

# GSI Competitor & EMCS Portable Dryer Models

## Troubleshooting and Reference Manual

2004 Revised Edition  
PNEG-630



Competitor Series 2000 Dryer



a division of  

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THE GSI GROUP

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## Dryer Safety Instructions and Information

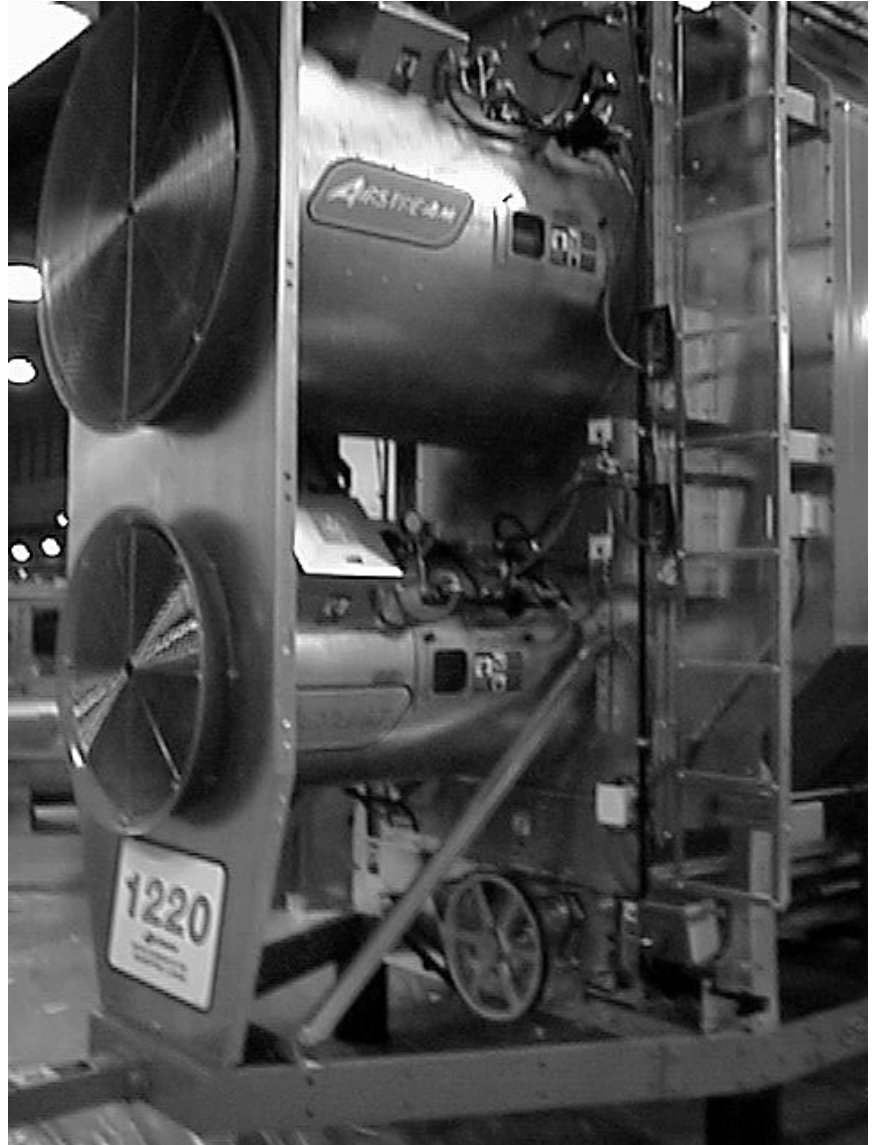
Thank you for choosing an GSI Grain Dryer. It is designed to provide excellent performance and service for many years.

This manual refers to the troubleshooting of the E.M.C.S. and Series 2000 Competitor models. Different models are available for liquid propane or natural gas fuel supply, with either single phase 230 volt, or three phase 230, 460, 575 volt electrical power. (Also 380 volt 50Hz).

The GSI Group Inc. recommends contacting your local power company, and having a representative survey your installation so the wiring is compatible with your system and adequate power is supplied.

The principal concern of the GSI Group, Inc. ("GSI") is your safety and the safety of others associated with grain handling equipment. This manual is written to help you understand safe operating procedures, and some of the problems that may be encountered by the operator or other personnel.

As owner and/or operator, it is your responsibility to know what requirements, hazards and precautions exist, and to inform all personnel associated with the equipment, or who are in the dryer area. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation, where serious injury or death may occur.



### **WARNING! BE ALERT!**

Personnel operating or working around electric fans should read this manual. This manual must be delivered with the equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

### **Safety Alert Symbol**

The symbol shown is used to call your attention to instructions concerning your personal safety. Watch for this symbol; it points out important safety precautions. It means "**ATTENTION**", "**WARNING**", "**CAUTION**", and "**DANGER**". Read the message and be cautious to the possibility of personal injury or death.

Grain Systems, Inc. recommends you contact your local power company and have a representative survey your dryer installation, so your wiring will be compatible with their system and you will have adequate power supplied to your unit.



Safety decals should be read and understood by all people in and around the dryer area. If the following safety decals are not displayed on your dryer, or if they are damaged, contact Grain Systems, Inc. for replacement.



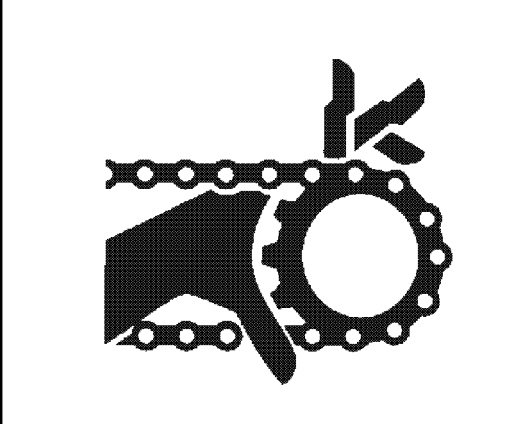
**⚠ DANGER!**



**Auto equipment can start at anytime. Do not enter until electric power is locked in off position. Failure to do so will result in serious injury or death.**

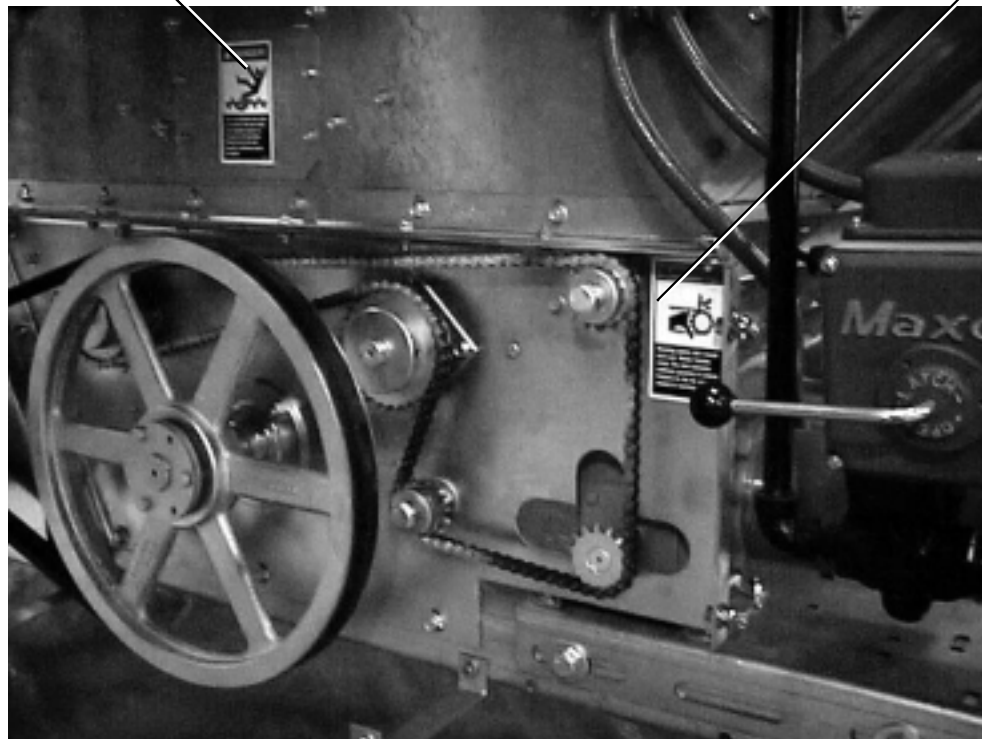
DC-974

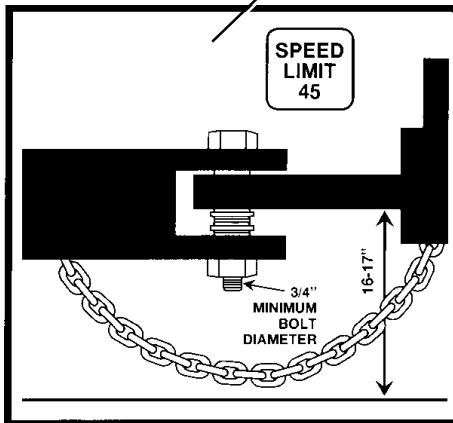
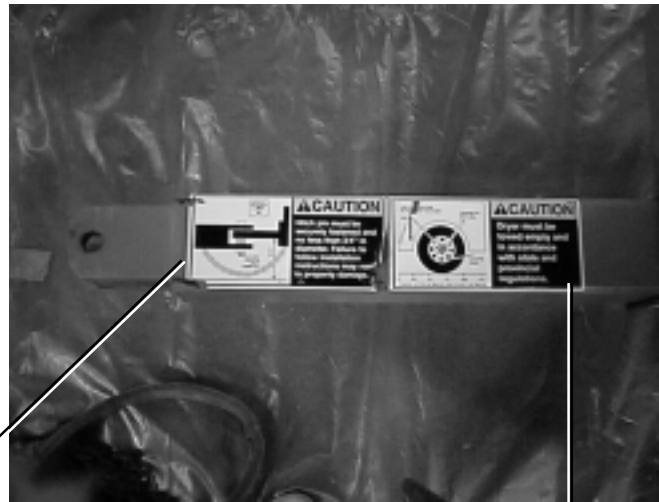
**⚠ WARNING!**



**Moving parts can crush and cut. Keep hands clear. Do not operate without guards in place. Failure to do so could result in serious injury.**

DC-972

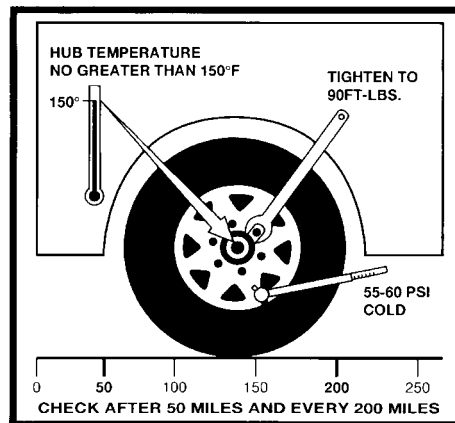




**⚠ CAUTION**

Hitch pin must be securely fastened and no less than 3/4" in diameter. Failure to follow installation instructions may result in property damage.

DC-388



**⚠ CAUTION**

Dryer must be towed empty and in accordance with state and provincial regulations.

DC-1249

**READ THESE INSTRUCTIONS  
BEFORE OPERATION AND SERVICE  
SAVE FOR FUTURE REFERENCE**

1. Read and understand the operating manual before trying to operate the dryer.
2. Power supply should be OFF for service of electrical components. Use CAUTION in checking voltage or other procedures requiring power to be ON.
3. Check for gas leaks at all gas pipe connections. If any leaks are detected, do not operate the dryer. Shut down and repair before further operation.
4. Never attempt to operate the dryer by jumping or otherwise bypassing any safety devices on the unit.
5. Set pressure regulator to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. Do not exceed maximum recommended drying temperature.
6. Keep the dryer clean. Do not allow fine material to accumulate in the plenum or drying chamber.
7. Use CAUTION in working around high speed fans, gas burners, augers and auxiliary conveyors which START AUTOMATICALLY.
8. Do not operate in any area where combustible material will be drawn into the fan.
9. Before attempting to remove and reinstall any propeller, make certain to read the recommended procedure listed within the servicing section of the manual.
10. Clean grain is easier to dry. Fine material increases resistance to airflow and requires removal of extra moisture.

**This product is intended for the use of grain handling only. Any other use is considered a misuse of the product.**

**Some edges of the product components can be sharp. It is recommended that each component of this product be examined to determine if there are any safety considerations to be taken. Any and all necessary personal protective equipment should be worn at all times when handling, assembling, installing and operation of the product and/or components.**

**Guards are removed for illustration purpose only. All guards must be in place before/during operation.**

**Use Caution in the  
Operation of this  
Equipment**

The design and manufacture of this dryer is directed toward operator safety. However, the very nature of a grain dryer having a gas burner, high voltage electrical equipment and high speed rotating parts, does present a hazard to personnel, which can not be completely safeguarded against, without interfering with efficient operation and reasonable access to components.

Use extreme caution in working around high speed fans, gas-fired heaters, augers and auxiliary conveyors, which may start without warning when the dryer is operating on automatic control.

---

**KEEP THE DRYER CLEAN  
DO NOT ALLOW FINE  
MATERIAL TO ACCUMULATE  
IN THE PLENUM CHAMBER  
OR SURROUNDING THE  
OUTSIDE OF THE DRYER**

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Continued safe, dependable operation of automatic equipment depends, to a great degree, upon the owner. For a safe and dependable drying system, follow the recommendations within this manual, and make it a practice to regularly inspect the operation of the unit for any developing problems or unsafe conditions.

Take special note of the safety precautions listed at left before attempting to operate the dryer.





## Safety Voltage Check Points

FAN #	Error Message	1		2		3		4		5		6		RESULT
		-	+	-	+	-	+	-	+	-	+	-	+	
	Fan # Housing High Temperature	J5-12	J1-7	J5-12	J1-8	J5-12	J2-7	J5-12	J2-8	J5-12	J3-7	J5-12	J3-8	12VDC
	Burner # Vapor High Temperature	J5-12	J1-5	J5-12	J1-6	J5-12	J2-5	J5-12	J2-6	J5-12	J3-5	J5-12	J3-6	12VDC
	Burner # Flame not Detected	J5-12	J1-9	J5-12	J1-10	J5-12	J2-9	J5-12	J2-10	J5-12	J3-9	J5-12	J3-10	12VDC
	Plenum # High Temperature	J5-12	J1-11	J5-12	J1-12	J5-12	J2-11	J5-12	J2-12	J5-12	J3-11	J5-12	J3-12	12VDC
	Burner # Shutdown Loss of Airflow	J5-12	J1-13	J5-12	J1-14	J5-12	J2-13	J5-12	J2-14	J5-12	J3-13	J5-12	J3-14	Note 1
	Fan # Failure No Airflow	J5-12	J1-13	J5-12	J1-14	J5-12	J2-13	J5-12	J2-14	J5-12	J3-13	J5-12	J3-14	Note 2
	Fan # cannot Start Check Air Switch	J5-12	J1-13	J5-12	J1-14	J5-12	J2-13	J5-12	J2-14	J5-12	J3-13	J5-12	J3-14	Note 3

<p>Lower or Left Fixed Grain Lower Adjustable or Right Fixed Grain Middle Fixed Grain Middle Adjustable Grain Upper Fixed Grain Upper Adjustable Grain</p>	<p>2200/2300/2400</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>J5-12</td><td>J1-19</td></tr> <tr><td>J5-12</td><td>J4-19</td></tr> <tr><td>J5-12</td><td>N/A</td></tr> <tr><td>J5-12</td><td>N/A</td></tr> <tr><td>J5-12</td><td>J4-4</td></tr> <tr><td>J5-12</td><td>J4-8</td></tr> <tr><td>J5-12</td><td>J4-2</td></tr> <tr><td>J5-12</td><td>J4-6</td></tr> </table>	J5-12	J1-19	J5-12	J4-19	J5-12	N/A	J5-12	N/A	J5-12	J4-4	J5-12	J4-8	J5-12	J4-2	J5-12	J4-6								
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<p>1100/1200/1300</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>J5-12</td><td>J1-19</td></tr> <tr><td>J5-12</td><td>J4-19</td></tr> <tr><td>J5-12</td><td>N/A</td></tr> <tr><td>J5-12</td><td>N/A</td></tr> <tr><td>J5-12</td><td>N/A</td></tr> <tr><td>J5-12</td><td>N/A</td></tr> </table>	J5-12	J1-19	J5-12	J4-19	J5-12	N/A	J5-12	N/A	J5-12	N/A	J5-12	N/A	<p>3300/3400/3600</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>J5-12</td><td>J1-19</td></tr> <tr><td>J5-12</td><td>J4-19</td></tr> <tr><td>J5-12</td><td>J4-4</td></tr> <tr><td>J5-12</td><td>J4-8</td></tr> <tr><td>J5-12</td><td>J4-2</td></tr> <tr><td>J5-12</td><td>J4-6</td></tr> </table>	J5-12	J1-19	J5-12	J4-19	J5-12	J4-4	J5-12	J4-8	J5-12	J4-2	J5-12	J4-6
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J5-12	J4-4																								
J5-12	J4-8																								
J5-12	J4-2																								
J5-12	J4-6																								

**Misc Errors**

Auxiliary Safety Shutdown	J5-12	J1-20
Motor Overload	J5-12	J4-12
Grain Discharge Warning	J5-12	J5-5
Maxon Valve Shut Warning	J5-12	J5-2
Unknown Safety Error	J5-12	J5-10
20 Second Safety Circuit Failure	J5-12	J5-6

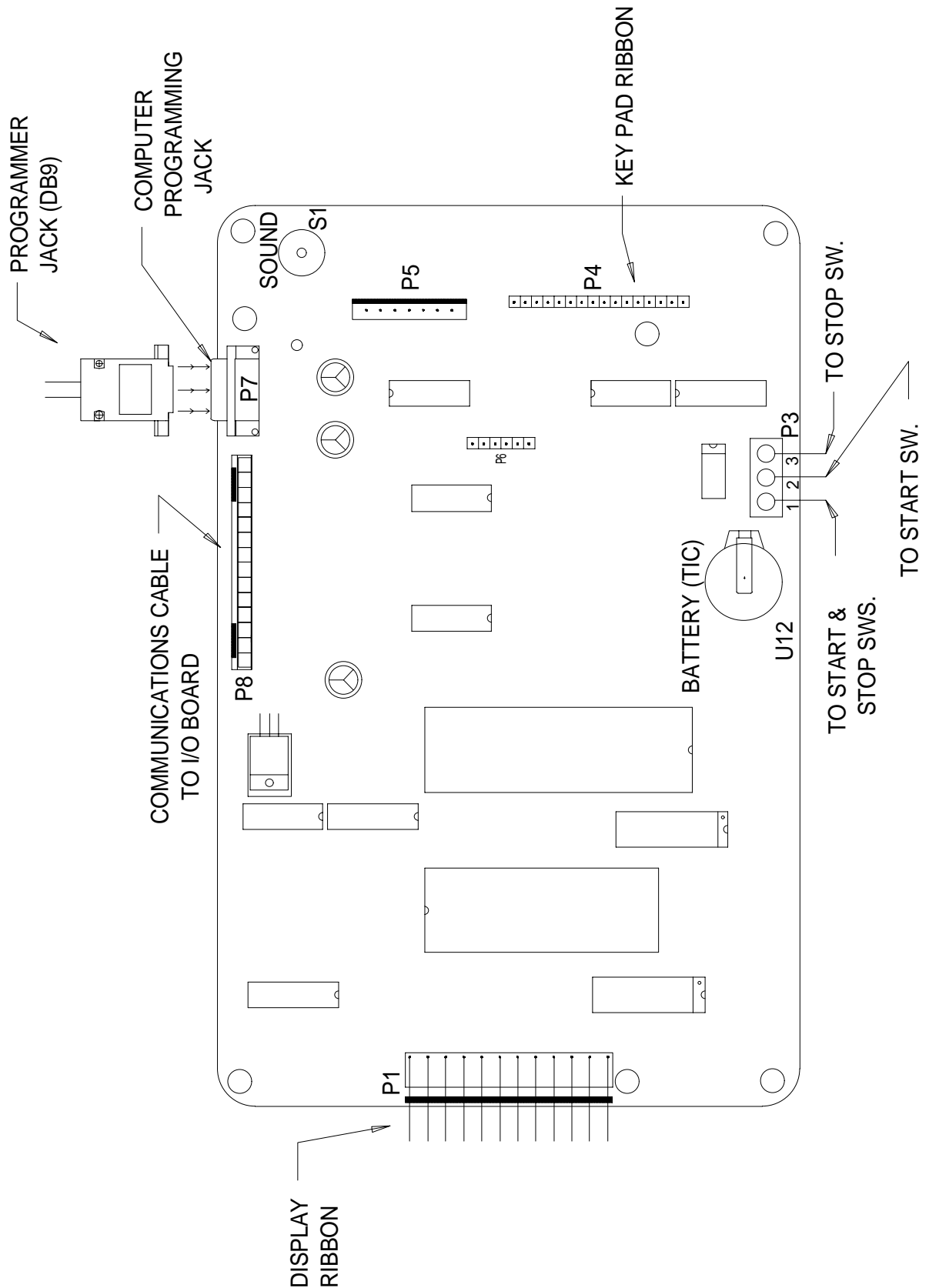
**Note:**

- 1 This error will occur if the fan and burner were both operating and the air switch opens which indicates loss of static pressure. 12 volts should be present if the fan is on.
- 2 This error will occur if after the fan has started the air switch does not detect any static pressure. 12 volts should be present if the fan is on.
- 3 The condition for this error will occur if the air switch is stuck in the closed position. No voltage should be present if the dryer is stopped.

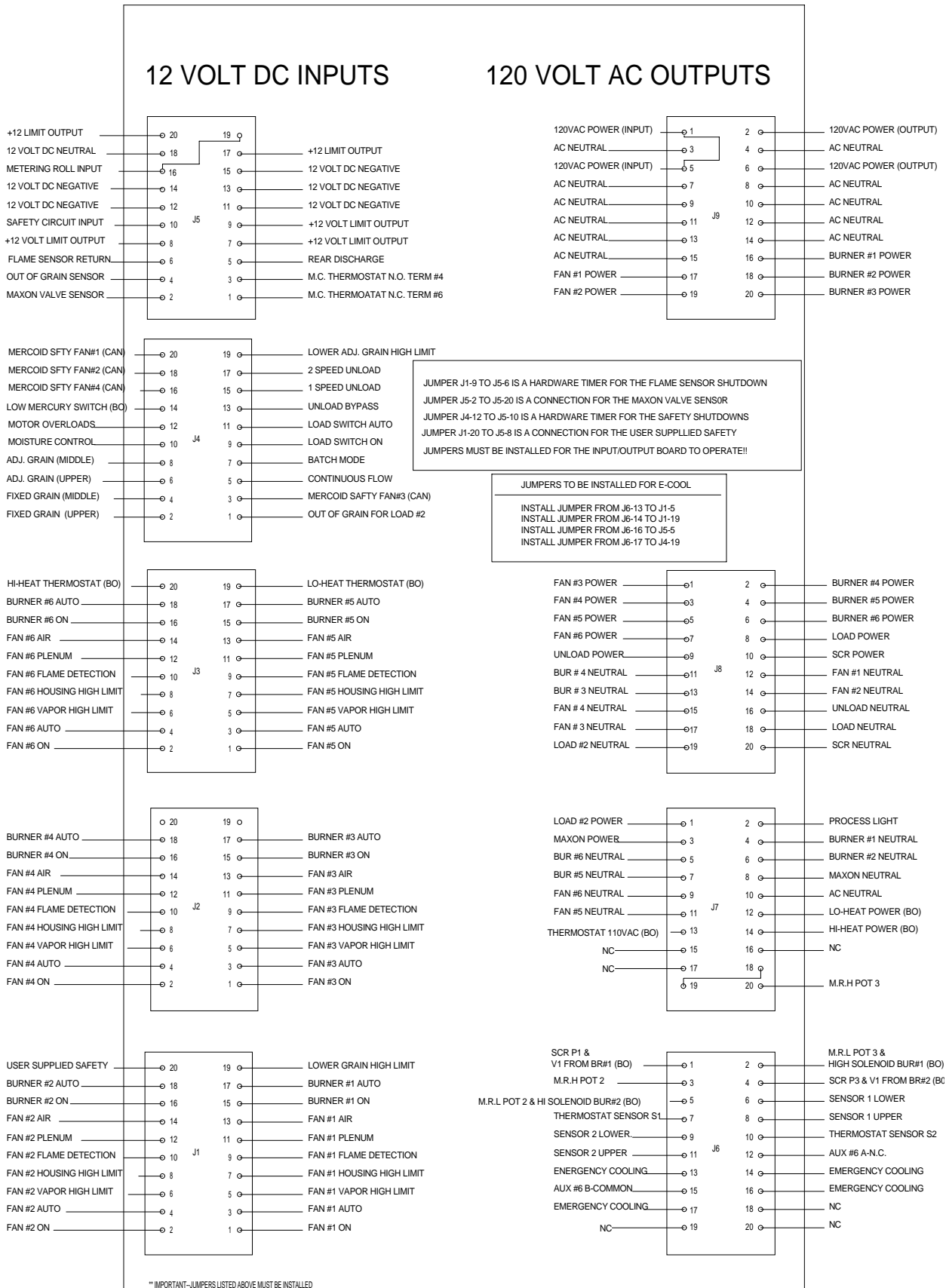
## **Programming Instructions for EMCS Grain Dryers**

1. Turn Control Power on dryer to off.
2. Locate programming jack (P7) on back of computer. (See page 13).
3. Plug the DB-9 jack of the programmer into the computer's jack.
4. Be sure that the rotary switch on the programmer is set to position 8.
5. Turn on Control Power to the dryer.
6. The four (4) lights on the programmer will come on, then three (3) will go out leaving the power light still on.
7. Push the start button on the programmer to start the transfer of Software.
8. The busy light will flash until the transfer process is complete.
9. When completed the pass light will flash indicating a successful transfer.
10. If the fail light flashes then check your connections and repeat the above process.
11. Turn Control Power on dryer to off and remove the cable.
12. Turn on the dryer and the opening screens should indicate the newer version of software.

### EMCS Display Board

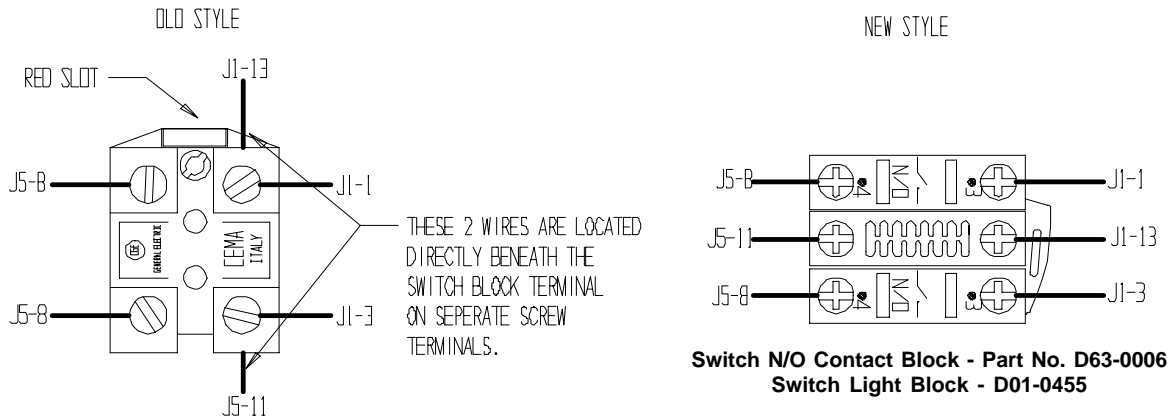


### Input/Output Board Identification



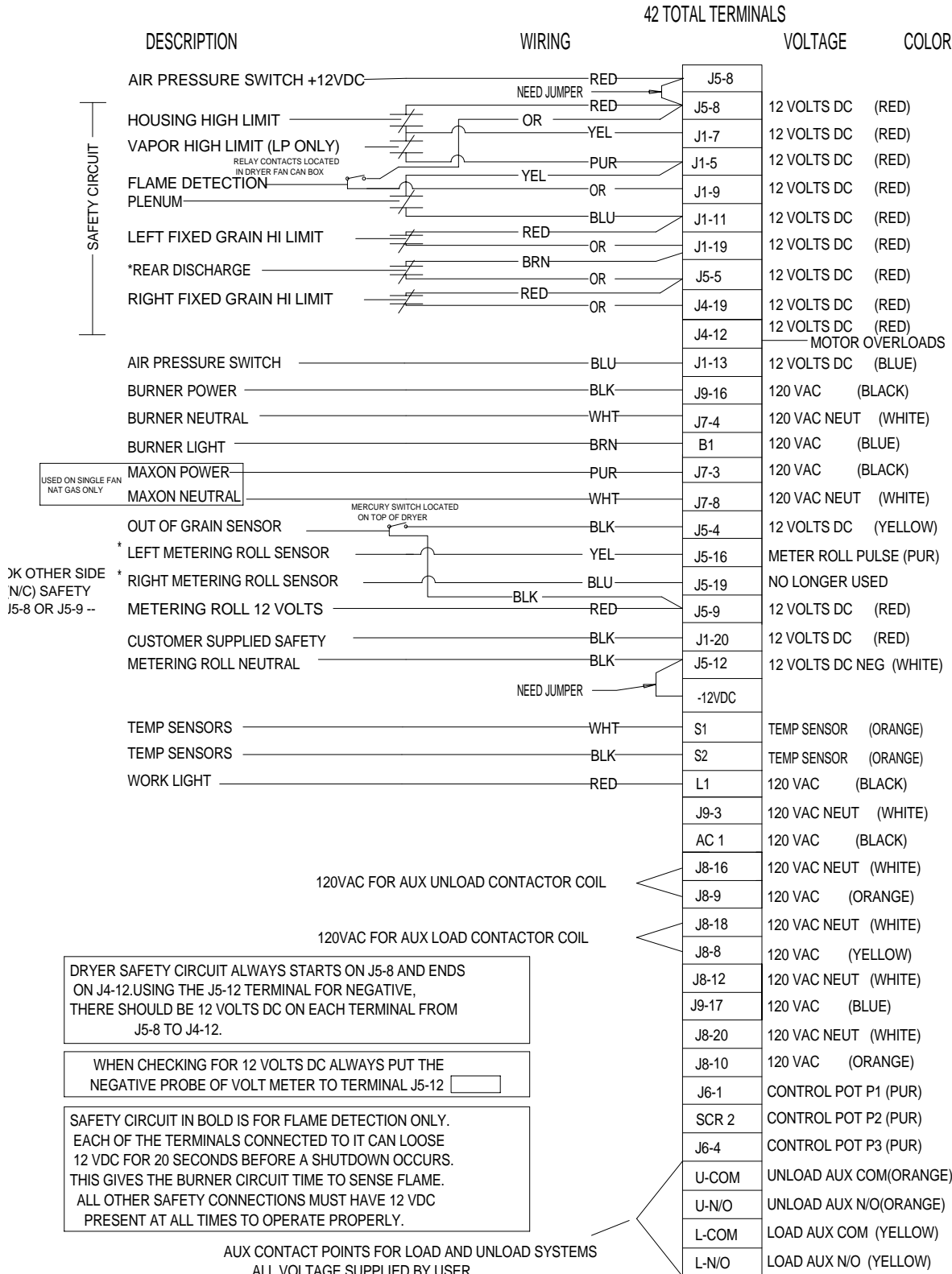
**Switch Replacement for EMCS Dryer**

PRE 1996 SWITCH REPLACEMENT FOR DRYERS AND AUTOFLOW WITH EMCS CONTROLLERS



1. DISCONNECT POWER TO DRYER CONTROL CIRCUIT.
2. OPEN CONTROL BOX AND MAKE NOTES ON WIRE PLACEMENT ON OLD SWITCH.
3. DISCONNECT WIRES FROM LIGHT BLOCK
4. INSERT A SCREWDRIVER INTO THE RED SLOT AND RAISE IT TO DISSENGAGE THE SWITCH ASSEMBLY FROM THE LENS COLLAR
5. REMOVE THE SWITCH ASSEMBLY FROM THE LENS COLLAR.
6. USE A PAIR OF PLIERS TO LOOSEN THE COLLAR HOLDING THE LENS ASSEMBLY TO THE CONTROL PANEL.
7. REMOVE THE LENS ASSEMBLY FROM THE CONTROL PANEL.
8. INSERT THE NEW LENS ASSEMBLY INTO THE MOUNTING HOLE.
9. ALIGN THE TAB OF THE NEW LENS COLLAR WITH THE NOTCH IN THE MOUNTING HOLE.
10. SCREW THE NEW COLLAR ONTO THE LENS ASSEMBLY.
11. ROTATE THE BLOCK AND SWITCH ASSEMBLY AS SHOWN ABOVE INTO THE LENS ASSEMBLY
12. REATTACH THE WIRES TO THE NEW SWITCH. (USE THE ABOVE EXAMPLE FOR REFERENCE)
13. UNSCREW LENS RETAINING COLLAR (SILVER RING) LOCATED ON THE COLORED PLASTIC LENS AND REMOVE.
14. AFTER THE LENS COLLAR IS REMOVED, REMOVE THE COLORED LENS AND REPOSITION THE LENS SO IT MATCHES THE DECAL WHEN SWITCHED.
15. REINSTALL THE LENS RETAINING COLLAR.

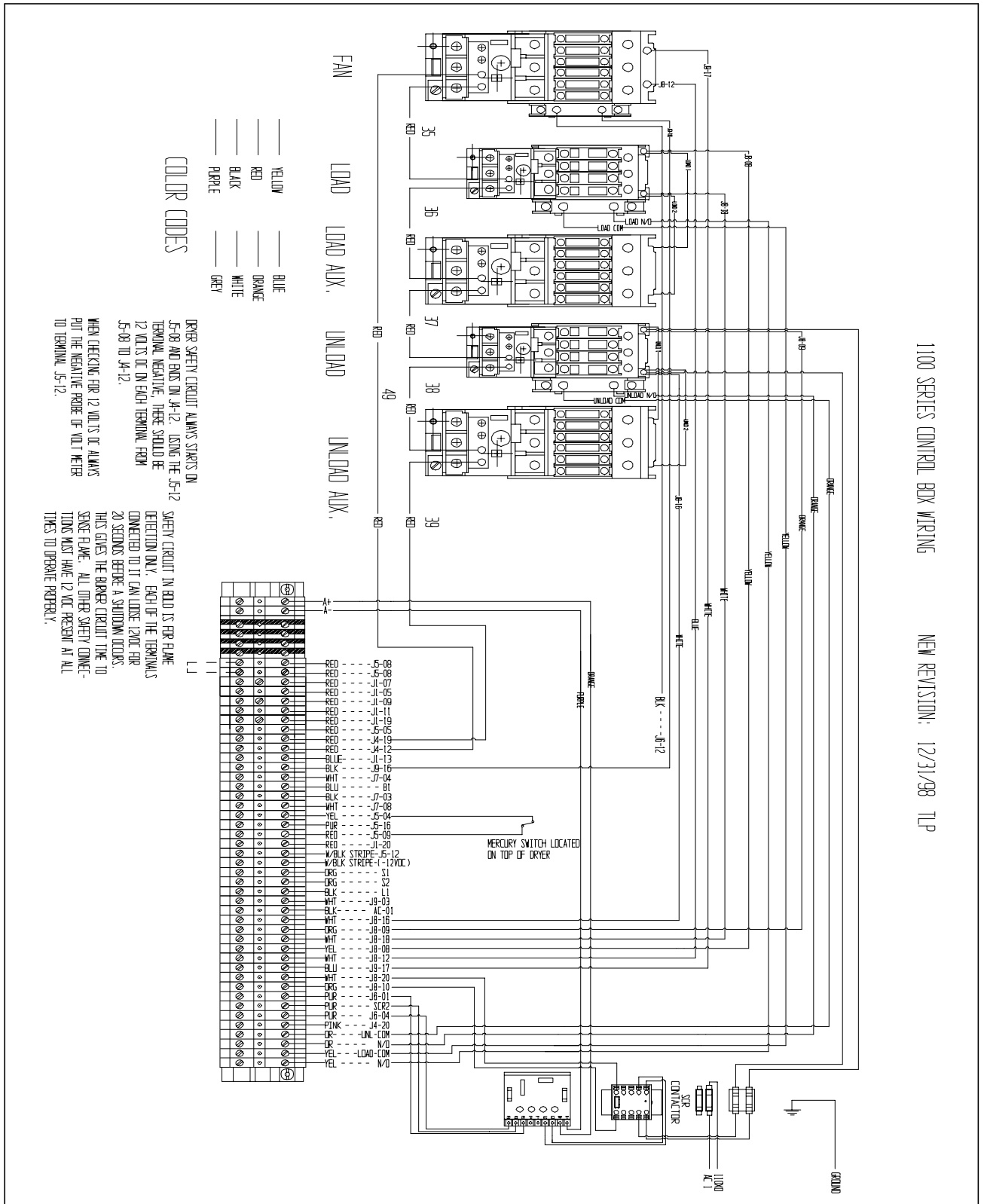
### 1100 Series Control Box Wiring



\*LOCATED AT REAR OF DRYER  
1100EW98.PRT REV. DATE 4/10/98

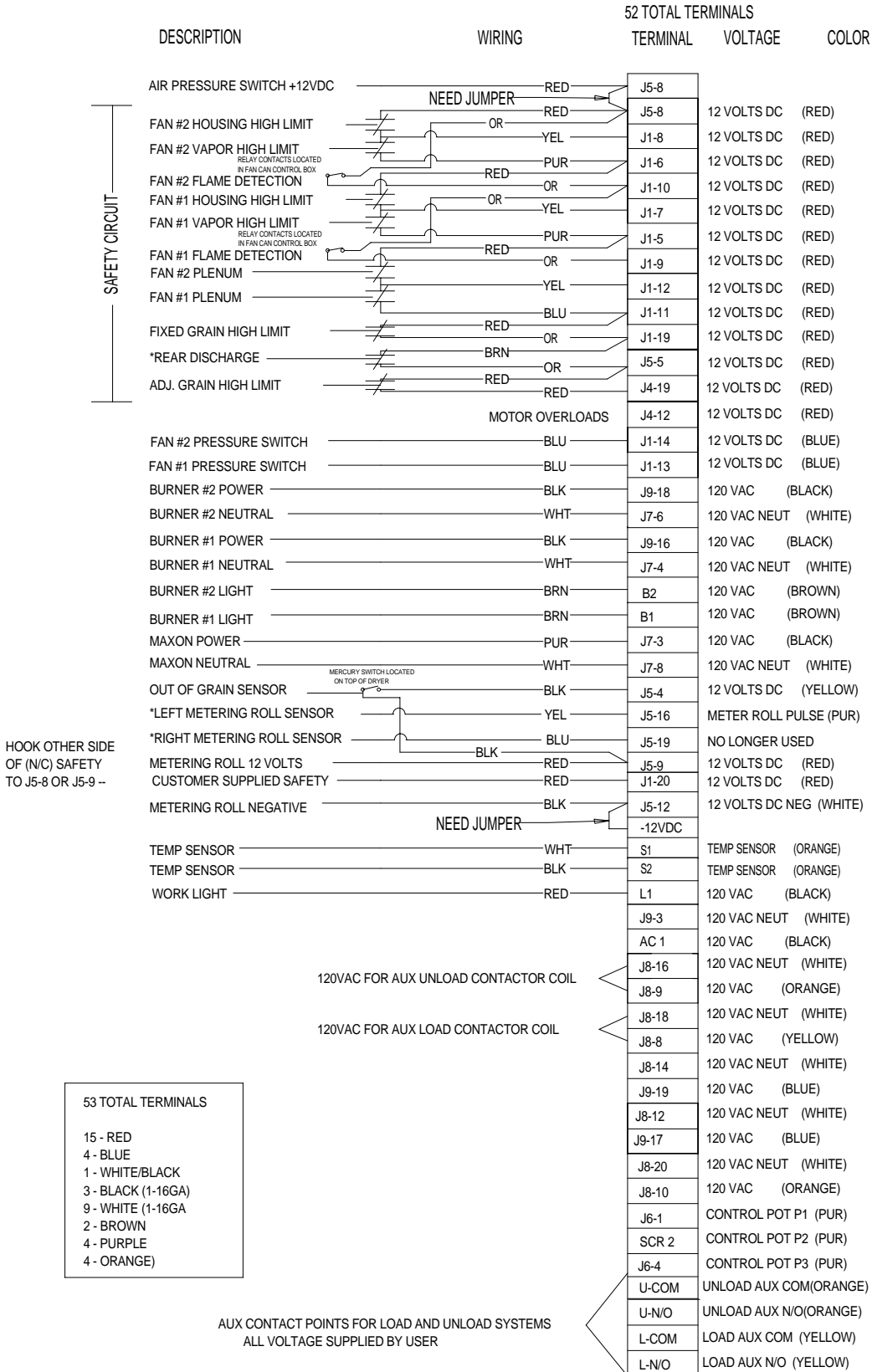
ALL SAFETIES MUST BE CLOSED FOR DRYER TO OPERATE

# 1100 Series Control Box Wiring (New Version)





### 1200 Series Control Box Wiring



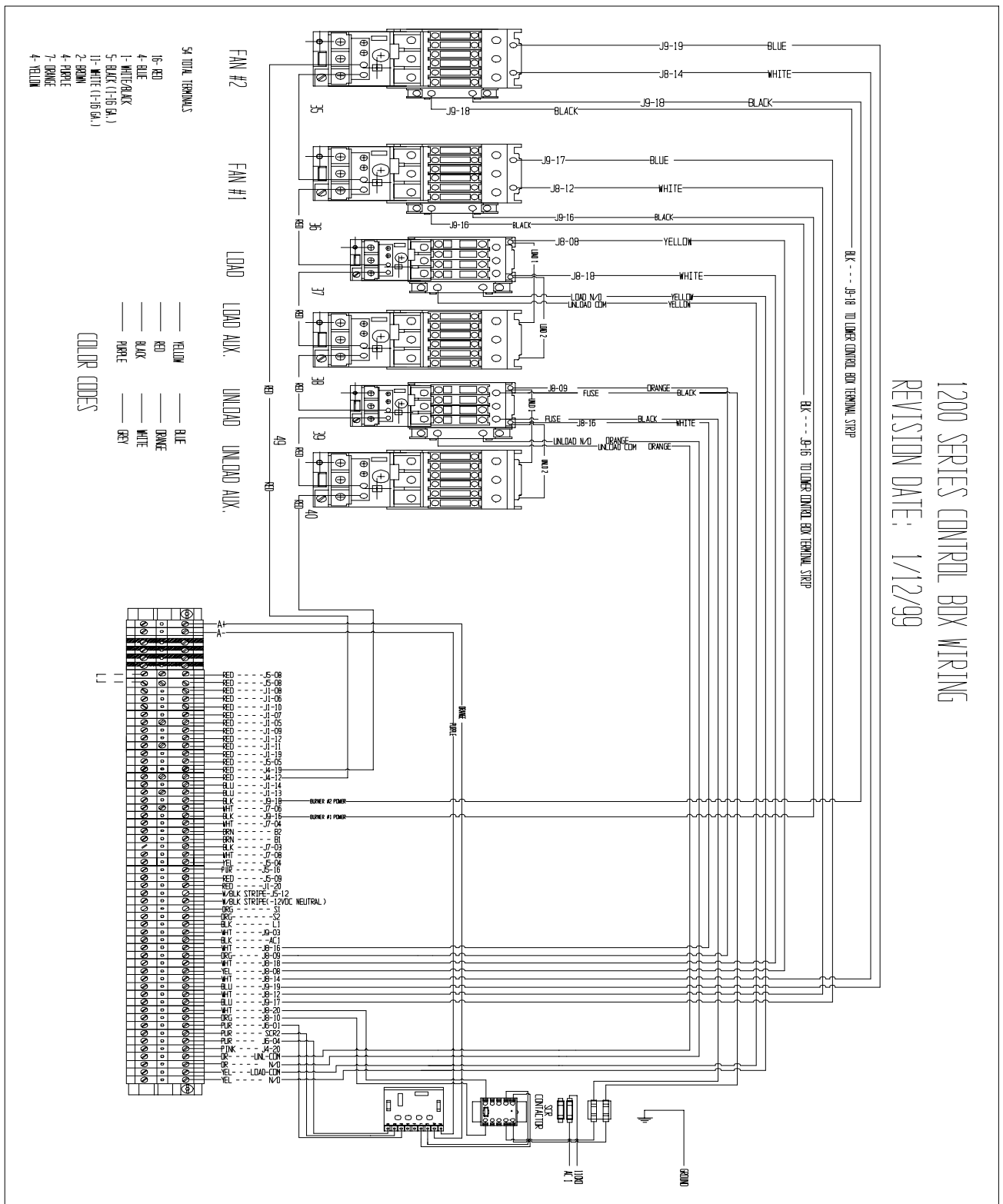
- 53 TOTAL TERMINALS
- 15 - RED
  - 4 - BLUE
  - 1 - WHITE/BLACK
  - 3 - BLACK (1-16GA)
  - 9 - WHITE (1-16GA)
  - 2 - BROWN
  - 4 - PURPLE
  - 4 - ORANGE

AUX CONTACT POINTS FOR LOAD AND UNLOAD SYSTEMS  
ALL VOLTAGE SUPPLIED BY USER

\*LOCATED AT REAR OF DRYER  
1200EW98.PRT REV. DATE 3/5/98

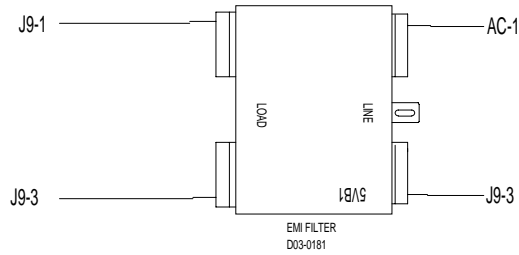
ALL SAFETIES MUST BE CLOSED FOR DRYER TO OPERATE

### 1200 Series Control Box Wiring (New Version)



### 1100 Fan Lower Control Box Interconnect Strip

EMERGENCY COOLING JUMPERS  
 INSTALL J6-13 TO J1-5  
 INSTALL J6-14 TO J1-19  
 INSTALL J6-16 TO J5-5  
 INSTALL J6-17 TO J4-19

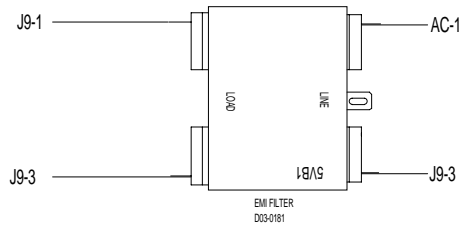


L1	⊗	○	⊗	BLACK - 120 VAC - OUTSIDE LIGHT
B1	⊗	○	⊗	BROWN - 120 VAC - BURNER #1 LIGHT
S1	⊗	○	⊗	ORANGE - TEMPERATURE SENSOR
S2	⊗	○	⊗	ORANGE - TEMPERATURE SENSOR
SCR2	⊗	○	⊗	PURPLE - CONTROL POT P2
J1-5	⊗	○	⊗	RED - 12 VDC - FAN #1 VAPOR HIGH LIMIT
J1-7	⊗	○	⊗	RED - 12 VDC - FAN #1 HOUSING HIGH LIMIT
J1-9	⊗	○	⊗	RED - 12 VDC - FAN #1 FLAME DETECTION
J1-11	⊗	○	⊗	RED - 12 VDC - FAN #1 PLENUM HIGH LIMIT
J1-13	⊗	○	⊗	BLUE - 12 VDC - FAN #1 AIR SWITCH
J1-19	⊗	○	⊗	RED - 12 VDC - LOWER FIXED GRAIN LIMIT
J1-20	⊗	○	⊗	RED - 12 VDC - USER SUPPLIED SAFETY
J4-12	⊗	○	⊗	RED - 12 VDC - MOTOR OVERLOADS
J4-19	⊗	○	⊗	RED - 12 VDC - LOWER ADJUSTABLE GRAIN HIGH LIMIT
J5-4	⊗	○	⊗	YELLOW - 12 VDC - OUT OF GRAIN SENSOR
J5-5	⊗	○	⊗	RED - 12 VDC - REAR DISCHARGE SWITCH
J5-8	⊗	○	⊗	RED - 12 VDC - 12 VOLT SUPPLY
J5-9	⊗	○	⊗	RED - 12 VDC - 12 VOLT SUPPLY
J5-12	⊗	○	⊗	WHITE - 12 VDC NEG - 12 VOLT SUPPLY NEGATIVE
J5-16	⊗	○	⊗	PURPLE - TIMING PULSE - LEFT METERING ROLL PULSE
J5-19	⊗	○	⊗	PURPLE - TIMING PULSE - RIGHT METERING ROLL PULSE
J6-1	⊗	○	⊗	PURPLE - CONTROL POT P1
J6-4	⊗	○	⊗	PURPLE - CONTROL POT P3
J7-3	⊗	○	⊗	BLACK - 120 VAC - MAXON POWER
J7-4	⊗	○	⊗	WHITE - AC NEUTRAL - BURNER NEUTRAL
J7-8	⊗	○	⊗	WHITE - AC NEUTRAL - MAXON NEUTRAL
J8-8	⊗	○	⊗	YELLOW - 120 VAC - LOAD POWER
J8-9	⊗	○	⊗	ORANGE - 120 VAC - UNLOAD POWER
J8-10	⊗	○	⊗	ORANGE - 120 VAC - SCR POWER
J8-12	⊗	○	⊗	WHITE - AC NEUTRAL - FAN #1 NEUTRAL
J8-16	⊗	○	⊗	WHITE - AC NEUTRAL - UNLOAD NEUTRAL
J8-18	⊗	○	⊗	WHITE - AC NEUTRAL - LOAD NEUTRAL
J8-20	⊗	○	⊗	WHITE - AC NEUTRAL - SCR NEUTRAL
J9-16	⊗	○	⊗	BLACK - 120 VAC - BURNER #1 POWER
J9-17	⊗	○	⊗	BLUE - 120 VAC - FAN #1 POWER

