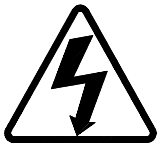
2.0 Electrical

Contents

2.2 Safety

CAUTION! Before performing procedures in this chapter, review the chapter on Safety at the beginning of this manual.



WARNING!!! When performing procedures in this chapter that require projector covers to be off, wear high voltage gloves (ANSI/ASTM 10,000 volt rated) when working near the CRTs, Arc Lamp, or power supplies. Wear safety goggles (rated X5) when working anywhere near the light path from the arc lamp or the projection lens.

CAUTION! It is very strongly recommended that setup data be downloaded before performing any of the following procedures. Exporting baseline source setup data to disk is an excellent precautionary measure. It will save the time of setting up new source file(s) in the case of an unexpected problem.

Left/Right Orientation: When referring to the left or right in this chapter, it is with reference to standing at the rear of the projector, facing the screen.

Connectors on subassemblies and PCBs have tabs that must be released first before pulling on the connector. The proper procedure is to push slightly *IN* on the connector, then squeeze the tab, then pull the connector out.

2.3 Incoming Power Circuit

AC Power Cord and Plug

The Power Cord and plug perform one basic function: to deliver the AC power from the power source to the projector. They are shipped as one unit, HJT p/n 104691 (US) and 105991 (Europe). It must be configured to meet the Electrical Specifications for the region the projector will be used.

AC Circuit Breaker & Subassemblies Circuit Breaker

The AC Circuit Breaker has two basic functions: one is to connect and disconnect electrical power from the projector. The second is to protect the projector from over-voltage conditions.

When the AC Circuit Breaker is in the OFF position, no electrical energy will reach any part of the projector except for the AC Circuit Breaker. When the AC Circuit Breaker is in the ON position, electrical energy goes to the Subassembly AC Circuit Breaker box where it is distributed to the Low Voltage Power Supply, Arc Lamp Power Supply and Distribution Box.

When the AC Circuit Breaker is in the ON position but the projector has not received the POWER ON command from a Tethered Remote Control or computer terminal, the projector is in Standby mode. In the Standby mode, the +5.1 VDC Standby and the +24 VDC Standby Voltages maintain power to the CPU chips on the System Controller PCB, and to the cooling fans.

The ILA-12K operates from a 3-phase WYE, 5-wire (3-phase DELTA, 4 wire- in Japan) source. Voltages, currents, and line frequencies vary with the country of use (*see Table 2-1*)

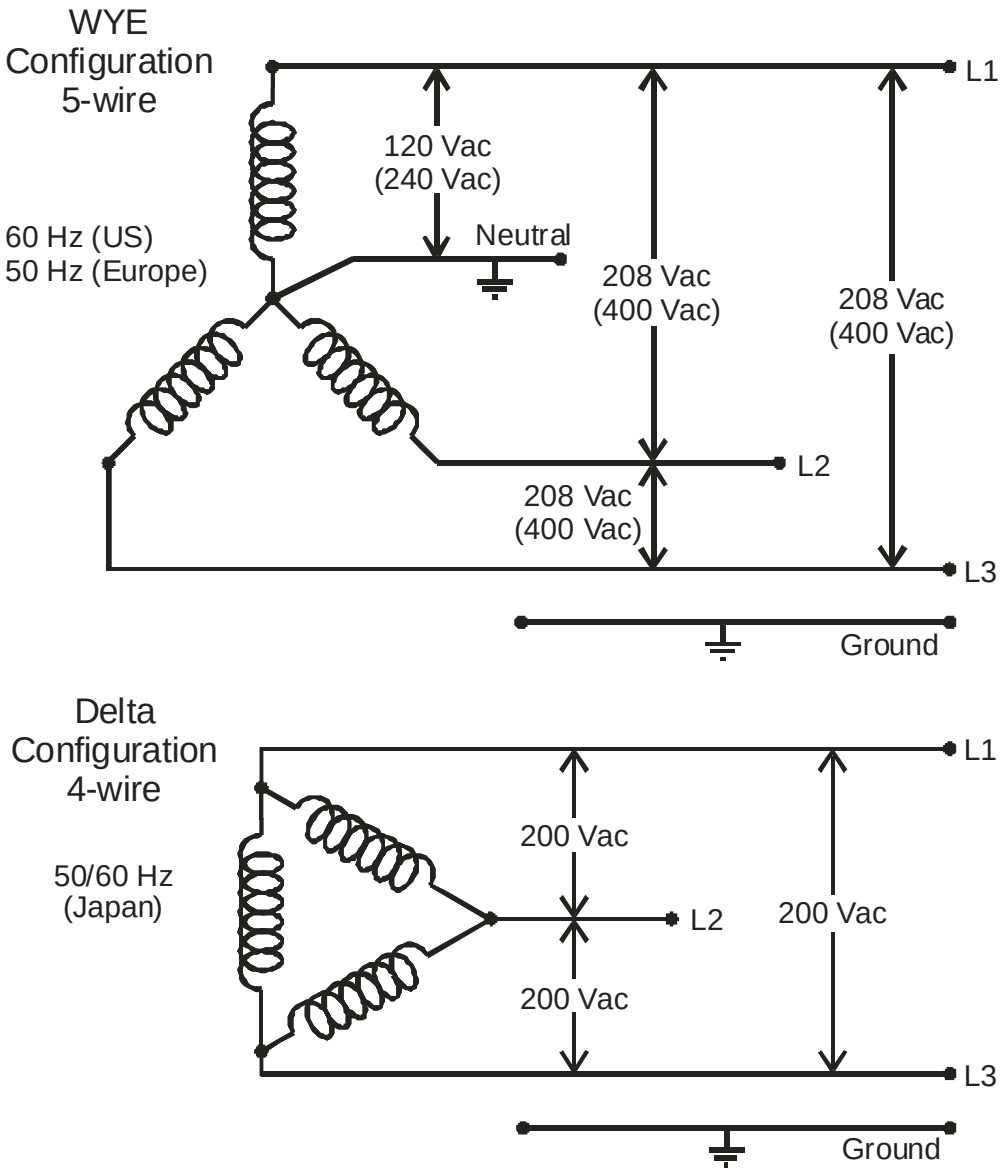


Figure 2-1 AC Power configurations for different countries.

Table 2-1 Countries with voltage, current, and frequency requirments

Countries	Voltage	Current	Line Frequency
United States	208 Vac	60 Amps	60 Hz
Japan	200 Vac	60 Amps	50-60 Hz
European	380/400/416 Vac	32 Amps	50 Hz

NOTE: In Figure 2-2, the L2 output (in gray) is for European units that require 400 Vac

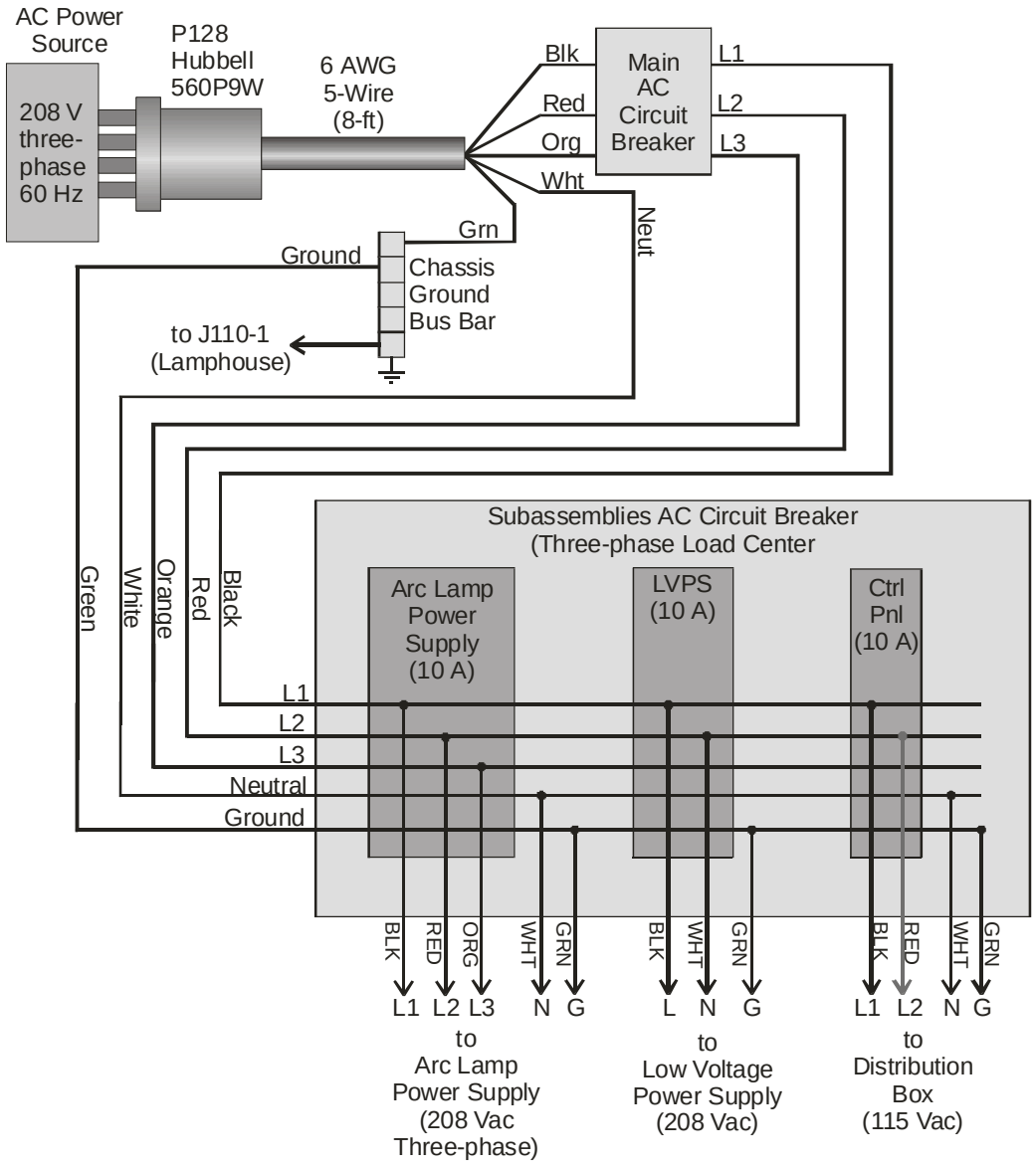


Figure 2-2 AC Power circuit I/O Diagram.

Distribution Box

The Distribution Box receives 115 Vac from the Control Panel AC Circuit Breaker on the Subassemblies Circuit Breaker panel. It distributes the AC power to the various cooling fans, and blowers.

When the Control Panel AC Circuit Breaker is switched to the ON position, the Distribution Box immediately sends 115 Vac to power the Control Panel. When the Low Voltage Power Supply AC Circuit Breaker is switched to the ON position, it sends AC power to the Low Voltage Power Supply. The Low Voltage Power Supply sends the +24 VDC Stdby voltage through the Control Panel to the Distribution Box. The Distribution Box uses the +24 VDC Stdby voltage to activate a relay that switches 115 Vac to power the cooling fans, exhaust fans, and blowers. This allows the System Controller PCB to control the blowers and cooling fans. They continue to run for about 10 minutes after the projector has received the POWER OFF command from the Tethered Remote Control or computer terminal.

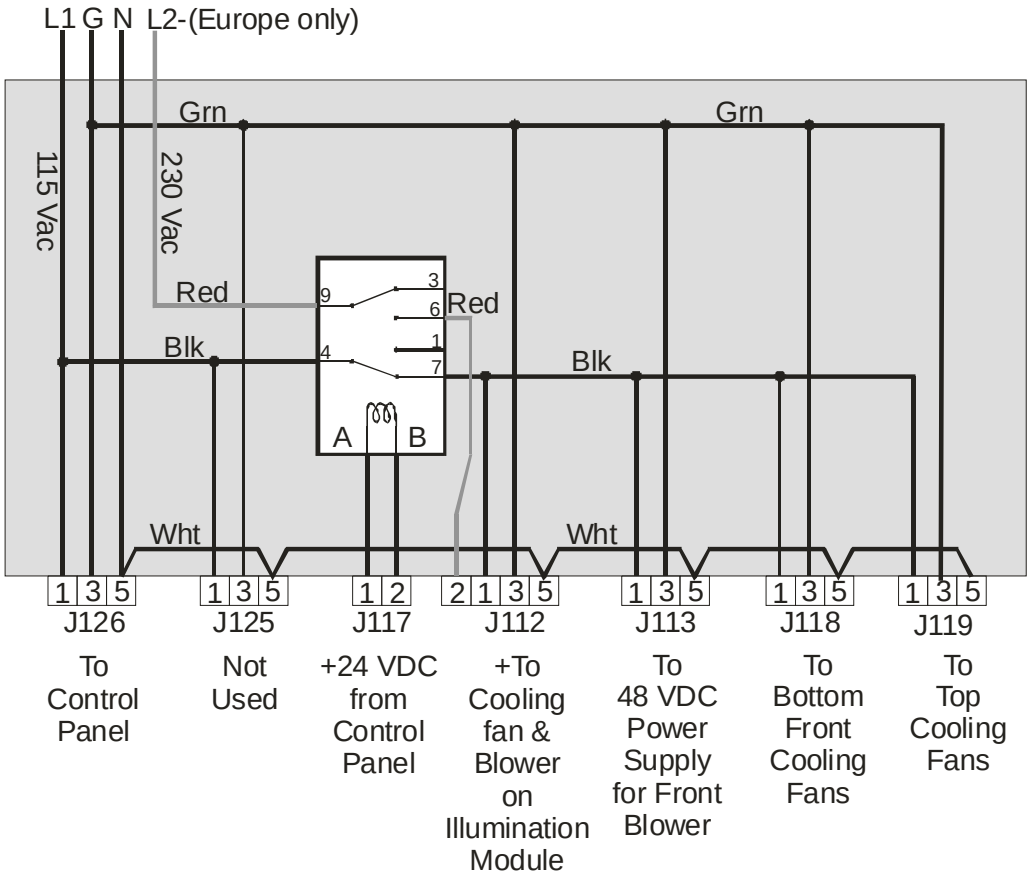


Figure 2-3 AC Distribution Box I/O Diagram (note the extra pin on J112, this is used on European installations only).

