LOCAL TEST DESK
OPERATION AND TEST PROCEDURES
NO. 3 ELECTRONIC SWITCHING SYSTEM

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TABLES

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1. GENERAL

1.01 This section provides information for testing customer lines connected to a No. 3 Electronic Switching System (No. 3 ESS).

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 Testing procedures outlined in this section pertain to the 12-, 14-, modified 14-, and 16-type local test desks (LTD). Specific sections for operating the test desks are provided in the 662 division. Testing operations outlined in this section are intended to supplement the standard operation section for each test position.

1.04 The No. 3 ESS is a common control system which means the switching actions are separate from the equipment that controls them (Fig. 1). Call connections through a switching network can be directed for many lines by one centralized or "common" group of control equipment. The control equipment routes a call through the switching network and is released to act on other calls.

1.05 The No. 3 ESS uses a concept called "stored program control" to offer service and maintenance features. This means the actions of the No. 3 ESS are governed by lists of instructions. The lists of instructions are called programs. The Local Test Desk Handler Program permits the necessary communication between the local test desk and the No. 3 ESS to perform any test procedure required.

1.06 Since the call handling techniques employed by an ESS central office are different from

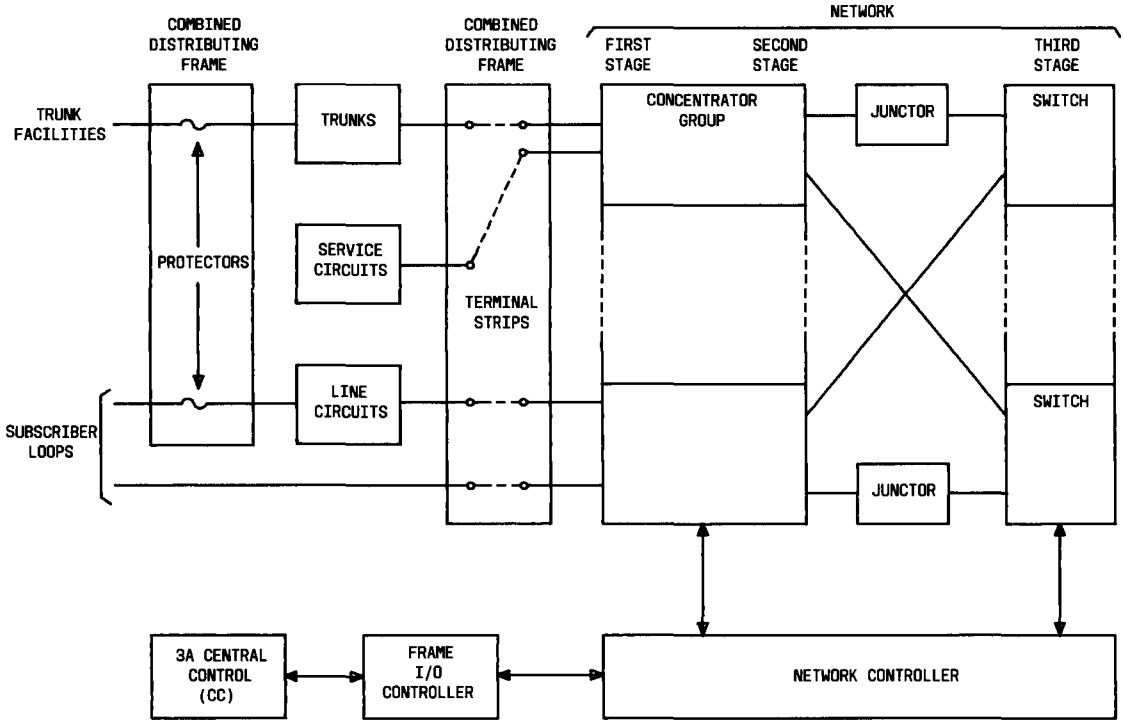


Fig. 1—Switching Network Functional Relationship

other types of offices, testing from the LTD will be affected to some extent. This section along with Section 662-517-501 will provide information required to analyze and handle service-affecting troubles. Knowledge of the TTY features and LTD operation will help to reduce customer trouble and improve the efficiency of the repair service bureau (RSB).

1.07 Test trunks are provided which are either dedicated or nondedicated test trunks. If dedicated test trunks are provided, test connections to a customer line are performed in the conventional manner. If nondedicated test trunks are provided, test connections are established to a test trunk by dialing a "trigger" number, the connection is established, and the LTD is called back. A connection to a customer line can then be established.

1.08 Test connections from the local test desk to a customer line served by the No. 3 ESS central office are made through either a no-test vertical or through the trunk and line switching circuit of the network. When a line is idle, it is connected through the switching network in the same basic way that an incoming call is connected to a line. The Local Test Desk Handler Program has control of the circuit. If a line is busy, the local test desk is connected to the busy line through the no-test vertical. The difference in making test connections to busy or idle lines does not affect the testing operation from the LTD. Main distribution frame (MDF) test trunks are provided, where applicable, to provide test connections at the combined distributing frame (CDF).

No-test type of test connection will override a busy connection. To prevent service interruptions, the proper procedures outlined in this section should be practiced when testing customer lines connected to an ESS central office.

1.09 ***Input Message Manual (IM):*** Refer to the Repair Service Bureau Channel Manual (which is part of the Input Message Manual IM-3H000-01) for the list of input messages that can be typed on the ALIT TTY to request a system action or function. A description of each message, as well as cautions and expected results, is given for each message. The messages are arranged in alphanumeric order. Section 662-517-501 provides a more detailed explanation and examples of input messages commonly used on the ALIT TTY.

1.10 ***Output Message Manual (OM):*** Refer to the Repair Service Bureau Channel Manual (which is part of the Output Message Manual (OM-3H000-01) for the list of output messages received on the ALIT TTY. The OM contains a listing in alphanumeric order of output messages either automatically produced by the ESS system or as a response to a TTY input message. The OM contains a description of each message, its purpose, its significance, and recommended actions to be taken, if any. Also listed is the appropriate alarm indication. Section 662-517-501 provides more detailed explanation, analysis, and examples of output messages commonly received on the ALIT TTY.

OFFICE EQUIPMENT NUMBER (OEN)

1.11 The office equipment number (OEN) is a 6-digit number used to designate the location of lines, trunks, and service circuits on the combined distributing frame (CDF). The OEN also describes the location of associated equipment in the network frame. The format of the OEN is:

OEN = AA BCDE

DIGIT	EQUIPMENT IN NETWORK FRAME
AA (00-15)	Concentrator Group
B (0-1)	Concentrator
C (0-2)	Switch Group
D (0-7)	Switch
E (0-7)	Level

Note: The terms "office equipment number (OEN)" and "terminal equipment number (TEN)" are used interchangeably in the Input/Output Message Manual (IM/OM 3H000-01). The term "office equipment number (OEN)" will be used in this section.

1.12 A typical OEN assignment, as it appears on an office record, is 02 0270. The meaning to the central office personnel is:

```
 02  0270
 |   ||||__ Level                   \
 |   |||___ Switch                   |  EQUIPMENT
 |   ||____ Switch group             |- LOCATION
 |   |_____ Concentrator             |  IN NETWORK
 |_________ Concentrator group      /   FRAME
```

The OEN must be shown in its proper sequence on all work orders and office records. The repair service bureau (RSB) personnel must recognize and be able to locate the OEN on all work orders, RSB records, and on the input/output messages.

> ***Note:*** The OEN 02 0270 will appear on the TTY output message as 2 0270. (The first digit to the left is dropped if 0.)

PERMANENT SIGNAL AND PARTIAL DIAL TREATMENT

A. Permanent Signal

1.13 Permanent signals occur when no digits are received by a customer digit receiver within 10 to 16 seconds after an off-hook condition. The time-out period is 10 seconds during periods of heavy traffic. Permanent signals also occur if a line fails to disconnect after a call is torn down. The customer receives an announcement, receiver off-hook tone, and then an operator challenge is initiated to alert the customer. Either of these three may be omitted on an optional basis. If action is not taken by the customer, the line is placed in the high and wet state. Lines placed in the high and wet state are scanned for on-hook only, and network paths are not occupied.

B. Partial Dial Calls

1.14 Partial dial calls are calls that are not completely dialed and therefore time out after the reception of one or more digits. The time-out period is normally 10 seconds. Partial dial calls are routed to tone or announcement and then given permanent signal treatment, if necessary.

C. High and Wet State

1.15 In the No. 3 ESS, lines with a permanent signal or partial dial condition are placed in a high and wet state. Lines placed in the high and wet state are scanned for on-hook only, and network paths are not tied up. There is no limit to the number of lines that can be placed in a high and wet state.

1.16 The RSB personnel may request a printout of all permanent signal lines presently in the high and wet state by typing in the following message:

OP:LINE:STAT HAW!

on the ALIT TTY. The resulting printout is as follows:

```
                   OEN        TN
46 ØP LINE 1  0225 TN 534 5573 STAT HAW
           2  0147 TN +534 3915 STAT HAW
           3  0113 TN 534 5589 STAT HAW
           4  1145 TN 534 3995 STAT HAW
   ØP LINE STAT CØMPL
```

D. Tests

1.17 A printout of the telephone numbers of all permanent signal lines presently in the high and wet state should be manually requested using the OP:LINE input message (refer to 1.16). These lines should be tested at the LTD at the start of each day. The permanent signal list should not be requested too early as numerous receiver-off-hook (ROH) conditions may appear. Only solid tested troubles should be dispatched.

> ***Note:*** Some subscriber lines may appear consistently in a permanent signal condition. A record of these lines should be maintained to prevent needless testing at the LTD.

1.18 Tests may be performed on a line in the permanent signal or partial dial condition using the LTD. With the connection to the LTD established, any of the following conditions may be applied to the subscriber line:

(a) Voltmeter tests

(b) Ringing

(c) Receiver-off-hook (ROH) tone.

1.19 After repairs are completed, subscriber lines may be removed from the high and wet state and restored to service using the RST:LINE input message at the ALIT TTY. Refer to Section 662-517-501 for the format and use of the RST:LINE input message.

TROUBLE INTERCEPT (PLUG-UP)

1.20 Plug-up, or more descriptively, trouble intercept, is a special feature which allows the operating company to automatically route calls intended for a line that is known to be in trouble to an intercept operator or trouble message. The plug-up feature can be activated by the RMV:LINE input message from the ALIT TTY or the maintenance (MTC) TTY. The maximum number of lines that can be placed in the plug-up condition is four. Refer to Section 662-517-501 for the format and use of the RMV:LINE input message.

1.21 A printout of the telephone numbers of all the lines presently in the high and wet state can be manually requested using the OP:LINE input message. By using the variable field input PLUGUP, the list is restricted to only those lines that are on the plug-up condition. Refer to Section 662-517-501 for the format and use of the OP:LINE input message.

1.22 The plug-up state can be deactivated on line by a RST:LINE input message from the ALIT TTY or maintenance (MTC) TTY, or automatically as a result of an indication that the line has been cleared. A line in trouble can be in one of two basic states: permanently off-hook or permanently on-hook. The line trouble is presumed cleared and the plug-up feature automatically deactivated if the line changes state.

2. NO. 3 ESS SYSTEM FEATURES AND CAPABILITIES

2.01 Various features and capabilities are available to No. 3 ESS subscribers on an optional basis. The system determines what features are provided to an individual subscriber by consulting translation tables.

TERMINAL HUNTING

2.02 The following hunting arrangements are available for hunting an idle line:

- Series Completion
- Multiline Hunting (MLH).

Note: A local test desk connection to either a series completion or multiline hunt group number does not cause hunting to occur. The LTD is connected directly to the telephone number that is dialed.

A. Series Completion

2.03 The series completion arrangement is available for individual line customers who desire completion to other lines via a hunt. If the party being called has series completion and is busy, the call is routed to another directory number in the office. If the new party has series completion and is busy, a new directory number is found. The process continues until an idle line is found or until the last line of the series completion chain is reached and found busy. Up to 16 lines can be handled by series completion. It is recommended that more than 12 lines should be handled by multiline hunting. The telephone numbers in the series completion chain need not be consecutive, but the same office code must be used.

2.04 ***Remote Make-Busy:*** The remote make-busy feature in No. 3 ESS may be used to make a line(s) in the series completion chain busy to incoming calls. The remote make-busy feature is activated by a key on the customer premises. A line is considered busy in the series completion process if the scan point associated with the key is found to be set, in which case a new telephone number is reached and the process continues.

