

BELL TELEPHONE LABORATORIES, INC.

STEP BY STEP SYSTEMS NO. 350A AND BRANCH OFFICE KEY SHEET

CONTENTS

PAGE TITLE	
ALARM CIRCUITS	12,13
AUTOMATIC NUMBER IDENTIFICATION CKTS.	23
CIRCUITS CONNECTING WITH:	
CABLE TEST DESK NO. 3	7
LOCAL TEST CABINET NO. 3	10
LOCAL TEST DESK NO. 14	7
REPAIR SERVICE DESK NO. 2	8
CONNECTOR CIRCUITS	3,16
EMERGENCY MANUAL CIRCUITS	
TYPE A	14
TYPE B	15
INDEX	35 TO 42
INTERCEPTING TRK. & TRK. FINDER CIRCUITS	6
LOCAL ORIGINATING CIRCUITS	1,19
LOCAL SELECTOR CIRCUITS	2,5
MISCELLANEOUS CIRCUITS	11,18,21
PLUGGING UP FRAME	8
RANGE INFORMATION	24 TO 31
REPEATER CIRCUITS	20
TEST CIRCUITS	5
TEST DISTRIBUTOR	3
TOLL TRAIN	9
TRUNK CIRCUITS	
INC. & OUTG.	2,4,17,20,22
CKT.DETAILS	32 TO 34

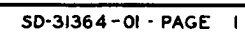
DWG. ISS.	C. D. ISSUE	DATE ISSUED	APPROVED	
19	19	4-9-40	W.L.F. _I	O.A.F.
20	20	1-27-42	W.L.F. _I	O.A.F.
21	21	6-26-42	W.L.F. _I	O.A.F.
22	22	11-26-47	F.J.S. _I	
23	23	5-10-49	A.J.B. _I	
24	24	10-16-53	E.E. ^{co} J.J.S. H.P.	E.W.O.
25	25	10-22-59	C.A.S. F.J.S.	S.W. E.W.O.

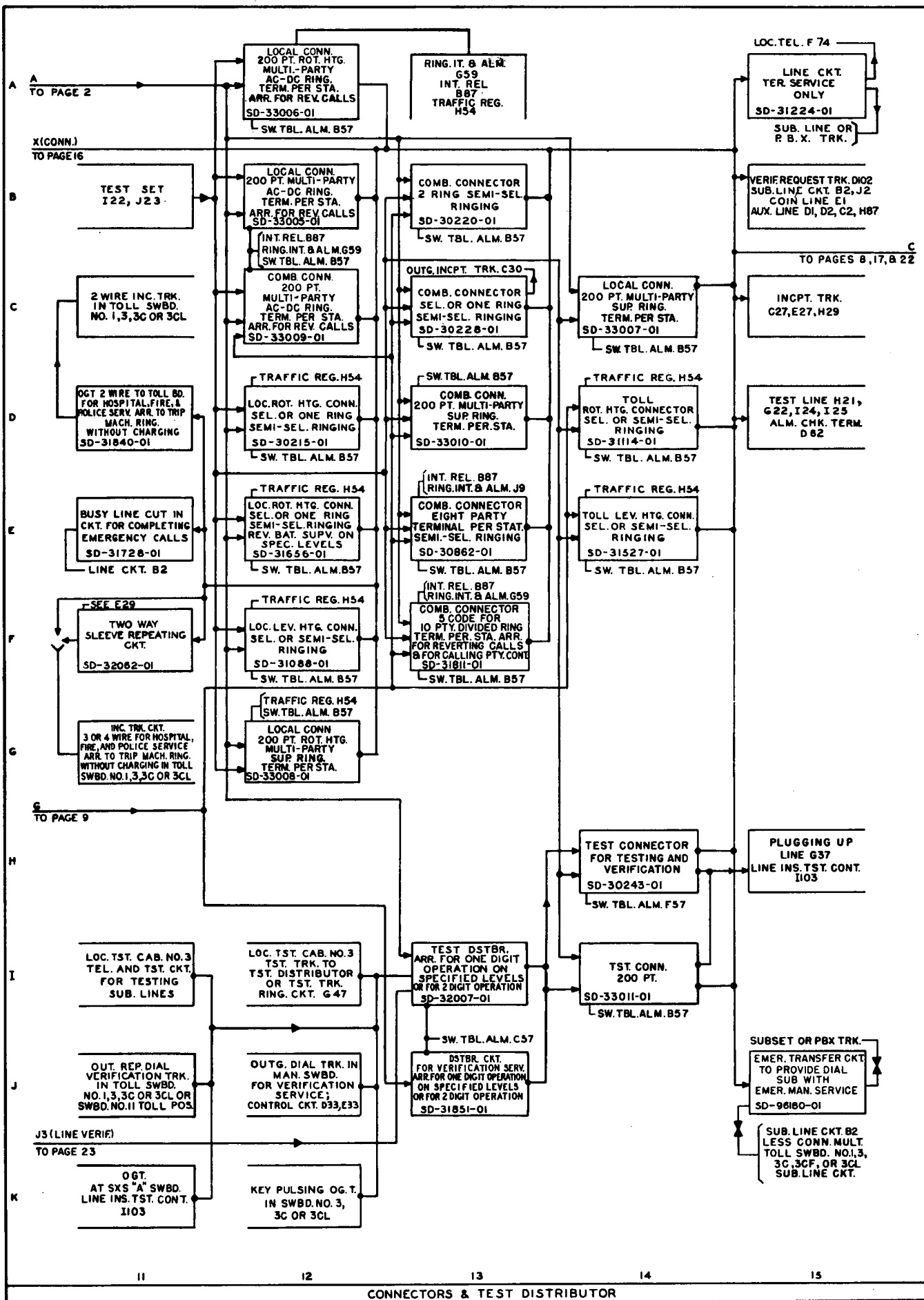
PRINTED IN U.S.A.

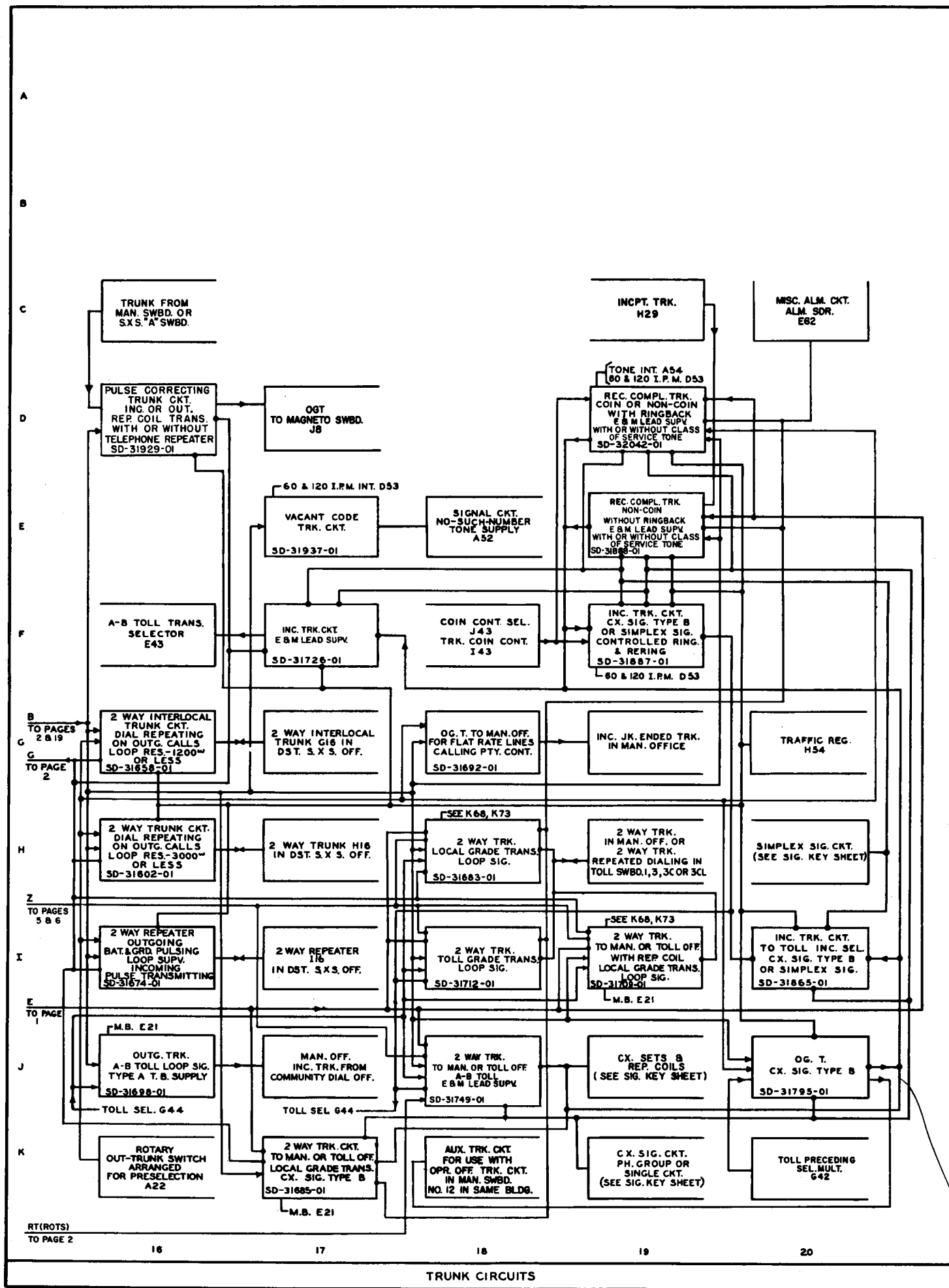
AT&TCO
STANDARD

FOR CURRENT DRAIN DATA SEE SD-31364-02
FOR EXPLANATION OF CONVENTIONS SEE
MASTER KEY SHEET SD-90250-01

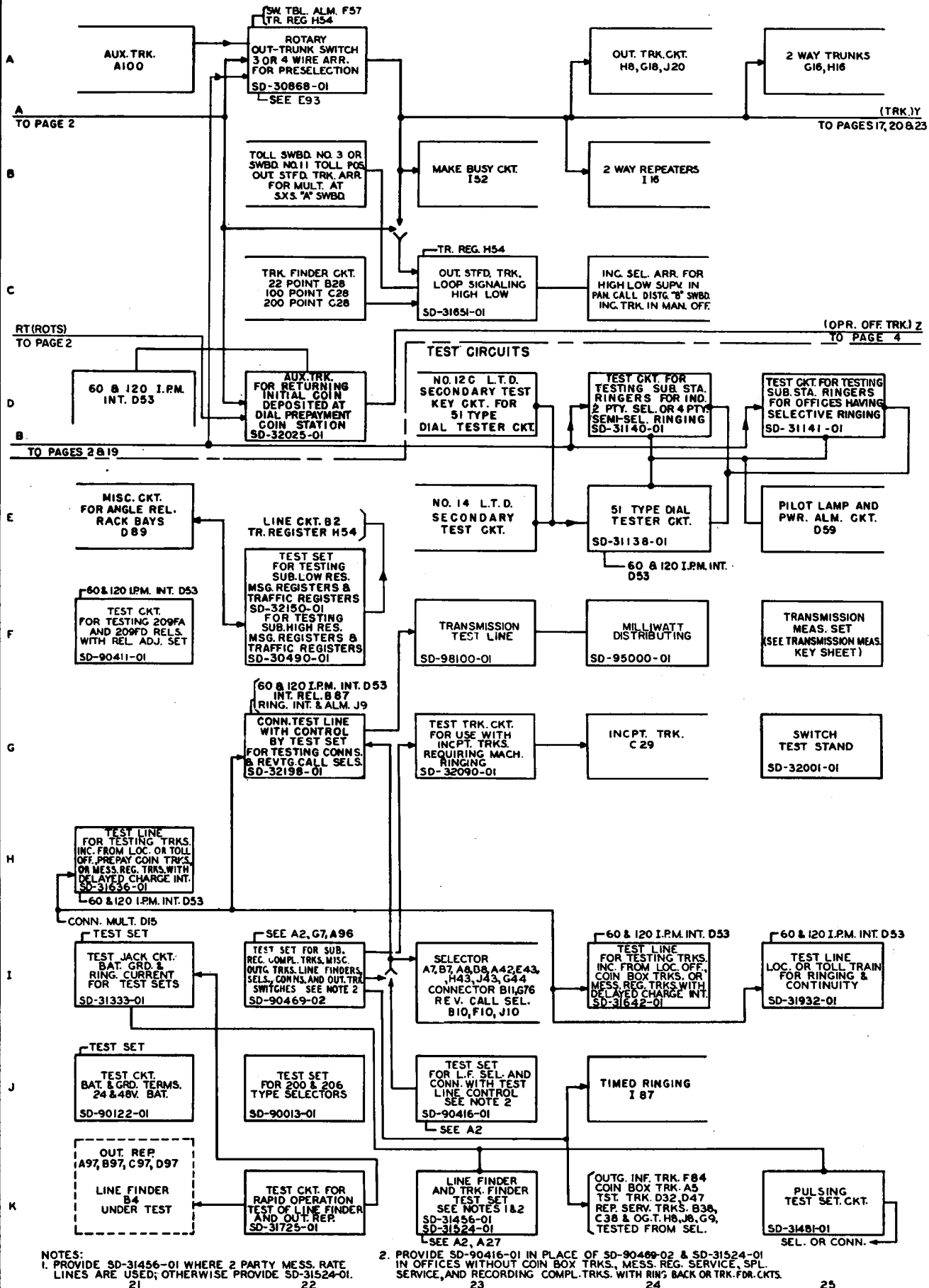
SD-31364-01





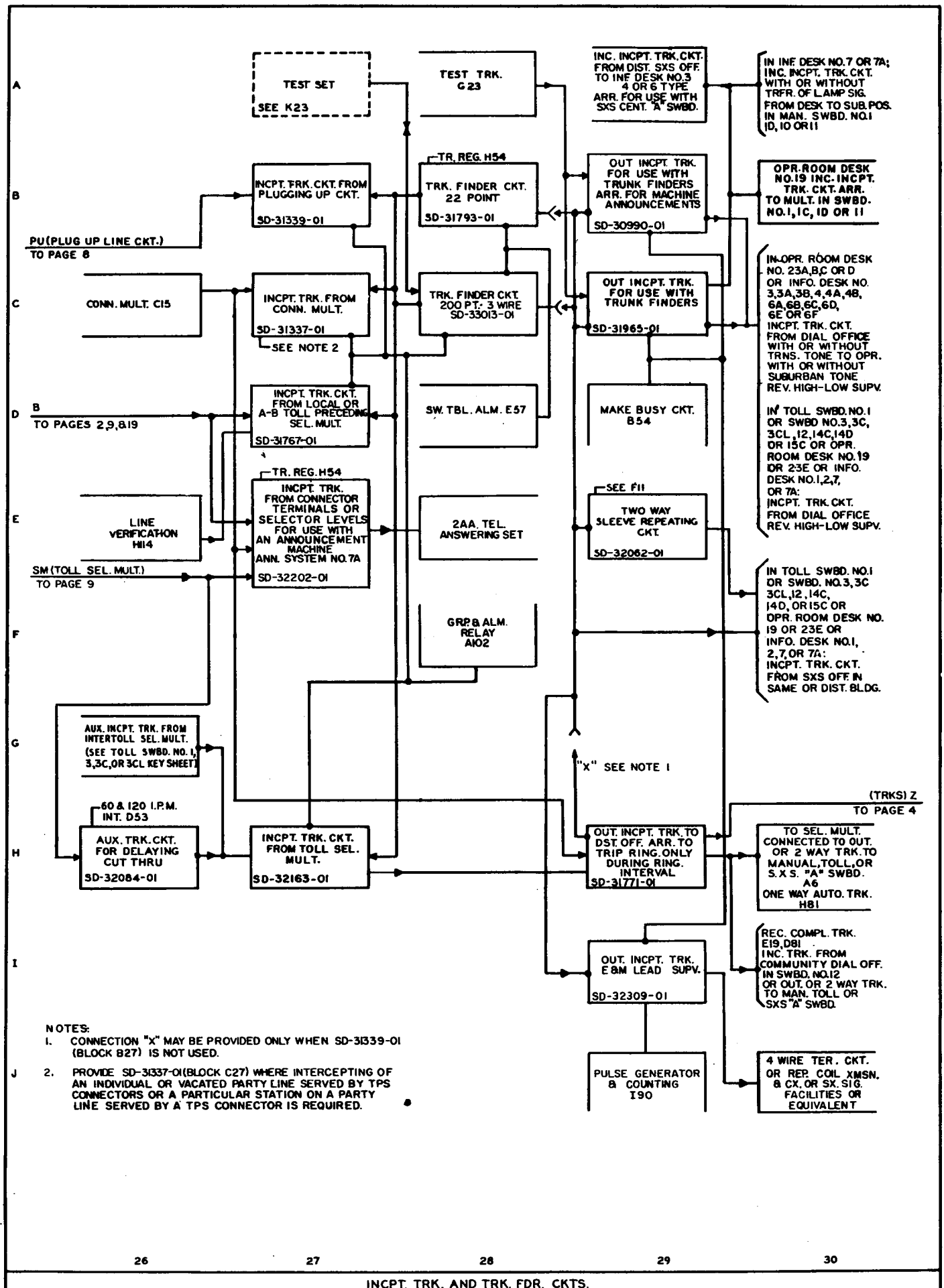


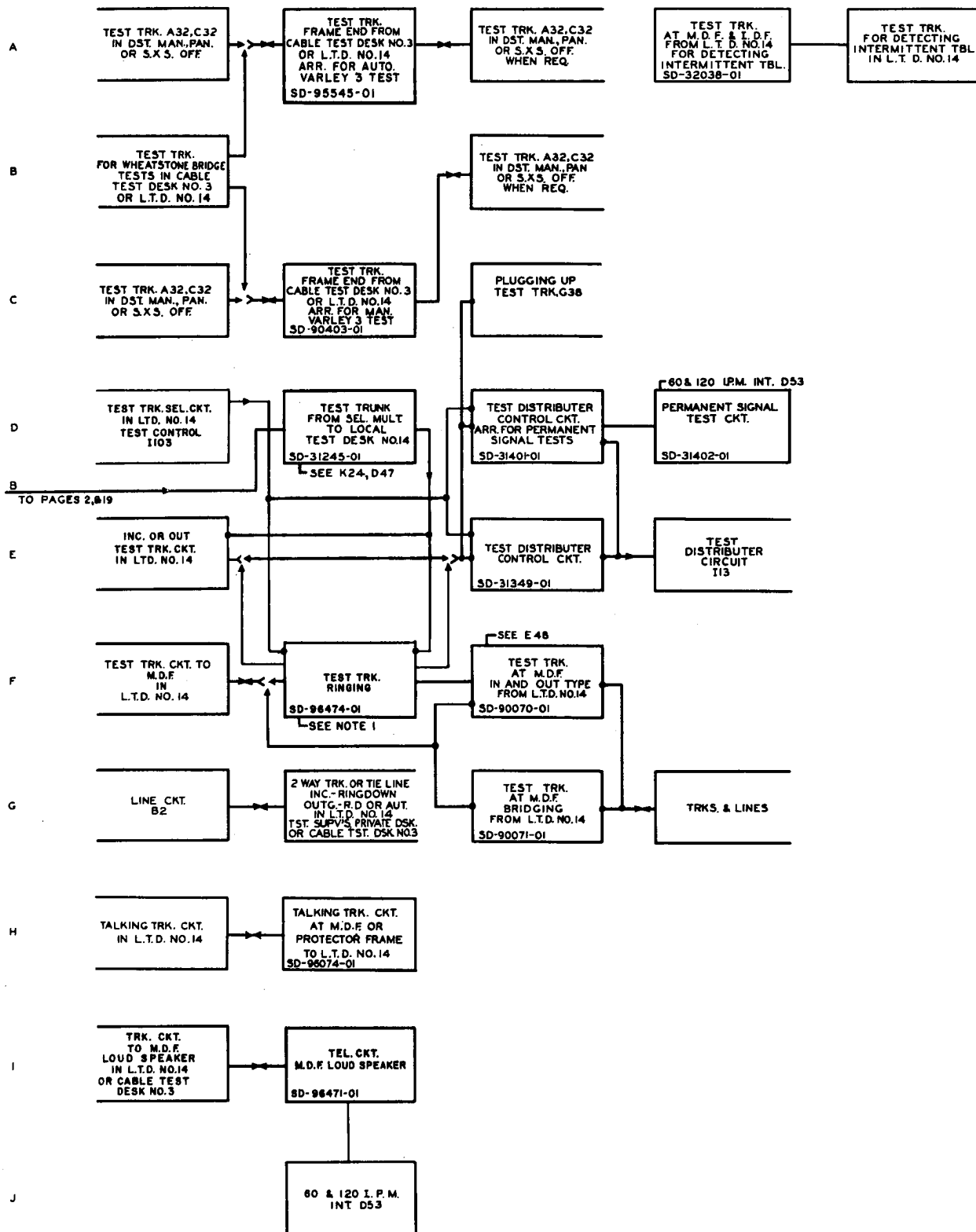
LOCAL SELECTORS & TRUNK CIRCUITS



TEST CIRCUITS, LOCAL SELECTORS & TRUNK CIRCUITS

SD-31364-01- PAGE 5





NOTES:

1. PROVIDE THE TEST TRUNK RINGING CKT. F32 WHEN THE TRUNK CONDUCTOR LOOP EXCEEDS 300 OHMS IN SEMI-SELECTIVE OFFICES OR FULL SELECTIVE OFFICES IN WHICH ALL THE 4 PTY. LINES ARE EQUIPPED WITH TUBE TYPE SETS, AND WHEN THE TRUNK CONDUCTOR LOOP EXCEEDS 200 OHMS IN FULL SELECTIVE OFFICES IN WHICH SOME OF THE LINES HAVE RELAY SETS REGARDLESS OF THE LENGTH OF THE MAX. SUB. LOOP IN THE OFFICE.

