මෙය රාජ්‍ය භාෂාවෙන් වෙනම මුද්‍රණය කර ඇත.

ශ්‍රී ලංකා ප්‍රමිති 236: 1973
SRI LANKA STANDARD 236 : 1973
විශ්ව දශම වර්ග කිරීම UDC 621.396.62

රේඩියෝ ආදායක පිළිබඳ ප්‍රමිතිය
වන කොටස ගෘහ්‍ය ඝන අවස්ථා රේඩියෝ ආදායක සඳහා අවම අවශ්‍යතා
STANDARD FOR RADIO RECEIVERS
Part I - Minimum Requirements of Domestic Solid State Radio Receivers

ලංකා ප්‍රමිති කාර්යාංශය
BUREAU OF CEYLON STANDARDS

STANDARD FOR RADIO RECEIVERS

Part I - Minimum Requirements of Domestic Solid State Radio Receivers

S.L.S.236 : 1973

Gr.6

BUREAU OF CEYLON STANDARDS
53, DHARMAPALA MAWATHA,
COLOMBO 3.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This Standard does not purport to include all the necessary provisions of a contract.

BUREAU OF CEYLON STANDARDS
53, DHARMAPALA MAWATHA,
COLOMBO 3.

Telephone : 26055
26054
26051

Telegrams: "PRAMIKA"

SRI LANKA STANDARD FOR RADIO RECEIVERS
PART I - MINIMUM REQUIREMENTS OF DOMESTIC SOLID STATE RADIO RECEIVERS

FOREWORD

This Sri Lanka Standard has been prepared by the Drafting Committee on Radio Receivers. It was approved by the Electrical Engineering Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 5th December, 1973.

The object of this standard is to recommend certain basic minimum performance requirements of domestic radio receivers, incorporating solid state devices. This standard, is Part I of the Sri Lanka Standard relating to Radio Receiving equipment.

A broad classification of receivers into different types based largely on the performance requirements and the provision of additional facilities has been attempted. While Types A and B cater to the requirements of simple receivers (either medium wave range only or medium wave and short wave ranges), Type C covers the minimum performance of most of the average domestic receivers. If and when it is intended to cover more sophisticated receivers which would be far above the minimum recommended for Type C, this may be done by addition of requirements for types D,E, etc., in future.

For convenient reference, the standard has been divided into different sections; Section 1 giving general requirements applicable to all types of receivers and the subsequent sections covering the specific performance requirements of particular types of receivers.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value observed or calculated expressing the result of a test or observation shall be rounded off in accordance with C.S. 102 'Ceylon Standard on Presentation of Numerical Values.' The number of figures to be retained in the rounded off values shall be the same as that specified in this standard.

In the preparation of this standard considerable assistance was obtained from the publications of the Indian Standards Institution, South African Bureau of Standards, British Standards Institution and the International Electro Technical Commission and the assistance gained therefrom is gratefully acknowledged.

SECTION 1 - GENERAL

1. SCOPE

1.1 This section of the standard covers general requirements applicable to all types of domestic solid state radio receivers including portable receivers, intended for reception of amplitude-modulated (AM) broadcast transmissions except miniaturized receivers such as camera size and pocket size receivers. Car radios are also not covered by this

standard.

1.2 The minimum performance requirements of specific types of receivers are covered in the subsequent sections.

2. TERMINOLOGY

For the purpose of this standard the following definitions shall apply.

2.1 Bel - The fundamental division of a logarithmic scale used to express the ratio of two specified or implied amounts of power, the number of bels denoting such a ratio being the logarithm to the base 10 of this ratio.

NOTE: With P_1 and P_2 designating two amounts of power and N the number of bels denoting their ratio,

$$N = \log_{10} \frac{P_1}{P_2} \text{ bels.}$$

2.2 Decibel - One tenth of a bel, the number of decibels denoting the ratio of two specified or implied amounts of power being 10 times the logarithm to the base 10 of this ratio. The abbreviation dB is commonly used for the term decibel.

