

FEATURE DOCUMENT
OFF-NETWORK CALLING USING "TOUCH-TONE®" AND DIAL PULSE OUTPUTTING
ENHANCED PRIVATE SWITCHED COMMUNICATIONS SERVICE (EPSCS)
2-WIRE NO. 1 ELECTRONIC SWITCHING SYSTEM

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NOTICE

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FEATURE DEFINITION AND DESCRIPTION**1. DEFINITION/INTRODUCTION****DEFINITION**

1.01 The Off-Network Calling Using TOUCH-TONE® and Dial Pulse Outpulsing (ONTTDP) capability provides the EPSCS ESS network switch with the capability to complete private network calls to the message telecommunications service (MTS) network via either a class 5 office or customer premises switcher.

INTRODUCTION

1.02 The ONTTDP capability utilizes the TOUCH-TONE outpulsing feature group (LHTO) and associated hardware circuits to outpulse dial pulse and/or TOUCH-TONE digits over HILO 4-wire trunks used for off-network calling. The LHTO feature group provides the capability to insert pause(s) of 1 to 10 seconds duration during a TOUCH-TONE or dial pulse outpulsing sequence.

1.03 Outpulsing is provided either by TOUCH-TONE transmitters SD-1A375 **or** pulse transmitters SD-1A378, operated under control of the LHTO feature group. A TOUCH-TONE transmitter is capable of dial pulse outpulsing; this capability permits a single transmitter to be used for calls requiring both dial pulse and TOUCH-TONE digits. A dial pulse or TOUCH-TONE transmitter **may** be used if all outpulsing is dial pulse.

1.04 The ONTTDP capability is used with:

- (a) Foreign exchange off-network access lines (FX ONALs)—FX ONALs are foreign exchange trunk circuits which connect the HILO trunk link network (TLN) with a class 5 MTS office. ONALs provide EPSCS customers with access to MTS or OUTWATS.
- (b) Network access lines (called NALs or ALs)—ALs are trunk circuits which provide access between the EPSCS network and the business service switcher serving the EPSCS customer. The ONTTDP capability is used if the serving business service switcher is used in the routing of on- to off-network calls.

1.05 In the case described in paragraph 1.04(b), the ONTTDP capability is used to “cut-through”

the business service switcher and establish a connection between the private network and a class 5 office for the purpose of MTS calling. The practicality of this arrangement is discussed below.

1.06 EPSCS is a private network offering which is tarified separately from MTS calling. MTS calls are charged from the class 5 office providing an exit from the private network. The private network is normally used to route MTS calls as near to the called party as possible before accessing the MTS network, thus reducing the MTS charges.

1.07 When a call is routed off-network via customer-premises equipment, the outpulsing sequence used in the HILO 4-wire equipped office is based upon the characteristics of the customer-premises equipment and serving class 5 office. A normal sequence is: outpulse an access code, typically “9”, to “cut-through” the customer-premises switcher, pause 4 seconds to allow the class 5 office time to recognize the line seizure, then outpulse the called number. The permissible outpulsing combinations are:

- (a) dial pulse, pause, dial pulse
- (b) dial pulse, pause, TOUCH-TONE
- (c) TOUCH-TONE, pause, TOUCH-TONE

A TOUCH-TONE transmitter is used for (b) and (c). A TOUCH-TONE **or** dial pulse transmitter is used for (a). Note that dial pulse outpulsing cannot follow TOUCH-TONE outpulsing. Once TOUCH-TONE outpulsing is used, all subsequent outpulsing **must** be TOUCH-TONE.

1.08 When TOUCH-TONE transmitters are provided in a No. 1 ESS EPSCS office, a TOUCH-TONE transmitter test circuit SD-1A369 is required for maintenance purposes.

1.09 This document provides the information to incorporate the ONTTDP capability into a No. 1 ESS EPSCS office and describes the operation thereof. No attempt is made to describe outpulsing per se; outpulsing is detailed in the documentation listed in reference A(1) in Part 19.

2. USER PERSPECTIVE**CUSTOMER**

2.01 The customer is unaware of the ONTTDP capability except for reduced call setup time on certain off-network calls.

TELEPHONE COMPANY

2.02 The ONTTDP capability is an arrangement using the LHTO feature group and associated hardware circuits. ONTTDP is *not* a feature package. After the ONTTDP capability is incorporated into the office, no telephone company action is required.

