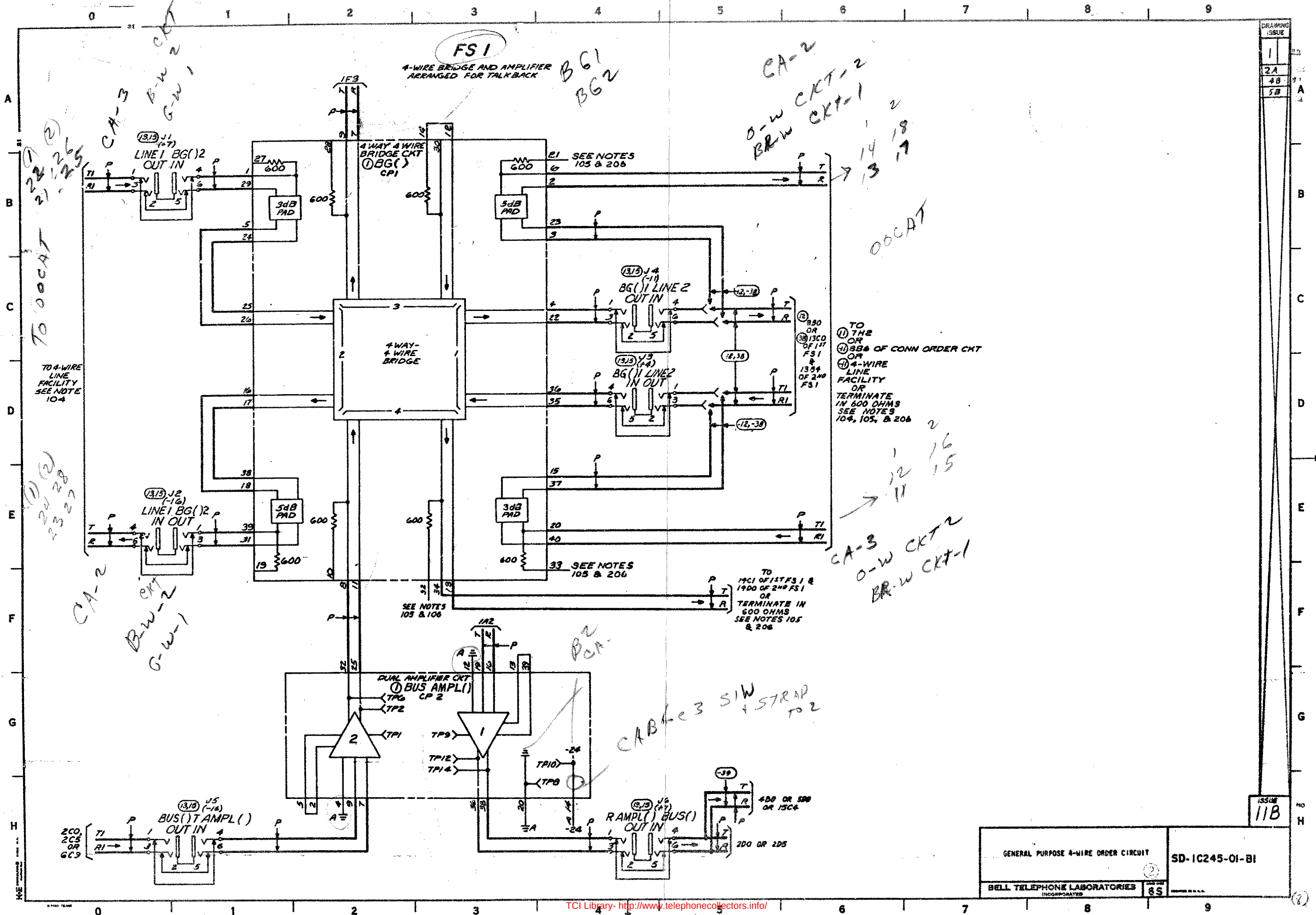
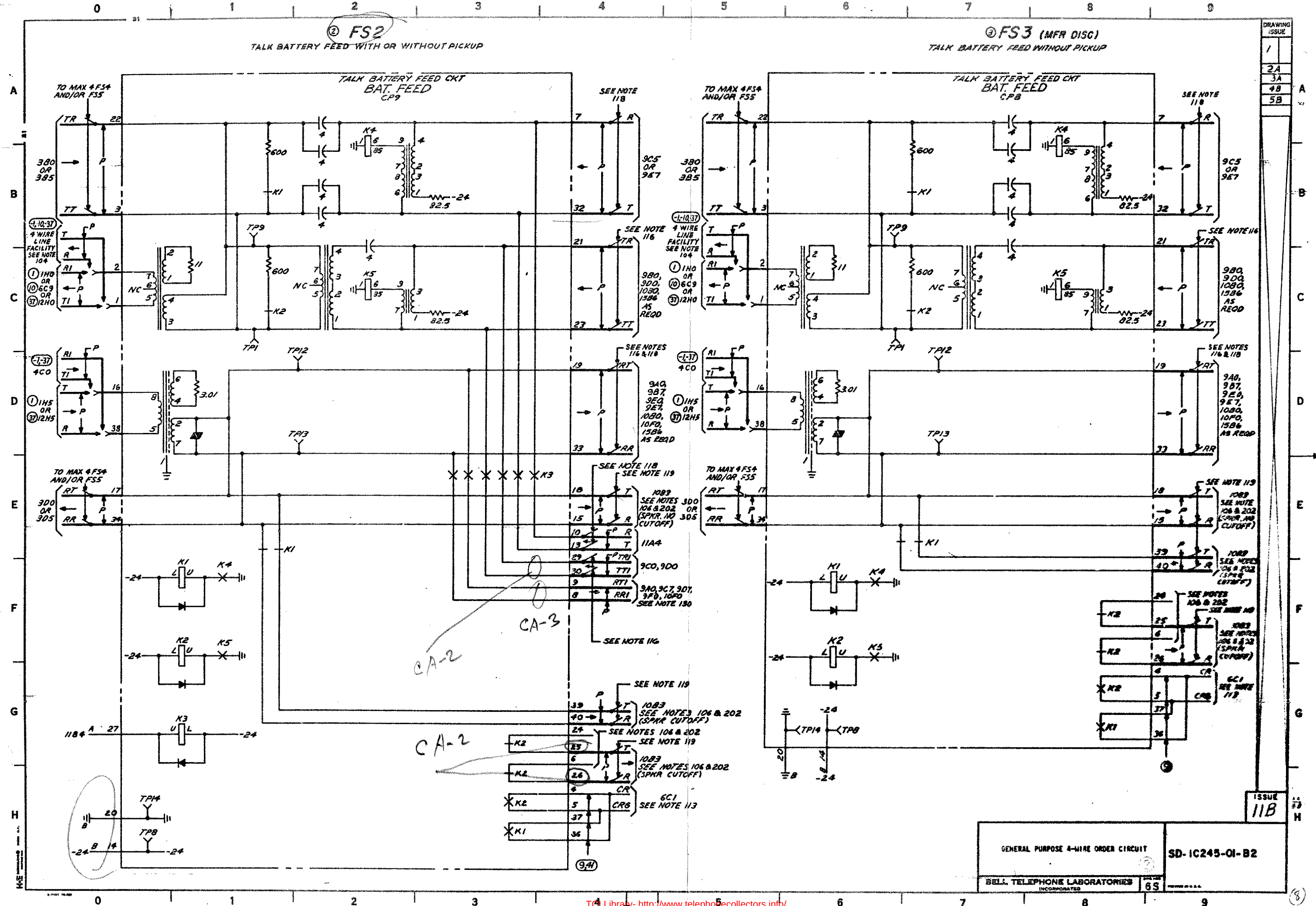
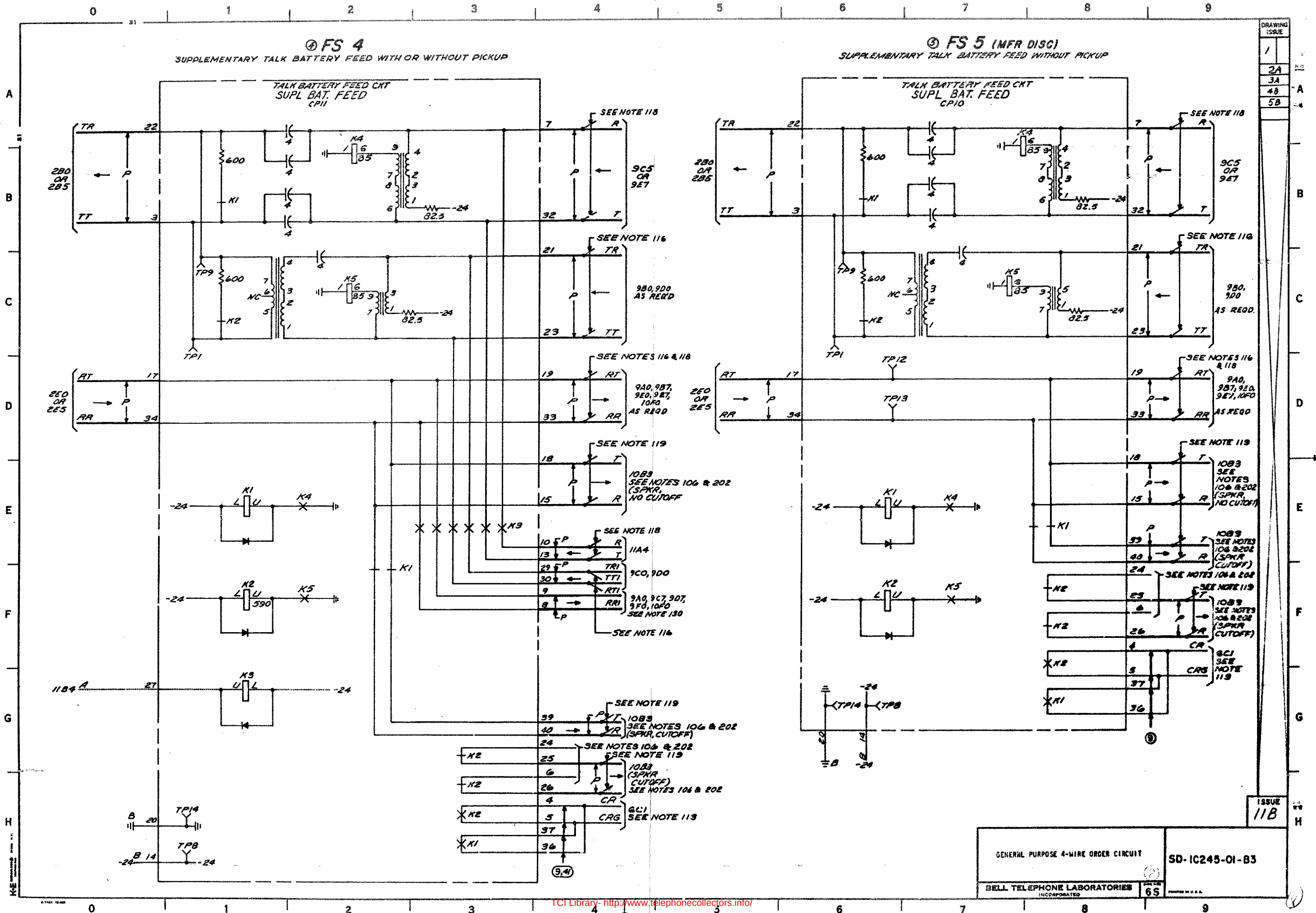


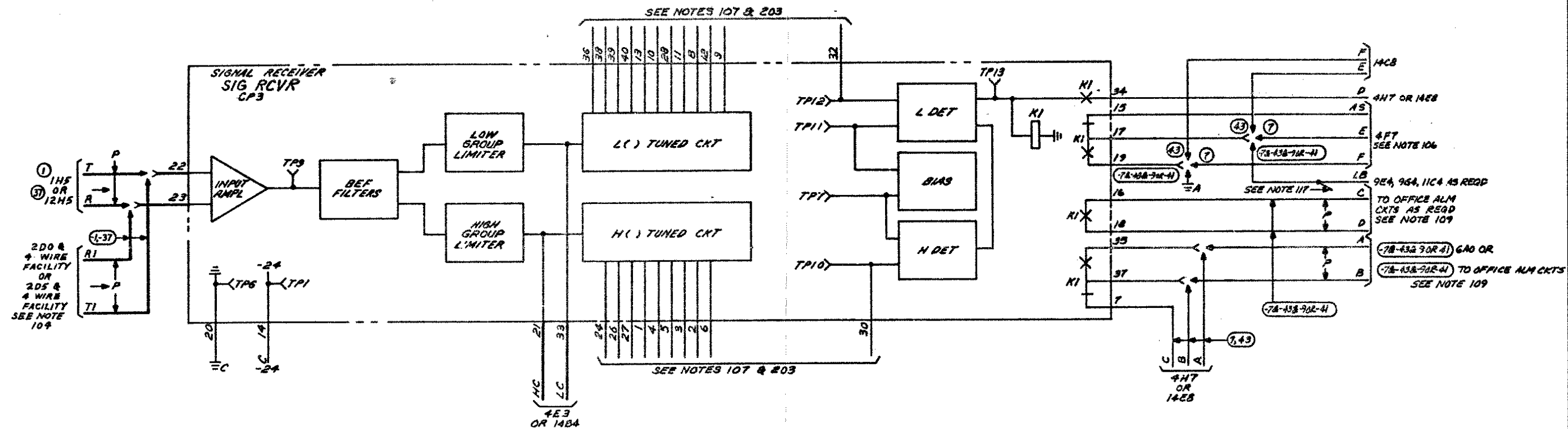






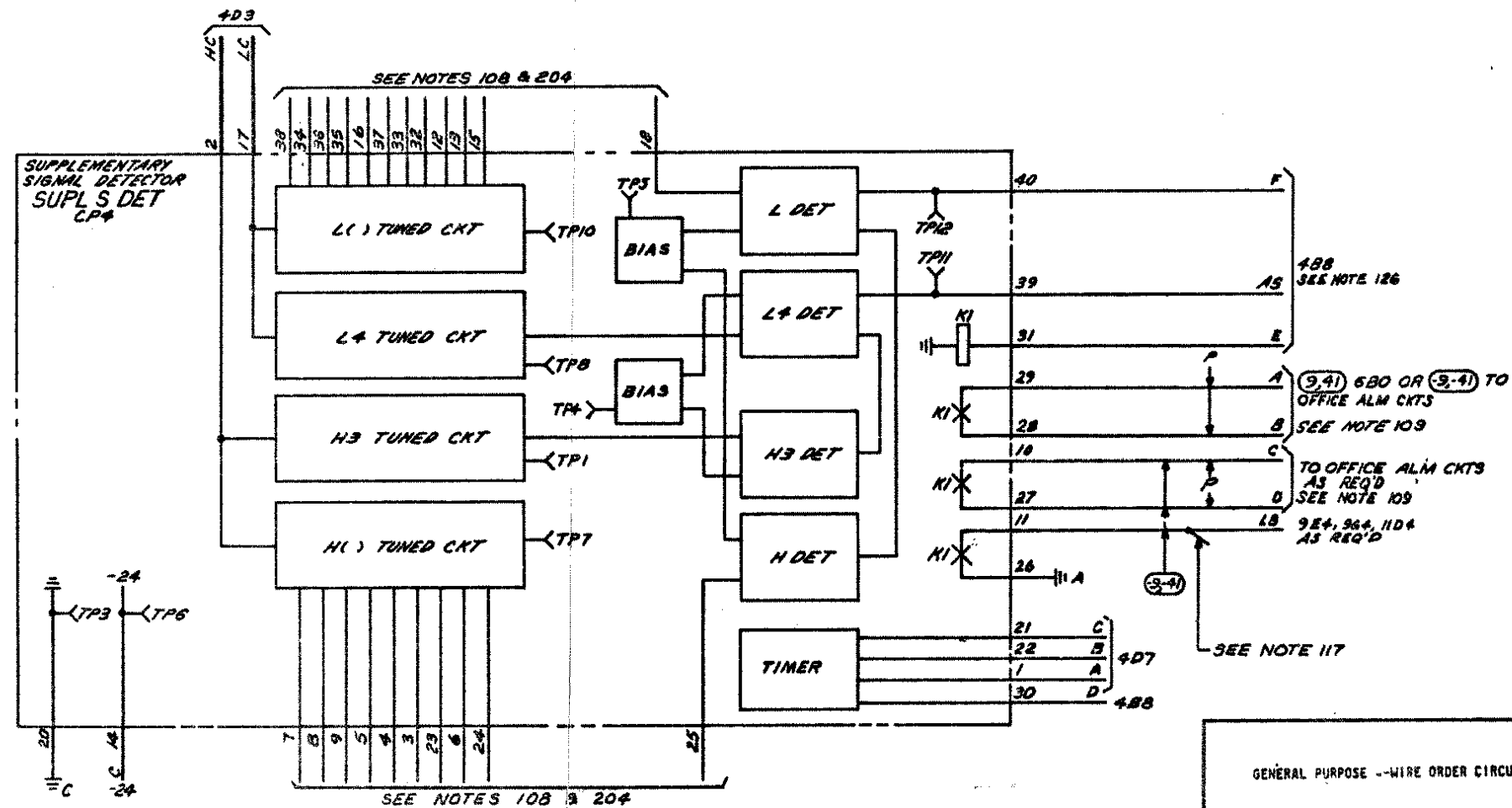
FS6

SIGNAL RECEIVER

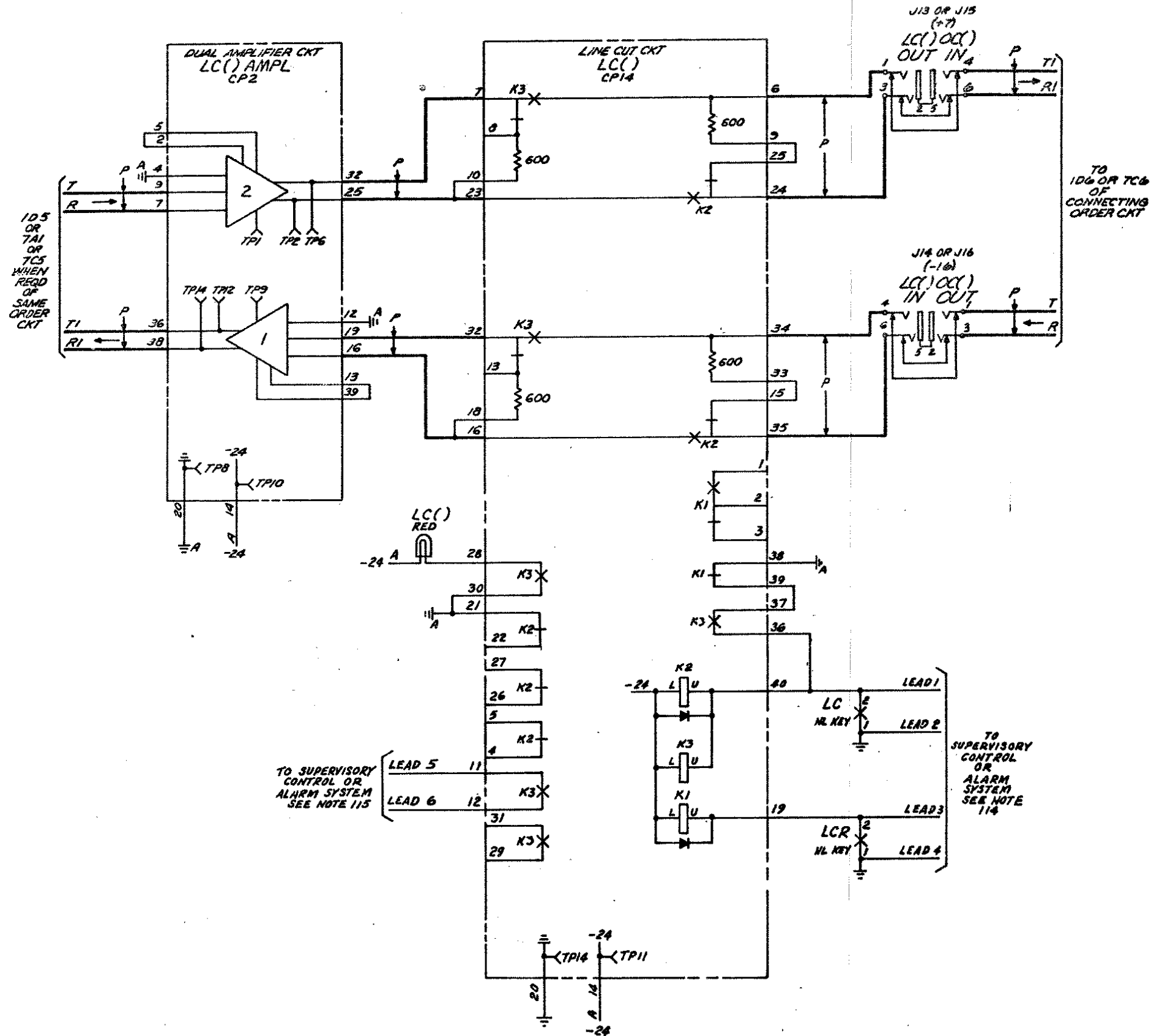


FS7

SUPPLEMENTARY SIGNAL DETECTOR

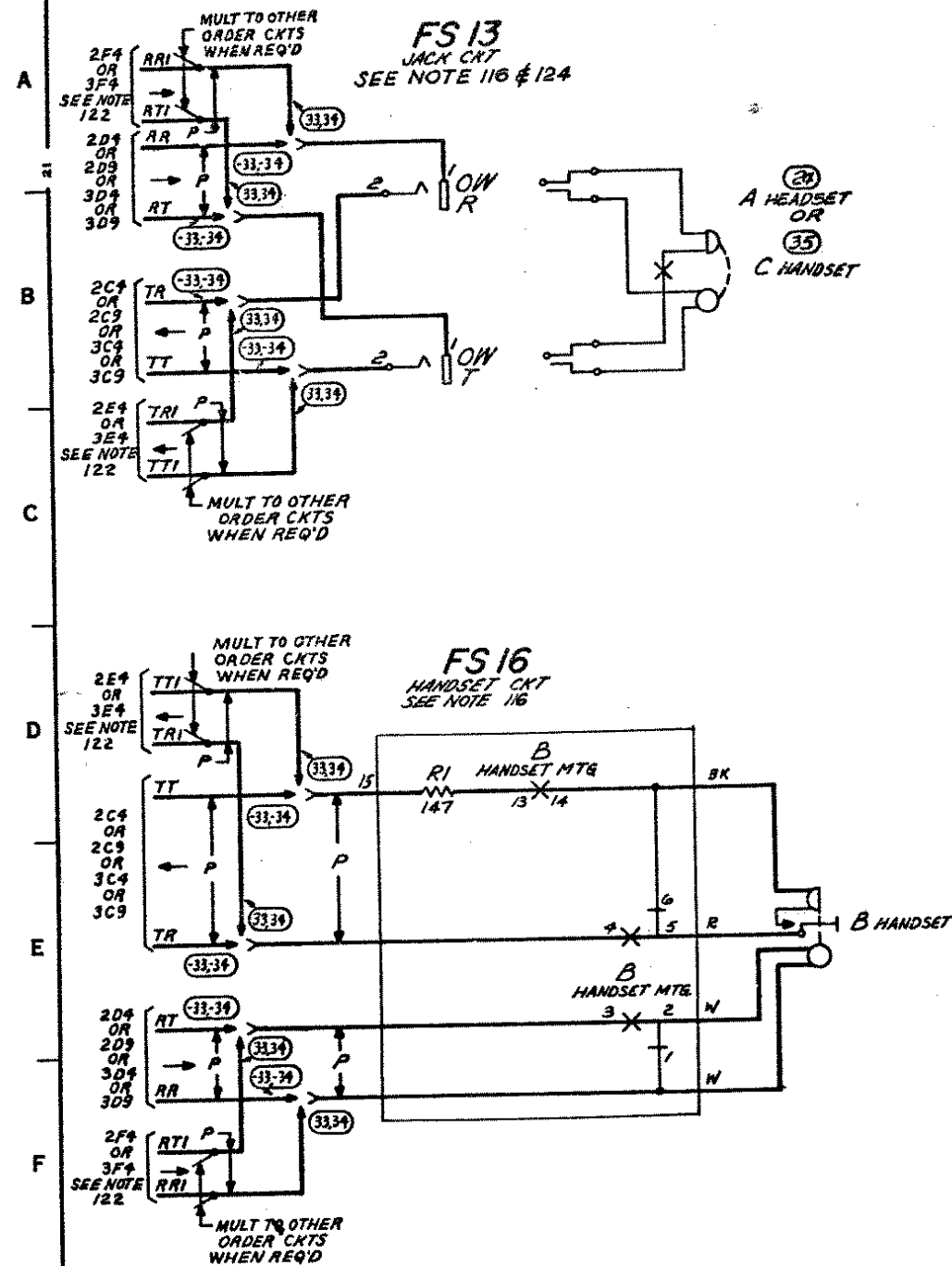


FS 12 4-WIRE LINE CONNECT CKT

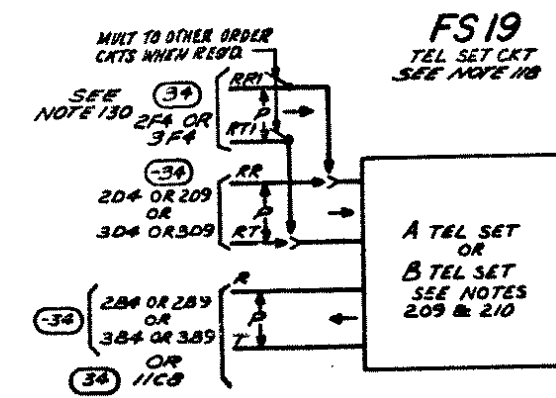
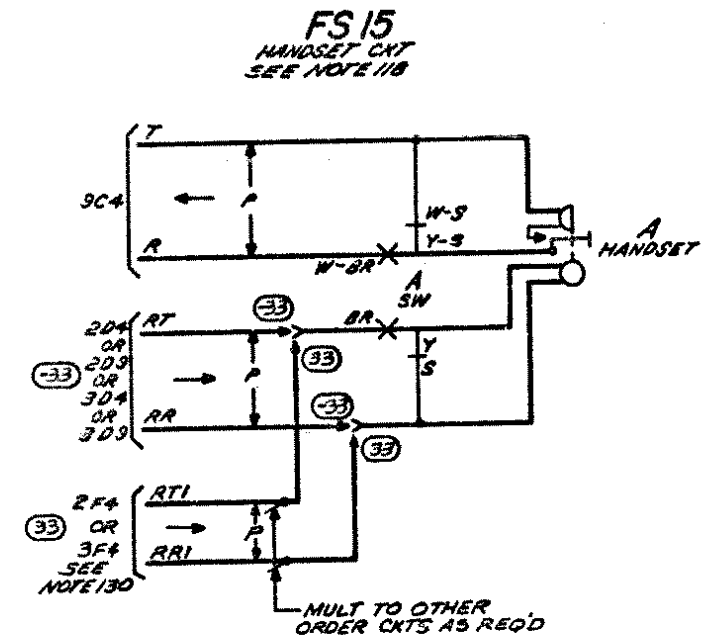
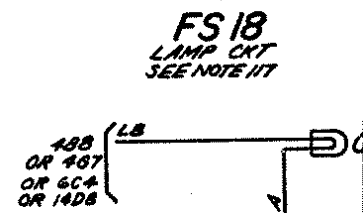
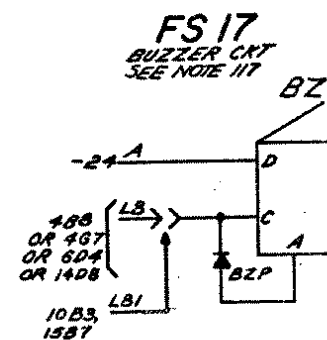
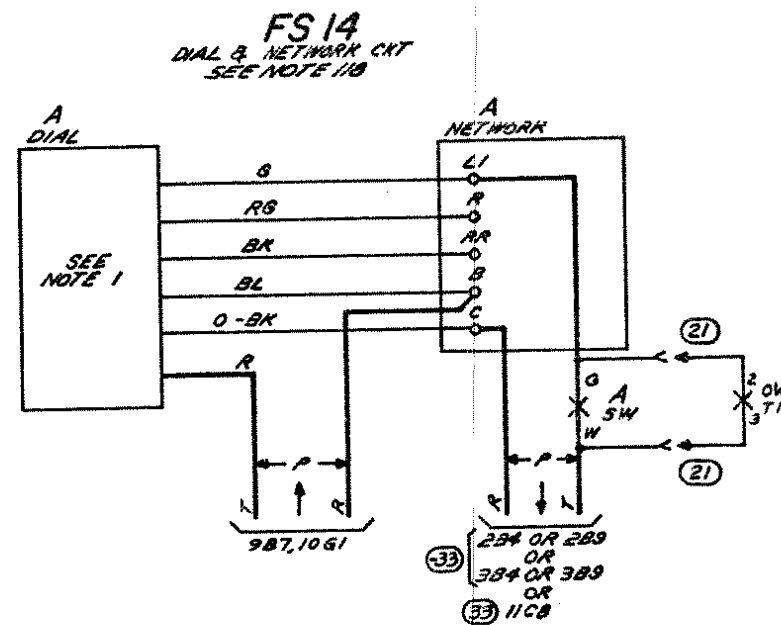


DRAWING
ISSUE
1
34
58

ISSUE
108



NOTES:
1. INSULATE AND STORE UNUSED LEADS.



