

**CALL TRACE**  
**SOFTWARE SUBSYSTEM DESCRIPTION**  
**NO. 3 ELECTRONIC SWITCHING SYSTEM**

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. SUBSYSTEM FUNCTIONAL DESCRIPTION . . . . .	2
IN-PROGRESS CALLS . . . . .	2
INCOMING CALLS . . . . .	5
OUTGOING CALLS . . . . .	5
3. GLOSSARY . . . . .	7

**Figures**

1. Loading of Nonresident Function Into On-Line Memory . . . . .	3
2. Terminal Equipment Number Format . . . . .	3
3. Stable and Transient TMRs . . . . .	4
4. CLID Table Format . . . . .	6

**1. GENERAL**

- 1.01** This section provides a functional description of the software required to perform call tracing operations in No. 3 Electronic Switching System (ESS) offices.
- 1.02** Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.
- 1.03** Part 3 contains a glossary of terms, abbreviations, and definitions which will assist in understanding this document. In addition, the term originating equipment (OE) number is used interchangeably with terminal equipment number (TEN). The directory number is interchangeable with telephone number in this document.

**1.04** The following sections may be helpful in understanding call tracing software:

SECTION	TITLE
233-151-105	Call Processing Software Subsystem Description (SSD) No. 3 ESS
233-151-130	Basic Call Processing SSD No. 3 ESS

**1.05** Information contained in this SSD will also aid in accessing the software listings which contain detailed program functions and coded software instructions. Two programs perform most call tracing functions:

- CTRACR—Resident portion of the call trace program (PR-3H005-01)
- CTRACN—Nonresident call trace program (PR-3H079-01).

**1.06** CTRACR is a resident program which contains the following subroutines:

- CLISR—Searches the calling line identification table (CLID)
- OCT—Traces outgoing calls
- PDFE—Sets up a CLID table entry for printing
- ICT—Traces incoming calls.

The subroutines may be invoked by another call tracing routine or another program.

**1.07** A teletype (TTY) input message regarding a tracing function results in CTRACN, a nonresident program, being brought into memory

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## SECTION 233-151-110

for execution as shown in Fig. 1. CTRACN is a collection of the following subroutines:

MESREC—Processes TTY input messages for tracing functions and passes control to the appropriate nonresident tracing routine

MSGTAB—Sets up and prints error messages for the nonresident call tracing subroutines

CLIENT—Enters a number into the CLID table

CLIDEL—Deletes a number from the CLID table

CCT—Traces current calls

DIGFIX—Aligns digits for CLID table.

### 2. SUBSYSTEM FUNCTIONAL DESCRIPTION

**2.01** Call tracing programs identify calling and called lines in a No. 3 ESS office to determine the source of nuisance and threatening calls and to identify lines in emergency situations. The programs are capable of handling the following call situations:

- In-progress calls
- Incoming calls
- Outgoing calls.

#### IN-PROGRESS CALLS

**2.02** An in-progress trace is normally requested to identify a line in an emergency situation. It runs as a multiscan function; therefore, when another multiscan function is active, it must be completed or aborted before the request for an in-progress trace is accepted. The ABT:MSF; action-options! TTY input message may be used to abort an active multiscan function. An in-progress trace is invoked by a TTY input message which indicates either the directory number or the terminal equipment number (TEN) (Fig. 2) of one side of the connection. Following are the two possible input message formats:

(a) TRC:OE(aa,bcde)!

where aa = concentrator group

b = concentrator

c = switch group

d = switch

e = input level

(b) TRC:TN(aaa,bbbb)!

where aaa = office code

bbbb = telephone number

**2.03** The subroutine MESREC in CTRACN is given control to determine the type of input message received. MESREC then passes control to location CCTDN for current call traces handling when the directory number is supplied. The directory number is translated into the TEN. Location CCTTEN is given control when the originating equipment number (OE), also called TEN, is supplied in the TTY message.

**2.04** In both cases, the terminal memory records (TMR) (Fig. 3) are examined for a match. When a match is found in either the calling or called party location of the TMR, the other party is examined to determine whether it is a line or a trunk. For individual lines, the TEN is translated into the directory number before printing the successful TTY trace message. The OE is converted to BCD characters and is printed for a multiparty line.

