

MODEL 611
AC CONVERTER
OPERATION MANUAL

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表紙
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KIKUSUI ELECTRONICS CORP.

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1. Outline

The Kikusui Electronics Type AC Converter Model 611 converts input AC voltage to the DC voltage corresponding to the mean value of the input AC voltage.

When the Model 611 is connected with a digital voltmeter or a DC electronic voltmeter, precise measurement can be made on AC voltage in the ranges of 30Hz - 10KHz and 0 - 1000V RMS.

In this Model, converting precision and stability have been improved by applying much negative feedback to the input circuit through the rectifying diode couple from the output of a high gain broad-band DC amplifier with high input impedance which has employed FET at the input stage.

The Kikusui Electronics Type AC Converter Model 611 is of the aluminum alloy frame packaging type (F.P.).

Not only bottom and top plates but also side plates can be removed easily at option.

Incidentally, transistors have been adopted for all the circuits of the AC converter. Furthermore, the plug-in type system for print wiring has been adopted for them.

2. Specification

System.....	Mean value indicating characteristic system
Voltage range.....	0-1,000V/10.00V/100.0V/1000V RMS
Frequency range...	30Hz - 10KHz
Accuracy.....	0.2% or below of full scale
Balance time.....	Max. 10 sec. or below
Input resistance..	1M Ω

Input capacity

- (Input terminal)..... 50PF or below
- (When connected with cable for measurement)..... 150PF or below

Offset voltage

- (Indication 154 when the input terminal is shortcircuited)..... One figure or below

Output voltage..... Max. -1.5V

Power 100V 50/60Hz Approx. 10VA

External dimensions

100mm(W) x 150mm(H) x 370mm(D)

100mm(W) x 168mm(H) x 407mm(D)

Weight..... Approx. 5Kg

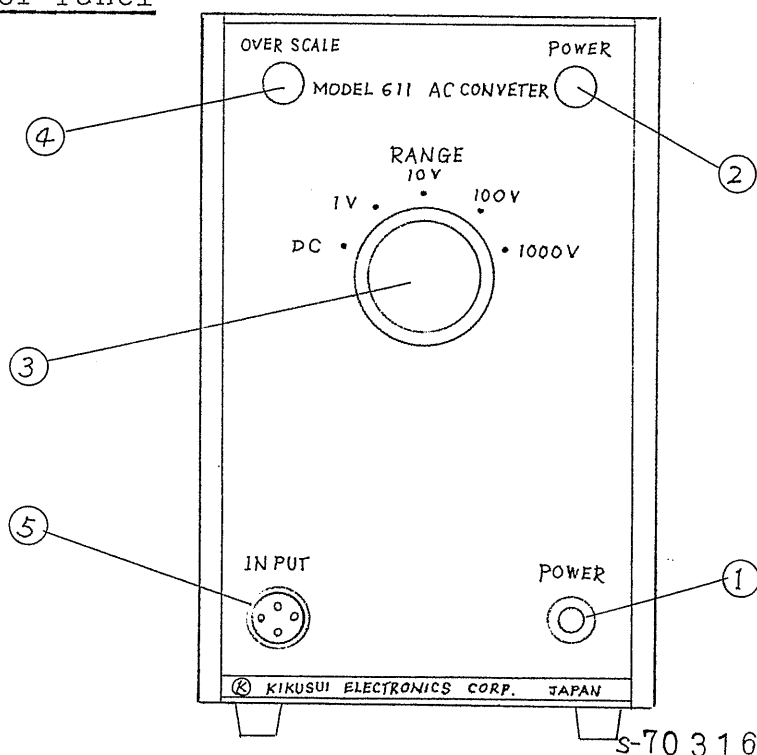
Accessories

- o Operation manual..... 1 copy
- o Cable for measurement..... 1
- o Cable with 4P connector..... 1
- o Cable with 8P connector..... 1

3. Operation procedure

3-1. Description for front surface of panel (Refer to Fig.3-1.)

FIG.3-1. Front Surface of Panel



(1) POWER

This is a push-button switch for power. When it is pushed and locked, power will be turned on. When pushed further, it will be unlocked and power, be turned off.

(2) POWER

This is a pilot lamp for AC power. When power is turned on, it will be lighted.

