LEADER TEST INSTRUMENTS

MODEL LPS-160A/161A/162A/163A/164A

REGULATED DC POWER SUPPLY

32V SERIES

INSTRUCTION MANUAL

LEADER ELECTRONICS CORP.

CONTENTS

1. INTRODUCTION

LPS-160A to 164A, 32V series are regulated DC power supply units with voltmeter and amperemeter; the LPS-160A can supply the DC power of 0 to 32V, 0.5A; the LPS-161A 0 to 32V, 1.2A; the LPS-162A 0 to 32V, 2A; the LPS-163A 0 to 32V, 3A; and the LPS-164A 0 to 32V, 5A. They are provided with continuously variable coarse adjustment and fine adjustment of the output voltages, and with continuously variable current adjustment in a range of 10 to 100%.

2. FEATURES

- Built-in output current limiter circuit.
- Availability of series and/or parallel operation.

3. SPECIFICATIONS

MODEL	LPS-160A	LPS-161A
Output voltage	0 ~ 32 V Continuously variable	
Output polarity	Positive and negative	
Output current	0 ~ 0.5A	0 ~ 1.2A
Ripple voltage	Less than 3mVp-p	
Output stability	Less than 5mV for power source voltage change of ± 10% Less than 5mV for load variation of 0 to 100%	
Voltmeter	40V (F.S) Accuracy of 2.5% for full scale	
Amperemeter	0.6A (F.S) Accuracy of 2.5% for full scale	1.5A (F.S) Accuracy of 2.5% for full scale
Insulation	Between chassis and output terminal: More than 10 MΩ at DC 500V Between chassis and AC plug: More than 50MΩ at DC 500V	
Compensation/ protection circuit	Overload protection circuit of constant current self-restoring type	
Ambient temperature range	0 ~ + 40°C	
Power Source	AC 100 ~ 120V 50/60Hz 47VA	AC 100 ~ 120V 50/60Hz 84VA
	AC 200 ~ 240V 50/60Hz 24VA	AC 200 ~ 240V 50/60Hz 43VA
Size and weight	175(H) x 100(W) x 195(D)mm 3.5 kg	
Accessories	Short-circuit bar x 1 Fuse x 1	
Operation	Series and parallel	

Model	LPS-162A	LPS-163A	LPS-164A
Output voltage	0 ~ 32V continuously variable		
Output polarity	Positive and negative		
Output current	0 ~ 2A	0 ~ 3A	0 ~ 5A
Ripple voltage	Less than 3 mVp-p		
Output stability	Less than 5mV for power source voltage change of ± 10% Less than 5mV for load variation of 0 to 100%		
Voltmeter	40V (F.S) Accuracy of 2.5% for full scale		
Amperemeter	2.5A (F.S) Accuracy of 2.5% for full scale	4A (F.S) Accuracy of 2.5% for full scale	6A (F.S) Accuracy of 2.5% for full scale
Insulation	Between chassis and output terminal: More than 10 MΩ at DC 500V Between chassis and AC plug: More than 50MΩ at DC 500V		
Compensation/ protection circuit	Overload protection circuit of constant current self-restoring type		
Ambient temperature range	0 ~ ± 40°C		
Power source	AC100 ~ 120V 50/60Hz 153VA	AC100 ~ 120V 50/60Hz 220VA	AC100 ~ 120V 50/60Hz 340VA
	AC200 ~ 240V 50/60Hz 77VA	AC200 ~ 240V 50/60Hz 110VA	AC200 ~ 240V 50/60Hz 170VA
Size and weight	175(H)x115(W) x225(D)mm 7kg	175(H)x150(W) 300(D)mm 8 kg	175(H)x150(W) 300(D)mm 8.8 kg
Accessories	Short-circuit bar x 1 Fuse x 1		
Operation	Series and parallel		