DRAWING
ISSUE
1
2A
3A
4B
5B

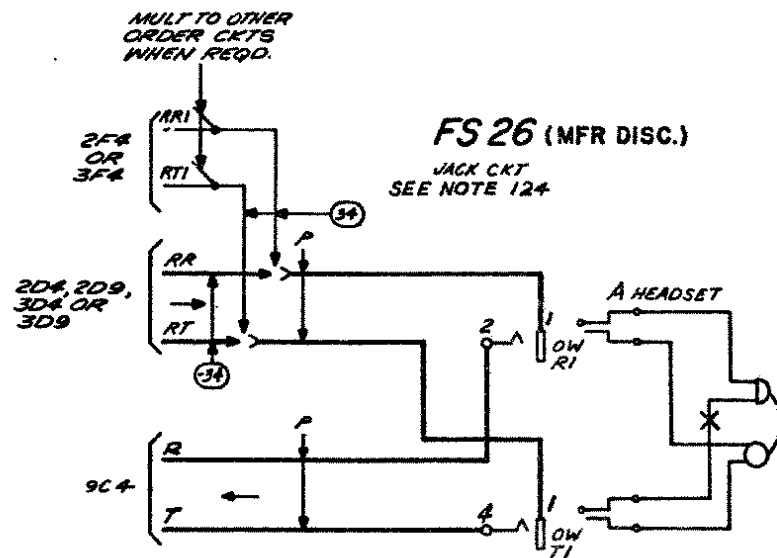
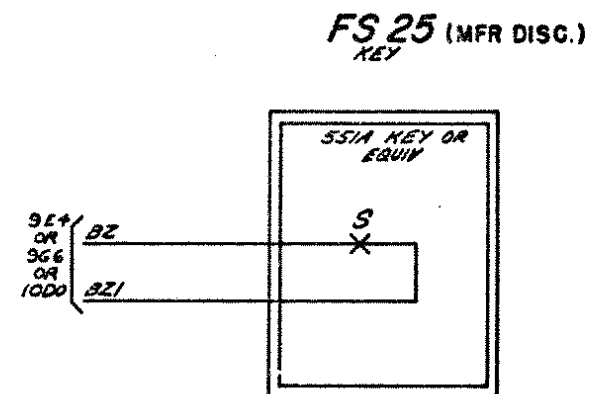
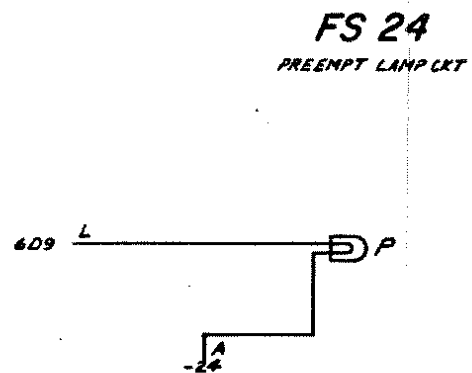
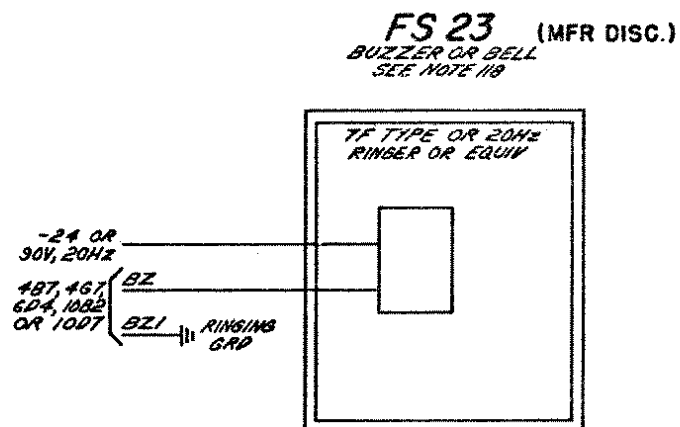
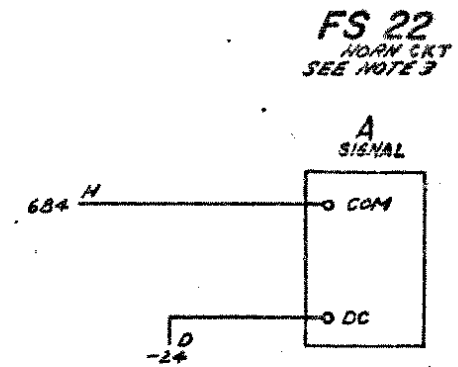
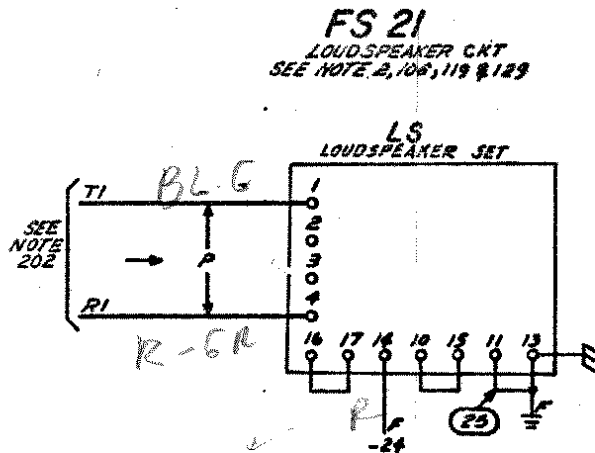
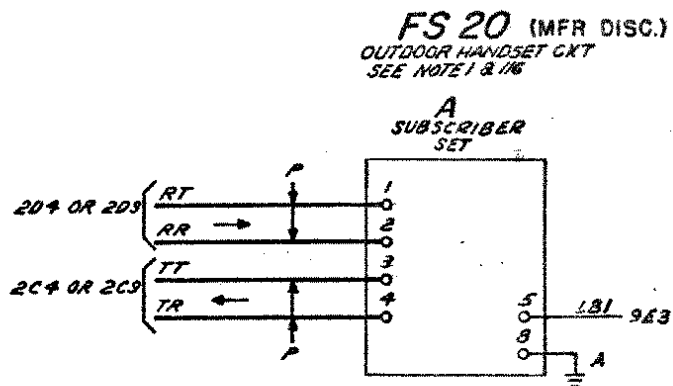
ISSUE
11B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

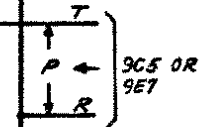
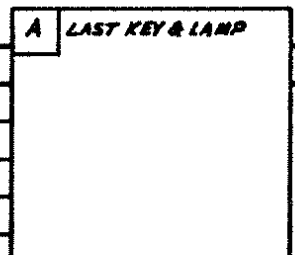
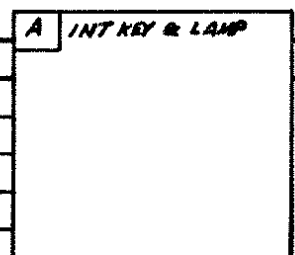
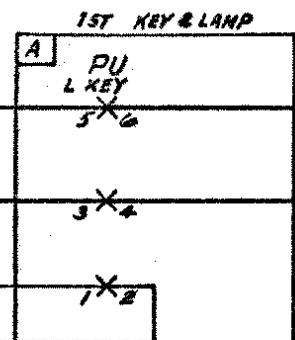
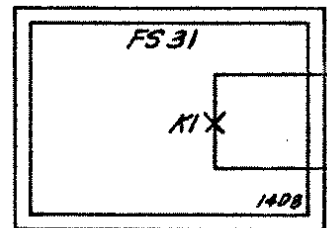
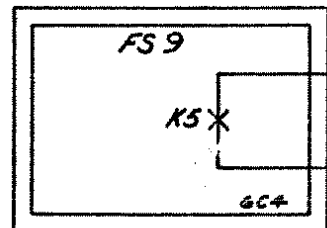
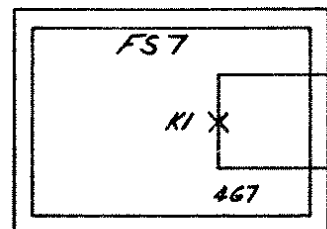
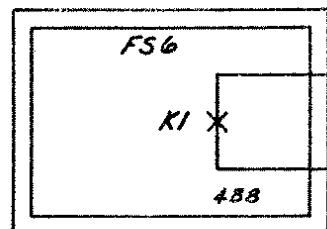
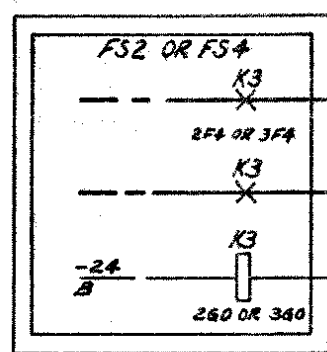
SD-IC245-01-89

65



- NOTES:**
1. SEE BSP SECTION 502-201-102.
 2. SEE BSP SECTION 443-220-100.
 3. SEE BSP SECTION 443-110-400.

FS 27
LINE PICKUP KEYS
SEE NOTE 1



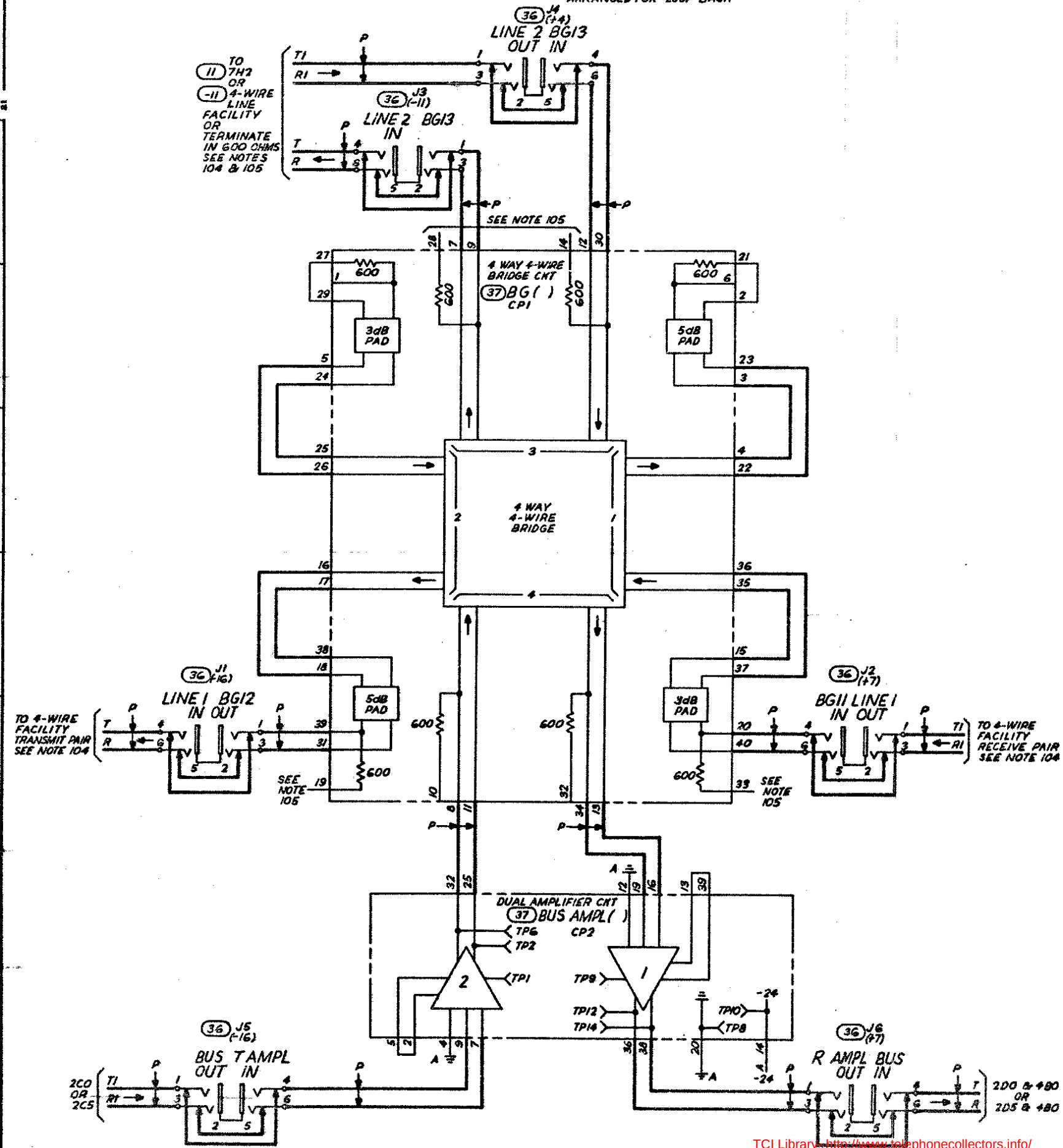
NOTE:
1. FOR ADDITIONAL PICKUP KEY POSITIONS
SEE CIRCUIT NOTE 125.

FS 28
4-WIRE BRIDGE AND AMPLIFIER
ARRANGED FOR LOOP-BACK

DRAWING
ISSUE
53

A
B
C
D
E
F
G
H

A
B
C
D
E
F
G
H



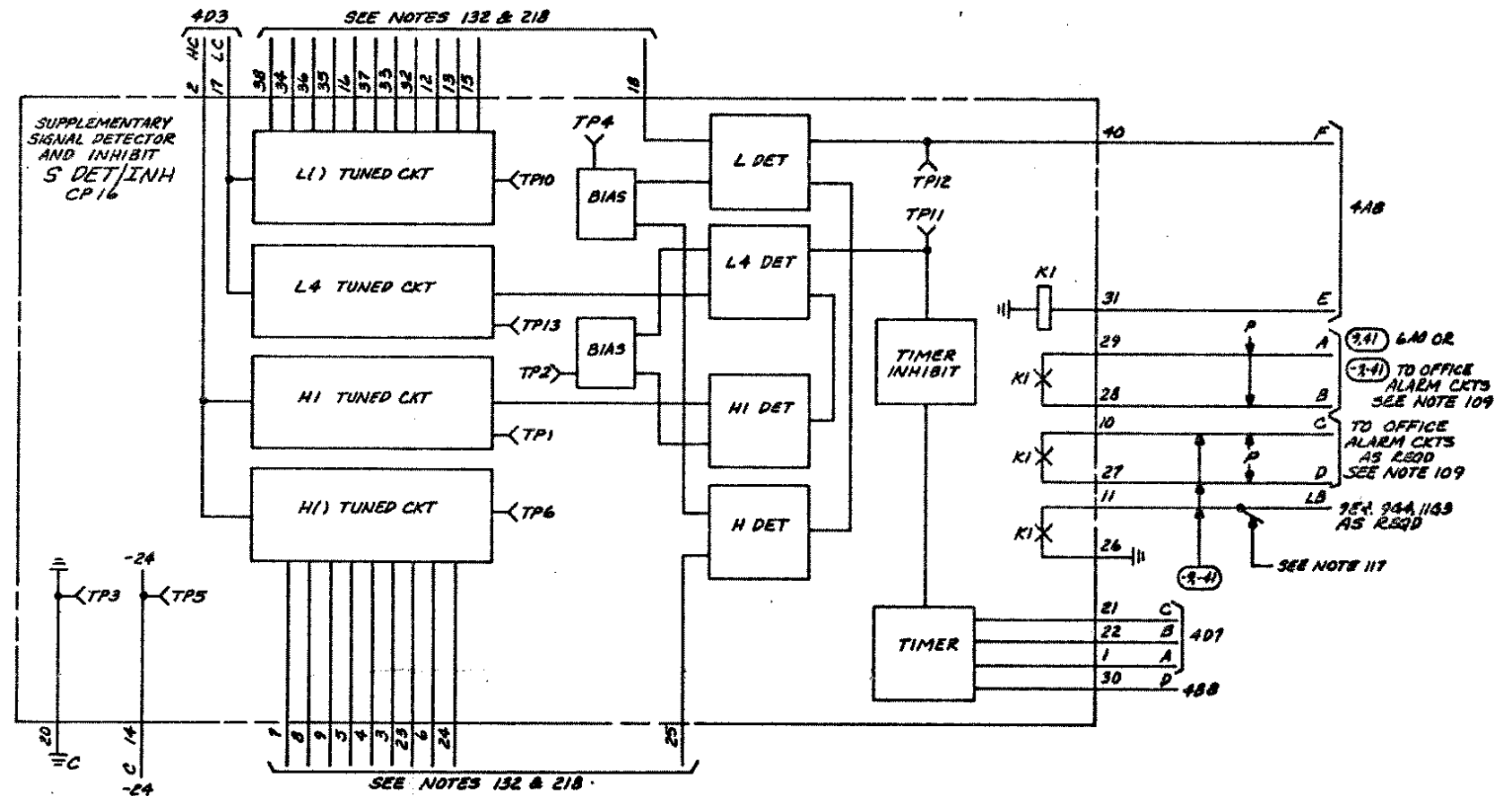
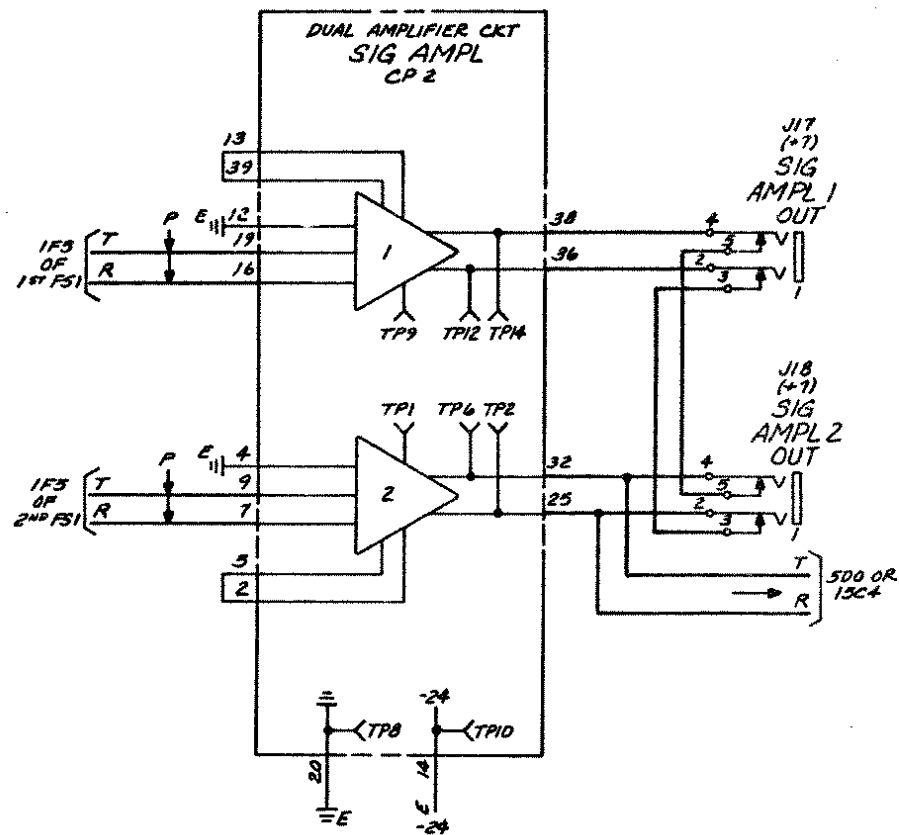
SD-1C245-01-B12

4-WIRE LINE CONNECT CKT
ARRANGED FOR DIALED CUT-THROUGH

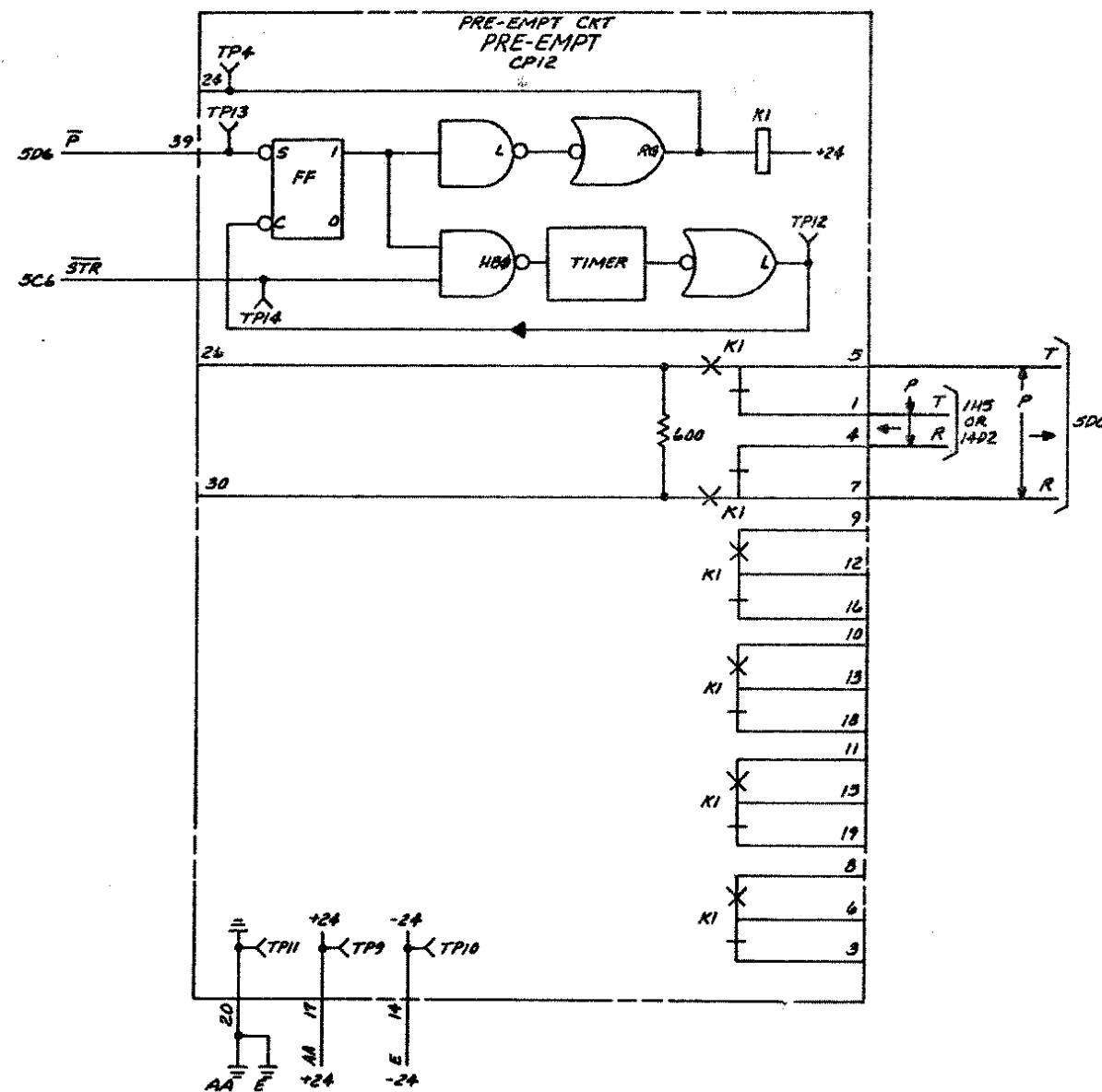


FS 30 SIGNALING AMPLIFIER CKT

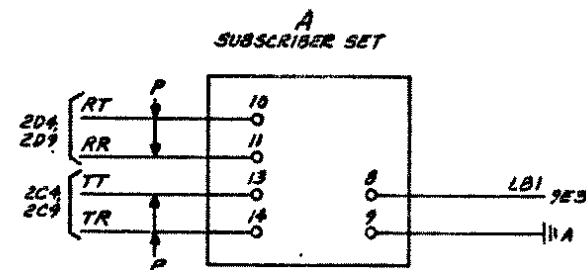
FS 31 SUPPLEMENTARY SIGNAL DETECTOR WITH INHIBIT CKT



FS 32
TOUCH-TONE RECEIVER INHIBIT CKT



FS 33
OUTDOOR HANDSET CKT
SEE NOTE 1 & 116



NOTES:
1. SEE BSP SECTION 502-504-117.

111B

APP FIG. 1

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
BG() (CP1)	182	SEE	ED-1C304
BUS AMPL(CP2)	163	NOTE	ED-1C305
		201	

APP FIG. 2

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
BAT FEED(CP9)	2A2	SEE	ED-1C311-G2 (MD)
		NOTE	ED-1C311-G5
		201	

APP FIG. 3 (MFR DISC.)

