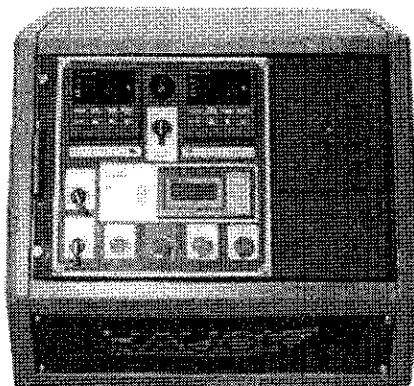




Asphalt Equipment

INSTRUCTIONS

BCS-3000J BURNER CONTROL SYSTEM



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel.

Adjustment of this equipment and its components, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

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Attachments: Appropriate Drawing and Schematics



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The Hauck Burner Control System (BCS) provides burner management and temperature control of a single pilot ignited burner firing on gas, oil or liquid propane (LP). The spark ignited, gas fired pilot is interrupted after the main burner flame has been established. Flame supervision is provided by a Honeywell RM7890A1015 flame relay combined with a R7849A1023 amplifier module and two C7027A1049 UV detectors.

Two Honeywell UDC3000 series microprocessor based instruments are provided for temperature control. The controllers are electronically linked to the burner control motor(s) to automatically adjust the burner firing rate and maintain process temperature near the controller setpoint. The STACK TEMPERATURE controller thermocouple senses the temperature of the exhaust gases while the MATERIAL TEMPERATURE controller thermocouple is positioned to read the temperature of the material as it exits the dryer. Both instruments generate a position proportional output based on the difference between the controller setpoint and the process temperature input.

The CONTROL MODE selector enables the operator to assign control of the burner to either controller. The center, LOW FIRE, position of this switch is used to hold the burner at low fire. The alarm contact of the STACK CONTROLLER is used to shut down the burner if the preset high temperature limit is exceeded. Refer to Appendix B for entering the desired alarm setpoints.

NOTE

High temperature limits will not prevent baghouse fires. They will, when properly installed and adjusted shut off the burner when a given temperature setpoint is exceeded. Outside factors such as chemicals, bag contamination or other ignition sources are beyond the control of the burner management system.

CAUTION

The **STACK** alarm setpoint is factory set at 400°F (204 °C). If the system is equipped with a fabric dust collector (baghouse), consult the manufacturer for recommended baghouse temperature limitations.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. Examine all parts to determine if there has been any damage in shipment. If equipment is to be stored prior to installation, provide a dry storage area.

IMPORTANT

For optimum use of the BCS panel, it is suggested that the drawings provided by Hauck be referred to for limit switch and valve installation and wiring. In the event that a recommended switch or valve is not used, it may be necessary to connect jumper wire(s) between appropriate terminals in the control panel or burner junction box. Such determination remains the responsibility of the Customer, based upon his application, accepted safe installation and operating procedures, and any applicable insurance guidelines or governmental regulations.

C. DRAWINGS AND SUPPLEMENTAL LITERATURE

Burner System

	StarJet	EcoStar
System Schematic	CY6827	CY6827
External Wiring	CY6834	CY6835
Wiring Diagram	CY6828	CY6828
Tabletop Panel Assy.	CY6826	CY6826
Drop-in Panel Assy.	CY6853	CY6853

D. INSTALLATION



WARNING

Adjustment of this equipment, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

1. Locate the tabletop panel on a firm support in an area which is protected from the weather and free from vibration. The drop-in version is designed to install in an existing enclosure. Reference drawing CY6853 for required cutouts and mounting dimensions.

IMPORTANT

Operating specifications of 32 to 130 °F, 30 to 95% relative humidity (non-condensing) should be considered in selecting a suitable location for the control panel.

2. Provide 120Vac single phase **GROUND**ED **NEUTRAL** power to the burner control panel. It is recommended that the customer provide a master disconnect switch to interrupt power service to the panel. Maintain polarity as indicated on the drawings provided when connecting the main power source to the panel.
3. **Install a heavy gauge (No. 12 AWG minimum) ground wire between the panel ground connector and "Earth" ground.**

IMPORTANT

A ground wire is also required between the burner junction box(es) and the control panel terminal strip.

4. Wire the fuel valves, valve position limit switches and fuel pressure limit switches as shown on the external component wiring diagram.
5. Install the exhaust fan flow limit switch in the dryer exhaust duct as shown in **Appendix C**. Wire the normally open contact of the exhaust flow limit to the appropriate terminals in either the burner junction box or the BCS control panel.
6. Install the stack temperature thermocouple in the dryer exhaust duct to sense exhaust gas temperature. See **Appendix D** for installation instructions.
7. Install a Hauck Rapid Response material temperature thermocouple in the material discharge chute to sense the temperature of the material leaving the dryer. See **Appendix E** for recommended installation.
8. Connect the thermocouples to the appropriate terminals in the BCS control panel using thermocouple cable of the same type as the Material and Stack thermocouples.

IMPORTANT

Thermocouple cables must be separated from AC power and control wiring to avoid interference and nuisance shutdowns. Observe polarity when making thermocouple connections. Regardless of thermocouple type, the red wire is always negative. Shielded cable may be used to provide additional protection from AC power and radio frequency (RF) interference. **ONLY ONE END OF THE CABLE SHOULD BE GROUNDED.** Use a ground terminal in the BCS panel for this purpose.

9. Install the pilot and main flame scanners on the burner and wire them to the appropriate terminals in the burner junction box. Reference burner instructions for scanner installation details.
10. Refer to the external component wiring diagram for interconnection between the burner junction box(es) and the BCS panel terminal strips.

IMPORTANT

The flame scanner and control motor position feedback signals should be run in a separate cable from the burner junction box to the BCS control panel. This cable may be run along with thermocouple cables but must be separated from all other AC power and control cables. Shielded cable may be used to provide additional protection from AC power and radio frequency (RF) interference. **ONLY ONE END OF THE CABLE SHIELD SHOULD BE GROUNDED.** Use one of the ground terminals in the BCS control panel for this purpose.

E. ADJUSTMENTS

1. Adjust the purge timer, 1TR, for the required purge time (1/2 to 10 minutes).

IMPORTANT

Before igniting the burner, the dryer must be purged to remove possible accumulation of combustible gases. **A MINIMUM OF FOUR COMPLETE AIR CHANGES MUST BE SUPPLIED.** Multiply the total system volume (dryer, baghouse and exhaust ducts) in cubic feet by four. Divide this value by the burner air capacity in cubic feet per minute. The result will be the required purge time in minutes

2. Perform the fuel motor calibration procedure described in Appendix A.

RECALIBRATE ANNUALLY OR WHENEVER A CONTROL MOTOR IS SERVICED OR REPLACED.

3. Verify that all low fire limit switch contacts are closed when the burner is at 0% and open when the burner leaves low fire. Reference burner operating instructions for switch adjustment.
4. Install a limit switch on the exhaust damper set to close when the damper is greater than 50% open.
5. Verify that all purge permissive contacts are closed after the air control valve(s) drive open for purge (EcoStar and PowerStar burners only).

F. FINAL CHECKOUT

1. Be sure that all equipment and components have been installed in accordance with the manufacturer's instructions.
2. Verify all wiring and tighten connections.
3. Confirm all linkage adjustments and insure that control arms and linkage rods are tight.
4. Clean all traps and filters.
5. Check all fuel and air supply lines for leaks.
6. Verify all pressure settings.

G. PANEL OPERATION

1. Open all manual shutoff valves to supply air and fuel to the system.
2. Move the panel **POWER** switch to **ON** and verify that the **FUEL SELECTOR** switch is in the desired position.
 - a. The temperature controllers and flame relay will perform their self-test procedures.
 - b. The burner fuel control motor will drive to its low fire position.
 - c. The **RESET** indicator will come on.
 - d. A "*BURNER STOPPED...*" message will appear.
3. Start the combustion air and exhaust fans and all other equipment required for plant operation. After all safety limits have closed, the Purge Relay, R4, will be energized and the air control motor(s) will drive open to prepare for system purge (EcoStar and StarJet conversion burners only).
4. Place the **CONTROL MODE** selector in the desired position and verify the setpoints of both temperature controllers.
5. Momentarily press the **RESET** button to initiate the system purge sequence.
 - a. Run Relay, R1, will be energized.
 - b. The **RESET** indicator will go out.
 - c. A "*WAITING FOR PURGE LIMITS to CLOSE*" message will appear.
6. If all purge permissive contacts are closed:
 - a. The Purge Timer, 1TR, will begin its timed delay and its "Timing" indicator will begin flashing.
 - b. A "*PURGING ...SECONDS*" will appear.

7. After the purge delay has been completed:
 - a. Purge Timer, 1TR, and Purge Latch Relay, R2, will be energized.
 - b. The air control motor(s) will drive closed to prepare for pilot ignition (EcoStar and StartJet conversion burners only).
 - c. A *"WAITING FOR LOW FIRE LIMITS to CLOSE"* message will appear.
 8. When the motor(s) have reached their low fire start positions and the burner low fire limit switches have closed:
 - a. A *"PURGE COMPLETE READY to START"* message will appear.
 - b. The **START** pushbutton will flash indicating that the burner is ready to start.
 9. Press and hold the **START** pushbutton to begin the burner ignition sequence.
 - a. The RM7890A flame relay will be energized.
 - b. Start Relay, R3, will be energized and a ten second trial for ignition will begin.
 - c. When the *"PILOT ENERGIZED"* message appears, the **START** push-button may be released.
 - d. The ignition transformer and pilot solenoid valves will be energized.
 10. If a satisfactory pilot flame is detected by the UV scanner:
 - a. Flame signal strength will be displayed on the **FLAME METER** bar.
 - b. Spark Timer, 2T, will be energized and begin timing.
 - c. A *"FLAME ON FIRING TIME"* message will appear.
 11. After 2T timer has completed its three second delay:
 - a. 2TR relay will be energized.
 - b. The Purge Timer, 1TR, will be de-energized and reset.
 - c. The ignition transformer will be de-energized.
 - d. Power will be supplied to the main fuel valves.
 12. As soon as the valve open switch contact in the main fuel valve has closed, pilot timer, 3T will begin timing.
 13. After the pilot timer has completed its 10 second delay:
 - a. The pilot solenoid valves will be de-energized.
 - b. The pilot scanner will be de-energized.
 - c. The burner control motor(s) will be released from low fire and respond to the motor positioning output of the selected temperature controller.
 14. Start material flow to the dryer. Use the [↑] and [↓] keys to manually control the burner firing rate, or press the **MANUAL/AUTO** key on the selected controller to begin automatic temperature control.
- NOTE:** The center, **LOW FIRE**, position of the **CONTROL MODE** selector will return the burner to its low fire position.
15. To terminate burner operation, press the **STOP** pushbutton.
 - a. Run Relay, R1, will be de-energized and the **RESET** indicator will come on.

- b. Purge Latch Relay, R2, will be de-energized and a "*BURNER STOPPED*" message will appear.
- c. The Honeywell RM7890 flame relay will be de-energized.
- d. All fuel valves will be de-energized.
- e. The fuel control motor will drive closed.
- f. Purge Relay, R4, will be energized and the air control motor(s) will drive open to prepare for system purge. (EcoStar and StarJet conversion burners only.)

H. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
No power to instruments or indicator lights.	L1 fuse blown	Check for 120Vac between L1 and L2. Replace 10A fuse, L1.
"PURGE LIMITS HAVE NOT CLOSED. CHECK FOR POWER ON TERM #24."	Purge limits are not made	Check purge limits series: 120Vac on terminals 19, 24F, 24E, 24D, 24C, 24B, 24A and 24.
"CHECK LOW FIRE LIMIT SWITCHES"	Low fire limit switch(es) are not made.	Check low fire limit switch(es). Check for 120Vac on terminals 21B, 21A and 21.
Limits are made but air motor(s) do not drive open for purge.(EcoStar & StarJet Conversion burners)	Slidewire feedback voltage fault. Motor positioner fault.	Check for 1.2Vdc between terminals 82 (+) and 81 (-). (Replace Stack instrument) Check for 1.2Vdc between terminals 99 (+) and 81 (-). Verify positioner mode switch is in AUTO. (Replace positioner)
"IGNITION FAILURE RESET REQUIRED"	Pilot fault Flame relay fault	Verify operation of pilot solenoid & ignition transformer. Check pilot adjustment and fuel supply. Check for 120Vac on terminals 8 and 9 (Replace 2A fuses...Replace flame relay).
"FLAME FAILURE RESET REQUIRED"	3 second spark timer fault.	Verify operation of 2TR relay (replace 2T timer).
"EXHAUST FAN FLT. (TERM 13) CHECK INTERLOCK AND FLOW SWITCH.	Fuse 7 blown Exhaust Fan fault occurred	Check for 120Vac at fuse 7 (replace 5A fuse). Latched on if an exhaust fan fault occurs. Check the exhaust fan flow limit switch (120Vac on terminal 12) <u>and</u> motor starter interlock contact (120Vac on terminal 13)
"COMBUSTION AIR FAULT. (TERM 16) CHECK INTERLOCK & PRESSURE SWITCH"	Combustion Air fault occurred.	Latched on when a combustion air fault has occurred. Check the combustion air interlock contact (120Vac on terminal 14 and/or 15) <u>and</u> the combustion air pressure switch (120Vac on terminal 15A and/or 16)

"FUEL LIMIT FAULT (TERM 18 OIL or 17 GAS) CHECK FULE PRESSURE	Fuel Supply Limit fault	If GAS fuel is selected, check the low gas pressure limit switch (120Vac on terminal 16A) <u>and</u> the high gas pressure switch (120Vac on terminal 17). For OIL or LP fuel, check the low pressure limit switch (120Vac on terminal 17A) <u>and</u> the low oil temperature limit (120Vac on terminal 18).
"HIGH STACK TEMP. (TERM 26) CHECK STACK TEMP. ALARM CONTACT"	Stack Temp. Limit	If the stack temperature limit contact in the STACK temperature controller opens due to high stack temperature or a thermocouple failure

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
"FLAME ON" indication, but fuel control motor does not drive.	Valve open switch fault. 10 second pilot timer fault. Fuse 5 blown. Control mode switch location	Check for 120Vac on terminal 43 on the P.C.B. (verify operation of main valve open switch). Verify operation of 3TR relay (replace 3T timer). Check fuse 5 and replace if necessary. Verify 3TR relay is energized and that the CONTROL MODE switch is not in the LOW FIRE position
Flame meter indicates presence of flame when burner is shut off.	Fire in dryer drum. Poor flame meter connection. Defective scanner.	Check for fire in drum. Check flame meter connections. Unplug 3TR relay. If signal disappears replace pilot scanner. If signal remains replace main flame scanner.
Flame relay fault indicator comes on and will not reset.	Improper grounding or voltage polarity. Flame relay failure.	Verify neutral (L2) of 120Vac supply is grounded. Verify that control panel is grounded. Replace flame relay amplifier and/or relay module.
Fuel control motor will not drive.	Fuse 5 blown. Pilot timer failure Control motor failure Controller failure	Check fuse 5 and replace if necessary. Verify 3TR relay is energized and that the CONTROL MODE switch is not in the LOW FIRE position Verify 120Vac Between motor terminals L1 and L2. Remove fuse 5 then jumper motor terminals X to 2 and X to 3 to test motor operation. Move CONTROL MODE switch to other controller.

APPENDIX A: FUEL MOTOR SLIDEWIRE CALIBRATION

The burner fuel control motor incorporates a position feedback slidewire. A 1.2 Vdc supply voltage from the **Stack** temperature instrument is connected to the slidewire in order to generate a 0 to 1.2 Vdc position feedback signal for the control panel. The following calibration procedure must be performed before operating the burner for the first time.

RECALIBRATE ANNUALLY OR WHENEVER A CONTROL MOTOR, SLIDEWIRE OR TEMPERATURE CONTROLLER IS SERVICED OR REPLACED.

1. Turn the panel **POWER** switch to **OFF**. Move the **FUEL SELECTOR** switch to the center (Off) position and place the **CONTROL MODE** selector in the **MATERIAL** position.
2. Unplug 3TR relay from its socket and place a **temporary** jumper between control panel terminal 47 and Ground for Barber Colman EA-57 (Medium Torque). Jumper between 47 and 7 for an Barber Colman EA-71 or EA-73 (High Torque) This will enable the burner control motor(s) to be driven by the Honeywell temperature controller without having to fire the burner.
3. Turn the panel power on. Enter the calibration mode on the **Material** controller by pressing the **[SETUP]** key until the display reads CALIB POS PROP.
4. Press the **[FUNCTION]** key to display MTR TIME then use the **[↑]** and **[↓]** keys to set the upper display to the **fuel motor** travel time in seconds (40 seconds for Barber-Colman medium torque motors).
5. Press **[FUNCTION]** again to display DISABLE POS PROP then press the **[↑]** key to change the upper display to DO AUTO.
6. Press **[FUNCTION]** to begin motor calibration. The lower display will read ZERO VAL while the upper display will show the slidewire feedback value,
7. Wait for the zero value to stop changing and confirm that the motor(s) are in their low fire positions.
8. Press **[FUNCTION]** again to advance to SPAN VAL. The control motor(s) will drive open and the upper display value should increase.
9. After the feedback value has stopped increasing, confirm that the motors have reached their high fire positions then press **[FUNCTION]** once more to complete the calibration sequence.
10. Move the **CONTROL MODE** selector to the **STACK** position and repeat steps 3 through 9 for the **Stack** controller.
11. Turn the panel **POWER** switch **OFF** and return the **FUEL SELECTOR** to the **GAS** or **OIL** position. Replace 3TR relay and remove the temporary jumper from terminal 47 and Ground.

Hauck part number 56887 Honeywell model DC330B-EE-000-22-0A0000-00-0.

The Honeywell DC300E controllers have been configured at the factory with parameters which generally produce accurate temperature control. Before making any field adjustments, other than as noted in this instruction sheet, **PLEASE CONTACT THE HAUCK SERVICE DEPARTMENT.**

I. OPERATOR INTERFACE

Figure 1 shows the front face of the DC300E instrument. The following paragraphs describe the function of the various displays and keys. Examples are given for changing the controller setpoint, positioning the burner control motor(s) in the manual mode, and changing the alarm setpoints. Detailed information is given in the vendor literature supplied with the control panel.

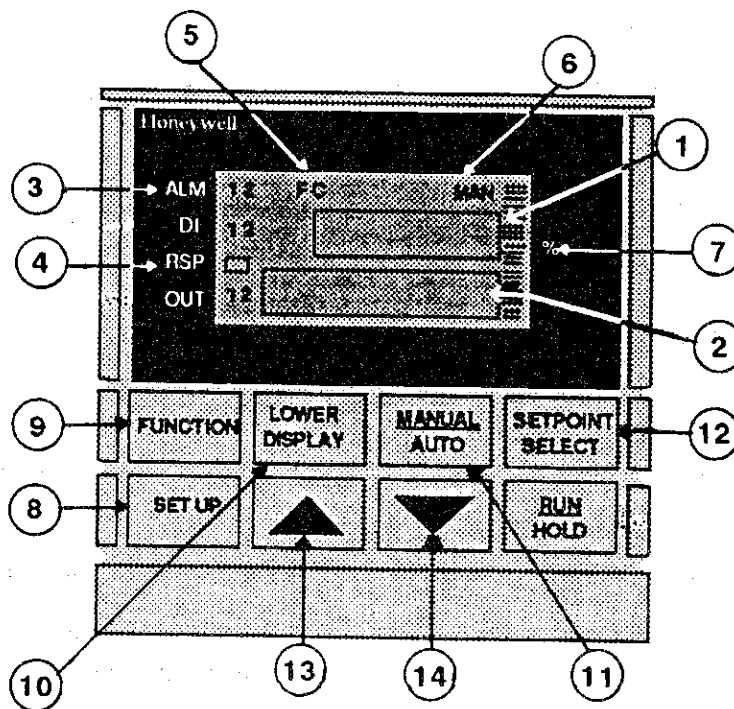


Figure 1.

1. **Upper Display:** Normally displays process temperature. Also displays parameter values or selections when in the configuration set up mode.
2. **Lower Display:** Shows value of set point deviation from setpoint or output percentage. Also displays function groups and parameters when in the configuration set up mode.
3. **ALARM 1 INDICATOR:** Illuminated when alarm 1 setting has been exceeded.
4. **RSP INDICATOR:** Illuminated when the remote setpoint or second local setpoint has been selected.
5. **UNITS INDICATOR:** Indicates degrees F or degrees C as applicable.

6. **AUTO/MANUAL INDICATOR:** Indicates **A** for automatic or **MAN** for manual controller mode.
7. **DEVIATION BARGRAPH:** Displays difference between the process variable temperature and the controller's setpoint. Each bar represents a deviation of 1% of span (7.5 degrees F for type J TC low range.)
8. **[SET UP] KEY:** Places the controller in the configuration set up mode. Scrolls through set up groups and enables the **[FUNCTION]** key to access parameters within each group. Note that selections made in this mode affect the basic operation of the controllers (deg. F or deg. C, thermocouple type, alarm type, etc.) These parameters have been pre-configured by Hauck and should not be changed without consulting the Hauck service department.
9. **[FUNCTION] KEY:** Used in combination with the **[SET UP]** key to display and select functions within the set up groups.
10. **[LOWER DISPLAY] KEY:** Selects which operating parameter will be shown in the lower display.
 - **SP:** Controller setpoint
 - **2SP:** Second setpoint when so configured.
 - **DEV:** Deviation between process temperature and setpoint.
 - **OUT:** Output percentage.

This key is also used to exit the set up mode and return the controller to its normal operating mode.
11. **[MANUAL/AUTO] KEY:** Alternately selects manual or automatic control mode.
12. **[SETPOINT SELECT] KEY:** Alternately selects setpoint 1 or setpoint 2. A **KEY ERROR** message appears if the controller is not configured for two setpoints.
13. **[↑] KEY:** Used to increase setpoint, % output or configuration values.
14. **[↓] KEY:** Used to decrease setpoint, % output or configuration values.

II. OPERATING THE CONTROLLER

EXAMPLE 1: CHANGING THE SETPOINT

Press the **[LOWER DISPLAY]** key until **SP** and the current setpoint appears in the lower display.

Press and hold the **[↑]** key to increase the set point value. To make changes more quickly, press the **[↓]** key while holding **[↑]** key. This will shift the changing digit one place to the left.

To decrease the set point value, reverse the above procedure.

EXAMPLE 2: ADJUSTING THE BURNER FIRING RATE IN THE MANUAL MODE

Press the **[AUTO/MANUAL]** key to place the Controller in the Manual Mode. The **MANUAL** indicator will come on and the lower display will automatically change to show % **OUT**.

Press and hold the **[↑]** key to increase % Output value. To make changes more quickly press the **[↓]** key while holding **[↑]** key. This will shift the changing digit one place to the left.

To decrease the % Output value, reverse the above procedure.

EXAMPLE 3: CHANGING THE ALARM SET POINT

Press and hold the **[SET UP]** key until the display reads **SETUP ALARMS**.

Press the **[FUNCTION]** key once to change the lower display to **A1S1 VAL** or **A1S2 VAL**. The upper display will show the current alarm set point. Use the **[↑]** or **[↓]** arrow key to change to the desired set point.

Press the **[LOWER DISPLAY]** key to exit the Set Up mode and return the controller to normal operation.

NOTE

High temperature limits will not prevent baghouse fires. They will, when properly installed and adjusted shut off the burner when a given temperature setpoint is exceeded. Outside factors such as chemicals, bag contamination or other ignition sources are beyond the control of the burner management system.

