Honeywell

MULTIZONE CONTROL SYSTEM

THIS SOLID STATE SYSTEM IS A COMPONENT-FOR-COMPONENT FIELD REPLACEMENT FOR THE RANCO EA3 LODAPT SYSTEM. THE BASIC SYSTEM CONTROLS UP TO 12 ZONE DAMPERS, 3 HEATING STAGES, 3 COOLING STAGES, AN INTEGRATED ECONOMIZER, AND MODULATING VALVES FOR HOT WATER AND CHILLED WATER. OPTIONAL UNITS PROVIDE CONTROL OF UP TO 12 ADDITIONAL ZONES, 5 STAGES OF ELECTRIC HEAT, VARIABLE AIR VOLUME (VAV) SYSTEM FAN, AND A 4TH STAGE OF COOLING.

ALTHOUGH THE FEATURES AND RANCO CROSS REFERENCES FOR ALL COMPONENTS IN THE W7080 MULTIZONE SYSTEM ARE LISTED, ONLY THE SIX COMPONENTS ILLUSTRATED ON THIS COVER PAGE ARE COVERED IN DETAIL IN THIS SPECIFICATION SHEET. THE REMAINING COMPONENTS ARE COVERED IN SEPARATE SPECIFICATION SHEETS.

[ ] W7080A Load Analyzer (Ranco EA3) provides spdt relay switching of 3 stages of heating and 3 stages of cooling, and provides modulating output to economizer and valve motors in response to highest heating and cooling demand from zone thermostats. Analyzer is source of 24 Vdc power for zone thermostats and sensors.

[ ] Modulated dc voltage signal from zone thermostat, modified by zone discharge sensor, provides direct control of associated zone damper.

[ ] Pilot duty spdt relays control heating and cooling stages.

[ ] Economizer uses M745K or M745L motor to provide true first stage of cooling, using outdoor air whenever possible.

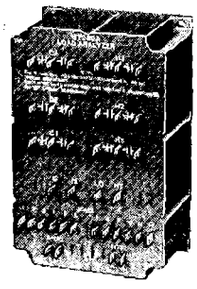
[ ] System switches all stages off when power is interrupted, switches stages on when power is restored. Compressor turn-on time delays must be incorporated for each compressor.

[ ] Quick-connect, 1/4 in. male terminals for reliable, convenient connections.

[ ] Power supplies in W7080A Load Analyzer and W7084A Zone Adder are short-circuit protected. Short circuits of 24 Vdc from load analyzer or zone adder will not damage their power supplies.

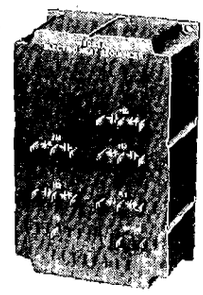
[ ] System is Underwriters Laboratories component recognized and meets guidelines of ASHRAE 90-75 and U.S. Department of Defense.

[ ] Night setback and cooling shutdown for individual or all zones by addition of time clock.

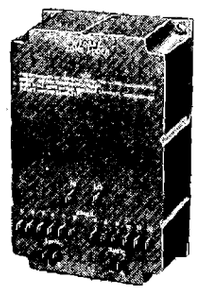


W7080A

W7082A

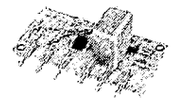


W7083A



W7084A

S7080A



195325B

W7080A, W7082A, W7083A, W7084A, S7080A, 195325B

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Form No.
60-2526

SPECIFICATIONS

IMPORTANT

THE SPECIFICATIONS GIVEN IN THIS PUBLICATION DO NOT INCLUDE NORMAL MANUFACTURING TOLERANCES, THEREFORE, THIS UNIT MAY NOT MATCH THE LISTED SPECIFICATIONS EXACTLY. ALSO, THIS PRODUCT IS TESTED AND CALIBRATED UNDER CLOSELY CONTROLLED CONDITIONS, AND SOME MINOR DIFFERENCES IN PERFORMANCE CAN BE EXPECTED IF THOSE CONDITIONS ARE CHANGED.

MODELS: Ranco components are cross referenced to Honeywell components in Table 1.

TABLE 1 – RANCO-HONEYWELL COMPONENT CROSS REFERENCE

RANCO	HONEYWELL
EA3	W7080A Load Analyzer
EA5-C3002	W7081A Limit Controller
EA5-C6001-35	W7082A Load Integrator
EA5-C0501	W7083A Electric Heat Sequencer
EA5-C9001, EA5-C9002	W7084A Zone Adder
EA5-C9100	195325B 4th Stage Cooling Board
J15	H205A Enthalpy Controller
LA2-1000	M734J Motor
LA2-2000	M745P Motor
LA2-3000	M745K,L Motor
TE1	S7080A Thermostat Simulator
TR1-1001	C7046B Discharge Air Sensor, 6 in. [152 mm]
TR1-1002, TR1-1003	C7100B Averaging Discharge Sensor, 13 in. [330 mm]
TR3, TR4	T7080A Electronic Thermostat (integral sensor)
TR3-3001, TR4-3001	T7080B Transmitter (requires T7047C1082 Remote Sensor)
TR3-5071	T7047C1082 Remote Sensor
TR5-C1001	S963A Remote Minimum Position Potentiometer

SYSTEM COMPONENTS: All components of the W7080 Multizone System are briefly described in this section. For detailed information on C7046B and C7100B Sensors, T7080A,B Thermostats and W7081A Limit Controller, refer to the associated specification sheets (form number in parentheses): C7046B (60-2350), C7100B (60-2539), T7080A,B (60-2527), W7081A (60-2512).

C7046B Temperature Sensor (Ranco TR1-1001) is non-averaging type with 6 in. [152 mm] probe for

(continued on page 3)

ORDERING INFORMATION

WHEN PURCHASING REPLACEMENT AND MODERNIZATION PRODUCTS FROM YOUR TRADELINE WHOLESALER OR YOUR DISTRIBUTOR, REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING NUMBER, OR SPECIFY—

1. **Order number.**
2. **Order additional system components and system accessories separately.**

IF YOU HAVE ADDITIONAL QUESTIONS, NEED FURTHER INFORMATION, OR WOULD LIKE TO COMMENT ON OUR PRODUCTS OR SERVICES, PLEASE WRITE OR PHONE:

1. **YOUR LOCAL HONEYWELL RESIDENTIAL SALES OFFICE (CHECK WHITE PAGES OF YOUR PHONE DIRECTORY).**
2. **RESIDENTIAL GROUP CUSTOMER SERVICE**
   HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH
   MINNEAPOLIS, MINNESOTA 55422 (612)542-7500

   (IN CANADA - HONEYWELL CONTROLS LIMITED, 740 ELLESMERE ROAD, SCARBOROUGH, ONTARIO M1P 2V9) INTERNATIONAL SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD.

use in ducts where space does not permit the longer C7100B.

C7100B Averaging Temperature Sensor (Ranco TR1-1002,-1003) installed in hot deck, cold deck, and mixed-air duct to provide limit signals for limit controller operation. Also installed in discharge air duct of each zone to provide anticipation for the T7080 Thermostat. Sensor probe length is 13 in. [330 mm].

H205A Enthalpy Controller (Ranco J15) senses heat content (temperature and humidity) of outdoor air. Allows use of outdoor air for free cooling.

S7080A Simulator (Ranco TE1) portable unit provides check of system by substituting adjustable dc voltage for zone thermostat and sensor signals.

T7080A,B Solid State, *dual set point* Thermostat (Ranco TR3, TR4) modulates zone dampers and supplies load demand signal to load analyzer. Single voltage ramp design has variable, 3 F–30 F (1.7 C–16.7 C) deadband. For complete T7080A,B information, refer to Form No. 60-2527. T7080A has built-in sensor, T7080B requires remote sensor.

W7080A Load Analyzer (Ranco EA3) provides spdt relay switching of 3 stages of heating and 3 stages of cooling, and provides modulating output to economizer and valve motors in response to highest heating and cooling demand from zone thermostats. Analyzer is source of 24 Vdc power for zone thermostats, sensors, and W7081A Limit Controller.