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
BAT FEED(CP8)	2A7	SEE	ED-1C311-G1
		NOTE	SUPL BAT FEED(CP11) JA2
		201	

APP FIG. 4

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
ED-1C311-G4 (MD)		SEE	ED-1C311-G4 (MD)
		NOTE	SUPL BAT FEED(CP10) JA7
		201	

APP FIG. 5 (MFR DISC.)

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
ED-1C311-G3		SEE	ED-1C311-G3
		NOTE	
		201	

APP FIG. 6

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
SIG RCVR(CP3)	4A1	SEE	ED-1C306-G1 (MD)
		NOTE	ED-1C306-G2
		201	

APP FIG. 7

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
SUPL S DET(CP4)	4E2	SEE	ED-1C307-G1 (MD)
		NOTE	ED-1C307-G2
		201	

APP FIG. 8

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
DECODER(CP5)	5E1	SEE	ED-1C308
DECODER(CP6)	5A4	NOTE	ED-1C309
DECODER(CP7)	5A8	201	ED-1C310

APP FIG. 9 (MFR DISC.)

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
CALL-RECALL(CP13)	6A2	SEE	ED-1C313
		NOTE	
		201	

APP FIG. 10 (A & M ONLY)

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
PRE-EMPT(CP12)	6A7	SEE	ED-1C312-G1 (MD)
		NOTE	BG() (CP1)
		201	ED-1C312-G2

APP FIG. 11

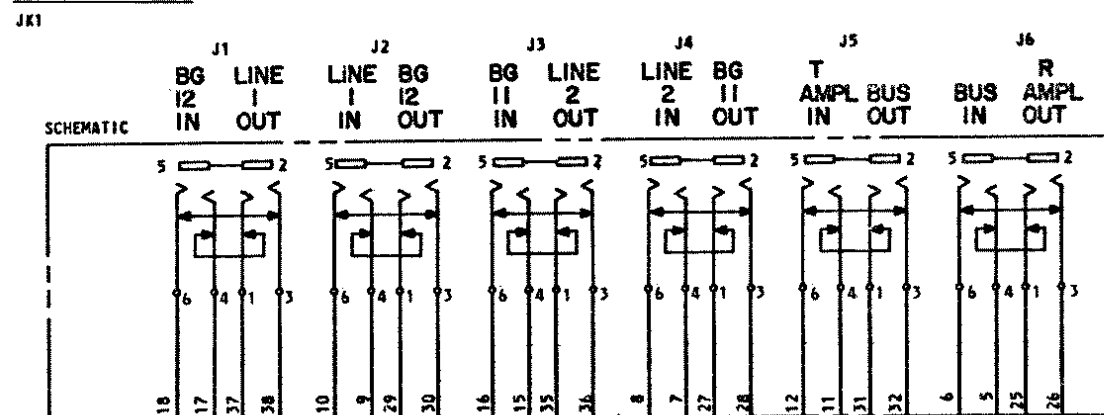
CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
LINE 2 AMPL(CP2)	7B2	SEE	ED-1C304
		NOTE	ED-1C305
		201	

APP FIG. 12

CIRCUIT PACK	FS	EQPT	CODE
DESIG	LOC	LOC	
LC() AMPL(CP2)	8A1	SEE	ED-1C305-G1 (MD)
LC() (CP14)	8A3	NOTE	ED-1C314-G2
		201	

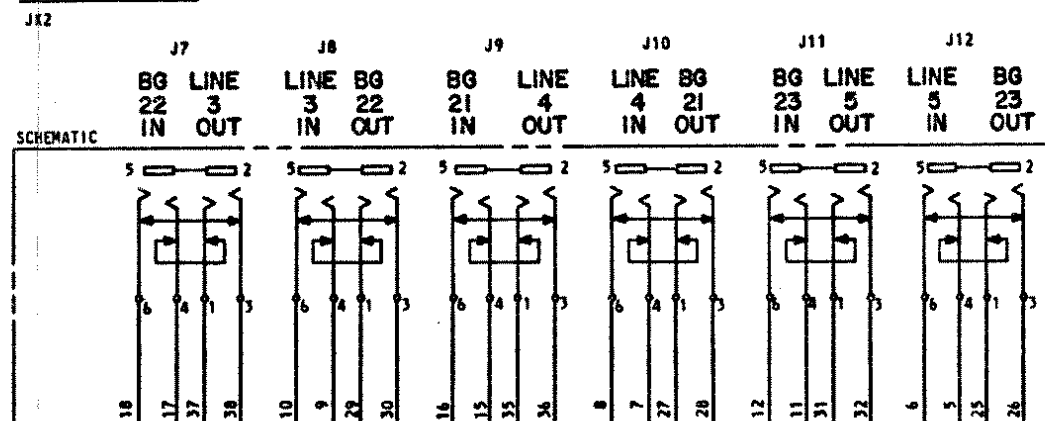
APP FIG. 13

JACK UNIT (PLUG-IN)



APP FIG. 14

JACK UNIT (PLUG-IN)

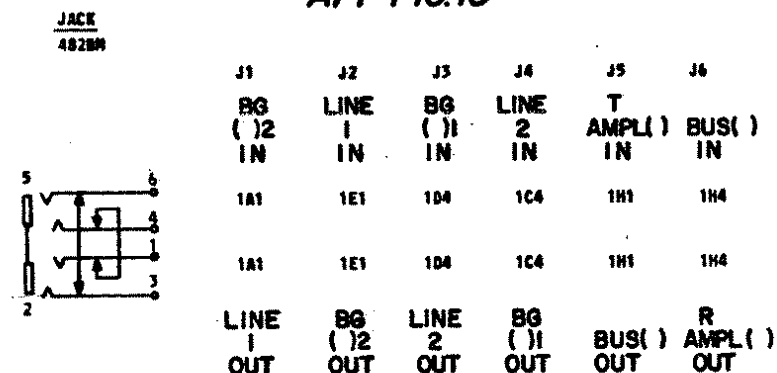
JACK UNIT
ED-1C315-()-G1 E/M

JACK	DESIG	LOC	CODE
J1	1A1	4828M	
J2	1E1	4828M	
J3	1D4	4828M	
J4	1C4	4828M	
J5	1H1	4828M	
J6	1H4	4828M	

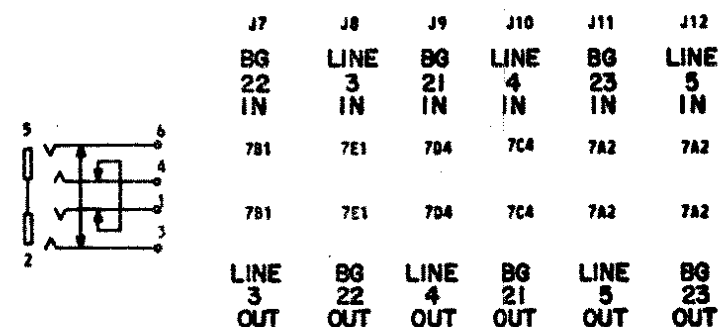
JACK UNIT
ED-1C315-()-G2 E/M

JACK	DESIG	LOC	CODE
J7	7B1	4828M	
J8	7E1	4828M	
J9	7D4	4828M	
J10	7C4	4828M	
J11	7A2	4828M	
J12	7A2	4828M	

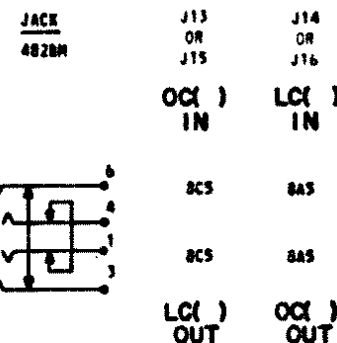
APP FIG. 15



APP FIG. 16

JACK
4828M

APP FIG. 17



GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

SD-IC245-OI-CI

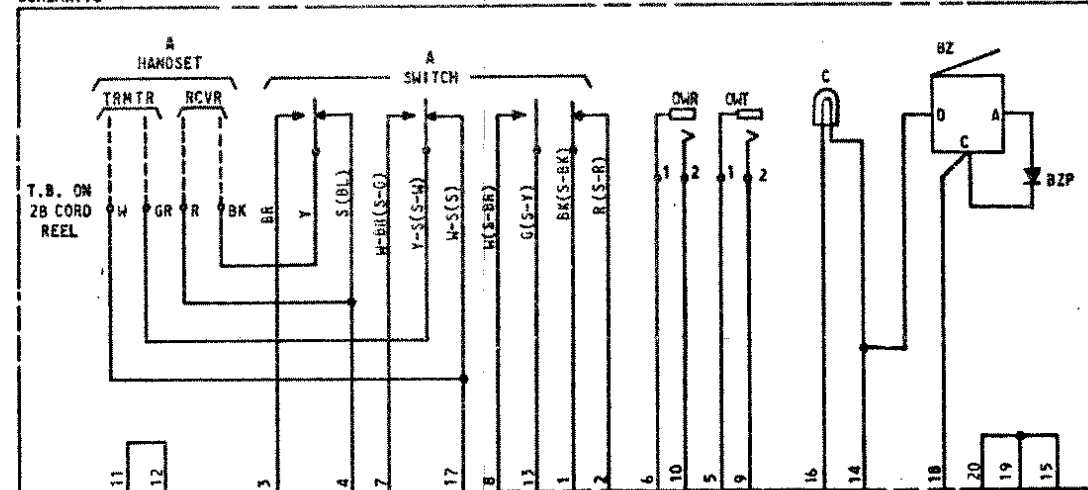
7B

APP FIG. 18

KEY	LC ()	LCR ()	LAMP	LOC	CODE
547A			DESIG	8E9	A1 (RD)
			LC ()	13E2	A1 (RD)
	8E2	8D2			
	13D4	13E4			

HANDSET UNIT (PLUG-IN)
HANDSET

SCHEMATIC

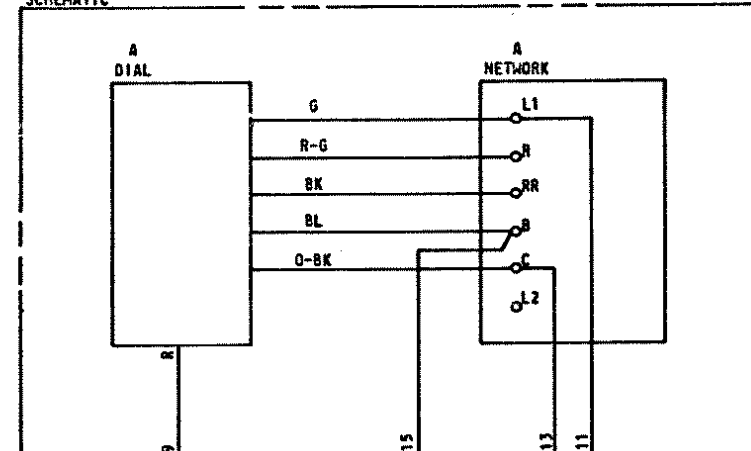
HANDSET UNIT
ED-6G190-()-G2 E/W

APP	DESIG	CONT	LOC	CODE
SET, HAND	A		988	65GR-61
SWITCH (HANDSET)	A	BR	988	235F
		Y		
		S		
		W-BR	988	
		Y-S		
		W-S		
		W	985	
		G		
JACK	OWR	1	9A1	223A
		2		
	OWT	1	9B1	223A
		2		
BUZZER	BZ		904	7F-49
DIODE	BZP		9E4	446F
LAMP	C		9F4	A1

APP FIG. 20

DIAL UNIT (PLUG-IN)
TT DIAL

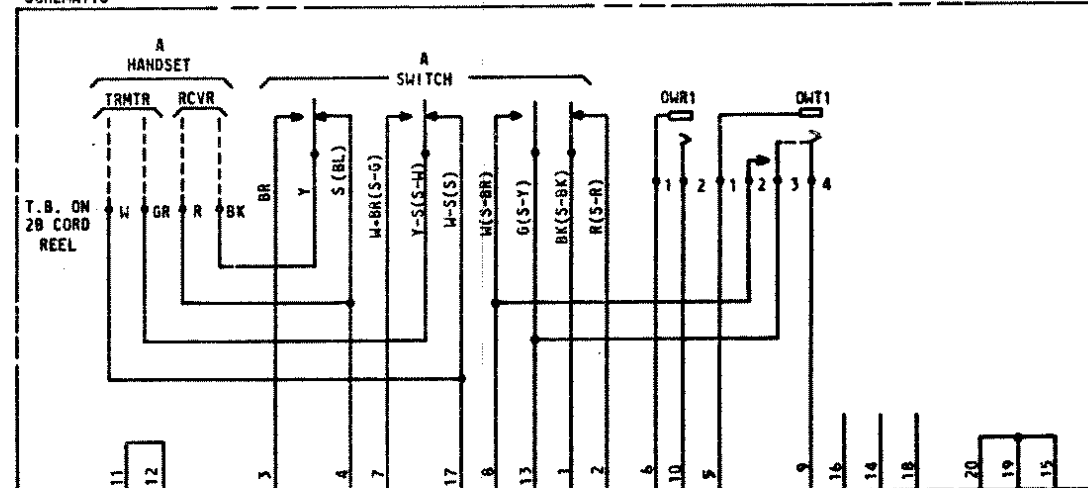
SCHEMATIC

DIAL UNIT
ED-6G191-()-G2 E/W

DIAL	LOC	CODE
DESIG		
A	9A3	35C3A
NETWORK	LOC	CODE
DESIG		
A	9A5	425E

HANDSET UNIT (PLUG-IN)
HANDSET

SCHEMATIC

HANDSET UNIT
ED-6G190-()-G3 E/W

APP	DESIG	CONT	LOC	CODE
SET, HAND	A		988	65GR-61
SWITCH (HANDSET)	A	BR	988	235F
		Y		
		S		
		W-BR	988	
		Y-S		
		W-S		
		W	985	
		G		
JACK	OWR1	1	10F2	223A
		2		
	OWT1	1, 4	10G2	215A
		2, 3	9C6	

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

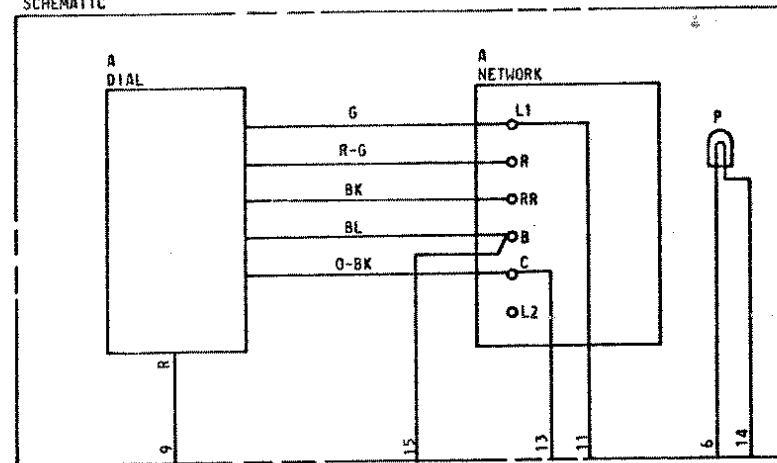
SD-1C245-01-C2

BELL TELEPHONE LABORATORIES
INCORPORATED

6S

APP FIG. 22

DIAL UNIT (PLUG-IN)
TY DIAL
SCHEMATIC



DIAL UNIT
ED-6G191-()-G3E/H

DIAL	LOC	CODE
DESIG		
A	9A3	35C3A

NETWORK	LOC	CODE
DESIG		
A	9A5	425E

LAMP	LOC	CODE
DESIG		
P	10D4	A1

APP FIG. 25 (MFR DISC.)

SET, LOUDSPEAKER

DESIG	LOC	CODE
LS	10B4	106A*

* LOUDSPEAKER SET IS PROVIDED WITH 2Y LAMP WHICH SHALL BE DISCARDED AND REPLACED WITH A1 LAMP.

APP FIG. 26

SIGNAL, HORN

DESIG	LOC
A	10B7

CODE
KS-16301, L8 BACKBOX
KS-16301, L15 RELAY
AND
L2(115V DC) HORN(MFR DISC)
OR
L5(115V AC) HORN
OR
L6(48V AC) HORN(MFR DISC)
(SEE NOTE 217)

APP FIG. 23

JACK
223A

OWT OWR
9B1 9A1
9B1 9A1

APP FIG. 24

SET, HEAD TELEPHONE

DESIG	LOC	CODE
A	9B2 OR 10G3	52PR

APP FIG. 27 (MFR DISC.)

SET, SUBSCRIBER

DESIG	LOC	CODE
A	10B2	695A

APP FIG. 28

SET, TELEPHONE

DESIG	LOC	CODE
A	9D8	2504B-() SEE NOTE 209

CONNECTOR, JACK

DESIG	LOC	CODE
A	9D8	KS-16690, L1

APP FIG. 29

SET, TELEPHONE

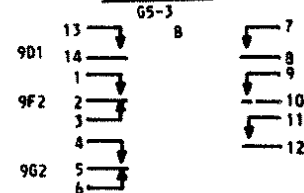
DESIG	LOC	CODE
B	9D8	2554B-() SEE NOTE 210

APP FIG. 30

SET, HAND

DESIG	LOC	CODE
B	9E2	G5GR-()

HANDSET MTG



RESISTOR

DESIG	LOC	CODE
R1	9E1	KS-14603, L3A 147Ω

APP FIG. 31

BUZZER

DESIG	LOC	CODE
BZ	9D4	7F-49

DIODE

DESIG	LOC	CODE
BZP	9D4	446F

APP FIG. 32

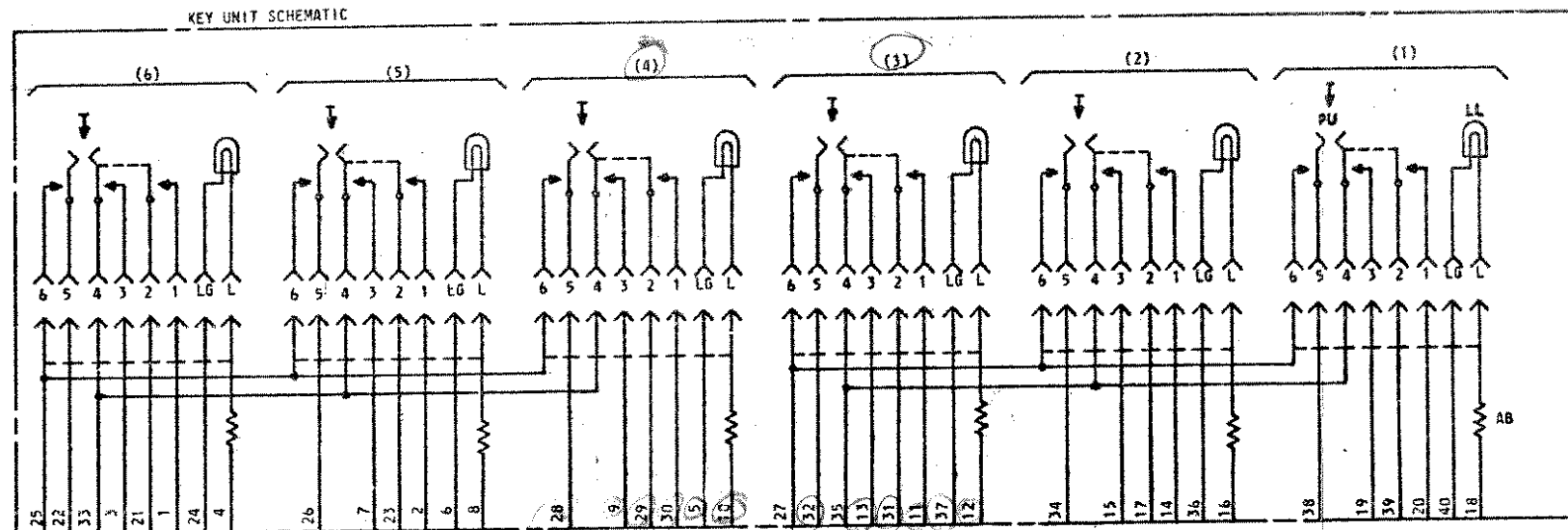
LAMP

DESIG	LOC	CODE
C	9G4	A1

APP FIG. 33

KEY UNIT (PLUG-IN)

KEY UNIT SCHEMATIC



KEY UNIT (PLUG IN) ED-66193-() 05E/W

53502 KEY*					PLUG		RESISTOR	
DESIG	CONT	LOC	LAMP		CODE	DESIG	LOC	CODE
(1)**			DESIG	LOC				
(2)	PU	1-2	11B6	LL	508A	[6]AB		KS-20289, L6C 348
(3)					508B			
(4)					508C			
(5)					508D			
(6)					508E			
					508F			

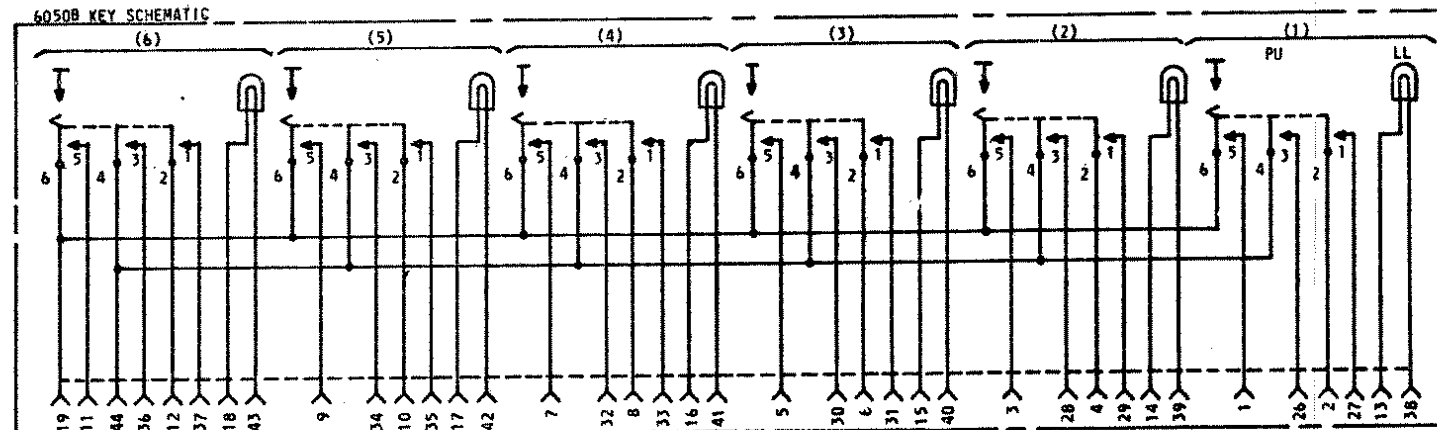
* PROVIDED WITH [6] 53A LAMPS

** NUMBERS IN PARENTHESIS ARE FOR REFERENCE ONLY AND ASSOCIATE KEY SEGMENT WITH PLUGS AND RESISTORS.

APP FIG. 34

(SEE NOTE 214 FOR CABLES REQ'D)

6050B KEY SCHEMATIC



KEY
E/W LAMP*

6050B-() KEY				
DESIG	CONT	LOC	52A LAMP	
			DESIG	LOC
(1)**	PU	1-2	11B6	LL
(2)				
(3)				
(4)				
(5)				
(6)				

* KEY IS PROVIDED WITH 51A LAMPS WHICH ARE TO BE DISCARDED AND REPLACED BY 52A LAMPS.

