

5A ANNOUNCEMENT SYSTEM GENERAL DESCRIPTION

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A. Dual System	2	1.01 The 5A Announcement System is used in No. 4-type toll crossbar and crossbar tandem offices for providing recorded announcements to operators and customers. Some typical announcements are circuit-busy (CBA), vacant code (VCA), and sender overload (SOA). A maximum of six different announcements may be recorded in a single 5A system. Dual system arrangements provide for 12 recording channels. All announcements are recorded from a telephone set or from a toll switchboard position.	
B. Single System	2	1.02 Announcements are recorded on a recorder-reproducer, called an announcement machine, that has a 6-channel capacity. All six channels playback simultaneously with each channel connected separately to the toll equipment through a channel amplifier and the announcing trunk circuit. A 5A announcement system may be single, or it may be dual for reducing traffic interruptions during maintenance or for increasing the announcement capacity of the office. For simplicity, a single system is described in this section.	
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B. Capacity

1.05 A single 5A system contains six separate channels for automatic announcements to toll offices. A dual system has 12 channels, 6 in each system.

1.06 In a No. 4 toll office, each channel of the 5A system may be connected to 20 trunk groups. This flexibility is obtained by patching each 4-wire channel to five jacks at a traffic supervisory rack.

1.07 In crossbar tandem offices, the 5A system may be connected to 8 announcement trunk groups for each channel, with 80 connecting trunks per group. Therefore, offices equipped with a traffic supervisory cabinet can select up to 640 announcement connecting trunk circuits with the rotary selector switches.

C. Toll Office Connections

1.08 Figure 1 is a diagram of the 5A announcement system used in a No. 4 toll office. The six announcement channels are connected to the traffic supervisory rack where each channel is patched to a group of announcement connecting trunk circuits. Also, a monitoring trunk circuit connects the 5A system to an outgoing link frame, enabling an operator to answer calls directed to an announcement.

1.09 Figure 2 is a diagram of the 5A system used in a crossbar tandem office. The six announcement channels are connected to the traffic supervisory circuit where each is connected to an announcement amplifier for distribution to a group of announcement connecting trunk circuits. A part of the announcement connecting trunk circuit connects the 5A system to an office link frame, enabling an operator to answer calls directed to the announcement connecting trunk circuit.

2. SYSTEM ARRANGEMENT

A. Dual System

2.01 A dual system is mounted on an 11-foot 6-inch high by 2-foot 5/8-inch wide single bay frame arranged to mount 2- by 23-inch mounting plates. The two systems are physically separated as shown in Fig. 3. Two frame local cables are provided, each interconnecting the units of one announcement system.

2.02 An announcement machine is mounted to the center of the frame for each system. The distribution of parts in the machine is shown in Fig. 6 and 7 and discussed in Part 3.

2.03 The limiting amplifier is transistorized and mounted on an adapter with the announcement machine for each system. Therefore, no additional frame height is used by the amplifier.

2.04 The announcement trunk circuit unit is surface wired on five 2- by 23-inch mounting plates.

2.05 Six channel amplifiers are mounted for each system. Each amplifier is transistorized and mounted on a 2- by 23-inch plate. A dust cover is provided to protect the unit and must be removed for circuit adjustments.

2.06 A 619A or 619B telephone set, located in a quiet area away from the equipment frame, is required for each system. One extension or remote telephone may be installed for each system. External lead resistance for a remote set should not exceed 450 ohms per conductor.

2.07 Figure 4 illustrates a 619A telephone set. On the face plate are six horizontal rows of five buttons. Each row corresponds to an announcement channel. The button positions shown in Fig. 4 are: (1) alarm, (2) announcement (channel selector), (3) emergency announcing, (4) ring, and (5) monitor, release, and record. The dial is reserved for future use and is not used within the 5A announcement system.

2.08 A miscellaneous unit is located on the frame below the announcement machine and contains signal and channel testing facilities. A 1000-cycle tone at -10 dbm is present at a 1000, -10, 600 jack.

B. Single System

2.09 A single announcement system mounts on the same frame as a dual system, but has only one announcement trunk, announcement machine, limiting amplifier, and six amplifiers (Fig. 3). Less than half a frame is utilized for the transistorized system.

