INSTRUCTION MANUAL

FOR

ELECTRONIC LOAD

MODEL PLZ 152W

KIKUSUI ELECTRONICS CORPORATION

1. GENERAL

1.1 Description

The Model PLZ 152W Electronic Load is a highly versatile floating load which may be operated in either Constant Current or Constant Resistance modes. The PLZ 152W provides two levels of loading with automatic switching between them. Built-in protection for the following conditions include: Overvoltage; Overcurrent; Overpower; Overtemperature; and Reverse Polarity connection.

Major features of the PLZ 152W are:

1. Built-in Digital Panel Meter (Volts/Amps).
2. Front panel, ten turn potentiometers for setting load currents.
3. Built-in oscillator for electronic switching between load level settings.
4. Remote control of loads in either Constant Current or Constant Resistance modes.
5. Single control operation of multiple units. Parallel operation in Master/Slave configuration. Any PLZ 152W Electronic Load may be used as either Master or Slave.
6. Built-in automatic reset features on protection circuits.
7. Available as bench top instrument or optional rack-mount configuration. (Either EAI Standard or JIS Standard).

1. Connect the Load to the DC power source to be tested as shown in Figure 2.5.2.

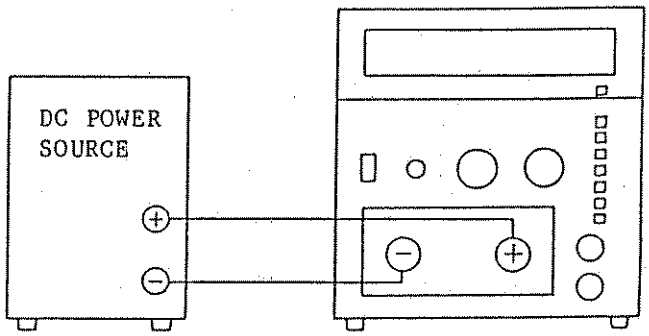
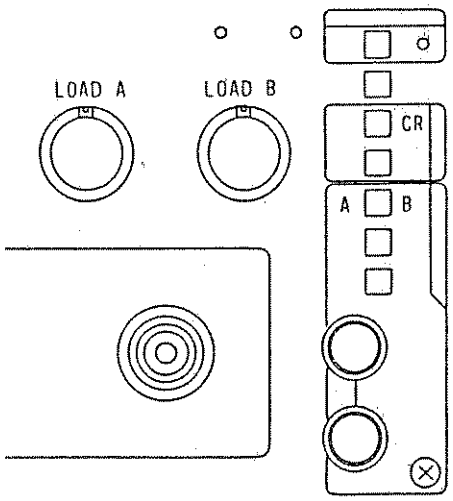


Figure 2.5.2 DC Power Source Connected to PLZ 152W



2. Set the CC/CR switch to CR (in).

3. Set the A/B switch to A (out).

4. Turn the LOAD switch ON (in).

5. Adjust LOAD A control for the desired current reading. The Digital Panel Meter will display the current value.

6. Set the A/B switch to B and vary the LOAD B control. Observe that the current is now set by this control.

7. When power to the LOAD exceeds 150 W, the Overpower Protector circuit operates and the POWER LIMIT lamp blinks, signifying that the output reading is erroneous. The input power must be reduced to within the operating limits of the Load.

8. When the DC input voltage applied exceeds 110 V, the Overvoltage Protection circuit operates and the ALARM LED lights while the DC voltage input is disconnected by the operation of an internal relay. When the DC voltage is reduced to lower than 110 V, the Overvoltage circuit automatically resets.

2.6 Switching Mode

In this mode the PLZ 152W switches between two preset loads. Values of the loads are determined by the setting of the LOAD A and B controls.

CAUTION

When in Switching mode, be certain that the LOAD A and LOAD B controls are not set to the same values!

Switching mode operation may be used in either Constant Current or Constant Resistance operation.

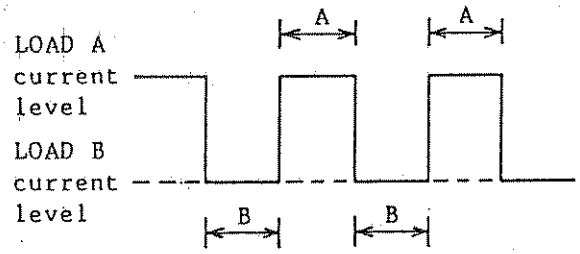
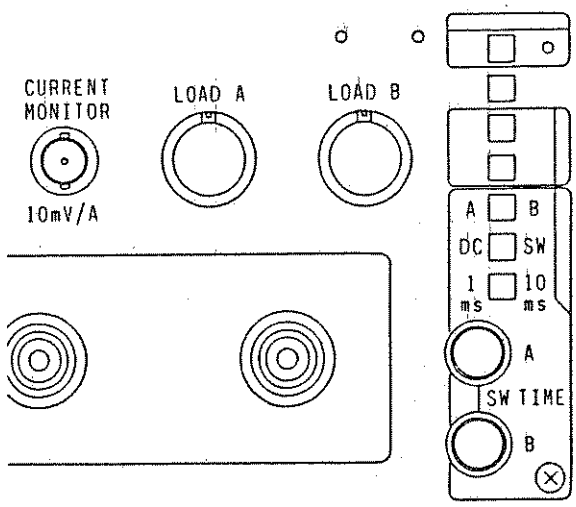


Figure 2.6.1 Waveshape of A and B Switching Signal

Typical uses in this mode include the testing of the transient response time of a power source.

There are two basic time periods available for Switching operation: 1 millisecond and 10 milliseconds. The duration of ON time for LOAD A and LOAD B is determined by the setting of the SW TIME A and SW TIME B controls. See Figure 2.6.1. The maximum period of the waveshape, A+B, is 2 - 20 ms, or 20 - 200 ms.



1. Set the Load up as instructed in Sections 2.4 or 2.5, depending on whether operating in Constant Current or Constant Resistance modes.

2. Set the DC/SW switch to SW (in). The Load will be switched between levels set by the LOAD A and LOAD B controls.

3. Set the 1ms/10ms switch to the period desired as a maximum that LOADS A & B will be on.

4. Periods of current levels desired should be set with the TIME A & B controls.

5. This terminal provides a source for monitoring loading current waveform with an oscilloscope.

2.7 Remote Sensing of Voltmeter

Inputs to the voltmeter are normally connected to the "+"/"-" (DC INPUT) terminals on the Rear Panel Strip through shorting straps. The Voltmeter input may be connected to any remote point by removing the shorting straps and connecting the + S and - S terminals to any remote point through a shielded cable. This feature is provided so that the voltmeter may be operated in the Remote Sense mode. This mode eliminates measurement errors caused by voltage drop in the wires that connect the power source to the Load.

To operate the voltmeter in the remote sense mode proceed as follows:

a. Set the A/V switch to V (in). If the shorting straps are in place, the Digital Panel Meter will indicate the input voltage.

CAUTION

Remove any voltage source from the Load prior to making or changing connections of either shorting straps or shielded cable.

b. Disconnect the shorting straps and connect the shielded cable to the terminals as shown in Figure 2.7.2. The + S and - S terminals may now be connected directly to the power source for Remote Sense operation.

