BRITISH STANDARD

BS 6840-1: 1987
IEC 268-1: 1985
(including Amendment Nos. 1 (March 1988) and 2 (June 1988) to IEC 268-1:1986)

Sound system equipment —

Part 1: Methods for specifying and measuring general characteristics used for equipment performance —

[IEC title: Sound system equipment. Part 1: General] —

(Implementation of CENELEC HD 483.1 S2)

UDC 681.84.004.15

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Equipment Standards Committee to Technical Committee EEL/32, upon which the following bodies were represented:

Association of British Theatre Technicians
Association of Sound and Communications Engineers Ltd.
Audio Engineering Society
British Educational Equipment Association
British Kinematograph, Sound and Television Society
British Radio and Electronic Equipment Manufacturers' Association
British Telecommunications plc.
Cable Television Association of Great Britain
Consumer Standards Advisory Committee of BSI
Consumers' Association
Council for Educational Technology for the United Kingdom
Electronic Components Industry Federation
Federation of British Audio
Independent Television Companies' Association
Industrial Council for Educational and Training Tech Ltd.
Institution of Electronic and Radio Engineers
Radio Electrical and Television Retailers' Association
Royal Institute of British Architects
Royal National Institute for the Deaf
Society of Cable Television Engineers
Telecommunication Engineering and Manufacturing Association (TEMA)
Training and Educational Systems Testing Bureau

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6921	May 1992	Indicated by a sideline in the margin

Contents

National foreword

This Part of BS 6840 has been prepared under the direction of the Electronic Equipment Standards Policy Committee and is identical with IEC 268-1:1985 "*Sound system equipment" — Part 1: "General"* published by the International Electrotechnical Commission (IEC), as amended by Amendment No. 1 dated March 1988 and Amendment No. 2 dated June 1988. This British Standard is also in agreement with Harmonization Document HD 483.1 S2 published by the European Committee for Electrotechnical Standardization (CENELEC). This Part of BS 6840, together with Part 2, supersedes BS 5428-1:1977 which is withdrawn.

BS 6840 consists of the following Parts:

— *Part 1: Methods for specifying and measuring general characteristics used for equipment performance (supersedes part of BS 5428-1);*

— *Part 2: Glossary of general terms and calculation methods (supersedes part of BS 5428-1);*

— *Part 3: Methods for specifying and measuring the characteristics of sound system amplifiers (supersedes BS 5428-2);*

— *Part 4: Methods for specifying and measuring the characteristics of microphones (previously BS 5428-3);*

— *Part 5: Methods for specifying and measuring the characteristics of loudspeakers (supersedes BS 5428-11 and BS 5428-11: Supplement 1);*

— *Part 6: Methods for specifying and measuring the characteristics of auxiliary passive elements (previously BS 5428-4);*

— *Part 7: Methods for specifying and measuring the characteristics of headphones and headsets (new)*[1]*;*

— *Part 8: Methods for specifying and measuring the characteristics of automatic gain control devices (previously BS 5428-7);*

— *Part 9: Methods for specifying and measuring the characteristics of artificial reverberation, time delay and frequency shift equipment (previously BS 5428-8);*

— *Part 10: Methods for specifying and measuring the characteristics of peak programme level meters (supersedes BS 5428-9);*

— *Part 11: Specification for application of connectors for the interconnection of sound system components (supersedes BS 5428-5.2);*

— *Part 12: Specification for applications of connectors for broadcast and similar use (supersedes BS 5428-5.3);*

— *Part 13: Guide for listening test on loudspeakers (new);*

— *Part 14: Guide for circular and elliptical loudspeakers; outer frame diameters and mounting dimensions (previously BS 5428-5.1);*

— *Part 15: Specification for matching values for the interconnection of sound system components (supersedes BS 5428-10);*

— *Part 16: Guide to the "RASTI" method for the objective rating of speech intelligibility in auditoria (new);*

— *Part 17: Methods for specifying and measuring the characteristics of standard volume indicators.*

References to page numbers in the text relate to the IEC page numbers given in brackets at the bottom of each page.

[1] In preparation.

Cross-references

International standard	Corresponding British Standard
IEC 68	BS 2011 Basic environmental testing procedures (Majority of individual Parts are identical)
IEC 225:1966	BS 2475:1964 Specification for octave and one third octave band-pass filters (Technically equivalent)
IEC 263:1982	BS 6397:1983 Specification for scales and sizes for plotting frequency characteristics and polar diagrams (Identical)
IEC 417:1973	BS 6217:1981 Guide to graphical symbols for use on electrical equipment (Identical)
IEC 617	BS 3939 Guide to graphical symbols for electrical power, telecommunications and electronics diagrams (Individual Parts are identical)
IEC 651:1979	BS 5969:1981 Specification for sound level meters (Identical)
ISO 266-1975	BS 3593:1963 Recommendation on preferred frequencies for acoustical measurements (Technically equivalent)

The Technical Committee has reviewed the provisions of IEC 27, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this British Standard. There is no British Standard corresponding to IEC 27. IEC 65:1985, to which reference is made in the text, has been harmonized by CENELEC under HD 195 and is implemented by BS 415:1990 which is a related standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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1 Scope

This standard applies to sound systems of any kind, and to the parts of which they are composed or which are used as auxiliaries to such systems.

This standard deals with the determination of the performance of sound system equipment, the comparison of these types of equipment and the determination of their proper practical application, by listing the characteristics which are useful for their specification and laying down uniform methods of measurements for these characteristics.

The standard is confined to a description of the different characteristics and the relevant methods of measurement; it does not in general specify performance (except in Part 10).

