p for G.D.B.

Microphon

Figure 1 — Cardioid Microphone 639A showing 3 selectivity patterns.

IDIOID MICROPHONES 639A AND 639B

— The 639 Type Microphones, because of their high y and cardioid directivity, are excellent for broadcast ublic address use, not only as all-purpose microphones lso as the solution to many difficult pick-up problems.

Description — Each microphone is a combination of a dynamic moving coil type pressure element and an improved ribbon type velocity actuated element enclosed in an attractive housing which serves as a protective guard and as a wind screen. The outputs of these two elements are combined in various proportions to yield the following patterns:

When combined equally, the directional characteristic is the heart-shaped cardioid curve "C" shown in figure 1. ei her element alone presents patterns "D" (dynd "R" (ribbon). These characteristics are availith either the 639A or the 639B Microphone.

The cardioid directional performance of the 639 Microphones over the entire useful frequency range insures a practical wide pick-up angle of at least 120° at the front of the microphone over which the quality is unchanged and the sensitivity remains practically the same.

The 639B Microphone has the above characteristics and in addition, patterns 1, 2, and 3, which combine the outputs of the two elements in three other ratios and produces the patterns shown in figure 2.

Since the problems of pick-up in studios and remote locations are different for each condition and since they may change from time to time these multi-purpose microphones can be used by the engineer to obtain the best possible pick-up under varying and difficult conditions.

Pick-up problems, such as the following, can either be improved or overcome by the use of the 639B with its directivity patterns, which may be selected by means of a simple screwdriver operated switch:

In the Studio — when sound treatment is not fully effective and control of undesired sound pick-up is necessary.

In the Playhouse or Night Club — where there is an excess of audience noise or where it is desired to give the artist the freedom of working at a greater distance from the microphone.

In Public Address Installations — where accoustical feedback takes place before a satisfactory reinforcement level can be reached.

Figure 2 — Cardioid Microphone 639B showing 6 selectivity patterns.

Features

High Quality.
Three-way (639A) or six-way (639B) directivity patterns.
Solves many difficult pick-up problems.
Dynamic moving coil type pressure element.
Improved type velocity activated element.
Multi-purpose microphones.

Specifications:

Frequency Response: Essentially uniform from 40 to 10,000 cycles.

Sensitivity: Open circuit terminal voltage 64 db below 1 volt per 10 dynes per square centimeter which is equivalent to 84 db below 1 volt for one dyne per square centimeter.

Signal-to-Noise Ratio: The signal for 10 dynes per square centimeter sound pressure is 78 db above the thermal agitation noise generated within the microphone; 58 db for 1 dyne per square centimeter.

Directivity, 639A: Three patterns C, D, R, selectable through three position screwdriver operated switch. At the angle of minimum response the average discrimination with respect to 0° response is 20 db over the range from 40 to 10,000 cycles.

Directivity, 639B: Six patterns R, D, C, 1, 2 and 3 selectable through six position screwdriver operated switch. At the angle of minimum response the average discrimination with respect to the 0° response is 20 db over the range from 40 to 10,000 cycles.

Impedance: The impedance varies somewhat throughout the frequency range, but has an average value of 40 ohms. The microphone is intended for use with equipment having a rated source impedance from 25 to 50 ohms.

Power Output Level: —56 dbm for a sound pressure of 10 dynes per square centimeter, or —76 dbm for 1 dyne per square centimeter when the microphone is terminated with a resistance equal to its internal impedance. Experience indicates that approximately ten dynes per square centimeter sound pressure is produced at conversational level three feet from a microphone.

Mounting: Both floor and desk type stands of attractive design are available. These, together with a number of other accessories, are described under "Microphone Accessories."

Dimensions and Weight For 639A and 639B: Height 7½" including the plug terminal, length 4-7/16", width 3-7/16", weight 3¼ lbs.

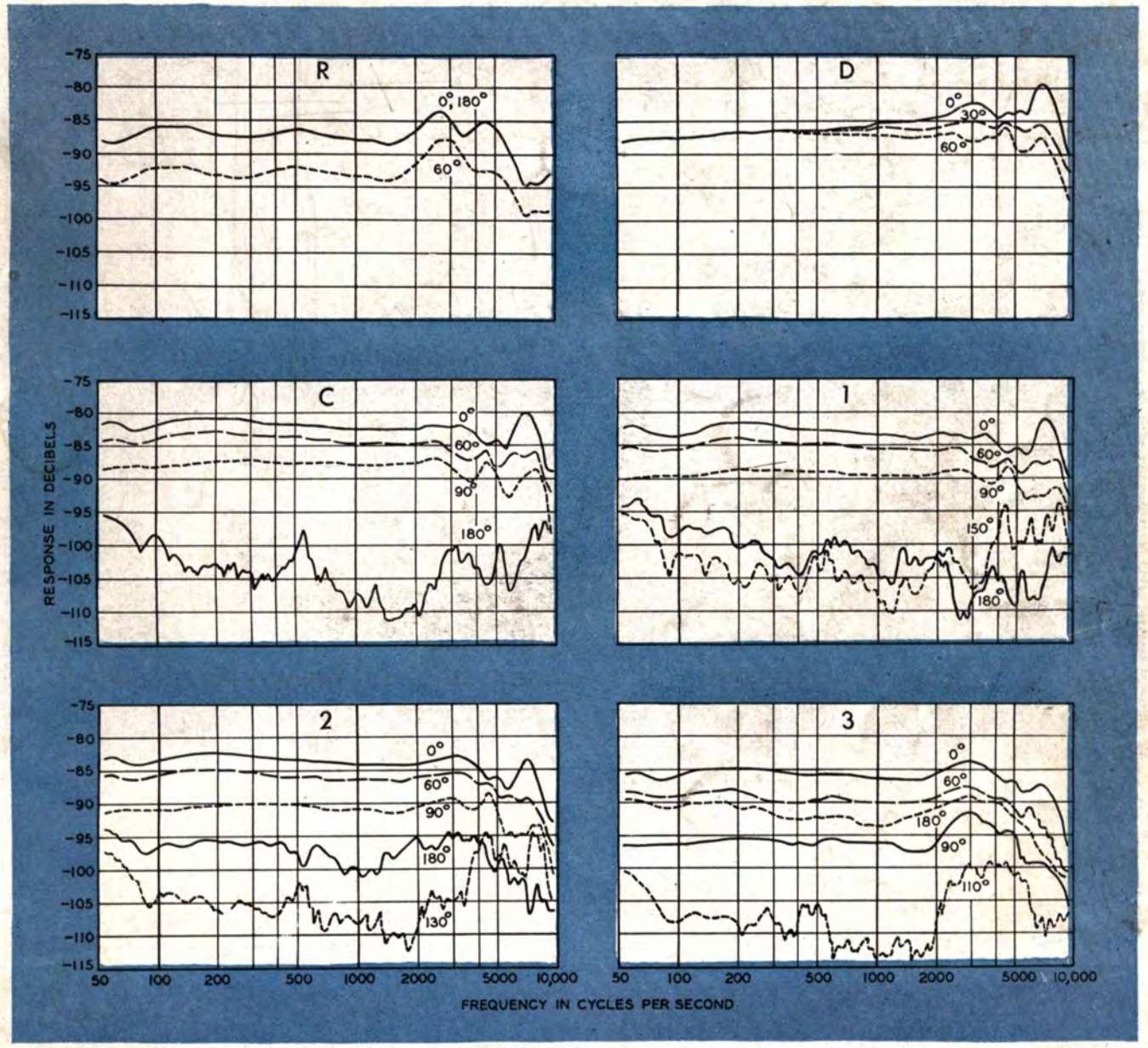


Figure 3 — Field responses of a typical production model 639B Microphone for the six switch positions. Because of the unusually wide discrimination, the lower curves in each group contribute negligible amounts to the total pick-up. Minute variations in the sensitivity of the individual elements prevent absolute cancellation and account for the unevenness of these curves on a decibel scale.

Curve R shows the response of the ribbon element alone, switch on R. The response at 0° and 180° is the same and maximum. The microphone is bi-directional and has a minimum response at 90°.

Curve D shows the response of the dynamic element alone, switch on D. The microphone is now essentially semi-directional. The variations of response with angle of incidence at the higher frequencies are caused by diffraction.

Curve C shows the response of the cardioid microphone, switch on C. The ribbon and dynamic elements are combined to produce maximum response at 0° and minimum response at 180°.

Curve 1 shows the response of the microphone with the switch on 1. Again the ribbon and dynamic elements are combined, this time in such a way that minimum response is obtained at the two 150° points. This directive pattern is slightly better than either R or C for discriminating against general room noise.

Curve 2 shows the response of the microphone with the switch on 2. This combination of ribbon and dynamic elements produces minimum response at the two 130° points.

Curve 3 shows the response of the microphone with the switch on 3. The ribbon and dynamic elements are combined to produce minimum response at the two 110° points.

Figure 4 — The 633A "Salt Shaker" Microphone.

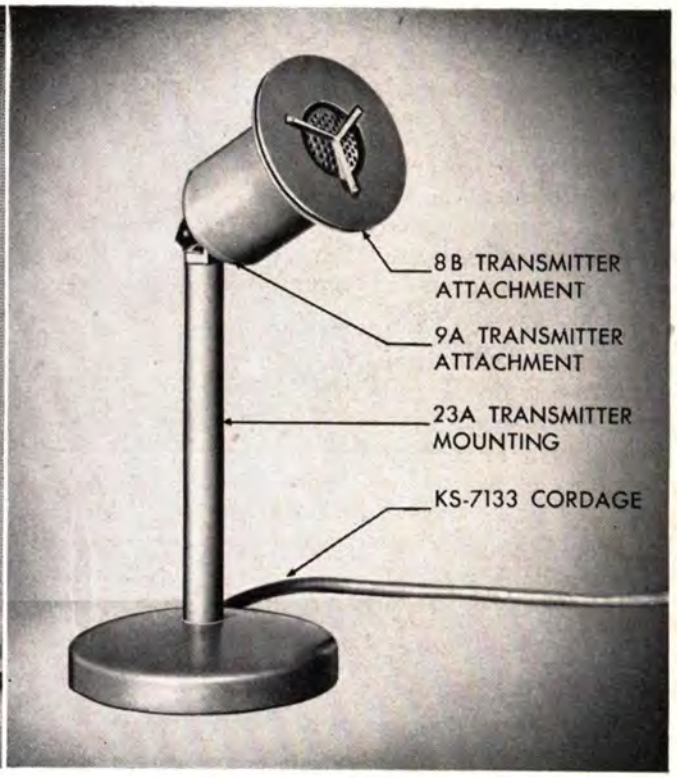


Figure 5 — The 633A Microphone with the 8B Transmitter Attachment (Baffle).

DYNAMIC MICROPHONE 633A

Use — This microphone is designed for application in radio broadcasting, high quality public address, announcing and sound distribution systems. Ruggedness, dependability, high quality and either non-directional or semi-directional performance are features which have contributed to its popularity.

Description — Having an impedance of approximately 20 ohms, the microphone is intended for use with equipment nominally rated at 25 to 50 ohms source impedance. Because of this low impedance the microphone may be used as much as 200 feet to 300 feet (or more) from associated amplifying equipment when connection is made with twisted pair, shielded microphone cordage.

For sound arriving along a line perpendicular to the plane of the diaphragm, the response is, for all practical purposes, uniform over the range of 40 to 10,000 cycles. This, however, includes a peak of up to 10 db in the neighborhood of 6,000 to 8,000 cycles.

For sound arriving along a line parallel to the plane of the diaphragm, the 633A has a uniform response over the frequency range of 50 to 10,000 cycles.

For non-directional use the microphone is mounted vertically on a stand or suspended by its cordage.

Because of the cylindrical symmetry of the microphone the above responses hold for all angles of approach in the horizontal plane (i.e., plane of the diaphragm).

The "in-between" characteristics or directional effects may be utilized by tilting the microphone at the desired angle. The 9A Transmitter Attachment (Swivel Joint) is available for this purpose. The directional effect may be further accentuated by the use of the 8B Transmitter Attachment (Baffle) a disc 3¼" in diameter which fits snugly over the face of the microphone and increases its sensitivity for sound arriving along a line perpendicular to the diaphragm over the range from 1,000 to 5,000 cycles.

Features

Non-directional and semi-directional performance.
Excellent frequency response.
Rugged construction.
Low impedance output.
Stand or suspension mounting.
Baffle for increased directivity.

Specifications

Frequency Response: 40 to 10,000 cycles.

Operates Into: 25 to 50 ohms.

Sensitivity: Open circuit terminal voltage 70 db below 1 volt per 10 dynes per square centimeter which is equivalent to 90 db below 1 volt per 1 dyne per square centimeter.

Power Output Level: —59 dbm for a sound pressure of 10 dynes per square centimeter or —79 dbm for 1 dyne per square centimeter when the microphone is terminated with a resistance equal to its internal impedance. Experience indicates that approximately ten dynes per square centimeter sound pressure is produced at conversational level three feet from a microphone.

Mounting: Both floor and desk type stands of attractive design are available. These together with a number of other accessories are described under "Microphone Accessories."

If the 633A Microphone is to be mounted in the same manner as, or interchangeably with, the 639 type microphones, on table or floor stands equipped with a 442-A Jack and 712-A Adapter, a 311-A Plug may be attached either to the 9A Swivel Joint or to the microphone and wired to the microphone terminals.

The 22A Transmitter Mounting (Floor Stand) or 23A Transmitter Mounting (Table Stand) as well as the 8B Transmitter Attachment (Baffle), 9A Transmitter Attachment (Swivel Joint), 311-A Plug and KS-7133 Cordage should be ordered separately. Unless otherwise specified, the cordage will be furnished in 20′ lengths.

Dimensions: 2″ in diameter and 3½″ long.

Weight: 10 ounces.

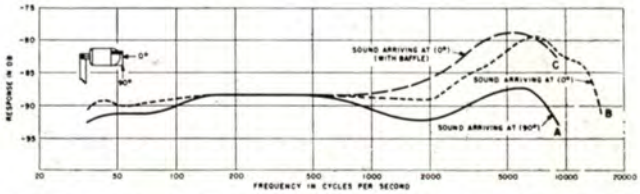


Figure 6 — Typical field response for 633A Microphone. 0 Decibels = 1 volt per dyne per square centimeter (open circuit voltage across output impedance of 20 ohms).

640AA CONDENSER MICROPHONE

Tops for FM

Use — The Western Electric 640AA Condenser Microphone offers numerous distinctive advantages both to the acoustical technician and to the broadcast studio engineer.

As a laboratory instrument this microphone incorporates the most recent technical advances in the precision measurement of sound intensity over a wide range of temperature and humidity conditions. Accurate, scientific production tests of other sound instruments such as receivers, loudspeakers and microphones may also be obtained through its use.

In the broadcasting field, when associated with its companion RA-1095 Amplifier, the 640AA Microphone provides a means for ultra-faithful program pick-up especially in auditoriums or in large studios which have proper acoustical characteristics for use of the remote single microphone pick-up

Figure 7 — 640AA Microphone.

Figure 8 — 640AA Microphone and its associated RA-1095 Amplifier.

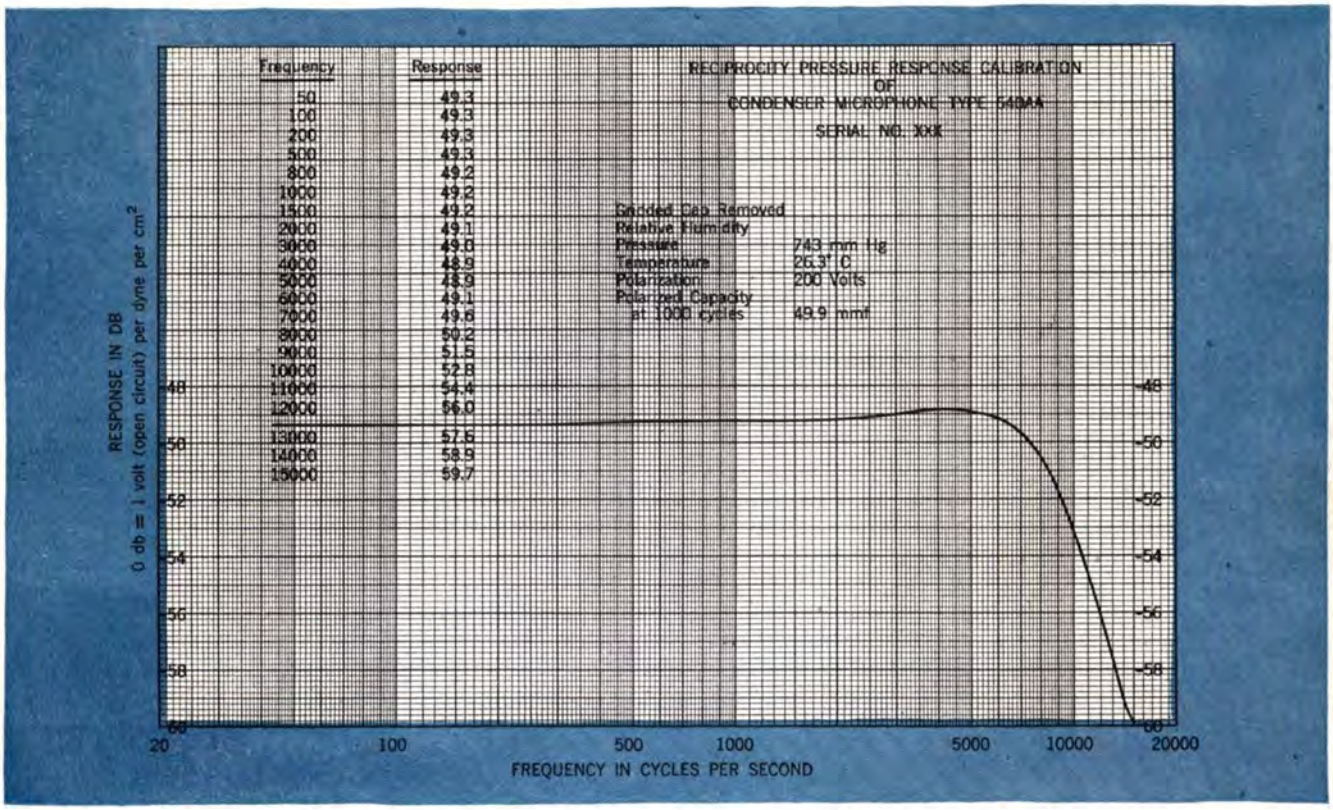


Figure 9 — Typical Pressure Calibration Chart of 640AA Condenser Microphone.

technique. This application is particularly effective where orchestras or similar large groups are involved. Another ideal application is for use as a cast microphone in broadcast stations and motion picture studios.

Description — The 640AA Condenser Microphone is furnished in a bright metal, cylindrical housing approximately 1″ in diameter and 1″ long. It is similar to its predecessor, the 640A Microphone, except for improved stability with respect to time, temperature and humidity.

For laboratory and test applications, the order should specify that the unit be supplied calibrated. This calibration will be in accordance with procedures established by the U.S. Bureau of Standards, Cruft Laboratories and Bell Telephone Laboratories, Inc. The stability of the 640AA Microphone is such that it will hold its calibration constant over a long period of time when treated with reasonable care. The stainless steel diaphragm and the diaphragm supporting ring have approximately the same expansion coefficients, thus assuring accurate sound measurements over an unusually wide range of ambient temperature.

This microphone is provided with a removable grid over the face of the diaphragm to afford mechanical protection under normal program pick-up conditions.

The pressure response characteristic shown in Figure 9, which is applicable only to measurements in small chambers, is approximately constant to 6,000 cycles per second and then falls off uniformly to the extent of about 8 db at 15,000 cycles per second. Being a condenser microphone it is designed to work into a high impedance grid circuit of a closely associated amplifier stage. The pressure response level of the microphone unit (less amplifier), in the 50 to 6,000 cycle range with 200 volts polarizing potential, is approximately 49.5 db below 1 volt (open circuit) per dyne per square centimeter. Pressure and free-field levels are identical from 50 to 500 cycles per second.

A chart (*Figure 9*) is supplied with *calibrated microphones* which, in addition to the pressure response curve, shows the conditions of test, namely, the polarized capacity at 1,000 cycles, polarizing voltage, relative humidity, barometric pressure, ambient temperature and other conditions of calibration. This chart also tabulates the response values for the specific instrument in convenient steps from 50 to 15,000 cycles per second. In order for the calibration to apply exactly, the instrument should be used under conditions identical to those under which it was calibrated. Suitable correction factors can, of course, be determined at the point of use if these conditions must be altered.

Features

Precision measurement of sound intensity.
Ideal for measuring frequency response of sound instruments.
Unvarying excellence under a wide range of temperature and humidity.
Removable cover for mechanical protection.
Small size diaphragm improves fidelity, forestalls phase

distortion, approaches "Ideal" of "point pick-up."
In combination with the RA-1095 Amplifier, it is especially adaptable for ultra-faithful pick-up in auditoriums, large studios, or cast microphone in small studios.
Especially effective for single microphone pick-up technique for large orchestras and choral or similar groups.
Compactness.

Specifications for the 640AA Microphone

Frequency Response: Pressure Response—See Figure 9.
Free-Field Response—See Figure 10.

Sensitivity: Approximately 49.5 db below 1 volt (open circuit) per dyne per square centimeter with 200 volts d-c polarizing potential.

Operates Into: High impedance grid circuit of closely associated vacuum tube amplifier (such as Western Electric RA-1095 Amplifier).

Output Impedance: Essentially that due to its capacitance which is approximately 50 mmf. to 60 mmf.

Polarizing Voltage: 200 volts d-c from well regulated quiet supply.

CAUTION: *Polarizing voltage exceeding 200 volts should not be applied as high voltages may damage the instrument.*

Mounting: Mount in structure containing first amplifier stage.

External Connection: The microphone should be connected to the grid of the vacuum tube by means of a short, well-shielded, low capacitance lead to center contact at rear of instrument. The cylindrical shell of the microphone should be connected to the ground of the vacuum tube circuit thereby serving as a shield for the inner components.

Dimensions: Cylindrical shape approximately 1″ diameter and 1″ long.

Weight: Approximately 1½ ounces.
Protection: Provided with a dust cap for each end of the cylinder when instrument is not in use.

Installation — In mounting the 640AA Microphone, it is important that its associated amplifier be arranged mechanically so as to preserve as nearly as possible the freedom from distortion of the sound field which is inherent in the small physical proportions of the microphone element.

The free-field response characteristics of the 640AA Microphone mounted on the RA-1095 Amplifier are shown in Figure 10. The difference in shape between the zero degree free-field curve, and the pressure calibration shown in Figure 9, is due almost entirely to diffraction effects which result when the microphone is placed in a free sound field, and not to the amplifier which has practically no effect on the shape of the response characteristic. The range covered, it will be noted, is admirably suited to the highest quality AM or FM program transmission requirements. With the line of sound approach normal, or perpendicular to the plane of the diaphragm, (0 degrees), the response is approximately constant for sounds in the frequency range between 50 and 1,000 cycles per second. Above 1,000 cycles the response rises gradually to a maximum of about 8 db at 8,000 cycles, then drops uniformly to a level which at 15,000 cycles per second is roughly equal to that at 1,000 cycles per second.

As illustrated in Figure 10, the response of the 640AA Microphone varies somewhat in the higher frequencies depending on the direction from which the sound wave approaches the diaphragm.

For pick-ups such as are common in broadcast applications, the small, bullet shaped Western Electric RA-1095 Amplifier described on the following page serves ideally both as a mounting for the 640AA Microphone and as a means of providing the unit with first stage amplification and polarizing voltage. Where a microphone boom or other similar device is used to direct the microphone toward a given sound source, the amplifier should be shock-mounted by means of soft springs or rubber supports to isolate the elements from possible mechanical vibrations which are likely to produce noise.

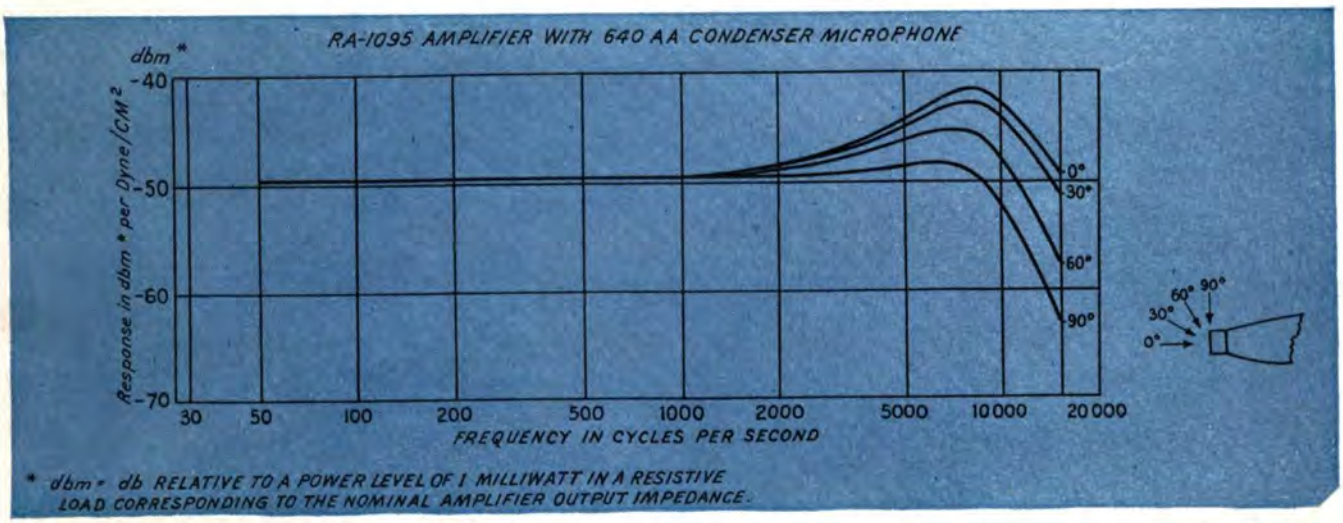


Figure 10 — Typical Free-Field Curve of 640AA Microphone mounted on the RA-1095 Amplifier.

AMPLIFIER RA-1095

Use — The RA-1095 Amplifier is a small, single stage amplifying unit developed especially for use with the 640 type Condenser Microphone.

Description — Streamlined in shape, this amplifier is approximately 7¾" long by 2½" in diameter and weighs only 1¾ lbs. All components are housed in a removable spun metal casing which is normally finished in bright chromium but can be obtained in a non-reflecting dark aluminum, wrinkle gray.

A threaded recess at the pointed end of the housing permits screwing the 640AA Microphone securely in place so that the two units present a uniform surface offering the least possible disturbance to the surrounding sound field.

The output level of this efficient combination for a given sound field is about 28 db higher than the 639 type high quality studio microphones and the signal-to-noise ratio compares favorably (see specifications). The frequency response characteristic of the amplifier is such as to assure optimum results from the use of the 640AA Microphone as an ultra-faithful pick-up device. The free-field frequency response characteristics for the combination are shown in Figure 10.

The amplifier is furnished complete with a selected 382A Vacuum Tube of the familiar "door knob" type. A row of terminals arranged alphabetically is provided on the outside of the amplifier base to permit strapping for different impedance conditions (see specifications). The amplifier case is designed to slip easily off the narrow end of the chassis frame to allow ready access to these connections.

Features

Designed specifically for 640AA Microphone.
Ease of attachment.
Ease of access to strapping arrangements.
Variety of application.
High signal-to-noise ratio.
High output level for low sound field.
Single stage amplifier.

Specifications for the RA-1095 Amplifier

Frequency Response: See Curve Figure 10.

Load Impedance: 30-50 or 200-250 ohms.

Operates From: 640A or 640AA Condenser Microphone.

Power Output Level: Approximately −29.5 dbm when used with the 640AA Microphone for a sound pressure of 10 dynes per square centimeter. Experience indicates that approximately ten dynes per square centimeter sound pressure is produced at conversational level three feet from microphone.

Signal-to-Noise Ratio: 85 db below 0.5 milliwatts measured with microphone elements replaced by shielded 45 micro-micro farad condenser.

Distortion: One per cent for an output of 0.5 milliwatts with a single fundamental frequency of 400 cycles. *Normal output level less than 0.0005 milliwatts.*

Power Supply: Quiet sources required for both filament and plate power.

Filament: 6.3 volts, 150 milliamperes, d-c.

Plate: 200 volts, 3 milliamperes, d-c.

CAUTION: *Plate voltages exceeding 200 volts should not be applied when the 640 type microphone is attached, as high voltages may damage the instrument.*

External Connections: Through 6 prong socket in base of Amplifier (Use Cannon 6 hole female plug P6-11). Suitable six conductor shielded cordage is available from our nearest distributor.

Dimensions: Approximately 7¾" long, 2½" diameter.

Weight: Approximately 1¾ pounds.

Installation — Because of the variety of applications for which this microphone is suited no mounting is supplied as a part of the amplifier. A shock-type mounting however should be used to insulate the microphone from the microphone support. Suitable mounting devices are available through our nearest distributor.

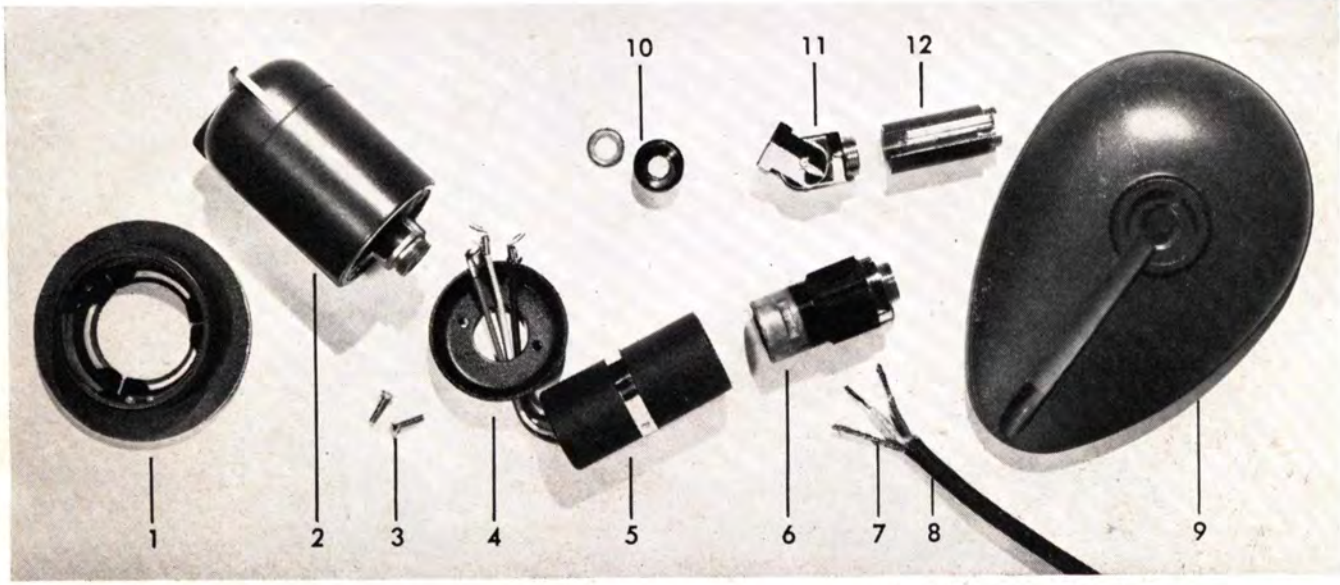
Figure 11 — RA-1095 Amplifier with Cover Removed.

Figure 12 — Base of Amplifier Showing 6 Prong Socket.

ACCESSORIES FOR 633A AND 639 TYPE MICROPHONES

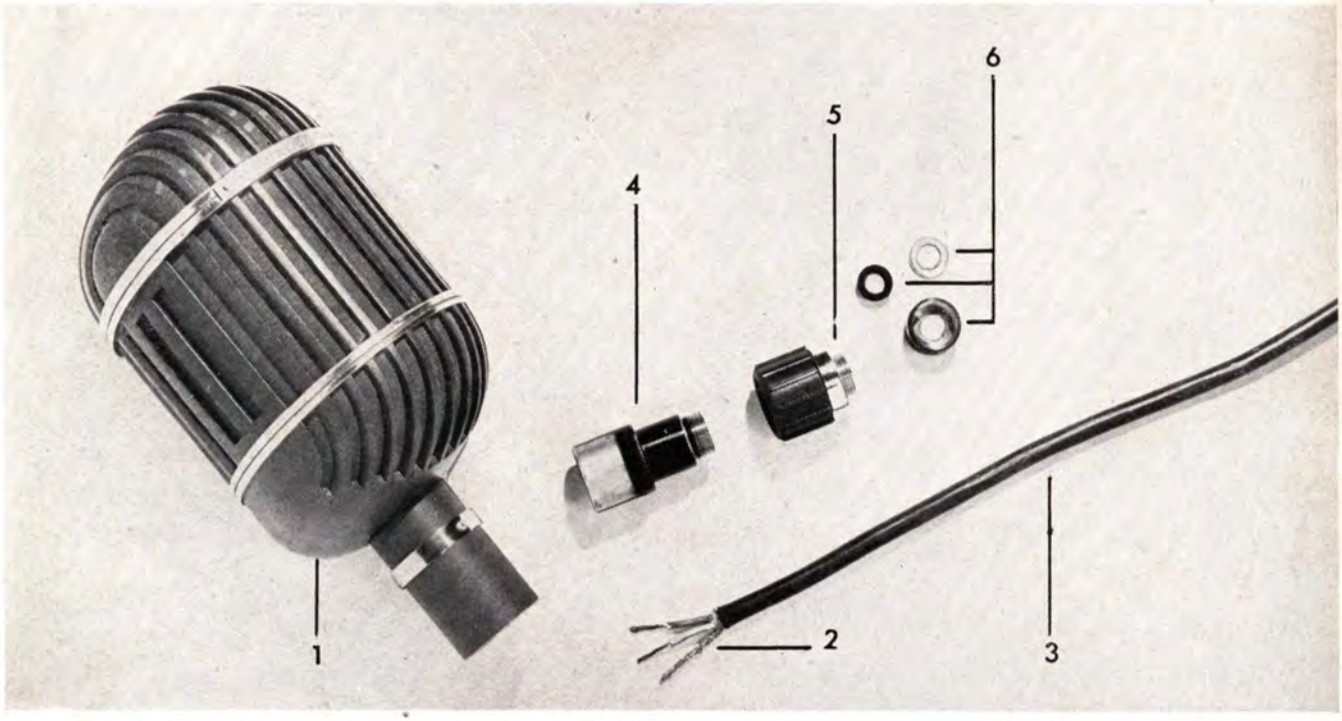
Figure 13 — 633A Microphone, with 8B Transmitter Attachment (Baffle), 311A Plug, 9A Transmitter Attachment (Swivel Joint), and 713A Adapter, mounted on 24A Transmitter Mounting.

Figure 14 — Left: 639 Microphone mounted on a 22A Transmitter Mounting (Floor Stand); Right: 633A Microphone (with 8B Baffle). This shows the ease of interchangeability of microphones when the 633A is equipped with the 311A Plug.



1. *8B Transmitter Attachment (Baffle)*
2. *633A Microphone*
3. *Screws from base of 633A Microphone*
4. *Cover for 633A Microphone*
5. *311A Plug*
6. *442A Jack and 712A Adapter*
7. *Shield Braid*
8. *KS-7133 Cordage*
9. *24A Transmitter Mounting*
10. *Parts of 442A Jack (unused for this application)*
11. *9A Transmitter Attachment (Swivel Joint)*
12. *713A Adapter*

Figure 15 — 633A Microphone and Mounting Accessories.



1. 639 Microphone
2. Shield Braid
3. KS-7133 Cordage
4. 442A Jack
5. 712A Adapter
6. Parts of the 442A Jack

Figure 16 — 639 Microphone and Accessories.

Several accessories are available for use with the 633A and 639 Type microphones. They are designed to permit the operator to use these microphones interchangeably on desk and table stands.

CORD ASSEMBLY

A Cord Assembly consisting of the 442A Jack, 712A Adapter, and KS-7133 Cordage is required for all applications of 639 Type Microphones. This Cord Assembly is used when the 639 Type Microphone is mounted on the 22A, 23A, or 24A Transmitter Mountings or is suspended from the 11A Transmitter Attachment.

442A JACK

The 442A Jack terminates the microphone cord at the microphone end. This jack when fitted with the 712A adapter fits the projecting cylindrical plug which is an integral part of the 639 Type Microphone and also the 311A Plug, which may be attached to the 633A Microphone.

311A PLUG

633A Microphones equipped with this plug may be used with the Cord Assembly. This makes it possible for customers who use both the 633A and the 639 Types of Microphones to use them interchangeably, as the particular application may dictate, on the 22A or 23A Stands. Equipped with 442A jacks and 712A adapters.

712A ADAPTER

Used in conjunction with the 442A Jack to give greater mounting security for 633A microphones equipped with 311A plugs and 639 Type microphones. New rubber sleeves for replacement may be ordered separately per ES-764300-2.

11A TRANSMITTER ATTACHMENT (Suspension Mounting)

For suspension mounting of the 639 Type Microphones, the 11A Transmitter attachment and the Cord Assembly are required.

The 11A Transmitter Attachment and the Cord Assembly are also used with the 639 Type Microphones, when mounted on either the 22A, 23A or the 24A Stand, if tilting of the microphone is desired.

9A TRANSMITTER ATTACHMENT (Swivel Joint)

This swivel joint is for use with the 633A Microphone. It makes possible tilting of the microphone to any desired angle from vertical to horizontal. This attachment may be used with any 633A Microphone whether equipped with the 311A Plug or not.

713A ADAPTER

This is a slotted connector which permits the microphone cord to be run outside the stand when the microphone is mounted on the 22A Floor Stand or 23A Desk Stand. When this adapter is used it is not necessary to disconnect the Cord Assembly from the microphone when the latter is removed from or secured to the stand.

KS-7133 CORDAGE

Two or three conductor, shielded rubber covered cordage, in any length specified. Use of the three conductor cordage permits carrying the ground through the cable in addition to the shield ground. Two conductor cable will be supplied unless otherwise specified.

22A TRANSMITTER MOUNTING

Floor stand, height adjustable from 42½" to 70", requires the use of the Cord Assembly. The 713A Adapter is necessary when the cord is to be run outside the stand. The 11A Transmitter Attachment must be used with the 639 Type Microphone on this stand when tilting the microphone is desired. Tilting of the 633A Microphone can be accomplished by means of the 9A Transmitter Attachment.

FLOOR STAND WEIGHTS

For 639 Type microphones it is recommend that the weight of the 22A Floor Stand be increased by the use of a 6 lb. pair of iron weights per ES-764305-2. These weights clamp in the base of the stand and give added stability. They are not necesasry for the lighter 633 Type microphone.

23A TRANSMITTER MOUNTING

The 23A Transmitter Mounting is for use with the 633A and 639 Type Microphones. The upper end of the mounting is arranged to take a 9A Swivel Joint or a 311A Plug. The base is 5″ in diameter and the stand is 7½″ high, exclusive of the microphone and accessories.

24A TRANSMITTER MOUNTING

A streamlined desk mounting for the 633A and 639 Type Microphones. This mounting requires the use of the Cord Assembly. The 24A Desk Stand has a cord slot which makes possible the removal or insertion of the Cord Assembly intact. The 11A Transmitter Attachment may be used for 639 Microphone or 9A Transmitter Attachment for the 633A Microphone with the 24A Transmitter Mounting when tilting of the microphones is desired.

8B TRANSMITTER ATTACHMENT (Baffle)

This 3¼″ baffle mounts on the front of the 633A Microphone and is held in place by a twist locking device. It increases the directional effect of the microphone.

Reproducer groups

1. 5A Reproducer Arm
2. 711A Bracket
3. 9A or 9B Reproducer
4. KS-13386 Equalizer and Cable Assembly
5. 171A Repeating Coil

Figure 1 — 109 Type Reproducer Group.

109 TYPE REPRODUCER GROUP

Use — A professional combination of the versatile single element 9 Type Reproducer with its supporting arm and equalizer equipment. Used for faithful reproduction of both vertical and lateral-cut disc-type recordings.

Description

The 109AA Reproducer Group consists of: 9A Reproducer, 5A Reproducer Arm, KS-13386 Equalizer and Cable Assembly, 171A Repeating Coil and 711A Bracket.

The 109B Reproducer Group includes the same equipment except that the 9B Reproducer is used in place of the 9A.

Features — A single unit designed to reproduce both lateral and vertical type recordings interchangeably.
On lateral position vertical modulation is suppressed.
On vertical position lateral modulation is suppressed.
Low mechanical impedance assures faithful reproduction.
Natural resonance outside operating range.
Sturdy construction consistent with above features.
Choice of modern equalizer curves.
Jewel stylus tip.
Attractive finish.

9 TYPE REPRODUCER

A dynamic (moving coil) type reproducer with the pick-up stylus arranged to move vertically for reproducing from hill-and-dale records and transversely for reproducing from lateral-cut records. This instrument is capable of discriminating between the two different types of groove modulation. The signal and noise always present in the bottom of lateral record grooves, as vertical modulation, are suppressed when the reproducer is switched for lateral reproduction. Correspondingly, unwanted lateral modulation, inherent in the sides of vertical record grooves, is reduced to a minimum heretofore attainable only under scientific laboratory conditions when the reproducer is switched for vertical reproduction. The 9 Type Reproducer and associated 5A Reproducer Arm have been designed so that their natural period of resonance lies below the audio frequencies usually reproduced in any program system. This coupled with the low mechanical impedance of the 9 Type Reproducer minimizes vibratory pick-up and enables the full range of groove modulation to be faithfully reproduced. The jewel stylus tip, together with the extremely light pressure of the generating element on the record (only 35 grams) assure long record life.

There are two codes of 9 Type Reproducers differing only in stylus tip material and radius; they are mechanically and electrically interchangeable on the 5A Reproducer Arm.

The 9A Reproducer has a stylus tip of diamond with a nominal 2 mil tip radius. It gives especially good performance and long life on transcription type records made of

non-abrasive material, ideally suited for vertical cut records and laterals with narrow or medium groove cross section.

The 9B Reproducer has a stylus tip of sapphire with a nominal 2½ mil tip radius. The larger stylus tip improves the signal-to-noise ratio of newer lateral recordings which have a wider groove cross section. It can also be used for records containing an abrasive (phonograph records) and when so used the sapphire may wear sufficiently to alter reproduction, in which case it should be returned to our distributor for stylus renewal.

