INSTRUCTION MANUAL FOR

MODEL 558 OSCILLOSCOPE

KIKUSUI ELECTRONICS CORPORATION, JAPAN

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.

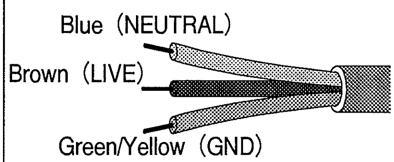
☐ AC power cable

The product is porvided 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.

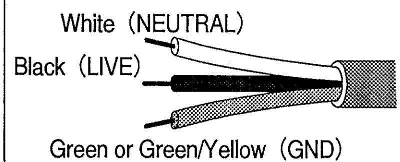
WARNING

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

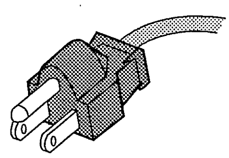
☐ Without a power plug



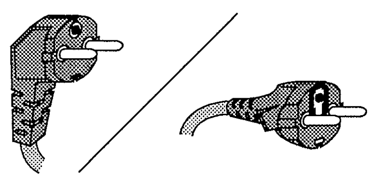
☐ Without a power plug



☐ Plugs for USA



☐ Plugs for Europe



☐ Provided by Kikusui agents

Kikusui agents can provide you with suitable AC power cable.
For further information, contact your Kikusui agent.

☐ Another Cable ________________________________

 Kikusui Part No. Z9-000-027 IB001681 KIKUSUI

TABLE OF CONTENTS

1. GENERAL

The Kikusui Model 558 is a high-reliability portable-type oscilloscope designed with completely solid-state electronics, a 133-mm diameter round cathode-ray tube, and a light metal housing. The 558 incorporates very advantageous features for signal observation and measurement of general electronic circuits, especially for maintenance, inspection, adjustment, and service of various apparatus.

The performance of the vertical axis is with a sensitivity of 10 mV/cm or over and frequency response of DC - 7 MHz.

The horizontal axis has a sweep frequency range of 10 Hz - 100 kHz and for TV.H, and operation modes of INT SYNC "+", INT SYNC "-", and EXT. In the EXT mode, the horizontal axis has a sensitivity of 200 mV/cm or over and a frequency range of 2 Hz - 400 kHz, providing an effective means for phase difference and frequency measurements.

The 558 has two output terminals which provide rectangular calibration signals of a frequency of approximately 1 kHz and voltages of 50 mVp-p and 5 Vp-p to check the vertical sensitivity and probe characteristics.

Illuminated switches are used for VERT and SYNC selector switches, positively indicating the operating mode.

2. SPECIFICATIONS

VERTICAL AXIS

Item	Specification	Remarks
Sensitivity	10 mV/cm or over	
Coupling	AC and DC	
Frequency range	AC coupling: 2 Hz - 7 MHz DC coupling: 0 - 7 MHz	Within -3 dB, at 50 kHz reference
Attenuator	1/1, 1/10, 1/100, and 1/1000, with frequency response compensation	
Attenuation accuracy	Within ±3%	
Input impedance	1 MΩ ±2%, 38 pF ±2 pF	
Input terminal	M-type plug	
Maximum input voltage	1/1 range: 400 Vp-p Other ranges: 600 Vp-p	The voltages as DC + AC peak; AC at frequency not higher than 1 kHz

HORIZONTAL AXIS (EXT SWEEP AMPLIFIER)

Item	Specification	Remarks
Sensitivity	200 mVp-p/cm or over	
Coupling	AC coupling	
Frequency range	2 Hz - 400 kHz	Within -3 dB, at 1 kHz reference
Input impedance	Approx. 220 kΩ, approx. 25 pF	

TIME AXIS

Item	Specification	Remarks
Sweep frequencies	10 Hz - 100 kHz, and TV.H.	In TV.H. mode, two peaks of video signal are displayed on CRT screen.
SYNC signals	INT (selectable for "+" or "-")	
	EXT (sync range 20 Hz - 7 MHz with sync signal not lower than 100 mVp-p)	With SIN wave

CALIBRATION SIGNALS

Item	Specification	Remarks
Waveform	Rectangular wave, approx. 1 kHz	
Output voltages	50 mVp-p, 5 Vp-p (two outputs)	Stabilized outputs
Output voltage accuracy	Within ±3%	

CRT CIRCUIT

Item	Specification	Remarks
Type	5-inch round CRT	
Acceleration voltage	Approx. 1.6 kV	
Intensity modulation	With signal of 10 Vp-p or over	AC-coupling; intensity increases as signal goes positive

POWER REQUIREMENTS

Item	Specification	Remarks
Line voltage	------------------	50 - 60 Hz
Power consumption	Approx. 20 VA	

DIMENSIONS AND WEIGHT

Item	Specification	Remarks
Dimensions	260 H x 165 W x 460 D (mm)	Maximums
	235 H x 175 W x 405 D (mm)	Housing only
Weight	Approx. 6.3 kg	

ACCESSORIES

Type 941B Terminal Adaptor 1

Instruction Manual 1

3. EXPLANATION OF FRONT PANEL

INTEN POWER OFF	Control for CRT trace intensity (brightness), with main power switch. As the control is turned clockwise from POWER OFF position, power is turned ON and the intensity increases.
FOCUS	For focussing the CRT beam to obtain sharp trace.
CALIBRATOR 50mV 5V	Terminals for reference signals of 5 Vp-p and 50 mVp-p to calibrate vertical deflection sensitivity and probe. The signals are zero-volt reference, positive-going, and approx. 1 kHz.
GND INPUT	Input terminals of vertical amplifier. Signal to be measured is applied to these terminals using lead wires or shielded cable. For more accurate measurement, signal may be applied to these terminals through Type 957M Low Capacitance Probe (accessory) which reduces loading effect on measured circuit.
AC DC GND	Pushbutton switches to select input coupling mode of vertical axis. In GND state, the input circuit of vertical amplifier is shorted to ground.
VERT GAIN VARIABLE 1/100 1/10 1/1000 1/1	Outer knob: For selection of vertical deflection sensitivity in four ranges. Sensitivity is maximum (unit) in the 1/1 position, and is reduced by factors of 10, 100, and 1000 as the knob is turned to the 1/10, 1/100, and 1/1000 positions, respectively. Inner knob (red): For continuously-variable adjustment of vertical sensitivity for a range of up to approximately 10 times when the knob is turned to extremely clockwise position.

When the <VERT GAIN> switch is set in the 1/1 position and this knob is turned to extremely clockwise position, sensitivity becomes 10 mV/cm or over.

POSITION

For vertical positioning of trace on CRT screen.

Outer knob: Selects sweep frequency in six ranges. The extremely clockwise EXT HOR position is for external sweep with an external signal applied through input terminal.

Inner knob (red): For continuously-variable adjustment of sweep frequency.

EXT HOR
OR
SYNC IN

Used as input terminal for trigger signal or external sweep signal for horizontal amplifier.