European Models

All the cooling and exhaust fans, and blowers in the ILA-12K projectors run off 115 Vac power. The units installed in European countries have a transformer inserted between the Subassemblies AC Circuit Breaker and the Distribution Box. The transformer steps down the voltage from European single phase 230 Vac to United States 115 Vac. On European installations, the large blower and exhaust fan for the Arc Lamp require 230 Vac. To supply the 230 Vac, the L2 (red wire shown as light gray) runs directly from the Control Panel AC Circuit Breaker to the large blower in the Arc Lamp Module (*see Figure 2-4*).

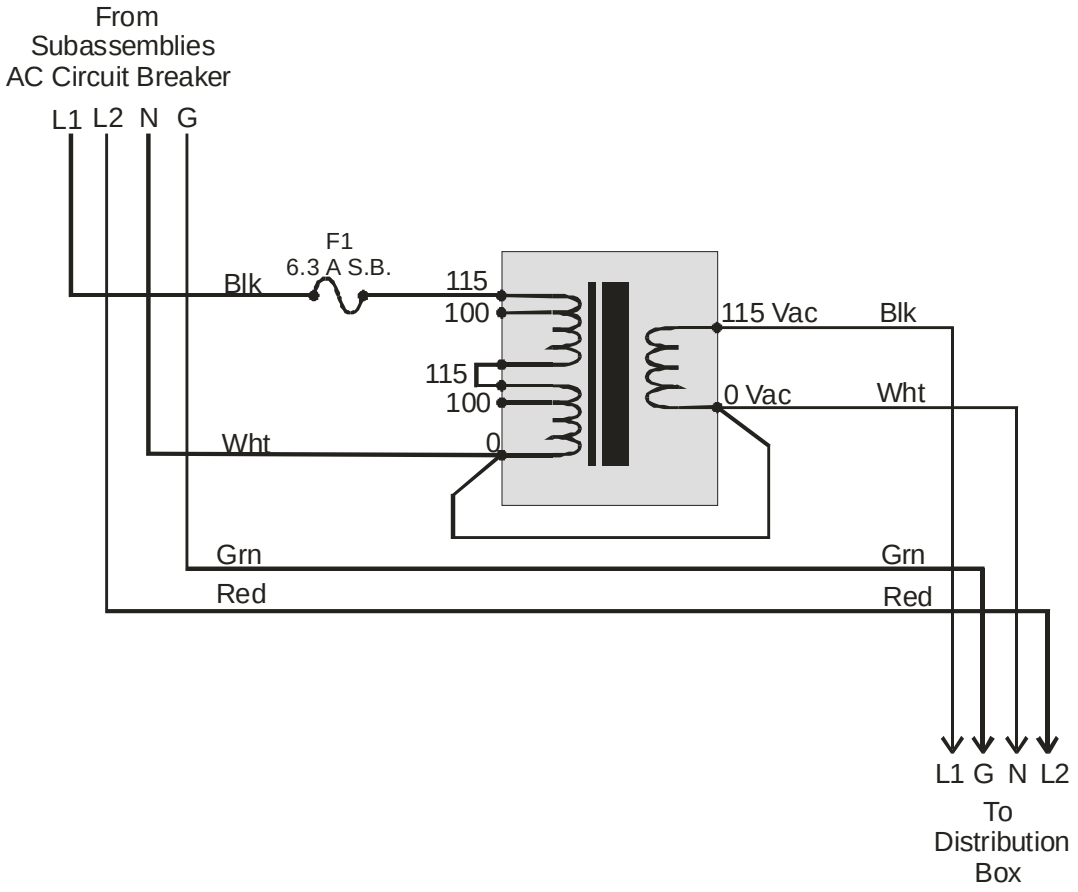


Figure 2-4 Step-down Transformer (European installations only).

2.4 Power Supplies

The ILA-12K has four main power supplies. These include:

- Low Voltage Power Supply (System Power Supply)
- Arc Lamp Power Supply
- High Voltage Power Supply
- +48 VDC Power Supply

A Laser Power Supply is used only for the Igniter Assembly during Arc Lamp lighting.

Low Voltage Power Supply (LVPS)

LVPS - Main Functions:

- Provides all the low voltages needed by the projector.
- Provides standby power (+5.1VDC) when the projector is OFF but the AC Circuit Breaker is in the ON position.
- Provides power (+24 VDC Stdby) to +24 VDC relay that switches AC power (115 Vac) to all blowers and cooling fans.

LVPS - Inputs:

The Low Voltage Power Supply receives AC input power directly from the AC Line Filter. The input range is from 180 Vac to 240 Vac, at 50/60 Hz.

/LVPSENBL - from the System Controller PCB. This signal enables the LVPS when the System Controller receives a Power On command.

/FANENBL - from the System Controller PCB. This signal enables the +24 VDC Standby voltage for the projector fans.

/ - the backslash preceding a signal name indicates the DC voltage goes low (≈ O VDC) to activate or enable something.

LVPS - Outputs:

+ 5.1 VDC Main - provides power to all digital components.

+ 5.1 VDC Stdby - provides power to CPU on System Controller PCB.

+ 6.3 VDC - provides power to heater on CRT.

± 15 VDC - provides power to all analog components

+ 24VDC Stdby - provides power to relay to switch AC power to the blowers and fans.

+24 VDC - provides power to the High Voltage Power Supply.

+48 VDC - provides power to the horizontal deflection supply on the Horizontal Deflection PCB.

+107 VDC - provides power to the amplifier section of the Video Amplifier PCBs.

/LV_OK - this diagnostic signal tells the System Controller PCB the status of the non-standby supply (all the outputs are working or not working).

/ = active low

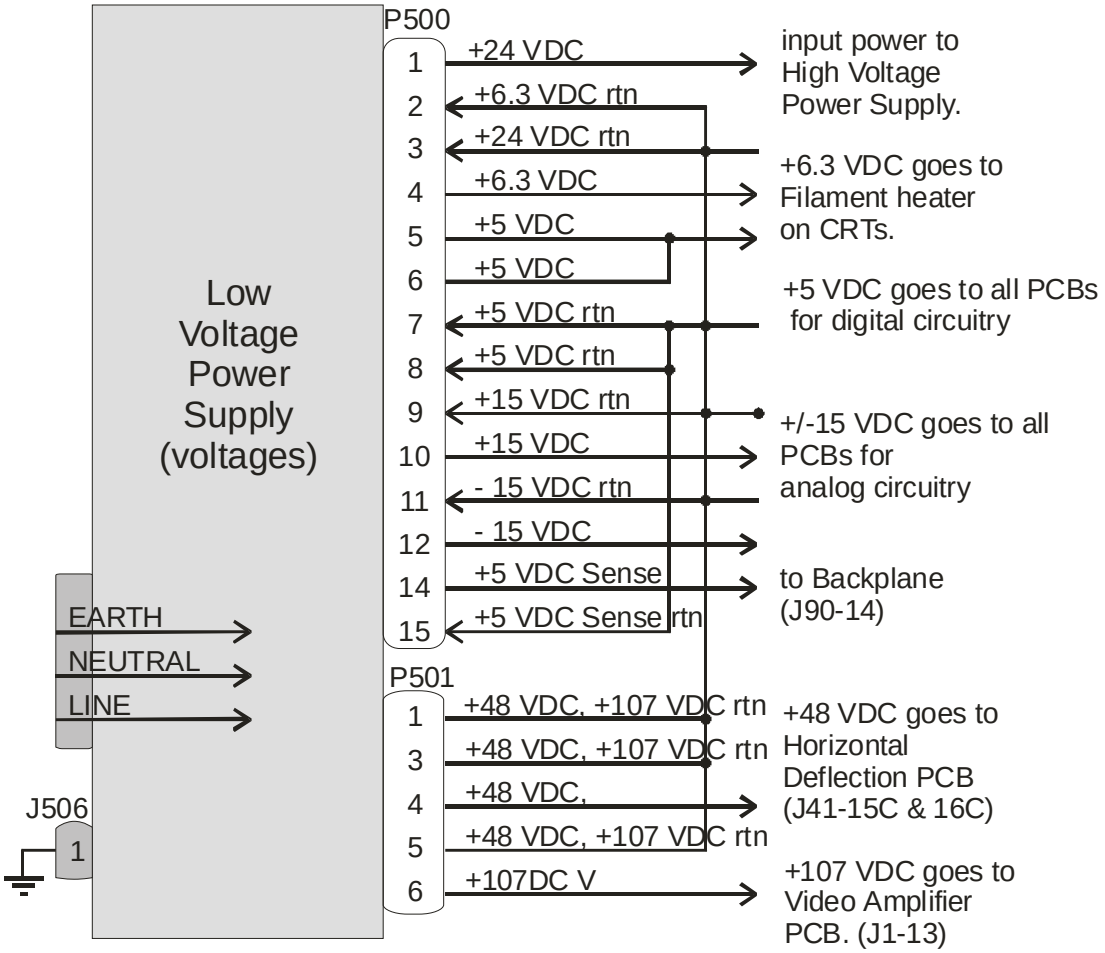


Figure 2-5 Low Voltage Power Supply I/O Diagram for voltages.

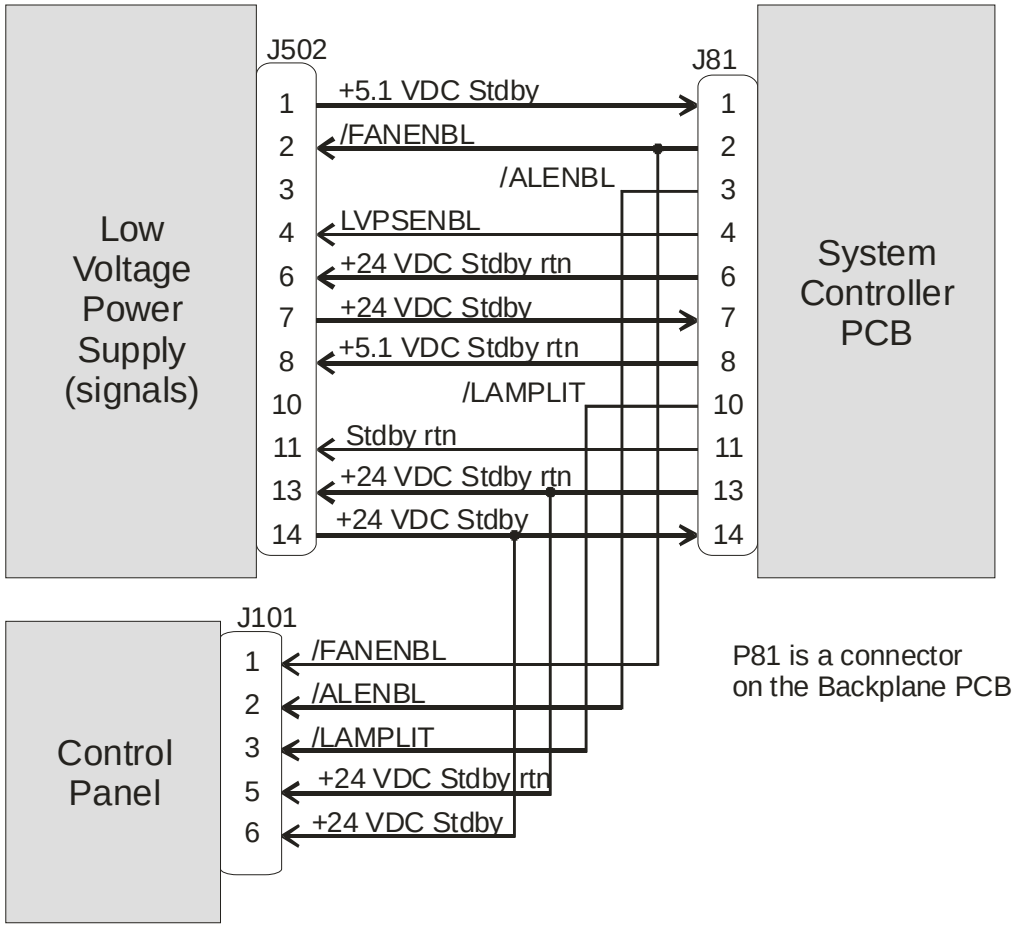


Figure 2-6 Low Voltage Power Supply I/O Diagram for voltages and signals.

