

JIS

JAPANESE INDUSTRIAL STANDARD

**Methods of measurement on
receivers for frequency modulated
sound-broadcasting emissions**

JIS C 6104—1993

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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JAPANESE INDUSTRIAL STANDARD

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Methods of measurement on receivers for
frequency modulated sound-broadcasting emissions

C 6104-1993

1. Scope This Japanese Industrial Standard specifies the standard test methods for evaluation by comparing the performances of receivers for monophonic (hereafter referred to as "mono") or stereophonic (hereafter referred to as "stereo") frequency modulated sound-broadcasting emission in a frequency range from 76 MHz to 90 MHz. In testing, each test item may be selected, if necessary.

- Remarks 1. In these methods, a receiver is considered as an apparatus which provides only two terminals for input and output, and no measurement is carried out on detail parts of the receiver.
2. The standards cited in this Standard and the International standards corresponding to this Standard are given below.

Cited standards :

JIS C 1505 Precision sound level meters

JIS C 1513 Octave and third-octave band analyzers for sounds and vibrations

JIS C 6007 Environmental requirements for electronic equipments

JIS Z 8703 Standard atmospheric conditions for testing

Corresponding International standards :

IEC 315-1 (1988) Methods of measurement on radio receivers for various classes of emission. Part 1 : General considerations and methods of measurement, including audio-frequency measurements

IEC 315-4 (1982) Methods of measurement on radio receivers for various classes of emission. Part 4 : Radio-frequency measurements on receivers for frequency modulated sound-broadcasting emissions

2. General notes on measurements

2.1 Voltage and current values These values shall be expressed in the r.m.s. value unless otherwise specified.

2.2 Expression of levels When the level of radio-frequency signal is expressed in decibel (dB), the unit of dB (fW) shall be used. The correlation of this unit with dB (mW) and dB (μ V) is as shown in Table 1.

Table 1. Expression of levels

Power		Voltage (impedance 75 Ω)			Voltage (impedance 300 Ω)	
dB (fW)	W	dB (mW)	dB (μ V)	μ V	dB (μ V)	μ V
0	10^{-15}	-120	-5	5.5×10^{-1}	1	1.1
10	10^{-14}	-110	5	1.75	11	3.5
20	10^{-13}	-100	15	5.5	21	1.1×10
30	10^{-12}	-90	25	1.75×10	31	3.5×10
40	10^{-11}	-80	35	5.5×10	41	1.1×10^2
50	10^{-10}	-70	45	1.75×10^2	51	3.5×10^2
60	10^{-9}	-60	55	5.5×10^2	61	1.1×10^3
70	10^{-8}	-50	65	1.75×10^3	71	3.5×10^3
80	10^{-7}	-40	75	5.5×10^3	81	1.1×10^4
90	10^{-6}	-30	85	1.75×10^4	91	3.5×10^4
100	10^{-5}	-20	95	5.5×10^4	101	1.1×10^5
110	10^{-4}	-10	105	1.75×10^5	111	3.5×10^5
120	10^{-3}	0	115	5.5×10^5	121	1.1×10^6
130	10^{-2}	10	125	1.75×10^6	131	3.5×10^6

Remarks: fW : femto watt 0 dB (fW) = 10^{-15} W

2.3 Measurement accuracy and environmental conditions The measurement accuracy may be affected by interference from external emission, therefore, most of the measurements in these methods should be carried out in a suitable screened room.

In the signal generator used for two-signal or three-signal measurement, the unwanted, frequency components of the output is required to be sufficiently small. Therefore, the unwanted frequency components which will result in the measurement errors should be eliminated by using an appropriate filter while the unwanted frequency components in the output are examined by means of a spectrum analyzer.

The test shall, as a rule, be carried out in the atmosphere at the ordinary temperature and ordinary humidity specified in JIS Z 8703.

If the manufacturer employs the environmental conditions other than that stated above, by necessity, the conditions employed shall be stated in the test results (see JIS C 6007).

2.4 Ratings The ratings shall be specified by the manufacturer.

The following ratings are related with these test methods:

- (1) Rated power supply voltage (s) and rated frequency (or frequency range)
- (2) Rated impedance of antenna input circuit
- (3) Rated value of load resistance (for each output terminal pair)

- (4) Rated output (voltage or power)

2.5 Presentation of measurement results

- (1) The correlation of two or more measured values can be expressed on a graph clear than in a table. When the measurement results are actually expressed, the examples of graphical presentation of each measurement result given in clause 5. and below shall be followed.

In the example of presentation, the relationship between parameters when the modulation mode is in phase ($R=L$) and the measured channel is left one.

- (2) The operation mode (stereo or mono) shall be additionally stated.

2.6 Types of power supply and relevant measuring conditions

2.6.1 Types of power supply

- (1) Commercial power supply A.C. power supply at a voltage of 100 V or 200 V and a frequency of 50 Hz or 60 Hz.
- (2) Batteries Primary batteries (dry cells, etc.), secondary batteries (lead-acid batteries, nickel-cadmium batteries, etc.)

Receivers intended for use on more than one type of power supply shall be measured with each type of power supply.

2.6.2 Commercial power operated receivers The rated supply voltage at the rated frequency shall be supplied to the receiver. For receivers with more than one rated voltage or frequency, each rated supply voltage at each rated frequency shall be applied. When the measurement is carried out while the supply voltage is changed, it shall be done over the range specified in Table 2.

2.6.3 Battery operated receivers A stabilized d.c. power supply with a voltage equal to the rated voltage of the receiver shall be used. When a battery is used, it shall be of the type specified for the receiver.

When the measurement is carried out while the supply voltage is changed, it shall be done over the range specified in Table 2.

2.6.4 Power consumption and current consumption of receivers For battery operated receivers, the current consumption at no signal shall be measured.

For a receiver having a power amplifier in the output circuit, the current consumption at the practical maximum output shall also be measured.

Remarks: The measurement conditions of receivers fed from commercial power shall be as stated in the Electric Appliance and Material Control Law (Ministerial Order determining technical bases of electric appliance).

Table 2. Variation range of supply voltage

Commercial power operated receiver	- 10 % to + 10 % of rated voltage
Battery operated receiver	0.9 V to 1.5 V (per unit cell) or 60 % of rated voltage to rated voltage
Car receiver	1.8 V to 2.6 V (per unit cell)

3. General provisions and explanation of terms

3.1 Radio-frequency signal

3.1.1 Carrier frequency The carrier frequency means the radio frequency which serves as the media when acoustic signals are transmitted. In FM emission, the transmission is made by changing the frequency of carrier wave (carrier frequency) corresponding to the acoustic signals (by modulating).

When more than one channel is transmitted on a carrier (a radio wave), like in stereo broadcast or multiple broadcast, it is necessary to maintain the individuality of each channel. In such a case, a carrier of different frequency is used for each channel and the said purpose is achieved by modulating these carriers. In this case, the carrier is especially called as "sub-carrier".

Informative reference: The carrier frequency which can be used for FM broadcast in Japan shall fall within 76.1 MHz to 89.9 MHz.

