DC-2060 Power On Sequence

The following document describes the chain of events required for the DC2060 to successfully complete a controlled power-on sequence. The process can be broken down into several steps and encompasses the following components:

- Power Cord
- GFI Breaker
- Noise Filter
- Power Chassis Module
- AC Switch
- Main On Switch
- LVPS 1,2,3,4,5 and A
- Power Distribution Pwb 1 / 2 & 3
- IOT Pwb
- System Control Pwb
- UI Assy

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Input Power (Unswitched):

The input power for the system is comprised of a 30 amp / 4 wire power cord. The ground wire ties to the chassis frame and is referenced as the machine ground. Two hot lines (L1 and L2) are wired to the GFI breaker and provide power to all components within the machine. L1 and L2 are each 120VAC lines when measured with respect to the system ground line. Measuring across L1 and L2 yields a voltage of 208VAC. This 208VAC power is distributed throughout the machine.

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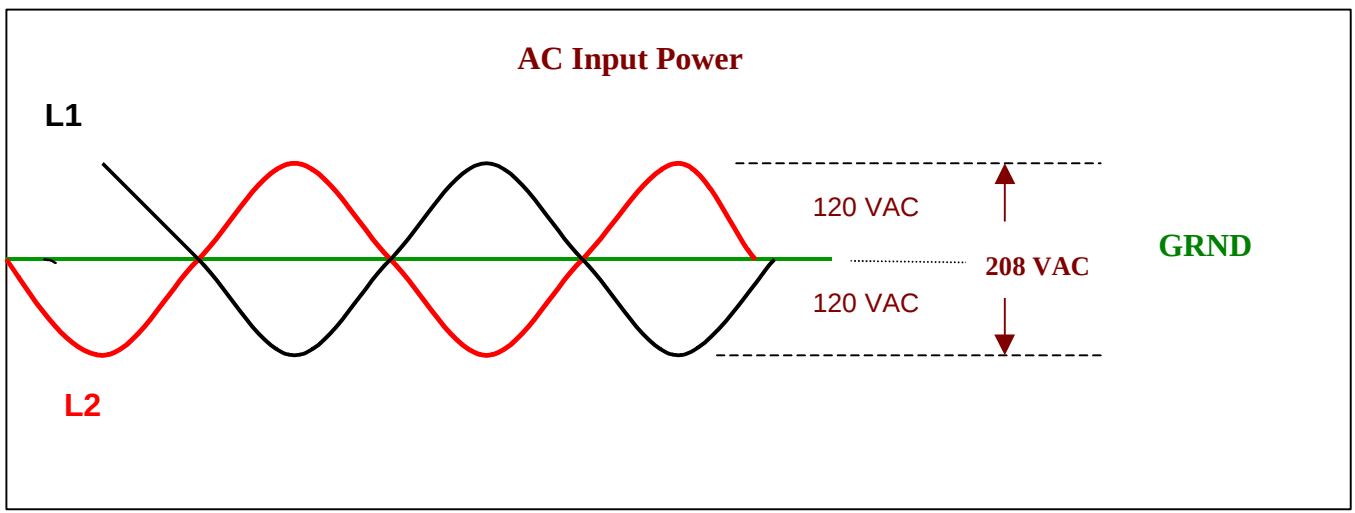
Input Power (Unswitched):

NOTE: The Neutral line is not used and is floating within the Ecology module. Any reference to neutral lines in the wiring diagrams are actually referring to the L2 line voltage.

Example:



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Input Power (Unswitched): cont.

Verification:
The correct input voltage can be measured on the top two wires of the GFI Breaker (Red and Black.). The correct voltage should be:

Black to System Frame	Red to System Frame	Black to Red
120VAC	120VAC	208VAC

GFI Breaker Power On (Sequence 1):

The first step in the power-on process is to switch the GFI Breaker on. It is assumed that all other switches are in the off position. After the breaker is turned on 208VAC is sent from the contacts on the GFI to the Noise filter. The filter is located inside the Power Control module behind the rear cover. The power is then distributed to the following areas:

- Input voltage is sent to LVPS 1. The +5VDc, +12Vdc and respective 0-VDC Returns are generated and sent to the Power Control Pwb inside the AC Power Module.
- Input is sent to the System Relay contacts located inside the AC Power Module.
- Input is sent to the IOT Power Relay contacts located inside the AC Power Module.

