Western Electric

Manual of Speech Input Equipment
Instructions For Use

MANUAL
OF
WESTERN ELECTRIC
SPEECH INPUT EQUIPMENT

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MANUAL OF SPEECH INPUT EQUIPMENT

SECTION I

GENERAL OUTLINE OF SPEECH INPUT EQUIPMENT

A radio broadcasting system consists of two major divisions: namely, a radio transmitter of sufficient power to cover a given service area with adequate radio frequency energy and a speech input system. The purpose of the speech input system is to pick up acoustic impulses, translate them into electrical impulses of corresponding frequency and relative magnitude, amplify and convey them to the input of the radio transmitter.

The requirements imposed upon speech input equipment were simple at first. However, the radio broadcasting art expanded from the original practice of individual station broadcasting to the simultaneous operation of a number of stations as a chain. This condition, together with the increase in power of many stations, which necessitated the removal of their radio transmitters to selected outlying locations, resulted in the geographical separation of the transmitting station from the studios where the major units of speech input equipment generally are installed.

Thus, the pick-up and handling programs has become more involved and the demands made upon speech input equipment have increased to such an extent that great care must now be taken to choose apparatus which will perform satisfactorily with the least amount of maintenance and supervision. Moreover, attention must be given to probable future demands for greater flexibility. With the continual expansion of program facilities and control points of the modern broadcasting station, it is inevitable that equipment will gradually become inadequate or even obsolete. Therefore, unless foresight is exercised in the choice of initial equipment, the addition of new and more up-to-date apparatus frequently complicates the maintaining of a high grade of transmission to the radio transmitter.

The purpose of this manual is to discuss some of the problems involved in the use of speech input equipment as well as the more important considerations governing its selection.

For the sake of discussion the speech input system may be separated into five principal groups:

MICROPHONES
AMPLIFIERS
MONITORING EQUIPMENT
TERMINAL AND CONTROL EQUIPMENT
POWER SUPPLY

Microphones

Generally, the input portion of the equipment consists of MICROPHONES. Incoming programs from other sources may be utilized or an electrical transcription provided, through a phonograph reproducer and its associated turntable.

The microphone converts acoustic impulses into electrical impulses of frequency and magnitude corresponding to the original sound pressures. The electrical energy thus generated is increased by amplification until it is suitable for use in the modulator unit of a radio transmitter or for transmission over wires to the transmitter location. In order to insure a faithful electrical copy of the original sound energy high quality microphones should be employed which are responsive to the frequency components of speech and music.

Western Electric microphones are known familiarly as the carbon button microphone, the condenser microphone, and the moving coil or dynamic microphone.

Carbon Button Microphone

The carbon button microphone has a stretched metal diaphragm which is held between two carbon electrodes mounted in metal cups containing finely divided grains of carbon. The diaphragm forms an electrode which is common to both carbon buttons. This type of microphone requires a direct current source which maintains a current through each button to the diaphragm. The resistance of the carbon elements is caused to vary by the sound pressures on the diaphragm. This causes changes in the current supplied to the microphone. In the circuit in which the microphone is connected these current changes across the resistance of the carbon buttons of the microphone are reflected as minute voltages which are the electrical equivalents of the sound pressures actuating the diaphragm.

Condenser Microphone

The condenser microphone, as its name implies, includes a condenser unit which consists of a very thin duralumin diaphragm tightly stretched in front of a flat plate and spaced from it one thousandth of an inch. The functioning of this microphone depends upon the variation in the capacity between the diaphragm and the back plate when the diaphragm is subjected to sound vibrations. A potential is maintained between the plates of the microphone. As the diaphragm vibrates the capacity of the device changes and an alternating current is generated in the circuit. On account of the high impedance of this unit and its small capacity it is essential to operate it in close proximity to an amplifier and therefore the condenser microphone and an associated amplifier are built up as a single unit for suspension, desk or pedestal mounting. This type of microphone overcomes the objectionable carbon noises which are encountered with the carbon microphone.

Moving Coil Microphone

The moving coil microphone consists of a diaphragm supporting a coil of fine wire suspended in the field of a permanent magnet. The vibration of the diaphragm and its attached coil sets up voltages in the coil due to its cutting the magnetic lines of force of the magnet. On account of its simplicity and ruggedness this microphone is now being used more generally for pick-up purposes. The impedance of this type of microphone is relatively low so that it is possible to operate it at a considerable distance from the speech input amplifier or an associated amplifier, when such an amplifier is necessary.

Amplifiers

Amplifiers

Programs are amplified through several successive stages of vacuum tube amplification to a power level which is suitable for transmission over telephone circuits or into the modulating unit of the radio transmitter.

The amplifier system usually comprises a preliminary unit which is a high gain voltage amplifier and a power amplifier which serves to increase the level of the program material still further and to deliver the power through the controlling keys and networks to the radio transmitter lines and the monitoring circuits. A main control potentiometer in the amplifier circuits provides a means for varying the output of the amplifier system. In a large studio layout monitoring amplifiers may be employed as bridging amplifiers on the program line for monitoring by means of loud speakers.

Ordinarily the program to be broadcast is rehearsed before presentation to the radio audience. In this way the operators become familiar with the program material and the particular manner in which it is to be presented. The volume range of the program is of particular interest to the operators since it enables them to predetermine the approximate settings of the potentiometers and thus to maintain the power levels within the required limits. In a well designed amplifier system there is a considerable margin of output power available above that ordinarily required for the program material so that sudden and unexpected power peaks will not overload the amplifier.

Monitoring Equipment

Visual Monitoring

Visual as well as aural monitoring is provided in the speech input equipment. The device used for visual monitoring is known as a volume indicator and is available as a rectifier, with coupling transformer and attenuating networks which are key or dial controlled. This unit, designed to operate across the line, takes a small portion of the output energy of the power amplifier.

This energy is rectified and registered on a sensitive DC meter as a series of impulses corresponding to the variations of power occurring in the program material. Calibrated adjustments are provided by a key and switches to give the proper meter deflection for the required power level. In actual practice the volume indicator is adjusted for the output level required and the control potentiometers are operated to hold the program output within proper limits as shown by the indicating meter.

Aural monitoring is effected through the use of loud speakers which may be connected to the power or high level amplifier output through keys, or operated from the output of monitoring amplifiers through a distribution panel whereby the power level to the loud speakers is controlled. Monitoring amplifiers are designed as high input impedance amplifiers for bridging across the output circuit of the high level amplifier. Aural Monitoring

Terminal and Control Equipment

When a radio transmitter is situated at a distance from the studios, it is necessary to employ telephone lines for the program circuits from the studios to the transmitter location. These lines ordinarily are furnished by local telephone companies. In order that the power level transmitted will be maintained within definite limits, thereby preventing crosstalk or interference with other circuits in the same cable, and in order to provide necessary control of transmission, the speech input equipment is supplemented by amplifiers and terminating apparatus at the studio. Terminating facilities and amplifiers also are required at the radio transmitter location or receiving end for the purposes of controlling and raising the level of incoming programs.

Considered as a whole the speech input system of a modern radio broadcasting station may be thought of as a number of separately operated and controlled equipments which are associated directly with the various studios or program originating points and which operate in conjunction with a similar equipment at the radio transmitter location. Obviously, these separate equipments will vary somewhat in their makeup depending upon the local requirements. For example, the apparatus required for a midtown studio consisting of, possibly, three or four adjoining broadcasting rooms will be more complete than that required for the remote pick-up of a football game where a simple portable outfit will be employed with perhaps a single outgoing program line and an order wire or telephone circuit. On the other hand, a temporary setup for broadcasting a political convention may involve an elaborate layout of microphone circuits, mixers, etc., and a number of connecting lines to the broadcasting station. Fundamentally the electrical processes undertaken after the sound has been converted into electrical energy and the intermediate steps involved in the control

of the circuits before they reach the radio transmitter are identical so that a description of a typical speech input equipment will suffice to cover the application and the functions of the intermediate equipment.

The circuits from the microphones and the program lines terminate in jacks which are arranged in rows before the operator. Normally these circuits pass to a set of switching keys or through the contacts of key controlled relays to mixer potentiometers and to the amplifiers. The speech circuits are brought out to jacks at numerous places throughout the electrical path and these jacks are so arranged that the circuit is normally continuous and uninterrupted. For testing purposes the operator may, by plugging into the proper jacks, open the circuit at any point in its path or isolate or bridge out of circuit any part of the equipment as required. Attenuation pads or resistance networks, and transformers are provided also to reduce the power in particular parts of the circuit or to match the impedances of the circuits where this is necessary.

Ordinarily the component parts of a typical speech input equipment, with the exception of the transmitters and loud speaking receivers, are mounted on relay racks with the circuit and telephone order wire jacks assembled at a convenient location before the operator together with the potentiometers, control keys, and the volume indicator unit. The circuits through the keys or relays and the jacks are so wired that the complete control of the system is centered at this location. With the newer AC operated units this applies to the power control as well since the power switch and pilot lamp are assembled at the control position.

The selection of the incoming circuits is made through keys which in their neutral positions terminate the respective lines in resistance networks to simulate the load conditions of the transmitters or program lines. These keys likewise cut off the monitoring loud speakers in the respective transmitter locations when the transmitters are being used.

The mixer potentiometers are designed to control the power of the incoming programs and at the same time maintain a constant impedance output to the equipment which they precede. By this means it is possible to combine the outputs of several sources if desired or to select a particular program as the occasion demands.

Power Supply

While many of the speech input equipments in present use employ storage batteries for the filaments of the vacuum tubes the newer equipments are completely AC operated with self-contained rectifiers, filters and potentiometers or voltage dividers. This has been made possible

through recent developments in vacuum tube design which permit the use of AC power for the filaments as well as for the plate supply of the vacuum tubes. However, in systems which employ relay-controlled switching a low voltage DC supply is required for the operation of the relays.

Conclusion

Each of the units which goes to make up a speech input system must be capable of performing a thoroughly satisfactory and reliable function in its particular field if the best results are to be obtained. The various elements must be so chosen with relation to one another that all of the functions of the speech input system as a whole are satisfactorily and harmoniously performed. This can be brought about only by the proper choice of apparatus, not only from the point of view of its own performance but also with regard to its operation in relation to the other parts of the system.

SECTION II

DESCRIPTION
AND
SELECTION OF SPEECH INPUT EQUIPMENT

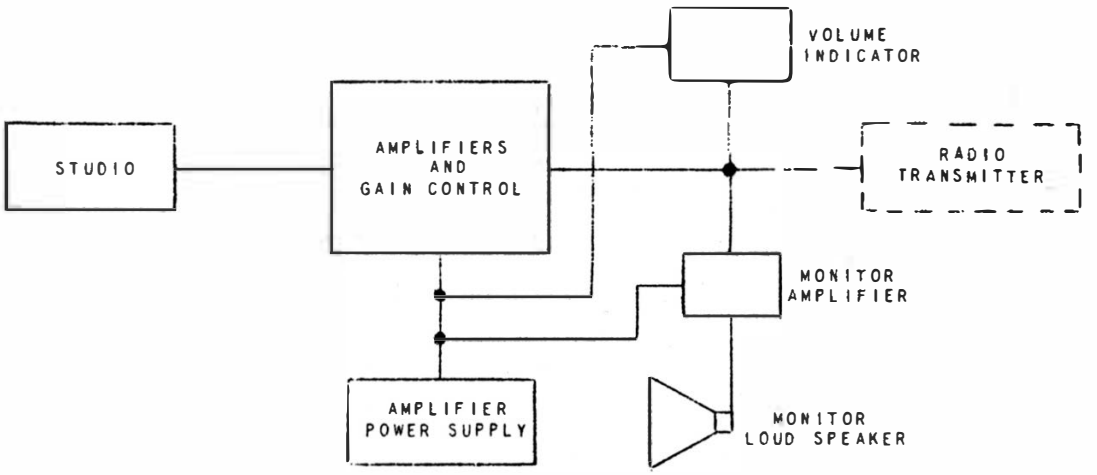
SECTION II

DESCRIPTION AND SELECTION OF SPEECH INPUT EQUIPMENT

The kind of speech input equipment employed at the several locations in the chain of operations preliminary to actual broadcasting depends primarily upon the service demands at these locations. Therefore, in order to appreciate the problems involved in the selection of proper speech input equipment, we shall discuss and illustrate briefly the two fundamental types, that is, studio equipment and station equipment, and trace their growth from the simplest system to the more intricate systems in present day broadcasting. Fundamental Types

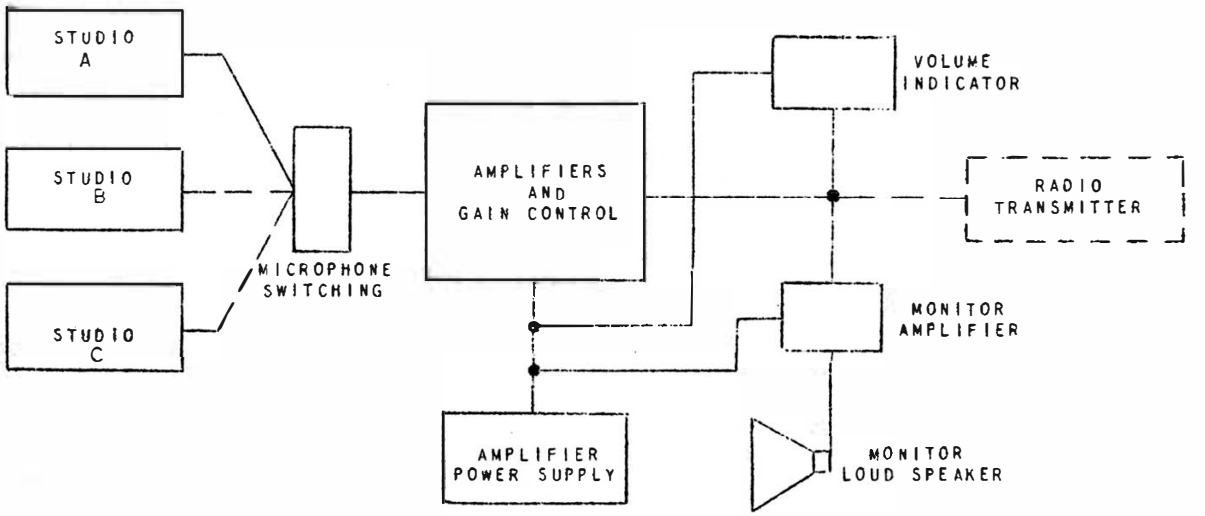
STUDIO SPEECH INPUT EQUIPMENT

The simplest broadcasting system employs a single studio which is in the same building and possibly on the same floor with the radio transmitter. Single Studio Single Channel



Since the studio and the radio transmitter are so closely associated, telephone lines are not needed for program transmission and only a minimum of speech input equipment is required. This usually is of the single channel type, that is, only one amplifier system with the necessary amplification and control to accommodate one program at a time.

A further step in a single program channel system is the addition of a second studio, or possibly two studios, to avoid confusion and delay when changing from one program to another. Two or More Studios Single Channel



The second studio can be prepared in advance and the radio artists placed in their proper positions for broadcasting as soon as the prior program is finished. Moreover, the spare studios provide settings for program rehearsals and auditions which are important phases of the station's activities.

Input Switching Facilities

With two or more studios it becomes necessary to provide microphone or input switching facilities for transferring from one studio to another without introducing objectionable switching noises. One method of doing this is by means of key controlled switches or through the contacts of relays which can be operated by keys from any convenient location. Another method is the use of mixing potentiometers. If two or more microphones are to be employed simultaneously, for the creation of background effects such as incidental music during a station announcement, the control circuit should be so designed that it is possible to combine the outputs of the several sources and to adjust the relative volumes from the microphones to create the desired overall effect. This is popularly known as "mixing." The control circuit should include a number of special potentiometers, one for each microphone or program source, which are combined in a single circuit in such a way that the impedance of the circuit is approximately constant regardless of the settings of the potentiometers. In addition, each potentiometer provides sufficient attenuation to fade out its particular program completely. By manipulating two potentiometers simultaneously one program may be faded out and another brought into service with the minimum of delay. The result is a smooth and noiseless transition from one program to another. This method is used quite extensively in preference to key switching.

Keys

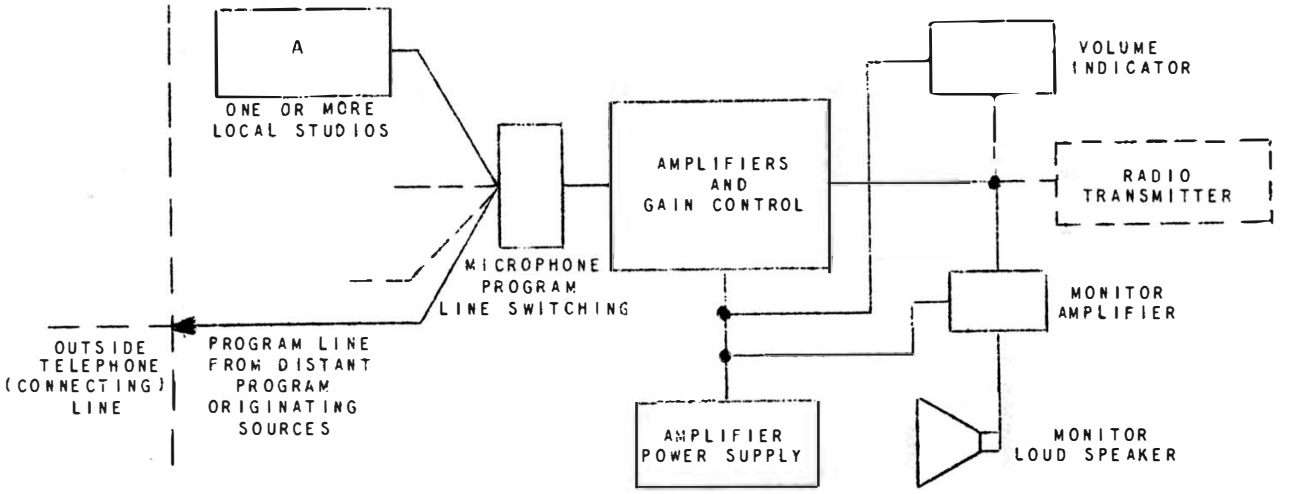
Mixing Potentiometers

Fading

The broadcasting of national events such as banquets, conventions, athletic games and races, which are beyond the normal pick-up area of the small broadcasting station may be accomplished through a program network whereby the local broadcasting station receives the program over telephone wires.

Outside Pick-up

Program Networks

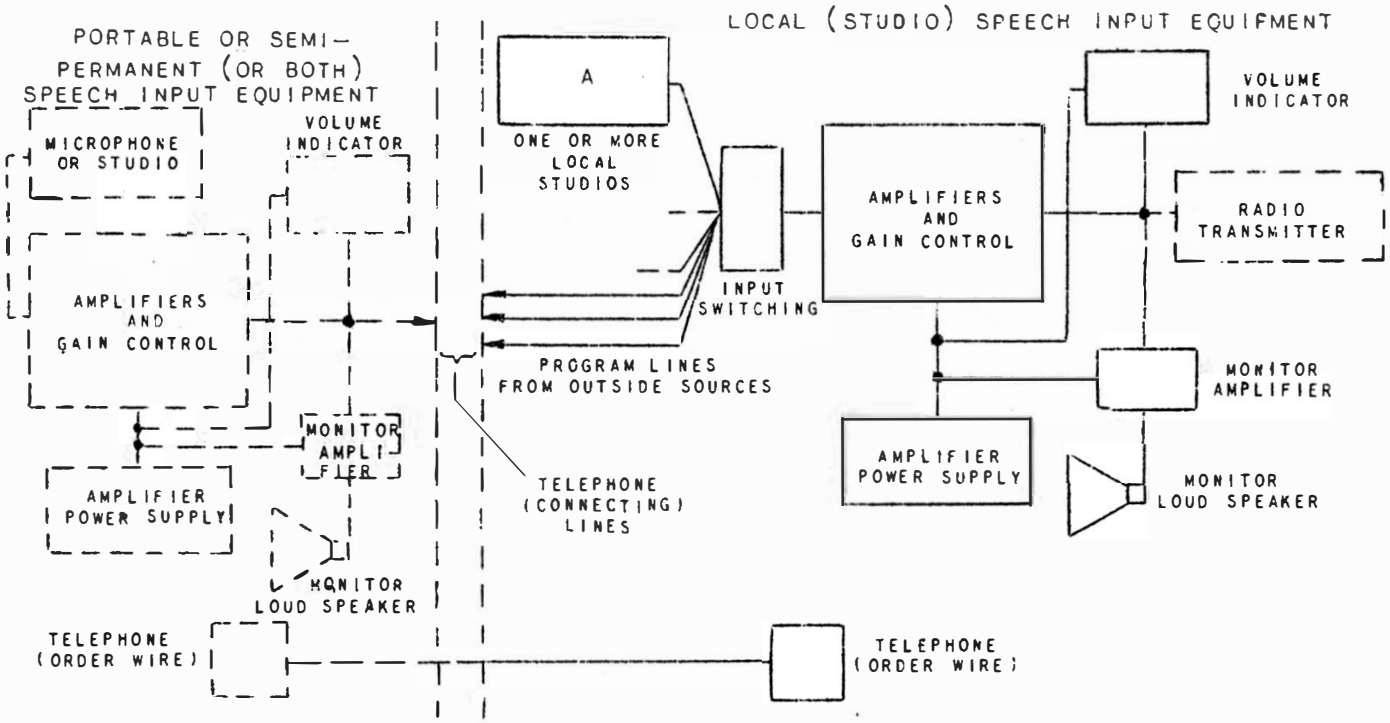


Many smaller broadcasting systems have entered into contractual relations with one or more larger stations which provide program networks for this type of service. The program thus received is amplified locally and broadcast in a manner similar to that employed with a program originating in the station's own studios.

When programs originate outside of the studios but in the immediate area of the small broadcasting station, it is necessary to have either portable pick-up equipment, or semi-permanent equipment at the pick-up point and to use telephone lines for connecting to the amplifier equipment at the station.

Portable Pick-up

The portable equipment is more suitable for outdoor events such as football games. The semi-permanent equipment is usually employed at hotels, convention halls, etc. where it will be available for frequent use. In either case, from an equipment standpoint, the fundamental requirements are the same as those of a studio: namely, one or more microphones, an amplifier unit with power supply and means for controlling and indicating the amplifier output. It is likewise necessary to provide a telephone or order wire circuit between the operators at the pick-up point and the radio station to insure coordination.



It is seen, then, that the simple, single channel broadcasting system may include several adjoining studios and one or more outside connecting program lines from either a program network or from outside program originating points in the local area. The Western Electric 9A Speech Input Equipment is an example of a speech input equipment which provides the necessary input and control circuits for the average small broadcasting system, and, in addition, is completely self-contained and AC operated. This system will be described in more detail later.

Western Electric No. 9A Speech Input Equipment

Having considered the single channel system for the condition where the main speech input equipment and the radio transmitter are situated in the same or adjoining rooms we shall next describe a two channel speech input system for the same condition and discuss its advantages over the single channel system.

Two Channel System

When the small broadcasting station has grown to the proportions outlined in the preceding pages, the next logical step in expansion is the introduction of a second, and possibly, third, amplifier channel. This is particularly desirable to accommodate such necessary operations as rehearsals and auditions.

Rehearsals and auditions are next in importance to the actual broadcasting of a program. Bearing in mind that the station's time on the air is generally contracted for, and this, of course, is the service which the radio station has for sale, it is important to prepare the broadcast schedule well in advance and to

Rehearsals

provide facilities for rehearsing programs. While the audience to which the radio broadcasting station caters generally does not appreciate the problems involved, nevertheless it does recognize and acknowledge interesting, well-presented programs. Thus, stations are encouraged to present better programs and to provide a wide variety of radio entertainment.

Rehearsals are necessary in order to acquaint the operators and the studio director with the nature of the program; the sound intensity range if an orchestra or a vocal ensemble is employed; the time required for presentation including the introduction and subsequent announcements by the station announcer, and other considerations, such as the placement of artists with relation to the microphone or microphones and the timing and coordination of cues which introduce various program features. At the same time rehearsals enable the artists to adjust themselves to the local conditions which will prevail during actual broadcasting. It is estimated that for a creditable presentation over the air, a one hour broadcast of a large and important program frequently requires as much as eight to ten hours of rehearsal.

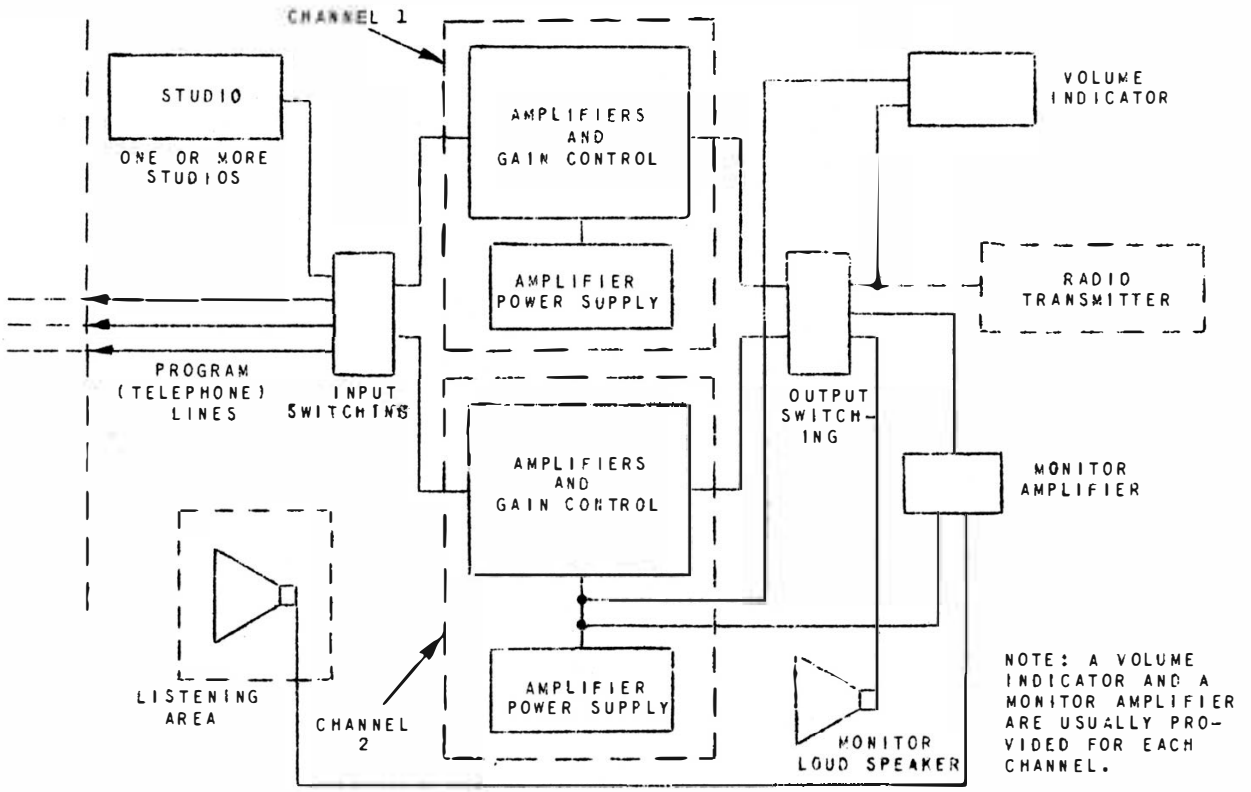
Auditions

The acquisition of new and novel talent for broadcasting purposes is another activity which must be engaged in if the station is to gain and maintain prestige in its particular field. For this reason, radio auditions have become a regularly scheduled part of many stations' activities. Moreover, auditions are an effective means of presenting a program for the approval of a prospective customer.

It is advantageous to employ microphones, amplifiers, and loud speakers for both rehearsals and auditions in order that the station operators and the program sponsors may hear the program under the same conditions which obtain in actual broadcasting, and it is for these reasons, primarily, that the small broadcasting station ultimately adds a second and possibly a third program channel to its equipment, and provides extra studios and audition rooms which may be operated simultaneously with, but independently of, the program being broadcast.

The two channel speech input system embodies two separate and distinct amplifying channels either of which may be used to supply a program to the radio transmitter.

The channels must be so designed that they may be operated simultaneously from either the same program or from entirely different programs; this latter condition prevails when a rehearsal or an audition is being held at the same time that a program is being broadcast.



Multi-Channel System

A still further development in speech input equipment is the multi-channel system employed in multi-studio broadcasting stations and in key stations. Fundamentally, a multi-channel speech input system is a combination of single channel systems, each of which may be a complete unit in itself. However, the operating problems necessarily are more complex than those of a single channel system and the signalling and intercommunicating equipment must be adequate to insure prompt and complete coordination between control points.

Multi-Studio Station

A multi-studio broadcasting station is one in which a number of complete program channels are available for simultaneous broadcasting, rehearsing, and auditions, which are necessary because of the type of programs presented and the prestige of the station. While there may be as many as six or more program channels available and in simultaneous use for the purposes outlined, usually only one channel is employed for broadcasting and quite frequently one or more of the others is held in readiness for the next scheduled broadcast.

Control Booths

The use of a control booth in immediate proximity to each studio is a distinct advantage from an operating standpoint. The operator at each of these locations is isolated acoustically from the studio as well as from the operators responsible for other simultaneous programs, and therefore may employ monitoring loud speakers to observe the program under his immediate control. The booths are provided with control turrets or tables at which the mixing potentiometers and the main input control potentiometers for the amplifiers are

located. Volume indicator extension meters are also provided to enable the operators to observe the program levels at the outputs of the line amplifiers. Further, it is possible to have in each booth the necessary amplifiers and power supply for the main program and for monitoring so that the studio and its associated booth form an integrated program production unit. A clear view of the associated studio - or studios, if one booth is used as the control position for two adjoining studios, which is an arrangement sometimes employed - is provided by sound insulated glass windows or partitions. High quality close talking microphones also may be located in the control booths to enable the operators to communicate with the studios during rehearsals and auditions: this is known as the "audition-break" feature. The circuits to the studio loud speakers pass through contacts on the microphone input control switches so that the studio loud speakers are rendered inoperative when the program microphones are in use. Telephone order wires, or connections to a suitable interphone system, are also available at the booths for coordinating purposes.

Central Control Room

A system of these proportions requires a central program trunking point for the purpose of insuring a coordinated schedule of the station's activities. A typical large broadcasting system will have a central or main control room, manned by two or more operators, as well as the individual control booths. In the main control room all the output circuits from the several booths, the program lines from outside sources, the outgoing program lines and the telephone order wire circuits terminate. The necessary amplifiers, volume indicators and output switching apparatus will be arranged for assignment either by patching cords or key-controlled relays to the several studios as the occasion demands. Any one of the available channels will be assignable at will to either a rehearsal studio or an audition studio, or to the program being broadcast at the moment from either a local studio or a program line. Announcers' microphones, telephone order wires and mixing potentiometers, as well as monitoring loud speakers if the studio control position is enclosed in a booth, will be provided at each studio. Program and operating personnel assignments will be made in advance of each day's activities and posted in bulletin form for the information of all concerned.

