MODEL 351

SWEEP GENERATOR

OPERATION MANUAL

KIKUSUI ELECTRONICS CORP.

1. GENERAL DESCRIPTION

Kikusui Electronics Model 351 Sweep Generator is designed for alignment of TV sets and FM receivers. It combined with sweep generator and marker oscillator in one cabinet to use easily for operating in service bench.

CONTENTS

2. SPECIFICATIONS

Sweep Section

Frequency	A band	2 ~ 130 MHz (beat down system)
	B band	140 ~ 270 MHz (direct osc.)
Sweep Width	for all frequency, Wide:	more than 12 MHz
	Narrow:	" 2 MHz
Output Voltage		more than 100 mV p-p
Output Impedance (with attached cable)	balanced	300 ohms
	unbalanced	200 ohms
Attenuator	H. M. L.	3-range with continuous variable
		more than 5 Vp-p

Marker Section

Frequency	A band	3.5 ~ 6 MHz (2nd harmonics: 7 - 12 MHz)
	B band	18 ~ 30 MHz (2nd harmonics: 36 - 60 MHz)
	C band	70 ~ 140 MHz (2nd harmonics: 140 - 280 MHz)
Accuracy		less than 1 %
Crystal Calibrator*	built-in	4.5 MHz ± 0.01 %

*It can be used with external crystal (2~12 MHz)

Tube used

5	~	6 J 6
1	~	1 2 A T 7
1	~	6 A U 6
1	~	6 A V 6
1	~	6 X 4

Power	AC -----V 50/60 Hz	Approx. 50 VA
Dimensions (Max.)	230 W x 310 H x 250 D mm - (230 W x 320 H x 295 D)mm	
Weight		Approx. 8.5 kg

