

**MODIFICATION OF EXISTING NO. 4 TYPE TOLL OFFICES
FOR ELECTRONIC TRANSLATOR SYSTEM
EQUIPMENT DESIGN REQUIREMENTS
NO. 4 TYPE TOLL SWITCHING SYSTEMS**

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Incoming Sender Test, and Incoming Sender and Register Test Frame	6	1.01 This specification, together with the sup- plementary information listed herein, cov- ers the general procedures for providing the Electronic Translator System for inservice 4A and 4M toll switching offices.	
Incoming, Outgoing and Intertoll Trunk Test Set	7	Description	
Automatic Incoming Trunk Test Frame	7	1.02 The Electronic Translator System (ETS) is designed to replace the decoder-card. translator equipment and has sufficient capacity to perform all routing and translation functions for a fully loaded 4A or 4M toll office. An office	
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equipped with an ETS has definite advantages over a card translator equipped office since the ETS provides greater translation flexibility and capacity, electrical alterability of route translation, greatly expanded trunk class translation, and greater adaptability to network management and new services.

1.03 The ETS is composed of a basic stored program control (SPC) and peripheral ETS frames. The SPC is a stored program, Digital Electronic Control System using piggy-back twistor modules, located on store frames, for program and data storage and a processor using low level transistor diode logic for signal processing and controls. The master scanner using ferrod sensors is provided to inform the processor of the status and condition of other SPC equipment. The central pulse distributor is provided for high speed execution of processor commands to both SPC and peripheral ETS equipment. Slow speed distribution to SPC equipment is via the signal distributor.

1.04 The ETS peripheral frames are provided to act as a buffer between the ETS and the remainder of the office equipment. The peripheral scanner (PSC) is an input buffer to the SPC with the link controller, decoder channel, and group busy relays being the principal circuits scanned. The distributor register frame provides fast single point distribution from its central pulse distributor applique (CPDA) circuitry to the link controllers and bulk distribution, 120 points, to decoder channels (DCH), network control equipment, and the trouble recorder. The DCH serves as an interface between the electromechanical elements of the office (senders and markers via decoder and marker connectors). The network control equipment (console and frame) is used to alter the routing procedure in the SPC by means of various controls activated from the console in the traffic management center. These controls replace those formerly provided on the alternate route traffic control frame.

1.05 New ETS frames (see Table A) fall into two categories, electronic and electromechanical. The electronic frames are composed of from one to three 2-foot 2-inches wide, 7-foot 0-inches high, and 1-foot 0-inches deep ESS type sheet metal bays. These low bays are floor supported and support their own cable racks and

lighting fixtures. The only new electromechanical frames required are the decoder channel and network control frames, which use standard 11-foot 6-inch high bulb-angle bays, 2-foot 2-5/8 inches and 2-foot 0-5/8 inches wide respectively and 10-inches deep.

1.06 The electronic frames require a separate +24 and -48 volt power and ground supply from the electromechanical frames in the office. A 111A power plant should be provided for this purpose. The separate ground supply requirement necessitates complete isolation between electronic and electromechanical frames with regard to cable racks, frame supports, building floors, etc.

1.07 The ETS has been designed to permit its introduction in an existing office on an inservice basis with the minimum of down time in common control equipment. The affected equipment is listed in Table B. The modification of this equipment and the installation of new equipment can be performed in various stages for ease of installation:

Stages

- I. Modifications made in preparation for ETS features and options.
- II. Modifications of existing equipment to add all or partial ETS features and options prior to cutting the ETS into service.
- III. Installation of ETS frames.
- IV. Actual transition from decoder to decoder channel (ETS) operation.
- V. Removal of unneeded equipment and conversion options after the office has been entirely converted to ETS operation.

Stages I, II, and III have been organized as three separate stages to present a logical breakdown of installation effort. These stages can overlap and should particularly with II and III.

1.08 A number of nonETS features, such as use of the E4390A trouble record card, removal of pretranslation in the senders, and increased capacity in the decoder connectors are required prior to ETS conversion. In addition consideration should be given to adding in-

creased capacity in the markers and the incoming and outgoing links if they are not already so arranged. The increased capacity features will reduce ETS holding time and will permit new decoder connector frames to handle their maximum sender capacity (36 senders per frame, 9 per connector). The marker speedup alone increases the new decoder connector frame capacity in an ETS equipped office from 28 to 32 senders. Adding the link frame increase capacity permits the 36 maximum senders.

1.09 One new marker connector frame equipped with three connectors is required for conversion and will be associated with the first three decoder channels cut into service. Though not recommended, the existing marker connectors could be reused for the remaining decoder channels (see 7.02). The advantages of all new marker connectors are:

1. Channels and connectors can be pretested before conversion begins.
2. Increased capacity version will decrease decoder channel holding time. (Old version cannot be modified for increased capacity.)
3. Old flat spring version connectors will have a shortened life due to higher ETS usage.
4. Ease of conversion.

2. SUPPLEMENTARY INFORMATION

General

- J69202 (818-005-150) — General Outline — Operating and Equipment Features — No. 4A Office
- J69212 (818-007-152) — Modification Procedures to Provide Increased Capacity Features

Cabling, Wiring, and Lighting

- J25552 (818-035-150) — Frame Lighting and Appliance Outlets
- J60101 (818-030-150) — Switchboard Power Cabling
- J60103 (818-031-150) — Limiting Conductor Lengths Between Frames and Units

Miscellaneous Frames

- J67422 (818-040-150) — Office Interrupter Frame
- J67444 (818-044-150) — Alternate Route Traffic Control and Traffic Control Frames

Miscellaneous Equipment

- J62601 (818-082-150) — Traffic Register Equipments
- J62603 (818-082-151) — Traffic Register Equipment
- J62604 (818-083-150) — Traffic Supervisory Rack
- J62607 (818-083-151) — Traffic Supervisory and Register Rack and Auxiliary Traffic Supervisory Cabinet Equipments

Automatic Message Accounting Equipments

- J67454 (818-104-150) — CAMA Sender Link Frame
- J67458 (818-105-150) — CAMA Sender Frame
- J67459 (818-107-150) — Trunk Class Translator and Supplementary Trunk Class Translator Frames
- J67460 (818-113-150) — Trouble Recorder Connector Frame

Incoming and Outgoing Link Frames

- J67437 (818-200-150) — Incoming Link Frame — Primary and Secondary Extension Frames
- J67438 (818-201-150) — Outgoing Link Frame — Primary and Secondary Extension Frames

