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WARREN//SHERER

INSTALLATION & OPERATION MANUAL

MODEL:

T.H.E.

ENVIRONMENTAL CONTROL PANEL

WARREN//SHERER
DIVISION OF KYSOR INDUSTRIAL CORPORATION
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FOR

T.H.E. PANEL

APPLICATION:

The Warren/Sherer T.H.E. PANEL is a multistage electronic sequencing device for control of cooling, heat reclaim, auxiliary heat and fan function as related to a supermarket environment. This panel and the related options should be installed and operated according to the instructions contained in this manual.

MODEL	DESCRIPTION	SERIAL CODE
T.H.E.	3 Stage Cool, 3 Stage Heat Reclaim, 3 Stage Auxiliary Heat	793

07/24/85

GENERAL INFORMATION

The Warren/Sherer environmental control panel is an advanced controller capable of controlling the Temperature and Relative Humidity in a supermarket Environment (T.H.E.).

The system contains a fan control circuit along with 6 stages of heating and 3 stages of cooling.

Individual controls allow the user to adjust store temperature, heat/cool deadband, auxiliary/reclaim deadband, night setback, morning warm-up delay, and dehumidification. Throttling ranges are fixed at 1dg. per stage for cooling and heat reclaim and 2dg. per stage for auxiliary heat.

Internal test switches allow the user to easily check out the system after applying power to the sequencer.

This system has been designed for ease of operation and troubleshooting. All outputs are dry contacts with interchangeable relays. Inputs are either temperature sensor or dry contacts, and all are low voltage.

All options not ordered from the factory can be added at any future date. This can be accomplished since the sequencer contains all interfacing circuitry for optional inputs as standard.

If the user chooses to use an energy management system (EMS) with the control panel, an input connector has been provided which allows user control of heat lockout, cool lockout, night setback, and flush.

Once the system has been adjusted to the Warren/Sherer recommended setpoints, it will operate without any further adjustments. Light emitting diodes (L.E.D.) provide a status indication of heating and cooling stages as well as air flow, night setback, warm-up delay, and flush.

Options such as elapsed time meters can be readily added and are available for the fan and each stage of cooling and heating. The elapsed time meters (24V) are powered from a connector on the main board. (Note: Elapse time meters are non-resetable).

While the panel continuously displays a digital readout of the store temperature, a momentary push button switch allows the user to display outside air temperature when the remote sensor is used. (This can aid in servicing the HVAC system).

Specifications

Power Consumption:

25VA Max.
115/208 VAC 60HZ

Output Relays	Contact Rating	
	10A	24VAC
	10A	115VAC
	7A	208VAC

Inputs:

Temperature Sensors	Thermistor
Cool Lockout	Dry Contact
Heat Lockout	Dry Contact
Dehumidification	Dry Contact
Night Setback	Dry Contact
Flush	Dry Contact

Input Connector — All Dry Contacts

Output Connector:
2.4VA Max. — 24VAC Elapsed Time Meters

Ambient:
35dg. to 130dg. F
0% to 90% R.H.

Weight	50lbs. max.
Size	20" x 24' x 5"

Installation

CAUTION:
1. INSTALLER MUST BE TRAINED AND EXPERIENCED SERVICEMAN.
2. ALL WIRING MUST BE DONE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
3. DISCONNECT POWER SUPPLY BEFORE BEGINNING INSTALLATION.
4. ALWAYS CONDUCT A COMPLETE CHECKOUT WHEN INSTALLATION IS COMPLETED.

Extreme care should be exercised when mounting the environmental control panel. When mounting the panel in the compressor room, avoid placing the panel in a location where it will come in contact with moisture. Condensation from refrigeration lines or rain can damage the electronic control boards.

Knockouts have been provided for field wiring. Panel power should be picked up at an electrical panel on a dedicated circuit breaker of 15 amp capacity.

Circuit wiring for the heating, air-conditioning, and fan is very simple. Since the output relays are dry contact, you simply break one leg of the control circuit through the contacts of the relay that corresponds to the circuit you wish to control. This voltage can be 24V, 120V, or 208V. (See Figure 2)

The input wiring is just as simple. 24 volt to the sequencer, N.S.B., and flush are all factory wired. Low voltage wiring is all that is required for the indoor temperature/dew point sensor. This sensor should be mounted in the center of the store and 1/3 of the way back from the front register area. This is the only device required to operate the controller.