The complete standard consists of the following parts, in which the characteristics of various parts of sound systems and their methods of measurement are specified; some parts include preferred values:

— *Part 1: General;*
(Uniform characteristics and methods of measurement);

— *Part 2: Explanation of General Terms;*
(Explanation of general terms and calculation methods);

— *Part 3: Sound System Amplifiers;*
(Amplifiers forming part of a sound system for professional and domestic applications);

— *Part 4: Microphones;*
(Microphones in professional and domestic applications);

— *Part 5: Loudspeakers;*
(Loudspeakers in professional and domestic applications, treated as entirely passive elements);

— *Part 6: Auxiliary Passive Elements;*
(Attenuators, transformers, filters and equalizers, applied as separate units to be combined with other separate sound system units);

— *Part 7: Headphones and Headsets;*
(Headphones and headsets intended to be used on the human ear);

— *Part 8: Automatic Gain Control Devices;*
(Limiters and compressors);

— *Part 9: Artificial Reverberation, Time Delay and Frequency Shift Equipment;*
(Devices commonly employed to achieve special effects in sound systems);

— *Part 10: Programme Level Meters;*
(Peak programme meters and vu-indicators);

— *Part 11: Connectors for the Interconnection of Sound System Components;*
(Application of connectors for the interconnection between parts of a sound system);

— *Part 12: Circular Connectors for Broadcast and Similar Use;*
(Application of connectors for the interconnection between parts of a broadcast or similar professional system);

— *Part 13: Listening Test on Loudspeakers;*
(Listening tests and objective methods for rating the quality of the transmission systems);

— *Part 14: Circular and Elliptical Loudspeakers; Outer Frame Diameters and Mounting Dimensions;*
(Dimensional characteristics of single moving-coil (dynamic) loudspeakers);

— *Part 15: Preferred Matching Values for the Interconnection of Sound System Components;*
(Preferred electrical values for the correct interconnection of sound system components).

2 Units and system of measurement

The International System of Units (SI units) as given in IEC Publication 27: Letter Symbols to be Used in Electrical Technology, is used exclusively in this standard.

3 Frequencies of measurement

If measurements are to be made at discrete frequencies, then these shall be the frequencies specified as preferred frequencies for acoustical measurements in ISO Standard 266, reproduced in Table I. If a measurement relates to a reference frequency, then, in the absence of a clear reason to the contrary, this shall be the standard reference frequency of 1 000 Hz.

If a measurement is to be made using only one signal frequency, the signal frequency shall be the chosen reference frequency. If measurements are to be made at a number of different frequencies, the chosen reference frequency shall be included, the other frequencies being so chosen that the results of the measurements give an adequate representation of the behaviour of the characteristics over the whole of the effective frequency range.

If measurements are to be made in frequency bands of constant relative bandwidth, preference shall be given to the one-octave and one-third octave bands mentioned in Sub-clause **6.2.3**.

4 Quantities to be specified and their accuracy

Unless otherwise stated, the values of voltage, current, sound pressure, etc., mentioned in this standard are assumed to be r.m.s. quantities. For most purposes it is sufficient to measure electrical quantities with an accuracy of ± 0.15 dB and acoustical quantities with an accuracy of ± 1 dB. The accuracy of measurement required depends only on the purpose for which the results are to be used.

5 Marking and symbols for marking

5.1 Marking

Terminals and controls shall be adequately marked to give information regarding their function, characteristics and polarity.

The marking shall be such that it must be possible to adjust the controls and to identify their positions with sufficient accuracy in connection with the information given in the user instructions.

5.2 Symbols for marking

Marking should preferably be composed of letter symbols, signs, numbers and colours, which are internationally intelligible. Reference is made to IEC Publication 27, IEC Publication 617: Graphical Symbols for Diagrams, and IEC Publication 417: Graphical Symbols for Use on Equipment. Index, Survey and Compilation of the Single Sheets.

Markings not included in the above-mentioned standards shall be clearly explained in the user instructions.

6 Filters, weighting curves and meters for noise specification and measurement

A specification of noise or signal-to-noise ratio shall refer to noise measured by one of the following methods:

6.1 Wide-band measurement

The filter shall be a band-pass filter having a frequency response within the limits shown in Figure 5, page 9. (This is identical to the wide-band filter specification in CCIR Recommendation 468-3.)

A band-pass filter which has a substantially constant transmission factor between 22.4 Hz and 22.4 kHz, decreasing outside this frequency band at the rates specified for octave-band filters having mid-band frequencies of 31.5 Hz and 16 000 Hz specified in IEC Publication 225: Octave, Half-octave and Third-octave Band Filters intended for the Analysis of Sound and Vibrations, has a response falling within the limits of this specification.

NOTE Care should be taken when there may be strong signals just above or below the band-limits since in this case the results will depend, to some degree, on the individual frequency response of the filter actually used.

6.2 Weighted measurements

6.2.1 *Noise (A-weighting) or signal-to-noise (A-weighting) ratio*

The filter used shall have A-weighting characteristics with tolerances type 1 as specified for sound level measurements in IEC Publication 651: Sound Level Meters. The meter shall be a true r.m.s. meter as described in Publication 651 for sound level meters type 1; the dynamic characteristic designated “S” shall be used.

NOTE A-weighted measurements are particularly appropriate where the noise output from the equipment in the absence of a programme is concerned.

6.2.2 *Noise (psophometric) or signal-to-noise (psophometric) ratio*

The filter and meter used shall have the characteristics described in Appendix A, which are identical to those specified in CCIR Recommendation 468-3.

NOTE 1 The word “psophometric” may be abbreviated to “ps” (see CCITT Recommendation J.16) if no confusion may arise.

NOTE 2 Psophometric measurements are particularly appropriate where the disturbing effect of the noise output from the system in the presence of a programme is concerned.

