32

COMMON SYSTEMS
OUTPULSER - IDENTIFIER TEST CIRCUIT
AUTOMATIC NUMBER IDENTIFICATION - TYPE B
CROSSBAR NO. 1, PANEL OR STEP-BY-STEP OFFICE

CHANGES

A. Changed and Added Functions

A.1 To provide a means to check the outpulser's ability to register receipt of tracetone on a CLI call.

B. Changes in Apparatus

B.1

Superseded	Superseded By
U2AT (C1AS) Key - Option ZN	TRT/U2AT (C1G) Key - Option ZS

B.2 Added

TRT (2Y) Lamp - Option ZP

D. Description of Changes

D.1 Calling line identification (CLI) features added on Issue 11D are changed on this issue as a result of new CLI requirements. The change is made on a no record basis by agreement with the Western Electric Company.

D.2 The designation of relay and lamp FMT was formerly CIT.

D.3 Relay OF8D/TRT, option ZR, was formerly shown as OF8D, option ZD, with the other half of the relay unused.

D.4 The CLI/SO (C1JG) key, option ZS, was formerly shown as option ZP.

D.5 The U2AT (C1AS) key, option ZN, was formerly shown without option.

D.6 FS6, FS7, and FS15, Circuit Notes 102 and 104, the circuit requirements, and CAD 1 and CAD 2 have been changed.

D.7 Notes 108 and 109 have been added.

F. Changes in CD Sections

F.1 In SECTION II, change 16.02 to read:

16.02 Operation of the CLI key causes resistance battery to be connected to the PSB lead into the outpulser when relay OTCI operates; this primes the outpulser to perform as on a CLI call. Operation of the CLI key also applies resistance battery to the CLIT lead into the outpulser; this is a CLI test indication. The outpulser grounds lead CLI to operate relay CLI which locks and lights lamp CLI; this indicates that the outpulser has started its CLI functions. If the outpulser completes all the CLI functions, the test circuit releases as on a non-CLI call. However, if the outpulser is unable to complete its CLI functions, it grounds lead FMT to operate relay FMT which locks and lights the FMT lamp; this is an indication that the outpulser has forced a manual trace on the CLI call.

F.2 In SECTION II, add a new 16.03:

16.03 Operation of key TRT primes the outpulser to indicate on a CLI ticket that the CLI tracetone had been received on the call. When operated, TRT key connects ground to lead PSB after operation of relay CLI. The outpulser responds by grounding lead TRT to operate relay TRT which locks and lights lamp TRT.

F.3 In SECTION II, change the unnumbered subheading after 16.02 to read:
17. REPEAT TEST (ZQ OPTION) and change the two succeeding paragraphs (formerly 16.03 and 16.04) to 17.01 and 17.02. Renumber the remainder of SECTION II accordingly.

F.4 In SECTION III, 2.01, Relays, add:

Designation	Meaning
CLI	Calling Line Identification
FMT	Force Manual Trace
TRT	Tracetone

F.5 In SECTION III, 2.02, Keys, add:

Designation	Meaning
CLI	Calling Line Identification
TRT	Tracetone

F.6 In SECTION III, 2.03, Lamps, add:

Designation	Meaning
CLI	Calling Line Identification
FMT	Forced Manual Trace
TRT	Tracetone

F.7 In SECTION III, 3. FUNCTIONS, add:

3.69 To provide means to check the outpulsers ability to register receipt of tracetone on a CLI call.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5223-MRM-MR

COMMON SYSTEMS OUTPULSER-IDENTIFIER TEST CIRCUIT AUTOMATIC NUMBER IDENTIFICATION - TYPE B CROSSBAR NO. 1 PANEL OR STEP BY STEP OFFICE

CHANGES

D. Description of Changes

D.1 Two 185A networks are added in FS17 and FS19, respectively.

D.2 In APP Fig. 16, the FS and NIRF networks are added per the FS17 and FS19 additions.

D.3 In Note 102, reference to APP 4 was removed and a reference to APP 17 was added to "PBX-AIOD DATA DISPLAY LAMPS - 1 PER CKT."

D.4 In Note 102 in APP 16, "A1 OR" was added to read "PBX-AIOD A1 OR A2 ALARMS AND ALARM RELEASE" and "1 PER CKT" was removed for all of APP 16.

D.5 The changes in D.3 and D.4 were made on a no-record basis.

D.6 In Note 104, reference to issues 7D and 9D, inadvertantly omitted, is added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5223-WCB-MR

COMMON SYSTEMS
OUTPULSER-IDENTIFIER
TEST CIRCUIT
AUTOMATIC NUMBER IDENTIFICATION - TYPE B
CROSSBAR NO. 1, PANEL OR STEP BY STEP OFFICE

CHANGES

A. Changed and Added Functions

A.1 For added functions, see Issue 5D.

B. Changes in Apparatus

B.1 Added

2 - 14E Registers (NIRF, FS)
2 - KS-16493, L1 Magnetic Counters (NIR, PBX)
2 - 185A Networks (NIR, PBX)
1 - 547B Key (RS AIOD A2)
1 - 547A Key (RESET)
2 - 2Y Lamps (MJ-AIOD, MN-AIOD)
5 - 2Y Lamps (DLN0, DLN1, DLN2, DLN4, DLN7)

D. Description of Change

D.1 Description of Operation

D.01 For description of operation see CD Issue 5D.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5823-WCB-MR

COMMON SYSTEMS
OUTPULSER-IDENTIFIER
TEST CIRCUIT
AUTOMATIC NUMBER IDENTIFICATION - TYPE B
CROSSBAR NO. 1, PANEL, OR STEP BY STEP OFFICE

TABLE OF CONTENTS PAGE

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The outpulser-identifier test circuit is designed to:

(a) Test outpulsers.

(b) Test identifiers.

(c) Provide means to adjust amplifier-detectors in the identifiers.

(d) Test service networks.

Note: The term service network as used herein refers to the Number Network and Primary Bus Circuit together with the secondary network and bus connector circuit.

(e) Register, and display on lamps, the information outpulsed on a test call made by an ANI automatic trunk test circuit.

(f) Serve three identifier groups where each group may have a maximum of seven outpulsers, two identifiers, and a service network containing a maximum of 60,000 number networks.

Note: Each number network is associated with a particular directory number and, when properly connected, permits the identification of the corresponding line on an ANI call. If the call is from an individual or 2-party line, the identification will be automatic. If the call is from a multiparty line, the identification will be accomplished by an operator.

(g) Provide facilities for checking the PBX AIOD translator.

2. GENERAL DESCRIPTION OF OPERATION

2.01 In order to test an outpulser, an identifier, or the service network, a test call is originated by means of the outpulser-identifier test circuit. Prior to the start of the test call, the test circuit is primed by means of keys. The progress of the test call and the results of the identification and outpulsing are displayed on lamps associated with the test circuit. If the service network is being tested, a connection must be patched up between a particular number network and a pin jack associated with the test circuit and located at the service network.

2.02 The test circuit is essentially a manual type of circuit in that each test must be started by operation of a key. At the end of the test, the information registered in the test circuit is released by means of a key. The service circuits that are involved in the call are seized and released just as on a service call, except that the outpulser is seized directly by the test circuit and not through the outpulser connector. Under control of the test circuit, the outpulser is seized and made busy in the outpulser connector. The identifier is seized by the outpulser to identify the calling line directory number. In order to identify the directory number, the identifier scans the outputs of the service network or goes through the motions of scanning while using a test network associated with the test circuit. There is one test network for each identifier group.

2.03 Calling line identification (CLI) features may also be tested by operating the appropriate keys and making a regular test call.

2.04 The AIOD features of the outpulser, and the transfer and registration features of the AIOD translator are tested by originating a test call using a line directory number that contains the office and thousandth digit assigned for AIOD service. This number is referred to as the PBX trunk number and is identified as described above. The identified office indicates to the outpulser that an AIOD call is originated, and the identified thousandth digit directs the outpulser to the proper AIOD translator. The outpulser forwards the PBX trunk number to the AIOD equipment for translation of this number to the PBX station number. The progress of the AIOD test call and the PBX station number is displayed on the test circuit lamp panel. Call progress and alarm indications are displayed remotely in the form of registers and lamps for PBX-AIOD A1 and A2 on the test frame panel.

SECTION II - DETAILED DESCRIPTION

1. TEST CALL

GENERAL

1.01 The operation of the test circuit and the connecting circuits is described in the following paragraphs. In general, the connecting circuits operate as they do on service calls under control of the test circuit. The operation of several keys is required prior to the start of a test call. By varying the key setting as described, the various features of the outpulser, the identifier, and the service network may be tested.

1.02 The basic test call, in which the outpulser and the identifier are made to function as on a service call, is described in 1. The outpulser is seized and, in turn, seizes the identifier and causes an identification to be made. The outpulser then outpulses the required number of digits; this information is registered in the test circuit and displayed on lamps.

1.03 The basic test call is actually an overall test of the identification and the outpulsing features of the ANI circuits.

1.04 Particular tests of other outpulser features are described in 2. and particular tests of other identifier features are described in 3.

1.05 Since there is no trunk circuit involved on this type of call, the test circuit is arranged to simulate the trunk and the calling line.

1.06 The test circuit also simulates the distant end of the call and provides means to detect and register the information outpulsed by the outpulser.

SEIZURE OF OUTPULSER (FS1)

1.07 In order to seize an outpulser, the operation of an outpulser select key OPO-9, an identifier group key IFO-2 (if provided), the outpulser-identifier test key OIT, and the start key ST is required. Upon operation of the ST and OIT keys, relay OIT operates and operates the IG- relays (if provided). Relay OIT closes ground to the selected outpulser over lead OT-. Relay OT in the selected outpulser operates. Relay OIT also operates busy test relay BTR, which locks to ground on lead OON if the selected outpulser is off-normal due to another call. Relay OT in the outpulser also closes ground back to the test circuit on lead OTL to operate outpulser test lock relay OTL, which locks and opens the operate circuit to BTR. Relay OTL also opens the OT lead to the outpulser; however, the OT relay in the outpulser is held operated over lead OTL through relay OTL operated. If the outpulser is idle, BTR releases to permit seizure of the outpulser.

1.08 Relay OT in the outpulser, operating as described, also operates the MB relay in the outpulser which, in turn, operates the BY relay in the outpulser connector to operate all the OB relays in the outpulser connector associated with the selected outpulser.

1.09 When all the OB- relays associated with the outpulser under test operate to make the outpulser busy to other calls, the outpulser busy relay OB operates and locks to relay OIT. Relay OB operates relay ON which, in turn, operates relay ON1. Relay OB causes the outpulser to go off normal and also to start its timing functions. The outpulser at this time prepares to select an identifier corresponding to the identifier select key ID- operated. If no ID- key has been operated, the outpulser will select its next preferred identifier as on a service call. The outpulser then operates the outpulser test cut-in relay OTCI which connects the T, R, AB, TPT, and SP leads of the test circuit simulated trunk FS3 into the outpulser. Relay OTCI also operates additional test cut-in relays in the outpulser.

1.10 The simulated trunk furnishes information that the outpulser needs with respect to the party that is calling. When the outpulser later seizes the identifier, it instructs that circuit whether to test for the calling number in the tip-party bus field or the ring-party bus field of the service network.

1.11 In crossbar and step-by-step offices, the ANI trunk has a record of the party identity of the calling station and the trunk passes this information to the outpulser, grounding lead R for ring party or lead T for tip party.

1.12 In crossbar offices, the party information is recorded in the trunk by the marker. In step-by-step offices, the party information is determined by a party test made by the ANI trunk on calls from flat rate subscribers or by a party test made by a message rate trunk intervening between the subscriber and the ANI trunk. The message rate trunk does not pass the information to the ANI trunk. Therefore, on calls from message rate subscribers, the party information in the ANI trunk is always ring party; however, on these calls both subscriber numbers appear in the ring-party bus field and the identification signal is transferred to one or the other number networks, depending on the party information registered in the message rate trunk. On flat rate calls, where the party test indicated a tip party, and on message rate calls, the step-by-step ANI trunk makes a ground-removal test at the end of the call to insure that a tip-party indication was not due to a permanent ground. If the ground remains, the trunk calls in the outpulser to cause an identification of the line and also to take a trouble record. To seize the outpulser, the trunk grounds lead AB on message rate calls and lead TPT on flat rate calls.