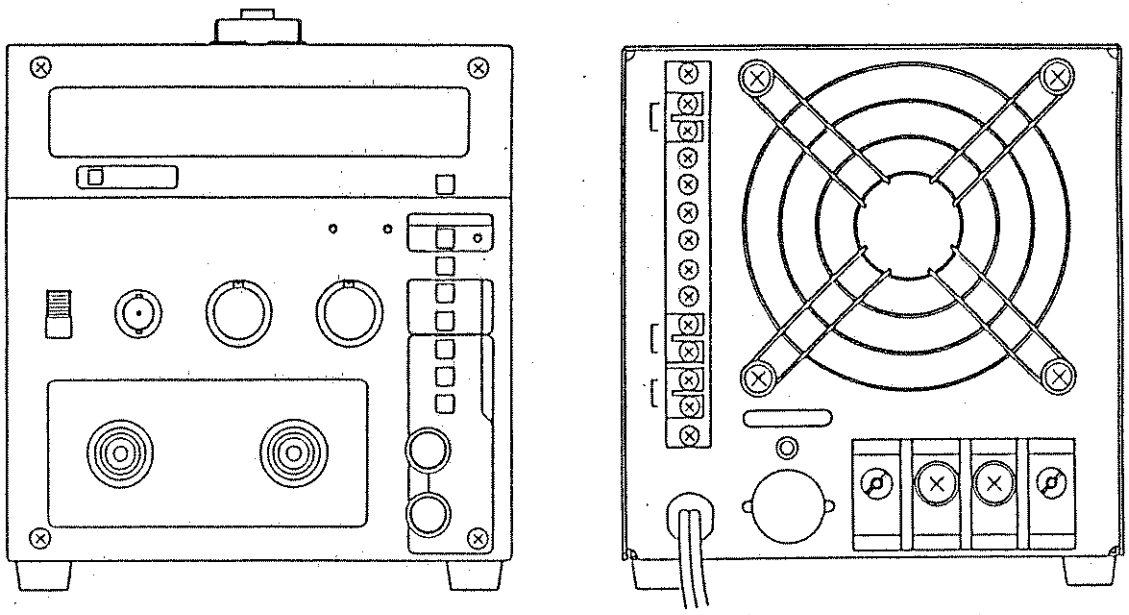
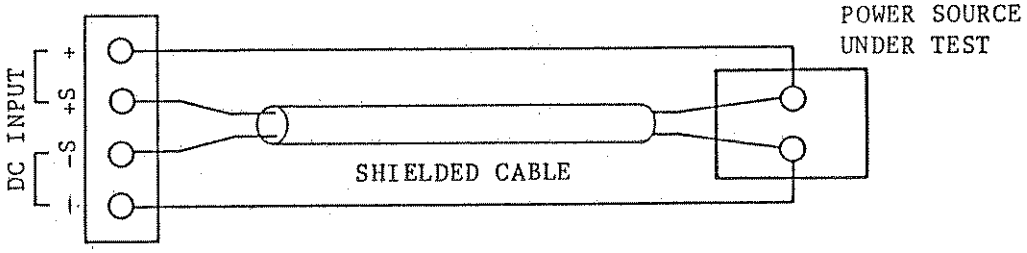


Figure 2.7.1 Front and Rear Views of the PLZ 152W Load



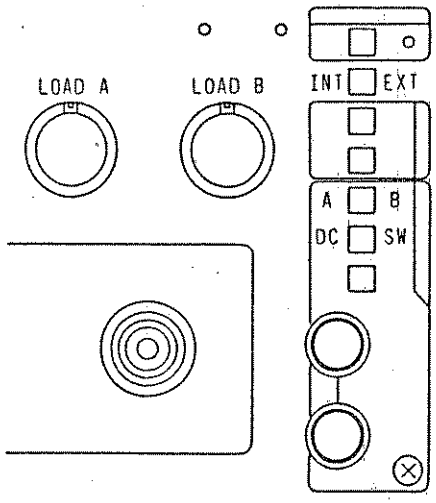
Note that power leads may be connected to the DC INPUT terminals on either the front or rear of the Load.

Figure 2.7.2 Remote Source Connection of Voltmeter

2.8 Remote Control of Constant Current Mode

It is possible to control the PLZ 152W remotely while operating in the Constant Current mode. Remote control may be accomplished by utilization of either an external voltage or a variable resistance. An externally adjustable voltage may be used to control either LOAD A or LOAD B operations. An adjustable resistance may be used to control only LOAD B.

2.8.1 To control the PLZ 152W with an external voltage proceed as follows:



1. Set the INT/EXT switch to EXT (in).
2. Set the CC/CR switch to CC (out).
3. Turn LOAD A and LOAD B controls fully clockwise. These controls determine the maximum load that may applied by the remote voltage. The accessory guard caps may be installed to prevent unintentional resetting of these controls. The Maximum allowable current may be controlled by setting the LOAD A or LOAD B controls to a position less than fully clockwise.
4. Check that the DC/SW switch is set at DC (out). The Switching mode cannot be used in Remote operation.
5. Set the A/B switch to the load that is to be used.
6. Connect a 0 - 10 Volt DC source across Rear Panel Strip terminals 4 and 5 as shown in Figure 2.8.1.

Input/output terminals for master/slave operation

Voltage signal input terminals for remote control of constant current mode

Resistance signal input terminals for remote control of constant current mode or constant resistance mode (Switch setting change within the case needed.)

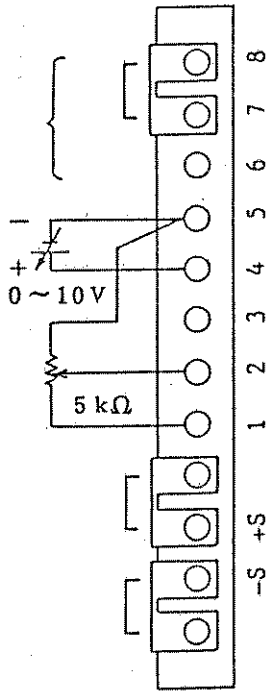


Figure 2.8.1 Remote Voltage Control of Constant Current Mode

2.8.2 Remote Resistance Control of Constant Current Mode

Remote Resistance control is available only for LOAD B channel; because of this restriction it is also referred to as EXT LOAD B mode.

2.8.2.1 To control the PLZ 152W with a variable resistance, proceed as follows:

1. Set the INT/EXT B slide switch to EXT.

   a. Unplug the Load from its AC source and remove any external DC power that may be applied to the Load.

   b. Remove the seven case binding screws shown in Figure 2.8.2 and remove the case.

   c. Locate the INT/EXT B slide switch shown in Figure 2.8.3 and set it in the EXT B (rearward) position.

2.10 Master/Slave Operation

Two or more PLZ 152W's may be operated in parallel using any unit as a master and other(s) as slave(s). This operation is also referred to as Single-control/parallel operation. See Figure 2.10.1.

Use of this mode is convenient when a load of greater capacity than a single PLZ-152W is needed.

2.10.1 To use multiple PLZ 152W's in this manner proceed as follows:

1. Turn POWER switch OFF or disconnect Loads from AC.
2. Place the Loads in close proximity.
3. Fashion shielded jumper wires to connect from the terminal strip of the master to the slave. Repeat this for as many slaves are to be used. Make harnesses to connect each subsequent slave.
4. Connect the jumper leads to Rear Panel Strip terminals 5 and 6 of the master unit.
5. Remove the Rear Panel Strip shorting strap from terminals 7 and 8 of each slave unit.
6. Connect the free end of the shielded jumper to terminals 5 and 7 of the first slave unit.
7. Interconnect the Rear Panel Strip terminals 5 and 7 between all subsequent slave units. DO NOT MIX UP LEADS! See Figure 2.10.1 (A).
8. Connect the DC Source to be loaded to the DC INPUT terminals as shown in Figure 2.10.1 (B).

NOTE Be certain that all source leads are of equal length and of the same gauge wire.

