MODIFICATION OF NO. 4A AND CONVERTED NO. A4A COMBINED TRAIN OFFICES TO PROVIDE SEPARATE TRAIN — COMBINED OPERATION NO. 4A OFFICE EQUIPMENT DESIGN REQUIREMENTS NO. 4 TYPE TOLL SWITCHING SYSTEMS

1. GENERAL

A. Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirement for the framework, equipment, circuits, and the general procedures for providing separate train-combined operation for the "in-service" No. 4A and the converted No. A4A combined train offices, either at the time of, or subsequent to their conversion to nationwide dialing operation. Engineering requirements are also covered for new No. 4A installations which will be initially installed with a single combined train but will ultimately require separate trains with combined operation.

B. Description

1.02 Combined operation of the two trains in a separate train office was developed to permit both trains to handle intertoll and toll completing traffic without restriction similar to that of the single trains in combined train offices. The separate train-combined office provides approximately twice the intertoll trunk capacity of the combined train office at much less than twice the cost due to the use of the same building, common test equipment, senders, connector equipment, etc. Substantial savings can be realized, therefore, through the addition of a second train to existing combined train offices when the traffic growth would otherwise require a second toll switching system in the locality. Similarily, there are economic advantages for new offices in providing one train initially and adding a second train at a later date for offices where the future traffic requirements are not firmly established. The basic requirement for adding a second train to combined train offices is that of sufficient floor space for the extra train, the supplementary connector frames and the increased number of trunks, senders, distributing frame verticals, etc, required for the greater traffic capacity.

1.03 Arrangements for combined operation of separate train No. A4A offices are not available. Therefore, the modifications covered herein, must be made in No. A4A offices which have been converted to nationwide operation or, if coordinated with such a conversion, not until all the common control equipment is of the 4A type.

1.04 The second train should generally be provided after the number of incoming frames installed is one half of the ultimate office requirement, based on the desirable maximum size of the office, floor space considerations, and junctor distribution plan. On new installations it will be found economical to arrange for the same junctor distribution plan in both trains. On existing installations, it is not necessary that both trains be arranged with the same plan, providing the smaller plan has sufficient capacity to permit the same number of incoming frames to be installed in each train. For example, an existing train might be in accordance with plan TC but, because space considerations restrict the maximum number of incoming frames in the office to 40, an added train in accordance with plan TB might be provided after the initial train reached 20 incoming frames.

1.05 For the converted offices and the future No. 4A offices, the initial train shall be designated as Intertoll and the added trains as Toll Completing. Certain equipment items of the toll completing train could be located on another floor than the intertoll train, if required for space reasons, providing the conductor length limitations as outlined in J60103 are met. Incoming frames, outgoing frames, and junctor grouping frames for the toll completing train are examples for this treatment. Equipment, such as senders, sender link frames, and trunk relay racks may be divided between floors if separate sender groups, link controller groups, etc, are established for each floor. All markers, decoders, and block relay frames should be located on the floor having the No. 4A maintenance center. The trunk and the assignment distributing frames must be used in common for the two trains.

1.06 Separate train-combined operation requires that all incoming trunks and the incoming appearance of 2-way trunks appear on incoming frames of both trains. Incoming frames in single train offices generally are arranged for 200-trunk terminations per frame, while in 2-train offices 400-trunk terminations per frame are usually provided. The 400-trunk terminations of an incoming frame in one train are multipled at the trunk distributing frame to the 400 terminations of an incoming frame in the other train so that like-numbered frames in both trains share 400 terminations in common.

1.07 When expanding an office to separate train-combined operation, as a minimum, the same number of incoming frames and terminals must be provided in the new train as are in the initial train. In addition, it will generally be necessary to provide additional termination capacity of the frames of both trains to care for growth requirements. It is not required that the frames be equipped with ultimate frame terminations at the time of expansion but floor space and distributing frame space for the ultimate should be provided for. The specification assumes that some increase in termination capacity will be required at the time of expansion. Thus, provisions for adding 100 or 200 additional terminations, by means of nonadjacent supplementary incoming link frames, are covered in Parts 4 and 5.

1.08 Since the added toll completing train must operate with the initially installed common control equipment, provisions are herein provided to increase the capacity of the initially installed marker connector, decoder connector, emergency translator connector, foreign translator connector, and alternate route traffic control frames for the required additional decoders and toll completing markers.

C. Modification

1.09 The modification effort and the equipment required to arrange a No. 4A or a converted No. A4A combined train office to separate train-combined operation and the requirements for engineering No. 4A combined train offices which will be ultimately modified to separate train-combined operation are covered in three parts as follows:

(a) The new equipment for the added toll completing train and the added nonadjacent supplementary frames required at existing common control connector frames in offices where provisions for the second train was not initially engineered. This equipment is covered in Part 4 and shown schematically in Fig. 1.

(b) The modification of the initially installed frames to provide separate train-combined operation features. This modification effort is covered in Part 5.

(c) The special arrangements for the equipment to be furnished initially in combined train offices which will facilitate ultimate modification to separate train-combined operation. This information is covered in Part 6.

D. Floor Plan Arrangements

1.10 The incoming second and third primary extension frames must be adjacent to each other when located remotely from the associated incoming link frame. These frames and the supplementary connector frames added, to "in-service" offices, at the time of modification to separate train-combined operation, shall meet the critical lead conductor length limitations specified in 4.33 and 4.35.

