

ELECTRONIC LOAD

**PLZ152WA**

INSTRUCTION MANUAL



Part No. Z1-707-720, IB002363

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# Power Requirements of this Product

Power requirements of this product have been changed and the relevant sections of the Operation Manual should be revised accordingly.

(Revision should be applied to items indicated by a check mark )

## Input voltage

The input voltage of this product is \_\_\_\_\_ VAC,  
and the voltage range is \_\_\_\_\_ to \_\_\_\_\_ VAC. Use the product within this range only.

## Input fuse

The rating of this product's input fuse is \_\_\_\_\_ A, \_\_\_\_\_ VAC, and \_\_\_\_\_ .

### WARNING

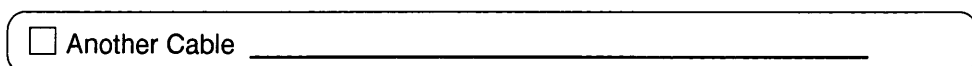
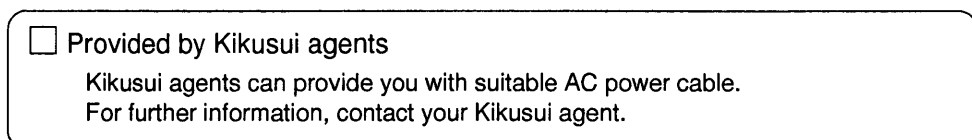
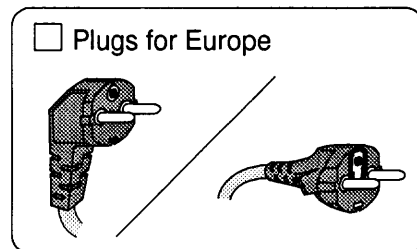
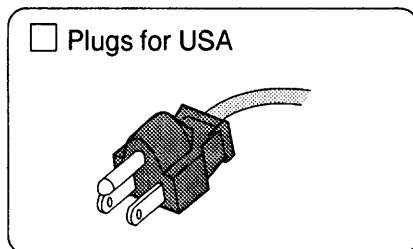
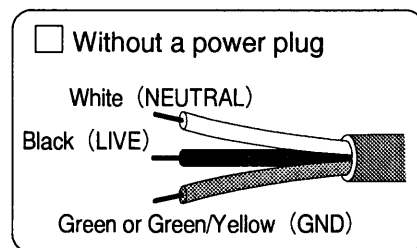
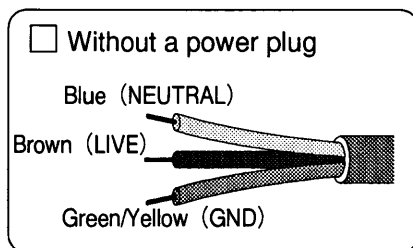
- To avoid electrical shock, always disconnect the AC power cable or turn off the switch on the switchboard before attempting to check or replace the fuse.
- Use a fuse element having a shape, rating, and characteristics suitable for this product. The use of a fuse with a different rating or one that short circuits the fuse holder may result in fire, electric shock, or irreparable damage.

## AC power cable

The product is provided with AC power cables described below. If the cable has no power plug, attach a power plug or crimp-style terminals to the cable in accordance with the wire colors specified in the drawing.

### WARNING

- The attachment of a power plug or crimp-style terminals must be carried out by qualified personnel.



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## 1. GENERAL

### 1.1 Description

Model PLZ152WA Electronic Load is rated for loading voltage 0 - 110 volts, loading current 0 - 30 amperes, and wattage 150 watts. The PLZ152WA can be operated either in a constant current mode or in a constant resistance mode.

The PLZ152WA allows dynamic load test by switching between two different levels of load current with its internal oscillator and electronic switching circuit. This function is available when in either the constant current or resistance mode.

The PLZ152WA is incorporated with protectors against overvoltage, overcurrent, and overpower. It has a digital voltmeter/ammeter of 3-1/2 digits. It has a fan for forced air cooling.

#### Features

- (1) The PLZ152WA can operate down to zero volts. It renders perfect shorting with the current controlled, which have hardly been attainable with traditional load devices.
- (2) The PLZ152WA employs power unit of triple diffused bipolar transistor, thereby improving the reliability.
- (3) A digital voltmeter/ammeter of 3-1/2 digits is provided.
- (4) Two 10-turn helical potentiometers are provided to set individual levels of loading current.
- (5) The loading current can be switched between two different levels, thereby allowing dynamic load test.
- (6) The loading current can be remote-controlled with a voltage signal (when in the constant current mode) or with a resistance signal (when in the constant current or resistance mode).

- (7) Two or more units of PLZ152WA can be operated in parallel in a master-slave mode.
- (8) The PLZ152WA is incorporated with protectors against overvoltage, overcurrent, overpower, overheat, and inverted connections of input. These protectors reset automatically.
- (9) The PLZ152WA is incorporated with a rapid-response rush current suppression circuit.
- (10) Optional frames and brackets are available to install the PLZ152WA on a rack of the EIA Standard or the JIS Standard.

## 1.2 Specifications

Model		PLZ152WA
Power Requirements	Input voltage Power consumption	120 V, 50/60 Hz AC, single phase Approx. 285 VA (with 120 V AC line voltage)
Load Input	Loading voltage  Loading current (resolution)  Allowable loading power	0 - 110 V DC (constant current mode)  0.5 - 110 V DC (constant resistance mode)  0 - 30 A (30 mA) DC, theoretical values  150 W
Operation Modes	Constant current mode  Constant resistance mode	Two ranges of 0 - 30 A and 0 - 3.0 A, continuously variable  Two ranges of 0.1 ohm and 1 ohm, continuously variable
Constant Current Mode	4 - 100 V change of loading voltage  $\pm 10\%$ change of line voltage  Ripple noise  Temperature coefficient (typical)  Rise-up/fall-down time	$\pm 0.1\% + 5 \text{ mA}$ (at loading current 1 A)  $\pm 0.1\% + 5 \text{ mA}$  7 mA rms (5 Hz - 1 MHz)  Approx. 0.01%/°C  100 $\mu\text{s}$ or faster (at load current 0 - 30 A and switching mode)
Constant Resistance Mode	Temperature coefficient (typical)  $\pm 10\%$ change of line voltage	Approx. 0.01%/°C  $\pm 0.1\% + 5 \text{ mA}$

Model		PLZ152WA
Remote Control	Constant current mode	With external voltage With external resistance
	Constant resistance mode	With external resistance
Protectors	Overvoltage protector	Cuts out load input at approximately 115 V DC.
	Overcurrent protector	Cuts out load input at approximately 31 A DC.
	Overpower protector	Cuts out load input at approximately 155 W.
	Reverse connection protector	Checks reverse current with series thyristor.
	Overheat protector	Cuts out load input at 100 ±5 deg C.
	AC line power fuse	4 A (SB)
Digital Voltmeter/ Ammeter	Maximum effective display	1999
	Ammeter accuracy	(0.5% of rdg + 0.1% of FS + 1 digit). at 23°C ±5°C, 85% RH or less
	Voltmeter accuracy	(0.1% of rdg + 0.1% of FS + 1 digit). at 23°C ±5°C, 85% RH or less
	Range select	Automatic range select
Oscillator for switching	Switching period	Two ranges: 1 ms - 10 ms, 10 ms - 100 ms
Parallel Operation		In master-slave mode
Current Monitor Output		10 mV/A, BNC connector



Model	PLZ152WA
Overpower Indicator	Yellow LED (blink)
Overvoltage and Overpower Indicator	Red LED
Ambient Temperature and Humidity	0 to 40 deg C (32 to 104 deg F), 10 to 90% RH
Cooling System	Forced air cooling with fan
Dielectric Strength	±250 V DC between DC input terminal and chassis
Insulation Resistance	Between DC input terminal and chassis: 20 MΩ or more as tested with 500 V DC  Between AC line and chassis: 30 MΩ or more as tested with 500 V DC
Dimensions (Including Extrusions)	210 (218) W x 140 (168) H x 400 (465) D mm  8.27 (8.58) W x 5.51 (6.61) H x 15.75 (18.31) D in.
Weight (net)	Approx. 12 kg (27 lbs)
Accessories (in carton)	
Power cord	1
Instruction manual	1 copy
Guard caps	2
EMC	Complied with the following standards *1  IEC61326-1:1997-03 / A1:1998-05 Electrical Equipment for Measurement, Control and Laboratory Use - EMC requirements Radiated Emissions     Class A Conducted Emissions    Class A  IEC61000-4-2:1995-01 / A1:1998-01 Electrostatic discharge  IEC61000-4-3:1995-02 Radiated, radio-frequency, electromagnetic field  IEC61000-4-4:1995-01 Electrical fast transient/Burst  IEC61000-4-5:1995-02 Surge  IEC61000-4-6:1996-04 Conducted disturbances  IEC61000-4-11:1994-06 interruptions and voltage variations
SAFETY	Complied with the following standards *1 European Community Requirements (73/23/EEC)

\*1 CE marking are put only on the products sold in Europe.