31

32

33

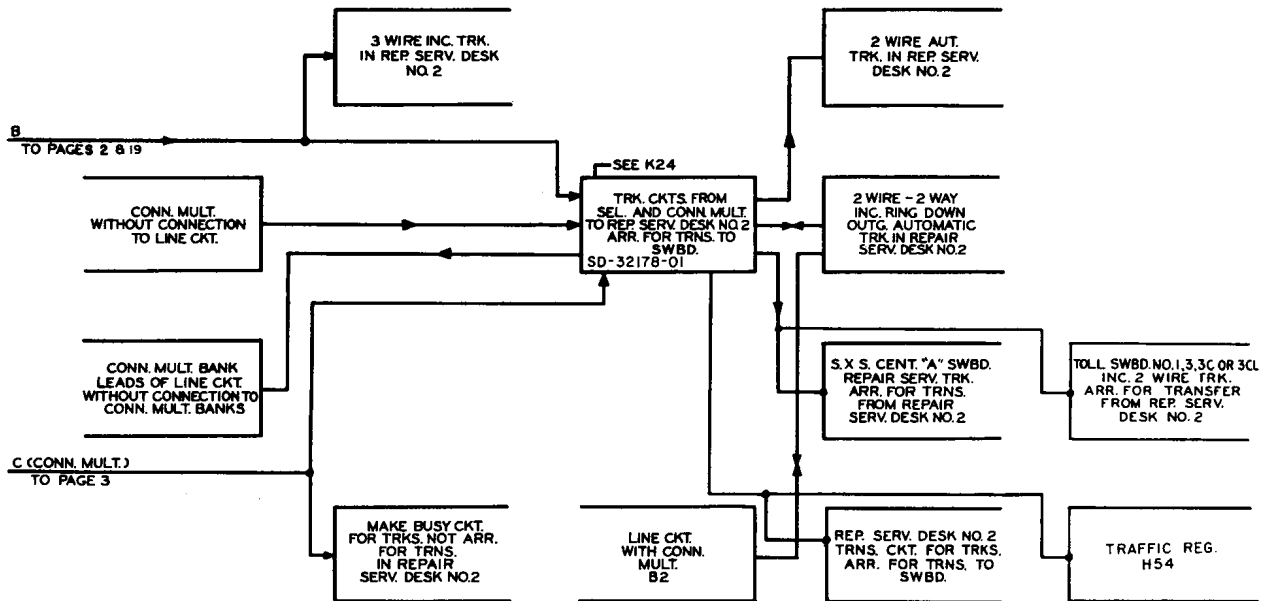
34

35

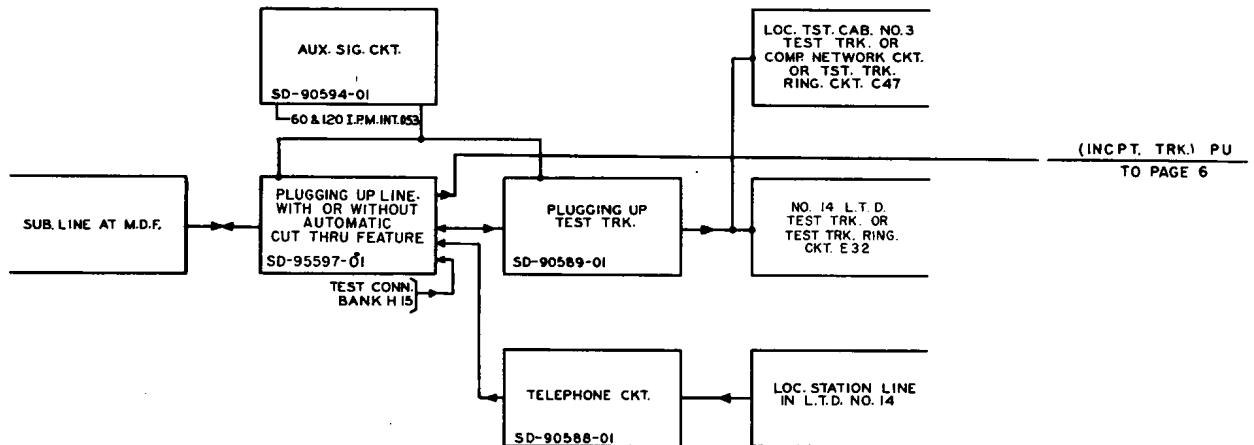
CKTS. CONNECTING WITH LOCAL TEST DESK NO. 14 AND CABLE TEST DESK NO. 3

CIRCUITS CONNECTING WITH REPAIR SERVICE DESK NO. 2

A
B
C
D
E
F
G
H
I
J

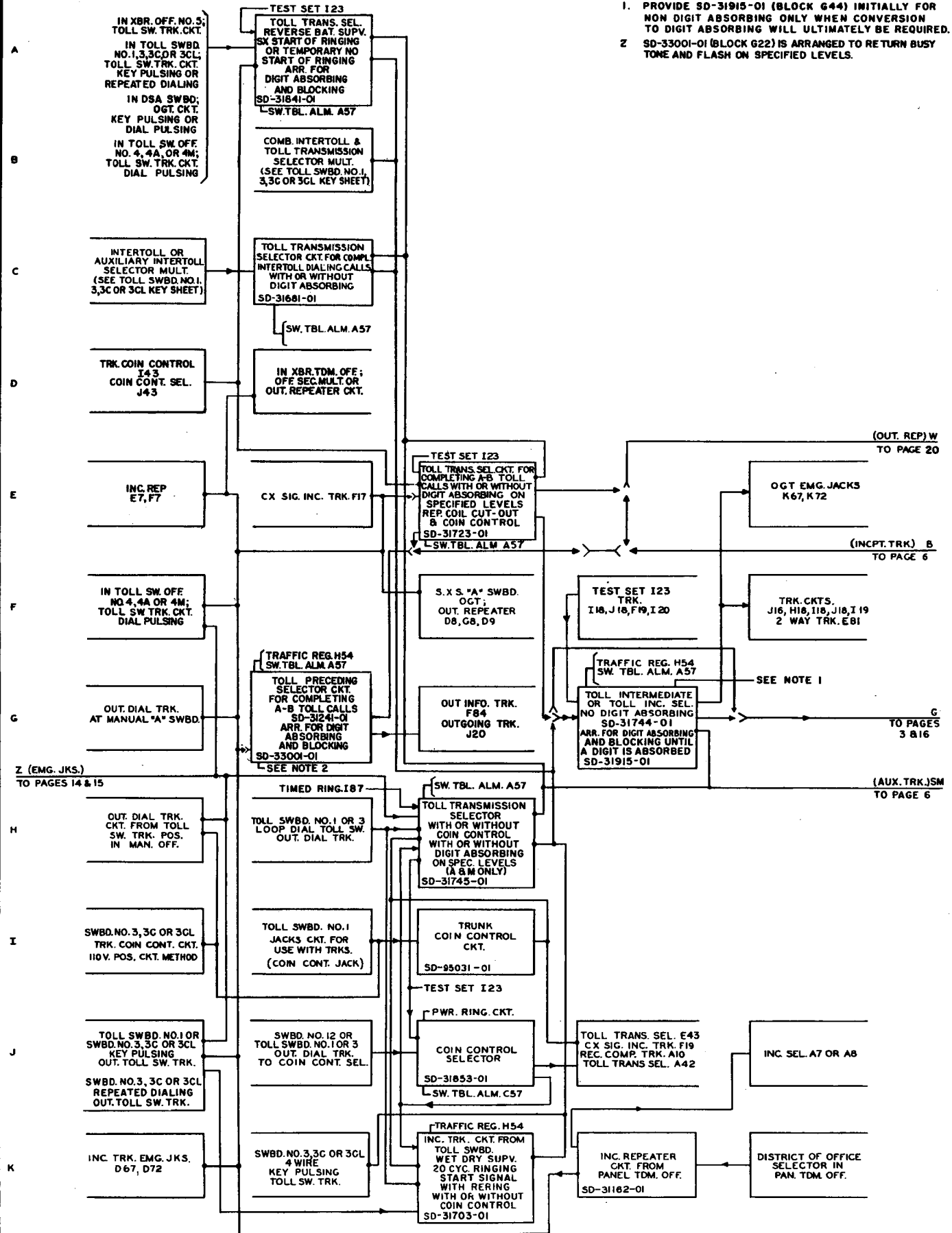


CIRCUITS FOR PLUGGING UP FRAME



NOTES:

1. PROVIDE SD-31915-01 (BLOCK G44) INITIALLY FOR NON DIGIT ABSORBING ONLY WHEN CONVERSION TO DIGIT ABSORBING WILL ULTIMATELY BE REQUIRED.
2. SD-33001-01 (BLOCK G22) IS ARRANGED TO RETURN BUSY TONE AND FLASH ON SPECIFIED LEVELS.



TOLL TRAIN CKTS.

A

B

C

D

E

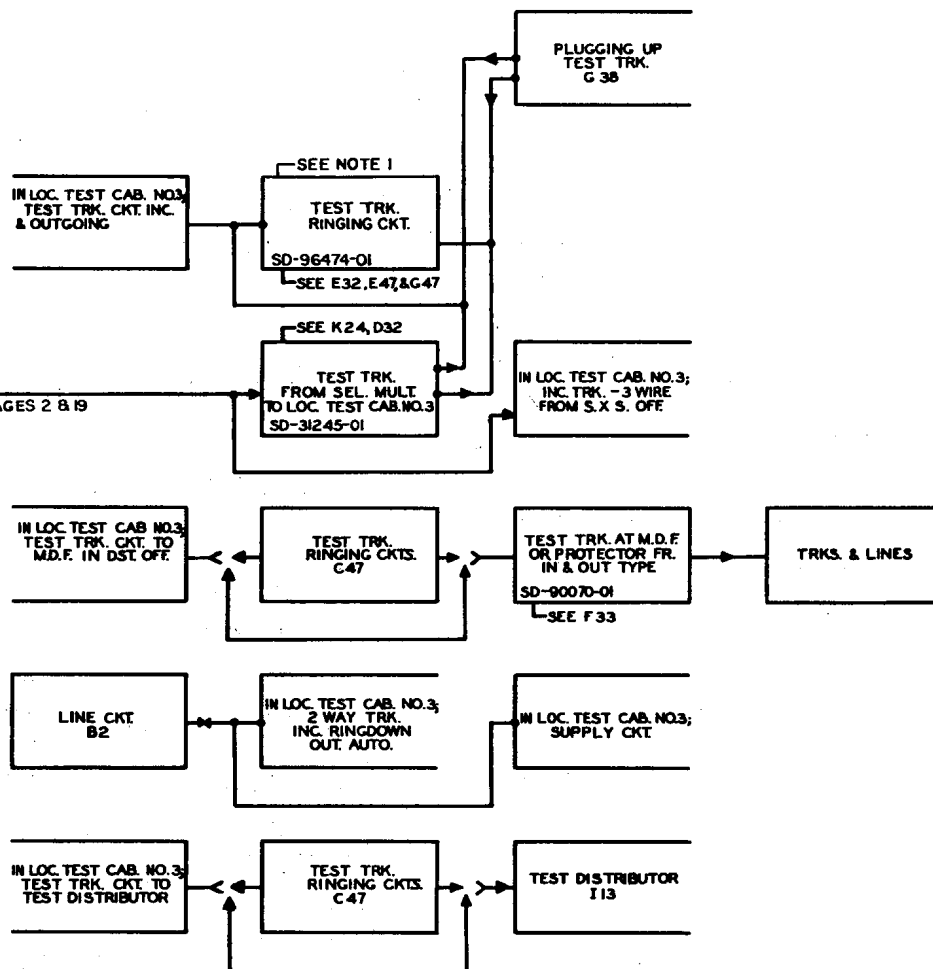
F

G

H

I

J



NOTES:

1. PROVIDE THE TEST TRUNK RINGING CKT. C47 WHEN THE TRUNK CONDUCTOR LOOP EXCEEDS 300 OHMS IN SEMI-SELECTIVE OFFICES OR FULL SELECTIVE OFFICES IN WHICH ALL THE 4PTY. LINES ARE EQUIPPED WITH TUBE TYPE SETS, AND WHEN THE TRUNK CONDUCTOR LOOP EXCEEDS 200 OHMS IN FULL SELECTIVE OFFICES IN WHICH SOME OF THE LINES HAVE RELAY SETS REGARDLESS OF THE LENGTH OF THE MAX. SUB. LOOP IN THE OFFICE.