CAUTION

The **STACK** alarm setpoint is factory set at 400°F (204°C). If the system is equipped with a fabric dust collector (baghouse), consult the manufacturer for recommended baghouse temperature limitations.

III. MATERIAL CONTROLLER CONFIGURATION RECORD SHEET

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SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
<u>TUNING</u>			
	PROP BAND	15	_____
	RATE MIN	0.00	_____
	RESET RPM	1.00	_____
	SECURITY	0	_____
	LOCKOUT	NONE	_____
	AUTO MAN	ENABLE	_____
	SP SEL	ENABLE	_____
	RUN HOLD	DISABLE	_____
<u>SP RAMP</u>			
	SP RAMP	DISABLE	_____
	SP RATE	DISABLE	_____
<u>ACCUTUNE</u>			
	FUZZY	DISABLE	_____
	ACCUTUNE	DISABLE	_____
<u>ALGORITHM</u>			
	CONT ALG	PID A	_____
	TIMER	DISABLE	_____
	IN ALG 1	NONE	_____
<u>OUT ALG</u>			
	OUT ALG	POSITN	_____
<u>INPUT 1</u>			
	IN 1 TYPE	J TC LOW	_____
	IN 1 HIGH	770 F OR 410 C	_____
	IN 1 LOW	20 F OR -7 C	_____
	RATIO 1	1.000	_____
	BIAS IN 1	0.0	_____
	FILTER 1	0	_____
	BURNOUT 1	UP	_____
<u>INPUT 2</u>			
	IN 2 TYPE	SLIDEW	_____
	IN 2 HIGH	1000	_____
	IN 2 LOW	0.000	_____
	RATIO 2	1.000	_____
	BIAS IN 2	0.0	_____
	FILTER 2	0	_____
	BURNOUT 2	UP	_____
<u>CONTROL</u>			
	PID SETS	1 ONLY	_____
	LSP'S	1 ONLY	_____
	SP TRACK	NONE	_____
	POWER MODE	MANUAL	_____
	SP HI LIMIT	770 F OR 410 C	_____
	SP LO LIMIT	20 F OR -7 C	_____
	ACTION	REVERSE	_____

SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
	OUT RATE	DISABLE	_____
	OUT HI LIM	100.0	_____
	OUT LO LIM	0.0	_____
	I HI LIM	100.0	_____
	I LO LIM	0.0	_____
	DROPOFF	0.0	_____
	DEADBAND	2.0	_____
	FAILMODE	NO LAT	_____
	FAILSAFE	0.0	_____
	MAN OUT	0.0	_____
	AUTO OUT	0.0	_____
	PB OR GAIN	PB PCT	_____
	MIN OR RPM	RPM	_____
<u>ALARMS</u>			
	A1S1 TYPE	PV	_____
	A1S2 TYPE	NONE	_____
	A2S1 TYPE	NONE	_____
	A2S2 TYPE	NONE	_____
	A1S1 H L	HI	_____
	ALARM HYST	0.1	_____
	ALM OUT 1	NO LAT	_____
	BLOCK	DISABLE	_____
	A1S1 VALUE	400 F OR 204 C	_____
	A1S1 VALUE	Not Applicable	_____
	A2S1 VALUE	Not Applicable	_____
	A2S2 VALUE	Not Applicable	_____
DISPLAY			
	DECIMAL	XXXX	_____
	TEMPUNIT	DEG F	_____
	PWR FREQ	60 HZ	_____
	LANGUAGE	ENGLIS	_____

IV. STACK CONTROLLER CONFIGURATION RECORD SHEET

SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
<u>TUNING</u>			
	PROP BAND	15	_____
	RATE MIN	0.00	_____
	RESET RPM	1.00	_____
	SECURITY	0	_____
	LOCKOUT	NONE	_____
	AUTO MAN	ENABLE	_____
	SP SEL	ENABLE	_____
	RUN HOLD	DISABLE	_____
<u>SP RAMP</u>			
	SP RAMP	DISABLE	_____
	SP RATE	DISABLE	_____
<u>ACCUTUNE</u>			
	FUZZY	DISABLE	_____
	ACCUTUNE	DISABLE	_____
<u>ALGORITHM</u>			
	CONT ALG	PID A	_____
	TIMER	DISABLE	_____
	IN ALG 1	NONE	_____
<u>OUT ALG</u>			
	OUT ALG	POSITN	_____
<u>INPUT 1</u>			
	IN 1 TYPE	J TC LOW	_____
	IN 1 HIGH	770 F OR 410 C	_____
	IN 1 LOW	20 F OR -7 C	_____
	RATIO 1	1.000	_____
	BIAS IN 1	0.0	_____
	FILTER 1	0	_____
	BURNOUT 1	UP	_____
<u>INPUT 2</u>			
	IN 2 TYPE	SLIDEW	_____
	IN 2 HIGH	1000	_____
	IN 2 LOW	0.000	_____
	RATIO 2	1.000	_____
	BIAS IN 2	0.0	_____
	FILTER 2	0	_____
	BURNOUT 2	UP	_____
<u>CONTROL</u>			
	PID SETS	1 ONLY	_____
	LSP'S	1 ONLY	_____
	SP TRACK	NONE	_____
	POWER MODE	MANUAL	_____
	SP HI LIMIT	770 F OR 410 C	_____
	SP LO LIMIT	20 F OR -7 C	_____

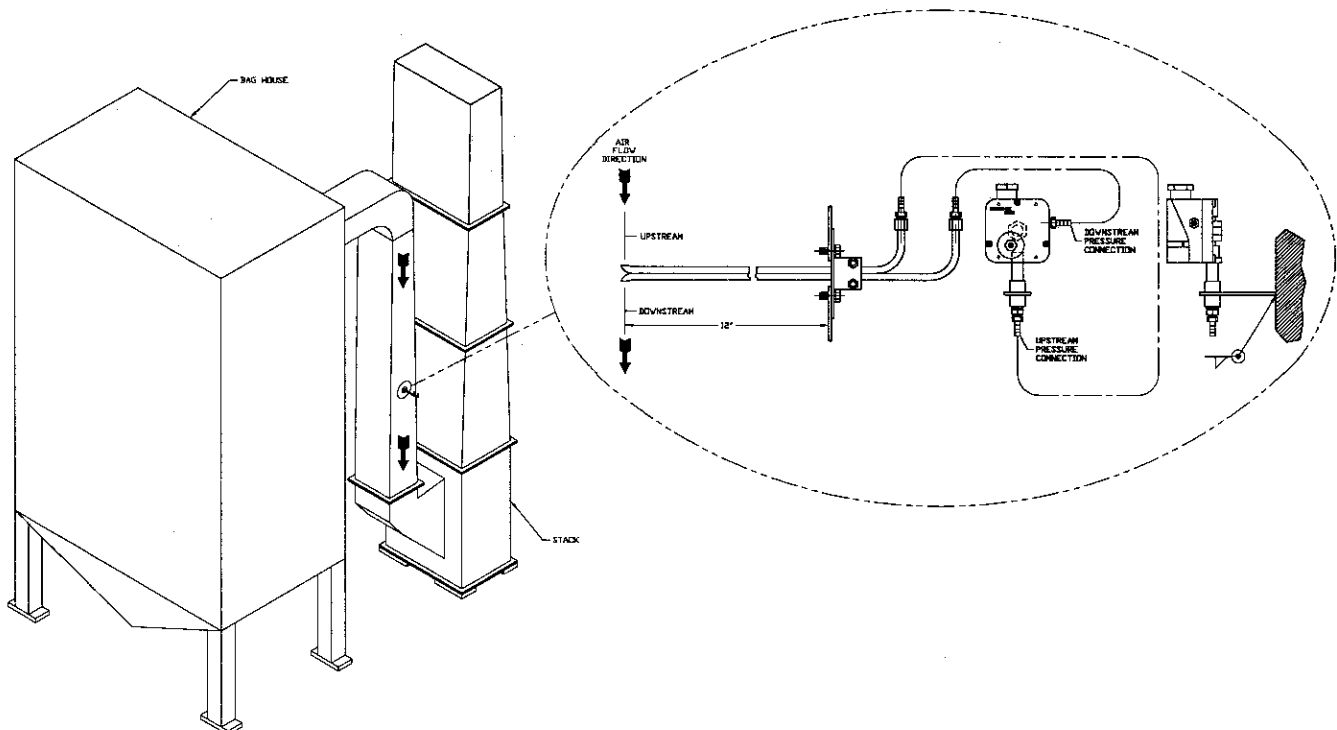
SET UP GROUP	LOWER DISPLAY (FUNCTION)	FACTORY CONFIGURATION	FINAL SETTING
	ACTION	REVERSE	_____
	OUT RATE	DISABLE	_____
	OUT HI LIM	100.0	_____
	OUT LO LIM	0.0	_____
	I HI LIM	100.0	_____
	I LO LIM	0.0	_____
	DROPOFF	0.0	_____
	DEADBAND	2.0	_____
	FAILMODE	NO LAT	_____
	FAILSAFE	0.0	_____
	MAN OUT	0.0	_____
	AUTO OUT	0.0	_____
	PB OR GAIN	PB PCT	_____
	MIN OR RPM	RPM	_____
<u>ALARMS</u>			
	A1S1 TYPE	PV	_____
	A1S2 TYPE	NONE	_____
	A2S1 TYPE	NONE	_____
	A2S2 TYPE	NONE	_____
	A1S1 H L	HI	_____
	ALARM HYST	0.1	_____
	ALM OUT 1	NO LAT	_____
	BLOCK	DISABLE	_____
	A1S1 VALUE	400 F OR 204 C	_____
	A1S1 VALUE	Not Applicable	_____
	A2S1 VALUE	Not Applicable	_____
	A2S2 VALUE	Not Applicable	_____
DISPLAY			
	DECIMAL	XXXX	_____
	TEMPUNIT	DEG F	_____
	PWR FREQ	60 HZ	_____
	LANGUAGE	ENGLIS	_____

APPENDIX C: EXHAUST FAN FLOW LIMIT SWITCH INSTALLATION

Mount the exhaust fan flow switch in the dryer exhaust duct as shown below.

