FEATURE DOCUMENT

INTERFACE WITH SWITCHBOARDS FEATURE

2-WIRE NO. 1 AND NO. 1A ELECTRONIC SWITCHING SYSTEMS

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FEATURE DEFINITION AND DESCRIPTION

1. DEFINITION/INTRODUCTION

DEFINITION

1.01 The interface with switchboards feature provides an ESS with the capability to operate with standard Bell System toll and other switchboard positions.

INTRODUCTION

1.02 Typical functions and operations with operators who may be associated on calls involving the No. 1 and No. 1A ESS offices will vary according to the practice in each individual office. In general, No. 1/1A ESS offices are arranged to interconnect with 3C or 3CL switchboards and are compatible with all present standard, toll, combined toll and dial system "A" (DSA) switchboards for assistance, recording-completing, toll switching, and other service functions.

2. USER PERSPECTIVE

CUSTOMER

2.01 The interface with switchboards feature provides an access from a customer to an operator. When a customer dials zero or a service code (long distance, etc.) which requires operator assistance, the call is routed to a switchboard location (an operator position). Audible ringing is returned to the calling customer. Upon operator answer, the necessary assistance is provided to the customer.

TELEPHONE COMPANY

2.02 The interface between the ESS and the different types of switchboards consists of operator type trunks. These operator type trunks are toll switch, recording-completing, reverting, verification-requests and trouble-intercept, no-test, permanent signal, partial dial, and special usage operator trunks. (See Table A for applicable trunk circuits).

A. Toll Switch Trunks

Toll Switch Controlled-Ring Trunk

2.03 Toll switch controlled-ring trunks are incoming trunks from a toll switchboard (3CL) to the ESS. These trunks are used by operators to complete calls to ESS subscribers and are arranged so that the operator controls the disconnect action. A hang-up by the subscriber is passed along to the operator as a lamp signal, but the network path remains complete until the operator disconnects. A toll switch controlled-ring trunk is arranged to ring the subscriber only when the operator operates a ring key.

Toll Switch Automatic-Ring Trunk

2.04 Toll switch automatic-ring trunks are the same as toll switch controlled-ring trunks except that the called line is rung immediately. The operator does not control the original ring with the ring key but may cause subsequent rings (rerings) by operating the ring key.

B. Recording-Completing Trunks

2.05 Recording-completing trunks are outgoing trunks from an ESS to a switchboard. It is over recording-completing trunks that subscribers reach operators for either dial assistance or long distance. These trunks are called joint holding trunks because both the subscriber and operator must disconnect before the ESS will take the network connection down. By operating the ring key, the operator can ring back any individual line whether it is on-hook or off-hook.

C. Reverting Trunks

2.06 Reverting trunks are outgoing trunks from the ESS to a switchboard used specially to connect to an operator on calls from a party line subscriber who has dialed another party on the same line. The characteristics of this trunk are identical to that of a recording-completing trunk and its actions are controlled by the same sequence. The signaling that these trunks use may be either inband or noninband. Inband trunks use multifrequency signaling. Inband signals are preceded by a momentary disconnect signal (a wink) which alerts the program that either ring or coin signals are coming. Noninband signaling uses the operation of either coin return, coin collect, or ring key by

the operator to activate one or more ferrods associated with the trunk.

D. Verification-Requests and Trouble-Intercept Trunks

2.07 Verification-requests and trouble-intercept trunks are used to provide verification-requests and trouble-intercept connections to a switchboard operator. A verification-request trunk is used to provide a trunk-to-trunk tandem connection through the ESS providing a talking path between operators. A verification-request call is placed by an operator at a distant switchboard to a local switchboard operator for the purpose of verifying a busy condition on a subscriber's line within the local office. A trouble-intercept trunk is used to provide a connection between a calling subscriber and a trouble-intercept operator at a switchboard. A trouble-intercept call may be originated by a local subscriber or one located in a distant office. Calls originated locally will be completed using a line-to-trunk connection; calls originated from a distant office will be completed using a trunk-to-trunk tandem connection.

E. No-Test Trunks

2.08 No-test trunks are used by toll or assistance operators for number checking and busy-idle verification of a particular line. No-test calls are originated by a toll or DSA operator at a 3C or 3CL switchboard position upon request of a customer who has tried unsuccessfully to reach a called number. The operator verifies that the line is legitimately busy or breaks in on a call in an emergency situation. A no-test call may also be made during an operator-handled toll call to check the calling number given and to prevent improper charging. Any incoming operator trunk circuit (toll switch controlled-ring trunk type) may be arranged to provide a no-test function.

F. Permanent Signal, Partial Dial Operator Trunks

2.09 An outgoing trunk from an ESS office to a switchboard is used to provide an interface to a permanent signal, partial dial operator. A permanent signal occurs when a line times out before any digits are received. A partial dial occurs when a line times out after the reception of at least one digit but less than the number of digits required to complete the call. After a series of programmed steps, the permanent signal line is routed to an operator's position (switchboard) to provide assistance to the calling customer.

G. Special-Service Operator Trunks

Centralized Automatic Message Accounting (CAMA) Operator Trunk

2.10 The advent of the CAMA feature in CTX-6 for No. 1 ESS offices and the 1AE1 generic program for No. 1A ESS offices required an interface between these offices and operator positions to handle operator number identification (ONI) and automatic number identification (ANI). In No. 1/1A ESS offices, each CAMA position will have an appearance on the trunk switch network through customized outgoing trunk circuits (OGT) SD-1A313, SD-1A315 and SD-1A316. These OGTs have a multifrequency (MF) receiver associated with them connected via the switching network when the CAMA position is occupied.

Coin Zone Operator Trunk

2.11 Coin zone dialing, an optional coin feature, requires an interface between the ESS office and an operator position (switchboard). Coin zone dialing is an arrangement whereby multiple message unit calls may be dialed from a coin telephone. When dialing is complete, the coin customer is connected to a coin zone operator via a coin zone operator trunk SD-1A254.

Local Coin Overtime Trunk

2.12 Local coin overtime, another optional coin feature, provides for a nickel overtime charge on local calls after an initial talk period has elapsed. At the end of the initial talk period, the ESS tests the coin station for deposit of the overtime charge. If the coin is not deposited, the call is connected to an overtime operator at a switchboard via the local coin overtime trunk SD-1A255.

Business Office Trunks

2.13 Connections to a business office (usually after subscriber dials 811) from the ESS are made to a switchboard. Traffic to a business office is routed over a special trunk group consisting of outgoing trunks from an ESS to a switchboard. These trunks are not joint holding; therefore, network connections are released immediately on a disconnect from the subscriber or the incoming

TABLE A

TRUNK CIRCUITS

TRUNK CIRCUITS	CPI	OGT	ICT	TOLL SW	R RC	NO TEST	PERM SIG	BUS OFF.	INTER-CEPT	VERIF REQ	OGT CAMA	COIN ZONE	LOCAL COIN OVERTIME	INBAND	NOT INBAND	DIST BLDG	SAME BLDG	CONTROL RING	NOT CONTROL RING	MISC TRUNK	UNIV TRUNK
SD-1A169	8	X			X		X	X	X	X					X	X			X	X	
SD-1A177	9	X							X	X					X				X	X	
SD-1A184	17		X	X		X									X	X		X	X		X
SD-1A192	13	X	X	X	X	X	X	X	X	X				X	X	X		X	X		X
SD-1A223	6	X					X	X	X	X					X		X		X		
SD-1A224	5		X	X	X										X			X	X	X	
SD-1A254	10	X										X			X			X	X	X	
SD-1A255	14	X											X		X			X	X	X	
SD-1A313	34	X									X				X			X	X	X	
SD-1A315	47	X									X							X	X	X	
SD-1A316	36	X									X							X	X	X	

ABBREVIATIONS:

CPI = Circuit Program Index
OGT = Outgoing Trunk
ICT = Incoming Trunk
TOLL SW = Toll Switch Trunk
R,RC = Reverting or Recording-Completing Trunk
NO-TEST = No-Test Trunks
PERM SIG = Permanent Signal Trunk
BUS. OFF. = Business Office Trunk
INTERCEPT = Intercept Trunk
VERIF REQ = Verification-Request Trunk
OGT CAMA = Outgoing Trunk to CAMA Operator

COIN ZONE = Coin Zone Trunk
LOCAL COIN OVERTIME = Local Coin Overtime Trunk
INBAND = Inband Signaling Used on Trunk
NOT INBAND = Inband Signaling Not Used on Trunk
DIST BLDG = Switchboard Located in Distant Building From ESS Office
SAME BLDG = Switchboard Located in Same Building as ESS Office
CONTROL RING = Operator Control Ringing Trunk
NOT CONTROL RING = Automatic Control Ringing Trunk
MISC TRUNK = Miscellaneous Trunk Circuit
UNIV TRUNK = Universal Trunk Circuit

trunk. Trunk circuits SD-1A192, SD-1A169, and SD-1A223 can be used as business office trunks.

