KS-16610, L1 AMPLIFIER — DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This practice describes the KS-16610, L1 Amplifier. This amplifier is designed for general purpose applications and may be used in paging and announcing systems requiring 75 watts of audio power.

1.02 The input arrangements for this amplifier are identical to those for the KS-16608, L1 Amplifier. For this reason, the arrangements are discussed in detail in Section AA466.075 (AB48.153.5).

1.03 The KS-16610, L1 Amplifier is a basic amplifier which has a single high impedance input and is designed to deliver a nominal 75 watts output. It is equipped with sockets into which plug-in units may be inserted to provide greater flexibility in its input connections.

1.04 The input circuit arrangements to the basic amplifier may be changed by plugging into an appropriate socket, a KS-16611, L1 Transformer, a KS-16612, L1 Mixer Unit and a KS-16607, L1 Amplifier. The basic amplifier provides the ac and dc voltages required to operate the above preamplifier.

1.05 The circuit schematic drawing for the amplifier is SD-95274-01. The application schematic is SD-95275-01. These drawings are not attached to this practice. The detailed description of the amplifier will be found in CD-95274-01 which also is not attached.

1.06 Fig. 1 shows a front view photograph of the amplifier with the cover mat and mounting brackets assembled. The figure also shows part of the perforated cover on the apparatus side.

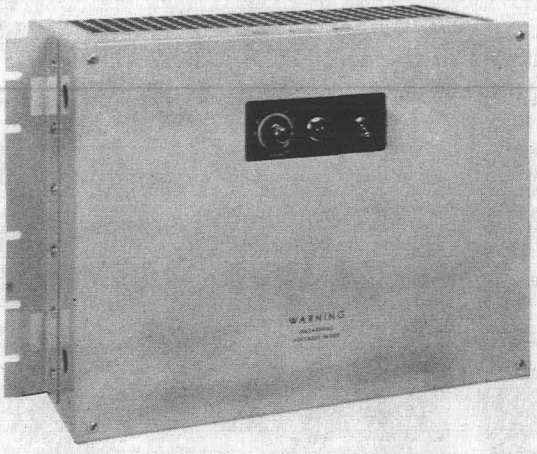

Fig. 1 – Front View

1.07 Fig. 2 shows a rear view photograph with the perforated cover removed and the plug-in units assembled. Two KS-16611, L1 Transformers are shown in the upper right-hand corner of the photograph. One is shown mounted in the mixer unit. The plug-in units are not in-

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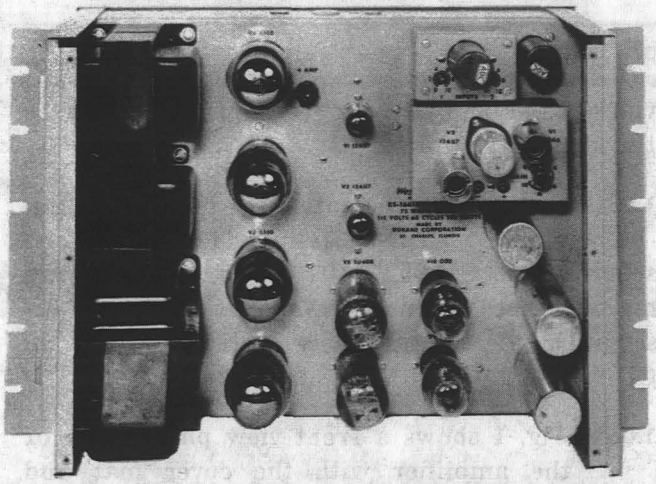

Fig. 2 – Rear View with Cover Removed and Plug-In Units Assembled

1.08 Fig. 3 shows a rear view photograph of the amplifier with one 9-pin shorting plug mounted in the INPUT NO. 2 LINE socket. The amplifier is equipped with one shorting plug.

