

CIRCUIT DESCRIPTION

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19

COMMON SYSTEMS
MISCELLANEOUS CIRCUIT
TROUBLE TICKETER FRAME
AUTOMATIC NUMBER IDENTIFICATION - TYPE B
PANEL, CROSSBAR NO. 1, OR
STEP-BY-STEP OFFICE

CHANGES

D. Description of Changes

D.01 The use of the TTB, 185A contact protection network of App Fig. 1 in FS11 is changed to include option YX for use with the common system message printer if the existing option ZH for use with TASC or ASC features is not provided. Circuit Notes 102 and 104 are changed to show the application of option YX for the CSMP, SD-94865-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5413-DAJ

WE DEPT 45240-WCR-JTT-SVB

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CHANGES

A. Changed and Added Functions

A.01 Function 3.42, which provides a tens peg count registration of identifier group usage to a centralized control center, is deleted for use with No. 1 AMARC and toll identifiers as a result of circuit noise interference.

B. Changes In Apparatus

B.01	<u>Superseded</u>	<u>Superseded By</u>
	AID0, AID1 -	AID0, AID1 -
	KS-21291 L1 -	21A -
	Magnetic Counter -	Magnetic Counter -
	Option YZ - FS14 -	Option YZ - FS14 -
	App Fig. 1	App Fig. 1

D. Description of Changes

D.01 The B.01 change above represents only a class "B" manufacturing change being made at the same time as option YZ is being added per D.02 which follows.

D.02 Apparatus ZH used in the identifier in-use lamp circuit, FS14, is changed to option YZ for its exclusive use with the Identifier, SD-95810-01. Some opposing part of the ZJ wiring in FS14 is changed to option YY for use with the No. 1 AMARC and Toll Identifier, SD-1C593-01, when used with the ASC system or without ASC also.

D.03 The change is necessary in order to eliminate circuit noise produced by the magnetic counters on the ID- leads to the No. 1 AMARC and toll identifiers which

caused identification failures. Scan information of AMARC and toll identifier tens peg count on the A0 and A1 scan points is therefore eliminated. However, the AMARC center is aware of the operational status of the local office identifiers in its own way. This means that the missing data to the TASC is not too serious of a loss in system effectiveness since a number of other valid scan points still afford the center with a good indication of the ANI-B systems operational status.

F. Changes in CD Sections

F.01 In SECTION II - DETAILED DESCRIPTION under 7. IN-USE LAMPS - FS13, 14, AND 33, change 7.02 to read as follows:

7.02 If the CSACS or TASC system is provided, with option YZ and the Toll Identifier, SD-95810-01, used, a tens counter and relay AID- will provide the system with an individual register indication of usage of each of the first two identifier groups. With options YY and ZH provided with the No. 1 AMARC and Toll Identifiers, SD-1C593-01 only a local identifiers in-use lamp indication is provided. The operation or release of the battery cut-off key has no effect on the tens peg count registration; only the identifier in-use lamps are affected.

F.02 In SECTION III - REFERENCE DATA under 3. FUNCTIONS, change 3.42 to read as follows:

3.42 To provide a tens peg count registration of identifier group usage to a centralized control center when identifiers per SD-95810-01 are utilized.

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CHANGES

A. Changed and Added Functions

A.01 The circuit is changed to function with ASC systems E2A satellite telemetry in step-by-step offices.

D.01 Description of Changes

D.01 Option ZX is added to FS27 to provide connection of the AN2 and BSY leads to the E2A CDO satellite circuit. To bring the connecting circuit terminology into agreement with current usage, the use of CSACS or TASC acronyms is replaced by simply the E2A TLM SYS with some reference to the original circuits by means of Circuit Note 110. Likewise, the CSACS interface and control circuit is changed to interface and control circuit for ASC systems. The FS8, 10, 11, 14, 27, and 28 are revised to reflect these connecting information changes; corresponding changes are made in CADs 5, 6, and 13.

D.02 In addition to the changes in FS27 per D.01, a no-record option change is made to change part of option ZJ to read ZY where the MJ, B, and MN diodes are not specified. Where these diodes are specified, the former part of option ZH is changed to option ZZ. This change does not represent a wiring change in the schematic itself, but was made at the request of WEC to facilitate a correction to their T-drawings. Circuit Note 102 is revised to include both D.01 and D.02. Circuit Notes 104 and 110 are revised and Note 111 is added for these items.

D.03 Several minor drafting corrections are made. Option ZH is added for contact 8B of relay EOS in FS14, for the TT diode in FS11, and for the EOS lead in FS29 (sheet B2B). Option ZH on the AL and

AL1 leads in FS27 (sheet B2A) that in turn connect to option ZV are eliminated. The use of option ZV alone for these leads is sufficient to identify this feature according to the revised Note 102. The drafting corrections do not affect job records and should be in agreement with WECO T-drawings at this time.

F. Changes in CD Sections

F.01 In SECTION I the following paragraphs where either, CSACS or TASC, features are mentioned, substitute the word ASC: 6.01, 6.04, 6.06, 7.02, 17.02, 19.07 (including the paragraph heading, text, and index for 19.07).

F.02 In SECTION II, add 19.08 and 19.09 as follows:

ASC WITH OPTION ZX

19.08 When E2A satellite telemetry is provided with the ASC system, connection to the interface and control circuit for the ASC system is optional. Option ZV provides this connection whereas Z does not. Common to the ASC system, however, is option ZZ which provides diodes MJ, B, and MN. Option ZX provides for monitoring only the AN2 and BSY scan points. Provision for releasing alarms may be provided by option ZV, but not with option Z. The E2A satellite telemetry is intended to furnish the ASC system features on a partial basis to step-by-step, CDOs, or other smaller offices.

19.09 The general nomenclature for those circuits identified with, TASC (No. 1 crossbar only) and the former, CSACS (No. 1 crossbar or step-by-step) are simply designated as, ASC on the schematic, Issue 19B, or in the circuit description, except where some documentation of the different applications is necessary.

F.03 In SECTION III, under 3. FUNCTIONS, add the following:

3.50 To provide a control center (via E2A satellite telemetry) with an abbreviated capability of alarm indications consisting of only a major alarm and an all outpulsers busy alarm. The provision for

release of locked in alarms is optional with this feature, but not with the other ASC features.