Intercept Operator Trunks

2.14 There are four outgoing trunks which can be used to connect the originating line or an incoming trunk to intercept operator. These trunks are SD-1A177, SD-1A169, SD-1A192, and SD-1A223. These trunks may connect an intercepted call to a trouble intercept operator (see 2.07), a regular intercept operator, or an announcement system.

3. SYSTEM PERSPECTIVE

SOFTWARE DATA STRUCTURES

3.01 The interface with an ESS office for switchboards consists of incoming and outgoing miscellaneous and universal trunk circuits.

A. Universal Trunk Translations

3.02 Incoming calls on universal trunks are detected by a seizure signal recognized by a trunk scanner. The trunk scanner address is translated to find the associated trunk network number (TNN) so that a receiver may be connected. The trunk class code (TCC) is also obtained to determine the type of receiver to connect to the incoming trunk. The TCC is derived by a TNN translation. The TCC is a compact trunk class code expansion. The expanded translations are used to provide the call processing program the necessary information of the type of trunk involved in the interface. The trunk network number is also used to mark the path memory of all the paths associated with the trunk. Disconnect is recognized by the trunk scanner and a translation from trunk scanner to TNN is required so the disconnect signal is associated with the proper path memory.

3.03 Outgoing calls cause an interface trunk to be seized initially because it is a member of the trunk group indicated by the route index. The route index is found by the office code translation of the dialed digits. The route index expansion yields the trunk group number containing the interface trunk circuits. For outgoing calls, the route index also indicates the number of digits to be deleted, any digit prefixing or deletion information, and the transmitter type. Trunk group number (TGN), peripheral equipment number (PEN), trunk network number (TNN), and the trunk class code expansion (TCC) translations are used to hunt for an idle interface trunk.

3.04 A TNN-to-PEN translation is used to derive all equipment location numbers associated with the universal trunk interface circuit. After selection of the appropriate trunk, a trunk class code expansion is necessary to select the transmitter to be used in connection with the outgoing trunk circuit and to provide the circuit program index necessary to control the trunk. In order to control a trunk circuit and its associated scan memory, it is necessary to know the trunk network number and the trunk group number. A disconnect by the subscriber can be detected at the trunk circuit. A translation from trunk scanner to trunk network number is used to find the proper network path information and the trunk class code expansion to release the trunk.

B. Miscellaneous Trunk Translations

3.05 Incoming calls on miscellaneous trunk circuits are detected by the master scanner via a seizure signal. The master scanner address is translated to find the trunk network number associated with the seizure so that a receiver may be connected to the incoming trunk. In addition, the trunk class must be established so that the proper receiver is connected to the trunk. The trunk class code is derived by translation from the TNN. The trunk class code is a 3-digit number representing a 4-word trunk class code expansion. The expanded translations indicate the number of digits expected over the trunk. The expanded trunk class code indicates the number of digits expected over the trunk. The information is given in the form of a circuit program index (CPI) that is an identifying number unique to each type of circuit configuration. A TNN-TGN translation is used for a network path hunt, and the TNN is used to permit the call processing programs to mark the appropriate path memory of the trunk.

3.06 Outgoing calls cause an interface trunk to be seized initially because it was a member of the trunk group indicated by the route index (RI). The route index is found by office code translation of the dialed digits. The route index translation yields the trunk group number containing the interface circuits. TGN, TNN, and TCC translations are used to hunt for an idle interface trunk. After selection of the appropriate trunk, a

TCC expansion is used to select the transmitter to be used with the outgoing trunk circuit. Miscellaneous trunks are controlled from signal distribution (SD) and central pulse distributor (CPD) points which have no relation to the master scanner number; therefore, a TNN-PEN translation is required to find the SD and CPD numbers necessary for controlling the interface trunk circuit.

3.07 A coin control register is seized and loaded with an indication that the coin should be either collected or returned on toll switch or recording-completing operator trunks. The operator trunk (inband or noninband) is placed in the hold state. The MF receiver for inband trunks must be idled. When these actions have been successfully performed, the coin control register is seized and loaded with an indication that the coin should be either collected or returned. The register also contains the direct program returns in case of a failure or success to return or collect the coin.

3.08 When an operator originates a call on a trunk, the dialed number is translated and an incoming register is seized. Ringing information, the trunk network number (TNN) of the operator trunk, and other pertinent information is stored in the incoming register. This information is transferred to an operator register.

3.09 When an off-hook has been detected on either the line side or trunk side of a toll switch or recording-completing trunk, no register is attached. Program entry is made via a special program index (SPI) or a trunk program index (TPI). Call store scratch area and central control registers contain all information pertinent to the call such as the trunk network number, the trunk scanner number (TSN) of the operator trunk, and the time scan junior register (TSJR) address. An operator register will be associated with a call when party ring information is saved on a toll ring-controlled switch call. An operator register is seized and loaded with information pertinent to the call such as an operator TNN, circuit program index (CPI), trunk class code, and the trunk distribution number (TDN).

3.10 If an operator goes on-hook on a toll switch call, the connection is abandoned regardless of the state of the line. Control is transferred to the disconnect program and the call is disconnected. If a disconnect is received on a line which has add-on service and the trunk side is off-hook, a scan is set up to time for a flash. The timed scan junior register (TSJR), attached when the disconnect is received, is used to set up a scan on the line side for a maximum of 1100 msec. If the line goes off-hook before the 1100 msec period expires, the report is interpreted as a flash and program control is transferred to the add-on program. If the line is still on-hook after the 1100 msec period expires, a peripheral order buffer (POB) is seized and orders are loaded to return on-hook supervision to the operator. If the operator disconnects, control is transferred to the disconnect program and the call is disconnected.

3.11 An operator register, an engineered group of blocks of call store memory (discussed previously), is seized by the operator no-test program soon after it assumes control of a no-test call and is not released until the operator disconnects. Holding time for this register is essentially the duration of the no-test call.

HARDWARE

3.12 The interface with switchboards feature uses various trunk circuits to provide interconnection between the ESS and the switchboard positions. These trunks are:

(1) SD-1A156—This circuit is used to provide manual service for certain customers when an emergency exists. The operation of a key at the master control center (MCC) or a distant switchboard transfers these lines to emergency manual service. Calls can be completed in either direction between the subscriber and switchboard. This service is independent of the ESS central office equipment except that battery and ringing are supplied via the ESS.

(2) SD-1A169—This circuit is used to carry out the functions required at the originating end of a trunk to complete recording-completing, special service, and vacant code calls to operators at 3CL switchboards.

(3) SD-1A177—This circuit is used to carry out the functions required at the originating end of a trunk to complete a call to an intercept facility or to a 3CL switchboard handling verification traffic.