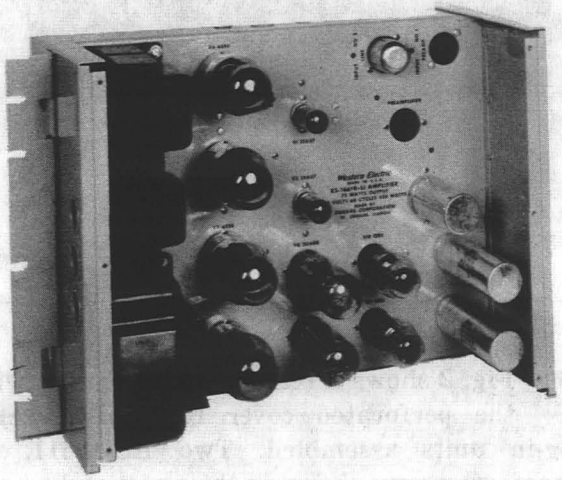

Fig. 3 – Rear View Showing 9-Pin Shorting Plug

2. ELECTRICAL CHARACTERISTICS

2.01 The nominal electrical characteristics of the amplifier are as follows:

Power Supply:

110 to 130 volts, 60 cps ac; at 115 volts, 185 watts (1.8 amperes) with no input signal; 295 watts (2.9 amperes) with 75 watts output. When equipped with KS-16607, L1 Amplifier, 190 watts (1.85 amperes) with no input signal; 300 watts (2.95 amperes) with 75 watts output. Fused with 4-amp fuse.

Power Output:

75 watts into rated resistive load with less than 5% harmonic distortion from 100 to 5000 cps.

Load Impedance:

Nominal rated loads of 1, 4, 9, 16 and 67 ohms.

Loudspeaker Distribution Line Voltage:

70 volts.

Internal Output Impedance:

Approximately 15% of nominal load impedance.

Input Impedance:

Unbalanced, 250,000-ohm gain control.

Gain:

Approximately 61 db from 600-ohm source. Approximately 0.4 volts in for 75 watts out.

When equipped with KS-16611, L1 Transformer, approximately 79 db. Approximately 48 db with bridging input.

When equipped with KS-16607, L1 Amplifier and KS-16611, L1 Transformer, approximately 126 db.

When equipped with KS-16607, L1 Amplifier, KS-16611, L1 Transformers and KS-16612, L1 Mixer Unit, approximately 116 db for high gain channel and approximately 68 db for line level channel.

Frequency Response:

± 1 db from 50 to 10,000 cps.

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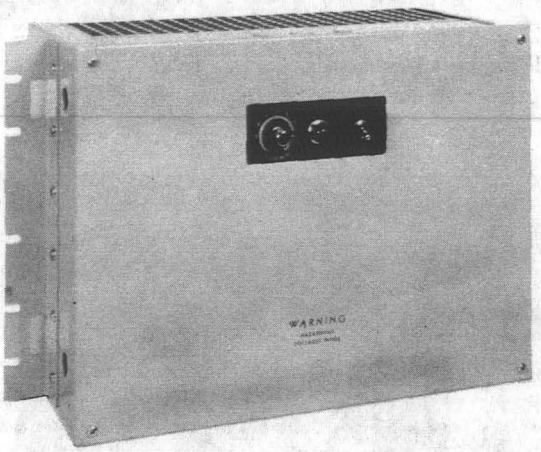

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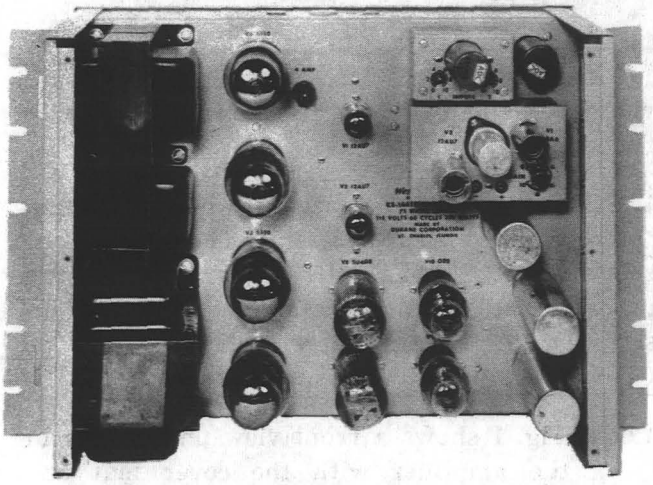

