# SWITCHING SYSTEMS MANAGEMENT
# NO. 5 CROSSBAR (2-WIRE) – SYSTEM DESCRIPTION
# NO. 5A CROSSBAR

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# NO. 5A CROSSBAR

## 1. INTRODUCTION

### 1.01 Contents

This section describes the No. 5A Crossbar Switching System which employs basic No. 5 Crossbar System technology and operation. Since most of the features and functions of the No. 5 and No. 5A crossbar are identical, this section is confined to a description of the differences between the two systems and assumes that the reader is familiar with No. 5 crossbar operation and features.

## 2. DESCRIPTION

### 2.01 Modular Design

The No. 5A Crossbar System is a palletized, electromechanical common control system, designed to meet specialized needs for applications requiring up to 1960 lines, 3000 numbers, and 400 trunks.

All equipment is installed on 7-foot high frames mounted on steel pallets and is wired and system tested at the factory. The complete system is packaged in three containers (modules) which are readilly transportable to the central office site (Exhibit 1). Module No. 1 contains the switching apparatus to serve 980 lines and 2000 numbers, module No. 2 contains the power equipment, and module No. 3, where required, contains the switching equipment to serve an additional 980 lines and 1000 numbers. The maximum quantities of lines, common control, and switching equipment that can be provided in offices composed of module 1 and modules 1 and 3 are summarized in Exhibit 2. Maximum trunk quantities are summarized in Exhibit 3, optional and miscellaneous equipment is summarized in Exhibit 4, and No. 5A crossbar features are summarized in Exhibit 5.

### 2.02 No. 5 Adaptation to No. 5A

The adaptation of the No. 5 crossbar equipment design for application in No. 5A crossbar primarily involved: (1) rearranging equipment to conform to the 7-foot frame height; (2) scaling down connectors, relay preference chains, etc., to the reduced No. 5A crossbar requirements; (3) replacing certain flexible arrangements with fixed arrangements (fixed junctor pattern, fixed trunk link frame assignments, etc.); and (4) eliminating equipment items such as dial tone markers, pretranslators, etc., and feature options such as group alerting, centrex, line link pulsing, 10-digit tandem completing, etc., from No. 5A crossbar circuitry. Also included in the adaptation for No. 5A crossbar was the implementation of small switch crossbar switches on line link frames, trunk link frames, incoming register links, out sender links, coin supervisory links, and ringing selection switches.

The system utilizes existing and modified No. 5 crossbar components, small size crossbar switches, and plug-in registers, senders, and trunks. Incoming registers and out senders are capable of operating in either the dial pulse or multifrequency mode. It also employs combined markers which perform both the dial tone and completing functions. Common overflow and tone trunks have been eliminated and their functions have been assumed by the originating register and a new line circuit 2.04.2.

The trunk tables and trunk assignment worksheet shown in Exhibits 6 and 7 are in agreement with Issue 2 of Western Electric Questionnaire E8099B.

### 2.03 Number Group Frames

2.03.1 No. 5A crossbar contains two or three number group frames. Module No. 1 contains frames numbered NG0 and NG1; Module No. 3 contains number group frame NG2. The number group frames are the same as No. 5 crossbar frames except that ringing combinations are as shown in Fig. 1 and the quantities of auxiliary relays provided on each number group frame are as follows:

| | | |
|---|---|---|
| 10 A relays | 30 SC relays | 2 OF relays |
| 5 FN relays | 13 TBA relays | 2 POF relays |

| RC RING COMB. | RF PUNCHING NO. | SIDE OF LINE | RINGING CODE | RINGING POLARITY | TYPES OF LINES SERVED: HUNTING NO., TRUNK NO., OR NO. WITH ORIGINATING SERVICE ONLY | NUMBERS TO BE REACHED ONLY BY INCOMING TEST TRUNKS CANCEL RINGING | 2-LINE NO. HUNT UP 1 HORIZONTAL GROUP | 2-LINE NO. HUNT DOWN 1 HORIZONTAL GROUP | NONHUNTING FREE NO. | INDIVIDUAL | 2-PARTY SELECTIVE | 4-PARTY SELECTIVE | 4-PARTY SEMISELECTIVE | 8-PARTY SEMISELECTIVE | SPARE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | 010-014 | R | 1 | — | | | | | | X | X | X | X | X | |
| 02 | 020-024 | R | 1 | — | | | X | | | X | | | | | |
| 03 | 030-034 | R | 1 | — | | | | X | | X | | | | | |
| 04 | 040-044 | R | 2 | — | | | | | | | | | X | X | |
| 05 | 050-054 | R | 2 | + | | | | | | | | | | X | |
| 06 | 060-064 | R | 1 | + | | | | | | | | X | | X | |
| 07 | 070-074 | T | 1 | + | | | | | | | | X | | X | |
| 08 | 080-084 | R | 1 | — | | | | | X | X | X | | | | |
| 09 | 090-094 | T | 1 | — | | | | | X | | X | | | | |
| 10 | 100-104 | R | 1 | — | X | | | | | X | | | | | |
| 11 | 110-114 | T | 1 | — | | | | | | | X | X | X | X | |
| 12 | 120-124 | | | | | | | | | | | | | | X |
| 13 | 130-134 | — | — | — | | X | | | | | | | | | |
| 14 | 140-144 | T | 2 | — | | | | | | | | | X | X | |
| 15 | 150-154 | T | 2 | + | | | | | | | | | | X | |

Figure 1
Number Group Frame Ringing Combinations

2.03.2 Two number series (series 0, Office A and series 1, Office B) are available for number assignments. Three office codes (physical, theoretical, and extra-theoretical) may be assigned in Office A. A fourth office code (physical) may be assigned in Office B. The station numbers assigned under the three office codes in Office A must be nonconflicting. The station numbers assigned in Office B may duplicate station numbers assigned in Office A. Station numbers are assigned by hundred block multiples. One number group frame in each number series (Office A and Office B) may have two "thousands" digits assigned. The remaining number group frame is restricted to one "thousands" digit. Fig. 2 gives a typical assignment involving four office codes, three number group frames, and two "thousands" digits assigned in one number group frame in each number series.

| NO. SERIES | OFFICE CODE | STA NO. | NO. GROUP FRAME |
|---|---|---|---|
| 0 (Off. A) | 866 (Physical) | 2000-2499 | 0 |
| 0 (Off. A) | 867 (Theoretical) | 2500-2899 | 0 |
| 0 (Off. A) | 868 (Extra-theoretical) | 2900-2999 | 0 |
| 0 (Off. A) | 866 (Physical) | 3000-3699 | 1 |
| 0 (Off. A) | 867 (Coin Theoretical) | 9700-9799 | 1 |
| 0 (Off. A) | 868 (Coin Extra-theoretical) | 9800-9899 | 1 |
| 0 (Off. A) | 866 (Coin Physical) | 9900-9999 | 1 |
| 1 (Off. B) | 869 (Physical) | 2000-2899 | 2 |
| 1 (Off. B) | 869 (Coin Physical) | 9900-9999 | 2 |

Figure 2
Number Group Frame Typical Assignment

### 2.04 Line Link Frames

No. 5A crossbar contains two or four line link frames. Two line link frames, LL0 and LL1, are furnished in Module No. 1 and two additional frames, LL2 and LL3, are furnished in Module No. 3. Each frame is composed of thirty 10-level, 200-point, small-type crossbar switches which provide 100 junctors to trunk link frames, 10 verticals to no-test trunks, and 490 verticals to line appearances. The line appearance verticals are connected directly to line relay circuits. Although the physical equipment arrangements of No. 5A crossbar line link frames are radically different from No. 5 crossbar line link frames, their functions, features, capacities and line designations (LL-VG-HG, VF) are essentially the same as the 490-size, large switch line link frames in a No. 5 crossbar office.

#### 2.04.1 Line Relay Circuits

**A. Provision**

The 490 line circuits of each line link frame are composed of 70 universal and 420 nonuniversal-type relays. Ordinarily, the line relay circuits are equipped, wired and cross-connected as shown in Figure 3. However, when office requirements for line circuits differ from the arrangement covered in Figure 3, the arrangement requested is shown in the Traffic Order. If more than 70 ground-start coin lines are required on a line link frame, regular line relays are replaced with universal line relays.

| QUANTITY OF LINE LINK FR TERMINATIONS | LINE SERVICE OPTIONS | LINE LINK FR 0, 1, 2, 3 HORIZONTAL GROUPS 0-9 | |
|---|---|---|---|
| | | VERT GRP | VERT FILE |
| 420* | Loop-start with line lockout (can be converted to ground-start PBX or terminating-only service and line lockout can be disabled) | 00<br>02<br>03-09 | 0-4<br>3,4<br>0-4 |
| 50 | UNIVERSAL LINE (can be cross-connected to provide any class of service) loop-start lines with lockout furnished | 01 | 0-4 |
| 20 | UNIVERSAL LINE (can be cross-connected to provide any class of service) ground-start coin lines without lockout furnished | 02 | 1,2 |
| 10 | NO-TEST VERTICALS | 02 | 0 |

Figure 3
Standard Line Link Frame Line Relay Circuit Arrangement

**B. Non-Universal**

The non-universal line relays can be used to provide all but ground-start coin service (with or without line lockout and terminating-only features); however, these relays are not arranged for changes of service or features on a cross-connection basis. When it is necessary to change a non-universal circuit from ground-start PBX to loop-start (or vice versa) or to disable or reinstate line lockout and/or terminating-only features, a wiring change is required. (Caution: see 2.04.1 D)

**C. Universal**

Universal relays can be cross-connected to provide any class-of-service: ground-start coin, ground-start PBX, loop-start coin, loop-start flat rate, and loop-start measured rate, with or without line lockout (2.04.2) and terminating-only features.

**D. Assignment Considerations**

Since the wiring changes entail considerably more effort than the cross-connection changes, it is advisable to reserve universal relays in the following order:

Universal relays should be reserved for the ultimate quantity of ground-start coin lines. Line lockout is not compatible with ground-start coin service.

Secondly, universal relays should be reserved for the ultimate quantity of ground-start PBX lines. Two-way ground-start PBX service, where the PBX dials 9 to reach the central office, is not compatible with the line lockout feature. Line lockout should be provided on 1-way (dial 9) ground-start PBX lines and manual ground-start PBX lines.

Thirdly, universal relays should be reserved for the ultimate quantity of lines that are used for incoming tandem trunk and originating-terminating test lines. Lines of this type are arranged for terminating-only service (line relay is disabled) without the lockout feature.

Finally, universal relays should be reserved for the ultimate quantity of lines that are required for terminating-only customer lines. Requests for originating service receive immediate permanent signal holding

or line lockout treatment. Lines in this cateogry must be assigned a unique class-of-service, and originating registers and markers must be arranged to provide the PSHT or lockout treatment for the assigned class-of-service. A similar feature is mandatory in No. 5 crossbar to prevent charge conditions on calls to terminating-only lines that are in permanent signal conditions. The No. 5A crossbar feature, while not required to prevent charge on calls to lines in trouble, is recommended to permit detection of line trouble and to transmit 60-IPM tone to a person attempting to originate a call on a terminating-only phone.

#### 2.04.2 Line Lockout

The No. 5A crossbar line circuit performs all the functions of its No. 5 crossbar counterpart and, in addition, provides a new feature known as line lockout. The activation of the lockout feature prevents lines in permanent signal from initiating repeated dial tone requests, makes lines in lockout appear busy to marker completing attempts, and transmits 60-IPM tone toward the off-hook line. The lockout feature automatically releases when the line is restored to normal (receiver placed on-hook or line trouble cleared). The line lockout equipment is also employed to transmit busy tone under certain call conditions. The busy-tone function, in combination with the ability of originating registers to transmit reorder tone (120 IPM) or busy tone (60 IPM) under certain call conditions, precludes the need for common overflow and tone trunks. All No. 5A crossbar line circuits are furnished with relay apparatus to provide the lockout feature; however, the lockout feature is not compatible with ground-start coin lines, 2-way (dial 9) PBX lines, and line circuits used for incoming tandem trunks. Cross-connections or wiring of the relays serving these types of lines are arranged to disable the lockout feature.

#### 2.04.3 Sleeve Leads

Unlike the No. 5 crossbar, the sleeve leads of all line circuits in No. 5A crossbar are cabled to the main distributing frame for use with terminal hunting lines and trunks requiring line link frame appearances.

#### 2.04.4 Class of Service

With the exception that No. 5A crossbar is arranged for a maximum of only 20 class-of-service indications (00 through 19), the method of generating class of service on the line link frame and class-of-service screening in the marker is identical to the No. 5 crossbar method. Each vertical file is assigned and cross-connected (Western Electric Questionnaire E8099A, pages H1 through H9) for a specific class-of-service. The line link pulsing and class-of-service rate treatment features are not available in No. 5A crossbar.

#### 2.04.5 Line Load Control

The No. 5A crossbar line load control is identical to the No. 5 crossbar feature, is always furnished, and requires only removal of cross-connections per E8099A, page H10, for its implementation. When line load control is required, the assignments to load control categories of the vertical groups are shown in the Traffic Order. As in No. 5 crossbar, the "B" category is effective in even vertical groups and the "C" category is effective in odd vertical groups.

### 2.05 Trunk Link Frames

**2.05.1** No. 5A crossbar always contains two trunk link frames numbered TL0 and TL1. The trunk link frames are furnished in Module No. 1. Each trunk link frame is composed of ten 10-level, small crossbar type junctor switches and ten 12-level, small crossbar type trunk switches. Each frame has the capacity of terminating 200 junctors (50 per line link frame) and 200 trunk and originating register appearances (100 "A" appearances and 100 "B" appearances). Each appearance is precabled to a specific originating register position on an OR frame or to a specific trunk position on a trunk frame.

**2.05.2** Trunk link frames are equipped with TB-relays numbered TB0 through TB9. The trunk test leads, BT00 through BT19, of TB-relays are cross-connectable and can be associated with the "A" and "B" appearances of any switch and level in the same manner as No. 5 crossbar, small switch trunk link frames. Unlike No. 5 crossbar, originating registers in the No. 5A are prewired to switches 0 through 9 of level 0A and can be assigned to any TB relay.

**2.05.3** Extension trunk link frames, auxiliary trunk link frames, and junctor grouping frames are not required because of the limited size of the No. 5A Crossbar System. Separate trunk link connector frames are not provided since their

functions have been incorporated into the connector frame.

2.05.4 The operation and functions of No. 5A crossbar trunk link frames are basically the same as No. 5 crossbar small switch trunk link frames. The trunk assignment concept (trunks and originating registers to trunk link frame appearances) differs considerably in No. 5A crossbar because of the precabling of trunk link frame appearances. The relationships between trunk link frame and trunk relay frame assignments are covered in 2.06.2 through 2.06.4.

### 2.06 Trunk Relay Frames

2.06.1 No. 5A crossbar contains either four or six single-bay trunk relay frames designated TRK0 through TRK5. Trunk relay frames TRK0, TRK1, TRK4, and TRK5 are furnished in Module No. 1 and trunk relay frames TRK2 and TRK3 are furnished in Module No. 3. Trunk relay frames TRK0, TRK1, TRK2, TRK3, and TRK5 each contain from 20 to 73 trunk positions which are equipped for plug-ended trunks. Trunk relay frame TRK4 contains terminal strips and thirty-two 2-inch mounting plate spaces for mounting common systems type or No. 5 crossbar type trunk units without plugs.

2.06.2 In No. 5 crossbar, there is no fixed relationship between trunk link frame appearances and trunk relay frames. That is, trunk types are assigned to trunk link frame appearances and the appearances are cabled to appropriate-type trunks on the most convenient trunk relay frames. In No. 5A crossbar, however, each trunk link frame appearance (except 20 universal appearances) is precabled to (1) a specific plug-ended originating register position on an originating register frame, (2) a specific plug-ended trunk position on a trunk relay frame (TRK0—3 and TRK5), or (3) a specific test trunk on a relay rack bay. The 20 universal appearances are cabled to terminal strips at the top of trunk relay frame TRK4 for cross-connection to common systems or No. 5 crossbar type (not plug-ended) trunks.

2.06.3 Each plug-ended trunk position and its associated trunk link frame appearance(s) on TRK0, TRK1, TRK3, and TRK5 are limited to accommodate only certain types of trunks by precabling of the trunk plug and in some cases by mounting plate space limitations. The precabling of the plugs in some trunk positions is limited to the connections required for only one category of trunk and they are designated FIXED positions and appearances (See Exhibit 7). For example, trunk plugs arranged for intraoffice trunks are cabled to two trunk link frame appearances and to a ringing selection switch. Trunk positions and associated TLF appearances that are FIXED for intraoffice trunks cannot be used for incoming or outgoing trunks because the plugs are not cabled to incoming register or out sender links. There are, however, FIXED positions and appearances for certain trunk types of each of the other categories: reverting, incoming, outgoing, and incoming or outgoing trunks.

2.06.4 Some trunk positions and associated trunk link frame appearances are designated FLEXIBLE (See Exhibit 7). FLEXIBLE trunk positions are equipped with two plugs, one of which is precabled to an "A" appearance on a trunk link frame and an incoming register link appearance. The other plug is precabled to a "B" appearance on the same trunk link frame and an out sender link appearance. Each FLEXIBLE position is thereby arranged to serve one incoming trunk ***and*** one outgoing trunk, or by using both plugs, a FLEXIBLE position can serve one of certain types of intraoffice or 2-way trunk types. (See Exhibit 7).

*Note:* FLEXIBLE positions should be used only when trunking requirements exceed the quantities of trunks that can be provided in FIXED positions since their utilization reduces trunking versatility. Assignment of 2-way trunks to FLEXIBLE positions should also be avoided since a 2-way trunk uses both plugs but occupies only the "B" trunk link frame appearance.

2.06.5 The terminal strips at the top of trunk relay frame TRK4 are cabled to ten "A" appearances and ten "B" appearances on trunk link frames (designated UNIVERSAL appearances), ten incoming register link appearances, ten out sender link appearances, ten ringing selection switch appearances, and nine coin supervisory link appearances. Trunk relay frame TRK4 is arranged for mounting nonplug-ended, common systems type and/or No. 5 crossbar type trunk units and for cross-connecting the trunk units to trunk link (TL), incoming register link (IRL), out sender link (OSL), coin supervisory link (CSL) and ringing

selection switch appearances on the terminal strips, as required. When required, common systems and No. 5 crossbar type units can be mounted on relay rack bays and cabled to the link and ringing selection switch appearances in TRK4 on a special order basis. Certain No. 5A crossbar trunk types can also be mounted on TRK4. (See Exhibit 7.)

*Note:* The assignment of UNIVERSAL appearances should be reserved for trunk types that are not available on other trunk frames.

**2.07 Trunks**

2.07.1 Unlike trunk link frames and trunk relay frames, which are provided as parts of basic modules, all traffic handling trunks required in No. 5A crossbar are specified in the Traffic Order. The No. 5A crossbar trunk types available are shown in trunk tables (PA, PB, PC, PD, and PM) of Exhibit 6. These trunks are plug-ended and installation consists of mounting the trunk unit on the frame and connecting the plugs. When required, plant can "install" or change trunk units, thus providing fast reaction to changing trunk requirements or office balance characteristics.

