

INSTRUCTION MANUAL FOR
REGULATED DC POWER SUPPLY

MODEL 7318A

KIKUSUI ELECTRONICS CORPORATION

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TABLE OF CONTENTS

	<u>PAGE</u>
1. GENERAL	1
2. SPECIFICATIONS	2
3. EXPLANATION OF PANELS	4
3.1 Explanation of Front Panel	4
3.2 Explanation of Rear Panel	5
4. OPERATION METHOD	6
4.1 Types of Operation	6
4.1.1 Single Operation	6
4.1.2 Series Operation	6
4.1.3 Overload Protection in Series Operation	7
4.1.4 Parallel Operation	7
4.1.5 Remote Control	9
4.2 Conditions of Use	11
4.3 Overshoots of Output Voltage	11
4.4 Voltage Drop by Ammeter	11
4.5 Current Limiting Circuit	11
5. MAINTENANCE	13

1. GENERAL

Kikusui Model 7318A is a compact, lightweight, transistorized series-type regulated DC power supply. Its output voltage is continuously variable for a range of 0 - 18 V with a double-knob control; its output current rating is 5.5 A maximum. It has a voltmeter and an ammeter mounted on its front panel.

The 7318A is incorporated with an output current limiting circuit which securely protects the power supply against overload and output shorting. The limiting current value is continuously variable for a range of 10% - 100% of the maximum rating. With this feature, the 7318A can be used also as a constant-current source device.

On its rear panel the 7318A has a jack for remote control of supply voltage and an AC outlet to supply an AC line power (100 V) for the Remote Control Box, Model OP-2.

Two or more Model 7318A Power Supplies can be connected in series to obtain a higher voltage or two units in parallel to double the current.

2. SPECIFICATION

AC input power: 100 V $\pm 10\%$, 50/60 Hz AC, 1 ϕ

Power consumption: Approx. 220 VA (at full load of 18 V, 5.5 A)

Ambient temperature: 0 - 40°C

Dimensions: 106 W x 145 H x 356 D mm *

(Maximum dimensions): (111 W x 170 H x 400 D mm)

Weight: Approx. 7.5 kg

Accessories: Short-bar 1
Instruction manual 1

Output

Terminals: Binding posts, color-coded with red (+), white (-) and black (GND), 19 mm spacing, horizontal layout

Polarity: Positive or negative

Floating voltage: ± 100 V maximum

Voltage: 0 - 18 V, continuously variable (with coarse and fine control)

Current: 5.5 A

Ripple: 3 mVp-p

Regulation: 10 mV for $\pm 10\%$ variation of AC line voltage
10 mV for 0 - 100% variation of load current

Current limiting: 0.55 A - 5.5 A, continuously variable,
(constant-current automatic crossover type)

Voltmeter: 20 V (Class 2.5 JIS)

Ammeter: 6 A (Class 2.5 JIS)

Others: Jack for remote control of output voltage.
Outlet for AC power (100 V).
Series and parallel connection allowable.

* Four units can be mounted on a 19-inch standard rack (RMF-4).