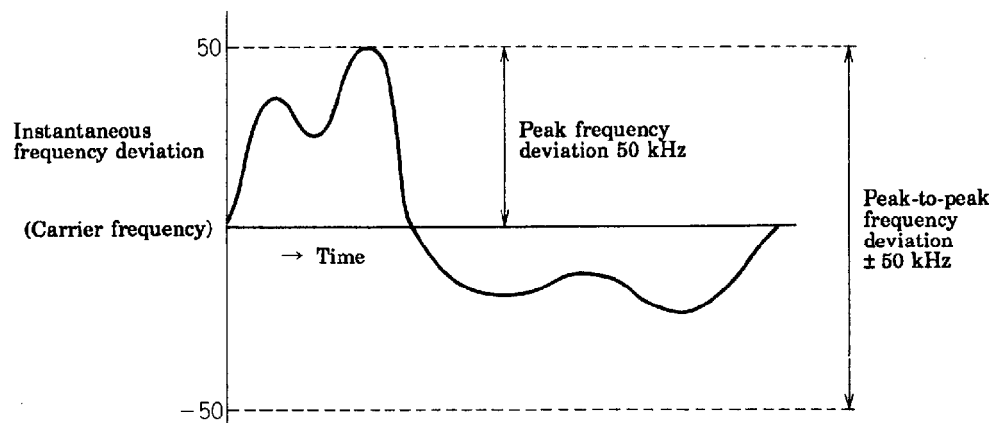
3.1.2 Peak-to-peak frequency deviation The peak-to-peak frequency deviation is defined as twice the peak frequency deviation, and hereafter it is called as "frequency deviation".

Peak frequency deviation is the peak value of the instantaneous frequency deviation.

In order to avoid confusion between "peak frequency deviation" and "frequency deviation", "frequency deviation" shall be expressed as, for example, ± 50 kHz.

As illustrated in Fig. 1, peak-to-peak frequency deviation is not the peak-to-peak value of instantaneous frequency deviation but twice the absolute value of the peak value of instantaneous frequency deviation on + side or that on - side whichever is the larger.

Fig. 1. Peak-to-peak frequency deviation



3.1.3 Specified maximum frequency deviation The specified maximum frequency deviation means the maximum value of frequency deviation specified for the system under consideration (see 3.1.2). In the case of mono, the specified maximum frequency deviation is ± 75 kHz, in the case of stereo, it is ± 7.5 kHz for pilot signals and ± 67.5 kHz for aural signals.

3.1.4 Standard frequency deviation In the case of stereo, the standard frequency deviation is ± 6.75 kHz for pilot signals and ± 67.5 kHz for aural signals. In the case of mono, it is ± 75 kHz. The deviation shall be clearly stated in the measurement results.

3.1.5 Standard modulation frequency The standard modulation frequency shall be 1 kHz.

3.1.6 Standard test frequency The standard test frequency means the frequency of the carrier used for signals in the test, and shall be as given in Table 3.

Table 3. Standard test frequencies

Unit: MHz

Test frequencies A	Test frequencies B	Test frequency C
Nine frequencies	Three frequencies	One frequency
76.1	76.1	
78.0		
80.0		
82.0		
83.0	83.0	83.0
84.0		
86.0		
88.0		
89.9	89.9	

3.1.7 Standard test signal The standard test signal means the test signals of standard test frequency, standard modulation frequency, standard frequency deviation and standard input signal level; where the standard input signal level is expressed in available power at the antenna terminals of the receiver and the value shall be 70 dB (fW).

Unless otherwise specified, stereo modulation shall be employed for both of mono receivers and stereo receivers, without distinction, and the modulation mode shall be in phase (R=L).

3.2 Dummy antenna

3.2.1 Single-signal dummy antenna The rated impedance of a signal source for measurement (signal generator or the like) is usually resistive and its value is clear, but the signal source impedance of a receiving antenna distributes over a wide range, it is not resistive, and depends upon the frequency. Therefore, it is necessary to insert a dummy antenna which carries out the correct matching with the signal source and gives the signal source impedance imitating the impedance of a specific antenna to the receiver between the signal source and the radio frequency input terminals of the receiver.

The dummy antenna shall at least satisfy the following requirements:

- (1) The antenna shall give an impedance close to that of actual antenna as far as possible over required frequencies.
- (2) The impedance shall be matched with the signal source impedance correctly enough.
- (3) The attenuation (power loss) shall not change significantly with frequency.

It shall be practically low enough except for an inevitable case.

3.2.2 Two-signal and three-signal dummy antenna It is necessary to apply two or more signals to the input terminals of receiver for some measuring items. In such a case, it is usually necessary to provide a coupling circuit in order to preserve measurement accuracy and avoid interaction between signal sources such as inter-modulation.

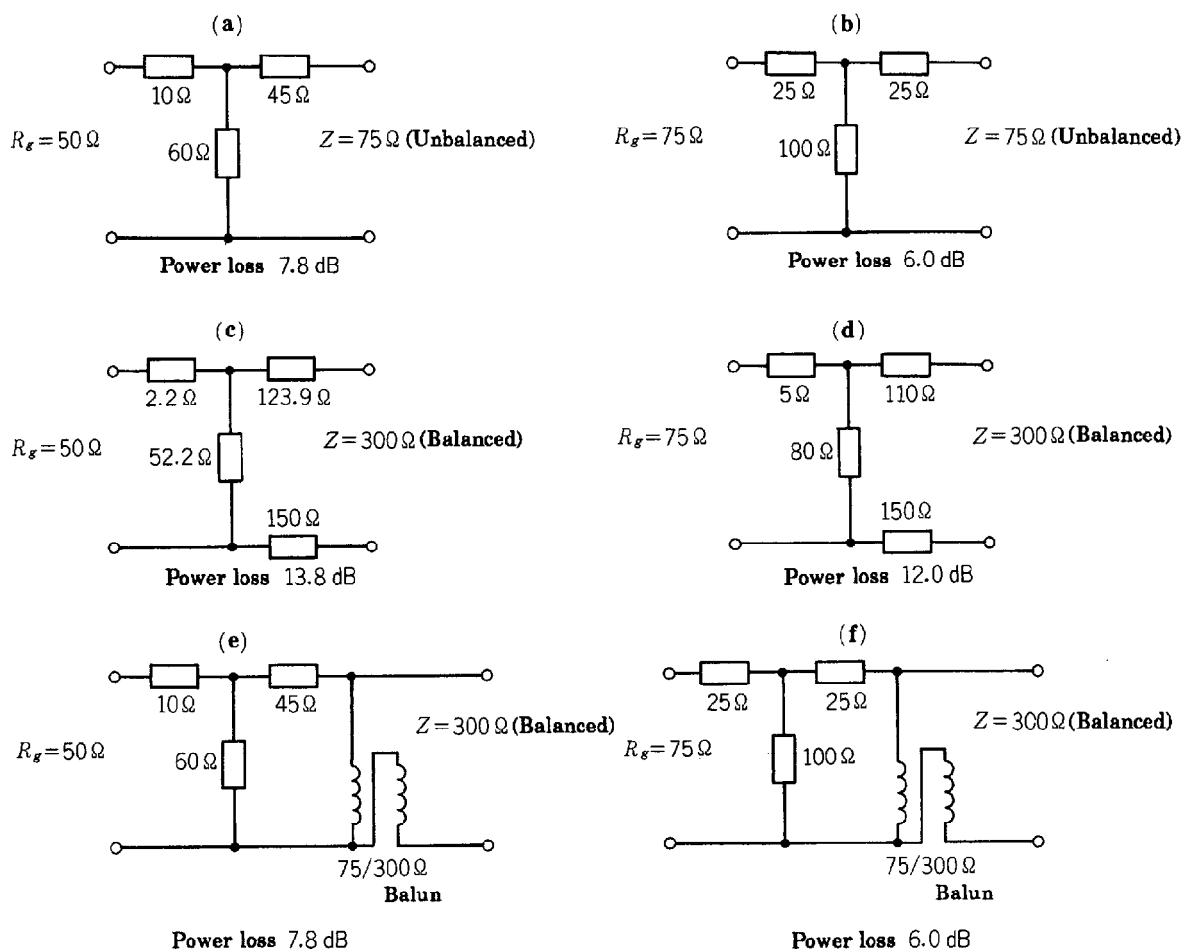
A two-signal and three-signal dummy antenna is composed by combining a single-signal dummy antenna with a coupling circuit. When the relative level of each signal is set, better accuracy can be obtained by the adjustment of output level of signal source, than by the adjustment of attenuation (power loss) in the coupling circuit.

