



The FERRANTI AUDIO FREQUENCY TRANSFORMER

TYPE AF5

Ratio : 1/3-5.
Inductance : 120/170 Henties.
Dimensions : 2 $\frac{5}{8}$ " x 3" x 3 $\frac{1}{4}$ "
Weight : 2 lbs. 8 ozs.

CODEWORD - AFIVE.

The FERRANTI AF5 Transformer has been designed for those who require the most nearly perfect amplification that science and technical skill have yet made available, and the curves indicate the degree of perfection achieved under normal working conditions.

Price 30/- Nett (in Great Britain only)

Price in I.F.S. 35/6.

No better Intervolve Coupling is available at any price.

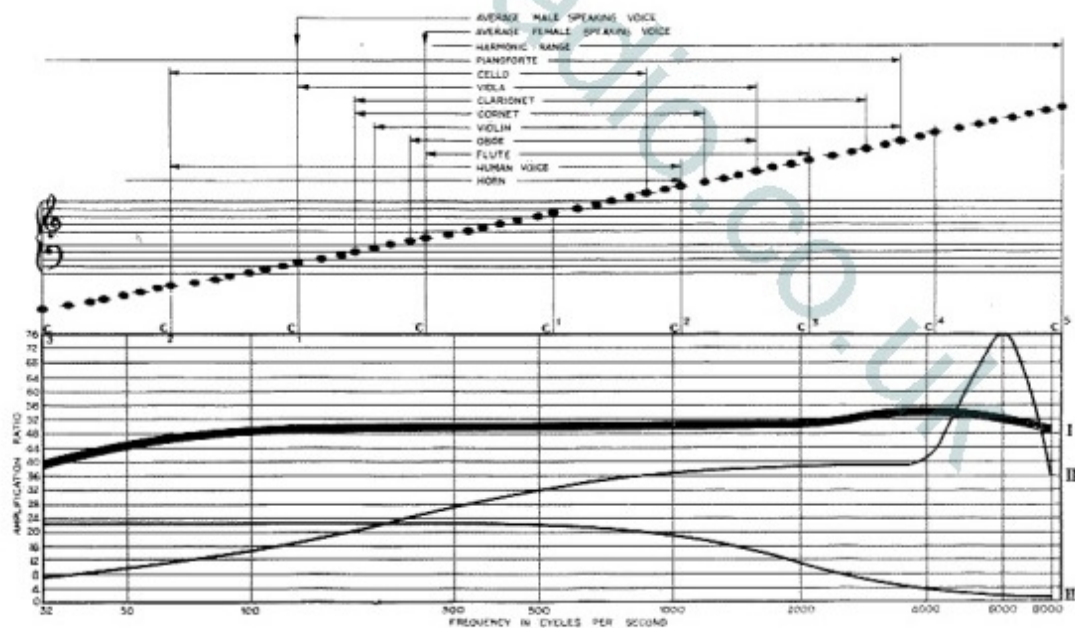


FIG. 1.

AUDIO FREQUENCY TRANSFORMER, TYPE AF5

The curves on page 1 are obtained when using the respective components under their normal working conditions, each being followed by a power valve with a non-inductive load in the anode circuit. The following are the conditions relating to each curve:—

Curve 1.—The FERRANTI AF5 Transformer following a 10,000 ohm valve having an amplification factor of 14. H.T. 100 volts. Milliamps 3.5. Grid Bias 1.5 volts. Filament 4 volts.

Curve 2.—A modern Cheap Transformer used under similar conditions.

Curve 3.—Resistance Capacity using high amplification Couplings.

These curves are drawn on a musical scale, and should not be compared with curves drawn on a straight frequency scale. A vertical logarithmic scale is not used, as it tends to make the performance of any amplifying device look better than it is.

Figure 1 shows the remarkable amplification provided by the AF5 Transformer under normal operating conditions throughout the whole of the range of broadcast audio frequencies. The cut-off at 32 cycles (three octaves below middle C) is approximately 20 per cent., an amount of cut-off noticeable only by measurement.

The curve, at the bass end, may be made flat by feeding the Transformer through a Resistance and Blocking Condenser, but the complication of this is usually not worth while as frequencies of the order of 32 cycles are seldom broadcast, and few Speakers will respond to these frequencies.