Accessories	Input Cable	1
	Output Cable	1
	Operation Manual	1
	Test Data	1

FRONT PANEL

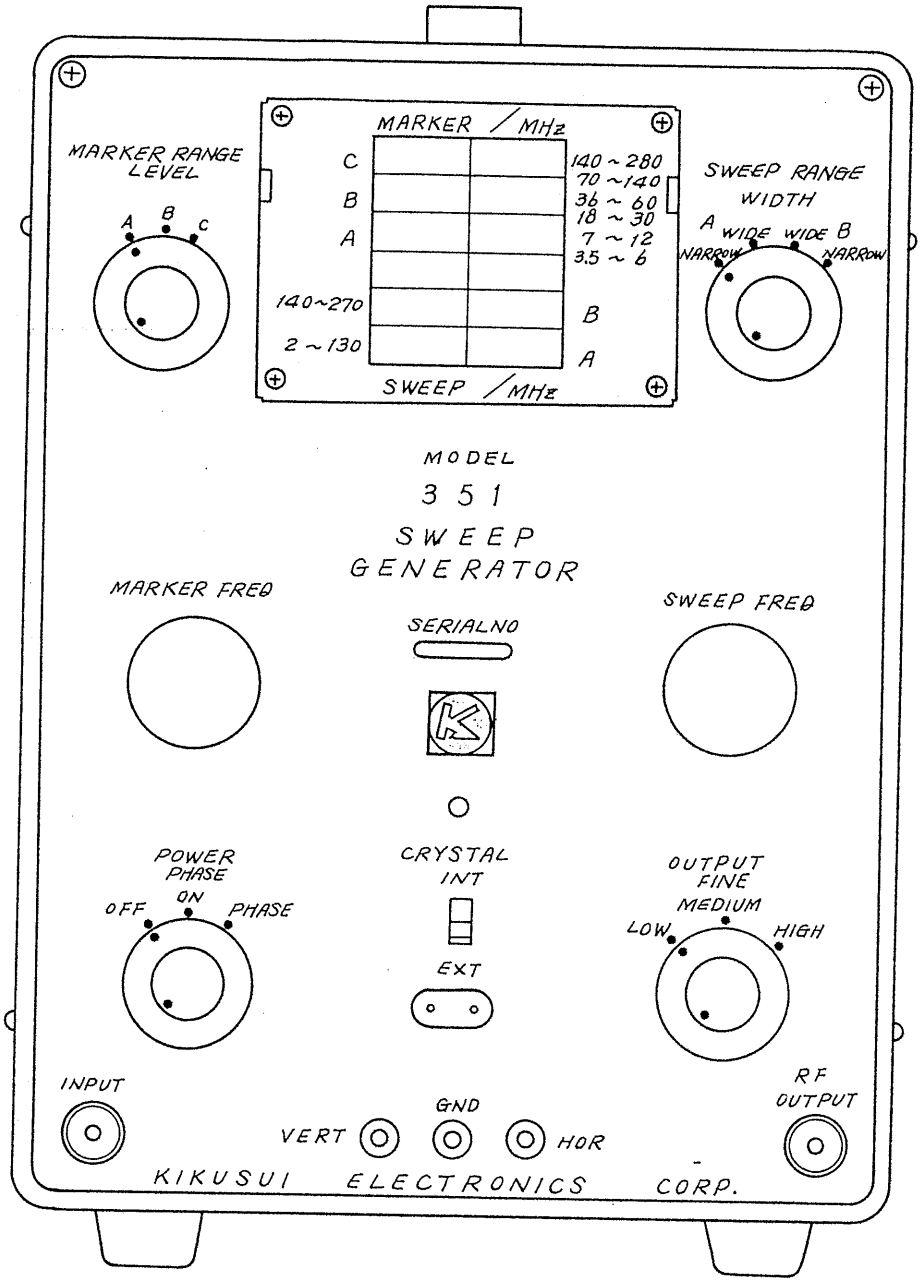


Fig. 3-1

3. FRONT PANEL DESCRIPTION

FREQUENCY DIAL — Located at the upper part of front panel, consist of sweep dials (including A and B) and Marker dials (A, B and C).

This marker oscillator generates fundamental 3.5 to 6 MHz and its second harmonics 7 to 12 MHz. Use a same marker range, when it operates in a range from 3.5 to 6 MHz or 7 to 12 MHz.

DIAL NEEDLE — Which is common use for sweep and marker dial. This sliding needle can be adjusted accurately to calibrate its frequency by pushing with a screw driver through side square holes.

MARKER RANGE LEVEL — External black-colored knob is a selector switch of marker frequency range. Internal red knob is a control of marker level. When this control is turned to clockwise, marker level increases.

MARKER FREQ. — This knob is for marker frequency control.

POWER PHASE — When external black-colored knob is turned to clockwise, it steps Power off, Power on - blanking and Power on - unblanking ("PHASE" position). Internal red colored knob is used for phase control at "PHASE" position of the external knob.

SWEEP RANGE WIDTH — Sweep range is selected with this external black-colored knob. Internal red-colored knob controls sweep width continously.

SWEEP FREQ.	This knob is for setting center sweep frequency.
RF OUTPUT	External black-colored knob is a selector of output voltage range, which is turned to clockwise and it steps L(low), M(medium), and H(high), output range increases. Internal fine control knob is turned to same direction. Output voltage increases.
CRYSTAL EXT --- INT	This switch selects internal crystal (4.5 MHz) or external crystal (from 2 to 12 MHz crystal may be used). If you desire variable marker, select to external position and pull out external crystal.
INPUT Terminal	Connect this terminal to detector output of TV set or receiver to be measured.
RF OUTPUT Terminal	This is a sweep output terminal. Connect to input of TV set or receiver with attached cable.
VERT Terminal	Connect this terminal to vertical input of oscilloscope. It provides observed waveform added marker signal.
HOR Terminal	This is output of line sweep signal to be connected to horizontal input of oscilloscope.
GND Terminal	This ground terminal is connected to chassis and front panel.

Colored clip of
attached cable

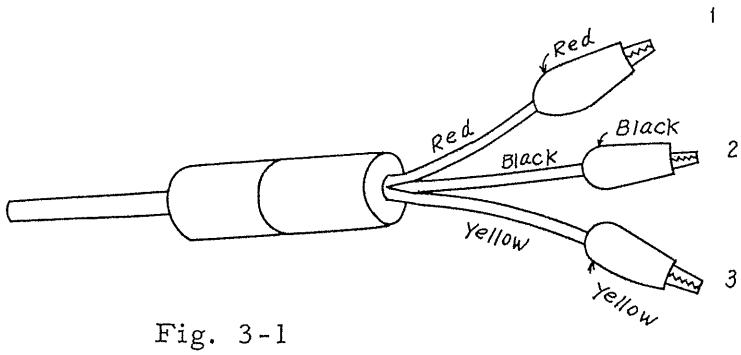


Fig. 3-1

1 - 2 : 200 ohms, Use for IF and other measurements

1 - 3 : 300 ohms, Use for tuner and overall measurment.

