

**SWITCHED SERVICES NETWORKS
USING CENTRAL OFFICE SWITCHING MACHINES
DESCRIPTION OF
GENERAL ELECTRIC NETWORK**

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1. GENERAL

1.01 This section describes the General Electric Switched Services Network and covers only the particular features and requirements of this network. A general description of switched services networks and a glossary of definitions are contained in Section 310-200-100.

1.02 The G.E. SSN is designed to meet the message transmission requirements of the General Electric Company. It will also handle data at speeds up to 1200 bits per second.

1.03 Circuit order and routine test requirements for all networks are covered in Section 310-200-300. Special requirements applicable to the G.E. SSN are covered in Section 310-204-300. Testing methods are covered in

Section 310-200-500 and associated sections. Requirements and testing methods for PBX facilities are covered in other sections.

2. SERVICE FEATURES

2.01 All the standard service features available in the message network are provided in the G.E. SSN. Special features such as 4-wire station-to-station switching, priority, special grade trunking and downgrade are not furnished.

2.02 The network is designed to provide voice communication and data transmission at speeds up to 1200 bits per second. The design is based on use of the 202A Data Set with built-in equalizer strapped in.

3. OVER-ALL SYSTEM CONCEPT

A. Type of Network

3.01 The General Electric Network is a hierarchy network. Access to the network for all tributary and satellite PBXs in a major population area is provided through one or more main (serving) PBXs. The main PBX may be manual or dial.

3.02 All traffic to the network is routed through a main PBX on access lines to a switching center by dialing of an exit code such as the digit "8".

3.03 Station user dialing through the operator's position is provided at some PBX locations to permit the operator to record traffic information for the customer's use.

B. Numbering Plan

3.04 The General Electric Network is, for the most part, a dial network with a 7-digit numbering plan. Wherever equipment arrange-

SECTION 310-204-100

ments permit, there is extension-to-extension dialing. Network numbers consist of an NNX code plus 4 digits. These numbers are assigned to various locations as follows:

(a) ***SxS Dial PBXs, No. 5 Centrex, and 757 PBX locations***

Each extension or station is assigned a 7-digit network number.

(b) ***Manual and 756-type PBXs***

Each location at which access lines terminate is assigned a 7-digit network number.

(c) ***Station key locations and 755-type PBXs***

Each location at which access lines terminate is assigned a 7-digit network number.

3.05 Arbitrary digits are assigned to numbers at dial PBXs having 2- and 3-digit extensions so that the extension has a 7-digit network address. Thus, all dialable stations connected to the network are assigned two numbers — a network number and the regular number used for other than network service. In a very few cases these numbers may be the same. Digits are either deleted at the No. 5 switching center or used or absorbed at the PBX. PBX extensions by class (i.e., nonrestricted, semirestricted, and fully restricted) are given outgoing and incoming network access in accordance with local tariff arrangements.

3.06 Arrangements are provided at each dial PBX so that the same quantity of digits can be pulsed forward from the No. 5 switching center to reach all extensions at the PBX. These include the absorption of one digit or the use of one digit in switching so that 4 digits are pulsed to a PBX having both 3- and 4-digit extensions. Also, if tandem arrangements are used to reach a satellite location, arrangements are provided to permit pulsing the same quantity of digits from the No. 5 office to reach both main and satellite extensions. In general, a minimum number of digits will be pulsed from the No. 5 switching center. It will be as few as 2 or as many as 5 to regular dial PBXs and 7 to No. 5 CENTREX PBXs.

3.07 In order to permit flexibility in switching at the No. 5 switching center and allow for growth in number assignments, the incom-

ing network selectors are of the digit absorbing type at all SxS PBXs having 3-digit extension numbers.

C. Method of Operation

3.08 Outgoing calls to the network are handled in the following manner:

(a) ***SxS Dial PBXs*** at which access lines are terminated have access to the network as follows:

- (1) User picks up handset and receives dial tone from serving PBX.
- (2) User dials "8" and receives second dial tone from the No. 5 switching center. (*Note:* At some smaller attended dial PBXs the customer may want to gather network usage information by extension number. In this case, the call is routed to the attendant via an attendant trunk. The attendant will record the information and complete the connection to the network access line.)
- (3) User dials 7-digit network number.

Satellites or small main PBXs may gain access to the network by tandeming through a main PBX via a connecting tie trunk. In this case a 2-digit access code is required, generally "18".

Where the traffic warrants, satellites may be given access lines direct to the switching center with dial "8" access.

(b) ***Manual PBXs***

Extension users place network calls via the attendant. Access to the network is provided by connection to the associated jack or key in the switchboard. Dial tone is received from the switching center and the attendant either dials the destination number or lets the extension user dial the number. Specific arrangements are required for each condition and are shown in Fig(s). 1 through 9.

(c) ***756 PBXs***

Access lines are terminated on central office trunk circuits. Extension users place network calls through the attendant. Access to network lines is provided by connection to the associated jack or key in the switchboard. Dial tone is received from the switching center and the attendant dials the destination number.

(d) 757 PBXs

Access lines are terminated in the machine. Extension users place network calls by dialing "8", dial tone is received from the No. 5 switching center and the user dials the network number.

(e) No. 5 CENTREX

Access lines to the No. 5 switching center are 2-way MF trunks. The extension user dials "8", second dial tone is received from the serving CENTREX, and the user dials the 7-digit network number.

(f) Miscellaneous Station Key Locations and 755-type PBXs

Access lines are terminated on buttons or keys of the station equipment. The station user operates the associated key or button, dial tone is received from the switching center and the user dials the network number.

3.09 Incoming calls from the network are handled in the following manner in that portion of the dialing train accessible to the network. The local train may be arranged differently for intra-PBX dialing:

(a) Incoming to SxS type Dial PBXs

Incoming calls are completed directly to the extension number.

(b) Incoming to 756 PBXs

Incoming calls are handled by the attendant similar to foreign exchange line calls. The attendant completes the call to the extension.

(c) Incoming to Manual PBXs

Incoming calls are handled by the attendant and completed to the desired extension.

(d) Incoming to Miscellaneous Station Key Locations and 755-type PBXs

Incoming calls complete directly to the station and are answered by the station user.

3.10 Most of the PBXs are capable of Universal Service. This means that an incoming call from the network may be switched to the message network through a C.O. trunk by the PBX attendant. Incoming calls from the local office may also be connected to the SSN by the attendant. In some cases, supervision may be

complete on these calls. Transmission is not guaranteed on this type of service, because it is impossible to control the number of facilities connected in tandem.