(3) RANGE

DC
1V
10V
100V
1000V

When this knob is turned counterclockwise to the position DC, measurement can be made on DC voltage. The DC voltage applied to the AC converter turns to be the converter output directly.

When it is turned clockwise to the positions, 1V, 10V, 100V and 1000V, the full scale values of the respective ranges are indicated and measurement can be made on DC voltage.

(4) OVER SCALE

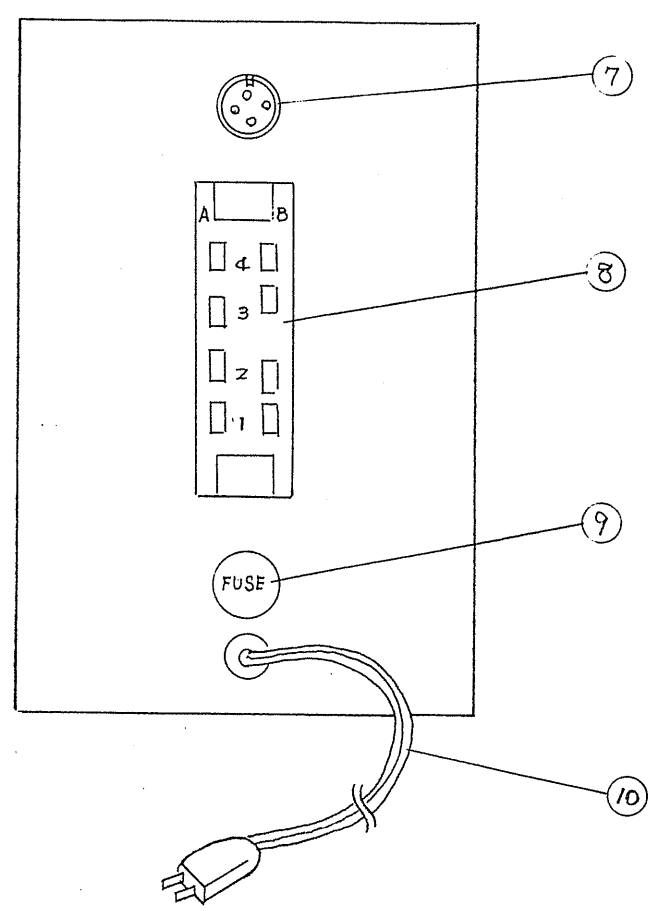
When an input voltage of approx. 150% or more of the full scale in each range should be applied, this OVER SCALE lamp will be lighted.

(5) INPUT

This is an input connector for measurement. The cable for measurement attached to the converter is connected with it.

3-2. Description for back surface of panel (Refer to Fig.3-2.)

FIG.3-2. Back Surface of Panel



(7) 4P CONNECTOR

This is a connector for taking out of output voltage. It is connected with the input connector of the Digital Voltmeter Model 154.

(8) 8P CONNECTOR

This is a connector for taking out of outputs of decimals, AC and DC symbols corresponding to the set value of the range switch of the AC converter. It is connected with a digital voltmeter.

(9) FUSE

This is a fuse holder put in the primary side of the power transformer.

(10)

This is a power cord. It supplies 100V 50/60Hz.

3-3. Preparatory procedure for measurement

- 1) Connect the cable for measurement with the input connector (CON_1) located on the front surface of the panel.. Then, connect the output connector (CON_2) and 8P connector (CON_3) located on the back surface of the panel with the respective connectors (CON_2 and 3) of the digital voltmeter Model 154.
- 2) After finishing the aforementioned connecting operation, change over the range switch of the AC converter and confirm the movement of AC and decimal of the digital voltmeter. Then, connect the power cord with the commercial power source (100V 50/60Hz).
- 3) Turn on the power switch. Then, the action will be stabilized approx. 15 minutes later.

3-4. Operation

After finishing the aforementioned preparatory procedure for measurement, operate the AC converter as described hereunder and start measuring.

- 1) The clip for the cable for measurement (black) is the GND for the converter circuit and floated in DC from the case.
Connect it with the low impedance side of the power source to be measured. Connect the clip (red) with the high impedance side of the power source.
- 2) Change over the range switch selectively according to the following table.

