TRANSMISSION CONSIDERATIONS INVOLVED IN ENGINEERING

COMMUNITY DIAL OFFICES AND CENTRAL SWITCHBOARDS

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TRANSMISSION CONSIDERATIONS INVOLVED IN ENGINEERING COMMUNITY DIAL OFFICES AND CENTRAL SWITCHBOARDS

1. Introductory

This Section discusses the transmission considerations involved in engineering dial offices, the A and B boards of which are located in another building. In multi-office exchanges, certain or all of the dial offices, while having the same numbering plan as the other offices in the exchange area, may be served by "central A and B boards." The central "A" board may be separate from the toll board, in the same or different location, or may be combined with the toll board. In the case of small outlying single office exchanges, the dial office may be served from another exchange. In the latter case, the dial office, which has a separate numbering scheme not related to that of the exchange from which the office is served, is known as a "community dial office," abbreviated "C.D.O." The transmission problems involved in the C.D.O.'s and offices served by Central switchboards are similar except for certain differences in the equipment involved and the fact that in C.D.O.'s such services as information, repair clerk, etc., are usually handled over the zero level trunks rather than trunks provided specifically for these purposes.

The following paragraphs summarize the transmission features of the various equipment arrangements which may apply and discuss certain transmission problems, peculiar to these types of offices, which should be taken into account in studying the economical field of use of such offices, as well as in the design of the outside plant to be used therewith.

2. General

The plant arrangements and routing schemes used with central A and B boards or community dial offices may have an important reaction on the outside plant costs. For example, in a given case a comparison might involve a magneto office which had direct trunks to the toll board, and a C.D.O. with trunks only to a master office not located in the same building with the toll board. In the latter case, the toll traffic is handled over a built-up connection consisting of the trunk to the master office and the toll switching or recording-completing trunk from the latter office to the toll board. This difference in routing would frequently involve some backhaul, excess equipment losses, etc.

It is important, of course, that in the studies to prove in C.D.O.'s or central switchboards there be included adequate allowance for added cost involved in meeting the transmission standards under the proposed arrangements. This is particularly important in cases where the arrangement appears to prove in by only a small margin.

There are now available a number of different arrangements as regards equipment and routing schemes for C.D.O.'s and central switchboards. These are summarized on the attached sketches, which cover step-by-step and panel central switchboards, and C.D.O.'s.

3. Transmission Features

3.1 Battery Supply Arrangements

The type of battery supply arrangements at C.D.O.'s and offices served by central switchboards are, in general, the same as at other dial offices; that is, there may be involved the 24-volt repeating coil or 48-volt bridged impedance type local grade battery supply circuits and the 48-volt repeating coil circuit for toll grade battery. The attached sketches indicate for the various types of traffic and different routing schemes the grade of battery supply obtained for the several types of office.

3.2 Provision of Repeating Coils

Repeating coils are employed in circuits involved in C.D.O.'s and offices served by central switchboards for the usual purposes of battery supply and impedance correction. In addition, repeating coils are required in certain of the trunk circuits for signaling reasons, and traffic routings peculiar to these offices may introduce other coils, such as in the cord circuit of the master office. It is important that the effects of all these coils be included in any evaluation of the transmission obtained on the several items of traffic. In order to facilitate this work, there have been indicated on the attached sketches, the circuits in which repeating coils are employed, indication being given where there is a choice of coils having different impedance ratios.

3.3 Loop Losses

The effective loop losses for C.D.O.'s and offices served by central switchboards are the same as those applying to the regular panel or step-by-step offices for the same conditions of battery supply. These losses are given in Section 2-A of Effective Transmission Equivalent Data, and design information for loops of combinations of gauges is covered in Sections 2-C and 8-A of those Data.

3.4 Central Office Losses

The effective central office losses for C.D.O.'s and offices served by central switchboards are the same as for regular offices of the same size and the same equipment arrangements as covered in Section 6-A of Effective Transmission Equivalent Data. However, there are involved on a large proportion of the traffic additional losses due to the equipment at the central A and B

boards or at the master office. These losses are comparable in nature with those of tandem and toll boards. Pending the availability of the effective losses for such intermediate offices, a reasonable approximation can be made by applying the volume losses.