4. ALIGNMENT OF VIDIO AMPLIFIER

(A) Connect a power cord of this Model 351 to AC source 50/60 Hz outlet, and turn on power switch.

(B) Wire between Model 351 and TV set to be measured as shown in Fig 4-1.

(C) Clip mixer cap with attached cable of 200 ohms wire as indicated in Fig. 4-2. (When there is not mixer cap, connect to test point.)

(D) Select a channel not to be broadcasted or stop local oscillator.

(E) Set control knobs as following.

SWEEP RANGE	A - WIDE
WIDTH	center
RF OUTPUT	
external knob	M - Position
Internal knob	full clockwise
POWER	PHASE position
PHASE	center

(F) Oscilloscope control knobs are to be set as following.

INTENSITY	suitable intensity

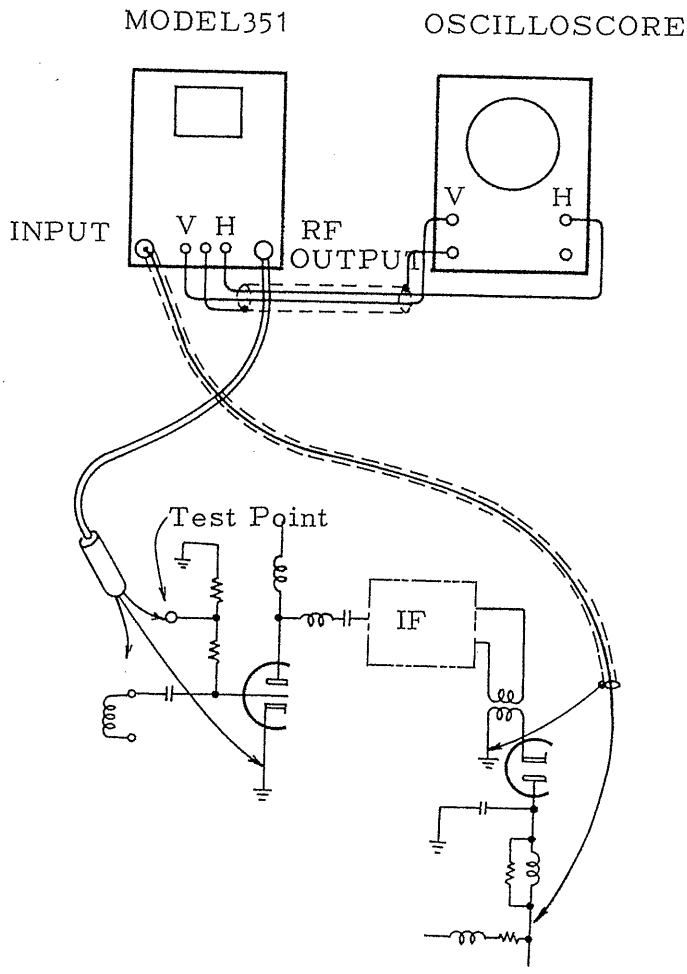


Fig. 4-1

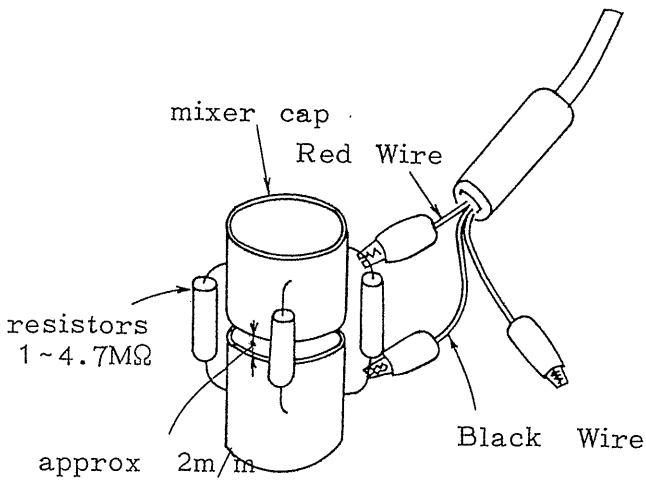


Fig. 4-2

VERT	max. sensitivity
HOR	select HOR AMP position
HOR GAIN	medium
POSITIONS	down quarter from center position

(G) Adjust sweep center frequency to approx. 25 MHz SWEEP FREQ. knob, a curve of vidio IF response appears on oscilloscope screen.