6.2.3 *Octave/third-octave band measurements*

The filters shall have characteristics as specified for octave or third-octave band filters in IEC Publication 225. The meter shall be a true r.m.s. meter as described in IEC Publication 651 for sound level meters, type 1. When measuring in narrow bands, particularly at low frequencies, it is recommended that the instruments should confirm dynamically to the characteristics designated “S” for the sound level meter.

7 Simulated programme signal

A signal, whose mean power spectral density closely resembles the average of the mean power spectral densities of a wide range of programme material, including both speech and music of several kinds, is stationary weighted Gaussian noise without amplitude limiting, the weighted power spectrum being in accordance with Table II and Figure 1, page 7, when measured with third-octave filters in accordance with IEC Publication 225.

Such a signal may be obtained from a pink-noise source by means of the filter circuit shown in Figure 2, page 7.

Measurements made with narrow-band signals shall, if appropriate, be made with the relative level in each frequency band corresponding to that indicated in Table II and Figure 1. (Measurements and characteristics related to the use of this signal, especially for amplifiers and loudspeakers, are under consideration.)

NOTE It should be noted that the power level of the signal measured over the full frequency range is approximately 12.5 dB higher than the indicated zero relative level, which is measured over ⅓ octave.

8 Climatic conditions

Measurements and mechanical checks may be carried out at any combination of temperature, humidity and air pressure within the following limits:

— Ambient temperature: 15 °C to 35 °C, preferably at 20 °C

— Relative humidity: 25 % to 75 %

— Air pressure: 86 kPa to 106 kPa (860 mbar to 1 060 mbar)

If the manufacturer finds it necessary to specify climatic conditions differing from the above these should be chosen from IEC Publication 68: Basic Environmental Testing Procedures, and the measurements shall be made under these specified conditions.

The conditions mentioned above represent those under which the equipment is required to meet its specification. Over a wider range the equipment may operate but not meet all of its specifications and it may be permissible to store the equipment under much more extreme conditions.

For a more complete discussion of these concepts, reference is made to IEC Publication 68.

9 Individual specification and type specification

Values may be specified either for a general type or for an individual sample of this type.

In the first case, the manufacturer shall state whether the specified values are:

— limits,

— statistical “worst case” values (see note),

— average values (see note).

NOTE These values are derived from measurements on a batch and accompanied by the data required to render them significant, see the relevant ISO standards on sampling procedures.

10 Graphical presentation of data

10.1 General

The relation between two or more quantities is often more clearly presented as a graph rather than as a table.

When the results of a point-to-point measurement for an individual sample are presented as a continuous curve, the measured points shall be clearly indicated. Extrapolated or intermediate curves based on theoretical expectations or other information presented, but not based on direct measurement, shall be clearly distinguished from measurement curves, for example by another style of drawing.

Where appropriate, data may be presented as a line or band spectrum of constant bandwidth or constant proportional bandwidth. The bandwidth used shall be stated. Preference shall be given to one octave and one-third octave bands as mentioned in Sub-clause **6.2.3**.

10.2 Scales

Linear or logarithmic scales are recommended for graphical presentation. Other kinds of scales, such as double logarithmic and combinations of linear and logarithmic, should be avoided. Linear decibel scales are equivalent to logarithmic scales.

Where quantities represented by abscissa and ordinate are of the same kind, the same unit length should be used for both. A remote zero point in linear scales should be avoided as far as possible. The zero reference in a decibel scale should, if possible, be the rated value.

10.3 Logarithmic scales and polar diagrams

For logarithmic frequency scales and polar level diagrams reference is made to IEC Publication 263: Scales and Sizes for Plotting Frequency Characteristics and Polar Diagrams.

10.3.1 *Logarithmic frequency scales*

For graphs in which a level (in decibels) is plotted against frequency on a logarithmic scale, the scale proportions shall be those for which the length for a 10 : 1 frequency ratio is equal to the length for a level difference of 50 dB on the ordinate scale.

NOTE The alternative values of level difference (10 dB and 25 dB per decade) given in IEC Publication 263 are not prohibited.

10.3.2 *Polar level diagrams*

For polar plots in which a level in decibels is shown increasing outward along a radius on a linear scale, the maximum level shall preferably be plotted on, or within 2.5 dB of, the reference circle whose radius corresponds to a difference in level of 25 dB. The tolerance limits on the radius of the reference circle correspond to ± 0.25 dB. These requirements apply for whatever length is chosen to represent 1 dB.

For an absolute level, when the radius of the reference circle corresponds to 25 dB, the level assigned to the reference circle shall be a multiple of 5 dB.

NOTE If it is necessary to plot a characteristic over a range greater than 25 dB, then a difference in level of 50 dB should be used.

11 Personal safety and prevention of spread of fire

Reference is made to IEC Publication 65: Safety Requirements for Mains Operated Electronic and Related Apparatus for Household and Similar General Use, or to other appropriate IEC safety standards.

12 Measurements in a uniform alternating magnetic field

12.1 Method of producing a uniform alternating magnetic field

A convenient and fairly accurate method of producing a uniform alternating magnetic field makes use of the arrangement of three square coils according to Figure 3, page 8, in which $a = 0.375\ b$, where a is the distance between the coils and b the dimension of the side of each coil. The coils are supplied with a current at the required frequency.

The three coils 1, 2 and 3 have turns in the ratios of:

$$\frac{n_1}{100} = \frac{n_2}{100} = \frac{n_3}{100}$$

When the same current I flows through each coil in the same direction, a field is produced that may be considered to be uniform to within ± 2 %, inside a spherical space having a diameter of $d = 0.5\ b$, the centre of which coincides with the geometrical centre of coil 2.