W7081A Limit Controller (Ranco EA5-C3002) provides economizer control in addition to hot and cold deck selectable limits. Saves energy by maintaining selected temperature limits of hot and cold decks when zone demands are reduced. For complete W7081A information, refer to Form No. 60-2512.

W7082A Integrator Analyzer (Ranco EA5-C6001-35) optional unit controls system blower in VAV systems in response to zone demand. During decreased demand, the W7082A reduces fan output, thus saving energy. (Requires additional blower equipment, not available from Honeywell.)

W7083A Electric Heat Sequencer (replaces Ranco EA5-C0501) optional unit switches up to 5 ON-OFF stages of electric heat, provides stage turn-on delay on power restoration.

W7084A Zone Adder (Ranco EA5-C9001,-C9002) optional unit permits addition of up to 12 zones to system.

195325B 4th Stage Cooling Board (Ranco EA5-C9100) optional unit permits addition of a 4th stage of cooling to system.

ELECTRICAL RATINGS:

Voltage and Frequency—24 Vac, 50/60 Hz.

Maximum Power Consumption—W7080A, 10 VA; W7081A, 0.29 VA; W7082A, 1.5 VA; W7083A, 1.4 VA; W7084A, 3 VA.

Contact Ratings (spdt pilot duty relays)—See Table 2.

TABLE 2 – RELAY CONTACT RATINGS FOR W7080A, W7083A, 195325B

	VOLTAGE Vac	INRUSH VA	RUNNING VA
Contact			
Normally open	24	240	60
	120/240	750	75
Normally closed	24	75	30
	120/240	240	40

NOTE: VA ratings not valid when maximum load is connected to both NORMALLY OPEN and NORMALLY CLOSED contacts.

INPUT SIGNALS: See Table 3.

TABLE 3 – SYSTEM INPUT SIGNALS

TO	SIGNAL (Vdc)	FROM
W7080A	2-22	T7080A,B
W7081A	2-12 (LO) 12-22 (HI)	W7080A, W7084A
W7083A	2-12	W7080A, W7081A
195325B	12-24	W7080A, W7081A
M745K,L	14-17	W7081A
M744D, M745P	4-7	W7081A

OUTPUT SIGNALS: See Table 4.

TABLE 4 – SYSTEM OUTPUT SIGNALS

FROM	SIGNAL (Vdc)	TO
T7080A	2-22	W7080A, W7082A, W7084A, M734
	10.5-13.5	M734
W7080A, W7084A (LO)	2-12	W7081A, W7083A, 195325B
W7080A, W7084A (HI)	12-22	W7081A, W7083A, 195325B
W7081A	14-17 4-7	M745K,L M744D, M745P
W7082A	0 to -10	Inverter (VAV fan motor control)

THERMOSTAT DEADBAND: 3 F to 30 F [1.7 C TO 16.7 C], depending on separation between heat and cool set point levers on T7080A.

STAGE DIFFERENTIALS: See Fig. 1.

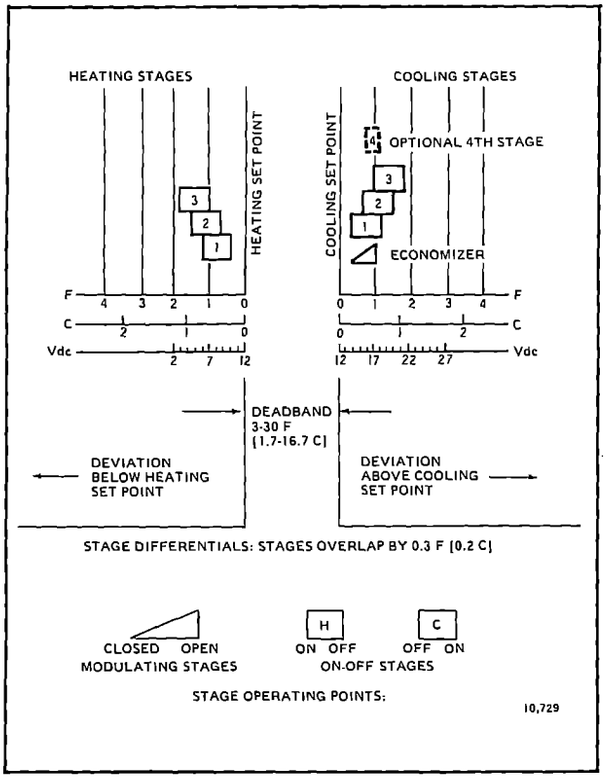


FIG. 1—W7080A STAGE OPERATING POINTS, DIFFERENTIALS AND THROTTLING RANGES.

COLD DECK LOW LIMIT: Limits cold deck temperature to selectable set points of 45 F, 50 F or 55 F [7.2 C, 10 C or 12.8 C].

HOT DECK HIGH LIMIT: Limits hot deck temperature to selectable set points of 90 F, 110 F or 130 F [32.2 C, 43.3 C or 54.4 C].

ECONOMIZER MIXED AIR LIMIT: Economizer motor modulates outdoor air damper to minimum position when mixed air temperature is below set point of W7081A Limit Controller. This set point is selectable to 50 F, 55 F, or 60 F [10 C, 12.8 C or 15.6 C], with a 10 F [5.6 C] fixed throttling range.

INTEGRATOR MINIMUM OUTPUT: Selectable from 0 to minus 8 Vdc (0 to 80 percent fan motor speed).

ZONE DISCHARGE SENSOR AUTHORITY: 20:1 which means a 20 F [11.1 C] rise at the zone discharge sensor produces a voltage change equal to a 1 F [0.5 C] rise at the space thermostat.

AMBIENT TEMPERATURE RISE:

Operating—Minus 40 F to plus 150 F [minus 40 C to plus 65 C].

Shipping—Minus 30 F to plus 150 F [minus 34 C to plus 65 C].

MOUNTING: The W7080A, W7081A, W7082A, W7083A, W7084A units each attach with 4 screws through mounting holes in the base (screws not provided). The 195325B 4th Stage Cooling Board can be mounted on a flat surface by means of the bracket provided. See individual specification sheets for mounting details.

DIMENSIONS: See Fig. 2.

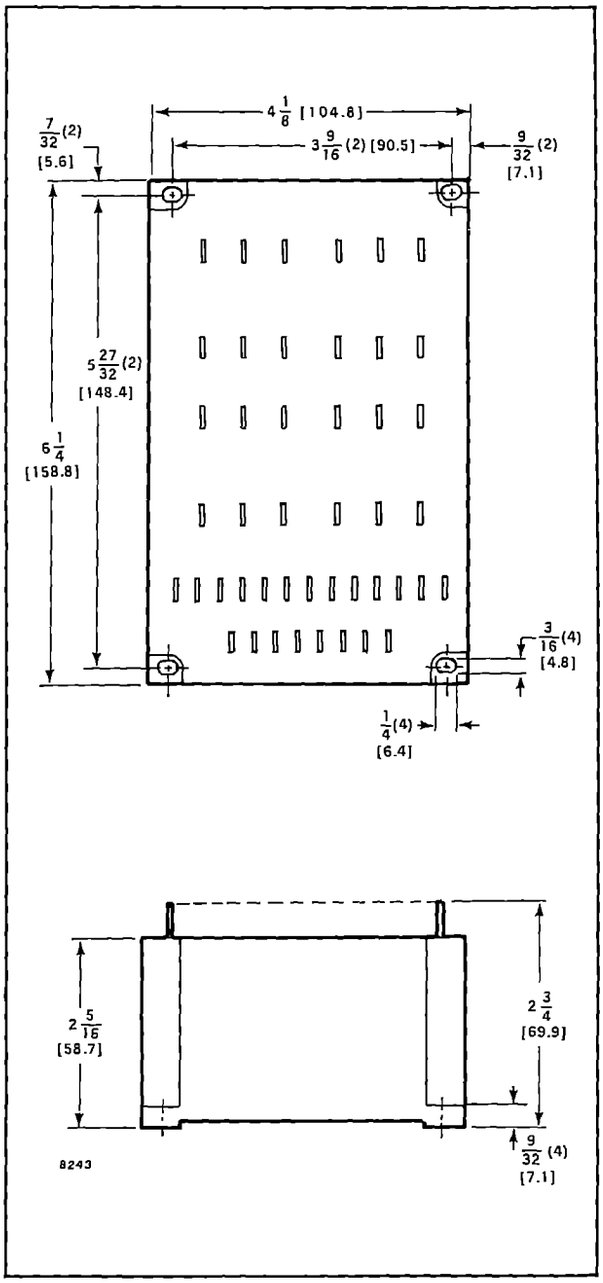


FIG. 2—MOUNTING DIMENSIONS FOR W7080A, W7081A, W7082A, W7083A, W7084A UNITS IN IN. [mm IN BRACKETS].

