

CENTREX SERVICE
STEP-BY-STEP CENTREX
USING
CORD SWITCHBOARDS WITH NORMAL CORD
OPERATION AS THE ATTENDANT FACILITIES

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CENTREX SERVICE

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GENERAL

Centrex service for step-by-step P.B.X.'s where cord switchboards with normal card operation are provided for the attendant facilities can be implemented with standard arrangements now available. These arrangements permit direct inward dialing (DID) to the stations of the Centrex by trunking through a crossbar tandem, a No. 5 crossbar office equipped with tandem features, or from the selector levels in step-by-step central offices. It is also possible to route all outgoing traffic from the Centrex directly through a crossbar tandem rather than the local central office.

Several new circuits are now available which permit the provision of Centrex service at a step-by-step P.B.X. where cord switchboards with normal cord operation are used at the attendant positions. These new circuits are:

- a. In-dialing trunks arranged for transfer.
- b. Transfer trunk finder.
- c. Attendant transfer trunk.
- d. Outgoing trunk to crossbar tandem.
- e. Listed number trunks.

These circuits and the various Centrex arrangements described in the following sections have been designed for use with 700C, 701A, 701B and 702A type P.B.X.'s using 552, 605, 607 and 608 cord switchboards as attendant facilities. Figure 1 is a traffic schematic of the overall plan.

CENTREX ARRANGEMENTS

DID Arrangements

A one-way incoming trunk group from the tandem or the step-by-step central office must be established to the Centrex for direct inward dialing (DID). Both DID and listed number traffic can be

routed over this trunk group or it can be restricted to DID traffic only.

An incoming switching train must be established at the Centrex. It can be arranged to receive either 3 or 4 digits from the originating office for DID traffic. This can be a separate incoming train consisting of incoming 1st selectors, incoming 2nd selectors (if required), and incoming connectors. The incoming and local connectors can be combined into a common connector group if desirable.

Associated with each incoming 1st selector is a new in-dialing trunk circuit which is arranged to return answer supervision to the originating office on called station answer. The connection will be held under control of the calling party. An option is provided in the trunk for establishing charge or non-charge supervision to permit the use of this trunk for "free service" calls to official Telephone Company Centrex installations.

DID Transfer Arrangements

The in-dialing circuit is also designed to recognize a switchhook flash from the called DID station as a request for transfer and will signal the attendant. Each circuit can be terminated directly on a jack and lamp at the cord switchboard, or all in-dialing circuits can be concentrated and a fewer number of transfer trunks terminated on the switchboard. Figure 2 illustrates the transfer arrangements possible.

A transfer trunk finder is used to concentrate the incoming trunks to reduce the number of transfer trunk terminations at the switchboard. A maximum of 200 incoming trunks can be terminated on the levels of the trunk finder. The number of trunk finders required depends on the estimated volume of transfer traffic. Associated with each trunk finder

is a new attendant transfer trunk which is terminated on a jack and lamp at the switchboard.

The attendant completes the transfer call in the normal manner with the cord pair remaining in the connection for the duration of conversation. Normal supervision will be received on this connection. The attendant will be able to recall a distant operator, if necessary, over this transfer connection by repeatedly removing and re-inserting her cord in the transfer jack. Any additional transfer request received on this connection will be received as a cord supervisory signal.

The initially called station can remain in the connection after the second station has been added. He can disconnect at any time, however, and his line will be free to receive or originate other calls. No indication of his disconnection is received by the attendant when it occurs.

Listed Number Arrangements

This traffic can be routed to the P.B.X. in several ways. These include:

1. Combined with the DID traffic from the originating office and routing to the switchboard from a level of the incoming 1st selector (Figure 3a).
2. A separate trunk group from a crossbar tandem modified for P.B.X. translation (Figure 3b).
3. Retention of the listed number in the local central office with no change in the existing arrangements in effect today (Figure 3c).