2. SUPPLEMENTARY INFORMATION

818-000-000 - No. 4 Type Toll Switching Systems Index
AA128.006 - List of General Equipment Requirements Sections
J60103 (818-031-150) - Limiting Conductor Lengths Between Frames and Units - Toll Switching Systems No. 4A and 4M
J69202 (818-005-150) - Toll Office Equipment - General No. 4A Toll Switching System
Floor Plan Data - Section 10 - Toll Switching System No. 4A

3. DRAWINGS

WECo ED and J drawings listed should be ordered by referring to the prefix and base number and requesting the highest suffix dash (-) number.

Key Sheets

SD-68000-01 - Toll Switching System No. 4
SD-68400-01 - Toll Switching System No. 4A

Equipment

ED-68221-01 - Junctor Grouping Frame Equipment Plans TA, TAB, TB, TBC, and TC
ED-68222-01 - Junctor Grouping Frame Equipment Plans LA, LAB, LB, and TLB
J67418D-( ) - Automatic Outgoing Toll Connecting Trunk Test Frame
J67437B-( ) - Incoming Link Frame for Plans TB, LB, TBC, TC, and TLB
J67437C-( ) - First Primary Extension Frame
J67437D-( ) - Second Primary Extension Frame
J67437F-( ) - Secondary Extension Frame - Plan TB, LB, TBC, TC, and TLB
J67437G-( ) - Third Primary Extension Frame
J67438A-( ) - Outgoing Link Frame - For Plans TA, LA, TB, TAB, LAB, and TBC
J67438B-( ) - Outgoing Link Frame for Plan TC - Even Frame
J67438C-( ) - Outgoing Link Frame for Plan TC - Odd Frame
J67438D-( ) - First Secondary Extension Frames
J67438E-( ) - Second Secondary Extension Frame
J67438F-( ) - Primary Extension Frame - Plan TBC

J67438G-( ) - Primary Extnesion Frame - Plan TC
J67439A-( ) - Decoder Frame
J67439S-( ) - Marker Selection Unit for Separate Train Offices - Combined Operation
J67439U-( ) - Marker Selection Unit for Combined Train Officer
J67440A-( ) - Marker Frame
J67440N-( ) - Check and Control - Routing Control and Marker Busy Unit
J67442A-( ) - Card Translator
J67442E-( ) - Channel Amplifier Unit
J67442F-( ) - Channel Output Detector Unit
J67443A-( ) - Trouble Recorder Test Frame
J67443B-( ) - Trouble Recorder Perforator Frame
J67444A-( ) - Alternate Route Traffic Control Frame or Supplementary Alternate Route Traffic Control Frame
J67444B-( ) - Supplementary Unit for Alternate Traffic Control Frame or Supplementary Alternate Route Traffic Control Frame
J67445B-( ) J67445C-( ) - Foreign Translator Connector Frame or Supplementary Foreign Translator Connector Frame
J67445C-( ) J67445F-( ) - Emergency Translator Connector and/or Frame Identification Frequency Control Frame
J67445D-( ) J67445G-( ) - Emergency Translator Connector Frame for 18-decoder Capacity
J67446A-( ) J67446C-( ) - Marker Connector Frame for Use in Separate Train Offices
J67446B-( ) J67446D-( ) - Marker Connector Frame or Supplementary Marker Connector Frame for Use in Combined Train Offices
J67447A-( ) - Automatic Outgoing Intertoll Trunk Test Frame
J67449B-( ) - Decoder Connector Frame for Use in Combined Train Offices 6-decoder Capacity
J67449C-( ) J67449G-( ) - Decoder Connector Frame for Use in Combined Train Offices 10-decoder Capacity
J67449E-( ) J67449J-( ) - Supplementary Decoder Connector Frame for Use in Combined Train Offices
J67449K-( ) - Supplementary Decoder Connector Frame for Use in Combined Train Offices Modified to Separate Train-combined Operation

4. EQUIPMENT FOR ADDING THE SECOND TRAIN IN INITIALLY INSTALLED COMBINED TRAIN OFFICES

A. New Frames (See 4.21)

J67440A (818-450-150) - No. 4A Marker Frame

4.01 Furnish these toll completing markers equipped and wired for separate train-combined operation and the ultimate number of decoders in accordance with the feature and option table per SD-68388-01.

J67439A (818-400-150) - No. 4A Decoder Frame

4.02 Furnish these frames to provide for the added traffic requirement of the new toll completing train. The added frames shall be equipped and wired for separate train-combined operation in accordance with the feature and option table per SD-68340-01.

J67442A (818-420-150) - No. 4A Card Translator Equipment

4.03 Furnish this equipment to provide for the added traffic requirement of the added toll completing train equipped for intertoll and toll completing train operation in accordance with the feature and option table per SD-68342-01. (See 4.29.)

J67446A or J67446C (818-451-150) - No. 4A Marker Connector Frame for Use in Separate Train Offices

4.04 Furnish one of these frames for each two decoders furnished per 4.02, equipped with the preference relays to agree with the number of intertoll and toll completing markers at the end of the modification period. (See 4.23.)

J67446B or J67446D (818-451-150) - No. 4A Supplementary Marker Connector Frame for Use in Combined Train Offices

4.05 Furnish one supplementary frame for each marker connector frame furnished prior to separate train modification equipped with the preference relays to agree with the number of added toll completing markers. (See 4.22, 4.34, and 4.35.)

J67449E or J67449J (818-401-150) - No. 4A Supplementary Decoder Frame for Use in Combined Train Offices

4.06 Furnish one supplementary frame for each two initially furnished J67449B frames in offices where more than these six decoders have not been required prior to separate train-combined modification. (See 4.24, 4.34, and 4.35.)