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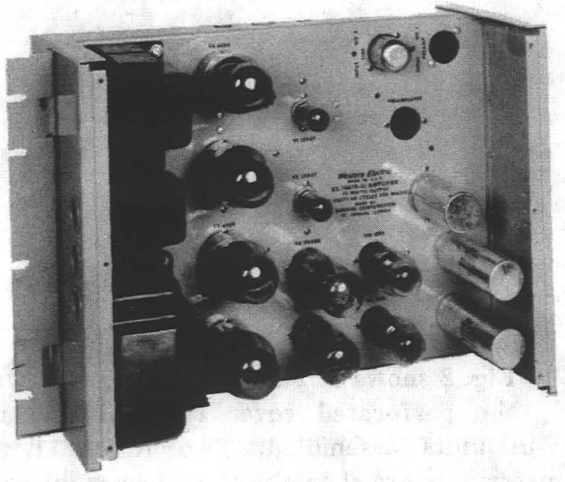

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Frequency Response:

± 1 db from 50 to 10,000 cps.

Low Frequency Roll-Off:

Three low frequency roll-off filters can be connected in circuit by screw terminals on TB4 to give low frequency attenuation of 6 db per octave with 3 db points at approximately 100, 400 and 1000 cps. The application of the roll-off is discussed with the curves in Part 6 of this practice.

Gain Control:

Continuously variable potentiometer.

Output Noise:

−30 dbm. (unweighted and maximum gain)

3. MECHANICAL CHARACTERISTICS

3.01 The mechanical characteristics of the amplifier are as follows:

Mechanical:

Width: 16-1/4" without mounting flanges. 19" with mounting flanges.

Height: 12-3/16".

Depth: 8-5/16" (front projection from mounting surface approximately 4-3/4").

Weight: 42 pounds.

Mounting: Ten, No. 12-24 screws.

Finish: Light gray enamel — chassis. Dark gray — perforated cover.

Electron Tubes:

The following electron tubes are required for the amplifier and are supplied with it:

TUBE DESIGNATION	CODE	FUNCTION
V1	12AU7	Voltage Amplifier
V2	12AU7	Voltage Amplifier and Phase Inverter
V3	6550	Output)
V4	6550	Output) Parallel
V5	6550	Output) Push-Pull
V6	6550	Output)
V7	5U4GB	Rectifier
V8	5U4GB	Rectifier
V9	OD3	Voltage Regulator
V10	OD3	Voltage Regulator

4. MOUNTING AND MECHANICAL ARRANGEMENTS

4.01 The amplifier is designed to mount on a standard 19" relay rack by means of screws. The mounting flanges are readily detachable so that the amplifier may be mounted on a table or shelf.

4.02 When the amplifier is placed on a shelf or table, the mounting flanges should be removed. The controls should be relocated in the appropriate holes in the chassis. The amplifier is supplied with four rubber feet and these should be fastened under the screws which normally hold the front cover in place.

4.03 The front cover may be removed to provide access to the wiring side of the chassis. A perforated rear cover protects the electron tubes and apparatus and it may be easily removed.

4.04 The gain control, pilot light and power switch are located on the front of the chassis and extend through the front cover for accessibility. When the unit is to be placed on a table or shelf (with tubes in vertical position) the above components should be relocated on the side of the chassis in the holes provided for this purpose. The snap buttons which normally cover these holes may be used to cover the holes from which the components were removed.

4.05 The amplifier should operate satisfactorily in normal room ambient temperatures. However, if the ambient is above 100°F, trouble may be experienced if the amplifier is operated continuously.

4.06 Not more than three KS-16610, L1 Amplifiers should be mounted in the same relay rack. Not more than two should be mounted in an enclosed cabinet. The minimum spacing between each amplifier should be at least 3-1/2" in either situation.

