

FEATURE DOCUMENT
CALL TRACING
NO. 2 ELECTRONIC SWITCHING SYSTEM

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NOTICE

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

1.01 The Calling Line Identification Program (CLID) covers procedures used to identify calling lines. There are two basic modes of operation. One is identification of a particular call while it is in progress. The other, primarily used for nuisance calls, identifies all calls placed to a particular directory number. In either case, if the call originated in the No. 2 Electronic Switching System (ESS) office, the call trace output messages contain identification of both ends of the call and the time of day when the message was formed. In the case of incoming calls, the call trace output messages do not identify the calling line; however, the incoming trunk is identified. See Section 232-110-301 for detailed procedures on how to implement call tracing.

In-Progress Calling Line Identification

1.02 The prerequisite for identifying a particular call while it is in progress is that one end of the network path be known. The known terminal must be identified by directory number if it is a line, by group and member number if it is a trunk, or by centrex attendant number. There are three messages available to request identification of a call in progress; one for use when the line is known, another for use when the trunk is known, and a third for use when the centrex attendant is known. An output message identifies the terminal at the other end of the connection.

Nuisance Calling Line Identification

1.03 Identification of calls to a particular directory number is implemented after a customer complains about nuisance calls. One method of calling line identification identifies calls terminating to a line in the No. 2 Electronic Switching System (ESS) office. This method is initiated by a recent change service order which adds the trace feature to the line's terminating directory number translation. The other method gives the No. 2 ESS the capability of identifying outgoing calls. This calling line identification method is implemented by using a message to set the call trace bit in the 3-digit translation table corresponding to the called office code, and to enter the called directory number or service code into a special calling line identification (CLID) table in the call store. Initiation of either

method results in an automatic teletypewriter (TTY) printout whenever a call is placed to the given directory number.

Service Code Identification

1.04 CLID has the capability of identifying calls to 3-digit service codes (911, 411, 611, etc.). This feature is implemented by using a message that sets the call trace bit in the 3-digit translation table and enters the service code into the CLID table. This results in an automatic TTY printout when a call is placed to the particular service code being traced.

1.05 The Call Tracing feature is available in any No. 2 ESS office with any generic program. With the LO-1 generic program, it is only possible to trace stable calls. However, with the implementation of the transient call trace feature in the EF-1 generic program, it is possible to identify the two ends of a call which is in a transient state.

1.06 No special equipment is required to implement the Call Tracing feature.

2. USER PERSPECTIVE**CUSTOMER**

2.01 Call tracing service can be used to aid authorities in identifying the calling line from which anonymous threatening or nuisance calls are originated. Identification of calls to a particular directory number is implemented after a customer complains about nuisance calls.

TELEPHONE COMPANY

2.02 Call tracing can be implemented in No. 2 ESS with a minimum of effort since no additional equipment is required. Call tracing is a standard part of all the No. 2 ESS generic programs.

3. SYSTEM PERSPECTIVE**IN-PROGRESS CALLING LINE IDENTIFICATION**

3.01 An in-progress trace request is used to identify the other party of a call currently active in the system. There are two types of requests. One TTY input message is used to request identification of the party connected to a given line. The other message is used to request

identification of the party connected to a specific trunk or centrex attendant.

Directory Number Request

3.02 The party connected to a particular line can be identified by typing the input message:

A L:TRC:aaa bbbb!

where aaa bbbb is the 7-digit directory number of the line to be traced. (Refer to Figure 1.)

3.03 Upon receiving the request to trace a line, the calling line identification routine (ALTRC) translates the given directory number to a terminal equipment number (TEN). The TEN identifies the location of the line on the network and is the number used to identify a line during a call.

3.04 After translating the given directory number to TEN, the line is busy tested. The busy-idle status of a line is kept in call store memory. If the line is found to be idle, an error message is printed and the call is not traced.

3.05 In order to find the call involving the busy line, the terminal memory records (TMR) of stable (talking) calls in the system must be searched. All stable calls involving lines use either a circuit junctor (intraoffice call) or a trunk (incoming or outgoing call). A stable circuit junctor TMR contains the TENs of the two line terminals connected to the junctor. A stable trunk TMR contains the identification of the terminal to which it is connected. The method used to find the call involving the busy line is to search the TMRs of the trunk and circuit junctors in the office for a TEN match. An error message is printed if the line requesting the trace goes idle during the search of TMRs. If a match is not found in the stable TMRs and if the office uses the LO-1 generic program, an error message is printed and the call is not traced. If the office uses the EF-1 generic program and a match is not found in the stable TMRs, the transient call records (TCRs) are then searched for a match. If a match is not found in the TMRs or TCRs, an error message is printed and the call is not traced. If a match is found in the stable TMRs (or the TCRs in the EF-1 generic program), one of the following trace messages is printed.

