

RECENT CHANGE PROCESSING SOFTWARE SUBSYSTEM DESCRIPTION NO. 3 ELECTRONIC SWITCHING SYSTEM

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- In the 3E3 generic, several verify messages have been deleted and an expanded set of office record programs are available.

- The speed of recent change messages has been improved by the 3E3 generic.

Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

1.03 A list of recent change and verify programs is given in Table A. The following Bell System Practices or documents provide information related to translations, recent changes, and office records.

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1. GENERAL

1.01 This section provides a functional description of administration control and recent change programs used to alter resident and nonresident translation data. A brief description of office records and verify programs is also included.

1.02 This section is being reissued to include the following changes:

- The basic description of translation data has been eliminated. The translation data will be covered by Section 233-151-150, Issue 1 (Translations, Software Subsystem Description, No. 3 Electronic Switching System)

SECTION	TITLE
233-101-115	Office Records, Description, No. 3 Electronic Switching System
233-151-150	Translations, Software Subsystem Description, No. 3 Electronic Switching System
233-152-150	Office Records, Software Subsystem Description, No. 3 Electronic Switching System
233-154-130	Recent Change Users Guide, No. 3 Electronic Switching System
233-154-135	Recent Change Users Guide, Issue 3E3 Generic, No. 3 Electronic Switching System
680-536-101	ESS Service Order Procedures Using The Service Order Teletypewriter, No. 3 Electronic Switching System (SO-2 Generic)

NOTICE

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SECTION	TITLE
	Input Message Manual, IM-3H300, No. 3 Electronic Switching System
	Output Message Manual, OM-3H300, No. 3 Electronic Switching System
	Translation Guide, No. 3 Elec- tronic Switching system, TG-3
1.04	The following listings contain codes and comments which are common for control and implementation of all recent change programs.
	<ul style="list-style-type: none"> ● Program RCREAD (subroutines to load translation data into the translation buffer) reads translation data. ● Program RCSUB (recent change subroutines) provides subroutines used by the recent change (RC) programs. ● Program WRTSUB (recent change subroutines to store data) stores or writes data from recent change programs into various storage or memory areas. ● Program RCMOVE (recent change subroutine to move data) moves data from ADMBUFFR to XSLBUF (translation buffer) ● Routine MSFC (multiscan function controller) in program CBLM (common base level monitor) provides control for nonresident programs.
1.05	Translations define lines, trunks, service circuits, and office parameters unique to a given No. 3 ESS office. Translation routines are part of the program; therefore, they are the same in any No. 3 ESS office using the same issue. The translation routines operate to locate specific office data and provide the data to requesting programs. This information consists of directory numbers, office codes, line and trunk identifications, routing and charging information, etc, and is the translation data for a specific central office.
1.06	Translation data is furnished by local plant, traffic service, service order bureaus, and line engineering organizations and defines particular lines, trunk groups, or service circuits to the using programs.

1.07 Translation data is stored in the translation area of memory and is write-protected. Certain translations such as call forwarding change frequently, so temporary store is used for this type of data.

1.08 Translation data and remark data are added, changed, or removed through the use of RC programs. The RC programs are a series of nonresident (tape storage) programs which are used to modify the resident translation and nonresident data in a particular No. 3 ESS office. These programs are accessed and initiated by teletypewriter (TTY) inputs. In general, there is an RC program supporting each type of valid RC message. Because of the large number of programs and their functional similarities, the description in Part 2 is a general example which is representative of all RC programs rather than any specific RC program.

1.09 Verify programs are used to verify inputted recent change data. The programs are nonresident and accessed by TTY input messages. Due to the large number of verify programs and functional similarities, Part 3 presents a general example representative of all verify programs.

1.10 In the 3E3 generic, the office records feature has been expanded. The office records programs can be used to obtain an up-to-date copy of translations and remarks. Therefore, many verify messages are eliminated in the 3E3 generic.