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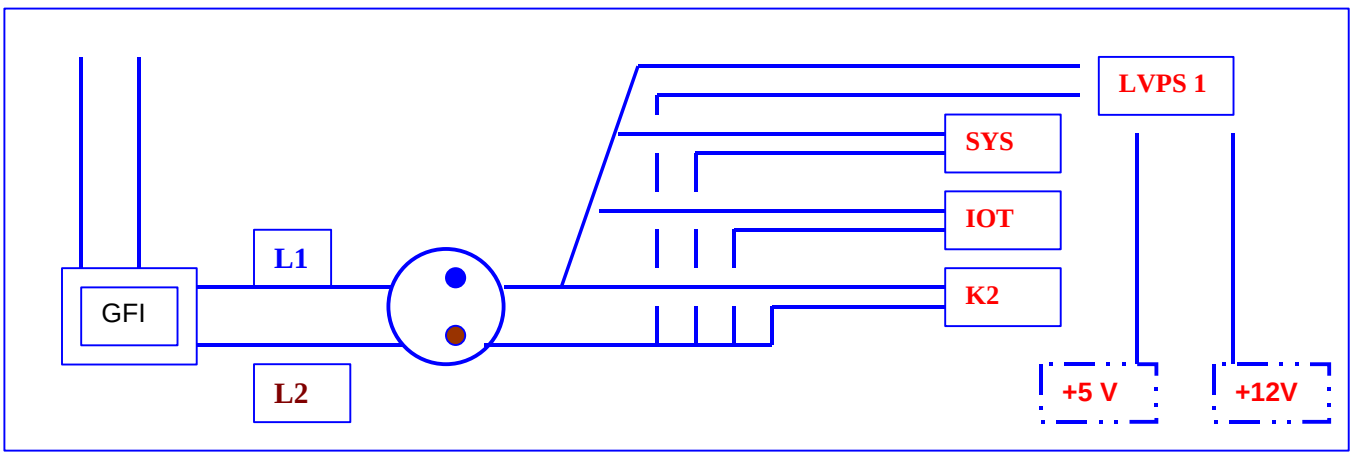
GFI Breaker Power On (Sequence 1): cont

- Input is sent to the K2 relay contacts located in the AC Power Module.



The AC voltages are supplied to one set of the contacts on the relays only; no voltage is distributed outside the AC Power Module. The +5 VDC and +12VDC voltages are sent to the Power Control Pwb. These DC voltages are distributed throughout the machine providing the first level of logic control used for powering up the system. The remaining components will only be switched on when system logic has determined adequate control exists.

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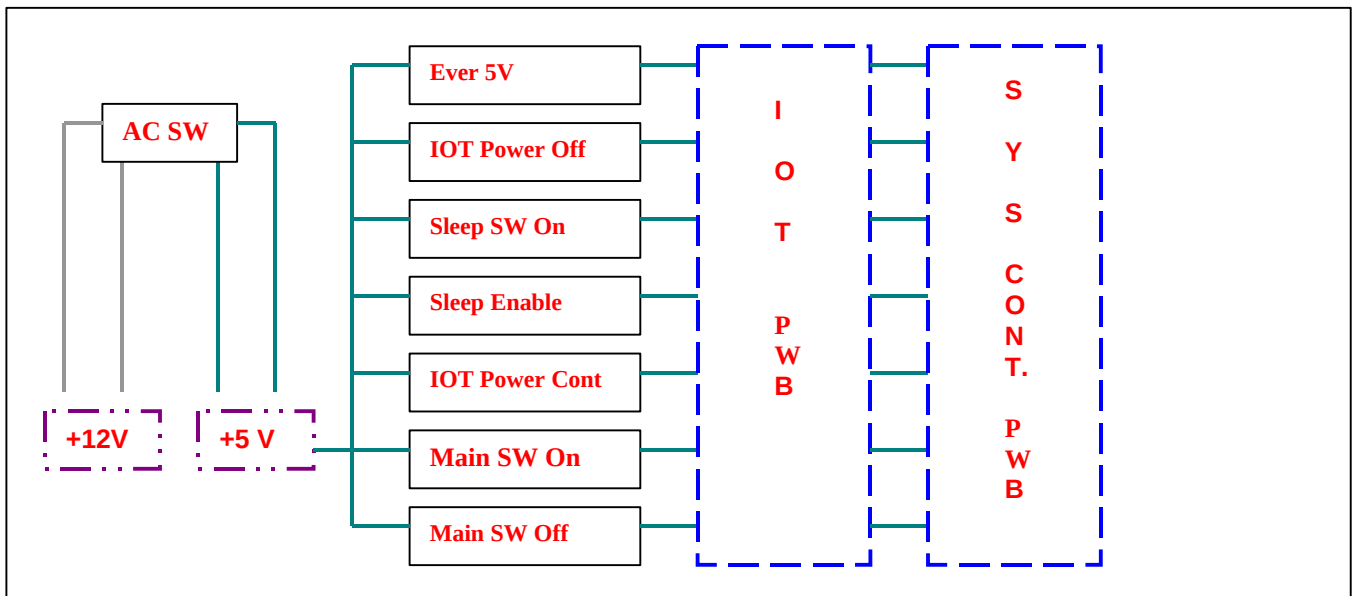
The low voltage distribution can be viewed as follows:

GFI Breaker Power On (Sequence 1): cont.