It is also used to express voltage and current ratios, the relations being Number of $dB = 20 \log_{10} \frac{V_1}{V_2}$ or $20 \log_{10} \frac{I_1}{I_2}$

NOTE: By definition these formulae apply when the impedances at the reference points where the voltages and currents occur are identical. However, it has long since become customary to use the decibel notations in an extended sense, to express numerical ratios in general on a logarithimic basis. In such cases it is recommended that a note be made of the special use of dB notation with information about the impedance to which the values refer.

2.3 Decibel suffixes:- A decibel ratio related to a specified reference quantity will define the level of a new quantity. The reference quantities used in expressing the levels of power, voltage, current or field strength may be indicated by means of a suffix associated with dB.

Type of level	Reference	Abbreviation
Power	1 milliwatt	dB (mW)
Voltage	1 microvolt	dB (μV)
Current	1 microampere	dB (μA)
Field strength	1 microvolt per meter	dB (μV/m)

2.4 Level - The magnitude, in a general form of an electrical quantity.

2.5 Mains operation - Operation from any power source with an operating voltage of more than 34 V (peak) and not used solely to supply radio receivers.

2.6 Battery operation - Operation of a radio re-

ceiver by either primary battery/batteries or by secondary battery/batteries or by both.

NOTE: This also covers receivers designed for battery operation but actually operated from mains through suitable devices.

2.7 Terminal - A device for connecting external conductor or apparatus.

2.8 Signal to noise ratio - The ratio of the electrical output power due to the signal to that due to the random noise.

2.9 Standard modulation frequency - It shall be either 400 Hz or 1000 Hz. The specific frequency used in measurements and in specification shall be stated.

NOTE: Unless otherwise stated all modulation shall be at the standard modulation frequency to a depth of 30%.

2.10 Noise limited sensitivity - The minimum input signal level giving standard output power when modulated at the standard frequency and depth at which any chosen value of signal to noise ratio is achieved.

2.11 Maximum sensitivity - The level of the input signal modulated 30% at the standard modulation frequency to produce the standard output power whilst all controls are set for maximum amplification. It is expressed in μV (or μV/m) or in dB (V) (or dB V/m).

2.12 Automatic gain control (AGC) - Automatic

gain control is that characteristic of the receiver which automatically maintains the output power substantially constant over a wide range of variations in the input signal level.

NOTE: The figure of merit of the automatic gain control may be expressed as the number of decibels by which the input signal has to be reduced from a specified level to produce a change of output power of 10 dB.

2.13 Image frequency rejection ratio - (Image ratio) - The ratio, expressed in decibels, of the input signal level at the image frequency to the input signal level at the frequency to which the receiver is tuned, both giving standard output power when modulated to the same depth.

NOTE: The image frequency is equal to the frequency to which the receiver is tuned plus or minus twice the intermediate frequency, according to whether the local oscillator frequency is above or below the signal frequency.

2.14 Intermediate frequency rejection ratio (IF ratio) - The ratio, expressed in decibels, of the input signal level at the intermediate frequency to the input signal level at the frequency to which the receiver is tuned, both giving standard output power when modulated to the same depth.

2.15 Total harmonic distortion - The harmonic distortion of a receiver is evaluated by the

R.M.S. values of the harmonics in the output signal. The degree of harmonic distortion is expressed by a factor K defined by:

$$K = \frac{\sqrt{A_2^2 + A_3^2 + A_4^2 + \ldots\ldots\ldots\ldots\ldots\ldots}}{\sqrt{A_1^2 + A_2^2 + A_3^2 + A_4^2 + \ldots\ldots\ldots\ldots\ldots}}$$

In this formula A_1, A_2, A_3 etc. are the current or voltage values of the individual harmonics present in the output circuit. Hum voltages should not be included in harmonic distortion.

2.16 Maximum useful output power - The lowest R.M.S. value of the electrical output power at which the total harmonic distortion (including random noise amounts to 10 percent.