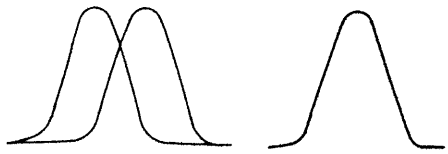
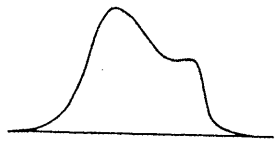


Fig.5-3

(H) It appears so, adjust two-fold waveform to a single waveform by "PHASE" knob as illustrated in Fig. 5-3.

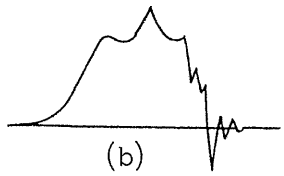
Fig.5-4

(I) Set a "POWER" knob to "ON" position, when blanking waveform to be desired. See Fig. 5-4.



(a)

(J) Indicating a point frequency of the response by marker signal, set a marker signal, set a marker level to medium position. Select marker range and turn slowly its dial untill apearance of pip marker on the response.

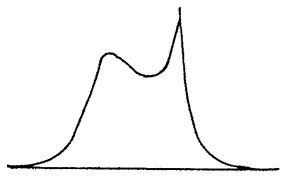


(b)

(K) Readjust oscilloscope control knobs, as a waveform to be seen easily.

(c)

(L) Mentioned above, align IF transformer cores and damping resistors to desired IF responses.



(d)

Fig.5-5

(M) Fig. 5-5 indicates various IF responses in TV set.

5. ALIGNMENT OF TURNER CIRCUIT

(A) 300 ohms clips of attched cable (see Fig. 3-1) is to be connected to TV input terminal as shown Fig. 5-1.

(B) Select "SWEEP RANGE" according to channel frequency of TV set to be aligned.

(C) Turn fully clockwise "WIDTH" control knob.

(D) If you need marker signal on swept response, set marker frequency according to sweep frequency, and adjust marker level properly. Marker level should not be so high, for high level causes difficulty to distinguish true marker from image marker.

(E) Align carefully cores of coil or trimming capacitors of tuner circuit as well as proceeding description about IF circuit. This alignment is so important for increasing of signal to noise ratio.