LVPS - Operation:

The Low Voltage Power Supply receives AC power when the Low Voltage Power Supply AC Circuit Breaker is switched to the ON position. The AC is rectified to a DC Voltage, filtered, and goes through a power factor correction circuit to force the current waveform to follow the voltage waveform.

When the AC Circuit Breaker is in the ON position, the LVPS supplies the +5.1 VDC to the System Controller PCB. The System Controller PCB drives the /FANENBL signal to the Low Voltage Power Supply low. When the /FANENBL signal goes low, it switches ON the +24 VDC Standby power that switches 115 Vac to the blowers and fans.

When the projector receives a POWER ON command from a Tethered Remote Control or computer terminal, the System Controller PCB sends the /LVPSENBL signal to the LVPS. The Low Voltage Power Supply needs to receive the /LVPSENBL from the System Controller PCB to activate all the non-standby voltages. These include:

- +5.1 VDC for digital components
- +6.3 VDC for CRT filaments

- +/-15 VDC for analog circuits
- +24 VDC for the High Voltage Power Supply and Vertical Deflection PCB
- +48 VDC for the horizontal supply section of the Horizontal Deflection PCB
- +107 VDC for amplifier section of the Video Amplifier PCB

In addition to the /LVPSENBL signal, the System Controller PCB also send the /ALENBL signal to the Control Panel. The Control Panel uses the /ALENBL to switch on the Arc Lamp Power Supply (see Arc Lamp Power Supply (ALPS) section). When the Arc Lamp lights, the /LAMPLIT signal is pulled low by a Current Sense Switch on the negative cable of the Arc Lamp Power Supply. This tells the Low Voltage Power Supply that the Arc Lamp is lit. If the Arc Lamp does not light, the /LAMPLIT signal stays high. The System Controller PCB waits 10 minutes, and tells the LVPS to shut off the +24 VDC Stdby voltage, which switches off the 115 Vac to the blowers and fans.

If the System Controller PCB does not receive a POWER ON command from a Tethered Remote Control or a computer terminal, it waits about 10 minutes and then tells the LVPS to shut off +24 VDC Standby power (/FANENBL goes high). This switches off the 115 Vac to the cooling fans and blowers.

When the System Controller PCB receives a POWER OFF command it waits 10 minutes, and then tells the LVPS to shut off the +24 VDC Stdby voltage, which switches off the 115 Vac to the blowers and fans. This time gives the Arc Lamp and the PCBs time to cool down to avoid damage or reduction of operating life.

LVPS - Service Adjustments

There are no service adjustments for the Low Voltage Power Supply.

LVPS - Remove and Replace

Tools Needed:

Lrg. Flatblade screwdriver

#1 short-shank (1-2-inch) Phillips-head screwdriver*

11-mm Hex-socket wrench *

10-mm Balldriver Hex-head wrench

3-mm Balldriver Hex-head wrench

* not included in Toolkit provided with projector

Parts Needed:

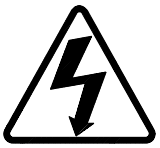
Low Voltage Power Supply - p/n 104071

To remove the Low Voltage Power Supply:

NOTE: In the following instructions as a point of reference, the Arc Lamp Module is attached to the right side of the Projection Module.

1. Power off the projector by Tethered Remote Control or computer terminal, and allow the cooling fans to run until they shut off.
2. Turn the three Subassemblies AC Circuit Breakers to the OFF position, turn the Main AC Circuit Breaker to the OFF position and unplug the AC Power Cord.
3. Remove the two lower left-side Projection Module access covers using the 10-mm Balldriver Hex-head wrench. Open the lower right-side access door (in front of Arc Lamp Module).
4. Remove the four Low Voltage Power Supply mounting bolts using the large Flatblade screwdriver. The two mounting bolts on the left side of the power supply screw in from the side. The two mounting bolts on the right side of the power supply screw in from the bottom.
5. Remove the two Phillips-head screws from the Plexiglas cover over the AC Terminal Block using the #1 short-shank Phillips-head screwdriver. Remove the Phillips-head screws securing each of the AC power wires (black-Line, white-Neutral, and green-Ground).
6. Disconnect the braided ground strap using the 11-mm Hex-socket wrench.
7. Use the diagonal wire cutters to cut the tie-wraps that provide strain relief to the ground strap and AC power cord.
8. Disconnect J501, J500, and J502 on the back of the power supply. Pinch the tabs of the connector and pull on the connector body (not on the wires).

   NOTE: It is easier to remove the J500 connector if J501 and J502 are removed first.
9. Lift and remove the power supply from the left side of the Projection Module.

    **WARNING!!!** Removing the Low Voltage Power Supply should be considered a two-person operation. Attempting to lift and remove the power supply with one person could result in an awkward lifting situation.
10. Reinstall the LVPS in reverse order. After installing a new LVPS, it may be necessary to touch-up the Timing, Geometry, Electronic Focus, ILA® device Bias/Sensitivity, Convergence, G_2, and Shading.

    NOTE: After the Low Voltage Power Supply is installed, the AC Circuit Breaker on the power supply must be in the ON position and the Interlock Switch must be pulled up in the Service position.

CAUTION! Be careful not to damage the Airflow Pressure lines to and from the HEPA filters directly in front of the Low Voltage Power Supply.

Arc Lamp Power Supply (ALPS)

ALPS - Main Functions:

- Provides ignition power to turn the Arc Lamp ON (via the Igniter).
- Provides steady state power to maintain the Arc Lamp operation.

ALPS - Inputs:

AC input power - 208 Vac, 160-166 A, 60 Hz (US), 400 Vac, 160-166 A, 50 Hz (Europe).

/ALENBL - from the System Controller PCB. Turns on the ALPS.

/ = Active Low

ALPS - Outputs:

+170 VDC output during the boost phase to get Arc Lamp ignition. This supplies the power for the Igniter.

Run Voltage - 7 kW (approx. +42 VDC) to maintain the arc lamp operation.

Current - 160-166 Amps to maintain the arc lamp operation.

LAMP_OUT - Lamp output voltage, positive.

LAMP_RTN - Lamp return.

/LAMP_LIT - signal to System Controller PCB indicating that the Arc Lamp is lit.

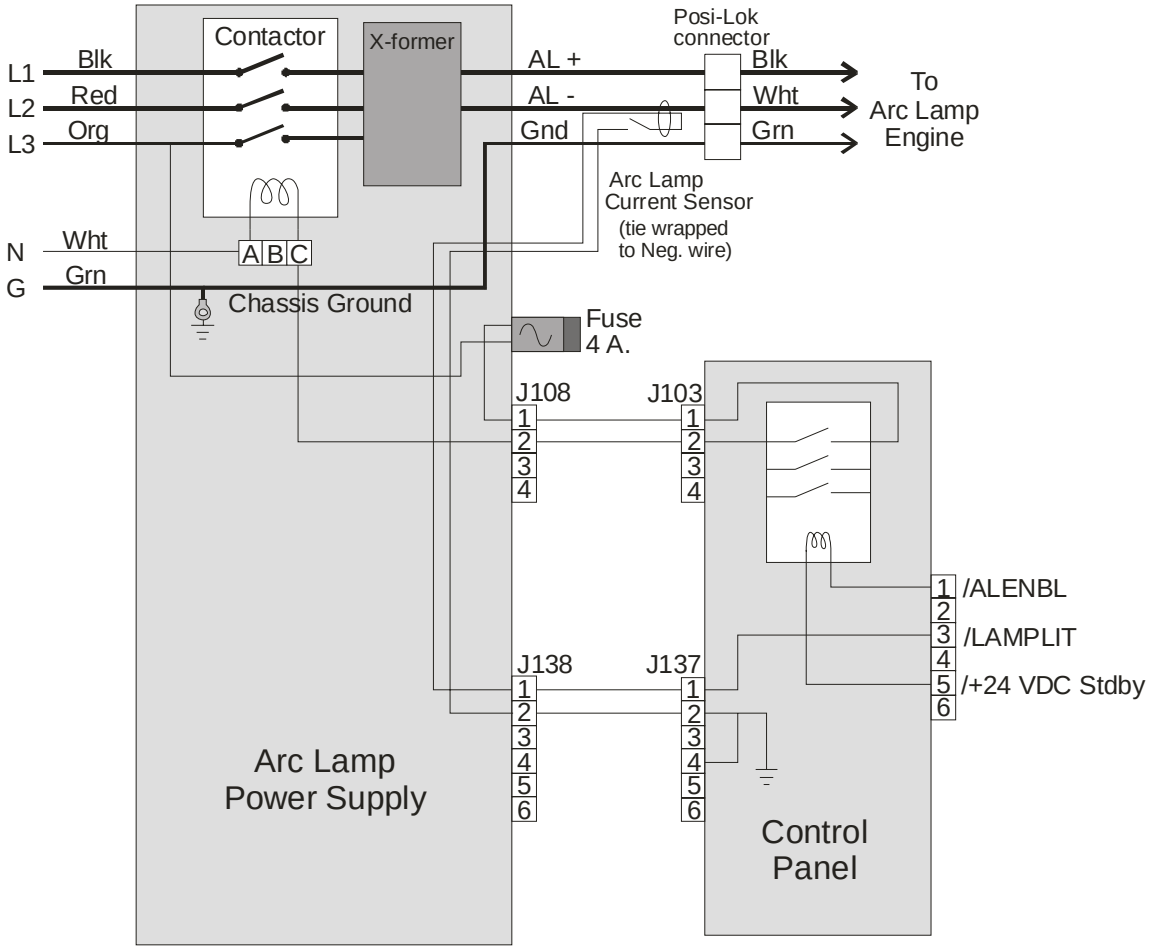


Figure 2-7 Arc Lamp Power Supply I/O Diagram.

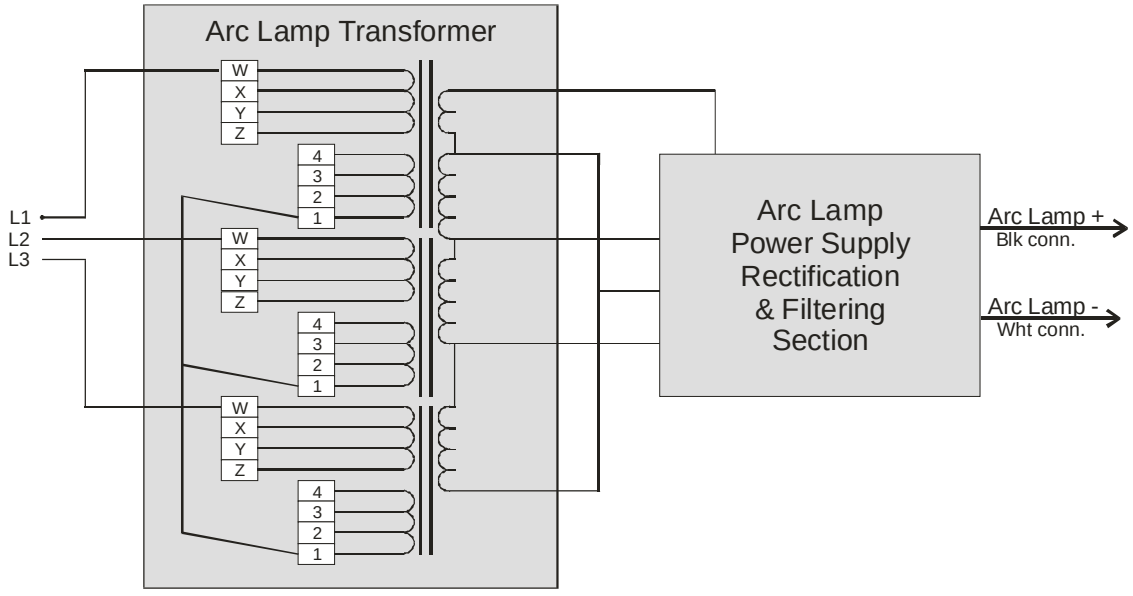


Figure 2-8 Arc Lamp Power Supply Transformer I/O Diagram.