3. EXPLANATION OF PANELS

3.1 Explanation of Front Panel

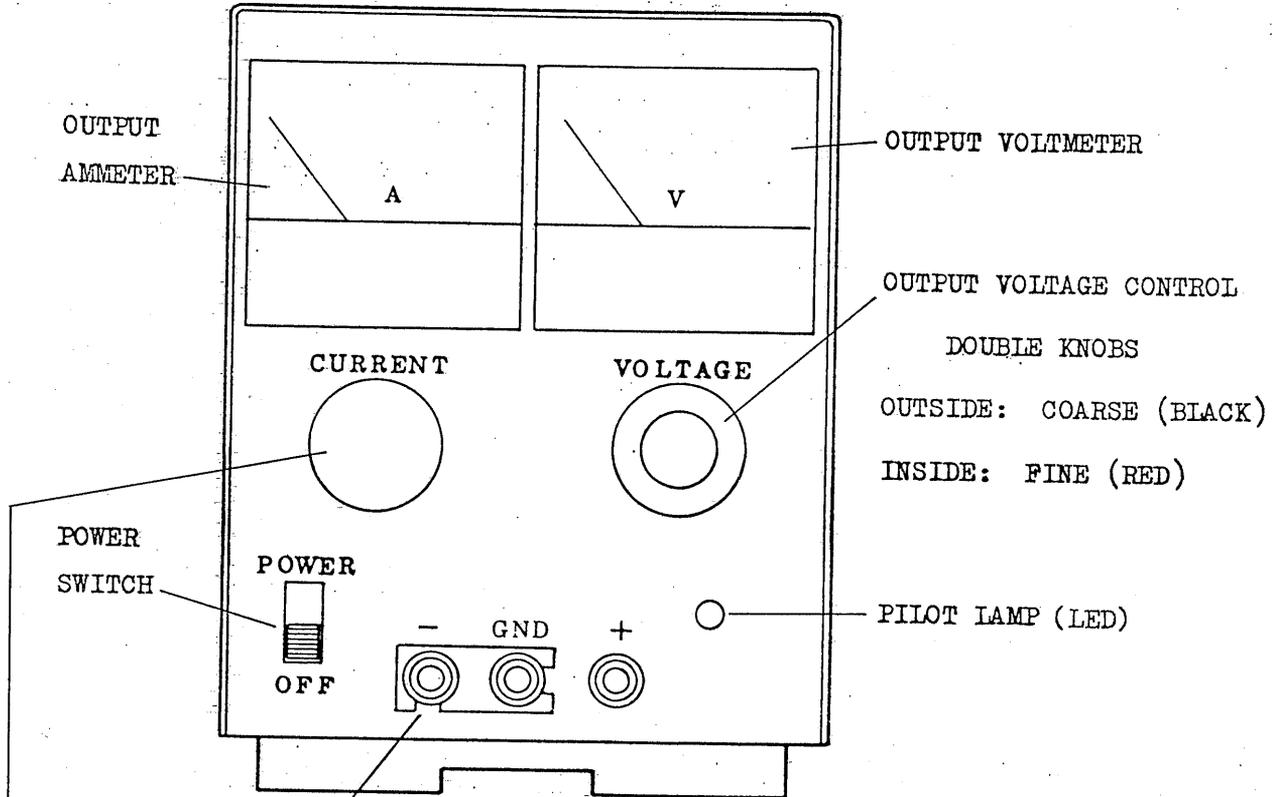


Fig. 1

OUTPUT TERMINALS

Normally the "+" or "-" terminal is connected with the short bar to the GND terminal which is electrically connected to the chassis and panel. It also is possible to operate with a DC bias voltage. (Refer to the specification of "Floating voltage")

CURRENT LIMITING KNOB

The output current can be limited at a certain value within a range of 0.55 A ~ 5.5 A. Within this range the 7318A can be used also as a constant-current source.

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3.2 Explanation of Rear Panel

