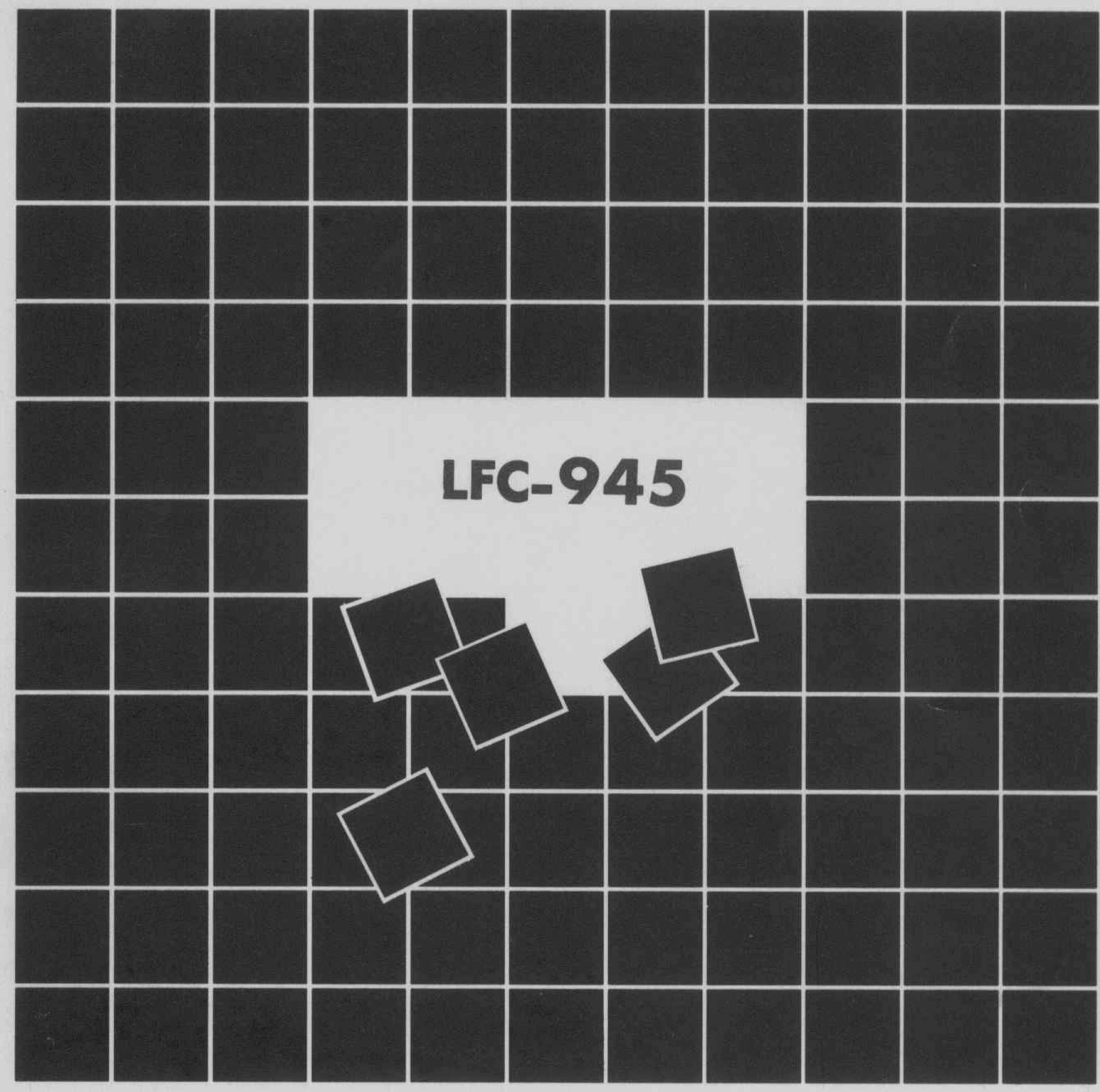
LEADER

SIGNAL LEVEL METER

INSTRUCTION MANUAL



LEADER ELECTRONICS CORP.

LFC-945

SIGNAL LEVEL METER

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7.9 Coaxial Clip (LJ-09)

When a connector is not attached to the coaxial cable to be connected to the instrument, it takes a time to attach the plug. However if you use the coaxial clip (LJ-09), a relatively high accuracy measurement is available.

Characteristic impedance	75Ω
Insertion loss	VHF: Less than ±0.5 dB UHF: Less than ±1.0 dB

Table 7-1 Specifications of coaxial clip

To use the coaxial clip, make the cable tip as shown in Fig. 7-5.

When the coaxial cable tip is prepared as shown in Fig. 7-5, the cable can be easily attached to a TV receiver, distributer, and matching unit, after the measurement. If the dimensions of the tip are deviated from the ones specified in the figure, the measurement deviation will increase.

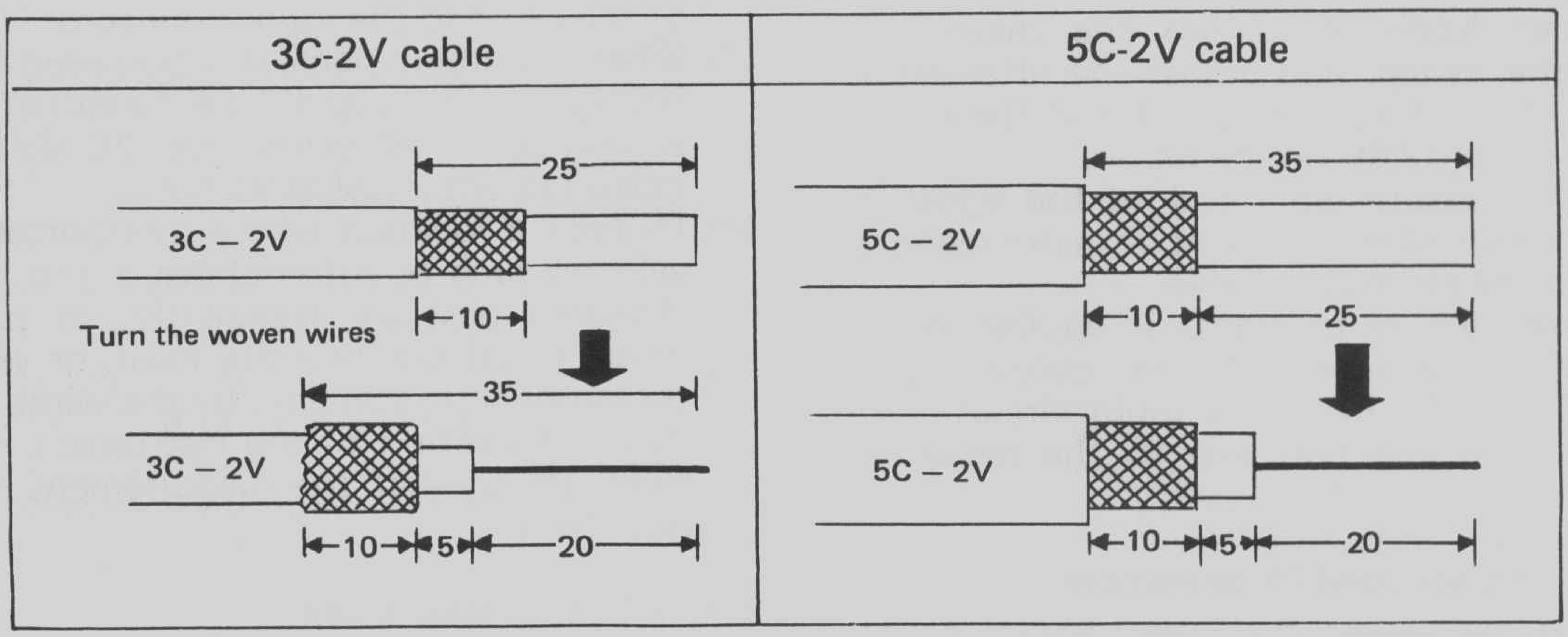


Fig. 7-5 Tip preparation of coaxial cable (Unit: mm)

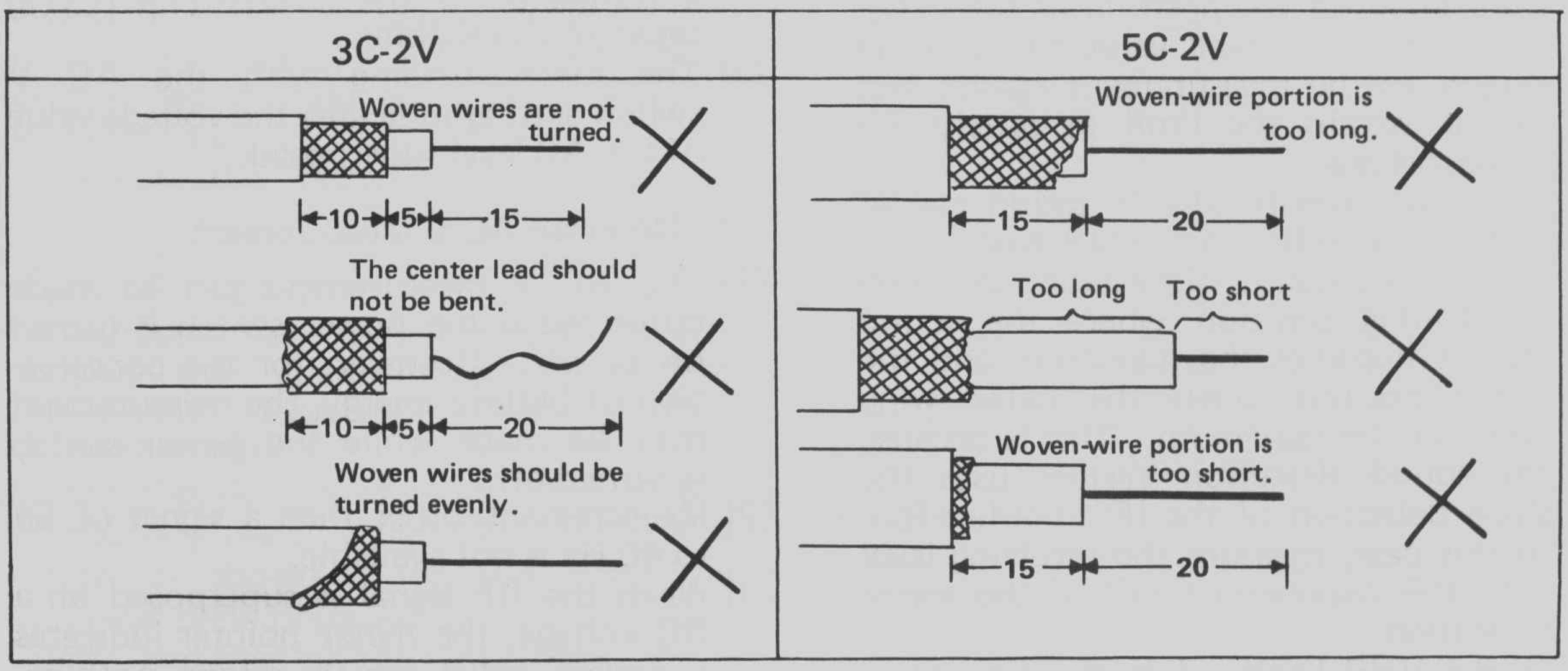


Fig. 7-6 Wrong examples of cable tip preparation

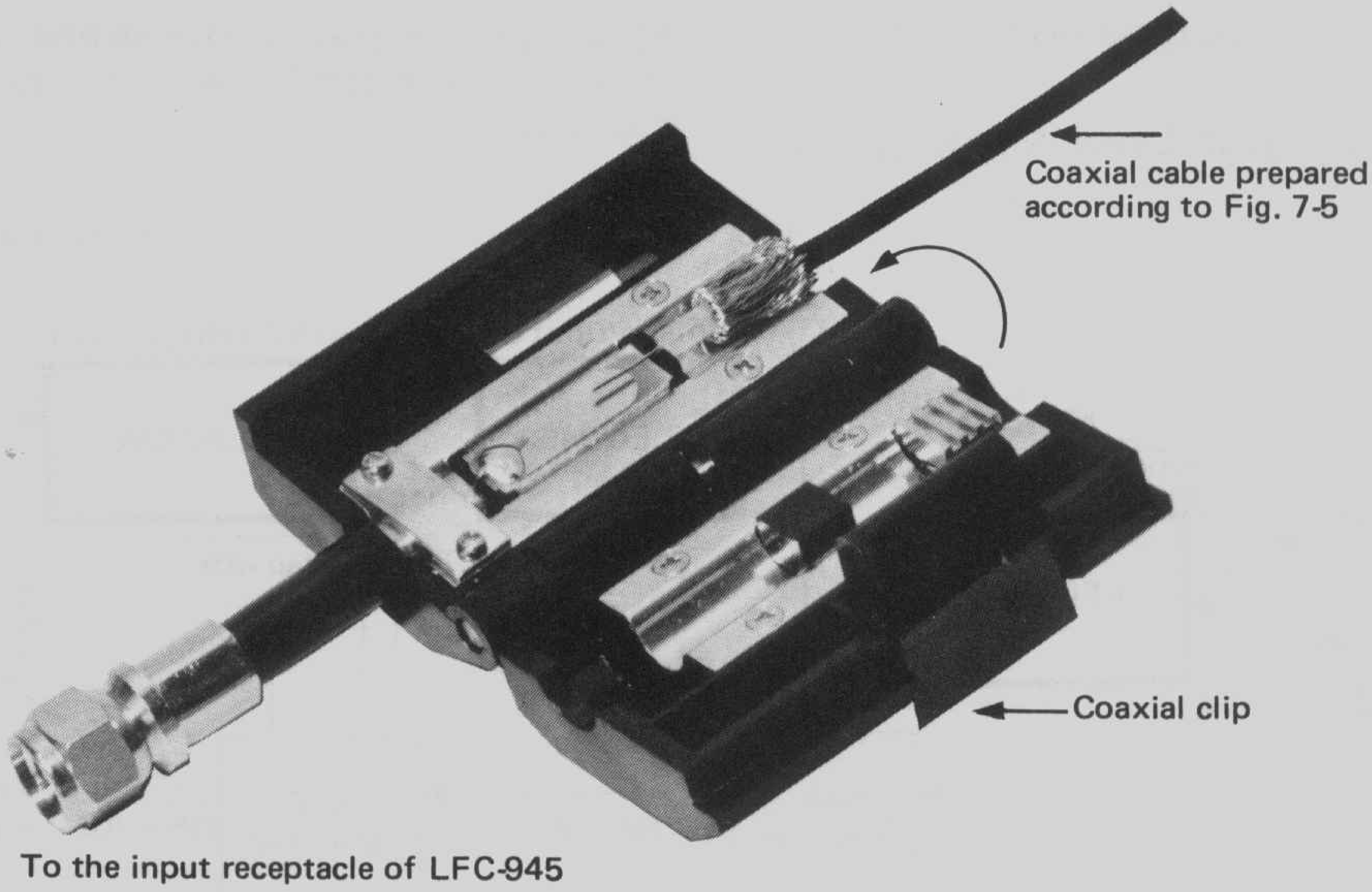


Fig. 7-7 Connection of coaxial cable and coaxial clip

Connect the coaxial clip to the coaxial cable which was prepared according to Fig. 7-5, and close the cover of the clip. Fig. 7-7 shows the coaxial clip inserted with the cable.

Note: When the RF signal is superposed on an AC voltage, the power circuit of the signal source will be damaged by the short-circuit, if the center lead and woven wires are shorted.

7.10 Use for Field Common Receiving System

The LFC-945 Signal Level Meter can be used for various applications on a field common receiving system as shown in Fig. 7-8.

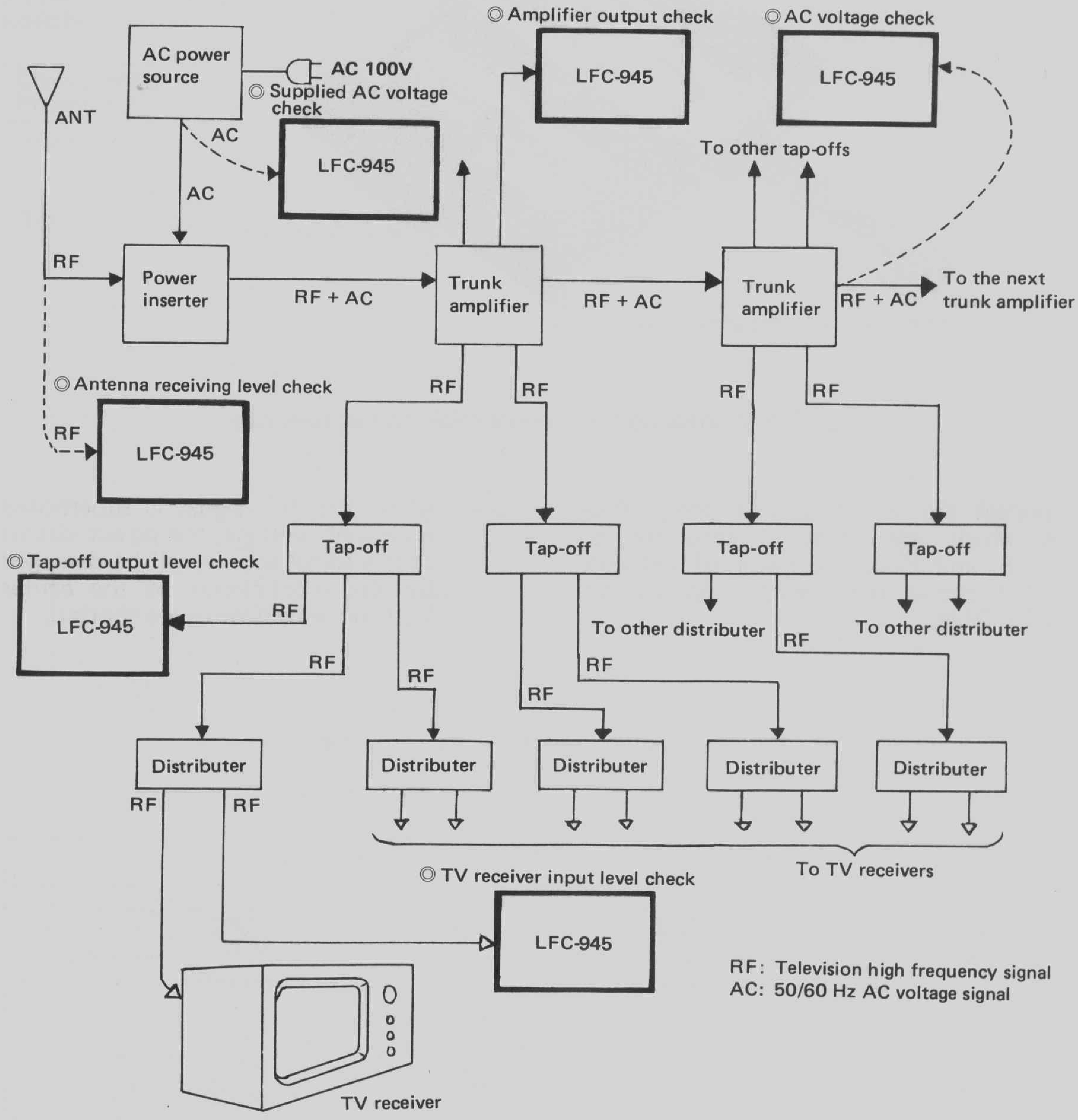
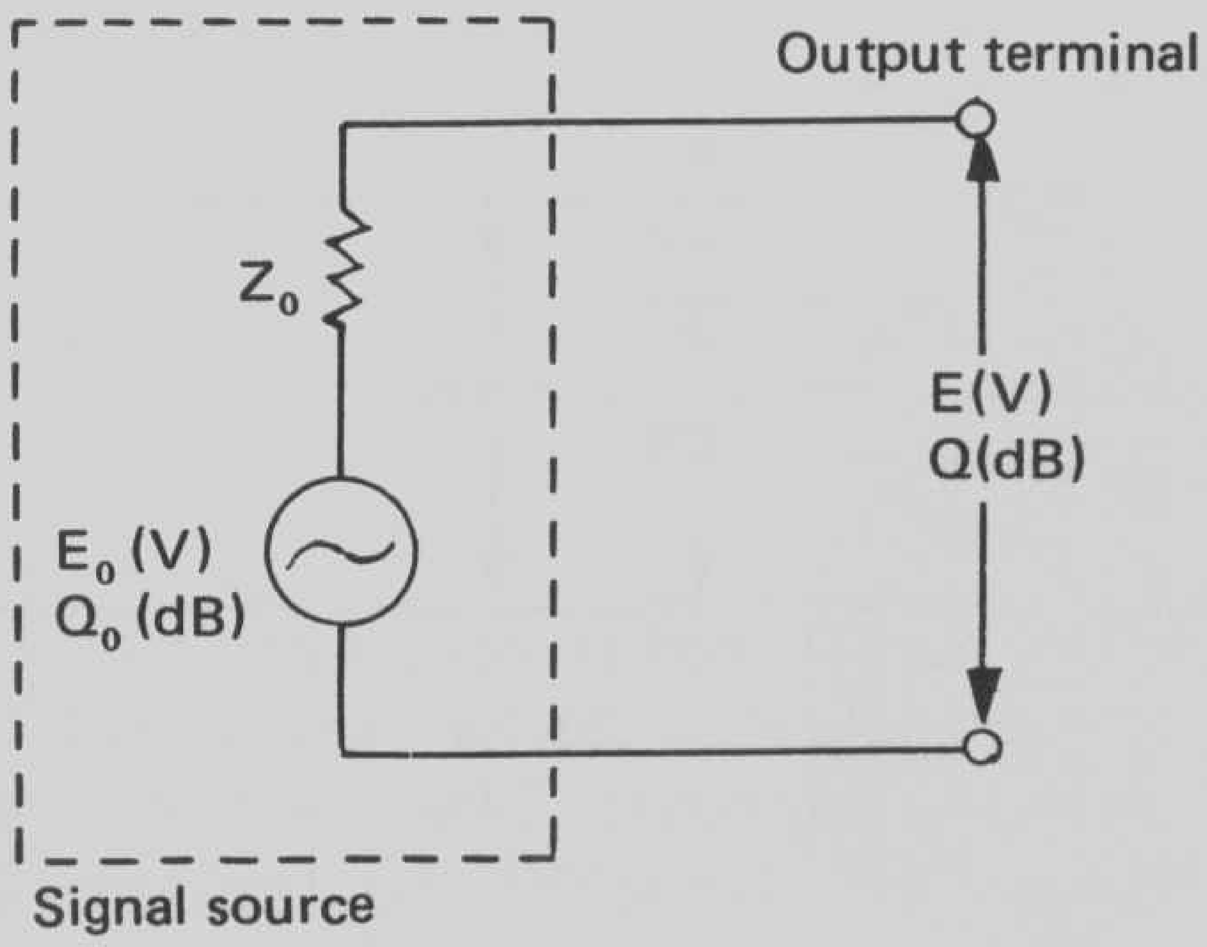


Fig. 7-8 Application for field common receiver system

8. VOLTAGE INDICATION SYSTEM AND DETECTION SYSTEM

8.1 Voltage Indication System

(a) Open condition



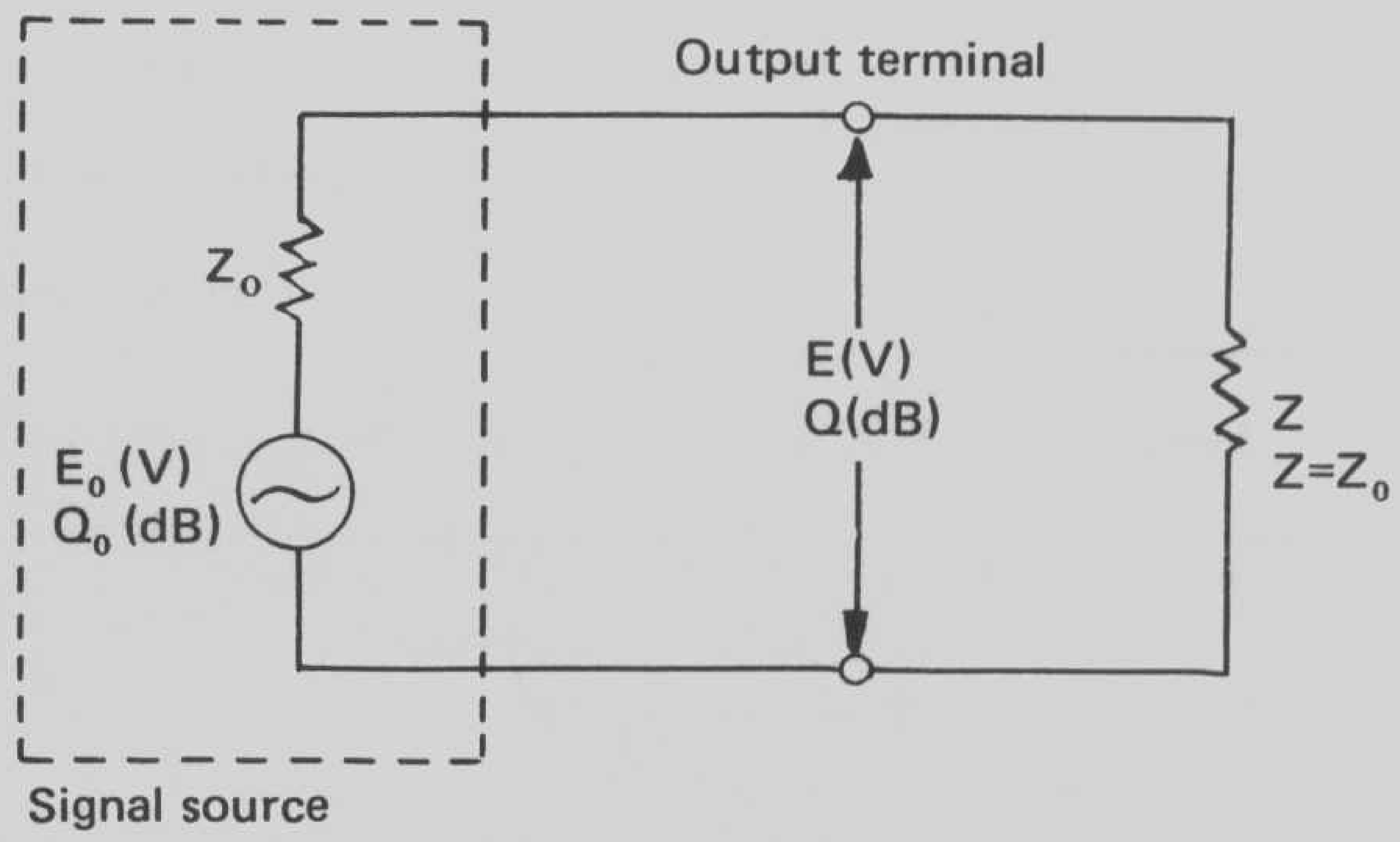
The output terminal voltage E(V), i.e., Q(dB), is represented by:

E (V) = E_0 (V)

Q (dB) = Q_0 (dB)

In other words, the output voltage E(V), i.e., Q(dB), is equal to the internal generation voltage E_0 (V), i.e., Q_0 (dB).