## 2. OPERATION METHOD

### 2.1 General Precautions

To prevent damage to the Load, pay attention to the general precautions given in this section.

#### (1) AC Line Voltage

Make sure that the AC-line voltage is 108 - 132 V, 48 - 62 Hz, single phase. Note that the Load will be damaged if it is connected to a 240 V AC line.

#### (2) Loading Input Voltage

The allowable loading input voltage is 0 - 110 V DC. When the voltage has exceeded approximately 115 V, the overvoltage protector (OVP) will trip. Refrain from attempting to apply an overvoltage to the Load. Never apply a overvoltage higher than 150 V to the Load. (See Figure 2-1-1.)

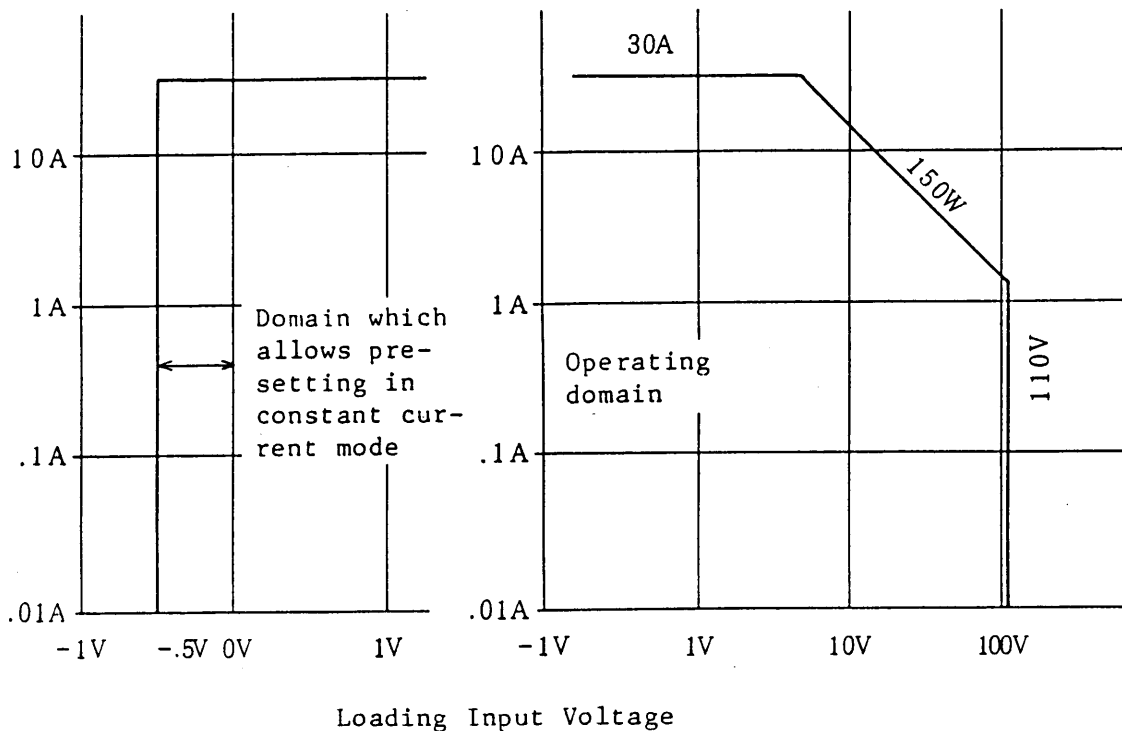


Figure 2-1-1

(3) Preset Voltage

Observe the instructions given in Section 2.4 (1).

(4) Loading Wires

For the wires to connect the Load to the power source to be tested, use wires of cross sectional area  $14 \text{ mm}^2$  or more and length not longer than 3 meters. If the wires are too small or too long, the resistance or inductance of the wires will increase and a large voltage drop will be caused, thereby making narrower the operating range of the Load. To connect a distance longer than 3 meters, use wires of correspondingly larger sectional area. Strand the two wires as shown in Figure 2-1-2.

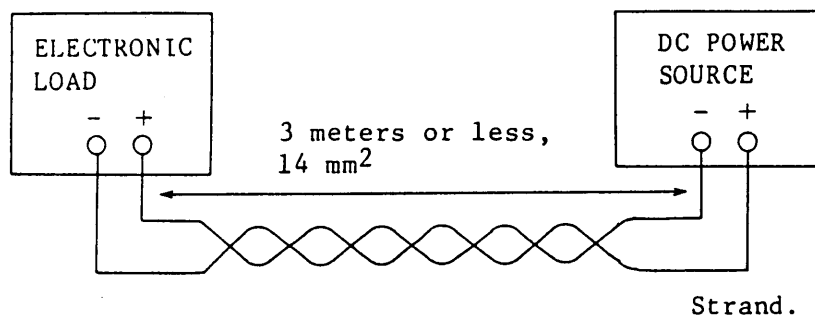


Figure 2-1-2

(5) Ambient Temperature and Humidity

The Load is operable safely and to the performance specifications within a temperature range of 0 to 40 deg C (32 to 104 deg F) and a humidity range of 10 to 90% RH. Pay attention so that the cooling air intake/outlet openings are not blocked. Clean periodically the filter of the air intake opening.

(6) Environments

The place of use of the Load should be without corrosive gases, and should be reasonably free from dust and mechanical vibration.

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(7) Rear Terminal Block

Make it double sure that the shorting pieces of the rear terminal block are securely connected as shown in Figure 2-1-3. Note that the Load will not properly operate unless these shorting pieces are connected securely and correctly.

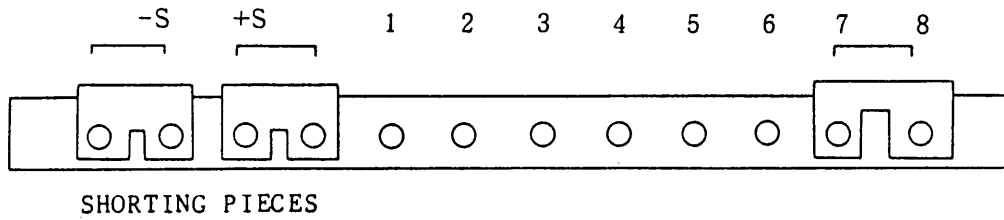
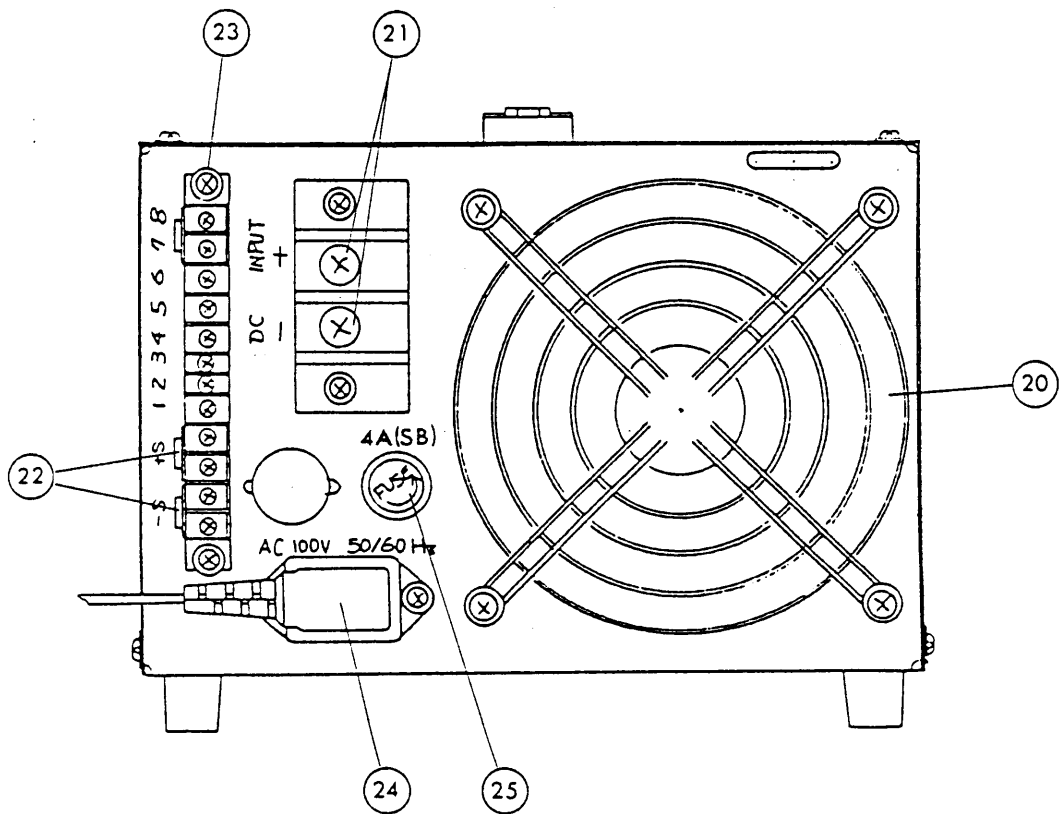
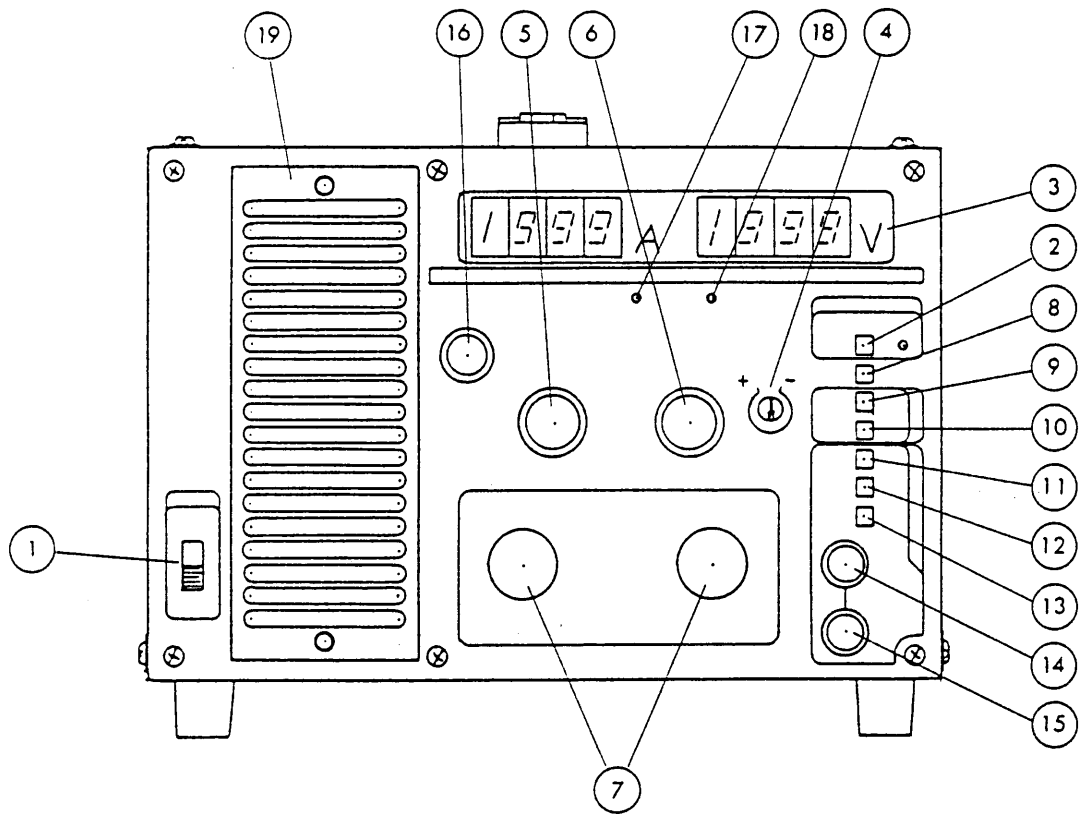