**2.05** When the other party is a trunk, the OE is translated by translation subroutines in the scan point number translation program (XSLSPN) to the supervisory scan point of the trunk and then to the trunk group number and member number. The information is then converted to BCD characters for printing. The successful TTY trace message printed is:

tt REPT CCT AA aaaa bbbb

where tt is time

AA indicates the type of party

TN normal line

aaaa office code

bbbb directory number

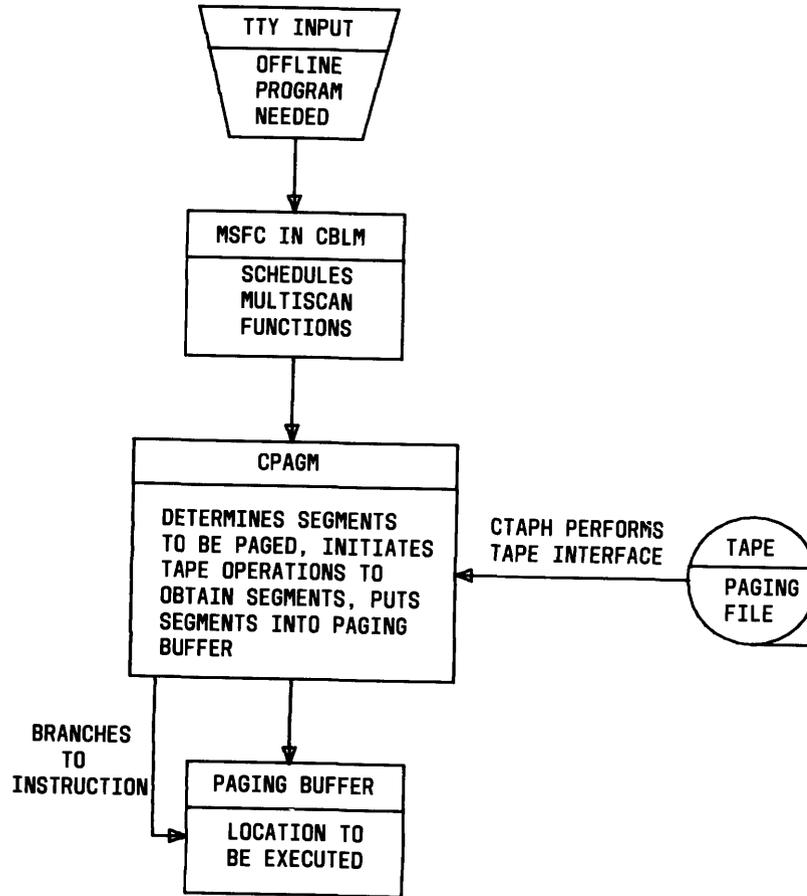


Fig. 1—Loading of Nonresident Function Into On-Line Memory

			CONCENTRATOR GROUP				SWITCH GROUP		CONCENTRATOR	SWITCH			INPUT LEVEL		
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Fig. 2—Terminal Equipment Number Format

TRK trunk  
 aaaa group member  
 bbbb member number

OE terminal equipment number (multiparty)  
 aaaa concentrator group  
 bbbb concentrator, switch group, switch,  
 level

2.06 Any errors encountered in the current call trace result in an error message being printed. Error messages are as follows:

tt REPT CCT FAIL—a TMR was not found for the call

tt REPT ERROR TRL OC—translation error on an office code

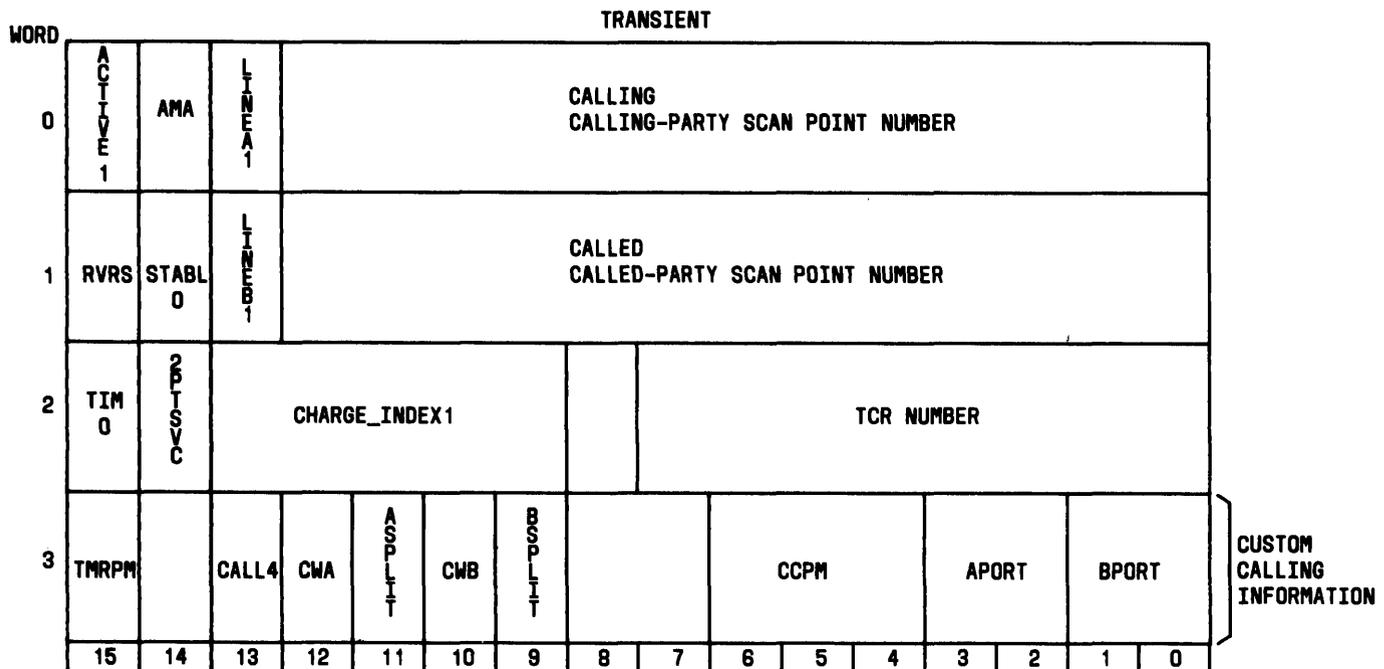
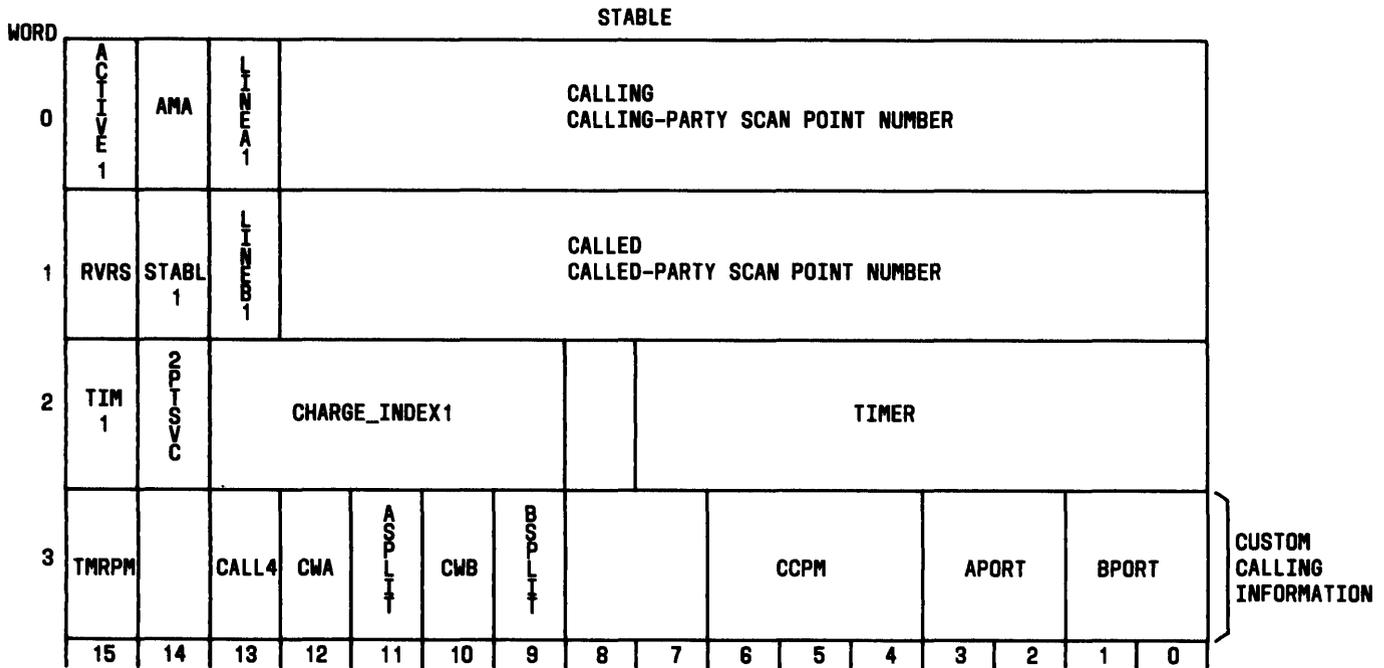