(b) Termination condition



The output terminal voltage E(V), i.e., Q(dB), is represented by:

E (V) = $E_0/2$ (V)

Q (dB) = $Q_0 - 6$ (dB)

where $Z = Z_0$.

In other words, the output voltage E(V) is a half of the internal generation voltage E_0 (V) of the signal source. When the output voltage is represented in dB, it is 6 dB lower than the generation voltage.

Fig. 8-1

As shown in Fig. 8-1, when the internal generation voltage is E_0(V), i.e., Q_0(dB), the output voltage E(V), i.e., Q(dB), of the signal source with the output impedance Z_0 is different by the impedance (load impedance) connected to the output terminal.

As can be seen from Fig. 8-1, the output voltage of the terminal terminated by the load impedance which is equal to the output impedance of the signal source is a half of the output voltage of the open condition, and the termination output voltage is 6 dB lower in the dB representation.

In general, when the output terminal of the signal source is terminated by the load impedance which is equal to the output impedance of the signal source, the output voltage is referred to as termination voltage.

There are two types of field strength meters (signal level meters); one is with the termination voltage indication, and the other is with the open terminal voltage indication.

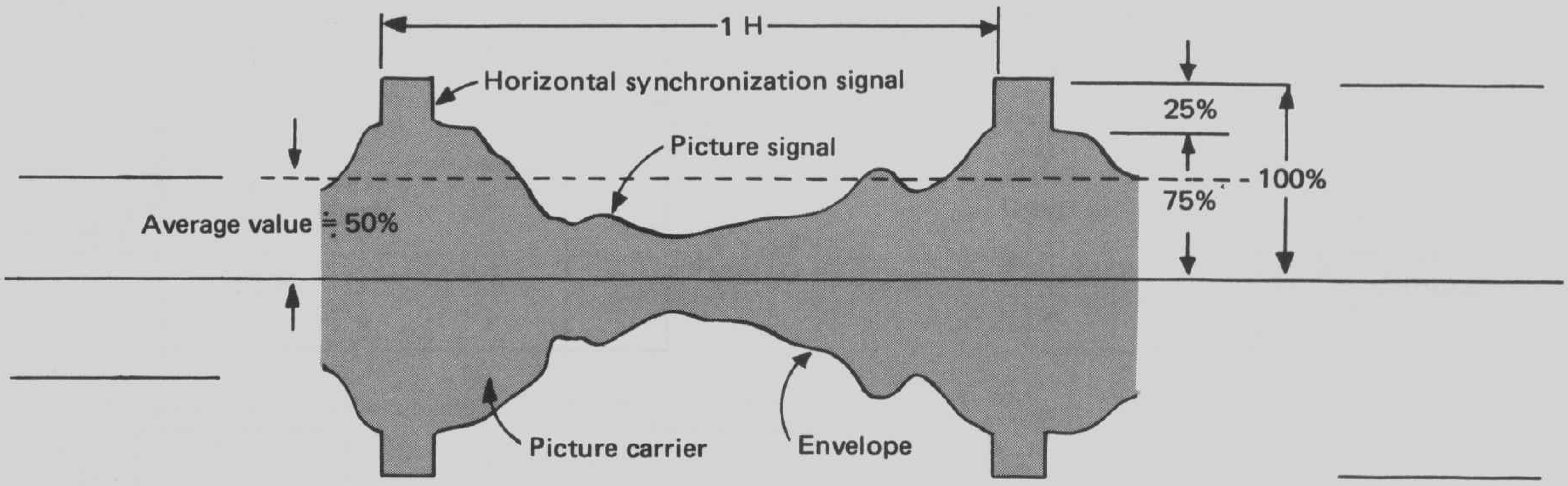
When a non-modulated carrier is measured with a field strength meter (signal level meter) of the open terminal voltage indication type, the measurement level is, regardless the detection system, 6 dB higher than that measured by a meter of the termination voltage indication type.

8.2 Detection System

In general, a field strength meter converts the frequency of RF signal into the IF signal, amplifies the IF signal, detects it, and applies the detection signal to the meter to indicate the voltage level received.

When a TV RF signal is measured, the indication value is different by the detection system used.

There are two types of detection systems as shown in Fig. 8-2; one is the average value detection system, and the other is the peak value detection system.



(a) Carrier amplitude corresponding to average value of envelope

(b) Television RF signal of picture carrier which is amplitude-modulated by composite picture signal

(c) Carrier amplitude corresponding to peak value of synchronizatio signal

Average value detection system

As shown in (a) above in the figure, the meter indicates the carrier amplitude level in rms corresponding to the average value of envelope.

As the envelope (picture signal) changes depending on television picture and its brightness, the detection output may slightly change, accordingly.

Peak value detection system

As shown in (c) above in the figure, the meter indicates the carrier amplitude level in rms corresponding to the peak value of the synchronization signal.

As the synchronization signal is independent of the picture signal, the detection output is not influenced by the television picture and its brightness.

Fig. 8-2

When a non-modulated carrier is measured under same voltage indication system, the measurement value of the average value detection system is same as the measurement value of the peak value detection system.

When a television RF signal broadcasted is measured, the measurement value of the peak value detection system is higher by about 6 dB compared with the measurement value of the average value detection system, if the voltage indication systems are the same.

8.3 Conversion Between Different Voltage Indication Systems and Detection Systems

When the above-described detection systems and voltage indication systems are combined, various indication systems of the following are available:

(1) Average value detection — open terminal voltage indication
(2) Average value detection — termination voltage indication
(3) Peak value detection — open terminal voltage indication
(4) Peak value detection — termination voltage indication (indication system of the LFC-945)

Type of signal	Detection system / Voltage indication system / Measurement item	Average value detection: Termination voltage indication	Average value detection: Open terminal voltage indication	Peak value detection (LFC-945): Termination voltage indication	Peak value detection: Open terminal voltage indication
Nonmodulation Picture carrier	Open terminal voltage	+ 6dB	0dB	+ 6dB	0dB
	Termination voltage	0dB	– 6dB	0dB	– 6dB
Television RF signal	Average value detection – termination voltage	0dB	– 6dB	– 6dB	–12dB
	Average value detection – open terminal voltage	+ 6dB	0dB	0dB	– 6dB
	Peak value detection – termination voltage	+ 6dB	0dB	0dB	– 6dB
	Peak value detection – open terminal voltage	+12dB	+ 6dB	* + 6dB	0dB

Table 8-1 Conversion table

The conversion table shown in Table 8-1 can be used when measurement values obtained by field strength meters (signal level meters) of different voltage indication systems and different detection systems are to be compared, or when a measurement value is to be converted to the equivalent value of other voltage indication system or of other detection system.

Note: The LFC-945 uses the peak value detection – termination voltage indication system which corresponds to the area enclosed by thick lines in Table 8-3.

A confusion was inevitable in describing, referencing, and comparing television RF signal levels in the past, due to different systems of the detection and voltage indication, but the peak value detection – termination voltage indication system is now becoming the major system commonly used.

Use example of Table 8-1:

From a measurement value obtained by the LFC-945, in order to get the value in the peak value detection – open terminal voltage indication, follow the following procedure:

- First, see the column of the peak value detection and the termination voltage indication.
- Then, see the row of the peak value detection – open terminal voltage.
- The crosspoint indicated by an asterisk in the table shows the value of +6 dB. Thus the converted value can be obtained by the following:

  (Peak value detection – open terminal voltage) = (measurement value by LFC-945) + 6 dB

9. APPLICATIONS

9.1 Field Strength (dB/m) Measurement

In field strength measurement, a half-wave doublet antenna or an antenna of known gain is connected and the measurement level G_r (dB) is obtained.

The field strength G_0 (dB/m) is represented by:

$$G_0 = G_r - G_H - G_A \text{ (dB/m)}$$

where

G_0 = field strength (dB/m) to be obtained

G_H = $20 \log \frac{\lambda}{\pi}$ (dB) (Reference Fig. 9-1)

λ = wave length of measurement wave $= \dfrac{300}{\text{measurement frequency (MHz)}}$ (m)

G_A = gain of antenna used (dB)

When a half-wave doublet antenna is used: 0 dB

When the antenna impedance is a value other than 75Ω, insert an impedance matching unit (balun) between the antenna and the instrument, and add the insertion loss of the balun to the value G_0 obtained.

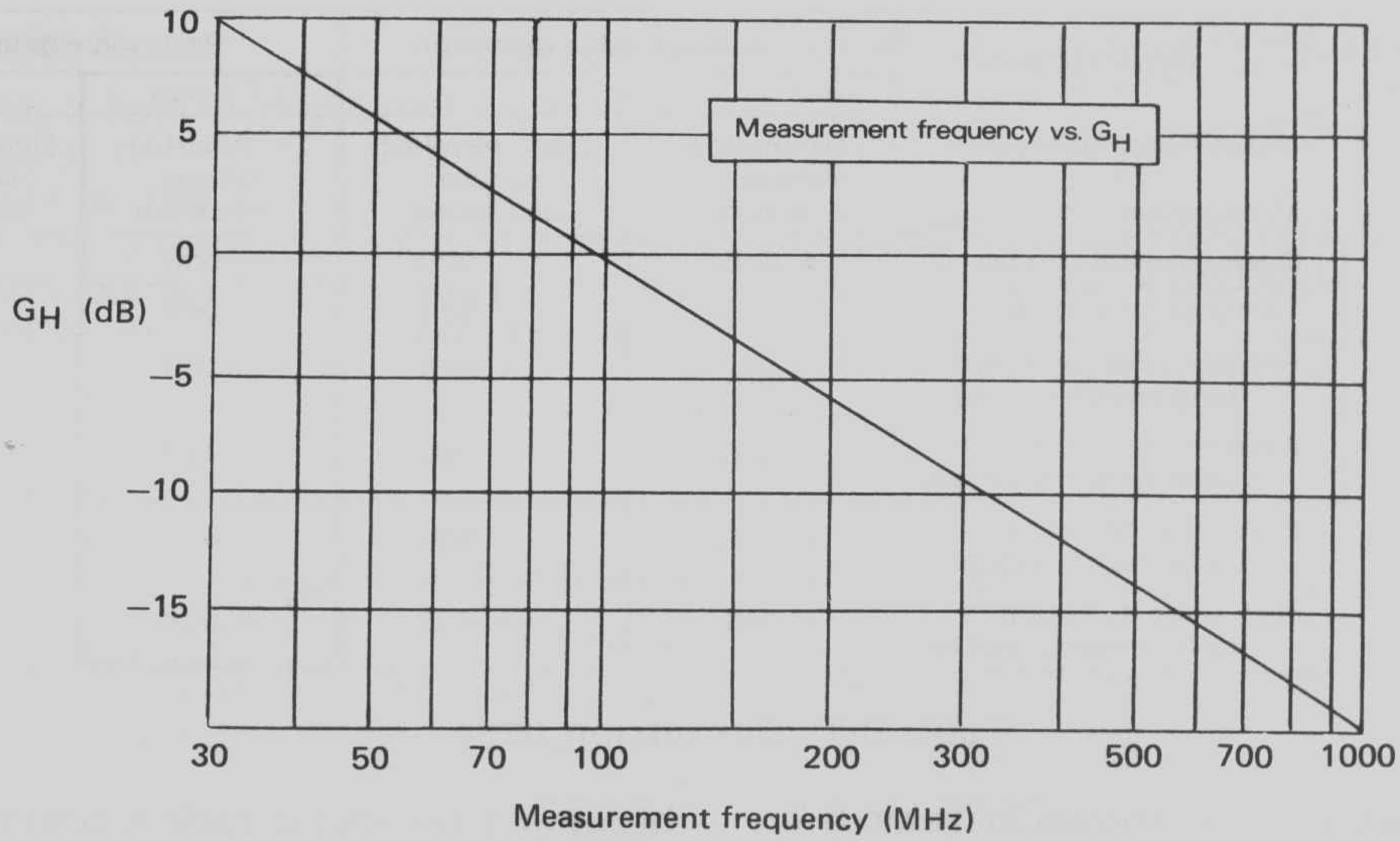
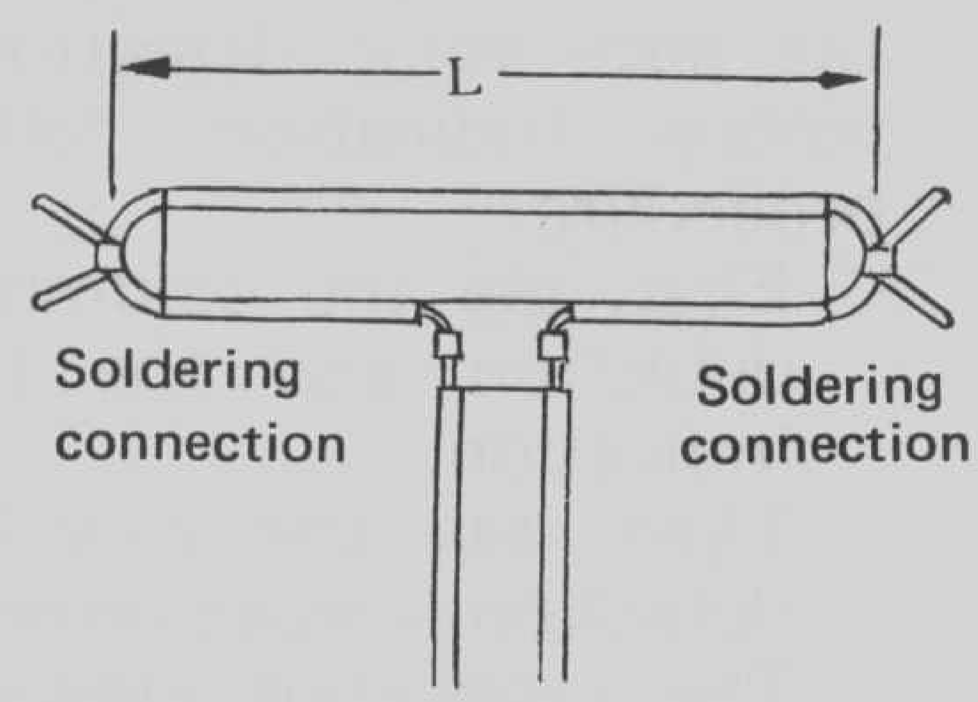


Fig. 9-1 Measurement frequency vs. G_H



$$L = \frac{150}{f\,(MHz)} \times 0.85\ (m)$$

f: Measurement frequency (MHz)

Fig. 9-2 How to make 1/2-wave doublet antenna

The half-wave antenna may be constructed using commercially available 300-Ω pair lead feeder, and the structure of the simple-type doublet antenna is illustrated in FIG. 9-2. When this antenna is to be connected to the LFC-945, the balun of 300Ω : 75Ω matching (LBN-14 which is provided as an accessory) must be used.

9.2 Measurement of Antenna Gain

The antenna gain is obtained by a comparison with the gain of the half-wave doublet antenna as 0 dB = 1 and is represented in power gain (dB).

If the field strength of a receiving signal measured by the half-wave doublet antenna is G_0 dB and the field strength measured by an antenna to be tested is G_X (dB), the gain of the antenna to be tested G_A (dB) is represented by:

$$G_A = G_X - G_0$$

9.3 Measurement of Antenna Directivity Characteristics

The antenna directivity characteristics is a factor, beside the antenna gain, representing the antenna performance. The antenna directivity characteristics is obtained by making a pattern as shown in Fig. 9-3 when nonreflective wave signal of broadcasting is received.

First obtain the maximum value F_{max} (dB) of the measurement level at the direction of the broadcasting station, and plot this point at the coordinate of 0 dB and 0° on the chart.

Then turn the antenna to an angle of $\theta°$, and obtain the measurement level $F(\theta)$dB. Plot the value $F_{max} - F(\theta)$ and the angle $\theta°$ on the chart.

Repeating this measurement procedure for the entire angles of 360° results in getting the directivity pattern as shown in FIG. 9-3.

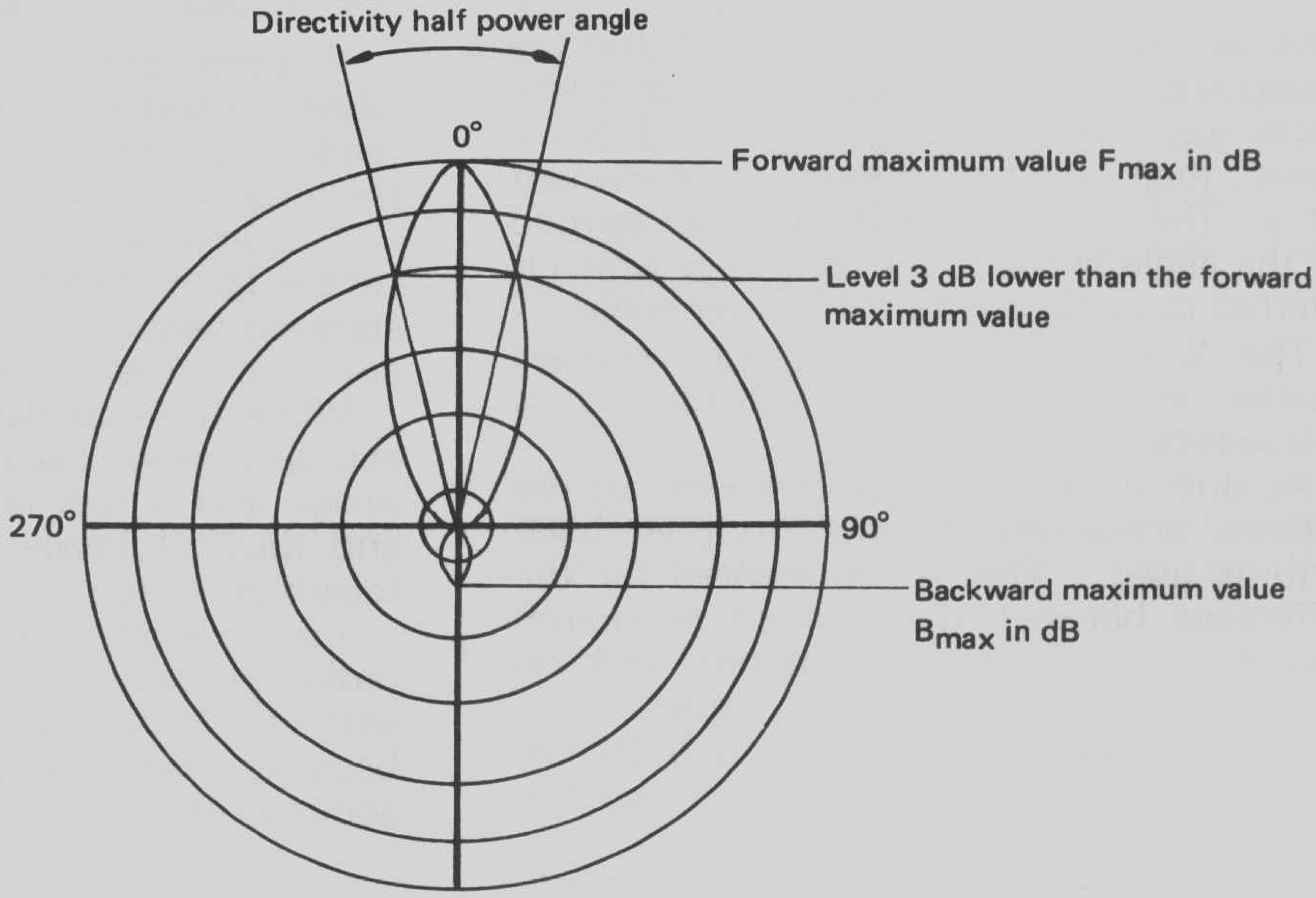


Fig. 9-3 Antenna directivity pattern

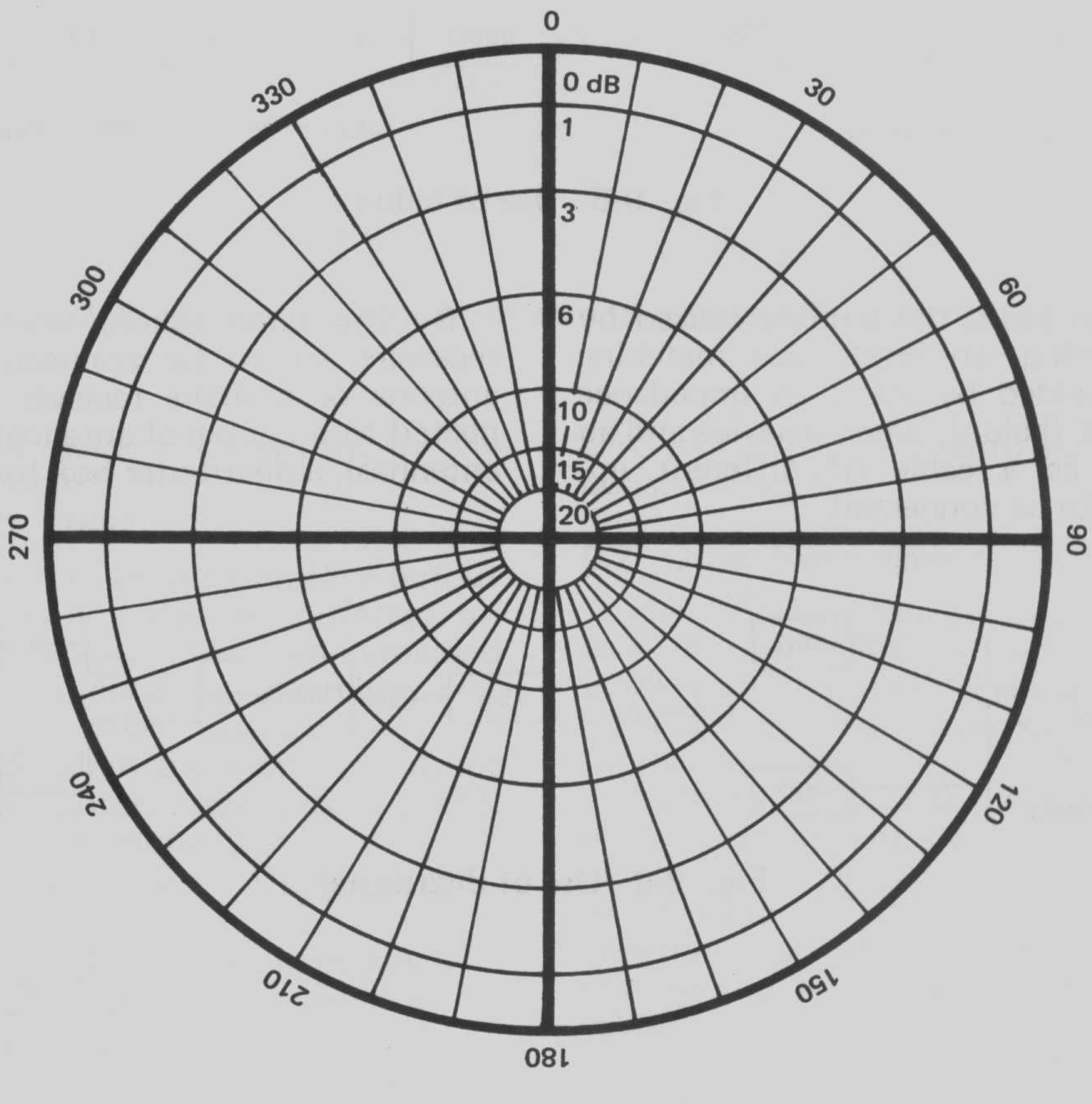


Fig. 9-4

On the directivity pattern obtained, draw lines between the coordinate origin and the crosspoints of the plotted curve and the circle line corresponding to a level 3 dB lower than the maximum measurement value. The antenna directivity is represented by the angle between the two lines which is referred to as directivity half-power angle.

The directivity half-power angle becomes smaller as the directivity characteristics becomes better.

As one other factor for representing the antenna characteristics, the front vs. back ratio is used. This is represented by the difference between the forward maximum gain F_{max} (dB) of the antenna and the backward maximum gain B_{max} (dB).

The antenna characteristics is better as this difference $F/B = F_{max} - B_{max}$ becomes larger.

Fig. 9-4 shows an example of the chart paper used for the determination of the antenna directivity characteristics.

9.4 Impedance Matching

In antenna installation and measurement, when instrument, receiver, antenna, and feeder (cable) are to be interconnected, the impedance matching must be considered.

The impedance condition is represented by the term VSWR which stands for voltage standing wave ratio. The ratio 1 is the best, and it becomes worse as its ratio increases.

When the impedance is mismatching, the standing wave occurs resulting in a ghost image and a loss at the connection point, and thus an image trouble is caused on a television screen.

For example, when the antenna of the radiation impedance of 300Ω is connected with a 75-Ω coaxial cable, the VSWR becomes value 4, and the power loss is about 2 dB.