2.10 Earlier systems, now manufacture discontinued, use vacuum tube amplifiers which require

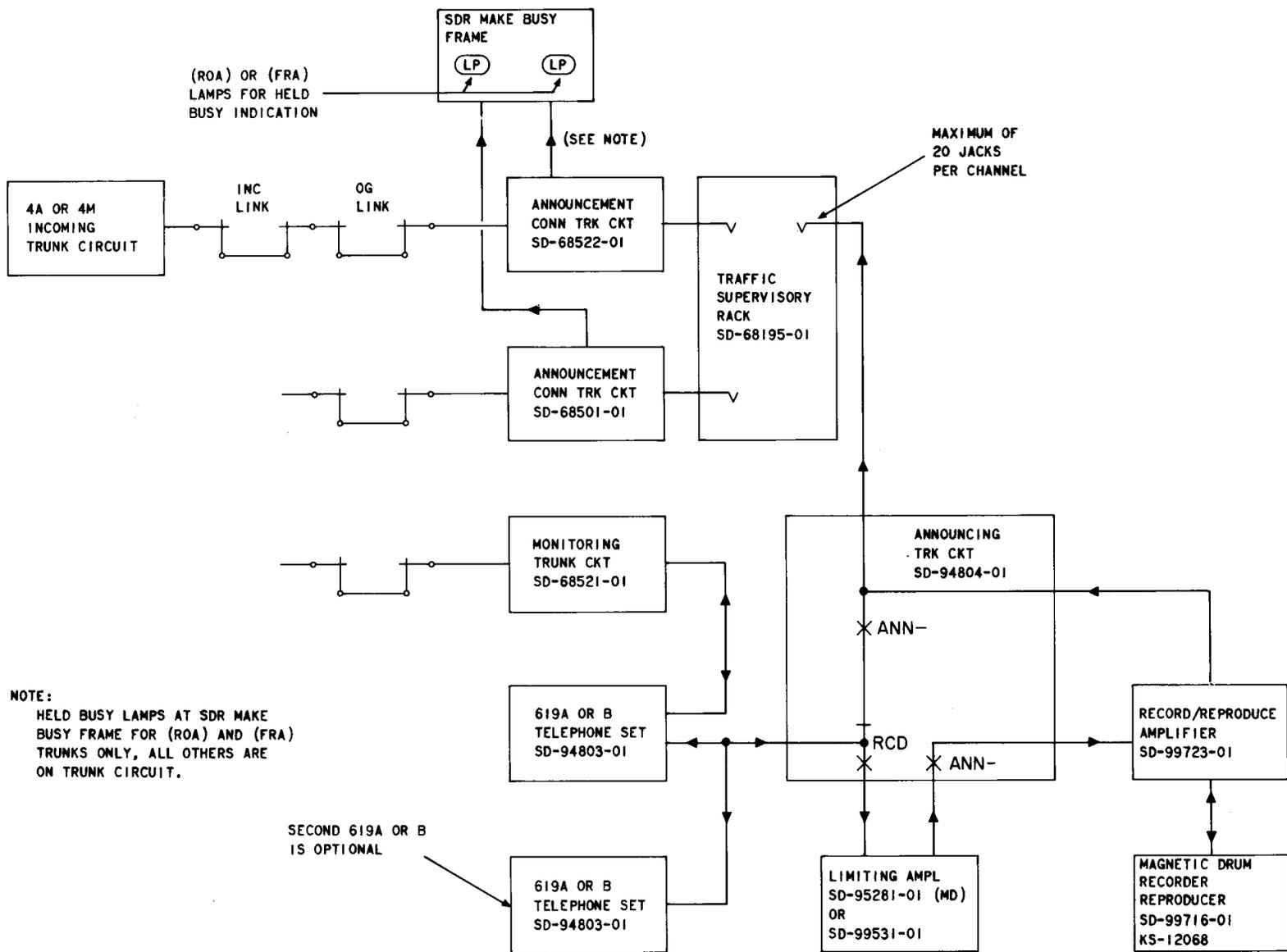


Fig. 1—Announcement System Used In No. 4 Toll Office

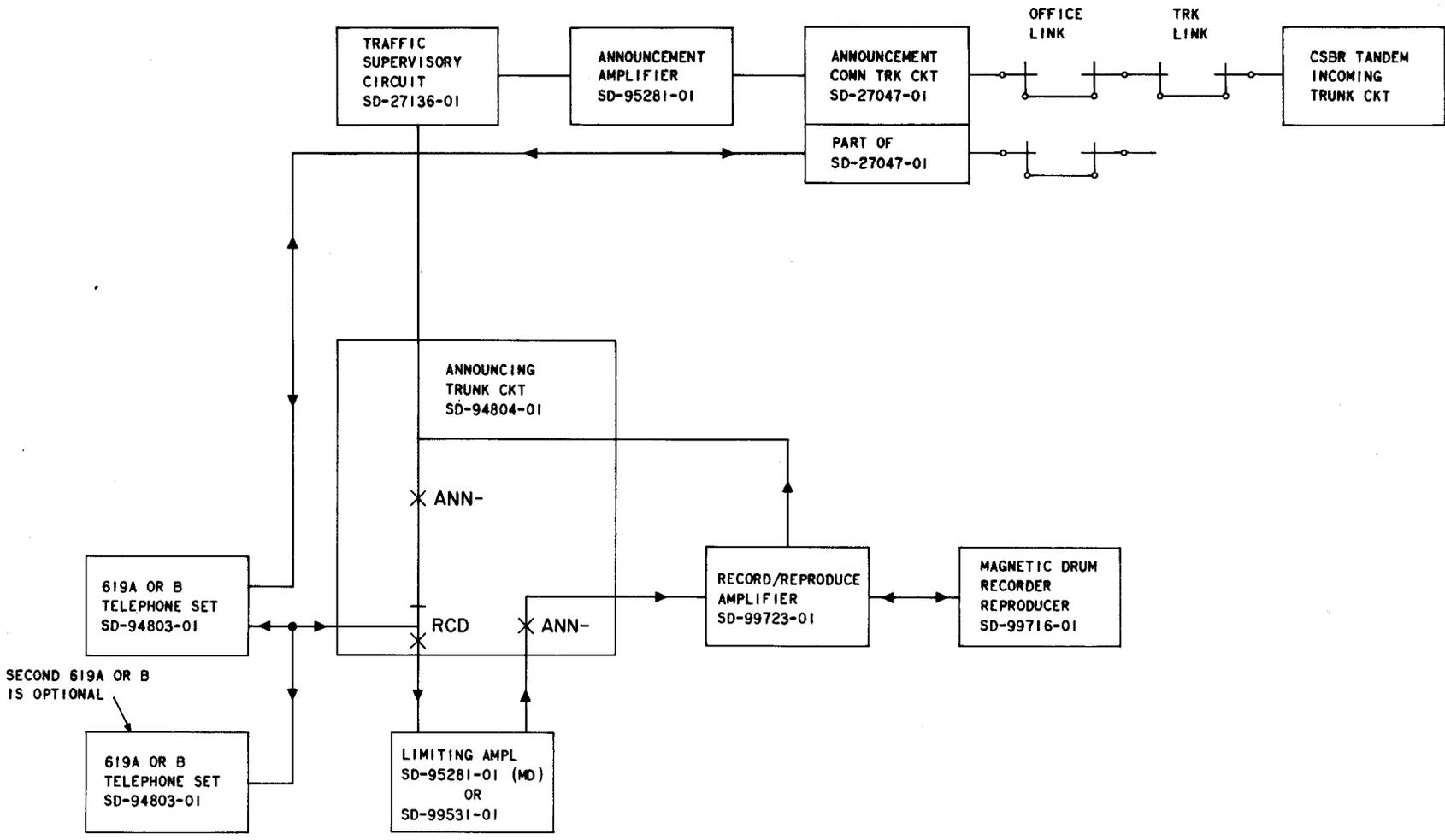


Fig. 2—Announcement System Used In Crossbar Tandem Office

