(TMB)

PARKWAY C.O.

CD-95810-01
ISSUE 4D
APPENDIX 7AC
DWG ISSUE 17AC
DISTN CODE 1N99

28

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

CHANGES

B. Changes In Apparatus

B.1

Removed	Replaced By
HS, THS, TS, US Relays - AF105 - FS1 App Fig. 1, Option ZC	HS, THS, TS, US Relays - AF175 - FS1 App Fig. 1, Option ZC

D. Description of Changes

D.1 When message charging was added to SD-95829-01, the service observing network circuit, continuity of the K lead on sheet B8 was not provided by looping in that circuit as supposed. To complete the missing wiring, an equivalent of option X of sheet B8 and option Y of sheet B10 is added as option ZB. In addition to the new option ZB added to FS6 and FS10, it is added to Notes 102 and 104 to provide for the No. 1 Crossbar Message Charging System feature.

D.2 Erratic identifier circuit operation, which produced incorrect or mutilated digits as the result of shock chatter or contact bounce on four AF105 relays is corrected by the replacement of these relays with AF175 relays, option ZD. For the HS, THS, TS, and US digit steering relays in FS1, on sheet B1, option ZC is replaced by option ZD. This change is reflected in Circuit Notes 104 and 108.

D.3 Minor drafting corrections are made on sheet B8 and on sheet G2, CAD6, Pchgs G33 and G27.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-WCR-GFC

WE DEPT 25120-WCR-WEA-BT

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

CHANGES

A. Changed and Added Functions

A.1 To test for a false ground or cross on the OSC leads and when a cross occurs to signal a minor alarm, light a trouble lamp, and ground the OSX lead to the trouble ticketer.

B. Changes In Apparatus

B.1 Added

OSX0, OSX1 Relay -
AK47 - FS7,
App Fig. 1,
E Option

OSX0, OSX1 Networks -
185A - FS7,
App Fig. 1,
E Option

OSX, OSX0, OSX1, OSXA Diodes -
446K - FS7,
App Fig. 1,
E Option

B.2

Superseded	Superseded By
BHT Capacitor - 0.001UF - KS-13368,L-3 App Fig. 1	BHT Capacitor - 0.001UF - KS-13367,L-34 App Fig. 1
CL1,2 Capacitors - 4300UUF - KS-13367,L-4 , App Fig. 3	CL1,2 Capacitors - 4320PF - KS-13368,L-32, App Fig. 3
CLC Capacitor - 200UUF - KS-13365,L-4, App Fig. 3	CLC Capacitor - 200UUF - KS-13365,L-33, App Fig. 3
FB1 Capacitor - 0.01UF - KS-13368,L-1 App Fig. 3	FB1 Capacitor - 0.01UF - KS-13368,L-29 App Fig. 3
D1, D2 Diodes - 420A, App Fig. 3	D1, D2 Diodes - 459B, App Fig. 3
P, PD Jacks - 239C, App Fig. 8	P, PD Jacks - 239CM, App Fig. 8
BO1 Resistor - 4700 Ohms - 144E - App Fig. 3	BO1 Resistor - 4700 Ohms - KS-20289,L-6C, App Fig. 3
F1 Resistor - 84.5 Ohms - 144E - App Fig. 3	F1 Resistor - 84.5 Ohms - KS-20289,L-6C - App Fig. 3
F2 Resistor - 569 Ohms - 147D - App Fig. 3	F2 Resistor - 569 Ohms - KS-20289,L-6C App Fig. 3
FB1 Resistor - 20K Ohms - 144E - App Fig. 3	FB1 Resistor - 20K Ohms - KS-20289,L-6C - App Fig. 3
KA1 Resistor - 681 Ohms - 144E - App Fig. 3	KA1 Resistor - 681 Ohms - KS-20289,L-6C - App Fig. 3
KA2, KC1 Resistors - 1000 Ohms - 144E - App Fig. 3	KA2, KC1 Resistors - 1000 Ohms - KS-20289,L-6C - App Fig. 3
KC2 Resistor - 2610 Ohms - 144E - App Fig. 3	KC2 Resistor - 2610 Ohms - KS-20289,L-6C - App Fig. 3
KL1 Resistor - 619 Ohms - 144E - App Fig. 3	KL1 Resistor - 619 Ohms - KS-20289,L-6C - App Fig. 3

Printed in U.S.A.

Superseded (cont)	Superseded By
KL2 Resistor - 383 Ohms - 144E - App Fig. 3	KL2 Resistor - 383 Ohms - KS-20289,L6C - App Fig. 3
HTT Resistor - 715K Ohms - 145 or 221A - App Fig. 1	HTT Resistor - 715 Ohms - KS-20810,L-1A - App Fig. 1

D. Description of Changes

D.1 A trouble condition in an outgoing ANI-B trunk can result in a cross on the OSC lead to the identifier. This in turn will allow both OSC relays to operate and produce two 5800Hz signals to a common sleeve. When the two signals drift out of phase, an identification failure will result.

D.2 As a maintenance feature, (OSX-) false ground on the OSC lead relay is added to FS7 on sheet B9, on an identifier group basis. The operation of the OSX0 or OSX1 relay by an OSC cross will provide a display and alarm in the miscellaneous circuit for the trouble ticketer. It will also operate a trouble register in the ticketer. A nonshorting 310 plug is used for this purpose.

D.3 On sheet B9E7, reference to Auxiliary Line Identification - Panel, CSBR No. 1 or SXS, is removed since the circuit is being rated Mfr Disc.

D.4 A recent change made on Issue 28B of the outpulser circuit SD-95811-01 is added to sheet B8E0 to show a PS relay break contact removed, by an option in the outpulser, from the operate path of the identifier TST relay.

D.5 Circuit Notes 102, 104 and SC1 and CAD6 are changed to cover items D1 and B1.

F. Changes in CD - Sections

SECTION II

F.1 Under 9. LOCKOUT BETWEEN TWO IDENTIFIERS, add:

9.03 Option E (and B if the second identifier is provided in a group) is provided, and oscillator cross check circuit provides a maintenance feature to detect trunk troubles relating to faults on the OSC lead in FS6. A false ground on an idle OSC lead will operate an OSX0 or OSX1 relay located in identifier 0. Likewise, a cross will be detected as soon as one identifier goes off-normal.

9.04 Means are provided to display and alarm the trouble condition in the miscellaneous circuit, or to cause a trouble ticket in case the OSC lead cross or false ground produces an identification failure. Such a failure occurs as the two 5800 Hz signals to a common sleeve drift out of phase.

9.05 To expedite the taking of a trouble record, a corresponding OSX - jack in the trouble ticketer frame can be plugged to force a trouble record of the offending trunk (in any type office). It causes a first trial outpulser failure and a bid for the ticketer to record the operation of an OSX register in that circuit. A plug in the OSX- jack also functions to retire the alarm until the trouble can be located. A nonshorting 310 plug is used for this purpose.

SECTION III

F.2 Under 2. FUNCTIONAL DESIGNATIONS add to 2.01:

Designation	Meaning
OSX-	Oscillator Cross

F.3 Under 3. FUNCTIONS, add:

3.20 To test for a false ground or cross on the OSC leads and when a cross occurs to signal a minor alarm, light a trouble lamp, and ground the OSX lead to the trouble ticketer.

F.4 Under 4. CONNECTING CIRCUITS, 4.02 delete:

(h) ANI-B Auxiliary Circuit for CLI - SD-1C208-01.

F.5 Under 7. ALARM INFORMATION, add:

OSCILLATOR CROSS

7.03 If in response to a minor alarm and a lighted OSX- lamp display on the trouble ticketer frame, it is an indication that a false ground or cross exists on an OSC lead to the identifier (see 9.03-9.05). This alarm can be silenced by operating either the AR key or preferably by placing a 310 plug in the jack to the left of the lighted amber OSX-lamp on the trouble ticketer frame.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-GFC

WECO-DEPT 25830-WCR-GWC-CB

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

CHANGES

D. Description of Changes

D.1 To alleviate severe contact erosion on office steering control relays OFO-6, redundant (dual) contacts are provided in FS2 for the thousands connector steering contacts.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-HNS

WE DEPT 583-WCR-EER-PN

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

CHANGES

B. Changes in Apparatus

B.1	Remove	Replaced By
	HR1, HR2 THR1, THR2, TR1, TR2 UR1, UR2 Resistors, 18FK - FS4, App Fig. 1 F Option	ON3 Relay AF132 - FS4, App Fig. 1, F Option

D. Description of Changes

D.1 The F option HR1, HR2, THR1, THR2, TR1, TR2, UR1, and UR2 resistors, which were provided to reduce wear on contacts 9 and 12 of relay ON1, are replaced by relay ON3 because these resistors caused the associated 293A reed relay contacts to stick shunt. The ON3 relay provides eight off-normal contacts instead of two, to distribute the previous contact load. Changes are made in FS4, 6, 8, SC1, 8, and 9. Minor changes are made in option G where F is not provided

D.2 Circuit Note 107 is changed to include a circuit improvement to distribute wear on contact 3M of the P relay in FS8 by the addition of a parallel 2M contact by option F.

D.3 The timing requirements table (sheet F5) is revised for the HTT relay and reference is added to include relay ON3 in blocking preparations for testing relay PD.