SOURCE
INT EXT

Select synchronization signal source -- INT button for internal trigger with the measured signal itself and EXT button for external trigger with an external signal (100 mVp-p or over) applied through SYNC IN terminal.

SLOPE
\+ -

Select triggering polarity in INT SOURCE synchronization operation mode only. The "+" button is for triggering with positive-going slope of the synchronization signal and the "-" button is that with negative-going slope.

HORIZ. GAIN

For continuously-variable adjustment of horizontal amplifier gain -- gain increases as this knob is turned clockwise.

POSITION

For horizontal positioning of trace displayed on CRT screen.

4. EXPLANATION OF SIDE AND REAR PANELS

Side Panel

DC BAL — DC balance control of vertical amplifier. This control should be so adjusted (with a screwdriver) that trace does not vertically shift when VARIABLE knob (red) is turned.

ASTIG — Astigmatism control of CRT circuit. This control, in conjunction with <FOCUS> control on front panel, should be so adjusted (with a screwdriver) that trace image displayed on CRT screen becomes sharpest.

Note: This control has been finely factory-adjusted and requires only very infrequent adjustment.

Rear Panel

INTEN MODU — Input terminals for an external intensity modulation signal. Signal must be 10 Vp-p or over. Intensity increases with positive-going signal and vice versa.

FUSE — Fuse holder for a 1-ampere slow-blow fuse.

5. OPERATING PROCEDURE

PREPARATIONS

Before turning on the main power switch, set the controls on the front panel as below. Then, connect the power cord of the instrument to a line power outlet of   V, 50/60 Hz.

CRT circuit	<INTEN>	POWER OFF position
	<FOCUS>	Mid-position
Vertical axis	<POSITION>	Mid-position
	<VERT GAIN>	Set at 1/1
	<AC·DC·GND>	Depress DC
	<VARIABLE>	Mid-position
Horizontal axis	<POSITION>	Mid-position
	<HORIZ GAIN>	Mid-position
	<SWEEP RANGE>	100 - 1 kHz
	<VARIABLE>	Mid-position
	<INT EXT>	Depress INT
	<+ ->	Depress +

After the above settings are complete, turn clockwise the INTEN knob to turn on the main power. The knob may be turned to the fully clockwise position to obtain the maximum trace intensity. The trace will appear on the CRT screen in approximately 10 seconds after the main power switch is turned on.

After the trace is displayed on the screen, adjust the POSITION knobs so that the trace is located in the center of the CRT screen and adjust the FOCUS knob so that the trace image is made very sharp. Turn the INTEN knob to obtain adequate trace brightness.

The CALIBRATOR 50 mVp-p output terminal may be connected with a cable to the VERT INPUT terminal so that a square-wave calibration waveform is displayed on the screen. By adjusting the VARIABLE (red) knob of the horizontal (time) axis, a stationary calibration waveform can be displayed on the CRT screen.

Under the above state, the trigger polarity selection switch ("+" and "-") and the VARIABLE (red) knob of the vertical axis may be turned for trial because it will be helpful in understanding the explanation given in Section "MEASURING PROCEDURE."

SYNCHRONIZATION CIRCUIT AND SWEEP GENERATOR

The sweep generator (time axis generator) produces a sawtooth signal which is used to sweep the trace horizontally. The sweep frequency is selectable with the SWEEP RANGE knob at the front panel to suit the frequency of the measured signal.

The function of the synchronization circuit is to synchronize the oscillating frequency of the sweep generator with respect to that of the signal to be measured, either in the internal synchronization (SOURCE, INT) or external synchronization (SOURCE, EXT) mode.

HORIZONTAL AMPLIFIER

This amplifier boosts the sweep generator output signal to a sufficient level to provide the required sweep deflection amplitude on the CRT screen and to provide the required horizontal positioning.

When set in the external sweep mode, this amplifier is isolated from the sweep generator and amplifies the external signal which is applied through the EXT HOR terminal for Lissajous figure observation and phase measurement.

VERTICAL AMPLIFIER

This amplifier boosts the measured signal to a sufficient level to provide the required vertical deflection amplitude and the required vertical positioning on the CRT screen.

The amplifier actually is a push-pull DC-coupled wide-band type. The signal applied to the INPUT terminal is fed through the VERTICAL GAIN control (an attenuator for 1/1, 1/10, 1/100, and 1/1000) and the cathode follower (Q101), and is further boosted by the 3rd stage transistors (Q105 and Q106) with a continuously variable gain control.

The DC BAL control (semi-fixed resistor) is provided in order to adjust DC-balancing of the DC amplifier. For adjustment of the DC BAL control, refer to Section "MAINTENANCE."

6. MEASURING PROCEDURE

6.1 Vertical Amplifier Sensitivity Calibration

Prior to measuring the voltage of a signal, the sensitivity of the vertical axis should be calibrated. As for the calibration procedure, at first, set the controls on the front panel as follows:

Vertical axis	<POSITION>	Mid-position
	<VERT GAIN>	Set at 1/1
	<AC·DC·GND>	Depress AC
	<VARIABLE>	Mid-position
Horizontal axis	<POSITION>	Mid-position
	<HORIZ GAIN>	Mid-position
	<SWEEP RANGE>	100 - 1 kHz
	<+ ->	Depress +
	<INT·EXT>	Depress INT

After the above setting is complete, proceed as follows:

(1) Connect the CALIBRATOR 50 mVp-p terminal to the vertical INPUT terminal using a cable. When this is done, the waveform of the calibration signal is displayed on the CRT screen.

(2) Adjust the vertical VARIABLE knob (red) so that the vertical amplitude of the calibration signal waveform is made 5 cm. When this is done, the sensitivity of the vertical amplifier is calibrated at 10 mVp-p/cm.

(3) Keeping the vertical VARIABLE knob (red) in the above position, the sensitivity of the vertical amplifier can be changed to 100 mVp-p/cm, 1 Vp-p/cm, and 10 Vp-p/cm by turning the VERT GAIN switch to the 1/10, 1/100, and 1/1000 positions, respectively.

The above is an example of a particular case in which the CALIBRATOR 50 mVp-p signal is used. In general, the vertical deflection sensitivity can be expressed as below.

$$\text{Vertical deflection sensitivity} = \frac{E_{cal}}{\ell} \text{ (Vp-p/cm)}$$

where, E_{cal} (Vp-p): Calibration signal connected to vertical INPUT terminal

ℓ (cm): Vertical deflection amplitude of calibration signal on CRT screen.