3.2.3 Standard dummy antenna The circuit and the constant of each element are shown in Fig. 2 to Fig. 4.

Z : rated input impedance of receiver (Ω)

R_g : output impedance of signal generator (Ω)

Fig. 2. Single-signal dummy antenna



Remarks: The balun used here shall be the one of high accuracy.

Fig. 3. Two-signal dummy antenna

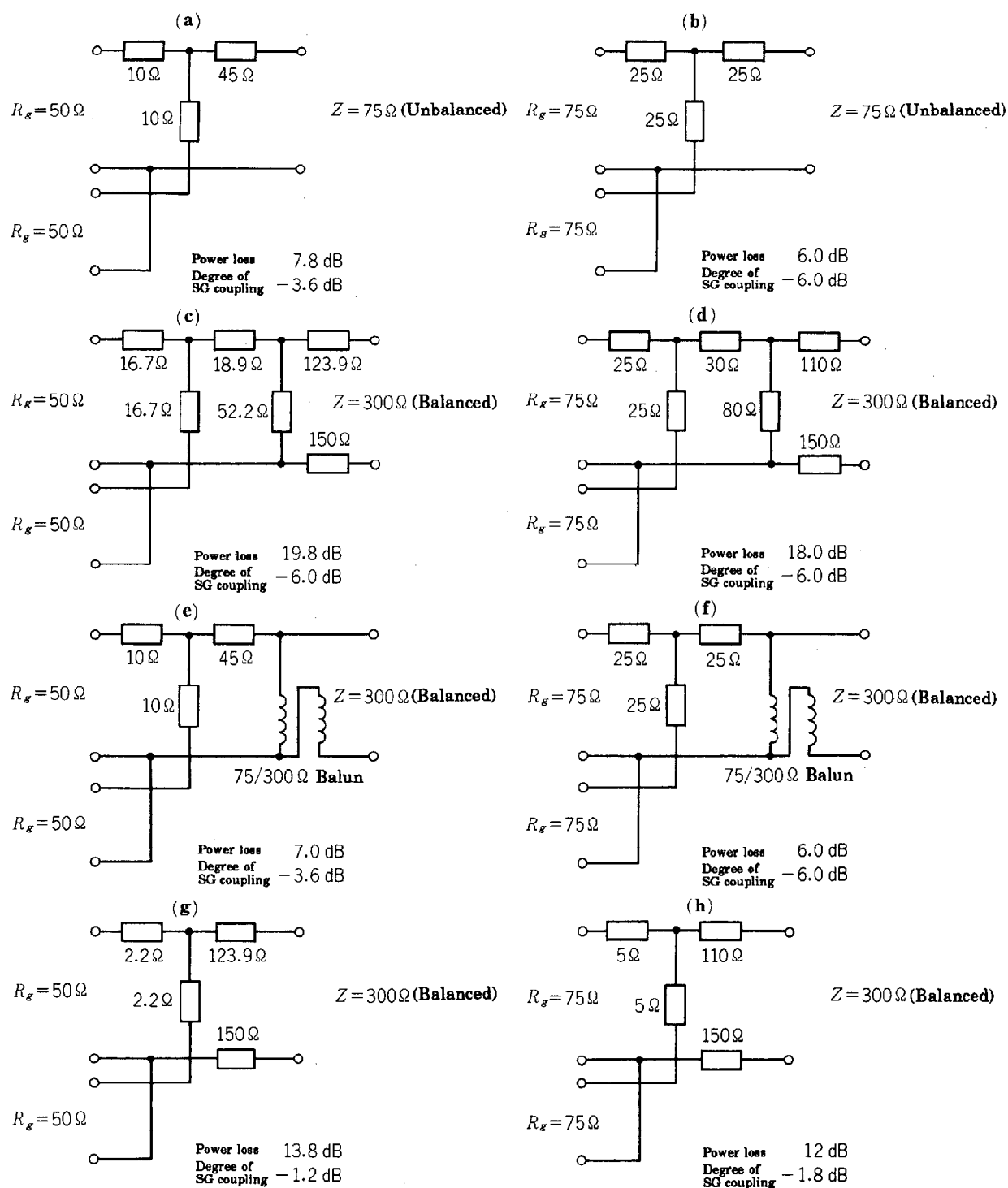
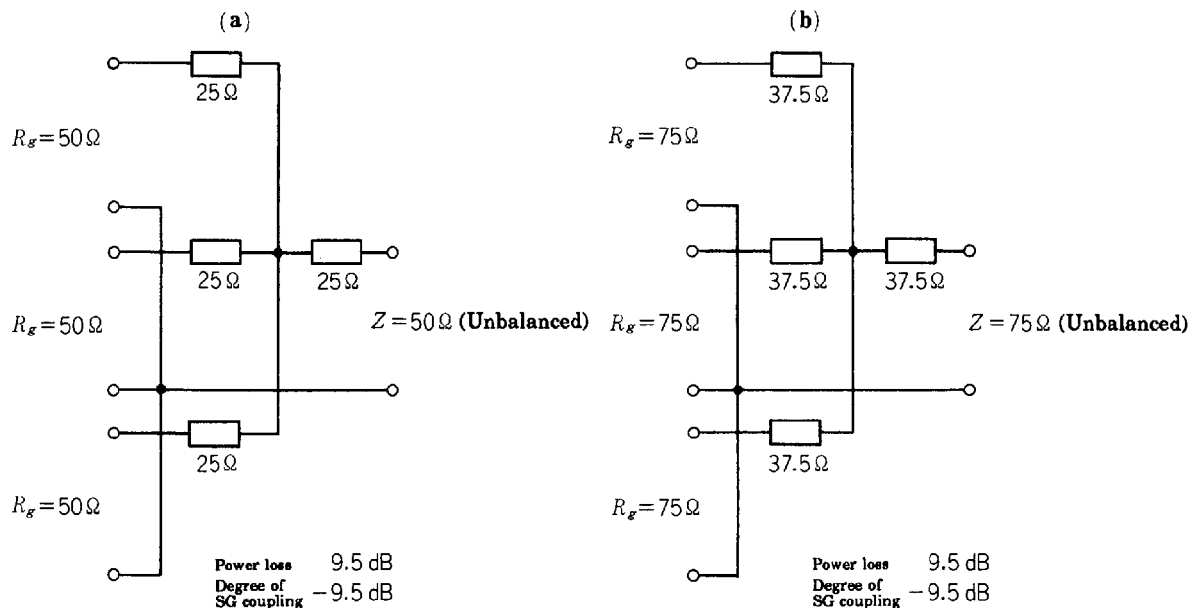


Fig. 4. Three-signal dummy antenna



3.3 Audio frequency signal

3.3.1 Standard test output The standard test output shall be lower than the rated output voltage or power by 10 dB. It may be selected from output voltage 500 mV or output powers 1 W, 500 mW, 50 mW, 5 mW and 1 mW. In this case, the value shall be stated in the measurement results.

3.3.2 Dummy load The dummy load means a physical impedance (usually resistive) and the value of which is equal to the rated load impedance at the output terminals in consideration. The load shall not change its electrical characteristics remarkably during the measurement and shall withstand the maximum output voltage and current at the appropriate output terminals.