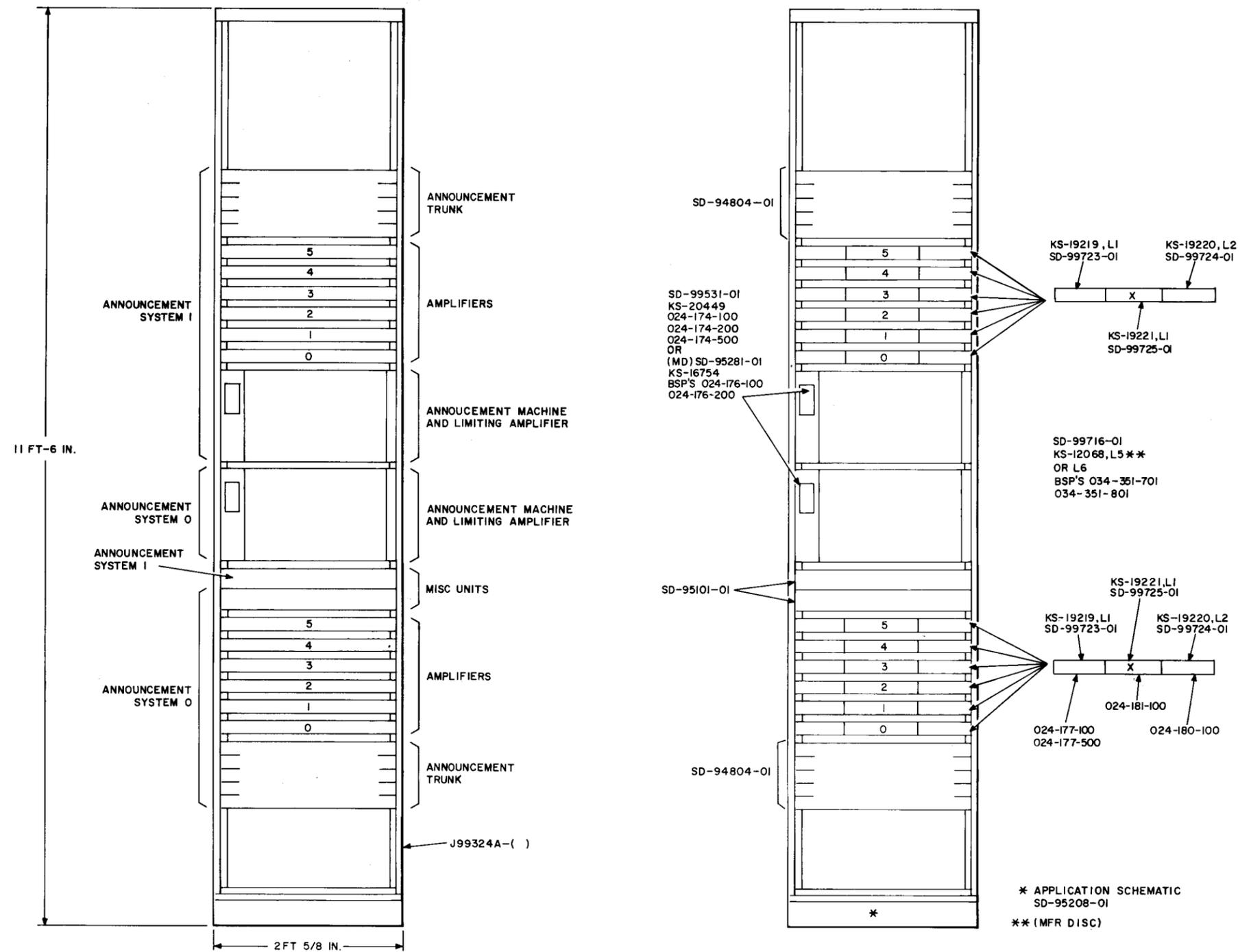


Fig. 3—Announcement Frame—Dual 5A Announcement System Using Transistor Components

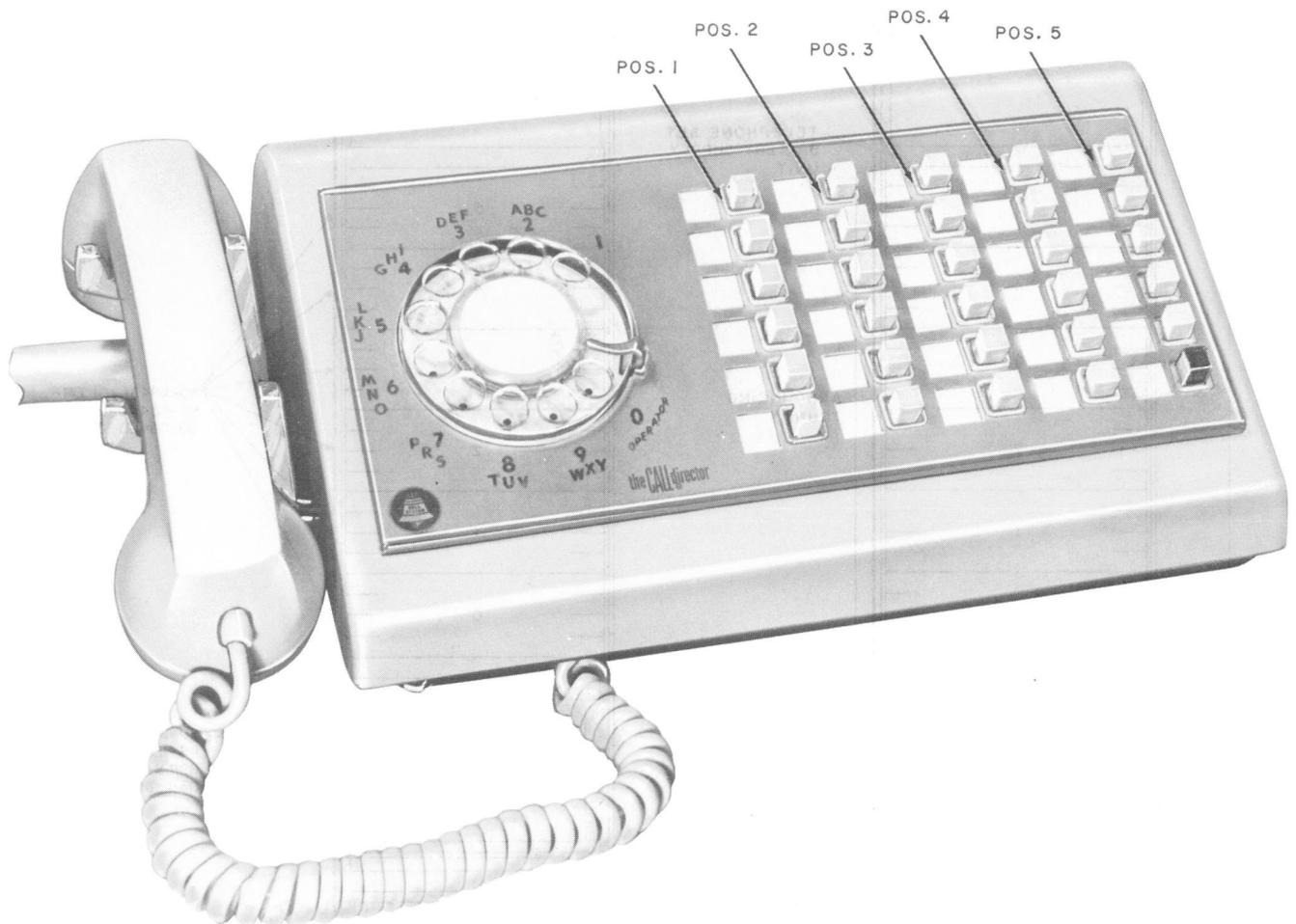


Fig. 4—619A Telephone Set

more space. Figure 5 shows the equipment arrangement.