Arrangements of studio speech input equipment

The diagram on page 2.9 illustrates the different arrangements of studio speech input equipment ordinarily employed in multi-studio systems. While as many as two of these arrangements are sometimes employed, it would obviously lead to confusion if an attempt were made to use more than two in a single set up.

Studio A

Studio A has an adjacent booth which contains all amplifier and control apparatus. This is representative of the application of the Western Electric 701-A Speech Input Bay and is the ideal combination of a studio and booth as an integral program producing unit. No external switching or set-up operations are required in order to produce a program. Also, the observation of the program, particularly by means of a loud speaker, does not conflict acoustically or electrically with the activities in any other studio.

Studio B

Studio B has what is essentially a one channel system with the amplifying and control apparatus located in the main control room. One arrangement such as this may well be provided in a multi-studio set up with the main control room serving in effect as a control booth. Obviously, should more than one studio be on this basis in a multi-channel set-up, simultaneous operation would lead to confusion in the main control room, particularly should simultaneous loud speaker monitoring be attempted. Such an arrangement also has the limitation that ordinarily it is not practical to arrange the main control room so as to have visual observation of the associated studio or studios.

Studio C

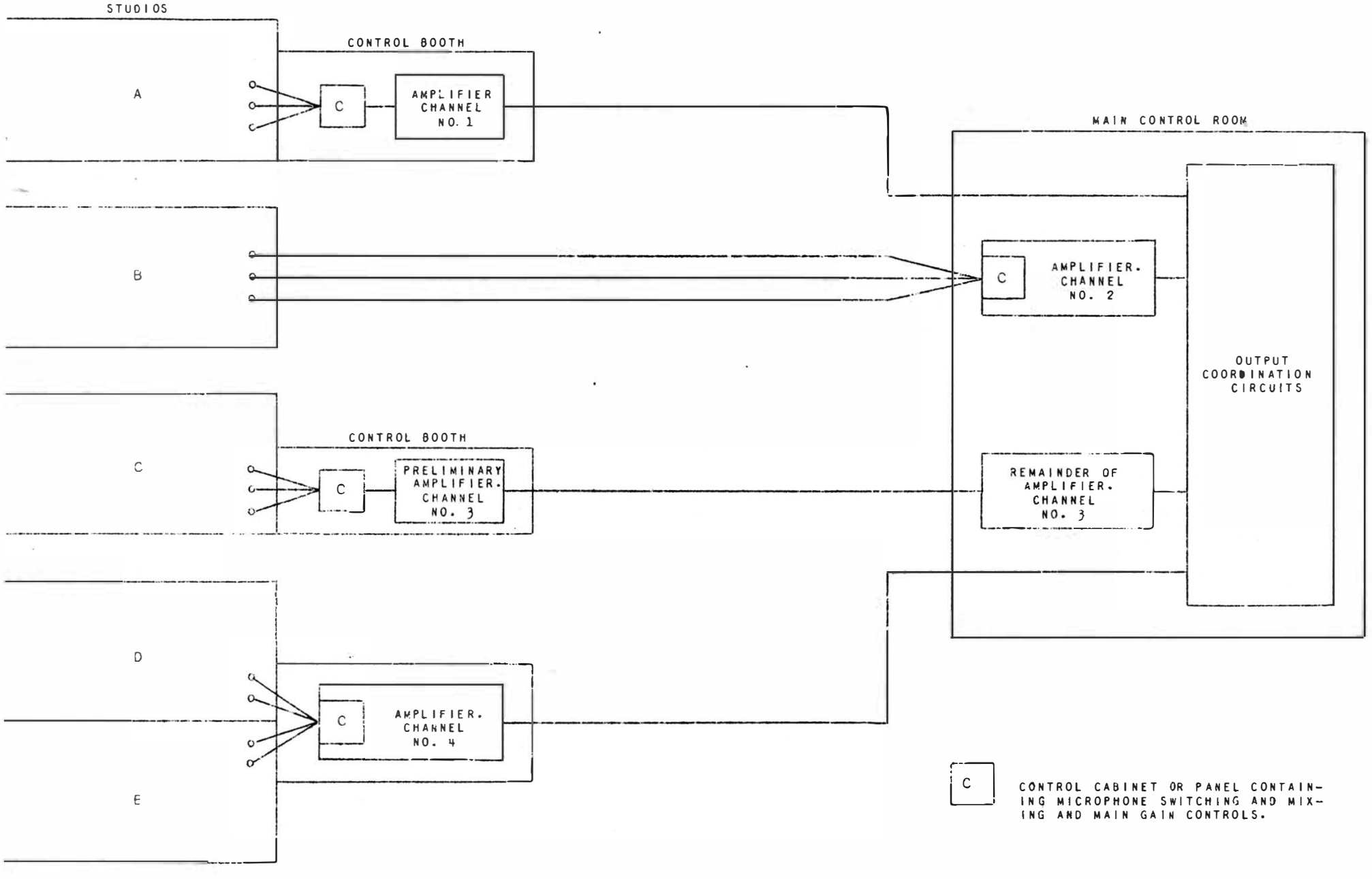
The arrangement for Studio C is fundamentally similar to that for Studio A but differs in that complete amplifying equipment is not situated in the booth. The gain controls, microphone switching facilities and some amplification are located in the booth while the remainder of the amplifying equipment is located at some central point. It has been desirable to use this arrangement in some cases to reduce the amount of apparatus in the booth and also to provide a certain amount of interchangeability by having several combinations of amplifiers located in the main control room. Further, such an arrangement has been used in the past due to the limitations in flexibility imposed by supplementary apparatus such as plate power supply rectifiers which have been common in whole or in part to several amplifier combinations. The disadvantage of this arrangement is that the studio and control booth are not a completely self-contained program unit.

Studios D & E

Studios D and E are an adaptation of the arrangement for Studio A where, due to limited floor space or economic necessity, one booth serves two studios. Except for the limitation that only one studio can be used at one time the advantages and equipment considerations are the same.

Key Stations

On the other hand, a key station, strictly speaking, is a program center from which the same or totally different programs may be sent simultaneously in several directions to a number of separate broadcasting stations or to one or more program networks which serve a chain of stations.


STUDIOS
A
B
C
D
E
CONTROL BOOTH
C
AMPLIFIER CHANNEL NO. 1
CONTROL BOOTH
C
PRELIMINARY AMPLIFIER. CHANNEL NO. 3
C
AMPLIFIER. CHANNEL NO. 4
MAIN CONTROL ROOM
C
AMPLIFIER. CHANNEL NO. 2
REMAINDER OF AMPLIFIER. CHANNEL NO. 3
OUTPUT COORDINATION CIRCUITS
C
CONTROL CABINET OR PANEL CONTAINING MICROPHONE SWITCHING AND MIXING AND MAIN GAIN CONTROLS.

STATION SPEECH INPUT EQUIPMENT

The primary purpose of a radio broadcasting system is to reach as large an audience as possible and through the excellence of its programs to hold the attention of the radio listeners. When this is accomplished, the commercial interests which sponsor the programs, and from which the majority of broadcasting systems receive their compensation, are assured of a better return for the costs of the programs; in other words, radio broadcasting becomes an attractive advertising medium, which benefits both the leasor of time and the broadcasting system. The power of radio transmitters has been increased from time to time as one method of attaining these ends. Starting with a modest 100 or possible 500 watt radio transmitter, the power has been increased to 1000 watts, 50,000 watts, and higher. As a result the removal of the transmitter proper to a selected outlying point away from the congested areas of population has been necessary in a great many instances. Another reason for the separation of the studios and the radio transmitter is the interference problem created when a number of high powered stations operate in the same small area.

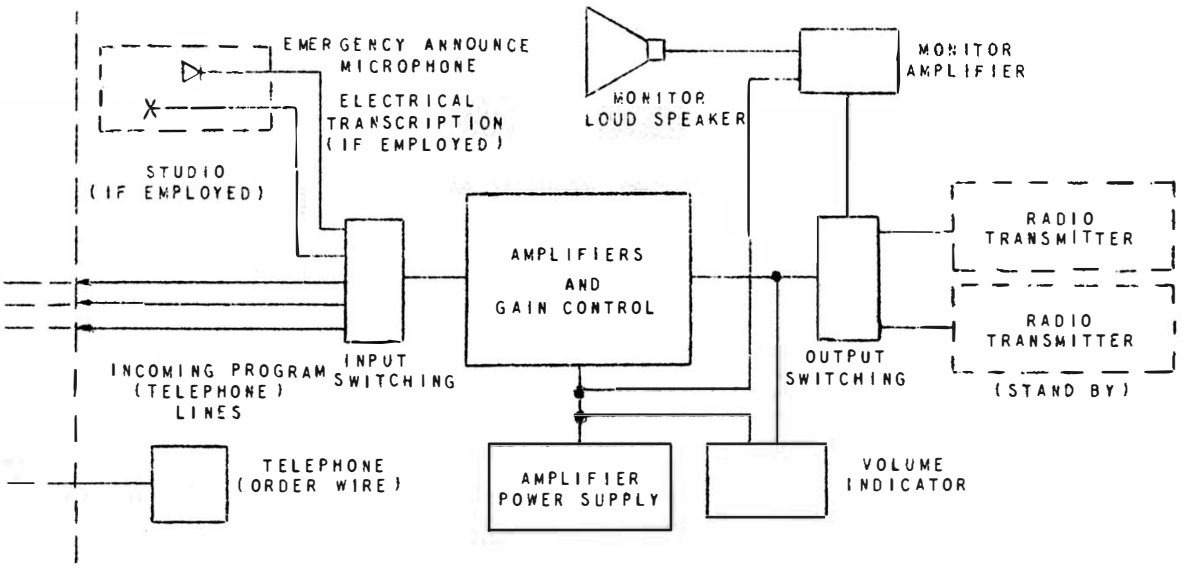
Separation of Station and Studios

Leased telephone circuits, often in cables, are employed for program transmission from the studios to the radio transmitter location. While the distance which separates the studios and the transmitter generally is not more than 20 miles, and therefore not a serious problem from a transmission standpoint, the program energy level entering the line at the studio end of the circuit must be kept low enough to prevent introducing cross-talk into other circuits in the same cable. As a result, reamplification is required at the transmitter location. Furthermore, it is necessary to provide loud speaker monitoring and a volume indicator as well as amplification controls, switching, and means of emergency announcing, at the transmitter station. Therefore, the speech input equipment of many modern broadcasting systems may be composed of a series of separate equipments situated at the studios, at remote pick-up points and also at the radio transmitting station. This leads to a consideration of the second fundamental type of speech input equipment, which is called Station Speech Input Equipment, for use where the radio transmitter is located at a point remote from the studios.

Telephone Lines

Station speech input equipment consists of a switching unit for selecting incoming program circuits, an amplifier system which may be generally similar to that employed at the studios and output control circuits leading to the radio transmitter and to a standby transmitter if one is employed.

Station Speech Input



Usually the amplifier equipment is of the single channel type taking its program from one of several program circuits leading into the station. Circuit flexibility is unimportant since the station is usually directly associated with its studios by means of a telephone circuit. However, some means must be provided at the station for emergency announcements and, possibly, electrical transcriptions to serve as an emergency program. It also is necessary to provide adequate telephone order wire facilities between the station and the studios. The Western Electric 15A Speech Input Equipment which will be described later is an example of a station equipment which includes all the necessary speech input facilities for complete service at the radio transmitter which is situated at a distance from the studios.

Western Electric No. 15A Speech Input Equipment

WIRE LINE TRANSMISSION

Modern radio broadcasting has come to rely more and more upon the electrical transmission of program material over telephone wires. The reasons for this are apparent when the broad scope of activities associated with broadcasting are considered. The use of leased telephone circuits imposes certain restrictions upon the amplified programs the most important of which is the power level of the program material entering the circuits. It is not possible - however desirable it may seem from a noise standpoint - to transmit the full energy level of the amplifiers over the telephone cable circuits to the radio transmitter location, or from a remote pick-up point to the central studios, because of the interference or crosstalk which would result in other circuits in the same cables. It is necessary therefore to hold the energy levels below definite prescribed values and to provide some recognized means of measuring the energy levels at the entrance to a cable circuit. This is accomplished through the use of volume indicators which are necessary parts of all speech input equipments.

The program energy is attenuated or weakened in its transmission over wires and distorted from its true form to an extent which is dependent upon the length of the connecting lines. For all cable circuits over a few miles in length it becomes necessary to introduce equalization or compensation for the unequal transmission of the various components of the program material. This introduces further attenuation so that the program ultimately received at the distant end of the circuit requires reamplification before it is suitable for use with the radio transmitter.

WHAT TO EXPECT OF A WELL-DESIGNED SYSTEM

From the time that sound or acoustic energy is translated into electrical energy by the microphone, it is subject to a series of electrical operations, such as preliminary amplification, mixing or combining of outputs from several sources, switching, power amplification, transmission over telephone lines, equalization, and reamplification. In all these operations, the frequencies and relative intensity of the original sound must be carefully retained in order that the ultimate result, when reconverted into sound, may be a faithful representation of the original sound. This requires electrical equipment of the best type capable of passing and amplifying, without distortion, a true electrical pattern of the original sound as created in the microphones. The introduction of extraneous sounds caused by faulty or imperfect switching, mixing, or gain control potentiometers should be avoided; also the accumulated power noises from the amplifiers and the transmission lines must be carefully guarded against by the selection of high power amplifiers with a low distortion factor and a negligible noise level.

Overall Fideility

High Signal to Noise Ratio

There should be sufficient circuit and control flexibility to permit interchange of amplifiers and control units from one channel to another in an emergency. Proper monitoring facilities should be provided in the form of visual and aural indication of program output.

Monitoring

In order to improve the overall dependability of the equipment and eliminate the trouble and expense of battery maintenance, the equipment should be entirely operated from AC lines. The question of power supply is an important one, especially in multi-channel systems in which a large number of amplifying and control units are involved. However, in the modern self-contained speech input equipment with AC power supply separately fused at each equipment assembly, the question of power supply becomes relatively simple and additions to the speech input system which may be necessary to meet increasing service demands are greatly facilitated.

Power Supply

Expansion

Aside from these electrical requirements, the equipment should be so designed mechanically that it may be easily operated and maintained. Unit assembly of major apparatus components, such as amplifiers, volume indicators, mixing and gain control potentiometers, etc., wired and tested in the factory, results in low apparatus costs and low installation and maintenance costs. The employment of standard apparatus reduces engineering and system costs and facilitates the addition of new apparatus when required. The equipment should occupy a minimum floor space and be attractively designed so as to harmonize with its surroundings.

Unit Assembly

SURVEY OF PROPOSED INSTALLATION

The information given in the preceding pages of necessity is of a general nature and, therefore, since the requirements of individual installations vary considerably, it is felt that the following survey will prove a valuable aid to prospective purchasers of speech input equipment in making an analysis of their needs.

SPEECH INPUT EQUIPMENT

SURVEY OF PROPOSED INSTALLATION

FOR_____

I General

(a) Location of proposed installation -

(b) Type of building construction -

(c) Is radio transmitter to be in same location or at a distance?

(d) What power supply is available? Voltage (and frequency if a.c.)

(e) Date when installation can start -

(f) Date completion is desired -

(g) Date of promised apparatus delivery, if any -

II Operating Schedule (Probable)

(a) Local Programs _____ Hours per day

(b) Chain Programs _____ " " "

(c) Auditions _____ " " "

(d) Rehearsals _____ " " "

(e) Total Operating Schedule _____ " " "

III Studios and Transmitters

(a) How many studios are planned?

(b) What acoustic treatment will be applied?

(c) How many transmitters are to be used in each studio?

(d) How many transmitter outlets are to be provided in each studio?

(e) What type of transmitter is to be used?

IV Studio Control

(a) To what points will interphone connections be desired?

(b) Are individual control booths adjacent to the studios to be used?

(c) Is a control desk to be used in the main control room?

(d) From what points will transmitter circuits be switched?

(1) From main control room.

(2) From studios (or control booths adjacent thereto).

(e) From what point will volume be controlled?

(f) What switching control will be given to announcer?

(1) Complete control of switching

(2) Control of functional groups of transmitters

(3) No control

(g) Are any special features of control desired which are not covered by the above questions?

V Outside Lines

(a) How many program lines are to be provided from outside pick-up points?

(b) From how many of these points will there be three lines (order wire, program and emergency)?

(c) From how many of these points will there be two lines (order wire and program)

(d) Will more than one program be sent out from these studios at the same time?

(e) To what points will these programs be sent?

(f) How many lines will be provided to each point?

VI Amplifiers and Mixers

(a) How many mixer channels are to be provided?

(b) In how many separate groups will these be arranged?

(c) How are the mixer channels to be divided between these groups?

(d) How many amplifier channels are to be provided?

(e) Will rehearsals take place while broadcasting is in progress?

(f) Will auditions take place while broadcasting is in progress?

VII Monitoring Equipment

(a) How many programs will be monitored simultaneously?

(b) Is a radio receiver to be used for monitoring on the transmitter?

(c) How many loud speaking telephones are desired for monitoring and other purposes?

(d) Where are these to be located?

(e) Will these loud speaking telephones all operate on the same program?

(f) If not, explain the distribution of the programs to the various loud speaking telephones.

VIII Possible Sources of Noise

(a) Electrical Induction.

(b) Building and street vibration.

(c) Building and street noise.

IX Studio Layout

Attach a floor plan (an architect's drawing, if it can be secured) showing the layout of the studios and control room. Indicate thereon: The approximate location desired for transmitter outlets; space available for apparatus racks, batteries and charging equipment; ceiling heights; wall space available for terminal boxes and positions of ventilating ducts, conduit, windows and elevators.

X Previous Recommendations

(a) Have any equipment recommendations been made for this installation?

(b) What equipment was recommended?

(c) By whom were these recommendations made?

XI General Notes

Information not listed above but pertinent or of interest to the particular installation.

SECTION III

TYPICAL APPLICATIONS

SECTION III

TYPICAL APPLICATIONS

This section contains suggestions and typical lists of apparatus for use in single channel, multi-channel and key stations.

Monitoring loud speakers are not included in the equipment listed for the several types of installations because the requirements will vary widely as to the number, types and mountings of these units. The use of high quality speakers, preferably of the dynamic or moving coil type is recommended for the best results in monitoring. Loud speakers other than the dynamic type may be used if the particular requirements warrant, provided they can be satisfactorily coordinated with the other parts of the system. The No. 701A Speech Input Bay is designed for use with dynamic type loud speakers having 1000 ohms input transformers.

Each amplifier channel (No. 701A Speech Input Bay) requires approximately 1.5 amperes direct current at 12 volts potential for the operation of the relays, signals and the telephone panel. The 12-volt DC. source for this purpose is not provided with the equipment since this is usually obtainable locally either in the form of storage batteries or rectifiers. A single 12-volt DC. source of the proper current capacity may be employed for the common supply to all the equipment in cases where several amplifier channels are employed.

A 20-cycle power supply is required for signalling from the order wire panel of the No. 702A Speech Input Bay over the connecting telephone lines to the distant operating points. This can probably be obtained from the local operating telephone company or otherwise provided as desired. If the 20-cycle ringing voltage is not available signalling may still be effected through the hand-operated generator of the telephone panel.

The equipment specified for the several types of installations is normally operated without patching cords, the various circuits being continuous through the jack contacts. However, it is advisable to provide a supply of patching cords for testing purposes and for interchange of program and order wire circuits and emergency interchange of line and monitoring amplifiers as these occasions arise.

SINGLE CHANNEL STATIONS

Figure I shows a typical studio system utilizing the 701A and 702A Speech Input Bays which include facilities for handling local studio programs as well as programs from external sources.

Three optional arrangements of the microphone circuits are shown, any one of which may be employed to meet the requirements of a single channel system. The first shows three of the five available microphone circuits in the local studio with the fourth used for an announcer's microphone in the control booth. The fifth input channel is employed for program circuits originating outside the studio. In the second arrangement the control panel is connected for an audition-break microphone which is at the disposal of the control operator for direct contact with the studio during rehearsals. The third arrangement, in which all input circuits are assigned to local studio microphones, is applicable to single channel systems employing two adjacent studios with a common control booth.

The 701A Bay does not contain terminating facilities for incoming programs originating outside the studio. These facilities are provided in the 702A Bay, shown in the main control room in the diagram in Figure I, and include provisions for handling the incoming program circuits and telephone order wire lines from outside program points as well as the outgoing circuit from the local amplifier channel.

Complete coordination is effected between the dispatching operator in the main control room and the studio operator in the control booth through dual control circuits and signal lights at their respective positions. The dispatcher ordinarily has primary control of the studio system output and may, at his discretion, disconnect the studio channel.

The equipment has been designed with extreme flexibility of application in mind. The particular combinations of microphone circuits and fundamental equipment units shown are presented simply to illustrate some of the circuit capabilities of the equipment and do not exclude other combinations to meet the requirements of a particular installation. For example, when a single channel system depends mainly upon programs originating outside of its own studio, a suitable arrangement would be to combine the main control room equipment and the booth equipment in one room adjacent to the studio so that one operator can handle the entire system unless the addition of one or more studios at a later date is contemplated, in which event the provision of a booth initially is highly desirable. Another feature not illustrated here, but entirely practicable, is the combination in a single studio bay of the announce microphone and audition-break microphone features.

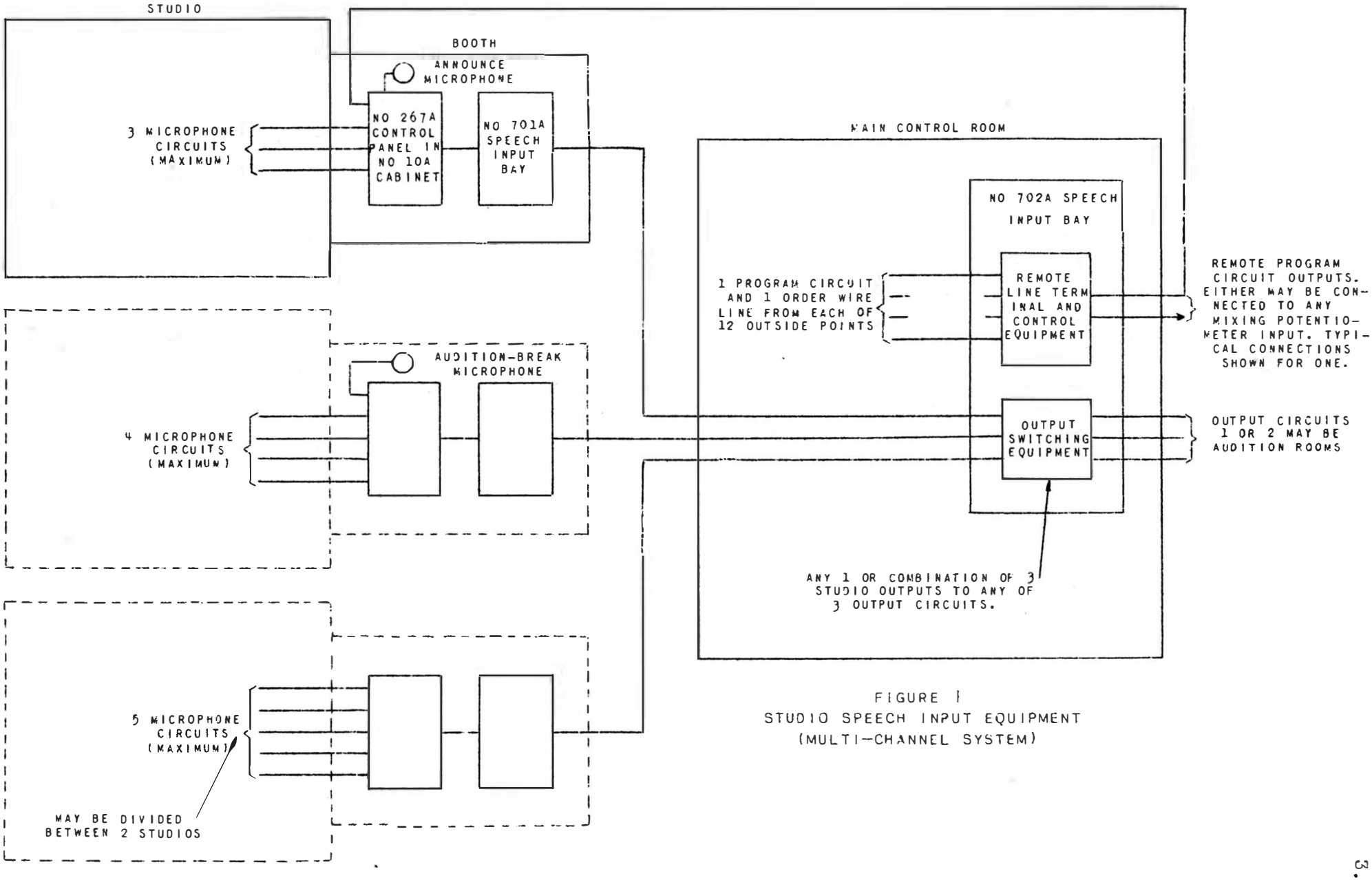


FIGURE 1
STUDIO SPEECH INPUT EQUIPMENT
(MULTI-CHANNEL SYSTEM)

TYPICAL APPARATUS LISTS

The following apparatus lists are typical of the equipment required for the several types of installations specified. These lists may, of course be modified or expanded to include additional equipment, depending upon the particular requirements of the installation.

EQUIPMENT FOR ONE-CHANNEL STUDIO SYSTEM

1 - 701A Speech Input Bay - specify whether for 60- or 50-cycle AC. operation
1 - 267A Control Panel)
1 - 10A Cabinet)or
1 - 267B Control Panel - mounts in 701A Speech Input Bay
4 - 271A Vacuum Tubes
5 - 262A Vacuum Tubes
1 - 247A Vacuum Tube
1 - 6 Ampere Clearsite Plug Fuse, or the equivalent
1 - Extension Volume Indicator Meter consisting of
    1 - 12A Cabinet
    1 - KS-7497 Meter
    1 - M2CC Cord
    for use at operator's control position - if 267B Control Panel is used extension volume indicator meter may be omitted.
    618A (dynamic) Transmitters)
    Transmitter Mountings)
    Transmitter Cords) as required
    Transmitter Plugs)
    Transmitter Jacks)
1 - 702A Speech Input Bay
1 - 206A Hand Telephone Set

Spare Vacuum Tubes and Fuses

4 - 271A Vacuum Tubes
5 - 262A Vacuum Tubes
1 - 274A Vacuum Tube
1 - 6 Ampere Clearsite Plug Fuse, or the equivalent

Optional Equipment

P2AA Patching Cords each equipped with two plugs - specify the number required and the lengths and colors of cords, also the colors of the plugs. Cords are obtainable in white, red, green and black colors and 1-, 2-, 3-, 4-, and 6-foot lengths as specified. Plugs are obtainable in black (241A) and red (241B) shells.
2 - Graybar 6044C-4 Interphones
1 - Operator's Telephone Set consisting of
    1 - 528 Receiver
    1 - 396A Transmitter
    1 - L4F Cord with 289A Plug
    1 - 3A Transmitter Attachment

Optional Equipment

P2AA Patching Cords each equipped with two plugs - specify the number required and the lengths and colors of cords, also the colors of the plugs. Cords are obtainable in white, red, green and black colors and 1-, 2-, 3-, 4-, and 6-foot lengths as specified. Plugs are obtainable in black (241A) and red (241B) shells.

3 - Graybar 6044C-4 Interphones
1 - Operator's Telephone Set consisting of
    1 - 528 Receiver
    1 - 396A Transmitter
    1 - L4F Cord with 289A Plug
    1 - 3A Transmitter Attachment

EQUIPMENT FOR THREE-CHANNEL STUDIO SYSTEM

3 - 701A Speech Input Bays - specify whether for 60- or 50-cycle AC. operation
3 - 267A Control Panels) or
3 - 10A Cabinets)
3 - 267B Control Panels - mount in 701A Speech Input Bays
12 - 271A Vacuum Tubes
15 - 262A Vacuum Tubes
3 - 274A Vacuum Tubes
3 - 6-Ampere Clearsite Plug Fuses, or the equivalents.
3 - Extension Volume Indicator Meters each consisting of
    1 - 12A Cabinet
    1 - KS-7497 Meter
    1 - M2CC Cord
    for use at operator's control positions - if 267B Control Panels are used extension volume indicator meters may be omitted.

- 618A (dynamic) Transmitters)
  Transmitter Mountings)
  Transmitter Cords) as required
  Transmitter Plugs)
  Transmitter Jacks)
1 - 702A Speech Input Bay
1 - 206A Hand Telephone Set

Spare Vacuum Tubes and Fuses

12 - 271A Vacuum Tubes
15 - 262A Vacuum Tubes
3 - 274A Vacuum Tubes
3 - 6-A Ampere Clearsite Plug Fuses, or the equivalents

Optional Equipment

P2AA Patching Cords each equipped with two plugs - specify the number required and the lengths and colors of cords, also the colors of the plugs. Cords are obtainable in white, red, green and black colors and 1-, 2-, 3-, 4-, and 6-foot lengths as specified. Plugs are obtainable in black (241A) and red (241B) shells.