4. CENTRAL OFFICE SWITCHING MACHINES

4.01 The G.E. SSN makes use of three class SS-2 central offices and 12 class SS-3 offices arranged in a hierarchy plan as described in Section 310-200-100.

4.02 The class SS-2 offices and one class SS-3 office are 4-wire No. 5 crossbar machines. 19A testboards are provided for transmission testing.

4.03 The remaining class SS-3 offices are 2-wire No. 5 crossbar machines. 17E testboards are provided for transmission testing.

4.04 The 4-wire offices are 600 ohms nominal impedance. The 2-wire offices are 900 ohms nominal impedance. All offices are designed as -2 TLP.

4.05 The 2-wire offices must meet strict transmission balance requirements if the network is to provide a high quality of transmission. Balance testing methods are provided in Section 310-200-550.

4.06 A typical arrangement of a 4-wire No. 5 crossbar office is shown in Fig. 1. A typical arrangement of a 2-wire No. 5 crossbar office is shown in Fig. 2.

5. PBX COMPLEX ARRANGEMENTS**A. General**

5.01 A PBX complex (or individual PBXs) may home on either a 2-wire or a 4-wire switching center. Typical arrangements are shown in Fig. 3.

5.02 A No. 5 CENTREX may be employed as a main PBX. A typical arrangement of such an office is shown in Fig. 4.

5.03 A dial PBX may be arranged in a number of ways. It may serve as a main PBX and also as a tandem switching point for tribu-

tary or satellite PBXs. Such an arrangement is shown in Fig. 5A. A dial PBX may also serve as a main or tributary PBX without satellites, as shown in Fig. 5B. When the customer desires attendant recording, this feature may be provided with an arrangement similar to the one shown in Fig. 5C.

5.04 A manual PBX may serve as a main, tributary or satellite PBX. The various methods of interconnection are shown in Fig. 6.

5.05 A manual satellite PBX may home on either a manual or dial main PBX. The arrangement is shown in Fig. 7.

5.06 A dial PBX may also be operated as a satellite PBX. A typical arrangement is shown in Fig. 8. Incoming calls are tandemed through the serving main PBX, but outgoing calls may be either tandem or direct.

5.07 Network connections to miscellaneous stations not part of a PBX complex may be arranged as shown in Fig. 9.

B. PBX Features

5.08 PBX attendant features for outgoing calls from PBXs are:

(a) From Dial PBXs

If access lines do not exceed 18 in number, all access lines are terminated in the switchboard multiple. In other cases, 18 of the access lines will be terminated in the switchboard. These are usually terminated in universal jacks and jacks assigned horizontally. This provides outgoing access for attendant-handled assistance calls.

At CENTREX locations with console operation, special arrangements are provided for attendant access and are governed by local requirements.

(b) From Manual PBXs

Access lines are terminated in the switchboard multiple and the attendant has direct access.

5.09 Features for incoming calls at attended dial PBXs are as follows:

(a) To SxS Dial PBXs

Attendant access trunks (digit absorbing-type SD-65793 or equivalent) are provided off the "0" level of the incoming selectors and terminated at the attendant position. (Switchboard must be within the limited loop range of SD-65793.)

(b) To 756 Crossbar and Manual PBXs

Access lines are terminated at the attendant position. Attendant is reached by dialing the network number for the PBX.

(c) To No. 5 Crossbar CENTREX and 757 Crossbar PBXs

Extension numbers assigned to the attendant are routed to the attendant position with a network indication.

5.10 Extension numbers are generally assigned to the attendant at dial PBXs in accordance with the following:

| | |
|-------------|------|
| 4-digit PBX | 0111 |
| 3-digit PBX | X011 |
| 2-digit PBX | XX01 |

These extension numbers are preceded with the network NNX code for network dialing.

5.11 At attended PBX locations the customer may complete incoming network calls to the local exchange area through the attendant. At these locations, a few (1 to 3) low loss (0 to 3 db) central office trunks may be provided from the PBX to the serving central office for the completion of these calls. Transmission on these calls is not guaranteed.

5.12 Conference arrangements are provided, as required, to meet the customer's requirements at each PBX location. Transmission on conference calls depends on local arrangements and is not guaranteed on the network.

5.13 Conferencing of extensions at the originating PBX is handled through the serving attendant. Conferencing of extensions at the destination point is handled through the serving attendant at the destination location.

6. SWITCHBOARDS

6.01 Switchboards are not provided in any of the C.O. switching machines. Dial Service Assistance is provided only by PBX attendants.

7. STATION EQUIPMENT

7.01 The basic types of station equipment found at dial and manual PBXs are used in the G.E. network. Rotary dial equipment is required to operate at a speed of 10 pps. TOUCH-TONE sets will not be employed until such time as the PBXs can be arranged for TOUCH-TONE operation. Stations served directly from No. 5 switching centers can be TOUCH-TONE if the office is equipped for it.

