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

CHANGES

B. Changes in Apparatus

B.01 Added

RVR - 18CJ Resistor - App Fig. 1 - Option YJ

VR1, VR2 - 808DA Diodes - App Fig. 1 - Option YJ

D. Description of Changes

D.01 In FS8, the wiring to the upper winding of relay CT that was shown as option YM is changed to read, option YG. Without selector replacement, the operation of the nonfunctional CT key would operate relay CT which would lock up to 10 make of relay CT. It could not release because the shunt down path was disabled. Consequently, the false operation of the CT would disable the circuit until it was manually released. Thus, the change to YG wiring for either version of the trouble ticketer, with or without selector replacement, will correct the problem.

D.02 During actual operating conditions in a central office, it was found that the nominal expected 22Vac actually was much higher: 28Vac. This overvoltage resulted in overheating the input voltage transformer in the CSMP. To correct the problem, a voltage regulation circuit is added to this circuit, rather than the circuit pack of the CSMP, because of physical design considerations. The new voltage regulation circuit consists of two voltage regulation diodes, VR1 and VR2, which maintain a safe operating voltage with the aid of a current limiting resistor, RVR in series with the ac supply. This feature is shown as part of option YJ on FS8A, whereas, the former arrangement is shown under option YG is FS8 for the No. 1A message ticketer. These wiring options also appear in CAD 4 on the (miscellaneous) terminal strip on the frame, on sheet G2. Connections are also added to CAD 14 for the (J1) connector.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5413-DAJ

WE DEPT 45240-WCR-JTT-SVB

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

CHANGES

B. Changes in Apparatus

B.01 Added

ON1, PR1-6 - 185A Networks,
App Fig. 1, Option YJ

B.02

Removed	Replaced By
TMA - KS-20810 L1A 0.267 Megohm, App Fig. 1, Option YN	TMA - KS-20810 L1A 0.511 Megohm, App Fig. 1, Option YN

D. Description of Changes

D.01 To reduce circuit noise on leads to the CSMP, contact protection networks per B.02 are added under option YJ.

D.02 The value of resistor TMA is changed per B.01 to increase the timing interval for the CSMP print operation from 1480 through 2800 milliseconds to 2500 through 4500 milliseconds.

D.03 Several minor drafting corrections are made to show:

(a) The J99391A-( ) list as required for the "A" ticketer which is the App Fig.1, option YJ, CSMP, on sheet C4.

(b) Additional wiring is designated for removal as option YG when option YJ is specified.

D.04 A number of drafting corrections are made to correct the SC1 sequence chart. Corrections are also made on sheets E1, E1A, E1B, E3, E4, E8, E9, and E11 to eliminate or correct changes originally made for Issue 22B.

D.05 The trouble ticketer was printing a false 9 in position 21 when used for calling line identification for the 02 or third marker group or subsequent numbered groups when used in No. 1 crossbar offices using the CLI App Fig. 6 feature. The problem is corrected by adding a contact 12EBM of relay CLI2 in FS12 to effectively short 9B of the PK3A with 12M, while using 12B to open the print 9 bus to the printer. When Fig. 6 is not required for CLI, option ZJ is used for existing wiring.

D.06 To avoid the possibility of excessive current to the CSMP printed wiring board, the 5-ampere fuse, "A", per Note 101, is designated as option YG, and the replacement, "A" fuse, 2 amperes, is designated as option YJ and Standard.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5242-DAJ

WE DEPT 45240-WCR-JTT-SVB

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

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* This CD covers drawing issues through 23A. For reasons for reissue, see Appendix 1A.

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 The trouble ticketer is a unit of equipment forming part of an automatic number identification system that may be used in No. 1 crossbar, panel, and step-by-step offices. One trouble ticketer is provided in each automatic number identification installation and is accessible to each outpulser circuit.

1.02 When a failure occurs in the automatic number identification system, the trouble ticketer provides a means of recording pertinent trouble information on a 40-line trouble ticket. The information recorded is as follows:

(a) Type of record

(b) ANI trunk location

(c) Outpulser number

(d) Identifier number and trial

(e) Identifier group number

(f) Calling office number

(g) Calling line number

(h) Party information

(i) Outpulser progress

(j) Identifier progress

(k) Digit checks

(ℓ) With option G - progress on an Automatically Identified Outward Dialed (AIOD) call from a PBX station

(m) Condition of timers

(n) Time of day

1.03 If a permanent signal identification circuit and/or calling line identification is provided, the trouble ticketer also provides a means of recording permanent signal and/or calling line identification information on a 35-line ticket. The information recorded is as follows:

(a) Type of record

(b) Outpulser number

(c) Identifier group number

(d) Office number

(e) Line number

(f) Multiparty information

(g) Time of day

1.04 If operation with No. 1 crossbar terminating markers to record calls to a particular line is provided, the following information is recorded on a 35-line ticket:

(a) Type of record

(b) Incoming frame tens

(c) Incoming frame units

(d) Primary switch

(e) Called office unit

(f) Called line directory number

(g) Test call indication

(h) Even or odd trunk

(i) Trunk level

(j) Terminating marker group

(k) Time of day

1.05 Information is printed on a ticket produced by the 1A message ticketer. The ticketer is designed to print a total of 12 different characters on a paper tape fed from a reel. The paper is automatically cut after a predetermined number of lines have been printed. The characters that can be printed are the numerals 0 to 9, a star (asterisk), and a dash. The ticketer prints these characters at the rate of six characters per second.

1.06 When the 1A message ticketer is not provided, a Common System Message Printer (CSMP), SD-94865-01, is utilized instead. It prints the same characters on an 8-3/8 inch wide roll of paper tape that the 1A message ticketer prints. The messages are printed on a typewriter format and are rolled up in a loose paper spool which can be cut off manually as required. The CSMP also has an optional feature which allows its electronics to replace the function of all selectors in the ticketer if desired. For readability, a position header may be printed by the CSMP by operation of the HD key on the printer. For further description of the CSMP, refer to SECTION II, 10., and the CSMP circuit description.

2. GENERAL DESCRIPTION OF OPERATION

2.01 When a ticket is to be printed, the outpulser or marker places battery on the start lead to seize the trouble ticketer. If the trouble ticketer is available, the trouble ticketer cut-in relays in the associated circuits are operated. Register relays in the trouble ticketer record whatever information is to be printed. After the information is registered and checked, the cut-in relays are released, and the trouble ticketer proceeds to print the ticket.

2.02 When an outpulser finds the trouble ticketer busy, it withdraws its seizure signal and lights a display lost lamp. When a marker finds the ticketer busy, it withdraws the seizure signal and attempts to seize an associated trouble indicator to record the information on lamps.

SECTION II - DETAILED DESCRIPTION

1. TROUBLE TICKETER SEIZURE AND REGISTRATION

1.01 Operation of the trouble ticketer start relay in an outpulser circuit places resistance battery on lead OP- to operate the outpulser preference relay for that outpulser. Relay OP- operates register relays for the outpulser number, identifier group number, and time of day. The operated OP- relay also grounds the associated CI- lead to operate the trouble ticketer connector relays in the outpulser circuit. The trouble ticketer connector relays pass outpulser progress and registration information into the trouble ticketer to operate appropriate register relays in the trouble ticketer circuit.

1.02 Relay TTC1 in the outpulser circuit grounds lead TKN- to the outpulser connector circuit to operate relay TKN- in the subgroup being served by the outpulser. The trunk location leads are closed through to the trouble ticketer circuit.

1.03 If the identifier circuit is connected, the trouble connector relays in the identifier are operated by the outpulser. The trouble connector relays pass the identifier number and when option ZO is provided, pass the identifier progress information into the trouble ticketer to operate appropriate register relays in the trouble ticketer circuit.

1.04 The operated OP- relay also operates the trouble ticketer off-normal relays, which in turn start the motor of the 1A message ticketer by operating relay MS in the message ticketer. The motor causes the type wheel and ticketer distributor to revolve.

1.05 The registration check relay operates from off-normal ground through the operated identifier number register if an identifier is connected, or through the no-identifier register if an identifier is not connected. After registration check, the disconnect relay is operated to ground lead TTB. The trouble ticketer busy relay in the outpulser circuit is operated to release the outpulser and identifier circuit now that registration is complete. The disconnect relay also starts the TM timer for timing of the printing of each line on the ticket and it energizes the progress selector step magnet in preparation for the printing of the ticket.

1.06 Seizure of the ticketer by a marker results in circuit action similar to that described for a seizure by an outpulser. However, in this case a marker preference relay operates to start the action and cut in relays in the marker and its associated trouble indicator operate to operate the register relays in the ticketer. The register relays operated are the same as those operated on an outpulser seizure but the resultant information printed on the ticket has a different meaning for the marker seizure.