(a) If the line is found to be connected to another line, then the intraoffice trace message is

printed. The resulting TTY output message is AR L LCT followed by the directory number of the other line involved in the call, the directory number of the line traced, and the time of day.

(b) With the EF-1 generic program, if the line is found to be connected to a centrex attendant, the TTY output message is AR AT LCT followed by the centrex number, attendant number, attendant port, and attendant loop (attendant port identifier) of the attendant involved in the call followed by the directory number of the line traced and the time of day.

(c) If the line is found to be connected to a trunk, then the interoffice call trace message is printed. The resulting TTY output message is AR TK LCT followed by the group and member number of the trunk, the directory number of the line requesting the trace, and the time of day.

(d) With the EF-1 generic program, if the call is found in a transient state, the transient call trace message is AR TT LCT followed by the scanner, row in scanner, and bit position in row of the other end of the connection, followed by the directory number of the line requesting the trace and the time of day.

Group and Member Number Request

3.06 A call involving a line in another office can be identified if the interoffice trunk being used by the call is known. The input TTY message used is:

A TK:TRC:aaa bbb!

where aaa bbb is the group and member number of the trunk involved in the call. (Refer to Figure 2.)

3.07 After receiving a request to trace a call involving a trunk to another office, the given group and member number is used to find the location of the TMR associated with the trunk.

3.08 If an invalid group and member number is given or if the TMR associated with the trunk is found to be in an idle state, then an NG message is returned after the input message (A TK:TRC:aaa bbb! NG). If a valid group and member number is given, and if the TMR associated

