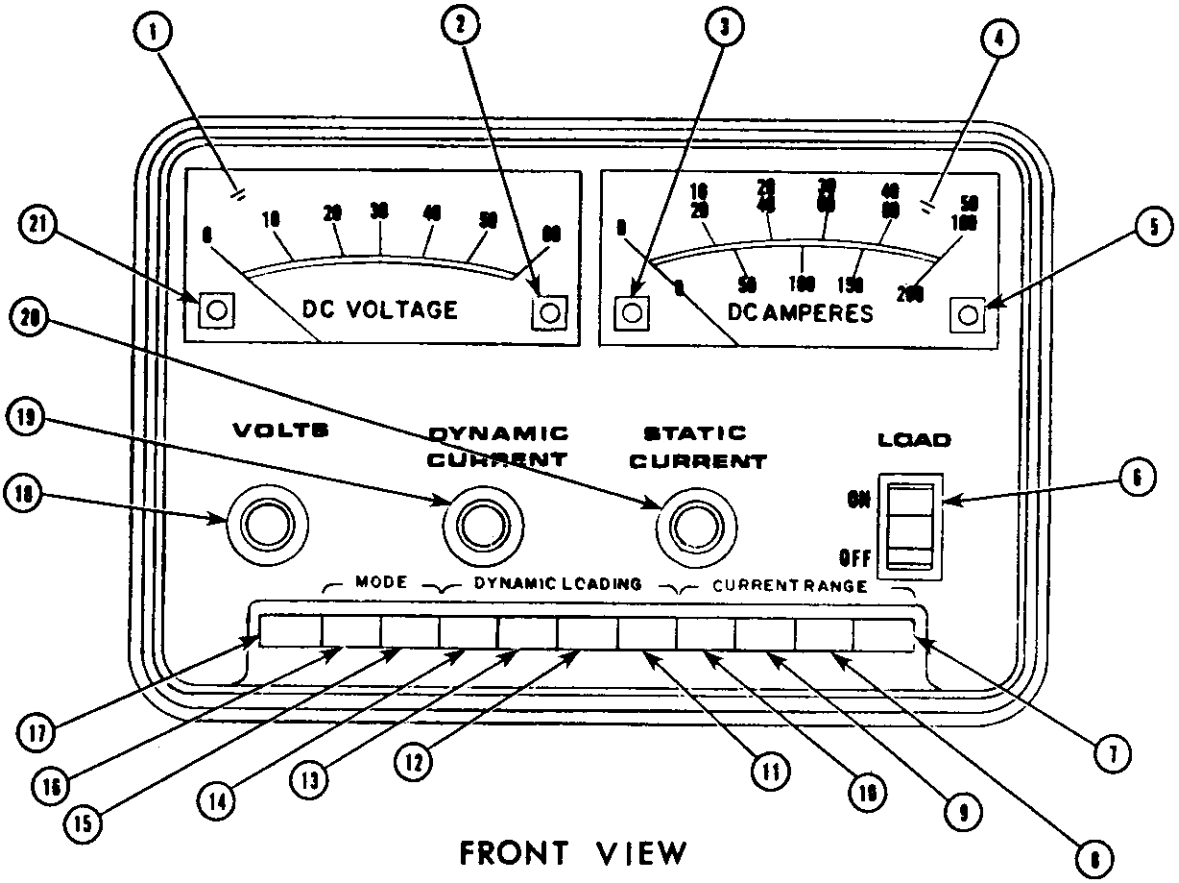
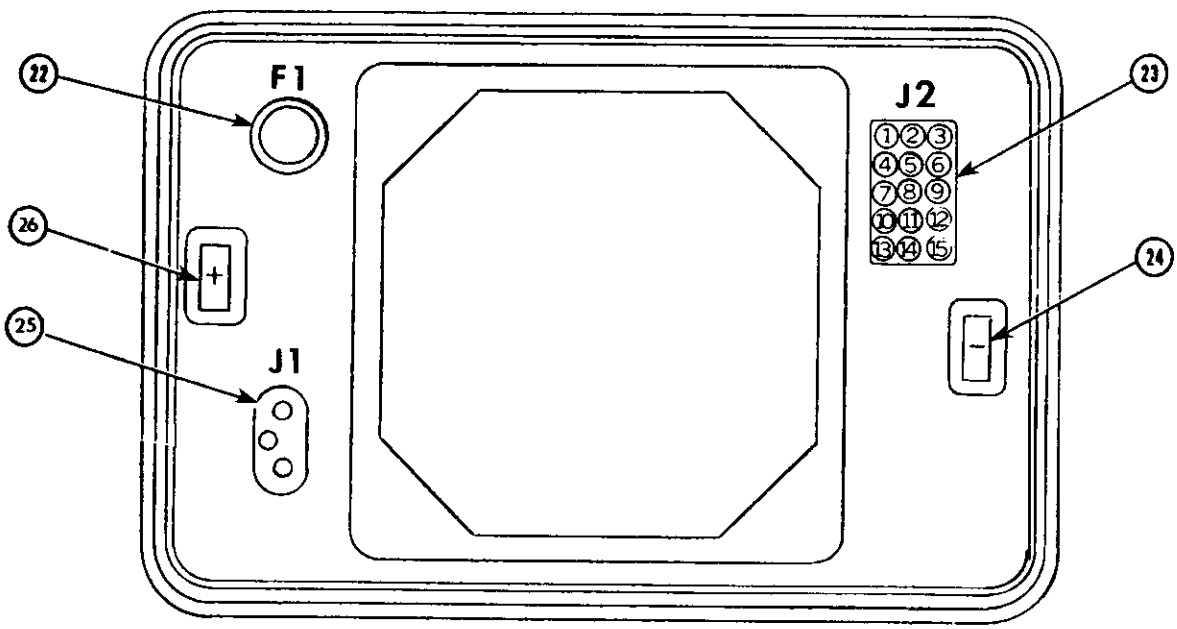
FUNCTIONAL CONTROLS