The resulting magnetic field strength H and magnetic induction B are approximately:

$$H = 1.35\ \frac{n_1 I}{b}\ \text{A/m} \qquad B = 1.70\ \frac{n_1 I}{b}\ \mu\text{T}$$

The magnetic field strength shall be measured before the device is placed into the field. This can be done with a search coil, in accordance with Sub-clause **12.2**.

12.2 Measuring the magnetic field strength

For measuring the magnetic field strength, the use of a search coil, according to Figure 4, page 8, is recommended, which will produce an e.m.f. of 1 mV in a magnetic field with a strength of 1 A/m at a frequency of 50 Hz, the voltage being proportional to both the magnetic field strength and the frequency.

The search coil output voltage should also be measured with the magnetic field switched off. If the output voltage under these conditions exceeds one third of the output voltage with the field present, a selective measurement is required. If possible, the search coil output voltage should be measured using a voltmeter with balanced input.

12.3 Positioning the sample

The sample under test shall be placed in the magnetic field and the position of the sample relative to the pattern of the field shall be varied until the interference is at maximum.

The sample under test shall not project from the spherical space of diameter d.

Table I — Frequencies conforming to ISO Standard 266

The table may be extended in either direction by successive multiplication or division by 1 000. The sign × indicates in each column the geometric mean frequencies of the filters mentioned in Clause **6**.

Preferred frequencies	$^1/_1$ octave	$^1/_2$ octave	$^1/_3$ octave	Preferred frequencies	$^1/_1$ octave	$^1/_2$ octave	$^1/_3$ octave	Preferred frequencies	$^1/_1$ octave	$^1/_2$ octave	$^1/_3$ octave
16	×	×	×	160			×	1 600			×
18				180		×		1 800			
20			×	200			×	2 000	×	×	×
22.4		×		224				2 240			
25			×	250	×	×	×	2 500			×
28				280				2 800		×	
31.5	×	×	×	315			×	3 150			×
35.5				355		×		3 550			
40			×	400			×	4 000	×	×	×
45		×		450				4 500			
50			×	500	×	×	×	5 000			×
56				560				5 600		×	
63	×	×	×	630			×	6 300			×
71				710		×		7 100			
80			×	800			×	8 000	×	×	×
90		×		900				9 000			
100			×	1 000	×	×	×	10 000			×
112				1 120				11 200		×	
125	×	×	×	1 250			×	12 500			×
140				1 400		×		14 000			
160			×	1 600			×	16 000	×	×	×

NOTE The exact preferred frequencies calculated from $1\ 000 \times 10^{3n/10}$ for octave band filters, $1\ 000 \times 10^{3n/20}$ for half-octave band filters and $1\ 000 \times 10^{n/10}$ for third-octave band filters where n is a positive or negative integer, or zero, are to be used for the design of filters rather than the nominal values given in the table.
For normal acoustical measurements, the difference between the nominal and the exact frequencies is negligible.

Table II — Power spectrum of simulated programme signal

Frequency (Hz)	Relative level (dB)	Tolerance limits (dB) +	Tolerance limits (dB) –	Frequency (Hz)	Relative level (dB)	Tolerance limits (dB) +	Tolerance limits (dB) –
20	– 13.5	3.0	3.0	630	0	0.5	0.5
25	– 10.2	2.0	2.0	800	0	0.5	0.5
31.5	– 7.4	1.0	1.0	1 000	– 0.1	0.6	0.6
40	– 5.2	1.0	1.0	1 250	– 0.3	0.7	0.7
50	– 3.5	1.0	1.0	1 600	– 0.6	0.8	0.8
63	– 2.3	1.0	1.0	2 000	– 1.0	1.0	1.0
80	– 1.4	1.0	1.0	2 500	– 1.6	1.0	1.0
100	– 0.9	0.8	0.8	3 150	– 2.5	1.0	1.0
125	– 0.5	0.6	0.6	4 000	– 3.7	1.0	1.0
160	– 0.2	0.5	0.5	5 000	– 5.1	1.0	1.0
200	– 0.1	0.5	0.5	6 300	– 7.0	1.0	1.0
250	0	0.5	0.5	8 000	– 9.4	1.0	1.0
315	0	0.5	0.5	10 000	– 11.9	1.0	1.0
400	0	0.5	0.5	12 500	– 14.8	1.5	1.5
500	0	0.5	0.5	16 000	– 18.2	2.0	2.0
630	0	0.5	0.5	20 000	– 21.6	3.0	3.0