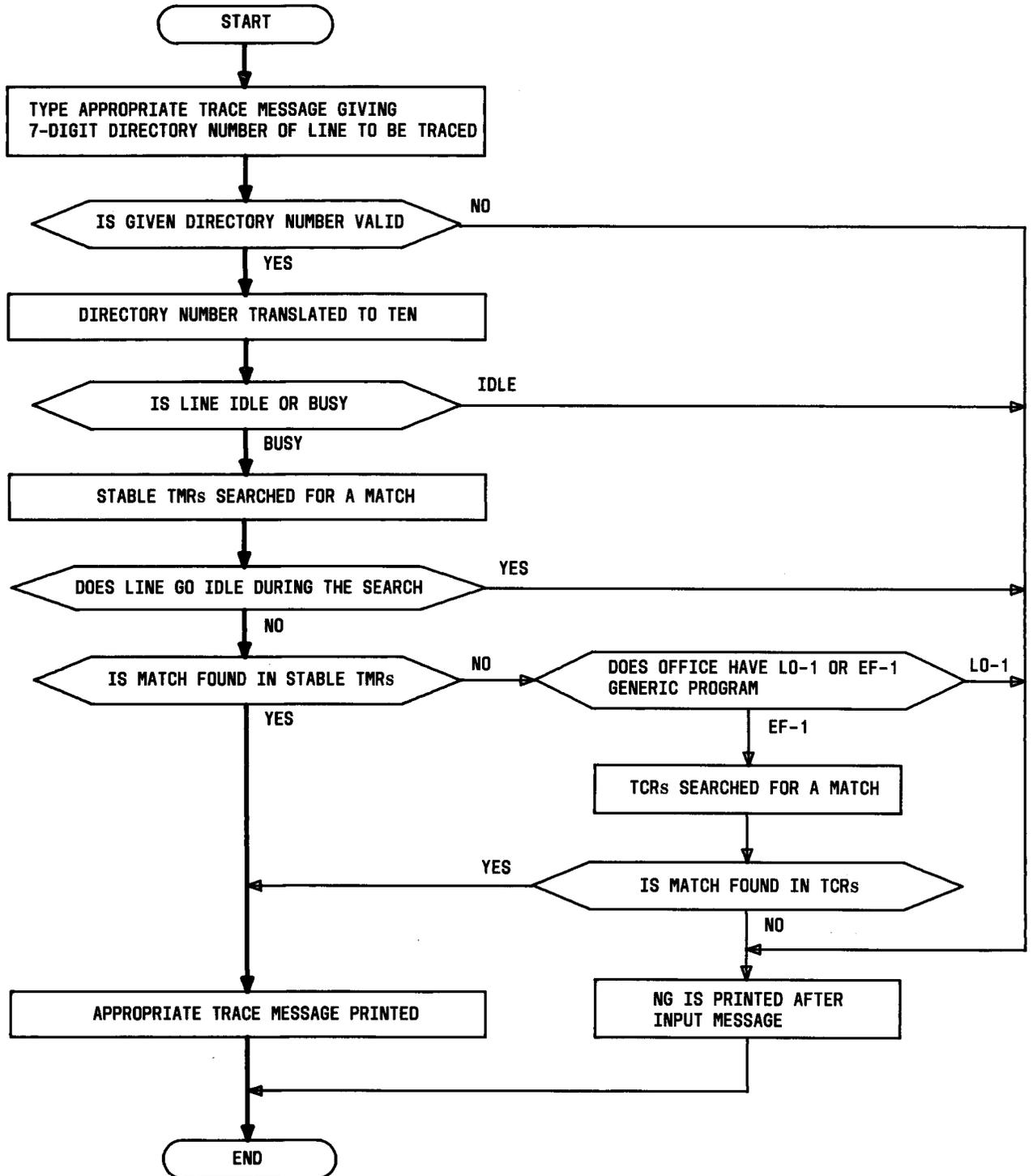


Fig. 1—In-Progress Directory Number—Trace Feature Flow Diagram

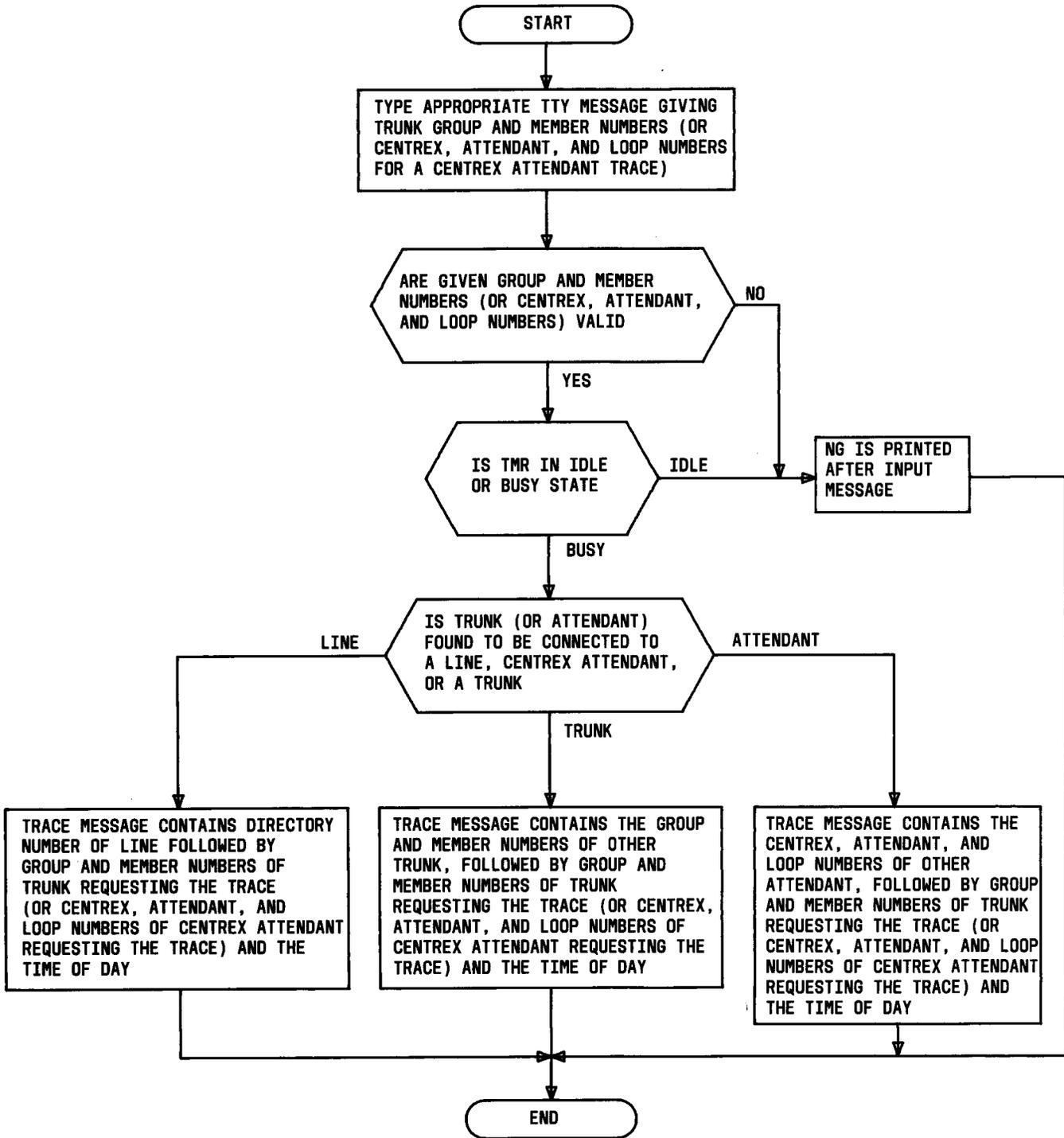


Fig. 2—In-Progress Group and Member Number or Centrex Attendant—Trace Feature Flow Diagram

with the trunk is found to be in a busy state, one of the following output messages is printed.