2. RECENT CHANGE PROCESSING

2.01 The translation tables and data are originated or changed by recent change programs initiated by TTY input. The TTY input messages have the form of RC:RTI, RC:TTY/, etc. These input messages are followed by a series of keywords [TN (telephone number), RI (route index), etc] which define the translation data to be changed or added followed by the data pertaining to the keyword. There are 27 recent change input messages defined and a recent change program for each message.

2.02 In both the SO-2 and 3E3 generic, these programs are nonresident and stored on tape. Since they are nonresident, they must be called by the multiscan function controller (MSFC). When TTY messages are entered for resident programs, the message inputs are predefined and the TTY programs can call the appropriate programs directly.

In the case of nonresident programs, such as recent change programs, the messages are not predefined and some standard method is needed for defining the input messages and calling the required programs. The administrative functions control (ADMCON) program is used to establish the interface between the TTY programs and MSFC for entering the processing nonresident administrative program messages, such as the recent change programs.

2.03 The speed of recent change messages has been improved in the 3E3 generic by increasing the size of the paging buffer. The exact size of the generic paging buffer is defined in the Application Temporary Store Definition Program (PR-3H011). The RC programs have been divided into groups. When a RC message is inputted at the TTY, all the RC programs (except the remark file) in this group are paged into the paging buffer. For example, the first RC:LINE message requires about 1.5 minutes to complete. But for each RC: LINE message entered after the first one, the time to complete is reduced to under 30 seconds. Therefore, a significant time savings results when several recent change messages of the same type are entered at the TTY. Also, the line class index per line and line class code table have been made resident to improve the speed of recent change (3E3 generic only).

2.04 To initiate the administrative functions control program (Fig. 1) and the recent change programs, an input message is entered at the teletypewriter in the form of RC:RTI/, RC:TTY/, etc. The input message is processed through various TTY programs which call the recent change program identified in the ID portion of the input message. The first section of the recent change program contains an immediate branch to the subroutine ADMMSG (Message Initialization Subroutine) of ADMCON. The TTY information (input message and any associated data) and the address of the keyword table from the second section of the recent change program are passed to ADMMSG.

2.05 The ADMMSG checks the administrative control word for the validity of the request, sets the multiscan function controller work flag, and saves all data received from the recent change program. It then clears all work areas and sets the TTY to a wait condition.

2.06 On the next base level loop, MSFC enables ADMMSF (multiscan function interface

subroutine) which resides along with ADMTSD (temporary storage definitions) in the paging (overlay) buffer used for nonresident activities. ADMMSF performs validity and status checks and sets time conditions. ADMMSG determines the work to be done and then branches to an address which points to the ADMTBL portion (second section) of the recent change programs. This causes the paging buffer to be loaded with the subroutine ADMSEG (segmented input message processor) and the second section (ADMTBL) of the recent change programs (Fig. 1). A return is made to ADMSEG.

2.07 The subroutine ADMSEG disables MSFC, checks the input data, and determines if the messages are nonlinked or linked. Nonlinked messages are passed directly to user programs. For linked messages, ADMSEG locates the applicable keyword table and releases the teletypewriter from the wait condition via the subroutine ADMCHK. (Check for TTY reply while in a wait state.) ADMSEG then prepares to enter the scanning routines (ADMSCN) as the keywords and data are received from the teletypewriter inputs.

2.08 The teletypewriter inputs (keywords and data) are accepted directly by the scanning routines in ADMSEG (ADMSCN). The keywords and data are checked for validity by comparing them with the keyword table of the applicable recent change program and are then stored in the ADMBUFFR area. After all segments have been received, ADMSEG sets up the address of the implementation portion, returns the TTY to the wait state, and reactivates ADMMSF. ADMMSF calls the implementation portion of the recent change program which will be loaded in the paging buffer. The recent change program will then be run alternate base level loops until complete. On completion, the recent change program exits to the routine ADMEND. (Return to multiscan function idle state.) ADMMSF is idled, the TTY is removed from the wait state, and the paging buffer is cleared to its original state (ADMMSF, ADMTSD).