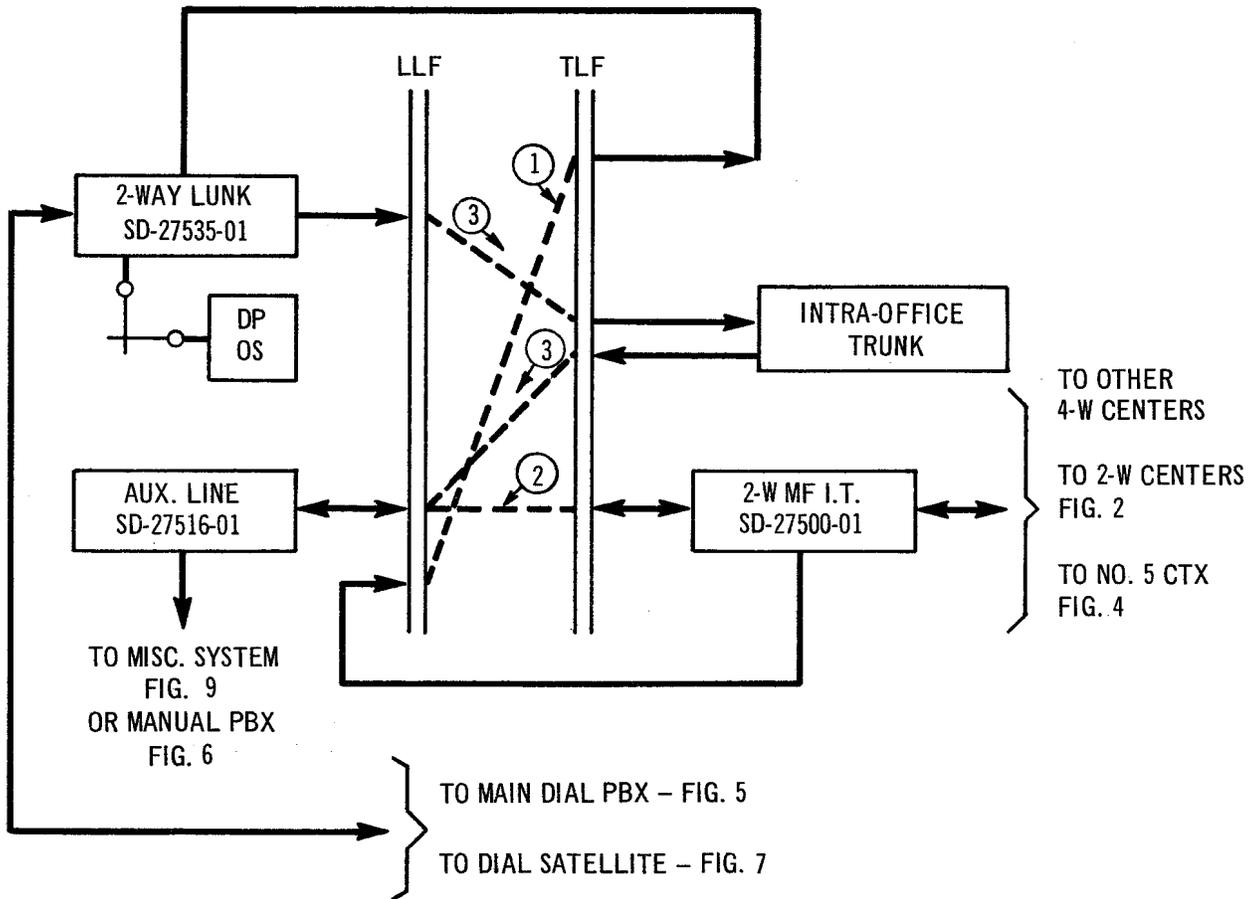
7.02 Data sets are provided for operation at speeds up to 1200 bits per second. It will be necessary to equalize line and trunk facilities in some cases, to meet these transmission requirements.

8. MAINTENANCE FACILITIES

8.01 19A testboards are provided at 4-wire No. 5 crossbar offices. Master test frames and portable test sets are provided, as necessary, to meet transmission testing requirements. Dial test lines are provided for circuit order and routine testing.

8.02 17E testboards are provided at 2-wire No. 5 crossbar offices. Master test frames and portable test sets are also provided in these offices. Dial test lines are also installed.

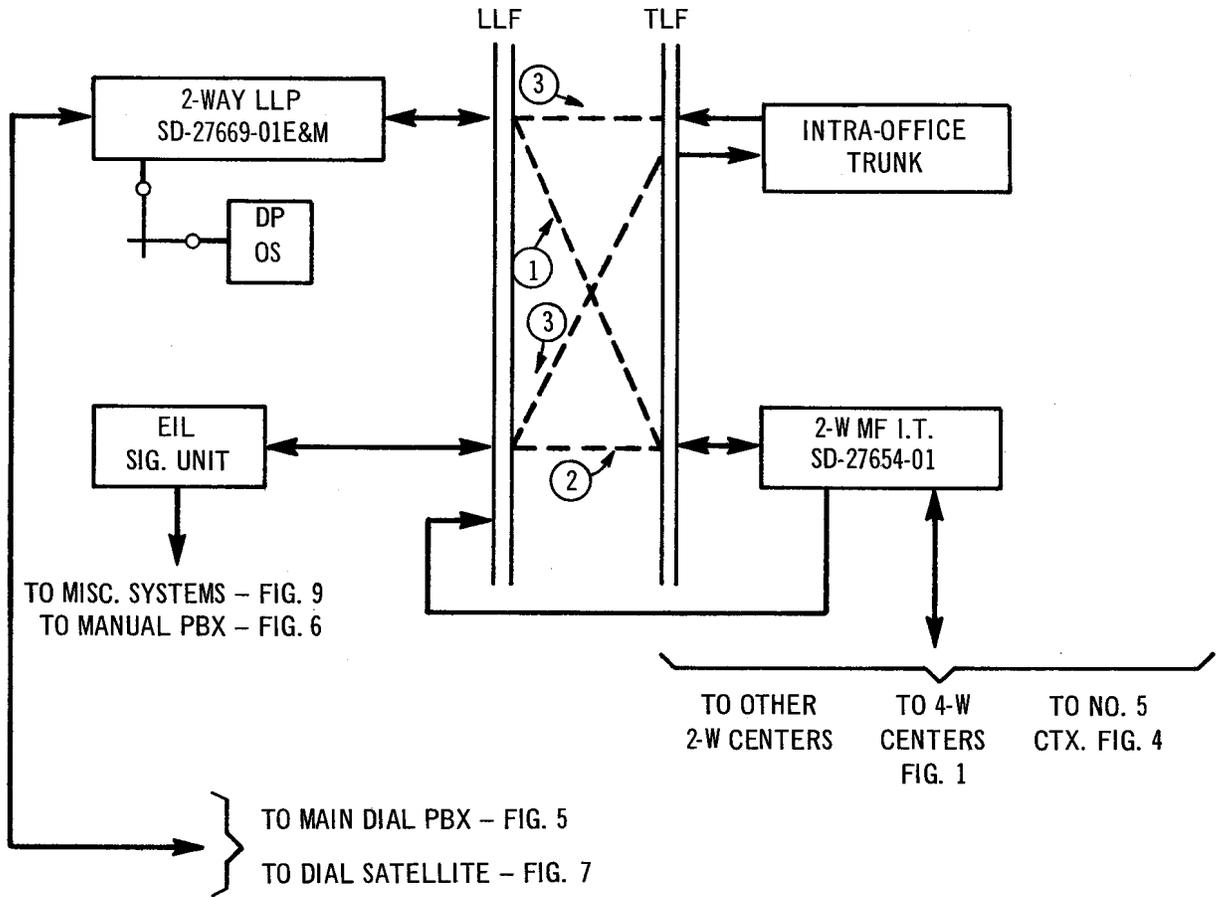
8.03 Dial PBXs may be equipped with dial test lines. These consist of a milliwatt, loop-around and balance combination and a jack-ended test trunk. Numbers are assigned to the test lines, as necessary, to provide for their use. The test lines are usually installed at all main PBXs. They may also be installed at tributary and satellite PBXs where the location and number of circuits warrant their use.