B. Multiline Hunting

2.05 The multiline hunting (MLH) arrangement refers to a method of selecting an idle line from a group of lines in the central office, as distinguished from a PBX, which refers to a type of equipment on the customer premises. In general, a multiline hunting group (MLHG) is associated with a PBX on the customer premises, or it could be associated with any group of individual lines in the central office. A 2-digit MLHG number (00-63) is used to identify a particular ***group*** of lines. Lines associated with an MLHG are identified within the group by 2-digit ***member numbers (00-63).***

2.06 A selection status block is associated with each MLHG. The block contains one selection

status bit per MLHG member. The translation for the listed telephone number specifies a first hunt member and a last hunt member. The hunt process involves searching for an idle member in the selection block starting with the first hunt member's selection bit and ending at the last hunt member's selection bit. If an idle member in the hunt range is found, the selection bit is marked busy, the terminal equipment number is retrieved from the member list, and the call is completed to the selected member's terminal.

2.07 ***No Hunt:*** In the No. 3 ESS, a telephone number is assigned to each member in the MLHG. Associated with each member's telephone number in translations is the member number (considered the first hunt member) and the last hunt member number. The last hunt member number may be the same as the member number, thus creating a "no hunt" telephone number. ***Incoming calls to these telephone numbers do not cause hunting to occur.*** Telephone numbers received from no-test and local test desk trunks are completed to the member number specified in translations on a "no-hunt" basis (ie, the last hunt member number is ignored). ***Thus, a local test desk connection to an MLHG telephone number does not cause hunting to occur.***

2.08 In the No. 3 ESS, the MLHG includes two features which affect the hunting process: ***night stop and stop hunt.*** A dial-up arrangement that replaces PBX keys is used to activate the night stop and stop hunt features in the No. 3 ESS. The dial-up arrangement provides "key" control over existing working lines from a PBX. The dial-up procedure by the customer is as follows:

DIAL TONE + ACCESS CODE + DIAL TONE + MLHG SECURITY CODE + ACTION CODE + SERVICE CODE

ACCESS CODE = 67

MLHG SECURITY CODE = 00 through 63 = Assigned multiline hunt group number.

ACTION CODE =
1 = Activate the service
2 = Deactivate the service

SERVICE CODE =
1—7 for remote make-busy (RMB) service
8 for stop hunt service
9 for night stop service

2.09 ***Night Stop Feature:*** If a telephone number within the MLHG is dialed when the night stop feature is activated, the normal hunting sequence for that MLHG is ignored. Instead of starting the hunting sequence with the member number associated with the telephone number dialed and continuing until the last hunt member is reached, the hunting starts with the first member of the MLHG (00) and stops with the "night stop" member.

2.10 ***Stop Hunt Feature:*** When the stop hunt feature is activated, all hunt groups associated with the MLHG will start at their normal

member but will not hunt past the "stop hunt" member.

2.11 ***Night Make-Busy Feature:*** The night stop feature may be used to provide the "night make-busy" feature. When the "night make-busy" feature is activated, all incoming calls to that MLHG are completed to a preselected line. This line in the No. 3 ESS would be defined as member 0, and also as the night stop member. The listed telephone number for the MLHG would specify member 1 as the first hunt member. When the night stop feature is activated, all calls for the MLHG are completed to member 0 on a no-hunt basis (first hunt member number is the same as the night stop member number). With the night stop feature deactivated, all calls using the telephone number assigned to member 0 are completed to member 0.

CLASSES OF SERVICE

2.12 All customer lines have class-of-service translation information associated with them. This information is stored is the translation area of program store in the No. 3 ESS. The classes of service provide information which identifies privileges, restrictions, and treatments associated with a customer line.

A. Major Class

2.13 The major class includes any special originating and terminating actions required for a particular line or telephone number (TN). The major class is divided into originating and terminating classes. Table A gives the originating and terminating classes for No. 3 ESS. Major classes of service are identified on the VER LINE output message (requested using the VER:LINE:TN input message on the ALIT TTY).

Example:

```
VER:LINE:TN 534 3929!WT-PF
            |
            Telephone number of line to be verified

M 49 VER LINE
  TN 534 3929——Telephone number of line
  OE 3 1 2 Ø 4
  OESP 3  2Ø 4
  RTI Ø
  LCC 4FR
  LCI 16
  RAX Ø
  OMAJ 16———Originating major class
  SCR 4
  TMAJ 16———Terminating major class
  PTY 1 4
  END
```

Note: Refer to Section 662-517-501 for format and use of the VER:LINE input message and VER LINE output message.

B. Screening Class

2.14 The screening class is an indication of the type of treatment given to various types of calls. The screening class is used to distinguish various types of service, eg, local, extended area, metropolitan, and WATS, and to obtain the routing and charging information for each. Screening classes are identified on the VER LINE output message (requested using the VER:LINE input message on the ALIT TTY).

Example:

```
VER:LINE:TN 534 5361!WT-PF
            |
            Telephone number of line to be verified

M 48 VER LINE
  TN 534 5361——Telephone number of line
  OE 4 1 2 5 6
  OESP 4 22 1 4
  RTI Ø
  LCC 2FR
  LCI 1Ø
  RAX Ø
  OMAJ 4
  SCR 2————Screening class code
  TMAJ 4
  PTY 1 2
  CONNECT DP REC
  END
```

Note: Refer to Section 662-517-501 for format and use of the VER:LINE input message and VER LINE output message.

CUSTOM CALLING SERVICE

2.15 Standard service in the No. 3 ESS consists of the ability to accept and derive appropriate routing for all telephone numbers used in current practice using dial pulse signaling and 20-Hz ringing. Custom services are used to supplement the standard services and include the following:

- TOUCH-TONE® calling
- Speed calling
- 3-Way calling
- Call forwarding
- Call waiting.

2.16 ***TOUCH-TONE Calling:*** TOUCH-TONE calling requires the system to accept originations from TOUCH-TONE stations in addition to originations from conventional dial stations. When a line classed as TOUCH-TONE originates a call, the No. 3 ESS connects signal-receiving equipment capable of recognizing either frequency pairs or dial pulse.

2.17 ***Speed Calling:*** This service allows a customer to originate calls to frequently called numbers by dialing one or two digits instead of the full seven or more digits. For each customer who subscribes to speed calling, the system retains a list of unique numbers assigned to each abbreviated code. Speed calling lists may contain either 8 or 30 entries or both. Individual entries may be changed by the subscriber.

2.18 ***3-Way Calling:*** By subscribing to this feature, a customer can add a third party to an existing connection by alerting the system with a momentary on-hook, and then dialing the number for the added party.

2.19 ***Call Forwarding:*** When activated by the station user, this feature automatically routes calls intended for a subscriber line to another subscriber line the user has designated. Forwarded calls may be toll charged if the forwarded-to party is in a different rate area.

2.20 ***Call Waiting:*** This feature permits a subscriber who is in the talking state of an established call to be notified of an incoming call. The customer may then elect to receive the second call, via a switchhook flash while holding the existing connection.

3. AUTOMATIC LINE INSULATION TEST (ALIT) TELETYPEWRITER

3.01 The ALIT teletypewriter (TTY) is also referred to as either the plant service center (PSC) TTY or local test desk (LTD) TTY. This send-receive TTY is used by the system to request and/or record information at a local or remote repair service bureau (RSB). The No. 3 ESS provides the following line information at the ALIT TTY:

Power Cross (PX) Failure

Restore Verify Failure (RVF)

Ringing Continuity (RC) Failure

Network Controller (NWC) Errors

Daily Automatic Line Insulation Test (ALIT)

High and Wet List (HWL)

(a) Permanent Signals

(b) Partial Dials

(c) Power Cross (PX)

(d) Maintenance Busy (Manual Request)

Low Leakage Resistance (LLR) Failure

Line Cut-Off (LCO) Failures

TOUCH-TONE Receiver (TTR) Failures

Coin Line Circuit (CLC) Failures

No-Coin Control (NCC) Failures

STUCK COIN Control Failures

3.02 ***Major and Minor Alarms:*** An output message printed on the ALIT TTY which indicates an equipment failure or a trouble condition

TABLE A

ORIGINATING AND TERMINATING MAJOR CLASSES

MAJOR CLASS	ASSIGNMENT	ORIG	TERM
00	Unassigned	√	√
01	Denied Service		
02	Spare		
03	Spare		
04	Two-Party-Ring	√	√
05	Two-Party-Tip	√	√
06	Individual Traffic		√
07	Free Individual		√
08	Individual (Single Party, PBX, or MLHG)	√	√
09	Hotel, Motel	√	
10	Manual	√	
11	Spare		
12	Spare		
13	Spare		
14	Spare		
15	Spare		
16	Multiparty — Party 1	√	√
17	Multiparty — Party 2		√
18	Multiparty — Party 3		√
19	Multiparty — Party 4		√
20	Multiparty — Party 5		√
21	Multiparty — Party 6		√
22	Multiparty — Party 7		√
23	Multiparty — Party 8		√
24	Coin First (Prepay Ground Start)	√	√
25	Coin Dial Tone First	√	√
26	Spare		
27	Spare		
28	Intercept		√
29	Auto-Connect	√	√
30	Denied Service	√	√
31	Special Routing		√

which would operate a major or minor alarm will be indicated on the TTY printout. Two asterisk signs (**) preceding the type of output message will indicate a major alarm. Two consecutive audible signals may also be provided at the TTY when a major alarm is operated. One asterisk (*) preceding the type of output message will indicate a minor alarm. One audible signal may also be provided at the TTY when a minor alarm is operated.

3.03 In addition to the line failure information printouts, the ALIT TTY is provided with output messages which provide information on the condition of network equipment (equipment currently out of service). The following network information is provided:

- Output Network State information (OP NW STAT)—(Network links that are currently out of service are listed. This includes junctor B links, wire B links, and A links as well as test vertical test circuits, test vertical test multiples, junctor test verticals, and wire test verticals.)
- Output Service Circuit State information (OP SVC STAT)—(Provides service circuit information which indicates the state of the service circuits; ie, idle, busy, locked-out, or invalid.)
- Output Trunk State information (OP TRK STAT)—(Provides trunk circuit information which indicates the state of the trunk circuits; ie, idle, busy, locked-out, disabled, or high and wet.)

ABBREVIATED TOPICS FOR INPUT AND OUTPUT MESSAGES

3.04 The ALIT TTY information provided in this section is intended to provide a general knowledge of the messages requiring further testing from the LTD. Section 662-517-501 provides a detailed explanation of typical input and output messages with examples. It also provides a more detailed description of the ALIT TTY and its operation. The input and output messages that are assigned to the ALIT TTY are listed in Tables B and C, respectively. The messages are listed in alphabetical order with the abbreviated topic for each message.

LINE TROUBLE CONDITION

3.05 The line information printed out by the ALIT TTY frequently is the result of a solid trouble condition on a customer line. By giving the printout information prompt attention, a customer-reported trouble could be prevented and duplicate trouble printouts on the ALIT TTY could be reduced. Troubles indicated by the ALIT TTY printouts should be handled with the following priorities:

- Power Cross (PX)
- Restore Verify Failure
- Coin Failures (STUCK COIN, EA CLC, and EA NCC)
- Ringing Continuity Failure (EA RC)
- Programmed ALIT
- High and Wet List
- Continuity Failures (EA CONT)
- Low Leakage Resistance Failure (EA LLR)
- Line Cut-Off Failure (EA LCO)
- TOUCH-TONE Receiver Errors (EA TTR)
- Network Controller Error (EA NWC)

Local conditions and priorities may cause the priority lists to differ for certain repair service bureaus. The succeeding paragraphs provide a description of the various trouble conditions.

3.06 ***Power Cross Failure:*** A power cross failure (PX) indicates there is false ac or dc power on a line terminal. The power cross test is performed by applying a power cross test circuit to the line via a test vertical and network path. The power cross test is performed on all lines that are being connected to a customer dial pulse receiver or to a ringing service unit. If a line fails the power cross test, the line is removed from service for about 20 seconds (to give the line a chance to recover) and the power cross test is retried. If the retry test passes, the line is restored to service and a REPT LINE----TRBL EA PX output message is printed out on the ALIT TTY.