Figure 2-1-3

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## 2.2 Panel Description



- ① POWER: AC line power switch
- ② LOAD: Loading input switch. Automatically trips when overvoltage or overheating is caused. Red LED illuminates when in the ON status.
- ③ VOLTMETER/  
AMMETER: Digital voltmeter/ammeter of 3-1/2 digits, with auto-range function
- ④ PRESET MIN  
VOLTAGE  
0 TO -0.5V: To preset the minimum operating voltage at load input (DC INPUT) terminal ⑦ when in the CC mode. The presettable range is 0 to -0.5 V. (See Section 2.4 (1).)
- ⑤ LOAD A: 10-turn potentiometer to control loading current A in the constant current or resistance mode
- ⑥ LOAD B: 10-turn potentiometer to control loading current B in the constant current or resistance mode
- ⑦ DC INPUT: Loading input terminal
- ⑧ INT  EXT: Switch to select the local mode or the remote mode when in the constant current mode
- ⑨ CC  CR: Switch to select the constant current (CC) mode or the constant resistance (CR) mode
- ⑩ 30A  3A  
.1Ω  1Ω: Range selector switch
- ⑪ LOAD A  LOAD B: Switch to select load A or load B
- ⑫ DC  SW: Switch to select the DC loading current or the switched loading current
- ⑬ 1-10  10-100 mS: Switch to select a switching period of loading current
- ⑭ A: To control the period of loading current set by LOAD A ⑤
- ⑮ B: To control the period of loading current set by LOAD B ⑥

- ①⑥ MONITOR 10mV/A: This terminal delivers a signal to monitor the switched loading current using an oscilloscope.
- ①⑦ ALARM: This lamp illuminates when the overvoltage (110 V or over) protector or the overheat protector has tripped.
- ①⑧ POWER LIMIT: This lamp blinks when the loading input power has exceeded 150 watts.
- ①⑨ Air intake: Cooling air intake louver
- ②⑩ Air outlet: Cooling fan air outlet
- ②① DC INPUT -, +: Loading input terminal which is connected in parallel to DC INPUT ⑦
- ②② -S, +S: Voltmeter input terminals, which are connected to DC INPUT terminals ②① with shorting pieces
- ②③ Control terminal block: For the following functions:  
 (1) Control with voltage when in the constant current mode  
 (2) Control with external resistance signal when in the constant current or resistance mode.  
 (3) Master-slave parallel operation  
 (4) Sensing for voltmeter
- ②④ AC 100V 50/60Hz: AC line input power cord connector
- ②⑤ FUSE 4A(SB): AC line input power fuse

### 2.3 Initial Setting

Before turning on the POWER switch, set the panel switches and controls as shown in the following table.

Switch or Control	No.	Setting
LOAD switch	②	OFF (■)
LOAD A	⑤	Fully counterclockwise
LOAD B	⑥	Fully counterclockwise
INT <input type="checkbox"/> EXT switch	⑧	INT (■)
CC <input type="checkbox"/> CR switch	⑨	CC (■)
30A <input type="checkbox"/> 3A 0.1Ω <input type="checkbox"/> 1Ω switch	⑩	30A (■)
A <input type="checkbox"/> B switch	⑪	A (■)
DC <input type="checkbox"/> SW switch	⑫	DC (■)
1-10 <input type="checkbox"/> 10-100 ms switch	⑬	1-10
TIME A	⑭	Mid-position
TIME B	⑮	Mid-position
PRESET	④	Mid-position

After the above initial setting is over, turn on the POWER switch.

The digital ammeter will indicate "0.00A" and voltmeter will indicate between "-0.80 to 0.4V."

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## 2.4 Constant Current Mode

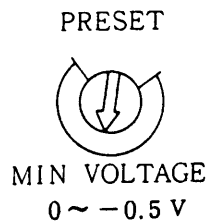
Features of the constant current mode of operation are as follows:

- o The Load draws a constant current.
- o The Load acts starting by zero volts of loading input voltage. In order to allow up to 0.5 V of voltage drop in the loading wires, the Load end voltage can be preset down to -0.5 V with the PRESET function (refer to (1) which follows).
- o The loading current can be switched for dynamic test.

### (1) PRESET Function

The lowest operating input voltage of the Load is adjustable for a range of -0.5 to 0 volts with the PRESET control (4). When the input terminal of the Load is made open, the preset voltage appears at the terminal. For presetting, proceed as shown in Table 2-4-1.

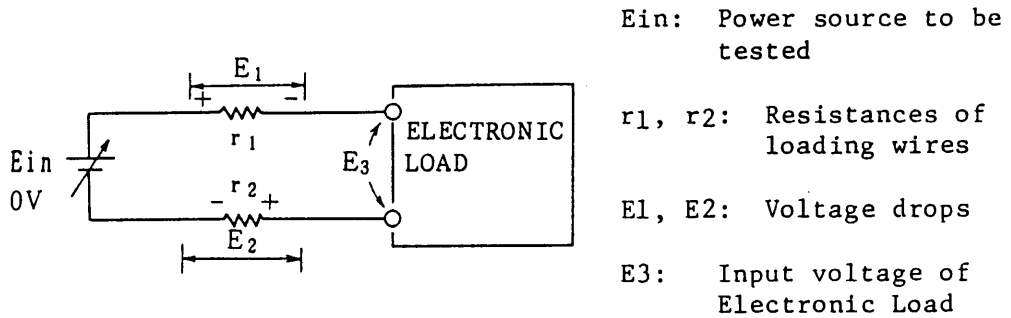
Table 2-4-1



1. Make initial setting as described in Section 2.3.
2. Turn ON the LOAD switch.
3. Turn clockwise the LOAD A knob by one turn or more.
4. Turn ON the POWER switch.

When the above procedure is done, the voltmeter will indicate the voltage which appears at the open DC INPUT terminal. The voltage is adjustable for a range of 0 to -0.5 volts or more with the RESET control. Normally, set the voltage at zero volts.

PRECAUTION: By presetting a negative voltage, the voltage drops in the loading wires can be compensated for and a loading current can be drawn down to a level of  $E_{in} = 0$  V. Note that, when in this state, the Electronic Load is able to act as a power source and feed out a current. Exercise care not to short the input terminal when in this state.



$$E_3 = E_{in} - (E_1 + E_2)$$

When  $E_{in} = 0$  V

$E_3 = -(E_1 + E_2)$  ..... Input of Electronic Load is negative.

