

**NO. 6A ANNOUNCEMENT SYSTEM
MACHINE INTERCEPT
ENGINEERING INFORMATION
COMMON SYSTEMS**

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C. Distributing and Alarm Circuit	4	1.01 The No. 6A announcement system pro- vides a recorded announcement for an- swering calls to vacant or disconnected tele- phone numbers. Where this system is used, calls to changed numbers (regular intercept) and calls to lines in trouble (trouble intercept) are both routed to intercept operators as heretofore.	
8. ADDITIONAL ALARM CIRCUITS	4	1.02 This section contains engineering infor- mation concerning the No. 6A announce- ment system. Section 951.005.01 describes the equipment and operation of the system. Other machine intercept facilities are provided by the No. 7A announcement system for use in com- munity dial offices, step-by-step offices, and No. 5 crossbar offices. In No. 4-type toll crossbar offices, certain types of irregular calls are inter-	
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cepted and given an appropriate announcement by the No. 5A announcement system. Descriptions of the No. 7A and 5A announcement systems are given in other sections. (See references.)

1.03 The No. 6A announcement system has been designed primarily for use in conjunction with centralized intercepting service. Subcentering arrangements are available for use where more than one centralized intercepting center is required or where intercept traffic is now being handled at several local switchboards.

1.04 It is expected that large economies may be realized from the use of centralized intercept facilities. Centralized intercept may be provided whether or not recorded announcement facilities are used.

2. TRUNKING ARRANGEMENTS

2.01 In general, machine intercept will reduce the number of operator handled intercept calls by approximately 50 per cent. However, on initial installations of the system or when major rearrangements of existing installations are planned, it is recommended that operator intercept positions sufficient to handle 60 per cent of the total intercept traffic be provided.

2.02 Whenever centralized machine intercept is required, it is necessary to install outgoing and incoming intercept trunk circuits arranged to handle machine intercept. Outgoing intercept trunk circuits and incoming intercept trunk circuits which can handle and distinguish between machine, regular operator, and trouble intercept traffic are now available. The correct trunk circuits to be used can be determined by referring to the appropriate system key sheet and J specification.

2.03 When calls are intercepted from a distant central office, the connection to the distributing center (central bureau or subcenter) is made on a channel using loop or E and M lead signaling, the correct signal being routed to an incoming intercept trunk which in turn directs the call to the proper intercept position (the machine announcement, or a regular or trouble intercept operator).

2.04 A large number of incoming intercepting trunk circuits have been replaced by universal-type incoming intercepting trunk circuits. The new circuits omit the following four features which are no longer required.

- (1) Completion of intercepted calls by the intercept operator.
- (2) Answer supervision on intercepted local or toll calls.
- (3) Flashing the originating operator.
- (4) A toll identification tone on intercept trunks.

2.05 A 3-wire incoming intercept trunk circuit is available to handle intercept traffic from local step-by-step offices.

2.06 Since the amount of intercept traffic in a given central office determines the number of intercept trunks required, each office is engineered to meet its own needs.

3. CROSS CONNECTIONS FOR INTERCEPT

3.01 Cross connections must be made in each central office to "sort" the various types of intercepted calls. Distinctive signals identify the type of call and route the call to the machine announcement, or to a regular or trouble intercept operator, as required. The actual cross connections necessary for each type of intercept service are given in the appropriate systems drawings and A300 BSP sections.

4. CENTRAL OFFICE FEATURES

4.01 Central offices arranged for No. 6A intercept provide trunking arrangements as shown in Fig. 1. The actual number of trunk circuits assigned is governed by traffic and transmission considerations. The assignment of intercept trunk circuits is such that a calling party reaching intercept should not receive repetitive "false" busy indications, and also transmission must be satisfactory.

A. Panel and Step by Step

4.02 When traffic is intercepted from final terminals in panel offices or connector terminals in step-by-step offices, one intercept trunk circuit is generally provided for each hundreds group (for instance, those terminals to be inter-

cepted in each hundreds group are multiplied to one trunk circuit). Certain multiplying arrangements are also employed when intercepting final selector multiples in panel offices or selector levels in step-by-step offices. See the appropriate division D traffic engineering practices for specific details.

4.03 Intercept trunks from each dial central office should be concentrated so that the number of trunks to the centralized location is kept to a minimum. Concentration of intercept traffic is an inherent feature of crossbar systems. However, concentrating equipment (trunk finders) should be provided in all those panel or step-by-step offices that connect to a centralized intercept location. The use of such equipment avoids the need for excessive switchboard and outside plant facilities.

B. Panel

4.04 For concentrating final terminal, vacant incoming multiple, and trouble intercept traffic over a small group of trunks from a panel office to a centralized intercept location, 400-point trunk finder equipment may be used. A common group of trunks is provided from the concentrating equipment to the centralized intercept location. Two arrangements of the trunk finder equipment are available for this purpose.