The slightly rising characteristic of the AF5 Transformer at the higher audio frequencies is an advantage, as it tends to compensate for the loss of the higher frequencies which commonly occurs in Radio Sets due to the following factors:—

1. Radio frequency cut-off.
2. Shunting by interwiring capacities.
3. The loss of higher frequencies due to the by-pass condensers when Resistance Capacity Coupling is used in conjunction with a Transformer stage.
4. Valve inter-electrode capacities.

It is found, in consequence of the above, that the reproduction of the higher register by Receivers incorporating AF5 Transformers is usually more natural and brilliant than when employing other forms of coupling.

INDUCTANCES. High primary inductance under working conditions is the most important requirement of a good Audio Frequency Transformer. Inductance varies with signal strength and anode current. The curve, Figure 2, shows the inductance of the AF5 Transformer under normal conditions of signal strength with various anode currents. It should be observed that the inductance of Transformers using special iron cores, such as Permalloy, falls off more rapidly with increased anode current, and in many cases such special cores become permanently highly magnetised, rendering the Transformer inefficient.

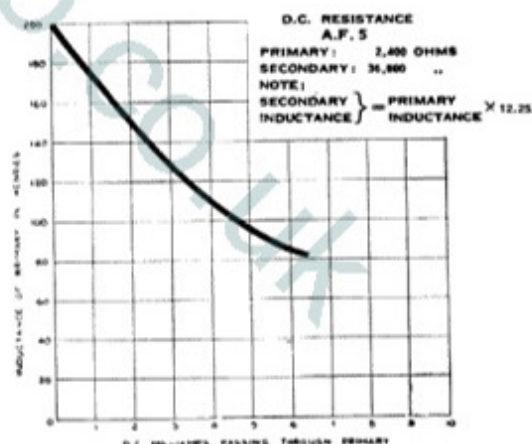


FIG. 2.

AUDIO FREQUENCY TRANSFORMER, TYPE AF5

IMPEDANCES. The AF5 Transformer with 2.5 milliamps flowing through the primary winding has the following impedances:—

At 50 cycles	40,000 ohms.
At 100 cycles	80,000 ohms.
At 500 cycles	580,000 ohms.

With lower milliamps the impedances are greater.

The Valve preceding the AF5 with suitable H.T. and grid bias should not take more than 5 milliamps, although larger currents up to 30 milliamps will cause no mechanical damage.

Examination of the Inductance Curve, Fig. 2, shows that the Inductance of the Primary winding decreases as the Valve anode current increases, and it will be seen that if a Valve is employed taking greater current than that stipulated, the Transformer is not being efficiently used, and the value of the large amount of expensive material put into the Transformer is to a great extent lost.

It should be observed that even in the largest Amplifiers it is not necessary to precede the Transformer by a Valve taking more than 5 milliamps.

A .0003 mfd by-pass condenser is incorporated in the AF5 Transformer across the primary. Without such a condenser proper rectification cannot take place and the condenser is included to ensure that the correct capacity shall be used.

It is important to note that the Transformer gives its characteristic curve under normal working conditions with this condenser in position and so avoids the cut-off in the L.F. amplifier that occurs with all other forms of coupling when a by-pass condenser of adequate capacity, which has to be employed, is used. This condenser included in the AF5 does not affect the satisfactory functioning of the Transformer in any well-designed circuit.

When using anode bend rectification, it is essential to use a Transformer of the AF5 class to obtain the finest reproduction.

For anode bend rectification the detector valve preceding the AF5 should have a normal impedance of about 10,000 ohms, and should be preceded by an H.F. stage so that the maximum rectified current measured by a Milliammeter in the anode circuit is usually not more than 1 milliamp, starting with about 0.2 of a milliamp, with no signal.

The characteristic curve of the AF5c Push-Pull Audio Frequency Transformer is similar to that of the AF5, and full details regarding this Transformer and other Push-Pull types are given in list W-412.

VOLUME CONTROL. Where this is necessary it should be carried out by means of a well-designed variable high resistance, having a total value of 50,000 or 100,000 ohms, placed across the primary of the first Audio Frequency Transformer.

The AF5 Transformer employs the well-known FERRANTI patent air-spaced sectionalised windings as used throughout the whole range of FERRANTI Audio Frequency and Output Transformers, and its construction is such that it is almost entirely immune from breakdown, even when used in humid tropical climates.

Reversible feet are fitted which permit the Transformer to be mounted in a position most suitable to the constructor.

FERRANTI Transformers are employed in Public Address Amplifiers, in connection with the manufacture of Gramophone records, and in the latest Sound Film Amplifiers; in fact, everywhere where good reproduction accompanied by freedom from breakdown is essential.