3. Power Supply

Power Requirements

SL 4000 Series consoles require either four or five power sources.

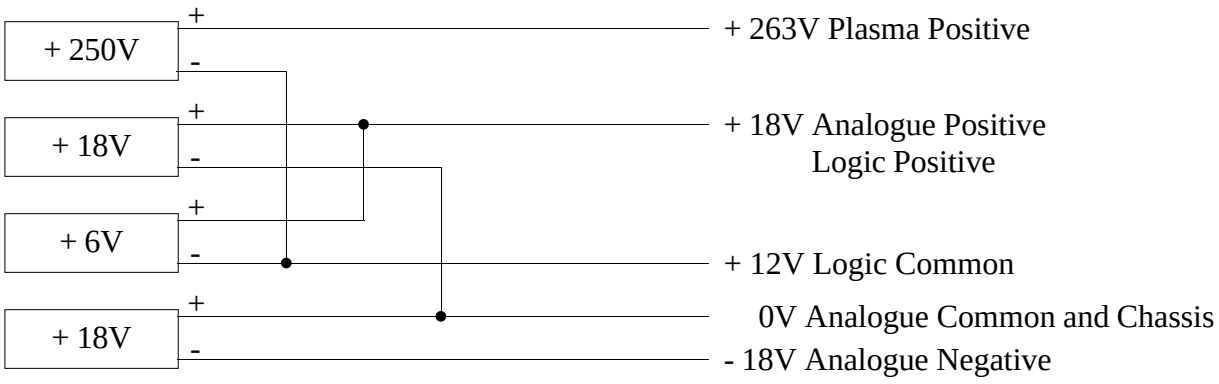
Analogue (Audio) integrated circuits and incandescent filament lamps are fed by +18.5V d.c.. A 40 input channel console will typically consume 20A on these rails.

Logic and LEDs are fed from a single 6.5V rail. The positive line of this supply is connected to the +18.5V supply rail. Thus the negative line of the 6.5V supply is at +12V (i.e. 18.5V *minus* 6.5V) with respect to the console 0V (signal ground and chassis). A 40 input channel console will consume between 2A and 6A depending upon the number of LEDs that are lit.

A 48V 0.5A supply is used to provide phantom power for microphone inputs.

Finally, consoles fitted with Plasma Bargraph metering use a 263V 0.5A d.c. supply for the displays. The negative line of this supply is connected to the negative of the 6.5V logic supply.

The interconnection of the various power sources is shown in symbolic form in the diagram below.



Power Supply Description

Power rail circuit breakers are fitted under the console (under the patch if it is integral, or elsewhere under the console if the patch is remote) which not only provide current overload protection for each section of the console but also allow sections of the console to be isolated to facilitate fault finding.

Consoles supplied with more than one power supply will also be supplied with changeover units. Should you require failure protection by backing up the supplies of the standard system, an additional supply should be specified. An audible warning and failure indication is given in the event of power supply failure.

The -20V regulator tracks the +20V regulator, the +18.5V and -18.5V supplies being connected in series at the 661G output. The supply is thermally protected by circuit circuit breakers operating at 100°C and mounted on the main transformer and on the +20V, -20V, and +7V regulator heatsinks.

Power is fed to the main transformer via a Current Trip, mounted on the front panel, and via Relay A which is energised via an auxiliary transformer. The secondary of this transformer feeds a rectifier, D1, on the 82E331 Trip / Driver Card. The output of D1 drives Relay A directly, and also drives Relay B via a delay circuit based around TR1 and associated components.

Four thermal circuit circuit breakers, mounted on the main transformer and on the +20V, -20V, and +7V regulator heatsinks respectively, and connected in series with the feed to Relay A, de-energise this relay under excess temperature conditions, thus disconnecting the power feed to the main transformer.

Inrush current to the main transformer is limited by a 1 Ohm 50W resistor which is shorted out by contacts 4 and 6 of Relay B after a time delay generated by circuitry on the 82E331 Trip / Driver Card.

All regulators are current limited, and all except the 250V supply have overvoltage devices fitted. The 250V supply has a separate front panel on / off switch in the rectifier circuit.

Input Voltage Selection

We strongly recommend that the power is not turned on until an SSL commissioning engineer has arrived at your installation; the engineer will ensure that your system has been correctly configured to the available voltage supply according to the table below.

Input Voltage	Main Transformer Links	Auxiliary Transformer Links	Connect Wire 52 to:
100 V	3 to 5, 4 to 8, 5 to 9	20 to 22, 21 to 23	Terminal 20
110 V	3 to 6, 4 to 8, 6 to 10	20 to 22, 21 to 23	Terminal 20
120 V	3 to 7, 4 to 8, 7 to 11	20 to 22, 21 to 23	Terminal 20
200 V	5 to 8, 3 to 9	21 to 22	Terminal 20
210 V	5 to 8, 3 to 10	21 to 22	Terminal 20
220 V	6 to 8, 3 to 10	21 to 22	Terminal 20
230 V	7 to 8, 3 to 10	21 to 22	Terminal 19
240 V	7 to 8, 3 to 111	21 to 22	Terminal 19

Output Specification

The table below shows the output specifications of the different power supply rails.