F.04 In SECTION III, under 4. CONNECTING CIRCUITS, add the following:

(a) E2A Satellite Circuit - SD-2P050-01 and its Application Schematic - SD-2P070-01 (See also E2A SAC Remote Application Schematic - SD-1C543-01).

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit is designed for use in No. 1 crossbar, panel, and step-by-step offices arranged for automatic number identification. It provides the miscellaneous apparatus mounted on the trouble ticketer frame and includes a talking line between ANI frames, the frame test battery, a spare jack, a remote control jack for testing, various make-busy jacks for ANI circuits, various failure peg count registers, the trunk lock-up register and control, the number of trouble tickets counter control, fuse alarms, and other alarm indications.

SECTION II - DETAILED DESCRIPTION

1. TALKING LINE BETWEEN ANI FRAMES - FS1 (CROSSBAR AND PANEL), FS5 (STEP-BY-STEP)

1.01 Communication may be established between two or more ANI frames by plugging telephone sets into the TEL jacks, FS1 or the SWMN jacks, FS5 on the ANI frames. Talking battery is supplied through the connecting circuit. No arrangement for signaling is provided.

2. FRAME TEST BATTERY - FS2

2.01 Test terminals are furnished on the frame to supply -48 volt battery, direct ground, and high-resistance 12,000-ohm ground. Test battery jacks A or 48-volt, and C or +130 volt are provided to supply battery and direct ground for use with test sets.

3. SPARE JACK - FS3

3.01 Jack B is provided for possible future requirements.

4. REMOTE CONTROL JACK - FS4

4.01 Control leads RC and AV from the Out-Pulser Identifier Test (OIT) circuit are brought out to the RC jack. A 32A test set can be used for remote operation of the outpulser identifier test circuit and the trunk test circuit.

5. FUSE ALARMS - FS6 AND FS7-48 VOLT FUSE ALARM (CROSSBAR AND PANEL) - OPTION W

5.01 The operation of the 20-ampere feeder fuse followed by the operation of the parallel 1-1/3 ampere pilot fuse, or the operation of any 1-1/3 ampere circuit fuse connects -48 volt battery through the operated contact of the fuse to the F lead of the associated alarm circuit. The FA lamp lights from ground in the alarm circuit and is extinguished when the operated fuse is removed.

5.02 The 20-ampere feeder fuse shall be replaced before its associated pilot fuse is replaced.

5.03 The 1075-ohm resistor shunting the FA lamp is used to prevent an open alarm circuit in case the FA lamp is removed from the circuit. The 220-ohm series resistor is used to protect the alarm lead between the FA lamp and the -48 volt battery source in case of a trouble ground. Resistor PF, 220 ohms, is used to protect the pilot fuse.

-48 VOLT FUSE ALARM (STEP-BY-STEP) - OPTION V

5.04 The operation of the 20-ampere feeder fuse followed by the operation of the parallel 1-1/3 ampere pilot fuse, or the operation of any 1-1/3 ampere circuit fuse connects -48 volt battery through the operated contact of the fuse and the 20A or FA resistor to the winding of relay FA. Relay FA operates to light the FA lamp and to ground the fuse alarm leads to the connecting alarm circuit.

5.05 When the fuse is replaced, relay FA releases, extinguishing the FA lamp and retiring the fuse alarm. The 20-ampere feeder fuse shall be replaced before its associated pilot fuse is replaced. The 221-ohm series resistor is used to protect the alarm lead in case of a trouble ground.

6. MAKE-BUSY FACILITIES - FS8, 9, 10, 11, 12, 32, AND 34IDENTIFIER MAKE-BUSY - FS8 AND 9

6.01 When an identifier is made busy to all outpulsers by the insertion of a make-busy plug into the I-B jack, or by a fuse alarm indication from the miscellaneous circuit for the identifier frame, relay I-B

is operated and the MB- lead to the corresponding identifier is grounded, operating the MB relay in the identifier. The operation of relay I-B grounds the MBI leads to all associated outpulsers, operating the MBI- relays in the outpulsers. If the CSACS or TASC feature is provided, an identifier can be made busy by a ground on the I-B lead with option ZS. A busy condition can be verified by a return ground over the IMB- lead to the remote circuit.

6.02 When an identifier is made busy to a particular outpulser by insertion of a make-busy plug into the I-BOP- jack, the MBI- lead to that outpulser is grounded to operate the MBI- relay in the outpulser. The operation of relay MBI- in the outpulser sets relay W-Z combination so that the available identifier is preferred for usage.

OUTPULSER MAKE-BUSY - FS10

6.03 When an outpulser is made busy by the insertion of a make-busy plug into the OP- jack, the OPMB- lead to the corresponding outpulser is grounded, operating the MB relay in the outpulser. Relay MB in the outpulser grounds the OPB lead to the outpulser connector to make the outpulser busy to all trunk subgroups in the connector circuit.

6.04 If the CASACS or TASC system feature is provided, outpulser can be made busy by a ground signal on the OC- lead and the corresponding status monitored for a ground indication on the OMB- leads.

TROUBLE TICKETER MAKE-BUSY - FS11, 12, AND 34

6.05 When the trouble ticketer is made busy by the insertion of a make-busy plug into the TTB jack or by a ground on the TTB lead from the trouble ticketer, relay TTB is operated and the MB lead to the ticketer is grounded. Relay TTB opens the TTST leads from the outpulsers, preventing relay OP- in the ticketer from operating. Relay TTB also operates relay TTBI for each associated terminating marker group to open the TTST leads from the terminating markers, preventing relay MLR- in the ticketer from operating. The ground on the MB lead is passed through relay OP- and MKR in the ticketer back through this circuit to the individual outpulsers and markers as a ticketer busy indication.

6.06 If the CSACS or TASC system is provided, option ZH, trouble ticketers can be made busy over the TTK lead. The status of the TTB jack can be monitored over the TKR lead.

6.07 When the trouble ticketer is made busy to a particular outpulser by the insertion of a make-busy plug into the TTBOP-jack, the TTST and TTB leads between the outpulser and the trouble ticketer are opened and ground is placed on the outpulser side of the TTBOP-jack.