2.11 A telephone set or switchboard position is required to operate the system. The 619A or 619B telephone set described in 2.06 is used with a single system arranged according to Fig. 3. A system arranged according to Fig. 5 utilizes a 619A, 619B, or modified 601A telephone set; or a No. 1, 3, 3C, 3CL, or 5 switchboard position. The modified 601A telephone set and the switchboard positions for recording are rated manufacture discontinued.

2.12 A milliwatt supply and flashing relay unit SD-95101-01 is provided on the frame (Fig. 5) to enable testing of the system.

2.13 When a telephone set is used with a system as arranged in Fig. 5, a battery supply unit is provided at the top of the frame.

3. SYSTEM OPERATION

A. General

3.01 Announcements are made through the telephone set, the announcing trunk circuit, limiting amplifier, record amplifier, and recorded on the selected channel in the announcement machine. Channels are selected at the telephone set and connections are arranged by the announcing trunk circuit.

3.02 Recorded announcements from the machine are played back through an associated channel

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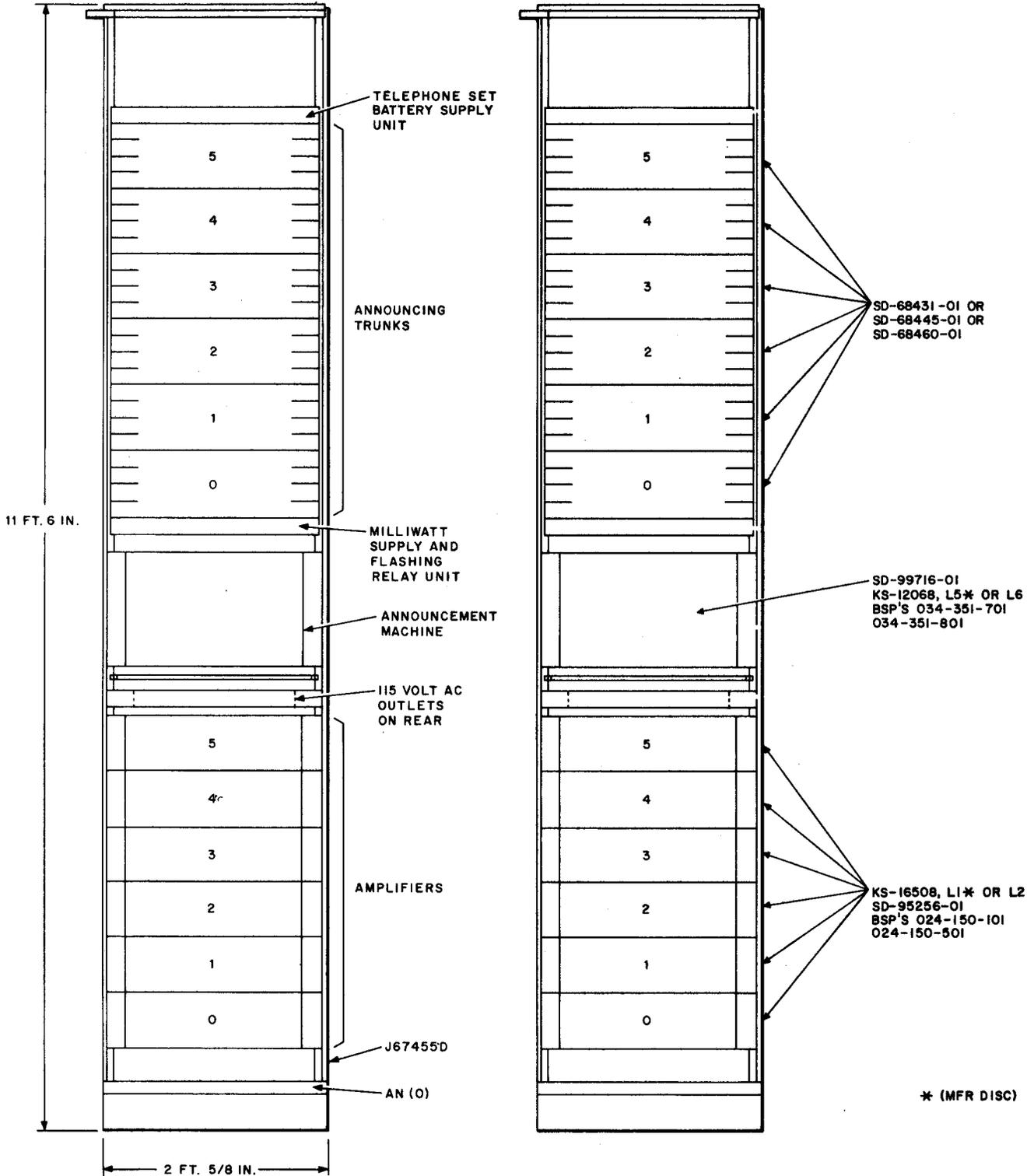


Fig. 5—Announcement Frame—5A Announcement System Using Vacuum Tube Amplifier

amplifier to the toll system. Connections between the amplifier and toll system are made by the announcing trunk circuit.

3.03 Emergency announcements by an operator are made from the telephone set through the announcing trunk circuit, limiting amplifier, and the record path of the amplifier.

3.04 The telephone set may also be used to answer calls directed to the 5A announcement system.

Note: For actual step-by-step methods of operation refer to Section 201-511-301.

B. Announcement Machine—Recorder Reproducer (SD-99716-01)

3.05 The heart of the 5A announcement system is the KS-12068 announcement machine. Figures 6 and 7 illustrate the front and rear views respectively. The circuit, in conjunction with a record-reproduce amplifier (SD-99723-01) provides the facilities required for magnetic recording and reproducing of audio signals in the voice-frequency range. The announcement machine provides six independent recording channels, each lasting for one revolution of the drum. Provided is a maximum of 10.6 seconds of recording time, automatic erasure of a given channel simultaneously with the recording of the channels, and control signals for operation of associated audio facilities and distributing circuit.

3.06 Announcements are recorded on a rubberized, magnetic recording band which forms a continuous "tape" around a revolving wheel called a recording drum. The band (tape) is approximately 1-1/2 inches wide to provide a recording medium for six channels. It is impregnated with magnetic iron-oxide particles, lubricated with a silicone fluid, and mounted on the drum.