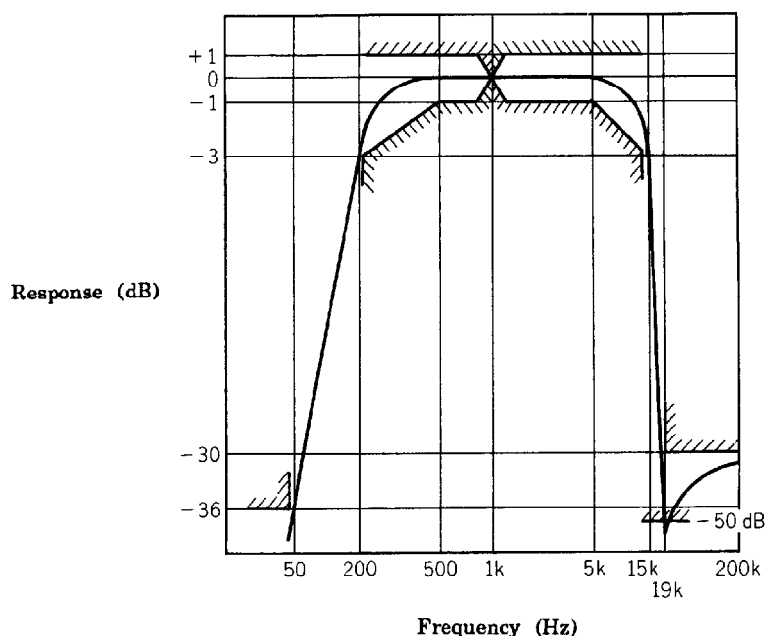
3.3.3 Filter When making measurements at audio-frequency output terminals, unless it is specially intended to measure low-frequency and ultrasonic components in the output voltage, it is desirable to interpose a band-pass filter with an adequate pass band between the output terminals and the measuring instrument. The dummy load shall be connected directly to the audio output terminals to eliminate the measurement errors due to the impedance of this filter. If the insertion loss of this filter is not negligible, it shall be allowed for in determining the results.

It is desirable to use the same filter for both of mono and stereo receivers. This filter prevents the measurement errors due to the pilot signal (19 kHz), sub-carrier (38 kHz) and hum component included in the receiver output. The pass band of this filter shall be from 200 Hz to 15 kHz, and the attenuation relative that at 1 kHz in this range shall not exceed 3 dB.

Not exceeding 200 Hz, the attenuation slope shall tend to at least 18 dB per octave. At 19 kHz, the attenuation shall be at least 50 dB, and 19 kHz or over, it shall be at least 30 dB (see Fig. 5).

Filters for octave and third-octave band measurements shall comply with the requirements of JIS C 1513.

Fig. 5. Frequency characteristic of band-pass filter from 200 Hz to 15 kHz



3.4 Tuning The tuning shall be made according to (1) or (2) given below, but one of the states described in (3) and below may be considered as the tuning state. In such a case, the one employed shall be stated in the measurement results.

- (1) For receivers having tuning indicator or automatic synchronizing function, the receiving state obtained according to the indication or the action shall be taken as the tuning state.
- (2) For receivers having no tuning indicator, the state where the distortion is the minimum shall be taken as the tuning state.
- (3) The state where the output is the maximum.
- (4) The state where the noise is the minimum.
- (5) The state where the amplitude modulation suppression is the maximum.

3.5 Standard measuring conditions The receiver shall be operated under the following conditions at the standard measurements:

- (1) The power supply voltage shall be the rated value.
- (2) The standard test signal shall be applied via the appropriate dummy antenna to the antenna terminals of the receiver.

Remarks: The frequency of wanted signal may be selected to avoid interference from the broadcasting.

- (3) A dummy load equal to the rated impedance shall be connected to the output terminals.
- (4) The receiver shall be tuned to the applied signal in accordance with 3.4.
- (5) The volume control, if any, shall be adjusted to the standard test output specified in 3.3.1.
- (6) For stereo receivers, the balance control or its equivalent, if any, shall be so adjusted that the outputs of two channels are equal.
- (7) The tone control shall be so adjusted that the frequency characteristic is flat.
- (8) AFC (automatic frequency control) and loudness shall be inoperative if they can be achieved by means of a user control.
- (9) The muting control, if any, shall be in the "muting off" position.

3.6 Preconditioning before measurements To avoid significant change in receiver characteristics with an elapse of time during the measurements, it is desirable to operate the specimen before the measurements under the standard measuring conditions for at least 10 min in the case of general receivers or 1 h for audio amplifier of large output.

4. Configuration of measuring circuit Unless especially stated, the basic configuration of receiver measuring circuit shall be as shown in Fig. 6. The measurements shall be carried out at the contact positions of switches S_0 , S_1 , S_2 , S_3 , S_4 and S_5 shown in this figure on the measurement items, unless especially noted.

The measuring signal and instruments used in these test methods shall be as follows:

- (1) **Colored noise** The colored noise in these tests means the artificial aural signal which can be obtained by passing the whitenoise through the filter having the frequency characteristic shown in Fig. 7.
- (2) **Output meter** Output meters which indicate the r.m.s. value are desirable. The r.m.s. value indication shall be employed for the measurements of an output consisting of plural frequency components such as noise, or noise and signal.

When a filter is used between the load and the output meter, the calibration shall be carried out by taking the attenuation of the filter at the measuring frequency into consideration.

- (3) **Quasi-peak voltmeter** The specification of quasi-peak voltmeter is given in Annex.
- (4) **Psophometer** The psophometer in these tests means an instrument combining the noise evaluation filter shown in Fig. 12 and a quasi-peak voltmeter.
- (5) **Filter** Use the filter by changing it to meet the purpose of measurement. The specifications of these filters are shown in Table 4.

Table 4. Specification of filter

Filter	Specification
15 kHz LPF	Attenuation slope at 15 kHz or more is 60 dB/oct.
1 kHz BEF	Attenuation at 1 kHz : SINAD ratio + 20 dB min. Attenuation at 2 kHz : 0.6 dB max. (Based on CCIR Rec. 331-4)
1 kHz BPF	
1 kHz notched filter	
200 to 15 k BPF	Characteristic is shown in Fig. 5.
22.4 to 15 k BPF	Characteristic is shown in Fig. 8.
200 to 1.5 k BPF	Characteristic is shown in Fig. 9.
Broad-band pass filter	Characteristic is shown in Fig. 10. (Based on CCIR Rec. 468-4)
Filter of frequency weighting A	Characteristic is shown in Fig. 11. (Based on JIS C 1505)
Noise evaluation filter	Characteristic is shown in Fig. 12. (Based on CCIR Rec. 468-4)

