

FEATURE DOCUMENT
CALL FORWARDING USAGE SENSITIVE FEATURE
2-WIRE NO. 1 AND NO. 1A ELECTRONIC
SWITCHING SYSTEMS

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INTRODUCTION

1. GENERAL INFORMATION

SCOPE

1.01 This document provides information for using the Call Forwarding Usage Sensitive (CFUP) feature with the No. 1/1A ESS.

REASON FOR REISSUE

1.02 This document is reissued to convert to the 18-part format and provide coverage for the RSS feature for the 1E6/1AE6 generic programs. Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

FEATURE AVAILABILITY

1.03 The CFUP feature is available with all active generic programs for the No. 1/1A ESS. The CFUP feature is in the generic program base.

2. DEFINITION

2.01 The Call Forwarding Usage Sensitive (CFUP) feature provides the telephone company with the option of offering call forwarding service to individual-line and small business customers on a casual use basis without the need for the customer to subscribe to call forwarding variable. [See reference A(3) in Part 18.]

DESCRIPTION

3. USER OPERATION

CUSTOMER

3.01 Customers who presently subscribe to call forwarding service will notice no difference in the mode of activating or deactivating their call forwarding service.

3.02 The usage-sensitive call forwarding customer can activate/deactivate a call forwarding request only by the 72/73 call forwarding access codes, respectively. Instructions for using these codes and the expected system responses are defined in reference A(3) in Part 18.

3.03 With the generic programs prior to 1E6/1AE6, the 72/73 access code arrangement requires

that a 4- to 5-second timing period or the TOUCH-TONE® # button be employed after the activation code is dialed before dialing the remote station number to resolve conflict between a call forwarding request and a valid NXX XXXX code. At the end of this timing period or upon reception of the end-of-dial signal, dial tone is returned to the subscriber.

3.04 Effective with the 1E6/1AE6 generic program and with 1E(B5)6/1AE < C5B6 > 5 restarts, the dialing plan recommends using the 72/73 access code with the *(11) prefix. The * prefix accesses prefixed access code translator (PACT) which eliminates the need for the time-out interval following the dialing of the access code. See reference A(13) in Part 18 for more information on the PACT feature.

3.05 During the time the call forwarding function is active, the base station receives a 500-millisecond burst of ringing whenever an incoming call is forwarded to the remote station. Its purpose is to serve as a reminder that the incoming call to the base station has been forwarded. With the 1E6/1AE6 generic programs, this ringing is provided by the ring reminder (RNGR) feature and is optionally available. See reference A(3) in Part 18.

3.06 Usage-sensitive call forwarding customers receive a billing notice indicating the remote station and the length of time the call forwarding function was active.

3.07 If a customer attempts to activate the CFUP feature and hardware or software limitations prevent the switching system from complying with the request, the customer is connected to a special announcement. This announcement indicates that the call forwarding request cannot be honored at this time, and the customer is to redial the request at a later time. This announcement results from the following hardware or software limitations:

- (a) No available recent change space
- (b) No space in recent change work buffer
- (c) No AMA register for billing procedures
- (d) No call forwarding register to monitor customer actions.

TELEPHONE COMPANY

3.08 Not applicable.

4. SYSTEM OPERATION

HARDWARE

4.01 One announcement trunk group utilizing either SD-1A218-01/05 (J1A032DC/J1A084DC) trunks or SD-1A221-01/05 (J1A033DT/J1A088DT) trunks is required.

OFFICE DATA STRUCTURES

A. Translations

4.02 The following translation data changes must be made before the Call Forwarding Usage Sensitive feature is active.

- (a) Office Options Table—The I item in word 4 is set to 1 if the CFUP feature is active in the central office.
- (b) Route Index 115—This route index must point to the group of announcement trunks.

4.03 The announcement trunk group containing SD-1A218 universal trunk circuits or SD-1A221 miscellaneous trunk circuits requires the following standard trunk translations.

- (a) Trunk Class Code Expansion.
- (b) Trunk Network Number to Peripheral Equipment Number (SD-1A221 requires an auxiliary block).
- (c) Trunk Group Number.
- (d) Trunk Network Number to Trunk Group Number.
- (e) Master Scanner Number.
- (f) Trunk Circuit Number.