J67449K (818-401-150) - No. 4A Supplementary Decoder Connector Frame for Use in Combined Train Offices Modified to Separate Train-combined Operation

4.07 Furnish one supplementary frame equipped with the preference relay quantities to correspond to the number of toll completing marker and decoder at the end of the modification for each initially furnished J67449B, or J67449C, or J67449G frames. (See 4.24, 4.34, and 4.35.)

J67449C or J67449G (818-401-150) - No. 4A Decoder Connector Frame for Use in Combined Train Offices

4.08 Furnish one of these frames and its associated J67449K supplementary frame equipped with the preference relay quantities to correspond to the number of intertoll and toll completing markers and decoders at the end of the modification for each 15 senders of growth per 4.18. (See 4.24, 4.34, and 4.35.)

J67445D or J67445G (818-421-150) - Emergency Translator Connector Frame - 18-decoder Capacity

4.09 Furnish one of these frames in offices where modification from combined train to separate train-combined operation is coordinated with conversion from No. A4A to 4A operation.

J67445B or J67445E (818-421-150) - Foreign Translator Connector Frame or Supplementary Foreign Translator Connector Frame

4.10 Furnish, when required, one supplementary frame for each initially furnished foreign translator connector frame and one of each frame for each two even- or odd-numbered foreign area translators that may be added as growth equipment per 4.03. (See 4.25, 4.34, and 4.35.)

J67445C or J67445F (818-421-150) - Supplementary Emergency Translator Connector Frame

4.11 Furnish, when required, one supplementary frame for the initially furnished emergency translator connector frame in offices requiring more than ten decoders. (See 4.26, 4.34, and 4.35.)

J67444A (818-041-150) - Supplementary Alternate Route Traffic Control Frame

4.12 Furnish one supplementary frame to the initially furnished alternate route traffic control frame for decoders 10 to 14 and equipped with supplementary unit J67447B when decoders 16 and 17 are required. (See 4.27, 4.34, and 4.35.)

J67408A (818-480-150) - Block Relay Frame

4.13 Furnish these frames to provide for the added traffic requirement of the new toll completing train. (See 4.28.)

J67437B (818-200-150) - Incoming Link Frame

4.14 Furnish these frames for the toll completing train in quantities to agree with the number of incoming link frames in the initial train at the time of the modification. These added link frames shall be arranged for the junctor distribution plan and trunk capacity as specified in traffic order. (See 4.30.)

J67437D and J67437G (818-200-150) - Second and Third Incoming Primary Extension Frames

4.15 Furnish one second primary extension frame or both a second and third primary extension frame for each intertoll incoming link frame now installed when trunk capacity is to be increased from 200 to 300 or from 200 to 400 trunks. (See 4.33.)

J67409 (818-210-150) - Junctor Grouping Frame

4.16 Furnish this frame for the added toll completing train arranged for the junctor distribution plan as specified in the traffic order.

J67438 (818-201-150) - Outgoing Link Frame

4.17 Furnish these frames for the toll completing train arranged for the required junctor distribution plan and trunk capacity. (See 4.31.)

B. Trunk Equipment and Related Frames

4.18 Furnish this equipment with separate train-combined operation features, as required for traffic growth, in accordance with the specification for No. 4A offices as listed in J69202 (818-005-150). Frames considered in this category are; incoming and outgoing senders, incoming and outgoing sender link frames, and link controller and connector frames. (See 4.32.)

C. Miscellaneous Equipment

4.19 The equipment considered in this category, is the added equipment to existing frames, bays, and racks for the added new frames and growth equipment at the time of the modification at the following locations; traffic register rack, interrupter frame, floor alarm frame, sender make-busy frame, circuit patch bays, test frames, TDF and ADF frames. This equipment shall be furnished, as required with separate train-combined operation features, in accordance with the specification for No. 4A offices as listed in J69202 (818-005-150).

D. Power

4.20 As outlined in Part 1, the modification of a initially installed combined train office to separate train-combined operation involves the addition of a new toll completing train and additional growth equipment to the initially installed train. Therefore, a recheck of the existing power plant will be required to determine the ultimate drain requirements.

E. Notes

Equipment

4.21 The new equipment covered in this part can be treated as any addition to a No. 4A office independently of the modification effort covered in Part 5 with the exception of connecting the supplementary connectors to their associated "in-service" connectors. The connecting of the supplementary connectors should be on a connector basis and coordinated with the modification of its associated frame covered in Part 5.

4.22 Marker connector frame J67446B or J67446D is used in combined train No. 4A offices to permit two decoders to secure connections to a maximum of ten markers in one group. When the second train is added in an expanded office, a second J67446B or J67446D frame is used as a supplementary bay to each existing frame for reaching markers in the second train.

4.23 Marker connector frame J67446A or J67446C which provides two decoders access to ten intertoll and ten toll completing markers, shall be furnished for each two decoders of growth required at the time of and after modification to separate train-combined operation.

4.24 The J67449B frame was furnished in combined train offices converted to No. A4A and early No. 4A installations to give 15 incoming senders access to six decoders and ten markers in one group. The J67449C or J67449G frame was furnished in the later vintage of No. 4A installations to provide sender access to ten decoders and ten markers. The J67449E or J67449J supplementary frame was furnished for the converted No. A4A and early No. 4A installations and is equipped with six connectors and four decoders. Therefore, one of these frames is required as a supplementary frame for each two initially installed J67449B frames where more than six decoders are required. The J67449K supplementary frame is equipped for three connectors, eight decoders, and ten toll completing markers, and one of these frames is furnished as a supplementary frame for each installed J67449B and J67449E or J67449J combination or J67449C or J67449G frames. Therefore, with this arrangement of supplementary frames, the 15 incoming senders on the initially installed J67449B or J67449C or J67449G frame have access to an ultimate of 18 decoders and 20 markers.