2.10.1.1 Set Front Panel Switches and Controls of SLAVE units as follows:

1. Turn LOAD switch ON (in).

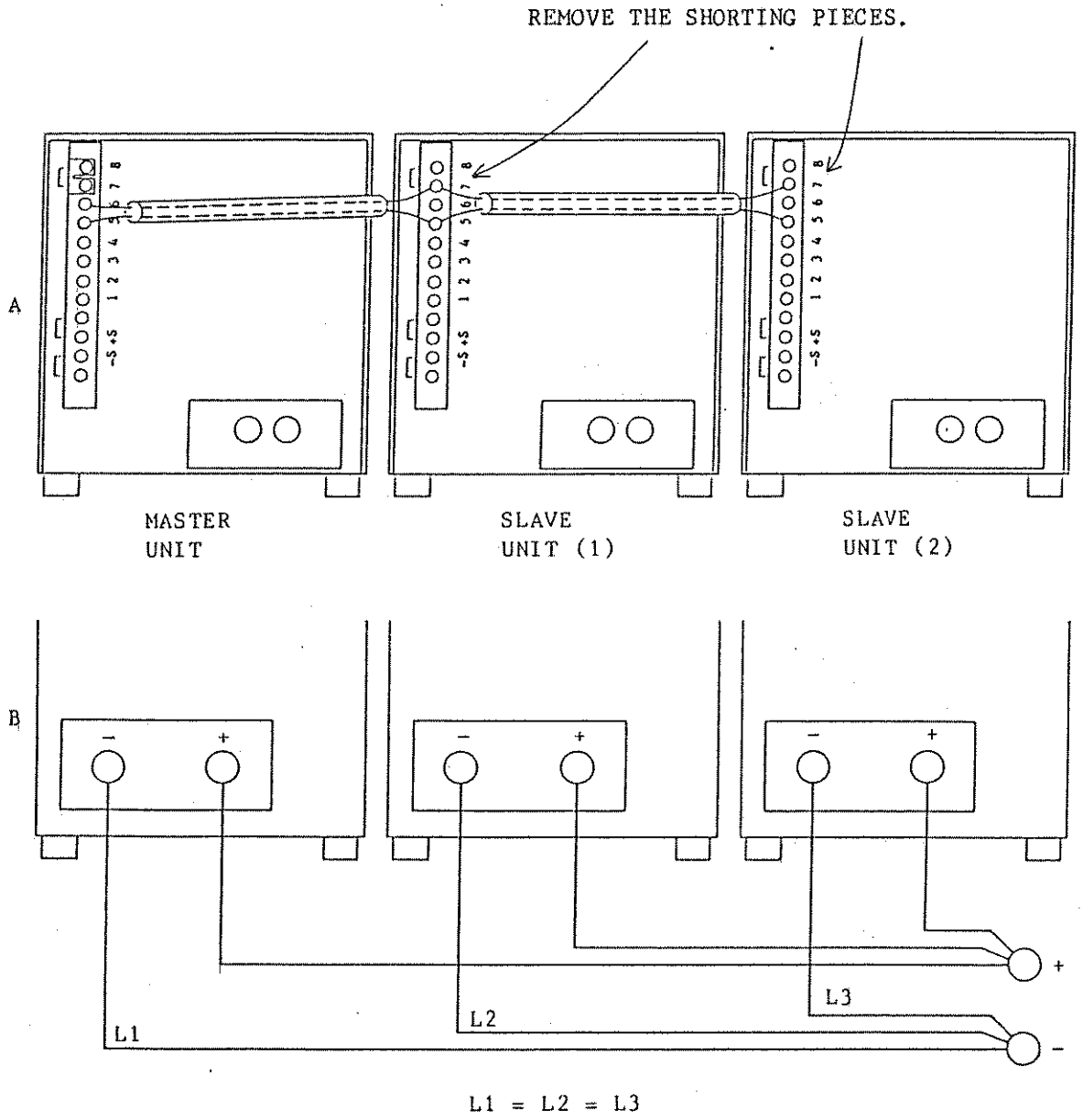
2. Set the A/B switch to A (out).

3. Plug in AC cord and turn POWER ON (in).

NOTES

1. When all switches are properly set, the master will control all units.

2. There may be as much as a 10% difference in loading currents between units due to internal Load component variances and input wiring resistances.



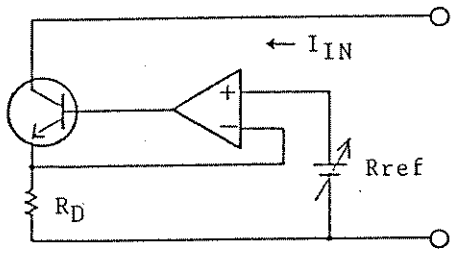
L1 = L2 = L3

Figure 2.10.1

3. OPERATING PRINCIPLES

3.1 Constant Current Operation

In the Constant Current mode the Load draws a fixed amount of current regardless of the applied voltage. This is accomplished by the use of an internal reference voltage source, Eref, and a current detecting resistor, Rd, connected in the negative feedback circuit of an operational amplifier. The operational amplifier drives an active element, Q1, so that the voltage drop across Rd is equal to the reference voltage. In this arrangement the current applied (Iin) is a function of the ratio of Ein/Rd, and not the applied voltage. See Figure 3.1.1.

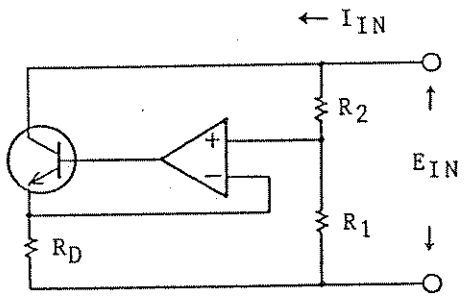


$$I_{IN} = \frac{E_{ref}\ [V]}{RD\ [\Omega]}$$

Figure 3.3.1 Simplified Diagram of Constant Current Control Circuit

3.2 Constant Resistance Operation

In the Constant Resistance mode the PLZ 152W presents a constant load to the applied voltage regardless of the applied voltage. This is accomplished by the use of an internal operational amplifier that uses the positive input as a portion of the applied voltage, and the negative feedback input as a portion of the voltage developed across the internal load. As seen in Figure 3.2.1, the equivalent resistance, Rd, is determined by the ratio between R1, R2 and the current detecting resistor, Rd.



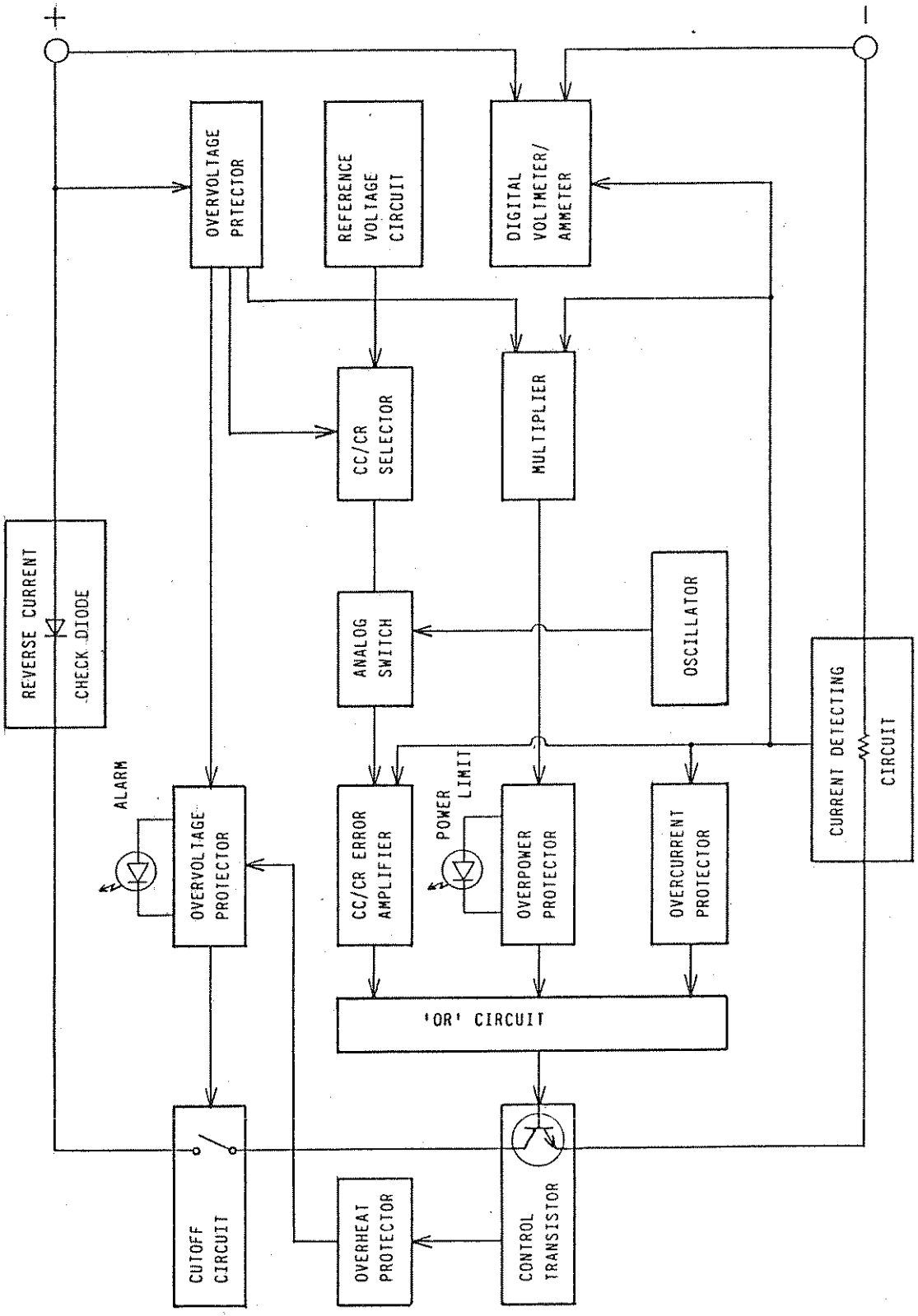
$$I_{IN} = \frac{R_1}{R_1 + R_2} \cdot \frac{E_{IN}\ [V]}{R_D\ [\Omega]}$$