5A REPRODUCER ARM

This arm has a four pin jack into which either of the 9 Type Reproducers plugs. The arm supports and counterbalances the reproducer and provides leads for connection to the KS-13386 Equalizer and Cable Assembly. The arm is sturdily constructed, attractively finished in bright aluminum crackle to match the reproducer and has sufficient mass to offer the inertia essential to good low frequency reproduction.

711A SUPPORTING BRACKET

The 711A Bracket is a simple T shaped arm rest supplied as part of the 109 Type Groups to support the reproducer end of the arm and reproducer when it is not resting on the record.

712A SUPPORTING BRACKET

By means of the 712A Bracket (not included in the code 109 type but available as an extra when ordered) the reproducer and arm can be adapted to cabinet types of transcription turntables which lack sufficient area on the table top to accommodate the base of the arm at the proper distance of 13¾ inches from the center of the turntable platter. This bracket has a guard which protects the rear or weighted end of the arm from accidental contact.

REPEATING COIL & EQUALIZER ASSEMBLY

The KS-13386 Equalizer and Cable Assembly and the 171A Repeating Coil form the equalizing, switching and impedance matching portion of the 109 Type Reproducer Groups.

The Equalizer Switch has seven reproducing positions, two for vertical and five for lateral. The seven reproducing characteristics are based on two fundamental frequency response characteristics which a survey of the recording field indicates are currently used for record production.

Curve A is the conjugate of the frequency response curve in general use in recording vertical transcriptions, some early lateral transcriptions and a few "instantaneous type" lateral transcriptions.

Curve B is the conjugate of the frequency response curve in general use in recording lateral transcriptions (NAB Standard and Orthacoustic) and phonograph records.

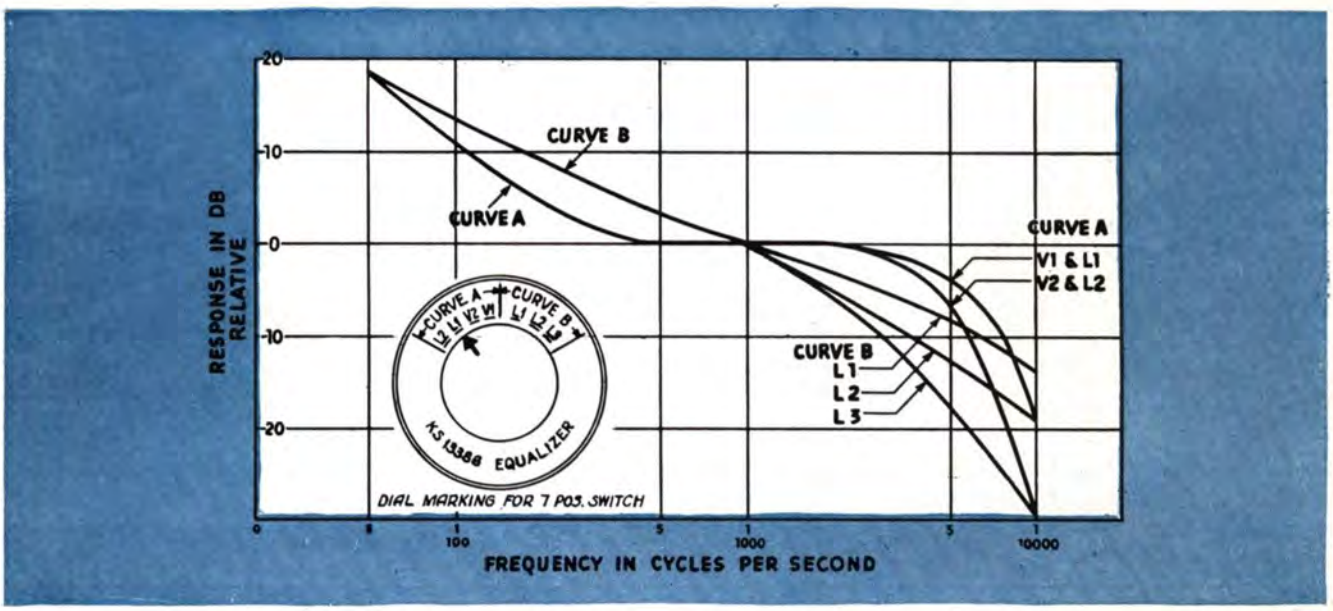


Figure 2 — Frequency Response Curves.

Choice of Proper Equalizer Switch Position

Choose one of the switch positions having the characteristic according to Curve A for reproduction of records made with the characteristic which is the conjugate of this curve. The overall frequency response between input to recording filter and output of reproducer group will then be as indicated in the following table for Curve A. Similarly, choose one of the switch positions indicated for Curve B for the reproduction of records made with the conjugate of Curve B.

TABLE I

Equalizer Switch Position		*Recording Type*	*Overall System Response*
Curve A	V1	Vertical	Uniform 50 to 10,000 cycles
	V2	Vertical	Uniform 50 to 2,500 with roll off to 15 db down at 10,000
	L1	Lateral	Uniform 50 to 10,000 cycles
	L2	Lateral	Uniform 50 to 2,500 with roll off to 15 db down at 10,000
Curve B	L1	Lateral	Uniform 50 to 10,000 cycles
	L2	Lateral	Uniform 50 to 1,000 with roll off to 5 db down at 10,000
	L3	Lateral	Uniform 50 to 1,000 with roll off to 17 db down at 10,000

The repeating coil provides taps for feeding circuit impedances of 30, 250 or 500/600 ohms. This can feed directly into a resistive type circuit such as a constant impedance type mixer circuit. For feeding inductive or capacitive circuits such as a pre-amplifier input a simple L pad should be interposed between the repeating coil and the pre-amplifier for purposes of impedance stabilization. Failure to use this pad will unduly emphasize the high frequencies.

Specifications for 109 Type Reproducer Groups

Frequency Response: For representative transmission from input to recorder filter to output of reproducer group, see Table I.

For new transcriptions use V1 or L1 positions.
For old or worn transcriptions use V2 or L2 positions.
For phonograph records use L2 or L3 positions.

Output Noise: Dependent upon record — Experience indicates that representative signal-to-noise ratio at output for transcription is 45 db; for phonograph records, 20 db.

Operates From: Vertical or Lateral-cut disc records up to 16″ diameter.

Load Impedance: 30, 250, or 500/600 ohm mixer or stabilized pre-amplifier input.

CAUTION: *Reproducer Group must be operated into a proper resistive termination.*

Output Level: Dependent upon record — Representative program level is –62 vu comparable to microphone output level.

Specifications for 9 Type Reproducer Mounted on a 5A Arm

Dimensions: Length 18⅛″, width 2″ tapering to ⅞″. Overall height 4″. Base 3″ in diameter. Height adjustable for platter above table ¾″ to 2″.

Weight: Reproducer ½ lb.; Arm 3½ lbs.; Total 4 lbs.

Mounting: Flat panel pivot center 13¾″ from platter center.

Finish: Light aluminum crackle.

Specifications for KS-13386 Equalizer

Dimensions: Length — body 3¾″, shaft 1¾″ and cable 3 ft. Diameter — body 3″, shaft ¼″.

Mounting: Mount on back of panel with shaft and two mounting screws through panel.

Finish: Bright aluminum. Black photo etched dial plate. Black knob.

Specifications for 171A Repeating Coil

Dimensions: Approximately 2-9/16″ by 3⅝″ by 3⅞″.

Mounting: Base mounted on flat surface. Avoid locating in a-c field such as produced by turntable motor or unshielded supply line.

Finish: Gray enamel.

Western Electric

Speech input consoles

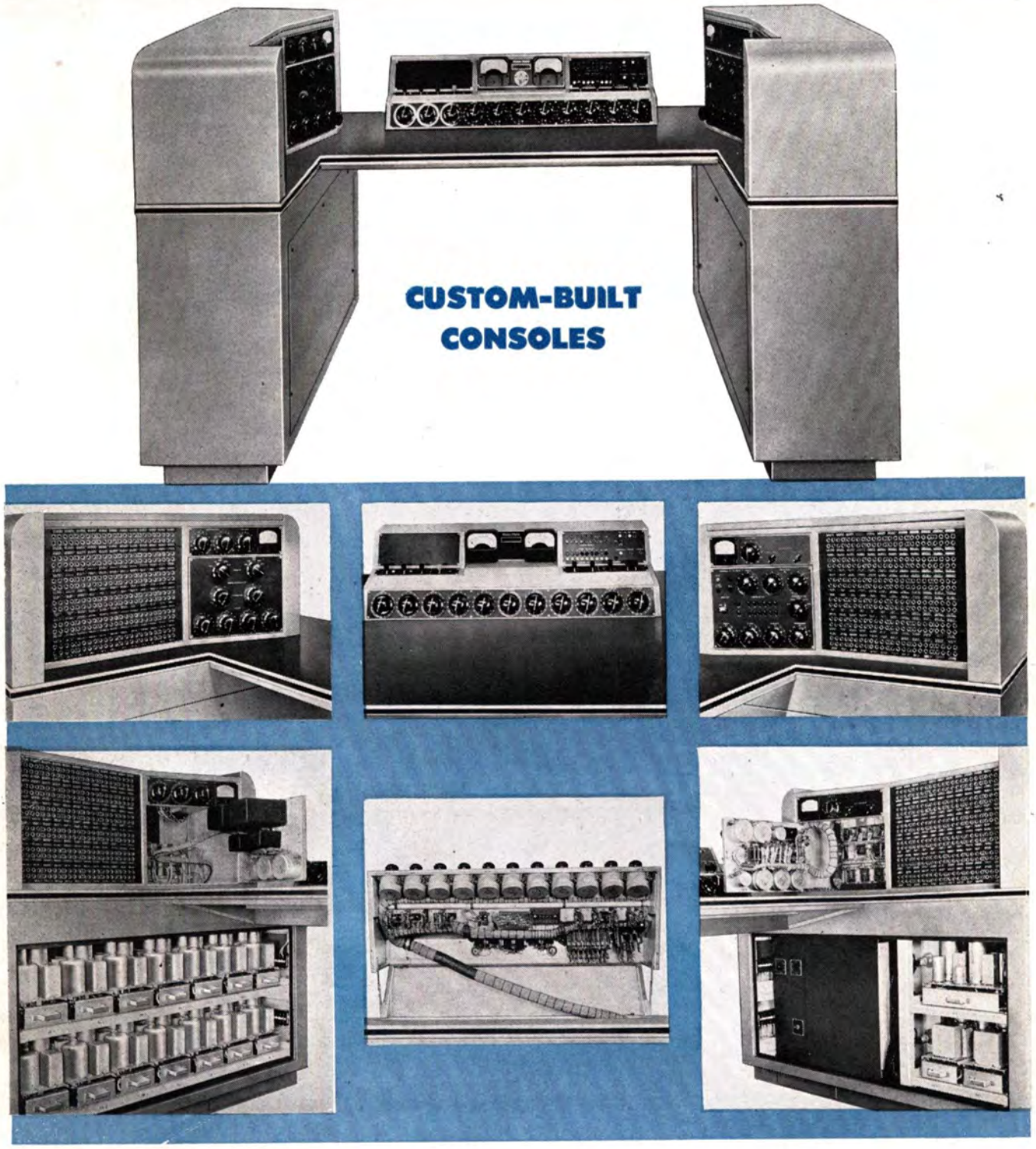


Figure 1 — Typical Custom-built Console showing convenience of controls and accessibility of all components.

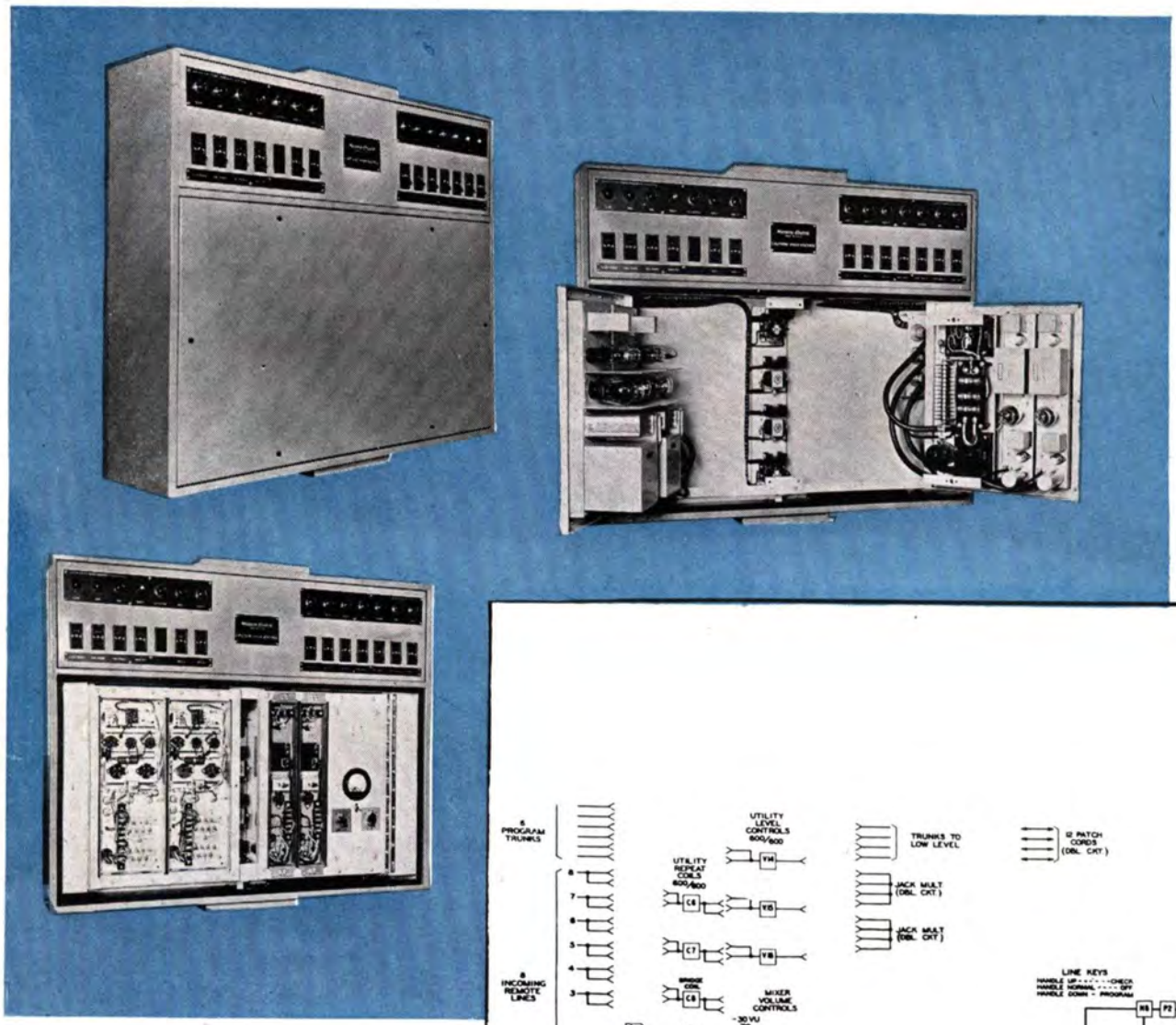


Figure 2 — Typical Custom-built Power Supply showing accessibility of all components for easy maintenance routines.

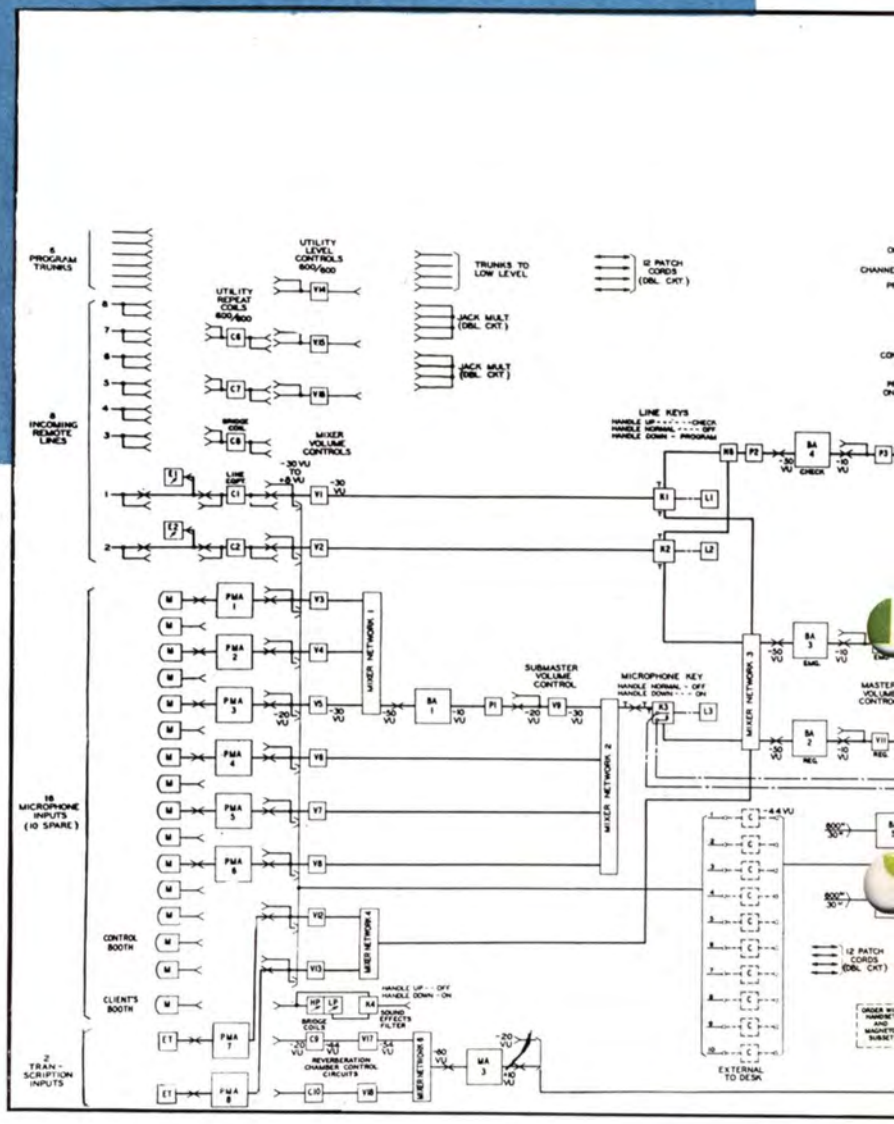


Figure 3 — Functional Schematic of Typical Custom-built Console.

CUSTOM-BUILT CONSOLES

The Custom-Built Consoles, now being engineered to customer requirements by the Western Electric Company, are keynoted by their versatility, utility, and attractive appearance. They are as modern as tomorrow and have been designed for application-plus.

Western Electric Broadcast Equipment specialists in cooperation with the engineers of the broadcast stations have designed a number of Custom-Built Consoles. Each installation incorporates standard Western Electric components combined into circuit arrangements and cabinet designs to meet individual requirements.

The equipment layout and cabinet construction are planned to provide a maximum of accessibility to all equipment for inspection and maintenance. The desk frameworks are metal and are normally finished in attractive aluminum gray colors with a narrow bright chromium strip around the front sides of the desk at shelf level. However they can be finished to harmonize with any architectural treatment.

Separate cabinets, for wall mounting, contain the rectifier units supplying the plate and filament power to the amplifiers, and the rectifier for the signal supply. Also located in these cabinets are the switches, circuit breakers, relays, and pilot lights for the operation and control of the power supply equipment, as well as relays for loudspeaker and studio sign control.

Western Electric Custom Built Consoles are designed to have frequency response, inherently low distortion level, and low noise level all better than the limits set by the FCC for the highest quality AM and FM broadcasting systems.

Some designs use standard amplifiers, rectifiers, etc., assembled into desk structures like those shown on pages 19 and 20. Others use standard consoles plus auxiliary cabinets like that for the 25B illustrated on page 93.

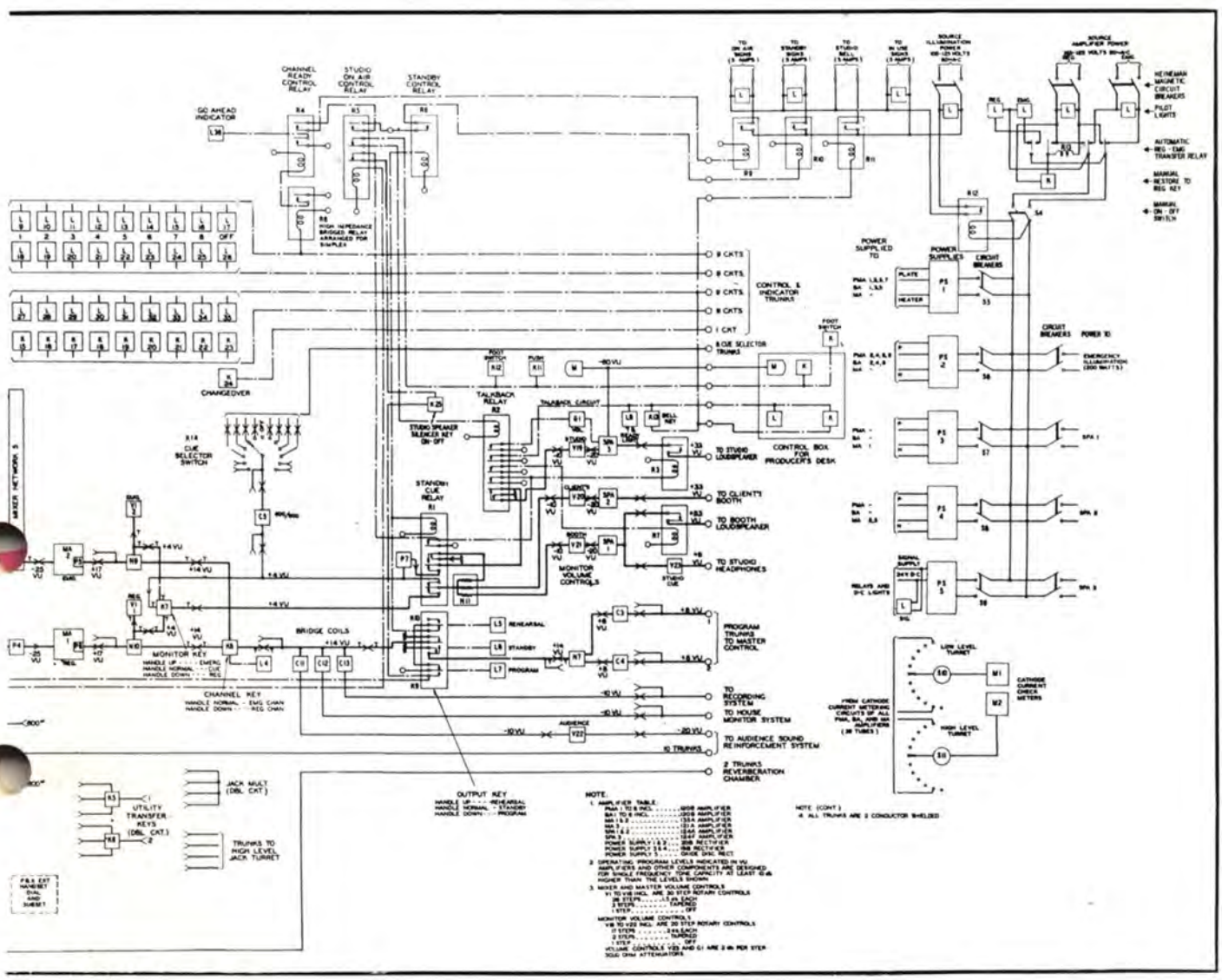


Figure 4 — Operator at 40A Console of 25B Speech Input Equipment. Controls are grouped functionally with frequently used controls nearest operator and all controls within convenient reach.

25B SPEECH INPUT EQUIPMENT

Tops for FM

Use — Several basically new ideas in speech input console design and operation have been built into Western Electric 25 Type Equipment. This console was designed by Bell Telephone Laboratories for use in High Fidelity AM and FM broadcasting stations. It is designed for operation over a 15,000 cycle range with low harmonic distortion and high signal-to-noise ratio.

Description — Precision controlled assembly and wiring contribute to assure a high signal-to-noise ratio and low distortion under studio operating conditions. The 25B Speech Input Equipment is a complete a-c operated console type program production unit for the amplification, control, and monitoring of programs originated by microphones, transcriptions, remote lines or equivalent sources. It has two main program channels, capable of simultaneous operation on separate programs without interference. Such combinations as the following are only a few of the many applications for which these consoles can be adapted. One program can be fed to the AM transmitter through one channel and the other channel can be used to feed the FM transmitter, thus permitting separate announcements to be made to each station. A studio program can be rehearsed while feeding a network program to the transmitter. A network program can be fed to the AM transmitter while originating a studio program to the FM transmitter. In addition, it has an independent monitoring channel for loudspeaker listening to programs being transmitted through the main channels, or direct from incoming lines or cue circuits. The monitor channel may also be used to feed cue programs back to the remote line circuits or for talkback to either of two studio loudspeakers in conjunction with one of the program channels.

The equipment has a seven channel mixer. Four of these mixer volume controls are associated with four preliminary amplifiers provided in the equipment for operation from a maximum of eight connected microphones (four simultaneously) or equivalent low level sources. The other three mixers are associated with the high level inputs which may be either incoming program lines or three additional microphones or other low level inputs by the use of three externally mounted pre-amplifiers.

Figure 5 — 40A Console mounted in KS-10284 table.

Figure 7 — 12A Power Unit. View shows equipment swung down to expose wiring.

Any combination of the seven simultaneous inputs may be connected to either one of the two main amplifier channels. Other facilities provided are: Two Volume Indicator Meters, Headset Monitoring Jacks, Studio light and signaling circuits, an audition or sound reinforcement output control; Jack terminations for four other lines in addition to those mentioned above.

In addition to provision for use of an external talkback microphone a mounting is also provided in the console for such a microphone. Every convenience for ease of operation has been incorporated into this console. The volume control knobs are the mushroom type with wide skirts, raised pointers, and knurling to facilitate fingertip control. Two colors of flat type key handles with concave finger surfaces are used. The arrangement of the equipment permits good visibility to the studio. All controls are located so that the operator may control a program or programs without the need for tiring movements or positions. The design is greatly simplified as to mounting and installation, requiring only a minimum of effort to put the fully assembled and wired console and associated power unit into service.

The 25B Speech Input Equipment consists of five principal units. The main unit is a desk style 40A Console Control Unit which contains all the amplifiers and controls. The writing table top of the KS-10284 Table in which the console is mounted stands 27½ inches from the floor and is about 55 inches long by 28 inches deep. The over-all height is 36 inches and the controls occupy about 13½ inches in depth at the rear of the table top. The amplifiers are housed in a hinged tray type enclosure in the console below the table top toward the rear. The control and amplifier enclosures are hinged so that complete and easy access is obtained to all internal wiring and components.

The third unit, a compact 12A Power Supply, is about 28 inches wide by 10 inches deep by 16½ inches high. It is arranged for wall mounting, and is generally located in the Control Booth but separately from the console. This unit contains the power supply units, rectifiers and transformers for plate and filament power to all vacuum tubes, and for the loudspeaker cut off relays. These units are mounted on a swinging frame for easy inspection and maintenance access. Thus the only need for any other auxiliary power supply is the usual d-c signal supply for operation of indicating lights and external relay systems where employed. A supply unit suitable for this is the KS-7593 Rectifier.

Two flush type wall mounting connections or junction boxes also form parts of the 25B Equipment. These are furnished with terminal strips to which the permanent con-

Figure 6 — Three views of the 25B showing the 40A Console and the KS-10284 table with control panel raised and amplifier racks lowered. View at left shows the control panel lifted for access to all keys, jacks, potentiometers and control apparatus and wiring in 40A Console. Lifting this panel also exposes tube side of all amplifiers. Center photograph shows the control panel raised and the amplifier racks swung forward with dust covers in place, and the flexible cables leading to the 7A and 7B junction boxes. At the right the control panel is raised and both amplifier racks swung forward into convenient position for servicing the wiring side of the amplifier.

Figure 8 — 7A Junction Box (left) and 7B Junction Box (right) with cover plates removed.

nections are made. Extending from the front of the boxes are flexible cables terminated in plug-in connectors, with which all connections to the control console are made.

The terminal strips and cable assembly can be removed so that the junction boxes may be installed during preliminary construction in new installations, thus permitting connecting conduit to be installed when most convenient. It is not necessary to install the console until after all construction is complete. Connections to the console are plug-in type to provide a maximum of utility.

The 25B Speech Input Console Provides a Whole Alphabet of Features

A. Four microphone preamplifiers.

B. Switching keys, for selecting either of two low level inputs for each preamplifier.

C. Eleven microphone or low level input circuits, seven of which can be used simultaneously (assuming three external preamplifiers are provided).

D. Three remote line input circuits, each with its own repeating coil.

E. Three remote line switching keys for selecting any one or combination of three lines for monitor, for cue, or for program feed.

F. Three utility keys for selecting any one or all of the three line mixers or for other line level sources for microphone or transcription inputs (using external preamplifiers).

G. Patching jacks, for substituting four additional remote lines, on a line-for-line basis. Thus, a total of seven input lines or trunks are available to the operator.

H. Seven mixer potentiometers, for individual level adjustment on four microphone input circuits, and three line input circuits, or outputs of external preamplifiers.

I. A seven channel mixer circuit, with individual mixer transfer keys, for switching each of the seven mixer potentiometers between the two main amplifier channels.

J. Two main amplifier channels capable of simultaneous operation on separate programs without interfering cross-talk.

K. Two master gain controls, one for adjusting the overall level of each main channel.

L. Two output switching keys, allowing either of the two main channels to be fed to either or both of two outgoing lines.

M. Line isolation and branching pad for each output line, which provides two channel impedance matching and serves to stabilize the impedance into which the amplifiers work, aiding in maintaining high grade transmission.

N. Two volume indicators one for each main channel, for visual monitoring of program level on each of the output lines.

O. Jacks for individual head phone monitoring on each of the two main amplifier channels.

P. A monitor amplifier for aural monitoring, with the control room loudspeaker, of programs on the two main amplifier channels, on the incoming line circuits, or on an external cue feed circuit from master control; also for feeding cue programs to the studio speaker and to the remote line circuits.

Q. Monitor transfer key, giving the monitor amplifier input access to programs on either of the two main amplifier channels, and to the cue transfer key.

R. Cue transfer key, for switching between the conditions of monitoring on the remote lines, receiving cue from master control, and feeding cue to the remote lines.

S. Gain control for monitor amplifier.

T. Loudspeaker cut-off relays, for control room and two studio loudspeakers, with strapping arrangement for interlock with regular microphone input keys automatically to prevent operation of loudspeaker in same room with a live microphone.

U. Contacts for closing control circuits to relays outside this equipment for operation of studio warning signs, buzzer cut-offs, master control equipment and other auxiliaries.

V. A branching circuit, with gain control and channel switching key, for feeding a separate local amplifier system external to this equipment. This is useful for audition purposes or for sound reinforcement in large audience studios and similar applications.

W. Tube check circuit with meter and rotary tap switch, for quickly checking cathode currents, to determine the operating condition of all amplifier tubes between microphones and broadcast lines.

X. Power source for operating loudspeaker cut-off relays.

Y. Adequate pre-wired plug in terminal facilities to accommodate incoming and outgoing line and program circuits and power supply feeds.

Z. Talk-back control key switches, talk-back microphone input circuit, and the loudspeaker control circuits for talk-back from the control room into the associated studio.

Specifications

Frequency Response: See Figure 10.

Signal-to-Noise Ratio: 70 db unweighted, with 70 db net gain and with +18 dbm peak signal for single frequency output level.

Harmonic Distortion: See Figure 11

Source Impedances

Microphone Inputs	30-50, 250 or 600 ohms
Line Inputs	600 ohms
Utility Inputs	600 ohms
Air Cue Input	600 ohms

Load Impedances

Line Outputs	600 ohms
Audition Output	600 ohms
Monitor Amplifier Outputs	Furnished adjusted for loudspeaker impedances of 3 to 10 ohms. May be adjusted to a wide range of impedances, between 1 and 1200 ohms. Cue to line circuit is 600 ohms.

Over-all Gains

	Max. Gain	*Typical Operating Gains (Approx.)*
Microphone Inputs to line outputs	100 db.	70 db.
Remote Line Inputs to line outputs	38 db.	24 db.
Utility Inputs to line outputs	58 db.	30 db.
Cue Input to Monitor Output Loudspeakers	44 db.	38 db.
Cue Input to Remote Line	6 db.	2 db.

Volume Controls

Mixer Network Loss	Approx. 16 db. (mixer vol. controls on minimum loss).
Mixer Volume Controls (600 ohms to 600 ohms ladder type attenuator)	20 steps total; 34 db. loss in steps of 2 db., then tapered to "infinity" in 3 steps (one of about 8 db. and one of about 10 db. and "off").
Master Volume Control: (100,000 ohm potentiometer)	Has same steps as mixer volume control.
Audition Volume Control (600 ohm to 600 ohm ladder type attenuator)	6 db. minimum loss: Control has same steps as mixer volume controls.
Monitor Volume Control (600 ohm to 600 ohm ladder type attenuator)	6 db. minimum loss. Control has same steps as mixer volume control.

Output Power: +18 dbm. Allows 10 db. margin for peak factor above +8 vu which is the normal program output for the equipment.

Power Supply: 105-125 volts, 50-60 cycles a-c. Approximately 225 watts. Power for signal light and external relay operation must be supplied from external source. Western Electric KS-7593 Rectifier furnishing 1.2 amperes at 12 volts d-c or Western Electric KS-5653 Rectifier furnishing 1 ampere at 24 volts d-c is recommended. The lamps included in the equipment are for 12 volt operation and must be changed for the 24 volt supply.

Dimensions:

	Height	*Length*	*Depth*
Console	36"	55"	28"
Power Unit	16½"	28"	10"
Junction Boxes	18"	20"	4"

Essential Elements:

40A Console: Approximate weight 200 pounds.

129A Amplifier
130B Amplifier
131A Amplifier

12A Power Unit: Approximate weight 60 pounds.

18B Rectifier
20B Rectifier

Junction Boxes, 7A & 7B: Approximate total weight 70 pounds.

Table KS-10284: Approximate weight 75 pounds.

Vacuum Tubes:

40A Console

Quantity Required	*Western Electric*		*Commercial Receiver Type*
8	348A	or	1620 (6J7)
4	349A	or	6F6
6			1603
18			

12A Power Unit

Quantity Required	*Western Electric*		*Commercial Receiver Type*
2	274A	or	5Z3
1	300B	or	2A3
1	348A	or	6J7
1	313C		
1	351A	or	6X5
6			

Accessories:

P-2AA Cord 1 foot long equipped with 241A (black) or 241B (red) plugs, for patching purposes.

Monitoring headset 1002F or the D-97690.

Repeating coils 177C for changing unbalanced input or output circuits of 40A Console for balanced operation. Brackets and Mounting Plates for mounting 8 such coils are provided in the 40A Console. Space is also available in the console to mount brackets for 5 additional coils. A 42-A shield may be added to the coils externally where further electro-magnetic protection is necessary.

12 Volt Signal Supply: No supply is provided for the signal and lamp circuits; the KS-7593 (12 Volt) or KS-5653 (24 volt) is recommended.

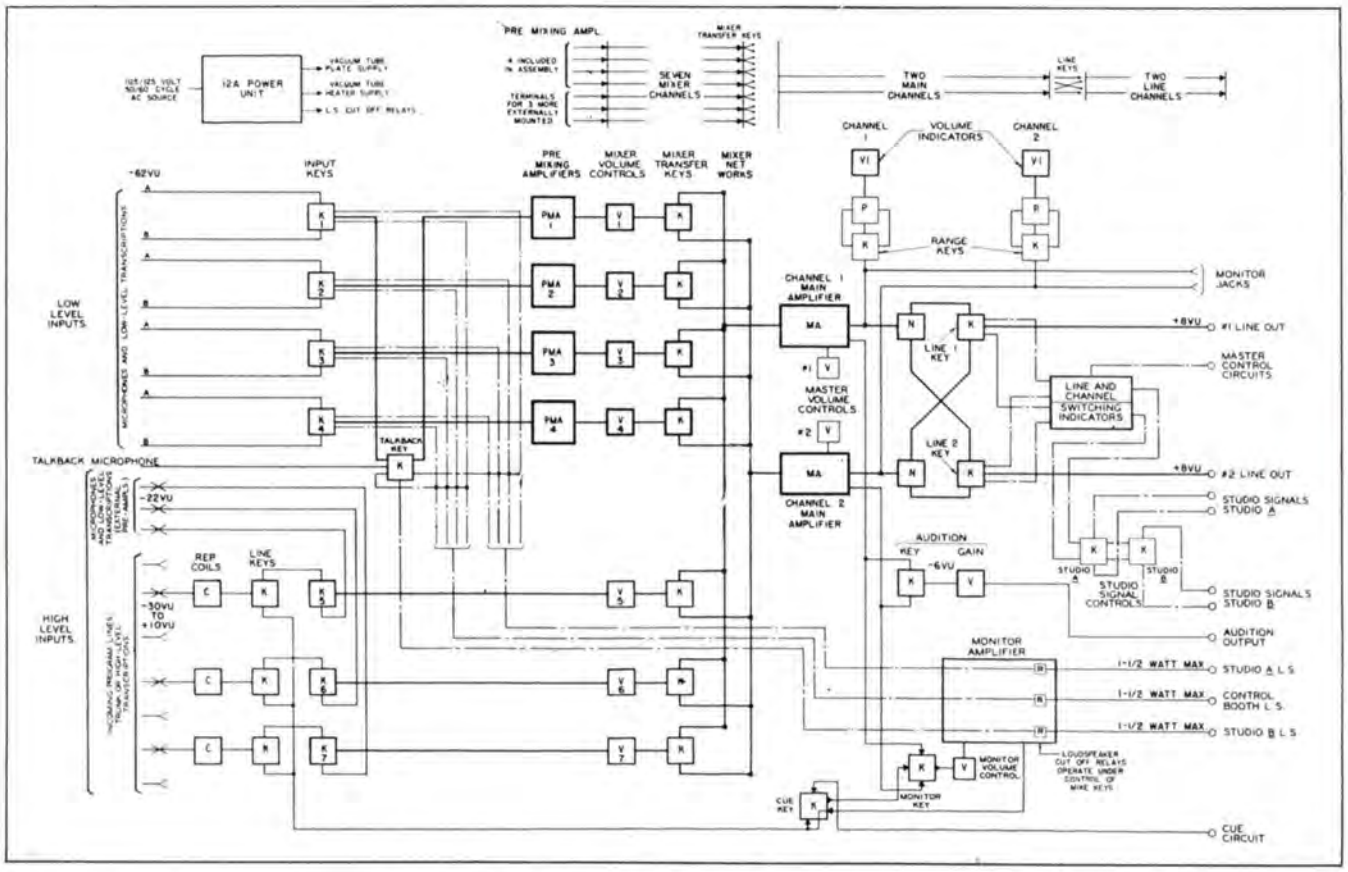


Figure 9 — Functional schematic of 25B Speech Input Equipment.

External Preamplifiers: Preamplifiers mounted externally may be provided for use of the "Utility" inputs for additional microphone or low level transcription sources. The following equipment is available for this purpose:

For 19" Relay Rack or Bay Cabinet Mounting, the following apparatus is recommended:

3 — 120 B Amplifiers
1 — 177A or B Mounting Plate
1 — 296A or B panel (face mat)

or

1 — 129A Amplifier
1 — 190B Mounting Plate

For mounting in a 21A Wall Cabinet the following apparatus is recommended:

1 — 21A Cabinet
1 — Terminal Strip per BA-44609 (has 3 terminals)
2 — Terminal Strips per BL-44607 (each has 10 terminals)
1 — 190A Mounting Plate
3 — 120B Amplifiers, or 1 — 129A Amplifier
1 — Mounting Plate per BO-74389 (for mounting up to four 177C Repeating Coils in 21A Cabinet)

The three external 120B Amplifiers, or one 129A Amplifier, may be operated from the 20B Rectifier in the 12A Power Supply in addition to the 129A Amplifier and 130B Amplifier in the 40A Console. Under this condition the 20B Rectifier is approximately ten percent more heavily loaded which may shorten tube life somewhat.

The 40A console may be ordered separately for installation in other types of desks; for example, see page 93.

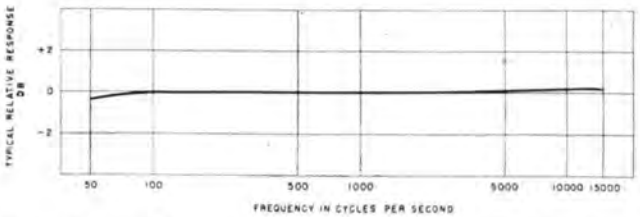


Figure 10 — Typical overall frequency response characteristic from input terminals for microphones to output terminals to lines.

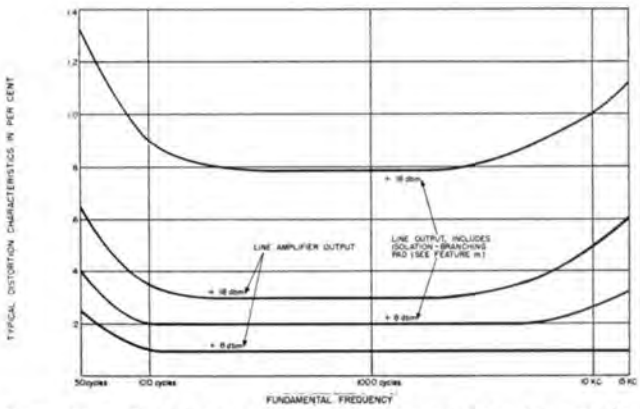


Figure 11 — Typical harmonic distortion characteristics for Amplifier Channels Microphone to line. (Includes harmonics to 30 kc.)

MASTER CONTROL ROOM SWITCHING SYSTEMS

The Western Electric Company is producing custom built master control switching and program dispatching systems for use in broadcast stations that use multiple studio installations. These systems employ standard components but are designed to customers' individual requirements.

A typical functional schematic of a relay type system is shown below.

This system provides for ten studios and six outgoing lines. Other combinations of studios and lines and integrated switching systems can be arranged.

A typical key type system is shown as part of the functional schematic on pages 90 and 91.