(4) SD-1A184—This circuit is used to carry out the functions required at the incoming end

of a trunk to handle calls which terminate locally or are to be switched tandem through the ESS office.

(5) SD-1A192—This circuit is used to carry out the functions required to handle incoming and outgoing calls between an ESS office and a 3CL switchboard.

(6) SD-1A223—This circuit is used to carry out the functions required at the originating end of a trunk to complete recording-completing, special service, and vacant code calls to operators at 3C or 3CL switchboards.

(7) SD-1A224—This circuit provides a means to carry out the functions required at the incoming end of a trunk to handle calls which terminate locally or are switched tandem through the ESS office.

(8) SD-1A243—This circuit is used to provide manual service for certain customers when an emergency exists in the office of which this circuit is a part. The operation of a key switch at the MCC or at a switchboard transfers these lines to emergency manual service.

(9) SD-1A254—This circuit is used to carry out the functions required to extend coin zone dialing beyond the local zone.

(10) SD-1A255—This circuit is used to carry out the functions required to permit coin dialing within the local area.

(11) SD-1A313—This circuit is a 2-port circuit and is arranged to handle all operator number identification (ONI) calls and all calls that fail automatic number identification (ANI).

(12) SD-1A315—This circuit is arranged to handle operator number identification (ONI) calls or calls that fail automatic number identification (ANI).

(13) SD-1A316—This circuit is arranged to handle operator number identification (ONI) calls or calls that fail automatic number identification (ANI).

3.13 In addition to the interface trunk circuits discussed above, trunks which use E&M type signaling (e.g. SD-1A252) can be used to provide an interface with a switchboard.

FEATURE OPERATION

3.14 Calls for which a customer dials zero or a service code on coin type calls, which require operator assistance, are switched to operator trunks discussed previously when operator switchboard positions are associated with No. 1/1A ESS offices. A description of the types of calls that require switchboard interfaces is discussed below.

A. Toll Switch Calls

3.15 Toll switch calls are incoming calls from a toll switchboard to the ESS. The calls are originated by operators on toll switch trunks to local subscribers. These incoming calls from operators are handled the same as any incoming call except the trunk class information indicates whether the operator has control of ringing or if the trunk is arranged for immediate (automatic) start of ringing of the called line. With the operator in control of the start of ringing, any individual or party line can be rung whether it is on-hook or off-hook. The connection to the called line is established; if the line is one party and is on-hook, a ringing register is loaded with the information if the operator is in control of the start of ringing. The called line is connected to a ringing trunk and the operator trunk to audible. The line is then supervised for answer. When the line goes off-hook in response to ringing, the talking path connection is reestablished between the line and operator completing the call.

3.16 When an operator originates a call on a toll switch trunk, the number the operator dialed is translated and an incoming register (IR) is seized. Ringing information, the TNN of the toll switch trunk, and other information pertinent to the originated call is stored in an incoming register and is transferred later to an operator register. If no transfer keys are operated at the switchboard position and the called line is found busy, the toll switch trunk is routed to busy tone; if transfer keys are operated, the calls from a toll switch trunk are completed to a base station. If the base station is busy, the operator is connected to busy tone.

3.17 When an operator requests either ringing, coin collect, or coin return on an inband

signaling trunk, the multifrequency signals are preceded by a wink which is an on-hook indication of less than 200 msec. When the trunk side of a trunk receives a wink and the wink has been from the operator via an inband trunk, an MF receiver is connected to the operator trunk. Ground-start PBX lines must be connected to a holding trunk when the operator is connected to a receiver. Operator trunks arranged for noninband signals have a coin ferrod and a ring ferrod associated with them. When the ring key is operated, the ring ferrod is activated.

3.18 When either the inband or noninband signal detection portions interpret that a request for ringing has been made (manually via ring key or automatically), ringing is applied to the called line. If the line is off-hook and is not a PBX line, receiver-off-hook (ROH) tone is applied to the line. If the line is one party and on-hook, a ringing register is seized and loaded with information required to apply ringing to the line. The same procedure is followed for ringing an off-hook PBX line except that PBX lines are always one party. If all the ringing registers are busy, the operator register is placed on a queue until a ringing register is idle. After the ringing register has been seized and loaded, the cut-through relays in the operator trunk must be opened. After all the cut-through relays are open, the line is connected to a ringing trunk and the operator trunk is connected to audible. When the ringing connection is set up successfully, the line is supervised for answer at the ringing trunk. When special ringing is required, the same sequence is required in connecting the line to a ringing trunk and the operator to audible. A special ringing trunk is used and the line is supervised during the ringing period.

3.19 When the line has come off-hook in response to an operator ringing or when special ringing has been completed, the talking path between the line and an operator is established. Ringing and audible trunks are released. If ringing information for a subsequent rering is required for a party line, the operator register is held; otherwise, the operator register is released. If the operator abandons the call during an on-hook ring, the operator, audible, and ringing trunks are idled.

3.20 Control is transferred to the coin control sequence when either the inband or noninband signal detection portions interpret that a request for coin collect or coin return has been activated by the operator. When the coin ferrod is activated, a coin return action is required. Both the coin ferrod and the ring key (ring ferrod activated) are activated for a coin collect in offices where coin return potential is negative; the opposite is true for offices where coin return potential is positive. After the request has been interpreted, the operator trunk is placed in the HOLD state, and the MF receiver is idled for inband trunks. A coin control register is seized and loaded with an indication the coin should either be collected or returned. A peripheral order buffer (POB) is seized and loaded with orders to connect the line to a coin control circuit. If a blocked or busy condition is encountered when attempting to connect the line to a coin control circuit or if all coin control registers are busy, the coin control queue is entered. A second attempt is made to connect the line to a coin control circuit when a coin control register becomes available. If the second attempt also finds a blocked condition, the original connection between the line and an operator is reestablished. The operator can then initiate the request by operating the proper coin key again. When the connection to the coin control circuit is successful, the proper coin action is complete. For inband trunks the original connection between the line and operator is reestablished. When a coin action is performed on a noninband trunk, the coin indicator lamp on the switchboard is lit and will remain lit until the operator releases the coin and ring keys.

B. Recording-Completing and Reverting Calls

3.21 Calls for which a customer dials zero or a service code (long distance, etc.) which require operator assistance to complete are switched to recording-completing trunks when the operator switchboard positions are associated with an ESS office. No outpulsing is required and, therefore, transmitters are not required on these calls. However, some service code calls, excluding zero operator calls, are routed via interoffice trunks to a centralized location, and outpulsing is required as in any other outgoing interoffice call.

3.22 A reverting call between customers on the same party line can be routed to an operator for completion. Operator-routed calls and message-rate reverting calls are routed over a separate operator trunk group or a combined operator trunk group with class-of-service tone identification. Class-of-service tone identification involves applying a low or high

tone to identify the calling class of service to the operator. The operator completes the call over a toll switching trunk group after instructing the calling customer to hang up, delay for called party answer, and then to go off-hook again.

3.23 When a subscriber dials 211 or 0, or if a party line customer dials another party on his line, a path is reserved in the network between the subscriber and the first available recording-completing trunk. Audible tone is supplied to the subscriber and a seizure signal is sent toward the switchboard to call an operator. Ringing information, the TNN of the recording-completing trunk, and information pertinent to the originated call are stored in an incoming register. If a blocked or busy condition is encountered in reserving the recording-completing operator trunk, overflow is returned to the subscriber. If a blocked or busy condition is encountered in connecting the subscriber to an audible tone, the call is allowed to proceed without giving the audible tone to the subscriber. When attempting to give the subscriber overflow if a blocked or busy condition is encountered, the subscriber will appear as another origination and will be given dial tone.

3.24 Upon operator answer, the talking path between subscriber and operator is established, and audible tone to the subscriber is abandoned. A class-of-service tone may be applied to the line to identify the calling class of service to the operator before establishing the talking connection for 0.5 to 1 second. A link-list queue is available to wait for a tone trunk if all of them are busy. Ground-start lines with no audible tone applied are connected to a holding trunk to provide holding current while a class-of-service tone is being given to the operator. If no holding trunk is available, the class-of-service tone is omitted.