*Note: Unless specified otherwise, the store temperature sensor will be mounted within the dew point control enclosure. The sensor is polarity sensitive, and the black wire should terminate on the (-) terminal on the sequencer.

The connecting cable between the temperature sensor and the sequencer should be two conductor AWG-22 shielded twisted cable with vinyl jacket (Belden 9451 or equivalent).

The cable should not be installed in a conduit or tray containing power lines, nor close to strong electromagnetic sources such as electric lines, electric motors, transformers, or high voltage lines. These sources may induce transient electrical noise and cause false electrical signals.

The shield should be grounded at the T.H.E. panel and allowed to "float" at the temperature sensor end.

Input Options

1. Cool lockout	When ordered, a SPST thermostat will be shipped. This device should be mounted on an outside wall with the sensor positioned to measure outside air (set stat to 60dg. and close on rise).
2. Heat Lockout	Same as cool lockout (set stat to 30dg. and open on rise).
3. Air Flow	Attach differential pressure switch or sail switch to air handler so as to sense air flow.
4. Outdoor Sensor	Thermistor should be mounted as described for lockout thermostats and will provide digital readout of outside air temperature.
5. Night Setback	A seven-day time clock with spring carryover is provided for night setback. Pins are easily located on the face of the clock for scheduling night setback (NSB) and regular operation. Hands on the clock are easily adjusted to set the current time of day when placed in operation.
6. Flush Clock	A twenty-four hour clock is provided for flush operation of the heat reclaim system. Simply set the time of day and duration desired.

Note: All options are low voltage (24 VAC).

Settings and Adjustments

Once the panel has been wired, setup is extremely easy.

The setpoint represents the store temperature. It is adjustable from 60 to 85dg. Warren/Sherer's recommended setpoint is 73dg.

The deadband for aux/reclaim is adjustable from 2dg. to 10dg. This represents the spread from heat reclaim to auxiliary heat. Warren/Sherer recommended setpoint is 2dg.

The deadband for heat/cool is adjustable from 2dg. to 10dg. This represents the spread between the first stage of heat and the first stage of cooling. The Warren/Sherer recommended setpoint is 4dg.

The warm-up delay is adjustable from 3 min. to 3 hrs. This delays the auxiliary heat from coming on after night setback until the delay period has timed out. The Warren/Sherer recommended setpoint is 130 min. or higher.

The night setback is adjustable from 2dg. to 12dg. This represents the number of degrees above and below your setpoint that you have when in night setback. The Warren/Sherer recommended setpoint is 4dg. The actual setback hours are adjustable for each of 7 days on the night setback clock.

The dehumidification switch is a 4-position D.I.P. switch labeled A, B, C, & D. (DIP switches are energized when pressed in at the top). With A in the ON position, the first stage of heat reclaim is enabled on a call for dehumidification. With B in the ON position, the first stage of air-conditioning is enabled on a call for dehumidification. With C in the ON position, the second stage of air-conditioning is enabled on a call for dehumidification. (Note C should only be enabled when B is enabled). With D enabled, the controller will sense if any stage of air-conditioning is on because of temperature, and if so it will add an additional stage of cooling upon a call for dehumidification. Warren/Sherer recommends placing B & D in the ON position.

DIP SWITCH CHART

A	-	Heat Reclaim	1
B	-	Cool	1
C	-	Cool	2
D	-	Cool	Add

The fan control switch is a 3-position switch. In the ON position the fan will run continuously. In the OFF position the fan will be off and will lock out all heating and cooling. In the AUTO position the fan will remain on during store hours and will cycle off at night during night setback; however, the fan will be energized upon a call for heating or cooling during the night setback. Warren/Sherer recommends the fan switch be placed in the AUTOMATIC position.

Below is a chart of the Warren/Sherer recommended settings

					AUX/RECLAIM DEADBAND					HEAT/COOL DEADBAND							
	H6		H5		H4 ←		→ H3	H2	H1 ←				→ C1	C2	C3		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	
											SETPOINT						

Store Temperature Setpoint - 73dg. F

Heat/Cool Deadband - 4dg. F

Auxiliary/Reclaim Deadband - 2dg.