	7 Volt Supply	48 Volt Supply	250 Volt Supply	+20 Volt Supply	-20 Volt Supply
Off Load VCres	15V ±1V	77V ±2V	375V ±5V	32V ±0.5V	32V ±0.5V
On Load (Imax) VCres	12V ±1V	65 V ±2V	310V ±5V	28V ±0.5V	28V ±0.5V
Ripple on O/P at Imax	< 10mV	< 10mV	< 50mV	< 10mV	< 10mV
Voltage Range Normally Set	5 - 10 6.5V	44 - 50 48V	215 - 265 250V	18 - 22 18.5V	18 - 22 18.5V
Max. Current (Set)	7A	0.5A	0.55A	25A	25A
Over Voltage Threshold (Set)	12V (Fixed)	52V	-	22.5V	-22.5V
Max. Short Cct. Current (Set)	2A	0.015A	0.015A	5A	5A

These levels are factory set and should NOT be adjusted.

Console Power Supply Requirements

	No. of PSUs	No. of Changeover Units		No. of PSUs	No. of Changeover Units	
Frame Size	**VU Meters**	**2-Way**	**3-Way**	**Bargraphs**	**2-Way**	**3-Way**
4032	1	0	0	1	0	0
4040	1	0	0	1	0	0
4048	2	1	0	2	1	0
4056	2	1	0	2	1	0
4064	2	1	0	2	1	0
4072	2	1	0	3	0	1
4080	3	0	1	3	0	1

4. Installation

System Grounding

SSL products are designed to operate under a variety of electrical conditions. In common with any large system, correct installation is essential for best performance. Noise is an important parameter in professional audio systems; the following recommendations are intended to maximise the performance of your system.

Noise is introduced by differences in ground potential between different pieces of equipment. The noise is induced in one of two ways:

i) A difference in ground potential will introduce a common mode signal on any connection between two pieces of equipment.

Provided the input side of the system has balanced or differential inputs then the amount of noise induced will be reduced by the CMRR of the input, so in a well designed professional system the noise will be at relatively low levels, but may still be significant if there is a large difference in ground potential.

ii) If the cable screen is connected at both ends then current will flow down the screen. This will induce noise into the signal cable, which may have a significant non common mode component.

System Grounding Rules

There are two basic system grounding rules, which may be summarised as follows:-

Rule 1: Minimise variations in ground potential between different parts of the system.

Rule 2: Each part of the system should have only one path to ground, and that path should be through the mains ground not the signal screen.

Rule 1 can be achieved in a number of ways. The larger the installation, the more care needs to be taken. One possible solution is described below:

Provide a central technical ground point of the lowest practical impedance. This should be separate from the ground used for heavy plant (air conditioners etc.). Ideally every piece of equipment would have a separate connection to the main ground point, however this is unlikely to be practicable. A more realistic option is to connect the main technical earth to each room in the facility, using the thickest practical cable, and create a central earth point for each room. Each piece of equipment in the room should be connected to this star point.

Rule 2 particularly affects equipment in which the power 0V can be easily separated from chassis (and hence mains ground); where possible, this should be done; the power 0V should then be connected directly to the local technical ground. This normally only applies to large, permanent or semi-permanent items. All SSL consoles have this facility; a separate ground should be connected to the console.

All electrical outlets that are to be used for other items of studio equipment should have their third (earth) pin connected to the central earth point.

Under no circumstances should the safety earth be disconnected from the equipment - it is dangerous and, in most countries, illegal.

Equipment Connection

Creation of earth loops is normally avoided by ensuring that cable screens are connected at one end only, thus allowing them to act as signal screens without creating loops. Best practice is to disconnect the screen at the input end of the cable, though if cable runs are relatively short (less than 10-15 metres) disconnecting the screen at the output is unlikely to cause problems. SSL's recommendations for equipment connection are as follows:

Balanced Output to Balanced Input:	**Output**		**Input**
	Positive	to	Positive
	Negative	to	Negative
	Screen	to	No connection

With unbalanced equipment, if one end of the connection is balanced and floating then connection can be made easily and without creating a ground loop:

Balanced Output to Unbalanced Input:	**Output**		**Input**
	Positive	to	Positive
	Negative	to	Screen
	Screen	to	No connection

Unbalanced Output to Balanced Input:	**Output**		**Input**
	Positive	to	Positive
	Screen	to	Negative
	No connection	to	Screen

Note that all SSL consoles are wired with all screens connected to 0V on installation connectors; the installation may or may not make use of these connections.