Figure 2-4-1

(2) Connection to DC Power Source

Connect the DC power source to be tested to the Electronic Load as shown in Figure 2-4-2.

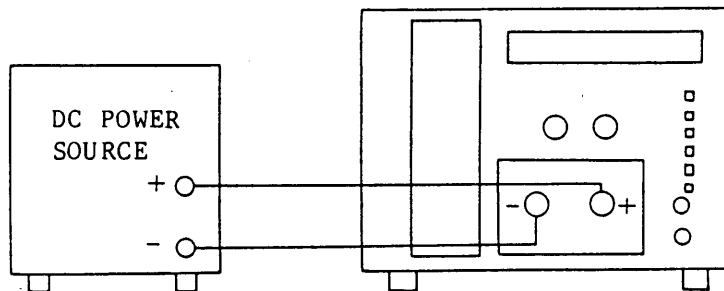
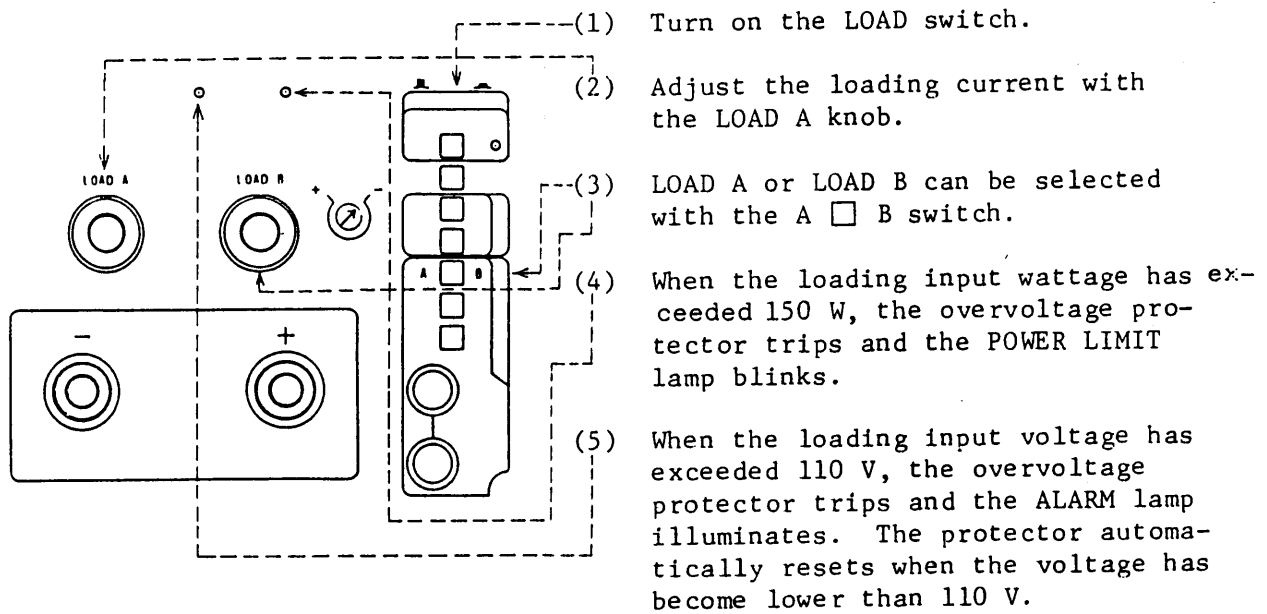


Figure 2-4-2

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### 2.5 Constant Resistance Mode

When in this mode the Electronic Load operate as a resistive load with characteristics as shown in Figure 2-5-1. The resistance is continuously variable with the LOAD A or LOAD B knob.

0.1  $\Omega$  range: 0.1 - 2  $\Omega$  or more, continuously variable

1  $\Omega$  range: 1 - 20  $\Omega$  or more, continuously variable

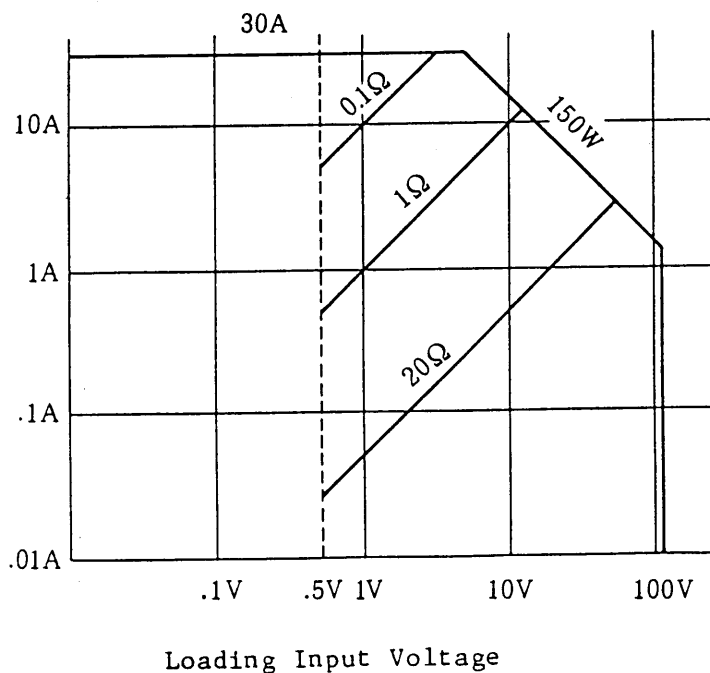
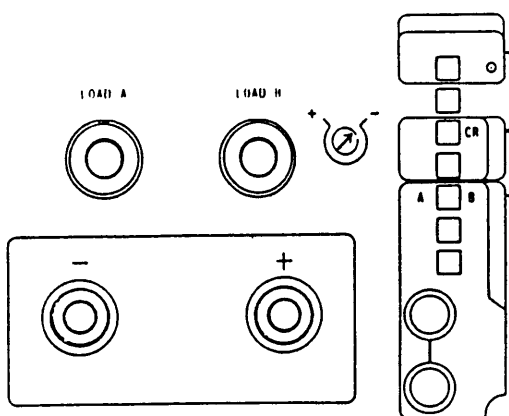


Figure 2-5-1

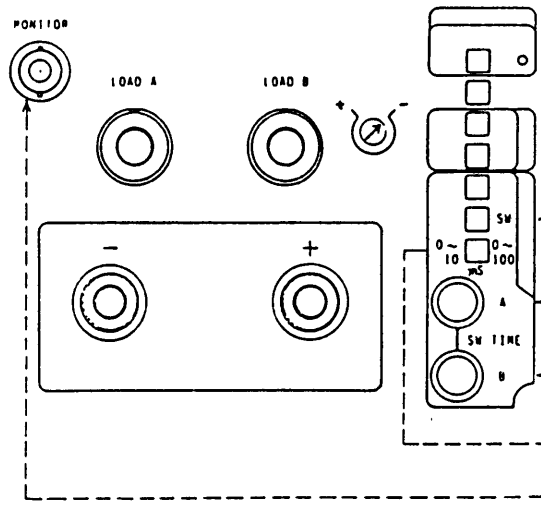
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- (1) Set the CC  CR switch to CR ()
- (2) Turn on the LOAD switch.
- (3) LOAD A or LOAD B can be selected with the A  B switch.
- (4) The function of the POWER LIMIT and ALARM lamps are identical with those of Section 2.4.

### 2.6 Switching Mode

The loading current can be switched for transiiential response test of a power source. This can be done when the Electronic Load is either in the constant current mode or in the constant resistance mode.



- (1) Set the Electronic Load to the constant current or resistance mode as described previously.
- (2) Set the DC  SW switch to the SW () state. The loading current will be switched between the levels set by the LOAD A and LOAD B knobs.
- (3) The switching periods are adjustable with the TIME A knob for the LOAD A current and with the TIME B knob for the LOAD B current.
- (4) Switching period range selector
- (5) Loading current monitor terminal (See Figure 2-6-1 for an example of switched loading current.)

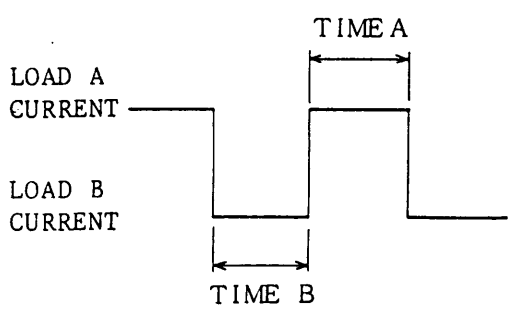


Figure 2-6-1

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## 2.7 External Sensing with Voltmeter

The voltmeter on the front panel of the Electronic Load can be operated for external sensing as described in this section.