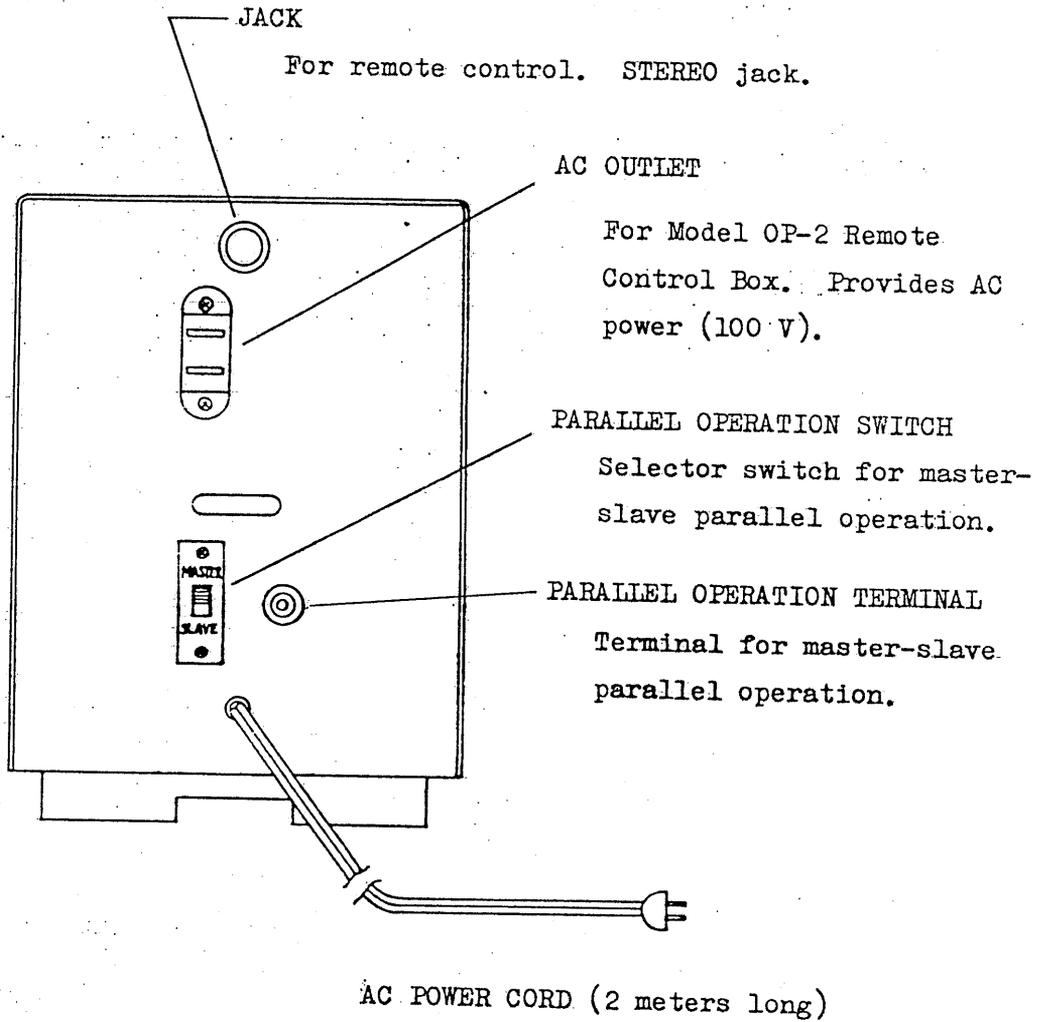


Fig. 2

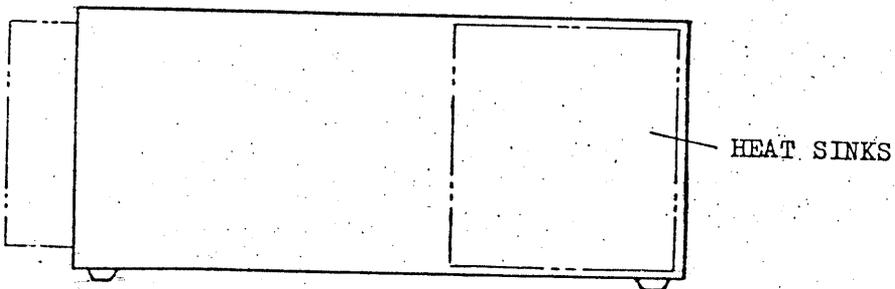


Fig. 3

When operating at a low voltage and a large current, pay attention to ventilation of the heat sinks.

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4. OPERATION METHOD

4.1 Types of Operation

4.1.1 Single Operation

The 7318A can be used directly as an independent power supply unit.

4.1.2 Series Operation

Two or more units can be connected in series to obtain a higher supply voltage. In this case the voltage of any output terminal must not exceed the specification of the floating voltage (= chassis and panel).