Note: The two concentrating equipment arrangements are described in Division D, Section 3m of the Panel System, Traffic Engineering Practices.

C. Step by Step

4.05 In step-by-step offices, machine intercept facilities may be provided for terminal-per-station equipment. Terminal-per-line equipment is not recommended for new installations or additions to existing equipment due to its limitations in making possible an adequate intercepting service and its requirement for an excessive number of central office codes.

4.06 Intercept trunks from the connector terminals, toll selector levels, local selector levels, and plugging-up lines should be assigned in a common group to one trunk finder unit (see Fig. 1). When more than one trunk finder unit is required, the trouble and regular intercept trunks may be assigned to the different units as

desired. Trouble intercept trunks from plugging-up lines should be assigned to trunk positions on adjacent levels, since these trunks do not require equipment on the relay bay of the unit.

4.07 A 200-point trunk finder unit using step-by-step switches and having a capacity for 198 intercept trunks per unit is presently available for intercept concentration. A smaller unit using rotary-type selectors has a capacity for 22 intercept trunks. The 50- and 100-point trunk finder units formerly used for intercept purposes have been rated "A&M Only." Intercepting trunks from connector terminals, vacant local selector levels, vacant toll selector levels, and plugging-up lines are connected to the banks of trunk finders. Each trunk finder is connected to an outgoing intercept trunk, outgoing to the centralized intercept location.

D. No. 1 Crossbar

4.08 Each outgoing intercepting trunk circuit in No. 1 crossbar offices can be arranged to handle any combination of three types of intercept traffic; machine, regular operator, and trouble operator.

4.09 Since toll identification is now rated "Mfr Disc.," it is no longer necessary to provide separate trunking facilities for local and toll intercept. The two marker relays that were originally used for toll identification are now used for machine and operator intercepting.

E. No. 5 Crossbar

4.10 It is customary to provide one group of outgoing trunks for regular intercept and a separate group of trunks for trouble intercept. It is also possible to combine the two groups of trunks into a common group where substantial outside plant savings can be realized. The latter procedure may be undesirable since it can result in considerable degradation of service on regular intercept traffic when an abnormal number of lines are placed on trouble intercept. No provision is made for separate trunk groups on local and toll intercept.

4.11 An outgoing intercept trunk circuit is arranged to handle intercept traffic from the trunk link frame. This circuit routes vacant code calls to an incoming intercept trunk circuit which in turn directs the call to the machine

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announcement or a regular intercept operator. It should be noted that the announcement provided by the No. 6A announcement system should be appropriate for the type of machine intercept involved.

5. PAD CIRCUITS

5.01 Incoming intercept trunk circuits are provided with an adjustable pad circuit (optionally strapped) to adjust the machine announcement level in accordance with the connected trunk loss. The 3-wire incoming intercept trunk circuit for use in step-by-step offices is provided with both an adjustable and a fixed pad circuit to be used, respectively, in a nearby office and in an office located in the same building as the distributing center.

6. CALL TRANSFER (MACHINE TO OPERATOR)

6.01 All incoming trunks arranged for machine intercept automatically transfer (cut through) calls from the machine announcement to a regular intercept operator if the subscriber fails to disconnect after receiving a predetermined number of announcements. A strapping arrangement is used for setting the cut through. Ordinarily, the trunks will be set to transfer calls to an operator at the end of the first announcement. The operator generally receives a distinctive signal which indicates that the subscriber has been given the predetermined number of announcements. However, when a tone is required to identify a particular type of call (such as suburban), the distinctive signal to indicate transfer is not provided.

7. ANNOUNCEMENT MACHINE UNITS AND ASSOCIATED CIRCUITS

A. Announcement Machine

7.01 The announcement machine equipment consists essentially of two units, each consisting of a recorder-reproducer and associated amplifier. One unit carries the load while the other is arranged for stand-by operation. Failure of the working unit results in automatic transfer to the stand-by unit. The transfer can also be made manually for maintenance or recording purposes. The announcement machine equipment is shown mounted on a frame in

Fig. 2, and close-ups of the recorder-reproducer are shown in Fig. 3 and 4.

B. Announcement Machine Control Circuit

7.02 This circuit controls the operation of the announcement machine equipment including the making, erasing, and reproducing of recordings. The control panel of this circuit contains the keys and lamps necessary for control of both recorder-reproducers.

C. Distributing and Alarm Circuit

7.03 This circuit operates in conjunction with the announcement machine control circuit to distribute the recorded announcement to the various announcement trunks. It is composed of two main parts, a distributing circuit and a control and alarm circuit.

7.04 If a distributing center (see 9.01) is required to handle more than the equivalent of 100 incoming intercept trunks, the signal multiplier circuit specified in the distributing and alarm circuit must be provided.

7.05 Although each distributing center (see 9.01) serves a similar network of trunks (see Fig. 1), a subcenter has a separate and distinct distributing and alarm circuit from the one in the central bureau since the amplifiers and some of the alarms required in the central bureau are contained in the announcement machine control circuit.

