OPERATOR FUNCTIONS
SOFTWARE SUBSYSTEM DESCRIPTION
NO. 3 ELECTRONIC SWITCHING SYSTEM

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1. GENERAL DOCUMENTATION INFORMATION

1.01 This section describes the software operator functions of the No. 3 Electronic Switching System (ESS) and the relation to other subsystem programs. The functions are:

(a) Handling all outgoing calls which do not require outpulsing, generally called operator calls

(b) Processing multiple winks, inband signals, and expanded inband signals from operator trunks.

In addition, this section will serve as an aid in accessing the program listings. Detailed program functions and coded software instructions can be found in the program listings.

1.02 This section is being reissued to provide information and changes concerning operator ringback and expanded inband signaling for the 3E3 generic. Since this is a general revision, no revision arrows have been used to denote significant changes.

1.03 Part 3 contains a glossary of terms, abbreviations, and definitions necessary for comprehension of the information contained in this document.

1.04 The following Bell System Practices may be helpful in understanding the software which performs operator functions:

SECTION	TITLE
233-151-105	Call Processing
233-151-120	Call Charging
233-151-125	Input Processing and Scanning
233-151-130	Basic Call Processing
233-151-135	Custom Calling
233-151-140	Network Path Hunt
233-151-145	Digit Processing
233-151-150	Translations
233-151-155	Peripheral Input/Output Control
233-151-160	911 Emergency Service Bureau

1.05 The following programs provide additional information relative to this document.

(a) Automatic Message Accounting (AMA), PR-3H187

(b) The Customer Error Program (CUSTER), PR-3H151

(c) 10 msec Interrupt Program—Digit Receiving and Sending (DIGPRO), PR-3H153

(d) The Disconnect Progress Marks (DISCON), PR-3H154

(e) Digit Interpretation Progress Marks (DNTRP), PR-3H155

(f) The 911 Service Program (EMERG), PR-3H156

(g) The Equipment Selection Subroutines (EQPSEL), PR-3H157

(h) Call Failure Program (FALTCR), PR-3H158

(i) Fast Trunk Scanning Program (FASTTK), PR-3H159

(j) Local Charging—Coin and Message Register Program (LCLCHG), PR-3H161

(k) Operator Call Program (OPER), PR-3H164

(l) Outgoing Call Program (OUTCAL), PR-3H165

(m) Network Path Hunt, Busy, and Idle Program (PATHNT), PR-3H166

(n) Peripheral Operations Subroutines (POPS), PR-3H169

(o) Ring and Answer—Completion of Intraoffice Calls Program (RING), PR-3H172

(p) Base Level TCR Scan Program (TCRSCN), PR-3H174

(q) Completion of Incoming and Intraoffice Calls Program (TERM), PR-3H175

(r) Conference Calling Program (TREWAY), PR-3H184

(s) Scan Point Number Translation Program (XSLSPN), PR-3H179

SOFTWARE ORGANIZATION

1.06 Figure 1 is a flowchart depicting software organization for completing calls to nonoutpulsing outgoing trunks.

1.07 The operator program, OPER, which is executed at base level is divided into two sections. The first section handles the outgoing calls which do not require outpulsing (0, X11, 11X, intercept, and time/weather service calls). However, some calls such as those which do require automatic number identification (ANI) are routed through this section to OUTCAL, the outgoing call handling program, which completes them to a Traffic Service Position (TSP) or a Traffic Service Position System (TSPS). Section 1 of OPER is entered through the destination code branch table in DNTRP, the digit interpretation program. All operator calls are sent to the program RING, which stabilizes the call.