The vertical deflection amplitude can be selected at an appropriate value by means of the VERT GAIN selector and VARIABLE control. (Fig. 1)

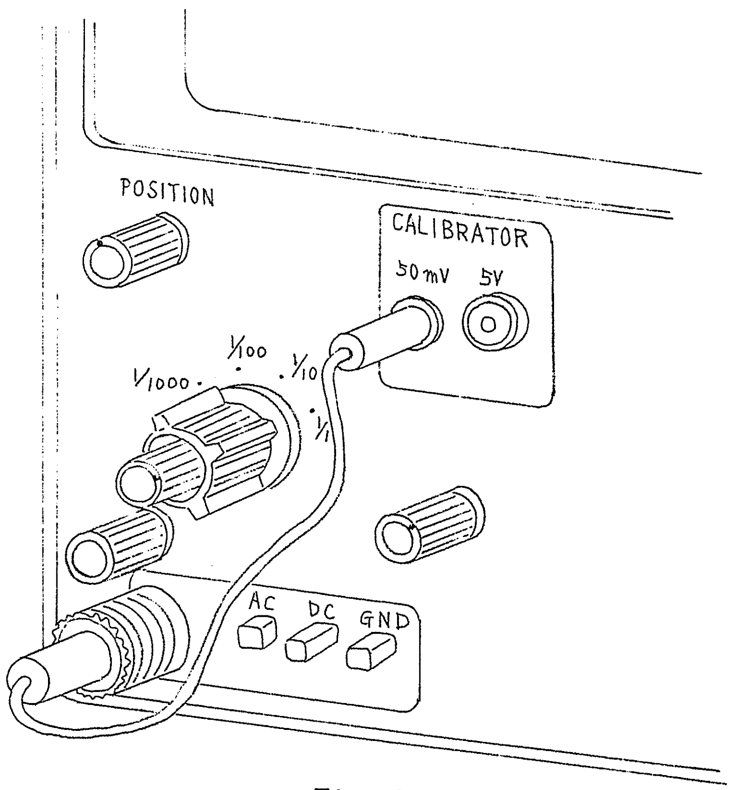


Fig. 1

6.2 Input Signal Connection

To connect the measured signal to the input terminal of the oscilloscope, either conventional insulated wires, a shielded cable, or a probe may be used. Selection should be made taking the below-mentioned factors into consideration and referring to the subsequent table.

- o Impedance of the measured circuit
- o Voltage and frequency of the measured signal
- o External induction noise

Measured signal	Connection	Insulated wire	Shielded cable	Probe
Low frequency	Low impedance	○	○	○
	High impedance		○	○
High frequency	Low impedance			○
	High impedance			○

To measure a signal of a high-frequency high-impedance source, use the low-capacitance probe. Note that this probe imposes an attenuation of -20 dB (1/10).

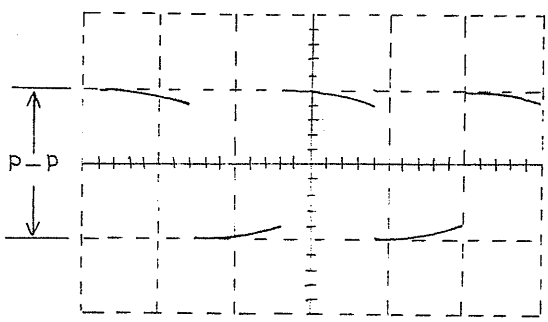
6.3 Waveform Observation

Connect the signal to be observed to the vertical INPUT and GND terminals. Adjust the VERT GAIN switch and SWEEP RANGE selector so that the signal is displayed in a conveniently observable waveform on the CRT screen. When the voltage of the measured signal is unpredictable, set the VERT RANGE switch in the 1/1000 position and the AC·DC·GND switch in the AC state.

The function of the AC·DC·GND switch is to select the input coupling mode of the vertical amplifier. If a square wave of a low repetition frequency is observed in the AC coupling mode, sagging will be caused as shown in WAVEFORM 1. In such a case, by changing switch to the DC coupling, a distortionless waveform as shown in WAVEFORM 2 can be displayed.

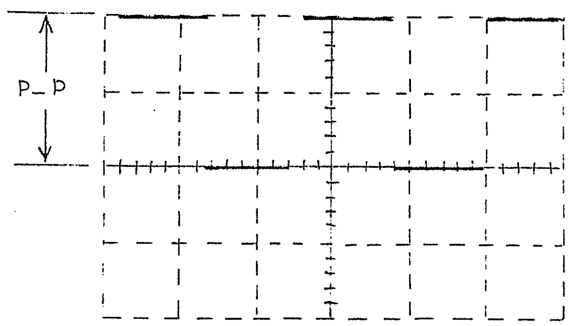
If a ripple component superimposed on a DC component is observed in the DC coupling, the displayed waveform will be with an insufficient amplitude for the ripple component. In such a case, the switch should be set in the AC state in order to eliminate the unnecessary DC component and display the required AC component alone with a sufficiently large amplitude on the CRT screen.

AC coupling

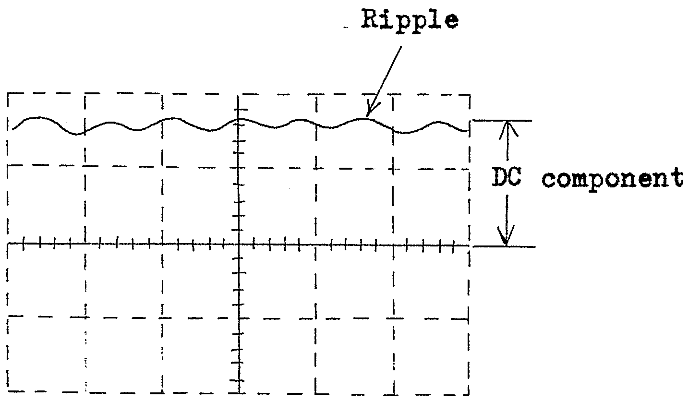


WAVEFORM 1

DC coupling



WAVEFORM 2



WAVEFORM 3

Next, adjust the sweep frequency by means of the SWEEP RANGE switch (see Fig. 2). The inner knob (red) is for continuous adjustment between the two adjoining frequency ranges in order to obtain a stationary waveform displayed on the CRT screen.

In general, the sweep frequency should be lower than the measured signal frequency. A synchronized state is obtained when the below condition is met.

$$\text{Sweep frequency} = \text{Measured signal frequency} \times \frac{1}{n}$$

where, $n = 1, 2, 3, \ldots$

The horizontal sweep amplitude on the CRT screen is adjustable by means of the HORIZ·GAIN knob.

6.4 TV.H

This sweep is provided for convenience in observation of various waveforms of a television receiver set. For observation of a vertical signal of a television set, the SWEEP RANGE switch must be set in a 10 - 100 Hz position and then the VARIABLE (red) knob must be so adjusted that two peaks of the signal is displayed on the CRT screen. When the SWEEP RANGE switch (outer knob) is turned to the TV.H position keeping the VARIABLE (red) knob in the above state, two peaks of the horizontal signal of the television receiver set is automatically displayed on the CRT screen.

6.5 Synchronization

For general waveform observation, the INT switch is set in the "+" or "-" state (see Fig. 2). When the frequency of the measured signal is high and its amplitude is small, the EXT button will be depressed and an external signal of the same frequency with the measured signal will be applied to the SYNC IN terminal to obtain stable triggering. For stable triggering, the external synchronization signal must be 100 mVp-p or over.