2.17 Standard output power - An R.M.S. electrical output power of 50 mW.

2.18 Reception frequency range of a receiver - The range of frequency receivable in the normal manner between the upper and lower ends of the dial scale of each band.

2.19 Selectivity of a receiver - The ability of the receiver to separate a desired signal from undesired signals on adjacent frequencies (the selectivity is dependent partly upon the proximity of the frequencies of the two signals and partly upon their levels).

2.20 Overall electrical frequency response - The

relation between the electrical output power delivered to the loudspeaker and the modulation frequency, the input signal level and modulation depth being kept constant.

2.21 Overall acoustic frequency response - The relation between the acoustic output power (delivered by the loudspeaker) and the modulation frequency, the input signal level and modulation depth being kept constant.

2.22 Calibration error - The calibration error at a specified frequency is the difference between a known frequency and the value of the frequency read on the dial, and it shall be expressed as a percentage of the measuring frequency.

2.23 Acoustic howling - Acoustic howling is defined as an audible self - oscillation of a receiver caused by acoustic feedback from the loudspeaker to other parts of the receiver. Feedback through the air and through mechanical conduction are both considered.

3. GENERAL REQUIREMENTS

3.1 The cabinet shall be of good quality and may be made of wood, plastic or any other suitable material. The design of the cabinet shall be such as to provide for the receiver reasonable protection from dust.

3.2 The loudspeaker shall be contained in the cabinet and shall form an integral part of the receiver in the case of Types A and B

receivers and preferably so in the case of Type C receivers.

3.3 Layout of components, wiring, soldering and workmanship shall conform to good engineering practice. The receiver shall be free from undesirable rattling noises under normal operating conditions.

3.4 Telescopic antenna, if provided, shall be such that it could be both pulled out and pushed in smoothly. It shall neither come off easily nor fall down spontaneously.

3.5 Any external terminals and sockets provided shall be reliably mounted and shall be clearly marked. They shall have adequate contact pressure.

3.6 All operating controls shall be clearly and adequately marked.

3.7 Battery housing

3.7.1 The battery housing (if provided) shall be such that;

(i) battery replacement can be affected without the use of a special tool,

(ii) no internal components are disturbed during battery replacement and,

(iii) batteries are so secured as to prevent damage to components owing to mechanical or chemical causes.

3.7.2 The housing (or the connection or the design of circuitry) shall be such that reversal of battery polarity cannot result in damage to the receiver.

Alternatively, the direction and positioning of the batteries in the housing shall be clearly and indelibly illustrated on the receiver.

3.8 Marking - Each receiver shall be clearly and permanently marked with the following:-

a. Trade name or trade mark of the manufacturer.

b. Model and serial numbers.

c. The frequency range/s.

d. Operating voltage, number and type of batteries (eg. 4 of R 20).

e. The number of transistors if integrated circuitry is not used.

f. Intermediate frequency.

g. Maximum useful output power.

h. Country of origin.

4. SAFETY

4.1 Receivers intended for mains operation shall conform to the requirements of Part III* of the standard on radio receivers.

---

* Sri Lanka Standard for Radio Receivers Part III Safety Requirements for Mains Operated Radio Receivers.

5. MEASUREMENT OF PERFORMANCE

5.1 The characteristics specified in subsequent sections of this standard shall be measured in accordance with the procedure laid down in Part II* of the standard on radio receivers.

6. RESISTANCE TO ENVIRONMENT

6.1 Damp heat (Cycling) - When damp heat test is carried out in accordance with Clause ..... of Part II* of the standard, after recovery, the receiver shall preferably conform to the applicable performance requirements specified in the relevant section of this standard.

6.2 Dry heat - When dry heat test is carried out in accordance with Clause ..... of Part II* of the standard, after recovery the receiver shall preferably conform to the applicable performance requirements specified in the relevant section of this standard.