1.08 Figure 2 is a flowchart showing software organization for handling operator requests for action.

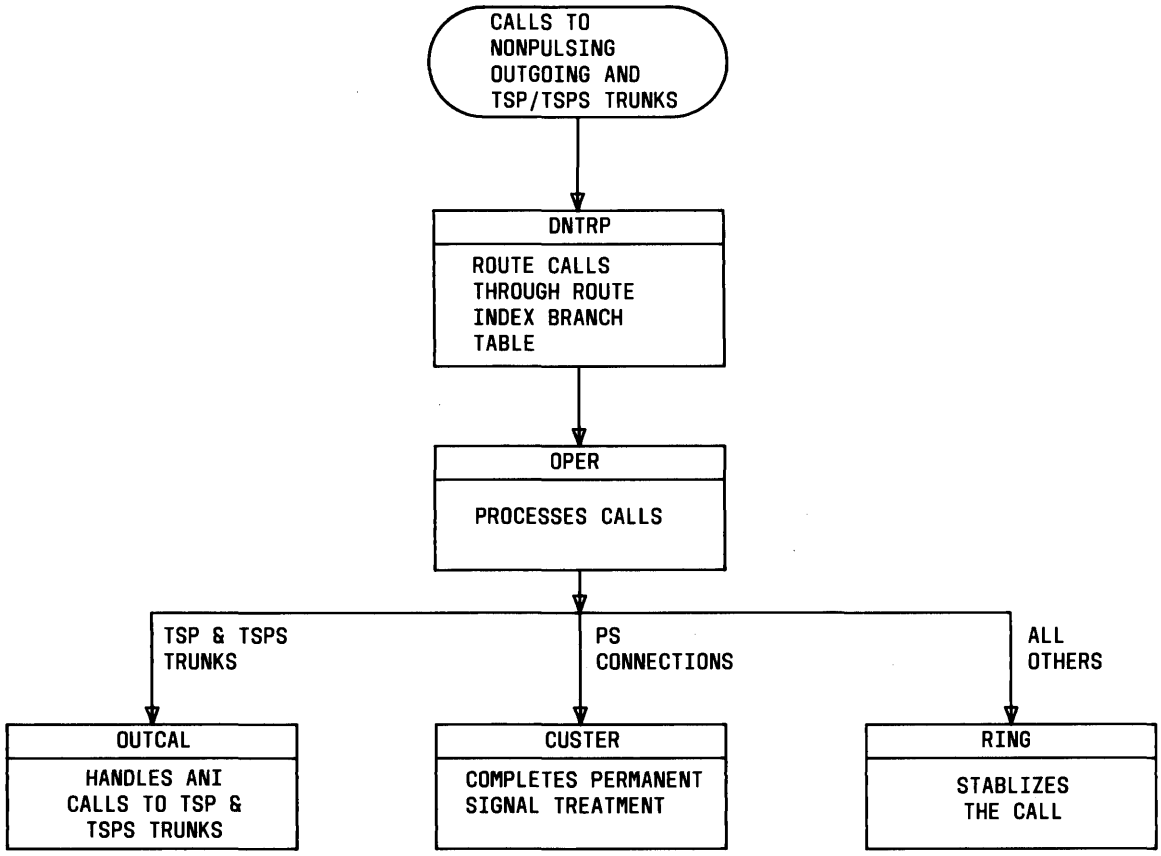

Fig. 1—Software Organization For Processing Calls to Nonoutpulsing Outgoing and TSP/TSPS Trunks

1.09 Section 2 of OPER processes inband or multiwink operator trunk signals for switching action. Five actions may be requested:

(1) Collect a coin

(2) Return a coin

(3) Supervise the coin line with a +48V (disable TOUCH-TONE® pad)

(4) Supervise the coin line with a -48V (enable TOUCH-TONE pad)

(5) Rering a line.

During interrupt level, FASTTK, the fast trunk scanning program, detects a wink from an operator trunk. Also during interrupt level, DIGPRO, the digit receiving and sending program, receives the inband signal, expanded inband signal, or multiple winks and indicates in the TCR the signal that was received. OPER acts on the request and routes the call to various routines which complete the functions required.

2. NONOUTPULSING OUTGOING TRUNK CALLS

2.01 Section 1 of OPER handles all outgoing calls which do not require outpulsing (generally referred to as "operator" calls). These include 0, X11, 11X, intercept, and time/weather service calls. In addition, some calls which do not require called number outpulsing but do require ANI are routed by this section to the outgoing call program (OUTCAL) which completes them to TSP or TSPS.

VACANT CODE OPERATOR DESTINATION CODE ENTRY

2.02 Entry is made to the vacant code operator entry point (VCOP) of OPER from the destination code branch table in the digit interpretation

program, DNTRP. The destination code branch table is described in Digit Processing, Section 233-151-145. DNTRP received the vacant code operator destination code from the 3-digit translation subroutine. The transient call record (TCR) address and the second word from the route index expansion (Fig. 3) are passed to OPER.

2.03 A time delay to allow for an unknown number of digits to be dialed is inserted before routing the call since a customer may not realize an error has occurred. The vacant code operator entry point will time 4 seconds between each digit and continue to allow the customer to dial until there is a 4-second pause, 11 digits have been dialed, or a "*" or "#" is keyed on a TOUCH-TONE phone. OPER continues to route the call by passing it to the nonoutpulsing trunk destination code entry point described next.

NONOUTPULSING TRUNK DESTINATION CODE ENTRY

2.04 Entry is made to the nonoutpulsing trunk destination code entry point NOPTRK of OPER from the destination code branch table in DNTRP. The TCR address and the second word of the route index expansion (Fig. 3) are passed to OPER. In addition, vacant code operator entries are passed to this entry point for further processing after all digits are received.

2.05 Digit reception is stopped. In addition, a check for a valid audit code in the TCR is made. If the audit code is invalid, the call is sent to the call failure subroutine in the program FALTCR. This subroutine prints a failure message on the TTY and returns control to TCRSCN, the base level TCR scanning program. During subsequent base level loops, the paths identified in the TCR are idled because it is assumed that the TCR contains erroneous data. The A-party and the B-party are set to the high and wet state, and the TCR is cleared.