F. Changes in CD Sections

F.1 In SECTION II, under 2. PULSING AND GATING, change the first sentence of 2.06 to read:

2.06 Relay ON1 and ON3 operated, also closes a circuit to the pulse steering relay PS to cause a current to flow in the winding of relay PS.

F.2 In SECTION II, change 2.11 to read:

2.11 Relay P released also removes the ground from the primary winding and a resistance shunt from the secondary winding of the PD relay to increase the current flow through the secondary winding of relay PD in series with the PD1 resistor. The established current path through the primary winding of the PD is initially large enough to overcome the effects of the current flowing in the secondary. The current through the relay PD primary winding decreases as the charge on the PD and PD1 capacitors through the PD3 resistance builds up. After about 12 ms, the primary current decreases sufficiently for the secondary current to take over and drive relay PD to its back contact.

F.3 In SECTION II, change 2.13 to read:

2.13 When relay P operates in the next cycle, it grounds the primary winding of relay PD, causing relay PD to operate. Relay P also discharges the capacitors PD and PD1. Relay PD operated, opens the operate circuit to relays P1 and P2; however, these relays are held operated through relay P operated.

F.4 In SECTION III, under 2. FUNCTIONAL DESIGNATION, add to relays ON, ON1, ON2 in 2.01:

Designation	Meaning
ON3	Off-Normal

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-LCB

WE DEPT 367-WCR-EER-TN

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

CHANGES

B. Changes in Apparatus

B.1

Superseded	Superseded By
B02 Res, 145A, or 221A	B02 Res, KS-20810,L1A Fig. 3
FBO Res, 145A, or 221A	FBO Res, KS-20810,L1A Fig. 3
GA1 Res, 145A, or 221A	GA1 Res, KS-20810,L1A Fig. 3
GA2 Res, 145A, or 221A	GA2 Res, KS-20810,L1A Fig. 3
LA1 Res, 145A, or 221A	LA1 Res, KS-20810,L1A Fig. 3
LA2 Res, 145A, or 221A	LA2 Res, KS-20810,L1A Fig. 3
PL2 Res, 145A, or 221A	PL2 Res, KS-20810,L1A Fig. 3

D. Description of Changes

D.1 CAD 4 is changed to provide for mounting an ANI secondary network on a 9-foot frame. Equipment specification is added to supporting information.

D.2 Information Note 302 is revised.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-LCB

WE DEPT 367-WCR-EER-JNC

Printed in U.S.A.

14

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

CHANGES

B. Changes in Apparatus

B.1 Added

Resistors: (App Fig. 1)
HR1, HR2, THR1, THR2,
TR1, TR2, UR1, UR2 } 18FK, 3150Ω, option F

D. Description of Changes

D.1 Resistors are added in the locking circuits of the digit registration relays, FS4, to prevent erosion of the number 9 and 12 contacts of relay ON1. This change is shown as option F. The former wiring is shown as option G and is rated Mfr Disc.

D.2 Circuit Note 107 is added to cover the use of F and G options and reference to these options is added in record Note 104.

D.3 A drafting error in FS4 and FS6 that shows the resistance of the 293-type relays as 2250 ohms instead of 2170 ohms is corrected on this issue without record.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5223-JLB-MR

Printed in U.S.A.

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

CHANGES

B. Changes in Apparatus

B.1 The use of a 1/2-ampere fuse to fuse the 130-volt L battery is superseded by a 0.18-ampere fuse to eliminate the possibility of overheating the PC resistor if the PC jack, in an amplifier detector, is accidentally grounded.

B.2 The use of a KS-20300, List 6, 0.1-uF capacitor has been added to the code of the BSC and OS capacitors, in App Fig. 3, at the request of the Western Electric Company.

B.3 The use of a 221A resistor has been added to the code of the HTT resistor in App Fig. 1 and to the code of the B02, FB0, LA1, LA2, GA1, GA2, and PL2 resistors in App Fig. 3 at the request of the Western Electric Company.

D. Description of Changes

D.1 Circuit Notes 101 and 104 have been changed to reflect the use of the 0.18-ampere fuse in the 130-volt L battery circuit.

D.2 The ANI-B auxiliary circuit for calling line identification has been shown as a connecting circuit in FS6 and CAD6.

F. Changes in CD Section

F.1 In SECTION III - REFERENCE DATA, 4.02, add:

(h) ANI-B Auxiliary Circuit for CLI - SD-1C208-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5223-MRM-MR

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

TABLE OF CONTENTS PAGE

TABLE OF CONTENTS PAGE

TABLE OF CONTENTS PAGE

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The automatic number identification system (ANI) is used to identify and transmit to the toll or tandem office the directory number of a customer who has dialed a toll or tandem call in a panel, crossbar No. 1, or step-by-step office. The ANI system works with the centralized automatic message accounting system (CAMA) at the tandem or toll office to make accounting for nearly all long-distance calls fully automatic. This system includes a trunk (used in common with the central office switching system), an outpulser connector, an outpulser, an identifier, an oscillator, a secondary network and bus connector, and a number network and primary bus circuit. The identifier scans the secondary networks for up to six local central offices in the building it serves for an identification tone, reads the calling customer's directory number as translated by the primary bus circuit and secondary networks, and forwards this number to the outpulser. The outpulser then transmits this number through the connector and trunk to the toll or tandem office to be used there in making a record of the call for accounting purposes. If automatic identified outward dialing (AIOD) from PBX stations is provided, one of the office units (0-5)* must be reserved for use by lines having AIOD service. This allows the ANI system to provide an AIOD class indication in the outpulser. Upon receipt of this class indication, which is derived from the office indication, and the four digits of the calling line number, the outpulser connects to the AIOD circuits. It passes the four digits (which on an AIOD call represent an arbitrary trunk number) to the AIOD equipment which translates the trunk number to the number of the calling PBX station; this number is then transmitted by the outpulser. In a building served by more than one identifier, only one can be working at a time in the service networks of the offices having access to a common group of ANI trunks.

1.02 In buildings with more than six offices or in buildings where traffic is heavy enough to require it, two or three identifier groups are provided. Each identifier group must serve a separate group of offices and must be connected to a separate group of trunks. Offices served by one identifier group do not have access to trunks served by another identifier group. Except in the Trouble Ticketer circuit, which is used to record trouble information, and in the test frame, there is no connection between identifier groups.

2. GENERAL DESCRIPTION OF OPERATION

SEIZURE

2.01 When a customer dials a toll or tandem call, a trunk circuit is seized by the central office switching system and a connection is set up to it. In crossbar No. 1 offices the marker, in seizing the trunk, passes party information to the trunk. In panel offices the trunk does not receive this information. In step-by-step offices the trunk makes a party test between digits being dialed and stores the result for later transmission to the outpulser. When the called number has been pulsed out to the toll or tandem office, the trunk bids for an outpulser. The outpulser connector then sets up a connection between the trunk and the outpulser. In crossbar and step-by-step offices the trunk passes party information to the outpulser. In panel offices the trunk signals the outpulser to make party test, which it does. When the party information is registered in the outpulser, it seizes the identifier through a preference and lockout portion of the outpulser and passes the party information to the identifier. The identifier registers the party information, directs an oscillator at the trunk frame to apply a 5800-cycle signal to the sleeve, and prepares to scan the secondary network and bus connectors.

SCANNING

2.02 The identifier and outpulser cause the oscillator to apply a 5800-cycle signal to the customer line sleeve through the trunk and central office switches. This line sleeve is connected to a terminal in the number network and primary bus circuit. The signals pass from the sleeve through the blocking capacitor and translating resistors of the primary bus circuit and the secondary network to the amplifier-detectors in the identifier. In the secondary network and bus connector circuit for each office there is a set of relays that connects the secondary network output leads for the thousands, hundreds, tens, and units digits to the identifier. The secondary network and bus connector is located on the identifier frames and permits keeping the signal-carrying leads as short as possible. Ten amplifier-detectors are provided in the identifier for the ten possible numbers that might be identified in a digit. To scan the busses of an office for the directory number, the secondary network circuit, under control of the identifier, connects the ten amplifier-detectors successively to the thousands, hundreds, tens, and units

---

* To provide for AIOD service on existing jobs where an identifier group already serves six central office units App. Fig. 10 is provided to increase the office scan to seven units. Under this condition the AIOD primary and secondary bus system is treated as the seventh office.

secondary network output leads in that order to permit the detectors to search for a 5800-cycle signal. If a signal is found, the amplifier-detector operates relays, which give an output signal to the outpulser.

2.03 For offices with 2-party lines there are two primary bus systems, one for ring parties and one for tip parties. These are mounted on the same panel of the number network and primary bus circuit. They are arranged so that the terminals corresponding to the customer directory number can be cross-connected to either bus system. Since the sleeve lead is common to both parties on a party line, a signal applied to the sleeve appears at both directory number terminals and it is brought by cross-connection into both the tip and ring bus systems. The output leads of only one of these two bus systems are scanned by the identifier. The identifier is told which to scan by the outpulser at the time of seizure.

2.04 In buildings with more than one office, a separate pair of bus systems is provided for each physical office. A separate bus system is also provided for lines arranged for AIOD service. To find the office from which the call is originating or to find the AIOD class unit, the identifier scans the thousands output leads of the first office secondary network circuit then the next, and so on until the identification signal is found. Then the hundreds, tens, and units output leads are scanned for that office. Note that the thousands digit is identified at the same time as the office name is identified.