4. Plant Design Considerations

4.1 Determination of Design Limits

In determining the transmission design limits for loops and trunks for C.D.O.'s and offices with central switchboards it is important that there be included in the economic balance the effect of all the routings and transmission losses peculiar to these types of boards.

In the fundamental studies of such offices to allocate the transmission losses to the various elements, it will usually be found that the loop and trunk limits for the dial office and the corresponding master office or office in which the central switchboard is located are closely related. For instance, in the case of a community dial office served from a master office not in the same building with the toll board, traffic from both the master and community dial offices may be routed over the same toll board, tandem, and direct trunks. The effects of this on the allocation of losses may be visualized by considering that the equivalent from the master office to the stations in the community dial office must be comparable with the loop limit of the master office if the same grade of transmission is to obtain. If the master office has only a single outlet as, for example, a tributary point having trunks only to the toll board, the effect of the inclusion of the community dial office in the economic balance will probably be to extend the loop limit of the master office beyond that which would prove economical if the community dial office were not involved. An exception to this might occur where terminal repeaters are employed at the local end of the toll switching, recording-completing or other toll board trunks, in which case the gain of the repeater might be limited unless pads are inserted when connection is made to loops in the master office, the effect of this being to reduce the loop limit in the master office.

Where the master office has tandem and perhaps direct trunks in addition to the toll board trunks and the traffic from the community dial office is to be routed over these outlets, the tendency again will be to extend the master office loop limit. If, however, the community dial office traffic is routed entirely to the toll board and the tandem and direct trunks of the master office are used only for traffic terminating in that office, it may be more economical to improve the toll board trunks in order to meet the requirements of the community dial office.

Similar considerationsare involved in the case of offices with central A and B boards. Such offices would normally have direct trunks to other nearby offices, the design features of which would be the same as for trunks between regular dial offices. However, the A-B toll traffic may be routed over trunks through the central boards and in this case, such A-B toll trunks would, of course, have to be suitable for connection to the trunks to the dial offices rather than being designed on the basis of terminating only in the office in which the central boards are located. Similar considerations apply to the toll board and tandem trunks terminated at the central boards in case the latter are not in the same building with the tandem and toll boards.

In some instances, especially community dial offices for which appreciable expenditures for outside plant are involved, consideration should be given to the use of the anti-sidetone sets with either the present or improved instruments (when available). If the office to be replaced is magneto, the cost of applying these improved station facilities would involve only the excess equipment costs. Obviously, if the community dial office stations can be economically equipped with station apparatus more efficient than that employed in the master office, the problem of meeting the transmission limits would be greatly simplified and appreciable savings might be realized. If this procedure is employed, further steps will later be necessary to care for the community dial office when the improved instruments are in general use and the master office trunks are designed on the basis of the new instruments. These steps may consist of either improving the outside plant or providing still more efficient station apparatus.

4.2 Loop Design

The general considerations involved in the design of the loop plant for C.D.O.'s and offices served by central switchboards are covered by the information in Section 2-A of these Practices. However, in the case of community dial offices having only one outlet which provides toll grade battery supply or if all the trunking outlets provide this grade of battery, it may be desirable to design the limiting lengths of the various loop gauges on the basis of toll loop losses inasmuch as the relations between the various gauges, on the basis of toll grade battery, may be somewhat different from those for local grade of battery supply which would be involved in such cases only for calls within the same office.

In some instances where the number of rural lines served from the dial office is not sufficient to justify the necessary multi-party ringing arrangements, these lines may be terminated on the central "A" board. From a transmission standpoint, such lines may be considered as served from the office

in which the central "A" board is located and the outside plant facilities used to extend the lines to that board should be designed correspondingly. If the rural lines are to be operated on a common battery basis, and the battery supply obtained from the cord circuit at the central "A" board is not adequate, long line equipment may be provided in these lines at the dial office.