** NUMBERS IN PARENTHESIS ARE FOR REFERENCE ONLY.

APP FIG. 35

SEE NOTE 215

SET, HAND

DESIG	LOC	CODE
C	9B2	G3CR-()

SD-10245-01-C4

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

2

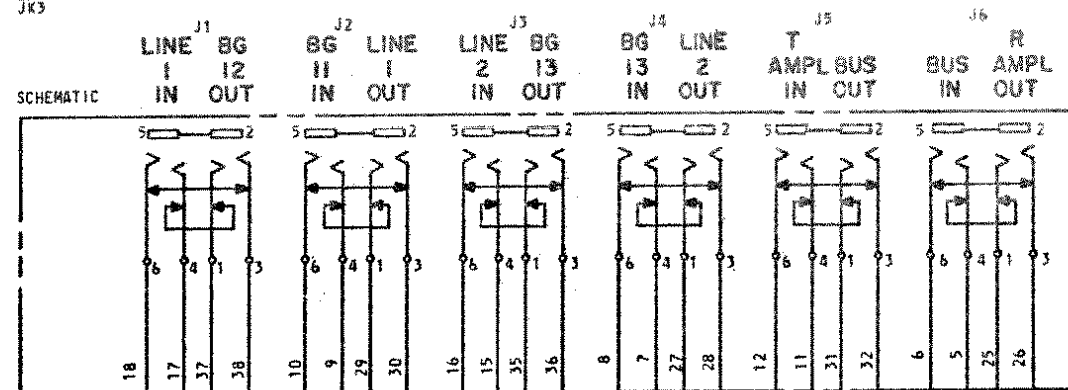
SD-10245-01-C4

BELL TELEPHONE LABORATORIES
INCORPORATED

65

ISSUE
11B

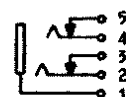
APP FIG. 36

JACK UNIT (PLUG-IN)
JK3JACK UNIT
ED-1C315-()-G3E/W

JACK

DESIG	LOC	CODE
J1	12F1	4828M
J2	12F4	4828M
J3	12B2	4828M
J4	12A3	4828M
J5	12H1	4828M
J6	12H4	4828M

APP FIG. 40

JACK
239A

J17	J18
SIG	SIG
AMPL	AMPL
1	2
OUT	OUT
14C2	14D2

APP FIG. 43

CIRCUIT PACK

DESIG	FS LOC	EQPT LOC	CODE
S DET/INH (CP16)	14C3	SEE NOTE 201	ED-2C439-() GR1

APP FIG. 41

CIRCUIT PACK

DESIG	FS LOC	EQPT LOC	CODE
CALL-RECALL (CP15)	6A2	NOTE 201	ED-1C767

APP FIG. 44

CIRCUIT PACK

DESIG	FS LOC	EQPT LOC	CODE
PRE-EMPT (CP12)	15A2	SEE NOTE 201	ED-1C312-() GR2

APP FIG. 37

CIRCUIT PACK

DESIG	FS LOC	EQPT LOC	CODE
BG() (CP1)	12C2	SEE	ED-1C304
BUS AMPL() (CP2)	12B3	NOTE 201	ED-1C305

APP FIG. 38

CIRCUIT PACK

DESIG	FS LOC	EQPT LOC	CODE
LC AMPL (CP2)	13A1	SCE	ED-1C305
LC (CP14)	13A3	NOTE	ED-1C314
CALL RECALL (V) CP13 (MD)	13A7	201	ED-1C313
(U) CP15	13A7		ED-1C767

APP FIG. 39

CIRCUIT PACK

DESIG	FS LOC	EQPT LOC	CODE
SIG AMPL (CP2)	14B1	SEE NOTE 201	ED-1C305

APP FIG. 42

SET, LOUDSPEAKER

DESIG	FS LOC	EQPT LOC	CODE
LS	10B4	SEE NOTE 129	1060

APP FIG. 45

SET, SUBSCRIBER

DESIG	LOC	CODE
A	19B7	526A

CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE PER
A	1-1/3	-24 SIG	APP FIG. 11, 37, 38, 39, AND [2] APP FIG. 1, 12, 18, AND [5] APP FIG. 19, 22, 31, 32
B	1-1/3	-24 SIG	APP FIG. 2 OR 3 AND [4] APP FIG. 4 OR 5
C	1-1/3	-24 SIG	APP FIG. 6, 7
D	1-1/3	-24 SIG	[5] APP FIG. 26 [5] APP FIG. 9 OR 41
E	1-1/3	-24 SIG	APP FIG. 8, 10
F	1-1/3	-24 SIG	[5] APP FIG. 25
AA	1-1/3	+24 SIG	APP FIG. 8, 10

BATTERY SYMBOL		VOLTAGE RANGE	
	-24		21-27
	+24		21-27

CURRENT DRAINS AMPERES	LIST 1 AVERAGE DRAIN PER BUSY HOUR		LIST 2 CURRENT DRAIN FOR DISTRIBUTION EQPT	
	-24	+24	-24	+24
SINGLE CODE AUX STATION J99340A	0.7	-	1.0	-
SINGLE CODE MAIN STATION J99340B	1.0	-	1.5	-
MULTIPLE CODE MAIN OFFICE J99340C	1.3	0.6	2.8	0.6
MULTIPLE CODE MAIN OFFICE J99340D	1.9	0.5	4.3	0.5
MULTIPLE CODE MAIN OFFICE J99340E	1.6	0.5	3.3	0.5
APP FIG 19, 20	0.1		0.1	
APP FIG 19, 22	0.15		0.15	
APP FIG 42	0.2		0.2	
APP FIG 31	0.05		0.05	
APP FIG 32	0.05		0.05	
SINGLE CODE MAIN STATION J99340F	1.0	-	1.5	-
MULTIPLE CODE MAIN OFFICE J99340G	1.3	0.6	2.6	0.6

FEATURE OR OPTION	APP FIG.	APP OR WRO	QUANTITY
AUXILIARY STATION SINGLE CODE (SEE BD1)			
BRIDGE AND AMPLIFIER	WITH TALKBACK	1	
	WITH LOOPBACK	37	
TALK BATTERY FEED		2	
SUPPLEMENTARY TALK BATTERY FEED		4	1 PER CKT
SIGNAL RECEIVER AND DETECTOR	SINGLE DIGIT CODE	6	
	TWO DIGIT CODE	7	
	TWO DIGIT CODE WITH INHIBIT CKT	43	1 PER APP FIG. 6
LINE TEST AND MTCE JACKS	WITH TALKBACK	13	
	WITH LOOPBACK	36	1 PER CKT
HANDSET, JACKS, LAMP AND BUZZER		19	
TOUCH-TONE® DIAL		20	

CIRCUIT NOTES: (CONT)

FEATURE OR OPTION	APP FIG.	APP OR WRO	QUANTITY
MAIN STATION SINGLE CODE (SEE BD2)			
BRIDGE AND AMPLIFIER	WITH TALKBACK	1	
	WITH LOOPBACK	37	1 PER CKT
TALK BATTERY FEED		2	
SUPPLEMENTARY TALK BATTERY FEED		4	AS REQD MAX 3 PER CKT
SIGNAL RECEIVER AND DETECTOR	SINGLE DIGIT CODE	6	1 PER CKT
	TWO DIGIT CODE	7	1 PER APP FIG. 6
	TWO CODE DIGIT WITH INHIBIT CKT	43	
LINE TEST AND MTCE JACKS	WITH TALKBACK	13	
	WITH LOOPBACK	36	
CALL-RECALL-ALERT		41	
BRIDGE AND AMPLIFIER FOR ADDITIONAL LINES AND/OR LINE CONNECT		11	1 PER CKT
TEST AND MAINTENANCE JACKS FOR ADDITIONAL LINES		14	
MULTIPLE CODE SIGNALING UP TO 5 CODES PER LOCATION (SEE BD3)			
BRIDGE AND AMPLIFIER WITH TALKBACK		1	
TALK BATTERY FEED		2	1 PER CKT
SUPPLEMENTARY TALK BATTERY FEED		4	AS REQD SEE BD3
TOUCH-TONE® RECEIVER AND DECODER	2 DIGIT	8	W
	3 DIGIT	X	1 PER CKT
TOUCH-TONE® RECEIVER INHIBIT CKT		44	
CALL-RECALL-ALERT	FIRST APP FIG. 41	41	2
	ADDITIONAL APP FIG. 41	Y	1 PER STATION CODE, SEE BD3
	TIMER	T	
LINE TEST AND MAINTENANCE JACKS		15	
BRIDGE AND AMPLIFIER FOR ADDITIONAL LINES AND/OR LINE CONNECT		11	1 PER CKT
TEST AND MAINTENANCE JACKS FOR ADDITIONAL LINES		16	
LINE CONNECT	RELAY AND AMPLIFIER	12	AS REQD MAX 2 PER CKT
	KEYS AND LAMPS	18	1 PER APP FIG. 12
TEST AND MAINTENANCE JACKS FOR LINE CONNECT		17	AS REQD MAX 2 PER CKT
OPERATORS POSITION FOR BAY MOUNTING ASSEMBLY SEE NOTE 213			
WITHOUT PICKUP	PLUG-IN HAND SET UNIT	19	
	PLUG-IN WITHOUT DIAL UNIT	20	
	WITH PREEMPT	22	
	LOUDSPEAKER	25	MAX 1 PER POSITION MAX 1 POSITION PER APP FIG 2 OR 4
	PLUG-IN HAND SET UNIT	19	
WITH PICKUP	PLUG-IN DIAL UNIT	20	
	PLUG-IN KEY UNIT	33	
MISC MOUNTED OPERATOR'S POSITION	DESK TELEPHONE SET	WITHOUT PICK-UP	28
		WITH PICK-UP	29, 34
	WALL TELEPHONE SET	WITHOUT PICK-UP	29
		WITH PICK-UP	29, 34

CIRCUIT NOTES: (CONT)

FEATURE OR OPTION	APP FIG.	APP OR WRO	QUANTITY
MISC MOUNTED TEL JACKS AND HAND SET APPEARANCES			
	TEL JACKS	23	AS REQD SEE NOTE 211
	HEAD SET	24	
	OUTDOOR HAND SET	45	AS REQD
	HAND SET WITH HAND SET MTG	30	
	HAND SET	35	
MISC MOUNTED SIGNALS	HORN SIGNAL	26	MAX 1 PER APP FIG. 9
	BUZZER	31	AS REQD
	LAMP	32	AS REQD SEE NOTE 212
MISC MOUNTED LOUDSPEAKER			
		42	AS REQD MAX 2 PER APP FIG 2, 3 4 OR 5
MULTIPLE CODE SIGNALING FOR TWO ORDER CKTS UP TO 5 CODES PER LOCATION (SEE BD4)			
BRIDGE AND AMPLIFIER WITH TALKBACK		1	2 PER CKT
TALK BATTERY FEED		2	1 PER APP FIG. 1
SUPPLEMENTARY TALK BATTERY FEED		4	AS REQD MAX 4 PER APP FIG. 1 SEE NOTE 219
SIGNALING AMPLIFIER		39	
TOUCH-TONE® RECEIVER AND DECODER	2 DIGIT	8	W
	3 DIGIT	X	1 PER CKT
TOUCH-TONE® RECEIVER INHIBIT CKT		44	
CALL-RECALL-ALERT	FIRST APP FIG. 41	41	Z
	ADDITIONAL APP FIG. 41	Y	1 PER STATION CODE, MAX 5 PER CKT
	TIMER	T	
LINE TEST AND MAINTENANCE JACKS		15	1 PER APP FIG. 1
TEST AND MAINTENANCE JACKS FOR SIGNALING AMPLIFIER		40	1 PER CKT
MULTIPLE CODE SIGNALING FOR TWO ORDER CKTS AND DIALED CUT THROUGH FOR UP TO 5 CODES PER LOCATION (SEE BD5)			
BRIDGE AND AMPLIFIER WITH TALKBACK		1	2 PER CKT
TALK BATTERY FEED		2	1 PER APP FIG. 1
SUPPLEMENTARY TALK BATTERY FEED		4	AS REQD MAX 2 PER APP FIG. 1
SIGNALING AMPLIFIER		39	
TOUCH-TONE® RECEIVER AND DECODER	2 DIGIT	8	W
	3 DIGIT	X	1 PER CKT
TOUCH-TONE® RECEIVER INHIBIT CKT		44	
CALL-RECALL-ALERT	FIRST APP FIG. 41	41	Z
	ADDITIONAL APP FIG. 41	Y	1 PER STATION CODE, MAX 4 PER CKT
	TIMER	T	
LINE CONNECT CKT		38	
LINE CUT KEY AND LAMP CKT		18	1 PER CKT
TEST AND MAINTENANCE JACKS FOR SIGNALING AMPL		40	
LINE TEST AND MAINTENANCE JACKS		15	1 PER APP FIG. 1

CIRCUIT NOTES: (CONT)

RECORD OF APP FIGURES, WIRING AND APPARATUS CHANGES	IF JOB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT		
CHANGED ON ISS				STD	ASM	MD
78			127	4	3	
				4	5	
				41	9	
					10	
						25
108			131			21
118				45		27

104. TRANSMISSION LEVELS ARE -16 dB TRANSMITTING AND +7 dB RECEIVING. IF THE CONNECTING CIRCUIT REQUIRES GAIN, LOSS AND/OR EQUALIZATION THE INTERCONNECTION SHOULD BE MADE VIA A 44V4 TYPE TELEPHONE REPEATER OR EQUIVALENT. (SEE BSP SECTIONS 332-104-100 AND AB24.100.01).
105. WHEN ALL PORTS OF THE 4-WAY 4-WIRE BRIDGE ARE NOT USED THE UNUSED PORTS MUST BE TERMINATED IN 600 OHMS. THIS MAY BE ACCOMPLISHED IN ACCORDANCE WITH NOTE 206, OR PORTS MAY BE TERMINATED BY CONNECTING T, R AND T1, R1 LEADS TO MULTI-STATION LINE CIRCUIT FIGURE 21, OR EQUIVALENT.
106. LOUDSPEAKER CONNECTIONS MAY BE MADE TO ANY TALK BATTERY FEED CIRCUIT AND MAY BE WIRED TO PROVIDE (a) NO SPEAKER CUT-OFF, (b) SPEAKER CUT-OFF BY ASSOCIATED OFF-HOOK TELEPHONE SET AT THE SIGNALING POSITION, OR (c) SPEAKER CUT-OFF BY ASSOCIATED OFF-HOOK TELEPHONE SET OR ASSOCIATED ACTIVE JACK AT ANY POSITION. FOR REQUIRED WIRING CONNECTIONS SEE NOTE 202. IT IS RECOMMENDED THAT A LOUDSPEAKER LOCATED IN THE VICINITY OF ANY TELEPHONE INSTRUMENT BE PROVIDED WITH SPEAKER CUT-OFF BY THAT INSTRUMENT TO PREVENT ACOUSTIC FEEDBACK. CONNECTIONS MAY BE MADE TO REMOTELY LOCATED JACKS TO FACILITATE PORTABLE SPEAKERS.
107. THE SIGNAL RECEIVER CIRCUIT MUST BE STRAPPED IN ACCORDANCE WITH NOTE 203 FOR THE SINGLE DIGIT STATION CODE OR THE FIRST DIGIT OF A TWO-DIGIT STATION CODE.
108. THE SUPPLEMENTARY SIGNAL DETECTOR MUST BE STRAPPED IN ACCORDANCE WITH NOTE 204 FOR THE SECOND DIGIT OF A TWO-DIGIT STATION CODE. FOR A TWO DIGIT CODE, THE FIRST AND SECOND DIGITS MUST BE DIFFERENT NUMBERS, i.e. CODES 00, 11, 22, ... 99 ARE NOT ALLOWED.
109. CONNECT AS REQUIRED TO GIVE PROPER AUDIBLE AND VISUAL SIGNALS PROVIDED FOR SERVICE ALARMS: ALARM LEADS ARE DESIGNATED AS FOLLOWS:

ALARM CIRCUITS	LEADS			
	SERVICE ALARM DESIGNATIONS			
	SA	SAW	SAV	SAVR
TD-3 AND TH-3 RADIO OFFICE AUDIBLE AND VISUAL ALARM CKT	A	AMTH	-	-
TD-3 AND TH-3 RADIO DISTRIBUTION FUSE AND INDIVIDUAL ALARMS FOR COMMON OFFICE AND BLDG EQPT	-	-	F	FOTH
ANNUNCIATOR CKT	A	-	AC	-
AUDIBLE ALARM AND PILOT LAMP CKT	A	-	SV	-
AUDIBLE AND VISUAL ALARM CKT	A	-	SV	-

* CONNECT TO LOCAL CKT GRD. IN THESE CASES PAIRING OF LEADS IS NOT REQUIRED.

GENERAL PURPOSE 4-WIRE ORDER CKT

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CIRCUIT NOTES: (CONT)

110. THE DECODER MUST BE STRAPPED IN ACCORDANCE WITH NOTE 205. FOR 3 DIGIT OFFICE CODE, ② OPTION IS REQUIRED. FOR 2 DIGIT OFFICE CODE, ③ OPTION IS REQUIRED AND STRAPPING FOR THE MIDDLE DIGIT IS NOT REQUIRED. FROM ONE TO FIVE SEPARATE LAST DIGITS MAY BE USED BY PROVIDING A CONNECTION BETWEEN CP13 (CALL-RECALL-ALERT CKT) AND THE ASSOCIATED STATION CODE (SC) OUTPUT OF CP7.

111. RELAY (K4) OF FS 9 OPERATES UPON RECEPTION OF THE INCOMING ALERT SIGNAL. THE OUTPUT LEAD H MAY BE CONNECTED TO MISC. HORN SIGNAL. LEADS A1, B1, C1, D1 MAY BE CONNECTED AS REQUIRED TO GIVE AUDIBLE AND VISUAL SIGNALS PROVIDED FOR SERVICE ALARMS. ALARM LEADS ARE DESIGNATED AS FOLLOWS:

ALARM CIRCUITS	LEADS			
	A1	B1	C1	D1
	SAT	SART	SAV1	SAV2
TD-3 AND TH-3 RADIO OFFICE AUDIBLE AND VISUAL ALARM CKT	A	ARTN	-	-
TD-3 RADIO DISTRIBUTION FUSE AND INDIVIDUAL ALARMS FOR COMMON OFFICE AND BLDG EQPT	-	-	F	FRTN
ANNOUNCIATOR CKT	A	*	AC	*
AUDIBLE ALARM AND PILOT LAMP CKT	A	*	SV	*
AUDIBLE AND VISUAL ALARM CKT	A	*	SV	*

* CONNECT TO LOCAL CKT GRD. IN THESE CASES PAIRING OF LEADS IS NOT REQUIRED.

112. RELAY (K8) OPERATED PREVENTS LOCK-UP OF SERVICE ALARM OUTPUTS ON INCOMING SIGNALING. THIS IS PROVIDED BY A LOCKING CONTACT CLOSURE IN CONNECTING CIRCUIT AND SHOULD BE USED ONLY IN UNATTENDED OR PARTIALLY ATTENDED OFFICES. THE CONTROL SHOULD APPEAR AT ONLY ONE LOCATION WITHIN THE OFFICE. LEADS L3 AND L63 FROM RELAY (K8) CONTACT 6 MAY BE CONNECTED TO PROVIDE A VISUAL INDICATION AS REQUIRED. ALARM CIRCUIT CONNECTING LEADS ARE DESIGNATED AS FOLLOWS:

ALARM CIRCUITS	LEADS	
	G	GRTN
TD-2, TD-3 AND TH-3 RADIO DISTRIBUTION FUSE AND INDIVIDUAL ALARMS FOR COMMON OFFICE AND BLDG EQPT	G	GRTN

113. IN OFFICES PROVIDED WITH MORE THAN ONE STATION CODE ONE FS9 IS PROVIDED WITH EACH SEPARATE CODE. THE CR AND CRG LEADS SHOULD BE CONNECTED TO THE TALK BATTERY FEED CIRCUIT(S) USED WITH THE TELEPHONE INSTRUMENT(S) ASSOCIATED WITH THE SAME CODE.

114. CONNECT AS REQUIRED TO PROVIDE A 300 ms GROUND FOR REMOTE OPERATION OF LINE CONNECT (LEADS 1 AND 2) OR LINE CONNECT RELEASE (LEADS 3 AND 4).

CONTROL CIRCUITS	LEADS			
	1	2	3	4
E TYPE STATUS REPORTING AND CONTROL SYSTEM REMOTE SWITCH CKT	RS	RSR	RS	RSR

CIRCUIT NOTES: (CONT)

119. CONNECT AS REQUIRED TO PROVIDE A STATUS INDICATION OF STATE OF LINE CONNECT CIRCUIT.

CONTROL CIRCUITS	LEADS	
	5	6
E TYPE STATUS REPORTING AND CONTROL SYSTEM STATUS INPUT CKT	SI	SIR

116. MULTIPLE CONNECTION OF JACKS FOR USE OF HEADSETS AND/OR HANDSETS MAY BE MADE TO TERMINALS 21, 23 OR 29, 30 (OF CP9 OR CP11) TO PROVIDE CONVENIENT ACCESS APPEARANCES. THEY SHOULD BE WIRED TO INCLUDE NO MORE THAN 50-OHM LOOP RESISTANCE BETWEEN THE TALK BATTERY FEED AND THE JACK APPEARANCE. DIRECT CONNECTIONS OF HEADSETS AND/OR HANDSETS MAY ALSO BE MADE TO THESE TERMINALS. NOTE, HOWEVER, THAT SIMULTANEOUS USE OF MORE THAN THREE HEADSETS AND/OR HANDSETS PER CP9 OR CP11 TALK BATTERY FEED (I.E. THREE MULTIPLES AT TERMINALS 21, 23 OR 29, 30 OR COMBINATION THEREOF) WILL RESULT IN SEVERE DEGRADATION OF THE TRANSMIT POWER.

117. MULTIPLE CONNECTION OF LAMPS AND BUZZERS TO FS 6, FS 7, FS9 OR FS 31 SHOULD BE LIMITED TO A MAXIMUM TOTAL CURRENT DRAIN OF 500 MA.

118. ONE BATTERY FEED (CP9 OR CP11) CAN SUPPLY TWO APPEARANCES OF A TEL SET OR HANDSET WITH TT DIAL AND NETWORK. THREE APPEARANCES PER BATTERY FEED ARE TOLERABLE WHEN SPECIFICALLY REQUIRED. NOTE THE APPEARANCES MAY BE CONNECTED AT TERMINALS 7, 32 (WITHOUT PICKUP), OR 10, 13 (WITH PICKUP) OR A COMBINATION THEREOF.

119. LOUDSPEAKERS SHALL BE LIMITED TO A MAXIMUM OF 2 PER TALK BATTERY FEED.

120. UNDER APP FIG. OPTION 11 AND 12 THE FIRST LINE CONNECT CIRCUIT (FS12) SHOULD BE CONNECTED TO PORT 3 OF THE 4-WAY 4-WIRE BRIDGE (FS11). IF REQUIRED, A SECOND LINE CONNECT CIRCUIT (FS12) MAY BE CONNECTED TO PORT 1 OF THE 4-WAY 4-WIRE BRIDGE (FS11). IF THE SECOND LINE CONNECT CIRCUIT IS NOT REQUIRED, PORT 1 OF THE 4-WAY 4-WIRE BRIDGE (FS11) SHOULD BE WIRED IN ACCORDANCE WITH APP FIG. OPTION -12.

121. THE TOUCH-TONE[®] CALLING RECEIVER IS A J99289B,L2 UNIT MODIFIED TO OPERATE WITH -24 AND +24 VOLTS INSTEAD OF -48 VOLTS. REFER TO NOTE 208 FOR MODIFICATION.

122. WHEN A SINGLE JACK CIRCUIT APPEARANCE IS REQUIRED FOR MORE THAN ONE ORDER CIRCUIT IN CONJUNCTION WITH PICKUP KEYS, THE TRANSMIT AND RECEIVE PAIRS FROM MAKE CONTACTS OF THE K3 RELAY IN ASSOCIATED BATTERY FEEDS SHALL BE MULTIPLIED TOGETHER. THIS ALSO APPLIES WHEN A SINGLE HANDSET APPEARANCE PER FS16 IS REQUIRED.

123. UNDER APP FIG OPTION 38 THE SC5 LEAD IS CONNECTED TO CP13 (CKT5) TO PROVIDE CUT-THRU WHEN A 5 IS DIALED AS THE LAST DIGIT OF AN OFFICE CODE. THE NUMBER OF STATION CODES AVAILABLE IS THEREFORE LIMITED TO A MAXIMUM OF FOUR BY PROVIDING A CONNECTION BETWEEN CP13 (CKT1-4) AND THE ASSOCIATED STATION CODE (SC1-4) OUTPUT OF CP7.

124. WHEN HEAD SET IS NOT IN USE IT MUST BE UNPLUGGED TO ALLOW CALL RELAY TO RELEASE.

125. IF REQUIRED, A 6051B KEY UNIT WITH 12 PICKUP KEYS, MISC. MOUNTED, MAY OPTIONALLY BE USED TO ACCOMMODATE UP TO A MAX. OF 12 ORDER WIRES. IF EVEN A GREATER NUMBER OF ORDER WIRES ARE TO BE ACCOMMODATED, REFERENCE SHOULD BE MADE TO BSP 512-240-101 AND BSP 512-240-100. THE FORMER DESCRIBES 400 SERIES TYPE KEY MOUNTINGS IN MODULES OF 6, 12 AND 18 LINE SIZES, WHILE THE LATTER DESCRIBES 400 SERIES TYPE KEY MOUNTINGS IN MODULES OF 30, 60, 90 AND 120 LINE SIZES.

126. IF ALL-STATIONS ALARM IS NOT REQ'D REMOVE LEAD "AS" BETWEEN CP3 & CP4.

127. STARTING WITH ISSUE 7B TALK BATTERY FEED WITHOUT PICKUP APP. FIG. 3 & 5 HAVE BEEN RATED MD. THIS FEATURE IS IN TALK BATTERY FEED APP FIGS. 2 & 4.

128. LEAD E MAY BE LEFT UNCONNECTED IF ALL STATIONS ALERT IS NOT REQUIRED FOR 2ND-5TH FS9.

CIRCUIT NOTES: (CONT)

129. TWO WIRING MODIFICATIONS ARE REQUIRED FOR 106D REPLACEMENT LOUDSPEAKER:

- FOR 24 VOLT DC SUPPLY CONNECT SPADE TIPPED LEAD FROM PILOT LAMP SOCKET TO SCREW TERMINAL 10.
- GROUNDING SCREEN PREVIOUSLY LOCATED ON THE AMPLIFIER RETAINING BRACKET IN THE 106A IS NOW LOCATED ON THE CHASSIS NEXT TO THE LAMP SOCKET IN THE 106D.

130. WHEN A PARTICULAR TEL SET OR NETWORK & HANDSET IS ASSOCIATED WITH MORE THAN ONE ORDER CIRCUIT IN CONJUNCTION WITH PICK UP KEYS, A SEPARATE BATTERY FEED MUST BE PROVIDED IN EACH ORDER CIRCUIT. RECEIVE PAIRS FROM MAKE CONTACTS OF THE K3 RELAYS IN ASSOCIATED BATTERY FEEDS SHALL BE MULTIPLIED TOGETHER. TRANSMIT PAIRS ARE CONNECTED AS SHOWN ON FS27.

131. AS OF ISSUE 10B APP FIG 21 IS RATED MFR DISC. AND IS REPLACED BY APP FIG 19.

132. THE SUPPLEMENTARY SIGNAL DETECTOR WITH INHIBIT CIRCUIT MUST BE STRAPPED IN ACCORDANCE WITH NOTE 218 FOR THE SECOND DIGIT OF A TWO-DIGIT STATION CODE. FOR A TWO DIGIT CODE, THE FIRST AND SECOND DIGITS MUST BE DIFFERENT NUMBERS, I.E. CODES 00, 11, 22, ...99 ARE NOT ALLOWED.

DRAWING

ISSUE

1
2A
3A
5B

ISSUE

11B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

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EQUIPMENT NOTES:

201. THE CIRCUIT PACK EQUIPMENT LOCATIONS ARE VARIED BY THE EQUIPMENT CODE AND ARE CONTROLLED BY THE EQUIPMENT DRAWINGS.
202. THE FOLLOWING TABLE PROVIDES INFORMATION FOR CONNECTIONS TO LOUDSPEAKER FOR CONDITIONS SPECIFIED.

CONDITION	CONNECTIONS AT TALK BATTERY FEED CONNECTOR CP8, CP9, CP10 OR CP11		
	"T" LEAD	"R" LEAD	STRAP
1 NO SPEAKER CUTOFF	18	15	-
2 CUTOFF BY TEL. SET	39	40	-
3 CUTOFF BY JACKS OR HANDSET	25	26	18-24, 6-15
4 CUTOFF BY EITHER 2 OR 3	25	26	24-39 6-40

203. THE SIGNAL RECEIVER MUST BE STRAPPED FOR THE OFFICE CODE. THE STRAPS ARE MADE BETWEEN TERMINALS ON THE CP3 CONNECTOR AS SHOWN IN TABLE BELOW.

DIGIT	STRAP ON THE CP3 CONNECTOR	
1	5-24-30, 2-4	28-32-36, 8-11
2	6-27-30, 1-2	
3	5-26-30, 3-4	
4	5-24-30, 2-4	10-32-38, 13-28, 8-11
5	6-27-30, 1-2	
6	5-26-30, 3-4	
7	5-24-30, 2-4	28-32-39, 9-11
8	6-27-30, 1-2	
9	5-26-30, 3-4	
0	13-32-40, 11-12, 1-2, 6-27-30, 10-28	

204. THE SUPPLEMENTARY SIGNAL DETECTOR MUST BE STRAPPED FOR THE SECOND DIGIT OF AN OFFICE CODE. THE STRAPS ARE MADE BETWEEN TERMINALS ON THE CP4 CONNECTOR AS SHOWN IN TABLE BELOW. THE SECOND DIGIT OF THE TWO DIGIT STATION CODE MUST NOT BE THE SAME NUMBER AS THE FIRST DIGIT.