2. PRINTING CONTROL, CUT, AND RELEASE

2.01 Operation of relay DISC operates relay PRL and energizes the progress selector step magnet. When the PG selector step magnet is energized, relay PGA is released to operate relay AV. Operation of relay AV opens the ground path to release the PG selector step magnet, stepping the PG selector switch to the next position and reoperating relay PGA. Operation of relay PGA releases relay AV to energize the PG selector step magnet and to operate the print magnet in the 1A message ticketer. The print magnet is operated through arc 1 or 4 or the PG selector and a contact network on the register relays. In order to print one of the 12 characters which the message ticketer is capable of printing, one segment on the distributor, corresponding to the character to be printed, is grounded. When the distributor reaches a grounded segment, the print magnet is energized. However, the character is not printed until the distributor has advanced to a slot provided for positioning the character on the ticket. When this slot is reached, a stabber enters this slot and the type wheel and the distributor are stopped. The motor continues to revolve due to a friction clutch introduced between the motor and the printing mechanism. When the stabber enters this slot, ground is closed through the print magnet contacts to operate and lock relay AV. Operation of relay AV removes the ground from the segment of the distributor, releasing the print magnet. The release of the print magnet advances the ticket tape for printing the next character. Operation and release of relay AV steps the PG selector to control the printing of the various lines on the ticket.

2.02 When the PG selector is in position 28, the release of relay AV operates the cut magnet in the message ticketer to cut the ticket printed on the previous usage of the ticketer. The operation of the cut magnet closes a ground path to operate relay AV to advance the PG selector to the next position.

2.03 For a 35-line ticket, relays PSR, CLI, or CLI1 operated causes the PG selector to advance through positions 31 to 35 under control of relay PRL, preventing operation of the print magnet and tape advance in these positions of the selector switch. In this manner the ticket on a permanent signal record is shortened by five character positions.

2.04 When the PG selector is in position 43, the release of relay AV operates relay PRL to close a ground path to operate relay AV when relay PGA releases. Relay AV advances the PG selector to position 44 and releases relay PRL.

2.05 When the PG selector steps from position 43 to position 44, the release of relay AV energizes the PG selector step magnet. Relay PGA releases, operating relay PRL1 through arc 4 of the PG selector. Operation of relay PRL1 opens the ground path to the PG selector step magnet, advancing the PG selector to position 1. In position 1, relay RLS is operated, releasing relays ON and ON1. Release of relays ON and ON1 restores all of the register relays to normal. Relays RGK, DISC, PRL1, and RLS release, restoring the trouble ticketer circuit to normal. The release of relay RLS removes ground from lead TTB to the miscellaneous circuit for the trouble ticketer frame, releasing relay TTB in that circuit. The release of relay TTB removes the trouble ticketer busy indication to all outpulsers and markers.

2.06 When operation with the automatic trouble analysis system is provided in No. 1 crossbar, refer to 9.0.

3. PRINTING SEQUENCE

3.01 The characters that may be printed on each line (or character position) and meaning of each character are shown in 3.02. Similar information is also shown in Information Notes 301, 302, and 304 in the D section of the SD. Tables A, B, and C in the E section of the SD show the register relays required to generate the characters for each line.

3.02 Table A indicates the characters available for each of the 35- or 40-line tickets and the meaning of each character. Not all lines and not all characters are utilized for every ticket. A particular character may have more than one meaning depending on the type of record produced. Variations in the line information in Table A are noted by a small letter beside the line and character. The significance of each letter is:

(a) Trouble ticket only

(b) Permanent signal record only

(c) Nonintercept call trouble ticket only

(d) Intercept call trouble ticket only

(e) Calling line identification ticket only

(f) Terminating marker calling line record only

(g) Not applicable to test calls

TABLE A

TICKET INFORMATION

Char Pos (Line)	Char Printed	Indication
1	*	Margin
	-	(TM) Time-Out
2	*	Margin
	-	(TM) Time-Out
3(f)	0	Terminating Marker Calling Line Identification Record
(c)	1	Trouble - Service Call
(b)	2	Trouble - Permanent Signal
(c)	3	Trouble - Trunk Test Call
(c)	4	Trouble - Line Verification
(c)	5	Trouble - Outpulser Identifier Test (OIT)
(d)	6	Trouble - Intercept Call
(e)	7	Trouble - Calling Line Identification
(e)	8	Calling Line Identification Record
(b)	9	Permanent Signal Record
	*	Over Registration
	-	(TM) Time-Out
4	0-9	Trunk Subgroup Tens No.

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
(f)	0-1	Incoming Frame Tens No.
	-	Missing Information or OIT Call
	*	Over Registration
5	0-9	Trunk Subgroup Units No.
(f)	0-9	Incoming Frame Units No.
	-	Missing Information or OIT Call
	*	Over Registration
6	0-9	Trunk No.
(f)	0-9	Primary Switch No.
	-	Missing Information or OIT Call
	*	Over Registration
7	0-9	Outpulser No.
	-	(TM) Time-Out
(f)	-	
	*	Over Registration
8	0	No Identification Failure - Ident 0 Connected
	1	No Identification Failure - Ident 1 Connected
	2	Ident 0 - First Trial Failure
	3	Ident 1 - First Trial Failure
	4	Ident Not Connected - First Trial Failure
	6	Ident 0 - Second Trial Failure
	7	Ident 1 - Second Trial Failure
	8	Ident Not Connected - Second Trial Failure
	9	Ident Not Connected - No Identification Failure
	-	(TM) Time-Out

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
(f)	-	
	*	Over Registration
9	0-2	Identifier Group No.
	-	(TM) Time-Out
(f)	-	
	*	Over Registration
10	0-2	AIOD Translator Number
	3	AIOD Translator Start Lead Cross
	4	AIOD Translator Over Registration
	*	More Than One Office Found by Identifier - Crossed Office
	-	No AIOD Translator Number or No Crossed Office Indication
(f)	-	
11	0-8	Office No. or AIOD Office Index No.
(f)	0-3	Called Office Unit
	-	Missing Information
	*	Over Registration
12	0-9	Calling Line - Thousands Digit
(f)	0-9	Called Line - Thousands Digit
	-	Missing Information
	*	Not Two-Out-of-Five Registration
13	0-9	Calling Line - Hundreds Digit
(f)	0-9	Called Line - Hundreds Digit
	-	Missing Information
	*	Not Two-Out-of-Five Registration

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
14	0-9	Calling Line - Tens Digit
(f)	0-9	Called Line - Tens Digit
	-	Missing Information
	*	Not Two-Out-of-Five Registration
15	0-9	Calling Line - Units Digits
(f)	0-9	Called Line - Units Digit
	-	Missing Information
	*	Not Two-Out-of-Five Registration
16	0	Abandoned Call
(f)	0	Test Call
	1	(PAN) - Party Test
	2	- Ring Party
	3	- Tip Party
	4	(PAN) - Ground Removal Test
	5	(PAN) - Ground Removal Test Failure
	5	(SXS) - Ground Removal Failure Tip Field
	6	(PAN) - Ground Removal Test OK
	6	(SXS) - Ground Removal Failure Ring Field
	7	Permanent Signal Record - Nonmultiparty
	8	Permanent Signal Record - Multiparty
	-	Missing Information
	*	Over Registration
17	0-1	Trunk Tens No. (Option ZF or ZN)
(e)	2	Tracetone Not Received
(e)	3	Tracetone Received

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
(f)	0	Not Used (Option ZF or ZN)
	-	Missing Information (Option ZN or ZF)
	-	Spacer (Option ZM or ZE)
(f)	-	(Option ZE)
18	*	Index Mark
	-	(TM) Time-Out
(g)	1	Oscillator Cross (Option ZY)
19	-	Spacer
20	0	Outpulser Seized
	1	TKC1
(f)	1	Even Incoming Trunk
	2	(No. 1 CBR & SXS) PK
	2	(PAN) PIK
	3	IK
(f)	3	Odd Incoming Trunk
	4	TRS
	5	L1
	6	(PAN) PT1
	7	(PAN) PK
	8	(PAN) IYF
	9	(No. 1 CBR & SXS) See Lines 25 and 26
	9	(PAN) IYK - See Lines 25 and 26
	-	(TM) Time-Out
21	0	See Line 20
	1	Identifier Connected
	2	Office 0 Steering
	3	Office 1 Steering
	4	Office 2 Steering
	5	Office 3 Steering