2.07.2 Exhibit 7 is a summary of the No. 5A crossbar trunk types that may be provided. Note that since the trunk link frame appearances and trunk relay frame positions are arranged to accommodate more than one trunk type, the decision to use an appearance for one trunk type reduces the quantities of all other types for which the appearance was arranged by the quantity of one. This interrelating characteristic of trunk assignments renders the ordinary method of summarizing trunk quantities inadequate and prevents the accurate determination of whether or not a No. 5A Crossbar System contains the trunking capabilities to meet the requirements of a given office until the ultimate quantity of each trunk type has been determined and the quantities of all trunk types have been applied to Exhibit 7 as covered in the notes thereon.

2.07.3 When the trunking capacity of the No. 5A crossbar is found to be adequate for the life expectancy of an office, the trunk requirements for the impending job are applied by the Traffic Engineer to the trunk assignment worksheets (pages Z1 through Z6) of Western Electric Company Questionnaire No. E8099. When trunk assignment is performed in accordance with the worksheet notes, each trunk-type is distributed equally between the two trunk link frames. Trunk link frame layout charts are provided in Exhibits 8 and 9 to illustrate the capacities of No. 5A crossbar with Module No. 1 only and with Modules No. 1 and 3. Trunk link frame layout charts are not included in the Traffic Order since trunk assignments are predetermined.

2.07.4 *Permanent signal holding trunks,* when required are specified in the Traffic Order (Western Electric Company Questionnaire E8099). (See Exhibit 4.) When *operator handling* of permanent signals is used, a permanent signal concentrator unit and four operator-type permanent signal holding trunks with Module No. 1 and two additional trunks with Module No. 3 are used. The four trunk units for Module No. 1 and the concentrator unit are mounted on RR202 are precabled to switches 2 and 3 of level 1B on TL0 and TL1. The two trunks of Module No. 3 are mounted on RR402 and precabled to switch 4 of level 1B on TL0 and TL1. The concentrator unit concentrates permanent signals from the six PSHT's to one operator trunk on a one-at-a-time basis.

2.07.5 When *recorded announcement treatment* is used, a PSHT 7A recorded announcement machine, two auxiliary trunk units, and four permanent signal holding trunk units are used. The announcement machine, trunk units, and auxiliary units are mounted in RR202 and precabled to switches 2 and 3 level 1B on TL0 and TL1, leaving switch 4 of level 1B on TL0 and TL1 vacant. There is no standard provision for adding two announcement-type PSHT's to use the vacant appearances.

2.07.6 *Dial-Tone-First Recorded Announcement Arrangements:* When the office is arranged for dial-tone-first on coin calls, the 7A announcement machine and trunk unit for dial-tone-first intercept is provided (E8099 Questionnaire and Exhibit 4). This unit provides the recorded announcement machine and two intercept trunk circuits on RR203. The intercept trunk circuits are precabled to switch 1 of level 1B on TL0 and TL1. Coin customers attempting to dial local numbers without depositing coins are connected to the intercept announcement trunks by the marker. When the dial-tone-first announcement trunk is not required, the two associated trunk link frame appearances are not used.

2.07.7 *Common Overflow and Tone Trunks:* Neither common overflow nor tone trunks are provided with the No. 5A Crossbar System. Their function has been assumed by the tones provided by the new line lockout circuit (60 IPM) and the originating register (60 or 120 IPM) as covered in 2.04.2 and 2.10.7, respectively.

### 2.08 Junctor Pattern

The line link frame to trunk link frame junctors are permanently wired on the standard No. 5 crossbar 4LL-2TL single junctor pattern. Junctor groups are composed of 5 subgroups of 10 junctors each, for a total of 50 junctors from each line link frame to each trunk link frame. When Module No. 3 (LL02 and LL03) is not provided on the initial order, the associated junctors are left unused, thereby avoiding a junctor transition when Module No. 3 is added.

### 2.09 Junctor Pattern Capacity

Marker testing of junctors is similar to junctor testing in No. 5 crossbar except that the first choice performance of junctor subgroup testing is rotated among all five subgroups. Also, on incoming calls, four instead of two junctor subgroups are tested. The improved efficiency of junctor testing has increased the theoretical call carrying capacity of the standard 4LL-2TL single pattern from 1480 CCS per line link frame to 1520 CCS per line link frame. Thus, the theoretical switching capacity for Module No. 1 is 3040 CCS and the total capacity for Modules No. 1 and 3 is 6080 CCS.

### 2.10 Originating Registers

2.10.1 The No. 5A crossbar can be equipped with a maximum of 20 originating registers (OR's). The OR's perform the same basic functions and have the same capabilities as the No. 5 crossbar OR's except as noted. Features and functions provided in No. 5 crossbar by the originating register line memory frame have been incorporated into the originating register frame circuitry. There are no arrangements for pretranslator frames.

2.10.2 Each originating register frame is completely wired and equipped to mount four plug-ended OR's. Module No. 1 provides four OR frames (OR0 through OR3) and Module No. 3 provides one additional frame (OR4).

2.10.3 All No. 5A OR's are equipped to provide the following:

(a) Standard pretranslation.

(b) Twelve-digit operation (TSPS IDDD).

(c) IDDD.

(d) Standard interchangeable code arrangement.

(e) Single prefix (0 and 1) operation with 3.5-second timing after seven digits. Also N.Y. plan (212 area) 0+ or 1+ indicates ten digits; L.A. plan (213 area) 1+ indicates ten digits; 0+ may be either seven or ten digits.

(f) Coin service-prepay, dial-tone-first.

(g) Only 20 classes of service.

(h) Only X11 service codes.

(i) 60 IPM and 120 IPM. (Refer to 2.10.7).

(j) Prefix counting for digit one access codes and one-one directing codes.

2.10.4 The following features are not provided:

(a) CENTREX.

(b) PICTUREPHONE®

(c) 11X service codes.

(d) Rate treatment by customer class of service.

(e) Private line network operation where register is required to recognize that access digit 8 was dialed to reach the No. 5A crossbar office.

2.10.5 No. 5A crossbar can accommodate two groups of OR's: a dial pulse (DP) group and a TOUCH-TONE® (TT) group. The basic originating register unit is arranged for DP. When TT is required, a plug-in TT receiver is added to the basic unit, converting it to a combination DP/TT originating register.

2.10.6 The installation of a No. 5A crossbar office is an excellent opportunity to intro-

duce TOUCH-TONE service. Therefore, it is recommended that in all cases only TOUCH-TONE originating registers be provided for efficiency and service reasons.

**2.10.7** The No. 5A crossbar originating register holding times differ from those stated in Fig. 7 of Traffic Facilities Practices Division D, Section 8-e(2) for No. 5 crossbar originating registers as follows:

(a) The No. 5A crossbar originating register is used to transmit line-busy tone (60 IPM) for a maximum period of 19.6 to 34 seconds when lines without the line lockout feature (ground-start and 2-way PBX) originate calls to busy lines. Lines, which remain off-hook after the tone interval, are released. After release, ground-start coin lines will appear dead (assuming successful coin return) and ground-start 2-way (dial 9) PBX lines will, in most cases, release back to PBX dial tone. Lines which do not release (stuck coin or PBX held) will continue to initiate a dial tone request followed by permanent signal treatment. The average holding time for calls from lines without lockout to busy lines will vary with the type of wire center being served and is unpredictable. Therefore, in the absence of historical data, use 10 seconds as the average holding time for OR busy tone and assume 20 percent of terminating calls will encounter line busy.

(b) The No. 5A originating register is used to transmit a maximum of 19.6 to 34 seconds of 120-IPM tone (reorder or overflow tone) under the following conditions:

(1) Partial dial and vacant code calls from lines with or without line lockout. After the tone interval, the originating register releases. Treatment after register release is the same as after register release on line-busy calls. With lockout, refer to 2.04.2; without lockout, refer to preceding Step (a).

(2) All-trunks-busy call treatment after the tone interval, is identical to partial dial treatment after lockout.

In absence of historical data, use 10 seconds as the average holding time for each incidence of partial dial and all trunks busy.

**2.10.8** *All-Originating-Registers-Busy Condition:* When a marker encounters an all-OR's-busy condition, the master traffic control circuit will give preferential treatment to an OR seeking access to a marker. Markers will not serve LLF tone requests until there is an idle OR. This operation will virtually eliminate ineffective marker attempts due to all OR's being busy.

**2.10.9** One originating register should be provided for maintenance in each group of registers where traffic requirements per group are ten or less. Two registers should be provided for maintenance where traffic requirements of a group are 11 or more.

**2.10.10** Since the originating registers are the plug-ended type, additional registers may be ordered on a Traffic Order (up to the limit of vacant OR positions on the OR frames provided) and can be installed by Plant in a short interval.

**2.10.11** Trunk link frame appearances of originating registers are preassigned. The quantity of registers required governs the OR frame position and assures that the OR's will be spread equally between the TLF's.

**2.10.12** Two originating register marker connectors are provided and located in Module No. 1 on the connector frame. Registers are preassigned even-numbered registers to the even-numbered connector and odd-numbered registers to the odd-numbered connector.

### 2.11 Markers

**2.11.1** The No. 5A Crossbar System always contains two markers. The markers, M0 and M1, furnished in Module No. 1 are equivalent to No. 5 crossbar wire-spring completing markers arranged for originating line identification (OLI). With this arrangement, the markers perform both the dial tone and completing functions. The No. 5A crossbar marker capacities (10-high day and average busy season) and theoretical holding times are the same as capacities and holding times published in Traffic Facilities Practices, Division D, Section 8-f(2) for No. 5 crossbar OLI completing markers, with one exception. Two-line hunt calls require the same marker holding time as a call to a single line. In no case should the marker load exceed the CCS capacity for one marker (one marker for maintenance) stated in the section:

highest day, 21.6 CCS; average 10-high day. 18.0 CCS; or average busy season, 14.4 CCS.

2.11.2 While the No. 5A crossbar marker function is basically the same as No. 5 crossbar markers, certain features have been changed or deleted as follows:

(a) Scale down quantities of code points, route relays, class-of-service relays, marker connector relays, etc., to No. 5A crossbar proportions.

(b) Delete obsolete features such as 11X service code screening.

(c) Delete features which are inappropriate to the No. 5A Crossbar System such as foreign area code translation, Local Automatic Message Accounting (LAMA) operations, CENTREX operations, group alerting, and Automatic Intercept Service.

2.11.3 Features of No. 5A crossbar markers are as follows:

(a) *Call Types:* Markers can establish the various types of call connections illustrated by block diagrams in Exhibits 13 through 29.

(b) *PBX Terminal Hunting – Block Hunting Only – Nonallotted Hunting:* 300 lines in up to 30 PBX groups, however, no more than 40 lines in a single group.

(c) *Two-Line Number Hunt:* No. 5A crossbar contains a unique 2-line (can be 3-line) hunting arrangement for an unlimited quantity of 2-line hunt groups. The feature is activated by two ringing combinations which cause the marker to recycle and perform busy test on another line when the called line tests busy. One ringing combination (RC02) causes the marker recycle to perform the busy test on the same numbered vertical group and vertical file one horizontal group higher, HG5 to HG6, etc. The other ringing combination (RC03) causes the marker recycle to test the same vertical file one horizontal group lower. The hunting function is performed without recalling the number group frame or obtaining the listed number of the line being hunted. The 2-line hunt feature has the capability for the following:

(1) *Two Lines Hunting to Each Other, 2-Way Hunting:* The two lines are assigned to the same numbered vertical group and vertical file in two consecutive horizontal groups. One line is cross-connected in the number group for RC02, the other for RC03. Hunting is from lower to higher or from higher to lower depending on which line is called.

(2) *One Line Hunting To Another Line, 1-Way Hunting:* Same as 2-way hunting except that the line without hunting is assigned RC01.

(3) *Two Lines Hunting to a Common Third Line, 3-Line 2-Way Hunting:* Three lines are assigned to the same numbered vertical group and vertical file in three consecutive horizontal groups. The common third line is assigned to the center horizontal group and RC01. One of the other lines is assigned to lower numbered horizontal group and RC02; the other is assigned the higher horizontal group and RC03. Hunting is from the higher or lower horizontal group to the center horizontal group. The nonhunting lines in 1-way and 3-line 2-way hunting groups can be arranged for termination on a hunt basis only by omitting their number group cross-connections. Lines in horizontal group 0 recycle to horizontal group 9 when cross-connected for RC03, and lines in horizontal group 9 recycle to horizontal group 0 when cross-connected to RC02.

(d) *Code Points:* No. 5A crossbar has the same code point translation capabilities as No. 5 crossbar with the following exceptions:

(1) In No. 5 crossbar, 1000 code points (ABC digits 000 through 999) are furnished for full translation of ABC digits. In No. 5A crossbar, 100 code points (00 through 99) are furnished for full translation of the A and AB digits. Cross-connection arrangements are provided for extending the translation of 20 AB codes (any 20 AB codes but only 20) for ABC code point translation.

(2) Cross-connection arrangements are

provided for extending the translation of one (and only one) ABC code for ABCD code point translation.

(e) *Route Relay:* Each No. 5A crossbar marker contains 42 route relays on four ground supplies (RR00-12, GS1, RR14-26, GS2; RR28-40, GS3; and RR13, RR27, and RR41 on GS4). The route relays and ground supplies provide routing flexibility and three route advances which are identical to No. 5 crossbar arrangements. Route advance must be from one ground supply to a route in any other ground supply.

(f) *Allotter Groups:* Arrangements are provided for two allotted trunk groups, AL0 and AL1. The AL0 is in ground supply GS1 and AL1 is in GS2. Route advance is from one ground supply to a route in any other ground supply.

(g) *Screening Relays:* Each marker is provided with Sort 1 and Sort 2 (No. 5 crossbar markers have Sort 1, 2, 3, and 4) discrimination for class-of-service indications and 36 screening relays (S00 through S35). With the exception of the scaled down quantities, the screening features are identical to No. 5 crossbar features.

(h) *Number Series:* No. 5A crossbar can be arranged for one or two number series (offices A and B) as defined in Traffic Facilities Practices, Division D, Section 8-i, and covered in paragraph 2.03.2 of this practice. The rate discrimination capability, however, is limited to office A physical, theoretical, extra-theoretical and office B physical. This feature may be required to avoid number changes when a No. 5A office is replacing existing offices or to use available numbers in an established number series.

(i) *Vacant code treatment:*

(1) Originating class — 120-IPM tone from originating register.

(2) Foreign area call class — operator intercept.

(3) INC class — operator intercept or 120-IPM tone set in incoming trunk.

(4) TOLL class — operator intercept or 120-IPM tone set in incoming trunk.

(5) TAN class — operator intercept or 120-IPM tone set in incoming trunk.

(j) *"A" and "B" Digit Translation in Originating Register:* This feature is provided for translation of zero operator and service code calls.

(k) *X11 Service Codes:* Capabilities are provided for X11 service code treatment.

(l) *PBX Dialing Arrangements:* Features are incorporated for providing 4-digit intercom service with dial 9 out and direct in-dialing to the station for one PBX customer. This combination of features does not provide facilities for reaching an attendant. The tariff offerings for PBX and CENTREX provide for a PBX or CENTREX attendant with a listed number and the capability to advance a call to a PBX or CENTREX station. Therefore, caution should be exercised when considering the use of these features since they are not covered by either existing PBX or CENTREX tariffs.

(m) *Toll Diversion:* The No. 5A crossbar toll diversion feature is identical to the No. 5 crossbar arrangement, which connects a PBX station to the PBX attendant when a station user dials a toll call.

(n) *Toll Restriction:* The toll restriction feature applies to PBX application of No. 5A crossbar which is not recommended.

(o) *Digit Deletion:* The markers, in conjunction with out senders, can be cross-connected to delete one, two, or three digits from the dialed number on outgoing calls.

(p) *Arbitrary Codes:* The markers, in conjunction with out senders, can be cross-connected to prefix ten "C" digit arbitrary codes and/or to provide ten 3-digit (A, B, C) arbitrary codes. In the case of 3-digit codes, any AB digit combination but only one AB digit combination can be used. "C" digits 0 through 9 are used with the selected AB digits to arrive at ten 3-digit arbitrary code possibilities. Code conversion as provided in No. 5 crossbar is not available.

(q) *Incoming Classes:* Eleven incoming class marks can be received from incoming registers:

| | |
|---|---|
| INC | Indicating incoming call |
| LT | Local translation incoming (4 digits) |
| FVD | Five-digit incoming |
| 2D | Six-digit incoming |
| TT | Toll translation (7 digits) |
| TAN0 | Tandem class (7 digits) |
| TAN1 | Tandem class (7 digits) |
| OA | Office A (4 digits) |
| OB | Office B (4 digits) |
| TOLL | Toll |
| SPL | Special (incoming no-test) |

### 2.12 Outgoing Senders

**2.12.1** A total of nine outgoing senders may be provided in a No. 5A crossbar office. The senders are plug-ended and mount three to each out sender frames. Two sender frames are provided with Module No. 1 and a third with Module No. 2. The frames are completely wired and equipped with sockets to accept the desired number of plug-ended senders which can be installed by Plant forces. Insertion of a sender in the frame automatically provides preassigned connection to the out sender connector and out sender link frame.

**2.12.2** No. 5A crossbar outgoing senders are arranged to outpulse either MF or DP on successive calls and therefore only one sender group is provided. The No. 5A crossbar senders are equipped to provide the following features:

(a) Standard out sender operation (wink, delay dial, stop-go, etc.).

(b) Steering and registration for 12 digits.

(c) Ability to either DP or MF outpulse according to a mark from the marker.

(d) Arranged for ANI (including PPCS) to remote CAMA.

(e) Arranged to delete on any or all calls these combinations of digits: "A" or "A and B" or "A, B, and C".

(f) Arranged to outpulse one or three arbitrary digits.

(g) Arranged so that only one sender may be stuck at one time.

(h) Arranged to operate with DP receiving offices which require time for register selection (wink start).

(i) Arranged to handle international direct distance dialing (IDDD) calls on a TSPS-ANI basis.

**2.12.3** The No. 5A crossbar out sender holding times are identical to those shown in T.F.P., Division D, Section 8-g. Figures 1 and 2.

**2.12.4** Out sender traffic requirements are determined by reading the average 10-high day load into the Poisson Capacity Table 10. In no case should the average load of the 10-high days exceed 105 CCS (eight senders). One sender is always provided for maintenance.

**2.12.5** One pair of out sender connectors is provided and located in Module No. 1 on the connector frame.

### 2.13 Out Sender Links

Four out sender link switches (80 trunk terminations) are provided with Module No. 1 on IR/OS L and TRK1 frame and four link switches (80 trunk terminations) are provided with Module No. 3 on IR/OS L and TRK3 frame. The eight switches are connected in such a way that they function as one out sender link frame. Out sender link appearances are permanently cabled to trunk positions on trunk frames TRK0, TRK1, TRK2, TRK3, amd TRK5 that can be used for outgoing trunks. Ten appearances are cabled to terminal strips on TRK4 for use with universal trunks. Out senders are permanently cabled to horizontals of link switches.