Night Setback - 4dg. F

Warmup Delay - 130 minutes

Dehumidification - B & D (Cool 1 & Cool Add)

Fan - Automatic

*NOTE: THROTTLING RANGES FIXED AT 1dg FOR COOLING AND RECLAIM HEAT
THROTTLING RANGE FIXED AT 2dg FOR AUXILIARY HEAT

(See Figure 1)

PARTS LIST

ITEM	DESCRIPTION	PART NO.	QTY.
1	Circuit Breaker	10J14094	1
2	Transformer	8F10012	1
3	Sequencer	8A10080	1
4	Relays	8E11059	10
5	Temperature Sensor	8A11030	1
6	Dew Point Control	8A11081	1
7	7-Day Clock	8A10077	1 OPT
8	Flush Clock	8A10079	1 OPT
9	Heating Lockout Thermostat	8A11028	1 OPT
10	Cooling Lockout Thermostat	8A11028	1 OPT
11	Elapsed Time Meter	8A10078	1-11 OPT

Checkout and Troubleshooting

The Warren/Sherer sequencer has been carefully designed from a service point of view. The heat and cool test switches allow the user to simulate temperature inputs to the sequencer. When depressed, heat test displays a temperature of 50dg. +/-2 which will bring on all stages of heat. If the auxiliary heat does not come on, check to see if the lockout thermostat is holding it off or if the morning warm-up delay is holding it off.

Cool test will simulate a temperature of 100dg. +/-2dg. This should bring on all stages of cooling. If cool 2 & 3 do not come on, check the cool lockout thermostat. Note that cool 1 is not controlled by the cool lockout thermostat. This has been done so that at least one stage of air-conditioning is available for dehumidification.

For any stage to operate the fan switch must either be in the ON or AUTO position. If a differential pressure or sail switch is used, air flow must be proven as indicated by the air proven L.E.D. before any stage of heating or cooling can operate.

The sequencer requires 24VAC. The transformer secondary voltage should not be less than 20 volts or greater than 30 volts.

The outputs on all stages are dry contacts. The corresponding L.E.D. for each stage only lights when the relay is energized. If a relay fails to energize, exchange it with another relay in the panel as they are interchangeable to determine if the relay is faulty.

The inputs with the exception of 24 volts and inside and outside sensors are looking for a dry contact. A small piece of jumper wire can be used to simulate any of the following: 1) NSB, 2) Flush, 3) Dehumidification, 4) Heat Lockout, 5) Cool Lockout, 6) Air Flow.

Refer to the troubleshooting chart to diagnose your problem if after reading this your problem is still not apparent.

TROUBLESHOOTING CHART

PROBLEM	CHECK	SOLUTION
	AIR PROVEN LIGHT OFF	JUMPER, OR FIX SAIL SWITCH
NO HEATING OR A/C	FAN SWITCH IN OFF POSITION	TURN SWITCH TO ON OR AUTO
	SEQUENCER DEAD	CHANGE SEQUENCER
	HEAT LOCKOUT STAT OPEN	CORRECT STAT
NO AUXILIARY HEAT	AUXILIARY DELAY FLASHING	IF SO - "WAIT"
	CHECK AUX/RECLAIM DEADBAND	SHOULD BE 4dg. - 6dg.
NO AIR CONDITIONING	STAGES 2nd & 3rd ONLY	CHECK COOL LOCKOUT STAT
NO OUTPUT SINGLE STAGE	LIGHT ON - RELAY NOT	CHANGE RELAY
DISPLAY DOES NOT READ TEMPERATURE CORRECTLY	POLARITY ON SENSOR WIRING PRESS HEAT/COOL SWITCH (IF DISPLAY READS OK)	REVERSE (BLACK SHOULD BE ON NEGATIVE) CORRECT SENSOR WIRING OR CHANGE SENSOR