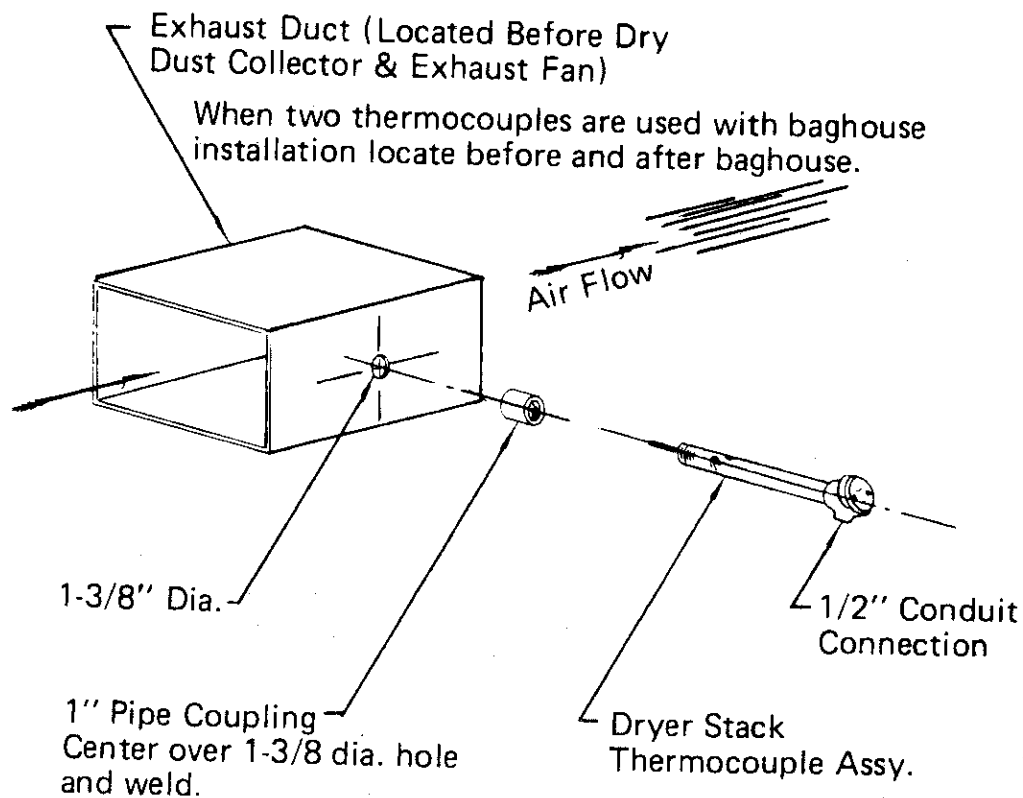
Installation:

1. Cut a 2" hole in the duct where the pitot will be located.
2. For "blind" applications, mark two of the holes using one half of the mounting flange.
3. Reach through the 2" hole to hold the nuts in place to mount the plate half. Use silicone sealant as a gasket. Tighten the nuts and bolts securely. Insert the pitot approximately 12" into the duct and hold in place.
4. Using the second half of the flange, tighten the ¼-20 bolts to hold the pitot in place.
5. **WARNING! Do not** fasten both halves of the flange. One side is left unbolted for removal and cleaning of pitot tube.
6. For other applications, weld the four duct mounting nuts to the inside of the ductwork using the flange as a pattern.
7. Use silicone caulk as a gasket.
8. Remote mount the pressure switch to a vibration and heat free location. Connect the plastic tubing from the pitot to the switch connecting the upstream side of the pitot to the bottom of the switch and the downstream side of the pitot to the top side of the switch. Wire switch per schematic.



APPENDIX D: STACK THERMOCOUPLE INSTALLATION

Install a Hauck stack temperature thermocouple in the dryer exhaust duct to sense exhaust gas temperatures.



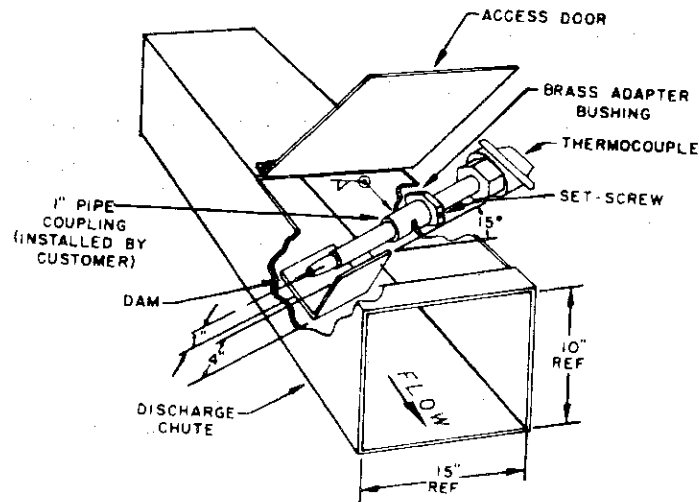
Drawing showing placement of
thermocouple in exhaust duct.

NOTE

Thermocouple cables must be separated from AC power and control wiring to avoid interference and nuisance shutdowns. Observe polarity when making thermocouple connections. Regardless of TC type, the red wire is always negative.

APPENDIX E: MATERIAL THERMOCOUPLE INSTALLATION

Install a Hauck Rapid Response Material Temperature Thermocouple in the material discharge chute to sense the temperature of the material leaving the dryer. Wire the thermocouple to the proper terminals in the panel.



Drawing showing the placement of the thermocouple and "dam" in the dryer discharge chute.

IMPORTANT

A small clearance (1" maximum) should be provided under the thermocouple so material will not be trapped between the thermocouple and the chute. Trapped material will cause a heat loss path and the thermocouple will give erroneous readings.

The thermocouple should make good contact with the material but not be subject to severe abrasion caused by high velocities. If the material is moving so fast that it bounces and leaves air adjacent to the thermocouple, the temperature it senses will be lower than the material. It may be necessary to place a dam in the chute so that the thermocouple is in a relatively slow moving area next to the dam. The dam must only be wide enough and high enough to create a localized area of build-up where the material loses velocity **BUT DOES NOT STOP FLOWING**. The thermocouple must not be located in a stagnant zone or erroneous temperature readings will result. Because of the large number of variables involved, it is impossible to set down any exact size or location of the dam that will always work. Field experimentation will be necessary if good results are to be obtained. It is advisable to tack weld the dam in place so that it can be easily modified if it fails to perform satisfactorily.

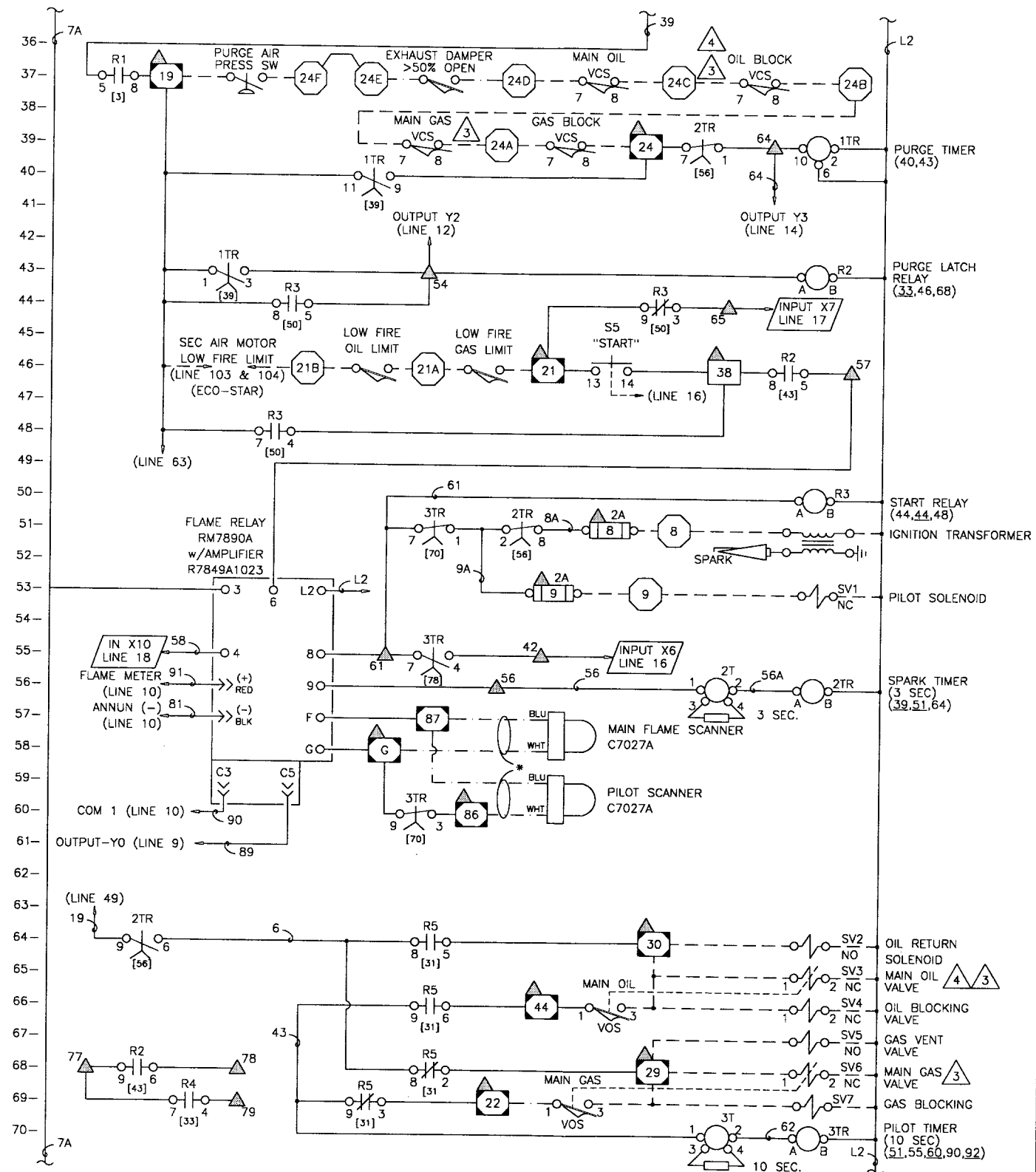
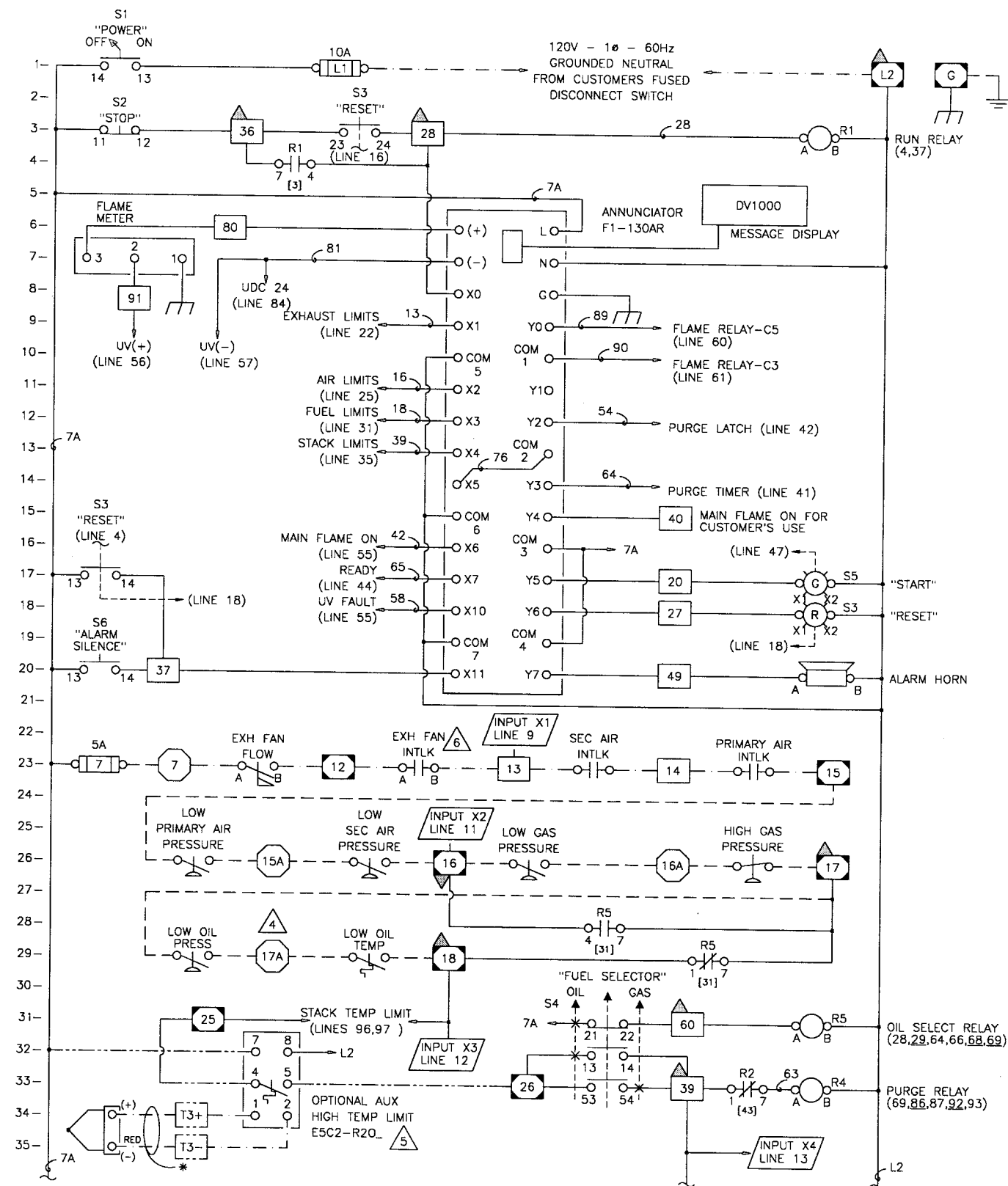
NOTE