### 2.14 Incoming Registers

**2.14.1** A total of nine incoming registers may be provided in a No. 5A Crossbar System.

The registers are plug-ended and mount three to an incoming register frame. Two register frames are provided with Module No. 1 and a third is provided with Module No. 3. Each frame is completely wired for three registers and equipped with sockets to accept the registers ordered and can be installed by Plant forces. Insertion of a register in the frame automatically provides the register with a preassigned connection to an incoming register link frame and an incoming register marker connector.

2.14.2 No. 5A crossbar incoming registers are arranged to accept either MF or DP on successive calls and therefore only one incoming register group is provided.

2.14.3 The registers are arranged for the following features:

(a) Seven-digit storage capacity.

(b) Bylink operation.

(c) Tandem operation (three relays — TANDEM, TAN1, and TOL).

(d) Variable number of digits (4, 5, 6, and 7).

(e) Eleven trunk classes.

*Note:* The No. 5A crossbar incoming register holding times are identical to those shown in TFP Division D, Section 8-h, Fig. 3.

2.14.4 Incoming register traffic requirements are determined by reading the average 10-high day load into the appropriate capacity table on Fig. 2 of TFP Division D, Section 8-h. In no case should the average load of the 10-high days exceed 79 CCS (eight registers). One incoming register is always provided for maintenance.

2.14.5 Two incoming register marker connectors are provided in Module No. 1 on the connector frame.

### 2.15 Incoming Register Links

Four incoming register link switches (80 trunk terminations) are provided with Module No. 1 on IR/OS L and TRK1 frame and three link switches (60 terminations) are provided with Module No. 3 on IR/OS L and TRK 3 frame. The seven switches are connected in such a way that they function as one incoming register link frame. Incoming register link appearances are permanently cabled to trunk positions on trunk frames TRK0, TRK1, TRK2, TRK3, and TRK5 that can be used for incoming trunks. Ten appearances are cabled to terminal strips on TRK4 for use with universal trunks. Incoming registers are permanently cabled to horizontals of link switches.

### 2.16 Coin Supervisory Circuits and Links

Two coin supervisory circuits and one coin supervisory link switch is provided with Module No. 1 on IR/CS L and TRK0. Module No. 3 contains one coin supervisory circuit on IR/CS L and TRK2 which is associated with the link switch on IR/CS L and TRK0. Coin supervisory link appearances are permanently cabled to all trunk positions arranged for coin-type trunks on TRK0, TRK1, TRK2, TRK3, and TRK5. Nine appearances are cabled to terminal strips on TRK4 for use with universal trunks. No. 5A crossbar is limited to a maximum of 36 coin-type trunks by the provision of only preference relays TP00 through TP35.

### 2.17 Translator Frame

Module No. 1 contains two 2000-line translators in a 3-bay frame designated T00/01. Each translator can translate a maximum of 2000 line locations (individual and/or 2-party lines) into customer directory numbers using the No. 5 crossbar translator technique. Cross-connection for individual and 2-party lines are threaded through inductor rings to identify the office index (indexes 0—9 provided) and the thousands, hundreds, tens, and units digits of the directory number. Translation is not provided for 4- or 8-party lines. Conceivably, the 2000-line capacity of each translator could be used to translate 2000 tip parties and 2000 ring parties into 4000 directory numbers; however, the quantity of directory numbers in 5A crossbar is limited to a maximum of 3000 numbers by three number group frames.

### 2.18 Transverter Frame

One ANI transverter and connector frame (ATV & C0) is furnished in Module No. 1. This frame, like its No. 5 crossbar counterpart, has a busy-hour capacity of 300 calls and provides for operator identification of all calls in the event of transverter failure. A second transverter and connector frame (ATV & C1) is provided where

anticipated busy-hour calls exceed the capacity of one transverter. Serious consideration should also be given to providing the second transverter even when not required for traffic since the outage of a transverter, when only one is provided, will introduce an unanticipated surge of traffic at the operator location.

#### 2.19 Connector Frame

A double-bay, multipurpose connector frame is provided in Module No. 1. This connector frame contains four line link connectors, three number group connectors, two outgoing sender connectors, four line link marker connectors, two originating register marker connectors, and two incoming register marker connectors, thus combining the functions of several types of No. 5 crossbar frames on one multipurpose frame. Adequate connectors of each type are provided and preassigned to serve two markers and the maximum quantities of related equipment that can be provided in Modules No. 1 and 3.

## 3. CALL PROCESSING

#### 3.01 Call Connections

In general, the equipment elements of No. 5A crossbar perform the same as comparable items in No. 5 crossbar; differences in functions and capacities only are covered in the following description of the various components. The block diagrams (Exhibits 13 through 29) illustrate the various call connections which are possible in No. 5A crossbar.

#### 3.02 Called Line Busy

When the marker encounters a called line busy on an *intraoffice* call from a line with lockout, it sets the calling line in the lockout condition which returns busy tone to the calling line and releases all connections and common control equipment engaged in the call. This feature eliminates the office load attributable to busy-tone trunk connections in No. 5 crossbar under similar call conditions.

#### 3.03 Terminating Only Lines — Dial Tone Request

When terminating-only customer lines are required, the associated lines should be assigned a distinct class of service and originating registers and markers may be arranged to give originating call attempts, permanent signal holding trunk (PSHT) treatment (3.05), or to immediately set the originating line in lockout (2.04.2).

#### 3.04 All Trunks Busy

When a marker in the completing phase of connecting a line with lockout to a trunk encounters an all-trunks-busy condition, it sets the originating register to transmit a maximum of 19.6 to 37 seconds of 120-IPM tone to the calling line. At the conclusion of the tone interval, the line is set in lockout (60-IPM busy tone is returned) and all connections and common control equipment are released. This feature reduces office load attributable to tone trunk connections on all-trunks-busy calls in the No. 5 crossbar. This feature increases originating register usage by approximately 10 seconds per ATB encounter.

#### 3.05 Permanent Signals With Lockout

The No. 5A crossbar originating registers and markers are arranged for one of two permanent signal treatments at the option of the telephone company. These are as follows:

(1) *Operator Handled:* After permanent signal timing (maximum 19.6 to 37 seconds) in the originating register, a marker is engaged and the line causing the permanent signal is connected to an operator via a PSHT. After the operator has challenged and disconnected from the trunk, the line is set in lockout (2.04.2) and all connections and common control equipment engaged in the call are released. The office load attributable to permanent signal conditions, continuing after operator challenge in No. 5 crossbar, is eliminated by this feature.

(2) *Recorded Announcement:* The recorded announcement treatment of permanent signals is similar to operator treatment except that recorded announcement type PSHTs and an announcement machine are furnished. The recorded announcement treatment differs in that a 10-second announcement followed by 50 seconds of receiver off-hook tone is transmitted on the line via the PSHT. At completion of the tone interval, the line is set in lockout (2.04.2) and all connections and common control equipment are released. Office load savings are approximately the same as for operator handling of permanent signals.

### 3.06 Permanent Signals Without Lockout

Permanent signal treatments for lines without lockout are as follows:

(a) *Ground-Start Coin:* Same as with Lockout (3.05) except that after operator challenge or recorded announcement and tone, the PSHTs are arranged to hold (lock in) ground-start coin lines until the line is restored to the on-hook condition.

(b) *Two-Way (Dial 9) Ground-Start PBX:* PSHTs are arranged to release from 2-way (dial 9) ground-start PBX lines after permanent signal treatment (operator challenge or recorded announcement and tone). Upon PSHT release, the 2-way (dial 9) ground-start PBX line initiates repeated dial tone requests followed by permanent signal treatment until the line is returned to the on-hook condition. In some types of PBX systems, the central office trunk at the PBX will release with the first release of the No. 5A crossbar PSHT, preventing recurring seizures.

(c) *Loop-Start Coin:* Markers in offices containing both ground-start and loop-start coin lines are arranged to give both types of lines, ground-start coin-type permanent signal treatment (3.06(a)).

### 3.07 Partial Dial

Partial dial treatment and the disposition of ineffective attempts from lines without line lockout are covered in 2.10.7.

## 4. TRAFFIC MEASUREMENT FACILITIES

**4.01** A traffic register bay (M & TR) is provided in Module No. 1 which is used as a combination message register and traffic register cabinet. The bay shown in Exhibit 10 is equipped as follows:

(a) Wired for 80 and equipped with 20 message registers for measured rate lines. The equipped registers and vacant locations are cabled to the MDF for cross-connection to MR lines.

(b) Thirteen registers (1—13) for hotel-motel service are provided. They are cabled to the MDF for cross-connection to PBX lines.

(c) Ninety 4-digit registers (00—39 and 70—119) are furnished on standard traffic register mounting strips with one battery supply jack, ten register P jacks, and ten 4-digit registers per strip. These register P jacks are connected to pulse jacks as shown in Exhibit 11. They can however, be reassigned to meet local requirements on a ***job basis.***

(d) Twelve 5-digit registers (120—125 and 130—135) are provided. They are mounted on standard mounting plates with one battery supply jack, six register P jacks, and six 5-digit registers per strip. They are also preassigned per Exhibit 11 and can be reassigned on a ***job basis*** if required.

(e) There are 140 pulse jacks (P000—139) provided. They are cabled to equipment per Exhibit 11. Double-ended pin jack cords are used to connect pulse jacks to register P jacks in the standard manner.

(f) Three sets of battery supply jacks are provided. Ten jacks (0—9) with continuous battery supply are designated S. Ten jacks (0—9) with battery supply under control of battery control switch C1 are designated S1, and ten jacks (0—9) with battery supply under control of battery control switch C2 are designated S2. The C0 switch is used to control the elapsed time register.

(g) Four mounting plate spaces are vacant. They can be used for additional registers as required.

**4.02** When not specifically requested, the M & TR bay is not equipped for traffic register camera operation. When camera operation is required, a camera can be mounted on the M & TR bay or if building space is available beyond the space required for Modules 1, 2, and 3, a standard No. 5 crossbar type traffic register cabinet with camera can be installed and multipled to the M & TR bay. The decision as to the method to be used should take into consideration the Dial Administrative, Traffic Engineering and Plant Maintenance needs.

**4.03** The peg-count, overflow, group-busy, and elapsed time circuits listed in Figure 4 are always connected to pulse jacks on the M & TR bay.

4.04 Relay rack RR200 contains cable connectors (Exhibit 12) which terminate usage leads as listed in Figure 5.

4.05 A permanently installed TUR (3B or equivalent) is recommended.

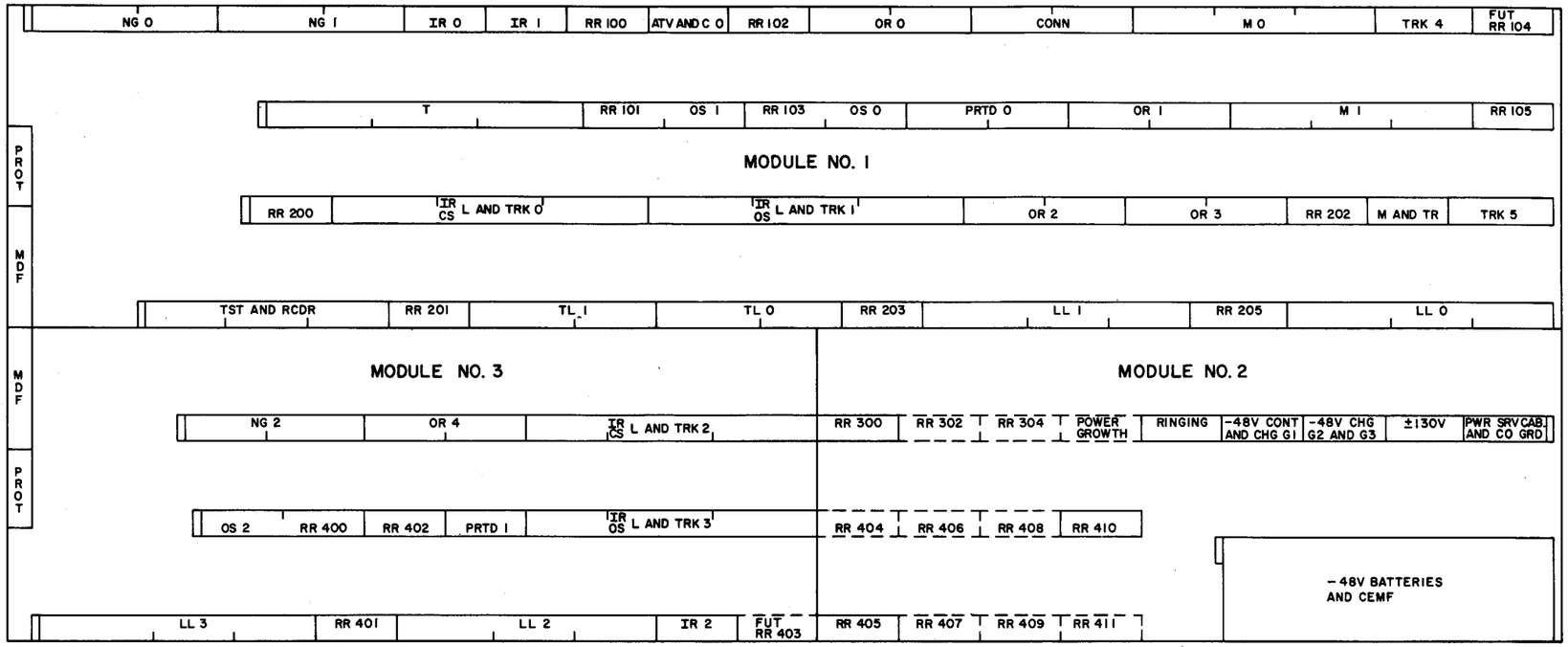
4.06 A standard dial tone speed unit is recommended.

| CIRCUIT | QTY REGISTERS |
|---|---|
| PEG COUNT REGISTER CIRCUITS | |
| Outgoing trunk group (revertive call, intraoffice, and permanent signal) | 20 |
| Abandoned partial dial | |
| Dial pulse | 1 |
| TOUCH-TONE | 1 |
| Outgoing sender group | |
| Dial pulse (1 per marker) | 2 |
| Multifrequency (1 per marker) | 2 |
| Incoming register group | |
| Dial pulse and multifrequency | 1 |
| Multifrequency | 1 |
| Total incoming (1 per marker) | 2 |
| Intercept | |
| Regular | 1 |
| Trouble | 1 |
| Blank number | 1 |
| Total marker | |
| Completing attempts (5-digit registers) | 2 |
| Dial tone attempts (5-digit registers) | 2 |
| Total channel (1 per marker) | 2 |
| Sample channel (1 per marker) | 2 |
| Total originating | |
| Dial pulse (5-digit registers) | 2 |
| TOUCH-TONE (5-digit registers) | 2 |
| Terminating calls to terminal hunting lines (1 per marker) | 2 |
| Terminating attempts to busy lines (1 per marker) | 2 |
| ANI transverter — total seizures | 2 |
| GROUP-BUSY REGISTER CIRCUITS | |
| Coin supervisory release circuit | 1 |
| OVERFLOW REGISTER CIRCUITS | |
| Originating matching loss | 1 |
| Office (1 per marker) | 2 |
| Incoming first failure-to-match | 1 |
| Outgoing sender group | 1 |
| Outgoing trunk groups | 20 |
| Customer line overflow | |
| Nonhunting lines<br>Nonallotted hunting | 12 |
| ELASPED TIME REGISTER CIRCUIT | |
| Elapsed time (clock) register | 1 |

Figure 4 Registers Provided

| USAGE MEASURED | QTY LEADS |
|---|---|
| Marker | |
| Total | 2 |
| Maintenance | 2 |
| Originating register | |
| Total | 20 |
| TOUCH-TONE | 20 |
| Maintenance | 20 |
| Incoming register | |
| Dial pulse | 9 |
| Multifrequency | 9 |
| Maintenance | 9 |
| Outgoing senders | |
| Dial pulse | 9 |
| Multifrequency | 9 |
| Maintenance | 9 |
| Sample link usage | 80 |
| Coin supervisory circuit | 3 |
| Transverter | |
| Total | 1 |
| Maintenance | 1 |
| Trunks — Intraoffice, reverting outgoing and 2-way, and junctors | 261 |

Figure 5
Leads Provided




LEGEND:

| | |
|---|---|
| NG | NUMBER GROUP |
| IR | INCOMING REGISTER |
| ATV AND C | ANI TRANSVERTER AND CONNECTOR |
| OR | ORIGINATING REGISTER |
| CONN | CONNECTOR |
| M | MARKER |
| T | TRANSLATOR |
| OS | OUTGOING SENDER |
| PRTD | POWER, RINGING, AND TONE DISTRIBUTION |
| IR/CS L AND TRK | INCOMING REGISTER LINK, COIN SUPERVISORY LINK, AND TRUNK |
| IR/OS L AND TRK | INCOMING REGISTER LINK, OUT SENDER LINK AND TRUNK |
| M AND TR | MESSAGE AND TRAFFIC REGISTER |
| TST AND RCDR | TEST AND RECORDER (TROUBLE RECORDER) |
| TL | TRUNK LINK |
| LL | LINE LINK |
| RR | RELAY RACK |
| TRK | TRUNK RELAY RACK |
| PROT | DISTRIBUTING FRAME PROTECTOR VERTICALS |
| MDF | MAIN DISTRIBUTING FRAME |

**Exhibit 1 — No. 5A Crossbar System — Equipment Layout**

| COMMON CONTROL EQUIPMENT | MAXIMUM QUANTITIES | |
|---|---|---|
| | MODULE NO. 1 | MODULES NO. 1 & NO. 3 |
| Call Carrying Capacity (1520 CCS/LLF) | 3040 CCS | 6080 CCS |
| Numbers | 2000 | 3000 |
| Line Link Frames (490 Size) | 2 | 4 |
| Lines | 980 | 1960 |
| Trunk Link Frames (200 Size) | 2 | 2 |
| Originating Register Termination | 20 | 20 |
| Trunk Terminations | 380 | 380 |
| Originating Registers* | 16 | 20 |
| Outgoing Senders* | 6 | 9 |
| Incoming Registers* | 6 | 9 |
| ANI Translator | 2 | 2 |
| ANI Transverter | 1 | 1 |
| Incoming Register Link Appearances | 80 | 140 |
| Outgoing Sender Link Appearances | 80 | 160 |
| Coin Supervisory Link Appearances | 24 | 36 |
| Markers (Combined) | 2 | 2 |
| Route Relays per Marker | 42 | 42 |
| Screening Relays per Marker | 36 | 36 |
| Classes of Service | 20 | 20 |
| Alternate Routes | 3 | 3 |
| Regular Intercept 7A Announcement Machine | 1 | 1 |

* The quantities of originating registers, incoming registers, and out senders are variable and are specified in the Traffic Order.