ITEM NO.	DESCRIPTION	FUNCTION
1	VOLTMETER	INDICATES VOLTAGE ACROSS INPUT TERMINALS
2	SATURATION INDICATOR LAMP	RED LED LAMP LIGHTS WHEN LOAD SATURATES DUE TO INSUFFICIENT VOLTAGE OR CURRENT FROM TEST UNIT
3	E. I. INDICATOR LAMP	RED LED LAMP LIGHTS WHEN VOLTAGE OR POWER EXCEEDS THE MAXIMUM RATING OF THE INSTRUMENT
4	AMMETER	INDICATES LOAD CURRENT ON FOUR RANGES, DETERMINED BY RANGE SWITCHES
5	OVERTEMPERATURE INDICATOR	RED LED LAMP LIGHTS WHEN INTERNAL HEAT EXCEEDS SAFE OPERATING TEMPERATURE
6	LOAD SWITCH	TURNS LOAD CURRENT ON WHEN IN THE UP POSITION
7	200 AMP RANGE SWITCH	SETS THE INSTRUMENT ON THE 0 TO 200 SCALE ON THE AMMETER
8	100 AMP RANGE SWITCH	SETS THE INSTRUMENT ON THE 0 TO 100 SCALE ON THE AMMETER
9	50 AMP RANGE SWITCH	SETS THE INSTRUMENT ON THE 0 TO 50 SCALE ON THE AMMETER
10	10 AMP RANGE SWITCH	SETS THE INSTRUMENT ON THE 0 TO 10 SCALE ON THE AMMETER
11	DYNAMIC LOADING 1KHz SWITCH	SWITCHES LOAD CURRENT BETWEEN TWO CURRENT LEVELS AT A RATE 1000 Hz PER SECOND (16 TIMES LINE FREQUENCY)
12	DYNAMIC LOADING 100/120 SWITCH	SWITCHES LOAD CURRENT BETWEEN TWO CURRENT LEVELS AT A RATE OF 100/120 Hz PER SECOND (2 TIMES LINE FREQUENCY)
13	DYNAMIC LOADING DC SWITCH	ALLOWS LOWER CURRENT LEVEL TO BE SET WHILE MONITORING CURRENT ON AMMETER
14	DYNAMIC LOADING OFF SWITCH	RESTORES INSTRUMENT TO NORMAL OPERATION
15	R MODE SWITCH	PLACES THE INSTRUMENT IN CONSTANT RESISTANCE MODE
16	I MODE SWITCH	PLACES THE INSTRUMENT IN CONSTANT CURRENT MODE
17	POWER SWITCH	PRESS-ON PRESS-OFF SWITCH CONTROLS INPUT POWER TO THE INSTRUMENT
18	INPUT VOLTAGE CONTROL KNOB	ADJUSTMENT FOR THE RATED VOLTAGE OF THE POWER SUPPLY UNDER TEST WHEN OPERATING MODE IS CONSTANT RESISTANCE
19	DYNAMIC CURRENT CONTROL KNOB	SETS THE LOWER OF THE TWO CURRENT LEVELS WHEN DYNAMIC LOADING FUNCTION IS OPERATING. AS CONTROL IS ROTATED CLOCKWISE LOAD CURRENT INCREASES. CONTROL IS INACTIVATED WHEN DYNAMIC LOADING OFF SWITCH IS DEPRESSED
20	STATIC CURRENT CONTROL KNOB	SETS THE LOAD CURRENT ROTATE CLOCKWISE TO INCREASE
21	AC POWER INDICATOR LAMP	GREEN LED LAMP LIGHTS WHEN AC POWER IS ON
22	LINE FUSE	FUSE HOLDER FOR 1/2 AMP FUSE FOR 115 VOLT OR 1/4 AMP FUSE FOR 230 VOLT CURRENT
23	INPUT-OUTPUT CONNECTOR	USED FOR SPECIAL APPLICATIONS SUCH AS EXTERNAL PROGRAMMING AND REMOTE CONTROL OPERATIONS
24	NEGATIVE INPUT TERMINAL	BUSBAR CONNECTOR FOR NEGATIVE DC SOURCE
25	AC CORD CONNECTOR	FOR AC INPUT POWER CORD
26	POSITIVE INPUT TERMINAL	BUSBAR CONNECTOR FOR POSITIVE DC SOURCE