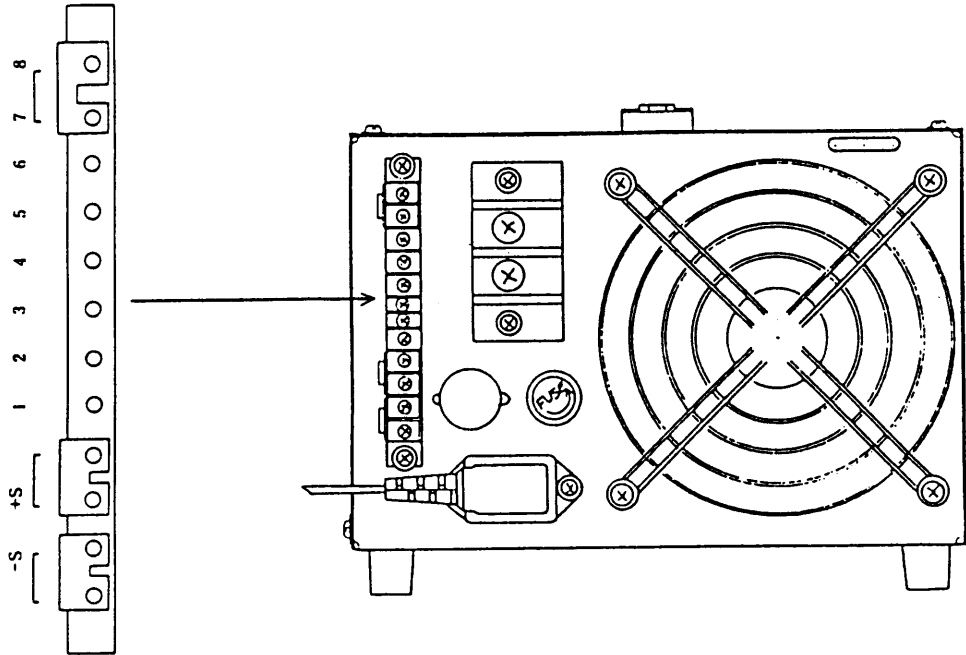


Figure 2-7-1

- (1) The input circuit of the voltmeter is connected to the +S and -S terminals of the control terminal block on the rear panel. See Figure 2-7-1
- (2) Disconnect the shorting pieces (22) and connect the input circuit of the voltmeter directly to the output circuit of the power source to be tested.

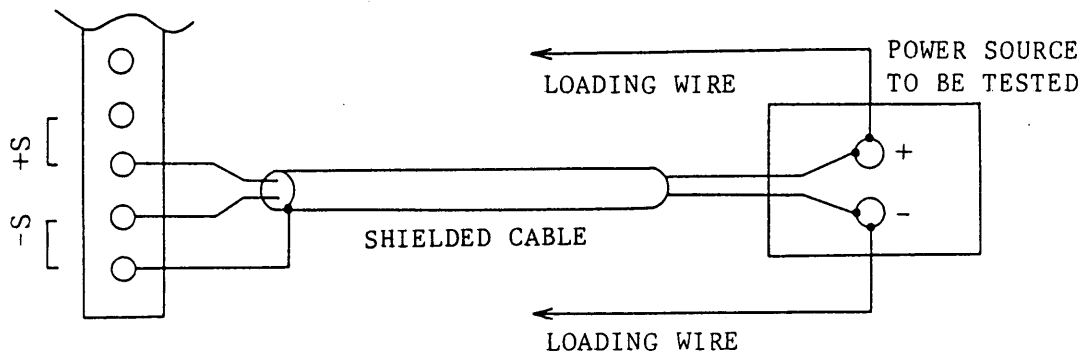


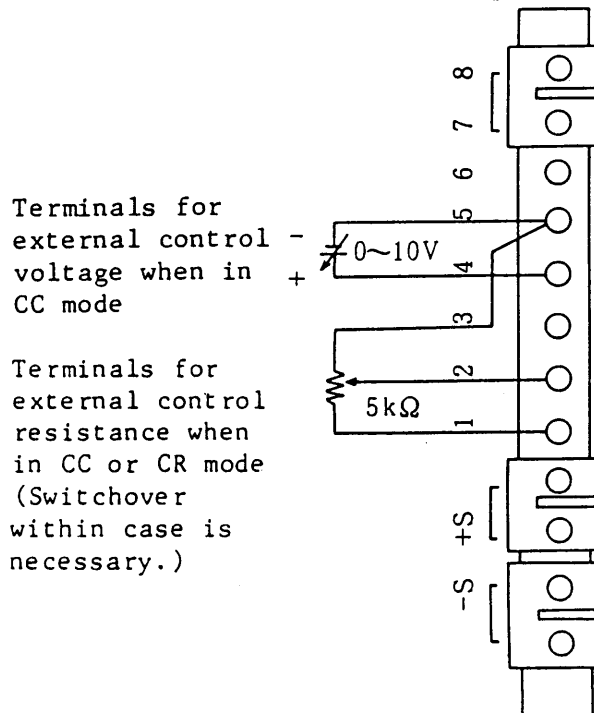
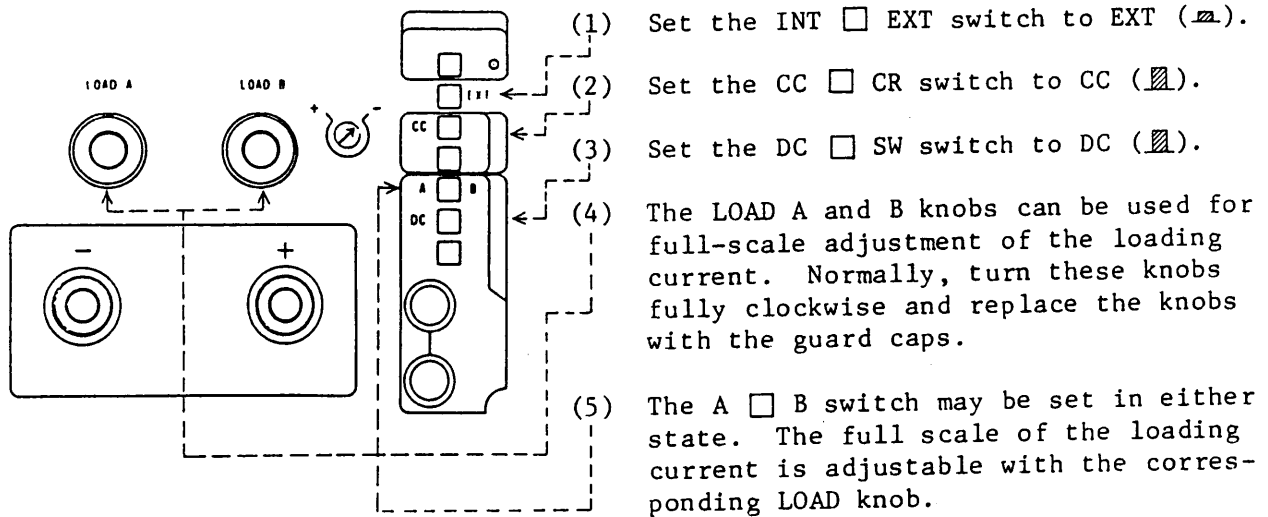
Figure 2-7-2

**PRECAUTION:** Connect the loading wires to the DC INPUT terminal on the front or rear panel of the Load. Do not connect them to the control terminals.

## 2.8 Remote Control When in Constant Current Mode

When in the constant current mode, the Load can be remote-controlled with an external voltage or resistance signal.

### (1) Remote Control with Voltage Signal



Apply an external control voltage to terminals 4 and 5 of control terminal block (23) . (See Figure 2-8-1.)

With an external control voltage of 0 - 10 V, the loading current can be controlled for 0 - 30 A.

Figure 2-8-1

(2) Remote Control with Resistance Signal

The Load can be remote-controlled with an external resistance signal when in the constant current or resistance mode. This remote control mode is equivalent to that the LOAD B potentiometer is extended to an outside of the Load. Therefore, this mode is referred to as "EXT LOAD B" mode.

For this control, contact your Kikusui agent because the internal switch must be changed. You must not change the switch.

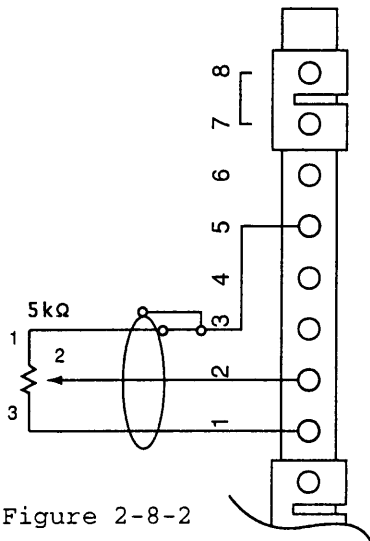
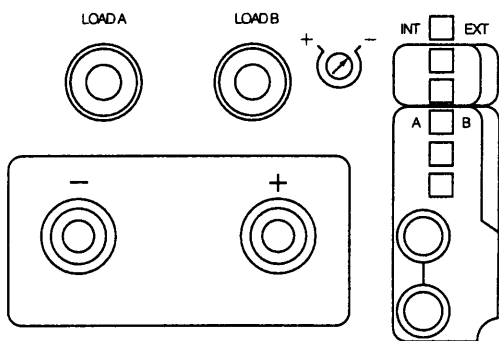


Figure 2-8-2

1. For the external resistance signal source, a 5-k $\Omega$  10-turn potentiometer is most recommendable. Connect the potentiometer to the control terminal block (23) as shown in Figure 2-8-2. For this connection, use a shielded cable to guard against noise.