4 - Graybar 6044C-4 Interphones
1 - Operator's Telephone Set consisting of
    1 - 528 Receiver
    1 - 396A Transmitter
    1 - L4F Cord with 289A Plug
    1 - 3A Transmitter Attachment

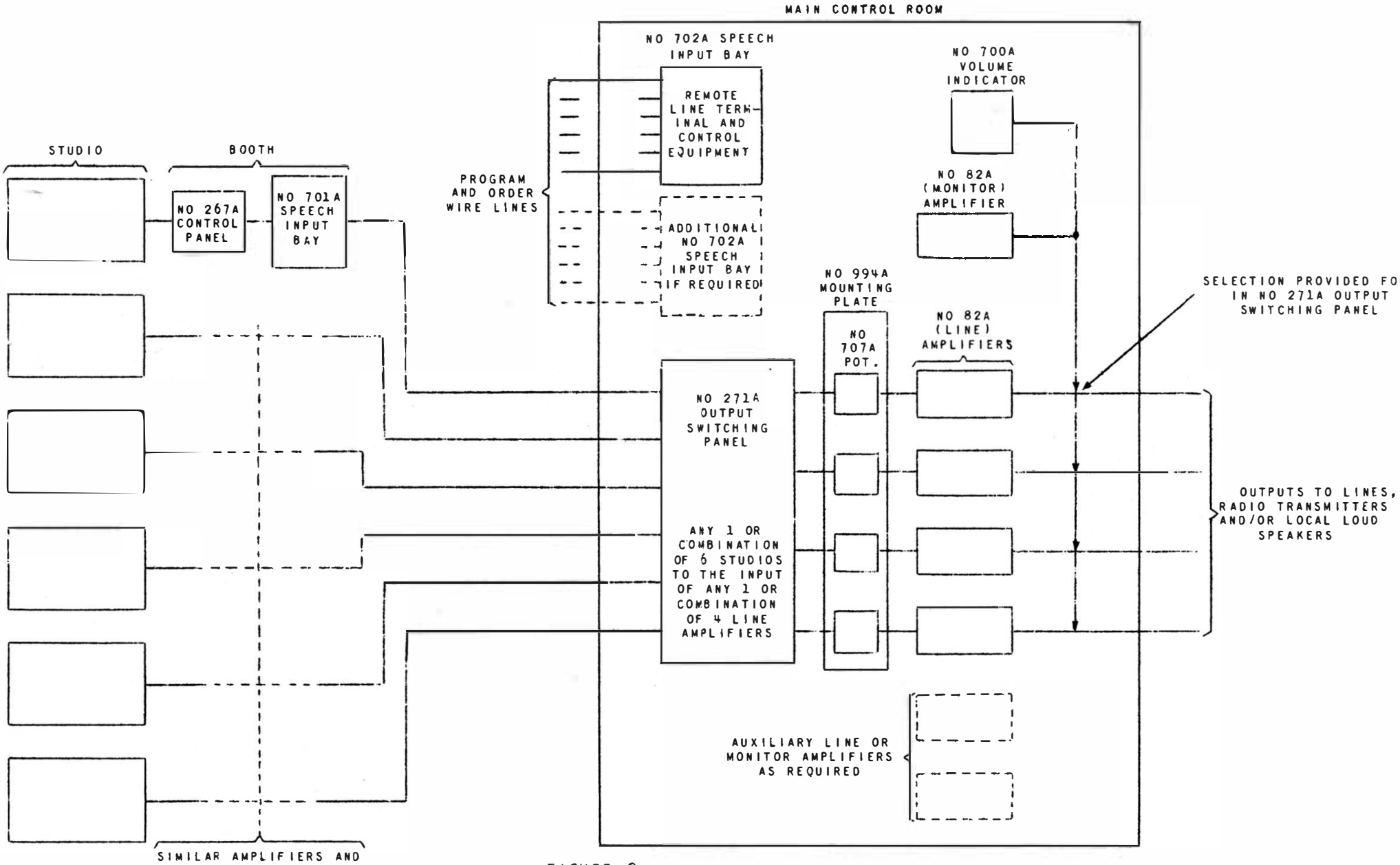


FIGURE 2
STUDIO SPEECH INPUT EQUIPMENT
(KEY STATION EQUIPMENT)

KEY STATIONS

Figure II illustrates a typical key station system. The service demands upon a system of this type are subject to wide variations from day to day and frequently from one program to the next. This is especially true during evening broadcasts when expensive and elaborate programs feature popular artists and entertainers. In order to assure prompt and efficient service the key station must be equipped with facilities for the preassignment of amplifier channels and outgoing programs in advance of the scheduled presentation so that programs will be delivered to their respective destinations exactly at designated time. Furthermore, arrangements must be made to operate several program network groups and the lines to local radio transmitters, if these are used independently of one another, so that unforeseen transmission difficulties in one group cannot cripple the entire program schedule.

The key station system shown in the diagram on page 9 contains a 271A output switching panel which accommodates six amplifier channels and four outgoing program circuits. Provision is made for the selection of any four of the six amplifier channels; in addition duplicate selector keys are included to permit preselection of the amplifier channels for the program circuit arrangements which are scheduled to follow. Each of the four circuits from the output switching panel includes a line amplifier and associated gain control potentiometer which enables the dispatching operator to control the energy levels. A master selector switch in the output switching panel controls the output of the selected studio amplifier channels through contacts which operate the output relays of the respective channels. A monitoring switch, also in the output switching panel, provides means for connecting a monitoring amplifier and/or a volume indicator across any one of the four-line amplifier circuits (outgoing) for either aural or visual monitoring or both if required. The provision of more than one of these panels in suitable combination with the remainder of the equipment makes possible the switching of more than six studio channels or more than four outgoing circuits or both.

The standard No. 702A Speech Input Bay furnishes accommodations for incoming program circuits from other sources and telephone order wire lines in the same manner described in connection with the single and multi-channel systems. Furthermore, the No. 270A Output Switching Panel in this assembly can be utilized with three additional amplifier channels for local rehearsal and audition activities if desired, or operated in conjunction with the selective output switching panel (No. 271A) for particular purposes such as combining or mixing three amplifier channel outputs.

The No. 271A Output Switching Panel and the associated equipment such as line amplifiers and auxiliary line or monitoring amplifiers together with the necessary power supply rectifiers and transformers are not available in standard equipment assemblies but may be purchased separately and added to the existing equipment as the particular conditions may require.

It can be readily seen that a speech input system of these proportions may involve numerous circuit combinations depending upon the extent of the services required and the frequent peak loads which must be handled upon special occasions. For example, if the traffic demands require it a second complete No. 702A Speech Input Bay may be installed for handling additional remote incoming program circuits and telephone order wires, and providing dispatching facilities for three additional amplifier channels; or if all of this equipment is not required, additional units such as No. 272A Program Line Panels for the incoming program circuits and No. 268A Order Wire Panels for order wire lines may be purchased and combined with the existing equipment for the particular requirements of the system. Additional No. 271A Output Switching Panels may be obtained also together with line amplifiers and other standard equipment units to provide dispatching facilities for twelve amplifier channels if necessary. If two output switching panels are used as separate units a preselection of amplifier channels for assignment to program lines and line amplifiers is, of course, obtainable in each group of six connecting channels. With this arrangement eight outgoing program circuits to line amplifiers are available. Furthermore, it is possible to combine two output switching panels as a single dispatching unit between twelve amplifier channels and four outgoing trunks to line amplifiers with preselection of any four of the twelve channels for the next scheduled broadcast. This requires only slight modifications in one of the panels, which can be made when the equipment is being installed. With this arrangement the master switches of the two panels would be operated simultaneously as a single master switch.

The circuit design of a key station system should be such that a maximum of circuit flexibility is obtainable and patching cords may be employed freely for interchange and transfer of amplifiers to obtain the particular circuit combination desired. If the circuit requirements in a particular case are sufficiently well defined it is possible to obtain factory wired and assembled units. This simplifies the installation of the equipment. Furthermore, the use of standard apparatus and standard accessories such as jack mountings, mounting plates for repeating coils, potentiometers, terminal strips, etc. will result in reduced engineering costs for specific installations.

EQUIPMENT FOR SIX-CHANNEL (KEY STATION) STUDIO SYSTEM

6 - 701A Speech Input Bays - specify whether for 60- or 50-cycle AC. operation
6 - 267A Control Panels) or
6 - 10A Cabinets)
6 - 267B Control Panels - mount in 701A Speech Input Bays
24 - 271A Vacuum Tubes
30 - 262A Vacuum Tubes
6 - 274A Vacuum Tubes
6 - 6-Ampere Clearsite Plug Fuses, or the equivalents
6 - Extension Volume Indicator Meters each consisting of
    1 - 12A Cabinet
    1 - KS-7497 Meter
    1 - M2CC Cord
    for use at operator's control positions - if 267B Control Panels are used extension volume indicator meters may be omitted

- 618A (dynamic Transmitters)
  Transmitter Cords)
  Transmitter Plugs) as required
  Transmitter Jacks)

1 - 702A Speech Input Bay
1 - 206A Hand Telephone Set
1 - Speech Input Bay (Line Amplifier Bay) consisting of
  1 - 993A Mounting Plate equipped with
    6 - 119B Repeating Coils
  1 - 262A Meter Panel
  2 - 82A Amplifiers
  1 - 700A Volume Indicator
  1 - 271A Output Switching Panel
  1 - 994A Mounting Plate equipped with 2 - 707A Potentiometers
  1 - 219A Jack Mounting equipped with
    72 - 218A Jacks in positions 1-72; 24 are spares
  1 - 992A Mounting Plate equipped with
    5 - 700A Terminal Strips in positions 2, 4, 6, 8, 10
  1 - 7" Mounting Space to be covered by blank mounting plate and mat
  1 - 8A Rectifier
  1 - 263 Type Voltage Regulator Panel - specify whether 60- or 50-cycle AC. operation
  4 - 271A Vacuum Tubes
  3 - 262A Vacuum Tubes
  1 - 274A Vacuum Tube
  1 - 6-Ampere Clearsite Plug Fuse, or the equivalent

1 - Speech Input Bay (Auxiliary Line Amplifier Bay) consisting of:

  1 - 5-1/4" Mounting Space to be covered by blank mounting plate and mat
  1 - 262A Meter Panel
  4 - 82A Amplifiers
  1 - 993B Mounting Plate equipped with
    1 - 135B Repeating Coil in position 8
  1 - 994A Mounting Plate equipped with
    4 - 707A Potentiometers
  1 - 219A Jack Mounting equipped with
    48 - 218A Jacks in positions1-48 and 48 apparatus blanks in positions 49-96
  1 - 992A Mounting Plate equipped with
    4 - 700A Terminal Strips in Positions 4, 5, 6, 7
  2 - 8A Rectifiers
  1 - 264 Type Voltage Regulator Panel - specify whether 60- or 50-cycle AC. operation
  8 - 271A Vacuum Tubes
  4 - 262A Vacuum Tubes
  2 - 274A Vacuum Tubes
  2 - 6-Ampere Clearsite Plug Fuses, or the equivalents

Spare Vacuum Tubes and Fuses

36 - 271A Vacuum Tubes
37 - 262A Vacuum Tubes
9 - 274A Vacuum Tubes
9 - 6- Ampere Clearsite Plug Fuses, or the equivalents

Optional Equipment

P2AA Patching Cords each equipped with two plugs - specify the number required and the lengths and colors of cords, also the colors of the plugs. Cords are obtainable in white, red, green and black colors and 1-, 2-, 3-, 4-, and 6-foot lengths as specified. Plugs are obtainable in black (241A) and red (241B) shells.

7 - Graybar 6044C-8 Interphones
1 - Operator's Telephone Set consisting of
1 - 528 Receiver
1 - 396A Transmitter
1 - L4F Cord with 289A Plug
1 - 3A Transmitter Attachment

SECTION IV

WESTERN ELECTRIC

SPEECH INPUT SYSTEMS

WESTERN ELECTRIC 701A SPEECH INPUT BAY

The No. 701A Speech Input Bay is a standard factory-wired and tested equipment assembly for one studio amplifier channel. It is designed specifically for use with a 267 Type Control Panel which is the operating and control unit for a single channel system. The control panel is not part of the standard assembly, and must be furnished separately. In combination with a control panel the 701A Speech Input Bay provides the necessary amplifiers and circuit facilities for operation as an independent program production unit which is applicable to single channel speech input systems and also to multi-channel systems and key stations. Its principal features are as follows:

Unit assembly of amplifiers, volume indicator and power supply rectifiers and filters for operation from 60-cycle, 105-125 volt AC power supply. Obtainable also upon order for operation from 50-cycle AC power.

Relay operated control circuits for remote control from 267A Control Panel (located in 10A Cabinet) at studio control booth.

Provisions for adding 267B Control Panel to cabinet assembly for local control if this arrangement is preferred. Interconnections between control panel in the assembly and other units may be completed upon order before shipment from the factory or made in the field at the time of installation.

Accommodations for five dynamic (30-ohm) microphones or other 30-ohm inputs. These may be arranged for:-

Straight five-microphone channel mixing or

Four-microphone channel mixing with an audition-break circuit whereby booth operator may use the fifth microphone for talk-back purposes to the studio during rehearsals and auditions.

Interchangeable line and monitoring amplifiers independently operated and controlled.

Compact mechanical design in single equipment cabinet. Rear door equipped with a locking device and a door safety switch which cuts off power supply when door is opened. Removable writing shelf is attached to front of equipment cabinet.

A 12-volt DC power supply capable of furnishing 1.5 amperes current is required for the operation of the circuit control relays and signals. This is not furnished with the bay assembly and must be provided separately.

The 267 Type Control Panel in association with the 266A Relay Panel furnishes complete control of the input circuits and the output circuit of the studio amplifier channel. A description of these panels is given in the respective data sheets in Section V.

Means are provided for monitoring aurally either the line amplifier output or the program originating from a second studio or any other selected program circuit. A volume indicator is provided in the assembly for measuring the output energy of the line amplifiers. Provisions are made for the use of an extension volume indicator meter at the remote control position. This meter will operate in unison with the meter on the volume indicator panel in the equipment assembly. The external volume indicator meter is not supplied with the 701A Speech Input Bay and must be ordered separately.

Loud speakers in the studio and booth are controlled automatically by the microphone circuit control keys. When a microphone at either location is in service it is impossible to operate the loud speaker at the same location.

The power supply for the amplifiers and the volume indicator is obtained from an 8A Rectifier and a 263 Type Voltage Regulator Panel. The rectifier furnishes the plate supply voltages while the voltage regulator panel supplies the low voltage AC for the vacuum tube filaments. The 716A Filter is required for the plate supply circuit of the No. 81A Amplifier. The master power switch for the AC supply to the entire bay is on the 8A Rectifier.

Normal operation of the equipment is accomplished without the use of patching cords and plugs, the circuits being continuous through the jack contacts. Spare jacks are available at the bay for terminating additional circuits and tie lines to associated equipment such as the 702A Speech Input Bay. In addition jacks are employed at the necessary points in the electrical paths throughout the assembly for access to any part of the circuit assembly for testing or isolation purposes or for interchange of line and monitoring (No. 82A) amplifiers should this become necessary in emergencies.

701A SPEECH INPUT BAY
STUDIO SINGLE CHANNEL SPEECH INPUT EQUIPMENT
A.C. OPERATED

GENERAL Standard equipment assembly which with a 267 Type Control Panel provides the necessary amplifiers, power supply and control for one studio amplifier channel for radio broadcasting accommodating four microphones or 30-ohm input circuits and a rehearsal-break circuit with an operator's microphone for talk back purposes; or as an alternative a straight 5 microphone mixing channel input. Ordinarily supplied for use with an external control panel - 267A Control Panel mounted in 10A Cabinet for table or desk use. Space is provided for mounting the control unit, 267B Control Panel in the equipment cabinet if this arrangement is desired. Assembly is factory wired and tested for use with external control position but may be obtained upon order with control panel mounted in equipment cabinet. 267 Type Control Panel is not part of the equipment assembly and must be ordered separately. If 267A Control Panel (external control) is required order should include 10A Cabinet which is required for mounting.

DESCRIPTION Consists of the following apparatus panels mounted in a steel cabinet 83-3/8" high, 22" wide and 13-1/8" deep. Back of cabinet contains a steel door with a locking device. A removable writing shelf is attached to the front of the cabinet approximately 31" above the floor.

1 - 266A Relay Panel
1 - 262A Meter Panel
1 - 81A Amplifier
2 - 82A Amplifiers
1 - 700A Volume Indicator
1 - 219A Jack Mounting
2 - 992A Mounting Plates (Terminal Strips)
1 - 716A Filter (Plate Supply for 81A Amplifier)
1 - 8A Rectifier
1 - 263 Type Voltage Regulator Panel

Cabinet and equipment panels are finished in dark gray and cabinet is equipped with a satin-chromium finished metal trim and baseboard.

AC power supply is brought in at bottom of cabinet.

POWER SUPPLY Operates from 105-125 volt, 60-cycle AC power supply. Obtainable also upon order for operation from 50-cycle power supply in which case 263B Voltage Regulator Panel is used instead of 263A Voltage Regulator Panel.

Power consumption is 160, 168 and 176 watts at 105, 115 and 125 volts, respectively at 50 cycles or 60 cycles frequency.

12-volt DC power is required for operation of the relays and the signal circuits of an associated 267 Type Control Panel. This power supply is not furnished with the 701A Speech Input Bay and must be provided separately.

VACUUM TUBES The vacuum tubes for the amplifiers, volume indicator and plate supply rectifier and the plug fuse for the AC power supply are not supplied with the 701A Speech Input Bay and must be ordered separately. The following is a list of these items which are necessary for the operation of the 701A Speech Input Bay.

5 - 262A Vacuum Tubes
4 - 271A Vacuum Tubes
1 - 274A Vacuum Tube
1 - 6 Ampere (Clearsite) plug fuse.

It is recommended that a duplicate set of vacuum tubes and additional power supply fuses be obtained and kept on hand as spare parts.

REMARKS Sheet 2 shows the outline dimensional drawing of the 701A Speech Input Bay.
The block schematic circuit is shown on Sheet 3.

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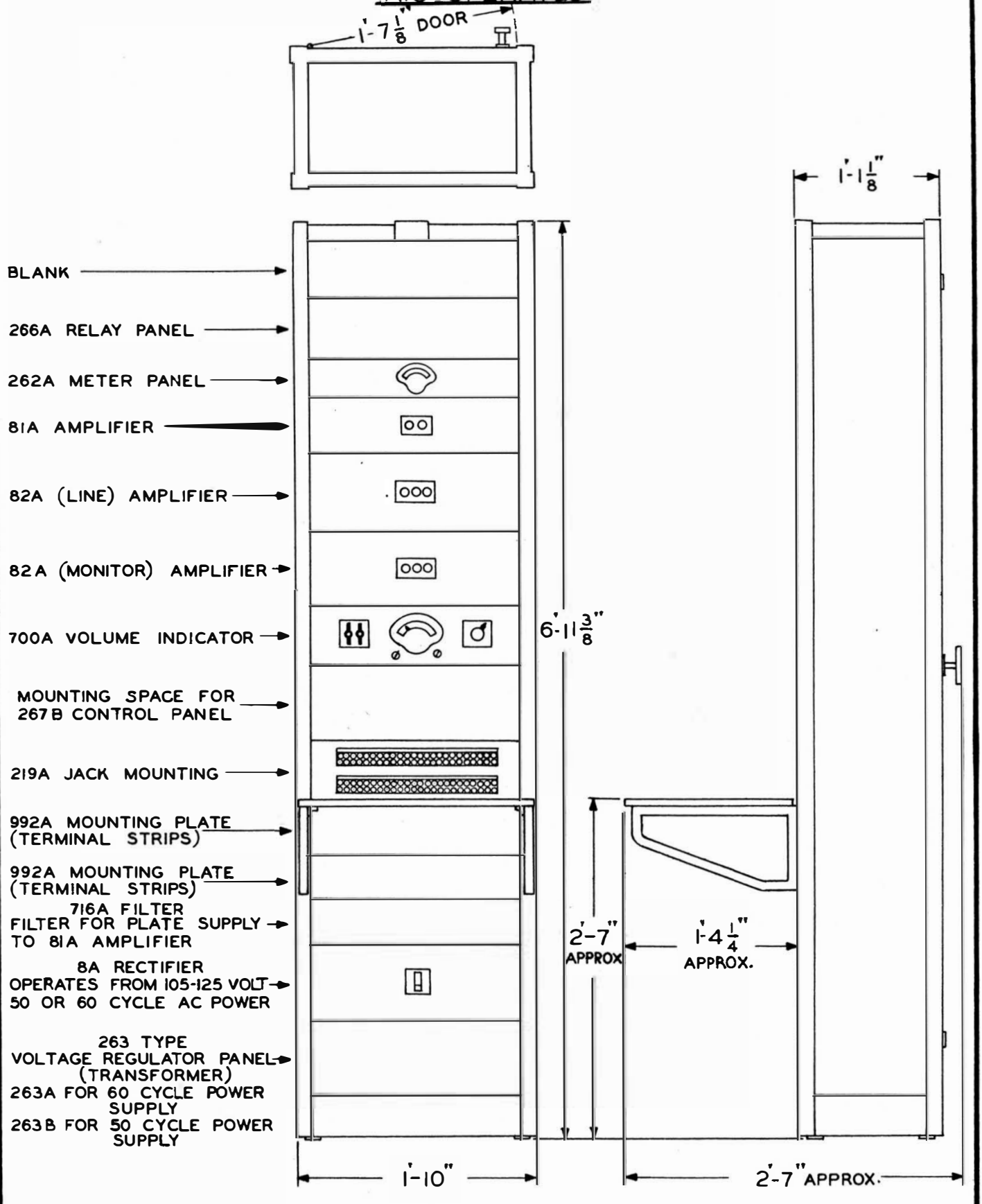
701A SPEECH INPUT BAY
STUDIO SINGLE CHANNEL SPEECH INPUT EQUIPMENT
A.C. OPERATED



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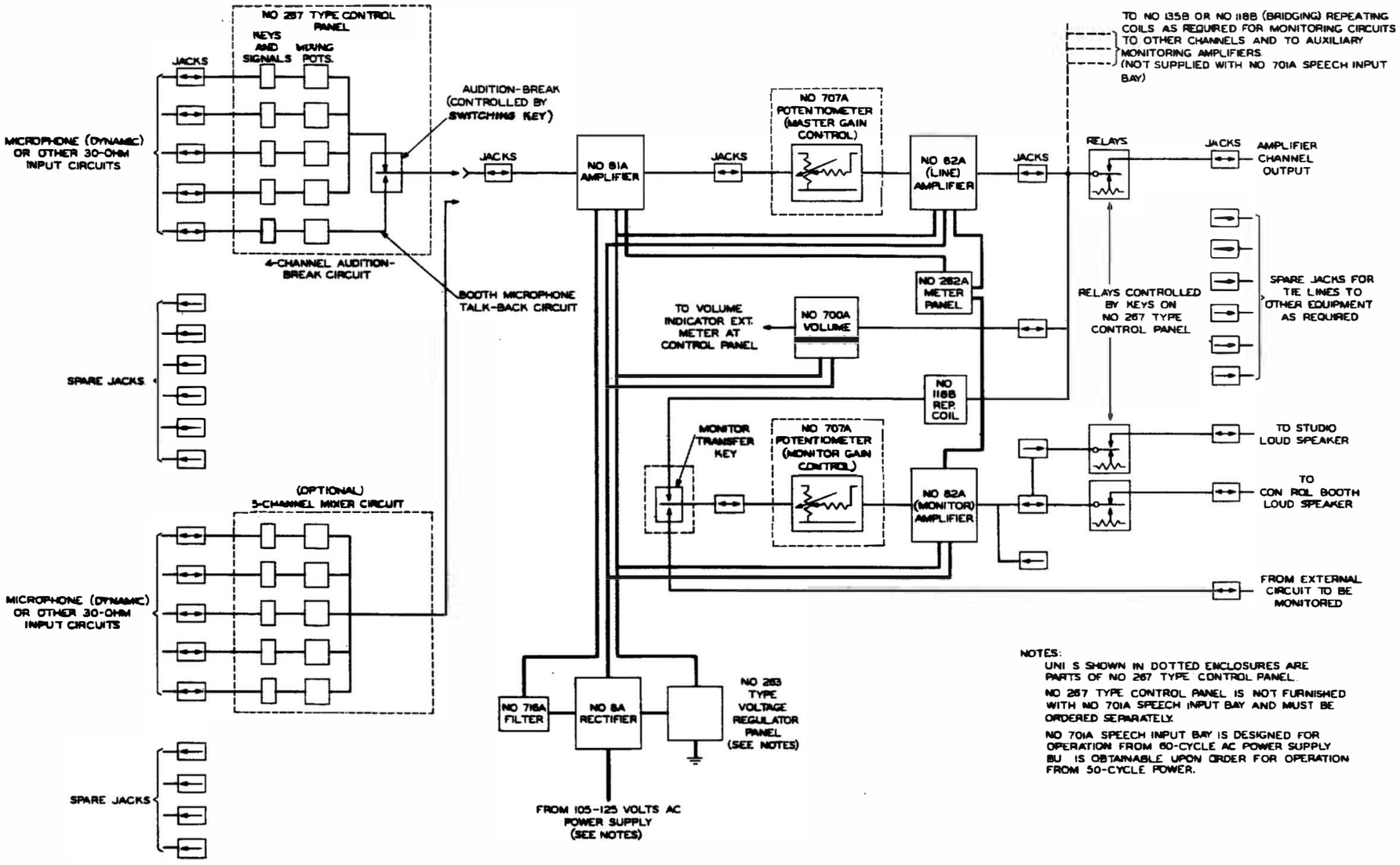
701A SPEECH INPUT BAY
STUDIO SINGLE CHANNEL SPEECH INPUT EQUIPMENT
A.C. OPERATED



NOTES:

UNITS SHOWN IN DOTTED ENCLOSURES ARE PARTS OF NO 267 TYPE CONTROL PANEL.

NO 267 TYPE CONTROL PANEL IS NOT FURNISHED WITH NO 701A SPEECH INPUT BAY AND MUST BE ORDERED SEPARATELY.

NO 701A SPEECH INPUT BAY IS DESIGNED FOR OPERATION FROM 60-CYCLE AC POWER SUPPLY BU IS OBTAINABLE UPON ORDER FOR OPERATION FROM 50-CYCLE POWER.

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WESTERN ELECTRIC 702A SPEECH INPUT BAY

The 702A Speech Input Bay is the program receiving and dispatching unit of a studio speech input system. It is a factory-wired and tested equipment assembly which provides facilities for handling incoming and outgoing program circuits and telephone order wire circuits in installations employing one or more studios and one or several studio amplifier channels such as 701A Speech Input Bays.

This assembly furnishes:

Terminating facilities for twelve incoming (Telephone) program circuits. These facilities include:

- Jacks for testing and interchanging program and order wire circuits in emergencies.
- High impedance monitoring (bridging) jacks.
- Line Equalizers for 8000 cycles (2 - 23A Equalizers are supplied with the standard assembly with provisions for additional equalizers as required.)
- Repeating Coils for use with incoming program circuits.
- Attenuators which reduce the energy levels of incoming program circuits to values comparable to the levels from high quality microphones.

Selection of any two of twelve program circuits for assignment, through attenuators, to two local circuits which connect ultimately to the control panel of a local amplifier channel such as the 701A Speech Input Bay, or to the control panels of two such local amplifier systems. Either of the two program circuits may be preset while the other is in use.

Terminating facilities for twelve incoming (telephone) order wire lines, each associated with one of the program circuits, previously mentioned. These facilities include:

- Jacks for testing and interchanging order wire and program circuits if this becomes necessary in emergencies.
- Twelve combined jack and signal units, one for each order wire line.

Call indicator lamp and a key controlled buzzer for registering incoming signals simultaneously with the individual line signals.

Calling and answering cord.

Key-controlled ringing from 20-cycle ringing voltage or through hand-operated generator on associated telephone panel.

Spare jacks for additional lines.

Jacks for talking and ringing circuit of associated telephone panel.

Telephone panel for use with either a hand telephone set or operator's breast type telephone set, or both if desired. (Instruments not furnished)

Outgoing program dispatching unit accommodating three studio amplifier channels such as the 701A Speech Input Bay and three outgoing circuits. Includes facilities for dual control, signalling and supervision of the amplifier channels between the program dispatcher and the several studio operators.

Assignment of amplifier channels either singly or as a combination of two or three channels to any one of three outgoing circuits.

Outgoing circuit repeating coils (1 - 119C Repeating Coil is supplied with the assembly but provisions are made for additional coils as required in particular installations.)

Jacks provided at necessary points in the electrical paths between equipment units of the bay for testing purposes; however, normal operation is effected without using patching cords.

Jacks associated with output circuits from amplifier channels.

Jacks for outgoing program circuits from the bay to telephone lines and/or audition rooms.

Compensating resistances and resistance networks to maintain constant impedance relations throughout the system regardless of switching combinations employed.

Compact assembly of equipment in standard equipment cabinet 83-3/8" high, 22" wide and 13-1/8" deep. Cabinet contains rear door with locking device.

Three 5-1/4" blank mounting spaces are available for such installations in the assembly as may be required for particular installations. These spaces are covered by mats.

A 12-volt DC power supply is required for the operation of the signal lamps and for the line lamp and the buzzer of the order wire panel. The telephone panel also requires 12 volts DC for the current to the transmitter. Ordinarily this voltage is obtained from a common 12-volt DC source which serves the standard amplifier channel assemblies associated with the No. 702A Speech Input Bay.

Recommended Accessory Equipment:

1 - 206A Hand Telephone Set (for use with telephone panel)
1 - Operator's Telephone Set (optional) consisting of
- 1 - 396A Transmitter
- 1 - 528 Receiver
- 1 - L4F Cord with 289A Plug
- 1 - 3A Transmitter Attachment

Patching cords equipped with plugs - P2AA white cords (specify length required) each equipped with 2 - 241A Plugs. (Number as required)

The No. 702A Speech Input Bay includes circuit combining and switching facilities which are adequate for a wide variety of field conditions, especially if patching cords and plugs are employed for particular set-ups as conditions may from time to time demand. It is seen from the block schematic circuit that this bay will accommodate three separate amplifier channels simultaneously with complete supervision and signalling facilities between the several operating points. The programs for a maximum of two of these channels may be furnished from outside sources over two selected incoming program circuits while the third program is originated in a local studio; or, as an alternate condition, all three channels may be engaged simultaneously with programs from local studios. The dispatching operator assumes dual control of the studio channels with the respective studio booth operators through the output control keys on the output switching panel.

For programs received from outside sources the dispatching operator selects the particular incoming program circuit by means of the keys on the 272A Program Line Panel and assigns the selected program over one of the two available circuits, through the 269A Attenuator Panel and associated repeating coils (119B) mounted on the 993A Mounting Plate, to the particular amplifier channel with which it is normally associated. Patching cords are assumedly available for cross-connection of the program circuits to other amplifier channels if conditions are such that this procedure is necessary. The signal lights on the 272A Program Line Panel inform the dispatcher when the normally assigned studio amplifier channels are already in service in which case idle channels are selected for the incoming programs as just described.

In cases where outside program circuits are used extensively a separate amplifier channel may be provided at the dispatcher's location for this service alone, or possibly the amplifiers may be located in a separate control and announcing booth adjacent to the dispatcher's position. If this procedure is followed the output of the amplifier channel may be dispatched through a fourth repeating coil (119C) of the 702A Speech Input Bay.

As in the case of the standard studio amplifier assemblies the 702A Speech Input Bay contains spare jacks which may be used for tie lines to associated equipment or to the studio amplifier assemblies. Jacks are provided also at the necessary points in the electrical circuits through the bay for access to any part of the circuits through the use of patching cords and double plugs. However, the normal operation of the assembly is effected without the use of patching cords and plugs, the circuits being continuous through the jack contacts.

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702A SPEECH INPUT BAY
STUDIO SPEECH INPUT EQUIPMENT

GENERAL Standard factory-wired and tested equipment assembly which provides facilities for handling incoming and outgoing program circuits and telephone order wire lines in installations employing one or more studios and one or several studio amplifier channels such as 701A Speech Input Bays.

This assembly furnishes:

Terminal facilities for 12 incoming program circuits. These facilities include:
- Jacks for testing and interchange of program and order wire circuits if necessary in emergencies.
- High impedance monitoring jacks.
- 2 - 23A Equalizers - provisions made for additional equalizers as required.
- 2 - 119B Repeating Coils, for incoming program circuits, and 1 - 119C Repeating Coil for outgoing program circuit - provisions made for additional (3) output circuit repeating coils as required.
- Program circuit attenuators for 2 (selected) incoming program circuits.

Selection of any one, or any two of 12 incoming program circuits.

Terminal facilities for 12 order wire lines. These facilities include:
- Jacks for testing and interchange of order wire and program circuits.
- 12 combined jack and signal units.
- Buzzer and call indicator lamp.
- Calling-answering cord.
- Key controlled ringing from 20-cycle ringing voltage if this is available or from hand-operated generator of telephone panel.
- Local telephone set for use with either handset or operator's telephone set.

Outgoing program dispatching unit accommodating 3 amplifier channels and 3 or 4 outgoing lines ultimately. (Assembly includes one repeating coil only for outgoing circuits but provisions are made for additional coils as required.)

Assignment of amplifier channels either singly or as a combination of 2 or 3 channels to any one of 3 outgoing circuits.

Jacks at necessary points in the circuits for testing or isolation purposes.