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
	6	Office 4 Steering
	7	Office 5 Steering
	8	Office End Steering
	9	See Line 22
(f)	2-9	Incoming Trunk Level
	-	(TM) Time-Out
	*	Office 6 Steering
22	0	See Line 21
	1	THS (ID)
	2	HS (ID)
	3	TS (ID)
	4	US (ID)
	5	ES (ID)
	6	ES1 (ID)
	9	See Line 23
(f)	1-6	Terminating Marker Group 0-5
	-	(TM) Time-Out
23	0	See Line 22
(f)	0	Line Not Used
	1	THS, ES1 (ID)
	2	HS, ES1 (ID)
	3	TS, ES1 (ID)
	4	US, ES1 (ID)
	5	ES, ES2 (ID)
	9	See Line 25
	-	(TM) Time-Out
24	-	Spacer
25	0	See Lines 20 and 23
(f)	0	Line Not Used
	1	IRL (OP)
	2	SP (OP)
	3	KP (OP)

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
	4	IDS (OP)
	5	AS (OP)
	6	BS (OP)
	7	CS (OP)
	9	See Line 26
	-	(TM) Time-Out
26	0	See Line 25
(f)	0	Line Not Used
	1	THS (OP)
	2	HS (OP)
	3	TS (OP)
	4	US (OP)
	5	STS (OP)
	6	EP (OP)
	7	RL (OP)
	-	(TM) Time-Out
27	0	IOD - AIOD Class
	1	TLS - Translator Start
	2	CON - Translator Connected
	3	TRNK - Trunk Number Checked by Translator
	4	SNK - Station Number Checked by Translator
	5	RCL - Outpulser Register Clear
	6	SNR - Station Number Received
	7	TLR - Translator Released
	8	FTM - Failure of AIOD Equipment To Match a Trunk Number With a Station Number
	9	TLB - Translator Busy
	-	Non-AIOD Call or Missing Information on an AIOD Call

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
(f)	-	
28	-	Spacer
29(c)	0	ID0, NOB (OP)
	1	ID1, NOB (OP)
	2	ID2, NOB (OP)
	3	ID0, SO (OP)
	4	ID1, SO (OP)
	5	ID2, SO (OP)
	6	PTY, NOB - No ID- Relay (OP)
	7	PTY, SO - No ID- Relay (OP)
	8	NOB - Over Registration in ID- Relays
	9	SO - Over Registration in ID- Relays
29(c)	-	Missing Information
	*	SO and NOB Operated
29(d)	0	ID0 - Blank or Unequipped Line
	1	ID1 - Line Plugged Up for Trouble
	2	ID2 - Identification Trouble
	3	ID3 - Regular Intercept
30(a)	0	THK (OP)
	1	HK (OP)
	2	TK (OP)
	3	UK (OP)
	4	HK, TK, UK (OP)
	5	THK, TK, UK (OP)
	6	THK, HK, UK (OP)
	7	THK, HK, TK (OP)
	8	THK, HK, TK, UK (OP) - All Digit Checks

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
	9	See Line 31
	-	No Digit Checks
31(a)	0	See Line 30
	1	THK, HK (OP)
	2	THK, TK (OP)
	3	THK, UK (OP)
	4	HK, TK (OP)
	5	HK, UK (OP)
	6	TK, UK (OP)
	8	No Party Check in Identifier
	-	(TM) Time-Out
32(a)	0	None of CCKF, TNC, RO (OP)
	1	CCKF (OP)
	2	TNC (OP)
	3	TNC, TNK (OP)
	4	TNK (OP)
	5	RO (OP)
	6	RO, TNK (OP)
	-	(TM) Time-Out
33(a)	0	Connector Time-Out
	1	TM1 (OP)
	2	TM2 (OP)
	3	TM1, TM2 (OP)
	4	Overall Time-Out (OP)
	5	TM1, TAL (OP)
	6	TM2, TAL (OP)
	7	TM1, TM2, TAL (OP)
	9	No Outpulser Time-Out
	-	(TM) Time-Out

TABLE A (Cont)

Char Pos (Line)	Char Printed	Indication
34(a), 29(b,e,f)	-	Spacer
35(a), 30(b,e,f)	0-2	Hour-Tens
	-	(TM) Time-Out
36(a), 31(b,e,f)	0-9	Hour-Units
	-	(TM) Time-Out
37(a), 32(b,e,f)	0-5	Minute-Tens
	-	(TM) Time-Out
38(a), 33(b,e,f)	0-9	Minute-Units
	-	(TM) Time-Out
39(a), 34(b,e,f)	*	Margin
	-	(TM) Time-Out
40(a), 35(b,e,f)	*	Margin
	-	(TM) Time-Out

4. TIME OF DAY

4.01 Every six seconds a battery pulse is sent from the clock circuit over lead M to operate relay P through its primary winding. Operation of relay P energizes the P selector step magnet and operates the TMK slow release relay. At the end of the battery pulse, relay P releases to de-energize the P selector step magnet, stepping the P selector to the next position.

SELECTOR CONTROL

4.02 Whenever the P selector is in position 10 or 20, the next operation of relay P operates relay MU to energize the MU selector step magnet. The release of relay P releases relay MU which de-energizes the step magnet to step the MU selector to the next position. When the MU selector reaches position 9, the next operation of relays P and MU will operate relay MT to step the MT selector to the next position. When the MU selector reaches position 10, arc 2 of the selector and relay MU will step the selector around to position 1.

4.03 When the MT selector reaches position 5, the next operation of relay MT operates relay HU to step the HU selector to the next position. The release of relay MT steps the MT selector to position 6. The MT selector will then step around to position 0 through arc 2.

4.04 When the HU selector reaches position 9 the next operation of relay HU operates relay HT to step the HT selector to the next position. The release of relay HU steps the HU selector to position 10. The HU selector will then step around to position 0 through arc 2.

4.05 At 23:59 hours, when the HT selector is in position 2 and the HU selector is in position 3, the next operation of relay HU operates relay HT to step the HT selector to position 3. Meanwhile, the HU selector steps to position 0 through arc 2 of the HU selector. When the HU selector reaches position 0, the HT selector then steps to position 0 through arc 2 of the HT selector.

MANUAL ADVANCE OF SELECTORS

4.06 Operation of locking key TMS makes nonlocking keys P, MU, MT, HU, and HT effective for controlling the respective selector step magnets. With key TMS operated, operation and release of one of the nonlocking keys can then step the selector to any position desired.

5. NUMBER OF TICKETS COUNTER

5.01 The trouble ticketer has a feature whereby the number of trouble tickets which the circuit will accept within a 2-minute interval is limited. After the trouble ticketer has accepted the specified number of trouble tickets within the 2-minute interval, the trouble ticketer is made busy for the balance of the timed interval. By cross-connecting the NTC punching to an NT punching, as shown in Table B, the specified number of records may be selected as 2, 3, 4, or 5. Permanent signal records are eliminated from the count of the number of records to be accepted.

TABLE B

Cross-Connection	Number of Records	Counter Relays Operated
NTC to NT2	2	A, B, C
NTC to NT3	3	B, C, D
NTC to NT4	4	A, B, C
NTC to NT5	5	A, C, D

5.02 Each time the P selector reaches position 20 (every two minutes) relay ET is operated through arc 1 of the P selector to recycle the number of ticket counter. When the P selector leaves position 22, relay ET is released to start the 2-minute timed interval. Relays A, B, C, and D form a minimum relay counter, under control of relay DISC, to register the usages of the trouble ticketer.

5.03 If relay ET operates before the NTC punching is grounded by relays A, B, C, and D of the counter, the counting circuit is recycled for counting the trouble tickets accepted in the next 2-minute interval.

5.04 If the NTC punching is grounded before relay ET is operated, relay NTC operates to take the trouble ticketer out of service, to sound a major alarm, and to recycle the number of trouble tickets counter.

NUMBER OF TICKETS ALARM

5.05 Operation of relay NTC operates relay TOS in the ticketer and relay NTA in the miscellaneous circuit. Operation of relay TOS lights the TOS lamp, recycles the number of tickets counter, and operates relay TTB in the miscellaneous circuit to take the trouble ticketer out of service. Relay TOS locks to lead CTC through a back contact of relay ET. Operation of relay ET at the end of the 2-minute timed interval releases relay TOS to restore the trouble ticketer to service.

5.06 Operation of relay NTA in the miscellaneous circuit lights the NTA lamp and operates relay ALM to bring in a major alarm. The major alarm can be retired by momentary operation of the AR key.

CANCEL NUMBER OF TICKETS COUNTING

5.07 Operation of locking key CTC in the miscellaneous circuit removes the ground from lead CTC to release any operated relays in the number of tickets counter (A, B, C, or D), recycling the counter, and to release relay TOS, if operated, to restore the ticketer to service.