For further information on specialized switching systems consult our nearest distributor.

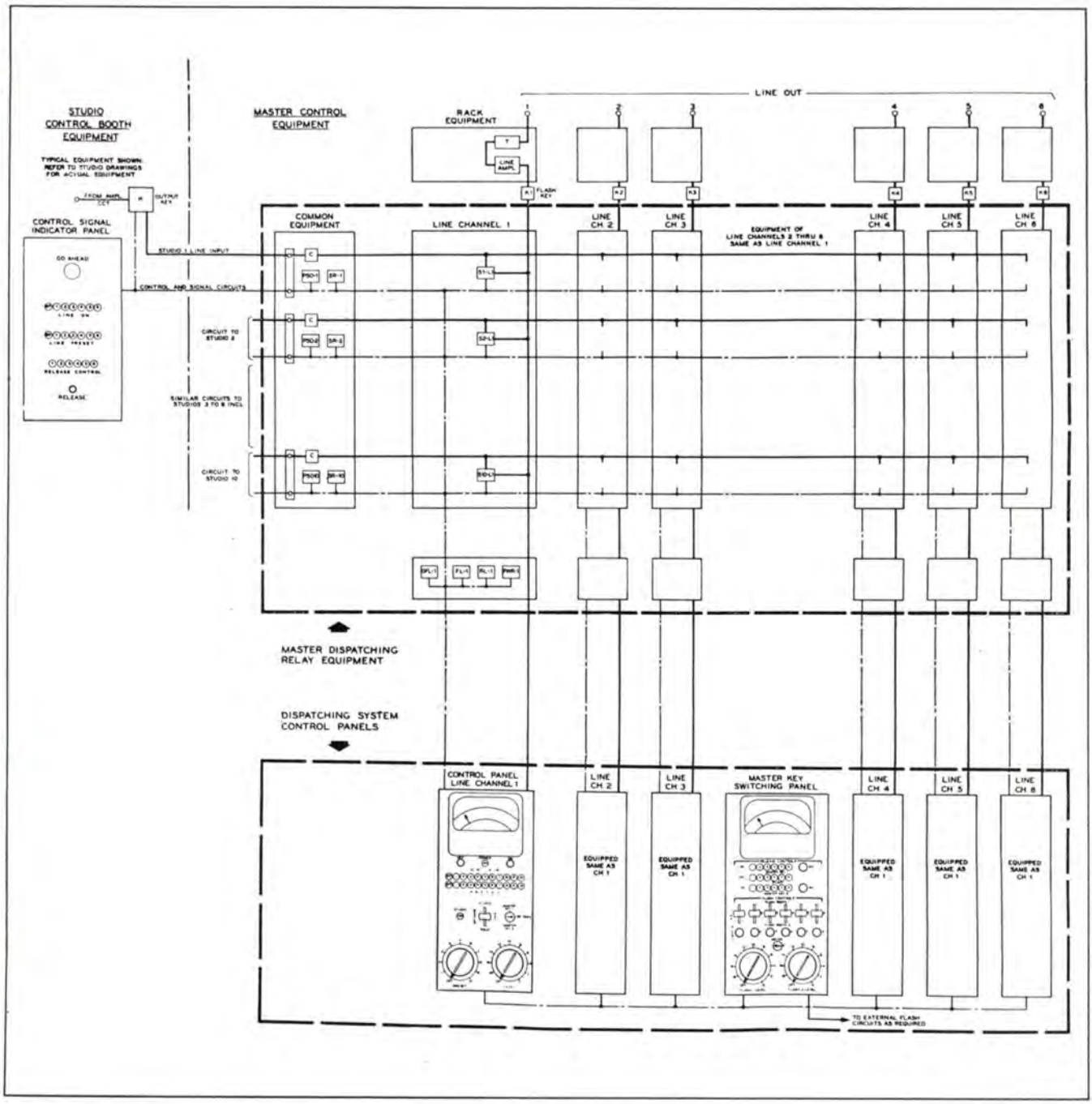
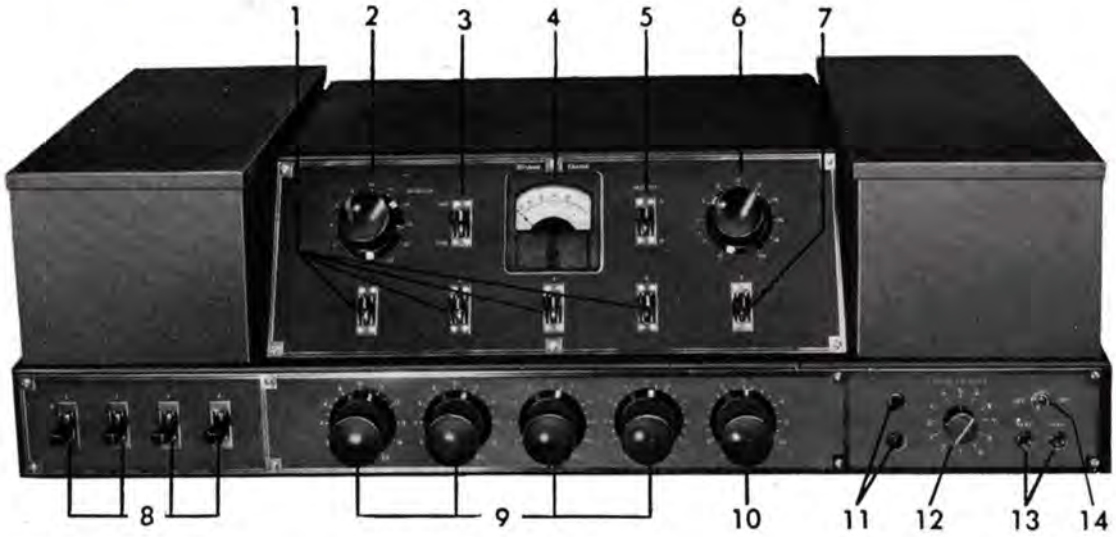


Figure 12 — Functional Schematic of a Typical Master Control Room Switching System.



1. *Keys for Microphone Switching*
2. *Monitor Gain Control*
3. *Monitor Transfer Key*
4. *Volume Indicator Meter*
5. *Output Switching Key*
6. *Mixer for Incoming Lines*
7. *Key for Talkback*
8. *Program Line Keys*
9. *Mixers for Microphone Inputs*
10. *Main Gain Control*
11. *Lamp and Push Button for Signalling*
12. *Plate Current Selector Switch*
13. *Test and Headphone Monitoring Jacks*
14. *Main Power Switch*

Figure 13 — 23C Speech Input Equipment.

23C SPEECH INPUT EQUIPMENT FOR AM OR FM BROADCAST

Use — A complete a-c operated Amplifier and Control Assembly designed for AM or FM radio broadcasting service. It can serve either one or two studio layouts and can be used as part of a system incorporating additional units whose outputs are coordinated and switched at a common point such as a Master Control Room.

It has facilities for program production, audition and monitoring, as well as for monitoring on incoming lines. Eight studio microphones or low output level transcription tables, control room announce and talkback microphones and four remote lines or other medium level inputs can be accommodated.

The use of a pre-mixing amplifier stage for each low level input, stabilized feedback and factory controlled assembly and wiring all contribute to assure high signal-to-noise ratio and low distortion under actual operating conditions. See page 92 for typical studio layout.

Description — The 23C has a frequency range which makes it ideal for FM service.

The equipment includes four microphone input circuits with pre-mixing amplifiers, and one input circuit for incoming program lines, all of which are combined in a 5-channel mixer. A three stage amplifier, with master gain control, following the mixer, amplifies the signals to the level required either for outgoing program lines or for switching systems in master control rooms. An indirectly lighted volume indicator meter is connected across the output circuit and terminals are provided for an extension meter. The equipment also includes a monitoring amplifier with provision for operating three loudspeakers. Cut-off relays operated from contacts on the microphone keys are included in the loudspeaker circuits.

Switching keys permit the selection of any of four microphones or equivalent program sources in each of two studios. A "talk-back" key substitutes a microphone in the control room for a studio microphone for talking back into the studio during rehearsals or for making announcements from the control room. The program line input circuit has four keys arranged to connect any one of four incoming program lines either to the mixer circuit or to the monitor amplifier for preliminary monitoring. An output switching key connects the output of the equipment to either of two outgoing program lines and in the intermediate position terminates the unit in 600 ohms.

The output of the line amplifier operates into a line isolation pad which, in turn, feeds the output line terminals. The volume indicator meter is bridged across the input to this pad and is calibrated to indicate the 0 vu or 100% mark when the level is +8 vu at the output line terminals. For lower levels to the line, the resistances of the isolation pad may be replaced by other standard resistances of the same type, as required.

Monitoring is carried on through a separate monitoring amplifier which has a level control and a three-position input switch for monitoring the output of the main amplifier, for preliminary checking of line programs, and for connecting to some external source such as a radio monitor or a master cue line.

Provision is made for a duplicate volume indicator meter at a remote point; jack and rotary switch for measuring plate current of vacuum tubes with external meter; jack for

headphone monitoring of main channel when loudspeaker cannot be used; and key and lamp for use in signaling system.

Mushroom type mixer knobs with wide skirts, raised pointers and knurling facilitate fingertip control. Two colors of flat type key handles with concave finger surfaces are used.

Features

Tops for FM. Excellent frequency response and low distortion.
Accessibility of components.
Minimum of maintenance.
Multiple studio operation.
Controls conveniently located.
Selector switch permits checking of tubes.
Self-contained power supply.

Specifications

MAIN SYSTEM:

Frequency Response: See Figure 14.

Signal-to-Noise Ratio: 64 db with 70 db net gain. Under normal operating conditions, referred to a single frequency output level of +18 dbm*. See Figure 15.

Harmonic Distortion: See Figure 16.

Source Impedances: Microphone Circuits-30 or 250 ohms. Program Line Circuit-600 ohms.

Load Impedance Maximum: 600 ohms.

Maximum Gain: 96 db through microphone channels. 64 db through incoming line channels.

Volume Controls:

(a) ***Mixer Controls:*** 20 steps. 17 steps of 1½ db each; tapering to cut-off on last three steps.

(b) ***Master Gain Contol:*** 20 steps. 17 steps of 2 db each; tapering to cut-off on last three steps.

Maximum Output Level: See curves of distortion vs. output level. Figure 16.

MONITOR AMPLIFIER:

Source Impedance: 600 ohms.

Load Impedance: 750 ohms — Three 250-ohm loudspeakers in series or combination of 250-ohm loudspeakers and 250-ohm load resistors in series.

Maximum Gain: 51 db.

Volume Control: 19 two db steps and "OFF."

Maximum Output Level: 2.5 watts with approximately 5% distortion at 400 cycles. 1.5 watts with approximately 1% distortion at 400 cycles. (Divided among three loudspeakers).

POWER SUPPLY:

105 to 125 volts, 50 to 60 cycles a-c. Approximately 90 watts. Power for relay and signal light operation (12 volts d-c, 0.25 ampere) must be supplied from external source. Western Electric KS-7593 Rectifier is recommended. A Western Electric KS-5653 List 3 may be used if signal lamp is changed for 24 volt operation.

Dimensions: 34" long, 14½" wide, 9¾" high.

Weight: 110 pounds.

Construction: Console Type Cabinet designed to mount on table.

Finish: Chassis and covers — dark gray crinkled lacquer. Control Panels — black photo-etched.

VACUUM TUBES:

Quantity Required	Commercial Receiver Types
7	1603
2	42
1	83V
—	
10	

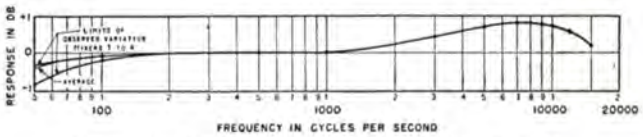


Figure 14 — Typical frequency response characteristics.

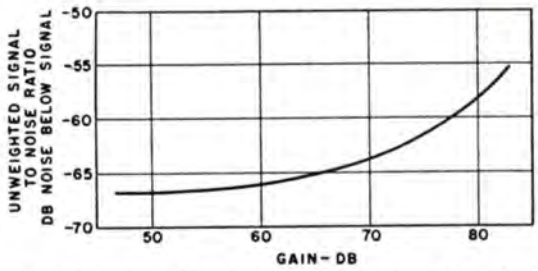


Figure 15 — Typical uweighted signal-to-noise ratio for output level of +18dbm. (Master gain set at 14db and mixer control changed to obtain various values of overall gain.)

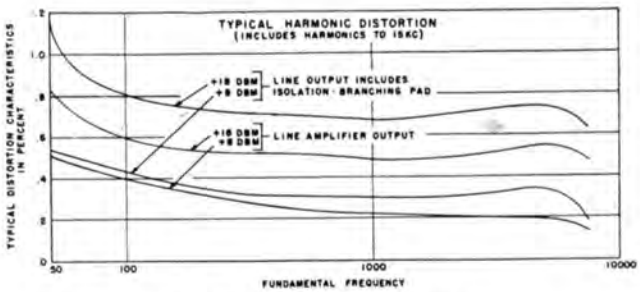


Figure 16 — Typical harmonic distortion.

* dbm Single Frequency Level referred to 1 milliwatt.

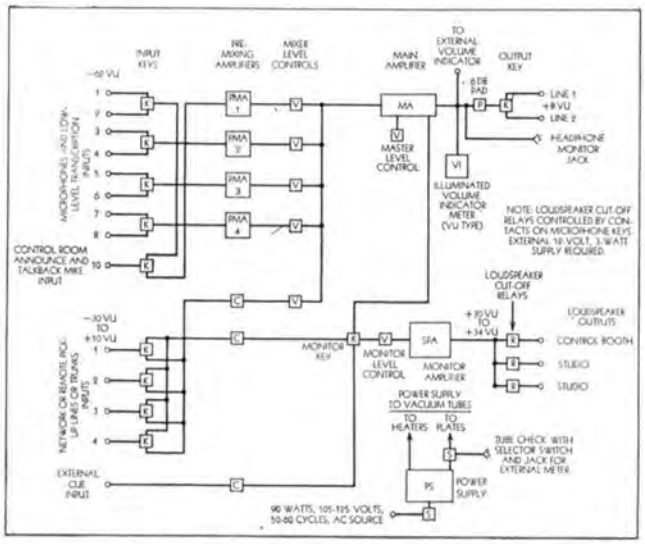


Figure 17 — Block diagram of 23C Speech Input Equipment.

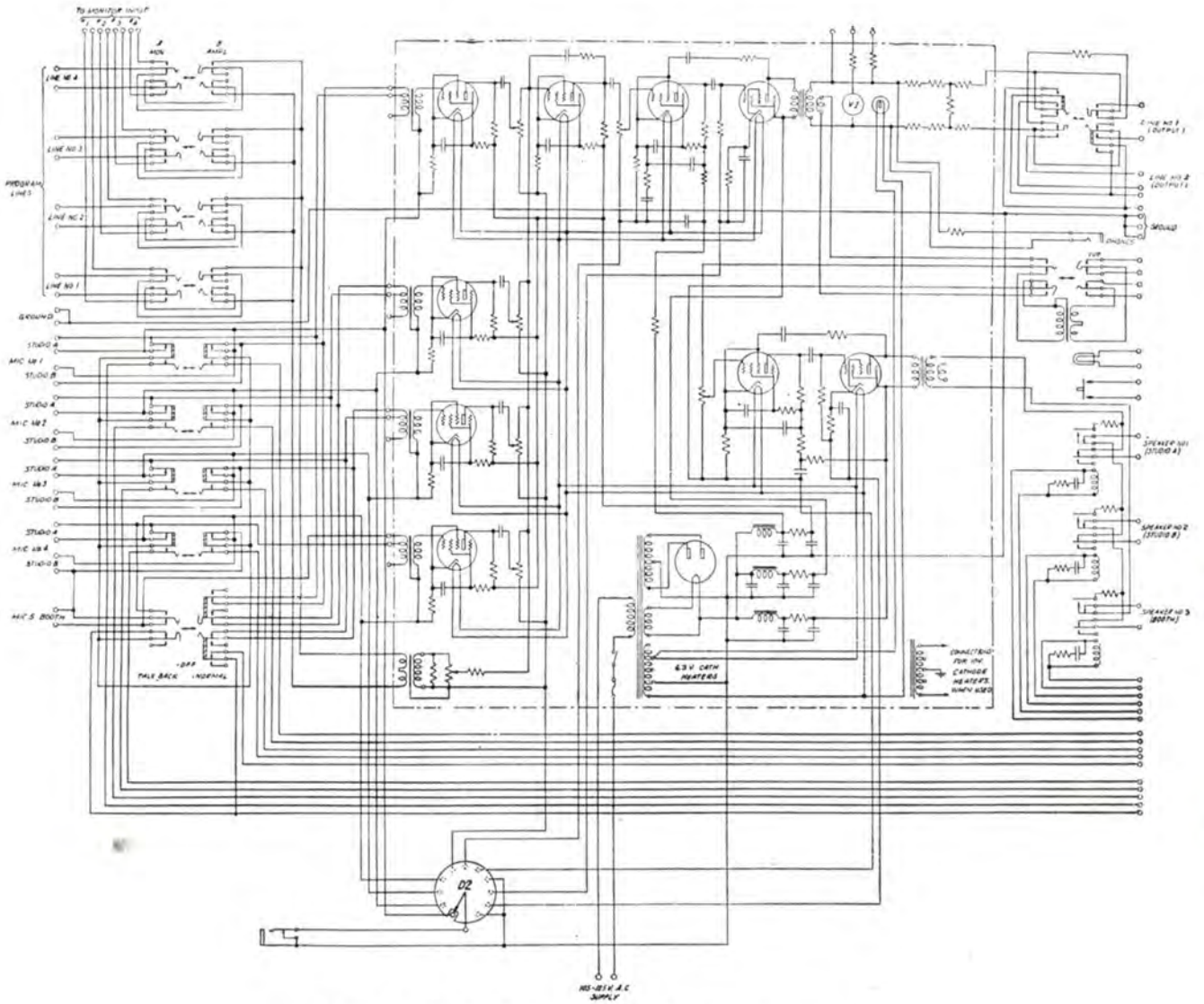
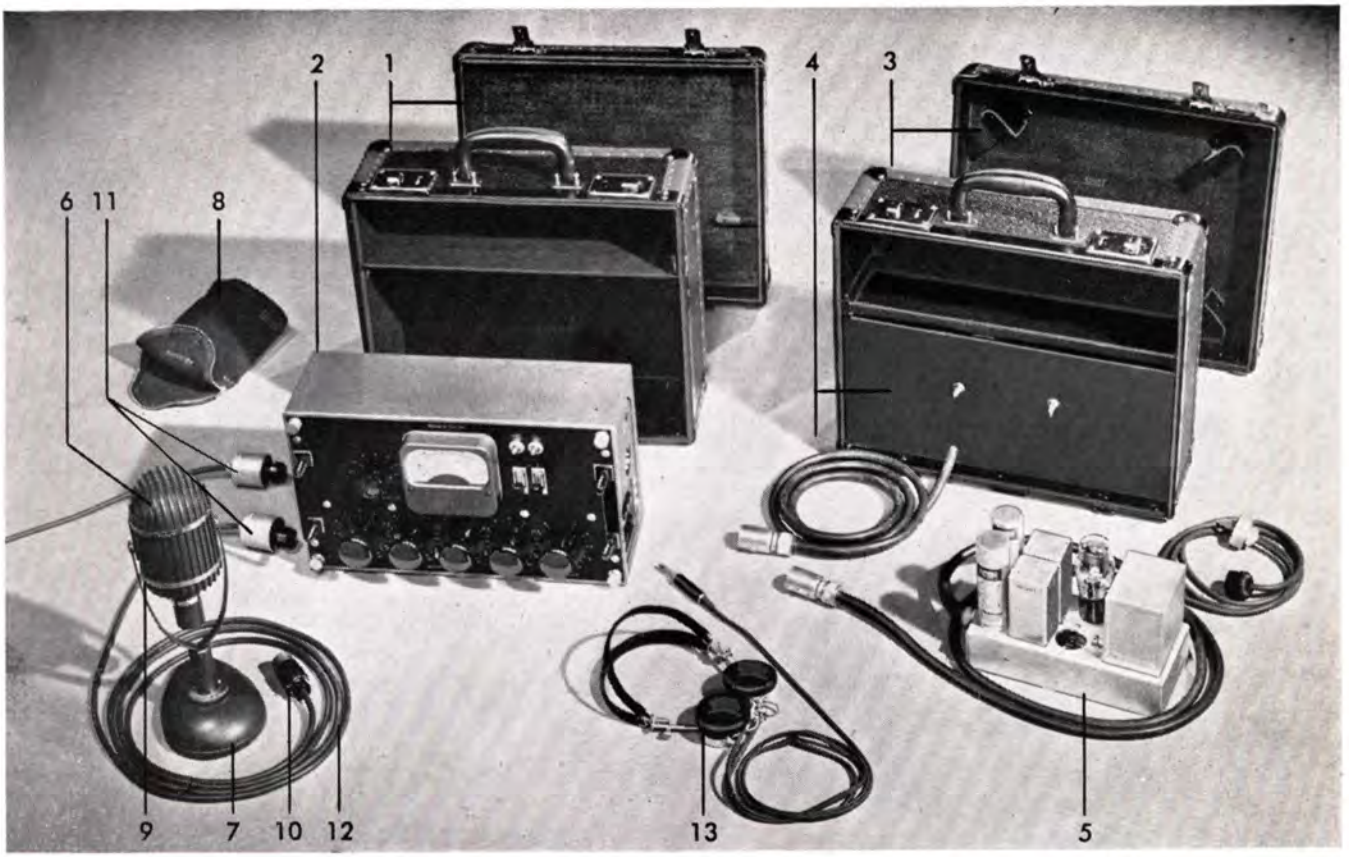


Figure 18 — Functional schematic of 23C Speech Input Equipment.



1. *Amplifier-control Unit Carrying Case with Cover*
2. *Amplifier-control Unit*
3. *Power Supply Carrying Case with Cover*
4. *Battery Rack Assembly with Cord and Plug*
5. *A-c Power Unit with Cord and Plug*
6. *639 Type Microphone*
7. *KS-12000 Transmitter Cover*
8. *24A Transmitter Mounting*
9. *11A Transmitter Attachment*
10. *442A Jack and 712A Adapter*
11. *Microphone Plugs*
12. *KS-7133 Cordage*
13. *1002F Headset*

Figure 19 — Components of the 22D Speech Input Equipment.

22D SPEECH INPUT EQUIPMENT

Use — A compact portable speech input system, light in weight and designed to provide complete pick-up facilities both for established remote and for on-the-spot broadcasts.

Description — It consists of a combination amplifier and control unit with a carrying case, and either a power unit for a-c operation or a battery holder for battery operation or both, as specified, with a carrying case and a power supply cord. The long and dependable service experienced with this high quality light weight equipment has made this unit a favorite among broadcasters.

The 22D includes a four channel parallel mixing circuit designed to work with 30 ohm dynamic microphones or other sources of comparable impedance. Master gain control, indirectly illuminated volume indicator, binding posts for two program lines, jacks for two monitoring headsets, and both binding posts and a jack for an order wire telephone set are provided. There is ready accessibility to the interior without disconnecting any cords or wires by simply removing the rear cover.

Outstanding Features

Real portable equipment — compact and light in weight.

Divided into two packages, each approximately 30 pounds, for balanced carrying.

Highly efficient performance.

Operates from an impedance of 30 ohms and into 150 or 600 ohms. A maximum gain of approximately 92 db when operated between these impedances.

Frequency response uniform within ±1 db from 30 to 10,000 cycles.

Stabilized feedback.

Low harmonic distortion. Low noise level.

Operates from either a-c or battery power supply. The a-c unit has switch for instant change to battery supply in case of a-c power interruption.

Flexible control — four paralleled mixers and a master gain control.

Contacts on output line keys, in unoperated positions, short-circuit inputs of outgoing lines, enabling station

Figure 20 — Amplifier-control and Power Supply Units. Each case is divided into two compartments, providing space for accessories. The lower compartment of the Power Supply Carrying Case holds the batteries when battery operation is desired. The upper compartment holds the a-c power supply.

Figure 21 — Left: Right end of the Amplifier-control Unit showing line terminals, telephone binding posts and plug, plug for monitoring headset and the multi-pronged socket for the power supply plug. Right: Left end of the Amplifier-control Unit showing four plug-in type microphone receptacles.

operator to test the loops from master control.

Instantaneous interchange of program and order wire lines in emergencies.

Indirectly illuminated volume indicator gives output level in vu. Battery condition may be checked on volume indicator meter during operation.

Range switch for adjusting normal level indication of the volume indicator meter to correspond to output levels of +4, +6, +8, +10, +12, or +14 vu (0 level calibration 1 milliwatt)

Non-glare Alumilite finish on control panel.

Mushroom type mixer knobs with skirts and raised pointers facilitate fingertip control and avoid cramped hands.

Accessibility — ready access to interior without disconnecting any cords or wires, simply by removing rear cover.

Microphone receptacle mounting plate removable and readily adapted to substitution of other microphone receptacles.

Provision for two monitoring headsets.

Rugged construction assures long service and dependability.

Specifications

Frequency Response: Uniform within ±1 db from 30 to 10,000 cycles.

Signal-to-Noise Ratio: 66 db for battery operation and 60 db for a-c operation; at 72 db gain and referred to peak output signal of +18 dbm.

Source Impedance: 30 ohms. (Use 172A Repeating Coil in cord for 250-ohm microphones).

Load Impedance: 150 or 600 ohms.

Gain: Maximum 92 db. Typical operating 70 db.

Mixer Controls: 45 db in 20 steps. 12 steps of 1½ db each increasing on the last eight steps to cut-off.

Master Volume Control: Seventeen 2 db steps, last three steps have increasing attenuation to cut-off.

Maximum Output Level: +20 dbm single frequency fundamental with less than 1 per cent harmonic distortion. +10 vu program level with 10 db peak factor.

Power Supply: A-C operation — 110-120 volts, 50-60 cycles. Power consumption is 28 watts at 115 volts. Battery operation — Filament 1.6 amperes at 6 volts and plate 21 ma. at 180 volts. Batteries not supplied with the equipment.

Vacuum Tubes:

	Quantity Required	*Commercial Receiver Types*
Amplifier:	2	6J7
	1	6F6
Power Unit:	1	80
	4	

Dimensions and Weights: Total weight of two units and full equipment 50-60 pounds.

Components	*Dimensions*	*Weight*
Amplifier-Control Unit	9"x15"x5"	15 lbs.
Battery Rack Ass'y (Eqpd.)	7"x15"x5"	14 lbs.
A-C Power Unit	7"x12"x5"	9½ lbs.
Carrying Cases (2 Required)	14"x16¾"x7¾"	12 lbs. ea.

Accessories: 633 or 639 type Microphones, and the 1002F Headset for monitoring purposes, are recommended.

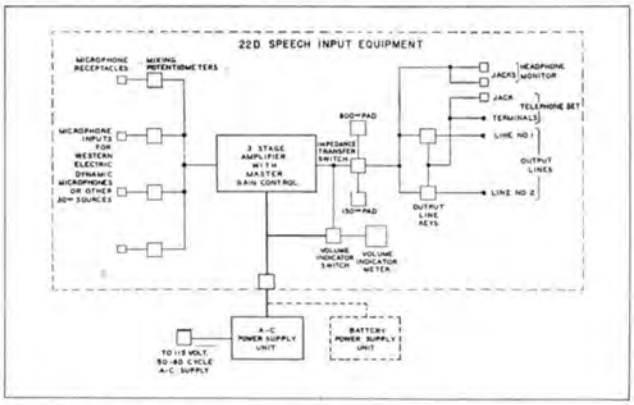


Figure 22 — Block schematic of 22D Speech Input Equipment.

Figure 1 — Front View, 1126C Amplifier.

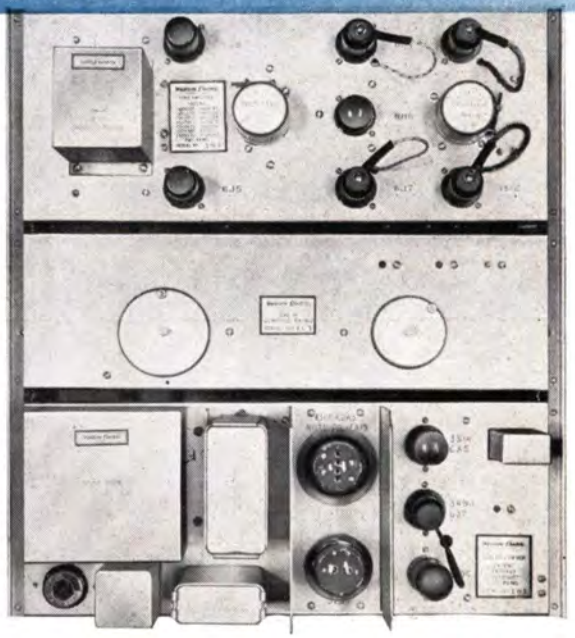


Figure 2 — Rear View, 1126C Amplifier.

1126C PROGRAM OPERATED LEVEL GOVERNING AMPLIFIER

Tops for FM

Use — The 1126C is designed to reduce excessive peaks, protecting against over-modulation in AM with its potentially inherent interference. It has an extremely short attack time. For average program use, peak level reduction will begin within the first half cycle of program frequency. This eliminates results of overloading by peaks: (1) splash or short-interval adjacent-channel interference due to instantaneous overmodulation of AM transmitter; (2) overswing in FM transmission which may cause distortion to occur in the receiver and the guard band to be overridden; (3) instantaneous overload and consequent distortion in other transmission systems.

The self-contained automatically regulated power supply stabilizes the operation of the amplifier over a wide range of power supply conditions.

For convenience in installation, the 1126C Amplifier can be separated into three units. The control panel may, for example, be mounted in a control desk and the power supply unit at the base of a rack containing the remainder of the circuit equipment, thus lending itself to flexibility in installation.

Description — The 1126C consists of a 126C three-stage push-pull amplifier, 298A Control Panel, and 20B Rectifier. It is an audio frequency operated level governing amplifier containing automatic means to reduce its gain when the level input reaches a predetermined amount and to restore the gain as the input level falls below that amount. The 1126C has improved decoupling of the control circuit from the program circuit, and is entirely interchangeable with the 1126B.

Features

Permits higher average program level to be transmitted.
No appreciable change in frequency response or increase in distortion between conditions of no limiting and 5 db limiting.
Switch to disable limiting action permitting use as a straight amplifier.
Meter indicating degree of limiting.
Self-contained attenuators for wide range of input and output levels.

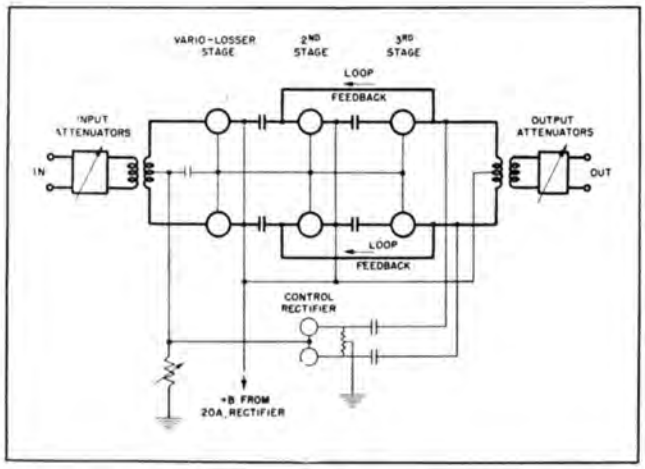


Figure 3 — Functional Schematic of 1126C Amplifier.

Plate current checking and improved accessibility.
Automatic means for controlling gain.
Short attack time.
Self-contained power supply.
Flexibility of installation.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: —45 dbm unweighted.

Signal-to-Noise Ratio: 69 db at point where gain reduction starts.

Harmonic Distortion: *For program* — less than 1 per cent for all operating conditions up to 5 db compression. *For single frequency tone* — (a) below compression, less than 1 per cent; (b) for 5 db compression, less than 1 per cent for frequencies above 200 cycles and not more than 1.75 per cent for frequencies as low as 50 cycles.

Compession Ratio: 10:1 (10 db input increase results in 1 db output increase above point at which gain reduction starts).

Recovery Time: Variable in 5 steps of 0.2 second each from 0.2 second to 1 second. Optional adjustment permits variation from 0.1 second to 0.5 second.

Source Impedance: 600 ohms (circuit not balanced to ground).

Load Impedance: 600 ohms (circuit not balanced to ground).

Maximum Gain: 53.5 db maximum with all input and output fixed attenuators omitted (37 db as shipped with 10 db input and 6.5 db output attenuators connected) when working from 600 ohms and into 600 ohms, both adjustable attenuators at zero.

Input Level Range: —30 dbm to +20 dbm (single frequency tone).

Output Level Range: —6 dbm to +23.5 dbm (single frequency tone).

Program Level Range: Deduct 10 db from input and output level to allow for peak factor.

Output Power: +17 dbm single frequency (as shipped and with adjustable output attenuator at zero) when gain reduction starts. (+23.5 dbm, maximum, with all output fixed attenuators omitted).

Power Supply: 105 to 125 volts, 0.7 ampere, 50-60 cycles a-c.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2			1612
3	348A	or	6J7-G
2			6SN7
1			6H6-G
1	274A	or	5Z3
1	351A	or	6X5-G
1	313C		
1	300B	or	2A3
12			

(One No. 46 Mazda Lamp required for meter illumination)

Dimensions: 19" wide, 19-7/32" high and 6¾" deep.

Weight: 49 pounds.

Finish: Chassis — Gray
Mat — 1126C-15: Dark aluminum gray
1126C- 3: Black.

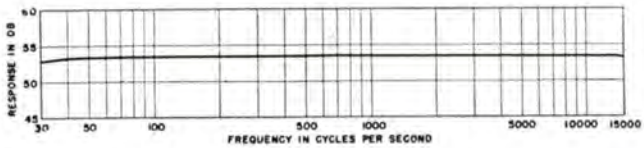


Figure 4 — Typical Overall Frequency Response.

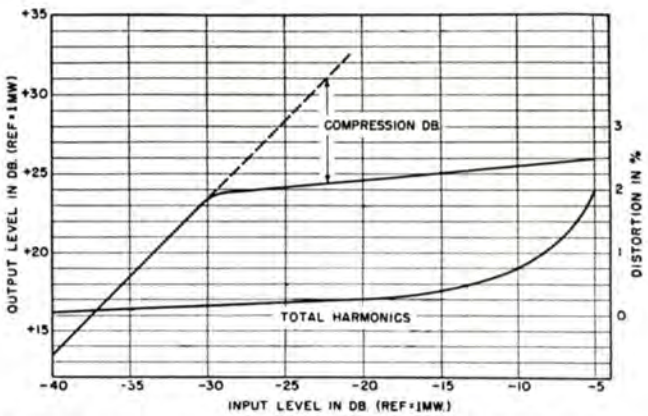


Figure 5 — Typical 1000 Cycle Load and Distortion Characteristics.

106A LINE AMPLIFIER *Tops for FM*

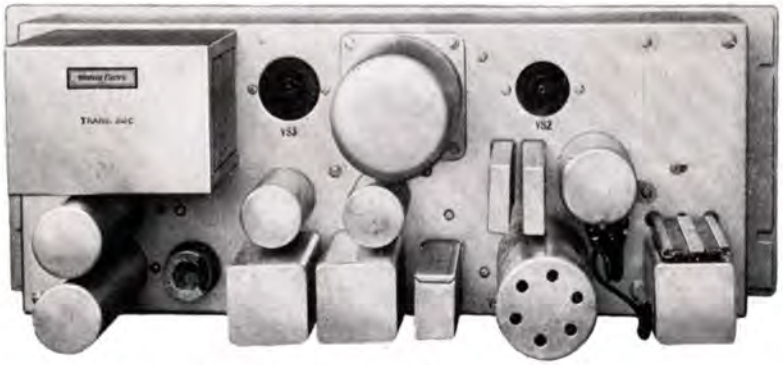


Figure 6 — Rear View, 106A Line Amplifier.

Use — The 106A is designed to provide isolation between outgoing program lines fed from the same source and to compensate for output switching circuit and line equalization losses. It may also be used as a general purpose amplifier for applications where its gain and power level are adequate.

Description — A two-stage, a-c operated line amplifier for bridging or matching service, it has a self-contained power supply. Resistors in cathode circuits are provided to permit tube checks. See Schematic, page 36.

Features

Excellent frequency response ±1 db, 50 to 15,000 cycles.
Variety of application — General purpose, bridging, matching.
Low noise level.
Self-contained power supply.
Two stages.
Isolated monitor output.
Recessed panel construction permits easy maintenance.

Specifications

Frequency Response: Uniform within ±1 db over range 50 to 15,000 cycles.

Output Noise: Main output at maximum gain setting −52 dbm unweighted, −68 dbm weighted (normal ear sensitivity curve).

Signal-to-Noise Ratio: 70 db with +18 dbm output or 80 db with +28 dbm output.

Source Impedance: 600 ohms (matching or bridging connection).

Load Impedance: Main output 600 ohms. Monitor output 40 ohms (approximately).

Maximum Gain: 45 db (600 ohm matching connection). 20 db (10,000 ohm bridging connection).

Gain Control: 38 db in 20 steps (2 db each plus "off").

Output Power: Main output +28 dbm (600 milliwatts) with less than 1 per cent harmonic distortion. Monitor output 20 db less than main output (isolation between main and monitor output 20 db). +18 vu maximum program level allowing for a 10 db peak factor.

Power Supply: 105-125 volts, 50-60 cycles a-c, 0.4 amperes, 48 watts maximum.

VACUUM TUBES

Quantity Required	*Western Electric*
1	310B
1	336A
1	274A
3	

Mounting: Relay rack or equipment cabinet. Recessed panel construction. Panel has removable front mat to allow access to wiring and terminals in recessed portion of panel.

Dimensions: 19" wide, 8" deep, 6-31/32" high.

Weight: 22 pounds.

Finish: Chassis: Gray Enamel
Mat: 106A-15 Dark Aluminum Gray
106A-3 Black.

Figure 7 — Front View, 106A Line Amplifier.

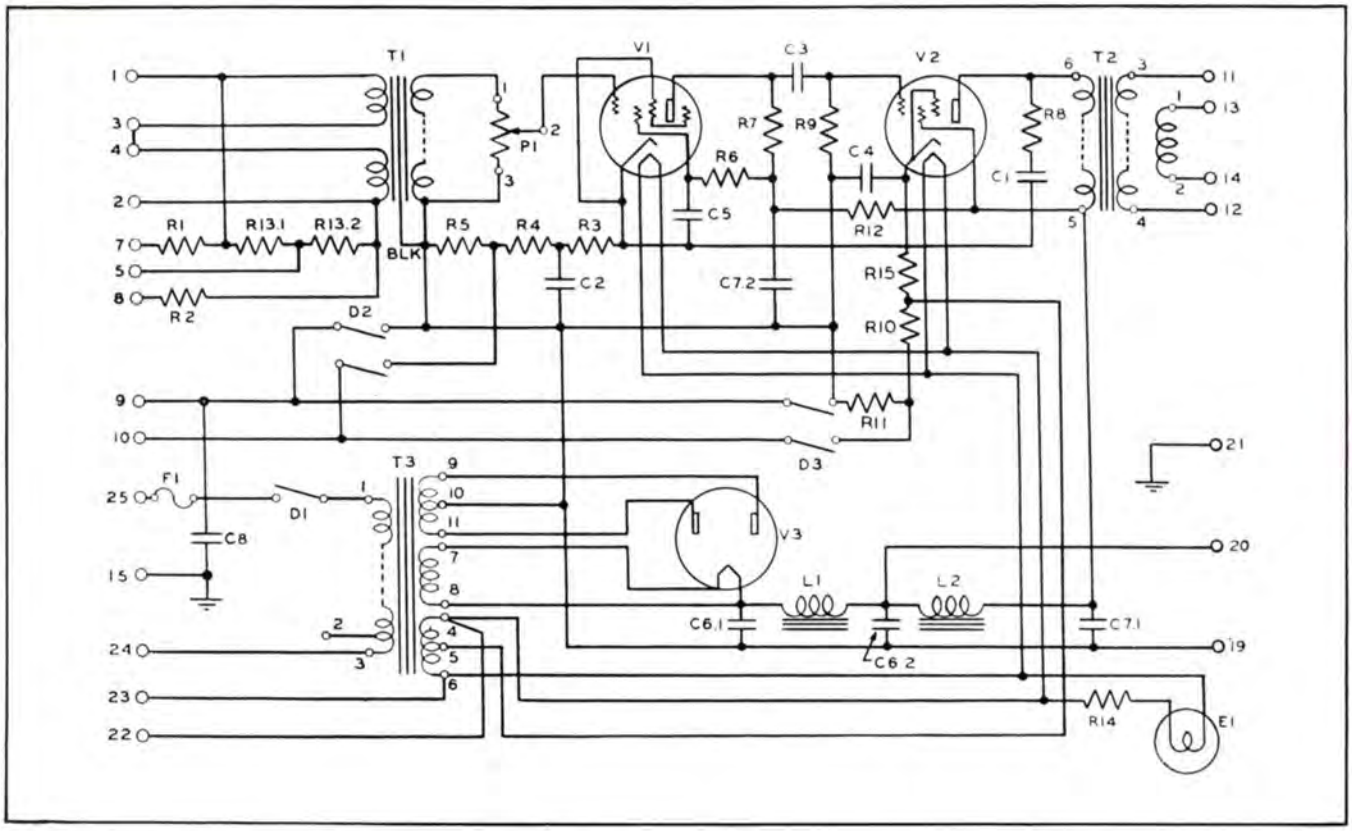


Figure 8 — Schematic of 106A Line Amplifier.