Fig. 6. Measuring circuit

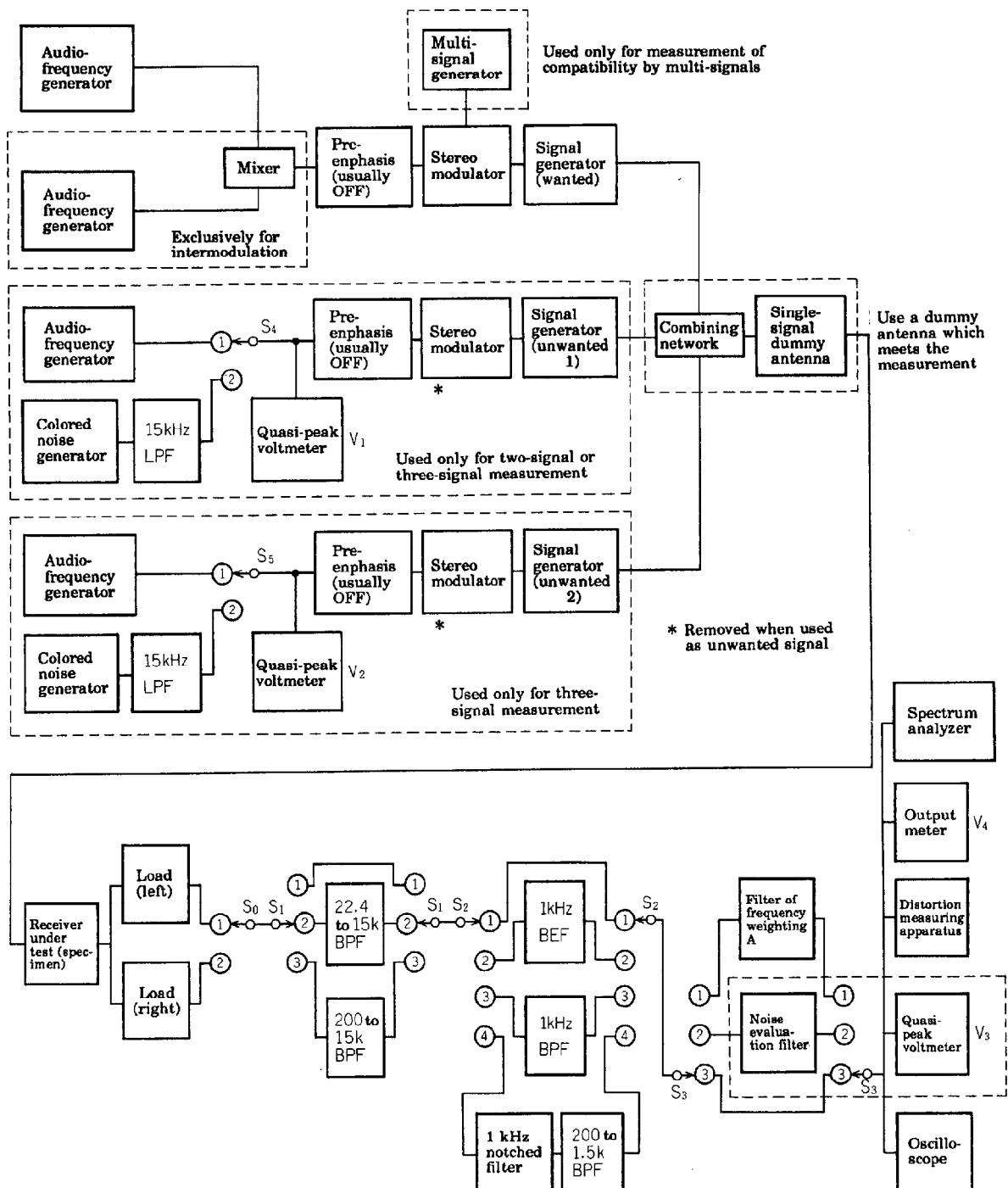
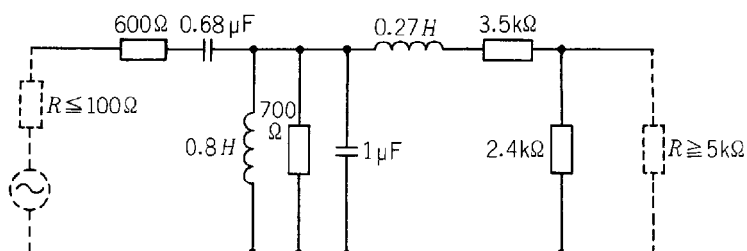
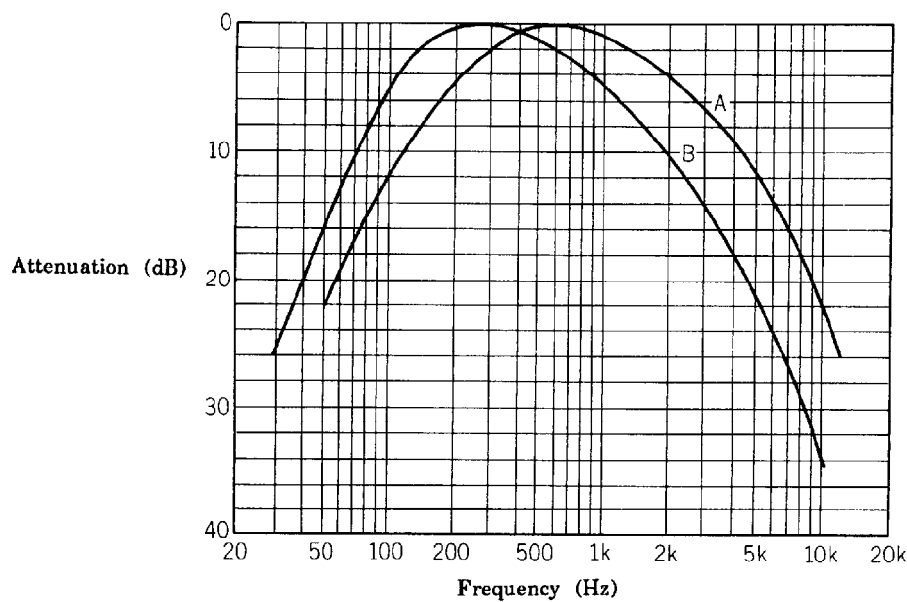


Fig. 7. Circuit arrangement and frequency characteristic of colored noise filter



(White noise of bandwidth 10 Hz to 15 kHz is attenuated by 32 dB.)



A : frequency spectrum of colored noise (by third octave filter)
B : frequency characteristic of filter circuit