B. Parameters/Call Store

4.04 The 13-word AMA register in call store is required to store details of usage-sensitive forwarded calls temporarily for later transferral to AMA tape. Set card NAM specifies the number

of AMA registers in the office for the engineering period.

4.05 The call forwarding register in call store is used to record data pertaining to both the local and the forwarded-to-station calls when a call is directed toward a station with an active transfer to a station in another office. A call forwarding register is not required on calls transferred to stations in the same office. When required, the register is held for the duration of the transferred call. Set card NTR specifies the number of call forwarding registers in the office for the engineering period.

FEATURE OPERATION

4.06 At the time a call forwarding activation or deactivation code is dialed, entry is made to the call forwarding usage sensitive program. At that time, a check is made to determine whether or not usage-sensitive call forwarding is allowed. If the option has not been turned on, control is returned to the requesting program where it is then determined whether or not the originating line has been assigned the call forwarding privilege. If so, normal call forwarding functions occur. If the line does not have the call forwarding treatment assigned, then that line is given reorder, vacant code, or partial dial treatment depending on what digits were dialed.

4.07 If the call forwarding usage-sensitive option has been turned on, the CFUP program makes a check to determine if the originator is an allowable category of line. Allowable categories include the following:

- (a) Lines assigned the call forward function
- (b) Lines with an originating major class of individual (F4MAJ = 04) that are not also assigned as part of a hotel-motel or multiline hunting (MLH) group.

4.08 If the line is not a member of the subset defined above [eg, coin lines, multiparty, wide area telecommunications service (WATS), etc], the line is given partial dial treatment unless the customer either abandons or completes dialing a valid 7-digit number before partial dial timing has elapsed. If the customer is permitted to dial the call forwarding access code, the remaining program actions are dependent upon the activation request.

These functions are outlined in the following paragraphs.

4.09 All call forwarding requests activated via the 72 access code that have passed the previous screening mechanism received dial tone, and the originating register (OR) reinitialized to accept the next 7 or 10 digits. Upon receipt of the last digit, the outgoing route (if applicable) is checked to determine if forwarding is allowed. Effective with the 1E6/1AE6 generic program and 1E5/1AE5 restarts, a prefix (*/11) must be dialed and the PACT is entered to obtain analysis of digits to identify the action. If forwarding is not allowed, the customer is given announcement or reorder treatment via route index (RI) 80. If the routing is allowed, a 13-word AMA register is then seized, initialized with the proper data, and linked to the master call register. A temporary recent change is then made against the line directory number (DN), and the call to the dialed destination is set up. If an AMA register is not available, if no recent change space is available, or if the allowable number of total call forward activations has been reached for that office, the call is routed to special announcement treatment via fixed RI 115.

4.10 When the dialed destination returns answer, after charge delay timing is complete, the call forwarding AMA register is unlinked from the call; and the data is encoded into the proper format and placed in the tape buffer for eventual copying onto the AMA magnetic tape.

4.11 If the originating customer abandons before answer, the call forwarding AMA register is released, the call forwarding details are placed on a 2-minute timing list, and the temporary recent change against the DN is erased. However, if the customer redials the same call forwarding request before the 2-minute timing interval expires, another 13-word AMA register is seized, initialized, and immediately placed on the AMA output queue for eventual encoding into the magnetic tape format. The originating customer then hears a burst of confirmation tone followed by dial tone. The call to the dialed destination is not set up for this method of activation. Again, if the AMA register or recent change space is not available, the call will be given special announcement treatment.

4.12 All call forwarding deactivation requests via the 73 access code that have passed the

previous screening mechanisms enter the CFUP program. The program determines if a call forwarding activation is now in effect for the originating line. If call forwarding is not in effect, the call will be routed to reorder via RI 80. Otherwise, a new AMA register is seized and initialized with the pertinent data. The temporary recent change against the base station DN is erased, and the AMA register is placed on the AMA output queue for eventual encoding into the proper AMA tape format. At this time, the calling subscriber is given confirmation tone followed by dial tone to indicate that the system has honored the customer's request. If an AMA register is not available, the subscriber is given special announcement treatment via fixed RI 115.

CHARACTERISTICS

5. FEATURE ASSIGNMENT

5.01 The CFUP feature is provided as a telephone company option. When the option is applied, the feature is applicable to all individual lines connected to the switching equipment. This includes individual lines associated with the Remote Switching System (RSS) feature. See reference A(14) in Part 18.