Sender Equipments

- J67402 (818-330-150) — Incoming and Outgoing Sender Link Frames
- J67407 (818-331-150) — Link Controller and Connector Frame
- J67430 (818-300-150) — Incoming Sender Frame — DP and MF Sender Equipment Units — No. 4A Office
- J67431 (818-302-150) — Incoming DP and MF Sender Equipment Subunits
- J67452 (818-301-150) — Incoming Sender Frame — DP and MF Sender Equipment Units — No. 4M Office
- J67467 (818-304-150) — Overseas Sender Frame REV, PCI, SXS and CA Sender Equipment Units
- J67468 (818-303-150) — Incoming MF Sender Frame — No. 4A Office

Decoder Equipments

- J67439 (818-400-150) — Decoder Frame
 J67449 (818-401-150) — Decoder Connector Frame and Supplementary Decoder Connector Frame

Translator Equipments

- J67442 (818-420-150) — Card Translator Equipment
 J67445 (818-421-150) — Foreign Translator Connector Frame — Emergency Translator Connector and/or Frame Identification Frequency Control Frame

Marker Equipments

- J67440 (818-450-150) — Marker Frame
 J67446 (818-451-150) — Marker Connector Frames

Test Frames

- J67418 (818-705-150) — Automatic Outgoing Toll Connecting Trunk Test Frame — Outgoing Toll Connecting Trunk Test and Make-Busy Frame — Outgoing Toll Connecting Trunk Test Connector Frame
 J67443 (818-701-150) — Trouble Recorder Frame — No. 4A Office
 J67447 (818-706-150) — Automatic Outgoing Intertoll Trunk Test and Connector Frames — Automatic Transmission Test and Control Frames — Teletypewriter Frame — Floor Model 28-Type Teletypewriter
 J67461 (818-707-150) — Automatic Incoming Trunk Test and Connector Frames
 J67462 (818-702-150) — Incoming Sender and Register Test Frame

Test Sets

- J63525 (818-740-150) — Incoming, Outgoing and Intertoll Trunk Test Set — (Wagon Type) — and Associated Relay Rack Equipment

Alarm Equipments

- J67423 (818-780-151) — Floor Alarm Units
 J67441 (818-780-150) — Floor Alarm Frame

Stored Program Control Frame and Units

- J1C020 (AA381.337) — Processor Frame
 J1C021 (AA381.338) — Control Display — Program Tape and TTY Frame

- J1C022 (AA381.339) — Master Scanner Frame
 J1C023 (AA381.340) — Signal Distributor Frame
 J1C024 (AA381.341) — Central Pulse Distributor Frame
 J1C025 (AA381.342) — Filter Units
 J1C026 (AA381.343) — Store Frame
 J1C027 (AA381.344) — Stored Program Control No. 1A — General — Common Systems

Electronic Translator Peripheral Frames and Units

- J67471 (818-425-150) — Decoder Channel Frame
 J67472 (818-425-151) — Peripheral Scanner Frame
 J67473 (818-425-152) — Distributor Register Frame, and Central Pulse Distributor Applique Unit
 J67474 (818-425-153) — Alarm and Display Frame
 J67475 (818-425-154) — Power Distributing Frame and Miscellaneous Power Distributing Units
 J67476 (818-425-155) — Peripheral Function Translator Unit
 J67479 (818-425-156) — Teletypewriter Buffer Frame
 J67492 (818-048-150) — Miscellaneous Frame

3. DRAWINGS

- ED-68958-() — Office Alarm Unit for 7-foot Electronic Frames
 ED-68870-01 — Wire Gauge and Types of Insulation
 ED-1A150-70 — Single Bay Frame Assembly
 ED-1A151-60 — Double Bay Frame Assembly
 ED-68936-30 — AC Power Distribution and Frame Base Appliance Outlets
 EA-1A159-10 — Method of Terminating Battery and Ground Feeders
 ED-1A184-70 — Line-up Cable Racks
 ED-1A184-73 — Line-up Cable Rack Covers
 ED-1A197-71 — Cross-aisle Cable Rack
 ED-1A198-71 — End Guard Assemblies
 ED-68066-() — Method of Running and Connecting Power Feeders, 111A Power Plant
 ED-68918-12 — Method of Running Power Feeders

- ED-1A209-70 — Cable Rack Support Stanchion Assembly
- ED-1A210-11 — Method of Installing Framework
- ED-1A210-12 — Method of Installing End Guards
- ED-1A210-13 — Method of Installing Cable Rack Support Stanchion
- ED-1A210-14 — Method of Installing Line-Up Cable Racks
- ED-1A210-15 — Method of Installing Cross-Aisle Cable Troughs
- ED-1A227-01 — Method of Running and Butting Switchboard Cables
- ED-1A228-50 — Directory and Fuse Holder Assembly for End Guards
- ED-1A232-10 — Typical Cable and Equipment Arrangement for 514-Type Terminations in End Guard
- ED-1A250-70 — Triple Bay Frame Assembly
- ED-1C111-31 — Specific Requirements For Wiring and Cabling TSPS No. 1, SPC No. 1A, and ETS
- ED-82097-30 — Frame Aisle Lighting
- H-396-207 — Modification of Trouble Recorder Test and Perforator Frames For Electronic Translator Conversion

4. ETS MODIFICATION OF EXISTING EQUIPMENT

The modifications listed in this section for each frame are as of the circuit drawing issue shown in Table B. See sections 5 and 6 for the sequence in which these changes should be applied.

Marker — J67440A

4.01 Marker modifications consist of adding the “trunk selection scan and marker registration failure retrial” features per SD-68388-01, Fig. 49 and “TN” option prior to installation of the decoder channel frames. The “announcement trunk routing” and “recording of stuck sender” features per SD-68388-01, Fig. A, B, 36, 37, and 40; “TJ” option of Fig. 8, and 13; “TO” option of Fig. 42; and wiring option “XR” and “WE” are not required with ETS operation but, if provided, cannot be removed until the last decoder is removed from service. These features can, if desired, be left in operation without affecting the marker operation in an ETS equipped office.

Marker Connector Frame — J67446A, B, C, D, J, and K

4.02 Marker connector frame modifications consist of adding ETS features by replacing “ZI” option with “ZH” option of SD-68395-01. This includes the addition of a frame terminal strip for distributing the “M” leads to the decoder connectors. This distribution was formerly performed at the decoder frames (see 1.09 and 7.02).

Sender Link Frame — J67402A, C, E, and F, J67454A

4.03 Sender link frame modifications consists of adding 3-out-of-7 cross-connections on existing terminal strips to identify the sender link frame number through the controller connector to the peripheral scanner frame per SD-68334-01, “ZY” option (J67402C, E, or F) for non-CAMA and SD-68486-01, “S” option (J67454A) for CAMA. The J67402A frame (Philadelphia only) shall be modified per SD-68023-01, “ZN” option.