6.08 When the trouble ticketer is made busy to a particular terminating marker group by the insertion of a make-busy plug into a TTBMG jack, the corresponding relay TTB1. Relay TTB2 also grounds the TTB lead to each marker in the group as a busy indication. Relay TTB1 opens the TTST lead from each marker as described in 6.05 and 6.06.

6.09 When a make-busy plug is inserted into a CTT jack at a terminating trouble indicator for a particular terminating marker group, a ground is applied over the CTT-lead to operate a corresponding relay TTB2 in FS34. Operation of relay TTB2 functions to provide a remote means of making the trouble ticketer busy to the associated marker group as described in 6.07.

AIOD TRANSLATOR MAKE-BUSY - FS32

6.10 The AIOD translator is made busy by insertion of a make-busy plug into the TL-B jack. This action causes operation of a make-busy relay in the associated AIOD translator connector. The make-busy relay prevents seizure of the translator by the outpulser except on certain test calls and causes the outpulser to recognize the busy condition and to take alternative action.

7. IN-USE LAMPS - FS13, 14, AND 33

7.01 The OP-, ID-, and TL- lamps identify the usage of the outpulser, identifier, and AIOD translator circuits. Battery for these lamps is supplied under control of a lamp battery cutoff key, which may be released by the maintenance employee if it is desired

to have these lamps unlighted during certain periods. The TL-lamp also lights when the translator is plugged busy.

7.02 If the CSACS or TASC system feature is provided, a tens counter and relay AID- will provide the system with an individual register indication of usage of each of the first two identifier groups. The operation or release of the battery cut-off key has no effect on this registration.

8. PEG COUNT REGISTERS - FS15, 16, 18, 26, 30, AND 38

FIRST ATTEMPT IDENTIFICATION FAILURE REGISTER - FS15

8.01 When the identifier has failed to identify on its first attempt, the IAF-lead is grounded by a pulse from the identifier circuit operating the IAF-message register and its associated AF-pulse help relay. When the message register is fully operated, the locking path for relay AF- is opened, releasing the message register and relay AF-. The release of the message register scores the first attempt failure of the identifier circuit.

FIRST TRIAL IDENTIFIER FAILURE REGISTER - FS16

8.02 When an outpulser registers a first trial failure by an identifier, the ITF-lead is grounded, operating the ITF message register. When ground is removed by the outpulser, the message register releases, scoring the first trial failure of the identifier circuit.

SECOND TRIAL IDENTIFIER FAILURE REGISTER - FS18

8.03 When an outpulser registers a second trial failure by an identifier, the 2TF lead is grounded, operating the 2TF message register. When the ground is removed by the outpulser, the message register releases, scoring the second trial failure of the identifier circuit. Option ZN prevents false second trial failure peg counts when the ANI-B system is being used for the print out of directory numbers feature on line insulation test failures.

OUTPULSER FAILURE REGISTER - FS26

8.04 When an outpulser registers a failure, other than a failure by the identifier, the OPF- lead is grounded, operating the OPF- message register. When the ground is removed by the outpulser, the message register releases, scoring the outpulser failure.

TEST CALLS REGISTER - FS30

8.05 The TC lead is grounded by the outpulser on test calls which causes the operation of the TC message register. When ground is removed from the TC lead by the outpulser, the message register releases, scoring a test call.

SERVICE CALL FAILURE REGISTER - FS31

8.06 When the trouble ticketer is seized to print a ticket on a service call failure, it grounds lead SCF to operate the SCF register. When ground is removed by the ticketer, the message register releases, scoring the failure.

GROUND REMOVAL FAILURE REGISTER - FS38 - OPTION ZW

8.07 When an outpulser is arranged to transmit ground removal failures detected by step-by-step ANI trunks, a ground on the GRF- lead from an outpulser will operate and score the GRF- message register. If this register is not provided, the GRF indications will be recorded as OPF indications in FS26.

9. CANCEL FIRST TRIAL IDENTIFIER FAILURE RECORDINGS - FS17

9.01 Jack CFTF is provided so that recording of first trial identifier failures can be canceled. Insertion of a make-busy plug into the CFTF jack operates relay CFTF- in all outpulsers in the associated identifier group.

10. DISPLAY LOST - FS19

10.01 If an outpulser attempts to seize the trouble ticketer and the ticketer is not available at the time, the relay DL in the outpulser operates and locks to the DLL lead. The DL lamp associated with that outpulser lights. Operation of the AR key releases all operated relay DL- in the outpulsers, in turn extinguishing the DL lamps.

11. NUMBER OF TICKETS COUNTER CONTROL AND ALARM - FS20

11.01 The ground to control the number of tickets counter in the trouble ticketer is supplied over the CTC lead through the back contact of the CTC key. Operation of the CTC key cancels counting of the trouble tickets and recycles the number of trouble tickets counter. If the predetermined number of tickets are counted in a 2-minute interval, the NTC lead is grounded to operate relay NTA which locks to the AR key, lights the NTA lamp, and sounds a major alarm. The trouble ticketer is removed from service and the TOS lamp is lighted for the balance of the 2-minute interval. Operation of the AR key releases relay NTA to retire the major alarm and extinguish the NTA lamp.

12. TROUBLE TICKETER TIME-OUT ALARM - FS21

12.01 A time-out of one of the timers in the trouble ticketer grounds the TTA and one of the PTO, TTO, or TDA leads. Ground on the TTA lead operates relay TTA which locks and in turn operates relay ALM to bring in a minor alarm. Relay TTA also grounds the ALM lead to operate relay ALM in the trouble ticketer. Ground on the PTO lead lights the PTO lamp indicating a trouble ticketer progress time-out. Ground on the TTO lead lights the TTO lamp indicating a trouble ticketer overall time-out. Ground on the TDA lead lights the TDA lamp indicating a time of day alarm.

13. TAPE ALARM - FS22

13.01 When the tape supply of the 1A ticketer becomes low, the tape alarm contacts close, grounding the PA lead to operate the relay PA. Relay PA lights the PA lamp and operates relay ALM to bring in a minor alarm.