1.13 In panel offices, the ANI trunk will not know the identity of the calling party. Panel trunks, therefore, tell the outpulser to make a test to determine the calling party or, if there are no party lines in the office, the trunk tells the outpulser to omit party test. If party test is required, the trunk grounds lead AB into the outpulser. If party test is to be omitted, the trunk grounds lead R into the outpulser. One other signal is needed from panel trunks to make a ground removal test. This test is made only in panel offices and only on calls from tip-party stations that have been answered and charged. The outpulser is called in to make this test after conversation ends and the trunk grounds lead TPT to indicate that the outpulser should make ground-removal test.

1.14 On calls from multiparty lines (three or more parties) the party indication is always ring party.

1.15 To simulate the action of the crossbar, step-by-step, and panel trunks, the simulated trunk FS3 of the test circuit grounds the leads to the outpulser as follows:

(a) TP key operated to ground lead T for tip party.

(b) TP key normal to ground lead R for individual, ring party, or multiparty.

(c) PT key operated to ground lead AB for panel-party test.

(d) GRT key operated to ground lead TPT for panel ground-removal test.

(e) GRFMR key operated to ground lead AB for a step-by-step ground removal failure on a message rate call.

(f) GRFFR key operated to ground lead TPT for a step-by-step ground removal failure on a flat rate tip-party call.

The circuit operation resulting from operation of TP, PT, GRT, GRFMR, or GRFFR key is described under particular tests in 2.

INDIVIDUAL LINE, RING-PARTY, AND MULTIPARTY OPERATION

1.16 When relay OTCI operates, the simulated trunk FS3 grounds the R lead into the outpulser as a signal that an individual line, ring-party station, or multiparty station is calling. The outpulser then operates its ring party, party check, and information check relays and connects its SPL relay to the SP lead. Lamps RP, PK, and IK light. The split relay SP of the test circuit is also connected to the SP lead. Relay SPL operates on its high-resistance primary winding and operates its auxiliary relay which closes the low-resistance winding of the SPL relay to the SP lead. The test circuit SP relay operates in series with the SP lead, locks to off-normal ground, disconnects itself from the SP lead, and connects relay SP1 to the SP lead. SP1 does not operate at this time. The operation of relay SP releases the identification relays in the outpulser which, in turn, operates a transfer relay in the outpulser which connects resistance battery to the SP lead to operate relay SP1. Relay SP1 operates relay SP2 and connects the A relay across the T and R leads. The A relay simulates the subscriber loop. Relay SP1 also opens the operate circuit of relay AR (relay AR was operated previously by relay ON). Relay AR is slow release to hold over the period from the release of SP1 to the operation of relay A. When relay A operates, it closes a locking circuit to hold relay AR operated. If relay A fails to operate, relay AR releases and relay ARL operates to lock in the fact that A relay released.

1.17 At the same time that relay A is simulating the subscriber loop, the outpulser line relay is looking out at the loop to check whether the call has been abandoned or not. If call has not been abandoned, the outpulser line relay operates and, in turn, operates an auxiliary relay which starts the attempted seizure of an identifier. Lamp L1 lights.

IDENTIFIER SEIZURE

1.18 As previously noted, the selection of a particular identifier is forced by operation of a particular ID0/1 key. If no ID0/1 key is operated, the outpulser will choose its next preferred identifier. The outpulser must bid in a preference circuit for the identifier. When the outpulser gets preference for the particular identifier, it operates connector relays to cut into the identifier. The outpulser passes the party information to the identifier and operates the identifier off-normal relays. The identifier will then attempt to identify the calling line directory number and the calling office number.

1.19 At the same time that it operates the connector relays, the outpulser also operates its tone connect relay to release relay SP1, and to ground lead R to operate the identification relay ID in the simulated trunk of FS3. Lamp TNC lights. Release of SP1 causes the release of relay A and recloses the operate circuit of relay AR. Relay ID causes a 5800-Hz identifying signal to be applied to the S lead into the test circuit from the associated oscillator. Relay ID also operates the outpulser tone check relay over lead T. Lamp TNK lights.

1.20 In order to identify the calling line directory number, the identifying signal must be fed into the identifier on four leads representing the thousands, hundreds, tens, and units digits of the calling line directory number. This information can be fed into

the identifier either through the service network or the test network.

OPERATION WITH SERVICE NETWORK

1.21 The service network consists of the Number Network and Primary Bus Circuit (primary network) together with the secondary network and bus connector circuit (secondary network). A calling subscriber sleeve is permanently connected into the primary network at a number network corresponding to the subscriber directory number. When the identifying signal is applied to the sleeve of the calling subscriber line, it feeds into the number network and onto a horizontal and vertical bus. These buses feed into two separate resistive grid arrays in the secondary network. There are two outputs for each of the two separate resistive grids, or a total of four outputs arranged to represent the four digits of the calling line directory number. Under control of the identifier, the secondary network connects the thousands, hundreds, tens, and units leads into the identifier in that order when the identifier has determined the calling office.

1.22 Each number network is cross-connected to a horizontal and a vertical bus in a tip- or ring-party field, or to a bus in the multiparty bus field. Under control of the identifier, the secondary network connects to either the tip-party or the ring-party bus field and to the multiparty bus field. The identifier checks that the secondary network is connected into the proper primary network field. If the check fails at the start or during the identification, the identifier will stop its identification attempt and cause the outpulser to take a trouble ticket. No party check lamp NPK lights under this condition.

1.23 To connect to the input of a number network in the service network, a patching arrangement has been provided on the number network and primary bus frames, which permits connecting to a number network extending the connection into the test lead over leads NNT0-6. The operation of service network key SVN, office select key OFF0-6, and identifier group key IG0-2 (if provided) is also required.

1.24 If the connection is made to a particular number network and the associated subscriber line becomes busy in service, the holding ground or battery on the subscriber sleeve lead will be closed back into the test circuit over a lead NNT0-6 to operate line busy test relay BYT. Option M is provided for ground-cutoff panel offices with line switches and line finders in combination. The line finder LF or line switch LS key must be operated corresponding to the type of line connection equipment being used. Relay BYT operates line busy auxiliary relay BYA, which removes the test identification signal from the subscriber sleeve lead, grounds lead RL to release the outpulser to drop the test call, opens the start lead to prevent reseizure of the outpulser while the line is busy, and lights the LBY lamp. When the outpulser releases, it operates relay RL. Lamp RL lights. Relay BYT will remain operated until the subscriber line is idle or until the test circuit is restored. To originate a new test call, the test circuit should first be restored and then the call restarted.

OPERATION WITH A TEST NETWORK

1.25 A test network is provided for each identifier group served and is located on the identifier 0 frame in each group. The test network simulates the service network. Test relays in the identifier circuit connect the test network leads into the identifier at the time the identifier is seized by the outpulser. In order to select the test network, the SVN key must be normal. When relay ON1 operates, lead TST1 is grounded through the SVN key, normal, as an indication for the identifier to connect to the test network.

1.26 To simulate the action of the bus connector relays in the service network, the office check relays OFK, the thousands test relay THT, hundreds test relay HT, tens test relay TT, and the units test relay UT, operate as the identifier scans for the calling line directory number digit (see 3.).

1.27 Since there is no tip- or ring-party bus field associated with the test network, the identifier does not have to check that the secondary network is connected to the right bus field in the primary network. However, the identifier check relay is held operated by the test relays that connect the identifier into the test network. If the check relay fails to operate, the identifier will stop its identification attempt and cause the outpulser to take a trouble ticket. Lamp NPK lights under this condition.

1.28 To check that the outpulser has recorded the correct party information in the identifier, the test circuit monitors lead TP to the identifer. On ring-party calls, the tip-party key and TPA relay will be normal. No signal is expected on lead TP. If the identifier tip-party relays operate falsely, relay TPB operates and lights the false tip-party lamp FTP. On tip-party calls, the TP key and the TPA relay will be operated. The identifier grounds lead TP, operating relay TPC which lights identifier tip-party lamp ITP. If the identifier tip-party relays fail to operate, the ITP lamp will be unlit at the end of the call to indicate the failure.

OUTPULSER MAKES TRUNK GUARD TEST (NON-AIOD TESTS)

1.29 When the identifier has completed its identification, the outpulser releases the identifier. Lamp IRL lights. Relay ID releases and releases the outpulser tone

check relay to operate the MF relay in the outpulser. Lamps MF and KP light. Lamp TNC extinguishes. The outpulser operates the test circuit MF relay. Relay MF transfers the T and R leads from the simulated subscriber loop to a simulated tandem office loop. The outpulser places a trunk test relay across the T and R leads. If the loop is continuous and the outpulser trunk test relay is in proper adjustment, the outpulser trunk test relay operates to start outpulsing. Lamp SP lights. At the same time trunk guard relay TGD, which is part of the simulated tandem office loop, operates and lights lamp TGD, which remains lighted all during outpulsing.

OUTPULSING

1.30 When the trunk guard test is completed, the outpulser starts outpulsing digits over the T and R leads. Each digit outpulsed consists of two frequencies applied simultaneously to the T and R leads. There are six possible frequencies that may be used and these frequencies are designated 0, 1, 4, 7, and 10 so as to fit in with the standard additive 2-out-of-5 code. Frequencies 0 to 7 are used in the additive 2-out-of-5 code to represent the digits 0 to 9. Frequency 10 is used in combination with other frequencies for the keypulse KP and start ST signals. The table below gives the frequency assignment for the various codes.

Designation	0	1	2	4	7	10
Digit Freq Hz	700	900	1100	1300	1500	1700
0				X	X	
1	X	X				
2	X		X			
3		X	X			
4	X			X		
5		X		X		
6			X	X		
7	X				X	
8		X			X	
9			X		X	
KP			X			X
ST					X	X
ST'		X				X

TEST OF OUTPULSING

1.31 The information outpulsed by the outpulser is transmitted through the test circuit and into a Signaling Receiving Circuit, where it is translated into dc signals suitable for operating register relays in the test circuit. The dc signals are transmitted to the test circuit over leads 0, 1, 2, 4, 7, and 10.

1.32 The first digit outpulsed by the outpulser is the KP signal consisting of a relatively long pulse of frequencies 2 and 10. The KP signal is a priming signal which prepares the Signaling Receiving Circuit for the reception of the other digits outpulsed. The KP signal is absorbed by the Signaling Receiving Circuit and is not transmitted to the test circuit as a dc signal as are all the remaining digits.

1.33 As the succeeding digits are outpulsed, they are received by the Signaling Receiving Circuit, translated into dc signals, and transmitted to the test circuit where the information is registered on relays and displayed on lamps.

INFORMATION OUTPULSED

1.34 In addition to the KP digit which is used to prime the Signaling Receiving Circuit, the following digits are outpulsed by the outpulser and finally registered in the test circuit.

A. Information Digit

1.35 This digit is outpulsed immediately after the KP digit and is used to inform the equipment at the CAMA point whether the calling number has been automatically identified, the calling number is to be operator identified, or if trouble has been encountered in automatically identifying the calling number. The information digit also indicates whether or not the calling line is service observed. The following table lists the information digits and their meanings for nonintercept calls.

Meaning	Information Digit	
	Nonobserved	Service Observed
Automatic Identification	0	3
Operator Identification	1	4
Trouble in Identification	2	5

1.36 The following table lists the information digits and their meanings for intercept calls.

Meaning	Information Digit
Blank Number	0
Trouble Intercept	1
Trouble in Identification	2
Regular Intercept	3

B. Calling Office and Directory Number Digits A, B, C, TH, H, T, and U

1.37 These digits outpulsed one after the other indicate the calling office (ABC digits) in which the subscriber directory number (TH, H, T, U digits) is located. This information is used by the CAMA equipment to record the call for charging purposes.

Note: The identifier identifies the calling office as a single digit 0-5. The outpulser then translates this information into the 3-digit office code.

C. Start ST Digit

1.38 This digit is outpulsed after all other digits have been outpulsed and is an indication that all necessary digits have been outpulsed.

OPERATION WITH SIGNALING RECEIVING CIRCUIT

1.39 As described in 1.31 through 1.33, the Signaling Receiving Circuit translates multifrequency pulses from the outpulser into dc signals that operate register relays in the test circuit.