7.06 Fig. 1 is intended only for general engineering information and does not replace the No. 6A announcement system key sheet listed under references. It is offered merely as a guide in engineering a system installation. The key sheet arrangement should be used in selecting the required circuits.

8. ADDITIONAL ALARM CIRCUITS

8.01 A standard central office alarm circuit is required in each distributing center. The alarm circuit connects to and operates in conjunction with each distributing and alarm circuit, and the announcement machine control circuit (central bureau only). The alarm circuit used is dependent on the type of central office in which the distributing center (see 9.01) is located.

9. DISTRIBUTING CENTERS

9.01 The term distributing center as used herein applies to the central bureau and also to each subcenter.

A. Central Bureau

9.02 The function of the central bureau is to record, reproduce, and amplify the announcement and, by means of a distributing and alarm circuit, to distribute the announcement to a network of incoming intercept trunks and announcement trunks outgoing to subcenters (see Fig. 1).

9.03 The volume level supplied by the announcement machine on local, tandem, and short-haul toll connections is equal to or better than that received from intercept operators talking at average speech volume.

B. Subcenters

9.04 A subcenter is installed in an area where it is not economically justifiable to install a separate central bureau. The function of a subcenter is to receive the machine announcement from another distributing center, amplify the announcement, and distribute it over an intercepting trunk network similar to the one served by the central bureau (see Fig. 1). The subcenter is also equipped with switchboard positions for intercepted calls to be handled by regular or trouble intercept operators.

9.05 A subcenter is normally supplied with the machine announcement from the central bureau. A subcenter may also be supplied with the same announcement from another subcenter. Each subcenter supplied from the *central bureau* may, in turn, distribute the machine announcement to a number of other incoming trunks and additional subcenters (see Fig. 1). However, any subcenter being supplied by another *subcenter* should be used only to handle incoming intercept traffic and not to supply additional subcenters. This limitation must be observed when determining subcenter capabilities (see 9.14). One reason for limiting tandem operation is that a cumulative frequency distortion is introduced in the system (as discussed in 9.06 and 9.07).

9.06 An important factor must be considered when it is necessary to connect subcenters in tandem. In order to minimize the possibility of loss of service, two cable pairs (each of which carries the machine announcement and associated signals) are provided between any two distributing centers. The two pairs preferably should be run in different cable ducts and, if possible, over different routes. Substantially identical voice signals are simultaneously transmitted over both connecting channels between distributing centers. When the propagation time over one channel differs with that over the other, frequency distortion will be introduced. The distortion effect is more pronounced at the higher frequencies. To avoid excessive frequency distortion, the difference in physical make-up of the two cable pairs must be restricted as indicated in 9.07 below.

9.07 As seen in Table B, loaded or in some instances short nonloaded facilities may be used between distributing centers. When both channels contain pairs of the same gauge throughout, the maximum permissible difference in the length of the two pairs is the value given in the table. However, if one or both cable pairs consist of mixed gauges, the permissible difference of each cable pair must be determined *individually* by apportioning according to the lengths of each gauge. After determining the permissible difference of each cable pair, the more critical (smaller) value of the two is taken as the maximum permissible difference and should not be exceeded. For example, let cable pair (1) consist of

- (a) 19NL for 70 per cent of the over-all length.
- (b) 16NL for 30 per cent of the over-all length.

while cable pair (2) consists exclusively of 22NL. In this case, the maximum permissible difference is determined as follows:

For cable pair (1):

$$\begin{aligned} 0.7 \times 3.5^* \text{ (permissible difference for 19NL)} &= 2.45 \text{ miles} \\ 0.3 \times 4.2^* \text{ (permissible difference for 16NL)} &= 1.26 \text{ miles} \end{aligned}$$

$$\text{For cable pair (1) the permissible difference} = 3.71 \text{ miles}$$

* Value obtained from Table B.

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For cable pair (2) the permissible difference is taken directly from the table since it consists of only one gauge. The permissible difference for cable pair (2) is 2.5 miles. The maximum permissible difference is the more critical (smaller) value of the two cable pairs or 2.5 miles.

9.08 The permissible high-frequency loss *between* any two distributing centers is 2 db. Wherever a subcenter is supplied by another subcenter, the total high-frequency loss due to frequency distortion can be 4 db maximum.

9.09 In addition, there is a volume level loss between the all trunks idle and all trunks busy conditions amounting to 0.7 db maximum at *each* distributing center. Wherever a subcenter is supplied by another subcenter, the total volume level loss can be a maximum of 2.1 db.

9.10 Limiting central bureau distribution to groups of no more than two *successive* subcenters is based (from 9.08 and 9.09) on a maximum over-all high-frequency loss of about 6 db.