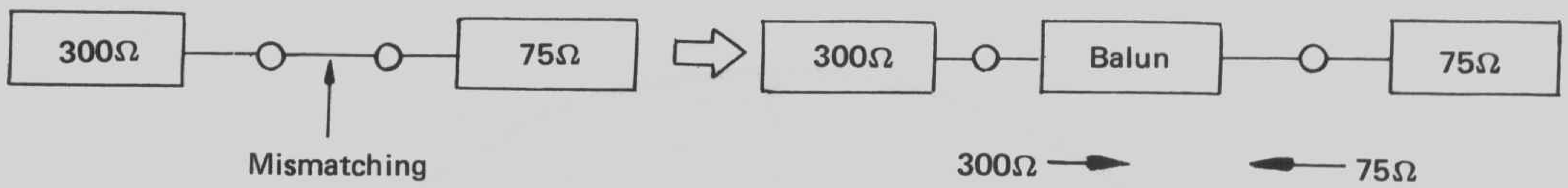


Fig. 9-5 Use of balun

In order to avoid the trouble caused by the mismatching, an impedance matching must be provided by using an impedance matching unit (balun), when a device and an object such as a cable of different impedances are to be connected.

By the same token, when a couple of receivers are to be connected to a single antenna or a single receiver is to be connected to a couple of antennas (e.g., stacked antennas), a distributer box has to be used.

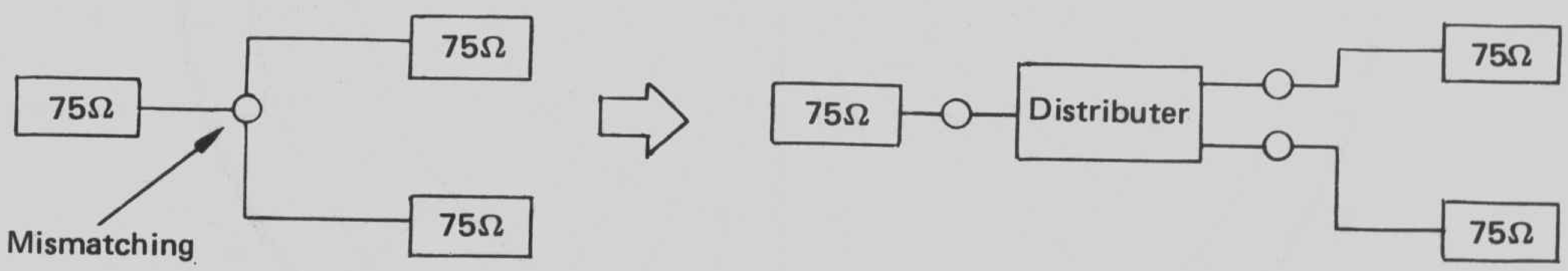


Fig. 9-6 Use of distributer

9.5 Measurement of Receiving Level

The receiving level is represented by terminated antenna output voltage or input voltage to a receiver. When the input terminal of the LFC-945 is applied with the output level of the antenna to be tested, the receiving level is obtained as the sum of the meter indication value and the attenuation value of the attenuator inserted.

When the balun is used, the insersion loss of the balun must be added to the sum above-mentioned.

The receiving levels necessary for TV receivers are;

VHF	Black and white . . .	More than 55 dB
	Color	More than 60 dB
UHF	Black and white . . .	More than 60 dB
	Color	More than 70 dB

The above-mentioned values should be increased slightly when noise and ghost are present.

9.6 Measurement of Amplifier Gain

To obtain the amplifier gain value, the input level and the output level of the amplifier are measured, and the difference between them is determined as the amplifier gain.

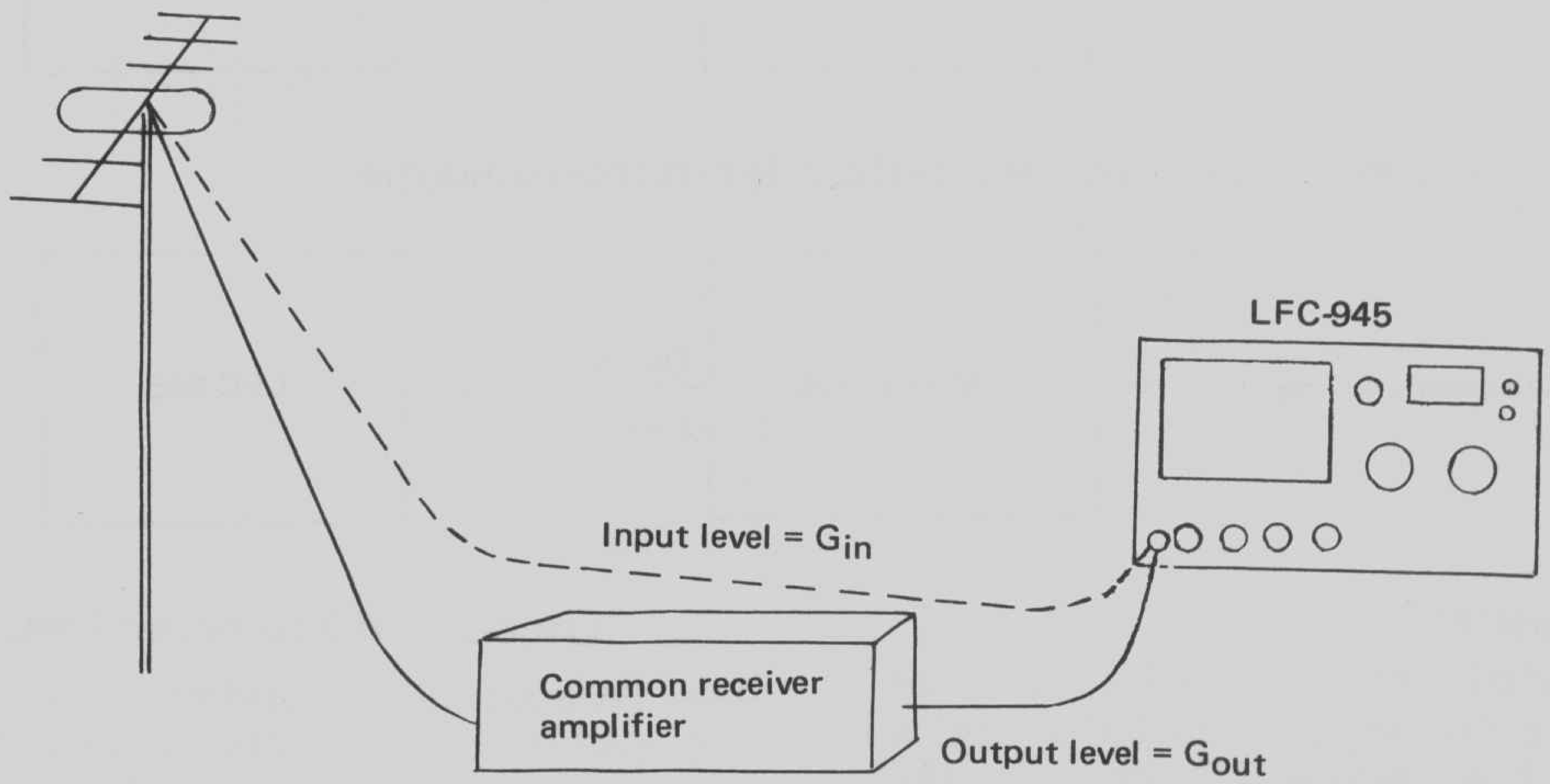


Fig. 9-7 Gain measurement of common receiver booster amplifier

The amplifier gain is represented by the following equation:

$$G = G_{out} - G_{in} \text{ (dB)}$$

When the input impedance and the output impedance of an amplifier are different, an impedance matching must be provided by use of a impedance matching unit (balun).

For example, when the input impedance is 75Ω and the output impedance is 300Ω, the amplifier gain is represented by:

$$G_A = G_{out} - G_{in} - G_R + G_B$$

where

$$G_R = 10 \log \frac{\text{balun output impedance}}{\text{balun input impedance}}$$

$$G_B = \text{insertion loss of balun}$$

If the internal noise level of an amplifier to be tested is high, the meter of the LFC-945 may swing with no input to the booster amplifier.

9.7 Other Measurements

The LFC-945 can be applied for output level measurements of other equipments which output television RF signals, such as VTR, TV game equipment, and TV interface for micro-computer.

As the LFC-945 has the input impedance of 75Ω, an impedance matching unit must be used if the output impedance of a device to be measured is other than 75Ω, and the insertion loss of the impedance matching unit should be added to the measurement value.

If the output of the above-mentioned equipments is other than video signal, its level can not be measured.

1. GENERAL

The LFC-945 is a Signal Level Meter of service use for field strength measurements of broadcastings of VHF and UHF television, CATV, and FM radio.

The instrument covers the measurement frequency bands of the VHF (40 to 300 MHz) and the UHF (470 to 890 MHz), and the 75-Ω termination peak level of the input RF signal can be correctly read by the sum of meter indication and attenuator setting.

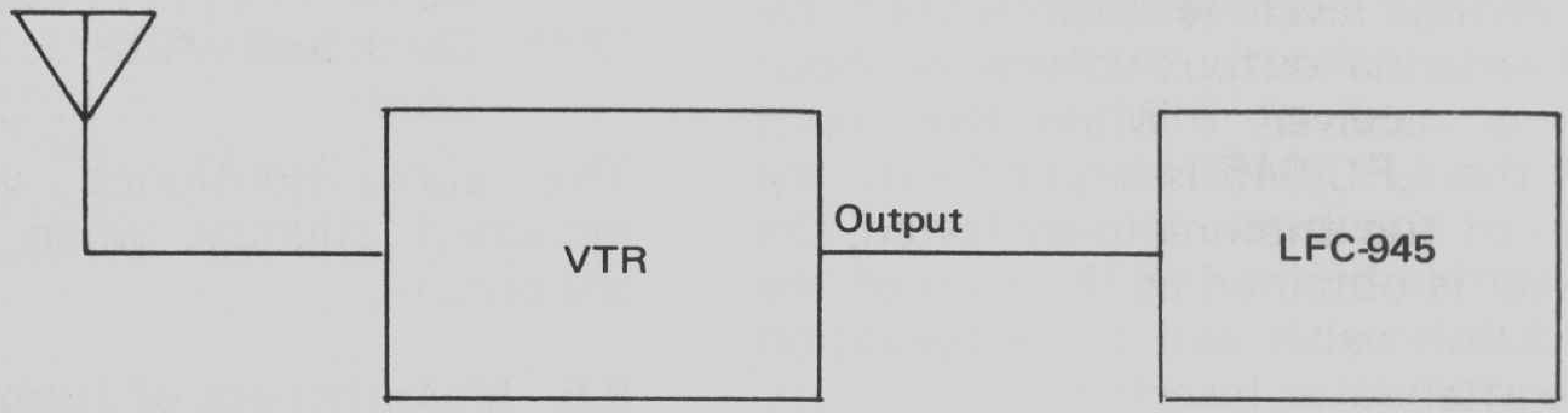
Further when 50/60 Hz AC voltage is superposed on the television RF signal with the output of the common receiver's amplifier, the signal level can be measured by the F-type jack for the RF input signal.

The LFC-945 has a wide range of applications, including the measurements of receiving levels, measurements of field strengths, TV and FM antenna selections, antenna installations, directivity determination of antennas, boost amplifier's gain measurements, master antenna television distribution system laying, and home antenna distribution construction.

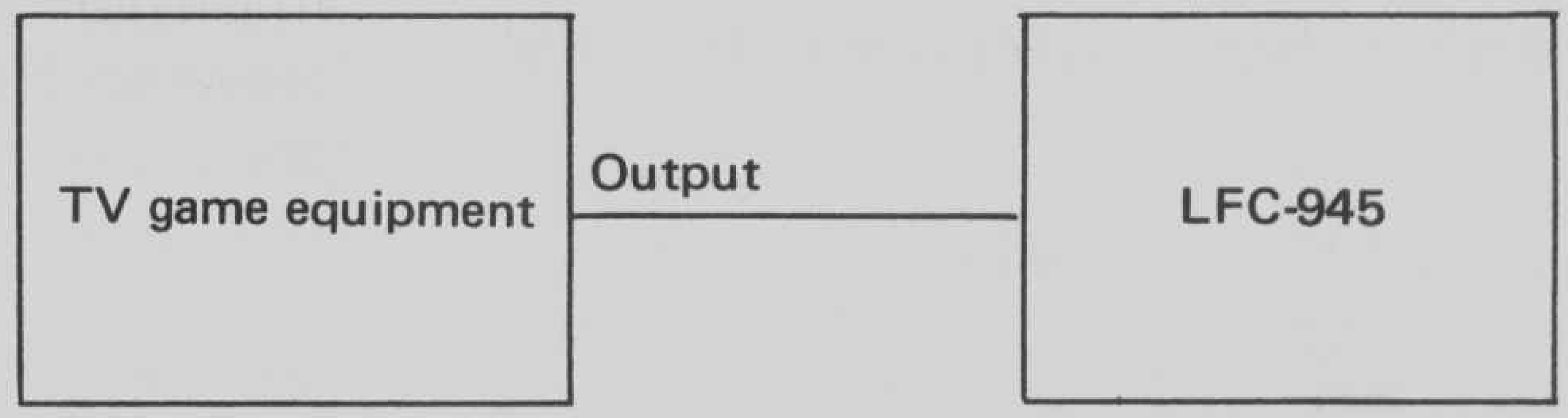
2. FEATURES

(1) As the instrument covers the VHF band, 40 to 300 MHz, and the UHF band, 470 to 890 MHz, the level measurements of VHF and UHF television signals as well as CATV and FM radio broadcastings can be made.
(2) It indicates the 75-Ω termination peak level of the input RF signal.
(3) Correct level measurements are available when the input RF signal is superspoosed on 50/60 Hz AC voltage.
(4) AC voltage measurement is available of the 50/60 Hz AC voltage superposed.
(5) The buzz sound can be monitored by a loudspeaker. Also the voice sound can be monitored by a loudspeaker.
(6) A wide dynamic range, 32 dB (30 to 62 dB), of the meter.
(7) The provision of the fine tuning knob common to the VHF and UHF makes it easy to select signals.
(8) The panel cover is provided to protect the meter and switches. When the cover is placed the power is automatically turned off, so that the battery loss can be eliminated.
(9) Temperature stability is assured by the use of the temperature compensation circuit.
(10) The taut-band meter is used which is resistant to shocks.
(11) Gold-plated points are used for the attenuator switch. Thus high reliability is assured against the aging effect.
(12) The instrument is portable with battery power. A car battery can be used as an alternative.

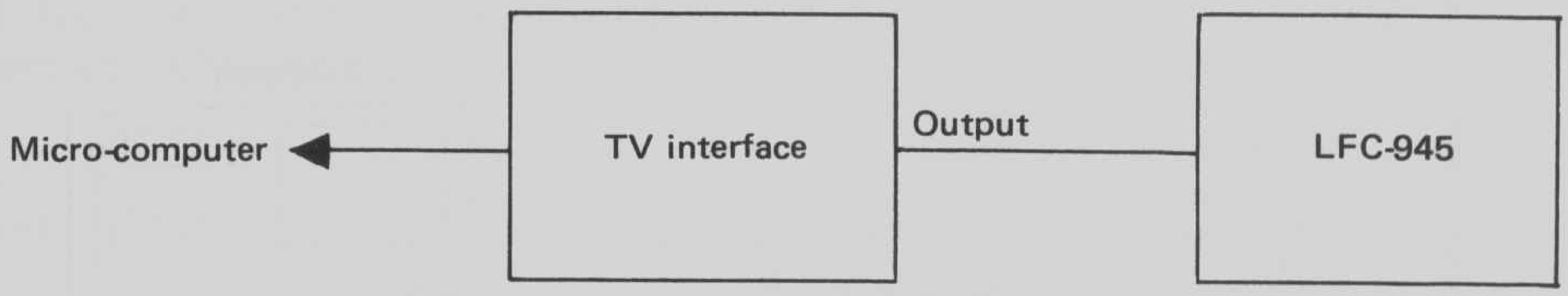
Output level measurement of VTR



Output level measurement of TV game equipment



Output level measurement of TV interface for micro-computer



10. INFORMATION

10.1 Ghost and Countermeasure

Ghosts are created by buildings, mountains, chimneys, power lines, towers, etc., as shown in Fig. 10-1.

Other reasons of ghost are reflecting wave signal due to impedance mismatching of a feeder or cable and the pick-up of signals by a feeder.

Countermeasures to the ghost are:

(1) When the source is known to be a building under construction, negotiate with the construction company for the solution.

(2) Change the location of the receiving antenna considering its height and the influence of ghost.

(3) Use a multi-element antenna of sharp directivity.

(4) Use an antenna of high F/B ratio.

(5) Use a combined antenna of low-channel and high-channel elements.
(Generally, a multi-element wideband antenna is a low-channel type and has a bad directivity.)

(6) Use a common receiving system.
Install a master receiving antenna at a location where the ghost influence is small, and distribute the receiving signal to the users.

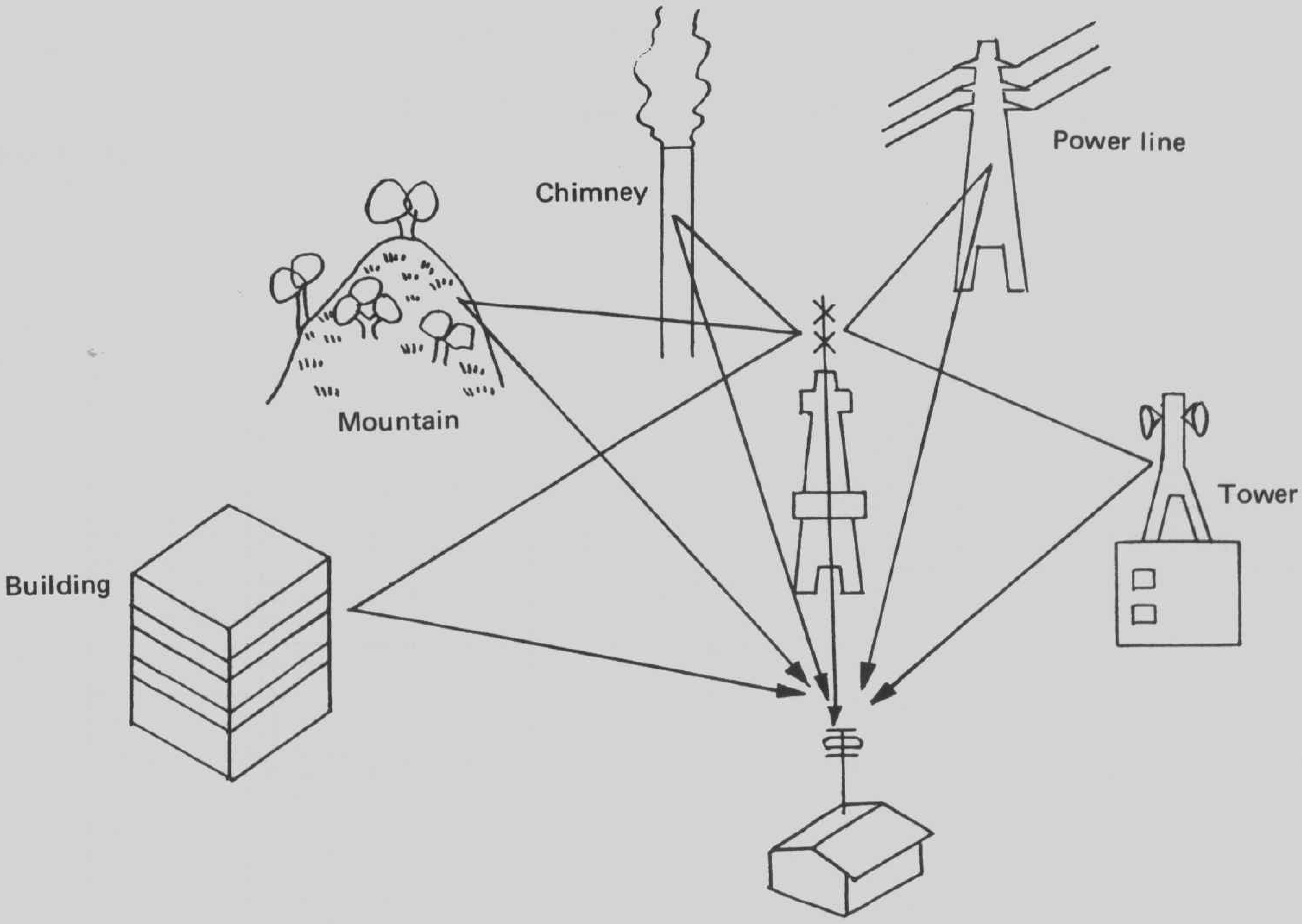


Fig. 10-1 Sources of ghost

10.2 Determination of Ghost Source

The distance between the receiver and the ghost source such as a building and mountain can be determined based on the distance between the correct picture and the ghost picture on the TV screen.

As shown in Fig. 10-2, if the distance between the correct picture and the ghost picture is d (cm) on a TV CRT of L-cm wide, the difference between the arrival distance of the radiation signal and that of the reflection signal is represented by:

$$X = \frac{d}{L} \times 53.5 \times 10^{-6} \times 3 \times 10^{5}$$

$$= \frac{d}{L} \times 16.05 \text{ (km)}$$

where

53.5×10^{-6} (sec) .... effective horizontal scanning time

3×10^{5} (km) .... speed of radio wave signal

Fig. 10-2 shows a graph indicating the relationship between the distance d (cm) (between the correct picture and the ghost picture on the TV screen) and the propagation distance difference X (km) (difference between the direct path length and the reflection path length).

A simple method to find out an objective source of the ghost based on the propagation distance difference X obtained is shown in Fig. 10-3.

Propagation distance difference X (km)

$$= \frac{d}{L} \times 53.5 \times 10^{-6}(sec) \times 3 \times 10^{5} (km)$$

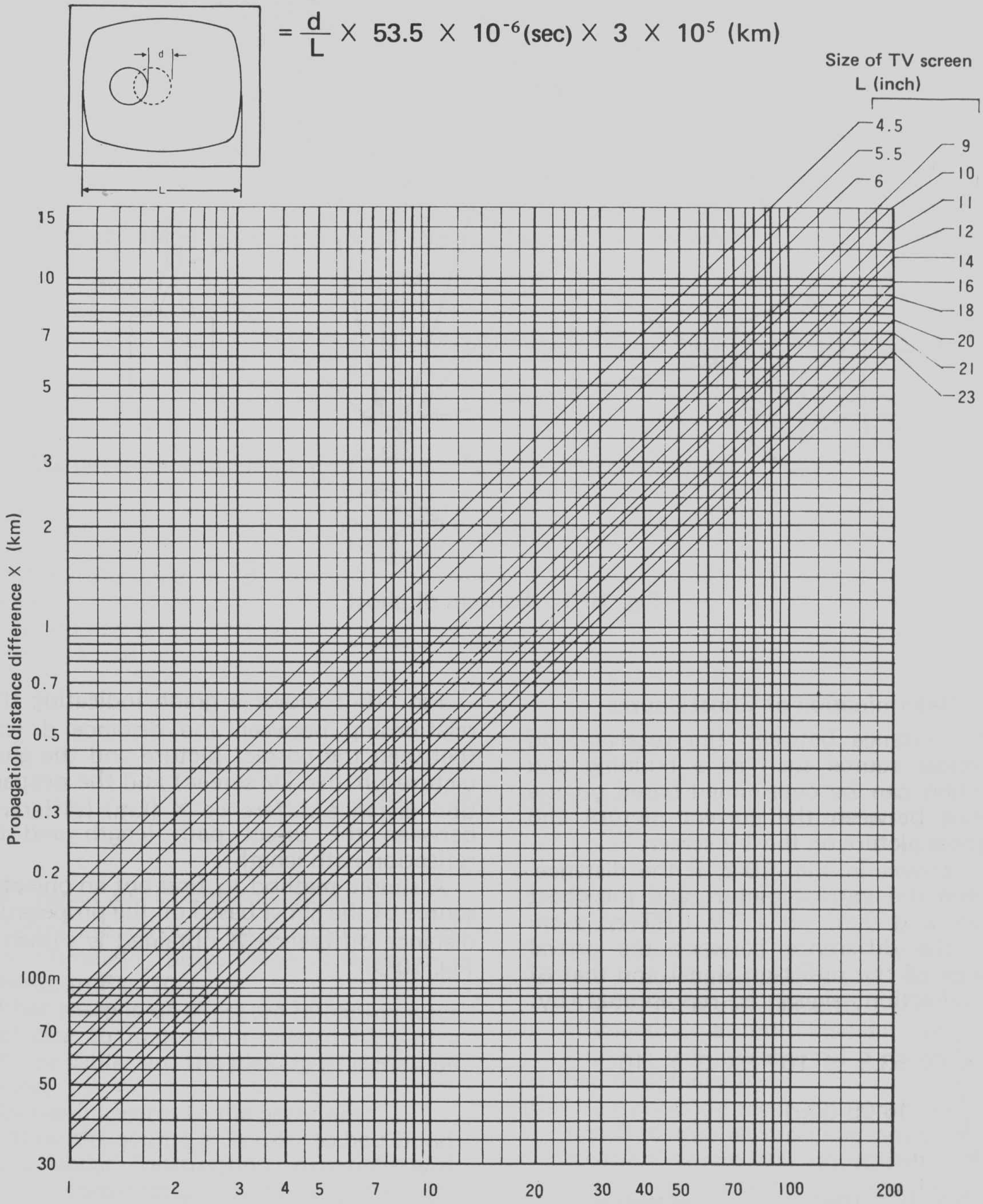
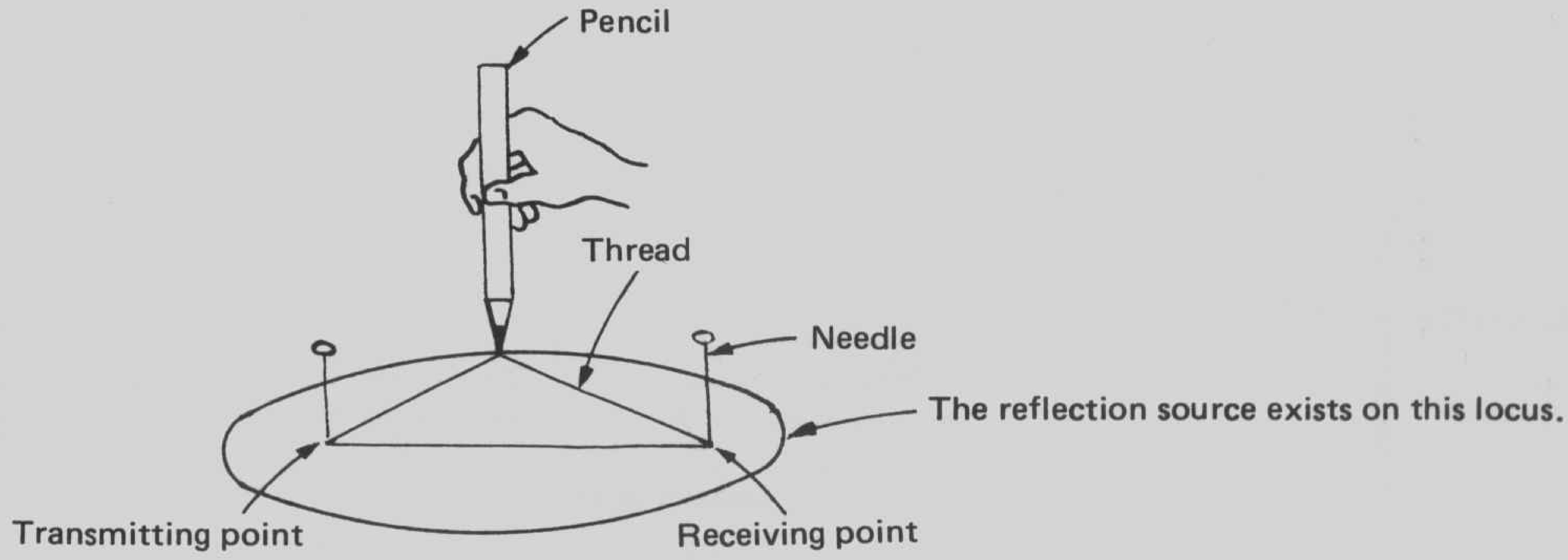


Fig. 10-2 Graph for finding out propagation distance difference



$$\text{Length of thread} = \frac{\begin{pmatrix}\text{distance between transmitting} \\ \text{point and receiving point}\end{pmatrix} + \begin{pmatrix}\text{propagation distance} \\ \text{difference}\end{pmatrix}}{\text{scale degree of map}}$$

Fig. 10-3 Method to find out ghost source

10.3 Decibel

The term decibel is a unit used to represent gain, amplitude, attenuation, etc.