14. TRUNK LOCKUP, FIG. 4 - FS23

14.01 If the trunk lockup feature is provided the operation of the TKL key operates relays TKL- and lights the TKL lamp. The TKL- leads to all outpulsers are grounded. The first outpulser that recognizes a condition which requires the trunk to be locked up for tracing operates relay TKL in that outpulser. The LUG lead is grounded by the outpulser, operating relays LU- to place resistance battery on the LU- leads to all of the ANI trunks.

- 14.02 When the outpulser has completed outpulsing the trouble indication digit to the CAMA office, relay OTM in the outpulser operates to place resistance battery on the TPT lead and to lock the operated relay TKL. Relay OTM also operates relay CITN in the miscellaneous circuit. The operation of relay CITN:
- (a) Grounds the TL lead to all outpulsers.
 - (b) Releases relay TKL- which removes the grounds from the TKL- leads to all outpulsers.
 - (c) Operates the CI- relays.
- 14.03 The operation of relay CI2 operates relay LTN which locks to the TKL key. Relay LTN provides the operate ground for the trunk identification lamps and the locking circuit for the trunk number register relays.
- 14.04 The outpulser that recognized the trunk lockup condition grounds the TKN- lead to the outpulser connector, operating relay TKN in the trunk subgroup being served by the outpulser. The TK(00-13), SGU(0-9), and SGT(0-6) leads are cut through to the trunk number register relays. One of each of relays TK--, SGU-, and SGT- operates and locks to relay LTN. Corresponding lamps are lighted to indicate the location of the locked up ANI trunk.
- 14.05 When relay OTM in the outpulser is released by the pulse generator circuit:
- (a) The locking circuit for relay TKL in the outpulser is opened, releasing relay TKL.
 - (b) Relays CITN and CI- in the miscellaneous circuit are released.
 - (c) Resistance battery is removed from the TPT lead to the ANI trunk.
- 14.06 The release of the TKL key:
- (a) Extinguishes the TKL lamp.
 - (b) Releases relay LTN to remove the locking circuits for the trunk number register relays and extinguishes the corresponding lamps.
 - (c) Releases relays LU- to remove the resistance battery from the LU- leads, permitting the locked relay TM in the ANI trunk to release.
- 14.07 The release of relay TM restores the locked up trunk to normal, permitting the connection to break down.
15. IDENTIFIER MAKE-BUSY ALARM - FS24
- 15.01 When relay MB- in all of the identifiers in an identifier group are operated, the MBA lead is grounded to operate relay IMBA. Relay IMBA lights the IMBA lamp and operates relay ALM to bring in a major alarm.
16. ALL OUTPULSERS BUSY ALARM AND TRUNK SEIZURE FAILURE REGISTER - FS25
- 16.01 When option ZQ is provided in a cross-bar No. 1 or a step-by-step office, the operated relay B1 also closes a BSF-ground path lead from the miscellaneous circuit for the ANI trunk frame to operate the BSF plant register in this circuit and a BSF traffic register over another BSF lead to the traffic register circuit. The ground pulse is produced by the momentary operation of the Outpulser Seizure Failure (OSF) peg count relay which is located in the miscellaneous circuit for the ANI trunk frame. This relay is operated by a momentary ground pulse from an ANI trunk which has just timed out, waiting for an outpulser seizure. The OSF relay has a shunted secondary to make it slow-releasing so as to provide a pulse long enough to operate the registers.
- 16.02 Another function of the OSF relay is to score an OSF traffic register. A comparison therefore can be made between the BSF and OSF traffic registers. The ratio between the total number of OSF peg counts versus the lesser BSF score, equals the

percentage of time all outpulsers were busy and could not process requests for service by the trunks. Further analysis of these readings may provide additional data for both traffic load and trouble conditions in the office.

16.03 When relay AOPB- in all of the outpulsers in an identifier group are operated, the AOPB lead is grounded to operate relay B1. The operated relay B1 lights the AOB lamp and starts the TM tube timer. If the ground is removed from the AOPB lead before the TM timer times out, the B1 relay releases, extinguishing the AOB lamp and recycling the TM timer. If the ground is maintained on the AOPB lead, the TM tube fires in approximately 40 to 60 seconds. When the TM tube fires, relay B is operated through its secondary winding. Relay B locks to the AR key through its primary winding and releases relay B1 to recycle the TM timer. Relay B also lights the AOBA lamp, transfers the AOPB lead from relay B1 to the AOB lamp, and operates relay ALM to bring in a major alarm if option N is furnished, or a minor alarm if option Q is furnished.

16.04 Operation of the AR key releases relay B which in turn extinguishes the AOB and AOBA lamps, transfers the AOPB lead back to the B1 relay, and releases the ALM relay to retire the alarm.

17. ALARM RELAY AND ALARM RELEASE KEY - FS27

17.01 When relay ALM is operated by relays MN, PA, or TTA, lead 2 is grounded to sound a minor alarm and leads 3 and 4 are grounded to activate the aisle and frame pilot lamps. If relays IMBA, NTA, or MJ are operated to bring in the alarm, lead 1 is grounded instead of lead 2 to sound a major alarm. Operation of the AR key releases the operated alarm relays to retire the alarm.

17.02 If the CSACS or TASC system feature is provided, the various relays which operate relay ALM will also provide the control center with an indication of alarm on the TMN lead. The operation of relays MN, MJ, B, or CLIA will provide the center with a specific indication by a ground on the AN1, AN2, BSY, or CLI leads.

18. LAMP BATTERY CUTOFF - FS28

18.01 Battery for the identification lamp is supplied under control of relay BAT

in the operated position. Release of the BA locking key releases relay BAT to remove the battery for the lamps. When the ANI installation is not arranged for the transfer of alarms, Z wiring is provided which places direct ground on the BAT and TKL keys. When alarm transfer is provided, ground for the BAT and TKL keys is supplied over the LPC lead, and Y wiring from the alarm transfer circuit which removes this ground when alarms are transferred.

18.02 When connection to the step-by-step interface and control circuit or the No. 1 crossbar alarm release and control circuit is required, option ZV will also allow a ground to be removed from the LPC lead by one of these connecting circuits.