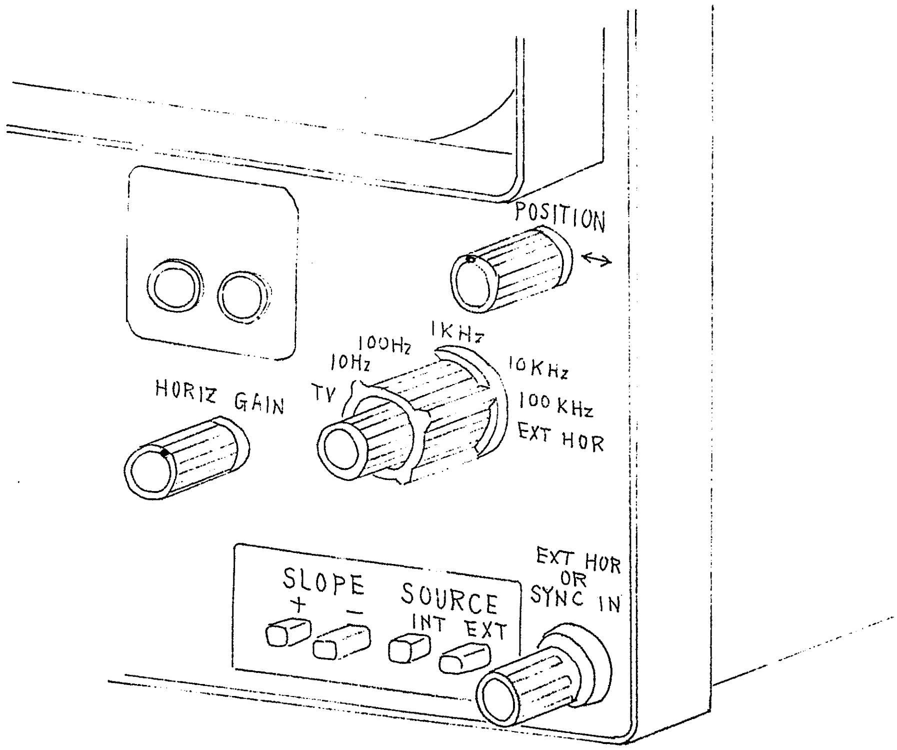


Fig. 2

6.6 Horizontal Amplifier

To apply an external signal to the horizontal axis for Lissajous figure observation or phase measurement, the SWEEP RANGE switch must be set in the EXT position and the external signal must be applied to the EXT HOR terminal. The horizontal sensitivity is adjustable with the HORIZ GAIN knob.

6.7 Beam Spot and Trace Positioning

The position of the beam spot or trace on the CRT screen is adjustable with the POSITION knobs. (See Fig. 3.)

6.8 Signal Polarity v.s. Moving Direction of Spot or Trace

Of the vertical axis, the spot or trace moves upward on the CRT screen as the signal goes positive, and vice versa. Of the horizontal axis, the spot is swept from left to right with the sawtooth signal of the sweep generator.

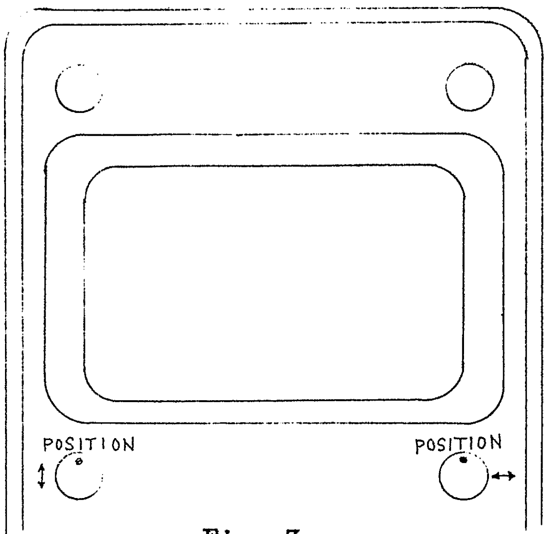


Fig. 3

6.9 Phase Difference Measurement

The phase difference between two signals of the same frequency can be conveniently measured by displaying Lissajous figures. The factor to be taken into consideration in this measurement is the phase difference between the vertical and horizontal axes of the oscilloscope itself. This inherent phase difference is not negligible at some frequencies. Therefore, before measuring the phase difference, the inherent phase difference of the oscilloscope itself must be determined.

(1) Measurement of Inherent Phase Difference (θo) of Oscilloscope

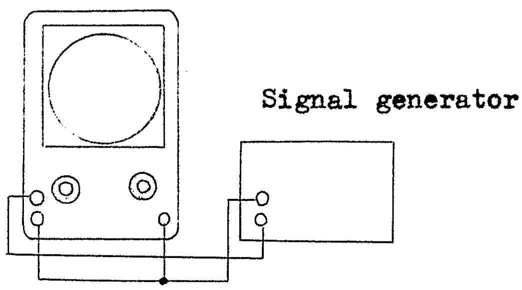
Set the SWEEP RANGE switch in the EXT HOR position. Apply the sinusoidal wave output of a signal generator to the vertical INPUT terminal and EXT HOR terminal as shown in Fig. 4. Adjust the size of the displayed pattern with the VERT GAIN switch and VARIABLE knob for the vertical dimension and with the HOR GAIN knob for the horizontal dimension.

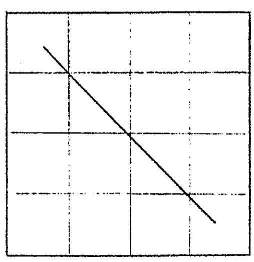
When the above is done, if the generator frequency is low, the displayed Lissajous figure will be a single slanted line as shown in WAVEFORM 4. The line signifies that there is no phase difference between the vertical and horizontal axes. The slanted angle depends upon the difference between the vertical and horizontal amplitudes -- being 45° when the two amplitudes are equal.

If the frequency is high, the Lissajous figure will be displayed as a loop as shown in WAVEFORM 5. The phase difference (θo) between the vertical and horizontal axes is expressed by the following equation:

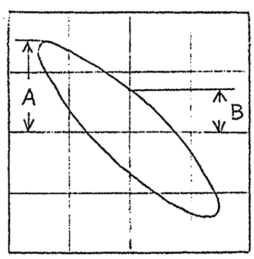
$$\theta o = \sin \frac{A}{B}$$

The phase difference (θo) signifies that the phase of the vertical axis is leading that of the horizontal axis by θo.