Link Controller and Connector Frame — J67407A, E, and F

4.04 Link controller and connector frame modifications consist of adding sender link identification leads to the peripheral scanner frame per SD-68336-01, “ZC” option and adding ETS features per SD-68028-01, Fig. 8 and 9, and “XC” and “XJ” option. (Option “XJ” cannot be connected until the SPC is in service until which time temporary option “XH” is required.) Also furnish “XE” and “XG” options if the link controller test circuit is provided and “XD” if not provided. This frame must be updated to include SD-68028-01, Fig. M, O, and S and “XA”, “YN”, “ZC”, and “ZP” options. Controller connector circuit SD-68025-01 (Philadelphia only) is modified by adding “ZE” option.

4.05 The apparatus per SD-68028-01, Fig. 8 is mounted on a new mounting plate replacing SK.A of J67407D-(). This requires relocating the ten 177C networks presently located on SK.A to SK.B. The five 177H networks presently on SK.A will be provided on the new mounting plate. Apparatus per SD-68028-01, Fig. 9 is added on existing SK.K and L of J67407D-() (List 2 per J67407D furnishes Fig. 8 and 9). In addition two, 224B terminal strips for terminating switchboard cable to the

peripheral scanner must be added in positions 14 and 15 of SK.S. The switchboard cable leads to the front of the terminal strips are to be brought through the drilling in position 16 of SK.S and should be sleeved where passing through the plate.

Decoder Connector Frame — J67449B, B, F, J, G, and Y

4.06 The J67449Y basic frame (4 connector and 12 decoder capacity) modification includes adding a 255F terminal strip per Fig. J of J67449Y-() and modifying the stamping on terminal strips per Fig. E, F, and G. In addition, SD-68339-01, Fig. 12, and "XH" option (J67449, List 10) must be provided per equipped connector. One new frame mounting plate is used to mount all four Fig. 12 for the four connectors on the frame.

4.07 The J67449F basic frame (3 connector and 10 decoder capacity) modification includes adding a 255F and 251H terminal strip per Fig. P and Q of J67449F-(). In addition, SD-68339-01, Fig. 3, 7, R, and M, and "XH" option and SD-68339-01, Fig. 12 must be provided per equipped connector. One new frame mounting plate is used to mount all three Fig. 12 for the three connectors on the frame.

4.08 The J67449G basic frame (3 connector and 10 decoder capacity) modifications includes adding a 255F terminal strip per Fig. P and changing the stamping terminal strips per Fig. N of J67449G-(). In addition, SD-68339-01, Fig. 3, R, and M, and "XH" option and SD-68339-01, Fig. 12 must be provided per equipped connector. In combined train offices SD-68339-01, Fig. 7 is also required per equipped connector. One new frame mounting plate is used to mount all three Fig. 12 for the three connectors on the frame.

4.09 The J67449B basic frame (3 connector, 6 decoder capacity) modification includes adding a 255F terminal strip per Fig. L of J67449B-() and equipment per SD-68339-01, Fig. 4 and 12, and "XH" option for each equipped connector. The arrangement of this apparatus is covered on J67449B-().

4.10 The J67449J supplementary frame (6 connector, 4 decoder capacity) modification consists of adding a BB8A terminal strip per

Fig. K and changing the stamping on the terminal strip per Fig. J of J67449J-().

Trouble Recorder Frame — J67443A, B, S, and T

4.11 The trouble recorder frame modifications include adding ETS features per SD-68392-01, Figs. 111 and 118 to 132 and options "ZC" and "ZE"; and per SD-68405-01, Fig. 8, and "K" option, plus "H" option if any controller serves both incoming and outgoing senders. The major change, however, is on SD-68389-01 and is covered in detail on notes 102 and 130 of that drawing.

4.12 A new single plate unit J67443AG is required for SD-68392-01, Fig. 126. The other new apparatus figures required for SD-68392-01 are furnished as part of existing units. Two new units J67443AE and F are required for SD-68389-01, Fig. 57 and 58, respectively. The new apparatus for SD-68405-01 is furnished as part of Fig. Y of the J67443A or S frame.

4.13 In addition to the standard units of 4.12, four transitional units are required. These are the J67443AH unit (SD-68389-01, Fig. 59 and 60) and Fig. C, E (SD-68392-01, Fig. 11) and D (SD-68389-01, Fig. 58) of H-396-207. Fig. 1 of H-396-207 shows the mounting locations for all of these units. The right hand writing shelf must be removed before mounting Fig. C and D. After the transition to ETS is completed the J67443AH unit is removed and Figs. C, D, and E are relocated to their standard locations per Fig. U of J67443B or T and Fig. Y of J67443A or S.

Incoming Sender Test Frame — J67433W

4.14 Incoming sender test frame modifications consist of replacing the trunk class check feature per SD-68226-01, "UW" option with "UX" option for connections to decoder channel and peripheral scanner and replacing Fig. T with Fig. S. In addition "TH" and "UN" options must be provided if senders are arranged for interchangeable office and area codes and option "TI" if not so arranged. In offices equipped with overseas senders, options "N" and "TF" are required. Equipment modifications are covered on J67433W-().

Incoming Sender and Register Test Frame — J67462A

4.15 Incoming sender and register test frame modifications consist of adding ETS features per SD-68491-01, Fig. 1, "YG" option (J67462A, List 15), replacing "YH" option of Fig. 8 with "YI" option, and removing "YF" option in Fig. 1 and 8.

Incoming Sender Test Transitional Unit — J67462K

4.16 A transitional circuit per SD-68636-01 (J67462AK) is required during the period when converting from decoder to decoder channel operation. This unit is required one each per incoming sender test frame and incoming sender and register test frame, and consists of a single 4-inch mounting plate with J67462AK, List 1 always provided. One list 2 is required for each 18 senders in excess of 108. This unit is to be removed after the conversion to decoder channel operation has been completed.

Incoming, Outgoing, and Intertoll Trunk Test Set — J63525D, G, and H

4.17 The incoming, outgoing, and intertoll trunk test set wagon and relay rack mounted unit modifications consist of adding a new incoming trunk test feature to verify a sender link frame identification cross-connection and trunk class information stored in ETS memory. This change requires the replacement of "YE" option with "YF" option of SD-68359-01.

Automatic Incoming Trunk Test Frame (AITT) — J67461A

4.18 The AITT frame modifications consist of adding a trunk class verification feature per SD-68484-01, "H" option of Fig. 8 (J67461G, List 2) and removal of "J" option of Fig. 1 and 8.

Automatic Outgoing Toll Connecting Trunk Test Frame (AOCT) — J67418D, J67418H

4.19 The AOCT frame modification consist of adding the ETS features per SD-68373-01, Fig. W and removing Fig. M if provided. Also add option "WZ" in separate train combined operation offices.