For example, an amplifier with the voltage gain of 100 times is called a 40-dB gain amplifier. An attenuator with the attenuation of 1/10 for the output and input signals is called a 20-dB attenuator.

Table 10-1 shows the conversion table between dB and gain.

The term decibel is used as a unit not only to represent a ratio between input signal and output signal but also to represent voltages.

If 1 μV is 0 dB, 100 μV becomes 40 dB and 1 mV = 1000 μV becomes 60 dB.

In FIG. 10-4, assuming the antenna output is 60 dB, when a 20-dB gain amplifier is inserted, the amplifier output is 80 dB.

If the output is supplied with a coaxial cable of 10-dB loss and distributed by a distributer of distribution loss of 8 dB to a TV receiver, the distributer output becomes 62 dB.

Calculating the output signal level based on Table 10 - 1 results in:

$$\begin{aligned} 62\text{ dB} &= 20 + 20 + 20 + 2\text{ dB} \\ &= 10 \times 10 \times 10 \times 1.26 \\ &= 1260\ \mu\text{V} = 1.26\text{ mV} \end{aligned}$$

As described above, when the unit of decibel is used, calculations becomes very easy because multiplication can be made by an addition and division can be made by a subtraction.

Decibel	Gain	
dB	Voltage ratio	Power ratio
0	1.00	1.00
1	1.12	1.26
2	1.26	1.58
3	1.41	2.00
4	1.58	2.51
5	1.78	3.16
6	1.99	3.98
7	2.24	5.01
8	2.50	6.31
9	2.82	7.94
10	3.16	10.0
20	10.0	100

Table 10-1

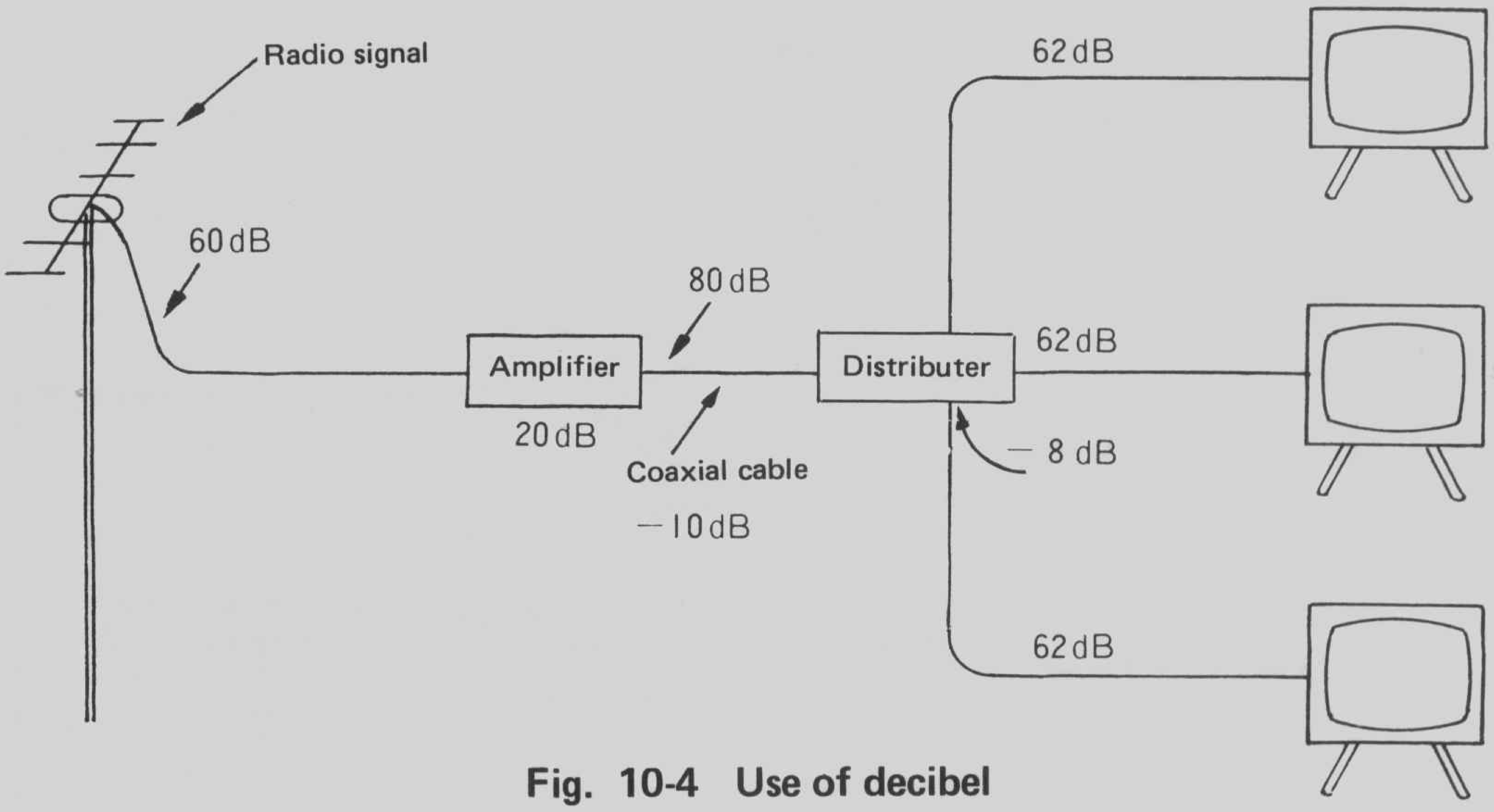
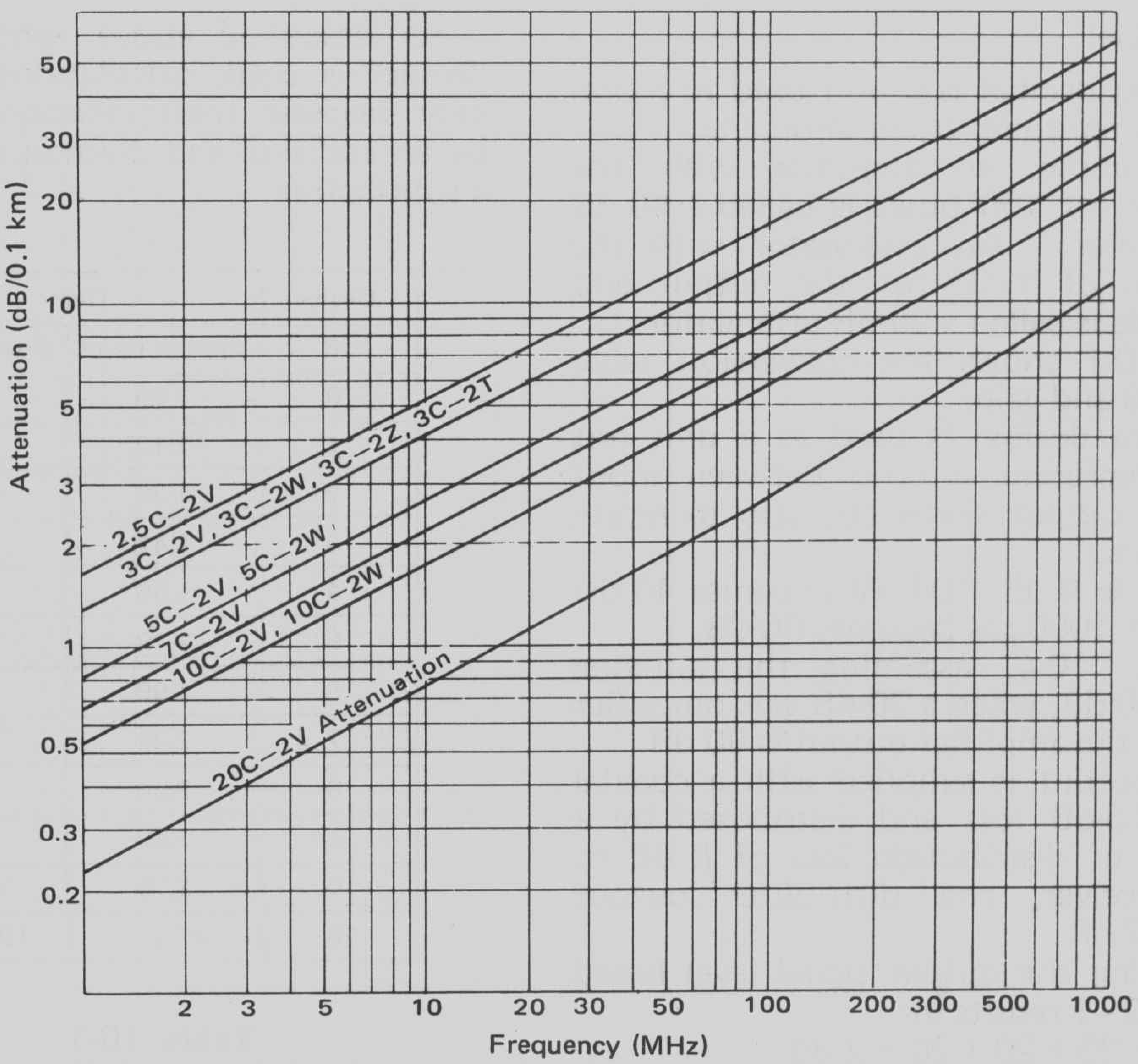


Fig. 10-4 Use of decibel

10.4 Attenuation of 75-Ω Coaxial Cable



Note: The standard attenuation is the value at 20°C.

Fig. 10-5 Attenuation of coaxial cable

Attenuation of 75-Ω series coaxial cables is different by frequency, as shown in Fig. 10-5.

Example:

To find out the attenuation when the television RF signal of #12 channel is supplied with a 50-m 3C-2V cable:

(A) The picture carrier frequency of #12 channel is 217.25 MHz (referring to Fig. 10-5). Thus the attenuation of the cable is 20 dB per 100 m as seen from Fig. 10-4.

(B) Thus when the cable length is 50 m, the attenuation becomes 20 dB. Accordingly, when the received RF signal of #12 channel TV broadcasting is supplied with a 50-m 3C-2V coaxial cable, the attenuation becomes 10 dB.

10.5 TV Channel Frequency Charts

CHINA

fv: Video frequency
fs: Sound frequency

V H F			U H F					
CH	fv [MHz]	fs [MHz]	CH	fv [MHz]	fs [MHz]	CH	fv [MHz]	fs [MHz]
1	49.75	56.25	13	471.25	477.75	36	695.25	701.75
2	57.75	64.25	14	479.25	485.75	37	703.25	709.75
3	65.75	72.25	15	487.25	493.75	38	711.25	717.75
4	77.25	83.75	16	495.25	501.75	39	719.25	725.75
5	85.25	91.75	17	503.25	509.75	40	727.25	733.75
6	168.25	174.75	18	511.25	517.75	41	735.25	741.75
7	176.25	182.75	19	519.25	525.75	42	743.25	749.75
8	184.25	190.75	20	527.25	533.75	43	751.25	757.75
9	192.25	198.75	21	535.25	541.75	44	759.25	765.75
10	200.25	206.75	22	543.25	549.75	45	767.25	773.75
11	208.25	214.75	23	551.25	557.75	46	775.25	781.75
12	216.25	222.75	24	559.25	565.75	47	783.25	789.75
			25	607.25	613.75	48	791.25	797.75
			26	615.25	621.75	49	799.25	805.75
			27	623.25	629.75	50	807.25	813.75
			28	631.25	637.75	51	815.25	821.75
			29	639.25	645.75	52	823.25	829.75
			30	647.25	653.75	53	831.25	837.75
			31	655.25	661.75	54	839.25	845.75
			32	663.25	669.75	55	847.25	853.75
			33	671.25	677.75	56	855.25	861.75
			34	679.25	685.75	57	863.25	869.75
			35	687.25	693.75			

U.S.A.

fv: Video frequency
fs: Sound frequency

V H F			U H F					
CH	fv [MHz]	fs [MHz]	CH	fv [MHz]	fs [MHz]	CH	fv [MHz]	fs [MHz]
2	55.25	59.75	14	471.25	475.75	49	681.25	685.75
3	61.25	65.75	15	477.25	481.75	50	687.25	691.75
4	67.25	71.75	16	483.25	487.75	51	693.25	697.75
5	77.25	81.75	17	489.25	493.75	52	699.25	703.75
6	83.25	87.75	18	495.25	499.75	53	705.25	709.75
A	121.25	125.75	19	501.25	505.75	54	711.25	715.75
B	127.25	131.75	20	507.25	511.75	55	717.25	721.75
C	133.25	137.75	21	513.25	517.75	56	723.25	727.75
D	139.25	143.75	22	519.25	523.75	57	729.25	733.75
E	145.25	149.75	23	525.25	529.75	58	735.25	739.75
F	151.25	155.75	24	531.25	535.75	59	741.25	745.75
G	157.25	161.75	25	537.25	541.75	60	747.25	751.75
H	163.25	167.75	26	543.25	547.75	61	753.25	757.75
I	169.25	173.75	27	549.25	553.75	62	759.25	763.75
7	175.25	179.75	28	555.25	559.75	63	765.25	769.75
8	181.25	185.75	29	561.25	565.75	64	771.25	775.75
9	187.25	191.75	30	567.25	571.75	65	777.25	781.75
10	193.25	197.75	31	573.25	577.75	66	783.25	787.75
11	199.25	203.75	32	579.25	583.75	67	789.25	793.75
12	205.25	209.75	33	585.25	589.75	68	795.25	799.75
13	211.25	215.75	34	591.25	595.75	69	801.25	805.75
J	217.25	221.75	35	597.25	601.75	70	807.25	811.75
K	223.25	227.75	36	603.25	607.75	71	813.25	817.75
L	229.25	233.75	37	609.25	613.75	72	819.25	823.75
M	235.25	239.75	38	615.25	619.75	73	825.25	829.75
N	241.25	245.75	39	621.25	625.75	74	831.25	835.75
O	247.25	251.75	40	627.25	631.75	75	837.25	841.75
P	253.25	257.75	41	633.25	637.75	76	843.25	847.75
Q	259.25	263.75	42	639.25	643.75	77	849.25	853.75
R	265.25	269.75	43	645.25	649.75	78	855.25	859.75
S	271.25	275.75	44	651.25	655.75	79	861.25	865.75
T	277.25	281.75	45	657.25	661.75	80	867.25	871.75
U	283.25	287.75	46	663.25	667.75	81	873.25	877.75
V	289.25	293.75	47	669.25	673.75	82	879.25	883.75
W	295.25	299.75	48	675.25	679.75	83	885.25	889.75

EUROPE

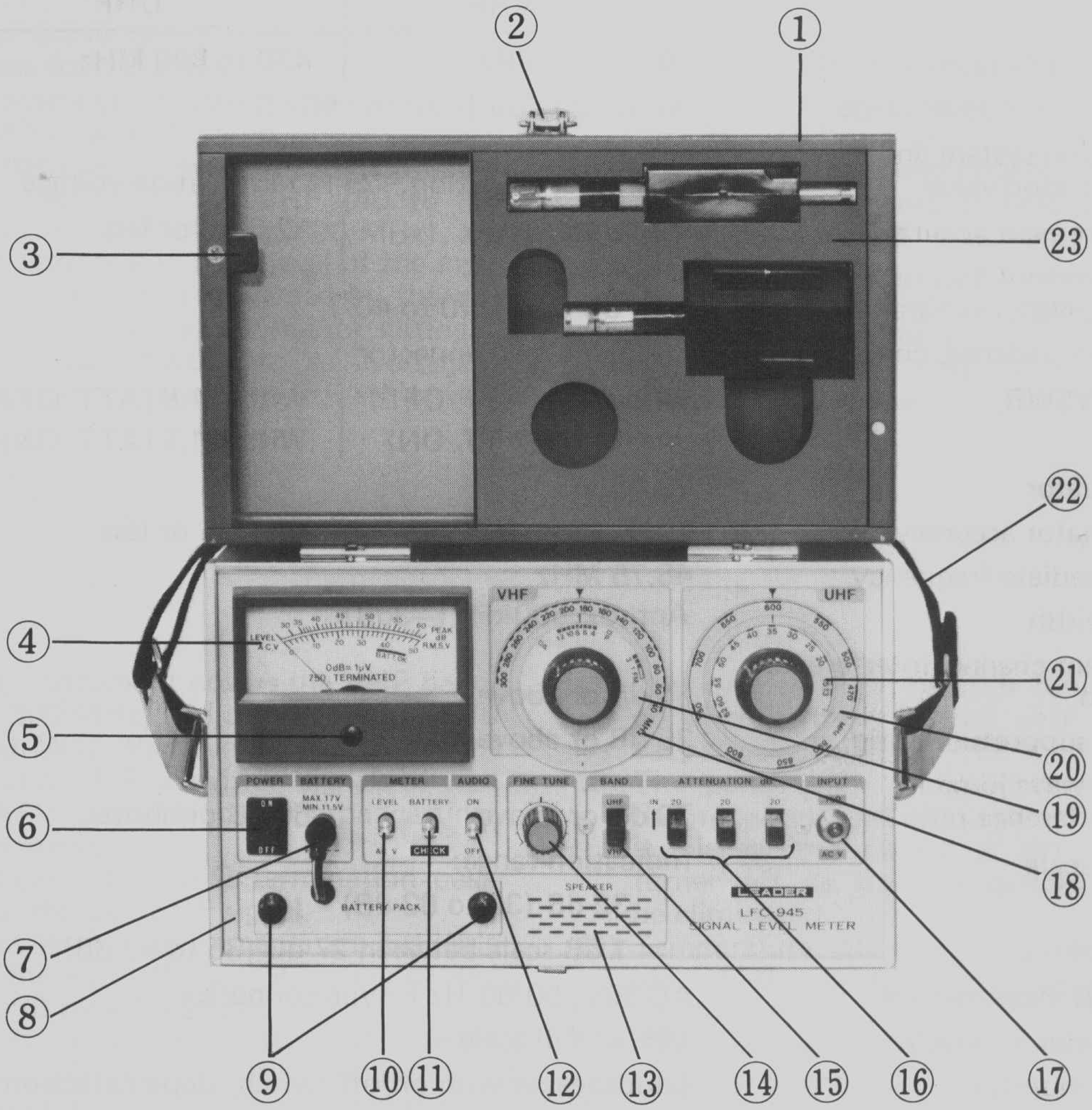
fv: Video frequency
fs: Sound frequency

V H F			U H F					
CH	fv [MHz]	fs [MHz]	CH	fv [MHz]	fs [MHz]	CH	fv [MHz]	fs [MHz]
2	48.25	53.75	21	471.25	476.75	55	743.25	748.75
3	55.25	60.75	22	479.25	484.75	56	751.25	756.75
4	62.25	67.75	23	487.25	492.75	57	759.25	764.75
X	69.25	74.75	24	495.25	500.75	58	767.25	772.75
Y	76.25	81.75	25	503.25	508.75	59	775.25	780.75
Z	83.25	88.75	26	511.25	516.75	60	783.25	788.75
S 1	105.25	110.75	27	519.25	524.75	61	791.25	796.75
S 2	112.25	117.75	28	527.25	532.75	62	799.25	804.75
S 3	119.25	124.75	29	535.25	540.75	63	807.25	812.75
S 4	126.25	131.75	30	543.25	548.75	64	815.25	820.75
S 5	133.25	138.75	31	551.25	556.75	65	823.25	828.75
S 6	140.25	145.75	32	559.25	564.75	66	831.25	836.75
S 7	147.25	152.75	33	567.25	572.75	67	839.25	844.75
S 8	154.25	159.75	34	575.25	580.75	68	847.25	852.75
S 9	161.25	166.75	35	583.25	588.75	69	855.25	860.75
S10	168.25	173.75	36	591.25	596.75			
5	175.25	180.75	37	599.25	604.75			
6	182.25	187.75	38	607.25	612.75			
7	189.25	194.75	39	615.25	620.75			
8	196.25	201.75	40	623.25	628.75			
9	203.25	208.75	41	631.25	636.75			
10	210.25	215.75	42	639.25	644.75			
11	217.25	222.75	43	647.25	652.75			
12	224.25	229.75	44	655.25	660.75			
S11	231.25	236.75	45	663.25	668.75			
S12	238.25	243.75	46	671.25	676.75			
S13	245.25	250.75	47	679.25	684.75			
S14	252.25	257.75	48	687.25	692.75			
S15	259.25	264.75	49	695.25	700.75			
S16	266.25	271.75	50	703.25	708.75			
S17	273.25	278.75	51	711.25	716.75			
S18	280.25	285.75	52	719.25	724.75			
S19	287.25	292.75	53	727.25	732.75			
S20	294.25	299.75	54	735.25	740.75			

3. SPECIFICATIONS

	VHF	UHF
Receiving frequency band	40 to 300 MHz	470 to 890 MHz
Measurement level range	30 to 120 dBμ (−30 to +60 dBmV)	
Detection system and indication value	Peak level detection: 75-Ω termination voltage	
Measurement accuracy (at 20°C)	±1.5 dB or less	±2.0 dB or less
Measurement accuracy temperature characteristic	±1.5 dB or less (0 to 40°)	
Input impedance, connector	75-Ω, F-type connector	
Input VSWR	Within 1.5 (ATT. OFF) Within 1.3 (ATT. ON)	Within 1.8 (ATT. OFF) Within 1.5 (ATT. ON)
Attenuator	20 dB x 3	
Attenuator accuracy	±0.5 dB or less	±1.5 dB or less
Intermediate frequency	45.75 MHz	
Bandwidth	Approx. 500kHz (−3dB)	
Adjacent channel interference ratio	30 dB or above	
Image suppression ratio	35 dB or above	
Direct wave jump-in interference ratio	70 dB or above	60 dB or above
Meter scale	Indication range: 32 dB (30 to 62 dB) 1 dB scale between 27 dB (35 to 62 dB)	
Voltage measurement	AC 50V, 50/60 Hz F-type connector	
Voltmeter accuracy	±5% of full scale	
Audio monitor	Loudspeaker with on/off switch, slope detection	
Rating operating temperature range	0 to 40°C	
Operating temperature range limitation	−10 to 45°C	
Power source	DC 15 V, UM-3 dry cell x 10	
Size and weight	250(W) x 150(H) x 235(D) mm (including 35-mm cover) Approx. 4 kg	
Accessories	UM-3 dry cell x 10 Shoulder band x 1 Balun: 300Ω: 75Ω (LBN-14) x 1 Hexagonal wrench x 1 Channel plate x 6	

4. DESCRIPTION OF PANEL



4.1 Front Panel

① Panel cover:
Protects the panel face. When the panel cover is closed, the power switch is automatically turned off.

② Lock metal:
Locks the panel cover.

③ Switch plate:
When the panel cover is closed, the switch plate turns off the power switch automatically.

④ Output meter:
Indicates the VHF and UHF levels, AC voltages, and the battery checking result. The VHF and UHF levels are indicated by the 75Ω terminated peak voltages.

⑤ Mechanical zero adjuster screw:
Is used to adjust the zero position of the meter.

⑥ Power switch:
Turns on and off the power.

⑦ Power connector:
Is connected to the power source. The center conductor is negative, and the outside conductor is positive.
The instrument is operated with the power voltage range of +11.5 to 17.0 V DC.

⑧ Battery pack:
Accepts 10 pieces of UM-3 dry cells.

⑨ Nylatch:
Fastens the battery pack to the main body of the instrument. When the tips of the Nylatches are pulled, the battery pack can be removed.

⑩ LEVEL·AC V selection switch:
Selects the meter connection to AC V measurement or LEVEL measurement.

⑪ Battery check switch:
When the switch lever is pressed downward, the meter pointer swings depending on the voltage applied to the power connector.

⑫ Audio switch:
When this switch is turned on, the buzz sound or voice sound can be monitored by the loudspeaker.

⑬ Sound output opening:
When the audio switch is turned on, the output sound is heard through the opening.

⑭ Fine tuning knob:
Is a fine tuning adjustment knob of the level measurements which is common to both the VHF and UHF bands.

⑮ Band switch:
Selects between the VHF band and UHF band for level measurements.