TABLE B

ABBREVIATED TOPICS FOR INPUT MESSAGES

INPUT MESSAGE	TOPIC
OP:LINE	Print line information (busy, idle, out-of-service, plugged-up, or high and wet).
OP:NW	Print network equipment information (list of network links currently out of service).
OP:SVC	Print service circuit information (state of single-service circuit or list of all service circuits out of service).
OP:TRK	Print trunk circuit information (state of single trunk or list of all trunk circuits out of service.
RMV:LINE	Remove a line or unassigned terminal from service.
RMV: LINE---- PLUGUP	Remove line from service and activate plug-up on line.
RST:LINE	Restore line to service. If line was plugged-up, remove line from plug-up list.
TST:LINE	Perform Line Insulation Test (LIT) on single line.
VER:CFN:TN	Verify the call forwarding number associated with a customer telephone number.
VER:LINE	Verify line using telephone number (TN) or office equipment number (OEN).
VER:OE	Verify line using telephone number (TN) or office equipment number (OEN).
VER:GRP	Verify group and member numbers for PBX/MLH.
VER:SCN:TN	Verify speed-calling numbers associated with customer telephone number.
VER:TWOPTY	Verify 2-party line using telephone number (TN).

If the retry test fails, the line is left out of service (and placed in the high and wet state) and an RMV LINE PX output message is printed out on the ALIT TTY immediately. The line should be tested immediately from the LTD by accessing the line through a no-test trunk and making the FEMF test. Accidently crossing a customer line with conductors used for supplying power (greater than 50 volts) while testing may cause a PX failure and remove the line from service. If the line is on the High and Wet List (HAW), it should be tested as soon as possible. When the line is tested and found OK, it must be restored to service using the RST:LINE input message at the ALIT TTY.

3.07 ***Restore Verify Failure:*** A restore verify failure (RVF) indicates that current is not flowing in a line scan point during the verify test. The cutoff contacts of the line are restored (closed), and a verify test is made by connecting

TABLE C

ABBREVIATED TOPICS FOR OUTPUT MESSAGES

OUTPUT MESSAGE	TOPIC
OP LINE	Printout of line information (busy, idle, out-of-service, plugged-up, or high and wet).
OP NW STAT	Printout of network equipment information (list of network links currently out of service).
OP SVC	Printout of service circuit information (busy, idle, locked-out, or invalid state).
OP TRK	Printout of trunk circuit information (busy, idle, locked-out, disabled, or high and wet).
REPT LINE	Printout to report trouble on a line: PX — Power cross failure RVF — Restore verify failure STUCK COIN — Stuck coin control error EA CONT — Continuity failure EA RC — Ringing continuity failure EA NWC — Network control error EA LLR — Low leakage failure EA TTR — TOUCH-TONE receiver error EA CLC — Coin line circuit failure EA NCC — No coin control failure
RMV LINE	Used to report the removal of a line or the failure of a removal request. Removal reason or failure reason: Blank — Removed from service by TTY request. PX — Line experienced a power cross failure. PLUGUP — Removed from service and placed on plug-up list (intercept). PLUGUP STOPPED LIST FULL — Plug-up list is full. If line should be plugged-up, repeat input request later. STOPPED BSY — Line remained busy for 5 minutes since RMV: LINE input message was received. If line should be removed, repeat the request. UNAS — An unassinged terminal went off-hook. The terminal was removed from service by the system to prevent further problems. Use VFY:LINE input message and compare with line card for error.

TABLE C (Cont)

ABBREVIATED TOPICS FOR OUTPUT MESSAGES

OUTPUT MESSAGE	TOPIC
TST LINE - - - - ERR	Line failed the line Insulation Test (LIT).
TST LINE - - - - ABT	Line Insulation Test (LIT) aborted.
TST LINE - - - - COMPL	Line Insulation Test (LIT) completed. (All lines are tested.)
TST LINE START	Line Insulation Test (LIT) started. (May have been started manually or automatically during nightly routine tests.)
VER ERR	Error was encountered on previous input message.
VER GRP	Verification of group and member numbers for PBX/MLH.
VER LINE	Verification of office equipment for a customer line originating and terminating translation — provides a one-to-one correspondence with the recent change message RC:LINE.
VER OE	Verification of a line in response to one of the following input messages: VER:OE VER:LINE VER:TWOPTY VER:MTL VER:MPTY
VER SCN	Verification of speed-calling numbers (one-digit or 2-digit) associated with a customer line.

a restore-verify test circuit to the line via a test vertical and network path. The test circuit provides a loop-closure for loop start lines and a ground for ground start lines. If a restore verify failure occurs, the line may not have originating service. A REPT LINE----TRBL EA RVF output message is printed out immediately on the ALIT TTY. The line should be tested from the LTD.

3.08 ***Continuity Failure:*** A continuity failure indicates that current is not flowing in a tip-ring loop formed partly by a path in the network. The problem may be in the network or in the circuits connected to the network completing the current loop. There are two sources of continuity failure:

(a) ***Supervisor continuity failure***—Indicates that supervision failed to transfer from one circuit to another along a network path.

(b) ***Transmitter continuity failure***—Indicates that dc current is not flowing from an MF or DP transmitter, through a network path, to an outgoing or 2-way trunk just prior to outpulsing digits.

A continuity failure may involve a full-path between two connected circuits or, in the case of a supervision continuity failure, may involve a half-path between a junctor and a connected circuit. If a line is involved in three consecutive continuity failures, a REPT LINE----TRBL EA CONT output message is printed out on the ALIT TTY. The line should be tested from the LTD.

> ***Note:*** If several continuity failures occur in a short time, the No. 3 ESS system considers the line a "Showering Line." The line is automatically removed from service for about 20 seconds to lessen its effect on call processing. It is then returned to service automatically.

3.09 ***Ringing Continuity Failure:*** A ringing continuity failure indicates that ringing current is not flowing from a ringing circuit, through a network path, to a line when it should be. Ringing continuity failures are generally caused by open lines which do not provide a complete ac circuit for the applied ringing potential. Ringing continuity failures may be caused by an open circuit in the central office or in the outside plant, certain data lines, answering sets, and lines with portable sets and no permanently connected ringer, or nonworking lines in ESS translations. If a line is involved in three consecutive ringing continuity failures, a REPT LINE----TRBL EA RC output message is printed out on the ALIT TTY. The line should be tested from the LTD.

3.10 ***Low Leakage Resistance:*** A low leakage resistance failure (LLR) indicates that an idle line looks off-hook to a ringing circuit before ringing current is applied. The line is scanned to verify that it is idle (on-hook) before a failure is reported. If three consecutive low leakage resistance failures occur involving the same line, a REPT LINE----TRBL EA LLR output message is printed out on the ALIT TTY. The line should be tested from the LTD.

3.11 ***Line Cut-Off Failure:*** A line cut-off failure (LCO) indicates that a line scan point looks off-hook after the line's cut-off contacts have been opened. The cut-off contacts may be stuck closed. If a line is involved in three consecutive line cut-off failures, a REPT LINE----TRBL EA LCO output message is printed out on the ALIT TTY. The line should be tested from the LTD.

3.12 ***TOUCH-TONE Receiver Error:*** A touch-tone receiver error (TTR) indicates that an illegal TOUCH-TONE digit is present at a TOUCH-TONE receiver. A legal digit consists of exactly 1-out-of-4 high tones. The cause may be a defective TOUCH-TONE receiver at the No. 3 ESS central office or a defective line or TOUCH-TONE station equipment. If a line is involved in three consecutive TOUCH-TONE receiver errors, a REPT LINE----TRBL EA TTR output message is printed out on the ALIT TTY. The line should be tested from the LTD.

3.13 ***Network Controller Error:*** A network controller error (NWC) indicates that the network controller order failed to execute correctly from both system control 0 (SYC 0) and system control 1 (SYC 1). The problem is probably in the unduplicated portion of the network control. If a line is involved in three consecutive network controller errors, a REPT LINE----TRBL EA NWC output message is printed out on the ALIT TTY. The line should be tested from the LTD.

3.14 ***STUCK COIN Control Error:*** A STUCK COIN control error indicates that a coin control circuit continued to detect the presence of a coin after applying coin collect or coin return voltage to a connected coin line. A REPT LINE----TRBL STUCK COIN output message is printed out immediately on the ALIT TTY. The message may be caused by a defective coin relay, full money box, shorted carbon block at CDF protector, station protector, station ground fault, or a defective coin control circuit in the central office. An attempt should be made to verify coin failures from the LTD to determine if the trouble still exists or if the trouble is inside the office or in the outside plant. Testing coin lines which generate coin trouble output messages is important since the cause of trouble may be cleared after one or more coin failure messages have been received. A shorted carbon block at the CDF may test clear from the LTD and still be detected as a coin failure. Carbon blocks or protector units should be replaced when repeated coin station troubles are detected by the system and the trouble cannot be measured from the LTD.

3.15 ***No Coin Control Error:*** A no coin control error (NCC) indicates that a coin control circuit failed to detect the presence of a coin about to be collected. Collect voltage was applied from the coin control circuit to a connected

coin line and the coin that was supposed to be there was not detected. If a line is involved in three consecutive no coin control errors, a REPT LINE----TRBL EA NCC output message is printed out on the ALIT TTY. The coin line should be tested from the LTD.

3.16 ***Coin Line Circuit Failure:*** A coin line circuit failure (CLC) indicates that a dial tone first (DTF) coin line circuit failed to provide a loop closure to hold supervision at the junctor when placed in the +48 supervision state. No dial tone is received at the coin station. The dial tone first line is connected to an operator, and +48 supervision is returned to the line to disable the TOUCH-TONE dialing pad. If a line is involved in three consecutive coin line circuit errors, a REPT LINE----TRBL EA CLC output message is printed out at the ALIT TTY. The coin line should be tested from the LTD.

4. AUTOMATIC LINE INSULATION TEST (ALIT) PROGRAM

4.01 The Automatic Line Insulation Test (ALIT) program provides automatic testing of line insulation in the No. 3 ESS. The ALIT program is started at a specified time each day and is run to completion. A TST:LINE input message is provided to change the type of test and resistance ranges from the ALIT TTY. The ALIT program may be started and stopped using the TST:LINE input message. No facilities are provided at the LTD to control the ALIT program.

4.02 The ALIT program also performs line ferrod restore verify tests. The test restores line ferrods left disconnected by program errors and detects line ferrods which cannot be reconnected due to hardware faults.

4.03 The TST:LINE input message is also used to perform the line insulation test of a specified line. The resistance range and type of test may be specified. The line is identified by the office equipment number (OEN). If the resistance range and type of test is different from the daily ALIT program, the ALIT circuit runs the test specified for a single line and then reverts back to the resistance range and type of test specified in the daily ALIT program.

LINE TESTS—LINE INSULATION TEST (LIT)

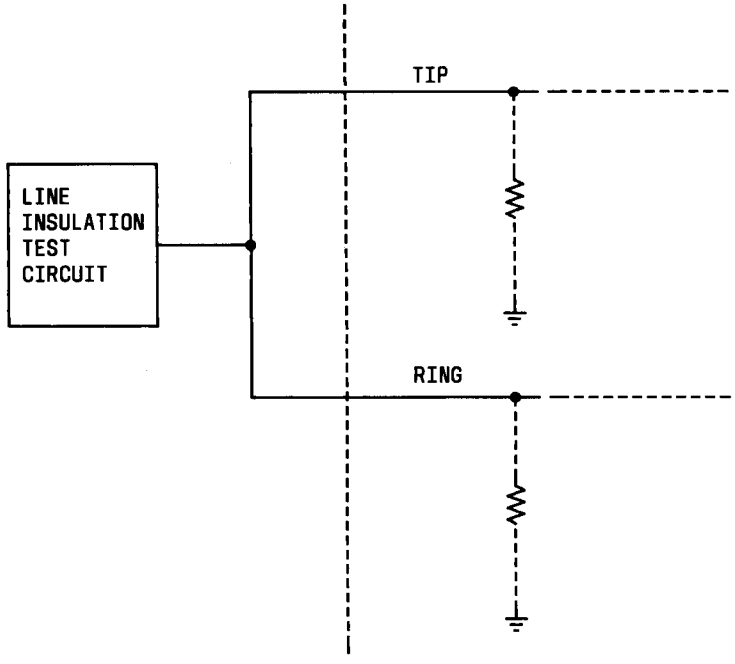
4.04 The ALIT program will connect the line insulation test circuit in sequence to every nonbusy line in the office with the exception of ground start PBX and coin lines and lines used with autoconnect circuits. Starting with OEN 00 0001, unless otherwise specified, the program sequences through the networks searching for the next nonbusy lines until all lines have been tested. Connections are not made to unequipped or unassigned terminals, trunk or service circuit terminals, busy line terminals, or noncutover terminals.