NOTES:

1. NETWORK CALL TO DIAL PBX WITH LUNK OPERATION.
2. NETWORK CALL TO OR FROM STATION KEY LOCATION OR MANUAL PBX.
3. ORIGINATING CALL FROM PBX TO KEY LOCATION OR MANUAL PBX.

Fig. 1 - A Typical Arrangement of a 4-Wire No. 5 Crossbar Office



NOTES:

1. NETWORK CALL TO DIAL PBX WITH LLP OPERATION
2. NETWORK CALL TO OR FROM KEY LOCATION OR MANUAL PBX.
3. CALL FROM KEY LOCATION OR MANUAL PBX TO DIAL PBX OR CONCENTRATOR.

Fig. 2 - A Typical Arrangement of a 2-Wire No. 5 Crossbar Office

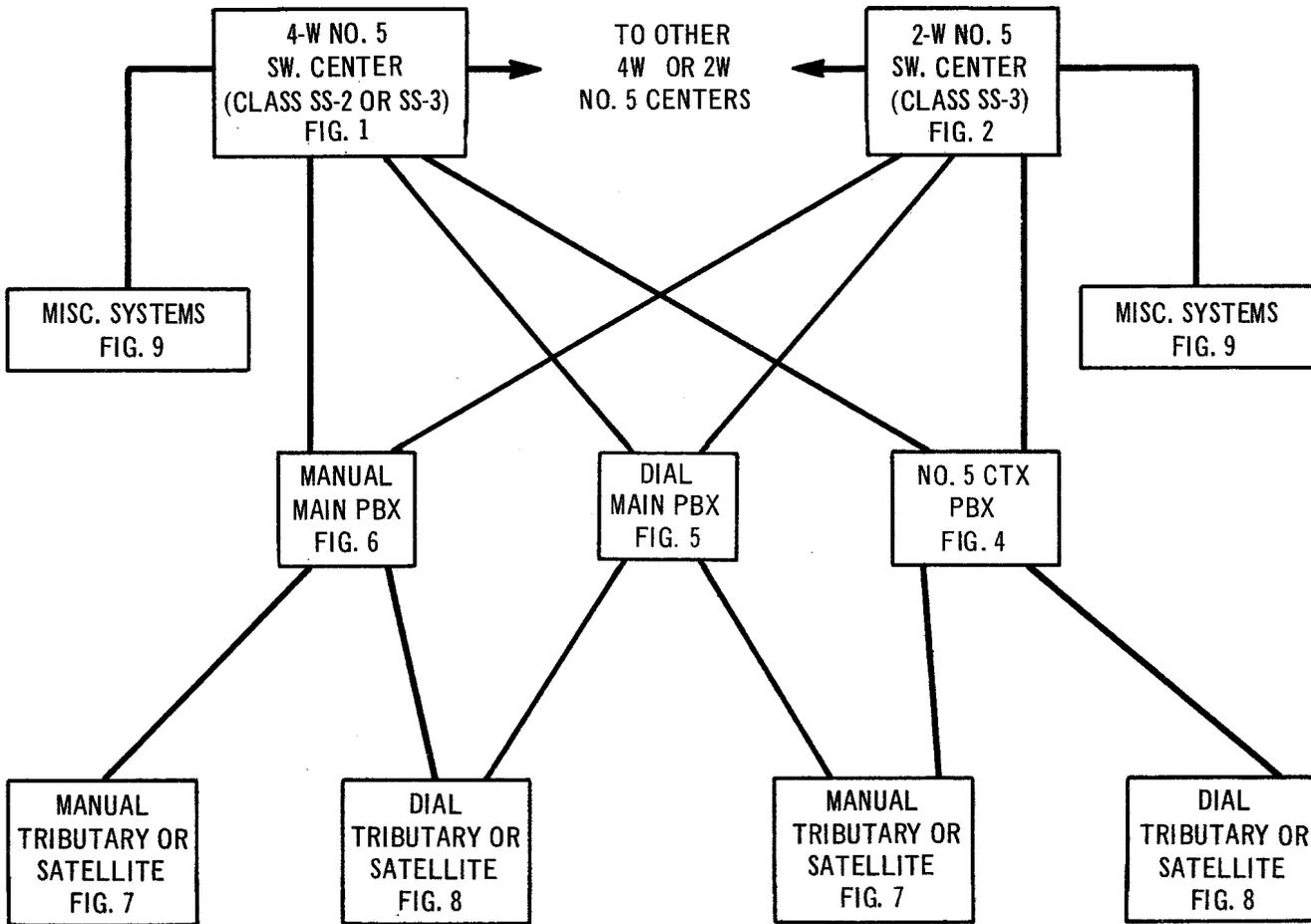


Fig. 3 - Typical Arrangements of PBX Complexes Homed on 2-Wire or 4-Wire Switching Centers