FRONT VIEW



REAR VIEW

FUNCTIONAL CONTROLS

FIGURE 2

SPECIFICATIONS

POWER REQUIREMENTS

EL750B	105 TO 125V
EL750B-A	210 TO 250V
EL750B-E	198 TO 242V
EL750B-K	216 TO 264V

47 TO 63Hz, 1Ø, 20W

MAXIMUM LOADING POWER

750W (See Safe Operating Curve)

MINIMUM LOAD VOLTAGE

1.8VDC

MAXIMUM LOAD CURRENT

150A

MAXIMUM LOAD VOLTAGE

55VDC

OPERATING MODE

Constant Current or Constant Resistance.

CURRENT RIPPLE

Less Than 0.1A P-P

DYNAMIC LOADING

ALLOWS SWITCHING BETWEEN TWO CURRENT LEVELS AT A SWITCH SELECTED RATE OF ≃ 1 KHZ OR TWO TIMES INPUT LINE FREQUENCY. THE TWO CURRENT LEVELS ARE SET BY FRONT PANEL CONTROLS.

DYNAMIC LOAD RESPONSE TIME

1 MICROSECOND PER AMP OR 50 MICROSECONDS, WHICHEVER IS GREATER.

REMOTE PROGRAMMING (CONSTANT CURRENT)

0 - 10V IS EQUAL TO 0 - 150A. ACCURACY IS ± 1%. PROGRAM VOLTAGE INPUT IMPEDANCE APPROXIMATELY 100K.

METER RANGES

VOLTMETER 0 - 60 VDC
AMMETER 0 - 10 - 50 - 100 - 200A

METER ACCURACY

2% FULL SCALE

PROTECTION CIRCUITS

ELECTRONIC CIRCUIT LIMITS POWER DISSIPATION TO 750W. LOAD SHUTS DOWN IN THE EVENT OF AN OVERVOLTAGE. THERMAL SENSORS SHUT OFF LOAD IN THE EVENT OF AN OVERTEMPERATURE CONDITION. UNIT IS PROTECTED AGAINST APPLICATION OF REVERSED POLARITY VOLTAGES.

CURRENT SIGNAL OUTPUT

VOLTAGE PROPORTIONAL TO CURRENT IS PROVIDED. 1 MILLIVOLT PER AMP, ± 1%.

OPERATING TEMPERATURE RANGE

0 - 40°C.

COOLING

FORCED AIR COOLING INTEGRAL IN DESIGN.