35 - D01-0531 ENTRELEC TERMINALS  
 2 - D01-0533 END STOPS  
 1 - D01-0532 BLANK PROTECTOR END

I/O BOARD JUMPERS  
 INSTALL J1-9 TO J5-6  
 INSTALL J5-2 TO J5-20  
 INSTALL J4-12 TO J5-10  
 INSTALL J1-20 TO J5-8

## 1200 Fan Lower Control Box Interconnect Strip



L1				BLACK - 120 VAC - OUTSIDE LIGHT
B1				BROWN - 120 VAC - BURNER #1 LIGHT
B2				BROWN - 120 VAC - BURNER #2 LIGHT
S1				ORANGE - TEMPERATURE SENSOR
S2				ORANGE - TEMPERATURE SENSOR
SCR2				PURPLE - CONTROL POT P2
J1-5				RED - 12 VDC - FAN #1 VAPOR HIGH LIMIT
J1-6				RED - 12 VDC - FAN #2 VAPOR HIGH LIMIT
J1-7				RED - 12 VDC - FAN #1 HOUSING HIGH LIMIT
J1-8				RED - 12 VDC - FAN #2 HOUSING HIGH LIMIT
J1-9				RED - 12 VDC - FAN #1 FLAME DETECTION
J1-10				RED - 12 VDC - FAN #2 FLAME DETECTION
J1-11				RED - 12 VDC - FAN #1 PLENUM HIGH LIMIT
J1-12				RED - 12 VDC - FAN #2 PLENUM HIGH LIMIT
J1-13				BLUE - 12 VDC - FAN #1 AIR SWITCH
J1-14				BLUE - 12 VDC - FAN #2 AIR SWITCH
J1-19				RED - 12 VDC - LOWER FIXED GRAIN LIMIT
J1-20				RED - 12 VDC - USER SUPPLIED SAFETY
J4-12				RED - 12 VDC - MOTOR OVERLOADS
J4-19				RED - 12 VDC - LOWER ADJUSTABLE GRAIN HIGH LIMIT
J5-4				YELLOW - 12 VDC - OUT OF GRAIN SENSOR
J5-5				RED - 12 VDC - REAR DISCHARGE SWITCH
J5-8				RED - 12 VDC - 12 VOLT SUPPLY
J5-9				RED - 12 VDC - 12 VOLT SUPPLY
J5-12				WHITE - 12 VDC NEG - 12 VOLT SUPPLY NEGATIVE
J5-16				PURPLE - TIMING PULSE- LEFT METERING ROLL PULSE
J5-19				PURPLE - TIMING PULSE- RIGHT METERING ROLL PULSE
J6-1				PURPLE - CONTROL POT P1
J6-4				PURPLE - CONTROL POT P3
J7-3				BLACK - 120 VAC - MAXON POWER
J7-4				WHITE - AC NEUTRAL - BURNER #1 NEUTRAL
J7-6				WHITE - AC NEUTRAL - BURNER #2 NEUTRAL
J7-8				WHITE - AC NEUTRAL - MAXON NEUTRAL
J8-8				YELLOW - 120 VAC - LOAD POWER
J8-9				ORANGE - 120 VAC - UNLOAD POWER
J8-10				ORANGE - 120 VAC - SCR POWER
J8-12				WHITE - AC NEUTRAL - FAN #1 NEUTRAL
J8-14				WHITE - AC NEUTRAL - FAN #2 NEUTRAL
J8-16				WHITE - AC NEUTRAL - UNLOAD NEUTRAL
J8-18				WHITE - AC NEUTRAL - LOAD NEUTRAL
J8-20				WHITE - AC NEUTRAL - SCR NEUTRAL
J9-16				BLACK - 120 VAC - BURNER #1 POWER
J9-17				BLUE - 120 VAC - FAN #1 POWER
J9-18				BLACK - 120 VAC - BURNER #2 POWER
J9-19				BLUE - 120 VAC - FAN #2 POWER

**EMERGENCY COOLING JUMPERS**

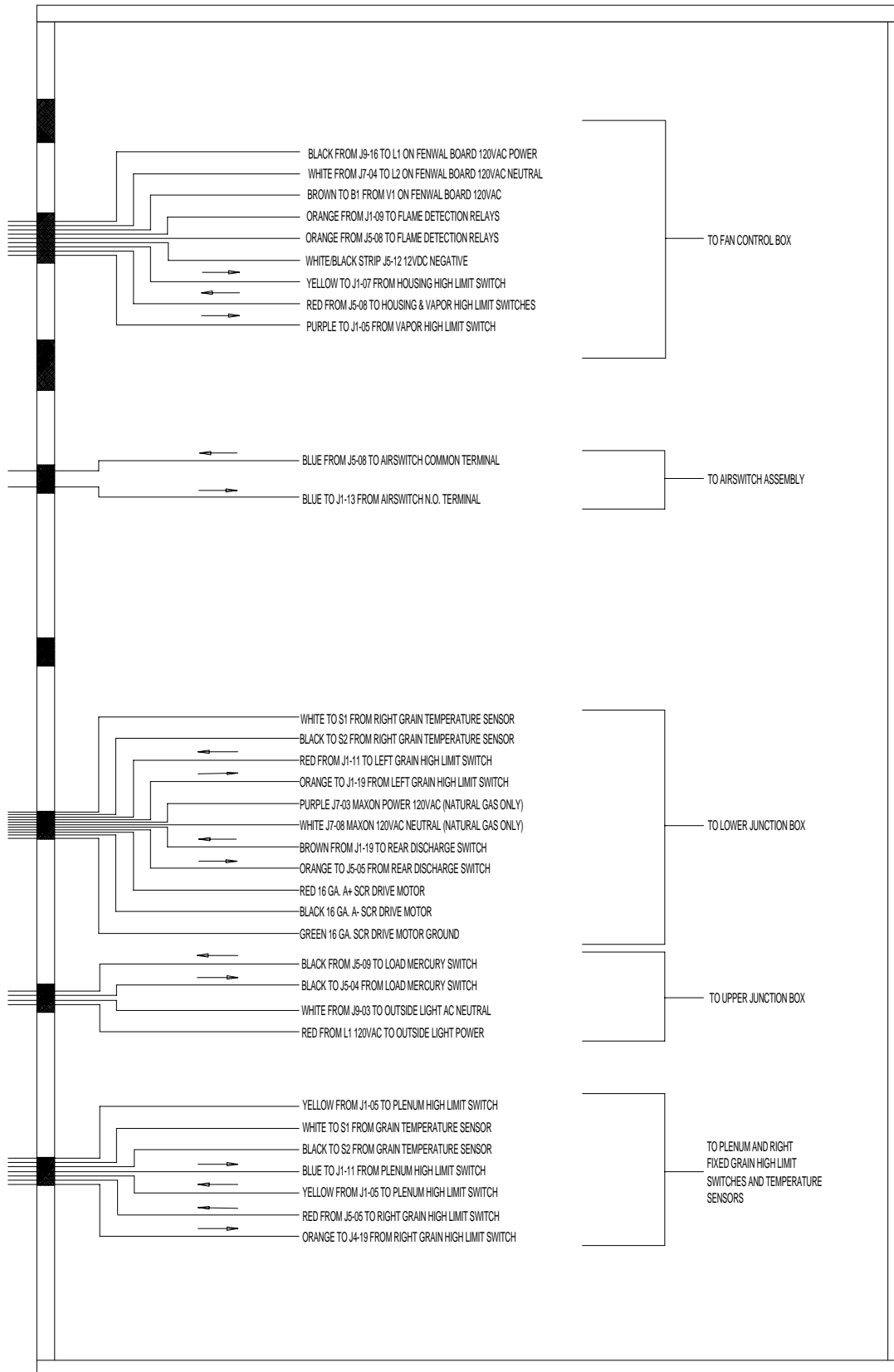
INSTALL J6-13 TO J1-5  
 INSTALL J6-14 TO J1-19  
 INSTALL J6-16 TO J5-5  
 INSTALL J6-17 TO J4-19

**I/O BOARD JUMPERS**

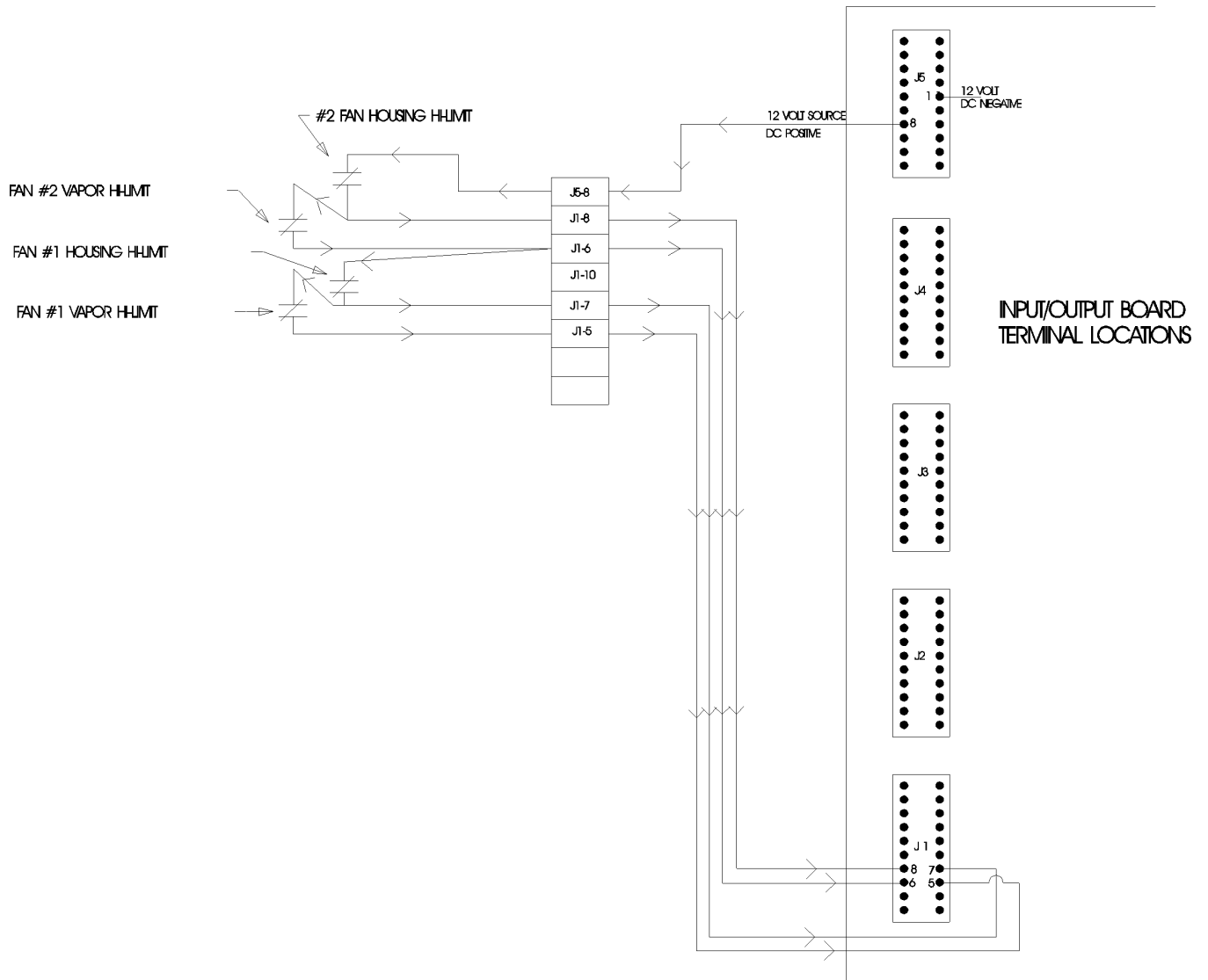
INSTALL J1-9 TO J5-6  
 INSTALL J5-2 TO J5-20  
 INSTALL J4-12 TO J5-10  
 INSTALL J9-1 TO J9-5

45 - D01-0531 ENTRELEC TERMINALS  
 2 - D01-0533 END STOPS  
 1 - D01-0532 BLANK PROTECTOR ENDS

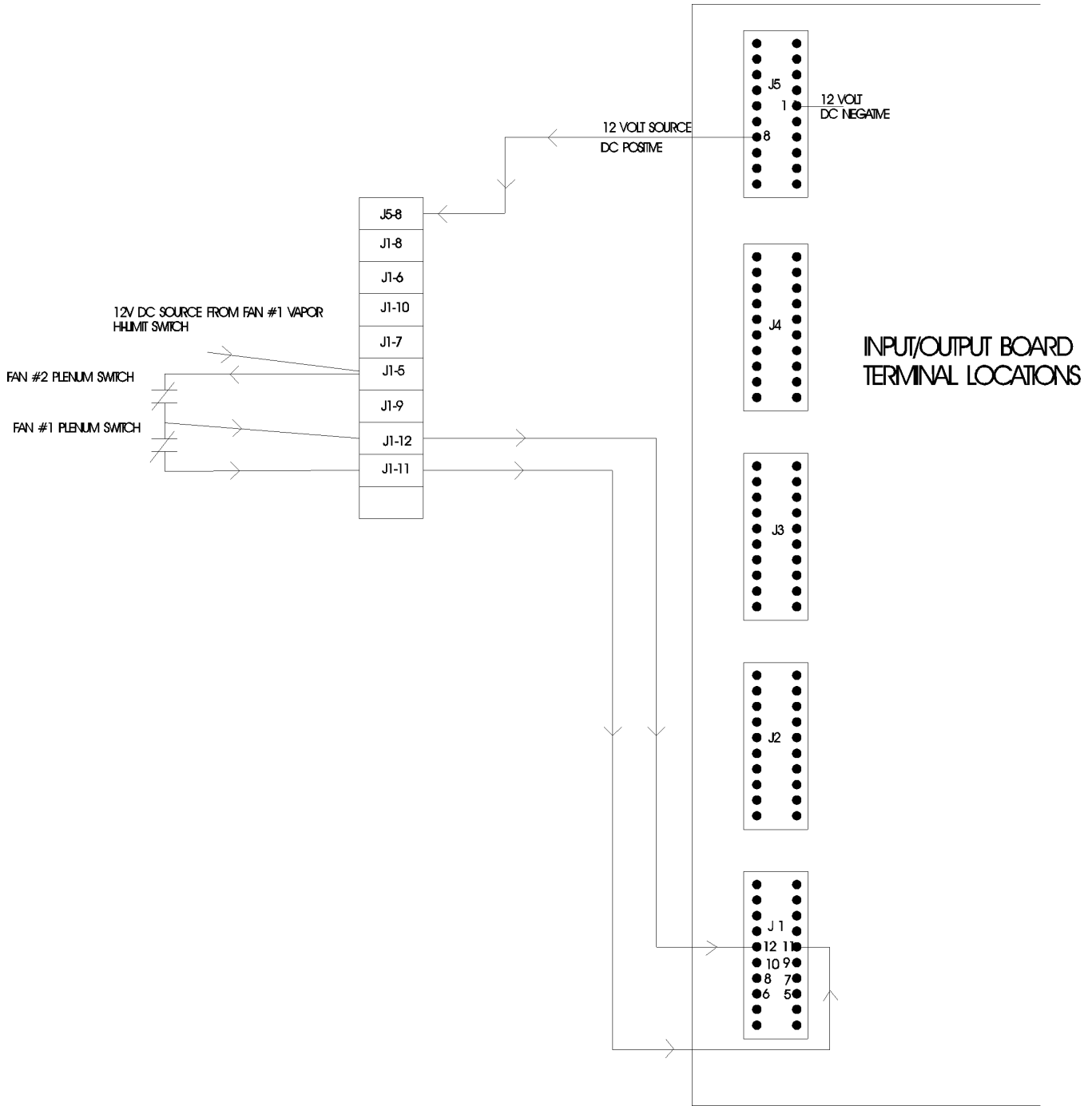
### Upper Control Box External Wiring



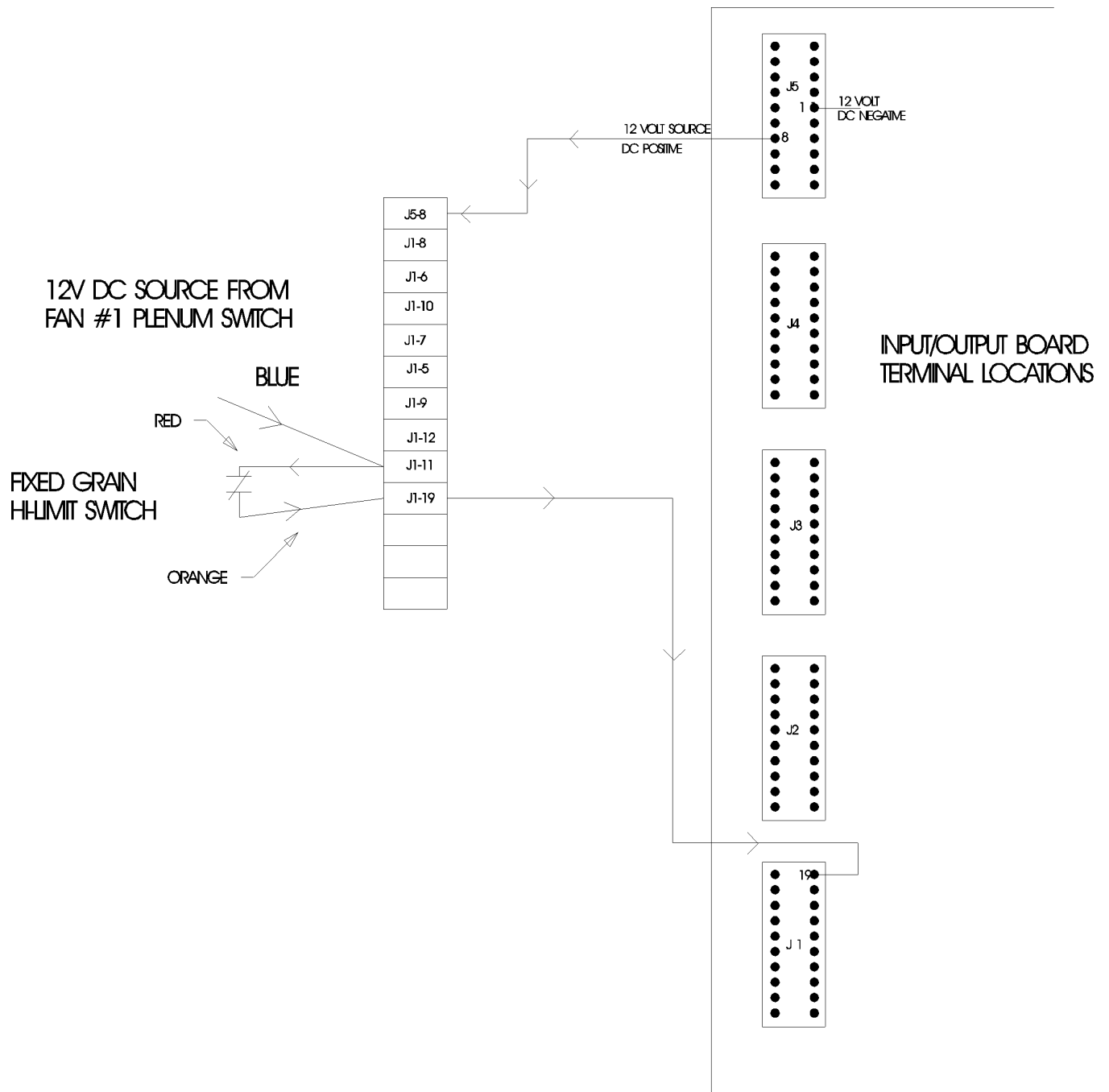
### Fan Housing and Vapor Hi-Limit Circuit



### Plenum Hi-Temperature Switch

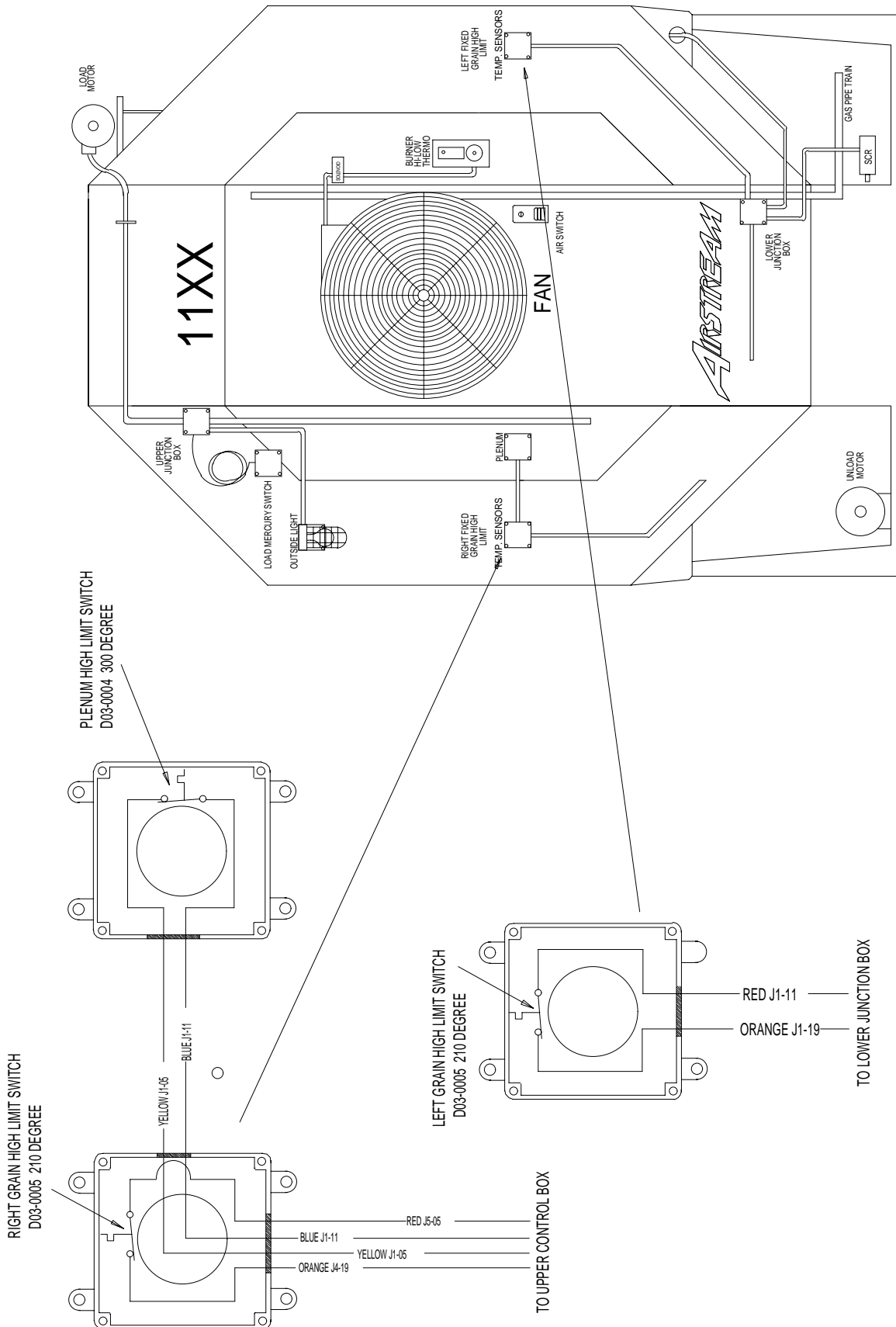


### Fixed Grain Hi-Limit

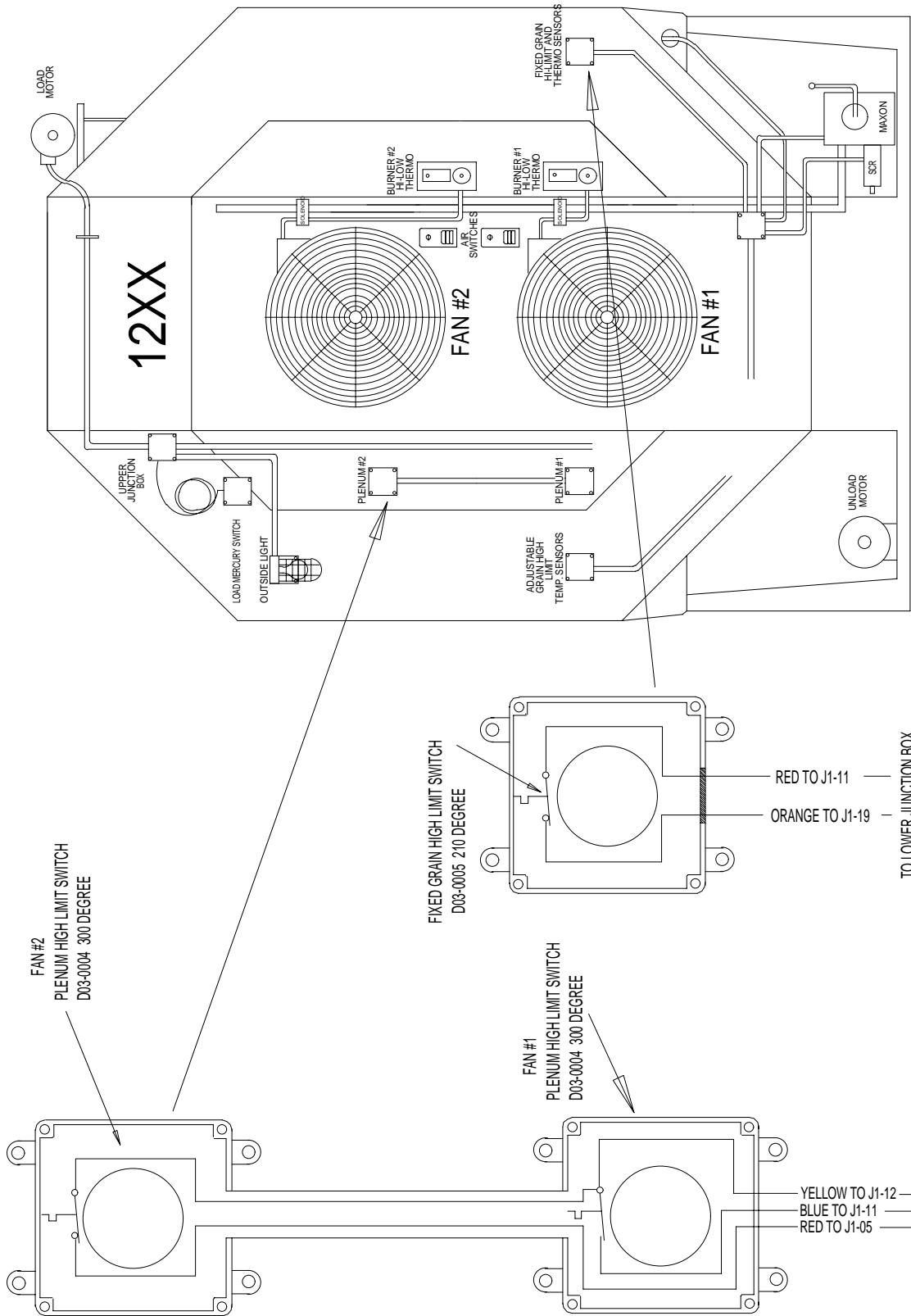




### Grain & Plenum Hi-Limit Locations

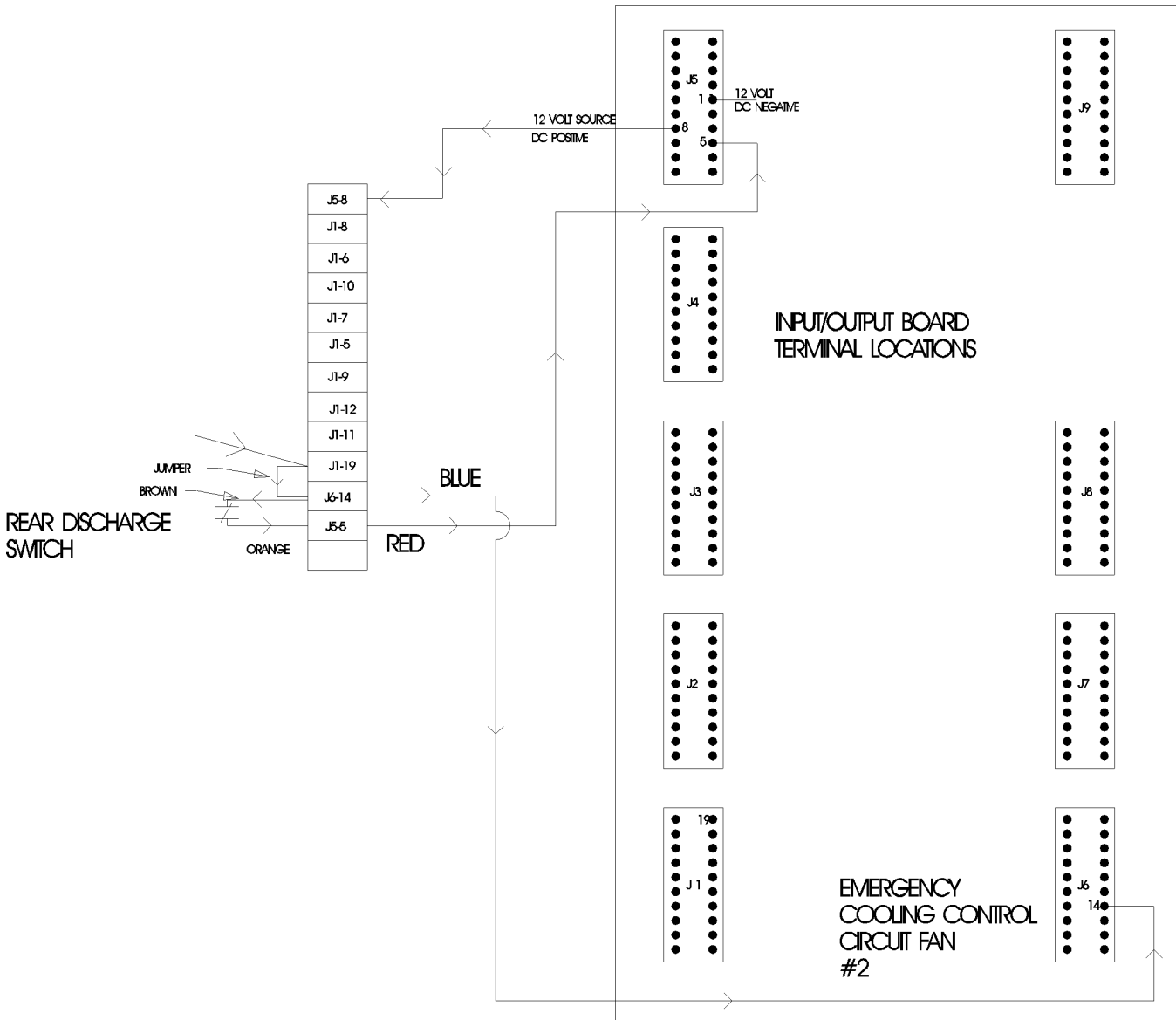


## Two Fan Plenum and Grain Limit Switch Wiring

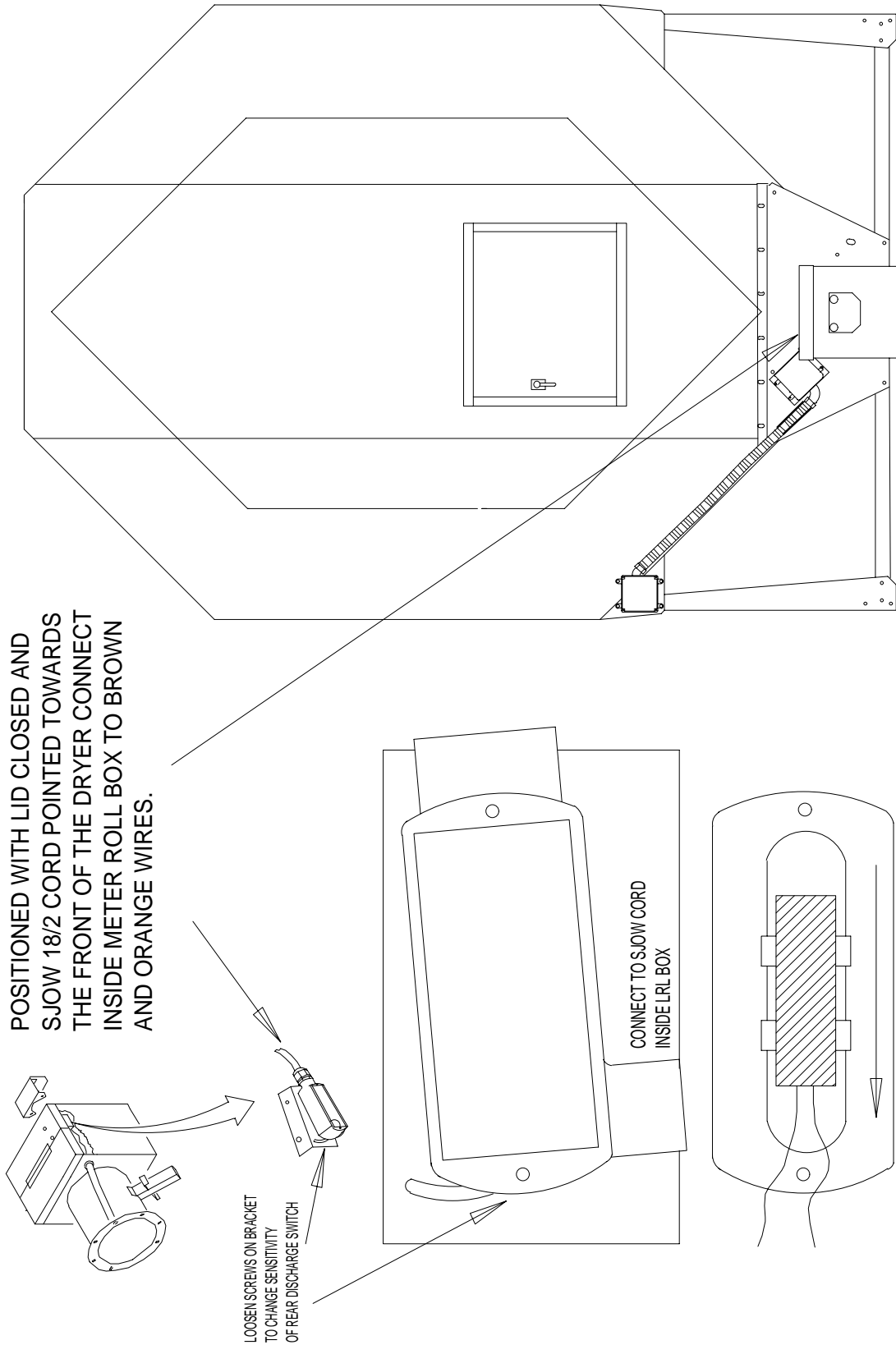


2FNLMTSW98.PRT REV. DATE 4/5/98

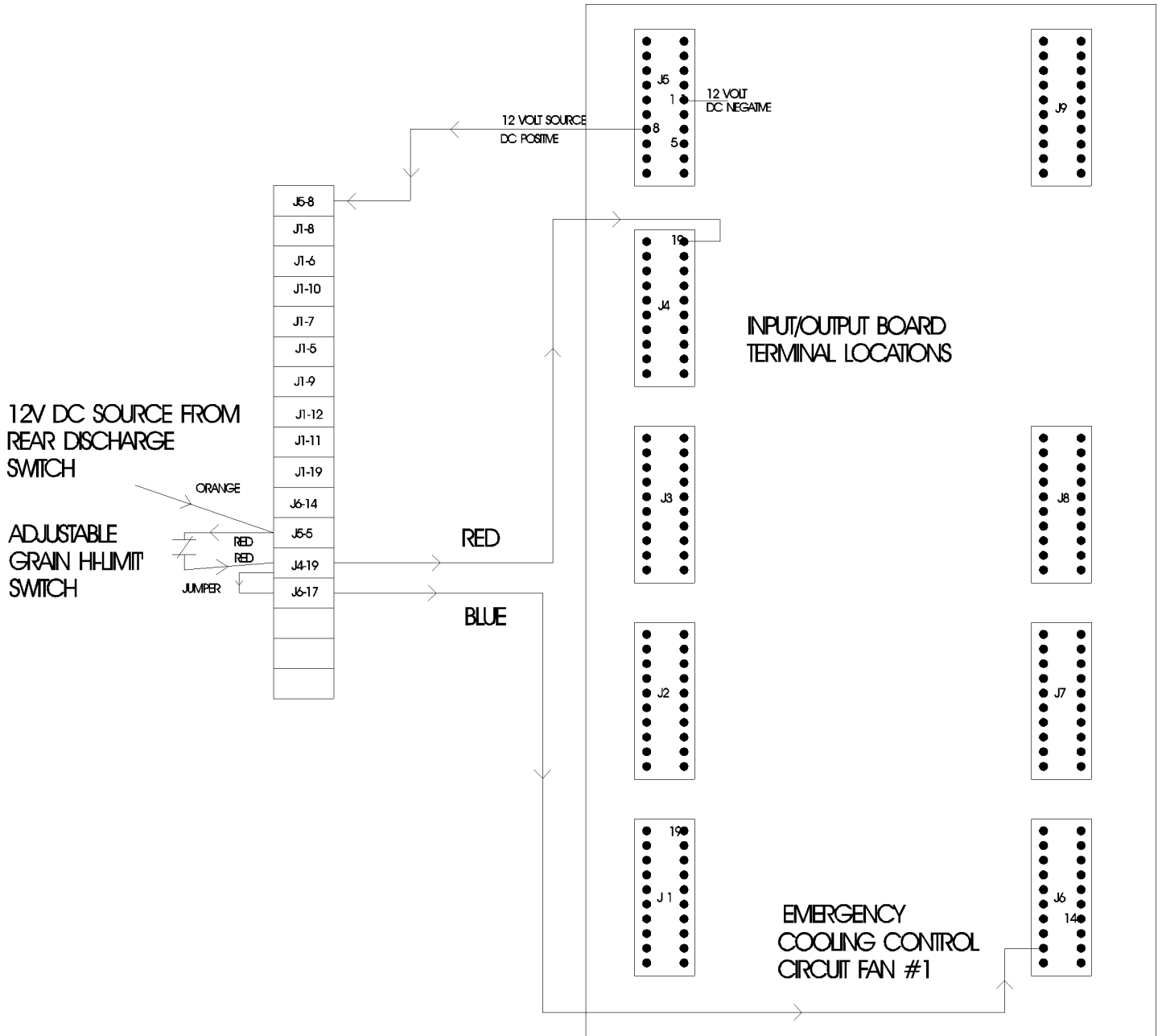
### Rear Discharge & Emergency Cooling Circuit



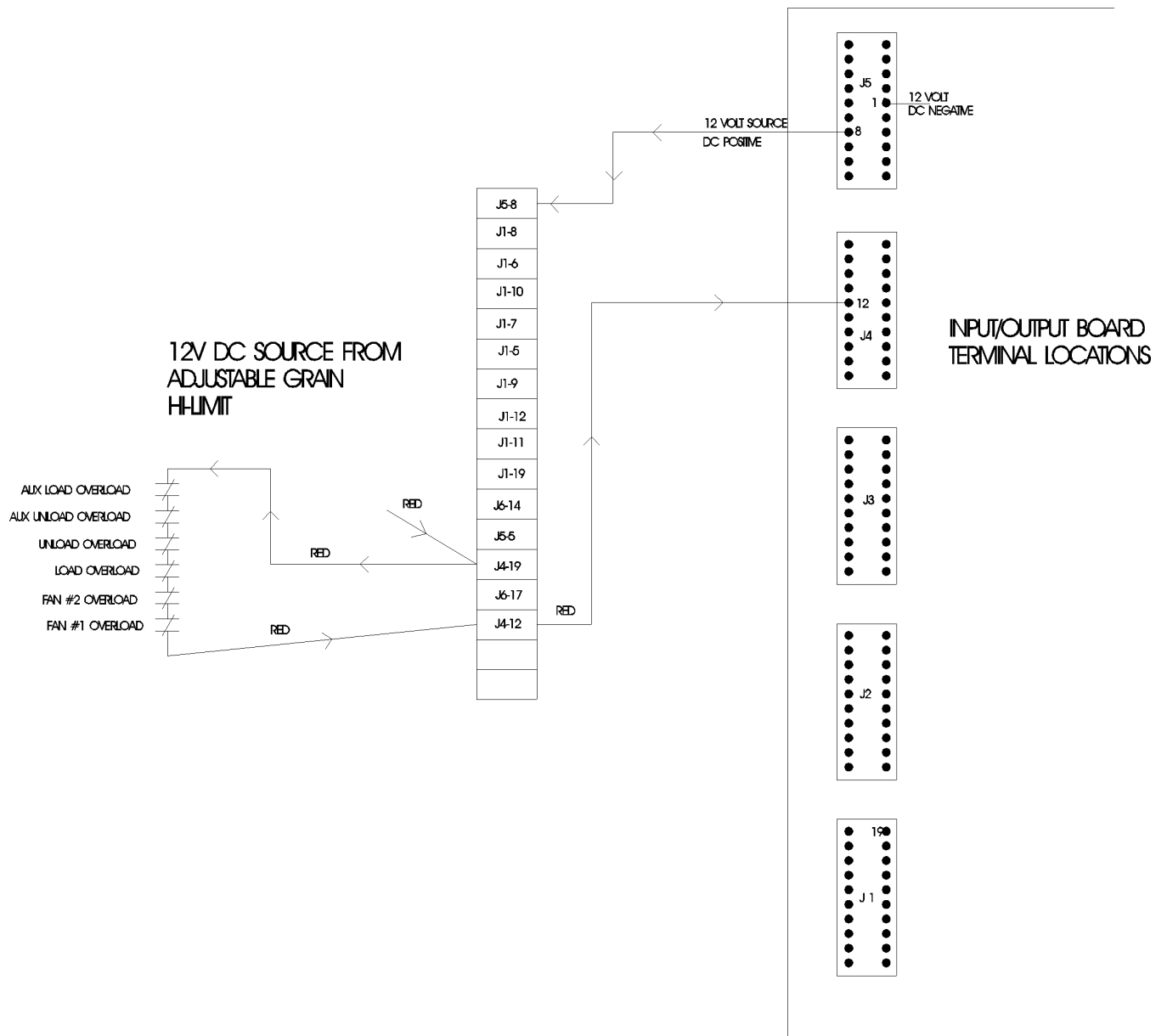
### Rear Discharge Mercury Switch



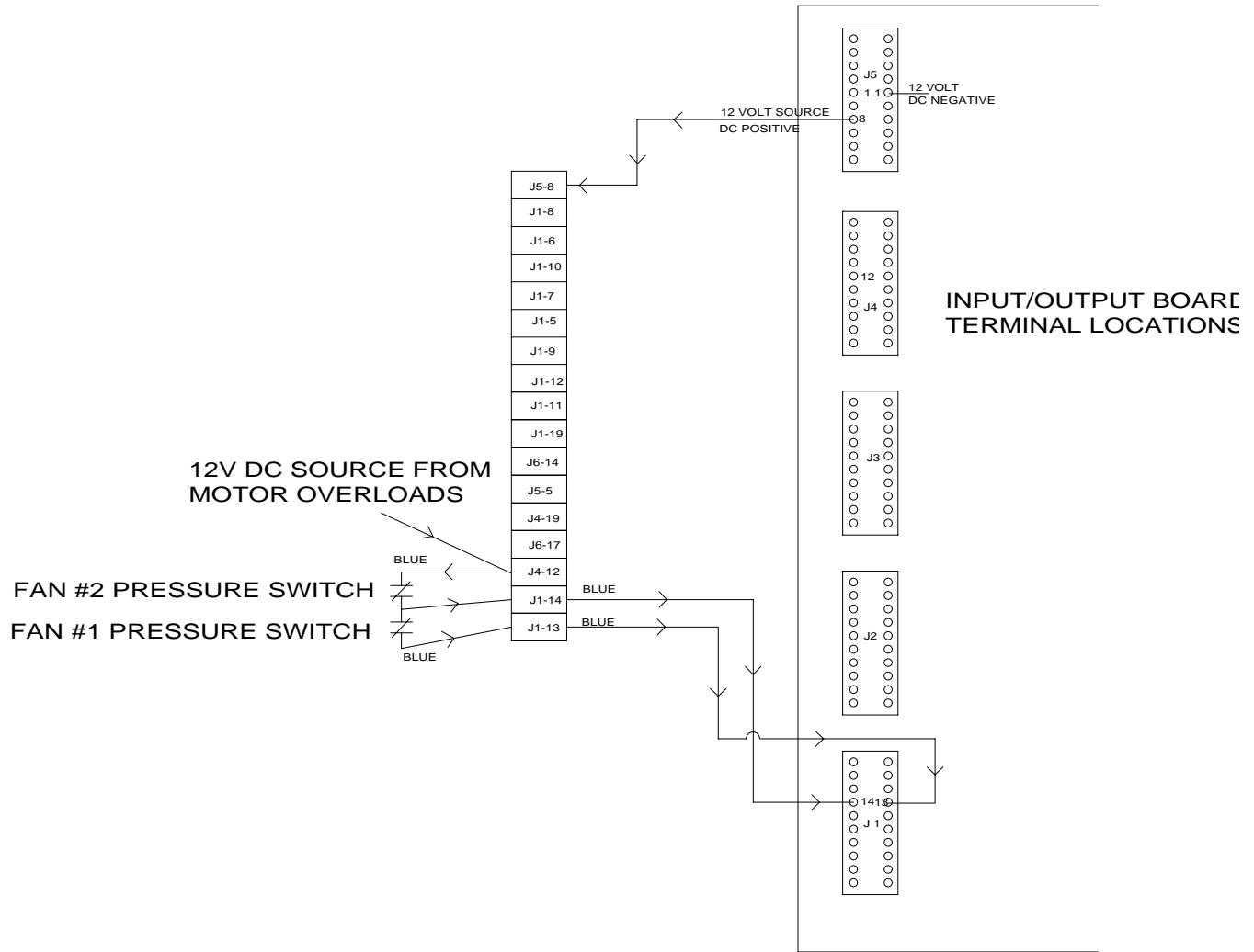
### Adjustable Hi-Limit & Emergency Cooling Circuit