Note: The drum revolves continuously while the machine is on.

The band is held in position on the drum by friction without the aid of an adhesive.

3.07 The recording drum on the front of the machine is connected through a gear case to a belt driven pulley on the rear of the machine. An air-cooled motor drives the belt, causing the drum to rotate at about 4-3/4 rpm. This results in the announcement cycle of 10.6 seconds.

3.08 The recorder-reproducer employs a permanent magnet which is mounted on the record drum and operates a magnetic switch. The switch is mounted on a plate on the front of the recorder-reproducer and is operated once per revolution of the drum. This magnetically operated D2 mercury switch is used for the control of the recording time interval and interrelated switching operations. The recorder-reproducer has a manually operated power switch for the primary control of the motor and a 48-volt dc control relay, whose contacts are in series with the power switch, for remote operation through an external control circuit. This control relay when operated applies 115-volt ac power through a 3.2-amp fuse to the windings of the motor and also to terminals 1 and 2 of TS8 for operation of associated equipment.

3.09 Two micro switches operated by cams fixed to the recording drum make closures to indicate the start of each recording time interval. The closures operate relays in the trunk circuit and flash lamps at the telephone set or switchboard position. Actual recording or announcing time is 9.2 seconds with the remaining 1.4 seconds of the cycle used for micro switch operation.

3.10 The D2 and D3 micro switches are actuated by the three lobes of the cam as the recording drum rotates. Cam-lobes 1 and 2 each maintain D2 switch closed for approximately 0.5 second with an interval between them of approximately 0.5 second. The D2 switch will remain open for the duration of the remaining portion of the revolution of the drum. Lobe 3 closes D3 switch before lobe 2 permits D2 switch to open. Approximately 1 second after lobe 2 closes D2 switch, lobe 3 permits D3 switch to open. This once-per-revolution switching operation provides a means of sending signaling pulses from the recorder-reproducer to the external control circuit through leads of D2 and D3 for providing information that recording can be started.

3.11 Recording is accomplished by means of the external control circuit and the associated record-reproduce amplifier. When the record key for a given channel of the external control circuit is operated, the magnetic record-reproduce head is energized. This is accomplished by passing the desired audio signal and high-frequency recording bias through leads "RC1" and "RC2" to the record-reproduce head of the selected channel from the recording circuit of the associated record-reproduce amplifier. Generally, satisfactory recordings will

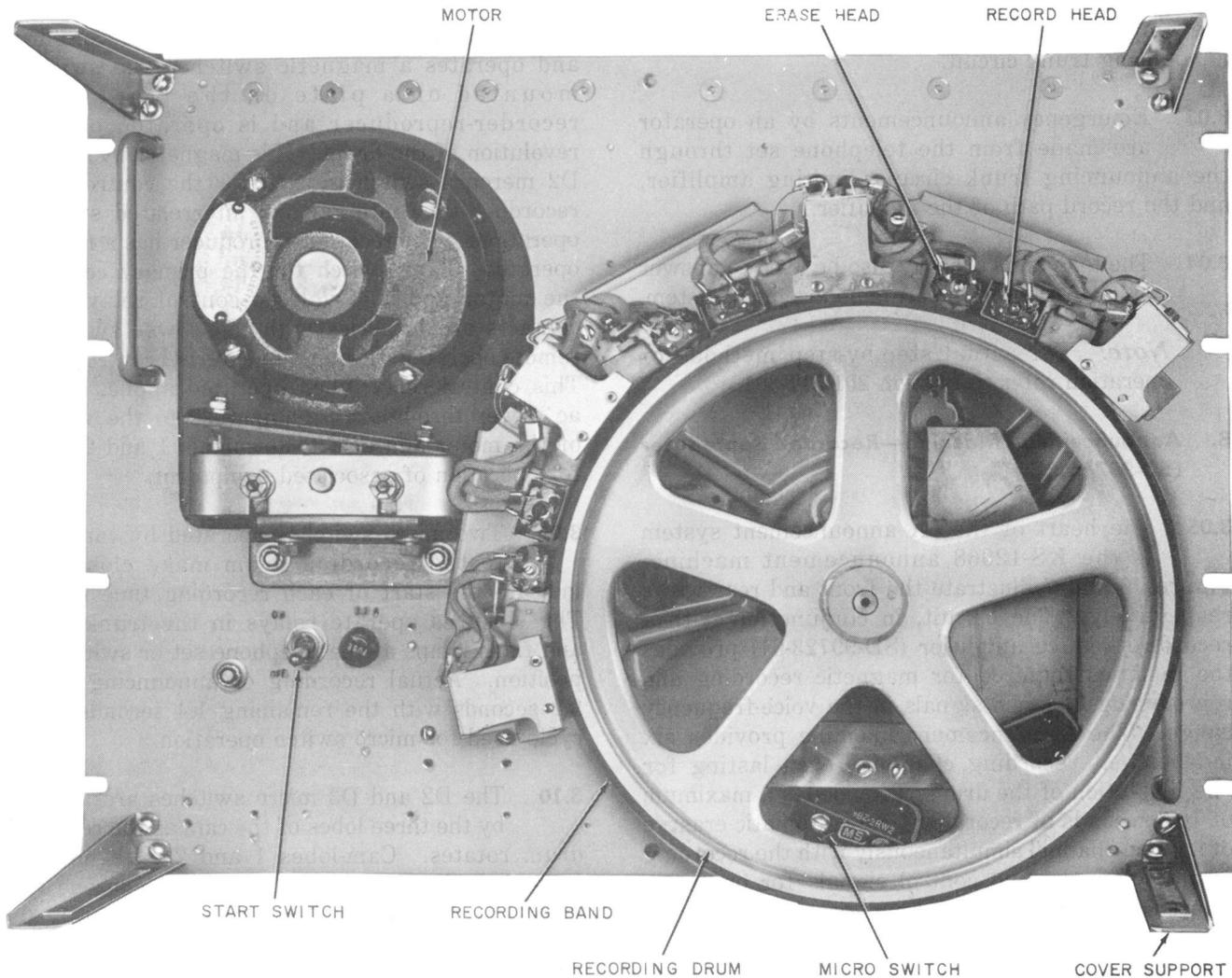


Fig. 6—Announcement Machine (KS-12068, L6)—Front View

result when the record circuit of the associated record-reproduce amplifier is adjusted such that when recording a 1000-Hz audio-test-signal, the voltages present at the TS1 thru TS4 terminals of the respective record-reproduce heads are nominally 0.8 volts rms for the audio-test-signal and 30 volts rms for the high-frequency recording bias.