UNDERWRITERS LABORATORIES INC. COMPONENT RECOGNIZED: File No. SA481, Guide No. SDFY2D (applies to W7080A, W7083A and 195235B units only).

ADDITIONAL SYSTEM COMPONENTS:

C7100B (13 in.) Averaging Temperature Sensor—one sensor in hot deck, one sensor in cold deck and one sensor in mixed air to supply the 3 sensor input signals required by the W7081A Limit Controller. Also, one sensor is installed in each zone discharge duct to supply anticipation to the T7080A Zone Thermostat.

NOTE: Economizer mixed air sensor (C7100B or C7046B) may be mounted in cold deck if it is desired to close the economizer when mechanical cooling is operating. May be used as remote return air sensor when used with T7080B Zone Thermostat.

Where space is insufficient for the 13 in. [304.8 mm] probe of the C7100B, the C7046B single-point temperature sensor, with 6 in. [152.4 mm] probe, may be installed.

195325B 4TH STAGE COOLING BOARD—controls operation of two-stage compressor in the system. Mounts separately from other components on bracket supplied.

H205A ENTHALPY CONTROLLER—Controls economizer operation in response to enthalpy (total heat content) of outdoor air. Signals economizer to close outdoor air damper (or modulate to minimum position) when enthalpy is above H205 set point, and to open damper on a call for cooling when enthalpy is below set point.

NONSPRING RETURN MOTORS—M734J, M744D have a solid state balance relay, operate on 24 Vac, 50/60 Hz.
- —M734J produces 35 lb.-in. [4 N.m] torque over 160 degree stroke. Modulates zone discharge damper in response to 10.5 to 13.5 Vdc signal from zone thermostat.
- —M744D produces 150 lb.-in. [17 N.m] torque with 90 or 160 degree non-adjustable stroke. Modulates hot water or chilled water valves in response to 4-7 Vdc signal from W7081A Limit Controller. Requires separate power supply.

SPRING RETURN MOTORS—M745K,L,P motors have solid state balance relay, require separate 24 Vac, 50/60 Hz power supplies.
- —M745K or M745L motor operates economizer damper in response to modulating signal of 14-17 Vdc signal from W7081A.
- —M745P modulates hot water or chilled water valves in response to 4-7 Vdc signal from W7081A. Requires 4074EAC Resistor Kit (order separately).

TIME DELAY RELAYS—To improve stability of the system and minimize energy use, 5 minute turn-on time delays should be added to all heating and cooling loads. These relays should be wired between cooling and heating stage switching outputs (of W7080A Load Analyzer W7083A Electric Heat Sequencer and 195325B 4th Stage Cooling Board) and the heating and cooling equipment.

SYSTEM ACCESSORIES: Transformers
- AT20—20 VA
- AT72—40 VA
- AT88—75 VA

IMPORTANT

The transformer used to power the W7080A Load Analyzer can also be used to power stage relays in the W7083A Electric Heat Sequencer (if used). The M744 and M745 motors each require a separate transformer to insure electrical isolation. NEVER GROUND THE SECONDARY OF ANY TRANSFORMER USED TO POWER ANY SYSTEM COMPONENT.

Q209A MINIMUM POSITION POTENTIOMETER—mounts directly on M734, M744, M745 motors; controls minimum open postion of damper.

Q605 DAMPER LINKAGE—connects motor to damper; includes motor crank arm.

Q618 VALVE LINKAGE—connects Modutrol motor to modulating hot or chilled water valves.

S963A REMOTE MINIMUM POSITION POTENTIOMETER—provides remote manual control of minimum open position of economizer motor.

MODULATING WATER VALVES—use appropriate valve with Super Modutrol motor and Q618 Linkage to provide proportional control of hot or chilled water flow.

COMPRESSOR AMBIENT LOCKOUT THERMOSTAT—use with direct expansion cooling system to prevent compressor operation when outdoor air temperature falls below economizer set point.
- —T675A Temperature Controller.
- —L6018C Temperature Controller.

ECONOMIZER CHANGEOVER CONTROLLER—holds economizer at minimum position whenever outdoor air temperature or enthalpy is above controller set point.
- —H205A1038 or H205A1046 Enthalpy Controller.
- —T675A Temperature Controller.
- —L6081C Temperature Controller.

NIGHT SETBACK—provides heating setback of 6 F to 22 F [3.3 C to 12.2 C]. Requires connection of a 1 percent resistor and S6005 Time Clock contact connected between terminals 1 and 5 of T7080A or T7080B Thermostat.
- —802139BAAC Resistor (10.0 K Ω) provides 6 F [3.3 C] setback.
- —802139EJHB Resistor (4.87 K Ω) provides 10 F [5.6 C] setback.
- —802139CGHB Resistor (2.67 K Ω) provides 14 F [7.8 C] setback.
- —802139BEDB Resistor (1.43 K Ω) provides 18 F [10 C] setback.
- —802139GJBA Resistor (681 ohms) provides 22 F [12.2 C] setback.

MORNING WARMUP THERMOSTAT—holds outdoor air damper fully closed following night setback and until return air temperature exceeds selected set point.
—T675A Temperature Controller.
—L6018C Temperature Controller.
—T675A Temperature Controller.

S43 SAIL SWITCH—activates circuits when minimum airflow is maintained in duct. Deactivates circuit below minimum airflow.

191444B METAL COVER—designed to protect the W7080A, W7081A, W7082A, W7083A and W7084A components when mounted on open surface. Overall dimensions of units with metal cover in place: 6-5/8 in. long, 4-5/16 in. wide, 4-13/16 in. high [168.3 x 109.5 x 122.2 mm].

INSTALLATION

WHEN INSTALLING THIS PRODUCT . . .

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

CAUTION

1. Disconnect power supply before connecting wiring to prevent electrical shock and equipment damage.

IMPORTANT

Each M744 and M745 motor must have its own transformer for isolation. The transformer used to power the W7080A can also be used to power load relays only, providing the VA rating of the transformer is not exceeded. NEVER GROUND THE SECONDARY OF ANY TRANSFORMER USED TO POWER ANY SYSTEM COMPONENT.

LOCATION AND MOUNTING

The W7080A, W7082A, W7083A and W7084A units can be located on any flat wall or control panel where they are not exposed to the weather and do not exceed ambient temperature ratings. These units are each mounted with 4 screws through the mounting holes in the base.

The 195325B 4th Stage Cooling Board, if used, should be located near the W7080A and mounted on the bracket supplied.

If the optional metal cover (Part No. 191444B) is used, allow at least 4-3/4 in. [120.7 mm] clearance above the W7080 units to allow removal of the cover for checkout or service.

Mount other system components according to installation instructions supplied with the individual units.

WIRING

Disconnect power supply before connecting wiring to avoid electrical shock or equipment damage. All wiring must comply with local codes and ordinances.

When replacing Ranco units with the Honeywell equivalent units, care should be taken to insure proper replacement wiring. The equivalent Ranco and Honeywell terminals have identical designations except in the W7080A, W7081A and T7080 units. A cross reference of terminal designations for these 3 units is given in Table 5.