**Exhibit 2 — Common Control Equipment Summary**

| TRUNK CATEGORIES | TRUNK QUANTITIES | |
|---|---|---|
| | MODULE 1 | MODULES 1 & 3 |
| Reverting | 4 | 8 |
| Intraoffice | 28 | 46 |
| Outgoing, Outgoing to Switchboard | 45 | 95 |
| Incoming or 2-Way | 8 | 16 |
| Intraoffice or 2-Way or Incoming and Outgoing (Flexible) | 24 | 38 |
| Intraoffice, Incoming, Outgoing, Outgoing to Switchboard, 2-Way, Reverting (Universal) | Note 2 | Note 2 |

*Notes:*

1. ***Caution:** Certain trunk types in the categories shown cannot be furnished in the listed quantities. For precise determination of quantities, refer to the Traffic Order.*
2. Twenty trunk link frame appearances on TRK 4 provide facilities for various quantities of trunks in the categories shown. See UNIVERSAL appearances in Exhibit 7.

**Exhibit 3 — Trunk Summary**

| OPTIONAL MISCELLANEOUS EQUIPMENT THAT MUST BE SPECIFIED IN ORDER WHEN REQUIRED | | MAXIMUM QUANTITIES | | SEE NOTE |
|---|---|---|---|---|
| | | MODULE 1 | MODULES 1 & 3 | |
| Emergency Line Units | | 2 | 2 | |
| OPERATOR HANDLED | Permanent Signal Holding Trunks | 4 | 6 | 1 |
| | Permanent Signal Concentrating Unit | 1 | 1 | |
| RECORDED ANNOUNCEMENT | Permanent Signal Holding Trunks | 4 | 4 | 1 |
| | Aux Permanent Signal Holding Trunk Units (Provide one per two recorded announcement permanent signal holding trunks) | 2 | 2 | |
| | Permanent Signal Voice Control, Alarm Unit, and 7A Announcement Machine | 1 | 1 | |
| 7A Announcement Machine and Trunk for Dial-Tone-First Intercept (2 trk ckts provided) | | 1 | 1 | |
| Message Registers for MR Lines (Module 1 wired for 80 registers, 20 furnished) | | 80 | 80 | |
| Traffic Registers | | See Exhibit 10. | | |

*Notes:*

1. Permanent signals can be arranged for operator handling or recorder announcement.
2. One 7A announcement machine is always furnished as part of Module No. 1 for regular intercept.

**Exhibit 4 — Optional Miscellaneous Equipment Summary**

- Single party service—2-, 4-, 8-party service with reverting call arrangements
- Coin service—prepay dial-tone-first, local overtime, (5, 4, 3, 2, or 1 minute interval) stuck coin recycle, coin control service options permit positive or negative 130 volts
- Message register operation—message register overtime, hotel-motel MR operation (single operation), wired for 80 message registers equipped with 20
- TOUCH-TONE with revertive call arrangements
- Automatic number identification (10 office indexes in ANI transverter)
- Free number arrangement
- Line lockout—line-busy tone applied on lockout
- Manual line operation
- Dynamic service protection for fire and police (VG 02 originating selection preference)
- Emergency manual line service—provides 2-way connections from essential lines to remote switchboards by borrowing the facilities of operator class trunks without utilizing the switching network or common control equipment
- Line load control
- Call tracing—standard marker arrangement, number group trap circuit
- Standard no-test access and verification
- Restricted ringback service options—permit restricted or unrestricted ringback facilities. Emergency ringback not provided
- Q-Z billing arrangements for PBX traffic requiring special billing (PEL 7428)
- Toll diversion—restricts the calling area of PBX extensions by providing a battery reversal to the PBX
- "A" and "B" digit translation provided in originating register
- 100 AB code points, 200 ABC code points (20 AB code points can be wired through "C" digit)
- Discrimination for one ABC office code by "D" digit 0-9
- Standard interchangeable code arrangement—N. Y. plan (212 area) 0+ or 1+ indicates 10 digits—L. A. (213 area) 1+ indicates 10 digits, 0+ may be either 7 or 10 digits
- International DDD (TSPS arrangement with office equipped for 12-digit operation)
- Two number series
- 42 route relays, 38 screening relays
- Allotted trunk
- TB relays provided for all trunk switch levels
- X11 service codes
- PBX hunting
- Two-line number hunt
- Marker digit deletion (up to 3 digits)
- Marker arbitrary digit—digit addition for outpulsing, arbitrary "C" digit, one fixed AB combination
- Incoming classes (11)
- VACANT CODE TREATMENT
  Originating class — 120-ipm tone originating register
  Foreign area call class — operator intercept
  INC class — operator intercept or 120-ipm tone
  TOLL class — operator intercept or 120-ipm tone
  TAN class — operator intercept or 120-ipm tone
- PERMANENT SIGNAL TREATMENT
  Operator handled with line lockout on continuing PS or recorded announcement with line lockout on continuing PS
- PARTIAL DIAL TREATMENT
  120-ipm tone followed by line lockout
- Operator intercept or recorded accouncement facilities for calls to changed, disconnected, usassigned, or blank numbers. Trouble intercept is arranged for operator handling
- TSPS arrangement with office arranged for 12-digit operation
- Standard out sender operation (wink, delay-dial, stop-go, etc)
- Outgoing sender—DP and MF capability in the same sender
- Incoming register—DP and MF capability in same register
- Incoming register link—bylink operation
- Plug-ended outgoing senders, incoming registers, originating registers, and trunks
- Traffic usage recording availability
- Traffic registers

## TRUNK TABLE PA – INTRAOFFICE AND REVERTING CALL TRUNKS

| USE | CHARGING CONDITIONS | | | | | | | TYPE OF LINES | | | | CIRCUITS/UNIT | MTG PLATE SPACE/UNIT | TRK TYPE | CIRCUIT DRAWING SD- | EQUIPMENT DRAWING J- | SEE NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MESSAGE REG | | | COIN | | | | 4-PTY | | | | | | | | |
| | FLAT RATE | IND | 2-PTY | WITH OVER-TIME | WITH-OUT OVER-TIME | WITH OVER-TIME | ARR FOR TESTING ON SUPV CIRCUITS | IND & 2-PTY | SEL | SEMI-SEL | 8-PTY | | | | | | |
| INTRA-OFFICE | √ | | | | | | | √ | √ | √ | √ | 1 | 1 | PA13 | 26060-05 | 29154AA- | |
| | √ | | | | | | | √ | √ | √ | √ | 1 | 2 | PAU13 | 26060-05 | 29154AU- | |
| | | √ | √ | | | | | √ | √ | √ | √ | 1 | 1 | PA29 | 26062-05 | 29154AG- | |
| | | √ | √ | | | | | √ | √ | √ | √ | 1 | 2 | PAU29 | 26062-05 | 29154AB- | |
| | | √ | √ | √ | | | | √ | √ | √ | √ | 1 | 2 | PA31 | 26062-05 | 29154AB- | |
| | | | | | √ | | | √ | √ | √ | √ | 1 | 2 | PA11 | 26064-05 | 29154AC- | |
| | | | | | | √ | | √ | √ | √ | √ | 1 | 2 | PA12 | 26064-05 | 29154AC- | |
| | | | | | √ | | √ | √ | √ | √ | √ | 1 | 2 | PA153 | 26064-05 | 29154AC- | 1 |
| | | | | | | √ | √ | √ | √ | √ | √ | 1 | 2 | PA155 | 26064-05 | 29154AC- | 1 |
| REVERTING CALL | √ | | | | | | | √ | | √ | | 1 | 2 | PA18 | 26068-05 | 29154AF- | 2 |
| REVERTING CALL WITH OR WITHOUT TOUCH-TONE | √ | | | | | | | √ | √ | √ | √ | 1 | 3 | PAZ34 | 26069-05 | 29154AD- | 2,3 |

*NOTES:*

1. REQUIRED ONLY ONCE PER OFFICE.
2. TRUNK TYPE PAZ34 MAY BE USED WITH 2-PTY AND 4-PTY SEMISELECTIVE LINES, BUT TRUNK TYPE PA18 IS MORE SUITED.
3. WHEN TOUCH-TONE IS REQUIRED, TRUNK TYPE PAZ34 REQUIRES ASSOCIATION WITH RELAY RACK MOUNTED TOUCH-TONE RECEIVER CIRCUIT (SD-98148- , J99289- ) AND TRUNK TYPE PA75 (RELAY RACK MOUNTED), WHICH PROVIDE TRANSLATION FOR TOUCH-TONE AND A (CLASS PA75) TOUCH-TONE TRANSLATOR (SD-26069-05, J29154AE).

Exhibit 6 – Trunk Tables (Sheet 1 of 6)

## TRUNK TABLE PB – INCOMING TRUNKS

| USE | EXTRA-MURAL SWBD | INC REG ASSOC WITH | | CONT. RING SX | 4-PTY SEMI-SEL, 8-PTY | COIN STATION ARR FOR | | TDM SW WITH LOCAL COMPL | TRK COND LP BAT. TO GRD PULSING | | INTEROFFICE SUPERVISION | | LINK RESEIZURE DELAY | CIRCUITS/UNIT | MTG PLATE SPACE/UNIT | TRK TYPE | CIRCUIT DRAWING SD- | EQUIPMENT DRAWING J- | SEE NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0-2K | 2K-4.2K | | | | | | | | | |
| | | | | | | | | | LP PULSING | | | | | | | | | | |
| | | DP | MF | | | CN TST | ON SERV IMPR (DT IST) | | 0-1.2K | 1.2K-2.5K | REV BAT. | E&M 900 OHMS | | | | | | | |
| INTER-OFFICE (FROM MACHINE SWITCHING OFFICE) | | √ | √ | | √ | | | | | | √ | | | 1 | 1 | PB61 | 26070-05 | 29154BA- | |
| | | √ | √ | | √ | | | | | | √ | | √ | 1 | 1 | PBK61 | 26070-05 | 29154BA- | |
| | | √ | √ | | √ | | | √ | | | √ | | | 1 | 1 | PB225 | 26071-05 | 29154BG- | |
| | | √ | √ | | √ | | | √ | | | √ | | √ | 1 | 1 | PBK225 | 26071-05 | 29154BG- | |
| | | √ | √ | | √ | | | | | | | √ | | 1 | 1 | PB1 | 26346-05 | 29154BH- | |
| INTER-OFFICE (BYLINK) | | √ | | | √ | | | | √ | | √ | | | 1 | 1 | PB90 | 26077-05 | 29154BB- | |
| | | √ | | | √ | | | | | √ | √ | | | 1 | 1 | PB91 | 26077-05 | 29154BB- | |
| NO TEST | ANY TOLL OR DSA | √ | √ | √ | √ | | | | | | | √ | | 1 | 2 | PB113 | 26073-05 | 29154BC- | |
| | | √ | √ | √ | √ | | | | | | √ | | | 1 | 2 | PB235 | 26073-05 | 29154BC- | |
| | | √ | √ | √ | √ | | | | | | √ | | √ | 1 | 2 | PBK235 | 26073-05 | 29154BC- | |
| TOLL SWITCHING OR DSA REGULAR | ANY | √ | √ | | √ | | | | | | √ | | | 1 | 1 | PB61 | 26070-05 | 29154BA- | |
| | | √ | √ | | √ | | | | | | √ | | √ | 1 | 1 | PBK61 | 26070-05 | 29154BA- | |
| | | √ | √ | | √ | √ | | | | | √ | | | 1 | 2 | PB125 | 26123-05 | 29154BD- | 1 |
| | | √ | √ | | √ | √ | | | | | √ | | √ | 1 | 2 | PBK125 | 26123-05 | 29154BD- | 1 |
| | | √ | √ | | √ | √ | | | | | | √ | | 1 | 2 | PB135 | 26123-05 | 29154BD- | 1 |
| | | √ | √ | | √ | | √ | | | | √ | | | 1 | 2 | PB237 | 26123-05 | 29154BD- | 1 |
| | | √ | √ | | √ | | √ | | | | √ | | √ | 1 | 2 | PBK237 | 26123-05 | 29154BD- | 1 |
| | | √ | √ | | √ | | √ | | | | | √ | | 1 | 2 | PB241 | 26123-05 | 29154BD- | 1 |

*NOTE:*

1. THIS TRUNK CAN ONLY BE USED WITH A SWBD CIRCUIT WHICH USES A WINK SIGNAL TO CONNECT TO THE DUAL CHANNEL RECEIVER CIRCUIT SD-26348-05 (HS-1 CIRCUIT PACK). THIS RECEIVER IS INCLUDED AS PART OF THE TRUNK TYPE AND IS PHYSICALLY LOCATED ON REAR OF THE TRUNK UNIT.

TRUNK TABLE PC – OUTGOING TRUNKS

| USE | TYPE OF PULSING | CHARGING CONDITIONS | | | | | INTEROFFICE SUPERVISION | | CAMA MAKE-BUSY (SEE NOTE 1) | TDM COMPL | CIRCUITS/UNIT | MTG PLATE SPACE/UNIT | TRK TYPE | CIRCUIT DRAWING SD- | EQUIPMENT DRAWING J- | SEE NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MESSAGE REG | | | COIN | | | | | | | | | | | |
| | | IND | 2-PTY | WITH OVER-TIME | WITH-OUT OVER-TIME | WITH OVER-TIME | LOOP | E & M 900 OHMS | | | | | | | | |
| FLAT RATE | DP OR MF | | | | | | √ | | | √ | 1 | 1 | PC36 | 26085-05 | 29154CA- | |
| | | | | | | | √ | | √ | √ | 1 | 1 | PCV36 | 26085-05 | 29154CA- | |
| | DP | | | | | | | √ | | √ | 1 | 1 | PC2 | 26373-05 | 29154CL- | |
| | MF | | | | | | | √ | | √ | 1 | 1 | PC1 | 26345-05 | 29154CK- | |
| MR JCTR | | √ | √ | | | | √ | | | | 1 | 2 | PC151 | 26086-05 | 29154CB- | |
| | | √ | √ | √ | | | √ | | | | 1 | 2 | PC157 | 26086-05 | 29154CB- | |
| COIN JCTR | | | | | √ | | √ | | | | 1 | 2 | PC161 | 26087-05 | 29154CC- | |
| | | | | | | √ | √ | | | | 1 | 2 | PC164 | 26087-05 | 29154CC- | |

*NOTE:*

1. FOR USE WITH CAMA OFFICE

TRUNK TABLE PC – OUTGOING TRUNKS

| USE | COIN CONTROL | | | | | INTEROFFICE SUPERVISION | | | CIRCUITS/UNIT | MTG PLATE SPACE/UNIT | TRK TYPE | CIRCUIT DRAWING SD- | EQUIPMENT DRAWING J- | SEE NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COIN ONLY | COIN AND NON-COIN | COIN STATION ARR FOR: CN IST | COIN STATION ARR FOR: CN SERV IMPR (DT IST) | AUTO RETURN OF INIT COIN ON OPR ANS | HIGH-LOW | E & M 900 OHMS | | | | | | | |
| OPR ASSIST SPL TOLL ANI-MF | | | | | | √ | | | 1 | 2 | PC184 | 27546-05 | 29154CG- | |
| | | | | | | | √ | | 1 | 2 | PC188 | 27550-05 | 29154CH- | |
| | | √ | √ | | | | √ | | 1 | 2 | PC216 | 27551-05 | 29154CJ- | 2,4 |
| | | √ | √ | SEE NOTE 3 | √ | | √ | | 1 | 2 | PC224 | 27551-05 | 29154CJ- | 2,4 |
| | | √ | | SEE NOTE 3 | | √ | | | 1 | 2 | PCX228 | 27547-05 | 29154CF- | |

*NOTES:*

1. FOR USE WITH CAMA OFFICE
2. MAY BE CONNECTED LOCALLY FOR (+) OR (—) COIN COLLECT OR RETURN.
3. MAY BE CONNECTED LOCALLY.
4. A DUAL CHANNEL RECEIVER PER SD-26348-05 (HS-1 CIRCUIT PACK) IS INCLUDED AS PART OF THE TRUNK TYPE AND IS PHYSICALLY LOCATED ON REAR OF THE TRUNK UNIT.

TRUNK TABLE PD – OUTGOING TRUNKS (ASSOCIATED WITH SWITCHBOARDS)

| USE | EXTRA-MURAL SWBD | CLASS-OF-SERVICE IDENT | | COIN CONTROL | | | INTEROFFICE SUPERVISION | | ASSOCIATED WITH EMER LINE CKT | | CIRCUITS/UNIT | MTG PLATE SPACE/UNIT | TRK TYPE | CIRCUIT DRAWING SD- | EQUIPMENT DRAWING J- | SEE NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | COIN STATION ARR FOR | | | | | | | | | | | |
| | | TONE | LP | TIP AND RING | CN IST | COIN SERV IMPR (DT IST) | HIGH-LOW | E & M 900 OHMS | | | | | | | | |
| RECORDING COMPL, SPECIAL SERVICE | ANY | √ | | √ | √ | | √ | | | | 1 | 2 | PD56 | 26091-05 | 29154DB- | 1,2 |
| | | √ | | √ | | √ | √ | | | | 1 | 2 | PD197 | 26091-05 | 29154DB- | 1,2 |
| | | √ | | √ | √ | | | √ | | | 1 | 2 | PD138 | 26099-05 | 29154DD- | 1,2,3 |
| | | √ | | √ | | √ | | √ | | | 1 | 2 | PD183 | 26099-05 | 29154DD- | 1,2,3 |
| | | √ | | | | | √ | | √ | | 1 | 2 | PD2 | 26090-05 | 29154DA- | |
| | | √ | | | | | √ | | | | 1 | 2 | PD140 | 26090-05 | 29154DA- | |
| | | √ | | | | | | √ | | | 1 | 1 | PD150 | 26098-05 | 29154DE- | |
| | | √ | | | | | | √ | √ | | 1 | 2 | PDU1 | 26098-05 | 29154DC- | |
| | | √ | | | | | | √ | | | 1 | 2 | PDU150 | 26098-05 | 29154DC- | |

*NOTES*

1. MAY BE CONNECTED LOCALLY FOR (+) OR (—) COIN COLLECT OR RETURN.
2. WITH AUTOMATIC COIN RETURN AFTER DISCONNECT (191 COIN COLLECT).
3. THIS TRUNK CAN ONLY BE USED WITH A SWBD CIRCUIT WHICH USES A WINK SIGNAL TO CONNECT TO THE DUAL CHANNEL RECEIVER CIRCUIT SD-26348-05 (HS-1 CIRCUIT PACK). THIS RECEIVER IS INCLUDED AS PART OF THE TRUNK TYPE AND IS PHYSICALLY LOCATED ON REAR OF THE TRUNK UNIT.