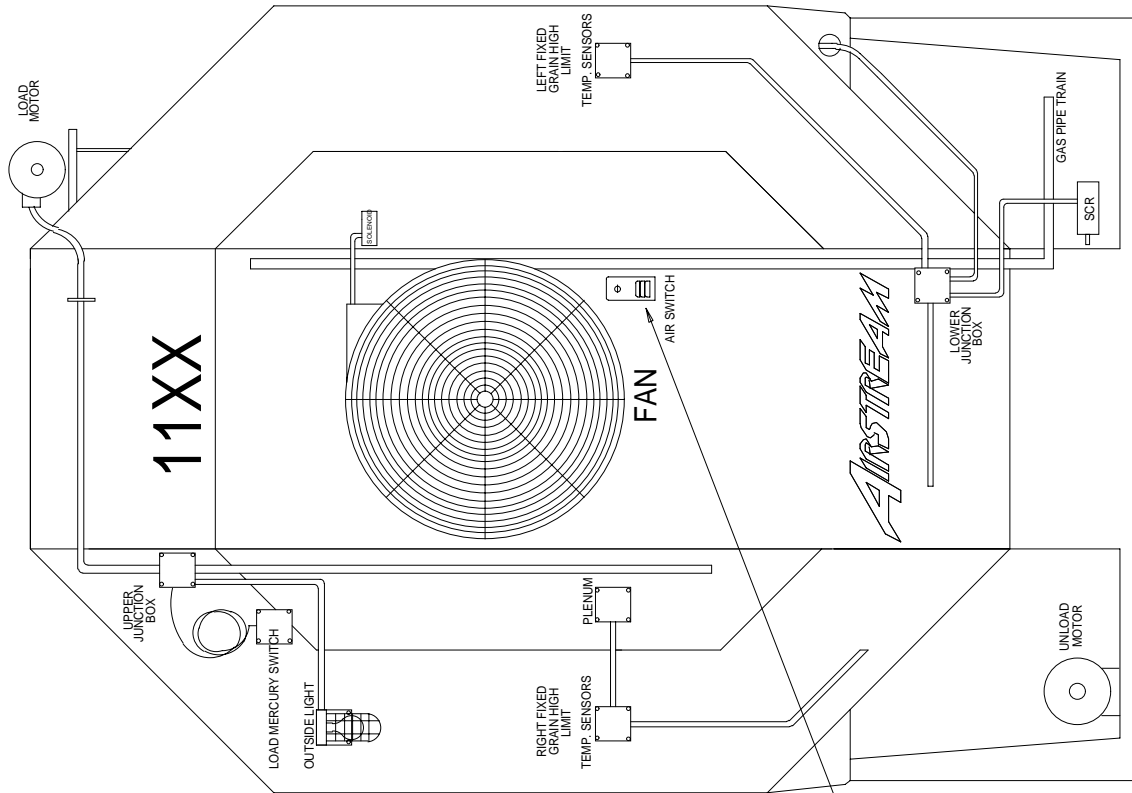
### Motor Overloads



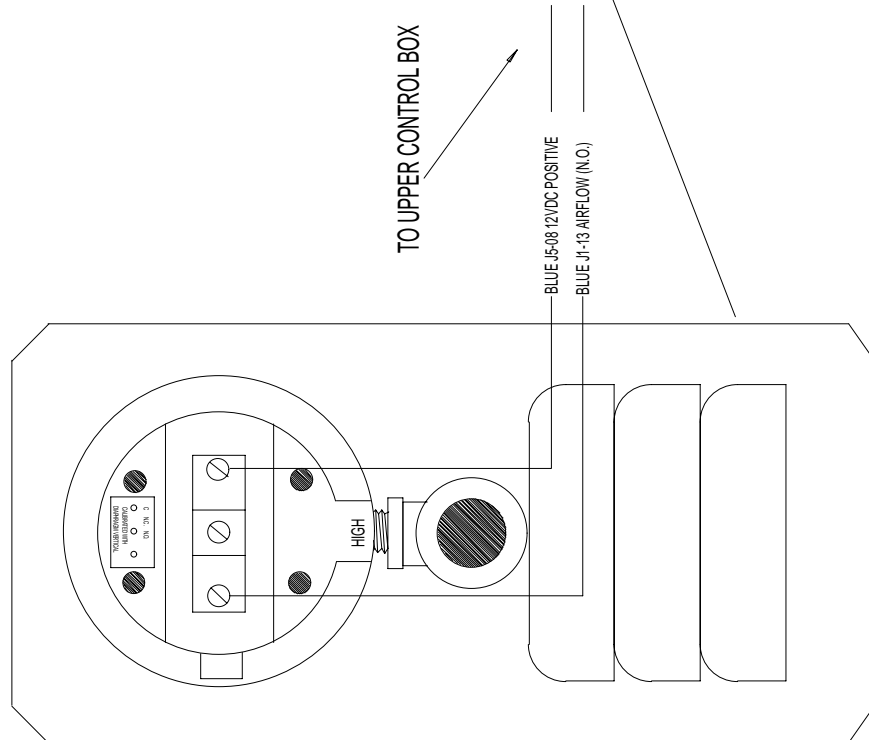
### Air Pressure Switch



### Air Pressure Switch Drawing

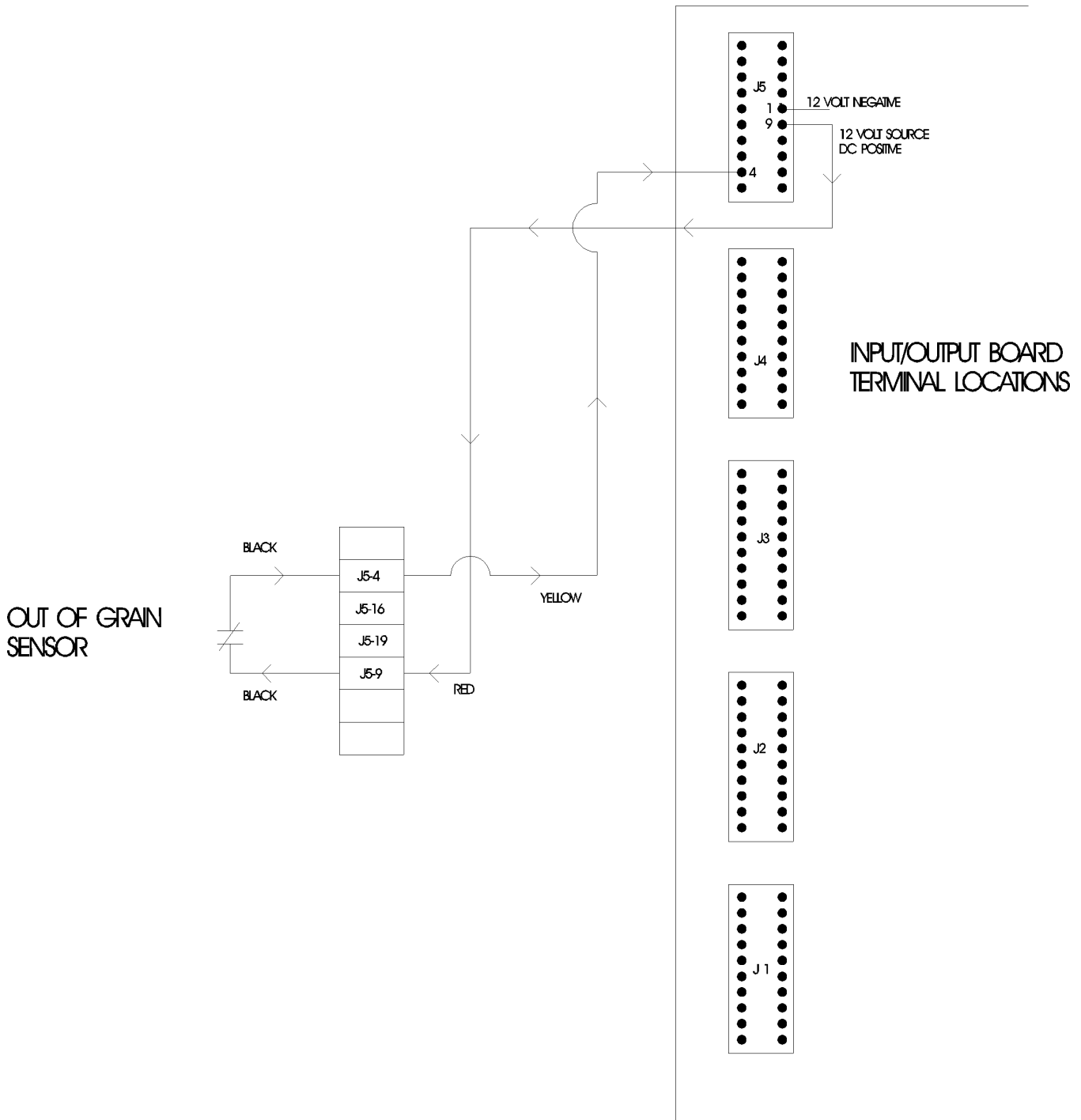


### BACKVIEW OF AIR SWITCH ASSEMBLY

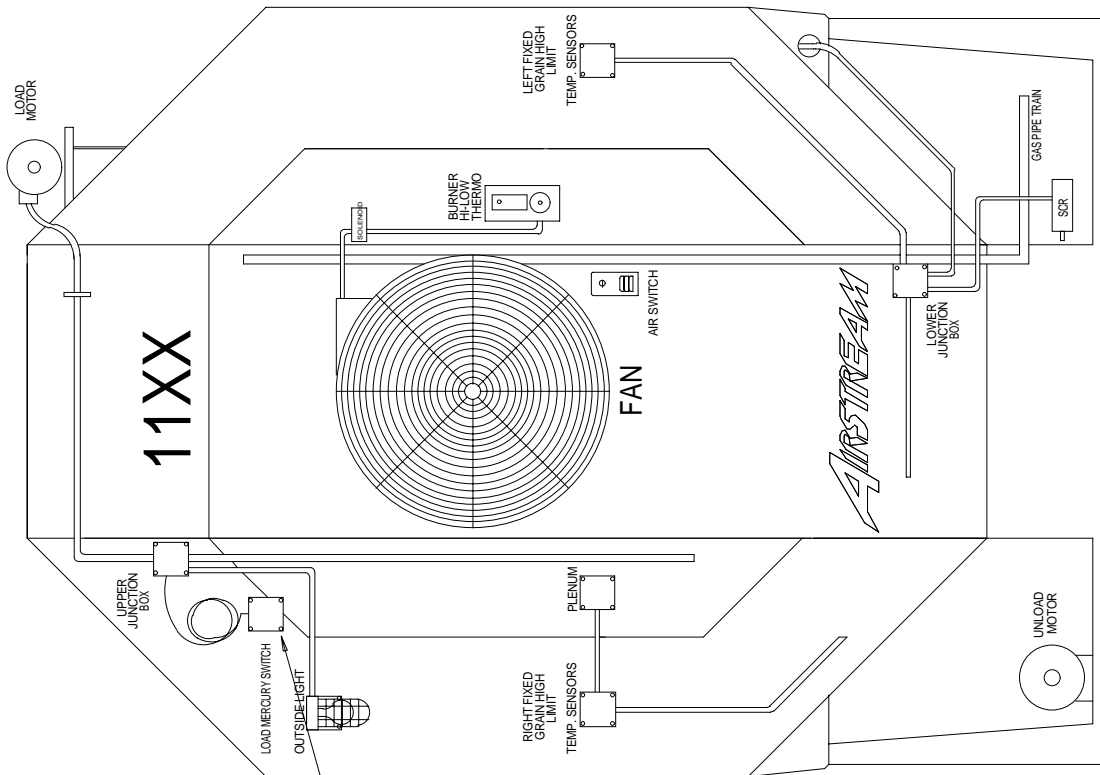




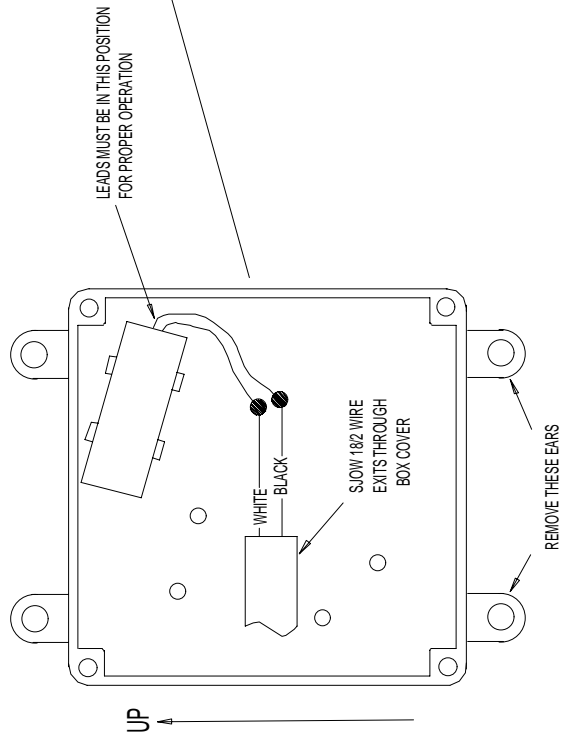
### Out of Grain Safety Circuit



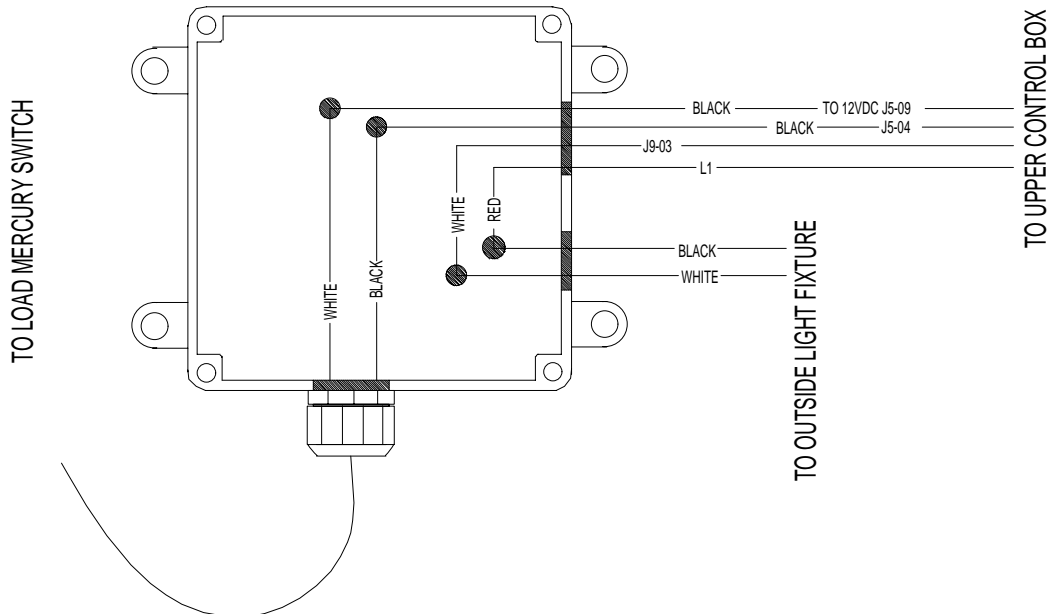
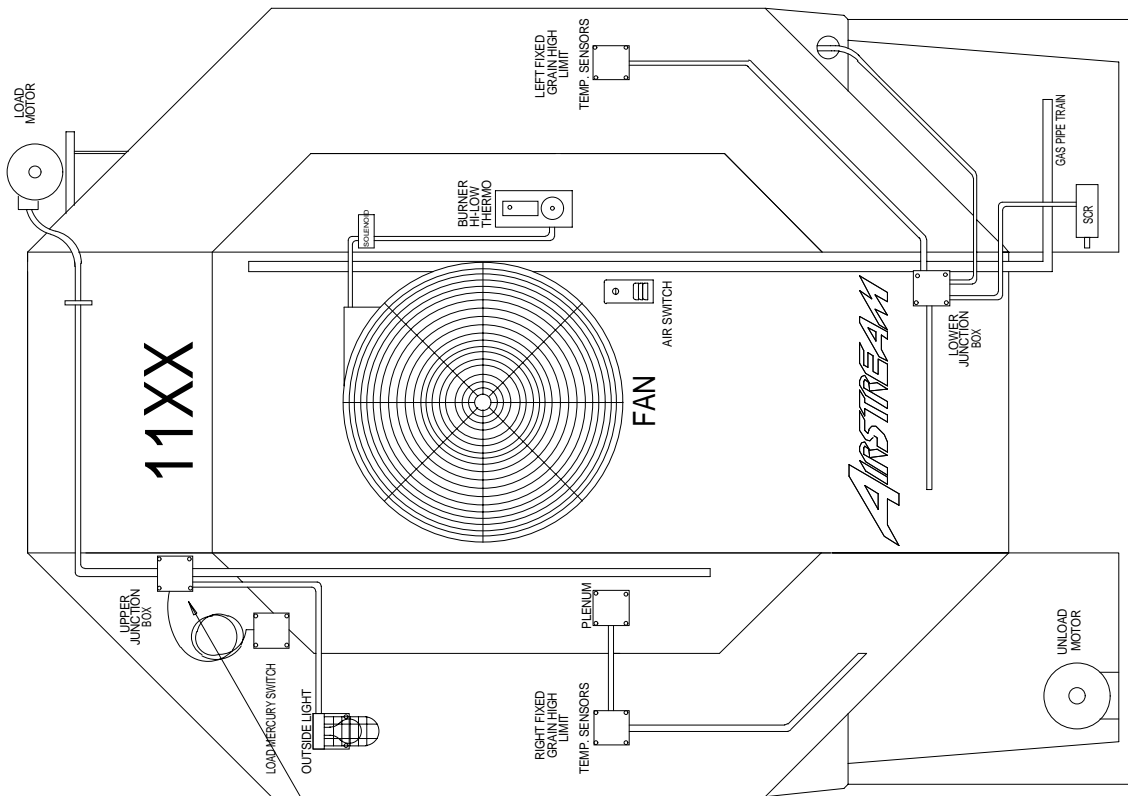
### Out of Grain Safety Circuit Location



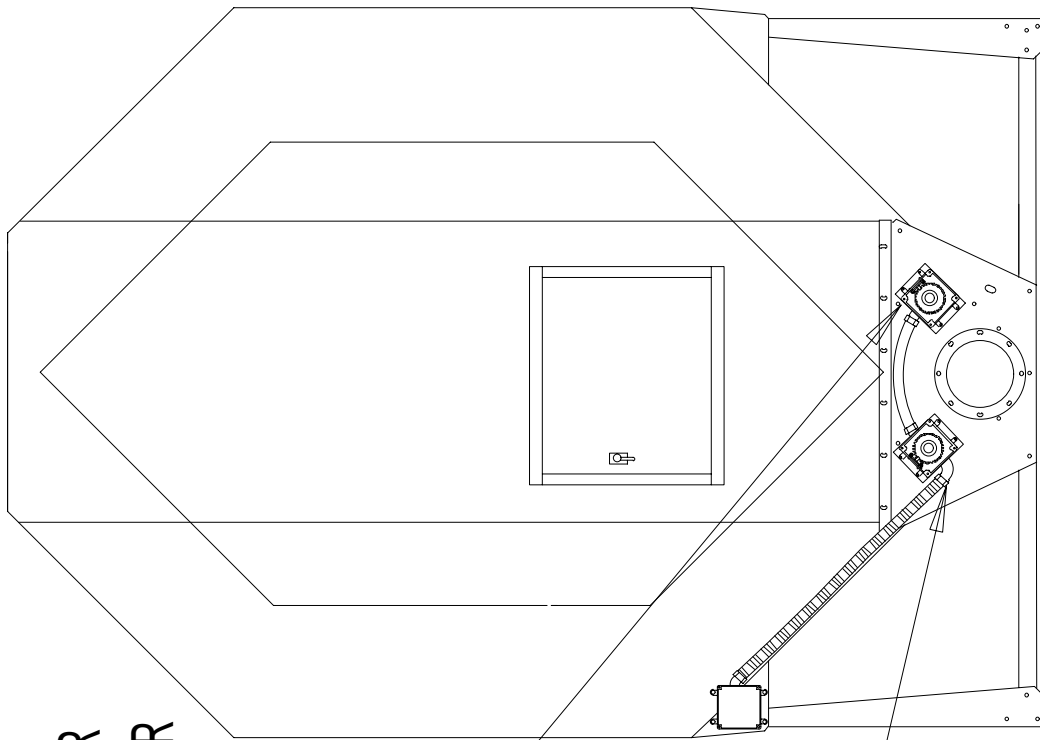
FRONT VIEW OF OPEN BOX



### Upper Junction Box Drawing

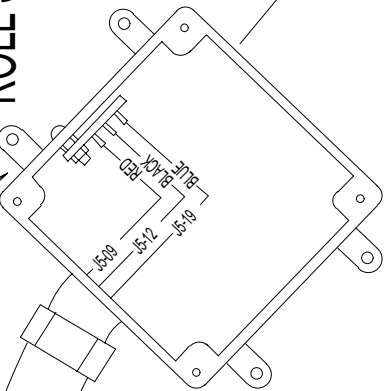


### Meter Roll Sensor



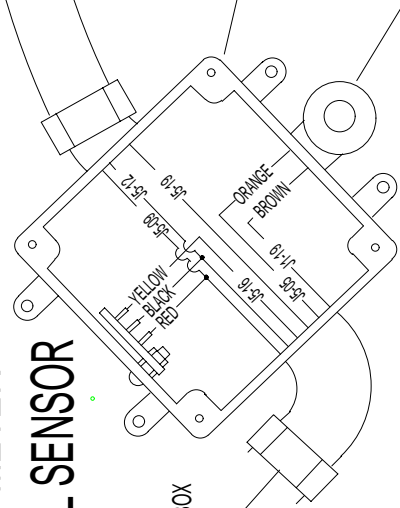
#### RIGHT METER ROLL SENSOR

NOTE:  
RIGHT SENSORS  
NO LONGER USED ON  
DRYERS MANUFACTURED  
AFTER MARCH 1, 1997

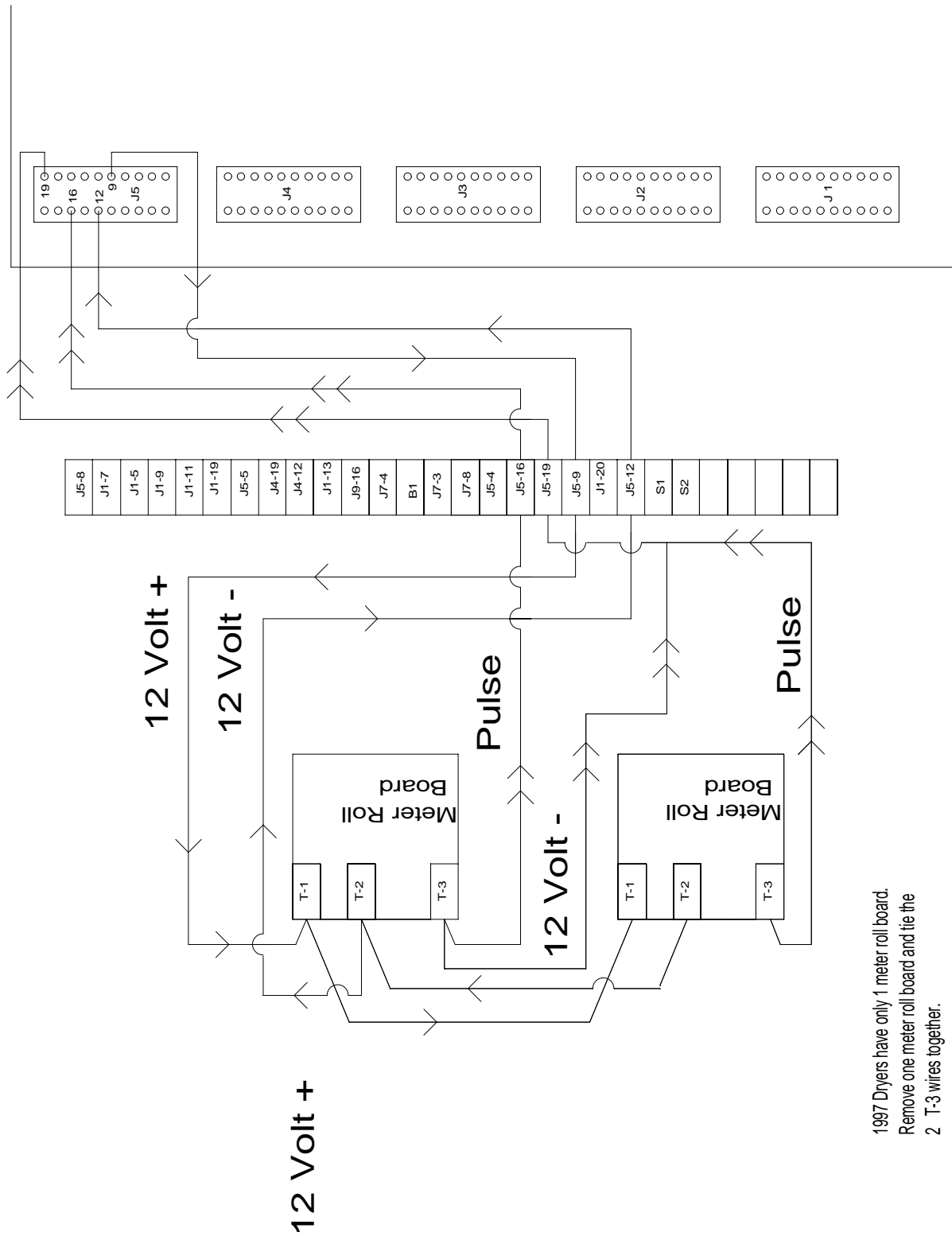


- RED 12VDC POS
- BLACK OR WHITE/BLACK STRIP 12VDC NEG
- YELLOW LEFT METER PULSE RETURN
- BLUE RIGHT METER PULSE RETURN
- ORANGE REAR DISCHARGE RETURN
- BROWN 12VDC TO DISCHARGE SWITCH

#### LEFT METER ROLL SENSOR



### Meter Roll Sensor Wiring



1997 Dryers have only 1 meter roll board.  
 Remove one meter roll board and tie the  
 2 T-3 wires together.

### Meter Roll Reversing

YOU MUST ENTER INTO THE DRYER PARAMETER MODE BY PRESSING THE INCREASE AND DECREASE BUTTONS SIMULTANEOUSLY. YOU WILL HAVE THE FOLLOWING OPTIONS LISTED:  
 SHUTDOWN HISTORY (PRESS ENTER)  
 DRYER MODEL # (IE. 1112)  
 FAN DELAY (DEFAULT = 5)  
 FILL AUGER (DEFAULT = END)  
 BPH FACTOR (DEFAULT = 1.0)  
 TEST METER ROLL (DEFAULT = YES)  
 TEST AIR SWITCH (DEFAULT = YES)  
 M.R. REVERSE (DEFAULT = NO) <- CHANGE TO YES  
 \* REVERSE DELAY (DEFAULT = 60)  
 \* REVERSE TIME (DEFAULT = 1)

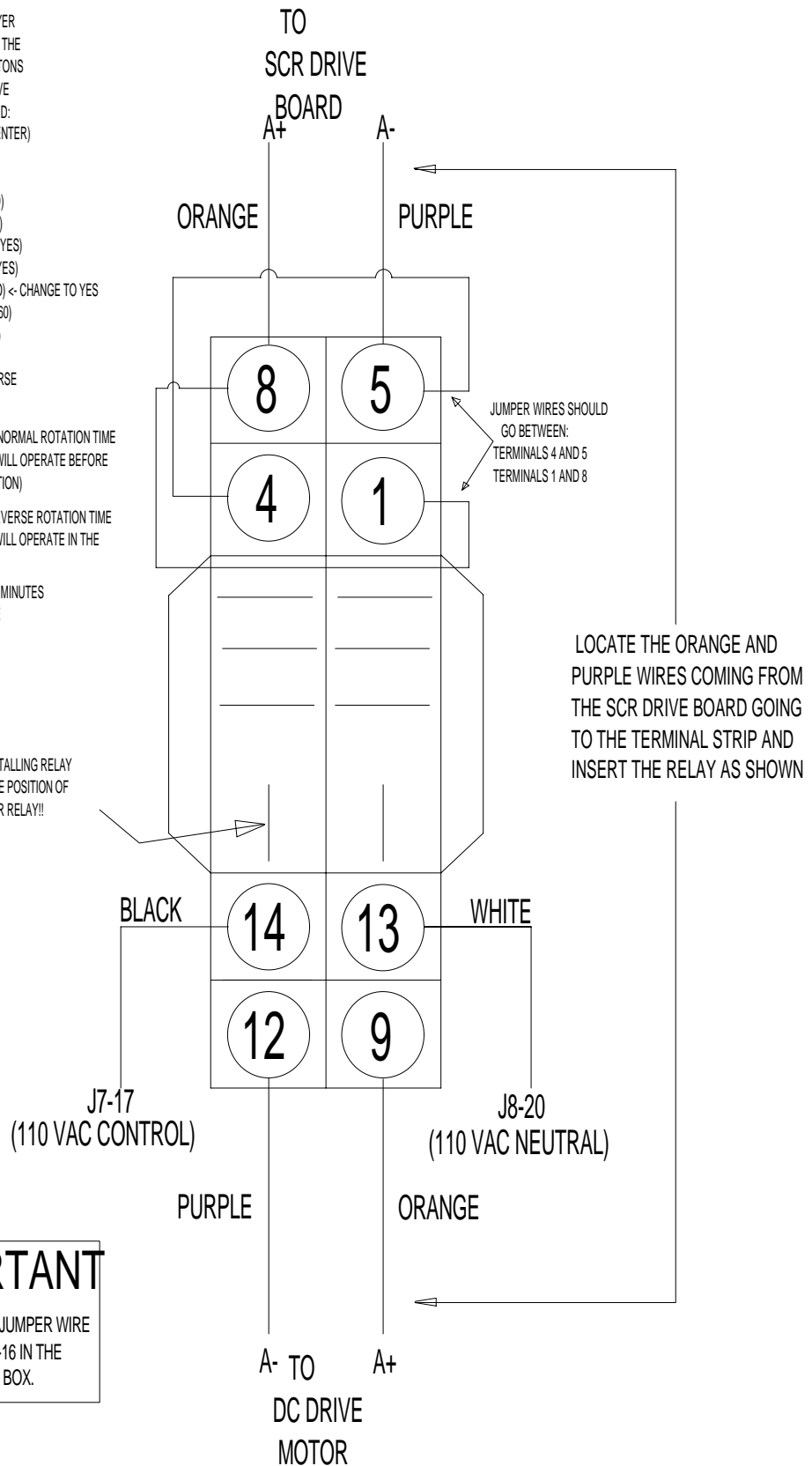
\* DISPLAYED ONLY IF M.R. REVERSE IS CHANGED TO YES

REVERSE DELAY = METER ROLLS NORMAL ROTATION TIME (AMOUNT OF TIME METER ROLLS WILL OPERATE BEFORE THEY WILL BEGIN REVERSE ROTATION)

REVERSE TIME = METER ROLLS REVERSE ROTATION TIME (AMOUNT OF TIME METER ROLLS WILL OPERATE IN THE REVERSED ROTATION MODE)

EXAMPLE: REVERSE DELAY = 10 MINUTES  
 REVERSE TIME = 1 MINUTE

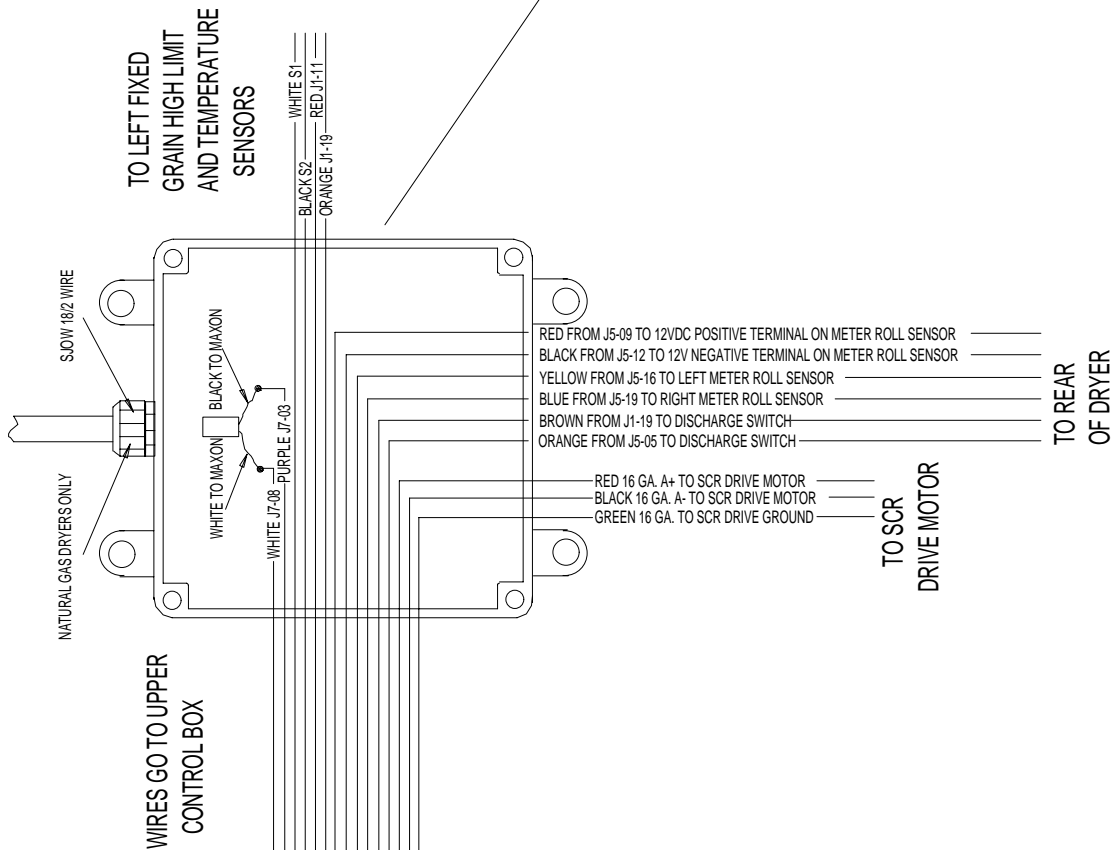
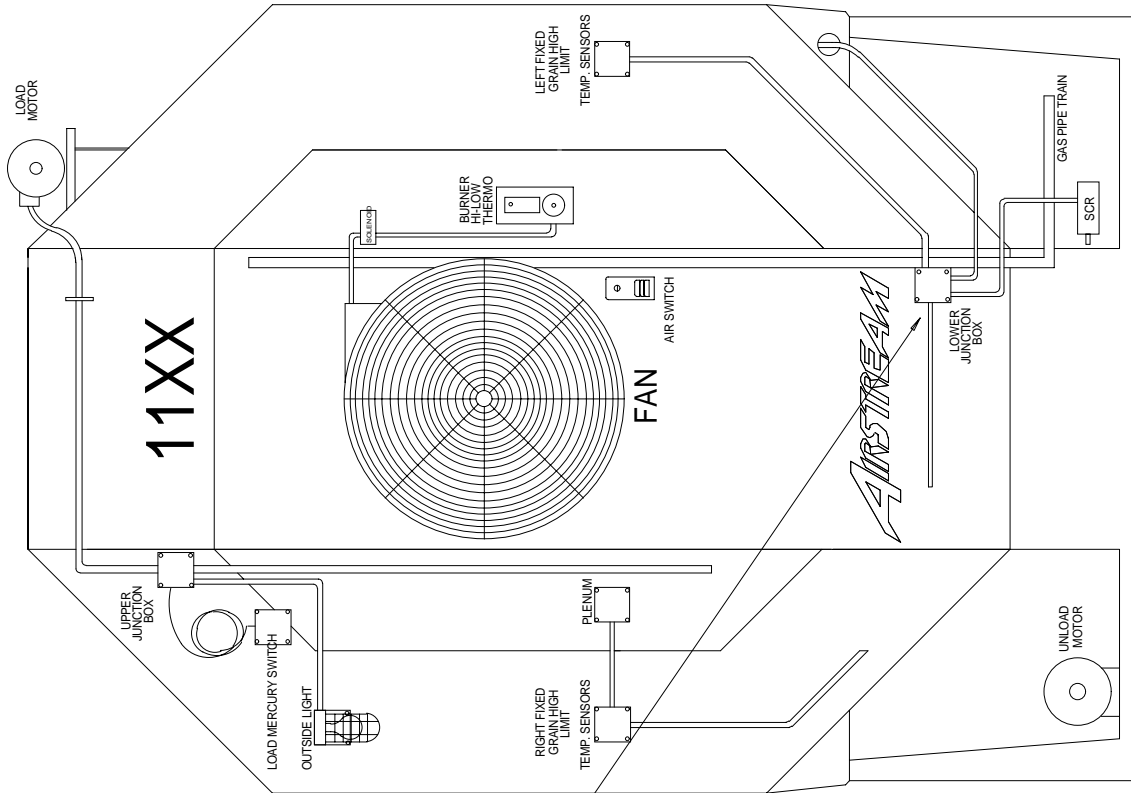
NOTE:  
 WHEN INSTALLING RELAY BASE NOTE POSITION OF SLOTS FOR RELAY!!



### IMPORTANT

YOU MUST ADD A JUMPER WIRE FROM J9-09 TO J7-16 IN THE LOWER CONTROL BOX.

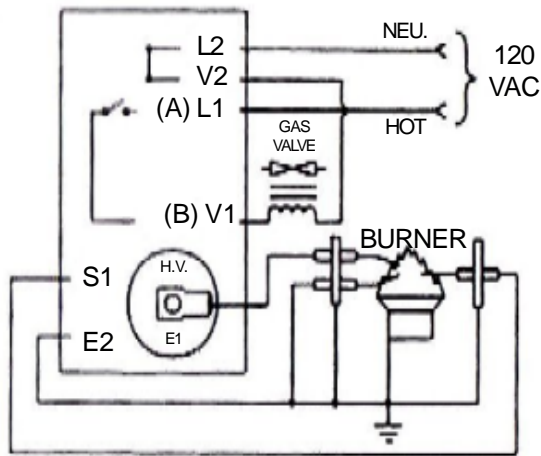
### Lower Junction Box Wiring



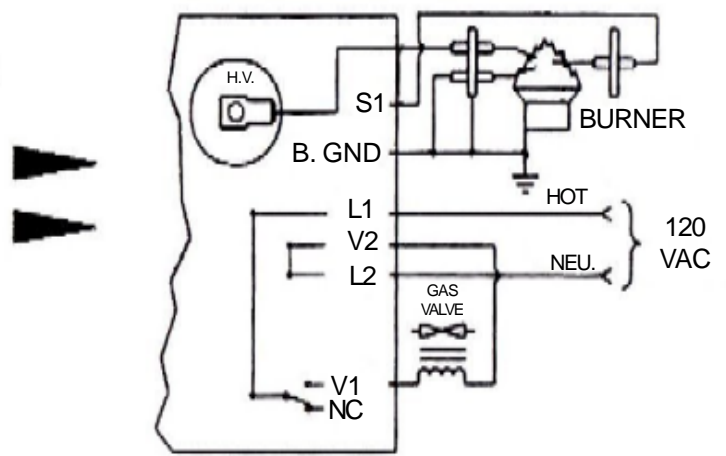
**New Fenwal Board Wiring**

The B. GND terminal is used to ground the burner and to complete the flame current signal circuit. This terminal is new for systems that used the older version of the Fenwal board. This terminal must be connected to the burner (chassis) ground not only to ensure the best, long term, stable flame signal, but also to ground the burner for proper sparking.

The use of a burner ground terminal eliminates the problem of loss of flame sense signal due to a missing or loose neutral or ground (green) wire at the 120 VAC power source. The new board has been designed such that reversing the polarity of the 120 VAC line does not cause a loss of flame signal. Thus providing a more reliable flame signal along with a reduction of nuisance lockouts, due to its design and the use of the B. GND terminal.

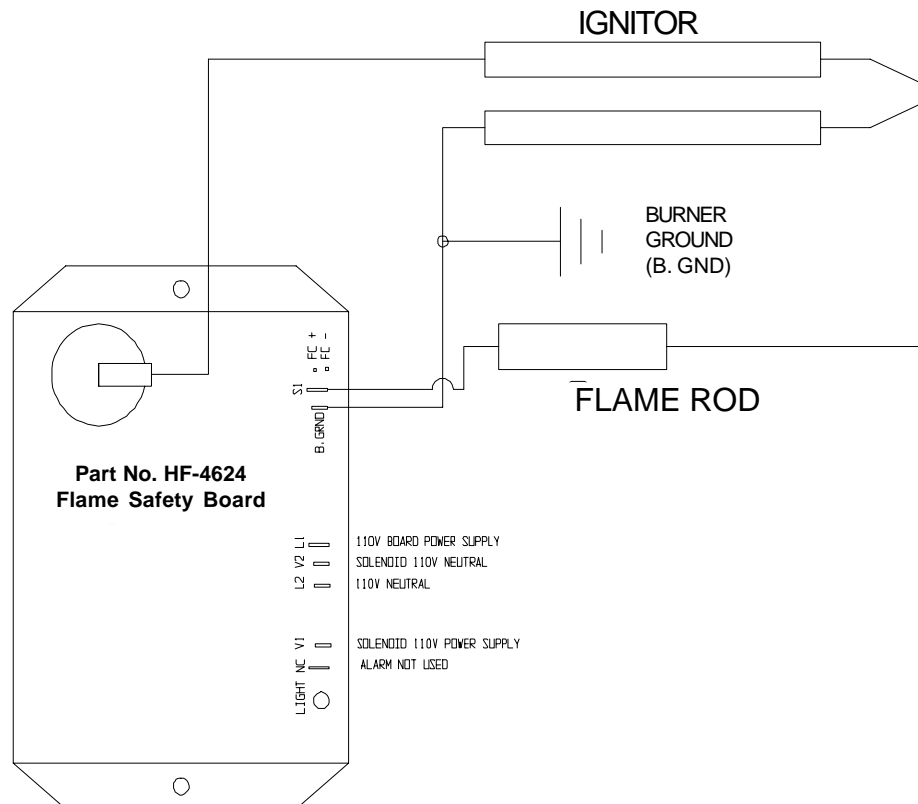


Old version with Remote Flame Sense.



New version with Remote Sense using existing spark and remote sense electrodes.

**Note that terminal E2 on the old version has been replaced by terminal B.GND on the new board.**





## Fenwal Board Troubleshooting

### On-Board Diagnostics

The LED will flash on for 0.2 seconds then off for 0.2 seconds to indicate an error condition. The pause time between error codes will be 2.5 to 3.0 seconds. During power-up, the LED will light for one second and then turn off to indicate normal operation.

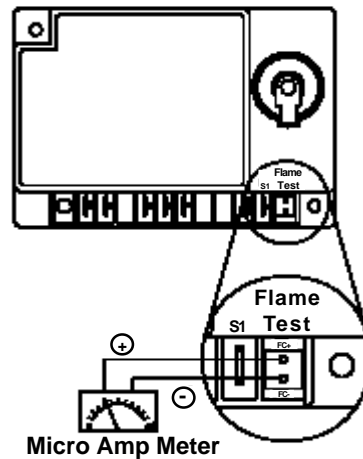
LED Indication	Fault Mode
Steady on	Internal Control Failure
2 Flashes	Flame Fault**
3 Flashes	Ignition Lockout Fault

\*\* May indicate either that a flame was detected during pre- or post-purge, or that there is a flame sensing error.

**If a lockout occurs, the board will have to be reset by shutting off the power to the board.**

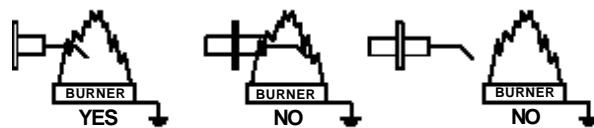
### Measure Flame Current

To measure flame current, disconnect the input voltage, and attach the leads from a multi-meter with a DC microampere scale to FC+ and FC- terminals to the 35-70 flame sense test pins. Reconnect the input voltage and initiate a call for heat. After sparking is complete and the flame is established, the meter should read 1.0 DC microamperes or higher. If meter reads below 0 on the scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

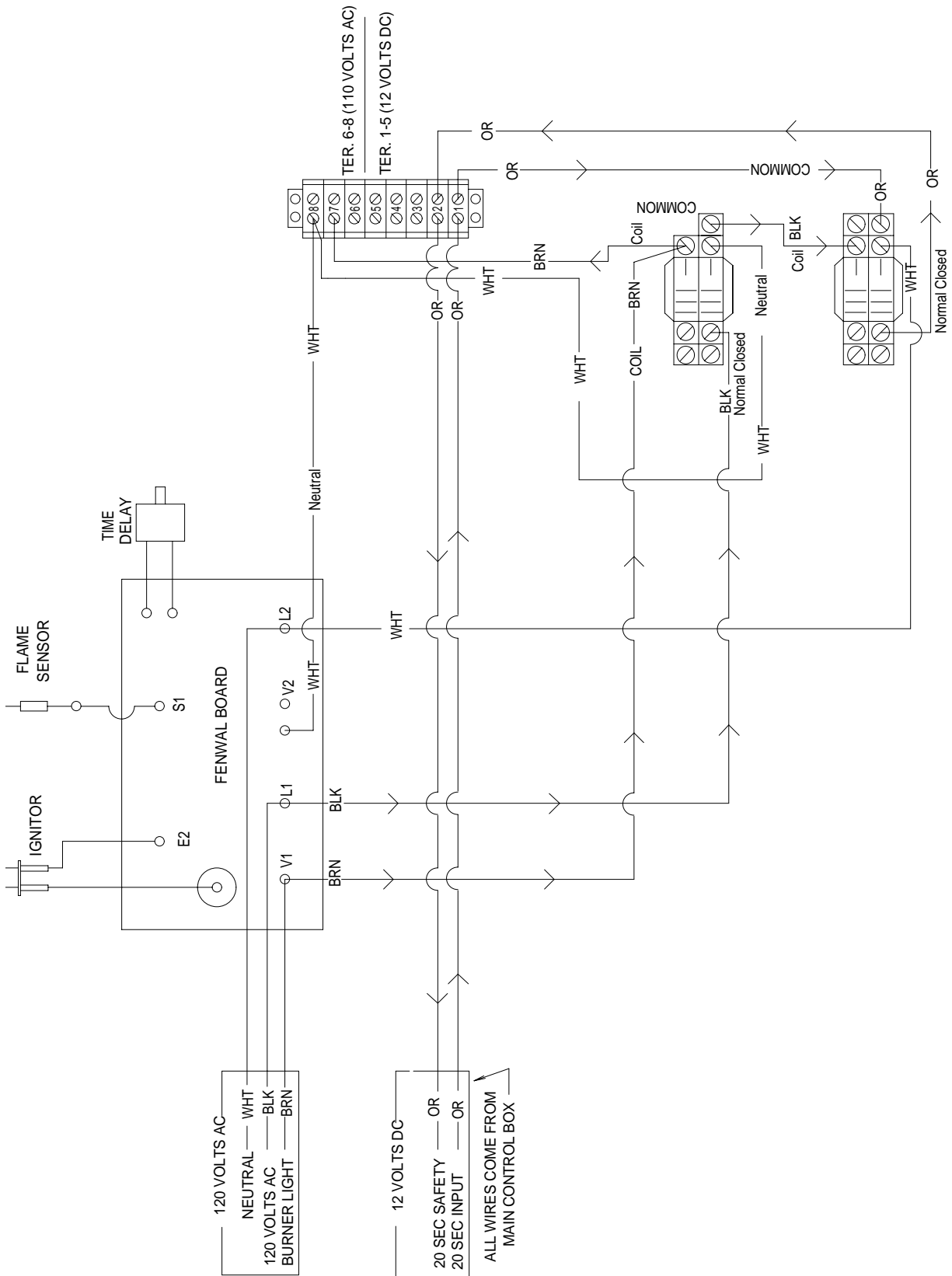


### Flame Sensing

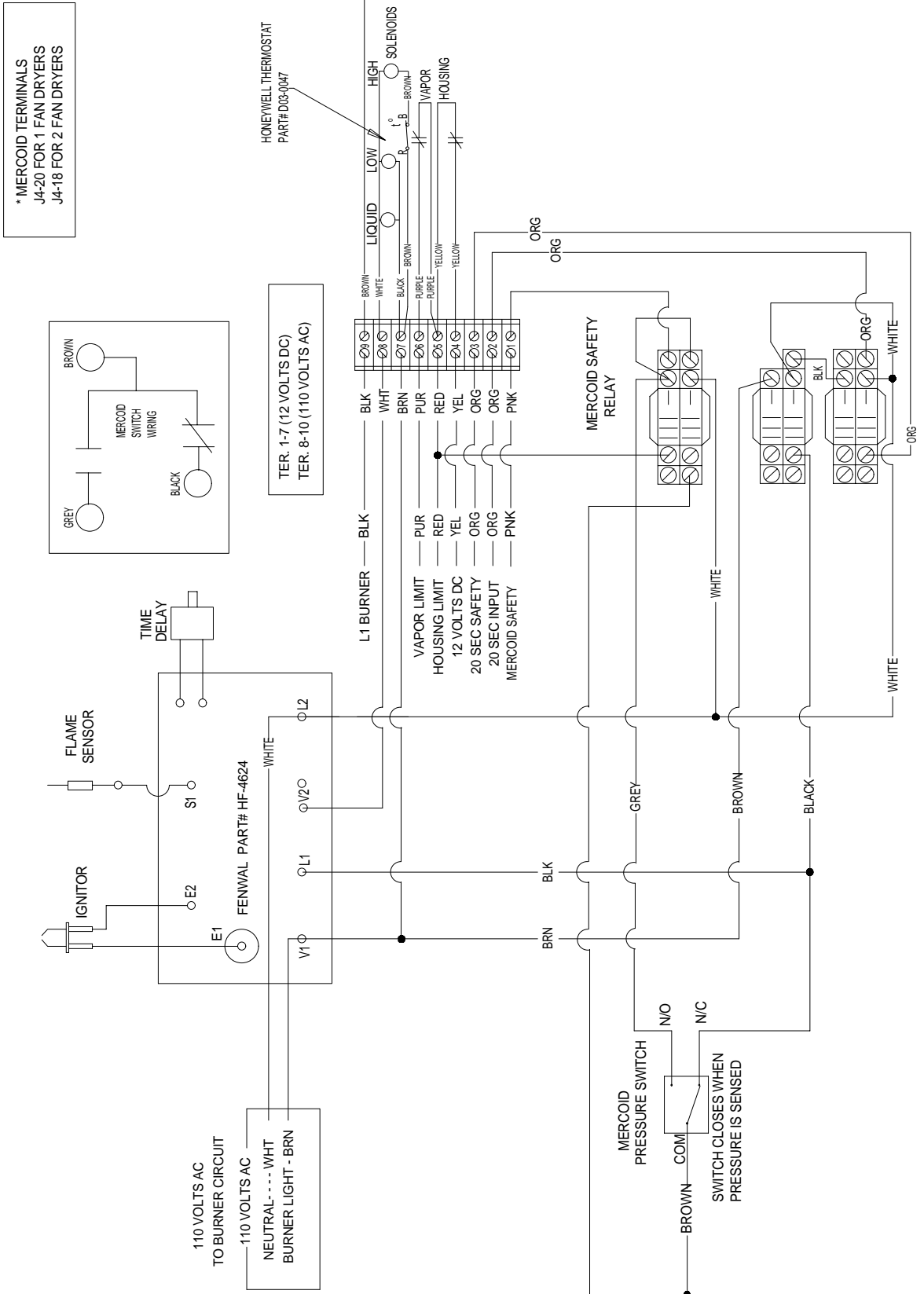
Flame sensing is achieved using the principal of flame rectification. Flame rectification relies on current passing from ground through the flame to the sense rod. The minimum flame current necessary to keep the system operating is 1.0 DC microamperes.