4. DESCRIPTION OF PANEL FUNCTIONS

4.1 Front Panel

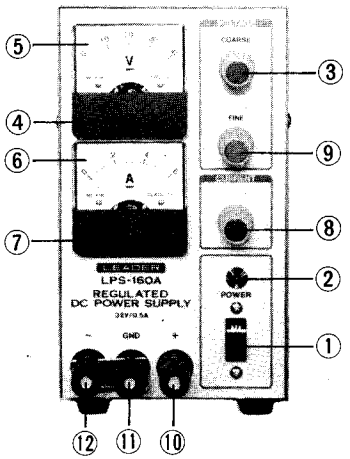


Fig. 4-1(a)

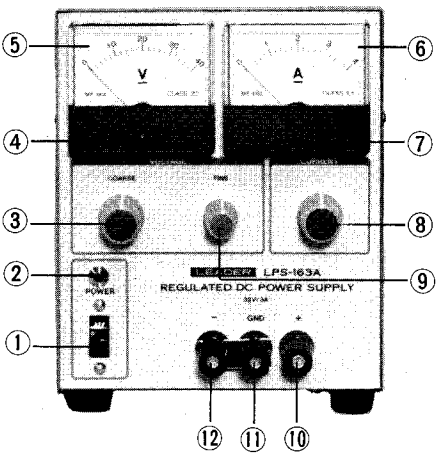


Fig. 4-1(b)

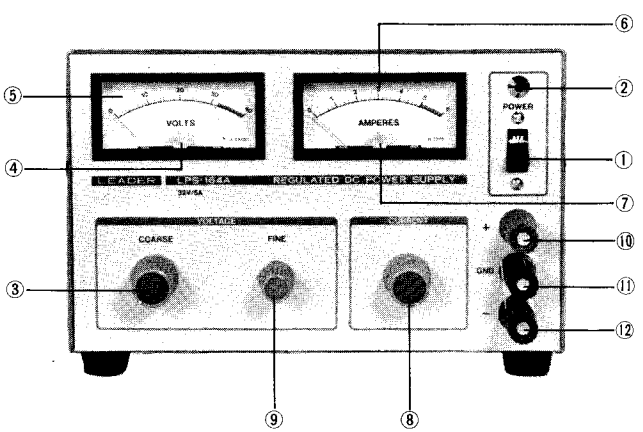


Fig. 4-1(c)

① Power switch:

Turns on and off the power.

② Pilot lamp:

Indicates the power-on condition when it is on.

③ COARSE:

Is the coarse adjustment knob of the output voltage.

④ Zero adjuster:

Is the mechanical zero adjuster screw for the voltmeter. If the meter needle is off the zero position, adjust the screw while the power is off.

⑤ Voltage indicator:

Set an output voltage while reading the voltage indication.

⑥ Load current indicator:

Indicates the load current.

⑦ Zero adjuster:

Is the mechanical zero adjuster screw for the amperemeter. If the meter needle is off the zero position when the power is off or with no load, adjust the screw by a screw driver.

⑧ CURRENT:

Is the current limiting knob for setting and adjusting the output current in a range of max. 10 to 100%.

⑨ FINE:

Is the fine adjustment knob of the output voltage.

⑩ + :

Is the positive side of output terminal.

⑪ GND:

Is connected to the frame of the instrument. When the positive polarity or negative polarity is to be connected to the ground, either an appropriate output terminal should be connected to the GND by a short-circuit bar supplied as an accessory. When no bar connection is made, the terminal is used as the ground terminal.

⑫ − :

Is the negative side of output terminal.

4.2 Rear Panel

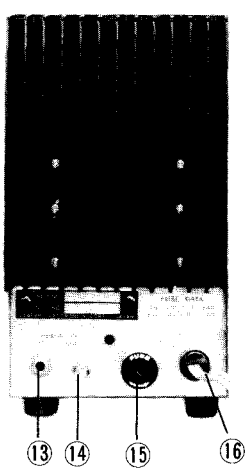


Fig. 4-2(a)

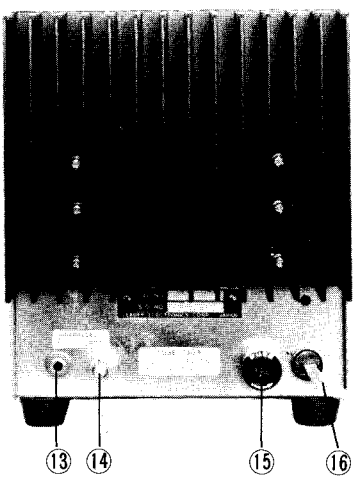


Fig. 4-2(b)