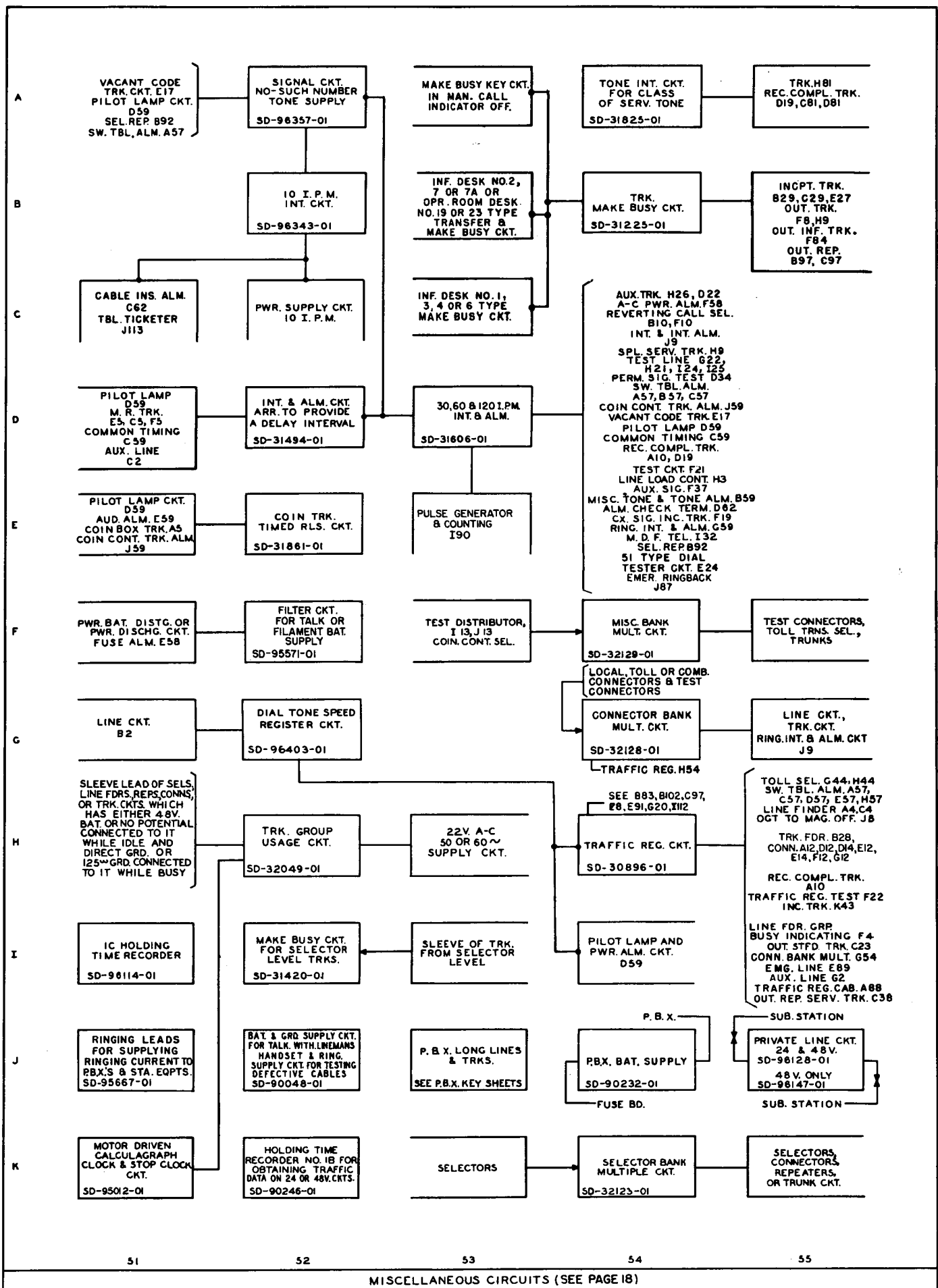
46

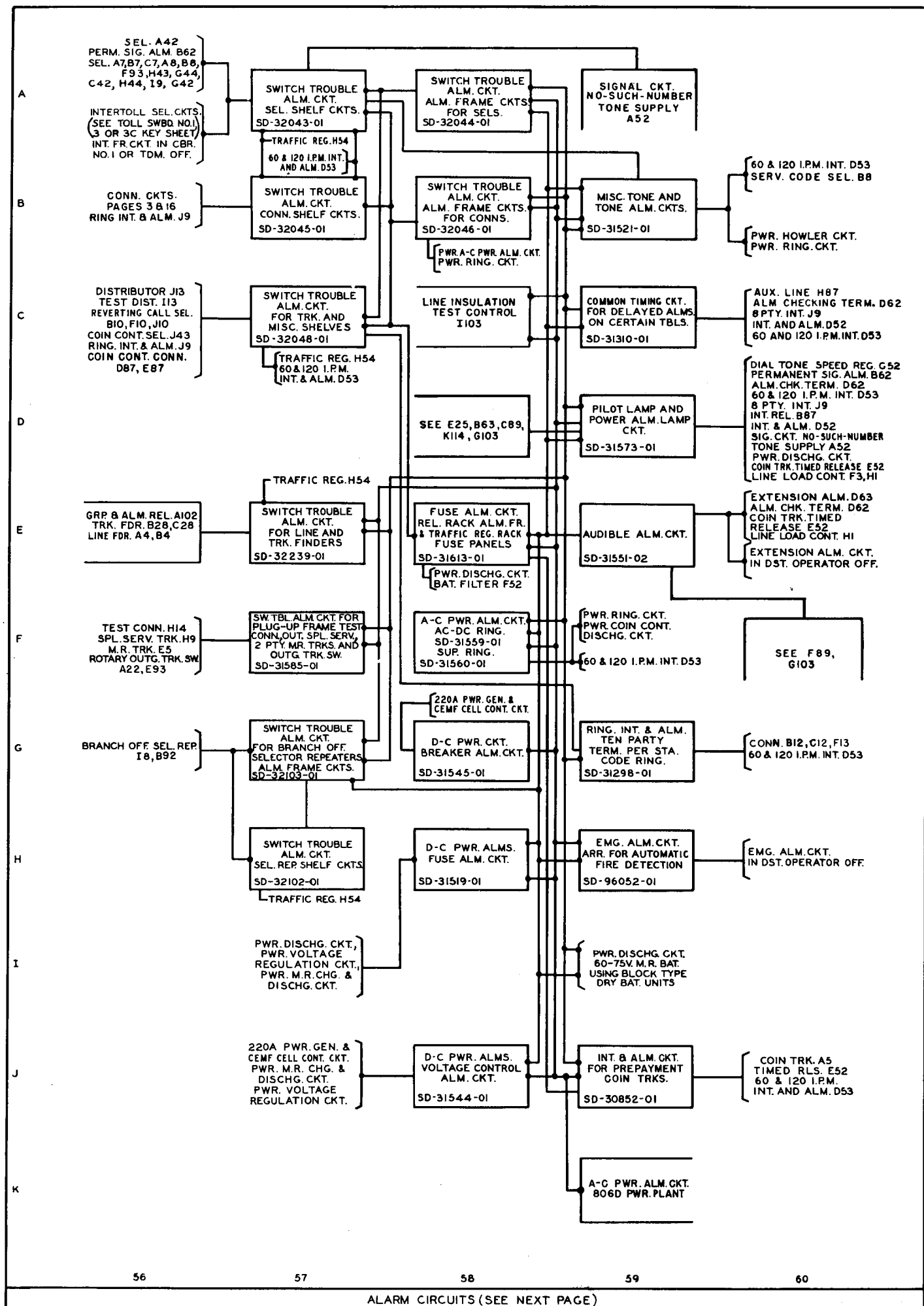
47

48

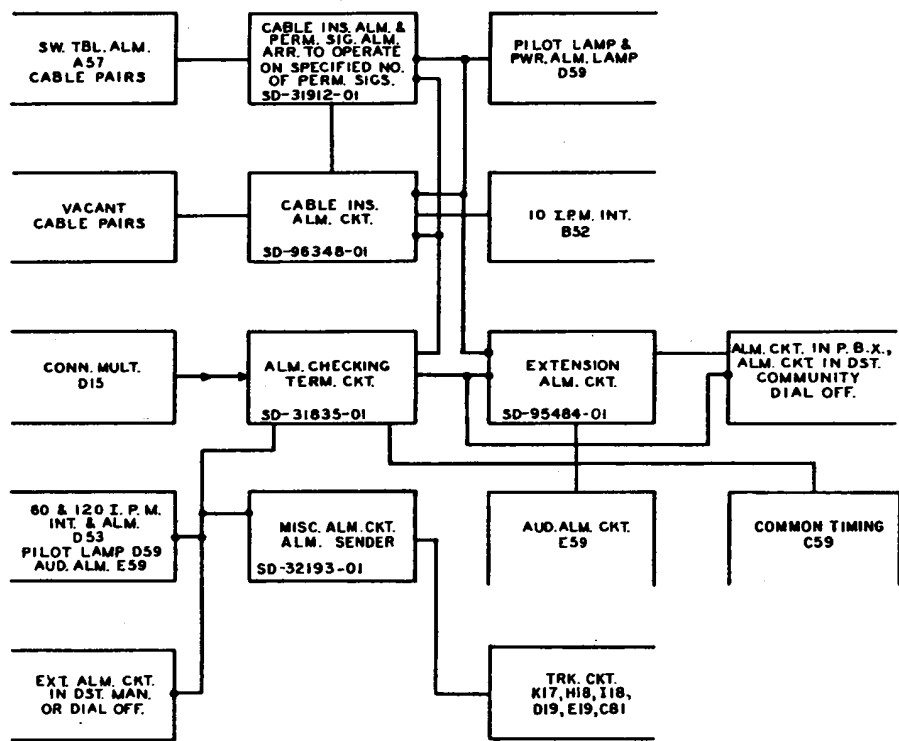
49

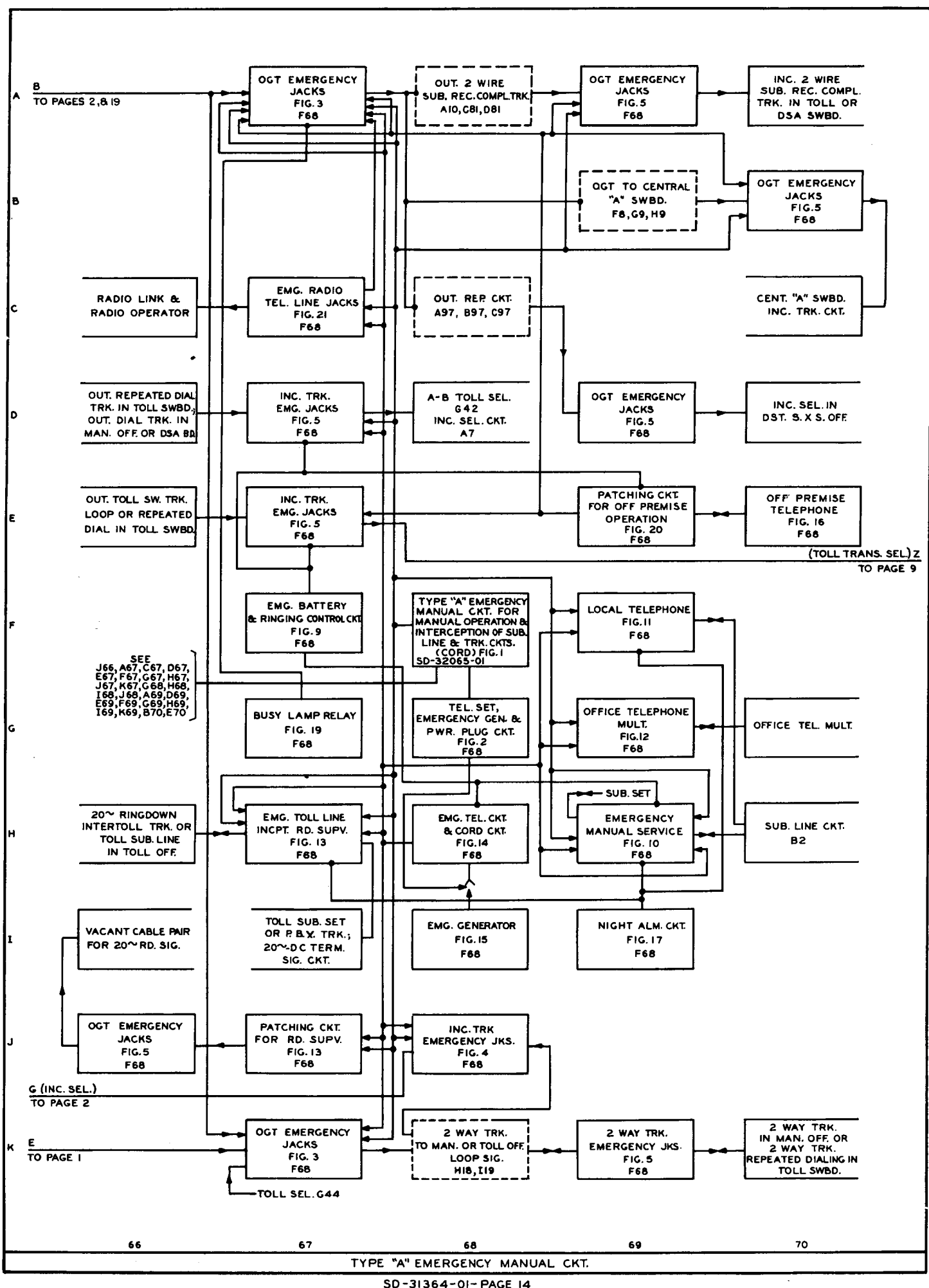
50



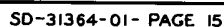


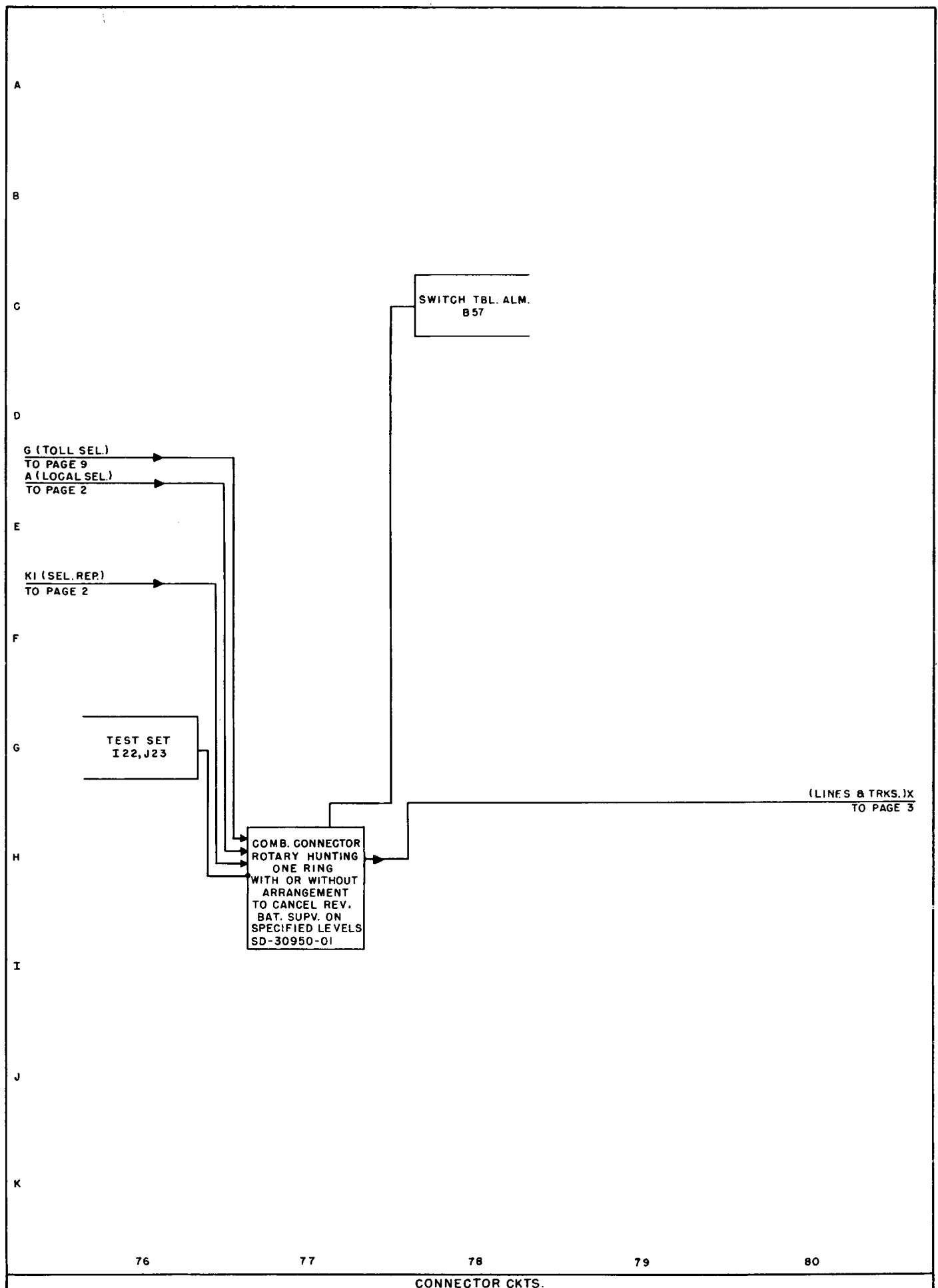
A
B
C
D
E
F
G
H
I
J

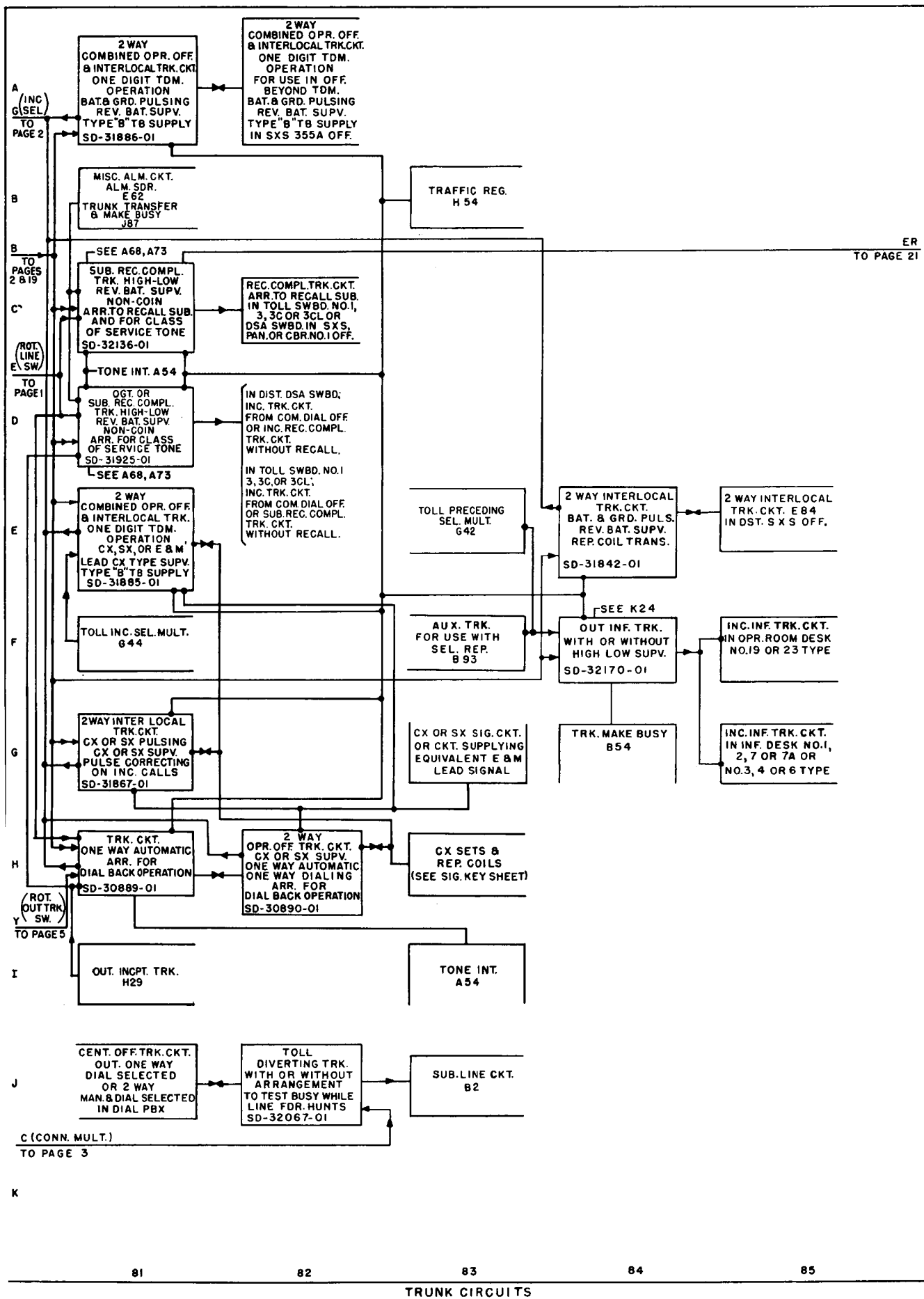


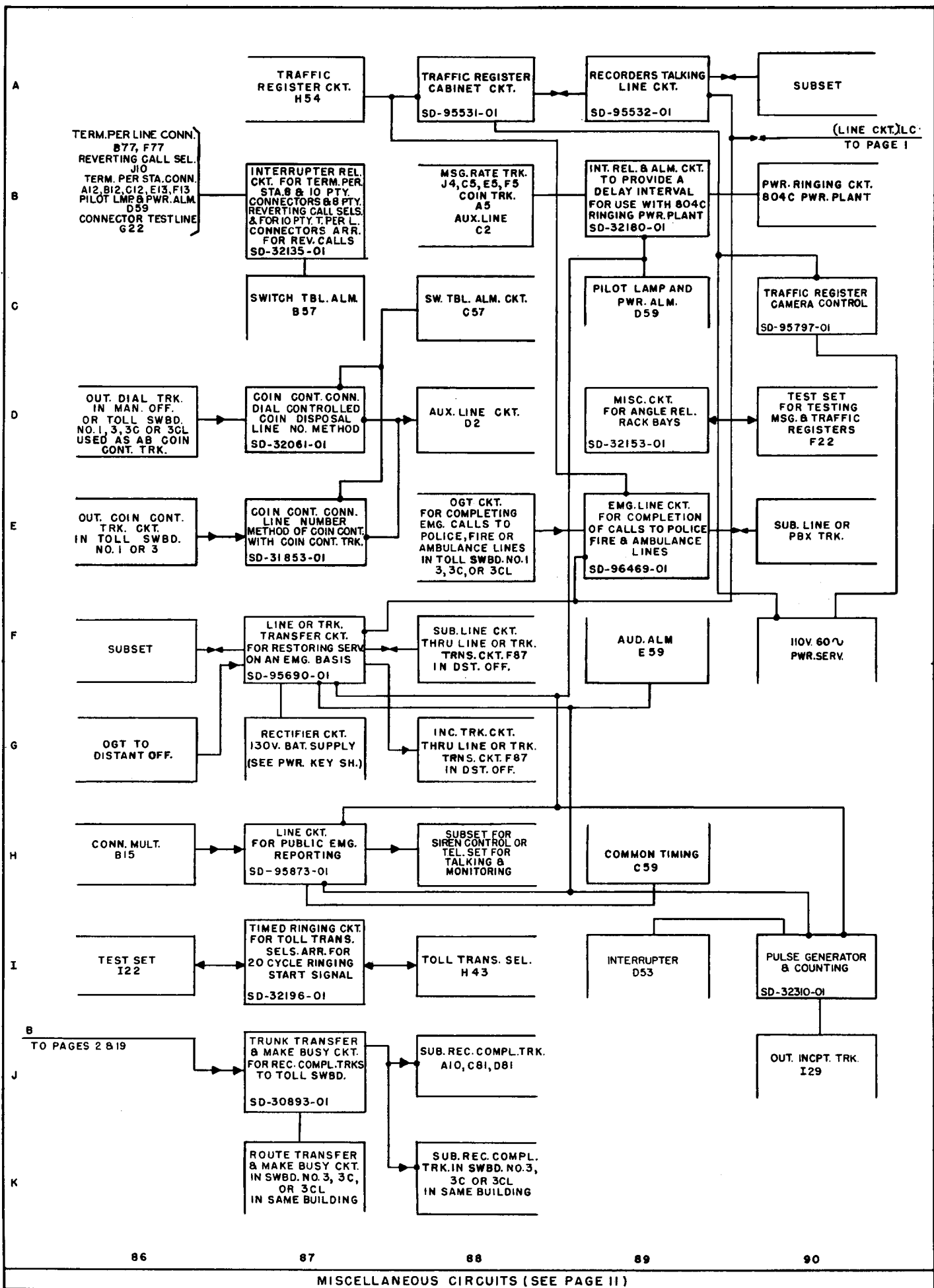