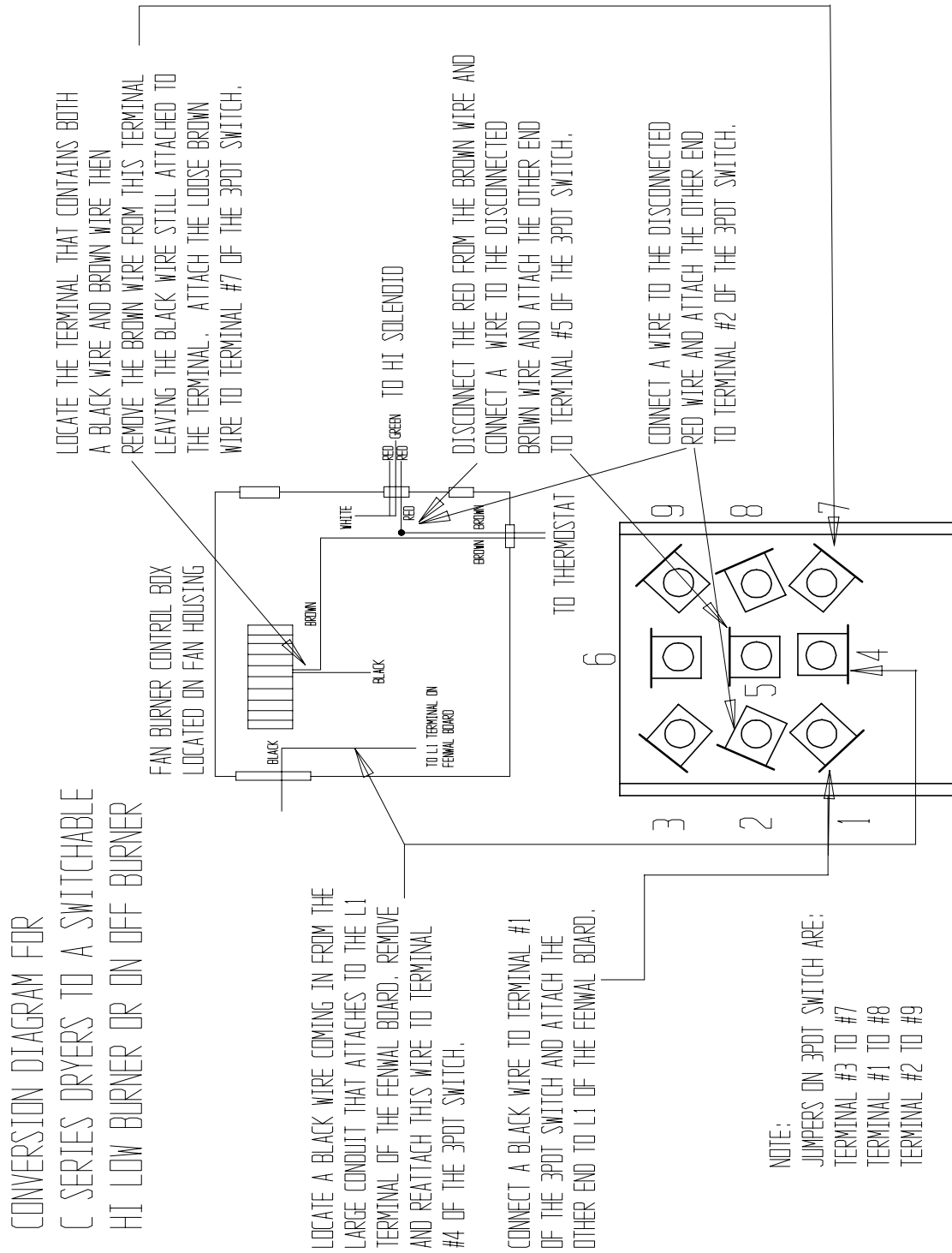
### Flame Control Circuit



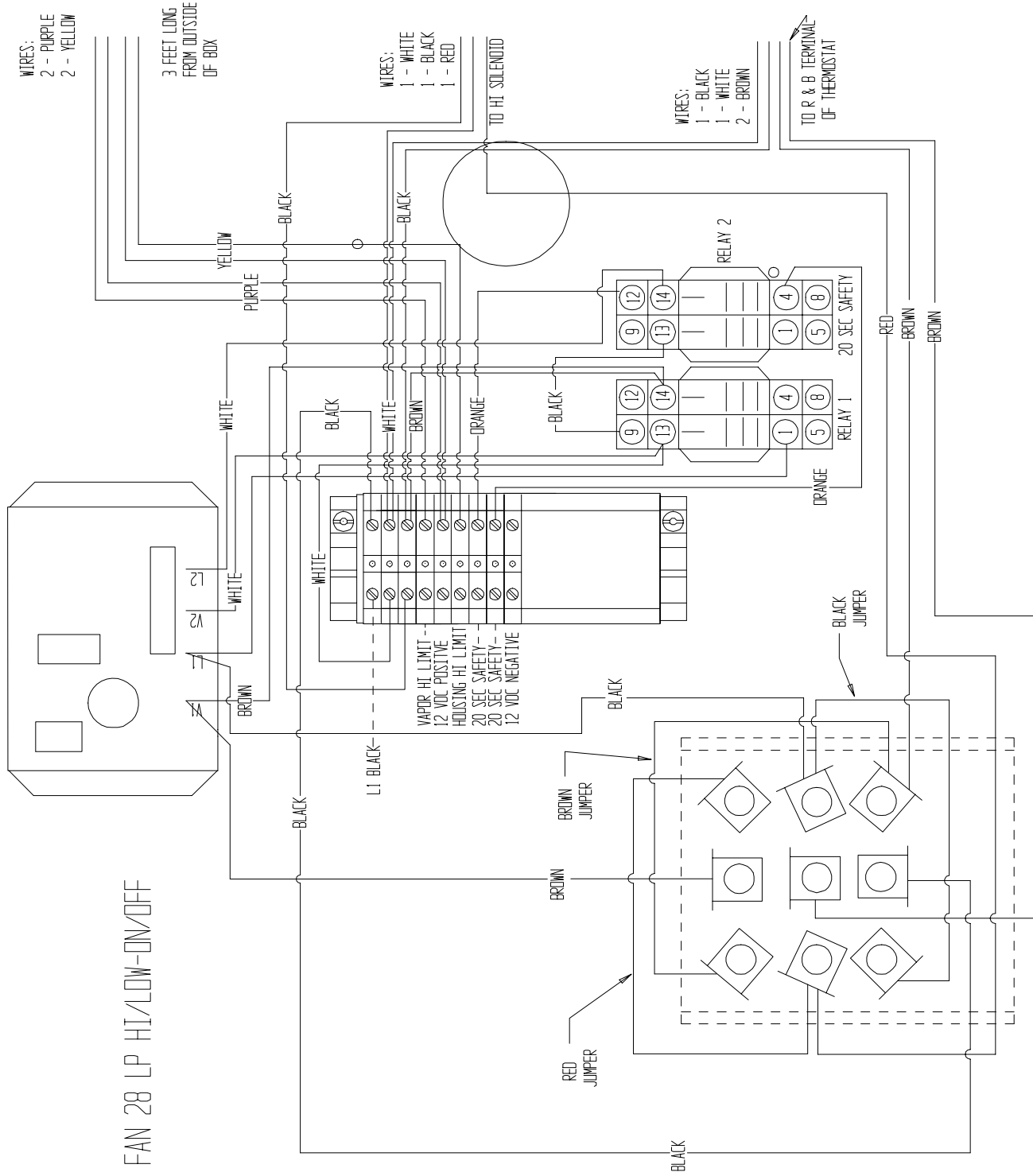
### Fan Burner Circuit for Canadian Models Only



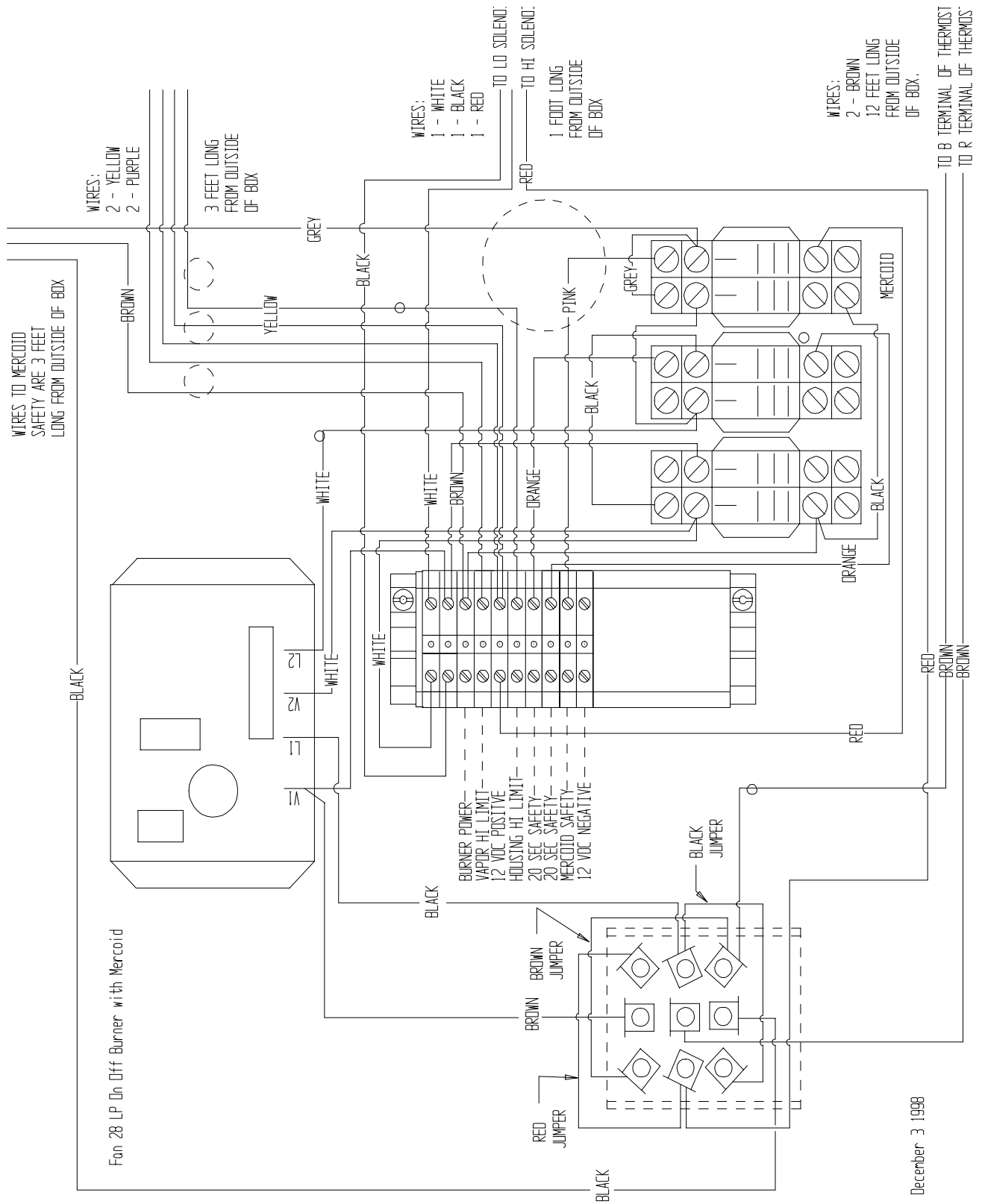
### Conversion Diagram For C Series Dryers To A Switchable Hi/Low Burner Or A On/Off Burner



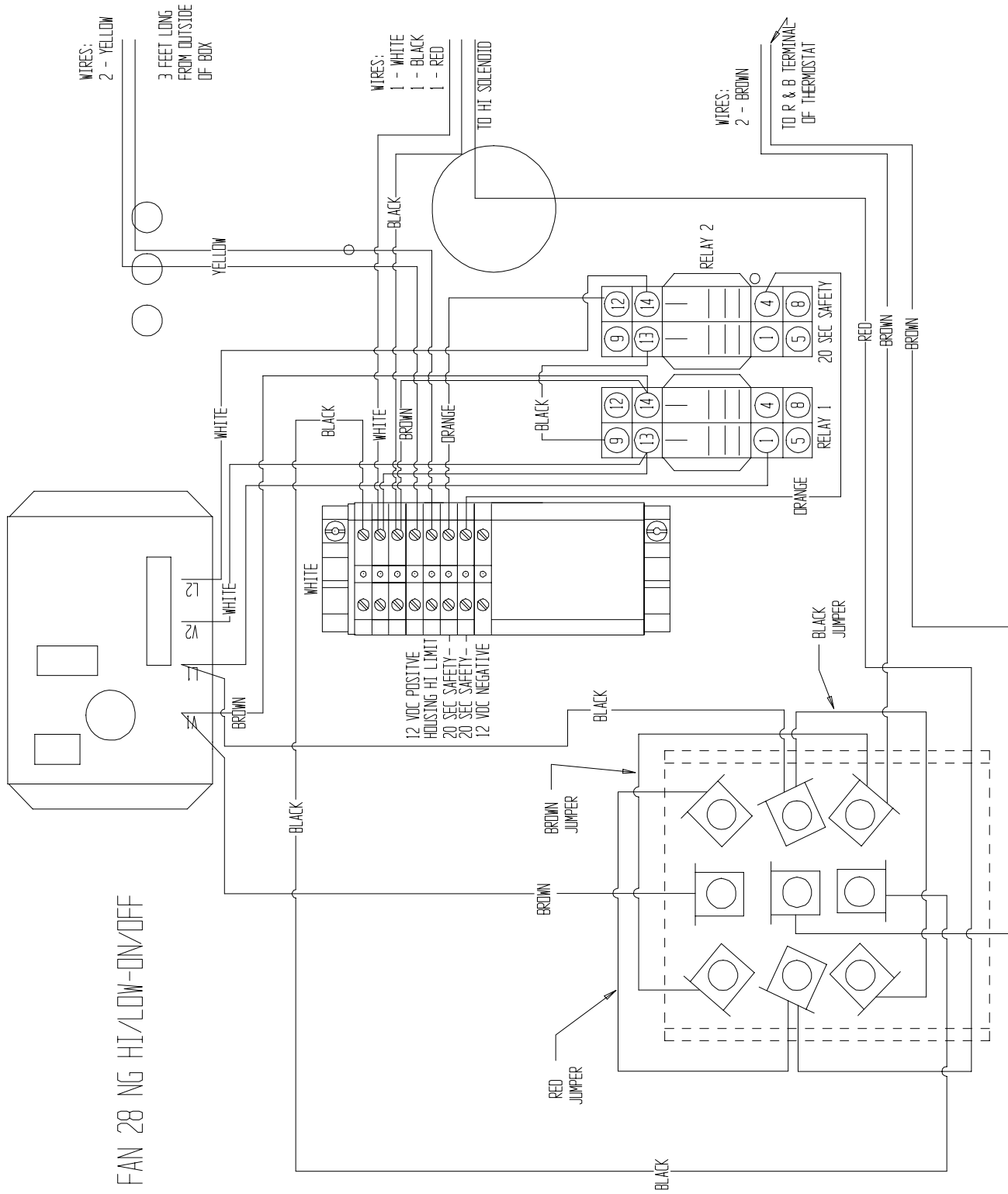
### Fan 28 LP Hi/Low-On/Off



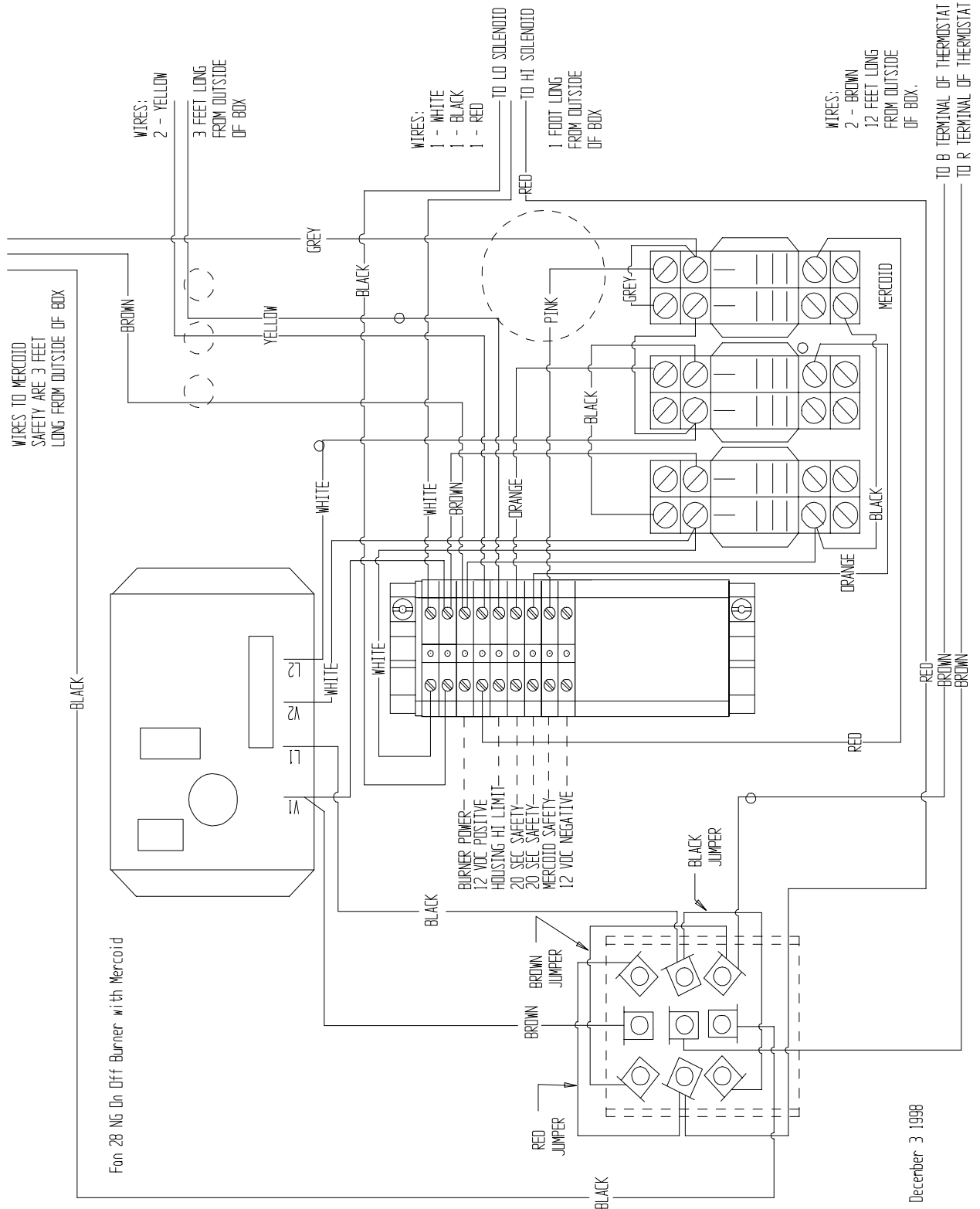
Fan 28 LP Hi/Low-On/Off Burner With Mercoïd



### Fan 28 NG Hi/Low-On/Off

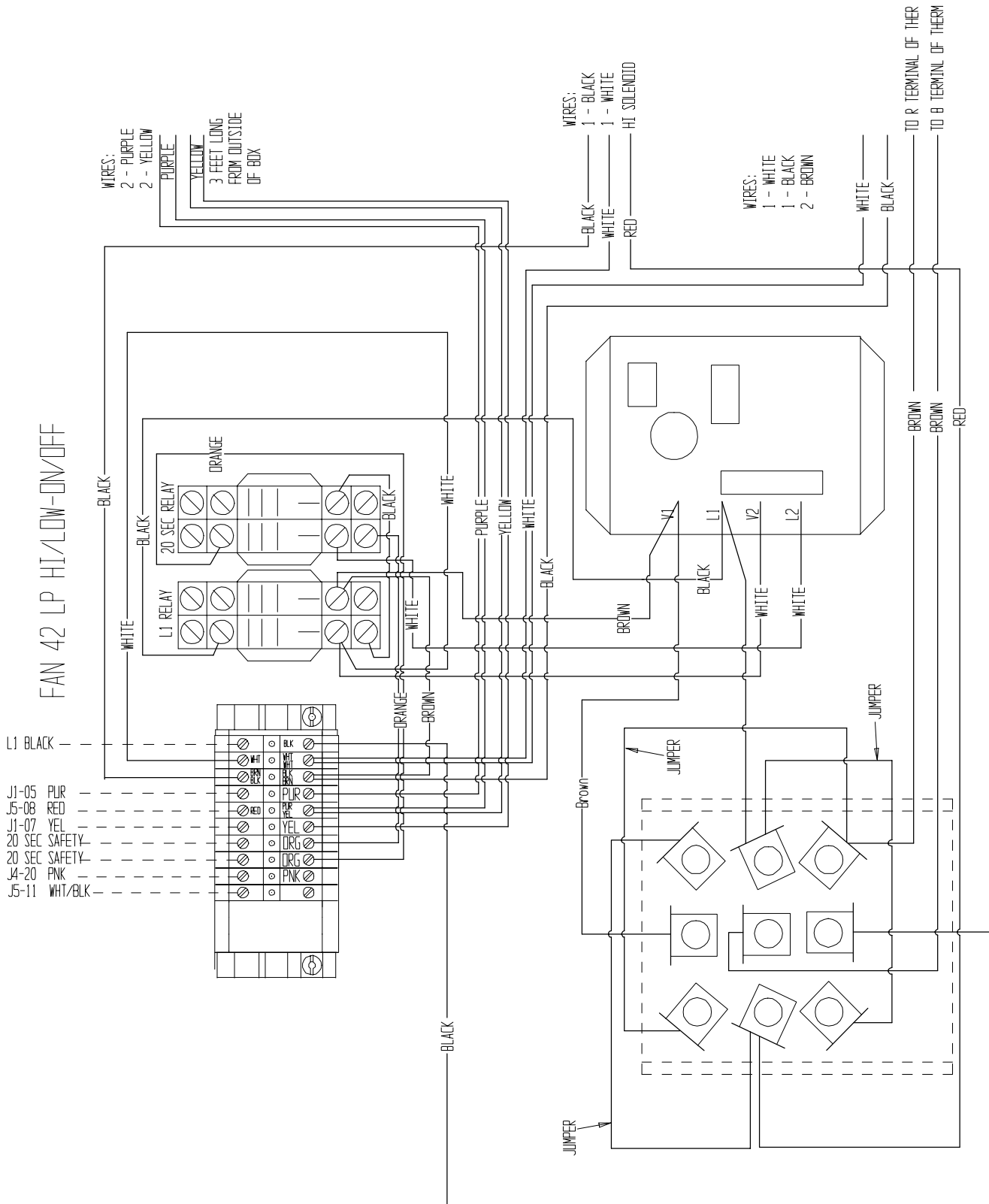


### Fan 28 NG Hi/Low-On/Off Burner With Mercoïd

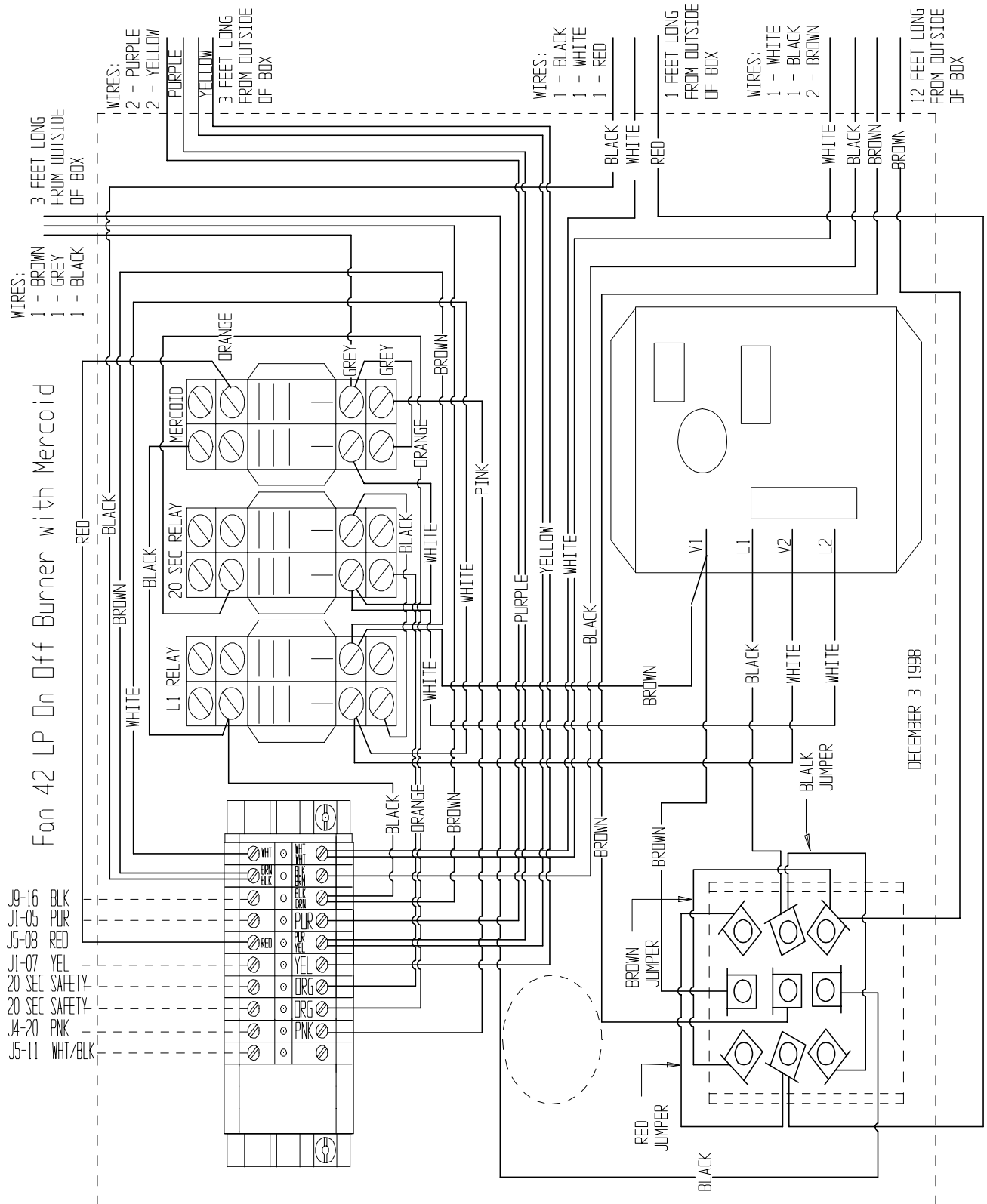




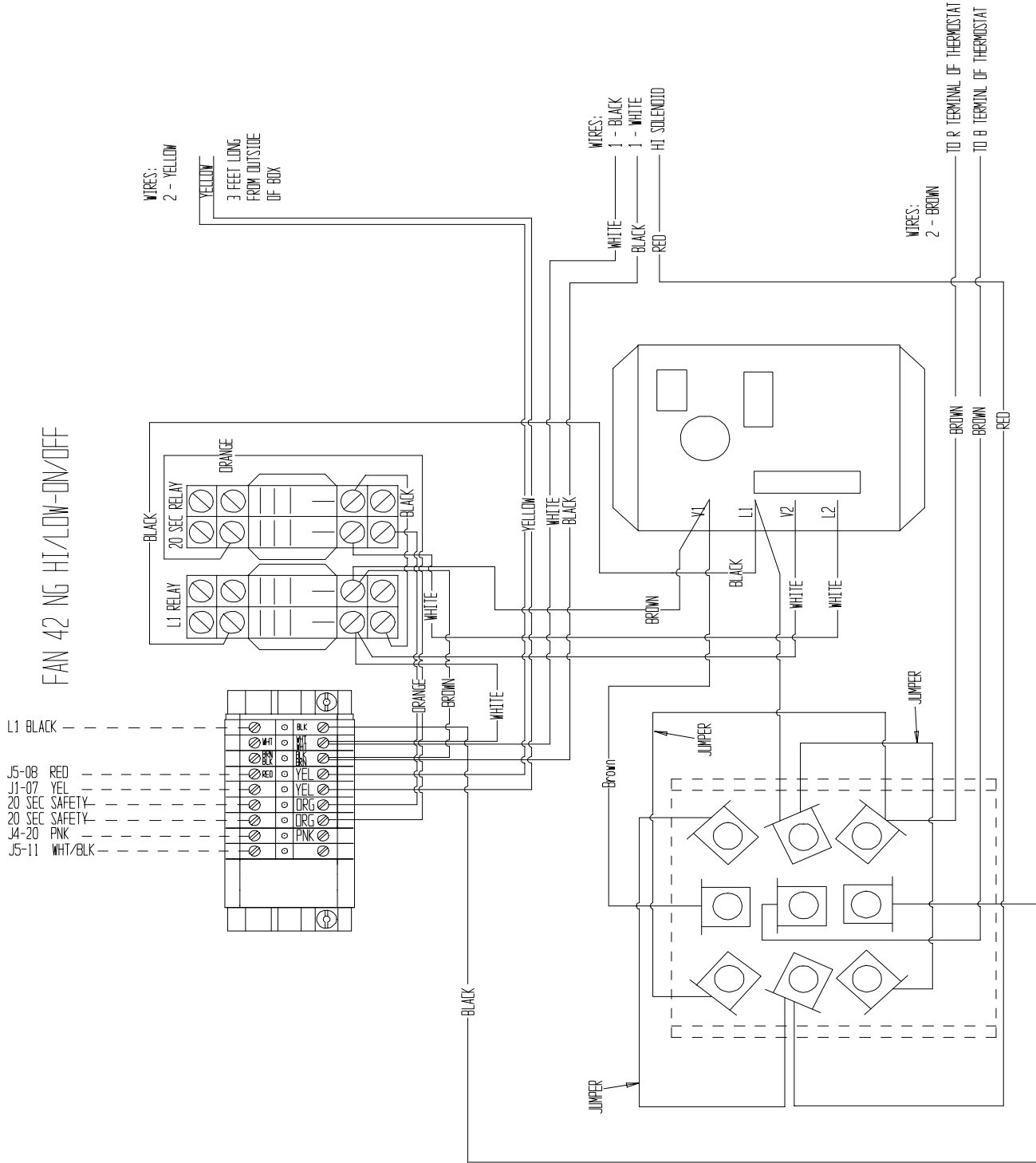
### Fan 42 LP Hi/Low-On/Off



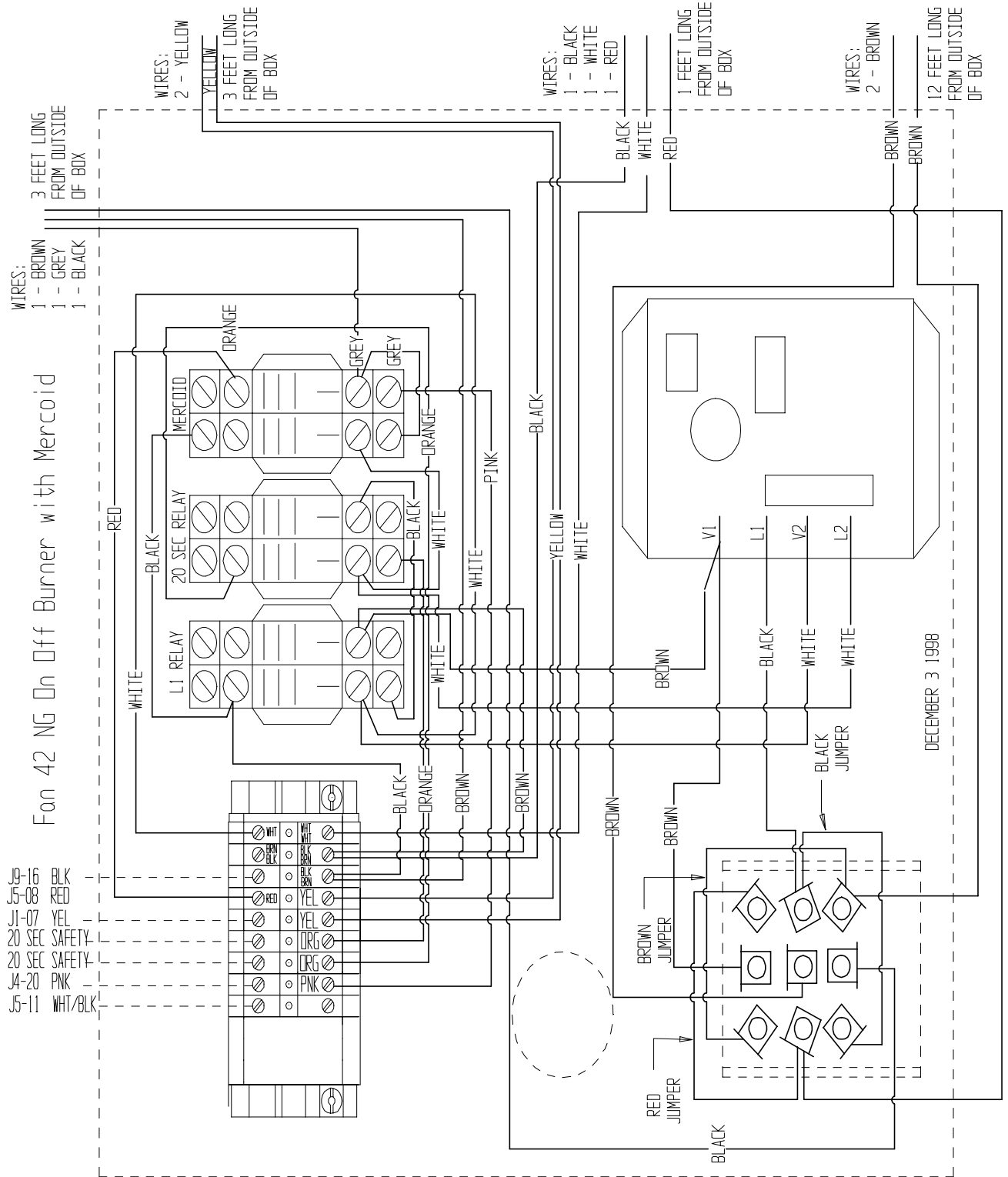
### Fan 42 LP Hi/Low-On/Off Burner With Mercoid



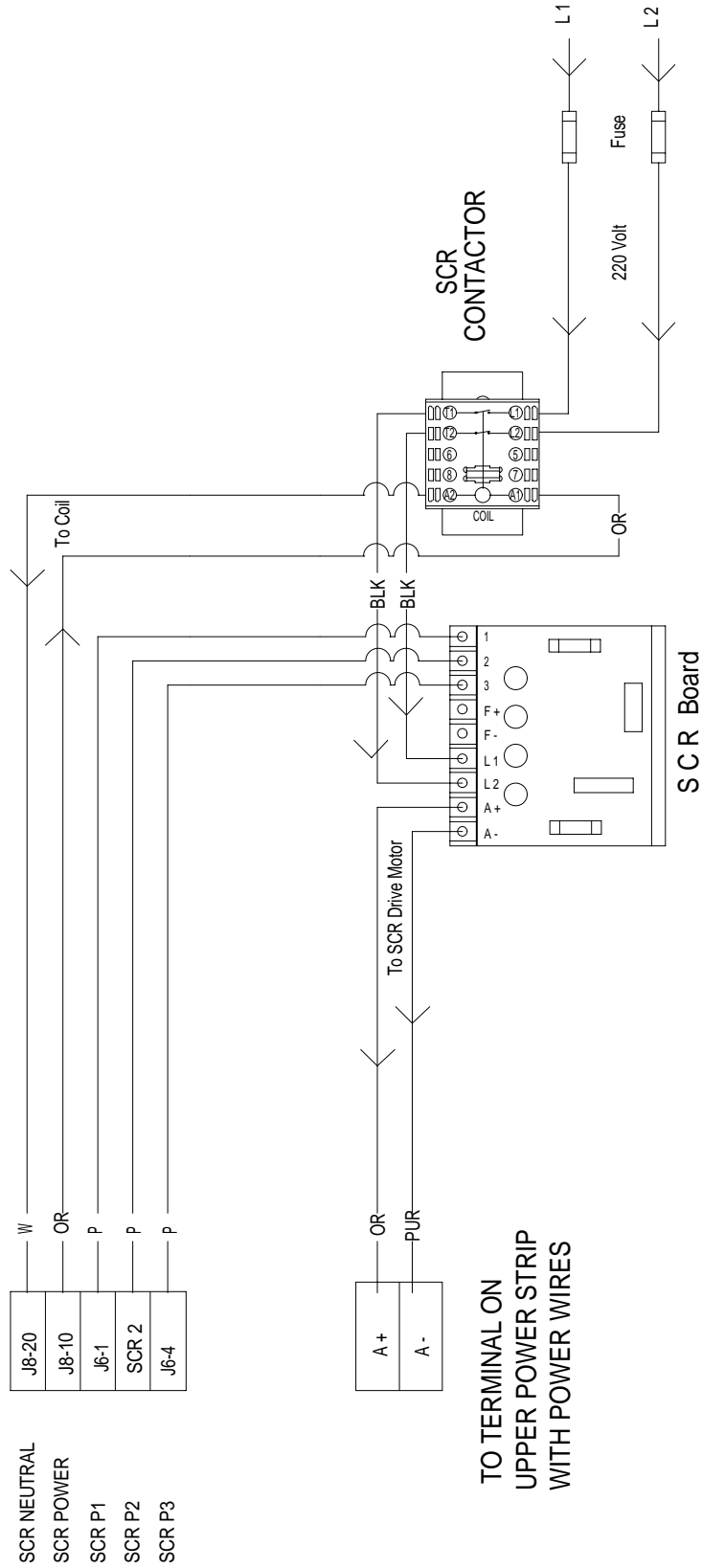
### Fan 42 NG Hi/Low-On/Off



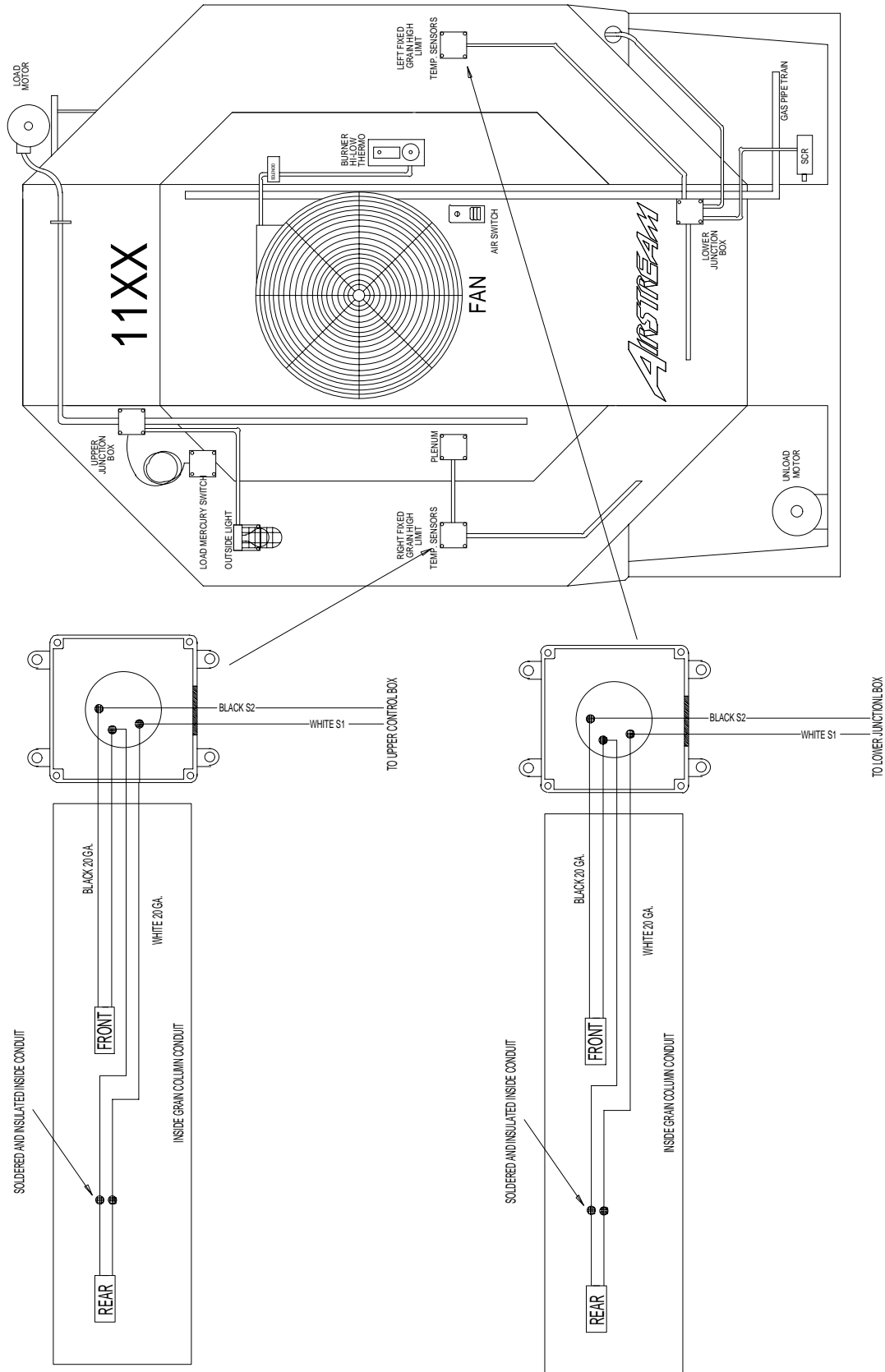
### Fan 42 NG Hi/Low-On/Off Burner With Mercoid



### SCR Drive Circuit



### RTD Temperature Sensor



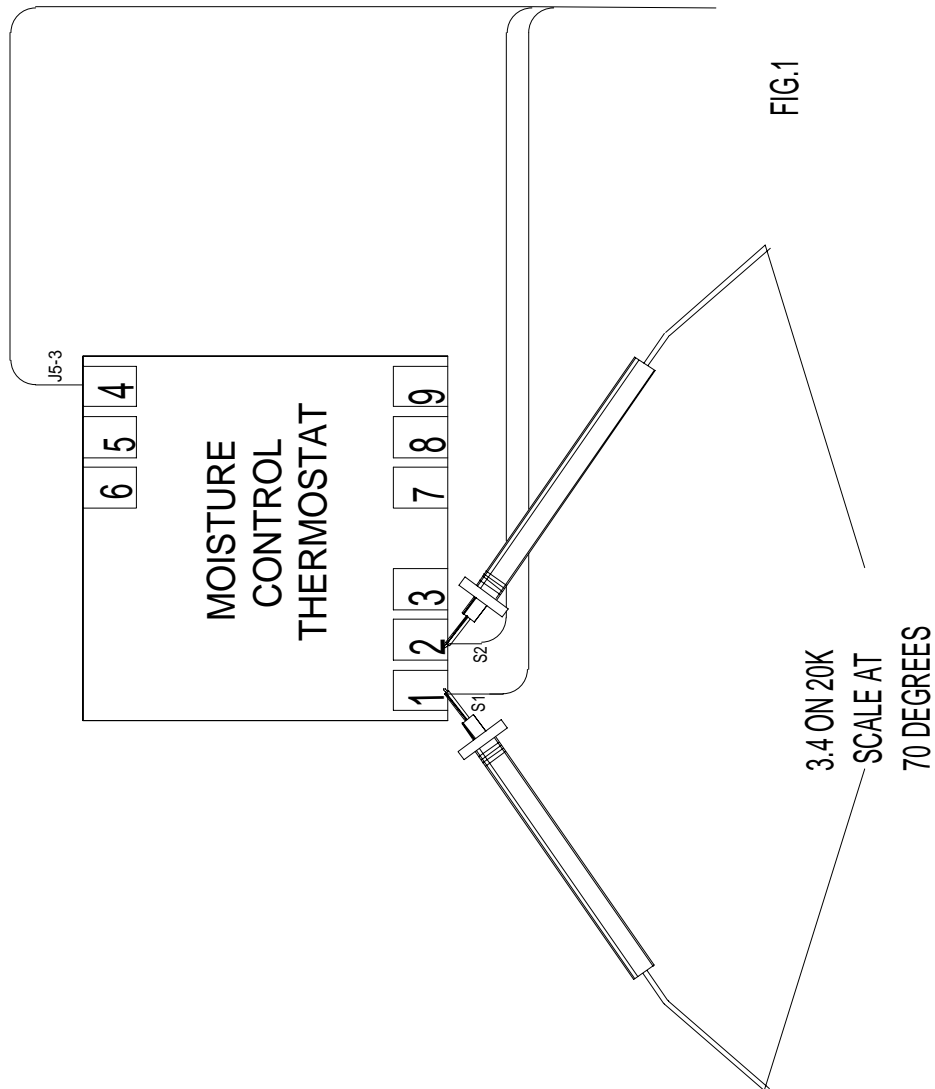
### Test Procedure for E.M.C.S. Dryers

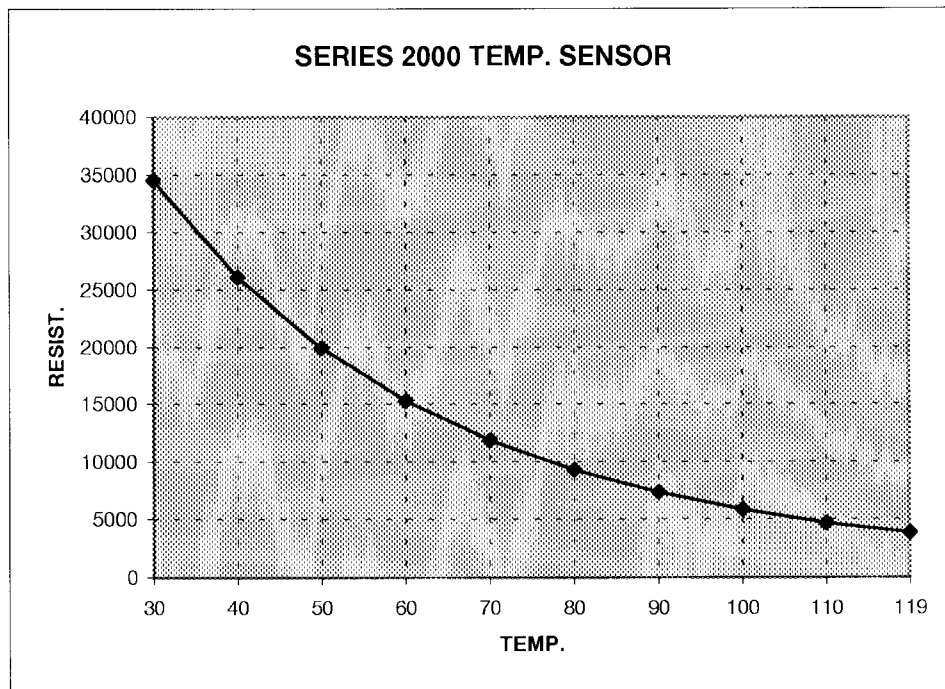
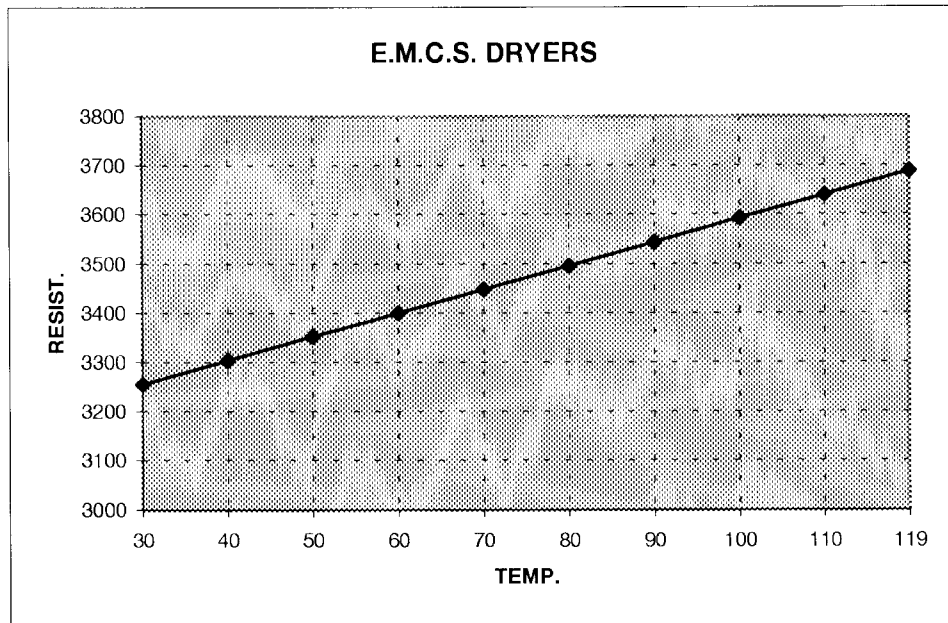
USING OHM METER BEGIN CHECKING THE SENSORS FOLLOWING FIG. 1

IF OHMS DOES NOT = 3.4 K  
CHECK LOWER AND UPPER TERMINAL STRIP (ON SINGLE MODULES CHECK S1 & S2) (ON DOUBLE OR TRIPLE MODULES CHECK J6-9 TO J6-6 = 3.4 AND CHECK J6-11 TO J6-8 = 3.4)

IF MEASUREMENTS DO NOT = 3.4 K  
CHECK CONNECTIONS IN WHITE JUNCTION BOX ON FAR LEFT AND RIGHT SIDES FACING THE FAN END.

IF NONE OF THE MEASUREMENTS = 3.4 K,  
THEN CHECK EACH INDIVIDUAL SENSOR.





We use two (2) different types of sensors (NTC thermistor on the Competitor Series 2000, and an encapsulated sensor on the E.M.C.S dryer) in our dryers. The resistance of the sensors varies according to the outside temperature. For example, on the E.M.C.S. dryers, for every one (1) degree rise in temperature the resistance increases 4.8 ohms. However, on the Competitor Series 2000 dryer, the sensor reacts just the opposite, the resistance rises with colder temperatures. The charts displayed above will help when troubleshooting any sensor problems.



## DC Drive Metering Roll System

**Symptoms: Metering Roll will not turn, dryer shutdown-"Metering Roll Drive Failure"**

### Metering Roll Operation

- The DC drive system on the portable dryer is used to control the output of grain from the dryer. It is adjusted from the front of the control box using the high and low metering roll potentiometers. Components used in this circuit are the SCR contactor, SCR drive board, DC motor/gear box, and the input/output board from the Electronic Monitoring Control System.
- All voltage for the drive system comes from terminals 1-(L1) and 3-(L2) of the SCR contactor. There should be 220 volts AC *across* these two points even if the unload system is turned off. If this voltage is zero, check your incoming main power.
- When the unload system is turned on you should be able to observe the SCR contactor energizing. The power to the contactor should turn on and off with the unload switch. You can check for power by putting an AC voltmeter *across* terminals *A1 and A2*. *Across these points you should read 120 Volts AC*. Also on the top of the contactor you can see a plunger pulling in whenever the contactor coil gets power. When the contactor is energized, power is transferred from terminals L1 and L2 to terminals T1 and T2. Understand that *L1 and L2 are the Input of the SCR contactor and T1 and T2 are the Output of the contactor*.

### Check the SCR Drive Board

- Next if all the above checks out okay, put your voltmeter *across terminal L1 and L2* of the SCR drive board. You should get 220 Volts AC across these points when the Unload Switch Is

*in the 2 Speed position*. If this is present then the SCR contactor and input/output board are okay.

- If 220 volts AC is present across input of the SCR drive board (L1 and L2) then check for voltage across the output of the board. *Change your voltmeter to check for DC voltage* at a range above the 200 volt scale. Put the leads *across A+ and A-*. The voltage *across* these two points will vary depending on where the speed control potentiometer is turned. Also try turning the potentiometer up and down. The voltage should go from zero to approximately *180 Volts DC*. If zero voltage is present across the A+ and A-terminal, first try to disconnect the wires from these two points and then check for DC volts again. If the voltage returns, suspect a bad motor or a problem in the wiring to the motor. If the voltage does not return, suspect a bad DC drive board.

### Check the Motor

- The wires attached to A+ and A- go directly to the DC drive motor on the dryer. You may remove the top cover of the motor and check for the same DC voltages mentioned above at the motor. If the voltage is not present try to disconnect the wires, then check for DC volts again. If you do not get any voltage then look for a broken or loose wire between the motor and the drive board terminals.
- If the voltage is present suspect the motor or the gear box. Removing the motor from the gear box and trying to run the motor only is one way of narrowing down the problem, or you may want to remove the chain and see if the metering rolls are froze up. Using a pipe wrench is an easy way to try and rotate the metering rolls.