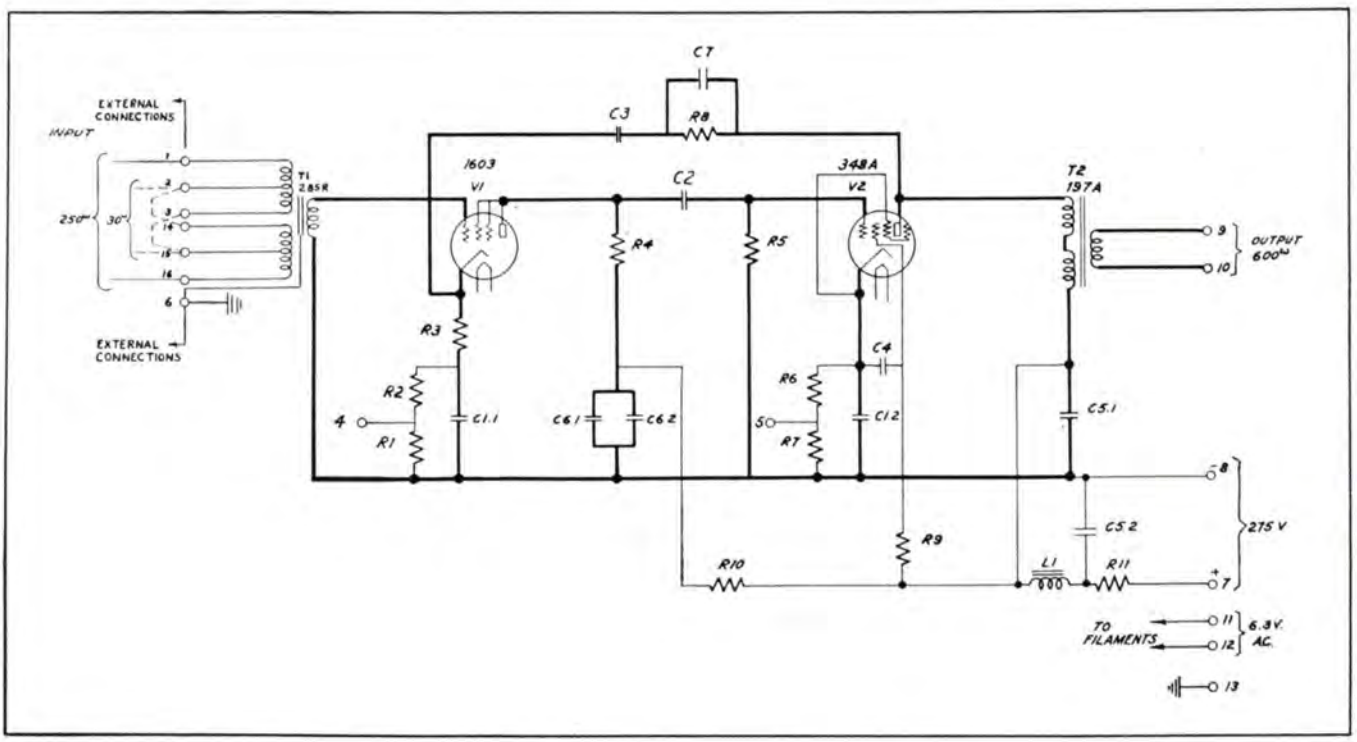


Figure 9 — Schematic of 120C Line Amplifier.

120C PRE-MIXING AMPLIFIER

Tops for FM

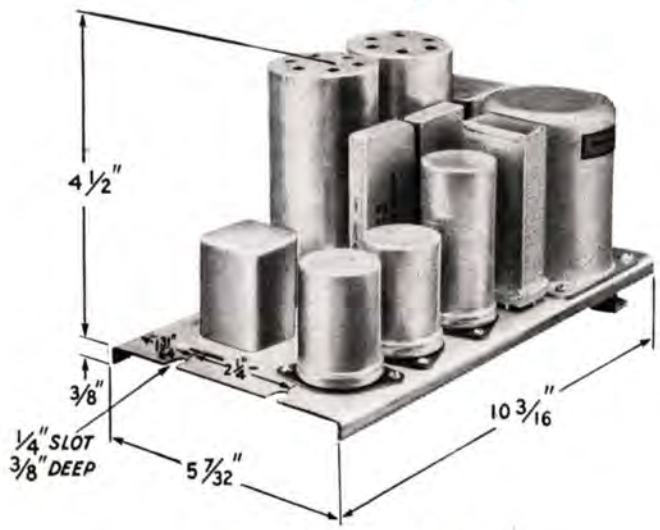


Figure 10 — 120C Line Amplifier.

Use — Designed to fulfill requirements as a pre-mixing or booster amplifier and for use in "no gain" bridging isolation amplifier circuits.

Description — It is a compact two stage 44 db fixed gain amplifier unit having excellent frequency response and low distortion. It has a balanced input transformer with electrostatic and electromagnetic shields. Resistors in cathode circuits are provided to permit checking the tubes through the use of the KS-10003 type or equivalent meter.

Features

Compact, two stage fixed gain amplifier.
Pre-mixing or booster application.
Ready checking of plate circuits.
Ease of mounting.
Electrical and mechanical isolation.
Isolation amplifier by use of input pad.
Stabilized feedback.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: 82 dbm unweighted. 87 dbm weighted. (Normal ear sensitivity curve).

Signal-to-Noise Ratio: 77 db weighted, 72 db unweighted, for —10 dbm output level.

Source Impedance: 30, 250 or 600 ohms matching. For bridging add proper input pad.

Load Impedance: 600 ohms.

Gain: 41 db.

Output Power: Single frequency output power for less than 1 per cent total harmonics: +16 dbm (38 milliwatts), at fundamental frequency of 400 cycles; +13 dbm (20 milliwatts) at fundamental frequency of 50 cycles.

Power Required: Filaments, 6.3 volts, 0.8 ampere a-c; plates, 275 volts d-c, 7 ma. Power is normally obtained from Western Electric 18 or 20 type Rectifiers which are capable of supplying a number of 120C Amplifiers. Power for one 120C Amplifier may be obtained from the Western Electric 124 type Amplifier by the use of a simple supplementary power supply circuit consisting of two resistances.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
1	348A	or	1620 (or 6J7)
1			1603
2			

Mounting: Advanced type of basic amplifier unit designed for mounting in desks or other structures and also adaptable for relay rack or bay cabinet mounting through the use of 177 or 190 type mounting plates and 296 type panels. Isolation both electrically and mechanically is accomplished by using rubber supports furnished with the amplifier.

Dimensions: 10-3/16″ wide, 5-7/32″ deep and 6-3/16″ high.

Weight: 6½ pounds.

Finish: Light gray.

121A LINE AMPLIFIER

Tops for FM

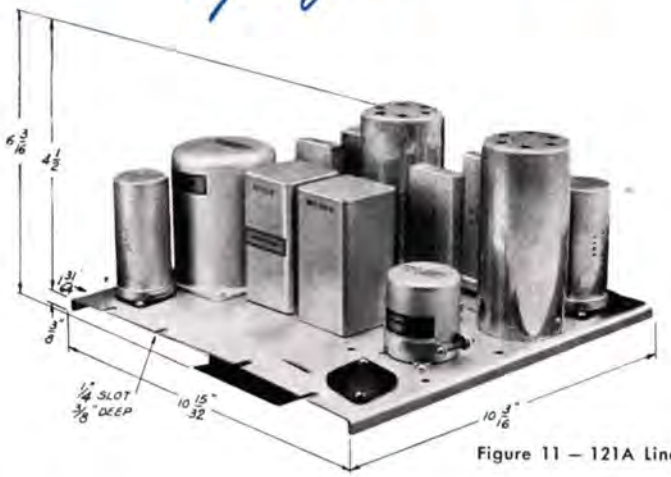


Figure 11 — 121A Line Amplifier.

Use — An adaptable 78 db fixed gain amplifier unit for use as an intermediate or microphone-to-line level main amplifier in FM and AM speech input and sound distribution systems.

Description — It is a three stage 78 db fixed gain amplifier having low distortion and high signal-to-noise ratio. Input impedances of 30, 250, or 600 ohms can be selected by arranging the strapping to the input transformer. The output impedance is 600 ohms. Each cathode circuit is arranged for checking the tubes through the use of the KS-10003 type or equivalent meter. The total d-c power required is 0.03 ampers at 275 volts. The filaments require 2 amperes at 6.3 volts.

The construction is compact and rugged resulting in a small chassis size for this type of amplifier.

Features

Three-stage fixed gain amplifier.
Intermediate or microphone-to-line amplifier.
Ready checking of tubes.
Ease and variety of mounting.
Electrical and mechanical isolation.
Stabilized feedback.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: (Weighting follows normal ear sensitivity curve).

Gain	78 db	70 db	45 db
Noise Level:			
Unweighted	−42 dbm	−50 dbm	−75 dbm
Weighted	−52 dbm	−60 dbm	−85 dbm
At + 18 dbm output level signal-to-noise ratio:			
Unweighted	60 db	68 db	93 db
Weighted	70 db	78 db	103 db

Source Impedance: 30, 250 or 600 ohms matching. For bridging add proper input pad.

Load Impedance: 600 ohms.

Maximum Gain: 78 db; 70 db by internal connection change; 45 db by restrapping to eliminate the first stage.

Output Power: Single frequency output power for less than 1 per cent total harmonics: +28 dbm (600 milliwatts) for fundamental frequency of 400 cycles: +25 dbm (300 milliwatts) for fundamental frequency of 50 cycles.

Power Required: Filaments, 6.3 volts, 2 amperes; plates, 275 volts, d-c, 30 ma.

Power normally obtained from Western Electric 18 or 20 type Rectifiers.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
1	347A	or	6J7 (or 1620)
1	348A	or	6J7 (or 1620)
1	349A	or	6F6 (or 6V6)
3			

Mounting: This basic amplifier unit is designed for mounting in desks or other structures; also adaptable for relay rack or bay cabinet mounting through the use of 177 or 190 type mounting plates and 296 type panels. Isolation, both electrically and mechanically, is accomplished by using rubber supports which are furnished with the amplifier.

Dimensions: 10-3/16" wide, 10-15/32" deep and 6-3/16" high.

Weight: 10 pounds.

Finish: Light gray.

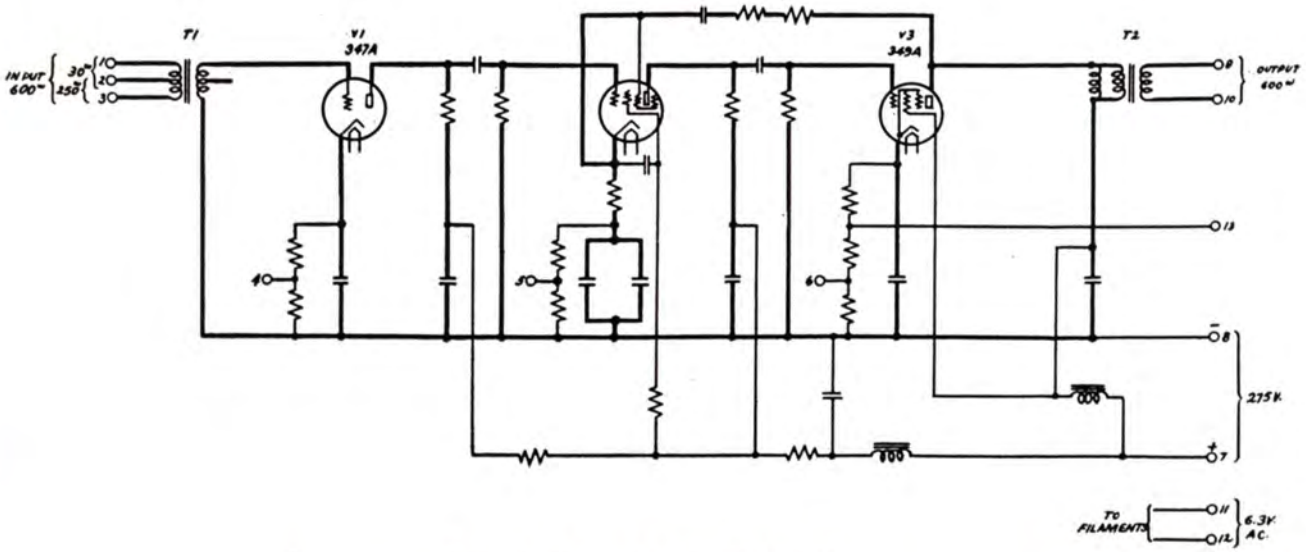


Figure 12 — Schematic of 121A Line Amplifier.

124 SERIES LOUDSPEAKER AND GENERAL PURPOSE AMPLIFIERS

Brief guide to selection based on application of 124 type amplifiers; see individual descriptions for details.

124A — One input — line level.
Basic unit — lowest cost.
No control on front panel — can be set in loudspeaker base or rack mounting.

124E — One input — line level.
More flexible input circuit.
Gain control and power switch on front panel, rack or cabinet mounting.

124F — Two inputs — one line level.
— one microphone level.
Two gain controls and a power switch on front panel, rack or cabinet mounting.

124G — Two inputs — both microphone level.
Two gain controls and a power switch on front panel, rack or cabinet mounting.

The following chart of Output Transformer Terminations (T-2) applies to all amplifiers in the 124 series, i.e., 124A, 124E, 124F and 124G:

OUTPUT TRANSFORMER TERMINATIONS (T-2)

Nominal Load Impedance (ohms)	*Working Range of Load Impedance (ohms)*	*Strap Terminals*	*Output Connections*
600	300 to 1200	7-8, 9-10, 11-12	5 and 14
150	70 to 300	7-8, 9-14, 11-12, 5-10	5 and 14
30	20 to 70	7-8, 9-10, 11-12	6 and 13
16	10 to 20	8-10, 9-11, 7-8, 11-12	6 and 13
7.5	3 to 10	7-9, 11-13, 9-10, 6-8, 10-12	6 and 13
1.75	1 to 3	6-8-10-12, 7-9-11-13	6 and 13

Figure 12A.

124A AND 124E MONITOR AND AUDITION AMPLIFIERS

Tops for FM

Figure 13 — Front View, 124E Monitor Amplifier.

Use — These amplifiers are intended primarily for use as high quality AM and FM monitoring and audition loudspeaker amplifiers.

Description — They are identical except that the 124E has a gain control and power switch mounted on the face mat and two extra fixed pads in the input circuit for a wider range of input level connection. In addition to its primary use as a loudspeaker amplifier, the 124E is also widely used as a high level booster and general purpose amplifier.

The frequency characteristics of the amplifier, signal-to-noise ratio and power handling capability, conform fully to the requirements of radio broadcast frequency modulation systems. The frequency response is uniform from 50 to 15,000 cycles and at full power output of 20 watts, the dynamic range between signal and noise is about 80 db. Designed for quiet operation, the 124A or 124E may be placed in the loudspeaker cabinet. The 124A, because it has no panel controls, may be placed face down in the cabinet. Its design, furthermore, facilitates use in high gain assemblies by reducing to a minimum the radiated field from the power transformer and retard coil.

Features

Tapped output coil for operating into load impedance from 1 to 1200 ohms.
12 or 20 watt output.
Input coil especially shielded and rotatable to a position of minimum noise pick-up.
Stabilized feedback. Glass fibre insulated wire. Self-contained power supply.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: Unweighted, —37 dbm (signal approximately 78 db above noise).

Source Impedance: Line input 600 ohms matching or bridging. See input arrangements at end of this section.

Load Impedance: 1-1200 ohms.

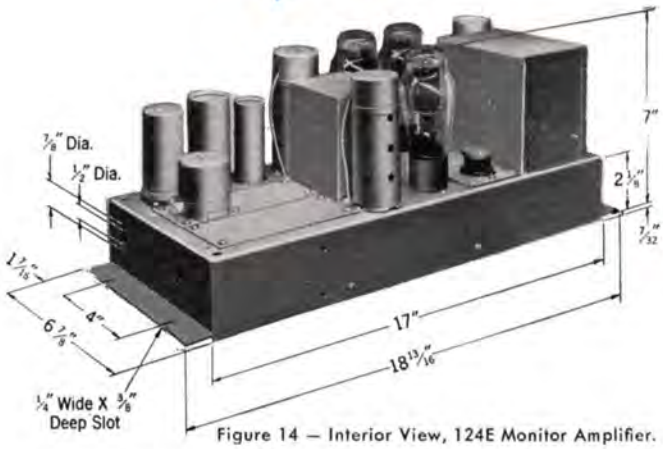


Figure 14 — Interior View, 124E Monitor Amplifier.

Nominal load impedances: 600, 150, 30, 16, 7.5 or 1.75 ohms. See chart Figure 12A.

Maximum Gain: 124A — 50 db bridging input, 63 db high gain input.
124E — depends on the input strapping used — see schematic of input arrangements, see page 41.

Gain Control: 124A — no gain control.
124E — 38 db in 2 db steps.

Maximum Input Level: 124A — 8 vu bridging input, 25 vu high gain input.
124E — depends on input strapping used. See schematic. Levels given are as read on volume indicator calibrated for 600 ohm load, connected across input terminals.

Output Power: 12 watts (+41 dbm) with less than 2 per cent total harmonics as shipped; 20 watts (+43 dbm) with less than 5 per cent total harmonics available by a simple reconnection of taps for higher plate voltage and use of Western Electric tubes.

Power Supply: 105-125 volts, 50-60 cycles.
125 watts maximum. Fused with 1.25 amp. Buss Fustat.

VACUUM TUBES

This amplifier should not be operated with a mixed complement of Western Electric and non-Western Electric amplifier tubes. This, however, does not apply to the rectifier tube.

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2	348A	or	6J7 (or 6J7G)
2	350B	or	6L6 (or 6L6G)
1	274B	or	5T4 (or 5U4G)
5			

Installation: Connections — all external connections are normally made to terminals under the chassis. Knockouts are provided in the ends of the chassis to admit the wires. There are additional knockouts in the sides of the chassis where sockets may be installed if plug and socket connections are desired.

Dimensions: 19" wide, 7" deep and 6-31/32" high.

Weight: 20 pounds.

Finish: ***Chassis*** — Light gray.
Mat — 124A (or E) — 15: dark aluminum gray.
— 124A (or E) — 3: black.

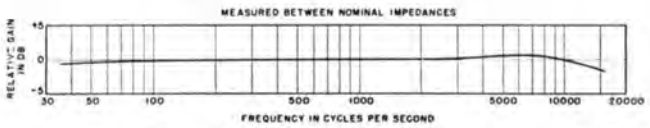
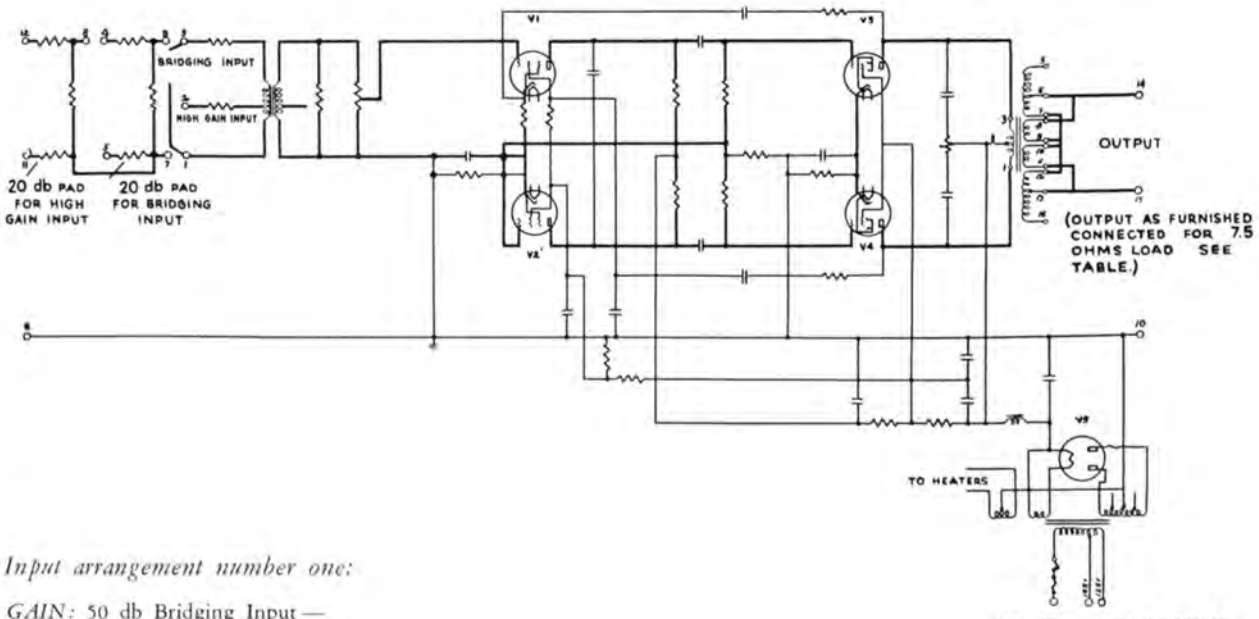


Figure 15 — Typical Overall Frequency Response, Measured Between Nominal Impedances.



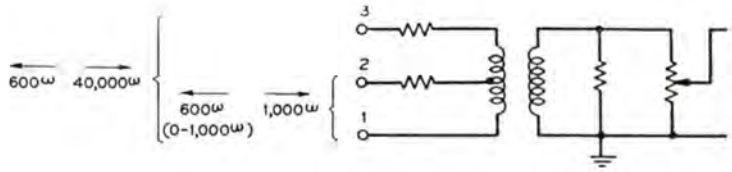
Input arrangement number one:

GAIN: 50 db Bridging Input — Terminals 1 and 3
63 db High Gain Input — Terminals 1 and 2
Measured between nominal impedances.

GAIN CONTROL: 38 db in 2 db steps.

MAXIMUM INPUT LEVELS:
+23 vu — Bridging Input
+5 vu — High Gain Input

USE: General purpose where gain control is desired.



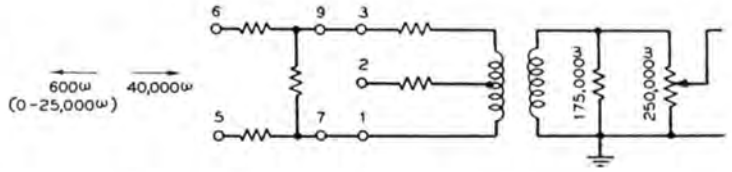
Input arrangement number two:

GAIN: 30 db. Measured between nominal impedances.

GAIN CONTROL: 38 db in 2 db steps

MAXIMUM INPUT LEVEL: +42 vu

USE: Same as for Input Arrangement No. 1 when higher input levels are available.



Input arrangement number three:

GAIN: 43 db. Measured between nominal impedances.

GAIN CONTROL: 38 db in 2 db steps

MAXIMUM INPUT LEVEL: +22 vu

USE: Same as for Input Arrangement No. 1 when higher input levels are available and where a 600 ohm internal input impedance is desired.

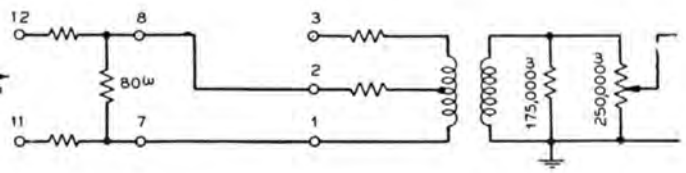


Figure 16 — Schematic of 124E Monitor Amplifier.

124F MONITOR AND TALKBACK AMPLIFIER

Tops for FM

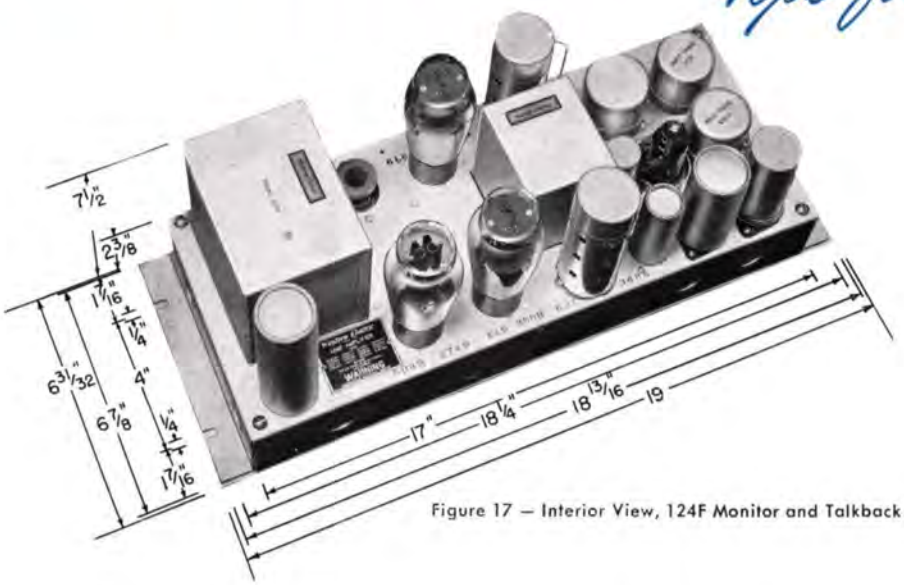


Figure 17 — Interior View, 124F Monitor and Talkback Amplifier.

Use — Ideally suited as a monitor and talkback amplifier, the 124F has separate line level and microphone level input circuits, each with its own gain control.

Description — The microphone input includes one 116B Pre-amplifier. In addition to the other features described for the 124E, the 124F provides a means of feeding programs to booth and studio loudspeakers, as well as cue-feeding to remote lines, either from low level sources or from line or bus level sources. The low level circuit allows talkback and cue to performers in an associated studio.

Features

Two inputs — one microphone — one line level.
Separate gain controls both of which may be removed from amplifier and located remotely.
Quiet operation — The 124F Amplifier may be placed in the loudspeaker cabinet.
Minimum field radiation from power and retard coil, facilitating its use in high gain assemblies.
Shielded input coil — Rotatable to position of minimum noise pickup.
Stabilized feedback.
Glass-fiber insulated wiring.
Push-pull output.
Self-contained power supply.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 10,000 cycles. Down approximately 3 db at 15,000 cycles on line input.
±1db from 50 to 15,000 cycles for microphone input.

Output Noise: −8 dbm unweighted, under maximum gain conditions (signal approximately 50 db above noise).

Source Impedance: Line input 600 ohms matching or bridging. Low level input 15 to 250 ohms.

Load Impedance: 1 to 1,200 ohms. Nominal load impedances: 600, 150, 30, 16, 7.5 or 1.75 ohms. See chart, figure 12A.

Maximum Gain: Line level input 60 db (600 ohm matching connection); 45 db (20,000 ohm bridging connection). Low level input 104 db.

Gain Control: Line input 38 db in 2 db steps. Low level input 35 db continuously adjustable.

Output Power: 12 watts (+41 dbm) with less than 2 per cent total harmonics as shipped; 20 watts, (+43 dbm) with less than 5 per cent total harmonics available by a simple reconnection of taps for higher plate voltage and use of Western Electric tubes.

Power Supply: 105-125 volts, 50-60 cycles, 1.25 amperes, 125 watts maximum. Fused with Buss Fustat.

VACUUM TUBES

The amplifier should not be operated with a mixed complement of Western Electric and non-Western Electric

Figure 18 — Front View, 124F Monitor and Talkback Amplifier.

Amplifier Tubes. This however does not apply to the rectifier tube, nor to the 1612 Type tube.

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2	348A	or	6J7G (or 6J7)
2	350A	or	6L6G (or 6L6)
1	274B	or	5U4G (or 5T4)
1			1612 Type (or 6L7G or 6L7)
6			

Mounting: Standard 19" relay rack occupying 7" of panel space.

Dimensions: 19" wide, 7½" deep and 6-31/32" high.

Weight: 20 pounds.

Finish: Chassis — Light gray.
Mat — 124F-15: dark aluminum gray.
124F-3: black.

Figure 19 — 116B Pre-Amplifier used in 124F, 124G, and other amplifiers. Employs d-c bias gain control.

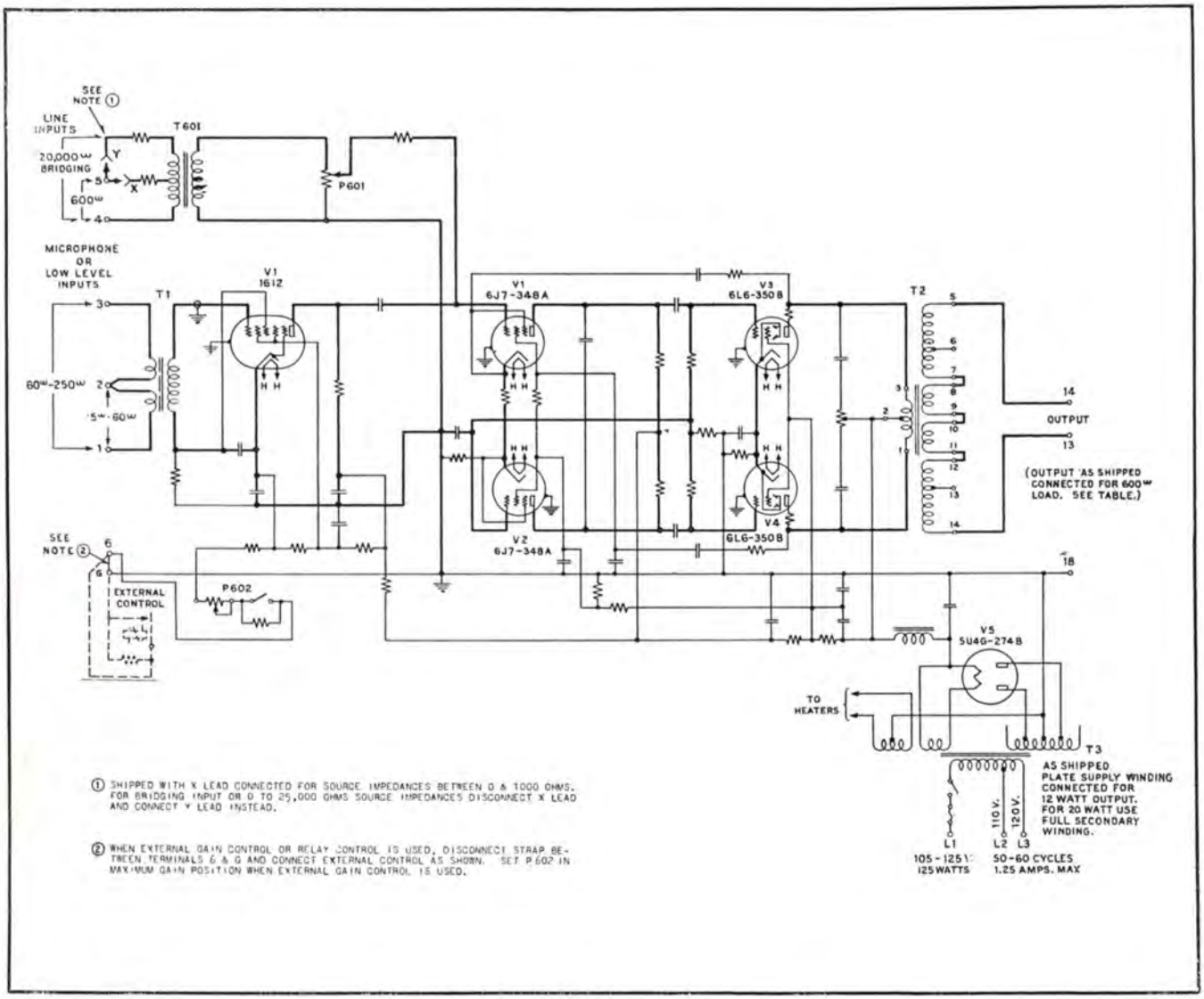


Figure 20 — Schematic of 124F Monitor and Talkback Amplifier.

124G MONITOR AND AUDITION AMPLIFIER

Tops for FM

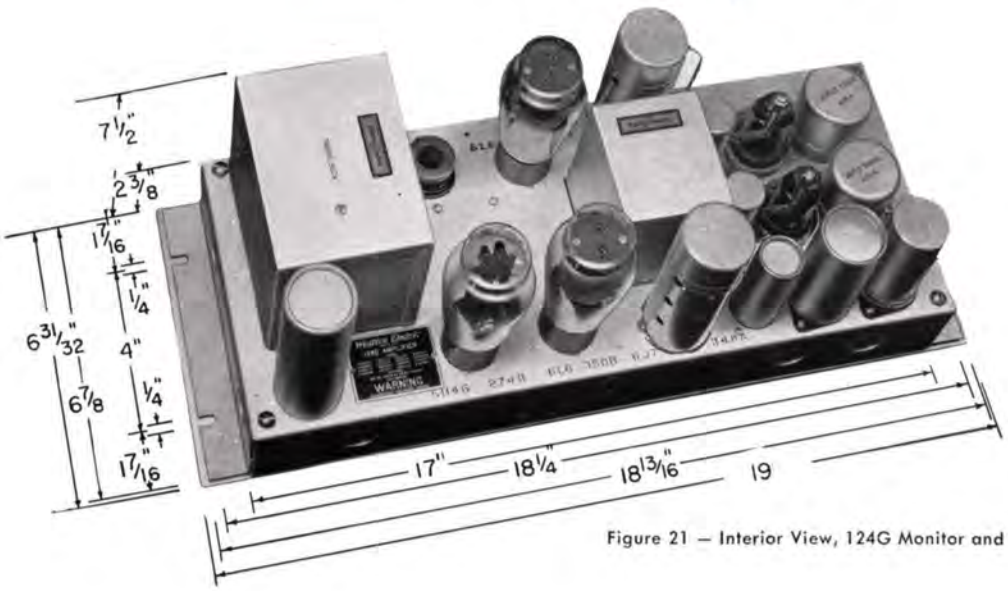


Figure 21 — Interior View, 124G Monitor and Audition Amplifier.

Use — The 124G is a high quality amplifier designed to feed program busses, lines or loudspeakers. It can be adapted as an emergency standby system for larger program production systems because its overall gain and output power are high enough to cover the entire range between input and output network levels. Its performance characteristics make it ideally suited for FM applications as a monitor amplifier.

Description — This unit is completely self-contained, including the power supply. It has two input channels feeding a common output circuit. The input stages are single tube units, each having its own gain control. The output transformer can be connected to work into any impedance from 1 to 1200 ohms.

Features

- Two inputs — both microphone level.
- Separate gain controls both of which may be removed from amplifier and located remotely.
- Quiet operation — The 124G Amplifier may be placed in the loudspeaker cabinet.
- Minimum field radiation from power and retard coil, facilitating its use in high gain assemblies.
- Shielded input coil — rotatable to position of minimum noise pick-up.
- Stabilized feedback.
- Glass-fiber insulated wiring.
- Push-pull output.
- Self-contained power supply.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: −8 dbm unweighted, under maximum gain conditions. (Signal approximately 50 db above noise).

Source Impedance: 15 to 250 ohms. See schematic for connections, Figure 23.

Load Impedance: 1 to 1,200 ohms. Nominal load impedances 600, 150, 30, 16, 7.5 or 1.75 ohms. See chart, Figure 12A.

Maximum Gain: Approximately 104 db.

Gain Control: 35 db continuously adjustable — separate control for each input.

Figure 22 — Front View, 124G Monitor and Audition Amplifier.

Output Power: 12 watts (+41 dbm) with less than 2 per cent total harmonics; 20 watts (+43 dbm) with less than 5 per cent total harmonics available by a simple reconnection of taps for higher plate voltage and use of Western Electric tubes.

Power Supply: 105-125 volts, 50-60 cycles, 1.25 amperes, 125 watts maximum. Fused with Buss Fustat.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2	348A	or	6J7G (or 6J7)
2	350B	or	6L6G (or 6L6)
1	274B	or	5U4G (or 5T4)
2			1612 (or 6L7G or 6L7)
7			

The amplifier should not be operated with a mixed complement of Western Electric and non-Western Electric Amplifier Tubes. This however does not apply to the rectifier tube, nor to the 1612 Type tube.

Mounting: Standard 19″ relay rack occupying 7″ of panel space.

Dimensions: 19″ wide, 7½″ deep and 6-31/32″ high.

Weight: 20 pounds.

Finish: Chassis — Light gray.

Mat — 124G-15: Dark aluminum gray.
124G-3: Black.

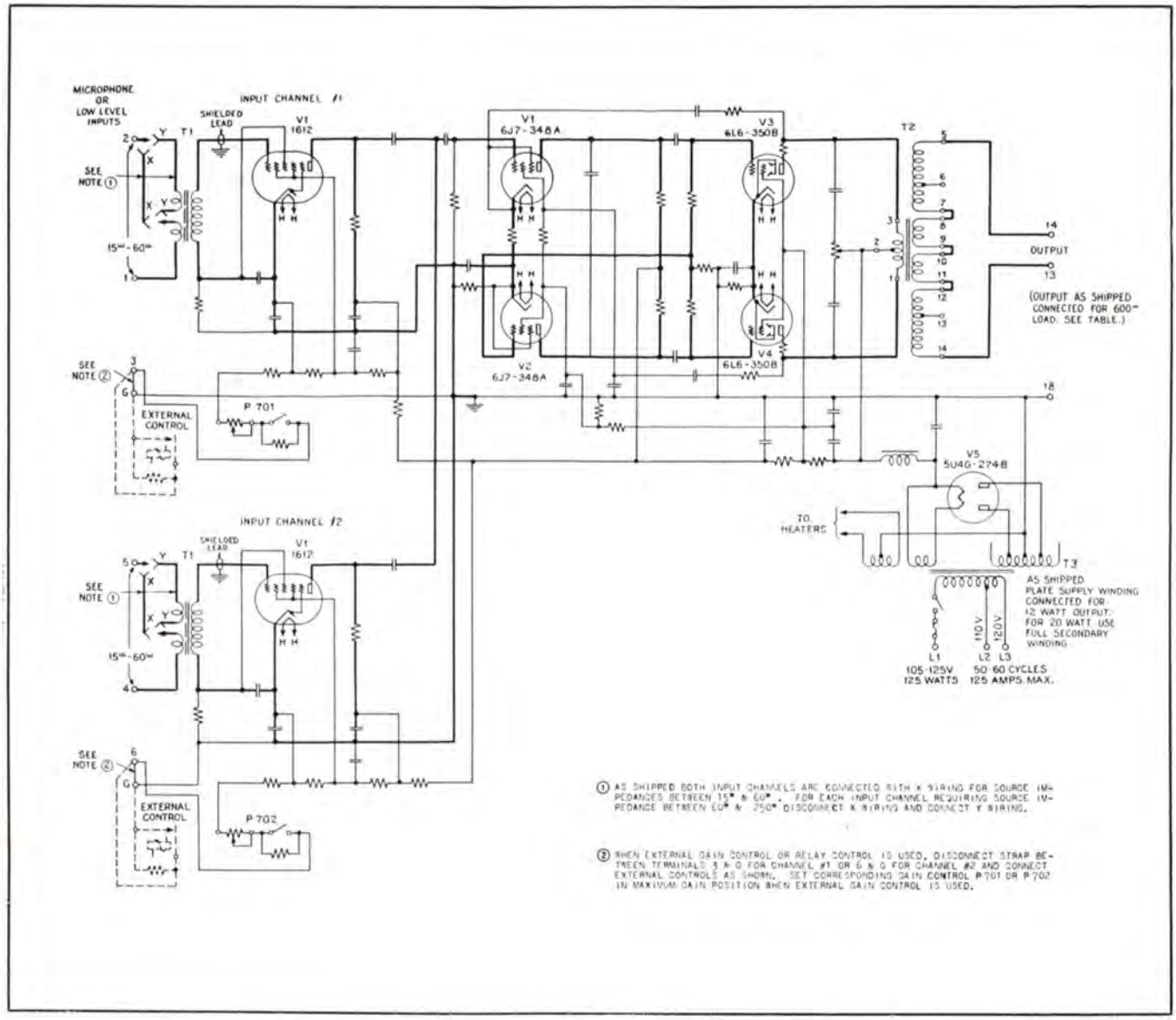


Figure 23 — Schematic of 124G Monitor and Audition Amplifier.

129A PRE-MIXING AMPLIFIER

Tops for FM

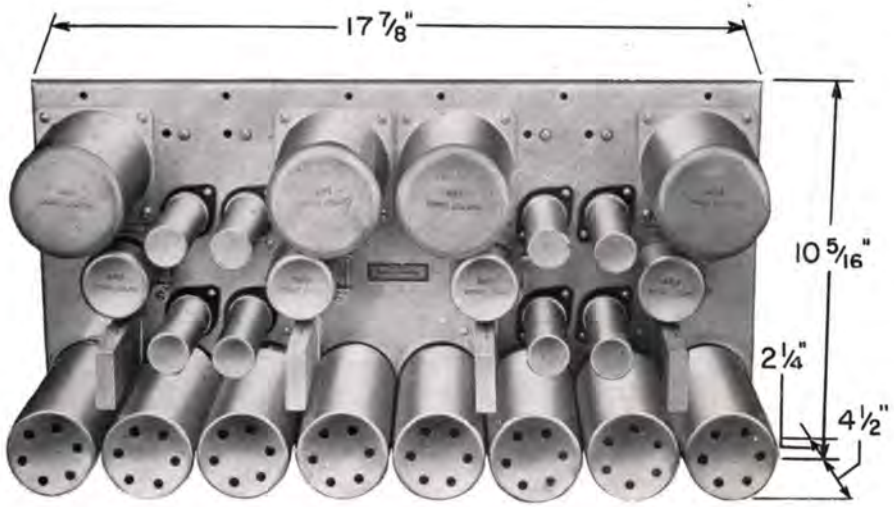


Figure 24 — 129A Pre-Mixing Amplifier.

Use — The 129A is particularly designed for use as a pre-mixing or booster amplifier in high quality AM and FM speech input and sound systems; it can also be connected for use as a group of "no-gain" low level bridging isolation amplifiers.

Description — Four identical two-stage amplifiers with fixed gain, mounted on a common chassis, comprise the 129A unit. Four electrically separate audio channels are provided in which the inputs from four low level sources (microphones or reproducers) are simultaneously and individually amplified prior to mixing. Each input transformer is arranged so that it can be rotated to provide a minimum pick-up from electromagnetic field interference. Cathode resistors are provided to permit tube checks.

Features

- High quality pre-mixing and booster amplifier.
- Useful with no-gain low level bridging isolation amplifiers.
- Four electrically separate channels for simultaneous and individual amplification.
- Designed for minimum pick-up from electromagnetic field interference.
- Cathode resistors for tube check circuits.
- Stabilized feedback.

Specifications

Frequency Response: Flat within ±1 db over the range 50 to 15,000 cycles.

Output Noise: −82 dbm unweighted, −87 dbm weighted. (Normal ear sensitivity curve).

Signal-to-Noise Ratio: 77 db weighted, 72 db unweighted, for −10 dbm output.

Source Impedance: 30, 250 or 600 ohms matching. For bridging add proper input pad.

Load Impedance: 600 ohms.

Gain: 41 db.