TRUNK TABLE PM – 2-WAY TRUNKS

| USE | INCOMING PULSING | OUTGOING PULSING | ALM SDG & NO TEST | COIN STATION ARR FOR | | INTEROFFICE SUPERVISION | | | CIRCUITS/UNIT | MTG PLATE SPACE/UNIT | TRK TYPE | CIRCUIT DRAWING SD- | EQUIPMENT DRAWING J- | SEE NOTE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CN IST | ON SERV IMPR (DT IST) | REV BAT. | E & M 900 OHMS | | | | | | | |
| 2-WAY OPR OFFICE | DP OR MF | | | | | | √ | | 1 | 2 | PM69 | 27593-05 | 29154BF- | |
| | | | | √ | | | √ | | 1 | 3 | PM70 | 27593-05 | 29154BE- | 1,2 |
| | | | √ | √ | | | √ | | 1 | 3 | PM71 | 27593-05 | 29154BE- | 1,2 |
| | | | | | √ | | √ | | 1 | 3 | PM108 | 27593-05 | 29154BE- | 1,2 |
| | | | √ | | √ | | √ | | 1 | 3 | PM109 | 27593-05 | 29154BE- | 1,2 |
| 2-WAY EXCHANGE | MF | MF | | | | | √ | | 1 | 2 | PM1 | 26349-05 | 29154BK- | |
| 2-WAY EXCHANGE BYLINK | DP | DP | | | | | √ | | 1 | 2 | PM2 | 26350-05 | 29154BJ- | |

*NOTES*

1. MAY BE CONNECTED LOCALLY FOR (+) OR (–) COIN COLLECT OR RETURN.
2. A DUAL CHANNEL RECEIVER PER SD-26348-05 (HS-1 CIRCUIT PACK) IS INCLUDED AS PART OF THE TRUNK TYPE AND IS PHYSICALLY LOCATED ON REAR OF THE TRUNK UNIT.

Exhibit 6 – Trunk Tables (Sheet 6 of 6)

# TRUNK SUMMARY SCO-2 APPLICATION

| | TRUNK LINK FRAME APPEARANCES | MAXIMUM TRUNK QUANTITIES FOR MODULES NO. 1 | MAXIMUM TRUNK QUANTITIES FOR MODULES NO. 1 & 3 | INTRAOFFICE AND REVERTING CALL TRUNK TYPES: PA11 | PA12 | PA13 | PAU13 | PA18 | PA29 | PAU29 | PA31 | PAZ34 | PA153 | PA155 | INCOMING TRUNK TYPES: PB1 | PB61 | PB90 | PB91 | PB113 | PB125 OR PBK125 | PB135 | PB225 OR PBK225 | PB235 OR PBK235 | PB237 OR PBK237 | PB241 | OUTGOING TRUNK TYPES TO SWITCHBOARD: PC1 | PC2 | PC36 OR PCV36 | PC151 | PC157 | PC161 | PC164 | PC184 | PC188 | PC216 | PC224 | PCX228 | OUTGOING TRUNK TYPES TO SWITCHBOARD: PDU1 | PD2 | PD56 | PD138 | PD140 | PD150 | PDU150 | PD183 | PD197 | TWO-WAY TRUNK TYPES: PM1 | PM2 | PM69 | PM70 | PM71 | PM108 | PM109 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FIXED | 8 | 4 | 8 | | | | | X | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 76 | 24 | 38 | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 14 | 3 | 7 | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 1 | 1 | | | X | | | | | | | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 49 | 22 | 49 | | | | | | | | | | | | X | X | X | X | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 11 | 8 | 11 | | | | | | | | | | | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 64 | 32 | 64 | | | | | | | | | | | | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | | | X | | | | | |
| | 17 | 5 | 17 | | | | | | | | | | | | | | | | | | | | | | | | X | X | X | | | | | X | X | X | X | X | | | | | | X | X | X | | |
| | 12 | 6 | 12 | | | | | | | | | | | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | X | X | | | X | X | X | | X | X | X | | |
| | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | X | X | X | | | | | X | X | X | X | X | X | X | X | X | X | | X | X | X | | |
| | 9 | 3 | 9 | | | | | | | | | | | | X | X | X | X | | X | X | | | X | X | | | | | | | | | | | | | | | | | | | | | X | | | | |
| | 4 | 2 | 4 | | | | | | | | | | | | X | X | X | X | X | X | X | | | X | X | | | | | | | | | | | | | | | | | | | | | X | X | X | X | X |
| | 2 | 2 | 2 | | | | | | | | | | | | X | X | X | X | X | X | X | | | X | X | | | | | | | | | | | | | | | | | | | | | X | | | | |
| | 1 | 1 | 1 | | | | | | | | | | | | X | X | X | X | | X | X | X | | X | X | | | | | | | | | | | | | | | | | | | | | X | | | | |
| | (271) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FLEXIBLE | 56 | 14 OR 14 & 14 | 28 OR 28 & 28 | | | | X | | | X | X | | | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 20 | 10 OR 10 & 10 | 10 OR 10 & 10 | | | | X | | | | | | | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (76) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UNIVERSAL | 20 | QTY AS SHOWN | SAME | 8 | 8 | 8 | | 10 | 8 | | 8 | | | | 10 | 10 | 10 | 10 | | 10 | 10 | 10 | | 10 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | (20) | | | | | | | | | | | | | | | | | | | | | | | | | | 10 | 10 | 10 | 10 | 10 | 9 | 9 | 10 | 10 | 10 | 10 | 10 | | | 10 | 10 | 16 | 20 | 16 | | 10 | 10 | | | | | | | |
| | (367) | | | TOTAL TRUNK APPEARANCES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FIXED | 20 | 16 | 20 | ORIGINATING REGISTER APPEARANCES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 11 | 9 | 11 | RELAY RACK MTD TEST AND MISC TRUNK APPEARANCES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 2 | 2 | BUNCHED TRUNK APPEARANCES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 400 | | | TOTAL TRUNK LINK FRAME APPEARANCES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

ASSIGNMENTS AGREE WITH E8099, ISSUE 8, PAGES ZI-Z6

NOTES

1. FIXED AND FLEXIBLE TRUNK LINK FRAME APPEARANCES CAN BE ASSIGNED TRUNK TYPES INDICATED WITH X'S AND IN THE QUANTITIES SHOWN IN QUANTITIES COLUMNS FOR MODULE 1 OR MODULES 1 AND 3. THE TRUNK QUANTITY CAN BE COMPOSED OF ANY SINGLE TYPE THAT IS INDICATED OR ANY COMBINATION OF THE INDICATED TYPES. IN THE FLEXIBLE CATEGORY, TRUNK TYPES OCCUPYING TWO TRUNK LINK FRAME APPEARANCES (ONE A AND ONE B APPEARANCE) ARE INDICATED WITH AN ELONGATED X. INCOMING AND OUTGOING TRUNKS OCCUPY ONLY ONE APPEARANCE ( A APPEARANCES FOR OUTGOING AND B APPEARANCES FOR INCOMING) AND ARE INDICATED WITH A REGULAR SIZED X IN THE UPPER OR LOWER SPACES OF FLEXIBLE APPEARANCES. THE USE OF TRUNKS REQUIRING TWO APPEARANCES REDUCES THE QUANTITIES OF BOTH INCOMING AND OUTGOING TRUNKS PROPORTIONATELY.
2. TRUNK TYPES THAT CAN BE USED IN UNIVERSAL APPEARANCES ARE INDICATED WITH FIGURES INSTEAD OF X'S. UNIVERSAL TRUNK LINK FRAME APPEARANCES AND THE ASSOCIATED TRUNK FRAME (TRK 4) CAN ALSO ACCOMMODATE NO. 5 CROSSBAR OR COMMON SYSTEMS TYPE TRUNKS. CONSULT THE EQUIPMENT ENGINEER CONCERNING TRUNK FRAME MOUNTING SPACE AND TRUNK LINK, INCOMING REGISTER LINK, OUT SENDER LINK AND RING SELECTION SWITCH APPEARANCE UTILIZATION WHEN TRUNKS OF OTHER THAN 5A TYPES ARE REQUIRED.
3. THIS TABLE, WHEN USED AS A WORKSHEET, PROVIDES AN ACCURATE METHOD FOR DETERMINING IF 5A SYSTEM TRUNKING WILL MEET THE NEEDS OF PROPOSED OFFICES.
4. AFTER DETERMINING THE TOTAL QUANTITY OF EACH TRUNK TYPE REQUIRED IN A PROPOSED OFFICE, START WITH TRUNK TYPES REQUIRING THE FEWEST QUANTITY OF TRUNKS; ENTER THE TABLE FROM THE TOP DOWN, AND ENTER THE QUANTITIES REQUIRED OVER THE APPROPRIATE X'S. CAUTION: DO NOT EXCEED THE MAXIMUM TRUNK QUANTITIES IN THE COLUMNS FOR MODULE NO. 1 OR FOR MODULES NO. 1 AND 3.

Exhibit 7 — Trunk Assignment Worksheet

TRUNK LINK FRAME TLO

| LEVEL APP | SWITCH NUMBER 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0A | ← OR-0 REG 0 | 2 | OR-1 0 | 2 | OR-2 0 | 2 | OR-3 0 | 2 → | | |
| 1A | | | | OG/OGSW | | ← | | U → | | |
| 2A | ← | | | | OG/OGSW → | | | | | |
| 3A | | | | | ← | | F | → | | |
| 4A | | | | | | | | | | OG/OGSW |
| 5A | ← | | | F | → | | | | | F |
| 6A | | | | | | | | | | |
| 7A | | | | | | | | | | |
| 8A | IAO | ← OG/OGSW → | | IAO | → | | | OG/OGSW → | | IAO |
| 9A | ← | | | | IAO → | | | | | |

TRUNK LINK FRAME TLI

| SWITCH NUMBER 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| ← OR-0 REG 1 | 3 | OR-1 1 | 3 | OR-2 1 | 3 | OR-3 1 | 3 → | | |
| | | | RINGER TEST TRK | | ← | | U → | | |
| ← | | | | OG/OGSW → | | | | | |
| | | | | ← | | F | → | | |
| | | | | | | | | | OG/OGSW |
| ← | | F | → | | | | | | F |
| | | | | | | | | | |
| | | | | | | | | | |
| IAO | ← OG/OGSW → | | IAO | → | | | OG/OGSW → | | IAO |
| ← | | | | IAO → | | | | | |

| LEVEL APP | SWITCH NUMBER 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0B | ← | INC → | 2-W/INC | ← | INC → | | | 2-W/INC → | | |
| 1B | TST AND REC FRAME TRK | DT FIRST INCPT TRK (ANN) | ← PS HLDG TRKS → | | | ← | | U → | | |
| 2B | | ← OG/OGSW → | | | | | ← OG/OGSW → | | B | |
| 3B | ← | INC → | | | | ← | | F → | | |
| 4B | | | | | | | | | | |
| 5B | ← | | F | → | | | | | | |
| 6B | | | | | | | | | | |
| 7B | | | | | | | | | | |
| 8B | ← IAO → | | REV → | | ← IAO → | | | ← INC → | | |
| 9B | ← | | | | IAO → | | | | | |

| | SWITCH NUMBER 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| | ← | INC → | 2-W/INC | ← | INC → | | | 2-W/INC → | | |
| | INC LINE TST TRK | DT FIRST INCPT TRK (ANN) | ← PS HLDG TRKS → | | | ← | | U → | | |
| | | ← OG/OGSW → | | | | | ← OG/OGSW → | | B | |
| | ← | INC → | | | | ← | | F → | | |
| | | | | | | | | | | |
| | ← | | F | → | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | ← IAO → | | REV → | | ← IAO → | | | ← INC → | | |
| | ← | | | | IAO → | | | | | |

ASSIGNMENTS AGREE WITH E 8099, ISSUE 8, PAGES ZI-Z6.

LEGEND

| | |
|---|---|
| IAO | INTRAOFFICE |
| REV | REVERTIVE |
| OR-I | ORIGINATING REGISTER FRAME |
| B | BUNCHED APPEARANCE |
| OG/OGSW | OUTGOING TRUNK OR OUTGOING TRUNK TO SWITCHBOARD |
| 2-W/INC | 2-WAY OR INCOMING |
| F | FLEXIBLE |
| U | UNIVERSAL |
| INC | INCOMING |

**Exhibit 8 — Trunk Link Frame Assignment Layout — Module No. 1**

TRUNK LINK FRAME-TLO

| LEVEL APP | SWITCH NUMBER 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0A | OR-0 REG 0 | 2 | OR-1 0 | 2 | OR-2 0 | 2 | OR-3 0 | 2 | OR-4 0 | 2 |
| 1A | OG/OGSW | | | | | | U | | | |
| 2A | | | | | | OG/OGSW | | | | |
| 3A | | | OG/OGSW | | | | F | | | OG/OGSW |
| 4A | INC | | 2-W/INC | | INC | | 2-W/INC | | | OG/OGSW |
| 5A | | | | F | | | OG/OGSW | | | F |
| 6A | | | | F | | | | | OG/OGSW | |
| 7A | | | IAO | | | | | | OG/OGSW | IAO |
| 8A | IAO | | OG/OGSW | | IAO | | OG/OGSW | | | IAO |
| 9A | | | | | IAO | | | | | |
| 0B | | INC | | 2-W/INC | | INC | | | 2-W/INC | |
| 1B | TST AND REC FRAME TRK | DT FIRST INCPT TRK (ANN) | | PS HLDG INCPT TRK (ANN) | | | | U | | |
| 2B | | | | | OG/OGSW | | | | | B |
| 3B | | | INC | | | | F | | | |
| 4B | | | | | INC | | | | | |
| 5B | | | | F | | | | | OG/OGSW | |
| 6B | REV | | | | F | | | | OG/OGSW | |
| 7B | | | | | IAO | | | | | REV |
| 8B | IAO | | REV | | IAO | | INC | | | |
| 9B | | | | | IAO | | | | | |

TRUNK LINK FRAME TLI

| SWITCH NUMBER 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| OR-0 REG 1 | 3 | OR-1 1 | 3 | OR-2 1 | 3 | OR-3 1 | 3 | OR-4 1 | 3 |
| | OG/OGSW | | RINGER TEST TRK | OG/OGSW | | | U | | |
| | | | | OG/OGSW | | | | | |
| | OG/OGSW | | | | | | F | | OG/OGSW |
| | INC | | 2-W/INC | | INC | | | 2-W/INC | OG/OGSW |
| | | | F | | | | | OG/OGSW | F |
| | | | F | | | | | | OG/OGSW |
| | | | IAO | | | | | | OG/OGSW |
| IAO | | OG/OGSW | | IAO | | | | OG/OGSW | IAO |
| | | | | IAO | | | | | |
| | INC | | 2-W/INC | | INC | | | 2-W/INC | |
| INC LINE TST TRK | DT FIRST INCPT TRK (ANN) | | PS HLDG TRKS | | | | U | | |
| | | | | | OG/OGSW | | | | B |
| | | INC | | | | | F | | |
| | | | | INC | | | | | |
| | | | | F | | | | OG/OGSW | |
| REV | | | | F | | | | OG/OGSW | |
| | | | | IAO | | | | | REV |
| IAO | | REV | | IAO | | | INC | | |
| | | | | IAO | | | | | |

ASSIGNMENTS AGREE WITH E 8099, ISSUE 8, PAGES Z1–Z6.

LEGEND:

| | |
|---|---|
| IAO | INTRAOFFICE |
| REV | REVERTIVE |
| OR-I | ORIGINATING REGISTER FRAME |
| B | BUNCHED APPEARANCE |
| OG/OGSW | OUTGOING TRUNK OR OUTGOING TRUNK TO SWITCHBOARD |
| 2-W/INC | 2-WAY OR INCOMING |
| F | FLEXIBLE |
| U | UNIVERSAL |
| INC | INCOMING |