3. SYSTEM PERSPECTIVE**SOFTWARE DATA STRUCTURES**

3.01 To provide TOUCH-TONE outpulsing, changes were required in the trunk class code expansion and route index expansion for the message trunk circuits. The trunk class code expansion change allows "101" (decimal 5) - TOUCH-TONE to be used as an outpulsing type; "010" (decimal 2) - dial pulse is one of the outpulsing types already allowed and did not require a change. The outpulsing type indicated in the trunk class code expansion is the type used for the first stage of outpulsing.

3.02 The route index expansion contains the transmitter type to be used for outpulsing. Since transmitter switching is not allowed, outpulsing must be compatible with the transmitter; a dial pulse transmitter only transmits dial pulse digits; a TOUCH-TONE transmitter transmits dial pulse and/or TOUCH-TONE digits. The route index expansion also contains the outpulsing type for the second stage of outpulsing; this is indicated in the prefix digit slots. The programmed pause during outpulsing capability is also controlled by entries in the prefix digit slots. The layout and details are given in Fig. 1.

3.03 New peripheral equipment auxiliary blocks are defined for the TOUCH-TONE transmitter and test circuit. These auxiliary blocks are shown in Fig. 2.

3.04 An existing multifrequency (MF) junior register is used for TOUCH-TONE digit

outpulsing. This register has a capacity of seven digits. If more digits are required, the register is reloaded with the additional digits.

3.05 The TOUCH-TONE outpulsing control register layout is similar to the multifrequency control register; TOUCH-TONE outpulsing requires two new items, PAUS and DWPD. These items, contained in the seventeenth word (word 16) of the register, are set or reset under program control. Item PAUS (pause) is set (1) if a pause has been found and is being acted upon; otherwise PAUS is clear (0). Item DWPD (done with prefix digits) is clear (0) when prefix digits are being acted upon and is set (1) after all prefix digits have been acted upon. (Registers used as outpulsing control registers are actually originating registers and are engineered as such when the LHTO feature group is incorporated into the office.)

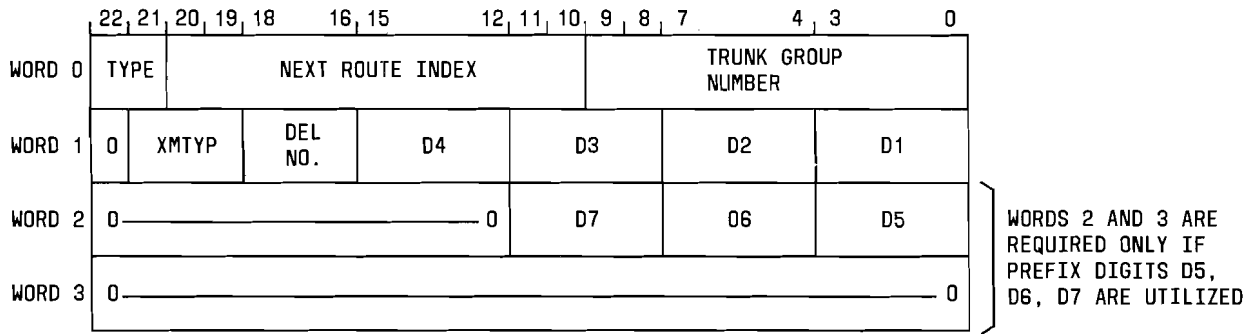
3.06 The trunk class code expansion for the TOUCH-TONE transmitter indicates a trunk usage of miscellaneous in the first word and a circuit program index of 125 in the fourth word. All other entries are zero.

3.07 The trunk class code expansion for the TOUCH-TONE transmitter test circuit indicates a trunk usage of miscellaneous in the first word and a circuit program index of 119 in the fourth word. All other entries are zero.

HARDWARE

3.08 The TOUCH-TONE transmitter contains two oscillators for generating voice frequency TOUCH-TONE signals in a 2-out-of-8 code. One of the frequencies is from a high-voice frequency group and the other is from a low-voice frequency group. The scheme used is detailed in Table A. The TOUCH-TONE transmitter has built-in logic which permits an output only when exactly one frequency from each group is generated.

3.09 The duration of a TOUCH-TONE signal is program controlled to be at least 60 ms; the time between signals is at least 60 ms. The MF junior register used during outpulsing can contain only the numeric digits 0 through 9. After digit outpulsing is complete, a "#" is automatically outpulsed under program control to indicate the end of outpulsing.