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GFI Breaker Power On (Sequence 1): cont.

Verification:

The following voltages will be present if the machine has successfully performed the initial GFI Power-on sequence.

Voltage	Component	P/J Connector
208 VAC	Noise Filter	Between 2 Lugs
208 VAC	Power Control Pwb	P/J 11 Between 1 & 3
+12 VDC	Power Control Pwb	P/J 418 Between 7 & 8
+5 VDC	Power Control Pwb	P/J 418 Between 5 & 6
+5 VDC	Power Control Pwb	P/J 415 Between 1 & Grnd.
+5 VDC	Power Control Pwb	P/J 415 Between 4 & Grnd.
+5 VDC	Power Control Pwb	P/J 415 Between 5 & Grnd.
+5 VDC	Power Control Pwb	P/J 415 Between 6 & Grnd.
+5 VDC	Power Control Pwb	P/J 415 Between 9 & Grnd.
+5 VDC	Power Control Pwb	P/J 415 Between 10 & Grnd.

At this point no audible noises are present to determine correct operation. The AC lines have been limited to the input side of the relay contacts and no relays have energized.

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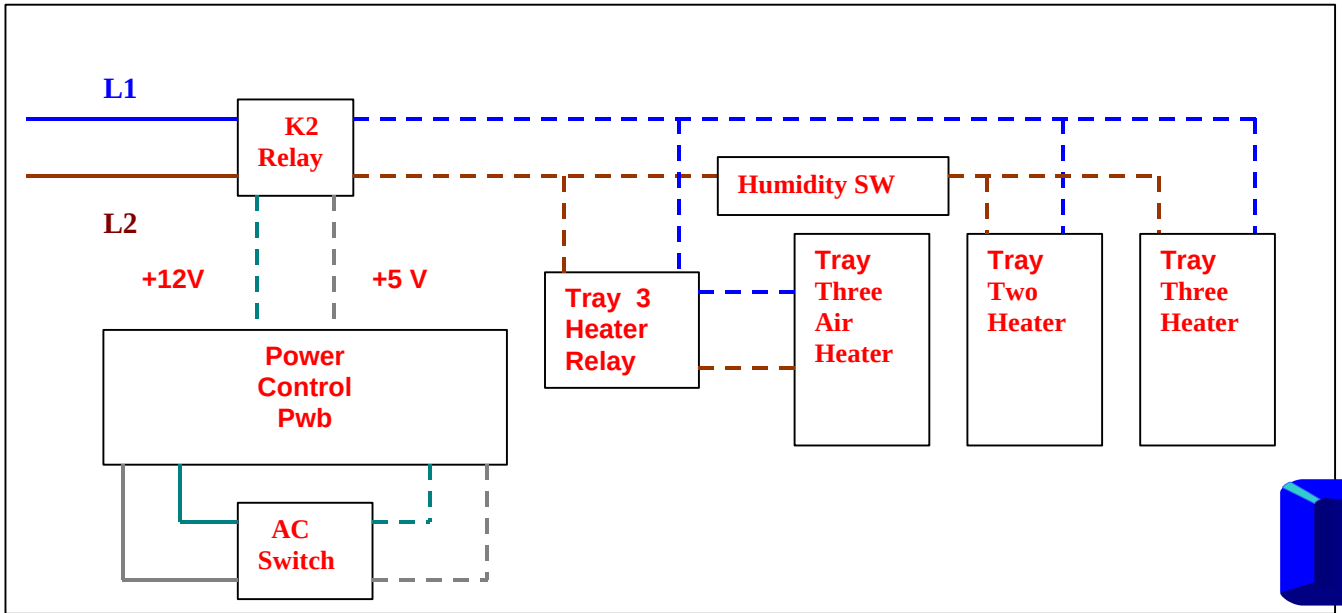
AC Switch On (Sequence 2):

The AC Switch has two primary functions. When selected to the on position it will send both +5 VDC and +12 VDC back to the Power Control Pwb. The +5VDC is used to enable one side of an “AND” gate for the AC relays in the Power Module. If this voltage is not present, the machine will not energize any relays and remain in the Sequence 1 mode. The switch acts as a basic “Kill” switch. The +12VDC signal is used in conjunction with the 5VDC signal to energize the K2 relay. This in return supplies AC power to all of the Tray Heaters.



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AC Switch On (Sequence 2): cont

Power to the Tray 3 Air Heater will only be distributed when the IOT Control Pwb energizes the Tray 3 Heater Relay. All other power will be present even if the printer has not been turned on. It is possible to hear the relay contacts of K2 energize and can be used to verify correct operation of the components.