In the first category (Fig. 3a), the remaining digits not used for routing at the originating office would be pulsed forward to the P.B.X. The first digit received would select the level of the incoming 1st selector assigned to listed number traffic. The new listed number trunks would be assigned to the terminals of that level. The listed number trunks are arranged to absorb none, one, two or three digits as required before signaling the attendant. Completion of the call is via operator first selectors. Should the calling party disconnect before the attendant has released, the circuit will remain busy to prevent re-seizure. Any possible flash by the attendant toward the listed number trunk will not activate the transfer feature in the in-dialing trunk and bring in a transfer signal to the switchboard.

Another possibility in this first category applies to completion from crossbar tandem only. If the tandem has been modified for P.B.X. translation, the listed number is converted to "0" (the listed number must have zero as the last digit) and the "0" is pulsed forward. This restricts the assignment of the listed number trunks to level 0 of the incoming 1st selectors. All other features are as described above.

For the second category (Fig. 3b), a separate trunk group is used for the listed number traffic at the crossbar tandem. The tandem must have the P.B.X. translation features. It recognizes the call as a listed number call and completes the connection on a straightforward basis directly to the switchboard.

The third condition (Fig. 3c), retaining the listed number in the local central office, is no change from existing arrangements in effect today. These trunks can be used for 2-way operation if desirable.

Outgoing Arrangements

Three outgoing arrangements are possible. They are —

1. Route all outgoing traffic through the local central office as it exists today (Figure 4a).
2. Route all local, service code, and operator traffic through the local central office. Establish a new outgoing trunk group to crossbar tandem for all DDD traffic (Figure 4c).
3. Route all outgoing traffic through a crossbar tandem modified to accept it. A new trunk circuit is now available for this purpose. It is arranged for both selector level and switchboard jack termination (Figure 4b). Joint holding features are available on calls to the DSA or toll operators.

In general, the outgoing arrangements described above will require one-way trunk groups. A two-way group could be provided, however, when the listed number traffic is retained in the local office and all outgoing traffic is routed to the local central office.

Intercepting Arrangements

It is recommended that all calls to vacant numbers in the blocks of numbers assigned to this type of Centrex as well as those to any vacant levels in the in-dialing train be routed to a recorded an-

nouncement on a non-charge basis. This arrangement can be provided with 7A recorded announcement facilities.

Calls to changed numbers may be routed to either the recorded announcement or to the attendant for completion. If these calls are routed to the attendant, answer supervision must be returned to the originating office. It is expected that these would be routed to the recorded announcements as soon as the call volume decreases to an acceptable level.

Night Closing Arrangements

With DID to the stations of a Centrex, there is no longer a requirement for night service connections to selected stations to provide these stations with incoming service. There is however, a requirement on the part of most customers for some night arrangement to provide for the answer of any listed number calls after hours.

The listed number traffic, with this Centrex System, can be extended to special night telephones when the attendant positions are unattended. These night telephones should be terminated on a separate strip of jacks in the board and will be used for

incoming calls only. No switching of the call is contemplated.

Listed number traffic incoming from the local central office (Fig. 3-c) can be extended to the night telephones by patching the regular incoming trunk jacks to the night telephone jacks. The position cords are used and the Night-Thru Dial keys are operated.

When the listed number traffic is routed to the switchboard from a level of the incoming 1st selector (Fig. 3-a) or over a separate trunk group from crossbar tandem (Fig. 3-b) special night jacks must be provided to extend this traffic. The listed number trunk circuit used with these arrangements recognizes a "loop closure" rather than "generator" as a signal to call in the attendant and cannot be patched to the night telephones. An auxiliary line circuit normally used for single digit dialing in Hotel-Motel service for completion from a selector level to a station line must be bridged to each listed number trunk. The auxiliary line circuits would be terminated on night trunk jacks and would be patched to the night telephone jacks with switchboard cords as described above. The auxiliary line circuits would provide ringing current toward the night telephones on incoming calls.