Range	Measuring voltage	Indication
DC	DC 0 - 1099.9V	According to the range of digital voltmeter
1V	AC 1V or below	AC 0.000 - 1,000
10V	AC 10V or below	AC 00.00 - 10,00
100V	AC 100V or below	AC 000.0 - 100,0
1000V	AC 1000V or below	AC 0000 - 1000

3) When an over input of approx. 150% or above of the full scale value is applied to the set range, the lamp "OVER SCALE" will be lighted.

At such a state, the amplifier inside will be saturated, causing an error. Accordingly, change over the range one step higher.

4) The following operation must be carried out in the same way as in the case of measuring DC voltage by digital voltmeter Model 154.

NOTE

The output voltage of the converter is obtained by half-wave rectification of the AC input voltage. Accordingly, it responds to the mean value of the input waveform.

For this reason, if there should exist a distortion in the power source to be measured, there will be a possibility that there will arise an error in the measured value.

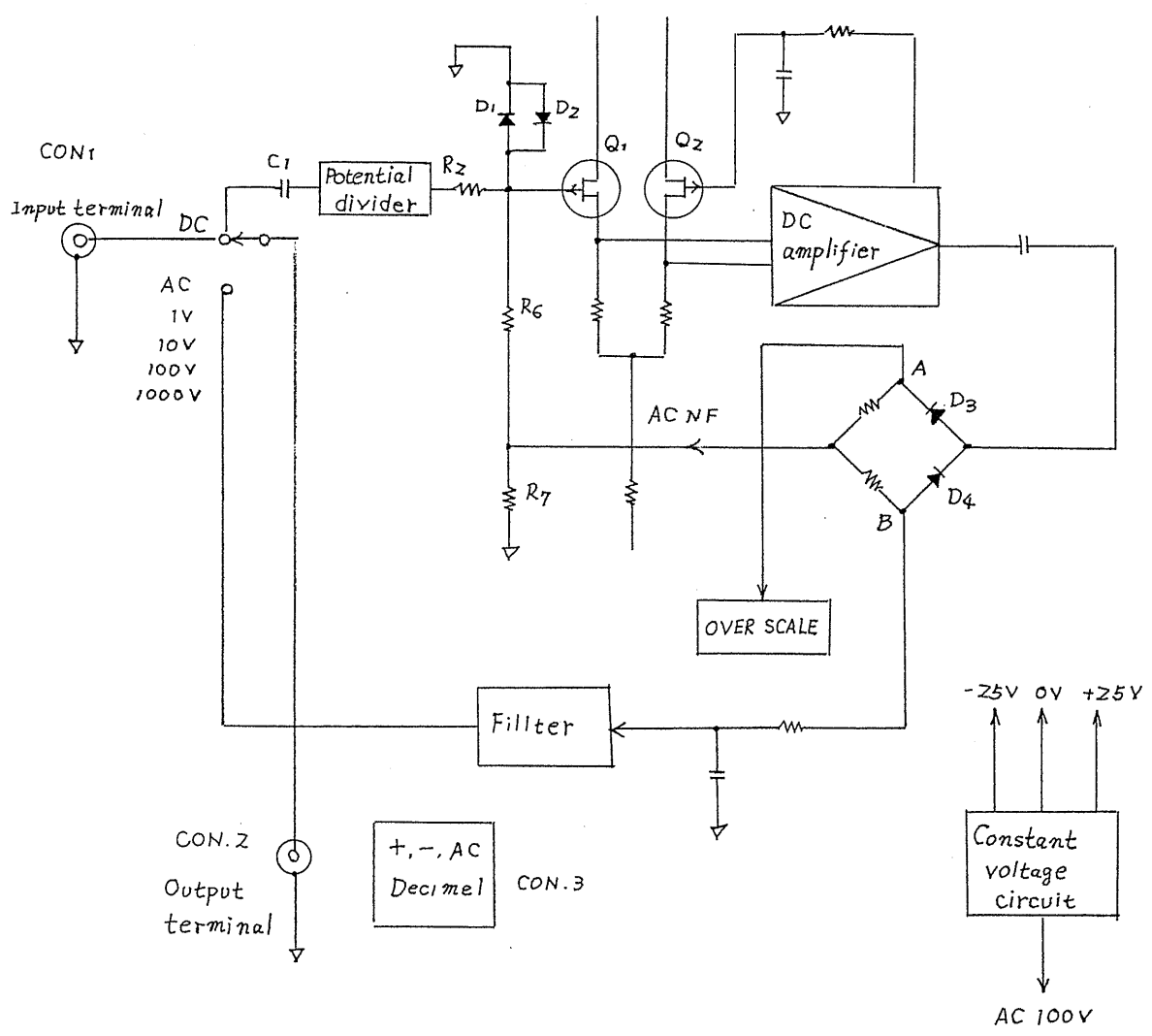
We recommend you to use the power source with a low distortion factor (0.1% or below).