$$= \frac{E_{IN}\ [V]}{R_E\ [\Omega]}$$

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

Figure 3.1.2 Simplified Diagram of Constant Resistance Control Circuit

3.3 Block Diagram Analysis (See Figure 3.3.1)



Block Diagram of PLZ 152W

3.3.1 Reverse Current Blocking Diode

This diode prevents accidental damage to the Load or power source when the power source is connected incorrectly to the Load.

3.3.2 Cutoff Circuit

This circuit opens a relay contact in series with the collector of the control transistor whenever an Overvoltage or Overtemperature condition exists in the PLZ 152W.

3.3.3 Overvoltage Protection

If an excessive voltage is applied (over 110 VDC) to the DC LOAD terminals the Overvoltage detector will trip the Overvoltage Protector which in turn operates the Cutoff relay. The condition will be indicated by the illumination of the red ALARM LED.

3.3.4 Overtemperature Protection

An internal temperature detector will cause the cutoff relay to operate if the control transistor is subjected to too much heat. The condition will be indicated by the illumination of the red ALARM LED.

3.3.5 Control Transistor

The control Transistor is the basic load of the PLZ 152W. It is controlled by any of three sources which are connected to it through an "OR" circuit.

3.3.6 "OR" Circuit

Output voltage drives the "OR" circuit. Input is from CC/CR Error Amplifier or the Overpower Protector or the Overcurrent Protector.

3.3.7 CC/CR Selector

The CC/CR Selector chooses the basic mode of the CC/CR Error Amplifier. When the PLZ 152W is operated in the Constant Current Mode, the Reference Voltage circuit provides the necessary voltage.

3.3.8 CC/CR Error Amplifier

The CC/CR Error Amplifier drives the Control Transistor through the "OR" circuit.

3.3.9 Overpower Detection

In the event that too much power is applied to the PLZ-152W, the Overpower Protector will cause the Control Transistor to reduce current to an acceptable operating level. The POWER LIMIT LED will blink at this time.

3.3.10 Overpower Protection

CC/CR Error Amplifier controls the amount of current passing through the control transistor. When too much power is applied to the Load this circuit will limit the Control Transistor current flow.

3.3.11 Multiplier Circuit

The Multiplier circuit performs the mathematical function of I×E to provide the power quotient for the Overpower circuit.

3.3.12 Overcurrent Protection

In the event that more than 30 A is applied to the PLZ-152W, the Current Protection Circuit will cause the Control Transister to reduce the load current to an acceptable operating level. No front panel indication will be given.

3.3.13 Switching Circuitry

The PLZ-152W is capable of switching a power source between two loads. This is accomplished by the Oscillator driving the Analog Switch at a rate of either 1 Kilohertz or 100 Hertz, depending upon the setting of the Front Panel 1mS/10mS switch.

3.3.14 Digital Voltmeter/Ammeter

The input voltage or current may be measured by the built in Digital Panel Meter. This meter may be used as a voltmeter only in Remote Sense mode, and will measure signals from any connected source. (See Section 2.7).

d. Replace the case and reconnect the Load to the AC and DC power sources.

2. Fashion a three lead shielded cable to a variable resistance (5k ohms recommended) and attach it to terminals 1, 2 and 5 of the Rear Panel Strip as shown in Figure 2.8.4.

3. Set the front panel controls as follows:

   a. Set the INT/EXT switch to INT (out).

   b. Set the A/B switch to B (in).

2.9 Remote Control of Constant Resistance Mode

To operate the PLZ 152W remotely in the Constance Resistance Mode proceed as follows:

1. Set the CC/CR Switch to CR (in).

2. Proceed as in section 2.8.

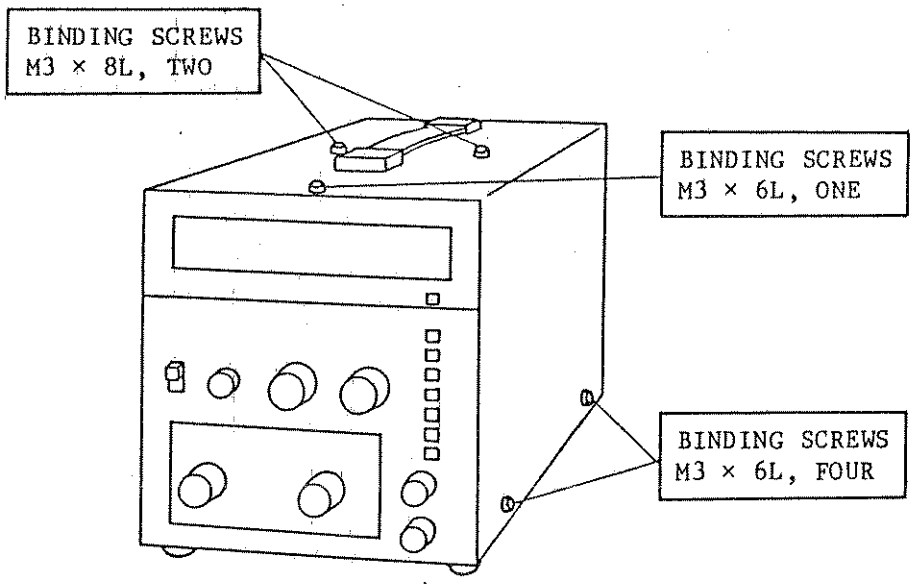


Figure 2.8.2 Case Binding Screws Location

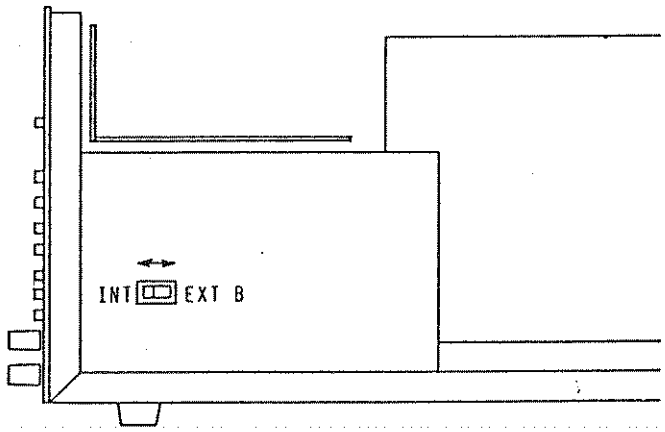


Figure 2.8.3 Location of INT-EXT Switch
(Located inside case)