4.05 When an idle line is found, the line is connected to the LIT, disconnecting the line ferrod. A check is then made to determine the type of line ferrod. If the line ferrod is wired in a ground start arrangement, a restore verify test is performed. If the line is loop start, the insulation test is performed. The LIT circuit is scanned to determine the condition of the line—if the insulation test doesn't fail, a restore verify test is performed on the line. If the insulation test failed, a retest is performed and a TST LINE---ERR output message is printed.

4.06 The LIT circuit performs three types of tests with respect to the way in which the insulation test is connected to the line under test. Each type of test may be made in three different ranges of resistance. An initial test is performed, and, in the event of a failure, a retest is performed. If a general test (all three types of tests in sequence) is made, a retest is not performed. The connection of the line insulation test circuit to the tip and ring of the line for each test is shown in Fig. 2, 3, and 4.

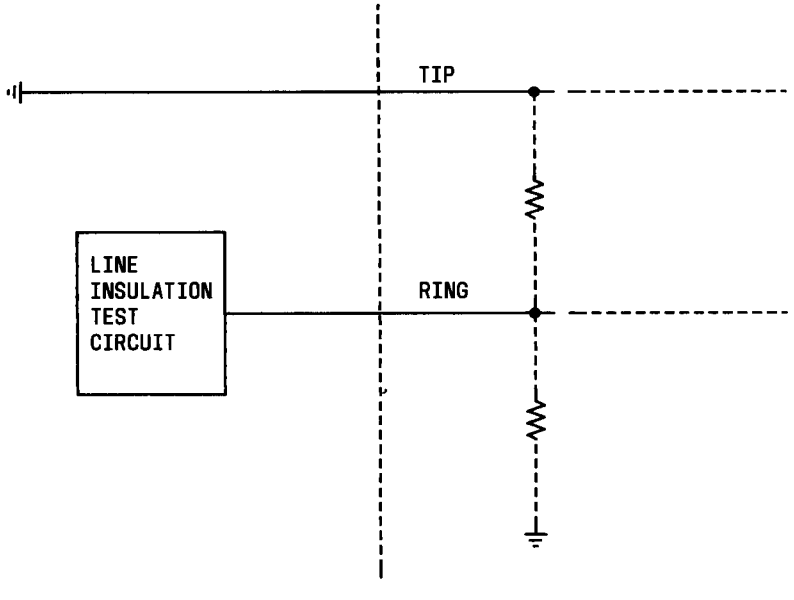
4.07 The following insulation tests are performed on loop start lines.

- ***Short Circuit and Ring to Ground (SRG):*** This test detects leakage (insulation failure) between ring and tip or ring and ground. If a failure is detected, a retest is performed to determine if the leakage is between ring and ground. This test is used to detect trouble in drop wire and inside wire at the subscriber premises (leaks between tip and ring) and in open wire conductors (leaks from ring to ground).



TEST CONDITION MEASURES COMBINED TIP TO GROUND AND
RING TO GROUND RESISTANCE

Fig. 2—Tip and Ring to Ground (TRG) Test



TEST CONDITION MEASURES COMBINED SHORT CIRCUIT AND
RING TO GROUND RESISTANCE

Fig. 3—Short Circuit and Ring to Ground (SRG) Test

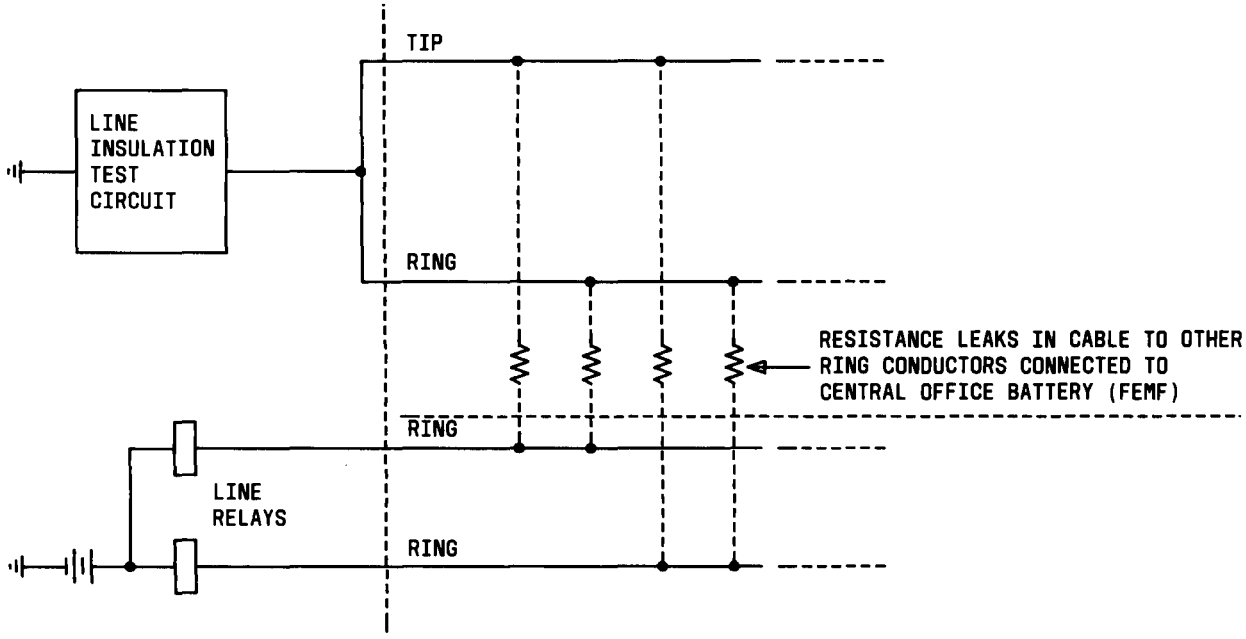


Fig. 4—Foreign Potential on Tip or Ring (FEMF) Test

- ***Tip and Ring to Ground (TRG):*** This test will detect leakage between tip and ring to ground. If a failure is detected, a retest is performed to determine if the leakage occurs between ring and ground. This test checks for trouble in cable terminals and cable sheaths (leaks from tip or ring to ground).

- ***Foreign Electromotive Force (FEMF):*** This test will detect the presence of a foreign potential on tip or ring. If a foreign potential is detected, a retest is performed to determine if the foreign voltage is on the ring. This test is used to detect defects in underground and overhead cable sheaths (leaks from tip or ring to battery). Such defects admit moisture which causes leaks from the line under test to battery in the ring conductor of other lines in the same cable. Leaks to ground or across cable pairs are also present under these conditions. Leaks to battery are normally caused by cable troubles, whereas leaks to ground and across pairs may occur at other components of the line.

4.08 The type of test performed by the LIT circuit is selected by the TST:LINE input message. The following tests or combinations of tests may be selected:

SRG

TRG

TRG and SRG

FEMF

SRG and FEMF

TRG and FEMF

SRG and TRG and FEMF.

4.09 Test ranges are selected from three ranges, 80 Kohms, 320 Kohms, or 2.56 Mohms. The higher ranges (320 Kohms or 2.56 Mohms) will detect the first stages of insulation leakage which do not presently affect service. Lower test ranges (80 Kohms) will detect only faults currently causing service problems. The high test ranges would normally be specified during dry weather while the low ranges would be used during wet weather conditions.

ALIT OUTPUT MESSAGES

4.10 Each time the ALIT program is started, a TST LINE START output message is printed to report the ALIT was started. If a line fails the ALIT test, a TST LINE----ERR output message is printed. When all lines have been tested, a TST LINE----COMPL output message is printed.

4.11 The ALIT tests are aborted when 128 line faults have been detected. After the 128th failure, only the restore verify test is performed. This number is sufficient to identify a faulty cable without flooding the TTY with messages. If the ALIT tests have been aborted, a TST LINE----ABT output message is generated.

5. ESTABLISHING CONNECTIONS TO ESS LINES FOR TESTING

NO. 3 ESS AUTOCONNECT FACILITY

5.01 The No. 3 ESS autoconnect facility provides a means to obtain a secure switched link to the ESS for nondedicated trunks. The autoconnect is initiated by dialing a "trigger" telephone number. The call is routed to a confirmation tone (high tone) if the nondedicated trunk is available, or a busy tone if the nondedicated trunk is not available. The calling party, after listening to 10 seconds of the confirmation tone, hangs up. The No. 3 ESS calls a prestored return telephone number associated with the dialed "trigger" number. The called party answers and the secure connection has been made with the No. 3 ESS. A time-out feature allows an autoconnect line to be released automatically if the channel remains idle for a 1-minute time interval (the KP key is not released within a 1-minute time interval or an LTD test key is not operated within a 1-minute time interval). There is a maximum of two incoming LTD trunks permitted in a No. 3 ESS central office.

LTD TEST TRUNK CONNECTIONS

A. Dedicated Test Trunks

5.02 ***Dedicated Test Trunks:*** Connection from the LTD to the No. 3 ESS central office via the dedicated test trunk is accomplished as follows. On the No. 12 LTD or No. 14 LTD, connect the primary (or secondary) test cord to the test trunk plug-in. A test connection can then be established to the customer line in accordance with 5.04. On the No. 16 LTD or modified No. 14 LTD, depress the appropriate test trunk key. The LTD is automatically connected to the No. 3 ESS office via the test trunk.

B. Nondedicated Test Trunks

5.03 ***Nondedicated Test Trunks:*** Test trunk connections from the LTD to the No. 3 ESS via the nondedicated test trunks is accomplished as follows. After establishing a connection to the No. 3 ESS central office with the primary test circuit, operate the KP key (for MF signaling) to establish an origination in the No. 3 ESS office. When the origination is made, the sender S lamp, if provided, will light at the LTD. Do not dial before the S lamp lights. Key the assigned "trigger" number for the No. 3 ESS and monitor for a high tone. Listen for 10 seconds and then hang up. The No. 3 ESS will then call back, and LTD access is provided to the test vertical. A test connection can then be established to the customer line is accordance with 5.04.

> ***Note:*** If the test trunk is busy, a busy tone is returned during the 10-second interval instead of the high tone.

TEST CONNECTION

5.04 No failure tone is heard until the incoming LTD trunk is in the test state (cut through). The trunk will be cut through when the KP key is released after dialing. However, there is a 1-minute time interval in which the KP key must be released after dialing. If the KP key is not released within the time limit, the LTD will disconnect from the line to be tested. The LTD can reoriginate by operating the KP key. If the

LTD is autoconnected (remote nondedicated) and this time-out occurs, the autoconnect path will not be taken down and the LTD can reoriginate.

5.05 The autoconnect facility provides a 1-minute time interval in which a test key must be operated or the LTD will be disconnected from the line under test. If the time-out occurs, the LTD can reoriginate by operating the KP key, dialing the telephone number of the line, and then releasing the KP key.

5.06 After a test trunk connection is made, the MF keyset is used to establish a connection to the customer line. The KP key (for MF signaling) must be operated before the proper dial signals may be generated. Operating the KP key causes the trunk scan to establish an origination in the ESS office. When the origination is made, the sender (S) lamp, if provided, will light at the LTD. The illuminated sender lamp indicates a connection has been established to an MF receiver. ***Do not dial before the S lamp lights.*** When the dialing operation is completed, the KP key must be restored. The S lamp will extinguish when the KP key is restored, the receiver connection is released, and the dialed information is processed by the ESS office. The test connection has been established and the line may be tested.

IDLE LINE CONNECTION

5.07 A network connection is established between the LTD trunk and the line circuit, and the trunk is put in the test state. This permits voltmeter and other tests which require no changes in the LTD trunk circuit to be performed.

BUSY LINE CONNECTION

5.08 If the originating LTD trunk is not in a no-test group, a busy tone is returned to the tester. If the originating LTD trunk is in a no-test group, the ESS system will connect to the line via the no-test vertical. If the required no-test vertical is busy, 120-ipm low tone is returned to the LTD.

LINES IN HIGH AND WET STATE

5.09 If a line is found in the high and wet state (permanent signal condition), the line is removed from the list and a connection is made as if it were an idle line. Upon disconnect, the line is left busy and returned to the high and wet state.

5.10 If a line is found in the high and wet state due to a power cross failure or due to a manual request, the line is removed from the high and wet state and a connection is made to the line as if it were idle. At disconnect, the line is returned to the nonsupervised high and wet state and can only be returned to service by a RST:LINE input message at the ALIT TTY.

ONE-PARTY OR MULTIPARTY LINES

5.11 To use a no-test vertical for connecting to a one-party or multiparty customer line in an ESS office, the number of digits to be dialed depends on the following conditions:

(a) If the ESS office serves only one central office code, the 4-digit station number is all that must be dialed, ie, 555-2368, dial 2368.