6. ADVANCE AND CUT LAST TICKET PRINTED

6.01 A feature is provided to advance and cut the last ticket printed if it is necessary to obtain this ticket without waiting for the next seizure of the trouble ticketer.

6.02 If the trouble ticketer is normal, the operation of nonlocking key CT operates relay CT, which locks. Relay CT supplies a ground for printing a series of dashes, except for a zero in position 9, and for advancing the PG selector under control of relays AV and PGA. When the PG selector reaches position 28, the ground through arc 1 of the selector operates the CUT magnet to cut the last ticket printed. When the PG selector moves to position 29, the ground through arc 1 shunts down the operated relay CT. The release of relay CT closes a path to step the PG selector around to position 1.

6.03 While relay CT is operated, the trouble ticketer is made busy to all outpulsers.

7. TIMING

7.01 Three timing circuits are provided in the trouble ticketer circuit. Progress timing is provided by the TM tube timer and is effective from the release of relay AV, when the ticketer is ready to print a character, until the operation of relay AV, after a character has been printed and the PG selector is ready to advance. Overall timing is provided by relays TMA-D and is effective while the trouble ticketer is offnormal. Time of day alarm timing is provided by the AL tube timer and is effective continuously as long as a battery supply is connected.

PROGRESS TIMING

7.02 The TM tube timing interval is for 0.74 to 1.40 seconds. When the trouble ticketer is seized, relay ON operates to remove the shunt across capacitor TM. After registration check, relay DISC operates to connect relay TM winding to capacitor TM and through resistor D to terminal 7 of the TM tube. Terminal 2 of the TM tube is connected to positive 130-volt battery. Capacitor TM starts charging through resistor TMA, resistor D, and relay TM winding. The charging action continues until either the voltage across the capacitor TM is high enough to fire the TM tube or until the operation of relay to advance the PG selector. The operation of relay AV disconnects relay TM winding from the timer and shunts capacitor TM, discharging the capacitor through resistor D. The release of relay AV, after the PG selector has advanced, reconnects relay TM winding to the timer and removes the shunt across capacitor TM. This action continues for each position of the PG selector until relay

ON releases to shunt capacitor TM. The release of relay DISC disconnects relay TM winding from the timer.

7.03 If the TM tube fires, relay TM operates and locks through contacts of the operated DISC and the released AV relays. The operated relay TM closes a path for printing a dash on the ticket and initiates action to sound a minor alarm and to light the PTO lamp. When relay AV operates to advance the PG selector for printing the next line, relay TM releases and the timing cycle is restarted.

OVERALL TIMING

7.04 The overall timing interval is for 11-1/2 to 17-1/2 seconds. When the trouble ticketer is seized, relay ON1 operates to place ground on contact 6 of relay P. Relay P operates from a 10-IPM battery pulse over lead M from the clock circuit.

7.05 The first operation of relay P after the trouble ticketer is seized, operates relay TMA. With relay TMA operated, the release of relay P operates relay TMB. With relay TMB operated, the next operation of relay P operates relay TMC. With relay TMC operated, the next release of relay P operates relay TMD. Relays TMA, TMB, TMC, and TMD lock to relay ON1 contact. With relays TMB and TMD operated, the next operation of relay P operates relay TME which locks to key LR.

7.06 When the trouble ticketer restores to normal, relays TMA, TMB, TMC, and TMD release to recycle the overall timer.

7.07 If relay TME operates, it initiates action to cause the minor alarm to sound and lamp TTO to light. Relay TME operated also operates relay RLS to restore the circuit to normal, closes a path to step the PG selector around to position 1, and releases relays TMA, TMB, TMC, and TMD. Relays TME and ALM remain locked to key LR. While relay TME is operated, the trouble ticketer is made busy to all outpulsers. Operation of key AR retires the alarm. Operation of key LR releases relays ALM and TME and extinguishes lamp TTO.

7.08 During the recycle time of the P selector, at the end of each 2-minute interval, the operate circuit of relay TME is opened by a break contact of relay ET. This prevents false operation of relay TME due to the pulsing of relay P as the selector is advanced through positions 21 and 22.

TIME OF DAY ALARM TIMING

7.09 The AL tube timing interval is for 8 to 25 seconds. When the fuses for the positive 130-volt and negative 48-volt central office battery are installed, the Al timer becomes effective. Relay AL winding is connected to capacitor A and to terminal 7 of the AL tube through the 2500-ohm portion of resistor C. Terminal 2 of the AL tube is connected to positive 130-volt battery. With relays P and TMK in the same state (both operated or both released), capacitor A starts charging through resistors A and C and the relay AL winding. The charging action continues until either the voltage across capacitor A is high enough to fire the AL tube, or until the state of relay P or TMK changes (relay P operates on the next battery pulse, or slow release relay TMK releases) to recycle the AL timer.

7.10 If the AL tube fires, relay AL operates and locks to key LR. The operation of relay AL recycles the AL timer, initiates action to sound a minor alarm, and lights lamp TDA to indicate a time of day alarm. Operation of key AR retires the minor alarm. Operation of key LR releases relay AL to extinguish lamp TDA and to restart the AL timing interval.

8. LIT - DIRECTORY NUMBER IDENTIFIED

8.01 For No. 1 crossbar, provision is made to provide for printing the directory number of lines upon test failures made by the line insulation test circuit. Operation with up to three identifier groups may be provided, and the maximum number of offices within each group is limited to six office indications. Features are also available to provide for the translation of office indications (10,000 number series) into physical and theoretical office codes. The circuit elements are provided in FS24, option ZR, and the sequence of operation is covered in SC8. Basically, the method of operation is that whenever a line fails an LIT test, the LIT seizes the trouble ticketer, operating relay LIT, operating the corresponding (0, 1, or 2) identifier group relay, option YA, if provided, or just relay OFA if only one identifier group is provided. The identifier group relay operates the OFA. The OFA operated, closes paths to relays OF0A through OF5A to FS11, 0-5 leads, to provide the physical number of the office in the identifier group. In the simplest case with option ZZ, the LIT OFF cross-connect punchings 0-9 are cross-connected per Note 402 to OFF IND 0-5

terminal punchings. The LIT circuit causes a permanent signal identification of the lines number and office number. Leads A, B, and C from the LIT control circuit receive a ground, one at a time, which are then translated by one of the operated OF-A relays into a number 0-9, that corresponds to that offices A, B, C digit. The ground is returned to the LIT control circuit back over the 0-9 leads. The LIT teletypewriter prints the complete directory number.

8.02 Where more than one identifier group is required, the A, B, C digits require the additional translation by the identifier group translation relays provided by App Fig. 9 and 10 and several additional options according to the number of offices in each identifier group. The only difference between single identifier group and multiple identifier group operation is one or two additional relays operate to further provide segregated cross-connect punchings for each group. Cross-connect Note 403 is used. The in-between physical and theoretical office code translation relays and cross-connections (shown in FS24 as part of App Fig. 11 and 12) are not provided or wired unless the outpulsers are arranged for this feature.

8.03 When the outpulsers in any identifier group are arranged to provide for the translation of office indications into physical and theoretical office codes, the translation is made in the outpulsers. This information is passed on to the trouble ticketer when App Fig. 11 or 12 is required and is stored in an operated office units relay that corresponds to a similar relay in the outpulser. The make contacts of these relays are inserted between the LIT OFF punching and the OFF IND 0-5 punchings for each identifier group to translate this arbitrary number into the proper A, B, C digits for the line number identified. The cross-connecting of these additional interceding cross-connect points is covered in Note 403.

8.04 An example of a cross-connect field is presented in a portion of Note 403 part (C) to illustrate the provisions of the translation circuit of FS24. A physical representation of the LIT translation field is shown in 4.03 (D). Note 403 (E) shows how extra common punchings may be obtained if more than five common terminal punchings are required.

8.05 Option ZR wiring also provides contacts of relays LIT, LTA, OFA, and IG in FS24 and FS8 to isolate and control the operation and the release of the trouble ticketer circuit when used with the LIT control circuit. Contacts of the VK, TK, HK, and THK are used in a series up check lead to this control circuit. The ground off a make contact of the DISC relay operates relay LC in the permanent signal identification circuit. Lead TRC in FS8 permits relay RLS to follow the operation of relay TRC in the LIT control circuit, thus ending the seizure of the ticketer by the control circuit as shown following a trouble record complete in SC8. Break contacts of the RLS, ON1, and CT in the operate path of relays LIT and LTA prevent interference by the LIT when the ticketer is busy printing a ticket for ANI. Likewise, a make contact of relay OFA in lead TRC prevents a false feedback over lead TRC if the ON key on the LIT circuit is not operated.