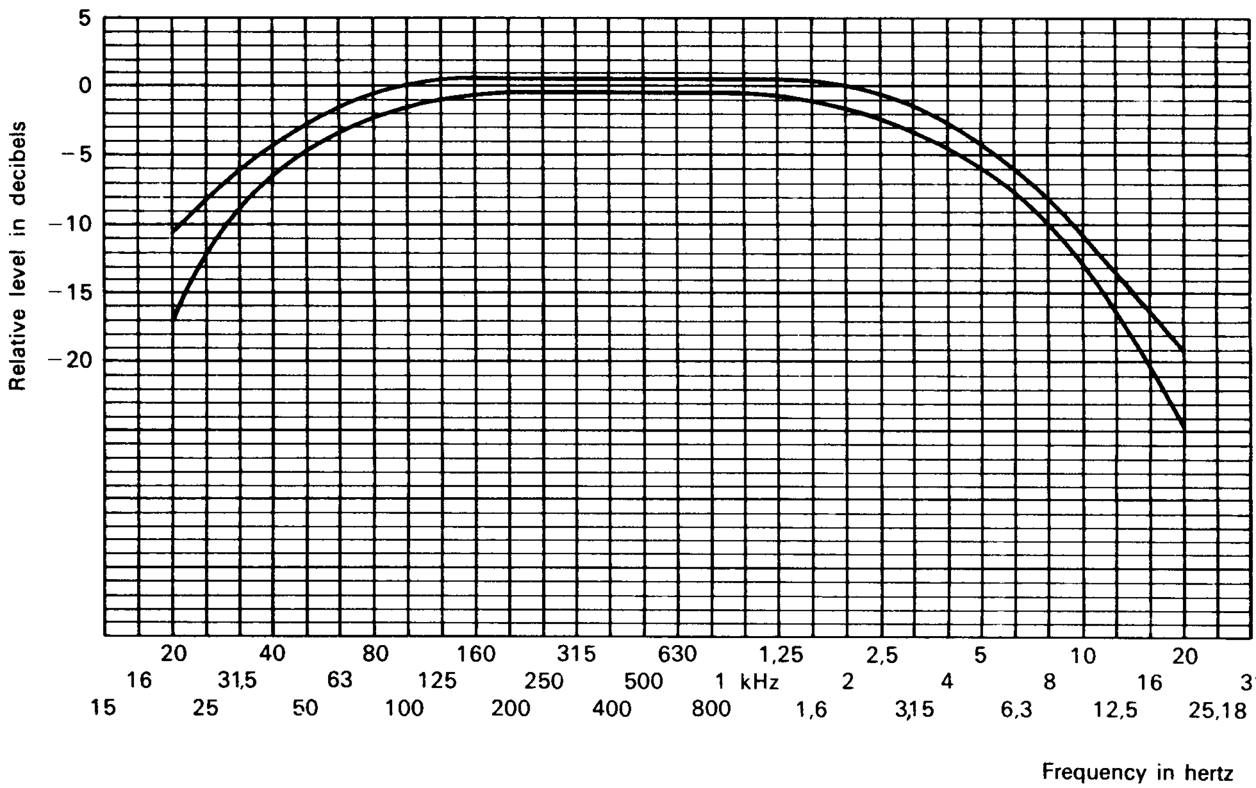
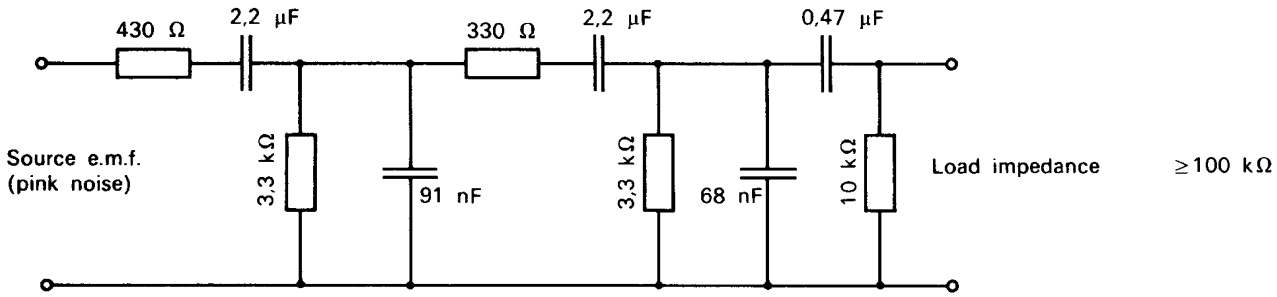


Figure 1 — Power spectrum of simulated programme signal



The output impedance of the source shall be included in the value of the first resistor (430 Ω). The effect of the load impedance may be taken into account by adjusting the value of the 10 kΩ resistor.
The tangent of loss angle of the capacitors shall not exceed 0.005.

Figure 2 — Filter for simulated programme signal (for pink-noise source)

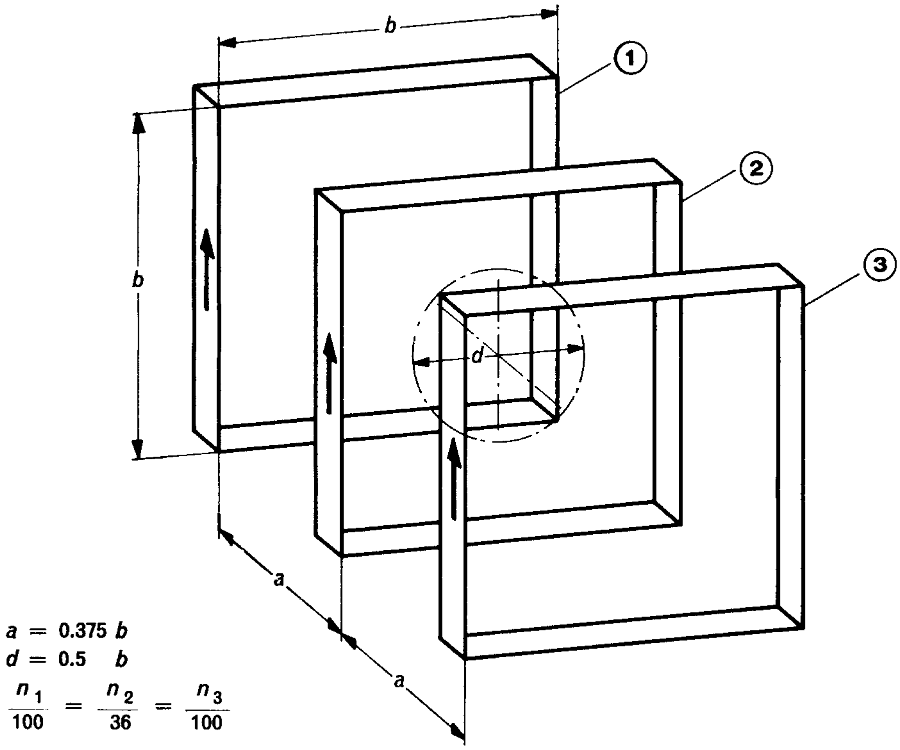


Figure 3 — Arrangement of three coils for the production of a uniform alternating magnetic field