2.06 If the TCR audit code is valid, OPER obtains the class-of-service tone bit and the high tone/low tone bit from the route index expansion word and places the information in the TCR. Charge information is obtained from the route index expansion word, and if completions to the desired route are free, the charge index in the TCR is changed to free. The AMA TRF subroutine in AMA is called to peg the billing counters.

2.07 The program OPER then selects a trunk using the get circuit (GET_CKT) subroutine in OUTCAL. It passes the trunk group number from the route index expansion word to GET_CKT which attempts a trunk selection and usually returns a code to OPER. If all circuits were out of service or there were no working members, GET_CKT gives control directly to the transient disconnect routine in DISCON after notifying the craftsperson (via TTY) of the problem. DISCON then disconnects the call. A return code of 0 indicates trouble. A return code of 1 indicates all trunks in the group are busy. In both cases reorder tone is provided. GET_CKT returns a 2 to OPER to indicate a trunk was successfully selected. It also returns to OPER the scan point number of the selected trunk, trunk terminal equipment number, circuit type code, first distribute triplet address, trunk group number, and address of the trunk group data block.

2.08 If the outgoing trunk is a TSP or TSPS trunk, the call is prepared for transfer of control to OUTCAL. OPER zeros the alternate route allowed bit, the interrupt level progress mark, and the peripheral progress mark in the TCR for the call. It inhibits in the TCR outpulsing of keypulse-start signals for TSP trunks. In addition, OPER passes to OUTCAL the route index, route index expansion words, TCR address, trunk group data block address, trunk terminal equipment number, and trunk distributor point number. OUTCAL obtains a talk path, a transmitter, and a transmitter path and prepares for outpulsing. These outgoing call handling functions are described in Basic Call Processing, Section 233-151-130.

2.09 The program OPER examines the trunk group data for other outgoing trunk types and identifies the following trunk characteristics in the TCR:

- Two-way trunks
- Trunk expecting answer
- Audible ring desired
- Class-of-service tone to be used.

The outgoing trunk scan point number (SPN) is saved for the path-hunting function, and its distributor triplet address is placed in the TCR. The selected terminal equipment number (TEN)

