: Static Pressure Deadband. Measure the resistance between pins 9 and 10. The resistance range across the terminals is approximately 000 to 1000 ohms. At the 0.5" w.c. Set Point setting, the resistance should be 500 (± 39) ohms.



Supply Air Cooling Setpoint

Setpoint (Deg F)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
40	1084	2.60
41	1065	2.58
42	1045	2.56
43	1026	2.53
44	1006	2.51
45	987	2.48
46	967	2.46
47	948	2.43
48	928	2.41
49	909	2.38
50	889	2.35
51	870	2.33
52	850	2.30
53	831	2.27
54	812	2.24
55	792	2.21
56	773	2.18
57	753	2.15
58	734	2.12
59	714	2.08
60	695	2.05
61	675	2.02
62	656	1.98
63	636	1.94
64	617	1.91
65	597	1.87
66	578	1.83
67	558	1.79
68	539	1.75
69	519	1.71
70	500	1.67
71	481	1.62
72	461	1.58
73	442	1.53
74	422	1.48
75	403	1.44
76	383	1.39
77	364	1.33
78	344	1.28
79	325	1.23
80	305	1.17

Morning Warmup Setpoint

Setpoint (Deg F)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
50	889	2.35
51	870	2.33
52	850	2.30
53	831	2.27
54	812	2.24
55	792	2.21
56	773	2.18
57	753	2.15
58	734	2.12
59	714	2.08
60	695	2.05
61	675	2.02
62	656	1.98
63	636	1.94
64	617	1.91
65	597	1.87
66	578	1.83
67	558	1.79
68	539	1.75
69	519	1.71
70	500	1.67
71	481	1.62
72	461	1.58
73	442	1.53
74	422	1.48
75	403	1.44
76	383	1.39
77	364	1.33
78	344	1.28
79	325	1.23
80	305	1.17
81	286	1.11
82	266	1.05
83	247	0.99
84	227	0.93
85	208	0.86
86	188	0.79
87	169	0.72
88	150	0.65
89	130	0.58
90	111	0.50

Reset Setpoint

Return/Zone Setpoint (Deg F)	Outdoor Setpoint (Deg F)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
50	0	889	2.35
51	2.5	870	2.33
52	5	850	2.30
53	7.5	831	2.27
54	10	812	2.24
55	12.5	792	2.21
56	15	773	2.18
57	17.5	753	2.15
58	20	734	2.12
59	22.5	714	2.08
60	25	695	2.05
61	27.5	675	2.02
62	30	656	1.98
63	32.5	636	1.94
64	35	617	1.91
65	37.5	597	1.87
66	40	578	1.83
67	42.5	558	1.79
68	45	539	1.75
69	47.5	519	1.71
70	50	500	1.67
71	52.5	481	1.62
72	55	461	1.58
73	57.5	442	1.53
74	60	422	1.48
75	62.5	403	1.44
76	65	383	1.39
77	67.5	364	1.33
78	70	344	1.28
79	72.5	325	1.23
80	75	305	1.17
81	77.5	286	1.11
82	80	266	1.05
83	82.5	247	0.99
84	85	227	0.93
85	87.5	208	0.86
86	90	188	0.79
87	92.5	169	0.72
88	95	150	0.65
89	97.5	130	0.58
90	100	111	0.50

Reset Amount

Setpoint (Deg F)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
0	684	2.03
1	662	1.99
2	641	1.95
3	631	1.93
4	610	1.89
5	590	1.86
6	571	1.82
7	552	1.78
8	533	1.74
9	515	1.70
10	488	1.64
11	471	1.60
12	455	1.56
13	438	1.52
14	414	1.46
15	399	1.43
16	376	1.37
17	362	1.33
18	340	1.27
19	320	1.21
20	299	1.15

Static Pressure Setpoint (I.W.C.)

Setpoint (I.W.C.)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
0	743	2.13
0.1	724	2.10
0.2	704	2.07
0.3	685	2.03
0.4	665	2.00
0.5	646	1.96
0.6	626	1.93
0.7	607	1.89
0.8	587	1.85
0.9	568	1.81
1.0	548	1.77
1.1	529	1.73
1.2	509	1.69
1.3	490	1.64
1.4	470	1.60
1.5	451	1.55
1.6	431	1.51
1.7	412	1.46
1.8	393	1.41
1.9	373	1.36
2.0	354	1.31
2.1	334	1.25
2.2	315	1.20
2.3	295	1.14
2.4	276	1.08
2.5	256	1.02

Static Pressure Deadband (I.W.C.)