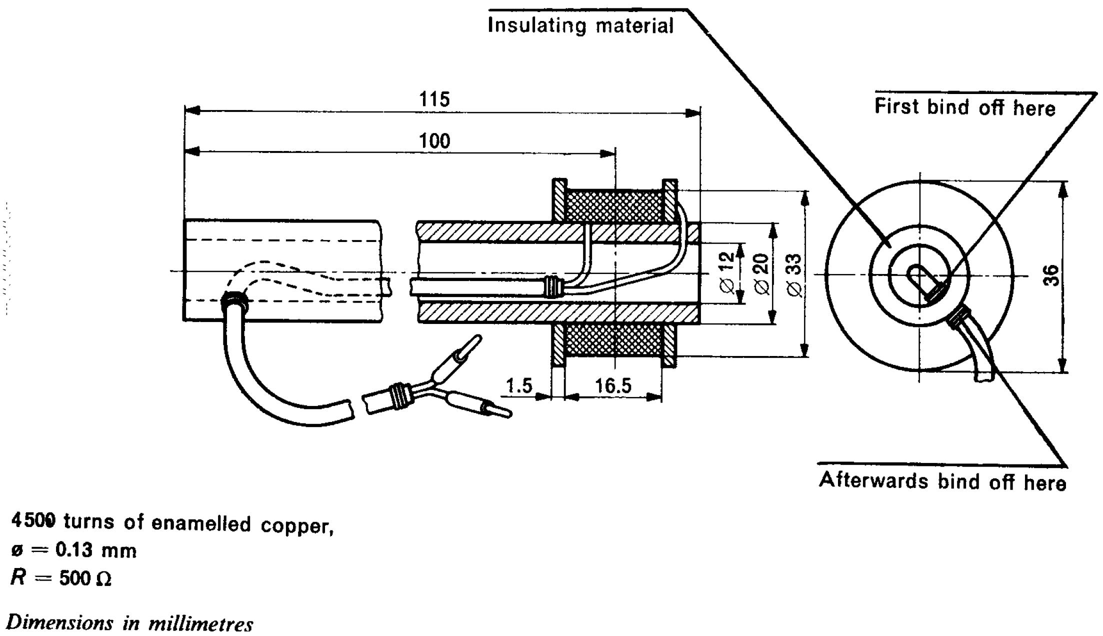


Figure 4 — Search coil for measuring the magnetic field strength

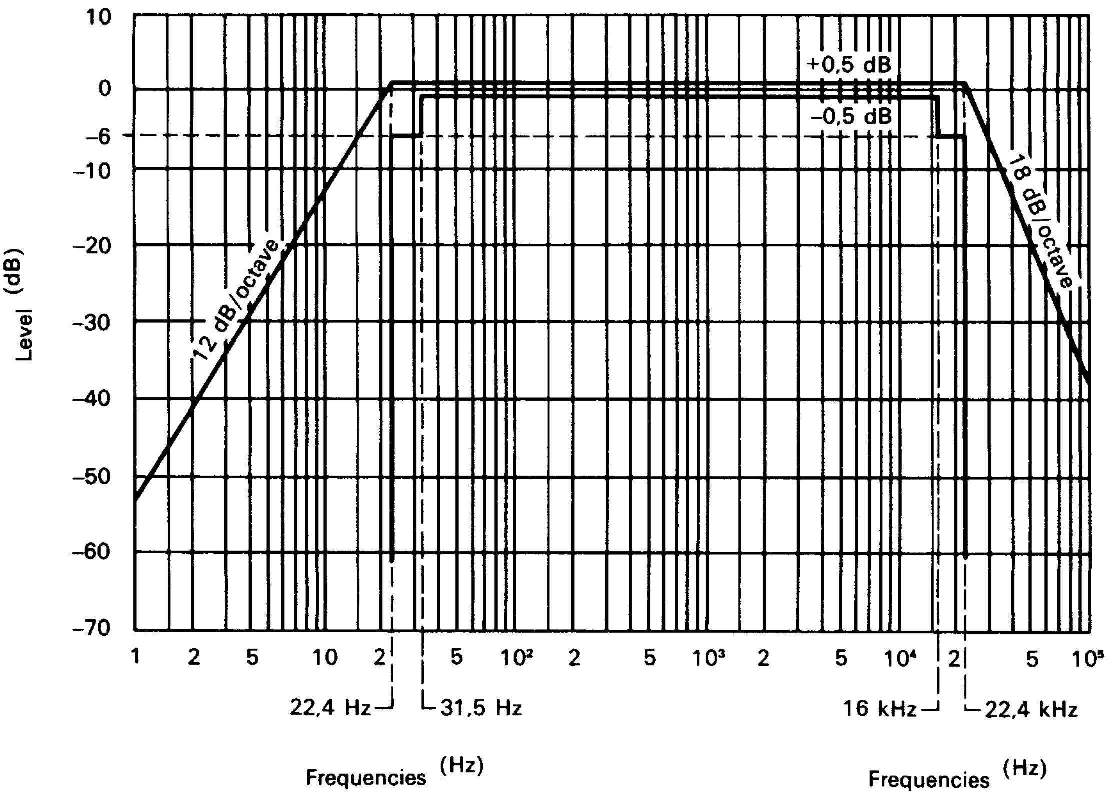


Figure 5 — Band-pass filter for wide-band noise measurement (amplitude/frequency response limits, see Sub-clause 6.1)

Appendix A Noise weighting network and quasi-peak meter

NOTE This weighting network and meter are in accordance with CCIR Recommendation 468-3.

A.1 Weighting network

The nominal response curve of the weighting network is defined in Figure A.1, page 11, which is the theoretical response of the passive network shown in Figure A.2, page 11. Table A.I gives the values of this response at various frequencies.