6. LIMITATIONS

OPERATIONAL

6.01 The total number of coexistent call forwards is controlled by the administration of the Recent Change Area feature. This feature limits the total number of temporary recent change registers in use to a predetermined number. See reference A(3) in Part 18.

ASSIGNMENT

6.02 Not applicable.

7. INTERACTIONS

STATIC

7.01 Not applicable.

DYNAMIC

7.02 Activation or deactivation of call forwarding on a usage-sensitive basis does not in itself

interact with any other feature. Activation of Call Forwarding Usage feature on any line supersedes any other terminating service the line may have (call waiting, etc). These interactions are described in reference A(3) in Part 18.

7.03 The Call Forwarding Variable feature allows the call forwarding service to be provided to individual customers on a monthly rate.

8. RESTRICTION CAPABILITY

8.01 This feature provides the telephone company with the capability of inhibiting call forwarding activation requests by means of an RC-INH-CFV input message on the maintenance teletypewriter.

INCORPORATION INTO SYSTEM

9. INSTALLATION/ADDITION/DELETION

9.01 Figure 1 illustrates the recent change procedure required to implement the CFUP option. See Part 11 for set cards and Part 13 for testing.

10. HARDWARE REQUIREMENTS

Note: This part contains cost factors and determination of quantities. Central Office Equipment Engineering System (COEES) Planning and Mechanized Ordering Modules are the recommended procedures for developing these requirements. However, for planning purposes or if COEES is not available, the following guidelines may be used.

10.01 Two SD-1A218-01 trunk circuits (trunk order code 07870) are required on the universal trunk frame. For the miniaturized universal trunk frame, two SD-1A218-05 trunk circuits (trunk order code 07800) are required. These circuits require one scan point, two signal distributor points, and one network appearance per circuit and are used for the announcement facility.

10.02 Six SD-1A221-01 trunk circuits (trunk order codes 07970 and 07904) are required on the miscellaneous trunk frame. For the miniaturized combined miscellaneous trunk, two SD-1A221-05 trunk circuits (trunk order code 07901) are required for the announcement facility. These circuits require one scan point, two signal distributor points, and one network appearance per circuit.

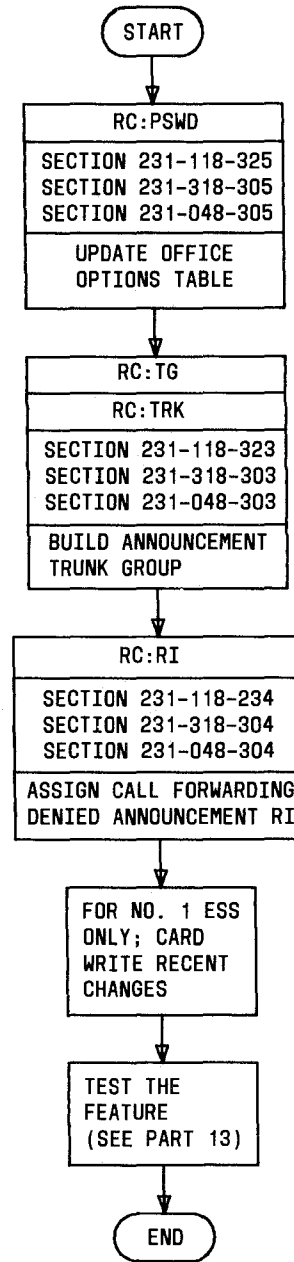


Fig. 1—Recent Change Procedures for Activating CFUP Feature

11. SOFTWARE REQUIREMENTS

Note: This part contains cost factors and determination of quantities. Central Office Equipment Engineering System (COEES) Planning and Mechanized Ordering Modules are the recommended procedures for developing these requirements. However, for planning

purposes or if COEES is not available, the following guidelines may be used.

MEMORY

A. No. 1 ESS

Fixed

11.01 The following memory is required whether or not the CFUP feature is used:

- **Generic (program store):** 320 words

Conditional

11.02 The following memory is required when the CFUP feature is activated:

- **Call Store:**

(a) Recent Change Register—One or two recent change registers are required for the duration of the call forward activation. One register is required for an intraoffice remote DN. Two registers are required if the remote DN is interoffice. A recent change register consists of two call store words.