C. Verification-Request and Trouble-Intercept Calls

3.25 A verification-request call is initiated by an operator located at a distant switchboard by keypulsing the office code destination of the busy subscriber's line followed by the four digits 9901. The purpose of this type of call is to verify a busy condition on a subscriber's line. When this code is dialed, a talking path is provided between an operator at a distant switchboard and an operator at a local switchboard. Signaling between operators, after a talking condition has been established, is accomplished by having the terminating operator remove and insert the switchboard cord plug from the trunk jack appearance at the operator's position. The operator then initiates a no-test vertical call to verify the line.

3.26 Trouble-intercept calls are established when the called subscriber's line is in a trouble state. When this condition exists, a connection is established between the calling subscriber and a trouble-intercept operator at a switchboard. This type of call can be originated by a local subscriber or a subscriber in a distant office. Separate trunk groups are always provided for verification-request and trouble-intercept calls from the ESS to a switchboard. Although the trunk groups serve different purposes, the actions performed in handling either type of call are identical.

3.27 The seizure of a trunk in either a verification-request trunk group or an intercept trunk group is initiated by a local subscriber or by a distant subscriber or operator via an incoming trunk. The trunk seizure occurs after the dialed directory number has been translated and routed to the appropriate trunk group. A seizure signal is then sent to the operator switchboard lighting the appropriate trunk lamp while audible tone is returned to the calling customer or operator. Upon operator answer, the trunk group lamp will automatically be extinguished and a talking connection is set up between the operator and the call originator. In the event that the originating end is unable to connect to a trunk in the proper trunk group due to path blockage or all-circuits-busy condition, overflow tone is returned to the calling end. Signaling between operators after a talking condition between them has been established is permitted only when using the verification-request trunk group.

D. No-Test Calls

3.28 No-test calls are originated by the operator for number checking and busy-idle verification of a particular line. This is usually done at the request of a customer trying unsuccessfully to reach a called number in order to verify that the line is legitimately busy or to enable the operator to break in on a call in an emergency situation. Operator actions are identical to those required to the operator on any incoming trunk. The circuit operation, however, is quite different due to the location of the no-test verticals on the junctor side of the line-link and trunk-link networks. If the

called line is idle, a normal terminating call connection will be established, and the system will process the call as though it were a controlled start-of-ring toll switch call. When the called line is busy, a connection will be established via the junctor switching frame rather than the line switching frame. No-test call processing must follow the called line connection. The network path configuration of the called line is checked every 500 msec by the system. Whenever the network connection has changed, the system institutes a call trace to determine the network configuration and establishes a new no-test connection. The no-test connection is made without disturbing the called-line connection.

3.29 A no-test call is initiated when an operator uses a no-test trunk to dial a directory number. Upon origination, the operator will receive one of several indications to indicate the state of the called line. If the called line is found idle, the no-test trunk is identified in memory as a toll switch trunk, and an on-hook supervisory signal is returned to the operator. A check is made to see if a temporary transfer is active on the called line; if so, busy tone is returned to the operator. If no transfer is active, a call trace is initiated. If the call trace indicates that the called line is connected to a network path and this path is not controlled by a master control center (MCC) register or a permanent signal register, the called line is legitimately busy and a no-test connection can be made to the line. If an MCC register or a permanent signal register controls the call or if the line is found in the MCC queue or high and wet list, permanent signal tone is returned to the operator. If none of the above conditions are found or if an operator register or a no-test vertical is not available, overflow tone is returned to the operator.

3.30 A no-test connection can be completed in two ways:

(1) If the called line is connected in a line-to-junctor path only, the no-test vertical on the line junctor frame nearest the called line is the only one available. Since no other no-test vertical can bridge the established path, only one no-test connection is attempted.

(2) If the line is connected in a line-to-line path or a line-to-trunk path, the no-test vertical on the junctor frame farthest from the desired line is tried first. If that no-test vertical is busy, the one on the junctor frame nearest the called line is tried.

3.31 Once a no-test connection is made, timing is started. After 500 msec the path memory associated with the called line is checked; if found to be unchanged, timing is reinitiated. If the path memory is changed, the no-test connection is broken down and a call trace is initiated. If the call trace indicates that the line is connected to another network path and an MCC or permanent signaling register is not controlling, a no-test connection is reestablished. If an MCC or permanent signal register is controlling or the line is now on an MCC queue or high and wet list, permanent signal tone is returned to the operator. If the line is found idle, an operator's cord lamp lights indicating an on-hook condition. The lamp will remain lighted until the operator disconnects. When the operator disconnects from a no-test call, the no-test connection is taken down and the operator register is idled. The path associated with the line will not be disturbed.

3.32 An operator register is seized by the operator no-test program after it assumes control of the call and is not released until operator disconnect. Holding time of this register is essentially the duration of the no-test call.

E. Permanent Signal--Partial Dial Calls

3.33 When a line times out before any digits are dialed, a permanent signal condition results; when a line times out after the reception of at least one digit but less than the number of digits required to complete the call, a permanent signal condition may result. When these conditions exist, these lines are sent through a series of programmed steps in an attempt to get the calling party to go back on-hook. The permanent signal line is connected first to a permanent signal holding announcement trunk which provides connection to the recorded announcement circuit for one cycle of announcement. The line connection, if not cleared, is then transferred to a receiver-off-hook tone (ROH), and if the permanent signal condition still persists, the line is routed to an operator-position switchboard over a record-completing trunk. If an operator does not succeed in clearing the off-hook condition, the line is put on a high and wet list.

3.34 After the customer dials the first digit, each succeeding digit is timed for a 16- to 24-second

interdigital timing interval. If the interval is exceeded, the calling line is disconnected from the customer dial pulse receiver and connected to a partial dial holding announcement trunk which may either provide a partial dial announcement or overflow tone (operating company option). If the partial dial persists, it is given the same treatment as described for permanent signals.

3.35 An outgoing trunk from the ESS office to a switchboard is used to provide an interface to a permanent signal, partial dial operator. A permanent signal occurs when a line times out before any digits are received. A partial dial occurs when a line times out after the reception of at least one digit but less than the number of digits required to complete the call. When these conditions exist, these lines are sent through a series of program steps in an attempt to get the lines back on-hook. Partial dial handling of a call varies from permanent signal calls in that the line is connected to a partial dial holding trunk before connection to the permanent signal announcement. One of the series of programmed steps used to get the lines back on-hook is connecting these lines to ROH tone for a period of 40 to 50 seconds. If the ROH tone fails to cause the subscriber to hang up, a connection is made to a permanent signal operator trunk. At the associated 3CL switchboard, one of two lamps associated with coin and noncoin trunk groups lights. The lamps are designated as PS COIN and PS NONCOIN to indicate the class of the customer line. The lamp is extinguished at the operator position if the operator does not answer within 70 to 80 seconds. If the operator failed to answer, if the operator answers and is unable to dispose of the call, or if the line cannot be connected to a permanent signal (PS) operator because of a blocked or busy condition, the line equipment number (LEN) of the line is placed on the high-priority list (HPL) of the high and wet list (HWL). The purpose of the operator is to lend assistance if necessary, especially in an emergency.