(b) If the ESS office serves more than one central office code, dial an office selection digit (referred to as a steering digit) and the 4-digit station number, ie, 555-2368, dial 5-2368; 556-2244, dial 6-2244; and 557-3146, dial 7-3146. The last digit of the 3-digit office code is often used as the office selection digit, but any other single digit may be assigned locally as an office selection digit.

After dialing four digits, a 3- to 4-second timing check is made on each digit to determine the end of the dialing operation. The dialing operation must be completed with a maximum delay of 3 seconds between each digit dialed. The office equipment will not receive any digits dialed after the time-out interval. This dialing operation is important where 5-digit numbers are required when dialing into offices served by more than one ESS office code and for lines associated with multiline hunting.

LINES ARRANGED FOR HUNTING

5.12 ESS equipped central offices provide for two types of line hunting arrangements: series completion and multiline hunting. Series

completion hunting is restricted to a maximum of 16 lines which may or may not be in numerical sequence. These lines will be seized in the same order as they have been placed in the memory of the office equipment. Multiline hunting arrangements provide for a large number of lines in a hunting group and also provide for special call handling features. ***A local test desk connection to a series completion or multiline hunt group telephone number does not cause hunting to occur.***

5.13 ***Series completion*** lines are seized from the LTD by dialing the telephone number of the line to be seized. Test connections to each of these lines will be made in the same way as connections are established to one-party and multiparty lines. The last four digits of the telephone number will be dialed when the repair bureau only serves one ESS office. The steering digit and last four digits of the telephone number must be dialed when more than one ESS office is being served.

5.14 ***Multiline hunting*** (MLH) arrangements will have lines which are assigned a 7-digit directory number. The first 7-digit directory number associated with a multiline hunt group may also be referred to as a pilot number. The lines may be arranged to provide 2-way service, incoming service only, or outgoing service only.

REORIGINATING ON A TEST CONNECTION

A. Dedicated Test Trunk

5.15 After the connection to the customer line is established and testing on the line is completed, the customer line may be disconnected and the test trunk held for testing other lines by momentarily operating the 3W0 key. To seize another line, operate the KP key, dial the customers telephone number, and release the KP key.

B. Nondedicated Test Trunk

5.16 When the dialing (key pulse) operation is completed, the KP key must be restored before a connection is made. After the connection to the customer line is established and testing on the line is completed, the customer line may be disconnected and the test trunk held for testing other lines by operating the KP key. The second operation of the KP key provides a disconnect signal on the sleeve lead which releases the connection to the first line and prepares the circuit for initiating the connection to a new line. The line is accessed by dialing the proper digits for the service arrangement as outlined in the preceding paragraphs of this section.

5.17 When a connection is made to an idle customer line from the LTD, the line will appear busy to the customer if the customer should attempt to originate a call while the line is being tested. The customer will not have access to the line until the test connection is released.

When disconnecting from a test trunk with the No. 14 local test desk, the disconnect button must be depressed before the test cord plug is removed from the jack. The test trunk circuit may not release if the test cord is removed from the plug before the disconnect button is depressed.

6. TESTS

6.01 The No. 3 ESS provides test circuits for use with the LTD to perform and interpret, where necessary, specific tests such as the line ferrod test and TOUCH-TONE dialing tests.

6.02 The line ferrod test (6.04) is made to verify that a line may originate calls. The ferrod (Fig. 5) is essentially a transformer in which the magnetic coupling between the interrogate and readout windings is determined by the current in the control windings. The current flow in the control windings is determined by whether the stations on the line are in an on-hook or off-hook condition. When a station is off-hook, the control windings have a complete circuit, and the current flow in these windings prevents a pulse from being induced from the interrogate winding to the readout winding. The presence or absence of a readout pulse (1 or 0) determines if a station is on-hook or off-hook. A pulse (1) signal on the readout winding is detected by the office equipment as an off-hook station and dial tone will be applied to the line.

6.03 The line ferrod test determines if the customer can originate calls. If the test indicates the customer cannot originate calls, any of the

following conditions (see Fig. 6) should be considered as the cause:

(1) Open winding in line ferrod.

(2) Defective cut-off switch.

(3) Line has been placed in the high and wet state.

(4) Customer denied originating class of service.

(5) Random make-busy key operated at customer station. (A 1-second burst of dial tone is heard.)

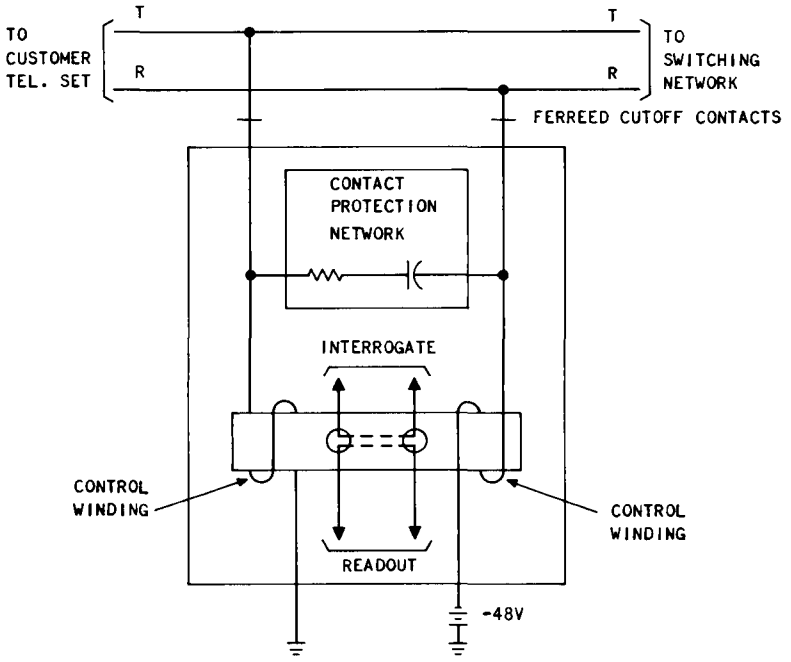
When testing lines, it is important that the T (talk) key is operated before releasing the KP key. In some tests, a single (1-second) burst of dial tone will be heard, and, if the KP key is released before the T key is operated, there is a chance the burst of dial tone will not be heard.

6.04 Line Ferrod Test

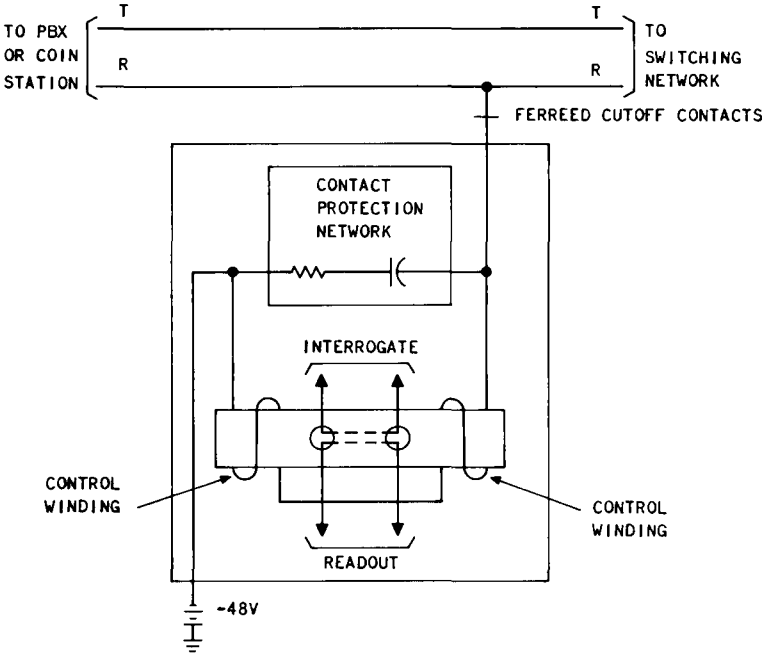
A. Lines Arranged for Loop Start (Fig. 5, Arrangement

STEP	ACTION	VERIFICATION
1	Connect to customer line with primary test circuit.	
2	Operate T (talk) key.	
3	Operate 3W0 key.	Dial tone is heard, indicating line ferrod is OK.
If no dial tone is heard:		
4a	Check OP LINE output message at the ALIT TTY to determine if the line is in a high and wet state. ***Note:*** To acquire the list of lines in the high and wet state, an OP:LINE input message must be typed in on the teletypewriter. An OP LINE output message will be received.	Office battery and ground can be measured on the line if this condition exists.
5a	Check service bureau records to determine if the customer is being provided a "denied originating" class of service. (If a line under test is denied both origination and termination, a denied origination response is given.)	Office battery and ground can be measured on the line if customer has this type of service.
6a	Verify if line ferrod has an open winding.	Office battery or ground cannot be measured. Line will measure open.
If a 1-second burst of dial tone is heard:		
	Note: A 1-second burst of dial tone indicates the customer has been denied termination class of service or the customer has a remote make-busy key (KEY scan point) associated with the line, operated. To verify if either of these conditions exists, the VMA meter	

STEP	ACTION	VERIFICATION

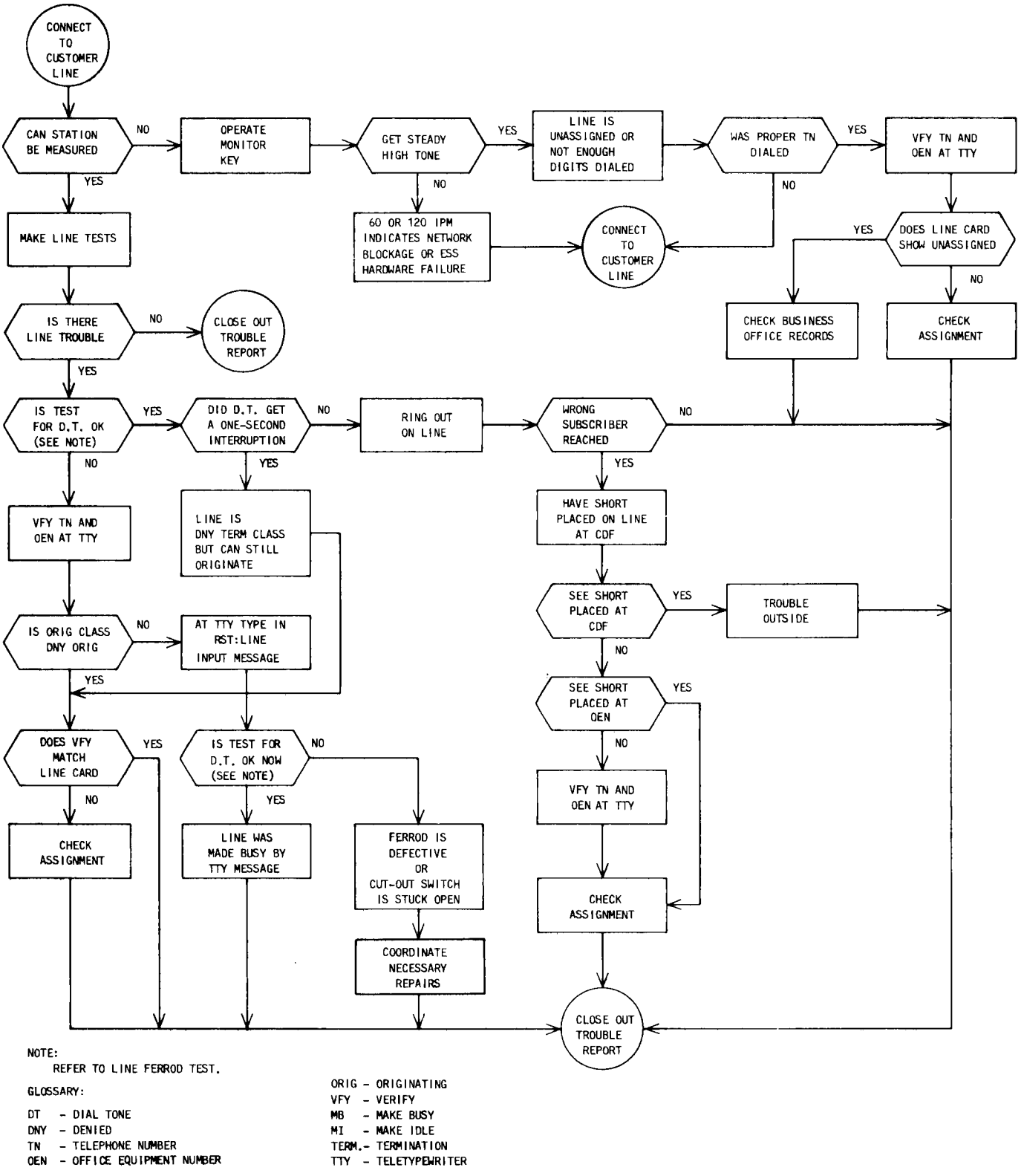


A. LOOP START ARRANGEMENT WITH 1-OR 2-TYPE LINE FERROD



B. GROUND START ARRANGEMENT WITH 2-TYPE LINE FERROD

Fig. 5—Typical Line Ferrod Arrangements for Residence, PBX, and Coin Service



NOTE:
REFER TO LINE FERROD TEST.