ALPS - Operation:

The Arc Lamp Power Supply receives three-phase 208 Vac power when the Arc Lamp AC Circuit Breaker on the Subassemblies AC Circuit Breaker Panel is switched to the ON position. The System Controller PCB receives the Power ON command from the Tethered Remote Control or a Control-P (or Control-L for Arc Lamp with no electronics) from a computer terminal, and drives the /ALENBL signal low. The /ALENBL signal goes to the Control Panel where it energizes a RE1 relay that switches 115 Vac tapped from the L3 line to the Contactor relay inside the Arc Lamp Power Supply. The Contactor relay inside the Arc Lamp Power Supply switches the three-phase 208 Vac (400 Vac) input to the Transformer. The Transformer steps down the AC voltage to approximately 30 Vac and allow for current adjustment by changing the "taps" (*see ALPS - Service Adjustments section*). The AC power is rectified to DC voltage, filtered, and output to the anode of the Arc Lamp in the Arc Lamp Module.

When the Power ON command is received and the Arc Lamp Power Supply receives AC power, it sends the +170 VDC boost voltage to the primary coil of the Igniter. The Laser Power Supply charges up a capacitor. When the capacitor reaches +5.5 kV, a spark gap arcs causing a very high voltage pulse (approximately 32 kV) to be induced onto the secondary coil inside the Igniter. This high voltage pulse ignites the Xenon Arc Lamp. Immediately after the Arc Lamp lights, the voltage from the Arc Lamp Power Supply drops to about 42 volts at 160-166 amps. It will stay at this level during normal Arc Lamp operation.

In order for the /ALENBL signal to switch power to the Contactor relay in the Arc Lamp Power Supply, several conditions must be within a preset range. For example, Arc Lamp Reflector temperature must be less than 205 C°, the blower under the Arc Lamp Engine must be operating, and Air Pressure to the Arc Lamp Engine must be less than 0.350-inches of H_2O (indicating the condition of the HEPA filter in front of the blower). These parameters are controlled in the Control Panel.

When the Arc Lamp is lit, the Current Sensor Switch tie-wrapped to the negative lead of the Arc Lamp Power Supply output ties the /LAMP_LIT signal that comes through the Control Panel from the System Controller to ground. If the Arc Lamp fails to light, the Current Sensor Switch opens and the /LAMP_LIT signal goes high. This tells the System Controller PCB the Arc Lamp is not lit and it drives the /ALENBL signal high shutting down the Arc Lamp Power Supply.

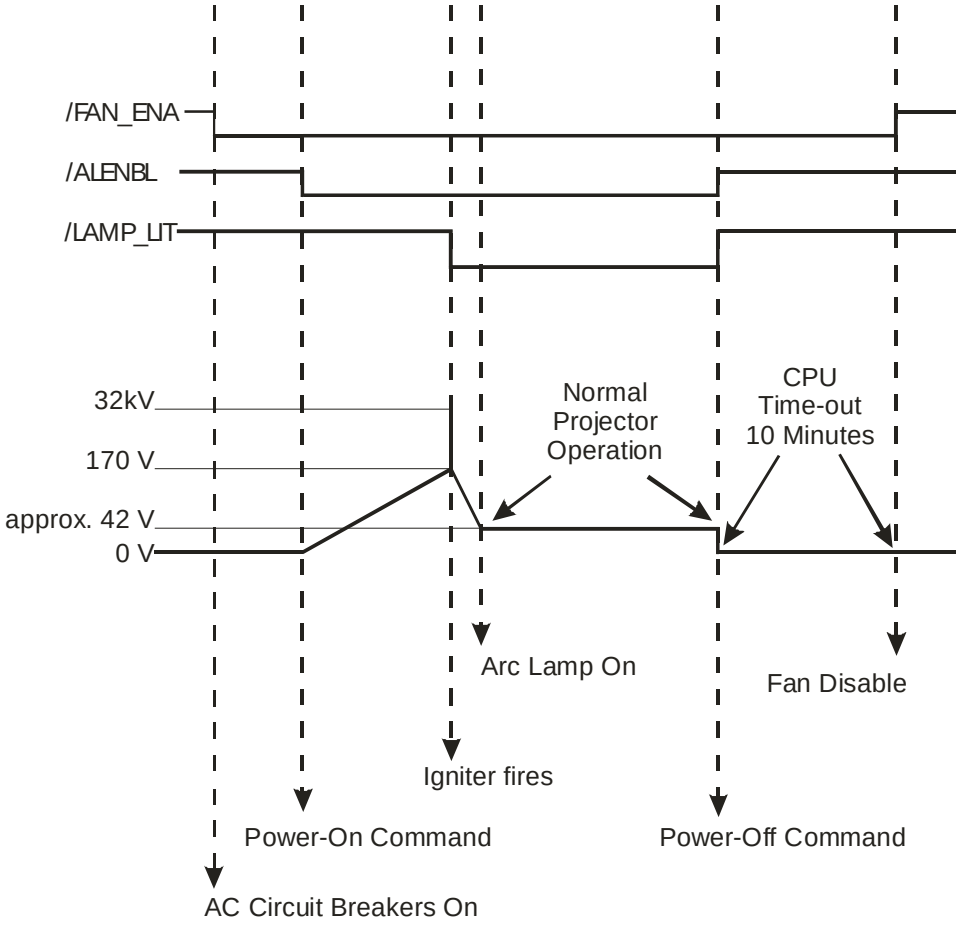


Figure 2-9 Timing for signals during projector power-up.

ALPS - Service Adjustments

Arc Lamp Current Adjustment

The Arc Lamp current is factory-adjusted and should not normally need adjustment however, it should be verified after each installation. If the Arc Lamp current is not between 160-167 amps, it will need to be adjusted. The current is adjusted by moving jumpers on the Arc Lamp Power Supply from one terminal or "tap" to another (*see Figure 2-10*).

The lower taps (marked W, X, Y, and Z) are for coarse adjustment and must be moved together. Relocating these taps to the next terminal to the right increases the Arc Lamp current 20-25 amps. The upper taps (marked 1, 2, 3, and 4) are for fine adjustment. These taps must also be moved together and increase the Arc Lamp current 5-7 amps when moved to the next terminal to the right.

WARNING!!! Before removing the Projection Module cabinet covers to move the jumpers, make sure the AC Circuit Breaker is

set to OFF and the AC Power plug is disconnected from the AC Power source.

Tools Needed

Clamp-on type ammeter such as AMPROBE Model AC/DC 1000, Fluke 36 Clamp Meter, or equivalent

Large Flatblade screwdriver

10-mm Balldriver Hex-head wrench

To verify Arc Lamp current:

NOTE: Ensure that the projector has been ON for at least 15 minutes prior to measuring Arc Lamp current.

1. Remove the Projection Module front right access panel on the bottom section using the 10-mm Balldriver Hex-head wrench.
2. Measure the Arc Lamp current around either the white or black Arc Lamp cable. The Arc Lamp current should be between 160-166 amps.
3. If the current is less than 160 amps, the upper or lower jumper wires on the Arc Lamp Transformer must be relocated to the taps toward the right. If the current is higher than 167 amps, the jumpers must be moved to the left (*see Figure 2-10*).
4. Power OFF the Arc Lamp by entering Ctrl-L if using a computer terminal, and turning the Arc Lamp circuit breaker on Projection Module front panel to OFF. If using the Tethered Remote Control, power OFF the projector by pressing both POWER buttons simultaneously, and turning the Arc Lamp circuit breaker on the Projection Module to OFF.
5. Remove the left side panel (as seen from facing the rear of the Projection Module) using the 10-mm Balldriver Hex-head wrench.

To increase current by 5-7 amps,

6. Disconnect each of the black jumper wires connected to the top terminal blocks marked 1, 2, 3, and 4 using the large Flatblade screwdriver. Reconnect these jumper wires to the next terminal to the right. For example, if the three jumper wires are connected to tap number 3, disconnect each of these three wires, then reconnect each of them to tap number 4. The jumper is one solid wire that necessitates all three connections be moved together. Each move to the right increases the current by about seven amps.
7. If the top jumpers are on number 4 tap and need to be increased, move the jumpers to the number 2 tap and move the tap on the lower terminal blocks (lettered W, X, Y, and Z) to the next tap to the right. For example, if the settings were X-4 (X being the setting of the bottom terminal blocks and 4 being the setting of the upper terminal blocks), the resulting move will be Y-2.

To decrease the current by 5-7 amps,

8. Disconnect each of the black jumper wires connected to the top terminal blocks marked 1, 2, 3, and 4 using the large Flatblade screwdriver. Reconnect these jumper wires to the next terminal to the left. For example, if the three jumper wires are connected to tap number 3, disconnect each of these three wires, and reconnect each of them to tap number 2. **Move ALL jumpers together!** Each move to the right decreases the current by about seven amps.

To increase current by 20-25 amps,

9. Disconnect each of the black jumper wires connected to the bottom terminal blocks marked W, X, Y, and Z using the large Flatblade screwdriver. Reconnect these jumper wires to the next terminal to the right. For example, if the three jumper wires are connected to tap X, disconnect each of these three wires, then reconnect each of them to tap Y. **Move ALL jumpers together!** Each move to the right increases the current by about 25 amps.

To decrease current by 20-25 amps,

10. Disconnect each of the black jumper wires connected to the bottom terminal blocks marked W, X, Y, and Z using the large Flatblade screwdriver. Reconnect these jumper wires to the next terminal to the left. For example, if the three jumper wires are connected to tap X, disconnect each of these three wires, and reconnect each of them to tap W. **Move ALL jumpers together!** Each move to the right decreases the current by about seven amps.

    NOTE: Perform Step 10 only if the coarse adjustment in Step 8 or 9 was necessary. Before reapplying power, move the three black jumper wires on the numbered terminal blocks to tap number 1 on the extreme left. Reapply power and measure the current around one of the Arc Lamp cables (Step 1 above). Move the three black jumper wires at the numbered terminal blocks to the right, one terminal at a time, until the 160-166 amps range is reached.

11. Make sure all the tap screws are tight Turn the Arc Lamp Power Supply circuit breaker on the front panel to ON.

12. Power ON the Arc Lamp by entering Ctrl-L if using a computer terminal. If using the Tethered Remote Control, power ON the projector by pressing both POWER buttons simultaneously.

13. Re-measure the Arc Lamp current. Repeat the adjustment process as needed to obtain a current that is between 160-167 amps.

14. Install the Projection Module cover panel.

CAUTION! When the Main AC Circuit Breaker is powered OFF, power to the cooling fans is also shut off. Always allow the cooling fans to run long enough to cool the Arc Lamp before powering OFF the Main AC Breaker.

CAUTION! Do not adjust the Arc Lamp current above 167 amps. Damage to the equipment could result.

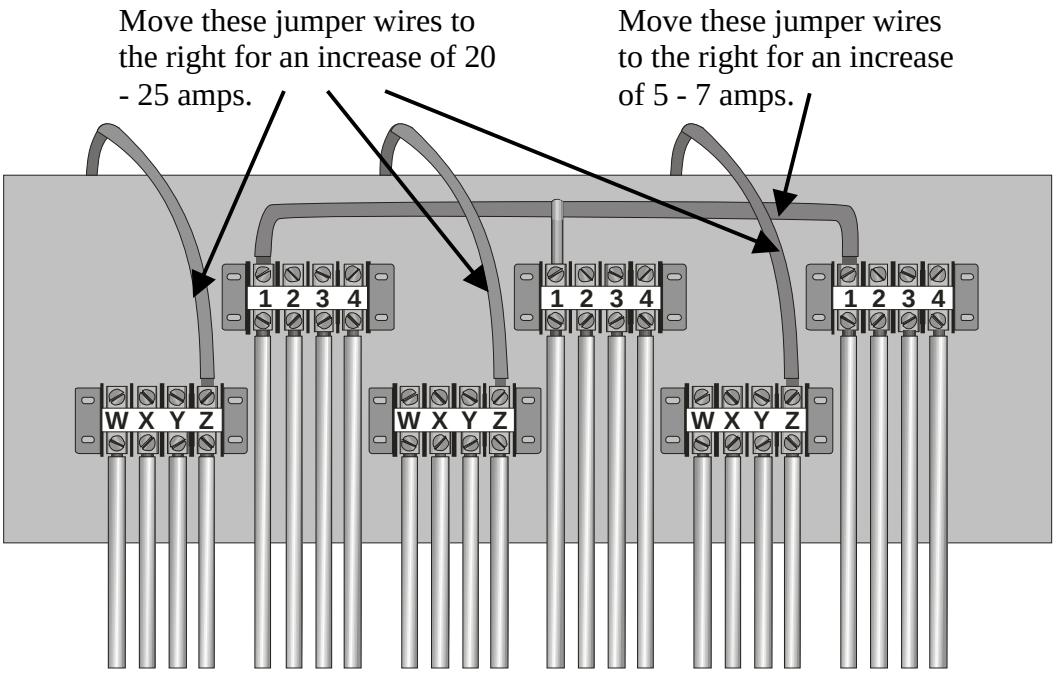


Figure 2-10 Current Adjustment Terminal Blocks on the Arc Lamp Power Supply Transformer.