(b) Call Forwarding Register—A 10-word call forwarding register is used to monitor the call forwarding function. Set card NTR is equal to the quantity of call forwarding registers required in the office for the engineering period. This register is associated with the call forward activation attempt up to the end of charge delay timing. If no answer report is seen on the initial attempt, the register is held for a maximum of 2 minutes after the abandon report to allow the customer time to repeat the call forwarding request. In addition, the call forwarding register is required for the call duration for all calls that are forwarded on an interoffice basis. This use of the call forwarding register also prevents a call from being forwarded back and forth between two offices.

(c) AMA Register—A 13-word AMA register is seized during each call forwarding activation and deactivation attempt. Set card NAM is equal to the quantity of AMA registers required in the office for the engineering period. Provision of the AMA registers specifically for this function is not required due to the very short holding

times. However, in offices with significant use of the CFUP feature, the use of AMA registers should be monitored via traffic measurements. See reference C(3) in Part 18 for set card engineering.

Variable

11.03 The following memory is required when the CFUP feature is applied:

- **Translations (program store):**

- (a) Route index expansion table—2 words per trunk group.
- (b) Trunk class code expansion—4-words per trunk group.
- (c) Trunk network number to peripheral equipment number—1 primary translation word used plus 4 words in the auxiliary block. For miscellaneous trunks only (SD-1A221).
- (d) Trunk network number to peripheral equipment number—1 primary translation word used for universal trunks only (SD-1A218).
- (e) Trunk group number—1 word.
- (f) Master scanner translator—1 word used.
- (g) Trunk circuit number translator—1 primary translation word used for universal trunks only (SD-1A218).

B. No. 1A ESS

Fixed

11.04 The following memory is required whether or not the CFUP feature is used:

- **Generic (program store, file store):** 352 words.

Conditional

11.05 Conditional memory requirements are identical to paragraph 11.02; however, registers are in duplicated call store. See reference C(5) in Part 18 for set card engineering.

Variable

11.06 Variable memory requirements are identical to paragraph 11.03 above; however, translations are in unduplicated call store and file store.

REAL TIME IMPACT

11.07 See reference A(3) in Part 18 for the CFUP real time impact.

12. DATA ASSIGNMENTS AND RECORDS

12.01 The following ESS translation forms, detailed in reference C(7) in Part 18, are applicable to the CFUP feature.

- (a) ESS 1200—Universal Trunk Frame Record: This form relates the equipment location on a frame basis with the trunk network number, trunk group, and trunk class code.
- (b) ESS 1201—Miscellaneous Trunk Frame Record: This form relates the equipment location on a frame basis with the trunk network number, trunk group, trunk number, trunk class code, signal distributor points, and supervisory scan points.
- (c) ESS 1204—Trunk Class Code Record: This form identifies scan points and associates the arbitrarily assigned 3-digit trunk class code with a 4-word trunk class code expansion in memory which associates the circuit program index with trunk usage.
- (d) ESS 1216—Trunk Group Supplementary Record: This form identifies the three digit trunk group number for each active trunk or service circuit group assigned in the office.
- (e) ESS 1219—Combined Miscellaneous Trunk Frame Record: This form relates the equipment location on a frame basis with the trunk network number, trunk group, trunk number, and trunk class code.
- (f) ESS 1500D—Office Option Record: This form is used to record the office option table entry for the Call Forwarding Usage Sensitive feature.

(g) ESS 1303B1—Trunk and Service Circuit Record: This form is used to record the route index for trunk and service circuits.

RECENT CHANGES

12.02 Not applicable.

13. TESTING

13.01 Teletypewriter input and output messages found in references in Part 18B can be used to verify the CFUP feature. These messages are as follows.

- (a) VFY-PSWD input message verifies entries to the office options translations table. System response should be OK followed by a TR34 output message.
- (b) VFY-EXP-42 input message verifies a route index translation of a route order expansion with an unconditional recent change hunt. System response should be OK followed by a TR05 output message.
- (c) The T-READ and TAG-TNN input messages verify the trunk class expansion table entries. The system response should be the TWO2 and TR21 messages (for No. 1 ESS).
- (d) DUMP:CSS input message verifies trunk class expansion table entries. The system response should be a DUMP:CSS message (for No. 1A ESS).
- (e) VFY-MSN input message verifies the master scanner translations. The system response should be a TR12 message.
- (f) VFY-TKGN input message verifies trunk group number translations. The system response should be a TR10 message.
- (g) VFY-TNN input message verifies trunk network number. The system response should be a TR14 message.