Automatic Outgoing Intertoll Trunk Test Frame (AOIT) — J67447A

4.20 The AOIT frame modification consist of adding the ETS features per SD-68404-01, Fig. U and removing either Fig. G or H. In two train offices also add option "WS."

Automatic Outgoing Toll Connecting Trunk Test Frame (ATCT) — J67418A

4.21 The ATCT frame modification consist of adding the ETS features per SD-68067-01, Fig. 31 and "WD" option and removing Fig. 18 and "YM" or "YL" option.

Automatic Outgoing Toll Connecting Trunk Transmission Test Frame (AOTT) and Automatic Outgoing Toll Trunk Operational Test Frame (AOOT) — J67418J and K

4.22 The AOOT and AOIT frame modifications consist of the removal of SD-68580-01, "ZP" option (if provided) and in separate train, combined operation offices, the addition of "ZN" option and the removal of "ZM" option.

Trunk Class Translator Frame — J67459A

4.23 Trunk class translator frame ETS modification consist of removing SD-68492-01, Fig. 1 and 7, and "X" option after the office has been entirely converted to ETS operation. However, if desired, the equipment can be left in place and only "X" option removed.

Floor Alarm Frame — J67441A, J67423A

4.24 Floor alarm frame modifications include adding an alarm relay for each aisle of decoder channel frames and for the 120V ac distribution panel per SD-68067-01, Fig. 27 (J67441D, List 7) and one alarm relay for the network control frame per SD-68067-01, Fig. 1 (J67441C, List 2). An additional alarm relay is required per aisle for each other type of ETS frame per SD-68067-01, Fig. 33 (J67441D, List 26) and for each type of SPC frame per SD-68067-01, Fig. 36, List 28). One circuit failure major and minor alarm frame relay is also required for each the alarm and display frame per SD-68067-01, Fig. 34 (J67441D, List 27) and the control and display frame per SD-68067-01, Fig. 37 (J67441D, List 29). For those offices having the J67423A frame the SD-68067-01, Fig. 33, and 36 are furnished per J67423F, Lists 2, and 3, respectively, and Fig. 34 and 37 per List 1.

Circuit Busy Announcement Trunk Frame — J67448A

4.25 Group busy chain relay modification consist of adding the "SCN" register per SD-68420-01, Fig. 3 "ZD" option, (J67448D or J67448E, List 4) and leads to the peripheral scanner. The leads to the decoders, "W" and "ZC" option, cannot be removed until the decoders have been removed from service.

Interrupter Frame — ED-25213-()

4.26 Provide new or assign existing interrupters per Items 229, 230, and 231 of SD-68058-01.

Traffic Register Frame — J62601, J62603

4.27 Provide necessary traffic registers per table of corrections (Electronic Translator Office only) of SD-68060-01 or SD-68412-01.

Traffic Control Frame — J67444D

4.28 Traffic control frame modifications consist of adding ETS features per SD-68967-01, "V" option and removing "W" option.

5. CONVERSION STAGES

Stage I — Modifications Made in Advance and Preparation for ETS Features and Options.

5.01 The following modifications are required and must be provided in offices in which they are not already provided:

- (a) remove pretranslation features from the senders per J69212,
- (b) add increased capacity features to the decoder connectors per J69212, and
- (c) modify the trouble recorder per SD-68389-01, part of note 103.

The part of note 103 done during this stage is as follows:

- (1) Equip E-4390A card by adding Fig. 43 and options "YZ", "YV", "YX" and "XE" and either option "WT" for 10 or less decoders or Fig. 60 for more than 10. This *must* be done as the first step. Once this

change is started a trouble record card cannot be made by the trouble recorder until it is finished.

- (2) Add Figs. D and E and options "E", "CL", "YB", "WP" and "ZN" and also "J" where office is non-CAMA. These figures and options can be added in any order and one at a time if desired.

- (3) Add Fig. 50 and options "YT" and "WA" and also "VI" or "VH" options for CAMA offices having new numbering plan. These figures and options can be added in any order and one at a time if desired.

5.02 The following increased capacity features are not required for ETS operation but are recommended to be added per J69212 if they are not already provided (See 1.08):

- (a) incoming and outgoing link,
- (b) marker,
- (c) decoder-marker test and trouble recorder's marker increased capacity compatibility options.

Stage II — Modifications of Existing Equipment to Add All or Partial ETS Features and Options Prior to Cutting the ETS Into Service.

5.03 Modifications to be made as part of Stage II are as follows:

1. **Docoder Marker Test and Trouble Recorder Frame**

- (a) Add Figs. 57, 58 and 59 and options "WE" and "WH." Add option "WR" or "WQ" for CAMA and non-CAMA respectively. Also for TASI equipped offices add options "WB" and "WC" and for private network calls add option "WK". All of these changes are per SD-68389-01, Note 103. These changes should be done in one step.

- (b) Add modifications covered in 4.11 and 4.12 for SD-68392-01 and SD-68405-01. The changes for each circuit may be done separately in individual steps.

2. **Marker** — Add the marker registration failure retrial request feature (see 4.01).

3. **Sender Link** — Add modifications covered in 4.03.

4. **Link Controller and Connector** — Add modifications covered in 4.04 and 4.05. Note that SD-68028-01, "XJ" option should not be provided at this time.

5. **Decoder Connector** — Depending on the decoder connector version and the number of decoders, some of the modifications covered in 4.06 to 4.10 can be done prior to the actual conversion to ETS operation included in Stage IV and covered in Section 6. Basically these items are:

- (a) add new terminal strips,
- (b) change stamping on existing terminal strips, as required.
- (c) mount new apparatus. (Fig. 12 can be mounted and wired if the TIA and TIB relays are blocked non-operated.)
- (d) add new multiple leads between connector frames and connect leads if terminals are spare.
- (e) apply steps 1 to 3 of the decoder to decoder channel basic plan as covered in 6.02 if that plan is used.

6. **Incoming Sender and Register Test Frame** — Add modifications covered in 4.15 and add the incoming sender test transitional unit covered in 4.16. Note that the transitional circuit SD-68636-01, "Y" option in effect retains SD-68491-01, "YF" option and cancels part of "YG" option.

7. **Incoming Sender Test Frame** — Add modifications covered in 4.14 and the incoming sender test transitional unit (if not already provided) covered in 4.16. Note that the transitional circuit SD-68636-01, "Y" option in effect retains SD-68226-01, "UW" options and cancels part of "UX" option.

8. **Incoming, Outgoing and Intertoll Trunk Test Set** — Add modifications covered in 4.17.

9. **Traffic Register Frame** — Provide traffic registers as covered in 4.27.

10. **Automatic Incoming Trunk Test Frame (AITT)** — Add SD-68484-01, "H" option as covered in 4.18 to allow incoming trunks either associated with decoder or decoder channels to be tested. Do not remove "J" option at this time.