2.05 Occasionally the identification signal may be mutilated by interference from the central office switches. This may cause the identification of the office or of a digit to be missed. The identifier recycles when this happens as will be described in RECYCLE.

2.06 The progress of scanning is timed by a relay interrupter in the identifier. During office scanning it is necessary to provide time for the checking feature to function so that scanning can be switched to digit scanning in the identified office as soon as that office is found. Because only one identifier can be used at a time in offices having a common trunk group, the identifier holding time must be kept short. Therefore the scanning is speeded up as soon as the office is found.

REGISTRATION

2.07 During the scanning of the secondary network and bus connector output leads a set of ten amplifier-detectors is momentarily connected to each set of leads corresponding to a digit. The amplifier-detector that receives a signal amplifies it and checks its frequency with the aid of tuned amplifier stages. Then individual cycles are counted up to a point where the amplifier-detector can be sure that the signal is legitimate and not just a surge. It then operates a pair of dry-reed-type relays that, in turn, operate two out of five register relays in the outpulser. These correspond to the digit being scanned. The outpulser checks the registration for 2-out-of-5 validity and signals the identifier when the check is satisfied. Relays in the identifier operate as each digit is checked. The check of office identification, however, is different. The registration of any signal in the dry-reed relays of the identifier causes the office check in the identifier to be satisfied without waiting for a 2-out-of-5 check. This immediately transfers the steering from office steering to digit steering within the office identified.

RECYCLE

2.08 The identification signal to which the amplifier-detectors in the identifier circuit respond passes from the oscillator on the trunk frame through the trunk, central office switches, the number network and primary bus circuit, and the secondary network and bus connector to an amplifier-detector in the identifier. In the central office switches this signal may be shorted out by bridging brushes in selector switches or may become lost in a surge that is induced into the signaling path. If this interference comes during the enabled period of the amplifier-detector and if it lasts long enough, it can cause failure to identify a digit. If this happens during the scan for office and thousands identification, the identifier continues to scan the remaining thousands outputs of the secondary network circuits in the remaining offices. Then the identifier recycles and advances to the hundreds digit outputs of the secondary networks. It scans these until the office is found.

2.09 If a digit identification is missed because of a mutilated signal, the identifier continues to advance and seek the remaining digits until the units digit has been scanned. Then the identifier looks at its check relays. If any digit check relay is unoperated, the identifier returns to that digit and scans it. If it identifies that digit and no other digit is missing, the outpulser releases the idnetifier.

2.10 However, if other digits are missing, the identifier advances to scan the next missing digit. During the second attempt, the identifier passes over any digits that were identified in the first attempt. For example, if the thousands and tens digits are identified in the first attempt, the identifier does not scan the thousands or tens digit in the second attempt. Rather, it starts with the hundreds digit and then advances directly to the units digit.

2.11 The identifier makes up to two attempts to identify the digits of the calling customer's directory number. If the number is not found in two attempts, the outpulser is notified. The outpulser then makes a trouble record and releases the identifier.

RELEASE

2.12 Upon completion of scanning, if all digits are identified and all digit checks in the outpulser are satisfied, the outpulser opens the start lead to the identifier and the identifier releases. If at least one digit is missing after two attemps by the identifier, the identifier signals the outpulser that it has completed its work. This signal, together with the lack of a check on a digit, causes the outpulser to make a trouble record and release the identifier by opening the start lead. The outpulser then seizes the other identifier, if two are provided, and attempts identification through it. An identifier seized for second trial proceeds as it would on a first trial.

2.13 The trouble recording may be canceled for failures on first trial by the insertion of a plug in a jack provided for that purpose. In this case, or if the trouble ticketer is busy, the outpulser will release the identifier after a first trial failure without making a trouble record. If the trouble ticketer is idle upon completion of a second trial that failed, a record is made of the second trial failure. In making a trouble record the outpulser operates only the trouble ticketer register relays before releasing the identifier. It does not wait for the ticket to be printed. It cannot, however, seize the trouble ticketer for a new record if the ticket is still in the process of being printed.

MULTIPARTY LINES

2.14 In offices having more than two parties on a line, a third bus is used in the number network and primary bus circuit. This is attached to the same panel as the tip and ring busses so that the customer number terminal can be cross-connected to it. When the outpulser is seized to make an identification, it receives a ring party indication from the trunk or from its own party test. But the outpulser does not know which party is making the call. So it passes on the ring indication to the identifier. The identifier, not knowing that this is a call from a multiparty line, proceeds to scan in the bus field indicated by the outpulser. However, on all calls in buildings where there are four-party or multiparty lines, an extra amplifier-detector is provided to scan the multiparty busses as the other amplifier-detectors scan the tip or ring bus systems of one office after another. When the bus system or the office originating the call is scanned the multiparty amplifier-detector operates the multiparty register relay. This, in turn, operates the multiparty relay in the outpulser. The outpulser then sends an information digit to the distant office to tell it that this is a call from a multiparty line and releases the identifier. The toll or tandem office then calls in an operator to make identification.

SERVICE OBSERVING

2.15 If a line is being observed, either for complaint observing or for traffic measuring where an operator locks the observing equipment to the line for the call, a special mark is placed on the automatic message accounting (AMA) tape at the tandem or toll office. When this line is identified, the identification signal proceeds along the sleeve in the central office switches to the point in the line circuit where the service observing shoe is connected. Here the signal splits, part going into the number network and primary bus circuit and part going through service observing circuits to the service observing network circuit. If no operator is available, in traffic service observing, the line is not observed and the identification signal is not passed to the service observing bus. But if an operator is available, the service observing equipment locks in and connects the identification signal to the service observing bus. While the directory number is being identified, the service observing detector is repeatedly enabled and exposed to the service observing bus. When this amplifier-detector receives a signal it operates a relay. This, in turn, operates a relay in the outpulser which causes the information digit, sent before the directory number to the distant office, to be altered to show a service observing indication.

SECTION II - DETAILED DESCRIPTION

1. SEIZURE OF IDENTIFIER

1.01 When an outpulser is required to connect to an identifier, it selects one of two identifiers and grounds the start lead ST into that identifier to operate the off-normal relays. These relays supply off-normal ground to control all the functions of the identifier.

1.02 On calls originated by a tip party customer, the outpulser grounds lead TP to operate the tip party relays. On calls originated by a ring party customer, or by a multiparty line customer, the outpulser grounds lead RP to operate the ring party relay. The tip or ring party relays operated determine which bus system - tip party or ring party - will be scanned by the identifier.

2. PULSING AND GATING

GENERAL

2.01 On seizure by the outpulser, a pulsing relay in the identifier begins operating to control the various identifier functions. The operation of the pulsing relay is under control of a pulse generator relay and a pulse steering relay. The pulse generator relay is a resistance-capacitance timed polar relay that controls the rate at which the pulsing relay operates. The pulse steering relay is a resistance-capacitance timed polar relay that controls the per cent break of the pulsing relay contacts. Under control of the pulse generator relay and the pulse steering relay the pulsing relay controls the scanning and steering functions of the identifier. The pulsing relay also controls the amplifier-detectors. A third resistance-capacitance timed polar relay, the pulsing detector control, also under control of the pulsing relay, limits the length of time that the amplifier-detectors are gated on.

PULSING

2.02 Prior to the operation of relay ON1 the positive end of the pulse generator relay PG primary winding is at -48 volts and the PG capacitor is charged to 48 volts. Also, the relay is held on its back contact by a reverse acting current in the secondary winding. When relay ON1 operates, it reverses the current through the secondary winding of relay PG and causes a current to flow in the primary winding. The current through the secondary winding is in the direction to operate the relay to its front contacts. The current through the primary winding is in the direction to oppose the operation of the relay to its front contacts. Initially the current through the primary winding is very high and it overcomes the effect of the current in secondary. As the current through the primary winding decreases, due to the charging of the capacitor, the secondary current takes over and operates the relay to its front contacts.

2.03 When relay PG operates, it again reverses the direction of current flow in both windings. The current through the secondary now tries to drive relay PG to its back contacts, while the current through the primary tends to keep the relay operated to its front contacts. Initially the current through the primary winding is high enough to overcome the effects of the secondary current and relay PG remains operated to its front contacts. As the current through the primary decreases, due to the action of the capacitor, the secondary current takes over and drives the relay to its back contacts.

2.04 With relay PG released, the cycle of operation and release will be repeated. Relay PG operates and releases in this manner until relay ON1 is released by the outpulser, or until end pulsing relay EP is operated by the identifier. With relay ON1 released or with relays ON1 and EP operated, the PG relay is driven to its back contact.

2.05 At the time relays ON and TPA or RP operated they closed a circuit to operate the pulsing relays P, P1, and P2. Relay P is prevented from operating at first by the immediate operation of relay PS as will be described. Later, when relay PS releases, relay P operates to provide an operating circuit for relays P1 and P2 independent of relay PD. When relay P operates, it also closes a circuit to operate relay PD.