XMTYP = 010 (DECIMAL 2) – DIAL PULSE TRANSMITTER
 = 101 (DECIMAL 5) – TOUCH-TONE TRANSMITTER

DEL NO. – DELETE NUMBER – THE NUMBER OF DIGITS TO BE DELETED FROM THE DIALED NUMBER (E.G., THE 3-DIGIT AREA CODE)

D1 THROUGH D7 – PREFIX DIGITS. ANY PREFIX DIGIT D1 THROUGH D6 MAY CONTAIN A PAUSE INDICATION, BINARY 1101 (WHICH IS EQUIVALENT TO DECIMAL 13 OR HEXIDECIMAL D). THE NEXT DIGIT SLOT FOLLOWING THE PAUSE DIGIT RELATES THE PAUSE DURATION AND THE OUTPULSING TYPE TO BE USED AFTER THE PAUSE. HEXIDECIMAL VALUES, REQUIRED FOR RECENT CHANGE PROCEDURES, ARE GIVEN BELOW. DECIMAL AND BINARY EQUIVALENTS ARE GIVEN IN PART 19.

PAUSE DURATION	NEXT STAGE OF OUTPULSING WILL BE:	
	DIAL PULSE	TOUCH-TONE
1-2 SECONDS	0	1
2-3	2	3
3-4	4	5
4-5	6	7
5-6	8	9
7-8	A	B
9-10	C	D

NOTE: OUTPULSING MAY BE DIAL PULSE, TOUCH-TONE, OR A COMBINATION OF DIAL PULSE AND TOUCH-TONE, WITH THE RESTRICTION THAT ONCE TOUCH-TONE IS USED, ALL SUBSEQUENT OUTPULSING MUST BE TOUCH-TONE. THE FIRST STAGE OF OUTPULSING IS GOVERNED BY THE OUTPULSING TYPE CONTAINED IN THE TRUNK CLASS CODE EXPANSION. SUBSEQUENT OUTPULSING IS GOVERNED BY THE PREFIX DIGIT ENTRIES.

Fig. 1—Route Index Expansion

3.10 Eight pairs of leads to the TOUCH-TONE transmitter are provided for TOUCH-TONE outpulsing (one pair for each frequency in Table A). These leads are connected to central pulse distributor (CPD) points, which are set and reset under program control. One additional pair of leads is provided for dial pulse digits. This pair of leads is also connected to CPD points which are operated and released under program control. The digits generated (and outpulsed) are controlled by

the program via CPD operation.

3.11 The TOUCH-TONE transmitter test circuit receives and tests the voice frequency TOUCH-TONE signals generated by the TOUCH-TONE transmitter. Tests are made for correct signal amplitude and frequency. Test results are utilized by the ESS for diagnostic purposes. The test circuit **does not** exercise control during outpulsing.

+0	WORD NO. = 4	QUANTITY = 9	CENTRAL PULSE DISTRIBUTOR NUMBER (CPDN)
+1	QUANTITY = 1	SIGNAL DISTRIBUTOR POINT ASSIGNMENT (SD00)	
+2	0 _____ 0		
+3	QUANTITY = 4	00	DIRECTED MASTER SCAN POINT ASSIGNMENTS (SC00)

A. TOUCH-TONE TRANSMITTER (SD-1A375-01)

+0	WORD NO. = 6	QUANTITY = 0	CPDN = 0
+1	QUANTITY = 3	SIGNAL DISTRIBUTOR POINT ASSIGNMENTS (SD00)	
+2			
+3	QUANTITY = 8	00	DIRECTED MASTER SCAN POINT ASSIGNMENTS (SC02)
+4	0 _____ 0		
+5	QUANTITY = 2	00	FAST MASTER SCAN POINT ASSIGNMENTS (SC00)

B. TOUCH-TONE TRANSMITTER TEST CIRCUIT (SD-1A369-01)

Fig. 2—Peripheral Equipment Auxiliary Blocks

TABLE A

TOUCH-TONE DIGIT FREQUENCIES

LOW-GROUP FREQUENCIES (Hz)	HIGH-GROUP FREQUENCIES (Hz)			
	1209	1336	1477	1633
697	1	2	3	SPARE@
770	4	5	6	SPARE@
852	7	8	9	SPARE@
941	*@	0	#	SPARE@
	@ These digits are not supported by the TOUCH-TONE outputting feature.			

SYSTEM OPERATION

General

3.12 An idle outgoing trunk, if available, is selected from the indicated trunk group (Fig. 1), a TOUCH-TONE or dial pulse transmitter is reserved, an MF or dial pulse junior register is reserved (based on the outputting type in the trunk class code expansion), and a seizure is created on the selected trunk. The start dial signal obtained from the trunk class code expansion is loaded into the junior register and a peripheral order buffer (POB) is loaded with orders to place the junior register on the start dial signal scan list, to connect the outgoing trunk to the transmitter, to perform the network continuity scan, and to put the outgoing trunk into the talk state.

