

MODEL 682
FREQUENCY RESPONSE CHECKER
INSTRUCTION MANUAL

KIKUSUI ELECTRONICS CORP.

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This instruction manual is made for standard type
MODEL 682. Explanations and circuit diagrams
may differ for the instruments other than the
standard ones.

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1. GENERAL

The MODEL 682 FREQUENCY RESPONSE CHECKER is designed for quick test of frequency response characteristics of tape recorders, stereo amplifiers, and other audio equipment. The check operation (to test whether the frequency response is within the specification range or not) can be instantaneously made with 400 Hz or 1 kHz as a reference signal, without being affected by gain variation of the checked equipment.

MODEL 682 has three check spot frequencies, ranging from 30 Hz to 20 kHz. Frequency is changed by replacing internal printed circuit board.

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2. CONSTRUCTION

MODEL 682 consists of two major blocks -- transmitter and receiver. At the transmitter, the output of oscillators is mixed at equal voltage levels, the resultant compound signal is conditioned to a certain voltage level and, then, the signal is fed through an attenuator to the output terminal.

The output terminal of MODEL 682 is connected to the input terminal of the tested equipment and its output terminal is connected to the input terminal of MODEL 682.

The receiver can be operated either in a manual or an AGC mode of measurement. For manual measurement, the input signal is manually adjusted to an appropriate voltage by the potentiometer and, then, the signal is applied to the input circuit and individual band pass filters (BPF's). On AGC mode measurement, the output voltage of the standard frequency BPF is controlled so as to be constant by changing of AGC circuit gain. The output voltage of the standard frequency BPF is used as the control signal of the AGC circuit. The gain of input circuit is magnified by a factor of approximately 20dB by pulling out input variable resistor knob.

A block diagram of MODEL 682 is shown in Fig. 1 on next page.

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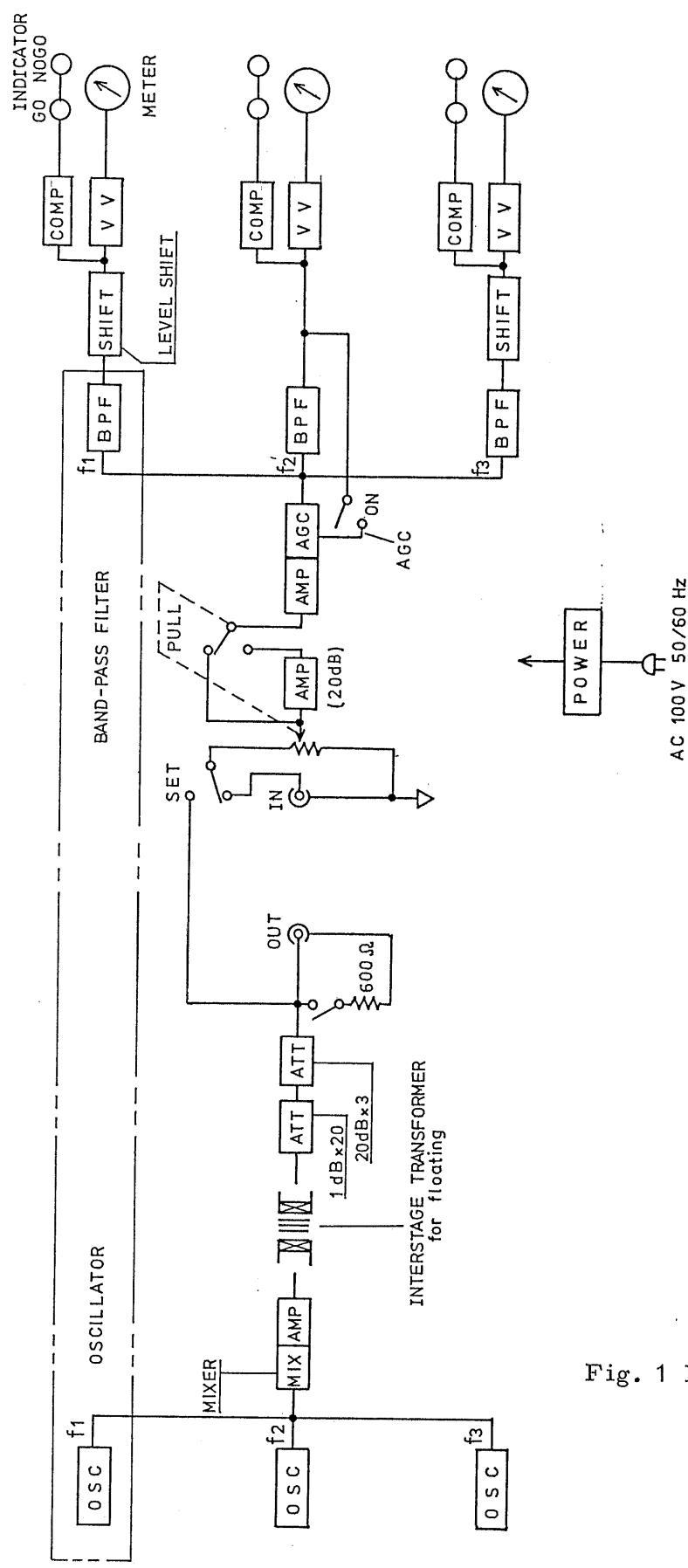