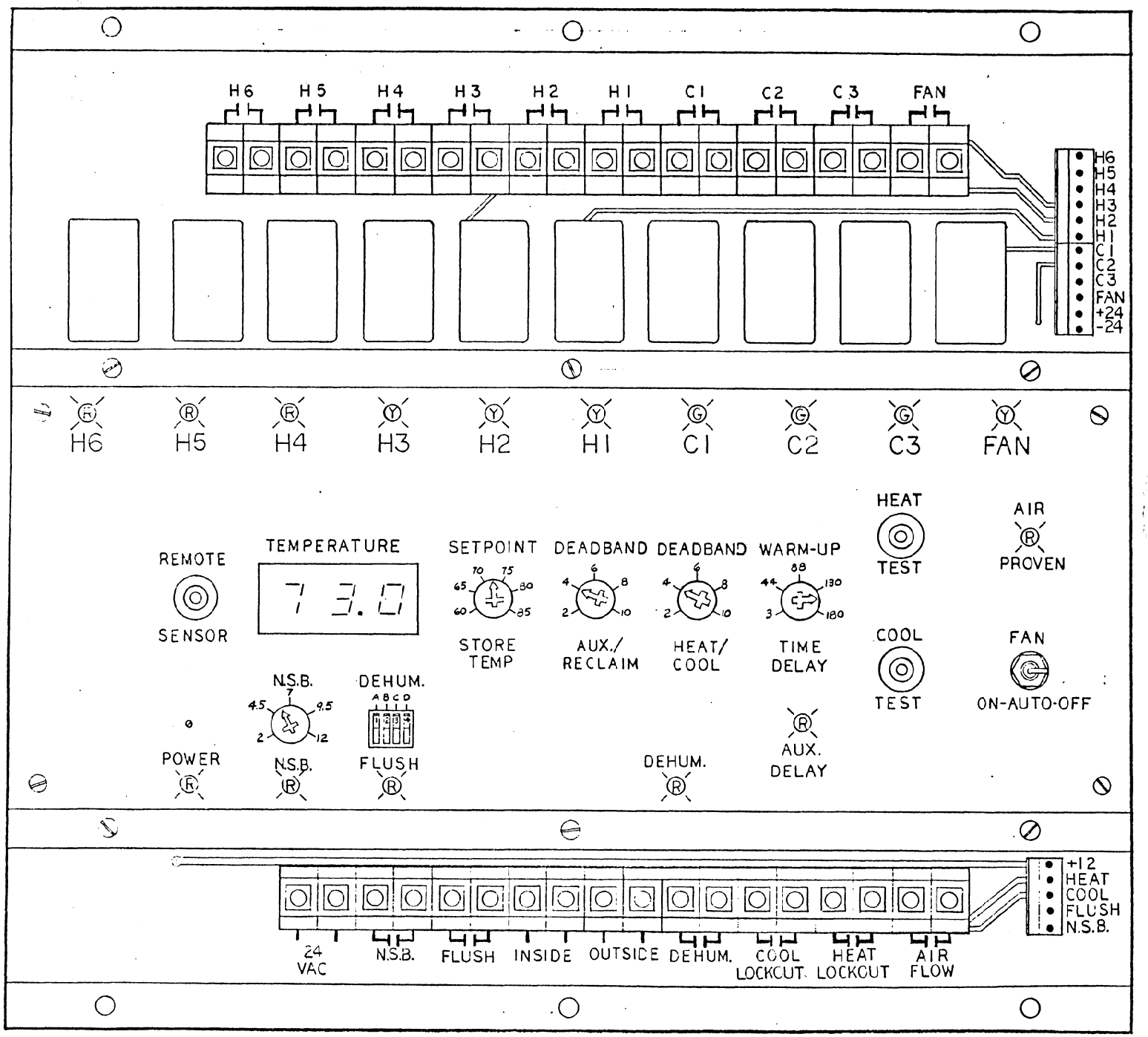
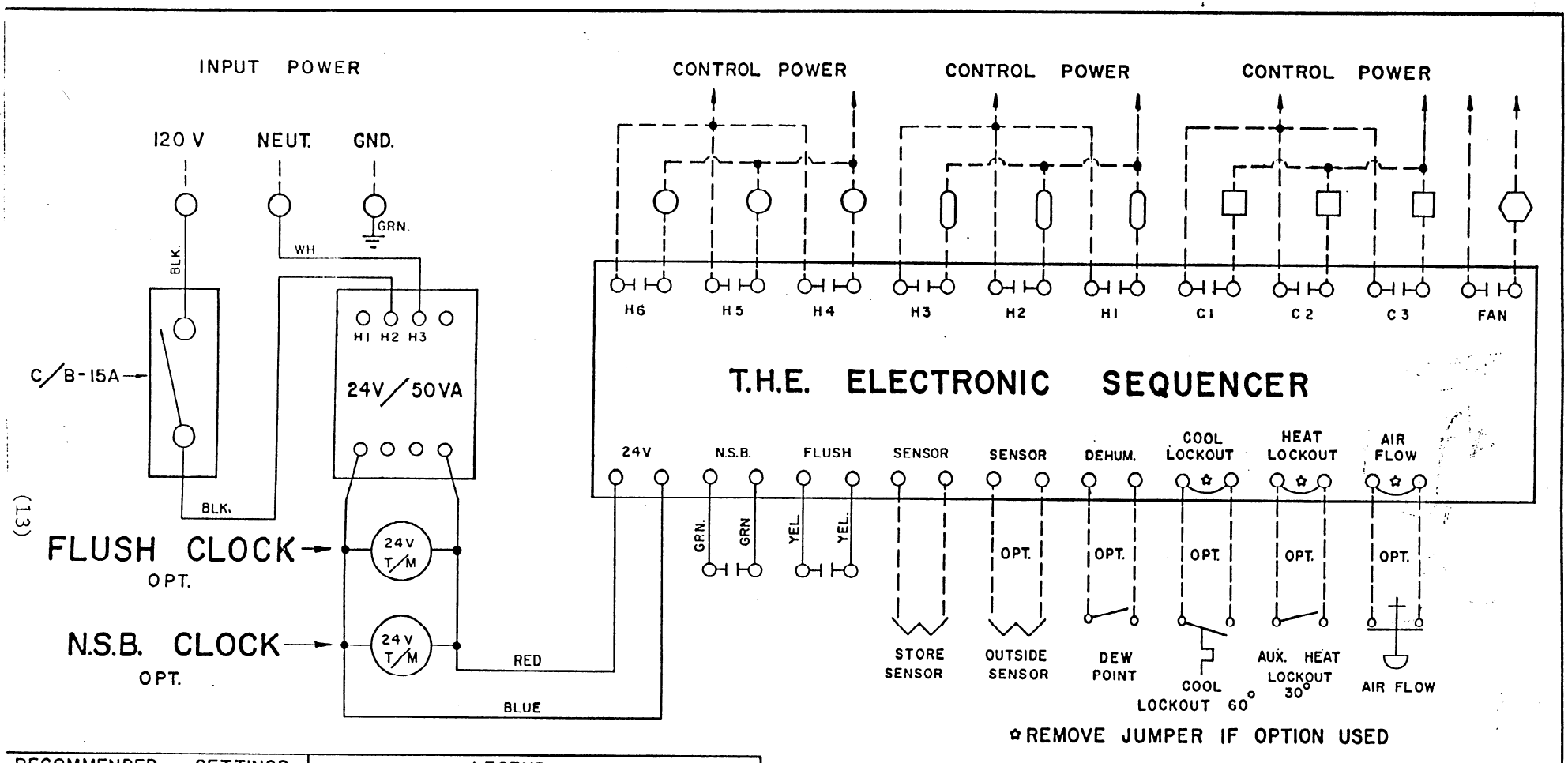