11. **Floor Alarm Frame** — Add modifications and new units as covered in 4.24.

12. **Interrupter Frame** — Provide additional interrupters as covered in 4.26.

Stage III — Installation of ETS Frames.

5.04 Installation of new ETS frames (see Table A) and Stage III modifications are as follows:

1. Install and test the new electronic ETS frames and a new 111A power plant.
2. Install and test decoder channel frames with new marker connector frames (see 1.09 and 7.02).
3. Install and test network control frame and console.
4. After ETS preliminary testing, connect distributor register and peripheral scanners to the electromechanical portion of the office.
5. Add straps per SD-68028-01, "XJ" option, removing "XH" option, at the link controller and connector (see 4.04 and 4.05). After each strap is added, perform operational tests from the link controller test circuit. This verifies controller scanner appearances and CPD applique circuits. Turn up controller for service to permit calls to be presented to SPC for memory storage. Calls will still be completed via decoder-card translators at this time.
6. Make operational test via decoder-marker test and trouble recorder frame. These are overall tests of decoder channels, marker connectors, markers, peripheral scanner, distributor registers, and the SPC translation data.
7. Perform trunk class verification test of SPC memory via teletypewriter.

Stage IV — Actual Transition From Decoder to Decoder Channel (ETS) Operation.

5.05 This specification covers five plans (A-E) for converting from decoder to decoder channel (ETS) operation. Plans A and B will work in all offices equipped with four or more decoders. The other plans have certain advantages in particular offices. These plans covered in Section 6 should be reviewed to establish which is best for a particular conversion.

5.06 The outgoing trunk test frames (see 4.19 through 4.22) that gain access to the outgoing trunks through a sender appearance on decoder connectors cannot be modified and still be available for testing unless the decoder connector to which each is wired is turned up for ETS operation. The modification of these frames should therefore be coordinated with the associated decoder connector modifications.

5.07 Modify existing marker connectors that are to be reused with decoder channels. (See 1.09 and 7.02.)

Stage V — Removal of Unneeded Equipment and Conversion Options After the Office Has Been Entirely Converted to ETS Operation.

5.08 The following changes should be done after the last decoder is removed from service:

1. **Incoming Sender and Register Test Frame** — Add SD-68636-01, "Y" option (see 4.16) and remove SD-68491-01, "YF" option, (see 4.15). The transitional unit J67462AK should then be removed.
2. **Incoming Sender Test Frame** — Add SD-68636-01 "Y" option (see 4.16) and remove SD-68226-01, "UW" option (see 4.14). The transitional unit J67462AK should then be removed.
3. **Automatic Incoming Trunk Test Frame** — Remove SD-68484-01, "J" option (see 4.19).
4. **Trunk Class Translator Frame** — Modify this frame per paragraph 4.17.
5. **Trouble Recorder Frame** — Apply stage 2 of note 130 of SD-68389-01 and note 1.14 of SD-68392-01. (See 4.11-4.13.) The decoder terminal strips should be removed at this time and the decoder channel strips moved back into position. In addition, the equipment located in the position of the right hand writing shelf should be relocated and the writing shelf reinstalled.
6. **Traffic Control Frame** — Replace card translator option "W" with ETS option "V" per SD-68967-01.

7. **Marker** — Remove announcement trunk routing and recording of stuck sender features. (See 4.01.)

8. Remove decoders, card translators, translator connectors, and the alternate route traffic control.

6. PLANS FOR CONVERTING DECODER CONNECTORS TO OPERATE WITH DECODER CHANNELS

6.01 This section covers five methods of converting existing decoder connectors from decoder to decoder channel (ETS) operation. Most serious consideration should be given to plan A since overall it is more practical from an economic and ease of conversion standpoint in offices not having excess decoder capacity.

Due to excessive office installation activity, particularly during the early transitions stages, a minimum of four decoder channels should be provided in all offices converting from decoder to ETS operation.

Plan A— Establish a Separate Decoder Channel Group by Adding Additional Decoder Connectors

6.02 Plan A requires the addition of a sufficient number of new decoder connectors for reassigning existing office senders in order to deload traffic from the existing decoders. Enough senders must be reassigned to permit removing three decoders from service with the remaining decoders having sufficient capacity to handle normal traffic conditions. While this plan does require recabling of a number of senders and additional decoder connector frames overall, it represents the most practical plan in a decoder limited office. The plan applied to a 10 to 12 decoder office converting to five decoder channels is covered in the following steps:

1. Add new DC frames equipped with ETS options and for five DCHs and nine senders per connector (36 senders per DC frame).
2. Connect DCH0-4 to the added DC frames.
3. Reassign one sender to the new ETS decoder connectors for an in-service test of the ETS.
4. Reassign sufficient additional working senders to the new connectors to allow DR0-2 to be removed from service.

5. Block operated CB relays for DR0-2 on all non ETS DC frames and remove DR0-2 permanently from service.
6. Modify the DR0-2 multiples and preference chain for ETS operation.
7. Individually connect the DCH0-2 multiples and preference chains between the new and old DC frames.
8. On a connector by connector basis on existing connectors:
 - (a) busy senders,
 - (b) block all remaining CB relays operated,
 - (c) apply ETS modifications
 - (d) unblock CB relays for DCH0-2,
 - (e) test senders with DCH0-2, and
 - (f) restore senders for ETS operation until the remaining decoders are deloaded sufficiently so that DR3 and 4 can be removed permanently from service.
9. Repeat steps 5 through 8 for DCH3 and 4 and the remaining DC frames.

Plan B — Establish a Partial Decoder Channel Group

6.03 Plan B is to establish a partial decoder channel group by rearranging the decoder connector multiple and chain leads for three decoders. The actual sender conversion to ETS operation would be on a connector by connector basis. The main advantage to this plan is that it will work in all offices presently equipped with four or more decoders and will generally provide an economical transition while still leaving an adequate number of senders, decoders, and decoder channels in service at all times. The two basic requirements of this plan are (1) an adequate number of senders, decoders and/or decoder channel must always be available to handle normal traffic conditions and (2) any sender must have access to a minimum of two (preferably three) decoders or decoder channels. The plan does, however, require some decoder to decoder connector recabling and connector multiple rearrangements. The plan applied to a 10 to 12 decoder office converting to operation with

five decoder channels is covered in the following steps (also see Fig. 1):