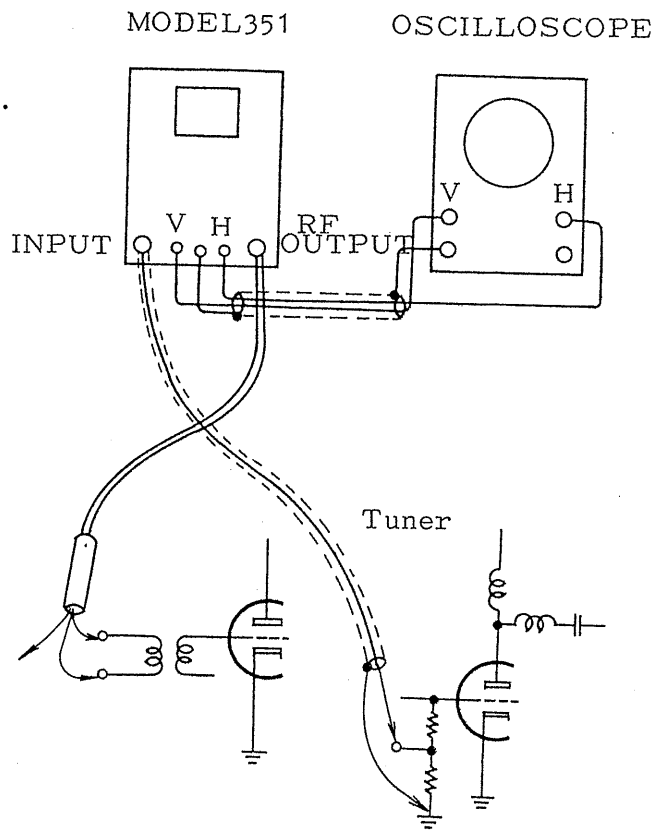


Fig. 5-1

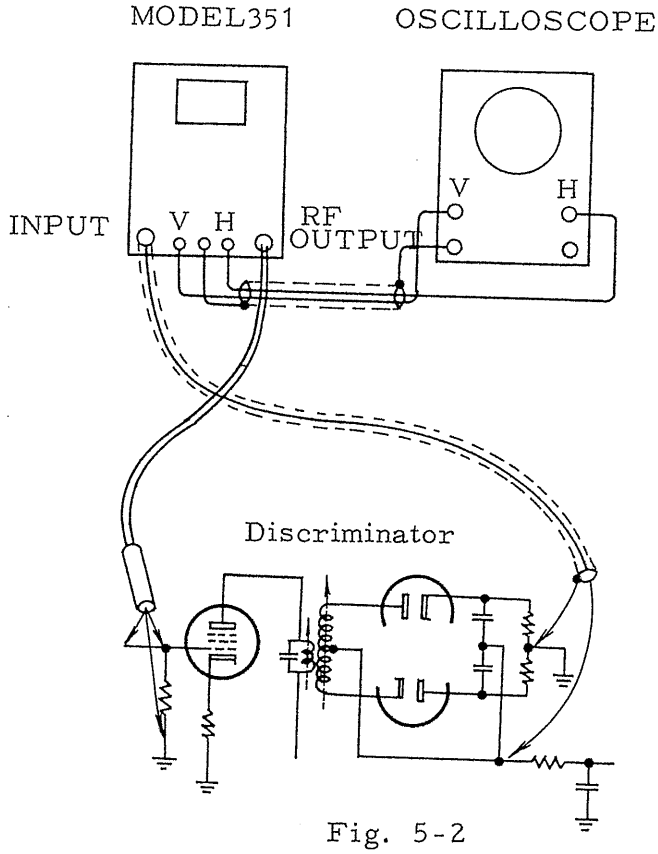


Fig. 5-2

6. DISCRIMINATOR ALLIGNMENT

(A) In this alignment, circuit arrangement is illustrated in Fig. 5-2.

(B) Set sweep center frequency to 4.5 MHz(TV set) or 10.7 MHz (FM receiver).

(C) Switch sweep width to "NARROW" position, and control continuous variable knob to get proper sweep width.

(D) Marking of sweep frequency by crystal oscillator is shown as following.

<u>In case of TV set (4.5 MHz)</u>

Set variable marker dial to max. frequency, select crystal switch to "INT" position.

<u>In case of FM receiver (10.7 MHz)</u>

Switch to "EXT" position, install 10.7 MHz crystal to its socket on the panel.

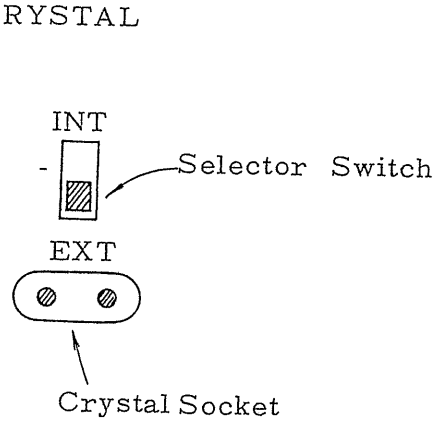


Fig.6-1

7. MARKER CALIBRATION

(A) Marker of this equipment can be calibrated in proceeding circuit arrangement.
(See Fig. 4-1, 5-1, 5-2)

(B) For example, when you calibrate A, Band of marker frequency, switch crystal selector to "EXT" and install crystal to the socket.

beat waveform

Fig.7-1

(C) Next, turn slowly "MARKER FREQ." dial to clockwise or counter clockwise, strong beated waveform as shown in Fig. 5-1 appears at the frequency of n times 2 MHz on the oscilloscope screen, (n = 2, 3, . . .)

(D) This strong beated waveforms indicate point of 4 MHz, 6 MHz . . .

(E)) Crystal selector switch to "INT", it can be calibrated by 4.5 MHz crystal. Calibration points are n times 4.5 MHz (n=1, 2, 3, . . .)

8. MAINTENENCE

(A) Turn off power switch, and put off two screws fixed on panel side, two screws on the bottom, one on the back. Draw slowly from the cabinet.

(B) When you repair the equipment, see drawing of circuit diagram and parts location filed in end of this manual.