Verification:

The following voltages will be present if the machine has successfully performed the AC Switch-on sequence.

Voltage	Component	P/J Connector
208VAC	Power Control Pwb	P/J 11 Between 5 & 7
+12VDC	Power Control Pwb	P/J 417 Between 4 & Grnd.
+5VDC	Power Control Pwb	P/J 417 Between 5 & Grnd.

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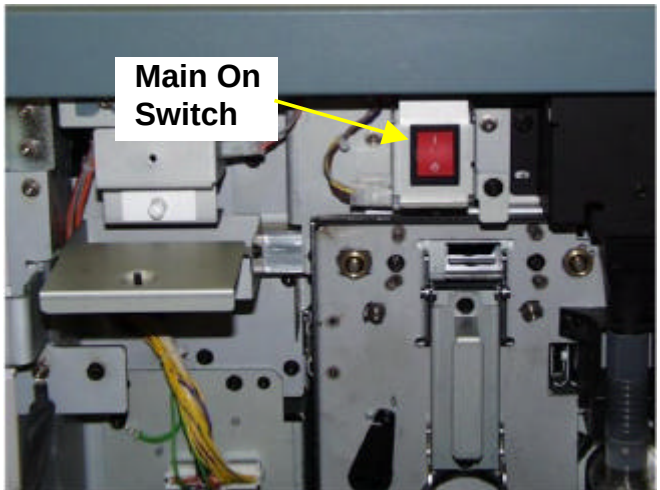
Main Switch On (Sequence 3):

The Main-On Switch is a momentary contact switch that has 0-Volt Return entering through the common contact. Depending on which direction the switch is pressed, it will ground either the **Main SW On** or **Main SW Off** signal from the Power Control Pwb. If the **Main SW Off** signal is grounded the System Power Relay, IOT Power Relay, and Fuser Relay will all be de-energized. This will result in the machine returning to the AC Switch On (Sequence 2) level.

If the Main-On Switch is pressed to turn on the printer it will ground the **Main SW On** signal and cause the machine to sequentially turn on the System Power Relay, IOT Power Relay and Fuser Relay. This will in return distribute AC power throughout the machine causing the Low Voltage Power supplies to turn on. All low voltages will then be generated and the machine will begin various initializations.



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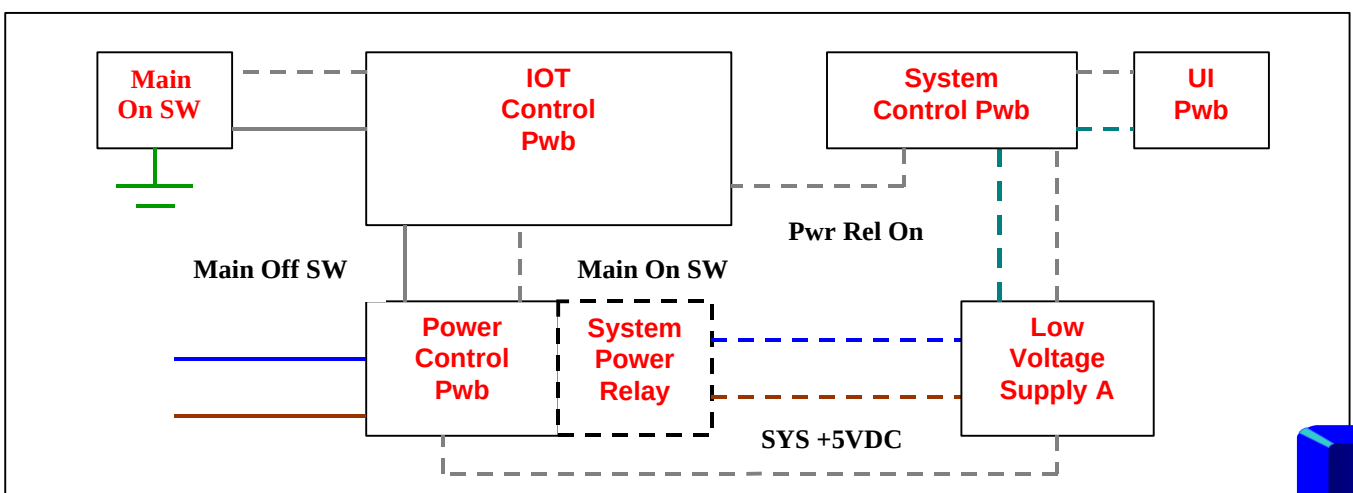
Phase –1 (System Power Relay On):

When the Main On switch common contact grounds the **Main SW On** signal the System Power Relay will energize immediately (+5 VDC is also required from the AC Switch On sequence). This will distribute AC power to Low Voltage Power Supply-A. As a result +5 VDC and +12 VDC are produced and sent to the Distribution-3 Pwb. Voltage is then sent to the Base Mother Pwb/ System Control Pwb and the UI Pwb. The UI Pwb will receive both +5 VDC and +12VDC voltages and begin the initialization process. The UI screen will then begin displaying its initial screens and messages. At the same time the System Control Pwb is initializing and generating two signals- **SYS+5VDC** and **PWR RLY ON.** These signals are sent to the Power Control Pwb and IOT Pwb respectively. The signals are used to trigger the next phase in this sequence.