4. Principle

As shown in Fig.4-1 BLOCK DIAGRAM, the Kikusui Electronics

Type AC Converter Model 611 consists of a potential divider, a DC amplifier employing source follower, a half-wave rectifying circuit, a circuit for indicating over-scale, a filter circuit and a constant voltage circuit.

FIG. 4-1. Block Diagram for AC Converter Model 611



When DC voltage is applied to the input terminal, if the range switch "DC" is changed over, the input terminal (CON₁) will be connected directly with the output terminal (CON₂) and measurement can be made on DC voltage with the AC converter connected.

In the case of AC voltage, it will enter the gate of the source follower Q₁ through a DC blocking condenser C and a potential divider where frequency has been compensated. The output is amplified by the DC amplifier consisting of Q₃ - Q₈. In the positive amplitude, it will be fed back negatively to the gate of Q₁ through D₇. In the negative amplitude, it will be fed back negatively to the gate of Q₁ through D₄. Thus, it will improve the non-linearity of the DC output voltage by rectification of diodes and stability of gain.

Furthermore, DC negative feedback is applied to the source follower of Q₂ from the collector of Q₆ for the DC amplifier for stabilization of the working point by temperature change.

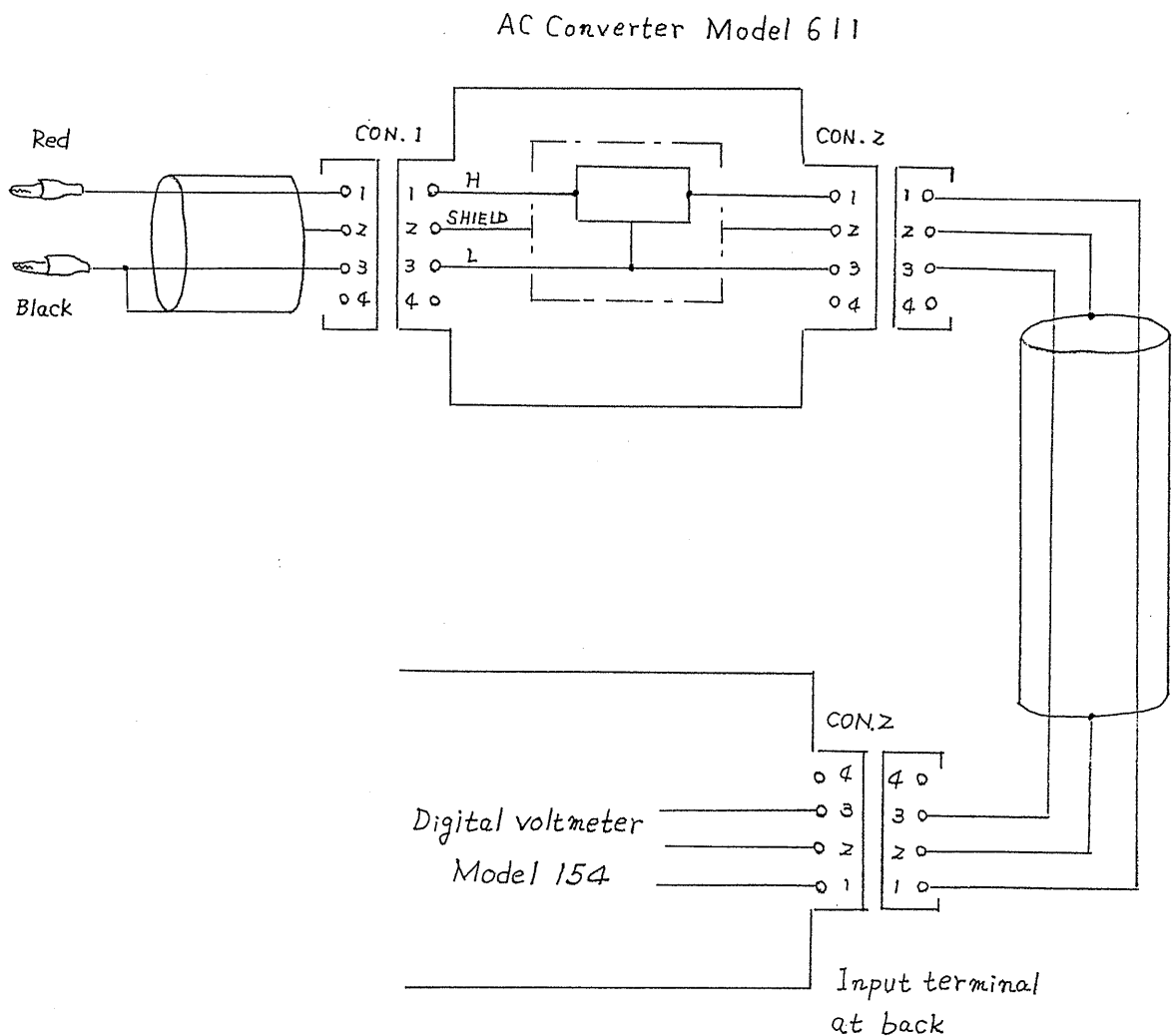
The half-wave rectifying output voltage is taken out of the Point B of diode D₄ and smoothed by RC filter to be DC output voltage.