1.40 In order to steer the dc signals into the proper register relays, the leads from the Signaling Receiving Circuit over which the dc signals are transmitted (leads 0, 1, 2, 4, 7, and 10) are switched into register relays of FS4 by the outpulsing check steering relays of FS5.

1.41 When the Signaling Receiving Circuit receives an MF digit, its signal-present circuit grounds lead J into the test circuit to operate register advance relay RAV. The ground on lead J is maintained as long as the MF signal is present.

1.42 Relay RAV operates a steering control relay SCA, B, or C which locks and prepares a circuit to operate a digit steering relay (IS, AS, BS, etc) on its next release. Relay RAV, upon releasing, operates the digit steering relay corresponding to the next digit expected.

1.43 On the first digit outpulsed, the KP digit, the signal-present ground on lead J is closed back into the Signaling Receiving Circuit on lead L to operate a relay in that circuit that controls the translation of multifrequency pulses from the outpulser into dc signals. Upon removal of the signal-present ground, ground is removed from lead L. On all the remaining digits outpulsed (I through ST) the signal-present ground on lead J is closed back into the Signaling Receiving Circuit on lead L as described for the KP digit. However, each time a digit is registered in the test circuit register check, relay RGK operates to remove the ground from lead L to prepare the Signaling Receiving Circuit for the next digit.

RELEASE OF THE OUTPULSER

1.44 As the outpulser starts to outpulse the last digit (the start digit) it operates its end pulse relay. Lamp OEP lights. At the end of the start digit, the outpulser ends its pulsing and releases. Upon releasing, the outpulser grounds lead RL1 into the test circuit to operate release relay RL which locks to off-normal ground. Relay RL lights lamp RL and opens lead OTL into the outpulser to release the outpulser test relay. Release of the outpulser test relay releases the outpulser.

PROGRESS AND TROUBLE INDICATION REGISTER (FS12)

1.45 At the time that the oupulser is connected to the test circuit, a number of leads are connected into FS12. The function of these leads is to permit operation of outpulser progress relays which lock to off-normal ground and light progress lamps. The information provided by these lamps, together with other lamp signals, permits checking the action of the circuits under test.

1.46 In addition, several leads are connected into FS12 from the identifier to permit operation of registers and corresponding lamps.

RELEASE OF TEST CIRCUIT

1.47 To restore the test circuit to normal, the ST key is restored to normal. Relay OIT releases, followed by all other operated relays.

SECOND TRIAL OPERATION

1.48 On calls where an identification failure occurs, the outpulser, on recognizing the first trial failure, takes a trouble ticket, releases the identifier, and then attempts to make a second trial. For the second trial, the outpulser will seize the other identifier unless an identifier select key ID0/1 had been operated at the start of the call, in which case the same identifier will be reseized.

1.49 To permit the registration of information pertaining to the second trial, certain of the test circuit registers must be cleared of information registered on the first attempt. This is accomplished as follows. When the outpulser recognizes the first trial failure, it operates test circuit first trial failure relay 1TR. Lamp 1TR lights. Relay 1TR opens the locking circuits to certain of these registers; some of these relays release immediately, others release when the identifier releases. Upon release of the identifier, the end of first trial relay TR1 operates; upon reseizure of an identifier for second trial, the start of second trial relay TR2 operates. This action completes the recycling of the registers and the test circuit is now primed to register the second trial information.

1.50 Should an identification failure occur on second trial, the outpulser will attempt to take a trouble ticket and release. Second trial failure lamp (2TR) lights as well as the RL lamp.

1.51 Under normal conditions, the trouble ticketer will be busy printing the first trial trouble ticket at the time the outpulser requests the second trial ticket so that no second trial ticket will be printed. However, a second trial ticket may be printed under the following conditions:

(a) The trouble ticketer was busy at the time the first trial ticket was requested but became idle before the second trial ticket was requested.

(b) The cancel first trial ticket feature was in use at the trouble ticketer frame.

PBX AUTOMATIC IDENTIFIED OUTWARD DIALED CALLS (AIOD)

1.52 The AIOD features of the outpulser are tested by originating a test call using a directory number that contains the office and thousandth digit assigned to AIOD service. Selection of the directory number can be made through the service or test network. The directory number identifies the PBX incoming trunk and is referred to as the PBX trunk number. The ANI equipment identifies the PBX trunk number in the same manner as an individual line directory number. The progress of the AIOD call and the PBX station number received from the PBX AIOD equipment are displayed on the lamp panel.

1.53 There are two types of AIOD test calls, a short loop-around test and a long loop-around test. The ANI-B equipment operation is the same for either test. The difference between the two tests is in the operation of the AIOD equipment. The long loop-around test applies only when the AIOD translator is associated with the station identification store PBX system.

A. Short Loop-Around Test

1.54 When this test is originated (LLT key normal when provided), the AIOD translator forwards a test signal as well as the PBX trunk number to the AIOD equipment. The AIOD equipment recognizes this as a test call and, through a loop-around arrangement, sends back to the AIOD translator a PBX station number which is the same as the trunk number. In addition, an office index tens as 3/3 and an office index units as 5/5. On a service call, office index information is normally received on a 1/3 in the tens and 2/5 in the units. The operated TST relays in the AIOD translator transfer the office unit index leads to the test circuit POF- or UNO- key. The operated POF- or UNO- key determines the office index number to be transferred from the AIOD translator to the outpulser.

B. Long Loop-Around Test

Caution: The long loop-around test must be coordinated with the long loop test requirements covered in the PBX AIOD trouble locating manual. The trunk number used by the OIT test circuit must be the same as the trunk number used by the PBX AIOD test circuit to address the station information store SIS circuit. The inadvertent operation of the LLT key can result in service calls normally automatically identified to be operated identified. The operated LLT key lights the LLT lamp to give a visual indication that the test circuit is primed for an AIOD long loop-around test.

1.55 With the exception that the LLT key is operated, the test circuit operations on a long loop-around test are the same as they are on a short loop-around test. The operated LLT key removes the test signal that the AIOD translator sends to the PBX AIOD equipment on a short loop-around test. The removal of the test signal permits the test call to appear as a service call to the PBX AIOD equipment. The PBX AIOD equipment addresses the station identification store for the PBX station number associated with the PBX trunk number received from the AIOD translator. The PBX AIOD equipment transfers the PBX station number and an office index tens 1/3 and an office index units 2/5 to the AIOD translator. Although the proper number of office relays are operated in the AIOD translator on a long loop-around test as compared to all the office index relays operating on short loop-around test, it is still necessary that the associated POF- or UNO- key be operated to complete the transfer of office index information from the AIOD translator to the outpulser.

1.56 The sequence of key and relay operation for direct seizure of an outpulser is shown on SC1 and described in 1.07 through 1.15. The relay operation for an individual ring-party test call, as shown on SC2 and explained in 1.16 and 1.17, also applies to

an AIOD test call. Identifier seizure and PBX trunk number identification is described in 1.18 through 1.24 or 1.25 through 1.28. The sequence of relay operation is shown on SC3. The only difference in sequence of operation as shown on SC3 is that in the outpulser in which the operated OF- relay operates the IOD relay. The operated outpulser IOD relay operates the test circuit IOD relay which lights the AIOD lamp.

1.57 On a service call, the operated IOD relay in the outpulser connects a resistance bridge across the T and R leads toward the trunk to hold the tandem trunk during the interval required for the outpulser to receive the PBX station number from the AIOD translator. The holding feature of the outpulser is checked by the operation of the TGD relay. The TGD relay simulates the tandem office loop and is operated through the operated MF relay over the T and R leads to the resistance bridge in the outpulser. The MF relay is operated from ground applied by the outpulser to the AB lead following completion of trunk number identification. The operated TGD relay operates the TGD1 relay. The operated TGD1 relay lights the TGD1 lamp and prepares the test circuit to test the trunk guard test feature of the outpulser as described in 1.63.

1.58 At the end of trunk number identification, the operated IRLA relay in the outpulser will cause the outpulser to select an AIOD translator for identification of the PBX station number. This sequence of operation is shown on SC12. The operated TS- relay in the outpulser will cause the TS- lamp to light, indicating that a translator has been selected. The operated CON relay in the outpulser will operate the CON relay in the test circuit. The operated CON relay will light the CON lamp, indicating that the outpulser is connected to the translator.

1.59 The outpulser transfers the PBX trunk number to the AIOD translator where it is registered and checked. When the trunk number is completed, the translator applies ground over the TNK lead through the outpulser to the test circuit TRNK lead causing the TRNK lamp to light. When the translator receives the PBX station number from the PBX AIOD equipment, it signals the outpulser to release the trunk number registration and check relays by applying ground over the RR lead, causing the outpulser SNK relay to operate. Also at this time, the translator grounds the SDK lead to the test circuit, causing the SDK lamp to light. The operated SNK relay in the outpulser causes the SNK lamp to light, indicating that the translator has sent a trunk number release signal to the outpulser. The lighted SNK lamp is not an indication that the translator has successfully received the PBX station number from the PBX AIOD equipment. See 13. for further explanation of PBX station number check.

1.60 The operated SNK relay in the outpulser will also cause the TNR relay to operate. The operated TNR relay will perform the following functions:

(a) Opens the locking path of the THK, HK, TK, and UK relays.

(b) Releases the DCA and DCB relays. These relays are operated from the operated IDK key. The function of the IDK key is described in 5. If the outpulser should fail to seize an AIOD translator, the lamps should remain lighted.

(c) Opens the locking path of the TH, H, T, and U relays when the IDK key is operated.

(d) Opens the locking path of the OF-D relays.

1.61 The RCL relay in the outpulser operates after the number check relays have released. The operated RCL relay prepares the outpulser to receive the PBX station number from the AIOD translator and also operates the RCL relay in the test circuit. The operated RCL relay in the test circuit performs the following functions:

(a) Lights the RCL lamp.

(b) Closes the operating ground for the TH, H, T, and U relays when the IDK key is operated.

(c) Operates the DCA and DCB relays when the IDK key is operated.

(d) Closes the operating ground for the THK, HK, TK, and UK relays.

(e) Releases the TGD relay.

1.62 Release of the register relays in the outpulser associated with the PBX trunk number, and a subsequent check in that circuit that the relays have released, cause the AIOD translator to transfer the PBX station number to the outpulser. The SNR relay in the outpulser operates when the outpulser has received and checked the PBX station number. The operated SNR relay in the outpulser causes the translator to release and provides an operate path for the outpulser MF relay. The outpulser will make a trunk guard test and complete its functions as described in 1.63.

C. AIOD-Outpulser Trunk Guard Test

1.63 When the AIOD translator releases, the CON relay in the outpulser releases. The released CCN relay operates the MF relay in the outpulser. The outpulser places a trunk test relay across the T and R leads to the test circuit. At approximately the same time, the operated SNR relay in the outpulser operates the TGDA relay in the test circuit. The operated TGDA relay and the operated MF relay in the outpulser provide a continuous loop over the T and R leads, operating the

TGD relay and the trunk test relay in the outpulser. The outpulser starts pulsing and the TGD and SPK lamps light.

1.64 The PBX office code and station number are displayed on the lamp panel in the same manner as described in 1.30 to 1.43. (Also see 5.)

2. OUTPULSER TESTS

RING PARTY TEST (TP KEY NORMAL)

2.01 This test checks the ability of the outpulser to respond to information on lead R from the trunk that indicates the following:

(a) An individual line subscriber, a ring-party, or a multiparty subscriber is calling (crossbar and step-by-step offices).

(b) Omit party test (panel offices) since there are no party lines in the office.

2.02 Upon operation of relay OTCI, as described, ground is closed into the outpulser on lead R through the test circuit TP key normal to register the ring-party information in the outpulser. This information is later passed to the identifier.

2.03 Satisfactory registration of the ring-party information in the outpulser is indicated by the lighting of lamp RP; satisfactory lockin of the ring-party information is indicated by the lighting of party check lamp PK. No indication of satisfactory registration of ring party in the identifier is provided; however, the identifier is arranged so that it must receive either an RP or a TP signal from the outpulser or it cannot advance. Therefore, on ring-party calls in the test network, satisfactory registration of ring party in the identifier is assumed if the identifier advances. If a tip party is falsely registered, false tip-party lamp FTP lights.