## Fenwal Ignition System

**Symptoms: Burner will not light, dryer shutdown for "Loss of Flame"**

### Fenwal Ignition Operation

- The Fenwal Ignition System ignites the burner and monitors the flame. Once 120 VAC is applied to the Fenwal, the solenoids are powered up and the transformer begins ignition through the ignitor. If flame is sensed during the ignition period (about 4 seconds), the transformer is turned off, but the solenoids stay on. If no flame is detected after the ignition period, both the solenoids and transformer lose power and the dryer begins a shutdown sequence.
- All voltage for the Fenwal Ignition System is derived from the input/output board of the Electronic Monitoring Control System. For ignition to occur:
  1. The fan must be turned on.
  2. The pressure switch in the plenum must indicate the fan is operating.
  3. The burner switch must be in the auto or manual position.
  4. The dryer must go through a 10 second purge delay, which is indicated on the LCD screen.

These steps must take place before troubleshooting of the Fenwal System can occur. The following assumes the above steps have been taken.

### Fenwal Troubleshooting

- The Fenwal Board located in the fan can control box on the dryer has seven(7) terminals. They are L1, L2, V1, V2, S1, S2 and E2. L1 and L2 are considered the input to the board. After the 10 second purge delay, an AC voltmeter connected *Across L1 and L2 should read 120 Volts AC*. If this is true, you can assume the input/output board is operating properly and the problem is in the

Fenwal Ignition System. If no voltage is present after the 10 second purge delay, check for voltage going through the auxiliary switch mounted on the side of the fan contactor for that burner. This switch has to close before the Fenwal gets power. If this is OK, check the appropriate output on the input/output board for that burner.

- If voltage is present across L1 and L2, check for voltage across the *Output* of the Fenwal board. The output terminals are *V1 and V2*, and they will also have *120 VAC across them for approximately four(4) seconds*. The four(4) seconds is the amount of time the Fenwal has to ignite and sense flame or it concludes no flame is detected and begins a "Loss of Flame" shutdown. If you have power on the input terminals and no voltage on the output terminals, unload the secondary (take the wires off of V1 and V2) and recheck for voltage. If no voltage is present then suspect a bad Fenwal board. If power returns, look for a bad solenoid valve or a problem in the wiring.

***Note: All of the above voltage checks can be bypassed if you can hear one or more of the solenoids on the gas train snap on after the 10 second purge delay. This is true because the solenoids are connected across V1 and V2, and for the solenoids to come on, power must be going through the Fenwal board. Also during the four(4) second ignition period the transformer is energized and you should be able to observe sparking across the ignitor. If the solenoids snap, but no ignition takes place, check for loose ignitor wires or check the ignitor condition/ignition gap (1/8 " to 3/16"). Remember even if flame is sensed the sparking will discontinue after the ignition period (4 seconds).***

Continued on page 55.

Fenwal Ignition System continued...

### Hints

- Hearing the solenoids snap on after the 10 second purge delay means that power is coming to and through the Fenwal board. The Fenwal board is probably okay.
- If flame is sensed, the power to the solenoids stays on but the power to the ignitor always goes off after about four(4) seconds.
- Power to the low pressure solenoid is always on anytime flame is sensed. This is because the power to the low solenoid is hooked directly across terminals V1 and V2 of the Fenwal board.
- Power to the high pressure solenoids is controlled by the Plenum thermostat. One side of the solenoid is hooked to V2(neutral) and the other side is run through the normally closed switch of the thermostat and then back to V1. This is how the burner is made to cycle. When the plenum is below temperature, power is run through the thermostat to the high pressure solenoid. When temperature is reached, the thermostat opens and the high solenoid loses power.
- L2 and V2 are connected internally in the Fenwal, and they *must be neutral*.

### Ignitor Tips

- Make sure that the ignitors are mounted correctly through an opening in the burner skirting. Also, make sure that they are not close enough to the edges of the opening to cause a spark to jump the skirting, instead of between the ignitors.
- Be sure that the ignitor tips are no more than 1/8" apart from each other.
- Make sure that the wire connections on the ignitors are good and tight.
- On stubborn lighting burners reverse the direction the ignitor tips are facing. Instead of having the tips pointing toward the fan or burner, change the direction so the tips are facing the exhaust end of the dryer. (This is especially true on burners with no burner cone installed (i.e. Natural Gas).

## Metering Roll Sensors

**Symptoms: No BPH, Total Bushels, RPM displayed on LCD or dryer shutdown with metering roll problems**

### Metering Roll Sensor Operation

- Each metering roll on the portable dryer has a sensor mounted to read pulses as the metering roll is turning. These pulses are transmitted to the input/output board of the Electronic Monitoring Control System. The computer interprets this information and then displays the data on the LCD screen.
- All voltage for the metering roll sensors is derived from the input/output board of the Electronic Monitoring Control System. The sensors are operated with *12 Volts DC from terminals J5-9 and J5-12 on the board*. When checking for voltage the negative or black probe (-) of a voltmeter should always go to terminal J5-12.

*Always use j5-12 for the negative anytime you check for any DC voltage on the dryer.*

Then put the red probe (+) of the voltmeter on terminal J5-9. Across these two points there should be 12 volts DC. This voltage needs to be checked, but you can be reasonably assured the 12 volts DC is present if the rest of the dryer is operating. Check for this voltage on the terminal strip in the upper control box.

- 12 volts DC is transmitted from J5-8 and J5-12 *directly* to the metering roll sensors located on the back of the dryer. Each of the metering rolls is enclosed in a white plastic box mounted to the back of the metering rolls. Inside each box is the metering roll sensor and the metering roll wheel.
- Each sensor has three(3) wires connected to it. Two(2) of these wires are

the incoming 12 volts DC (the T1-+12V and T2-GND terminals), and one is a pulsing 12 volts DC back to the input/output board (the T3 out terminal). Checking across T1 and T2 will verify that 12 volts DC is getting to the sensor.

- The T3 (out) terminal is what delivers the metering roll information back to the input/output board in the main control box. The information for the metering roll on the left side of the dryer is sent on a yellow wire and goes to terminal J5-16. The information for the metering roll on the right side is sent on a blue wire and goes to terminal J5-19.
- You can use a DC voltmeter to observe this pulsing voltage. The best place to check for this voltage is directly on the input/output board located in the very back of the lower control box on the dryer. Check for a pulsing voltage from J5-16 to J5-12 (negative) and J5-19 to J5-12 (negative). Across each of these test points you should be able to observe a pulsing DC voltage when the metering rolls are turning. You should be able to speed up or slow down the pulses by turning the speed of the metering rolls up or down.

**Note:** *Because a digital voltmeter cannot react fast enough you may not see a full 12 volts DC, instead you may see a pulsing from zero to about eight(8) volts.*

### Hints

- When checking for a pulsing voltage on J5-16 or J5-19 you should always leave the voltmeter across the terminals for about 30 seconds. Watch the meter closely. Each pulse should be about the same length and about the same time apart. If this is not true, suspect a problem with the sensor on the back of the dryer.

### Air Pressure System

- When inspecting the sensor make sure that the wheel going through the sensor is positioned in the center and is not touching either side. If the sensor is scratched it is either bad or will probably go bad.

### Airflow Operation

#### Symptoms: Dryer will indicate a "Loss of Airflow"

- After turning on a fan the computer must get a signal from the air pressure switch telling it that the fan is actually running and the plenum has been pressurized. If the switch does not show the air pressure within 20 seconds a "Loss of Airflow" shutdown occurs.

#### Troubleshooting: "Loss of Airflow"

- This error message indicates that the fan is running and the air pressure in the plenum did not pressurize. First, verify that the fan is running, and the dryer is full of grain. There must be grain in the dryer or no pressure will develop. If the fan does come on and the dryer is full of grain, but a "Loss of Airflow" shutdown still occurs, check the air pressure switch circuit.
- Watching the blue light in the fan switch is the easiest way to tell if the air pressure switch is sensing air pressure. Each air pressure switch has a light in the fan switch that will only come on if air pressure has developed. Turn on the fan and after it has run up to about one half of its operating speed the light should go on. If the fan light is not coming on then the air pressure circuit is not sensing pressure.
- Try adjusting the air switch on the front of the plenum to see if it is just out of adjustment. Use a straight blade screw-

driver and turn the adjusting screw counterclockwise. Turning it this way makes the switch more sensitive to pressure and will turn on the light easier.

- If adjusting the screw does not solve your problem consult the layout diagram of the input/output board. Look for the input for the problem switch. Example: Fan #1 switch's input is J1-13. This is a 12 volt DC input and it can be checked with a DC voltmeter. One of the following conditions will exist when checking this input.  
 NO AIR PRESSURE---ZERO VOLTS  
 HAS AIR PRESSURE---12 VOLTS DC  
 Remember when checking for 12 volts DC you should always use one of the DC negatives for the black probe(-) of your voltmeter. Some of the terminals that may be used for the negative(-) are J5-11, J5-12 or J5-13.
- To check fan #1 for air pressure with a voltmeter:
  1. Turn on the dryer.
  2. Place the black probe(negative) of your voltmeter on J5-11 or J5-12.
  3. Place the red probe(positive) of your voltmeter on J1-13. At this point there should be zero volts here because the fan is not running.
  4. Turn on the fan and watch your voltmeter.
- If the air switch is adjusted properly you should have zero volts across these test points when you first turn on the fan. After the fan has run up to about one half of its normal operating speed you should see the voltmeter change from zero volts to 12 volts DC. This also works in reverse when turning off the fan. After the fan is first turned off, the voltmeter should still show 12 volts DC until the fan has slowed down to about one half of its operating speed. This is because even though the fan is turned off it is still turning and developing some pressure in the plenum.

- If all the above fails to work then remove the two wires while blowing into the air tube. Blowing into the switch is the same as having air pressure in the plenum. You should have an open circuit until you blow into the switch, then it should close. If the switch does not close try adjusting it, or replace it with a known good one.

### Hints

1. Dryer must be full of grain.
2. Light in the fan switch can be used exactly like a voltmeter to test.
3. Make adjustments of the pressure in one quarter turns.
4. Make sure the air tube in the plenum is not plugged after sitting over the summer.
5. Check the bulb in the fan light. It is a 12 volt bulb.

### Vapor High Temperature

**Symptoms: Dryer runs for only a short period of time, then a shutdown occurs.**

- This message indicates that the vaporizer on an LP Dryer is not properly adjusted. LP (liquified petroleum) must be vaporized before the burner can operate properly. If LP is being fed to the dryer it must run through a vaporizer before it can be burned. If the vaporizer is getting the fuel too hot it will cause a Vapor High Limit shutdown.
- The vaporizer is located in the fan/heater unit. It is wrap of pipe mounted inside the fan can directly in front of the burner. It can be seen by looking through the inspection door on the side of the burner.
- To properly adjust the vaporizer a 1/2" wrench is needed. Knowing that the gas can get too hot, you must feel the pipe train before the regulator to check this temperature. This point may be very hot so be careful while checking the temperature. *The temperature before the regulator must be warm to the touch.* This point cannot be hot, nor can it be cold...only warm. Use the 1/2" wrench to loosen the hold down bracket on the vaporizer. Move the vaporizer away from the flame to cool down the pipe train or move it closer to the flame to make the pipe train warmer.

### Troubleshooting: Vapor High Temperature

- The dryer will shutdown but will probably restart as soon as the computer is reset. This is because the high limit is an automatic reset and after the dryer shuts down it allows the pipe train to cool down.
- After the dryer is reset, it will run from a few seconds to a few minutes and then shutdown again. This is because the Vapor High Limit is heating up again as

soon as the burner is turned on. The vaporizer must be adjusted to solve this problem.

*Using J5-11 as the negative test point for all voltage tests, check for 12 volts DC using the following terminals to help diagnose the problem:*

- Fan #1-J1-5      Fan #2-J1-6
- Fan #3-J2-5      Fan #4-J2-6
- Fan #5-J3-5      Fan #6-J3-6

Remember that each of these input terminals is part of the main safety circuit of the dryer, and *each must have 12 volts DC on it before the dryer will operate.*

### Vapor High Limit Hints

1. Anytime you adjust the Vapor High you should wait and be sure that the pipe train temperature stays constant. It may slowly allow the pipe train to get hotter or colder the longer the dryer runs.
2. If a dryer is shutting down constantly from a Vapor High Limit, it may also be caused from a gas line that is exposed to direct sunlight. If the fuel line to the dryer is exposed to direct sunlight, the liquid in the line will start to vaporize before it even gets to the dryer. Then, when it runs through the vaporizer it gets too hot and causes a shutdown (no matter where you try and adjust the vaporizer). This problem can be helped by insulating the gas line from outside heat.
3. In extreme cases the vaporizer may have to be changed before it will run the proper temperature. Example: If a dryer has a burner with a three wrap vaporizer and the dryer is located in the southern United States, you may have problems adjusting the vaporizer far enough from the flame. In this case, you may have to install a two wrap vaporizer.

The two wrap has less surface area and it will not heat the LP quite as much. This may also be true in colder climates where a two wrap will not heat up enough. In this case, the pipe train may develop frost or even freeze the solenoids open.

4. The Vapor High Limit is an automatic reset safety device. It will reset itself as soon as its temperature drops below 190° F. Because the pipe train of the burner cools down rapidly when there is a dryer shut down, the Vapor High Limit will generally be cool before the operator gets back to the dryer. As soon as he hits the stop button to reset the computer, it comes back up to normal operation. It appears that the dryer is shutting down for no apparent reason. Usually if this happens the dryer will shut down again a short while after restarting the dryer.
5. If the LP tank feeding the dryer is getting very low on fuel, it can also cause the dryer to shutdown on a Vapor High Limit. Before adjusting the vaporizer always check the fuel level in the customers tank. If the fuel pressure is very low, try suggesting that the tank be refilled. Usually this will solve the problem.

## Out Of Grain Warning Shutdown

### Out Of Grain Warning

- This message indicated that the dryer has run low on grain. The shutdown occurs when the loading equipment has run longer than the time the operator has set on the Out of Grain timer. *The mercury switch located on top of the dryer tells the computer when the dryer is full or calling for grain.* The shutdown usually occurs when the loading equipment is having trouble keeping up with the output of the dryer.

### Possible Solution

- Look at the loading equipment to see if this is the problem. Remember, the top hopper of the dryer should always have grain in it. If any of the side screens are opening up at anytime, then you are losing heat along with efficiency. This indicates that you are not filling fast enough. *Speed up the loading equipment to the dryer.*
- *Using J5-11 for the test point ground, test for 12 volts on J5-4 to test the load mercury switch.* This switch should have 12 volts DC on it when the dryer is calling for grain and has zero volts on it when the dryer is full.

### Out of Grain Hints

1. The out of grain timer is only in use when the fill switch is in the auto position. In the manual position the top mercury switch will still shut off the fill auger, but the dryer will not shutdown if the source of grain to the fill auger is depleted.

2. Before setting the Out of Grain timer, monitor how long it takes the dryer to refill for shrink. Then, set the Out of Grain timer accordingly. Example: If a dryer takes six minutes to refill for shrink, add an additional five minutes to this, and use this as the amount of time to program into the Out of Grain timer. The additional five minutes is to avoid any nuisance shutdowns. A lot of customers don't want their fill augers to run empty if the source of grain runs out. They may want to set the Out of Grain timer closer than the additional five minutes. (this is fine, but caution the customer that it may cause some nuisance shutdowns.)
3. For the Out of Grain warning to work properly, the fill equipment must be large enough to handle the capacity of the dryer. You do not want the side columns to get low on grain. This will allow the airflow to escape from the dryer through the side screens. If this happens you lose efficiency and may start having a loss of airflow shutdown.



### Motor Overload Shutdown

This indicates that one of the Motor Overloads has tripped, shutting down the dryer. Each of the Motor Overloads is located in the upper main power control box. They are all wired into a single series circuit that goes to the input/output board on terminal J4-12. Before the dryer will start terminal J4-12 must have 12 volts DC present, or the Motor Overload shutdown will occur.

Visually inspect each of the overloads. You can tell by looking at them if a trip has occurred. Simply press the reset handle on the overload to reset it. After resetting the overloads press the stop button to clear the error.

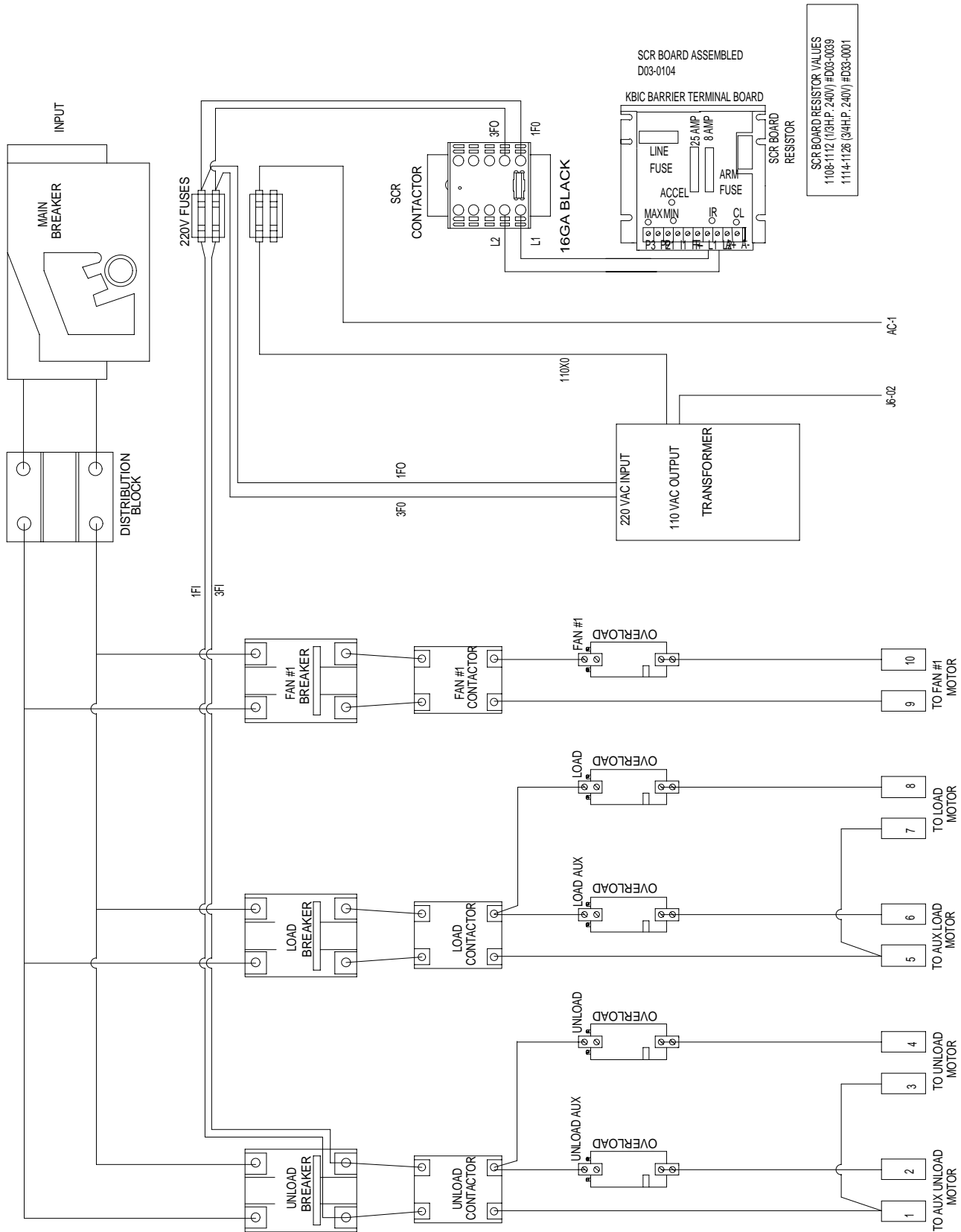
If no overloads are tripped try the following voltage tests: Using terminal J5-11 as the negative terminal for all DC voltage checks. Look for 12 volts DC on terminal J-419. This is the terminal that feeds power to the Motor Overloads. If the 12 volts DC is present then check for voltage on J4-12. During a Motor Overload shutdown J4-12 should have zero volts. If you have power going to and not returning to J4-12 inspect the wiring from J4-19 to the overloads and then back to J4-12. If the wiring is okay, turn off all power to the dryer and do a continuity check from J4-19 to J4-12. This must be closed circuit to operate properly.

### Motor Overload Helpful Hints

1. Each of the Motor Overload is run in a series circuit. This means, if any of the Motor Overloads trip, a shutdown will occur. Visually inspect the overload to tell which has caused the shutdown.
2. Even though GSI uses ambient compensated overloads, hot weather or positioning the dryer control box in the sunlight may cause a Motor Overload shutdown to occur. This can usually be tested by trying to run the dryer with the control box door open a little bit.
3. Each of the overloads has an adjustable trip setting that can set up to 115 %. At 115% the overload will hold in longer before it trips.
4. Always check amperages on the motors to be sure that the problem is not in the motor itself.
5. Remember that each motor has a built-in service factor. This allow the motor to actually run over the rated full load amps. The motor manufacturers have allowed GSI, *on a number of applications*, to run motors over the full load amp rating. this is possible because they are being used in an air over application.

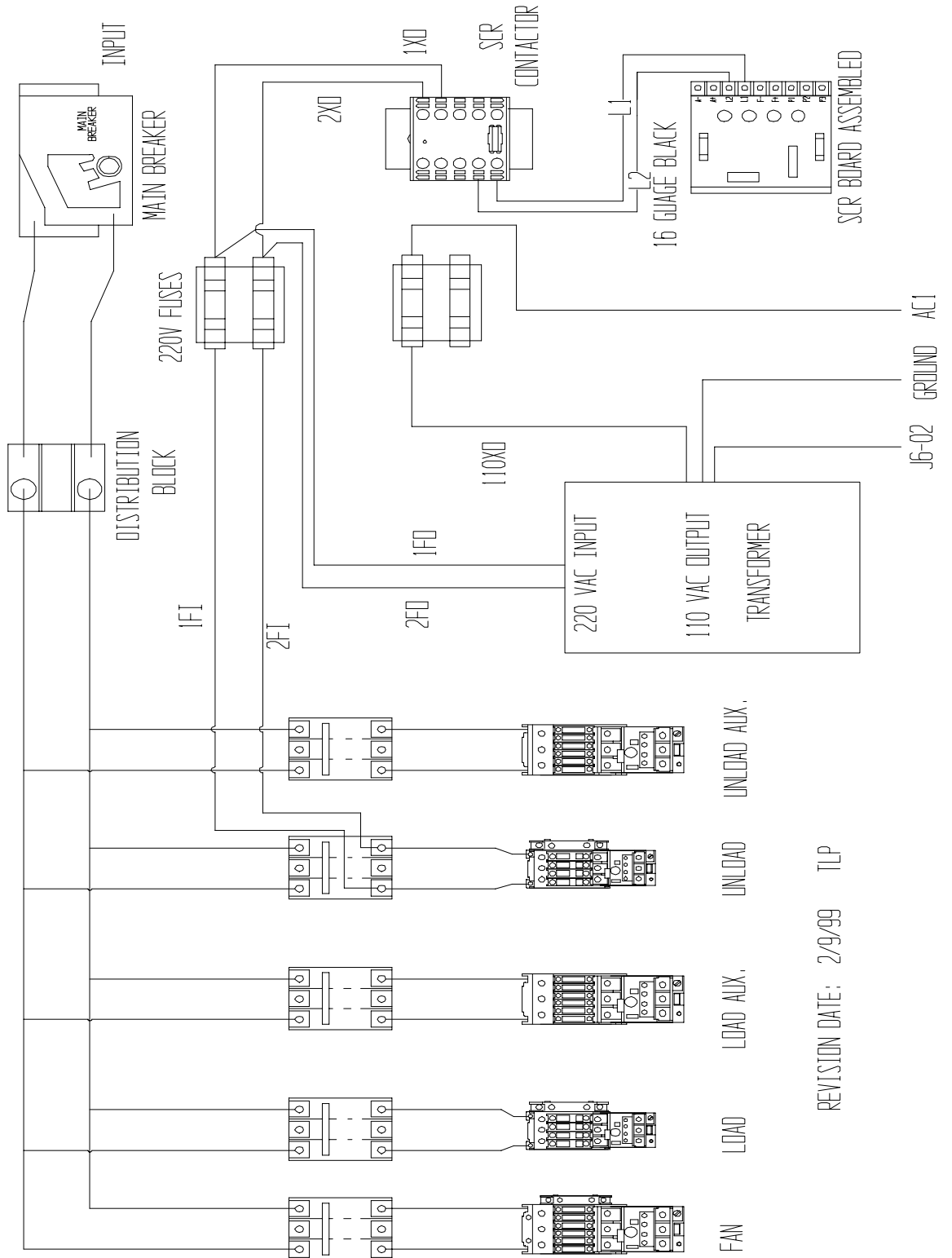


## 220 Volt Single (1) Phase Power Drawing



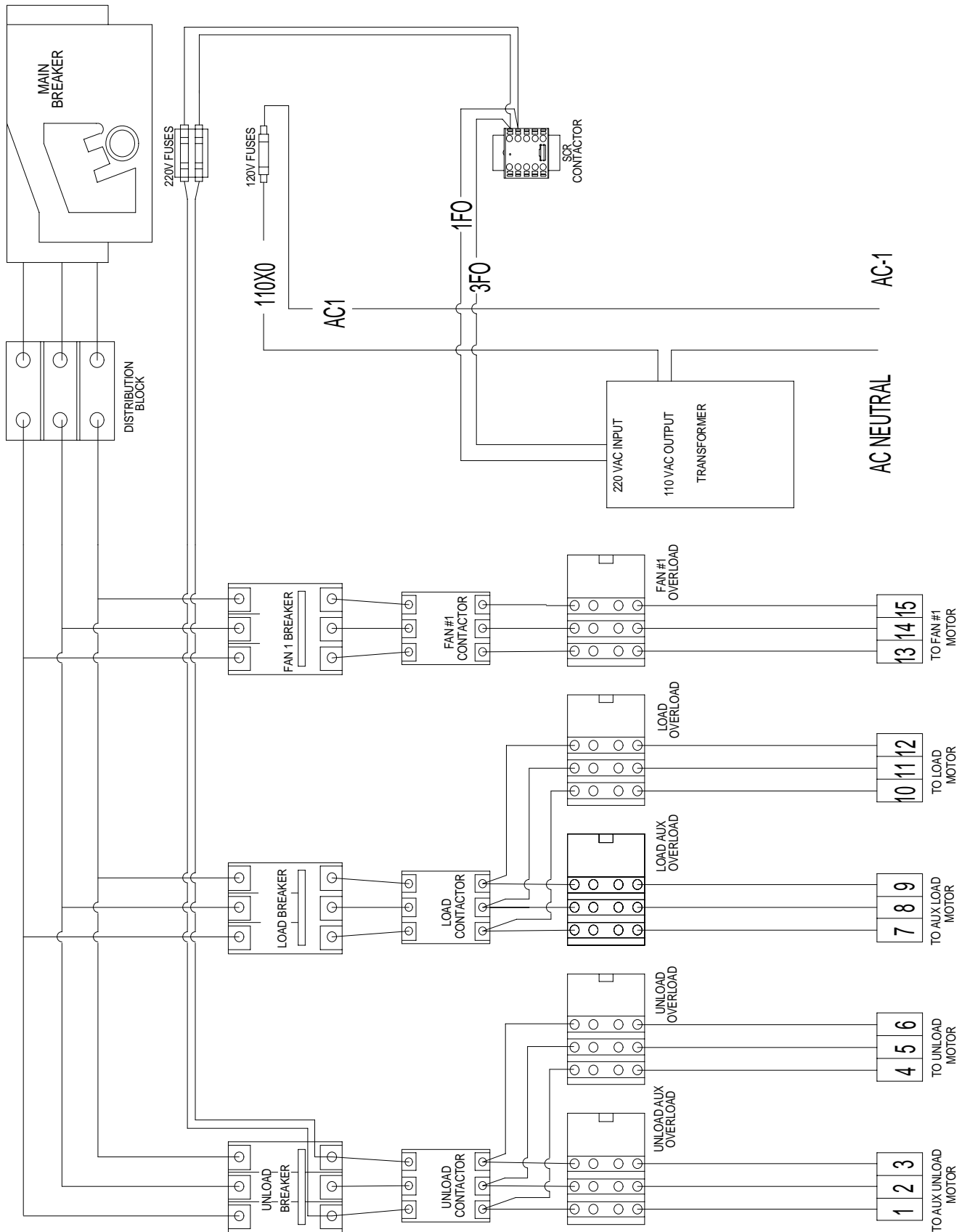
220 Volt Single (1) Phase Power Drawing (New Version)

SERIES 2000 220V SINGLE PHASE COMPETITOR SERIES



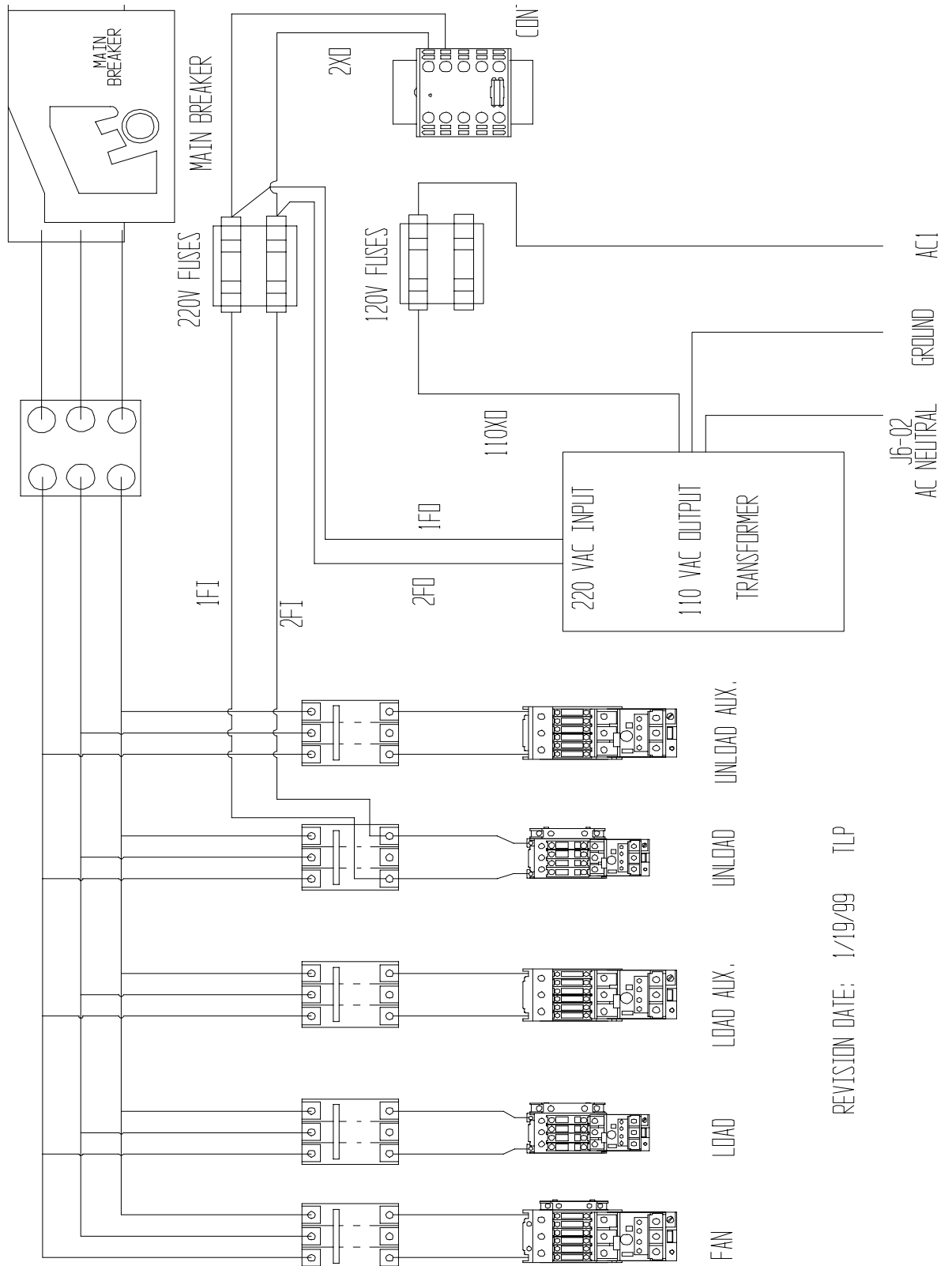
REVISION DATE: 2/9/99 TLP

### 220 Volt Three (3) Phase Power Drawing



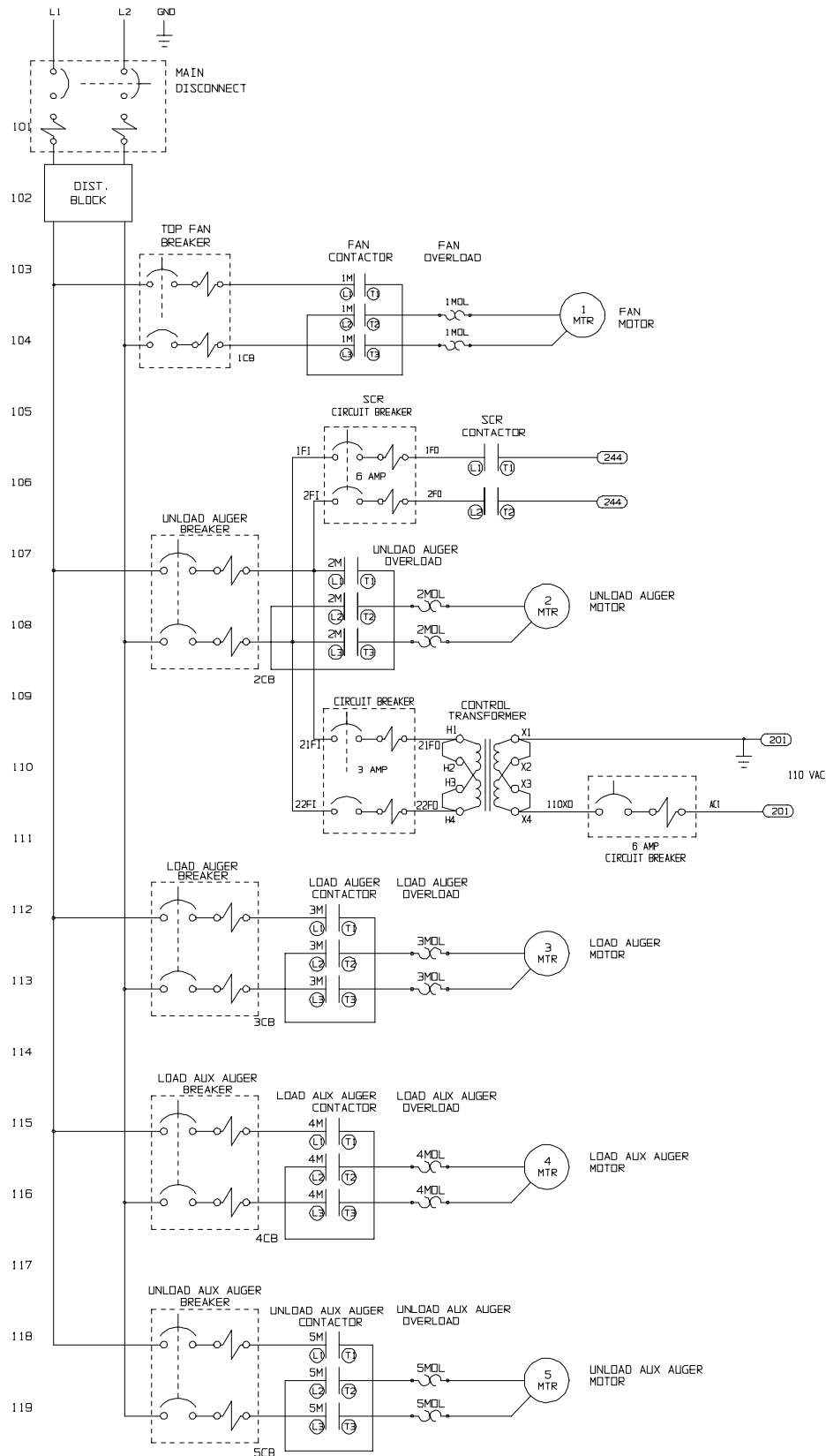
220 Volt Three (3) Phase Power Drawing (New Version)

SERIES 2000 220VOLT 3 PHASE COMPETITOR SERIES

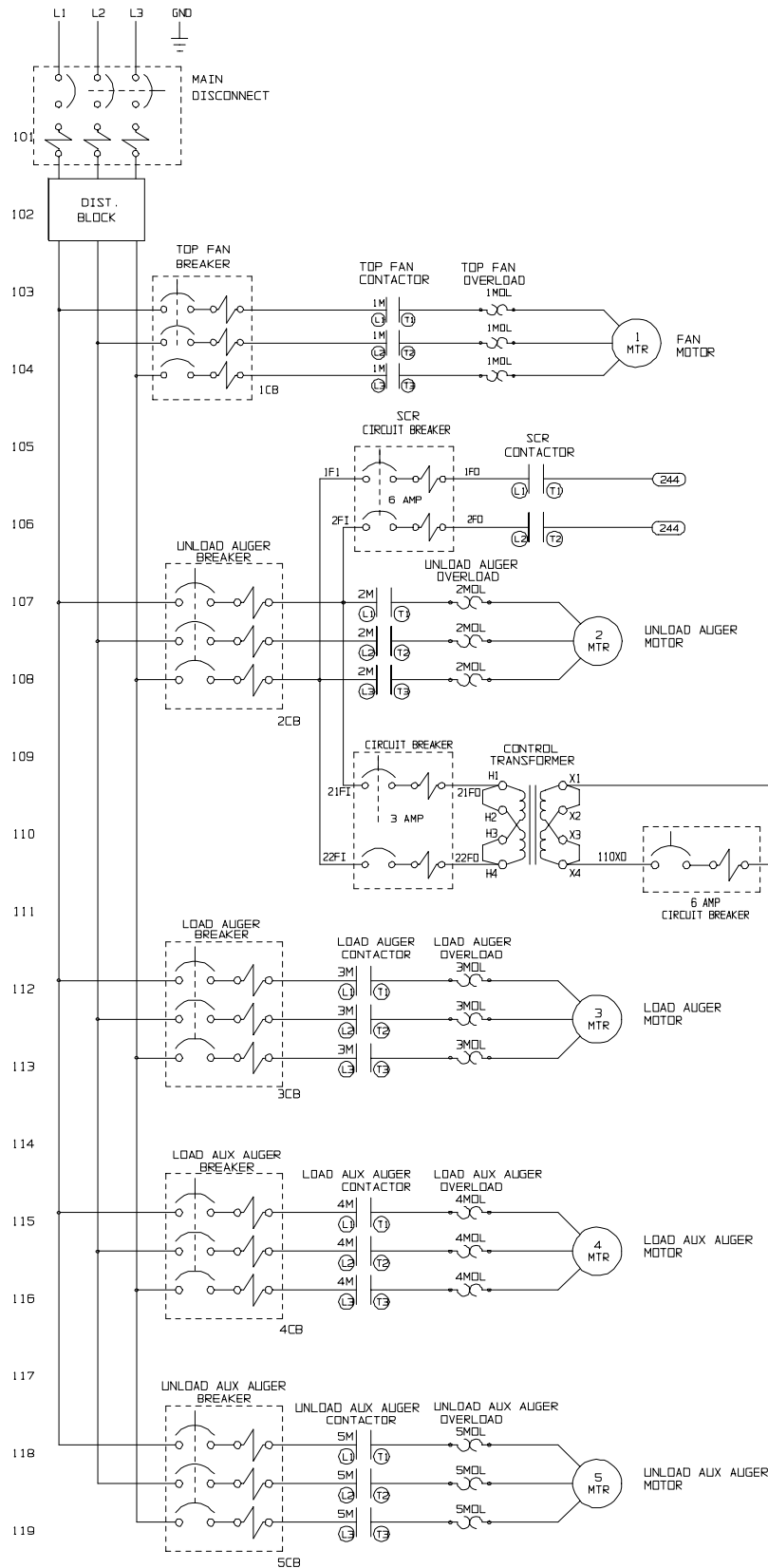


REVISION DATE: 1/19/99 TLP

### COMPETITOR POWER CIRCUIT ( 220 VOLT 1PH )

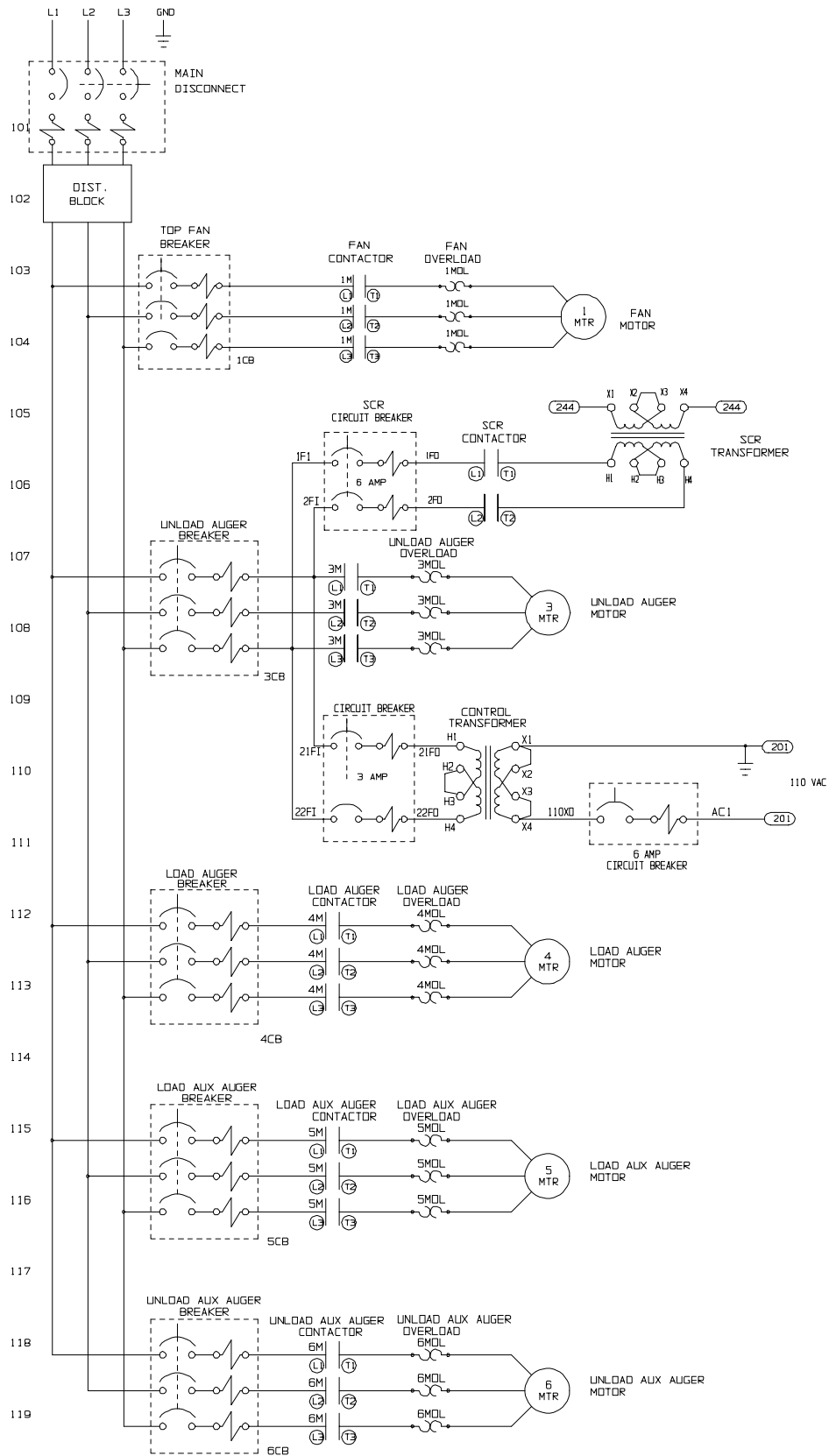


### COMPETITOR POWER CIRCUIT ( 220 VOLT 3PH )

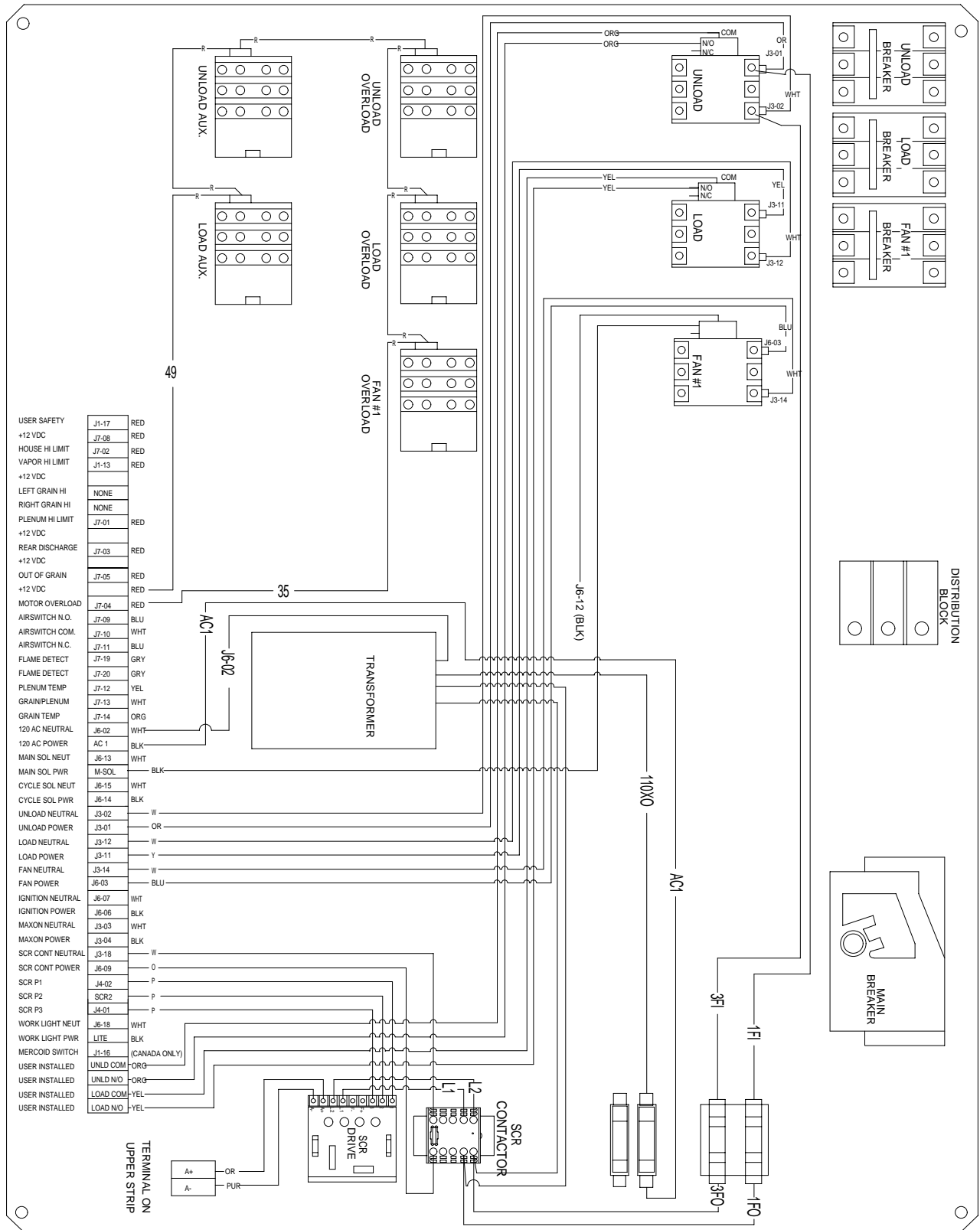




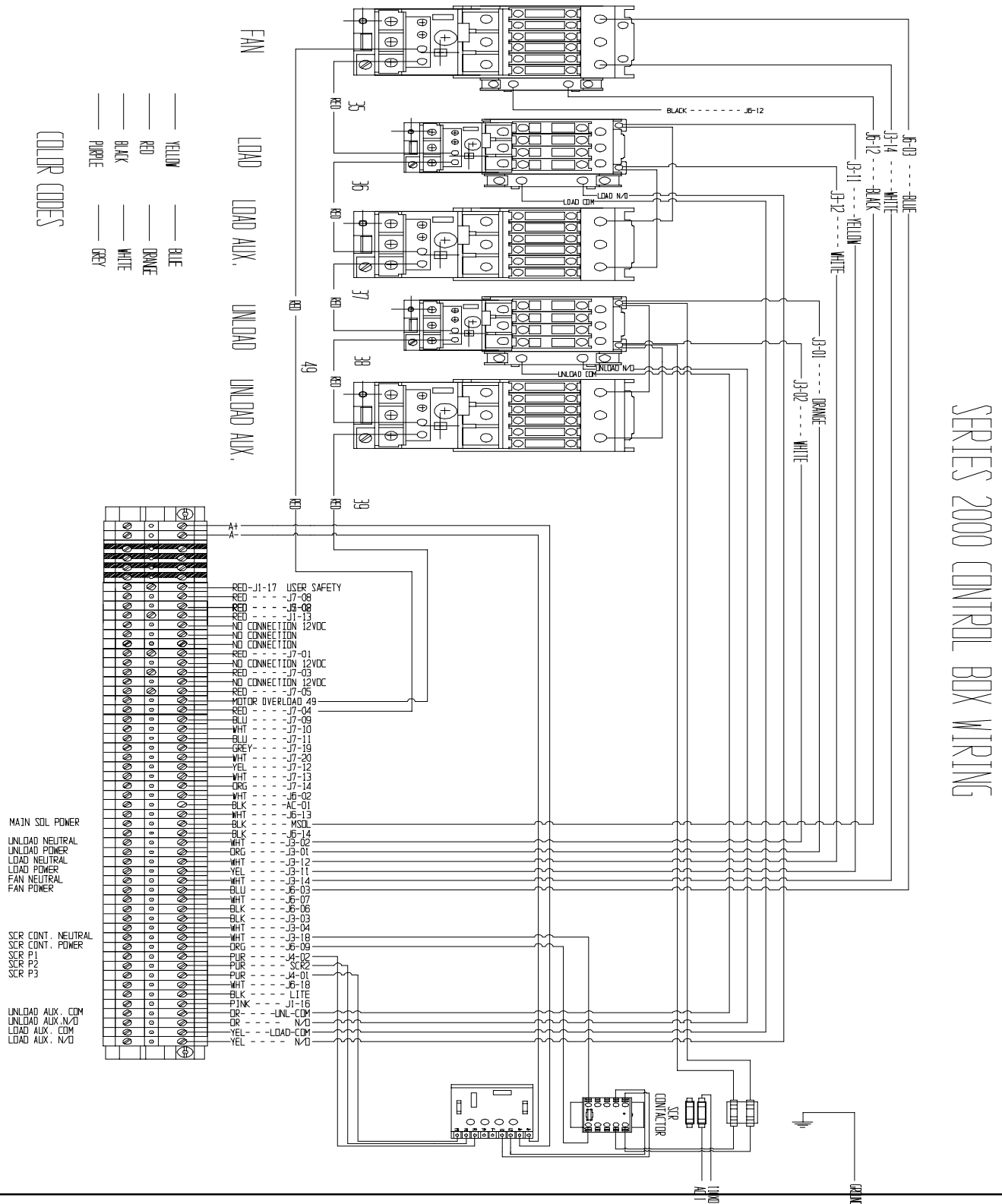
### COMPETITOR POWER CIRCUIT ( 440 VOLT 3PH )