1. Recable DR0:
 - (a) busy DR0
 - (b) remove cable from DR0 to DC frame 0 and add temporary cable from DR0 to last DC frame in multiple. This includes "M" leads from the MC.
 - (c) restore DR0
2. Repeat step 1 for DR2
3. Recable DR1:
 - (a) busy DR1
 - (b) disconnect DR1 multiple at DC frame 0 and add temporary cable from DR1 to last DC frame in multiple. This includes "M" leads to the MC.
 - (c) restore DR1
4. Busy DR0 and block operated CB relays associated with DR0 on DC frames 0-3.
5. Disconnect DR0 multiple, including "M" leads, between DC frames 3 and 4 at either DC frame.
6. Establish a DCH preference chain for DC frames 0-3 separate from the other DC frames and then restore DR0.
7. Modify the DR0 multiple between DC frames 0-3 for ETS operation.
8. Connect DCH0 and its associated MC (M leads) to the modified DR0 multiple at DC frame 0.
9. Repeat steps 4 through 8 for DR1 and DCH1.
10. Repeat steps 4 through 8 for DR2 and DCH2.
11. On a connector by connector basis on DC frames 0-3:
 - (a) busy senders
 - (b) block remaining CB relays operated
 - (c) apply ETS modifications
 - (d) unblock CB relays for DCH-2
 - (e) test senders with DCH0-2

(f) restore senders for ETS operation

(The total number of DR minus three should have enough capacity to serve all senders not assigned to DC frames 0-3.)

12. Block operated CB relays for DR3 on DC frame 4 to the last DC frame.
13. Remove DR3 from service.
14. Modify the DR3 multiple for ETS operation.
15. Replace the DR3 appearance on DC multiple with DCH3, including "M" leads to new MC.
16. Unblock CB relays for DCH3 on DC frames 0-3.
17. Repeat steps 12 to 16 for DR4 and DCH4.
18. Block operated CB relays for DR2 and DC frame 4 to the last DC frame.
19. Remove temporary cable previously added in step 2 between DR2 and the last DC frame in the multiple.
20. Modify the remainder of DR2 multiple for ETS.
21. Busy DCH2 and reconnect the DR2 multiple (modified) previously disconnected in step 10 between DC frames 3 and 4.
22. Revert to a single DCH2 preference chain for all DC frames and then restore DCH2.
23. On a connector by connector basis on DC frames 4 to 6:
 - (a) busy senders
 - (b) block remaining CB relays operated
 - (c) apply ETS modifications
 - (d) unblock CB relays for DCH2-4
 - (e) test senders with DCH2-4
 - (f) restore senders for ETS modifications

(The total number of original DR minus five should have the capacity to serve all senders not assigned to DC frames 0 to 6.)
24. Block operated CB relays for DR0 and 1 on DC frame 0 to last DC frame.
25. Remove cables previously added in steps 1 and 3 between DR0 and 1, respectively, and the last DC frame in the multiple.
26. Remove the cable from DR1 to its original appearance at the DC multiple.
27. Modify the remainder of the DR0 and 1 multiple for ETS.
28. Busy DCH0 and 1 and reconnect the DR0 and 1 multiple (modified) previously disconnected in steps 5 and 9, respectively, between DC frames 3 and 4.
29. Revert to single DCH0 and 1 preference chains for all DC frames and then restore DCH0.
30. Relocate the DCH1 cable to initial DR1 appearances:
 - (a) remove cable added in step 9 from DCH1 to DCH frame 0
 - (b) add cable from DCH1 to original appearance of DR1 at DC frame 4
 - (c) reconnect the DR1 multiple previously disconnected in step 3 at DC frame 0
31. Restore DCH1.
32. On a connector by connector basis on remaining DC frames:
 - (a) busy senders
 - (b) block remaining CB relays operated
 - (c) apply ETS modifications
 - (d) unblock relays for DCH0-4
 - (e) test senders with DCH0-4
 - (f) restore senders for ETS operation
33. Modify DCH0-4 preference chains per SD-68339-01 for full ETS modifications.

Plan C — Establish a New Decoder Channel Group with New Decoder Connectors

6.05 Plan C is to establish a new decoder channel group with all new decoder connectors, reassigning senders to the new group. After a few of the senders were reassigned, the ETS would be made operational and work in parallel with the card translators. The card translator complex would be disabled and removed only

after the last sender is reassigned. This plan offers a smooth transition period without affecting the traffic handling capability of the office. It cannot, however, be justified from a strictly economic standpoint due to the cost of the new connectors and recabling the senders. However, since the new connector frame can handle 36 senders and occupies less floor space than its predecessors, offices which are floor space limited with the older vintage decoder connectors, should be reviewed to determine if the increased cost is justified.

Plan D — Direct Replacement of Decoders with Decoder Channels

6.06 Plan D is the direct replacement of decoders with decoder channels with the first two decoders replaced initially without de-loading decoders. The actual sender conversion to ETS operation would be on a connector by connector basis. This plan offers minimum installer effort but does affect the traffic handling capability of the office. Since most offices converting to ETS will be decoder limited, plan D will be difficult to use but should be considered since aside from its traffic effect, it is the easiest and most economical conversion method. The basic steps to be followed in a typical office are:

1. Busy DR0 and 1.
2. Block operated CB relays associated with DR0 and 1 on all DC frames.
3. Modify the DCH0 and 1 multiple and preference chain for ETS operation.
4. Replace DR0 and 1 appearance at the DC with DCH0 and 1, including recabling the "M" leads directly to the new MC frame.
5. On a connector by connector basis (until 30 to 35 senders have to be converted):
 - (a) busy senders
 - (b) apply ETS modifications
 - (c) unblock CB relays from DCH0 and 1 test senders with DCH0 and 1
 - (d) restore senders for ETS operation
6. Repeat the preceding steps on a single DCH basis until all DCH are in service.

Plan E — Add New Decoder, Decoder Channel Appearances on Existing Decoder Connector Frames

6.07 Plan E requires the addition of two new decoder or decoder channel appearances on existing decoder connector frames. The actual sender conversion to ETS operation would be on a connector by connector basis. The plan offers a smooth transition period without affecting the traffic handling capacity of the office, but has the disadvantage of the cost of the extra connector relays. In addition, it would be necessary to reassign DR0 and 1 initially or reassign the DCH assigned to the new appearances after transition, to allow sequential growth of decoder channels. This plan cannot be used in offices with more than eight decoders and should only be considered in smaller offices with large growth potentials. The basic steps to be followed (not reassigning DR or DCH) in a typical office are:

1. Add two new DCH appearances on all new DC, arranging their preference chain and multiple for ETS operation.
2. Block operated CB relays associated with the new DCH on all DC frames.
3. Connect the new DCH to their appearance.
4. On a connector by connector basis (until 30 to 35 senders have been converted):
 - (a) busy senders
 - (b) block remaining CB relays operated
 - (c) apply ETS modifications
 - (d) unblock CB relay for new DCH
 - (e) test senders with new DCH
 - (f) restore senders for ETS operation
5. Block operated CB relays associated with last equipped DR on all DC frames.
6. Modify this DR multiple and preference chain for ETS operation.
7. Replace this DR at the DC with an additional DCH, including recabling the "M" leads directly to the new MC frame.