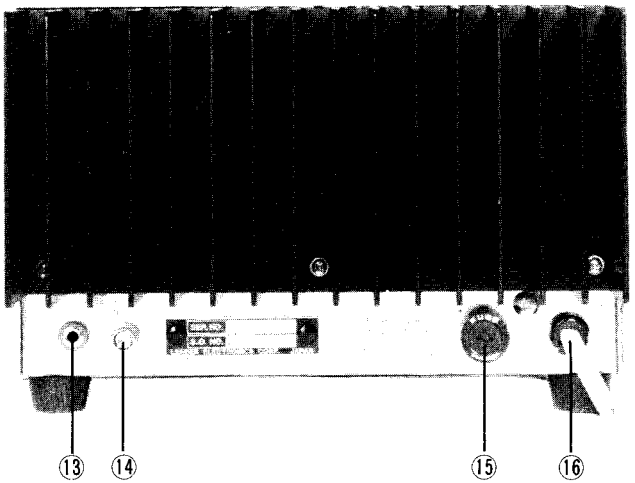


Fig. 4-2(c)

⑬ P :

Is the connection terminal for the parallel operation. (See the description for the details.)

⑭ G :

Is the ground terminal.

⑮ Fuse:

Turn the cap counterclockwise to remove the fuse.

⑯ AC power cord

5. NOTES ON OPERATION

(1) Apply the specified voltage to the primary input side.

(2) When a low voltage is used near the maximum current, be sure to provide a enough ventilation area near the radiator. (See Fig. 5-1)

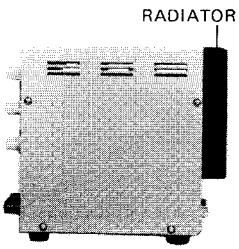


Fig. 5-1(a)

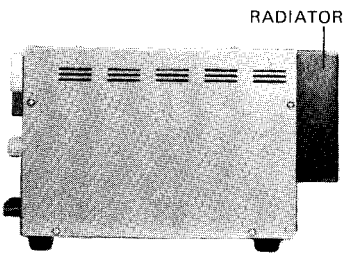


Fig. 5-1(b)

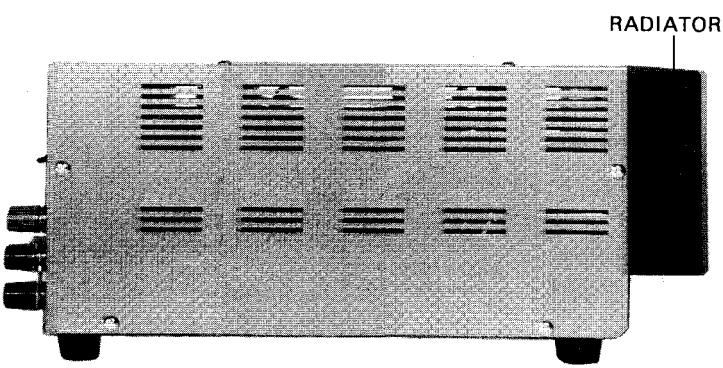


Fig. 5-1(c)

(3) Before using a parallel operation, read the instruction carefully.

(4) When using the instrument as a power supply for a high frequency device, connect the GND terminal to the ground. The frame will play a roll of the shield between the power supply and the amplifier.

(5) Even when the output is overloaded or short-circuited, the output current limiting circuit is activated. The short-circuit current flows in a range of 10 to 100% of the maximum current. For example, when the current setting knob is turned full counterclockwise, the current in a range of 100 to 500 mA flows, and the amperemeter indicates the current. This current flow occurs regardless the setting current. When a load to be tested is a type of load that can be broken by the current, a care must be taken for use of the instrument.