TIP-PARTY TEST (TP KEY OPERATED)

2.04 This test checks the ability of the outpulser to respond to information on lead T from the trunk that indicates a tip-party customer is calling in a crossbar or step-by-step office. In panel offices, the trunk does not know when a tip-party customer is calling; therefore, the T lead indication is not used in panel.

2.05 Upon operation of relay OTCI, as described, ground is closed into the outpulser on lead T through the test circuit tip-party auxiliary relay TPA operated to register the tip-party information in the outpulser; this information is later passed to the identifier.

2.06 Satisfactory registration of the tip-party information in the outpulser is indicated by the lighting of lamp TP. Satisfactory locking of the tip-party information is indicated by the lighting of lamp PK. Satisfactory registration of the tip-party information in the identifier on calls using the test network is indicated by the lighting of identifier tip-party lamp ITP.

PARTY TEST - PANEL OFFICES (PT KEY OPERATED)

2.07 This test checks the ability of the outpulser to respond to information on lead AB from the trunk that indicates that the outpulser should make party test. The test also checks the ability of the outpulser to determine whether the calling subscriber is a tip-party or a ring-party subscriber.

2.08 Party test is made in panel offices that have party lines; it is necessary since the party information is not registered in the trunk as it is in crossbar or step-by-step trunks.

2.09 Upon operation of relay OTCI, as described, ground is closed into the outpulser on lead AB through the test circuit party test key PT operated to register the make-party-test information in the outpulser. Lamp PT lights to indicate registration of the make-party-test information; party information check lamp PIK lights to indicate satisfactory lockin of the make-party-test information. Shortly thereafter the outpulser splits the T and R leads in the trunk (relay SP1 operated) so that it can look out to the calling subscriber loop with its line relay, as described. In the test circuit, the calling customer loop is simulated by the A relay (ring-party calls) or by the resistor TP1 (tip-party calls). The outpulser line relay operates to indicate that the loop out to the customer is continuous. When the outpulser is satisfied that the customer loop is continuous, it connects its party test polar relay to the T and R leads and lights test circuit lamp PT1.

2.10 The distinction between tip and ring party is that the switchhook contacts of the tip-party telephone set connect ground through the ringer winding to the T and R leads when the receiver is off-hook. No ground is connected at the ring-party station.

2.11 To simulate the tip-party ringer ground, the test circuit connects a potential divider composed of resistors TP2 and TP3 to the midpoint of resistor TP1. The party test relay then has to be operated over the T and R leads to the negative potential applied at the midpoint of resistor TP1. This negative potential simulates a ground potential that bucks the operating voltage in the outpulser.

2.12 To simulate the ring-party subscriber, the test circuit connects relay A across the T and R leads, and a simulated leakage

resistor TNO is connected between the R lead and ground. The purpose of resistor TNO is to insure that the leakage to ground does not cause a false tip-party indication.

2.13 When the outpulser determines which party is calling, it lights lamp RP or TP and lamp PK as described in 2.01 to 2.06. In addition, lamp TM2 operates since the outpulser employs its party test and abandoned call timer TM2 on party test.

2.14 If the outpulser recognizes a tip-party station, a ground removal test must be made at the end of the call to test that the ground that identified the station as a tip party is removed when the tip-party customer hangs up. The outpulser grounds lead TPT after the identifier has found the calling office. This is a signal for the trunk to initiate a ground removal test when the calling subscriber disconnects. Lamp TPK lights.

2.15 When the outpulser has determined which party is calling, it attempts to seize an identifier as described and, at the same time, makes an integrity test of its party test polar relay. An operate test of the party test polar relay is applied if the calling line is recognized as a ring-party station. An open circuit release test is applied if the line is recognized as a tip-party station. Integrity check lamp IYK lights to indicate a satisfactory integrity test of the polar relay.

2.16 If the integrity test fails, the outpulser multifrequency relay is prevented from operating, causing the outpulser to time out. Lamp TM1 lights.

GROUND REMOVAL TEST - PANEL OFFICES (GRT KEY OPERATED)

2.17 This test checks the ability of the outpulser to respond to information on lead TPT from the trunk that informs the outpulser to make ground removal test. The test also checks the ability of the outpulser to make the ground removal test.

2.18 Ground removal test is made on those calls where the outpulser party test indicates that a tip-party station has originated the call. The test is made when the calling party disconnects and requires that the trunk reseize an outpulser to make the test when the calling party disconnects.

2.19 To make ground removal test, the outpulser is seized as on any other call except that the SP relay is operated directly through the GRT key. When relay OTCI operates, ground is closed into the outpulser on lead TPT through the test circuit ground removal test key GRT to register the make ground removal test information in the outpulser. Lamp GRT lights to indicate registration of the make ground removal test information; party information check lamp PIK lights to indicate satisfactory lockin of the information. Identification check lamp IK lights. The outpulser then splits the T and R leads and looks out at the subscriber loop simulated by the test circuit and makes a party test. With the GRT key operated, the simulated tip-party ringer ground is removed from the T and R leads. The outpulser operates its ring-party relay as an indication of the successful removal of the tip-party ringer ground.

2.20 The outpulser then makes integrity test as described and releases. Lamps PT1, TM2, RP, PK, and RI light.

GROUND REMOVAL FAILURE TEST - PANEL OFFICES (GRF KEY OPERATED)

2.21 This test checks the ability of the outpulser to detect a false tip-party indication.

2.22 This test is similar to the ground removal test except that the simulated tip-party ringer ground is not removed from the T and R leads. The outpulser, therefore, sees a ground out on the customer loop when it makes the ground removal test and operates its tip-party relay. Lamps TP and GRF light to indicate the failure. The identifier is seized to identify the calling line number and the trouble ticketer is called in to print a trouble ticket. At the same time that the identifier is called in, an integrity test of the party test polar relay is made. A satisfactory integrity check is indicated by the lighting of lamp IYK. There is no outpulsing on this call.

GROUND REMOVAL FAILURE TEST - STEP-BY-STEP OFFICES (GRFMR OR GRFFR KEY OPERATED)

2.23 This test checks the ability of the outpulser to respond to information, on lead AB or lead TPT from a step-by-step trunk, that indicates that the trunk has detected a false tip-party indication on its ground removal test.

2.24 Ground removal test is made by the ANI trunk on calls from 2-party message rate lines, and on flat rate lines where the party test made by the ANI trunk indicates that a tip-party station originated the call. On calls from 2-party message rate lines, the party test is made by a message rate trunk and the indication in the ANI trunk is always ring party. However, at the time of outpulsing, the ANI trunk causes the message rate trunk to cut through as on operator calls. Then the ANI trunk makes the ground removal test when the calling party disconnects.

2.25 To make the ground removal failure test, the outpulser is seized as on any other call. However, when the outpulser transfer relay operates, as described, the test circuit SP1 relay does not operate. Instead, relay TLK operates, locks, and lights lamp

TLK. This is a check that the outpulser can hold the trunk which, in turn, holds the originating switch train to permit an identification to be made.

2.26 Upon operation of relay OTCI, as described, ground is closed into the outpulser on lead AB with the ground removal failure message rate key GRFMR operated, or on lead TPT with the ground removal failure flat rate key GRFFR operated. With the GRFMR key operated, the identifier must look for the line in the ring-party field. Therefore, the grounding of lead AB by the GRFMR key is a ring-party indication and lamp RP lights. With the GRFFR key operated, the identifier must look for the line in the tip-party field. Therefore, the grounding of lead TPT by the GRFFR key is a tip-party indication and lamp TP lights. Lamp PK lights to indicate satisfactory locking of the tip- or ring-party information. Identification check lamp IK lights. Ground removal failure lamp GRF lights to indicate that the outpulser has recognized the failure. The identifier is then seized to identify the calling line number and the trouble ticketer is called in to print a trouble ticket. There is no outpulsing on this call.

ABANDONED CALL TEST (AB KEY OPERATED)

2.27 This test checks the ability to test that the call has been abandoned by the calling subscriber.

2.28 When the outpulser looks out to the simulated customer loop with its line relay as described, it sees an open loop due to the abandoned key AB being operated. The line relay fails to operate and the outpulser times out. Lamp TM1 lights. The outpulser then releases relay SP1 which grounds lead AB into the outpulser to register the abandoned call. Abandoned call check lamp ABK lights to indicate the abandoned call registration in the outpulser. The outpulser releases and lamp RL lights.

WORK TIMER TEST (WT1 KEY OPERATED)

2.29 This test checks the ability of the outpulser work timer to time the progress of the call from the time the connector starts for an outpulser until the outpulser releases and also checks the ability of the timer to recycle as required.

2.30 Operation of the work timer key WT1 opens the T and R leads to prevent the trunk guard test from being made, as described. The outpulser then times out, takes a trouble ticket, and lights lamp TM1 to indicate successful time-out of the work timer. If the outpulser timer recycling feature is working properly, the time-out should occur after release of the identifier. Lamp IRL lights.

2.31 If the work timer should fail to operate, the outpulser overall timer will control the time-out of the outpulser. The outpulser will take a trouble ticket and release. Lamp RL lights. If the outpulser fails to release, lamp TA will light to indicate that the overall timer has timed out.

PARTY TEST AND ABANDONED CALL TIMER TEST (WT2 KEY OPERATED)

2.32 This test checks the ability of the outpulser party test and abandoned call timer TM2 to provide a timed interval required on party test and abandoned call operation. The test also checks the outpulser ability to recognize a continuity failure between the outpulser and the trunk.

2.33 Operation of party test and abandoned call timer key WT2 opens the T and R leads in simulated customer loop of FS3. When the outpulser looks out at the customer loop, as described, it sees an open circuit between the T and R leads and a 10,000 shunt to ground on the R lead. If the outpulser line relay is in proper adjustment, it will fail to operate through the shunt. The outpulser then releases the SP1 relay as described in 2.27 and 2.28. At the end of the timed interval, the outpulser times out. Lamp TM2 lights. Since this is not an abandoned call, the test circuit does not ground lead AB into the outpulser. Continuity check failure lamp CCKF lights to indicate that the outpulser has recognized a continuity failure between the trunk and the outpulser.

Note: The above test should be made with the TP key normal.

2.34 If the outpulser line relay fails to operate, the outpulser will call in the identifier for the identification. Lamp L1 lighted at this time indicates false operation of the line relay.

SECOND TRIAL TEST (2TR KEY OPERATED)

2.35 This test checks the ability of the outpulser to make a second trial if the identification fails on the first trial.

2.36 With the second trial key 2TR operated, the identification signal is not connected to the identifier until after the first trial identification has failed. First, trial failure lamp 1TR lights. The outpulser attempts to take a trouble ticket and releases the identifier. The outpulser then attempts to make the second trial and reseizes the identifier. On second trial, the identification signal is closed into the identifier to permit identification of the keyed up directory number which is then outpulsed and registered in the test circuit. On second trial, the test circuit is arranged to drop the first trial information and

register the second trial information, as described in 1.45 through 1.51.

REORDER TEST - PANEL OFFICES WITH PARTY TEST (RO KEY OPERATED)

2.37 This test checks the ability of the outpulser to set a panel trunk to reorder if no digits can be identified on both first and second trial on a call where the party test indicated a call from a tip-party station. The test also checks the ability of the outpulser to release when it recognizes that the trunk is set to reorder.

2.38 With the RO key operated, the outpulser makes party test, as described in 2.07 and 2.16, and will find that the tip-party station has originated the call. However, since the sleeve lead is opened by the RO key, the identification will fail on both first and second trials. The outpulser recognizes this condition as the reorder condition and applies resistance battery on lead SP to reoperate relay SP1 in the simulated trunk of FS3. At the same time, the outpulser releases the identifier and operates the test circuit MF relay. Relays SP1 and MF operate reorder relay RO which grounds lead R into the outpulser to release the outpulser. Lamps IRL, RO, and RL light.

TRUNK LOCKUP FEATURE TEST

2.39 This test checks the ability of the outpulser to lock up a trunk and the subscriber line for tracing the call if no identification signal is received at the identifier. This feature, which is effective on all calls except those where the outpulser indicates the call is from a panel office tip-party station, is under control of a key designated TKL; one per building is provided. The feature is activated by the operation of the TKL key which is located on the trouble ticketer frame.