9. AUTOMATIC TROUBLE ANALYSIS

9.01 When the Automatic Trouble Analysis (ATA) system is provided in a No. 1 crossbar office, the trouble ticketer will be arranged to provide the connecting circuit, the Maintenance Data Transmitter (MDT), with a number of scan points identical to troubles registered and normally printed on a trouble ticket. The first indication that an output from the ticketer is available to the MDT, is a ground on the AF, or flag, lead. Lead AF is grounded in FS25 (App Fig. 6) when the DISC relay operates, provided neither relays CATA or LIT are preempting use by ATA. Refer to SC1, SC4, or SC7, depending upon the type of call being registered, for sequence of operation with the MDT for the ATA feature.

9.02 Lead AF grounded to the MDT requires an ATA decision whether to either print a trouble ticket, or to release the ticketer without printing a ticket. Should the decision be to print, the MDT operates PRT over lead APD . Reception of this ground is verified over lead APDA. PRT operated releases the Stop Advance (SAV) relay which normally operates with this feature on every call when relay ON operates. Later in the sequence, relay RLS provides a lock path for SAV during the release of the ticketer so as to avoid recycling the FG selector when the ticketer is placed in the nonprint mode by ATA. Diode SAV prevents feedback of this ground from affecting the off-normal ground. Relay SAV releasing permits relay MS to operate and the FG step magnet to energize. Operation is now the same as in 2.01 through 2.05.

9.03 In addition to those relays which release in 2.05, the release of ON1 with option ZW releases NTR which was operated at the beginning of the sequence, and relay AC which in turn releases PA1. When relay RLS releases, SAV finally releases also.

9.04 If instead of printing, the MDT is in a release mode as a result of a command from ATA, lead AD will be grounded. This command is verified by the MDT back over lead ADA. Immediately, relay RLS operates allowing the entire printing sequence to be skipped. The release is no different than if a ticket were printed except as noted in 9.03.

9.05 Unattended operation of the trouble ticketer by ATA requires added assurance trouble does not exist in the ticketer itself. Relay AC functions to monitor the 22-volt AC supply which is in the 1A message ticketer, and normally operates when relays ON1 or CT operate. A ground on lead A1 to the MDT indicates the printer is capable of being turned on. However, should another relay PA1 be operated, the ground is opened on lead A1 as an indication that the printer is nearly out of paper.

9.06 The ATA system has five modes of operation that the MDT utilizes with the ticketer:

(a) Send all records but print only manually generated test records.

(b) Send all records and print all records.

(c) Send all records but test - print only test.

(d) Send all records but test - print all records.

(e) Send no records but print all records.

If the ticketer printer is out of service, all records will be sent to the ATA central computer, which may be located at a Switching Control Center (SSC), via the MDT, except for mode (E) where none will be sent. Relay NTR functions on service or intercept calls, FS23, to interrupt ground on lead AT so that ATA system will not interpret it as a test call. The NTR also operates when CL12, Fig. 6, operates when AB remains normal for a terminating marker CLI call.

9.07 The trouble ticketer is provided with relay CATA to cancel automatic trouble analysis. It can be operated manually by using a 329A shorting plug inserted into the CATA jack, or by a ground on lead A2 from the MDT. The MDT will ground lead A2 to make it busy to itself or whenever it gets into a trouble condition. Operation of CATA lights the CATA lamp and operates relay CA in the miscellaneous circuit for the trouble ticketer. The CATA operated opens the flag lead AF, the AD and APD leads to the MDT. The CATA jack, when plugged in, will also return ground to the MDT over lead AMB to inform it is plugged busy to ATA.

9.08 Relay NTC is only functional, FS-20, when relay CATA is operated since when CATA is normal, ATA is aware of the number of tickets in any given period of time.

9.09 Whenever relay RLS is operated, FS8, by MDT and relay CATA is normal, the trouble ticketer will operate relay ATR in the miscellaneous circuit to release any alarms that may have been brought in as a result of the same trouble being recorded in the ticketer, or sent to ATA.

9.10 The scan points associated with the MDT are connected to the windings of the register relays of FS1, FS2, FS3, FS4, FS5, and FS6. The lead designations are the same as the register relays the leads connect to in the trouble ticketer. If AIOD is provided, connection is also provided to FS22. FS25 provides an SP scan point for any special use that the ATA central computer may have been programmed to accept on a job basis by SCC.

10. COMMON SYSTEMS MESSAGE PRINTER

10.01 When the 1A message ticketer, "T", is replaced by the CSMP, "A", unless the selector replacement feature is provided, very little difference exists between the functional operation of the two types of printers. Both provide up to 40 line horizontal messages exactly as indicated in the previous paragraphs with few exceptions in operation. The "A", CSMP, receives the print and control information over the same leads of FS8 or FS8A (selector replacement feature shown). Once the ticketer register relays have locked in their information, each character position is interrogated for ground on the J1-P1 connector TR1-TR12 print function leads of Table B of SC1, for all PG Sel arc 1 and 4 positions of Table A of SC1.

10.02 The printing without selector replacement, option YJ, can be followed off of SC1, PG Sel energized for position 1, following the release of relay PGA. The sequence is picked up on SC1A where a next character flag NCF is sent to the CSMP over terminal 19. The CSMP registers the character indication for the first position and grounds lead 15 to operate relay AV to advance the PG selector to position 2. Relay PGA then operates, removes the next character flag, releases relay AV, which re-energizes the PG selector to release relay PGA for the next character reading. This sequence continues until the PG selector steps into position 43, after which the CSMP can print the data.

10.03 To facilitate the reading of only a single line CSMP entry, operation of the CSMP Line Feed (LF) switch can extend a sufficient length of paper which can be read or manually cut off the resulting spool. Before this is done, if the HD Header switch is operated, a convenient 01, 05, 10, etc, to 40 character position heading may be printed first. Also, the operation of the PT switch first will print the present time. Should the time be incorrectly set, it can be reset utilizing the TMS key in conjunction with the manual advance keys: P, MU, MT, HU, HT, in the same manner as outlined in 4.06. When the desired selector time setting is made and the CSMP RST reset switch is operated, the CSMP time will be reset and the new time printed on the tape. To leave some space for adding written remarks on the tape after taking a record, operate the LF switch momentarily, if desired.

10.04 A representative CSMP entry is shown below with time, header, entry, and reset shown:

```
TIME 15:29
Ø:::Ø::::1::::1::::2::::2::::3::::3::::4
1:::5::::Ø::::5::::Ø::::5::::Ø::::5::::Ø
**1---19Ø------- *-ØØ Ø-ØØ----ØØØ-1529**
RESET AT 15:30
```

10.05 With the CSMP feature, without selector replacement, the number of tickets counter, progress timing, overall timing, time of day alarm, and all other features remain unchanged except the CT nonlocking key is not effective. In either case, however, the paper tape entries appear identical as illustrated in 10.04.

10.06 When the CSMP and the trouble ticketer are arranged for progress control and selector replacement, a number of other features are affected:

(a) All selectors are disabled or not provided. Parts 2.01 through 2.05 are affected.

(b) The time of day relay P is reused to control the time-out and alarm circuit, FS19, instead of the P selector. The FS17 is replaced by FS17A, the reset clock circuit, to utilize the same keys TMS, P, MU, MT, HU, and HT to directly reset the CSMP memory to a new time on an incremental basis. The RST reset switch operated on the CSMP is used to verify each incremental change or final result as required. Because of its 60-cycle AC time base, usually only a power outage will affect its time base.

(c) The number of tickets counter is reassigned a new time base of 12 seconds rather then the former 2-minute interval. Two 6-second relay P operations are counted in FS19 TMA-D relay timers to control the 12-second timing interval for FS20, the number of tickets counter. The acceptable number of tickets, according to 5.01, may remain the same; only the time base is changed to agree with the increased printing speed of the CSMP selector replacement feature. This timing is now covered by SC6A. Relay TME now controls relay ET, now in FS17A, for its function in FS20.

(d) The former progress timing provided by the TM tube timer of 7.01 is also reutilized to instead, time the overall timing formerly conducted by the FS19 relays TMA-D that are reused as described in (c) above. Relay RLS controls relay TM instead of the AV, and resistor TMA is changed to extend the timing interval to about 2.5 to 4.5 seconds.

(e) The time of day alarm, FS18, while still utilizing relay AL is controlled directly by the CSMP over lead TAL. The AL tube is not needed. Operation of the AR key is covered in item (h) which follows.

(f) The Cut-Tape (CT) feature is not functional. The LF switch on the CSMP is used to accomplish an individual ticket, if desired, without waiting for subsequent seizures and entries to extend the paper tape.