4.3 Trunk Design

The design of the trunks to conform with the design limits determined as discussed in Paragraph 4.1, is covered in Sections 3-A, B, C and D of these Practices. Particular reference should be made to Section 3-B which includes a discussion of trunks to community dial offices.

4.4 Zoning

Inasmuch as the battery supply arrangements and loop design are, in general, comparable with those of the other offices, the zoning practices covered in Section 2-B of these Practices are applicable to C.D.O.'s and offices served by central switchboards. However, in community dial offices having toll grade battery on all trunked calls, the proportion of such calls may be such as to make it advisable to extend the sidetone reduction zone (3SR) to say 200-250 ohms as compared with 150-200 ohms for regular offices.

4.5 Miscellaneous Services

Intercepting service when given, is handled at the central "A" board or at the master office and is, therefore, comparable with centralized intercepting service. The transmission considerations involved in this problem are discussed in Section 4-B of these Practices.

Where the information service is given at the central "A" board building or master office and calls to information routed over the special service trunks, no particular problem is involved. If, however, separate trunks from the dial office are provided for information service, they should, of course, be of the grade necessary to meet the usual standards for this type of service as discussed in Section 4-A of these Practices. In the event the information desk is located in a building other than that of the central A board or master office, and the traffic is handled by connecting the special service trunks from the dial office and the trunks from the "A" board to the informatic.. board, similar design considerations would, of course, be involved.

Other supplementary services, such as repair clerk, etc., are usually handled at a central desk or at the master office. The design of the trunks over which this traffic is routed should, of course, be such as to result in a satisfactory grade of transmission.

Attached:
Drawings: 601-121
601-122
601-123
601-124

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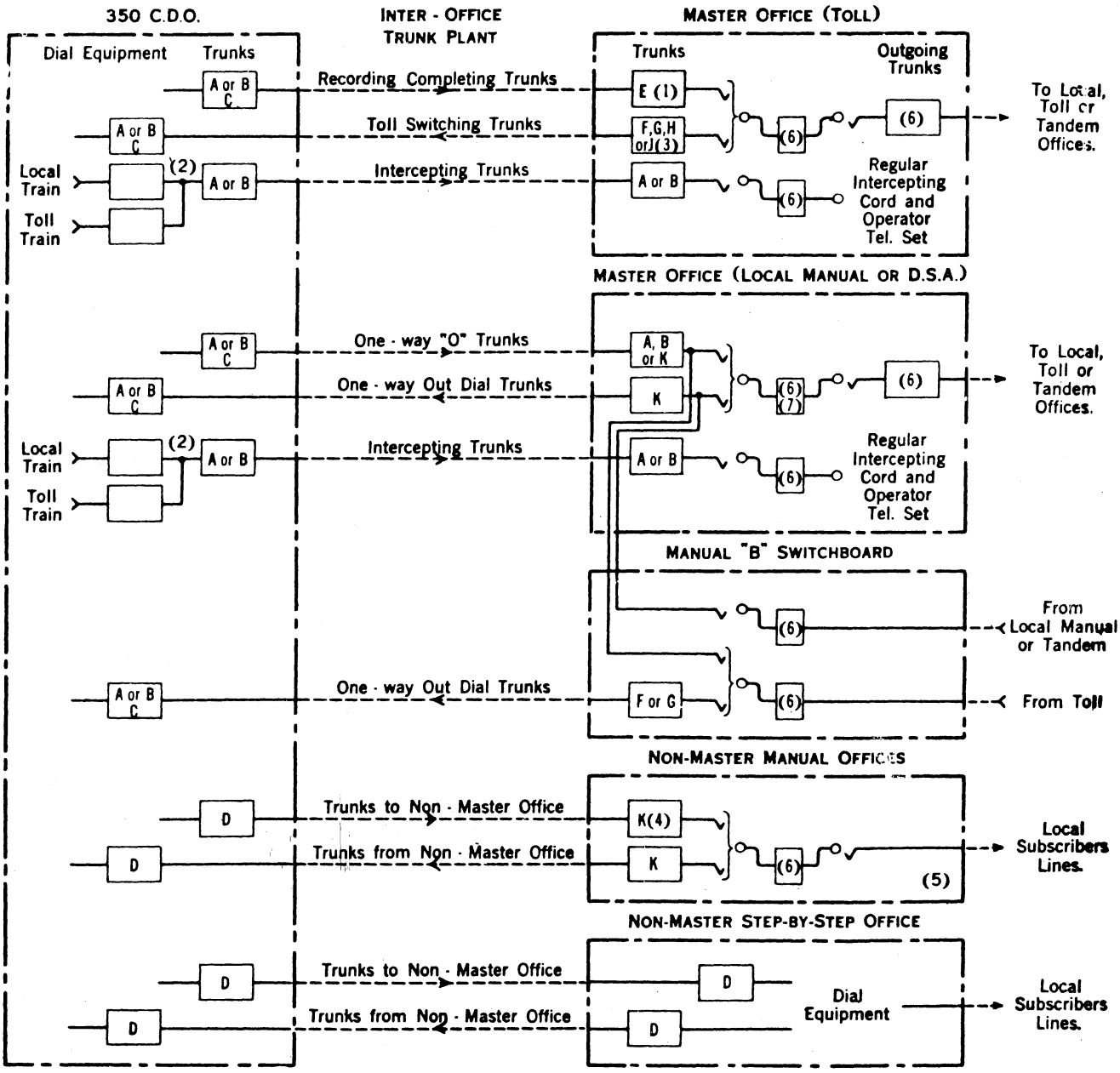
350 COMMUNITY DIAL OFFICE TRUNKS