Dial Pulse Outpulsing

3.13 At the time the POB is activated, dial pulse digit information, such as the dial pulse digit value (0 through 9) and the address of the associated CPD points, are loaded into the dial pulse junior register on a digit-by-digit basis. Each digit is processed individually under control of the dial pulse digit generation program. When the start dial signal is detected, the junior register is placed on the active outpulsing list and the indicated digit is subsequently outpulsed.

3.14 After return from outpulsing, either another dial pulse digit is processed in the previously described manner or a pause is detected. When a pause digit, binary 1101, is detected, the outpulsing type and pause duration are determined from the digit slot following the pause digit (Fig. 1). If dial pulse outpulsing is to follow the pause, the outpulsing control register is placed on timing for the appropriate number of seconds. At the expiration of the pause, dial pulse outpulsing is resumed per the previously described procedure. If TOUCH-TONE outpulsing is to follow the pause, the outpulsing control register is modified to reflect TOUCH-TONE outpulsing, an MF junior register is seized and initialized, the dial pulse junior register is released, and control is passed to the TOUCH-TONE portion of the program, which handles the pause and subsequent digit generation.

3.15 Normally, TOUCH-TONE outpulsing will follow after the initial dial pulse outpulsing sequence. However, two pauses are permissible in an outpulsing sequence and the capability exists for dial pulse, pause, dial pulse, pause, dial pulse (or TOUCH-TONE). If the final stage of outpulsing is dial pulse, the pause and digits generation are handled in the previously described manner (which will complete all outpulsing). If the final stage is TOUCH-TONE, control is passed to the TOUCH-TONE portion of the program which handles the pause and subsequent digit generation.

TOUCH-TONE Outpulsing

3.16 Operation of the TOUCH-TONE portion of the program, when utilized in an outpulsing sequence, is dependent upon the preceding stage(s)

of dial pulse outpulsing. The TOUCH-TONE portion of the program does the following:

- (a) If two stages of dial pulse outpulsing preceded, control the pause and a single stage of TOUCH-TONE outpulsing.
- (b) If one stage of dial pulse outpulsing preceded, control the pause, a stage of TOUCH-TONE outpulsing, and possibly another pause and another stage of TOUCH-TONE outpulsing.
- (c) If zero stages of dial pulse outpulsing preceded, control zero, one, or two pauses and one, two, or three stages of TOUCH-TONE outpulsing.

3.17 TOUCH-TONE outpulsing utilizes an MF junior register and MF pulsing programs. The MF junior register is seized whenever TOUCH-TONE outpulsing is indicated, either as the initial stage or following a pause. The junior register is loaded with CPD point addresses representing digits to be outpulsed; up to seven digits may be outpulsed with a single loading of the register. When the start dial signal is detected or a pause duration has elapsed, the junior register is placed on the MF active outpulsing list. The MF pulsing programs act on the CPD point addresses to cause the TOUCH-TONE transmitter to generate the desired digits (each of which may have a value of 0 through 9). At the end of outpulsing, an outpulsing status code is entered in the outpulsing control register. This code represents (a) successful outpulsing of all loaded and required digits, (b) outpulsing failure, (c) successful outpulsing of all loaded digits, but more digits required, or (d) a pause is required.

3.18 In the case of all outpulsing complete, the trunk enters a talk state; call progress tones or audible ringing are received from the distant office. In the case of outpulsing failure, the system takes the appropriate actions. In the case of more digits required, the junior register is reloaded and placed back on the active outpulsing list. In the case a pause is required, the duration of the pause (Fig. 1) is retrieved from the digit slot following the pause indication and the outpulsing control register is placed on timing for that number of seconds. After the pause, the junior register is reloaded and placed back on the active outpulsing list.

3.19 When an outpulsing status code indicating the successful outpulsing of all loaded and required digits is received, the digit “#” is outpulsed under program control to indicate the end of outpulsing.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 TOUCH-TONE outpulsing is available on a per trunk group basis. The initial application is for the EPSCS network and provides off-network calling via:

- (a) FX ONALs, which connect the HILO 4-wire TLN to a 2-wire class 5 office.
- (b) Network access lines between the EPSCS network and the customer's serving business service switcher. The initial outpulsed digit(s), usually “9”, causes a connection between the serving business service switcher and the serving class 5 office. Subsequent outpulsing is received directly by the class 5 office.

4.02 Programmed pauses during outpulsing are used to allow the connecting office(s) sufficient setup time prior to subsequent outpulsing. Pauses therefore occur in the prefix digits on actual calls. However, pauses will be recognized at any point in the dial pulse or TOUCH-TONE outpulsing sequence. This allows pauses on test calls originated from a test position whenever the required digit values can be entered from the test position.