Fig. 1 Block diagram

3. SPECIFICATIONS

TRANSMITTER

Oscillation frequencies	30Hz ~ 20kHz, selection of maximum three points. (standard : 100Hz, 1kHz, 10kHz)
Accuracy	Within $\pm 3\%$
Stability	Within $\pm 2\%$
Mixing ratio	Within ± 1 dB (for each frequency, 1kHz reference)
Output voltage (Max.)	$0.245 \times \sqrt{n} V_{rms} / 600\Omega$ (n is number of oscillation points)
Impedance	$600\Omega \pm 20\%$, unbalanced floating.
Stability	Within ± 0.5 dB
Attenuator	0 dB ~ 80 dB, 1 dB step (1dB x 20) + (20dB x 3)
Terminals	Binding posts

RECEIVER

Input voltage	10mVp-p ~ 20Vp-p (Pull +20dB)
Impedance	$100 k\Omega \pm 20\%$ unbalanced
AGC operation range	Level deviation within ± 0.5 dB for ± 10 dB or over input.
Band pass filter characteristics	
Center frequency	The same with oscillator frequency
Selectivity	Within ± 1 dB at $\pm 5\%$ of nominal frequency. 35 dB or over at one-octave-deviated frequency
Frequency stability	Within $\pm 2\%$
Indicating meter	Edgewise meter (JIS class 2.5)
Indication range	+5 dB ~ -15 dB (meter scale)

Meter indication level shift	Indication level (meter scale 0 dB) can be changed to +20 dB, +10 dB and - dB, except at 400 Hz and 1kHz.
Measurable range	+25 dB ~ -25 dB
Accuracy	Within $\pm 3\%$ of full scale
GO - NO GO indication (for each frequency)	
Indication setting range	Full meter scale range for both UPPER and LOWER setting
Indication	GO -- Green LED , NO GO -- Red LED
Power requirement	AC 100V, 50/60Hz, approx. 15.5 VA
Stability	The above specifications are satisfied at 100V $\pm 10\%$, 50/60Hz.
Dimensions	200 (W) x 140 (H) x 320 (D) mm
Maximum	200 (W) x 160 (H) x 350 (D) mm
Weight	Approx. 5.5 kg
Accessory	Instruction Manual 1

4. EXPLANATION OF PANEL

(Refer to Fig. 2 on page 18)

(1) OUTPUT ATTEN (-dB)

This is a 600Ω attenuator for attenuation of the output signal at 1 dB step x 20. As used in conjunction with (2) ATTENUATOR, a 600Ω attenuator of 80 dB in 1 dB steps can be obtained.

(2) ATTENUATOR

This is a 600Ω attenuator which attenuates the output signal at 20 dB x 3.

(3) 600Ω SHUNT

As the operator depresses this button, the output is terminated with a resistor of 600Ω, 1%, 1/2W.

(4) OUTPUT

This is the output terminal. A set of 3/4 inch pair plugs can be connected to this terminal.