A - 94-E Repeating Coil.
B - 94-F Repeating Coil.
C - Toll Grade Battery - Repeating Coil Circuit.
D - Local Grade Battery - Bridged Impedance Type Circuit.
E - 62-Type Repeating Coil per D-79982.
F - 108-A Repeating Coil.
G - 108-B Repeating Coil.
H - 62-Type Repeating Coil per D-79981.
J - 62-Type Repeating Coil per D-85655.
K - Bridged Impedance signalling circuit.

(1) For Recording Trunks, coils A or B are used instead.
(2) Trunk finders may be used when required.
(3) Some trunks for No. 1 Toll Switchboard do not have condensers or repeating coils.
(4) Magneto Switchboards usually use 76-A or 77-A repeating coils.
(5) When "B" positions are involved arrangements similar to Local Master Office are used.
(6) The types of equipment such as repeating coils, condensers etc. in the cord and outgoing trunk circuits will depend upon types of switchboards encountered.
(7) Completing originating toll calls may be accomplished by the operator substituting a cord without repeating coils for the answering cord after determining it is a toll call.

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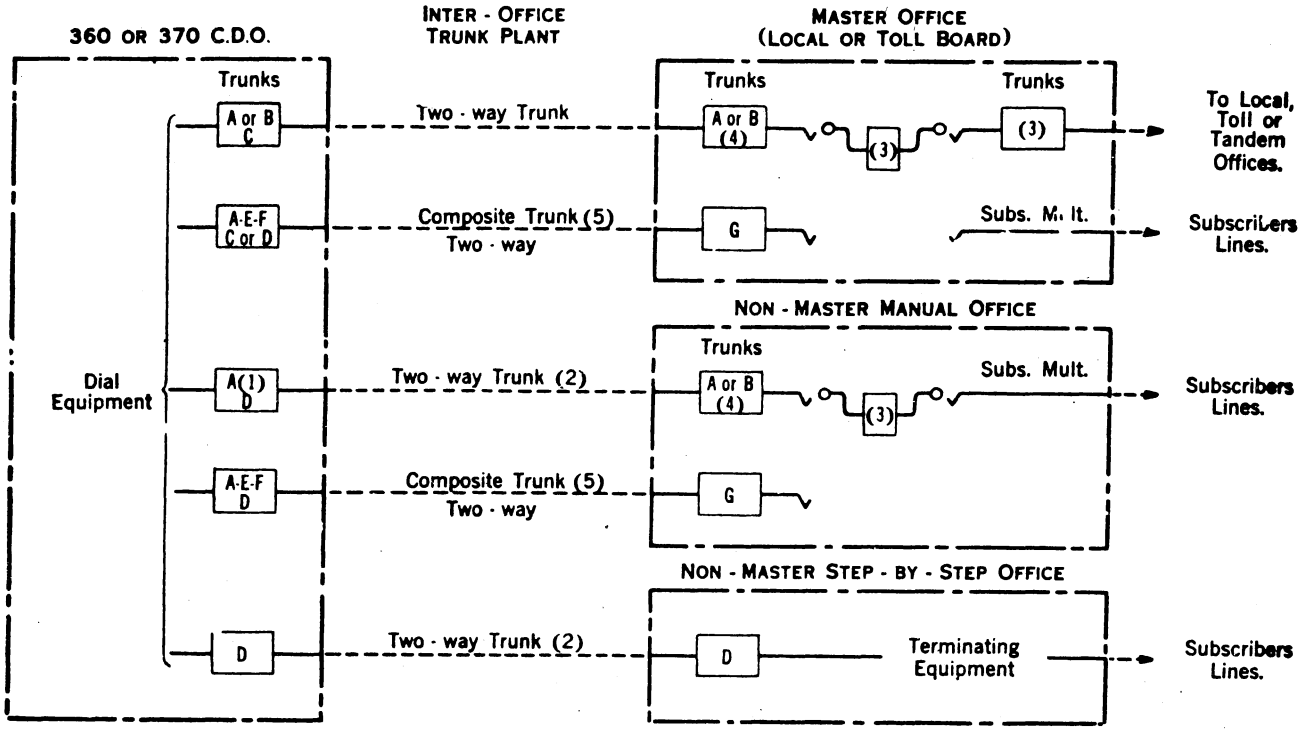
360 AND 370 COMMUNITY DIAL OFFICE TRUNKS



A - 94-E Repeating Coil.
B - 94-F Repeating Coil.
C - Toll Grade Battery - Repeating Coil Circuit
D - Local Grade Battery - Bridged Impedance Type Circuit.
E - 100-A Repeating Coil.
F - 100-B Repeating Coil.
The 100 - Type coils, are for use in the side - circuits while the 94 - E is used for the phantom circuit.
G - 62-A, 62-C, 62-E, 83-B, D-79981 or D-79982 Repeating Coils.
The type of coil used is determined by loading used on the trunk or whether it is non - loaded. See drawing SD-63026-011 for details.

(1) Arrangement for 360 C.D.O. Local Grade Battery - Repeating coil circuit.
(2) May be used one way when desired.
(3) The types of equipment such as repeating coils, condensers etc., in the cord and outgoing trunk circuits will depend upon the types of switchboards encountered.
(4) When magneto switchboards are used at the Master or Non - Master office, trunks employing repeating coils will usually be encountered.
(5) For use with side or phantom circuits.