4.07 When the amplifiers are mounted in an enclosed cabinet it is advisable to allow at least 100 square inches of open area above the top amplifier and below the bottom amplifier. This will provide an open path for convection currents to flow which will provide some cooling.

4.08 The amplifiers should be mounted so that the tubes are toward the rear of the frame (normally the "wiring side" of the frame or rack). The cover mat and external controls will then be on the "apparatus side" of the frame or rack.

4.09 The end of the gain control shaft is slotted for screwdriver adjustment and is protected from accidental turning by means of a removable cap. The power switch is also protected from accidental operation by means of a guard.

4.10 Two 13/16" diameter holes, equipped with spun eyelets, are located on the left end of the chassis and one is located on the right end. These are provided for external connections. In addition to these, one 7/8" diameter hole is provided on the right end of the chassis for the ac power connections.

4.11 All terminal boards are located on the wiring side of the chassis. These are designated TB1, TB2, TB3 and TB4.

5. EXTERNAL CONNECTIONS

5.01 All power connections should be made in accordance with local wiring codes. Terminal No. 41 is provided for a ground connection where the local code requires a 3-conductor cord. The ac power leads should be brought through the lower right-hand entrance hole adjacent to TB3. Power connections to the amplifier should be made in accordance with Table I. A satisfactory central office ground wire should be connected to terminal No. 32 of TB2.

TABLE I

TERMINAL NO.	CONNECTION
42	Ungrounded side of ac line
43	Grounded side of ac (110-120 volts)
44	Grounded side of ac (120-130 volts)

5.02 A 2-conductor flexible cord, 8 feet long, is provided with each amplifier. It is equipped with a parallel blade molded plug. An adapter and a strain relief bushing are also furnished with the cord. The black conductor should be connected to terminal No. 42 and the white conductor to terminal No. 43 or 44.

5.03 The input arrangements are discussed in detail in Section AA466.075 (AB48.153.5). The connections should be brought through one of the entrance holes at the left end of the chassis.

5.04 The lead with the spade tip from terminal 7 on the INPUT NO. 2 LINE socket should normally be connected to the unmarked terminal on TB4. If low frequency roll-off is desired, this connection should be changed to one of the terminals marked 1000, 400 or 100 depending upon the amount of low frequency attenuation required. The terminals marked HI FREQ on TB4 should be strapped if high frequency roll-off is required. These features are discussed in more detail in Part 6.

5.05 The amplifier output connections should be brought through the upper entrance hole at the right end of the chassis. Connections should be made to terminals on TB2 in accordance with Table II.

TABLE II

NOMINAL LOAD IMPEDANCE	STRAP TERMINALS	OUTPUT CONNECTIONS
1 ohm	24-26-28-30, 25-27-29-31	24 and 25
4 ohms	25-26, 29-30, 24-28, 27-31	24 and 27
9 ohms	25-26, 27-28	24 and 29
16 ohms	25-26, 27-28, 29-30	24 and 31
67 ohms (70 volts)	NONE	21 and 23

6. TRANSMISSION INFORMATION

6.01 Fig. 4 shows the frequency response of the KS-16610, L1 Amplifier. The response of the low impedance outputs is combined into one curve since they are almost identical.

6.02 Fig. 5 shows the frequency response of the amplifier with low frequency roll-off. This feature is provided to reduce the output level of the frequencies in the low end of the band and thereby prevent damage to reproducing horns. This feature may also be used to minimize auditorium reverberation at the lower frequencies. The connections for the desired roll-off are made on TB4.