TABLE 5 – DIFFERENCES IN HONEYWELL TO RANCO TERMINAL DESIGNATIONS FOR W7080A, W7081A AND T7080

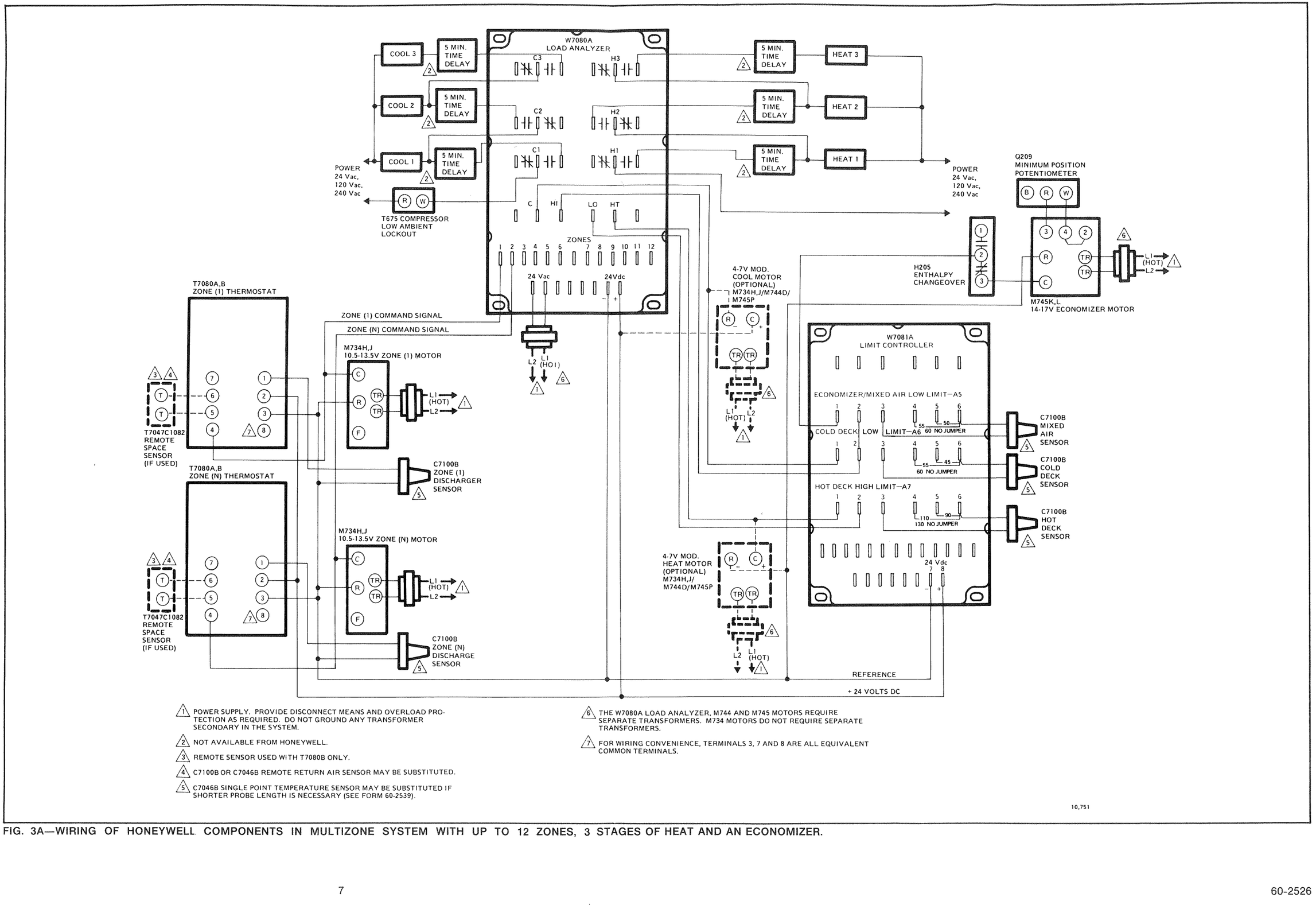
HONEYWELL	RANCO
W7080A Load Analyzer Terminal HT.	EA3 Load Analyzer White wire on right side of unit.
Terminal C.	A6 Limit, terminal 1.
W7081A Limit Controller has 3 sets of signal terminals numbered 1–6 and a pair of power terminals designated 7 and 8.	A5, A6 and A7 Limits are separate units, each with a set of terminals numbered 1–8. The 1–6 terminals are for signal input, terminals 7 and 8 for 24 Vdc power on each unit.
T7080 Thermostat—remote sensor connects to terminals 5 and 6.	TR3 and TR4 Thermostats—remote sensor connects to terminals 3 and 5.

Connections to Honeywell components in a multizone system are shown in Fig. 3A.

Wiring of multizone system with night setback is shown in Fig. 3B.

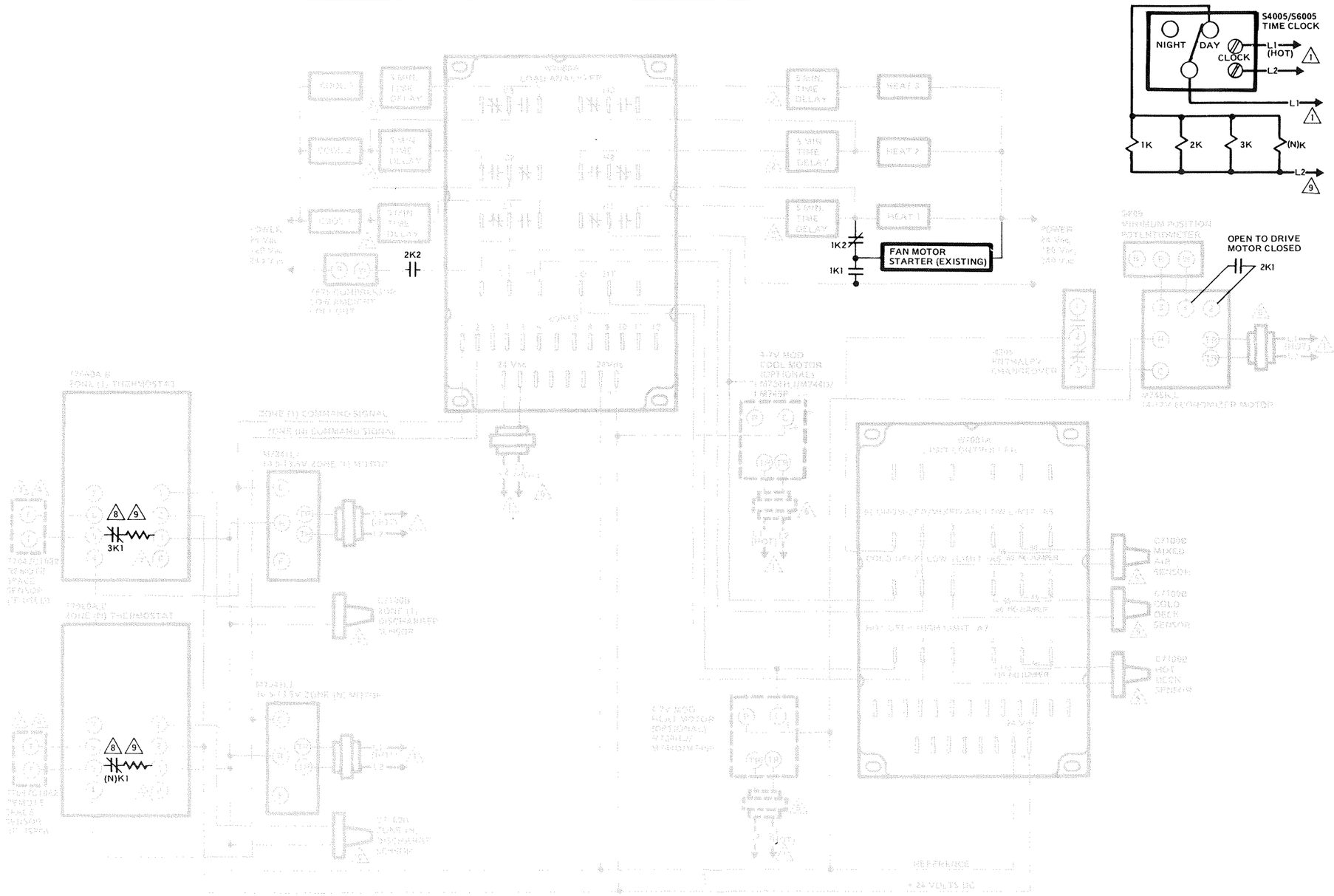
BLOWER MOTOR SPEED—VAV SYSTEM

An adjustment, located on the side of the W7082A case, provides for setting minimum blower motor speed. In the fully clockwise position, this potentiometer gives 0 V (0 percent speed). In the fully counterclockwise position, the minimum output voltage is minus 8 V (80 percent speed). To set the minimum speed, disconnect all zone inputs and connect a dc voltmeter with a 0 to 10 V range to the Ref and Load terminals. Connect positive meter lead to Ref terminal, negative meter lead to Load terminal. Adjust the control until the voltmeter reads the desired voltage for minimum speed.



1. POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. DO NOT GROUND ANY TRANSFORMER SECONDARY IN THE SYSTEM.
2. NOT AVAILABLE FROM HONEYWELL.
3. REMOTE SENSOR USED WITH T7080B ONLY.
4. C7100B OR C7046B REMOTE RETURN AIR SENSOR MAY BE SUBSTITUTED.
5. C7046B SINGLE POINT TEMPERATURE SENSOR MAY BE SUBSTITUTED IF SHORTER PROBE LENGTH IS NECESSARY (SEE FORM 60-2539).
6. THE W7080A LOAD ANALYZER, M744 AND M745 MOTORS REQUIRE SEPARATE TRANSFORMERS. M734 MOTORS DO NOT REQUIRE SEPARATE TRANSFORMERS.
7. FOR WIRING CONVENIENCE, TERMINALS 3, 7 AND 8 ARE ALL EQUIVALENT COMMON TERMINALS.

FIG. 3A—WIRING OF HONEYWELL COMPONENTS IN MULTIZONE SYSTEM WITH UP TO 12 ZONES, 3 STAGES OF HEAT AND AN ECONOMIZER.



8 SETBACK RESISTORS SHOULD BE 1/8 W, 1%, METAL FILM TYPE. (10.0K FOR 6 F; 4.87K FOR 10 F; 2.67K FOR 14 F; 1.43K for 18 F; 681 OHMS FOR 22 F).

9 LOW POWER SWITCHING RELAY CONTACTS, SUCH AS R4222N REQUIRED TO SWITCH NIGHT SETBACK RESISTOR. A LOW VOLTAGE COIL RELAY (R8222N) MAY BE USED WITH 24 Vac TRANSFORMER IF DESIRED.

10,752

FIG. 3B—WIRING OF HONEYWELL COMPONENTS IN MULTIZONE SYSTEM WITH WIRING FOR NIGHT SET- BACK SHOWN IN DARK LINES.

OPERATION

T7080A,B THERMOSTAT

A solid state thermostat (T7080A or T7080B) is mounted in each zone of a multizone system to provide zone temperature control. The thermostat provides a signal voltage that modulates the zone damper motor, and also provides zone demand input to the W7080A Load Analyzer.

On a call for cooling (zone temperature rise), the zone thermostat output voltage rises at the rate of 5 V per degree F (9 V per degree C) from 12 V to a high of 22 Vdc.

On a call for heating (zone temperature fall), thermostat output voltage drops 5 V per degree F (9 V per degree C) from 12 V to a low of 2 Vdc. Within the deadband between heating and cooling set points, the thermostat output voltage is constant at 12 Vdc.

Anticipation in the zone is provided by a C7100B or C7046B sensor installed in the zone discharge duct and connected to the zone thermostat.

W7080A LOAD ANALYZER

The analyzer selects only the highest and lowest voltage signals from the zone thermostats (highest signal from zone of greatest cooling demand, lowest signal from zone of greatest heating demand). These two voltage signals are sent to the W7081A Limit Controller where they are modified in response to inputs from the C7100B or C7046B Sensors in the hot and cold decks. The modified signals are returned to the analyzer as HT (heating) and C (cooling) inputs that control heating and cooling stages. The voltages at which heating and cooling stages are switched on and off are shown in Table 6. The analyzer operates from a 24 Vac source and provides 24 Vdc to the zone thermostats, W7081A and W7083A units.

ECONOMIZER

Economizer operation is initiated on a call for cooling when the high signal voltage (12 to 22 Vdc) from the W7080A passes through the W7081A and H205 Enthalpy Controller to the economizer motor. The economizer motor will begin to open the damper when the cooling demand signal reaches 14 V, provided mixed air temperature is above the W7081A set point, and the H205 contacts are closed. When the demand signal reaches 17 V, this damper will be fully open. If the economizer does not satisfy the cooling demand, the signal will continue to rise until mechanical cooling comes on at 18.5 V.

TABLE 6 – LOAD ANALYZER STAGE SWITCHING VOLTAGES

STAGE	SWITCHING (Vdc)	VOLTAGE
	ON	OFF
Heat 1	6.0	10.0
Heat 2	4.5	8.5
Heat 3	3.0	7.0
Economizer	17.0	14.0 (fully open at 17 V)
Cool 1	18.5	13.5
Cool 2	20.0	16.0
Cool 3	21.5	17.5

ZONE DISCHARGE DUCT SENSOR

A C7100B or C7046B Sensor is installed in each zone discharge duct to anticipate changes in zone temperature based on discharge air temperature to eliminate droop and overshooting. The sensor has an authority of 20:1, meaning that a 20 degree change in temperature at the sensor causes the same output voltage change as a 1 degree change at the zone thermostat.

DAMPER MOTOR

A 24 Vac damper motor is installed in each zone and linked to the damper(s) in the zone discharge air duct to control air delivered to the zone from both the hot and cold decks. The motor control circuit operates over a range of 10.5 to 13.5 Vdc, supplied by the zone thermostat. At 10.5 V (call for maxmimum heating), the motor fully opens to the hot deck and fully closes to the cold deck, providing maximum zone heating. At 12 V (zone temperature at set point), the motor opens damper(s) to midpoint (or to minimum position). At 13.5 V (call for maximum cooling), the motor fully opens to the cold deck and fully closes to the hot deck for maximum cooling.

W7081A LIMIT CONTROLLER

The W7081A Limit Controller limits the maximum or minimum temperatures of the hot and cold decks and of the mixed air by supplying modified demand signals to the W7080A Analyzer and to the economizer. The controller contains 3 printed circuit boards designated Economizer/Mixed Air Low Limit A5, Cold Deck Low Limit A6, and Hot Deck High Limit A7. These boards have jumper selectable set points for temperature limits, using sensors in the decks for temperature input signals.

ECONOMIZER LIMIT

The input to the economizer board is the HI zone demand voltage from the W7080A Analyzer. This board modifies the signal based on deviation of mixed air temperature from the limit set point. This modified signal will decrease from 17 V down to 14 V over a 10 F [5.6 C] throttling range as mixed air temperature drops. Set point is at midpoint of throttling range (15.5 V). Mixed air set point selections on the W7081A Limit Controller are 50 F, 55 F, and 60 F [10 C, 13 C, and 16 C] (Fig. 4).

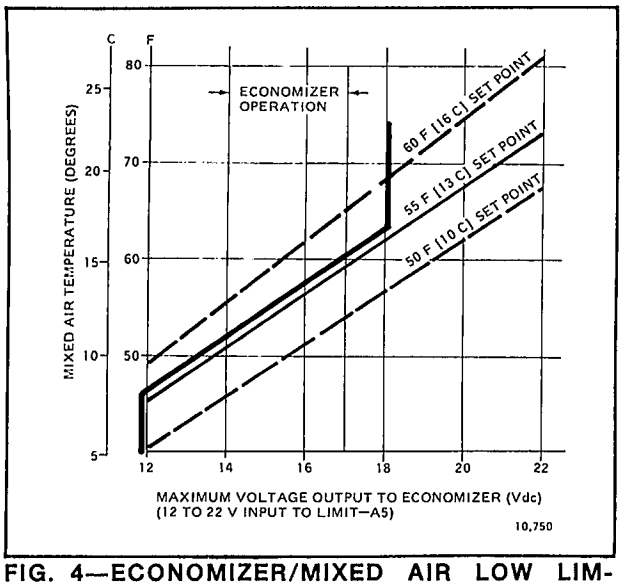


FIG. 4—ECONOMIZER/MIXED AIR LOW LIMIT—MAXIMUM VOLTAGE OUTPUT.