4.25 The initially installed J67445B or J67445E frames provides arrangements for ten decoders to secure connections to two foreign area translators. When more than ten decoders are required, a second J67445B or J67445E frame is provided as a supplementary bay to each initial foreign translator connector frame.

4.26 The J67445C frame is used in a combined train No. 4A office to give ten decoders access to the emergency card translator. This frame also provides the frame identification frequency control unit. When more than ten decoders are required, a second J67445C frame, less the frame identification frequency control unit, should be furnished as a supplementary frame to the basic frame.

4.27 The J67444A frame is used in combined train offices with a maximum of ten decoders. When more than ten decoders are required, a supplementary frame arranged for a maximum of eight decoders is required.

4.28 The ADF assignment of the added outgoing links and trunk block connectors shall be in accordance with the arrangement specified for the initial combined train installation per ED-685200-01.

4.29 If any of the added translators are required for service prior to separate train-combined operation, their cards shall be punched for the appearance of the outgoing trunks on the existing train. If not, the cards shall be punched as required for the intertoll or toll completing train location of the trunks for separate train-combined operation.

Cable

4.30 The horizontal levels of all switches of all incoming primary bays shall be cabled to the HTDF for terminating on like-numbered bay, switch, and horizontal level of the initially installed train per Fig. 2B or 2D. The connections of these cables can be accomplished on a frame by frame basis after the supplementary testing of added link frames has been completed.

4.31 The TDF appearance of outgoing link frames are not required for combined train operation as for incoming link frames. However, it is recommended that all the horizontal levels of all secondary bays be terminated at the HTDF thereby, facilitating the trunk transfers required for the modification as well as future train load balance.

4.32 All added incoming trunks shall be cabled to the TDF for cross-connecting to the link frames as specified in the office trunk assignments. (See Fig. 2D.)

4.33 The cable run between the incoming link frame and its associated nonadjacent second primary extension frame or second and third primary extension frames shall not exceed 2 ohms conductor resistance.

4.34 The initial connector and its associated supplementary connector shall be supplied from the same A or B battery feeder.

4.35 The supplementary connector frames should be located adjacent to the initial frame where floor plan layout permits, or may be located at a near-by non-adjacent location within the limiting conductor lengths specified in J60103 (818-031-150).

5. MODIFICATION OF INITIALLY INSTALLED COMBINED TRAIN EQUIPMENT TO PROVIDE SEPARATE TRAIN-COMBINED OPERATION FEATURES (SEE 5.20 AND 5.24)

A. Frames

J67440A (818-450-150) - No. 4A Marker Frame

5.01 The modification of this frame consists of providing the following features:

(a) Intertoll combined train features by replacing "B" and "YQ" options with "ZB" and "YP" options in accordance with the feature and option table per SD-68388-01 and the step sequence outlined in Fig. 2C.

(b) Provisions for more than ten decoders by furnishing Fig. 33.

(c) Incoming select magnet operate control feature by adding "XH" and "XO" options. These options to be connected prior to incoming link frame modification covered in 5.15(c). (See 5.22.)

J67443A (818-701-150) - No. 4A Trouble Recorder Frame

5.02 The modification of this frame consists of furnishing the additional equipment required for offices equipped with intertoll and toll completing markers and for the added growth equipment furnished in Part 4, in accordance with the feature and option table per SD-68389-01 and SD-68392-01.

J67442A (818-420-150) - No. 4A Card Translator

5.03 The modification of this equipment consists of adding plug-in equipment per list 2, "V" option per SD-68342-01, Fig. 1, 2, and 3. (See 5.10 and 5.21.)

J67446B or J67446D (818-451-150) - No. 4A Marker Connector Frame

5.04 The modification of this frame consists of extending the marker connector relay multiple, of each connector, per Fig. 1, and the test selection circuit multiple, per Fig. 2, per SD-68395-01, between the initially furnished marker connector frame and its associated supplementary marker connector frame furnished per 4.05.

J67445B or J67445E (818-421-150) - Foreign Translator Connector Frame

5.05 The modification of this frame consists of extending the multiple of the decoder connector relays between the connectors of the initially furnished frame and the added associated supplementary frame per 4.10 and the modification of the decoder preference chain, emergency relay and lockout relay circuits in accordance with the feature and option table per SD-68341-01, as required for added decoders 10 to 17.

J67445C (818-421-150) - Emergency Translator Connector Frame and/or Frame Identification Frequency Control Frame

5.06 The modification of this frame in converted No. A4A offices and initially installed No. 4A offices is as follows:

(a) In converted No. A4A offices, this frame is furnished for emergency translator connector operation only and the modification of this equipment is the same as covered in 5.05 for the added associated supplementary frame furnished per 4.11 for added decoders 10 to 17.

(b) In No. 4A offices, this frame is furnished for emergency translator connector operation and frame identification frequency control operation serving combined train incoming and outgoing link frames. The modification of the emergency translator connector equipment is the same as covered in 5.05 to add the supplementary frame furnished per 4.11. The modification of the frame identification frequency control circuit consist of adding the additional equipment, as required, for the added second train toll completing incoming and outgoing link frames furnished in 4.14 and 4.17 in accordance with the feature and option table per SD-68119-01.

J67424C (818-043-150) - Frame Identification Frequency Control Frame

5.07 The modification of this frame in converted No. A4A offices consists of adding the equipment required for the added second train toll completing incoming and outgoing link frames furnished per 4.14 and 4.17 in accordance with the feature and option table per SD-68119-01.