Fig. 3—Stable and Transient TMRs

tt REPT ERR TRL DN—translation error for a directory number

tt REPT ERR TRL TRK—translation error on a trunk

tt REPT ERR TRL PBX—translation error on a line in a PBX

where tt = time

**INCOMING CALLS**

**2.07** When a customer in the No. 3 ESS office has received nuisance calls, the source of these calls may be discovered by tracing calls to that number. The trace is activated by a TTY recent change message (RC:LINE) which modifies the translation data for the line. The terminating program, TERM, invokes subroutine ICT in CTRACR for the trace of an intraoffice or incoming call when the trace bit is set in the line translation data.

**2.08** A trace is accomplished by obtaining the calling party from the TCR and formatting the information for printing on the TTY. When the calling party is a trunk, the TEN is translated first into the supervisory scan point number and then to the trunk group and member number. A translation error results in a return code of 0 being returned to TERM. Otherwise, the group and member number are converted to BCD, and the message is formatted.

**2.09** When the calling party is a line, the TEN is translated to the directory number if possible (that is, the line is a 1- or 2-party line or a PBX/multiline hunt group). The correct directory number cannot be distinguished for 4- or 8-party lines; therefore, the TEN is printed instead.

**2.10** The TEN for the called party is translated into the directory number unless a 2-party line, in which case the TEN is printed. The TTY trace output message format is:

```
TT REPT ICT FROM AA aaaa bbbb TO BB
aaaa bbbb
```

where tt is time  
AA = calling party type

```
TRK trunk
aaaa group number
bbbb member number
```

```
OE terminal equipment number (4- or 8-party
line)
aa concentrator group
bbbb concentrator, switch group, switch,
level
```

```
TN normal line
aaaa office code
bbbb directory number
```

```
MP PBX
aaaa office code
bbbb directory number
```

BB = called party type

```
OE terminal equipment number (2-party line)
aa concentrator group
bbbb concentrator, switch group, switch,
level
```

```
TN normal line
aaaa office code
bbbb directory number
```

After printing of the trace information, control of the call is returned to the program TERM with a return code of 1 (indicating success) for further call processing.