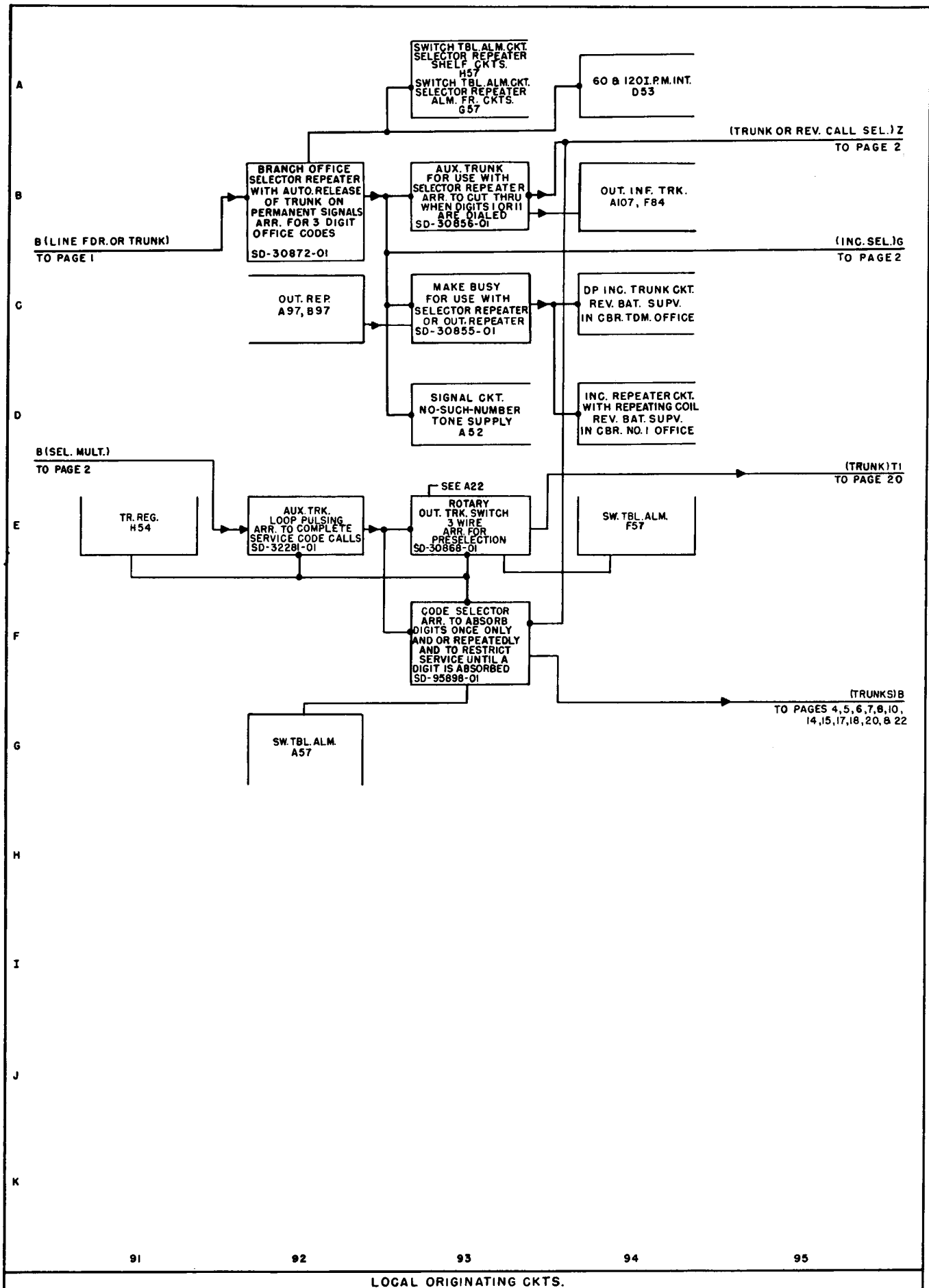
TYPE "A" EMERGENCY MANUAL CKT.

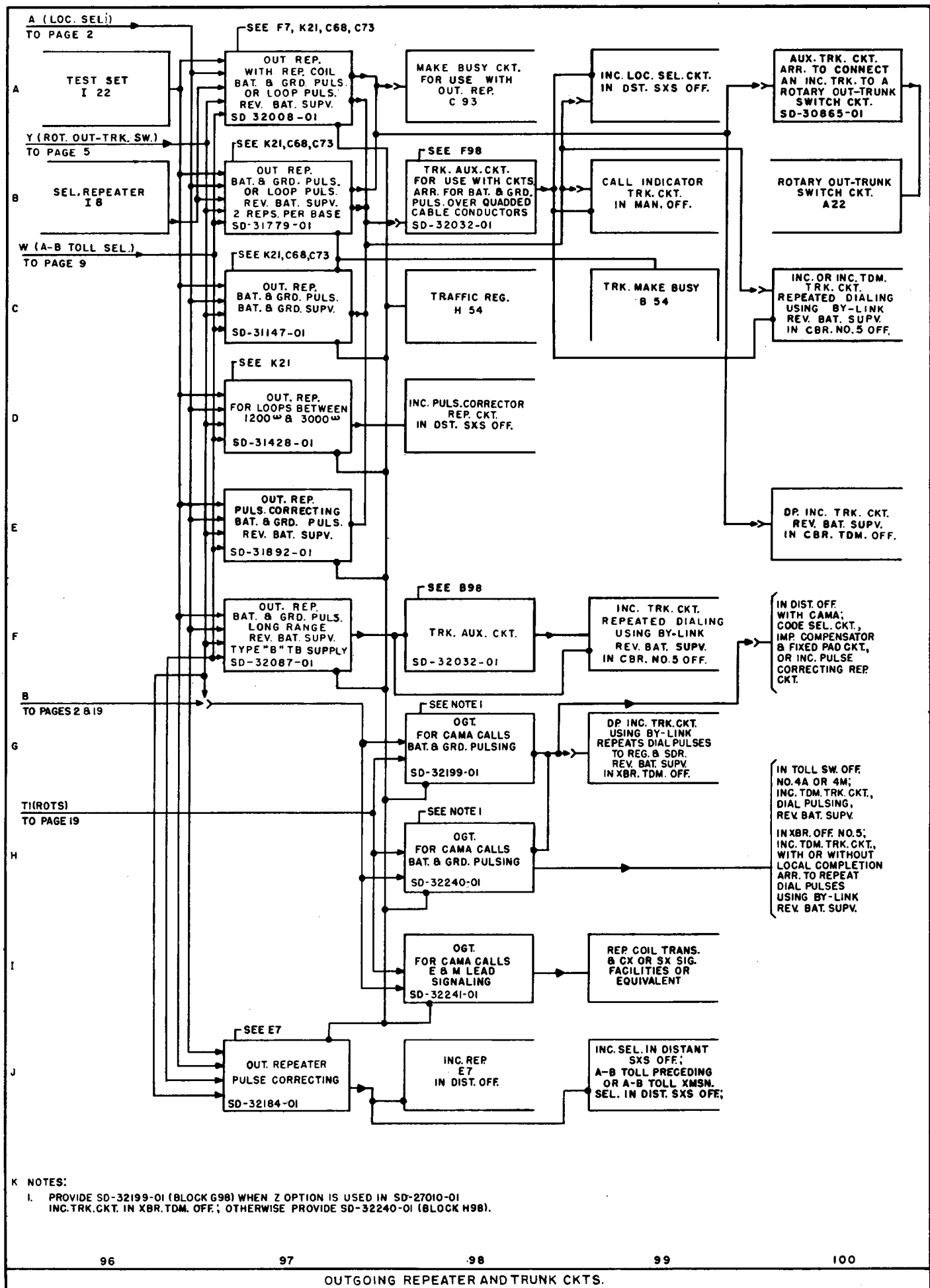


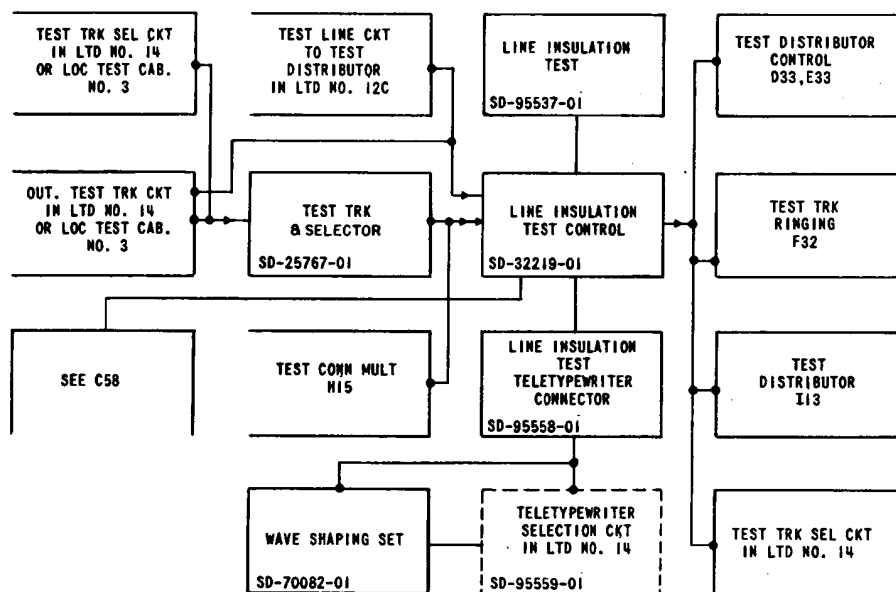
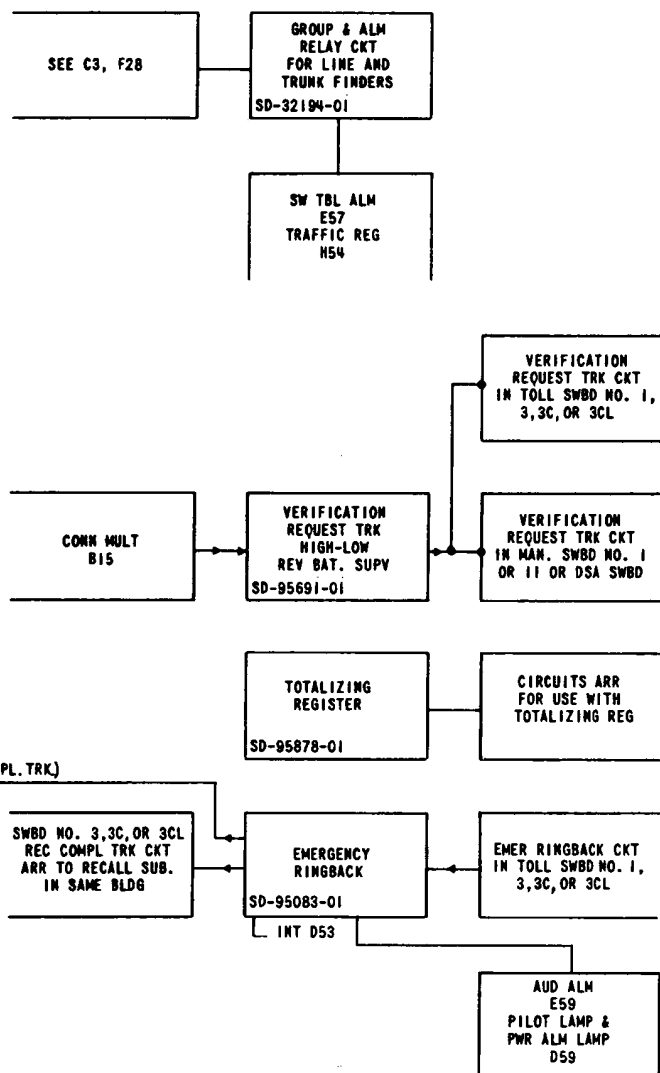












101

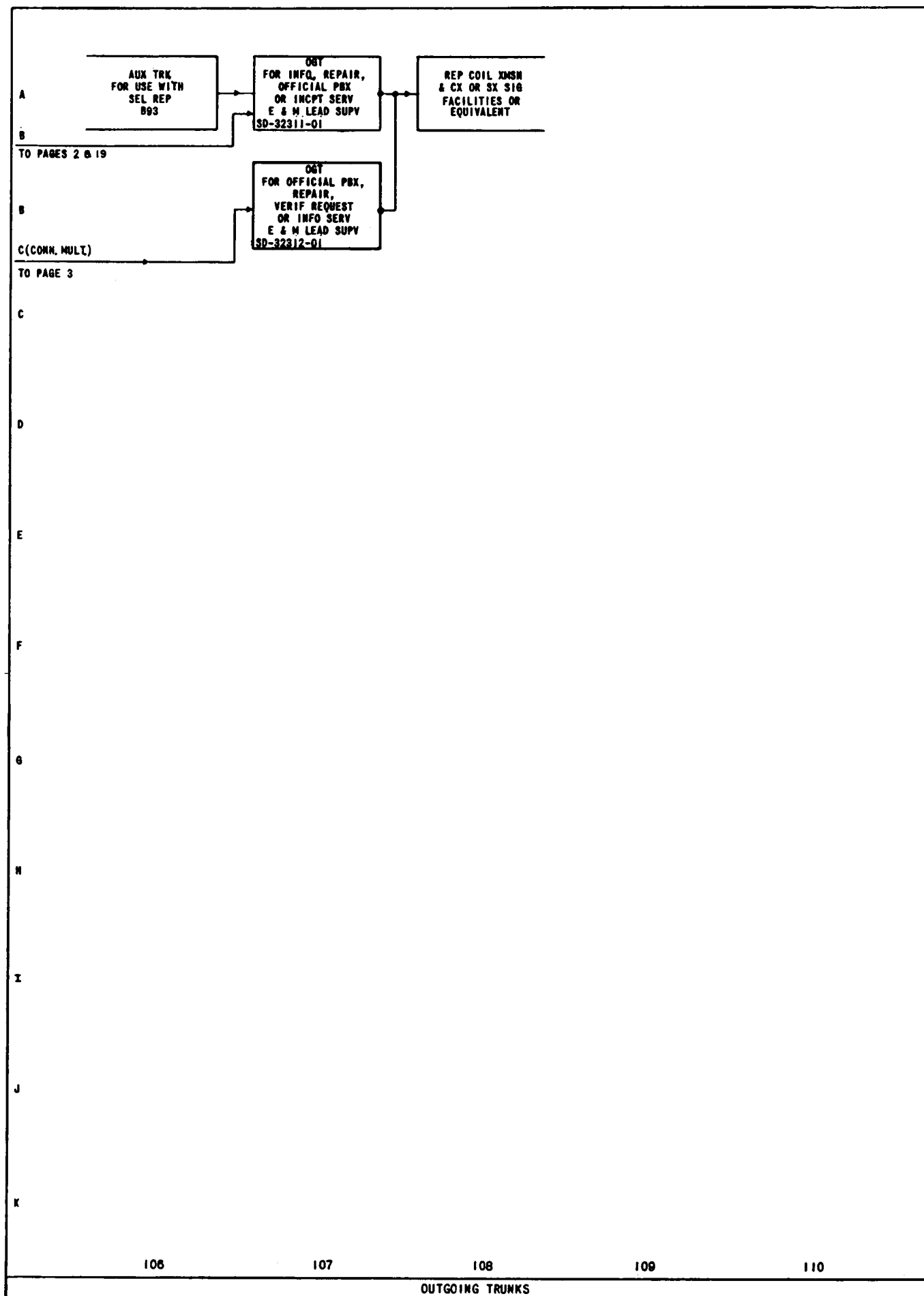
102

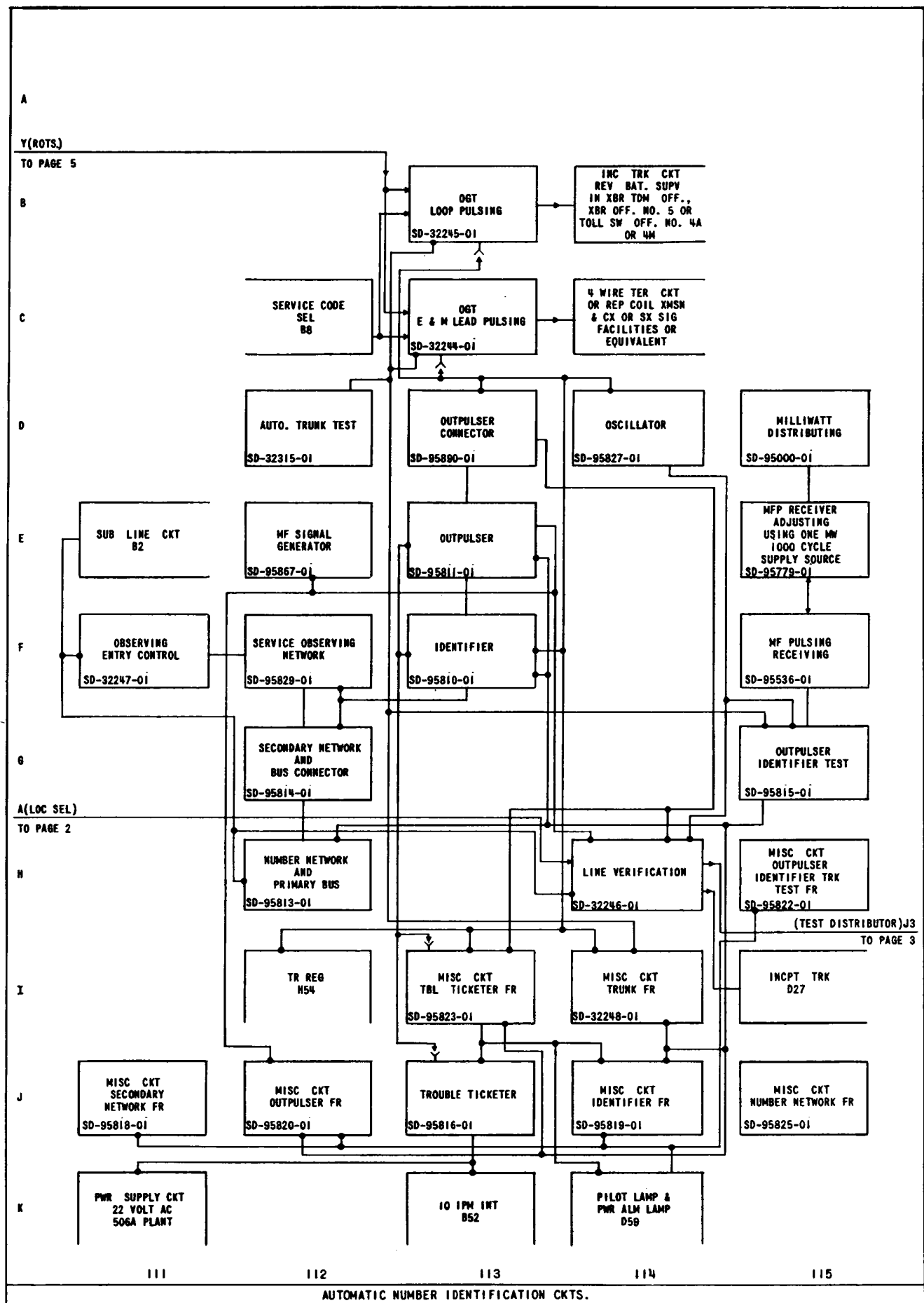
103

104

105

MISCELLANEOUS CIRCUITS





NOTES:

I. FOR LINES WHERE THERE IS NO DC PATH TO GROUND AT THE STATION.

- (A) THE 635 OR 735 OHM RANGE CAN BE OBTAINED IN AC-DC. SUPERIMPOSED 42A, SUPERIMPOSED TUBE, INVERTED 42A OR A MIXTURE OF SUPERIMPOSED TUBE AND INVERTED 42A DISTRICTS. THE 885 OHM RANGE CAN BE OBTAINED ONLY IN AC-DC, SUPERIMPOSED TUBE, INVERTED 42A OR A MIXTURE OF SUPERIMPOSED TUBE AND INVERTED 42A DISTRICTS. THE 1000 OR HIGHER OHM RANGE CAN BE OBTAINED ONLY IN AC-DC OR SUPERIMPOSED TUBE DISTRICTS. FOR RANGES EXCEEDING 635 OHMS IT IS ASSUMED THAT THE INFORMATION SHOWN ON THE DRAWINGS FOR EXTENDED RANGES ARE EMPLOYED.
- (B) VALUES IN THE FOLLOWING TABLES ARE SHOWN IN TERMS OF CONDUCTOR LOOP BETWEEN THE CENTRAL OFFICE LINE CKT. AND THE STATION RESISTANCE. A MAXIMUM OF 115 OHMS IS ALLOWED IN THE STATION RESISTANCE IN CONDUCTOR LOOPS UP TO 1000 OHMS. WHERE EXTERNAL CKT. RESISTANCE IS IN EXCESS OF 1115 OHMS (1000 OHM CONDUCTOR LOOP + 115 OHMS STATION RES.), THE ADDITIONAL EXTERNAL CKT. RESISTANCE OVER 1115 OHMS IS CONSIDERED AS A PART OF THE STATION RESISTANCE UP TO 200 OHMS STATION RESISTANCE. AFTER THE STATION RES. HAS REACHED 200 OHMS, FURTHER INCREASES IN THE EXTERNAL CKT. LOOP WILL BE CONSIDERED AS AVAILABLE FOR INCREASING THE CONDUCTOR LOOP.

I.1 SINGLE CENTER AREAS.

THE SUBSCRIBER CONDUCTOR LOOP RANGE FOR ANY SINGLE OFFICE AREA WITH THE DIFFERENT TYPES OF DIALS AND CENTRAL OFFICE VOLTAGES OF 45-50 AND 48-50 IS AS FOLLOWS; IT IS ASSUMED THAT LEAK "B" IS USED WITH THE 1000 OHM LOOP PULSING TEST AND LEAK "A" WITH THE 1200 AND 1400 OHM LOOP PULSING TESTS AND THAT A SWITCH WILL REQUIRE A 248 TYPE OR THE EQUIVALENT, OR A 222 TYPE MODIFIED WITH A 1:1 RATIO ARMATURE "B" FUNCTIONAL RELAY FOR THE 1400 OHM LOOP PULSING TEST.

LOOP TEST (OHMS)	CENT. OFF. VOLTAGE	SUB. CONDUCTOR LOOP (OHMS)		
		5 OR EARLIER TYPE DIAL	6-TYPE DIAL	7-TYPE DIAL
1000	45-50	635	1000	900
1000	48-50	735	1300	1200
1200	45-50	735	1200	1100
1200	48-50	885	1300	1300
1400	45-50	885	1200	1200
1400	48-50	1000	1300	1300

I.2 MULTI-CENTER AREAS

THE SUBSCRIBER CONDUCTOR LOOP RANGE FOR ANY OFFICE IN A MULTI-OFFICE AREA IS DETERMINED BY THE TYPE OF DIAL USED, THE PULSING TESTS USED FOR MAINTENANCE IN ALL OFFICES REACHED WITHOUT USING PULSE CORRECTING REPEATERS, THE TYPES OF OUTGOING REPEATERS, THE CENTRAL OFFICE BATTERY REGULATION AND IN SOME CASES THE EARTH POTENTIAL BETWEEN OFFICES. THE TABLES FOLLOWING SHOW THE SUB. CONDUCTOR LOOP RANGES OBTAINABLE IN THE ORIGINATING OFFICE WITH 5 OR EARLIER TYPE, 6 OR 7-TYPE DIALS FOR VARIOUS COMBINATIONS OF LOOP TESTS, BATTERY VOLTAGES, AND REPEATERS IN THE ORIGINATING AND TERMINATING OFFICE. IN THE TABLES IT IS ASSUMED LEAK "B" IS USED WITH THE 1000 OHM LOOP PULSING TEST AND LEAK "A" WITH THE 1200 OR 1400 OHM LOOP PULSING TESTS AND THAT A SWITCH WILL REQUIRE A 248 TYPE OR THE EQUIVALENT, OR A 222 TYPE MODIFIED WITH A 1:1 RATIO ARMATURE "B" FUNCTIONAL RELAY FOR THE 1400 OHM LOOP PULSING TEST.

- I.2.1 45 VOLTS IN ORIGINATING OFFICE WITH OUTGOING REPEATERS ADJUSTED TO 44 TO 80 OR 45 TO 80 PERCENT BREAK, AND EARTH POTENTIAL WITH RESPECT TO THE TERMINATING OFFICE NOT EXCEEDING + 20, - 8 VOLTS FOR REPEATERS OF THE BATTERY AND GROUND PULSING TYPE.

ORG. OFF. LOOP TEST (OHMS)	TERMINATING OFF.		ORG. SUB. CONDUCTOR LOOP (OHMS)			SEE NOTE
	LOOP TEST (OHMS)	CENT. OFF. VOLTAGE	5 OR EARLIER TYPE DIAL	6-TYPE DIAL	7-TYPE DIAL	
1000	1000	45-50	635	1000	900	2,3
	1200	OR				
	OR	48-50				
	1400					
1200	1000	45-50	635	1100	900	2,3
	1000	48-50	735	1200	1100	
	1200	45-50	735	1200	1100	3
	OR	OR				
1400	1000	45-50	635	1100	900	2,3
	1200	45-50	735	1200	1100	3
	1000	48-50	735	1200	1200	
	1200	48-50	885	1200	1200	
	1400	45-50	885	1200	1200	3
		OR				
		48-50				

NOTES (CONT.)

1.22 48 VOLTS IN ORIGINATING OFFICE WITH OUTGOING REPEATERS ADJUSTED TO 48 TO 80 OR 45 TO 80 PER CENT BREAK, AND EARTH POTENTIAL WITH RESPECT TO THE TERMINATING OFFICE NOT EXCEEDING +20, -8 VOLTS FOR REPEATERS OF THE BATTERY AND GROUND PULSING TYPE.

ORG. OFF. LOOP TEST (OHMS)	TERMINATING OFF.		ORG. SUB. CONDUCTOR LOOP (OHMS)			SEE NOTE
	LOOP TEST (OHMS)	CENT. OFF. VOLTAGE	5 OR EARLIER TYPE DIAL	6-TYPE DIAL	7-TYPE DIAL	
1000	1000	45-50	635	1000	900	2
	1200	45-50	735	1300	1100	
	1400	45-50	735	1300	1200	
	1000	48-50	735	1300	1200	
	1200 OR 1400					
1200	1000	45-50	635	1100	900	2
	1200	45-50	735	1300	1100	
	1000	48-50	735	1300	1200	
	1400	45-50	885	1300	1300	
	1200 OR 1400	48-50	885	1300	1300	
1400	1000	45-50	635	1100	900	2
	1200	45-50	735	1300	1100	
	1000	48-50	735	1300	1200	
	1200	48-50	885	1300	1300	
	1400	45-50	885	1300	1300	
	1400	48-50	1000	1300	1300	

1.23 45 VOLTS IN ORIGINATING OFFICE WITH BATTERY AND GROUND PULSING TYPE OUTGOING REPEATERS ADJUSTED TO 48 TO 78 PER CENT BREAK AND EARTH POTENTIAL WITH RESPECT TO THE TERMINATING OFFICE NOT EXCEEDING +20, -6 VOLTS. WHEN THE REPEATERS ARE REQUIRED TO OPERATE WITH HIGHER EARTH POTENTIALS NOT EXCEEDING ± 20 VOLTS, THE SUB. LOOP RANGE VALUES ARE THE SAME AS SHOWN IN NOTE 1.21.

ORG. OFF. LOOP TEST (OHMS)	TERMINATING OFF.		ORG. SUB. CONDUCTOR LOOP (OHMS)			SEE NOTE
	LOOP TEST (OHMS)	CENT. OFF. VOLTAGE	5 OR EARLIER TYPE DIAL	6-TYPE DIAL	7-TYPE DIAL	
1000	1000	45-50	635	1000	900	2,3
	1200 OR 1400	OR 48-50				
1200	1000	45-50	735	1200	1100	3
	1200 OR 1400	OR 48-50				
1400	1000	45-50	735	1200	1100	3
	1000	48-50	885	1200	1200	
	1200 OR 1400	45-50 OR 48-50	885	1200	1200	3

RANGE CHART NOTES

NOTES (CONT.)

- 1.24 48 VOLTS IN ORIGINATING OFFICE WITH BATTERY AND GROUND PULSING TYPE OUTGOING REPEATERS ADJUSTED TO 48 TO 78 PER CENT BREAK AND EARTH POTENTIAL WITH RESPECT TO THE TERMINATING OFFICE NOT EXCEEDING ± 20 VOLTS. WHEN THE REPEATERS ARE REQUIRED TO OPERATE WITH HIGHER EARTH POTENTIALS NOT EXCEEDING ± 20 VOLTS, THE SUBSCRIBER LOOP RANGE VALUES ARE THE SAME AS SHOWN IN NOTE 1.22.

ORG. OFF. LOOP TEST (OHMS)	TERMINATING OFF.		ORG. SUB. CONDUCTOR LOOP (OHMS)		
	LOOP TEST (OHMS)	CENT. OFF. VOLTAGE	5 OR EARLIER TYPE DIAL	6-TYPE DIAL	7-TYPE DIAL
1000	1000	45-50	735	1300	1100
	1000	48-50	735	1300	1200
	1200	45-50	735	1300	1200
	OR	OR			
	1400	48-50			
1200	1000	45-50	735	1300	1100
	1000	48-50	885	1300	1300
	1200	45-50	885	1300	1300
	OR	OR			
	1400	48-50			
1400	1000	45-50	735	1300	1000
	1000	48-50	885	1300	1300
	1200	45-50	885	1300	1300
	1400	45-50	1000	1300	1300
	1200	48-50	1000	1300	1300
	OR	OR			
	1400				

1.25 PULSE CORRECTING REPEATERS

IF THE OUTGOING REPEATER IS A PULSE CORRECTING TYPE OR IF AN INCOMING REPEATER OF THE PULSE CORRECTING TYPE IS USED AT THE TERMINATING OFFICE, THE ORIGINATING SUBSCRIBER PULSING LOOP RANGES ARE THE SAME AS THOSE LISTED IN NOTE 1.1 FOR SINGLE CENTER AREAS.

2. A SWITCH WHICH JUST PASSES THE 1000 OHM LOOP MAY FAIL AT 45 VOLTS ON 635 OHM LOOPS, WHEN USING A 5 OR EARLIER TYPE DIAL.
3. RANGES SHOWN FOR 45-50 VOLTS IN BOTH ORIGINATING AND TERMINATING OFFICES ARE BASED ON THE ASSUMPTION THAT IF THE VOLTAGE DROPS TO 45 VOLTS IN ONE OFFICE, THE VOLTAGE IN THE OTHER OFFICE WILL BE 48-50 VOLTS AT THE EQUIPMENT.
4. FOR LINES HAVING A DC PATH TO GROUND AT THE STATION

4.1 COIN AND 2 PARTY LINES

VALUES ARE SHOWN IN TERMS OF CONDUCTOR LOOP BETWEEN THE CENTRAL OFFICE LINE CKT. AND THE STATION RESISTANCE ALLOWING FOR A MAXIMUM OF 115 OHMS IN ALL CASES EXCEPT FOR THE 191 COIN COLLECTOR, FOR WHICH A MAXIMUM OF 215 OHMS IS ALLOWED.

4.11 DIAL COIN LINES IN A 635 OHM RANGE OFFICE

THE EARTH POTENTIAL LIMITS SHALL NOT EXCEED $-10V$. AND $+12V$. THE CONDUCTOR LOOP SHALL NOT EXCEED THE VALUE OBTAINED FROM THE FOLLOWING FORMULA AND IN NO CASE SHALL THIS VALUE EXCEED 635 OHMS. THE VALUE 1865 ASSUMES THE USE OF THE 12L OR 13L RESISTANCE LAMPS IN THE COIN CONTROL CIRCUITS. WHERE THE 12E OR 13E RESISTANCE LAMPS ARE USED IN THE COIN CONTROL CKTS. USE THE VALUE 2065 INSTEAD OF 1865.

$$\text{CONDUCTOR LOOP (OHMS)} = 28 (V - E.P.) - 1865$$

WHERE V = COIN CONTROL VOLTAGE
E.P. = $\pm$ OR - EARTH POTENTIAL

4.12 DIAL COIN LINES IN A 735 OHM RANGE OFFICE

THE EARTH POTENTIAL LIMITS SHALL NOT EXCEED ± 10 VOLTS. THE CENTRAL OFFICE VOLTAGE LIMITS SHALL BE 47.5 TO 50 VOLTS. THE CONDUCTOR LOOP SHALL BE OBTAINED FROM THE FORMULA IN NOTE 4.11 AND IN NO CASE SHALL THIS VALUE EXCEED 735 OHMS.

4.13 DIAL COIN LINES IN A 885, 1000 OR OVER 1000 OHM RANGE OFFICE

THE EARTH POTENTIAL LIMITS SHALL NOT EXCEED ± 6 VOLTS. THE CENTRAL OFFICE VOLTAGE LIMITS SHALL BE 47.5 TO 50 VOLTS. THE CONDUCTOR LOOP SHALL BE OBTAINED FROM THE FORMULA IN NOTE 4.11 AND IN NO CASE SHALL THIS VALUE EXCEED 885 OHMS.

4.14 MANUAL COIN LINES

THE EARTH POTENTIAL LIMITS SHALL NOT EXCEED ± 20 VOLTS. THE CONDUCTOR LOOP SHALL BE OBTAINED FROM THE FORMULA IN NOTE 4.11 BUT IN NO CASE SHALL THIS VALUE EXCEED THE VALUE BELOW FOR THE TYPE OF DISTRICT AND OHM RANGE OFFICE.

TYPE OF DISTRICT	CONDUCTOR LOOP (OHMS)	OHM RANGE OFFICE
SUP. 42A	785	635 OR 735
AC-DC	915	635, 735 OR 885
INVERTED 42A & TUBE	925	635, 735 OR 885
AC-DC OR TUBE	1000	1000
AC-DC OR TUBE	1200	1200
AC-DC OR TUBE	1300	1300

NOTES (CONT.)

4.15 2 PARTY MESSAGE RATE LINES

THE EARTH POTENTIAL LIMITS SHALL NOT EXCEED +6, -16 VOLTS. THE CONDUCTOR LOOP (OHMS) WITH THE DIFFERENT LINE RELAYS AND CENTRAL OFFICE VOLTAGES OF 45-50 AND 48-50 VOLTS IS AS FOLLOWS; IN NO CASE SHALL THE VALUE EXCEED THE OHM RANGE OFFICE.

R913, R1316 AND R1885 LINE RELAYS			
45V.		48V.	
EARTH POTENTIAL		EARTH POTENTIAL	
0	+6	0	+6
1135	1100	1260	1200

EA5 LINE RELAY

45V.		48V.	
EARTH POTENTIAL		EARTH POTENTIAL	
0	+6	0	+6
1060	1000	1175	1100

4.16 2 PARTY FLAT RATE FOR AUTOMATIC TICKETING

THE EARTH POTENTIAL LIMITS SHALL NOT EXCEED +6, -20 VOLTS. THE CONDUCTOR LOOP (OHMS) WITH THE DIFFERENT LINE RELAYS AND CENTRAL OFFICE VOLTAGES OF 45-50 AND 48-50 VOLTS IS AS FOLLOWS; IN NO CASE SHALL THE VALUE EXCEED THE OHM RANGE OFFICE.

<u>R913, R1316 AND R1885 LINE RELAYS</u>				
<u>TYPE TELEPHONE SET</u>	<u>45V.</u>		<u>48V.</u>	
	<u>EARTH POTENTIAL</u>		<u>EARTH POTENTIAL</u>	
	<u>0</u>	<u>+6</u>	<u>0</u>	<u>+6</u>
500	1200	1190	1300	1300
OTHER THAN 500	1200	1200	1300	1300

EA5 LINE RELAY

TYPE TELEPHONE SET	45V.		48V.	
	EARTH POTENTIAL		EARTH POTENTIAL	
	0	+6	0	+6
500	1180	1140	1300	1270
OTHER THAN 500	1200	1180	1300	1300

5.