9.11 Failure of one of the two channels between distributing centers results in a volume level loss of approximately 6 db out of the subcenter. Immediate action should therefore be taken to re-establish dual channel operation. Until normal service is restored however, the gain of the amplifier in the remaining channel may be temporarily increased 6 db.

C. Capacity

9.12 The capacity of each distributing center is to be computed separately.

9.13 To determine the intercept trunk load capabilities of a distributing center, each announcement trunk circuit consisting of two channels outgoing to a subcenter must be considered an equivalent load impedance of 14 incoming intercept trunk circuits. Therefore, the maximum number of incoming intercept trunk circuits that a distributing center can handle is decreased by 14 for each subcentering arrangement served by it.

9.14 The central bureau has a maximum capacity of 800 incoming intercept trunk circuits, or the number of announcement trunk

circuits (outgoing to subcenters) having an equivalent impedance, or any combination thereof.

9.15 Each subcenter is capable of handling a maximum of 300 incoming intercept trunk circuits, or the number of announcement trunk circuits (outgoing to subcenters) having an equivalent impedance, or any combination thereof. See 9.05 for limitation.

10. EMERGENCY ANNOUNCEMENT FACILITIES

10.01 Failure of both channels in a distributing center is considered to be so unlikely that facilities for emergency announcement have not been provided in the No. 6A announcement system.

11. RECORDING FACILITIES

11.01 The system provides for making recordings either at the machine or from a remote, quiet location in the same building. Remote recording, being more quiet, is preferred. Two headsets and one beehive lamp should be provided at the remote location in addition to a lamp path and two talking paths from the machine to a jack box in the recording room.

11.02 It is suggested that the remote recording facilities be portable, if possible, so they can be stored when not in use. However, the jacks necessary for recording should be permanently installed, mounted on or in the wall (preferably recessed).

12. TRAFFIC REGISTERS

12.01 Peg count registers may be provided for counting intercepted calls under the following conditions.

- (a) For counting calls routed initially to the machine announcement.
- (b) For counting calls routed initially to a regular intercept operator. This count does not include calls transferred from the machine announcement.
- (c) For counting calls transferred from the machine announcement to a regular intercept operator.

12.02 For all three conditions listed above, circuits are available to permit the use of 14- or 12-type registers. The 14-type registers will be used when they are to be located in the new wall-mounted dial traffic register rack or in the No. 23 traffic register cabinet. The 12-type registers will be used in the older type dial traffic register racks. Provision is made in the incoming intercept trunk circuit for connecting to peg count registers as required.

12.03 The maximum number of peg count registers that the incoming intercept trunk circuits are capable of handling is dependent on the type of central office being provided. The actual number of registers assigned is determined by traffic considerations.

12.04 No automatic count of trouble intercepted calls will be provided. Portable registers of the 13-type will be suitable for such counts, when required.

13. SERVICE OBSERVING

13.01 Provision is made in the incoming intercept trunk circuit for including service observing features, when required. Machine intercepted calls will not be observed. However, calls transferred from the machine to a regular intercept operator will be observed. Calls to regular and trouble intercept operators will be observed as at present. Table A, attached, lists typical arrangements for service observing on intercepted calls.

14. MAINTENANCE

14.01 No special maintenance facilities are required for the No. 6A announcement system. Maintenance information on the recorder-reproducer can be found in sections in the A series.

15. POWER

15.01 A 115-volt, 60-cycle commercial ac power supply is required to operate the recorder-reproducers and all of the amplifiers used in the system. In the event of failure of the commercial ac supply at the central bureau, standard emergency power supply facilities may be used (see No. 6A announcement system key sheet and J specification).

15.02 Other power supplies required by the No. 6A announcement system circuits are generally available in most central offices.

16. REFERENCES

Bell System Practices

TITLE	SECTION NO.
General Descriptive Information — No. 6A Announcement System, Machine Intercept — Common Systems	951.005.01
Equipment Design Requirements—No. 6A Announcement Systems for Machine Intercept Service—Common Systems	801-603-156 (J95417)
No. 4A Announcement System — Common Systems	801-603-155 (J95416)
<i>Note:</i> The No. 4A (time) announcement system and the No. 6A (intercept) announcement system subcentering arrangements are very similar.	
Frameworks and Equipment for No. 23 Operating Room Desk—Common Systems	821-704-150 (J94910)
Transmission Engineering and Data, Exchange Area Transmission Practices	AB22.172.1-.4
DSA Service, Relay Rack Mounted Units, Toll Switchboards — Toll Systems	821-706-158 (J61577)
Intercepting Trunk Finder Frame, Trunk Finder Supplementary Frame, and Miscellaneous Relay Rack Equipment—Panel Systems	815-041-150 (J21401)
Intercepting Trunks and Trunk Finder Equipment; No. 1, 350A, and 355A Offices — Step-by-Step Systems	814-415-151 (J32008)
Intercepting Trunks, Relay Rack Units Using 2-inch by 23-inch Mounting Plates — Step-by-Step Systems	814-415-150 (J32003)
Auxiliary Central Office Relay Rack Mounted Equipment — No. 1 Crossbar System	816-027-150 817-041-150 (J23066)