19. TROUBLE TICKETER REQUEST ALARM - FS29

19.01 Whenever an outpulser attempts to connect to the trouble ticketer, whether successful in the attempt or not, either the MJ- or MN- lead is grounded by the outpulser. Option ZN prevents false alarm indications when the ANI-B system is being used for the feature to print out directory numbers on line insulation test failures.

ALARM SENDING NOT PROVIDED, OPTION Z OR ALARM SENDING PROVIDED WITHOUT TONE IDENTIFICATION - OPTION Y

19.02 Ground on the MN- lead operates relay MN and ground on the MJ- lead operates relay MJ. Operation of either of these relays lights the TTR lamp. Relay MN, with the ACO key nonoperated, or relay MJ operates relay ALM to activate the audible and visual alarm circuits. Relays MJ and MN lock to the AR key. The trouble ticketer request alarm may be retired by momentarily operating the AR key.

ALARM SENDING PROVIDED WITH TONE IDENTIFICATION - OPTION R

19.03 Ground on the MJ- lead operates one of relays T(4-9, 4A-7A) and ground on the MN- lead operates one of relays T(14-19, 14A-17A). Relay T- or T-- connects ground to one of the tone control leads to the alarm sending circuit and also operates relay MJ or MN. Relay MJ or MN locks to the LK lead to the alarm transfer circuit through the AR key and lights the TRR lamp.

19.04 Relay MN, with the ACO key non-operated, or relay MJ operates ALM relay to activate the audible and visual alarm circuits through the alarm transfer circuit.

19.05 If the alarm transfer circuit is activated, a distinctive lamp signal is transmitted in response to a ground on the MJ1 or MN1 lead and a distinctive tone signal is transmitted in response to a ground on the tone control leads.

19.06 The trouble ticketer request alarm may be retired by momentarily operating the AR key in the local office or by removal of the ground on the LK lead by the alarm transfer circuit.

CSACS OR TASC SYSTEM PROVIDED - OPTION ZH, Y, OR ZV

19.07 With the CSACS or TASC feature, ground from an outpulser on an ANI- lead operates the corresponding relay OP- which locks to a normal contact on relay EOS. An indication of an outpulser first trial failure in either of the first two identifier groups is thereby locked-in and furnished separately to CSACS or TASC system using two sets of relays OP0-9. Relay EOS retires the indication at the end of each scan cycle when it operates momentarily from a ground on the EOS lead from another circuit or from ground the alarm release key of FS27 whenever it is operated. Relay EOS also will release an operated identifier usage relay AID- of FS14 at the same time.

20. CALLING LINE IDENTIFICATION ALARM - FS35

20.01 Whenever a marker connects to the ticketer to cause a record of the Calling Line Identification (CLI) to be printed, relay CLIA is operated to bring in a major alarm at the ticketer frame. If it is unable to seize the ticketer, an alarm is brought in at the terminating trouble indicator on marker calls.

20.02 Relay CLIA lights lamp CLIA (if the BAT key is operated) and operates relay ALM. It also grounds the MJB lead to the miscellaneous circuit for the scanner frame, Mfr Disc.

20.03 When relays CLIA and ALM are operated, the major alarm is brought in locally or at a remote location if the alarm transfer feature is activated.

20.04 Relay CLIA locks to the AR key. Momentary operation of the key will retire the alarm.

21. OSCILLATOR CROSS INDICATION AND TICKET JACK - FS36 - OPTION ZR

21.01 The OSX jack and lamp are provided when option ZR is provided in App Fig. 7. One jack is provided for each identifier group and one lamp is provided for each identifier in every group. When the OSX-lamp is lighted, it indicates the associated identifier has cross or false ground on its idle OSC lead to the ANI trunks. This problem will not always cause a trouble ticket to be printed. Therefore, to force a trouble ticket (only on first trial failures so the CFTF jack should not be plugged busy), plug a 310 plug into the OSX jack. The next time the ANI identifier, SD-95810-01 encounters a trouble on the OSC lead to a faulty trunk or trunk multiple, it will permit the trouble ticketer to print a record of the trunk number (if the ticketer is idle). The OSX plug will also prevent a reoccurrence of a minor alarm from this cause while the system is looking for the fault.

21.02 When the defect has been discovered and corrected, the OSX plug should be removed to restore the alarm circuit, FS27, to its normal mode of operation.

21.03 The OSX feature will not function on test calls, nor will the ATA function to silence an OSX audible minor alarm since the OSX cross does not always cause an ANI failure immediately.

21.04 Without the OSX feature, the only other positive indication of the oscillator cross problem is the momentary dual operation of relay OSC- associated with the several ANI trunk frames, and perhaps an undefined trouble ticket of an ANI failure on the first or second trial, but not always occurring every time the offending trunk is seized.

22. CANCEL AUDIBLE ALARMS AND ALARM RELEASE FOR ATA - FS37

22.01 A CATA jack, relay, and lamp are provided on the trouble ticketer frame by the trouble ticketer circuit when automatic trouble analysis is provided in a No. 1 crossbar office. If the CATA lamp is lighted, it means relay CATA is operated either by means of the jack or from the Maintenance Data Transmitter (MDT). The CATA relay operates relay CA in FS37 over the CA lead. This restores this circuit to normal in respect to the operation of FS27.

22.02 When the ATA is functioning with the trouble ticketer, the CATA lamp will not be lighted nor will CATA or CA relays be operated. This will alter FS27 so that most audible alarms will be silenced since ATA is fully aware of the causes of these alarms. Those alarms ATA is not completely aware of will not be silenced, an oscillator cross indication is an exception, and will produce an audible alarm.