Output Power: Single frequency output power for less than 1 per cent total harmonics: +16 dbm (38 milliwatts) at fundamental frequency of 400 cycles: +13 dbm (20 milliwatts) at fundamental frequency of 50 cycles.

Power Supply (For Complete Amplifier): Filament 6.3 volts, 3.2 amperes. Plate 275 volts, 30 milliamperes d-c. Two of the pre-amplifiers can be supplied from one source while the other two are supplied from another. 1.6 amperes filament and 15 milliamperes plate required for each half of the amplifier. 20 Type Rectifier recommended for power supply. A single 20 Type Rectifier will supply power for several 129A Amplifiers.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
4	348A	or	1620 (or 6J7)
4			1603
8			

Mounting: Designed for console mounting: also for rack mounting on 190 Type Mounting Plate (one per plate). Type 296 panel required as face mat.

Dimensions: 17⅞" wide, 10-5/16" deep and 6¾" high.

Weight: 20¼ pounds.

Finish: Light gray.

Accessories: The following accessory equipment is recommended for use with the 129A Amplifier:

KS-10003 Meter (for measuring plate currents of vacuum tubes).

Western Electric 190 Type Mounting Plate (one mounts one 129A Amplifier).

Western Electric 296 Type panel.

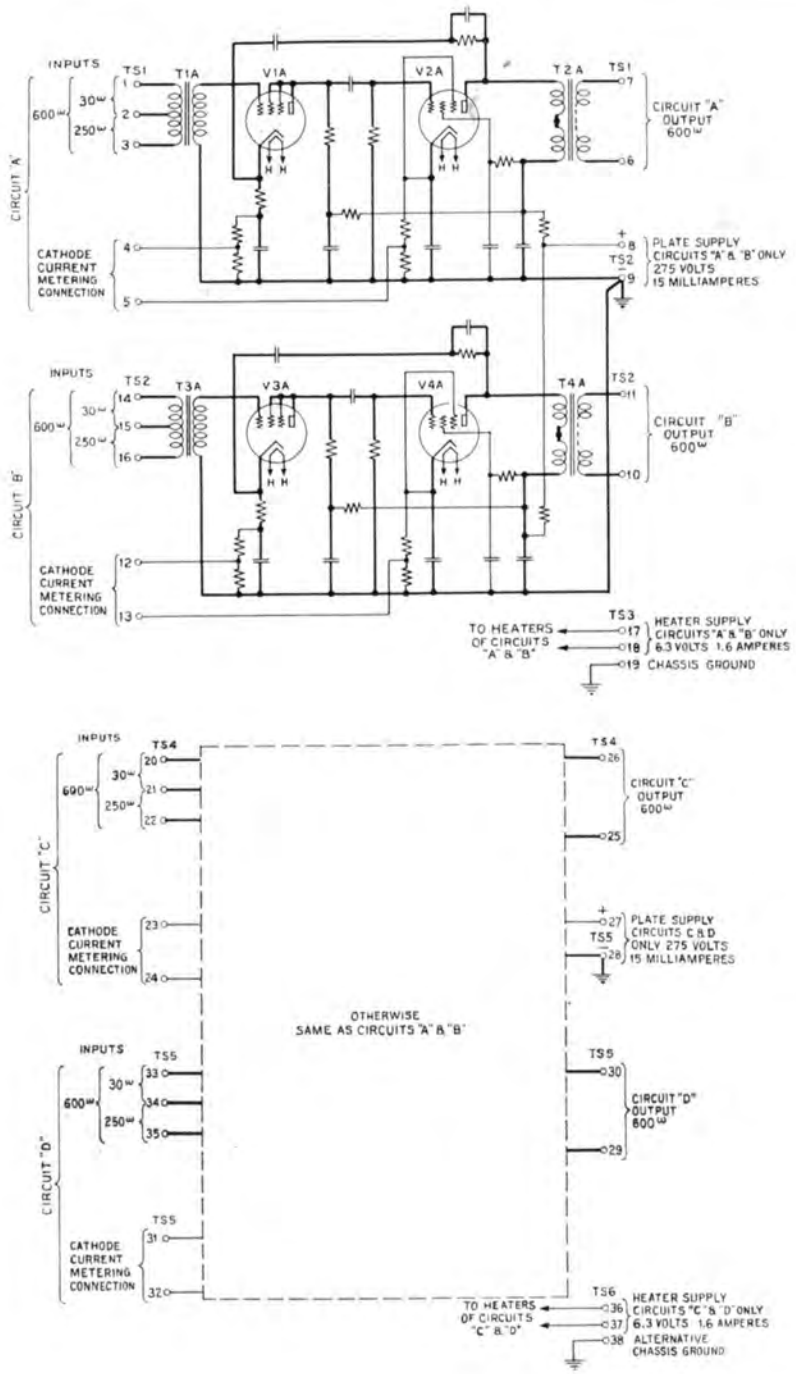


Figure 25 — Schematic of 129A Pre-Mixing Amplifier.

130B TWIN CHANNEL MAIN AMPLIFIER

Tops for FM

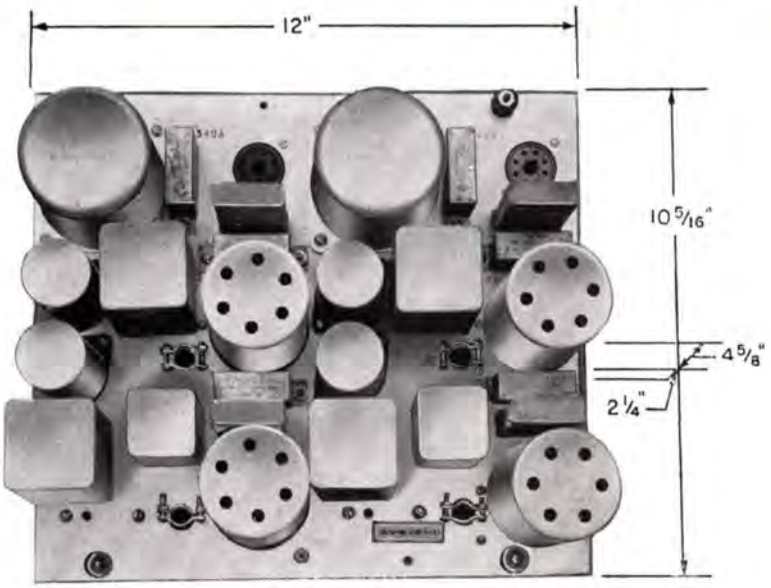


Figure 26 — 130B Twin Channel Main Amplifying Equipment.

Use — Recommended for use in high quality AM and FM audio systems where it is desirable to feed two programs through a single program production unit simultaneously. May also be used to provide one regular and one emergency transmission channel. Each amplifier element is arranged for its own interstage gain control, which is intended as the master gain control for that channel.

Description — Two identical, electrically separate, three stage amplifiers are mounted on a common chassis. In operation, cross talk between the two channels is held below audible levels through careful circuit design and expert selection of components.

By the same means a high signal-to-noise ratio and low harmonic distortion characteristic, comparable to that featured in units of the single channel type, have been achieved in this equipment. Resistors in cathode circuits are provided to permit tube checks.

Features

Handles two programs simultaneously.
Twin, electrically separate, three stage amplifiers.
Crosstalk held below audible levels.
High signal-to-noise ratio.
Low harmonic distortion.
Stabilized feedback.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: Main output with maximum gain setting —37 dbm unweighted, —47 dbm weighted (normal ear sensitivity curve).

Signal-to-Noise Ratio: 61 db unweighted, 71 db weighted; with +24 dbm output.

Source Impedance: 30, 250 or 600 ohms matching. For bridging add proper input pad.

Load Impedance: Main output 600 ohms. Monitor output 40 ohms (approximately).

Maximum Gain: 81 db.

Gain Control: Requires two (one for each amplifier unit) 100,000 ohm potentiometers mounted externally; low capacity wiring for interconnection must be used as this is a high impedance interstage gain control.

Output Power: Normal +24 dbm (250 milliwatts), for frequencies between 100 and 5,000 cycles less than 1 per cent harmonic distortion; +22 dbm (160 milliwatts) at 50 cycles 1 per cent harmonic distortion. Monitor output 20 db less than main output. (Isolation between main and monitor output is 20 db).

Power Supply for Complete Amplifier (2 amplifier units): Filament 6.3 volts, 3.6 amperes (d-c or a-c). Plate 275 volts, 65 milliamperes, d-c.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2			1603
2	348A	or	1620 (or 6J7)
2	349A	or	6F6
—			
6			

Mounting: This amplifier is designed for mounting in desks or other structures. It is also adaptable for relay rack or bay cabinet mounting thru the use of a 190 Type Mounting Plate (one per plate). 296 Type Panel required as a face mat.

Dimensions: 12" wide, 10-5/16" deep and 6⅞" high.

Weight: 17¼ pounds.

Finish: Light gray.

Accessories: The following accessory equipment is recommended for use with this amplifier:

2 — 100,000 ohm potentiometers, Western Electric BA-73987-3 or BA-73987-4 (for gain controls).

1 — KS-10003 Meter (for measuring plate currents of vacuum tubes).

1 — 18 or 20 Type Rectifier.

1 — Western Electric 190 Type Mounting Plate (one mounts one 130B Amplifier).

1 — Western Electric 296 Type Panel.

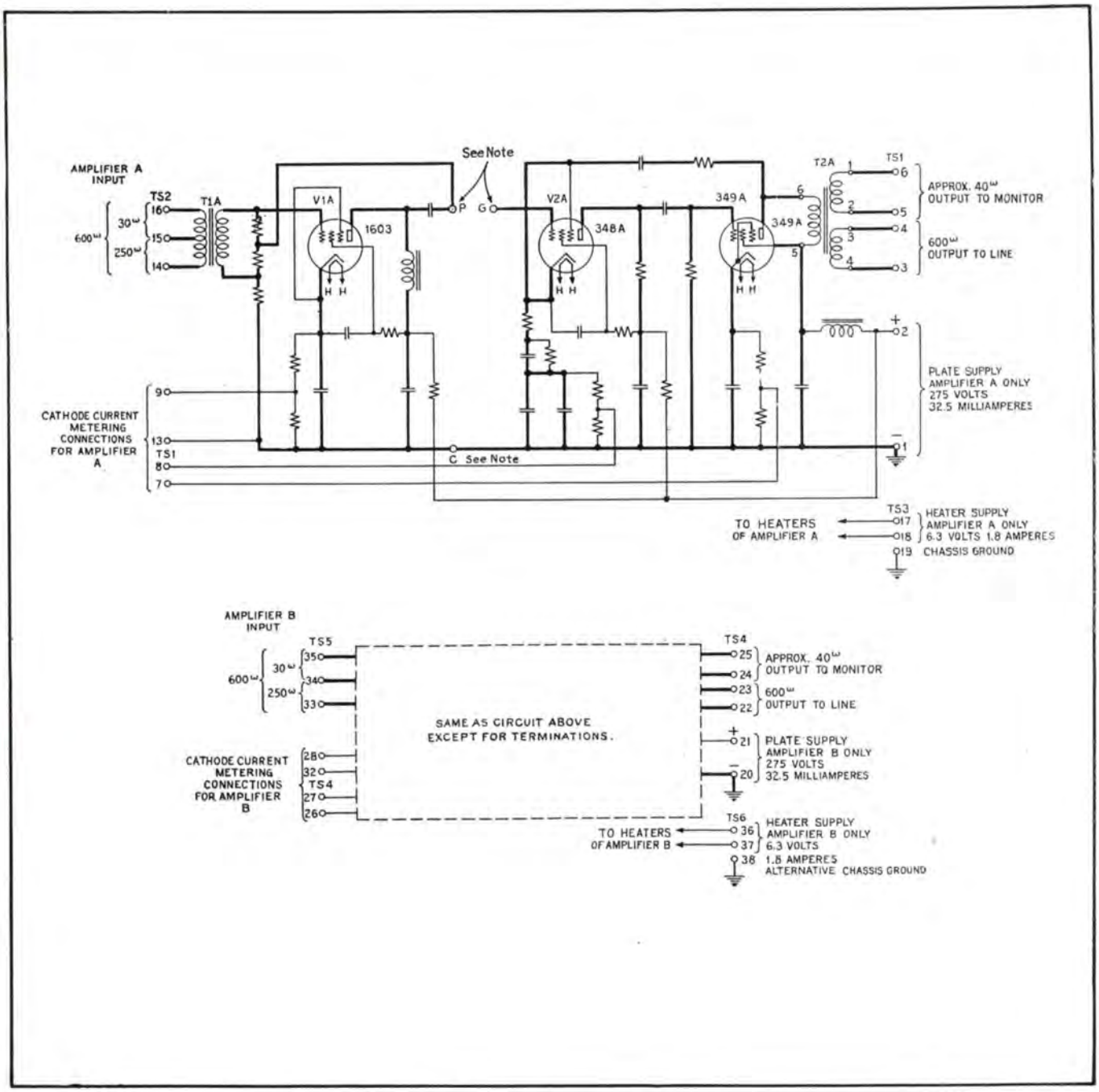


Figure 27 — Schematic of 130B Twin Channel Main Amplifying Equipment.

131A MONITOR AMPLIFIER

Tops for FM

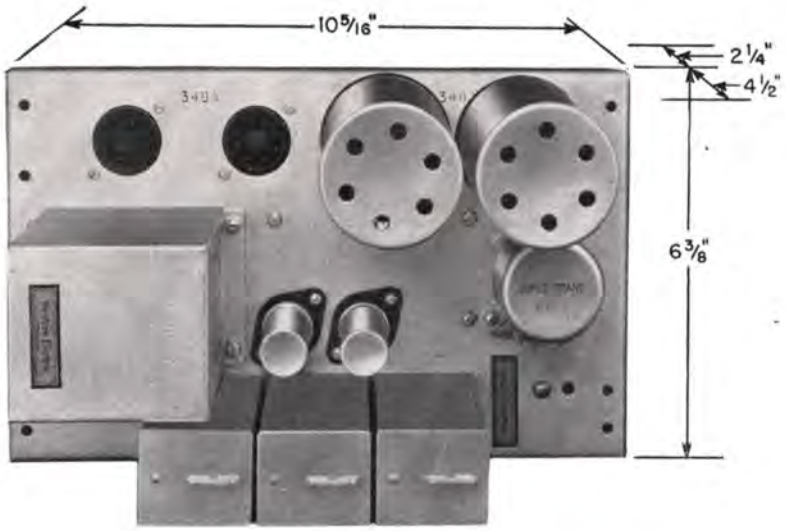


Figure 28 — 131A Monitor Amplifier.

Use — This amplifier is a compact single unit, especially designed for AM and FM studio-booth monitoring applications where the control booth operator requires a means for program cueing to performers in an associated studio or to remote pick up lines. A booth and two studio loudspeakers, as well as line cue-feeding circuits, can be served from its output network.

Description — The 131A Amplifier is of the two-stage push-pull type and possesses adequate gain to operate either from the output of a single preamplifier or to be bridged across the output of a main amplifier.

Output power is sufficient to satisfy normal booth and studio requirements. Taps are provided on the output transformer which permit adjustment to work into impedances from 1 to 1200 ohms, thus assuring high quality performance over a wide variety of loudspeaker impedance combinations. The unit is constructed for operation from an external power supply source.

Each of the three loudspeaker branch circuits is provided with a cut-off relay which may be connected to operate from microphone or talkback keys so that switching a microphone on, will at the same time, automatically silence the associated loudspeaker. This feature is desirable where microphone and loudspeakers are located in the same room since it offers a safeguard against acoustic feedback or "singing" which is likely to occur when a microphone is exposed to sound from a loudspeaker connected to the same amplifier channel.

Power for operating the relays is obtained from the power stage cathode circuit of the amplifier so that a separate relay power supply is not required.

Features

Excellent for studio-booth monitoring.
Variety of application.
Cut-off relays — for loudspeakers.
Tapped output transformer to permit working into impedances from 1 to 1200 ohms.
Stabilized feedback.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: −55 dbm unweighted, with maximum gain.

Signal-to-Noise Ratio: 80 db under conditions of normal gain and output level.

Source Impedance: 600 ohms matching. For bridging add proper input pad.

Load Impedance: Tapped output transformer provides for operation into any impedance from 1 to 1,200 ohms.

Maximum Gain: 50 db.

Output Power: 3.2 watts (+35 dbm) with 1 per cent harmonic distortion; 5 watts (+37 dbm) with 5 per cent harmonic distortion.

Power Supply: Filament 6.3 volts, 3 amperes a-c or d-c; plate 275 volts, 75 ma., d-c. (18 or 20 Type Rectifiers recommended for power supply).

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2	348A	or	1620 (or 6J7)
2	349A	or	6F6
4			

Mounting: Designed for console mounting; also for rack mounting on 190C Type Mounting Plate (capacity one per plate). 296 Type Panel required with each 190 Type Mounting Plate.

Dimensions: 10-5/16" wide, 6⅜" deep and 6¾" high.

Weight: 7¾ pounds.

Finish: Gray.

Accessories: The Western Electric 18 or 20 Type Rectifier is recommended for use with the 131A Amplifier.

1 — Western Electric 177 Type or 190 Type Mounting Plate.

1 — Western Electric 296 Type Panel. See "Components and Accessories" for ordering information.

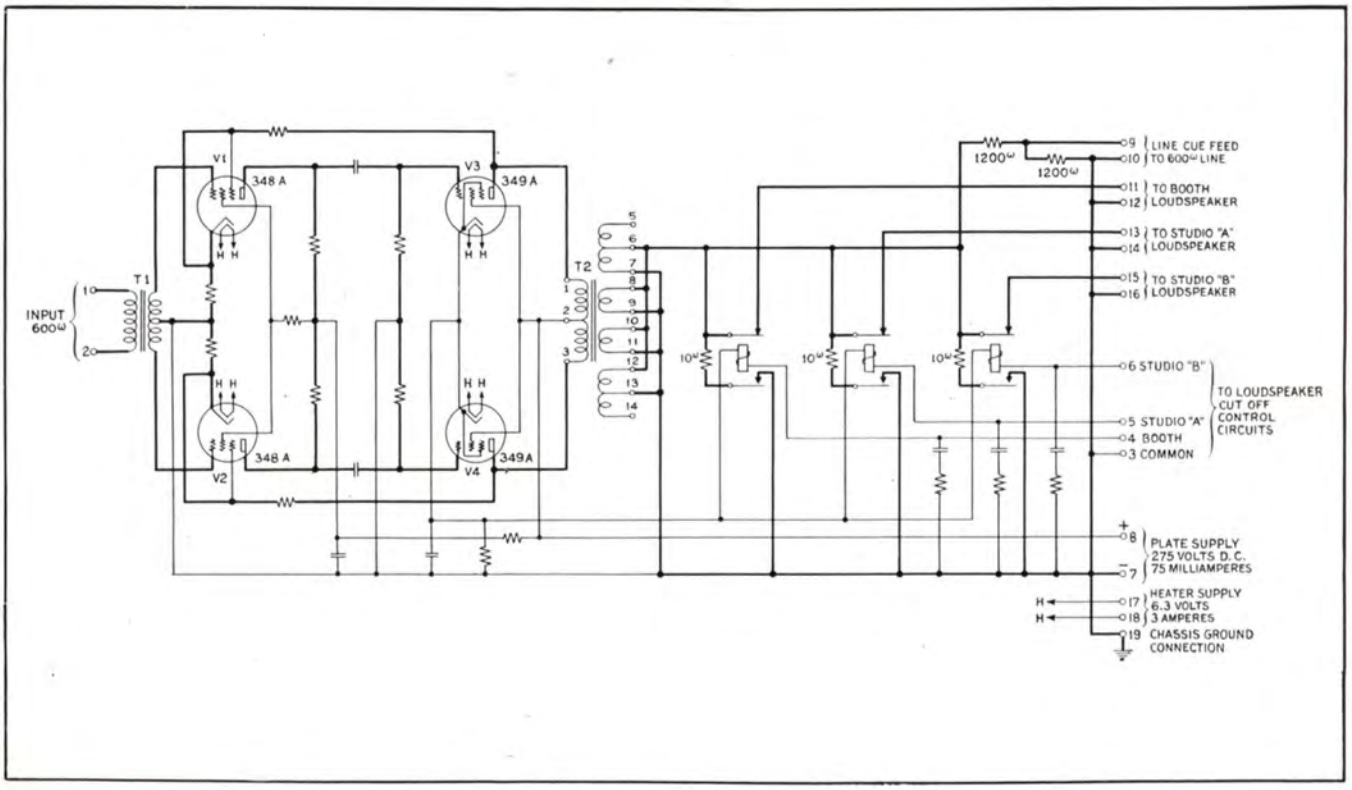


Figure 29 — Schematic of 131A Monitor Amplifier.

OUTPUT TRANSFORMER STRAPPING TABLE T-2

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS	OUTPUT CONNECTIONS
600ω	300ω TO 1200ω	7-8, 9-10, 11-12	5 & 14
150ω	70ω TO 300ω	7-8, 9-14, 11-12, 5-10	5 & 14
30ω	20ω TO 70ω	7-8, 9-10, 11-12	6 & 13
16ω	10ω TO 20ω	7-8-10, 9-11-12	6 & 13
7.5ω	3ω TO 10ω	7-9-10-12, 6-8, 11-13	6 & 13
1.75ω	1ω TO 3ω	6-8-10-12, 7-9-11-13	6 & 13

132A MAIN AMPLIFIER

Tops for FM

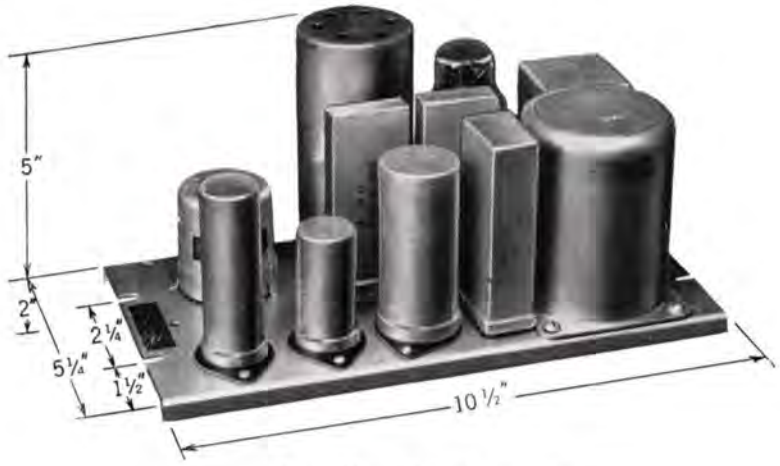


Figure 30 — 132A Main Amplifier.

Use — The 132A is recommended as a Main Amplifier in modern AM and FM audio system installations. In addition to feeding normally equalized transmission lines or master switching circuits, adequate power is available to handle program bus systems or studio auditioning facilities.

Description — This two stage amplifier has compact physical dimensions, low signal-to-noise ratio, gain and output capable of providing a suitable margin above line level to allow for losses in coupling and equalizing devices. Fidelity is maintained over the full 50-15,000 cycle range through use of stabilized feedback, and components are fully shielded to prevent self-generated noise. The 132A operates from an external power supply, and is suited for either desk or rack mounting. Resistors in cathode circuits are provided to permit tube checks.

Features

Latest design for modern AM and FM.
Can handle program bus systems and studio auditioning facilities.
High signal-to-noise ratio.
Stabilized feedback.
Desk or rack mounting.
Easy checking of tubes.
Compact.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: −65 dbm unweighted, −75 dbm weighted (normal ear sensitivity curve).

Signal-to-Noise Ratio: 73 db unweighted, 83 db weighted, for +18 dbm output.

Source Impedance: 30, 250 or 600 ohms matching. For bridging add proper input pad.

Load Impedance: 600 ohms.

Maximum Gain: 48 db.

Output Power: +28 dbm (600 milliwatts) with 1 per cent total harmonic distortion.

Power Supply: Filament 6.3 volts, 1.5 amperes; plate 275 volts, 31 ma. d-c.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
1	348A	or	6J7 (6J7G or 1620)
1	349A	or	6F6 (or 6F6G)
2			

Mounting: Designed for console mounting; also for rack mounting on a 177 or 190 Type Mounting Plate (Capacity three 132A Amplifiers per plate). A 296 Type Panel required for each mounting plate.

Dimensions: 10½" wide, 5¼" deep and 7" high (overall).

Weight: 6½ pounds.

Finish: Gray.

Accessories: The following accessory equipment is recommended for use with this amplifier:

1 — KS-10003 Meter (for measuring plate currents of vacuum tubes).

1 — 18 or 20 type Rectifier.
1 — Western Electric 177 or 190 Type Mounting Plate.
1 — Western Electric 296 Type Panel. See "Components and Accessories" for ordering information.

132B AMPLIFIER

The 132B Amplifier is the same as the 132A Amplifier except that it has a 50 db gain, a balanced input transformer with an electrostatic shield and an extra electromagnetic shield.

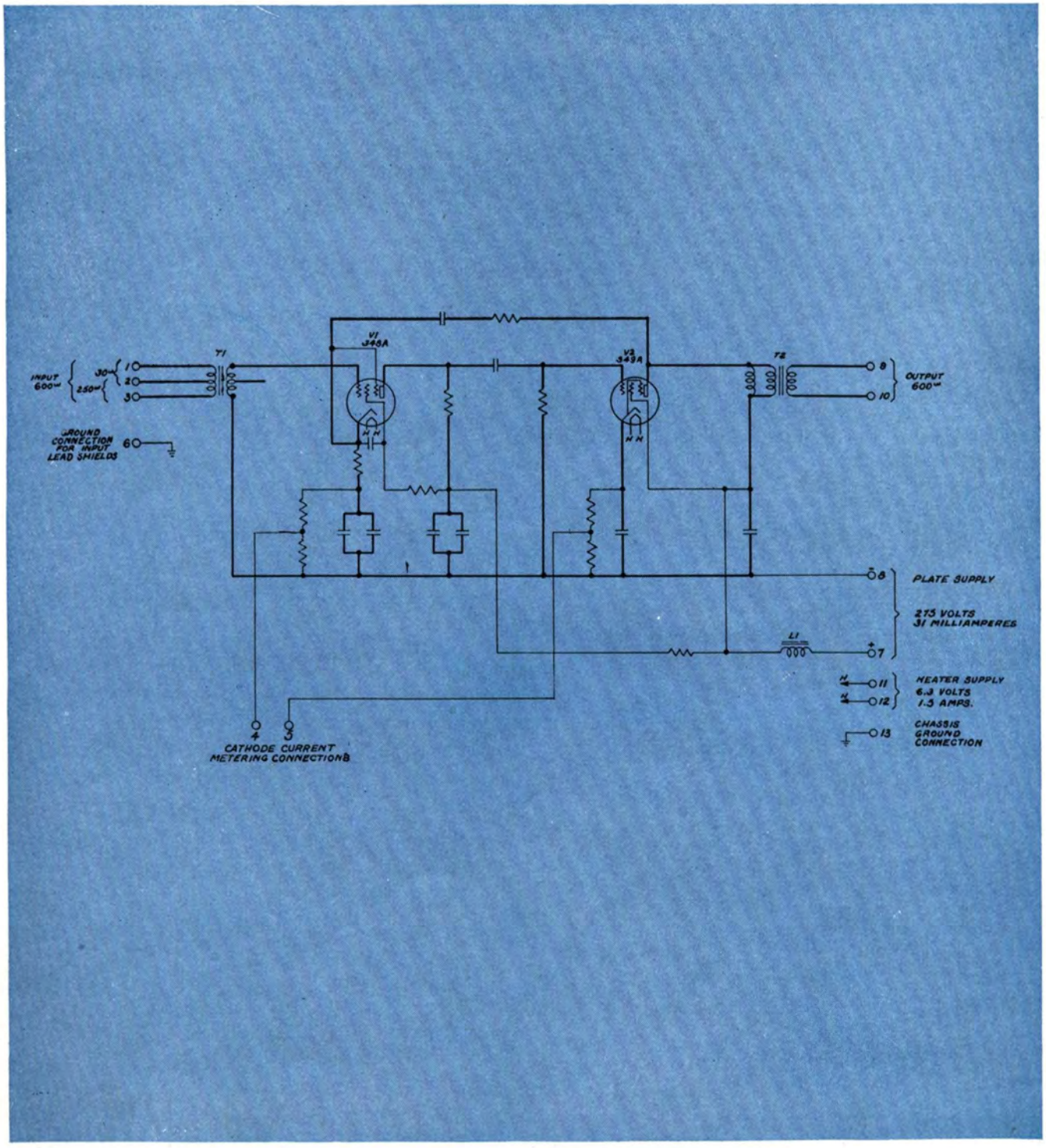


Figure 31 — Schematic of 132A Main Amplifier.

133A LINE AMPLIFIER

Tops for FM

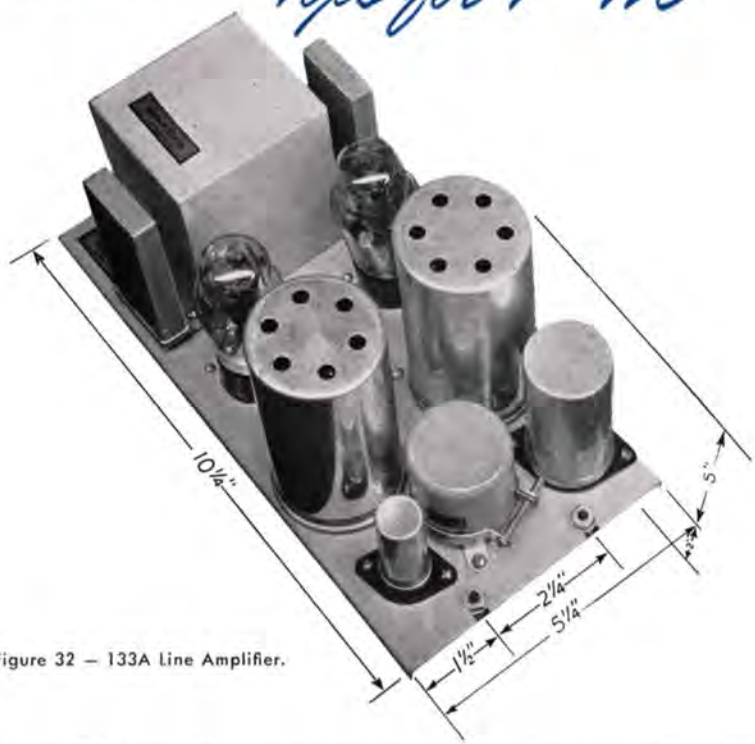


Figure 32 — 133A Line Amplifier.

Use — A multi-purpose amplifier providing greater output power than most line amplifiers and less harmonic distortion than many lower-powered units of this type. Its versatility of application is outstanding in the AM and FM speech input and sound system fields.

Used as a line amplifier, the unit can either match or bridge 600 ohm impedances, and provides ample power capacity to feed heavily equalized transmission lines, complex switching systems or branching networks, contributing a minimum of harmonic distortion — less than is found in many lower-powered units.

As an isolation amplifier, it can be bridged on main circuits without noticeably affecting the main line transmission. Here again, power and gain are adequate for supplying even the highest level studio bus systems.

For general monitoring purposes, the 133A Amplifier has sufficient power for many studio applications. An output transformer with taps which will satisfactorily feed circuit impedances over a range from 1 to 1200 ohms has been included in its design.

Description — The 133A Amplifier is of the two-stage, push-pull type, incorporating stabilized feedback as a further assurance of high grade transmission. The unit is small in size, light in weight, permitting ready installation in new or existing systems. Resistors in cathode circuits are provided to permit easy tube checks.

Features

Multi-purpose amplifier.
Versatility of application, as line or isolation amplifier or for general monitoring purposes.
Output transformer for feeding circuit impedances from 1 to 1200 ohms.
Stabilized feedback for high grade transmission.
Small size, lightweight.

Specifications

Frequency Response: Uniform within ±1 db over the range 50 to 15,000 cycles.

Output Noise: —65 dbm unweighted with maximum gain. —70 dbm unweighted with 5.2 db output pad connected.

Source Impedance: 600 ohms nominal matching or high impedance (20,000 ohms) bridging.

Load Impedance: Tapped output transformer provides for operation into any impedance from 1 to 1200 ohms.

Maximum Gain: 47 db with 600 ohm matching input; 21.5 db with bridging input.

Output Power: 4 watts (+36 dbm) with 1 per cent harmonics.

Power Supply: Filament 6.3 volts, 3 amperes; plate 275 volts, 66 ma., d-c.

VACUUM TUBES

Quantity Required	*Western Electric*		*Commercial Receiver Types*
2	348A	or	1620 (or 6J7)
2	349A	or	6F6
4			

Mounting: Designed for horizontal or vertical desk mounting or for rack mounting on a 177 or 190 Type Mounting Plate. A 296 Type Panel required for each mounting plate.

Dimensions: 10¼" wide, 5¼" deep and 7" high.

Weight: 6½ pounds.

Finish: Light gray.

Accessories: The following accessory equipment is recommended for use with the Western Electric 133A Amplifier:

1 — KS-10003 Meter (for measuring plate currents of vacuum tubes).

1 — Western Electric 18 or 20 Type Rectifier.

1 — Western Electric 177 or 190 Type Mounting plate.

1 — Western Electric 296 Type Panel. See "Components and Accessories" for ordering information.

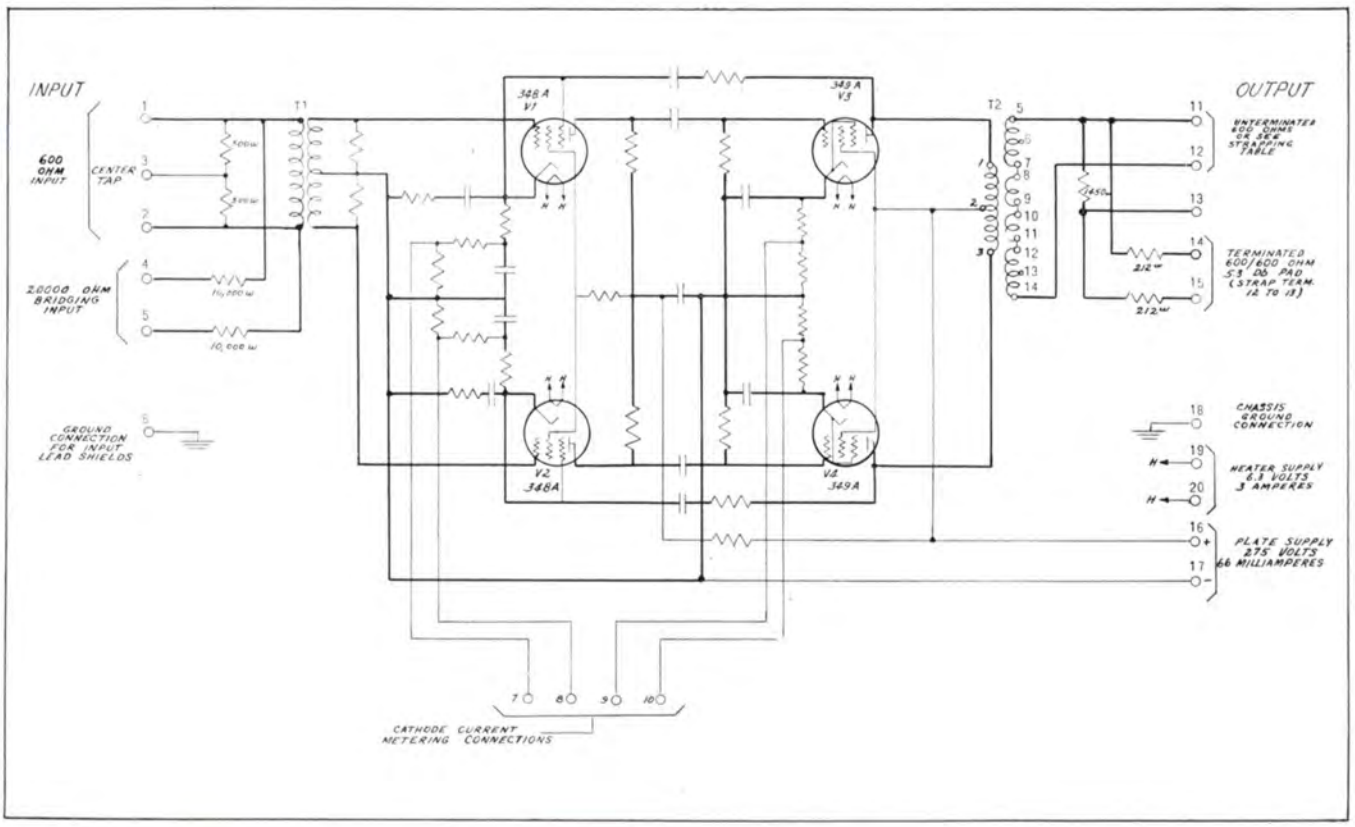


Figure 33 — Schematic of 133A Line Amplifier.

OUTPUT TRANSFORMER STRAPPING TABLE T-2

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS	OUTPUT CONNECTIONS
600 w	300w TO 1200w	7-8, 9-10, 11-12	5 & 14
150 w	70 w TO 300w	7-8, 9-14, 11-12, 5-10	5 & 14
30 w	20w TO 70 w	7-8, 9-10, 11-12	6 & 13
16 w	10 w TO 20 w	7-8-10, 9-11-12,	6 & 13
7.5 w	3 w TO 10 w	7-9, 10-12, 6-8, 11-13	6 & 13
1.75 w	1 w TO 3 w	6-8-10-12, 7-9-11-13	6 & 13

Western Electric

Volume indicating equipment

Figure 1 — 754A Volume Indicator Equipped With KS-8218 Volume Indicator Meter.

754A AND 754B VOLUME INDICATING EQUIPMENT

Use — These volume indicators are designed primarily for use in program line transmission systems, for radio telephone broadcasting, and for speech input and public address systems.

Description — They are of panel type construction, suitable for mounting on a 19″ relay rack or bay cabinet and differ only in that the 754B has provision for an increased sensitivity of 10 db when terminating a line.

The KS-10065 Meter Cabinet is intended primarily for use by a control engineer in riding gain on a program where the instrument is always used in the same circuit at the same level. While means for adjustment during installation is provided, a range switch for the adjustment of sensitivity is not required under these conditions.

The KS-8218, KS-8208 and KS-8207 Meters are used in the 754 Type Volume Indicators and in the Meter Cabinet and differ only in the choice of scales and illumination. The KS-8218 Meter has an emphasized arbitrary voltage scale of 0 to 100 and a subordinated vu scale, indirectly illuminated by lamps mounted inside the front cover of the meter case. The KS-8208 differs from the KS-8218 in that the scales are reversed, the vu scale being emphasized. The KS-8207 Meter is similar to the KS-8208 except that the scales are not illuminated. The readings of these instruments are based on the accepted standard reference level for broadcast use.

Features

Excellent frequency response.
Does not introduce distortion into circuit terminated.
Rugged construction.

754A VOLUME INDICATOR

A volume level indicating device which is direct reading when bridged on a 600 ohm circuit. It includes a switch for adjusting the sensitivities over a range from +4 to +26 vu at the 0 vu or 100 mark on the scale (about two-thirds full scale).

As there is a choice of meters (KS-8218, KS-8208 or KS-8207) the meter is not supplied as part of the indicator assembly and should be specified separately on the order. A blank plate is available which covers the meter mounting space in installations where the meter is mounted in a control desk or console apart from the 754A Volume Indicator. This plate also should be ordered separately, if desired.

Specifications

Frequency Response: ±0.2 db 50 to 15,000 cycles.

Distortion: Less than the equivalent of 0.2 per cent rms is introduced into a 600 ohm circuit due to the bridging of the volume indicator.

Source Impedance: 7500 ohms when the meter is indicating at the 0 vu or 100 mark.

Bridging Loss: Approximately 0.3 db from 50 to 15,000 cycles when connected to 600 ohms.

Range of Measurements: +4 vu to +26 vu in circuits of 600 ohms impedance for a deflection to the 0 vu or 100 mark on the meter. −16 to +29 for the whole meter scale.

Dimensions: 19″ wide, 5-7/32″ high, 5-3/16″ overall depth which includes 1-3/16″ meter projection.

Mounting: Assembled on a 5-7/32" x 19" non-magnetic panel arranged for relay rack or cabinet mounting.

Finish: Dark aluminum gray on the front and light gray enamel on the rear. The panel has a photo-etched designation plate finished in black satin with chromium trim.

754B VOLUME INDICATOR

This Indicator has the same circuit and utility as the 754A. In addition it has a key by means of which the volume indicator circuit is changed to terminate a circuit in 600 ohms and give an increased sensitivity of 10 db. With this key operated to give increased sensitivity the volume indicator should not, of course, be bridged across a line.

The mechanical design and finish of the 754B are similar to those of the 754A. The electrical characteristics, other than sensitivity, and the choice of meters also are the same.

KS-8218-1 METER

The KS-8218-1 Meter is of the copper-oxide, rectifier type. From 25 to 16,000 cycles per second the response is uniform within 0.5 db (0.5 vu as read on the vu scale). As a result of refinements in design of this industry standard meter and of associated rectifier elements, an accuracy of approximately 3 percent of the voltage required for a deflection to the 0 vu or 100 mark is obtainable at any point of the scale at a room temperature of 75° F. Among the features of this instrument are:

Frequency and Temperature Stability — The response is uniform for all frequencies between 35 and 10,000 cycles per second to within 0.2 db (0.2 vu as read on the vu scale). The effect of temperature on the readings is less than 0.2 vu between 50° and 110° F.

Scale Reading — The KS-8218-1 Meter is provided with a type B scale in which the 0 to 100 scale is emphasized and the vu scale subordinated. The meter scale is long (arc length 3.3 inches) and the reference point so located that about two-thirds of the total scale length is utilized. This, together with the cream yellow scale and bold figures, reduces eye-strain and fatigue. The scale is indirectly illuminated by lamps mounted within the meter case which are accessible by removing the front of the meter.

The sensitivity of the meter in series with 3600 ohms external resistance is such that a deflection to the 0 vu or 100 mark is obtained when 1.228 volts a-c is impressed across the combination. This corresponds to a volume level of +4 vu in a 600 ohm circuit.

KS-8208 METER

The KS-8208 Meter is essentially the same as the KS-8218 except that it is provided with a type A scale in which the vu scale is emphasized and the 0 to 100 scale subordinated.

KS-8207 METER

The KS-8207 Meter is essentially the same as the KS-8208 Meter except that no provision is made for illuminating the scale.