ENGINEERING RECOMMENDATIONS

Engineering recommendations for the Centrex arrangements are covered below for all equipment involved.

Item	Engineering Recommendation
1. Incoming trunk group — DID and/or listed number	Table 20
2. Incoming second selectors (if required)	Table 10
3. Incoming connectors	Table 10
4. Combined local and incoming connectors	Table 10
5. Transfer trunk — terminated directly on switchboard	One jack/trunk
6. Transfer trunk finders	Table 10
7. Transfer Attendant trunk	One/trunk finder
8. Listed number trunks — from incoming selector levels	Table 10
9. Operator dialing selectors (Note)	Table 10
10. Outgoing trunks to crossbar tandem	Table 20
11. Outgoing trunks to the central office	Table 20
12. Local train equipment will be engineered as specified in the T.E.P. for 701 type PBX's.	

Note — Dial completion of incoming attendant traffic is recommended in all Centrex installations. However, station multiple can be retained for those installations already equipped if the conditions warrant this action.

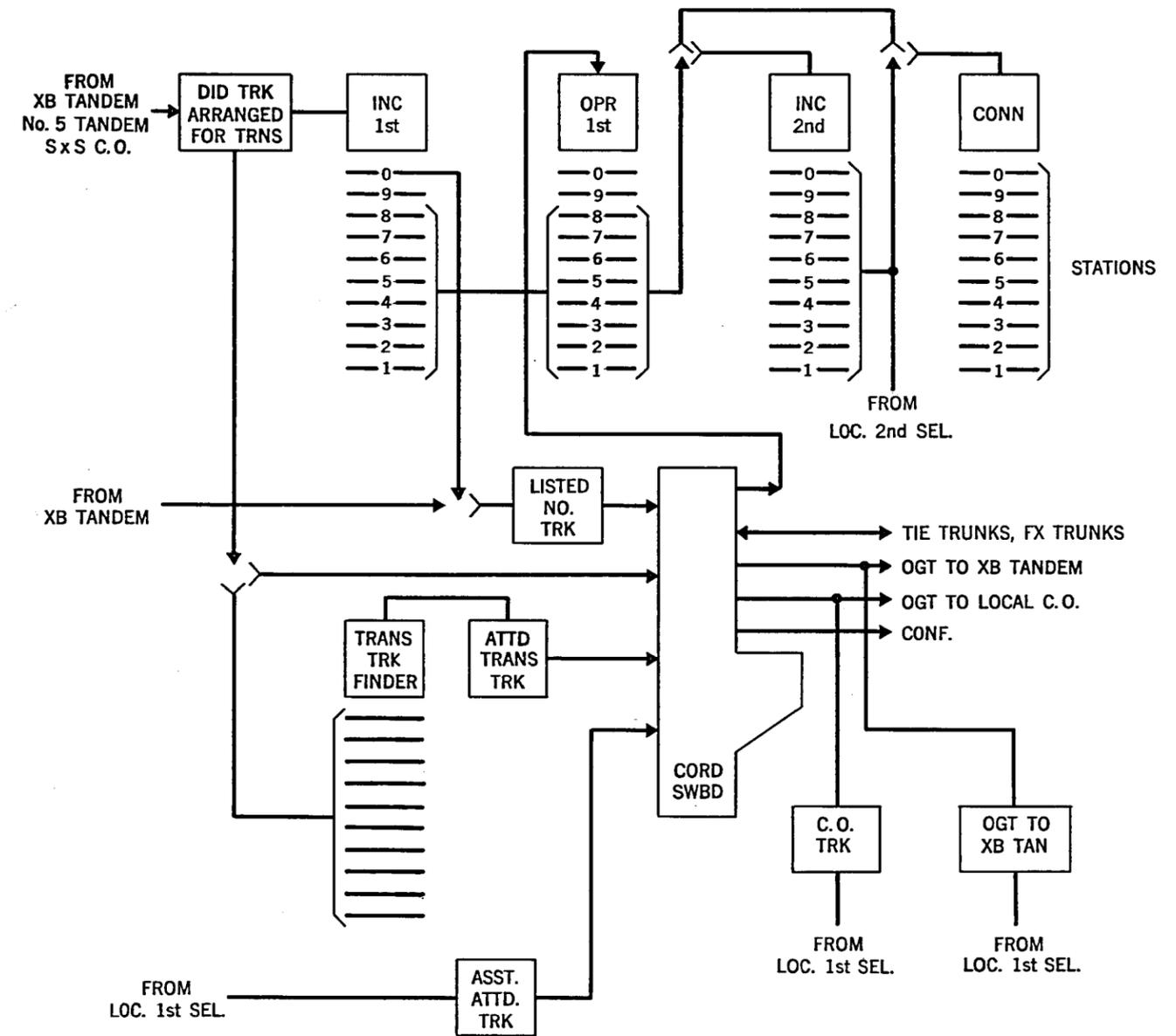
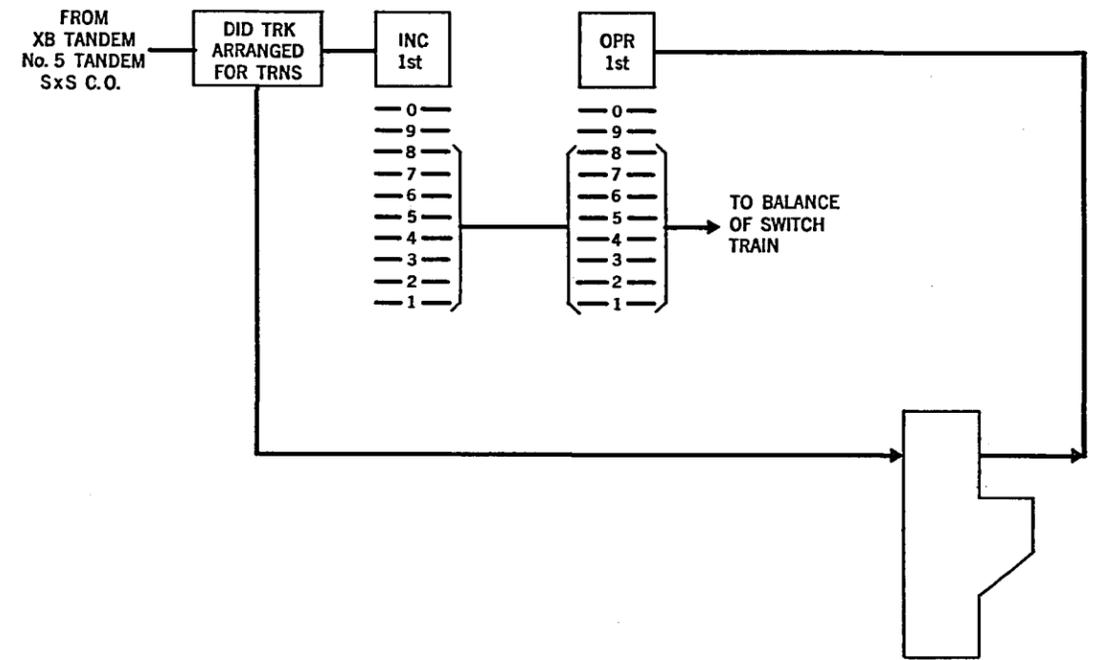


FIG. 1
 STEP - BY - STEP PBX ARRANGED FOR CENTREX SERVICE
 CORD SWITCHBOARD WITH NORMAL CORD OPERATION FOR ATTENDANT POSITION.