Voltage for working the circuit for indicating over input (OVER SCALE) is obtained from Point A of diode D₃. When an input voltage of approx. 150% or more of the set range is applied, the pilot lamp "OVER SCALE" will be lighted. Incidentally, diodes D₁ and D₂ are utilized in order to prevent the amplifier from being damaged by over input.

The power circuit supplies +25V, -25V to the respective parts on a basis of a constant voltage circuit of serial control system. With emitter Q_{17} as standard, -25V fluctuated voltage is detected and amplified at its base and the complementary circuits Q_{16} and Q_{15} are controlled. Q_{14} drives the base current of Q_{16} with constant current. The circuit for +25V has almost the same constitution as that for -25V.

The AC converter Model 611 is connected with the digital voltmeter Model 154 as shown in Fig.4-2. It serves as an AC or DC digital voltmeter.

Fig.4-2. Connection Diagram of AC Converter

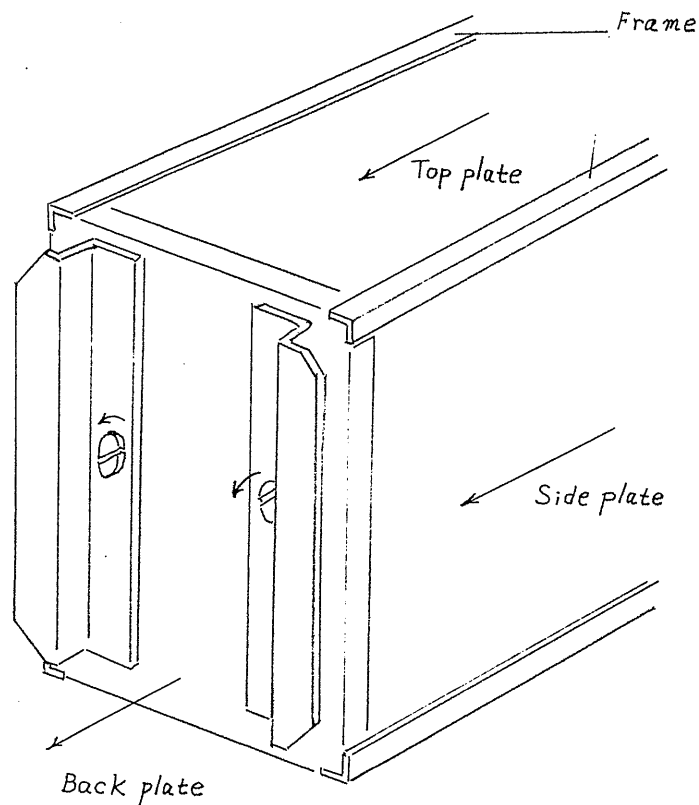


5. Maintenance

5-1. Inspection of the interior mechanism

Turn the 2 set screws shown in Fig.5-1 with a coin counterclockwise and remove the back plate from the case. Then, pull out the both side plates, top and bottom plates slowly in the arrow direction and you can inspect the interior mechanism.