When two units are operated in series, a voltage of the double of a single unit and a current the same with that of a single unit can be obtained.

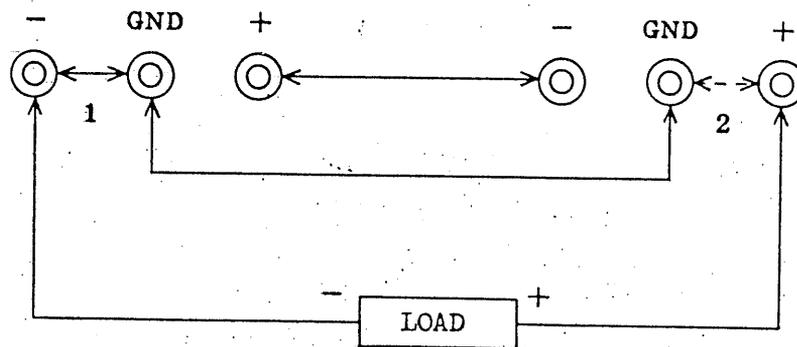


Fig. 4

Connect the GND terminals as follows:

- 1) For "-" grounded: As indicated with solid line in Fig. 4.
- 2) For "+" grounded: As indicated with broken line in Fig. 4.

Be sure not to connect the GND terminals in wrong polarity.

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4.1.3 Overload Protection in Series Operation

If an overload is caused to two (or more) units connected in series, as the protecting circuit of one unit will operate at first, the output voltage of the other unit is applied in the reverse polarity to the one unit and the series control elements of this unit may be damaged. In order to guard against this, diodes are connected in the output circuit as shown in Fig. 5.

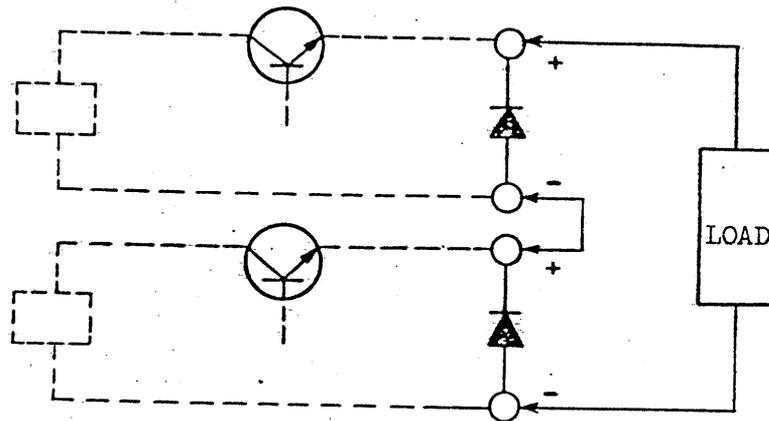


Fig. 5

4.1.4 Parallel Operation (Master-slave)

Two units can be connected in parallel to double the output current.

Be sure to turn-OFF the AC powers of the unit before making connections for this type of operation.

When in the parallel operation, one unit operates as a master unit and the other unit as a slave unit. The output voltage and current are controlled by the master unit.

- (1) Throw the MASTER/SLAVE switch on the rear panel of the slave unit from the MASTER position to the SLAVE position.
- (2) Connect the PARALLEL OPERATION TERMINAL (J_4) on the rear terminal of the master unit with that (J_4) of the slave unit.

- (3) Set the CURRENT knob of the slave unit in the maximum position (extremely clockwise position). Set the VOLTAGE knobs also in the maximum positions.
- (4) Turn-ON the power switches.

The output voltage and current can be controlled as required with the master unit. In this case also the output limiting current can be set at any required point within a range of 10% - 100% of the maximum current rating.

Note that, when in the one-control parallel operation, a load current of 5% or over of the rated current must always flow. If the load current is reduced to zero or lower than 5%, the output voltage becomes uncontrollable with the master unit and the variable resistor of voltage of the master may be damaged.