J67424D (818-043-150) - Frame Identification Frequency Supply Frame

5.08 The modification of this frame consists of adding the equipment required for the added second train toll completing incoming and outgoing link frames per 4.14 and 4.17

in accordance with the feature and option table per SD-68119-01.

J67444A (818-041-150) - Alternate Route Traffic Control Frame

5.09 The modification of this frame consists of connecting the route transfer leads of the supplementary frame for decoders 10 to 17 furnished per 4.12 to the initially furnished frame for decoders 0 to 9 in accordance with the feature and option table per SD-68408-01.

J67439 (818-400-150) - No. 4A Decoder Frame

5.10 The modification of this frame consists of replacing Fig. B with Fig. E in accordance with the feature and option table per SD-68340-01. The "N" wiring specified in Fig. E for even decoders only shall also be connected in the odd decoders and all translator cards punched for IT operation. (See 5.21 and 5.23.)

J67449B and J67449C or J67449G (818-401-150) - No. 4A Decoder Connector Frame

5.11 The modification of these frames consists of increasing the decoder and marker capacity of the connectors by extending the connector multiples of the initial connectors to the added connectors on the supplementary frames furnished in 4.06 and 4.07. The modification effort shall be accomplished on a connector basis and in accordance with SD-68339-01 and the following procedure:

(a) Extend the multiple of the decoder connector relay circuit Fig. 2 of the initial J67449B connectors to Fig. 2 of the J67449E or J67449J and J67449K supplementary connectors or from the initial J67449C or J67449G connectors to the J67449K supplementary connectors.

(b) Extend the marker connector relay circuit Fig. 4 of the initial J67449B, J67449C, or J67449G connectors to the J67449K supplementary connectors.

(c) Modify the decoder preference relay circuit Fig. D, E, and F, to include the added decoders furnished in 4.02.

(d) Connect "X" option in the J67449B or J67449C or J67449G frame in accordance with the step procedure covered in Fig. 2C.

(e) Disconnect the "MAO-9" leads of Fig. 4 on the basic J67449B, J67449C, or J67449G frame between the MCO-9 relay windings and DC1 terminal strip. (See 5.23.)

(f) Connect cable leads "MAO-9" from Fig. 5, on the J67449K supplementary frames, to the MCO-9 relay windings on the basic J67449B, J67449C, or J67449G frame. (See 5.23.)

J67402 (818-330-150) - No. 4A Incoming and Outgoing Sender Link Frames

5.12 The modification of these frames consists of connecting "ZM" option in accordance with the feature and option table per SD-68334-01 to provide separate train operation. This consists of connecting the "SMI" lead between the trunks and incoming sender link frames and sender links and the decoder connector frames and shall be accomplished in accordance with the step procedure outlined in Fig. 2C.

J67418D (818-705-150) - Automatic Outgoing Toll Connecting Trunk Test Frame

5.13 The modification of this frame consists of replacing "M" and "ZY" options with "N" and "ZX" options in accordance with the feature and option table per SD-68373-01 for separate train-combined operation. (See 5.25.)

J67447A (818-706-150) - Automatic Outgoing Intertoll Trunk Test Frame

5.14 The modification of the frame consists of replacing Fig. G and "W" option with Fig. H and "X" option in accordance with the feature and option table per SD-68404-01 for separate train-combined operation.

J67437B (818-200-150) - No. 4A Incoming Link Frame

5.15 The modification of this frame consists of the following:

(a) The connecting of the added nonadjacent primary extension frames, furnished in 4.15, to the initially furnished primary frame.

(b) The recabling of all directly cabled trunks to primary switch horizontal level so that all trunks and switch levels appear at the TDF in accordance with Fig. 2D. (See 5.22.)

(c) The addition of Fig. 20 and "ZD" option to provide select magnet operate control feature in accordance with the feature and option table per SD-68393-01. [See 5.22 and 5.01(c).]

J67438A, J67438B, or J67438C (818-201-150) - No. 4A Outgoing Link Frame

5.16 These frames do not require modification for separate train-combined operation but it is recommended that all directly cabled trunks to horizontal levels be recabled so that all trunks and outgoing

horizontal levels appear at the TDF or as a minimum, the direct cabled relays that are to be relocated and their associated link levels be recabled to the TDF.

J67450B and J67450C (818-042-150) - No. 4A Sender Traffic Control Frame - Small and Large Capacity

5.17 No modifications are required for this frame for separate train-combined operation. However, the increased traffic capacity of the new arrangement will require more senders and controllers than originally planned. If these exceed the capacity of the smaller J67450B frame, recommendations as to procedure should be requested of the Bell Telephone Laboratories, Incorporated.

J67408A (818-480-150) - Block Relay Frame

5.18 The modification of this frame consist of the reassignment of the trunk block relays in accordance with the transfer of intertoll and toll completing trunks from the initial trunk block relays to the added toll completing trunk block relays as will be required to provide a traffic balance of intertoll and toll completing trunks in each train. When more intertoll trunk assignments are required, then initially provided in a trunk block group, the trunk block terminal strip or strips initially arranged for the assignment of toll completing trunks shall be modified to add GB punchings and the associated cable leads to the AOTC test frame recabled to the AOIT test frame as required. (See 5.21.)

B. Trunk Equipment

5.19 This modification consists of the recabling of all incoming trunks that were initially cabled direct to the incoming link frame horizontals so that all incoming trunks appear at the TDF for cross-connecting to incoming link frames as shown in Fig. 2A and adding the "SMI" lead, when not initially furnished, between the trunk and the TDF and the trunk and incoming sender link frame in accordance with the step procedure outlined in Fig. 2C. (See 5.22.)