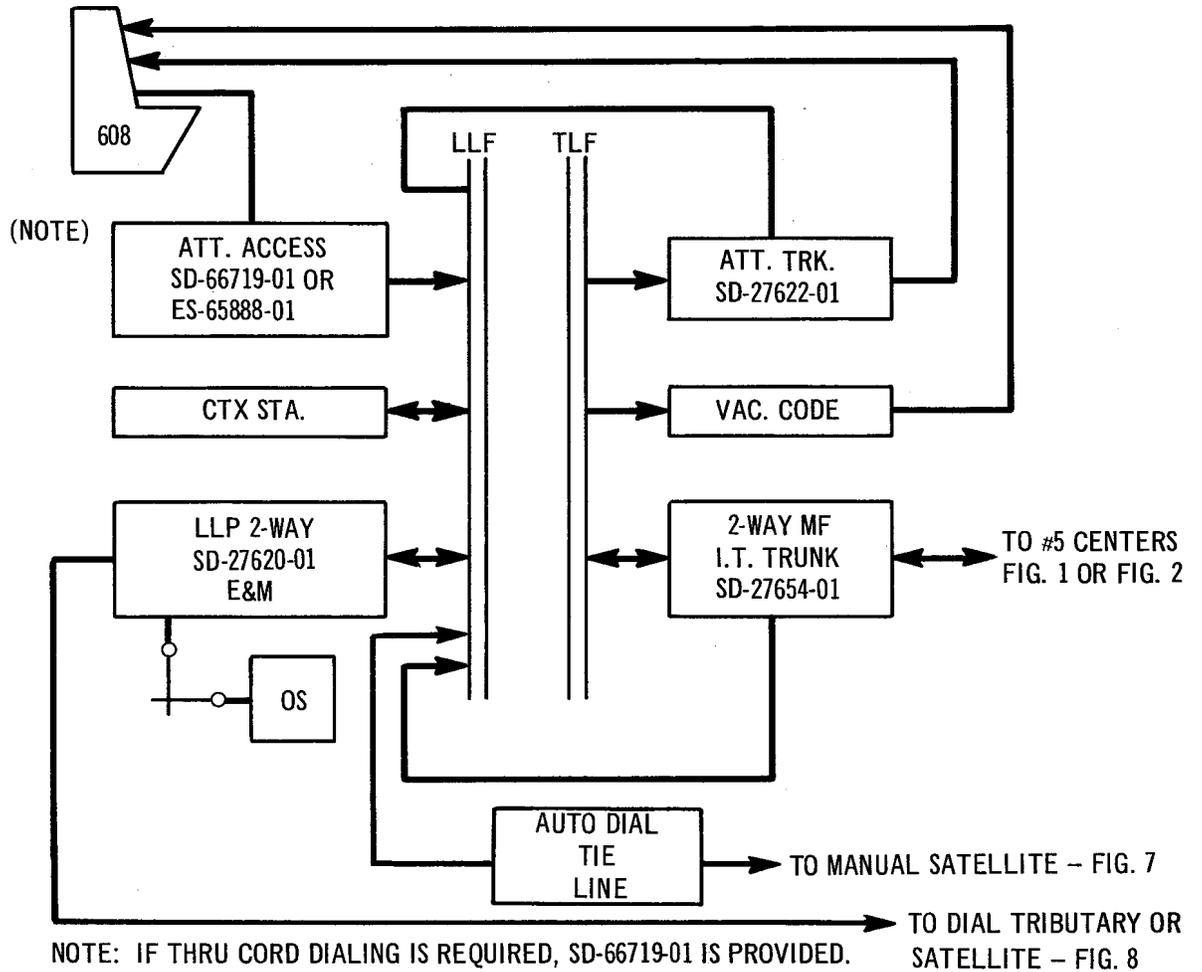
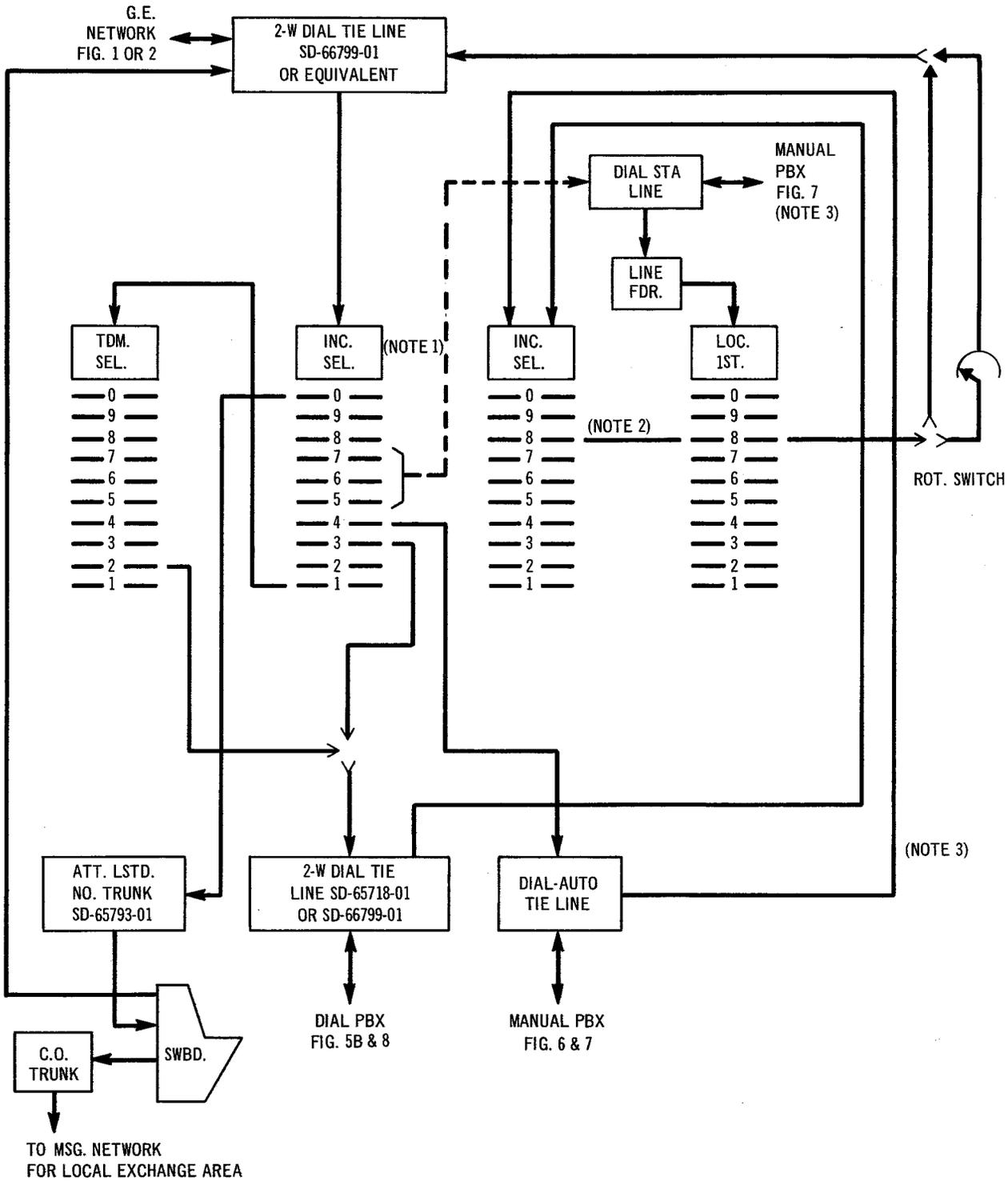