3.12 Reproducing is accomplished by switching the magnetic record-reproduce head of a given channel to the input of the reproducing circuit of the record-reproduce amplifier associated with the selected channel by means of the external control circuit. The record-reproduce head is energized by the recorded medium and sends the

audio signal to the input of the associated record-reproduce amplifier by leads "RC1" and "RC2" where it is amplified and transmitted to the distributing circuit. For test recordings made using the 1000-Hz audio-test-signal, the playback voltages present at the TS1 thru TS4 terminals of the respective record-reproduce heads should be nominally 1.8 to 3.5 mv rms.

3.13 For each channel, there is an erase head to remove previously recorded announcements and a record-reproduce head to transcribe new announcements onto the recording band and to playback recorded announcements. The erase head is mounted in front of the record-reproduce head

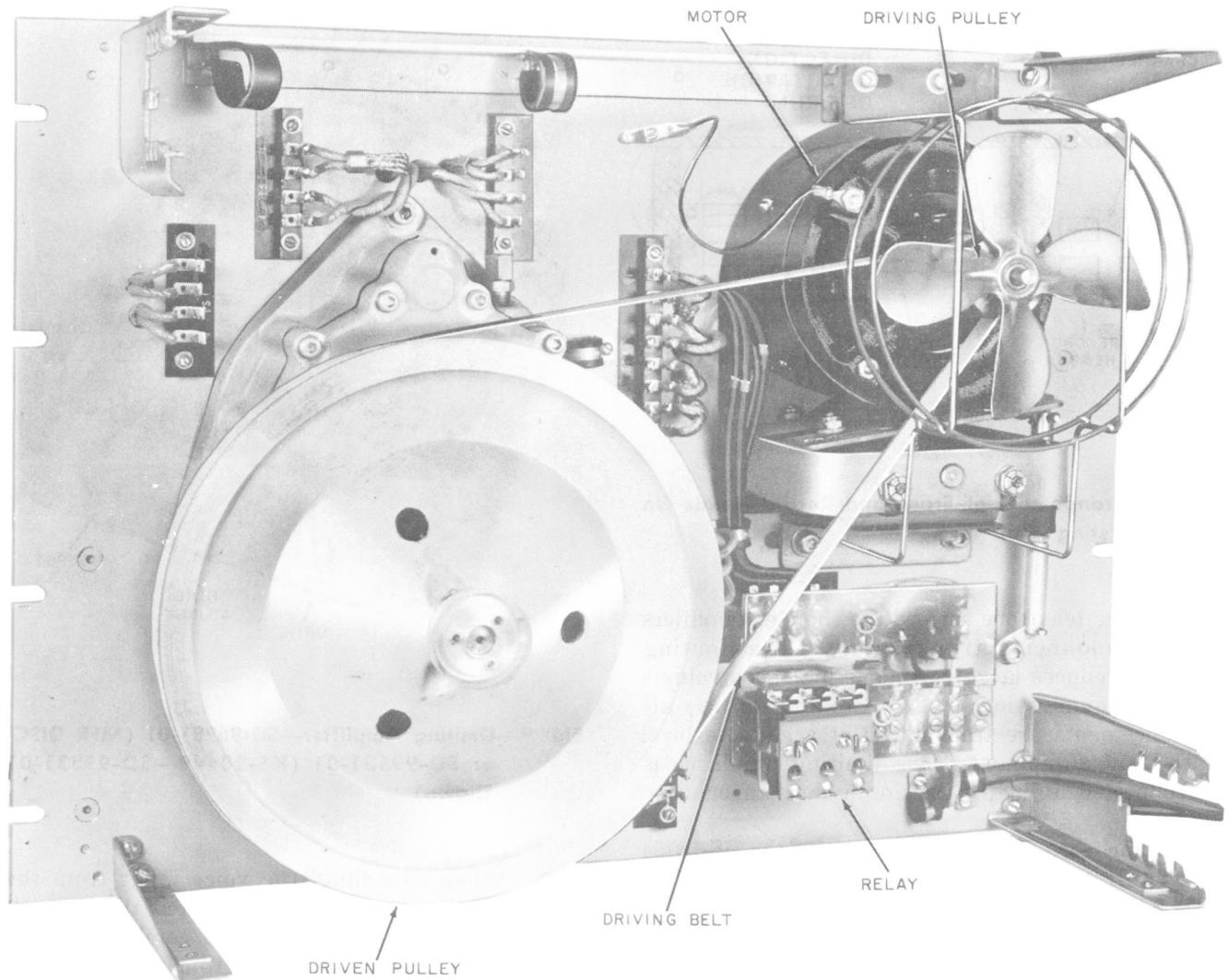


Fig. 7—Announcement Machine (KS-12068, L6)—Rear View

and, therefore, erases immediately before the new recording is transcribed as the recording drum rotates. The channel is erased and recorded simultaneously during one revolution of the recording drum. The erase head is energized by high frequency bias current generated in the associated record-reproduce amplifier oscillator circuit. Playback from the record-reproduce head follows immediately after the recording cycle. All 12 heads are arranged on a casting as shown in Fig. 8. With this arrangement and the operation of the recorder-reproducer, the magnetic heads follow six continuous tracks around the magnetic band, so spaced as to form six independent recording channels,

each lasting for one revolution of the recording drum.

3.14 Provisions have been made for adjusting the pressure of the heads on the recording band, for adjusting the belt tension, and for adjusting the micro switch operating times. (Refer to Sections 034-351-701, and 801 for this information).

C. Limiting Amplifier (SD-95281-01 MFR DISC) or (SD-99531-01)

3.15 During recording or operator announcing, a volume limiting amplifier, Fig. 9, is connected

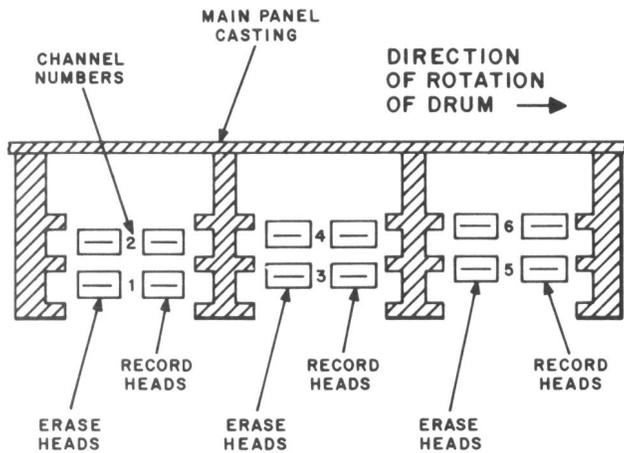


Fig. 8—Arrangement of Erase and Record Heads On Casting—Top View

between the telephone set and the channel amplifiers by the announcing trunk circuit. The limiting amplifier reduces large variations in speech volume to a uniform voice level. Consequently, all announcements are transmitted at a suitable level to the toll equipment. The limiting amplifier is not connected during playback or machine announcing.