F. CAMA Calls

3.36 Local offices route CAMA calls to CAMA offices over dedicated trunk groups. These groups contain two types of trunks—those to handle ONI calls and those for ANI calls. CAMA offices receive the called number from the originating office in an identical manner for ONI and ANI calls. The originating office seizes an idle outgoing trunk and outpulses the called number using either multifrequency (MF) or dial pulse (DP) signaling. The CAMA office is now prepared to receive the calling number and signals the originating office to begin transmission. For ANI calls the originating office sends the calling number by means of MF pulsing only. If the received number is invalid or the ANI signaling equipment fails to operate, the call will be forwarded to a CAMA operator at a switchboard or traffic service position system (TSPS) position to determine the calling number. For ONI calls, the ESS connects the incoming CAMA trunk to an outgoing trunk that terminates on a CAMA operator position at a CAMA switchboard, or a 3C or 3CL switchboard, or a traffic service position system (TSPS). The operator attempts to ascertain the calling number and transmits it to the CAMA office using keypulsing. If the operator is unable to receive a valid number, a position disconnect signal is sent to the CAMA office and reorder tone is returned to the calling customer.

3.37 When the received number is invalid or the signaling equipment fails to operate on an ANI call, the call is forwarded to a CAMA operator at a switchboard position. ONI calls are connected to an incoming CAMA trunk, to an outgoing trunk that terminates on a CAMA operator position, or a 3C or 3CL switchboard. When an ESS connection is made to an operator position, the TNN of port 0 of the interface trunk circuit (SD-1A313, SD-1A315 or SD-1A316) is determined by PEN translation of the TNN associated with port 1 stored in the CAMA register. If the call resulted from an ANI failure, an 800 msec burst of zip tones is sent to the operator. If the call is a normal ONI or ANI multiparty call, two bursts of 100 msec zip tones with a 100 msec silent interval between them are sent to the operator. Supervision is then set for customer abandon and operator position disconnect.

3.38 The CAMA operator attempts to determine the calling number from the customer and transmits it by MF pulsing. The digit frequencies are sent to the CAMA operator trunk on the keying pair. At the end of a 1-second interval a check is made to determine if the calling office code is invalid. A check is also made to insure that the first three digits of the calling number are not identical to the called numbers. If the operator is unable to determine a valid calling number from the customer, the position make-busy key is used to terminate the call.

G. Coin Zone Calls

3.39 A coin zone call is a call made by a coin customer to a point outside of the local calling area. The area in which coin zone dialing is allowed is separated into zones based on the initial charge for calls to the various points. A coin zone operator momentarily comes on the line to monitor the initial coin deposit and to supervise calls that go into overtime for any additional coin charges. The call proceeds after the required deposit is made. If there is no answer, the coins are returned upon disconnect. If the called party answers, a charge delay or minimum recordable duration (with CTX-7, Issue 9, and 1AE4) is initiated after the called customer answers. After the charge-delay interval, the initial charge period is timed and can be 1 to 5 minutes. The deposited coins are automatically collected by the ESS 24 seconds before the end of the initial charge period. If the call continues after the initial charge period, the ESS determines the overtime charging rate. The ESS connects both the called and coin customers via a coin zone trunk to an operator and alerts the operator to the overtime charge by flashing a rate lamp. The operator can request the overtime charge immediately or can tell the coin customer to signal when the call ends.

3.40 When a coin zone call is initiated by a coin customer, routing and charging information are determined from the area code and/or office code via the 3-digit translator. One of the coin zone operator trunks (SD-1A254) is selected by the ESS via the coin zone operator route index found in the charge index expansion table. A coin charge register is seized and initialized. The customer's initial deposit may be retained or returned (telephone company option). A no-coin test is needed if the initial deposit is returned. When the initial deposit is retained, a coin test is required via a coin control circuit. The customer is then connected to a coin zone operator trunk previously seized. Path memory annex is associated with the call. The operator is alerted of a coin zone call by a steady light from one of the zones outside the local calling area. The operator requests the additional coin deposit, determines if the deposit is sufficient, and releases the connections. When the operator is satisfied with the deposit and releases the connections, the call proceeds through outpulsing to ringing. If the deposit is insufficient and the customer does not deposit the required amount of money, the insufficient deposit can be returned and the call can be disabled. The operator disables the call by pushing the rering key and then removing the cord.

3.41 When the called customer answers, the coin charge register starts timing the call. Twenty-four seconds before the end of the initial charge period, the deposited coins are collected via a coin collect circuit. At the end of the initial period, the coin zone overtime operator is alerted with a flashing rate lamp (120 IPM). The flashing lamp indicates the overtime charge set by the operating company.

3.42 After the overtime charge is deposited, the operator requests a signal when through. At the end of the call, the ESS retains the connection even if the calling party goes on-hook prior to payment; if so, the operator rerings and obtains the final deposit. After the operator collects the final deposit, the calling party is disconnected and the connection is idled.

H. Local Coin Overtime Calls

3.43 Local coin overtime divides a call into two distinct periods—initial and overtime. Each of these periods may be from 1 to 7 minutes. The initial period begins after the called party answers. The initial deposit is collected by the ESS 24 to 30 seconds before the end of the initial interval. This collection is an indicator to the coin customer that the initial period is near completion and the customer must either disconnect or deposit the overtime rate (usually five cents) in order to continue the call. Twenty-four seconds after the end of the initial period if no disconnect is detected, a coin-present test is made and if a coin is present the system reinitiates the timing for another 5-minute period. If the coin is not present, the calling and called customer are connected to an overtime monitoring operator via a 2-port local coin overtime trunk. The operator requests the coin deposit if the call is to continue and disconnects when this deposit has been made.

3.44 At the expiration of the initial period, the ESS automatically tests the coin station for coin deposit. If the deposit exists, the call is marked in overtime and is allowed to continue for the overtime period. If the coin is not present, both the calling and the called customers are connected to an overtime monitoring operator at a switchboard via the local coin-overtime circuit

SD-1A255. The overtime operator requests the coin deposit if the call is to be continued. When an operator is satisfied that the overtime coin is deposited, the operator releases the connection. Another coin test is made via the coin-control circuit. If the coin is present, the overtime timing period is started again. If the coin is not present, the operator is flashed again. After disconnect is recognized, the coin-control circuit is used to collect any coins that are present; then the connection is released.

I. Business Office Calls

3.45 Calls to a business office when a subscriber dials 811 (or in some areas the 3-digit access code may be in the form of a 11X code or a X11 code) are routed to a switchboard. The switchboard appearance of the incoming trunk identifies the originating office of the call. The operator at the switchboard knows the trunk identification, the identity of the originating office, and that the call is destined for a business office. The calling number is obtained by the operator. The operator then consults a list of business customer representatives, selects the correct one for the particular phone number, and completes the call to the correct representative over a group of direct local trunks.

3.46 A subscriber dialing a business office results in a network path being reserved for the call between the subscriber and an available business office trunk. Audible ringing is supplied to the subscriber by the ESS, and a seizure signal is sent toward the switchboard to alert an operator. Ringing information, the TNN of the business office trunk, and originating call information are stored in an incoming register. If the call is blocked in the network or if all 811 trunks are busy, overflow is returned to the calling subscriber. In the event that audible ringing is blocked or all circuits are busy, the call is completed without audible ringing.

3.47 When the operator answers, a talking path between the operator and the subscriber is established. The operator asks the subscriber's telephone number and determines whether it is a business or residence, consults a list of business representatives, selects the correct one listed for that particular phone number, and completes the call over a group of direct local trunks. Coin return on disconnect or abandonment is automatic on business office calls from coin phones.

J. Intercept Operator Calls

3.48 Calls to unassigned, vacant, or blank numbers or area codes, disconnected numbers, station-to-station calls with proper use of barrier-code-one prefix can be routed directly to an intercept operator. These call conditions result in some form of intercept treatment as determined by operating company practices. These calls can be routed as follows:

(1) To tone circuits or the ESS recorded announcements where the connection is retained until the customer hangs up

(2) To an announcement system (not part of the ESS) such as a 6A machine announcement

(3) Directly to an intercept operator located at a switchboard.