DESCRIPTION Consists of the following equipment panels which are mounted in a steel cabinet 83-3/8" high, 22" wide and 13-1/8" deep. Back of cabinet contains a steel door with a locking device. Cabinet and equipment panels and blanks mounted therein are finished in dark gray and cabinet is equipped with a satin-chromium finished metal trim and baseboard.

1 - 270A Output Switching Panel
1 - 269A Attenuator Panel
1 - 260A Telephone Panel
1 - 268A Order Wire Panel
1 - 272A Program Line Panel
1 - 220A Jack Mounting
2 - 992A Mounting Plates (Terminal Strips)
1 - 996A Mounting Plate (Repeating Coils)
1 - 993B Mounting Plate (Program Circuit Equalizers)

Four 5-1/4" blank mounting spaces are available for such additions to the assembly as may be required for particular installations.

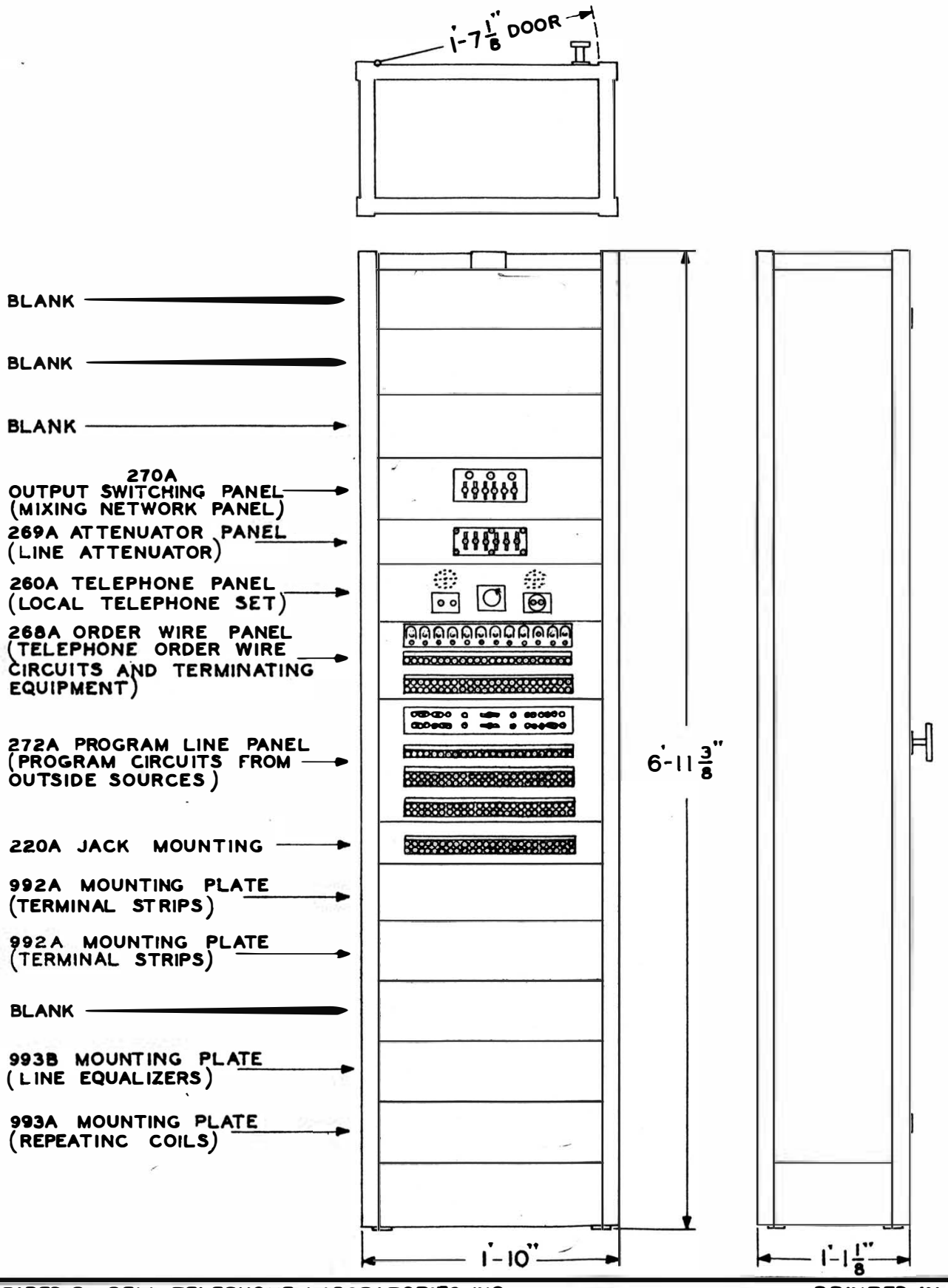
A 206A Hand Telephone Set is required for use with the 260A Telephone Panel. This is not furnished with the 702A Speech Input Bay and must be provided separately.

POWER SUPPLY 12 volts DC power is required for the operation of the telephone order wire panel, the telephone panel and the signal lamps of the output switching panel. The 12 volt power supply is not furnished with the 702A Speech Input Bay and must be provided separately.

REMARKS Sheet 2 shows the outline dimensional drawing of the 702A Speech Input Bay.

The block schematic circuit is shown on Sheet 3. This indicates the functions of the assembly and its separate components in conjunction with local studio amplifier channels and incoming program circuits from other sources.

702A SPEECH INPUT BAY
STUDIO SPEECH INPUT EQUIPMENT



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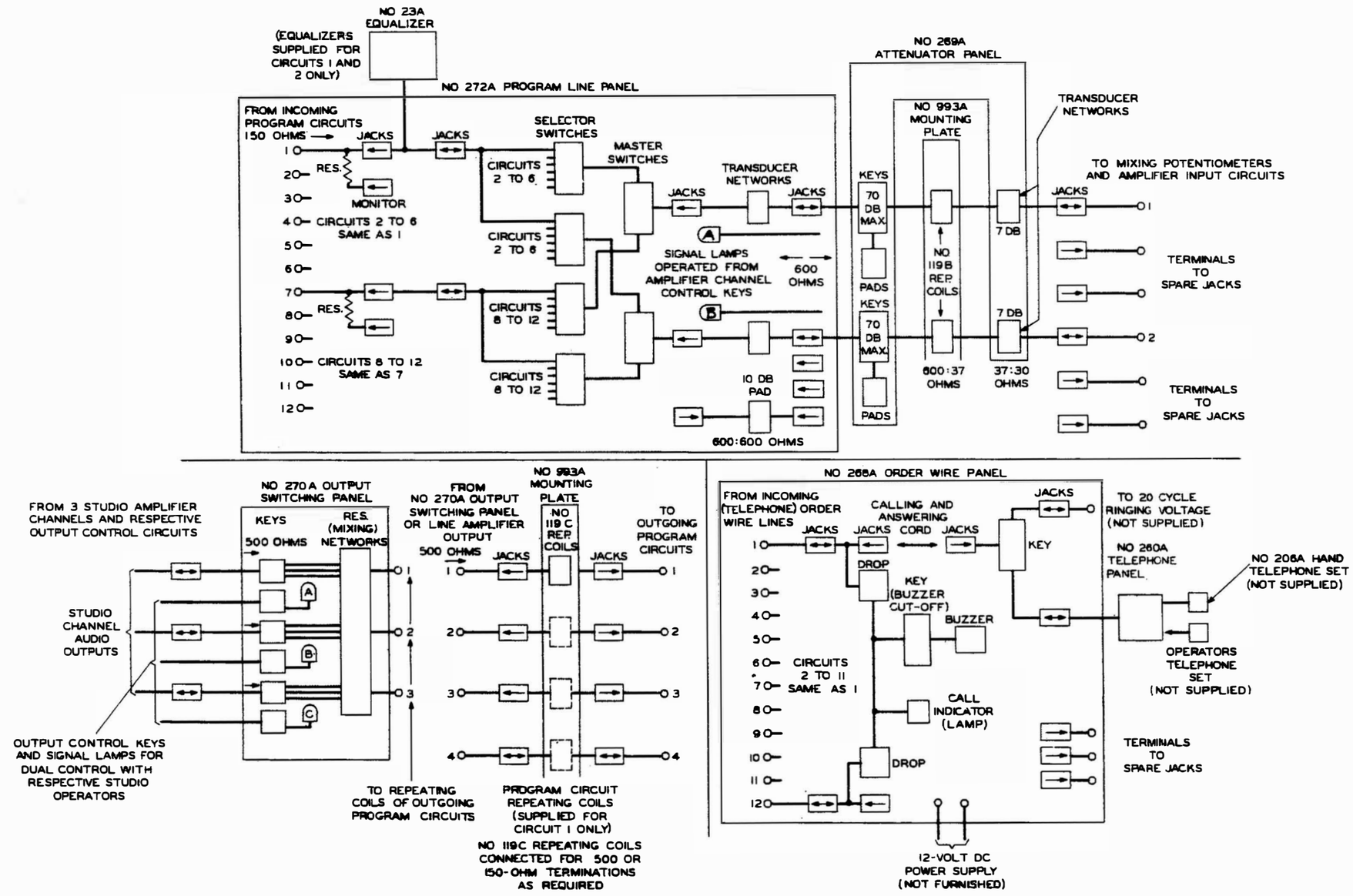
ISSUE 1
DATE 10-2-34

702A SPEECH INPUT BAY
STUDIO SPEECH INPUT EQUIPMENT



WESTERN ELECTRIC

STATION

SPEECH INPUT EQUIPMENT

15A SPEECH INPUT EQUIPMENT

The Western Electric 15A Speech Input Equipment is a self-contained station equipment for use at the remote transmitter location of a radio broadcasting system. It consists principally of the 700A Speech Input Bay which is a unit assembly of the major components such as amplifiers, potentiometers and volume indicators. In addition to the 700A Bay the 15A Speech Input Equipment includes a moving coil transmitter with table mounting, cord and outlet for emergency station announcements, a monitoring loud speaker, patching cords, and the necessary vacuum tubes for the amplifiers, rectifier and the volume indicator. A dry battery and a telephone handset are supplied for use with the telephone panel which is a part of the 700A Speech Input Bay.

The component parts of the No. 700A Speech Input Bay are assembled on a series of panels mounted in a steel cabinet which is 83 inches high, 21-1/4 inches wide and 12-1/2 inches deep. The various panels are mounted in the equipment cabinet in a manner which provides maximum ease of operation. At the rear of the cabinet is a steel door with a locking device and a safety switch. When the door is opened the switch automatically shuts off the main power supply and protects the operator from accidental contact with high voltage circuits.

The No. 15A Speech Input Equipment is designed to accommodate four incoming program circuits and two telephone order wire circuits. One line equalizer is furnished to compensate for the higher frequency transmission losses which may be encountered in the non-loaded cable program circuit. This equalizer is normally associated with circuit No. 1 but may be adjusted for use with any of the other incoming circuits. Space and wiring are provided for the addition of a second equalizer when two equalized program circuits are required. Space is also available for adding a No. 81A (low level) Amplifier and its associated No. 716A Filter when there is a studio at the radio station for emergency programs or electrical transcriptions.

The emergency announcing microphone may be employed by operating the announce key to the proper position in which case both the incoming program circuit and the monitoring circuit are rendered inoperative.

A selection of two outgoing circuits to the radio transmitters is available; one for the regular transmitter and the other for a standby radio transmitter.

A number of spare jacks and circuit terminations provided for additions to or modification of the input and output circuits, should these become necessary.

The monitoring circuit provides for connecting the monitoring amplifier and its external gain control potentiometer either to the radio transmitter input or to the monitoring output of the transmitter. The radio transmitter monitor circuit contains a potentiometer which is in addition to the potentiometer associated with the monitoring amplifier. By means of this potentiometer the radio transmitter monitor output can be adjusted so that a direct comparison of the input and the output of the transmitter can be readily obtained.

Control of the program energy levels throughout the system is obtained from an external master gain control potentiometer associated with the line amplifier, the monitor gain control potentiometer in the circuit of the monitoring amplifier, and the potentiometer in the radio transmitter monitor circuit. The line amplifier and associated master gain control potentiometer are identical electrically to the monitoring amplifier and its gain control potentiometer and may be interchanged by patching cords if necessary as an emergency measure.

Jacks are provided at the necessary points in the electrical path for access to any part of the circuit. However the normal operation of the equipment is accomplished without the use of patching cords and plugs, the circuits being continuous through the jack contacts.

The power supply system for the equipment consists of a rectifier with self-contained filters, and a voltage regulating transformer. Operating from the commercial 105-125 volt 60 cycle AC power supply this part of the equipment functions automatically to maintain the proper voltages for the vacuum tube filaments and plate circuits. It is obtainable upon order for operation from 50 cycle AC power supply. The power supply system is designed for the constant load requirements of the two No. 82A Amplifiers and the volume indicator but may also be used, with the No. 716A Filter, to furnish power to a No. 81A Amplifier when this is added to the system. Under full load conditions the power consumed by the No. 700A Speech Input Bay from the supply mains is as follows:

Line Voltage	Watts	Volt Amperes
105	160	270
115	168	345
125	176	447

The entire equipment is controlled manually through the use of the three potentiometers previously mentioned, four switching keys, and the master power switch of the rectifier.

Aside from the flexibility of the circuit and its adaptability to the various possible requirements for a station speech input equipment, the amplifiers and other essential parts embody the latest design features which result in extremely low noise level, and the practical elimination of distortion under the rated operating conditions.

A.C. OPERATED

GENERAL

Self-contained alternating current operated speech input system for use at the radio transmitter station of a broadcasting system.

Designed to accommodate four incoming program circuits and two telephone order wire circuits. One line equalizer is furnished; this unit is normally associated with circuit No. 1 but may be adjusted for use with any of the other incoming circuits if necessary.

Space and wiring are provided for adding a second line equalizer if this is required. Space is also available for adding an 81A (low level) Amplifier and associated 716A Filter in cases where a studio is available at the radio station for emergency programs or electrical transcriptions.

A dynamic transmitter is provided for emergency announcing.

Consists principally of a 700A Speech Input Bay which is the unit assembly of the amplifiers, volume indicator, potentiometers, meter panel, jacks, and other circuit accessories.

COMPONENT PARTS

This equipment consists of the following apparatus:

1 - 700A Speech Input Bay
1 - 618A Type (dynamic) Transmitter
1 - 18A Type Transmitter Mounting
1 - M3J, or M3K Cord (5' long)
1 - 286B Type Plug
3 - P2AA Cords (1' long) each equipped with two 241A Plugs
3 - " " (2' long) " " " " " "
1 - Graybar No. 4306 - 6 Ampere "Clearsite" Plug Fuse
1 - Eveready No. 771 Battery
3 - 262A Vacuum Tubes
4 - 271A " "
1 - 274A Vacuum Tube
1 - 206A Type Hand Telephone Set

NOTE: One Jensen Imperial Reproducer equipped with Auditorium Model M-10 3001 Unit with input transformer for operation from 500 ohm lines is required as part of this equipment.

No spare parts are furnished with this equipment. However, the following are recommended as spares which may be purchased at the customer's option.

3 - 262A Vacuum Tubes
4 - 271A " "
1 - 274A Vacuum Tube
6 - Graybar No. 4306 - 6 Amp. Clearsite Plug Fuses

Two sets of instruction bulletins in loose-leaf binders are furnished as a part of this equipment.

REMARKS

See also 15A Speech Input Equipment (Sheet 2) and Engineering Data for 700A Speech Input Bay.

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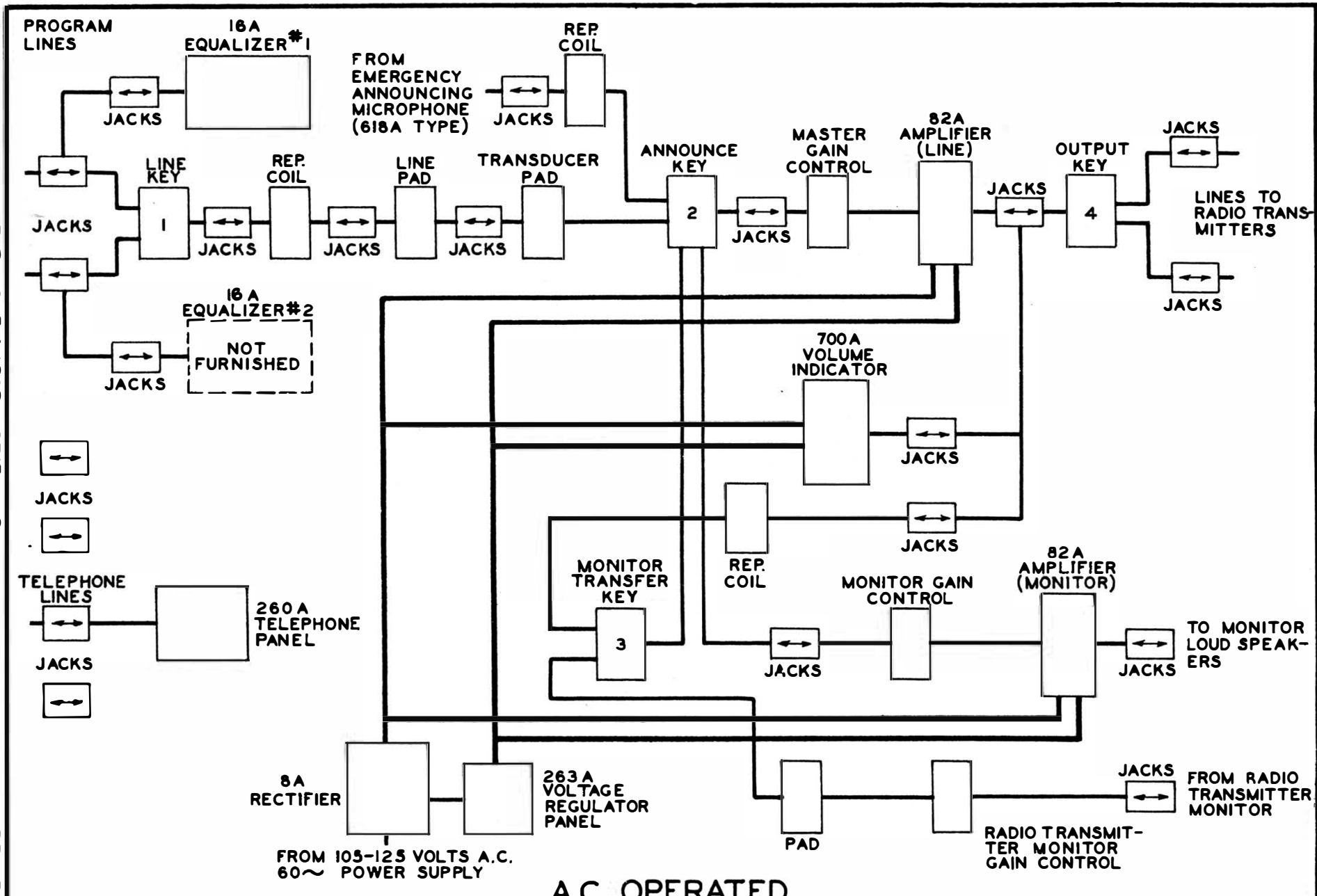

A.C. OPERATED

BLOCK SCHEMATIC 15A SPEECH INPUT EQUIPMENT

Western Electric
SPEECH INPUT EQUIPMENT
SPEECH INPUT EQUIPMENT 15A (SHEET 2 OF 2 SHEETS)

PREPARED BY BELL TELEPHONE LABORATORIES, INC.
PRINTED IN U.S.A.

700A SPEECH INPUT BAY
(15A SPEECH INPUT EQUIPMENT)
A.C. OPERATED

GENERAL

Designed as a component part of the 15A Speech Input Equipment for radio station use. The 700A Speech Input Bay contains in a single equipment cabinet substantially all the essential apparatus for a station speech input system accommodating four incoming program circuits and two telephone order wire circuits.

The vacuum tubes, 4-1/2 volt battery and the hand telephone set for the telephone panel, and the plug fuse for the power supply circuit are not supplied with the 700A Speech Input Bay and must be ordered separately. The following is a list of these parts which are necessary for the operation of the 700A Speech Input Bay.

3 - 262A Vacuum Tubes
4 - 271A " "
1 - 274A Vacuum Tube
1 - Eveready No. 771 Battery. See Remarks.
1 - 6 Ampere Plug Fuse
1 - 206A-3 Hand Telephone Set

DESCRIPTION

Consists of an assembly of apparatus panels mounted in a steel cabinet which is 83-3/8" high, 22" wide and 13-1/8" deep. The back of the cabinet contains a steel door with a locking device and a door safety switch. A removable writing shelf is attached to the front of the cabinet approximately 31" above the floor.

The AC power supply is brought in at the bottom of the cabinet. Operates from 105-125 volts.

The internal wiring is completed before shipment from the factory.

COMPONENT PARTS

The following apparatus units are assembled in the 700A Speech Input Bay:

992A Mounting Plate (terminal strip)
16A Equalizer
262A Meter Panel (amplifier plate current measurements)
82A Amplifiers (2) (line and monitoring amplifiers)
259A Switching Panel (keys)
260A Telephone Panel
700A Volume Indicator
261A Control Panel (gain control)
219A Jack Mounting
8A Rectifier
263 Type (263A for 60 cycle AC, or 263B for 50 cycle AC) Voltage Regulator Panel (10 volts AC for vacuum tube filaments)

In addition space is provided for the addition of an 81A (low level) Amplifier and an associated 716A Filter. Space and wiring are also available for adding a second 16A Equalizer if required.

REMARKS

See also 700A Speech Input Bay (Sheet 2) and Engineering Data for 15A Speech Input Equipment.

260A Telephone Panel is designed primarily for 12 volts battery supply; if this is not available dry battery (4-1/2 volts) is used.

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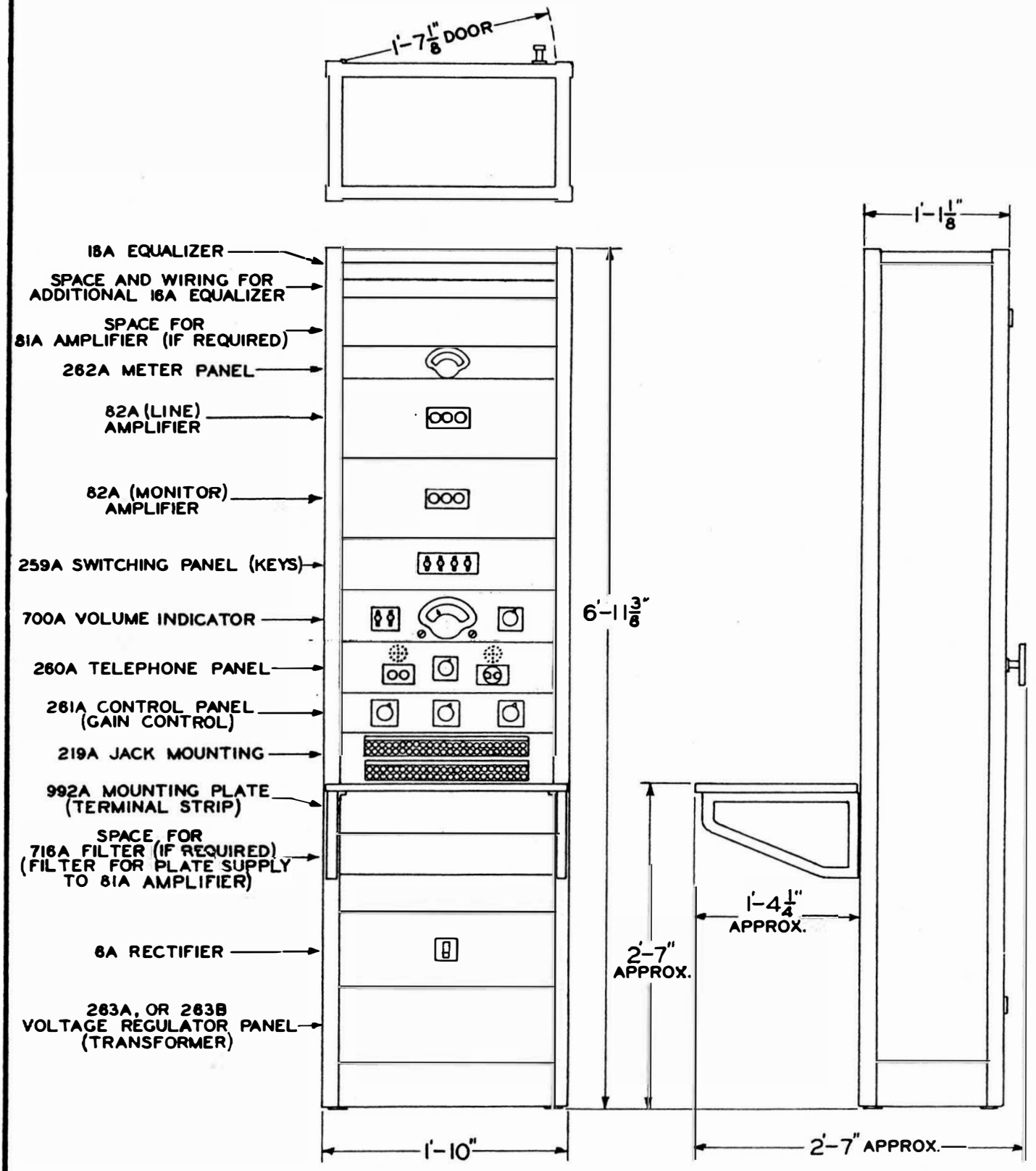
700A SPEECH INPUT BAY
(15A SPEECH INPUT EQUIPMENT)
A.C. OPERATED



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SECTION V

Engineering information on Western Electric apparatus units is given in the Data Sheets which are included in this section.

APPARATUS

Amplifiers, 47A, B, C & D)
48A & B) See Conductor
53A, B, C & D) Microphones
54A & B)
60A
61A
80A
81A
82A

Cabinet, 10A

Equalizer, 16A
23A

Filters, 707A
708A
709A
710A
711A
716A

Jack Mountings, 216A
219A
220A

Microphones, 600A Carbon
394 Condenser
618A Moving Coil

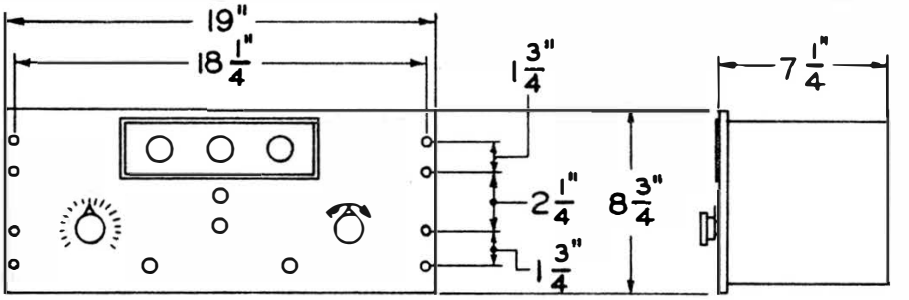
Mounting Plates, 831E
884AH
988A
992A
993A
993B
994A

Panels,

(Condenser Transmitter Control)	217A
(Carbon Transmitter Control)	218A
(200 Volt Filter)	221A
(Telephone Order Wire)	260A
(Meter)	262A
(Voltage Regulator)	263 Type
(Voltage Regulator)	264 Type
(Gain Control)	265A
(Relay Panel)	266A
(Type Control Panel)	267
(Order Wire)	268A
(Attenuator)	269A
(Output Switching)	270A
(Output Switching Panel)	271A
(Program Line Panel)	272A
(Meter)	514C

APPARATUS

Potentiometers,	
(Gain Control)	707A
(Mixing)	709A
Rectifiers,	4A
	8A
Terminal Strip,	700A
Volume Indicator,	700A

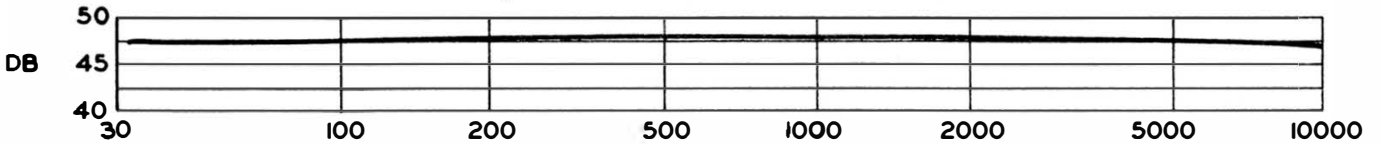


D.C. OPERATED

SEE REMARKS

GENERAL	Two stage, transformer coupled amplifier designed primarily for use as a high level amplifier and as a monitoring amplifier in Speech Input Equipments. The second stage of this amplifier is push pull.
INPUT	Operates from 200 ohms. Input terminals are Nos. 1 and 2.
OUTPUT	Normally operates into 500 ohms (terminals 7 and 8). Transformer has taps for 250 ohm load. Output level for single frequency +24 db; for program material +16 db.
GAIN	Approximately 48 db at 1000 C.P.S.
GAIN CONTROL	22 step potentiometer, approximately 3 db per step.

GAIN FREQUENCY CHARACTERISTIC - Measurement of Representative Amplifier.



VACUUM TUBES	First stage one 244A; second stage two 205E in push-pull. Tubes must be ordered separately.
FILAMENT SUPPLY	3.2 amperes at 7-15 volts (normal 12 volts). Terminals 3 and 4, terminal 4 is +. Storage batteries are recommended.
PLATE SUPPLY	Approximately 55 mils at 350 volts DC (terminals 5 and 6, 5 is +). The 4A Rectifier with 707A and 708A filters is recommended.
FUSES	None.
GRID BIAS	First stage bias obtained from potential drop across resistance in the cathode circuit. Second stage bias from 22.5 volt battery. Eveready #763 Battery is recommended. (Battery must be ordered separately.)
CONTROL	Filament rheostat is provided for adjustment of the filament currents and jacks are available for measuring plate and filament currents.
FINISH	Black japan.
WEIGHT	Approximately 45 lbs.
MOUNTING	Arranged to mount on a standard relay rack or equipment cabinet. Mounting screws and washers are furnished. Back cover is removable for inspection.
REMARKS	When this amplifier is bridged on a circuit for monitoring purposes a 118B Repeating Coil should be used to insulate the amplifier from the line. Under these conditions the amplifier gain is approximately 23 db.

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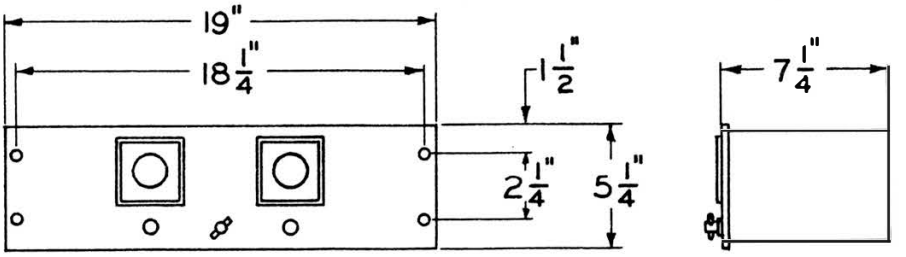


D.C. OPERATED

GENERAL — Two stage, fixed gain, transformer coupled amplifier designed primarily for use as a low level amplifier in conjunction with the 60A Amplifier in Speech Input Equipments.