22.03 Whenever the CA relay is normal (ATA mode) and relay RLS is operated in the trouble ticketer by ATA, relay ATR will operate in this circuit to release all alarms, and the associated relays that are locked up through the AR key in FS27 or FS19. This is done since ATA is aware of the alarm causing problems, and to allow new alarm indications to reoccur.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

<u>Designation</u>	<u>Meaning</u>
AF	Attempt Failure (Identifier)
AID-	ANI-B Identifier Group
ALM	Alarm
B	All Outpulsers Busy Alarm
Bl	All Outpulsers Busy
BAT	Battery

<u>Designation (Cont)</u>	<u>Meaning</u>
CI0-2	Cut-In
CITN	Cut-In Trunk Number
CLIA	Calling Line Identification Alarm
EOS-	End of Scan
FA	Fuse Alarm
I-B	Identifier Make-Busy
IMBA	Identifier Make-Busy Alarm
LTN	Locked up Trunk Number
LU-	Lockup
MJ	Major Alarm
MN	Minor Alarm
NTA	Number of Tickets Alarm
OP-	Outpulser (First Trial Failure)
PA	Paper Alarm
SGT0-6	Subgroup Tens Number
SGU0-9	Subgroup Units Number
T-, T--	Tone Identification
TKL	Trunk Lockup
TK00-13	Trunk Units Number
TTA	Ticketer Time-Out Alarm
TTB, 1, 2	Trouble Ticketer Busy

2.02 Keys

<u>Designation</u>	<u>Meaning</u>
ACO	Alarm Cutoff Trouble Ticketer Request
AR	Alarm Release
BAT	Battery
CTC	Cancel Ticket Counting
TKL	Trunk Lockup

2.03 Jacks

<u>Designation</u>	<u>Meaning</u>
48V	-48 Volts
+130	+130 Volts
A	-48 Volts
B	Spare
C	+130 Volts
CFTF	Cancel First Trial Failure
I-B	Identifier Make-Busy
I-OP-	Identifier Make-Busy to Outpulser
OP-B	Outpulser Make-Busy
RC	Remote Control
SWMN	Switchmans Talking Line
TEL	Telephone
TL-B	Translator Make-Busy
TTB	Trouble Ticketer Make-Busy
TTBMG-	Trouble Ticketer Make-Busy to Marker Group
TTBOP-	Trouble Ticketer Make-Busy to Outpulser

2.04 Lamps

<u>Designation</u>	<u>Meaning</u>
AOB	All Outpulsers Busy
AOBA	All Outpulsers Busy Alarm
CLIA	Calling Line Identification Alarm
CTC	Cancel Ticket Counting
DL-	Display Lost
FA	Fuse Alarm
ID-	Identifier in Use

Designation (Cont)

<u>Designation</u>	<u>Meaning</u>
IMBA	Identifier Make-Busy Alarm
MTA	Number of Tickets Alarm
OP-	Outpulser in Use
PA	Paper Alarm
PTO	Progress Time-Out
SGT0-6	Subgroup Tens Number
SGU0-9	Subgroup Units Number
TDA	Time of Day Alarm
TL-	Translator in use or Plugged Busy
TKL	Trunk Lockup
TK00-13	Trunk Units Numbers
TOS	Ticketer Out of Service
TTO	Trouble Ticketer Time-Out
TTR	Trouble Ticketer Request

2.05 Electron Tubes

<u>Designation</u>	<u>Meaning</u>
TM	Timing All Outpulsers Busy

2.06 Message Registers

<u>Designation</u>	<u>Meaning</u>
1AF-	First Attempt Failure (Identifier)
1TF-	First Trial Failure (Identifier)
2TF	Second Trial Failure (Identifier)
AID-	ANI-B Identifier Group (Tens Count)
BSF-	Busy Seizure Failure (Trunk Times Out to Busy Outpulser)
GRF-	Ground Removal Failure (Trunk in Identifier Group)

<u>Designation (Cont)</u>	<u>Meaning</u>
OPF-	Outpulser Failure
SCF	Service Call Failure
TC	Test Calls

3. FUNCTIONS

- 3.01 To provide a line for talking between ANI frames.
- 3.02 To provide battery and ground terminals for testing.
- 3.03 To provide battery and ground at jacks for use with test sets.
- 3.04 To provide a spare jack for future requirements.
- 3.05 To provide a remote control jack for remote operation of the outpulser identifier test circuit and the trunk test circuit.
- 3.06 To provide visual and audible alarm signals when a frame fuse operates.
- 3.07 To provide a make-busy jack and a relay to make an identifier busy to all outpulsers.
- 3.08 To provide a jack to make an identifier busy to a particular outpulser.
- 3.09 To provide a make-busy jack for an outpulser.
- 3.10 To provide a make-busy jack and relays to make the trouble ticketer busy to all outpulsers and terminating markers.
- 3.11 To provide a jack to make the trouble ticketer busy to a particular outpulser.
- 3.12 To provide a lamp to indicate an outpulser in use.
- 3.13 To provide a lamp to indicate an identifier in use.
- 3.14 To provide a register to record first attempt identification failures by an identifier.
- 3.15 To provide a register to record first trial failures by an identifier.
- 3.16 To provide a register to record all second trial failures in an identifier group.
- 3.17 To provide a register to record outpulser failures.
- 3.18 To provide a jack to cancel recording on a trouble ticket of first trial failures by the identifiers.
- 3.19 To provide means for bringing in an audible and visual alarm should an outpulser request connection to the trouble ticketer.
- 3.20 To provide a key to cut off trouble ticketer request minor alarms.
- 3.21 To provide a lamp to indicate that an outpulser did not connect to the trouble ticketer on a trouble ticketer request.
- 3.22 To provide a minor alarm and lamps to indicate various trouble ticketer time outs.
- 3.23 To provide a key to cancel counting of the number of trouble tickets and to recycle the number of tickets counter in the trouble ticketer circuit. If option H is furnished, to light a lamp when the key is operated.
- 3.24 To provide a major alarm and a lamp to indicate that a predetermined number of trouble tickets were printed in a 2-minute interval.
- 3.25 To provide a lamp to indicate that the trouble ticketer circuit was taken out of service by the number of tickets counter in the trouble ticketer circuit.
- 3.26 To provide a minor alarm and a lamp to indicate a tape alarm if the supply of paper tape for the trouble ticketer is low.