H6
H5
H4
H3
H2
H1
C1
C2
C3
FAN
+24
-24
+12
HEAT
COOL
FLUSH
N.S.B.
REMOTE
SENSOR
TEMPERATURE
SETPOINT
STORE TEMP
DEADBAND
AUX./ RECLAIM
DEADBAND
HEAT/ COOL
WARM-UP
TIME DELAY
HEAT TEST
AIR PROVEN
COOL TEST
FAN ON-AUTO-OFF
POWER
N.S.B.
DEHUM.
FLUSH
AUX. DELAY
24 VAC
INSIDE
OUTSIDE
COOL LOCKOUT
HEAT LOCKOUT
AIR FLOW

Figure 1



RECOMMENDED SETTINGS		
STORE TEMP.	=	73°
AUX./RECLAIM	=	4°
HEAT/COOL	=	4°
WARM UP	=	≥ 130
N.S.B.	=	6°
DEHUM.	=	B & D-ON

LEGEND		
○	=	AUX. HEAT CONTACTORS
⬭	=	HEAT RECLAIM VALVES
□	=	A/C (LIQ. LINE SOLENOIDS)
⬡	=	FAN CONTACTOR
----	=	FIELD WIRING

LETTER	REVISED	DATE	BY

DATE 7-12-84
SCALE NONE
DRAWN MR Mc
APPD MB

TITLE
WIRING SCHEMATIC
T.H.E. CONTROL PANEL

KYSOR | WARREN/SHERER DIVISION OF KYSOR INDUSTRIAL CORPORATION

DRAWING NUMBER PB-22126

(13)

Figure 2