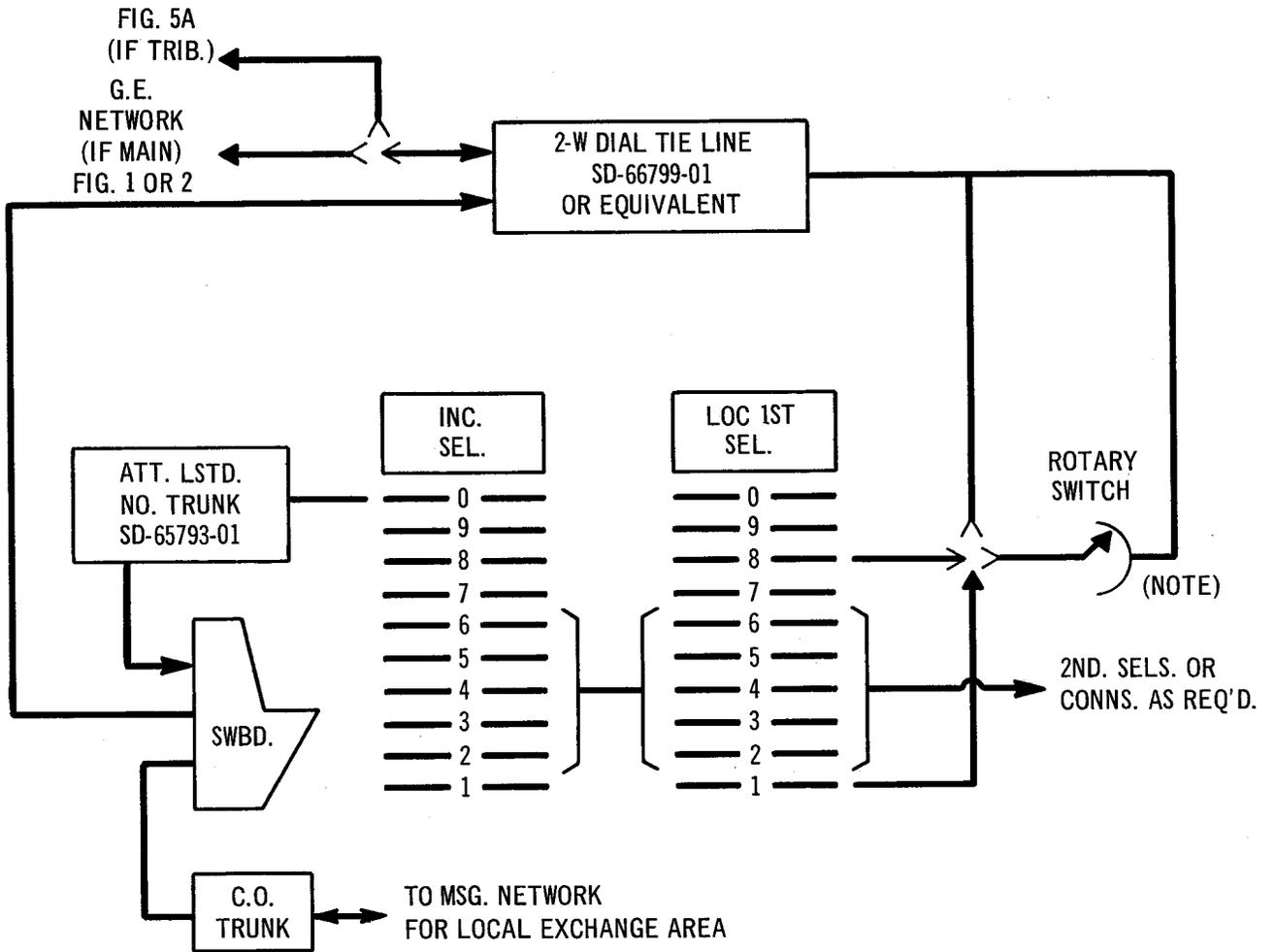
Fig. 4 - A Typical Arrangement of a No. 5 CENTREX as a Main PBX



NOTES:

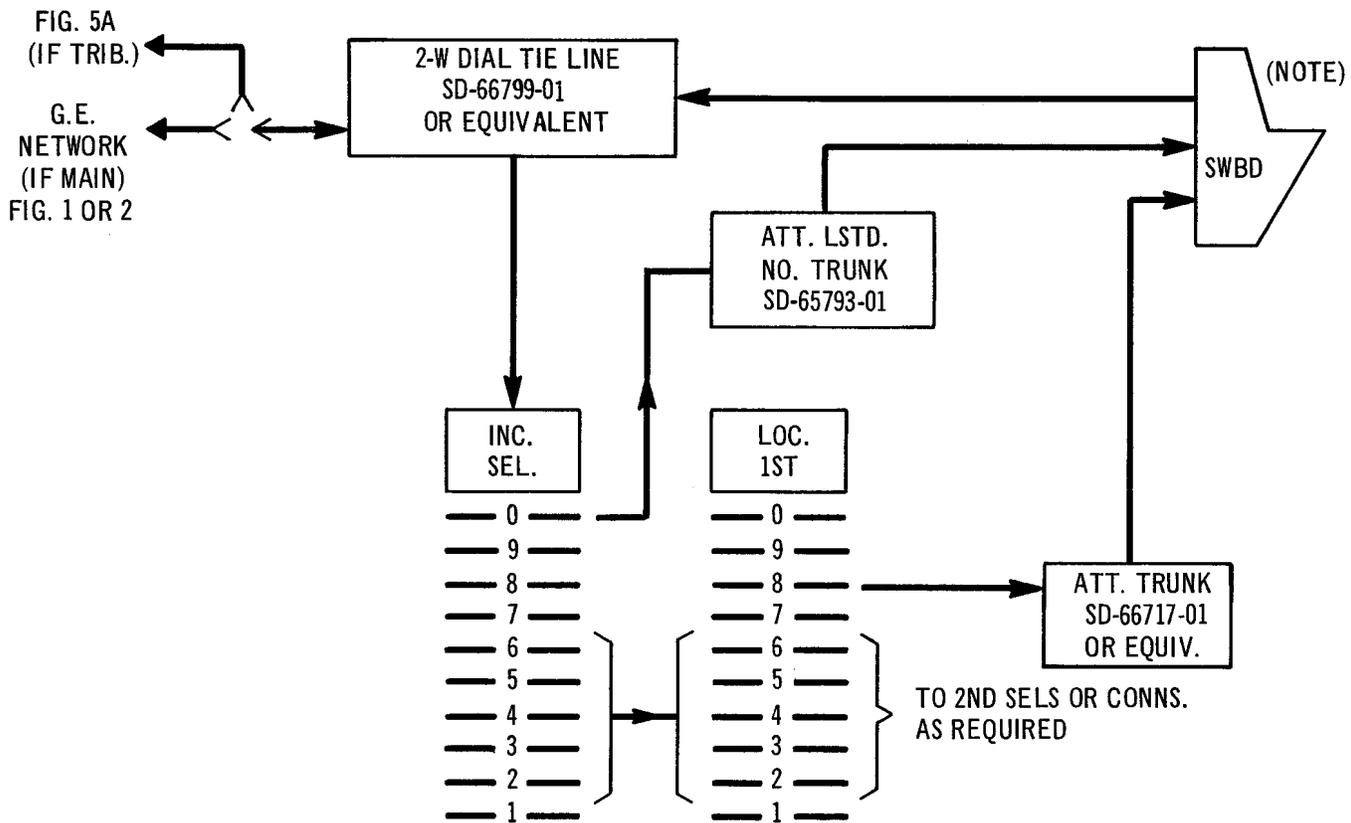
1. FOUR WIRE BANKS PROVIDED FOR PAD CONTROL WHEN REQUIRED.
2. ACCESS TO NETWORK BY DIALING 18 FROM REMOTE DIAL PBX AND 8 FROM MANUAL.
3. EITHER A 2-WAY TIE LINE OR OFF PREMISE EXTENSION MIGHT BE USED.