NOTE: To prevent economizer operation from introducing cool air to the hot deck when there is a call for heating, an economizer lockout relay may be installed. The relay coil is wired in parallel with the first stage of heating with the normally closed contacts controlling the output from terminal 1 of the W7081A Economizer/Mixed Air Low Limit A5.

COLD DECK LIMIT

The input to the cold deck board is also the HI signal voltage from the load analyzer. This limit adjusts the voltage downward as the cold deck temperature (measured by the cold deck sensor) approaches the limit set point. The voltage decreases 0.6 V per degree F drop in cold deck temperature (1 V per degree C). At cold deck limit set point, the voltage will be limited to 13.5 V (turn-off point of first stage of cooling). Cold deck limit set point selections on the W7081A are 45 F, 50 F and 55 F [7 C, 10 C and 13 C] (Fig. 3B). The cold deck output signal is fed to input terminal C of the W7080A to control cold deck cooling stages.

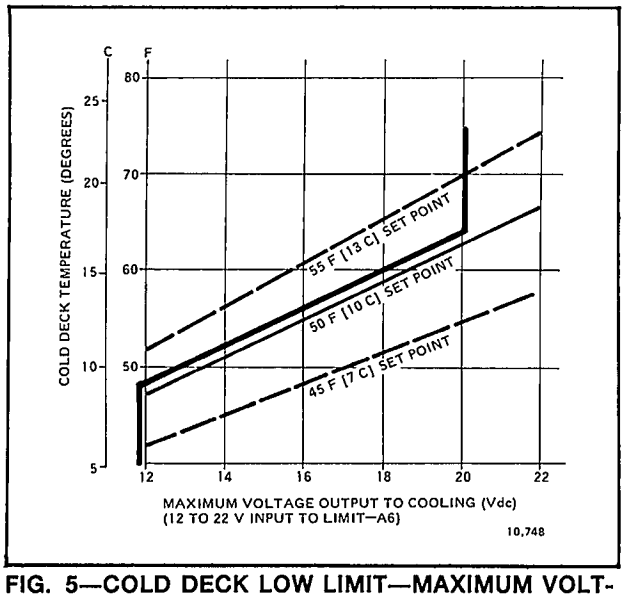


FIG. 5—COLD DECK LOW LIMIT—MAXIMUM VOLTAGE OUTPUT.

HOT DECK LIMIT

The input to the hot deck board is the LO signal from the load analyzer. This limit adjusts the voltage upward as the hot deck temperature (measured by the hot deck sensor) approaches the limit set point. The voltage increases 0.4 V per degree F [0.7 V per degree C] as the hot deck temperature increases. At hot deck limit set point, the voltage is 6 V minimum (first stage heat on). Hot deck limit selections are 90 F, 110 F and 130 F [32 C, 43 C and 54 C]. The hot deck output signal is fed to the HT input terminal on the W7080A to control hot deck heating stages (Fig. 6).

NOTE: If the cold deck limit is not used, jumper the HI terminal to the C terminal on the W7080A. If the hot deck high limit is not used, jumper the LO terminal to the HT terminal on the W7080A. If the mixed air limit is not used, connect the economizer motor (through the H205 Enthalpy Controller) to the HI terminal on the W7080A.

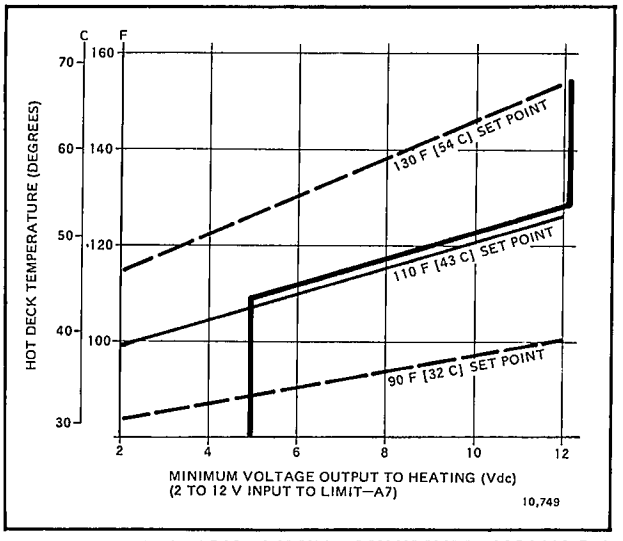


FIG. 6—HOT DECK LIMIT—MINIMUM VOLTAGE OUTPUT.

MODULATING HEAT AND COOL OUTPUTS

A motorized valve with a 4 to 7 Vdc motor control input may be used in the W7080 system to provide modulated heating and cooling.

MODULATED HEATING

For modulated heating, the motor is connected to the (—) 24 VDC terminal and HT terminal on the W7080A. This arrangement provides hot deck limit action. If hot deck limit action is not desired, the motor is connected to the LO terminal rather than the HT terminal on the W7080A. The motor and valve must be fully open at 4 Vdc and fully closed at 7 Vdc.

MODULATED COOLING

For modulated cooling, the motor is connected to the (+) 24 VDC terminal and the C terminal on the W7080A. This provides cold deck limit action. If cold deck limit action is not desired, the motor is connected to the HI terminal rather than the C terminal on the W7080A. The motor is controlled by the difference in the voltage between C (+12 to +22 Vdc) and the +24 Vdc supply. The difference decreases on a call for

cooling from 12 V down to 2 V. The motor and valve must be fully open at 4 V and fully closed at 7 V.

4TH STAGE COOLING

A 4th stage of cooling that turns on at 18 V and off at 16.5 V may be added to the system where two-speed compressors are used. The 4th stage of cooling cycles on before the first stage to insure start of two-speed compressor at high speed. If space demand does not require a high speed compressor, the 4th Stage Cooling Board will cycle off to allow low speed operation. The input for the 4th Stage Cooling Board is from the C terminal of the W7080A if cold deck limit action is desired, or to the HI terminal if no limit action is desired.

W7082A LOAD INTEGRATOR

The load integrator provides an output signal that can be used to control the volume of air delivered to the zones of a multizone VAV (variable air volume) system. Control is in response to the average heating or cooling demands of up to 12 zones. When average zone demand decreases, fan speed will also decrease, minimizing drafts and conserving energy.

Up to 12 zone thermostats—each with a range of 2-22 Vdc—can be connected to the W7082A. The authority of any zone can be increased by connecting the thermostat in that zone to two or more integrator inputs. Unused inputs automatically assume a 12 V level (no demand for heating or cooling).

Solid state circuits in the W7082A integrate all zone inputs and produce an output voltage of 0 to minus 10 Vdc that is directly proportional to average deviation from the set point voltage of 12 V (Fig. 7).

The W7082A output voltage provides the input for an inverter type blower motor speed control (not available from Honeywell). At 0 V, the blower motor will stop. At minus 10 V, the motor will run at full speed. A field adjustment is provided on the W7082A to set the minimum output voltage (minimum blower speed). This voltage is adjustable from 0 to minus 8 Vdc (0 to 80 percent of full blower speed) and is factory-set at minus 4.5 Vdc (45 percent of full blower speed). Blower speed should never be reduced below the level required for minimum building ventilation requirements. The W7082A operates from a 24 Vac power source.