2.40 With the TP key normal and the PT key operated, or with both keys normal, the outpulser will be primed for a ring-party station call or a nonpanel tip-party station call as described in previous sections. However, with the TH2AT and H2AT keys operated, the identification will fail on both first and second trial. The outpulser will outpulse the failure signal and will then attempt to lock up the trunk and the calling connection if the TKL key on the trouble ticketer frame has been operated and if no other trunk is locked up. To lock up the trunk, the outpulser applies -48 volts to lead TPT to operate the TLK relay. Lamp TLK lights to indicate that the outpulser has locked up the trunk. On service calls, the number of the trunk locked up is displayed on lamps located on the trouble ticketer frame. There is no number displayed on this test.

2.41 Since the trunk lockup feature is effective only for locking up one trunk at a time, the TKL key must be restored and reoperated for each retest of this feature.

DIGIT OVERREGISTRATION TEST (DX KEY OPERATED)

2.42 This test checks the ability of the outpulser to recognize an overregistration in its digit register relays.

2.43 Overregistration in the digit registers will occur if the identifier grounds more than 2-out-of-5 leads as it passes an identified digit to the outpulser. Under normal conditions, the identifier grounds only 2-out-of-5 digit registration leads. However, if there is a cross on the digit registration leads or if an amplifier-detector in the identifier operates falsely, more than 2-out-of-5 digit register relays will operate and the identification will fail.

2.44 To make an overregistration test, digit cross key DX is provided to reduce the attenuation on the test signal level. If two digit operate keys are operated for either the thousands, hundreds, tens, or units digit, two amplifier-detectors will be energized causing overregistration in the outpulser. The outpulser will take a trouble ticket and make a second trial which will also fail.

START PULSE TEST - F OPTION - STEP-BY-STEP OFFICES (STPP KEY NORMAL)

2.45 This test checks the ability of the outpulser to detect a ground signal from an associated step-by-step trunk on lead T (tip-party call) or lead B (individual or ring-party call).

START PRIME PULSE TEST - F OPTION - STEP-BY-STEP OFFICES (STPP KEY OPERATED)

2.46 This test checks the ability of the outpulser to detect a battery signal from an associated step-by-step special toll or operator assistance trunk on lead T (tip-party call) or lead R (individual or ring-party call).

3. IDENTIFIER TESTS

AMPLIFIER-DETECTOR TEST AND STEERING TEST

3.01 This test checks the ability of the amplifier-detectors in the identifier to respond to a signal whose level corresponds to a test value. The test also checks the office steering and the digit steering features of the identifier.

3.02 Upon seizure of the identifier by the outpulser, the identifier connects to the test circuit by means of test relays. The identifier then begins its attempt to identi-

fy the office and the directory number of the calling subscriber line.

TEST OF OFFICE STEERING

3.03 As the identifier attempts to find the calling office, it operates its office steering relays one after the other and at the same time operates the corresponding office steering check relays OF0-6K. As each OF-K relay operates, it operates a corresponding office steering relay OF0-6S which locks and lights a corresponding lamp to indicate the progress of the office steering. As the identifier office steering advances, the previously operated OF-K relay releases. The identifier office steering continues until the office corresponding to the operated office select key OFF0-6 is reached. The corresponding OF-K relay does not operate; instead the thousands digit test relay THT operates. When THT operates, it operates the corresponding OF-S relay to light the progress lamp and also operates thousands digit lock relay THL which locks and lights the thousands digit steering lamp THS. Relay THT also connects the identifying signal from the oscillator to the thousands digit operate keys THO 0-9 and to the thousands digit nonoperate keys THN 0-9 to apply an operate or a nonoperate test to an amplifier-detector. The amplifier-detector corresponding to the operated THO- key will recognize the signal and register the thousands digit in the outpulser. At the same time, the identifier will identify the office in which the calling number is located. This information is recorded in the outpulser as a single digit. Lamp OF-I indicates office number registered in the outpulser by the identifier. Later, the outpulser will translate the single office digit into a 3-digit office code to be outpulsed to the CAMA point.

3.04 Upon identifying the office, the identifier does one of two things:

(a) During heavy traffic with heavy traffic lamp HTR lighted, the identifier begins its digit scanning in an attempt to identify the remaining digits of the directory number.

(b) During light traffic, the identifier scans the remaining offices in an attempt to find a cross between offices. If it finds no cross, it returns to the office identified and begins digit scanning. If a crossed office condition is found, the office cross lamp OFX and the identifier end pulsing lamp IEP light to indicate the failure.

If heavy traffic key HTR is operated at the start of a test, the heavy traffic operation will be forced. However, if the call goes to second trial because of an identification failure, the second trial call will be forced to operate as light traffic.

TEST OF DIGIT STEERING

3.05 As described in 3.03 and 3.04, the identifier operates relay THT; this connects the thousands digit identifying signal into the identifier where the office and thousands digit are identified simultaneously. The identifier then begins its digit steering by releasing THT and operating hundreds digit test relay HT which operates the hundreds digit lock relay HL. Relay HL locks and lights the hundreds digit steering lamp HS. Relay HT connects the identifying signal into the identifier through an operated hundreds digit operate key HO 0-9 where the signal is detected by the amplifier-detector corresponding to the operated HO- keys. The identifier does not check whether or not it has recognized a signal but advances to the next digit after a timed interval. The tens and units digits are scanned in the same manner as the hundreds digit. Tens digit steering lamp TS and units digit steering lamp US light to indicate a satisfactory tens and units digit steering. When all digits have been registered in the identifier, the identifier is released. Lamp IRL lights.

AMPLIFIER-DETECTOR 0-9 OPERATE TEST

3.06 The operation of relays THT, HT, TT, and UT controls the identifying signal used to test the amplifier-detectors as described in 3.03, 3.04, and 3.05. The signal originates at an oscillator and is closed through attenuating resistors which control the level of the signal to provide an operate test and a nonoperate test. The signal is then closed to the common side of two 10-button key sets by each relay as it operates. One 10-button key set controls the operate signal, the other controls the nonoperate signal. A particular amplifier-detector may be tested by operation to either a THO 0-9, an HO 0-9, a TO 0-8, or a UO 0-9 key prior to the start of the test. Four amplifier-detectors may be tested on one test call by keying up separate digits for the thousands, hundreds, tens, and units digit.

Note: When making an operate test on an amplifier-detector, the corresponding nonoperate test key should be set to some other digit; a nonoperate test of the amplifier-detector corresponding to the operated nonoperate test key will automatically be made.

3.07 The number identified by the identifier will be outpulsed by the outpulser and registered in the test circuit. Lamps corresponding to the operated register relays light to permit a check of the identified number. If the identifier fails to identify the complete directory number, the call will fail and the outpulser will outpulse an identification failure in the information digit. This information will be recorded as a digit 2 (nonobserved call) or a digit 5 (observed call). A check of the digits

actually identified and registered in the outpulser can be made. (See 5.)

AMPLIFIER-DETECTOR 0-9 NONOPERATE TEST

3.08 The nonoperate test of the amplifier-detectors is similar to the operate test, described above, except that the nonoperate test keys THNO 0-9, HNO 0-9, TNO 0-9, and UNO 0-9 must be operated corresponding to the amplifier-detector under test. Four amplifier-detectors may be tested on one test call by keying up separate digits for the thousands, hundreds, tens, and units digits.

Note: When making a nonoperate test of an amplifier-detector, the corresponding operate test key should be set to some other digit; an operate test of the amplifier-detector corresponding to the operated operate test key will be made automatically and the directory number identified will correspond to the settings on the operate test keys.

3.09 If an amplifier-detector fails its nonoperate test, an overregistration will occur, causing the outpulser to outpulser the identification failure digit 2 (nonobserved call) or 5 (observed call).

AMPLIFIER-DETECTOR PTY OPERATE AND NONOPERATE TEST

3.10 Amplifier-detector PTY is the multiparty amplifier-detector. When a call from a multiparty line (four or more stations) is recognized, amplifier-detector PTY recognizes the identifying signal on the multiparty bus and registers the information in the outpulser. The outpulser then outpulses an information digit 1 (nonobserved) or 4 (observed), which indicates that operator assistance is required. Lamp PTY lights. No directory number digits are identified on this type of call.

3.11 With the multiparty key PTY normal, a nonoperate test is applied to the PTY amplifier-detector each time an operate test or nonoperate test is applied to the amplifier-detectors 0-9. Should amplifier-detector PTY operate falsely on its nonoperate test, the PTY signal would be registered in the outpulser and the identifier would be released immediately. The outpulser would outpulse a 1 or 4 in the information digit and lamp PTY would light as an indication of the failure.

3.12 With the multiparty key PTY operated, an operate test is applied to amplifier-detector PTY. Satisfactory operation of the amplifier-detector is indicated by the outpulsing of information digit 1 or 4. Failure of the operate test is indicated by the outpulsing of information digit 2 or 5.

AMPLIFIER-DETECTOR "SO" OPERATE AND NONOPERATE TEST

3.13 Amplifier-detector SO is used to detect that a calling subscriber line is service observed. When a call is recognized as a service-observed call, the outpulser modifies the information digit to inform the CAMA point that the call is observed. Lamp SO lights.

3.14 With the service-observed key SO normal, a nonoperate test is applied to the SO amplifier-detector each time an operate or nonoperate test is made on amplifier-detectors 0-9 or PTY.

3.15 A satisfactory nonoperate test is indicated by an information digit 0, 1, or 2. Should the amplifier-detector operate on its nonoperate test, the information digit would be 3, 4, or 5 and lamp SO would light.

3.16 With the SO key operated, an operate test is applied to the amplifier-detector at the same time that amplifier-detectors 0-9 or PTY are being tested. Satisfactory operation of amplifier-detector SO is indicated by an information digit 3, 4, or 5. Failure of the operate test is indicated by information digit 0, 1, or 2.

TEST OF AMPLIFIER-DETECTOR N OR P LEAD INPUTS

3.17 Each amplifier-detector has two input leads, an N and a P lead. The identification signal may be received over either of these leads. To test the ability of an amplifier-detector to respond to a signal on the N or P lead, the test circuit also provides an N and P lead input to each amplifier-detector. The amplifier-detector tests, described above, may be made using the N or the P lead input to the amplifier-detector. With N or P lead control key NP normal, the test signal is applied to an amplifier-detector over an N lead. With key NP operated, the test is applied over the P lead.

OFFICE AND DIGIT STEERING - SECOND ATTEMPT TEST

3.18 The identifier, in attempting to identify the office in which the calling line is located, scans the thousands digit output leads and the multiparty output leads for each of seven possible offices served. It looks at one office at a time under control of its office steering. When the identification signal is found on a particular thousands digit lead, the identifier determines the office in which the lead, and therefore the calling line, is located. Both the office number and the thousands digit are passed into the outpulser.

3.19 If the identifier fails to find the office due either to a trouble or to momentary loss of signal caused by switching

transients, the identifier will attempt to identify the office by scanning the hundreds digit output leads. Having found the office and a hundreds digit, the identifier will attempt to identify the tens digit and the units digit. The identifier then makes a second attempt to identify the thousands digit. If the digit is found, the call completes satisfactorily. When the digit is missed on the second attempt, the identifier signals the outpulser (lamp IEP lights) and the outpulser takes a trouble ticket and attempts a second trial.

3.20 The identifier is arranged so that it will make a second attempt to find as many as three digits missed on the first attempt. However, if both the thousands and the hundreds digits are missed, the identifier will signal the outpulser that it has failed to identify the office.

3.21 To test the second attempt feature of the identifier, a thousands digit second attempt key TH2AT, a hundreds digit second attempt key H2AT, a tens digit second attempt key T2AT, and a units digit second attempt key U2AT have been provided.

THOUSANDS DIGIT SECOND ATTEMPT TEST (TH2AT KEY OPERATED)

3.22 With key TH2AT operated, the identification signal is prevented from being connected into the identifier. On first attempt, this causes the identifier to attempt to scan all seven offices. Lamps OF(0-6)S light to indicate satisfactory scan for office on the thousands digit. The identifier then recycles and makes a second attempt to find the office corresponding to the operated OF 0-6 key. Office steering (0-6) repeat lamps OF(0-6)R light to indicate the progress of the identifier office steering circuit on the second attempt. On light traffic operation, all lamps OF(0-6)R will light.