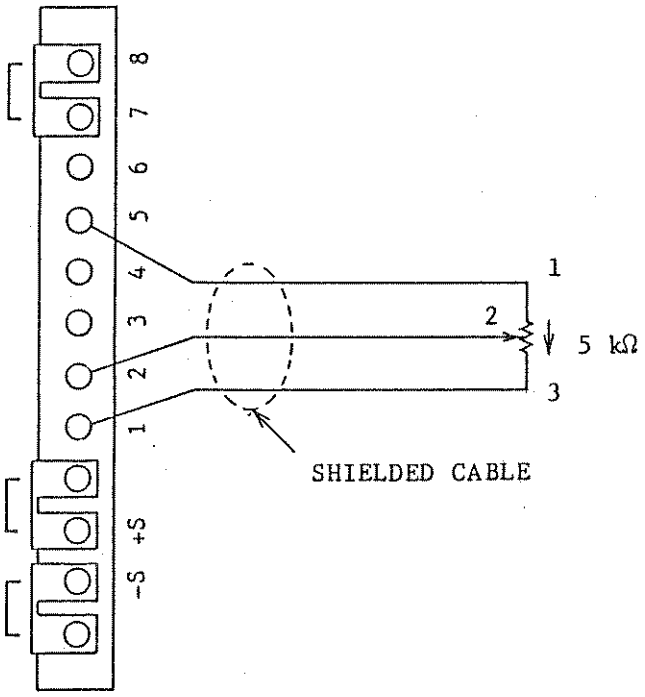


Figure 2.8.4 Rear Panel Terminal Strip Connections
for External Resistance Control

1.2 Specifications

Item	Specification
Model	PLZ 152W
Power Requirements	
Line Voltage	120 VAC ±10%, 50/60 Hz single phase Switchable to 240 VAC ±10% (Outside US)
Power Consumption	Approx. 30 VA
Input	
Loading Voltage	4 - 110 VDC
Loading Current (resolution)	0 - 30 A (30 mA)
Maximum Loading Power	150 W
Modes	
Constant Current	0 - 30 A and 0 - 3.0 A (two ranges; continuously variable)
Constant Resistance	0.1Ω and 1Ω (two ranges; continuously variable from minimum 0.13Ω)
Constant Current characteristics	
Stability	±0.1% + 5 mA for loading voltage variation of from 4 V to 110 VDC ±0.1% + 5 mA for line voltage variation of 10%
Ripple and Noise	5 mA rms (5 Hz - 1 MHz)
Temperature Coefficient	Approx. 0.02% per deg. C
Constant Resistance Characteristics	
Stability	±0.1% + 5 mA for line voltage variation of 10%
Temperature Coefficient	Approx. 0.02% per deg. C
Remote Control	
Constant Current	External Voltage 0 to 10 VDC (Input Resistance is 10 kΩ) External Resistance is 0Ω to 5 kΩ
Constant Resistance	External Resistance is 0Ω to 5 kΩ
Protection Features	
Overvoltage Protection	Trips at approx. 115 VDC
Overcurrent Protection	Trips at approx. 31 A DC
Overpower Protection	Trips at approx. 155 W
Reverse-Polarity Protection	Reverse Current Blocking Diode

Item	Specification
Overtemperature Protection	Trips at internal temperature of 100 deg. C ±5 deg. (212 ±9 deg. F)
Input Fuse	1 A
Digital Volt/Ammeter	
Maximum Effective Display	1999
Auto-Ranging (Voltmeter Only)	19.00 V Maximum reading in low range 199.9 V Maximum reading in high range
Voltmeter Accuracy	±(0.1% of rdg + 0.1% of FS + 1 digit)*
Ammeter Accuracy	±(0.5% of rdg + 0.1% of FS + 1 digit)*
Indication of Overpower Protection Activation	Blinking Yellow LED
Indication of Overpower or Overheat Protection Activation	Lighted Red LED
Parallel Operation	May single-control multiple units
Current Monitor Output	10 mV/A at BNC terminal
Switching Oscillation	
Switching Period	1 to 10 ms & 10 to 100 ms ranges
Switching Transition Time	Less than 150 µs @ 30 A load
Ambient Temperature Range	0 to 40 deg. C (32 to 104 deg. F)
Ambient Humidity Range	10 to 90% Relative Humidity
Cooling System	Forced air, fan assisted
Input Voltage to Chassis	
Between DC Input Terminal and Chassis	250 V DC
Insulation Resistance	
Between DC Input & Chassis	20 Megohms or over, @ 500 VDC
Between AC Line & Chassis	30 Megohms or over, @ 500 VDC
Overall Dimensions	5.67" W × 5.26" H × 15.9" D (144 mm W × 159 mm H × 405 mm D)
Net Weight	Approx. 11 lbs. (5 kg)
Standard Equipment	
Instruction Manual	1 copy
Control Guard Caps	2
Optional Accessories	See Section 5

* 23 deg. C ±5 deg. (73.4 deg. F ±9 deg.), 85% RH or less

2. OPERATION

2.1 Preliminary

2.1.1 Unpacking and Inspection

The PLZ152W comes from the factory fully calibrated and ready to use. Immediately upon receipt of the instrument inspect it for physical damage. If any damage is discovered, notify the carrier and/or Kikusui International Corp. at once.

2.1.2 Setup

Check line voltage.

a. 120 VAC ±10% in US; 240 VAC ±10%, International; @ 50/60 Hz.

2.1.3 Operating Precautions

a. Never apply AC voltage to the DC INPUT terminals.

b. Do not operate outside the DC input range of 4 VDC to 110 VDC. (See Figure 2.1.1).

c. Always connect the DC voltage with the positive lead connected to the + DC INPUT terminal and the negative lead connected to the - DC INPUT terminal.

d. Be certain the DC input voltage applied does not contain high frequency noise spikes that exceed the limitation of the instrument. (See Figure 2.1.2, Example 1).

e. Be certain that the DC input voltage applied does not exceed the lower limitation of the instrument. (See Figure 2.1.2, Example 2).