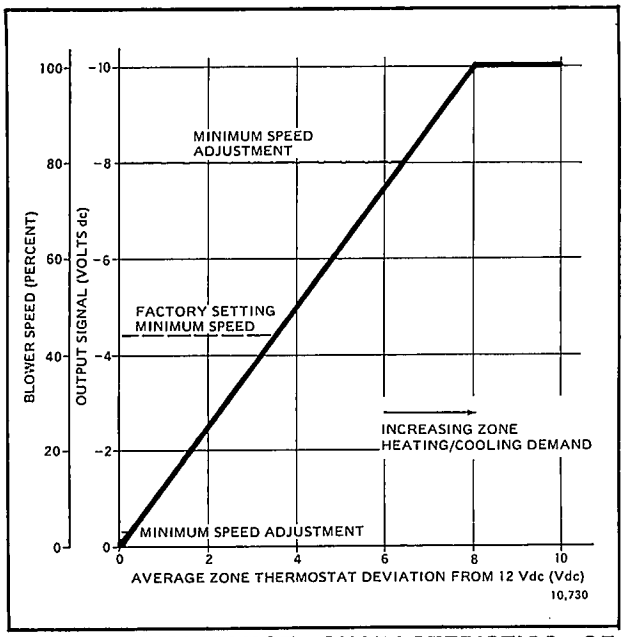


FIG. 7—PERFORMANCE CHARACTERISTICS OF W7082A INTEGRATOR.

W7083A ELECTRIC HEAT SEQUENCER

The W7083A Electric Heat Sequencer provides sequential switching of 5 stages of electric heat in response to heating demand in the zones of a multizone system. The sequencer operates on 24 Vdc, obtained from the W7080A Load Analyzer. The W7083A is used in lieu of the 3 heating stages of the W7080A when electric heat is used.

When power to the sequencer is interrupted, all heat stages are turned off. When power is restored, stages are restored in sequence H1, H2, H3, H4, H5. A period of approximately 60 seconds is required to sequence all stages on.

When the signal input to the sequencer is interrupted, stages are turned off in the sequence H2, H1, H3, H4 and H5. A period of approximately 15 seconds is required to sequence all stages off.

Input to the sequencer is the limited LO signal output from the W7081A Limit Controller. This signal is determined by zone demand, modified by the temperature in the hot deck and based on the set point selected in the W7081A Limit Controller. Voltages at which heat relays are switched on and off are shown in Table 7. The relationship of switching of the 5 heat stages is shown in Fig. 8.

TABLE 7 – HEAT STAGE RELAY SWITCHING VOLTAGES

	SWITCHING (Vdc)	VOLTAGE
HEAT STAGE	ON	OFF
1	5.5	7.5
2	4.8	5.8
3	4.0	9.0
4	3.3	9.8
5	2.5	10.5

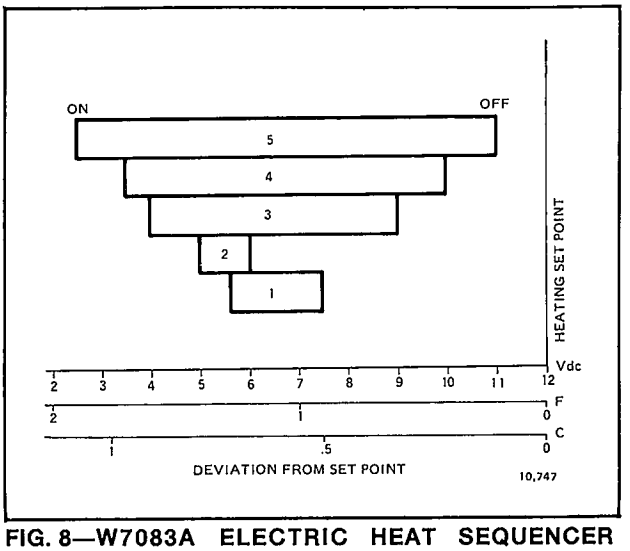


FIG. 8—W7083A ELECTRIC HEAT SEQUENCER STAGE ON-OFF AND OVERLAP.

W7084A ZONE ADDER

The W7084A Zone Adder is used in multizone systems with more than 12 zones. The adder monitors the 2 to 22 Vdc signals from zones 13 through 24 and supplies the highest and lowest of these signals to the W7080A Load Analyzer.

The W7084A operates from a 24 Vac power source and supplies regulated 24 Vdc for up to 12 zone thermostats.

195325B 4TH STAGE COOLING BOARD

The 4th Stage Cooling Board operates from the limited HI signal produced in the W7081A Limit Controller. The 4th stage of cooling is energized at 18 V and is turned off at 16.5 V. This 4th stage overlaps some other cooling stages (Fig. 1).

CHECKOUT

After completing installation, verify system operation by performing the Multizone System Checkout below. If a fault is discovered, use the Component Checkout that follows to locate the faulty component(s). For terminal locations, see Fig. 3A or 3B.

MULTIZONE SYSTEM CHECKOUT

DC POWER CHECK

1. With 24 Vac connected to the 24 VAC terminals of the W7080A, W7082A and (if present) the W7084A, check for 24 Vdc at the 24 VDC terminals on the W7080A, W7081A, W7082A, W7083A, and (if present) the W7084A.

THERMOSTAT OUTPUT

1. Check for 24 Vdc between terminals 2 (+) and 8 (−) on each T7080 Zone Thermostat.
2. On each T7080, measure the dc output voltage between terminal 4 (output) and 3 (COM). Check that the same voltages are also present between the -24 VDC terminal and the corresponding zone input terminals on the W7080A (and on the W7084A Zone Adder, if installed).

SYSTEM CONTROL VOLTAGES

3. On W7081A Limit Controller, check that voltage between terminal 7 and terminal 1 (on mixed air cold deck limit) is 12 V or greater.

NOTE: If these voltages are not within these limits, the fault is either in the A5, A6 limit boards, or in the wiring between W7080A and W7081A.

4. Check that voltage between terminal 7 and terminal 1 (A7 hot deck limit only) is less than 12 V and greater than the voltage between terminals 2 and 7.

NOTE: If voltage is not within these limits, the fault is either in the A7 limit board or in the wiring between W7080A and W7081A.

5. If W7084A Zone Adder is installed, check that voltage between HI and (—) terminals is the same on both W7080A and W7084A (about 0.6 V lower than highest zone input voltage to the W7080A).
6. Also check that voltage between LO and (—) terminals is the same on both W7080A and W7084A (about 0.6 V higher than the lowest zone input voltage to the W7080A).

COMPONENT CHECKOUT

STEP	ACTION	VERIFICATION
	ALL SENSORS	
1.	Disconnect one lead from each C7100B and C7046B sensor and check sensor resistance.	Resistance depends on temperature as follows: 29.6K at 68 F [20 C] nominal 22.8K at 77 F [25 C] nominal 17.6K at 80 F [27 C] nominal
	T7080A,B THERMOSTATS	
1.	Connect terminal 3 on thermostat to (−) terminal on W7080A or W7082A. Connect terminal 2 on thermostat to (+) on W7080A or W7082A.	—
2.	Check dc voltage between terminals 2 and 3 on thermostat.	Voltage should be 24 V.
3.	Disconnect zone duct sensor from thermostat.	—
4.	Check dc voltage between terminals 1 and 3.	Voltage should be 2.8 V.
5.	Check dc voltage between terminals 6 and 3.	Voltage should be 12 V.
6.	Disconnect remote sensor from terminals 5 and 6 (T7080B only).	—
7.	Check dc voltage between terminals 6 and 3 on T7080B.	Voltage should be 14.7 V.
8.	Reconnect duct sensor (terminals 1 and 3), and remote sensor (terminals 5 and 6) on T7080A,B.	Voltage should be approx. 12 V.