To reset the unit to the normal operation, be sure to return the MASTER/SLAVE switch to the MASTER position.

Connect the short bars of both units to the terminals of the same polarity. Do not connect them to terminals of different polarities. (See Fig. 6)

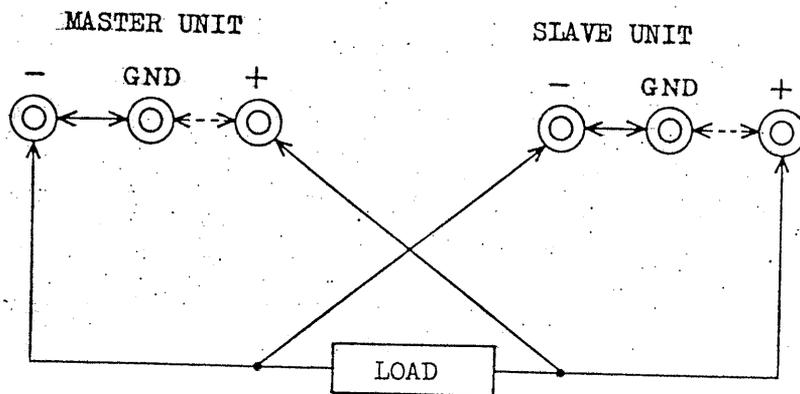


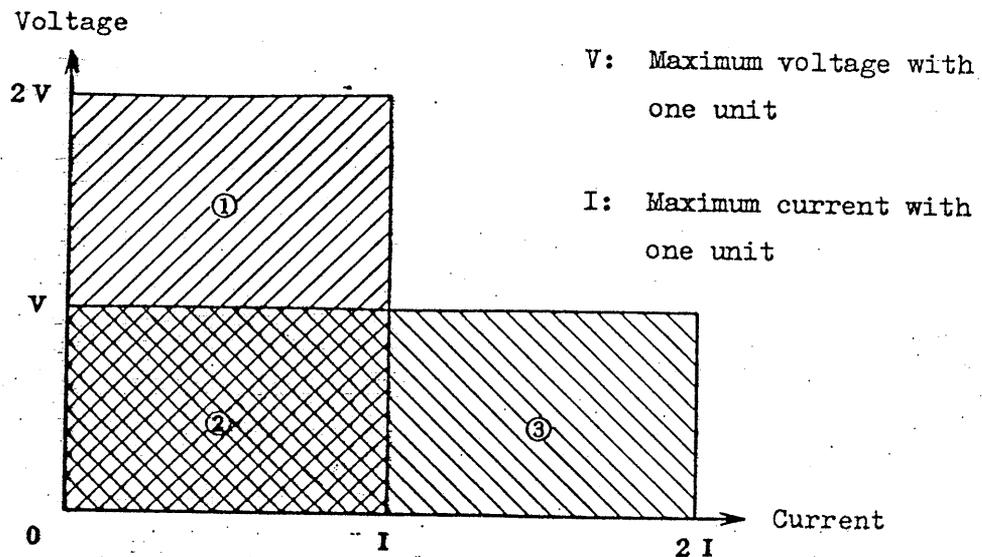
Fig. 6

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Maximum two units can be operated in parallel. As a general rule, do not operate the 7318A in parallel with other type of power supply unit.

Precaution: Do not turn-ON the POWER switch when the MASTER/SLAVE switch is in the SLAVE position, except the parallel operation. The unit may be seriously damaged.

The operating areas when two units are connected in series or parallel are as shown in Fig. 7.



Single-unit operation: Within area (2)

Series operation: Within area (1) + (2)

Parallel operation: Within area (2) + (3)

Fig. 7

4.1.5 Remote Control

A jack for remote control of the output voltage with an external variable resistor is provided on the rear panel of the unit. The jack accepts a large single-head plug (EIAJ RC-707 Stereo Jack).