- (a) If the trunk is found to be connected to a line, then the interoffice trace message is printed. This message is AR L TCT followed by the directory number of the line to which the trunk is connected, the group and member number of the trunk requesting the trace, and the time of day.
- (b) With the EF-1 generic program, if the trunk is found to be connected to a centrex attendant, the TTY output message is AR AT TCT followed by the attendant port identifier, the group and member number of the trunk requesting the trace, and the time of day.
- (c) If the trunk is found to be connected to another trunk, then the tandem call trace message is printed. This message is AR TK TCT followed by the group and member number of the other trunk in the call followed by the group and member number of the trunk requesting the trace and the time of day.

Centrex Attendant Request

3.09 With the EF-1 generic program, a call involving a centrex attendant can be identified if the attendant port identifier is known. The input TTY message used is:

A AT:TRC:aaa bbc!

where aaa is the centrex number, bb is the attendant number, and c is the attendant loop. (Refer to Figure 2.)

3.10 After receiving a request to trace a call involving a centrex attendant, the given centrex number, attendant number, and loop is used to find the location of the TMR associated with the attendant.

3.11 If invalid attendant information is given or if the TMR associated with the trunk is found to be in an idle state, then an NG message is returned after the input message (A AT:TRC:aaa bbc! NG). If valid attendant information is given and the TMR associated with the trunk is found to be in a busy state, one of the following output messages is printed.

- (a) If the attendant is found to be connected to a line, then the intraoffice trace message is printed. This message is AR L ACT followed by the directory number of the line to which the attendant is connected, the attendant port identifier of the centrex attendant requesting the trace, and the time of day.
- (b) If the attendant is found to be connected to another centrex attendant, the TTY output message is AR AT ACT followed by the traced attendant's port identifier, the attendant port identifier of the centrex attendant requesting the trace, and the time of day.
- (c) If the attendant is found to be connected to a trunk, then the tandem call trace message is printed. This message is AR TK ACT followed by the group and member number of the other trunk, the attendant port identifier of the centrex attendant requesting the trace, and the time of day.

NUISANCE CALL TRACING

3.12 There are two methods of implementing nuisance calling line identification. The method used depends on whether the directory number to be traced belongs to a line or centrex attendant terminating in the No. 2 ESS office or a line in another office.

Identification of Calls to Terminating Lines

3.13 As mentioned in 1.03 a recent change service order is used to add the Call Tracing feature to the translation information. See Figure 3. The input recent change message is A RC:L/ or A RC:MLH/. The keyword to add the trace feature is TRC ADD/. The keyword to remove the trace feature is TRC DLT/.

3.14 Whenever a call is placed to a local No. 2 ESS line the translation is performed (refer to Figure 4). If the translation indicates the trace feature for the called number, the TTY message is generated by the TERMTRC routine. If the call is an intraoffice call, the TTY output message is AI L LCT followed by the directory number of the calling line, the directory number of the called line, and the time of day. If the call is from a centrex attendant, the TTY output message is AI AT LCT followed by the attendant port identifier, the directory number of the called line, and the