**Exhibit 9 – Trunk Link Frame Assignment Layout – Modules 1 and 3**

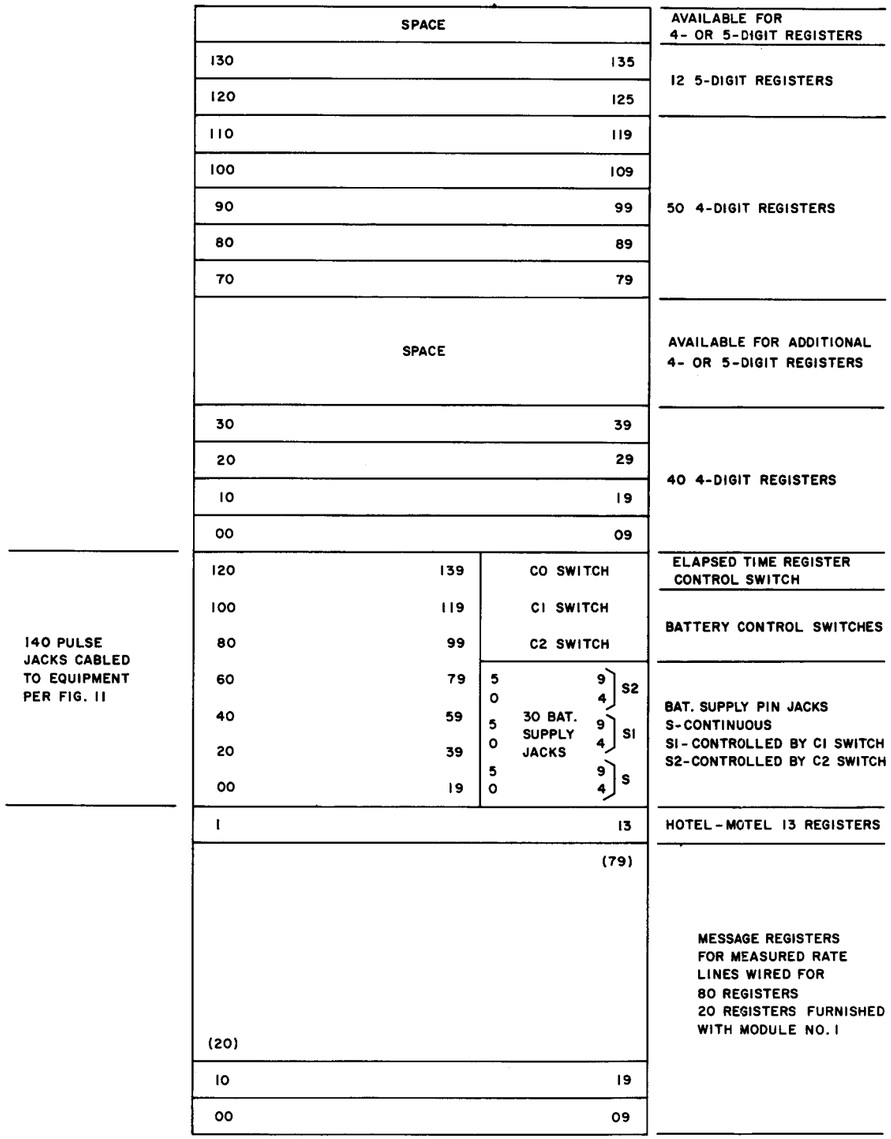



**Exhibit 10 — M and TR Bay — Equipment Arrangement**

ASSIGNMENT OF PIN JACKS AND REGISTERS

| CKT NAME | (LEAD DESIG) | JACK NO. | REG NO. |
|---|---|---|---|
| SPARE | | 135 | |
| SPARE | | 134 | |
| SPARE | | 133 | |
| SPARE | | 132 | |
| MKR(1) | (TOR) | 131 | 131 |
| MKR(0) | (TOR) | 130 | 130 |
| MKR(1) | (TMOR) | 125 | 125 |
| MKR (0) | (TMOR) | 124 | 124 |
| MKR(1) | (TPCD) | 123 | 123 |
| MKR(0) | (TPCD) | 122 | 122 |
| MKR(1) | (TPCC) | 121 | 121 |
| MKR(0) | (TPCC) | 120 | 120 |
| MKR(1) SPARE | (PCSC) | 119 | 119 |
| MKR(0) SPARE | (PCSC) | 118 | 118 |
| 20(AA-G)TS | (PC) | 117 | 117 |
| 21(AA-G)TS | (PC) | 116 | 116 |
| ETC TO | (PC) | ETC TO | ETC TO |
| 39(AA-G)TS | (PC) | 98 | 98 |
| MKR(0) | (BNA) | 97 | 97 |
| MKR(0) | (TBI) | 96 | 96 |
| MKR(1) | (IH) | 95 | 95 |
| MKR(0) | (IH) | 94 | 94 |
| MKR(1) | (IB) | 93 | 93 |
| MKR(0) | (IB) | 92 | 92 |
| MKR(1) | (TCH) | 91 | 91 |
| MKR(0) | (TCH) | 90 | 90 |
| MKR(1) | (TIP) | 89 | 89 |
| MKR(0) | (TIP) | 88 | 88 |
| MKR(0) | (RIA) | 87 | 87 |
| MKR(1) | (OSM) | 86 | 86 |
| MKR(0) | (OSM) | 85 | 85 |
| MKR(1) | (OSD) | 84 | 84 |
| MKR(0) | (OSD) | 83 | 83 |
| ORIG REG | (APPB) | 82 | 82 |
| ORIG REG | (APD TT) | 81 | 81 |
| ORIG REG | (APD DP) | 80 | 80 |
| INC REG | (MF PC) | 79 | 79 |
| INC REG | (PC) | 78 | 78 |
| TV(1) | (PC) | 77 | 77 |
| TV(0) | (PC) | 76 | 76 |
| COIN SR RLS | (GB) | 75 | 75 |
| 53(E)TS | (M) | 74 | 74 |
| SPARE | | | |
| SPARE | | | |
| 43(E)TS | (IFFM) | 36 | 36 |
| MKR(0) | (FM) | 35 | 35 |
| MKR(0) | (ASB) | 34 | 34 |
| MKR(1) | (TCO) | 33 | 33 |
| MKR(0) | (TCO) | 32 | 32 |
| NG FR 2 CKT 3 | (OF) | 31 | 31 |
| NG FR 2 CKT 2 | (OF) | 30 | 30 |
| NG FR 2 CKT 1 | (OF) | 29 | 29 |
| NG FR 2 CKT 0 | (OF) | 28 | 28 |
| NG FR 1 CKT 3 | (OF) | 27 | 27 |
| NG FR 1 CKT 2 | (OF) | 26 | 26 |
| NG FR 1 CKT 1 | (OF) | 25 | 25 |
| NG FR 1 CKT 0 | (OF) | 24 | 24 |
| NG FR 0 CKT 3 | (OF) | 23 | 23 |
| NG FR 0 CKT 2 | (OF) | 22 | 22 |
| NG FR 0 CKT 1 | (OF) | 21 | 21 |
| NG FR 0 CKT 0 | (OF) | 20 | 20 |
| 19(AA-G)TS | (OF) | 19 | 19 |
| ETC TO | (OF) | ETC TO | ETC TO |
| 01(AA-G)TS | (OF) | 01 | 01 |
| 00(AA-G)TS | (OF) | 00 | 00 |

**Exhibit 11 — M and TR Bay — P Jack Assignments**

**Exhibits 10 and 11**

| RR FR CONN NO. | CONNECTOR TERMINAL ASSIGNMENT OF SCAN LEADS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 60 | TRK FR 0 | | | | | | | | | | | | | | | | | | | |
| | (S LEADS) | | | | | | | | | | | | | | | | (TU LEADS) | | | |
| | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 56 | 76 | 77 | 78 |
| 61 | TRK FR 0 | | | | | | | | | | | | | | | | | | | |
| | TU | | | S | | | | | | | | | | | | | | | | TU |
| | 79 | 80 | 81 | 01 | 03 | 05 | 07 | 09 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 57 |
| 62 | TRK FR 1 | | | | | | | | | | | | | | | | | | | |
| | S | | | | | | | | | | | | | | | | | | | |
| | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 |
| 63 | TRK FR 1 | | | | | | | | | | | | | | | | | | | |
| | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | | | | | | |
| | 40 | 40 | 42 | 42 | 44 | 44 | 46 | 46 | 48 | 48 | 50 | 50 | 52 | 52 | 70 | 71 | 72 | 73 | 74 | |
| 64 | TRK FR 1 | | | | | | | | | | | | | | | | | | | |
| | S | | | | | | | | | | | | | | | | | | | |
| | 01 | 03 | 05 | 07 | 09 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 |
| 65 | TRK FR 1 | | | | | | | | | | | | | | | | | | | |
| | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | | | | | | |
| | 41 | 41 | 43 | 43 | 45 | 45 | 47 | 47 | 49 | 49 | 51 | 51 | 53 | 53 | | | | | | |
| 66 | TRK FR 4 | | | | | | | | | | | | | | | | | | | |
| | S OR TU | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 67 | TRK FR 5 | | | | | | | | | | | | | | | | | | | |
| | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S |
| | 00 | 00 | 01 | 01 | 02 | 02 | 03 | 03 | 04 | 04 | 05 | 05 | 06 | 06 | 07 | 07 | 08 | 08 | 09 | 09 |
| 68 | M-0 | M-1 | | CSR | | | | | | | | | | | | | | | | |
| | MBM | | | 402 | 100 | | | | | | | | | | | | | | | |
| | | | | 00 | 01 | 02 | | | | | | | | | | | | | | |
| 69 | TRK FR 2 | | | | | | | | | | | | | | | | | | | |
| | S | | | | | | | | | | TU | | | | | | | | S | |
| | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 | 46 | 76 | 77 | 78 | 79 | 80 | 81 | 01 | 03 |
| 70 | TRK FR 2 | | | | | | | | | | TRK FR 3 | | | | | | | | | |
| | S | | | | | | | | TU | | S | | | | | | | | | |
| | 05 | 07 | 09 | 11 | 13 | 15 | 17 | 19 | 21 | 47 | 00 | 02 | 04 | 06 | 08 | 10 | 12 | 14 | 16 | 18 |
| 71 | TRK FR 3 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | TU | S | TU | S | TU | S | TU | S | TU | S |
| | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 40 | 42 | 42 | 44 | 44 | 46 | 46 | 48 | 48 |
| 72 | TRK FR 3 | | | | | | | | | | | | | | | | | | | |
| | TU | S | TU | S | S | | | | | | | | | | | | | | | |
| | 50 | 50 | 52 | 52 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | | | | | | |
| 73 | TRK FR 3 | | | | | | | | | | | | | | | | | | | |
| | S | | | | | | | | | | | | | | | | | | | |
| | 01 | 03 | 05 | 07 | 09 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 | 37 | 39 |
| 74 | TRK FR 3 | | | | | | | | | | | | | | | | | | | |
| | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | TU | S | | | | | | |
| | 41 | 41 | 43 | 43 | 45 | 45 | 47 | 47 | 49 | 49 | 51 | 51 | 53 | 53 | | | | | | |
| 75 | OR-0 | | | | OR-1 | | | | OR-2 | | | | OR-3 | | | | OR-4 | | | |
| | RBM | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| 76 | OR-0 | | | | OR-1 | | | | OR-2 | | | | OR-3 | | | | OR-4 | | | |
| | RB(SHT) | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| 77 | OR-0 | | | | OR-1 | | | | OR-2 | | | | OR-3 | | | | OR-4 | | | |
| | PBC(SHT) | | | | | | | | | | | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| 78 | IR-0(SHT) | | | IR-1(SHT) | | | | IR-2(SHT) | | | ATV-0 | OS-0(SHT) | | | | OS-1(SHT) | | | | ATV-1 |
| | RB(SHT) | | | | | | | | | | TB | SB(SHT) | | | | | | | | TB |
| | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | | | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 |
| 79 | OS-0 | | | OS-1 | | | OS-2 | | | ATV-0 | IR-0 | | | IR-1 | | | IR-2 | | | ATV-1 |
| | SBM | | | SBM | | | SBM | | | TBM | RBM | | | RBM | | | RBM | | | TBM |
| | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | |
| 80 | LL-0 | | | | | | | | | | | | | | | | | | | |
| | LO | | | | | | | | | | L5 | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 81 | LL-1 | | | | | | | | | | | | | | | | | | | |
| | LO | | | | | | | | | | L5 | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 82 | LL-2 | | | | | | | | | | | | | | | | | | | |
| | LO | | | | | | | | | | L5 | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 83 | LL-3 | | | | | | | | | | | | | | | | | | | |
| | LO | | | | | | | | | | L5 | | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 84 | M-0 | M-1 | IR-0 | | | IR-1 | | | IR-2 | | | OS-0 | | | OS-1 | | | OS-2 | | |
| | MB(SHT) | | RBMF(SHT) | | | | | | | | | MF(SHT) | | | | | | | | |
| | | | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 |
| 85 | | | | | | | | | | | | | | | | | | | | |

CONN TERM. NO.
TRK FR NO.
LEAD DESIG
TRK POS NO.

OR FR NO.
LEAD DESIG
OR NO.

FR NO.
LEAD DESIG
IR/OS NO.

LL FR NO.
LEAD DESIG(LEVEL)
SW NO.

**Exhibit 12 – Traffic Usage Measurement Leads**

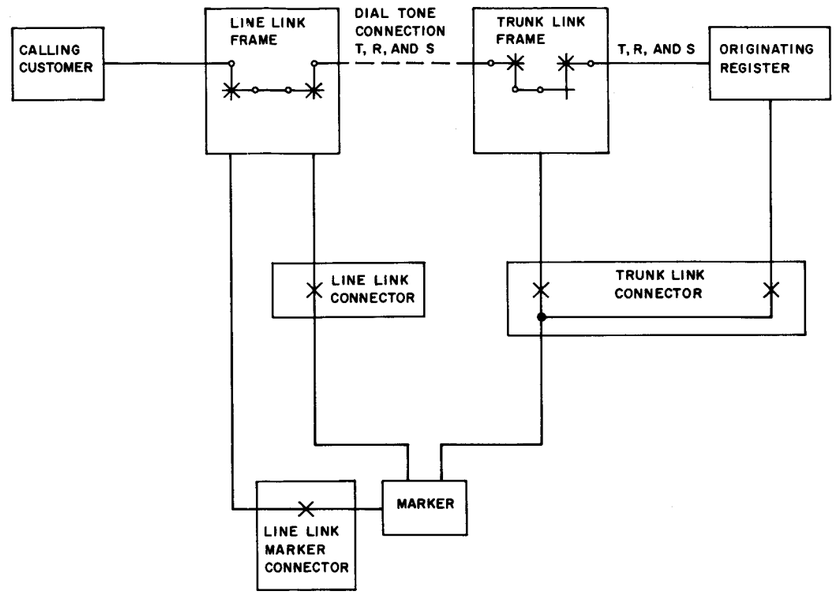
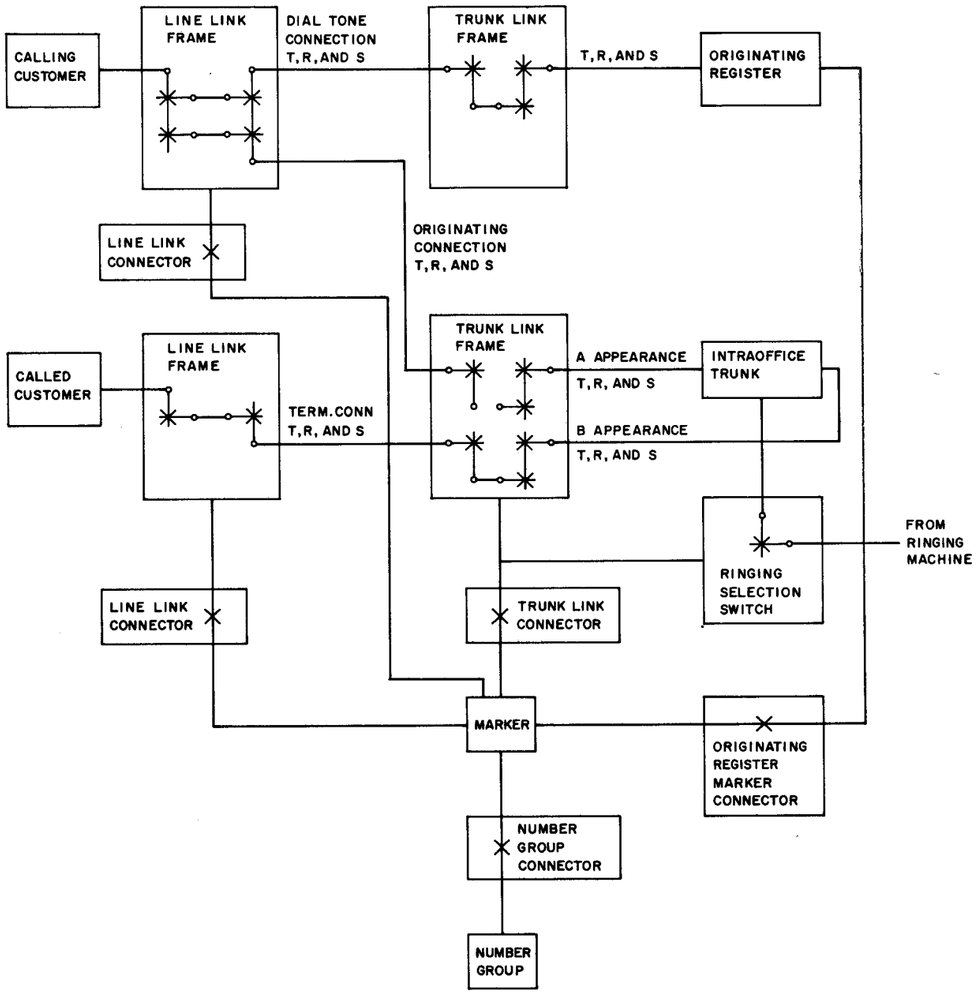
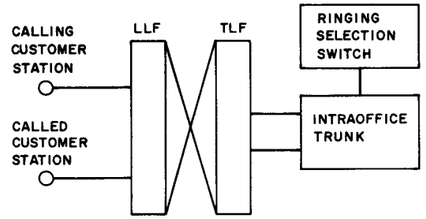



Exhibit 13 — Dial Tone Connection

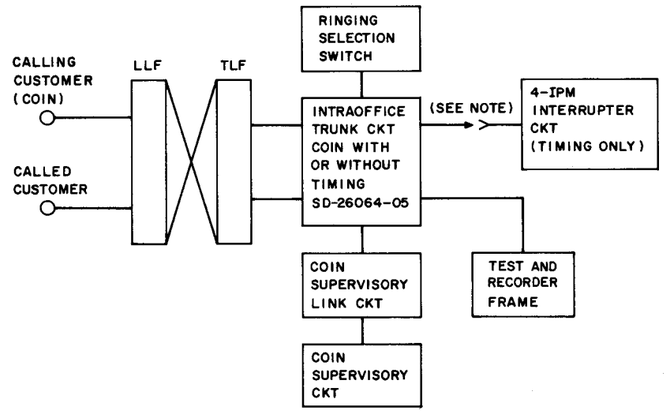



A. BASIC CONNECTION

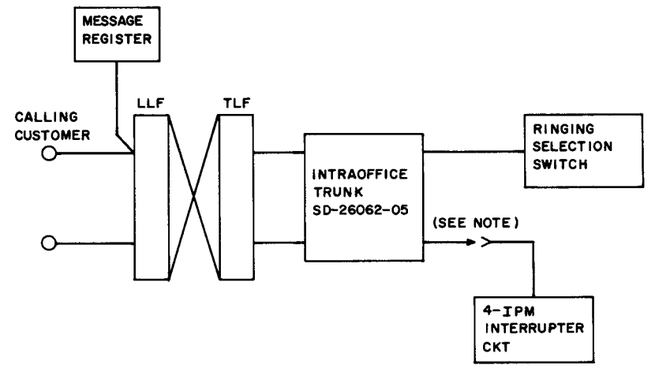
NOTE:
TIMING IS PROVIDED ON AN OPTIONAL BASIS WITH AN ADDITIONAL MESSAGE REGISTER OPERATION FOR EACH INTERVAL ON ANSWERED CHARGE CALLS.