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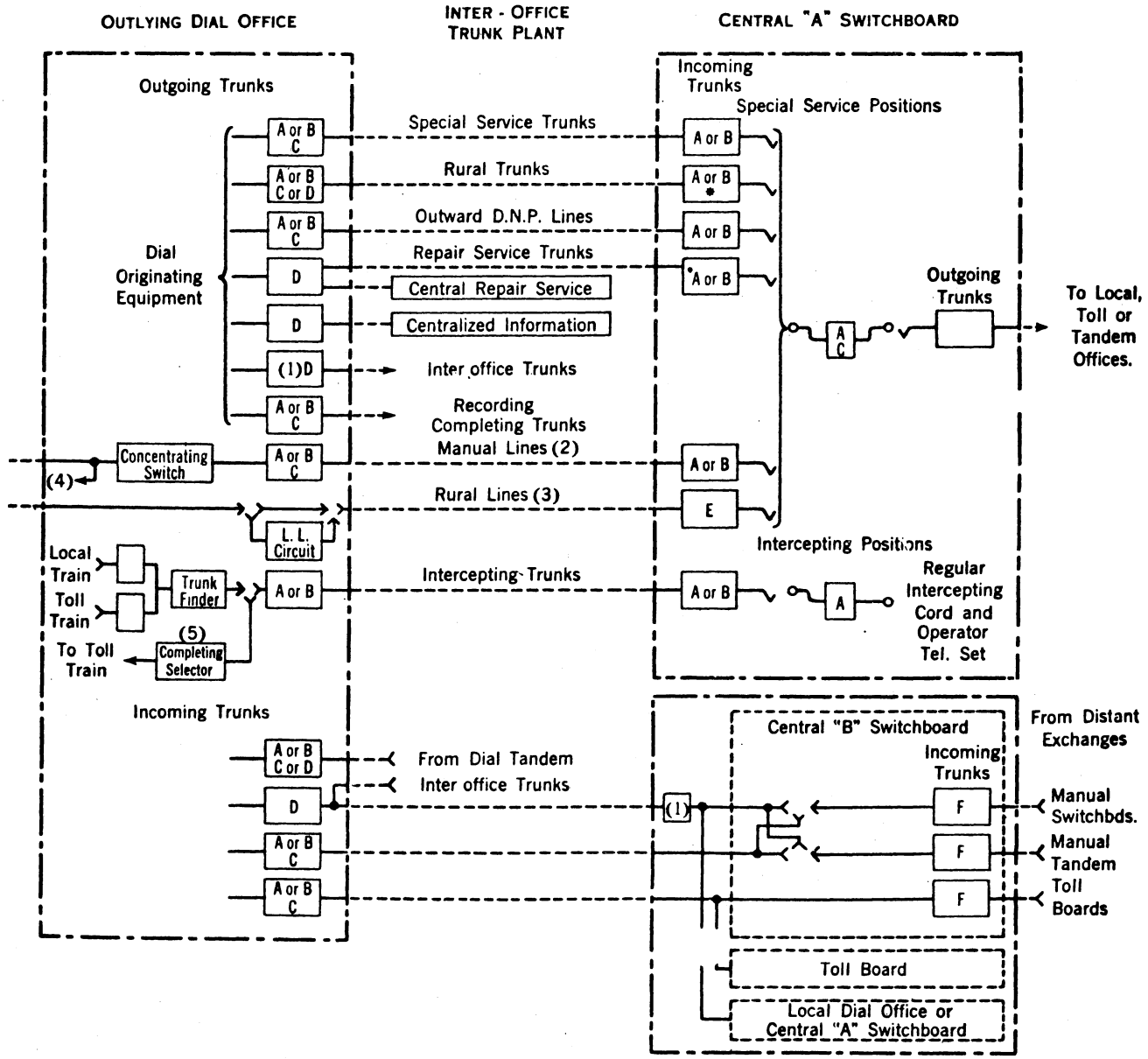

A - 94-E Repeating Coil.
B - 94-F Repeating Coil.
C - Toll Grade Battery - Repeating Coil Circuit.
D - Local Grade Battery - Bridged Impedance Type Circuit.
E - Common Battery lines cut through. Magneto Lines use Series Condenser Bridged Impedance Type Circuit.
F - 94-E or F Repeating Coils when required for signalling reasons otherwise cut straight through.

(1) Interoffice Pulse Repeater - Bridged Impedance circuit.
(2) When only small number of "Manual Lines" involved they may be routed over "Special Service" group of Trunks.
(3) Used only when not economical to provide multi - party connectors - if the latter are provided, common battery "Rural Lines" treated the same as "Manual Lines".
(4) Multipled to connector for incoming service.
(5) Completion of intercepted calls optional.
* Bridged Impedance Circuit when from 350-A or 360-A Offices.