continued on page 13

continued from page 12

COMPONENT CHECKOUT

STEP	ACTION	VERIFICATION
	T7080A,B THERMOSTATS	
9.	Connect dc voltmeter to terminals 4 (+) and 3 (–).	–
10.	Move heat lever to extreme left, cool lever to extreme right.	Voltage should be 12 V (room temperature 57 F to 85 F [14 C to 29 C].
11.	Move cool lever below room temperature.	Voltage should increase from 12 to 22 V.
12.	Move cool lever above room temperature.	Voltage should decrease to 12 V.
13.	Move heat lever to right until voltage is between 4 and 10 V.	(Voltage reference for steps 14 and 15).
14.	Disconnect duct sensor from terminals 1 and 3.	Voltage should fall below reference voltage in step 13.
15.	Connect a jumper between terminals 1 and 3.	Voltage should rise above reference voltage in step 13.
	W7080A LOAD ANALYZER	
1.	Check voltage at 24 Vac terminals.	20 to 30 Vac.
2.	Check voltage between 24 Vdc (+) and (–).	24 Vdc.
3.	Disconnect thermostats, W7081A and any other components from the W7080A. On W7080A, jumper HI to C, jumper LO to HT.	–
4.	Connect S7080A Simulator to W7080A with black lead to (–), red lead to (+), green lead to (1).	–
5.	Connect dc voltmeter with positive lead to green lead of simulator, negative lead to (–). With voltmeter range set at 50 Vdc, monitor simulator output voltage.	–
6.	Set simulator for 12 V reading.	All heat and cool stages off.
7.	Turn simulator knob *slowly* clockwise until voltage reads 22 V.	Cool stages turn on in 1, 2, 3 sequence.
8.	Turn simulator knob *slowly* counterclockwise until voltage reads 12 V.	Cool stages turn off in 3, 2, 1 sequence.
9.	Turn simulator knob *slowly* counterclockwise until voltage reads 2 V.	Heat stages turn on in 1, 2, 3 sequence.
10.	Turn simulator knob *slowly* clockwise until voltage reads 12 V.	Heat stages turn off in 3, 2, 1 sequence.
11.	Disconnect simulator green lead from terminal 1 and connect to next input terminal in order.	–
12.	Repeat steps 6 through 11 for zone inputs 2 through 12 under W7080A.	Same as steps 6-11 under W7080A.
	W7081A LIMIT CONTROLLER	
1.	Connect terminal 7 on W7081A to (–) 24 Vdc terminal on W7080A and connect terminal 8 on W7081A to (+) 24 Vdc terminal on W7080A. Apply 24 Vac power to W7080A.	–
2.	Check voltage between terminals 7 and 8 on W7081A.	Voltage should be 24 Vdc.
	W7081A ECONOMIZER/MIXED AIR LOW LIMIT (A5)	
1.	Connect S7080A Simulator to W7081A with black clip to terminal 7, red clip to terminal 8, and green clip to terminal 2 on A5. Connect jumpers between terminals 3 and 6 on A5 (simulator hot sensor).	–
2.	Connect dc voltmeter to W7081A, terminals 1 (+) and 6 (–). Set voltmeter to 50 Vdc range.	–

continued on page 14

continued from page 13

COMPONENT CHECKOUT

STEP	ACTION	VERIFICATION
	W7081A ECONOMIZER/MIXED AIR LOW LIMIT (A5)	
3.	Vary S7080A knob between 12 and 22 V positions and note voltmeter reading.	Voltage should vary with position of S7080A knob and be the same as simulator.
4.	Remove jumpers from terminals 3 and 6. Remove sensors from terminals 3 and 6 (simulates low temperature).	Voltage between terminals 3 and 6 should remain at approximately 12 V.
5.	Vary S7080A knob between 12 and 22 V.	Voltage should vary with position of S7080A knob and be the same as simulator.
6.	Remove all wires from terminals 3, 4, and 5.	–
7.	Check resistance between terminals 3 and 4 of A5.	Resistance should be 309 K.
8.	Check resistance between terminals 3 and 5 of A5.	Resistance should be 162 K.
	W7081A COLD DECK LIMIT (A6)	
1.	Repeat steps 1-5 of checkout for economizer limit A5.	Same as steps 1-5 of A5.
2.	Check resistance between terminals 3 and 4 of A6.	Resistance should be approximately 309 K.
3.	Check resistance between terminals 3 and 5 of A6.	Resistance should be approximately 162 K.
	W7081A HOT DECK LIMIT (A7)	
1.	Connect S7080A Simulator to W7081A with black clip to terminal 7, red clip to terminal 8, and green clip to terminal 2. Disconnect sensor terminal 3.	–
2.	Connect dc voltmeter to W7081A, terminals 1 (+) and 6 (–).	–
3.	Vary S7080A knob between 0 and 12 V positions and note voltmeter reading.	Voltage should vary with position of S7080A knob.
4.	Connect jumper between terminals 3 and 6.	Voltage between terminals 1 and 6 should remain at approx. 12 V.
5.	Remove all wires from terminals 3, 4, and 5.	–
6.	Check resistance between terminals 3 and 4.	Resistance should be 174 K.
7.	Check resistance between terminals 3 and 5.	Resistance should be 87.3 K.
	W7082A INTEGRATING ANALYZER	
1.	Check voltage at 24 Vac terminals.	Voltage should be 20 to 30 Vac.
2.	Disconnect all thermostat inputs from terminals 1 through 12. Connect dc voltmeter (set at 10 Vdc range) with positive lead to REF terminal, negative lead to LOAD terminal.	–
3.	Turn P1 adjustment fully counterclockwise and note voltmeter reading. (P1 accessible through hole in left side of W7082A cover).	Voltage should be approximately 8 V.
4.	Turn P1 fully clockwise and note voltmeter reading. (P1 accessible through hole in left side of W7082A cover).	Voltage should be less than 1 V.
5.	Connect all thermostat input terminals (1-12) together.	–
6.	Connect S7080A Simulator to W7080A (or W7084A) with black clip to (–) and red clip to (+). Connect green clip to terminals 1-12 of W7082A.	–
7.	Set S7080A for 12 V.	Voltage should be less than 1 V.
8.	Set S7080A clockwise for 22 V.	Voltage should increase to 10 V.
9.	Set S7080A counterclockwise for 12 V.	Voltage should decrease to less than 1 V.
10.	Set S7080A counterclockwise for 2 V.	Voltage should increase to 10 V.

continued on page 15

continued from page 14

COMPONENT CHECKOUT

STEP	ACTION	VERIFICATION
	W7083A ELECTRIC HEAT SEQUENCER	
1.	Connect (+) and (–) terminals on W7083A to matching terminals on W7080A.	–
2.	On W7083A, check voltage at (+) and (–) terminals.	Voltage should be 24 V.
3.	On W7083A connect jumper between LO and (+) terminals.	Heat stage relays should turn on in 1, 2, 3 sequence. H1 should turn on after 10 or more seconds. H5 should turn on before 90 seconds.
4.	Disconnect wire from LO terminal.	Heat stage relays should turn off in 2, 1, 3, 4, 5 sequence. H5 should turn off before 30 seconds.
	W7084A ADDER	
1.	Check voltage at 24 Vac terminals.	20 to 30 Vac.
2.	Check voltage at 24 Vdc terminals.	24 Vdc.
3.	Disconnect zone thermostats and W7081A from W7084A.	–
4.	Connect S7080A Simulator to W7084A with black lead to (–), red lead to (+), green lead to (1).	–
5.	Connect dc voltmeter with positive lead to green lead of simulator, negative lead to (–).	–
6.	Set simulator for 12 V reading.	12 Vdc.
7.	Disconnect voltmeter positive lead from green lead and connect it to HI terminal of W7084A (or use second voltmeter connected between HI and (–) terminals of W7084A).	–
8.	Rotate simulator *slowly* clockwise.	Voltage between HI and (–) must increase from 12 to 22 V as knob is rotated and be the same as simulator voltage.
9.	Rotate simulator knob counterclockwise until voltage reads 12 V.	–
10.	Disconnect voltmeter lead from HI and connect to LO terminal of W7084A.	–
11.	Rotate simulator knob *slowly* counterclockwise.	Voltage between LO and (–) must decrease from 12 to 2 V as knob is rotated and be the same as simulator voltage.
12.	Disconnect simulator green lead from terminal 1 and connect to next input terminal in order.	–
13.	Repeat steps 7-12 for zone inputs 2 through 12 of W7084A.	–
	195325A 4TH STAGE COOLING BOARD	
1.	Connect COM terminal on board to (–) terminal on W7080A, and +24 V terminal on board to (+) on W7080A.	–
2.	Connect dc voltmeter to board with positive lead to +24 V terminal and negative lead to COM terminal.	–
3.	Connect S7080A Simulator to board with black clip to COM terminal, red clip to +24V terminal, green clip to C terminal.	–
4.	Vary S7080A knob between 12 and 24 V positions.	4th stage relay should turn on at 18 V and off at 16.5 V.

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