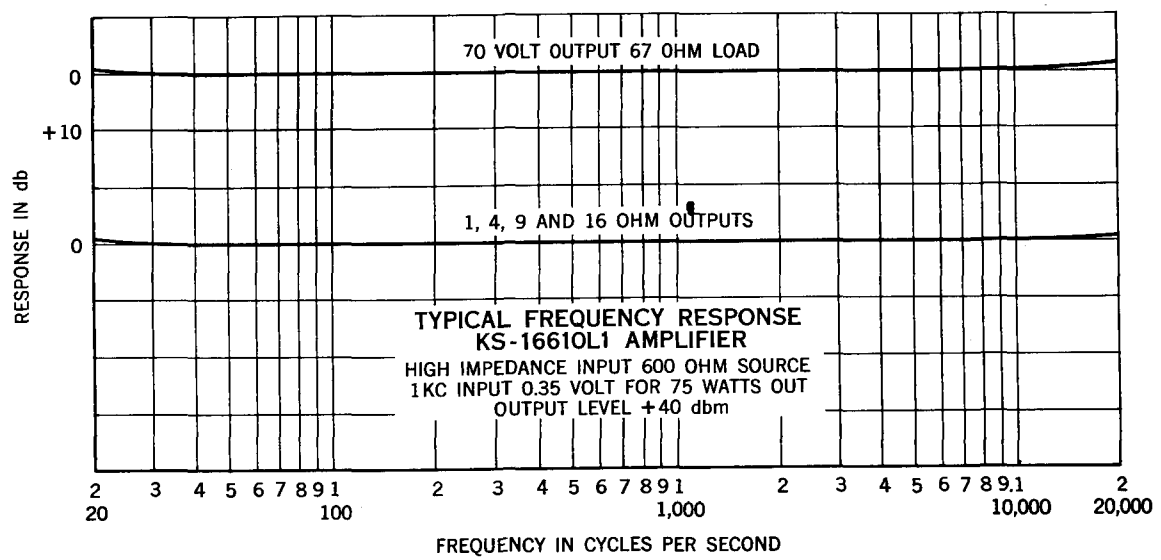

Fig. 4 – Frequency Response — High Impedance Input

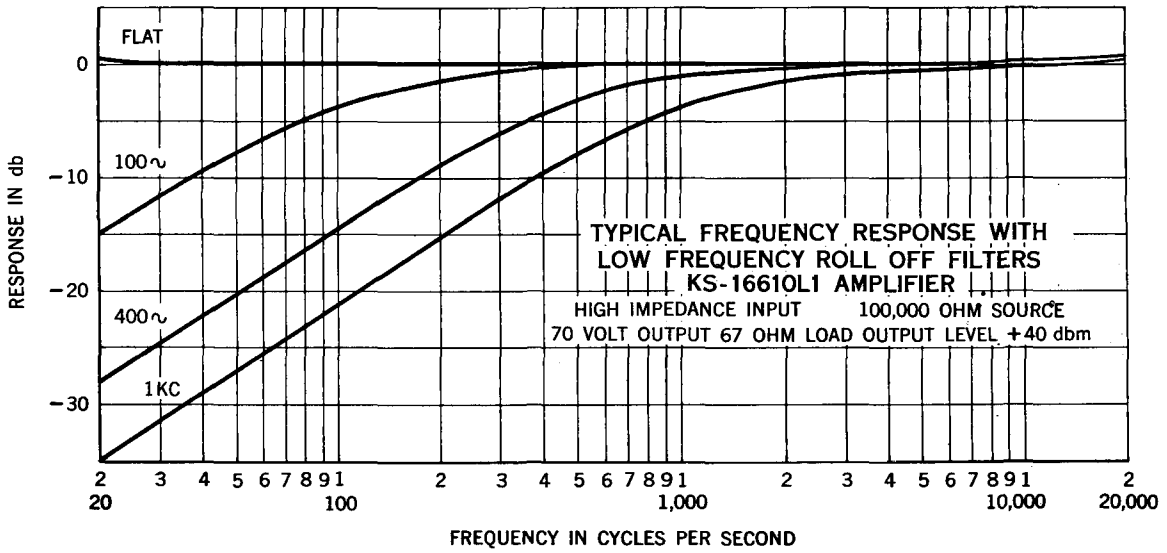

Fig. 5 – Response with Low Frequency Roll-Off

6.03 Fig. 6 shows the power output characteristics of the amplifier for 1% and 5% distortion. The curves shown are typical for all the output impedances.