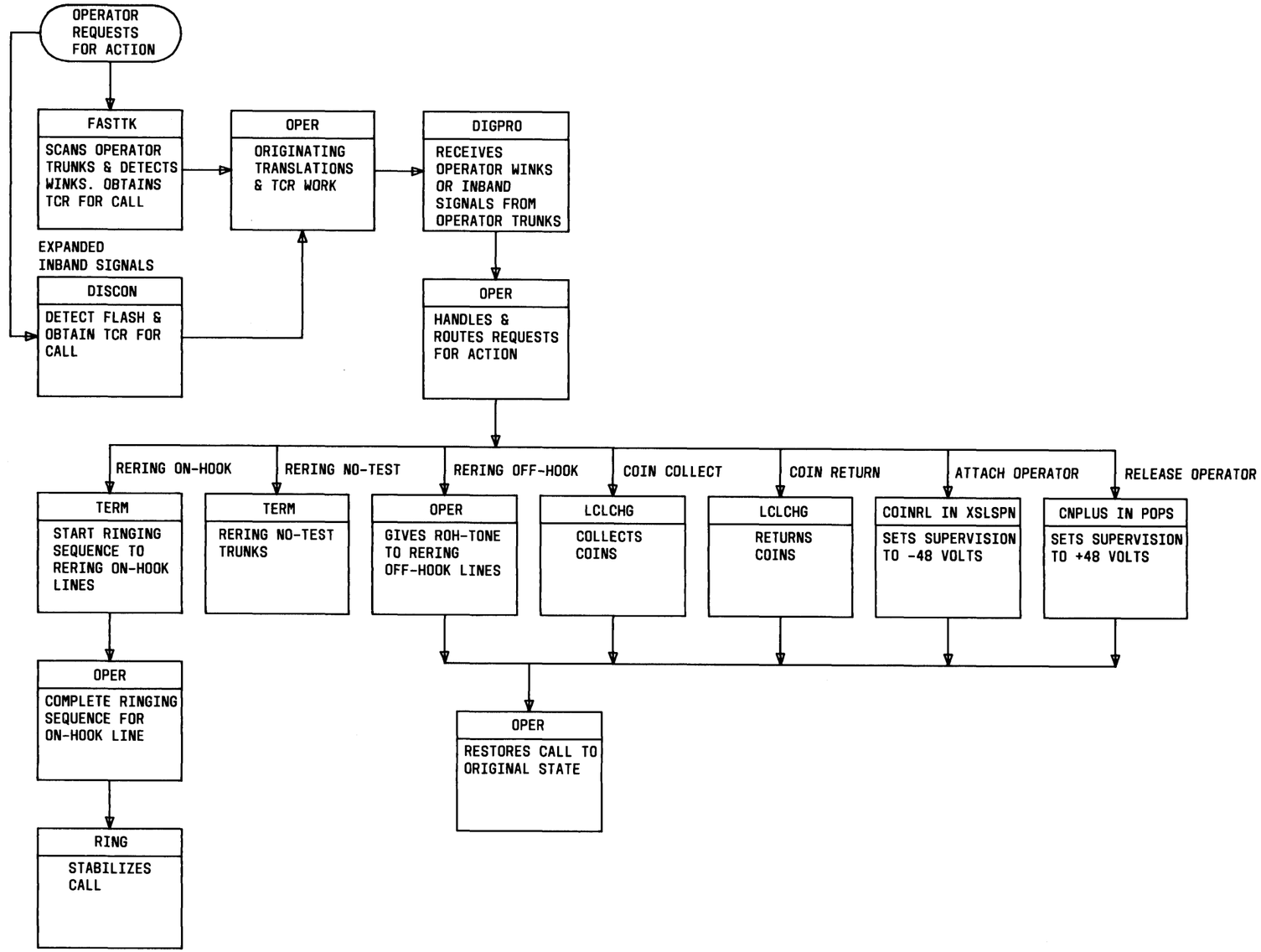

Fig. 2—Software Organization For Processing Operator Requests For Action

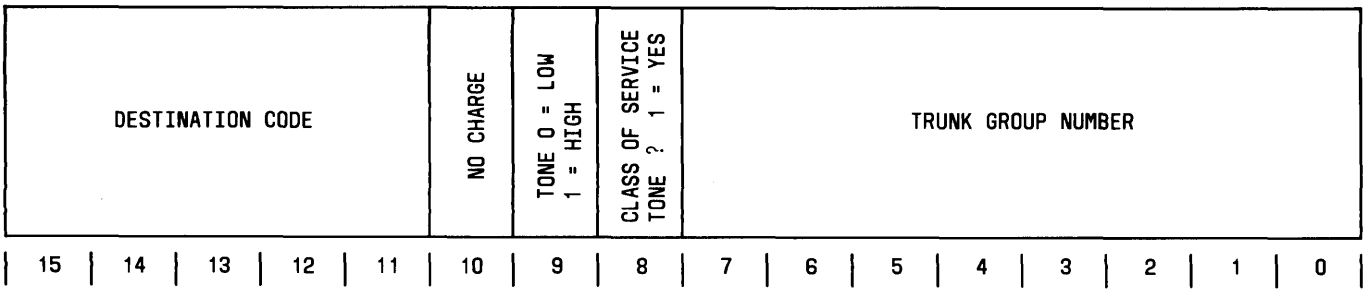

Fig. 3—Second Word of Route Index Expansion Entry

for the trunk is placed in the B-party area of the TCR.

2.10 A toll diversion check is now performed by OPER. If the incoming line is from a PBX, OPER performs an outgoing call trace.

2.11 If the calling party is a trunk, OPER obtains the supervisory SPN for that trunk through a translation subroutine in XSLSPN. Translation failure causes the call to be failed as described in Table A, entry 3.

2.12 If the calling party is a 911 trunk, OPER obtains the trunk SPN and calls the outgoing call trace subroutine (OCT) in the program CTRACR. Control is then given to the 911 service program, EMERG. OPER also has an entry point that is used when a caller has hung up after calling the 911 bureau and the bureau flashes for a rering. The 911 service is described in 911 Emergency Service Bureau, Section 233-151-160.

2.13 The program OPER then requests a talk path to be hunted from the customer to the outgoing trunk by the path hunting program, PATHNT. If no path is found, OPER has the selected outgoing trunk idled and then makes a second try by selecting another trunk. Only two attempts are made. If the second attempt fails, the call is given reorder by CUSTER.

2.14 If an idle path is found, PATHNT busies the links in NETMAP, sets the ignore bits for the junctor, updates audit code, defines talk junctor and related path information in the TCR, and loads TMR. OPER then checks the TCR for the requirement of a class-of-service tone. For calls not requiring class-of-service tone, OPER proceeds to seize an outgoing trunk in the continuity-hold state. However, when a class-of-service tone is needed, not only is the talk path needed but also a path from a tone service circuit to the operator. Since there is only one talk path area in the TCR, these two paths must be swapped between the TCR talk path area and a TCR save area, depending on which path is to be worked on at the time.

2.15 The program OPER determines from the TCR whether a high tone or low tone is needed and passes the proper tone group number to GET_CKT in OUTCAL which tries to select a tone service circuit. If GET_CKT returns a code of 0 indicating an error, the use of the class-of-service tone is aborted, and the call is processed like other calls not requiring the tone. If a code of 1 is returned, all circuits are busy so tone trouble is indicated in the TCR. OPER, after waiting one second, makes a second attempt to complete the call by again selecting an outgoing trunk and performing the functions already described. If the second attempt fails, OPER tries to complete the call without the class-of-service tone.