(5) RESPONSE (Meter)

This is an edgewise meter which indicates frequency response for a range of +5 dB ~ -15 dB.

(6) GO LAMP (Green)

This lamp lights when the meter pointer is within the range which has been set as Item (8) below, to indicate that the condition is GO.

(7) NO GO LAMP (Red)

This lamp lights when the meter pointer is out of the range which has been set as Item (8) below, to indicate that the condition is NO GO.

(8) SET UPPER LOWER

This potentiometer sets the upper limit or lower limit for GO/NO GO limit level. The GO range is made narrower from an upper position of the meter by the UPPER potentiometer and it is made narrower from a lower position of the meter by the LOWER potentiometer.

(9) Frequency Indicating Name Plate

This name plate indicates the oscillating frequency of the spot frequency oscillator and the center frequency of the band pass filter. The oscillating frequency of the oscillator and the center frequency of the band pass filter are the same for each unit.

(10) AGC (on off) switch

This switch for on-off control of the AGC function. The AGC function covers $\pm 10\text{dB}$ with respect to the 0dB position of the meter.

(11) METER SELECTOR

The meter indicates frequency response with respect to the selected METER SELECTOR button. If two or more buttons are pushed, meter does not indicate accurate frequency response.

(12) dB -10 0 +10 +20

This switch is for meter level shift. For example, when it is switched to the $+10\text{dB}$ position, the 0dB position of the meter becomes to indicate a value of $+10\text{dB}$.

(13) LEVEL PULL 20 dB

This control is for continuously variable attenuation of the input signal. The input sensitivity is increased to approximately 20dB by pulling out the knob.

(14) SET

This switch is used to connect the output directly to the input.
(This switch is used for GO/NO GO preset.)

(15) INPUT

These are input terminals. A $3/4$ inches pair-plug is connected.

(16) POWER

This is the main power switch.

(17) STAND

The stand may be used to get a better reading angle of the meter.

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(18) FUSE

The fuse holder, which contains 1 A fuse, is connected in the AC input circuit.

(19) Cord take-up

The power cord can be wound and taken up.

(20) Power cord

This is connected to a receptacle of 100 V, 50/60 Hz power line.

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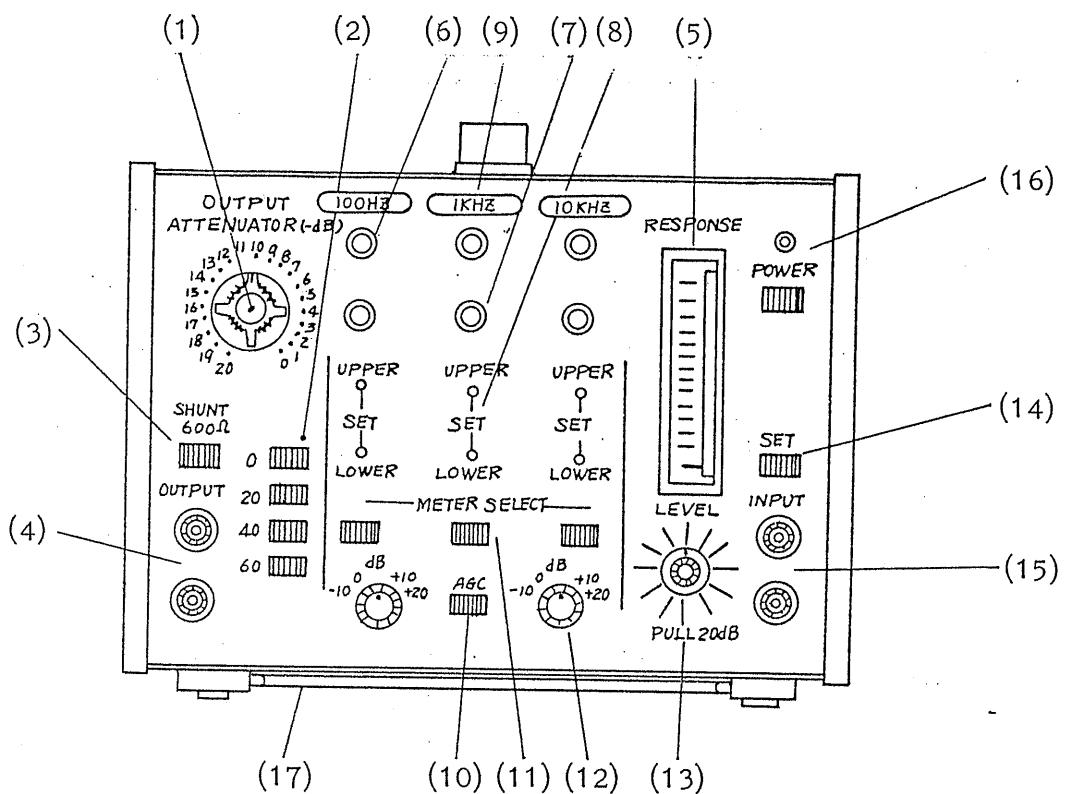