The permissible differences between the response curve of measuring networks and this nominal curve are shown in the last column of Table A.I and in Figure A.3, page 12.

NOTE The whole instrument is calibrated at 1 kHz (see Sub-clause **A.2.6**). In order to make accurate measurements at frequencies giving maximum gain it would be useful to reduce the tolerance at 1 kHz (for instance: ± 0.2 dB).

Table A.I

Frequency (Hz)	Response (dB)	Tolerance (dB)
31.5	– 29.9	± 2.0
63	– 23.9	± 1.4
100	– 19.8	± 1.0
200	– 13.8	± 0.85[a]
400	– 7.8	± 0.7[a]
800	– 1.9	± 0.55[a]
1 000	0	± 0.5
2 000	+ 5.6	± 0.5[a]
3 150	+ 9.0	± 0.5[a]
4 000	+ 10.5	± 0.5[a]
5 000	+ 11.7	± 0.5
6 300	+ 12.2	0
7 100	+ 12.0	± 0.2[a]
8 000	+ 11.4	± 0.4[a]
9 000	+ 10.1	± 0.6[a]
10 000	+ 8.1	± 0.8[a]
12 500	0	± 1.2[a]
14 000	– 5.3	± 1.4[a]
16 000	– 11.7	± 1.65[a]
20 000	– 22.2	± 2.0
31 500	– 42.7	{ ± 2.8[a] – ∞ }

NOTE This table is in accordance with CCIR Recommendation 468-2.

[a] The tolerances are obtained by a linear interpolation on a logarithmic graph on the basis of values specified for the frequencies used to define the mask, i.e. 31.5 Hz, 100 Hz, 1 000 Hz, 5 000 Hz, 6 300 Hz, and 20 000 Hz.

A.2 Characteristics of the measuring device

A quasi-peak value method of measurement shall be used, defined by the time-response characteristic of the measuring set, as described in Table A.II.

The required dynamic performance of the measuring set may be realized in a variety of ways. It is defined by the performance of the measuring set as described by the following characteristics.

NOTE After full-wave rectification of the input signal, a possible arrangement would consist of two peak rectifier circuits of different time-constants connected in tandem.

A.2.1 ***Dynamic characteristic in response to single tone-bursts***

Method of measurement

Single bursts of 5 kHz tone are applied to the input at an amplitude such that the steady signal would give a reading of 80 % of full scale. The burst should start at the zero-crossing of the 5 kHz tone and should consist of an integral number of full periods. The limits of reading corresponding to each duration of tone-burst are given in Table A.II.

The tests should be performed both without adjustment of the attenuators, the readings being observed directly from the instrument scale and also with the attenuators adjusted for each burst duration to maintain the reading as nearly constant at 80 % of full scale as the attenuator steps will permit.

Unless otherwise specified, measurements should be made through the weighting network.

A.2.2 ***Dynamic characteristic in response to repetitive tone-bursts***

Method of measurement

A series of 5 ms bursts of 5 kHz tone starting at zero-crossing is applied to the input at an amplitude such that the steady signal would give a reading of 80 % of full scale. The limits of the reading corresponding to each repetition frequency are given in Table A.III.

The tests should be performed without adjustment of the attenuators but the characteristic should be within tolerance on all ranges.

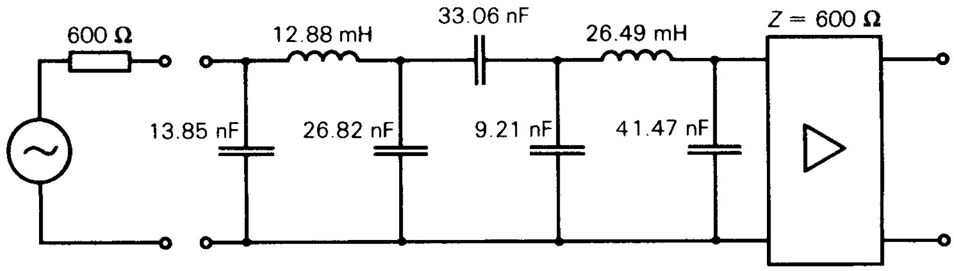
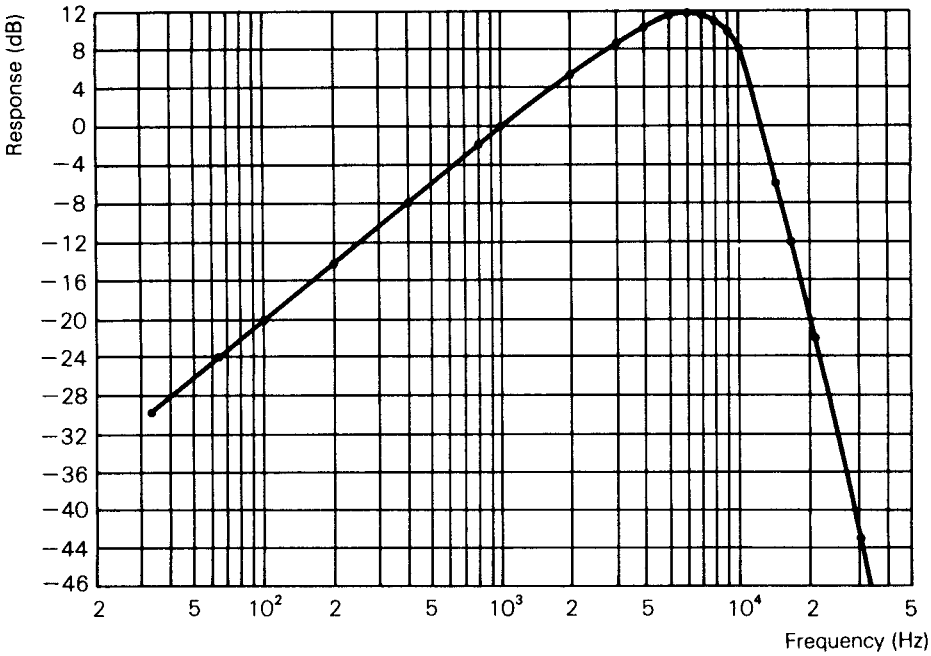
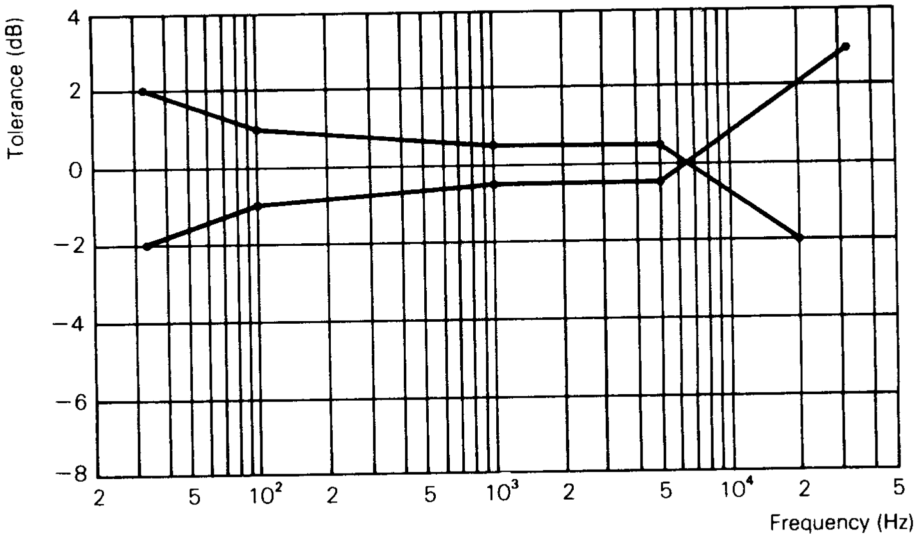