A) DIRECT TERMINATION



B) CONCENTRATION

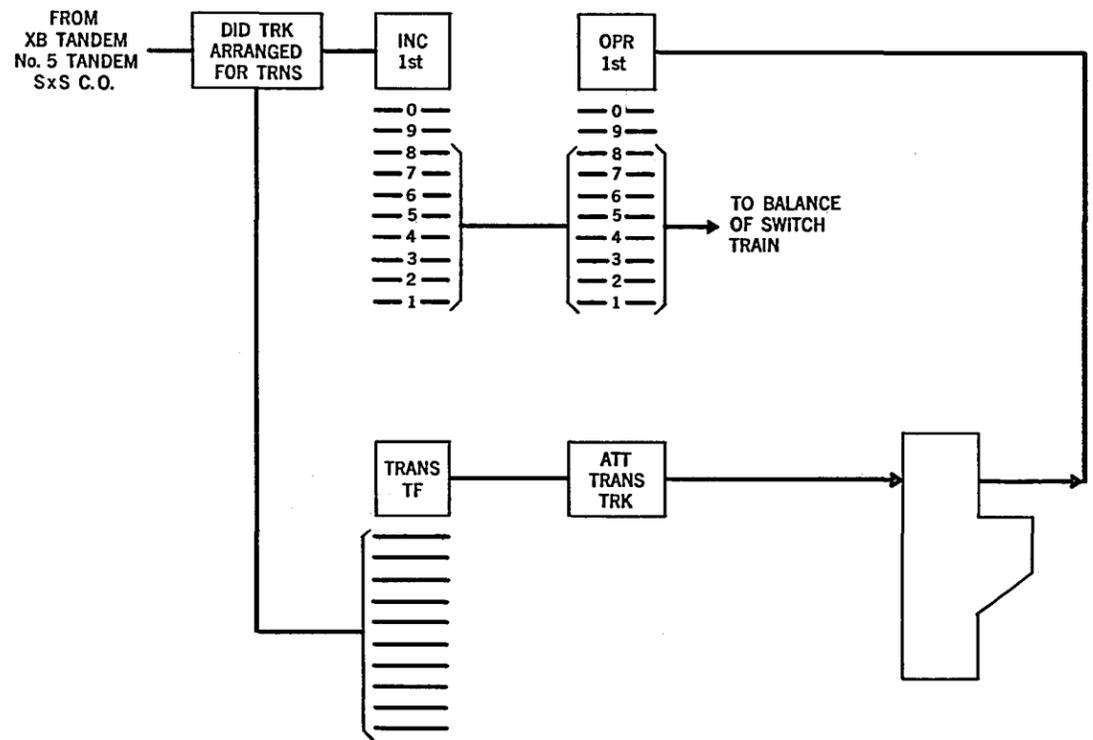