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TITLE	SECTION NO.	TITLE	SECTION NO.
Rotary Line Switch and 22-point Line or Trunk Finder — Step-by-Step Systems	814-425-150 (J33020)	Key Sheets	
Trunks and Lines Associated With Line Link Frames — No. 5 Crossbar Systems	819-605-150 (J23056)	Announcement System — No. 6A	SD-96480-01
Intercepting Trunks for Manual Intercepting and Intercepting Trunks and Common Equipment for the No. 7A Announcement System — Step-by-Step Systems	814-524-150 (J33016)	Panel Systems — Ground Cut-off Relay Office	SD-21680-01
		Panel Systems — Battery Cut-off Relay Office	SD-21300-01
		Step-by-Step Systems — No. 1	SD-31359-01
		Step-by-Step Systems — No. 350A	SD-31364-01
Outgoing Trunks Not Requiring Association With Senders — No. 5 Crossbar System	819-608-150 (J23057)	Step-by-Step Systems — No. 355A	SD-31780-01
		Crossbar Systems — No. 1	SD-25000-01
		Crossbar Systems — No. 5	SD-25760-01

Note: This specification is a reference for the No. 7A (intercept) announcement system.

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Table A — Typical Service Observing Arrangements

TYPE OF INTERCEPT	WHERE HANDLED	26-LINE KEY-ENDING CIRCUIT*	100-LINE CALL DISTRIBUTING CIRCUIT**
Regular	No. 23 desk (A, B, C, D)		X
Regular	Toll, DSA switchboard	X	X
Regular	No. 2, 7, 7A key-ended desks	X	X
Regular	No. 1 key-ended desk	X	
Regular	No. 3, 4, 6 desks (pos distrib)	X	
Regular	No. 19 desk	X	X
Machine Transferred		Same as regular intercept in each case as given above	
Trouble	Switchboard No. 19 desk	X	X

Notes

* Multiline (26 loop) key-ended service observing circuit.

** Multiline (100 loop) call distributing service observing circuit.

Table B — Equalization of Trunks Between Distributing Centers for the No. 6A Announcement System

FACILITY	LENGTH OF LONGEST TRUNK (MILES)	EQUALIZED TO 2 DB BETWEEN	REPEATING COIL ARRANGEMENT USED IN ANNOUNCEMENT TRUNK CIRCUIT	EQUALIZER	PERMISSIBLE DIFFERENCE IN LENGTH BETWEEN THE TWO TRUNKS OF EACH SUBCENTER (MILES)
22NL	0-3.5	300-3200	Fig. A	None	2.5
19NL	0-5.5	300-3200	Fig. A	None	3.5
16NL	0-5.5	300-3200	Fig. A	None	4.2
19H44	0-8	300-3200	Fig. B	None	1
	8-30	300-3200	Fig. B	23A	1
19B88	0-7	300-3200	Fig. B	None	0.5
	7-30	300-3200	Fig. B	23A	0.5
19H88	0-6	300-3000	Fig. B	None	0.7
	6-30	300-3000	Fig. B	23A	0.7
22H88	0-5	300-3000	Fig. B	None	0.7
	5-30	300-3000	Fig. B	23A	0.7
24H88	0-3.5	300-3000	Fig. B	None	0.7
	3.5-24	300-3000	Fig. B	23A	0.7