8. Repeat step 4 for the step 7 DCH.
9. Repeat steps 5 through 8 until all DCH are in service.

7. MISCELLANEOUS

7.01 After the first decoder channel has been turned up for service the trouble recorder will be operating with both decoders and decoder channels. The 4390A trouble record cards perforated as a result of an electronically translated call failure will have holes punched in different locations from a decoder-card translator trouble perforated card, and will include a hole in the (ETS TEMP) punch location at S8-29. A 100% perforated 4390B will then be used as a template and placed over the 4390A card to translate the information on the record card. When the office has reached the half-way point in the transition the 4390A card can be replaced in the perforator by the 4390B card

and a 100% perforated 4390A card used as the template.

7.02 To reuse an existing marker connector frame for ETS requires extensive recabling. After the decoders to which the connectors on the frame are dedicated have been removed from service, the frame should be disconnected and removed to its new location near the decoder channels. All of the leads entering the marker connector frame will have to bypass the frame before moving it in order that the other marker connectors can continue to function properly. After it has been removed it can then be installed and connected at the end of the preference chain and assigned to decoder channels 3 and 4 or 3, 4 and 5 depending on the number of connectors on the frame. This procedure should be followed until all of the necessary frames have been moved and put into service. If there are any remaining frames that are not to be used these can be removed from service permanently after the office has been completely converted to ETS.

TABLE A

ELECTRONIC TRANSLATOR FRAMES AND UNITS — (CONVERSION STEP III — SEE 5.04)

	FRAME OR UNIT	J CODE	HEIGHT	WIDTH	QUANTITY REQD	REMARKS
PERIPHERAL FRAMES & UNITS	Decoder Channel Frame (DCH)	J67471A	11'-6"	2'-2 5/8"	2	DCH0,2,4,6,&8 located on FR0 DCH1,3,5,7,&9 located on FR1
	Network Control Frame	J67444E	11'-6"	2'-0 5/8"	1	
	Network Control Console	J67444EF	4'-2"	2'-8" W 1'-10" D	1	Located in Traffic Management Area
	Peripheral Scanner Frame (PSC)	J67472A	7'-0"	2'-2"	2 Min 4 Max	1280 Scanpoints per FR
	Distributor Register Frame (DREG)	J67473A	7'-0"	2'-2"	2 Min 5 Max	CPDA0 located on FR0 CPDA1 located on FR1 Max3 DREG per FR
	Alarm and Display Frame (AD)	J67474A	7'-0"	2'-2"	1	CPDA2 and 3 located at top of FR
	Power Distributing Frame (PD)	J67475A	7'-0"	2'-2"	2	
	120 Volt AC Distribution Panels	J67475B,C	1'-2"	23"	1	Mounts on 11'-6" Misc. RR
	Peripheral Function Translator Unit (PFT)	J67476A	1'-4"	25"	2	PFT0 located on CPD0 PFT1 located on CPD1
	Teletypewriter Buffer Frame (TTYB)	J67479A	7'-0"	2'-2"	1	TTYB Units 0-3 and Two Data
	Miscellaneous Frame (M)	J67492A	7'-0"	2'-2"	1	(As Required)
	Traffic Data Transmitter (TDT)	J67492AD	1'-0"	25"	1	Mounts on Misc. Frame (As Required)
SPC FRAMES	Processor Frame (P)	J1C020A	7'-0"	6'-6"	2	
	Control Display, Program, Tape, & Teletypewriter Frame (CD-PT-TTY)	J1C021A	7'-0"	6'-6"	1	
	Master Scanner Frame (MS)	J1C022A	7'-0"	2'-2"	1	1024 Scanpoints per FR
	Signal Distributor Frame (SD)	J1C023A	7'-0"	2'-2"	1	256 Distributor Pts per FR
	Central Pulse Distributor Frame (CPD)	J1C024A	7'-0"	2'-2"	2	
	Store Frame (S)	J1C026A	7'-0"	4'-4"	8 Min 10 Max	

TABLE B
MODIFIED EXISTING EQUIPMENT

FRAME	J CODE(S)	SCHEMATIC			REMARKS	COV. STAGE	SECTION OR PARAGRAPH REF			
		SD	ISS*	NOTES						
Marker Frame	J67440A	SD-68388-01	30A	102A	Increased capacity per J69212	I	1.08, 5.02			
				102B				Add marker registration failure retrial request feature	II	5.03
				104						
				115B	Remove ANN trk routing and recording of stuck sender features	V	5.08			
				121						
Outgoing and Incoming Link Frames	—	—	—	—	Increased capacity per J69212	I	1.08, 5.02			
Incoming, Outgoing, and Intertoll Trunk Test Set	J63525D,G,H	SD-68359-01	17D	102 104	Add feature to verify a sender link frame identification crossconn and trk class info stored in translator memory	II	5.03			
Incoming Senders	—	—	—	—	Remove pretranslation per increased capacity spec J69212	I	5.01			
Sender Link Frame	J67402C,E,F	SD-68334-01	23D	102 104	Add 3-out-of-7 cross-connection to identify sender link frame number to peripheral scanner	II	5.03			
	J67454A	SD-68486-01	9D	102 104						
Link Controller and Connector Frame	J67407,D,E,F	(Connector) SD-68336-01	13D	102 104	Add sender link identification to peripheral scanner	II	5.03			
		(Controller) SD-68028-01	35D	102 104 111 112 207	Add ETS features to controller except "XH" option must be provided Replace "XH" option with "XJ" option	II III	5.03 5.04			

TABLE B (Cont)

MODIFIED EXISTING EQUIPMENT

FRAME	J CODE(S)	SCHEMATIC			REMARKS	COV. STAGE	SECTION OR PARAGRAPH REF			
		SD	ISS*	NOTES						
Decoder Connector Frame	J67449B,F,G J,Y	SD-68339-01	17A	102	Add increased capacity	I	5.01			
				112						
				117				Add terminal strips and mult cable	II	5.03
				126						
127	Modify connectors for ETS operation recable decoder 0 and 2 to last dec. conn.	IV	5.05							
220										
221										
Incoming Sender and Register Test Frame	J67462A	SD-68491-01	16D	102B	Add transitional circuit J67462AK	II	5.03			
				104						
				113				Add ETS features Remove transitional circuit	V	5.08
Incoming Sender Test Frame	J67433W	SD-68226-01	36D	102	Add transitional circuit J67462AK	II	5.03			
				103						
					Add ETS features Remove transitional circuit	V	5.08			
Automatic Incoming Trunk Test Frame	J67461A	SD-68484-01	14D	102	Add ETS features	II	5.03			
				104						
					Remove card translator options	V	5.08			

TABLE B (Cont)