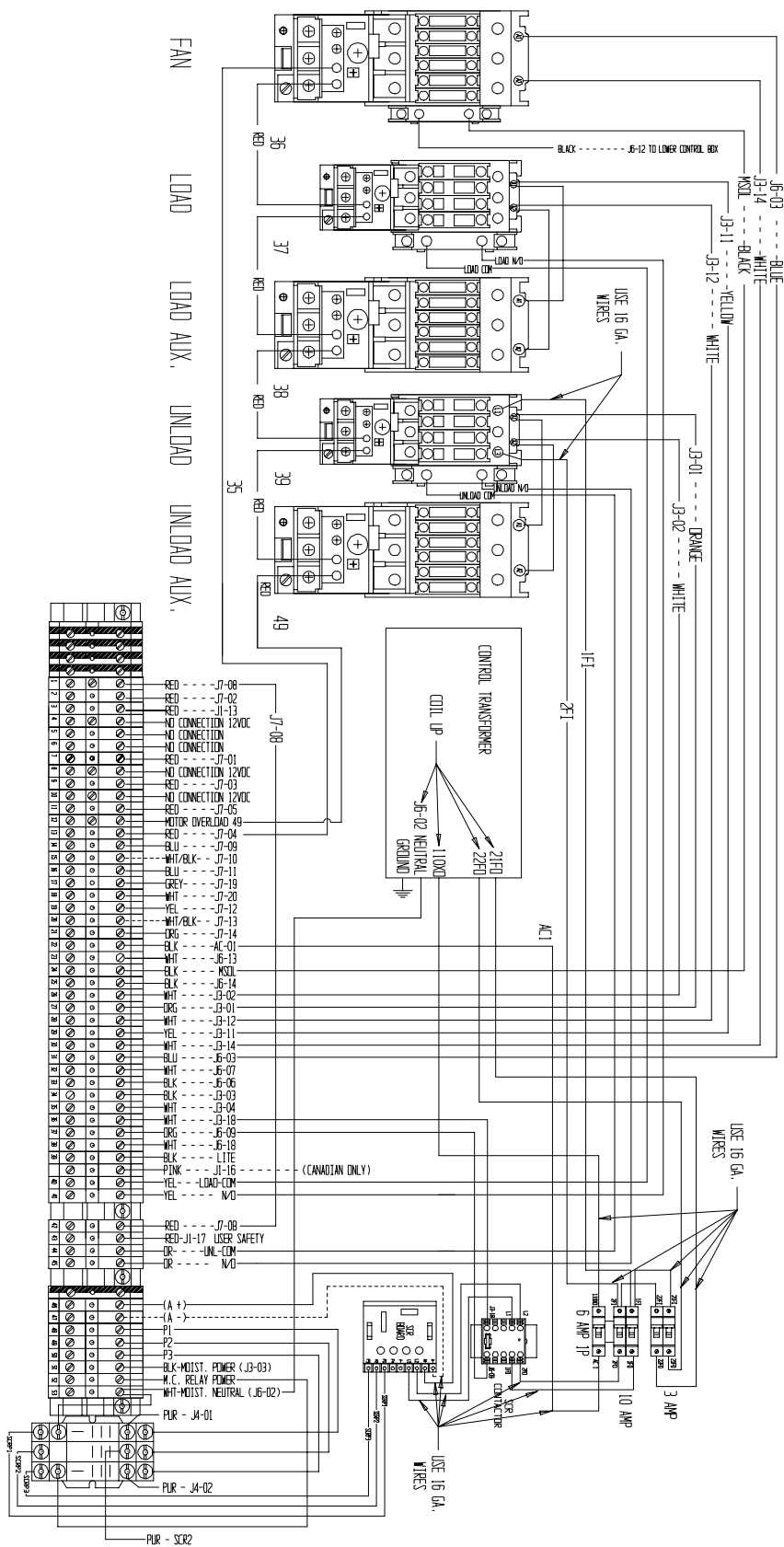
### Upper Control Box Internal Wiring



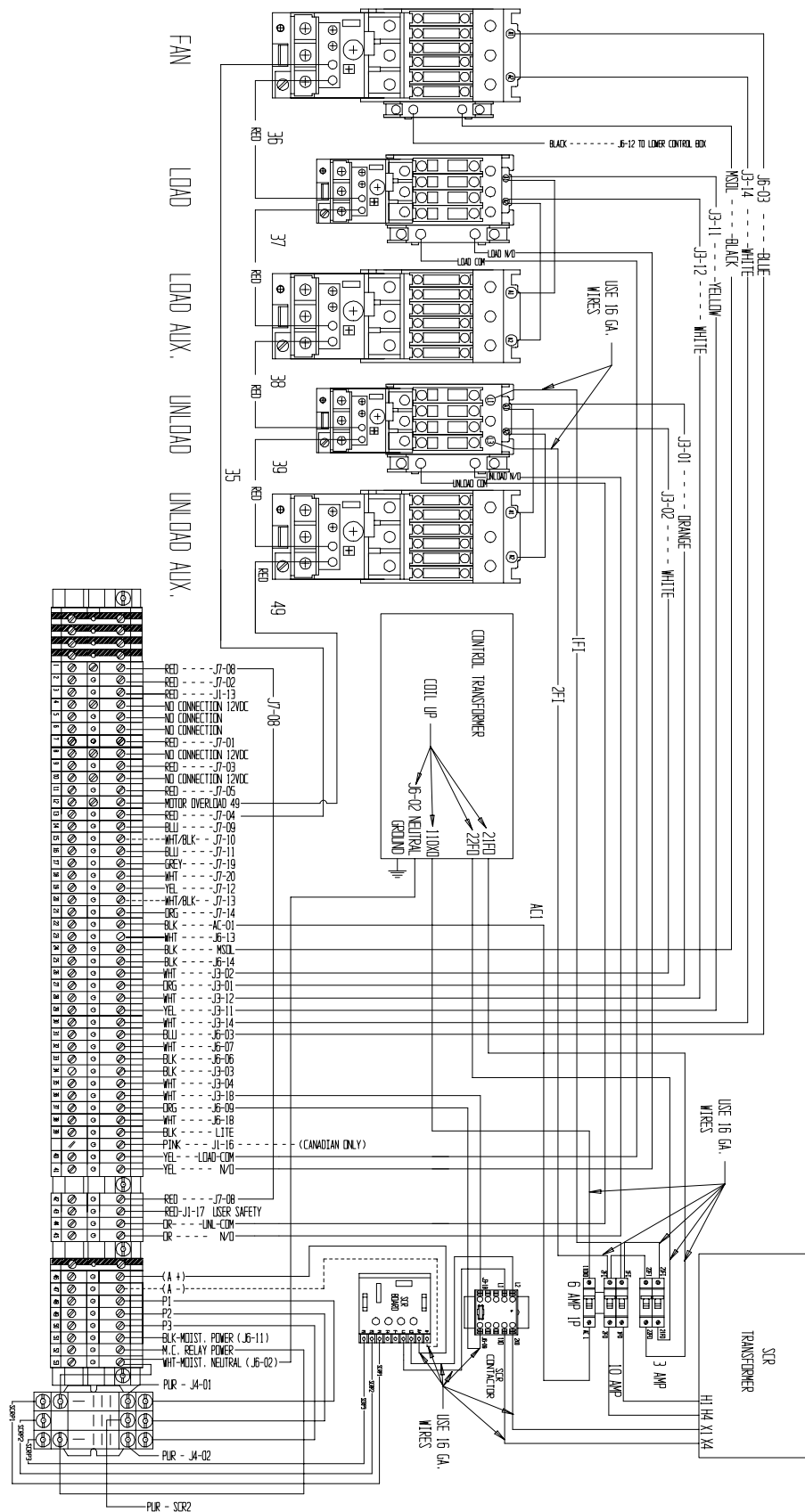
Series 2000 Control Box Wiring (New Version)



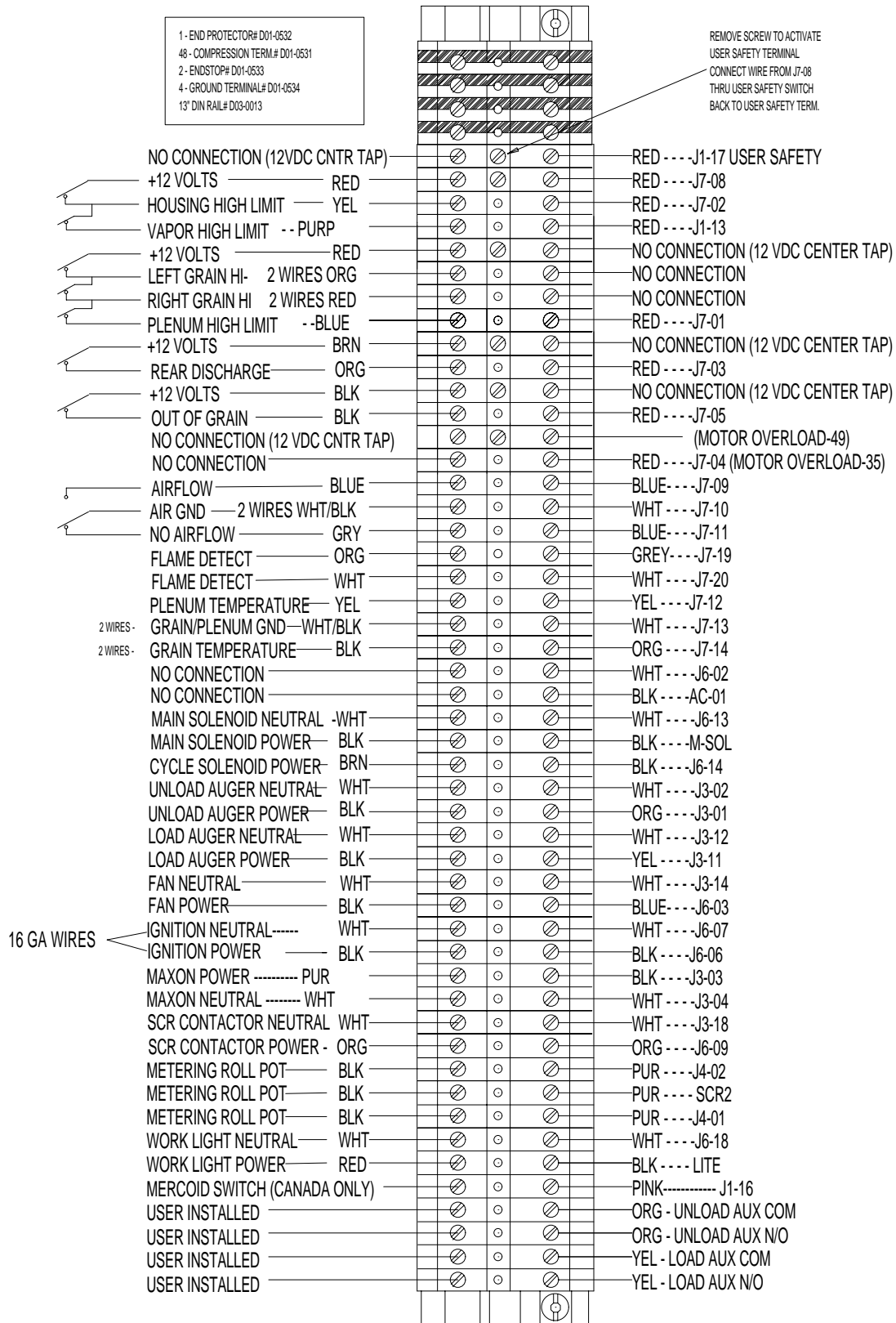
### Upper Control Box Wiring 220 Volt 1PH



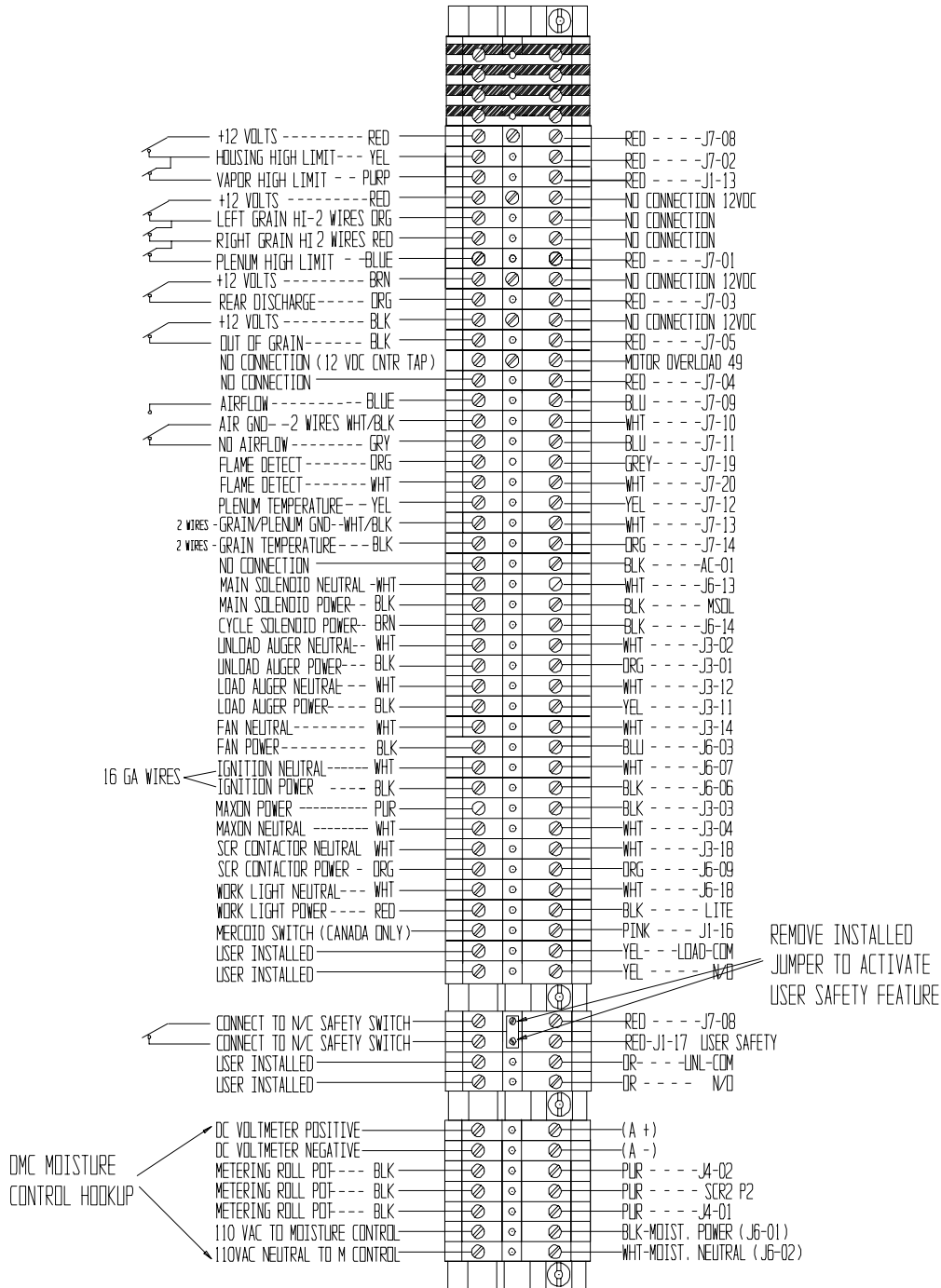
### Upper Control Box Wiring 380, 460 & 575 3PH



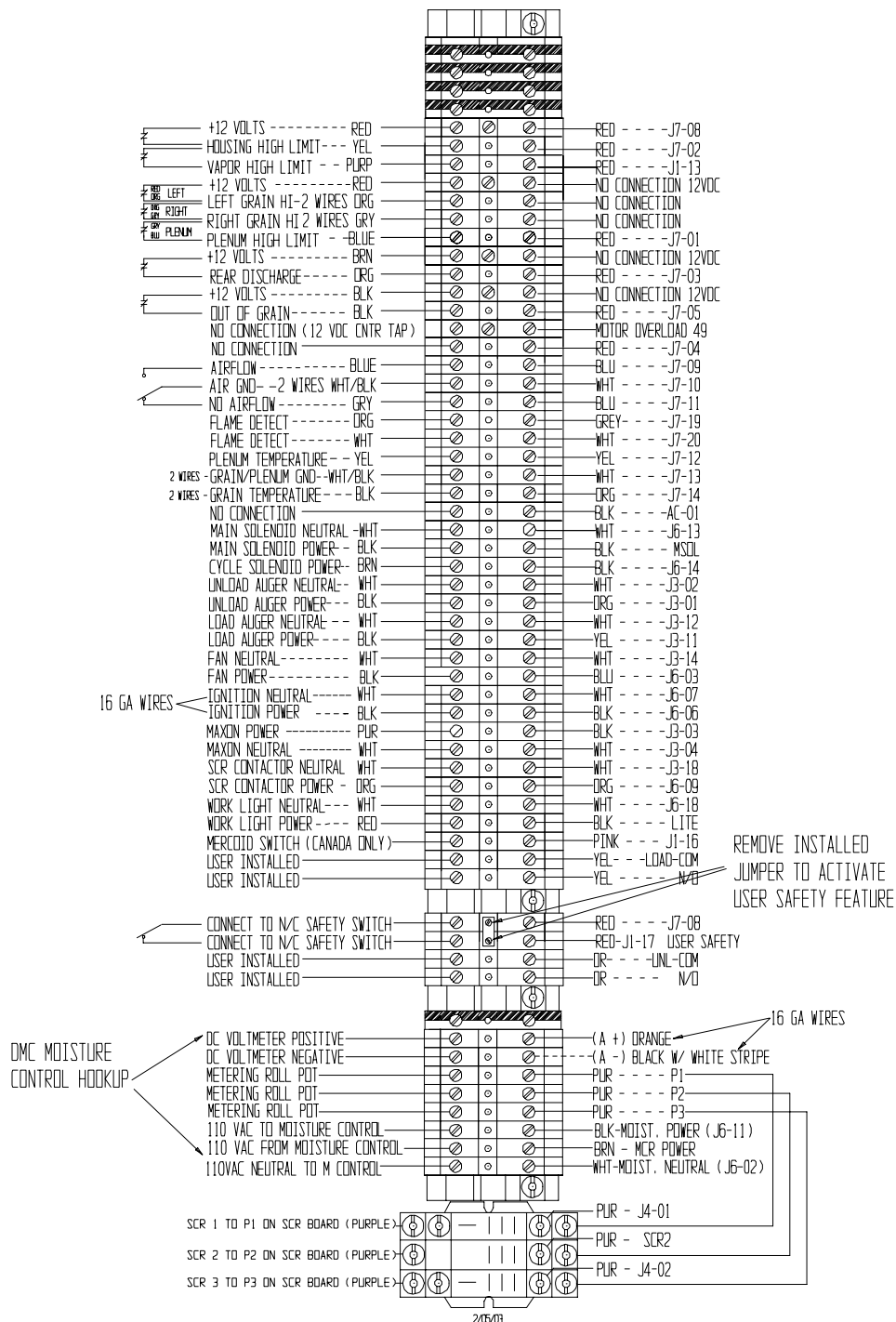
### Series 100 Control Box Wiring



### Upper Terminal Strip With Moisture Control Hook Up

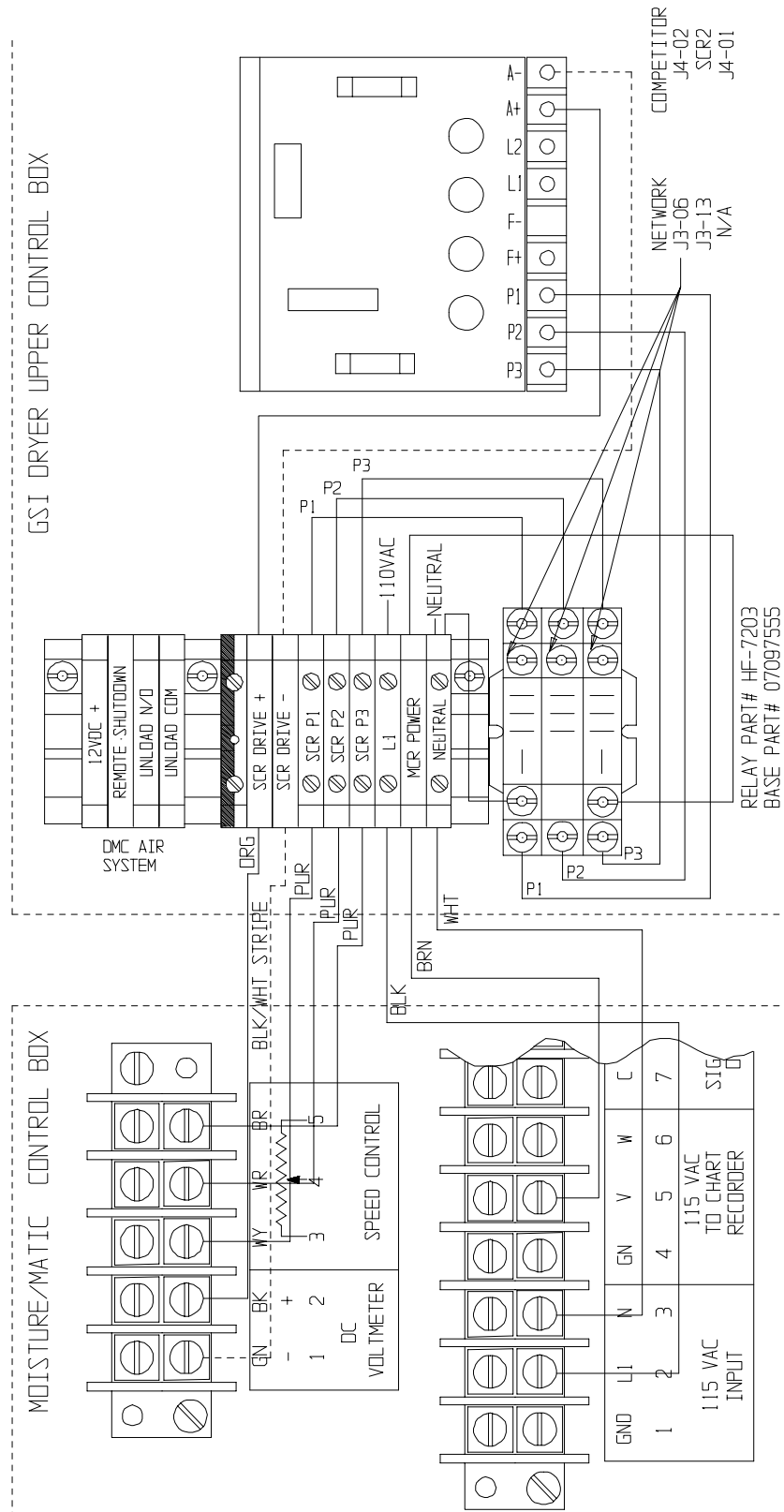


### Upper Terminal Strip With Moisture Control Relay Hook Up



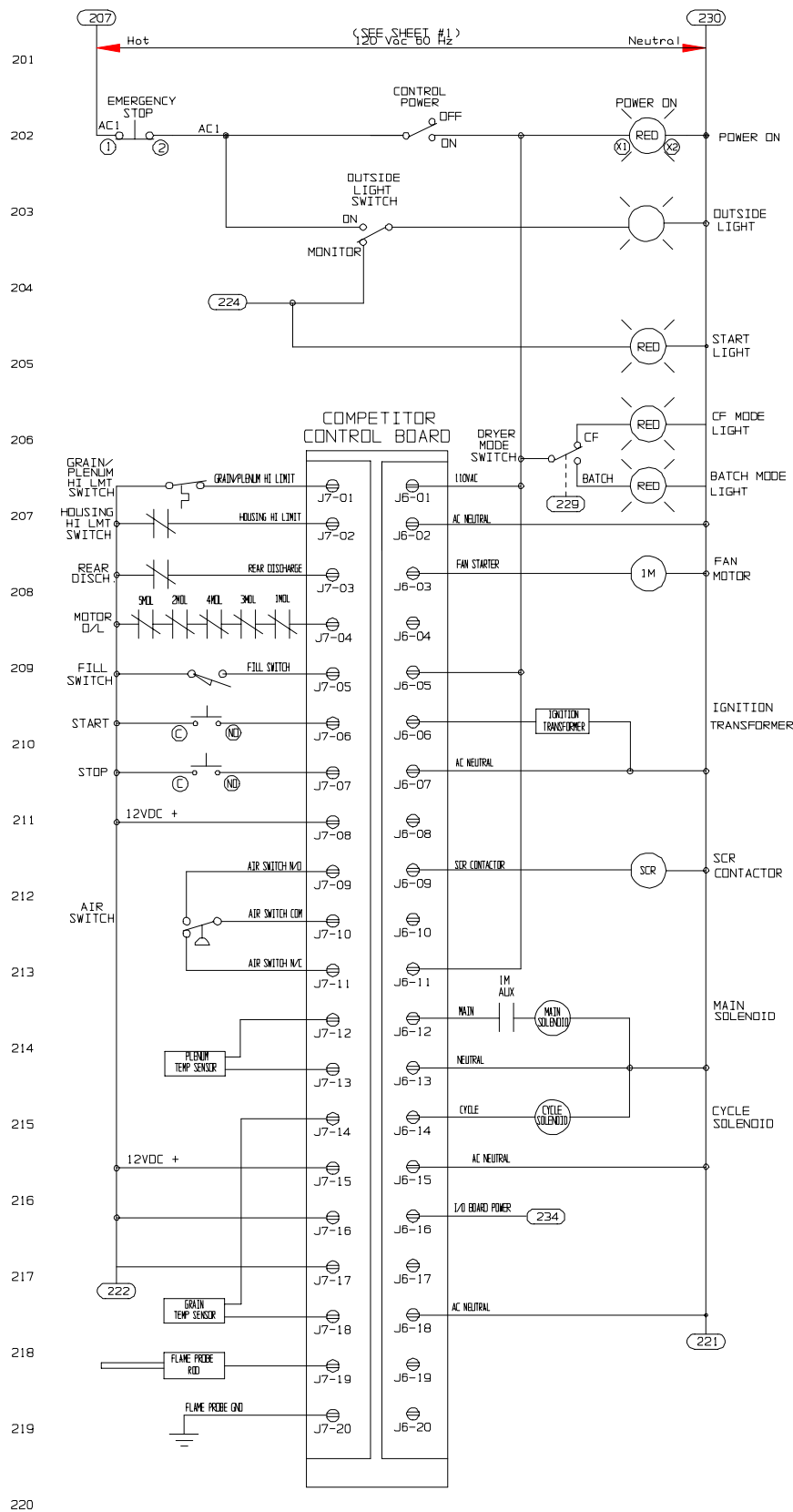


### Moisture Manager to Dryer Wiring (Upper Control Box)

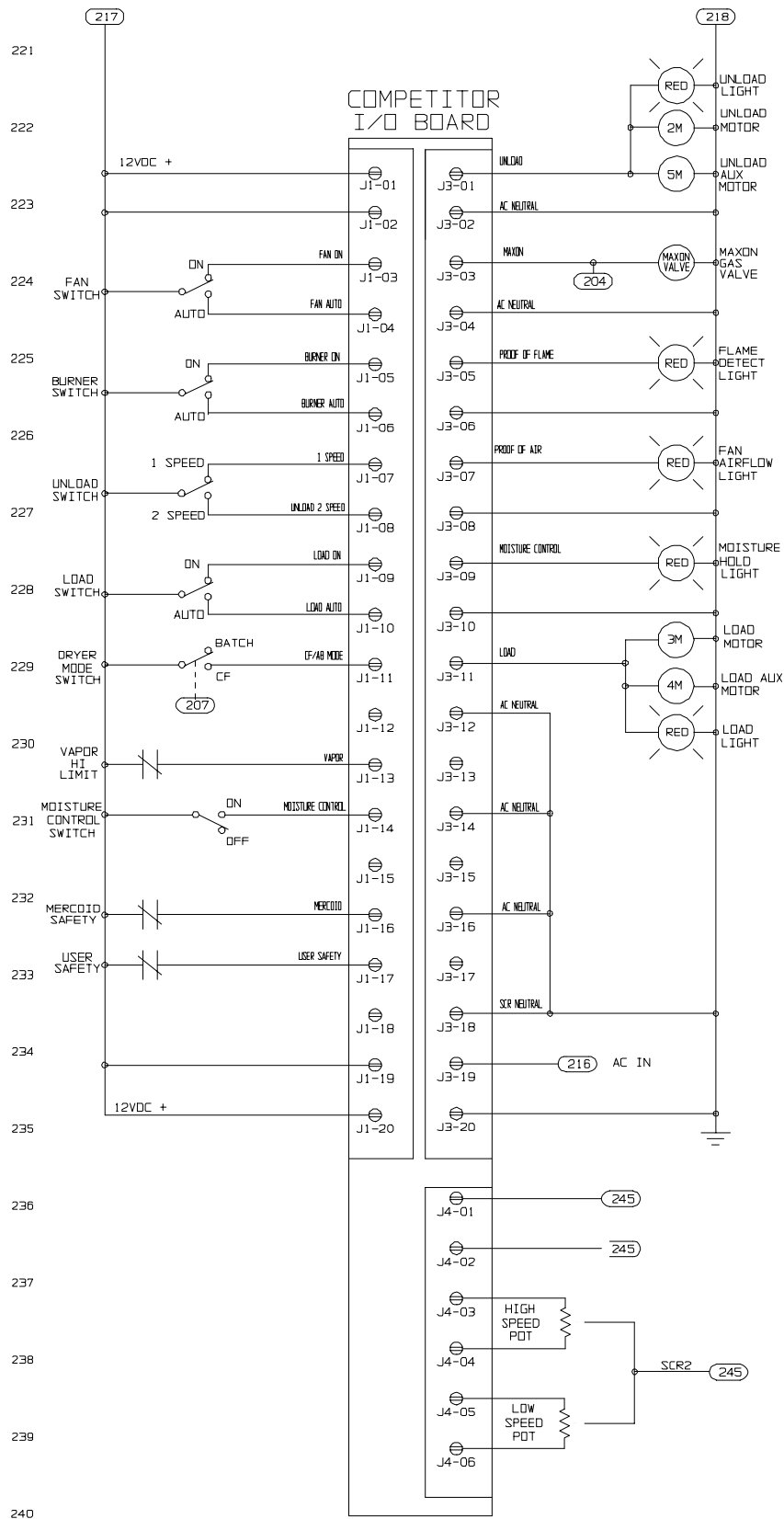




### Competitor Control Circuit CPU/Display Board



### Competitor Control Circuit I/O Board

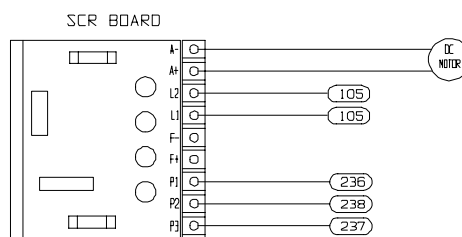


### Competitor Control Circuit SCR Drive Board

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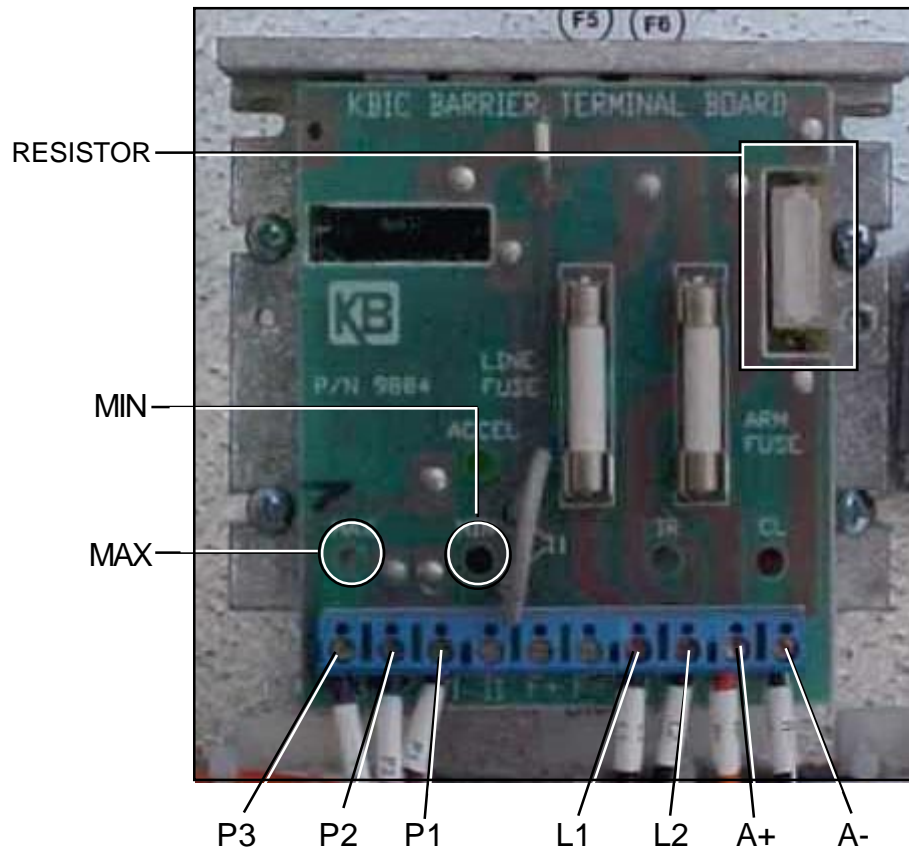
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\* The SCR board is located in the upper control box.

\* Terminals L1 and L2 are the input terminals. When the unload system is turned on there should be 220 Volts AC across these terminals.

\* Terminals A+ and A- are the output terminals. The voltage across these terminals is **DC** and will vary depending on where the speed control potentiometer is set.

\* The item circled at the bottom right of the SCR board in the photograph is the minimum set potentiometer. This will be used in the SCR board set up to set minimum DC voltage.

\* The item circled at the bottom left of the SCR board in the photograph is the maximum set potentiometer. This will be used in the SCR board set up to set maximum DC voltage.

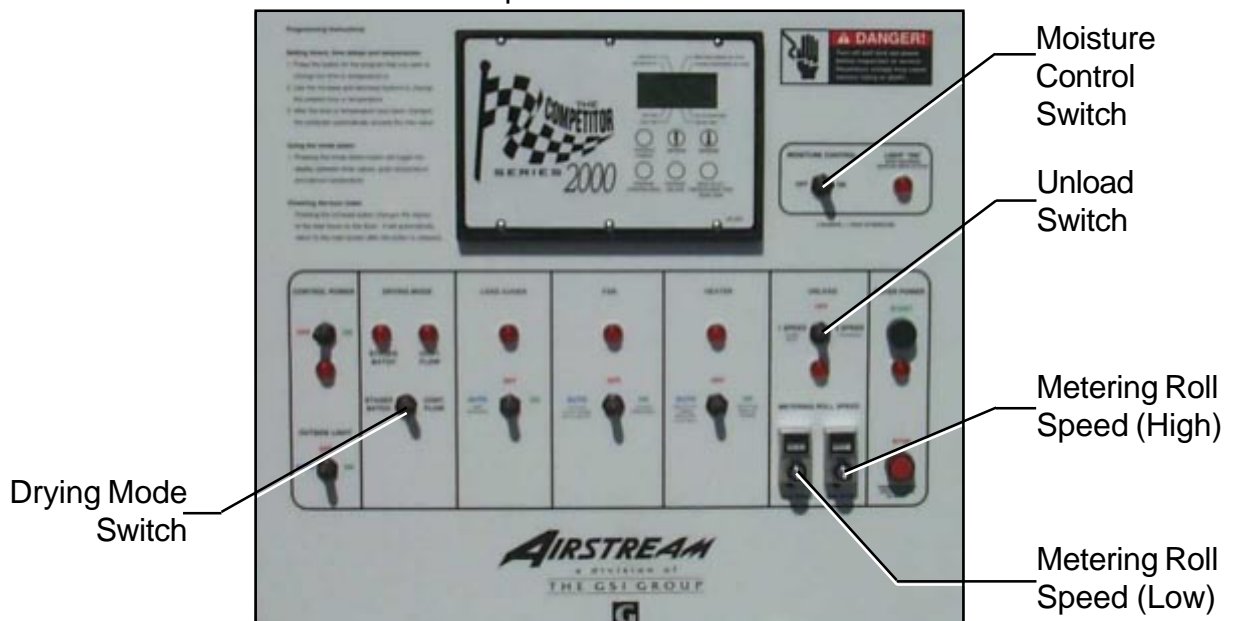
**IMPORTANT: After the new board has been installed be sure to remove the resistor (shown in the photograph above) from the old board and install it in the new board. Just pull the resistor from the two pin socket and install in the same socket on the new board.**

Resistor for 1/3 Hp Meter Roll motors used on 12 ft dryers and shorter. (part no. D03-0039)



Resistor for 3/4 Hp Meter Roll motors used on 14 ft dryers and longer. (part no. D33-0001)

Control panel switch locations.



### Setting SCR Board Maximum Voltage

**Before starting the procedure set the dryer up as follows:**

1. All fan and heater switches to off position and load switch to off position.
2. Control power to on position.
3. Push the dryer power switch.
4. Dryer mode switch to cont. flow position.
5. Moisture control switch to on position.
6. Unload switch to 2 speed position.



Unload Switch to 2 speed position

Metering Roll Speed (High) set to 999

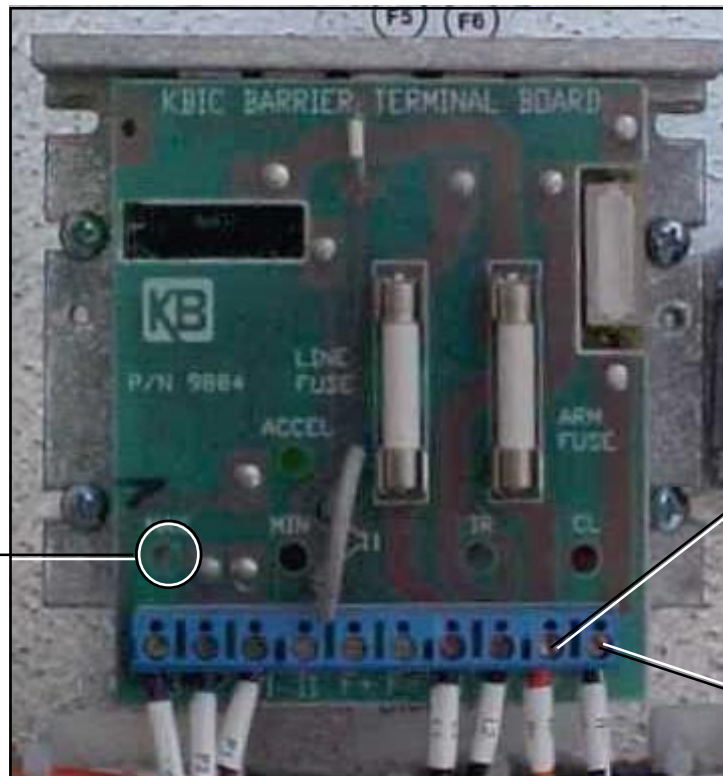
Metering Roll Speed (Low) set to 050

1. Set the low metering roll speed to 050 on the dial indicator shown in the photograph on the left. Set the high metering roll speed to 999.

2. Switch the Unload switch to the 2 speed position.

3. Switch the Moisture Control switch to the off position. This will put the meter roll rotation speed to the high setting.

4. Use a voltmeter set at the 200 volt DC range and probe terminal A+ with the red voltmeter probe and A- with the black voltmeter probe. If the display on your voltmeter reads 180 volts DC no maximum adjustment is needed. If your voltmeter does not read 180 VDC, then use a small screw driver and adjust the max set potentiometer until the voltage is 180 VDC.



MAX

A+

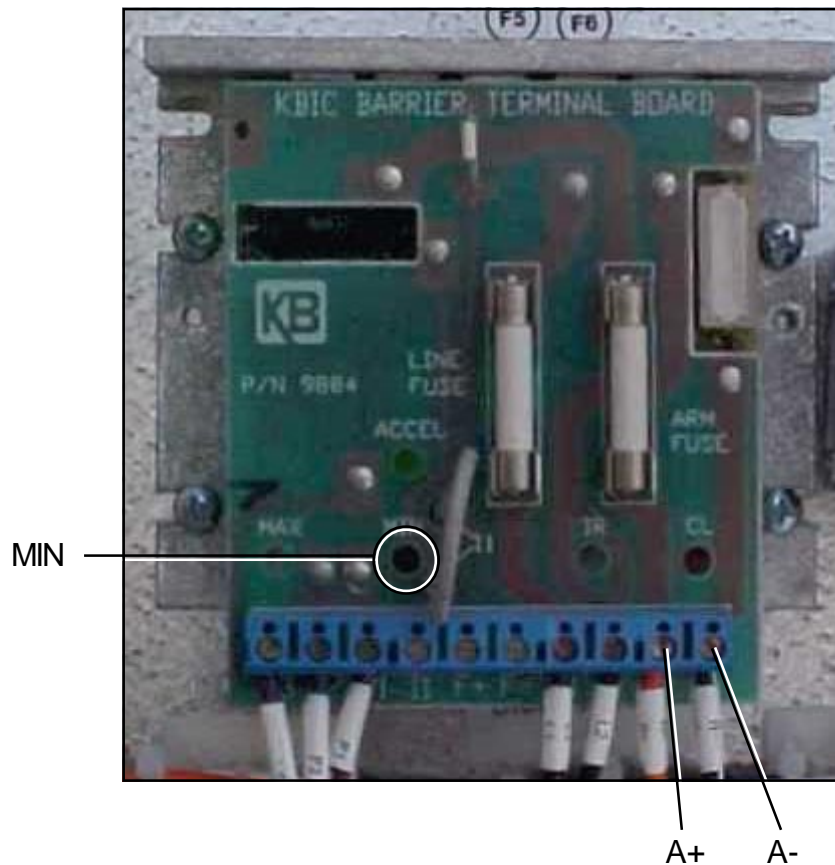
A-

### Setting SCR Board Minimum Voltage

1. Switch the Moisture Control Switch back to the on position. This will put the meter roll rotation speed at the low setting.
2. Use a voltmeter set at the 20 volt DC range and probe terminal A+ with the red voltmeter probe and A- with the black voltmeter probe. Use a small screw driver and adjust the min set potentiometer until the voltage is 9 VDC.