3.23 Upon finding the office corresponding to the operated OFF0-6 key, the identifier attempts to identify the tens digit, the units digit, and then the thousands digit missed on the first attempt. The thousands digit repeat lamp THR lights to indicate that the identifier digit steering circuit recycled properly and made a second attempt to identify the keyed up directory number.

HUNDREDS, TENS, OR UNITS DIGIT - SECOND ATTEMPT TEST (H2AT, T2AT, OR U2AT KEY OPERATED)

3.24 With key H2AT, T2AT, or U2AT operated (all three may also be operated), the identification signal is prevented from being connected into the identifier causing the corresponding digit to be missed on the first identification attempt. The identifier then recycles and attempts to identify those digits that were missed. Lamp hundreds digit repeat HR, tens digit repeat TR, or units digit repeat UR lights to indicate that the identifier digit steering circuit has recycled properly and made a second attempt to identify the corresponding digit missed on the first attempt.

OFFICE CROSS TEST (OFX KEY OPERATED)

3.25 This test checks the ability of the identifier to detect an office cross (identification signal appearing in more than one office) when this condition occurs during light traffic operation.

3.26 Operation of key OFX causes the signal to be cut into the identifier through relays OF0 and OF1, simulating a signal in office 0 and office 1. If the identifier is seized on the test call after it has been idle for approximately 1 second (HTR lamp extinguished to indicate light traffic operation), lamp OF0 lights to indicate iidentification of office 0 and lamp OFX lights to indicate detection of the signal in office 1.

4. ADJUSTMENT OF IDENTIFIER AMPLIFIER-DETECTORS (ADR KEY OPERATED)

4.01 The adjustment of an amplifier-detector in the identifier requires the use of a test signal fed into the input of the amplifier-detector. The operate test signal, described in 3. is intended for use or adjusting an amplifier-detector. The nonoperate test signal, described in 3. is intended to permit checking that a readjusted amplifier-detector will fail to operate on the worst circuit nonoperate conditions.

4.02 By operating the appropriate key, each of the amplifier-detectors may be adjusted in accordance with the adjustment procedure given on the Identifier Circuit drawing.

4.03 For purposes of adjustment, the test signal may be fed into the identifier on the N or P lead inputs, as described in 3. The ADR key is operated to connect the test signal into the identifier through the thousands operate test and thousands nonoperate test keys and also through the service observing and multiparty keys. Prior to the adjustment, the identifier should be primed in accordance with the instructions in the Identifier Circuit Notes.

5. IDENTIFICATION CHECK - DIRECT CONNECTION TO OUTPULSER (IDK KEY OPERATED)

5.01 With the identification check key IDK operated, the directory number digits (thousands, hundreds, tens, and units), as registered in the outpulser by the identifier or AIOD translator, are registered directly in the corresponding registration relays of the test circuit. The office digit registered in the outpulser by the identifier or

AIOD translator is registered by an office direct relay OF0-6D and displayed on lamps OF(0-6)I. This registration does not depend on the operation of key IDK.

5.02 When the outpulser starts to outpulse its information into the test circuit, those digits not registered directly are registered in the test circuit by the Signaling Receiving Circuit. For example, the I, A, B, C, and ST digits will be registered in the test circuit.

6. IDENTIFICATION OF A PARTICULAR SUBSCRIBER DIRECTORY NUMBER (SVN KEY OPERATED)

6.01 This test checks the ability to identify the directory number of a particular subscriber using the service network.

6.02 Prior to the test, a connection must be made from the input of the particular subscriber number network on the Number Network and Primary Bus Circuit frame (primary network frame) to a test circuit pin jack located on the same frame. Operation of the corresponding office select OFF0-6 key is also required.

> Caution: The outputs of all the pin jacks associated with a 10,000-number series are multipled. Therefore, to avoid falsely connecting the sleeves of two subscriber lines, no more than one connection between a pin jack and a number network should ever be made.

6.03 With service network key SVN operated, the outpulser and the identifier will be primed for operation in the service network just as on a service call.

6.04 The number identified will be outpulsed and registered in the test circuit for checking.

6.05 If the subscriber line is busy on a service call, lamp LBY lights and the outpulser is released as described in 1.21 to 1.24. Lamp LBY will remain lighted until the line becomes idle or until the test circuit is restored to normal.

7. OPERATION WITH THE ANI AUTOMATIC TRUNK TEST CIRCUIT (TT KEY OPERATED)

7.01 The automatic testing of ANI trunks is performed by an automatic trunk test circuit. On these trunk test calls, an outpulser is called in by the trunk just as on a service call. A complete trunk test requires an identification of a simulated subscriber directory number and the outpulsing of the information by the outpulser. To permit an identification on trunk tests, the identifying tone from the trunk is connected into the identifier through the test network as described in 3. The number identified and outpulsed is registered in the OIT circuit as described in 1.31 to 1.33.

7.02 With the trunk test key TT and the start key ST operated, a start ground is closed into the trunk test circuit to start the trunk tests. Trunk test group cut-in relay TTGC operates to control the identifier group signal from the identifier (when provided) and to control the office relays OF0-6. Off-normal relay ON1 is operated by the trunk test circuit to control certain functions in the OIT circuit. After a trunk is tested, the ON1 relay is released to restore the OIT circuit relays. Relay ON1 is reoperated at the start of each trunk test.

7.03 At the time of identification, the trunk test circuit connects the identifying signal into the OIT circuit on lead S. The signal is then connected into the identifier through the test network and through operated digit operate keys under control of relays THT, HT, TT, and UT which operate one at a time under control of the identifier digit steering circuit (identification of the directory number is similar to that described in 3.). Where more than one identifier group is served, it is necessary for the identification signal to be steered into the test network associated with the group in which the call originates. This steering is performed by the IGA- and IGB- relays. To indicate the identifier group in which the call originates, the identifier grounds lead GR- into the test circuit. Lead GR- is closed through the trunk test group connector relay TTGC and causes operation of the associated IG relays. The corresponding IG lamp lights to indicate the identifier group. After the identification, the outpulser registers the information in the OIT circuit register as described in 1.31 to 1.33. A check circuit in the OIT circuit grounds lead IOK or IOK1 to the trunk test circuit when all digits outpulsed have been registered in the OIT circuit. The ground on lead IOK advances the trunk test circuit. At the completion of the trunk test, the trunk test circuit releases relay ON1 to restore the OIT circuit.

7.04 In addition to the keys mentioned above, the following keys control functions in the trunk test circuit:

(a) Key RN restores the trunk test circuit to normal.

(b) Key CA advances the test circuit.

(c) Key TP primes trunk test circuit for a tip-party call. When TP key is normal, trunk test circuit is primed for a ring-party call.

(d) Keys GRFMR and GRFFR prime trunk test circuit (step-by-step office only) for a ground removal failure test.

8. CONTROL ADVANCE OPERATION

8.01 Operation of the control advance key CA causes the operation of relay CA which

grounds lead RL to the outpulser. The outpulser attempts to release and grounds lead RL1 to operate relay RL in the test circuit. Relay CA also releases relay OIT which causes the circuit to restore.

8.02 Upon restoring key CA, relay CA releases and closes the start ground to relay OIT to restart the test.

9. REMOTE CONTROL OPERATION

9.01 Jacks RC-, provided at certain other ANI frames, provide for remote control of the CA feature using a 32A test set. The plug of the test set is inserted in the RC remote control jack at the remote frame. When the RED key of the 32A test set is operated, relay CA operates to release the outpulser and the test circuit as described in 8.01 and 8.02.

9.02 Release of key RED releases relay CA to restart the test.

9.03 When the remote control operation is used on calls made by the ANI automatic trunk test circuit, operation of key RED also causes the control advance feature in that circuit to be activated. Release of key RED permits restarting of the trunk test.

10. CANCEL TIME-OUT IN OUTPULSERS (CTO OR ICA KEY OPERATED)

10.01 In order to facilitate trouble-shooting in the various ANI circuits, the overall timing and the main work timing in the outpulser under test may be canceled by operation of cancel time-out key CTO or identifier control advance key ICA. The outpulser or the identifier may then be blocked without a time-out occurring. This type of operation may be used when operating with a test network or with a service network. If a test network is used, the test circuit grounds lead TSN into the outpulser. This causes the outpulser to be removed from the preference chain in outpulser connector and permits the other outpulser to be seized for service calls using the other identifier. Operation of an identifier select key ID- is also required when a test network is used with the cancel time-out feature. This insures that the identifier used on the test call will be made busy to other outpulsers. If the service network is used, lead TSN is not grounded and key ID need not be operated unless a particular identifier is to be used. However, if the service network is being used on the test call (key SVN operated) and any other outpulser in the identifier group goes off-normal, the cancel time-out release relay CTOR will be operated to release the outpulser and identifier under test and to clear the service network for the service call.

10.02 To restore relay CTOR, the release of the ST key or the operation of key CA is required.

11. CONTROL ADVANCE OF IDENTIFIER (ICA KEY OPERATED)

11.01 In order to permit observation of the circuits under test during the identification portion of the test call, and also to control the identifier operation for adjustment of the identifier amplifier-detectors, the control-advance-of-identifier feature has been provided.

11.02 With identifier control advance key ICA operated, the advance of the identifier office and digit steering is placed under control of the test circuit advance key AV. Each time key AV is operated, the identifier is advanced to its next scanning position. The identifier can be advanced in this manner until it completes its steering function and is released by the outpulser.

11.03 Advance of the identifier as described above can also be controlled from a remote control jack RC by operating key WH of a 32A test set when key ICA is operated.

11.04 To prevent time-out of the outpulser during the control advance of the identifier, the overall timing, and the work timing in the outpulser are canceled by key ICA. This is described in 10.01 and 10.02.

12. CANCEL TROUBLE TICKET (CTT KEY OPERATED)

12.01 Whenever it is desired to cancel a request for a trouble ticket, cancel trouble ticket key CTT should be operated prior to the start of a test call. With key CTT operated, the trouble ticketer busy relay in the outpulser will be operated instead of the trouble ticketer start relay. The outpulser will then react just as in service when it finds the trouble ticketer busy.

13. AIOD TRANSLATOR TEST

13.01 Outpulser operation for this test is described in 1.52 through 1.61. Translator selection is made by the operation of the TS- key prior to the start of testing. The operated TS- key applies ground to the TLT- and TLT leads to the outpulser. Ground on the TLT lead operates the TLT relay in the outpulser. The operated outpulser TLT relay transfers the control of operating the outpulser translator select relays TS- from the outpulser operated TH- relay to the test circuit operated TS- key. This arrangement permits originating test calls using a thousandth digit that is not associated with AIOD service. When translator selection is made from the test circuit on a short loop-around test, any 4-digit number can be used as the PBX trunk number. Before making translator selection from the test circuit on long loop-around test, refer to the caution as described in 1.54. With the above arrangement, the operation of all the PBX trunk and station number registration relays (TH-, H, T-, U-) in the translator can be checked by

applying short loop-around tests selecting trunk numbers as required.

PBX AIOD STATION NUMBER CHECK

A. Short Loop-Around Test

13.02 When the PBX equipment receives the test call signal, it will transmit back to the AIOD translator, as a station number, the same digits it received as a trunk number. In addition, this causes all office index relays to operate. Since all office index relays are operated, the station number check would fail and a transfer of the station number from the translator to the outpulser could not take place. To prevent this, a path is provided in the translator to operate the station number check relay SNK through the operated TST, OF0, OF1, and OF2 relays.

13.03 On a short loop-around test, the station number portion of the check circuit is checked by operating the test circuit SDK relay over the SDK lead, through the operated 2/5 station number, TST, and office index relays in the translator.

B. Long Loop-Around Test

13.04 The operated LLT key removes the test signal to the PBX equipment and causes the LLT relay in the translator to operate. The operated LLT relay in the translator supplements the functions of the translator SNK relay. The long loop-around test call appears as a service call to the PBX equipment. The PBX equipment transfers back to the translator the station number 2/5, office index tens 1/3, and office index units 2/5.