KS-10065 METER CABINET

The KS-10065 Meter Cabinet contains a complete volume indicator circuit which is essentially the same as that of the 754A Volume Indicator except that it is without a range switch and adjustable calibrating resistance and is designed for permanent bridging across a 600 ohm circuit of suitable level in a speech input channel. When shipped, the input circuit of this cabinet is arranged to give a meter deflection to the 0 vu or 100 mark (about two-thirds full scale) with an input level of +18 vu.

Instructions which accompany the KS-10065 cabinet give suitable values of fixed resistances which may be substituted in the input circuit to adjust its sensitivity over a range from +4 to +38 vu. These values are for a deflection to the 0 vu or 100 mark on the meter. Taking into account the whole meter scale, these ranges are extended to volumes which are 20 vu lower than, and 3 vu higher than the values just given.

Specifications

The KS-10065 Meter Cabinet is aluminum cast and measures 4¾" long by 4-5/16" high. It is finished in dark aluminum gray. This cabinet is arranged to mount the KS-8218, KS-8208 or KS-8207 meter. Meters are not furnished as part of the cabinet and should be specified separately on the order.

Figure 1 — 728B Loudspeaker.

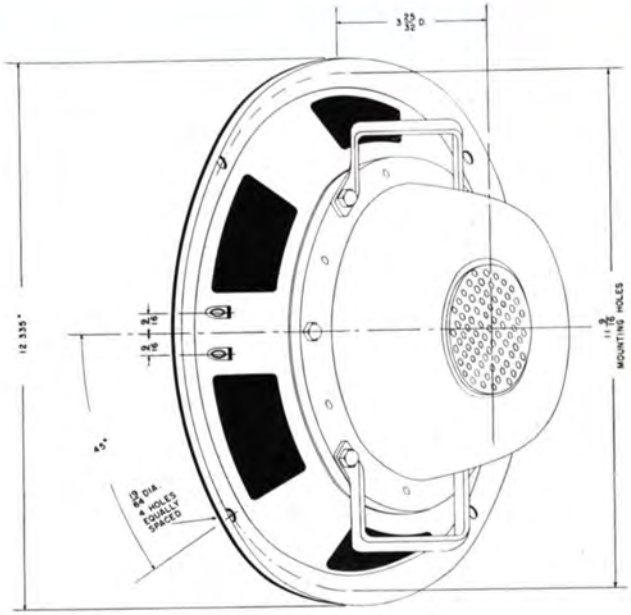


Figure 2 — 728B Loudspeaker, Dimensional Drawing.

728B LOUDSPEAKER

Use — The 728B Loudspeaker is a single unit type speaker intended for high quality reproduction of sound for radio monitoring of speech and music, and for music reproduction and public address systems.

Description — The single direct-radiator type of loudspeaker with its compact construction, high power handling capacity, and low cost is ideally suited for application into new and existing sound systems where a wide frequency range must be reproduced by a single speaker. It is designed to respond to frequencies from 60 to 10,000 cycles when installed in an enclosure as described below. The enclosure is not furnished as a part of the loudspeaker.

This speaker gives firm, well damped low frequency reproduction. It also gives smoothness of reproduction of the higher frequencies as it has a gradual roll-off characteristic at these frequencies.

Features

High power handling capacity.
Wide frequency range in single unit.
Compact and simple to install.
Relative high efficiency.
No field power supply required.

Specifications

Impedance: 4 ohms.

Coverage Angle: 50°.

Power Handling Capacity: 30 watts continuous.

Efficiency: At a distance of 100 feet on axis the 728B will produce a level of 81 db above 10^{-16} watt per square centimeter at 30 watts. This level is on a basis of a warble frequency covering a range from 500 to 2,500 cycles per second. (This input is approximately 10 db above average speech as read on a standard volume indicator).

Nominal Frequency Response: Uniform 60 to 8,000 cycles with a gradual roll off to 10 db down at 10,000 cycles. (In enclosure as described).

Diameter (overall): 12-11/32".

Depth (overall): 3-25/32".

Weight: 17 pounds (approximate).

Baffle Hole Diameter: 11".

Mounting Holes: Four equally spaced on 11-35/64" diameter.

Speaker Enclosure Required: Total enclosure of not less than 2½ cubic feet.

The low frequency response can be improved (within limits) by increasing the size of the speaker enclosure.

Speaker Enclosure and Mounting

The enclosure should have a minimum of 2½ cubic feet and the plywood used for construction should be at least ¾" thick. The only critical dimension is depth and this dimension should be sufficient to provide adequate clearance for the speaker frame.

The inside surfaces of the box should be lined with sound absorbing material 1" thick. Hair felt, or absorbent cellulose material is satisfactory. If a grille cloth is used for covering the speaker, it should be open mesh material, to have no audible effect on the high frequency response.

Conveniently placed handles on the speaker frame make it easy to hold the speaker when installing it in a cabinet.

750A AND 751B LOUDSPEAKERS

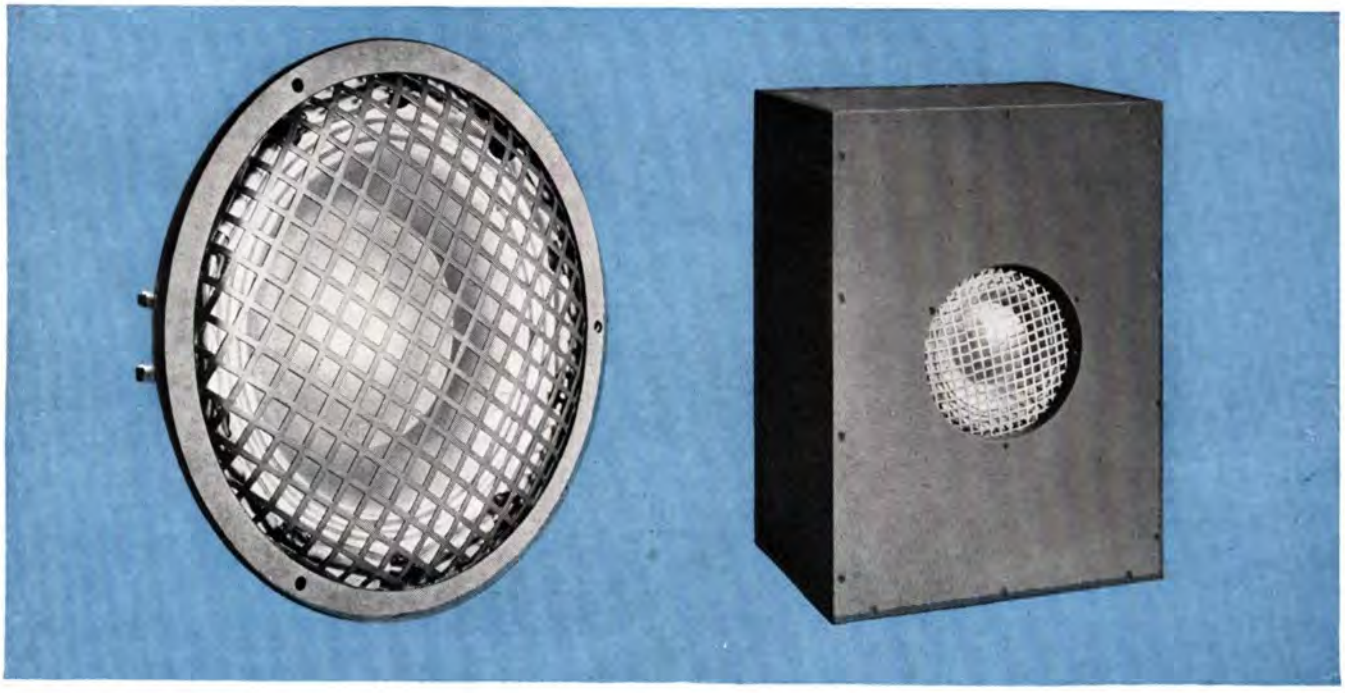


Figure 3 — 750A Loudspeaker.

Figure 4 — 751B Loudspeaker.

Use — These loudspeakers are intended for use in music reproduction and public address systems and for radio monitoring of speech or music over limited areas where high quality reproduction and low cost are essential.

Description — A single radiator type of loudspeaker with moderate power handling capacity, it is capable of covering a wide frequency range that usually requires a multiple device.

The 751B consists of a 750A Permanent-Magnet Loudspeaker mounted in a specially constructed box.

Features

Single unit.
Good frequency response.
Relatively small size.
Simple installation.
Permanent magnet.

Specifications

Frequency Range: The 751B has a frequency range of 80 to 10,000 cycles.

Impedance: 8 ohms.

Efficiency: At a distance of 10 feet on the axis the speaker will produce a level of 96 db above 10^{-16} watt per square centimeter at 20 watts input. This corresponds to a 76 db level at 100 feet distance. These levels are on the basis of a warble frequency covering a range from 500 to 2,500 cycles per second. (This input is approximately 10 db above average speech as read on a volume indicator).

Coverage Angle: 60°.

Power Capacity: The 751B will safely handle speech or music with a peak power of 20 watts.

750A LOUDSPEAKER

Dimensions: 9½" diameter and 3¾" depth.

Weight: Approximately 9 pounds.

Mounting: It should be mounted in a rigidly constructed box with an enclosed volume of 2½ to 3 cubic feet with a depth of at least 9" and not more than 24" for width or height. Inside surfaces should be lined with sound absorbing material 1" thick.

751B LOUDSPEAKER

Dimensions: 24" high, 17" wide and 13½" deep.

Weight: Approximately 42 pounds.

Finish: The box has a plain gray lacquer finish which may be decorated to harmonize with its surroundings.

753B-753C LOUDSPEAKER

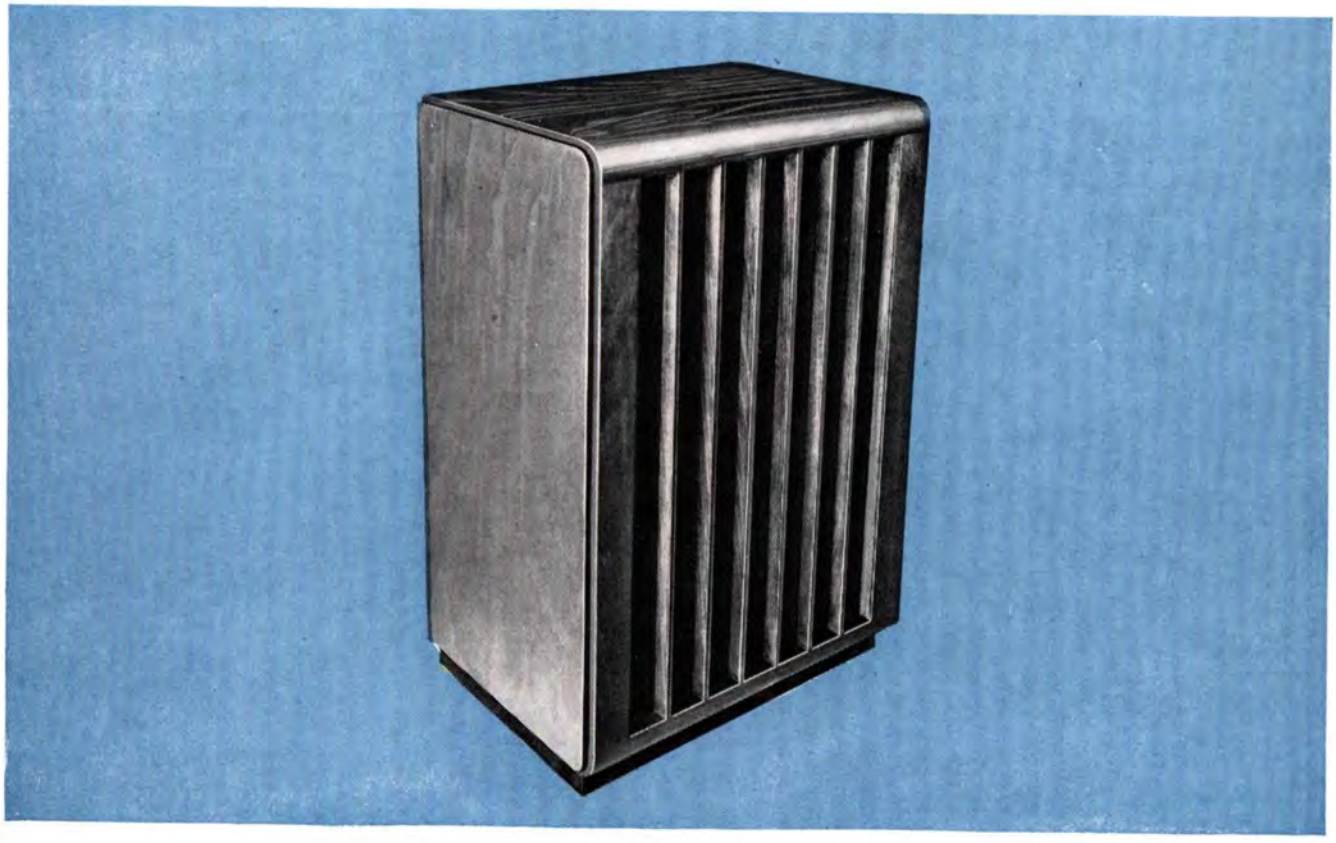


Figure 5 — 753 Type Loudspeaker.

Use — The 753B and 753C Loudspeakers are designed for high quality sound reproduction. They are ideally suited for broadcast program monitoring, high quality public address and music reproduction systems.

Description — They employ a two band system with high and low frequency units. The 753C consists of a KS-12004 Speaker (15" dynamic) for low frequencies, a 713A Receiver and 32A Horn for the higher frequencies, and a D-173048 Network. All are mounted in a walnut finish cabinet of attractive design.

The 753B has the same electrical and physical characteristics as the 753C except that it employs a 722A Receiver in place of the 713A Receiver and has less frequency range.

Features

Wide frequency range.
High power handling ability.
Highly efficient in converting electrical impulses into sound.
Attractive cabinet.

Specifications

Frequency Range: 753C — 60 to 15,000 cycles.
753B — 60 to 6,500 cycles.

Impedance: 16 ohms.

Efficiency: At a distance of 100 feet on the axis the 753C will produce a level of 81 db, or the 753B a level of 80 db, above 10^{-16} watt per square centimeter at 25 watts input. These levels are on the basis of a warble frequency covering a range from 500 to 2,500 cycles per second. (This input is approximately 10 db above average speech as read on a volume indicator).

Coverage Angle: Substantially uniform in frequency and intensity over an angle of 90° horizontally and 60° vertically.

Power Capacity: Will handle speech or music with peak powers of 25 watts.

Dimensions and Mounting: Mounted in a walnut finished cabinet approximately 20" wide by 30" high by 13½" deep.

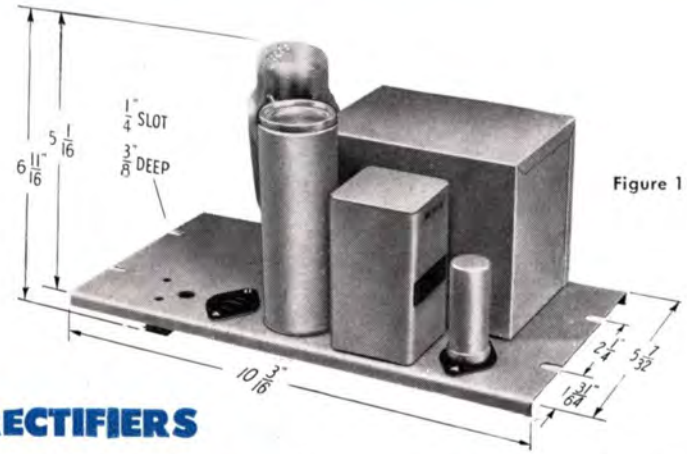


Figure 1 — 18A Rectifier.

18A AND 18B RECTIFIERS

Use — Rectifier type power units for supplying plate and filament power to speech input and sound system amplifiers.

Description — A full wave vacuum tube rectifier for plate supply and a transformer winding to supply filament power. Normally used to supply power for Western Electric Types 120, 121, 129, 130, 131, 132, 133 and similar amplifiers. The 18A is designed for mounting on a 177 Type Mounting Plate with additional rectifiers or other plate mounted units. The 18B is designed for direct mounting on a relay rack or equipment cabinet.

Features

Efficient.
Compact.
Rugged construction.
Tapped transformer permits input and output voltage selection.

Specifications

Input: 105-125 volts, 50 or 60 cycles a-c. Approximately 100 watts for full load.

Output: Plate supply maximum 75 ma. at approximately 250 volts d-c, taps on high voltage winding of transformer to maintain voltage between 320 and 250 volts d-c for loads between 0.007 amperes and 0.075 amperes. Filament supply maximum 8 amperes at approximately 6.3 volts a-c.

Dimensions: (18A) 10-3/16″ wide, 5-7/32″ deep and 6-11/16″ high.
(18B) 19-5/32″ wide, 3-15/32″ high, 6-27/32″ deep.

Weight: (18A) 9 pounds.
(18B) 12 pounds.

Mounting: (18A) Designed for mounting on 177 or 190 Type Mounting Plate with 296 Type panel (Capacity 3 rectifiers per plate). See "Components and Accessories" for ordering information.
(18B) Designed for mounting on standard 19″ relay rack (includes face mat) or equipment cabinet. Occupies 3½″ of rack space.

Finish: (18A) Gray enamel.
18B-15 Dark aluminum gray.
18B-3 Black.

Tubes: One W.E. 274A or one Type 5Z3.

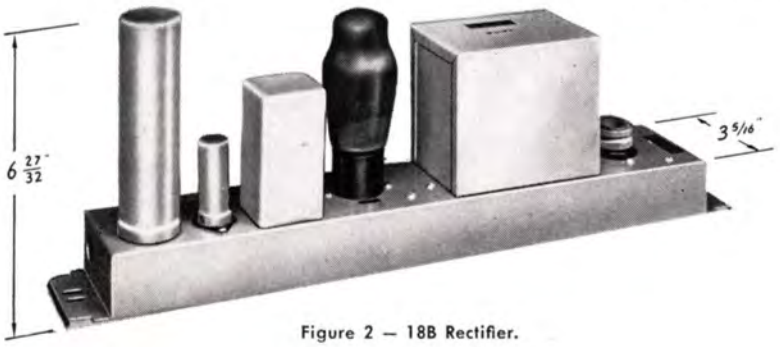


Figure 2 — 18B Rectifier.

20B RECTIFIER

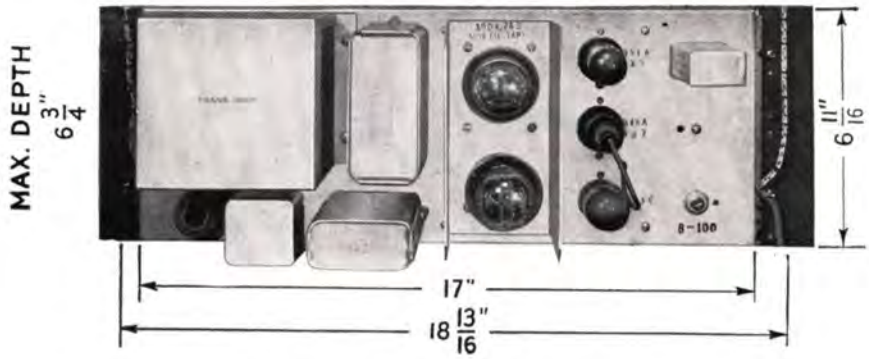


Figure 3 — Rear View, 20B Rectifier.

Use — This rectifier is intended for use with equipment which requires excellent voltage regulation. It is especially useful where several amplifiers are powered from the same source.

Description — A full-wave vacuum-tube rectifier incorporating a vacuum tube voltage regulating circuit which is ultra rapid in operation and which is designed to prevent the plate voltage supply from rising above its final value during the warm-up period of the voltage-regulator tube. Due to its ultra rapid feature it has negligible internal impedance and therefore, practically eliminates coupling between amplifiers which might otherwise be caused by the use of a common plate supply source.

Features

Efficient.
Rapid automatic voltage regulation.
Low ripple component.
Compact construction.

Specifications

Input: 100-130 volts, 50 to 60 cycles. Power consumption approximately 55 watts, 0.7 ampere at 115 volts for no load and 196 watts, 1.7 amperes for rated load.

Output: Rated load — plate supply 110 milliamperes at 275 volts d-c and filament supply 10 amperes at 6.3 volts a-c.

Plate Supply Regulation: 3 volts maximum voltage change from no load and +10 per cent line voltage to rated load and −10 per cent line voltage.

Plate Supply Ripple: Approximately 5 millivolts rms at rated load.

Dimensions: Mat — 19″ x 6-31/32″. Chassis-overall including mounting flanges, 18-13/16″ wide, 6-11/16″ high and 6¾″ deep.

Weight: 26 pounds.

Mounting: Designed to mount on standard 19″ relay rack or cabinet, where it occupies 7″ of panel space.

Finish: Chassis — Light gray.
Mat — 20B-15 Dark aluminum gray.
20B-3 Black.

Vacuum Tubes

Quantity Required	*Western Electric*		*Commercial Receiver Type*
1	274A	or	5Z3
1	300B	or	2A3
1	348A	or	6J7
1	313C		
1	351A	or	6X5
5			

Figure 4 — Front View, 20B Rectifier.

12A POWER UNIT

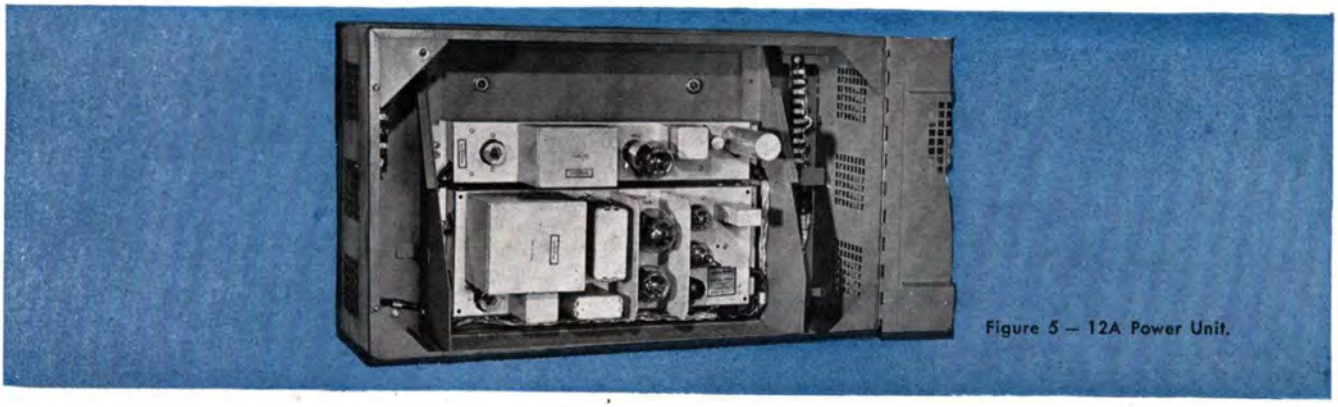


Figure 5 — 12A Power Unit.

A complete, compact power supply unit consisting essentially of an 18B Rectifier and a 20B Rectifier for mounting in a wall in a 21A Cabinet. Developed as the power supply for the 25B Speech Input Equipment but useful for other like applications, the 12A contains power supply units for plate and filament power to vacuum tubes.

The 21A Cabinet, which can be ordered separately, provides 14″ of rack space for the mounting of equipment normally mounted on standard 19″ racks.

Specifications

Input: 110 to 120 volt, 50 to 60 cycle a-c.

Output: See data on the 18B Rectifier and the 20B Rectifier.

Dimensions: (21A Cabinet) approximately 28″ wide, 16½″ high and 9½″ deep.

Weight: 60 pounds.

Mounting: Designed for wall mounting.

Finish: The 21A Cabinet is finished in gray finished metal.

KS-7593 RECTIFIER

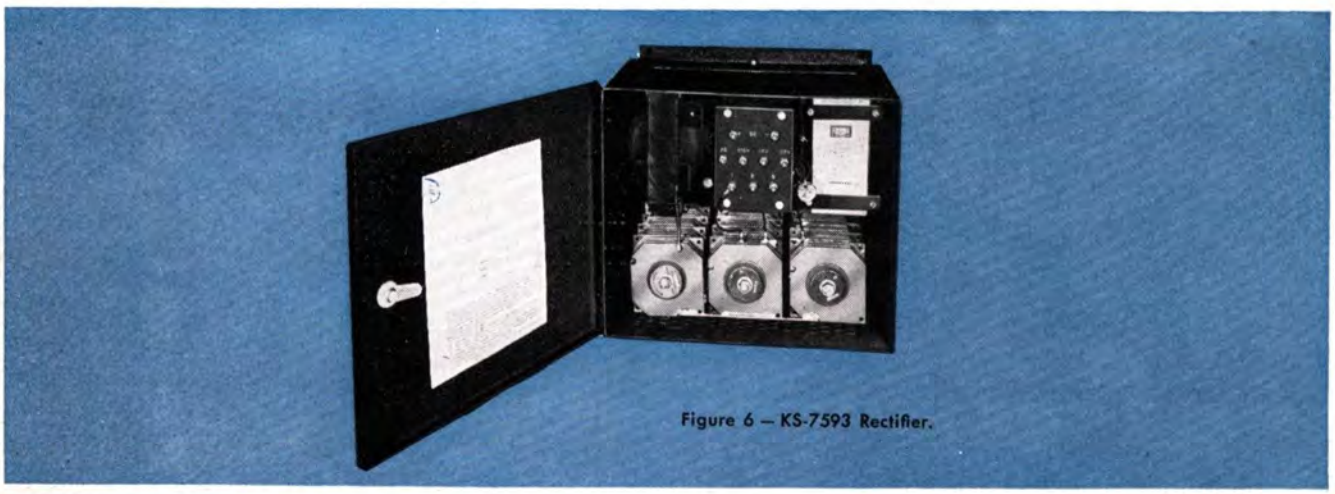


Figure 6 — KS-7593 Rectifier.

A copper-oxide rectifier used as a 12-volt d-c power source for operating relays and signal lamps in speech input equipment.

Specifications

Input: 105 to 125 volts, 60 cycle a-c.

Output: 1.2 amperes d-c full load. No load voltage 14 volts. Full load voltage 10 volts.

Dimensions: 14″ wide, 13¾″ high and 9½″ deep.

Weight: 40 pounds.

Mounting: Assembled in a steel cabinet with hinged front cover, arranged for wall mounting.

Finish: Black crinkle lacquer.

KS-5653 LIST 3 RECTIFIER

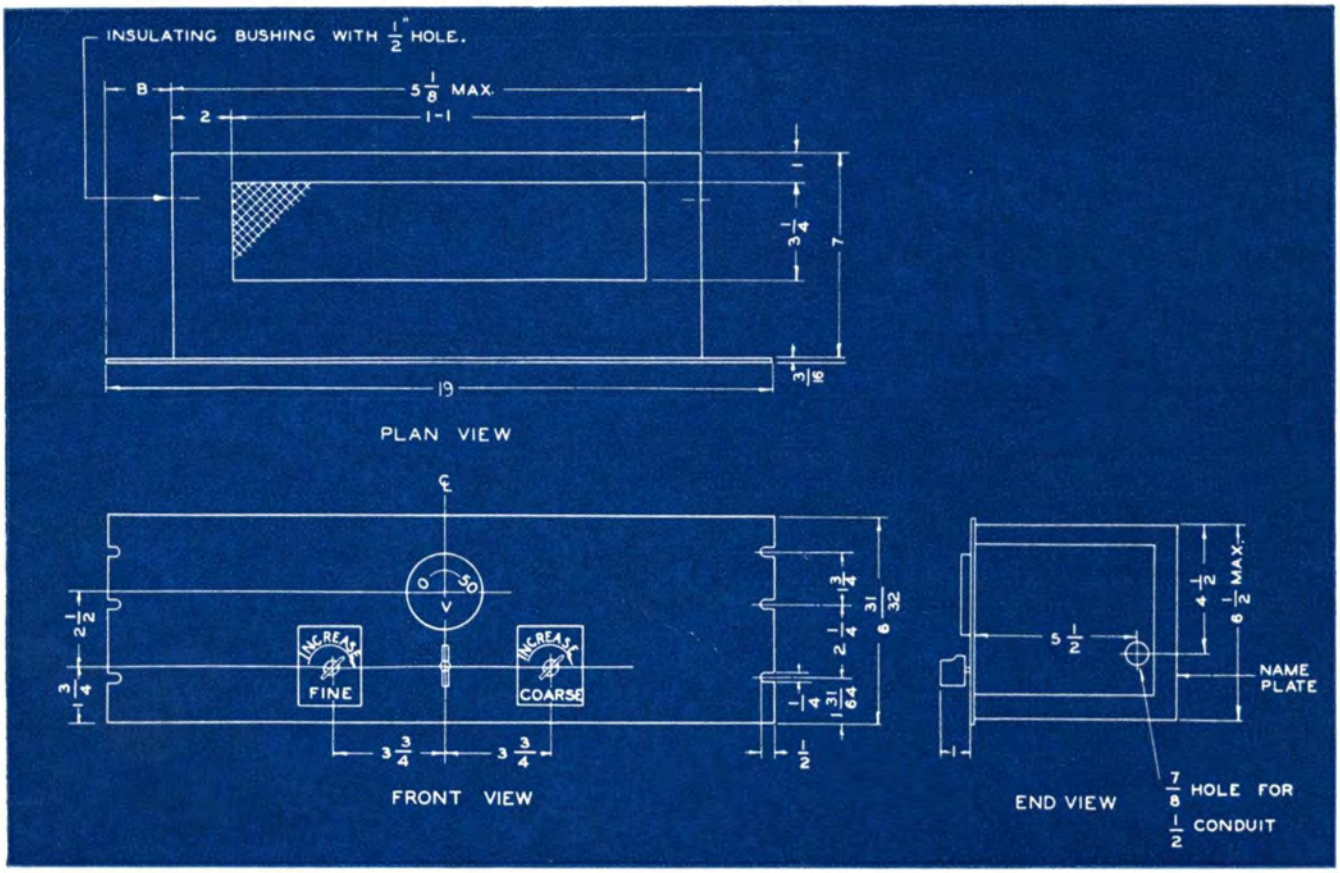


Figure 7 — Dimensional Drawing, KS-5653, List 3 Rectifier.

This rectifier is a selenium disc type designed to furnish power for relay and signaling circuits in connection with speech input equipment.

Specifications

Input: 105 to 125 volts, 50 to 60 cycles a-c.

Output: 1 ampere d-c full load at 24 volts.

Dimensions: 19″ wide, 6-31/32″ high, and 7″ deep.

Weight: 42 pounds.

Mounting: Arranged to mount on a standard 19″ relay rack.

Finish: Gray enamel.

SPECIAL FACILITY PANELS

TELEPHONE PANEL 260A

Use — The Western Electric 260A Telephone Panel provides magneto type subset facilities for order wire telephone communication between the operating points in a radio broadcasting system over a pair of wires. (Check suitability for use with owner of wire circuits).

Description — This panel permits the use of standard type telephone instruments such as the Western Electric F2B-3 Handset, or an operator's telephone set with breast type transmitter and headset or both if desired. (Instruments not included with panel).

The component parts are assembled on a recessed metal panel. It is designed to mount in a standard relay rack or equipment cabinet. A mat finished in dark aluminum gray is provided for the face of the panel where the various keys and jacks, as well as the control for the hand operated generator are assembled for convenient operation. The rear side of the equipment mounting is covered with an aluminum-finished dust cover which is removable to provide access to the apparatus. The mat and back cover may be obtained with a black finish if desired.

The circuit of the 260A Telephone Panel is designed to operate from an external quiet 12 or 24 volt d-c source or (as an alternative where 12 volts is not available) from a 4.5 volt dry battery, space for which is provided in the panel.

Specifications

General: Intended for furnishing telephone subset facilities for order wires at the operating points in a radio broadcasting system.

Accessory Equipment: An F2B-3 Hand Telephone Set or an operator's telephone set, or both simultaneously, may be used but must be ordered separately.

Current Supply: 12 or 24 volt d-c source or local 4.5 volt dry battery. (Dry battery is not furnished and must be ordered separately.)

Weight: 25 pounds.

Dimensions: 19″ wide by 5-7/32″ high.

Finish: Chassis — Light gray.
Mat — 260A-15 — Dark aluminum gray.
260A-3 — Black.

268A ORDER WIRE PANEL

Use — This order wire panel is a ring down drop and patching panel for terminating magneto type order wire lines for use when radio broadcast programs originate at points remote from the main studio and where communication is important between the operator at the remote pickup point and the operator in the main control room. This panel is ideally suited for use in main control rooms where a large number of lines are to be terminated. (Check suitability for use with owner of wire line facilities). The use of this panel expedites handling calls and promotes efficient program dispatching. Requires separate subset facilities such as 260A telephone panel.

Description — Terminating facilities are provided for twelve incoming order wire lines.

The 268A Order Wire Panel furnishes terminating facilities for twelve income order wire lines including:

1. Twelve plug in restoring combined jack and signal units, one for each order wire line.
2. Jacks for testing and for interchange of order wire lines and program lines in emergencies.
3. Night alarm type call indicator lamp and key-controlled buzzer which announces incoming signals simultaneously with respective line signals.
4. Calling and answering cord.
5. Key for ringing from external 20 cycle ringing voltage supply.

6. Spare jacks for three additional lines.
7. Jacks for talking and ringing circuit of associated telephone panel.

The components are assembled on a recessed panel approximately 19″ wide and 7″ high that is designed for mounting on standard relay rack or in an equipment cabinet. The face of the panel is covered with a mat which conceals the panel mounting screws. This mat provides a mounting for the designation strips which identify the telephone line signals or drops as well as the three rows of jacks.

Incoming calls are registered by the line drops, the signal lamps and the buzzer simultaneously. A key is provided for disconnecting the buzzer.

Specifications

General: Provides terminating and signalling facilities for twelve telephone order wire circuits between the operating points in radio broadcasting systems. Spare jacks and mounting positions for terminating three additional lines if required.

Power Supply: 12 volts grounded d-c supply for the signal lamps and the buzzer and 20 cycle ringing voltage are required. 24 volt d-c may be used instead of 12 volts if lamps suitable for this voltage are employed.

Dimensions: 19″ wide by 6-31/32″ high.

Weight: 25 lbs.

Finish: Chassis — Light gray.
Mat — 268A-15 — Dark Aluminum Gray.
268A-3 — Black.

OUTPUT SWITCHING PANEL 270B 3 STUDIO-3 LINE CAPACITY

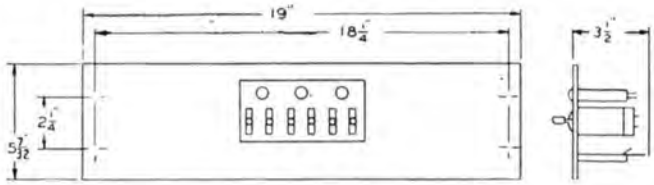
Use — The 270B Output Switching Panel provides lever key switching facilities for interconnecting three studio amplifier channels to three outgoing line circuits in any combination except that the outgoing lines cannot be connected to more than one studio at a time. The outgoing line circuits may be used for local audition purposes, or for direct connection to an adjacent radio transmitter. They may also be used in conjunction with repeating coils and telephone lines to furnish programs to networks or to radio transmitters situated remotely from the studio.

Description — The 270B panel is designed to operate between 600 ohm impedances and will accommodate input power levels as high as 240 milliwatts (+24 dbm). Resistance networks maintain constant impedance relations in the connecting circuits irrespective of the switching combinations employed. The insertion loss introduced by these coupling networks is 10 db.

The components are assembled on a metal panel, equipped with a face mat, which serves as a mounting for the designation plate associated with the control keys and indicating lamps.

There are six lever type keys and three signal lamps. Three keys are employed to assign the various studio channels to the outgoing circuits. Each key is connected to a particular studio amplifier system or channel and is locking in both up and down positions. The other three keys and the three signal lamps are for control of the signals to the studio booth operator. These keys are locking in both "On" and "Off" positions.

Four terminal strips are provided for external connections.



Specifications

Input: Input impedance is 600 ohms for each of three available circuits. Will accommodate input levels up to +24 dbm.

Output: Three output circuits of 600 ohms each.

Power Supply: 12 volts battery supply is required for the operation of the signal lamp system; 24 volts d-c supply may be used if lamps suitable for this voltage are employed.

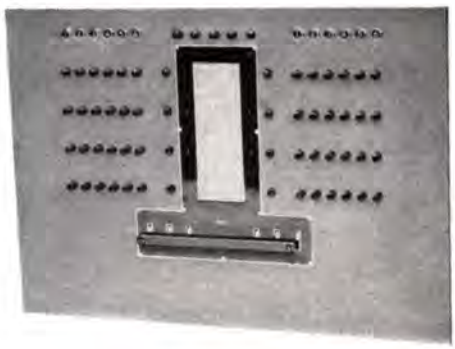
Dimensions: 19″ wide by 5-7/32″ high.

Mounting: Standard relay rack or equipment cabinet.

Weight: 7½ pounds.

Finish: Chassis — Light gray.
Mat — 270B-15 — Dark aluminum gray.
270B-3 — Black.

271B OUTPUT SWITCHING PANEL 6 STUDIO-4 LINE OR 4 STUDIO-6 LINE CAPACITY



The 271B output switching panel provides high grade mechanically interlocked selector key switching facilities for inter-connecting six studio amplifier channels to four outgoing line circuits in any combination except that the outgoing lines cannot be connected to more than one studio at a time. Duplicate banks of selector keys allow presetting of studio amplifier channels for the next scheduled program. A master key switches between the banks of selector keys and a monitor switch transfers a monitoring amplifier or a volume indicator to any one of the outgoing circuits. The 271B is designed to operate between input and output circuits of 600 ohms impedance.

Specifications

Source Impedance: 600 ohms.

Load Impedance: 600 ohms.

Insertion Loss: (Studio to Line) 23 db from input to output.

Power Supply: 12 volts d-c required for the amplifier channel designation lamps; 24 volts d-c may be used if suitable lamps are employed.

Dimensions: 19″ wide, 13-31/32″ high and 3⅜″ deep.

Weight: 18 pounds.

Mounting: Designed to mount in a standard relay rack or equipment cabinet.

Finish: Chassis — Light gray.
Mat — 271B-15 — Dark aluminum gray.
271B-3 — Black.

272A PROGRAM LINE PANEL

Use — The 272A Program Line Panel provides facilities for terminating and switching incoming programs from outside sources. It may be used at the main studio location or other suitably equipped switching points of a radio broadcasting system.

It is intended for operation from incoming program circuits of 150 or 600 ohms nominal impedance. The two outgoing circuits contain transducer networks which effect for each circuit an output impedance of 600 ohms to the studio equipment. The transmission loss from any selected incoming program circuit to either of the two available output circuits is approximately 11 db exclusive of the loss introduced by the associated program circuit equalizer if one is employed. A 600 ohm artificial line with an attenuation or loss of 10 db is provided in the panel for further attenuating the program energy of either output circuit, should this be required. The terminals of this pad are connected to jacks which appear at the front of the panel.

Description — This panel accommodates twelve incoming program circuits which are connected to jacks for testing, cross connection or interchange of program circuits and order wire lines in emergencies. High impedance monitoring (bridging) connections are provided for each program circuit for headset monitoring, testing, or other purposes as may be required.

Any one or two of the twelve incoming program circuits may be selected and assigned to either of two output key circuits.

The program circuit selector keys are mechanically interlocked which ordinarily prevents the assignment of more than one incoming program circuit to a single output key circuit.

The selector keys in duplicate also make possible presetting for one outside program while another is in progress.

Indicating lamps associated with each local circuit inform the operator when selected program circuits are in service through the local amplifier channels.

Circuit jacks at the necessary points in the electrical paths throughout the panel provide access to any part of the circuit for testing purposes. However, normal operation is accomplished without the use of patching cords and plugs, the circuits being continuous through the jacks.

The component parts of this unit are assembled on a mat covered metal panel which occupies a space approximately 19¼″ wide and 10½″ high in a standard relay rack or an equipment cabinet.

Specifications

General: Provides facilities for terminating and switching twelve incoming program lines.

Input: Operates from 150 or 600 ohms nominal impedance.

Output: 600 ohms for each of two output circuits.

Weight: 12 lbs.

Dimensions: 19-5/32″ long by 10-15/32″ high.

Finish: Chassis — Light gray.
Mat — 272A-15 — Dark aluminum gray.
272A-3 — Black.

279A EQUALIZER PANEL

Covers the same equalization range as the 23A Equalizer and is designed for use on lines which do not warrant the permanent association of a fixed equalizer. This adjustable equalizer may be patched to any program line and the equalization and program level quickly adjusted to meet the characteristics of the line.

It employs three dial-type adjustable series resistances, connected in place of the resistance elements of the 23A, to facilitate rapid equalization of the line. It also incorporates a separate 600:600 ohm dial type attenuator having maximum attenuation of 50 db adjustable in 5 db steps, useful in controlling incoming line level, so that the output is approximately correct for mixing with the outputs of pre-mixing amplifiers associated with studio microphones.

Specifications

Frequency Range: 25 to 8000 cycles.
Range of adjustment same as 23A equalizer. See description below.

Dimensions: 19″ wide and 3-15/32″ high.

Weight: 8½ pounds.

Finish: Mat — 279A-15 — Dark aluminum gray.
279A-3 — Black.

Mounting: Standard 19″ relay rack or equipment cabinet.

23A EQUALIZER

Use — Used to correct the non-uniformity of transmission in the range from 25 to 8,000 cycles of non-loaded telephone cable employed for the transmission of program material. It is intended for use on program lines which are employed frequently enough to justify the permanent association of an equalizer.

Description — The 23A is of the shunt type consisting of an inductance and a capacity in parallel and a tapped series resistance the value of which is determined at the time of installation from the transmission characteristic of the circuit. Seven resistance units provide a total of 322.5 ohms.

By use of the 23A Equalizer, non-loaded cable circuits consisting entirely of one gauge can be equalized up to the following approximate lengths with a maximum deviation of 1 db: 16 gauge — 21.5 miles; 19 gauge — 10 miles; 22 gauge — 6.5 miles. The following lengths can be equalized with a maximum deviation of 2 db: 16 gauge — 25 miles; 19 gauge — 11.5 miles; 22 gauge — 7 miles.