GLOSSARY:

DT - DIAL TONE
DNY - DENIED
TN - TELEPHONE NUMBER
OEN - OFFICE EQUIPMENT NUMBER
ORIG - ORIGINATING
VFY - VERIFY
MB - MAKE BUSY
MI - MAKE IDLE
TERM. - TERMINATION
TTY - TELETYPEWRITER

Fig. 6—Test Desk Procedures for Customer Report of No Dial Tone in No. 3 ESS Offices

STEP	ACTION	VERIFICATION
	should momentarily deflect to read +100 volts of test battery and drop to zero when the 3W0 key is operated in Step 3.	
7b	Check service bureau records to determine if customer has remote make-busy key on the line.	
8b	Verify with customer if remote make-busy key is operated.	
9b	Check service records to determine if customer is being provided a "denied terminating" class of service.	
10b	Release and operate 3W0 key to repeat 1-second burst of dial tone.	A 1-second burst of dial tone is heard when 3W0 key is operated, indicating line ferrod is OK.
If an intermittent dial tone is heard:		
11c	Discontinue line ferrod test until the line is idle.	An intermittent dial tone (on-off every 1/2 second) indicates the customer has gone off-hook.
To verify that an intermittent line ferrod trouble does not exist:		
12d	Release and reoperate T key.	Dial tone is heard indicating line ferrod is OK. If dial tone is not heard, line ferrod may be defective.
If no further tests are required:		
13c	Disconnect primary test circuit and release all operated test keys.	
B. Lines Arranged For Ground Start (Fig. 5, Arrangement B)		
1	Connect to customer line with primary test circuit	
2	Operate T key.	
3	Operate 3W0 key.	
4	Momentarily operate G (ground) key.	Dial tone is heard, indicating line ferrod is OK.

STEP	ACTION	VERIFICATION
	If no dial tone is heard:	
5a	Check OP LINE output message at the ALIT TTY to determine if the line is in a high and wet state. ***Note:*** To acquire the list of lines in the high and wet state, and OP:LINE input message must be typed in on the teletypewriter. An OP LINE output message will be received.	Office battery and ground can be measured on the line if this condition exists.
6a	Check service bureau records to determine if the customer is being provided a "denied originating" class of service.	Office battery and ground can be measured on the line if customer has this type of service.
7a	Verify if line ferrod has an open winding.	Office battery or ground cannot be measured. Line will measure open.
	If a 1-second burst of dial tone is heard:	
	Note: A 1-second burst of dial tone indicates the customer has been denied termination class of service or the customer has a remote make-busy key (KEY scan point) associated with the line, operated. To verify either of these conditions exists, the VMA meter should momentarily deflect to read +100 volts of test battery and drop to zero when the 3W0 key is operated in Step 3.	
8b	Check service bureau records to determine if customer has remote make-busy key on the line.	
9b	Verify with customer if remote make-busy key is operated.	
10b	Check service record to determine if customer is being provided a "denied terminating" class of service.	
11b	Operate and release G key to repeat 1-second burst of dial tone.	A 1-second burst of dial tone is heard when G key is released, indicating line ferrod is OK.
	If an intermittent dial tone is heard:	
12c	Discontinue line ferrod test until line is idle.	An intermittent dial tone (on-off every 1/2 second) indicates the customer has gone off-hook.

STEP	ACTION	VERIFICATION
	To verify an intermittent line ferrod trouble does not exist:	
13d	Release and reoperate T key.	
14d	Momentarily operate G (ground) key.	Dial tone is heard, indicating line ferrod is OK. If dial tone is not heard, line ferrod may be defective.
	If no further tests are required:	
15e	Disconnect primary test circuit and release all operated test keys.	

6.05 TOUCH-TONE® Test

STEP	ACTION	VERIFICATION
1	Connect the customer line with primary test circuit.	
2	Signal the customer station.	
3	Operate T key.	
4	Instruct the customer to operate the TOUCH-TONE buttons after listening for dial tone as follows.	
4	(a) Listen for the first dial tone and operate the numbered buttons in this order: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.	
4	(b) Listen for second dial tone and then operate the # (sharp) button.	
4	(c) Listen for third dial tone and then operate the * (star) button.	
4	(d) Instruct customer that bursts of high tone will be heard after each button operation.	
5	Operate the TT key.	Subscriber line connected to TOUCH-TONE test circuit. Dial tone is heard at the LTD and by the customer. Both hear tone signals as numbered buttons are depressed. Indications are as follows: (a) Two bursts of high tone indicating test passed.

STEP	ACTION	VERIFICATION
		(b) One burst of high tone indicating failure of one of the following conditions: Incorrect level of a digit Incorrect sequence of a digit Incorrect sequence of digits Incomplete sequence of digits (see note 1). ***Note 1:*** Time-out of incomplete sequence of digits occurs 15 seconds after the last digit is dialed. ***Note 2:*** If 120 ipm overflow tone (reorder tone) is heard, it signifies one of two conditions. (1) TOUCH-TONE test circuit is not available. (2) Subscriber has hung-up while waiting for dial tone.
6	Release and reoperate TT key.	Second dial tone is heard at LTD and by customer. Tone signal is heard as the # (sharp) button is depressd. Indications are as follows: (a) Two bursts of high tone indicating test passed. (b) One burst of high tone indicating test failed.
7	Release and reoperate TT key.	Third dial tone is heard at the LTD and by customer. Tone signal is heard as the * (star) button is depressed. Indications are as follows: (a) Two bursts of high tone indicating test passed. (b) One burst of high tone indicating test failed.
To perform additional TOUCH-TONE tests:		
8a	Release the TT key. ***Note:*** The TOUCH-TONE test circuit is disconnected by releasing the TT key.	

STEP	ACTION	VERIFICATION
9a	Instruct customer to repeat the test by listening for dial tone and operating the TOUCH-TONE buttons as described in Step 4 and then perform Steps 5, 6, and 7.	
If no further tests are required:		
10b	Disconnect primary test circuit and release all operated test keys.	

6.06 Test Dialing on Customer Line

STEP	ACTION	VERIFICATION
1	Seize an MDF test trunk.	
2	Request test cord (sometimes referred to as shoe or sticks) be connected from the test trunk jack at MDF to the customer line at the frame protector.	
3	Operate T (talk) key.	
4	Operate 3W0 key.	Dial tone is heard.
5	Operate 4X4 key.	
6	Operate ST key.	
7	Dial a test telephone number. ***Note:*** Test number should be one that will not result in a charge to the customer.	
8	Operate END key.	
9	Restore 4X4 key.	Connection to test telephone number verifies the proper dial signals are detected and are outpulsed in the central office.
10	Restore 3W0 key.	
11	Restore T key.	
12	Request test cord be disconnected.	
13	Release MDF test trunk.	

6.07 Test to Verify 60-ipm, 120-ipm, and Steady High Tones (Table D) Operate Properly at LTD

TABLE D

TONES HEARD WHEN TESTING LINES
ASSOCIATED WITH A NO.3 ESS CENTRAL OFFICE

TYPE OF TONE	CONDITION INDICATED
Low 60 ipm (Busy Tone)	1. Network busy or blocked
Low 120 ipm (Overflow Tone)	1. Receiver time-out 2. Hardware failure occurs
High Steady	1. Too few digits dialed 2. Translation indicates invalid directory number or intercept line
One Burst Of Dial Tone	Denied termination line or line has a key scan point

STEP	ACTION	VERIFICATION
1	Remove receiver from station being used for test telephone number.	Dial tone is heard.
2	Listen for permanent signal announcement.	Recorded message (hang up and attempt to redial number) heard.
3	Seize a test trunk for the office code of test telephone number.	
4	Operate KP key for primary test circuit.	
5	Dial telephone number of station used in Step 1.	
6	Restore KP key.	
7	Operate RCCI key.	
8	Operate T key.	Steady high tone heard.
9	Restore RCCI key.	
10	Restore T key.	High tone stops.
11	Disconnect test connection at LTD.	

STEP	ACTION	VERIFICATION
12	Hang up receiver for station used in Step 1.	
13	Seize test trunk for office code of test telephone number used in Step 1.	
14	Operate KP key.	
15	Dial permanent busy number assigned to the No. 3 ESS central office.	
16	Restore KP key.	
17	Operate RCCI key.	
18	Operate T key.	60-ipm low tone heard.
19	Operate KP key.	Steady low tone heard.
20	Restore KP key.	60-ipm low tone heard.
21	Restore RCCI key.	
22	Restore T key.	No tone heard.
23	Disconnect test connection at LTD.	
24	Seize test trunk for station used in Step 1.	
25	Operate KP key.	
26	Dial last two digits of office code and first digit of station number for station used in Step 1.	
27	Restore KP key.	
28	Operate RCCI key.	
29	Operate T key.	120-ipm low tone heard.
30	Restore RCCI key.	
31	Restore T key.	Tone stops.
32	Disconnect test connection at LTD.	

6.08 Breakdown Test of Line Insulation

STEP	ACTION	VERIFICATION
	Caution: In an ESS office, do not apply the breakdown test while on a	

STEP	ACTION	VERIFICATION
	test selector. Applying the breakdown voltage generates excessive current which will burn out the line ferrod in the line under test. If a breakdown test is required, use an MDF cord to test out on the customer line.	
1	Connect the primary test circuit to an MDF test trunk.	
2	Request test cords (sometimes referred to as "shoes") be connected from combined distributing frame appearance of the test trunk to the subscriber line.	
Notes:		
2	(1) Before applying breakdown test voltage, be sure there is no possibility of anyone contacting conductors over which test is being made. (2) Before applying breakdown test voltage, it is advisable to check the REPT LINE output message at the ALIT teletypewriter. The power cross output messages may indicate a line which is crossed with the line that is being prepared for application of breakdown voltage. This precaution could reduce the possibility of damaging the line ferrod of a crossed line.	
3	Operate BR (No. 12 LTD) or BT2 key momentarily.	Breakdown test applied between ground and both the tip and ring conductors.
4	Observe VMA meter during test.	Current should not exceed locally prescribed limits.
5	Reoperate BT or BT2 key to recycle breakdown test circuit.	
To apply test to ring conductor only:		
	Note: The BT1 key may be provided on the 12-type LTD and is provided on the 14, 16, and modified 14 LTD.	
6a	Operate nonlocking BT1 key momentarily.	Test voltage is applied to ring conductor, and ground is applied to tip conductor.

STEP	ACTION	VERIFICATION
	To apply test to tip conductor only:	
7b	Operate REV key.	
8b	Operate nonlocking BT1 key.	Test voltage is applied to tip conductor, and ground is applied to ring conductor.

6.09 Testing Lines on Denied Service

STEP	ACTION	VERIFICATION
1	Select a test trunk for the proper office code.	
2	Connect to customer line by keying last four or five digits of directory number.	
3	Operate T key.	
4	Operate 3W0 key.	A 1-second burst of dial tone will be heard. ***Note:*** A 1-second burst of dial tone will also be heard on lines in a multiline hunt group controlled by a remote make-busy key.
5	Test the line for faults or stations in the same manner as testing a working line. ***Note:*** Even when a line is denied service, measurements may be made on the line from the LTD.	

ESS CUSTOMER SERVICE TEST

6.10 Table E provides additional information on testing customer lines served by an ESS office.

7. TYPICAL SERVICE FEATURES

7.01 A combination of service features are available to No. 3 ESS customers. No. 3 ESS line features are listed in Table F. Trouble reports on those lines with special features are difficult to analyze from the LTD unless the RSB personnel handling these reports are familiar with the services these features provide. Reference should be made to Section 233-190-100 for a complete list and explanation of each feature. The succeeding paragraphs identify the most common features and the related equipment provided. An explanation of what may be done to verify that the feature is provided and working properly is provided.

DENIED SERVICE

7.02 Customer lines which have been denied service (both originating and receiving) may be accessed from the LTD. The lines may be measured to verify they are good and the stations are properly connected, even though the customer is denied service for nonpayment of bills, etc.