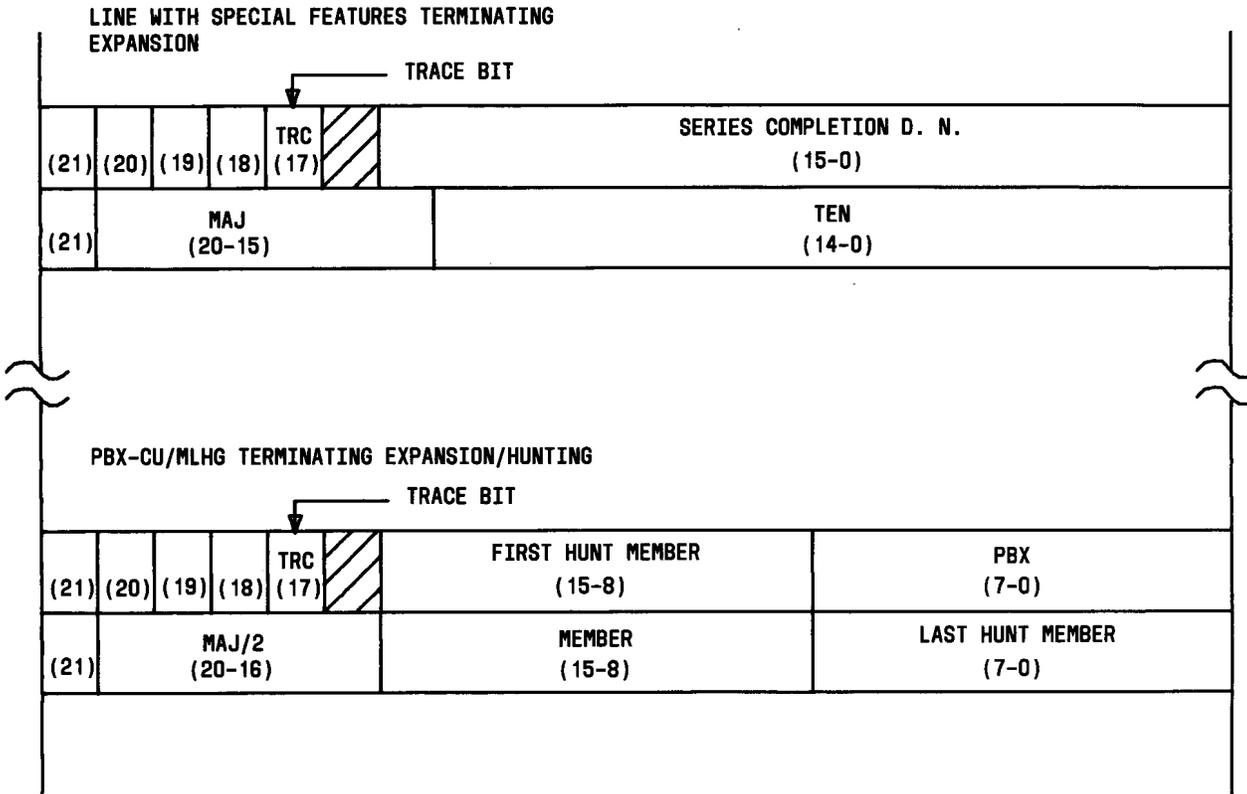


Fig. 3—Line or MLHG With Special Features Terminating Translation Expansions

time of day. If the call is incoming from another office, the TTY output message is AI TK LCT followed by the group and member number of the incoming trunk, the directory number of the called line, and the time of day. When a call is placed to a multiline hunt group (MLHG) number which has requested the trace feature, the TTY output message contains the directory number of the MLHG and the MLHG member number identifying the terminal selected in the MLHG and the time of day.

3.15 The TTY printout of an incoming or intraoffice call is made even if the call is not successfully completed. The printout is also made if the called number is busy.

3.16 When the trace is no longer desired on a directory number, the trace feature must be deleted from the directory number translation by recent change service order message.

Identification of Outgoing Calls

3.17 Because outgoing calls are not placed over a specific trunk to another office, trunk translation information cannot be used to contain call trace information. A special calling line identification table in the call store contains the outgoing directory numbers to be traced. See Figure 5.

3.18 Recent change is used to set a trace flag in the 3-digit translation table corresponding to the first three digits of the directory number entered in the calling line identification table. See Figure 6 for code point translator expansion. The input TTY message is:

A CT:ENT:aaa bbb cccc!

Where aaa is the area code and bbb cccc is the 7-digit directory number of the line to be traced.

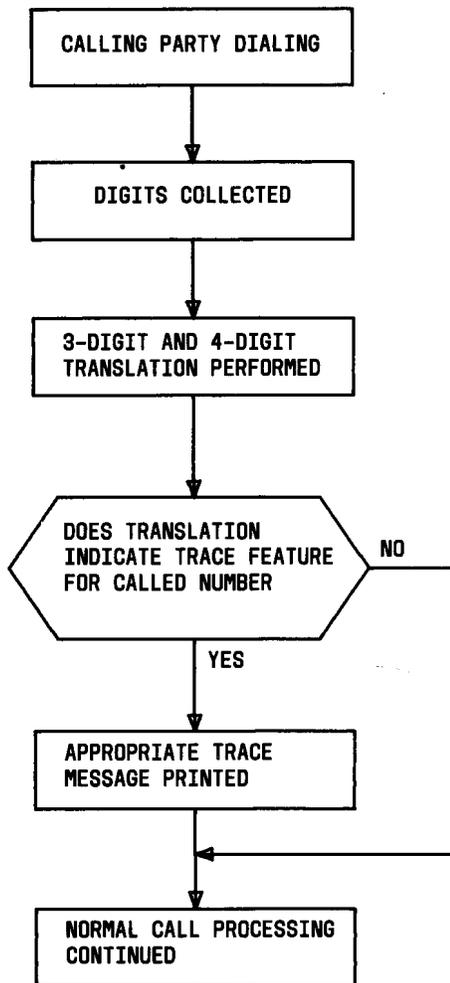


Fig. 4—Nuisance Calls to Terminating Lines of Centrex Attendants—Trace Feature Flow Diagram

3.19 When an outgoing call is placed to a directory number that is in the calling line identification table, after all the digits are received, the translation performed, and the call is determined to be an outgoing call, the trace flag is interrogated. The calling line identification table is searched only if the trace flag is set. If the called directory number is found in the calling line identification table, then an appropriate trace message is generated. (Refer to Figure 7.)