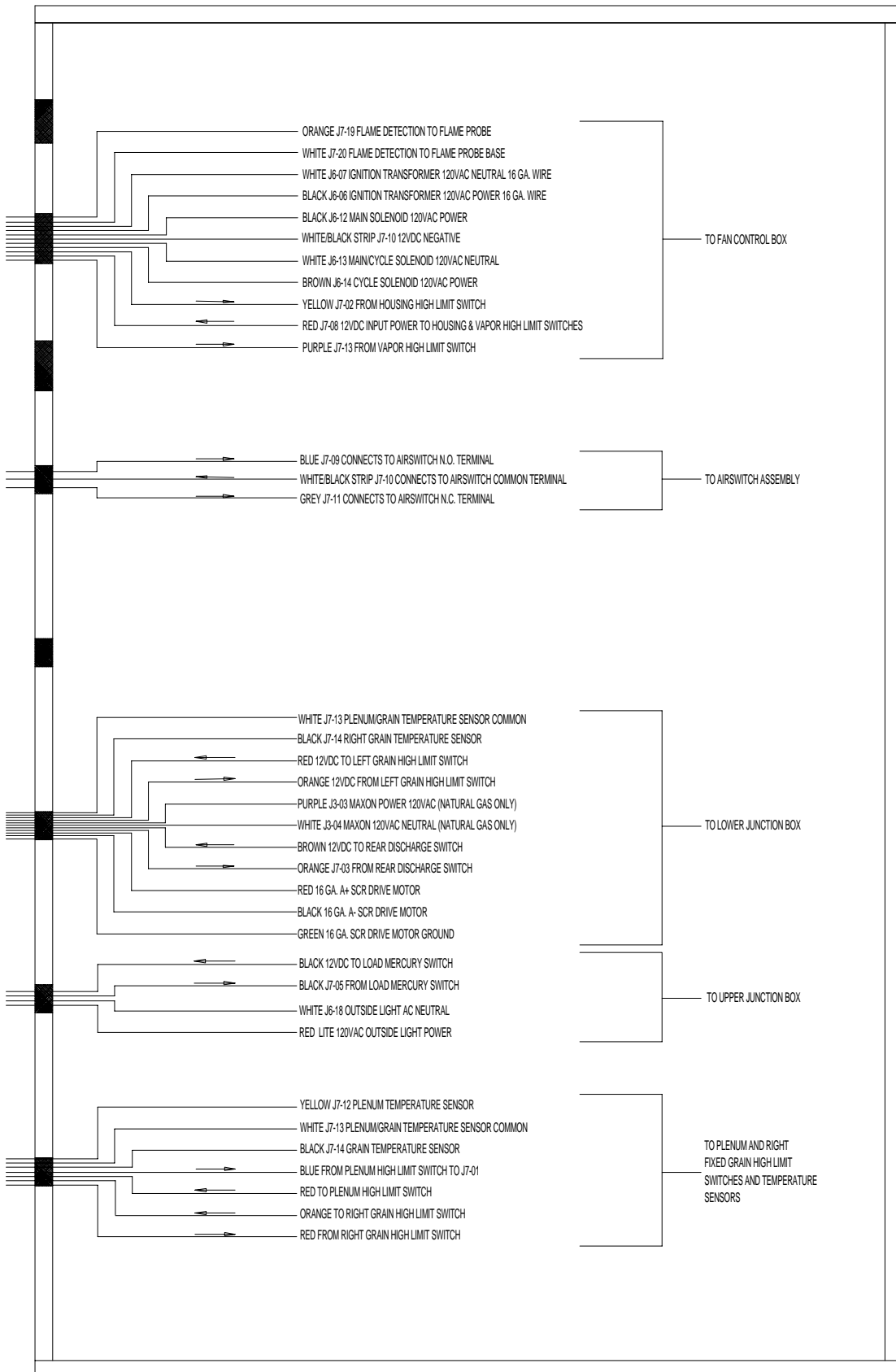
**The SCR board is now set and dryer is ready for normal operation at desired settings.**

SCR Drive Board (Part No. D03-0104)

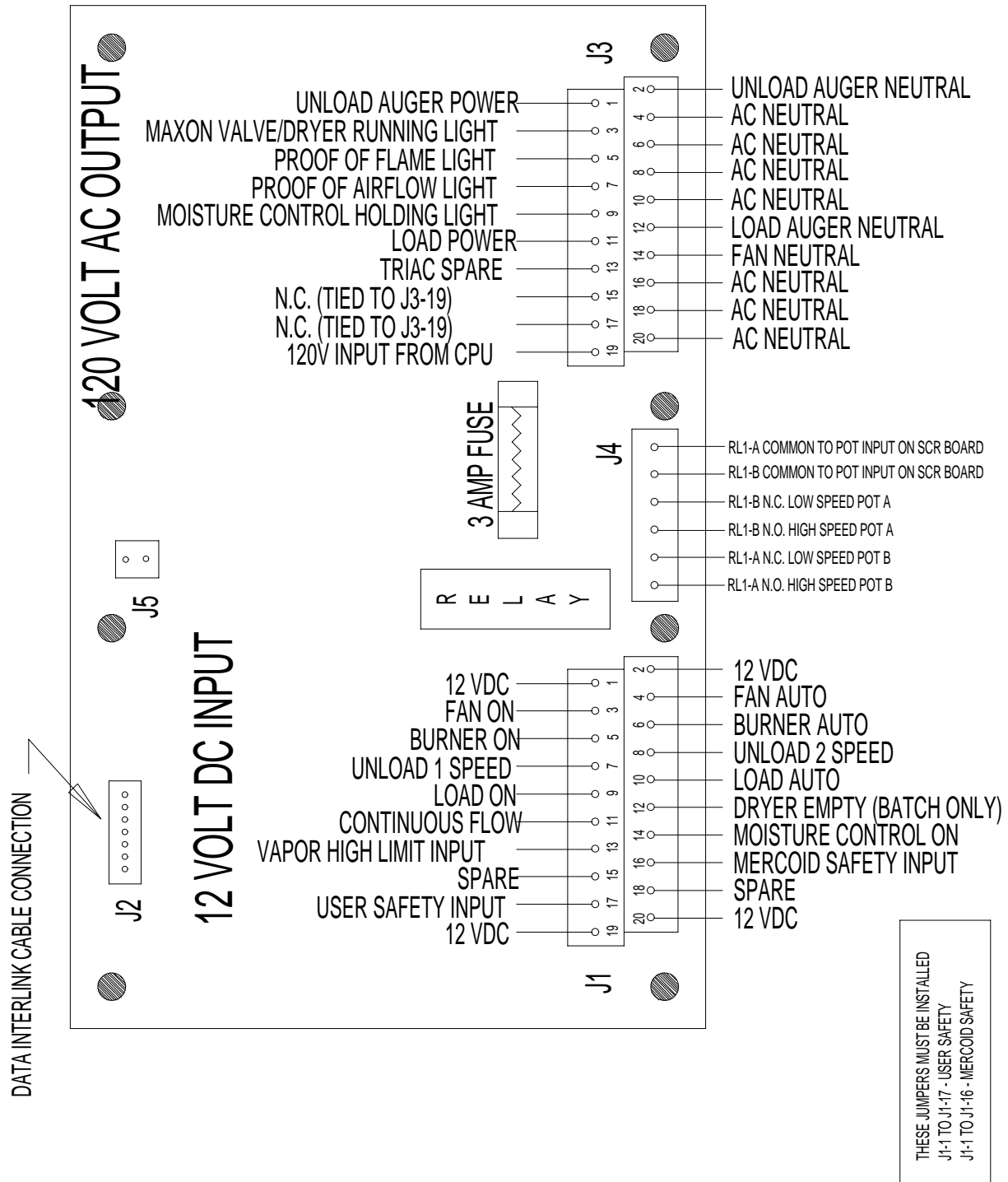




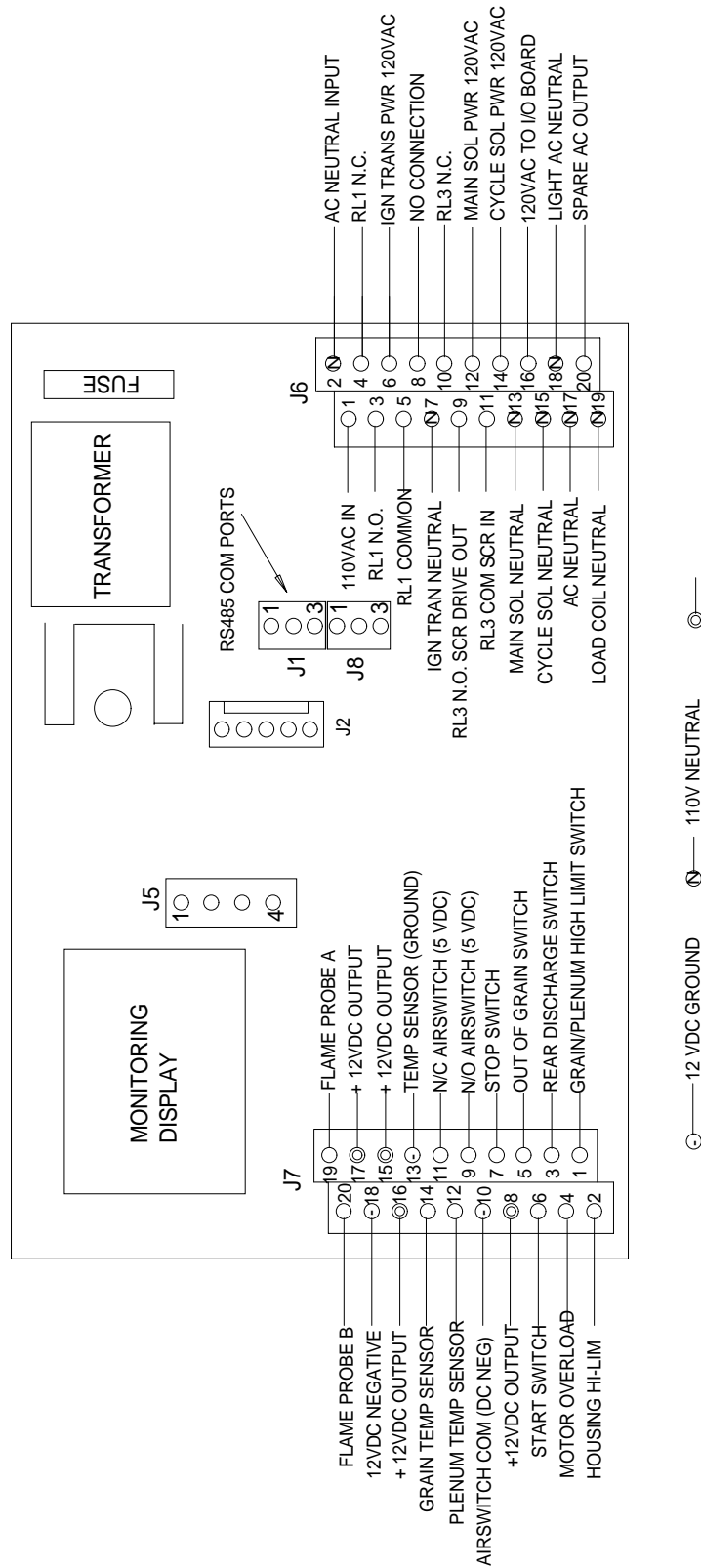
## Upper Control Box External Wiring



### Input/Output Board 12 Volt



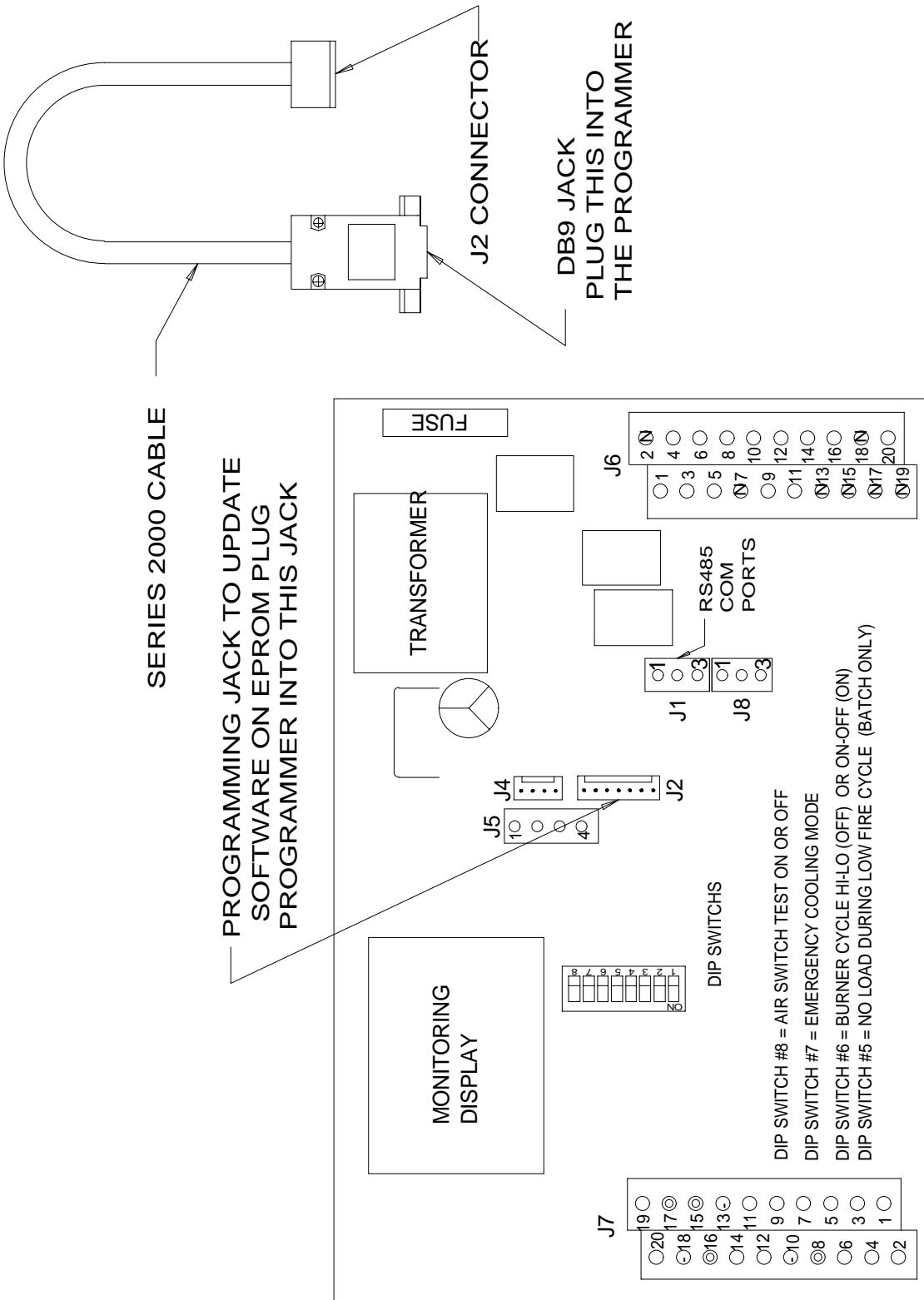
### Cpu Board Wiring



### **Programing Instructions for Competitor Series Grain Dryers**

1. Turn Control Power on dryer to the off position.
2. Locate programming jack (J2) on back of computer. (See next page). There will be a cable plugged into this jack that comes from the other computer board. Unplug this cable to plug the programmer into the jack.
3. Plug the series 2000 cable into programming jack and into programmers DB-9 jack.
4. Be sure that the rotary switch on the programmer is set to position 8.
5. Turn on Control Power to the dryer.
6. The four (4) lights on the programmer will come on, then three (3) will go out leaving the power light still on.
7. Push the start button on the programmer to start the transfer of Software.
8. The busy light will flash until the transfer process is complete.
9. When completed, the pass light will flash indicating a successful transfer.
10. If the fail light flashes then check your connections and repeat the above process.
11. Turn Control Power on dryer to off and remove the cable.
12. Turn on the dryer and the opening screens should indicate the newer version of software.

### Programmer Hook Up Diagram



## Programming Instructions Using Palm Pilot

On the Competitor Dryer there is only one board to program. This board is called the CPU Display board. It is mounted to the door of the lower box. To access, open the door and the programming jack is located on the back of this board. To program, follow the instructions below.

1. Turn the control power on the dryer to the off position.
2. Locate the programming jack (J2 connector) on back of board.
3. Unplug the communications cable that is connected to that connector. This is the cable that runs from the CPU/Display board and IO Board.
4. Connect the DB-9 connector from the Palm Pilot to the series 2000 cable.
5. On the Palm Pilot select the program for that particular board and tap on it.
6. Turn the dryer control power back on.
7. The programming process should begin, it will erase the present program and start the new program.
8. A screen will come up telling you when the transfer of software is complete.
9. When the process is complete turn dryer control power off, remove the connector from the board and plug the communications cable back on to the CPU/Display board.
10. Turn on the dryer and the opening screens should indicate the latest version of software.

**Refer to next page for more information on programming the Series 2000 board.**

If ordering Palm Pilot from GSI there are two kits available:

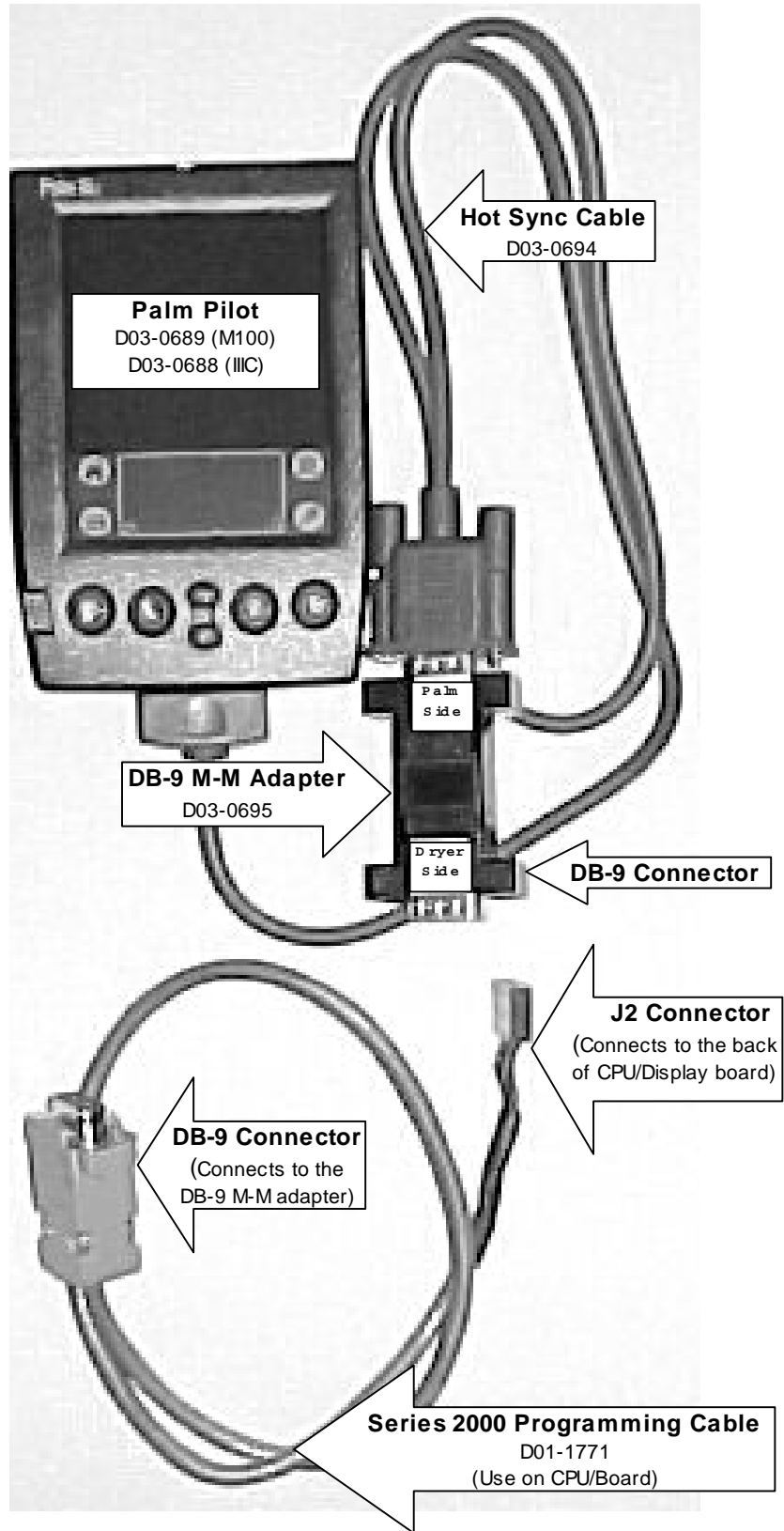
**D03-0692 ( Palm Flash Program Kit Deluxe )**

D01-1771 Series 2000 Programming Cable  
D03-0688 Palm Pilot IIIC (color)  
D03-0694 Palm Pilot Hot Sync Cable  
D03-0695 Palm Flash 9 Pin M-M Adapter  
D03-0709 Disk, CD-Rom Palm Flash Software

**D03-0693 ( Palm Flash Program Kit Economy )**

D01-1771 Series 2000 Programming Cable  
D03-0689 Palm Pilot M100 (black & white)  
D03-0695 Palm Flash 9 Pin M-M Adapter  
D03-0709 Disk, CD-Rom Palm Flash Software

**Programming Competitor Dryer Using Palm Pilot**



### Back of Switch Panel Layout

FROM I/O BOARD:

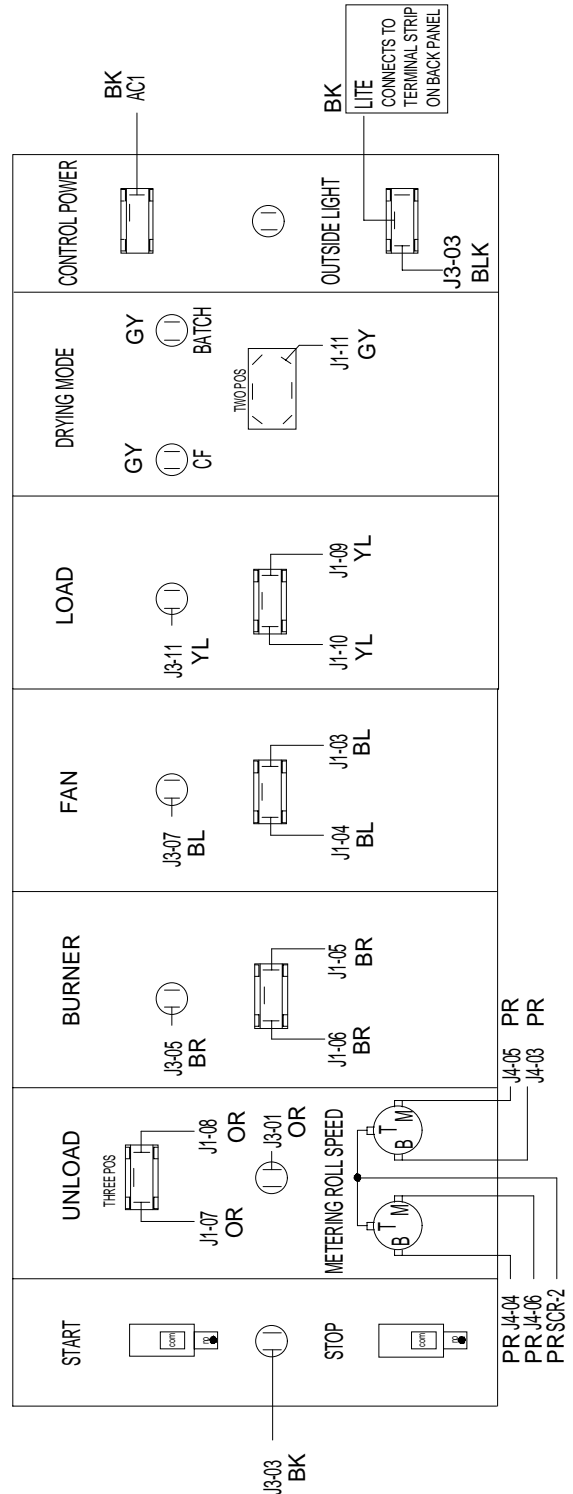
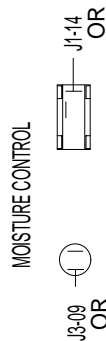
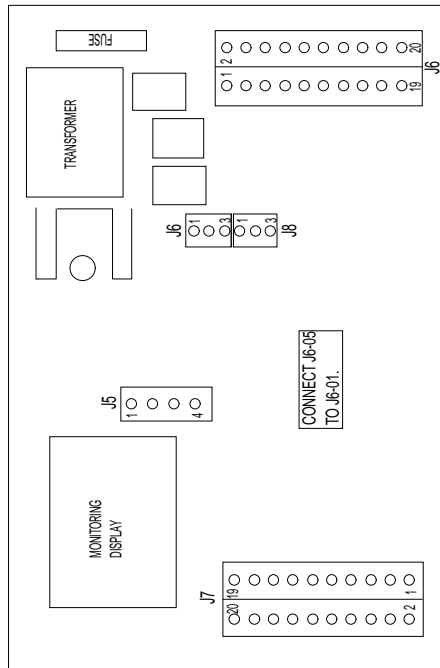
- ORANGE-5
- BLACK-1
- PURPLE-4
- BROWN-3
- BLUE-3
- YELLOW-3
- GREY-1

TO DISPLAY:

- BLACK-1
- RED-1
- WHITE-1
- BLUE-1
- YELLOW-1

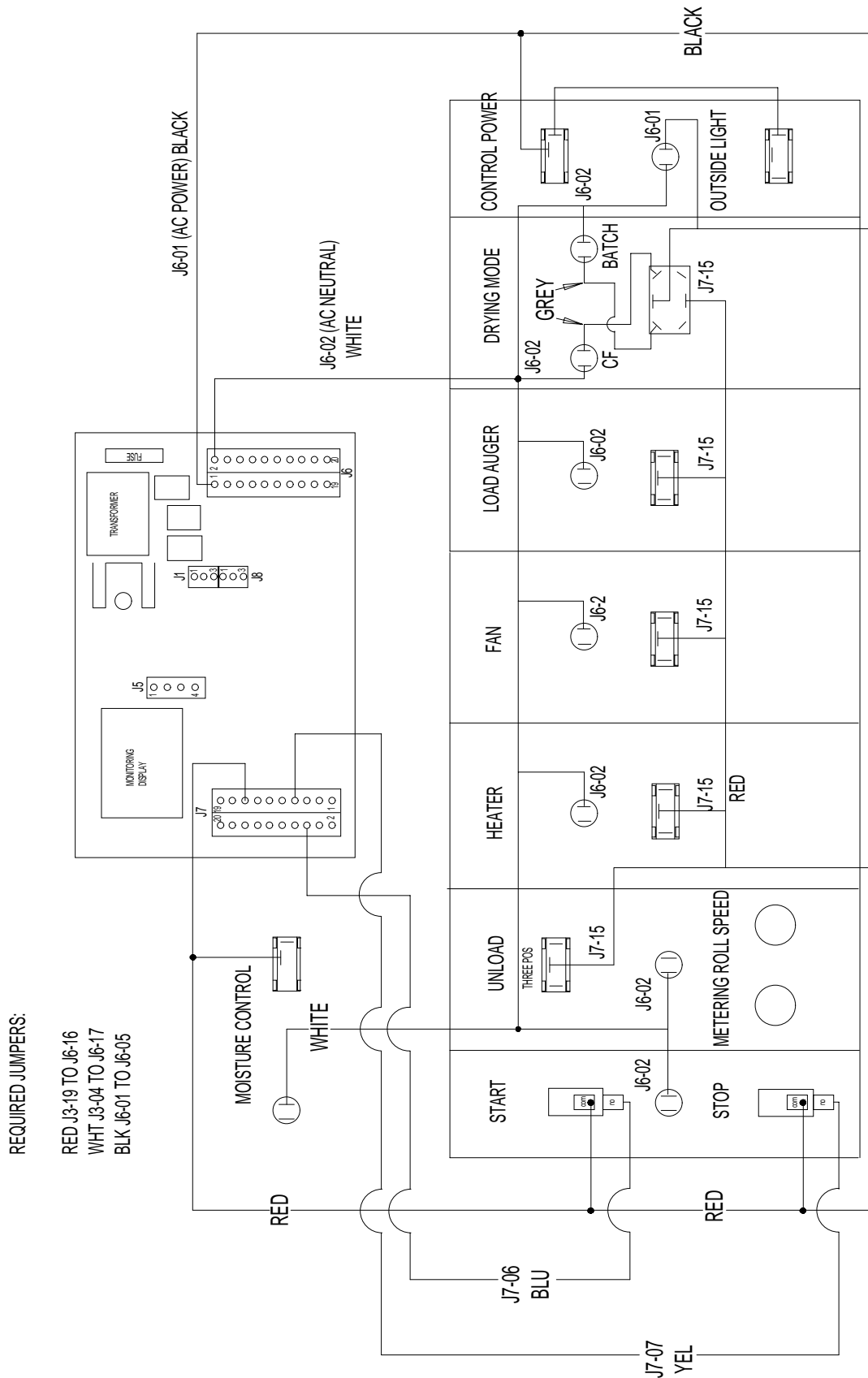
JUMPERS:

- RED J1-16 TO J1-20
- RED J3-19 TO J6-16
- WHITE J3-04 TO J6-17
- BLACK J6-05 TO J6-11
- BLACK J6-01 TO J6-05





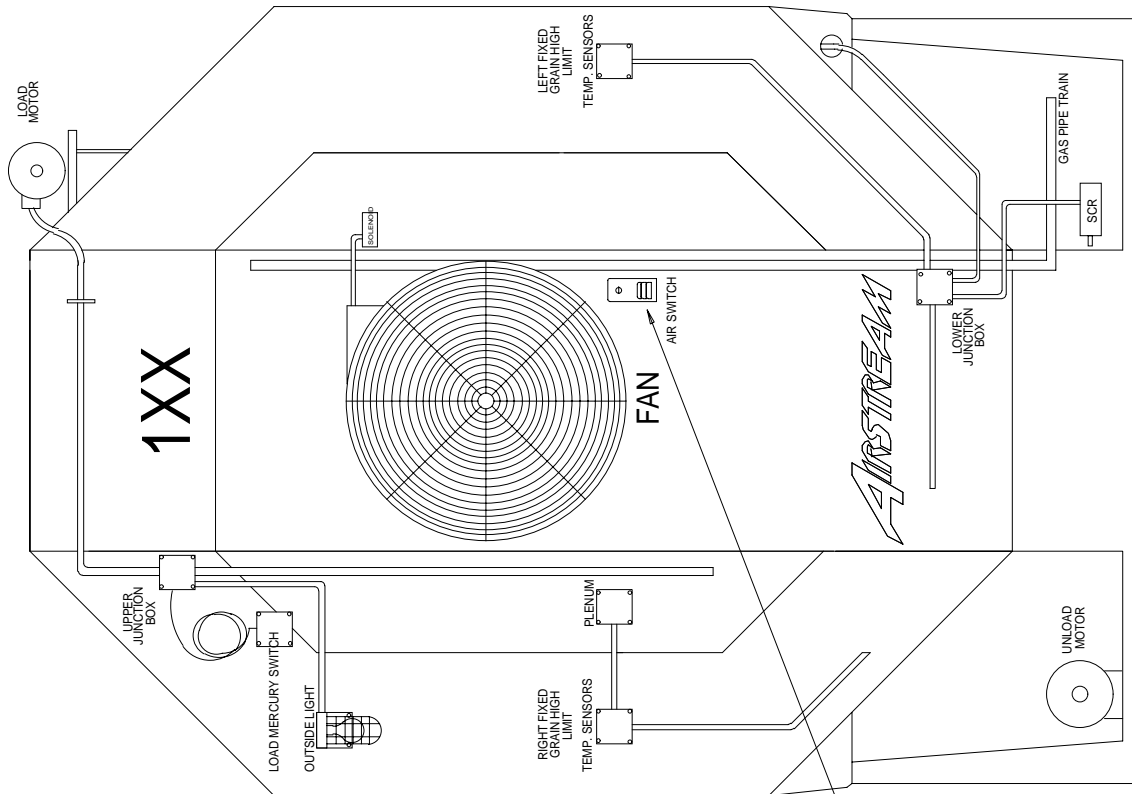
### Back of Switch Panel Wiring



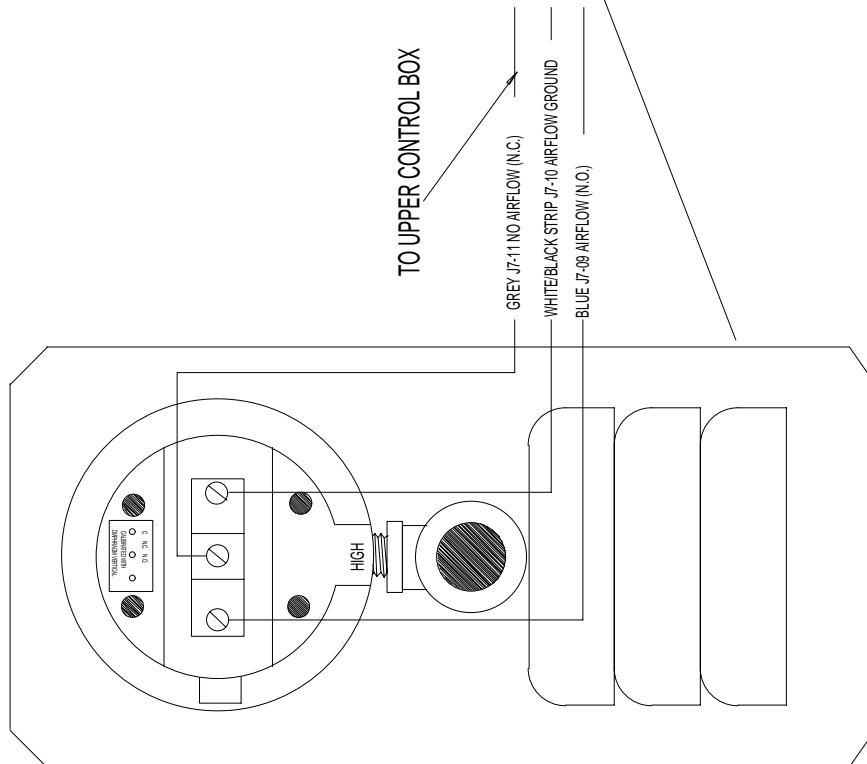
REQUIRED JUMPERS:

- RED J3-19 TO J6-16
- WHT J3-04 TO J6-17
- BLK J6-01 TO J6-05

### Air Switch Assembly



### BACKVIEW OF AIR SWITCH ASSEMBLY



## Competitor Air Switch Adjustment

Air Switch location.



Air Switch assembly.

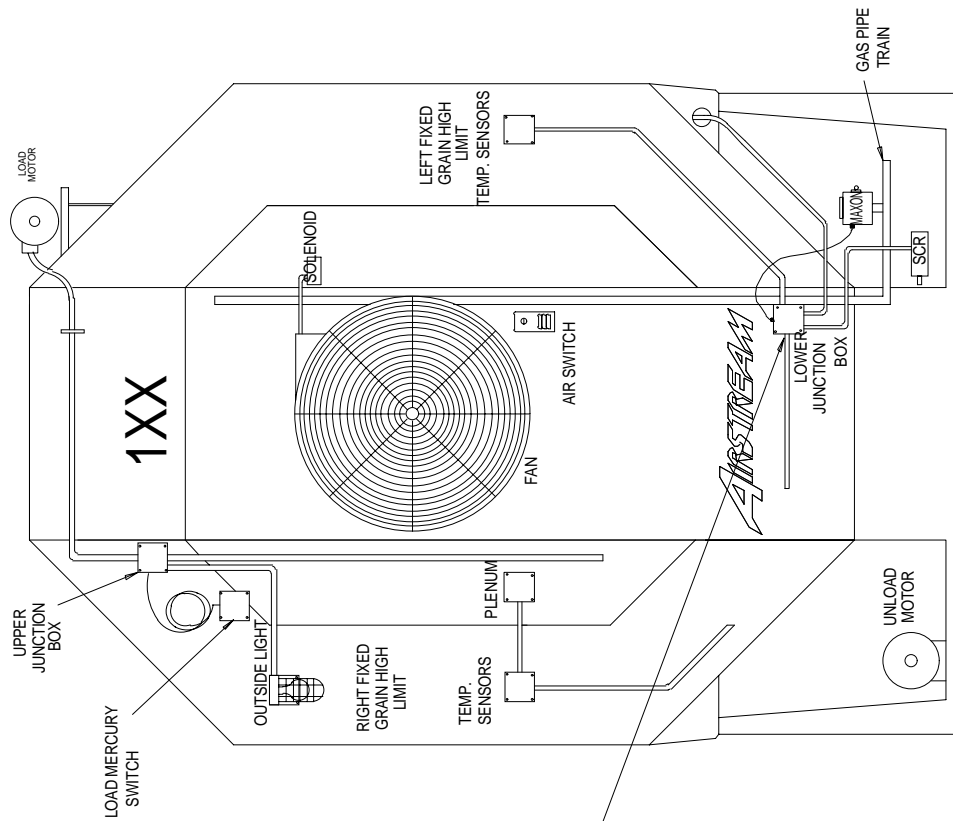


**IMPORTANT:** To adjust the air switch the grain columns need to be full of grain so that the plenum can build up air pressure and close the air switch.

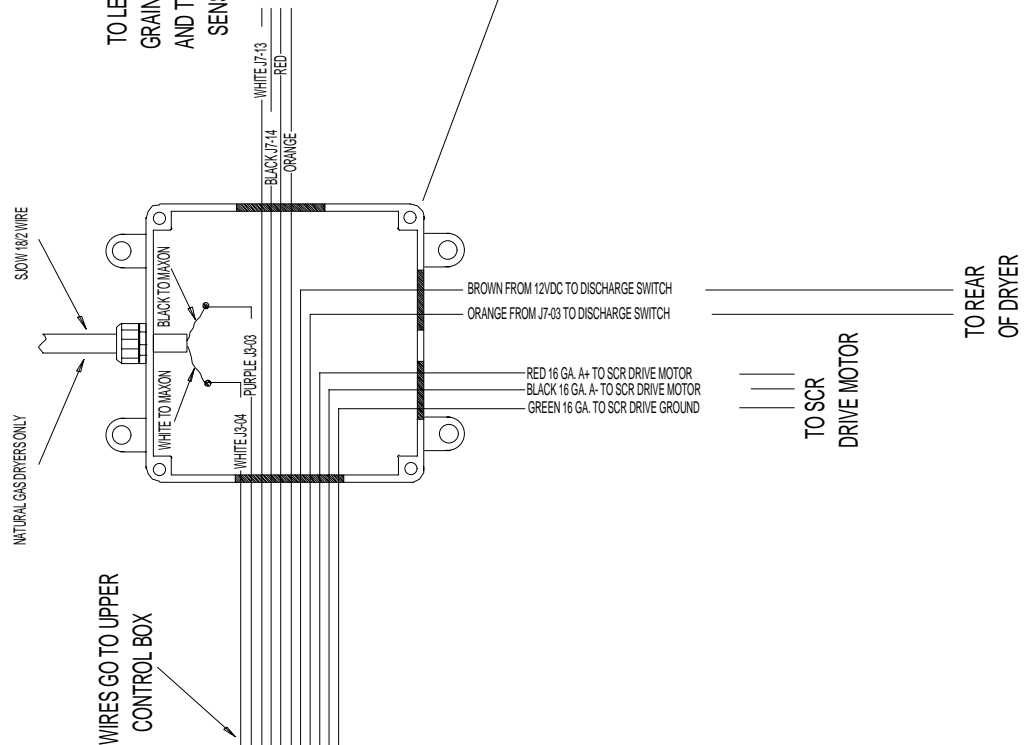
1. With the Load Auger, Fan, Heater, and Unload switches in the off position turn on the Control power then push the Dryer Power Start switch.
2. With power now applied to the dryer flip the fan switch to the on position and watch the light right above that switch. If the light illuminates when the fan reaches half its full speed, then no adjustment is required. However, if the light does not illuminate until the fan is running at full speed or the light does not illuminate at all and the dryer shuts down the air switch is adjusted too high (skip to step 3a). If the light illuminates before the fan reaches half its full speed the air switch is adjusted too low (skip to step 3b).
- 3a. If the light above the fan switch illuminates after the fan reaches full speed or did not illuminate at all and the dryer shut down then the air switch needs to be made more sensitive. Turn adjustment screw in the more sensitive direction (counter clockwise). Make this adjustment on the air switch 1/4 turn at a time and each time restart the fan and watch to see when the light illuminates.
- 3b. If the light above the fan switch illuminates before the fan reaches half its full speed then the air switch needs to be less sensitive. Turn adjustment screw in the less sensitive direction (clockwise). Make this adjustment on the air switch 1/4 turn at a time and each time restart the fan and watch to see when the light illuminates.
4. Flip the fan switch to the off position and watch the light. Now it should go out when the fan is about half its full speed. Adjust the air switch if necessary. Remember that *less sensitive* (clockwise adjustment) will require a higher fan speed to close the air switch, and *more sensitive* (counter clockwise adjustment), the switch can close at a slower fan speed.



### Fixed Grain Hi-Limit & Temperature Sensor

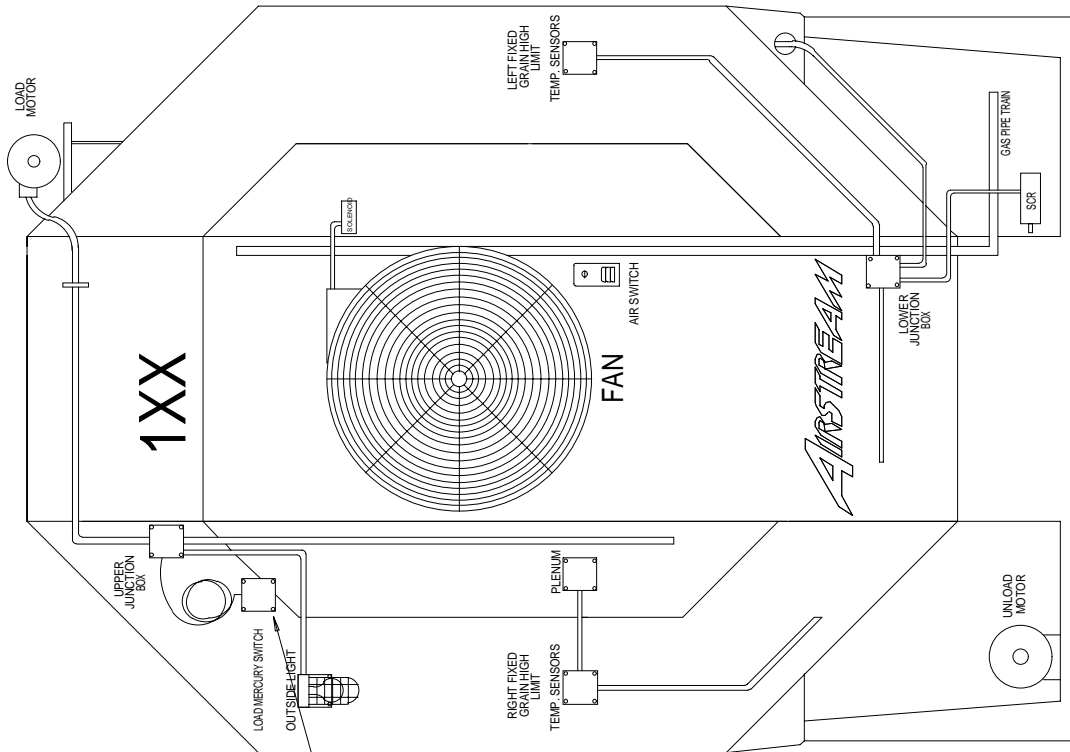


TO LEFT FIXED GRAIN HIGH LIMIT AND TEMPERATURE SENSORS

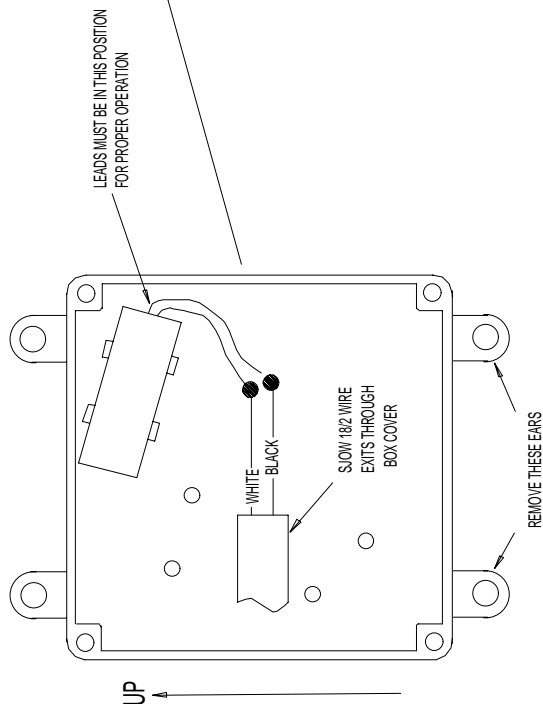


WIRES GO TO UPPER CONTROL BOX

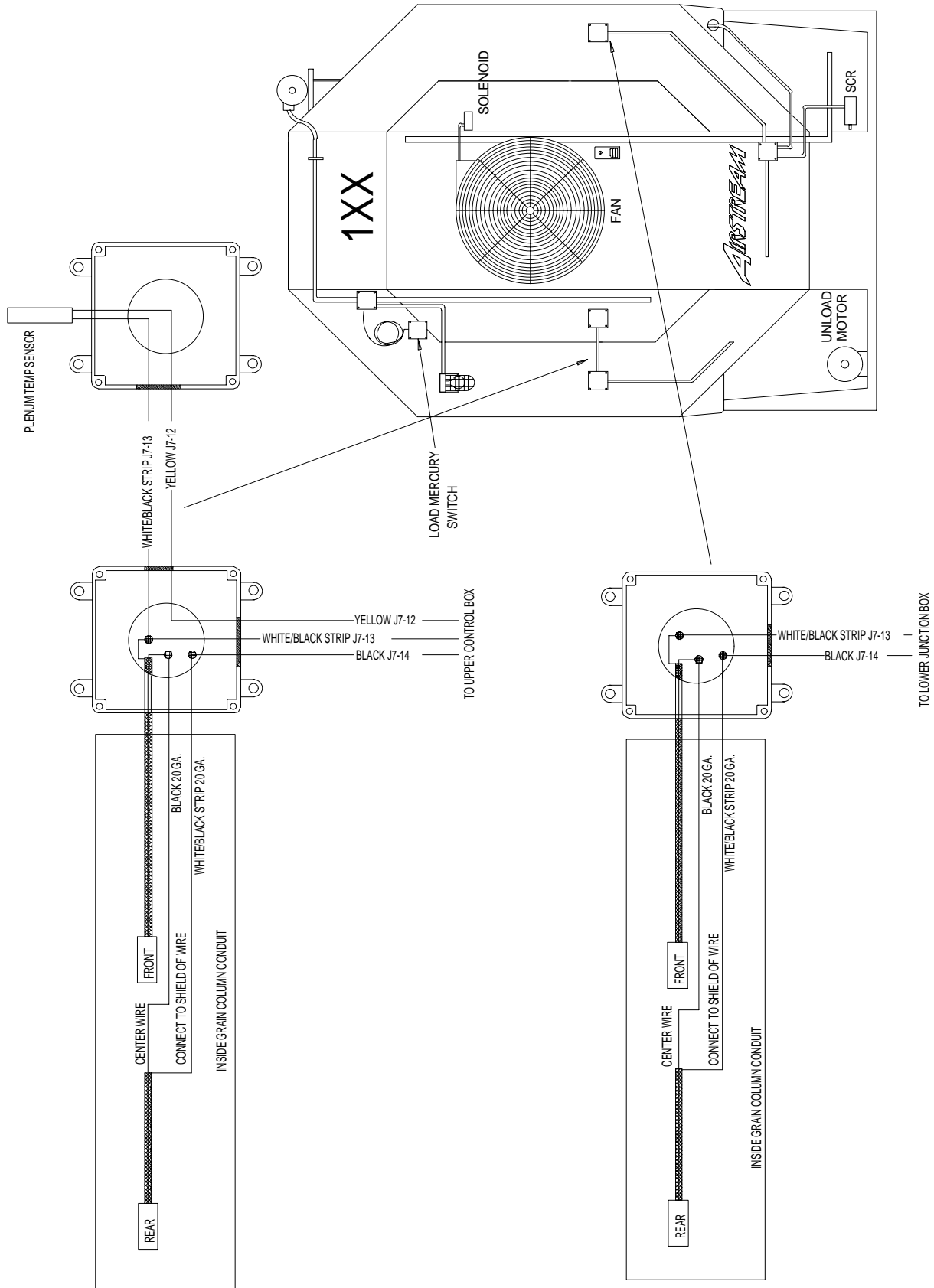
### Out of Grain Sensor



FRONT VIEW OF OPEN BOX



### Grain Temperature Sensor



### Grain Sensor Testing

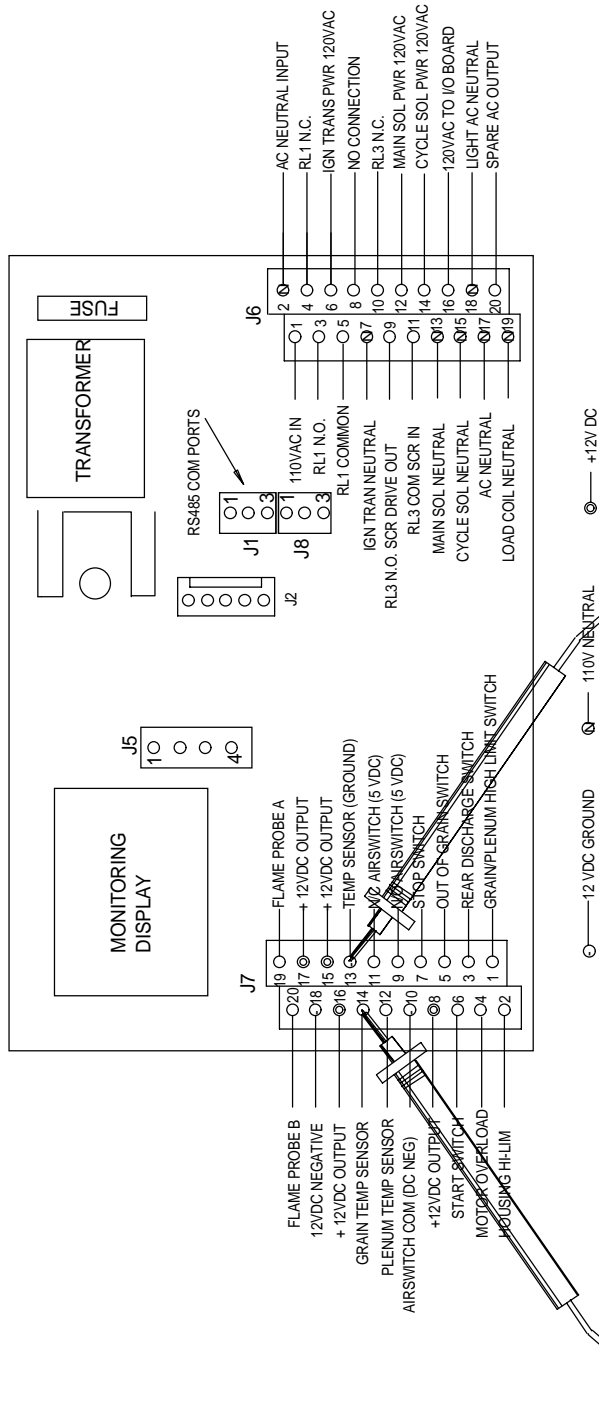


FIG.1

See page 47 for resistance vs. Temperature chart

11.0 ON A  
20K SCALE  
AT 70 DEGREES

- IF OHMS DOES NOT = 11.0 K CHECK LOWER AND UPPER TERMINAL STRIP (J7-13 GND & J7-14)
  - IF MEASUREMENTS DO NOT = 11.0 K CHECK CONNECTIONS IN WHITE JUNCTION BOX ON FAR LEFT AND RIGHT SIDES FACING THE FAN END.
  - IF NONE OF THE MEASUREMENTS = 11.0 K, THEN CHECK EACH INDIVIDUAL SENSOR.
- SENSORS COMP98.PRT

## Procedure for Locating, Testing and Replacing a Defective Grain Temperature Sensor

### Symptoms of a bad sensor may include:

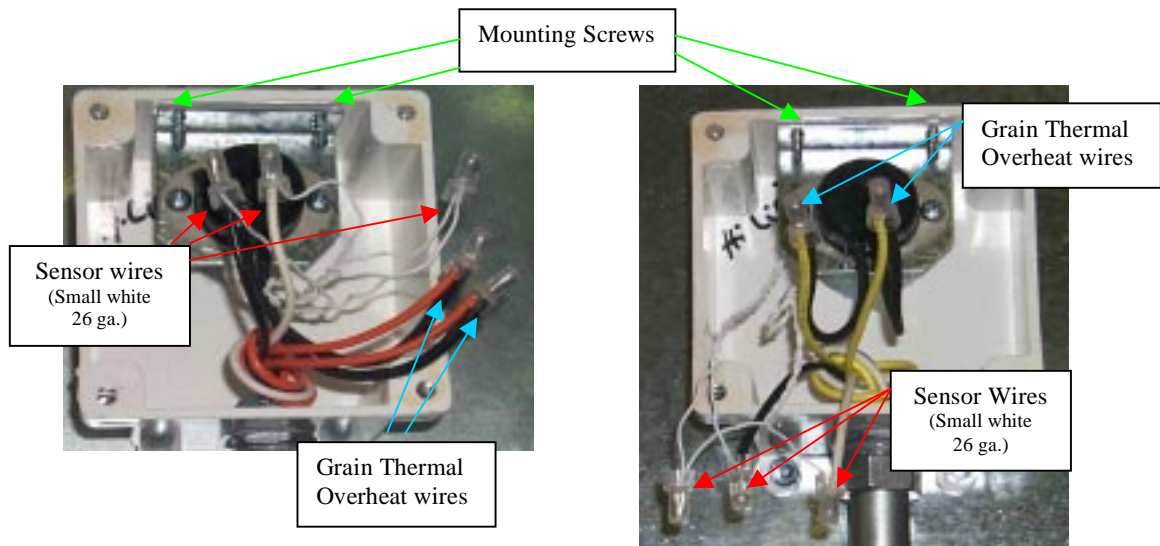
- Temperature readings that are not consistent with the ambient outside temperature or with any known verified grain temperatures entering the dryer.
- Grain temp open or grain temp short on Network dryers
- Display readings of 255° or -127°.

Grain Thermistor Sensor



### Troubleshooting:

1. Locate the left and right grain sensor electrical boxes on the dryer (see drawing below)
2. Open each box by removing the lid. They are held in place by 4 phillips head bolts and nuts.
3. Once inside the box, determine which wires you need to test by identifying the wire routing.



4. The grain sensor wires are small white (26 ga.) and are connected to a 18 ga. white and a 18 ga. black wire with 2 of the smaller (26 ga.) grain sensor wires butt connected together.
5. The grain thermal overheat switch is a black disk mounted on a silver bracket with 2 black 18 ga. wires connected to 2 colored wires.
6. Disconnect the white and black 18 ga. wires from the smaller white grain sensor wires.
7. Strip back about 1/4 inch from the end of each 26 ga. sensor wire.
8. With an ohm meter, set your scale to 20k (if its not a autorange model).
9. Place the black lead into the still butt connected wire connection with the 2 – 26 ga. wires.
10. Connect the red lead to either of the disconnected 26 ga. wires and make note of the reading.