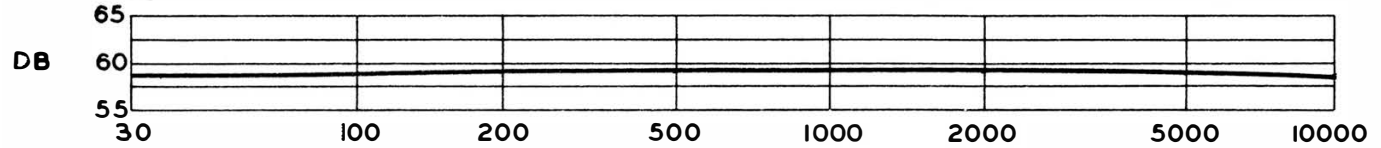
INPUT — Operates from 200 ohms. Input terminals are Nos. 1 and 2.

OUTPUT — Operates into 200 ohms (terminals 7 and 8). Output level for single frequency -2 db; for program material -10 db.

GAIN — Approximately 58 db at 1000 C.P.S.

GAIN CONTROL — One step of 25 db attenuation, controlled by a key operated potentiometer.

GAIN FREQUENCY CHARACTERISTIC - Measurement of Representative Amplifier.



VACUUM TUBES — Two 247A. Tubes must be ordered separately.

FILAMENT SUPPLY — 3.2 amperes at 2 volts DC. Terminals 3 and 4, terminal 4 is +. Filament circuit operates in series with that of the 60A Amplifier. When used otherwise an external filament rheostat is required.

PLATE SUPPLY — Approximately 5 mils at 350 volts DC (Terminals 5 and 6, 5 is +). The 4A Rectifier with 707A and 709A Filters is recommended.

FUSES — None.

GRID BIAS — Obtained from potential drops across resistances in the cathode circuits.

FINISH — Black japan.

WEIGHT — Approximately 25 lbs.

MOUNTING — Arranged to mount on a standard relay rack or equipment cabinet. Mounting screws and washers are furnished.

Back cover is removable for inspection.

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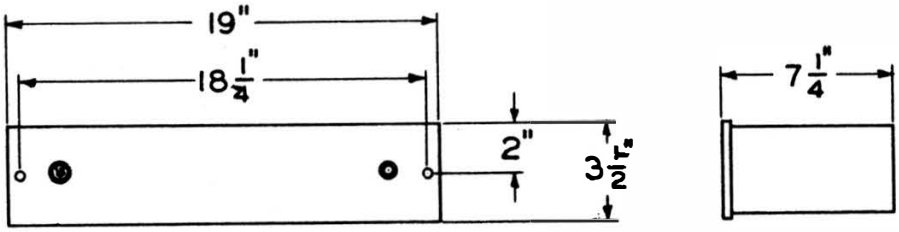
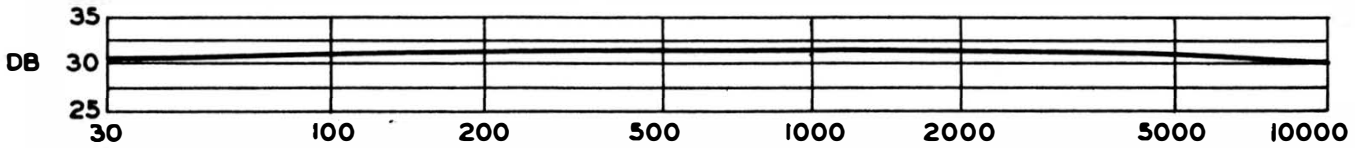


FILAMENT A.C. OR D.C. OPERATED

GENERAL	Single stage, fixed gain, amplifier designed primarily for use with the moving coil (618A) transmitter for Speech Input Equipments and other purposes.
INPUT	Operates from one 618A Transmitter or from an impedance of 30 ohms.
OUTPUT	Operates into 50 ohms or 200 ohms as determined by strapping on output transformer. Output level for single frequency 0 db; for program material -10 db.
GAIN	Approximately 31 db at 1000 C.P.S. See Remarks.
GAIN CONTROL	None.

GAIN FREQUENCY CHARACTERISTIC - Measurement of Representative Amplifier.



VACUUM TUBES	One 262A. Tube must be ordered separately.
FILAMENT SUPPLY	.32 ampere at 12 volts AC or DC.
PLATE SUPPLY	Approximately 2.5 mils at 200 volts DC. The 4A Rectifier with 707A and 710A Filters is recommended.
GRID BIAS	Bias obtained from potential drop across resistance in the cathode circuit.
CONTROL	Filament ON-OFF switch. A jack is provided for measuring the plate current.
FINISH	Black japan on mat and back cover.
WEIGHT	Approximately 15 lbs.
MOUNTING	Arranged to mount on a standard relay rack or equipment cabinet. Mounting screws and washers are furnished. Back cover is removable for inspection.
REMARKS	For additional gain two or three of these amplifiers may be operated in tandem. The directions for connecting the amplifiers in tandem are furnished in the operating instructions for the amplifier.

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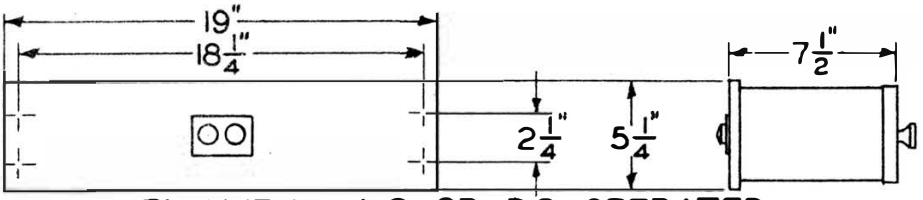
ISSUE-2
DATE 6-1-33

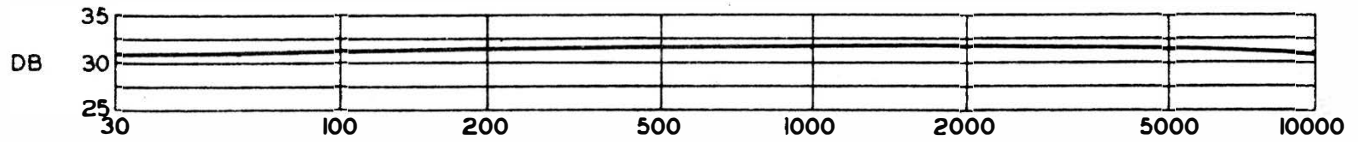


FILAMENT A.C. OR D.C. OPERATED

SEE REMARKS

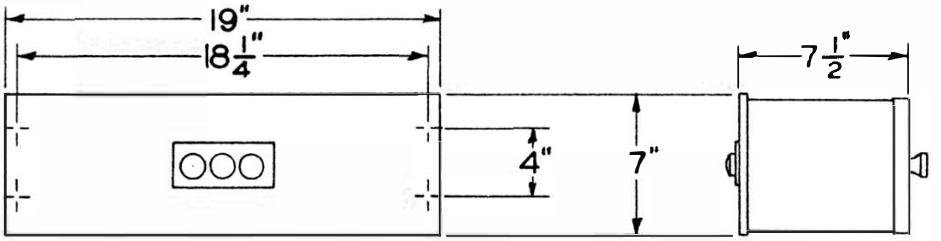
GENERAL	Two stage, adjustable gain, resistance coupled, amplifier designed primarily for use as a low level amplifier in alternating current operated Speech Input Equipments for radio broadcasting.
INPUT	Operates from 200 ohms. Input terminals are 1 and 2.
OUTPUT	Operates into a 500 ohm load. Output terminals are 7 and 8. Output level for single frequency 0 db with less than 1 percent total harmonics introduced by the amplifier.
GAIN	30, 40 or 50 db at 1000 cycles per second.
GAIN CONTROL	Flexible connector on 3-tap coupling resistance in grid circuit of second amplifier stage. Use tap 1 for 30 db gain, tap 2 for 40 db gain, and tap 3 for 50 db gain.

GAIN FREQUENCY CHARACTERISTIC - Measurement of Representative Amplifier.



VACUUM TUBES	Two 262A. Vacuum tubes must be ordered separately.
FILAMENT SUPPLY	0.64 ampere at 10 ± 0.3 volts AC or DC. Terminals 9 and 10 or te inals 13 and 12 which are multiples of 9 and 10 respectively.
PLATE SUPPLY	Approximately 5 mils at 375 ± 25 volts DC. (Terminals 5 and 6, 6 is +). Terminals 3 and 4 provide means for connecting an external meter (262A Meter Panel) for measuring the plate currents through the use of the push button keys at the front of the amplifier. Terminal 3 is +.
FUSES	None.
GRID BIAS	Obtained from potential drops across resistances in the cathode circuits.
FINISH	Dark gray on mat, aluminum finished back cover, designated by number 15 after code number, 81A-15 Amplifier. Available also with black mat and back cover, 81A-3 Amplifier. Unless otherwise specified dark gray mat and aluminum finished back cover will be furnished.
WEIGHT	Approximately 23 pounds.
MOUNTING	Arranged to mount in a standard relay rack although designed for equipment cabinet with rear door equipped with safety switch. Mounting screws are furnished. Back cover is removable for inspection.
REMARKS	Intended for use as a high quality low hum level amplifier for coded assemblies of Speech Input Equipment. Recommended accessory equipment: 263A, or 263B Voltage Regulator Panel for 10 Volts AC power supply at 60 or 50 cycles, respectively, 262A Meter Panel for plate current measurements, 8A Rectifier and 716A Filter for plate supply. Depressed panel construction, terminal blocks and panel wiring located in depressed section of panel behind the mat.

ESL-498929
ISSUE 1
DATE 8-2-33



FILAMENTS A.C. OR D.C. OPERATED

SEE REMARKS

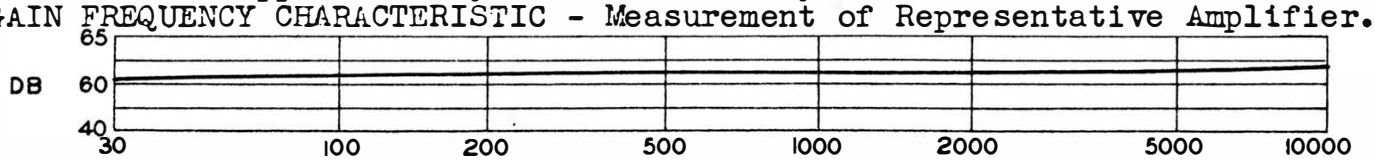
GENERAL — Two stage, fixed gain, transformer coupled, amplifier designed primarily for use as a high level line or monitoring amplifier in alternating current operated Speech Input Equipments for radio broadcasting.

INPUT — Operates from 200 ohms. Input terminals are 1 and 2.

OUTPUT — Normally operates into 500 ohms. Output terminals are 7 and 8. Output transformer tapped for 250 ohm load. Single frequency output level +24 db, with less than 1 percent total harmonics introduced by the amplifier.

GAIN — Approximately 61 db at 1000 cycles.

GAIN FREQUENCY CHARACTERISTIC - Measurement of Representative Amplifier.



VACUUM TUBES — First stage one 262A; second stage two 271A in push pull. Vacuum tubes must be ordered separately.

FILAMENT SUPPLY — 2.32 amperes at 10 ± 0.3 volts AC or DC. Terminals 9 and 10 or 13 and 12 which are multiples of 9 and 10 respectively. Vacuum tube filaments operate on a voltage basis.

PLATE SUPPLY — Approximately 55 mils at 375 ± 25 volts DC (terminals 5 and 6, 6 is positive). Terminals 3 and 4 provide means for connecting an external meter (262A Meter Panel) to measure the plate currents through the use of the push button keys at the front of the amplifier. Terminal 3 is +.

FUSES — None.

GRID BIAS — Obtained from potential drops across resistances in the cathode circuits.

FINISH — Dark gray on mat, aluminum finished back cover, designated by number 15 after code number, 82A-15 Amplifier. Available also with black mat and back cover, 82A-3 Amplifier. Unless otherwise specified dark gray mat and aluminum finished back cover will be furnished.

WEIGHT — Approximately 25 pounds.

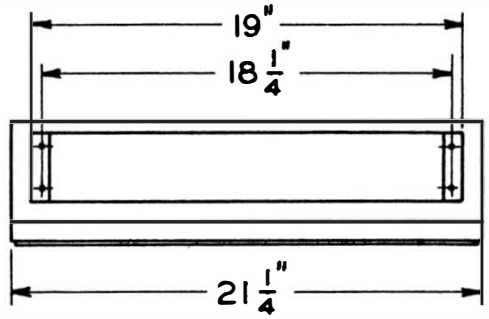
MOUNTING — Arranged to mount in a standard relay rack or equipment cabinet with rear door equipped with safety switch. Back cover removable for inspection.

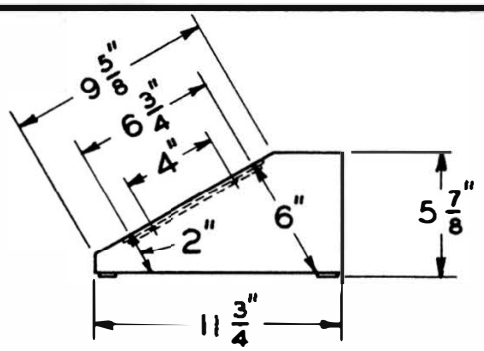
REMARKS — Intended for use as a high quality line or monitoring amplifier in coded assemblies of Speech Input Equipment.

Recommended accessory equipment: 263A, or 263B, Voltage Regulator Panel for 10V AC power supply at 60 or 50 cycles, respectively, 262A Meter Panel for plate current measurements, 265A Control Panel for gain control as a line or as a monitoring (bridging) amplifier, 8A Rectifier for plate supply for two 82A Amplifiers.

Depressed panel construction, terminal blocks and panel wiring located in depressed section of panel behind the mat.

ESL-498930
ISSUE 1
DATE 8-2-33





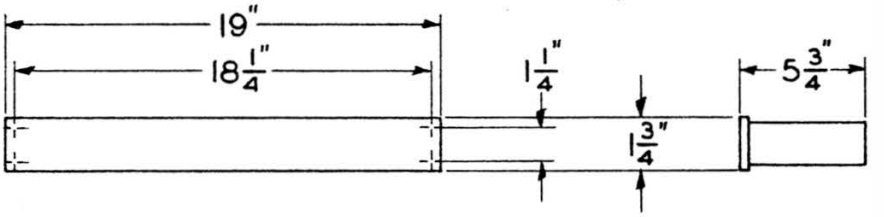
GENERAL Designed primarily to mount a 267A Control Panel for table or desk use in Speech Input Equipment assemblies.

Consists of a metal cabinet with a sloping top section in which the control panel is placed for convenient operation. The cabinet is completely enclosed on all sides and equipped with a 1" felt-bushed hole at the back left side, viewed from the front, to provide entrance for the connecting cables. The bottom is covered by a removable metal plate which is equipped with two suede leather covered metal strips across the front and the back to prevent slipping and scratching the table or desk top on which the cabinet is located. Four 1" holes are provided in the bottom cover for finger grips in removing the cover.

FINISH Dark gray, designated by number 15 after code number, 10A-15 Cabinet. Available also in black finish, 10A-3. Unless otherwise specified dark gray finished cabinet will be supplied.

WEIGHT Approximately 10 lbs.

ESL-499191
ISSUE 1
DATE 1-2-34



SEE REMARKS

GENERAL — Shunt-type equalizer designed for use with non-loaded telephone cable circuits employed for the transmission of high quality program material, to correct for the non-uniform frequency transmission of the cable circuits in the range from 35 to 8000 cycles per second.

DESCRIPTION — Depressed metal panel equipped with formed mat and back cover. Equalizer consists of an inductance and a capacity in parallel and a series resistance the value of which is determined in the equalization tests. Four resistance units are provided but are not wired in the circuit. A terminal strip is provided in the depressed section of the panel behind the mat.

INPUT — Terminals 1 and 2.

FINISH — Aluminum on mat and back cover. May be obtained also with dark gray mat and aluminum finished back cover or with black finished mat and back cover, if this is specified in the order. Unless otherwise specified, aluminum finished mat and back cover will be furnished.

WEIGHT — Approximately 5 lbs.

MOUNTING — Arranged to mount in standard relay rack or equipment cabinet. Mounting screws are furnished.

REMARKS — In making tests to determine value of resistance to be employed an external variable resistance box is used (terminals 3 and 4 of terminal strip). When the correct value of resistance has been determined the variable resistance box is removed from the circuit and the fixed resistances connected in its place, to terminals 3 and 4.

Non-loaded cable circuits consisting entirely of one gauge can be equalized up to the approximate lengths given below by the use of the 16A Equalizer.

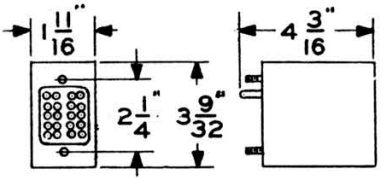
For equalization with maximum deviation of 1 db.

Gauge	Length (Miles)
16	21.5
19	10
22	6.5

For equalization with maximum deviation of 2 db.

Gauge	Length (Miles)
16	25
19	11.5
22	7

ESL-498928
ISSUE 1
DATE 8-2-33



GENERAL — Shunt type equalizer designed for use with non-loaded telephone cable circuits employed for the transmission of high-quality program material to correct for the non-uniform frequency transmission of the cable circuits in the range from 35 to 8000 cycles per second.
Replaces 16A Equalizer.

DESCRIPTION — Consists of an inductance and a capacity in parallel and a series resistance the value of which is determined in the equalizer tests. Seven resistance units are provided the ends of which are brought out to numbered terminals to facilitate connections.
Component parts are assembled in a metal case of the dimensions shown above, designed to mount on an equipment panel such as 993B Mounting Plate which mounts 8 - 23A Equalizers on 1-3/4" centers.

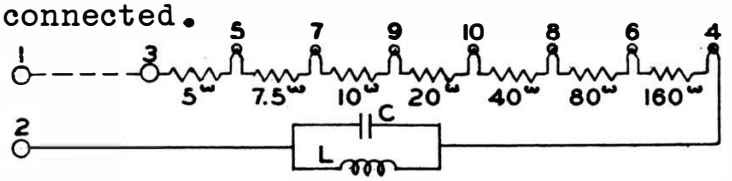
INPUT — Terminals 1 and 2.

FINISH — Aluminum.

WEIGHT — Approximately 3 lbs.

MOUNTING — Mounts on equipment panel through 7/32" holes on 1-3/4" centers. Mounting bolts (.164"-32 thread) attached to metal case. Nuts and lockwashers furnished.

REMARKS — Resistance units are not connected. In making tests to determine value of resistance to be employed an external variable resistance box is used, (terminals 1 and 4 of terminal strip) When the correct value of resistance has been determined the resistance box is removed from the circuit and the fixed resistances connected. A total resistanc of 322.5 ohms is available across terminals 3-4. The following schematic circuit shows the manner in which the resistance units are connected.



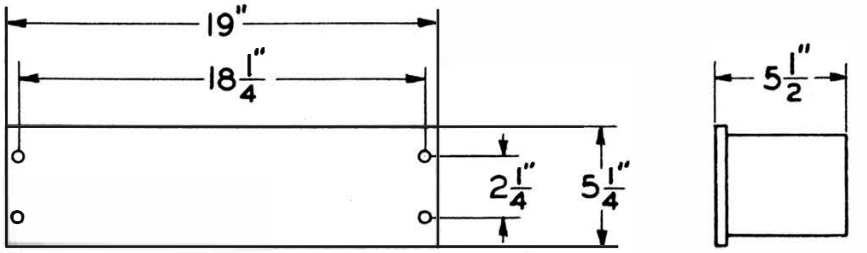
Non-loaded cable circuits consisting entirely of one gauge can be equalized up to the approximate lengths given below by the use of the 23A Equalizer.
For equalization with maximum deviation of 1 db

Gauge	Length (Miles)
16	21.5
19	10
22	6.5

For equalization with maximum deviation of 2 db

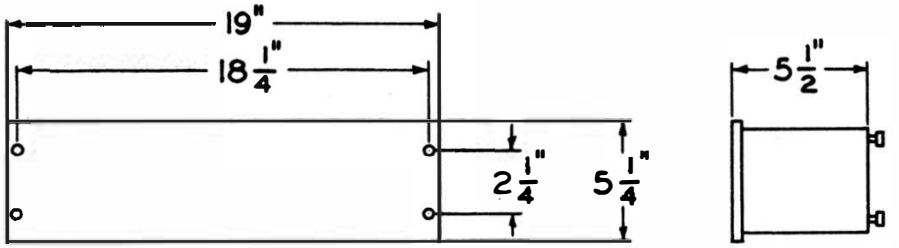
Gauge	Length (Miles)
16	25
19	11.5
22	7.

ESL-499192
ISSUE 1
DATE 4-27-34



GENERAL	Primarily for use in conjunction with the 4A Rectifier and the 708A, 709A, 710A and 711A Filters operating from either 50 or 60 cycle AC for supplying plate power to program amplifiers and volume indicators in Speech Input Equipment. One 707A Filter is required with each 4A Rectifier.
INPUT	From 4A Rectifier.
OUTPUT	To 708A, 709A, 710A and 711A Filters or any combination of these filters.
FUSES	None.
SAFETY SWITCH	None.
FINISH	Black japan.
WEIGHT	17 lbs.
MOUNTING	Arranged to mount on standard relay rack or equipment cabinet. Back cover, held in place by machine screws, is removable for inspection. Mounting screws and washers are furnished.

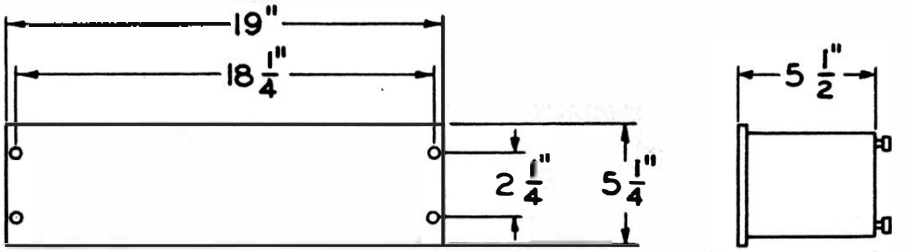
ESL-602561
ISSUE 2
DATE 10-31-32.



SEE REMARKS

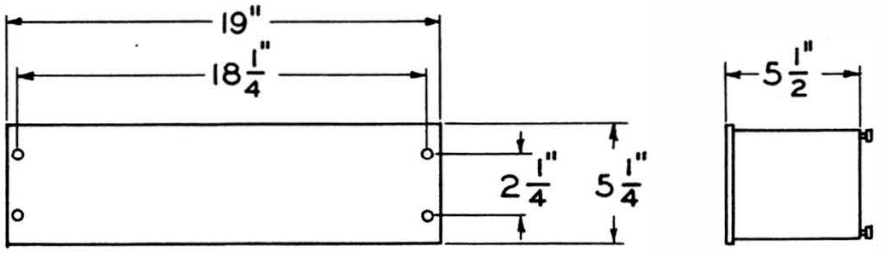
GENERAL	Primarily for use in conjunction with the 4A Rectifier and the 707A Filter operating from either 50 or 60 cycle AC for supplying plate power to program amplifiers in Speech Input Equipment.
INPUT	From 4A Rectifier and 707A Filter.
OUTPUT	To either one or two 60A Amplifiers. (There are two independent filter circuits.)
FUSES	Two 62B (.25 ampere) in positive side of input to each of the filter circuits.
SAFETY SWITCH	Opens positive side of input circuit when back cover is removed.
FINISH	Black japan.
WEIGHT	24 lbs.
MOUNTING	Arranged to mount on standard relay rack or equipment cabinet. Rear cover, held in place by thumb screws, is removable for inspection. Mounting screws and washers are furnished.
REMARKS	Can be used for plate power supply to either an 18B or a 9A Amplifier or the simultaneous operation of two such units.

ESL-602562
ISSUE 2
DATE 6-1-33



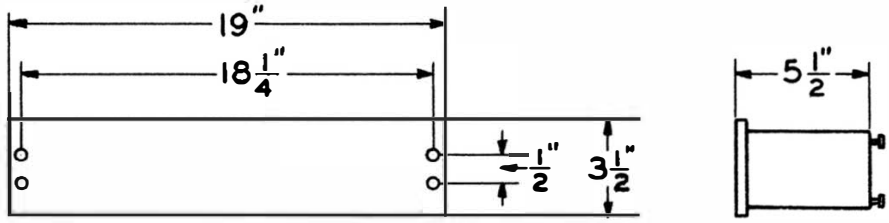
GENERAL	Primarily for use in conjunction with the 4A Rectifier and the 707A Filter operating from either 50 or 60 cycle AC for supplying plate power to program amplifiers in Speech Input Equipment.
INPUT	From 4A Rectifier and 707A Filter.
OUTPUT	To one 61A Amplifier.
FUSES	One 62B (.25 ampere) in positive side of input circuit.
SAFETY SWITCH	Opens positive side of input circuit when back cover is removed.
FINISH	Black japan.
WEIGHT	20 lbs.
MOUNTING	Arranged to mount on standard relay rack or equipment cabinet. Back cover, held in place by thumb screws, is removable for inspection. Mounting screws and washers are furnished.

ESL-602563
ISSUE 2
DATE 6-1-33



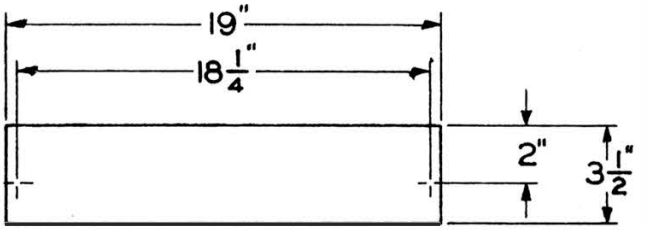
GENERAL	Primarily for use in conjunction with the 4A Rectifier and the 707A Filter operating from either 50 or 60 cycle AC for supplying plate power to program amplifiers in Speech Input Equipment.
INPUT	From 4A Rectifier and 707A Filter.
OUTPUT	To a maximum of four single stage condenser transmitter amplifiers or a maximum of two 80A Amplifiers.
FUSES	One 62B (.25 ampere) in positive side of input circuit.
SAFETY SWITCH	Opens positive side of input circuit when back cover is removed.
FINISH	Black japan.
WEIGHT	18 lbs.
MOUNTING	Arranged to mount on standard relay rack or equipment cabinet. Back cover, held in place by thumb screws, is removable for inspection. Mounting screws and washers are furnished.

ESL-602564
ISSUE 2
DATE 6-1-33



GENERAL	Primarily for use in conjunction with the 4A Rectifier and the 707A Filter operating from either 50 or 60 cycle AC for supplying plate power to volume indicators in Speech Input Equipment.
INPUT	From 4A Rectifier and 707A Filter.
OUTPUT	To one 203B or 203C Volume Indicator Panel.
FUSES	One 62B (.25 ampere) in positive side of input circuit.
SAFETY SWITCH	Opens positive side of input circuit when back cover is removed.
FINISH	Black japan.
WEIGHT	10 lbs.
MOUNTING	Arranged to mount on standard relay rack or equipment cabinet. Back cover, held in place by thumb screws, is removable for inspection. Mounting screws and washers are furnished.

ESL-602565
ISSUE 2
DATE 6-1-33



GENERAL — Designed primarily for use in alternating current operated Speech Input Equipment to operate in conjunction with an 8A Rectifier for supplying plate power to one 81A Amplifier.

INPUT — From terminals 1 and 2 of 8A Rectifier. Input terminals are 1 and 2. The even numbered terminals on both the 8A Rectifier and the 716A Filter are positive.

OUTPUT — From terminals 3 and 4, to terminals 5 and 6 of 81A Amplifier. The even numbered terminals are positive.

FINISH — Dark gray on mat, designated by number 15 after the code number, 716A-15 Filter. Available also with black finished mat, 716A-3 Filter.

Unless otherwise specified dark gray mat will be furnished.

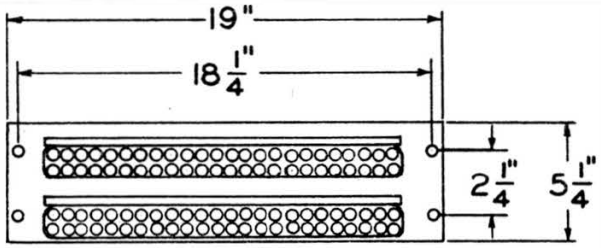
WEIGHT — Approximately 20 lbs.

MOUNTING — Mounts on a standard relay rack although designed for equipment cabinet with rear door equipped with safety switch. Mounting screws are furnished.

No back cover is required.

REMARKS — The maximum safe current through this filter is 6 milliamperes.

ESL-498298
ISSUE 1
DATE 6-1-33



GENERAL — Designed for the 1219A Panel which forms a part of the 9A Speech Input Equipment.

Consists of an assembly of two 185 jack mountings, two 22A shields and two steel ends and is designed to accommodate a total of 96 218A Jacks or similar jacks.

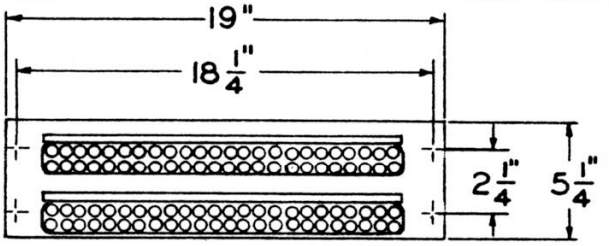
DESCRIPTION — Panel is equipped with a formed steel mat and two designation strips.

FINISH — Black japan.

REMARKS — Jacks do not form a part of this mounting plate and must be ordered separately. Ordinarily the 216A Jack Mounting will be supplied without jacks. If jacks are to be furnished and mounted in the mounting plates the number of jacks required and the types of jacks, as well as the jack positions on the mounting plates must be specified in the order.

Mounts on a standard relay rack or equipment cabinet. Mounting screws and washers are furnished.

ESL-498289
ISSUE 1
DATE 6-1-33



SEE REMARKS

DESCRIPTION Designed primarily for the 700A Speech Input Bay which is a part of the 15A Speech Input Equipment for radio broadcasting.

Consists of a depressed metal panel equipped with two jack mountings for a total of 96 - 218A Jacks, or similar jacks.

Panel is covered by a formed mat which contains two designation strips.

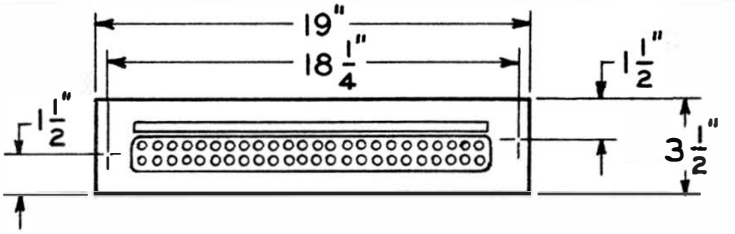
FINISH Dark gray on mat. Available also in black finish. Finish is designated by numbers 15 and 3 after the code number; for example 219A-15 Jack Mounting is dark gray, and 219A-3 is black finish. Unless otherwise specified dark gray (219A-15 Jack Mounting) mat will be supplied. Cadmium plated dust shields above and below jack space on rear of panel.