2.06 Relay ON1 operated, also closes a circuit to the pulse steering relay PS to cause a current to flow in the winding of relay PS. This current is in the direction to hold the relay on its back contact. Capacitors PS and PS1 in series with the primary winding of relay PS start to charge immediately and cause the PS relay to operate until the rate of charge decreases to the point when the primary winding current cannot hold the relay operated. When relay PG operates to its front contacts, as described, it reverses the current in relay PS. This current is now in the direction to operate the relay through its secondary winding to its front contact. The operation of relay PG to its front contact also causes the PS and PS1 capacitors to discharge through relay PS in a direction to hold relay PS on its back contact. Initially the discharge current overcomes the effect of the operate current. When the discharge current decreases sufficiently, the operate current takes over and operates relay PS to its front contact.

2.07 With relay PS operated, relay P releases. This releases the P1 and P2 relays and starts the release of relay PD. Relays P1 and P2 remain released until relay PD does release.

2.08 Upon the release of relay PG at the start of the next cycle of pulsing, the current through the PS winding is again reversed. This tries to drive the relay to its back contact, but the capacitor again discharges through the relay. This time the discharge current is in the direction to hold the relay on its front contacts. Initially the discharge current overcomes the effect of the operate current. When the discharge current decreases suff ciently, the secondary winding current takes over and drives the relay PS to its back contact.

2.09 Relay PS follows the operation of relay PG, as described, and alternately releases and operates relay P.

GATING

2.10 When relay ON operates, it prepares a circuit to operate relay PD on its primary winding, and relays P, P1, and P2. It also causes relay PD to remain on its back contact by closing a circuit to relay PD secondary winding. Relay P upon operating, closes the circuit to operate relays P1 and P2 as described in PULSING. It also operates relay PD as described. Later when relay P releases it starts the release of relay PD and releases relays P1 and P2. These remain released until relay PD releases. Relays P1 and P2 released enable the detector circuits of ten, eleven, or twelve amplifier-detectors. The amplifier-detectors are now in condition to register a calling number digit and service observing and multiparty indications.

2.11 Relay P released also removes the ground from the secondary winding relay PD permitting a current to flow through the secondary winding of relay PD in series with resistors PD1 and PD3 and capacitors PD and PD1. This current is in the direction to hold the relay operated and initially is large enough to overcome the effects of the current flowing in the primary. The current through the relay PD secondary winding decreases as the charge on the capacitor builds up. After about 12 msec the secondary current decreases sufficiently for the primary current to take over and drive relay PD to its back contact.

2.12 Relay PD operates relay P1 and P2 to disable the detecting circuits in each of the amplifier-detectors and also to discharge a capacitor in the detecting circuit of an amplifier-detector that has identified a digit.

2.13 When relay P operates in the next cycle, it grounds the secondary winding of relay PD, causing relay PD to operate. Relay P also discharges the capacitors PD and PD1. Relay PD operated opens the operate circuit to relays P1 and P2; however, these relays are held operated through relay P operated.

2.14 When relay P is again released, relays P1 and P2 are released to enable the amplifier-detector counting circuits again. Relay PD also starts to release so as to operate, after 12 msec, relays P1 and P2 which disable the amplifier-detector counting circuits. Relays P1 and P2 are operated and released in this manner until relay ON is released or until relay EP operates.

CONTROLLING SCANNING

2.15 As the P relay operates and releases under control of relays PG and PS, it controls the operation of the office and digit steering relays, permitting the identifier to scan the thousands digits of the Secondary Network and Bus Connector circuits of successive offices in turn and then scan a single Secondary Network and Bus Connector circuit of the office found to identify the remaining digits of the calling number

2.16 When an office steering control relay operates, it enables the connector relays in the Secondary Network and Bus Control circuit for all digits in the corresponding office. The office steering control relay furnishes battery to those relays. When a digit steering control relay operates it furnishes ground to the corresponding relays in all offices for that digit. The set of relays in the Secondary Network and Bus Connector circuit corresponding to both the office and digit steering control relays operated is the set that operates. This set of relays cuts through the outputs of the translating network to the amplifier-detectors for identification.

2.17 Digit steering control auxiliary relays, which operate in parallel with the digit steering control relays, advance the output leads of the amplifier-detectors to the proper set of register relays in step with the input steering.

3. SCANNING FOR CALLING OFFICE IDENTIFICATION

GENERAL

3.01 In order to determine which office the calling number is in, the identifier scans the thousands digit output leads of each Secondary Network and Bus Connector circuit in the identifier group. When a 5800-cycle tone is detected on one thousands digit output, the digit is identified and registered in the outpulser. The identifier immediately stops further office scanning and the office designation corresponding to the particular Secondary Network and Bus Connector in which the tone appeared is transmitted to the outpulser. The identifier then attempts to identify the remaining digits of the calling number.

3.02 The identifier may work with Secondary Network and Bus Connector circuits for up to six offices. If there are more than six offices in a central office building, two or three identifier groups are provided. Each identifier group is a self-contained unit serving a corresponding set of offices in the building. An identifier group may serve less than six offices depending on traffic and trunk grouping.

3.03 If the identifier fails to find an office indication by scanning all the thousand digit outputs, it recycles itself and repeats the office scanning. On this second attempt to find an office indication the identifier scans the hundreds digit output leads of each Secondary Network and Bus Connector circuit. If an office identification is made on the second attempt, the identifier then attempts to identify the other digits of the calling line including the thousands digit missed on the first office scan. If the office is not identified in the second attempt, the outpulser is then notified. The outpulser releases the identifier and disposes of the call.

OFFICE STEERING CONTROL

3.04 The office steering circuit includes the office steering control relays OFO to OF6 and OFE; the auxiliary relays PC1, PC2, ORK, ORK1 to ORK3; the traffic measuring relays HTR, HTR1, HTC, and HTT; and the office steering control auxiliary relays OFOA to OFEA.

3.05 The PC1 and PC2 relays operate to insure that proper pulsing speed and percent break is reached by the pulse generator before advancing among the offices. Also, while PC2 is operating, the first office is being tested for presence of signal by the amplifier-detectors. After relay PC2 is operated, the P relay, in operating, closes a circuit to operate the next office steering control relay OF-. Taking the operation of relay OF1 as an example, the operating circuit is as follows: From ground through make contact 11 of ON break contact 5 of LO, make contact 2 of TPA or RP, break contacts in series of HTR - contact 10 and OFKC - contact 5 or break contact of OFKA - contact 2, and through break contacts 6 in series of relays OFE, OF6, OF5, OF4, OF3, OF2, and OF1 to the winding and make contact 12 of relay OFO. The circuit continues through break contact 10 of OFKC, the P jack, make contact 6 of relay P, again the P jack, break contact 9 of EP, make contact 8 of PC2, break contact 8 of OFK, make contact 2 of PTK, make contact 6 of OFO, and break contact 8 of relay OFEA to the winding of relay OF1. Relay OF1 locks through the early make part of its own contact 6, to the portion of the operating circuit listed previous to contact 6 of relay OF1. Since the winding of relay OFO is connected to the winding of relay OF1 while relay P remains operated, relay OFO remains operated until relay P releases. The other office steering control relays operate and lock through similar paths.

TRAFFIC RATE TIMING

3.06 The rate of traffic is measured by the HTT tube and HTT relay. The tube starts timing when relay ON1 releases after the identifier has served a call and, if the identifier is not reseized within 1.5 seconds, the tube fires and operates relay HTT. Relay HTT remains operated only long enough to release relays HTR and HTR1. Relay HTC releases at the same time to open the operating circuit for relays HTR and HTR1. With relays HTR and HTR1 operated, the office steering functions according to its heavy traffic procedure. This means that as soon as the office is found, the office steering stops and digit steering begins. If, however, relays HTR and HTR1 are released, the office steering stops when the office is found but resumes as soon as the signal is received from the outpulser that the office identification is registered.

LIGHT TRAFFIC OFFICE SCANNING AND IDENTIFICATION

3.07 If relays HTR and HTR1 release, the office scanning follows the light traffic procedure. When the office is found, the OFK relay operates and stops the steering. Then relay OFKB operates. Relay OFKB then causes relay OFKA to operate. The OFKA relay connects ground through the operated office steering control relay to operate an office register relay in the outpulser. When the office register relay operates, the outpulser grounds on OFK- lead to operate relay ORK, which locks through a contact on relay OFKD. The next time relay P releases it closes a circuit to operate relay ORK1, which locks to off-normal ground. With relays ORK and ORK1 operated relay ORK2 can operate. Relay ORK2 operated bunches together the output leads of the amplifier-detectors to operate relay OFX1 if an identification signal is found in a second office. If OFX1 operates, it signals the outpulser through relays OFX4, OFX5, and EP that a trouble exists.

3.08 When relay ORK1 operates, the office steering resumes. When relays OFE and OFEA operate, relays OFKC and OFKD operate and lock. When relay OFKD operates, ground is cut through to the outpulser so that it can mark a lead indicating the office found. This pulls up the office steering control relay corresponding to that office. This relay then enables the connector relays in the Secondary Network and Bus Connector circuit for that office. Then the remaining digits are identified.

3.09 Relay OFE also releases relay ORK2 so that the output leads of the amplifier-detectors are no longer bunched to operate relay OFX1. This clears these leads to permit identification of the remainder of the customer number.