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Phase –1 (System Power Relay On): cont

The System Power Relay is the first relay that can be heard after the Main Switch is pressed to the on position. It is followed by a second relay energizing on the Distribution-3 Pwb. The UI screen will also initialize and a visible image should to observed on the screen.

Verification:

The following voltages will be present if the machine has successfully performed the System Power On Relay sequence.

Voltage	Component	P/J Connector
208 VAC	LVPS A	P/J 5 Between 3 & 4
+5 VDC	LVPS A	P/J 29 Between 4 & 8
+12 VDC	LVPS A	P/J 30 Between 4 & 8

Phase –2 (IOT Power Relay On):

The System Control Pwb will generate the **PWR RLY ON** signal and distribute it to the Power Control Pwb via the IOT Pwb . This signal in conjunction with the +5 VDC generated from the AC Switch On sequence will energize the IOT Power Relay. AC power will then be distributed and provide input to LVPS 2,3,4 & 5.

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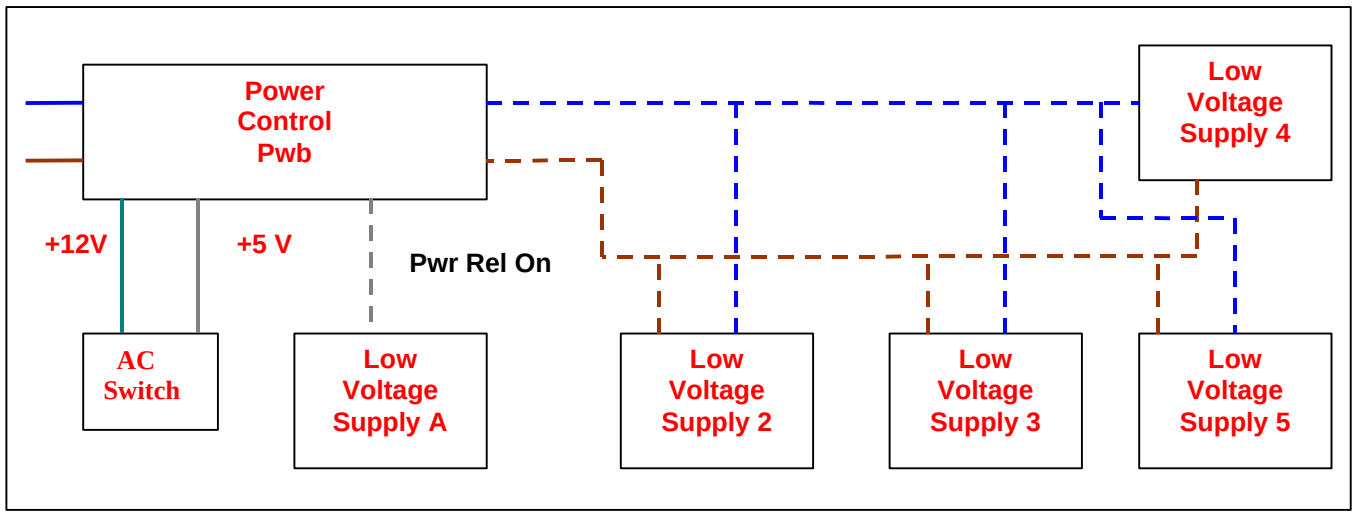
Phase –2 (IOT Power Relay On): cont



This sequence will result in the third set of relay contacts energizing. There will be approximately a four second delay between the relay on Distribution-3 Pwb and the Power Relay in the Power Module.

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Phase –2 (IOT Power Relay On): cont

Verification:
The following voltages will be present if the machine has successfully performed the System Power On Relay sequence.

Voltage	Component	P/J Connector
208 VAC	LVPS 2	P/J 1 between 3 & 4
208 VAC	LVPS 3	P/J 1 between 3 & 4
208 VAC	LVPS 4	P/J 1 between 3 & 4
208 VAC	LVPS 5	P/J 2 between 3 & 4

Unswitched DC Voltage Distribution (Sequence 4):

After the IOT Power Relay energizes AC power is supplied to LVPS 2,3,4, & 5. This input will cause each supply (except LVPS 5) to produce partial DC output voltages. The IOT Pwb will switch on the remainder of the voltages in a controlled (Switched) method. There are no output voltages from LVPS 5 during this sequence. Each power supply also has 2 built in protection circuits that will shut down all output voltages. If the Cooling Fans are not operating correctly or if an over-current condition exists the supplies will shut down outputs. The result will be AC input voltage present with no DC output voltage from the specific supply.