2.16 GET_CKT returns a code of 2 to indicate that a tone circuit has been selected. Because the talk path information from the customer to the operator has been switched to the scratch area of the TCR, the tone circuit TEN is placed in the A-party area of the TCR. PATHNT is called to obtain a network path from the tone circuit to the operator and to place the path information in the TCR. If no path is found, OPER idles the tone circuit by calling the idle circuit subroutine IDLECKT in EQPSEL and handles the call in the same manner as when all tone circuits are busy (see paragraph 2.15).

TABLE A

EPRORS INCURRED IN PROCESSING CALLS TO NONOUTPULSING OUTGOING TRUNKS

ERRORS	ACTION TAKEN
1. Invalid audit code	Fails the call via FALTCR with an error TTY message printed. Control is returned to TCRSCN.
2. Failure to obtain a trunk	GET _ CKT in OUTCAL finds a software error, all circuits out of service or no working members. The call is failed, and a TTY message is printed. If all trunks in the group are busy, OPER sends permanent signal entries to CUSTER for permanent signal treatment and sends all other calls to CUSTER for reorder treatment.
3. Trunk SPN translation error	Call is failed with a TTY message by FALTCR. Control is returned to TCRSCN.
4. Path not available between customer and outgoing trunk after two attempts	Call is given reorder by CUSTER unless it is a permanent signal connection which is sent back to CUSTER for permanent signal treatment.
5. Failure to obtain a tone circuit	When GET_ CKT in OUTCAL returns a 0, OPER aborts use of a class-of-service tone and continues normal processing. A return code of 1, indicating all circuits are busy, causes OPER to idle the talk path from the customer to the operator, idles the selected trunk, and makes a second attempt using another trunk to complete the call. If the second attempt fails, the use of a class-of-service tone is abandoned and an attempt is made to complete the call without it.
6. Distribute order failures for seizure of class-of-service tone circuit	The call is failed by FALTCR. A TTY error message is printed. OPER also call DISC in POPS to idle the class-of-service tone "talk" path and the tone circuit.
7. Peripheral order failures in trying to connect a class-of-service tone circuit	OPER calls PEA in POPS for peripheral error analysis. A return code of 0 implies continuity problems in which case OPER calls PECON in POPS to complete the analysis and report the trouble in the error analysis buffer. A return code of 1 means false cross and ground, and a 2 means all other problems. OPER aborts the use of the class-of-service tone. The tone circuit to operator path is idled via DISC in POPS. The talk path from customer to operator is idled via the PATHIDLE macro call to PATHNT. The selected trunk is hardware idled and is unreserved. OPER then makes a second attempt to complete the call without a class-of-service tone. If the second attempt fails, the customer is given reorder through CUSTER.
8. Glare condition	OPER stops all supervision, has the class-of-service tone path and the tone circuit idled, has the customer to trunk talk path idled, and has the trunk idled and unreserved. After selecting another trunk, OPER makes another attempt to complete the call.
9. Time-out waiting for answer	OPER stops all supervision, idles the paths and the equipment, and then fails the call with a TTY message via FALTCR.

2.17 When a network path from the tone circuit to the operator is obtained, OPER sends the distribute order to seize the outgoing trunk in the continuity-hold state. The handling of distribute order error returns is described in Table A, entry 6. The next step is to connect the class-of-service tone circuit testing dc continuity. Peripheral order errors are described in Table A, entry 7. The path information is swapped so that the talking path between the customer and the operator can be worked on.

2.18 After the outgoing trunk has been seized for calls requiring the class-of-service tone as well as those not requiring the tone, OPER proceeds to send the peripheral order for network connection from the customer to the talk junctor. Peripheral order errors are returned to OPER only for calls using class-of-service tone. This peripheral error handling is described in Table A, entry 7. The operator to talk junctor half of the network path is left open at this time so that it will not interfere with a possible class-of-service tone path.

2.19 If the trunk is a 2-way trunk, OPER initiates a break. The AMA INI subroutine in the program AMA is called to make a proper record of the call and to modify the charge index to reflect the status of the call for future recording (answer and disconnect). A conference call check is then made. Conference calls are branched to the CCHOOK subroutine in the program TREWAY. For a 2-way trunk, OPER performs a glare check. If a glare condition exists, it is indicated in the TCR and the call is torn down as described in Table A, entry 8. After the call is torn down, OPER attempts to get another trunk and tries again to complete the call.

2.20 For calls not expecting an answer, OPER turns off supervision and finishes setting up the talk path from the customer to the operator by connecting the operator to the talk junctor half of the network path. The AMA ANS subroutine in the program AMA is called to make answer records. All calls are sent to the program RING which turns on supervision, stabilizes the TMR, and destroys the TCR.