Figure A.1 — Weighting network



(A tolerance of at most 1 % on the component values and a Q-factor of at least 200 at 10 000 Hz are sufficient to meet the tolerances given in Table A.I.)

Figure A.2 — Frequency response of the weighting network shown in Figure A.1



NOTE This figure is in accordance with CCIR Recommendation 468-2.

Figure A.3 — Maximum tolerances for the frequency response of the weighting network value

Table A.II

Burst duration (ms)		1[a]	2[a]	5	10	20	50	100	200
Amplitude reference steady signal reading	(%)	17.0	26.6	40	48	52	59	68	80
	(dB)	– 15.4	– 11.5	– 8.0	– 6.4	– 5.7	– 4.6	– 3.3	– 1.9
Limited values — lower limit	(%)	13.5	22.4	34	41	44	44	50	68
	(dB)	– 17.4	– 13.0	– 9.3	– 7.7	– 7.1	– 6.0	– 4.7	– 3.3
— upper limit	(%)	21.4	31.6	46	55	60	68	78	92
	(dB)	– 13.4	– 10.0	– 6.6	– 5.2	– 4.4	– 3.3	– 2.2	– 0.7

[a] The use of burst durations less than 5 ms is not mandatory.

Table A.III

Number of bursts per second		2	10	100
Amplitude reference steady signal reading	(%)	48	77	97
	(dB)	– 6.4	– 2.3	– 0.25
Limiting values: — lower limit	(%)	43	72	94
	(dB)	– 7.3	– 2.9	– 0.5
— upper limit	(%)	53	82	100
	(dB)	– 5.5	– 1.7	– 0.0

A.2.3 ***Overload characteristics***

The overload capacity of the measuring set should be more than 20 dB with respect to the maximum indication of the scale at all settings of the attenuators. The term "overload capacity" refers both to absence of clipping in linear stages and to retention of the law of any logarithmic or similar stage which may be incorporated.

Method of measurement

Isolated 5 kHz tone-bursts of 0.6 ms duration starting at zero-crossing are applied to the input at an amplitude giving full scale reading using the most sensitive range of the instrument. The amplitude of the tone-bursts is decreased in steps by a total of 20 dB while the readings are observed to check that they decrease by corresponding steps within an overall tolerance of ± 1 dB. The test is repeated for each range.

A.2.4 ***Reversibility error***

The difference in reading when the polarity of an asymmetrical signal is reversed shall be not greater than 0.5 dB.

Method of measurement

1 ms rectangular d.c. pulses with a pulse repetition rate of 100 pulses per second or less are applied to the input in the unweighted mode, at an amplitude giving an indication of 80 % of full scale. The polarity of the input signal is then reversed and the difference in indication is noted.

A.2.5 ***Overswing***

The reading device shall be free from excessive overswing.

Method of measurement

1 kHz tone is applied to the input at an amplitude giving a steady reading of 0.775 V or 0 dB (see Sub-clause **A.2.6**). When this signal is suddenly applied, the overswing shall be less than 0.3 dB.

A.2.6 ***Calibration***

The instrument shall be calibrated such that a steady input signal of 1 kHz sine wave at 0.775 V r.m.s, having less than 1 % total harmonic distortion shall give a reading of 0.775 V (0 dB). The scale should have a calibrated range of at least 20 dB with the indication corresponding to 0.775 V (or 0 dB) between 2 dB and 10 dB below full scale.

A.2.7 ***Input impedance***

The instrument should have an input impedance ≥ 20 kΩ and if an input termination is provided then this should be 600 Ω ± 1 %.

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Publications referred to

See national foreword.

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