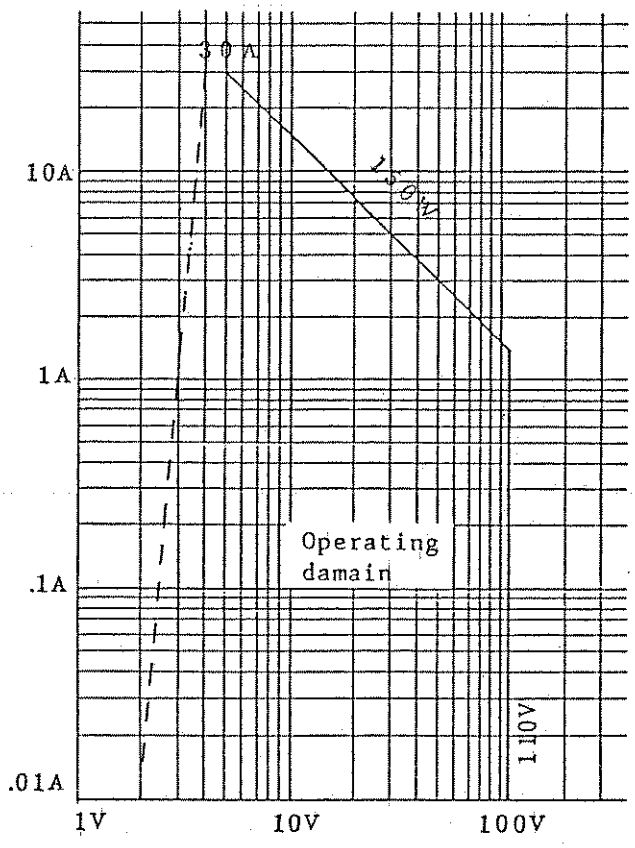


Figure 2.1.1

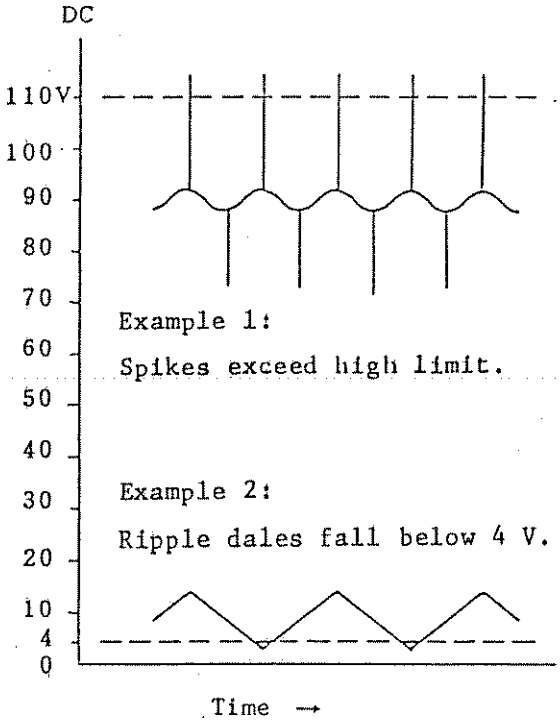


Figure 2.1.2

CAUTION

It is possible to apply short duration pulses which do not cause the Overvoltage or Overpower circuits to respond. In such a case damage to the load may occur. If it is suspected that high amplitude, high frequency pulses are present in the load source power, steps must be taken to inhibit such voltage components. (See Figure 2.1.2, Example 1).

f. Electrical connections to load.

When testing power sources it is necessary to keep the connecting wires as short as practicably possible. The "+" and "-" leads should be twisted to reduce EMI pickup while operating in the Switching mode.

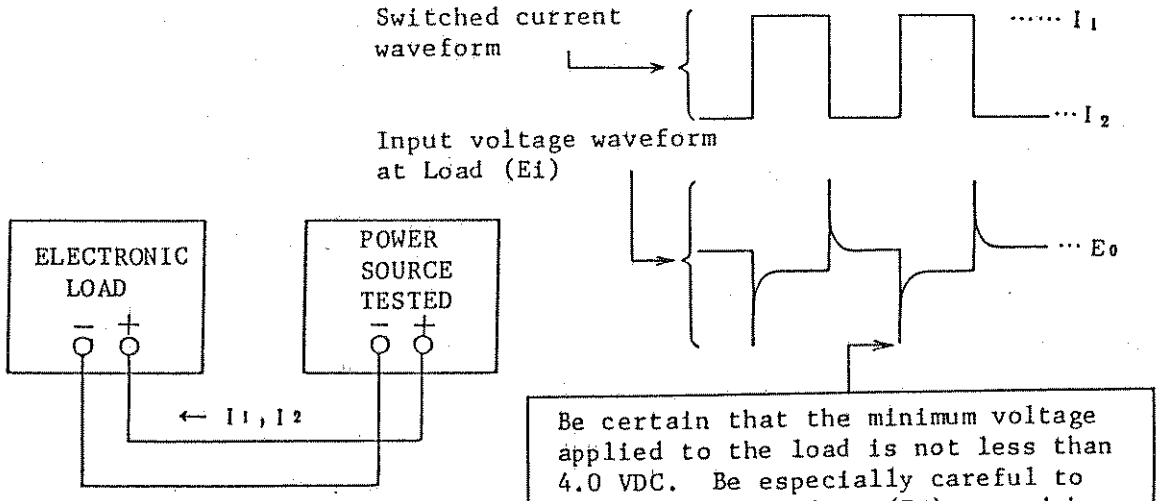
CAUTION

While the Load is being operated in the Switching mode it is possible that the voltage drop caused by the inductance of the connecting wires may cause the Load voltage to fall below the lower limit of the load. (See Figure 2.1.3.)

g. It is recommended that wires of at least 12 gauge (14 mm square cross section) be used. Length not to exceed 10' (3 m).

h. If the connecting wires pass through connectors or other resistance producing devices, voltage drops across such devices must be considered during use.

i. If the input power to the load exceeds the maximum allowable input power (150 W) while operating in the Switching mode, the Overpower Protector will trip. The switched current in this case will be as shown in Figure 2.1.4. As the wave shape indicates, when excessive power is applied, the Load will limit current to 30 A for the majority of the time that the 150 W limit is exceeded. Erroneous meter readings will result as well.



$$Ed = L\frac{di}{dt}$$

L: Wiring inductance

$\frac{di}{dt}$: Current change in unit time (A/sec)

Figure 2.1.3

84 36 37

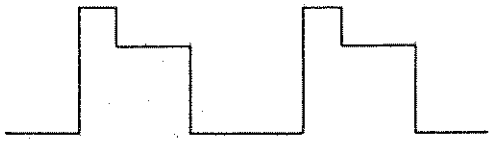


Figure 2.1.4

j. Operating Environment

Operating temperature range for the PLZ 152W is 32 to 104 degrees F (0 to 40 degrees C).

If the load is operated in a high ambient temperature environment or if its air inlet or outlet holes are blocked, the overtemperature detector will operate. In the event of such a situation, remove the obstruction or reduce the ambient temperature. When the problem is cleared the Overtemperature Detector will automatically reset.

CAUTION

The PLZ 152W should be operated only under conditions of:

1. Unrestricted air flow.
2. Relatively low humidity and minimal dust.
3. On a surface that is free of vibration.

k. Guard Caps. (See Figure 2.1.5)

Guard caps are provided to protect against inadvertent or unauthorized altering of the front panel current control settings. To install the caps proceed as follows:

1. Remove the normal knobs and collars from the controls.
2. If it is desired that the controls be adjustable with a small screw driver, break through the front surfaces of the guard caps with a small screwdriver or other pointed tool.

3. Screw the guard caps into the front panel to cover the control shafts.

Detach knob and collar. Screw-in the guard cap.

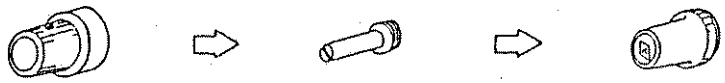


Figure 2.1.5

1. Rear Panel Strip.

The Rear Panel strip (See Figure 2.1.6) has three shorting straps on it. Make certain that these straps are securely connected.