6. OPERATIONS

6.1 Independent Operation

(1) When the + terminal ⑩ or the – terminal ⑫ is to be connected always to the GND terminal ⑪ , the shortcircuit bar as an accessory should be connected as shown in Fig. 6-I

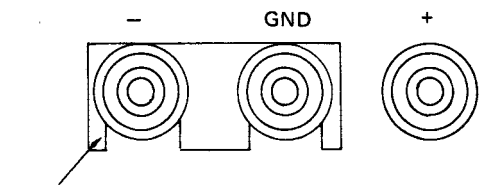


Fig. 6-I

(2) Connect the AC power cord to the power source of the specified valtage, and turn on the power switch. Then the pilot lamp will come on.

(3) To set the load voltage, slowly turn the voltage adjusting knob ③ clockwise with no load, while watching the amperemeter. The knob ③ is for coase adjustment, and the knob ⑨ is for fine adjustment.

(4) Load current setting is used to limit the current applied to a device to be tested at a specified power or to protect the device from the over current. To set the current, connect the ⊕ and ⊖ terminals by a thick lead wire. Slowly turn the current adjustment knob ⑧ , and set the current while watching the amperemeter indication. At this time, set the voltage adjustment knob ③ full counterclockwise and set the white mark of the FINE adjustment knob ⑨ at the middle.

The minimum current that can be set is as follows.

LPS-160A : Approx. 20mA
LPS-161A : Approx. 50mA
LPS-162A : Approx. 100mA
LPS-163A : Approx. 200mA
LPS-164A : Approx. 500mA

After setting a limiting current, remove the short-circuit wire. Then set the voltage to a required level.

(5) After completing the above procedure, watch the polarity of a device to be applied and use the instrument. If the voltmeter indication becomes less than the set level for a defect of a device to be tested or for any other reason, the overcurrent protection circuit is activated, resulting in switching into the constant current operation from the constant voltage operation.

When the instrument is to be used in the constant voltage operating condition, set the current adjustment knob full clockwise. In this case the short-circuit current is 0.5A +10% for the LPS-160A, 1.2A +10% for the LPS-161A, 2A +10% for the LPS-162A, 3A +10% for the LPS-163A, and 5A +10% for the LPS-164A.

6.2 Series Operation

(1) By connecting a couple of the units in series, a higher voltage than a single unit is available. In such a case, no terminal should be applied with a voltage more than the rating voltage against the ground potential between a terminal and the panel/chassis. The rating voltage against the ground is ±100 V.

With a series operation of a couple of the units, a double of the rating voltage of a single unit and a capacity of the current

of a single unit are available.

When two units are used, the maximum voltage available is +64V or−64V. The current available is 0.5A for LPS-160A, 1.2A for LPS-161A, 2A for LPS-162A, 3A for LPS-163A and 5A for LPS-164A.

Note: The overcurrent protection is effective at the smaller value set of the two.

(2) Notes on series operation:

When the series-connected two units of regulated DC power supplies are overloaded, the unit in which the overcurrent protection circuit activated first is applied with the reverse voltage of the output of the other unit, and so the series control element of the former will be damaged. To protect this problem, connect two diodes between the output terminals of the units as shown in Fig. 6-2.

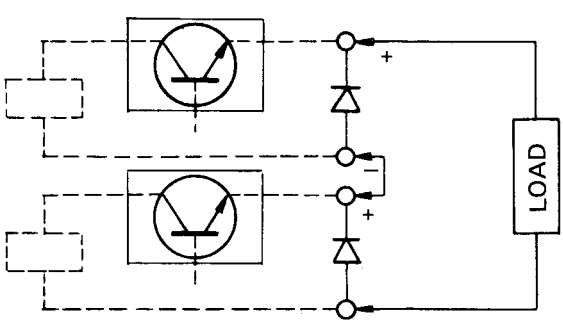


Fig. 6-2

Diodes to be used should be with a higher voltage than the maximum rating voltage of a single unit, and the voltage rating of diodes should be 2 to 3 times of the maximum voltage of the

series connection. For example, use Toshiba's 3BZ61 (or the equivalent) or 1S1380 · G2Bs in parallel connection.