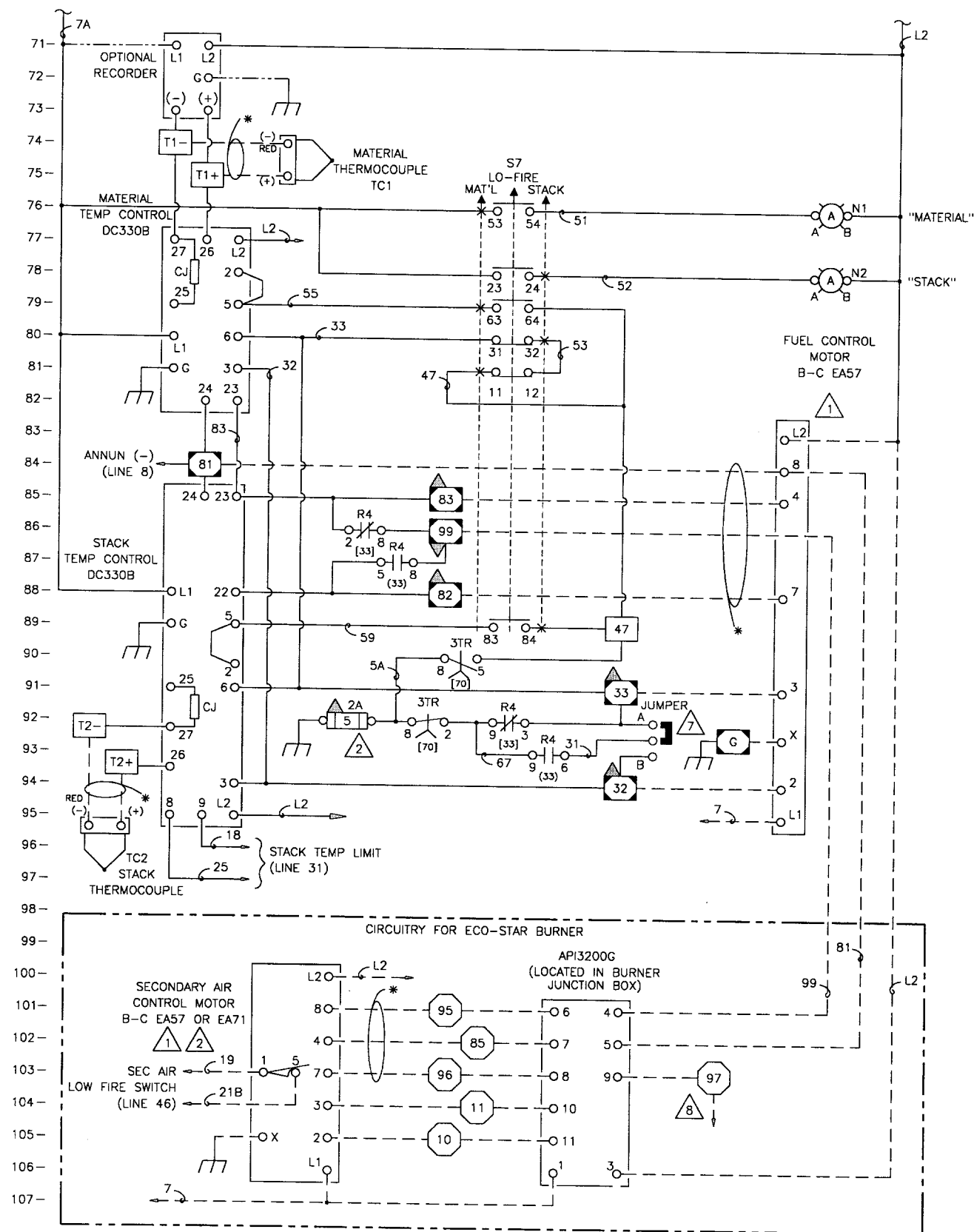
During normal operation, the thermocouple should be rotated once a month to expose a different area of its surface to the abrasive forces of the material. This procedure will increase the effective life of the thermocouple. If excessive wear occurs, a protective tube may be added to shield the shaft in the region of the high velocity flow.

Thermocouple cables must be separated from AC power and control wiring to avoid interference and nuisance shutdowns. Observe polarity when making thermocouple connections. Regardless of TC type, the red wire is always negative.

APPENDIX F: RECOMMENDED SPARE PARTS

PART NO.	QTY.	DESCRIPTION
56648	1	Flame relay, Honeywell RM7890A1015
56650	1	Amplifier, Honeywell R7849A1023
20579	2	Scanner, Honeywell C7027A1049
17292	2	Relay 3PDT, P&B KUP 14A35 or equal
61961	1	Purge timer, Eagle Signal B846-500
56887	1	Controller, Honeywell DC300E-E-000-22-0A00-0
40744	1	Timer, 10 second solid state, Omnetics MMS115A19-1/2B
40747	1	Timer, 3 second solid state, Omnetics MMS115A1Z3B
58889	2	Bulb, T 3-1/4 bayonet base, 120Vac, C-H 28-2468-7
58762	5	Fuse, 2A, 1/4 x 1-1/4, Buss MDA-2
58763	5	Fuse, 5A, 1/4 x 1-1/4, Buss MDA-5
48044	5	Fuse, 10A, 1/4 x 1-1/4, Littlefuse 312010
43508 --- or --- 43508R2037	1	Material thermocouple, Hauck TC100A-J --- or --- Material thermocouple, Hauck TC100A-K
43868 --- or --- 45474	1	Stack thermocouple, Hauck TC200A-J --- or --- Stack thermocouple, Hauck TC200A-K





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NOTES:

- 1 CONTROL MOTORS SHOWN ARE BARBER-COLMAN EA SERIES. USE OF THESE TERMINAL DESIGNATIONS ON ANY MOTOR OTHER THAN BARBER COLMAN EA SERIES MAY RESULT IN DAMAGE TO THE MOTOR AND CONTROL PANEL. TO REVERSE CONTROL MOTOR ROTATION, INTERCHANGE 2 WITH 3 AND 7 WITH 8 ON THE CONTROL MOTOR STRIP.
- 2 FOR MEDIUM TORQUE MOTOR, B-C EA57, JUMPER FUSE 5 TO GROUND. FOR HIGH TORQUE MOTORS, B-C EA71 OR EA73, JUMPER 5 TO 7.
- 3 TERMINAL DESIGNATIONS ON GAS AND OIL SHUT-OFF VALVES ARE FOR MAXON VALVES ONLY. USE OF THESE TERMINAL DESIGNATIONS ON ANY SHUT-OFF VALVE OTHER THAN A MAXON VALVE MAY RESULT IN SERIOUS DAMAGE TO THE COMBUSTION AND PROCESS EQUIPMENT FROM AN EXPLOSION. JUMPER JUNCTION BOX TERMINALS 24 TO 24B IF GAS VALVES ARE NOT INSTALLED. JUMPER JUNCTION BOX TERMINALS 24B TO 24D IF OIL/LP VALVES ARE NOT INSTALLED.
- 4 FOR APPLICATIONS USING LIQUID PROPANE, CONNECT LP LIMITS AND FUEL VALVES IN PLACE OF OIL LIMITS AND VALVES.
- 5 JUMPER CONTROL PANEL TERMINAL 25 TO 26 IF THE AUXILIARY HIGH TEMP LIMIT OPTION IS NOT INSTALLED.
- 6 IF A DRYER PRESSURE CONTROL SYSTEM IS INSTALLED, CONNECT THE "HOLD" CIRCUIT (DPS TERMINAL 41) TO CONTROL PANEL TERMINAL 13 AND JUMPER DPS TERMINAL 3 TO L2.
- 7 PRINTED CIRCUIT BOARD JUMPER IN POSITION "A" HOLDS FUEL MOTOR AT LOW FIRE DURING PURGE SEQUENCE. PRINTED CIRCUIT BOARD JUMPER IN POSITION "B" DRIVES FUEL MOTOR OPEN DURING PURGE SEQUENCE.
- 8 FOR MEDIUM TORQUE MOTOR, B-C EA57, JUMPER JUNCTION BOX TERMINAL 97 TO GROUND. FOR HIGH TORQUE MOTORS, B-C EA71 OR EA73, JUMPER 97 TO 7.

* THESE WIRES TO BE RUN IN A SEPERATE HARNESS, ISOLATED FROM ALL OTHER CONTROL WIRING.

- EXTERNAL WIRING
- REQUIRED CUSTOMER WIRING
- OPTIONAL WIRING

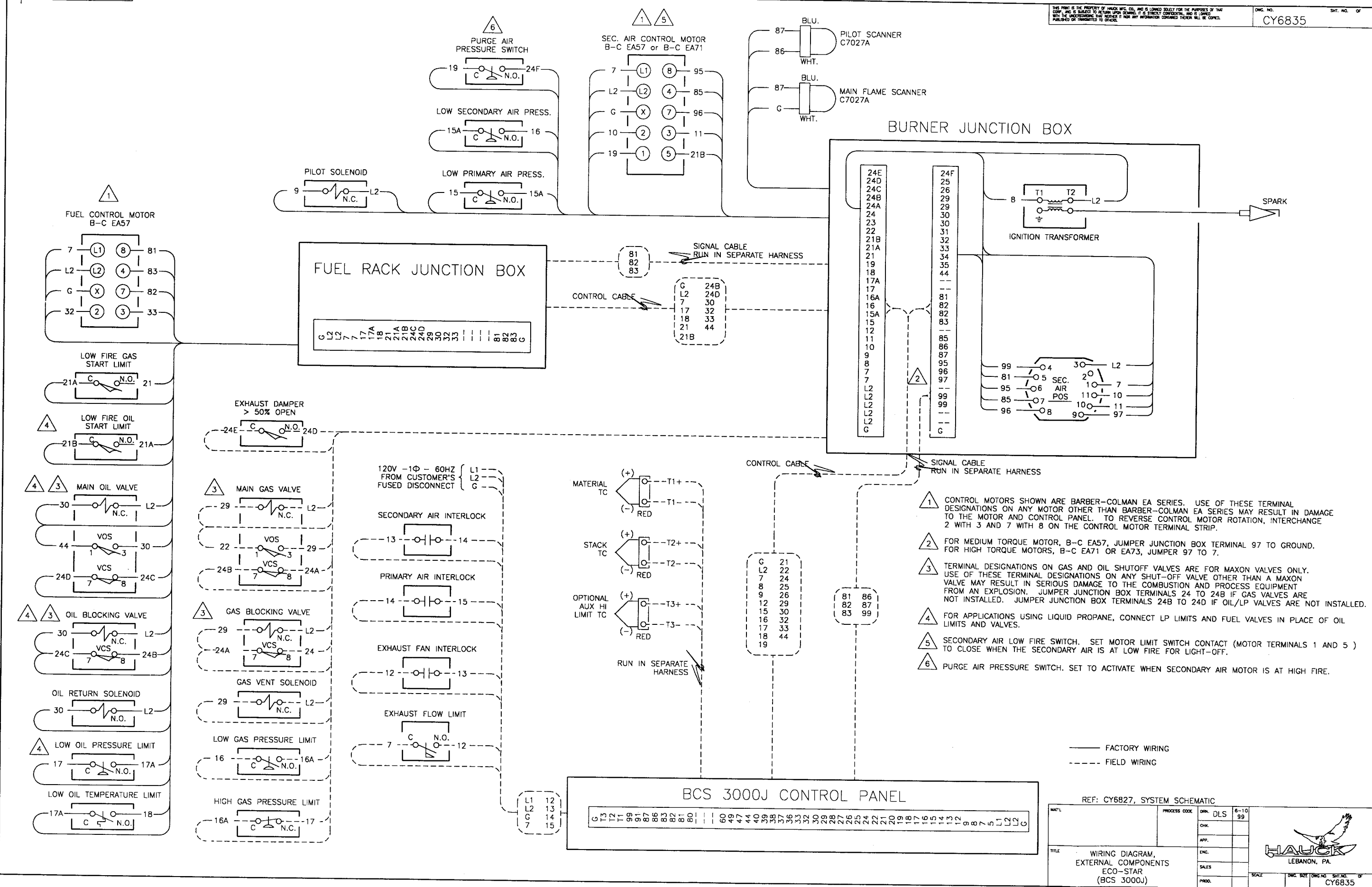
- TERMINALS IN BCS PANEL ONLY.
- ◻ TERMINALS IN BCS PANEL AND BURNER JUNCTION BOX.
- ◻ TERMINALS IN BURNER JUNCTION BOX ONLY.
- ▲ DENOTES PRINTED CIRCUIT BOARD CONNECTIONS.