HEAVY TRAFFIC OFFICE SCANNING AND IDENTIFICATION

3.10 If relays HTR and HTR1 are operated when the identifier is seized, the office scanning follows the heavy traffic procedure. When the office is found, the OFK relay operates and stops the office scanning immediately. The relays OFKC and OFKD operate. Relay OFKC cuts through the circuit for operating relay OFKA. Relay OFKA closes ground to the outpulser through an office steering control relay to register the office. Relay OFKC also transfers the steering to the digit steering circuit by opening the pulsing relay circuit in the office steering circuit and closing a similar pulsing circuit in the digit steering circuit.

OFFICE IDENTIFICATION MISSING ON FIRST ATTEMPT - RECYCLE FOR SECOND ATTEMPT

3.11 If no office identification is made before the first release of relay P after operation of the last office relay, the office end relay OFE operates and locks. Relay OFE operates relay OFEA, opens the operate circuit to itself and the preceding office relay, and releases the cut-in relays for the last pair of offices scanned. The preceding office relay is held to the locking ground of relay OFE through a portion of the OFE operate circuit.

3.12 Relay OFEA operates hundreds steering relay HS, which locks, and operates relay HSA. Relay HS opens the operate circuit to relay THS, but relay THS is held operated through relay OFEA operated to the locking ground on the winding of relay HS. Relays HSA and H1 operate in parallel with relay HS. Relay H1 transfers the amplifier. detector output leads to the hundreds register relays.

3.13 On the next release of relay P the last office relay and its auxiliary release.

3.14 On the next operation of relay P, relay OFO operates and locks through OFEA and operates relay OFOA. The operate circuit for OFO is: ground through ON operated, LO normal, TPA/RP operated, OFKA normal, OFE operated, OFOA normal, OFEA operated, OF6A, OF5A, OF4A, OF3A, OF2A, OFOA, and OFKC normal, P operated, EP normal, PC2 operated, OFK normal, PTK operated, OFO, OF1A, OF2A, OF3A, OF4A, OF5A, and OF5A normal, OFEA operated, THSA operated, to the OFO winding. With relay OFO and HS operated, a circuit is closed to operate the hundreds cut-in relays for office 0. The identifier will now scan the hundreds digit output leads from the secondary network and bus connector circuit for each office. This operation is similar to that described for the thousands leads.

3.15 When relay OFOA operates, it opens the locking curcuit of relay OFE; however, a second locking circuit closed by relay OFO holds relay OFE until the next release of relay P. The second locking circuit for relay OFE is: ground through ON operated, LO normal, TPA/RP operated, OFO, OFEA, THSA, OFO operated, OFKC normal, P operated, and EP normal, PC2 operated, OFK normal, PTK operated, OFO and OFEA operated, to the winding of OFE.

3.16 On the first release of relay P after operation of relay OFO, relays OFE and OFEA are released. Relay OFE released reestablishes the original operate circuit for relay OFO and relay OFEA, released opens the locking circuit for OFO. Relay OFEA released, releases relays THS, THSA, and TH1. This action complete the recycling of the office scanning. The identifier is now able to rescan each office as described, except that on this second attempt the identifier will look for a signal on a hundreds output rather than a thousands output.

OFFICE IDENTIFICATION FOUND ON SECOND ATTEMPT

3.17 When a signal is detected on a hundreds lead, the office number is transmitted to the outpulser and registered there. At the same time the hundreds digit is sent to the outpulser and registered there. The thousands digit is identified later in a second attempt as described in CALLING NUMBER DIGITS MISSED ON FIRST ATTEMPT - FOUND ON SECOND ATTEMPT.

OFFICE INDICATION MISSED ON SECOND ATTEMPT

3.18 If the identifier scans all the hundr d output leads and fails to detect a signal, the OFE and OFEA will operate as they did on the first attempt. With relay OFEA and HSA operated, and THSA and OFKB normal, a circuit is closed to operate end pulsing relay EP. Relay EP stops the pulse generator and ground the work completed lead, WC, to the outpulser. The outpulser then releases the identifier and attempts to set up the call in the other identifier on a second trial basis. If this failure to identify had been in a second trial, the outpulser would have summoned an operator at the tandem office to handle the call. The outpulser may or may not cause a trouble record to be taken.

4. SCANNING FOR CALLING NUMBER IDENTIFICATION

GENERAL

4.01 The digits of the calling number are identified one at a time. The identifier first attempts to identify a thousands output lead of a secondary network and bus connector circuit of some calling office. When a thousands digit has been identified and registered in the outpulser, the identifier then looks at the hundreds, tens, and units output leads of the same secondary network and bus connector.

4.02 As explained in SCANNING FOR CALLING OFFICE IDENTIFICATION, the first digit identified, either the thousands or the hundreds digit, is also an indication that the calling office has been recognized. The identifier then establishes the identification of the calling office and passes this information to the outpulser.

4.03 If the identifier fails to get an identification after scanning the thousand outputs of each office, it recycles itself and scans the hundreds output of each office in a second attempt to establish the identity of the calling office. If an identification is made on a hundreds output, the identifier then looks at the tens and units outputs in turn and then takes a second look at the thousands output of that office in an attempt to identify the thousands digit. If any other digit had been missed on the first attempt, the identifier would make a second attempt to identify the missing digit. However, if the identifier fails to identify a digit on the second attempt, it informs the outpulser. The outpulser will then attempt to set up the call in the other identifier or call in an operator to dispose of the call.

CALLING NUMBER IDENTIFIED ON FIRST ATTEMPT

A. Calling Number of Office 0

4.04 Relays ON and TP/RP operated close circuits to operate the thousands digit steering relay THS and the office relay OF0. With relays THS and OF0 operated, a circuit is closed to operate the thousands digit connector relays TH, (A, B, C, D) 0 in the secondary network and bus connector circuit. Relays TH (A, B, C, D) 0 connect the 0 through 9 thousands outputs of office number 0 to the number 0 through 9 amplifier-detectors. These relays also connect the output of the multiparty bus system of the office number 0 to the PTYA amplifier-detector.

4.05 When relay THS operates, relays THSA and TH1 operate in parallel with THS. Relay TH1 steers the amplifier-detector output leads to the thousands register relays. Relay THSA partially closes a circuit for operating the hundreds digit steering relay. This circuit is under control of the office check relays and cannot be closed until the office has been identified.

4.06 When the office is found while scanning the thousands digits with the heavy traffic condition, the pulsing relay contact is disconnected from the office steering circuit and another pulsing relay contact is enabled in the digit steering circuit to permit digit steering. Taking as an example the operating circuit for relay HS this is found to be: ground is connected through make contact 2 or relay ON, break contact 4 of relay LO, make contact 10 or TPB or RP, break contacts 6 of ES, US, TS, HS, and the series combination of ESA break 7 and ES1 break 7 in parallel with make 6 of THS, to the winding of relay THS and make 8 of THSA. From here the circuit continues through make 1 of PTK, the series combination of make 5 of OFK and make 9 of HTR in parallel with make 9 of OFKC, make 8 of pulsing relay P make 4 of PC2, make 4 of OFKC in parallel with the series combination of make 3 of HTR and make 7 of OFK, break 6 of ES1, make 4 of THSA, break 8 of HK to the winding of relay HS. Relay HS locks through its early make 6 and the operating circuit up to this contact. Since relays THS and HS have their windings connected together while relay P remains operated, relay THS remains operated until relay P releases.

4.07 If the identifier is operating in light traffic, the digit steering does not start until all offices have been scanned. Then relay OFKC operates to start digit scanning within the office found.

CALLING NUMBER DIGITS MISSED ON FIRST ATTEMPT FOUND ON SECOND ATTEMPT

4.08 When an office identification has been made, either because of a thousands digit identification, or a hundreds digit identification, the identifier then attempts to identify the remaining digits of the calling number. In scanning for digits, following office identification, the identifier does not check to see that a digit has been identified before proceeding to look at the next digit but for each digit that is registered in the outpulser, a corresponding check relay is operated by the outpulser in the identifier. If the outpulser fails to register one or more digits, the corresponding check relays in the identifier will fail to operate. The identifier "all check" relay AK will fail to operate after the units digit scan and the identifier will be recycled to make a second attempt to find the missing digits. The operation is as follows:

4.09 On the first release of relay P after the operation of relays ES and ESA, relays US and USA release. Relay ES1 operates through ESA operated, USA normal, and ON operated, to ground. Relay ES1 locks to off-normal ground.

4.10 On the next operation of relay P, the steering relay corresponding to the first missed digit is operated through a back contact on the corresponding check relay. The operate circuit for the thousands steering relay THS is: ground through ON operated, LO normal, TPA/RP operated, ES1 and ESA operated, PTK operated, OFKC operated, P operated, PC2, OFKC, ESA, and ES1 operated, ES2, ESR, and THK normal, to winding of THS. The operate circuit for the other steering relays is similar to that just described, except the ground is carried through THK operated and through a chain of make contacts on other check relays, through a break contact on the first unoperated check relay, to the winding of the corresponding steering relay.

4.11 Relay THSA which operated in parallel with THS operates relay ESR, which opens the operate circuit to relay THS. However, relay THS is held operated through THSA, ESA, ES1, and TP/RP operated, LO normal to ground on ON operated. Relay ESR transfers the holding circuit of relay ES so that relay ES is held operated under control of make contact 8 of relay P.

4.12 When relay P releases, it releases relays ES and ESA. Relay ES closes a path to hold relay THS before THS can be released by ESA. Relay ESA, on releasing, also operates relay ES2, which locks to off-normal ground.