(g) Key LR, nonlocking, although still functional to release relay ALM of FS19, releases the TME only upon circuit release or time-out by relay TM. The same lamps in the trouble ticketer frame are extinquished, however, when LR is operated.

(h) The operation of key AR retires the alarm produced by the operation of relay TTA of the miscellaneous circuit. Relay TME operated will not operate relay TTA, however, only the TM or AL will do so.

(i) Operation of ATA or LlI, if provided, is unaffected except that more tickets can be printed or received in a given interval of time.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Voltage Limits

Voltage	Min	Max
-48	-45	-50
+130	+125	+135
22 Volts 60 ohm		

2. FUNCTIONAL DESIGNATIONS

2.01 The functional meanings of the designations of the operating elements of the trouble ticketer are given in the following list.

2.02 Relays

Designation	Meaning
1TR	First Trial Identifier Failure
2TR	Second Trial Identifier Failure
A	Number of Tickets Counter
AB	Abandoned Call Register
AC	22V AC Supply
AL	Alarm (time of day)
ALM	Alarm
AS	"A" Digit Steer Advance
AV	Advance
B	Number of Tickets Counter
BS	"B" Digit Steer
C	Number of Tickets Counter
CATA	Cancel Automatic Trouble Analysis
CCKF	Continuity Check Failure
CIT	Calling Line Identification Trouble
CLI	Calling Line Identification
CLI1,2	Terminating Marker Calling Line Identification
CON	AIOD Translator Connected
CS	"C" Digit Steer
CT	Advance and Cut Tape
CTM	Connector Time-Out
D	Number of Tickets Counter
DISC	Disconnect Outpulser
EP	End Pulsing
ES	End Steering - Identifier
ES1,2	End Steering Attempt 1, 2 - Identifier
ET	End Timing (2-Minute Interval, Option YM, or 12-second Interval, Option YN)
FTM	Failure to Match
GRF	Ground Removal Failure
GRT	Ground Removal Test
H	Hundreds Steering - Identifier
H(0,1,2, 4,7)	Hundreds Digit
HK	Hundreds Check
HS	Hundreds Steering - Outpulser
HT	Hour Tens
HT(0,1,2)	Hour Tens Digit
HU	Hour Units
HU(0-9)	Hour Units Digit
HUA	Hour Units Auxiliary
IOD	AIOD Class
ID(0,1)	Identifier Number
IDG(0,1,2)	Information Digit
IDS	Information Digit Steering - Outpulser
IG	Identifier Group (0, 1, or 2)
IK	Identification Check
INT	Intercept
IRL	Identifier Release
IYK	Integrity Check
KP	Key Pulse Steering - Outpulser

Designation (Cont)	Meaning
L1	Line Relay
LIT	Line Insulation Test
LTA	Line Insulation Test Auxiliary
LV	Line Verification - Trouble
MT	Minute Tens
MT(0-5)	Minute Tens Digit
MU	Minute Units
MU(0-9)	Minute Units Digit
NI	No Identifier
NOB	Nonobserved
NPK	No Party Check - Identifier
NTR	Nontest Record
NTC	Number of Tickets Counter
OF(0-8)	Office Digit of AIOD Office Index
OF(0-6)S	Office Steering - Identifier
OFA, B, C OFBA, OFCA	Office Transfer To LIT Printout and ID Group Translation
OF(0-5)A	(First-Sixth) Office LIT Directory Number
OFES	Office End Steering Identifier
OFP	Office Physical Translation (LIT)
OFT(0-2)	Office Theoretical Translation (LIT)
OFX	Crossed Offices - Identifier
OIT	Outpulser-Identifier Test-Trouble
ON,ON1	Off Normal
OP(0-9)	Outpulser Preferences
OPR(0-9)	Outpulser Number Registration
OSX	Oscillator Cross
P	Pulse
P(0-8)	Print (0-8)
PA1	Paper Alarm Auxiliary
PGA	PG Selector Advance

Designation (Cont)	Meaning
PIK	Party Information Check
PK	Party Check
PK(1-7) PK3A	Print Check
PR(1-6)	Print Lines 1-6
PRL, PRL1	Printer Release
PRT	Print
PSR	Permanent Signal Record
PST	Permanent Signal - Trouble
PT	Party Test
PT1	Party Test Applied
PTY	Multiparty Line
RCL	Register Clear - Outpulser
RGK	Registration Check
RL	Release - Outpulser
RLS	Release
RO	Reorder
RP	Ring Party
SAV	Stop Advance
SER	Service Call - Trouble
SGT(0-6)	Trunk Subgroup Tens Number
SGU(0-9)	Trunk Subgroup Units Number
SNK	Station Number Checked - Translator
SNR	Station Number Received - Outpulser
SO	Service Observed
SP	Start Outpulsing
STS	Start Pulse Steering - Outpulser
T	Tens Steering - Identifier
T(0,1,2, 4,7)	Tens Digit
TA	Overall Time-Out
TH	Thousands Steering - Identifier

Designation (Cont)	Meaning
TH(0,1,2, 4,7)	Thousands Digit
THK	Thousands Check
THS	Thousands Steering - Outpulser
TLB	Translator Busy
TK	Tens Check
TKCI	Trunk Cut-In
TK(00-13)	Trunk Number
TM	Timing
TM1	Work Timer Time-Out
TM2	Timer 2 Time-Out
TMA,B,C, D,E	Overall Timing (Option YM) or Number of Tickets Timing (Option YN)
TMK	Timing Check
TNC	Tone Connected
TNK	Tone Check
TOS	Ticketer Out of Service
TP	Tip Party
TRS	Transfer Trunk Leads
TRT	Tracetone
TS	Tens Steering - Outpulser
TS0-2	AIOD Translator 0-2
TSX	Translator Start Lead Cross
TT	Trunk Test Call - Trouble
U	Units Steering - Identifier
U(0,1,2, 4,7)	Units Digit
UK	Units Check
US	Units Steering - Outpulser

2.03 Keys

Designation	Meaning
CT	Cut Tape
HT	Hour Tens
HU	Hour Units
LR	Lamp Release
MT	Minute Tens
MU	Minute Units
P	Pulse
TMS	Time Set

2.04 Selector Switches

Designation	Meaning
HT	Hour Tens
HU	Hour Units
MT	Minute Tens
MU	Minute Units
P	Pulse
PG	Progress

2.05 Electron Tubes

Designation	Meaning
AL	Alarm
TM	Timing

2.06 Diodes

Designation	Meaning
CR1-4	Full-Wave Rectifying Bridge for 22Vac
RLS	Release
SAV	Stop Advance

2.07 Jacks

Designation	Meaning
CATA	Cancel Automatic Trouble Analysis
VC	Voltage Check

3. FUNCTIONS

3.01 Response to a start signal to initiate printing of a trouble ticket.

3.02 Operates relay MS in the 1A message ticketer to start the motor for rotation of the type wheel and ticketer distributor.

3.03 Makes the trouble ticketer busy to all circuits attempting to seize the ticketer while a ticket is being printed.

3.04 Sends a trouble ticketer disconnect signal to the circuit that seized the ticketer by grounding lead TTB when registration is complete.

3.05 Registers the following information from the outpulser circuit: equipment used, office and subscribers directory number, type of call information digit, digit checks, outpulser progress time-out, and miscellaneous information.

3.06 Registers the following information from the identifier circuit: identifier number, and when option ZO is provided, identifier progress.

3.07 Registers the following information from the outpulser connector circuit: trunk subgroup tens and units number, and the trunk number.

3.08 Registers the time of day in terms of hour tens and units, and minute tens and units.

3.09 Controls the printing of a 40-line trouble ticket.

3.10 Controls the printing of a 35-line permanent signal and calling line identification record.

3.11 Provides a timer to time the printing of each line on the ticket.

3.12 Provides an overall timer to time the trouble ticketer usage.

3.13 Provides an alarm if the 6-second battery pulse for controlling the time of day selectors fails.

3.14 Counts the number of trouble tickets in a 2-minute timer interval.

3.15 Recycles the number of tickets counter every 2 minutes (option YM) or every 12 seconds (option YN).

3.16 Provides for canceling the number of tickets count.

3.17 Provides for a number of tickets alarm and takes the trouble ticketer temporarily out of service if the number of tickets counted is equal to the specified number as indicated by the NT cross-connection.

3.18 Indicates a paper alarm if the tape supply is low.

3.19 Provides a feature for advancing and cutting the last ticket printed by means of a CT key.

3.20 Scores a register each time a ticket is printed on a service call when option J is furnished.

3.21 Registers the progress of the outpulser and the AIOD translator on an Automatic Identified Outward Dialed (AIOD) class of call when option G is furnished.