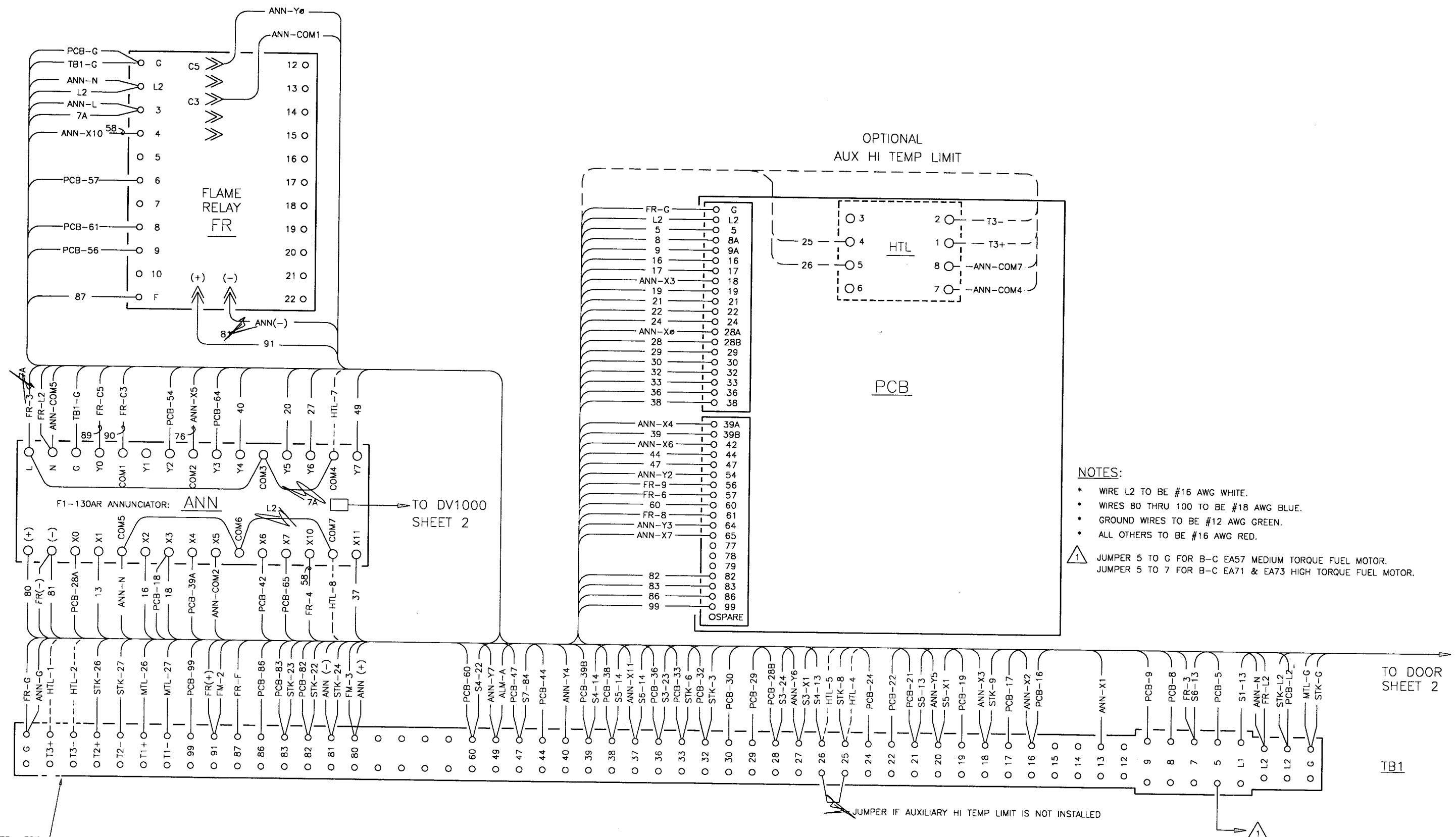
WIRE L2 TO BE #16 AWG WHITE
WIRES 80 THRU 100 TO BE #18 AWG BLUE
GROUND WIRES TO BE #12 AWG GREEN
ALL OTHERS TO BE #16 AWG RED

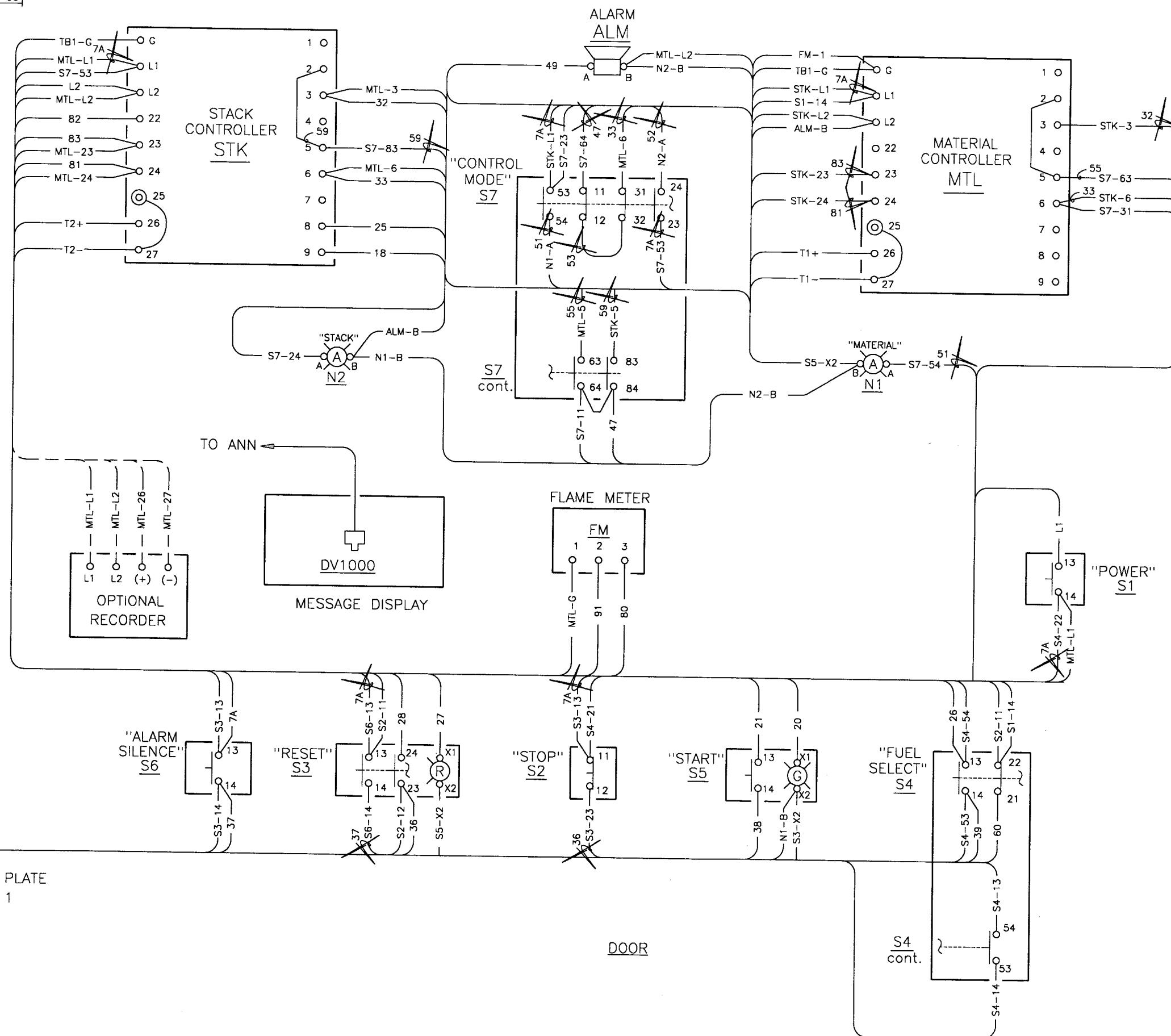
REF: CY682B, PANEL WIRING DIAGRAM,
CY6834, EXTERNAL WIRING DIAGRAM (STARJET)
CY6835, EXTERNAL WIRING DIAGRAM (ECO-STAR)

TITLE SYSTEM SCHEMATIC, BURNER CONTROL (BCS3000J)	MATL	PROCESS CODE	DRN FF/DLS	2-5 99
	CHK	APP	ENC	
	SALES	PROO		
	SCALE			
	DWC SIZE DWG NO. SHJ NO. 2 OF 2 CY6827			