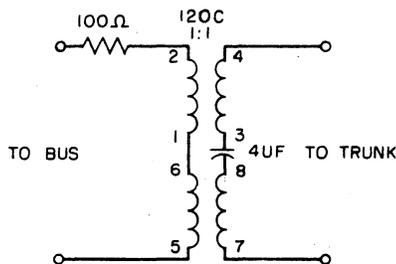


Fig. A

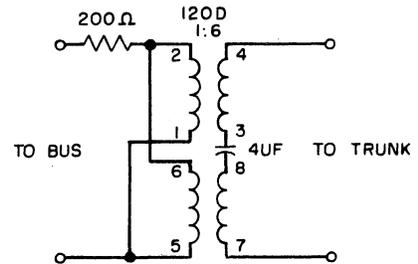


Fig. B

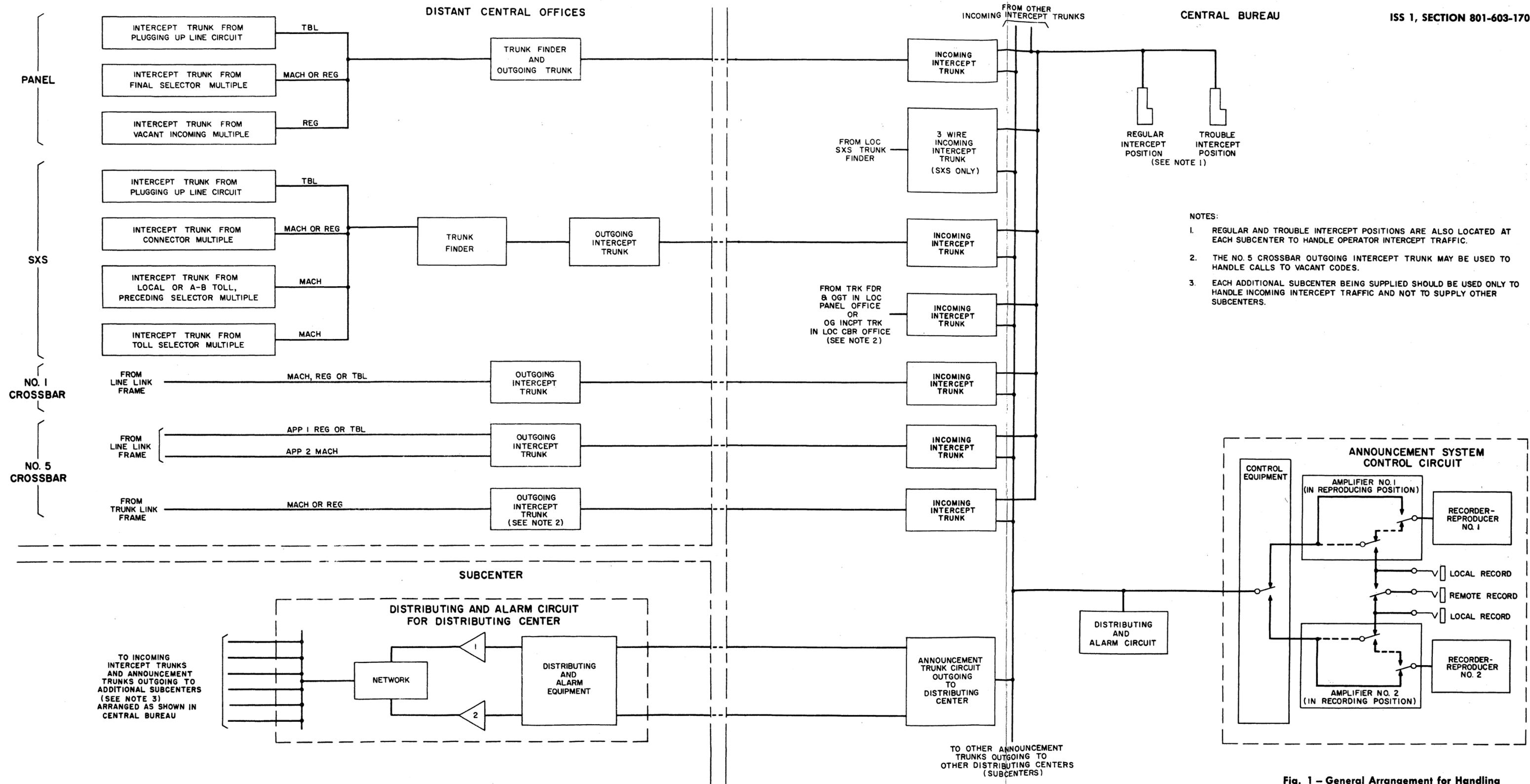