Fig. 2 Front panel

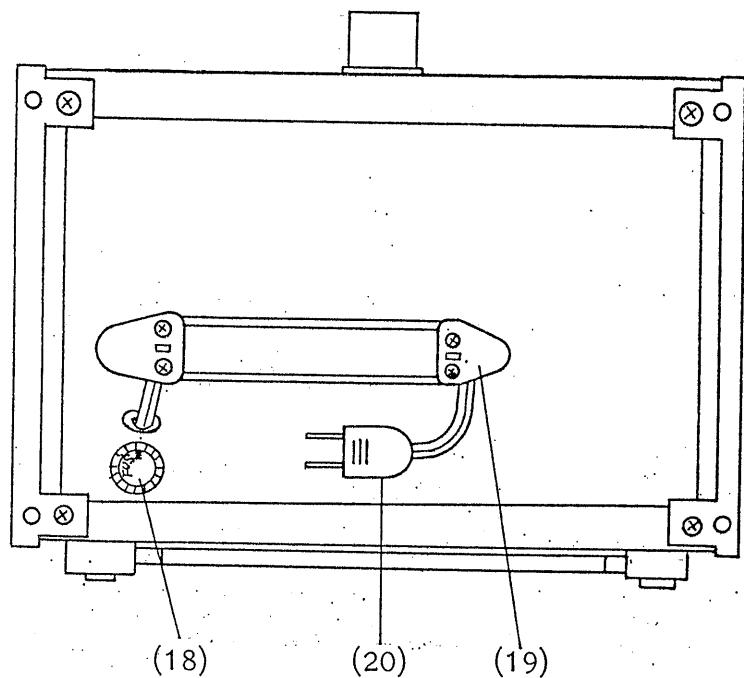


Fig. 3 Rear panel

5. OPERATING PROCEDURE

1. Before starting operating,, set the controls below. Allow approximately 10 minutes stabilization period after turning on the instrument power.

OUTPUT ATTENUATOR (- dB)	0 dB
SHUNT 600Ω	Depressed state
LEVEL PULL 20 dB	Approx. center, not pulled
SET	Depressed state
METER SELECT	The center button (1kHz) is pushed.
AGC	Off

2. After the stabilization period, turn the LEVEL knob and check that the level is variable for a range of from +5 dB to -10 dB. (Moreover, push the other METER SELECTOR switch, and check the each level of frequency corresponding to pushed button is variable for a range of from +5 dB to -15 dB.)
After check, adjust the LEVEL knob so that the RESPONSE meter indicates 0 dB.
3. Set the OUTPUT ATTENUATOR (- dB) in the 10 dB position. (The RESPONSE meter indicates the -10 dB position.)
4. Turn on the AGC switch. (The RESPONSE meter indicates 0 dB again.)
5. Set the AGC switch in the off position and the OUTPUT ATTENUATOR (- dB) in the 0 dB position.
6. Set the range for GO and NO GO. (For example, a range of +3 ~ -3 dB is set as the GO range and all other ranges as NO GO range.)
7. By turning the LEVEL knob, move the meter pointer to the upper limit point (in the above example, to the +3 dB scale position.)
8. Turn the UPPER (SET) control to the position where the GO/NO GO lamps are switched, using a slim screwdriver (-). (Upper limit setting)