13.02 Since the call forwarding usage-sensitive function will generate new types of AMA records, it is recommended that all testing be coordinated with the appropriate accounting center personnel. Test calls with both call forwarding flat-rate and usage-sensitive lines should be made

to insure that the call forwarding mechanism is functioning properly.

14. OTHER PLANNING TOPICS

14.01 Because of the uncertainty with respect to customer acceptance of the Call Forwarding Usage Sensitive feature, certain office engineered call store items must be carefully considered before the service is offered to the public. When office statistics have stabilized, it should then be possible to more accurately predict the quantities of call store items that are affected by the application of the Call Forwarding Usage Sensitive feature.

14.02 The call forwarding function relies on the ability of the line translation data to accurately point to the actual DN of the line requesting the call forwarding activation or deactivation. An abbreviated mechanism of providing the special billing number function does not allow this association without an exhaustive search of the entire office line equipment translators. If the call forwarding usage-sensitive function is to be applied to a central office, it must be ascertained whether or not this abbreviated special billing treatment is being used for individual lines in the office. If this treatment is being used, standard TRIMS translation repacking mechanisms have been provided to convert this data to the standard auxiliary block form of special billing treatment. The TRIMS package is available from Western Electric regional engineering. If the abbreviated billing number treatment is heavily used, then the translation program store space for the TRIMS translation data may not be available. In that case, a program store growth is required.

14.03 The telephone company accounting department should be included in the planning and implementation of the CFUP feature.

ADMINISTRATION

15. MEASUREMENTS

15.01 The following office schedules (TMC 05) are available with the CFUP feature:

EGO	DEFINITION
024	Activate call forwarding peg count.

026 Number of calls forwarded peg count.

051 Call forwarding recent change (number of centrex and POTS customers having call forwarding active) taken at 100-second intervals.

039 Call forwarding register measures call forwarding usage.

15.02 See reference A(15) in Part 18 for further information on the office schedules listed above.

16. CHARGING

AUTOMATIC MESSAGE ACCOUNTING

16.01 Each call forwarding activation/deactivation that is successfully completed results in an AMA record being generated (Table A). This AMA record is generated for both flat-rate and usage sensitive customers. The flat-rate call forwarding customer's AMA record has service code 12 in data group A. A CFUP customer's AMA record has service code 00 in data group A.

16.02 To avoid possible ambiguity among several lines using the call forwarding service and being billed to the same special billing number, the call forwarding AMA usage record indicates the actual DN rather than a special billing DN in the calling number position in data group B.

16.03 The deactivation AMA record does not show the total elapsed time that the call forwarding service has been in use. This total time must be calculated in the accounting center by associating the two separate activation and deactivation AMA records. It is possible for the CFUP recent change data to be accidentally destroyed by central office personnel. If this occurs, no deactivate AMA record is made. If the call forwarding service is not subsequently restored by central office personnel, the accounting center must be notified so that proper treatment of active call forwarding billing can be accomplished.

16.04 A listing of all currently active call forwarding entries can be obtained by using input TTY message V-DNSVY. This message produces a series of TR43 output messages indicating the base station DN and the remote 7/10 digit DN.

TABLE A

AMA FORMAT FOR CALL FORWARDING USAGE ENTRIES

<u>DATA</u>	<u>NUMBER OF DIGITS</u>	
Start of entry (V)	1	
Type of entry (26)	2	
Information digits (00)	2	
Service features*	2	
Noncheck dummy character (NCD)	1	} Data group A
Activation time of day†	7	
Base directory number	7	} Data group B
Midnights passed (0)	1	} Data group C
Deactivation time of day†	7	
Remote station directory number	10	} Data group D
Date		
Month	2	
Day	2	
Noncheck dummy character (NCD)	<u>1</u>	
	45	

*The service feature code is 12 if the customer has already purchased flat-rate call forwarding service or 00 if measured service applies.

†The AMA entry on activation contains noncheck dummy characters for the deactivation time (data group C); the AMA entry on deactivation contains noncheck dummy characters for the activation time (data group A).