(3) Connection:

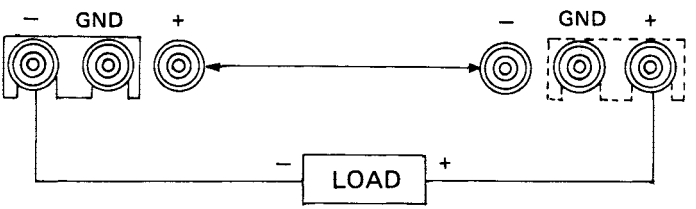


Fig. 6-3

Connect the GND terminal:

(a) For the negative grounding: As shown by a solid line in Fig. 6-3

(b) For the positive grounding: As shown by a dotted line in Fig. 6-3

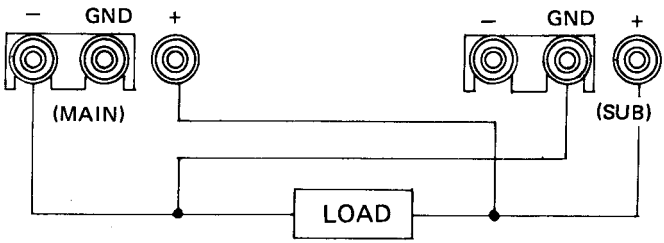
Do not connect the GND terminal to different polarities each other.

6.3 Parallel Connection

(1) When a current capacity larger than a single unit is required, a couple of the units may be used in a parallel connection.
In a parallel operation, a unit becomes the main unit and the other becomes the sub-unit. Settings of the voltage and current should be made on the main unit.

(2) Connection (Fig. 6-4)
Make the connection while the power is off.

(a) Connection on the front panel:



(b) Connection on the rear panel:

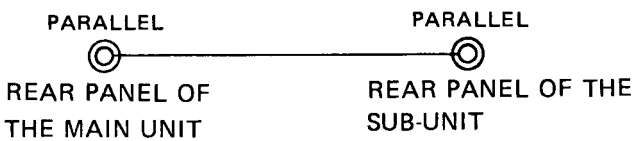


Fig. 6-4

For parallel operation, make the connection in the sequence of the ⊕ terminal of the main unit, ⊕ terminal of the sub-unit, ⊖ terminal of the main unit, and ⊖ terminal of the sub-unit. Then connect the wires between the PARALLEL terminal (main unit) and the PARALLEL terminal (sub-unit). Use thick wires for all the connections.

(a) Turn the voltage knobs ③, ⑨ and the current knob ⑧ of the sub-unit full clockwise.

(b) The voltage and the current are variable by the main unit. The output current limit can be selected within a range of about 10 to 100% of the double of the maximum rating current.

In this case, as the load current increases, the amperemeters of both the main and slave units swing, and the load current is

indicated as the sum of both amperemeters.

Notes: Other types of regulated DC power supply can not be connected for parallel operation. The maximum number of units for parallel operation is 2 units.

7. NOTES ON ENVIRONMENTAL CONDITION

7.1 Avoid to use the unit in such a place where the ambient temperature exceeds 40°C or under the direct sun shines. Limit the maximum output current, when the unit is used in such a place where ventilation is interrupted or where a radiation exists from other equipments.