REMARKS Jacks do not form a part of this jack mounting and must be ordered separately. Ordinarily the 219 Jack Mounting will be supplied without jacks. If jacks are to be furnished and mounted the number of jacks required and the type of jacks, as well as the jack positions, must be specified in the order. For reference to jack positions the mounting positions may be considered as numbered from left to right looking at the front of the panel. The top horizontal row is numbered first and then the positions in subsequent rows are numbered consecutively.

Mounts in a standard relay rack or equipment cabinet. Mounting screws are furnished.

No back cover is required.

ESL-498936
ISSUE 1
DATE 8-2-33



DESCRIPTION Intended primarily for use in Speech Input Equipment assemblies.

Consists of a depressed metal panel equipped with a double row jack mounting to accommodate a total of 48-218A or similar jacks. The jacks do not form a part of the jack mounting and must be ordered separately. If jacks are to be furnished and mounted the number of jacks required and the type of jacks, as well as the jack positions, must be specified in ordering. For reference to jack positions the mounting positions may be considered as numbered from left to right looking at the front of the panel. The top horizontal row is numbered first and then the positions in the second row are numbered.

Panel is covered by a formed mat which contains a single designation strip. No back cover is furnished.

FINISH Dark gray on mat, designated by number 15 after code number, 220A-15 Jack Mounting. Available also with black finished mat, 220A-3. Unless otherwise specified dark gray mat will be furnished.

Cadmium plated dust shields located above and below jack spaces at the back of panel.

WEIGHT Approximately 5 lbs.

MOUNTING Arranged to mount in a standard relay rack or an equipment cabinet. Mounting screws are furnished.

ESL-499190
ISSUE 1
DATE 12-27-33

SEE REMARKS

GENERAL — Double button carbon, push-pull type, high quality transmitter with a diaphragm of stretched duralumin.
Measures approximately 3-1/2 inches in diameter and 2 inches high and is intended for use in speech input equipments and for similar purposes.

OUTPUT — Designed to operate into 200 ohms.

FINISH — Nickel.

WEIGHT — Approximately 2-1/4 lbs.

MOUNTING — Four hooks attached to the outer periphery provide a means for suspension either in the open or inside a transmitter mounting.
Transmitter mountings usually associated with this transmitter are the 1105B which is the bronze pedestal type and the 1101B which is for table or desk use. These mountings include an anti-pack filter; see Remarks.

REMARKS — Replaces the 387 and 387W transmitters and is similar to these except for the means provided for stretching and clamping the diaphragm.
Requires 12 volts direct current supply. A 218A Panel is the control panel for one 600A Transmitter. This transmitter requires a 3 conductor cable which is usually a 2 conductor shielded cord where the shield is the ground or third conductor. T3A cord which is a 2 conductor shielded brown cotton covered cord is employed for this purpose. Hubbell 3 pole polarized caps and receptacles are generally used. T3A cord is supplied in 12' lengths unless otherwise specified.
The 1105B Transmitter Mounting consists of a drum shaped antique brass metal cage equipped with spring supports to support the transmitter. This is mounted on an adjustable floor pedestal with dull bronze finish. The anti-pack filter is mounted in the pedestal base and a 6' cord (D3N) is furnished to connect the microphone to the filter. No external transmitter cord is furnished.
The 1101B Transmitter Mounting employs the same transmitter housing as described for the 1105B Transmitter Mounting, with a base attached for table or desk use. The filter is mounted in the base of the metal housing and 3-8" cords (2-T1A, 1-M1E) are furnished to connect the filter to the microphone. A 5-1/2' external cord (#793) is furnished with this mounting. This cord is equipped with suitable tips for use with a Hubbell 3 pole polarized cap or the equivalent.

ESL-498313
ISSUE 1
DATE 6-1-33

SEE, ALSO, CONDENSER TRANSMITTER AMPLIFIERS
CONDENSER TRANSMITTER ASSEMBLIES

GENERAL — Stretched diaphragm condenser type microphone measuring approximately 2-7/8 inches in diameter and 1-1/8 inches high.

Condenser microphone must be operated with an adjacent associated amplifier. The microphone with its amplifier is known as a condenser transmitter or a condenser transmitter amplifier and is a high quality pickup device for speech input equipments and similar purposes.

FINISH — Microphone is nickel finished.

WEIGHT — Approximately 1-1/4 lbs.

MOUNTINGS — Condenser transmitter is available in several types of mountings finished in black, brown crinkled lacquer and ornamental bronze. These mountings permit its use on a floor stand or pedestal, on a table or desk, or suspended overhead.

REMARKS — Condenser transmitter requires 6 volts for the vacuum tube filaments and a 200 volt battery for polarizing the condenser microphone and furnishing plate potentials to the amplifier. Filament supply is usually obtained through a control panel with rheostats in which case a 12 volt battery is used.

A 217A Panel is the control panel for the filament supply and the 200 volt D.C. supply for one or two condenser transmitters.

ESL-498314
ISSUE 1
DATE 6-1-33

SEE, ALSO, CONDENSER TRANSMITTER ASSEMBLIES

GENERAL Condenser microphone (394) must be operated with an adjacent associated amplifier. Amplifier units used for this purpose are as follows:

Amplifier Unit	Number of Stages	Number and Types of Vacuum Tubes	Used in Condenser Transmitter (Assembly)	Remarks
47A	1	1 - 239A	1015A,1015B,1115A	See 47C
47B	1	1 - 239A	1008A, 1008B	See 47D
47C	1	1 - 264A	1015C, 1015D	Replaces 47A
47D	1	1 - 264A	1008C, 1008D	Replaces 47B
48A	1	1 - 239A	1007A,1007B,1009A 1009B, 1010A, 1010B, 1107A	See 48B
48B	1	1 - 264A	1007C,1007D,1009C 1009D,1010C,1010D	Replaces 48A
53A	2	2 - 239A	1215A, 1215B	See 53C
53B	2	2 - 239A	1208A	See 53D
53C	2	2 - 264A	1215C	Replaces 53A
53D	2	2 - 264A	1208B	Replaces 53B
54A	2	2 - 239A	1207A,1209A,1210A	See 54B
54B	2	2 - D-94044	1207B,1209B,1210B	Replaces 54A

OUTPUT Designed to work into either 200 ohms or 50 ohms as determined by strapping on the output transformer.

REMARKS These amplifiers require 6 volts for the vacuum tube filaments and 200 volts for polarizing the microphone and supplying plate potentials. Filament supply is usually obtained through a control panel with rheostat in which case a 12 volt battery is used. A 217A Panel is the control panel for the filament supply and the 200 volt D.C. supply for one or two condenser transmitter amplifiers.

264A vacuum tubes, designed to replace the 239A are superior from a noise standpoint.

D-94044 vacuum tubes are specially selected 239A tubes.

Microphones, tubes, cords and plugs used with these units must be ordered separately.

See Engineering Data Sheets for Condenser Transmitter Assemblies.

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ISSUE 1
DATE 6-1-33

The following condenser transmitter assemblies employ the 394 microphone and include microphone and mounting, tubes, cords and plugs.

See, also, Condenser Transmitter Assemblies 2 Stage Amplifiers.

Condenser Transmitter	Type	Finish	Ampl'r. Used	Trans. Mtg.	Cords	Plug
* 1007A	Table	Brown	48A	7A	T2E-4"-M6B-12'	253A
* 1007B	"	"	48A	7A	T2E-4"-M6P-12'	264A
1007C	"	"	48B	7A	T2E-4"-M6B-12'	253A
1007D	"	"	48B	7A	T2E-4"-M6P-12'	264A
* 1008A	Floor Stand	"	47B	8A	T2E-6'-M6B-12'	253A
* 1008B	" "	"	47B	8A	T2E-6'-M6P-12'	264A
1008C	" "	"	47D	8A	T2E-5'-M6B-12'	253A
1008D	" "	"	47D	8A	T2E-6'-M6P-12'	264A
* 1009A	Table	Bronze	48A	9A	T2E-4"-M6B-12'	253A
* 1009B	"	"	48A	9A	T2E-4"-M6P-12'	264A
1009C	"	"	48B	9A	T2E-4"-M6B-12'	253A
1009D	"	"	48B	9A	T2E-4"-M6P-12'	264A
* 1010A	Floor Stand	"	48A	10A	T2E-6'-M6B-12'	253A
* 1010B	" "	"	48A	10A	T2E-6'-M6P-12'	264A
1010C	" "	"	48B	10A	T2E-6'-M6B-12'	253A
1010D	" "	"	48B	10A	T2E-6'-M6P-12'	264A
* 1015A	Suspension	Black	47A	See Notes	T3B-4"-M6A-1'	253A
* 1015B	"	"	47A	" "	T3B-4"-M6N-1'	264A
1015C	"	"	47C	" "	T3B-4"-M6A-1'	253A
1015D	"	"	47C	" "	T3B-4"-M6N-1'	264A
1107A	Table	Brown	48A	7A	T2E-4"-M6J-5'	255A
1115A	Suspension	Black	47A	See Notes	T3B-4"-M6J-5'	255A

NOTES: 1 - 10A Cord Hook is furnished with each suspension type transmitter.

*Manufacture of these transmitters has been discontinued.

Suspension type transmitters employing the 47 and 53A and C amplifiers are self-contained in a black enamelled cylindrical case with the microphone mounted on the bottom.

7A Transmitter Mounting is the table or desk type mounting with a brown crinkled lacquer finish. It is approximately 8-1/4" wide, 5-1/4" deep and 10-1/2" high.

8A Transmitter Mounting is the floor pedestal type with a brown crinkled lacquer finish. Base plate is 16" in diameter and upright is adjustable to 6' height. Amplifier is self-contained in cylindrical form at bottom.

9A Transmitter Mounting is the ornamental bronze table or desk type mounting of the same proportions as the 7A.

10A Transmitter Mounting is the ornamental bronze floor or pedestal type mounting. The amplifier is mounted in the base of the pedestal which is adjustable to 6' height.

T2, T3, cords are used between the microphone unit and the closely associated amplifier.

M6 cords are the shielded cables which connect the condenser transmitter amplifier to the associated apparatus. Unless otherwise specified these cables will be furnished in the lengths indicated.

253A Plug - 6 conductor plug where the brass collar and plug shell is the sixth conductor. Used with 369 and 370 jacks.

255A Plug - 6 conductor plug. Used with 373 and 374 jacks.

264A Plug - 6 conductor plug. Used with 379, 380 and 381 jacks.

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The following condenser transmitter assemblies employ the 394 microphone and include microphone and mounting, tubes, cords and plugs.
See, also, Condenser Transmitter Assemblies 1 Stage Amplifiers.

Condenser Transmitter	Type	Finish	Ampl'r. Used	Trans. Mtg.	Cords	Plug
* 1207A	Table	Brown	54A	7A	T2E-4"-M6P-12'	264A
1207B	"	"	54B	7A	T2E-4"-M6P-12'	264A
* 1208A	Floor Stand	"	53B	8A	T2E-6'-M6P-12'	264A
1208B	" "	"	53D	8A	T2E-6'-M6P-12'	264A
* 1209A	Table	Bronze	54A	9A	T2E-4"-M6P-12'	264A
1209B	"	"	54B	9A	T2E-4"-M6P-12'	264A
* 1210A	Floor Stand	"	54A	10A	T2E-6'-M6P-12'	264A
1210B	" "	"	54B	10A	T2E-6'-M6P-12'	264A
* 1215A	Suspension	Black	53A	See Notes	T3B-4" M6N-1'	264A
* 1215B	"	"	53A	" "	T3B-4" M6J-5'	255A
1215C	"	"	53C	" "	T3B-4" M6N-1'	264A

NOTES: 1 - 10A Cord Hook is furnished with each suspension type transmitter.
*Manufacture of these transmitters has been discontinued.
Suspension type transmitters employing the 47 and 53A and C amplifiers are self-contained in a black enamelled cylindrical case with the microphone mounted on the bottom.
7A Transmitter Mounting is the table or desk type mounting with a brown crinkled lacquer finish. It is approximately 8-1/4" wide, 5-1/4" deep, and 10-1/2" high.
8A Transmitter Mounting is the floor pedestal type with a brown crinkled lacquer finish. Base plate is 16" in diameter and upright is adjustable to 6' height. Amplifier is self-contained in cylindrical form at bottom.
9A Transmitter Mounting is the ornamental bronze table or desk type mounting of the same proportions as the 7A.
10A Transmitter Mounting is the ornamental bronze floor or pedestal type mounting. The amplifier is mounted in the base of the pedestal which is adjustable to 6' height.
T2, T3, cords are used between the microphone unit and the closely associated amplifier.
M6 cords are the shielded cables which connect the condenser transmitter amplifier to the associated apparatus. Unless otherwise specified these cables will be furnished in the lengths indicated.
253A Plug - 6 conductor plug where the brass collar and plug shell is the sixth conductor. Used with 369 and 370 jacks.
255A Plug - 6 conductor plug. Used with 373 and 374 jacks.
264A Plug - 6 conductor plug. Used with 379, 380 and 381 jacks.

ESL-498323
ISSUE 1
DATE 6-1-33

(MOVING COIL) MICROPHONE TRANSMITTER 618A

GENERAL — Moving coil type, high quality microphone which requires no power supply for its operation.

DESCRIPTION — Consists of a diaphragm supporting the speech coil in the field of a permanent magnet. The microphone is enclosed in a metal case with a screened opening at the front and a jack at the rear. It measures approximately 3-1/4" across the diameter of the face and is about 3" deep.

OUTPUT — Designed to operate into 30 ohms.

FINISH — Black crinkled lacquer (618A-3) or oxidized bronze (618A-13). Finish must be specified in the order.

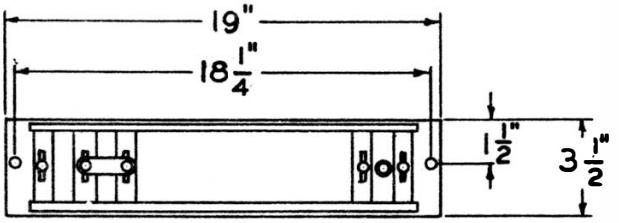
WEIGHT — Approximately 2-1/2 lbs.

MOUNTING — Three types of mountings are available for this transmitter as follows:

The 17A Transmitter Mounting is for overhead suspension. This consists of a metal framework with a closed hook at the top. In this mounting the face of the microphone may be adjusted to any position from the vertical to the horizontal.
The 18A Transmitter Mounting is for table or desk use. It has a fixed height of 13".
The 19A Transmitter Mounting is an adjustable floor pedestal for heights from 3'-8" to 5'-10".
These mountings are available in black crinkled lacquer or oxidized bronze finishes, designated by numbers 3 and 13, respectively, after the code numbers.
Cords are not furnished as part of the mountings and must be ordered separately.

CORDS AND PLUGS — M3J cord - 100' length 2 conductor shielded Tirex cord equipped with plug and jack is usually specified for the 17A-3 transmitter mounting. Plug and jack are black crinkled lacquer finish.
M3K cord - 2 conductor, shielded, flexible cord with brown cotton covering for use with the 18 and 19 type mountings. This cord is equipped with oxidized bronze plug and jack and is furnished in 12' and 5' lengths. Unless otherwise specified the 12' length will be supplied.
286B plug, designed for base board mounting on a single gang outlet box, is used with these cords.
405A jack is fixed mounted type and is a part of the 618A transmitter.
406A jack is portable type for use on a cord.
284A plug is fixed type for mounting on apparatus.
285A plug is portable type for use on a cord.
These plugs and jacks are of the compression type, connected and held in contact by pressure applied by means of a cam lever located on the side of the plug. They are available in the same finishes noted for the transmitter mountings.

ESL-498312
ISSUE 1
DATE 6-1-33



SEE REMARKS

GENERAL — Used for mounting the switching keys and lamps in the 1219A and 1219B Panels which are parts of the 9A and 9B Speech Input Equipments respectively. Provides a mounting for a total of eighteen C1 type keys and C type key spaces and 40A Lamp Sockets.

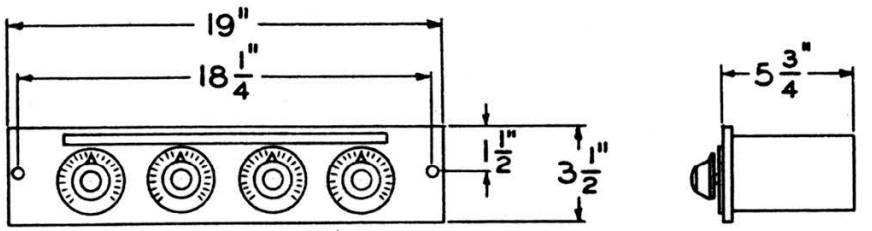
DESCRIPTION — Aluminum finished steel plate equipped with a formed mat. Designation strips are provided along the top and bottom of the plate.

FINISH — Black japan.

REMARKS — Keys, lamps and key spaces do not form a part of this mounting plate and must be ordered separately. Their positions on the mounting plate shall be specified in the order. For reference to positions on the mounting plate the mounting positions may be considered as numbered from left to right looking at the front of the panel.

Mounts on a standard relay rack or equipment cabinet.
Mounting screws and washers are furnished.
No back cover is required.

ESL-498286
ISSUE 1
DATE 6-1-33



GENERAL — Primarily designed for use in the 1219A Panel which is a part of the 9A Speech Input Equipment. Provides a mounting for four 700 Type Potentiometers.

DESCRIPTION — Aluminum finished steel plate equipped with mat and rear cover. A designation strip is mounted on the front of this mounting plate above the potentiometer positions.

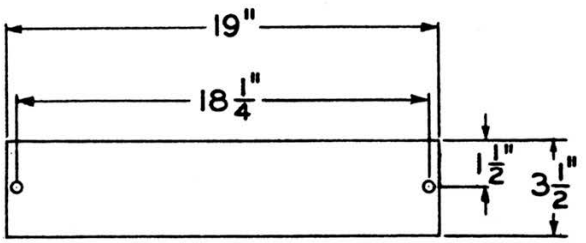
FINISH — Black japan on mat. Aluminum finish on back.

REMARKS — The Potentiometers do not form a part of this mounting plate and must be ordered separately. All positions are equipped with a blank unless specified. Apparatus required and positions on the mounting plate shall be specified in the order.

Mounts on a standard relay rack or equipment cabinet. Mounting screws and washers are furnished.

Back cover is removable for inspection.

ESL-498287
ISSUE 1
DATE 6-1-33



GENERAL — Primarily designed for the 1219A Panel which is a part of the 9A Speech Input Equipment. Provides a mounting for the terminal strips for the incoming and outgoing speech circuits

DESCRIPTION — Aluminum finished steel plate equipped with a mat and brackets for mounting one or two #36 terminal strips, (See Remarks).

FINISH — Black japan on mat. Aluminum finish on back.

REMARKS — The terminal strips do not form a part of this mounting plate and must be ordered separately. Their positions on the mounting plates shall be specified in the order.

Mounts on a standard relay rack or equipment cabinet. Mounting screws and washers are furnished.

This plate can be used to mount one or two of the following terminal strips - #35, 36, 37, 51.

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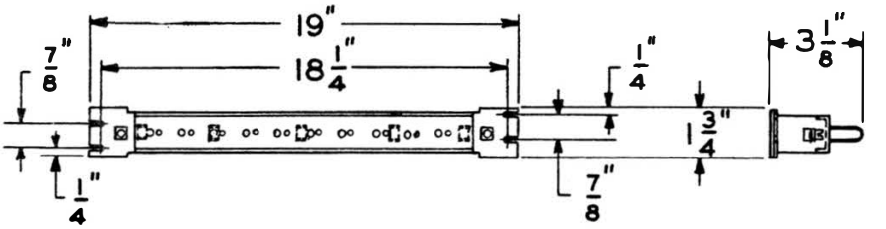


GENERAL Designed primarily for Speech Input Equipment assemblies for mounting a total of ten 700A Terminal Strips or 11A Connecting Blocks.

Consists of a depressed metal panel which is equipped with a ground lug and five metal tie posts to fasten connecting cables. Panel is drilled to accommodate a total of ten terminal strips or connecting blocks. Panel mounts behind standard screwless blank mat. However, blank mat is not part of this mounting plate.

700A Terminal Strips and 11A Connecting Blocks are not furnished with this panel and must be provided separately. (SEE REMARKS).

Each position equipped with a 700A Terminal Strip will require one .138"-32 x 3/8" round head machine screw and one #1206 shake-proof lock washer or the equivalent, for mounting. Each position equipped with an 11A Connecting Block will require one .138"-32 x 3/4" round head machine screw, one P-145651 washer, one #1206 shake-proof lock washer, and one .138"-32 Std. Hex. nut or the equivalents, for mounting. The necessary mounting parts for a total of 11 - 700A Terminal Strips and 5 - 11A Connecting Blocks are provided with this panel.

FINISH Cadmium plate.

WEIGHT Approximately 1 lb.

MOUNTING Arranged to mount in a standard relay rack or equipment cabinet. Mounting screws are furnished.

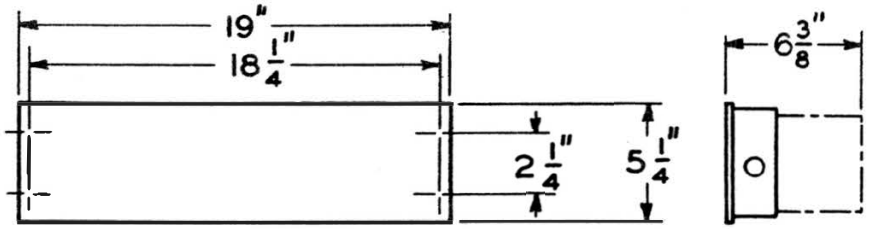
No mat and back cover are supplied.

REMARKS If mounting plate equipped with terminal strips and, or, connecting blocks is required, the number of each and the mounting positions to be occupied must be specified in ordering. Mounting positions are 1-10 reading from left to right, viewed from the rear.

ESL-499195
ISSUE 1
DATE 12-26-33

Western Electric
SPEECH INPUT EQUIPMENT

MOUNTING PLATE 993 A



GENERAL — Intended primarily as a mounting for 6 - 119 Type Repeating Coils in Speech Input Equipment assemblies.

Consists of a depressed metal panel equipped with a mat. Panel is drilled (7/32" holes) to mount 6 repeating coils on 2-5/8" centers. Repeating coils are not part of the mounting plate and must be provided separately. (SEE REMARKS)

A 1" hole is provided in each side wall of panel to admit connecting cables.

No terminal strip is provided.

Two ground lugs are provided for connection to the cable shields.

No back cover is required.

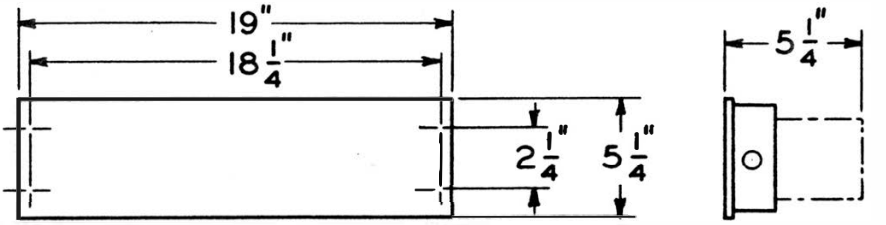
FINISH — Dark gray on mat designated by number 15 after code number, 993A-15 Mounting Plate. Available also with black finished mat, 993A-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT — Approximately 5 lbs.

MOUNTING — Arranged for mounting in a standard relay rack or equipment cabinet. Mounting screws are furnished.

REMARKS — If mounting plate equipped with coils is required, the type and number of coils and the mounting spaces for each must be specified. Mounting spaces may be referred to as 1 to 6 reading from right to left as viewed from the back of panel.

ESL-499194
ISSUE 1
DATE 12-27-33



GENERAL — Intended primarily as a mounting for 8 - 23A Equalizers in Speech Input Equipment assemblies.

Consists of a depressed metal panel equipped with a mat. Panel is drilled (7/32" holes) to mount 8 equalizers on 1-3/4" centers. Equalizers are not a part of the mounting plate and must be provided separately. (SEE REMARKS)

A 1" hole is provided in each side wall of panel to admit connecting cables.

No terminal strip is provided.

Two ground lugs are provided for connection to the cable shields.

No back cover is required.

FINISH — Dark gray on mat, designated by number 15 after code number, 993B-15 Mounting Plate. Available also with black finished mat, 993B-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT — Approximately 5 lbs.

MOUNTING — Arranged for mounting in a standard relay rack or an equipment cabinet. Mounting screws are furnished.

REMARKS — If mounting plate equipped with equalizers is required, the number of 23A Equalizers and the mounting spaces for each must be specified. Mounting spaces may be referred to as numbers 1 to 8 reading from right to left as viewed from the back of the panel.

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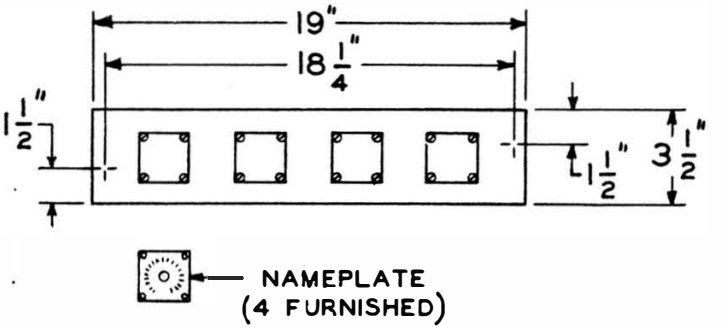
ISSUE 1
DATE 12-27-33



GENERAL — Designed primarily for use in Speech Input Equipment assemblies to provide a mounting and nameplate for 1 to 4 - 707A Potentiometers, which are employed as gain control potentiometers for 1 to 4 - 82A Amplifiers when the latter are used as isolating amplifiers for outgoing program lines.

Furnished with a mat which is equipped with four blank plates. These are removable and are replaced by photo-etched nameplates when 707A Potentiometers are installed. Nameplates are furnished. Metal panel is drilled and tapped to accommodate 4 potentiometers on 4-3/16" centers. Mat is drilled to accommodate potentiometer shafts.

No back cover is furnished.

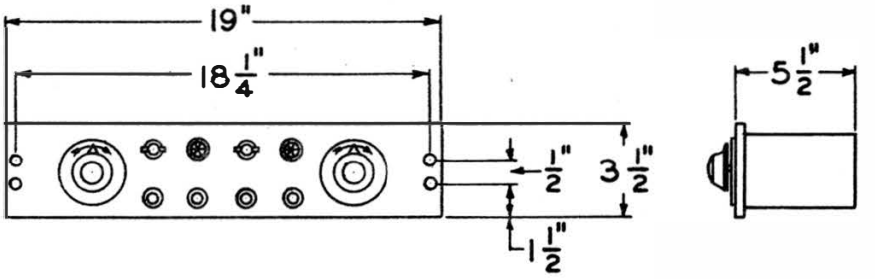
FINISH — Dark gray on mat, blank plates and nameplates, designated by number 15 after code number, 994A-15 Mounting Plate. Obtainable also with black finished mat, blank plates, and nameplates, 994A-3 Mounting Plate. Unless otherwise specified dark gray mat and plates will be furnished.

Nameplates have chromium colored photo-etched designations.

WEIGHT — Approximately 3 lbs.

MOUNTING — Arranged to mount in standard relay rack or equipment cabinet. Mounting screws are furnished.

ESL-499189
ISSUE 1
DATE 12-20-33



SEE REMARKS

GENERAL — Designed primarily for use in Speech Input Equipments to permit the use of condenser transmitters. Consists of a steel mounting plate and mat equipped with rheostats, keys, jacks, relays and lamps for controlling two condenser transmitter amplifiers.

Does not provide facilities for switching the output circuits of the amplifiers.

Back cover is furnished.

FUSES — None.

FINISH — Black japan.

WEIGHT — Approximately 15 lbs.

MOUNTING — Designed for standard relay rack or equipment cabinet. Mounting screws and washers are furnished.

Back cover removable for inspection.

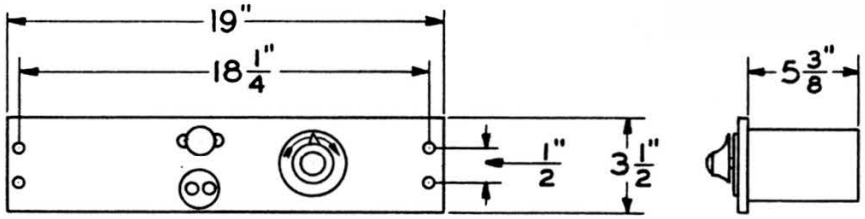
REMARKS — Used to control power supply to one or two condenser transmitters.

Designed as supplementary equipment for existing speech input systems where it is desired to use condenser transmitters or to provide additional condenser transmitters.

200 volt battery for polarizing the transmitter and plate supply for the transmitter amplifier as well as 12 volt storage battery and 12 volt signal battery are required with this equipment. Relays for pilot lamp indication and rheostats for adjustment of the filament current to the associated condenser transmitters are connected in series with the 12 volt filament supply to the transmitters. The voltage drop through these accessory parts is approximately 6 volts.

ESL-498293
ISSUE 1
DATE 6-1-33

(CARBON TRANSMITTER) CONTROL PANEL 218 A



SEE REMARKS

GENERAL — Primarily intended for use in Speech Input Equipments to permit the use of a carbon button microphone.

DESCRIPTION — Consists of a steel mounting plate and mat equipped with a rheostat, key, and jacks for controlling one carbon button microphone. Repeating coil, retardation coil and condenser are mounted on back of panel.

Back cover is furnished.

Does not provide facilities for switching the output circuit of the microphone.

FUSES — None.

FINISH — Black japan.

WEIGHT — Approximately 20 lbs.

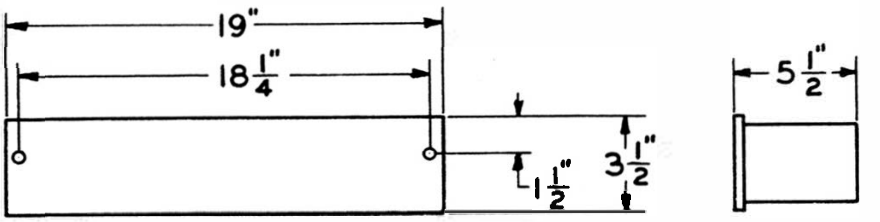
MOUNTING — Designed for standard relay rack or equipment cabinet. Mounting screws and washers are furnished.

Back cover removable for inspection.

REMARKS — Intended as supplementary equipment for existing speech input equipments where it is desired to use a carbon button microphone or to provide additional carbon microphones.

12 volt + or - ground battery is required with this equipment.

ESL-498295
ISSUE 1
DATE 6-1-33



SEE REMARKS

GENERAL — Designed primarily for the 1219A Panel of the 9A Speech Input Equipment, in association with the 217A Panel (CTA control) when condenser transmitters and condenser transmitter amplifiers are required.

This panel provides the filter for the 200 volt DC plate supply from the 223A Panel (Rectifier).

DESCRIPTION — Consists of a steel mounting plate and mat. Filter apparatus is mounted on back of mounting plate and provided with a cover as a shield.

INPUT — From 223A Panel (Rectifier) to terminals 1-3 (terminal 1 is positive).