4.13 When relay P operates the next time, it closes a circuit to operate the steering relay corresponding to the next missed digit, or to operate relay ES. The circuit is ground through ON operated, LO normal, TPA/RP operated, ES, US, TS, and HS normal, THSA, TPK, OFKC, P PC2, OFKC, ES2 and THSA operated, HK operated (since the office indication had been found on hundreds digit for this example), through TK normal to operate relay TS, or through TK operated, UK normal to operate relay US, or through UK operated to operate relay ES.

4.14 Assuming that UK was normal, relay US operates through the circuit just described. Relay US locks and opens the operate circuit to itself and relay THS. However, relay THS is held to the locking ground of relay US through a portion of the circuit just described.

4.15 Relay US operated, releases the thousands digit connector relays in the secondary circuit and operates units digit connector relays U (A, B, C, D)-. These connector relays connect the amplifier-detectors to the units digit outputs of the secondary networks of the calling office.

4.16 Relays USA and U1 operate in parallel with relay US. Relay U1 transfers the amplifier-detector output leads to the units digit register. Relay USA partially closes a path to operate relay ES on the next operation of relay P and also provides an additional operate circuit for relay ESR.

4.17 On the next release of relay P, the units digit is identified and registered in the outpulser. This results in the operation of relay UK. Relay THS and THSA release. When the outpulser units check relay operates, the outpulser opens the identifier start lead to restore the identifier to normal. However, if the outpulser fails to open the start lead, the identifier will attempt to force its release. The circuit action is described below.

4.18 On the next operation of relay P it closes a circuit to operate relay ES. The operate circuit of relay ES is: ground through ON operated, LO normal TPA/RP operated, ES normal, USA operated, TSA, HSA, and THSA normal, PTK, OFKC, P PC2, OFKC and ES2 operated, THSA, HSA, and TSA normal, USA operated to the winding of ES. Relay ES locks through relay ES2 operated and opens the operate circuit to itself and relay US. However, relay US is held to the locking ground of relay ES by its own locking contact which is connected to the winding of relay ES through a portion of the circuit just described.

4.19 Relay ESA operates in parallel with relay ES. Relay ESA operates relay EP which stops the pulse generator and grounds lead WC into the outpulser as a signal that the outpulser should release the identifier.

4.20 If a missing digit is not identified, the operation of the identifier is similar to that described and lead WC is grounded to indicate work complete. The outpulser knows that the identification is unsuccessful because one or more of its digit check relays is normal at the time lead WC is grounded. The outpulser then makes a trouble record, opens the start lead to release the identifier, and takes action to dispose of the call.

5. RELEASE OF IDENTIFIER

REGULAR RELEASE

5.01 Upon completion of identification when all the digit check relays in the outpulse have operated, the identifier release relay in the outpulser operates to open the start lead. Relay ON releases to restore the identifier to normal. At the same time the outpulser releases relays TPA to TPC/RP, THK, HK, TK, and UK.

TROUBLE RELEASE

5.02 If the outpulser fails to release the identifier after it has completed its work, the identifier grounds the WC lead to the outpulser as described in CALLING NUMBER DIGITS MISSED ON FIRST ATTEMPT - FOUND ON SECOND ATTEMPT. The outpulser then attempts to make a trouble record unless the failure is on the first trial and the first trial trouble recording is canceled by the insertion of a plug in the CFTF jack on the trouble ticketer frame. When the indication is registered on the trouble ticketer relays, the outpulser opens the start lead to the identifier. Relay ON releases and the remainder of the identifier releases. Relays TPA to TPC or RP and THK, HK, TK, and UK are releasesd directly by the outpulser.

5.03 If the trouble ticketer is busy, the outpulser scores a register in the trouble ticketer and then releases the identifier.

6. AMPLIFIER-DETECTORS

GENERAL

6.01 There are 10, 11, or 12 amplifier-detectors in an identifier. The details of one of these are shown in FS-5. In order of appearance from input to output these amplifier-detectors consist of a bandpass filter, two linear amplifier stages, a clipping stage, a linear amplifier stage, a Class A amplifier stage with a tuned plate circuit, a Class C1 amplifier stage with a tuned plate circuit, a dipper-and-bucket counter, a control contact on one of the relays P1 and P2, and and output stage employing a thyratron. The function of the amplifier-detector is to receive a 5800-cycle signal whose voltage is between 30 and 250-uv; check it to be sure it is the identification signal, and operate two register relays. It must reject other signals, some of which have much higher voltages. The filter and the two tuned amplifiers separate out noise of frequencies other than 5800 cycles. The Class C stage, by being biased about 29 volts beyond cut-off, prevents transmission of low-voltage noise. The counter makes sure the input signal is not just an isolated surge containing a sufficient voltage of 5800-cycle noise by counting cycles for about 8 msec before operating the output thyratron.

AMPLIFIER

6.02 Tracing a signal through the amplifier-detector we find a high pass filter consisting of inductors F1 and F2 and the input capacitance of tube LA1 reflected through transformer IN. This eliminates such noise as 60-cycle pickup in cables and major low and high frequency disturbances caused by the operation and release of relays and switches connected to the sleeve.

6.03 Transformer IN matches the low impedance of the input network to the high impedance of the grid in the first linear amplifier stage. This transformer also gives a voltage gain. No power gain is obtained here.

6.04 The first linear amplifier stage gives power gain as well as voltage gain. This stage includes half tube LA1 resistors LK1, LA1, and PL1, and capacitors BP1 and CL1. The second stage also gives linear power gain. It includes half tube LA2, resistors GL1, KA1, and GA1, and PA1 capacitor BP2, and tansformer IC. Transformer IC serves to match the impedance of the plate circuit of the tube LA2 to the impedance of the clipper, gain control potentiometer, GN, and the input impedance of tube LA3. Tubes LA1, LA2, LA3, and LA4 are halves of 407A tubes. These are high-gain miniature triodes Bias for these stages is developed by the voltage drop across the cathode biasing resistors KL1, KA1, KL2, and KA2 with the plate current flowing in them and by connecting the grid to ground through transformers IN and IC and resistor GA1 and to battery through resistor GA2. Resistors LA1 and LA2 serve as plate load resistors and resistor PL1 serves to decouple the plate circuit from the dc supply for ac signals. The FBP resistor forms a gain stabilizing feedback loop. The FBI resistor and capacitor working with resistor PL2 form a feedback loop for gain stabilization and sharpening of the tuning.

6.05 Diodes D1 and D2 and resistor LC constitute a clipping stage. They make use of the property of silicon diodes in which they act as back-biased diodes for forward voltages less than 0.6 volt. If a surge is received by the amplifier-detector and it is amplified by tubes LA1 and LA2 so that the peak voltage across the output winding of transformer IC exceeds 0.6 volt, one of the diodes conducts. This causes a voltage drop to appear across resistor LC so that the voltage on the grid at tube LA3 does not follow the transformer voltage but is clipped at 0.6 volt reduced by the ratio of the GN potentiometer. This stage helps prevent false operations of the amplifier-detector. The third linear stage includes tube LA3, resistors KL2 and LA2, and capacitor CL2. This gives linear power gain.

6.06 Potentiometer GN adjusts the over-all gain of the amplifier-detector by providing a variable loss just before the LA3 stage. Besides controlling sensitivity, this potentiometer helps to stabilize the circuit and reduces variations in gain if the characteristics of tube LA3 change with aging or tube replacement.

6.07 The fourth Class A amplifier stage includes tube LA4, resistors KA2, PL2, and GA2, capacitor CLC, and network N1. This network is a parallel tuned network. The tuning of this network is purposely broadened by using an internal resistor so as to avoid ringing, or self-oscillation of this network when subjected to surges. The peak response frequency of this network is 5800 cycles. Capacitor CLC is a coupling capacitor to the next stage. Pin jack PA2 is provided to permit the adjustment of potentiometer GN and to check the circuit operation to this point. This jack appears on both the tube deck and the main deck.

6.08 The fourth stage feeds into the Class C stage through capacitor CLC. The Class C stage includes tube CA, resistors C1, C2, BGC, KC1, KC2, SCC, and PC, capacitors KC, BSC, and BCP, and network N2. Resistors KC2 and KC2 provide a dc bias for this stage. This stage is called Class C because the tube CA is biased so that the grid is at -35 volts relative to the cathode. This is 29 volts beyond cutoff. Resistor BGC serves to connect the bias potential to the grid of tube CA without shunting the signal path appreciably. Again, resistors SCC and PC are screen and plate decoupling resistors and they are by-passed for ac signals by capacitors BSC and BPC. Jack PC permits a check of the functioning of this stage. This jack also appears on both decks. Network N2 is a sharply tuned antiresonant circuit with tuning centered on 5800 cycles. This network and N1 separate out unwanted frequencies of noise so that the amplifier-detector responds only to the identification frequency. Network N2 also converts the pulsing output of tube CA resulting from Class C biasing into a sinusoidal form of voltage wave shape. A coupling capacitor is made part of network N2 to permit tuning of this network but it is functionally part of the counter rather than the Class C stage. Resistors C1 and C2 prevent oscillation of this stage due to stray capacity and lead inductance.