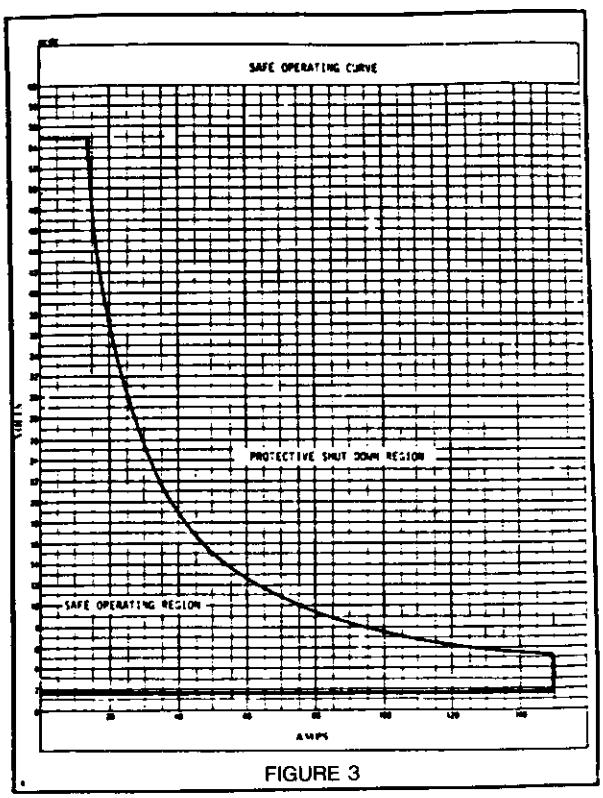


FIGURE 3

OPERATING INSTRUCTIONS

SEE FIG. (2) FUNCTIONAL CONTROLS

LOAD CONNECTION

The output of the DC power supply should be connected directly to the bus bars of the EL750B. Use short cables of adequate size to handle the rated load current of the power supply.

NOTE: No connections are required at J2 for normal operation.

CAUTION

OBSERVE POLARITY OF BUS BARS WHEN CONNECTING CABLES.

CONSTANT CURRENT

1. Turn the AC power switch on.
2. Set the mode switch to constant current, load switch off, current controls fully counter-clockwise, dynamic load switch off, and range switch to the desired current range.
3. Turn on power supply under test. At this point the EL750B is at no load.
4. Turn load switch on and adjust static current control clockwise until desired current level is obtained.
5. When the load current exceeds the maximum current capability of the power supply, the instrument will saturate. The indicator lamp marked SAT will indicate this condition. To reset circuit to normal operation turn current control counter-clockwise.

CONSTANT RESISTANCE

1. Turn the AC power switch on.
2. Set the mode switch to constant resistance, load switch off. Current controls fully counter-clockwise, dynamic load switch off, and range switch to the desired current range.
3. Set the volt selector knob to the voltage rating of the power supply under test.
4. Turn on power supply. At this point the EL750B is at no load.
5. Turn load switch on and adjust static current control clockwise until desired current is obtained.

DYNAMIC LOADING

The dynamic load section switches the load current from one level to another at a repetition rate of 2 times AC line frequency or ≃ 1 KHz and a duty cycle of 50%.

1. Set the upper current level as noted in constant current or constant resistance operating procedures.
2. Set dynamic load current control fully counter-clockwise and dynamic loading switch to DC.
3. Adjust dynamic load current control clockwise until desired lower current level is obtained.
4. After upper and lower current levels have been set, switch dynamic loading switches to either of the two frequencies provided.
5. At this point the current meter should indicate the average of the two current levels.
6. The current waveform may be monitored by connecting a scope to pins 1 and 2 of connector J2.

LOAD SWITCH

To prevent possibility of short circuit current "lockout", the EL750B load switch must be in the OFF position when connecting or disconnecting the power supply under test.

DYNAMIC LOADING NOTES

Dynamic loading in resistance mode.

In the resistance mode the load current change is modified by the voltage transient of the power supply and voltage drop across load cable.

Dynamic loading in current mode.

In the current mode the load current change is not affected by the power supply voltage transient unless the voltage drops below the minimum operating voltage of the EL750B. In this condition the load transistors will saturate causing distortion of the dynamic current waveform.