OUTPUT — From terminals 4-6 to 217A Panel (terminal 6 is positive).

FUSES — None.

SAFETY SWITCH — None (See MOUNTING).

FINISH — Aluminum gray on at. Aluminu finish on back.

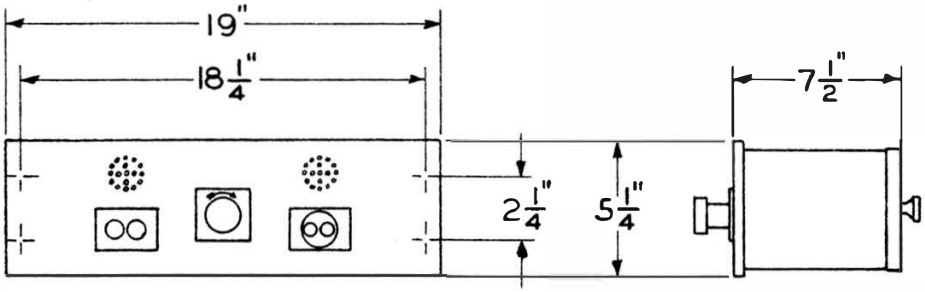
MOUNTING — Mounts on a standard relay rack although designed for equipment cabinet with back door equipped with safety switch. Mounting screws and washers are furnished.

Back cover removable for inspection.

REMARKS — Designed primarily for use in coded assemblies of apparatus.

Orders for this panel for uses other than herein specified should be referred to the Bell Telephone Laboratories, Inc.

ESL-498294
ISSUE 1
DATE 8-1-33



GENERAL — Intended primarily for use in Speech Input Equipments to furnish order wire facilities at the operating points in a radio broadcasting system. A 206A Hand Telephone Set or an operator's telephone set, or both simultaneously, may be used. The handset and the operator's telephone set are not furnished with the 260A Telephone Panel but must be ordered separately.

DESCRIPTION — Depressed metal panel equipped with a mat and a back cover. The ringing generator, ringer, induction coil, condensers, and other parts of the apparatus are mounted on the depressed panel. The panel wiring and terminal block are located in the depressed section of the panel behind the mat. At the front of the panel are the generator handle, a double jack for connecting the telephone set, and keys for the ringer and the local battery supply. The sound of the bells is audible through perforations in the mat.

INPUT — Terminals 1 and 2.

CURRENT SUPPLY — 12 volt DC source (terminals 9 and 10, 10 is +), or local 4.5 volt dry battery (No. 771A Eveready battery or the equivalent). Dry battery is not furnished with telephone panel but must be ordered separately.

SIGNALLING — Outgoing ringing accomplished by hand-operated generator. Incoming signal through the ringer previously referred to.

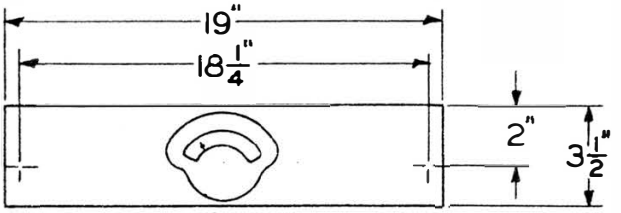
TALKING — Terminals 3, 4, 5, 6, 7, and 8 are provided for connection to a 206A Hand Telephone Set. Double jacks provide for the use of an operator's telephone set.

FINISH — Dark gray on mat, aluminum finished back cover, designated by number 15 after code number, 260A-15 Telephone Panel. Available also with black mat and back cover, 260A-3. Unless otherwise specified dark gray mat and aluminum finished back cover will be furnished.

WEIGHT — Approximately 25 pounds.

MOUNTING — Arranged to mount in a standard relay rack or equipment cabinet. Mounting screws are furnished. Back cover removable for inspection.

ESL-498932
ISSUE 1
DATE 8-2-33



FOR D.C.

SEE REMARKS

GENERAL — Designed primarily for use with the 81A and the 82A Amplifiers of Speech Input Equipments for radio broadcasting, to measure the plate currents of the vacuum tubes.

DESCRIPTION — Consists of a depressed metal panel equipped with a mat, for mounting a special two-scale (0-4, 0-40) milliammeter, a 100,000 ohm resistance and two terminal blocks. The meter is mounted on the mat and is connected to the meter terminal block by flexible conductors. By loosening the mat retaining screws at the back of the panel the mat and the meter may be dropped away from the panel to permit access to the wiring and the terminal strips in the depressed section of the panel.
100,000 ohms resistance is provided as a shunt to ground to prevent clicks in the amplifier outputs when measuring the plate currents.

INPUT — Input terminals are 1 to 8 inclusive. Odd numbered terminals are strapped together and are -. Even numbered terminals are strapped together and are +.

FINISH — Dark gray on mat, aluminum finish on back. Available also with black finished mat. Dark gray finish, designated by number 15 after code number; for example, 262A-15 Meter Panel. Black finish designated by number 3 after code number. Unless otherwise specified dark gray (262A-15 Meter Panel) finish will be supplied.

WEIGHT — Approximately 5 lbs.

MOUNTING — Arranged to mount in a standard relay rack or equipment cabinet.
Mounting screws are furnished.
No back cover is required.

REMARKS — Designed specifically for coded assemblies of Speech Input Equipment which employ 81A and 82A Amplifiers. Shunts for meter panel are provided in these amplifiers. No shunts are furnished with 262A Meter Panel and for this reason it is not suitable for use with amplifiers other than those mentioned or as a general service meter.
May be used with either 81A or 82A Amplifiers or a combination of these amplifiers.

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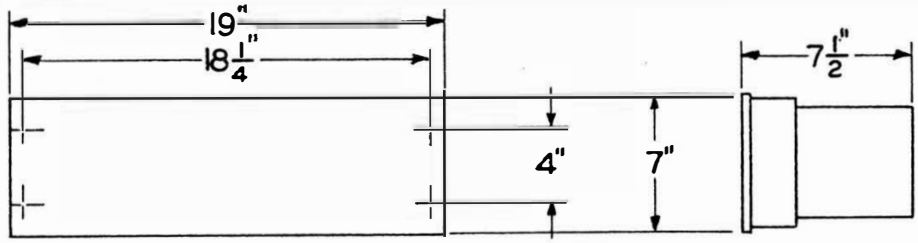
ISSUE 1
DATE 8-2-33

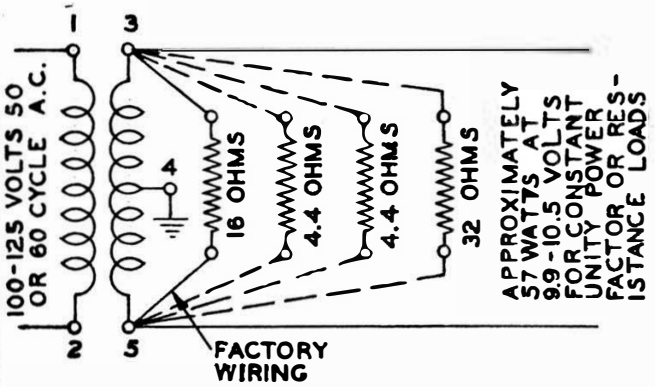
VOLTAGE REGULATOR PANEL 263 TYPE



A.C. OPERATED

GENERAL — Intended primarily for use with alternating current operated Speech Input Equipments for radio broadcasting, to furnish a constant 10 volt AC potential, from 100-125 volt AC power supply, for the filaments of vacuum tubes used in amplifiers and volume indicators. 263A is designed for 60 cycle alternating current supply. 263B operates from 50 cycle AC.

DESCRIPTION — Consists of a depressed metal panel which mounts a constant voltage transformer and four load compensating resistances.



Load Requirements	Connections
2-82A Amplifiers 1-700A Vol. Indicator	As shown
2-82A Amplifiers 1-700A Vol. Indicator 1-81A Amplifier	Disconnect 16 ohms
1-82A Amplifier 1-700A Vol. Indicator 1-81A Amplifier	Disconnect 16 ohms and connect 1-4.4 ohms
2-82A Amplifiers 1-81A Amplifier	Disconnect 16 ohms and connect 32 ohms

FUSES — None.

FINISH — Dark gray on mat, designated by number 15 after code number, 263A-15. Available also with black mat, 263A-3. Unless otherwise specified dark gray m t will be furnished. No back cover is required.

WEIGHT — Approximately 35 lbs.

MOUNTING — Arranged to mount in a standard relay rack although designed for equipment cabinet with rear door equipped with safety switch. Mounting screws are furnished.

REMARKS — Designed specifically for coded assemblies of Speech Input Equipment which employ 81A and 82A Amplifiers and 700A Volume Indicators. When used in assemblies other than those for which it is designed it will be necessary to provide a power switch and a 3 ampere fuse externally. Will deliver 5.6 amperes at 10 volts AC from 100-125 volt 50 or 60 cycle AC m ins for constant load condition only; otherwise low voltage regulation will not be maintained.

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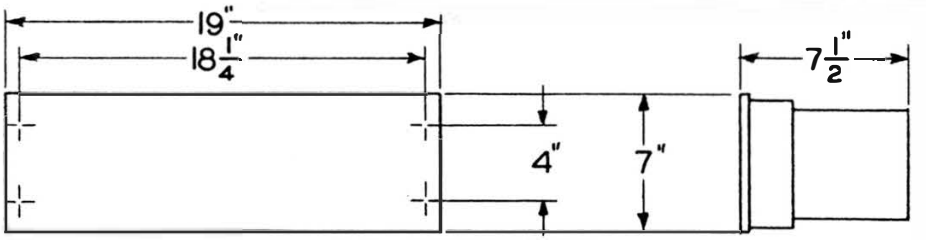
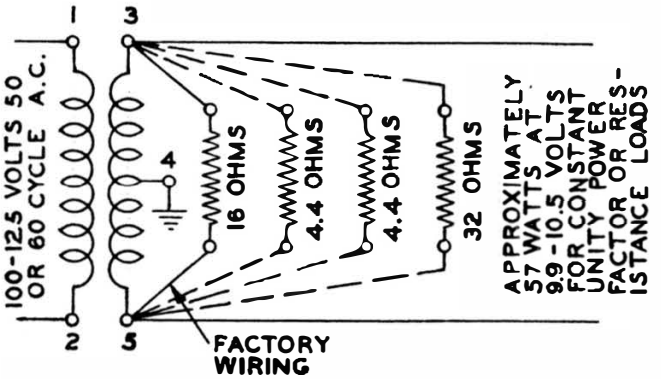


A.C. OPERATED

GENERAL — Intended primarily for use with alternating current operated Speech Input Equipments for radio broadcasting to furnish two sources of constant 10 volt AC potential from 100-125 volt AC power supply, for the filaments of vacuum tubes used in amplifiers and volume indicators. 264A is designed for 60 cycle alternating current supply. 264B operates from 50 cycle AC.

DESCRIPTION — Consists of a depressed metal panel which mounts two constant voltage transformers and eight load compensating resistances. The following diagram and table of connections is applicable to each transformer and its four associated resistances.



Load Requirements	Connections
2-82A Amplifiers 1-700A Vol. Indicator	As shown
2-82A Amplifiers 1-700A Vol. Indicator 1-81A Amplifier	Disconnect 16 ohms
1-82A Amplifier 1-700A Vol. Indicator 1-81A Amplifier	Disconnect 16 ohms and connect 1-4.4 ohms
2-82A Amplifiers 1-81A Amplifier	Disconnect 16 ohms and connect 32 ohms

FUSES — None.

FINISH — Dark gray on mat, designated by number 15 after code number 264A-15 Voltage Regulator Panel. Available also with black mat, 264A-3. Unless otherwise specified dark gray mat will be furnished.
No back cover is required.

WEIGHT — Approximately 60 lbs.

MOUNTING — Arranged to mount in a standard relay rack although designed for equipment cabinet with rear door equipped with safety switch. Mounting screws are furnished.

REMARKS — Equivalent to two 263 Type Voltage Regulator Panels. Designed specifically for coded assemblies of Speech Input Equipment which employ 81A and 82A Amplifiers and 700A Volume Indicators. When used in assemblies other than those for which it is designed it will be necessary to provide a power switch and 3 ampere fuse externally. Each transformer will deliver 5.6 amperes at 10 volts from 100-125 volt 50 or 60 cycle AC mains for constant load (unity power factor) condition only; otherwise low voltage regulation will not be maintained.

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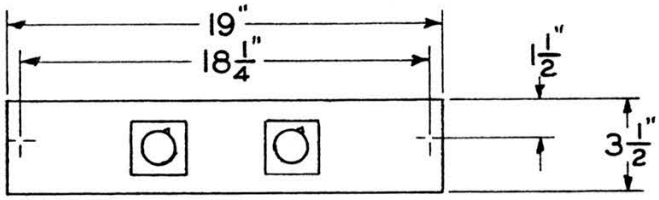
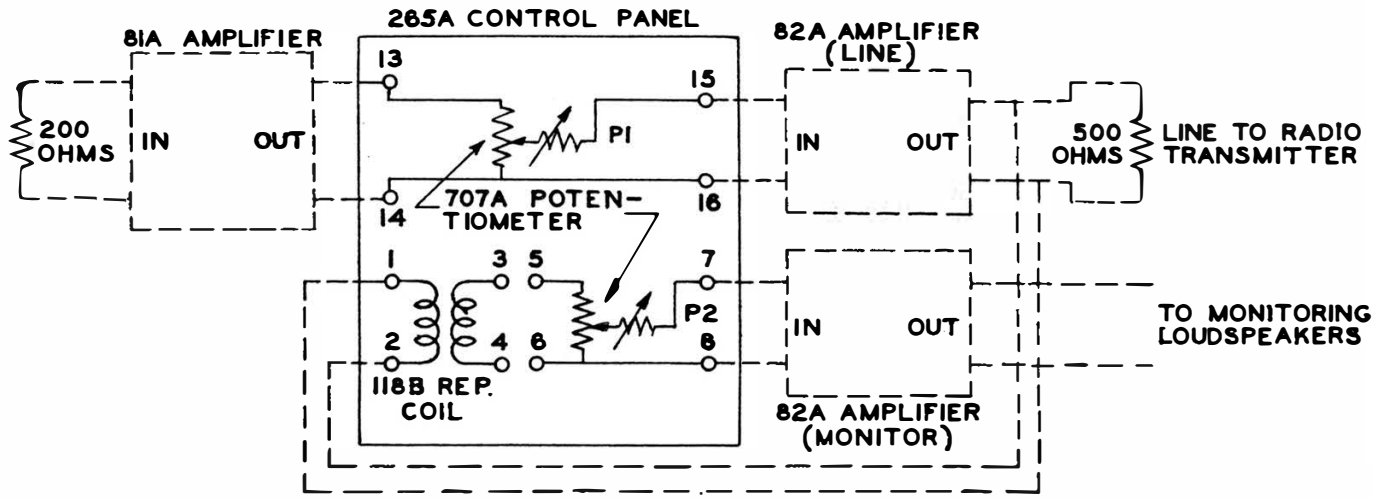


GENERAL — Designed primarily for use as a gain control unit with Speech Input Equipments which employ 81A and 82A Amplifiers.

DESCRIPTION — Consists of a metal panel which mounts two 707A Potentiometers, a 118B Repeating Coil, and two terminal blocks for the interconnections and connections to the external equipment. Front of panel is covered by a dark gray mat which is held in position by screws from the rear.
Potentiometers provide 36 db attenuation in 18 steps of 2 db each. Output impedances of potentiometers are constant-200 ohms for all settings. 118B Repeating Coil is intended as high impedance coupling unit for bridging or monitoring circuits on a 500 ohm line.
Repeating coil and potentiometer terminals are brought out to terminal strips TS1 and TS2 where the interconnections for the particular service required may be made.
In the following typical diagram of connections the numbers refer to terminals on TS1 and TS2.



FINISH — Dark gray mat designated by number 15 after code number, 265A-15 Control Panel. Available also with black finished mat, 265A-3. Unless otherwise specified dark gray mat will be furnished. No back cover is required.

WEIGHT — Approximately 10 lbs.

MOUNTING — Designed to mount in a standard relay rack or equipment cabinet. Mounting screws are furnished.

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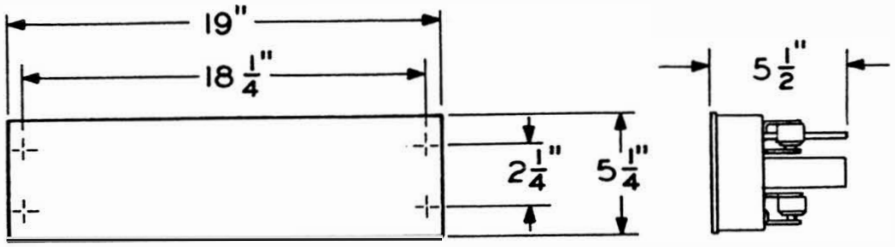

GENERAL — Designed primarily for use in 701A Speech Input Bay which is the major equipment assembly for a single channel studio speech input equipment. Relay panel contains the relays and substitute resistance loads and click-suppressing condensers and resistances for use with a 267 Type Control Panel and a 270A or 271A Output Switching Panel if one is used. In combination with the control panel the relay panel furnishes facilities for the switching operations incident to the operation of a single channel studio speech input system.

Contains 5 relays two of which are associated with the studio channel monitoring amplifier output circuit for the operation of studio and booth loud speakers and warning lights and telephone buzzers. The remaining 3 relays are the output relay, the output locking relay and the release relay which are employed for control of the single channel amplifier output circuit.

Apparatus units are mounted on a rubber-floated aluminum finished mounting plate; hence the transmission of vibrations resulting from the operation of the relays is minimized and the relay panel may be mounted in the same cabinet or relay rack with high gain amplifiers.

No back cover is furnished.

POWER SUPPLY — Requires 12 volts DC supply for the operation of the relays and the indicating lamps on the associated control and switching panels previously mentioned.

FINISH — Dark gray on mat designated by number 15 after the code number, 266A-15 Relay Panel. May be obtained with a black finished mat, 266A-3 Relay Panel. Unless otherwise specified dark gray mat will be furnished.

WEIGHT — Approximately 10 lbs.

MOUNTING — Arranged to mount in a standard relay rack or an equipment cabinet. Mounting screws are furnished.

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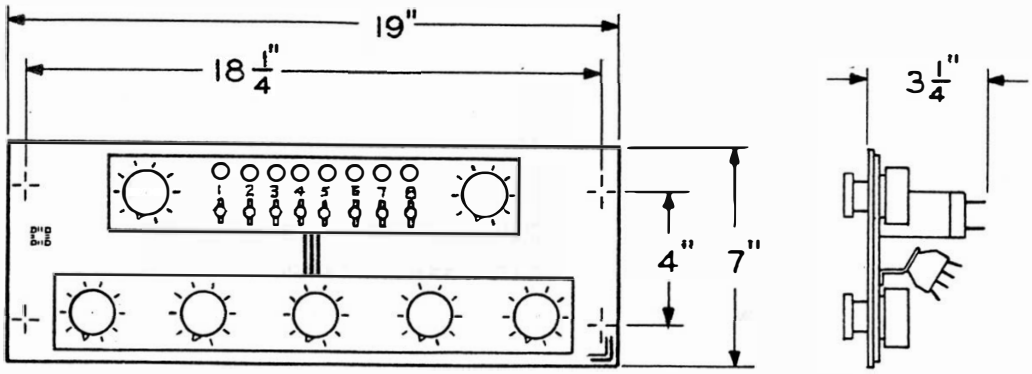

GENERAL — Intended for use with the 701A Speech Input Bay as the operating and control unit for one studio amplifier channel. Contains keys and mixing potentiometers for four or five microphone (dynamic) or 30-ohm input circuits, line and monitoring amplifier gain control potentiometers, and keys and signals for control of the line and the monitoring amplifier outputs and control of studio warning lights and buzzers if these are used.

No back cover is furnished.

12-volt DC power supply is required for the operation of the relays in the associated 266A Relay Panel and the signal lamp of the control panel.

WEIGHT — Approximately 15 lbs.

MOUNTING — 267A Control Panel utilizes a photo-etched chromium finished mat and is designed for use in 10A Cabinet in the control booth associated directly with the studio or with two adjoining studios.

267B Control Panel is intended for mounting in a standard relay rack or equipment cabinet such as 701A Speech Input Bay. It is available with either a dark gray or black finished mat. The finish is designated by a dash number after the code number; for example 267B-15 Control Panel includes a dark gray mat, 267B-3 Control Panel includes a black finished mat. Unless otherwise specified dark gray mat (267B-15 Control Panel) will be furnished.

Mounting screws are furnished.

REMARKS — The 267 Type Control Panel operates in conjunction with a 266A Relay Panel of a 701A Speech Input Bay for either a 4 microphone channel mixing circuit input with rehearsal-break or a straight 5 microphone channel input as required. The rehearsal-break feature controlled by key 5, enables the operator to converse over the amplifier system and studio loud speaker with the studio artists and personnel during the course of studio rehearsals or auditions, or to deliver program announcements and introductions during an actual broadcast.

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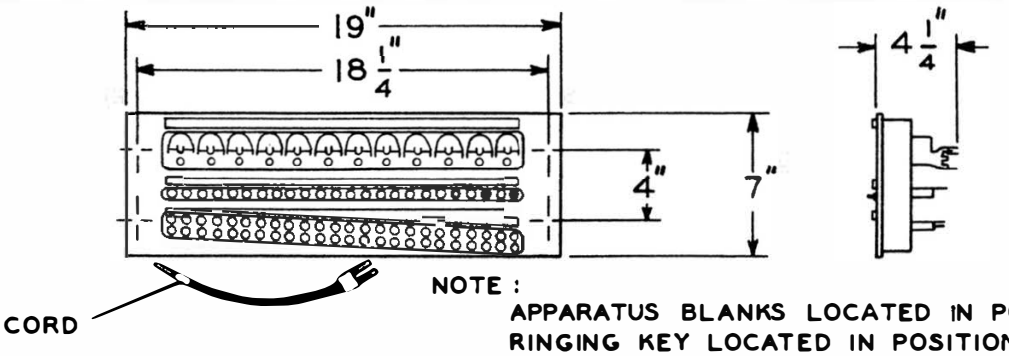
Western Electric
SPEECH INPUT EQUIPMENT

ORDER WIRE PANEL 268A



NOTE :
APPARATUS BLANKS LOCATED IN POSITIONS 19, 21, 23.
RINGING KEY LOCATED IN POSITION 20.
LINE LAMP LOCATED IN POSITION 22.
BUZZER CUT-OFF KEY LOCATED IN POSITION 24.

GENERAL Designed primarily for use in Speech Input Equipments to provide terminating and signalling facilities for telephone order wire circuits between the operating points in radio broadcasting systems. Intended for use with a 260A Telephone Panel and 206A Hand Telephone Set, or a similar telephone set. 12 volts grounded DC supply for the signal lamp and the buzzer and 20 cycle ringing voltage are required. The telephone set and the supply voltages are not furnished with the panel and must be provided separately.

DESCRIPTION Consists of an assembly of 12 combined line drop and jack units for the incoming telephone circuits and mountings for the line lamp, buzzer, ringing key and the jacks associated with the telephone lines and the local talking and signalling circuit.

Spare jacks and mounting positions are provided for additional lines if required.

An 18" black cord (P2T cord) equipped with a 241B (double) plug at one end and a 221 (single) plug at the opposite end, is furnished for answering and calling. Answering cord double plug is inserted in jacks 13-14.

A terminal strip at the back of the panel contains six terminals for connection to a telephone set (terminals 3 and 4), a 12 volt grounded DC supply, (terminals 5 and 6, 6 is ground) and 20 cycle ringing voltage (terminals 1 and 2).

Normal operation is effected without patch cords but jacks are provided so that lines on this panel and on an associated 272A Program Line Panel may be interchanged.

No back cover is furnished.

FINISH Dark gray on mat, designated by number 15 after code number, 268A-15 Order Wire Panel. Available also with black finished mat, 268A-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT Approximately 25 lbs.

MOUNTING Arranged to mount in standard relay rack or equipment cabinet. Mounting screws are furnished.

RECOMMENDED ACCESSORY EQUIPMENT

260A Telephone Panel
206A Hand Telephone Set
272A Program Line Panel
Patching cords - P2AA white cords each equipped with two 241A Plugs - specify cord lengths desired.

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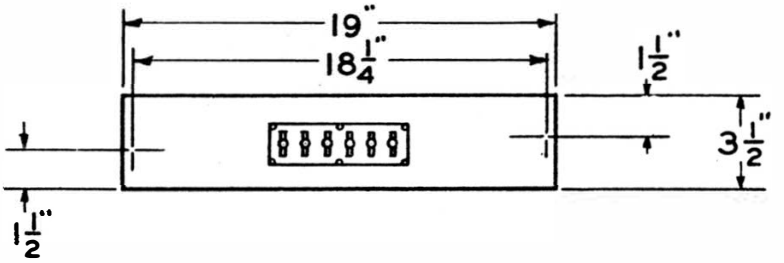
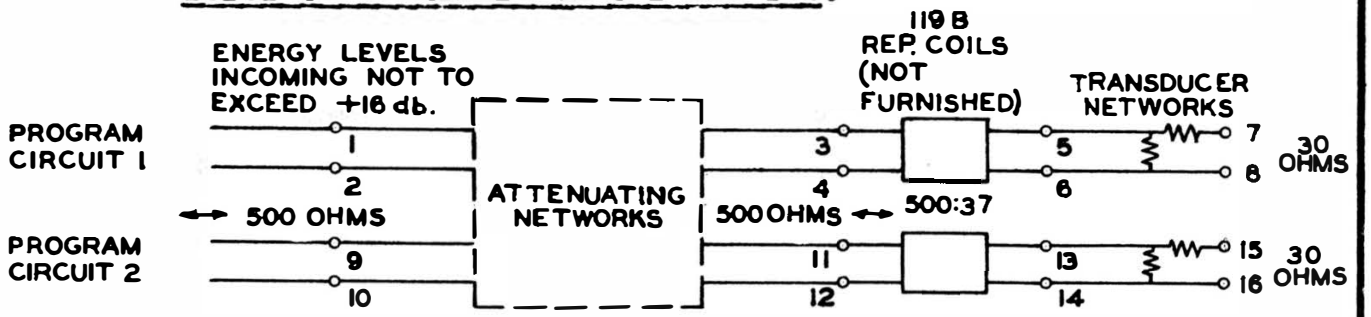


GENERAL — Designed for use with Speech Input Equipment assemblies to provide a maximum of 70 db attenuation in three key-controlled steps of 10 db, 20 db, and 40 db, in each of 2-500 ohm program circuits for radio broadcasting. Contains a transducer network in each circuit for connection between low windings of program circuit repeating coils (No. 119B Repeating Coils) and mixing potentiometers. The loss introduced by each transducer is 7 db.

DESCRIPTION — Consists of a metal panel which mounts six lever type keys for the attenuating networks associated with each program circuit, network resistances, and two terminal strips for external connections. In normal or center positions keys connect circuits through the panel without attenuation. Down positions of keys connect the balanced "H" type resistance networks in respective circuits.

No back cover is furnished.

In the following typical diagram of connections numbers refer to terminals on TS1 and TS2.



FINISH — Dark gray on mat, designated by number 15 after code number, 269A-15 Attenuator Panel. Available also with black finished mat, 269A-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT — Approximately 6 lbs.

MOUNTING — Designed to mount in standard relay rack or equipment cabinet. Mounting screws are furnished.

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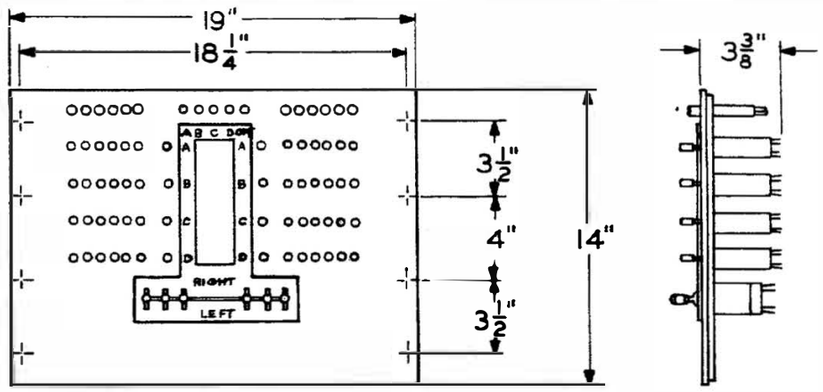

GENERAL Intended for use with multi-channel and key station studio speech input systems as a selective switching unit in which any four of six amplifier channel outputs may be connected to four outgoing circuits. Duplicate selector keys are provided to allow a pre-assignment of studio amplifier channels for the next scheduled program. The four output circuits of this panel contain attenuation and impedance translation networks and are intended for use with line amplifiers and associated potentiometers.

A monitor switch is provided to transfer a monitoring amplifier and, or, a volume indicator to any one of the four outgoing circuits.

DESCRIPTION Consists of a metal panel which mounts eight 6 position mechanically interlocked selector switches, a master switch and the monitor switch previously mentioned, in addition to 2 groups of six signal lamps each, associated with the incoming amplifier channels and seven terminal strips for the external connections. The circuit resistances are mounted at the back of the panel. Panel is equipped with an ornamental mat which contains a designation plate for the four output circuits. The signal lamps are numbered 1 to 6 to designate the incoming amplifier channels.

No back cover is furnished.

INPUT Intended for operation from 500 ohm amplifier channels through No. 119B Repeating Coils which effect an impedance of 30 ohms for each channel entering this panel. Repeating coils are not provided with this panel.

OUTPUT Impedance of each of the four output circuits is 330 ohms. Output circuits contain 32 db attenuation balanced networks with straps which may be changed and the attenuation increased to 42 db each for use with incoming amplifier channels of 0 db or +10 db power level, respectively. Output circuits designed to operate into No. 707A Potentiometers and No. 82A Line Amplifiers.

POWER SUPPLY 12 volts DC supply is required for the amplifier channel-designating lamps.

FINISH Dark gray on mat, designated by number 15 after code number, 271A-15 Output Switching Panel. Available also with black finished mat, 271A-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT Approximately 18 lbs.

MOUNTING Designed to mount in a standard relay rack or an equipment cabinet. Mounting screws are furnished.

RECOMMENDED ACCESSORY EQUIPMENT

Input:
6 - No. 119B Repeating Coils for 500 - 30 ohms impedance transformation. (No. 993A Mounting Plate is designed to mount six No. 119 Type Repeating Coils).