5. LIMITATIONS AND RESTRICTIONS

5.01 No stop-go signals are expected or handled **during** TOUCH-TONE outpulsing. Also, immediate TOUCH-TONE outpulsing (i.e., no start dial signal expected) is not valid with a TOUCH-TONE transmitter type (5).

5.02 TOUCH-TONE digits 0 through 9 are the only valid digits for outpulsing. A “#” is always outpulsed as the last digit (under program control) to indicate that all digits have been outpulsed.

5.03 Combinations of dial pulse and TOUCH-TONE outpulsing may be used with the restriction that once TOUCH-TONE is used, all subsequent outpulsing must be TOUCH-TONE; the combination

TOUCH-TONE, pause, dial pulse **is not** allowed. The dial pulse portion of the LHTO feature program can pass control to the TOUCH-TONE portion of the program, but the TOUCH-TONE portion of the program **cannot** pass control to the dial pulse portion.

5.04 When a TOUCH-TONE transmitter is used, dial tone from a class 5 office cannot be detected. Dial tone indicates that a digit receiver is connected to the call. In the case of off-network calling via customer premises equipment, the start dial signal is received from the customer premises equipment, an access code is outpulsed, and a programmed pause is used to allow time for receiver connection. In the case of off-network calling via a non-step-by-step class 5 office, the receiver is connected before the start dial signal is received. The required digits are outpulsed upon receipt of the start dial signal; a programmed pause is not required. In the case of off-network calling via a step-by-step class 5 office, the start dial signal may be received ahead of the receiver connection. This can cause lost calls since outpulsing may begin without a connected receiver. If the time required for receiver connection can be accurately determined, a programmed pause of that duration may be used before outpulsing begins; i.e., an initial pause may alleviate the problem. Upon receipt of the start dial signal, the program immediately detects a pause, delaying actual outpulsing for the indicated number of seconds and allowing time for a receiver connection. An initial pause should be used with a TOUCH-TONE transmitter only, since a dial pulse transmitter **can** detect dial tone.

6. COMPATIBILITY AND INTERACTIONS

DYNAMIC INTERACTION WITH OTHER FEATURES AND HARDWARE

6.01 The ONTTDP capability requires the HILO, EPSCS, and LHTO feature groups.

7. COST FACTORS

GENERAL

7.01 The ONTTDP capability is provided as a part of the EPSCS offering and utilizes HILO 4-wire switching. TOUCH-TONE outpulsing is provided via the LHTO feature group. EPSCS cost factors are given in the documentation listed in reference A(8) in Part 19. HILO cost factors

are given in the documentation listed in reference A(9) in Part 19. Thus, the memory costs given below are for the **LHTO feature group only**.

MEMORY

A. Fixed

7.02 The LHTO feature group increases the base generic program size by approximately 100 words. These words provide "hooks" for the feature package.

B. Conditional

7.03 The LHTO feature group requires 1705 program store words. Additionally, two words overhead and 149 patch words are required making the total number of words 1856.

C. Variable

Program Store

7.04 Four words are required for each TOUCH-TONE transmitter provided and six words are required for each TOUCH-TONE transmitter test circuit provided. The words serve as peripheral equipment auxiliary blocks (Fig. 2).

Call Store

7.05 Eighteen words are required for each originating register (outpulsing control register) provided, 18 words are required for each MF junior register provided, and seven words are required for each dial pulse junior register provided. Quantities are determined per Part 11.

PROCESSOR TIME

7.06 The base-level cycles required for a TOUCH-TONE outpulsing call are essentially the same as the cycles required for a call utilizing multifrequency outpulsing. Pause control requires approximately 500 cycles per pause. Pause control is independent of the pause duration.

HARDWARE

7.07 Each TOUCH-TONE transmitter SD-1A375 requires nine CPD points, two master scan points, and one signal distributor (SD) point.

Additionally, each transmitter requires a HILO interface circuit SD-1A392.

7.08 Each TOUCH-TONE transmitter test circuit SD-1A369 required three SD points and 10 master scan points. Each test circuit also requires a HILO interface circuit SD-1A392.

8. AVAILABILITY

8.01 The ONTTDP capability is available with the 1E5 and later generic program.

CONSIDERATIONS FOR INCORPORATION OF FEATURE INTO SYSTEM

9. PLANNING

9.01 For the LHTO feature group, a parameter update is required to increase the number of trunk dial pulse junior registers, the number of MF junior registers, and the number of originating registers (which serve as outpulsing control registers). These changes are reflected in set cards NAX (number of junior registers), NDO (number of trunk dial pulse junior registers), NMF (number of MF junior registers), and NOR (number of originating registers).