C. Notes

5.20 The modifications covered in this part can be coordinated with the installation of the new equipment furnished in Part 4 and can be made in the order corresponding to the paragraph number, unless otherwise noted.

5.21 The decoders and translators shall operate to the initial IT train until the reassignment of trunks between the IT and TC trains, per 5.19, which shall be accomplished on a trunk group and translator card basis, that is, as a trunk group is reassigned to the new TC train the associated translator card shall be replaced with a new card punched for TC operation and the associated trunk block information. The "N" wiring in the odd decoders shall be replaced with "Q" wiring after all the trunk reassignments have been completed.

5.22 The incoming select magnet operate control feature added in Fig. 20 and the corrdinated marker change per 5.01(c) permits the addition of a "SM" lead to the spare terminal normally provided between the "IS" and "SM" leads on 7-point TDF terminal strips. Therefore, this spare terminal shall be assigned as the "SMI" lead, for trunks not initially furnished with this lead, in accordance with Fig. 2C.

5.23 The modification of the decoder frames shall be completed prior to the modification of the decoder connector frames covered in 5.11(e) and 5.11(f).

5.24 The designations of the initially furnished combined train markers, block relay, incoming and outgoing link, and distributing frames shall be changed to those for intertoll train equipment.

5.25 The application of "N" option requires the removal of the toll switching trunk assigned to the connector switch horizontal crosspoint preceding the crosspoint to be assigned to an intertoll trunk. This made spare crosspoint is to be cross-connected to a set of terminals in accordance with SD-68373-01, Note 104 to provide a test frame changeover from toll switching to intertoll trunk testing.

6. EQUIPMENT REQUIRING SPECIAL ARRANGMENT FOR INITIALLY INSTALLED COMBINED TRAIN OFFICE ARRANGED FOR ULTIMATE SEPARATE TRAIN-COMBINED OPERATION (SEE 6.14 AND 6.15)

A. New Equipment

6.01 The equipment required for combined train offices in which a second train will be added at a later date should be furnished in accordance with the standard arrangements except as covered in the following paragraphs. Floor space shall be reserved for the second train frames, the necessary incoming link extension frames for the initial train and the supplementary connector and extension frames in accordance with 6.13.

J67440A (818-450-150) - No. 4A Marker Frame

6.02 Furnish these frames wired and equipped for combined train operation in accordance with the feature and option table per SD-68388-01. (See Fig. 2D.)

J67439A (818-400-150) - No. 4A Decoder Frame

6.03 Furnish these frames wired and equipped for separate train-combined operation in accordance with the feature and option table per SD-68340-01.

J67442A (818-420-150) - No. 4A Card Translator Equipment

6.04 Furnish this equipment wired and equipped for intertoll and toll completing operation in accordance with the feature and option table per SD-68342-01. The translator cards for all translators shall be punched for IT operation for the duration of combined train operation.

J67449C or J67449G (818-401-150) - No. 4A Decoder Connector Frame

6.05 Furnish these frames wired for separate train-combined operation in accordance with the feature and option table per SD-68339-01. (See Fig. 2D.)

J67402 (818-330-150) - No. 4A Incoming Sender Link Frame

6.06 Furnish these frames wired for separate train-combined operation in accordance with the feature and option table per SD-68334-01. (See Fig. 2D.)

J67437 (818-200-150) - No. 4A Incoming Frame

6.07 Furnish these frames wired and equipped for combined train operation in accordance with the feature and option table per SD-68393-01. (See 6.13 and Fig. 2D.)

J67418D (818-705-150) - Automatic Outgoing Toll Connecting Trunk Test Frame

6.08 Furnish this frame equipped and wired for combined train and separate train-combined operation in accordance with the feature and option table per SD-68373-01.

J67447A (818-706-150) - Automatic Outgoing Intertoll Trunk Test Frame

6.09 Furnish this frame equipped and wired for combined train and intertoll and toll completing train arranged for combined operation in accordance with the feature and option table per SD-68404-01.

B. Trunk Relay Equipment

6.10 Furnish this equipment in accordance with the specification for No. 4A offices per J69202 (818-005-150). The incoming trunk relays to be cabled and wired as outlined in Fig. 2D.

J67002 (AA381.129) - Distribution Frames

6.11 Furnish the trunk distribution frame arranged for the termination of all incoming link frames and trunks as outlined in Fig. 2D and for the termination of outgoing link frames and trunks as specified for the particular office. Space for the initial intertoll outgoing frames and first 200 or 300 terminations for each incoming frame should be provided in the first section of the HTDF. Space for toll completing outgoing frames and second 100 or 200 terminations for each incoming frame should be provided in an extension to the TDF made when the toll completing train is started. This will result in spreading incoming frame terminations over the entire length of the HTDF in about the same ratio that trunk relays are distributed over the VTDF and thus minimize the average length of cross connections.

J67434 (818-630-151) - Trunk Assignment Distributing Frame

6.12 Furnish this frame with the initial intertoll outgoing link frames and trunk block connectors assigned in accordance with ED-68520-01 for the combined train. The assignment of the second train toll completing equipment, when added, shall follow the same assignment arrangement as the initial train until the trunk block relay growth of the added train equals that of the intertoll train. At this time the assignment of growth equipment for both trains shall be in accordance with the arrangement for separate train-combined operation.