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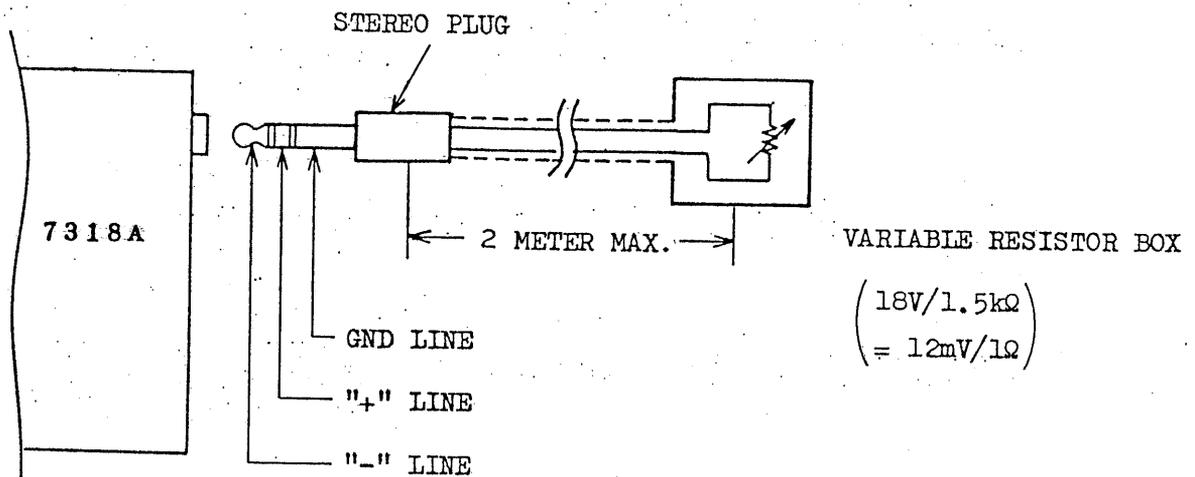


Fig. 8

- 1) Connect the Stereo plug with the variable resistor box using a 2-core shielded cable as shown in Fig. 8. (The length of the shielded cable should not exceed approximately 2 meters.) Connect the two core wires of the cable to the "+" and "-" lines and the shielding braid to the GND line.

The variable resistor (or fixed resistor) is approximately 1.5 kΩ and should handle an output voltage of 18 V, or it should operate with approximately 12mV/1Ω. Use a wire-wound or metal-film resistor of a sufficient wattage and good temperature coefficient.

- 2) Set both VOLTAGE knobs on the front panel of 7318A unit in the extremely counterclockwise positions.
- 3) Insert the Stereo plug in the remote control jack on the rear panel, and turn-ON the POWER switch of the unit.
- 4) If the resistance becomes higher than 1.5 kΩ by mistake while in the remote control operation and the output voltage becomes higher than approximately 20 V, the circuit is automatically clamped out.

Model OP-2 Remote Control Box is available from Kikusui Electronics Corporation. This control box is capable of 3-point preset voltages electronic switching.

4.2 Conditions of Use

Do not use the 7318A at a place where ambient temperature becomes higher than 40°C. When ventilation is hindered or the unit is subjected to direct sunlight or radiation from another heat source, reduce the maximum continuous output current accordingly.

The 7318A operates on an AC input power of 90% - 110% of the nominal AC input voltage.

4.3 Overshoots of Output Voltage

No overshoots exceeding the voltage setting is produced between output terminals when the AC input power is turned on or off.

4.4 Voltage Drop by Ammeter

The voltage drop caused by the ammeter is compensated for by circuitry.

4.5 Current Limiting Circuit

To guard the series control elements and output ammeter against damage when the output circuit is shorted by mistake, the 7318A is incorporated with an output current limiting circuit which positively limits the output current electronically.