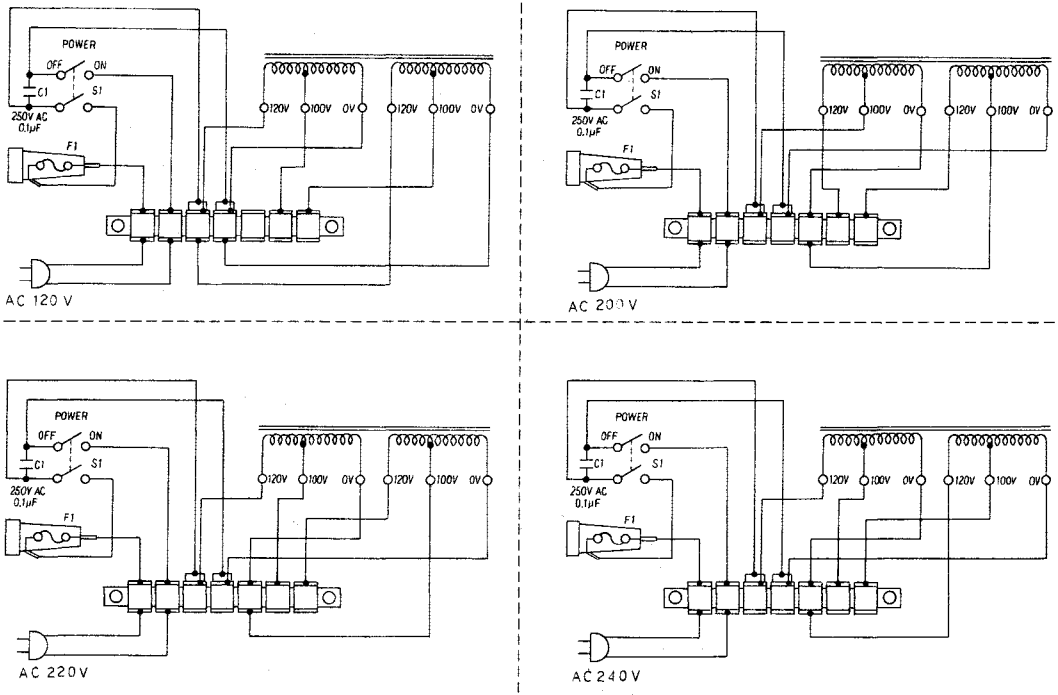
7.2 Use the instrument within ±10% of the specified voltage of the power source.

8. CURRENT LIMITING CIRCUIT

When the output terminals are short-circuited by mistake, the current limiting circuit is activated to limit the flow of the current in excess of the rating output current, so that the control elements and the amperemeter connected in series in the instrument are protected from the sudden damage.

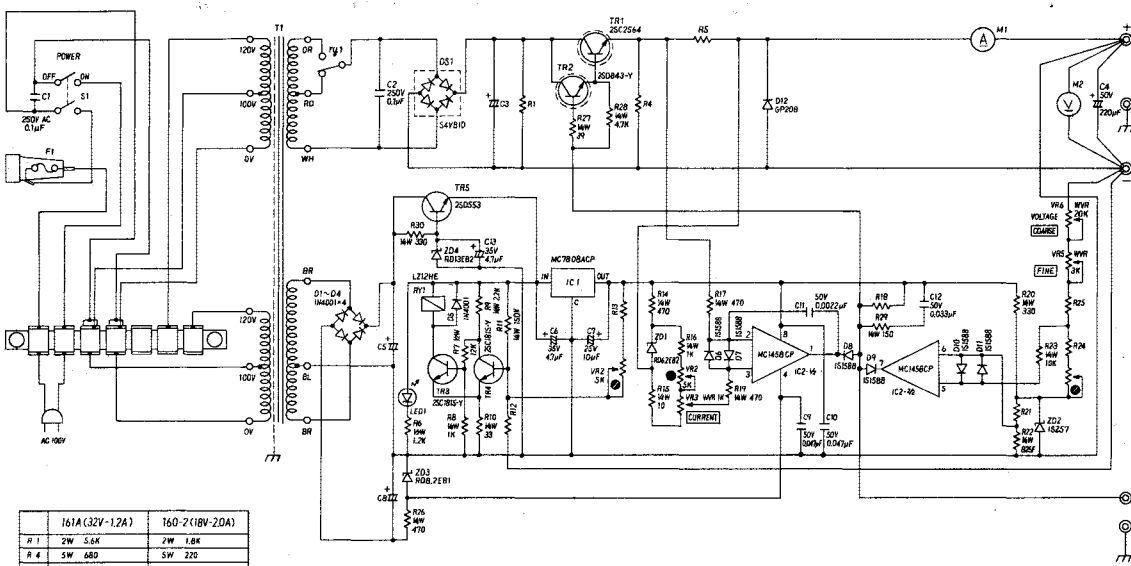
The output limit current can be set in a range of 10 to 100% of the rating current, and when the output current reaches the set value, the instrument operates in the constant current condition.

As the output current comes down below the set value, the constant voltage condition is automatically resumed.