⑯ Attenuator switch:
Is the input attenuator selection switch. When a single switch is turned IN, a 20-dB attenuation of the input is available. When two switches are turned IN, a 40-dB attenuation is available. When three switches are turned IN, a 60-dB attenuation is available.

⑰ Input connector:
Is a F-type connector for the input of VHF, UHF, and AC V signals.

⑱ VHF frequency plate:
Is the tuning dial for the VHF band indicated by frequency scale.

⑲ VHF channel plate:
Is the tuning dial for the VHF band indicated by channel numbers.

⑳ UHF frequency plate:
Is the tuning dial for the UHF band indicated by frequency scale.

㉑ UHF channel plate:
Is the tuning dial for the UHF band indicated by channel indications.

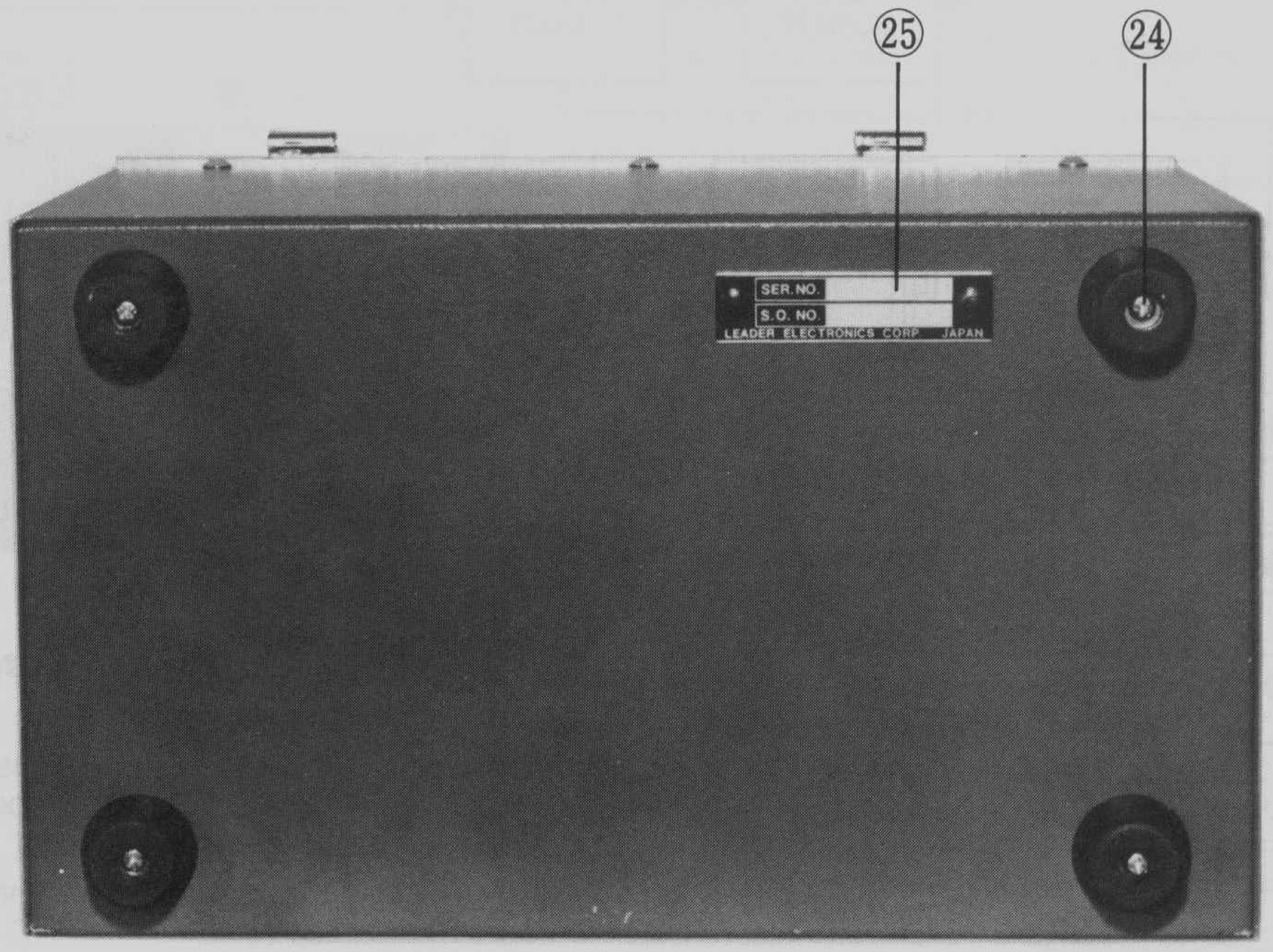
㉒ Shoulder band

㉓ Accessory storage:
Compartment for such accessories as LBN-14 Balun and LJ-09 coaxial clip (optional).

4.2 Rear Panel

㉔ Rubber feet

㉕ Serial number plate



5. OPERATIONAL NOTES

(1) When the instrument is not to be used for a long period of time, remove the batteries. Otherwise, the electrolyte may leak and damage the instrument.
(2) When stored or to be carried out, the panel cover must be closed. Be sure to fasten the lock metal.
(3) For out-door use, use the shoulder band to prevent an accidental drop of the instrument.
(4) Do not move the variable resistors, coil, and trimmer capacitor installed inside the instrument, as they were preadjusted to satisfy the performance.
(5) The rating operating temperature range is 0 to 40°C. When the instrument is used outside the range, the specifications may not be satisfied.

6. CIRCUIT CONFIGURATION AND OPERATING PRINCIPLE

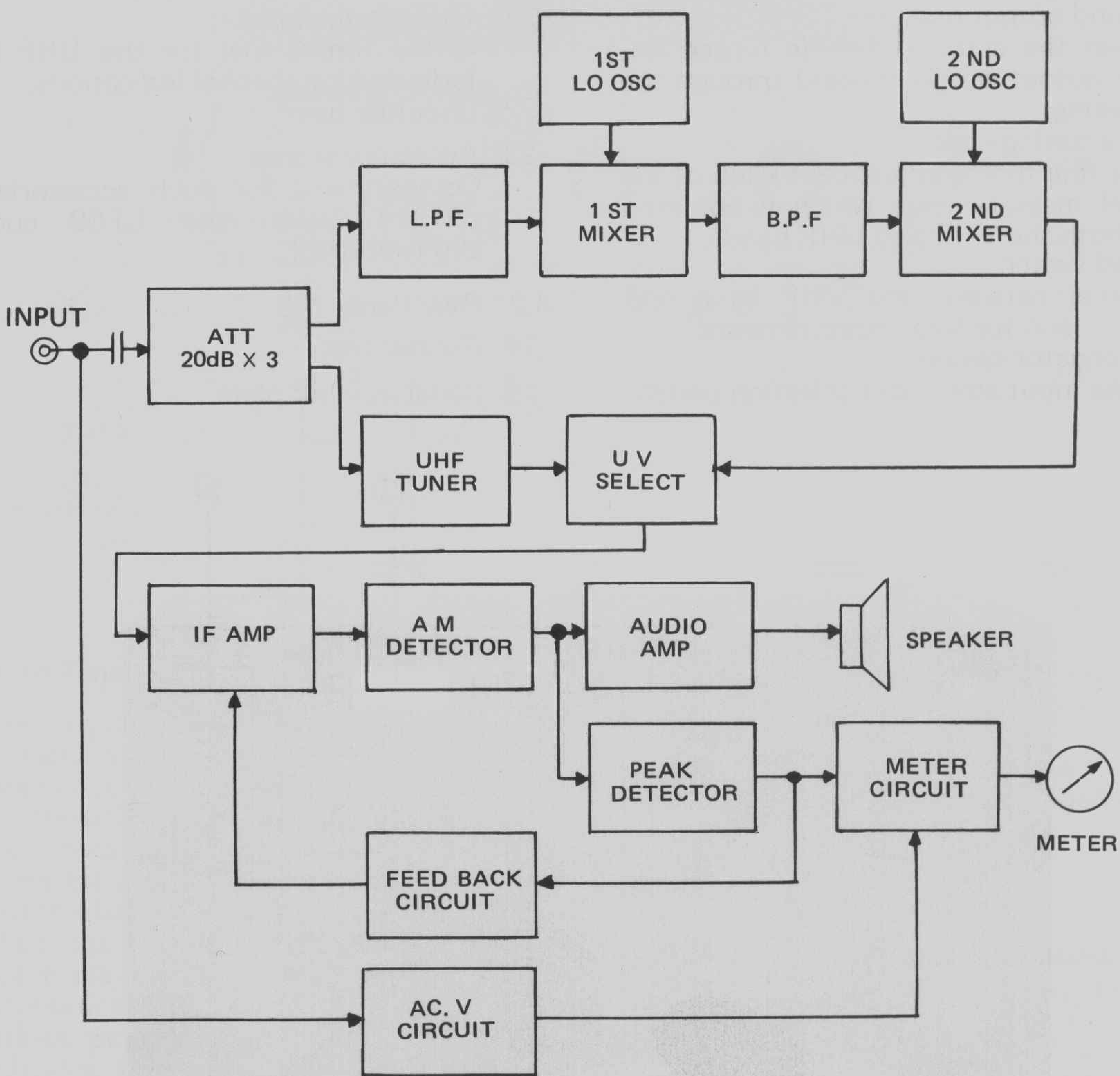


Fig. 6-1 Block diagram

The circuit configuration of the LFC-945 is shown in FIG. 6-1. The brief description of the operating principle will be given in reference to the figure.

When the superposed signal of RF signal of VHF band or UHF band (simply referred to as RF signal) and 50/60 Hz AC signal (referred to as AC signal) is applied to the input F-type plug, only the RF signal is applied to the attenuator and the AC signal is interrupted by the capacitor.

The RF signal is reduced in level by the attenuator to an appropriate level of signal. When the RF signal is a signal of the VHF band, the attenuated RF signal is applied to the low-pass filter (LPF) and converted into the IF signal of 45.75 MHz after passing through the 1ST MIXER, band-pass filter (BPF), and 2ND MIXER. On the other hand, when the RF signal is a signal of the UHF band, the attenuated RF signal is converted into the IF signal of 45.75 MHz by the UHF tuner.

This IF signal is selected by the UV SELECT circuit and amplified by the IF AMP. The amplified IF signal is applied to the AM detector for the AM detection. Then the output of the AM detector is entered to the audio amplifier as well as to the peak detector. The audio amplifier amplifies the AM detection output to drive the loudspeaker. On one hand, the peak detector outputs the DC current corresponding to the peak value of the AM detection output to drive the meter.

The AC signal is applied to the AC V circuit to indicate the voltage vlaue on the meter depending on the applied AC signal level.

7. OPERATION

7.1 Removal of Panel Cover

When the panel cover is opened 90° or less of angle, draw the cover to the left. Then the cover can be removed from the unit.

The cover can not be removed when the cover is opened more than 90°.

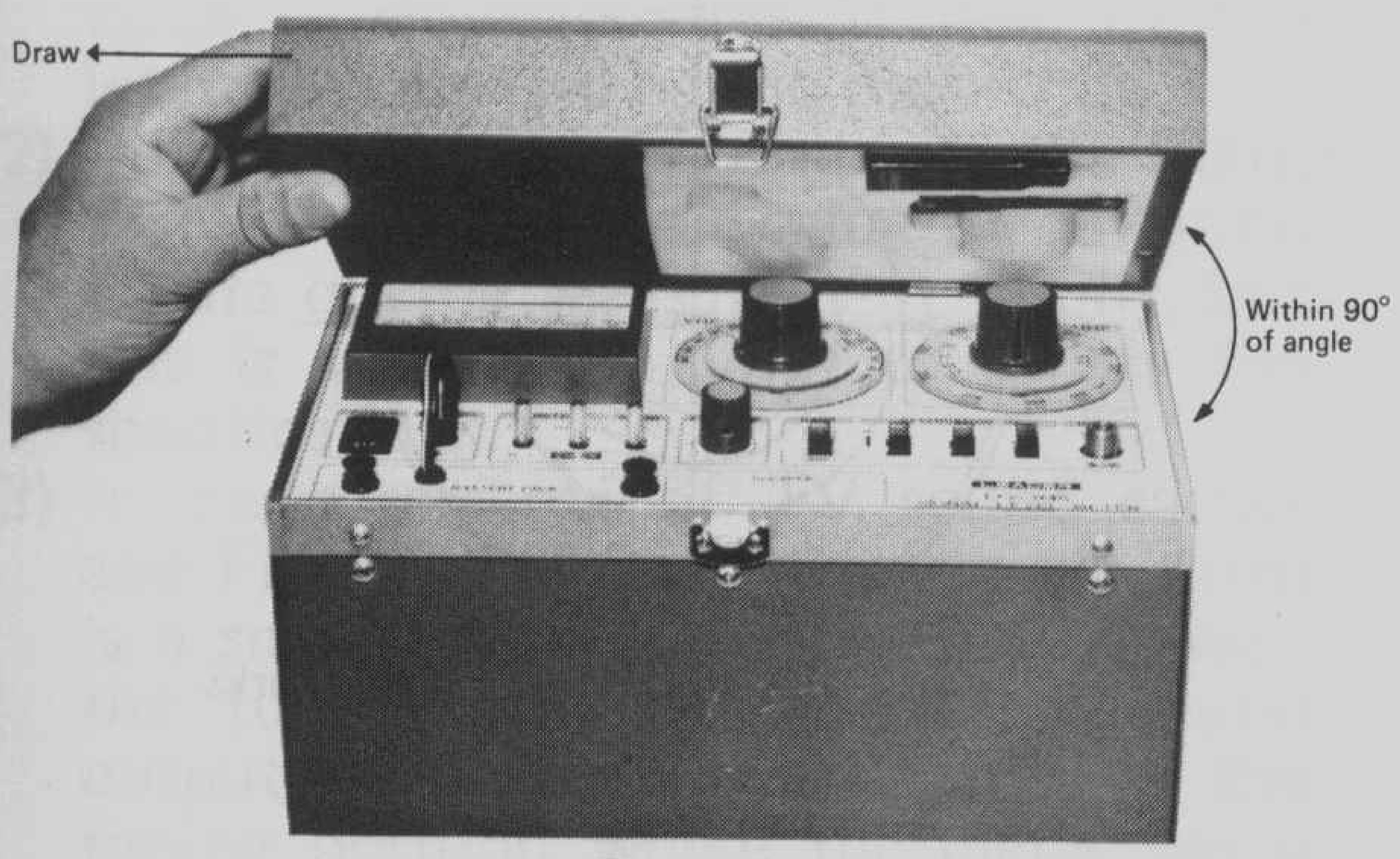


Fig. 7-1

7.2 Installation of Battery

(1) Turn off the power switch.

(2) Disconnect the power plug from the power receptacle of the unit.

(3) Pull two Nylatches as shown in FIG. 7-2, and draw the battery pack case as shown in Fig. 7-3.

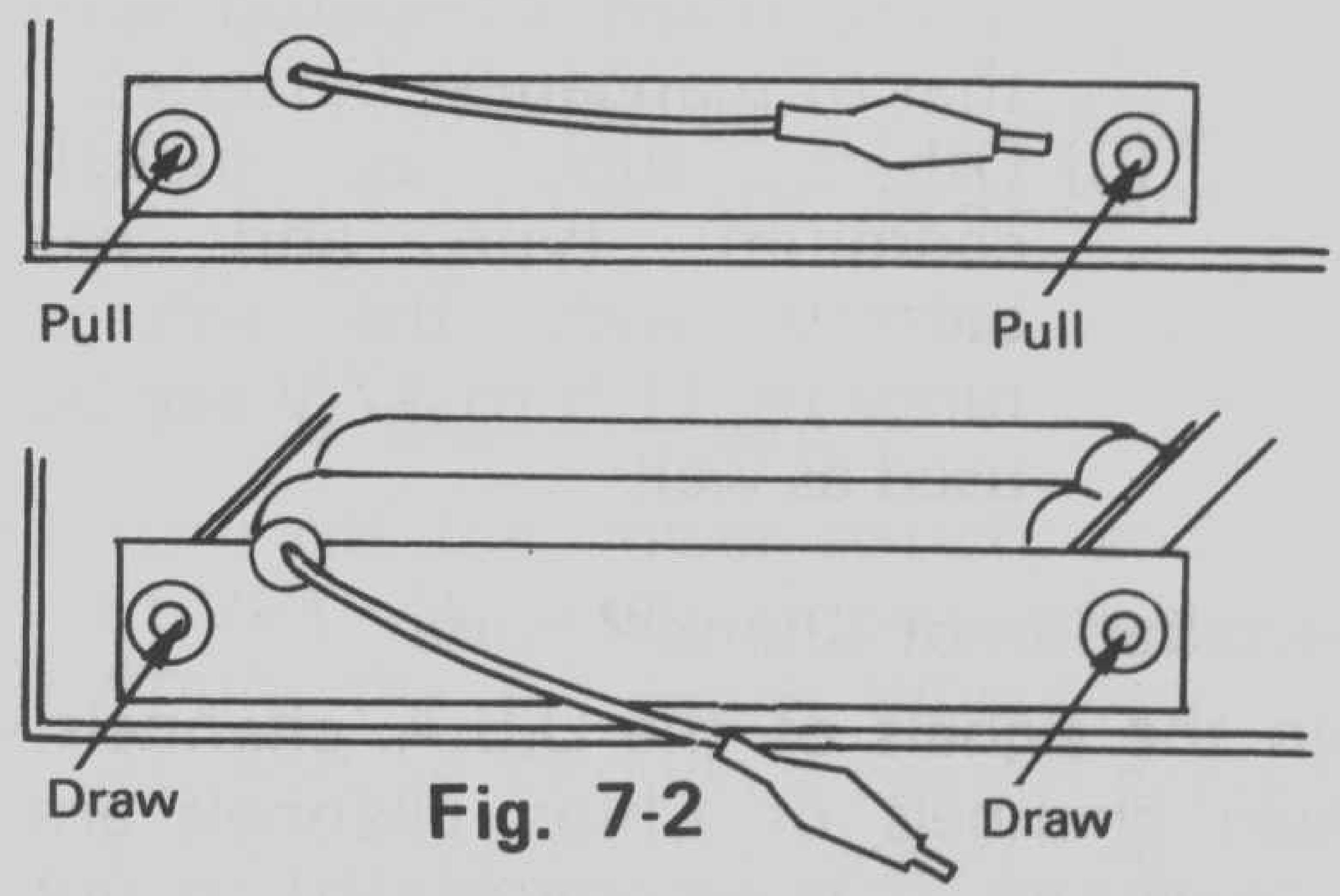


Fig. 7-2

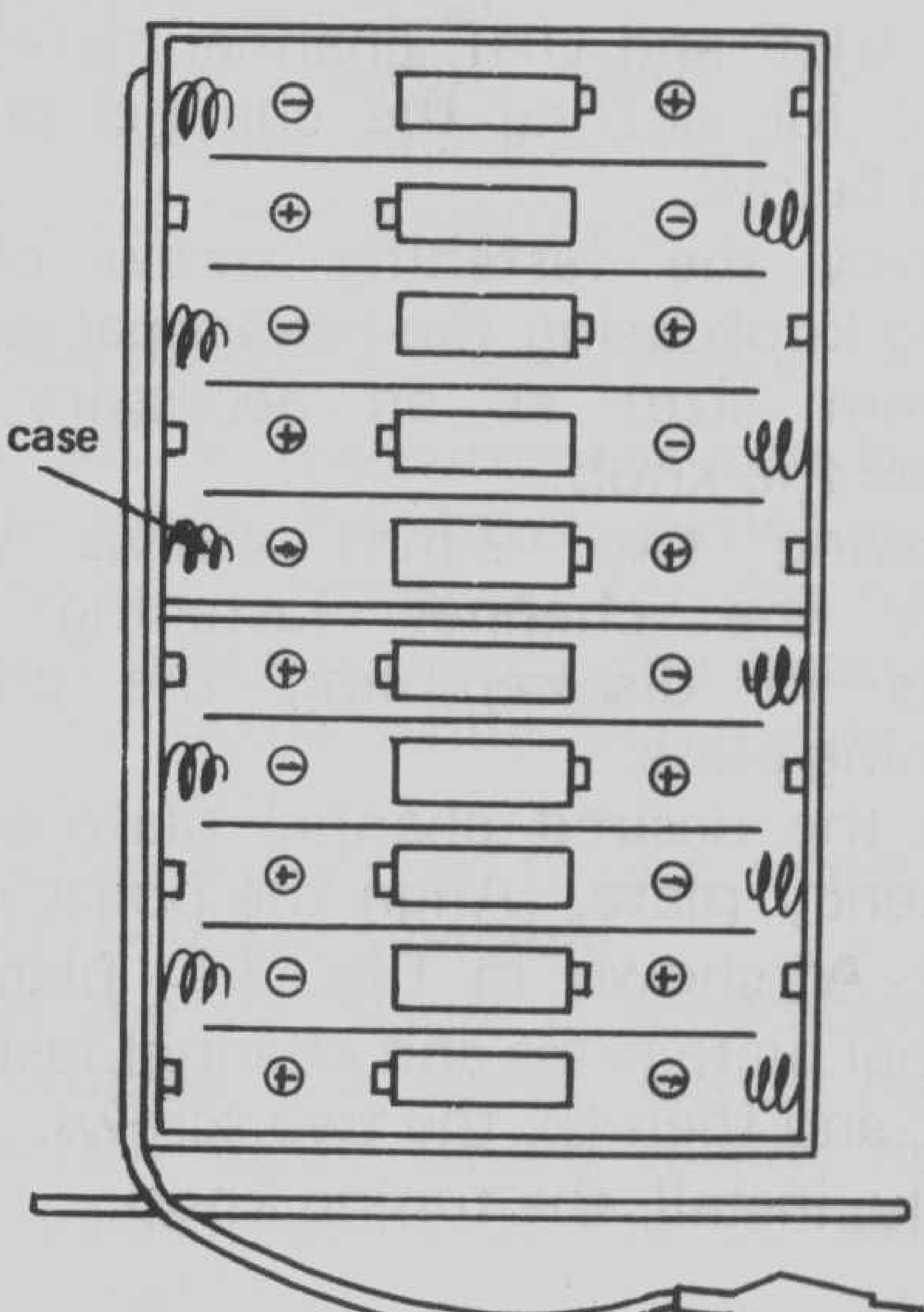


Fig. 7-3

(4) Install 10 pieces of dry cells by watching the specified polarities.
(5) Restore the battery pack case to the main unit and push the two Nylatches to lock.
(6) Connect the power plug to the power receptacle.

7.3 Battery Check

(1) Turn on the power switch.
(2) Set the battery check switch downward. If the meter pointer indicated the range of BATT·OK, the battery voltage is normal for the operation.
(3) If the meter pointer does not indicate the range of BATT·OK or it indicates near the lower limit, replace all the dry cells with 10 pieces of new UM-3 dry cells according to the procedure described in Section 7-1 above.
Note: (1) Continuous-use life time of manganese batteries is about 7 hours.
(2) The life time of alkaline-manganese batteries is a few times longer compared with that of manganese batteries.
(3) Others such as nickel-cadmium type and car battery with the voltage range of 11.5 to 17 V can be used as well.

7.4 Installation of Channel Plate

When the signals of the U.S.A. channels, European channels or China channels are to be measured, it is recommended to put both the VHF and UHF channel plates. The procedure for putting the channel plate is described below.

(1) Unscrew the fastening screw of the tuning knob using the hexagonal wrench (1.5-mm size) as an accessory, and remove the knob.
(2) Removing two 2-mm screws which fasten the channel fastening plate results in disassembling the channel fastening plate.
(3) Place the desired channel plate on the frequency plate. Align the point A and point A' shown in Fig. 7-4; place the channel plate press and channel fastening plate; and then fix the two screws.
(4) Finally, install the tuning knob.

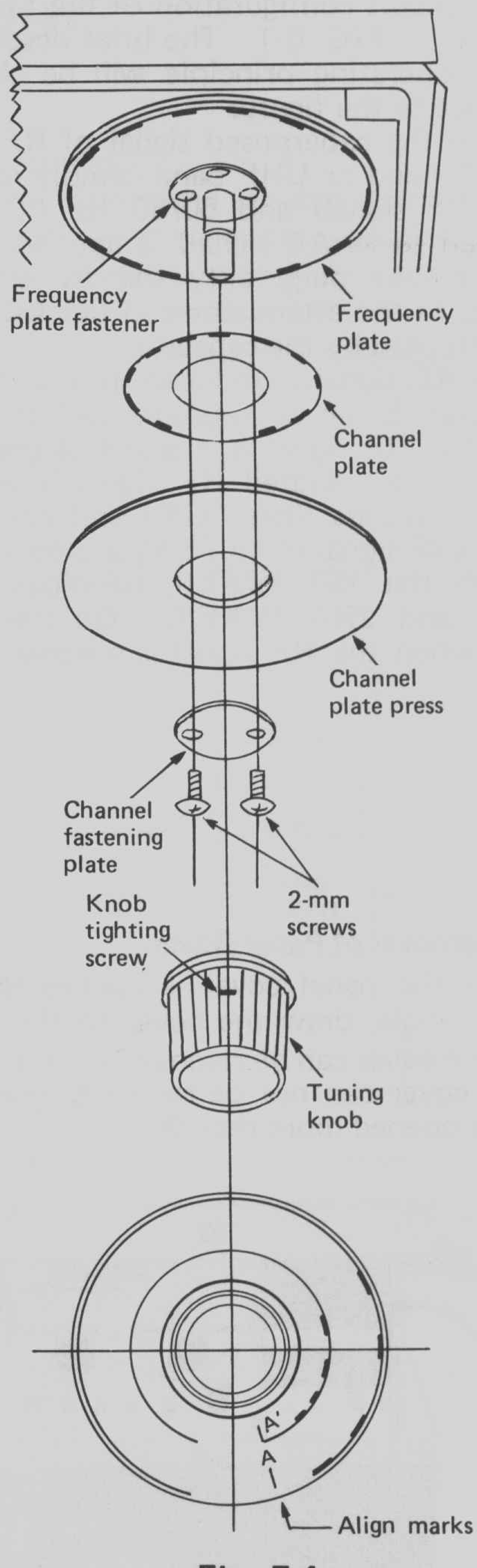


Fig. 7-4

Note: Do not remove the frequency plate fastener, as it is pre-adjusted.