WAVEFORM 4



WAVEFORM 5

Fig. 4

(2) Application Example: Measurement of Phase Difference Between Input and Output of an Amplifier

Prepare a measuring setup as shown in Fig. 6 and display a Lissajous figure on the CRT screen. Measure the apparent phase difference (θ) in the same manner as the inherent phase difference (θo) is measured. The actual phase difference (θa) between input and output of the amplifier can be calculated as follows:

$\theta a = \theta + \theta o$ (when the output is leading the input)

$\theta a = \theta - \theta o$ (when the output is lagging from the input)

where, θa: Actual phase difference between input and output of the tested amplifier

θo: Inherent phase difference of oscilloscope

θ: Apparent phase difference between

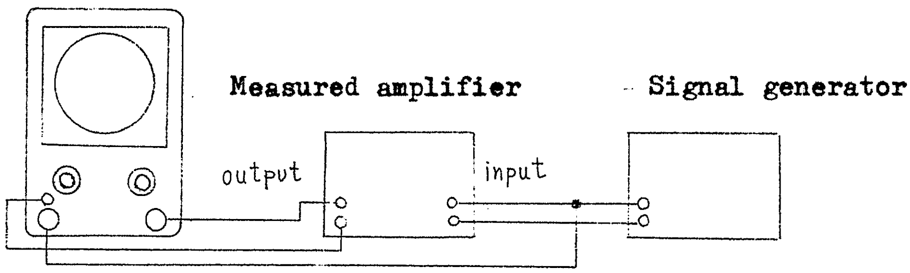


Fig. 5

6.10 Frequency Measurement

Set the SWEEP RANGE switch in the EXT HOR position, apply the measured signal to the vertical INPUT terminal, and apply a known signal to the EXT HOR terminal. (See Fig. 6.) Adjust both vertical and horizontal amplitudes at 4 cm with the VERT GAIN and HOR GAIN knobs, respectively. Vary the frequency of the known signal so that Lissajous figures as shown in WAVEFORM 6 are displayed. The figure will continuously vary in the order of (1) → (5) → (1) and will repeat this rotational cycle.

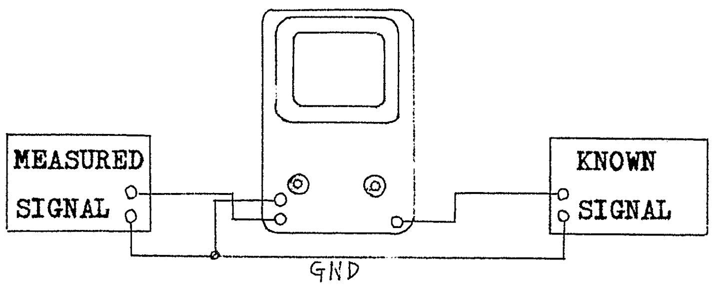
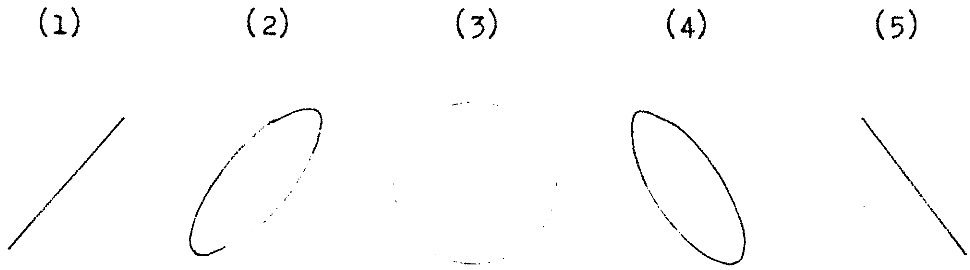


Fig. 6

As the ratio between the measured signal and the known signal becomes closer to 1:1, the rotational cycle of Lissajous figures become slower. When the two signals have become exactly the same frequency, the Lissajous figure becomes stationary in a pattern of either one of (1) - (5) of WAVEFORM 6. Thus the frequency of the measured signal can be accurately determined.

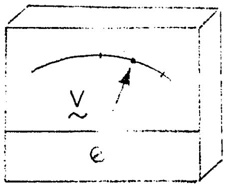
It is possible, of course, to determine the frequency of the measured signal not by employing the 1:1 frequency relationship but other ratios. However, it is the most simple and reliable method to determine the frequency in the 1:1 ratio using a signal generator which provides a wide frequency range.



WAVEFORM 6

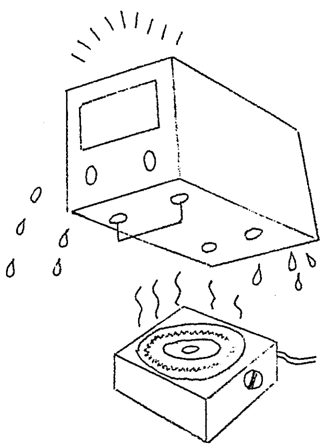
7. PRECAUTIONS

7.1 Line Voltage



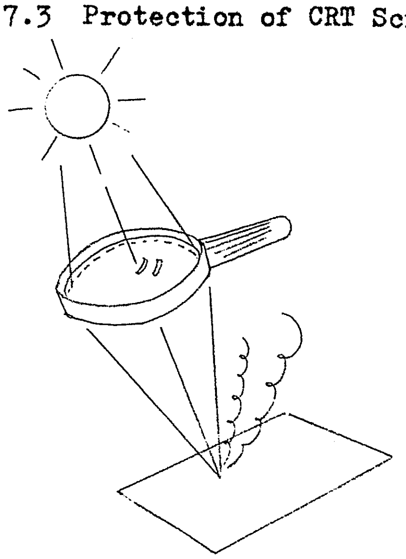
This oscilloscope can be operated on a line voltage of AC.
If the line voltage is not within this range, it must be boosted up to or stepped down to this range. Note that the oscilloscope may be damaged if a voltage higher than V is applied.

7.2 Ambient Temperature



The ambient temperature range for stable oscilloscope operation is +10 to +40°C. Do not expose the oscilloscope to a high temperature heat source.

7.3 Protection of CRT Screen



If a spot or a single line trace at the highest intensity is left for a long period, the fluorescent screen of CRT may be burnt. Keep it in mind that the oscilloscope must be operated at a subdued brightness except when the actual measurement is made.

7.4 Allowable Maximum Voltages of Input Terminals

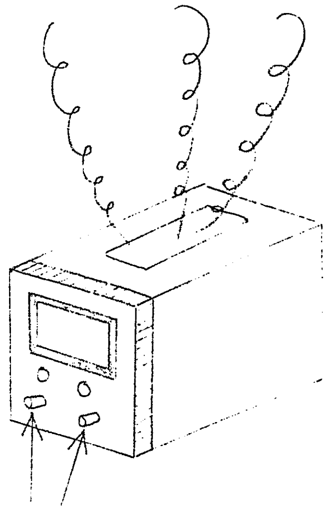
The oscilloscope may be damaged if an abnormally high voltage is applied to its input terminals. The maximum allowable input voltages are as tabulated below.

Input terminal	Maximum allowable voltage	Remarks
VERT IN	400 V (DC + AC peak, below 1 kHz)	When VERT GAIN switch is at 1/1.
	600 V (DC + AC peak, below 1 kHz)	When VERT GAIN switch is at 1/10, 1/100, or 1/1000.
EXT HOR/SYNC IN	100 V (DC + AC peak)	

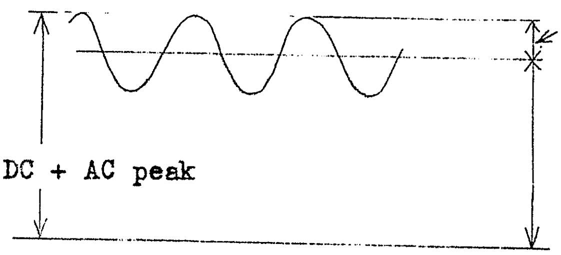
Notes: The term "DC + AC peak" signifies the total voltage of the DC component plus the peak value of the AC component.