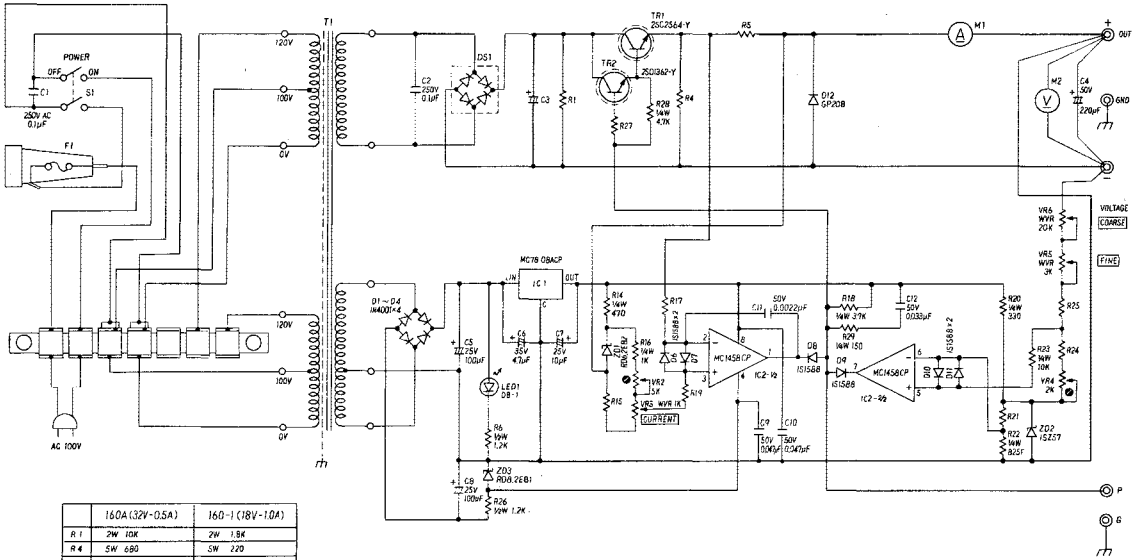
SCHEMATIC	MODEL	O - 1781
	LPS-160A~164A	LEADER ELECTRONICS CORP.

Terminal Arrangement and Wiring Diagram of the Power Transformer



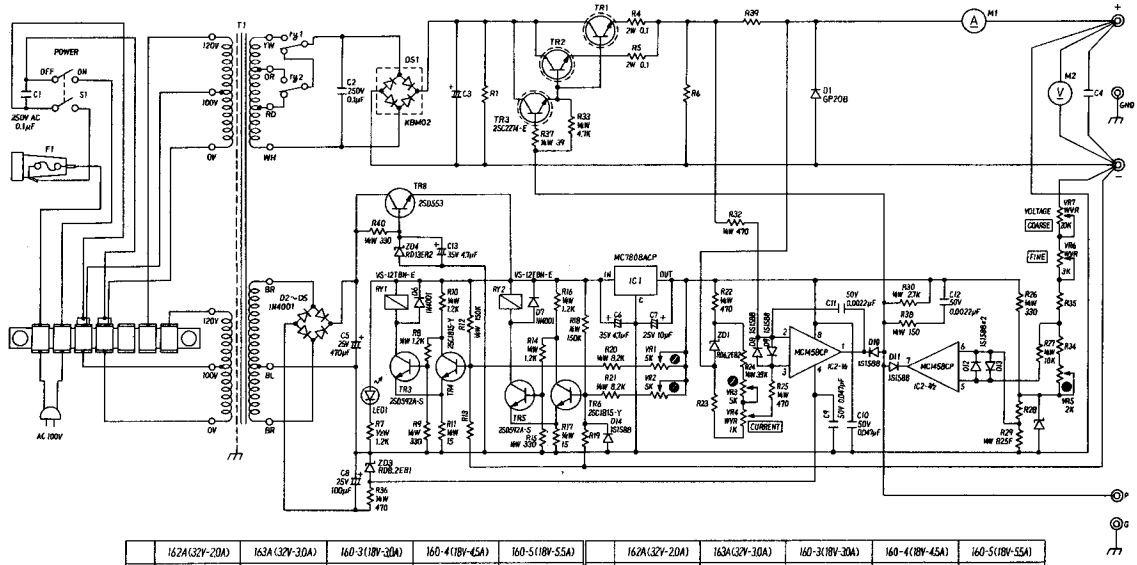
	161A (32V-1.2A)	160-2 (18V-2.0A)
R 1	2W 5.6K	2W 1.8K
R 4	5W 680	5W 220
R 5	5W 0.82	5W 0.47
R12	1/4W 24K	1/4W 12K
R13	1/4W 6.8K	1/4W 8.2K
R18	1/4W 3.9K	1/4W 2.7K
R21	1/4W 9.1KF	1/4W 9.53KF
R24	1/4W 3.01KF	1/4W 5.11KF
R25	1/4W 332F	1/4W 562F
C 3	80V 3300μF	50V 10000μF
C 5	25V 920μF	25V 100μF
C 8	25V 100μF	25V 47μF
M 1	MF45-1.5A	MF45-2.5A
M 2	MF45-40V	MF45-20V