DIGIT	STRAP ON THE CP4 CONNECTOR	
1	3-7-25,24-6	12-18-36, 32-35
2	4-8-25, 5-6	
3	3-9-25,24-23	
4	3-7-25,24-6	13-18-34, 36-38, 32-35
5	4-8-25, 5-6	
6	3-9-25,24-23	
7	3-7-25,24-6	15-18-36, 33-35
8	4-8-25, 5-6	
9	3-9-25,24-23	
0	16-18-38, 34-36, 35-37, 4-8-25, 5-6	

EQUIPMENT NOTES: (CONT)

205. FOR THREE DIGIT OFFICE CODE, (A) OPTION: THE DECODER MUST BE STRAPPED FOR THE FIRST AND MIDDLE DIGIT OF AN OFFICE CODE AND THE LAST DIGIT FOR A POSITION OR STATION WITHIN AN OFFICE. THE STRAPS FOR THE FIRST DIGIT ARE MADE BETWEEN TERMINALS ON THE CP5 AND CP6 CONNECTORS AND FOR THE MIDDLE DIGIT BETWEEN TERMINALS ON THE CP7 CONNECTOR. THE LAST DIGIT REQUIRES A SINGLE CONNECTION BETWEEN THE CP13 OR CP15 CONNECTOR ASSOCIATED WITH THE STATION CALL-RECALL-ALERT UNIT AND A TERMINAL ON THE CP7 CONNECTOR AS SHOWN IN TABLE BELOW. FOR TWO DIGIT OFFICE CODE, (B) OPTION: STRAPPING FOR THE MIDDLE DIGIT IS NOT REQUIRED. STRAPPING FOR THE FIRST AND LAST DIGITS IS THE SAME AS ABOVE.

DIGIT	1ST DIGIT		MIDDLE DIGIT	LAST DIGIT	
	FROM CP5 CONN.	TO CP6 CONN.	STRAP ON CP7 CONN.	FROM CP7 CONN.	TO CP13 OR CP15 CONN.
1	27	39	5-37	31	1
	23	38			
2	27	39	28-37	30	2
	22	38			
3	27	39	29-37	27	3
	21	38			
4	26	39	5-37	9	4
	23	38			
5	26	39	28-37	8	5
	22	38			
6	26	39	29-37		
	21	38			
7	25	39	5-37		
	23	38			
8	25	39	28-37		
	22	38			
9	25	39	29-37		
	21	38			
0	24	39	28-37		
	22	38			

206. THE FOLLOWING TABLE PROVIDES STRAPPING INFORMATION FOR 600 OHM TERMINATIONS AT THE PORTS OF THE 4-WAY 4-WIRE BRIDGE.

PORT	STRAP ON THE CP1 CONNECTOR	
	IN	OUT
1		33-40
	1	2-21
2		27-29
	2	19-31
3		12-14
	3	7-28
4		10-11
	4	13-32

207. PAIRING INFORMATION APPLIES TO LEADS 23 INCHES AND LONGER.
208. THE RECEIVER IS TO BE SPECIFIED AND ORDERED AS A H310-116 TOUCH TONE CALLING RECEIVER. THE H310-116 TOUCH TONE RECEIVER IS A MODIFIED VERSION OF THE J99289B,L2 TOUCH TONE RECEIVER SHOWN IN DETAIL ON SD-98148-01. THE BASIC MODIFICATION IS TO CHANGE THE RECEIVER SUPPLY VOLTAGE FROM -48V AND GROUND TO -24V AND +24V, RESPECTIVELY. CHANGES INCLUDE THE FOLLOWING: ALL GROUND POINTS ARE RETURNED TO +24V; ALL -48V POINTS ARE RETURNED TO -24V; ALL -22V POINTS ARE RETURNED TO CHASSIS GROUND. ALL VOLTAGE MEASUREMENTS REMAIN THE SAME AS SPECIFIED FOR THE J99289B,L2

EQUIPMENT NOTES: (CONT)

209. RECEIVER WHEN REFERENCED TO THE GRD TEST POINT ON CP5 5 (B19) INSTEAD OF FRAME GROUND. TO PROVIDE THE ABOVE MENTIONED CHANGES, THE FOLLOWING WIRING MODIFICATIONS ARE INCLUDED.

- THE UNIT CONNECTOR (F) TERMINALS 9, 15, AND 21 ARE ASSIGNED TO +24, -24 AND GROUND RESPECTIVELY.
- THE LEAD TO DIODE CR1 OF FS1 ON SD-98148-01 IS REMOVED. (DIODE CR1 IS NO LONGER NEEDED.)
- TERMINAL 2 OF B1, B2, B9, B19 AND TERMINAL 9 OF (F) CONNECTOR ARE REMOVED FROM CHASSIS GROUND.
- TERMINAL 5 OF B9, B19 AND TERMINAL 21 OF (F) CONNECTOR ARE CONNECTED TO CHASSIS GROUND.

210. THE 2504B TELEPHONE SET IS FACTORY WIRED FOR 2-WIRE SERVICE. THE FOLLOWING TABLE SHOWS THE CHANGE NECESSARY TO CONVERT THE SET TO 4-WIRE SERVICE. REFER TO BSP 529-225-102 FOR CONNECTIONS. SEE CAD 12 FOR EXTERNAL CONNECTIONS.

LEADS	REMOVE FROM NETWORK	CONNECT TO T81
DIAL (W)	GN	17
LINE SWITCH (BK)	R	18
MOUNTING CORD (BR-Y)		17
MOUNTING CORD (Y-BR)		18

211. THE 2554B TELEPHONE SET IS FACTORY WIRED FOR 2-WIRE SERVICE. THE FOLLOWING TABLE SHOWS THE CHANGE NECESSARY TO CONVERT THE SET TO 4-WIRE SERVICE. REFER TO BSP 502-503-101 FOR CONNECTIONS. SEE CAD 13 FOR EXTERNAL CONNECTIONS. FOR SETS WITH J-K CONTACTS OMITTED REFER TO NOTE 216.

LEADS	REMOVE FROM NETWORK	CONNECT TO NETWORK
DIAL (W)	GN	G
RECEIVER (W)	R	L2
LINE SWITCH (BK)	R	L2
LINE SWITCH (BL)	L2	L1

212. WHEN MULTIPLE APPEARANCES OF TELEPHONE JACKS ARE REQUIRED THEY SHALL BE MOUNTED ON A MISCELLANEOUS BASIS. IF AN EXISTING JACK MOUNTING WITH CONVENIENT SPARE POSITIONS IS NOT AVAILABLE IT IS RECOMMENDED THAT A 255A, OR 215 TYPE JACK MOUNTING OR JACK MOUNTINGS PER ED-60613-() BE USED.
213. WHEN LAMP APPEARANCES ARE REQUIRED THEY SHALL BE MOUNTED ON A MISCELLANEOUS BASIS. IF AN EXISTING JACK MOUNTING WITH A CONVENIENT SPARE POSITION IS NOT AVAILABLE IT IS RECOMMENDED THAT A 15 TYPE INDICATOR OR JACK MOUNTINGS REFERRED TO IN NOTE 211 BE USED.
214. TYPICAL EQUIPMENT ARRANGEMENTS FOR AN OPERATOR'S ORDER CIRCUIT POSITION IN A BAY FRAMEWORK MOUNTING ARE SHOWN ON ED-1C385-().
215. REFER TO BSP 512-210-103 FOR CABLE REQUIRED, INSTALLATION AND CONNECTIONS FOR 6050 B KEY.
216. WHEN HANDSET HANGER IS REQUIRED EITHER A 9B OR 10-61 HANDSET HANGER IS RECOMMENDED.
217. THE FOLLOWING TABLE SHOWS THE WIRING CHANGES NECESSARY TO CONVERT A 2554B TELEPHONE SET WITH J-K CONTACTS OMITTED FROM 2-WIRE TO 4-WIRE SERVICE. OTHERWISE SEE NOTE 210.

LEADS	REMOVE FROM		CONNECT TO	
	NETWORK	TERM STRIP	NETWORK	TERM STRIP
DIAL (W)	GN		G	
RECEIVER (W)	R		L2	
LINE SWITCH (BK)	R		L2	
LINE SWITCH (Y)		2	L2	
LINE SWITCH (BR)	C		L1	
ADD NEW LEAD			C	2

EQUIPMENT NOTES: (CONT)

217. THE XS-16301,L5 115V AC HORN HAS A SOUND LEVEL PRESSURE OF 105dB SPL AT 4 FEET. THIS HIGH LEVEL OUTPUT WAS SELECTED FOR NOISY ENVIRONMENTS IN VERY LARGE OFFICES AND WILL DEFINITELY BE TOO LOUD FOR MANY APPLICATIONS. FOR THOSE SITUATIONS, AN ALARM WITH APPROPRIATE LOUDNESS WILL HAVE TO BE PROVIDED ON A LOCAL BASIS.
218. THE SUPPLEMENTARY SIGNAL DETECTOR WITH INHIBIT CIRCUIT MUST BE STRAPPED FOR THE SECOND DIGIT OF AN OFFICE CODE. THE STRAPS ARE MADE BETWEEN TERMINALS ON THE CP16 CONNECTOR AS SHOWN IN TABLE BELOW. THE SECOND DIGIT OF THE TWO DIGIT STATION CODE MUST NOT BE THE SAME NUMBER AS THE FIRST DIGIT.

DIGIT	STRAP ON THE CP16 CONNECTOR	
1	3-7-25,24-6	12-18-36, 32-35
2	4-8-25,5-6	
3	3-9-25,24-23	
4	3-7-25,24-6	13-18-34, 36-38, 32-35
5	4-8-25,5-6	
6	3-9-25,24-23	
7	3-7-25,24-6	15-18-34, 33-35
8	4-8-25,5-6	
9	3-9-25,24-23	
0	16-18-38,34-36,35-37,4-8-25,5-6	

219. WHEN FS 32 IS USED, A MAXIMUM OF THREE FS 4'S (SUPPLEMENTARY TALK BATTERY FEED) MAY BE EQUIPPED IN CKT 2.
220. WHEN FS32 IS USED, A MAXIMUM OF TWO FS4'S (SUPPLEMENTARY TALK BATTERY FEED) MAY BE EQUIPPED.

DRAWING
ISSUE
2A
58ISSUE
11B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-D3

BELL TELEPHONE LABORATORIES
INCORPORATED

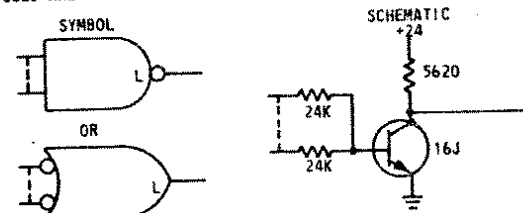
6S

INFORMATION NOTES:

301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS;
CAPACITANCE VALUES ARE IN MICROFARADS;
VALUES PRECEDED BY THE SYMBOL + (PLUS) OR
- (MINUS) ARE IN VOLTS.
302. FOR ALL GATES, ANY "0" INPUT PRODUCES A "1" OUTPUT. ALL "1" INPUTS PRODUCE A "0" OUTPUT. A "0" IS DEFINED AS A VOLTAGE LEVEL GREATER THAN +3 VOLTS. A "1" IS DEFINED AS A VOLTAGE LEVEL LESS THAN +0.3 VOLTS (NOMINALLY GROUND).

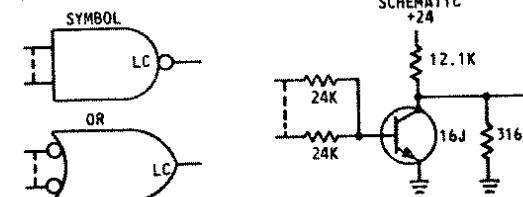
LOW FANOUT GATE

USED WHERE FANOUT REQUIREMENTS ARE LOW.



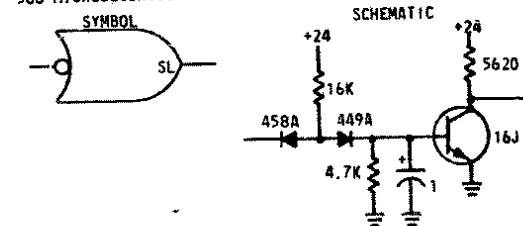
LOW FANOUT CLAMPED GATE

USED WHERE THE "0" OUTPUT MUST BE CLAMPED AT NO MORE THAN +6 VOLTS.



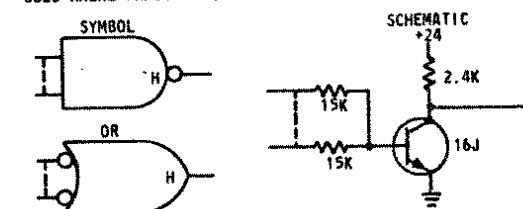
LOW FANOUT SLOW GATE

A "1" TO "0" TRANSITION AT THE INPUT PRODUCES A "1" TO "0" TRANSITION AT THE OUTPUT DELAYED BY APPROXIMATELY 300 MICROSECONDS.



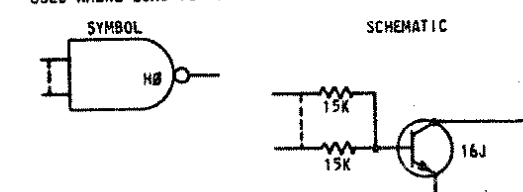
HIGH FANOUT GATE

USED WHERE FANOUT REQUIREMENTS ARE HIGH.



HIGH FANOUT OPEN GATE

USED WHERE LOAD IS FURNISHED BY A TIMER

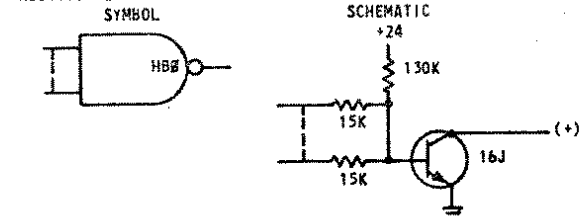


INFORMATION NOTES: (CONT)

302. (CONT)

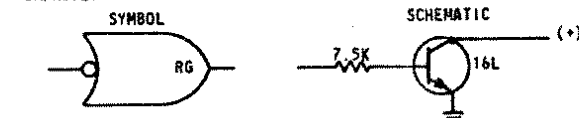
HIGH FANOUT OPEN BIASED GATE

USED WHERE LOAD IS FURNISHED BY A TIMER AND ADDITIONAL NOISE MARGIN IS REQUIRED.



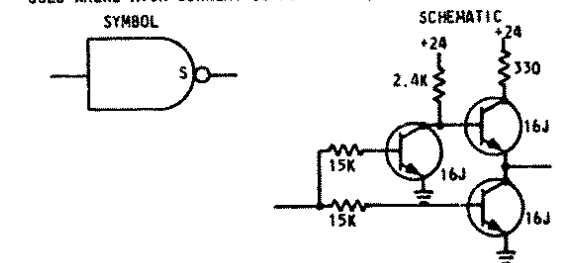
RELAY GROUND GATE

FURNISHES GROUND FOR DRIVING A RELAY MAXIMUM CURRENT CAPABILITY = 75 ma.



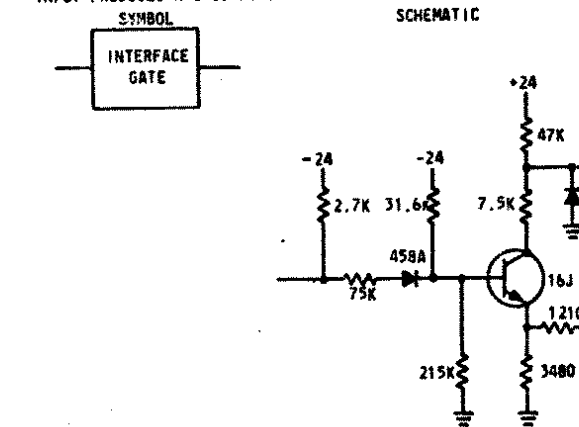
SUPER GATE

USED WHERE HIGH CURRENT OUTPUT IS REQUIRED.



INTERFACE GATE

USED AS INTERFACE BETWEEN TOUCH TONE RECEIVER AND TRL GATES. GROUND AT INPUT PRODUCES A "1" OUTPUT. OPEN AT INPUT PRODUCES A "0" OUTPUT.

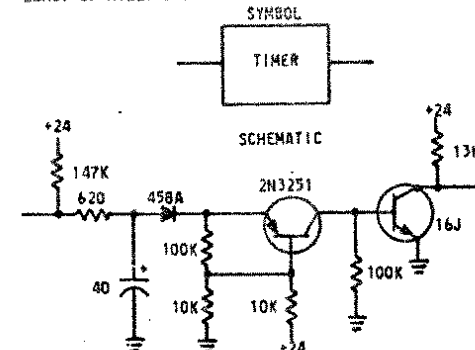


INFORMATION NOTES: (CONT)

302. (CONT)

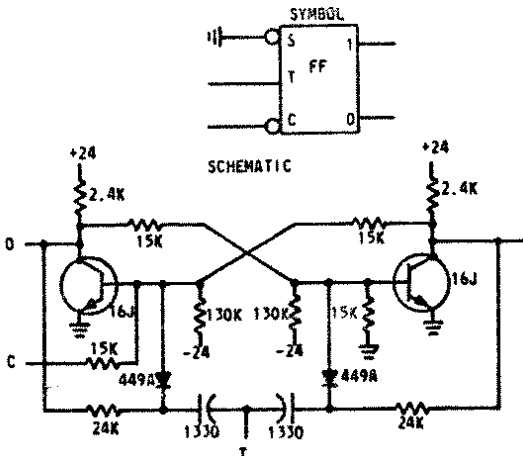
TIMER

A "1" INPUT PRODUCES A "0" OUTPUT. AN OPEN INPUT STARTS THE TIMER AND PRODUCES A "1" OUTPUT IN APPROXIMATELY 5 SECONDS. TIMING MAY BE RESTARTED DURING THE 5 SECOND PERIOD BY A "1" ON THE INPUT FOR AT LEAST 25 MILLISECONDS.



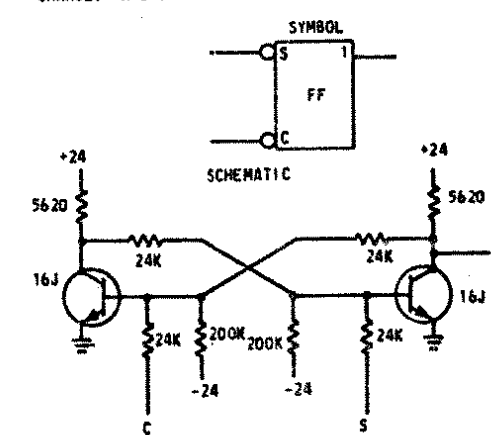
TOGGLE FLIP FLOP

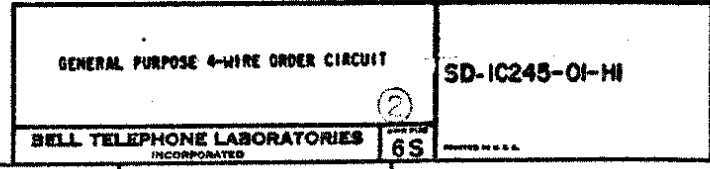
A "0" ON THE "C" INPUT PRODUCES A "1" ON THE "0" OUTPUT AND A "0" ON THE "1" OUTPUT. A "0" TO "1" TRANSITION ON THE "1" INPUT WITH A "1" ON THE "C" INPUT CAUSES BOTH OUTPUTS TO CHANGE STATE.



FLIP FLOP

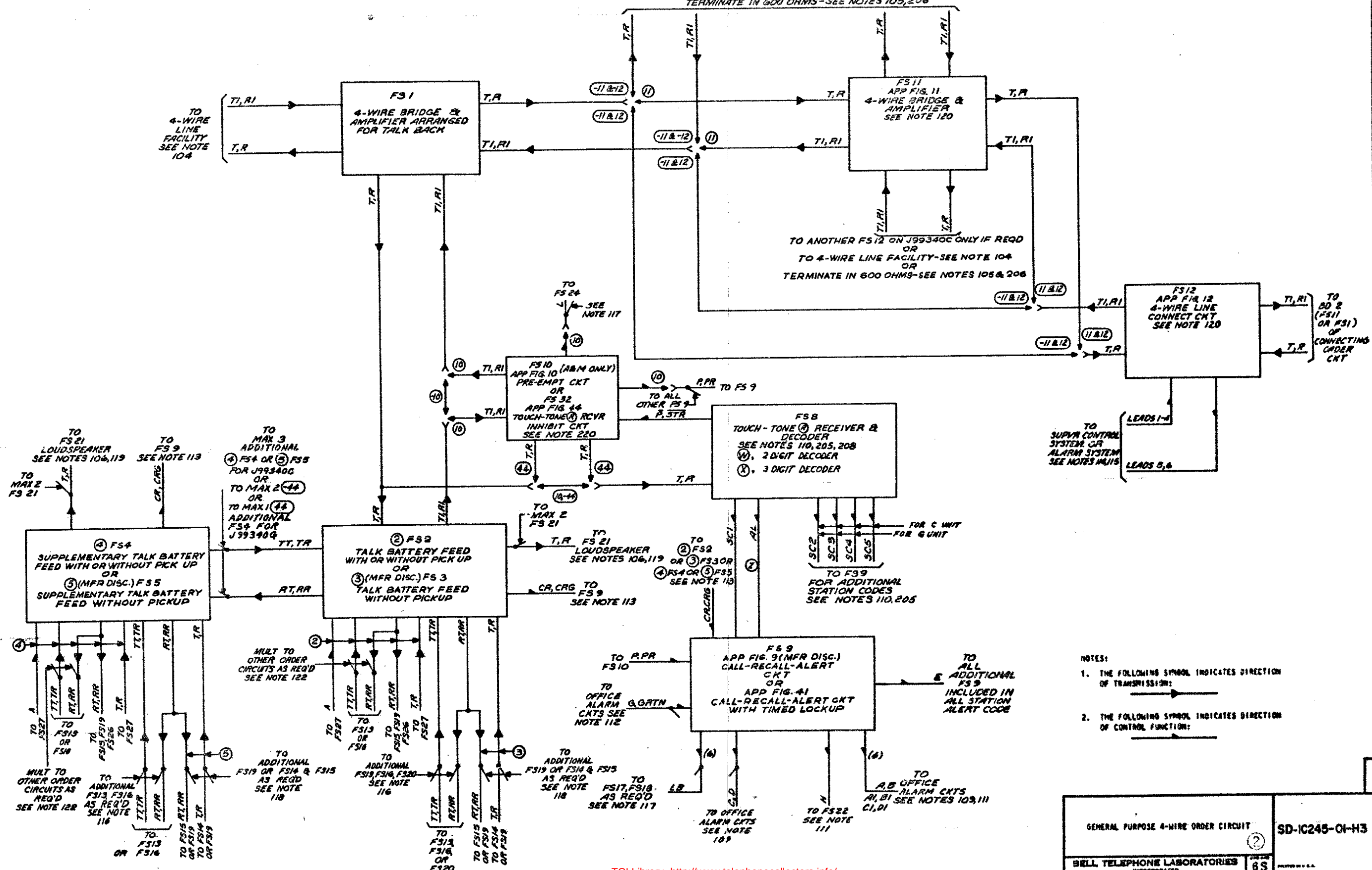
A "0" ON THE "C" INPUT WITH A "1" ON THE "S" INPUT PRODUCES A "0" ON THE "1" OUTPUT. A "0" ON THE "S" INPUT WITH A "1" ON THE "C" INPUT PRODUCES A "1" ON THE "1" OUTPUT. A "1" ON BOTH INPUTS CAUSES NO CHANGE. A "0" ON BOTH INPUTS IS NOT ALLOWED.



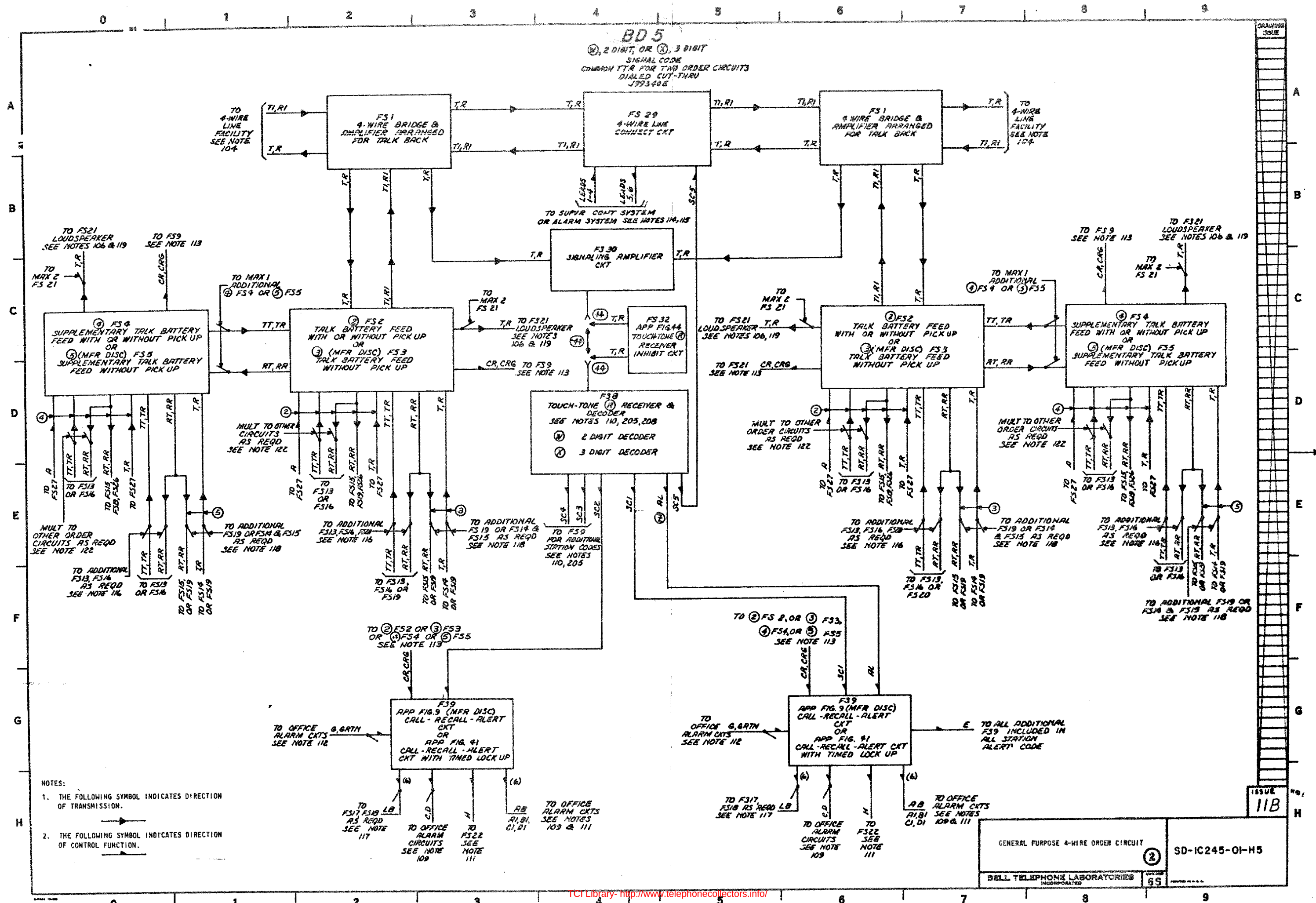


BD 3
 (W), 2 DIGIT, OR (X), 3 DIGIT
 SIGNAL CODE
 UP TO 5 CODES PER LOCATION
 FOR J99340C AND
 UP TO 4 CODES PER LOCATION
 FOR J99340G
 SEE NOTE 220

TO
 4-WIRE LINE FACILITY-SEE NOTE 104
 OR
 TERMINATE IN 600 OHMS-SEE NOTES 105, 206



- NOTES:
1. THE FOLLOWING SYMBOL INDICATES DIRECTION OF TRANSMISSION:
 2. THE FOLLOWING SYMBOL INDICATES DIRECTION OF CONTROL FUNCTION:



CPS I 4 WAY 4-WIRE BRIDGE CIRCUIT

COMPONENT LIST

RESISTOR

DESIG	CODE	KS-20616, L1A, 796
R1-R24	258A	600
R25-R32		106
R33		3520
R34, R35		106
R36		182
R37		2150
R38, R39		182
R40		106
R41		3520
R42, R43		106
R44		182
R45		2150
R46, R47	258A	182
R48		

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-1C304
CONNECTOR ON FRAME	908C

SYMBOL

SHOWN IN FS 1, FS 11

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS.