COUNTER-DETECTOR STAGE

6.09 Following the Class C stage is a dipper and bucket counter using tube CTR; capacitors CTR, BBO, and the capacitor in network N2, and resistors BO1, BO2, and CB. The network coupling capacitor charges through the left half of tube CTR on the negative half cycle of the signal from the Class C stage. Then on the following positive half cycle the network coupling capacitor discharges into capacitor CTR through the right half of tube CTR. This process repeats every cycle and the charge gradually builds up on capacitor CTR to a point where the thyratron in the output stage fires. Resistors BO1 and BO2 set the dc starting point for this charging. Capacitor BBO bypasses these biasing resistors to speed up the charging of capacitor CTR. Resistor CB permits a small part of the charge to leak off capacitor CTR so that a charge resulting from a momentary surge will be gone before it can cause false operation of the amplifier-detector output stage. Jack CTR permits checking of this stage.

OUTPUT STAGE

6.10 The output stage consisting of tube OUT, resistor OC, and capacitor OS performs three functions. It detects the voltage level on capacitor CTR that indicates the receipt of a good signal by causing the thyratron to fire; it locks in the condition of the signal having been found so that capacitor CTR can later be discharged without wiping out this condition, and it provides enough current to operate two reed-type relays in parallel to register the identification. The voltage on capacitor CTR is sampled through resistor OC so that the output stage does not take any signal away from the charging of capacitor CTR. Capacitor OS stabilizes the voltage of the grid of tube OUT so that the thyratron will not trigger on surges induced in its input lead or on the individual cycles coming through the right side of tube CTR.

GATING

6.11 A contact on one of the relays P1 and P2 is normally operated during scanning to keep capacitor CTR discharged. After the identifier is connected to the proper secondary network output pair, this contact opens and remains open for 12 to 15 msec to enable the amplifier-detector. During this time, if a signal is present, a charge builds up on capacitor CTR. At the end of this period the contact recloses and capacitor CTR discharges through resistor RS to limit the current. This occurs whether or not the signal was present. If the thyratron fires during the enabled period, it remains conducting, even though the firing potential is discharged, until the locking ground on the register relays shunts it down or until the high voltage supply circuit is opened.

MULTIPARTY AND SERVICE OBSERVING AMPLIFIER-DETECTORS

6.12 The multiparty and service observing amplifier-detectors are identical to the digit detecting amplifier-detectors. Where the digit identifying amplifier-detectors operate two register relays, the multiparty and service observing amplifier-detectors each operate only one relay.

7. IDENTIFICATION OF MULTIPARTY LINES

GENERAL

7.01 If the directory number to be identified is for a station on a line with more than two parties, the outpulser will signal the identifier that the calling party is a ring party. The identifier passes this on to the secondary network and scans the output pairs of the secondary network as it would on a call from a 2-party lin.. However, in scanning for identificat on the identifier also connects a multiparty detector to the multiparty network of each office as the corresponding thousands or hundreds digit is scanned. This is done on all calls in offices with multiparty lines.

SCANNING OFFICES

7.02 During office scanning the office steering relays operate and release as previously described. These, in turn, cause corresponding bus connector relays to operate and release. On the thousands bus connector relays in the Secondary Network and Bus Connector and on the hundreds bus connector relays, contacts are used for connecting the multiparty amplifier-detector to the multiparty bus when option Y is furnished. The fact that the call is from a multiparty line must be determined in the thousands or hundreds digit scan while office scanning is taking place. A signal appears on either the multiparty bus of a digit bus or neither, never on both.

REGISTRATION

7.03 If a 5800-cycle signal appears on the multiparty output of the secondary network and bus connector, the PTY amplifier-detector operates and it, in turn, operates a register relay. This relay locks and by putting ground on the output lead of the amplifier-detector it restores the thyratron in that circuit to normal. This relay operates a relay in the outpulser to mark the line as a multiparty line.

IDENTIFIER RELEASE

7.04 The multiparty register relay in the outpulser, in operating, operates the identifier release relay in the outpulser to remove ground from the start lead of the identifier. During this time office scanning has been continuing but when the ground is removed from the ST lead relay ON releases and the circuit restores to normal.

8. IDENTIFICATION OF SERVICE OBSERVED LINE

GENERAL

8.01 The 5800-cycle signal is cut through to the Service Observing Network Circuit if the line being identified is being complaint observed or if the line is being traffic observed and an operator connection is locked in for observing. A signal may appear in the service observing network at the same time as a signal on a digit output or a multiparty output of the secondary network and bus connector.

SCANNING AND REGISTRATION

8.02 While the thousands or hundreds digits of the successive offices are being acanned for office identification as previously explained, the output leads of the Service Observing Network Circuit are cut through to the service observing amplifier-detector by contacts on the ON2 relay. Presence of signal in this network results in the operation of the SO relay. This locks operated and operates a relay in the outpulser that changes the information digit sent to the distant office to indicate service observing.

9. LOCKOUT BETWEEN TWO IDENTIFIERS

9.01 If two identifiers were to signal their corresponding oscillators to apply a 5800-cycle identification signal to two different sleeves at the same time in an identifier group, each identifier might identify the signal of the other as its own. This would cause false identifications to occur. To prevent this the lockout circuit shown in FS-7 permits only one identifier handling a service call as distinguished from a test through the test network to progress beyond the operation of the off-normal relays. If the first identifier is seized, its ON2 relay prepares a path to operate its LO relay. When the pulse generator operates on the first pulse, relay PC1 operates. If later the ON2 relay in the other identifier operates, following a failure in the lockout circuits in the outpulsers, relay LO in the second identifier operates. This opens off-normal ground from the steering and connector relays for the second identifier.

9.02 If the second identifier is seized, first it operates the LO relay in the first identifier in a similar way, provided the ON2 relay in that identifier operates. If both identifiers are seized simultaneously, each will attempt to operate the LO relay in the other. When the LO relay in the second identifier operates, it opens the operating path for the LO relay in the first identifier. Then the first identifi r carries out its identification.

10. TESTING

GENERAL

10.01 An Outpulser-Identifier Test Circuit has been provided to test the features of the identifier. A test call is originated at the test frame where the progress of the call is displayed on lamps. Provision is made for testing all the various identifier functions. The test call proceeds through the identifier just as a service call does except that on a test call the outpulser upon seizing the identifier operates a test relay OIT in the identifier. The OIT relay operated connects the oscillator control lead into the Outpulser-Identifier Test Circuit to control a test oscillator associated with that circuit. Relay OIT also operates relay TST which connects several leads into the test circuit. There are two basic types of test calls: (a) one in which the identification signal is fed into the identifier through the service network which consists of the number network and Primary bus circuit together with the Secondary Network and Bus Connector circuit and, (b) one in which the identification signal is fed into the identifier through a test network associated with the test circuit. Under control of the test circuit the timing in the outpulser may be canceled and the steering functions of the identifier may be advanced, a step at a time, from office to office and from digit to digit; however, if the identifier is advanced in this manner on a call employing the service network, the call will be discontinued automatically should a service call in the same identifier group require an identification while the test call is in progress. This type of operation also permits adjustments to be made on the amplifier-detectors. Also under control of the test circuit the heavy traffic scanning operation may be forced.

10.02 The outpulser may also seize the identifier on a test call origianted by the automatic trunk test circuit. On this type of test call, the outpulser operates the TST relay directly and the OIT relay remains normal. The service oscillator is used as on a regular service call. The TST relay operated functions as described above to connect several leads into the Outpulser Identifier Test Circuit.

OPERATION WITH THE SERVICE NETWORK

10.03 A test call through the service network requires a patching connection between the test circuit and the number network associated with a particular directory number. This test is really a means to test the service network and requires that the identification signal be connected to the input of a particular number network where the signal is fed through the service network and identified by the identifier, outpulsed by the outpulser, and registered in the test. The information registered in the test circuit can then be verified.

OPERATION WITH A TEST NETWORK

A. Test Call

10.04 On this call, a test signal is fed into a test network that simulates the service network. The test signal, either an operate or a nonoperate signal that depends on test being made, simulated worst circuit conditions and will cause identification failures should any of the amplifier-detectors be operating abnormally.

10.05 By means of keys in the test circuit, any particular directory number may be set up. The identifier will then identify this number just as on a service call. The identifier number will be outpulsed by the outpulser and this information registered in the test circuit for verification. In addition, the test circuit registers the progress of the identifier during the call. By varying the key setting, each of the amplifier-detectors including the multiparty and the service observing amplifier-detectors may be checked as well as the identifier's ability to identify each of the six offices it serves.

10.06 Under control of the test circuit the identifier may be forced to make a second attempt to find a particular digit or it may be forced to fail and cause a second trial to be made.

10.07 In order to operate with the test network, the test circuit causes the identifier to operate its auxiliary test relays TST1, 2, and the test connector relays TSTA-D. These relays permit the identifier to connect to the test network and also close through the leads that permit the test circuit to monitor the identifier progress.

B. Adjustment of Amplifier-Detectors

10.08 The attenuated signal fed into the identifier through the test network is also used when a signal is required to adjust an amplifier-detector. The method of adjusting the amplifier-detector is given in Circuit Note 105.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The oscillator circuits on the trunk frames shall be adjusted to give the required output signal.