2.09 One of the first functions performed by the RC programs is to check the range of numbers specified by the keyword. This is to verify that the numbers fall within acceptable limits. If the numbers are within the boundaries, a read (RCREAD) subroutine is called. RCREAD reads the translation data from translation store areas and places the data and associated addresses in the specified translation buffer (XSLBUF). Any

required expansion data is noted, and the expansion number is stored for possible later assignment. The new recent change data entry is checked to determine if the input represents one of the following types of orders.

(a) **New Order:** If the data represents a new order, an entry-type keyword may be necessary to identify required and invalid keywords and to ensure that a requested location is unassigned. If the keyword checks are passed, the message keywords and data are processed through any required conversion routines. These may perform further range checking, data manipulation, etc. The keywords which indicate that expansions are required are checked and, if present, the proper subroutines are called and expansion data generated. Expansion blocks are created to store the expansion data. The new data is then stored in the proper buffer locations (XSLBUF) for basic data words (EXPBUF for expansion data) and represents new translation data words.

(b) **Out Order:** If the input represents an out order, a minimal range check is performed to assure that the type is valid or that an entry index is in a valid range. Once this is determined, the ZERO macro is used to clean the designated entry. If expansion entries are also present, the ZEROEXP macro calls the ZEROSOME or ZEROALL subroutines to clean the expansion entries. Also, assigned software equipment (eg, speed call list) is marked for reassignment.

(c) **Change Order:** Change orders are similar to new orders, except that not all keywords required in a **new** order are required in a **change** order. The same kinds of checks made on a new order are made on a change order. The valid and invalid keywords are defined at the beginning of each recent change program and for all messages in the Recent Change Input Manual. If all keywords are valid and the translation entry is in an assigned state, changes are processed with the new data replacing existing data in the appropriate buffer (XSLBUF).

2.10 Once all the data from the input message has been checked and regardless of the type of order, all translation words and their associated addresses will ultimately be transferred from ADMBUFFR to the specified buffer (normally XSLBUF). The translation words and their addresses

are then loaded into the output buffer, OPTBUF, for processing.

2.11 If expansion entries are required, the subroutine EXPPUT is used to place the data into the expansion buffer (EXPBUF). The macro EXPAND then processes the data to create the expansion entries. These entries and their addresses are finally entered into the output buffer, OPTBUF, by a subroutine called EXPD. In addition, EXPD also calls other routines which do necessary record keeping on the expansion entries, eg, selecting the smallest usable number, recording used numbers, and recording the last vacant entry for a specified size.

2.12 After the addresses and data words have been loaded into OPTBUF, the RCWRITE subroutine checks to see if the off-line store is available in case a processor switch becomes necessary. If the off-line store is available, the translation data and addresses in OPTBUF are written into the on-line store. If the off-line store is not available, the activity is aborted. If an error occurs during the write operation, the on-line store is assumed to have bad translations, a processor switch is initiated, and a store update is requested.

2.13 If the write into on-line store is successful, the translation data is read out into the RCMATCH buffer. A subroutine, MATCHER, then performs a comparison between the RCMATCH buffer and XSLBUF buffers. If the data is identical, a successful transfer has been completed to the on-line store, and the off-line store can be updated. The off-line store is updated by the RCCOPY subroutines, which process OPTBUF like RCWRITE except for the off-line store. Once this is done, the recent change is completed.

2.14 Except for remarks and restore routines, abnormal conditions are handled in the same manner at any point of a recent change procedure. If any error is detected, the entire procedure is aborted and a TTY error message is printed. The recent change message must be corrected and reentered from the beginning.

2.15 By utilizing the recent change procedures, the translation data which defines the office can be kept current. This data has a definite organization, both on-line and off-line.