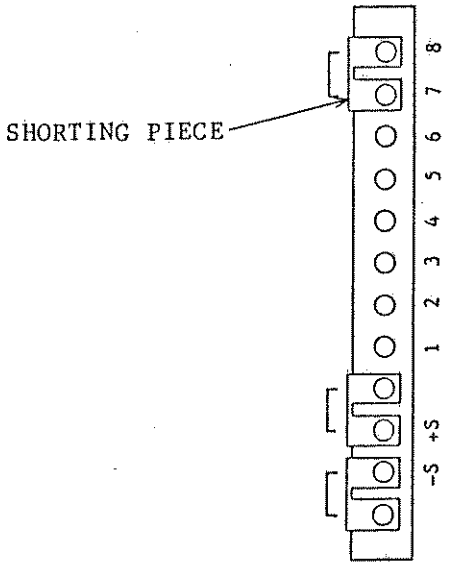


Figure 2.1.6

2.2 Controls and Connectors

2.2.1 Front Panel (See Figure 2.2.1)

1.	POWER	AC line power ON/OFF.
2.	LOAD	DC input circuit switch. Automatically cuts off when Overvoltage or Overtemperature Protectors trip. When tripped, the red LED illuminates.
3.	VOLTMETER/AMMETER	3 1/2 digit panel meter. As a voltmeter it has Auto-Ranging, and a "V" is displayed. In the ammeter function an "A" is displayed.
4.	V/A	Push button switch that selects digital panelmeter function. Out = Amps, In = Volts.
5.	LOAD A	Ten turn potentiometer that sets LOAD A. Used for both Constant Current and Constant Resistance.
6.	LOAD B	Ten turn potentiometer that sets LOAD B. Used for both Constant Current and Constant Resistance.
7.	DC INPUT	DC input terminals to the load. Left = -, Right = +.
8.	INT/EXT	Push button switch that selects local or remote operation. Out = INT, In = EXT.
9.	CC/CR	Push button switch that selects Constant Current or Constant Resistance modes. Out = CC, In = CR.
10.	30A / 3A 0.1Ω 1Ω	Push button switch that sets the range of the Load. Out = 30A or 0.1 ohm, In = 3A or 1 ohm.
11.	A/B	Push button switch that selects load A or B Out = A, In = B.
12.	DC/SW	Push button switch that selects either DC or Switching modes. Out = DC, In = Switching. May be used in either CC or CR modes.
13.	1mS/10mS	Push button switch that selects switching time range. Out = 1ms, In = 10ms.
14.	A (TIME)	Control that sets the ON time for load A while operating in Switching mode.
15.	B (TIME)	Control that sets the ON time for load B while operating in Switching mode.

16. CURRENT MONITOR — BNC connector for monitoring of switching current, (10mV/A) with an oscilloscope.

17. ALARM — Red LED that indicates an Overvoltage or Overtemperature condition. When voltage limit or internal temperature limit is exceeded lamp will light to indicate DC input circuit is off.

18. POWER LIMIT — Yellow LED that blinks when Overpower protector is activated by exceeding the limit of 150 W.

2.2.2 Rear Panel

19. FAN — Cooling fan air outlet.

20. DC INPUT "-"/"+" — DC Load Input Terminals. Parallel to front panel connectors.

21. "-S"/"+S" — Positive (+) and Negative (-) sense leads. Connect Digital Panel Meter to the DC Load terminals.

22. Terminal Block — Connection points for:

a. Remote control voltage while in Constant Current mode.

b. Remote control resistance while operating in Constant Current or Constant Resistance modes.

c. Connections for operating more than one PLZ 152W in a master/slave configuration.

23. AC POWER CORD — Power cord for primary power. Approx. 7 feet (2.3 meters) in length.

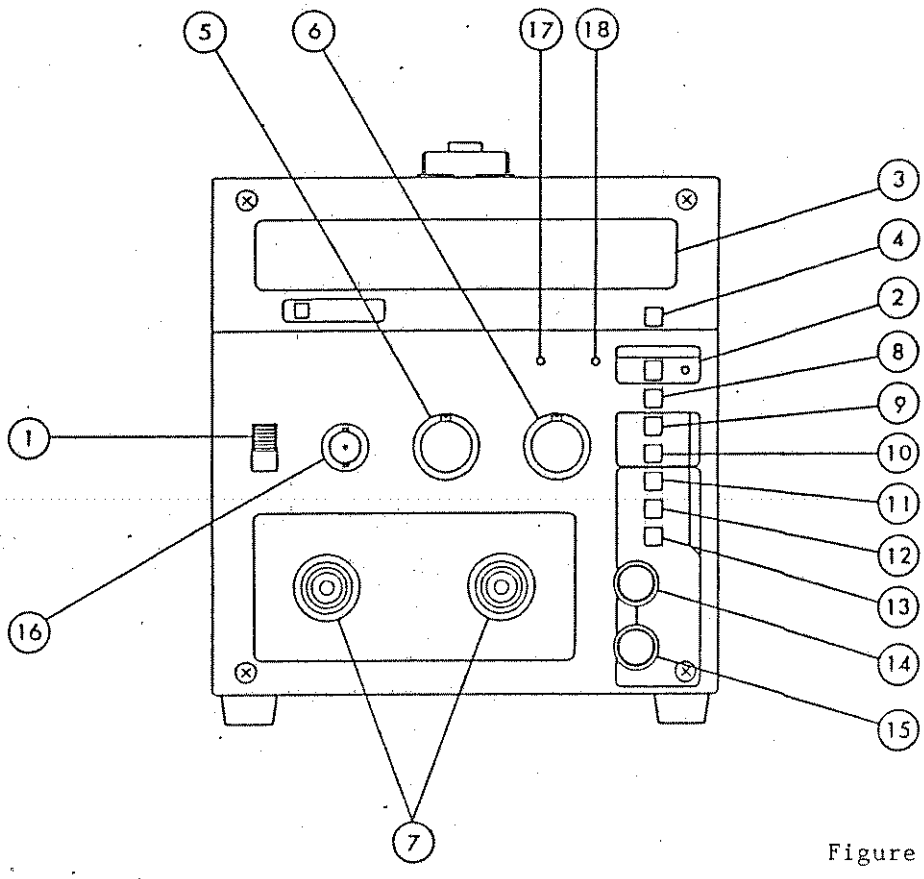
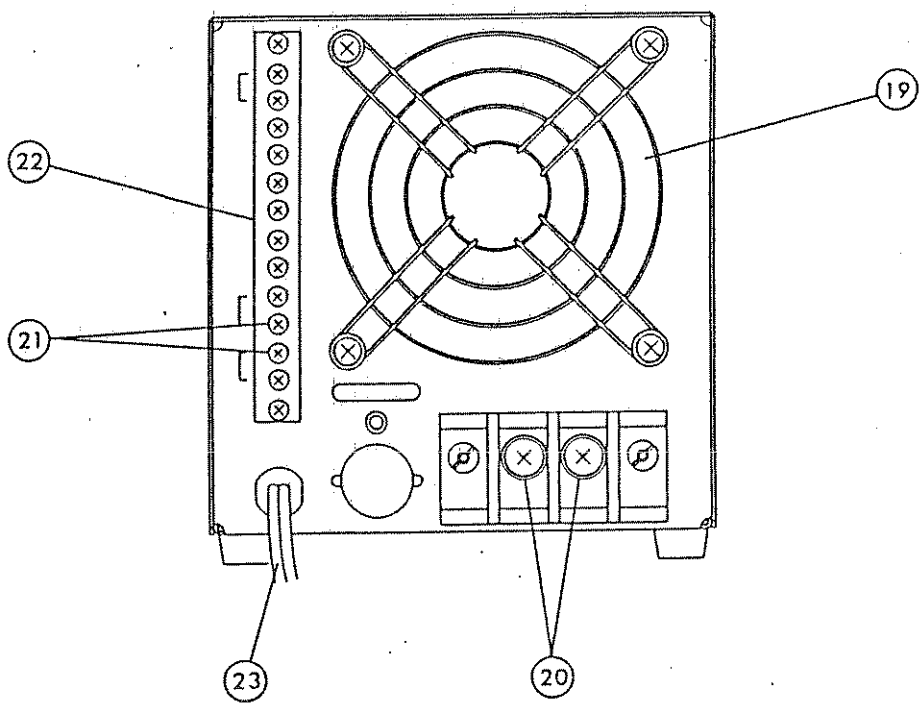


Figure 2.2.1



2.3 Initial Set up and Turn-on

Prior to turning the POWER Switch ON set the front panel switches and controls as shown in Table 2.3.1

Item	No.	Setting
LOAD switch	②	OFF (out)
LOAD A control	⑤	Fully Counterclockwise
LOAD B control	⑥	Fully Counterclockwise
A/V switch	④	A (out)
INT/EXT switch	⑧	INT (out)
CC/CR switch	⑨	CC (out)
30A / 3A 0.1Ω 1Ω	⑩	30A (out) 0.1Ω
A/B switch	⑪	A (out)
DC/SW switch	⑫	DC (out)
1mS/10mS switch	⑬	1mS (out)
TIME A control	⑭	Mid-range
TIME B control	⑮	Mid-range

Table 2.3.1

After all the front panel switches and controls are set as shown in Table 2.3.1 turn the LOAD switch ON (in) and observe the Digital Meter reading of 0.000A, that indicates the PLZ-152W is ready for normal operation.