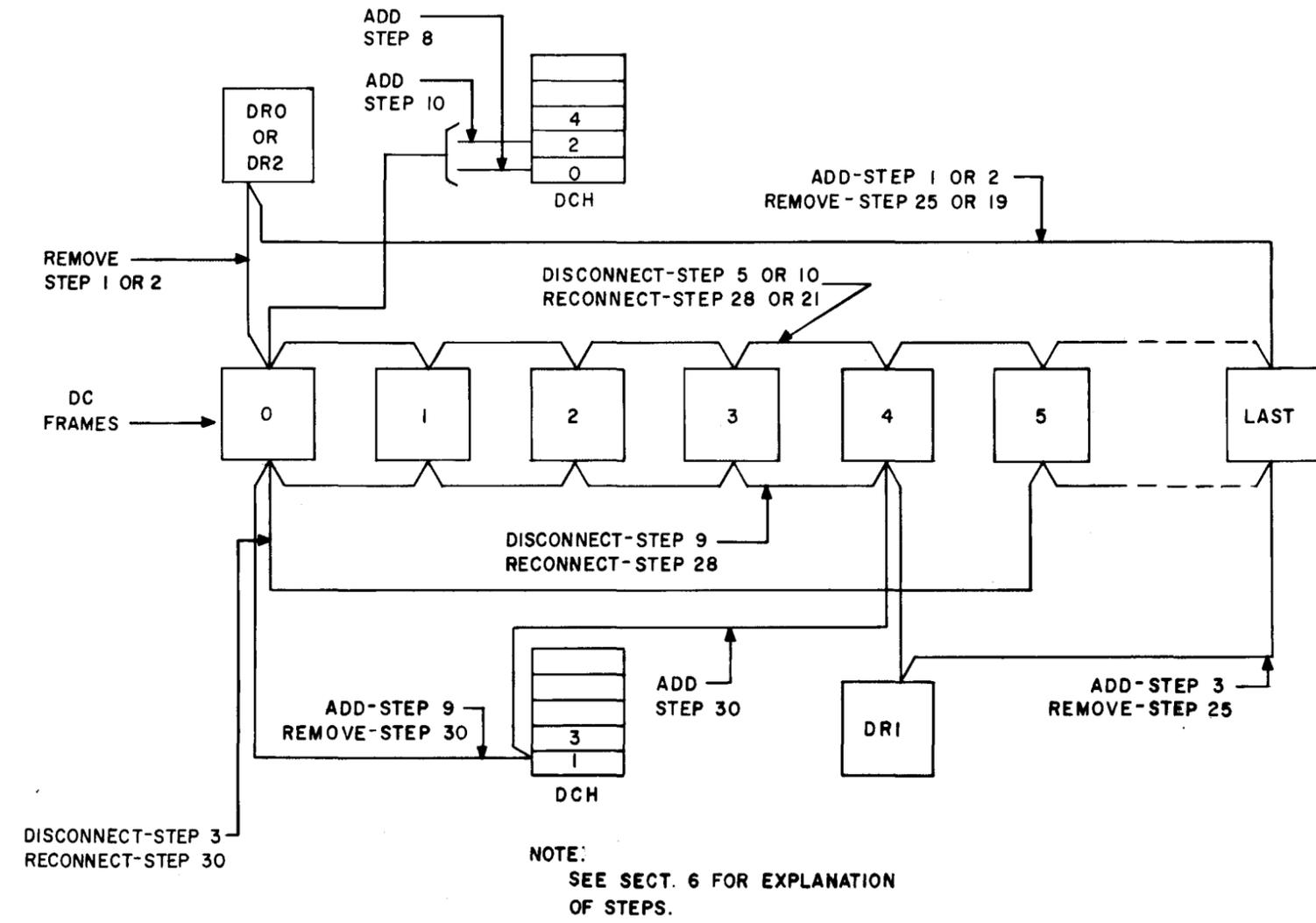
MODIFIED EXISTING EQUIPMENT

FRAME	J CODE(S)	SCHEMATIC			REMARKS	COV. STAGE	SECTION OR PARAGRAPH REF
		SD	ISS*	NOTES			
Automatic Outgoing Toll Connecting Trunk Test Frame	J67418D,H	SD-68373-01	24D	102E	Add ETS features (These frames cannot be modified to add ETS features until the particular decoder connector to which it is wired is turned down for ETS modification)	IV	5.06
Automatic Outgoing Intertoll Trunk Test Frame	J67447A	SD-68404-01	25D	102 103 111			
Automatic Outgoing Toll Connecting Trunk Test Frame	J67418A	SD-68076-01	30D	105 117 129			
Automatic Outgoing Toll Connecting Trunk Transmission Test Frame and Automatic Outgoing Toll Trunk Operational Test Frame	J67418J,K	SD-68580-01	3D	102 104 108 109			
Trunk Class Translator Frame	J67459A	SD-68492-01	4D	104	Remove card translator option	V	5.08
Floor Alarm Frame	J67441A	SD-68067-01	22D	104	Add additional required floor and aisle alarm relays	II	5.03

TABLE B (Cont)
MODIFIED EXISTING EQUIPMENT

FRAME	J CODE(S)	SCHEMATIC			REMARKS	COV. STAGE	SECTION OR PARAGRAPH REF
		SD	ISS*	NOTES			
Marker Connector Frame	J67446A	SD-68395-01	14A	102	Add new MC frames	III	1.09, 5.04
				104			
Trouble Recorder Frame	J67443A, B, S, T	SD-68389-01	31A	102	Convert to E4390A card	I	7.01, 5.02
				104			
				116	Remove conversion options and all decoder card translator features	V	5.08
				130			
308	Remove all decoder card translator features	V	5.08				
309				Add ETS features	II	5.03	
SD-68405-01	8D	102	Add ETS features				II
103	SD-68392-01	21A		102	Add ETS features	II	
103			Remove all decoder card translator features	V			5.08
114	SD-68420-01	11D			102	Add ETS options	
106			Remove decoder options	V	5.08		
Circuit Busy Announcement Trunk	J67448A	SD-68420-01				11D	104
Interrupter Frame	ED-25213-()	SD-68058-01	31D	—	Remove decoder options	V	5.08
Interrupter Frame	ED-25213-()	SD-68058-01	31D	—			
Traffic Register Frame	J62601 J62603	SD-68060-01 SD-68412-01	36D 25D	102 120	Provide Traffic Registers per Table of Connections	II	5.03
Traffic Control Frame	J67444D	SD-68967-01	5AR	102 107	Add ETS features	V	5.08

* The current issue of the SD- drawing should be consulted for the latest information. It is not intended that a job be engineered from this specification.



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Dept 5622

Fig. 1 - Plan B for Replacing Decoders 0-2 With Decoder Channels 0-2