2.16 Three copies of all translation data are maintained on each of the duplicated nonresident tapes. Copy 1 is updated automatically every 24 hours (can be updated manually as often as desired). Thus, copy 1 will not differ from the translations in memory (including any recent changes) by more than 24 hours. Copies 2 and 3 are maintained under the control of the operating company. When an update is made on these copies, the older of the two copies is updated. The update is done directly from memory; therefore, at times, two of the copies will have the same information.

2.17 Loading of translation data into memory from tape occurs automatically as a bootstrap function and results in a complete copy from tape into memory. Manual loading is initiated from the system status panel (SSP). The MEMORY RELOAD button on the SSP is used to load memory from copy 1. The PAST OFFICE DATA button is used to load memory from the more current of the other two copies. The BACKDATE OFFICE button is used to load the oldest version from tape to memory.

3. VERIFY PROGRAMS

3.01 In the SO-2 generic issues 4A, translation data can be printed on the TTY, upon request, via various TTY input messages. The TTY input messages have the general form of VER:RTI, VER:DATE/, etc, followed by a series of key words which specifically define the translation data to be printed. These programs are nonresident and stored on tape. The programs are executed under the control of the multiscan function controller (MSFC) in CBLM (common base level monitor). The administrative functions control (ADMCON) program is used to establish the interface between TTY programs and the MSFC. The verify messages are processed in a similar manner to RC messages (described in paragraphs 2.02 through 2.08).

3.02 When the verify program receives control, one of the first functions performed is verification of the keywords. The program then uses appropriate translation routines and other subroutines to access the data to be printed. The data is then processed and formatted for the message to be printed. Error messages are also printed on the TTY when an error is encountered during processing.

3.03 The SO-2 generic verify programs are used to verify single party, two-party, multiparty, and coin lines, multiline hunting group, multiline hunting group terminal, call forwarding numbers, customer speed calling numbers, and the software message register contents.

3.04 In the 3E3 generic, many of the verify messages have been deleted. As translation data and remark data are added, changed, or removed through the use of RC programs, the office records programs are used to obtain an up-to-date copy of translations and remarks. The office records feature provides the ability to automatically print the changed pages and all or part of any form.

3.05 The office records programs are also nonresident. The office records TTY input messages are followed by a series of keywords which define the office record data to be changed or printed, followed by data pertaining to the input keyword. The OP:OFR message is used to verify group data of multiline hunt groups, service circuit groups, trunk groups, service circuits, trunk circuits, route indexes, charge indexes, code indexes, line class codes, and various other tables.

4. GLOSSARY

4.01 Terms and definitions used in this document follow.

Buffer—A storage device used to compensate for a difference in rate of flow of information or time of occurrence of events, when transmitting information from one device to another.

BSP—Bell System Practice

Electronic Switching System (ESS)—An electronic system utilizing stored program control to provide telephone service

Memory—A storage unit containing information that can be accessed at a later time.

MSFC—Multiscan Function Controller

Office Records Program (OFR)—A collection of routines that are used to print the office records

RC—Recent Change

Recent Change Programs—Used to add, change, or remove translation and remark data.

SSP—System Status Panel

Translation—Customer service information contained in memory such as telephone numbers, central office terminal equipment, and class of service. Customer service information does not include cable pair information.

Translation Store Area—The write-protected area of main store for translation data.

Temporary Store—The area of main store in which translation data subject to frequent changes is stored.

TTY—Teletypewriter.