3.20 If the call originated in the No. 2 ESS office, the interoffice call trace message is AI L TCT followed by the directory number of the calling line, the number of the called party, and the time of day. If the call is from a centrex attendant,

the call trace message is AI AT TCT followed by the calling attendant port identifier, the number of the called party, and the time of day. If the call originated outside the No. 2 ESS office, the tandem call trace message is AI TK TCT followed by the incoming trunk group and member number, the called directory number, and the time of day.

3.21 When the trace feature is no longer desired on outgoing calls, it can be deleted by the following input message:

A CT:RMV:aaa bbb cccc!

Identification of Calls to Centrex Attendants

3.22 With the EF-1 generic program, nuisance call tracing can be implemented for centrex attendants. As mentioned in 1.03 a recent change service order must be used to add the call tracing feature to the centrex attendant's translation information. See translation explanation table in Figure 8. The input recent change message is A RC:L/. The keyword to add the trace feature is TRC ADD/. The keyword to remove the trace feature is TRC DLT/.

3.23 Whenever a call is placed to a centrex attendant the translation is performed (refer to Figure 4). If the translation indicates the trace feature for the called attendant, a TTY message is generated by the TERMTRC routine. If the call is an intraoffice, the TTY output message is AI L ACT followed by the directory number of the calling line, the attendant port identifier of the called attendant, and the time of day. If the call is from another centrex attendant, the TTY output message is AI AT ACT followed by the calling attendant port identifier, the port identifier of the called attendant, and the time of day. If the call is incoming from another office, the TTY output message is AI TK ACT followed by the group and member number of the incoming trunk, the attendant port identifier, and the time of day.

3.24 The TTY printout of an incoming or intraoffice call is made even if the call is not successfully completed. The printout is also made if the called attendant number is busy.

3.25 When the trace is no longer desired on a centrex attendant, the trace feature must be deleted from the centrex attendant's translation by recent change service order message.

	15				0	ESS BIT POS
CLID+0		D6	D7	D8	D9	LAST 4-DIGIT (WORD 0) ENTRIES
+1						
+2						
+3						
+4		0	D3	D4	D5	OFFICE CODE (WORD 1) ENTRIES
+5						
+6						
+7						
+8		0	D0	D1	D2	AREA CODE (WORD 2) ENTRIES
+9						
+10						
+11						

Fig. 5—Calling Line Identification (CLID) Table

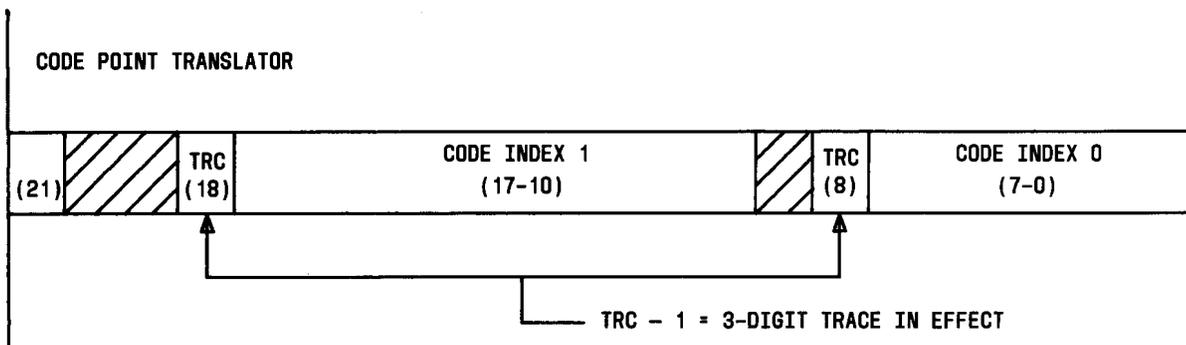


Fig. 6—Code Point Translator Translation Expansion

Service Code Call Tracing

3.26 Calls to 3-digit service codes (911, 411, 611, etc.) can be traced. The input TTY message is:

A CT:ENT:aaa bbb cccc!

where aaa is 000 and bbb is the service code and cccc is 0000.