6. ALL INTEROFFICE CONDUCTOR LOOP VALUES SHOWN ON THE RANGE CHART INCLUDE THE RESISTANCE OF THE OUTSIDE CABLING, THE CENTRAL OFFICE WIRING AND THE HEAT COILS. THE RESISTANCE OF THE CENTRAL OFFICE APPARATUS IS NOT INCLUDED. WHERE DIFFERENT CODED REP. COILS ARE IN A CKT, THE REP. COIL WITH THE HIGHEST WINDING RES. VALUES WAS CHOSEN IN ESTIMATING THE RANGE; USE OF REP. COIL WITH LOWER WDG. RES. VALUES INCREASES THE ESTIMATED RANGE BY THE DIFFERENCE IN THE RES. VALUES.

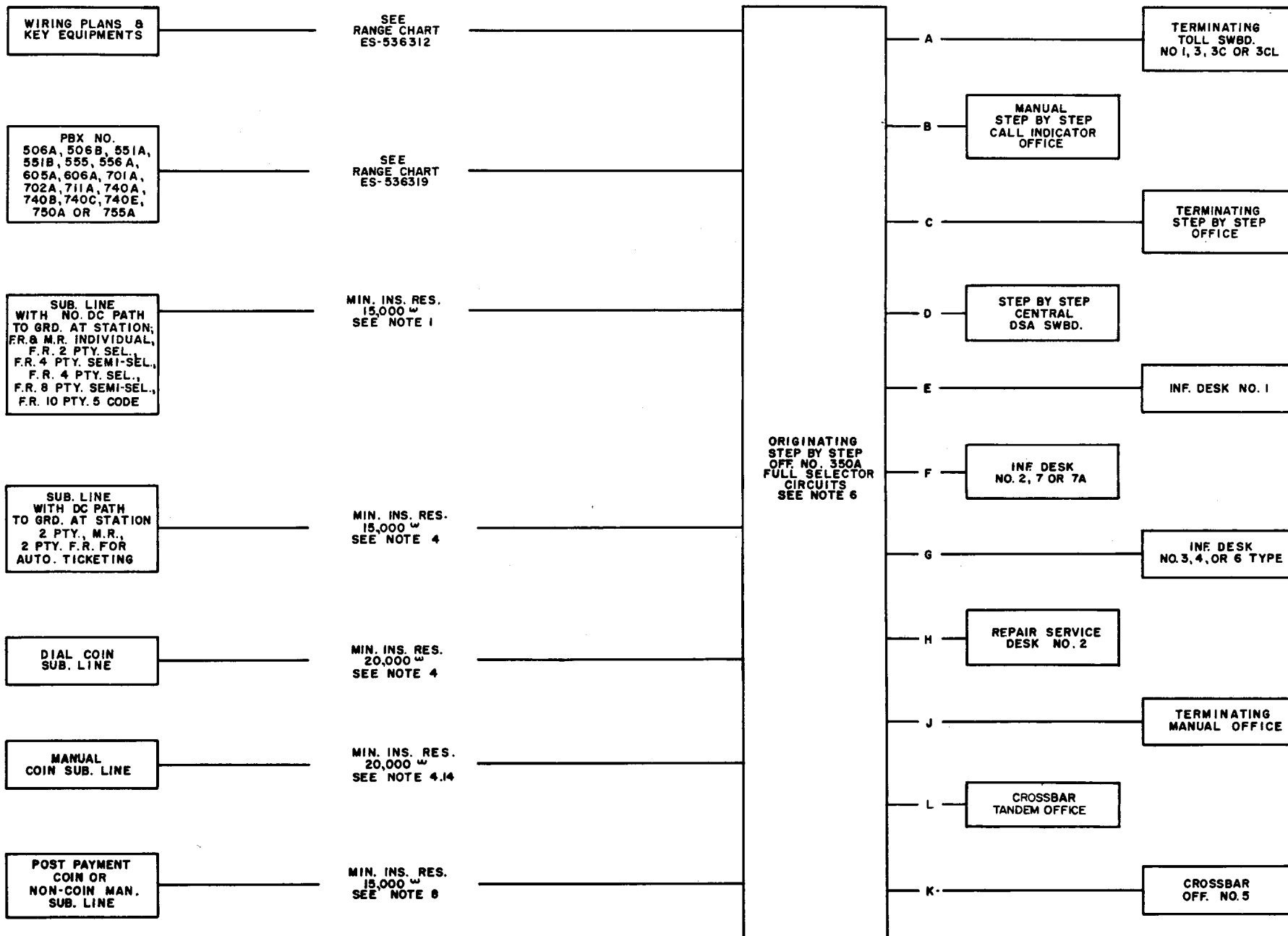
7. WHERE THE ENTIRE LENGTH OF THE CABLE IS 19 GAUGE, THE MAX. MILES OF CABLE IS 32; IN ALL OTHER CASES THE MAX. MILES OF CABLE IS 24.

8. THE CONDUCTOR LOOP SHALL NOT EXCEED THE VALUE BELOW FOR THE TYPE OF DISTRICT AND OHM RANGE OFFICE.

TYPE OF DISTRICT	CONDUCTOR LOOP (OHMS)	OHM RANGE OFFICE
SUP. 42A	785	635 OR 735
AC-DC	915	635, 735 OR 885
INVERTED 42A & TUBE	925	635, 735 OR 835
AC-DC OR TUBE	1000	1000
AC-DC OR TUBE	1200	1200
AC-DC OR TUBE	1300	1300

9. THIS RANGE SHALL NOT INCLUDE MORE THAN 30 MILES OF CABLE.

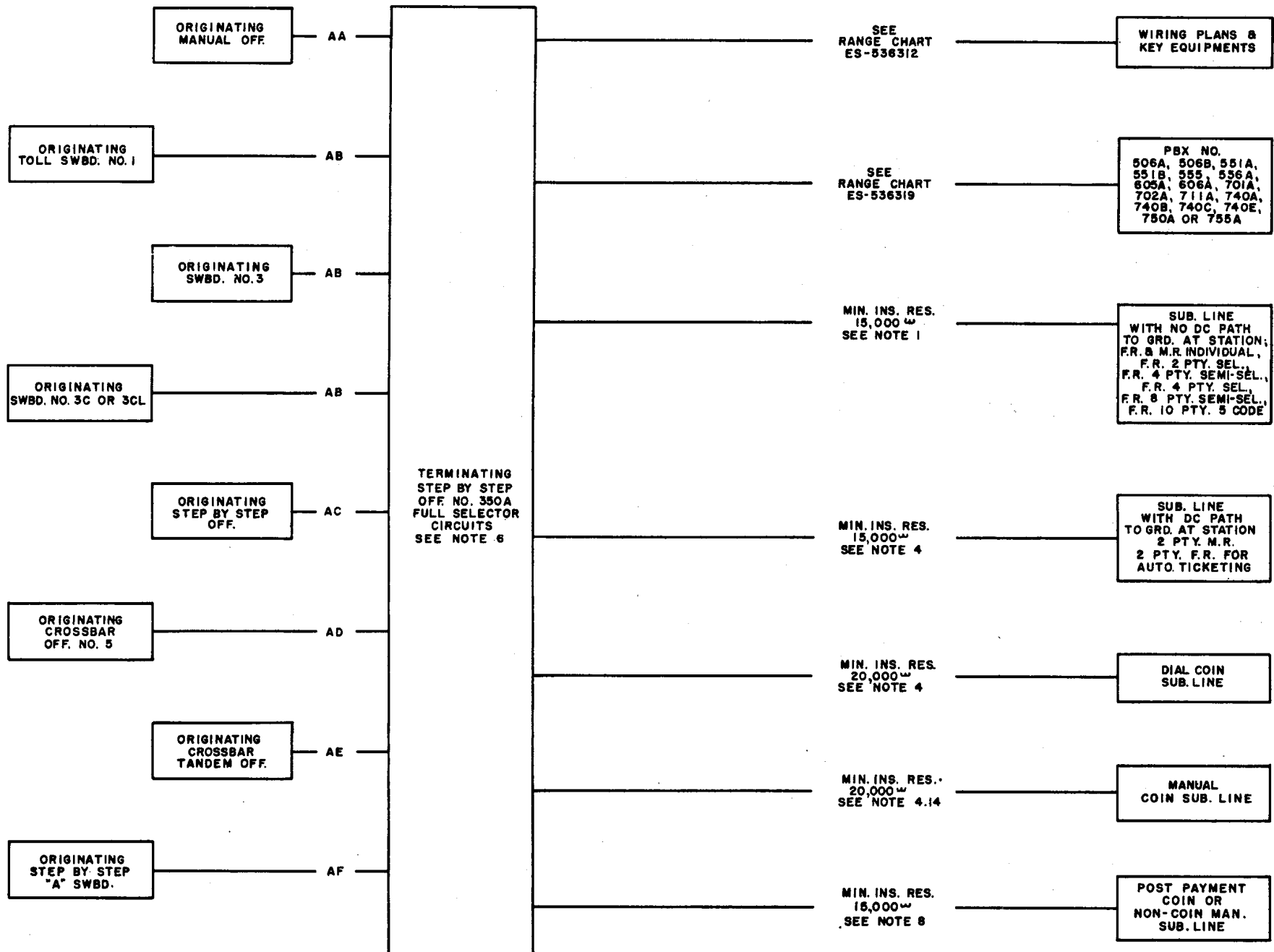
RANGE CHART



LOOP DESIG.	SXS NO. 350 A OFF. CKT.	SD- DWG. NO.	OHMS MAX. EXT. CKT. LOOP			OHMS MAX. CONDUCTOR LOOP			OHMS MIN. INS. RES.	SEE NOTE	REMARKS
			PLSG.	SUPV.	RING.	PLSG.	SUPV.	RING.			
A	SUB. REC. COMPL. TRK., COIN	32168-01		2475			2315	2500	30,000		DST. OFF. RING. VOLTAGE SHALL BE MIN. 95V. IN SERIES WITH I3 TYPE RES. LAMP
	SUB. REC. COMPL. TRK., NON-COIN WITH RECALL	32136-01		3050			2890	2500	30,000		DST. OFF. RING. VOLTAGE SHALL BE MIN. 95V. IN SERIES WITH I3 TYPE RES. LAMP
	SUB. REC. COMPL. TRK., NON-COIN WITHOUT RECALL	31925-01		5500			3410		30,000		
	OUT. INCP. TRK.	31965-01		3550			3000		30,000		40-56V. AT DST. OFF.
B	OUT. REP. BAT. & GRD. PLSG., LOOP SUPV.	31779-01		2560			2000	1840	30,000		45-50V. AT DST. OFF.
	OUT. REP. BAT. & GRD. PLSG., BAT. & GRD. SUPV.	31147-01					2400	2400	30,000		45-50V. AT DST. OFF.
C	OUT. REP. BAT. & GRD. PLSG., LOOP SUPV., CONDENSER TRANS.	31779-01		2560			2000	1985	30,000		
	OUT. REP. BAT. & GRD. PLSG., BAT. & GRD. SUPV.	31147-01					2400	2400	30,000		
	OUT. REP. BAT. & GRD. PLSG., LOOP SUPV., REP. COIL TRANS.	32008-01		2530			2000	1900	30,000		
D	OUT. SPL. SERV. TRK., COIN	31315-01		3600			3000		30,000		40-56V. AT DST. OFF.
	OUT. SPL. SERV. TRK., NON-COIN	31375-01		3550			3000		30,000		40-56V. AT DST. OFF.
	OUT. INCP. TRK.	31965-01		3550			3000		30,000		40-56V. AT DST. OFF.
	OUT. REP. SERV. TRK.	32178-01		4650			3000		30,000		
E	OUT. INF. TRK.	32170-01		3500			1850		30,000		
F	OUT. INF. TRK.	32170-01		3500			2550		30,000		
G	OUT. INF. TRK.	32170-01		3500			2200		30,000		
H	OUT. REP. SERV. TRK.	32178-01		4650			2900		30,000		(B) REL. LIMIT
				4990			2855		30,000		(MB) REL. LIMIT
J	OGT TO MAN. SWBD. NO. I, IC, ID OR II ARR. TO CHARGE SUB.	32167-01		4125			3245		30,000		
	OGT TO MAN. SWBD. NO. I, IC, ID OR II NOT ARR. TO CHARGE SUB.	31692-01		NONE			3300				INDUCTOR ONLY USED
	OGT TO SWBD. NO. I2 ARR. TO CHARGE SUB-CONDENSER TRANS.	32167-01		4125			2235		30,000		
	OGT TO SWBD. NO. I2 ARR. TO CHARGE SUB.-REP. COIL TRANS.	32167-01		4125			2190		30,000		
K	OUT. REP. BAT. & GRD. PLSG., LOOP SUPV.	31779-01		2560			2000	2120	30,000		
		32008-01		2530			2000	2090	30,000		
	OUT. REP. BAT. & GRD. PLSG., BAT. & GRD. SUPV.	31147-01					2400	2400	30,000		
	OUT. REP. BAT. & GRD. PLSG., LONG RANGE REV. BAT. SUPV.	32087-01		8000			4200	4125	30,000	7	
L	OUT. REP.	31779-01									RANGES ARE SHOWN ON SD-25435-01 XBR. TDM. OFF. KEY SHEET.
		32008-01									
	SEL. REP. & TRK. MB	30872-01									
		30855-01									
	OUT. TRK.	32199-01									
		32240-01									
		32241-01									

RANGE CHART TABLE

RANGE CHART



LOOP DESIG.	SXS NO. 350A OFF. CKT.	SD- DWG. NO.	OHMS. MAX. EXT. CKT. LOOP				OHMS. MAX. CONDUCTOR LOOP				MIN. INS. RES. OHMS	SEE NOTE NO.	REMARKS
			PLSG.	SUPV.	RING		PLSG.	SUPV.	RING				
AA	INC. LOCAL SEL.	30200-01 (TYPICAL)		2400			1200	1200			30,000		
	INC. PULSE CORRECTOR REP.	32184-01	5000				5000	5000			30,000	9	8-11 P.P.S.
AB	TOLL TRANS. SEL., WET DRY SUPV.	31745-01					1200	1200	1200		30,000		DST. OFF RINGING VOLTAGE SHALL BE MIN. 75V. IN SERIES WITH A 13 TYPE RES. LAMP
	TOLL TRANS. SEL., REV. BAT. SUPV., WITH 221 FAE PLSG. REL.	31841-01					1200	1200			30,000		
	TOLL TRANS. SEL., REV. BAT. SUPV., WITH 221 FAF PLSG. REL.	31841-01					2000	2000			30,000		
	A-B TOLL PRECEDING OR TOLL TRANS. SEL. WITH 221 FAE PLSG. REL.	31241-01		2100			1200	1200			30,000		
		31723-01		2200			1200	1200			30,000		
	A-B TOLL PRECEDING SEL. WITH 221 FAC OR A-B TOLL TRANS. SEL. WITH 221 FAF PLSG. REL.	31241-01 OR 31723-01		2690			2000	2000			30,000		
	TEST DISTRIBUTOR	32007-01		2750			2000	2000			30,000		
	INC. LOC. SEL.	30200-01		2400			1200	1200			30,000		
AC	LOC. SEL. INC. FROM OUT. REP. ARR. FOR BAT. & GRD. PLSG. & LOOP SUPV. WITH REP. COIL TRANS.	30200-01 (TYPICAL)		2400			1900	1900			30,000		
	LOC. SEL. INC. FROM OUT. REP. ARR. FOR BAT. & GRD. PLSG. WITH CONDENSER TRANS.	30200-01 (TYPICAL)		2400			1985	1985			30,000		
	LOC. SEL. INC. FROM OUT. REP. ARR. FOR BAT. & GRD. PLSG. & BAT. & GRD. SUPV.	30200-01 (TYPICAL)					2400	2400			30,000		
	INC. PULSE CORRECTOR REP. FROM OUT. PULSE CORRECTOR REP.	32184-01	5000				5000	5000			30,000	9	8-11 P.P.S.
AD	INC. LOC. SEL. LOOP PLSG. BAT. & GRD. PLSG.	30200-01 (TYPICAL)		2400			1200	1200			30,000		
				2400			1900	1900			30,000		
	INC. PULSE CORRECTOR REP.	32184-01	5000				5000	5000			30,000	9	8-11 P.P.S.
	TOLL TRANS. SEL., REV. BAT. SUPV. WITH 221 FAE PLSG. REL.	31841-01					1200	1200			30,000		
	TOLL TRANS. SEL., REV. BAT. SUPV., WITH 221 FAF PLSG. REL.	31841-01					2000	2000			30,000		
AE	INC. LOC. SEL., LOOP PLSG.	30200-01 (TYPICAL)		2400			1200	1200			30,000		
	INC. LOC. SEL., BAT & GRD. PLSG.	30200-01 (TYPICAL)		2400			1910	1910			30,000		
	INC. PULSE CORRECTOR REP., LOOP PLSG.	32184-01	5000				5000	5000			30,000	9	8-11 P.P.S.
	A-B TOLL PRECEDING OR TOLL TRANS. SEL. WITH 221 FAE PLSG. REL.	31241-01		2100			1200	1200			30,000		
		31723-01		2200			1200	1200			30,000		
	A-B TOLL PRECEDING OR TOLL TRANS. SEL. WITH 221 FAF PLSG. REL.	31241-01 OR 31723-01		2690			2000	2000			30,000		
AF	INC. LOC. SEL.	30200-01 (TYPICAL)		2400			1200	1200			30,000		
	A-B TOLL PRECEDING OR TOLL TRANS. SEL. WITH 221 FAE PLSG. REL.	31241-01		2100			1200	1200			30,000		
		31723-01		2200			1200	1200			30,000		
	A-B TOLL PRECEDING OR TOLL TRANS. SEL. WITH 221 FAF PLSG. REL.	31241-01 OR 31723-01		2690			2000	2000			30,000		
	TEST DISTRIBUTOR	32007-01		2750			2000	2000			30,000		
	INC. PULSE CORRECTOR REP.	32184-01	5000				5000	5000			30,000	9	8-11 P.P.S.
	TOLL TRANS. SEL., REV. BAT. SUPV., WITH 221 FAE PLSG. REL.	31841-01					1200	1200			30,000		
	TOLL TRANS. SEL., REV. BAT. SUPV. WITH 221 FAF PLSG. REL.	31841-01					2000	2000			30,000		

RANGE CHART TABLE

TABLE 2

OUTGOING AND 2 WAY TRUNK CIRCUITS TO OPERATOR OFFICE										
TRK. CKTS.	LOCATION OF CKT. ON KEY SHEET	OUT TIP & RING LEADS	TRK. SEIZED	OPR. ANS.	SUB. DISC.	KIND OF SUPV.	HAS RERING	HAS COIN CONTROL	HAS CLASS OF SERV. TONES	SEE NOTE
REC. COMPL.	A10	T	GRD.	GRD.	BAT.	HIGH-LOW	YES	YES	NO	2
		R	BAT.	BAT.	GRD.	REV. BAT.				
	E19					CX OR SX	NO	NO	NO	
	D81	T	GRD.	GRD.	BAT.	HIGH-LOW	NO	NO	YES	1
		R	BAT.	BAT.	GRD.	REV. BAT.				
	D19					CX OR SX	YES	YES/NO	YES	1, 2
	G81	T	GRD.	GRD.	BAT.	HIGH-LOW	YES	NO	YES	1
		R	BAT.	BAT.	GRD.	REV. BAT.				
SPECIAL SERV.	F8	T	BAT.	LOW RES.	HIGH RES.	REV.	YES	YES	NO	3
		R	GRD.	BRIDGE	BRIDGE	HIGH-LOW				
	H9	T	BAT.	LOW RES.	HIGH RES.	REV.	YES	NO	NO	
		R	GRD.	BRIDGE	BRIDGE	HIGH-LOW				
	G9	T	BAT.	LOW RES.	HIGH RES.	REV.	NO	NO	NO	
		R	GRD.	BRIDGE	BRIDGE	HIGH-LOW				
FOR HOSPITAL, FIRE, & POLICE SERV.	D11	T	LOW RES.	LOW RES.	HIGH RES.	HIGH-LOW				4
		R	BRIDGE	BRIDGE	BRIDGE	REV. BAT.				
OUT. AUTO.	J16	T	BAT.	BAT.	GRD.	HIGH-LOW			YES	1, 7
		R	GRD.	GRD.	BAT.	REV. BAT.				
2 WAY, OUT. AUTO., INC. DIAL TRANSMITTING	H18	T	BAT.	BAT.	GRD.	HIGH-LOW			YES	1, 5
		R	GRD.	GRD.	BAT.	REV. BAT.				
	I19	T	BAT.	BAT.	GRD.	HIGH-LOW			YES	1, 6
		R	GRD.	GRD.	BAT.	REV. BAT.				
2 WAY, OUT. AUTO., INC. DIAL REPEATING	I18	T	BAT.	BAT.	GRD.	HIGH-LOW			YES	1, 7
		R	GRD.	GRD.	BAT.	REV. BAT.				
2 WAY, OUT. AUTO., INC. DIAL TRANSMITTING	J18					CX OR SX			YES	1, 7
2 WAY, OUT. AUTO., INC. DIAL TRANSMITTING	K17					CX OR SX			YES	1, 6

NOTES:

1. CLASS OF SERVICE TONE IS USED TO DISTINGUISH BETWEEN SUCH AS POSTPAYMENT COIN AND NON-COIN.
2. A SEPARATE SINGLE TRK. CONDUCTOR OR 2 CONDUCTORS CONNECTING TO COIN CONTROL SELECTOR IS REQUIRED FOR DISPOSAL OF COINS.
3. THE DISPOSAL OF COINS IS CONTROLLED OVER THE TIP AND RING OF THE TRK. BY THE OPERATION OF COIN KEYS IN THE ASSOCIATED CORD CKT.
4. FREE SERVICE IS PROVIDED BY THIS TRK. CKT.
5. IMPEDANCE TRANSMISSION IS PROVIDED BY THIS TRK. CKT.
6. REP. COIL TRANSMISSION IS PROVIDED BY THIS TRK. CKT.
7. TOLL GRADE TRANSMISSION IS PROVIDED BY THIS TRK. CKT.