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES THE LINE DROP AND THROUGH CONNECTION FOR MULTIPLE OFFICE 4 WIRE 600 OHM VOICE ORDER CIRCUITS.

IMPEDANCE: APPROXIMATELY 650 OHMS AT ANY PORT WHEN ALL OTHER PORTS ARE TERMINATED IN 600 OHMS.

LOSS: ANY INPUT TO ANY OTHER NUMBERED OUTPUT - 15 dB.
ANY INPUT TO THE SIMILARLY NUMBERED OUTPUT AND ALL OTHER INPUTS >70dB.
ANY OUTPUTS TO THE SIMILARLY NUMBERED INPUT AND ALL OTHER OUTPUTS >70 dB.

CIRCUIT DESCRIPTION:

RESISTORS (R1) - (R24) FORM A FOUR PORT BALANCED NETWORK EACH HAVING A 600 OHM BALANCED INPUT AND OUTPUT. (R26), (R27), (R30), AND (R31) ARE 600 OHM TERMINATING RESISTORS WHICH MAY BE USED WHEN THE INPUTS AND OUTPUTS OF PORTS 3 AND 4 ARE NOT USED. ASSOCIATED WITH PORTS 1 AND 2 ARE BALANCED RESISTIVE PADS, 3 dB FOR INPUTS AND 5 dB FOR OUTPUTS. (R41) - (R44) FORM A 3 dB PAD AND (R37) - (R40) FORM A 5 dB PAD FOR PORT 1. (R33) - (R36) FORM A 3 dB PAD AND (R45)-(R48) FORM A 5dB PAD FOR PORT 2. THESE PADS PERMIT CONNECTING TO 4 WIRE FACILITIES HAVING STANDARD LEVELS OF +7 dB RECEIVING AND -16 dB TRANSMITTING. (R25), (R28), (R29), AND (R32) ARE 600 OHM RESISTORS ASSOCIATED WITH THE PADS TO PROVIDE TERMINATIONS WHEN PORTS 1 AND 2 ARE NOT USED.

PORT 2

PORT 4

PORT 1

4 WAY 4-WIRE BRIDGE CXT
CPS I

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-IC245-01-J1

BELL TELEPHONE LABORATORIES
INCORPORATED

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PRINTED IN U.S.A.

CPS 2 DUAL AMPLIFIER CIRCUIT

COMPONENT LIST

CAPACITOR

DESIG	CODE
[2] C1.0, C1.1	602A
[2] C2.0, C2.1	535H
[2] C3.0, C3.1	542C
[2] C4.0, C4.1	KS-16390, L9 602B
[2] C5.0, C5.1	KS-19953, L3 .022
[2] C6.0, C6.1	KS-16390, L12
[2] C7.0, C7.1	KS-16390, L12
[2] C8.0, C8.1	KS-16390, L12
[2] C9.0, C9.1	600A

DIODE

DESIG	CODE
[2] CR1.0, CR1.1	459AF
[2] CR2.0, CR2.1	459AF
[2] CR3.0, CR3.1	446Y
[2] CR4.0, CR4.1	446Y

POTENTIOMETER

DESIG	CODE
[2] R2.0, R2.1	KS-14786, L2A, 1K KS-20231, L1A, 1K

RESISTOR

DESIG	CODE
[2] R1.0, R1.1	258A, KS-20610, L1A, 1780
[2] R3.0, R3.1	258A, KS-20610, L1A, 750
[2] R4.0, R4.1	258A, KS-20610, L1A, 1620
[2] R5.0, R5.1	KS-13490, L1, 180
[2] R6.0, R6.1	KS-13490, L1, 51
[2] R7.0, R7.1	KS-13490, L1, 51
[2] R8.0, R8.1	258A, KS-20610, L1A, 12.1
[2] R9.0, R9.1	KS-13490, L1, 0.2K
[2] R10.0, R10.1	KS-13490, L1, 47
[2] R11.0, R11.1	KS-13490, L1, 120
[2] R12.0, R12.1	221A, 68.1
[2] R13.0, R13.1	KS-13490, L1, 33
[2] R14.0, R14.1	KS-13491, L1, 160 KS-20289, L6C, 165

TRANSFORMER

DESIG	CODE
[2] T1.0, T1.1	2532AD
[2] T2.0, T2.1	2568B

TRANSISTOR

DESIG	CODE
[2] Q1.0, Q1.1	12P
[2] Q2.0, Q2.1	43A

VARIATOR

DESIG	CODE
[2] RV1.0, RV1.1	1000
[2] RV2.0, RV2.1	1000

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES TWO IDENTICAL VOICE FREQUENCY AMPLIFIERS OPERATING FROM A COMMON -24 VOLT SUPPLY. PIN CONNECTIONS FOR VARIOUS INPUT AND OUTPUT IMPEDANCES ARE SHOWN IN TABLE A.

SIGNAL LEVELS: MAX OUTPUT LEVEL +18 dBm
GAIN RANGE - 12 TO 27 dB
GAIN RANGE WITH 10 dB PAD (STRAP TERMS 11-13 INPUT OR 11-15 FOR 1200Ω INPUT) - 2 TO 17 dB

FREQUENCY RESPONSE: 200 Hz - 20 KHz; 60 Hz - 20 KHz WITH TERMINALS 35 AND 39 STRAPPED (AMP 1), 2 AND 22 (AMP 2)

TABLE A

Z	AMPLIFIER 1			AMPLIFIER 2		
	INPUT TERMS	STRAP	OUTPUT TERMS	INPUT TERMS	STRAP	OUTPUT TERMS
1200	16-19 (CT-18)	(15, 39)	33-40 (CT-37)	7-9 (CT-8)	(2, 6)	10-21 (CT-26)
600	16-19 (CT-18)	(15, 39)	36-38 (CT-37)	7-9 (CT-8)	(2, 5)	25-32 (CT-26)
300	18-19 (15, 39)		33-37	8-9 (2, 6)		21-26
150	18-19 (15, 39)		36-37	8-9 (2, 5)		25-26

CIRCUIT DESCRIPTION

EACH AMPLIFIER IS COMPOSED OF AN INPUT CIRCUIT, OUTPUT CIRCUIT, AND A FEEDBACK SYSTEM. THE INPUT CIRCUIT CONSISTS OF A TERMINATED TRANSFORMER (T1), A CONTINUOUS GAIN CONTROL POTENTIOMETER (R2) OF APPROXIMATELY 15 dB RANGE AS PART OF A VOLTAGE DIVIDER CIRCUIT (C1), (R2), (R5), AND (R6), AND A 10 dB PAD (R1) AND (R3) TO REDUCE OVERALL GAIN WHEN REQUIRED. (R4) PROVIDES A TERMINATION FOR THE PAD ON (T1). CAPACITOR (C1) MAY BE STRAPPED IN PARALLEL WITH (C2) TO REDUCE THE LOW END CUT-OFF FREQUENCY. THE OUTPUT CIRCUIT CONSISTS OF A MULTIPLE WINDING TRANSFORMER (T2) IN WHICH THE PRIMARY WINDING IS TAPPED FOR A 10:1 IMPEDANCE DIVISION TO FURNISH FEEDBACK. THE FEEDBACK SYSTEM CONSISTS OF BOTH AC AND DC LOOPS. A PORTION OF THE OUTPUT SIGNAL FROM (T2) IS FED BACK THROUGH CAPACITORS (C6) AND (C7) AND ACROSS (R8) TO THE EMITTER OF TRANSISTOR (Q1). VARIATOR (RV2) PROVIDES TEMPERATURE

CIRCUIT DESCRIPTION (CONT)

COMPENSATION FOR (Q1). THE COLLECTOR CURRENT OF (Q2) IS STABILIZED BY EMITTER RESISTORS (R6) AND (R10). A PORTION OF DC VOLTAGE DEVELOPED ACROSS (R6) AND (R10) IS FED BACK THROUGH (R5) TO THE BASE OF (Q1) TO STABILIZE ITS COLLECTOR CURRENT. CAPACITOR (C4) IS AN EMITTER BYPASS FOR (Q2). (R11), (C3), AND (C5) SERVE TO CONTROL THE FEEDBACK LOOP CUT-OFF CHARACTERISTICS. (R14), (CR3), AND (CR4) PROVIDE REGULATION TO PERMIT OPERATION OVER A RANGE OF BATTERY SUPPLY VOLTAGE FROM -19 TO -29 VOLTS. (R13), (C8), AND (C9) SERVE AS BATTERY DECOUPLING. (RV1), (CR1), AND (CR2) PROVIDE LIGHTNING AND SURGE PROTECTION.

DUAL AMPLIFIER CKT

CPS 2

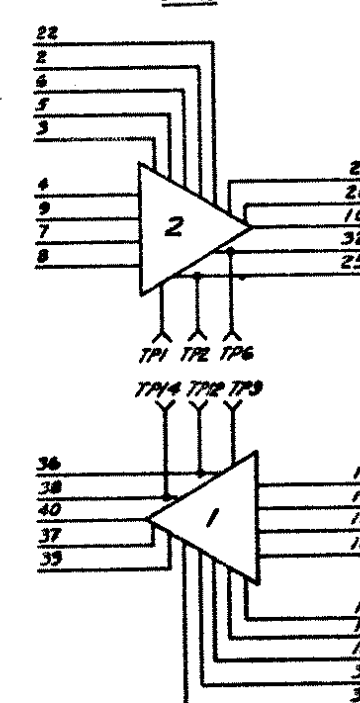
GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J2

BELL TELEPHONE LABORATORIES

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SYMBOL



NOTES:

- UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS; CAPACITANCE VALUES ARE IN MICROFARADS; VALUES PRECEDED BY THE SYMBOL "K" (PLUS) OR "M" (MINUS) ARE IN VOLTS.
- GROUND RETURN

PART OF CPS 3 SIGNAL RECEIVER

DRAWING
ISSUE

1
2A

12
11

A

B

C

D

E

F

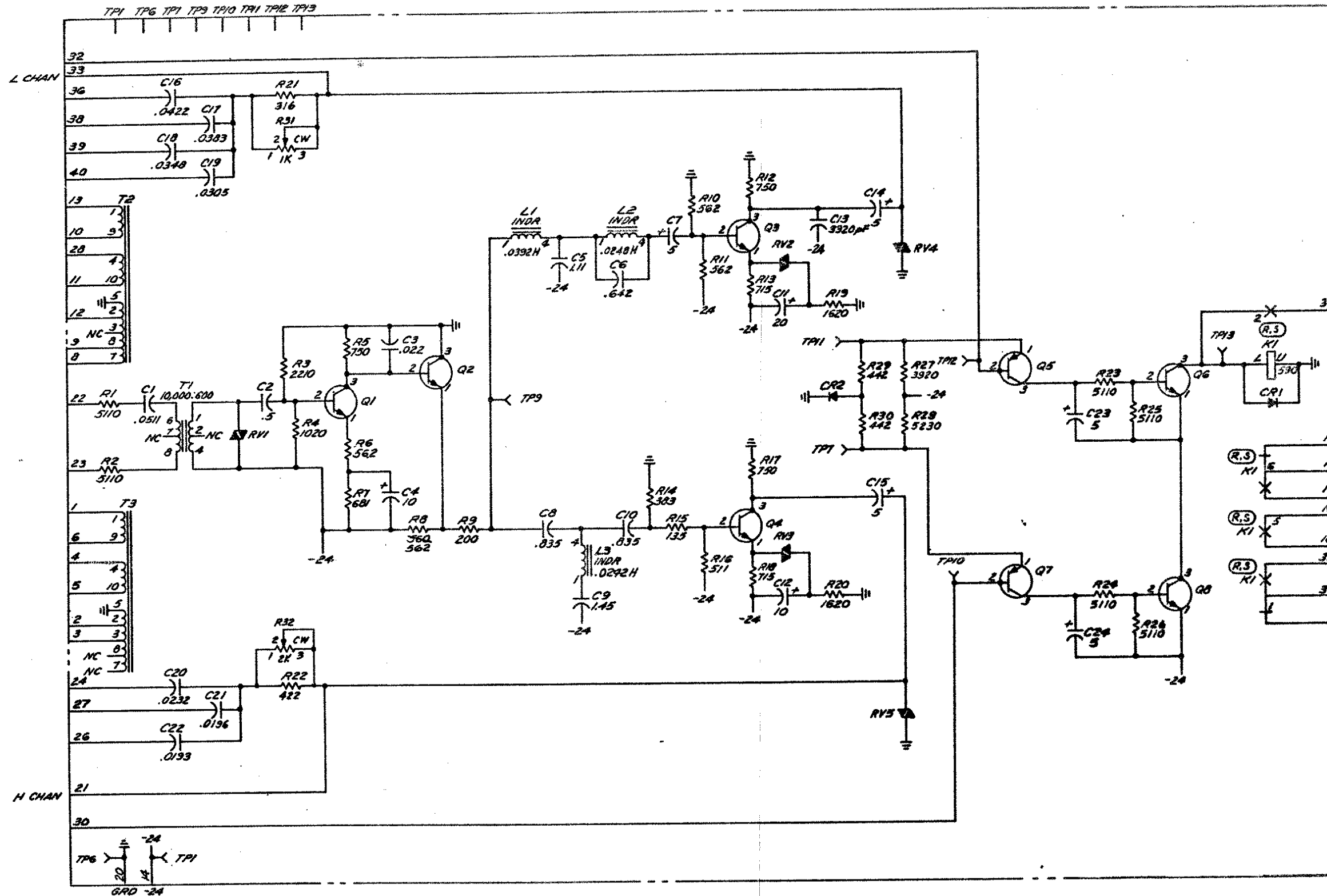
G

H

12
11

H

TP1 TP6 TP1 TP3 TP10 TP11 TP12 TP13



SIGNAL RECEIVER

PART OF CPS 3

ISSUE
10B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J3A

BELL TELEPHONE LABORATORIES
INCORPORATED

2

6S

SD-1C245-01-J3A

CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ			CIRCUIT PREPARATION			TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQ				REMARKS
DESIG	CODE	OPT	FIG.	BSP FIG.	CONT PRES	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA								
								CONN BAT.	CONN GRD	TEST WDG	TEST FOR	TEST MA	TEST MA	TEST READJ MA		
RELAY																
K1	BF6	R		5					L(K1)	U(K1)	1		0		25.3	24.0
K1	MB1	S		200					L(K1)	U(K1)	1		0		25.5	24.0

TEST NOTES:

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST

COMPONENT LIST

RELAY			
DESIG	K1	K1	
CODE	BF6	MB1	
OPTION	R	S	
CONT ARR	LOC	CONT ARR	LOC
6 BM	D9	ERM	D9
5 BM	E9	ERM	E9
4 BM		ERM	
3 BM		ERM	
2 BM	C8	ERM	C8
1 BM	E9	ERM	E9
COIL	C9		C9

CAPACITOR

DESIG	CODE
C1	542W
C2	542A
C3	KS-19066-L1 KS-20977, L4 .022
C4	601B
C5	535GT
C6	535GR
C7	601A
C8	535GS
C9	535CA
C10	535GS
C11	602C
C12	601B
C13	KS-16591 L1, 3320pF
C14	601A
C15	601A
C16	577D, .0422
C17	577D, .0383
C18	577D, .0348
C19	577D, .0305
C20	577D, .0232
C21	577D, .0196
C22	577D, .0193
C23, C24	601A

DIODE

DESIG	CODE
CR1	400J
CR2	446B

INDUCTOR

DESIG	CODE
L1	1592C, .0392H
L2	1592C, .0248H
L3	1592C, .0242H

POTENTIOMETER

DESIG	CODE
R31	KS-20231, L2 KS-20231, L2A, 1K
R32	KS-20231, L2 KS-20231, L2A, 2K

COMPONENT LIST (CONT)

RESISTOR

DESIG	CODE
R1, R2	257A KS-20616, L1A, 5510
R3	257A KS-20616, L1A, 2210
R4	257A KS-20616, L1A, 1020
R5	257A KS-20616, L1A, 750
R6	257A KS-20616, L1A, 56.2
R7	257A KS-20616, L1A, 681
R8	KS-15491 L1-540, KS-20289, L6C, 562
R9	237A, 200
R10, R11	221A, 562
R12	257A, KS-20616, L1A, 750
R13	221A, 715
R14	221A, 383
R15	257A, KS-20616, L1A, 135
R16	257A, KS-20616, L1A, 511
R17	257A, KS-20616, L1A, 750
R18	221A, 715
R19, R20	257A, KS-20616, L1A, 1620
R21	257A, KS-20616, L1A, 316
R22	257A, KS-20616, L1A, 422
R23, R24	257A, KS-20616, L1A, 5110
R25, R26	257A, KS-20616, L1A, 5110
R27	221A, 3920
R28	221A, 5230
R29, R30	257A, KS-20616, L1A, 442

TRANSFORMER

DESIG	CODE
T1	2564W
T2, T3	2597A

TRANSISTOR

DESIG	CODE
Q1-Q4	46F-66F
Q5	120
Q6	46F-66F
Q7	120
Q8	46F-66F

VARISTOR

DESIG	CODE
RV1-RV5	1000

PART OF CPS 3
SIGNAL RECEIVER

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	(A) ED-1C306(1)01 (S) ED-1C306(1)02
CONNECTOR ON FRAME	908C

SYMBOL

SHOWN IN DETAIL IN FS6

INPUT/OUTPUT INFORMATION

FUNCTION: RESPONDS TO A PAIR OF TONES WHICH CONSTITUTE A VALID TOUCH-TONE (TT) DIGIT AND GIVES A RELAY CONTACT CLOSURE OUTPUT UPON RECEPTION OF THE PARTICULAR DIGIT FOR WHICH THE RECEIVER IS STRAPPED.

INPUT: TOUCH-TONE DIGIT SIGNAL OF -1 dBm NOMINAL ON PINS 22 AND 23. INPUT IMPEDANCE APPROXIMATELY 10K OHMS FOR BRIDGING ONTO A 600 OHM BALANCED LINE.

CIRCUIT DESCRIPTION

THE BALANCED INPUT CIRCUIT CONSISTS OF RESISTORS (R1) AND (R2), CAPACITOR (C1), AND TRANSFORMER (T1). IT PROVIDES A HIGH INPUT IMPEDANCE FOR BRIDGING ONTO A LOW IMPEDANCE BALANCED CIRCUIT. (C1) BLOCKS DC FROM THE PRIMARY WINDING OF (T1). TRANSISTORS (Q1) AND (Q2), AND ASSOCIATED BIASING COMPONENTS FORM AN INPUT AMPLIFIER TO PROVIDE THE NECESSARY GAIN AS WELL AS IMPEDANCE TRANSFORMATION TO DRIVE THE CUT-APART FILTER AND LIMITERS. THE CUT APART FILTER SEPARATES THE INCOMING SIGNAL INTO TWO CHANNELS. (L1), (L2), (C5), AND (C6) FORM A LOW CHANNEL FILTER WHICH REJECTS FREQUENCIES ABOVE 1175 Hz. (C8), (C9), (C19) AND (L3) FORM A HIGH CHANNEL FILTER WHICH REJECTS FREQUENCIES BELOW 965 Hz. (Q3) AND (Q4) ARE LIMITERS FOR LOW AND HIGH CHANNELS RESPECTIVELY. EACH LIMITER PRODUCES A SQUARE WAVE OF FIXED AMPLITUDE. THE LIMITERS PROVIDE PROTECTION AGAINST FALSE OPERATION OF THE RECEIVER CAUSED BY SPEECH OR NOISE SIMULATION OF TOUCH-TONE FREQUENCIES. ONLY A SINGLE FREQUENCY INPUT WILL ALLOW THE LIMITER OUTPUT FUNDAMENTAL TO HAVE THE REQUIRED ENERGY TO BE ABOVE THRESHOLD. EACH LIMITER CONNECTS TO A SERIES RESONANT CIRCUIT WHICH IN TURN CONNECTS TO A THRESHOLD DETECTOR. THE FREQUENCY OF THE SERIES RESONANT CIRCUIT IS DETERMINED BY STRAPS AS INDICATED IN NOTE 203. THE DETECTOR OPERATES WHEN THE TUNED CIRCUIT IS PRESENTED WITH A SIGNAL AT OR NEAR ITS RESONANT FREQUENCY. THE OPERATING THRESHOLD IS SET AT APPROXIMATELY 2 dB BELOW THE PEAK-TUNED CIRCUIT RESPONSE AS DETERMINED BY THE BIAS CIRCUIT (CR2, R27-R30) AND THE BANDWIDTH ADJUSTING POTENTIOMETER (R31) OR (R32). (Q5), LOW TONE DETECTOR, OR (Q7), HIGH TONE DETECTOR, IS TURNED ON BY THE NEGATIVE PEAKS OF AN AC SIGNAL APPEARING ON THE BASE. A CHANGE IS BUTT UP ON (C23) OR (C24) AND FORWARD BIASES THE OUTPUT TRANSISTORS (Q6) OR (Q8). IF BOTH (Q6) AND (Q8) ARE ON SIMULTANEOUSLY, INDICATING A VALID TOUCH-TONE DIGIT FOR WHICH THE RECEIVER IS STRAPPED, A PATH TO -24 VOLTS IS PROVIDED WHICH OPERATES RELAY (K1) (K1) REMAINS OPERATED AS LONG AS BOTH (Q6) AND (Q8) ARE ON OR UNTIL RELEASED BY AN EXTERNAL CIRCUIT IF THE SELF LOCKING PATH THROUGH PIN 34 IS USED.

NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

2. $\perp$ GROUND RETURN.

3.

RECORD OF CHANGES				
DWG	ISS	PREV	STD	SEE
78	R	S	R	NOTE

SIGNAL RECEIVER

PART OF CPS 3

ISSUE
10B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J38

BELL TELEPHONE LABORATORIES
INCORPORATED

6S

CPS 4
SUPPLEMENTARY SIGNAL DETECTOR

CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ				CIRCUIT PREPARATION				TEST SET				DIRECT CURRENT FLOW REQ				REMARKS
DESIG	CODE	OPT	FIG	BSP FIG	CONV PRES	ARM TRVL	BLOCK OR INSULATE	TEST CLIP DATA		TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	TEST AFTER SOAK	TEST READJ	TEST WDG	TEST FOR	TEST AFTER SOAK	TEST READJ	
RELAY																				
K1	BP6	R		3				U(K1)	L(K1)	B/G	1				25.5	24.0				
K1	MB1	S		200				U(K1)	L(K1)	B/G	1				25.5	24.00				

TEST NOTES:
1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST

COMPONENT LIST

RELAY			
DESIG	K1	K1	
CODE	BP6	MB1	
OPTION	R	S	
	CONT ARR	LOC	CONT ARR
6	BM	H5	EBM
5	BM	H5	EBM
4	BM	H5	EBM
3	BM		
2	BM	A5	A5
1	BM	G5	G5
COIL	X	H3	H3

CAPACITOR

DESIG	CODE
C1	5770, .0422
C2	5770, .0383
C3	5770, .0348
C4	5770, .0305
C5	5770, .0305
C6	5770, .0193
C7	5770, .0232
C8	5770, .0196
C9	5770, .0193
[4] C10-C10.3	601A
C11	602A
C12	600A 1.0

DIODE

DESIG	CODE
CR1	400J
CR2	4460
CR3, CR4	4468

POTENTIOMETER

DESIG	CODE
R12	KS-20231, L2, KS-20231, L2A, 1K
R13	
R14	KS-20231, L2, KS-20231, L2A, 2K
R15	

RESISTOR

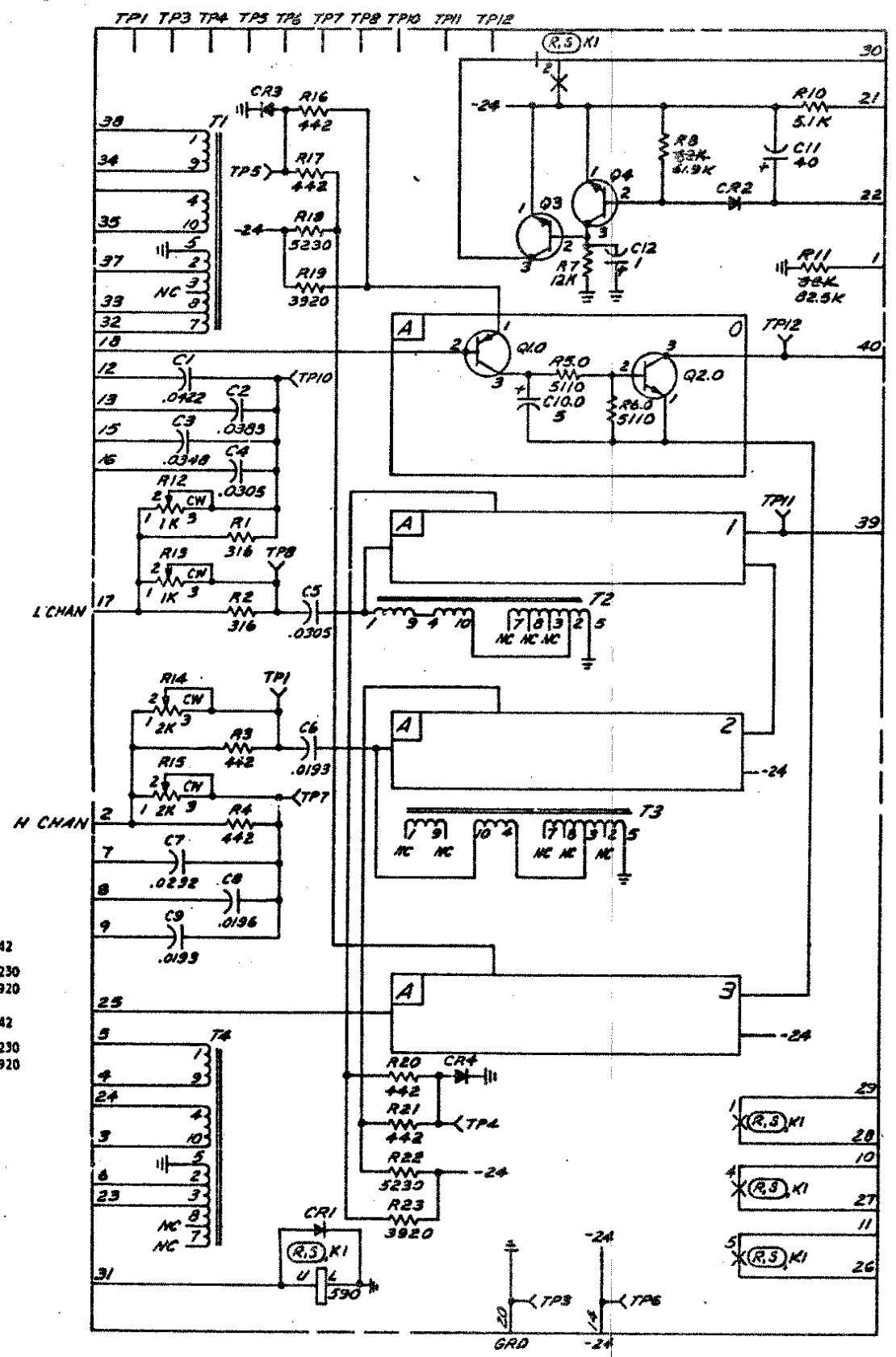
DESIG	CODE	DESIG	CODE
R1	237A, KS-20616, L1A, 316	R16	237A, 442
R2	237A, KS-20616, L1A, 316	R17	
R3	237A, KS-20616, L1A, 442	R18	221A, 5230
R4	237A, KS-20616, L1A, 442	R19	221A, 3920
[4] R5-R5.3	237A, KS-20616, L1A, 5110	R20	
[4] R6-R6.3	237A, KS-20616, L1A, 5110	R21	237A, 442
R7	KS-13490, LT, 12K	R22	221A, 5230
R8	KS-16645, LT, 62K	R23	221A, 3920
	KS-20616, L1A, 61.9K		
R10	KS-16645, LT, KS-20616, L1A, 5.1K		
R11	KS-16645, LT, KS-20616, L1A, 82.5K		

TRANSFORMER

DESIG	CODE
T1-T4	2597A

TRANSISTOR

DESIG	CODE
[4] Q1-Q1.3	120
[4] Q2-Q2.3	16F 66F
Q3	16L 66L
Q4	16J 66J



MANUFACTURING REFERENCES	
CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	(R) ED-10307(1)01 (S) ED-10307(1)02
CONNECTOR ON FRAME	908C

SYMBOL
SHOWN IN FS 7

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES TWO DIGIT DETECTORS WHICH RESPOND TO VALID TOUCH-TONE DIGITS WHEN USED IN CONJUNCTION WITH CP3. A TIMER CIRCUIT PROVIDES AN INTERDIGITAL TIME-OUT PERIOD OF APPROXIMATELY 2.5 SECONDS.