TABLE A

RECENT CHANGE AND VERIFY PROGRAMS

PR NO.	PROGRAM NAME	TITLE
*3H199	CDCHG	Customer-Dialed Changes
3H053	RCREAD	Recent Change — Subroutines to Load Translation Data Into Translation Buffer
3H054	RCRTI	Recent Change — For Route Indices
3H055	RCSCN	Recent Change — Change a Speed Calling List
3H056	RCSCR	Recent Change — Screening Class Expansion Entry
3H057	RCSP	Recent Change — Miscellaneous Scan Point Definition
3H058	RCSUB	Recent Change — Subroutines
3H059	RCTOTA	Recent Change — Specify Terminal Office Test Access Number
3H060	RCTTY	Recent Change — TTY Definitions
3H061	RCTWOP	Recent Change — Two-Party Line Service Orders
3H062	RCZERO	Recent Change — Zero Incorrect Office Data
3H063	RTISUB	Route Index Printing Subroutines
3H064	SCFSUB	Verify Call Forwarding and Speed Calling
3H065	SNGSUB	Single Line Output Message Subroutine
3H066	VRCFN	Verify Call Forwarding Telephone Number
3H067	VRCIRI	Verify Code Index and Route Index Translations
3H068	VRDATE	Verify Data of Translation Files
3H069	VRDIG	Verify 3-Digit — 6-Digit Translation
3H070	VRFATD	Verify Search Type Foreign Area Translation Default Code Index
3H071	VRGRP	Print Group and Member Data for Trunk or Service Circuit
3H072	VRLINE	Verify Line Translations
3H073	VRLSTR	List Route Indices Pointing to a Trunk Group
3H074	WRTSUB	Recent Change — Resident Translation Store Modification Subroutines
3H075	VRLST3	List 3-Digit Codes Pointing to a Route Index
3H076	VROCDN	List Normalized Office Codes With Office Data
3H077	VRSCN	Verify Speed Calling
3H078	VRTHDI	Verify Thousands Digit Translation
3H083	VRLSTO	List Working Terminals (OEs) in a Concentrator
3H084	VRSCR	Verify Screening Table
3H085	VRLCC	Verify Line Class Table Store on Tape
3H086	NRTRAF	Nonresident Traffic Routines
3H087	RCCLS	Recent Change Class of Service
3H088	RCG TSA	Recent Change Trunks, Service Circuits, and Multiline Hunt Groups Traffic Assignments
3H089	RCINCP	Recent Change Intercepts
3H090	RCQDM	Recent Change Quarter-Hourly Report
3H091	RCQH	Recent Change Quarter-Hourly Schedules
3H092	RCREPT	Recent Change Traffic Report Schedules
3H093	RCSCHE	Recent Change Schedule Assignments
3H007	RCWTE	Recent Change — Translation Store Modification Subroutines

* In the 3E3 generic only

TABLE A (Contd)

RECENT CHANGE AND VERIFY PROGRAMS

PR NO.	PROGRAM NAME	TITLE
3H034	RCBTN	Recent Change — Define Group of One Thousand Numbers as Billing Number
3H035	RCCDI	Recent Change — Code Index Expansion Entries
3H036	RCCFN	Recent Change — Call Forwarding
3H037	RCCHI	Recent Change — Charge Index
3H038	RCCKT	Recent Change — Trunk or Service Circuit
3H039	RCDIG	Recent Change — Define 3- or 6-Digit Code
3H040	RCDP	Recent Change — Define or Remove a Peripheral Decoder
3H041	RCGRP	Recent Change — Define Features for Trunks or Service Circuits
3H042	RCLCC	Recent Change — Line Class Code
3H043	RCLINE	Recent Change — Line Service Orders
3H044	RCMLHG	Recent Change — Multiline Hunt Group Information
3H045	RCMOVE	Recent Change — Subroutines to Move Data
3H046	RCPTY	Recent Change — Multiparty Line Service Order
3H047	RCMTL	Recent Change — Multiline Hunt Group Terminal Information
3H048	RCNG	Recent Change — Number Group Definition
3H049	RCODIG	Recent Change — One-Digit Translator
3H050	RCOE	Recent Change — Specify Miscellaneous Terminal Equipment
3H051	RCOFIC	Recent Change — Office Identification Parameters
*3H211	RCPAT	Recent Change — Patch Program
*3H212	RCTLU	Recent Change — Terminal Line Usage
*3H213	RCCAC	Recent Change — Country Access Code