3.49 Translation of the called office code or directory number will determine that a subscriber's request from a local or distant office or an operator's request requires intercept treatment. A path between an idle intercept trunk and the subscriber is reserved. A seizure signal is sent toward a switchboard to light the operator's trunk lamp. An audible ringing trunk is connected to the customer to supply audible ringing until operator answer. Ringing information, the TNN of the intercept trunk, and originating call information are stored in an incoming register. When the operator answers, the trunk lamp will be extinguished and a talking connection will be established between the customer and operator. The operator's answer indication is detected by the supervisory scanner program. A disconnect from the originating end first will release the network connection leaving the intercept trunk busy until the operator disconnects.

K. Emergency Manual-Line Calls

3.50 Emergency manual-line service provides temporary manual service to select critical customers under emergency conditions. Emergency conditions refer to when an ESS switching machine is experiencing a most severe and prolonged overload condition or is completely inoperative.

3.51 When emergency manual-line service is activated at the master control center (MCC) or at an equipped operator position (a 3C or 3CL

switchboard within the same building), a program makes busy the lines which have this service. The customer having this will terminate at an operator position when the line goes off-hook. The operator at the equipped switchboard handles the customer's service request. When this service is deactivated, the operator trunk associated with customers having this service is idled, and customers' requests are handled by the system.

3.52 When emergency manual-line service is activated, the trunk supervisory scan program detects a trunk off-hook signal from a scan point on the emergency manual line circuit if the circuit is arranged for activation from a remote switchboard (SD-1A156-01 circuit). A trunk on-hook signal is generated when the emergency manual-line circuit is deactivated. The program causes the trunk to be removed from the link list (made maintenance busy) when the service is deactivated. If the circuit is arranged for activation from a switchboard in the same building (SD-1A243-01 circuit), no trunk is used. In either case (local or remote switchboard), the ESS program detects customer lines on-hook and off-hook signals from a scan point in the emergency manual-line circuit. The program sets the appropriate busy line bit. For additional information concerning emergency manual-line service, see reference A(1) in Part 19.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 The interface with switchboards feature is applicable on a per trunk group basis.

5. LIMITATIONS AND RESTRICTIONS

OPERATIONAL

5.01 A trunk side wink received from an operator on an inband trunk causes an MF receiver to be connected to the operator trunk to receive MF signals. The signal-present lead of the receiver is then scanned at a 100 msec rate for a maximum of one second. If no signals are received in that time, the program assumes that a "hit" has occurred, and the original connection is set up again. This will result in a conversation interruption of approximately one second.

5.02 Inband trunks must be physically located on the trunk frames on horizontal mounting plates that are scanned at a 50 msec rate in order to guarantee that the program recognizes momentary disconnects (hits).

5.03 When the operator loop is opened to provide a connection to a receiver, if the line connected to the operator is a ground-start PBX line, it would drop out of the connection if the loop is left open for longer than 240 msec. To avoid this a ground-start PBX line is connected to a holding trunk while the receiver is connected to an operator inband trunk.

5.04 Route advance or route transfer on any operator or outgoing miscellaneous trunk group must use the same type of circuit used in the first choice group.

ASSIGNMENT

5.05 Not applicable.

6. COMPATIBILITY AND INTERACTIONS

6.01 Not applicable.

7. COST FACTORS

MEMORY—NO. 1 ESS

A. Fixed

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

- ***Generic (program store):*** The interface with switchboards feature requires approximately 140 words of generic program store. Each of the interfaces requires approximately 75 words dedicated to operator actions at a switchboard location.

B. Variable

7.02 The following memory costs depend on the amount of usage of the feature:

- ***Translations (program store):*** The variable cost for the trunks for coin zone, local overtime, and outgoing-to-CAMA calls to be routed to the switchboard is 16 words per trunk. Nine words are required to provide a TNN-PEN translation, six words for master scanner translations, and one word for the

TNN-to-TGN translation. The variable costs of other trunk interfaces are 11 words per trunk. Two words for route index expansion (required for outgoing calls), one word for TNN-to-PEN translation, one word for TNN-to-TGN translation, two words for trunk group number translations, one word for trunk circuit number translation (for universal trunks), and four words for trunk class code expansion translation.

- ***Call Store:*** An originating register of 18 words is seized when an operator originates a call. Ringing information and the TNN of the operator trunk are stored in this incoming register. A 15-word operator register is used for connect and disconnect action on a switchboard interface trunk. When an operator goes on-hook on a toll call, if the disconnect is received on a line with add-on service and the trunk side is off-hook, a 3-word timed disconnect register is seized to scan the line for a maximum of 1100 msec. A 10-word coin control register is seized and loaded with an indication that the coin should be collected or returned when coin actions are required on a toll switch or recording-completing operator trunk.

MEMORY—NO. 1A ESS

A. Fixed

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

- ***Generic (program store, file store):*** The interface with switchboards feature requires approximately 175 words of generic program store. Each of the interfaces requires approximately 93 words dedicated to operator actions at the switchboard.

B. Variable

7.04 The following memory costs depend on the amount of usage of the feature:

- ***Translations (unduplicated call store, file store):*** The variable cost for the trunks for coin zone, local overtime, and outgoing-to-CAMA calls to be routed to the switchboard is 16 words per trunk. Nine words are required to provide a TNN-PEN translation, six words for master scanner translations, and one word for the TNN-to-TGN translation. The variable costs of other trunk interfaces are 11 words per trunk. Two words for route index expansion (required for outgoing calls), one word for TNN-to-PEN translation, one word for TNN-to-TGN translation, two words for trunk group number translations, one word for trunk circuit number translation (for universal trunks), and four words for trunk class code expansion translation.

- ***Call Store (duplicated call store):*** An originating register of 18 words is seized when an operator originates a call. Ringing information and the TNN of the operator trunks are stored in this incoming register. A 15-word operator register is used for connect and disconnect action on a switchboard interface trunk. When an operator goes on-hook on a toll call, if the disconnect is received on a line with add-on service and the trunk is off-hook, a 3-word timed disconnect register is seized to scan the line for a maximum of 1100 msec. A 10-word coin control register is seized and loaded with an indication that the coin should be collected or returned when coin actions are required on a toll switch or recording-completing operator trunk.

PROCESSOR TIME

7.05 An incoming call entering the switching network from the trunk side and establishing a line connection requires approximately 4000 cycles in a No. 1 ESS office and 8000 cycles in a No. 1A ESS office. A typical switchboard interface call requires an additional 1500 to 2000 cycles in a No. 1 ESS office and 3000 to 4000 cycles in a No. 1A ESS office. The interface with switchboards using outgoing trunks requires no additional real time. The cycle time of the No. 1 ESS is 5.5 microseconds per cycle. The cycle time of the No. 1A ESS is 0.7 microsecond per cycle.

HARDWARE COSTS

7.06 The system hardware costs in terms of each interface trunk circuit and the emergency

manual line circuits consist of the scan points and signal distributor points required for circuit operation:

- SD-1A156—two scan points (emergency manual line circuit)
- SD-1A169—four scan points and five signal distributor (SD) points
- SD-1A177—two scan points and six SD points
- SD-1A184—four scan points and four SD points
- SD-1A192—two scan points and three SD points
- SD-1A223—four scan points and six SD points
- SD-1A224—four scan points and five SD points
- SD-1A243—one scan point (emergency manual line circuit)
- SD-1A254—six scan points and ten SD points
- SD-1A255—six scan points and nine SD points
- SD-1A313—three scan points and eight SD points
- SD-1A315—three scan points and eight SD points
- SD-1A316—five scan points and twelve SD points.

8. AVAILABILITY

8.01 The interface with switchboards feature is available in all No. 1 ESS active generic programs and all No. 1A ESS generic programs.

CONSIDERATIONS FOR INCORPORATION OF FEATURES INTO SYSTEM

9. PLANNING

9.01 Not applicable.

10. HARDWARE

10.01 The hardware required to provide an interface between No. 1/1A ESS offices and the types of switchboards consists of the following.