INPUT: SQUARE WAVE SIGNAL OF APPROXIMATELY 1.25 VOLTS PEAK TO PEAK.

CIRCUIT DESCRIPTION

TWO HIGH CHANNEL AND TWO LOW CHANNEL TUNED CIRCUITS ARE PROVIDED WHICH ARE DRIVEN FROM THE HIGH AND LOW LIMITERS, RESPECTIVELY, OF CP3. ONE HIGH CHANNEL (T3) AND (C6) AND ONE LOW CHANNEL (T2) AND (C5) ARE CONNECTED TO RESPOND TO TONES L4 (941 Hz) AND H3 (1477 Hz). THE OTHER TWO TUNED CIRCUITS MUST BE STRAPPED IN ACCORDANCE WITH NOTE 204. OPERATION OF THE DETECTORS IS IDENTICAL WITH THAT OF CP3. THE TIMER CIRCUIT CONSISTS OF TRANSISTORS (Q3) AND (Q4), REFERENCE DIODE (CR2), AND ASSOCIATED RESISTORS AND CAPACITORS. IT PROVIDES AN INTERDIGITAL TIME-OUT PERIOD OF APPROXIMATELY 2.5 SECONDS WHEN USED WITH CP3. WITH RELAY (K1) RELEASED AND PINS 21 AND 22 CONNECTED EXTERNALLY, CAPACITOR (C11) IS DISCHARGED, TRANSISTOR (Q4) IS OFF AND (Q3) IS ON. THIS APPLIES -24 VOLTS TO PIN 30. WITH THE CONNECTION BETWEEN PINS 21 AND 22 REMOVED AND PINS 22 AND 1 CONNECTED EXTERNALLY, CAPACITOR (C11) CHARGES THROUGH RESISTOR (R11). IN APPROXIMATELY 2.5 SECONDS THE REFERENCE VOLTAGE OF DIODE (CR2) IS OVERCOME. THIS FORWARD BIASES (Q4) WHICH TURNS OFF (Q3) REMOVING VOLTAGE FROM PIN 30. RECONNECTING PINS 21 AND 22 DISCHARGES (C11) THROUGH (R10) PROVIDING A TIMER RECOVERY TIME OF APPROXIMATELY 0.2 SECONDS. WITH RELAY (K1) OPERATED CONTACT 2 CONNECTS -24 VOLTS TO PIN 30 DIRECTLY.

NOTES:

- UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS; VALUES PRECEDED BY THE SYMBOL + (PLUS) ARE - (MINUS) ARE IN VOLTS.
- ⊥ GROUND RETURN.
-

RECORD OF CHANGES					
ENG	ISS	REV	STD	REV	NOTE

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

BELL TELEPHONE LABORATORIES

SD-IC245-01-J4

65

SD-IC245-01-J4

COMPONENT LIST

DESIG	CODE
[9] CR1.0-CR1.8	4538
[9] CR2.0-CR2.8	458A

RESISTOR

DESIG	CODE
[9] R1.0-R1.8	KS-13490, L1, 2.7k
[9] R2.0-R2.8	KS-16648, L1, KS-20616, L1A, 75k
[9] R3.0-R3.8	237A, KS-20616, L1A, 31.6k
[9] R4.0-R4.8	237A, KS-20616, L1A, 215k
[9] R5.0-R5.8	KS-16648, L1, 42k, KS-20616, L1A, 47.5k
[9] R6.0-R6.8	KS-16648, L1, KS-20616, L1A, 7.5k
[9] R7.0-R7.8	237A, KS-20616, L1A, 1210
[9] R8.0-R8.8	238A, KS-20616, L1A, 3480
[8] R9.9-R9.16	KS-16648, L1, 24k, KS-20616, L1A, 23.7k
[8] R10.9-R10.16	238A, KS-20616, L1A, 5620
[8] R11.9-R11.16	KS-16648, L1, KS-20616, L1A, 15k
[8] R12.9-R12.16	KS-13490, L1, 2.4k

TRANSISTOR

DESIG	CODE
[9] Q1.0-Q1.8	76A 66J
[8] Q2.9-Q2.16	76A 66J
[8] Q3.9-Q3.16	76A 66J

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES NINE SEPARATE INPUTS WHICH SUPPLY -24 VOLTS THROUGH 2700 OHM RESISTORS TO THE INPUT CONNECTING CIRCUIT. PROVIDES NINE SEPARATE OUTPUTS CAPABLE OF DRIVING CONNECTING TRL CIRCUITS.

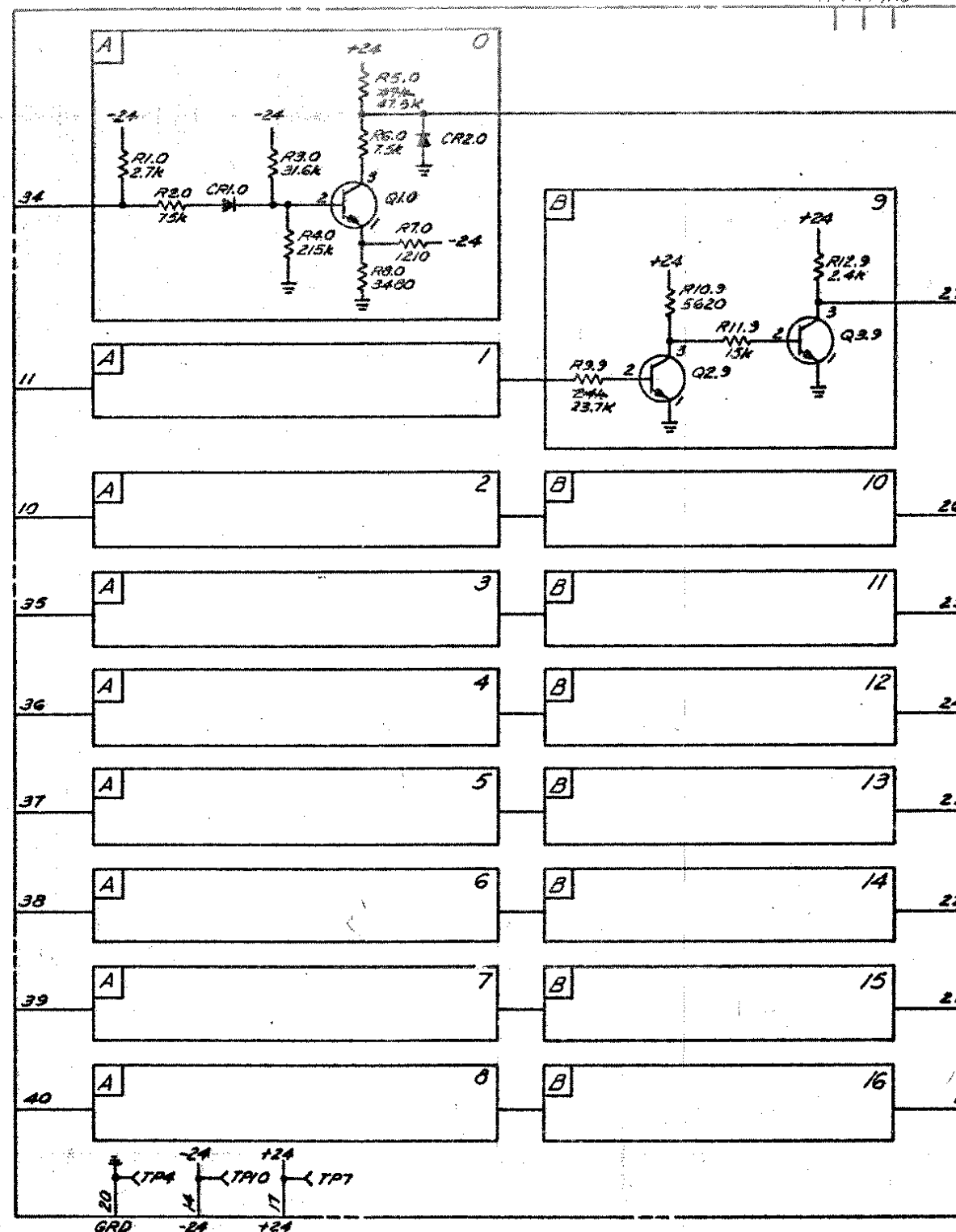
LEVELS: OUTPUTS ARE AT APPROXIMATELY GROUND POTENTIAL IF THE ASSOCIATED INPUT IS GROUND, AND GREATER THAN +6 VOLTS IF THE ASSOCIATED INPUT IS OPEN.

CIRCUIT DESCRIPTION:

TRANSISTORS (Q1.0) TO (Q1.8) AND ASSOCIATED COMPONENTS FORM NINE IDENTICAL INTERFACE GATES WHOSE FUNCTION IS TO PROVIDE THE PROPER LOGIC LEVEL CONVERSION BETWEEN THE INPUT CONNECTING CIRCUITS AND THE TRL GATES WHICH FOLLOW. (Q2.9) TO (Q2.16) AND ASSOCIATED RESISTORS FORM EIGHT IDENTICAL L GATES WHICH IN TURN DRIVE EIGHT IDENTICAL H GATES COMPOSED OF (Q3.9) TO (Q3.16) AND ASSOCIATED RESISTORS. THE H GATES ARE NEEDED TO SATISFY THE CURRENT REQUIREMENTS OF THE CONNECTING OUTPUT CIRCUITS. OPERATION OF THE INDIVIDUAL GATE CIRCUITS IS EXPLAINED IN NOTE 302.

CPS 5
PART OF DECODER

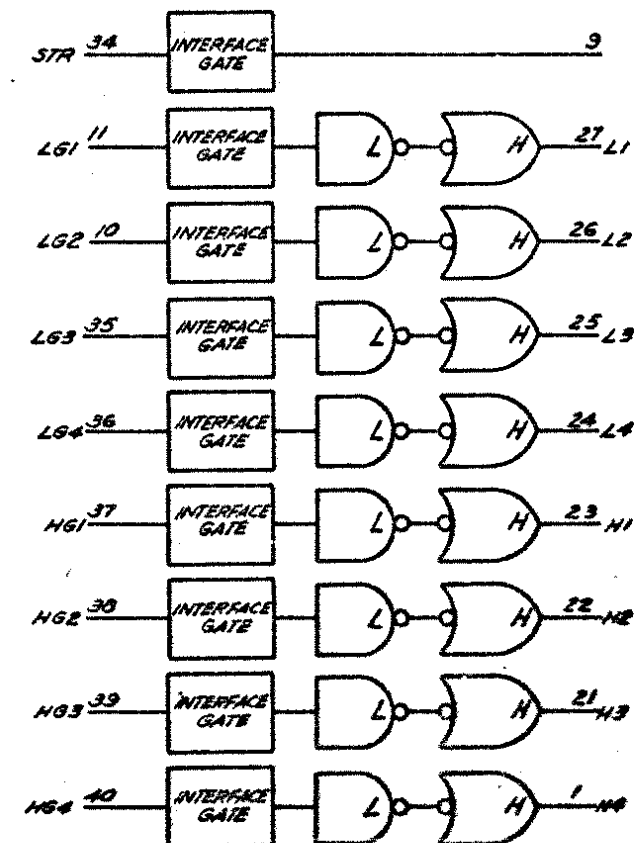
7P4 7P7 7P10



MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-10303
CONNECTOR ON FRAME	908C

SYMBOL



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS;
VALUES PRECEDED BY THE SYMBOL + (PLUS)
OR - (MINUS) ARE IN VOLTS.

2. $\frac{1}{2}$ GROUND RETURN

PART OF DECODER

CPS 5

ISSUE

108

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

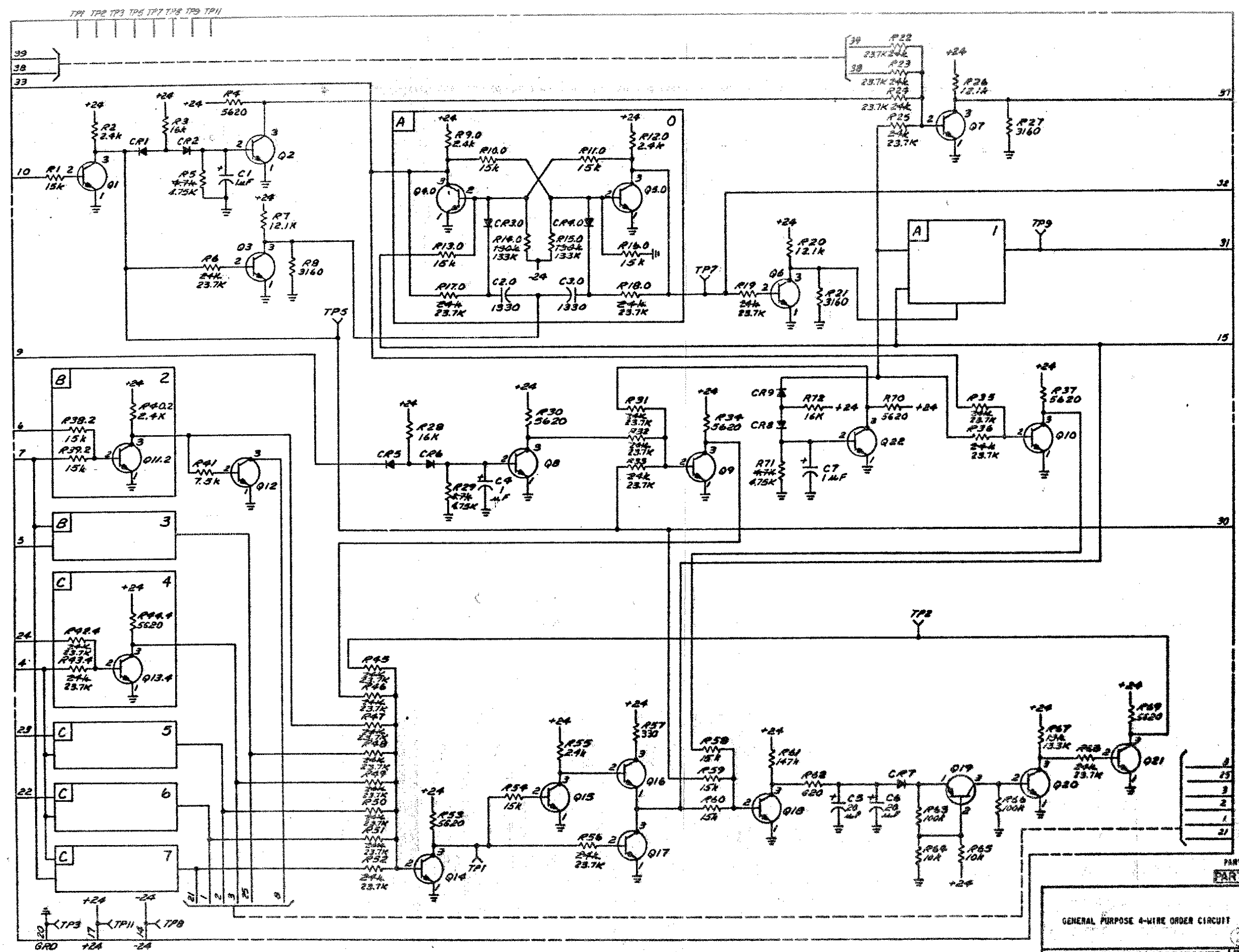
SD-IC245-01-J5

BELL TELEPHONE LABORATORIES
INCORPORATED

65

PART OF CPS 6
PART OF DECODER

DRAWING
1
2A



SD-IC245-01-J6A

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-IC245-01-J6A

BELL TELEPHONE LABORATORIES
INCORPORATED

65

COMPONENT LIST

CAPACITOR

DESIG	CODE
C1	600A
[2] C2.0-C2.1	794C, KS-20977, L4, 1330"
C3.0-C3.1	794C, KS-20977, L4, 1330
C4	600A
C5, C6	602C
C7	600A
DIODE	
DESIG	CODE
CR1	458A
CR2	449A
[2] CR3.0-CR3.1	449A
[2] CR4.0-CR4.1	449A
CR5	458A
CR6	449A
CR7	458A
CR8	449A
CR9	458A

RESISTOR

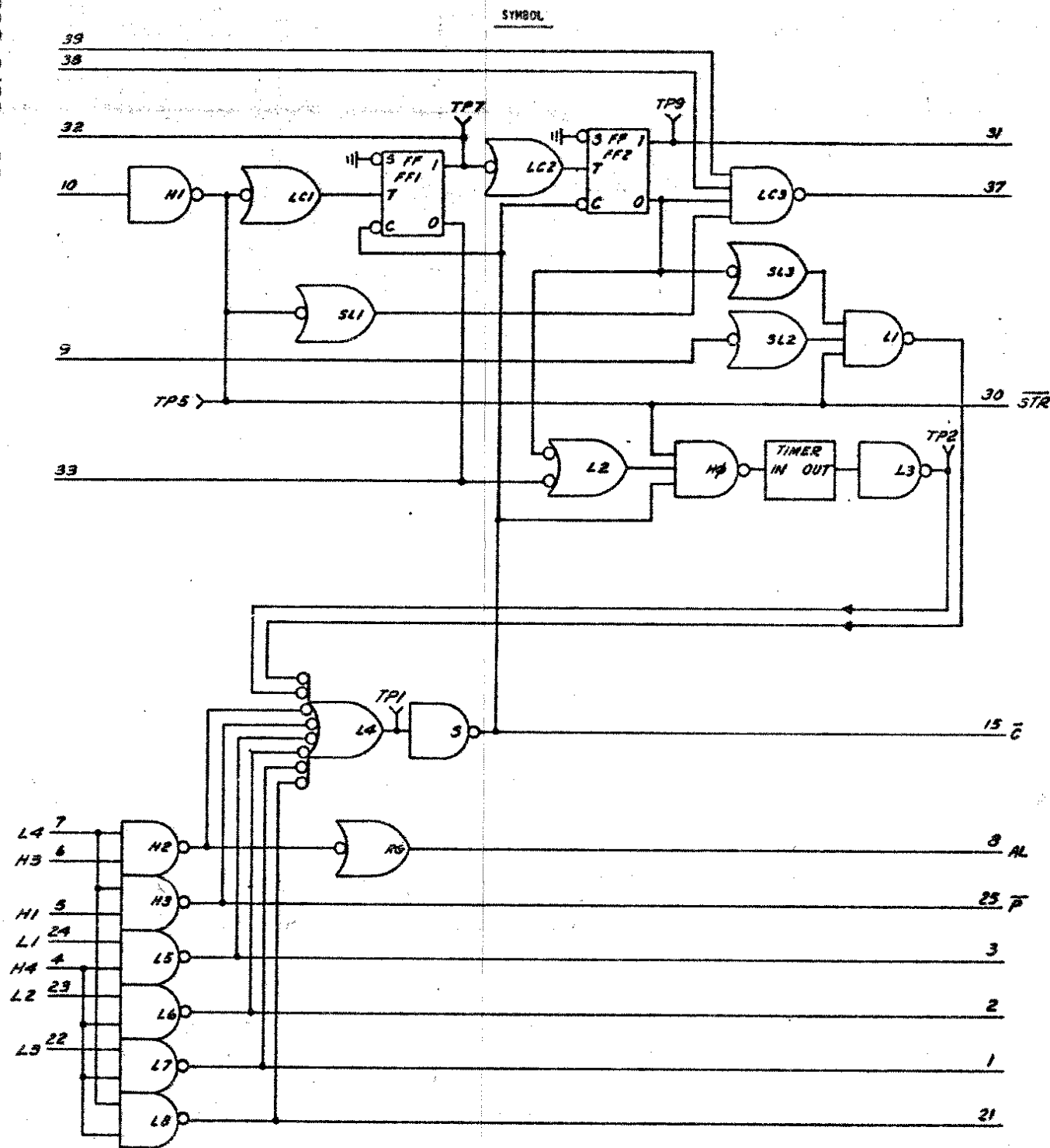
DESIG

DESIG	CODE
R1	KS-16645, L1, KS-20616, L1A, 15K
R2	KS-13490, L1, 2.4K
R3	KS-16645, L1, KS-20616, L1A, 16K
R4	238A, KS-20616, L1A, 5620
R5	KS-16645, L1, 4.7K, KS-20616, L1A, 4.75K
R6	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R7	237A, KS-20616, L1A, 12.1K
R8	237A, KS-20616, L1A, 3160
[2] R9.0, R9.1	KS-13490, L1, 2.4K
[2] R10.0, R10.1	KS-16645, L1, KS-20616, L1A, 15K
[2] R11.0, R11.1	KS-16645, L1, KS-20616, L1A, 15K
[2] R12.0, R12.1	KS-13490, L1, 2.4K
[2] R13.0, R13.1	KS-16645, L1, KS-20616, L1A, 15K
[2] R14.0, R14.1	KS-16645, L1, 130K, KS-20616, L1A, 133K
[2] R15.0, R15.1	KS-16645, L1, 130K, KS-20616, L1A, 133K
[2] R16.0, R16.1	KS-16645, L1, KS-20616, L1A, 15K
[2] R17.0, R17.1	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
[2] R18.0, R18.1	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R19	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R20	237A, KS-20616, L1A, 12.1K
R21	237A, KS-20616, L1A, 3160
R22-R25	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R26	237A, KS-20616, L1A, 12.1K
R27	237A, KS-20616, L1A, 3160
R28	KS-16645, L1, KS-20616, L1A, 16K
R29	KS-16645, L1, 4.7K, KS-20616, L1A, 4.75K
R30	238A, KS-20616, L1A, 5620
R31-R33	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R34	238A, KS-20616, L1A, 5620
R35, R36	KS-16645, 24K, KS-20616, L1A, 23.7K
R37	238A, KS-20616, L1A, 5620
[2] R38.2-R38.3	KS-16645, L1, KS-20616, L1A, 15K
[2] R39.2, R39.3	KS-16645, L1, KS-20616, L1A, 15K
[2] R40.2-R40.3	KS-13490, L1, 2.4K
R41	KS-16645, L1, KS-20616, L1A, 7.5K
[4] R42.4-R42.7	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
[4] R43.4-R43.7	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
[4] R44.4-R44.7	238A, KS-20616, L1A, 5620
R45-R52	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R53	238A, KS-20616, L1A, 5620
R54	KS-16645, L1, KS-20616, L1A, 15K
R55	KS-13490, L1, 2.4K
R56	KS-16645, L1, 24K, KS-20616, L1A, 23.7K
R57	KS-13490, L1, 330
R58-R60	KS-16645, L1, KS-20616, L1A, 15K
R61	237A, KS-20616, L1A, 147K
R62	KS-16645, L1, KS-20616, L1A, 620
R63	KS-16645, L1, KS-20616, L1A, 100K
R64, R65	238A, KS-20616, L1A, 10K
R66	KS-16645, L1, KS-20616, L1A, 100K
R67	KS-16645, L1, 13K, KS-20616, L1A, 13.3K
R68	KS-16645, L1, KS-20616, L1A, 24K
R69	238A, KS-20616, L1A, 5620
R70	238A, KS-20616, L1A, 5620
R71	KS-16645, L1, 4.7K, KS-20616, L1A, 4.75K
R72	KS-16645, L1, KS-20616, L1A, 16K

COMPONENT LIST (CONT)

TRANSISTOR

DESIG	CODE
Q1-Q3	76L 66J
[2] Q4.0-Q4.1	76L 66J
[2] Q5.0-Q5.1	76L 66J
Q6-Q10	76L 66J
[2] Q11.2-Q11.3	76L 66J
Q12	76L 66J
[4] Q13.4-Q13.7	76L 66J
Q14-Q18	76L 66J
Q19	2N3251
Q20, Q21	76L 66J
Q22	76L 66J

PART OF CPS6
PART OF DECODER

NOTES:

- UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS;
CAPACITANCE VALUES ARE IN PICOFARADS;
VALUES PRECEDED BY THE SYMBOL + (PLUS)
OR - (MINUS) ARE IN VOLTS
- GROUND RETURN

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-1C309
CONNECTOR ON FRAME	908C

INPUT/OUTPUT INFORMATION-

FUNCTION: WHEN USED AS PART OF THE DECODER IT PROVIDES THE COUNTING REQUIRED TO RECOGNIZE A PARTICULAR SET OF FIVE TOUCH-TONE 2-DIGIT OR 3-DIGIT CODES AS WELL AS SPECIAL SINGLE DIGIT CODES. INTER-DIGIT TIMING IS PROVIDED WHICH REQUIRES THE SEPARATE DIGITS IN A VALID CODE BE SPACED NO MORE THAN 5 SECONDS APART.