Fig. 8. Frequency characteristic of band-pass filter 22.4 Hz to 15 kHz

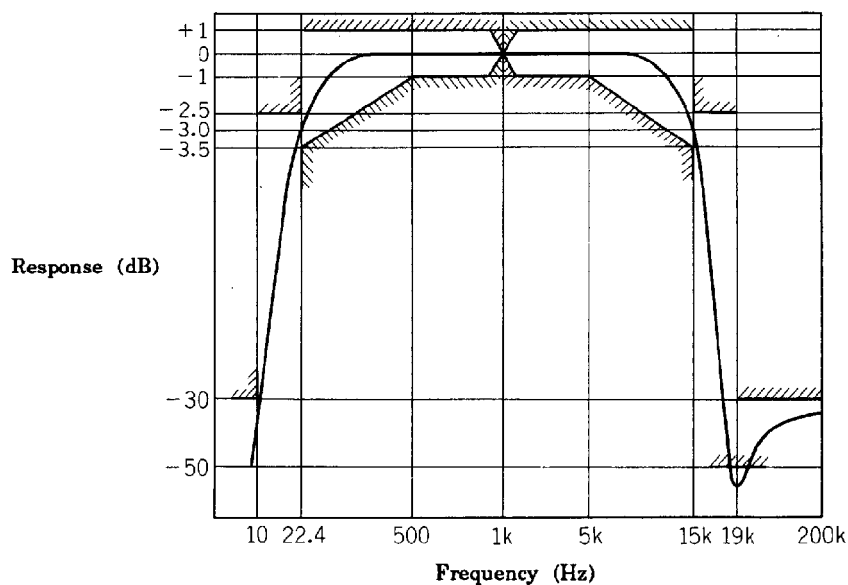


Fig. 9. Frequency characteristic of band-pass filter 200 Hz to 1.5 kHz

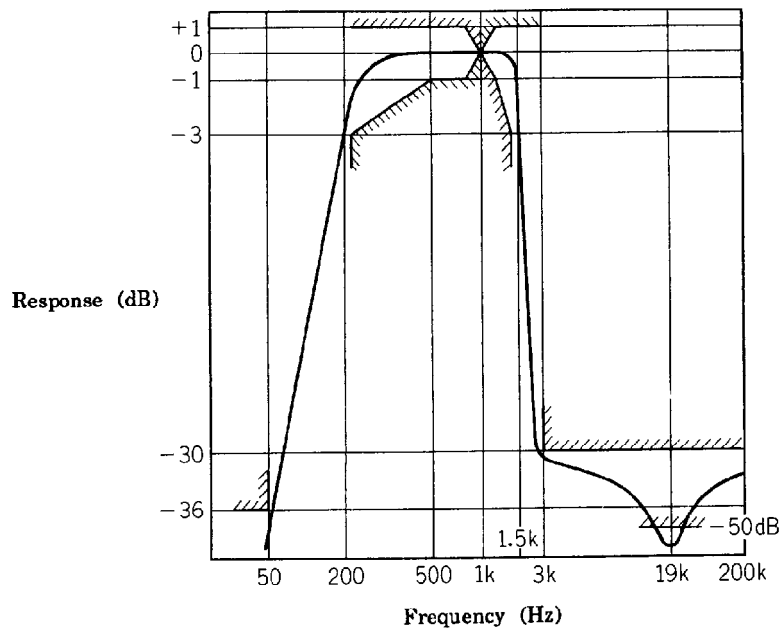


Fig. 10. Frequency characteristic of wide band-pass filter

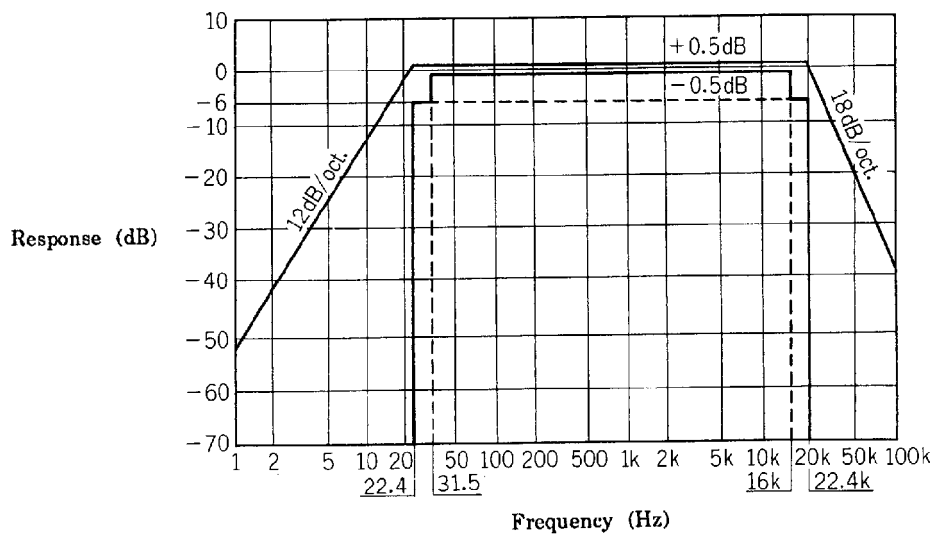
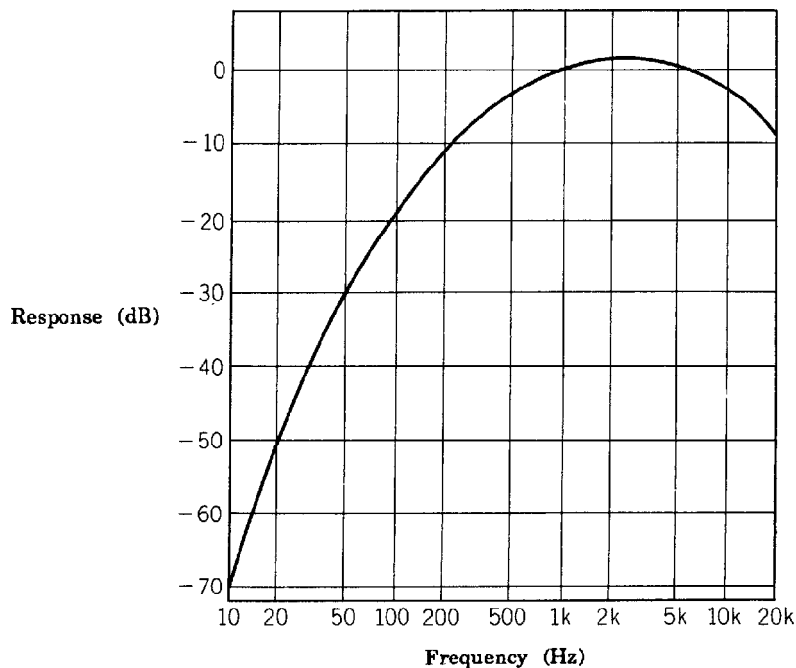
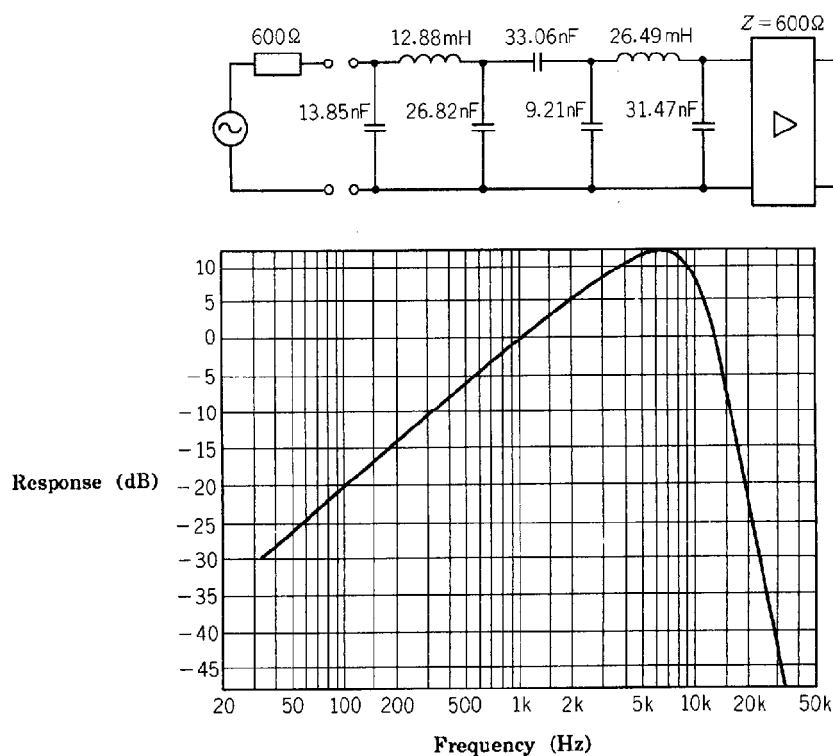


Fig. 11. Frequency characteristic of frequency weighting filter A (frequency weighting curve A)



Frequency Hz	Response dB	Tolerance dB	Frequency Hz	Response dB	Tolerance dB
10	-70.4	+ 3.0, - ∞	500	- 3.2	± 1.0
12.5	-63.4	+ 3.0, - ∞	630	- 1.9	± 1.0
16	-56.7	+ 3.0, - ∞	800	- 0.8	± 1.0
20	-50.5	± 3.0	1 k	0	± 1.0
25	-44.7	± 2.0	1.25 k	+ 0.6	± 1.0
31.5	-39.4	± 1.5	1.6 k	+ 1.0	± 1.0
40	-34.6	± 1.5	2 k	+ 1.2	± 1.0
50	-30.2	± 1.5	2.5 k	+ 1.3	± 1.0
63	-26.2	± 1.5	3.15 k	+ 1.2	± 1.0
80	-22.5	± 1.5	4 k	+ 1.0	± 1.0
100	-19.1	± 1.0	5 k	+ 0.5	± 1.5
125	-16.1	± 1.0	6.3 k	- 0.1	+ 1.5, - 2.0
160	-13.4	± 1.0	8 k	- 1.1	+ 1.5, - 3.0
200	-10.9	± 1.0	10 k	- 2.5	+ 2.0, - 4.0
250	-8.6	± 1.0	12.5 k	- 4.3	+ 3.0, - 6.0
315	-6.6	± 1.0	16 k	- 6.6	+ 3.0, - ∞
400	-4.8	± 1.0	20 k	- 9.3	+ 3.0, - ∞

Fig. 12. Circuit arrangement and frequency characteristic of noise evaluation filter



Frequency (Hz)	Response (dB)	Tolerance (dB)
31.5	-29.9	± 2.0
63	-23.9	$\pm 1.4^*$
100	-19.8	± 1.0
200	-13.8	$\pm 0.85^*$
400	-7.8	$\pm 0.7^*$
800	-1.9	$\pm 0.55^*$
1 k	0	± 0.5
2 k	+5.6	$\pm 0.5^*$
3.15 k	+9.0	$\pm 0.5^*$
4 k	+10.5	$\pm 0.5^*$
5 k	+11.7	± 0.5
6.3 k	+12.2	0
7.1 k	+12.0	$\pm 0.2^*$
8 k	+11.4	$\pm 0.4^*$
9 k	+10.1	$\pm 0.6^*$
10 k	+8.1	$\pm 0.8^*$
12.5 k	0	$\pm 1.2^*$
14 k	-5.3	$\pm 1.4^*$
16 k	-11.7	$\pm 1.6^*$
20 k	-22.2	± 2.0
31.5 k	-42.7	$\begin{cases} \pm 2.8^* \\ -\infty \end{cases}$

Note * The tolerances show the values by means of interpolation method based on the logarithmic graph determined by the values at specific frequencies. The specific frequencies are 31.5 Hz, 100 Hz, 1 kHz, 5 kHz, 6.3 kHz and 20 kHz.