WARNING!!! Ensure that all the “tap” connections are tight after making Arc Lamp current adjustments.

Table 2-2 Transformer tap settings for measured input voltages (measured).

	Domestic	European	Japan
187 V	Z3		N/A
195 V	Z2		
202 V	Y4		
208 V	Y3		
218 V	Y2		
342 V		Z2	
355 V		Y4	
370 V		Y3	
385 V		Y2	
400 V		X4	
414 V		X3	
428 V		X2	
442 V		X1	N/A

ALPS - Remove and Replace

Tools Needed

Lrg. Flatblade screwdriver

Med. Flatblade screwdriver

10-mm Balldriver Hex-head wrench

6-mm Balldriver Hex-head wrench

9/16-inch socket and ratchet wrench

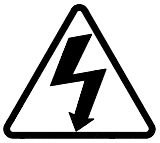
Parts Needed

Arc Lamp Power Supply p/n - 105045 (US),

105782 (European)

To remove the Arc Lamp Power Supply (ALPS):

1. Power off the projector by Tethered Remote Control or computer terminal, and allow the cooling fans to run until they shut off.



WARNING!!! After switching the Main AC Circuit Breaker to the OFF position, allow at least 2-3 minutes for the

capacitors to discharge and check the output of the Arc Lamp Power Supply with a voltmeter.

2. Switch the Main AC Circuit Breaker to the OFF position and unplug the AC Power Cord.
3. Remove the left side access panel of the Projection Module using the 10-mm Balldriver Hex-head wrench.
4. Disconnect the three large phase wires (black, red, and orange), using the large Flatblade screwdriver.
5. Disconnect the connector for the Current Sense line, which is tie-wrapped to the large negative output cable.
6. Disconnect the P108 connector, which supplies power to the Contactor relay.
7. Remove the four Hex-head mounting bolts using a 6-mm Balldriver Hex-head wrench. This will disconnect the green ground cable.
8. Disconnect the neutral wire from the terminal block using the medium Flatblade screwdriver.
9. Disconnect the two large output cables using a ratchet wrench and a 9/16-inch socket.

   HINT: It is easier to disconnect the output cables at the cable clamp, but reconnecting the cables is much more difficult.
10. Replace the Arc Lamp Power Supply in the reverse order.

High Voltage Power Supply (HVPS)

HVPS - Main Functions

The High Voltage Power Supply provides the following functions:

- Generation of Anode voltages (32 kV) for all three CRTs (RGB)
- Generation of Focus voltage (G3) (8.5-10 kV) for all three CRTs (RGB)
- Generation of G2 (400-1300 VDC) supply voltage for the Video Amplifier PCB.
- Generation of G1 (-200 VDC) supply voltage for the Video Amplifier PCB.
- Dynamic Focus Amplifier using horizontal and vertical parabolas supplied to the High Voltage Power Supply.

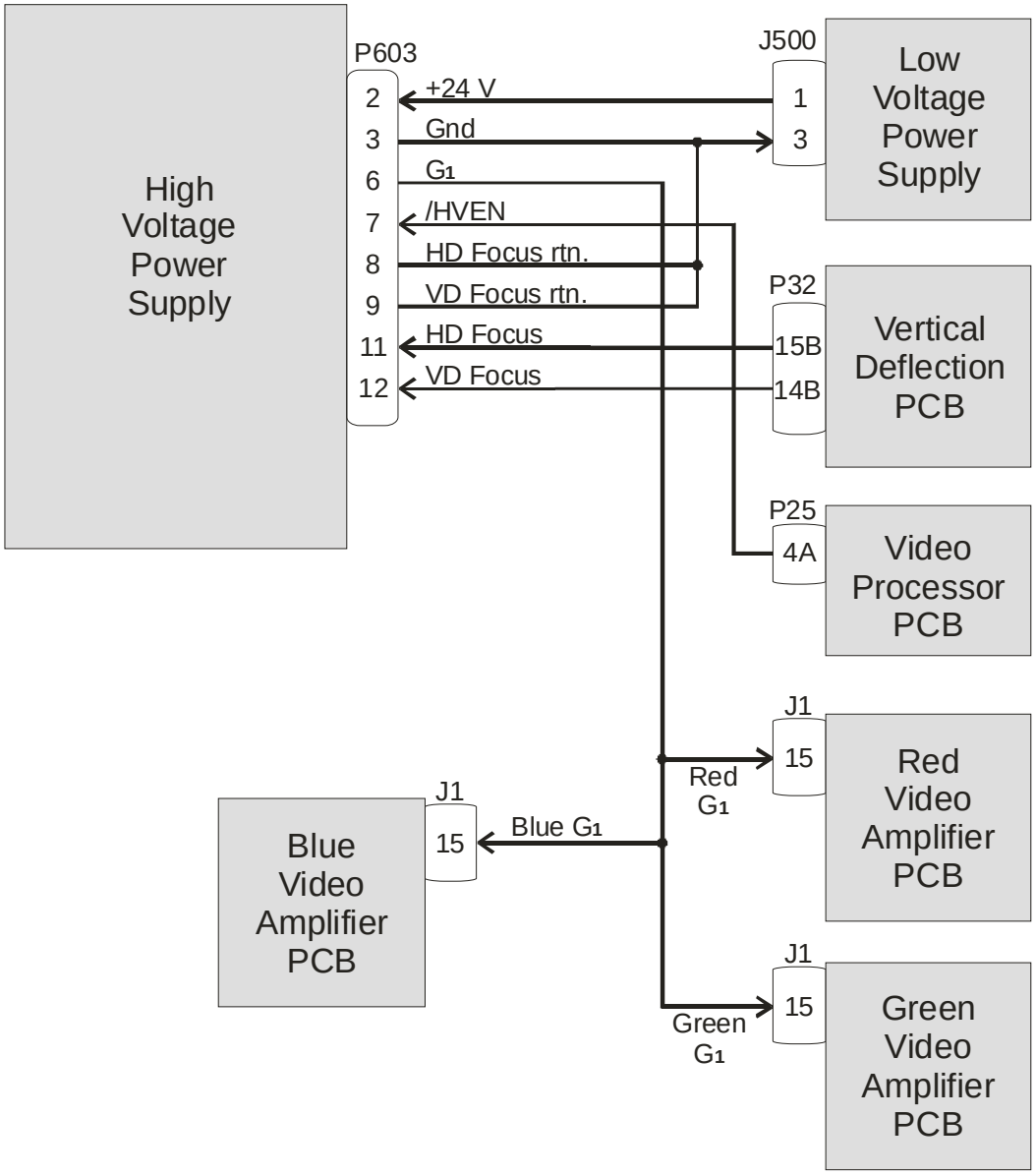


Figure 2-11 High Voltage Power Supply I/O signal Diagram.

HVPS - Inputs

/HVEN - The HVPS shutdown signal from the Video Processor PCB.

H_PARABOLA - The horizontal parabola from the Vertical Deflection PCB used by the Dynamic Focus Amplifier.

V_PARABOLA - The vertical parabola from the Vertical Deflection PCB used by the Dynamic Focus Amplifier.

+ 24 VDC - The input power for the High Voltage section of the High Voltage Power Supply.

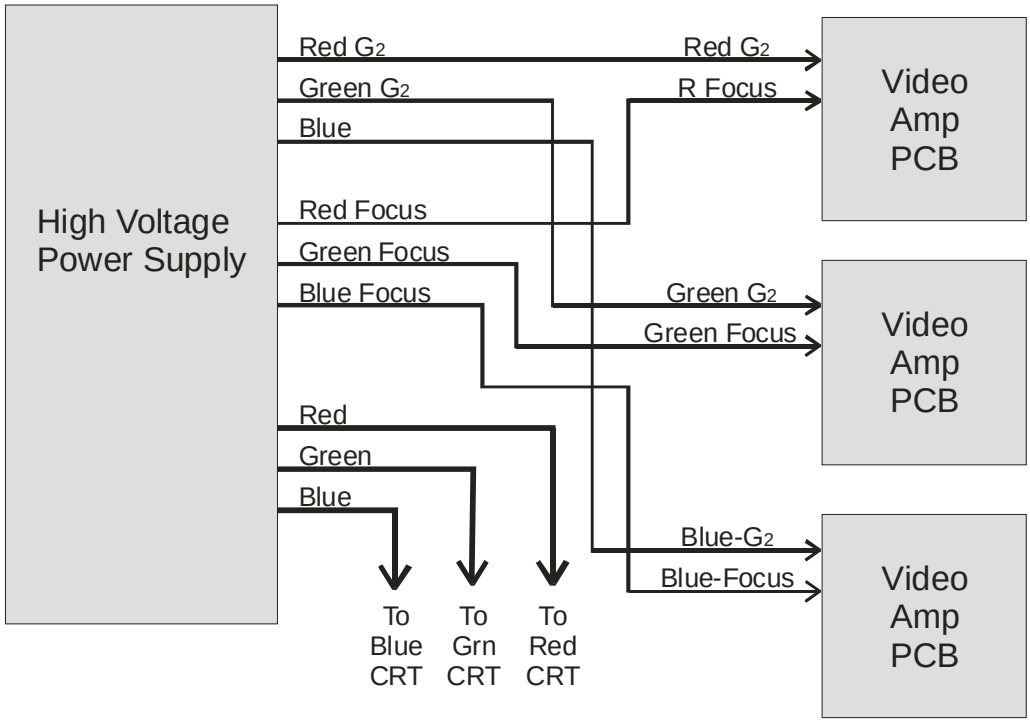


Figure 2-12 High Voltage Power Supply voltages to CRTs

HVPS - Outputs

G1 Supply (-200 VDC) - goes to each Video Amplifier PCB

G2 Supply (400-1300 VDC) - goes to each Video Amplifier PCB

RGB Anode Voltage (32 kV) - goes directly to each CRT

RGB Focus Voltage (8.5-10 kV) - goes to each Video Amplifier PCB.

HVPS - Operation

The High Voltage Power Supply has three basic functions.

- High Voltage Generation
- Focus Voltage
- High Voltage and CRT Protection

High Voltage Generation - The High Voltage Amplifier section converts the +24 VDC from the Low Voltage Power Supply, to +32 kV for the CRT Anode Voltage, and divides it into three outputs for each CRT. The High Voltage section also supplies the G_1 (-200 VDC) and G_2 (400-1300 VDC) Grid Voltage to each CRT through the Video Amplifier PCB. The G_2 voltage is divided into three outputs that have manually adjusted potentiometers located on the side of High Voltage Power Supply.

Focus Voltages - The High Voltage Power Supply receives the horizontal and vertical parabolas from the Vertical Deflection PCB and adds them together. They are amplified and sent to the Focus Pack section. The Focus Pack section couples

the amplified parabola waveforms to the Focus Voltages. The Focus Pack divides the Focus Voltage into three signals and outputs each signal to a CRT. The DC Focus Voltages are manually by a potentiometer at the High Voltage Power Supply (*see*).

The Arc Ground signal goes to the Video Amplifier PCB and from there, connects to the CRT. It provides a direct return path for arc currents in case of internal CRT arcing.

High Voltage and CRT Protection - The High Voltage Power Supply receives a /HVEN signal from the Video Processor PCB. This signal goes to the Protect OR section. The Protect OR section also checks the incoming +24 VDC. from the LVPS for an overcurrent condition. The Protect OR section also monitors the high voltage output for an overvoltage condition. If any of these checks shows a problem the Protect OR section shuts down the high voltage amplifier.

HVPS - Service Adjustments

Normally, the only High Voltage Power Supply adjustments are for CRT Focus and G_2 grid voltage. The CRT Focus Voltage adjusts are mechanical potentiometers located on the side of the High Voltage Power Supply (*see Figure 2-13*) that adjust the focus for each CRT. The CRT Focus Voltage adjustments are detailed in the CRT Section.

HVPS - Remove and Replace

Tools Needed

10-mm Balldriver Hex-head wrench

5-mm socket hex wrench (optional for adjusting CRT mechanical adjustment)

3-mm Balldriver Hex-head wrench

Offset ratchet Flatblade screwdriver (optional)

Flathead screwdriver

Parts Needed

High Voltage Power Supply p/n 106055

To remove the High Voltage Power Supply:

11. Power off the projector by Tethered Remote or computer terminal, and allow the cooling fans to run until they shut off.
12. Turn the Main AC Circuit Breaker to the OFF position and unplug the AC Power Cord.
13. Remove the two upper left-side access panels, the upper rear access panel and the small access panel on the upper right side using the 10-mm Balldriver Hex-head wrench.
14. Remove the M-3 screw that secures the Electronic Module. It is located on the front right-side corner of the Electronics Module.
15. Tilt the Electronics Module back.