7. MECHANICAL STRENGTH

7.1 Resistance to dropping - After the receiver has been tested in accordance with Clause ..... Part II* of the standard, there shall be no sign of damage and the receiver shall still comply with all the other requirements of this standard.

---

* Sri Lanka Standard for Radio Receivers, Part II Methods of measurements on receivers for amplitude modulated broadcast transmissions.

7.2 Resistance to vibration - After the receiver has been tested in accordance with Clause ..... of Part II* of the standard, there shall be no sign of damage and the receiver shall still comply with all the other requirements of this standard.

SECTION 2 - TYPE A RECEIVERS

8. SCOPE

8.1 This section of the standard covers minimum performance requirements of Type A radio receivers designed for reception of AM broadcast transmissions in the medium wave range only, having a frequency coverage from 525 kHz to 1605 kHz and intended for operation either from mains or from batteries.

NOTE: The receivers covered by this section of the standard are presumed to be provided with built-in-antenna.

9. PERFORMANCE REQUIREMENTS

9.1 Ease of tuning - The receiver shall be provided with adequate mechanical and/or electrical means for easy tuning.

9.2 Noise limited sensitivity - The noise limited sensitivity over the entire frequency range shall not be worse than 1 mV/m, at a signal to noise ratio of not less than 20 dB.

9.3 Selectivity - The selectivity shall be measured at 1 MHz. The pass band shall be not

*Sri Lanka Standard for Radio Receivers, Part II

greater than ± 10 kHz at the-20 dB points and not greater than ± 20 kHz at the -40 dB points.

9.4 Output power - The maximum useful output power shall be not less than 100 mW.

9.5 Frequency response - The variation in acoustical response in the frequency range 250 Hz to 3 150 Hz shall not exceed 18 dB.

9.5.1 Alternatively, the variation in electrical frequency response in the frequency range of 200 Hz to 4 000 Hz shall not exceed 6 dB.

NOTE: For graphical representation 400 Hz should be taken as the reference level.

9.6 Image frequency rejection ratio - The image ratio shall be not less than 30 dB.

9.7 Intermediate frequency rejection ratio - The IF ratio shall be not less than 20 dB.

SECTION 3 - TYPE B RECEIVERS

10. SCOPE

10.1 This section of the standard covers minimum performance requirements of Type B receivers designed for reception of AM broadcast transmissions in the medium wave and one short wave band, and intended for operation either from mains or from batteries.

10.1.1 Type B receivers covered by this section shall be a combined medium wave and short wave model with the frequency ranges as follows:-

Medium wave range	525 kHz to 605 kHz
Short wave range	3 MHz to 12 MHz

11. PERFORMANCE REQUIREMENTS

11.1 Tuning arrangements - The receiver shall be provided with adequate mechanical and/or electrical means for easy tuning. The mechanical tuning arrangement shall be free of backlash and free play.

11.2 Noise Limited sensitivity - The noise limited sensitivity over the entire frequency range shall be not less than following figures, at a signal to noise ratio of not less than 20 dB.

(a) For medium wave range : 400 μV/m

(b) For short wave range : 150 μV

11.3 Selectivity - The selectivity shall be measured at 1 MHz. The pass band shall be not greater than $\pm$ 10 kHz at the -20 dB points and not greater than $\pm$ 20 kHz at the -40 dB points.

11.4 Automatic gain control - The AGC figure of merit shall be not less than 30 dB, the initial input signal level being 100 mV/m when used with internal antenna and 100 mV when used with external antenna.

11.5 Output power - The maximum useful output power shall be not less than 100 mW.

11.6 Frequency response - The variation in acoustical response in the frequency range 250 Hz to 3150 Hz shall not exceed 18 dB.

11.6.1 Alternatively, the variation in electrical frequency response in the frequency range of 100 Hz to 4000 Hz shall not exceed 6 dB.

NOTE:- For graphical representation, 400 Hz should be taken as the reference level.

11.7 Image frequency rejection ratio - The image ratio shall be not less than 30 dB for medium wave range, and not less than 9 dB in the short wave range.