5. Sensitivity5.1 SN ratio and SINAD ratio

5.1.1 SN ratio and frequency weighted SN ratio The SN ratio means the ratio of the signal output to the random noise output produced by the receiver. The frequency weighted (to meet human audibility) SN ratio means the ratio of the signal output to the random noise output produced by the receiver corrected by means of frequency weighting curve A.

The measurement shall be carried out in the circuit of Fig. 6 as follows:

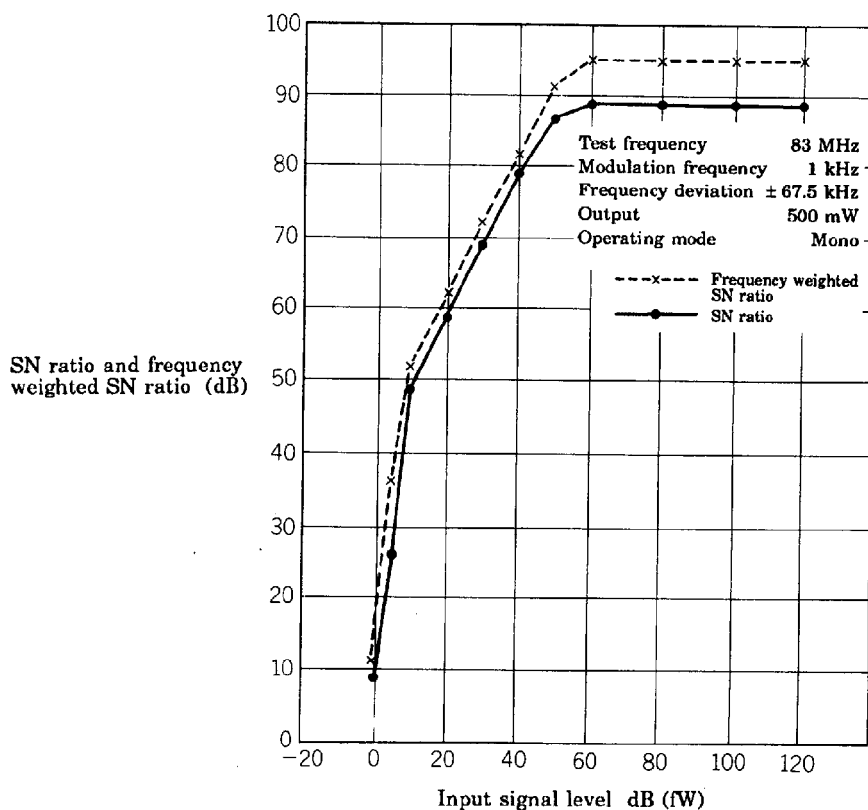
- (1) SN ratio Bring the receiver under the standard measuring conditions in accordance with 3.5. Adjust the volume control so that the indication of output meter is the standard test output.

Cut off the modulation of the signal generator (leave the pilot signal as it is), and read the noise output. The ratio of the standard test output and the noise output is the SN ratio, and it shall be expressed in dB.

Carry out the above operation by changing the input signal level. During such procedures, leave the volume control at the first setting.

As illustrated in Fig. 13, express the measurement results by plotting the input signal level in dB (fW) as abscissa on a linear scale and the SN ratio in dB as ordinate on a linear scale.

Fig. 13. SN ratio and frequency weighted SN ratio



- (2) **Frequency weighted SN ratio** Read the output level of the receiver in the same way as that in the above SN ratio test. Throw switch S_3 to ①, cut off the modulation of signal generator (leave the pilot signal as it is), and read the noise output. The ratio of output to noise output stated above is the frequency weighted SN ratio and it shall be expressed in dB. Carry out the above operation by changing the input signal level. During such procedures, leave the volume control at the first setting.

As illustrated in Fig. 13, express the measurement results by plotting the input signal level in dB (fW) as abscissa on a linear scale and the frequency weighted SN ratio in dB as ordinate on a linear scale.

5.1.2 SINAD ratio The SINAD ratio means the ratio of the signal output (signal + noise + distortion) to the output (noise + distortion) when the fundamental wave of modulation is removed by a filter instead of cutting the modulation of signal generator in the measurement of SN ratio.

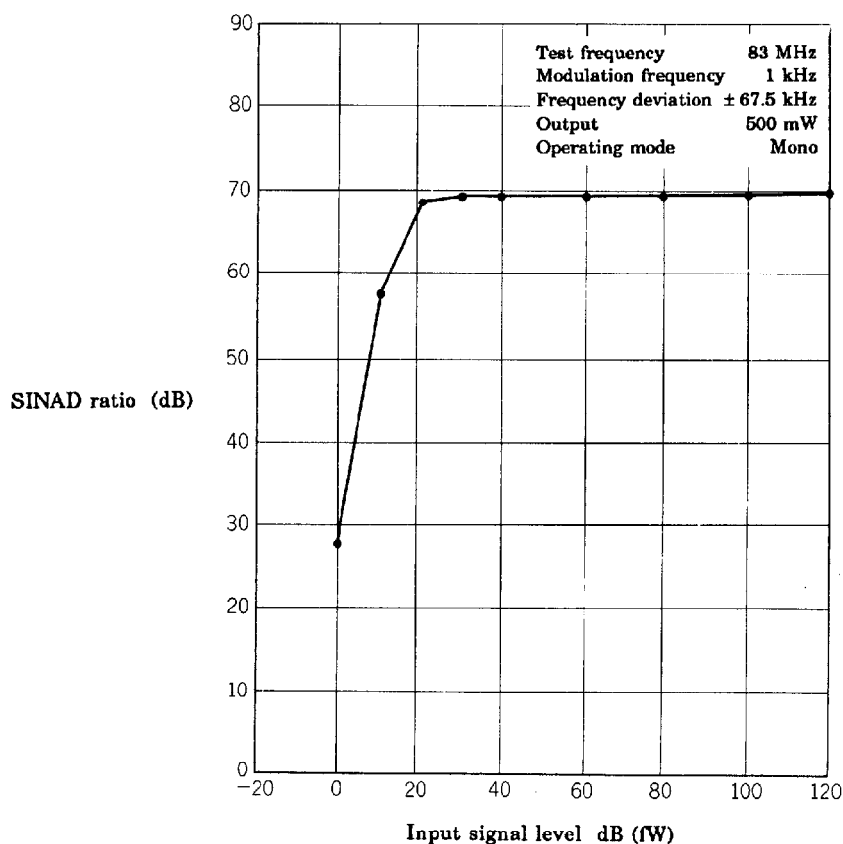
The measurement shall be carried out in the circuit of Fig. 6 as follows:

Read the output of the receiver in the same way as that in the test of 5.1.1. Throw switch S_2 to ② instead of cutting the modulation of signal generator, and read the value when the output of fundamental wave in the modulation frequency is removed. The ratio of the above stated output to this value is the SINAD ratio (signal + noise + distortion/noise + distortion) and it shall be expressed in dB. Carry out this operation by changing the input signal level. During such procedures, leave the volume control at the first setting.