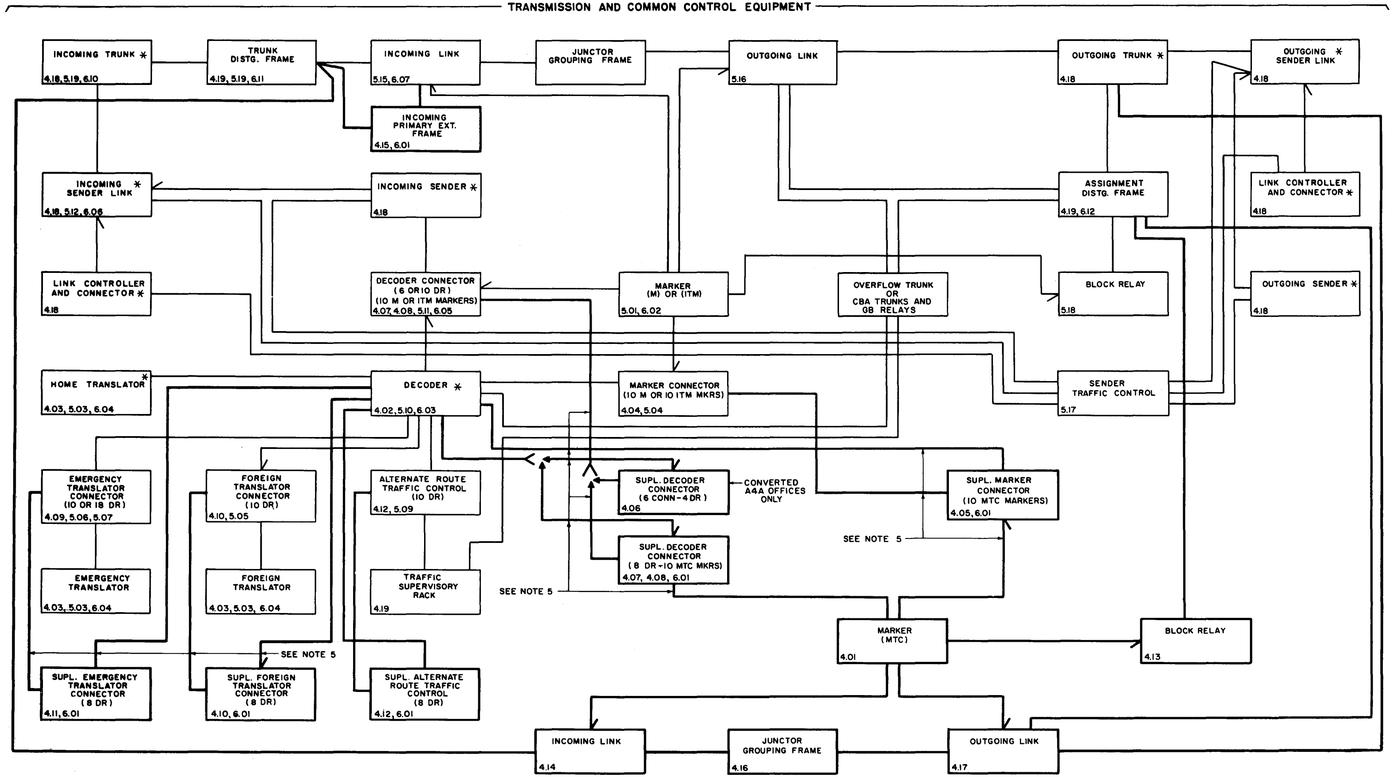
C. Notes

6.13 Floor space shall be reserved, to the left of the initially furnished connector frames and adjacent to the first incoming primary extension frame, for the supplementary connector frames and the incoming extension frames to be furnished at the time of expanding the office to separate train with combined operation in accordance with the following table:

Inc Pri Ext Fr	Supl Fr	Code	Size	Eqpt
Second Ext		J67437D	2 Feet 8-1/8 Inches	10 Switches 100 Trunks
Third Ext		J67437G	2 Feet 8-1/8 Inches	10 Switches 100 Trunks
	Marker Connector	J67446B or J67446D	2 Feet 2-5/8 Inches	2 Connectors 2 Decoders 10 TC Markers
	Decoder Connector	J67449K	2 Feet 8-1/8 Inches	3 Connectors 8 Decoders 10 TC Markers
	Foreign Translator Connector	J67445B or J67445E	2 Feet 2-5/8 Inches	2 Connectors 8 Decoders
	Emergency Translator Connector	J67445C or J67445F	2 Feet 2-5/8 Inches	1 Translator 8 Decoders
	Alternate Route - Traffic Control	J67444A	2 Feet 2-5/8 Inches	100 AR Relays 8 Decoders

6.14 The equipment furnished for initial combined train operation shall be designated for ultimate intertoll train operation.

6.15 When expanding the office, to provide separate train with combined operation the modification procedures covered in Part 5, where applicable, shall be followed in adding the supplementary frames and providing separate train-combined operation features.



TEST AND MISC. EQUIPMENT
(CONNECTIONS NOT SHOWN)

- TRAFFIC REGISTER 4.19
- SENDER MAKE BUSY 4.19
- INCOMING SENDER TEST 4.19
- FLOOR ALARM 4.19
- AUTOMATIC OUTGOING INTERTOLL TRUNK TEST 4.19, 5.14, 6.09
- AUTOMATIC OUTGOING TOLL CONNECTING TRUNK TEST 4.19, 5.13, 6.08
- TROUBLE RECORDER 4.19, 5.02
- OFFICE INTERRUPTER 4.19
- FRAME IDENTIFICATION FREQUENCY SUPPLY 4.19, 5.08

NOTES:

1. ▭ INDICATES INITIAL NO. 4A FRAMES FURNISHED FOR COMBINED TRAIN OPERATION.
2. ▭ INDICATES ADDED NO. 4A FRAMES REQUIRED TO MODIFY TO SEPARATE TRAIN COMBINED OPERATION.
3. NUMBERS IN EQUIPMENT BLOCK ARE PARAGRAPH NUMBERS IN TEXT WHICH COVERS THE PARTICULAR EQUIPMENT.
4. FRAMES MARKED WITH AN ASTERISK (*) INDICATE THOSE WHICH WILL BE REQUIRED IN GREATER NUMBER TO PROVIDE FOR THE GREATER TRAFFIC CAPACITY OF SEPARATE TRAIN COMBINED OPERATION.
5. THE INCREASED LEAD LENGTHS, IMPOSED WITH THE ADDING OF NON-ADJACENT SUPL FRAMES, SHALL NOT EXCEED THE LIMITING CONDUCTOR LENGTHS SPECIFIED IN J60103 (818-031-150).