Setpoint (I.W.C.)	Nominal Resistance (Ohms)	Nominal Voltage (V DC)
0.2	753	2.15
0.25	707	2.07
0.3	662	1.99
0.35	620	1.91
0.4	590	1.86
0.45	542	1.76
0.5	506	1.68
0.55	463	1.58
0.6	430	1.50
0.65	384	1.39
0.7	347	1.29
0.75	306	1.17
0.8	274	1.07
0.85	225	0.92
0.9	180	0.76
0.95	138	0.61
1.0	103	0.47

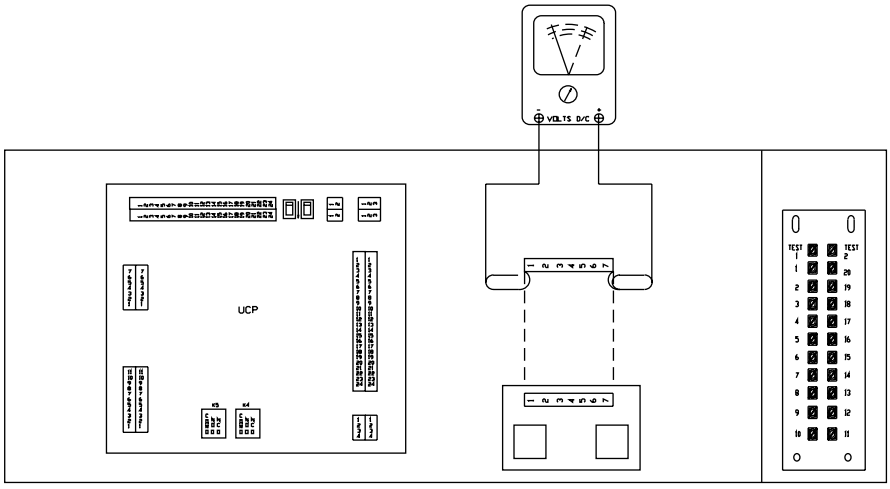
33. Testing The UCP / TCI Interface

This Test will allow you to determine whether a communication problem is a result of a failed UCP, or if an ICS Device / Communication Link problem exists. Complete the Test steps in numerical order, to locate the source of the problem.

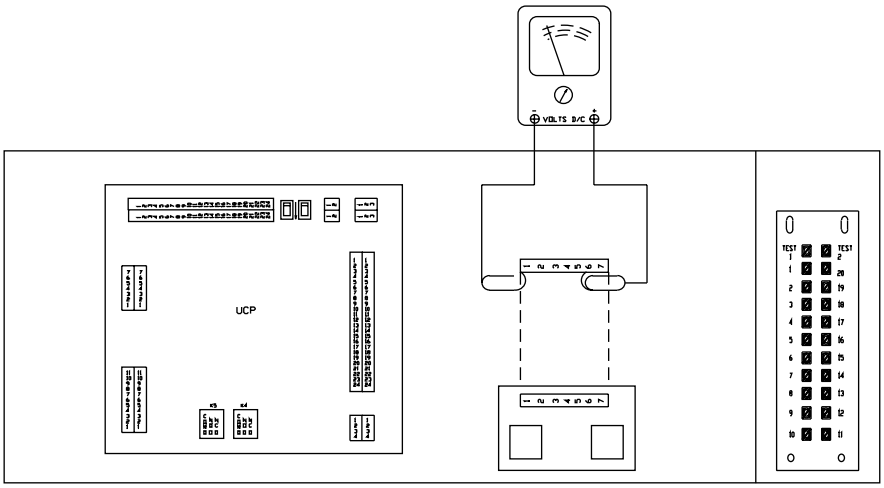
33.1. Test 1: Testing the UCP Output to the TCI

Note: Prior to performing Test 1, Steps 1-6, verify that the cable, which connects the UCP to the TCI, is installed properly. Wire number 43A of the TCI cable should be on the far right hand side, closest to the dip switches, on the TCI connector junction J1. If it is not, disconnect both ends of the cable, and reinstall the cable connectors in reverse.

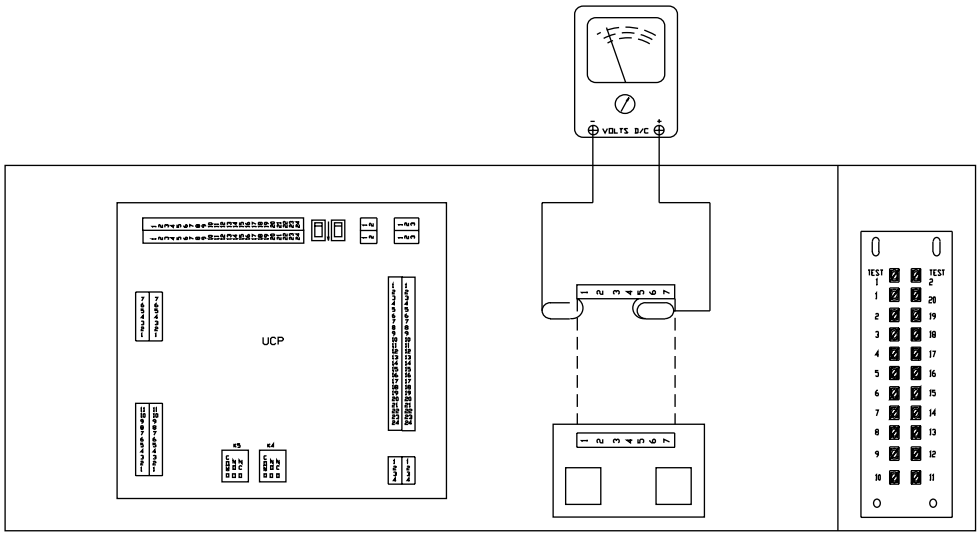
Step 1: Remove plug connector J1 on the TCI. Measure AC voltage at disconnected plug between terminals J1-7, and J1-1. Voltage measured should be approximately 24 VAC. If 24 VAC is not present, test for voltage directly at UCP. Measure voltage at connector junction J6, between terminals J6-1 and J6-7. If 24 VAC is present, replace TCI cable. If 24 VAC is not present, replace UCP.