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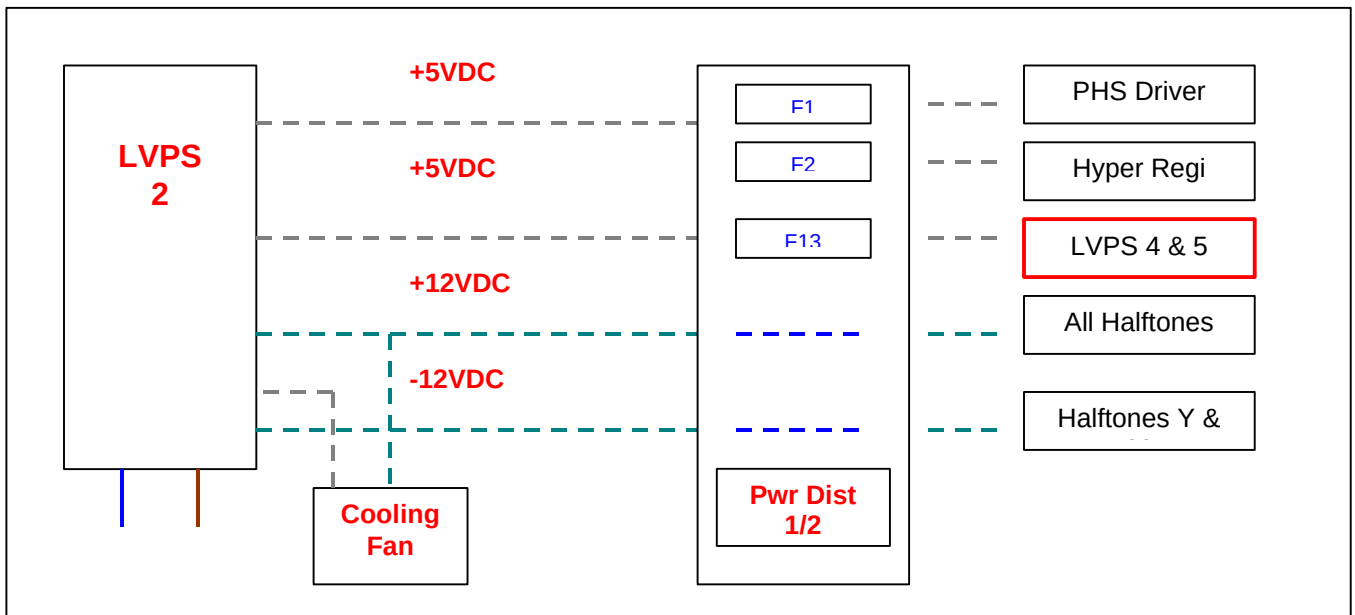
LVPS 2 Unswitched:



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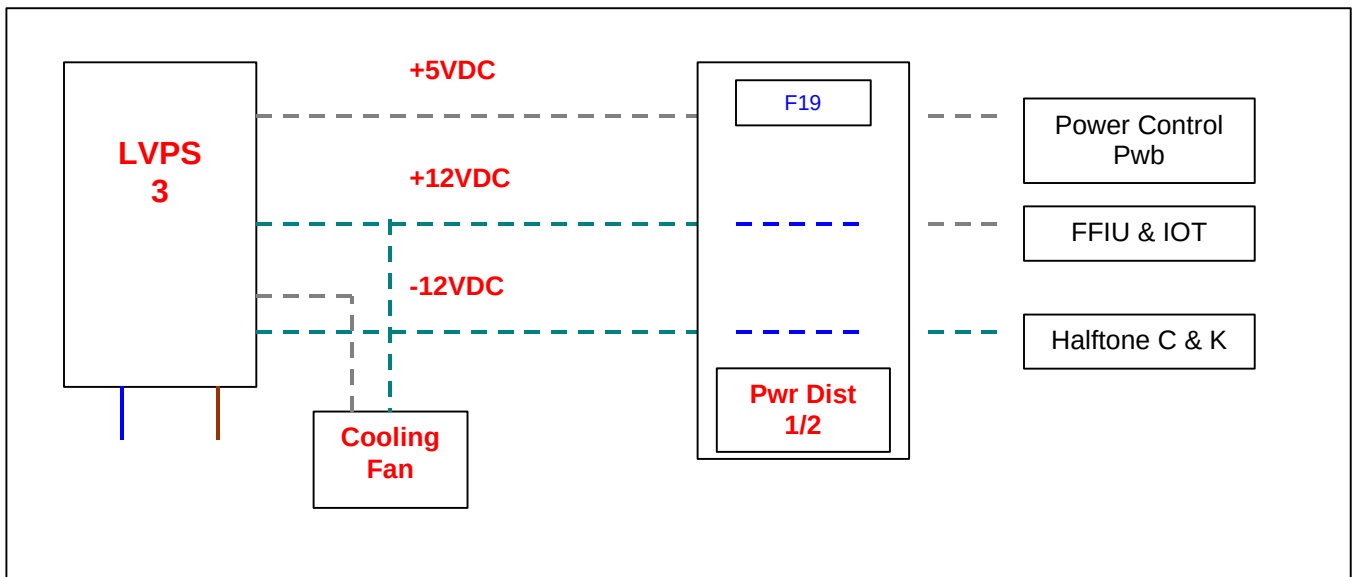
LVPS 3 Unswitched:



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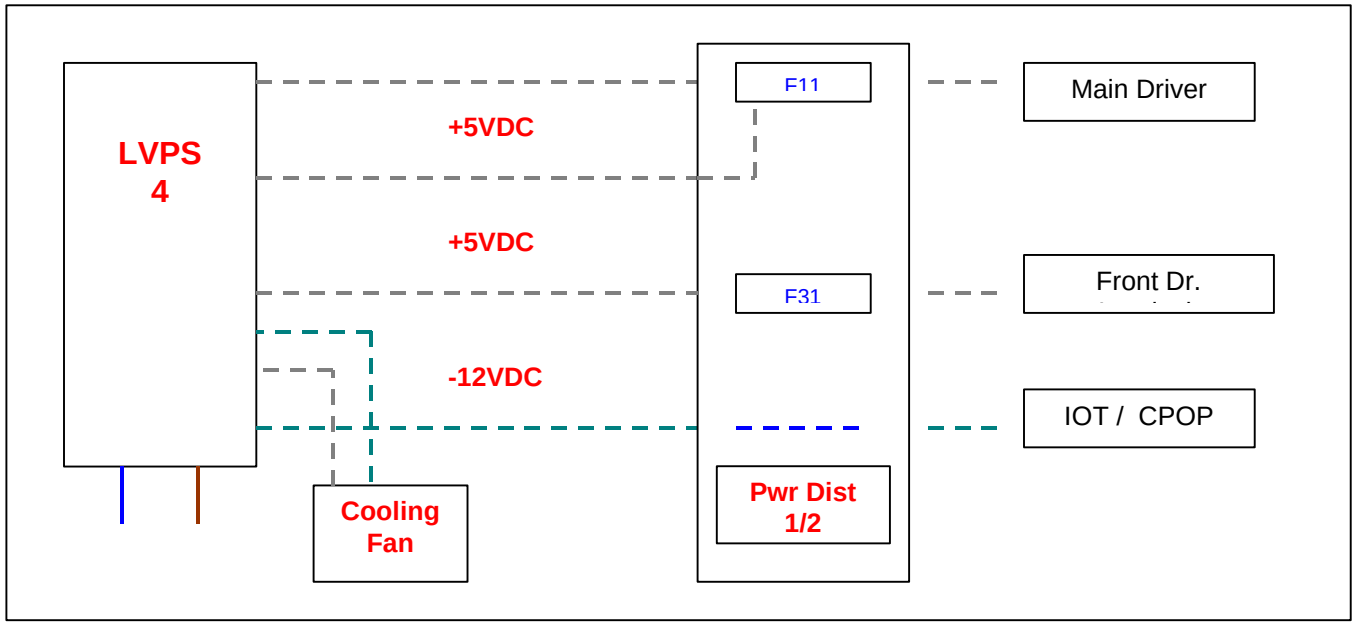
LVPS 4 Unswitched:



As a result of this sequence the fans underneath the Low Voltage Power supplies will be on. There will also be +5VDC, +12Vdc and –12 VDC LED's illuminated on the IOT Drive Pwb, Main Driver Pwb, HyperReg Pwb, and all of the Halftone Pwbs. The machine will not have performed any initialization routines at this time.

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LVPS 4 Unswitched: Cont

Verification:

The following voltages will be present if the machine has successfully performed the Unswitched DC Voltage Distribution sequence.