2. Set the panel switches as follows:

INT  EXT switch: INT (  )  
 A  B switch: B (  )

With the above procedure, the Load operates in the EXT LOAD B mode. All other panel switch and control functions except that of the LOAD B knob remain local.

2.9 Remote Control when in Constant Resistance Mode

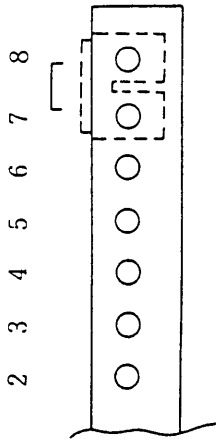
When in the constant resistance mode, the Load can be remote-controlled with an external resistance signal.

For this operation, set the CC  CR switch to CR (  ).

Other operation is same as 2-8-(2).

2.10 Master-Slave Parallel Operation

Two or more Loads can be operated in parallel for larger current capacity, with one of them acting as a master unit to dictate the other units.



- (1) Turn off the POWER switch.
- (2) Remove the shorting piece from between terminals ⑦ and ⑧ of the external control terminal block of the slave unit.
- (3) Connect terminal ⑥ of the external control terminal block of the master unit to terminal ⑦ of that of the slave unit.
- (4) Connect in parallel the DC INPUT terminals of the master unit and slave unit(s) as shown in Figure 2-10-2.
- (5) Make sure that the lengths and cross sectional areas of the loading wires are the same ( $L_1 = L_2 = L_3$ ).
- (6) Set the switches and controls of the slave unit(s) as follows:

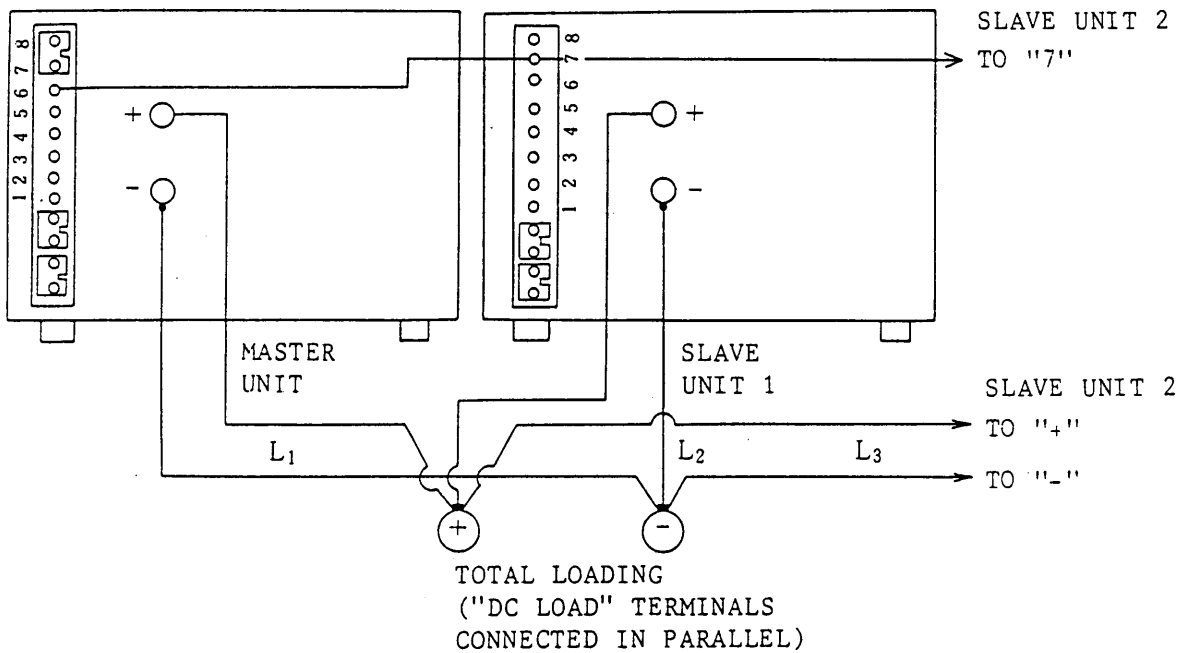
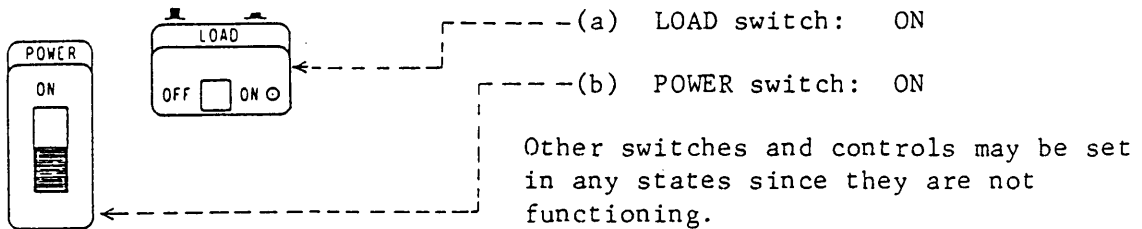


Figure 2-10-2

726/678  
 1000  
 20



With the above procedure, the Loads connected in parallel can be operated in a master-slave mode.

Note: The total of the loading currents of the individual Loads connected in parallel is drawn from the power source to be tested. The individual loading currents may differ by approximately  $\pm 5\%$ .

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### 3. APPLICATIONS

#### 3.1 Examples of Applications in Constant Current Mode

When in the constant current mode the Load draws a constant current irrespective of its input voltage (up to 150 watts). This mode is applicable to various types of constant current discharge tests.

##### (1) Discharge Test of Battery

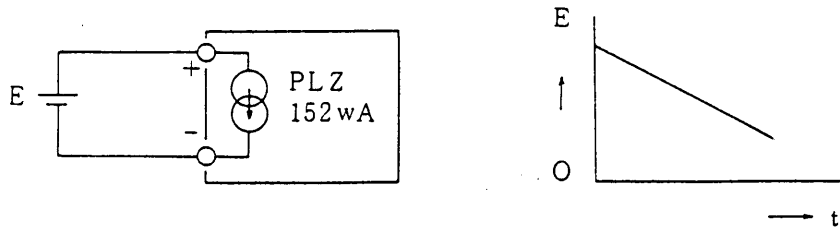


Figure 3-1-1

Figure 3-1-1 shows an example of constant current discharge test of a battery. The Load can draw a current down to zero volts of its input terminal voltage. The test can be remote-controlled.

**PRECAUTION:** The Load draws current even when the voltage has become zero volts. To prevent this, set the PRESET voltage (see Section 2.4 (1)) at zero volts.

##### (2) Discharge Test of Capacitor

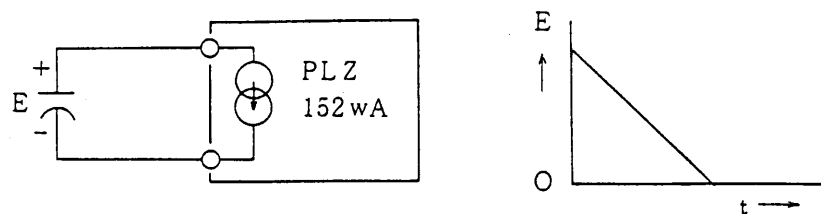


Figure 3-1-2

Figure 3-1-2 shows an example of constant current discharge test of a capacitor. The Load can draw a current down to zero volts of its input terminal voltage. Set the PRESET voltage (see Section 2.4 (1)) at zero volts.

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(3) Test of Regulated DC Power Supply

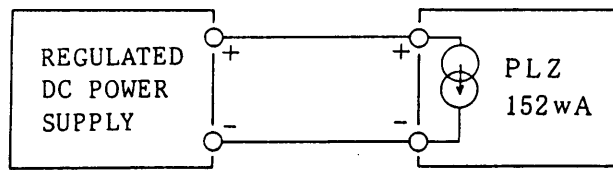


Figure 3-1-3

Figure 3-1-3 shows an example of loading test of a regulated DC power supply. The test can be made up to 30 amperes, 150 watts. The tested items include the following:

- (1) Regulation
- (2) Shorted current
- (3) Transient characteristics
- (4) Aging characteristics

(4) Test of Electric Contacts

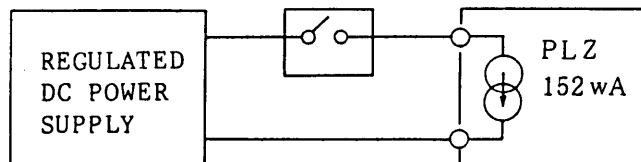
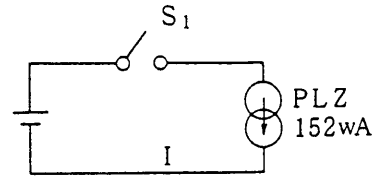
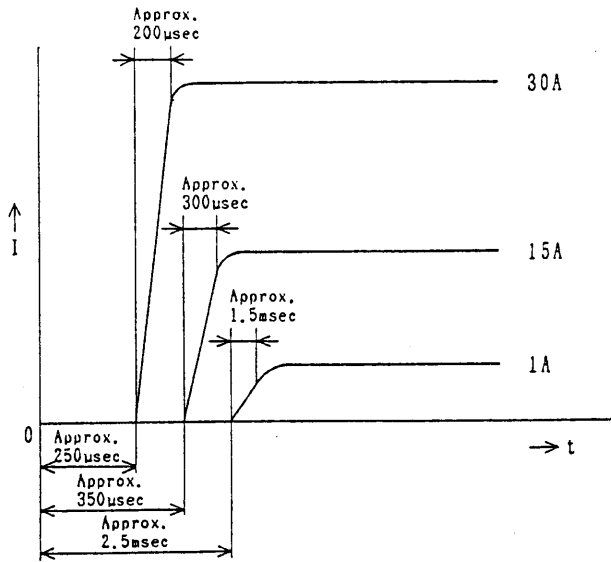


Figure 3-1-4

A setup as shown in Figure 3-1-4 may be used for longevity test or cutout test of relay contacts, circuit breakers or fuses. The response of the Load is rapid and without any substantial rush current as shown in Figure 3-1-5, making the Load applicable even to longevity test of such devices as relay contacts.