LOAD CABLE INFLUENCE WITH DYNAMIC LOADING

When dynamic loading a power supply with the EL750B, the type and length of interconnect system becomes important. The inductance of the cables or bus bars causes a negative voltage transient at the input terminals of the EL750B. If the input voltage, during the transient, drops below 1.8 volts, the load will saturate causing severe distortion of the current waveform. Load instability or oscillation may also be evident. The maximum interconnect system inductance may be approximated by using the following equation:

$$L=(Vin - 1.8) \times 10^{-6}$$

Where: L is in microhenries

Vin is the power supply voltage.

The following factors should be considered when selecting an interconnect system:

1. Keep interconnect system short. A five foot length of #2 AWG cable has an inductance of 2μH. A two foot length has 0.7μH.
2. Run interconnect cables parallel in close proximity for lower inductance. For example: Two #2 AWG cables spaced 1/8 inch apart have a total inductance of 0.68μH. Separated by more than 12 inches results in 4μH.
3. Use cables or bus bars with large surface areas to reduce "skin effect".

When operating the EL750B at or near the minimum operating voltage (1.8V), the interconnect system inductance effect becomes severe. Special effort must be made to lower the inductance.

Flat copper strips, separated by 10 mil insulation will provide the lowest inductance. If the inductance cannot be reduced enough, a capacitor may be connected across the input terminals of the EL750B. The capacitance value is not as important as the ESR. ESR should be less than 0.1 ohm at the switching frequency.

EXTERNAL PROGRAMMING

Constant Current Mode.

The EL750B can be programmed for constant current externally by applying a 0 to 10 volt signal to J2 pin 8 (+) and pin 7 (−). Set the controls as follows:

1. AC power switch on.
2. Set the load switch off, dynamic load switch off, and meter range switch to desired current range.
3. The setting of the mode switch and voltage and current controls is irrelevant because they are disconnected during external programming.

NOTE: The load switch must be off during external programming. Turning the load switch on restores control of the load to the front panel controls.

Figure 4A shows how to program using the internal 15V supply.

A programmable DC supply and a function generator may be used as shown in Fig. 4B. Any waveform may be used within the frequency range of 20Hz to 50KHz. The DC supply should be set to give the average current of the high and low current levels. For example, if the load is to vary between 50 and 100 amps, the DC program voltage should be set to produce a current of 75 amps (5VDC). The AC voltage is then set to produce a current which varies from 50 to 100 amps (3.33V P-P).

NOTE: Both the AC and DC signal sources must be isolated from the positive or negative inputs to the load.

When the DC and/or AC signal source must be connected to the negative input to the load, the circuit in Figure 4C should be used. An external ±15 volt supply must be used to provide operating voltages for the OP amps. The upper frequency response of this circuit is limited due to the slew rate of the OP amps used.

Constant Resistance Mode.

The EL750B Electronic Load can be remotely programmed to a fixed resistance within the range of 0.012 ohms to 55 ohms. The circuit shown in Figure 4D connects to the sense leads of the power supply under test and to the remote program input connector J2. The program resistor (Rp) value is determined as follows:

$Rp = 1.5 \times 10^4 R$, where R is the desired load resistance.

PROTECTION CIRCUIT

The EL750B is protected against overvoltage, overcurrent, and overpower by a circuit that automatically limits the current to a safe value. In the event of an overvoltage condition the protection circuit will reduce the load current to zero. When any of the three conditions occur, the "EI" indicator lamp will turn on to indicate a fault condition.

CURRENT MONITOR

The load current may be monitored at J2 pin 1 (+) and pin 2 (−) with a digital voltmeter or an oscilloscope. The output is one millivolt per amp. The minus output (J2 pin 2) is connected to the minus bus bar.

PARALLEL CONNECTED LOADS

Two or more EL750B's may be paralleled to obtain higher current or power ratings. The control of the loads is the same as for individual loads. If simultaneous control of all loads is required, the circuit described in Fig. 4C in the external programming section may be used. The circuit shown within the dashed lines is to be repeated for each EL750B.

J2 INPUT/OUTPUT CONNECTOR PIN FUNCTIONS

PIN NO.	FUNCTION
1	Common
2	Current shunt output
3	Not used
4	Not used
5	Not used
6	+15 VDC, 10mA Max. load
7	+15 VDC return
8	Remote Program Input

J2-9 through J2-15 — not used.