2.21 Before OPER can finish setting up the talk path from the customer to the operator for calls expecting answer, other functions must be performed. OPER turns on supervision of the operator trunk and the calling party. When audible ring is required, the talk junctor is set to give audible ring. OPER then initiates a wait for an answer. A time-out while waiting for an answer is considered to be a fatal error and is handled as described in Table A, entry 9. Customer abandons result in the call being disconnected.

2.22 After the operator answer is detected and if the class-of-service tone is not needed, OPER turns off supervision and completes the setting up of the talk path from the customer to the operator as described in paragraph 2.20. However, if a class-of-service tone is required, OPER initiates a delay of 1/2 second so the operator can hear the tone.

2.23 After the class-of-service tone is given to the operator, supervision is stopped and the class-of-service tone talk path and the tone circuit are idled (both hardware and software) by the disconnect subroutine in POPS. Then OPER completes the setting up of the talk connection between the operator and the customer. Calls are passed to RING for final stabilization.

OPERATOR REQUESTS FOR ACTION

2.24 Section 2 of OPER handles requests made by an operator. The operator uses either multiple wink, inband signaling, or expanded inband signaling to request action. An operator wink is an uninterrupted on-hook ranging from 50 to 160 msec. As many as five winks are possible when multiple wink signaling is used. See Table B for the winks and associated action requested.

2.25 Even when inband signaling is used, a wink precedes the inband signal. An inband signal is a burst of a pair of multifrequency (MF) tones for 900 msec. See Table C for the possible tones and the requested action.

2.26 Expanded inband signaling adds the "operator release" and "attach operator" signals to the regular inband signals. These signals are required to facilitate the auto bill calling (ABC), end-to-end signaling, and other new services in the 3E3 generic. See Table D for the possible tones and the requested action.

2.27 The fast trunk scanning program, FASTTK, scans operator trunks during interrupt level to detect scan point state changes. (Scanning and input processing functions are described in Section

TABLE B

MULTIPLE WINK SIGNALS

NUMBER OF MULTIPLE WINKS	ACTION REQUESTED
1	Operator release
2	Attach operator
3	Collect coin
4	Return coin
5	Rering

TABLE C

INBAND SIGNALS

INBAND SIGNAL	MULTIFREQUENCY TONES	ACTION REQUESTED
2	700 Hz and 1100 Hz	Collect coin
13	1700 Hz and 1100 Hz	Return coin
11	1700 Hz and 700 Hz	Rering

TABLE D

EXPANDED INBAND SIGNALS

INBAND SIGNAL	MULTIFREQUENCY TONES	ACTION REQUESTED
10	1300 Hz and 1500 Hz	Operator release
2	700 Hz and 1100 Hz	Operator attach

233-151-125.) FASTTK detects the initial wink by seeing the on-hook and timing it to determine if its length is in the time range for a wink. When an operator wink is detected, FASTTK selects a TCR. It stores the base level progress mark (WOPER) in the TCR to indicate that control is to be given to OPER during the next base level loop to process the wink. In addition, FASTTK assumes that multiple winks will be received and initializes the TCR to indicate that multiple winks should be collected at interrupt level by the digit receiving and sending program, DIGPRO. Multiple wink signaling is assumed because another wink, to determine the type of signaling expected, might be received before the base level work is completed. FASTTK sets the ignore bit for the trunk in the

circuit status table in writable memory so that any subsequent winks will not be detected by the scanning software. They will be detected and counted by the digit processing program, DIGPRO. The fact that one wink has been received is also indicated in the digit storage area of the TCR.

2.28 When an operator trunk employing expanded inband signaling goes on-hook, DISCON will time for 475 msec. If the trunk goes back off-hook during this timing, it is an expanded inband flash. A TCR is hunted and the WOPER entry point is invoked.

2.29 When no TCR is available or when an operator trunk sends a wink during a period when overload protect is in effect, the operator trunk is ignored for a specific time period. The operator must then regenerate the signal until a TCR is available or until overload protect is not in effect.

2.30 During the next base level loop, OPER is given control of the TCR at entry point WOPER via the base level TCR scanning program, TCRSCN. OPER then obtains a translation of the operator trunk SPN using the subroutine DATCKT in the program EQPSEL. A return code of 0 implies an error, and a return code of 1 means a service circuit. Both of these return codes are treated as errors and cause the call to be failed as described in Table E, entry 1. A return code of 2 indicates a trunk. The address of trunk group data, terminal equipment number, and distribute triplet are returned to OPER. From the trunk group data, OPER determines if the expected signal is multiple wink, inband, or expanded inband. OPER then sets a bit in the TCR to indicate the type of signal received.

2.31 The program OPER searches for a TMR associated with the call and, if none is found the call is failed as described in Table E, entry 2. If the TMR indicates the call is not stable, OPER accesses the TCR pointed by the TMR. A TCR is ignored and trunk supervision is restored if the TCR is not marked as expanded inband signaling or contains a base level progress mark other than joint hold timing (JHTMNG), service hold (SRVHLD), or operator support (OPRSUP). The new TCR is cleared, and control is returned to TCRSCN. If the TCR is marked as expanded inband signaling, the operator trunk is ignored and a branch is made to the TCR initialization (paragraph 2.33).