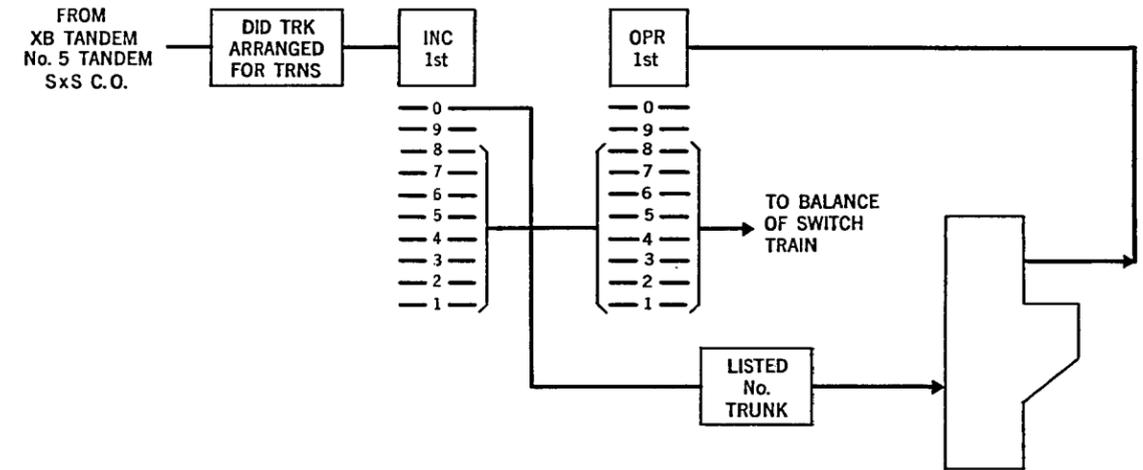
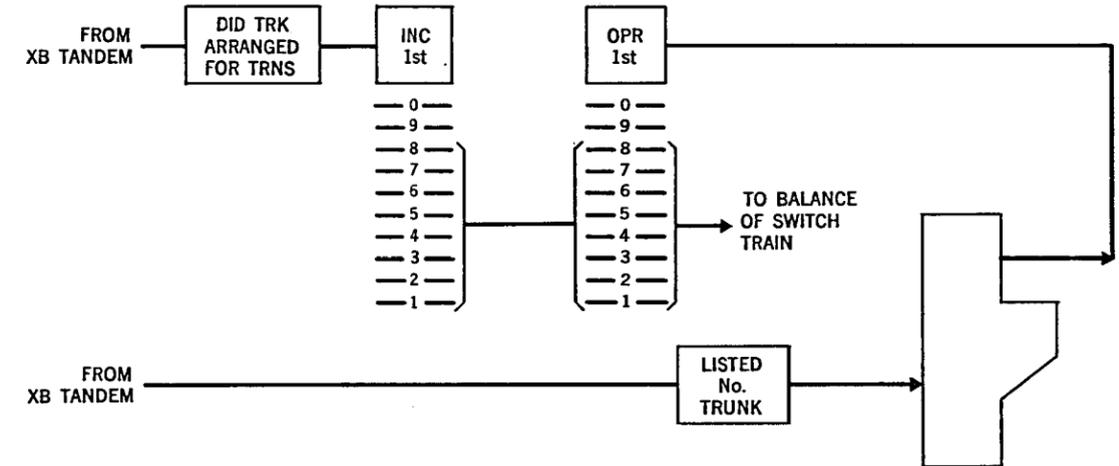