9. By turning the LEVEL knob, move the meter pointer to the lower limit point (in the above example, to the -3 dB scale position).
10. Turn the LOWER (SET) control to the position where the GO/NO GO lamps are switched, using a slim screwdriver (-). (Lower limit setting)

Note : Setting for GO/NO GO judgement can be made for a range of approximately -20 dB from the meter full scale. When the below condition is met, the red lamp alone lights.
UPPER setpoint > LOWER setpoint > -20 dB
When the meter pointer is lower than -20 dB, both red and blue lamps do not light.
11. Set the SET button in the unpressed state and adjust the output attenuators at 80 dB. (Set the OUTPUT ATTENUATOR (-dB) switch at 20 dB and the 20-dB-step attenuator at 60 dB.)
12. Set the LEVEL knob in the fully counterclockwise position.
13. Connect the output of MODEL 682 to the input of the measured equipment.
14. Connect the input of MODEL 682 to the output of the measured equipment.
15. By adjusting the OUTPUT ATTENUATOR ((-dB) (with 20 dB step attenuator), apply an appropriate input signal to the measured equipment.
16. Gradually turn the LEVEL knob until the level is made 0 dB at a certain frequency (one of the three spot frequencies). Read on meter the relative level difference at each frequency.
17. Turn on the AGC switch. Relative level difference at each frequency with respect to 0 dB of the 1kHz can be read.
18. If the frequency response characteristics of the measured equipment is flat for three spot frequencies, all green lamps light indicating that the state is GO.
If there are peaks higher than +3 dB or dips lower than -3 dB, the red lamp of the corresponding frequency lights indicating that the state is NO GO.

By the above procedure, the operation is completely attained.

6. CAUTION ON OPERATION

6-1 A certain stabilization period for signal levels is required. Allow certain warm up time after turning on the instrument power.

6-2 Output Voltage

The output voltage is -10 dBm ($= 0.245 \text{ Vrms}$) as terminated with 600Ω (the attenuator is at 0 dB) for one spot oscillator. When a "n" number of spot oscillators are used, the rms-value output voltage can be expressed as below.

$$V_{\text{rms}} = 0.245 \times \sqrt{n} \text{ Vrms} / 600\Omega$$

The output voltages of all spot oscillators are mixed at equal levels. Therefore, the peak to peak output voltage can be expressed as below.

$$V_{\text{p-p}} = 0.693 \times n \text{ Vp-p} / 600\Omega$$

Note : Note that, in the case the outputs are of two or more waves, level indication difference may result if measured with a millivoltmeter of an effective-value-scale type by a mean-value-indication.

6-3 Selection of Reference Frequency

Normally, either 400Hz or 1kHz is used as a reference frequency for audio equipment.

6-4 Selection of Oscillation Frequency of Spot Oscillator

The frequencies of the spot oscillators are selectable at any frequencies other than the reference frequencies. In such a case, however, attention must be paid so that two mutually adjoining frequencies are not closer than 1.5 times or $1/1.5$ times in frequency ratio, for indication error will become large.

When an equipment which has large modulation distortions is tested, frequency ratio should not be made 2 times or 3 times in order to prevent large indication errors, especially at the lower frequency range.

7. MAINTENANCE

7-1 Inspection of Inside

To gain access to the inside of the instrument, remove the four clamping screws of the two black studs at right and left of the instrument rear and, then, remove the right and left side, top and bottom panels.

7-2 Adjustment of Output Voltage

The output voltage is adjustable with potentiometer VR201 on printed circuit board A-2 (Output amplifier).

For adjustment, set st first the items as below.

SHUNT 600Ω	Depressed state
Attenuator	0 dB
Spot oscillator	Either 400Hz or 1kHz (Insert one unit only)

Connect a millivoltmeter to the output terminal, and adjust VR201 so that meter indicates 0.245 Vrms (= -10 dBm)

7-3 Adjustment of Input Level

The input level is adjustable with potentiometer VR 302 on the printed circuit board A-3 (INPUT AGC). Refer to Fig.5

7-4 Adjustment of AGC Level

The AGC level is adjustable with potentiometer VR301 on printed circuit board A-3. Refer to Fig. 5.