* In the 3E3 generic only

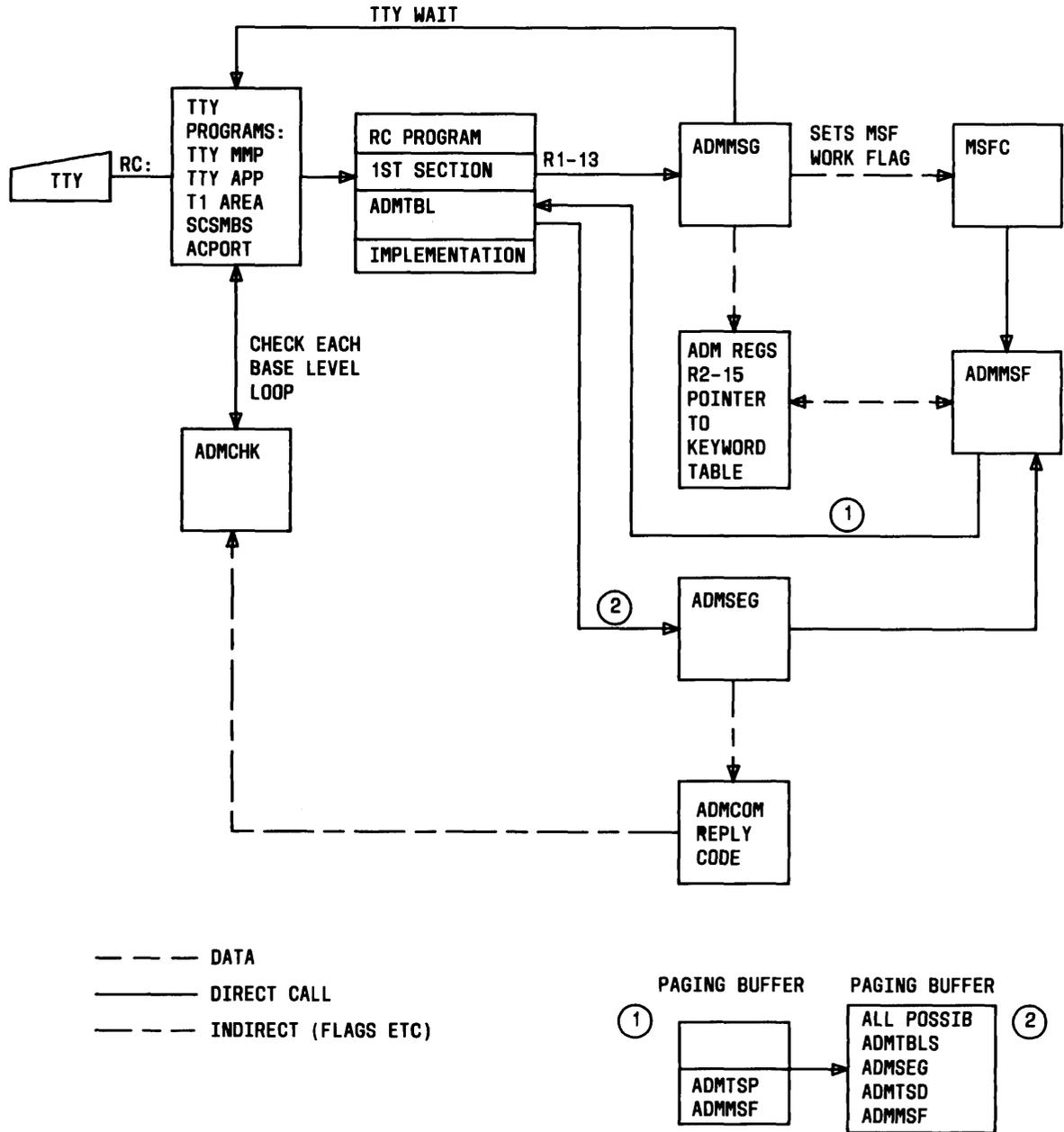


Fig. 1—Administration Control Initiation (SO-2 and 3E3)