11.8 Intermediate frequency rejection ratio - If ratio shall be not less than 20 dB in medium wave range and not less than 30 dB in the short wave range.

SECTION 4 - TYPE C RECEIVERS

12. SCOPE

12.1 This section of the standard covers minimum performance requirements of receivers of Type C designed for reception of AM broadcast transmissions in the medium and short wave bands and intended for operation either from mains or from batteries having provision for connecting an external antenna.

12.1.1 Type C receivers covered by this section shall be a combined medium wave and short wave model with the frequency ranges as follows:

Medium-wave range - 525 kHz to 605 kHz.
Short-wave range - 3 MHz to 26 MHz.

NOTE: In the short wave ranges, frequencies from 3 MHz to 21.7 MHz shall be positively covered.

13. PERFORMANCE REQUIREMENTS

13.1 Ease of tuning - The ease of tuning shall be not less than 2.0 mm per 10 kHz in the medium wave range.

13.2 Ease of reading - The ease of reading shall be not less than 0.4 mm per 10 kHz in the medium wave range.

13.3 Calibration error - The calibration error shall not exceed ± 3 per cent in all the frequency ranges.

13.4 Noise limited sensitivity - The noise limited sensitivity over the entire frequency range at a signal-to-noise ratio of not less than 20 dB shall not be less than the figures specified below:-

(a) For medium wave range, 200 uV/m
(b) For short wave range, 50 uV

13.5 Selectivity - The selectivity shall be measured at 1 MHz. The pass band shall be not

greater than $\pm$ 10 kHz at the -20 dB points and not greater than $\pm$ 20 kHz at the - 40 dB points.

13.6 Automatic gain control - The automatic gain control figure of merit shall be not less than 30 dB, the initial input signal level being 100 mV/m when used with internal antenna and 100 mV when used with external antenna.

13.7 Output power - maximum useful output power shall be not less than 500 mW.

13.8 Image frequency rejection ratio - The image ratio shall be not less than 30 dB in medium wave range, not less than 10 dB in short wave range upto 10 MHz and not less than 5 dB beyond 10 MHz.

13.9 Intermediate frequency rejection ratio - IF ratio shall be not less than 30 dB in both medium wave and short wave ranges.

13.10 Acoustical frequency response - The variation in acoustical frequency response in the frequency range 250 Hz to 3 150 Hz shall not exceed 18 dB.

13.11 Electrical frequency response - The variation in electrical frequency response in the frequency range 100 Hz to 4 000 Hz shall not exceed 6 dB.

NOTE:- For graphical representation, 400 Hz should be used as the reference level.

13.12 Acoustic feedback - The useable output power (that is, without acoustic howling) shall be not less than 6 dB below the maximum useful output power in all the frequency ranges subject to a minimum value as specified in Clause 13.7.

13.13 Frequency drift

13.13.1 The frequency drift under normal operating conditions shall not exceed 0.10 per cent of the frequency at which measurement is made.

13.13.2 Drift due to supply voltage variation - In the case of mains operated receivers, the frequency drift for variation of 10 per cent in the supply voltage shall not exceed 4 kHz in all the frequency ranges.

APPENDIX A

A - 1 Items to be provided with each radio receiver.

A-1.1 Manual - A manual may be provided with each receiver. It shall provide (in clear non-technical terms) the following details and operating instructions.

Essential details

1. Maximum useful output power.
2. The total frequency coverage or tuning ranges.

Operating instructions

1. A description of the action of all operating controls.

2. The types of batteries suitable for use in the receiver and complete instructions for the changing of batteries.

3. Any additional information necessary for the successful operation of the receiver and any external facilities (e.g. Turntable: tape recorder).

4. When applicable the aerial and earth connections, the recommended impedance of the external loudspeaker and earphone, and whether a low or high impedance gramophone pick-up should be used.

5. The name and address of the service organisation, or manufacturer of the receiver.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

Printed at SLSI (Printing Unit)

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.