1.02 Battery supply voltages at the identifier frame should be 45 to 50 volts and 125 to 135 volts dc.

2. FUNCTIONAL DESIGNATIONS

2.01 The functional meanings of the operating elements of the identifier are given in the following list:

Designation	Meaning
AK	All Check (all digit checks satisfied)
EP	End of Pulsing
ES	End of Steering (digit steering)
ESA	End of Steering Auxiliary
ES1	End of Steering - first attempt
ES2	End of Steering - second attempt
ESR	Release ES Relay
H1	Hundreds Digit Steering Control Auxiliary
HK	Hundreds Digit Check
HR(0-19)	Hundreds Register
HS	Hundreds Digit Steering Control
HSA	Hundreds Digit Steering Auxiliary
HTC	Heavy Traffic Control
HTR, HTR1	Heavy Traffic
HTT	Heavy Traffic Timing
LO	Lockout
LT	Light Traffic
OF(0-6)	Office Steering Control - Offices 0 to 6
OF(0-6)A	Office Steering Auxiliary
OFE	End of Office Steering
OFEA	End of Office Steering Auxiliary
OFK	Office Check
OFKA	Office Check (stops office steering)
OFK(B,C,D)	Office Check Cut-through
OFX(1,4,5)	Office Cross (false office identification)
OIT	Outpulser Identifier Test
ON, ON1, ON2	Off Normal
ORK, ORK(1,2)	Office Register Check
P	Pulsing Relay (steering control)
P(1,2)	Pulsing Relay (amplifier-detector gating)
PC(1,2)	Pulsing Check (checks that pulse generator is functioning before enabling its steering control)
[illegible]	Pulsing Detector Control
PG	Pulse Generator
PS	Pulsing Steering Control
PTK	Party Check
PTY	Multiparty
RP	Ring Party
SO	Service Observing
T1	Tens Digit Steering Control Auxiliary
TBL, TBLA	Trouble Ticketer Connectors
TH1	Thousands Digit Steering Control Auxiliary
THK	Thousands Digit Check
THR(0-19)	Thousands Register
THS	Thousands Digit Steering Control
THSA	Thousands Digit Steering Auxiliary
TK	Tens Digit Check
TP(A-C)	Tip Party
TR(0-19)	Tens Register
TS	Tens Digit Steering
TSA	Tens Digit Steering Auxiliary
TST	Test (operates on all test calls)

Designation	Meaning
TST1	Test (operates only on test calls using test circuit network)
TST(A-D)	Test (connect identifier to network of test circuit)
U1	Units Digit Steering Control Auxiliary
UK	Units Digit Check
UR(0-19)	Units Register
US	Units Digit Steering Control
USA	Units Digit Steering Auxiliary

3. FUNCTIONS

3.01 To register party information and control the selection of the corresponding busses by the Secondary Network and Bus Connector circuit.

3.02 To generate its own timing pulses to control the advance of steering.

3.03 To signal the corresponding oscillator on the trunk frame that 5800-cycle tone is required on the sleeve lead of the trunk that has requested identification of the calling number.

3.04 To scan rapidly the Secondary Network and Bus Connector circuits in successive offices in search of the 5800-cycle signal so as to identify the originating office.

3.05 To scan rapidly the Secondary Network and Bus Connector circuits within the originating office to identify the calling customer's directory number.

3.06 To receive, amplify, and detect low level 5800-cycle signals used for identification.

3.07 To check the received signals for validity by testing frequency, amplitude, and duration of the signals and by checking, with the aid of the outpulser, that two signals are received simultaneously.

3.08 To register digits in the outpulser as they are identified.

3.09 To recycle after a complete scan so as to identify a missed office or digit.

3.10 To skip digits found in the first attempt when recycling to identify a missed digit.

3.11 To skip digits found in the first attempt when advancing from one missed digit to the next.

3.12 To notify the outpulser upon completion of the second attempt. If digits are still missing, this causes the outpulser to record a trouble.

3.13 To increase speed of scanning as soon as the office is identified so as to minimize holding time.

3.14 To test for the identification signal on a multiparty bus set aside for that purpose and signal the outpulser immediately if such a signal is found.

3.15 To test for the identification signal on a service observing bus to determine if the line is being observed and signal the outpulser if it is observed.

3.16 To provide means to connect to the Outpulser-Identifier Test Circuit for testing of the identifier and also to permit readjustment of the amplifier-detectors in the identifier.

3.17 To ground lead IB for traffic usage recording whenever the identifier is made busy for any reason except plugged busy.

3.18 To ground lead IBM for traffic usage recording whenever the identifier is plugged busy.

3.19 To provide a series filament arrangement for electron tubes CTR and OUT that does not require the removal of the filament fuse (as is required with the former arrangement) in order to prevent possible damage to other filaments when any of these tubes are removed, and also to prevent damage to filaments if certain other filaments go open.

4. CONNECTING CIRCUITS

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

4.02 This circuit will function with the following common systems, automatic number identification circuits:

(a) Outpulser - SD-95811-01.

(b) Secondary Network and Bus Connector - SD-95814-01.

(c) Oscillator - SD-95827-01.

(d) Service Observing Network Circuit - SD-95829-01.

(e) Trouble Ticketer - SD-95816-01.

(f) Outpulser-Identifier Test Circuit - SD-95815-01.

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

(h) Miscellaneous Circuit for Trouble Ticketer Frame - SD-95823-01.

(i) Permanent Signal Identification Circuit - SD-95817-01.

(j) Line Verification Connector and Display Circuit - SD-95828-01.

4.03 This circuit will function with the following crossbar No. 1 trunk circuits:

(a) Outgoing Trunk, MF Pulsing - SD-26209-01 (typical).

(b) Outgoing Trunk, PCK Pulsing - SD-26210-01.

4.04 This circuit will function with the following step-by-step trunk circuits:

(a) Outgoing Trunk E and M Leads Signaling - SD-32244-01 (typical).

(b) Outgoing Trunk, Loop Pulsing - SD-32245-01 (typical).

4.05 This circuit will function with the following panel trunk circuits:

(a) Outgoing Trunk, MF Pulsing - SD-21972-01 (typical).

(b) Outgoing Trunk, PCI Pulsing - SD-21974-01.

4.06 No. 1, 350A or 355A Line Verification Circuit - SD-32246-01.

5. MANUFACTURING TESTING REQUIREMENTS

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

5.02 With an undistorted 5800-cycle-per-second signal of 25-uv applied between one input terminal and ground the amplifier-detectors in the identifier circuit shall be capable of pro iding a voltage of at least 30 volts at pin jack PA2. With the same input and the amplifier-detectors adjusted to give exactly 30 votls at pin jack PA2 a voltage of at least 75 volts should appear at pin jack PC. The amplifier-detectors should be capable of meeting this requirement with the input signal applied to either input terminal.

5.03 Adjusting the amplifier-detectors to give 30 volts at pin jack PA2 with a 5800-cycle-per-second input voltage of 50-uv (set potentiometer GN for this sensitivity), the amplifier-detectors shall be capable of providing a voltage of at least 70 volts at pin jack PC with a 50-uv input signal having a frequency of 5750 cps and also with a frequency of 5850 cps.

6. TAKING EQUIPMENT OUT OF SERVICE

IDENTIFIER CIRCUIT OR ANY OF ITS ASSOCIATED APPARATUS

6.01 In order to take the identifier or any of its associated apparatus out of service, insert a 246A plug in the corresponding I-B jack on the trouble ticketer frame. To make the identifier busy to only one outpulser insert a 329A plug in the corresponding I-BOP- jack on the trouble ticketer frame. The number following the I si the identifier number. That at the end of the jack designation is the outpulser number.

GENERAL PRECAUTIONS TO BE FOLLOWED WHEN WORKING ON THE APPARATUS

A. Making the Circuit Busy

6.02 When working on the apparatus, the identifier should be made busy by inserting a 246A plug in the corresponding I-B jack on the trouble ticketer frame.

B. Dry Reed Relay Contacts

6.03 When checking for the operation of dry reed type relays in this circuit only a high resistance receive or ohmmeter should be used.

7. ALARM INFORMATION

TIME-OUT

7.01 The identifier does not have a timer for overall time-out. The outpulser has a timer that covers the holding time of the identifier. If this timer functions, the outpulser causes a trouble ticket to be printed and a minor alarm to be sounded. This alarm can be silenced by operating the AR key on the trouble ticketer frame.

FUSE ALARM

7.02 If in response to a major alarm an FA lamp is lighted on an identifier frame it is an indication that a fuse has operated. Replace the operated fuse to restore the alarm and extinguish the FA lamp. The FG lamp lights when the fuse is replaced. The AR key on the identifier frame should be operated to restore this lamp.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.1 Added

App. Fig. 10 consisting of:

Relays

OF6 (AF518)
OF6A (AF100)

Networks

OF6 (185A)
OF6A (185A)

C. Changes in Circuit Requirements Other Than Those Caused by Changes in Apparatus

C.1 The blocking information for relay OFK has been revised.

C.2 The timing requirements for the PG and PS relays have been revised to include a current flow test of relay P prior to the pulsing check of relays PG and PS.

D. Description of Changes

D.1 FS2, 3, 4, and 5, Notes 101, 102, 104, and 201 and CAD 1 have been revised to add reference to automatic identified outward dialing (AIOD) service for PBX lines or to show the addition of App. Fig. 10.

D. 2 Notes 106 and CAD 11 have been added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 2364-MRM-JEM