The maximum allowable voltage also depends on frequency -- the voltage decreases as frequency increases. If the input signal is DC component alone, the maximum allowable voltage is plus or minus 400 V when the VERT GAIN switch is set at 1/1, or plus or minus 600 V when the switch is set in other position. If the signal is AC component alone of less than 1 kHz, the maximum allowable voltages are 400 Vp-p and 600 Vp-p in accordance with the setting of the VERT GAIN switch.

Note that the peak voltage of a commercial line voltage given in the rms value is as large as $2 \times \sqrt{2}$ times of the rms value. For example, a line voltage of 100 V rms is equivalent to approximately 280 Vp-p.



If an excessively high
input voltage is applied .....



8. MAINTENANCE

8.1 Removing the Housing Covers

The upper and bottom covers of the housing can be removed after undoing the eight clamping-screws for the upper cover and four clamping screws for the bottom cover.

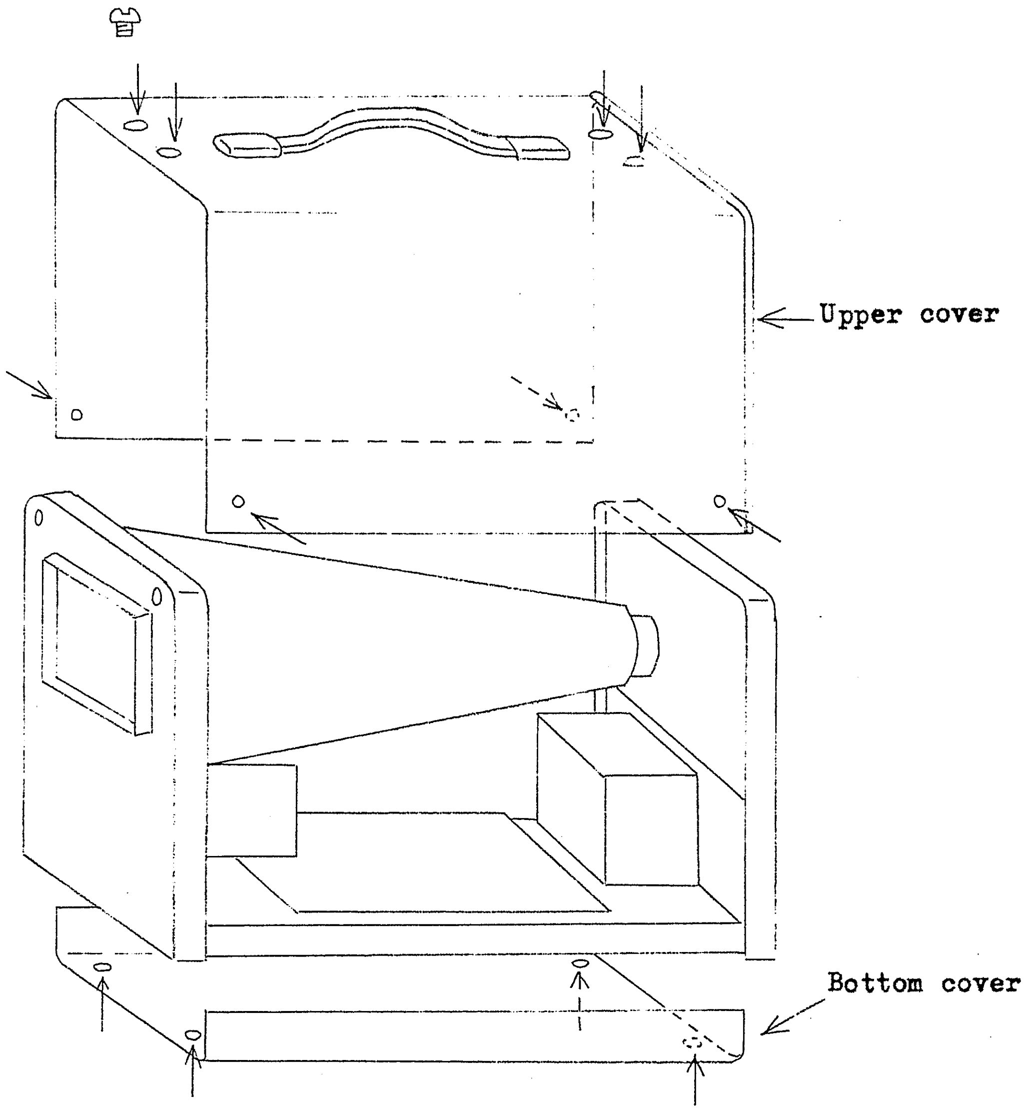


Fig. 7

8.2 Vertical Axis Attenuator Waveform and Input Capacitance Adjustment

When a component of the attenuator is replaced, adjustment must be made as follows:

With the housing covers removed, apply a quality square wave signal to the VERT IN terminal and check the frequency response of the attenuator. If the frequency response is degraded as shown in WAVEFORMS 7 and 8, adjust the frequency compensation semi-fixed capacitors C-204 (for the 1/10 range), C-208 (for the 1/100 range), and C-212 (for the 1/1000 range) so that a correct waveform as shown in WAVEFORM 9 is obtained.

Regarding the input capacitance, connect a capacitance meter to the VERT IN terminal and adjust the input capacitance compensation semi-fixed capacitors C-202 (for the 1/1 range), C-206 (for the 1/10 range), C-210 (for the 1/100 range) and the C-214 (for the 1/1000 range) so that the capacitance meter reads 38 pF.

The order of adjusting procedures is as follows: First, set the input capacitance at 38 pF for the 1/1 range. Next, adjust the waveform for the 1/10, 1/100, and 1/1000 ranges in this order. Then, adjust the input capacitance for the 1/10, 1/100, and 1/1000 ranges in this order.

8.3 Adjustment of Low Capacitance Probe

The performance of Type 957 Low Capacitance Probe may be disturbed when it is subjected to abnormally large mechanical shocks or a voltage largely exceeding the rated value is applied. To restore the correct performance, apply a quality square wave of approximately 1 kHz or the calibration signal to the probe and so adjust the trimmer capacitor using a screwdriver that a waveform as shown in WAVEFORM 9 is obtained.