As illustrated in Fig. 14, express the measurement results by plotting the input signal level in dB (fW) as abscissa on a linear scale and the SINAD ratio in dB as ordinate on a linear scale.

Remarks: SINAD is the abbreviation of the (signal plus noise plus distortion) to the (noise plus distortion).

Fig. 14. SINAD ratio



5.2 Noise-limited sensitivity

5.2.1 Noise-limited sensitivity (SN ratio method) The noise-limited sensitivity (SN ratio method) means the minimum input signal level at which the SN ratio can be achieved when it is specified 40 dB.

The measurement shall be carried out in the circuit of Fig. 6 as follows:

Bring the receiver under the standard measuring conditions in accordance with 3.5. Use the test frequencies A specified in 3.1.6, and obtain the minimum input signal level at which the specified SN ratio can be achieved at each frequency. During such procedures, leave the volume control at the first setting. When the operation mode is stereo, measure the noise-limited sensitivity (SN ratio method) in the same way with the modulation mode set in phase opposition ($R = -L$).

As illustrated in Fig. 15, express the measurement results by plotting the test frequency in MHz as abscissa on a linear scale and the sensitivity in dB (fW) as ordinate on a linear scale.

5.2.2 50 dB quieting sensitivity The 50 dB quieting sensitivity means the minimum input signal level at which SN ratio of 50 dB can be obtained in the measurement of 5.2.1. When the operation mode is stereo, measure the 50 dB quieting sensitivity in the same way with the modulation mode set in phase opposition ($R = -L$).

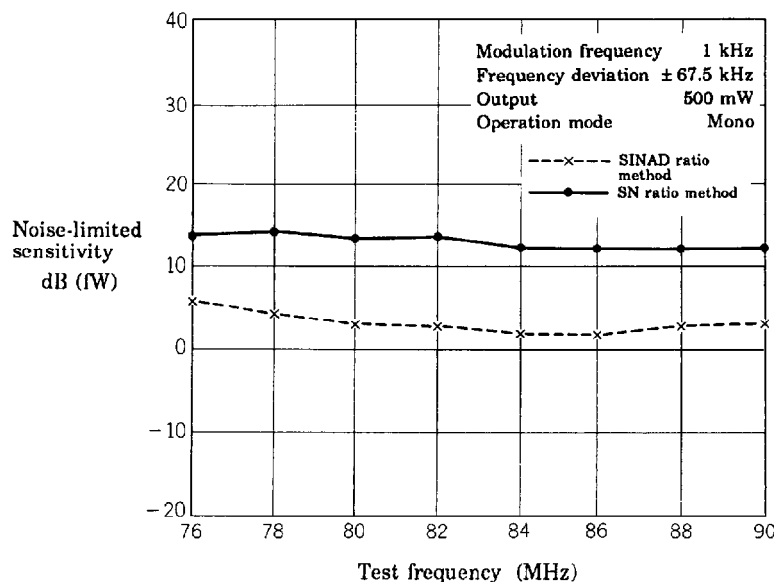
5.2.3 Noise-limited sensitivity (SINAD ratio method) The noise-limited sensitivity (SINAD ratio method) means the minimum input signal level at which the SINAD ratio can be obtained, when the SINAD ratio is specified to be 30 dB. When the operation mode is stereo, measure the noise-limited sensitivity (SINAD ratio method) in the same way with the modulation mode set in phase opposition ($R = -L$).

Carry out the measurement in the circuit of Fig. 6 as given below.

Use the test frequencies A specified in 3.1.6, and obtain the minimum input signal level at which SINAD ratio of 30 dB can be obtained at each frequency.

As illustrated in Fig. 15, express the measurement results by plotting the test frequency in MHz as abscissa on a linear scale and the sensitivity in dB (fW) as ordinate on a linear scale.

Fig. 15. Noise-limited sensitivity (SN ratio method, SINAD ratio method)



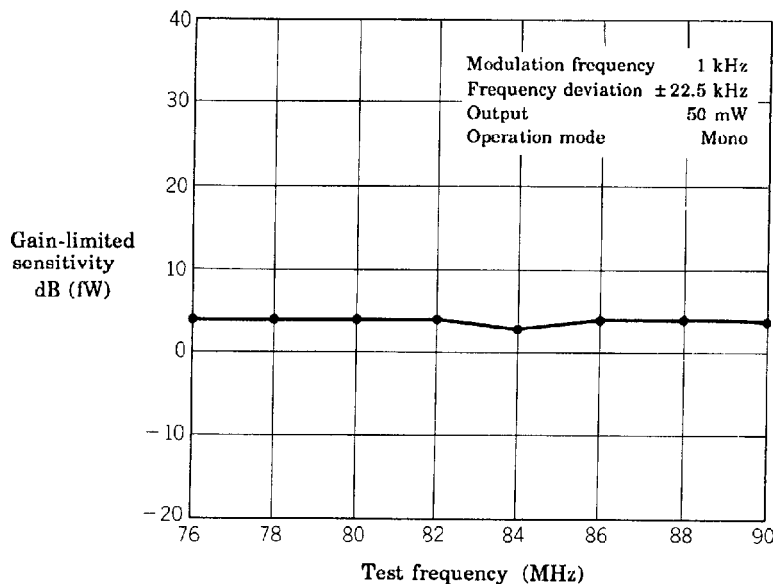
5.3 Gain-limited sensitivity The gain-limited sensitivity means the minimum input signal level at which the rated output can be obtained when the standard test signal is applied to the receiver and the volume control is set to the maximum.

Carry out the measurement in the circuit of Fig. 6 as given below.

Bring the receiver under the standard measuring conditions in accordance with 3.5. Keep S_2 to position ③ so that only the fundamental wave of the modulation frequency can be measured. Set the volume control to the maximum, use the test frequencies A given in 3.1.6, and obtain the minimum input signal level at which the rated output can be obtained at each frequency. For a receiver whose audio frequency amplifier saturates when the volume control is set to the maximum under the standard measuring conditions, employ 22.5 kHz as the frequency deviation, obtain the minimum input signal level at which an output lower than the rated output by 10 dB can be obtained, and record the frequency deviation on the measurement results additionally.

As illustrated in Fig. 16, express the measurement results by plotting the test frequency in MHz as abscissa on a linear scale and the sensitivity in dB (fW) as ordinate on a linear scale.

Fig. 16. Gain-limited sensitivity



5.4 Practical sensitivity The practical sensitivity means the input signal level (larger input) which satisfies the both of the noise-limited sensitivity (SN ratio method or SINAD ratio method) and the gain-limited sensitivity.

Record the sensitivity actually adopted as the measured value additionally.

5.5 Deviation sensitivity The deviation sensitivity means the amount of frequency deviation necessary to obtain the rated output when the standard test signal is applied to the receiver and the volume control is set to the maximum.

Carry out the measurement in the circuit of Fig. 6 as given below.

Bring the receiver under the standard measuring conditions in accordance with 3.5. Set the volume control of the receiver to the maximum, and measure the frequency deviation at which the rated output can be obtained by varying the frequency deviation.

5.6 Output/input characteristic The output/input characteristic means the relationship between the output and the input signal level of the receiver. Various characteristics (5.7 to 5.12) of the receiver can be obtained by indicating the relationship between the noise output and the input signal level on the same graph.

Carry out the measurement in the circuit of Fig. 6 as given below.

Keep S_1 to position ① and bring the receiver under the standard measuring conditions in accordance with 3.5. Lower the input signal level to a low level of about 0 dB (fW) and measure the output of receiver. Increase the input signal level to 130 dB (fW) stepwise and measure the output at each input signal level.