Specifications

Frequency Range: 25 to 8000 cycles.
Range of adjustment see "Description."

Dimensions: 1-11/16″ wide, 3-9/32″ high and 4-3/16″ deep.

Weight: 3 pounds.

Mounting: Mounts on equipment panel such as Western Electric 993B or 993C Mounting Plate.

Finish: Gray enamel.

HEADSETS AND HAND TELEPHONE SETS

D-97690 HEADSET

This ruggedly built dynamic type headset consists of two 711A Receivers and a D-90957 Head Band. A D-90944 cord 6 feet long equipped with a 47 Type Plug is required for use with this headset and must be ordered separately.

Specifications

Impedance: 50 ohms.

Frequency Response: Uniform to 7500 cycles.

1002F AND 1002H HEADSETS

Useful and durable monitoring headsets familiar to most broadcast operators. They are recommended for use with the 22D Portable Speech Input Equipment and in control room monitoring. Consist of a cloth-covered wire headband carrying two non-adjustable receivers (509W) connected in series by means of a Y cord (768). The 1002F has a two-conductor (47B) plug at the opposite end of the cord while the 1002H terminates in pin tips.

When either of these headsets is required fully equipped with the 241 Type Twin Plug, order the R2ET Cord and either the 241A (black shell) or 241B (red shell) plug and replace the corresponding items.

Specifications

DC Resistance: Receivers connected in series, 2,200 ohms.

AC Impedance: Nominal, 11,000 ohms each 509W receiver.

F2B-3 TYPE HAND TELEPHONE SET

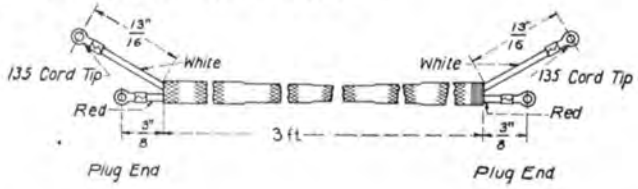
The F2B-3 Type Hand Telephone Set is designed for use with the 260A Telephone Panel and other installations using local battery talking (magneto) systems. It is made of the same durable material so widely used in your telephone. Normally supplied in black, it can be obtained in other colors on special order.

PATCHING CORDS

Western Electric Patching Cords have been proved through many years service to give long, trouble free life. They are designed to resist moisture in the humid climates, and dampness from the operator's hands.

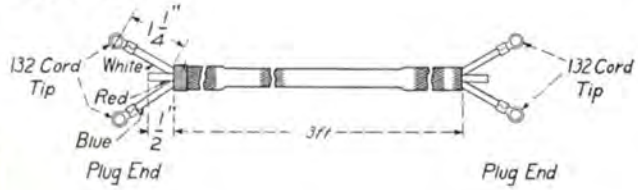
The resistance of each cord is approximately one ohm per six foot length. The current carrying capacity is 3 amperes which is much greater than normally experienced in actual service.

P2A AND P2AA CORDS



Moisture proof, long life, two-conductor patching cords, with rubber insulated tinsel conductors. While the stock length is 3 feet these cords are also available in 1, 2, 4 or 6 foot lengths. The P2A is equipped at each end with cord tips for 47 Type Plugs and the P2AA for 241 Type Plugs. Color: Slate gray. Can be obtained in red, green or black if specified on order.

P3J CORD

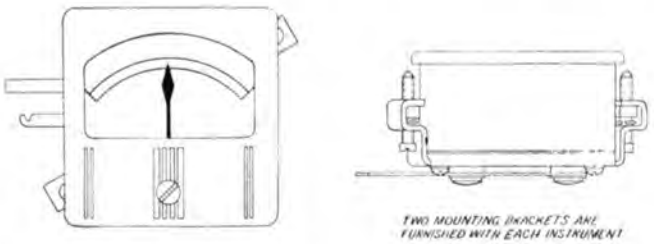


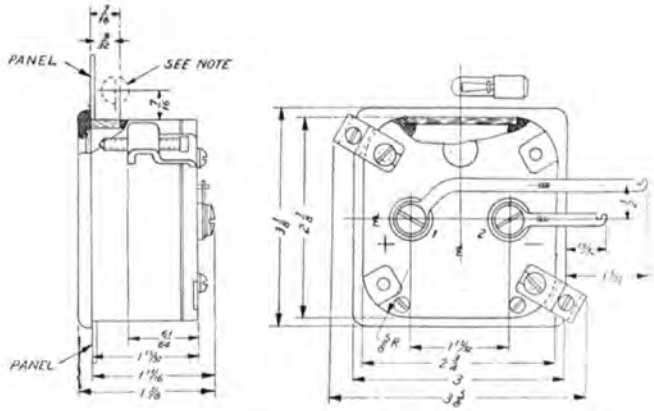
A three-conductor moisture proof patching cord with rubber insulated tinsel conductors. The third conductor is tied to the sleeves to carry through the grounding connection. While the stock length is 3 feet these cords are also available in 1, 2, 4 or 6 foot lengths. Arranged at each end for 241 Type Plugs. Color: Slate gray. Can be obtained in red, green or black if specified on order.

METERS

KS-10003 METER

This sensitive meter is designed for use as a plate current checking meter for Western Electric amplifiers. It is housed in a black bakelite case with a ground glass window above which a lamp may be mounted for scale illumination. Full scale sensitivity is 200 microamperes and the scale is calibrated 0 to 2 milliamperes, and 0 to 40 milliamperes. This meter is designed for tube checking using the cathode metering shunts which are provided in many of the standard Western Electric amplifiers.





REPEATING COILS

Outstanding features of Western Electric Repeating Coils are:

(1) Designed by communication experts especially for indicated use.
(2) Excellent Frequency Response.
(3) Rugged construction.
(4) Dependable performance.

111C AND 119C REPEATING COILS

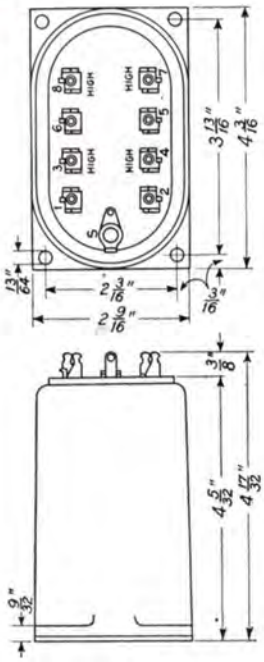
Toroidal type line repeating coils designed to provide dependable impedance matching and line isolation at line circuit transfer points. They are intended for use with amplifiers for program transmission over long or short cable or open wire circuits equipped with proper loading.

Specifications

Frequency Range: 30-15,000 cycles.

Insertion Loss: Less than 0.5 db.

111C REPEATING COIL*



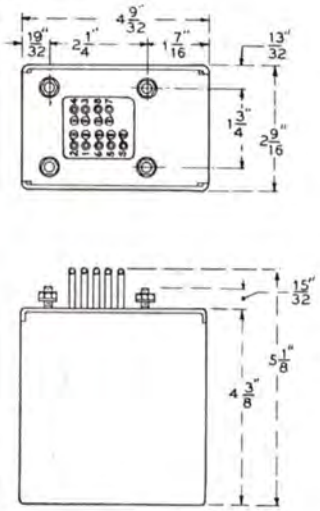
Dimensions: 2-9/16" x 4-3/16" x 4-17/32".

Weight: 4½ pounds.

Mounting: Flat base for board or panel mounting. Mounting holes to clear #8 machine screws.

Finish: Gray enamel.

119C REPEATING COIL



Dimensions: 2-9/16" x 4-9/32" x 5-1/8".

Weight: 4 pounds.

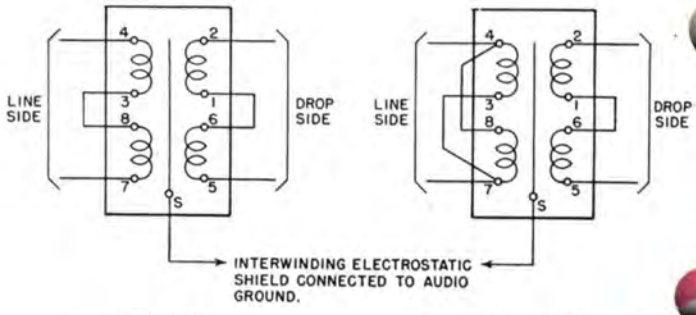
Mounting: Single side stud mounting using 993A or 993C Mounting Plate.

Finish: Gray enamel.

111C AND 119C REPEATING COILS

IMPEDANCE RATIO
111C 600Ω : 600Ω
119C 520Ω : 600Ω

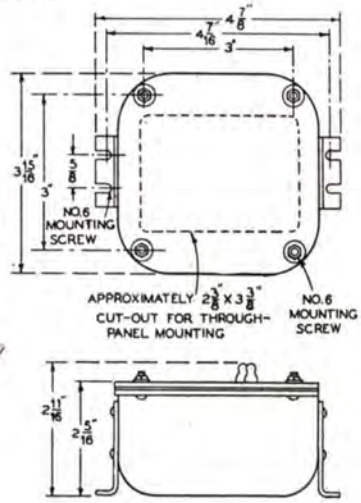
IMPEDANCE RATIO
111C 150Ω : 600Ω
119C 130Ω : 600Ω



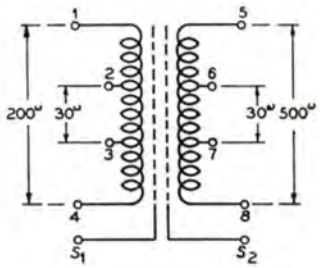
TYPICAL USE BETWEEN 600Ω CIRCUITS

TYPICAL USE FOR CABLE CIRCUITS & SHORT LINES

153A REPEATING COIL



A toroidal coil with permalloy core in a flat type mounting, potted in a heavy iron case. Designed for general use in microphone or line level circuits to match impedances. A high degree of shielding against unwanted longitudinal transmission is provided by two electrostatic shields between windings — use separately to segregate grounds or strap to form a single shield.



Specifications

Frequency Range: 40-15,000 cycles.

Insertion Loss: Less than 0.5 db.

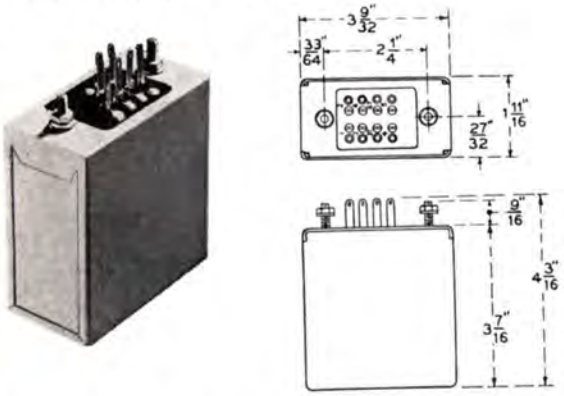
Dimensions: 4-7/8" x 3-15/16" x 2-11/16" including terminals.

Weight: 2 pounds, 10 ounces.

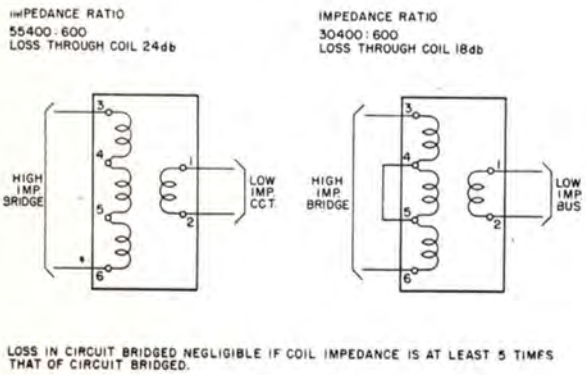
Mounting: Flat base for board or panel.

Finish: Gray enamel.

154C REPEATING COIL



A high quality repeating coil for bridging service. It has a shell type chrome permalloy core and is potted in a rectangular metal case arranged for single side stud mounting.



LOSS IN CIRCUIT BRIDGED NEGLIGIBLE IF COIL IMPEDANCE IS AT LEAST 5 TIMES THAT OF CIRCUIT BRIDGED.

Specifications

Frequency Range: 30-15,000 cycles.

Insertion Loss: See sketch above.

Dimensions: 3-9/32" x 1-11/16" x 3-7/16" (4-3/16" overall).

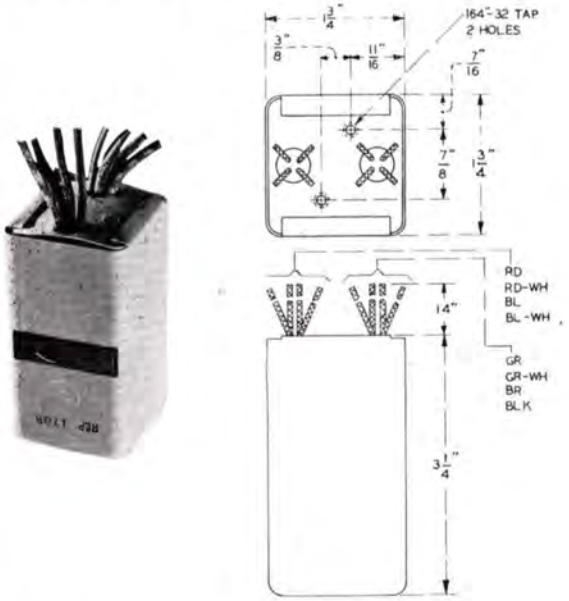
Weight: 2¼ lbs.

Mounting: Single side stud mounting using 993B or 993C Mounting Plate.

Finish: Gray enamel.

170B REPEATING COIL

A shell type line repeating coil with a permalloy core enclosed in a metal case of unusually small size. Designed to provide dependable impedance matching and line isolation at line circuit transfer points with complete assurance that the highest program quality is being maintained. It has an impedance ratio of 600:600 ohms.



Specifications

Frequency Range: 30-15,000 cycles.

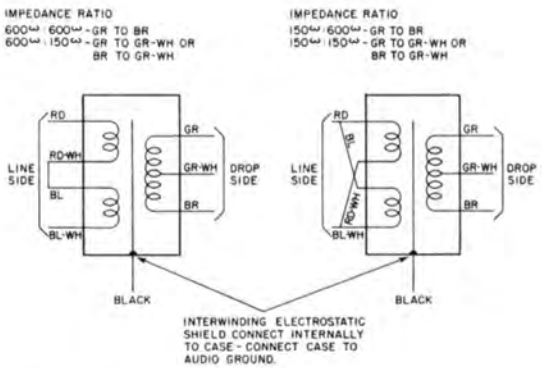
Insertion Loss: Approximately 1 db.

Dimensions: 1-3/4" x 1-3/4" x 3-1/4".

Weight: 1¼ pounds.

Mounting: Flat base for flat plate or chassis mounting. Two threaded mounting holes take 8-32 screws.

Finish: Gray enamel.



172A REPEATING COIL

An exceptionally high quality impedance matching device for use in low level circuits particularly between a microphone and amplifier. It employs screw type terminals and is adaptable for connection in the microphone cordage or it may be mounted on the associated amplifier. A plastic cover, illustrated below, protects and insulates the coil. The cord

slots grip the cord and relieve the strain on the terminals and terminal plate. The 172A will transmit equally well in either direction.

Specifications

Frequency Range: 30-15,000 cycles.

Insertion Loss: Approximately 1 db.

Dimensions: 1-3/4" diameter x 2-25/32" long.

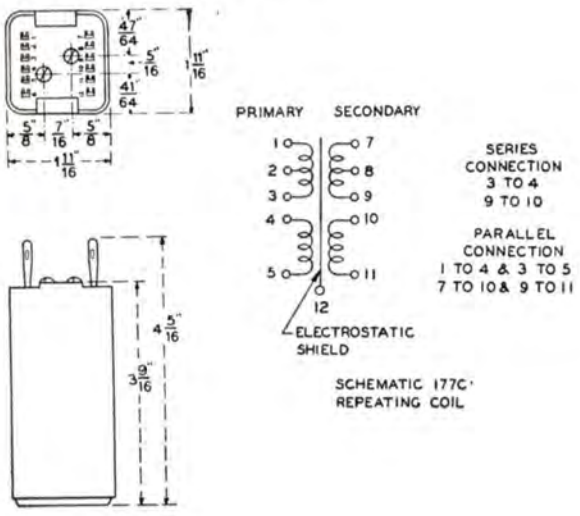
Weight: 12 ounces.

Mounting: Use connected in microphone cord or mount on flat surface by means of loop bracket.

Case: Magnetic shielding permalloy metal.

Finish: Black.

177C REPEATING COIL



A shell type line repeating coil with a permalloy core enclosed in a metal case of small size. Designed to provide dependable impedance matching and line isolation at line circuit transfer points, and for changing from balanced to unbalanced circuits. The coil has a one-to-one ratio.

It has an electrostatic shield between windings and an electromagnetic shield inside the case. Additional electromagnetic shielding, if required in instances of severe exposure, may be obtained by adding a 42A shield externally.

Winding data on the 177C Repeating Coil is shown above:

All windings are identical except that windings 1—3 and 7—8 have a mid-tap (terminal 2 and 8 respectively). These may be used to provide a mid-ground point for the parallel connection; for the series connection terminals 3 and 9 may, of course, be used. The following connections should be used for impedances between 25 ohms and 600 ohms:

WINDINGS		*OPERATING*
Primary	*Secondary*	*Impedance Ratios*
Series	Series	600 ohms to 600 ohms or 150 ohms to 150 ohms
Parallel	Parallel	25 ohms to 25 ohms
Series	Parallel	150 ohms to 25 ohms

Specifications

Frequency Range: 50-15,000 cycles.

Insertion Loss: Less than 1 db when connected between two like impedances. Slightly more when operating from a low impedance into an open circuit.

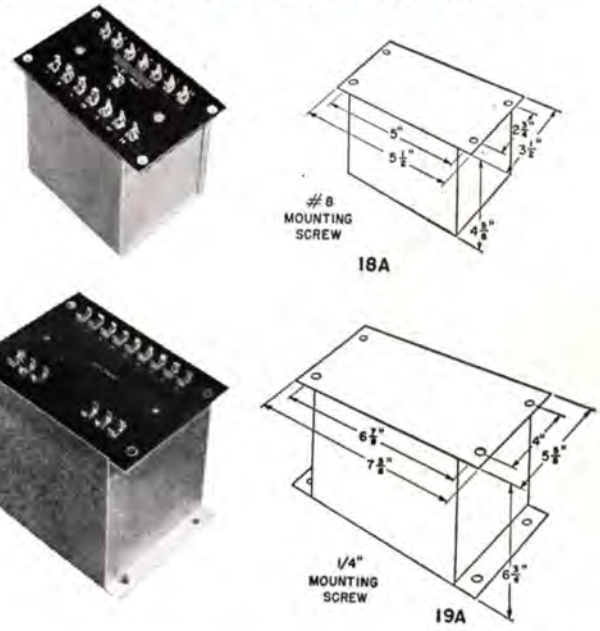
Dimensions: 1-11/16" x 1-11/16" x 3-9/16".

Mounting: Flat base for flat plate or chassis mounting. Two threaded mounting holes take 8-32 screws.

Finish: Gray enamel.

AUTO TRANSFORMERS

18A AND 19A AUTO TRANSFORMERS



Designed to provide impedance matching between amplifiers and loudspeakers over a wide range of applications. These two transformers have the same impedance ratios and cover the same frequency range, but differ in size and power handling capacity.

Specifications

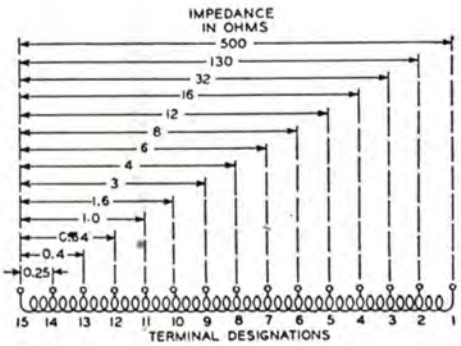
Frequency Range: 15 to 15,000 cycles.

Average Loss: 0.35 db for the 18A; 0.1 db for the 19A.

Power Capacity: 18A is 50 watts continuous; 19A is 200 watts continuous, 500 watts on speech or music from 100 to 15,000 cycles. (These power ratings hold only to tap 10. For lower taps reduce ratings 2 db.)

Insulation: 18A — 2,000 volts a-c; 19A — 3,000 volts a-c.

Impedance Ratio: See diagram.



Dimensions: 18A — 5-1/2" long, 3-1/2" deep and 4-5/8" high (not including terminals); 19A — 7-5/8" long, 5-5/8" deep and 6-3/4" high (not including terminals).

Weight: 18A — 9 pounds 3 ounces; 19A — 27 pounds.

BLANK PANELS AND MOUNTING PLATES

BLANK PANELS

For use on standard 19" equipment racks or bay cabinets. Panels are matte finished furniture steel in either dark aluminum gray or black japan. Length is the standard 19" or 19-5/32", and nominal widths are standard multiples of 1-3/4". The following nominal widths are available: 3-1/2", 5-1/4", 7", 8-3/4", 10-1/2", 12-1/4", 14", 15-3/4", 17-1/2". The 19" panels fasten with screws through them into the rack or bay cabinet. The 19-5/32" panels fasten to rack or cabinet with screw-held clips on the rear surface.

19" PANELS

Width	*Dark Aluminum Gray*	*Black*
3-15/32"	BR-74824 — 4	BR-74824 — 5
5-7/32"	— 9	—10
6-31/32"	—14	—15
8-23/32"	—19	—20
10-15/32"	—24	—25
12-7/32"	—29	—30
13-31/32"	—34	—35
15-23/32"	—39	—40
17-15/32"	—44	—45

Panels are furnished with the necessary Phillips recessed button head screws and spacers. The screws are brushed chrome finish. Spare screws and spacers are supplied with each panel, a minimum of one screw and washer where four or less are required, and 25% spares where the total exceeds four.

19-5/32" PANELS

Width	*Dark Aluminum Gray*	*Black*
1-23/32"	ES-611916 —21	ES-611916 —31
3-15/32"	—22	—32
5-7/32"	—23	—33
6-31/32"	—24	—34
8-23/32"	—25	—35
10-15/32"	—26	—36
12-7/32"	—27	—37
13-31/32"	—28	—38
15-23/32	—29	—39
17-15/32"	—30	—40

Furnished with mounting clips and screws to secure panel from rear. No screws appear in front.

296 TYPE PANELS

Blank mats, for chassis type apparatus having bent up flanges. Designed primarily for use with 177 and 190 type mounting plates. Made of finished furniture steel, they may be drilled or punched for any desired arrangement of controls, meters, etc.

The 296A Panel is designed so as to be attached to a mounting plate from the rear, thus eliminating screw heads on the front of the panel.

The 296B Panel is attached to a mounting plate from the front with four Phillips recessed binding head screws.

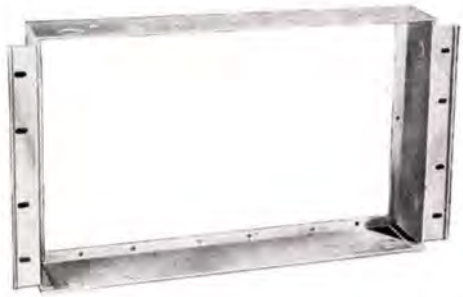
Specifications

Dimensions: 19-5/32" wide, 3/32" thick, and 10-15/32" high, (occupies 10-1/2" of vertical space in standard rack or cabinet).

Weight: 5-1/2 pounds

Finish: 296A-15 Dark Aluminum Gray
296A-3 Black
296B-15 Dark Aluminum Gray
296B-3 Black

177A AND 177B MOUNTING PLATES



Chassis for supporting plate-mounted amplifiers and similar apparatus. Designed primarily for mounting 120, 121, 132 and 133 type amplifiers and 18A rectifiers. It is made of 1/16" furniture steel with knockouts provided for all necessary accessory leads. The 177A Mounting Plate uses the 296A Panel as a mat and is fastened to the panel from the rear, eliminating screw heads on the front of the panel. The 177B Mounting Plate, using the 296B panel as a mat, is first secured to the rack or cabinet and the panel is fastened over it from the front with four Phillips recessed binding head screws. The 296 Type panel must be ordered separately.

Specifications

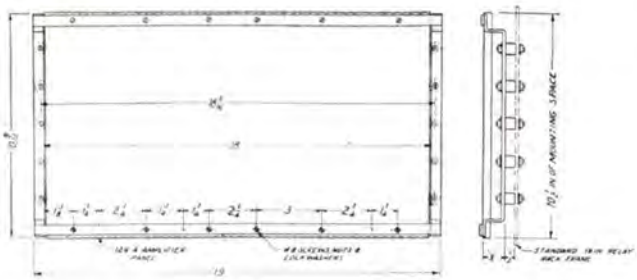
Width: 18-15/16", for 177A or B and 18-5/32" for 296A or B.

Height: 10-1/4" for 177A or B (occupies 10-1/2" of mounting space), and 10-15/32" for 296A or B.

Weight: 4 pounds.

Finish: Gray enamel.

190A & B MOUNTING PLATES



These mounting plates are designed for mounting 120, 121, 129, 130, 131, 132 and 133 type amplifiers and 18-A rectifiers in equipment cabinets or on standard 19" relay rack frames. These mountings are identical except for dimension "X" which is 1 inch and 2-1/4 inches for the 190-A and 190-B mounting plates respectively. The 190-A mounting plate is intended primarily for use in the 21A cabinet or other cabinets where no front panel is required. The 190-B mounting plate is intended for use in cabinets where the mounting frame is at the front. A 296 type panel which is required forms the front of the cabinet. The 296 type panels must be ordered separately.

Possible Mounting Combinations Using One 190A or 190B Mounting Plate.

COMBINATION	TYPE OF AMPLIFIER OR RECTIFIER							
	120B	121A	129A	130A	131A	132A	133A	18A
1	3							
2						3		
3							3	
4	2					1		
5	1					1	1	
6	1					2		
7						2	1	
8	2						1	
9						1	2	
10	1						2	
11	1	1						
12		1				1		
13		1					1	
14			1					
15	1			1				
16				1		1		
17				1			1	
18					1		1	
19					2			
20	1				1			
21					1	1		
22	1							1
23						1		1
24							1	1

993A, 993B AND 993C MOUNTING PLATES

993C Mounting Plate with 23A Equalizer, 154C and 119C Repeating Coils.

Recessed type relay rack mounting plates equipped with face mats. The 993A has a mounting capacity of six 119 Type Repeating Coils. The 993B has a mounting capacity of eight 23A Equalizers or 154C Repeating Coils. The 993C has a mounting capacity of three 119 Type Repeating Coils and either three 23A Equalizers or three 154 Type Repeating Coils.

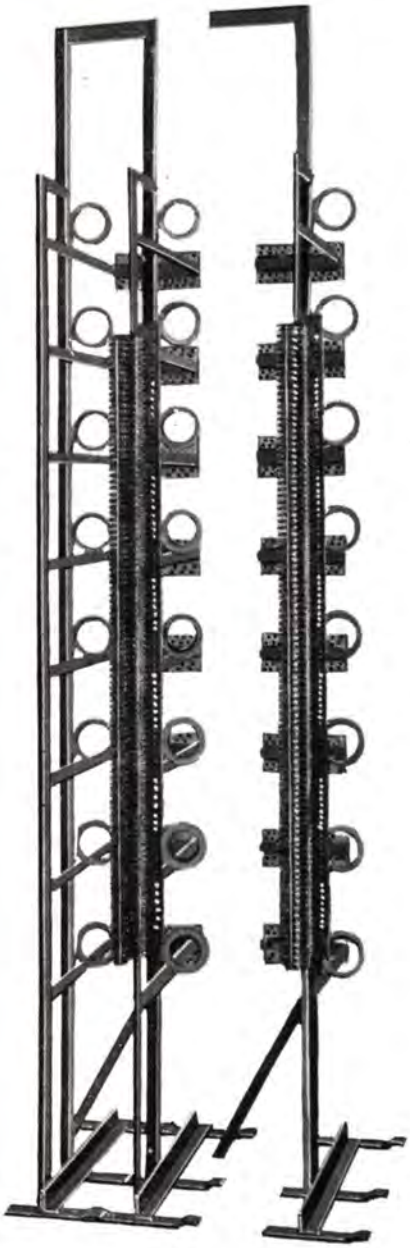
Specifications

Dimensions: 19" wide, 5-7/32" high.

Finish: 993A-15; 993B-15; 993C-15 — Dark aluminum gray.
993A-3; 993B-3, 993C-3 — Black.

DISTRIBUTING FRAMES

1425 TYPE DISTRIBUTING FRAMES



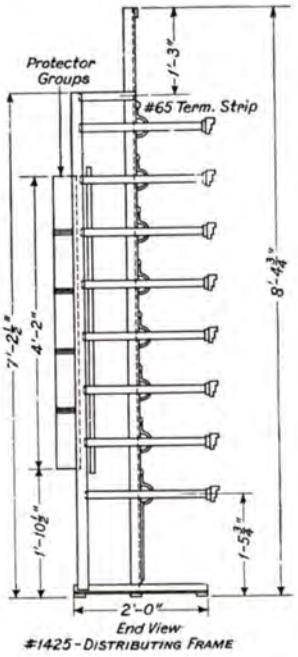
(Left) This shows two units of No. 1425C distributing frame lined up and bolted together. As many 100 line units as desired may be installed. Two units are necessary at the beginning of the frame; one unit for each additional 100 lines.

(Right) This is one 100 line unit of No. 1425C distributing frame. The Code No. 1425C covers the steel framework, distributing rings and fanning strips.

This is a unit type frame suitable for main frame and distribution points. In multiple studio installations considerable convenience can be gained by terminating all studio wiring on a central structure either in or closely associated with the main control room. These frames permit permanent cabling of established circuits and jumper wire connection for emergency or temporary circuits.

They are rigidly constructed of steel angles and bar iron, and are made up in units of one vertical member each. Each frame has a capacity of 100 lines. Several frames can be bolted together to increase the number of circuits that can be handled. By lining up a number of these frames any number of lines can be terminated. All frames are equipped with rubber covered distributing rings which are placed conveniently to facilitate the running of jumper wires.

An assembly of these frames should begin with at least two units. When ordering specify the number of units required. Further information on the application of the frames into a specific installation may be obtained from our distributors.



#1425-DISTRIBUTING FRAME

The Terminal strips shown on page 78 may be ordered separately for use with this frame; No. 65 Terminal strip is recommended.

FANNING STRIPS AND TERMINAL STRIPS

15 TYPE FANNING STRIPS

Made of well seasoned maple, the dimensions are 1-5/16" x 1/2" in either 16 pair capacity with a length of 10-7/16" (15A) or 26 pair capacity with a length of 16-11/16" (15B). They are designed to mount on edge and fasten in

place by means of flat head screws. The outside edge is finished in black, so that white characters may be painted upon the surface for identification of the various wires. The holes through which the wires are to pass have their edges carefully chamfered to prevent injury to the insulation.

Ideally suited for use with the 31 Type Connecting Blocks, where both are mounted on a suitable base or in a wall box, for studio or interstudio wiring arrangements; keeps wiring neat and orderly and permits designation for ready identification.

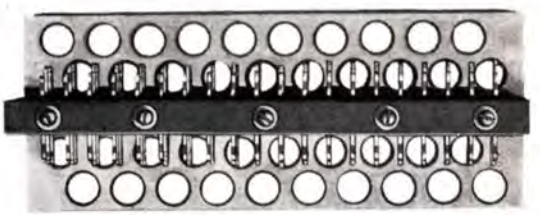
TERMINAL STRIPS

These terminal strips are ideal for mounting on the 1425 distributing frame, at the base of racks and inside equipment cabinets. They provide convenient terminations for many circuits. They are made of a solid maple base upon which are assembled hard rubber insulating strips which hold the terminal punchings in place. The base is drilled to act as a fanning strip for wires and the holes are chamfered to prevent injury to the insulation. The type 65 is a three way terminal which makes it suitable for junction points in multiple studio wiring.

No. 35 Terminal Strip.

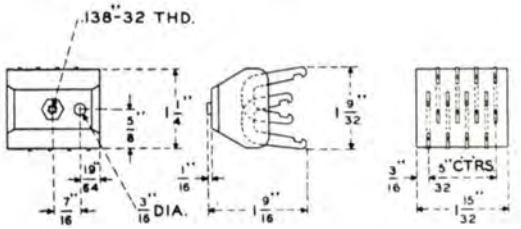
No. 65 Terminal Strip.

No. 85 Terminal Strip.



No. 100A Terminal Strip.

700A TERMINAL STRIP



A rugged, moulded, eight terminal strip for many applications in audio systems. U-shaped punchings are arranged so that terminals are in two rows of 4 each.

TERMINAL STRIP MOUNTING INFORMATION

Code No.	Number of Terminals per Row	Number of Rows of Terminals	Length of Strips in (Inches)	Width (Inches)	Height Overall (Inches)
35	20	3	7-31/32	2-17/32	2-31/64
36	20	4	7-31/32	2-17/32	2-55/64
*65	40	1	7-31/32	3-3/8	2-3/32
85	20	6	6-15/32	2-19/32	4-1/64
99	50	6	14-7/16	2-19/32	3-7/16
100A	20	3	6-1/16	2-15/16	2-11/16
100B	20	4	6-1/16	2-15/16	3-1/32
100C	20	5	6-1/16	2-15/16	3-13/32
100D	20	6	6-1/16	2-15/16	3-3/4
185A	30	6	11	2-15/16	4

* Three way.

TERMINAL PANEL AND CONNECTING BLOCKS

288A TERMINAL PANEL

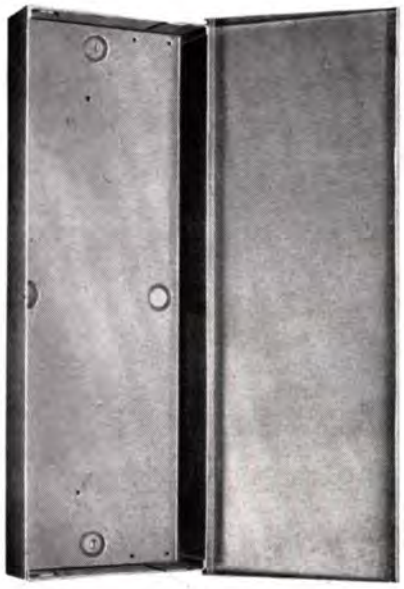
Consists of a mounting plate equipped with 16 P-250833 Terminal Units, of 10 terminals each, a total of 160 terminals. Tie bars are provided for external cables. Approximate overall dimensions are 19″ long, 1-3/4″ high and 4-1/8″ deep. The terminal panel, however, will require a minimum mounting space of 5-7/32″ for one and 8-23/32″ for two in standard racks or cabinets in order to provide space for cable forms and for making connections to the terminal units. The code 288A Terminal Panel does not include the necessary blank face panel which must be specified as a separate item on the order.

11 TYPE AND 31 TYPE CONNECTING BLOCKS

These connecting blocks provide suitable terminals for equipment wiring. They are available in a number of sizes and arrangements and can be mounted on 102D adapters in GA26 cable terminals.

CABLE TERMINAL BOX

TYPE GA26 — CABLE TERMINAL BOX



Intended for use in housing terminal strips or adapters for connecting blocks. They provide a flexible wiring arrangement by use of fanning strips and 8A distributing rings.

Overall Dimensions

Height: 19-9/16 inches.

Width: 7-5/16 inches.

Depth: 2-1/2 inches.

Can be used with all types of terminal strips. When used with 11 type and 31 type connecting blocks a 102D adapter is required.

CONNECTING BLOCK MOUNTING INFORMATION

Code No.	No. of Connectors	Descriptions	Size of Base (Inches) Length	Width	Thickness	Material Base
11A	2	Two screw terminals on each connector.				
(a) 11B	2	Opposite terminals are electrically	1-5/32	1-5/32	9/16	Composition
(b) 11C	2	connected.				
31A	12	Each connector has one lock nut binding	4-3/16	1-1/2	1/2	Composition
31B	22	post and one soldering terminal,	7-5/16	1-1/2	1/2	Composition
31C	32	brought out on the side. Intended for	10-7/16	1-1/2	1/2	Composition
31D	52	use with 15 Type fanning strips.	16-11/16	1-1/2	1/2	Composition

(a) The No. 11B consists of a No. 11A equipped with a black finished metal cover.

(b) The No. 11C is the same as No. 11B except that the under-surface of the top of the cover is provided with an insulating strip to protect the terminals from short circuits.

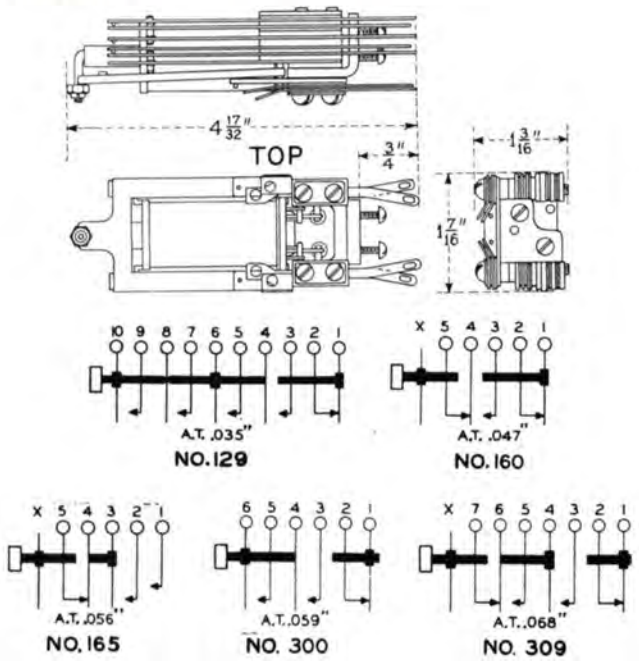
102D ADAPTER

The 102D Adapter is intended for mounting No. 31 type connecting blocks in the GA26 type cable terminal.

Code No.	Mounts in Cable Terminal Box	Overall Dimensions (Inches) Length	Width	Depth
102D	GA26	19-1/16	2-23/32	1-7/8

RELAYS AND MOUNTING PLATES

U TYPE

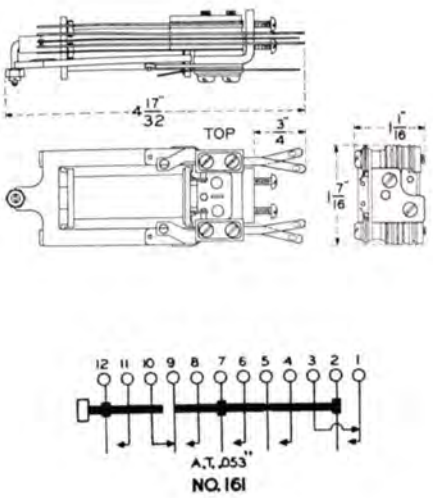


The "U" and "Y" type relays are flat type, round core, general purpose twin contact relays capable of operating large spring combinations with low current consumption.

The use of the rare-metal alloy twin contact arrangement on each contact spring provides paralleled paths for current. This coupled with a slight wiping action assures positive connection on every operation.

These relays can be used for program bus switching, loudspeaker cut-off, microphone switching, and for many other purposes where an efficient dependable relay is required.

Y TYPE



The "Y" type is essentially the same as the "U" type but is designed to have a slightly slower release time.

They will mount on 1-3/4" vertical centers; horizontal centers are shown in the accompanying table. They can be equipped with either individual or common dust covers. A variety of spring and contact combinations are available. Representative types only are listed below.

Code No.*	Winding	Rated Resistance Ohms	Operate Ampere	Horizontal Mounting Centers	Relay Cover	Spring Combinations Top	Bottom
U 430	Single	700	0.028	1-1/2"	U4	309	300
U 590	Single	700	.0245	1-1/2"	U4	165	160
U1183	Pri.	500	.026	1-3/4"	U5	129	129
	Sec.	500	.026				
Y 130	Pri.	165	.0645	1-7/8"	U5	161	161
	Sec.	225	.080				

* Note: Maximum safe coil dissipation for each type is 4 watts.

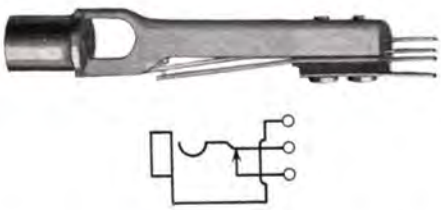
RELAY MOUNTING PLATES

These plates are of steel arranged for mounting relays on relay racks. Dust covers are available to protect the relays from dirt and damage. The 737 type comes equipped with a common cover for all the relays on one plate. The 600A is designed to use either no cover or an individual cover for each relay. The proper cover must be ordered to fit each relay.

Code No.	Relays per Plate	Mounting Centers	Length
737J	20	3/4"	19"
737N	10	1-1/2"	19"
600A	10	1-3/4"	19"

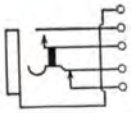
JACKS AND MOUNTINGS

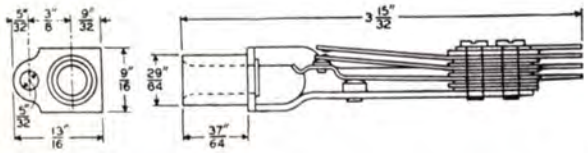
JACKS — 218A AND 218J



Singly mounted, electrically welded frame type jacks with contacts of rare metal alloy. Terminals are arranged to accommodate two No. 19 or smaller B and S gauge wires. The 218J has a nickel silver sleeve while the 218A has a plain brass sleeve. They are used with 47 and 241 Type Plugs, and mount in 221 and 222 Type Jack Mountings. With this type of mounting the springs are in the vertical plane. These jacks can be mounted on 5/8″ horizontal centers and 7/8″ vertical centers.

225CE JACK

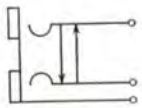




A singly mounted, electrically welded frame type jack equipped with platinum contacts and a nickel silver sleeve. Terminals of all springs are arranged to accommodate two No. 16 or smaller B & S gauge wires. It is used with 47 and 241 Type Plugs and mounts in the 221 and 222 Type Jack Mountings. With this type of mounting the springs are in the horizontal plane. This jack can be mounted on 7/8″ horizontal centers and 5/8″ vertical centers.