3.27 When a call is placed to a service code that is in the CLID table, after all the digits are received, the translation performed, and the call

determined to be to a service code, the trace flag is interrogated. (Refer to Figure 7.) The CLID table is searched only if the trace flag is set. See Figure 6 for code point translation expansion. If the called service code is found in the CLID table, then the appropriate trace message is printed.

3.28 If the call originated in the No. 2 ESS office, the intraoffice call trace message is AI L LCT followed by the director number of the calling line, the service code called, and the time of day. If the call is from a centrex attendant, the call trace message is AI AT LCT followed by the calling attendant port identifier, the service code called,

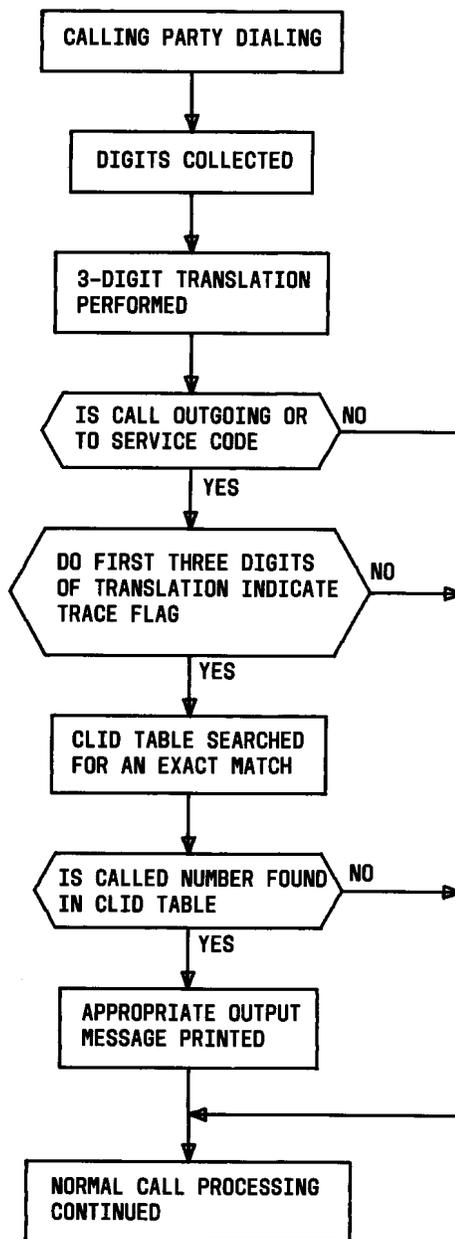


Fig. 7—Nuisance Outgoing or Service Code Calls—Trace Feature Flow Diagram

and the time of day. If the call originated outside the No. 2 ESS office, the tandem call trace message is AI TK LCT followed by the incoming trunk group and member number, the service code called, and the time of day.

3.29 When the trace feature is no longer desired on a service code it can be deleted by the following input message:

A CT:RMV:aaa bbb cccc!

where aaa is 000 and bbb is the service code and cccc is 0000.

FEATURE ATTRIBUTES

4. APPLICABILITY

4.01 In-progress calling line identification can be implemented in No. 2 ESS for the following conditions:

- (a) Directory Number Request—The party connected to a particular line can be identified.
- (b) Group and Member Number Request—A call involving a line in another office can be traced if the interoffice trunk being used by the call is known.
- (c) Centrex Attendant Request—With the EF-1 generic program, a call involving a centrex attendant can be traced if the attendant port identifier is known.

4.02 Nuisance call tracing can be implemented in the No. 2 ESS for the following conditions:

- (a) Identification of Calls to Terminating Lines—All calls placed to a line with the trace feature are traced.
- (b) Identification of Calls to Centrex Attendants—With the EF-1 generic program, all calls placed to a centrex attendant with this feature are traced.
- (c) Identification of Outgoing Calls—All outgoing calls placed to a given directory number in another office are traced.
- (d) Identification of Calls to Service Codes—Calls to 3-digit service codes (911, 411, 611, etc.) can be traced.

CENTREX LINE 4- OR 6-WORD EXPANSION

(21)	/											(18)	(17)	(16-15)	(14)	(13)	(12)	(11)	(10)	(9)	(8)	(7)	ASSOCIATED CTX. NO. (6-0)
(21)	(20)	(19)	(18)	(17)	(16)	BILLING/DIRECTORY NO. (15-0)																	
(21)	PICKUP GROUP (20-13)										(12)	TR ←	(11)	(10)	(9)	(8)	(7-6)	(5)	(4)	(3-0)			
(21)	(20)	FT	(18)	(17)	(16)	(15)	TEN (14-0)																
(21)	(20)	/			(16)	30 CODE 'LST SEL (15-10)					6 CODE LIST SEL. (9-0)												
(21)	ASSOCIATED CIRCUIT-HUNT WORD (20-0)																						