3.22 Provides a feature to print out, by directory number on the LIT teletypewriter, LIT failures.

3.23 Provides a feature that indicates to the Automatic Trouble Analysis (ATA) system that a trouble record is available, to send it to the MDT if directed, and to print all, some, or none of the tickets as determined by the Maintenance Data Transmitter (MDT).

3.24 Provides a means to make the trouble ticketer busy to ATA system from a jack or by the MDT.

3.25 Provides a means to silence audible alarms whenever ATA is functioning with the trouble ticketer.

3.26 Provides for the replacement of the 1A message ticketer, option YG, with the CSMP, option YJ, and the optional replacement of the HT, HU, MT, P, and PG selectors, option YH, with option YN.

3.27 Provides new and changed functions with the CSMP which changes functions 3.02, 3.13, 3.14, 3.15, and 3.19.

3.28 Provides control of printing, with option YJ and the CSMP, by means of off-normal, advance, next character flags and release signals, and with option YN also, controls progress and time of day functions using an optional CSMP feature.

3.29 Provides an alarm with option YN if the 6-second battery pulse for controlling the 12-second number of ticketer counter fails.

3.30 Counts the number of trouble tickets in a 12-second timer interval when option YN is provided.

4. CONNECTING CIRCUITS

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

(b) Identifier Circuit - SD-95810-01 or Identifier Circuit, ANI-B for use with No. 1 AMARC and Toll (Step-by-Step Offices) - SD-1C593-01.

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

(d) Clock Circuit - SD-96201-01.

(e) Impulse Clock Circuit - SD-96343-01.

(f) No. 1 Crossbar Terminating Marker - SD-25283-01.

(g) No. 1 Crossbar Terminating Trouble Indicator - SD-24284-01.

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

(i) Line Insulation Test Circuit - SD-25947-01.

(j) Maintenance Data Transmitter - SD-28110-01.

(k) Common Systems Message Printer - SD-95865-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 The trouble ticketer shall be capable of performing all of the functions specified in this Circuit Description and meeting all of the requirements of the Circuit Requirements and Timing Requirements Tables.

6. TAKING EQUIPMENT OUT OF SERVICE

6.01 To take the trouble ticketer out of service, insert a make-busy plug into the TTB jack at the trouble ticketer frame to operate relay TTB in the miscellaneous circuit for the trouble ticketer frame. Lead MB to the trouble ticketer is grounded and passed through the back contacts of relays OP and MKR in the trouble ticketer, over leads TTB to operate a relay in the outpulser or marker if that outpulser or marker attempts to seize the trouble ticketer. The operation of relay TTB in the miscellaneous circuit also opens the start leads for all of the outpulsers and markers.

6.02 To make the trouble ticketer busy to a particular outpulser, insert a make-busy plug into the associated TTBOP jack at the trouble ticketer frame to open leads TTST and TTB between that outpulser and the ticketer; this action also causes lead TTB to be grounded back into the outpulser as an indication that the ticketer is busy. To make the trouble ticketer busy to a particular terminating marker group, insert a make-busy plug into the associated TTBMG jack at the trouble ticketer frame to open the associated TTST and TTB leads between the markers of that group and the trouble ticketer; this action also causes lead TTB for each marker to be grounded as an indication that the ticketer is busy.

6.03 To make the trouble ticketer busy to the MDT of the ATA system, insert a make-busy plug into the CATA jack at the trouble ticketer frame. The CATA lamp will light to verify the make-busy condition is affected. Refer to 9.07 of SECTION II.

6.04 To make voltage checks on relay AC, insert a make-busy plug into the CATA jack before connecting VC plug of test set or AC meter into the VC jack per circuit requirements table. The VC jack isolates relay AC from AC current so that DC current tests can be made. A plug in the VC jack alone without the CATA plugged busy will still stop operation of the trouble ticketer since SAV will operate when ON operates.

7. ALARM INFORMATION, OPTION YM

TROUBLE TICKETER PROGRESS TIME-OUT ALARM

7.01 If the TM timer times out during the printing of any line on the ticket, relay TM operates to permit printing a dash in that position to advance the ticket to the next position and to ground lead TTA to the miscellaneous circuit for the trouble ticketer frame. Relay TTA in the miscellaneous circuit operates and locks to key AR. The operated relay TTA brings in a minor alarm and grounds lead ALM. Relay ALM operates and locks to key LR. The operation of relay ALM grounds lead PTO to light lamp PTO in the miscellaneous circuit indicating a trouble ticketer progress time-out. Operation of key AR will retire the alarm, and operation of key LR will release relay ALM to extinguish the PTO lamp.

TROUBLE TICKETER OVERALL TIME-OUT ALARM

7.02 The trouble ticketer overall timer consists of a set of counting relays, TMA, TMB, TMC, TMD, and TME, which respond to operations of relay P. Relay P in turn responds to the 10-IPM battery pulses from the clock circuit. If the trouble ticketer remains off-normal long enough to permit relay TME to operate, lead TTA to the miscellaneous circuit is grounded. Relay TTA in the miscellaneous circuit operates and locks to key AR. The operation of relay TTA brings in a minor alarm and grounds lead ALM, operating relay ALM. Relays TME and ALM lock to key LR. Relay TME in operating releases relays TMA, TMB, TMC, and TMD. Relay TMA continues to pulse under control of relay P but performs no useful function. The operation of relays TME and ALM grounds lead TTO to light the TTO lamp

in the miscellaneous circuit, indicating a trouble ticketer time-out. Operation of key LR will retire the minor alarm and operation of key LR will release relays TME and ALM to extinguish the TTO lamp.

TIME OF DAY ALARM

7.03 If a trouble occurs in the time of day circuit and relays P and TMK do not recycle the AL timer, the AL tube fires, operating relay AL. Relay AL locks to key LR and grounds lead TTA to operate relay TTA in the miscellaneous circuit for the trouble ticketer frame. Relay TTA brings in a minor alarm and grounds lead ALM to operate relay ALM which locks to key LR. The operated relays AL and ALM ground lead TDA to light the TDA lamp in the miscellaneous circuit, indicating a time of day alarm. Operation of key AR will retire the minor alarm and operation of key LR will release relays AL and ALM to extinguish the TDA lamp.

TAPE ALARM

7.04 If the supply of paper tape for the trouble ticketer becomes low, the tape alarm contacts close, grounding lead PA to operate relay PA in the miscellaneous circuit for the trouble ticketer frame. Operation of relay PA brings in a minor alarm and lights the PA lamp. The alarm is retired and the lamp is extinguished when the tape supply is replenished. Relay PA1, Fig. B of FS25, will also operate from relay PA to inform ATA of the paper status.

NUMBER OF TICKETS ALARM

7.05 If, in response to a major alarm, the Ticketer Out of Service (TOS) lamp is found lighted at the trouble ticketer frame, a predetermined maximum of trouble tickets have been accepted during the allowable timed interval.

7.06 When relay NTC operates, the trouble ticketer is taken out of service and relay NTA in the miscellaneous circuit for the trouble ticketer frame is operated to sound a major alarm. The TOS and NTA lamps are lighted. When the trouble ticketer is restored to service at the end of the 2-minute timed interval, lamp TOS is extinguished. Operation of key AR retires the major alarm and extinguishes the NTA lamp.

7.07 If it is desirable to print additional trouble tickets before the timed interval has elapsed, operate the Cancel Ticket Counting (CTC) key at the trouble ticketer frame. Operation of key CTC restores the trouble ticketer to service and extinguishes the lighted TOS lamp.

TROUBLE TICKETER REQUEST ALARM

7.08 If, in response to a minor or a major alarm, the Trouble Ticketer Request (TTR) lamp is found lighted at the trouble ticketer frame, it is probable one or more trouble tickets have been printed.

7.09 A lighted Display Lost (DL) lamp in addition to the lighted TRR lamp indicates an unsuccessful attempt to seize the trouble ticketer. A record of the DL- lamp indications should be made in accordance with local instructions.

7.10 Momentarily operate key AR at the trouble ticketer frame to retire the alarm and to extinguish the TRR and DL- lamps. Remove the printed ticket or tickets for analysis.

8. ALARM INFORMATION - OPTION YJ AND YN

TROUBLE TICKETER PROGRESS TIME-OUT ALARM, FS19, USED AS OVERALL TIME-OUT

8.01 When this circuit is provided with option YN and the CSMP, the function of the TM timer is changed, even though the operation is nearly the same as described in 7.01. With option YN, this timing interval is made longer so that the TM timer times out during the printing of each line entry rather then just for each character. Whereas, the TM timer was used to automatically print dashes for missing information, with YN, the CSMP does this, while it also adds a pair of leading and trailing dashes conventionally used at the beginning and end of a ticket.