13.05 On a long loop-around test, the office index portion of the station number check circuit is checked by operating the SDK relay over the SDK lead through operated office index 1/3 tens and units 2/5 relays.

14. AIOD TRANSLATOR MISCELLANEOUS TESTS

PBX STATION NUMBER NOT IDENTIFIED

14.01 If the PBX equipment cannot associate the PBX trunk number with a PBX station number, it will cause the 3-office tens relays to operate in the translator. The operated office tens relay will ground the TRL lead to the outpulser. The outpulser will provide alternate call treatment by routing it to the operator. This feature is tested by operating the FTM key prior to originating a short loop-around test. The operated FTM key removes the ground from the FTM lead to the outpulser so that the outpulser can recognize the ground applied to the TRL lead by the translator. The FTM relay in the outpulser is operated. The outpulser will attempt to take a trouble ticket with an FTM indication and release.

AIOD TRANSLATOR MANUAL MAKE-BUSY TEST

14.02 The manual make-busy feature of the translator is tested by operating the CMB key prior to originating an AIOD test call that is directed to select the busy AIOD translator. The operated CMB key will prevent the CMB relay in the outpulser from operating and permit the outpulser to recognize the busy condition. The translator busy relay TLB is operated in the outpulser and the outpulser will attempt to take a trouble ticket with a TLB indication and release.

15. TEST OF INTERCEPT CALL (INT KEY OPERATED)

15.01 This test checks the ability of the outpulser to respond to information on the INT lead from the outpulser connector that informs the outpulser that an intercepted line is being identified.

15.02 The operation of the INT key causes the operation of the INT relay in the outpulser under test. The outpulser functions as for a regular call, except that the information digit outpulsed will indicate a regular intercept call. With the TP/INT UT key also operated, the information digit shall indicate a blank intercept number.

15.03 The operation of the INT-TBL key along with the operation of the INT key will cause the outpulser to handle the call as a trouble intercept, and the information digit will so indicate.

16. TEST OF CALLING LINE IDENTIFICATION (CLI KEY OPERATED)

16.01 This test checks the ability of the outpulser to respond to information on the PSB lead from the outpulser connector to indicate that a calling line identification is being made.

16.02 The operation of the CLI key prepares for the operation of the calling line identification relays in the outpulser when the outpulser test-cut-in relay OTCI operates. If the outpulser functions properly, ground on the CLI lead operates the CLI relay which locks and lights the CLI lamp, indicating a successful test. If there is trouble, a ground on the CIT lead operates relay CIT which locks and lights the CIT lamp, indicating a trouble on the test.

REPEAT TEST (ZQ OPTION)

16.03 Operation of the REP key, in the associated Automatic Trunk Test Circuit, will cause the test in progress to be repeated, automatically, until the REP is restored to normal or until either the ST or OIT key is restored to normal.

16.04 The repeat feature is activated by operation of relay RL at the end of a test: relay RL closes ground through the operated REP key to operate relay CA, which releases relay OIT to restore the circuit. When the circuit has restored to normal, RL releases, releasing CA. Relay OIT then reoperates to restart the test circuit. While the REP key is activated, certain of the progress lamps that normally light at the end of a test will not have time to come up to full brilliance due to the short interval between operation of RL and release of the operated register relays; these lamps will be seen when the REP key is restored to normal.

Note: Since the repeat function is under control of the RL relay which in turn is operated by the outpulser RL relay, it is possible that tests that fail to complete in the normal manner will be repeated; this is due to the fact that in addition to its normal operate paths, the outpulser RL relay may be operated over a trouble release path after a failure. Under these failure conditions, repeated trouble tickets may be produced unless the trouble ticketer is made busy or the cancel trouble ticket (CTT) key is operated.

17. PLANT REGISTERS

PBX-AIOD A1 OR A2 NUMBER IDENTIFIER REQUEST COUNTER

17.01 Each time the central office requests identity of the PBX outward dialing station, the PBX-AIOD translator transmits a ground pulse to score the NIR register.

PBX-AIOD A1 OR A2 NUMBER IDENTIFICATION REQUEST COUNTER

17.02 If the PBX-AIOD translator fails to get the required station number, a ground pulse scores the NIRF register.

PBX-AIOD A1 OR A2 PBX REQUEST COUNTER

17.03 Each time there is a request to enter a station into memory, the PBX request register is scored by a ground pulse.

PBX-AIOD A1 OR A2 FAILURE TO STORE REGISTER

17.04 Each time there is a failure to store a station number in memory, the FS register is scored from the station identification test circuit.

18. PBX-AIOD ALARM LAMPS AND RELEASE KEY

18.01 A minor and major remote visual alarm are provided on the test panel, designated MN-AIOD and MJ-AIOD, respectively. An alarm release key designated RS-AIOD is provided to release these alarms remotely as described for the fuse, alarm and miscellaneous circuit for PBX-AIOD, A1 and A2.

19. PBX-AIOD - A2 DATA DISPLAY LAMPS

19.01 If a trouble is encountered in any one of a maximum of nine data link circuits (such as an open link), the number of the circuit is displayed in a combination of the data display lamps DLN0,1,2,4, and 7 on the test panel.

20. PBX-AIOD - A1 MAINTENANCE CONTROL LAMPS AND RESET KEY

TRAP INDICATOR

20.01 If there is a failure in the data link which causes a mutilated trunk number, the trap register will fill. This condition will be indicated by the lighted TRAP lamp on the test panel.

TIMED SHUTDOWN

20.02 The TSD lamp is lighted as an alarm indication when the automatic make-busy feature for PBX-AIOD registers an X or Y driver alarm, translator parity failure, or core driver alarm errors are registered in the SIT circuit.

PRINTER SHUTDOWN AND RESTART

20.03 If the number of errors recorded on the printer during a 60-second timer interim exceeds a specified number, a printer shutdown is initiated, curtailing further error printouts and lighting the PSD lamp on the panel, indicating the shutdown condition. Momentary operation of the RESET key clears the shutdown condition, which allows the restart of the printer and timing sequence if desired.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

None.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

Designation	Meaning
1TR	First Trial Failure
2TR	Second Trial Failure
A	Simulates PBX Line Relay
A0,1,2,4,7,10	A Digit Registration
ABK	Abandoned Call Check
ADR	Amplifier-Detector Readjust
AR	A Relay Release
ARL	A Release Lock
AS	A Digit Steering
AV	Advance (Identifier)
B0,1,2,4,7,10	B Digit Registration
BS	B Digit Steering
BTR	Outpulser Busy Test Relay
BYA	Line Busy Auxiliary
BYT	Line Busy Test
C0,1,2,4,7,10	C Digit Registration
CA	Control Advance
CCKF	Continuity Check Failure
CI	Cut-In Intercept
CON	AIOD Translator Connected
CS	C Digit Steering
CTOR	Cancel Time-Out Release
DCA,B	Direct Connection (to Outpulser)
EX1	End Steering (Identifier)
GRF	Ground Removal Failure
GRT	Ground Removal Test
H0,1,2,4,7,10	Hundreds Digit Registration
HK	Hundreds Digit Check
HL	Hundreds Digit Lock
HR	Hundreds Digit Repeat
HT	Hundreds Digit Test
HTR	Heavy Traffic
I0,1,2,4,7,10	Information Digit Register
ID	Identification
ID0,1	Identifier 0,1
IDG0,1,2	Information Digit 0,1,2
IEP	Identifier End Pulsing
IG0-2	Identifier Group 0-2
IGA0-2,IGB0-2, IGC0-2	Identifier Group 0-2 Auxiliary
IK	Identification Check
INT	Intercept Call
IOD	AIOD Call
IRL	Identifier Release
IS	Information Digit Steering
IYK	Integrity Check
KP	Keypulse
L1	Line Relay Auxiliary
MF	Multifrequency
NP	N or P Lead Control (to Identifier)
NPK	No Party Check (in Identifier)
OB	Outpulser Made Busy (to Connector)
OEP	Outpulser End Pulsing
OF0-6	Office 0-6
OF(0-8)D	Office (0-8) Direct Connection
OF(0-6)K	Office (0-6) Steering Check
OF(0-6)R	Office (0-6) Steering Repeat
OF(0-6)S	Office (0-6) Steering
OFE2	Office Steering End
OFX	Office Cross
OIT	Outpulser Identifier Test
ON	Off Normal
ON1	Off Normal Auxiliary

OP0-9	Outpulser 0-9
OTCI	Outpulser Test Cut-In
OTL	Outpulser Test Lock
PIK	Party Information Check
PK	Party Check
PT	Party Test
PTY	Multiparty
RAV	Register Advance
RCL	Recycle AIOD Calls
RGK	Register Check
RL	Release
RO	Reorder
RP	Ring Party
SCA,B,C	Steering Control A,B,C
SDK	Short Loop-Around Test - PBX 4-Digit Number Check Long Loop-Around Test - PBX Office Index Check
SNK	Outpulser PBX Station Number Check
SO	Service Observed
SP	Split
SP1,2	Split 1,2
SPK	Start Pulse Check
ST0,1,2,4,7,10	Start Digit Registration
STS	Start Digit Steering
T0,1,2,4,7,10	Tens Digits Registration
TA	Time-Out Alarm
TGD	Trunk Guard
TGD1	Trunk Guard Holding - AIOD Calls
TGDA	Trunk Guard Auxiliary - AIOD Calls
TH0,1,2,4,7,10	Thousands Digit Registration
THK	Thousands Digit Check
THL	Thousands Digit Lock
THR	Thousands Digit Repeat
THS	Thousands Digit Steering
THT	Thousands Digit Test
TK	Tens Digit Check
TL	Tens Digit Lock
TLK	Trunk Locked Up
TM1,2	Timing 1,2
TNC	Tone Connected
TNR	PBX Trunk Number Release
TNK	Tone Check
TP	Tip Party
TPA	Tip-Party Test
TPB,C	Tip-Party Check (Identifier)
TPK	Tip-Party Check (Outpulser)
TR	Tens Digit Repeat
TR1	End of First Trial
TR2	Start of Second Trial
TRNK	PBX Trunk Number Check
TRS	Transfer
TS	Tens Digit Steering
TS0-2	AIOD Translator
TT	Tens Digit Test
U0,1,2,4,7,10	Units Digit Registration
UK	Units Digit Check
UL	Units Digit Lock
UR	Units Digit Repeat
US	Units Digit Steering
UT	Units Digit Test

2.02 Keys

Designation	Meaning
2TR	Second Trial
AB	Abandoned Call
ADR	Amplifier-Detector Readjust
AV	Advance (Identifier)
CA	Control Advance
CMB	AIOD Transfer Cancel Manual Make Busy
CTO	Cancel Time-Out (in Outpulser)
CTT	Cancel Trouble Ticket

DX	Digit Cross
FTM	AIOD - Failure to Match
GRF	Ground Removal Failure (Panel)
GRFFR	Ground Removal Failure Flat Rate (Step-by-Step)
GRFMR	Ground Removal Failure Message Rate (Step-by-Step)
GRT	Ground Removal Test
H2AT	Hundreds Digit Second Attempt
HNO (0-9)	Hundreds Digit Nonoperate 0-9
HO (0-9)	Hundreds Digit Operate 0-9
HTR	Heavy Traffic
ICA	Identifier Control Advance
ID0,1	Identifier Select 0,1
IDK	Identification Check
IG0-2	Identifier Group 0-2
INT	Intercept
INT TBL	Trouble Intercept
LF	Line Finder
LLT	AIOD - Long Loop-Around Test
LS	Line Switch
NP	N or P Lead Control
OFF0-6	Office Select 0-6
OFX	Office Cross
OIT	Outpulser-Identifier Test
OP0-9	Outpulser Select 0-9
POF0-2	AIOD Office Selection (101 ESS)
PT	Party Test
PTY	Multiparty
RESET	Shutdown Printer Release
RO	Reorder
RN	Restore to Normal
RS-AIOD	Major and Minor Alarm Release
SO	Service Observed
ST	Start
STPP	Start Prime Pulse
SVN	Service Network
T2AT	Tens Digit Second Attempt
THNO (0-9)	Thousands Digit Nonoperate 0-9
THO (0-9)	Thousands Digit Operate 0-9
TNO (0-9)	Tens Digit Nonoperate 0-9
TO (0-9)	Tens Digit Operate 0-9
TP	Tip Party
TS0-2	AIOD-Translator Selection
TT/INT UT	Trunk Test/Unassigned Terminal
U2AT	Units Digit Second Attempt
UNO (0-9)	Units Digit Nonoperate 0-9 or AIOD Office Selection
UO (0-9)	Units Digit Operate 0-9
WT1	Work Timer 1
WT2	Party Test and Abandoned Call Timer