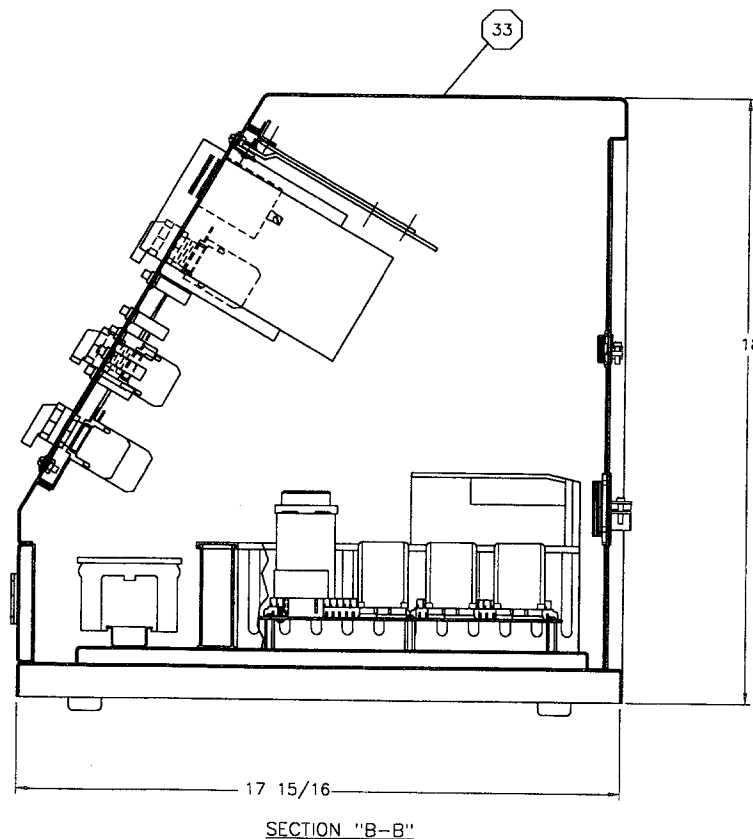
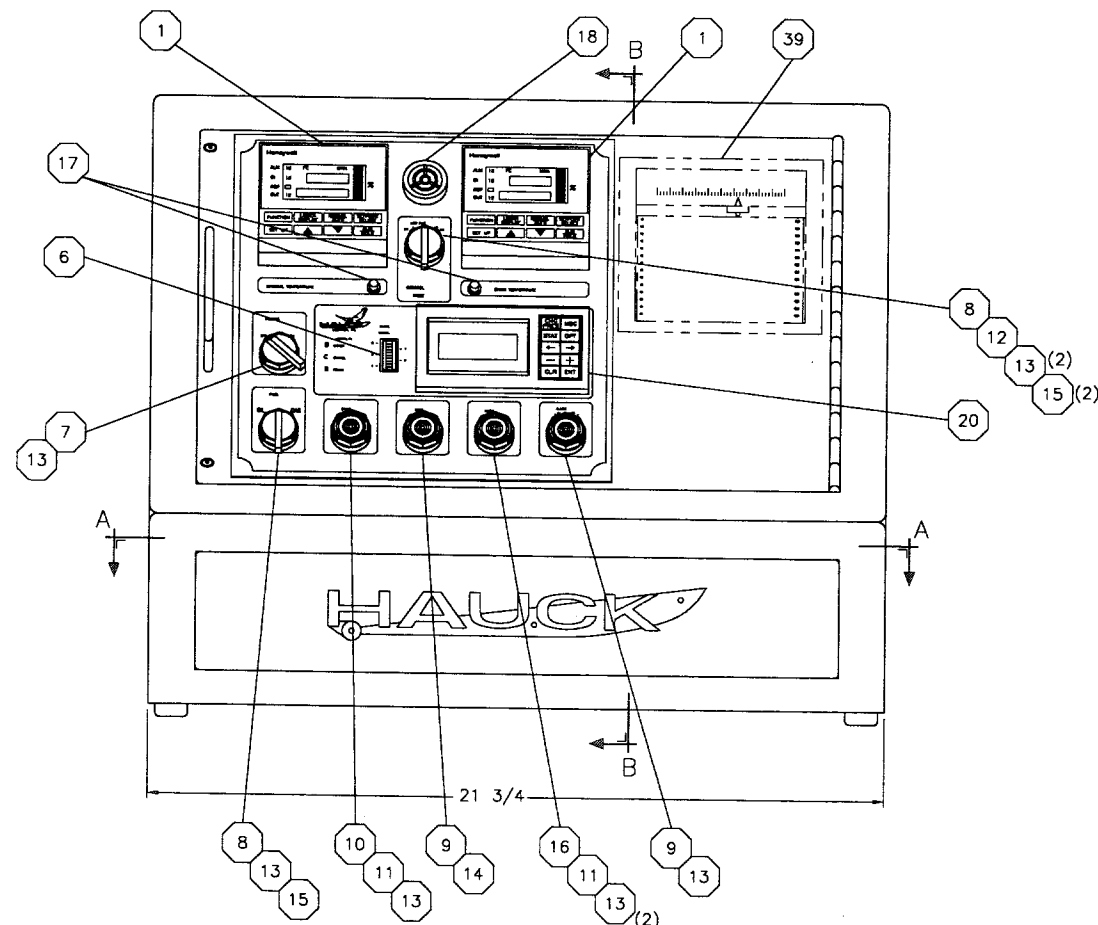
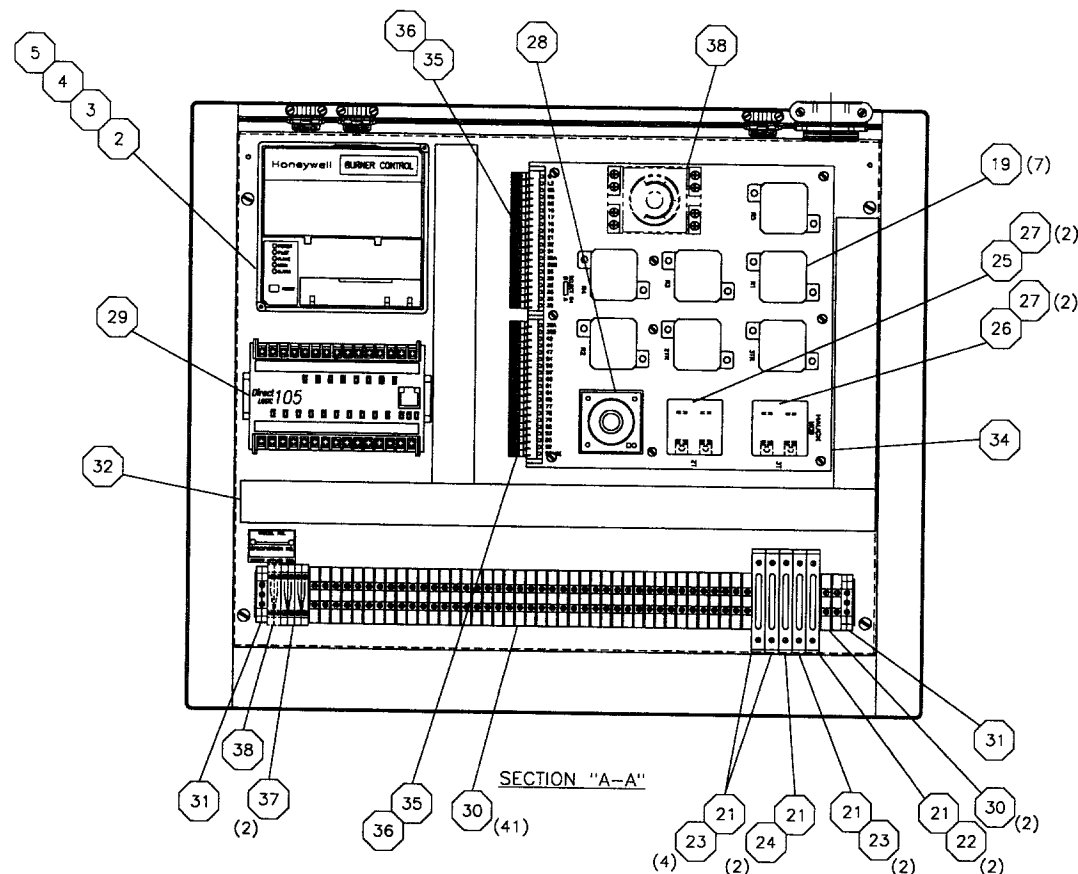
NOTES:

- * WIRE L2 TO BE #16 AWG WHITE.
- * WIRES 80 THRU 100 TO BE #18 AWG BLUE.
- * GROUND WIRES TO BE #12 AWG GREEN.
- * ALL OTHERS TO BE #16 AWG RED.

TO RELAY PLATE
SHEET 1

MATERIAL	PROCESS CODE	DWG. NO. 6-9 99	 HAUCK LEBANON, PA.
TITLE	WIRING DIAGRAM BURNER CONTROL SYSTEM (BCS 3000J)	APP.	
		ENG.	
		SALES	
		PROD.	SCALE
			DWG. NO. 6-9 99
			CY6828

NO.	REVISIONS
1	278-99-1 DLS 11-3-99



ITEM NO.			PART NO.	QTY	DESCRIPTION
1	56887	2			CONTROLLER, DC3330B-EE-00-22-0A0000-00-0
2	56648	1			FLAME RELAY, HONEYWELL RM7890A1015
3	56649	1			BASE, FLAME RELAY, HONEYWELL Q7800A1005
4	56650	1			AMPLIFIER, HONEYWELL R7849A1023
5	57988	1			CONNECTOR, FLAME RELAY RESET
6	58008	1			FLAME METER ASS'Y
7	58870	1			SWITCH, 2-POS, C-H E22V51
8	58871	2			SWITCH, 3-POS, C-H E22VG1
9	58874	2			PB, RED, C-H E22E2
10	58872	1			PB, ILLUM. GREEN, C-H E22N3
11	58875	2			LIGHT MODULE, C-H E22R2
12	58880	1			ADAPTER, 5 BLOCK MOUNTING, C-H E22BA12
13	58876	8			N.O. CONTACT, C-H E22B2
14	58877	1			N.C. CONTACT, C-H E22B1
15	58878	3			1 N.O./1 N.C. CONTACT, C-H E22B11
16	58873	1			PB, ILLUM. RED, C-H E22N2
17	44672	2			INDICATOR, NEON AMBER
18	56485	1			ALARM, MALLORY SC110N
19	17292	7			RELAY, 3PDT, P & B KUP14-A35 120AC
20	58476	1			MESSAGE DISPLAY, PLC DIRECT MODEL DV1000
21	48042	5			FUSE BLOCK
22	48044	2			FUSE, 10A, LITTLEFUSE 312010
23	58762	6			FUSE, 2A, BUSS MDA-2
24	58763	2			FUSE, 5A, BUSS MDA-5
25	40744	1			TIMER, SOLID STATE 10 SEC OMNETICS #MMS115A129-1/2
26	40747	1			TIMER, SOLID STATE 3 SEC OMNETICS #MMS 115A123B
27	45442	4			CONNECTOR
28	61961	1			TIMER, EAGLE SIGNAL #B846-500
29	62121	1			ANNUNCIATOR, PLC DIRECT F1-130AR
30	47478	43			TERMINAL, PHOENIX CONTACT
31	47479	2			TERMINAL, GROUND, PHOENIX CONTACT
32	62221	36"			DUCT, 1" x 3" WIRING
33	57858	1			ENCLOSURE ASSEMBLY, TABLETOP
34	74905	1			BOARD, PRINTED CIRCUIT
35	62728	2			PLUG, 20 SOCKET TYPE CPET2/20
36	62730	2			PEG, CODING (YELLOW) TYPE COPE

THE FOLLOWING ITEMS MUST BE SPECIFIED ON ORDER:

37	A58904x001	1	TYPE 'J' TC WIRING KIT
37	A58904x002	1	TYPE 'K' TC WIRING KIT
	43508	*	MATERIAL, TC WITH ADAPTER BUSHING TC100 J
	43508R2037	*	MATERIAL, TC WITH ADAPTER BUSHING TC100 K
	43868	*	STACK TC, TC200 J
	45474	*	STACK TC, TC200 K
	20579	2	SCANNER, HONEYWELL C7027A1049
	20758	2	SCANNER, HONEYWELL C7035A1023
	19300	1	SWITCH, EXH. FAN LIMIT

THE FOLLOWING ITEMS ARE OPTIONAL:

38	73308x001	1	TYPE 'J' AUX HI-TEMP LIMIT KIT
38	73308x002	1	TYPE 'K' AUX HI-TEMP LIMIT KIT
39	46201X001	1	RECORDER, SINGLE PEN