The limiting value is continuously variable within a range of 0.55A ~ 5.5A. After the output current has reached the limiting value, the unit operates as a constant-current power supply. When the output current is reduced to a value lower than the limiting value, the unit resumes its operation as a constant-voltage power supply. (See Fig. 9)

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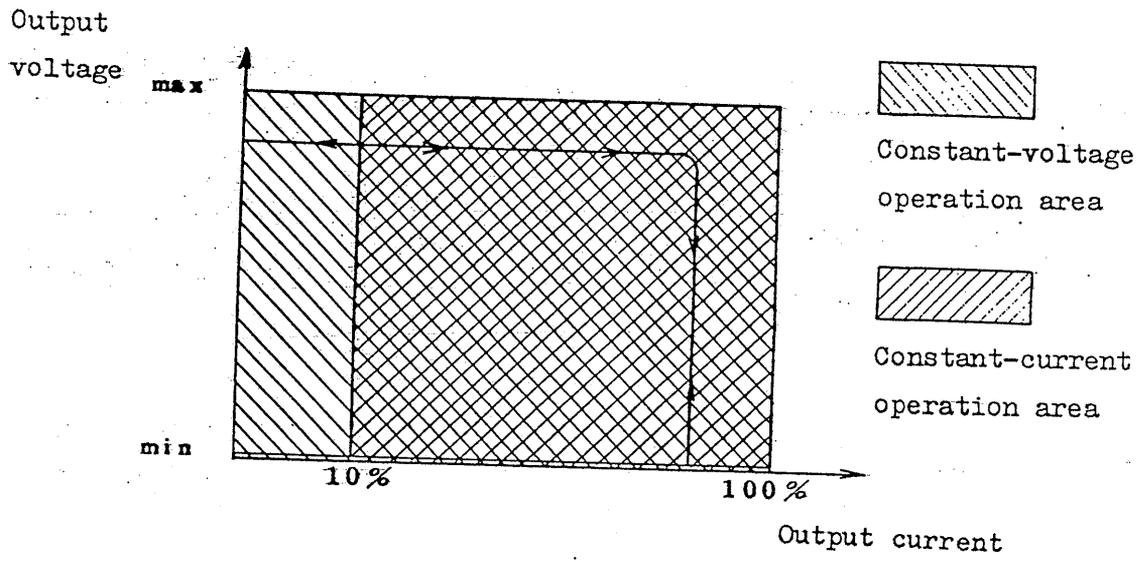


Fig. 9

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5. MAINTENANCE

When the output voltage has been deviated due to replacement of a component for repair or any other cause, adjust the unit as follows:

5.1 Adjustment of Maximum Voltage

Set the VOLTAGE knob on the front panel in the extremely clockwise position (the FINE knob in a mid-position of its adjusting range). Under this state, so adjust semi-fixed resistor R_7 on the printed circuit board that the output voltage becomes the rated maximum voltage.

5.2 Adjustment of Maximum Current

Set the CURRENT knob on the front panel in the extremely clockwise position and short between output terminals. Under this state, so adjust semi-fixed resistor R_4 on the printed circuit board that the output current becomes +5 ~ +10% of the rated maximum current.

For the locations of the semi-fixed resistors, see Fig. 10.

Never adjust other semi-fixed resistors without R_4 and R_7 .

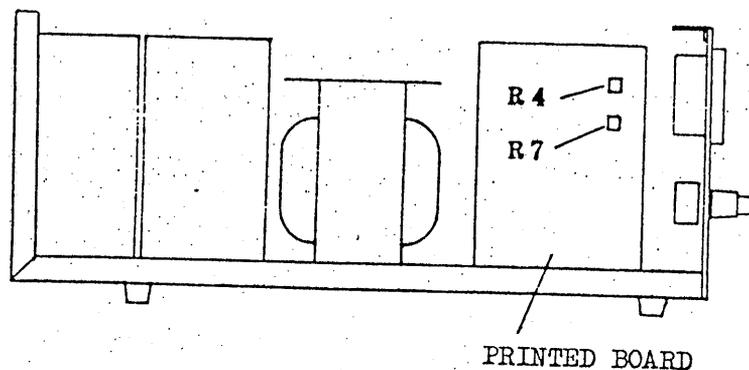


Fig. 10