Channel Plate

	VHF	UHF
CHINA	VC	UC
U. S. A.	VA	UA
EUROPE	VE	UE

7.5 Level Measurement

(1) Turn on the power switch.
(2) Turn all the attenuator switches upward.
(3) Check whether the signal frequency to be measured belongs to the VHF band or UHF band. Set the band switch depending on the signal frequency to be measured.

VHF: 40 to 300 MHz
UHF: 470 to 890 MHz

(4) Apply the signal to be measured to the input connector.
(5) Turn the VHF or UHF tuning knob whichever appropriate, and select a frequency or channel of the signal to be measured.
(6) Turn the tuning knob and fine adjustment knob to obtain the maximum meter swing, and adjust the attenuator to locate the meter pointer in the range of 40 to 62 dB on the meter.
(7) The measurement level of the signal is represented by the sum of meter reading and the attenuator value.
(8) When the input signal is applied by a 300-Ω twin lead feeder connect the LBN-14 Balun to the input circuit, and add the insertion loss to the measurement value.

7.6 Notes on Level Measurement

(1) With no input, when the LEVEL·AC V selection switch is set to LEVEL, the meter pointer indicates a small level of value. However this is due to the internal noise and has no problem.
(2) Depending on the position of the FINE TUNE knob, a small value of deviation occurs on the measurement results, but this is within the limit to satisfy the specifications.
(3) In measurements of TV sound carrier and FM radio broadcasting signals, there is a small amount of deviation between the tuning position where the sound output becomes the maximum and the tuning position where the meter swing becomes the maximum. This is because the sound detection system uses the slope detection of the IF amplification. In this case, measure the receiving level with the maximum point of the meter indication.
(4) In the VHF band, when the frequency plate is turned below 40 MHz, the meter pointer may overswing even with no input signal. This is due to the zero-beat signal generated by the frequency conversion and it is not a failure of the instrument. However, do not keep the instrument with the overswing condition for a long period.
(5) In the VHF band, when a frequency of higher than 300 MHz is selected, the meter pointer may overswing even with no input signal. This is because of the spurious component and is not a failure.
(6) When a coaxial cable is to be connected to the instrument, use a connector or a coaxial clip (LJ-09 separately available). Do not measure the signal level by directly touching the metal leads of the cable to the input connector.
(7) When the input signal is superposed on a DC voltage, the signal level measurement is available. However the DC voltage measurement is not available.
(8) In such a location where transportation vehicles such as automobiles, trains, and airplanes pass by frequently, or pulse noises of strong intensity exist, or when the antenna is swinging by the wind, the meter indication of the instrument may fluctuate so that the measurement may be difficult.

7.7 AC V Measurement

(1) Turn off the power switch, and set the LEVEL·AC V selection switch to AC V.
(2) Apply the RF signal superposed on an AC voltage through a coaxial cable with a connector or the coaxial clip (LJ-09 separately available).
(3) The meter reading with the AC V switch setting indicates the voltage value of the AC level superposed.

7.8 Notes on AC V Measurement

(1) The AC V measurement can be made either when the power switch is turned on or off. However, for the conservation of battery energy, the measurement may be made while the power switch is turned off.
(2) Measurement other than a signal of 50 to 60 Hz is not available.
(3) When the RF signal is superposed on a DC voltage, the meter pointer indicates a certain value which means nothing. The measurement of the DC voltage is not available.

CONTENTS

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NOTE

These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the service manual unless you are qualified to do so.

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9) Meter Scale Adjustment of VHF Band

a) Setup

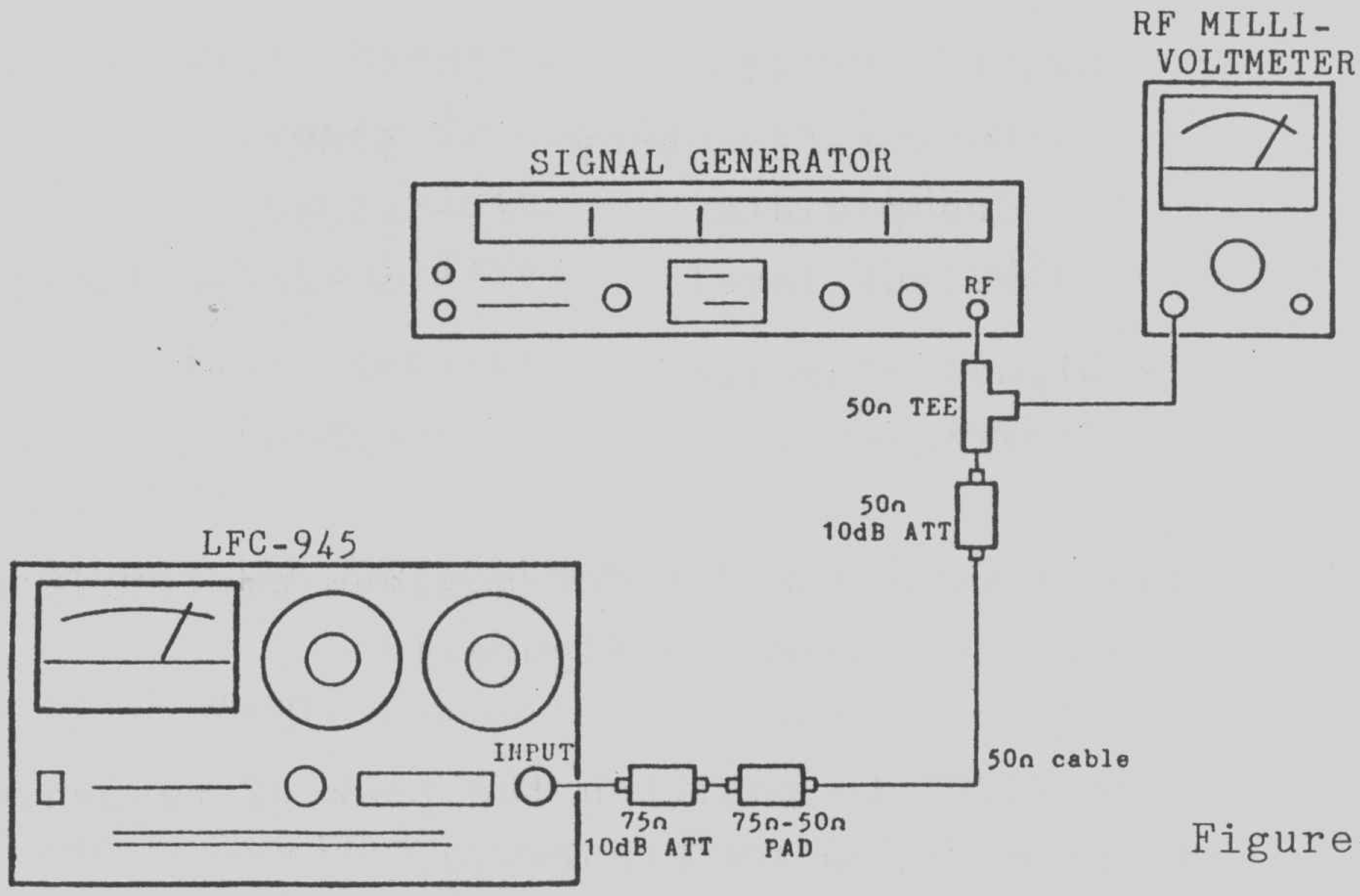


Figure-11

- LFC-945

VHF dial	≃ 100MHz
FINE TUNE	Center
BAND	VHF
ATTENUATION	20dB

- SIGNAL GENERATOR

Frequency	100MHz
Output level	+82dBμ at INPUT of LFC-945

b) Set the VHF dial at tuning point. (Maximum meter reading)

c) Adjust VR805 for a reading of 62dBμ.

- Measure the sensitivity for several points of the VHF dial, then plot the frequency response to graph paper as shown in Figure-12.

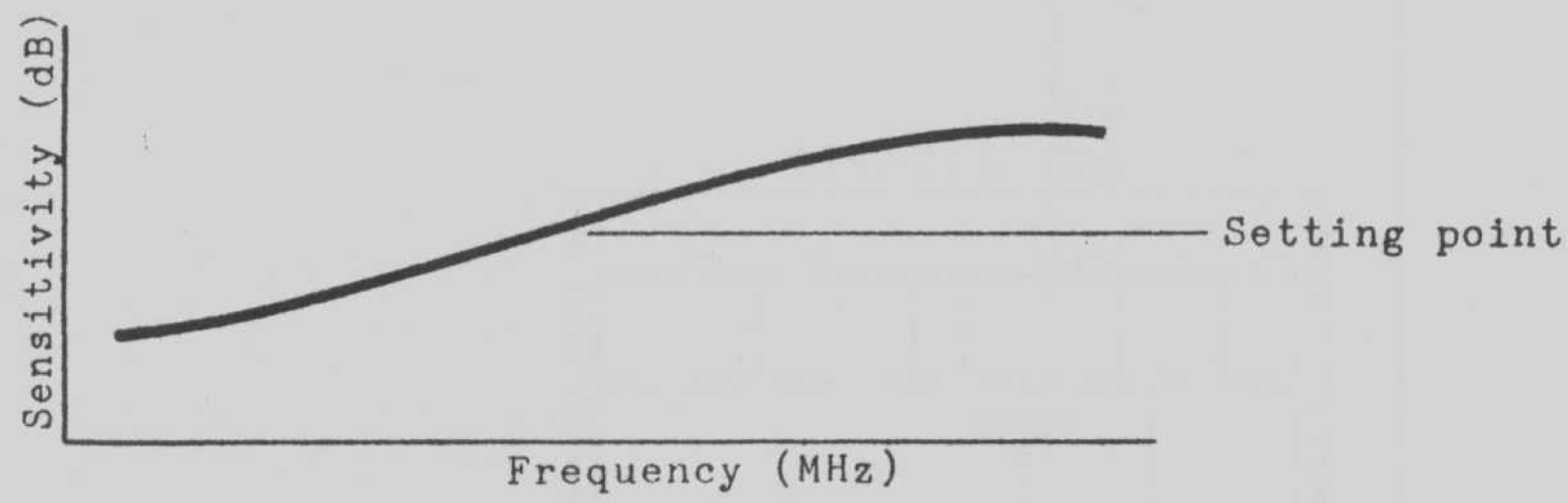


Figure-12

- Set the VHF dial to average sensitive frequency.

- Readjust VR805 for reading of 62dBμ

d) Set the output level for 50dBμ at INPUT of LFC-945.

e) The reading should be 30dBμ ±0.5dB (29.5dBμ to 30.5dBμ).

- If the meter indicates under 29.5dBμ, rotate VR601 slightly counterclockwise, then adjust VR805 for full scale indication with 82dBμ input signal level.

- If the meter indicates over 30.5dBμ, rotate VR601 slightly clockwise , then adjust VR805 for full scale indication with 82dBμ input signal level.

f) Check the meter reading at 40dBμ and 50dBμ point on the scale with input signal of 60dBμ and 70dBμ.

g) The reading should be 40dBμ ±0.5dB or 50dBμ ±0.5dB at each point.

- If the accuracy exceed 0.5dB at each point, adjust VR602 for a best calibration accuracy.

h) Repeat above adjustment (VR805, 601 and 602) for best calibration accuracy.

10) Meter Scale Adjustment of UHF Band

a) Setup

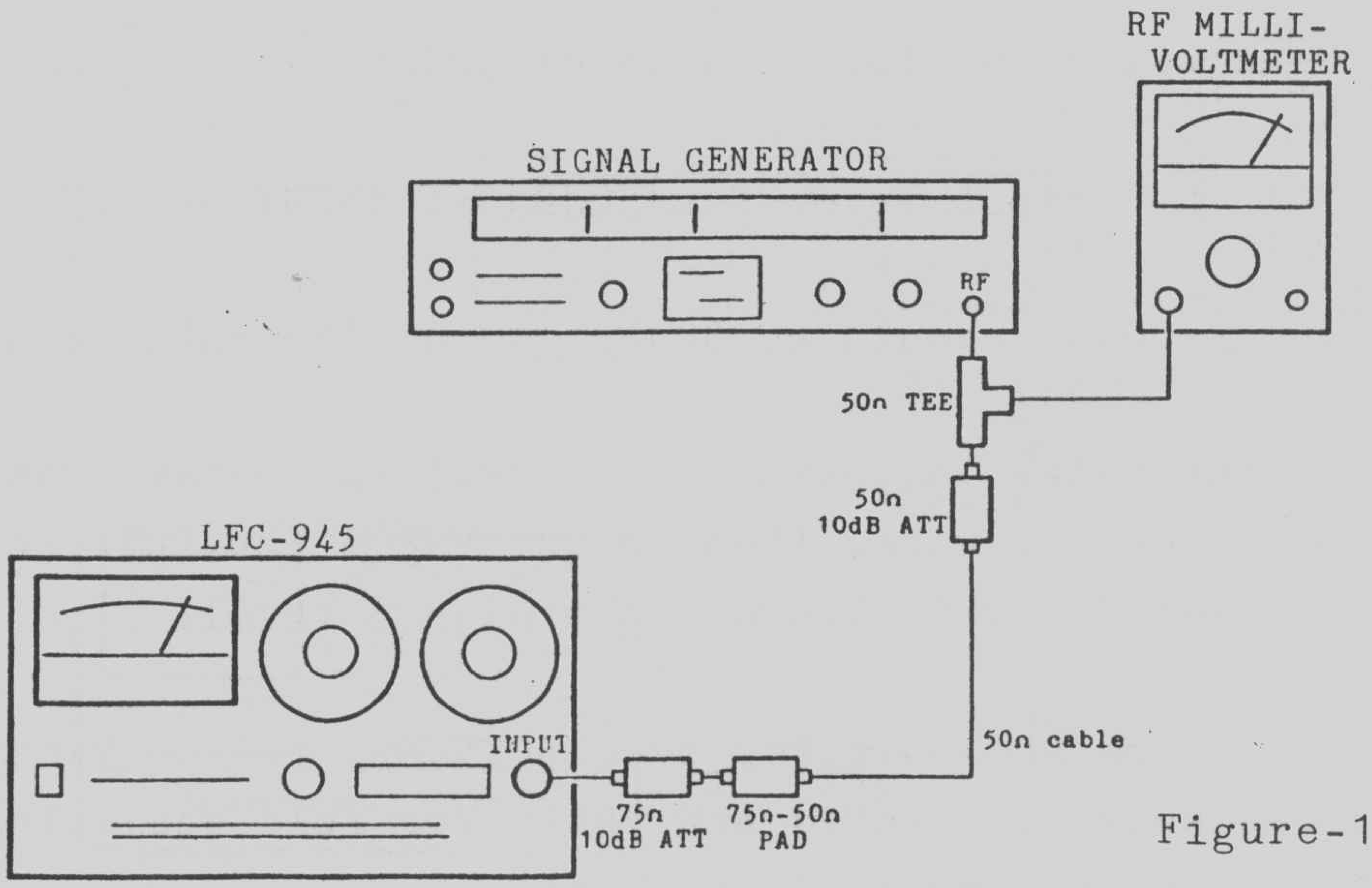


Figure-13

- LFC-945

UHF dial	≃ 500MHz
FINE TUNE	Center
BAND	UHF
ATTENUATION	0

- SIGNAL GENERATOR

Frequency	500MHz
Output level	+82dBμ at INPUT of LFC-945

b) Set the UHF dial at tuning point. (Maximum meter reading)

c) Adjust VR806 for a reading of 62dBμ.

- Measure the sensitivity for several points of the UHF dial, then plot the frequency response to graph paper as shown in Figure-14.

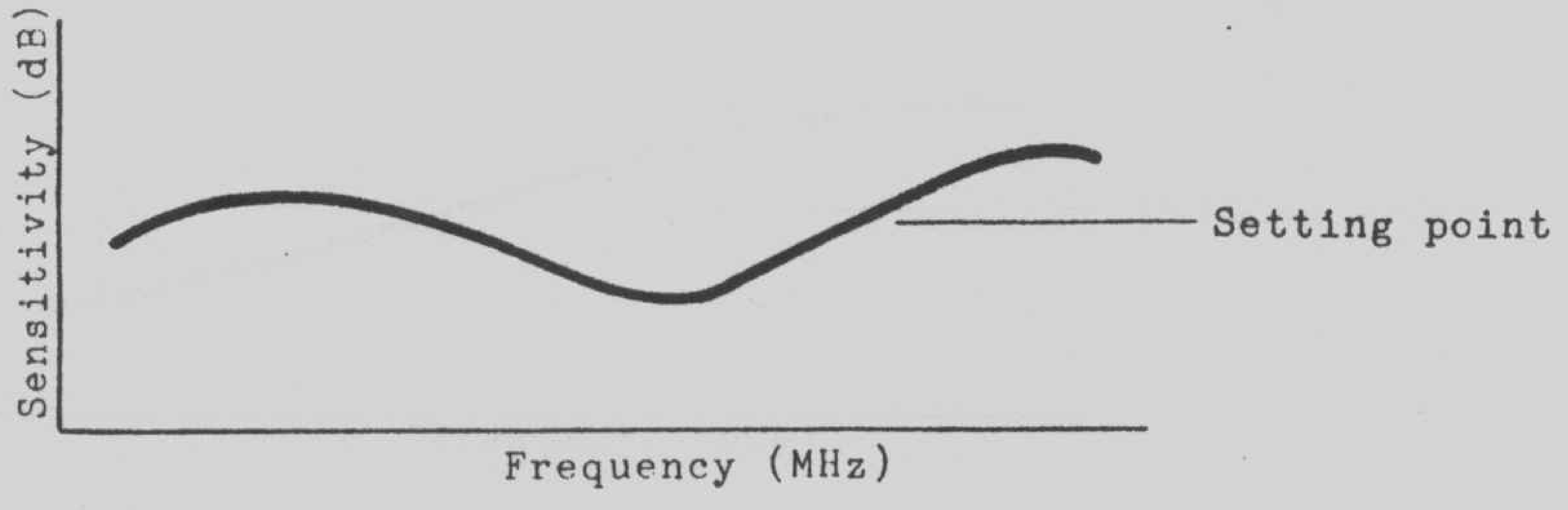


Figure-14

- Set the UHF dial to the average sensitive frequency.

- Readjust VR806 for reading of 62dBμ.

d) Set the output level for 30dBμ at INPUT of LFC-945.

e) The reading should be 30dBμ ±0.5dB.

- If the accuracy exceeds 0.5dB, adjust VR807 for a best calibration accuracy.

f) Repeat above adjustment (VR806, 807) to obtain a best calibration accuracy.

* If it can not be adjusted for full scale indication by VR806, adjust VR603 for full scale indication. In this case, readjust following adjustments.

  L604 --- 6) IF Amplifier Adjsutment
  VR804 --- 8) Meter Zero Adjsutment
  VR805, 601, 602 --- 9) Meter Scale Adjustment of VHF Band
  VR806, 807 --- 10) Meter Scale Adjustment of UHF Band

3. Troubleshooting Procedure

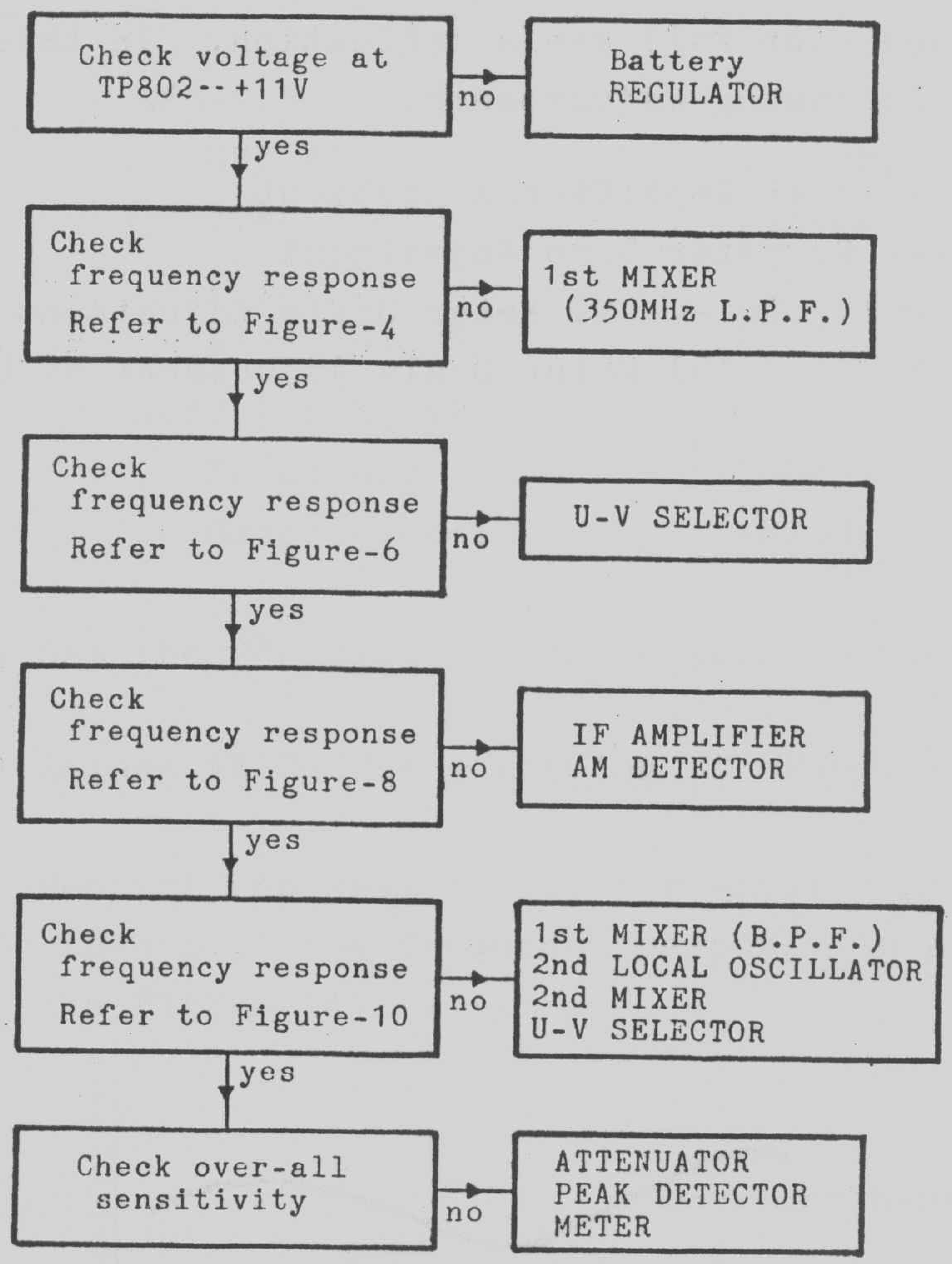
1) Check all control settings, because an incorrect setting can make a good unit appear defective.

2) Some trouble can be solved with proper adjustment.

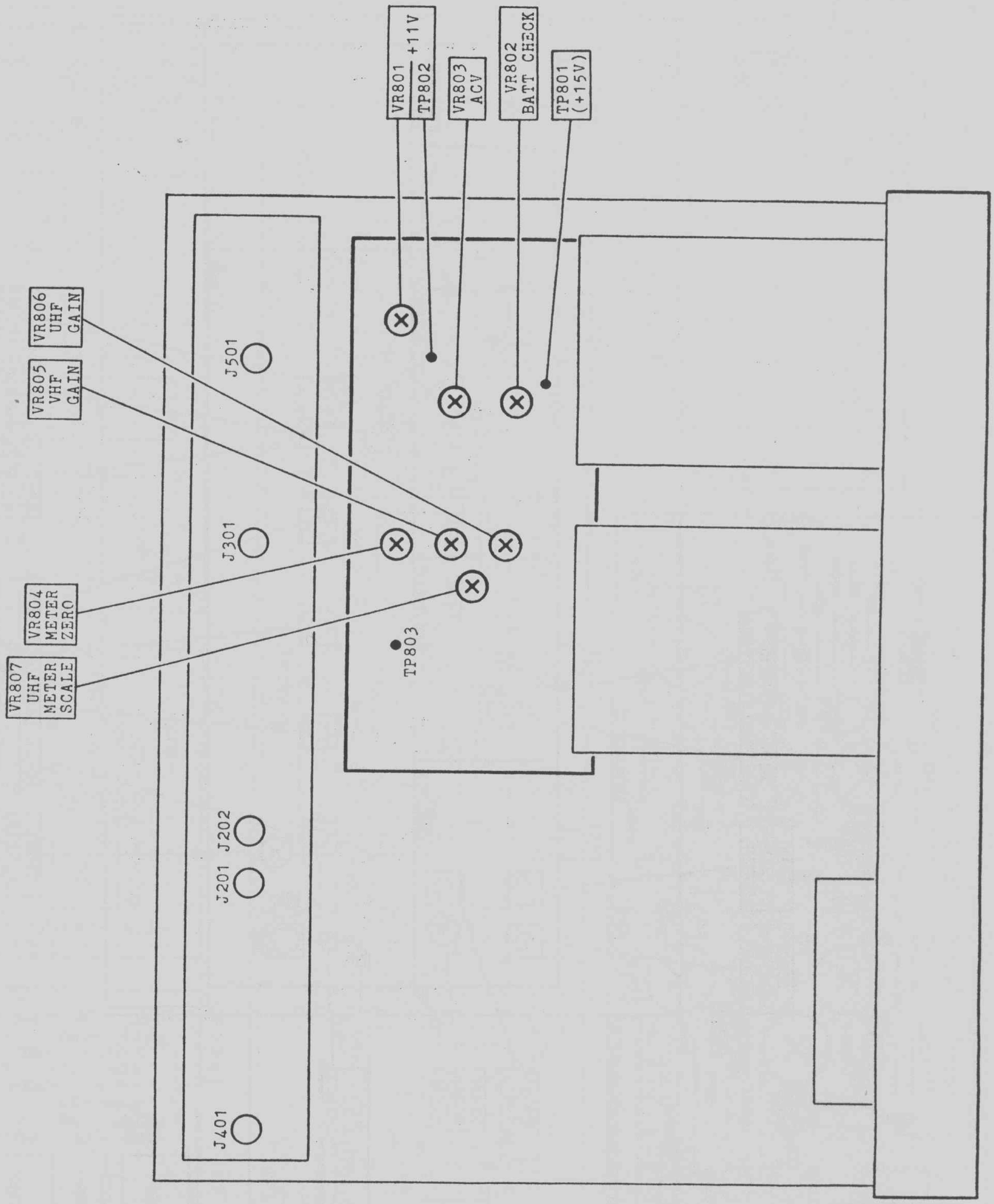
3) Check the DC voltage as shown on the schematic diagram to locate the defective circuit. Start with the power supply.