**OUTGOING CALLS**

**2.11** When an operating company is notified that a No. 3 ESS office is the source of nuisance calls to particular lines in other offices, all outgoing calls to those lines can be traced. The trace is initiated by a TTY input message which supplies the telephone number as shown:

```
TRC:ENTER(aaa,bbbb), DNP ccc!
```

where aaa = office code

bbbb = telephone number

ccc = area code (optional)

**2.12** Subroutine MESREC in CTRACN examines the TTY input message and passes control to subroutine CLIENT (also in CTRACN). CLIENT formats the number and enters it into the Calling Line Identification (CLID) Table if an empty slot exists. The table consists of three 3-word entries (Fig. 4); therefore, calls to three numbers can be traced at a time. The following error message is printed when the CLID table is full and an entry cannot be made:

```
tt REPT ERR CLID TF
```

**SECTION 233-151-110**

In addition, an attempt to place a 3-digit entry into the CLID table results in this error message:

tt REPT ERR CLID IE

**2.13** The outgoing call handling program (OUTCAL) calls the subroutine OCT in CTRACR for each outgoing call to determine whether calls to the called number are to be traced. The address of the TCR for the call is passed to OCT. OCT determines whether the call should be traced. Calls from manual lines and 0- calls, which are sent to a Traffic Service Position System (TSPS), are not traced and control is returned to OUTCAL.

**2.14** Subroutine OCT calls subroutine CLISR in CTRACR to search for a match of the called number to a number stored in the CLID table. No match means a trace is not to be made, and a 1 return code is returned to OUTCAL. When the dialed number matches a CLID table entry, subroutine PDFE in program CTRACR is called to set up the CLID entry (called number) for printing in the trace TTY message.

**2.15** Subroutine OCT must determine the calling party information to be printed. The calling party information is obtained from the TCR for the call. When the calling party is a line, the line TEN is translated by GET\_TN in program XSLSPN to the correct directory number when possible. The TEN is printed for 4- or 8-party lines. When the calling party is a trunk, the TEN is translated to its supervisory scan point number and then to the group number and member number by subroutines

in program XSLSPN. The trace message is then printed containing the following information:

tt REPT OCT FROM AA aaaa bbbb TO cccc  
dddd eeee

where tt is time

AA = calling party type

TRK trunk

aaaa group number

bbbb member number

MP PBX

aaaa office code

bbbb directory number

OE terminal equipment number

aaaa concentrator group

bbbb concentrator, switch group, switch,  
level

TN normal line

aaaa office code

bbbb directory number

Called Party

cccc area code

dddd office code

eeee directory number

Control is then returned to OUTCAL after the trace for further processing of the call. When a translation error is encountered in the trace, control is returned to OUTCAL with a return code of 0.

DIGIT				DIGIT				DIGIT				DIGIT			
DIGIT				DIGIT				DIGIT				DIGIT			
DIGIT				DIGIT				DIGIT				DIGIT			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

**Fig. 4—CLID Table Format**

**2.16** A directory number is removed from the CLID table when outgoing calls to that number no longer need to be traced. The number is deleted in response to the following TTY input message:

TRC:ERASE (aaa, bbbb), DNP ccc!

aaa = office code

bbbb = telephone number

ccc = area code (optional)

**2.17** Subroutine MESREC in CTRACN processes the message and passes control to CLIDEL also in CTRACN. CLIDEL reformats the number for comparison with entries in the CLID table. Subroutine CLISR in CTRACN is called to search the table for a match. When a matching entry is not found in the CLID table, the following error message is printed:

tt REPT ERR CLID ENF

Otherwise, the entry is deleted, thus ending traces to that number.

### 3. GLOSSARY

**3.01** Terms, abbreviations, and definitions used frequently in this document follow.

**BCD**—Binary Coded Decimal.

**Clear**—To restore a storage device to the “zero” state.

**Intraoffice call**—A call from one subscriber assigned to a central office to another subscriber in the same office.

**Nonresident program**—A program which does not reside in memory but resides on tape and is brought into memory for execution when needed.

**OE**—Originating equipment number which is the same number as the terminal equipment number.

**Subroutine**—A sequence of instructions which performs a well-defined function and is called by another section of instructions.

**TCR (transient call record)**—A 16-word block of writable main storage assigned to a call in the transient state containing control information, terminal and path information, and receiving and sending data applicable to the call. Information in the TCR and the format of the TCR constantly changes as different call processing functions are performed for a call. Therefore, a format is not provided in this document but formats of the TCR as it appears for different functions are available in the program listings.

**TMR (terminal memory record)**—A 4-word block of writable main storage assigned to each junctor.