16. On the left side of the projector, remove the cable clamps that hold the three Anode cables coming from the High Voltage Power Supply using a Flatblade screwdriver.

    HINT: The two screws holding the Anode cable clamps also secures a metal plate the partially covers the CRT cage. It is helpful to remove this plate to disconnect and reconnect the Anode cables inside the CRT cage. To remove the plate, remove the two screws on the right side of the projector. The screws are located under the plate and require an offset ratchet Flatblade screwdriver (*see Figure 2-13*).

17. Disconnect the P603 connector located on the backside of the High Voltage Power Supply (*see Figure 2-14*).

18. Disconnect the G_2 (thin white cables) and Focus red cables with large white connectors) cables from the Video Amplifier PCB.

    HINT: It is not necessary to remove the Video Amplifier PCBs from the back of the CRTs, however, it makes disconnecting and reconnecting the G_2 and Focus cables from the Video Amplifier PCB much easier. To remove the Video Amplifier PCBs from the CRTs, however, the CRTs must be moved forward (adjust the Z-axis). The other connections on the Video Amplifier PCB do not have to be removed. The CRT mechanical focus will have to be readjusted when the High Voltage Power Supply installation is complete. It is a judgement call as to whether it is worth the effort to remove the Video Amplifier PCBs to disconnect and reconnect the G_2 and Focus cables (*see the ILA-12K User's Guide for instructions on mechanical focus of CRTs*).

19. Remove the G_2 and Focus cables from the cable holders located inside the CRT cage.

20. Carefully pull the G_2 cables out the back of the CRT cage. Pull the Focus cables out the back of the CRT cage ***one at a time.*** The large connectors on the Focus cables will not fit through the hole more than one at a time.

21. Carefully remove the Anode cable connectors from their holders inside the CRT cage. Pull the connectors straight out from the cable holder.

22. Disconnect the Anode cable connectors and carefully pull them out the front of the CRT cage.

    NOTE: It is not necessary to label the Anode cables. The G2 cable length will determine where they go (the longest one will go to the red Video Amplifier PCB and the shortest will go to the blue Video Amplifier PCB). The Focus cables are labeled on the side of the High Voltage Power Supply, but again the length will help determine where each cable will go.

23. Reinstall the High Voltage Power Supply in the reverse procedure.

24. After replacing the HVPS, check and adjust G_2 and Focus voltages as necessary (*see the ILA-12K User's Guide for instructions on G2 and Electronic Focus adjustment*).

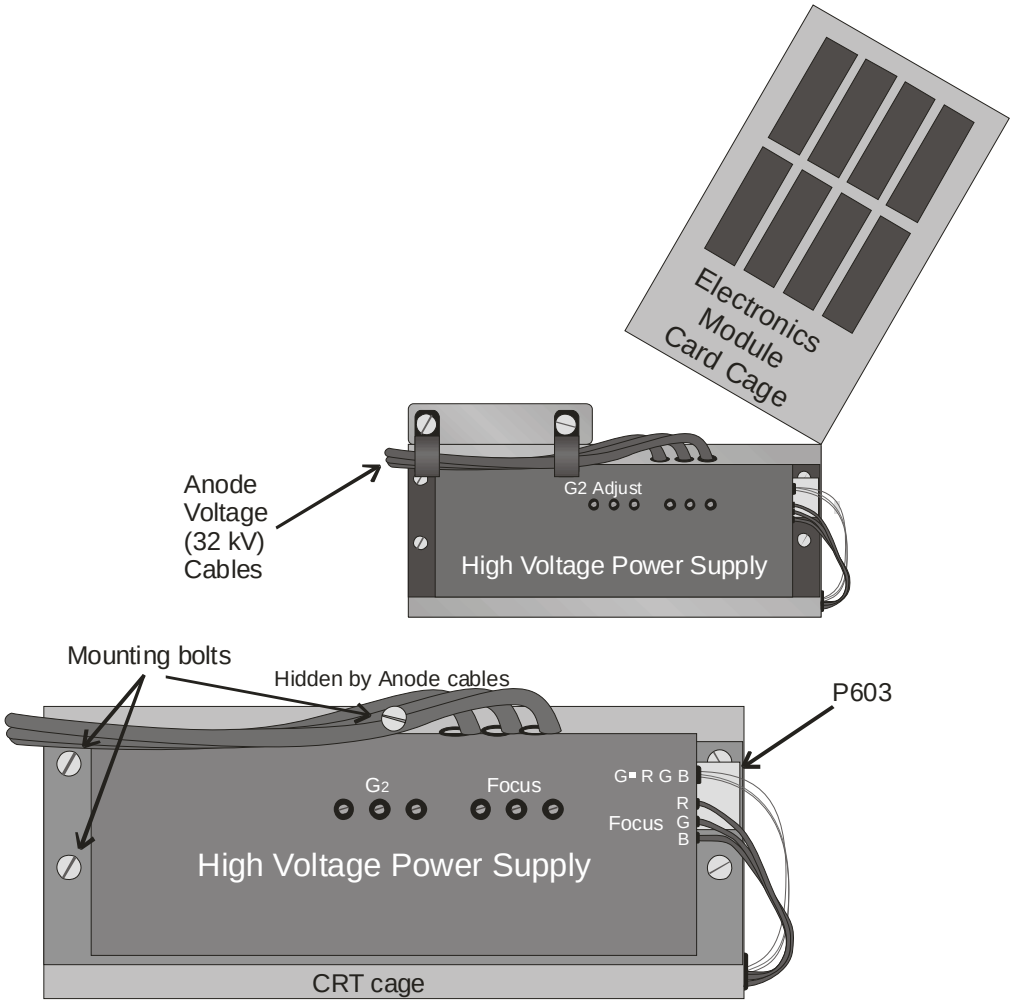
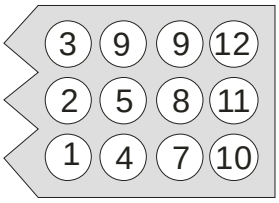


Figure 2-13 High Voltage Power Supply.



1. Not used
2. +24 VDC input
3. Gnd
4. Not used
5. Not Used
6. G_1 (-200 VDC)
7. /HVEN
8. HD Focus rtn.
9. VD Focus rtn.
10. Not used
11. HD Focus
12. VD Focus

Figure 2-14 P603 connection on the High Voltage Power Supply.

+48 VDC Power Supply

The +48 VDC Power Supply, located just behind the Distribution Box, supplies +48 VDC to the large blower in the ILA® devices Air Handler in the front of the Projection Module. The +48 VDC Power Supply receives 115 Vac from the Distribution Box.

When the Low Voltage Power Supply is switched ON, it sends the +24 VDC Stdby voltage that goes through the Control Panel and switches 115 Vac to the Arc Lamp blower, the cooling fans, and exhaust fans. It also switches 115 Vac to the +48 VDC Power Supply, which then supplies +48 VDC to the blower in the ILA® devices Air Handler. The +48 VDC Power Supply has a 3-Amp fuse.

2.5 Igniter Assembly

The Igniter Assembly consists of the Igniter and the Laser Power Supply. The Igniter and Laser Power Supply are replaced as one unit.

Igniter Assembly - Main Functions:

- Generates 32 kV pulse to light Arc Lamp Power
- Acts as link between Arc Lamp Power Supply and Arc Lamp during normal Arc Lamp operation

Igniter Assembly - Inputs

+170 VDC - From the Arc Lamp Power Supply during Arc Lamp lighting.

7 kW at 160-166 A - From Arc Lamp Power Supply during normal Arc Lamp operation.

Igniter Assembly - Outputs

32 kV - to the Arc Lamp during Arc Lamp lighting.

7 kW at 160-166 A - From Arc Lamp Power Supply during normal Arc Lamp operation.

Igniter Assembly - Operation

The Igniter has two functions: to light the Arc Lamp and to act as a link between the Arc Lamp Power Supply and the Arc Lamp during normal Arc Lamp operation. The Igniter contains the spark gap and the step-up transformer that supplies the 32 kV pulse that lights the Arc Lamp. During lighting of the Arc Lamp, the /ALENBL signal from the System Controller PCB, triggers the Arc Lamp Power Supply to output a +170 VDC boost voltage to the primary coil of the Igniter. The Laser Power Supply charges up a capacitor. When the capacitor reaches +5.5 kV, the spark gap arcs causing a very high voltage pulse (approximately 32 kV) to be induced onto the Igniter Transformer step-up (secondary) coil. The high voltage pulse goes to the Anode of the Arc Lamp. The spark generated by the 32 kV pulse creates an arc inside the Xenon bulb that ignites the Arc Lamp.

Igniter Assembly - Service Adjustments

There are no service adjustments performed on the Igniter Assembly.

Igniter Assembly - Remove and Replace

The Igniter Assembly is not considered a serviceable item.

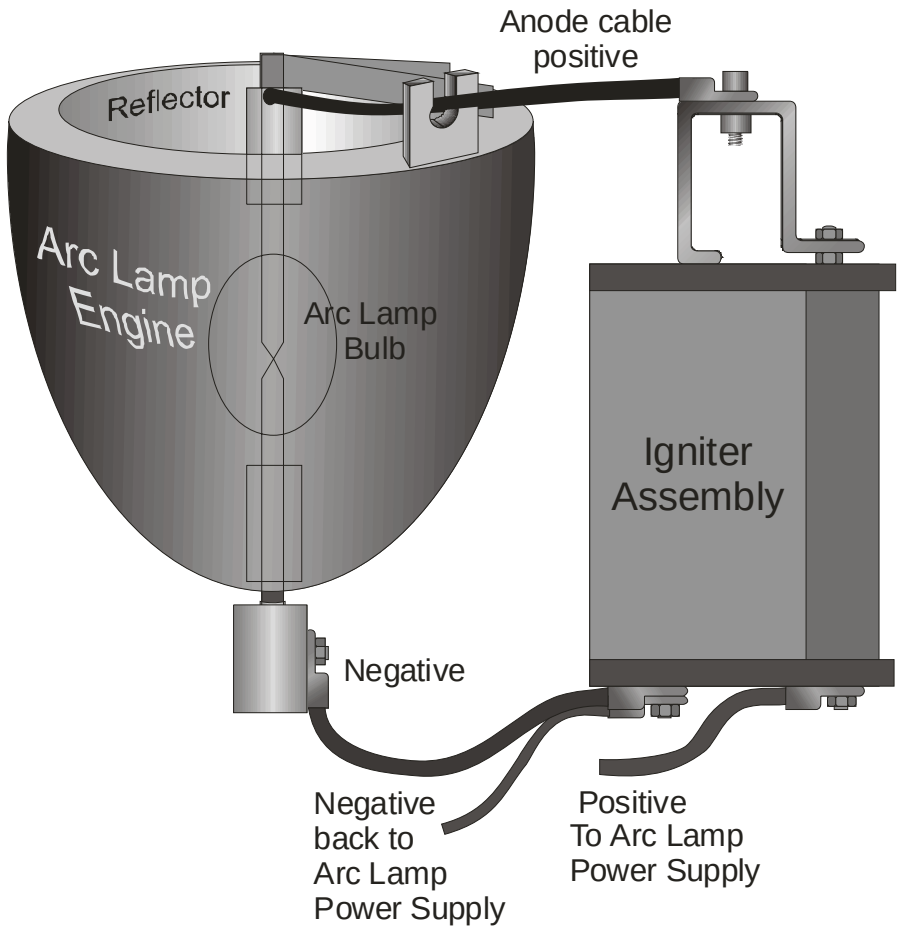


Figure 2-15 Igniter Assembly showing connections to Arc Lamp Engine.

2.6 Control Panel

The Control Panel controls the Arc Lamp Power Supply and all the blowers, cooling fans and exhaust fans. It monitors and displays the status of several parameters such as Arc Lamp Reflector temperature, airflow and air pressure to the Arc Lamp Engine, airflow and air pressure to the ILA® devices. Airflow sensors tell the Control Panel that the large blowers are operating. Air pressure Sensors tell the Control Panel if the filters are plugged with particles. If one of the filters is plugged, the Control Panel will not allow the Arc Lamp Power Supply to energize until the filter has been replaced.

Control Panel - Main Functions:

- Monitors the Arc Lamp Reflector temperature and displays the status with Indicator Lamp

- Monitors and airflow to the Arc Lamp Engine and displays the status with Indicator Lamp
- Monitors and displays air pressure at the Arc Lamp Engine
- Monitors and displays air pressure at the ILA® devices
- Monitors and displays the Arc Lamp Hours (of operation)
- Controls the switching on/off of the Arc Lamp Power Supply
- Controls the switching of 115 Vac to the blowers, cooling fans, and exhaust fans

Control Panel - Inputs

+115 Vac - input power from the Control Panel AC Circuit Breaker.

+24 VDC Stdby - from the System Controller PCB

+24 VDC Stdby rtn - from the System Controller PCB

/ALENBL - Arc Lamp Power Supply enable signal, triggers Contactor relay

/LAMPLIT - signal from the Current Sense switch from Arc Lamp Power Supply

ILA® device pressure sensor (positive) - positive lead (+ 24 V Stdby) to Air Pressure Sensor in the ILA® device Air Handler.