2.32 If the base level progress mark in the old TCR is OPRSUP, the NOTEST bit is set in the new TCR to indicate a no-test trunk, and the old TCR is cleared. For SRVHLD and JHTMNG a reverse test is made to see if the parties were reversed in the old TCR. If so, the reverse bit is set in the new TCR before the old TCR is cleared. The timing bit (TIM) in the TMR is reset to discontinue any timing function being performed.

2.33 After the old TCR is disposed of or it is determined that the TMR is associated with a stable call, the new TCR is initialized with the necessary information. The TMR is set to show a transient state, and the new TCR address is placed

TABLE E

ERRORS INCURRED IN PROCESSING OPERATOR REQUESTS

ERRORS	ACTION TAKEN
1. Trunk SPN translation error	Return codes of 0 or 1 from DATCKT in EQPSEL are considered an error so the call is failed with a TTY message.
2. No TMR for call found	Call is failed with a TTY message.
3. Invalid inband tones	If a second try to receive the tones fails, the error is reported in the maintenance buffer if there is room, and the call is sent to reorder treatment. Further receiving is stopped by DIGPRO.

in the appropriate TMR area. The talk junctor scanning status is set to the ignore state. Tandem calls are not allowed, and the call is reset to its original state as described in paragraph 2.48.

2.34 In order to receive an inband or expanded inband signal, an MF receiver is needed; therefore, OPER has a receiver selected. If the selection fails, the call is reset to its original state as described in paragraph 2.48.

2.35 Having selected a receiver, OPER requests a path to be hunted from the operator to the receiver by the network path hunting program, PATHNT. If a path cannot be found, OPER idles the selected receiver and then resets the call to its original state.

2.36 When a path from the operator to the receiver is found, OPER sends the peripheral order to start receiving the inband signal. Multiple wink receiving does not require a receiver; therefore, it is ready for receiving. For multiple wink and inband signaling, OPER allows 6 seconds for receiving and sets the signal digit to one in the TCR. For expanded inband signaling OPER allows 1.55 seconds for receiving. OPER then calls TCRSCN to wait for the signal to be received.

2.37 Receiving of the signal is performed by DIGPRO during the 10-msec interrupt periods. If multiple winks are expected, DIGPRO sends a scan order to obtain the present status of the trunk (on-hook or off-hook). By comparing the present state with the state of the trunk the last time it was scanned, DIGPRO determines whether the state has changed. In addition, it times on-hook periods and off-hook periods by incrementing a "wink timer" in the TCR. An on-hook period of 160 msec or greater is considered a disconnect from the operator which will be handled by the disconnect program, DISCON. On-hook periods of less than 50 msec are considered hits and are ignored by the multiwink receiving routine. On-hooks of 50 to 160 msec are considered to be winks; therefore, the wink counter (the first digit storage area of the TCR) is incremented.

2.38 When an off-hook period of 200 msec or greater is seen, DIGPRO considers all the winks to have been received since the maximum off-hook period between winks is 185 msec. The routine then sets the BACTION bit in the TCR to alert base level so that control will be returned to OPER during the next base level loop.

2.39 The program DIGPRO also receives the inband signals. The tone present scan point of the receiver is examined to determine if a tone is present. DIGPRO then obtains the scan point number for the tone bits and sends a scan order to interrogate the bits. Multifrequency decoding is accomplished by accessing a table called MFTABLE. This table is a 4-by-6 matrix whose rows are determined by the binary equivalent of the low order tones and whose columns are determined by the binary equivalent of the two high order tones. The six tone scan points of the multifrequency receiver are decoded. Invalid tones are handled as described in Table E, entry 3. The decoded tone is stored in the first digit storage area of the TCR, and control is returned to OPER by setting the BACTION bit in the TCR to indicate that the call is ready for more base level action.

2.40 A time-out while waiting for a signal results in restoring the talk path and resetting the call to its proper state by OPER. In addition, an invalid inband signal or an invalid number of winks (over five) also results in OPER restoring the talk path and resetting the call to its original state.

2.41 The program OPER looks at the signal received to determine the action requested—release operator (-48V), attach operator (+48V), coin collect, coin return, or ringback. OPER then obtains a line originating translation to obtain the major class of the line and a possible PBX identifier to be placed in the TCR. A translation error causes the talk path to be restored and the call to be reset to its proper state.

2.42 Attach operator, release operator, collect coin, and return coin requests are only valid for a coin line, so errors in the use of a request causes the talk path to be reconnected and the call to be restored to its original state.

2.43 The talk path is restored by OPER before doing coin functions. A request for an operator release is sent by OPER to XSLSPN which changes the coin line circuit to -48V supervision and returns control to OPER. OPER then restores the call to its original state.