- 3.27 To provide a major alarm and a lamp to indicate that all of the identifiers in an identifier group are made busy.
- 3.28 To provide an alarm and a lamp to indicate that all of the outpulsers in an identifier group are busy for a timed interval of from 40 to 60 seconds.
- 3.29 To provide an alarm release key to retire locked in major and minor alarms.
- 3.30 To provide a key to control the ANI trunk lockup feature.
- 3.31 To provide relays and lamps to indicate the location of the locked up ANI trunk in terms of the trunk number, subgroup tens number, and the subgroup units number.
- 3.32 To provide a major alarm and a lamp to indicate that an ANI trunk is locked up for tracing.
- 3.33 To provide a key and a relay to control the battery supply for various lamps.
- 3.34 If the alarm sending circuit is provided with tone identification, to provide a means for transmitting distinctive tone and lamp signals to the attended office for identification of the circuit requesting the trouble ticketer.
- 3.35 To provide a register to score the number of test calls made per identifier group including line verification and permanent signal calls.
- 3.36 To provide a register, option H, to score the number of trouble tickets printed on service call failure seizures of the outpulser.
- 3.37 To provide a make-busy jack for an AIOD translator.
- 3.38 To provide a lamp to indicate an AIOD translator in use or plugged busy.
- 3.39 To provide a means to make the trouble ticketer busy to a particular terminating marker group.
- 3.40 To bring in a major alarm when either an outpulser (Mfr Disc.) or a marker causes the trouble ticketer to make a record of a CLI call.
- 3.41 To provide a means for a control center to make an outpulser, a trouble ticketer, or an identifier busy, and to recognize these circuits as busy.
- 3.42 To provide a tens peg count registration of identifier group usage to a centralized control center.
- 3.43 To provide a control center with an indication of a major alarm, a minor alarm, an indication of an all outpulsers busy alarm, or a combined indication of any or all of these and alarm indications produced by a paper alarm, a ticketer time-out alarm, an identifier make-busy alarm, make a number of tickets alarm, or a calling line identification alarm.
- 3.44 To provide a locked in signal, of an outpulser first trial failure attempt, to a centralized control center and release this indication at the end of a scan cycle.
- 3.45 To provide a register to score the number of simultaneous trunk seizure failures and all outpulsers busy indications.
- 3.46 To provide a means to prevent the MJ relay in FS29 and the registers in FS18 from operating when a printout of directory numbers on line insulation test failures is functioning normally. This is to avoid false major alarms and false peg counts.
- 3.47 To provide means of locking in an alarm produced by the identifier circuit when a false ground or cross is detected by an idle identifier on its OSC lead to the ANI-B trunks. Means are also provided to ascertain the identifier circuit SD-95810-01 in trouble and to print a trouble ticket.
- 3.48 To provide a means to silence audible alarms when automatic trouble analysis system is serving the trouble ticketer frame, and to release locked in alarm relays when ATA is in the no-print-send-all mode of operation.
- 3.49 For each identifier group with option ZW, to provide a register to score the number of ground removal failures detected by step-by-step ANI trunks as received and transmitted by the outpulsers.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed in a key-sheet, the connecting information thereon is to be followed.

- (a) Trouble Ticketer Circuit (No. 1 Cross-bar, Panel, Step-by-Step) - SD-95816-01.

- (b) Outpulser Circuit (No. 1 Crossbar, Panel, Step-by-Step) - SD-95811-01.
- (c) Identifier Circuit (No. 1 Crossbar, Panel, Step-by-Step) - SD-95810-01 or Identifier Circuit, ANI-B for use with No. 1 AMARC and Toll (Step-by-Step Offices) - SD-1C593-01.
- (d) Outgoing Trunk Circuit - MF Pulsing - ANI (Panel) - SD-21972-01.
- (e) Outgoing Trunk Circuit - PCI Pulsing - ANI (Panel) - SD-21974-01.
- (f) Outgoing Trunk Circuit - MF Pulsing - ANI (No. 1 Crossbar) - SD-26209-01.
- (g) Outgoing Trunk Circuit - PCI Pulsing - ANI (No. 1 Crossbar) - SD-26210-01.
- (h) Outgoing Trunk Circuit - E and M Leads Pulsing - ANI (Step-by-Step) - SD-32244-01.
- (i) Outgoing Trunk Circuit - Loop Pulsing ANI (Step-by-Step) - SD-32245-01.
- (j) Miscellaneous Circuit - Identifier Frame (No. 1 Crossbar, Panel, Step-by-Step) - SD-95819-01.
- (k) Local Frame Line Circuit (No. 1 Crossbar, Panel BCO) - SD-96379-01 (Panel GCO) - ES-20360-01.
- (l) Switchmans Talking Line Circuit (Step-by-Step) - SD-32021-01.
- (m) Alarm Transfer Circuit (No. 1 Crossbar) - SD-25885-01 (Panel BCO) - SD-20733-01 (Panel GCO) - SD-20736-01.
- (n) Alarm Sending Circuit (No. 1 Crossbar, Panel) - SD-95417-01.
- (o) Floor Alarm Frame, Fuse, and Time Alarm Circuit (No. 1 Crossbar) - SD-25046-01.
- (p) Floor Alarm Board, Fuse, and Time Alarm Circuit (Panel BCO) - SD-21201-01.
- (q) Miscellaneous Alarm Circuit (Panel GCO) - SD-20241-01.
- (r) Aisle Pilot Circuit (No. 1 Crossbar) - SD-25087-01.
- (s) Floor Alarm Board, Miscellaneous, Auxiliary Alarm Circuit (Panel BCO) - SD-21203-01.
- (t) Audible Alarm Circuit for Floor Alarm Board (Panel) - SD-21819-01.
- (u) Audible and Visual Alarm Circuit (Step-by-Step No. 1) - SD-96188-01 (Typical)
- (v) Pilot Lamp Circuit (Step-by-Step No. 1) - SD-31548-01 (Typical).
- (w) Pilot Lamp and Power Alarm Lamp Circuit (Step-by-Step 350A) - SD-31573-01 (Typical).
- (x) Miscellaneous Alarm Circuit, Alarm Control, and Aisle Pilot Permanent Signal Timing Circuit (Step-by-Step 355A) SD-32192-01 (Typical).
- (y) Miscellaneous Alarm Circuit, Alarm Control and Sender Circuit (Step-by-Step 355A) - SD-32193-01 (Typical)
- (z) Outpulser Connector Circuit (No. 1 Crossbar, Panel, Step-by-Step) - SD-95890-01.
- (aa) Alarm Checking Terminal Circuit - SD-31835-01.
- (ab) Translator Connector Circuit - SD-99320-01.
- (ac) Terminating Marker Circuit (Crossbar No. 1) - SD-25283-01.
- (ad) Terminating Trouble Indicator Circuit (Crossbar No. 1) - SD-25284-01.
- (ae) Miscellaneous Circuit Scanner Frame - SD-1C211-01.
- (af) CSACS General Interconnection Circuit, SD-1P031-01 - (Reference for CSACS Step-by-Step Interconnection Circuit - SD-1P025-01.) Refer to SD-1C543-01 for latest information.
- (ag) Miscellaneous Circuit for ANI Trunk Frames - (Step-by-Step) - SD-32248-01 - (No. 1 Crossbar) - SD-95821-01.
- (ah) Traffic Register Circuits - (Step-by-Step) - SD-30896-01 or SD-31109-01, (Crossbar No. 1) - SD-25942-01 or SD-25317-01.