TR-1 = TRACE CALLS TO THIS NUMBER _____

UNIVERSAL CONSOLE ATTENDANT EXPANSION

(21)	/											(18)	(17)	/														ASSOCIATED CENTREX NUMBER (6-0)
(21)	/											(16)	/															
(21)	INCOMING CALL IDENTIFICATION LAMP CODE (20-16)										TR ←	(15)	(14)	(13)	(12)	(11)	/											
(21)	/											NIGHT SERVICE NUMBER (15-0)																

TR-1 = TRACE CALLS TO THIS ATTENDANT _____

Fig. 8—Centrex Line and Attendant Terminating Expansion

5. LIMITATIONS AND RESTRICTIONS

5.01 When an in-progress directory number trace request is implemented with the LO-1 generic program, calls which are in a transient state cannot be traced. With the implementation of the transient call trace feature in the EF-1 generic program, it is possible to identify the two ends of a call which is in a transient state. This applies only to an in-progress directory number trace request described in 3.02.

5.02 In-progress calling line identification, described in 3.01, cannot be implemented for a call to

a MLHG line. A MLHG can have several lines associated with a given directory number. A request to trace a MLHG line involved in a call in progress is denied because the specific MLHG terminal being used in the call cannot be determined from the directory number. Calls to a MLHG line may be traced by using the nuisance call tracing method described in 3.12.

5.03 When traced calls are found to be incoming from another office, the call trace output messages do not identify the calling line; however, the incoming trunk is identified.

6. COMPATIBILITY AND INTERACTIONS

6.01 Not applicable.

7. COST FACTORS

7.01 There is no additional cost for calling line identification since it is part of the standard LO-1 or EF-1 generic programs.

8. AVAILABILITY

8.01 Calling line identification is available as a standard part of LO-1 and EF-1 programs.

CONSIDERATIONS FOR INCORPORATION OF FEATURE INTO SYSTEM**9. PLANNING**

9.01 Not applicable.

10. HARDWARE

10.01 Not applicable.

11. DETERMINATION OF QUANTITIES

11.01 The special calling line identification table, which contains the outgoing directory numbers or service codes to be traced, can hold a maximum of four 10-digit directory numbers or 3-digit service codes. When it is desired to implement an outgoing call trace on a directory number or service code, a printout of the calling line identification table should first be scanned to determine whether an empty slot is available. The list can be printed by typing the TTY message:

A CT:LST!

12. ASSIGNMENTS AND RECORDS

12.01 The ESS translation forms, found in TG-2H which are affected by the Calling Line Identification feature are as follows:

- ESS 2100—Directory Number Record: It is recommended that lines assigned the Call Trace, Terminating Call Identification, or Outgoing Call Identification functions be noted in the remarks field of form ESS 2100 as an office record.

- ESS 2105—Multiline Hunt Group (MLHG) Record: It is recommended that a MLHG or number assigned the Terminating Call Identification function have a notation to that effect in the remarks field of form ESS 2105 as an office record.

13. NEW INSTALLATION AND GROWTH

13.01 Not applicable.

14. TESTING

14.01 As mentioned in 11.01, a special calling line identification table in the call store contains the outgoing directory numbers to be traced. The list can be printed by typing the TTY message:

A CT:LST!

14.02 Test calls should be made to a line with the call trace feature to verify that the feature is working properly.

15. MEASUREMENTS

15.01 Not applicable.

16. CHARGING

16.01 Not applicable.

SUPPLEMENTARY INFORMATION**17. GLOSSARY**

17.01 This section defines terms used to describe the Call Tracing feature.

- ALTRC—Calling Line Identification Routine
- Attendant Port Identifier—The attendant port identifier consists of the centrex number, attendant number, attendant port, and attendant loop
- CLID—Calling Line Identification Program
- DIGRTN—Digit Interpretation Program
- EF-1—Extended Feature Generic Program
- LO-1—Local Office Generic Program

SECTION 232-190-106

- MLHG—Multiline Hunt Group (Includes Private Branch Exchange (PBX))
- TEN—Terminal Equipment Number
- TERMTRC—Subroutine for Generating Intraoffice or Incoming Call Trace Information Message
- TMR—Terminal Memory Record
- TTY—Teletypewriter

18. REASONS FOR REISSUE

18.01 This is the initial issue of this section.

19. REFERENCES

19.01 The following documentation contains information pertaining to or affected by the Call Tracing feature:

Bell System Practices

232-110-301—Calling Line Identification Procedures

Other References

IM-2H200 Input Message Manual

OM-2H200 Output Message Manual

PD-2H204 Digit Interpretation Program

PD-2H225 Calling Line Identification Program

TG-2H Translation Guide