2.44 The program OPER calls a subroutine in POPS to handle attach operator requests

and change the coin line circuit to +48V supervision. When OPER gets control again, it restores the call to its original state.

2.45 The program OPER sends requests for coin collection and coin returns to LCLCHG which performs the collection or return functions. LCLCHG returns control to OPER with the talk path reconnected and the line circuit operated (+48V). OPER then resets the call to its original state.

2.46 When the request is for rering, OPER must first hardware-idle the operator half of the talk path if multiwink signaling was used. No-test entries are then sent to the terminating program, TERM, for ringing treatment.

2.47 For other trunks, if the line scan shows the line to be off-hook, a 2-second receiver-off-hook tone is used to rering the line. (For offices using the 3E3 generic a HI-TONE will be used for carrier lines.) A request to rering a PBX line is ignored, so the talk path is reset and the call is restored to its original state.

2.48 After coin functions, rering of an off-hook line, and handling errors or failures, control is given to a section of code in OPER which restores the call to its proper state. It is assumed that the talk path is already restored and connected. This section of code restarts supervision and sets the status bits of the parties to show off-hook. Calls involving a no-test trunk are left transient. The TMR indicates the call is transient, and the TCR is retained. All other calls are made stable. The TCR is cleared, and the TMR is marked stable. Control is then relinquished by OPER to the calling program for these calls.

2.49 If the line was found to be on-hook instead of off-hook, OPER sends the request for rering to TERM. In offices using the SO-2 Issue 4 or 4A generic, the program TERM selects a ringer and starts the ringing for 4 seconds and then returns control to OPER. When an operator rerings on a line, on-hook lines are given a ringing burst of 4 seconds, which is different from the regular ringing sequence. In the case of party lines, both the tip and the ring sides of the line must be rung separately, 4 seconds for each side. If the office is equipped for superimposed ringing, each side of a 4- or 8-party line must be rung with each polarity, a total of 16 seconds unless someone answers. Therefore, once started, everyone on the line will be rung once for 4 seconds unless someone answers. In offices using the 3E3 generic a 911 call will be honored unconditionally. The originating party will be rung for a duration of 4 seconds if it is a single or 2-party line. If the originating party is a multiparty line, all the parties will be rung for 4 seconds in succession. On the regular ringback request a check will be made to see if the originating party is a single or 2-party line. If such is the case, a 4-second ringing will be applied only to the originating line. A ringback request on a multiparty line will be ignored. If an answer is received during ringing, the call is handled by the RING program as an ordinary terminating call. However, if the ringing completes without an answer, then OPER generates a fake answer report and sends it to RING, which makes the call stable.

3. GLOSSARY

3.01 A glossary of terms is provided to aid in the understanding of definitive words used in this section.

Audit Code—Indicates in the TCR the type of network path which is active.

Baction Bit—Bit in TCR indicating that base level action is needed.

Base Level—Major software loop which includes all functions not performed during interrupt level. High priority tasks which cannot be deferred are performed during interrupts of the base level loop.

Base Level Progress Mark—Indicates in the TCR the next software routine to be executed during base level. See Section 233-151-105 for more detailed information.

Bit (Contracted From Binary Digit)— The binary unit of information which is represented by one of two possible conditions such as the digits 0 and 1, high potential or low potential, on or off.

Class-of-Service Tone—For economic reasons, an operating company can provide one trunk group rather than two or three by assigning a maximum of three discrimination tones to indicate individual classes of service (coin, noncoin, etc.). The tone is connected to the operator trunk after answer for a specified period of time.

Digit Storage Area—Digits are stored in the digit storage areas of the TCR. There are fifteen 4-bit fields.

Glare Condition—The blocking of a call by the seizure of a 2-way trunk from both ends simultaneously.

High and Wet State—The state in which the trunk or line is monitored for an on-hook condition only.

Interrupt (Timed)—A hardware-initiated interrupt which interrupts the base level loop every 10 msec for a period of time necessary to perform frequently required functions such as sending and receiving tasks, bylink and operator trunk scanning, and some peripheral functions.

Signal Digit—Used in the TCR to indicate the location of the digit to be received before base level is alerted that more base level action is needed.

SPN—Scan point number.

Tandem—Trunk-to-trunk call.

TCR (Transient Call Record)—A 16-word block of writable main storage assigned to a call in the transient state and containing control information, terminal and path information, and receiving and sending data applicable to the call. See Section 233-151-105 for more detailed information.

TEN—Terminal equipment number.

TMR (Terminal Memory Record)—A 4-word block of writable main storage assigned to each junctor. For stable calls, the junctor TMR specifies the SPN of the talking parties and provides timing control. For transient calls, the TMR also specifies the TCR assigned to the call as well as the SPNs of the connected circuits. See Section 233-151-105 for more details.

TSP—Traffic Service Position.

TSPS—Traffic Service Position System.