B. FLAT RATE IAO TRK CONNECTION




C. COIN IAO TRK CONNECTION




D. MEASURED RATE IAO TRK CONNECTION

Exhibit 14 — Intraoffice Trunk Connections

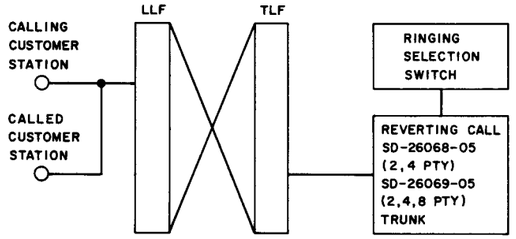



**Exhibit 15 — Reverting Call Connection**

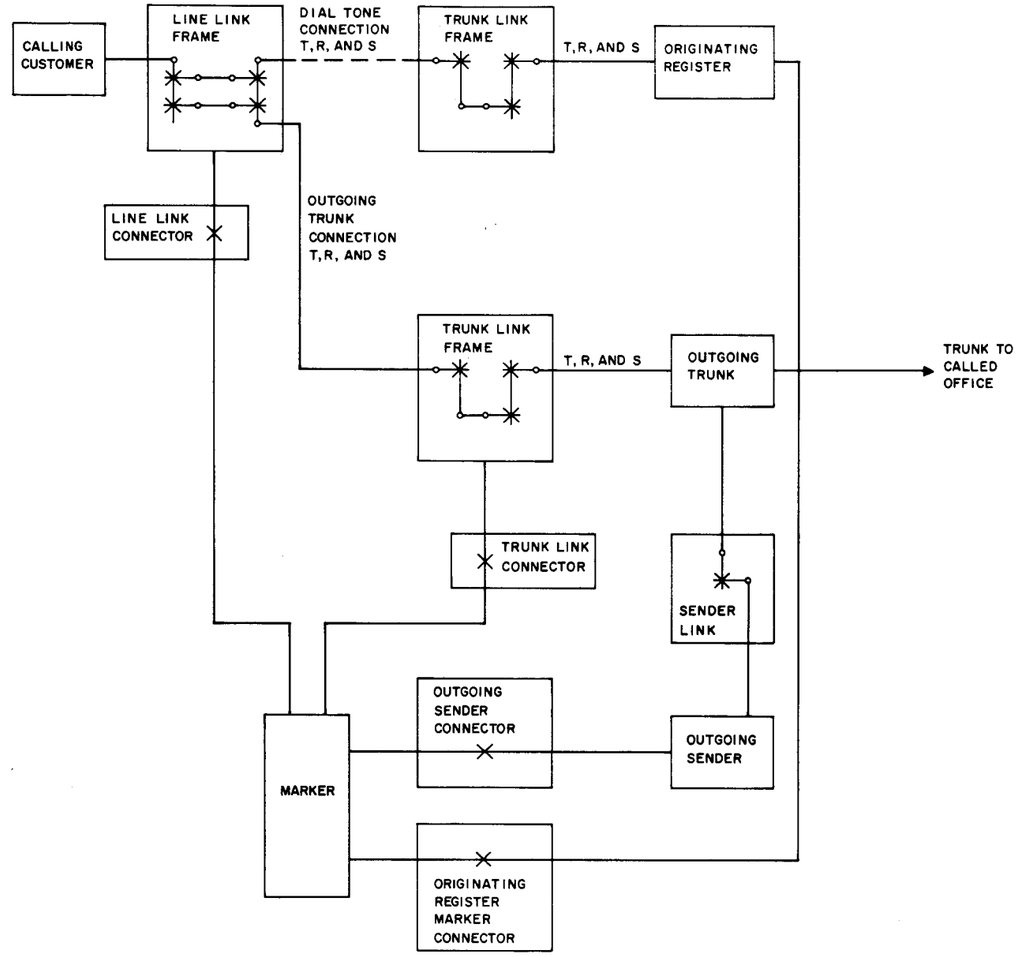



**Exhibit 16 — Outgoing Trunk Connection**

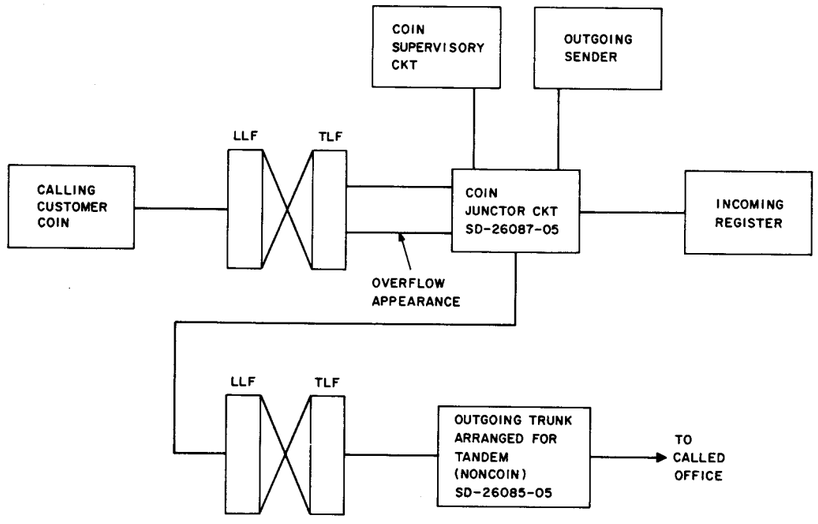



Exhibit 17 — Outgoing Trunk Connection — Coin Junctor

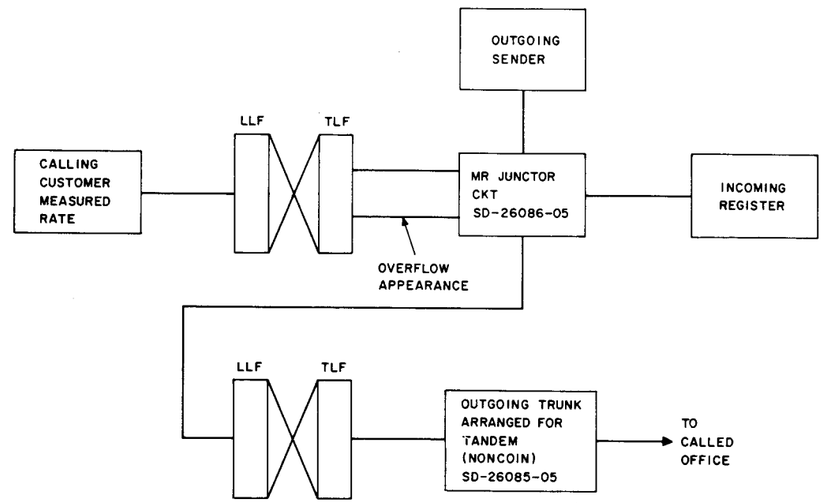



Exhibit 18 — Outgoing Trunk Connection (CAMA)

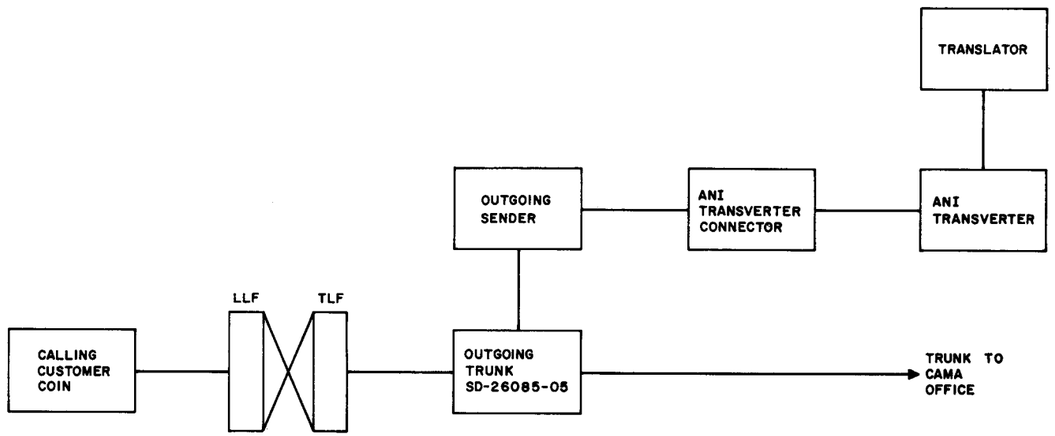
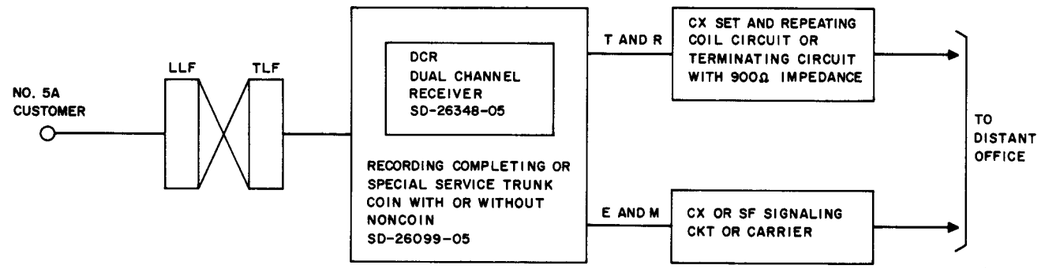



**Exhibit 19 — Outgoing Trunk Connection Message Rate Junctor**




NOTES:
1. THIS CIRCUIT IS USED IN COMPLETING SPECIAL SERVICE OR TOLL CALLS FROM COIN CUSTOMER LINES IN A NO. 5A CROSSBAR OFFICE TO A DISTANT SWITCHBOARD OVER CARRIER EQUIPMENT OR EQUIVALENT FACILITIES USING E AND M SIGNALING.
2. THIS CIRCUIT CAN BE ARRANGED, ON AN OPTIONAL BASIS, TO COMPLETE ROUTE ADVANCED SPECIAL SERVICE OR TOLL CALLS FROM NONCOIN CUSTOMER LINES IN A NO. 5A CROSSBAR OFFICE TO A DISTANT SWITCHBOARD OVER CARRIER EQUIPMENT OR EQUIVALENT FACILITIES USING E AND M SIGNALING.
3. THIS CIRCUIT CAN BE ARRANGED, ON AN OPTIONAL BASIS, TO OMIT AUTOMATIC RETURN OF THE INITIAL COIN WHEN THE OPERATOR ANSWERS.
4. THIS CIRCUIT IS ARRANGED TO USE AC SIGNALING FOR THE COIN DISPOSAL AND RERING FEATURES. A 700-HZ FREQUENCY ACTIVATES THE RERING FEATURE, A 1100-HZ FREQUENCY ACTIVATES THE COIN RETURN FEATURE, AND A COMBINATION OF 700 AND 1100-HZ ACTIVATES COIN COLLECT.
5. THIS CIRCUIT CAN BE ARRANGED FOR UNRESTRICTED RINGBACK.

**Exhibit 20 — Outgoing Trunk Connection — Recording Completing Trunk or Special Service Trunk**

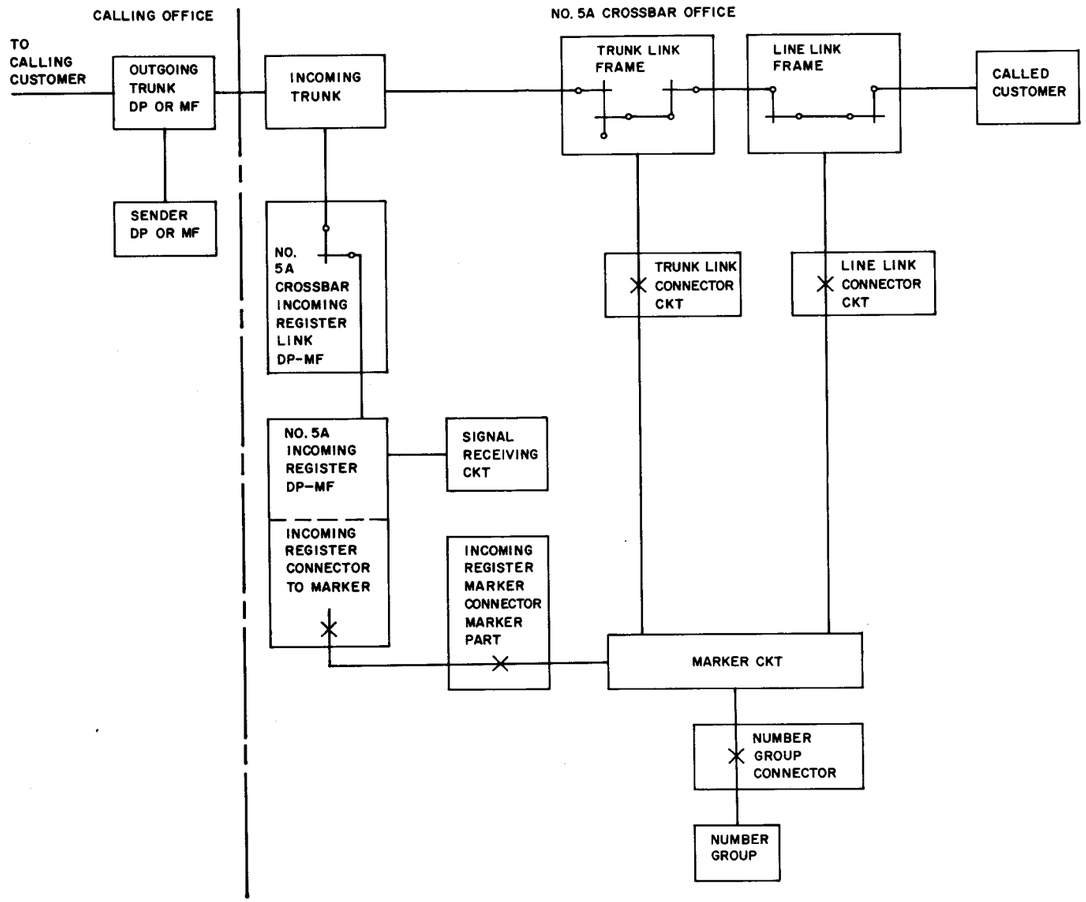



Exhibit 21 — Incoming Connection — Local Completion

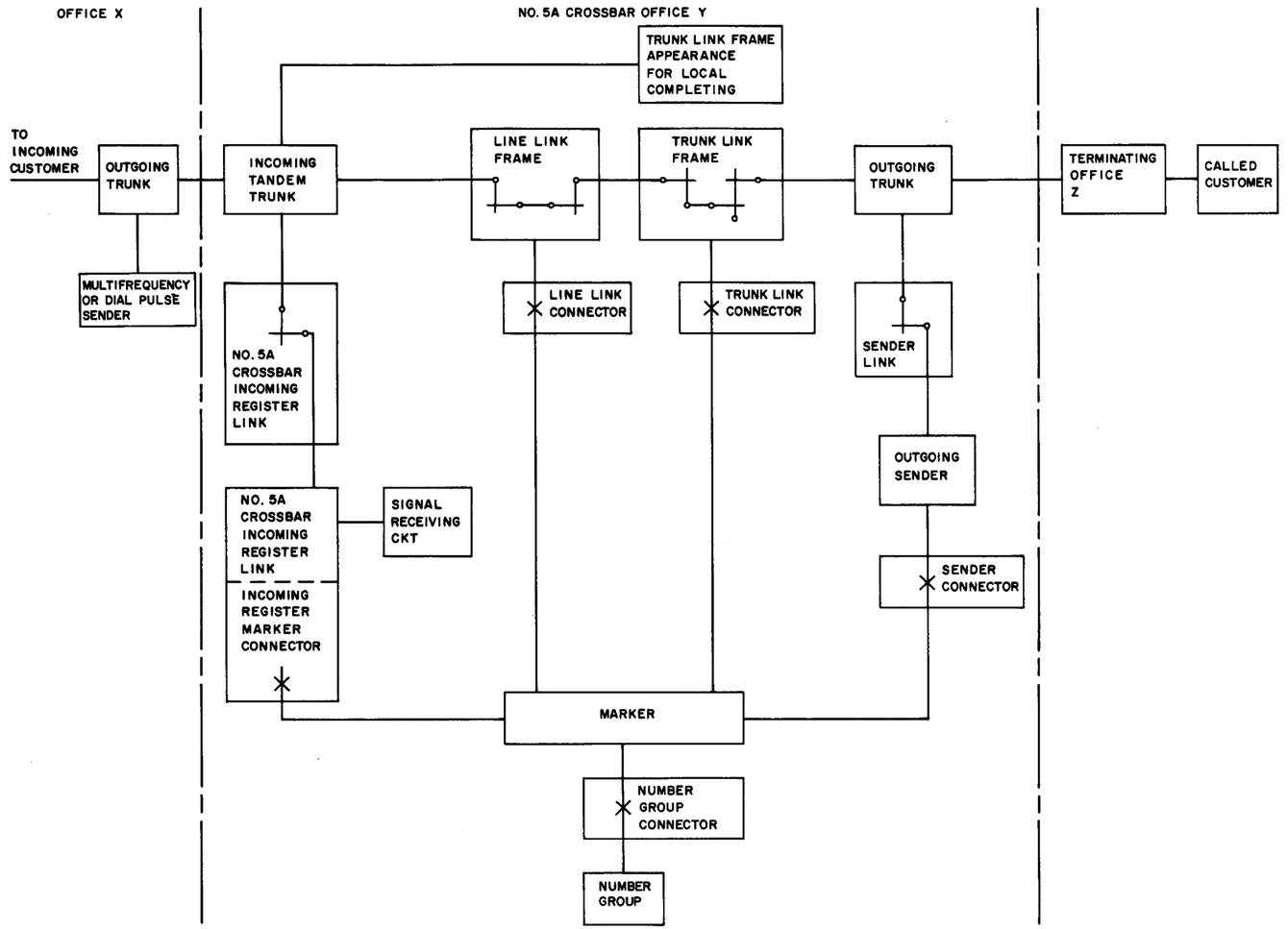
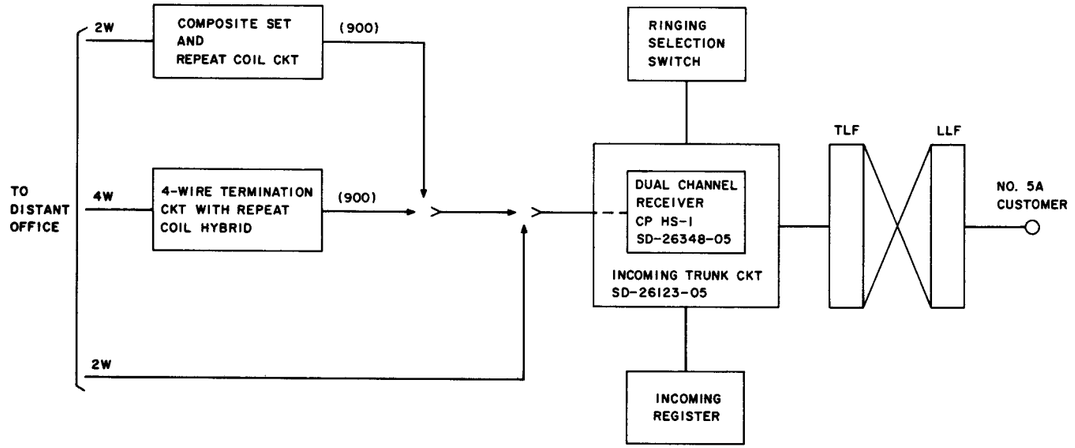
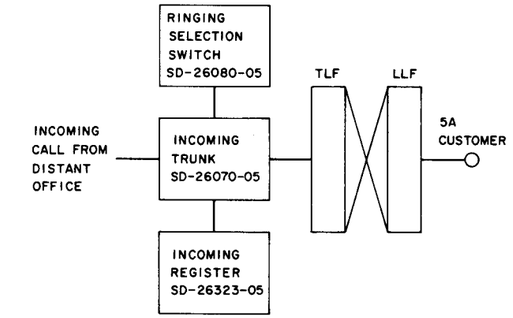



Exhibit 22 – Incoming Connection – Tandem Completing
(7-Digit Maximum)



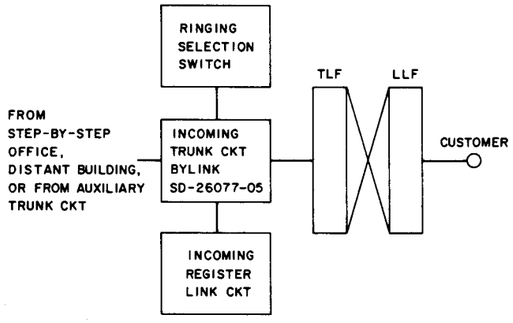

NOTES:
1. THIS CIRCUIT IS USED TO COMPLETE CALLS FROM A DISTANT TOLL OR DSA SWITCHBOARD TO COIN OR NONCOIN CUSTOMERS AND IS ARRANGED TO USE E AND M LEAD OR REVERSE-BATTERY SUPERVISION. THE COIN AND RERING FEATURES PROVIDED ARE CONTROLLED BY THE USE OF AC TONES.
2. THE CIRCUIT CAN BE ARRANGED FOR RESTRICTED OR UNRESTRICTED RINGBACK.