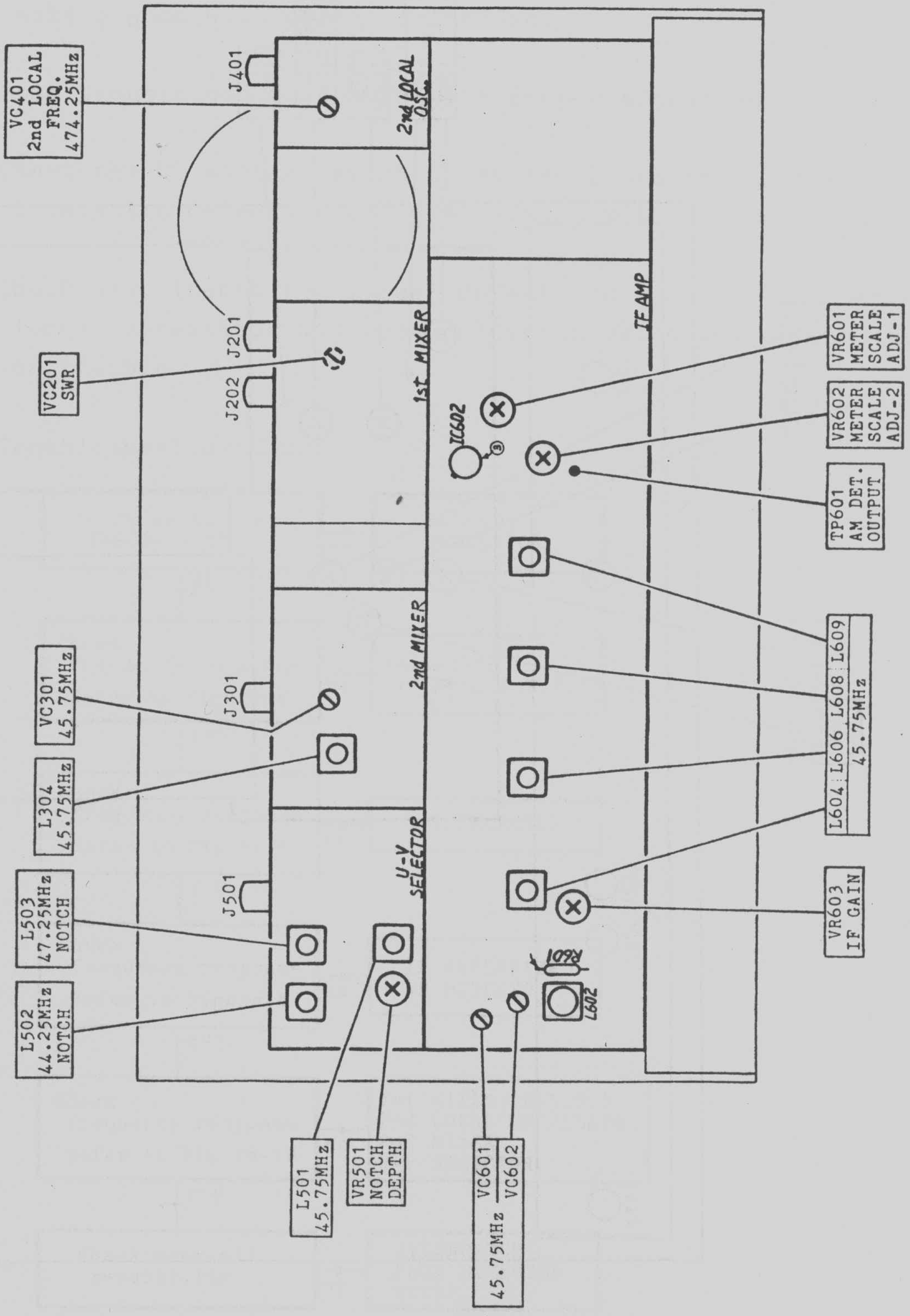
4) Check all circuit for visual defects such as broken components, loose connections and poor soldering which could be a cause of trouble.

5) Troubleshooting Chart

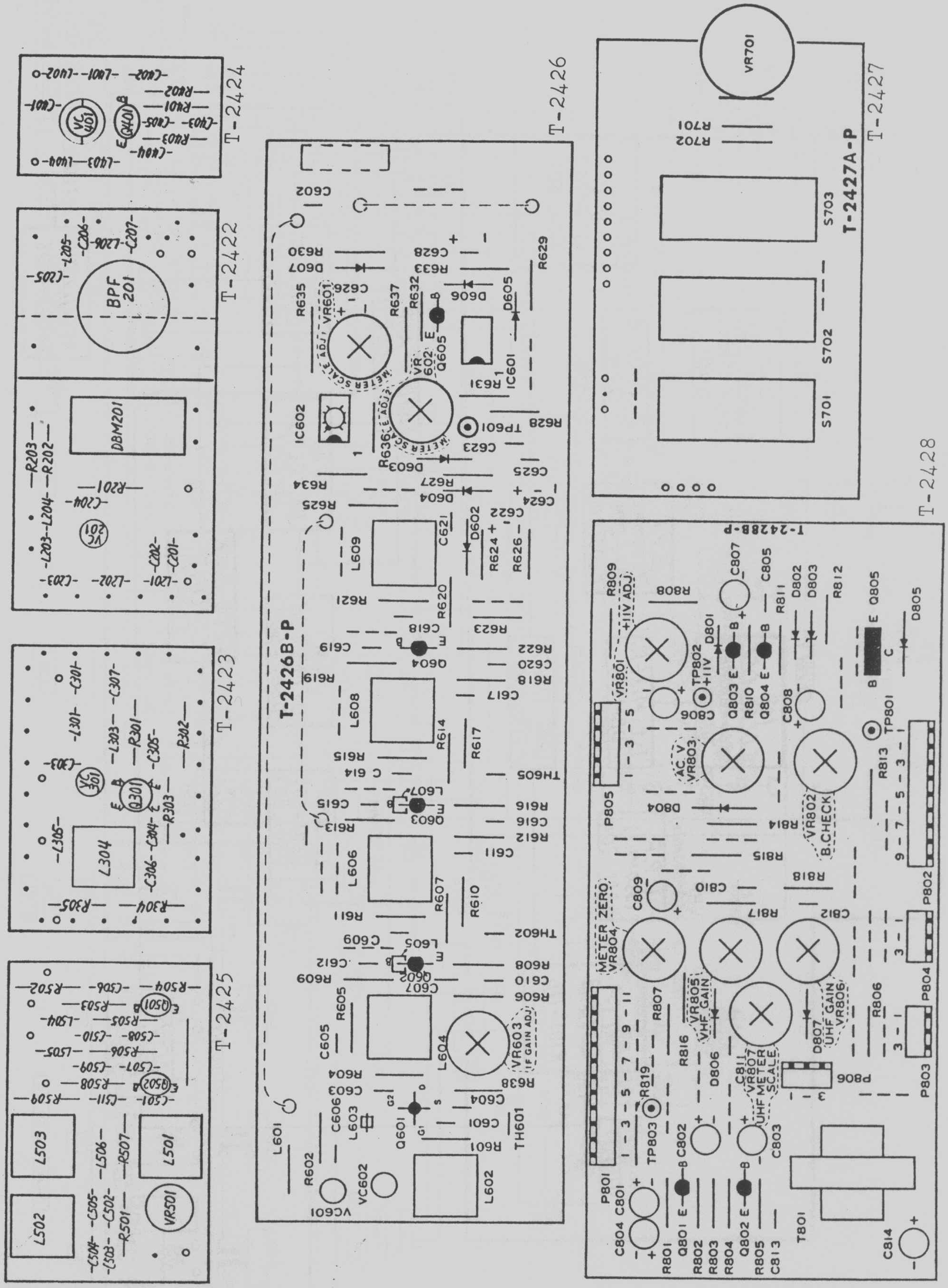


4. Location of Adjustment

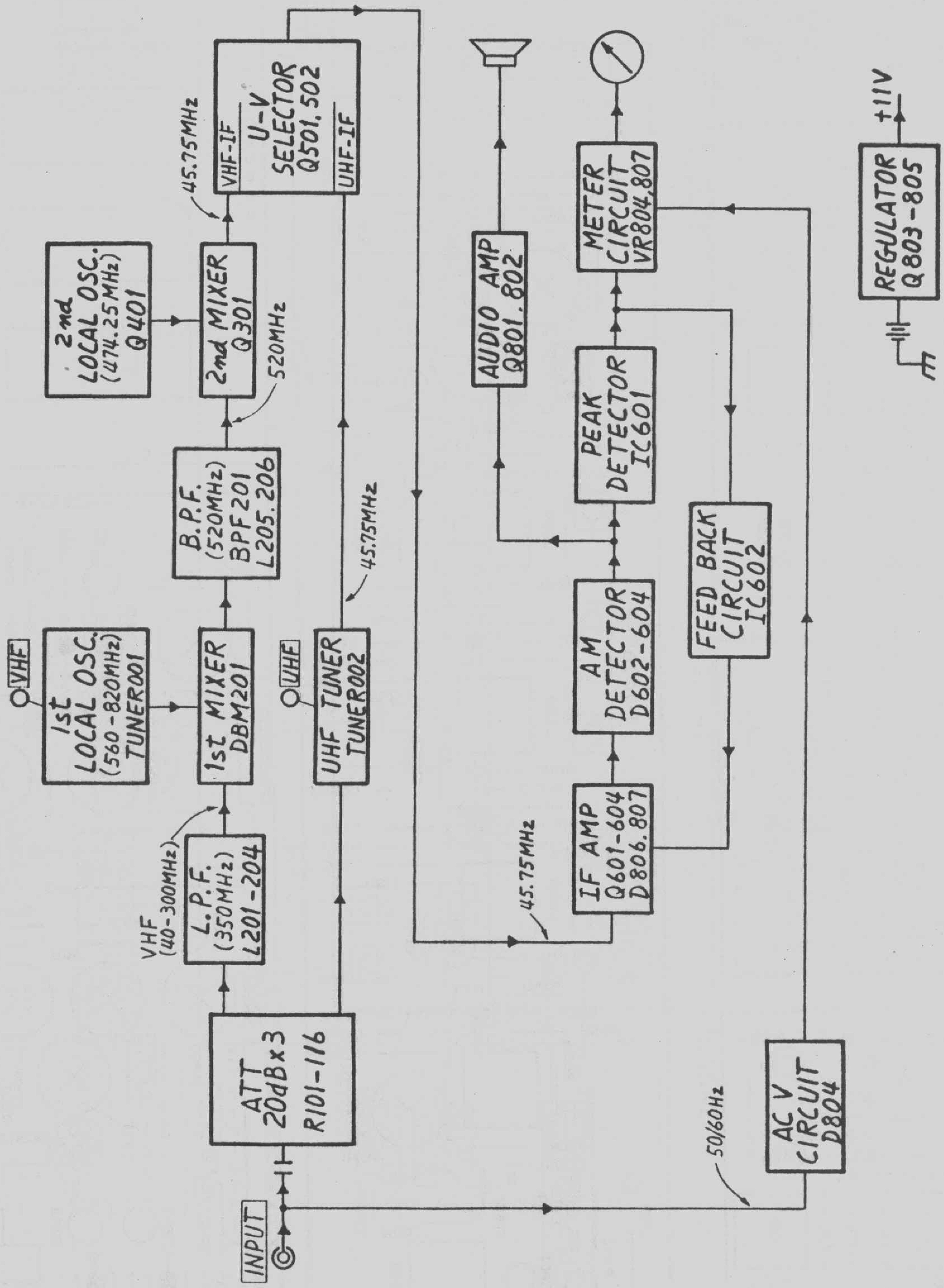



VC401 2nd LOCAL FREQ. 474.25MHz
J401
2nd LOCAL OSC.
VC201 SWR
J201
J202
1st MIXER
IC602
IF AMP
VR601 METER SCALE ADJ-1
VR602 METER SCALE ADJ-2
TP601 AM DET. OUTPUT
L609 L608 L606 L604 45.75MHz
2nd MIXER
VC301 45.75MHz
J301
L304 45.75MHz
U-V SELECTOR
J501
L503 47.25MHz NOTCH
L502 44.25MHz NOTCH
VR603 IF GAIN
R601
L602
L501 45.75MHz
VR501 NOTCH DEPTH
45.75MHz VC601 VC602

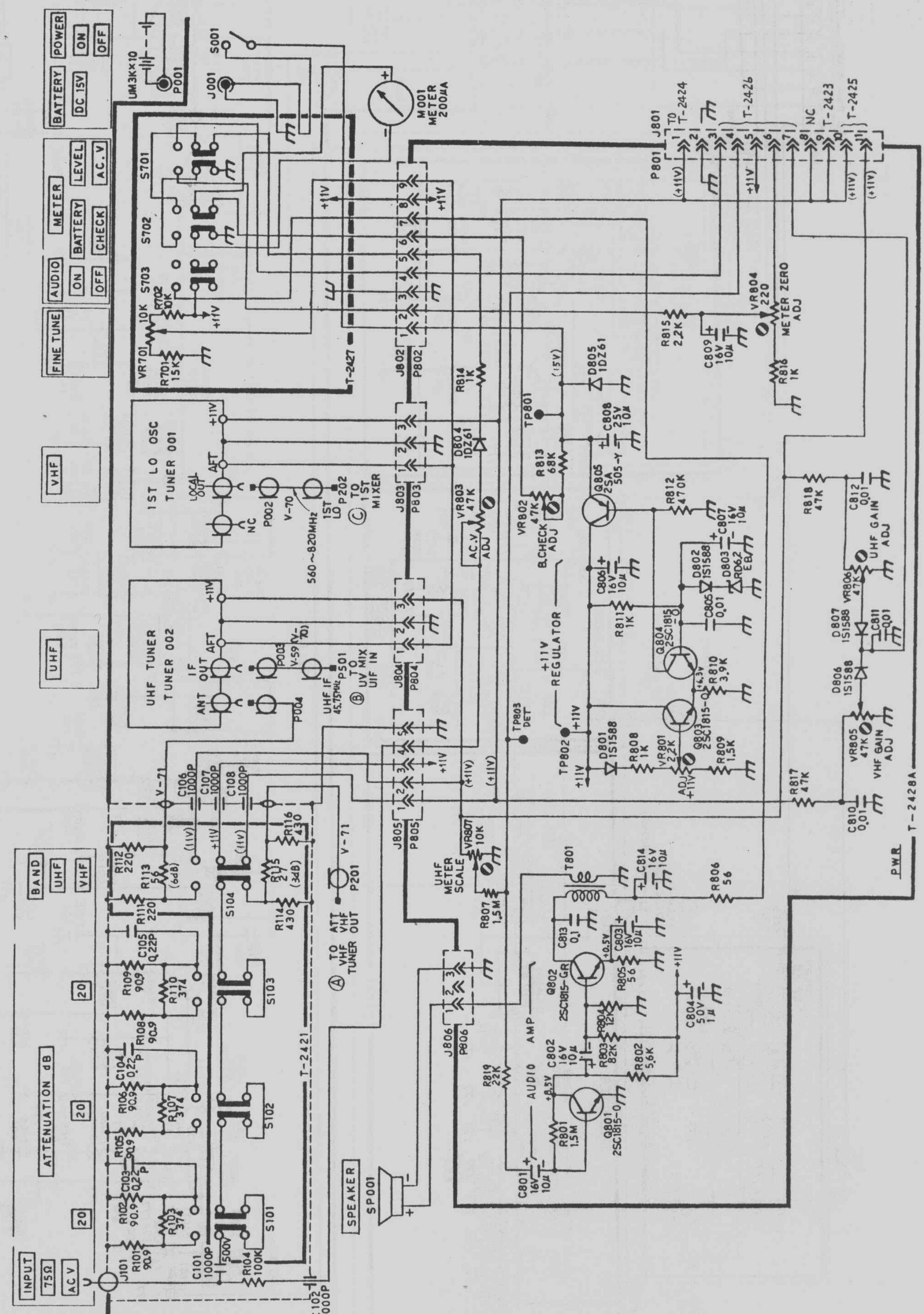
5. Printed Circuit Board



6. Block Diagram



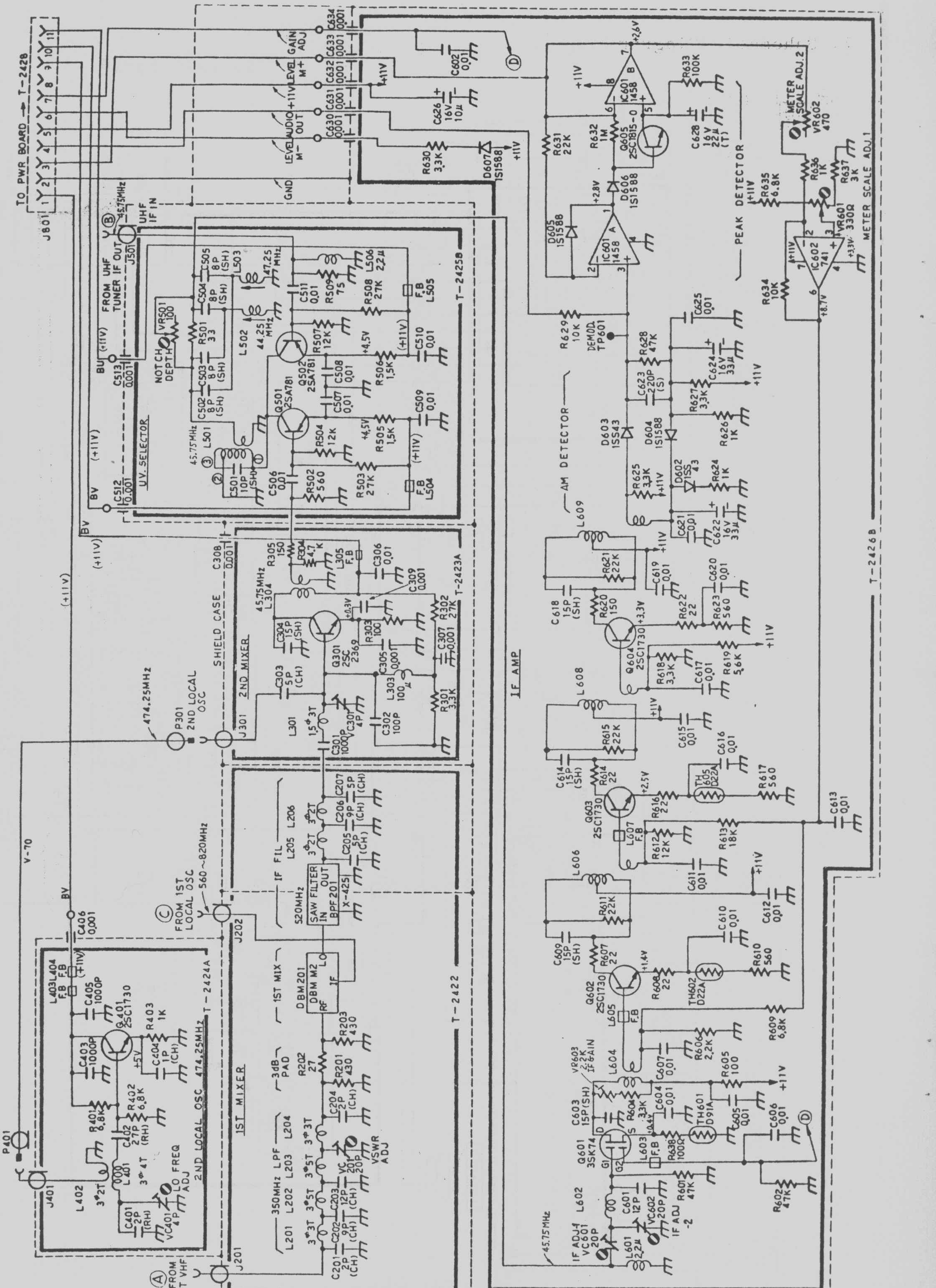
7. Schematic Diagram



1. Test Equipment Required

The following test equipment is required for calibration and servicing of the Model LFC-945. The suggested specifications are the minimum necessary for proper calibration of this instrument.

Test Equipment	Minimum Spec.
- Multimeter	Accuracy < 3%
- Regulated DC Power Supply	11V to 15V
- AC Voltmeter Calibrator	50V 50/60Hz
- Oscilloscope	Sensitivity: 1mV Band width: 100kHz
- Sweep Generator	Frequency: 40MHz to 900MHz Impedance: 75 ohm
- Signal Generator	Frequency: 40MHz to 900MHz Output Level: +27dBμ to +117dBμ (-80dBm to +10dBm) Impedance: 50 ohm
- Test Oscillator	Frequency: 1.5MHz
- RF Millivoltmeter	Sensitivity: -30dBm Band width: 900MHz
- SWR Bridge	Impedance: 75 ohm
- Fixed Attenuator	• 50 ohm 10dB • 75 ohm 10dB


TO PWR BOARD → T-2428
J801
FROM UHF TUNER IF OUT
J301
UHF IF IN
U.V. SELECTOR
NOTCH DEPTH
T-2425B
SHIELD CASE
2ND MIXER
T-2423A
P301
2ND LOCAL OSC
474.25MHz
IF AMP
AM DETECTOR
PEAK DETECTOR
METER SCALE ADJ.1
METER SCALE ADJ.2
T-2426B
FROM 1ST LOCAL OSC 560~820MHz
IF FIL
SAW FILTER
1ST MIX
3dB PAD
1ST MIXER
350MHz LPF
VSWR ADJ
T-2422
2ND LOCAL OSC 474.25MHz
LO FREQ ADJ
T-2424A
FROM ATT VHF
V-70
GND
LEVEL M-
AUDIO OUT
+11V
LEVEL M+
GAIN ADJ
DEMOD TP601

LFC-945

- Impedance Matching Pad	50 ohm - 75 ohm
- Detector	Impedance: 75 ohm
- Cable	Impedance: 50 ohm

2. Calibration Procedure

* Calibration should be performed after a 30 minute warm-up period. It should also be confirmed that the unit is connected to the rated power line voltage.

* All adjustment should be completed in the given order, because some adjustments interact with others.

* During the adjustment procedure, remove the case only when necessary and replace immediately after making an adjustment. This will maintain all circuit at constant operating temperature.

1) Adjustment of Meter Mechanical Zero

a) Turn the instrument off and allow 30 second for all capacitors discharge.

b) Rotate zero adjustment screw clockwise or counterclockwise so that pointer indicates exactly zero.

c) After pointer is exactly at zero, rotate the screw slightly opposite direction to release tension of meter suspension.

2) Initial Control Settings

The initial control settings to be used for each check and adjustment are listed below. Any variations from these settings are stated in the applicable procedure.

VHF dial	100MHz
UHF dial	500MHz
METER	LEVEL
	BATTERY
AUDIO	OFF
FINE TUNE	Center
BAND	VHF
ATTENUATION	0dB

3) Power Supply

a) Voltage Adjustment

- Remove the plug of BATTERY PACK from BATTERY jack.
- Connect the regulated DC power supply to BATTERY jack and set the output voltage to +15V.
- Connect the DC voltmeter to TP802.
- Adjust VR801 for reading of +11V.

b) Adjustment of BATT CHECK

- Set the voltage of DC power supply to +11.5V
- Depress BATTERY switch for CHECK.
- Adjust VR802 so that the pointer indicates left edge of BATT OK mark as shown in Figure-1.

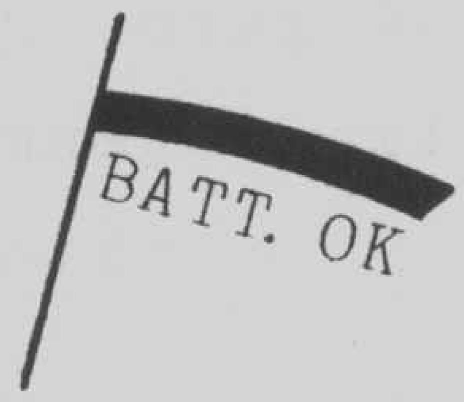


Figure-1

4) AC V Adjustment

a) Set METER switch to AC V.

b) Connect the AC voltmeter calibrator to INPUT connector and set the output voltage to 50V.

c) Adjust VR803 for meter reading of 50V.

5) Adjustment of 1st MIXER

a) Setup

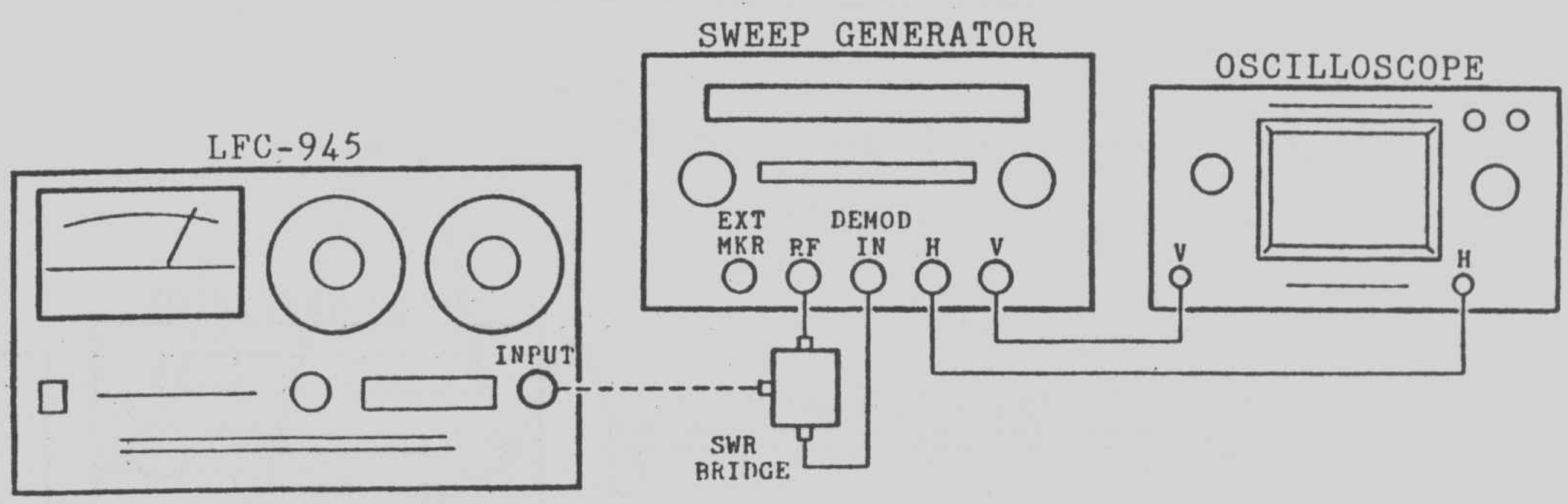


Figure-2

- LFC-945

METER	AC V (To avoid meter over swing by RF signal)

- SWEEP GENERATOR

Frequency range	40MHz - 350MHz
Output level	+110dBμ (+7dBm)

b) Connect the test equipment as shown in Figure-2, but do not connect the SWR bridge to LFC-945.

c) Adjust vertical controls of the oscilloscope to obtain a frequency response as shown in Figure-3.