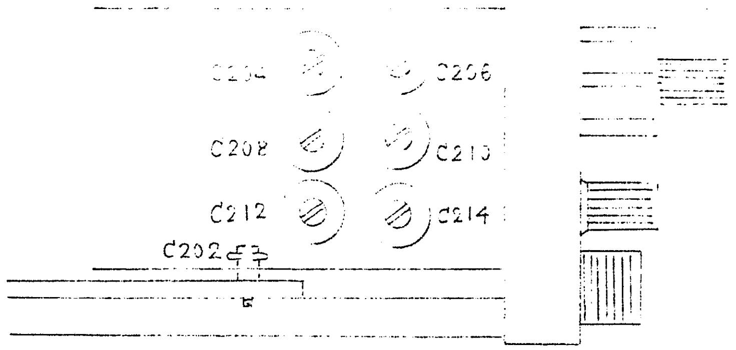
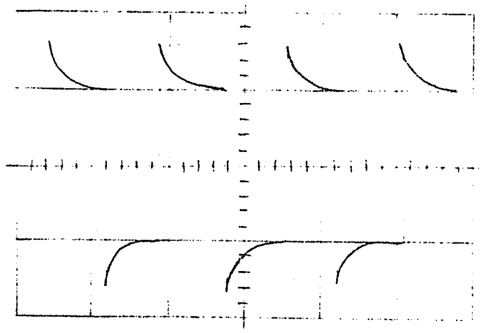
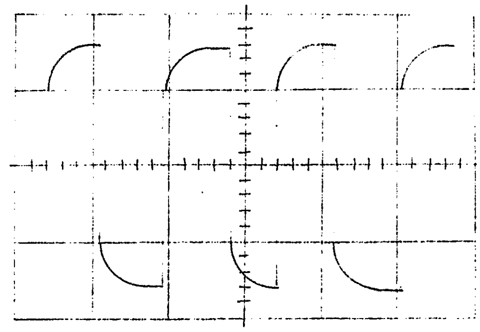


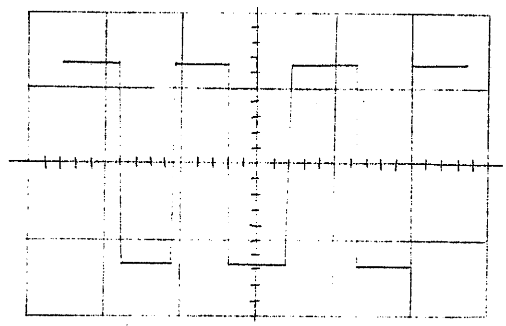
Fig. 8



WAVEFORM 7



WAVEFORM 8



WAVEFORM 9

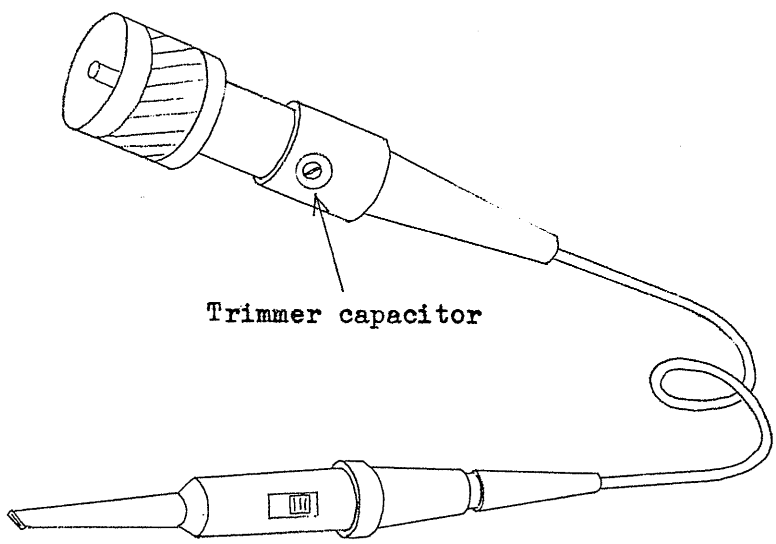


Fig. 9

8.4 VERT DC BAL Adjustment

If the trace on the CRT screen shifts vertically when the VARIABLE knob (red) of the vertical axis is turned under the state that no signal is applied to the VERT IN terminal, the VERT DC BAL control must be adjusted. For this adjustment, proceed as follows: Turn on the main power and allow more than 10 minutes of stabilization period. Then, adjust the DC BAL control (semi-fixed resistor shown in Fig. 10) using a screwdriver.

This adjustment must be made also when a component (FET, transistor, etc.) of the input-side stages of the vertical amplifier has been replaced.

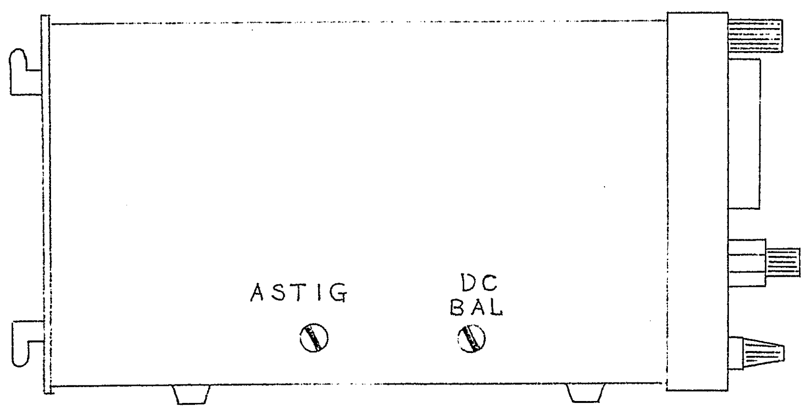


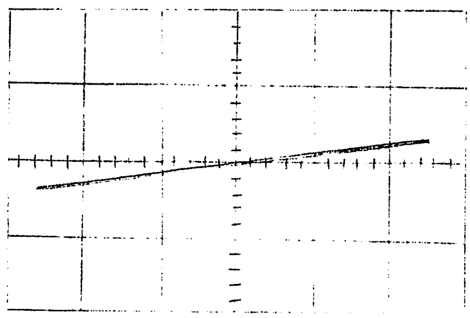
Fig. 10

8.5 ASTIG Adjustment

The astigmatism control (semi-fixed resistor) is rarely required to be adjusted, except the case the CRT has been replaced. Refer to Fig. 10 for location of this control.

8.6 Horizontal Base Line Alignment

When the base line of the trace is slanted from the graticule index as shown in WAVEFORM 10 due to mechanical vibrations or terrestrial magnetism, proceed as follows: First, remove the housing cover and undo the clamping-screw of the CRT. (See Fig. 11.) Next, rotate the CRT by holding it by the position indicated with the arrow in the illustration so that the base line is correctly aligned with the graticule index. Then, tighten the clamping-screw of the CRT.



WAVEFORM 10

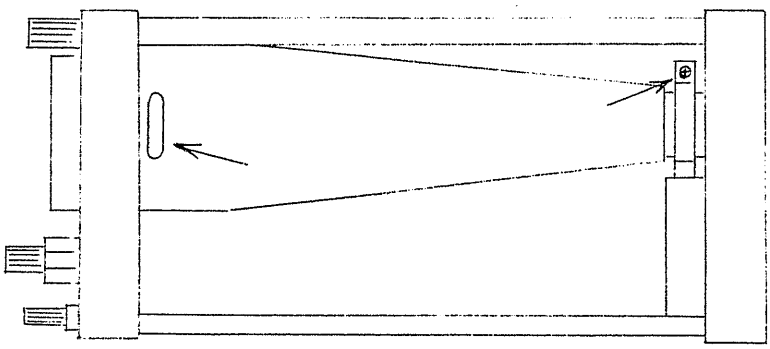


Fig. 11

8.7 Service

The Model 558 Oscilloscope employs the completely solid-state electronics ensuring a high operation reliability. Provided the oscilloscope is correctly operated under the specified operating conditions and with the rated supply voltage, it will operate troublefree for a long time. Should any trouble or operation failure be caused due to any abnormal state, please contact our representative in your area.