9.02 The outpulsing/inpulsing between offices must be compatible; e.g., if TOUCH-TONE outpulsing is used, the distant office must be capable of receiving TOUCH-TONE digits. Additionally, accurate call setup time data for the offices or customer-premises distant switchers are required when utilizing the programmed pause during outpulsing capability.

10. HARDWARE

10.01 TOUCH-TONE transmitters SD-1A375 and TOUCH-TONE transmitter test circuits SD-1A369 are required for the LHTO feature on an engineered basis (Part 11). Each transmitter and test circuit provided requires a HILO interface circuit SD-1A392. Engineering data and order codes are given in Table B.

11. DETERMINATION OF QUANTITIES

HARDWARE

11.01 The TOUCH-TONE transmitters should be provided on a high day basis with P.01

blocking. Holding times are a summation of the following:

- (a) 0.50 seconds overhead
- (b) 0.12 seconds per TOUCH-TONE digit outpulsed
- (c) 0.10 seconds per dial pulse; the number of pulses required equals the outpulsed digit, where "0" is treated as ten.
- (d) The required pause durations, in seconds. Typically, pauses are for dial tone delay in a class 5 office and/or customer premises equipment setup time; exact times should be determined from the characteristics of the interfacing equipment.

The load attributable to the ONTTDP capability should be added to the load attributable to features using the LHTO feature group to give the total load.

11.02 TOUCH-TONE transmitter test circuits should be provided in the same manner as other test circuits not used in message trunk diagnostics. The quantity provided is typically two.

11.03 Dial pulse transmitters may be used if an outpulsing sequence is all dial pulse. Usage is office dependent and may affect the quantity of dial pulse transmitters required. Engineering is per existing criteria.

B. Memory

11.04 MF junior registers, dial pulse junior registers, and originating registers (to serve as outpulsing control registers) are required for TOUCH-TONE outpulsing. The quantity of registers required is indicated via parameter set cards NMF (number of MF junior registers), NAX (number of junior registers), NDO (number of trunk dial pulse junior registers), and NOR (number of originating registers). Set cards are engineered per the documentation listed in references C(2) and C(6) in Part 19.

12. ASSIGNMENT AND RECORDS

ASSIGNMENT RECOMMENDATIONS AND GUIDELINES

12.01 Master scan points and central pulse distributor scan point assignments are given in SD-1A272 Issue 32B (Master Scanner Frame—Assignment of Master Scanner Points) and SD-1A270 Issue 23B (Central Pulse Distributor Frame—Assignment of Unipolar and Bipolar Points), respectively.

INPUT AND RECORD KEEPING

Translation Forms

12.02 The translation forms listed below are utilized for the LHTO feature group. A complete description of the forms is given in reference C(1) in Part 19.

(a) ESS 1202—Trunk Class Code Record—The OUTPUTSING item in the first word may be set to 101 (decimal 5) to indicate TOUCH-TONE outpulsing. If dial pulse will be used for the first stage of outpulsing, the entry should reflect dial pulse (decimal 2) even though a TOUCH-TONE transmitter is used.

(b) ESS 1303C—Trunk and Service Circuit Route Index Record—Nonfixed route indexes (RIs) must be assigned for TOUCH-TONE transmitters and TOUCH-TONE transmitter test circuits. These nonfixed RIs are also assigned pseudo RIs to provide the program access to the circuits; the program only references pseudo RIs since the nonfixed RIs assigned in a given office are unknown. For TOUCH-TONE transmitters, assign pseudo RI 0019. For TOUCH-TONE transmitter test circuits, assign pseudo RI 0052.

Recent Change Messages

12.03 The RC:PSWD recent change message or RC:GENT recent change message may be used to modify the trunk class code expansion for the outgoing trunk to indicate TOUCH-TONE outpulsing. Message details are given in reference A(3) in Part 19.

12.04 After modifying the trunk class code expansion, the RC:RI recent change message may be used to build the route index expansion using new keyword TT and changed keyword PFX.