TRK. CKTS., CKT. DETAILS

SD-31364-01 - PAGE 32

TABLE I

SWITCH TRAINS FOR COMPLETING CALLS FROM OTHER OFFICES									
FACILITIES FOR COMPLETING CALLS	LOCATION OF TYPICAL CKTS. IN SWITCH TRAIN ON KEY SHEET	INC. TIP & RING LEADS	TRUNK NORMAL	KIND OF RING. START SIGNAL	AWTG. ANSWER (ON-HOOK)	ANSWER (OFF-HOOK)	KIND OF SUPV.	TRANSMITTER BATTERY SUPPLY TYPE	SEE NOTE
LOCAL TRAIN	INC. SEL. A7 INC. REP. E7 COMB. CONN. C13	T	GRD.	NONE	GRD.	BAT.	REV. BAT.	B	5
		R	BAT.		BAT.	GRD.			
A-B TOLL TRAIN	A-B TOLL PRECEDING SEL. G42 A-B TOLL TRANS. SEL. E43 TOLL INTERMEDIATE SEL. G44 COMB. CONN. C13	T	GRD.	NONE	GRD.	BAT.	REV. BAT.	A	5
		R	BAT.		BAT.	GRD.			
LOOP DIALING TOLL TRAIN (WET-DRY SUPERVISION)	TOLL TRANS. SEL. H43 TOLL INTERMEDIATE SEL. G44 COMB. CONN. C13	T	GRD.	20 CYCLE	BAT.	DRY	WET-DRY	A	4,5
		R	BAT.		GRD.	DRY			
LOOP DIALING TOLL TRAIN (REV. BAT. SUPERVISION)	TOLL TRANS. SEL. A42 TOLL INTERMEDIATE SEL. G44 COMB. CONN. C13	T	GRD.	SIMPLEX OR NONE	GRD.	BAT.	REV. BAT.	A	1,4,5
		R	BAT.		BAT.	GRD.			
TEST TRAIN OR VERIFICATION TRAIN	TEST DISTRIBUTOR I13 TEST CONN. H14	LINE T	GRD.	NONE	GRD.	GRD.	NONE	NONE	3,5
		LINE R	BAT.		BAT.	BAT.			
		TEST T	DRY	NONE	DRY	DRY	BRIDGED	X	2
		TEST R	DRY		DRY	DRY			
OUTGOING REPEATER OR TRUNK CIRCUITS									
REP. OR TRK. CKT.	LOCATION OF TYPICAL CKT. ON KEY SHEET	OUT. TIP & RING LEADS			AWTG. SUB. ANS. FROM DST. OFF.	RECEIVER OFF HOOK FROM DST. OFF.	KIND OF SUPV.		SEE NOTE
OUT. REP.	A97, B97, C97, D97, E97, F97	T			GRD.	BAT.	REV. BAT.		
		R			BAT.	GRD.			

NOTES:

- THIS TOLL TRAIN MAY ALSO BE USED FOR AUTOMATIC START OF RINGING ON SEIZURE OF AN IDLE LINE UNDER WHICH CONDITION NO RINGING SIGNAL IS REQUIRED.
- RINGING OF THE SUBSCRIBER IS UNDER MANUAL CONTROL OF RINGING KEY BY TESTMAN ONLY. TRANSMITTER BATTERY IS FURNISHED FROM THE TEST DESK OR LOCAL TEST CABINET ONLY.
- WHEN THE CALLED LINE IS BUSY, THE TRUNK NORMAL POLARITY IS REVERSED AND THE TALKING CKT. IS CLOSED. WHEN THE CALLED LINE IS IDLE, THE TALKING CKT. IS CLOSED BUT THE TRK. NORMAL POLARITY IS NOT REVERSED.
- A SEPARATE SINGLE TRUNK CONDUCTOR CONNECTING TO TRUNK COIN CONTROL CKT. (BLOCK I43) IS REQUIRED WHEN THE 110 V. POSITION CKT. METHOD IS USED IN THE TOLL OFFICE FOR DISPOSAL OF COINS. OTHERWISE 2 TRUNK CONDUCTORS CONNECTING TO COIN CONTROL SELECTOR (BLOCK J43) IS REQUIRED FOR DISPOSAL OF COINS.
- PULSES INTO THE STEP-BY-STEP SWITCHES SHALL BE BETWEEN THE LIMITS OF 8-11 PULSES PER SECOND. THE INTERDIGITAL TIMING SHALL BE 0.6 SECOND BETWEEN DIGITS FOR TRUNK SELECTION AND A MINIMUM OF 0.4 SECOND FOR THE DIGITS PULSED INTO THE CONNECTOR.

TRK. CKTS., INCOMING & OUTGOING CKT. DETAILS.

General

The table on the preceding page shows the principal operating features of a step-by-step office from the viewpoint of interoffice operation and is intended primarily to facilitate the selection of options in the connecting circuits in other offices. These features are listed by types of circuits and are stated in terms of the functional names of circuit options. These options in turn indicate what kinds of circuits are required in the connecting offices and what options are required in these circuits. Heretofore this information was shown only on the circuit drawings and circuit description of the particular circuits involved. This kind of information will facilitate the general understanding of interoffice operation. It will be particularly useful on engineering new jobs and additions which connect with step-by-step because it eliminates much of the need of examining details on numerous circuits and in circuit description.

Let it be assumed, for example, that SD-55346-01, switchboard No. 3CL toll switching trunk circuit arranged for repeated dialing, is used to complete calls to subscribers in the step-by-step office requiring the following features.

1. Simplex start of ringing.
2. Rering of the called line with receiver off-hook
3. Coin control with positive coin battery used for coin collect.

Referring to the table on the key sheet, it is shown that the following features or options are furnished by the toll transmission selector circuit SD-31841-01 in the step-by-step office.

1. Ground on tip and battery on ring when trunk is normal.
2. Simplex start of ringing or none.
3. Rering or no rering of the called line with receiver off-hook.
4. Ground on tip and battery on ring for awaiting subscriber answer signal.
5. Battery on tip and ground on ring for receiver off-hook.

6. Reverse battery supervision.
7. Type "A" TB supply.
8. No coin control or coin control over separate single trunk conductor where the disposal of coins is controlled without dialing or over 2 conductors where dialing of 2 digits into the coin control selector is employed.

Referring to the drawing title and feature and option table on SD-55346-01 toll switching trunk circuit, it is shown that:

1. No option is furnished for polarity of T and R leads when circuit is normal since this required feature is not shown in the feature or option table.
2. Figure E is furnished for simplex start of ringing as covered in the feature and option table.
3. No option is furnished for rering of the called line with receiver off-hook since this required feature is not shown in the feature and option table.
4. No option is furnished for polarity of T and R leads for awaiting subscriber answer signal since this required feature is not shown in the feature and option table.
5. No option is furnished for polarity of T and R leads for receiver off-hook since this required feature is not shown in the feature and option table.
6. Figure C is furnished for reverse battery supervision without start dial signal or Figure J is furnished for reverse battery supervision with start dial signal, as covered in the feature and option table.
7. No option is furnished for coin control over separate single trunk conductor as the drawing title indicates that the circuit is arranged for this feature. The use of positive coin battery for coin collect is covered on the switchboard No. 3CL position circuit SD-64738-01.

ADAPTER

Multi-Party Line
For Use with Grounded
or Low Insulation
Metallic Lines -
Pulse Correcting and
Relayed Ringing

SD-31848-01 F1

ADJUSTING

MF Pulsing Receiver,
Using One Milliwatt
1000 Cycle Supply
Source

SD-95779-01 E115

ALARM

And Interrupter for
Prepayment Coin
Trks.

SD-30852-01 J59

8-Party Semi-Selective-
Rev. Call and Con-
nector

SD-31336-01 J9

Interrupter With Delay
Interval

SD-31494-01 D52

DC Power Fuse

SD-31519-01 H58

Tone

SD-31521-01 B59

DC Power Voltage Control

SD-31544-01 J58

DC Power Circuit Breaker

SD-31545-01 G58

Audible for Both Con-
nector Disconnect
Alarm and Extension
of Alarm

SD-31551-02 E59

AC Power - AC-DC

SD-31559-01 F58

AC Power - Superimposed
Ringing

SD-31560-01 F58

Flugging Up Frame

Test Connector, Out.
Special Service Trk.
and 2-Party Message
Rate Trunk Switch

SD-31585-01 F57

Trouble
60 and 120 I.P.M.

SD-31606-01 D53

Relay Rack Alarm Frame
and Traffic Register
Rack Fuse Panel Fuse

SD-31613-01 E58

Cable Insulation &
Perm. Sig. Arr. to
Operate on Spec.

SD-31912-01 B62

No. of Perm. Signals
Sel. Shelf Ckts. Sw. Tbl.

SD-32043-01 A57

Alm. Frame Ckts. for
Selectors Sw. Tbl.

SD-32044-01 A58

Conn. Shelf Ckts. Sw.
Tbl.

SD-32045-01 B57

Alm. Frame Ckts. for
Conns. Sw. Tbl.

SD-32046-01 B58

For Trk. & Misc. Shelves
Sw. Tbl.

SD-32048-01 C57

Switch Trouble - Sel.

SD-32102-01 H57

Rep. Shelf Ckts.

Switch Trouble - Sel.
Rep. Frame Ckts.

SD-32103-01 G57

Miscellaneous, Alm.

SD-32193-01 E62

Sender

Switch Trouble, for
Line & Trk. Finders

SD-32239-01 E57

Extension, for Re-
ceiving Alm. In-
dications Over
Separate Cable Pair
from Distant Office
or F.B.X.

SD-95484-01 D63

Automatic Fire Detec-
tion 48 Volt Single
Zone Emergency
Cable Insulation

SD-96052-01 H59
SD-96348-01 C62

AMPLIFIER

124C

SD-96330-01 I33

BANK MULTIPLE

Selector
Connector
Miscellaneous

SD-32123-01 K54
SD-32128-01 G54
SD-32129-01 F54

CABINET

Traffic Register

SD-95531-01 A88

CALCULAGRAPH

Motor Driven

SD-95012-01 K51

CUT-IN

Busy Line, for Complet-
ing Emer. Calls

SD-31728-01 E11

CONNECTOR

Local Rotary Hunting
2 Ring Combination
1 Ring Combination
Test and Verification
Combination 8-Party

SD-30215-01 D12
SD-30220-01 B13
SD-30228-01 C13
SD-30243-01 H14

Terminal per Station
Semi-Selective Ring

SD-30862-01 E13

Comb. Rotary Hunting,
One Ring, With or

Without Arrangement
to Cancel Rev. Bat.

on Spec. Levels
Local Level Hunting

SD-30950-01 G77

Toll Rotary Hunting
Toll Level Hunting

SD-31088-01 F12

Loc. Rot. Htg., Arr.
to Cancel Rev. Bat.

SD-31114-01 D14

Supv. on Spec. Levels
Combination, 5-Code 10-

SD-31656-01 E12

Party Terminal Per Sta-
tion, Divided Ringing

Arr. for Reverting
Calls & Calling Party

SD-31811-01 F13

Control
Coin Control, Line

Number Method of Coin
Control with Coin

SD-31853-01 E87

Control Trunk
Coin Control, Arr. for

Dial Controlled Coin
Disposal in Connection

with "Line Number
Method" of Coin

CONNECTOR (Cont'd.)

Control for Pre-payment Coin Stations	SD-32061-01 D87
Local, 200 Point, Multiparty, AC-DC Ringing, Term. per Station, Arr. for Reverting Calls	SD-33005-01 B12
Local, 200 Point, Rot. Hunting, Multiparty, AC-DC Ringing, Term. per Station, Arr. for Reverting Calls	SD-33006-01 A12
Local, 200 Point, Multiparty, Superimposed Ringing, Term. per Station	SD-33007-01 C14
Local, 200 Point, Rot. Hunting, Multiparty, Superimposed Ringing, Term. per Station	SD-33008-01 G12
Comb., 200 Point, Multiparty, AC-DC Ringing, Term. per Station, Arr. for Reverting Calls	SD-33009-01 C12
Comb., 200 Point, Multiparty, Superimposed Ringing, Term. per Station	SD-33010-01 D13
200 Point Test	SD-33011-01 I14
Line Insulation Test	
Teletypewriter	SD-95558-01 J103
Outpulser, for ANI	SD-95890-01 D113

CONTROL

Test Distributor	SD-31349-01 E33
Test Distributor, Permanent Sig. Test	SD-31401-01 D33
Line Load	SD-32069-01 F3
Line Load Arr. for Remote Control and Supervision of Line Load	SD-32108-01 H3
Line Insulation Test	SD-32219-01 I103
Obs. Entry, for ANI	SD-32247-01 F111
Trunk Coin	SD-95031-01 I43
Traffic Reg. Camera	SD-95797-01 C90

DISTRIBUTING

Milliwatt	SD-95000-01 D115
-----------	------------------

DISTRIBUTOR

Test	SD-32007-01 I13
For Verification Serv., One Digit Operation	
On Spec. Levels or 2 Digit Operation	SD-31851-01 J13

FILTER

Talk or Filament Bat. Supply	SD-95571-01 F52
------------------------------	-----------------

FINDER

Line, 22 Point, 4 Wire	SD-31793-01 A4
Trunk, 22 Point	SD-31793-01 B28
200 Point Line or Trk., 3 Wire, Arr. to Operate with Low Res. Sleeve	SD-33013-01 B4, C28
200 Point Line, 4 Wire, Arr. to Operate with Low Res. Sleeve	SD-33015-01 B4

GENERATOR

Pulse, & Counting for Use with Incpt. Trks. Using E & M Lead Supv.	SD-32310-01 I90
MF Signal, for Supplying the 6 Frequencies Required for MF Pulsing	SD-95867-01 E112

IDENTIFIER

For ANI	SD-95810-01 F113
---------	------------------

INDICATING

Line Finder Group Busy	SD-32097-01 F4
------------------------	----------------

INTERRUPTER

And Alm. For Pre-payment Coin Trks. Ringing and Alarm for 10-Party Terminal per Station	SD-30852-01 J59
Code Ringing	SD-31298-01 G59
Reverting Call Semi-Selective	SD-31501-01 E10
Reverting Call Selective	SD-31557-01 C10
30, 60 & 120 I.P.M., & Alarm	SD-31606-01 D53
Tone, for Class of Service	SD-31825-01 A54
10 I.P.M.	SD-96343-01 B52

JACK

Battery, Ground and Ringing Supply Test	SD-31333-01 I21
---	-----------------

KEY

Reverting Call Semi-Selective Transfer	SD-31501-01 E10
Reverting Call Selective Transfer	SD-31557-01 C10

LAMP

Pilot and Power Alarm	SD-31573-01 D59
-----------------------	-----------------

LEADS

Ringling, for Supplying
Ringling Current to PBX's
& Station Equipments SD-95667-01 J51

LINE

Long (See "Long Line")
Terminating Service
Only SD-31224-01 A15
Rotary Line Switch SD-31259-01 J2
Aux., For Use with
Coin Control Ckt. in
Connection with "Line
Number Method" of
Coin Control for
Prepayment Coin
Stations SD-32024-01 D2
Dial Subscriber SD-32133-01 B2
Test, for Testing Trks.
Inc. From Local or
Toll Off., Coin Box
Trks., or M.R. Trks.
With Delay Interval SD-31636-01 H21
Test, for Testing Trks.
Inc. From Loc. Off.,
Coin Box Trks. or
M.R. Trks. with
Delay Interval SD-31642-01 I24
Aux., for Busyding
Line to Inc. Calls
During Interval
Line Fdr. Hunts for
Line SD-31652-01 D1
Aux., for Dial Post
Payment Lines SD-31895-01 F2
Test, from Local or
Toll Train for Ring-
ing & Continuity SD-31932-01 I25
Aux., for Operating
Sub. Reg. with De-
layed Charge Interval
Using Cent. Off.
Battery SD-32082-01 C2
Connector Test, with
Control by Test Set
for Testing Connectors
& Reverting Call
Selectors SD-32198-01 G22
Dial, Repeated Ring.,
4-Party Selective
or 8-Party Semi-
Selective SD-95435-01 E2
Recorder's Talking SD-95532-01 A89
Plugging Up, with or
without Auto. Cut-
off Feature for
Plugging Up Frame SD-95597-01 G37
Aux., Arr. to Apply
Coin Return Potential
at End of Each Call
on Prepayment Coin
Lines Arr. for 10
Cent Initial Charge
for Use with Line
Ckt. Arr. for Ground
Start on Ring SD-95607-01 G2
For Public Emergency
Reporting SD-95873-01 H87