CRT ROTATOR (cathode-ray tube rotating mechanism)

The function of the CRT ROTATOR is to rotate the CRT mechanically for fine adjustment so that the horizontal trace of the CRT is made parallel with the horizontal scale lines of the graticule. An outstanding feature of the CRT ROTATOR is that the adjustment can be made without removing the casing.

The adjusting provision is located on the right-hand side panel (as viewed from the oscilloscope front) as shown in Fig. 1.
This adjustment should be made when the horizontal trace apparently is not parallel with the horizontal scale lines of the graticule.

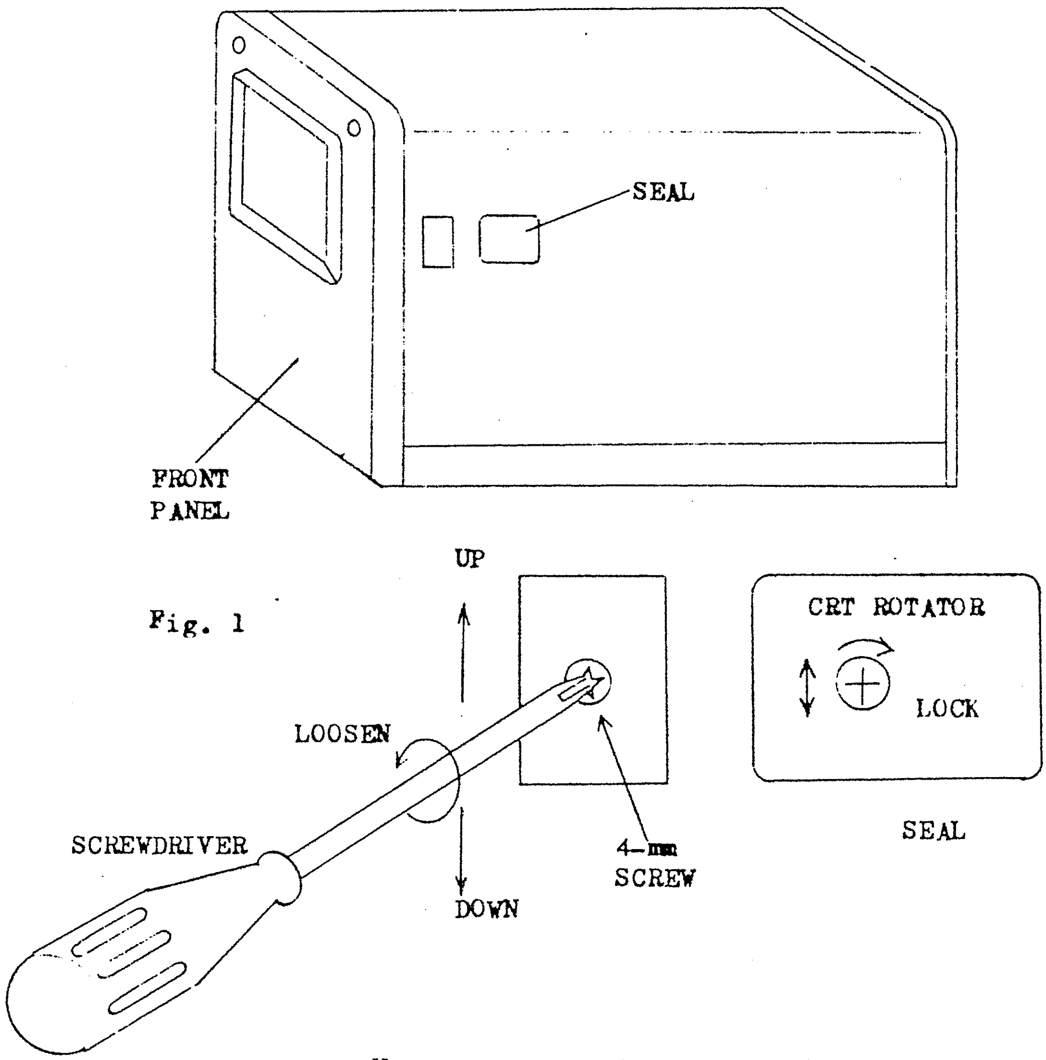


Fig. 1

Using a screwdriver, move the 4-mm screw upward or downward so that the horizontal trace is made parallel with the horizontal scale lines of the graticule.

ADJUSTING PROCEDURE

1. With a screwdriver (+), rotate the 4-mm screw counterclockwise for approximately 3 turns to loosen it. Note that the screw will come off if it is turned further.

2. When the screw si loosened, it can be moved upward and downward and in response the CRT is slightly rotated and thus the horizontal trace angle is adjustable. This adjustment should be made under the state that the power of the oscilloscope is turned on and it is displaying its horizontal trace.

Fig. 2

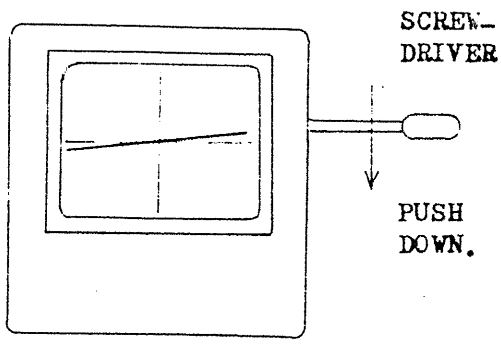
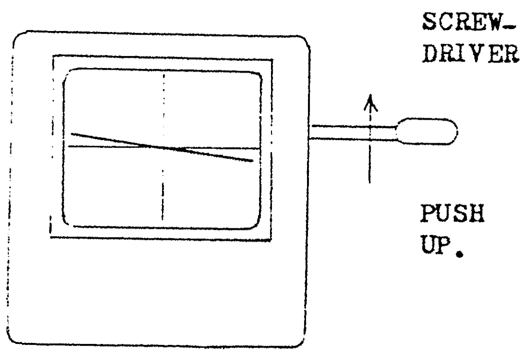


Fig. 3



3. Fig. 2 illustrates the case the right-hand side of the trace is high. In this case, set the screwdriver to the 4-mm screw and move it downward so that the trace is made parallel with the graticule. The 4-mm screw is heavy and should be pushed downward strongly.

4. Fig. 3 illustrates the case the left-hand side of the trace is high. In this case, move the 4-mm screw upward.

5. When the trace is made parallel with the graticule, lock tightly the 4-mm screw by turning it clockwise (LOCK) with the screwdriver.

The adjustment is complete by the above procedure.