**Exhibit 23 — Incoming Trunk Connection From Toll or DSA Switchboard With or Without Coin Control**




NOTE:
THIS INCOMING TRUNK CIRCUIT COMPLETES CALLS FROM LOCAL OR TANDEM OFFICES HAVING SENDERS OR OPERATOR POSITIONS ARRANGED FOR A START DIAL SIGNAL OR FOR DIAL TONE. THE ASSOCIATED INCOMING REGISTERS ARE ARRANGED FOR EITHER DIAL PULSING OR MULTIFREQUENCY PULSING.

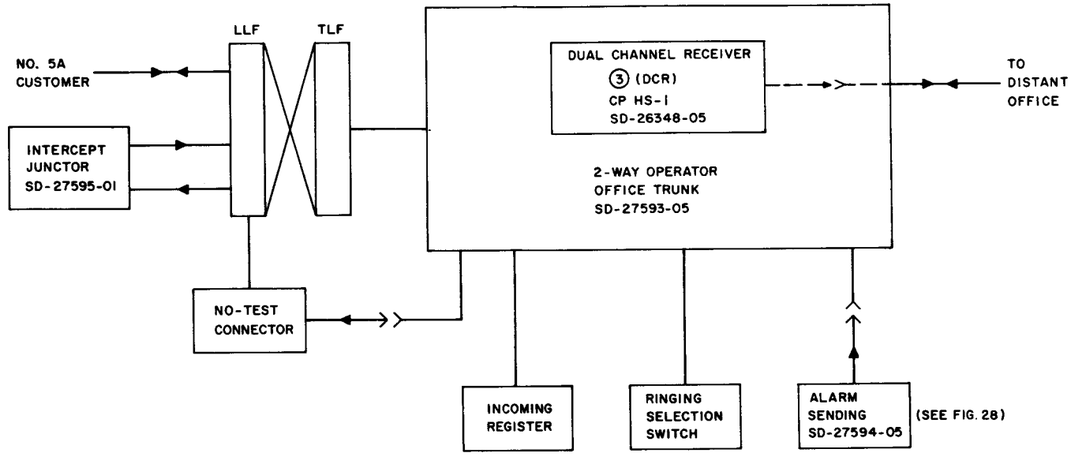
A MF OR DP




NOTE:
THIS CIRCUIT IS DESIGNED FOR USE IN THE NO. 5A CROSSBAR OFFICE AS AN INCOMING TRUNK CIRCUIT FROM A STEP-BY-STEP OFFICE. IT IS ARRANGED FOR BYLINK OPERATION.

B BYLINK

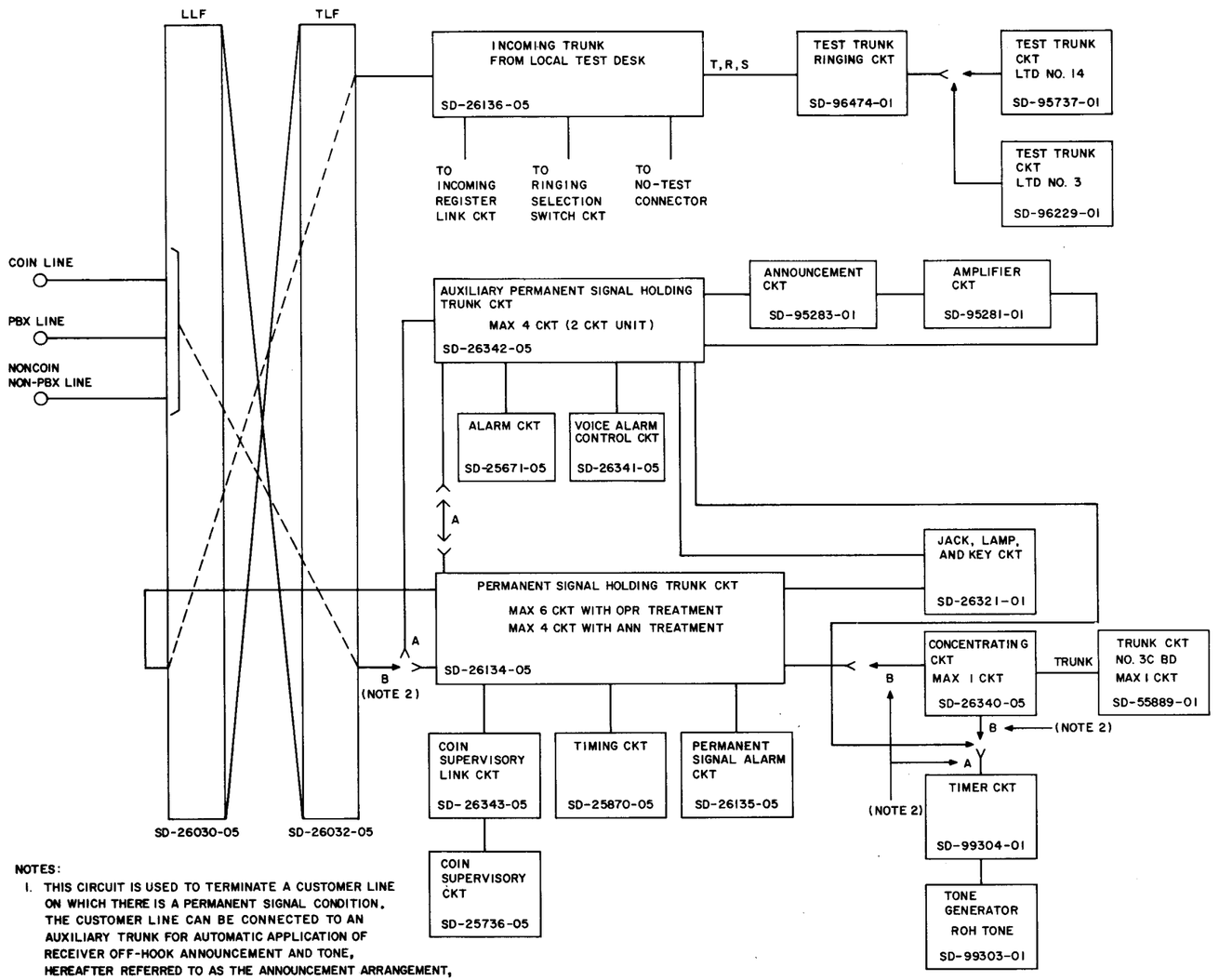
**Exhibit 24 — Incoming Trunk Connections — Miscellaneous**




NOTE:
THIS CIRCUIT CONNECTS BETWEEN A SINGLE TRUNK LINK FRAME APPEARANCE AND A TRUNK TO HANDLE COIN AND NONCOIN CUSTOMER OUTGOING CALLS TO AN OPERATOR, ALARM SIGNALS TO AN OPERATOR FROM AN ALARM SENDING CIRCUIT, INTERCEPT CALLS TO AN OPERATOR, DP OR MF BASIS INCOMING TERMINATING CALLS FROM A MACHINE SWITCHED OFFICE, AND DP OR MF BASIS INCOMING TERMINATING REGULAR AND NO-TEST CALLS FROM AN OPERATOR. THIS CIRCUIT CAN BE ARRANGED FOR RINGBACK AS FOLLOWS:
(A) UNRESTRICTED RINGBACK PERMITS RINGBACK AGAINST BOTH OFF-HOOK AND ON-HOOK SIGNALS.
(B) RESTRICTED RINGBACK PERMITS RINGBACK AGAINST AN OFF-HOOK SIGNAL FROM A NONCOIN LINE AND BOTH OFF-HOOK AND ON-HOOK SIGNALS FROM COIN LINES.

**Exhibit 25 — 2-Way Operator Office — Trunk Connection**

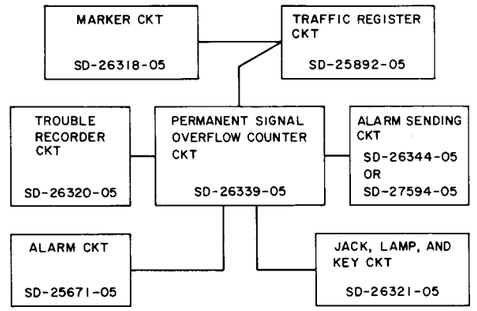
SKETCH A




NOTES:

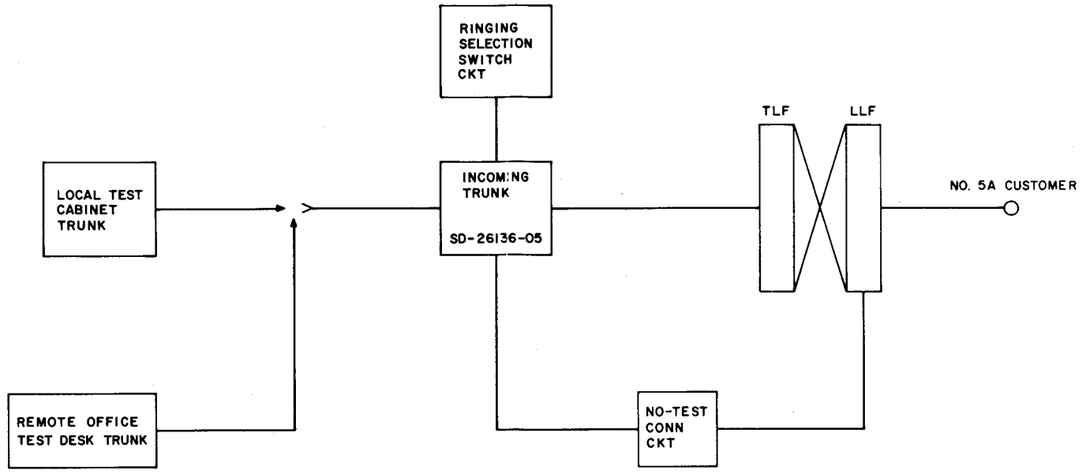
1. THIS CIRCUIT IS USED TO TERMINATE A CUSTOMER LINE ON WHICH THERE IS A PERMANENT SIGNAL CONDITION. THE CUSTOMER LINE CAN BE CONNECTED TO AN AUXILIARY TRUNK FOR AUTOMATIC APPLICATION OF RECEIVER OFF-HOOK ANNOUNCEMENT AND TONE, HEREAFTER REFERRED TO AS THE ANNOUNCEMENT ARRANGEMENT, OR TO AN OPERATOR THROUGH A CONCENTRATING CIRCUIT, REFERRED TO AS THE OPERATOR ARRANGEMENT. THE LINE IS ALSO ACCESSIBLE, FREE OF CENTRAL OFFICE EQUIPMENT, TO THE LOCAL TEST DESK AND THE TEST AND RECORDER FRAME. THE TRUNK IS ARRANGED FOR COIN RETURN AFTER DISCONNECT.
2. AUTOMATIC APPLICATION OF ANNOUNCEMENT AND RECEIVER OFF-HOOK TONE: A-PROVIDED, B-NOT PROVIDED.

SKETCH B



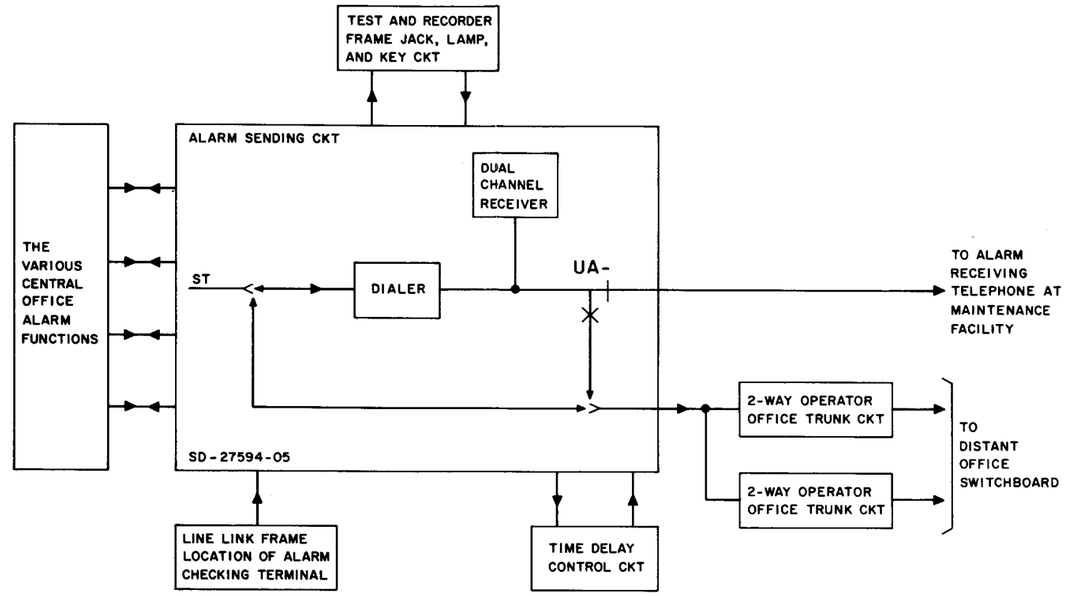

NOTE:
THIS CIRCUIT PROVIDES MEANS TO COUNT ALL PERMANENT SIGNAL CONDITIONS ENCOUNTERED BY THE OFFICE AND TO GIVE AN ALARM WHEN THE COUNT REACHES A PREDETERMINED NUMBER WITHIN A 24-HOUR PERIOD.

Exhibit 26 — Permanent Signal Connections




NOTE:
THIS CIRCUIT PROVIDES ACCESS FROM THE TEST DESK IN A DISTANT BUILDING OR TEST CABINET IN THE SAME BUILDING TO NO. 5A CROSSBAR CUSTOMER LINES FOR TEST THROUGH THE TRUNK LINK AND LINE LINK FRAMES. THIS CIRCUIT, ARRANGED FOR NO-TEST, PROVIDES ACCESS TO THE DESIRED LINE WHETHER IDLE OR BUSY. THE CONNECTION TO A BUSY LINE IS THROUGH A NO-TEST CONNECTOR. THIS CIRCUIT IS FOR USE WITH BOTH DIAL AND MULTIFREQUENCY PULSING.

Exhibit 27 — Local Test Desk Connection (No-Test)




PURPOSE OF CIRCUIT

THIS CIRCUIT PROVIDES TWO ARRANGEMENTS FOR TERMINATING ALARMS. ONE ARRANGEMENT TRANSMITS ALARM INDICATIONS VIA 2-WAY OPERATOR OFFICE TRUNKS TO AN OPERATOR POSITION. THE OTHER USES A SELF-CONTAINED DIALER TO TRANSMIT ALARM INDICATIONS VIA THE TELEPHONE NETWORK TO A DEDICATED ALARM TELEPHONE AT A MAINTENANCE FACILITY. THE FORMER ARRANGEMENT WILL HEREAFTER BE REFERRED TO AS OPERATOR OPERATION AND THE LATTER ARRANGEMENT AS DIALER OPERATION.

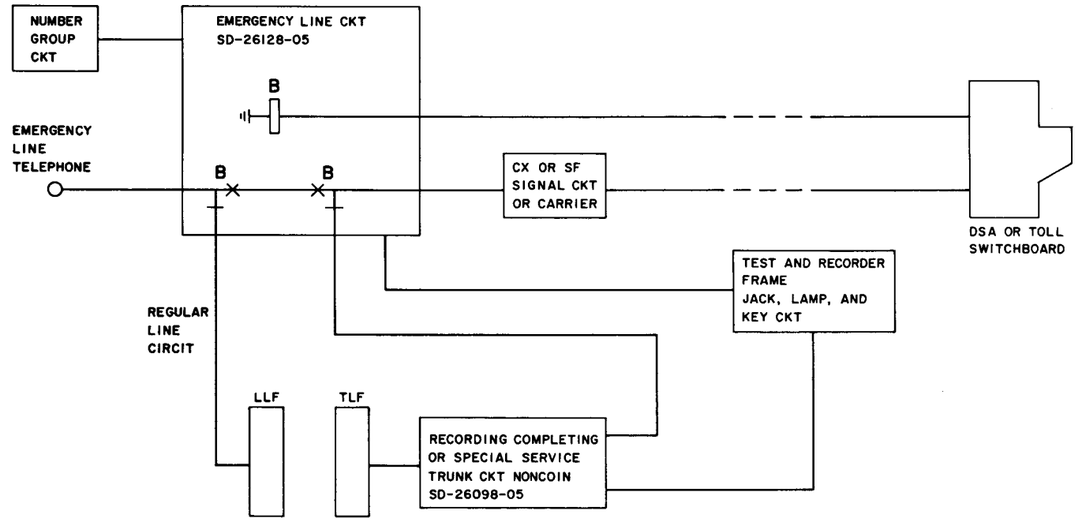
OPERATOR OPERATION

THIS CIRCUIT IS USED IN CONJUNCTION WITH TWO 2-WAY OPERATOR OFFICE TRUNK CIRCUITS TO SEND AN ALARM SIGNAL TO THE ATTENDANT WHEN CERTAIN ALARM CONDITIONS OCCUR IN AN UNATTENDED OFFICE. THIS CIRCUIT PROVIDES FOR THE DETECTION AND CLASSIFICATION OF THE ALARM CONDITIONS AND THE TRUNK CIRCUITS PROVIDE THE MEANS OF TRANSMITTING THE ALARM SIGNAL TO THE OPERATOR. AN ALARM CHECKING TERMINAL IS PROVIDED AS A PART OF THIS CIRCUIT FOR THE IDENTIFICATION AND CONTROL OF THE ALARMS.

DIALER OPERATION

THIS CIRCUIT USES A DIALER WHICH IS PRESET TO DIAL A PARTICULAR NUMBER, THEREBY TRANSMITTING AN ALARM INDICATION WHEN CERTAIN ALARM CONDITIONS OCCUR IN AN UNATTENDED OFFICE. THE CIRCUIT ALSO PROVIDES FOR DETECTION AND CLASSIFICATION OF THE OFFICE ALARMS WHICH ARE TERMINATED AT A MAINTENANCE FACILITY TELEPHONE. AN ALARM CHECKING TERMINAL IS PROVIDED AS A PART OF THIS CIRCUIT FOR THE IDENTIFICATION AND CONTROL OF THE ALARMS.

**Exhibit 28 — Alarm Sending Connections**




NOTE:
THIS CIRCUIT IS FOR USE WITH A DISTANT DSA OR TOLL SWITCHBOARD WHEN AN EMERGENCY EXISTS IN THE OFFICE OF WHICH THIS CIRCUIT IS A PART. THE OPERATION OF A KEY IN THE DISTANT OFFICE TRANSFERS CERTAIN LINES, WHICH ARE TO BE GIVEN SERVICE DURING AN EMERGENCY, FROM THE LINE LINK TO THIS CIRCUIT. CALLS MAY BE COMPLETED IN EITHER DIRECTION BETWEEN THE CUSTOMER AND THE SWITCHBOARD. THIS SERVICE IS INDEPENDENT OF THE NORMAL CENTRAL OFFICE EQUIPMENT WITH THE EXCEPTION OF THE CENTRAL OFFICE BATTERY AND RINGING SUPPLY.

**Exhibit 29 — Emergency Line Connections**