2.03 Lamps

Designation	Meaning
1TR	First Trial Failure
2TR	Second Trial Failure
A0,1,2,4,7,10	A Digit Registration
ABK	Abandoned Call Check
ADR	Amplifier-Detector Readjust
ARL	A Relay Release
B0,1,2,4,7,10	B Digit Registration
BTR	Busy Test Relay
CI	Cut-In Intercept
C0,1,2,4,7,10	C Digit Registration
CON	AIOD Translator Connected
CCKF	Continuity Check Failure
CTOR	Cancel Time-Out Release
DLN0,1,2,4,7	Data Link Display
FTP	False Tip Party
H0,1,2,4,7,10	Hundreds Digit Registration

HK	Hundreds Digit Check
HR	Hundreds Digit Repeat
HS	Hundreds Digit Steering
HTR	Heavy Traffic
GRF	Ground Removal Failure
GRT	Ground Removal Test
I0,1,2,4,7,10	Identification Digit Registration
ID0,1	Identifier 0,1
IDG0-2	Information Digit 0-2
IEP	Identifier End Pulsing
IRL	Identifier Release
IK	Identification Check
INT	Intercept Call
IOD	AIOD Call
ITP	Identifier Tip Party
IYK	Integrity Check
KP	Key Pulse
L1	Line Relay Auxiliary
LBY	Line Busy
LLT	AIOD Long Loop-Around Test
MJ-AIOD	Major Visual Alarm
MN-AIOD	Minor Visual Alarm
NPK	No Party Check (in Identifier)
OB	Outpulser Busy (in Connector)
OEP	Outpulser End Pulsing
OF (0-8) I	Office (0-8) Identified
OF (0-6) R	Office (0-6) Repeat
OF (0-6) S	Office (0-6) Steering
OFX	Office Cross
OIT	Outpulser-Identifier Test
ON	Off Normal
OP0-9	Outpulser 0-9
OTCI	Outpulser Test Cut-In
OTL	Outpulser Test Lock
PIK	Party Information Check
PK	Party Check
PSD	Printer Shutdown
PTY	Multiparty
PT	Party Test
PT1	Party Test Cut-In
RCL	Recycle AIOD Calls
RL	Release
RO	Reorder
SDK	Short Loop-Around Test - PBX 4-Digit Number Check Long Loop-Around Test - PBX Office Index Check
SNK	Outpulser PBX Station Number Check
SO	Service Observed
SPK	Start Pulsing Check
ST	Start
ST0,1,2,4,7,10	Start Digit Registration
T0,1,2,4,7,10	Tens Digit Registration
TA	Time-Out Alarm
TGD	Trunk Guard
TGD1	Trunk Guard Holding - AIOD Calls
TGDA	Trunk Guard Auxiliary - AIOD Calls
TK	Tens Digit Check
TH0,1,2,4,7,10	Thousands Digit Registration
THK	Thousands Digit Check
THR	Thousands Digit Repeat
THS	Thousands Digit Steering
TLK	Trunk Locked Up
TM1,2	Timer 1,2
TNC	Tone Connected
TNK	Tone Check
TNR	PBX Trunk Number Release
TP	Tip Party
TPK	Tip-Party Check (Outpulser)
TR	Tens Digit Repeat

TRAP	Trap To Prevent False Billing
TRNK	PBX Trunk Number Check
TRS	Transfer
TS	Tens Digit Steering
TSD	Timed Shutdown
TS0-2	AIOD Translator
U0,1,2,4,7,10	Units Digit Registration
UK	Units Digit Check
UR	Units Digit Repeat
US	Units Digit Steering

2.04 Registers

Designation	Meaning
FS	Failure to Store
NIR	Number Identification Request
NIRF	Number Identification Request Failure
PBX	PBX Request

3. FUNCTIONS

3.01 To select a particular outpulser in a particular identifier group and prime that outpulser for a test call.

3.02 To prevent seizing the outpulser if the outpulser is busy on another call.

3.03 To seize the particular outpulser if it is idle or when it becomes idle.

3.04 To make the outpulser busy to other calls in the outpulser connector.

3.05 To cause the outpulser to connect to the test circuit.

3.06 To prime the outpulser to select a particular identifier.

3.07 To simulate the action of an ANI trunk to permit the outpulser and identifier to function properly.

3.08 To simulate a ring-party line.

3.09 To simulate a tip-party line.

3.10 To prime the outpulser for either a tip-party or ring-party call.

3.11 To prime the outpulser to make a party test in panel offices to determine which party on a 2-party line is calling.

3.12 To prime the outpulser to make a ground removal test in panel offices with tip-party line.

3.13 To prime the outpulser to make a ground removal test in panel offices with ring-party lines.

3.14 To test that the outpulser recognizes a ground removal failure in panel offices with tip-party lines and in step-by-step offices.

3.15 To test that the outpulser can hold a step-by-step trunk while the trunk is informing the outpulser that a ground removal failure has occurred.

3.16 To simulate a call abandoned by the subscriber.

3.17 To test the work timer in the outpulser.

3.18 To test the party test and abandoned call timer in the outpulser.

3.19 To simulate a continuity failure between the outpulser and the trunk.

3.20 To test that the outpulser can cause trunk to be set to reorder in panel offices with tip-party lines.

3.21 To test that the outpulser can cause a trunk to lock up if no identification signal is received on calls other than panel tip-party calls.

3.22 To connect the outgoing T and R leads into a Signaling Receiving Circuit, which converts information outpulsed as ac signals into dc signals.

3.23 To register the information outpulsed by the outpulser and converted to dc signals by the Signaling Receiving Circuit.

3.24 To prime the Signaling Receiving Circuit to receive the next digit.

3.25 To register the information registered in the outpulser by the identifier.

3.26 To check the office and digit steering functions of the identifier.

3.27 To provide an identification signal attenuated to a test level.

3.28 To make an operate test or a nonoperate test on any digit amplifier-detector in the identifier on the thousands, hundreds, tens, or units digit scan of the identifier.

3.29 To make an operate or a nonoperate test of the service observing and the multiparty amplifier-detector in the identifier.

3.30 To provide means to adjust the amplifier-detectors in the identifier.

3.31 To connect to the identifier amplifier-detectors on either the P or the N input leads.

3.32 To force the identifier to make a second attempt to find a thousands, hundreds, tens, or units digit.

3.33 To force an identification on a second trial.

3.34 To force heavy traffic operation in the identifier on first trial.

3.35 To register the progress of the outpulser and the identifier.

3.36 To register the outpulser number.

3.37 To register the identifier number.

3.38 To release information associated with a first trial identification failure and to register second trial identification information.

3.39 To provide means to identify a subscriber directory number in the service network consisting of the primary network and bus circuit and the secondary network and bus connector circuit.

3.40 To recognize ground on the sleeve of a subscriber line as a busy indication in crossbar, step-by-step, and panel system battery cutoff offices.

3.41 To recognize battery on the sleeve of a subscriber line as a busy indication in panel system ground cutoff offices.

3.42 To release the outpulser and drop the test call through a service network if the subscriber line connected for testing is busy in service.

3.43 To permit the ANI automatic trunk test circuit to use certain features of the test circuit.

3.44 To recognize the identifier group in which an ANI trunk test originates.

3.45 To connect the identification signal from the ANI trunk, on a trunk test call, into an identifier in the associated group.

3.46 To provide control advance and remote control features.

3.47 To permit canceling the time-out features in the outpulser.

3.48 To provide means to automatically release test call when cancel time-out feature is employed on a test call employing service network, and some other outpulser in the same identifier group goes off normal for a service call.

3.49 To provide means for advancing the identifier circuit under key control.

3.50 To provide means for canceling trouble tickets on test calls.

3.51 To check that the outpulser can recognize an AIOD call.

3.52 To check that the outpulser can select and connect to an AIOD translator.

3.53 To check that the PBX trunk number is registered in the AIOD translator.

3.54 To check, on an AIOD call, that the outpulser registration relays operated from PBX trunk number identification have released, and that the outpulsing is prepared to receive the PBX station number.

3.55 To check that the office relays in the AIOD translator have operated.

3.56 To check the 2/5 station number check circuit in the AIOD translator.

3.57 To check the ability of the outpulser to detect an indication that the PBX equipment has no record of the AIOD call in progress.

3.58 To display on the lamp panel the PBX AIOD office code and station number.

3.59 To test the manual make-busy feature of the AIOD translator.

3.60 To check the ability of the outpulser to hold the tandem trunk during the interval required to receive the PBX station number from the PBX AIOD equipment.

3.61 To give a visual indication that the test circuit is primed for an AIOD long loop-around test.

3.62 To test that an outpulser equipped for special toll or operator assistance traffic in step-by-step offices can detect a battery or ground signal on the T or R lead and outpulse a start-prime or start pulse, respectively.

3.63 To check the ability of the outpulser to detect an intercept call, regular blank number, or trouble, and to outpulse the proper information.

3.64 To check the ability of the outpulser to recognize calling line identification.

3.65 To continuously repeat a particular test while the REP key in the associated automatic trunk test circuit is operated.

3.66 To provide plant registers to score the number of requests for station identification, failure to obtain identification, requests to record identification information in store, and failure to record identification in store.

3.67 To provide an alarm and lamp indication when there is a PBX-AIOD failure.

3.68 To provide a repeat test to permit automatic repeating of tests of outpulsers and identifiers.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) Identifier Circuit - SD-95810-01.

(b) Outpulser Circuit - SD-95811-01.

(c) Number Network and Primary Bus Circuit - SD-95813-01.

(d) Miscellaneous Circuit for Identifier Frame - SD-95819-01.

(e) Miscellaneous Circuit for Outpulser Frame - SD-95820-01.

(f) Miscellaneous Circuit for Trunk Frame - SD-95821-01.

(g) Oscillator Circuit - SD-95827-01.

(h) Automatic Trunk Test Circuit (Crossbar or Panel) - SD-95889-01.

(i) Automatic Trunk Test Circuit (Step-by-Step) - SD-32315-01.

(j) Signaling Receiving Circuit - SD-95536-01.

(k) Translator Circuit for PBX AIOD - SD-99319-01.

(l) Fuse, Alarm, and Miscellaneous Circuit - SD-1C006-01, PBX-AIOD A1, or SD-1C236-01, PBX-AIOD A2.

(m) Station Identification Test Circuit - SD-1C002-01, PBX-AIOD A2, or SD-1C005-01, PBX-AIOD A1.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The outpulser-identifier test circuit shall be capable of performing all the functions specified in this circuit description and meeting all the requirements of the Circuit Requirements table.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 Provides a means for checking the ability of the outpulser to recognize calling line identification.

B. Changes in Apparatus

B.1 Added - App Fig. 2

Relay CLI - CIT, AK4, option ZP

Resistor CL1, 18AN, option ZP

Resistor CL2, 18AN, option ZP

B.2 Added - App Fig. 8

Lamp CLI, 2Y, option ZP

Lamp CIT, 2Y, option ZP

B.3

Superseded	Superseded By (App Fig. 8)
Key SO, C1LB, option ZN	Key SO/CL1, C1JG, option ZP

D. Description of Changes

D.1 FS15, primarily option ZP for calling line identification, is added.

D.2 At location 8H5, existing contacts of the SO key are designated option ZN and new contacts designated option ZP are added.

D.3 Circuit Notes 102 and 104 are changed to reflect the above changes.

D.4 Relays CLI and CIT are added to the Circuit Requirements table.

D.5 FS16 through FS22 are added.

D.6 App Fig. 16, 17, and 18 are added.

D.7 The sheet index, sheet A1, is revised to reflect these additions.

D.8 The lead index and apparatus index are also revised.

D.9 Information is added in Notes 102 and 104.

D.10 Testing information for added registers is added in the Circuit Requirements table.

D.11 Note 101 is revised to add Q battery and R ground.

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