Voltage	Component	P/J Connector
+5 VDC	LVPS 2	P/J 21 Between 1 & 5
+5 VDC	LVPS 2	P/J 21 Between 3 & 5
+12 VDC	LVPS 2	P/J 22 Between 1 & 2
+12 VDC	LVPS 2	P/J 22 Between 3 & 4
+5 VDC	LVPS 3	P/J 21 Between 1 & 4
+12VDC	LVPS 3	P/J 22 Between 1 & 2
+12 VDC	LVPS 3	P/J 22 Between 3 & 4
+5 VDC	LVPS 4	P/J 21 Between 1 & 5
+5 VDC	LVPS 4	P/J 21 Between 2 & 6
+5 VDC	LVPS 4	P/J 21 Between 3 & 7
-12 VDC	LVPS 4	P/J 22 Between 4 & Grnd

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Switched DC Voltage Distribution (Sequence 5):

The remainder of the output voltages from the power supplies will be switched on in a controlled sequence. LVPS 2,3 and 4 will be enabled to generate +24 VDC and LVPS 5 will generate +3.2 VDC and +5VDC. The signals that are used to turn switch on the supplies are called the **SQ and SQ Return** signals. Each power supply has it's own unique signal denoted by the number of the supply (ie- LVPS 2 has an SQ2 and SQ2 Return signal). The supplies will switch in the following sequence.

- The Unswitched +5VDC output from LVPS 2 is routed to the Distribution 1 / 2 Pwb providing the **SQ4** and **SQ5** signals used to switch on LVPS 4 and LVPS 5.

- The LVPS 4 and LVPS 5 receive these signals and turn on the switched outputs. LVPS 4 will generate +24 VDC and LVPS 5 will generate + 5 VDC & + 3.2 VDC. These voltages are then distributed to the ROS Assembly's, Halftone Pwb's, and Paper Handling module.

- Simultaneously the IOT is generating a **+24V On** signal that is routed to the Distribution 1 / 2 Pwb providing the **SQ2** and **SQ3** signals used to switch on LVPS 2 and LVPS 3. These supplies then generate and distribute +24 VDC to the remainder of the IOT. The initial **+24V On** signal is temporarily forced on for approximately 4 seconds. After this time the IOT Control Pwb must successfully complete the initialization sequence in order to latch and hold the **+24V On** signal. This sequence includes communication links, sensor and motor inputs, and fan fail signals.

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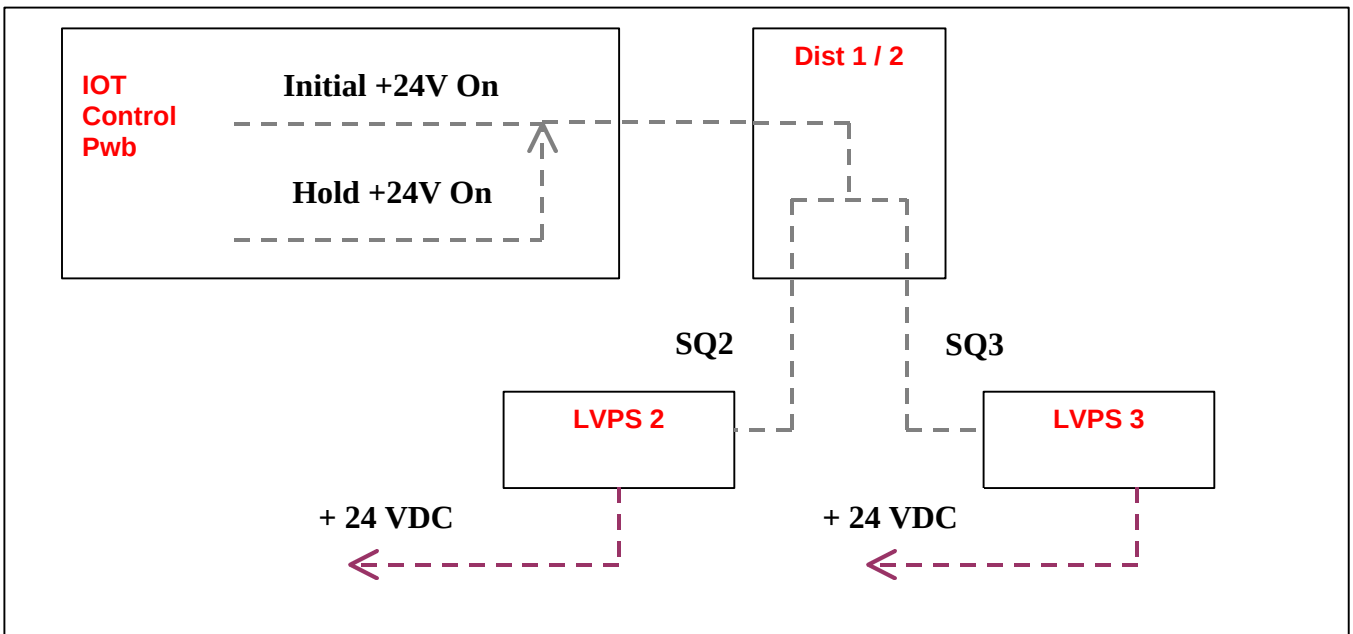
LVPS 2 & 3 Switched:



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