(1) Trunk circuit SD-1A169-01 has trunk order codes of 00840, 008L0 and 008C0. Trunk circuit SD-1A169-05 has trunk order codes of 00801, 00802 and 00803. These trunks are outgoing miscellaneous trunks.

(2) Trunk circuit SD-1A177-01 has a trunk order code of 00940. SD-1A177-05 has an order code of 00901. These trunks are outgoing miscellaneous trunks.

(3) Trunk circuit SD-1A184-01 has trunk order codes of 01708 and 01758; trunk circuit SD-1A184-05 has trunk order codes of 01700 and 01701. These trunks are incoming universal trunks.

(4) Trunk circuit SD-1A192-02 is a 2-way circuit. If the trunk is used as an outgoing trunk, the order codes are 01340, 013C0 and 013L0; for an incoming trunk usage, the order codes are 01358, 013D8 and 013M8. Trunk circuit SD-1A192-05 has order codes of 01300, 01301 and 01304 if used as an outgoing trunk and order codes of 01302, 01303 and 01305 if used as an incoming trunk. These trunks are universal trunks.

(5) Trunk circuit SD-1A223-01 has trunk order codes of 00640 and 006L0. Trunk circuit SD-1A223-05 has trunk order codes of 00601 and 00602. These trunks are outgoing miscellaneous trunks.

(6) Trunk circuit SD-1A224-01 has trunk order codes of 00558, 0055T, 00508, 005DT, 005M8, 005MT, 005W8 and 005WT. Trunk circuits SD-1A224-05 has trunk order codes of 00502, 00503, 00504, 00505, 00506, 00507 and 00508. These trunks are incoming miscellaneous trunks.

(7) Trunk circuit SD-1A254-01 has trunk order codes of 01040 and 010L0. This trunk is an outgoing miscellaneous trunk.

(8) Trunk circuit SD-1A255-01 has trunk order codes of 01440 and 014L0. This trunk is an outgoing miscellaneous trunk.

(9) Trunk circuit SD-1A313-01 has trunk order codes of 03400, 03401, 03402, 03404, 03405 and 03406. This trunk is an outgoing miscellaneous trunk.

(10) Trunk circuit SD-1A315-01 has trunk order codes of 04700 and 04701. This trunk is an outgoing miscellaneous trunk.

(11) Trunk circuit SD-1A316-01 has trunk order codes of 03600, 03601, 03602 and 03603. This trunk is an outgoing miscellaneous trunk.

(12) Emergency manual-line circuit has an order code of 10570 for reverse battery supervision and one transfer circuit SD-1A156, an order code of 10571 for reverse battery supervision emergency manual-line circuit SD-1A156, an order code of 10572 for emergency manual-line circuit for E&M supervision and one transfer circuit SD-1A156, and an order code of 10573 for emergency manual-line circuit SD-1A156-01.

(13) Emergency manual circuit to a switchboard in the same building and one transfer circuit SD-1A243 has an order of 09470. Emergency manual-line circuit SD-1A243 to a switchboard in the same building has an order code of 09471.

11. DETERMINATION OF QUANTITIES

HARDWARE

11.01 The hardware required to provide an interface between an ESS office and different switchboard locations consists of universal and miscellaneous trunks. Universal trunk circuits SD-1A184 (incoming) and SD-1A192 (2-way) can be used to provide a switchboard interface. Miscellaneous trunk circuits SD-1A169 (outgoing), SD-1A223 (outgoing), SD-1A224 (incoming), SD-1A254 (outgoing), SD-1A255 (outgoing), SD-1A313 (outgoing), SD-1A315 (outgoing) and SD-1A316 (outgoing) can be used to provide a switchboard interface. Emergency manual-line circuits SD-1A156 and SD-1A243 are used to provide an interface to switchboards for the activation of emergency manual-line service. Office engineering must consider the use of these circuits for interfacing with switchboards in the total office hardware. For guidelines used to determine the quantity of trunk and service circuits required for proper system operation, see references C(1) and C(3) in Part 19.

MEMORY

11.02 The interface with switchboards feature requires no dedicated call store memory but uses five types of registers from an office pool of each type of register. These registers are originating registers, operator registers, coin control registers, incoming registers, and timed scan junior registers. Set card NOR defines the number of originating registers and incoming registers required in a central office; set card NOP defines the quantity of operator trunk registers required; set card NCK defines the number of coin control registers required; and set card NTS defines the number of timed scan junior registers required. For formulas and guidelines for determining how many of these registers are required for proper system operation, see references C(2), C(4), and C(5) in Part 19.

12. ASSIGNMENTS AND RECORDS

INPUT AND RECORD KEEPING

12.01 The ESS translation forms used with the interface with switchboards feature are as follows:

- ESS 1200—Universal Trunk Frame Record: This form relates equipment locations to the corresponding trunk network appearances and the universal trunks assigned to this location.

- ESS 1201A—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 and its associated CPD points.

- ESS 1202—Trunk Group Record: This form is used to furnish trunk network number (TNN) to trunk group (TG) translations for all trunks.

- ESS 1203A—Trunk Network Number Record: This form relates the TNN of the trunk group and trunk frame location.

- ESS 1204—Trunk Class Code Record: This form specifies data for trunk class code expansion table.

- ESS 1303A—Trunk and Service Circuit Route Index Record: This form is used to assign route indexes. To gain access to a specific trunk group requires a route index.

- ESS 1506—Miscellaneous Assignment Information Record: This form associates the unit type and member number of the emergency manual line circuit with the customer line equipment number and with the trunk network number of the outgoing operator trunk.

13. NEW INSTALLATIONS AND GROWTH

13.01 The procedures for providing or changing an ESS office with standard Bell System switchboards are shown in Fig. 1.

14. TESTING

14.01 TTY input and output messages [refer to references B(1) through B(4) in Part 19] can be used to verify the assignment of translation data. These messages are:

- VFY-TNN—used to verify that TNNs associated with the trunk interface circuits are properly equipped

- VFY-TKGN—used to verify one trunk group number (TGN) translation for trunk groups with the trunk interface circuits.

14.02 Testing of the interface with switchboards feature is accomplished by using call-through testing. Test calls can be established to verify that the feature is properly installed and accesses the desired switchboard facility.

15. MEASUREMENTS

15.01 Not applicable.

16. CHARGING

16.01 A trouble intercept call is always a free call. A verification-request call is usually free on a line-to-trunk connection but not free on trunk-to-trunk connections.

16.02 There is no charge for a local call that terminates on a business office trunk; however, there may be a charge if the call originates in a distant office depending on the operating company practice.

SUPPLEMENTARY INFORMATION

17. GLOSSARY

Hit	A term applied to a nonvalid signal indication.
POB	Peripheral Order Buffer: A group of words in memory into which orders for consummating one or more connect or disconnect actions involving activation of relays and other switches are loaded.
Switchboard	A manual telecommunications switching facility where an operator can establish connections. A switchboard consists of an upright structural unit that is usually arranged with vertically placed panels and a flattop keyshelf. It is equipped with a telephone set, cords, plugs, jacks, and switching and signaling circuitry that is associated with mechanisms such as keys, buttons, lamps, etc.
Dial System "A" Switchboard	A local dial system switchboard that handles assistance calls, intercepted calls, and calls from miscellaneous lines and trunks. It may also be employed for handling certain toll calls.