TESTS—To verify a customer line is being denied service:

(1) Select a test trunk for the proper office code.

(2) Dial steering digit and last four digits of directory number.

(3) Operate T key.

TABLE E

ESS CUSTOMER SERVICE TESTS

TYPE SERVICE	TEST SELECTOR		MDF CORDS	
	IN	OUT	IN	OUT
Individual Line	—48V R/S GND T/S Dial Tone	Capacity	—48V R/S GND T/S Dial Tone	Capacity
Multiline Hunt (No hunt from LTD)	—48V R/S GND T/S Dial Tone	Capacity	—48V R/S GND T/S Dial Tone	Capacity
Party Line 1st or Ring Party	—48V R/S GND T/S Dial Tone	Capacity R/S to Ground	—48V R/S GND T/S Dial Tone	Capacity R/S To Ground
Party Line 2nd or Tip Party	—48V R/S GND T/S Dial Tone	Capacity T/S to Ground	—48V R/S GND T/S Dial Tone	Capacity T/S To Ground
Individual Line Maintenance Busy	—48V R/S GND T/S Dial Tone	Capacity	—48V R/S GND T/S No Dial Tone	Capacity
Hunt Line Maintenance Busy	—48V R/S GND T/S Dial Tone	Capacity	—48V R/S GND T/S No Dial Tone	Capacity
Coin Line Ground Start	—48V R/S — Open T/S Dial Tone (Use "LRP" Key)	Capacity	—48V R/S — Open T/S Dial Tone (Use "LRP" Key)	Capacity
Coin Line Dial Tone First	—48V R/S GND T/S Dial Tone	Capacity	—48V R/S — GND T/S Dial Tone	Capacity
Intercept	"T" Key operated Hear High Tone	GND R/S— Open T/S		
Trouble Intercept	—48V R/S GND T/S Dial Tone	Capacity		
Denied Termination	"T" Key operated 1-Sec burst of dial tone —48V R/S GND T/S	Capacity	—48V R/S GND T/S 1-Second burst of dial tone	Capacity
"SNP" One way Suspend for Non-Payment — One way (Denied Origination)	—48V R/S GND T/S Dial Tone	Capacity	—48V R/S GND T/S No Dial Tone	Capacity
"SNP" Two ways Suspend for Non-Payment — Two ways (Denied Term./Denied Orig)	"T" Key operated Hear High Tone	GND R/S Open T/S	—48V R/S GND T/S No Dial Tone	Capacity

GLOSSARY:
T/S — Tip Side of Line
R/S — Ring Side

TABLE F

NO. 3 ESS LINE FEATURES

LINE FEATURE	SINGLE PARTY			MULTIPARTY		
	RES. BUS.	MAN	PBX	COIN	2	4&8
Originating	X	X	X	X	X	X
Terminating	X	X	X	X	X	X
Flat Rate	X	X	X	—	X	X
Message Rate	X	—	X	—	X	—
Hotel — Motel (To TSP/TSPS)	—	—	X	—	—	—
Free Terminating	X	X	X	—	—	—
TOUCH-TONE ®	X	—	X	X	X	X
Dial Pulse 10 PPS	X	—	X	X	X	X
Dial Pulse 20 PPS	—	—	X	—	—	—
ANI	X	—	X	X	X	—
ONI	X	—	X	—	X	X
Bill To Listed Number	—	—	X	—	—	—
QZ Billing	X	—	X	—	—	—
Remote Message Register	X	—	X	—	—	—
Reverting Calls	—	—	—	—	X	X
Plug-Up List	X	X	X	X	X	X
Emergency Manual Line	X	X	X	—	—	—
Emergency Line (Fire, Police)	X	X	X	—	—	—
Denied-Originating	X	X	X	X	X	—
Denied-Terminating	X	X	X	X	X	X
Loop Start	X	X	X	X	X	X
Ground Start	X	—	X	X	—	—
Immediate Ring	X	X	X	X	X	X
Coin First	—	—	—	X	—	—
Dial Tone First	—	—	—	X	—	—
Retain Coin On 0 or X11	—	—	—	X	—	—
Return Coin On 0 or X11	—	—	—	X	—	—
Local Overtime	—	—	—	X	—	—
Multiline Hunt	X	—	X	—	—	—
Series Completion	X	—	—	—	—	—
No Hunt	X	—	X	—	—	—

TABLE F (Cont)

LINE FEATURE	SINGLE PARTY			MULTIPARTY		
	RES. BUS.	MAN	PBX	COIN	2	4&8
Make Busy	X	—	X	—	—	—
Dynamic Service Prot.	X	X	X	X	X	X
Group Alerting	X	—	—	—	—	—
Call Waiting	X	—	—	—	—	—
Speed Calling	X	—	X	—	—	—
3-Way Calling	X	—	—	—	—	—
Call Forwarding	X	—	X	—	—	—
Toll Diversion	—	—	X	—	—	—
Toll Restriction	X	—	X	X	—	—
Service Observing (Local)	X	X	X	X	X	X
High and Wet	X	X	X	X	X	X
Call Tracing	X	X	X	X	X	—
Nonsynchronized	X	X	X	X	X	X
Audible	X	X	X	X	X	X

(4) Operate 3W0 and listen for 1-second burst of dial tone.

(5) The line may be tested for faults by using the standard testing procedures pertaining to the specific test position being used.

A customer line which has been denied service and has the service restored will not be able to originate calls if the translation order used to restore service does not agree with the station equipment. Translation information such as TOUCH-TONE service, tip or ring party, ground start service, etc, must be correct or the customer will be restricted from originating calls.

MAKE-BUSY FEATURE

7.03 Lines which have repeated service failures should be made busy from the ALIT teletypewriter or master control center until the trouble condition is cleared. Refer to Section 662-517-501 for information on how to make lines busy from the ALIT teletypewriter. A teletypewriter input message is required to remove a line from the make-busy condition. If a repeated attempt is made to make a line busy, a single input message will be required to remove the line from the make-busy condition. When possible, the customer should be informed before the line is removed from service.

2-PARTY SERVICE

7.04 Stations on 2-party lines associated with an ESS office may encounter billing errors or dialing difficulty if the stations are not wired properly. When the line provides service to both the tip and ring customers and the extension station for the tip customer is not wired to provide an identifying ground, all calls originated from the extension station will be billed to the ring customer. When this condition exists, the ESS office has the translation information to recognize the line has a ring and tip customer, and either may originate calls. All stations (tip or ring) which do not provide an identifying ground will appear as a ring station and result in billing errors. When a 2-party line has the ring customer disconnected and provides service only to the tip party, ***ANY*** station on the

tip side of the line will be unable to originate calls if the station is not wired to provide an identifying ground. The translation information for the ESS office will recognize that a ring station should not exist and will not accept calls from a station unless the identifying ground is provided. The improperly wired station will appear as a ring station, and after three digits are dialed, a 120-ipm tone is heard.

SPEED CALLING (ABBREVIATED DIALING)

7.05 ***One-digit speed calling*** service enables the customer to establish a connection to any one of eight frequently called numbers by dialing an access code and a single-digit position number (abbreviated dial list). ***Two-digit speed calling*** service enables the customer to establish a connection to any one of 30 frequently called numbers by dialing an access code and a 2-digit position number (abbreviated dial list) for the called line.

TESTING—Since the speed calling feature is controlled by the software program in the ESS office, there will be no procedures for testing the operation of this feature from the local test desk. Maintenance testing the customer line and station will be handled from the LTD in the same manner as any POTS (plain old telephone service) lines are tested. The ALIT teletypewriter will have to be used to verify the speed call codes (abbreviated dial list) and the associated telephone numbers. The input message to verify a speed call list of a customer, given the telephone number (TN) is as follows:

VER:SCN:TN \555 2368!/

Substitute the 7-digit telephone number of customer with speed-calling list for number used in example.

The output response to the VER:SCN:TN input message will be printed as a VER SNC TN output message. Section 662-517-501 provides a more detailed description for using the ALIT TTY to verify the speed calling list.

CALL FORWARDING SERVICE

7.06 Call forwarding service allows a customer to have all incoming calls automatically forwarded to another line. The customer may activate or deactivate the call forwarding feature by dialing the appropriate code. Activation of the feature does not affect a station capability to originate calls, and deactivation may also be accomplished by the central office maintenance teletypewriter. Calls are forwarded without regard to the state (idle or busy) of the station originating the call forwarding feature. The call forwarding feature does not restrict a station from other individual line features; however, the call waiting feature does not operate while call forwarding is activated.

A calling customer may report getting a wrong line due to the call forwarding feature. Since the calling customer may not be aware that calls to a particular number are being forwarded, they may report trouble. Consider the call forwarding feature when a customer reports getting connected to a wrong line.

TESTS—Since the call forwarding feature is controlled by the software program in the ESS office, there will be no procedure for testing the operation of the feature from the local test desk. The customer line may be tested from the LTD to verify trouble reports which involve the station and outside plant. The ALIT teletypewriter will have to be used to verify if the line is provided with the call forwarding feature and/or to deactivate the call forwarding feature. The input message which must be typed into the ALIT teletypewriter to verify if a line has the call forward feature is:

VER:LINE:TN \555 2368/

Substitute the 7-digit telephone number (TN) of customer with speed calling list for numbers used in example.

or

VER:LINE:OE \000351!/

Substitute the 6-digit office equipment number (OEN) of customer with speed calling list for numbers used in example.

The output response to the VER:LINE input message will be printed as a VER LINE output message. Section 662-517-501 provides a more detailed description for using the ALIT TTY to verify the features associated with a TN or OEN.

7.07 To verify the call forwarding number associated with a customer telephone number, type in the following message on the ALIT TTY:

VER:CFN:TN 555 2386!

Substitute 7-digit telephone number (TN) of customer line with call forwarding feature for number used in example.

A VER CFN TN output message is printed which identifies the customer telephone number and the telephone number to which it has been call forwarded.

ADD ON (3-WAY) CALLING SERVICE

7.08 The 3-way calling feature enables a customer to add a third line to the connection. This feature provides a means for the customer to establish a 3-way conversation without any assistance from an operator. The procedure a customer uses to operate the 3-way calling feature is to flash the switchhook one time, and dial the telephone number of the customer to be added to the connection. After the called customer answers, flash the switchhook one more time, and the 3-way connection is established.

TESTS—Any testing on lines equipped with the 3-way feature is restricted to measuring trouble on the outside plant and to the station set in the same manner as any other individual lines are tested from the LTD.

7.09 On any service feature which requires the customer to provide a switchhook flash, the most frequent cause of trouble reports is the customer depressing the switchhook too rapidly or too slowly. The switchhook button must be firmly depressed and released. The switchhook button must be released within a 1-second interval.

7.10 A VER:LINE input message is used at the ALIT TTY to verify if the line is provided with the 3-way calling feature. An example of the VER:LINE input message is:

VER:LINE:TN 555 2386!

Substitute 7-digit telephone number (TN) of customer line for the numbers used in the example.

or

VER:LINE:OE 000351!

Substitute 6-digit office equipment number (OEN) of customer line for the number in the example.

A VER LINE output message will provide information on what service features are available to a particular line. Section 662-517-501 provides a more detailed description of input and output messages necessary to verify service features.

CALL WAITING

7.11 The call waiting feature provides a service to the customer which signals the called customer of an incoming call, even though the called line is busy; provides the customer with a means of placing the first call on hold while answering the second call; and also provides a means for the customer to return the connection to the first call. Two bursts of tone will interrupt the customer's conversation as a signal that a second incoming call has been made to the customer with the call waiting feature. The customer must momentarily flash the switchhook to place the first call on hold while answering the second incoming call. A second momentary flash of the switchhook releases the connection to the second incoming call and restores the connection to the original (first) call. The connection may be alternated between both calls by operating the switchhook. If a third call is made to the line which already has established a connection to two lines, the third caller will receive a busy signal.

TESTS—The customer line may be tested from the LTD in the same manner as any other individual line. The only test which may be made on the call waiting feature is to verify the feature has been provided in the line translation for that particular customer.

7.12 A frequent cause of trouble reports on the call waiting feature will be caused by the

customer not flashing the switchhook properly. The switchhook button must be firmly depressed and released. The switchhook button must be released within a 1-second interval.

7.13 A VER:LINE input message is used at the ALIT TTY to verify if the line is provided with the call waiting feature. An example of the VER:LINE input message is:

VER:LINE:TN 555 2386!