6.04 Fig. 7 shows the frequency response of the KS-16610, L1 Amplifier when it is equipped with a KS-16611, L1 Transformer. In most situations, the amplifier will be used with a transformer input.

6.05 Fig. 8 shows the frequency response when the KS-16610, L1 Amplifier is equipped with a KS-16607, L1 Amplifier and a KS-16611, L1 Transformer. The curves show the various options for low frequency cutoff. These options are available for the reasons discussed previously.

6.06 Fig. 9 shows the high frequency roll-off characteristics of the basic amplifier when it is equipped with a preamp and transformer.

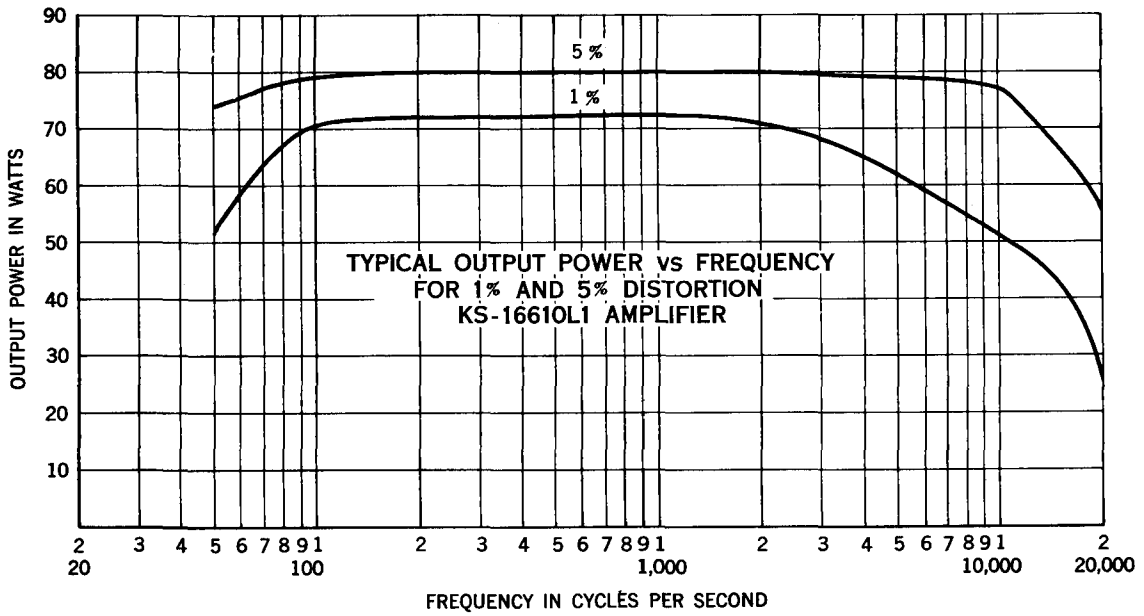

Fig. 6 – Output Power vs. Frequency

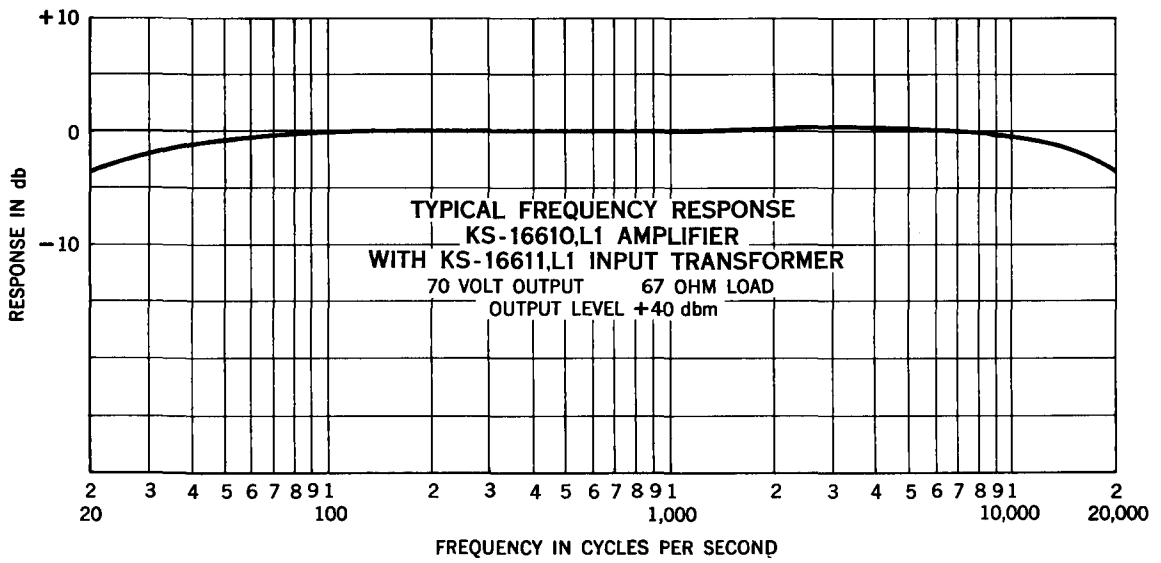