(ai) E2A Telemetry Systems Status and Command Remote Application Schematic - SD-1C543-01. (See also the No. 1 Crossbar TASC Interconnection Schematic - SD-1P128-01.)

(aj) No. 1 Crossbar Alarm Release and Control Circuit - SD-28110-01.

(ak) TASC Interconnection Information For Step-By-Step Equipment - SD-1P126-01 (see also, E2A Telemetry Systems Status and Command Remote Application Schematics - SD-1C543-01).

5. MANUFACTURING TESTING REQUIREMENTS

5.01 None required.

6. TAKING EQUIPMENT OUT OF SERVICE

TROUBLE TICKETER

6.01 To take the trouble ticketer out of service, insert a make-busy plug into the TTB jack. To make the trouble ticketer busy to a particular outpulser, insert a make-busy plug into the corresponding jack. To make the trouble ticketer busy to a particular terminating marker group, insert a make-busy plug into the corresponding TTBMG jack.

TTA RELAY

6.02 The TTA relay may be removed from service by blocking the TM, AL, and TMD relays in the trouble ticketer non-operated. The TMK relay in the trouble ticketer should also be block operated to prevent the AL timer from timing out. In doing this, the circuit will not give an alarm in the event of a trouble ticketer time-out or time of day alarm.

IMBA RELAY

6.03 The IMBA relay for an identifier group may be removed from service by blocking the MB relays in the associated identifiers nonoperated. In doing this, the circuit will not give an alarm in the event all of the identifiers in the identifier group are made busy.

PA RELAY

6.04 The PA relay may be removed from service by insulating the tape alarm contact in the 1A ticketer circuit. In doing this, the circuit will not give an alarm in the event of a low paper supply for the trouble ticketer circuit.

B1 RELAY

6.05 The B1 relay may be removed from service by blocking the AOPB relays in the associated outpulsers nonoperated. In doing this, the circuit will not give an alarm in the event that all of the outpulsers in the identifier group are busy for the timed interval of from 40 to 60 seconds.

B RELAY

6.06 The B relay may be removed from service by blocking the associated B1 relay nonoperated. In doing this, the circuit will not give an alarm in the event that all of the outpulsers in the identifier group are busy for the timed interval of from 40 to 60 seconds.

ALM RELAY

6.07 The ALM relay may be removed from service by blocking the MJ, MN, TTA, PA, TMBA, NTA, CLIA, and B relays nonoperated. In doing this, the circuit will not bring any audible or visual alarms with the exception of the fuse alarm. The OSX jack also functions to eliminate alarms associated with FS36.

MJ RELAY

6.08 The MJ relay may be removed from service by blocking the MJ relay non-operated. In doing this, the outpulser circuit will not bring in any non-CLI major trouble ticketer request alarms.

MN RELAY

6.09 The MN relay may be removed from service by operating the ACO key. In doing this, the outpulser circuit will not bring in any minor trouble ticketer request alarms.

NTA RELAY

6.10 The NTA relay may be removed from service by operating the CTC key to cancel counting the number of trouble tickets by the trouble ticketer circuit.

CLIA RELAY

6.11 The CLIA relay may be removed from service by blocking the CLIA relay nonoperated. This will prevent the terminating marker from bringing in a CLI major alarm at the ticketer frame.

FS8, FS10, AND FS11

6.12 In addition to the manual means of taking equipment out of service, a number of functional schematics in this circuit are arranged to duplicate these functions from another remote control circuit and to verify that the make-busy signal that was sent was actually received. The FS8, identifier make-busy jack; FS10, output make-busy jack; FS11, trouble ticketer make-busy jack may be controlled and scanned for verification by CSACS or TASC system when option ZH and Y are provided.

FS14, FS27, AND FS29

6.13 The CSACS or TASC system also provide scanning only in FS14, identifier in use lamp and in FS27, alarm relay and release key although remote control of the AR key function is accomplished by various other circuits. The FS29, trouble ticketer request alarm is also scanned by CSACS or TASC system.

FS37

6.14 With option 13, FS37, cancel audible alarms and alarm release for ATA is provided. This circuit is controlled by

the trouble ticketer circuit over the CA and ATR leads. A jack, CATA, is provided in the trouble ticketer to cancel ATA when that feature is not wanted by operating a CATA relay in that circuit. It in turn, operates the CA relay in this circuit which causes this entire circuit to function as it does normally. When the CA relay is not operated, however, it functions to cancel most audible alarms not directly associated with the functions of the trouble ticketer. When CA is normal, relay ATR can also be operated by the trouble ticketer to release locked in alarms.

SECTION IV - REASONS FOR REISSUE

B. Changes in Apparatus

B.01 Added

TRK, 533K Diode - Option ZH - FS11 - App Fig. 1

B.02 Superseded

Superseded By

All 446F Diodes All 533K Diodes
All App Fig. All App Fig.

D. Description of Changes

D.01 The FS11 is changed so that when option ZH is specified, a more distinctive busy indication will be obtained over lead TTK to the control center. A ground on this lead now indicates either a plug has been inserted into the TTB jack or a ground has been placed on lead TTK by central. No longer will an office seizure of the ticketer give a busy indication over lead TKR to central. The CAD 13 is also changed to reflect this improvement.

D.02 Relay PA was added to the relay list of the Apparatus Index.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5242-DAJ

WE DEPT 45830-WCR-WEA-MAF