### Procedure for Locating, Testing and Replacing a Defective Grain Temperature Sensor. (continued)

11. Now move the red lead to the other disconnected 26 ga. wire and make note of this reading.
12. Go to the other side of the dryer and repeat steps 6 through 11.
13. You will notice that 3 readings will be very close to the same, but one reading will be different. This is your defective sensor. **(Compare readings to Resistance/Temperature chart page 62.)**
14. If you don't have a replacement sensor, jump to [\*How to Bypass the Grain Temperature Sensor\*](#)

#### Sensor Replacement:

15. The grain sensors are mounted to the grain overhear capillary and need to be removed together.
16. To remove the overhear switch disconnect the grain thermal overhear wires.
17. Then remove the 2 self tapping screws and slide the bracket, overhear switch and sensors out of conduit.
18. Remove the tape surrounding the defective grain sensor then remove it.
19. Place your new sensor upon the capillary then apply tape to secure the sensor.
20. Slide the overhear switch and sensors back into the conduit until the bracket for the overhear switch is in the same mounting position as before.
21. Replace both mounting screws back into the overhear switch mounting bracket.
22. Butt connect together one wire from each of the grain sensors.
23. Connect one of the remaining grain sensor wires to the Black 18 ga. wire.
24. Connect the other remaining grain sensor to the White 18 ga. wire.
25. Connect one of the grain overhear switch wire to each one of the colored wires.
26. Reconnect the other side of the dryer following steps 22 through 24.
27. Double check the wire connections then replace the covers on the boxes.

#### How to Bypass the Grain Temperature Sensor:

The following instructions are for situations where you don't have an extra grain sensor to replace the defective one. So now, we are going to rewire the sensors so that instead of using 4 sensors to monitor the grain temperature with, we are only going to use one. The dryer will operate fine with only one sensor with the exception of only being able to monitor one small section of the grain columns.

1. On the side of the dryer in which sensor is defective, leave this sensor and the joining sensor disconnected from the white and black 18 ga. wires. Be sure to cap these 18 ga. wires off.
2. On the other side of the dryer, take one of the small white grain sensor wires and connect it to the white 18 ga. wire.

**Procedure for Locating, Testing and Replacing  
a Defective Grain Temperature Sensor. (continued)**

3. From the same sensor that you connected to the white 18 ga. wire, connect the other small white grain sensor wire to the black 18 ga. wire.
4. Double check the wire connections then replace the covers on the boxes.

**Resistance / Temperature Chart**

°F	Ohms	°F	Ohms	°F	Ohms	°F	Ohms	°F	Ohms	°F	Ohms	°F	Ohms
28	36,601	62	14,546	96	6,382	130	3,047	164	1,565	198	855.7	232	494.3
29	35,565	63	14,179	97	6,238	131	2,985	165	1,536	199	841.4	233	86.8
30	34,562	64	13,822	98	6,097	132	2,925	166	1,508	200	827.3	234	479.4
31	33,591	65	13,475	99	5,960	133	2,865	167	1,480	201	813.6	235	472.1
32	32,650	66	13,139	100	5,826	134	2,807	168	1,453	202	800.1	236	464.9
33	31,739	67	12,811	101	5,696	135	2,751	169	1,427	203	786.8	237	457.9
34	30,856	68	12,493	102	5,569	136	2,696	170	1,401	204	773.8	238	451
35	30,000	69	12,184	103	5,446	137	2,642	171	1,375	205	761.1	239	444.2
36	29,171	70	11,884	104	5,325	138	2,589	172	1,350	206	748.6	240	437.6
37	28,368	71	11,591	105	5,208	139	2,537	173	1,326	207	736.3	241	431
38	27,590	72	11,307	106	5,093	140	2,487	174	1,302	208	724.3	242	424.6
39	26,835	73	11,031	107	4,981	141	2,438	175	1,279	209	712.5	243	418.3
40	26,104	74	10,762	108	4,872	142	2,390	176	1,256	210	700.9	244	412.1
41	25,394	75	10,501	109	4,766	143	2,343	177	1,234	211	689.6	245	406
42	24,707	76	10,247	110	4,663	144	2,297	178	1,212	212	678.4	246	400
43	24,040	77	10,000	111	4,562	145	2,252	179	1,190	213	667.5	247	394.1
44	23,394	78	9,760	112	4,463	146	2,208	180	1,169	214	656.8	248	388.3
45	22,767	79	9,526	113	4,367	147	2,165	181	1,149	215	646.2	249	382.7
46	22,159	80	9,298	114	4,273	148	2,123	182	1,129	216	635.9	250	377.1
47	21,569	81	9,077	115	4,182	149	2,082	183	1,109	217	625.8		
48	20,997	82	8,862	116	4,093	150	2,042	184	1,089	218	615.8		
49	20,442	83	8,652	117	4,006	151	2,003	185	1,070	219	606.1		
50	19,903	84	8,448	118	3,921	152	1,965	186	1,052	220	596.5		
51	19,380	85	8,249	119	3,838	153	1,927	187	1,034	221	587.1		
52	18,873	86	8,056	120	3,757	154	1,890	188	1,016	222	577.9		
53	18,380	87	7,868	121	3,678	155	1,855	189	998.3	223	568.8		
54	17,902	88	7,685	122	3,601	156	1,820	190	981.2	224	559.9		
55	17,438	89	7,506	123	3,526	157	1,785	191	964.4	225	551.2		
56	16,988	90	7,333	124	3,453	158	1,752	192	947.9	226	542.6		
57	16,551	91	7,164	125	3,381	159	1,719	193	931.8	227	534.2		
58	16,126	92	6,999	126	3,311	160	1,687	194	915.9	228	525.9		
59	15,714	93	6,839	127	3,243	161	1,655	195	900.4	229	517.8		
60	15,313	94	6,682	128	3,176	162	1,624	196	885.2	230	509.8		
61	14,924	95	6,530	129	3,111	163	1,594	197	870.3	231	502		

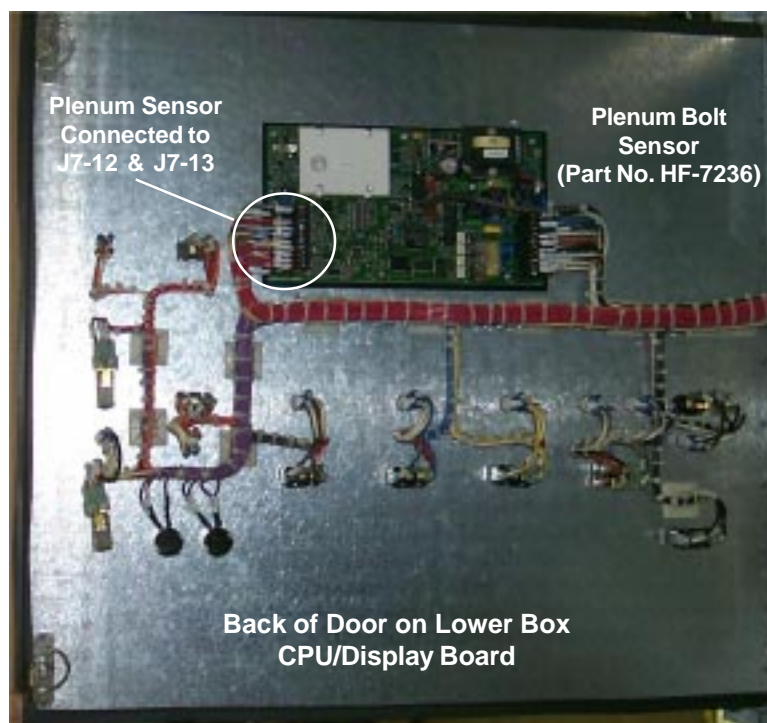
## Procedure for Locating, Testing and Replacing a Defective Plenum Temperature Sensor

### Symptoms of a bad sensor may include:

- Temperature readings that are not consistent with the ambient outside temperature or with a verified plenum temperature that has been taken with a thermometer.
- Erratic plenum display readings.
- Plenum temp open or plenum temp short.

### Troubleshooting:

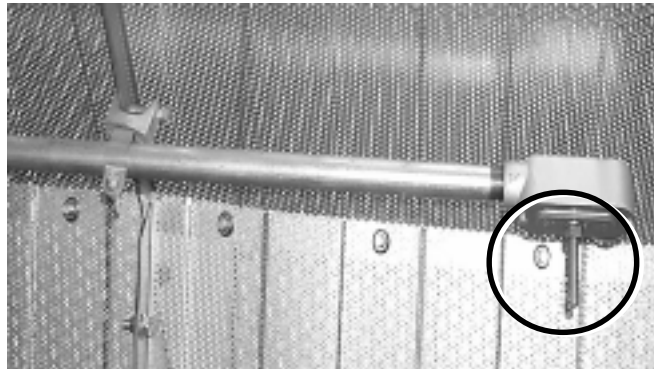
1. The process of checking the sensor is similar to that of the grain sensors, but you only have one sensor to check.
2. The actual plenum sensor is located in the plenum just inside the rear access door to the right. (Facing the rear of the dryer)(See picture on next page)
3. Start at the CPU/Display board, it is located on the door of the lower box.(See below)
4. The wires from the sensor (which are butt connected at the sensor) go through a conduit in the plenum section of the dryer.(See next page) That conduit terminates at a white plastic 4"x4" junction box. This box is located on the front of the dryer to the left of the fan/heater. (Facing the front of the dryer.) From that point to the CPU/Display board.
5. The wires are connected to terminals J7-12 (white wire) and J7-13 (black wire) on the back of the Cpu/Display board.(see picture below)
6. Unhook those wires
7. What you will be checking is resistance in relationship to a known temperature. (See resistance/temperature chart on previous page.)
8. With a ohm meter, set your scale to 20k (if it's not a autorange model).
9. Place one probe of your meter on one wire going out to the sensor and the other probe to the other wire.
10. The meter should read close to the resistance/temperature chart on previous page.
11. Assuming you have checked the wiring from the CPU/Display board to the sensor and it is OK. But the resistance is not close to what is on the chart. You probably have a bad plenum bolt sensor.



### Procedure for Locating, Testing and Replacing a Defective Plenum Temperature Sensor

The picture below is of the plenum bolt sensor in the plenum of the dryer. See previous page for more information.

Plenum Bolt Sensor (Part No. HF-7236)



View of back side of the plenum bolt sensor, as it is mounted in the conduit fitting.  
(Located inside the dryer plenum, to the right, just inside the rear access door.)

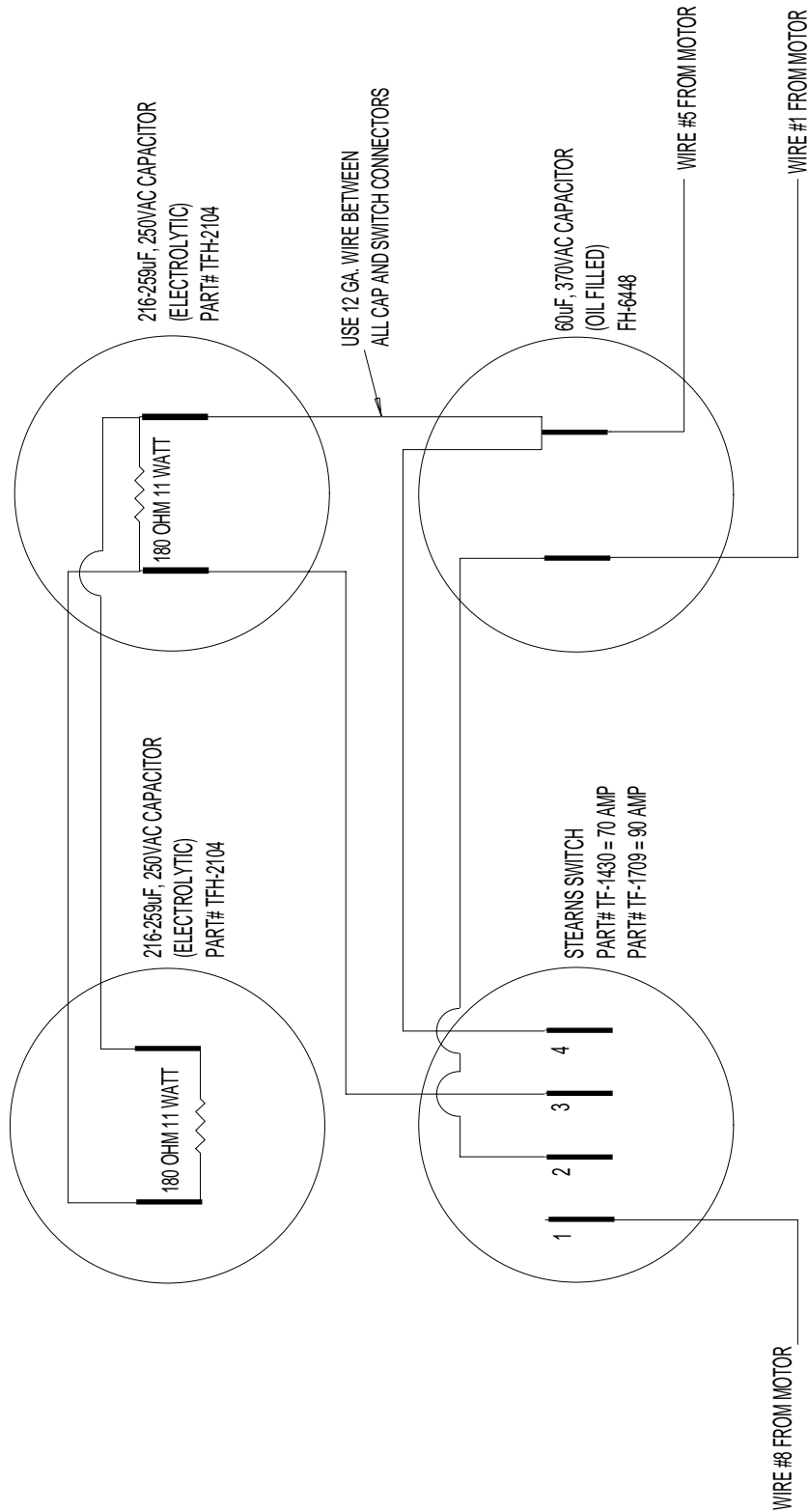


View of the 4"x4" plastic junction box. This is located to the left of the fan/heater facing the front of the dryer. It contains the plenum overheat and a junction point where the wires from the plenum bolt sensor are butt connected together.

Plenum 300 Degree Overheat (10' Length)(Part No.D03-0004)  
Plenum 300 Degree Overheat (24' Length)(Part No. D03-0377)



### Stern and Capacitor Diagram 10-17 HP 1Phase



## OPERATION HINTS FOR COMPETITOR DRYERS

Present Software version is 2.19

### 1. BURNER CYCLING

Keep Low pressure setting as low as possible without shutting down dryer or popping. Approx. 1 to 2 lb. Cycle on average 4 times per minute. 3 -5 times per minute is acceptable.

### 2. ERRORS

01 User switched from continuous flow to batch while dryer was running.

02 Grain Temperature Sensor Open. One or both leads are off (Open Circuit.).

03 Grain Temperature Sensor Leads are shorted together.

04 Plenum Temperature Sensor Open. One or both leads are off (Open Circuit).

05 Plenum Temperature Sensor Leads are shorted together.

06 Flame Probe Shorted to ground.

07 Illegal Flame Sense. Most likely caused by stuck open gas solenoid.

**Error 7 will not shut down fan until loss of flame is detected by control.** May occur if 1 of the 12 volt DC limits is shorted to AC ground, or to the communication port for the air switch or either temperature sensor is shorted to AC ground.

08 No safety circuit voltage.

09 I/O board communication failure. I/O board and Master board have lost communication.

10 User supplied safety. A safety connected to J7 -8 and J1-17.

11 Canadian Mercoïd sensor. In USA jump J7-8 to J1-16.

### BATCH ERRORS

BRN on the screen means the Burner Switch is turned off or there is a loose wire in its circuit.

FAN on the screen means the Fan Switch is turned off or there is a loose wire in its circuit.

Presently the Load Switch and the Unload Switch are not monitored by the Dryer Controls.

999 on the screen is not a n Error. It means the board has never had software loaded. This will come up when you turn on the power just after GSI appears. This means the latest software must be down loaded.

### 3. DIP SWITCHES

1. Dip Switch 8 = Air Switch Test Bypass. **WARNING! Bypassing this test will allow burner to come on without the Fan running.**

2. Dip Switch 7 = Emergency Cooling Mode. Fan will run alone for 5 minutes when the Start button is pushed with switch on.

3. Dip Switch 6 = Allows Off/On Burner operation instead of High/Low as is standard.

4. Dip Switch 5 = (In Software Ver. 2.11 and up) Adds Low Temp Timer to a nd low Temp finish dry like dual temp. Batch Dryer.

5. Dip Switch 4 = (In Software Ver. 2.14 and up) Adds Low Temp finish tripped by Grain Temperature to Batch Mode.

### 4. SHUTDOWNS

If both the GRAIN and PLENUM HIGH TEMPERATURE warnings appear on the screen at the same time one of the two mechanical temperature sensors are kicked out. **NOTE Emergency Cooling will NOT work if these are kicked out.** These temperature limits are in addition to the electronics high limits and are located in the same electrical conduits as the electronic thermister sensors. Note that J7-01 is the terminal the computer checks for 12 volts.

### 5. SPECIAL KEY USAGE

1. Pushing the **UP arrow key** will gives the Dryers Hour Meter reading. Two successive screens Hours x 100 | Balance of hours.

In software vers. 2.14 and above it reads in 5 successive screens Total Hours x 100 | Balance of hours | Balance of minutes | Batch Count | Minutes since last shutdown. So 5 | 23 | 12 | 144 | 188 would be Timer = 523 hours 12 minutes, 144 Batches dumped and 3 hours and 8 minutes since the last shutdown.

2. Pushing the **DOWN arrow key while an error is on the screen will tell how long ago the shutdown occurred.**

3. Pushing the **MODE SELECT key** exits any mode back to the main screen.

4. Holding the **STOP button for 4 seconds** or longer causes the Dry, Cool, and Unload timers to be reset to the values programmed by the user. **This also forces new times.**

5. Holding down the **HOURS key and turning on the power resets** the NOVRAM or does what is called a **HARD BOOT.**

6. Holding **down the DOWN key** while turning on the power restores the factory **default settings.**

7. In software vers. 2.19 and above Holding down the **Up Arrow Key** while powering up **resets the Total Batch Counter.**

---

**OPERATION HINTS FOR COMPETITOR DRYERS****6. OPERATION HINTS**

1. If you set a new timer setting which is lower then the present setting it becomes effective immediately. If it is

**7. OPTIONAL WIRING POINTS**

1. **J7-10, J7-13 and J7-18 are 12 volt ground points for use with a tester.**

**There are no 12 volt ground connections on the IO board.**

2. **J1-17 - User Supplied Safety.** If 12 volts is interrupted from J7-18 the User Supplied Safety Warning, ERROR 10 results.

3. **J1-16 - Canadian Mercoïd Sensor.** If 12 volts is interrupted from J7-18 the Canadian Mercoïd Warning, ERROR 11 results.

4. **J1-15 - Discharge Hold Function – First available in Version 2.19** - operates in Batch Mode only.

If 12 volts is applied to J1-15 before the unload cycle is reached, when it does reach the unload cycle the dryer will turn off the Fan and or the Heater (Only if the switches are in the AUTO position) and not allow the Dryer to unload until the 12 volts is removed from J1-15. When 12 volts is not detected the dryer will resume normal operation and immediately unload the Dryer and continue drying. This function cannot be activated if the unload cycle has already begun. If you are running Dry and Cool and want the Dryer to continue cooling while in Discharge Hold put the Fan switch in the Manual position. Otherwise both the Fan and Heater Switches should be in the AUTO position.

5. **J7-15, J7-16 and J7-17 are 12 volt Positive source points.**

**8. Temperature Sensor Testing**

1. You can find charts with the Resistance readings at various Temperatures in the following manuals

The Competitors use the Thermister type sensors, the bolt style for the Plenum and the round style for the Grain Temperature.

Located in Resource 2003 CD in the "Resources – Manuals" Folder

PNEG-630 Portable Dryer – Trouble Shooting

PNEG-377 Fan & Heater – Service Manual Feb 2000.pdf Page 50 (Fans and Heaters | Trouble Shooting Guide)

**9. TROUBLESHOOTING TIPS**

1. **If some 110 volt contactor control devices work and some do not check the fuse on the IO board to see if it has failed.**

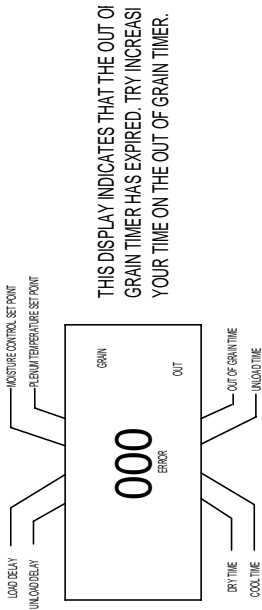
Likely devices that will not work are the Load Auger, Unload Auger and SCR drive.

### Series 100 Error Conditions

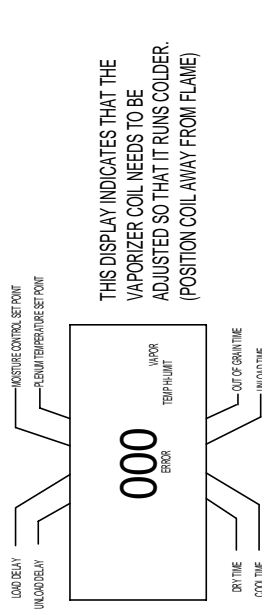
<p>1 ERROR</p>	<p>7 ERROR</p>	<p>Illegal flame sense. Error 7 is most likely caused by stuck open solenoid. Error 7 will not shut down fan until loss of flame is detected by control. Error 7 may also be caused by a bad ballast resistor (ballast resistor not open between poles). It may also occur if 1 of the 12 volt DC limits is shorted to AC ground, or either temperature sensor is shorted to AC ground. No safety circuit voltage.</p>
<p>2 ERROR</p>	<p>8 ERROR</p>	<p>Grain temperature sensor open. One or both leads are off (open circuit) (SEE FIGURE 4)</p>
<p>3 ERROR</p>	<p>9 ERROR</p>	<p>I/O board communication failure I/O board and master have lost communication.</p>
<p>4 ERROR</p>	<p>10 ERROR</p>	<p>Plenum temperature sensor is open. One or both leads are off (open circuit) (See figure 4)</p>
<p>5 ERROR</p>	<p>11 ERROR</p>	<p>User supplied safety.</p>
<p>6 ERROR</p>	<p>12 ERROR</p>	<p>Mercoird gas pressure safety.</p>
<p>User switched from continuous flow to batch while dryer is running.</p>	<p>This indicates that one of the other on screen errors (vapor, plenum, housing temp hi-limit, flame out, no airflow, motor overload or rear discharge) has occurred.</p>	



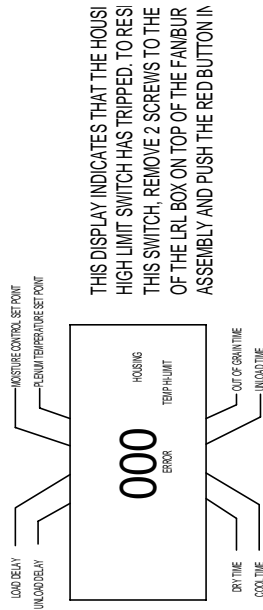
### Series 100 Error Conditions



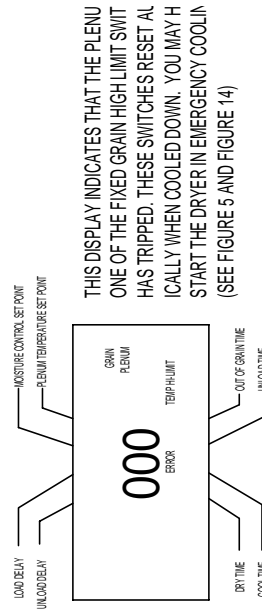
THIS DISPLAY INDICATES THAT THE OUT OF GRAIN TIMER HAS EXPIRED. TRY INCREASING YOUR TIME ON THE OUT OF GRAIN TIMER.



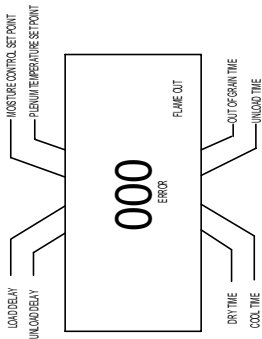
THIS DISPLAY INDICATES THAT THE VAPORIZER COIL NEEDS TO BE ADJUSTED SO THAT IT RUNS COLDER. (POSITION COIL AWAY FROM FLAME)



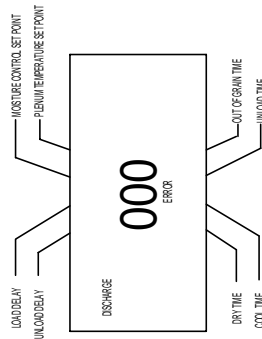
THIS DISPLAY INDICATES THAT THE HOUSING HIGH LIMIT SWITCH HAS TRIPPED. TO RESET THIS SWITCH, REMOVE 2 SCREWS TO THE OF THE LRL BOX ON TOP OF THE FANBUROUS ASSEMBLY AND PUSH THE RED BUTTON IN



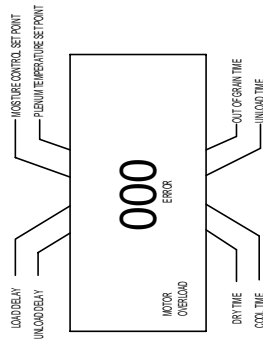
THIS DISPLAY INDICATES THAT THE PLUEN ONE OF THE FIXED GRAIN HIGH LIMIT SWITCHES HAS TRIPPED. THESE SWITCHES RESET AUTOMATICALLY WHEN COOLED DOWN. YOU MAY HAVE TO START THE DRYER IN EMERGENCY COOLING (SEE FIGURE 5 AND FIGURE 14)



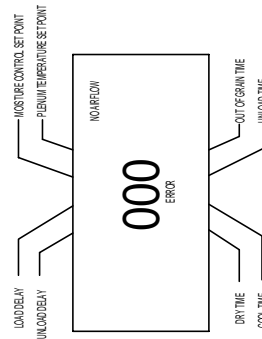
THIS DISPLAY INDICATES THE COMPUTER HAS STOPPED SENSING FLAME. THIS CAN BE CAUSED FROM RUNNING OUT OF FUEL, FLAME PROBE OUT OF ADJUSTMENT, OR THE BURNER FAILED TO IGNITE DURING IGNITION SEQUENCE.



THIS DISPLAY INDICATES THAT THE GRAIN DISCHARGE SWITCH LOCATED IN THE REAR OF THE DRYER WAS ACTIVATED. THIS IS CAUSED BY THE GRAIN EXITING THE DRYER WAS NOT TAKEN AWAY FAST ENOUGH OR SOMEONE HAS OPENED THE DISCHARGE LID. (SEE FIGURE 13)

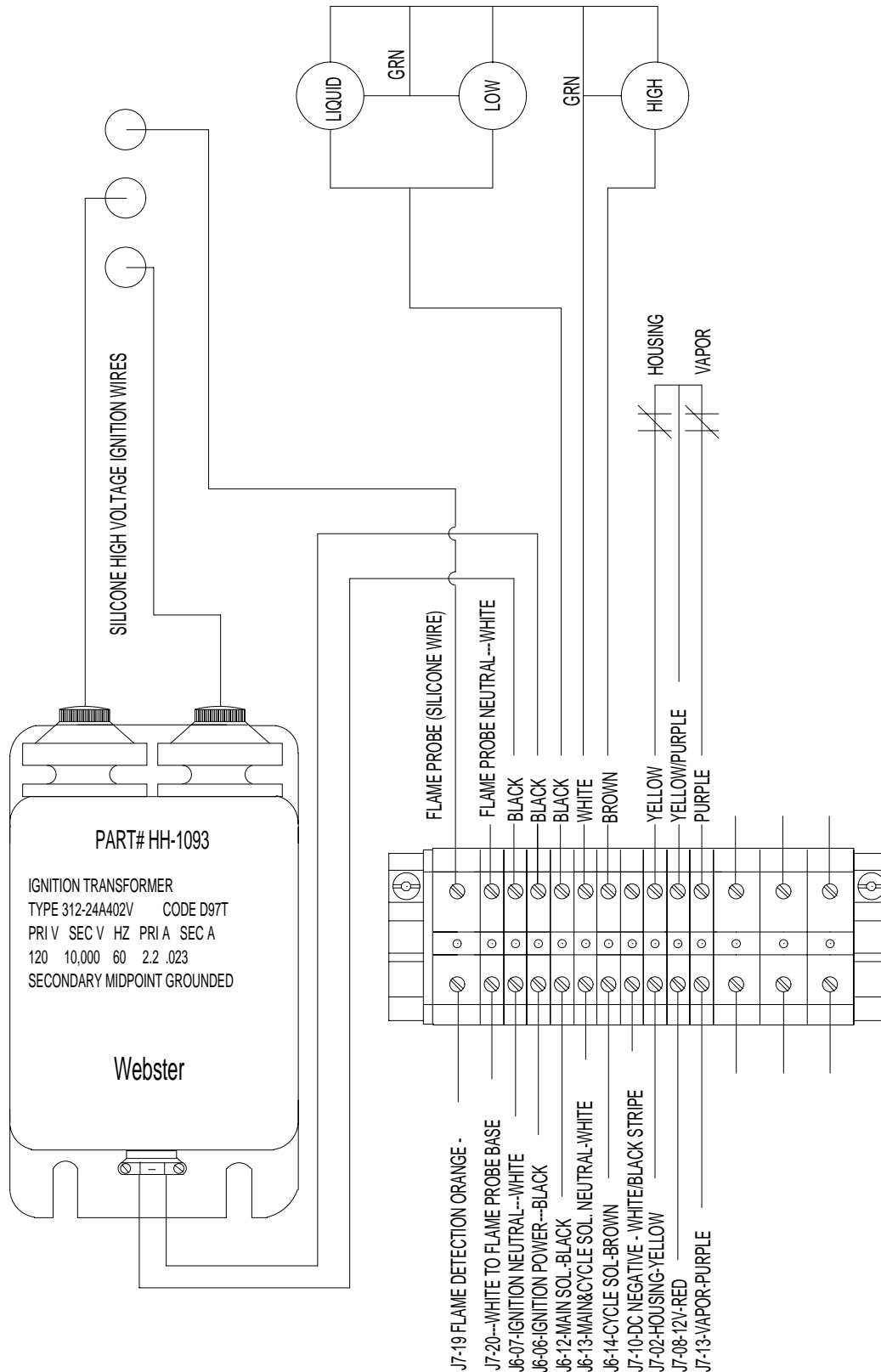


THIS DISPLAY INDICATES THAT A MOTOR OVERLOAD RELAY HAS TRIPPED. THIS RELAY MUST BE RESET MANUALLY. OPEN THE UPPER CONTROL BOX DOOR MAKE SURE THE POWER IS DISCONNECTED AND PUSH IN THE RED LEVERS ON ALL OF THE OVERLOAD RELAYS. NOTICE IF ONE OF THE LEVERS CLICKS AS IT IS PUSHED IN. THEN INSPECT THE MOTOR THAT TRIPPED THE RELAY. DETERMINE IF THE MOTOR IS BEING OVERWORKED.

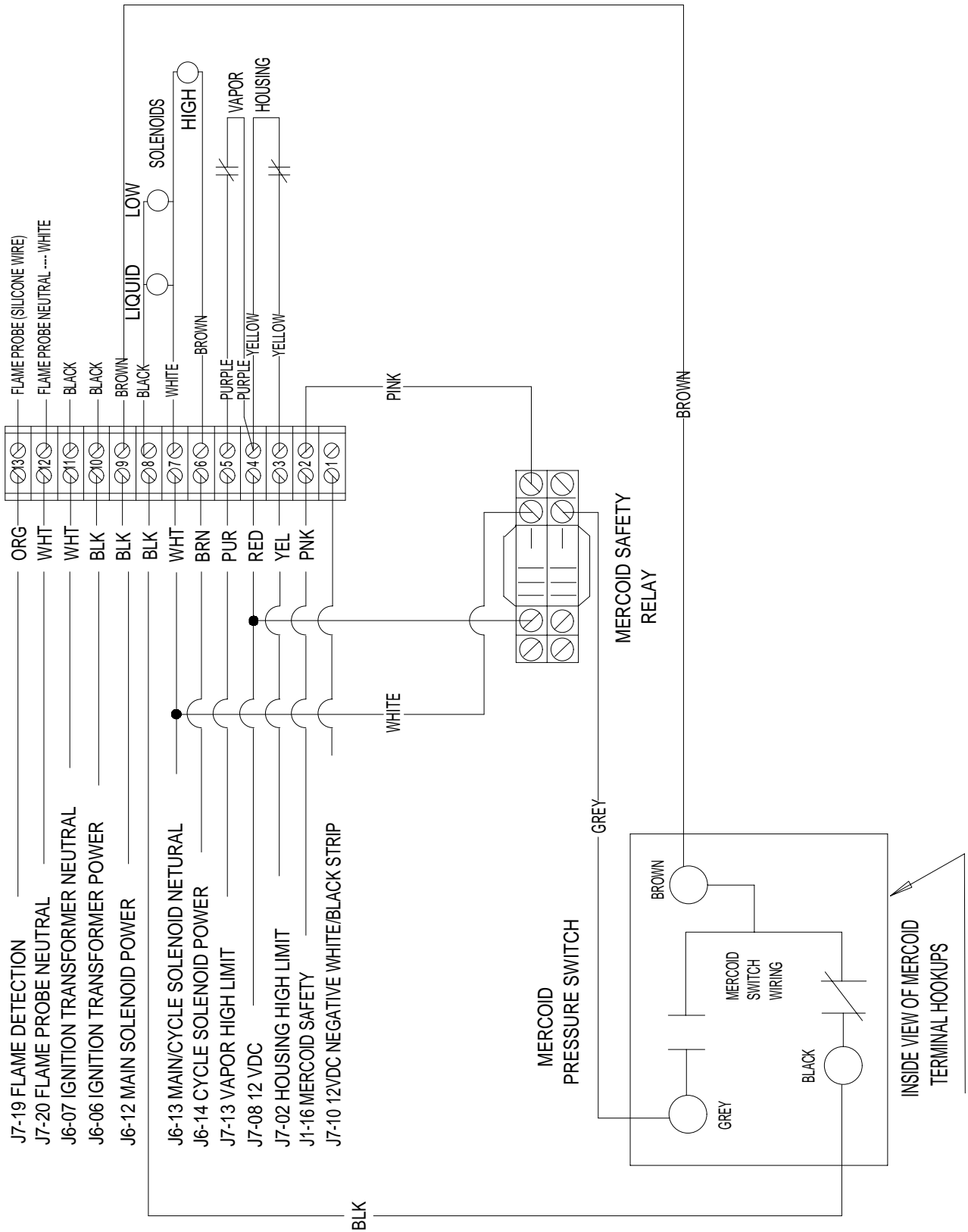


THIS DISPLAY INDICATES A LOSS OF AIR PRESSURE INSIDE THE DRYER. THIS IS USUALLY CAUSED BY LACK OF GRAIN INSIDE THE DRYER. THE AIR SWITCH MAY ALSO NEED TO BE ADJUSTED SO THAT IT BECOMES MORE SENSITIVE TO AIR PRESSURE. (SEE FIGURE 1)

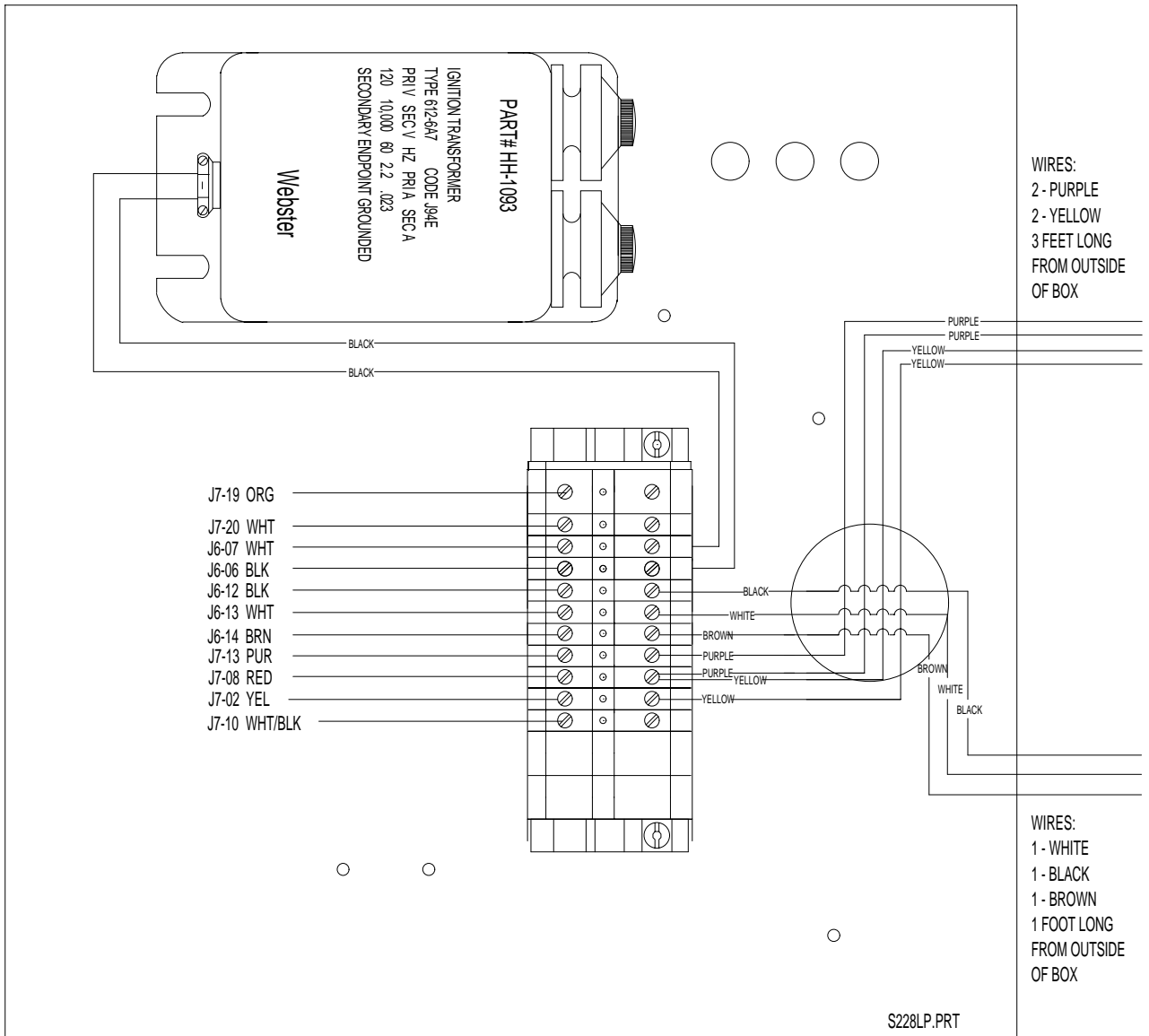
### Heater Circuit



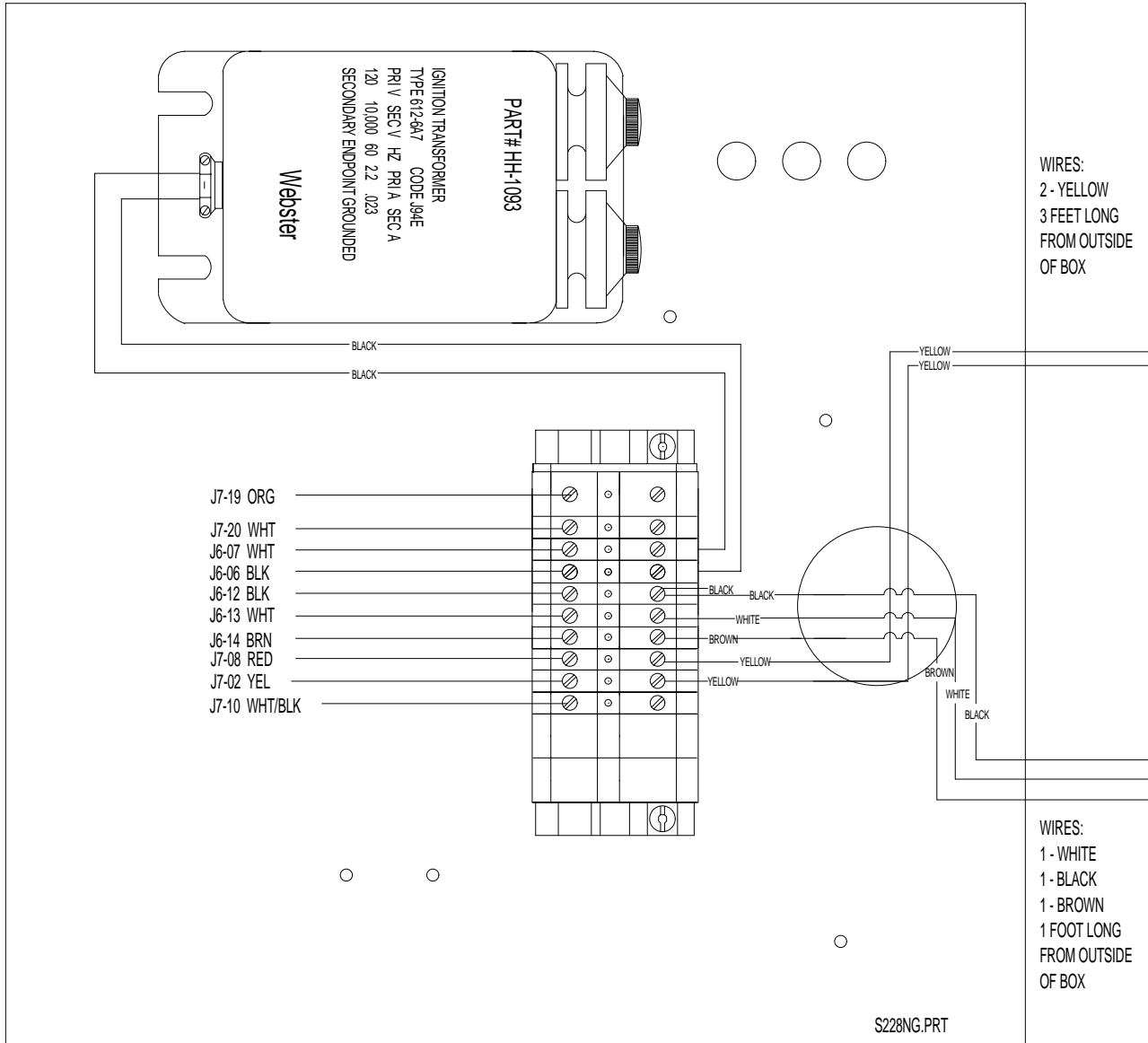
### Fan Burner Circuit For Canadian Models Only



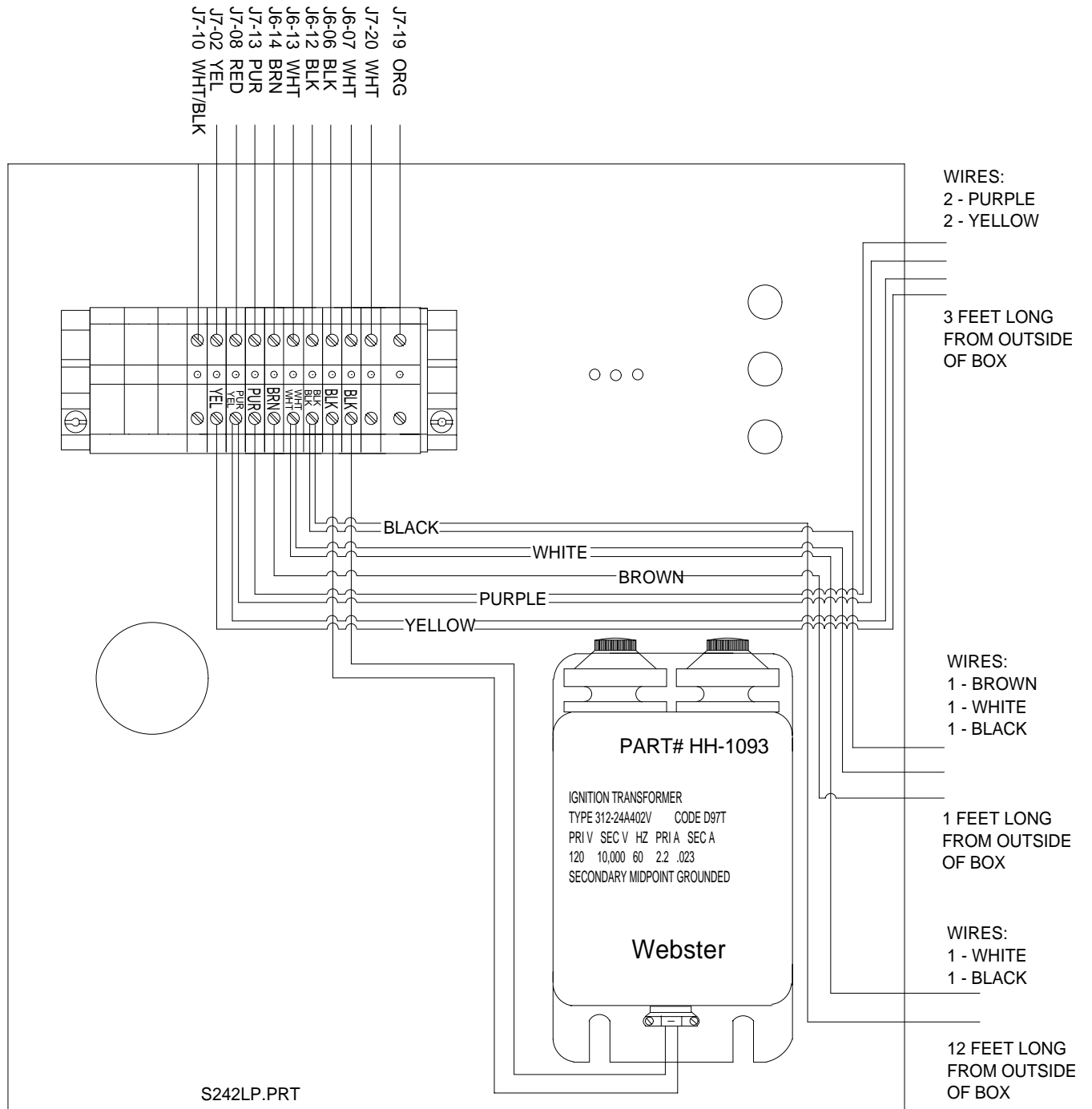
**Series 100 LP 26"/28" Fan**



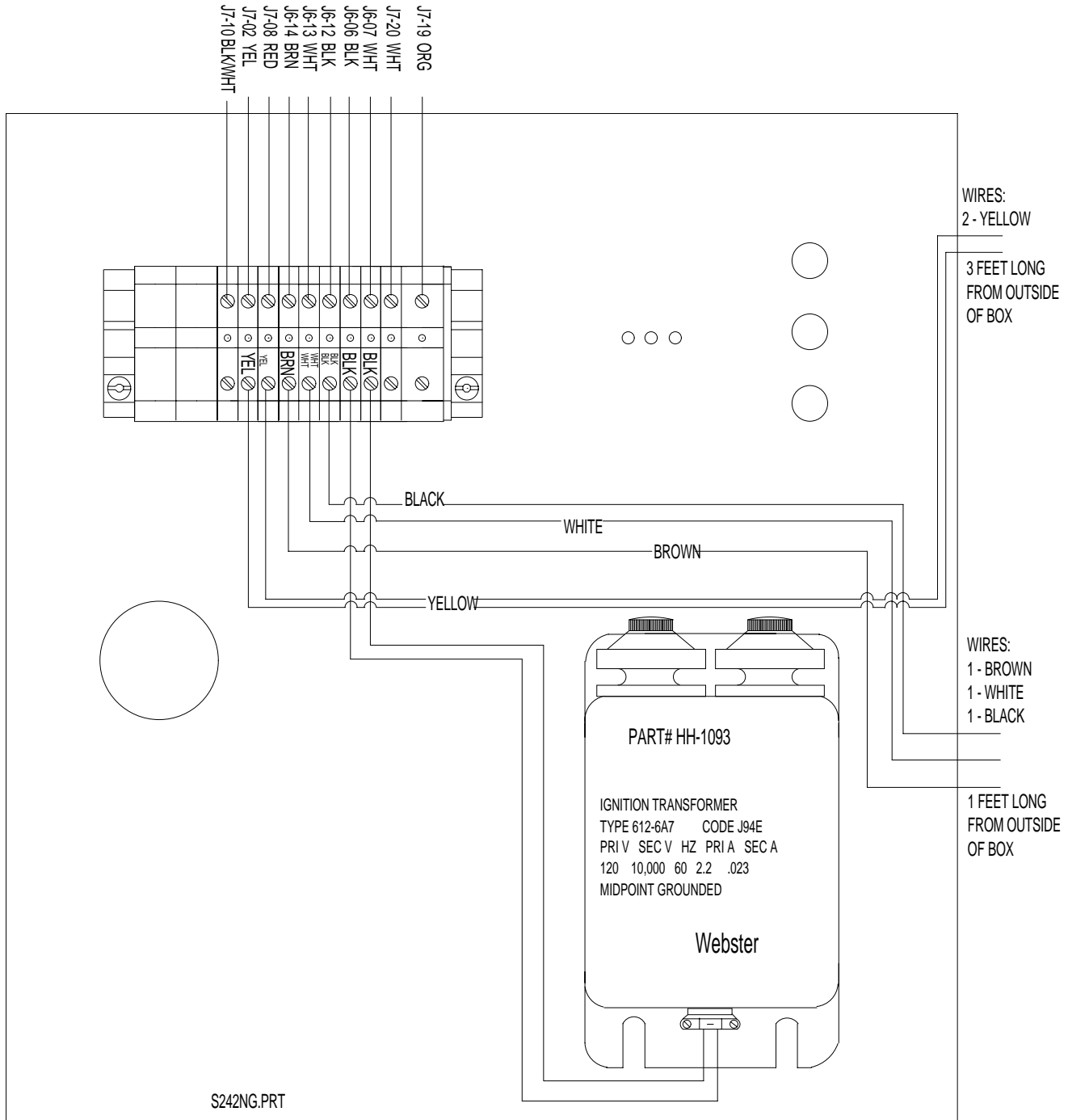
**Series 100 Natural Gas 26"/28" Fan**



Series 100 LP 36"/42" Fan



**Series 100 Natural Gas 36"/42" Fan**



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