Fig. 7 – Frequency Response with Transformer Input

The connection is made by strapping the HI FREQ terminals of TB4. This drooping characteristic of the amplifier is used to compensate for the rising characteristic of a carbon microphone at the high end of the band. The end result is a more uniform over-all frequency response.

6.07 Fig. 10 shows the frequency response of the amplifier with various options for low frequency roll-off filters. The amplifier is equipped with a plug-in transformer. In most situations the amplifier will be equipped with a transformer. The need for roll-off filters has been discussed previously.

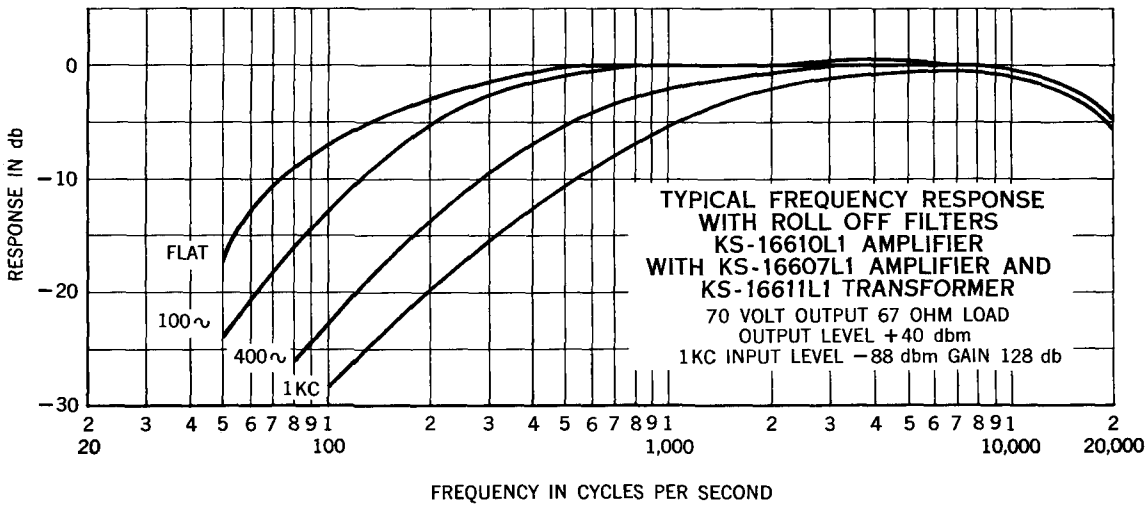

Fig. 8 – Roll-Off Frequency Response of Basic Amplifier Equipped with Preamp and Transformer