This output data can be used to reconstruct the call forwarding data in the event of a planned system reinitialization.

UNIFORM SERVICE ORDER CODES

16.05 Not applicable.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

Confirmation Tone—Burst of dial tone via the customer dial pulse receiver (one-half second on, one-half second off; repeated three times).

18. REFERENCES

18.01 The following documentation contains information related to or affected by the CFUP feature.

A. Bell System Practices

- (1) Section 231-048-304—Rate and Route Translation RC Formats for NOC NOG, DNHT, NOGRAC, RATPAT, DIGTRN, COL, RI, CHRGX, DITABS, TNDM, IDDD, TDXD, and RLST—(1E6 and 1AE6 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (2) Section 231-048-305—RC Formats for GENT, PSBLK, PSWD, and SUBTRAN—(1E6 and

- 1AE6 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (3) Section 231-090-073—Feature Document—Call Forwarding Features—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (4) Section 231-048-303—Trunk Translation RC Formats for TG, TGBVT, TRK, CFTRK, TGMEM, CCIS, and TKCONV—(1E6 and 1AE6 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (5) Section 231-118-324—Rate and Route Translation Recent Change Procedures for NOCNOG, DNHT, NOGRAC, RATPAT, DIGTRN, TOLDIG, CCOL, RI, CHRGX, DITABS, TNDM, IDDD, and TDXD—(CTX-6 through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System
- (6) Section 231-118-325—RC Procedures for PSWD, GENT, PSBLK, SUBTRAN—(CTX-6 through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System—With HILO 4-Wire Feature
- (7) Section 231-318-304—Rate and Route Translation Recent Change Procedures—for NOCNOG, DNHT, NOGRAC, RATPAT, DIGTRN, TOLDIG, CCOL, RI, CHRGX, DITABS, TNDM, IDDD, and TDXD (Through 1AE5 Generic Program)—2-Wire No. 1A Electronic Switching System
- (8) Section 231-318-305—RC Procedures for PSWD, PSBLK, SUBTRAN, and GENT (Through 1AE5 Generic Program)—2-Wire and HILO 4-Wire No. 1A Electronic Switching System
- (9) Section 231-061-460—Call Stores, Network Design—2-Wire No. 1 Electronic Switching System
- (10) Section 231-062-465—Processor Community Engineering—Duplicated Call Stores, Network Design—2-Wire No. 1A Electronic Switching System (when published).
- (11) Section 231-318-303—Trunk Translation Recent Change Procedures for TG, TGBUT, CFTRK, TGMEM, CCIS, and TKCONV (Through 1AE5, Generic Program)—2-Wire No. 1A Electronic Switching System
- (12) Section 231-104-301—Updating Program Store Translation Information and Monitoring Recent Change Area—2-Wire No. 1 Electronic Switching System
- (13) Section 231-090-061—Feature Document—Prefixed Access Code Translator Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (14) Section 231-090-153—Feature Document—Operation with the Remote Switching System Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (15) Section 231-090-207—Feature Document—Traffic Measurements Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems
- (16) Section 231-118-323—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, and TGMEM—(CTX-6 Through 1E5 Generic Programs)—2-Wire No. 1 and No. 1A Electronic Switching Systems.
- B. Teletypewriter Input and Output Manuals**
- (1) Input Message Manual IM-1A001—2-Wire No. 1 Electronic Switching System
- (2) Input Message Manual IM-6A001—2-Wire No. 1A Electronic Switching System
- (3) Output Message Manual OM-1A001—2-Wire No. 1 Electronic Switching System
- (4) Output Message Manual OM-6A001—2-Wire No. 1A Electronic Switching System.
- C. Other Documentation**
- (1) Translation Output Configuration PA-591003—No. 1 Electronic Switching System—2-Wire
- (2) Translation Output Configuration PA-6A002—No. 1A Electronic Switching System—2-Wire
- (3) Parameter Guide PG-1—No. 1 Electronic Switching System—2-Wire
- (4) Office Parameter Specification PA-591001—No. 1 Electronic Switching System—2-Wire

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- (5) Parameter Guide PG-1A—No. 1A Electronic Switching System—2-Wire
- (6) Office Parameter Specification PA-6A001—No. 1A Electronic Switching System—2-Wire
- (7) Translation Guide TG-1A—No. 1 and No. 1A Electronic Switching Systems—2-Wire.