ILA® device pressure sensor (negative) - ILA® device Air Handler Airflow Sensor return line.

115 Vac from ALPS - power from the Arc Lamp Power Supply

FLOWSENS - output from Airflow Sensor (+24 VDC if ok)

Arc Lamp Pre-Filter Sensor (positive) - positive lead +24 VDC to the Arc Lamp Airflow Sensor.

Thermocouple (positive) - positive lead to the Arc Lamp Reflector thermocouple.

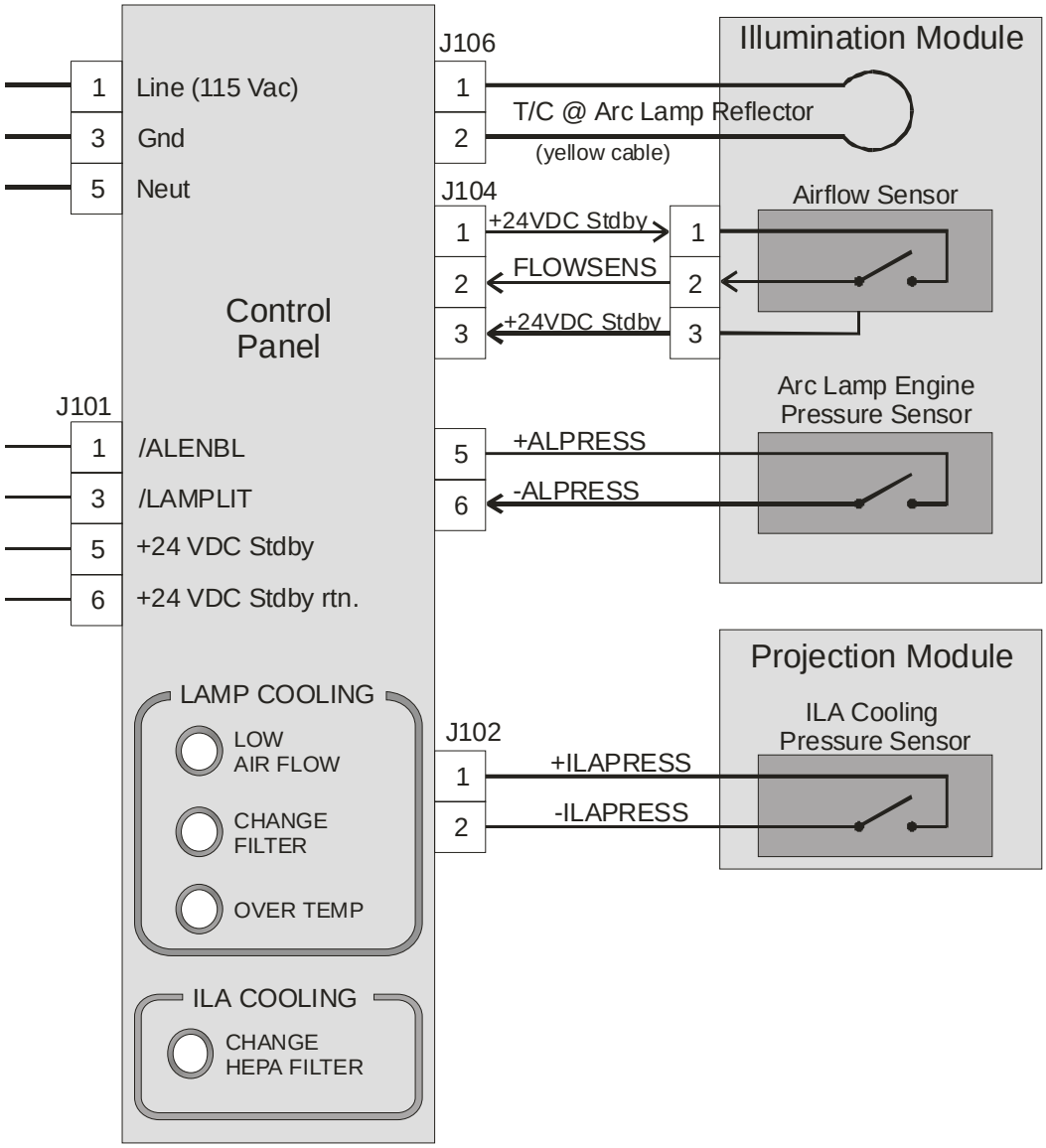


Figure 2-16 Control Panel I/O Diagram for Arc Lamp Module and Projection Module.

Control Panel - Outputs

/LAMPLIT - signal to System Controller PCB indicating the Arc Lamp is lit and operating normally

115 Vac to ALPS - to Contactor relay in the Arc Lamp Power Supply

+24 VDC Stdby - to Airflow Sensor

+24 VDC Stdby rtn - chkd gnd for Airflow Sensor

+24 VDC Stdby - to Distribution box (controls cooling fans and blowers)

+24 VDC Stdby rtn - to Distribution box

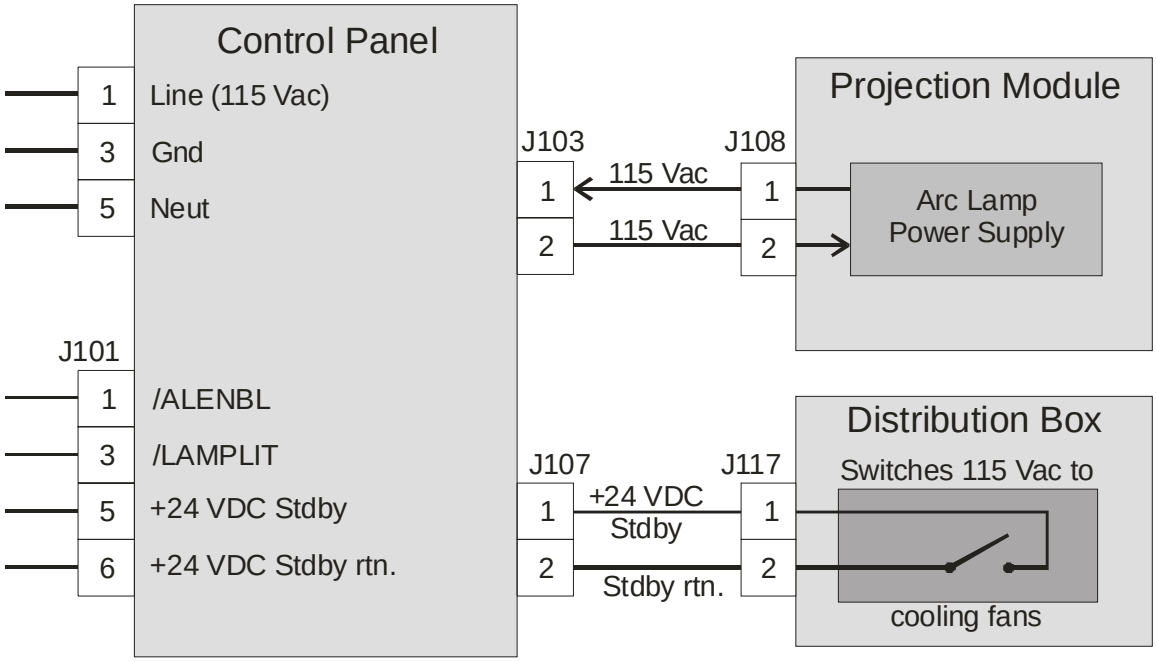


Figure 2-17 Control Panel I/O Diagram for Arc Lamp Module and Projection Module.

Control Panel - Operation

The Control Panel is a complex On/Off switch for the Arc Lamp Power Supply. Before the Control Panel switches the power to the Arc Lamp Power Supply, several parameters must be met. The temperature of the Arc Lamp Reflector must be less than 205° C. The large blowers that provide cooling to the Arc Lamp Engine and to the ILA® devices must be operating. Air Pressure Sensors monitor the condition of the air filter for the Arc Lamp Engine and the HEPA filter for the ILA®s.

Arc Lamp Reflector Temperature Sensor (Temperature Controller)

The Control Panel receives 115 Vac from the Control Panel AC Circuit Breaker in the Subassemblies AC Circuit Breaker Panel. If the Low Voltage Power Supply is not energized, nothing will happen. As soon as the LVPS is turned on, the Control Panel receives the /ALENBL signal from the System Controller PCB. The /ALENBL signal first passes through the Temperature Meter. The Temperature Meter is constantly monitoring the temperature of the Reflector on the Arc Lamp Engine. If the Arc Lamp Reflector temperature is below 205° C, the /ALENBL is allowed to the pass to the Arc Lamp Engine Air Pressure Sensor. If the Reflector is above 205° C. the Temperature Meter opens the /ALENBL circuit, turning the Arc Lamp off and illuminating the OVER TEMP warning light on the Control Panel front panel.

Air Pressure Sensors

Next, the /ALENBL passes through the Air Pressure Meter for the Arc Lamp. If the air pressure between the blower and the Arc Lamp air filter is below 0.350-inches H_2O of pressure the Air Pressure Meter passes the /ALENBL signal and it passes to the relay that turns on the Arc Lamp Power Supply. If the air pressure is above 0.350-inches H_2O, indicating a plugged air filter, the Air Pressure Meter opens the /ALENBL circuit. This shuts down the Arc Lamp Power Supply and illuminates the CHANGE FILTER warning light**. The air filter must be replace before the Control Panel will allow the Arc Lamp Power Supply to be turned on again.** The Air Pressure Meter is programmed as latching. After the air filter has been replaced, the operator must press the MENU button on the Filter Pressure Meter and then press RESET.

The Air Pressure Meter for the HEPA filter measures the air pressure between the large blower and HEPA filter in the ILA® devices Air Handler (located in the front of the Projection Module just below the ILA® devices). If the air pressure exceeds 1.400-inches H_2O, the CHANGE HEPA FILTER warning light on the Control Panel front panel illuminates. It does not turn off the Arc Lamp Power Supply when the air pressure reaches 1.400-inches of H_2O. The warning light informs the operator that the HEPA filter needs to be changed.

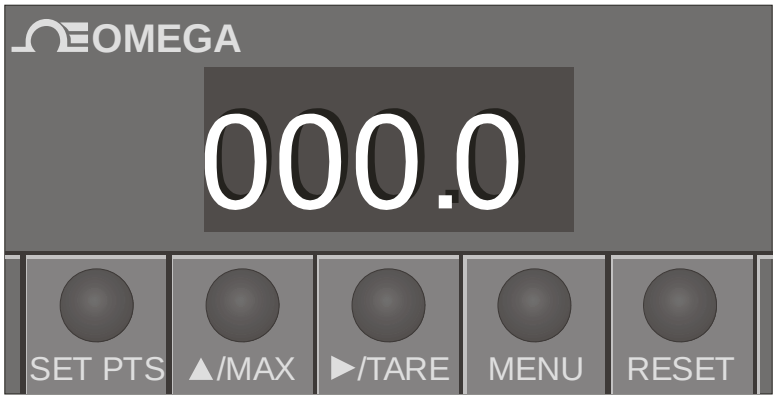


Figure 2-18 Air Pressure Meter for the Arc Lamp and ILA® device HEPA air filters.

Control Panel Readouts

The following table shows typical readouts for the ILA® device Filter Pressure and Airflow, and Arc Lamp Reflector temperature.

Table 2-3 Control Panel readouts

	Max.	Typical Range
Arc Lamp Reflector Temp (°C)	205	93 - 78
Arc Lamp Air Pressure (inches H_2O)	0.350	0.076 - 0.044
ILA® device Air Pressure (inches H_2O)	1.400	0.988 - 0.940

Airflow Sensor

The Control Panel also monitors airflow from the blower for the Arc Lamp Engine. The Airflow sensor receives the +24 VDC Stdby and sends back a +24 VDC FLOWSENS voltage if the blower is operating properly. If the blower is not working, the FLOWSENS will be 0 VDC. and the Arc Lamp Power Supply will not be allowed to energize. The LOW AIR FLOW light will illuminate, if the FLOWSENS voltage is low.

Light Sensor PCB

ILA-12K projectors installed in Europe, have a Light Sensor PCB. The Light Sensor PCB detects whether the Arc Lamp lights in a specific time AND remains lit. The Control Panel sends out +24 VDC (LIGHTSENS). If the Arc Lamp does not light within a specified time OR lights and then goes out, the LIGHTSENS line goes to 0 VDC and switches off the Arc Lamp Power Supply.

Hour Meter

The Hour Meter displays the hours for the Arc Lamp Bulb. It runs whenever the Arc Lamp Power Supply is energized. The Arc Lamp Bulb has a life expectancy of 500 hours. The bulb should never be operated more than 625 hour. The System Software requires operator acknowledgment during projector operation exceeding 500 hours of Lamp Bulb operation.