Substitute 7-digit telephone number (TN) of customer line for the number in the example.

The output response to the VER:LINE input message will be printed as a VER LINE output message. Section 662-517-501 provides a more detailed description for using the ALIT TTY to verify the features associated with a TN or OEN.

8. GLOSSARY OF TERMS

8.01 The following glossary contains definitions for words and phrases used in terminology related to ESS offices.

3A CC—The combination of logic, microstore, and input/output channel which is primarily utilized to interpret and act upon information read from the main store or from external stimuli through the interrupt mechanism.

Add On (3-Way) Calling)—An optional service feature which allows the customer to add other stations to a call already in progress.

Address—A combination of bits that identifies a location in a memory of an equipment unit.

Automatic Message Accounting (AMA)—An arrangement of apparatus for recording and processing on continuous tapes the data required for computing billing information.

Automatic Number Identification (ANI)—A scheme for identifying the calling party on outgoing calls by having the originating equipment outpulse the identifying information.

Base Station—The station having one of the temporary transfer features so that calls to it may be transferred to another customer telephone number.

Billing Index—For message rate calls, the billing index is a number furnished by the No. 2 ESS central office to the revenue accounting office which designates the schedule of charges to be applied to the call. Treatment of message rate calls differs depending upon the distance covered by the call.

Bipolar Ferreed—A component consisting of two sealed reed switches, a permanent magnet, and a winding with a semipermanent magnet. When the winding of the semipermanent magnet is pulsed in one direction, the reed switches close; when the winding is pulsed in the opposite direction, the reed switches open.

Bipolar Pulse—A pulse that may have either of two polarities: positive or negative.

Bit (Binary Digit)—A binary unit of information. It is represented by one of two possible conditions, such as the characters 0 or 1, on or off, high potential or low potential, conducting or not conducting, magnetized or demagnetized.

Buffer—(a) An isolating circuit used between two other circuits. The isolation may be between high- and low-speed circuits or between high- and low-impedance circuits. (b) A section of call store used to store information until it can be used by the system. (c) That portion of a peripheral decoder which controls relays.

Bus—A group of leads providing time-shared communication paths over which information is transmitted from any one of several sources to any of several destinations as governed by gates.

Call Store (CS)—The temporary memory equipment unit used to store the information pertaining to calls in progress, translation data, maintenance and diagnostic states, traffic and plant registers, etc.

Call Transfer—This feature permits a station user to transfer an incoming trunk call to another station.

Call Waiting (CWT)—Informs a customer whose line is busy that an incoming call is waiting and

allows the customer to hold the present connection while answering the new call.

Centrex (CTX)—Central office type equipment serving varied customers in one building, modified to serve each group of customers on a private automatic branch exchange (PABX) basis. The system features direct inward dialing, direct distance dialing, and console type switchboards.

Circuit Pack—A unit used as a convenient means for assembling on a single mounting one or more components, such as capacitors, inductors, diodes, resistors, transistors, etc. The components are interconnected to perform one or more circuit functions, such as amplification, gating, timing, etc, required in a circuit.

Concentration Group—One concentrator has 192 terminals. A concentration group is made up of two concentrators (384) terminals which comprise the first two stages of switching. It is packaged on a network frame.

Control Complex—That equipment required to provide control and maintenance of the No. 3 ESS office.

Control Unit (CU)—The combination of 3A CC, main store, power store buses, system status, and control panel.

Customer Dial Pulse Receiver (CDPR)—Is a service circuit that supplies dial tone to the calling line and detects but does not count dial pulses.

Customer TOUCH-TONE Receiver (CTTR)—Is similar to the CDPR with one addition—it has the ability to receive TOUCH-TONE signals.

Cut-Through—Refer to opening or closing of the final contacts for setting up or taking down a call through the network.

Destructive Readout—The process whereby information read out of a memory element is thereafter not retained by the element.

Direct Distance Dialing (DDD)—Toll service which permits customers to dial their own long-distance calls.

Directory Number (DN)—7-digit number assigned each customer.

Downtime of System—The average time a customer is denied service because of a central office failure.

Duplication—Providing two of the same units in vital areas to maintain call handling capabilities if a problem occurs to one of the units.

Enable Pulse—A pulse that permits a unit or a circuit to become operative.

Encode—To code information into a form suitable for transmission from one unit to another.

Error—A malfunction, the symptoms of which ***cannot*** be reproduced under program control.

Fault—A malfunction, the symptoms of which can be reproduced under program control.

False Cross and Ground Test (FCG)—Test for foreign conditions on line.

Ferrod Sensor—A current sensing device used in scanners for supervisory and other purposes.

Ferrite Sheet—A temporary memory using a ferrite sheet as a building block. Each sheet is the electrical equivalent of a matrix of individual ferrite cores with a conductor threading all cores in series.

Ferrod—A current sensing device operating on electromagnetic principles and used in the line switching circuits to detect the customer's request for service.

Flip-Flop—A device capable of assuming two stable states (set or reset), thereby storing a bit of information. It remains in either state until a signal changes it to the other state.

Ground Start—A line requiring an electrical ground at the customer premises for the purpose of signaling for service as opposed to loop-start which requires no ground at the customer premises.

Input Message Manual (IM)—A listing of TTY input codes understood by the system and used to inform the system that it must perform a specific task.

Interoffice Call—A call switched between different central offices to complete a talking path.

Intraoffice Call—A communication link provided within a central office between subscribers assigned to the same local central office.

Interrogate—To determine the state of a device or circuit.

Junctor—A circuit associated with the switching network which provides a path for a call through the network.

Key Pulse (KP)—A tone sent to the distant office indicating the beginning of MF signals.

Line—Any connection to a network terminal which is not classified as a trunk or service circuit. Usually a pair of wires which serves to connect a customer telephone to a terminal on the network.

Loop Start—A signaling method which uses the metallic loop formed by the trunk conductors and terminating bridges.

Main Store (MAS)—That part of the No. 3 ESS which stores program and translation information for the office as well as information collected, used, and deposited during each call.

Maintenance Busy—A line may be made busy by means of an input message via the teletypewriter. The busy may only be removed by manually typing an input message to remove the specified line from a busy condition which restores the line to service.

Maintenance Center (MC)—Serves primarily as a system maintenance tool in an operating office.

Memory—A unit into which information can be placed to be extracted at a later time; the ability to retain information for later uses.

Memory Circuit—A circuit which, having been put in some state by an input signal, will remain in that state after the removal of the input.

Memory Device—Apparatus having the faculty of retaining one bit of information. A relay, a flip-flop, or a twistor card magnet act as a memory device.

Multiline Hunting (MLH)—Multiline hunting may be used by PBX customers with five or more lines utilizing group and terminal numbers in place of directory numbers. An incoming call hunts for an idle line beginning with the first terminal through to the last terminal in the hunting group. If no idle line is found in the hunting group, a busy tone is heard at the station originating the call.

Network Fabric—The fabric consisting of network links and switches which serve to provide a 2-wire metallic talking path between any two network terminals. Remreed switches are used in No. 3 ESS.

Nonresident Programs—Those programs housed outside the main store and manually called into use with the system. These programs are stored on the tape cartridge.

Off-Line—A condition in which equipment is operating correctly but is not called on to perform its primary function.

Off-Hook—The condition that indicates the active state (closed loop) of a customer line, trunk, or service circuit.

On-Hook—The condition which indicates the idle state (open loop) of a customer line, trunk, or service circuit.

On-Line—A condition in which equipment is performing its primary function.

Outgoing Trunk—A one-way or 2-way interoffice trunk used on an outgoing call.

Output Message Manual (OM)—A listing of output codes automatically produced on a TTY. The OM describes the purpose and significance of the coding as presented on the TTY.

Protector Unit—A protector guards against lightning and other foreign potentials and serves tip and ring conductor pairs.

Permanent Signal—The occurrence of a line going off-hook without dialing any digits for an abnormally long time. A permanent signal may also be caused by a short or ground on the customer line.

Permanent Signal—Partial Dial (PSPD)—A list of telephone lines in an off-hook or partial dial state which have entered a high and wet state.

Plain Old Telephone Service (POTS)—Term used frequently in centrex offices.

Remanent Reed (Remreed)—Type of material used in the construction of the switches associated with the network. Characteristics of the material are faster operating speeds, fewer moving parts, and decrease in size.

Scan Point—A scanning address (in binary form) of a line, trunk, or equipment unit.

Semiconductors—Materials which are between metals and insulators in their ability to conduct electricity. Also, devices such as diodes and transistors made from semiconductor material.

Semipermanent Memory—A read-only memory which contains information which cannot be changed by the internal circuitry of the system but can be changed by external circuitry.

Serial—Pertaining to time-sequential transmission or storage, such as transfer or store in a digit-by-digit time sequence.

Series Completion (SER)—A series hunting technique used when attempting to terminate an incoming call to one of several telephone numbers.

Service Circuit—An auxiliary circuit connected through the switching network to lines or trunks as required. It performs a specialized function such as dial-pulse detection.

Service Observed—When a line is being observed by operating personnel for customer errors or customer complaints.

Service Order—A change or a new addition to the central office affecting subscriber lines.

Single-Sided Network—Lines, trunks, and service circuits are assigned to terminals at one side of the network.

Software—The programs associated with automatic data processing and computer systems.

Space Division—A method of serving a number of simultaneous calls by assigning to them different transmission paths through a switching network.

Standby—The state of a unit when it is not handling customer switching functions but is ready and able to do so. Units in the standby state may perform checking operations or be matched against the active units.

Start Pulse (ST)—A tone sent to the distant office indicating the end of the MF digit signals (signal to start phase of processing).

Stop Hunt (SHN or STOH)—A method used by a customer for making a series of hunting terminals busy by operation of a key at the customer station. The stop hunt feature provides for reducing the number of lines an incoming call will hunt through within a selected hunting group. This feature restricts the number of lines the hunting feature will have access to. An operated SHN key selects the terminal in the sequence where the hunting will stop.

Store—A unit containing memory devices in which information is kept until the system is ready to use it. A repository for information comprising memory, access, and control.

Subroutine—A sequence of programmed instructions to perform a particular function which is common to several programs.

Supervisory Scan—The sequential readings of groups of scan points to determine the state of lines, circuit junctors, trunks, or service circuits.

Supervision—An action or operation that performs a service of inspecting or directing other actions or operations such as off-hook and on-hook detection.

Switching Network—A network of switches arranged to perform an interconnecting function.

System Control (SYC)—The combination of the control unit, FIOCs, network controllers, scanner controllers, and peripheral pulse distributors which together provide complete control of the periphery and whose status is switchable as a single unit. Except for the system status panel, the system control is duplicated for reliability purposes.

Terminal—A point at which information can enter or leave a communication network.

Temporary Memory—A read and write memory which contains information that can be changed by the internal circuitry of the system.

Time-Shared Circuit—A common circuit whose services are used by a number of circuits during separate time intervals.

Translation Information—Information contained in the program store pertaining to individual lines or trunks. It may be used, for example, to convert a directory number into an equipment location, to derive the class of service, etc.

Translator—A circuit or program used to change information from one form of representation to another.

Trouble—A malfunction or other condition that causes a deviation from normal system operation.

Trouble Locating Manual (TLM)—Basically used to identify faulty circuit packs associated with particular failures. The TTY prints out a coded number which when referenced in the TLM indicates a list of possible faulty circuit packs.

Trunk—A channel connecting switching centers or exchanges. An interface circuit for transmission purposes.

9. ABBREVIATIONS

3A CC	3A Central Control
ANI	Automatic Number Identification
CAMA	Centralized Automatic Message Accounting
CDPR	Customer Dial Pulse Receiver
CU	Control Unit
DDD	Direct Distance Dialing
DP	Dial Pulse
FIOC	Frame Input/Output Controller
I/O	Input/Output
JC	Junctor
JSW	Junctor Switch
LPCDF	Low Profile Combined Distributing Frame
LTD	Local Test Desk
MAS	Main Store
MCC	Master Control Center
MF	Multifrequency
MTC	Maintenance
NWC	Network Controller
SCC	Switching Control Center
SSP	System Status Panel
SYC	System Control
TDC	Tape Date Controller
TLTP	Trunk and Line Test Panel
TLM	Trouble Locating Manual
TTYC	Teletypewriter Controller

ESS LINES ON MAINTENANCE BUSY

DIRECTORY NUMBER (DN)	OFFICE EQUIPMENT NUMBER	CABLE NUMBER	CABLE PAIR	BUSIED			REMARKS	RESTORED		
				DATE	TIME	BY		DATE	TIME	BY