FIG.5-1.



CAUTION

With the back plate removed, if the handle is held and the panel front is inclined, the top plate will be disconnected with the frame. Pay your attention to this point well.

5-2. Arrangement

Figs. 5-2, 5-3 and 5-4 show the arrangement of main parts of the AC converter.

FIG.5-2

Top view

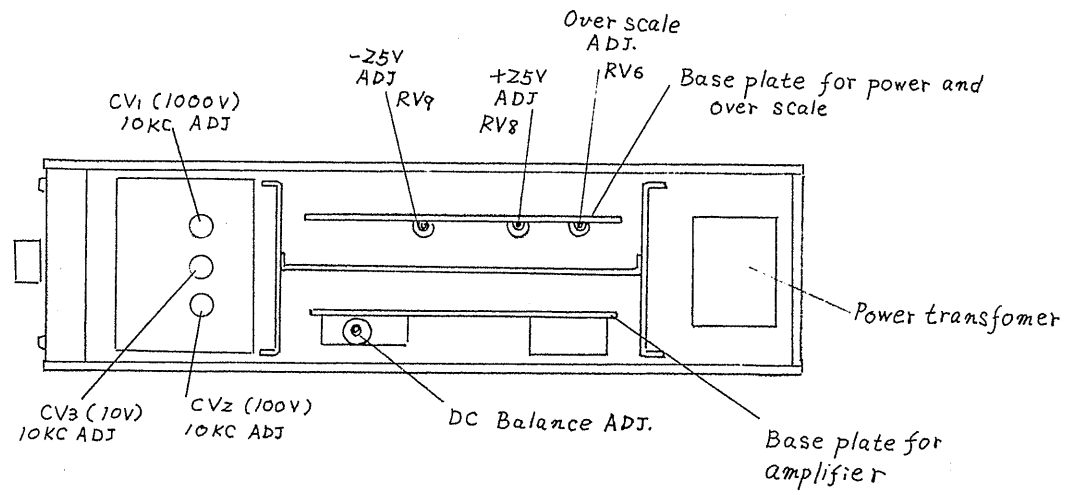


FIG.5-3

Side view

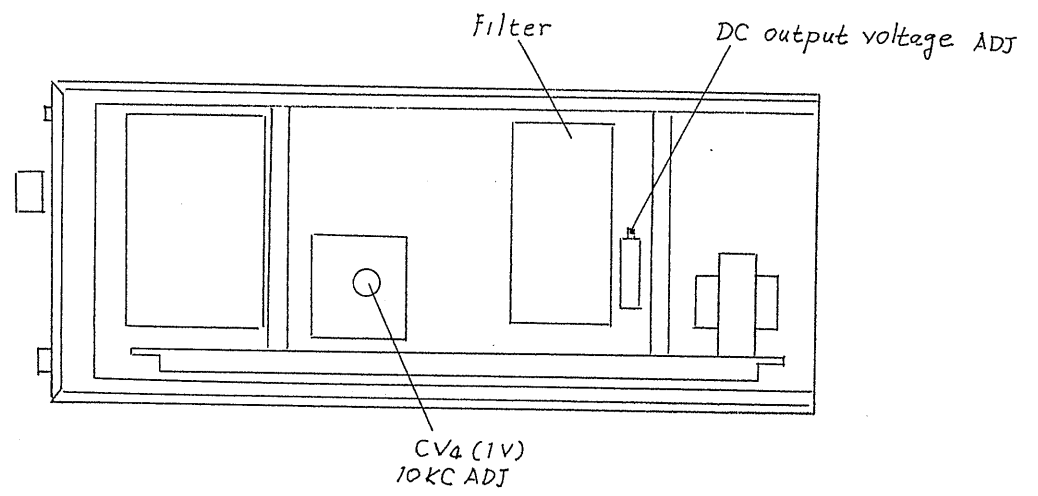


FIG.5-4