SCHEMATIC	MODEL	0-1782
	LPS-161A, LPS-160-2	LEADER ELECTRONICS CORP.



	160A (32V-0.5A)	160-1 (18V-1.0A)
R 1	2W 10K	2W 1.8K
R 4	5W 680	5W 220
R 5	5W 2	5W 1
R15	1/4W 22	1/4W 10
R17	1/4W 270	1/4W 470
R19	1/4W 270	1/4W 470
R21	1/4W 9.1KF	1/4W 9.53KF
R24	1/4W 3.01KF	1/4W 5.11KF
R25	1/4W 332F	1/4W 562F
R27	1/4W 10	1/4W 39
C 3	80V 1000μF	50V 4700μF
DS1	S4VB10	KBL02
M 1	MF45-0.6A	MF45-1.2A
M 2	MF45-40V	MF45-20V
T 1	LO1123-3	LO0223-3

SCHEMATIC	MODEL	0 - 1 7 8 3
	LPS-160A, LPS-160-1	LEADER ELECTRONICS CORP.



	162A(32V-20A)	163A(32V-30A)	160-3(18V-30A)	160-4(18V-45A)	160-5(18V-55A)
R1	2W 6.8K	3W 3.9K	2W 1.8K	3W 1.2K	3W 1.2K
R6	5W 680	5W 680	5W 220	5W 220	5W 220
R13	1/4W 39K	1/4W 39K	1/4W 22K	1/4W 22K	1/4W 22K
R19	1/4W 20K	1/4W 20K	1/4W 12K	1/4W 12K	1/4W 12K
R23	1/4W 27	1/4W 18	1/4W 27	1/4W 18	1/4W 18
R28	1/4W 9.53KF	1/4W 9.53KF	1/4W 9.53KF	1/4W 9.1KF	1/4W 9.1KF
R34	1/4W 3.01KF	1/4W 3.01KF	1/4W 5.11KF	1/4W 5.11KF	1/4W 5.11KF
R35	1/4W 332F	1/4W 332F	1/4W 562F	1/4W 562F	1/4W 562

	162A(32V-20A)	163A(32V-30A)	160-3(18V-30A)	160-4(18V-45A)	160-5(18V-55A)
R39	10W 0.39	10W 0.27	10W 0.27	10W 0.1	10W 0.1
C3	80V 2200μF	80V 3300μF	50V 4700μF	50V 6800μF	50V 6800μF
C4	50V 330μF	50V 470μF	50V 330μF	50V 470μF	50V 470μF
D14					
TR1	2SD718	2SC2564	2SD718	2SC2564	2SC2564
TR2	2SD718	2SC2564	2SD718	2SC2564	2SC2564
M1	MF45-2.5A	MF66-4A	MF45-4A	MF66-5.4A	MF66-6A
M2	MF45-40V	MF66-40V	MF45-20V	MF66-20V	MF66-20V

SCHEMATIC	MODEL	0 - 1784
	LPS-	LEADER ELECTRONICS CORP.