Fig. 5A – A Typical Arrangement of a Main Dial PBX Used as a Distributing Point



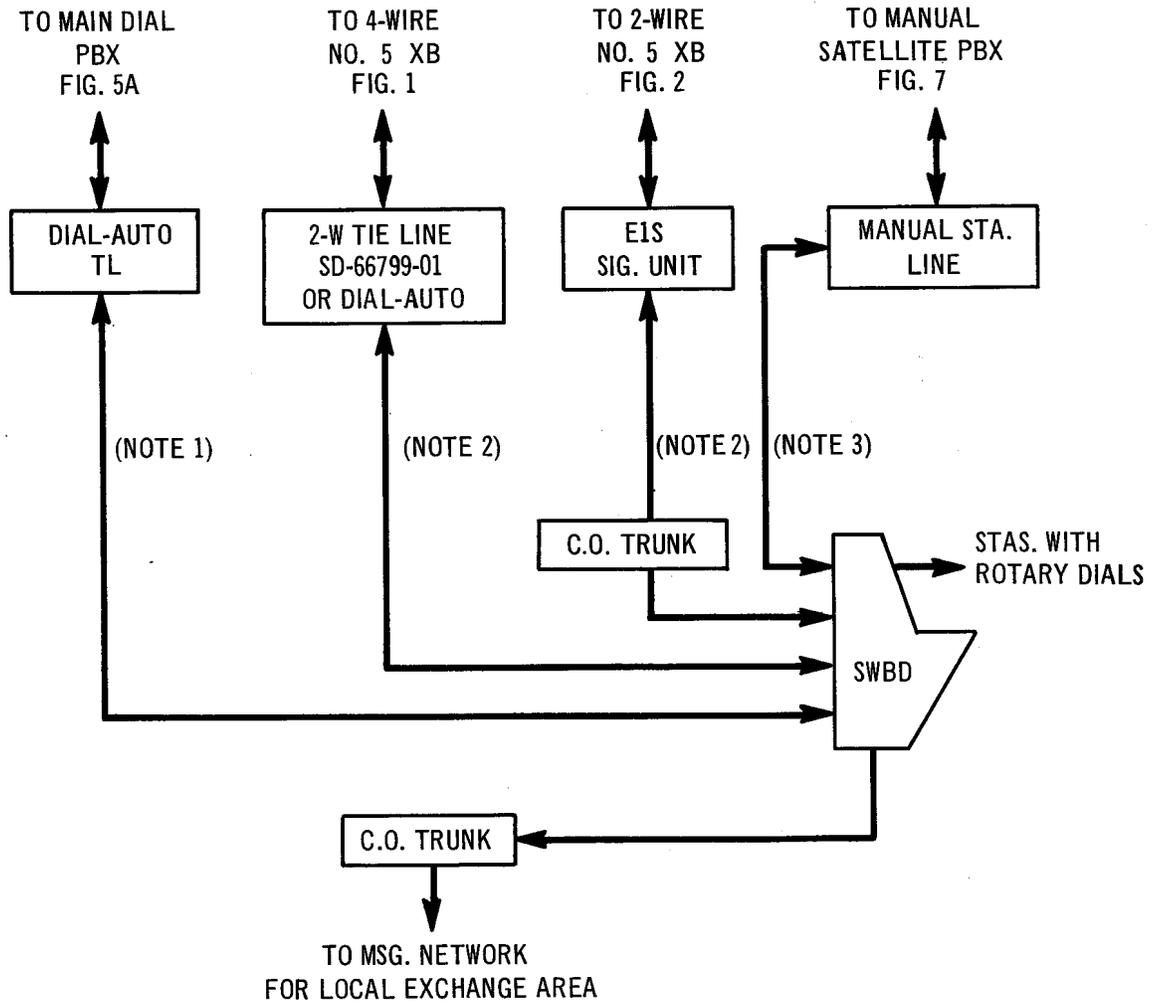
NOTE: ACCESS CODE 8 IF TRUNKING IS DIRECT TO THE NETWORK AND 18 IF VIA TANDEM. (SEE FIG. 5A)

Fig. 5B - A Typical Arrangement of a Dial PBX as a Main or Tributary PBX



NOTE: PBX ATTENDANT RECORDS CALL DATA REQUIRED AND COMPLETES THE CONNECTION TO AN IDLE ACCESS LINE. EXTENSION USER THEN DIALS THE DESIRED NETWORK NUMBER.

Fig. 5C – A Typical Arrangement of a Dial PBX as a Main or Tributary PBX With Attendant Recording



NOTES:

1. THIS ARRANGEMENT IS USED AT MANUAL TRIBUTARIES.
2. THIS ARRANGEMENT IS USED AT MAIN PBXS.
3. THIS ARRANGEMENT IS USED AT MAIN AND TRIBUTARY PBXS.