Control Panel - Service Adjustments

There are no service adjustments performed on the Control Panel.

Control Panel - Remove and Replace

The Control Panel is not generally considered a serviceable item, however it can be removed and replaced if it is determined to have a problem.

Tools Needed

10-mm Balldriver Hex-head wrench

3-mm Hex-head wrench

To remove the Control Panel:

1. Power off the projector by Tethered Remote or computer terminal, and allow the cooling fans to run until they shut off.
2. Turn the Main AC Circuit Breaker to the OFF position and unplug the AC Power Cord.
3. Remove the four mount screws with the 3-mm Hex-head wrench.
4. Disconnect the yellow Arc Lamp Reflector Thermocouple cable and the Sensors cable (J104) on the right side of the Projection Module. The Thermocouple cable just pulls out; remove the Sensors cable (J104) by turning the knurled ring counter clockwise and pulling out.

5. Remove the lower left-side rear access panels and open the small access panel on the lower right side using the 10-mm Balldriver Hex-head wrench.
6. Disconnect the J105 (AC Power), J101, J103, J137, J102, and J107 connectors. The cables and connections on the back of the Control Panel are labeled.
7. Pull the Control Panel out of the rear equipment rack.
8. Reverse the procedure to install the Control Panel.

Control Panel Programming

Temperature Controller

The following is a procedure to program the temperature procedure to monitor the Arc Lamp Reflector temperature. The Temperature Controller will shut down the Arc Lamp Power Supply or prevent the Arc Lamp Power Supply from turning on if the Reflector is too hot.

NOTE: The Ω symbol is used to represent the left button (circular arrow) on the Temperature Controller.

Menu 05

1. Press and hold the Ω button, until the lower LED alternates between "Ac.Cd" and "0X", where X is a number between 0 and 5.
2. Press the ∧ or ∨ buttons until the lower LEDs alternate between "Ac.Cd" and "05". The ∧ button increments and the ∨ decrements the number.
3. Press the Ω button until the display alternates between "SnSr" and something else.
4. Press the ∧ button until the lower LEDs alternate between "SnSr" and "c.A".
5. Press the Ω button until the display alternates between "OUt1" and something else.
6. Press the ∧ button until the lower LEDs alternate between "OUt1" and "Ht.0".
7. Press the Ω button until the display alternates between "Out2" and something else.
8. Press the ∧ button until the lower LEDs alternate between "Out2" and "ALr".
9. Press the Ω button until the display alternates between "CoL.t" and something else.
10. Press the ∧ button until the lower LEDs alternate between "CoL.t" and "nor".

11. Press the Ω button until the display alternates between “A1.H.L” and something else.
12. Press the ∧ button until the lower LEDs alternate between “A1.H.L” and “H1”.
13. Press the Ω button until the display alternates between “A1.P.d” and something else.
14. Press the ∧ button until the lower LEDs alternate between “A1.P.d” and “Pr”.
15. Press the Ω button until the display alternates between “A1.O.P” and something else.
16. Press the ∧ button until the lower LEDs alternate between “A1.O.P” and “LAt”.
17. Press the Ω button until the display alternates between “A2.H.L” and something else.
18. Press the ∧ button until the lower LEDs alternate between “A2.H.L” and “Lo”.
19. Press the Ω button until the display alternates between “A2.P.d” and something else.
20. Press the ∧ button until the lower LEDs alternate between “A2.P.d” and “Pr”.
21. Press the Ω button until the display alternates between “A2.O.P” and something else.
22. Press the ∧ button until the lower LEDs alternate between “A2.O.P” and “OFF”.
23. Press the Ω button until the display alternates between “Unlt” and something else.
24. Press the ∧ button until the lower LEDs alternate between “Unlt” and “F”.
25. Press ≡ (the button on the right) to exit.

Menu 04

26. Press the Ω button, the lower LED will alternate between “Ac.Cd” and “0X”, where X is a number between 0 and 5.
27. Press the ∧ or ∨ buttons until the lower LEDs alternate between “Ac.Cd” and “04”.
28. Press the Ω button until the display alternates between “Id.no” and a number.
29. Press the ∧ button until the lower LEDs alternate between “Id.no” and “01”.

30. Press ≡ to exit.

Menu 03

31. Press the Ω button, the lower LED will alternate between “Ac.Cd” and “0X”, where X is a number between 0 and 5.
32. Press the ∧ or ∨ buttons until the lower LEDs alternate between “Ac.Cd” and “03”.
33. Press the Ω button until the display alternates between “ALrl” and a number.
34. Press the ∧ or ∨ buttons until the lower LEDs alternate between “ALrl” and “400”.
35. Press the Ω button until the display alternates between “SP.tt” and a number.
36. Press the ∧ or ∨ buttons until the lower LEDs alternate between “SP.tt” and “OFF”.
37. Press the Ω button until the display alternates between “L.SP.L” and a number.
38. Press the ∧ or ∨ buttons until the lower LEDs alternate between “L.SP.L” and “00”.
39. Press the Ω button until the display alternates between “U.SP.L” and a number.
40. Press the ∧ or ∨ buttons until the lower LEDs alternate between “U.SP.L” and “2460”.
41. Press ≡ to exit.

Menu 02

42. Press the Ω button, the lower LED will alternate between “Ac.Cd” and “0X”, where X is a number between 0 and 5.
43. Press the ∧ or ∨ buttons until the lower LEDs alternate between “Ac.Cd” and “02”.
44. Press the Ω button until the display alternates between “H.HyS” and a number.
45. Press the ∧ or ∨ buttons until the lower LEDs alternate between “L.SCL” and “02”.
46. Press ≡ to exit.

Adjust the SET VALUE (SV)

47. Press the ∧ or ∨ buttons until the lower LEDs display “410”.

Menu 00

48. Press the Ω button, the lower LED will alternate between “” and “0X”, where X is a number between 0 and 5.
49. Press the ∧ or ∨ buttons until the lower LEDs alternate between “Ac.Cd” and “00”. This locks the keypad to prevent changes to the SV.
50. Press ≡ to exit.

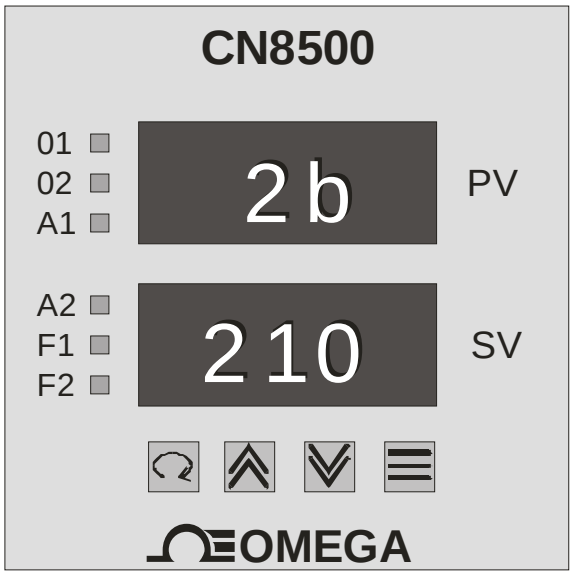


Figure 2-19 Temperature Controller Meter for Arc Lamp Reflector temperature on the Control Panel.

Air Pressure Meter (Arc Lamp Engine)

The following is a procedure to program the Air Pressure Meter to monitor the air pressure for the Arc Lamp Engine to determine the condition of the air filter. If the air filter is plugged, the Air Pressure Meter will shut down the Arc Lamp Power Supply or prevent the Arc Lamp Power Supply from turning on.

Table 2-4 Dip switch settings for Air Pressure Meter

1	2	3	4	5	6	7	8
C	O	C	C	O	O	O	O

C = closed, O = open

NOTE: The dip switched located at the rear of the meter should be set as follows:

1. Set the input type:
    a) Press MENU, the meter displays “INPUT”.
    b) Press >/TARE.
    c) Press ^/MAX until “0-20” is displayed.

d) Press MENU to store the setting. The meter will display “STRD” quickly followed by “DEC.P”. To exit, press MENU until “RST” is displayed. To continue the setup programming, continue.

2. Set the decimal point:
   a) Press MENU several times until the meter displays “DEC.P”.
   b) Press >/TARE.
   c) Press ^/MAX until “F.FFF” is displayed.
   d) Press MENU to store the setting. To exit, press MENU until “RST” is displayed. To continue the setup programming, continue.
3. Select the Reading scale and offset:
   a) Press MENU several times until the meter displays “RD.S.O”.
   b) Press >/TARE. The meter will display “IN 1”.
   c) Press >/TARE. The meter will display a number with the fourth (left most) digit flashing.
   d) Press ^/MAX until the number “2” is displayed.
   e) Press >/TARE, the third digit will flash.
   f) Press ^/MAX until the number “0” is displayed.
   g) Press >/TARE, the second digit will flash.
   h) Press ^/MAX until the number “0” is displayed.
   i) Press >/TARE, the first digit will flash.
   j) Press ^/MAX until the number “0” is displayed. The number “2000” should be displayed (ignore the decimal point).
   k) Press MENU to store the settings. The meter will display “RD1”.
   l) Press >/TARE. The meter will display a number with the fourth digit flashing.
   m) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show “0000”.
   n) Press MENU to store the settings. The meter will display “IN 2”.
   o) Press >/TARE. The meter will display a number with the fourth digit flashing.
   p) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show “9.999”.
   q) Press MENU to store the settings. The meter will display “RD 2”.
   r) Press >/TARE. The meter will display a number with the fourth digit flashing.
   s) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show “1.000” (“2.000” for HEPA).
   t) Press MENU to store the setting. To exit, press MENU until “RST” is displayed. To continue the setup programming, continue.

4. Set the Reading Configuration:
    a) Press MENU several times until the meter displays “RD.CF”.
    b) Press >/TARE and either “R.1=T” or “R.1=N” will be displayed.
    c) Press ^/MAX to toggle between settings and select “R.1=N”.
    d) Press >/TARE to store the settings. The meter will display “R.2=X”.
    e) Press ^/MAX until the meter displays “R.2=4”.
    f) Press MENU to store the settings.
    g) Press MENU several times until “RST” is displayed.
5. Configure Setpoints:
    a) Press MENU several times until the meter displays “S1.CF”.
    b) Press >/TARE and either “S.1=A” or “S.1=B” will be displayed.
    c) Press ^/MAX to toggle between settings and select “S.1=A”.
    d) Press >/TARE to store the settings. The meter will display “S.2=L” or “S.2=U”.
    e) Press ^/MAX to toggle between settings and select “S.2=L”.
    f) Press MENU to store the settings. The meter will display “S2.CF”.
    g) Press >/TARE and either “S.1=A” or “S.1=B” will be displayed.
    h) Press ^/MAX to toggle between settings and select “S.1=A”.
    i) Press >/TARE to store the settings. The meter will display “S.2=L” or “S.2=U”.
    j) Press ^/MAX to toggle between settings and select “S.2=L”.
    k) Press MENU to store the settings. The meter will display “S1.DB”.
    l) Press >/TARE and “X.XXX” will be displayed, where X is a number between 0 and 9.
    m) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show “0.003”.
    n) Press MENU to store the settings. The meter will display “S1.DB”.
    o) Press >/TARE and “X.XXX” will be displayed, where X is a number between 0 and 9.
    p) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show “0.003”.
    q) Press MENU to store the settings. The meter will display “LK.CF”.
    r) Press >/TARE and either “RS.=E” or “RS=D” will be displayed.
    s) Press ^/MAX to toggle between settings and select “RS.=E”.
    t) Press >/TARE to store the settings. The meter will display “SP.=E” or “SP.=D”.
    u) Press ^/MAX to toggle between settings and select “SP.=E”.

v) Press >/TARE to store the settings. The meter will display "L.3=X", where X is a number between 0 and 9.

w) Press ^/MAX until the meter displays "L.3=0".

x) Press >/TARE to store the settings.

y) Press MENU several times until "RST" is displayed.

z) Programming is complete.

6. Setting the Set Points for the Arc Lamp Air Filter:
   a) Press the SETPTS button. The meter will display "SP1, then X.XXX, where X is a number between 0 and 9.
   b) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show "0.800".
   c) Press >/TARE to store the settings.
   d) Press the SETPTS button. The meter will display "SP2, then X.XXX, where X is a number between 0 and 9.
   e) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show "0.600".
   f) Press >/TARE to store the settings.
7. Setting the Set Points for the HEPA:
   a) Press the SETPTS button. The meter will display "SP1, then X.XXX, where X is a number between 0 and 9.
   b) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show "1.400".
   c) Press >/TARE to store the settings.
   d) Press the SETPTS button. The meter will display "SP2, then X.XXX, where X is a number between 0 and 9.
   e) Using the ^/MAX button to change the numbers and the >/TARE button to select the digit, change the display to show "1.200".
   f) Press >/TARE to store the settings.