7-5 Making Equal the Levels of All Meters

Adjust the three potentiometers VR501, VR502 and VR 503 on printed circuit board A-5 each other.

Note : Set the AGC to on for meter level adjustment.

Unless the setting is made, the AGC level shifts.

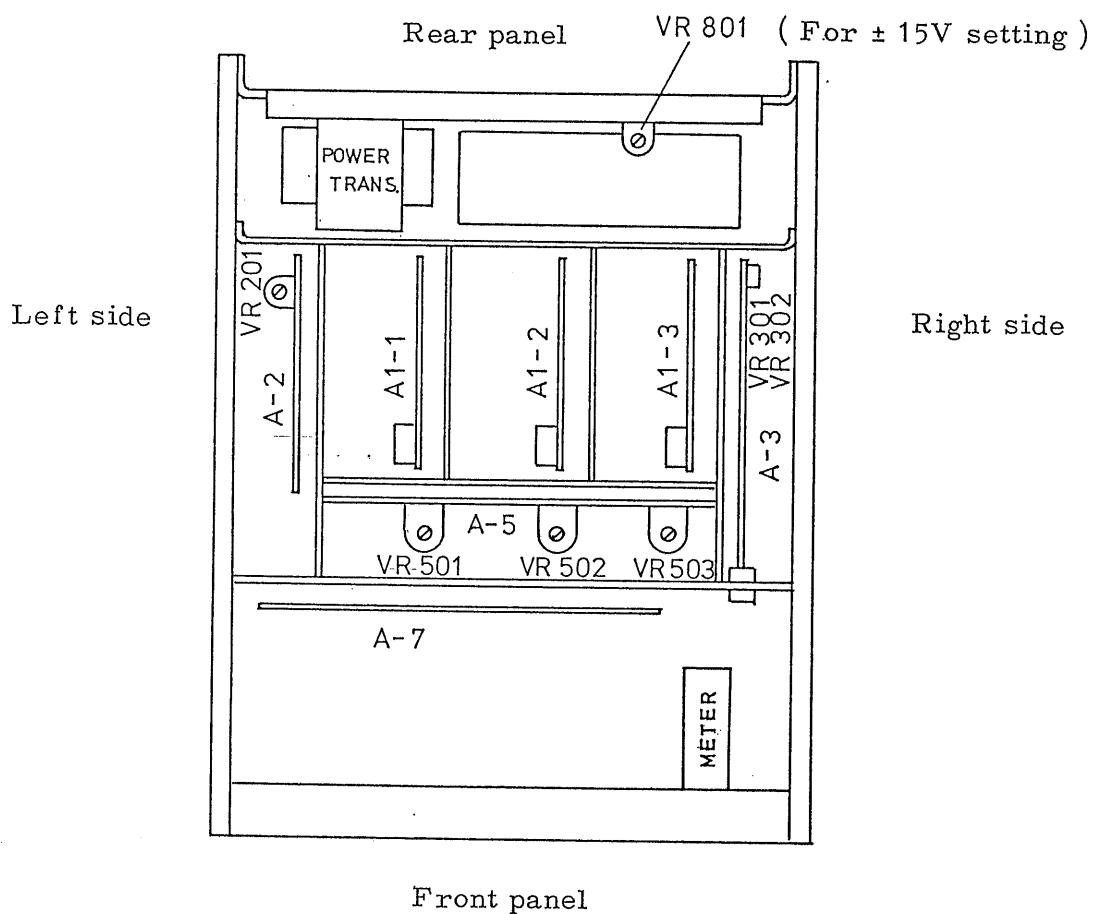


Fig. 4 Internal parts location

Note : Never turn the semi-fixed resistors other than the ones above.

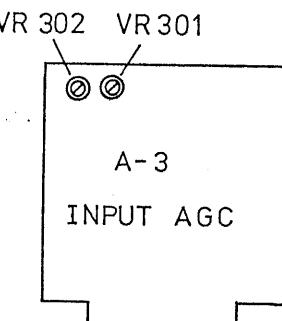


Fig. 5 Printed circuit board A-3

If the customer should have any further questions, the customer is requested to contact our representative in the customer's area.