TABLE B

ENGINEERING DATA

SD NUMBER	USE	FRAME	ORDER CODE	CIRCUIT PROGRAM INDEX	J-SPEC NUMBER	POINTS PER CIRCUIT			TLN TERMINATIONS PER CIRCUIT	CIRCUITS PER UNIT	2-INCH MOUNTING PLATES PER UNIT
						MASTER SCAN	SIGNAL DISTRIBUTOR	CPD			
1A369	TOUCH-TONE Transmitter Test Circuit	M	11900	119	1A033NF	10	3	0	1	1	2
1A375	TOUCH-TONE Transmitter	M	12500	125	1A033MH	2	1	9	1	1	2
1A392	HILO Interface Circuit	H(u) H(m)	14200	142	1A090BH	0	0	0	0	2	— (PLUG-IN)

Keyword TT indicates a TOUCH-TONE transmitter. Keyword PFX indicates pause duration and the subsequent outpulsing type. Message details are given in reference A(4) in Part 19.

UNIFORM SERVICE ORDER CODES

12.03 Not applicable.

13. NEW INSTALLATION AND GROWTH

13.01 The ONTTDP capability growth/retrofit procedures are given in Fig. 3.

14. TESTING

14.01 Teletypewriter input and output messages, found in the Input Message Manual [reference C(4) in Part 19] and Output Message Manual [reference C(5) in Part 19], respectively, may be used to verify the ONTTDP capability. These messages are:

(a) V-HLTNN- input message: Verifies trunk network number assignments. System response should be a TR56 output message.

(b) V-HLCN- input message: Verifies universal and miscellaneous trunk circuit number assignments. System response should be a TR56 output message.

(c) TAG-TNN-TCL and T-READ- input messages: Verifies the trunk class code expansion. System response should be a TR21 and TW02 output message, respectively.

(d) VFY-TKGN-14 input message: Verifies trunk group number translations. System response should be a TR10 output message.

(e) VFY-MSN-13 input message: Verifies the assignment of master scanner scan points. System response should be a TR12 output message.

(f) TAG-TNN-TGN input message: Verifies the address of the TNN-TGN primary translation word. System response should be a TR21 output message.

(g) V-HLTNN- input message: Verifies the address of the TNN-TGN auxiliary block.

System response should be a TR56 output message.

(h) T-READ- input message: Verifies the contents of the TNN-TGN auxiliary block. System response should be TW02 output message.

(i) VFY-EXP- input message: Verifies pseudo route index assignments and the contents of the route index expansion. System response should be a TR05 output message.

14.02 Test calls may be made to verify proper ONTTDP capability operation.

15. MEASUREMENTS

15.01 Normal peg, usage, and overflow counts are available on trunk groups utilizing the ONTTDP capability. Transmitter time-out counts are available for TOUCH-TONE transmitters. Traffic measurement details are given in references A(6) and C(1) in Part 19.

16. CHARGING

16.01 Not applicable.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

Hexidecimal—A number system to the base 16. Hexidecimal equivalents of the integers required for the ONTTDP capability are:

Decimal	Binary	Hexidecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7

8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D

18. REASONS FOR REISSUE

18.01 Not applicable.

19. REFERENCES**A. Bell System Practices**

- (1) Section 231-045-125—Outpulsing, Software Subsystem Description, 2-Wire No. 1 and No. 1A Electronic Switching Systems (changes planned)
- (2) Section 231-118-323—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, and TGMEM (CTX-6 through 1E5 Generic Programs), 2-Wire and HILO 4-Wire No. 1 Electronic Switching System
- (3) 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
- (4) 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
- (5) Section 231-118-337—RC Procedures for ANIDL CAMA, CFG, CPD, MSN, NMTGC, PLM, ROTL, SIMFAC, and TMBCGA (CTX-6 Through 1E5 Generic Programs)—2-Wire No. 1 Electronic Switching System
- (6) Section 231-120-301—Traffic Measurements—No. 1 Electronic Switching System

- (7) Section 231-090-366—Feature Document, HILO 4-Wire Switching Feature, 2-Wire No. 1 and No. 1A Electronic Switching Systems
- (8) Section 231-190-127—Enhanced Private Switched Communications Service Description, 2-Wire No. 1 Electronic Switching System.

B. Circuit Description and Schematic Drawings

- (1) CD- and SD-1A375-01—TOUCH-TONE Transmitter (For HILO 4-Wire Switching)
- (2) CD- and SD-1A369-01—TOUCH-TONE Transmitter Test Circuit (For HILO 4-Wire Switching)
- (3) CD- and SD-1A362-01—Two-Way Trunk, E&M Lead Supervision, Wink or Delay Dial (For HILO 4-Wire Switching)
- (4) CD- and SD-1A396-01—Long Haul Foreign Exchange Trunk Circuit
- (5) CD- and SD-1A392-01—HILO Interface Circuit (For HILO 4-Wire Switching)
- (6) SD-1A272-01—Master Scanner Frame—Assignment of Master Scan Points
- (7) SD-1A270-01—Central Pulse Distributor Frame—Assignment of Unipolar and Bipolar Points.