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Typical response (start-up of the loading current) of the Load when switch  $S_1$  is closed (at time  $t = 0$ ) is as shown in the left.

Figure 3-1-5

### 3.2 Example of Application in Constant Resistance Mode

When in the constant resistance mode, the characteristics of the Load is similar to that of a regular resistor and the Load draws a current in direct proportion to the voltage applied to the Load.

#### (1) Test of Regulated DC Power Supply

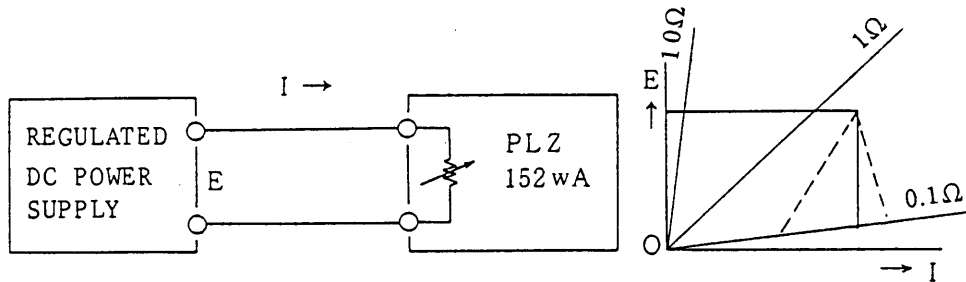


Figure 3-2-1

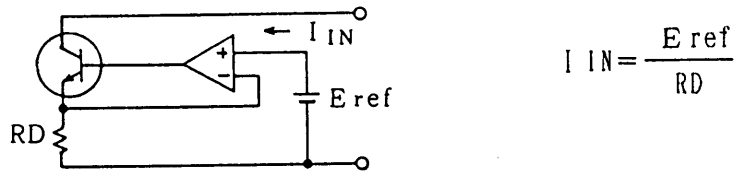
Figure 3-2-1 shows an example of an overcurrent protector. As the OCP trips, the output voltage of the power supply can droop to a voltage of  $0.1 [\Omega] \times I [A]$ .

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## 4. OPERATING PRINCIPLES

### 4.1 Constant Current Operation

Referring to Figure 4-1-1, the error amplifier controls the loading current ( $I_{IN}$ ) so that the voltage drop across the current detecting resistor ( $R_D$ ) becomes equal to the reference voltage ( $E_{ref}$ ).



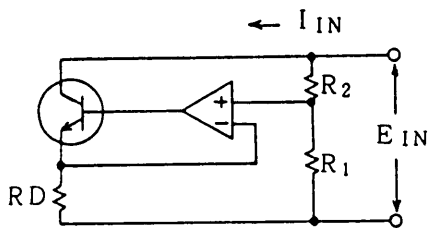
$$I_{IN} = \frac{E_{ref}}{R_D}$$

Figure 4-1-1

Consequently, the loading current ( $I_{IN}$ ) is determined only by the reference voltage ( $E_{ref}$ ) and the detecting resistor resistance ( $R_D$ ) irrespective of the loading voltage, thereby drawing a constant loading current.

### 4.2 Constant Resistance Operation

Referring to Figure 4-2-1, the error amplifier controls the loading current ( $I_{IN}$ ) so that it is directly proportional to the loading voltage ( $E_{IN}$ ).



$$I_{IN} = \frac{R_1}{R_1 + R_2} \cdot \frac{E_{IN}}{R_D} = \frac{E_{IN}}{R_E}$$

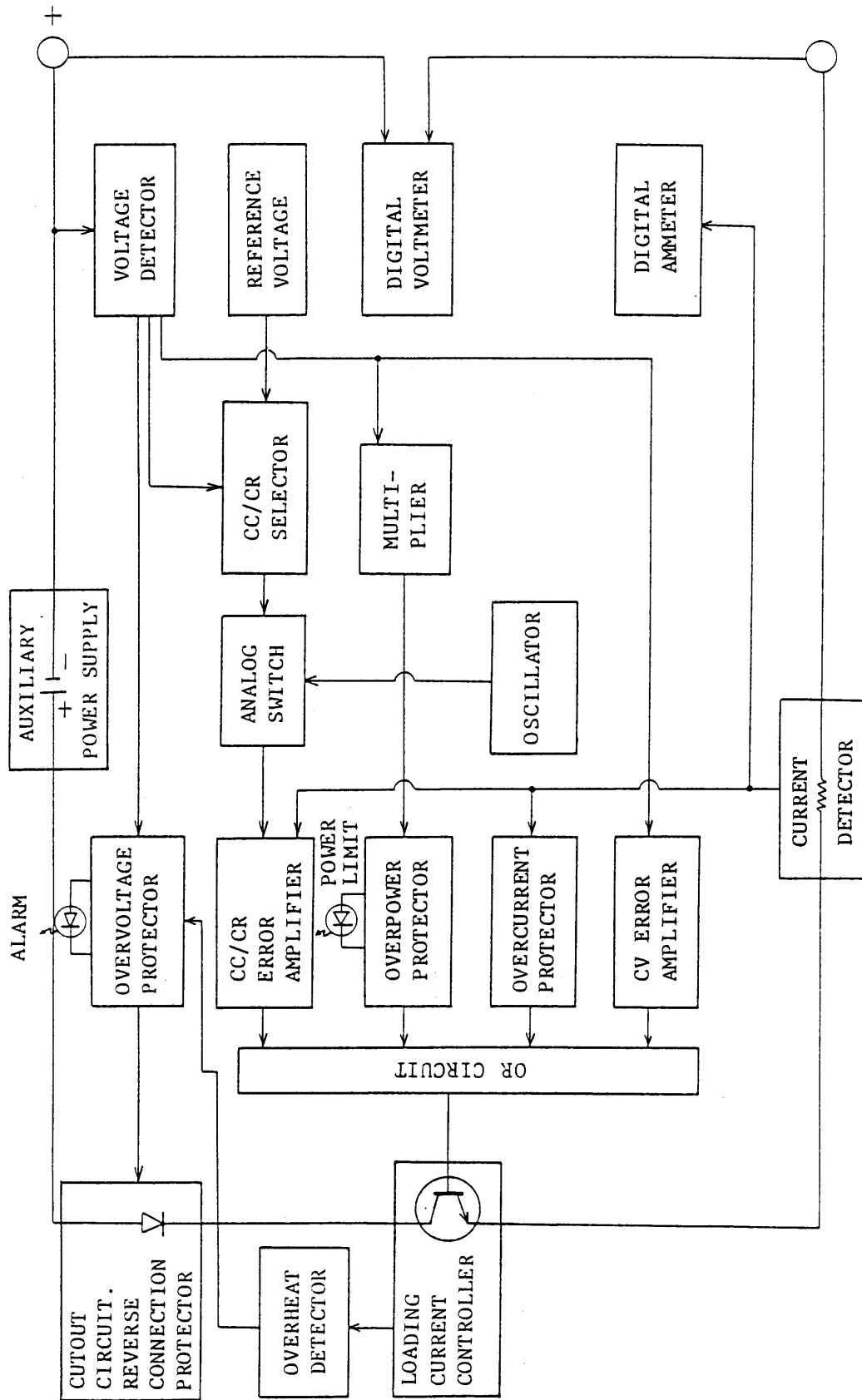
where,  $\frac{1}{R_E} = \frac{R_1}{R_1 + R_2} \cdot \frac{1}{R_D}$

Figure 4-2-1

The equivalent resistance ( $R_E$ ) as viewed from the input circuit of the Load depends only on the voltage dividing ratio  $\frac{R_1}{R_1 + R_2}$  and detecting resistor resistance  $R_D$ .

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4.3 Block Diagram of PLZ152WA



MODEL PLZ152WA Electronic Load

## 5. MAINTENANCE

The Electronic Load should be inspected, cleaned and calibrated at appropriate intervals.