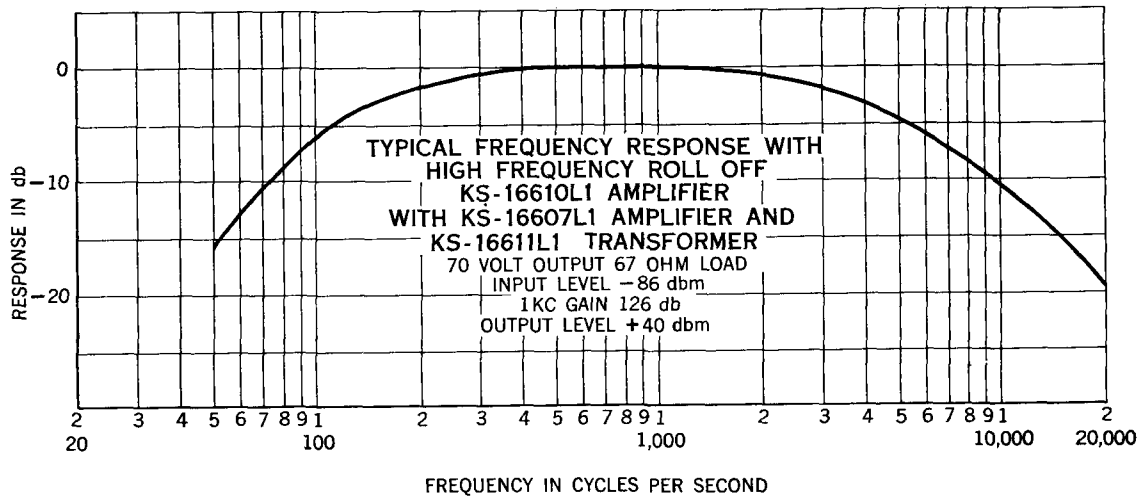

Fig. 9 – Response with High Frequency Roll-Off When Equipped with Preamp and Transformer

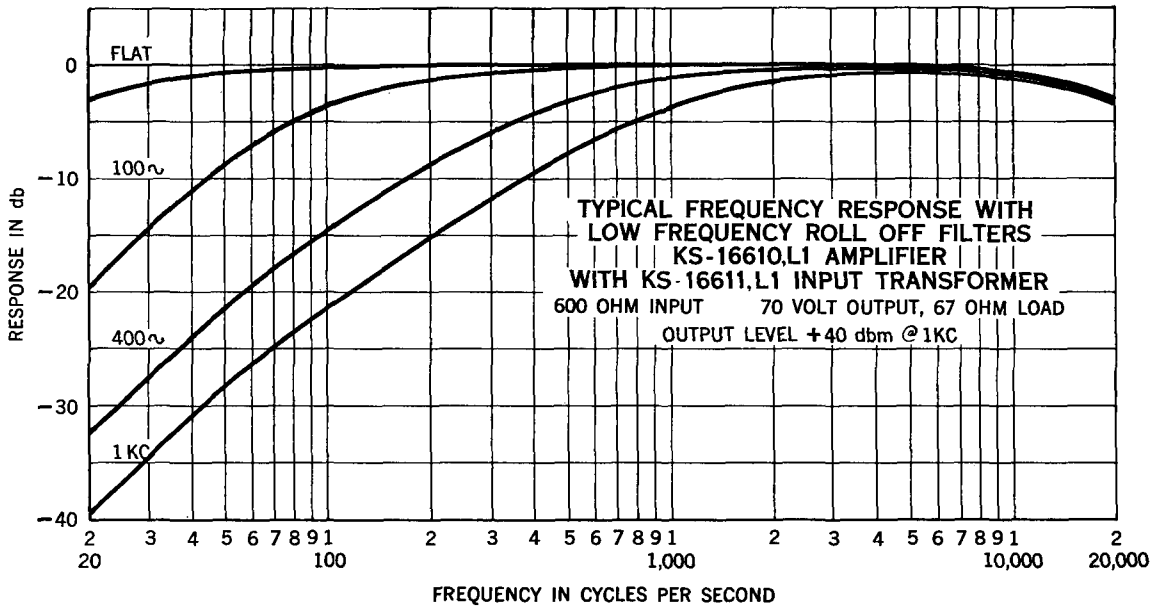

Fig. 10 – Frequency Response with Transformer and Low Frequency Roll-Off