FIG. 2
TRANSFER ARRANGEMENTS

A) COMBINED WITH DID



B) SEPARATE GROUP FROM CROSSBAR TANDEM



C) SEPARATE GROUP FROM LOCAL CENTRAL OFFICE

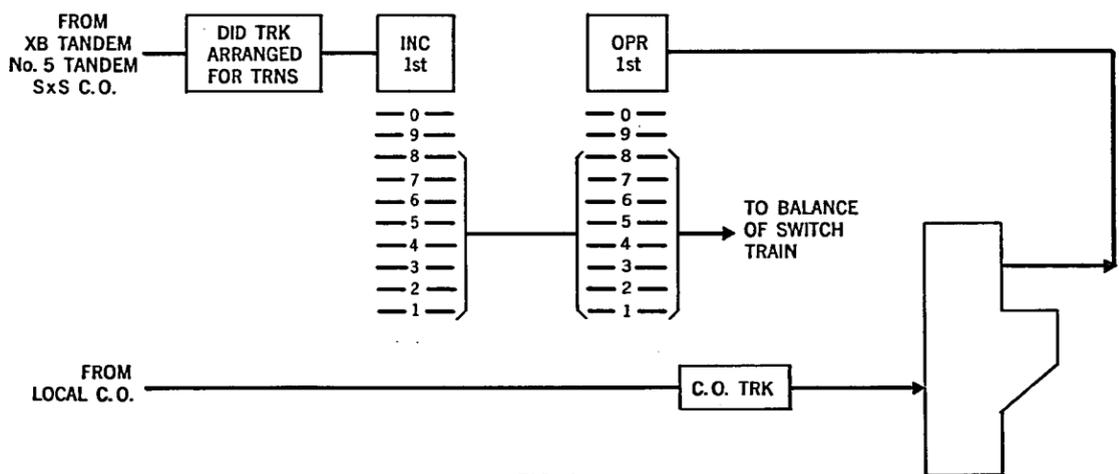
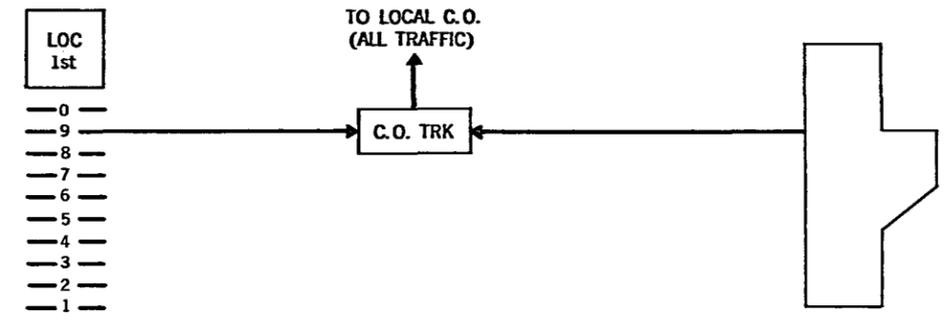
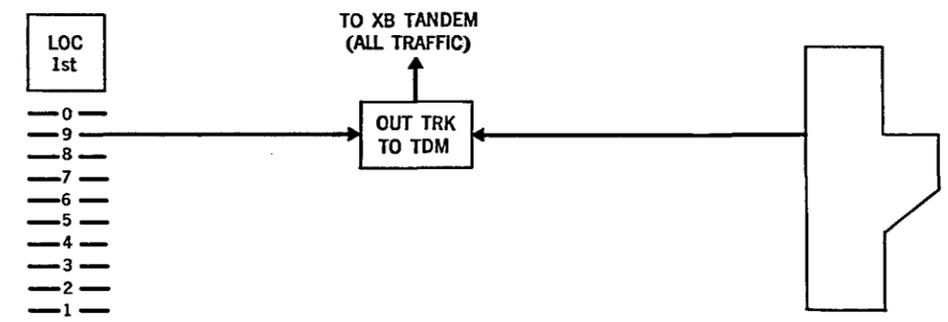


FIG. 3
LISTED NUMBER ARRANGEMENTS

A) ALL TO LOCAL C.O.



B) ALL TO CROSSBAR TANDEM



C) SPLIT

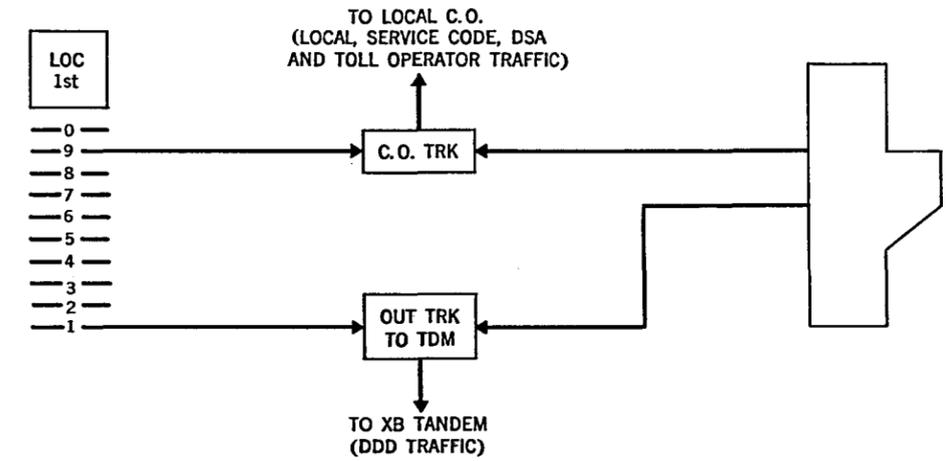


FIG. 4
OUTGOING ARRANGEMENTS