### 5.1 Cleaning the Dust Filter

Referring to Figure 5-1-1, remove the filter cover and take out the dust filter.

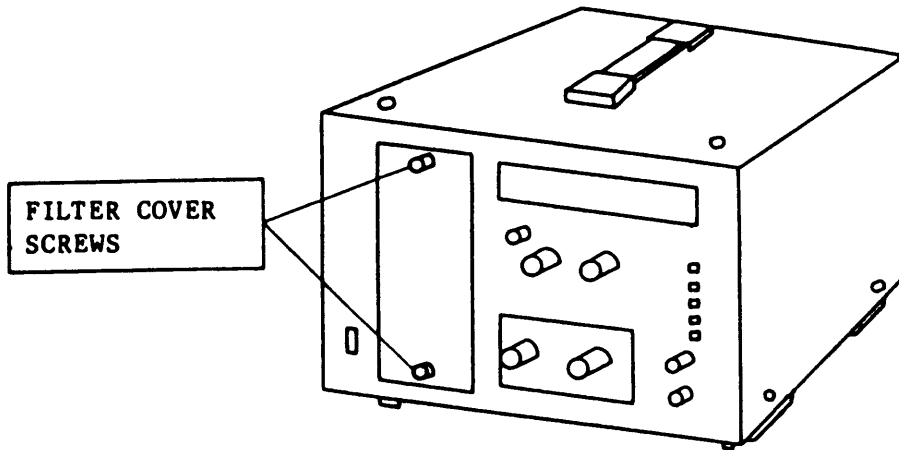


Figure 5-1-1

Clean thoroughly the dust filter and then install it in the original position.

### 5.2 Inspection and Cleaning

(1) When the front panel or case cover panels have become dirty, wipe them using a cloth moistened with a diluted neutral detergent or alcohol, and then wipe them using a dry cloth. Do not use benzine to any kind of thinner. To blow off dust accumulated inside of the case, use a clean and dry compressed air.

(2) Inspecting the Power Cord

Inspect the power cord for damage of the cord and plug.

### 5.3 Calibration

For calibration, contact your Kikusui agent.

## 5.4 Troubleshooting

Basic procedures for troubleshooting are shown in Table 5-1-1. When the Electronic Load is found to be malfunctioning, order your Kikusui agent for repair.

Table 5-1-1

Symptom	Item to be Checked	Probable Cause
No. loading current flows.	1. Is the ALARM lamp not illuminating?	<ul style="list-style-type: none"> <li>o OVP has tripped.</li> <li>o Overheating due to poor ventilation</li> </ul>
	2. Is the POWER LIMIT lamp not blinking?	<ul style="list-style-type: none"> <li>o The loading current has exceeded 150 watts.</li> </ul>
	3. Is the LOAD switch correctly set?	<ul style="list-style-type: none"> <li>o The LOAD switch is set in the OFF state. (Set the switch to the ON state.)</li> </ul>
	4. Is the LOAD switch lamp not illuminating?	<ul style="list-style-type: none"> <li>o If the LOAD switch is off, the Load is overheated. (Cool off the Load and then turn on the POWER switch.)</li> </ul>
	5. Is the INT <input type="checkbox"/> EXT switch correctly set?	<ul style="list-style-type: none"> <li>o The switch is set to EXT. (Set it to INT.)</li> </ul>
	6. Are the shorting pieces of control terminal block (23) correctly fixed?	<ul style="list-style-type: none"> <li>o Loose or disconnected shorting pieces</li> </ul>
The loading current is not adjustable.	1. Is the POWER LIMIT lamp not blinking?	<ul style="list-style-type: none"> <li>o The loading input power has exceeded 150 watts.</li> </ul>
	2. Is the loading current appropriate?	<ul style="list-style-type: none"> <li>o The loading current has exceeded 30 A and the over-current protector has tripped.</li> </ul>
	3. Is the A <input type="checkbox"/> B switch correctly set for the LOAD A or LOAD B knob?	<ul style="list-style-type: none"> <li>o The switch is not correctly set for the knob to be used to adjust the loading current.</li> </ul>

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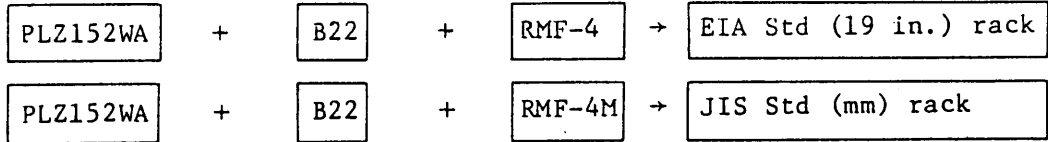


Symptom	Item to be Checked	Probable Cause
Switching of loading current is unsuccessful.	1. Is the DC <input type="checkbox"/> SW switch correctly set?	o The switch is set in the DC ( <input checked="" type="checkbox"/> ) state. (Set it to the SW ( <input checked="" type="checkbox"/> ) state.)
	2. Are the LOAD A and LOAD B knobs correctly set?	o The setting is in the state of LOAD A = LOAD B.
The ALARM lamp illuminates and no loading current flows.	1. Dust filter	o The dust filter has been clogged and the Load is overheated. (Turn off the POWER switch and clean the filter.)
	2. Loading voltage	o The loading voltage is higher than 110 V and the OVP has tripped.
The POWER LIMIT lamp blinks.	1. Loading voltage and current	o The loading wattage has exceeded 150 watts and the overpower protector has tripped.
Remote control with voltage signal is unsuccessful when in the constant current mode.	1. INT <input type="checkbox"/> EXT switch	o The switch is set in the INT ( <input checked="" type="checkbox"/> ) state. (Set it to the EXT ( <input checked="" type="checkbox"/> ) state.)
	2. Polarity of voltage signal	o Polarity is wrong. (Set it correctly as shown in Figure 2-8-1.)
Remote control with resistance signal is unsuccessful.	1. Setting of the slide switch shown in Figure 2-8-2	o The switch is set in the INT position. (Change it to the EXT position.)
	2. Control resistor	o Resistance or connection of the control resistor is incorrect.
Power of the Load cannot be turned on.	1. Fuse	o The fuse has blown out. (Replace the fuse (4 amperes SB).)

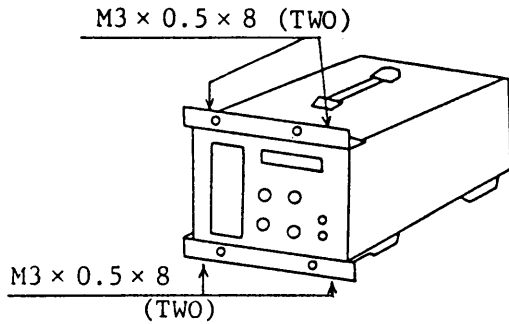
## 6. OPTIONS

### 6.1 Rack Mount

The Electronic Load can be installed on a rack by using B22 Brackets and an RMF-4 or RMF-4M Rack Mount Frame which are available as optional items. Frames are available for an inch rack and a mm rack.



- (1) Fix the B22 brackets to the PLZ152WA using the specified screws.



**PRECAUTION:**

Use M3 x 0.5 x 8 screws. Note that internal components may be damaged if screws longer than 8 mm are used.

Figure 6-1-1

- (2) Install the Load(s) in the RMF-4 (RMF-4M) rack mount frame.

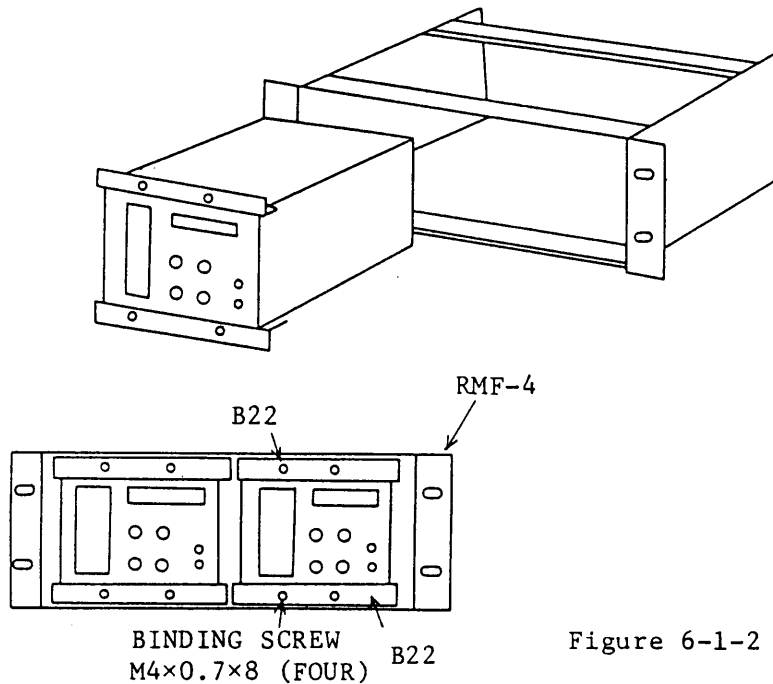


Figure 6-1-2

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