Output:
4 - No. 707A Potentiometers and 4 - No. 82A (Line) Amplifiers. (No. 994A Mounting Plates accommodates four No. 707A Potentiometers)
No. 700A Volume Indicator
No. 82A (Monitor) Amplifier
No. 8A Rectifiers and No. 263 or 264 Type Voltage Regulator Panels (number as required)

REMARKS This panel is not part of a standard equipment assembly, but may be combined with other equipment units, such as those mentioned to form a dispatching and monitoring unit which may be expanded as required for the particular circuit conditions. The schematic circuit is shown on Sheet 2

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ESO-499748
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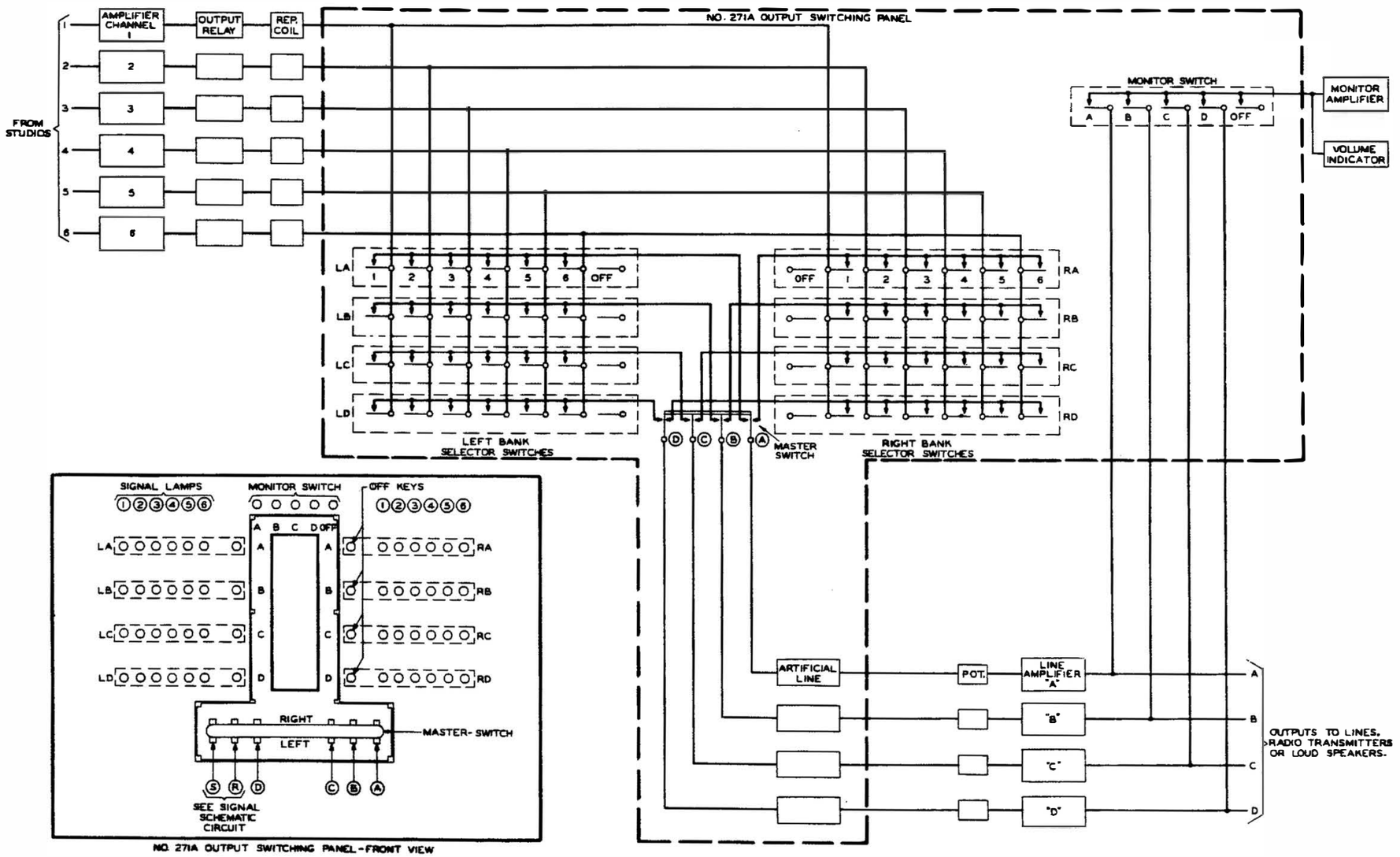
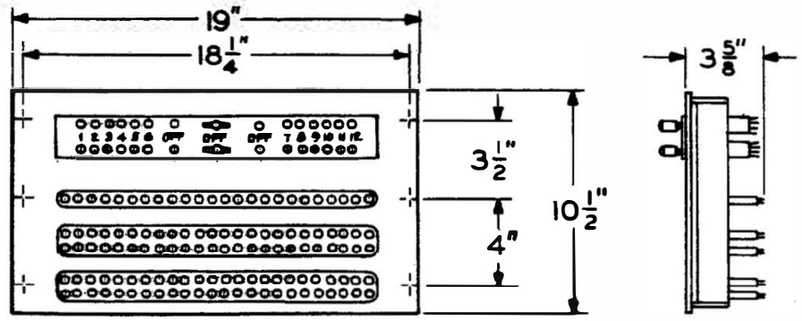
271A OUTPUT SWITCHING PANEL





GENERAL — Designed for use with studio speech input systems which employ incoming (telephone) program circuits in addition to local microphones. This panel accommodates twelve program circuits from outside sources and provides means for selecting any one program circuit for assignment to either of two local circuits which connect ultimately to one or two studio amplifier channels. If two amplifier channels are available for simultaneous service each local circuit of the program line panel may be assigned to an amplifier channel separately; under these conditions this panel permits a selection of any two of the twelve program circuits.

This panel is part of No. 702A Speech Input Bay.

DESCRIPTION — Consists of a metal panel which mounts the keys, jacks, signal lamps and circuit terminating resistances. Panel contains a mat with an ornamental designation plate for the circuit selector keys and designation strips for the jacks. Incoming and outgoing circuits connect directly to jacks and no terminal strips are required.

No back cover is furnished.

INPUT — Intended for operation from input (program) circuits of 150 ohms nominal impedance. Provisions are made for connecting program circuit equalizers to the incoming program circuits.

OUTPUT — The two outgoing circuits of this panel contain transducer networks which effect an output impedance of 600 ohms for each circuit. 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 used. A 600 ohm artificial line with an attenuation of 10 db is provided 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.

POWER SUPPLY — 12 volts DC supply is required for the two signal lamps associated with the output circuits.

FINISH — Dark gray on mat designated by number 15 after code number, 272A-15 Program Line Panel. Available also with black finished mat, 272A-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT — Approximately 12 lbs.

MOUNTING — Designed to mount in a standard relay rack or an equipment cabinet. Mounting screws are furnished.

RECOMMENDED ACCESSORY EQUIPMENT — No. 269A Attenuator Panel
23A Equalizers - number as required. No. 993B Mounting Plate mounts 8 - 23A Equalizers on 1-3/4" centers.
One, or two studio amplifier channel standard assemblies No. 701A Speech Input Bays each with a No. 267 Type Control Panel.

REMARKS — Sheet 2 shows the schematic circuit and indicates the manner in which the program line panel operates in conjunction with other parts of a studio system.

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E30-499749
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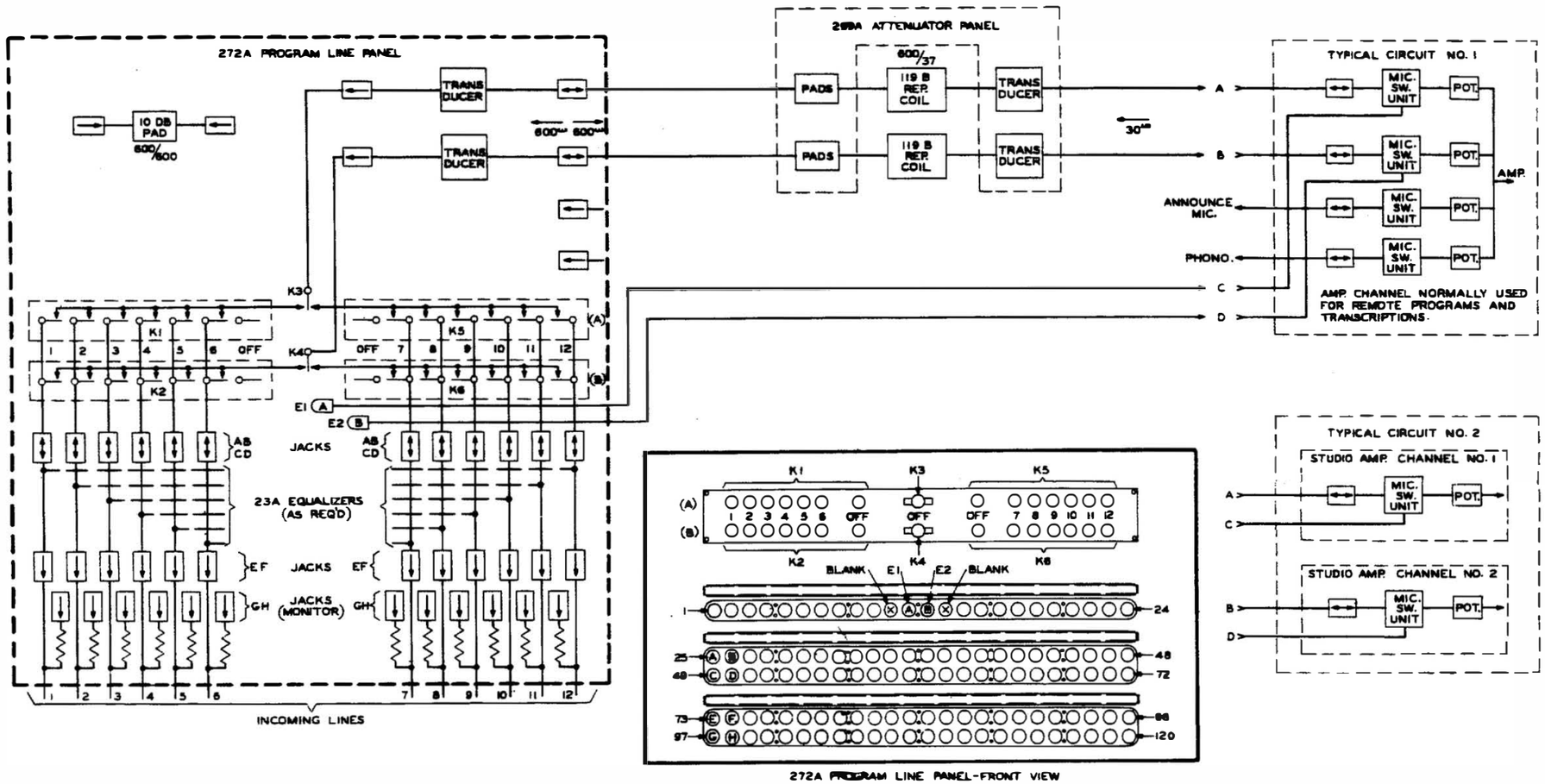
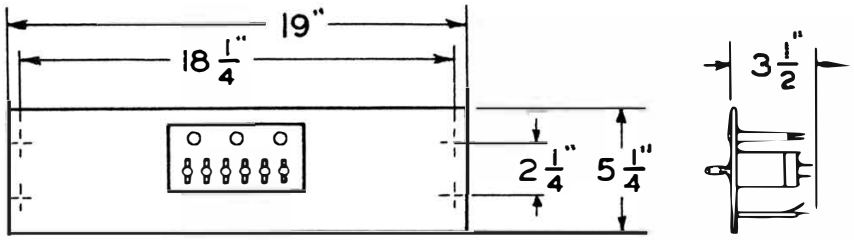
272A PROGRAM LINE PANEL AND ASSOCIATED PANELS



Western Electric
SPEECH INPUT EQUIPMENT

OUTPUT SWITCHING PANEL 270A



GENERAL — Intended primarily for two or more channel Speech Input Equipment assemblies to provide for assignment of any one studio channel, or a combination of two or three studio channels, to any one of three outgoing circuits. Resistance networks are provided for maintaining constant impedance relations in the circuits regardless of the switching combinations employed. The attenuation introduced by the coupling networks is 10 db.

DESCRIPTION — Consists of a metal panel upon which the keys, lamps, resistances and terminal strips are mounted. Panel is equipped with a mat which contains a designation plate for six keys. Three indicating signals or lamps intended for use in the relay circuits of the associated studio channels are located above the control keys.

No back cover is furnished.

INPUT — Input impedance is 500 ohms for each of three available circuits. Input terminals are 17-18, 19-20, and 21-22. Associated line keys are in mounting positions 2, 4 and 6, respectively, from left to right viewed from the front.

OUTPUT — Three output circuits of 500 ohms each. Output terminals are 23-24, 25-26, and 27-28 for the output circuits associated with indicated positions 3, 2 and 1, respectively, of the keys.
The three "ON-OFF" keys in positions 1, 3 and 5, and the associated lamps, are intended to control by means of relays the output circuits of three associated studio channels. The relays are not part of the 270AOutput Switching Panel.

POWER SUPPLY — 12 volts battery supply is required for the operation of the relay control circuit, if this is employed for remote control of the studio output channels.

FINISH — Dark gray on mat, designated by number 15 after code number, 270A-15. Available also with black finished mat, 270A-3. Unless otherwise specified dark gray mat will be furnished.

WEIGHT — Approximately 7-1/2 lbs.

MOUNTING — Designed to mount in a standard relay rack or equipment cabinet. Mounting screws are furnished.

RECOMMENDED ACCESSORY EQUIPMENT — 1 - 266A Relay Panel) for each studio amplifier
1 - 267 Type Control Panel) channel.

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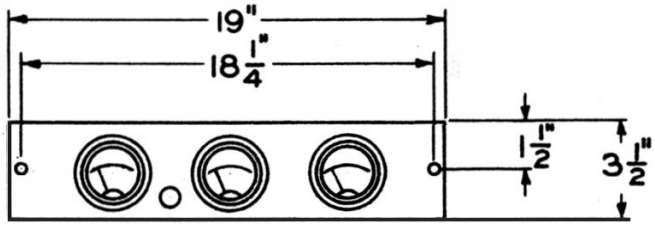

FOR D.C.

GENERAL — Designed primarily for use in the 1219A Panel which is a part of the 9A Speech Input Equipment. Provides facilities for measuring transmitter currents when carbon transmitters are used and filament currents when condenser transmitters are used, also plate currents of the amplifiers.

RANGE — 3 Weston (flush type) meters.

1 - Milliammeter 0-100 mils DC
1 - Milliammeter 0-10 mils DC
1 - DC Ammeter 0-1 ampere

FINISH — Black japan.

WEIGHT — Approximately 8 lbs.

MOUNTING — Arranged to mount on standard relay rack or equipment cabinet. Mounting screws and washers are furnished. Back cover removable for inspection.

REMARKS — 0-1 amp. ammeter is terminated in cord and #109 Plug for the types of jacks used in the vacuum tube filament circuits of Western Electric Equipment.

Milliammeters are terminated in cord and #221 Plug which fits only plate circuit and carbon transmitter current jacks of Western Electric Equipment. Meters may be safely used in circuits where the potential to ground is less than 1000 volts.

See also 514B Panel which consists of surface type meters but is otherwise identical to the 514C Panel.

100 scale milliammeter is normally associated with the cord and plug. For low readings a push-button switch is provided to connect 0-10 mil meter in place of the 0-100 mil meter.

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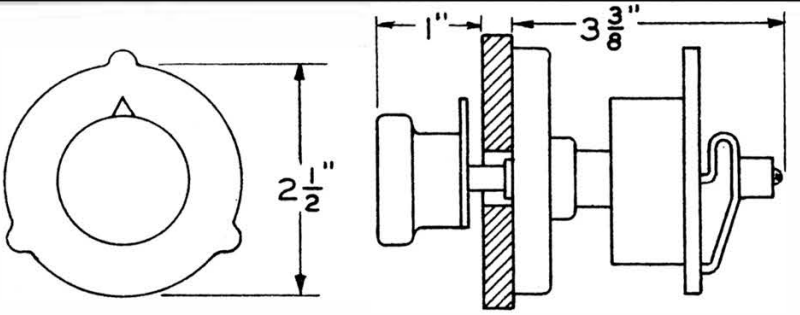
ISSUE 1
DATE 6-1-33

Western Electric
SPEECH INPUT EQUIPMENT

GAIN CONTROL POTENTIOMETER 707A



GENERAL — Intended primarily as a gain control potentiometer for use with Speech Input Equipments which employ 81A and 82A Amplifiers.
Consists of an unsymmetrical "T" resistance network with the variable resistance arms so designed that the input and the output impedances are constant for all settings of the potentiometer.
Potentiometer assembly includes knob and pointer but does not include nameplate.

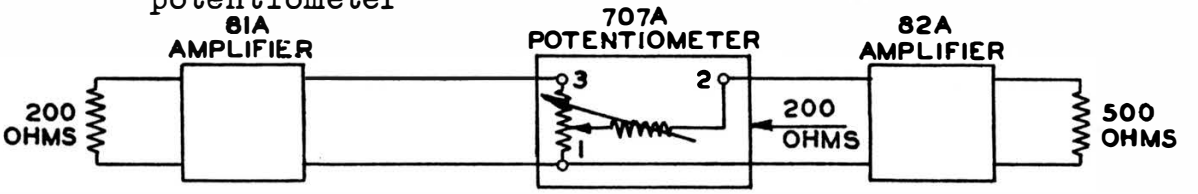
INPUT — Operates from 330 ohms. Input terminals are 1 and 3. Input impedance of potentiometer is 500 ohms.

OUTPUT — Output impedance is constant, 200 ohms. Output terminals are 1 and 2.

ATTENUATION — Provides 36 db attenuation in 18 steps of 2 db each. Potentiometer has an "OFF" position. Minimum attenuation is approximately 3 db.

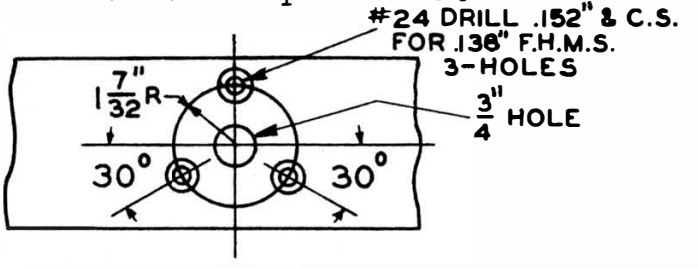
FREQUENCY CHARACTERISTIC — Frequency response of circuit in which the potentiometer is used is not changed by the presence of the potentiometer.

DIAGRAM OF CONNECTIONS — The following typical diagram illustrates the use of the potentiometer

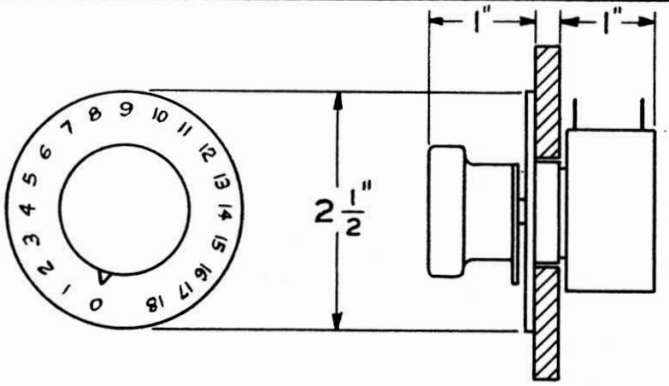


MOUNTING — Designed to mount on 994A Mounting Plates which provides space for four potentiometers and also nameplates for potentiometer pointers. Three .138"-32 x 3/8" machine screws are required for mounting - these are not furnished with the potentiometer and must be provided separately.

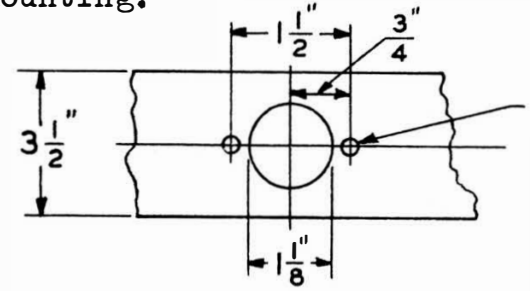
NAMEPLATE — Black japan nameplate with photo-etched chromium finished figures and nickel dipped mounting screws, per ES0-603999 is available upon order.



ESL-499170 ISSUE 1 DATE 1-19-34



GENERAL	Low noise level potentiometer designed for use in dynamic or other low level microphone circuits without premixing amplifiers.
INPUT	Operates from 30 ohms. Input terminals numbers 1 and 3.
OUTPUT	Operates into 50 ohms. Output terminals numbers 1 and 4. Four 709A Potentiometers may be used with their outputs connected in series to provide a 200 ohm circuit.
ATTENUATION	Continuously variable for a maximum range of 40 db. Minimum attenuation 13 db. Attenuation per division 2.25 db.
FREQUENCY CHARACTERISTIC	Frequency response of circuit not changed by presence of potentiometer in circuit for any setting of potentiometer.
MOUNTING	Designed to mount on 884F and 884AH Mounting Plate. (Either of these plates will mount 4 - 709A Potentiometers). Mounts on 2-1/2" minimum centers. Mounting screws furnished. Sketch gives drilling information for mounting. 2 - .164"-32x5/16 F.H.B.M. Screws are supplied for mounting.



FINISH	Black Japan with chromium figures on front escutcheon.
REMARKS	May be used as a replacement for the 700C or 700D Potentiometer.

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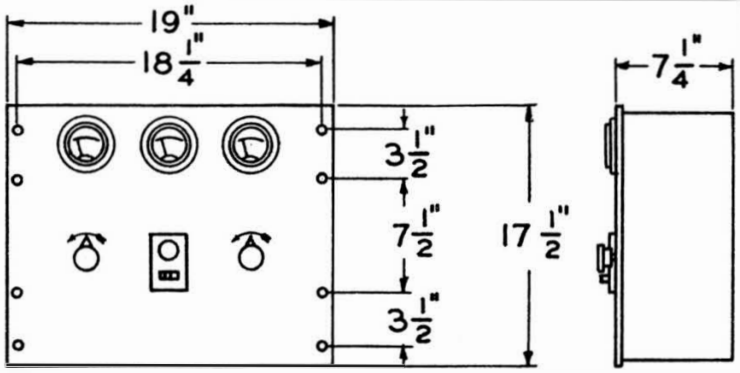

GENERAL	Full wave mercury vapor rectifier for use as a plate power supply in conjunction with the 707A, 708A, 709A, 710A and 711A Filters, for Program Amplifiers and Volume Indicators in Speech Input Equipment. Filters must be used with this rectifier.
INPUT	525 Watts maximum at 105 - 125 volts 50 - 60 c.p.s. for full power output.
OUTPUT	1 ampere maximum at 380 volts DC.
VACUUM TUBES	Two 249A (must be ordered separately).
CONTROL	Filament rheostat with associated voltmeter for control of rectifier tube filament voltages. Rheostat, voltmeter and ammeter for control of output. Tapped plate transformer for 105-110-115-120-125 volts input. On-off switch. Time delay relay controlling plate circuit. Pilot light connected across AC input.
FUSES	Plug fuse (Clearsite - 10 Amps.) in ungrounded side of AC supply circuit.
SAFETY SWITCH	Opens AC supply circuit when door is opened.
FINISH	Black japan.
WEIGHT	Approximately 125 lbs.
MOUNTING	Arranged to mount on standard relay rack or equipment cabinet. Mounting screws and washers are furnished. Two knockouts are provided at the top of the right side, viewed from the rear, to accommodate 1/2" conduit or porcelain bushings for input and output wiring.

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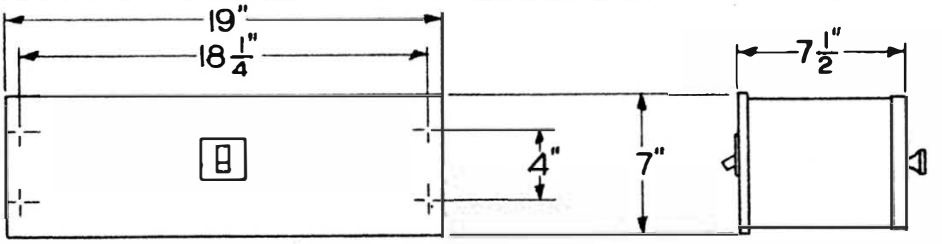

A.C. OPERATED
SEE REMARKS

GENERAL	Full wave vacuum tube rectifier, designed primarily to supply plate power to line and monitoring amplifiers and volume indicators in Speech Input Equipments for radio broadcasting. Terminals are provided to supply the line voltage, through the rectifier switch, to a filament supply panel such as the 263A or 263B Voltage Regulator Panel. A time delay relay delays (45 seconds) the application of AC power to the rectifier until the cathodes of the amplifier tubes have attained normal operating temperatures.
INPUT	Terminals 9 and 10. Operates from 105-125 volt 50 or 60 cycle AC. Power consumption is approximately 80 watts for full power output.
OUTPUT	116 milliamperes maximum at 375 volts DC. Output consists of three circuits, two of which include filters. Maximum safe current through each filtered output circuit is 55 milliamperes.
VACUUM TUBE	One 274A. Vacuum tube must be ordered separately.
CONTROL	"ON-OFF" power switch. Power transformer has tapped primary for voltages from 105 to 125 volts.
FUSES	Plug fuse - Clearsite 6 ampere, if rectifier is used with 263A or 263B Voltage Regulator Panel. Clearsite 3 ampere fuse, if rectifier is used independently.
FINISH	Dark gray mat and aluminum finished back cover, designated by number 15 after code number, 8A-15 Rectifier. Available also in black finish, 8A-3 Rectifier. Unless otherwise specified dark gray mat and aluminum finished back cover will be furnished.
WEIGHT	Approximately 30 pounds.
MOUNTING	Arranged to mount in relay rack or equipment cabinet with back door equipped with safety switch. Mounting screws are furnished. Back cover, held in place by screws, may be removed for inspection.
REMARKS	274A Vacuum Tube filament operates on a voltage basis; therefore primary winding of power transformer is tapped for supply voltages from 105 to 125 volts. 8A Rectifier will be furnished with terminals 1 and 3 of transformer connected for operation with line voltages between 112 and 118 volts. Depressed panel construction, terminal blocks and panel wiring located in depressed section of panel behind the mat. Recommended for supplying plate power to a total of two 82A Amplifiers, one 700A Volume Indicator, and, with an external 716A Filter, one 81A Amplifier.

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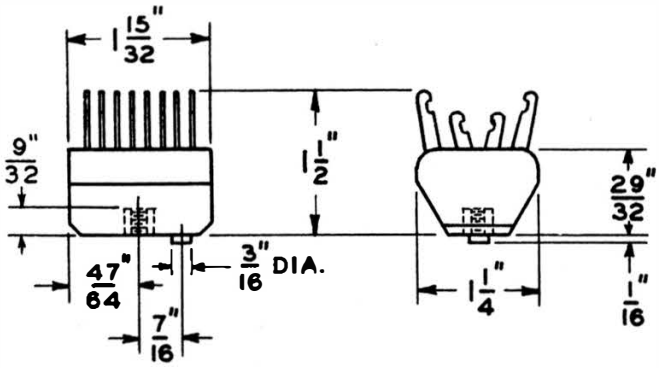
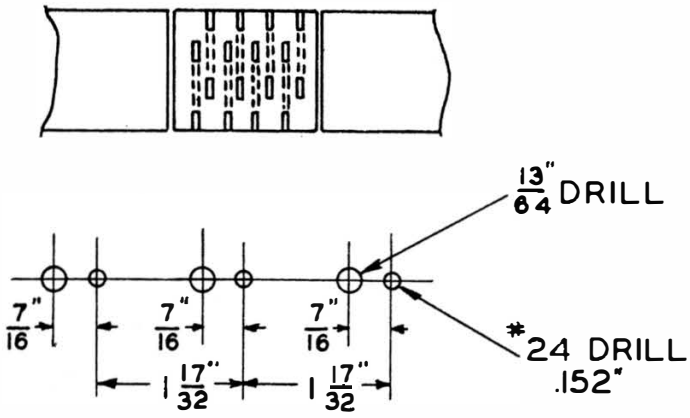


GENERAL Improved type of terminal strip intended primarily for Speech Input Equipment panels and assemblies.

Contains a single row of 8-double end terminals which are staggered from each other on 5/32" centers and moulded in a black phenol plastic back. Bottom of phenol plastic mould contains a .138"-32 tapped bushing for fastening to a panel by means of a .138"-32 brass machine screw, and a phenol plastic projection which is intended to fit into a hole on the mounting panel to prevent turning of the terminal strip after it has been fastened to the panel.

MOUNTING 992A Mounting plate provides for mounting 10 - 700A Terminal Strips on 1-17/32" centers.

Following sketch gives drilling information for mounting 700A Terminal Strips.



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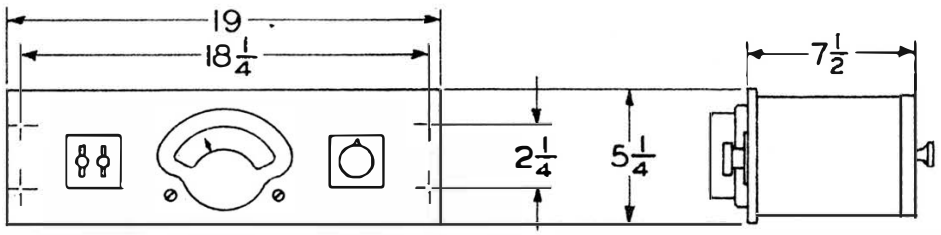
ISSUE 1
DATE 1-3-34

Western Electric
SPEECH INPUT EQUIPMENT

VOLUME INDICATOR 700A



FILAMENT A.C. OR D.C. OPERATED

SEE REMARKS

GENERAL	One stage, transformer-coupled, amplifier and copper oxide rectifier and meter. Designed primarily for use in alternating current operated Speech Input Equipments for radio broadcasting. Self-calibrated from 10 volt AC filament supply source.
INPUT	Operates across a circuit having 500 ohm impedance in each direction from the bridging point. Terminals 1 and 2. Bridging loss is approximately 0.3 db.
FREQUENCY RESPONSE	Uniform within approximately 1 db from 35 to 10,000 cycles per second.
VACUUM TUBE	One 262A. Vacuum tube must be ordered separately.
FILAMENT SUPPLY	0.32 ampere at 10 ± 0.3 volts AC. Terminals 9 and 10, or 13 and 12 which are multiples of 9 and 10, respectively. Vacuum tube filament operates on a voltage basis. 12 volts DC may be used. (Terminals 9 or 13, and 11) Volume indicator is not self-calibrating from DC filament supply.
PLATE SUPPLY	Approximately 2 mils at 135 to 200 volts DC, or 375 ± 25 volts DC. For 135-200 volts use terminals 3 and 4. For 375 volts, terminals 3 and 5. Terminal 3 is +.
FUSES	None.
FINISH	Dark gray on mat, aluminum finish on back cover, designated by number 15 after code number, 700A-15 Volume Indicator. Available also with black finish on mat and back cover, 700A-3 Volume Indicator. Unless otherwise specified dark gray mat and aluminum finished back cover will be furnished.
WEIGHT	Approximately 25 pounds.
MOUNTING	Arranged to mount in a standard relay rack although designed for equipment cabinet with rear door equipped with safety switch. Mounting screws are furnished. Back cover is removable for inspection.
REMARKS	Intended for use in coded assemblies of Speech Input Equipment. When used otherwise a constant 10 volt AC filament supply should be provided. The 263A Voltage Regulator Panel, operating from 100-125 volt 60 cycle AC, is recommended for the filament supply. If frequency of AC supply is 50 cycles, 263B Voltage Regulator Panel should be used. Depressed panel construction, terminal blocks and panel wiring located in depressed section of panel behind the mat.

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