TROUBLE TICKETER OVERALL TIME-OUT ALARM REVISED AND BECOMES TIME FOR NUMBER OF TICKETS ALARM, FS19

8.02 The overall time-out with the CSMP and option YN is revised to be the TM time interval of 8.01 above, which was the progress time-out interval. This is because it takes only 2.5 to 4.5 seconds to print a complete line versus 0.74 to 1.4 seconds required to print each character before with option YM. This trouble ticketer overall time-out is revised and becomes the time base for the number of tickets alarm. It is essentially the same set of counting relays, TMA, TMB, TMC, TMD, and TME, as used with option YM except with YN wiring. It also functions to release relay RL on a TM time-out at the same time TME releases if relay P is normal for a synchronous circuit release at the end of the timing period. The TME, without option YM, does not operate the TTA in the miscellaneous circuit when the single overall TM timing function is used, but TM

still does it if it operates, SC6A. Relay TME cannot lock up to the LR nonlocking key with option YN because relay P has a make contact in the lock path to interrupt this ground. The TME is used to reset the timer by operating relay ET, which is made part of FS17A with option YN. When releasing the locked-in relay ALM operated by TTA from relay TM or AL only using key LR, it must be held open over the one-half second operated interval of relay P if it is operated. The TMA has a revised option YN lock path to key LR which is cut off when TME operates. This could also affect the time LR must be operated to release ALM when ON1 is operated. Otherwise, key LR and AR operations are as per 7.02.

TIME OF DAY ALARM

8.03 If a trouble occurs in the time of day circuit of the CSMP, the resulting ground signal over lead TAL of FS18 operates relay AL. The AL locks to key LR and grounds lead TTA to operate relay TTA as described in 7.03. The alarms are released also as covered in 7.03.

TAPE ALARM

8.04 If the supply of paper for the CSMP becomes low, with or without selector replacement, the printer electronics grounds lead ALRM, which appears as lead PA in the trouble ticketer, to operate relay PA in the miscellaneous circuit for the trouble ticketer frame. Operation of the PA is the same as 7.04.

NUMBER OF TICKETS ALARM

8.05 Operation and release of alarms of FS20 are the same as with option YM and 7.05.

8.06 When relay NTC operates and a major alarm is produced, the trouble ricketer is taken out of service. The trouble ticketer is restored to service at the end of the 12-second timed interval and lamp TOS is extinguished. Operation of key AR, as in 7.06, retires the major alarm and extinguishes the NTA lamp.

8.07 Key CTC operation is the same as 7.07.

8.08 The Trouble Ticketer Request (TTR) alarm lamp is covered by 7.08; the Display Lost (DL) Lamp by 7.09; and the result of key AR operation by 7.10.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.01 Provides for replacement of the 1A message ticketer and the optional replacement of the HT, HU, MT, MU, P, and PG selectors by the common systems message printer.

A.02 Corrects an error in function 3.15 of the Circuit Description.

B. Changes In Apparatus

B.01

Superseded	Superseded By
HT, HU, MT, MU - 206CK Selectors, App Fig. 1, Option YH	A - Printer (SD-94865-01), App Fig. 1, Option YJ
P - 206AF Selector, App Fig. 1, Option YH	TMA - KS-20810 L1A 0.267 Megohm, App Fig. 1, Option YN
PG - 209A Selector, App Fig. 1, Option YH	RLS - 185A Network, App Fig. 1, Option YP
AV - 1/2 AK7 Relay, App Fig. 1, Option YH	TM - 1/2 177H Network, App Fig. 1, Option YN
CT - AF111 Relay, App Fig. 1, Option YH	
HT - 1/2 AK6 Relay, App Fig. 1, Option YH	
HT0-2 - 1/2 AK6 Relays, App Fig. 1, Option YH	
HU - AF70 Relay, App Fig. 1, Option YH	
HUA - 1/2 AK6 Relay, App Fig. 1, Option YH	
HU0-9 - 1/2 AK6 Relays, App Fig. 1, Option YH	
MT - 1/2 AK6 Relay, App Fig. 1, Option YH	
MT0-5 - 1/2 AK6 Relays, App Fig. 1, Option YH	
MU - 1/2 AK6 Relay, App Fig. 1, Option YH	
MU0-9 - 1/2 AK6 Relays, App Fig. 1, Option YH	
PGA - 1/2 AK6 Relay, App Fig. 1, Option YH	
PRL - 1/2 AK4 Relay, App Fig. 1, Option YH	
PRL1 - 1/2 AK4 Relay, App Fig. 1, Option YH	
TMK - AG8 Relay, App Fig. 1, Option YH	
A - KS-13490 L1 2.2 Megohm Resistor, App Fig. 1, Option YH	
AL - KS-14491 L1 2K Resistor, App Fig. 1, Option YH	
C - 19GR Resistor, App Fig. 1, Option YH	
CT - 18AG Resistor, App Fig. 1, Option YH	
PG - 18CN Resistor, App Fig. 1, Option YH	
TMA - KS-20810 L1A 0.133 Megohm Resistor, App Fig. 1, Option YM	
A - 1/2-439E and 2-437A Capacitors, App Fig. 1, Option YH	
AL - 437A Capacitor, App Fig. 1, Option YH	
PG - 441A Capacitor, App Fig. 1, Option YH	
S - KS-13367 L35 .001 μF, App Fig. 1, Option YH	
AV - 185A Network, App Fig. 1, Option YH	
HT, HU, MT, MU, P - 1/2 177H Network, App Fig. 1, Option YH	
T - 1A Message Ticketer, App Fig. 1, Option YG	
AL - 346C Electron Tube, App Fig. 1, Option YH	
RLS - 446K Diode, App Fig. 1, Option ZW	RLS - 533K Diode, App Fig. 1, Option ZW

D. Description of Changes

D.01 This circuit is redesigned and now permits the "T" 1A message ticketer, option YG, to be replaced by the "A" Common Systems Message Printer (CSMP), SD-94865-01, option YJ. In addition to some minor apparatus and wiring changes for the above feature, is an option YH to replace and disable the various 206-type selectors, associated control relays, and wiring with a separate new option available on the CSMP known as selector replacement.

D.02 Extensive circuit changes are made for D.01 regarding apparatus, wiring, options, notes, sequence charts and CADs and result in schematic changes (*indicates additions) to: FS7, FS8, *FS8A, FS9, FS10, FS11, FS12, FS13, FS14, FS15, FS16, *FS17A, FS18, FS19, FS20, FS25, CAD4, CAD5, *CAD14, Notes 102, *112, *113, 401, SC1, SC2, SC3, SC4, SC5, and SC6.

D.03 The CSMP features are implemented either on an after-date Standard basis for new trouble ticketer circuits per Note 104, or per Note 113, which allows field replacements of the 1A message ticketer alone or with selector replacement also. The options and their features are included in Notes 104 and 113 as follows:

Option	Rating	Feature
YG	Mfr Disc.	1A Message Printer Option
YJ	Standard	CSMP replacement for YG
YN	Standard	Provides progress control and time of day functions using the CSMP, option YJ.
YH	Mfr Disc.	Designates apparatus which may be left in place when disconnecting option YM wiring when option YN is specified.
YM	Mfr Disc.	Wiring disconnected from YH apparatus to disable it so that option YN can be used.
YP	Standard	Provides the RLS network, unless the same one is provided by option ZW by another feature.

D.04 A number of drafting changes are made, unrelated to items D.01 through D.03, to:

(a) Correct the apparatus index on sheet A3.

(b) Add the missing lead 0-9 designations on FS11 on sheet B5A, location B7.

(c) Correct the PG sel arc 1 to correctly read arc 4 in the circuit boxes in FS13, FS14, FS15, and FS16 on sheet B7, reflecting location 3D5.

(d) Add options ZF, ZN on sheet B10 to lead TT to close the end of this common option.

(e) Correct circuit reference boxes to agree with original locations, 4AG5 and 3CZ as shown on FS25, sheet B13.

(f) Clarify Sheet Note 8B on Information Note 301, sheet D2.

(g) Clarify Sheet Note 1B of Information Note 302, sheet D3.

D.05 On sheet D2, Information Note 301, Sheet Note 20 is added as a reference for character position 32, position 8, changed from: "No Pty Check In Identifier", to read, "No Pty Check. See Note 20". Note 20 states, "Normally - No Pty Check In Identifier; With No. 1 AMARC & Toll Identifiers, Disregard 'No Party Check'".

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5242-DAJ

WE DEPT 45240-WCR-JTT-MAF