Private - 24 or 48
Volt
Private - 48 Volt Only
Aux., with Auto. Cut-
off, for Individual
Lines with Main &
Extension Stations
on Separate Loops
Emer., for Completion
of Calls to Police,
Fire & Ambulance
Lines
Transmission Test

SD-96128-01 J55
SD-96147-01 J55

SD-96468-01 G1

SD-96469-01 E89
SD-98100-01 F23

LINE VERIFICATION

For ANI

SD-32246-01 H114

LONG LINE

Dial, For Use on Pre-
payment Coin Lines
Dial, Relayed or By-
passed Ring.,
Individual, 2 or 4
Pty. Selective &
4 or 8 Pty. Semi-
Selective

SD-32053-01 E1

SD-96234-01 C1

MAKE BUSY

For Use with Sel.
Repeater or Out.
Repeater
For Rec. Compl. Trks.
to Toll Swbd.
Trunk
Trunk, For Trunks
from Selector Levels

SD-30855-01 C93
SD-30893-01 J87
SD-31225-01 B54
SD-31420-01 I52

MANUAL

Type "A" Emergency
Type "B" Emergency

SD-32065-01 F68
SD-32093-01 F73

MISCELLANEOUS

For Angle Relay Rack
Bays

SD-32153-01 D89

MISC. FRAME

Trunk Fr., for ANI
Sec. Network Fr.,
for ANI
Identifier Fr., for
ANI
OutputFr., for
ANI
OutputFr.-Identifier
Trk. Test Fr., for
ANI
Tbl. Ticketer Fr.,
for ANI
Number Network Fr.,
for ANI

SD-32248-01 I114
SD-95818-01 J111
SD-95819-01 J114
SD-95820-01 J112
SD-95822-01 H115
SD-95823-01 I113
SD-95825-01 J115

NETWORK

Number, & Primary
Bus, for ANI

SD-95813-01 H112

NETWORK (Cont'd.)		Branch Office Selector With Repeating Coil. Bat. & Grd. Pulsing, Loop Supv.	SD-31914-01 I8 SD-32008-01 F7
Secondary, & Bus Connector, for ANI	SD-95814-01 G112	<u>Outgoing</u>	
Serv. Obs., for ANI	SD-95829-01 F112	Bat. & Grd. Puls., Bat. & Grd. Supv.	SD-31147-01 C97
OSCILLATOR		Bat. & Grd. Puls. or Loop Puls., Rev. Bat. Supv., 2 Repeaters per Base	SD-31779-01 B97
For ANI	SD-95827-01 D114	To SXS, Loop Res. 1200 Ohms to 3000 Ohms	SD-31428-01 D97
OUTPULSER		To SXS Off., Pulse Correcting, Rev. Bat. Supv.	SD-31892-01 E97
For ANI	SD-95811-01 E113	With Rep. Coil, Bat. & Grd. Puls. or Loop Puls., Rev. Bat. Supv.	SD-32008-01 A97
RECEIVER		To XBR No. 5 Off., Bat. & Grd. Puls., Long Range Supv., Type "B" TB Supply	SD-32087-01 F97
MF Pulsing	SD-95536-01 F115	Inc., Pulse Correcting Cut., Pulse Correcting	SD-32184-01 E7 SD-32184-01 J97
RECORDER			
Holding Time No. 13	SD-96246-01 K52		
Holding Time No. 1C	SD-96114-01 I51		
REGISTER			
Traffic	SD-30896-01 E54		
Totalizing	SD-95878-01 E102		
Dial Tone Speed	SD-96403-01 G52		
RELAY			
Trunk Alternating Interrupter, for Term. Per Sta. 8 and 10 Pty. Connectors and 8 Pty. Rev. Call Selectors & for 10 Pty. TPL Connectors Arr. for Rev. Calls	SD-32063-01 F9	RINGBACK	
Interrupter, & Alm. to Provide a Delay Interval, for Use with 804C Power Plant	SD-32135-01 B87	Emergency	SD-95083-01 F102
Group and Alarm, for Line and Trunk Finders	SD-32180-01 B89	RINGING	
	SD-32194-01 A102	Timed, for Toll Xmsn. Sel. Arr. for 20 Cycle Ringing Start Signal	SD-32196-01 I87
RELEASE		Test Trk., from Loc. Test Cab. No. 3	SD-96474-01 C47
Coin Trunk Timed	SD-31861-01 E52	Test Trk., from Loc. Test Desk No. 14	SD-96474-01 F32
REPEATING		SELECTOR	
Sleeve - 2 Way	SD-32062-01 E29	With Test Trunk, from Loc. Test Desk No. 14 or Loc. Test Cab. No. 3	SD-25767-01 I102 SD-30200-01 A7
REPEATER		Local or Incoming 3 or 4 Wire, Arr. for Feg Count on Cut- Thru, to Absorb Digits Once Only and/or Repeatedly, to Return Overflow Sig- nal on Specified Levels and for 2 Party Message Rate Service	SD-30976-01 A7
Branch Office Selec- tor, With Auto. Release of Trk. on Permanent Signals, Arr. for 3 Digit Off. Codes From Panel Sdr. Tdm. Off.	SD-30872-01 B92	Reverting Call, 8 Pty. Semi-Sel., And/Or 4 Pty. Sel. or Semi-Sel. Ringing Requiring Dialing of 2 Digits into Revert- ing Call Selector	SD-30978-01 J10
2 Way, Out. Bat. and Grd. Pulsing, Loop Supervision, Incoming, Pulse Transmitting	SD-31162-01 K44 SD-31674-01 I16		

SELECTOR (Cont'd.)

3 or 4 Wire, Arr. for
Peg Count on Cut-
Thru, to Absorb
Digits Once Only
and/or Repeatedly,
to Return Overflow
Signal on Specified
Levels and for 2
Party Message
Rate Service for
Modification of
Existing Equip. SD-30997-01 A7
A-B Toll Preceding SD-31241-01 G42
Reverting Call, 4-
Party Selective SD-31556-01 B10
Reverting Call, 2-Pty.
Selective or 4-
Party Semi-Selective SD-31647-01 F10
Toll Transmission for
Completing Intertoll
Dialing Calls with
or Without Digit
Absorbing SD-31681-01 C42
A-B Toll Transmission,
Arranged to Absorb
Specified Digits SD-31723-01 E43
Toll Intermediate SD-31744-01 G44
Or Toll Incoming
Toll Transmission,
with or without
Coin Control,
with or without
Digit Absorbing
and Blocking SD-31745-01 H43
Toll Transmission,
Rev. Bat. Supv.,
Simplex or No
Ringing, Start
Signal, Arr. for
Digit Absorbing
and Blocking SD-31841-01 A42
Coin Control SD-31853-01 J43
Toll Intermediate or
Inc., Arr. for Digit
Absorbing & Blocking
Until a Digit is
Absorbed SD-31915-01 G44
3 or 4 Wire Arr. to
Absorb Digits once
or Repeatedly and
to Restrict Service
on Spec. Levels SD-32077-01 A7
Service Code SD-32077-01 B8
3 or 4 Wire, Arr. to
Absorb one or two
Digits, to Return
No-Such-Number-Tone
on Specified Levels,
for Peg Count on Cut-
Thru and for 2 Pty
Msg. Rate Service SD-32183-01 A7
Toll Preceding, for
Completing A-B Toll
Calls, Arr. for
Digit Absorbing
and Blocking and
to Return Busy Tone
& Flash on Specified
Levels SD-33001-01 G42

Local, Inc. or 2 Pty.
Msg. Rate, 3 or 4
Wire, Arr. to Restrict
Service on any Spec-
ified Levels, for Peg
Count on Cut-Thru
& Busy Flash on Calls
from Operator SD-33003-01 A7,
C7,
A8
Code, Arr. to Absorb
Digits Once only and
or Repeatedly, and
to Restrict Service
until a Digit is
Absorbed SD-95898-01 F93
SET
Wave Shaping SD-70082-01 K102
SIGNAL
Flugging Up Frame
Auxiliary SD-90594-01 F37
No-Such-Number
Tone Supply SD-96357-01 A52
SUPPLY
Bat. & Grd. for
Talking with Line-
man's Hand Set &
Ringing Supply for
Testing Defective
Cables SD-90048-01 J52
FBX Battery SD-90232-01 J54
SWITCH
Rotary Out Trunk,
3 or 4 Wire, Arr.
for Preselection SD-30868-01 A22,
E93
Rotary Out Trunk,
3 or 4 Wire SD-32253-01 B9
TELEPHONE
Plugging Up Frame SD-90588-01 H38
MDF Loud Speaker SD-96471-01 I32
TERMINAL
Alm. Checking SD-31835-01 D62
TEST
51 Type Dial SD-31138-01 E24
Station Ringer, Semi-
Sel. Ringing SD-31140-01 D24
Station Ringer, Sel.
Ringing SD-31141-01 D25
Permanent Signal SD-31402-01 D34
For Rapid Operation
Test of Line Finders
and Out. Repeaters SD-31725-01 K22
Auto. Trk., for ANI SD-32315-01 D112
Battery and Ground
Terminals SD-90122-01 J21
207FA Relay SD-90411-01 F21
2A Sending Panel
Transmission SD-95000-01 F24
Line Insulation SD-95537-01 H103

TEST (Cont'd.)

Outpulser-Identifier, for ANI	SD-95815-01 G115	From Toll Swbd., Wet Dry Supv., 20 Cycle Ringing Start Signal with Rering, with or without Coin Control	SD-31703-01 K43
TEST SET		For Use with Type "B" CX Signaling or Simplex Signaling, Bat & Grd. Pulsing Intercept. from Local Sel. Mult.	SD-31726-01 F17 SD-31767-01 D27
Subscriber Message Rate and Traffic Register	SD-30490-01 G21	To Toll Inc. Sel., CX or Simplex Sig.	SD-31865-01 I20
Line Finder and Trunk Finder	SD-31456-01 K23 SD-31481-01 K25	To Toll Inc. Selector, CX or SX Signaling, With Controlled Ringing or Rering	SD-31887-01 F19
Pulsing	SD-31524-01 K23	Pulse Correcting, Re- peating Coil Trans- mission	SD-31929-01 D16
Line Finder and Trunk Finder		Test, Inc. from L.T.D. No. 14 to M.D.F. & I.D.F. for Detect- ing Intermittent Trouble	SD-32038-01 A34
For Testing Sub. Low Res. Msg. Registers & Traffic Registers	SD-32150-01 F22 SD-90013-01 J22	Intercepting, from Toll Selector Multiple	SD-32163-01 H27
206 Type Selector		From Local Test Desk No. 14 to M.D.F. or Protector Fr. For Testing Trunks and Lines - In and Out Type	SD-90070-01 F33
Line Finder, Selector and Connector With Test Line Control	SD-90416-01 J23	From Local Test Cabinet No. 3 to M.D.F. or Pro- tector Fr. for Testing Trks. & Lines - In & Out Type	SD-90070-01 E48
Subscriber Recording Completing Trunk, Outgoing Repeater and Miscellaneous Outgoing Trunks	SD-90469-02 I22	From Local Test Desk No. 14 to M.D.F. for Testing Trunks and Lines - Bridging	SD-90071-01 G33
TEST STAND		<u>Outgoing</u>	
Switch	SD-32001-01 G25	Incpt., for Use with Trk. Fdrs., Arr. for Machine An- nouncements	SD-30990-01 B29
TIMING		To Manual or Step-by- Step "A" Operator From Non-coin Lines Without Ringback	SD-31188-01 G9
Common	SD-31310-01 C59	From Local Selector Multiple to Local Test Desk No. 14	SD-31245-01 D32
TONE		From Local Selector Multiple to Local Test Cabinet No. 3	SD-31245-01 D47
Miscellaneous	SD-31521-01 B59	To Central "A" Board Special Service Opera- tor From Coin Box Lines	SD-31315-01 F8
TRANSFER			
Trk., for Rec. Compl. Trks. to Toll Swbd.	SD-30893-01 J87		
Line or Trk., for Restoring Service on an Emer. Basis	SD-95690-01 F87		
Emergency, to Provide Dial Sub. with Emergency Manual Service	SD-96180-01 J15		
TROUBLE TICKETER			
For ANI	SD-95816-01 J113		
TRUNK			
<u>Incoming</u>			
One Way Auto. Arr. for Dial Back Operation	SD-30889-01 H81		
Intercepting, from Conn. Mult.	SD-31337-01 C27		
From Plugging Up Line, for Trouble Intercepting	SD-31339-01 B27		

TRUNK (Cont'd.)

To Manual or Step-by-Step "A" Operator From Non-coin Lines with Ringback SD-31375-C1 H9
 To Magneto Office, Ring-down, Arranged for Coin Line Indication SD-31449-C1 J8
 To Manual Office - Stfd. High Low Loop Sig. SD-31651-01 C23
 To Manual Office for Flat Rate Lines From Selector Multiple SD-31692-01 G18
 From Selector Multiple to Manual Office - A-3 Toll Signaling - Type "A" T.B. Supply Intercepting, Arr. to Trip Ring. Only During Ring. Interval SD-31698-01 J16
 From Sel. Mult., CX Sig., Mult. at Swbd. SD-31771-01 H29
 SD-31795-01 J20
 2-Wire From Overflow Conn. Terms. for Hospital, Fire and Police Service SD-31840-01 D11
 Sub. Rec. Compl., CX or SX Signaling, without Ringback, Non-Coin, with Class of Service Tone SD-31888-01 E19
 To Distant DSA Swbd. or Sub. Rec. Compl., High-Low Supv., Non-Coin, without Recall, with Class of Service Tone SD-31925-01 D81
 Pulse Correcting, Repeating Coil Transmission SD-31929-01 D16
 Intercepting, for Use with Trk. Finders SD-31965-01 C29
 Sub. Rec. Compl., CX or SX Signaling, with Ringback, Coin or Non-Coin, with Class of Service Tone SD-32042-01 D19
 Rec. Compl., High-Low Rev. Bat. Supv., Non-Coin, Arr. to Recall Sub. and for Class of Service Tone SD-32136-01 C81
 To Manual Swbd. Arr. to Charge Sub. and Calling Party Control SD-32167-01 H8
 Rec. Compl., High-Low Supv., Arr. for Coin Control, with Class of Service Tone SD-32168-01 A10
 Information, with or without High Low Supervision SD-32170-01 F84

From Sel. & Conn. Multiple to Repair Service Desk No. 2 Arr. for Transfer to Swbd. SD-32178-01 C38
 For CAMA Calls, Bat. & Grd. Pulsing SD-32199-01 G98
 For CAMA Calls, Bat. & Grd. Pulsing SD-32240-01 H98
 For CAMA Calls, E&M Lead Signaling SD-32241-01 I98
 E&M Lead Pulsing for ANI SD-32244-01 C113
 Loop Pulsing, for ANI SD-32245-01 B113
 Intercepting, E&M Lead Supv. SD-32309-01 I29
 From Selector Mult. for Info., Repair, Off. PBX or Incpt. Serv., E&M Lead Supv. SD-32311-01 A107
 From Connector Mult. for Off. PBX, Repair, Verif. Request or Info. Serv., E&M Lead Supv. SD-32312-01 B107

2-Way

2-Way Operator Off., CX or SX Supv., One Way Automatic, One Way Dialing, Arr. for Dial Back Operation SD-30890-01 H82
 2-Way Interlocal - Dial Repeating on Outgoing Calls, Loop Resistance 3000 ohms Maximum SD-31602-01 H16
 2-Way Interlocal - Dial Repeating on Outgoing Calls, Loop Resistance 1200 ohms Maximum SD-31658-01 G16
 2-Way to Manual or Toll Office, Local Grade Transmission, Loop Signaling SD-31683-01 H18
 2-Way to Manual or Toll Office, Local Grade Transmission CX Signaling SD-31685-01 K17
 2-Way to Manual or Toll Office with Repeating Coil, Local Grade Transmission, Loop Signaling SD-31709-01 I19
 2-Way to Manual or Toll Office, Toll Grade Transmission, Loop Signaling SD-31712-01 I18
 2-Way to Manual or Toll Office, CX Supv. SD-31749-01 J18
 2-Way Interlocal, Bat. & Grd. Puls.,

TRUNK (Cont'd.)

Rev. Bat. Supv., Rep. Coil Xmsn. Interlocal, CX or SX Fuls., CX or SX Supv. Arr. for Fulse Correcting on Inc. Calls	SD-31842-01 E84
Combined Opr. Off. & Interlocal, One Digit Tandem Operation, CX Supv., Type "B" TB Supply	SD-31867-01 G81
Combined Opr. Office & Interlocal, One Digit Tdm., Opera- tion, Bat., & Grd. Fuls.; Rev. Bat. Supv., Type "B" TB Supply	SD-31885-01 E81
Toll Diverting, for Dial Selected PBX Trks., with or with- out Arrangement to Test Busy While Line Finder Hunts	SD-31886-01 A81
	SD-32067-01 J82

Miscellaneous

Auxiliary, For Use With Sel. Re- peater Ckt. Arr. to Cut Thru When Digit 1 or Digit 11 are Dialed	SD-30856-01 B93
Aux. Arr. to Connect an Inc. Trk. to a Rotary Out Trunk Switch	SD-30865-01 A100
Message Rate Individual 2-Party Message Rate, For Use With 4 Wire Line Finder	SD-31493-01 C5
Coin	SD-31506-01 E5
Coin, Dial Post-Payment Serv.	SD-31592-02 A5
Vacant Code From Local Selector Multiple	SD-31895-01 D5
Aux., For Returning Initial Coin De- posited in Connec- tion with "Line Number Method" of Coin Control for	SD-31937-01 E17

Prepayment Coin Stations	SD-32025-01 D22
Aux., For Use With Ckts. Arr. for Bat. & Grd. Fuls. over Quadded Cable Conductors	SD-32032-01 B98
Message Rate For Use With 4 Wire Line Fdr.	SD-32082-01 F5
Auxiliary, For Use Be- tween Toll Sel. Mult. & Incpt. Trk. Ckt. for Delaying Cut-Thru Test, For Use With Incpt. Trk. Ckts. Requiring Mach. Ring.	SD-32084-01 H26
Incpt., from Conn. Terminals or Sel. Levels For Use With Announcement Machine, Announcement System No. 7A	SD-32090-01 G23
Auxiliary, Loop Fuls- ing, Arr. to Com- plete Service Code Calls	SD-32202-01 E27
Test, Frame End From Cable Test Desk No. 3 or Local Test Desk No. 14, Arranged for Manual Varley 3 Test	SD-32281-01 E92
Flugging Up Frame, Flugging Up Test Test, Frame End, From Cable Test Desk No. 3 or Local Test Desk No. 14, Arr. for Automatic Varley 3 Test	SD-90403-01 C32
Verification Request, High- Low Rev. Bat. Supv.	SD-90589-01 G38
Talking at M.D.F. or Protector Frame to Local Test Desk No. 14	SD-95545-01 A32
	SD-95691-01 D1C2
	SD-96074-01 H32

USAGE

Trunk Group	SD-32049-01 H52
-------------	-----------------