18. REASONS FOR REISSUE

18.01 Not applicable.

19. REFERENCES

A. Bell System Practices

(1) Section 231-090-173—Manual Line Service Feature—2-Wire No. 1 and No. 1A Electronic Switching Systems

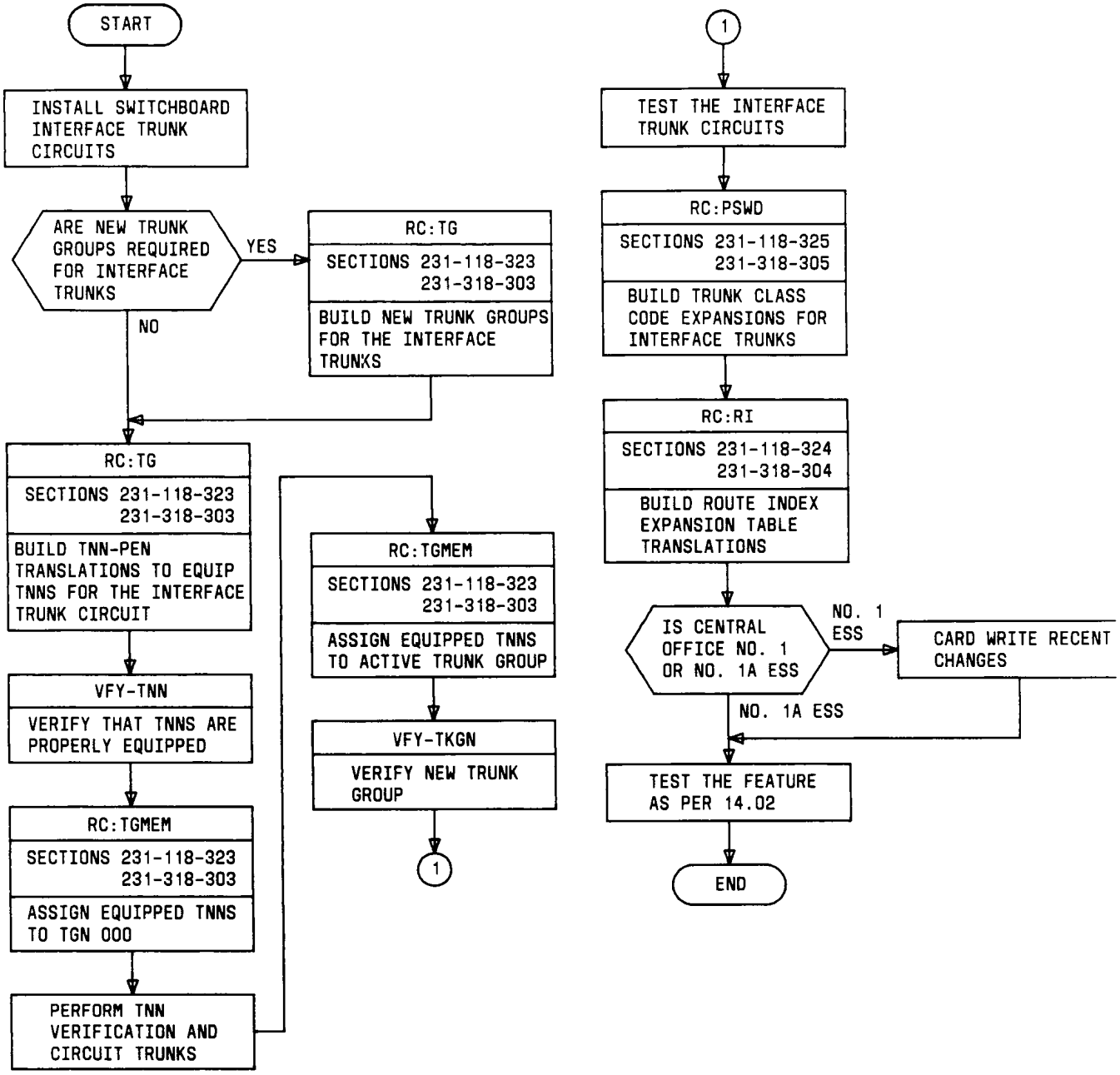

Fig. 1—Procedures for Adding or Changing the Interface With Switchboards Feature

(2) Section 231-118-103—Trunk Translation Data Description—2-Wire No. 1 Electronic Switching System

(3) Section 231-118-323—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, and TGMEM (CTX-6 through 1E4 Generic Programs)—2-Wire No. 1 Electronic Switching System

(4) Section 231-318-303—Trunk Translation Recent Change Procedures for TG, TGBVT, TRK, CFTRK, and TGMEM (1A2W<G1>1 Generic Program)—2-Wire No. 1A Electronic Switching System.

B. Teletypewriter Input and Output Manuals

(1) Input Message Manual IM-1A001, No. 1 Electronic Switching System

(2) Input Message Manual IM-6A001, No. 1A Electronic Switching System

(3) Output Message Manual OM-1A001, No. 1 Electronic Switching System

(4) Output Message Manual OM-6A001, No. 1A Electronic Switching System.

C. Traffic Facilities Practices

(1) Division D, Section 10c—Trunks and Miscellaneous Circuits, Traffic Facilities Practices, Dial Facilities—2-Wire No. 1 Electronic Switching System

(2) Division D, Section 10h—Call Stores, Traffic Facilities Practices, Dial Facilities—2-Wire No. 1 Electronic Switching System

(3) Division D, Section 11c—Trunks and Miscellaneous Circuits, Traffic Facilities Practices, Dial Facilities—2-Wire No. 1A Electronic Switching System

(4) Division D, Section 11f(5)—Duplicated Call Store, Traffic Facilities Practices, Dial Facilities—2-Wire No. 1A Electronic Switching System

(5) Division D, Section 11f(6)—Unduplicated Call Store, Traffic Facilities Practices, Dial Facilities—2-Wire No. 1A Electronic Switching System.

D. Other Documentation

(1) Translation Guide TG-1A

(2) Translation Output Configuration PA-591003, No. 1 Electronic Switching System

(3) Translation Output Configuration PA-6A002, No. 1A Electronic Switching System

(4) Office Parameter Specification PA-591001, No. 1 Electronic Switching System

(5) Office Parameter Specification PA-6A001, No. 1A Electronic Switching System

(6) Parameter Guide PG1, No. 1 Electronic Switching System

(7) CD- and SD-1A156-01 Emergency Manual Line Circuit

(8) CD- and SD-1A169-01 Outgoing Trunk Circuit to Switchboard No. 3CL in Distant Building High-Low Supervision Reverse Battery Ringback Coin Control on Tip and Ring

(9) CD- and SD-1A177-01 Outgoing Trunk Circuit Verification-Request and Intercept Reverse Battery, High-Low Supervision

(10) CD- and SD-1A184-01 Incoming Trunk Circuit From Switchboard No. 3CL in Distant Building Third Wire Coin Control Simplexed Rering Signal

(11) CD- and SD-1A184-05 Incoming Trunk Circuit From Switchboard No. 3CL in Distant Building Third Wire Coin Control Simplexed Rering Signal

(12) CD- and SD-1A192-02 Two-Way Trunk Circuit Switchboard No. 3CL in Distant Building Reverse Battery Supervision Inband Coin and Rering Signals

(13) CD- and SD-1A192-05 Two-Way Trunk Circuit Switchboard No. 3CL in Distant Building Reverse Battery Supervision Inband Coin and Rering Signals

(14) CD- and SD-1A223-01 Outgoing Trunk Circuit to Switchboard No. 3C or 3CL in the Same Building

(15) CD- and SD-1A224-01 Incoming Trunk Circuit From Switchboard No. 3C or 3CL in the Same Building

(16) CD- and SD-1A254-01 Outgoing Trunk Circuit Coin Zone Dialing to Switchboard No. 3CL in Distant Building Polar Double-Duplex Supervision

(17) CD- and SD-1A255-01 Outgoing Trunk Circuit Local Coin Overtime and Stuck Coin to Switchboard No. 3CL in Distant Building

(18) CD- and SD-1A313-01 CAMA Outgoing Trunk Circuit to CAMA Position or 3C or 3CL Switchboards in Same Building

(19) CD and SD-1A315-01 CAMA Outgoing Trunk Circuit to CAMA Positions in Remote Locations Arranged with Loop Signaling

(20) CD and SD-1A316-01 Outgoing Trunk Circuit to CAMA Positions in Remote Locations Arranged for E&M Lead Signaling.