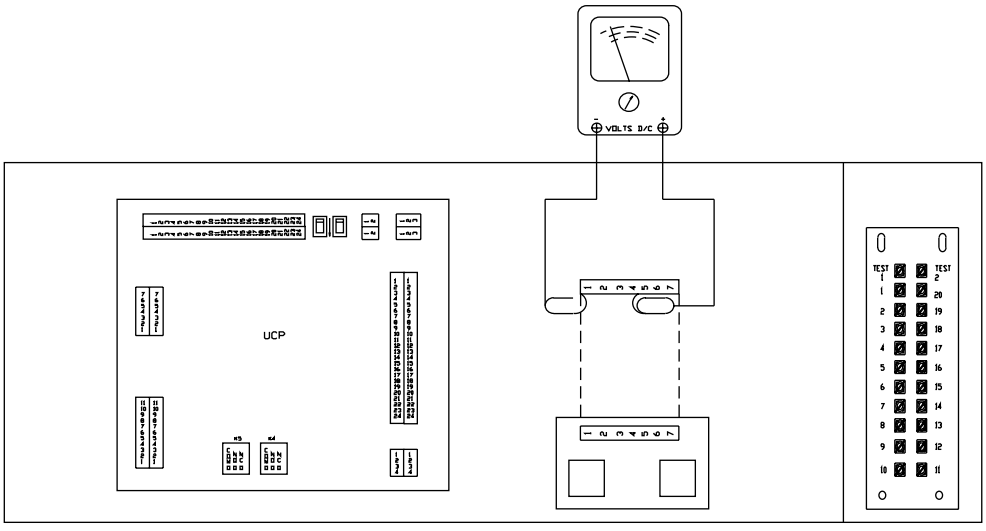
Step 2: With plug connector J1 removed from the TCI. Measure DC voltage at disconnected plug between terminals J1-6, and J1-1. Voltage measured should be approximately 30 VDC. If 30 VDC is not present, test for voltage directly at UCP. Measure voltage at connector junction J6, between terminals J6-2 and J6-7. If 30 VDC is present, replace TCI cable. If 30 VDC is not present, replace UCP.



Step 3: With plug J1 removed from the TCI, measure for DC voltage at the disconnected plug between terminals J1-5 and J1-1. Voltage measured will be either 4.67 +/-0.25 vdc or zero vdc. If voltage measured is zero, then check the voltage between J1-3 and J1-1; voltage measured should be 4.67 vdc.
If the voltage measured at J1-5 and J1-1 is 4.67 vdc , then the voltage at J1-3 and J1-1 should read zero volts. The voltage at J1-5 and J1-3 should always be the inverse of each other.
If no voltage is measured at the plug, then measure the voltage at the UCP board between terminals J6-3 and J6-7, and J6-5 and J6-7. If proper voltage is found at terminals J6-3 or J6-5, replace the cable. If proper voltage is not found, replace the UCP.



Step 4: With plug connector J1 removed from the TCI. Measure DC voltage at disconnected plug between terminals J1-4, and J1-1. Voltage measured should be approximately 5.0 VDC, +/- 0.25 VDC. If 5.0 (+/- 0.25) VDC is not present, test for voltage directly at UCP. measure voltage at connector junction J6, between terminals J6-4 and J6-7. If 5.0 (+/- 0.25) VDC is present, replace TCI cable. If 5.0 (+/- 0.25) VDC is not present, replace UCP



Step 5: With plug connector J1 removed from the TCI. Measure DC voltage at disconnected plug between terminals J1-2, and J1-1. Voltage measured should be approximately 30 VDC. If 30 VDC is not present, test for voltage directly at UCP. Measure voltage at connector junction J6, between terminals J6-6 and J6-7. If 30 VDC is present, replace TCI cable. If 30 VDC is not present, replace UCP. If after completing Test 1, Steps 1 through 6, and no problems are found, an ICS Device / Communication Link problem exists.