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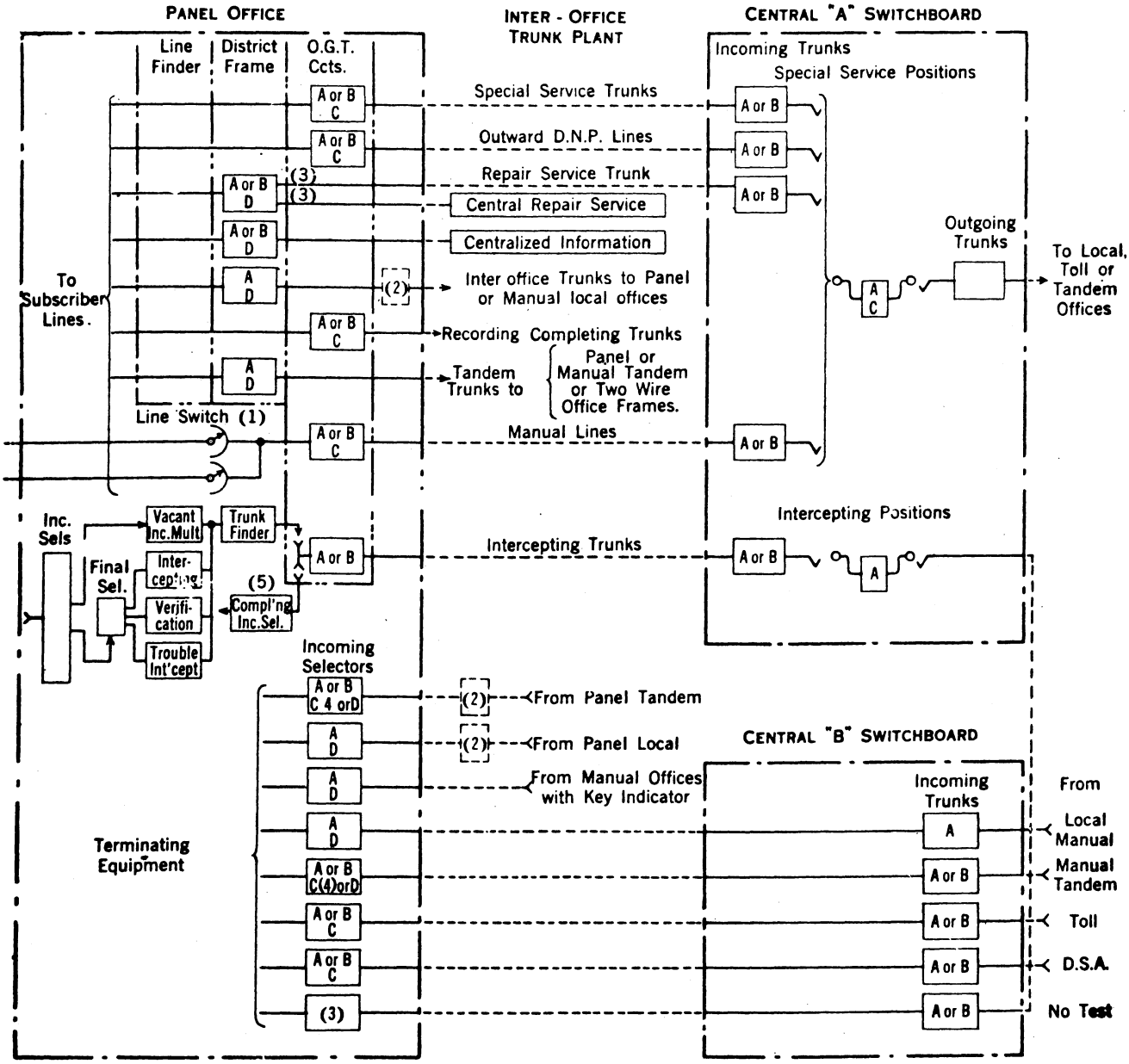
PANEL SYSTEM CENTRAL SWITCHBOARD TRUNKS



A - 94-E Repeating Coil.
B - 94-F Repeating Coil.
C - 48-Volt Battery.
D - 24-Volt Battery.

(1) When only small number of "Manual Lines" involved they may be routed over "Special Service" group of trunks.
(2) Through Office Frame when required.
(3) Series Condensers and bridged impedance signalling circuit.
(4) 48-Volt Battery when required.
(5) Completion of intercepted calls optional.

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