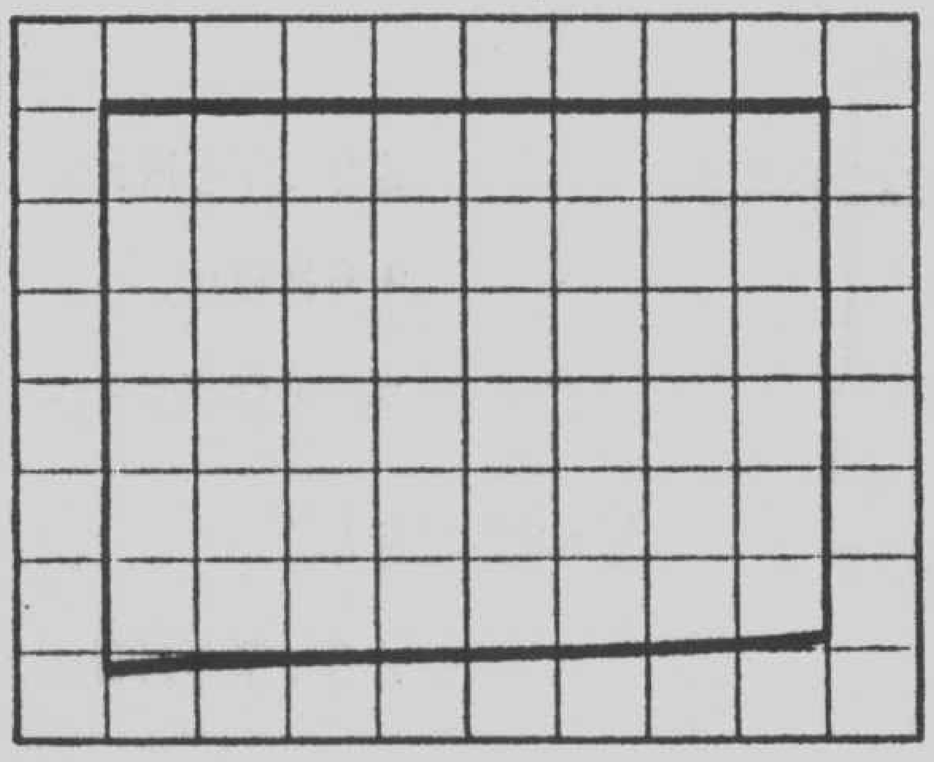


Figure-3

d) Connect the SWR bridge to INPUT connector.

e) Adjust VC201 to obtain a maximum return loss as shown in Figure-4.

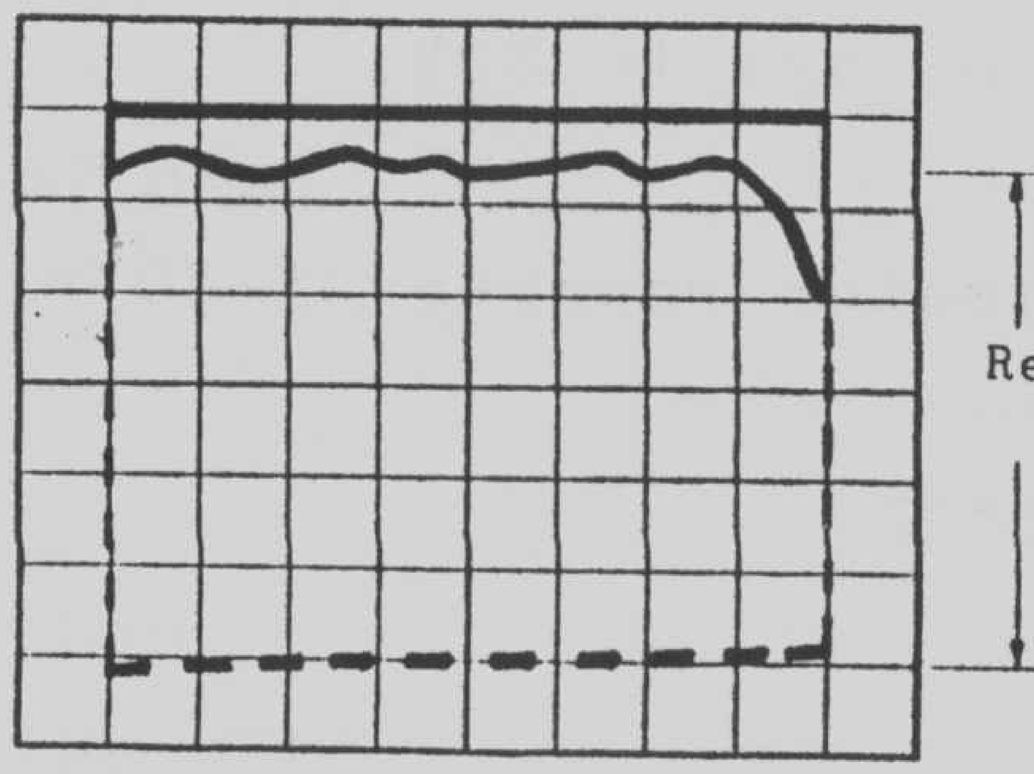


Figure-4

5) U-V Selector Adjustment

a) Setup

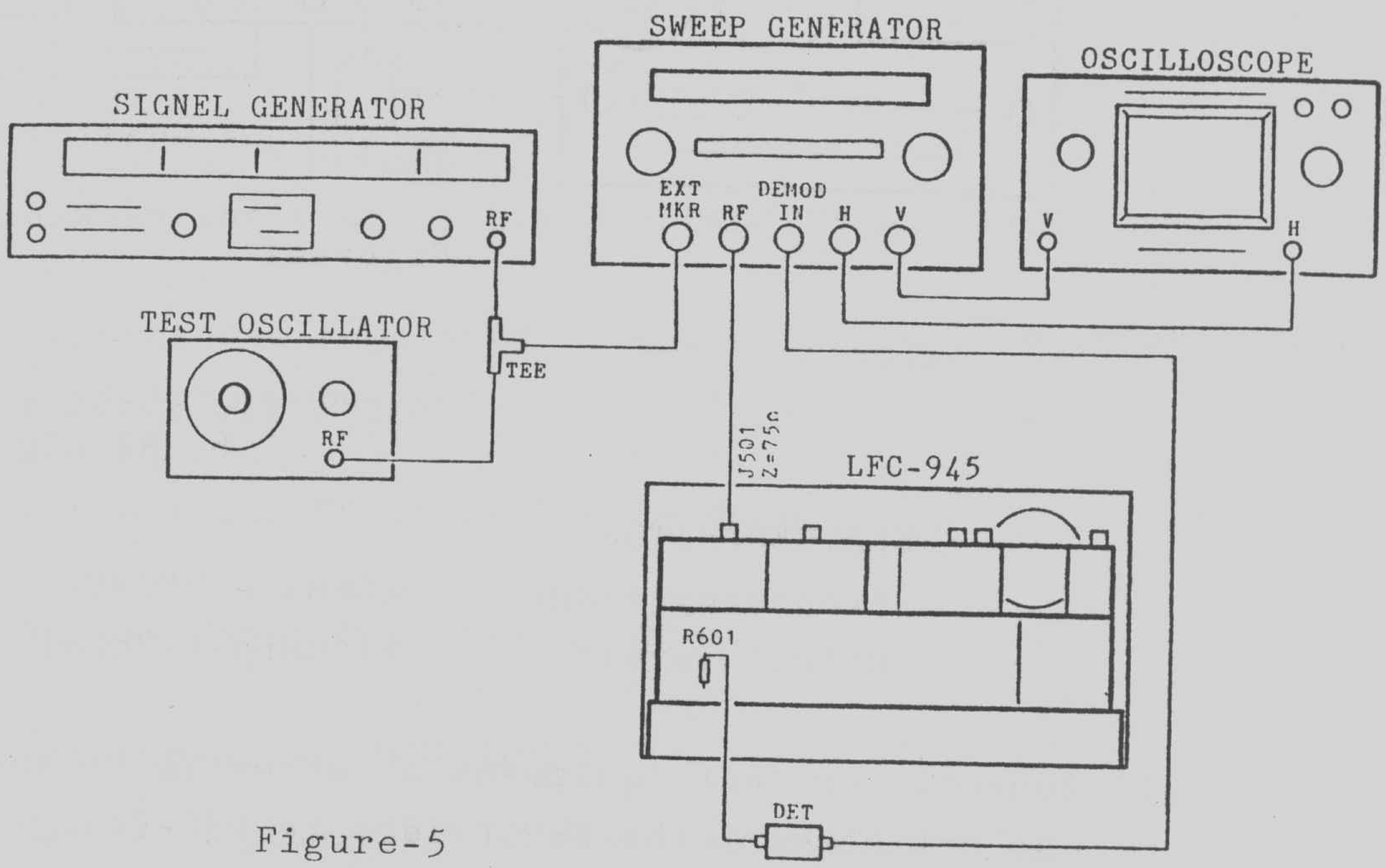


Figure-5

- LFC-945

BAND	UHF

- SWEEP GENERATOR

Center frequency	45.75MHz
Sweep width	±5MHz
Output level	≃ +90dBμ (-17dBm)

- Signal Generator

Frequency	45.75MHz

- Test oscillator

    Frequency 1.5MHz

b) Adjust the following adjustments to obtain a frequency response as shown in Figure-6.

- L501	45.75MHz	Maximum amplitude
- L502	44.25MHz	Notch frequency
- L503	47.25MHz	Notch frequency
- VR501	44.25MHz	Maximum notch depth
	47.25MHz	Maximum notch depth

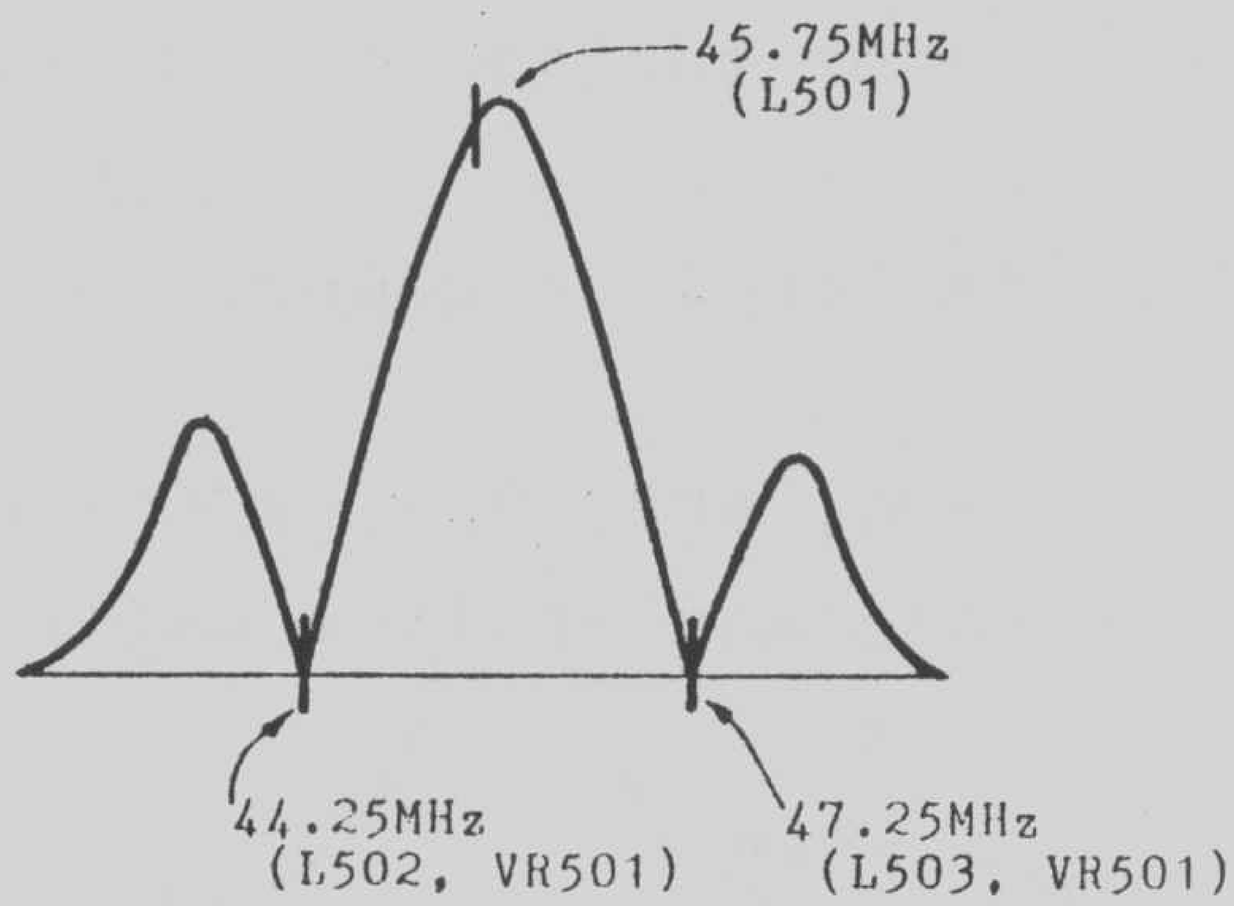


Figure-6

6) IF Amplifier Adjustment

a) Setup

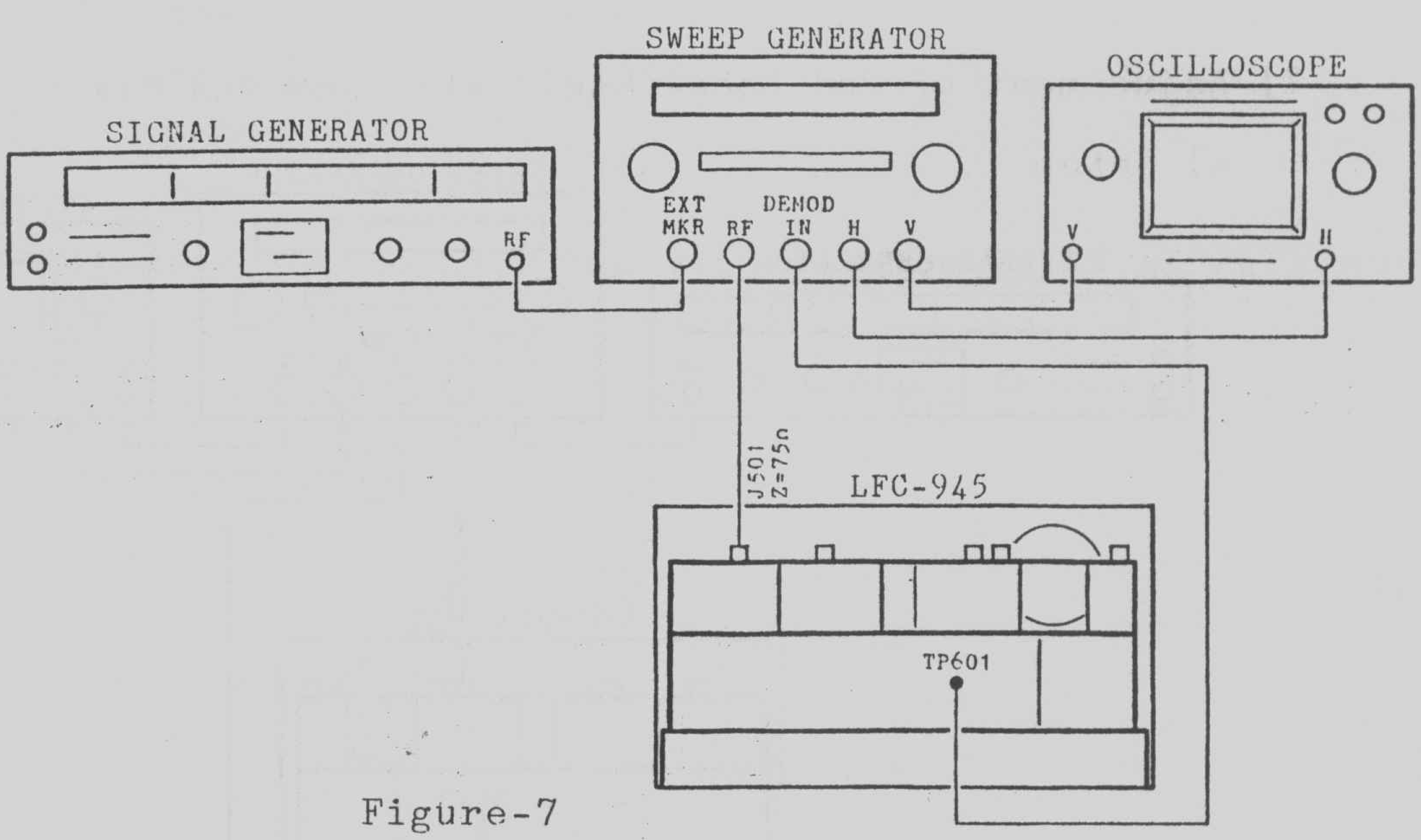


Figure-7

- LFC-945

BAND	UHF

- SWEEP GENERATOR

Center frequency	45.75MHz
Sweep width	±5MHz
Output level	≃ +40dBμ (-67dBm)

- Signal generator

Frequency	45.75MHz

b) Connect the DC voltmeter to pin3 of IC602.

c) Adjust VR601 for meter reading of +3.3V.

d) Remove the DC voltmeter from IC602.

e) Adjust L501, 604, 606, 608, 609, VC601 and 602 to obtain a frequency response and maximum amplitude at 45.75MHz as shown in Figure-8

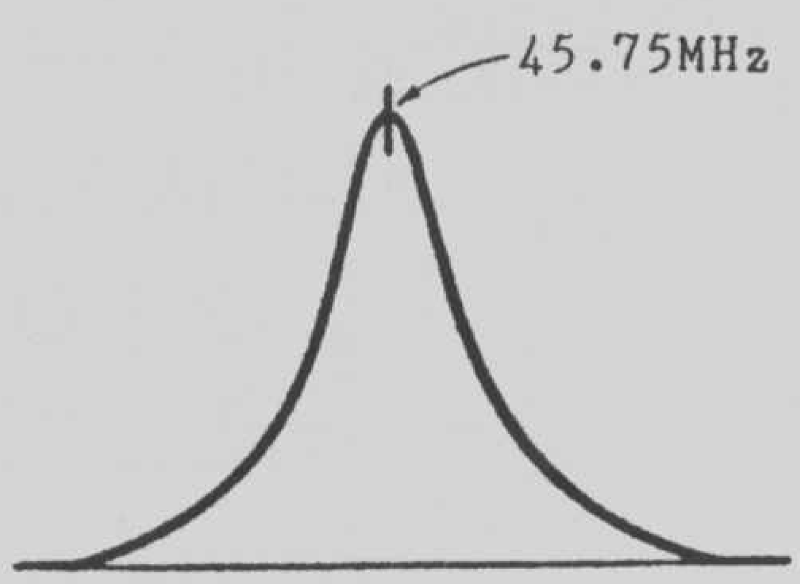


Figure-8

7) Adjustment of 2nd Local Oscillator and 2nd Mixer

a) Setup

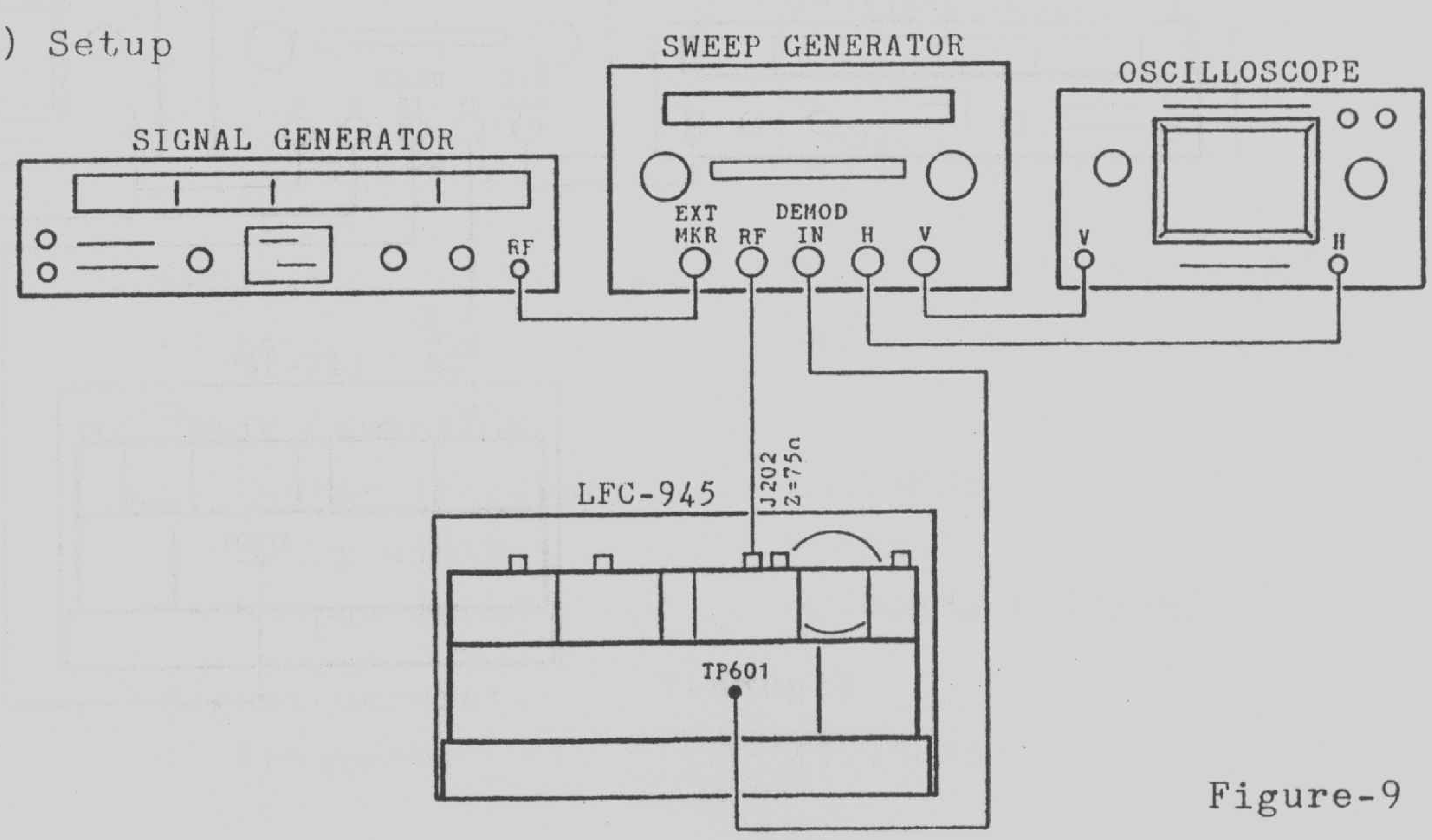


Figure-9

- LFC-945

BAND	UHF

- SWEEP GENERATOR

Center frequency	520MHz
Sweep width	±10MHz
Output level	≃ +40dBμ (-67dBm)

- Signal generator

Frequency	520MHz

b) Adjust L304 and VC301 for maximum amplitude of frequency response as shown in Figure-10

c) Adjust VC401 to position the peak of response at 520MHz marker as shown in Figure-10.

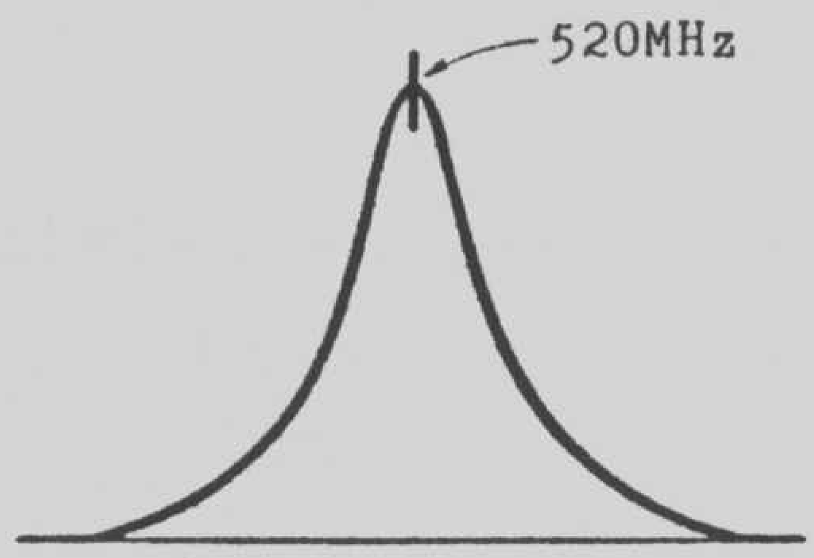


Figure-10

8) Meter Zero Adjustment

a) Control Settings

BAND	VHF
METER	LEVEL
INPUT	Open

b) Adjust VR804 so that the meter indicates 4% of full scale (point of 2V on the AC V scale).

LFC-945

SIGNAL LEVEL METER

SERVICE MANUAL