2.4 Constant Current Mode

In this mode the loading current is maintained as a constant for all voltage inputs within the range of the load. Input voltage, current and power relationships are shown in Figure 2.4.1.

Uses of the Load in this mode include constant-current discharge testing of batteries and capacitors.

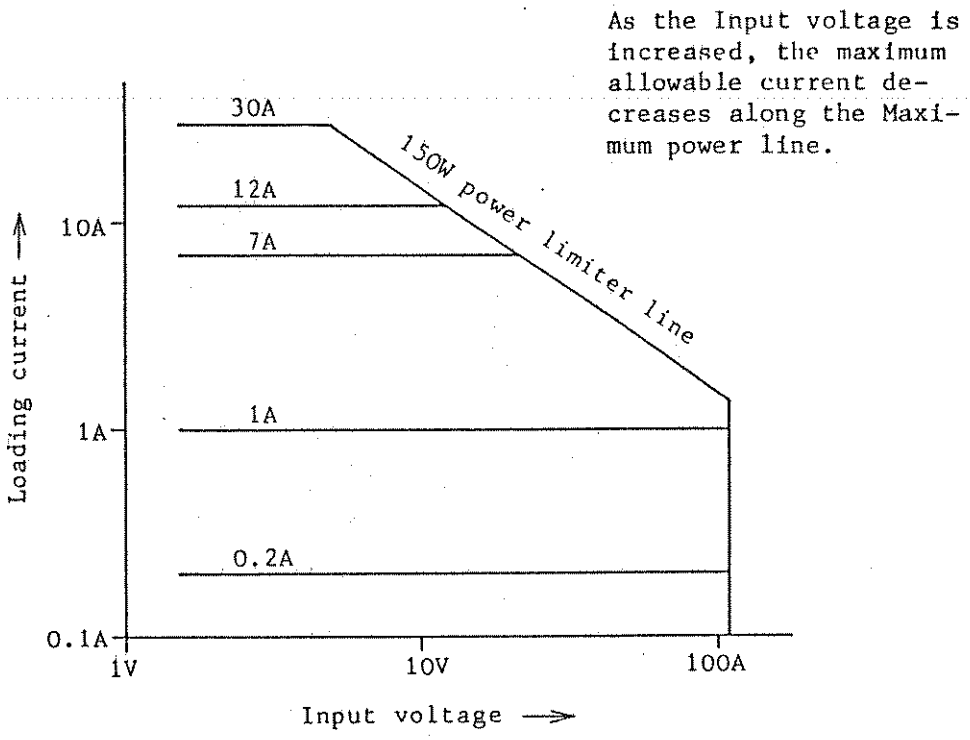


Figure 2.4.1. Constant Current Mode Operating Characteristics

1. Connect the Load to the DC power source to be tested as shown in Figure 2.4.2.

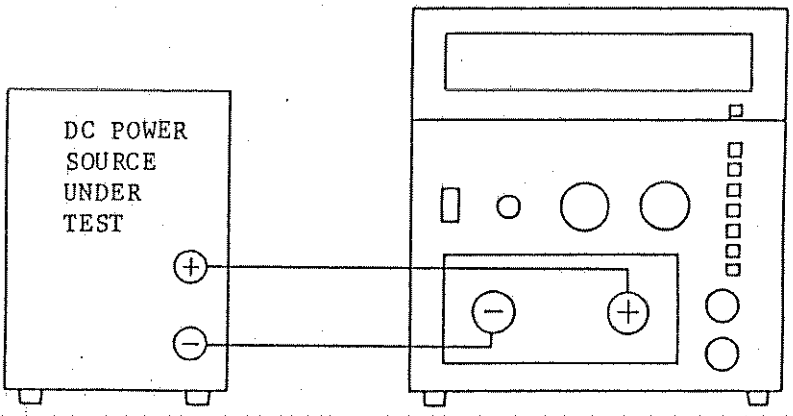
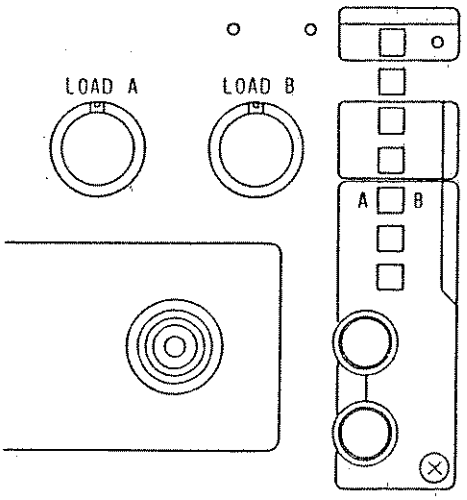


Figure 2.4.2 DC Power Source Connected to PLZ 152W



2. Set the A/B switch to A (out).

3. Turn the LOAD switch ON (in).

4. Adjust LOAD A control for the desired current reading. The Digital Panel Meter will display the current valve.

5. Set the A/B switch to B (in) and vary the LOAD B control. Observe that the current is now set by this control.

6. When power to the LOAD exceeds 150 W, the Overpower Protector circuit operates and the POWER LIMIT LED blinks, signifying that the output reading is erroneous. The input power must be reduced to within the operating limits of the Load.

7. When the DC input voltage applied exceeds 110 V, the Overvoltage Protection circuit operates and the ALARM LED lights while the DC voltage input is disconnected by the operation of an internal relay. When the DC voltage is reduced to lower than 110 V, the Overvoltage circuit automatically resets.

2.5 Constant Resistance Mode

Operating this mode is similar to loading a source with a variable resistor. Operating characteristics are shown in Figure 2.5.1. Uses of the load in this mode include adjustment and testing of regulated DC power supplies.

The load applied to the source can be continuously varied with use of the LOAD A and B controls.

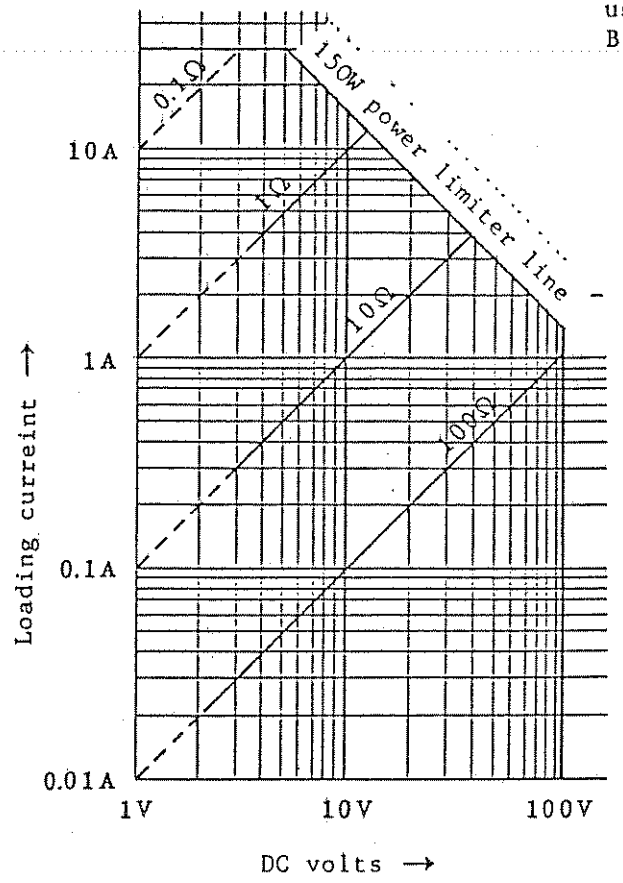


Figure 2.5.1 Constant Resistance Mode Operating Characteristics

3.3.15 Reference Voltage Circuit

While operating the Load in the Constant Current mode it is necessary to compare the input voltage to an internal reference voltage. This voltage is provided by the Reference Voltage Circuit.