Fig. 1 - General Arrangement for Handling Intercepted Calls

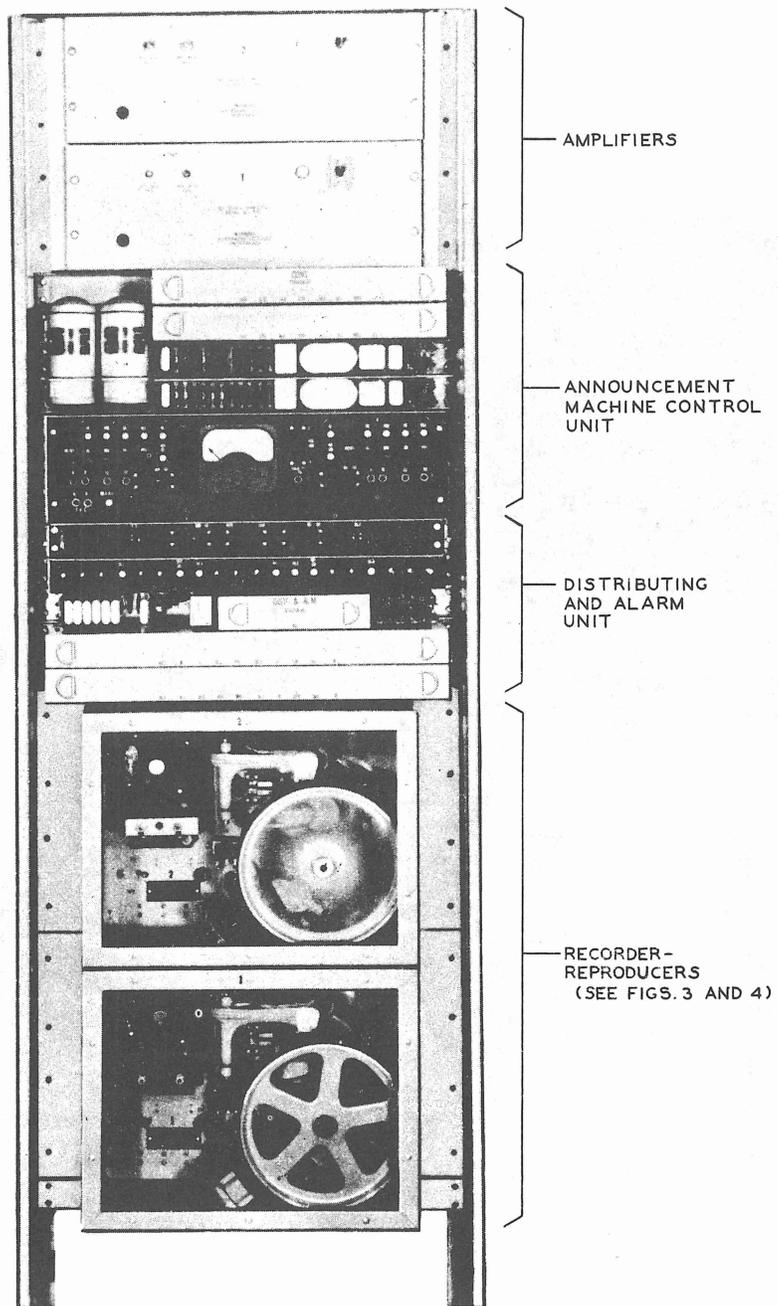


Fig. 2 – Announcement Equipment, Front View

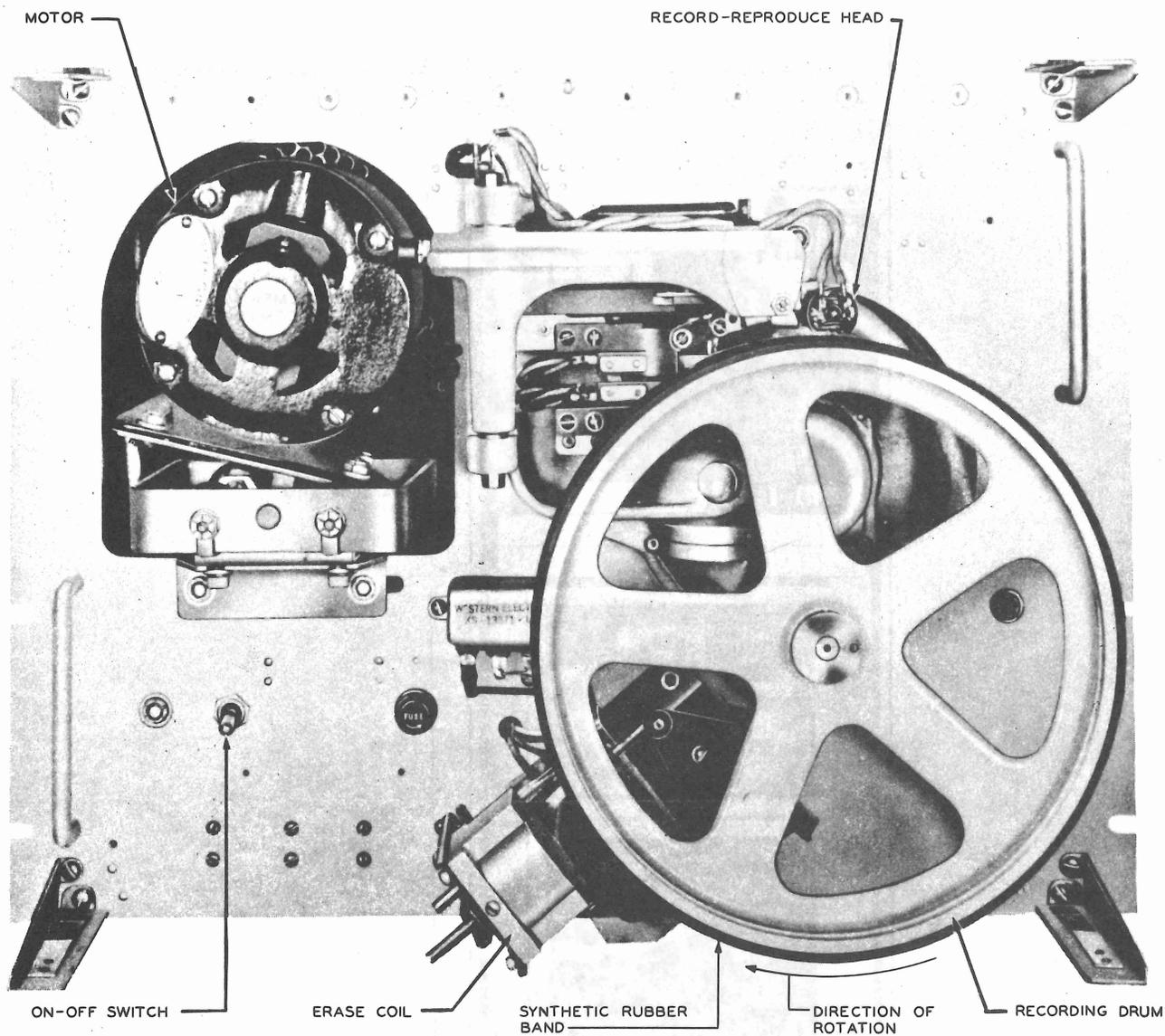