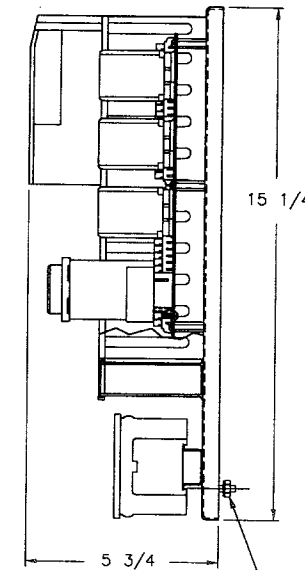
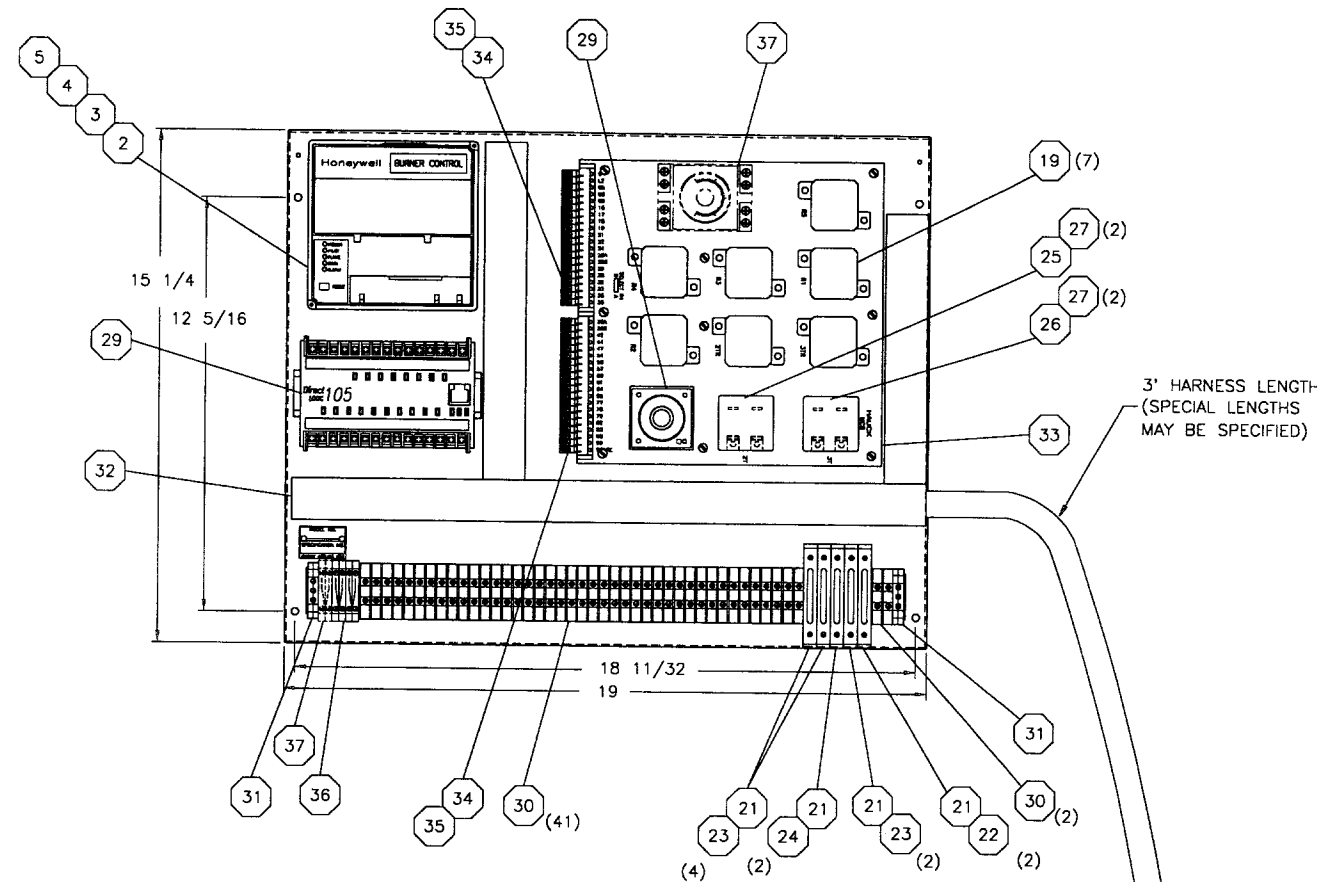
NOTE:

CY6827, SYSTEM SCHEMATIC
CY6828, WIRING DIAGRAM

* TOTAL OF 2 TYPE J OR TYPE K THERMOCOUPLES
ARE REQUIRED

MATL.	PROCESS CODE	DRN. DLS	6-3
		CHK	
		APP.	
		ENG.	
		SALES	
		PROD.	
TITLE PANEL ASSEMBLY, SINGLE BURNER DUAL TEMP CONTROL TABLETOP (BCS 3000J)		SCALE 3/8	
		Dwg. No. 6-3 Rev. No. 11-3-99 CY6828	

ITEM NO.	PART NO.	QTY	DESCRIPTION
1	56887	2	CONTROLLER, DC3330B-EE-00-22-0A0000-00-0
2	56648	1	FLAME RELAY, HONEYWELL RM7890A1015
3	56649	1	BASE, FLAME RELAY, HONEYWELL Q7800A1005
4	56650	1	AMPLIFIER, HONEYWELL R7849A1023
5	57988	1	CONNECTOR, FLAME RELAY RESET
6	58008	1	FLAME METER ASS'Y
7	58870	1	SWITCH, 2-POS, C-H E22V51
8	58871	2	SWITCH, 3-POS, C-H E22VG1
9	58874	2	PB, RED, C-H E22E2
10	58872	1	PB, ILLUM. GREEN, C-H E22N3
11	58875	2	LIGHT MODULE, C-H E22R2
12	58880	1	ADAPTER, 5 BLOCK MOUNTING, C-H E22BA12
13	58876	8	N.O. CONTACT, C-H E22B2
14	58877	1	N.C. CONTACT, C-H E22B1
15	58878	3	1 N.O./1 N.C. CONTACT, C-H E22B11
16	58873	1	PB, ILLUM. RED, C-H E22N2
17	44672	2	INDICATOR, NEON AMBER
18	56485	1	ALARM, MALLORY SC110N
19	17292	7	RELAY, 3PDT, P & B KUP14-A35 120AC
20	58476	1	MESSAGE DISPLAY, PLC DIRECT MODEL DV1000
21	48042	5	FUSE BLOCK
22	48044	2	FUSE, 10A, LITTLEFUSE 312010
23	58762	6	FUSE, 2A, BUSS MDA-2
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25	40744	1	TIMER, SOLID STATE 10 SEC OMNETICS #MMS115A129-1/2
26	40747	1	TIMER, SOLID STATE 3 SEC OMNETICS #MMS 115A123B
27	45442	4	CONNECTOR
28	61961	1	TIMER, EAGLE SIGNAL #B846-500
29	62121	1	ANNUNCIATOR, PLC DIRECT F1-130AR
30	47478	43	TERMINAL, PHOENIX CONTACT
31	47479	2	TERMINAL, GROUND, PHOENIX CONTACT
32	62221	36"	DUCT, 1" x 3" WIRING
33	74905	1	BOARD, PRINTED CIRCUIT
34		2	PLUG, 20 SOCKET TYPE CPET2/20
35		2	PEG, CODING (YELLOW) TYPE COPE



MOUNTING HARDWARE SUPPLIED
(4) SCREW, RD. HD. MACH. #10-24 x 1 LG.
(4) WASHER, LOCK #10
(4) NUT, HEX. MACH. #10-24

THE FOLLOWING ITEMS MUST BE SPECIFIED ON ORDER:

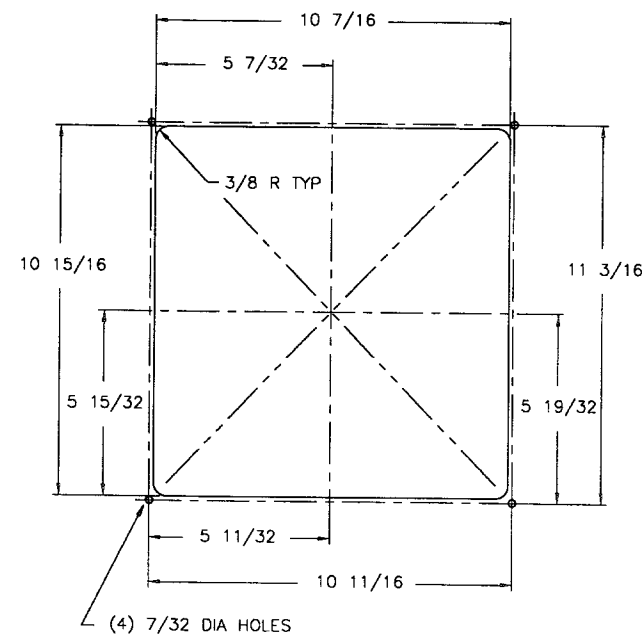
36	A58904x001	1	TYPE 'J' TC WIRING KIT
36	A58904x002	1	TYPE 'K' TC WIRING KIT
	43508	*	MATERIAL, TC WITH ADAPTER BUSHING TC100 J
	43508R2037	*	MATERIAL, TC WITH ADAPTER BUSHING TC100 K
	43868	*	STACK TC, TC200 J
	45474	*	STACK TC, TC200 K
	20579	2	SCANNER, HONEYWELL C7027A1049
	20758	2	SCANNER, HONEYWELL C7035A1023
	19300	1	SWITCH, EXH. FAN LIMIT

THE FOLLOWING ITEMS ARE OPTIONAL:

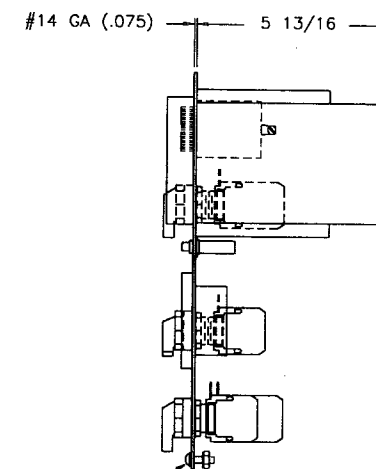
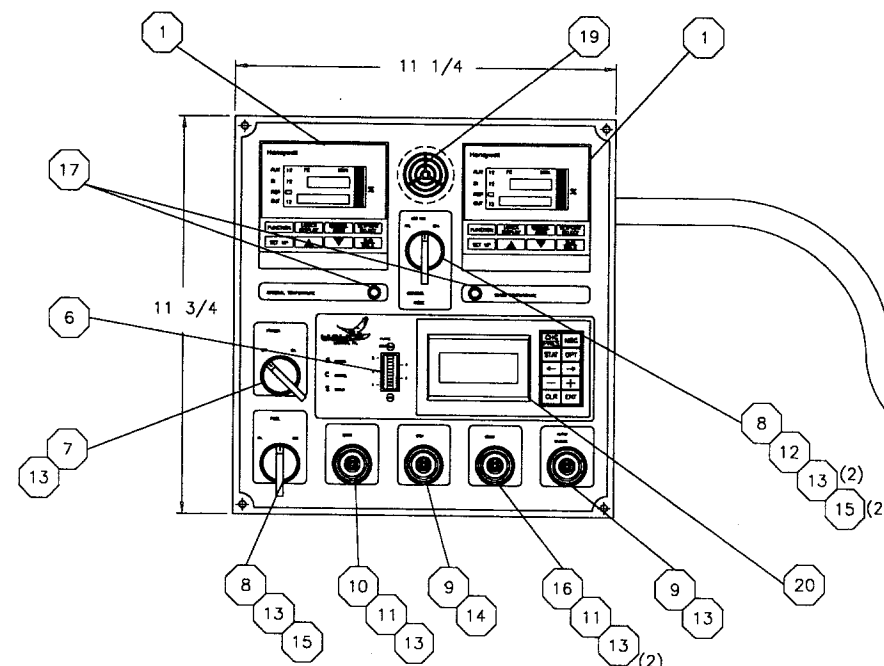
37	73308x001	1	TYPE 'J' AUX HI-TEMP LIMIT KIT
37	73308x002	1	TYPE 'K' AUX HI-TEMP LIMIT KIT

NOTE:

CY6827, SYSTEM SCHEMATIC
CY6828, WIRING DIAGRAM
* TOTAL OF 2 TYPE J OR TYPE K THERMOCOUPLES ARE REQUIRED



OPERATING PLATE
MOUNTING & CUT-OUT DIMENSIONS



MOUNTING HARDWARE SUPPLIED
(4) SCREW, PHILLIPS OVAL HD #10-32 x 3/4 LG
(4) WASHER, #10 METAL CUP
(4) WASHER, LOCK #10
(4) NUT, HEX. MACH. #10-23

MATL	PROCESS CODE	DRN. DLS	8-3 99
		CHK	
		APP	
TITLE	PANEL ASSEMBLY, SINGLE BURNER, DUAL TEMP CONTROL DROP-IN (BCS3000J)	ENG	
		SALES	
		PROD	
SCALE		DWG. SIZE	DWG. NO. SHI. NO. OF CY6853