410D JACK

A twin jack consisting of a single frame equipped with two plain brass sleeves and two sets of springs. The tip springs are gold plated at the tip end. The 410D is used with the 241 Type Plug and mounts in 221 and 222 Type Jack Mountings. When so used, plugging into one jack of a pair will disconnect both normal-through connections removing the equipment from the line, to permit testing, either toward the line or toward the equipment as desired.

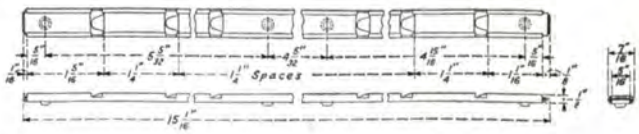


221A AND 222A JACK MOUNTING

Consist of one or two jack mounting strips and a metal face mat equipped with a designation strip. The mounting strips are made of hard rubber reinforced with metal strips on top and bottom. The 221A uses one mounting strip with a capacity of 48 jacks (218 or similar type) and occupies 3-1/2″ of mounting space on a standard 19″ rack or cabinet. The 222A employs two mounting strips with a capacity of 96 jacks and occupies 5-1/4″ of 19″ rack mounting space.

DESIGNATION STRIPS

90A TYPE DESIGNATION STRIPS



These strips consist of a black finish metal retaining strip. Each designation card holder is arranged to accommodate a card for each pair of jacks or lamps. Use as an additional designation strip with 221A 222A Jack Mountings or for other like applications requiring designation.

APPARATUS BLANKS

These blanks are designed to fulfill the need for neat appearing covers for blank jack and lamp holes. When inserted in unused apparatus holes they provide finished appearance to the equipment.

APPARATUS BLANKS

32B

39B

Code No.	*Material*	*Finish*	*Used*
32B	Metal	Black	In unequipped positions of No. 30 lamp sockets.
39B	Metal	Black	In unequipped positions of 218 type and similar jacks and 49 type lamp sockets.

RESISTANCES

To meet a wide range of circuit requirements and equipment conditions many types of dependable Western Electric Resistances have been developed. Information on all specific types may be had upon request but shown below are the 18 and 19 type Resistances which are unique non-inductive precision resistances of high wattage rating for size. They will dissipate six watts continuously without injury from overheating and are ideal for making up fixed attenuator pads.

NO. 18 TYPE RESISTANCES

Resistances of the No. 18 Type have a micanite core upon which a single winding is placed. The winding is protected by a covering of sheet mica. The ends of the winding are soldered to tinned terminal posts which are also used for mounting the unit. Each terminal post is provided with two fibre washers and a hexagonal nut. Will mount on 7/16 inch horizontal centers and 1-3/4 inch vertical.

The overall dimensions are: length, 4-21/32 inches, width, 1-31/64 inches, thickness, 3/8 inch.

The resistance values do not vary more than plus or minus 5 per cent from those rated in the table below. In some cases as noted, the resistance is held to even closer limits. Each resistance will dissipate six watts continuously without injury from heating.

The 600 type mounting plates listed under Relay Mounting Plates, page 80, can be furnished on order drilled to provide for assembling these resistances in compact groups and when so mounted the terminals are conveniently located for making soldered connections.

NO. 19 TYPE RESISTANCES

These resistances are similar in construction to the No. 18 Type and may be mounted on 7/16 inch horizontal centers and 1-3/4 inch vertical centers. They differ from the No. 18 Type in that two windings are provided and the end of each winding soldered to a center terminal. The two outside treminals are used as mounting posts as in the 18 Type. The resistance values do not vary more than plus or minus 5 per cent from those rated below and in some cases, as noted, the variation is held to closer limits.

NO. 18 TYPE RESISTANCE VALUES

Code No.	*Resistance (Ohms)*	*Code No.*	*Resistance (Ohms)*	*Code No.*	*Resistance (Ohms)*	*Code No.*	*Resistance (Ohms)*	*Code No.*	*Resistance (Ohms)*
18A	37	18T	50	(b) 18AP	500	18CJ	5	18EM	8600
18B	40	18U	100	18AR	380	18CN	800	18ES	4800
18C	83	18Y	90	18AT	1600	(b) 18CR	2000	(a) 18EU	500
18D	120	18Z	67	(d) 18AY	2.4	(d) 18CU	0.8	18EW	5000
18E	140	18AA	95	18BA	2000	(d) 18CW	1.6	18FB	900
18F	150	18AB	45	(b) 18BE	20	(b) 18DA	1510	18FC	4000
18G	200	18AC	500	18BF	284	18DB	3000	18FG	8080
18H	210	18AD	240	(b) 18BG	400	(b) 18DG	426	18FP	6350
18J	30	18AE	600	18BH	1000	18DH	700	(b) 18FR	3200
18K	80	18AF	300	18BJ	1200	(b) 18DJ	15	(b) 18FS	4250
18L	170	18AG	226	(b) 18BK	1300	(a) 18DP	18.75	(c) 18GL	5545
18N	180	18AJ	400	18BL	750	(b) 18DS	1700	(b) 18GU	8
18P	130	18AK	60	(b) 18BM	1000	18EA	9000	(b) 18GW	5.4
18Q	110	18AL	4	(b) 18BT	200	18EC	6000	(c) 18HH	0.3
18R	10	18AM	250	(b) 18BU	300	(b) 18EE	128	(c) 18HJ	0.5
18S	20	18AN	350	(b) 18BW	100	18EF	2500	(g) 18JC	600
								18JG	220.4

(a) Resistance value does not vary more than plus or minus ½%.
(b) Resistance value does not vary more than plus or minus 1%.
(c) Resistance value does not vary more than plus or minus 2%.
(d) Resistance value does not vary more than plus or minus 3%.
(g) Resistance value does not vary more than plus or minus 0.1 of 1%.

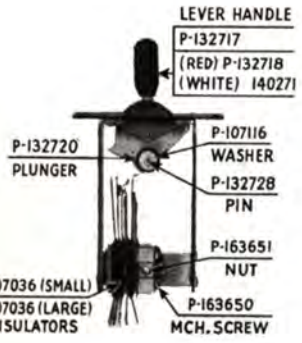
NO. 19 TYPE RESISTANCE VALUES

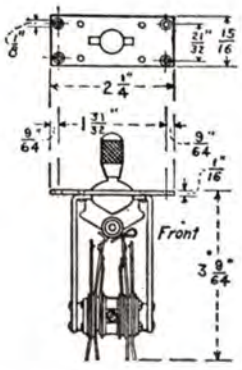
Code No.	Resistance (Ohms)	Code No.	Resistance (Ohms)	Code No.	Resistance (Ohms)	Code No.	Resistance (Ohms)
19A	37 and 37	19AN	260 and 260	(f) 19DN	100 and 100	19GJ	300 and 500
19B	40 and 40	19AP	180 and 180	19DP	0.25 and 0.5	19GL	300 and 300
19C	40 and 83	19AW	2.5 and 2.5	19DR	1 and 2	19GM	400 and 1000
19D	83 and 83	19BA	900 and 900	19DT	150 and 300	(c) 19KG	160 and 2990
19H	40 and 120	19BB	300 and 2300	19DY	500 and 500	(c) 19KH	286 and 1325
19K	100 and 100	19BC	50 and 300	(b) 19EA	115 and 115	(c) 19KJ	467 and 512
19S	60 and 90	19BE	30 and 90	19EB	20 and 330	(c) 19KL	269 and 1490
19T	25 and 25	19BG	200 and 400	19EC	650 and 1600	19KM	84 and 6350
19Z	120 and 120	19BJ	350 and 350	19EW	800 and 800	(c) 19KN	146 and 651
19AD	150 and 150	19BL	1 and 1	(b) 19GA	400 and 600	(a) 19PC	102.6 and 3509
19AH	240 and 240	(b) 19CA	185 and 770	(b) 19GB	80 and 85	(b) 19SR	600 and 800
19AJ	200 and 200	19CN	100 and 200	(b) 19GC	75 and 110	19SS	2500 and 2500
19AM	50 and 50	(b) 19DG	133 and 770	(b) 19GH	425 and 425		

(a) Resistance value does not vary more than plus or minus ½%.
(b) Resistance value does not vary more than plus or minus 1%.
(c) Resistance value does not vary more than plus or minus 2%.
(f) The two parts are balanced for resistance within 1% of each other.

KEYS AND KEY UNITS

479 KEY

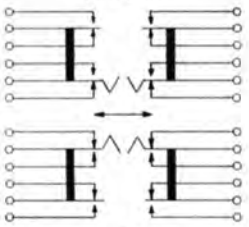




The No. 479 two or three position lever operated type keys have spring combinations mounted in a metal frame. A black finish metal top or face plate 2-1/4" long x 15/16" wide supports the 479 type key for mounting through a large rectangular hole in the front of a wood or metal panel. The face plate covers the mounting hole and is an integral nonremovable part of the key frame. Four No. 4 oval head wood screws are furnished with each key for mounting. Key handle not included; order as required.

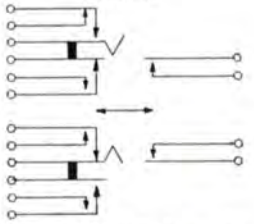
A wide variety of spring combinations are available in this type of key; some of the more popular combinations are shown below. For spring combinations other than those shown, consult our nearest distributor. (See also No. 2 Type Key Units, page 86.)

479 BN



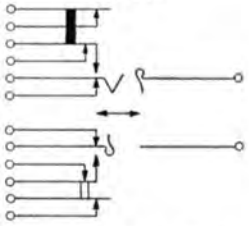
Lever Operates in Two Directions
Locking in Each Position

479 FR



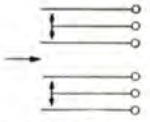
Lever Operates in One Direction Only
Locking in Operate Position

479 JN



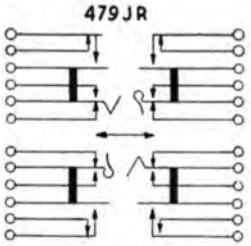
Lever Operates in One Direction Only
Locking in Operate Position

479 JP



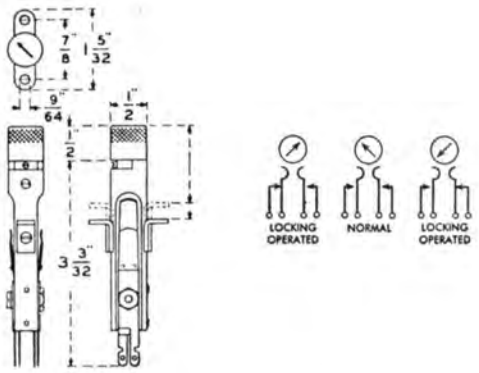
Lever Operates in One Position Only
Non Locking in Operate Position

479 JR



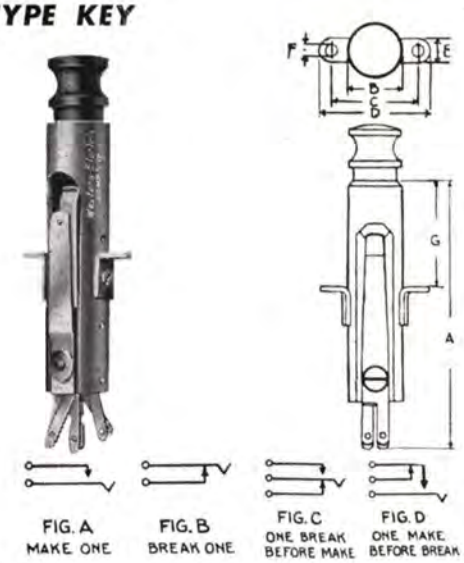
Lever Operates in Two Directions
Locking in Each Position

498A KEY



Singly mounted rotating type key intended for switching. Arranged to rotate 90 degrees clockwise and 90 degrees counterclockwise from normal; closes a "make" contact in each position except normal; designed to mount on a 7/8" thick panel. Other 498 type keys have a single 90 degree rotation and have various contact arrangements up to six springs.

92 TYPE KEY



A singly mounted, mechanically locking type key equipped with a variety of "make" and "break" contacts, up to a capacity of four transfers (twelve springs).

92 TYPE SINGLY MOUNTED KEYS

Singly Mounted Type Keys

LOCKING TYPE (*Button remains at rest in either operated or unoperated position*)

Code No.	No. of Springs	Spring Arrangement	Dimensions (Inches) (See Dimension Cut) A	B	C	D	E	F	*G			
92B (1)	6	2 Sets Fig. C	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32	5/8	11/16	7/8	1-1/4
92D	9	3 Sets Fig. C	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4
92H (2)	8	1 Set Fig. A, 2 Sets Fig. C	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4
92N (3 & 4)	3	1 Set Fig. C	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4
92P (3 & 5)	2	1 Set Fig. A	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4
92AA	6	2 Sets Fig. D	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4

NON-LOCKING TYPE (*Button at rest only in unoperated position, spring restoring*)

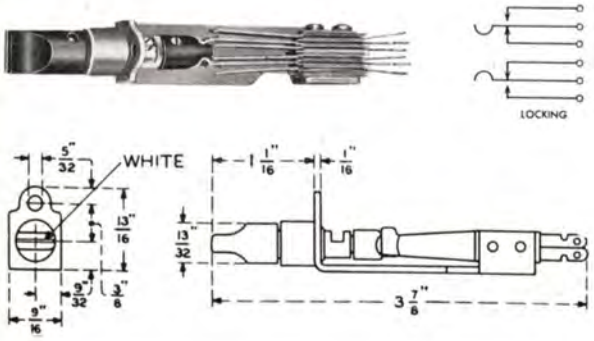
Code No.	No. of Springs	Spring Arrangement	Dimensions (Inches) (See Dimension Cut) A	B	C	D	E	F	*G			
92A (1)	6	2 Sets Fig. C	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32	5/8	11/16	7/8	1-1/4
92J	6	1 Set Fig. A, 2 Sets Fig. B	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4
92W	6	2 Sets Fig. D	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4
92Y (6)	4	2 Sets Fig. A	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32	1/2	11/16	7/8	1-1/4
92AN	8	1 Set Fig. A, 2 Sets Fig. C	3-5/32	21/32	1-1/32	1-5/16	9/32	5/32		11/16	7/8	1-1/4

(*) Arranged for thickness of shelf as indicated.
(1) Keys arranged for 7/8" shelf will be furnished unless otherwise specified.
(2) Top of button engraved "MON".
(3) Keys arranged for 1 1/16" shelf will be furnished unless otherwise specified.
(4) Top of button engraved "E".
(5) Top of button engraved "C".
(6) Keys arranged for 1/2" shelf will be furnished unless otherwise specified.

547A AND 547B KEYS

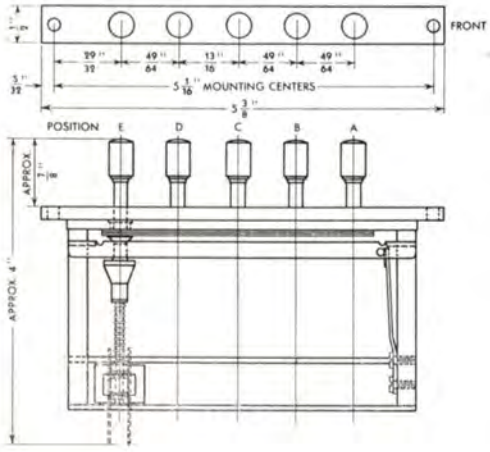
Non-locking push button type keys interchangeable with and mounting like the 218 Type Jack. The 547A closes one "make" contact while the button is pressed and 547B operates two sets of "break before make" contacts when the button is pressed.

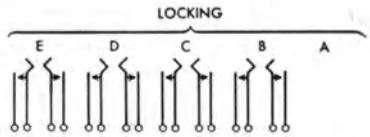
552A KEY



A turn button locking type key arranged to rotate 90 degrees clockwise from normal. The 552A closes two "break before make" contacts upon rotation of the button. It is interchangeable with and mounts like the 218 Type Jack.

553A KEY



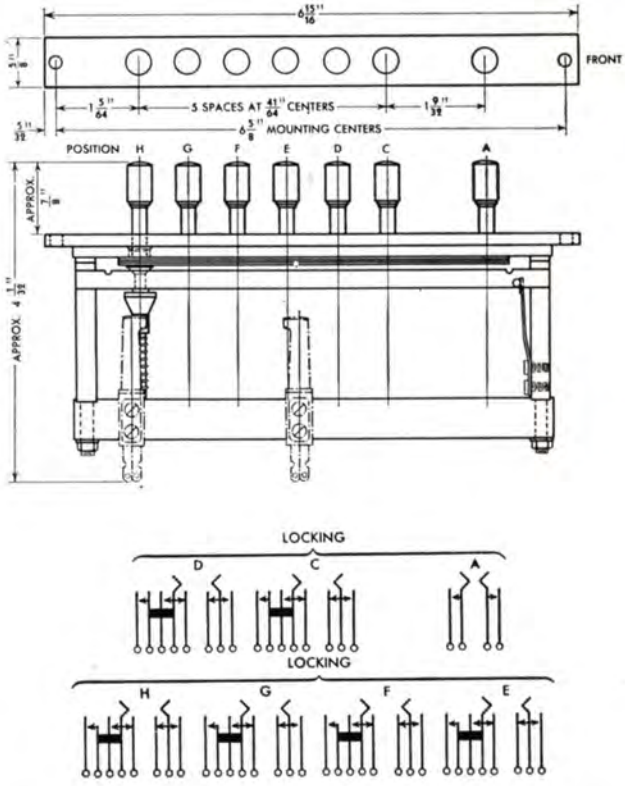


A reliable five button, mechanically interlocking key used for program switching. All plungers lock in the operated position, but operation of any one plunger releases any other operated plunger. This key is used in the 271 Type Output Switching Panel. Four active positions; fifth position is "Off".

Width: 25/64". Buttons project approximately 7/8" to the front.

Length: 5-3/8". Key projects 3-1/8" to the back.

554A KEY

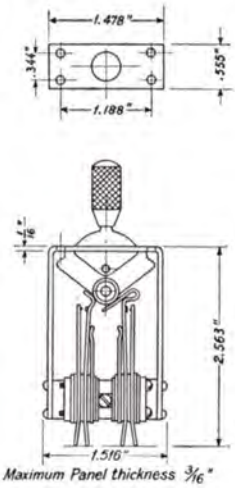


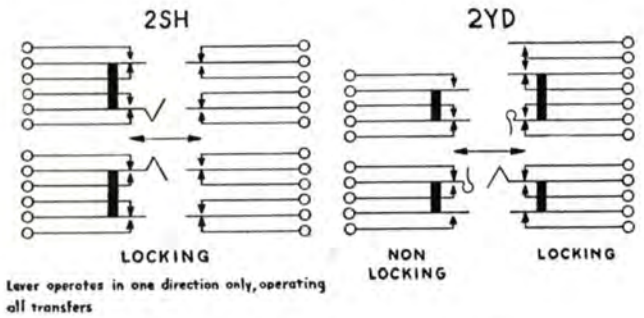
A reliable seven button, mechanically interlocking key used for program switching. All plungers lock in the operated position, but operation of any one plunger releases any other operated plunger. This key is used in the 271 Type Output Switching Panel. Six active positions; seventh position is "Off".

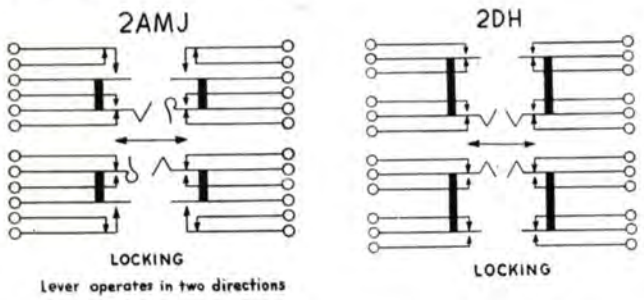
Width: 7/8". Buttons project approximately 7/8" to the front.

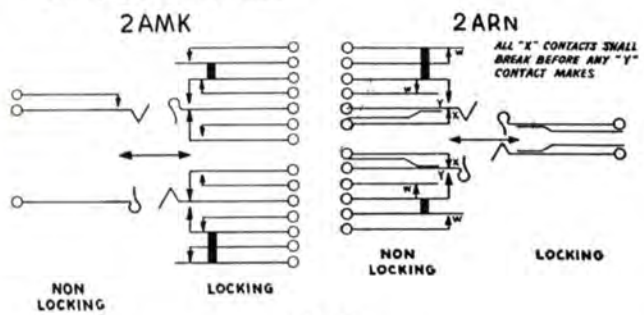
Length: 6-15/16". Key projects approximately 3-1/8".

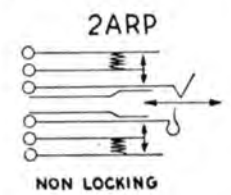
NO. 2 TYPE KEY UNITS









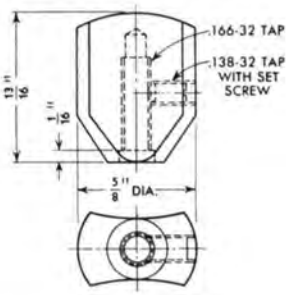


Two and three position lever operated type keys having spring combinations mounted in a metal frame. The operation of these key units is the same as for the 479 type keys described on page 83; the keys are also similar in mechanical arrangement. However, they are arranged for mounting on a metal panel only with a small rectangular slot for the key lever. The metal mounting serves instead of the key top (face plate), the face plates shown on the 479 type being omitted. Usually these switches are mounted on photo etched panels or other types of panels where face plates are unnecessary. Key handle not included; order as required.

A variety of spring combinations are available, some of the more popular of which are shown above.

KEY HANDLE AND KNOBS

KS-10011 KEY HANDLE



A decorative flat type key handle with convex finger surfaces for fingertip control of lever type keys such as 479 type keys or 2 type key units. Available in black, red, white, blue or green. Colors must be specified on order.

KS-10088 KNOB

A black phenol plastic mushroom type knob with skirts and raised pointers to facilitate fingertip control and eliminate cramped hands. It has a chromium bar on the pointer and a chromium indicator line inset in the top of the knob to show the knob setting at a glance. Used on 25, 23 and 22 Type Speech Input Equipments. The depth of the knob is 1-5/16" and the skirt diameter for List 1 is 2-7/16" and for List 2 is 2-1/8". Two set screws are provided 90 degrees apart to insure positive positioning.

KS-10283 KNOB

Primarily intended for use in Speech Input Equipment and similar applications.

Consists essentially of a black moulded knob having a chromium bar type pointer and equipped with a bushing for use on a 1/4" diameter shaft. Approximately overall dimensions of this knob are 1-3/4" in diameter by 1-1/8" high. Similar to the KS-10088 knob except that it is smaller in size.

PLUGS

47A, 47B PLUGS

For use with a two conductor cord (P2A) and 218 and 225 Type Jacks. The 47A has a red shell and the 47B has a black shell.

241A, 241B PLUGS

Double circuit plugs with the brass frames of the two plugs electrically connected to the two plug sleeves. Used with the P2AA and P3J Cords and 218, 225 and 410 Type Jacks when these jacks are mounted in jack mountings such as 221A and 222A. The 241A has a black shell and the 241B has a red shell.

LAMP SOCKETS

47B AND 49B SOCKETS

Singly mounted sockets arranged to take the 2 Type Lamp and the 2 or 72 Type Lamp Cap. The 47B mounts interchangeably with the 218 Type Jack. The 49B mounts on a key shelf or panel 7/8" thick. These sockets are made of brass with nickel silver springs and are insulated with hard rubber. The shell has a nickel plate finish. Brass finish can be had by specifying 47A or 49A type sockets.

LAMPS

2 TYPE LAMPS

High quality carbon or tungsten filament lamps with long life and high illuminating power. They have a tipless, clear glass bulb, length 1-3/4" and diameter 5/16" and mount in 47 and 49 Lamp Sockets. The special filament and rugged construction provide the user with a lamp that will give long and dependable service.

A 116 lamp tool is required to facilitate insertion and removal of the lamp from its socket.

Code No.	Operating Voltage	Current Consumption Min. Amps.	Max. Amps.
2F	12	.105	0.120
2G*	24	.075	.115
2U	24	.035	.0475
2Y	48	.025**	.035**
A1***	24	.033	.045
E1***	6	.033	.045

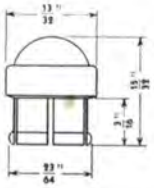
** The 2G is inherently more rugged than the 2U and provides nearly 3 times as much light.*

*** Currents at 40 volts.*

**** These lamps are Tungsten filament lamps; the others are carbon filament lamps.*

LAMP CAPS

2 TYPE LAMP CAPS



Made from specially selected and treated glass, the lens of this cap is thick and substantial. The cap is slotted to give a spring fit in the socket. It is available in a variety of surface treatments and colors including red, white, blue, green, and amber opalescent; jeweled red, blue, and green; and clear amber. The 2 Type Lamp Cap mounts in the 47 and 49 Type Lamp Sockets. In order to facilitate removal of the lamp caps for maintenance purposes a 319B lamp cap tool is required.

No. 2 Type Lamp Caps

Code No.	Symbol	Color
2H	○	Red opalescent
2L	○	Green opalescent
2P	⊛	Jeweled red
2S	⊛	Jeweled green
2U	○	Amber opalescent
2W	○	Blue opalescent
2AY	○	White opalescent
2BP	⊛	Clear Amber

72 TYPE LAMP CAPS

Similar to the 2 Type Lamp Cap except that the lens has a flat top with translucent numbers engraved on a black background (single characters), or black characters on white, red or green backgrounds (up to four characters). Mounts in the 47 and 49 Type Lamp Sockets.

No. 72 Type Lamp Caps

Code No.	*Symbol*	*Color*
72A	0	Translucent on black
72B	1	Translucent on black
72C	2	Translucent on black
72D	3	Translucent on black
72E	4	Translucent on black
72F	5	Translucent on black
72G	6	Translucent on black
72H	7	Translucent on black
72J	8	Translucent on black
72K	9	Translucent on black
*72L		Black on white, red or green
*72M	12 34	Black on white, red or green
*72N		Black on white, red or green

** Characters as specified in order. One, two, or three characters will be arranged on one line, four characters on two lines.*

WIRE

J1 WIRE

Solid, tinned conductors, two cotton braids, asphaltic impregnation. Obtainable in 18, 20, 22, and 24 gauges; singles only; black only.

KS-13385 WIRE

This hookup wire is designed for use at operating voltages of 600 volts rms or less and temperatures not exceeding 185F. This wire consists of solid or stranded tinned copper conductor insulated with a polyvinyl chloride covered with a cotton braid and a coat of lacquer.

It can be obtained in AWG conductor sizes 22, 20, 18, 16, 14, 12, 10 and 8 stranded and numbers 22, 20, 18, 16 and 14 solid in singles, pairs, triples, quads or other combinations. It is furnished in various colors designated by colored thread in the outer part. The order should include reference to KS-13385 and specify the quantity, feet, gauge and numbering, conductors, color and whether solid or stranded. For color combinations consult our nearest distributor.

P2 WIRE

Designed primarily for high grade transmission circuits and for general use where a shielded wire is required. Tinned enameled conductors, double cellulose acetate yarn, single cotton and lacquer coated. The wires are covered with a braided shield of tinned copper wires with a 22 gauge tinned copper wire running longitudinally under the shield for grounding purposes. The braided shield is covered with a paper tape and a gray cotton braid. Both the cotton braid and the braided shield may be readily pushed back in terminating the wires. Obtainable in 22 gauge; single, pair, and triple, and in a variety of colors. For color combinations please consult our nearest distributor.

CABLE

LEAD COVERED CABLE FOR INSIDE CONSTRUCTION

Western Electric lead covered cable possesses several advantages of material benefit to users. It makes use of the most suitable designs and materials to secure and maintain high quality cable construction. The design is such as to insure ease of handling without tendency to buckle. Manufacture is controlled to keep moisture content to a minimum. Sheathing and insulation are of uniform thickness and have a maximum of mechanical ruggedness as a protection against damage.

These cables are ideally suited for inter-studio relay circuit and speech input equipment wiring.

TYPE "OUA" LEAD COVERED CABLES

Conductors: No. 22 A. W. gauge — tinned.

Insulation: Enamel, double cotton, lacquered, each pair distinguishable from every other pair.

Core: Not impregnated.

Sheath: Pure lead.

Conductor Resistance: Not greater than 96 ohms per mile of cable at 68 degrees Fahrenheit.

Insulation Resistance: Not less than 20 megohm miles at 60 degrees Fahrenheit.

Dielectric Strength: Insulation between conductors and between conductors and sheath capable of withstanding a-c potentials having maximum instantaneous values of 700 and 1415 volts, respectively.

Intended for interior construction.

Code	Actual Number of Pairs	Number of Good Pairs	Mean Outside Diameter (Inch)	Thickness of Sheath (Inch)	Approx. Lbs. per Foot
OUA6	6	6	0.33	0.040	0.21
OUA11	11	11	.41	.043	.30
OUA16	16	16	.47	.045	.38
OUA21	21	21	.51	.047	.46
OUA26	26	26	.57	.049	.53
OUA31	31	31	.60	.050	.58
OUA41	41	41	.69	.053	.71
OUA51	51	51	.75	.056	.86
OUA76	76	76	.89	.061	1.1
OUA101	101	101	1.01	.065	1.4

TYPE "BUA" LEAD COVERED CABLES

Conductors: No. 22 A. W. gauge — tinned.

Insulation: Double cellulose acetate yarn, single cotton, lacquered, each pair distinguishable from every other pair.

Core: Not impregnated.

Sheath: Pure lead.

Conductor Resistance: Not greater than 96 ohms per mile of cable at 68 degrees Fahrenheit.

Insulation Resistance: Not less than 10 megohm miles at 60 degrees Fahrenheit.

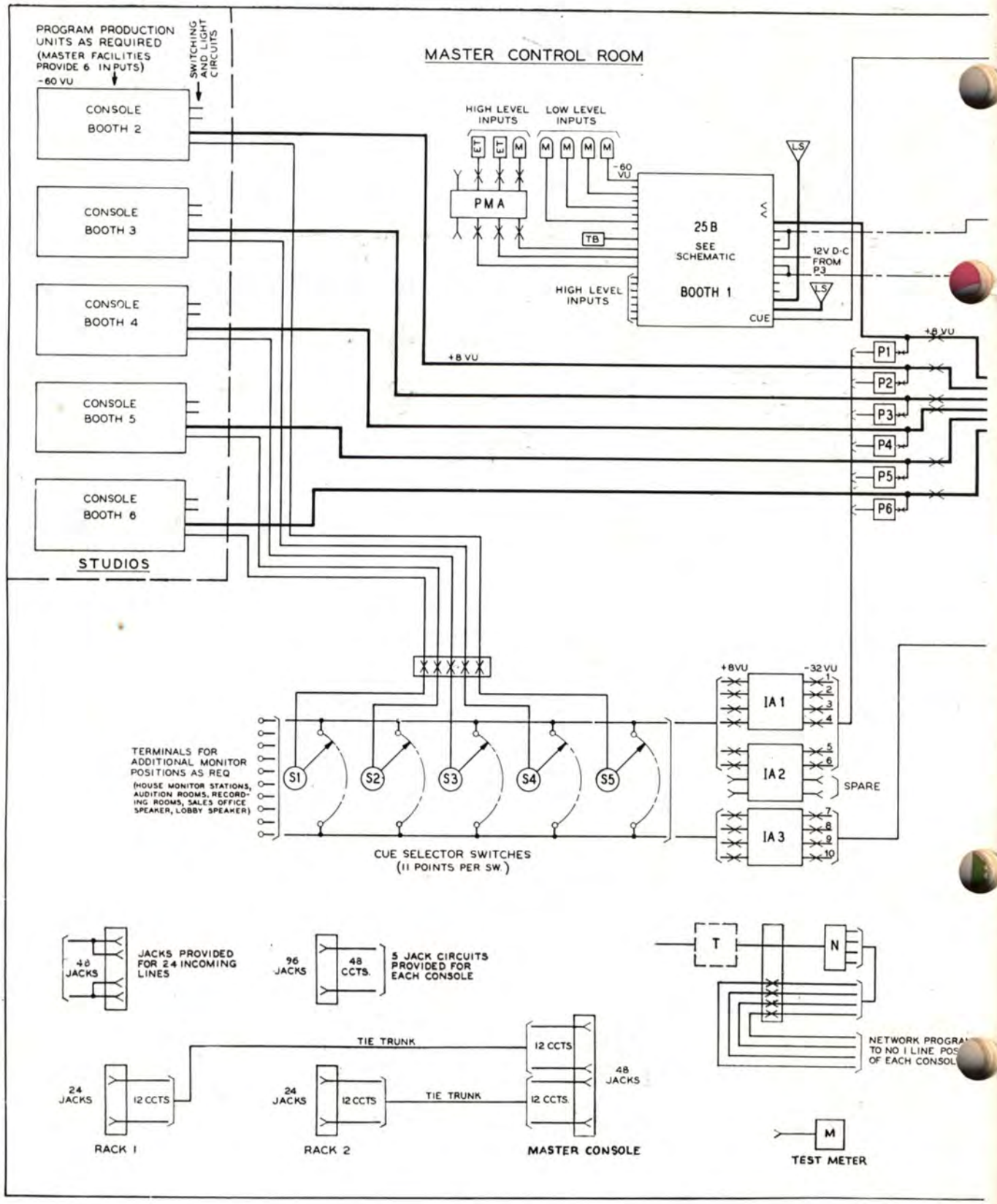
Dielectric Strength: Insulation between conductors and between conductors and sheath capable of withstanding a-c potentials having maximum instantaneous values of 700 and 1415 volts, respectively.

Intended for interior construction.

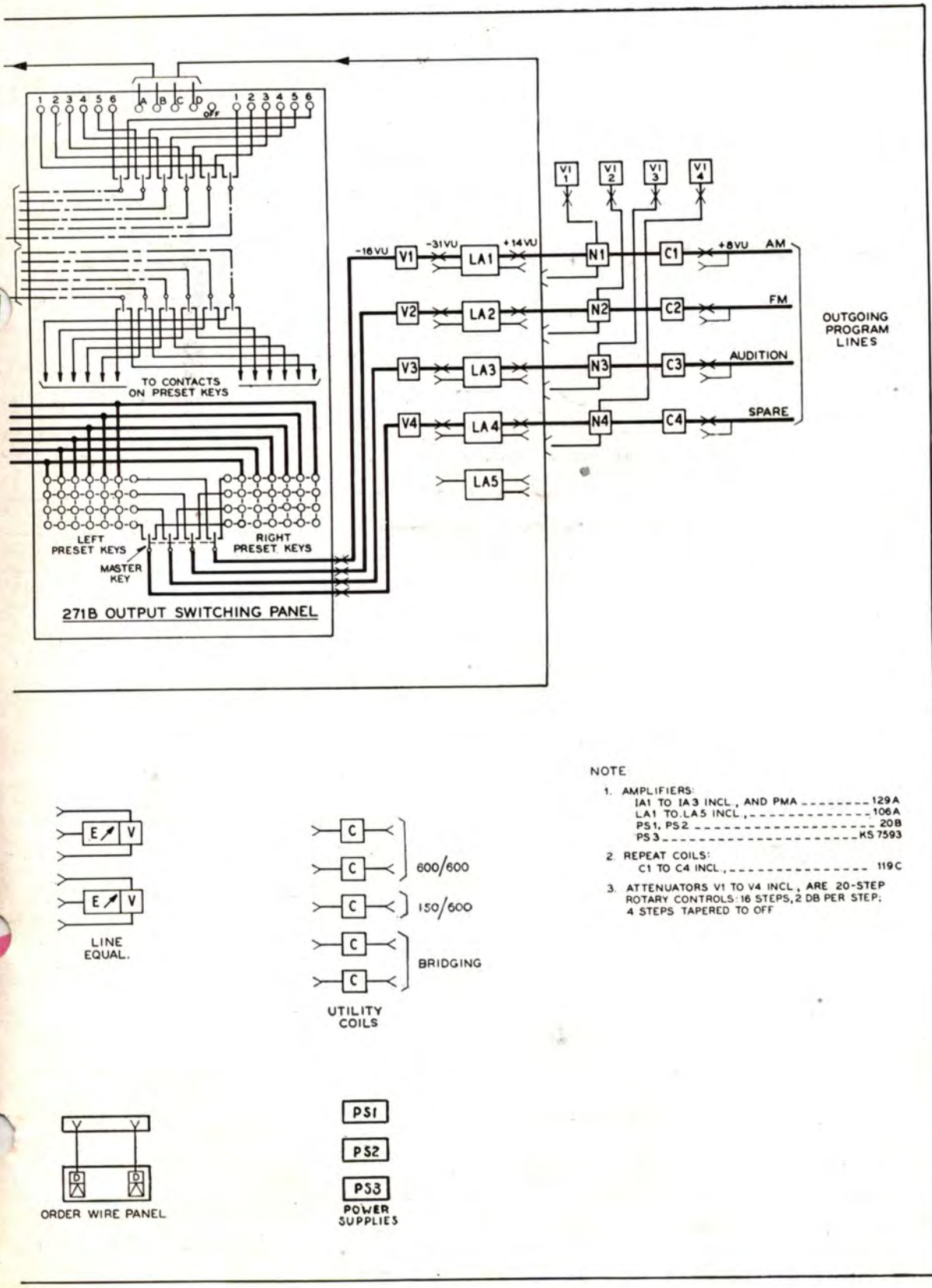
Code	Actual Number of Pairs	Number of Good Pairs	Mean Outside Diameter (Inch)	Thickness of Sheath (Inch)	Approx. Lbs. per Foot
BUA6	6	6	0.32	0.040	0.20
BUA11	11	11	.41	.043	.28
BUA16	16	16	.45	.045	.36
BUA21	21	21	.50	.047	.44
BUA26	26	26	.55	.048	.49
BUA31	31	31	.58	.049	.56
BUA41	41	41	.67	.053	.69
BUA51	51	51	.74	.055	.82
BUA76	76	76	.87	.060	1.1
BUA101	101	101	.99	.065	1.4

Typical applications of Western Electric Audio Facilities are shown on pages 90, 91, 92, *and* 93. *For index and distribution lists see pages* 94, 95, *and* 96.

MASTER CONTROL



Functional Schematic, Master Control, Featuring Key Switching.

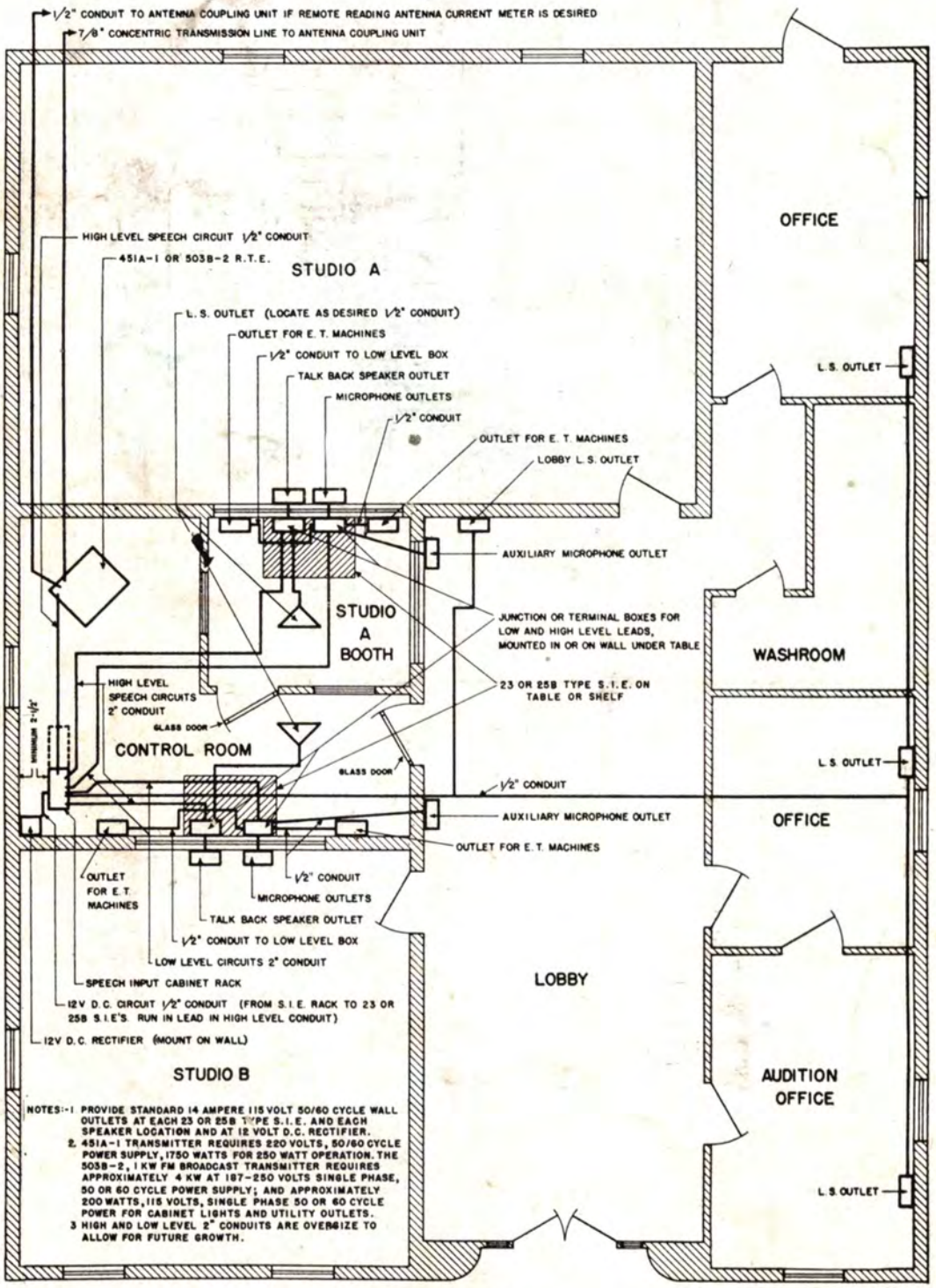


NOTE

1. AMPLIFIERS:
   IA1 TO IA3 INCL., AND PMA 129A
   LA1 TO LA5 INCL., ... 106A
   PS1, PS2 ..... 20B
   PS3 ..... KS 7593
2. REPEAT COILS:
   C1 TO C4 INCL., ... 119C
3. ATTENUATORS V1 TO V4 INCL., ARE 20-STEP ROTARY CONTROLS: 16 STEPS, 2 DB PER STEP; 4 STEPS TAPERED TO OFF

(Functional Schematic, continued)

STUDIO LAYOUT



A Typical Studio Layout.