Fig. 3 - Recorder-Reproducer, Front View, Without Cover

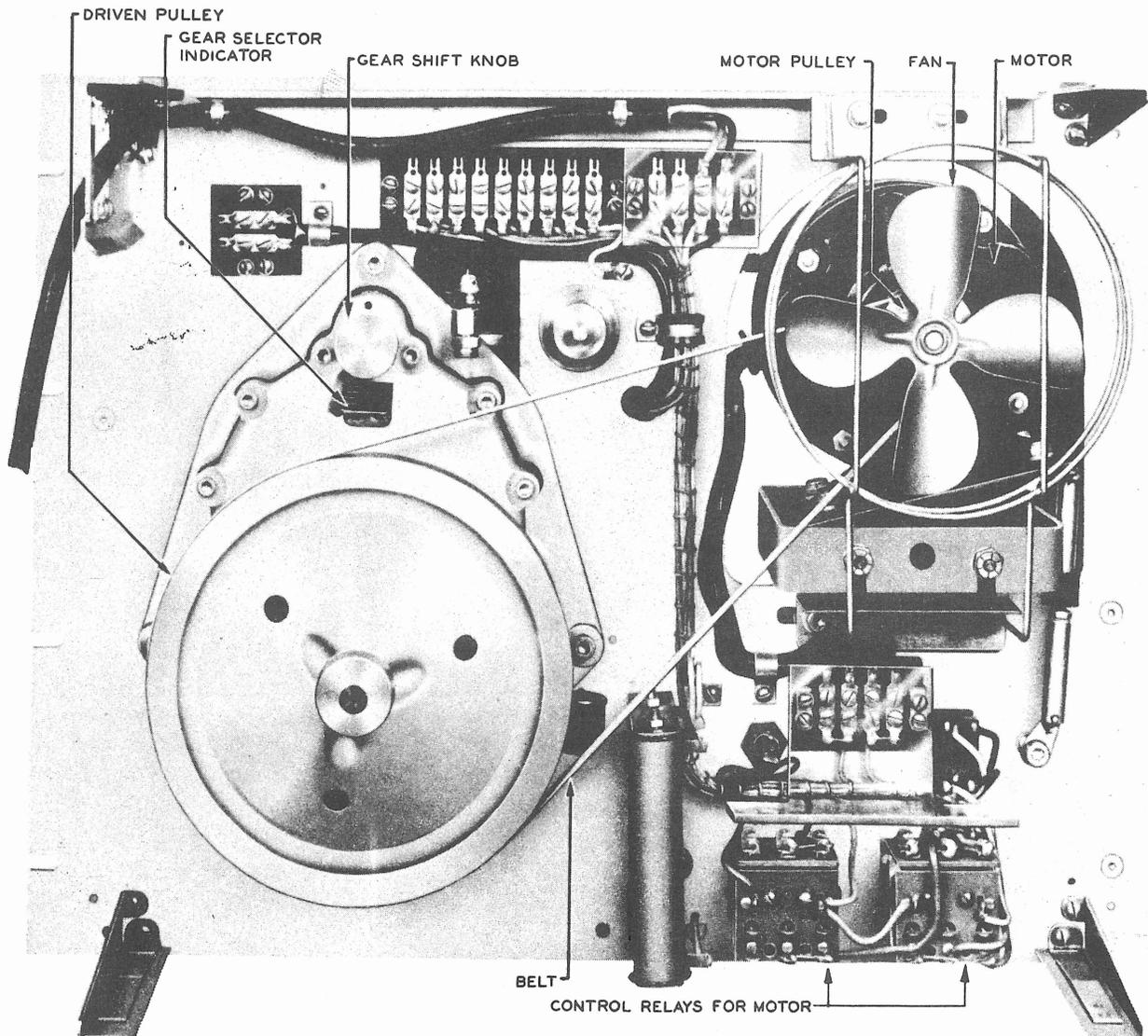


Fig. 4 - Recorder-Reproducer, Rear View,
Without Cover