C. Other Documentation

- (1) Translation Guide TG-1A
- (2) Parameter Guide PG-1—No. 1 Electronic Switching System
- (3) Translation Output Configuration PA-591003—No. 1 Electronic Switching System
- (4) Input Message Manual IM-1A001, No. 1 Electronic Switching System
- (5) Output Message Manual OM-1A001, No. 1 Electronic Switching System
- (6) Office Parameter Specification PA-591001—No. 1 Electronic Switching System.

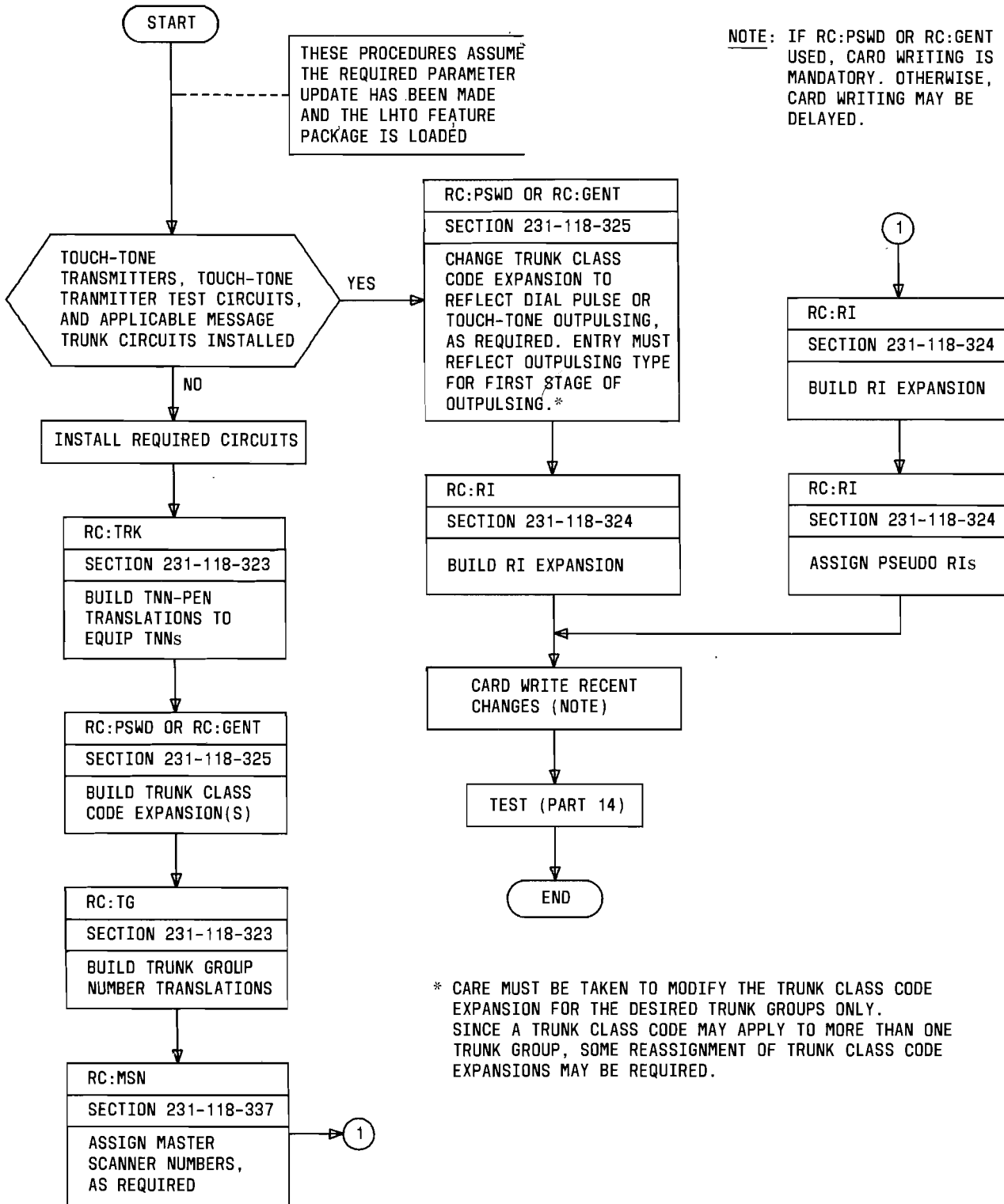


Fig. 3—ONTTDP Capability Growth/Retrofit Procedures (HILO 4-Wire Applications)