

RETMA RS-174

RETMA STANDARD

*Audio Transformers
for Electronic Equipment*

RS-174
(Revision of TR-121)



December 1956

Engineering Department

RADIO - ELECTRONICS - TELEVISION MANUFACTURERS ASSOCIATION

NOTICE

RETMA standards are adopted in the public interest and are designed to eliminate misunderstandings between the manufacturer and the purchaser and to assist the purchaser in selecting and obtaining without delay the proper product for its particular need. Existence of such standards does not in any respect preclude any member or non-member of RETMA from manufacturing or selling products not conforming to the standard.

Any proposal of recommended standards and practices made by the Association is without any regard to whether or not their adoption may in any way involve patents on articles, materials or processes. By such action, the Association does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the recommended standards or practices.

Published by

ELECTRONIC INDUSTRIES ASSOCIATION

Engineering Department

2001 Eye Street, N. W., Washington, D. C. 20006

Copyright 1986 by Radio-Electronics-Television Manufacturers Association

All rights reserved

PRICE \$1.80

Printed in U.S.A.

AUDIO TRANSFORMERS FOR ELECTRONIC EQUIPMENT*(From Standards Proposal No. 512 formulated under the cognizance of
RETMA Engineering Committee SQ-4 on Transformers and Reactors)***1. SCOPE**

This standard covers iron core transformers for use in Electronic Equipment in which long life, reliability and continuity of operation are essential, and which are required to transform voltages with fidelity over a designated frequency band and operate between specified impedances.

It is not intended that the "frequency band" referred to above be limited to the region of audible frequencies.

2. DEFINITIONS

2.1 Electrical terms used in this specification shall be in accordance with those given in "American Standard Definitions of Electrical Terms." ASA No. C42-1941, except as otherwise noted. Reference is made to the following ASA definitions:

65.10.005	Audio Frequency
65.10.015	Frequency Band
65.10.020	Band Width
65.10.025	Fundamental Frequency
65.10.030	Harmonic
65.10.300	Modulation
65.11.010	Decibel
65.11.020	Power Level
65.11.035	Insertion Loss (or later revision)
65.11.430	Distortion
65.11.440	Non-Linear Distortion
65.11.450	Fidelity
65.11.500	Self Impedance

2.2 The RMS working voltage between any winding and any other winding or ground, shall be defined as 0.707 times the sum of the maximum dc voltage and the peak ac voltage which may appear between that winding and the other winding or ground under normal conditions of continuous operation.

2.3 dbm is defined as db referred to one milliwatt, sine wave, single frequency.

2.4 Frequency response is defined as the ratio of the secondary voltage over the specified frequency band to the secondary voltage at the mid-band frequency, or any arbitrary reference frequency, with the source voltage held constant. In the case of modulation and driver transformers the load voltage may be held constant. In such cases the frequency response will then be defined as the ratio of the source voltage over the specified frequency band to the source voltage at the reference frequency.

2.5 Reflected impedance is defined as the impedance presented to the source by the transformer over the specified frequency band, all secondary windings being loaded as specified. The desired value of impedance should be given with tolerances.

2.6 Efficiency is defined in several ways:

2.6.1 Overall efficiency is the ratio of the power delivered to the load, to the power delivered to the transformer, and is expressed in percent.

2.6.2 Copper efficiency is the ratio of the power supplied to the secondary load or loads to the sum of that power and power losses in the conductors comprising the secondary and primary windings, as distinguished from losses in the magnetic and other aspects of the transformer structure.

NOTE: Overall efficiency, an important characteristic of power transformers, is used in relatively few instances as a measure of quality for audio transformers.

2.7 Longitudinal balance is the ratio of transmission of a signal introduced transversely to the transmission of a signal introduced longitudinally with the voltages from lines to ground held constant and equal. The balance must be stated for all combinations of connections taken over

the assigned frequency band. Balance shall be expressed in db. Refer to Fig. 2, Appendix III, for illustrative circuit.

2.8 The termination of a transformer winding is the total impedance of the circuit connected to the winding.

NOTE: While terminating impedances are frequently the source and load impedances, such is not always the case since the termination may include other network components which might be used between the transformer and its source or load.

2.9 The mid-band frequency is defined as the square root of the product of the lowest and highest frequencies in the specified bandwidth.

3. PURCHASE SPECIFICATIONS

The purchaser will specify:

3.1 Electrical Requirements

3.1.1 The source and load impedances in ohms, preferably chosen from standard values in Appendix I.

(a) If any of the source and load impedances are more than 5% reactive at any frequency within the specified frequency band the purchaser shall define the reactance-frequency characteristics. It may be necessary to specify these characteristics over a broader frequency band than that specified in 3.1.4.

(b) The tube type with specific operating conditions and voltages or an accurate description of the source and load with associated circuits.

3.1.2 The reflected impedance at specified frequencies and voltages.

3.1.3 The dc voltage and direction and magnitude of direct current in each winding, and the anticipated variation thereof.

3.1.4 The frequency response required and the permissible deviations thereof with respect to power level.

(a) If desired, instead of frequency response, the highest and lowest frequencies to be transmitted, the open circuit inductance of any winding at a specified low frequency ac voltage and rated dc, and any leakage inductance of interest, may be specified.

3.1.5 The power to be delivered to each load impedance over the frequency band specified in 3.1.4, the upper and lower limits to be specified in watts or dbm. Unless otherwise specified the lower limit shall be taken as 20 db below the upper limit for test purposes.

3.1.6 The minimum overall efficiency at the power specified in 3.1.5, if desired.

NOTE: In cases where core loss is not of importance and unless otherwise specified, the qualifications and determination in 5.1.3(b) shall apply.

3.1.7 The minimum longitudinal balance permissible between halves of windings terminated with balanced impedances. This balance may be expressed in db at the highest and lowest frequencies specified in 3.1.4. In the case of push-pull primaries, the voltage and impedance balance should be specified.

In Class B Modulation transformers, the balance of the leakage reactance of each half of the primary to the secondary winding is of importance.

3.1.8 The maximum permissible harmonic distortion over the frequency band at the maximum power specified in 3.1.5 expressed in percent of the total output voltage of the fundamental frequency, measured as specified hereafter in 5.1.7.

3.1.9 Electrostatic shielding if required.

3.1.10 If magnetic shielding is required, the maximum pick-up in volts for the specified winding, at a specified low frequency and maximum field strength, measured as specified hereafter in 5.1.9.

3.1.11 Any significant operating requirement not treated above, such as unusual surge voltage resulting from power supply fault, keying or switching.