3.16 For more detailed information of the KS-16754 (SD-95281-01 MFR DISC) or the KS-20449 (SD-95531-01) limiting amplifier, refer to Section 024-176-100 or 024-174-100 respectively. When testing is determined necessary, refer to Section 201-511-501 for tests when associated with 5A system.

**D. Channel Amplifier (Record/Reproduce Amplifier)
SD-99723-01 or SD-95296-01**

3.17 A separate amplifier is used for each of the six channels in the announcement machine. Each channel amplifier is used during record and playback to amplify the voice signal to a preset level. Individual gain controls for record and playback are provided.

3.18 Each channel amplifier consists of a pre-amplifier, power amplifier, bias oscillator, voice alarm circuit, and switching relay. The relay is controlled by the announcing trunk circuit and sets up a recording or playback path in the amplifier.

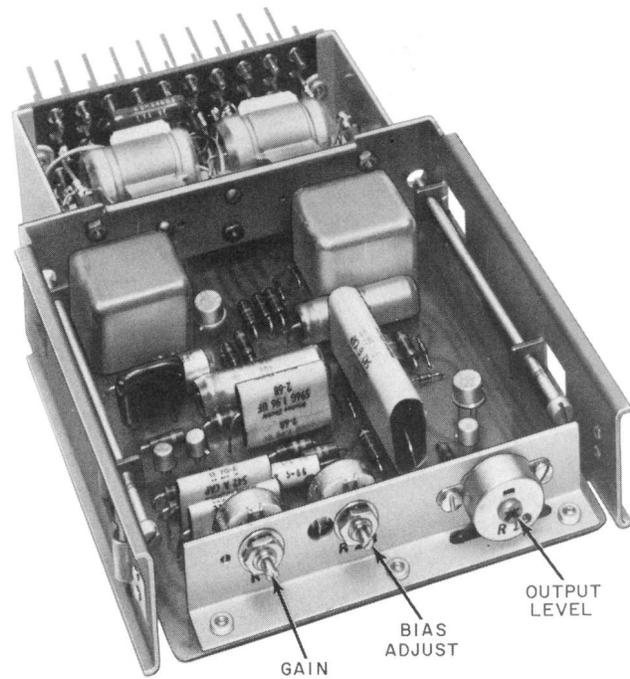


Fig. 9—Limiting Amplifier—SD-95281-01 (MFR DISC) or SD-99531-01 (KS-20449—SD-99531-01 Shown)

3.19 When recording, the voice input from the limiting amplifier is connected through the preamplifier and power amplifier, combined with a high frequency bias current from the oscillator, and applied to the record head of the announcement machine for transcription on the recording band. Simultaneously, the bias oscillator provides a high current to the erase head.

3.20 During playback, the recorded voice announcement is picked up by the reproduce head in the announcement machine, progressively amplified by the preamplifier and power amplifier, and provided to the toll equipment through the announcing trunk circuit. The high frequency oscillator is disabled and the voice alarm circuit monitors the announcement output of the amplifier.

3.21 Emergency operator announcements are made from the telephone set through the limiting amplifier and the record path of the channel amplifier with the bias oscillator disabled. Switching connections are made by the trunk circuit. In

earlier configurations, operator announcements are made from a switchboard position.

3.22 A voice alarm circuit monitors the announcement level in each channel amplifier and operates alarms when the announcement level falls below a preset value for more than 7 seconds. Minimum voice level is adjustable and the time delay is adjustable from 8 to 25 seconds at the amplifier.

E. Announcing Trunk (SD-94804-01)

3.23 The announcing trunk circuit is a switching circuit for controlling the various functions of the 5A system. This trunk works in conjunction with announcement connecting trunk circuits in crossbar tandem or 4A or 4M toll offices. Calls which require an announcement are routed to these announcement connecting trunks which have an appearance on the outgoing link. Announcement connecting trunks are arranged in groups of trunks which require the same announcements. These groups of trunks are associated with a particular channel of the 5A announcement machine. In crossbar tandem offices this association is made by means of rotary switches on the traffic supervisory cabinet or by direct connection if the traffic supervisory cabinet is not provided. In 4A or 4M toll offices the association is made by patching jacks at the traffic supervisory rack. This circuit provides means for an operator at a 619-type telephone set to record announcements on the 5A announcement machine, to monitor announcements that have been recorded, and to announce and flash, in case of trouble, directly to the connected trunks. Although most operations are initiated at the telephone set or a switchboard, the trunk circuit establishes paths and makes connections among the system elements and between the system and the toll equipment.

3.24 The trunk circuit provides access to and distribution of announcements recorded on the 5A announcement machine. The normal condition of the trunk circuit is to arrange a connection for the announcement system, for automatic announcing on six channels to the toll equipment through the reproduce portion of the record-reproduce amplifier to an announcement connecting trunk circuit and to establish the alarm control circuit.

3.25 The alarm control circuit makes provision for sounding an audible alarm and lighting alarm lamps when a recording is absent from a

channel or whenever a recording level falls below a predetermined and preset level.

3.26 The announcing trunk circuit arranges the connections for erasing announcements, recording, playback, and emergency operator announcing on any channel selected from the telephone set or switchboard. When making a recording from a 619 type telephone set, the trunk automatically provides 120-ipm tone to the toll equipment on the channel being recorded. Earlier trunks used in the 5A system do not have this feature.

3.27 The recording is made from the telephone of a 619A telephone set, through a limiting amplifier providing a constant level for a more uniform recording, to the record portion of the record-reproduce amplifier which transcribes the recording on a revolving magnetic band. A lamp display at the 619A telephone set indicates the start and end of the record cycle automatically.

3.28 The operator can monitor any channel by depressing the ANN key associated with the channel. After a new recording is made this trunk is arranged to automatically return the announcement to the operator.

3.29 In case of trouble, an operator announcement can be made rather than the normal machine announcement. By operation of the proper keys at a 619A telephone set, the announcing trunk circuit connects the operator's telephone circuit, through the limiting amplifier, to the input of the reproduce portion of the record-reproduce amplifier, and disables the record portion, enabling an operator to announce.