Fig. 6 – Methods of Interconnection at Manual PBXs

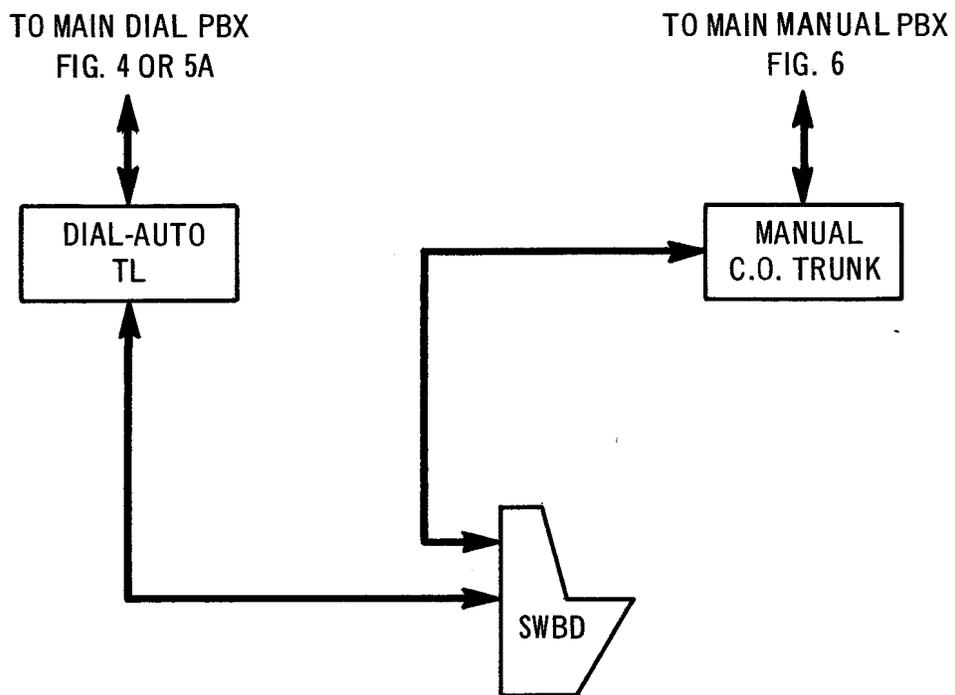
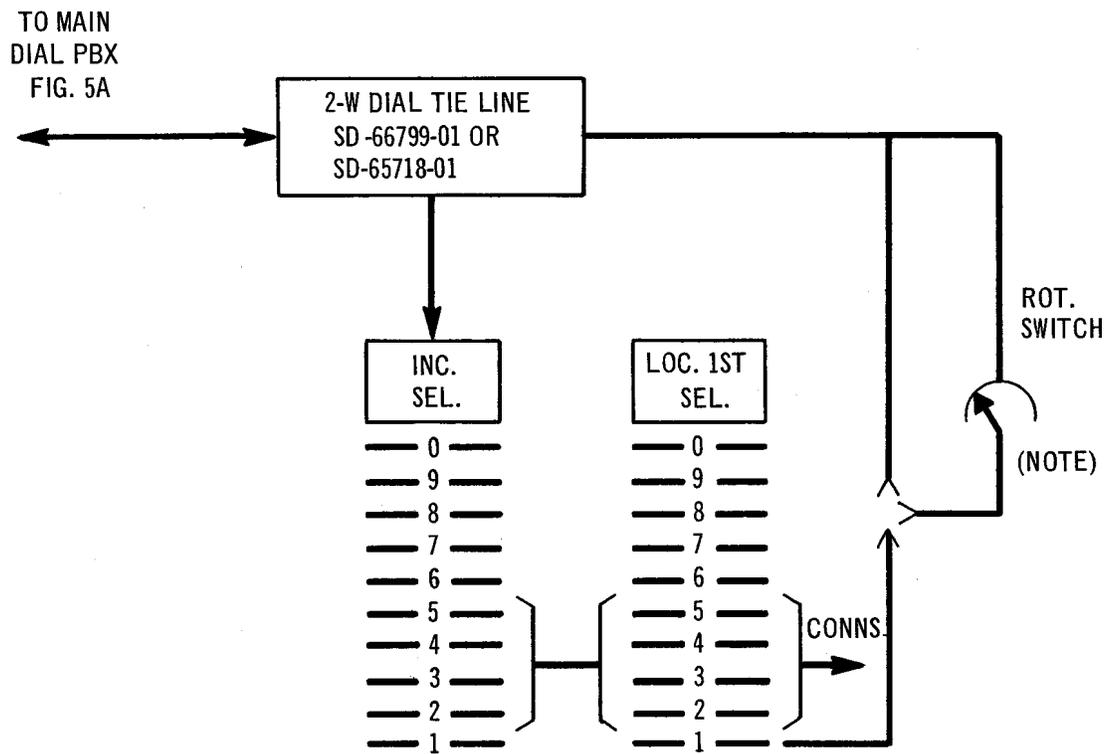
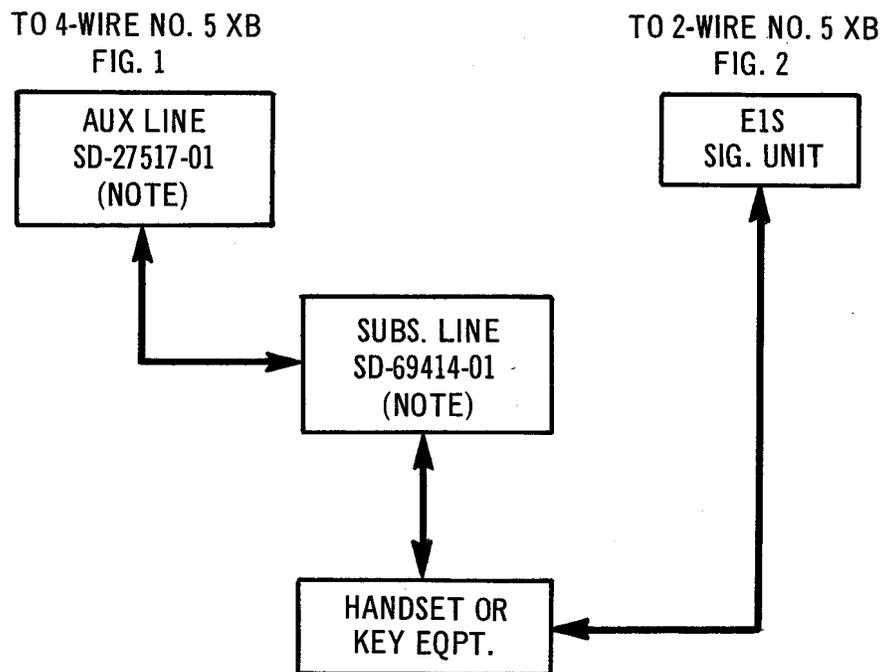


Fig. 7 – A Typical Arrangement of a Manual Satellite PBX



NOTE: ACCESS TO THE NETWORK BY DIALING 18 (SEE FIG. 5A)

Fig. 8 - A Typical Arrangement of a Dial Tributary or Satellite PBX



NOTE: COMBINED IN LATER VERSIONS SUCH AS SD-69482-01 AND SD-69488-01

Fig. 9 – Arrangements for Network Connection of Miscellaneous Stations