Fig. 1 - Equipment Schematic No. 4A and Converted No. 4AA to Combined Train Operation

FIG. A
REARRANGEMENT OF INITIALLY FURNISHED SEVEN POINT TRK TERMINAL STRIP FOR ADDED "SMI" LEAD

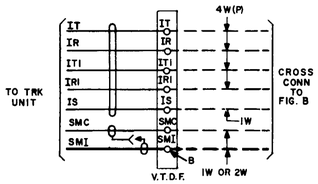


FIG. B
REARRANGEMENT OF INITIALLY FURNISHED SEVEN POINT LINK TERMINAL STRIP FOR ADDED "SMI" LEAD

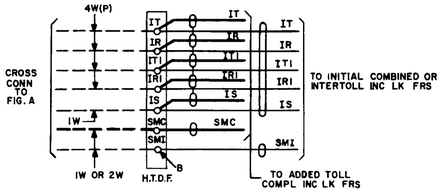


FIG. C
MODIFICATION PROCEDURE TO TRANSFER INITIAL TRAIN FROM SMC TO SMI LEAD OPERATION

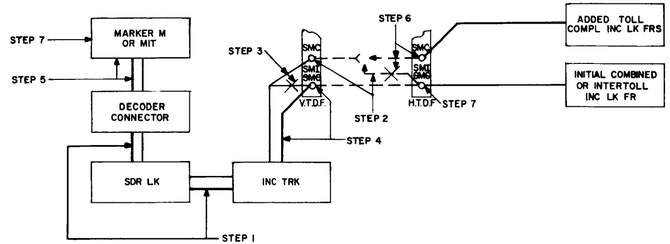


FIG. D
ARRANGEMENT OF T.D.F. FOR ADDED EQUIPMENT AND FOR INITIALLY INSTALLED COMBINED TRAIN OFFICES ARRANGED FOR ULTIMATE SEPARATE TRAIN COMBINED OPERATION

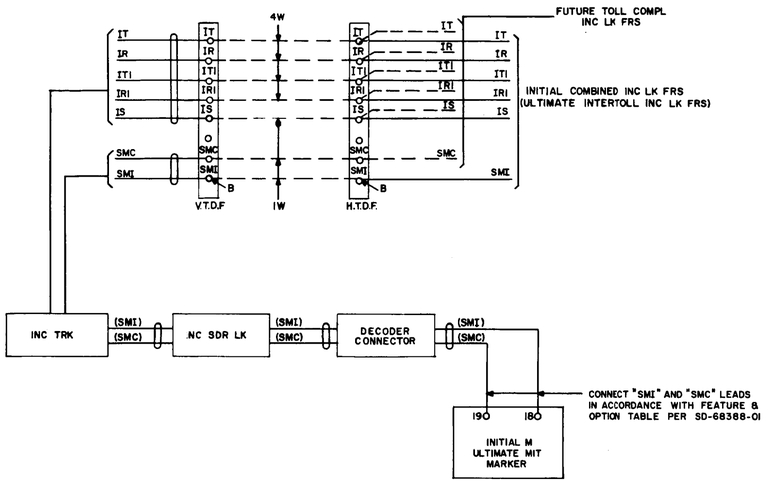


FIG. C STEP SEQUENCE	
STEP	PROCEDURE
1	ADD "SMI" LEADS BETWEEN FRAMES AS INDICATED.
2	STAMP SPARE VTDF TERMINAL "SMC" AND ADD CROSS CONNECTION TO IN-SERVICE HTDF "SMC" TERMINAL.
3	RELOCATE IN-SERVICE TRUNK "SMC" LEAD FROM INITIAL "SMC" TERMINAL TO ADDED "SMC" TERMINAL OF STEP 2.
4	RESTAMP "SMC" TERMINAL, SPARED IN STEP 3, TO READ "SMI" AND ADD TRUNK "SMI" LEAD.
5	MODIFY COMBINED MARKERS TO INTERTOLL COMBINED OPERATION BY ADDING "SMI" LEAD IN ACCORDANCE WITH THE FEATURE AND OPTION TABLE PER SD-68388-01. BLOCK MARKER (XIPS) RELAY NON-OPERATED UNTIL THE COMPLETION OF STEP 6.
6	STAMP SPARE HTDF TERMINAL "SMC" AND REMOVE CROSS CONNECTION AT HTDF "SMC" TERMINAL, PER STEP 2, AND CONNECT TO NEW "SMC" TERMINAL FOR USE WITH ADDED TOLL COMPLETING TRAIN.
7	REMOVE BLOCK FROM MARKER (XIPS) RELAY AND RESTAMP INITIAL HTDF "SMC" TERMINAL TO READ "SMI."

NOTES
1. —— INDICATES INITIAL LEADS
2. —— INDICATES ADDED LEADS

Fig. 2 - The Rearrangement and Assignment of "SMC" and "SMI" Leads at TDF for Separate Train-combined Operation

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