F. Telephone Sets (Supervisory and Control Circuit SD-94803-01)

3.30 The 619A or 619B telephone set is used for supervision and control of the 5A system. (See Fig. 4.) The set is connected to the announcing trunk circuit for announcing, recording, and playback and is connected to a monitor trunk circuit of the toll equipment for answering calls directed to a reorder or an announcement. Provision is made to announce and flash, in case of an emergency, through the machine amplifiers to an announcement connecting trunk circuit. The telephone is normally installed in a quiet area and connected by an A100D cord to suitable connecting blocks in the switchroom.

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One telephone set is required and a second 619A telephone set may be provided in parallel with the first for each single announcing system. In this case the same lamp indications are given on both sets, but only one telephone set may be used at a time. Lamps associated with each button indicate operations selected. During automatic announcing on all six channels, no buttons are depressed and no lamps are lighted.

3.31 The modified 601A telephone set is an earlier type similar to the 619A set and is used for supervision and control of the 5A system. However, the button arrangement, lamp indications, and method of operation are different depending on the associated announcing trunk.

G. Switchboard Positions

3.32 Twelve jack appearances and six associated lamps are located in a recording position, which is an end position of the switchboard. For No. 1- and No. 3-type switchboards, cords and associated keys and lamps from the last equipped position next to the recording position are used for recording and manual announcing. But each end position of the No. 5 switchboard is equipped with cord, lamp, and ringing key for the same purpose. No. 3-type switchboards must be equipped with a pad control simplex to operate relays in the announcing trunk circuit.

3.33 Two jack appearances and an answering lamp for each channel are multiplied throughout the No. 1- and No. 3-type toll switchboards. One jack appearance and an answering lamp for each channel are multiplied throughout the No. 5 toll switchboard for emergency manual operation in the event of machine failure.

4. PROCEDURES

A. Recording

4.01 With 5A announcement systems arranged to return 120-ipm tone to the toll equipment when a channel is being recorded, there is no need to remove patches at the No. 4 toll traffic supervisory rack or to make busy the connecting trunks of the crossbar tandem equipment.

4.02 In 5A announcement systems that are not arranged to return 120-ipm tone during recording, it is necessary to remove patches at

the traffic supervisory rack of a No. 4 office before recording. In crossbar tandem offices, since the announcing trunks are cabled directly to the connecting trunks, the announcement connecting trunks of the toll equipment must be made busy at the outgoing trunk test frame before recording.

4.03 The operational procedures for recording announcements include the flashing sequences for the various equipment arrangements. The nominal recording time is 9.2 seconds and flashes are approximately 1.4 seconds.

4.04 For detailed procedures on recording, refer to Section 201-511-301.

B. Machine Announcements

4.05 For the No. 4 systems, after the desired recording has been made and when conditions warrant, the channel is released or an announcing trunk is patched at the traffic supervisory rack to a group of announcement connecting trunks. When an announcement connecting trunk is seized, the announcement is sent out. Prior to each announcement, a flash originating at the announcement machine is sent to each trunk.

4.06 For crossbar tandem, after the desired recording has been made, the channel is released or the busy condition is removed from the connecting trunks. When a connecting trunk is seized, the announcement is sent out.

C. Emergency Operator Announcing

4.07 In the event of a failure in the announcement machine, an operator can make announcements in place of recorded announcements. But when the 5A system is arranged to return 120-ipm tone during recording, emergency operator announcements may also be made in place of a recorded announcement when it is not advisable to erase a recording.

D. Monitoring

4.08 Calls directed to an announcement trunk group may be answered from the telephone set or switchboard position. The No. 4A and 4M toll switching systems use a monitoring trunk circuit for this purpose. (See Fig. 1.) The monitoring trunk connects the telephone set of the announcement system to incoming calls directed to the announcement trunks. An operator may select and answer a call

directed to any announcement channel. When a call is selected for answering, the recorded announcement is temporarily blocked. When the monitor feature is not in use, the monitor trunk is automatically made busy and incoming calls receive the recorded announcement.

4.09 Crossbar tandem systems use a part of the announcement connecting trunk circuit for answering instead of a separate monitor trunk. (See Fig. 2.) As in the No. 4-type office, the circuit operates to connect an operator with an incoming call.

E. Voice Alarm

4.10 A voice signal failure on any channel during automatic announcing causes the alarms to operate. Therefore, when no announcement is present on a channel, a 1000-cycle tone should be recorded to prevent an alarm. The tone is available at the announcement frame.

4.11 When a voice signal fails for longer than 8 to 25 seconds, the ALM lamp at the telephone set or switchboard lights, a minor audible alarm sounds in the switchroom, an aisle pilot lamp lights, and the ALM lamp associated with the announcing trunk lights at the announcement frame.

4.12 Operation of the ALM CO key silences the audible alarm, extinguishes the aisle pilot lamp, and lights a guard lamp. The ALM lamp at the announcement frame or at the telephone set or switchboard remains lighted.

4.13 The ALM CO key will not retire an alarm lamp at a switchboard except during intervals when an operator is announcing and then, only if transmission of operator announcement is effective.

4.14 When the trouble is cleared, the ALM-lamps at the telephone set or switchboard and at

the announcement frame are extinguished. Releasing the ALM CO key extinguishes the guard lamp.

5. MAINTENANCE FACILITIES

5.01 The TST IN and TST OUT jacks provide access to the input and output of the record-reproduce amplifier. For maintenance purposes a 1000 cycle, -10 dB tone is available for recording at the 1000, -10, 600 jack. A five deck switch (SEL) selects the channel to be tested by connecting the tip and ring of the TST IN and TST OUT jacks to the input and output leads, respectively, of the record-reproduce amplifier associated with that channel. The fifth deck connects the sleeve of the TST IN jack to the "REC" lead associated with the channel being tested to ground that lead via patch cord from the sleeve of the 1000, -10, 600 jack by operation of the RCD key.

5.02 The LIM AMP IN and LIM AMP OUT jacks provide access to the input and output of the limiting amplifier to adjust the amplifier or to patch it out of this circuit in case of trouble.

6. MAINTENANCE

6.01 The recording machine requires periodic inspections for cleaning and lubricating. Also, occasional checks of head pressure on the recording band will prevent undue wearing of the band. General maintenance is infrequent; adjustments and replacements are normally performed on service order. For further maintenance requirements on the recording machine, refer to Sections 034-351-701 and 801.

6.02 The amplifiers and trunk circuits may be tested with the facilities at the announcement frame, a transmission measuring set, and a voltmeter. Occasional gain adjustments may be required. For details on testing and adjusting refer to Section 201-511-501.