LEVELS: LOGIC LEVELS REQUIRED FOR OPERATION OF THE VARIOUS TRL CIRCUITS ARE GIVEN IN NOTE 302.

CIRCUIT DESCRIPTION

A STEERING PULSE OF APPROXIMATELY 50 MSEC DURATION APPEARING ON PIN 10 IS FED THROUGH GATES (H1) AND (LC1) TO TOGGLE FLIP-FLOP (FF1). THE "1" OUTPUT OF FF1 IS FED THROUGH (LC2) AND APPEARS AT THE TOGGLE INPUT OF (FF2). SINCE ONLY A NEGATIVE GOING TRANSITION WILL TOGGLE A FLIP-FLOP, (FF2) WILL CHANGE STATE AT ONE HALF THE (FF1) RATE. BOTH FLIP-FLOPS ARE CLEARED SIMULTANEOUSLY EITHER BY A TIMER, WHICH ALLOWS A PERIOD OF NO MORE THAN FIVE SECONDS BETWEEN STEERING PULSES, OR BY RECOGNIZING THE COUNT FOR WHICH THE UNIT IS STRAPPED. A STRAP BETWEEN PINS 9 AND 32 PERMITS A 2 DIGIT COUNT WHILE A STRAP BETWEEN PINS 9 AND 33 PERMITS A 3 DIGIT COUNT. TIMING IS INITIATED WHEN ALL THREE INPUTS TO THE H1 GATE ARE IN THE "1" STATE WHICH TURNS OFF THE H1 GATE. THIS CONDITION IS PRESENT WHEN THE ZERO OUTPUT OF EITHER FLIP-FLOP HAS REACHED THE "0" STATE CAUSING THE (L2) GATE OUT TO BECOME "1" AND THE (H1) GATE OUTPUT HAS RETURNED TO THE "1" STATE. AFTER APPROXIMATELY FIVE SECONDS THE TIMER OUTPUT TURNS OFF GATE (L3); TURNS ON GATE (L4); TURNS OFF THE S GATE, CLEARING (FF1) AND (FF2). IN ORDER TO CLEAR THE FLIP-FLOPS AFTER THE PROPER COUNT, ALL THREE INPUTS TO GATE (L1) MUST BE IN THE "1" STATE TO TURN IT OFF. TWO OF THE INPUTS ARE FROM SLOW GATES (SL2) AND (SL3) WHICH HAVE, WHEN COUNTING THREE DIGITS, THE ZERO OUTPUTS OF (FF1) AND (FF2) RESPECTIVELY AS THEIR INPUTS. THE THIRD INPUT TO GATE (L1) IS THE OUTPUT OF GATE (H1). WHEN COUNTING TWO DIGITS THE "1" OUTPUT OF (FF1) IS CONNECTED TO (SL2). THE TURNING OFF OF L1 CLEARS BOTH FLIP-FLOPS IN THE SAME MANNER AS GATE (L3). THE OUTPUT OF THE (S) GATE IS ALSO FED TO THE (H1) GATE INPUT WHICH CLEARS THE TIMER. THE FIRST DIGIT OF AN OFFICE CODE PRODUCES A POSITIVE PULSE AT PIN 37. THIS REQUIRES THAT ALL FOUR INPUT LEADS TO GATE (LC3) BE IN THE "1" STATE DURING THE DIGIT PERIOD. PINS 38 AND 39 ARE DIGIT INPUTS WHICH OCCUR COINCIDENT WITH THE STEERING PULSE ON PIN 10. THE OUTPUT OF GATE (H4) TURNS ON SLOW GATE (SL1) WHOSE OUTPUT IS IN THE "1" STATE DURING THIS PERIOD. THE ZERO OUTPUT OF (FF2) IS THE FOURTH INPUT TO (LC3) AND, SINCE FF2 IS IN THE CLEAR CONDITION, IS ALREADY IN THE "1" STATE. THE INPUTS TO GATES (H2), (H3), AND (L3) TO (L8) ARE WIRED TO PRODUCE A "0" STATE OUTPUT FOR ANY OF SIX SPECIAL SINGLE DIGIT CODES. ALL OUTPUTS ARE FED TO GATE (L4) SO THAT THE TURNING OFF OF ANY OF THESE GATES WILL CLEAR FLIP-FLOPS (FF1) AND (FF2). AN H1 GATE IS SWITCHED BY THE OUTPUT OF GATE (H2) WHICH CAN OPERATE AN EXTERNAL RELAY. OPERATION OF THE INDIVIDUAL TRL CIRCUITS IS DESCRIBED IN NOTE 302.

PART OF DECODER

PART OF CPS 6

ISSUE

10B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-IC245-01-J6B

BELL TELEPHONE LABORATORIES
INCORPORATED

65

PART OF CPS7 PART OF DECODER

COMPONENT LIST

CAPACITOR

DESIG	CODE
[2] C1.0, C1.1	594C, KS-20977, L4, 1330
[2] C2.0, C2.1	594C, KS-20977, L4, 1330

DIODE

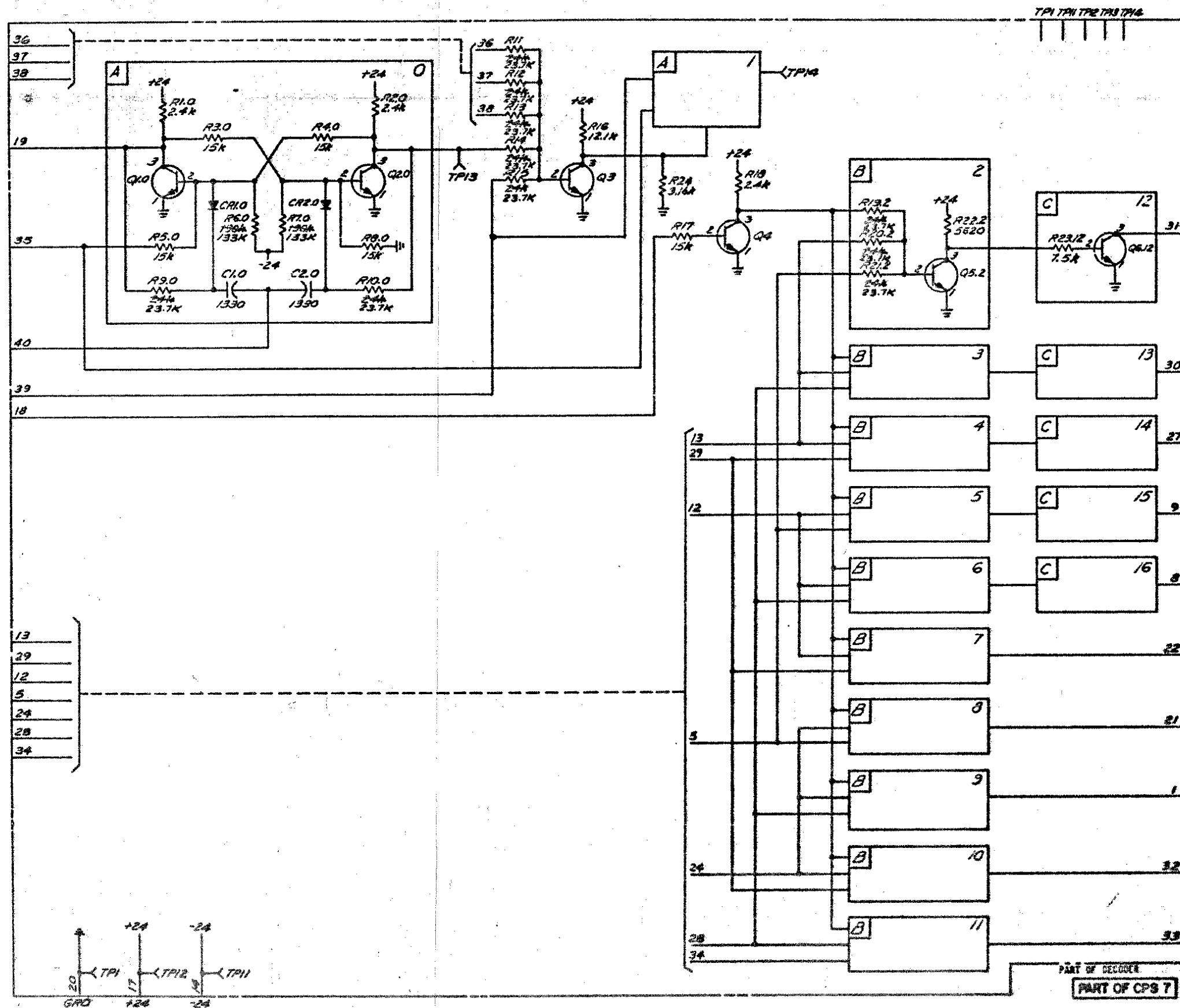
DESIG	CODE
[2] CR1.0, CR1.1	449A
[2] CR2.0, CR2.1	449A

RESISTOR

DESIG	CODE
[2] R1.0, R1.1	KS-13490, L1, 2.4k
[2] R2.0, R2.1	KS-13490, L1, 2.4k
[2] R3.0, R3.1	KS-16645, L1, KS-20616, L1A, 15k
[2] R4.0, R4.1	KS-16645, L1, KS-20616, L1A, 15k
[2] R5.0, R5.1	KS-16645, L1, KS-20616, L1A, 15k
[2] R6.0, R6.1	KS-16645, L1, KS-20616, L1A, 133k
[2] R7.0, R7.1	KS-16645, L1, KS-20616, L1A, 133k
[2] R8.0, R8.1	KS-16645, L1, KS-20616, L1A, 15k
[2] R9.0, R9.1	KS-16645, L1, KS-20616, L1A, 23.7k
[2] R10.0, R10.1	KS-16645, L1, KS-20616, L1A, 23.7k
[2] R11-R15	KS-16645, L1, KS-20616, L1A, 23.7k
R16	297A, KS-20616, L1A, 12.1k
R17	KS-16645, L1, KS-20616, L1A, 15k
R18	KS-13490, L1, 2.4k
[10] R19.2-R19.11	KS-16645, L1, KS-20616, L1A, 23.7k
[10] R20.2-R20.11	KS-16645, L1, KS-20616, L1A, 23.7k
[10] R21.2-R21.11	KS-16645, L1, KS-20616, L1A, 23.7k
[10] R22.2-R22.11	298A, KS-20616, L1A, 5620
[5] R23.12-R23.16	KS-16645, L1, KS-20616, L1A, 7.5k
R24	297A, KS-20616, L1A, 3.16k

TRANSISTOR

DESIG	CODE
[2] Q1.0, Q1.1	16L 66J
[2] Q2.0, Q2.1	16L 66J
Q3, Q4	16L 66J
[10] Q5.2-Q5.11	16L 66J
[5] Q6.12-Q6.16	16L 66L



PART OF DECODER
PART OF CPS 7

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

BELL TELEPHONE LABORATORIES

SD-IC245-01-J7A

100308
1003
BS

PART OF CPS7 PART OF DECODER

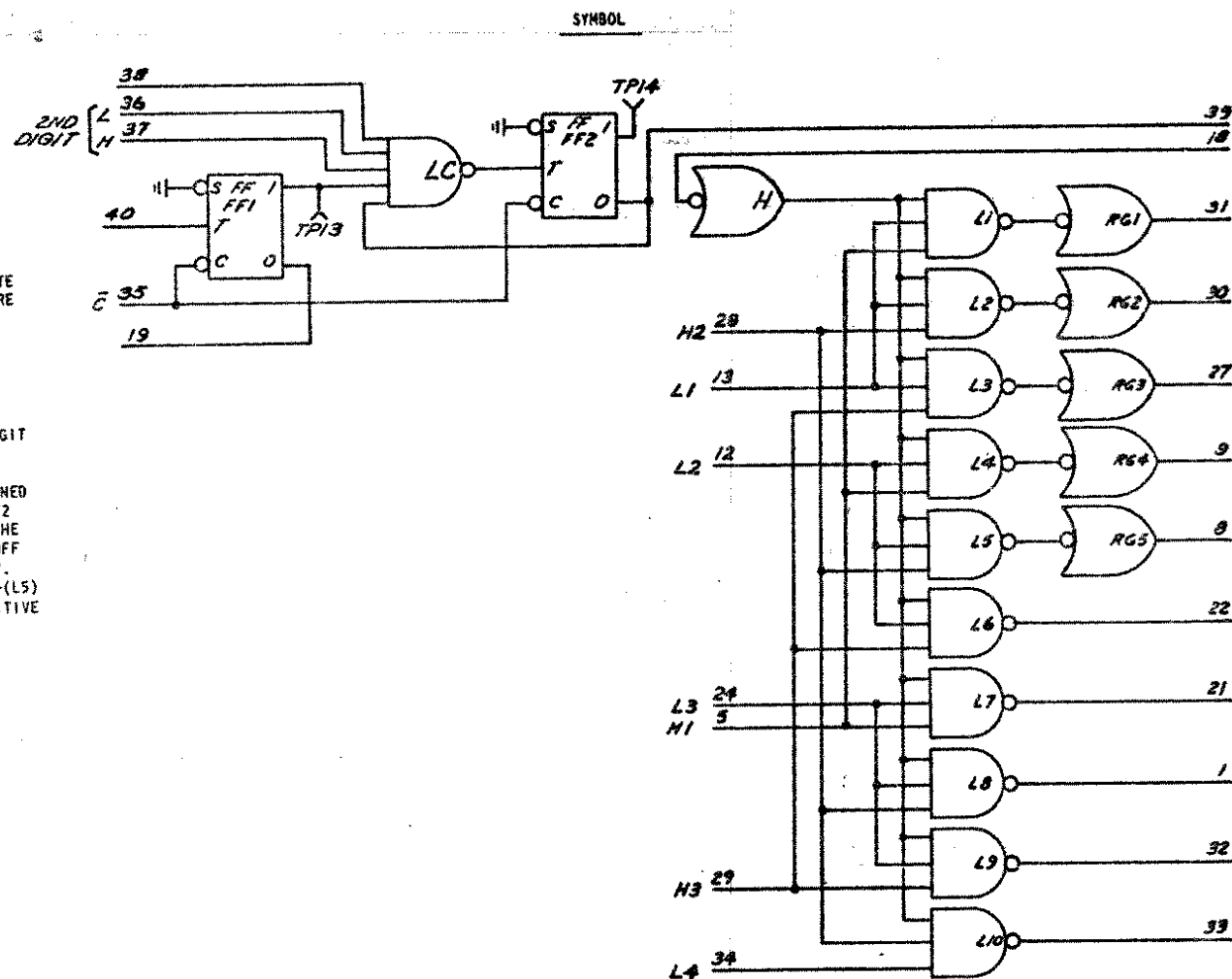
INPUT/OUTPUT INFORMATION

FUNCTION: WHEN USED AS PART OF THE DECODER IT PROVIDES THE TRANSLATION REQUIRED FOR THE MIDDLE AND LAST DIGITS OF A STATION CODE.

LEVELS: LOGIC LEVELS REQUIRED FOR OPERATION OF THE VARIOUS TRL CIRCUITS ARE GIVEN IN NOTE 302.

CIRCUIT DESCRIPTION

THE FIRST DIGIT OF AN OFFICE CODE CAUSES THE INPUT CONNECTING CIRCUIT TO FURNISH A POSITIVE PULSE ON PIN 40 WHICH TOGGLES FLIP-FLOP (FF1). THE "1" OUTPUT OF (FF1) ASSUMES THE "1" STATE AND IS FED TO THE LC GATE. TWO OTHER INPUTS TO THE LC GATE ARE THE MIDDLE DIGIT OF A THREE DIGIT OFFICE CODE WHICH APPEARS ON PINS 36 AND 37 AND ARE IN THE "1" STATE DURING THE DIGIT PERIOD. THE FOURTH INPUT TO THE LC GATE IS THE "0" OUTPUT OF FLIP-FLOP (FF2) WHICH IS CLEARED AND IN THE "1" STATE. UNDER THESE CONDITIONS THE LC GATE PRODUCES A POSITIVE PULSE DURING THE DIGIT PERIOD AND TOGGLES (FF2). THE "0" OUTPUT OF FF2 ASSUMES THE "0" STATE AND, WITH PINS 18 AND 39 STRAPPED (3 DIGIT OPERATION), TURNS ON THE H GATE. THE OUTPUT OF THE H GATE IS ONE OF THREE INPUTS TO EACH L GATE (L1)-(L10). FOR 2 DIGIT OPERATION, PIN 18 AND 19 ARE STRAPPED, AND THE H GATE IS TURNED ON BY THE "0" OUTPUT OF FF1. THUS, FOR 2 DIGIT OPERATION, FF2 IS IGNORED AND THE L GATES ARE ENABLED BY THE FIRST DIGIT. THE OTHER TWO INPUTS TO GATES (L1)-(L10) ARE WIRED TO BE TURNED OFF BY THE LAST DIGIT OF AN OFFICE CODE, 1 THROUGH 0 RESPECTIVELY. GATES (RG1)-(RG5) ARE TURNED ON BY THE OUTPUTS OF GATES (L1)-(L5) RESPECTIVELY. FLIP-FLOP (FF1) AND (FF2) ARE CLEARED BY A POSITIVE PULSE APPEARING ON PIN 35. OPERATION OF THE INDIVIDUAL TRL CIRCUITS IS DESCRIBED IN NOTE 302.



MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-1C310
CONNECTOR ON FRAME	908C

NOTES:

- UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS;
CAPACITANCE VALUES ARE IN MICROFARADS;
VALUES PRECEDED BY THE SYMBOL "P" (PLUS)
OR "M" (MINUS) ARE IN VOLTS.
- GROUND RETURN

PART OF DECODER

PART OF CPS7

4

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J7B

BELL TELEPHONE LABORATORIES

2

65

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CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ			CIRCUIT PREPARATION				TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQ					REMARKS
DESIG	CODE	OPT	FIG	BSP FIG.	CONT PRES	ARM TRVL	BLOCK OR INSULATE	TEST CLIP DATA		TEST WDG			TEST FOR	AFTER WDG	TEST MA	READ MA		
								CONN BAT.	CONN GRD									
RELAY																		
K1	BF6	R		3				L(K1)	U(K1)	B/G	1		0		25.5	24.0		
K2	BF6	R		3				L(K2)	U(K2)	B/G	1		0		25.5	24.0		
K3	BJ3	R		401				L(K3)	U(K3)	B/G	1		0		32.5	30.5		
K1-K3	MB1	S		200				L REL TST	U REL TST	B/G	1		0		25.5	24.0		

TEST NOTES:

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST

COMPONENT LIST

RELAY										SEE NOTE 2	
DESIG	K1	K2	K3	K1	K2						
CODE	BF6	BF6	BJ3	MB1	MB1						
OPTION	R	R	R	S	S						
	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	
12					BM						
11					BM						
10					BM						
9					BM	C6					
8					BM	F6					
7					BM	F6					
6	BM	H6	BM	H6	BM	C6	EBM	H6	EBM	H6	
5	BM	C3	BM	D4	BM	E6	EBM	C3	EBM	D4	
4	BM		BM		BM	E6	EBM		EBM		
3	BM	F5	BM	H6	BM	E6	EBM	F5	EBM	H6	
2	BM	F5	BM	H6	BM	E6	EBM	F5	EBM	H6	
1	BM		BM		BM	G6	EBM		EBM		
COIL		F3		G3		H3		F3		G3	

RELAY

DESIG	K4	K5
327C		
1	C5	D5
2	F3	G3

CAPACITOR

DESIG	CODE
C1-C5	5420

DIODE

DESIG	CODE
CR1-CR3	4004 SEE NOTE 2

RESISTOR

DESIG	CODE
R1	259A, KS-20616, L1A, 11
R2	259A, KS-20616, L1A, 3.01
R3, R4	259A, KS-20616, L1A, 600
R5, R6	KS-13492, L1, 82 KS-20289, L6C, 82.5

TRANSFORMER

DESIG	CODE
T1	2532AC
T2	2586C
T3	2532AC
T4, T5	2578U

VARISTOR

DESIG	CODE
RV1	104A, SEE NOTE 2

CPS 8, CPS 10 (MFR DISC.)
CPS 9, CPS 11
TALK BATTERY FEED CKT

MANUFACTURING REFERENCES

CATEGORY	NO
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	
CP 8	ED-1C311() 01
CP 9	ED-1C311() 02
CP 9	ED-1C311() 03
CP 10	ED-1C311() 03
CP 11	ED-1C311() 04
CP 11	ED-1C311() 06
CONNECTOR ON FRAME	908C

SYMBOL
SHOWN IN DETAIL IN FS2,3,4&5

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES CURRENT FEED FOR TELEPHONE TRANSMITTER. CP8 AND CP9 PROVIDE IMPEDANCE TRANSFORMATION FOR MATCHING MULTIPLE TALK BATTERY FEEDS (CP10 OR CP11) TO A 600 OHM AMPLIFIER CIRCUIT. CP9 AND CP11 PROVIDE PICK-UP CAPABILITY.

CIRCUIT DESCRIPTION:

CURRENT IS SUPPLIED THROUGH RELAY (K4) AND TRANSFORMER (T4) FOR A TOUCH-TONE TELEPHONE SET. CAPACITORS (C1), (C2), (C3), AND (C4) BLOCK THE DC WHILE PROVIDING AC COUPLING OF THE INPUT SIGNAL. CURRENT IS SUPPLIED THROUGH RELAY (K5) AND TRANSFORMER (T5) FOR A 50 OHM TELEPHONE TRANSMITTER. CAPACITOR (C5) BLOCKS THE DC WHILE TRANSFORMER (T3) STEPS UP THE AC IMPEDANCE FROM 50 TO 600 OHMS. IDLE CIRCUIT TERMINATING RESISTORS (R3) AND (R4) ARE REMOVED FROM THE CIRCUIT BY THE OPERATION OF RELAYS (K4) OR (K5) WHICH OPERATE RELAYS (K1) AND (K2) RESPECTIVELY. CP8 AND CP9 ARE EQUIPPED WITH TRANSFORMERS (T1) AND (T2). (T1) STEPS UP THE IMPEDANCE TO 600 OHMS AT TERMINALS 1 AND 2. (T2) STEPS UP THE IMPEDANCE TO 600 OHMS AT TERMINALS 16 AND 38. THIS ALLOWS UP TO FOUR CP10 OR 11 TO BE MULTIPLIED WITH A CP8 OR 9 WITH NO SIGNIFICANT CHANGE IN TRANSMIT OR RECEIVE LEVEL. CP9 AND 11 ARE EQUIPPED WITH A PICK UP RELAY (K3) WHICH OPERATES UNDER CONTROL OF AN ASSOCIATED STATION SET KEY. THE OPERATION OF (K3) CONNECTS THE TRANSMISSION LEADS OF THE ASSOCIATED STATION SET TO THE 4-WIRE LINE. CONTACTS ON RELAYS (K1) AND (K2) PROVIDE LOUDSPEAKER CUT-OFF AS REQUIRED.

NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN MICROFARADS. VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

OPTIONAL	ONLY COMPONENT
CP8	3, 4, 1, 2, 3
CP9	9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
CP10	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
CP11	11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

2. GROUND RETURN.

DESIG	PREV	STD	FR	SEE
ISS	PLANN	DISC	NOTE	
TS	R	S	R	

TALK BATTERY FEED CKT

CPS 8,9,10,11

ISSUE
103

GENERAL PURPOSE 4-WIRE CORD CIRCUIT

SD-1C245-01-J8

BELL TELEPHONE LABORATORIES
INCORPORATED

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PRINTED U.S.A.

CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ		CIRCUIT PREPARATION				TEST SET	SEE	DIRECT CURRENT FLOW REQ				REMARKS
DESIG	CODE	OPT	FIG.	BSP FIG.	CONT PRES	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA		PREP	TEST NOTE	TEST WDG	TEST FOR	TEST SCRN	TEST READJ	
RELAY								CONN BAT.	CONN GRD							
K1	BF6	R		3				L(K1)	U(K1)	B/G	1,2	0		23.2	24.0	
K1	MB1	S		200				L(K1)	U(K1)	B/G	1,2	0		22.2	24.0	

TEST NOTES:

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST.
2. USE + BATTERY.

COMPONENT LIST

RELAY			
DESIG	CODE	DESIG	CODE
K1	BF6	K1	MB1
OPT	R	OPT	S
CONT ARR	LOC	CONT ARR	LOC
6	BM	F7	EBM
5	BM	E7	EBM
4	BM	E7	EBM
3	BM	D7	EBM
2	BM	C7	EBM
1	BM	C7	EBM
COIL	C5		C5

CAPACITOR

DESIG	CODE
C1, C2	602C

DIODE

DESIG	CODE
CR1	400J
CR2	458A

RESISTOR

DESIG	CODE
R1	237A, KS-20616, L1A, 5620
R2, R3	KS-16645, L1, 24K KS-20616, L1A, 23.7K
R4	237A, KS-20616, L1A, 5620
R5, R6	KS-16645, L1, KS-20616, L1A, 200K
R7-R9	KS-16645, L1, 24K KS-20616, L1A, 23.7K
R10	237A, KS-20616, L1A, 5620
R11	KS-16645, L1, KS-20616, L1A, 7.5K
R12, R13	KS-16645, L1, KS-20616, L1A, 15K
R14	KS-16645, L1, 130K KS-20616, L1A, 133K
R15	237A, KS-20616, L1A, 147K
R16	KS-16645, L1, 620K KS-20616, L1A, 619
R17	KS-16645, L1, KS-20616, L1A, 100K
R18, R19	237A, KS-20616, L1A, 10K
R20	KS-16645, L1, KS-20616, L1A, 100K
R21	KS-16645, L1, 13K KS-20616, L1A, 13.3K
R22	KS-16645, L1, KS-20616, L1A, 24K
R23	237A, KS-20616, L1A, 5620
R24	237A, KS-20616, L1A, 600

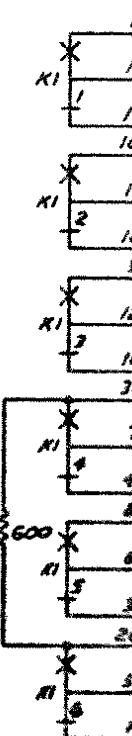
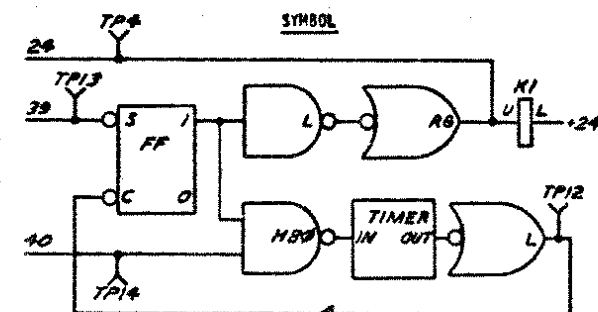
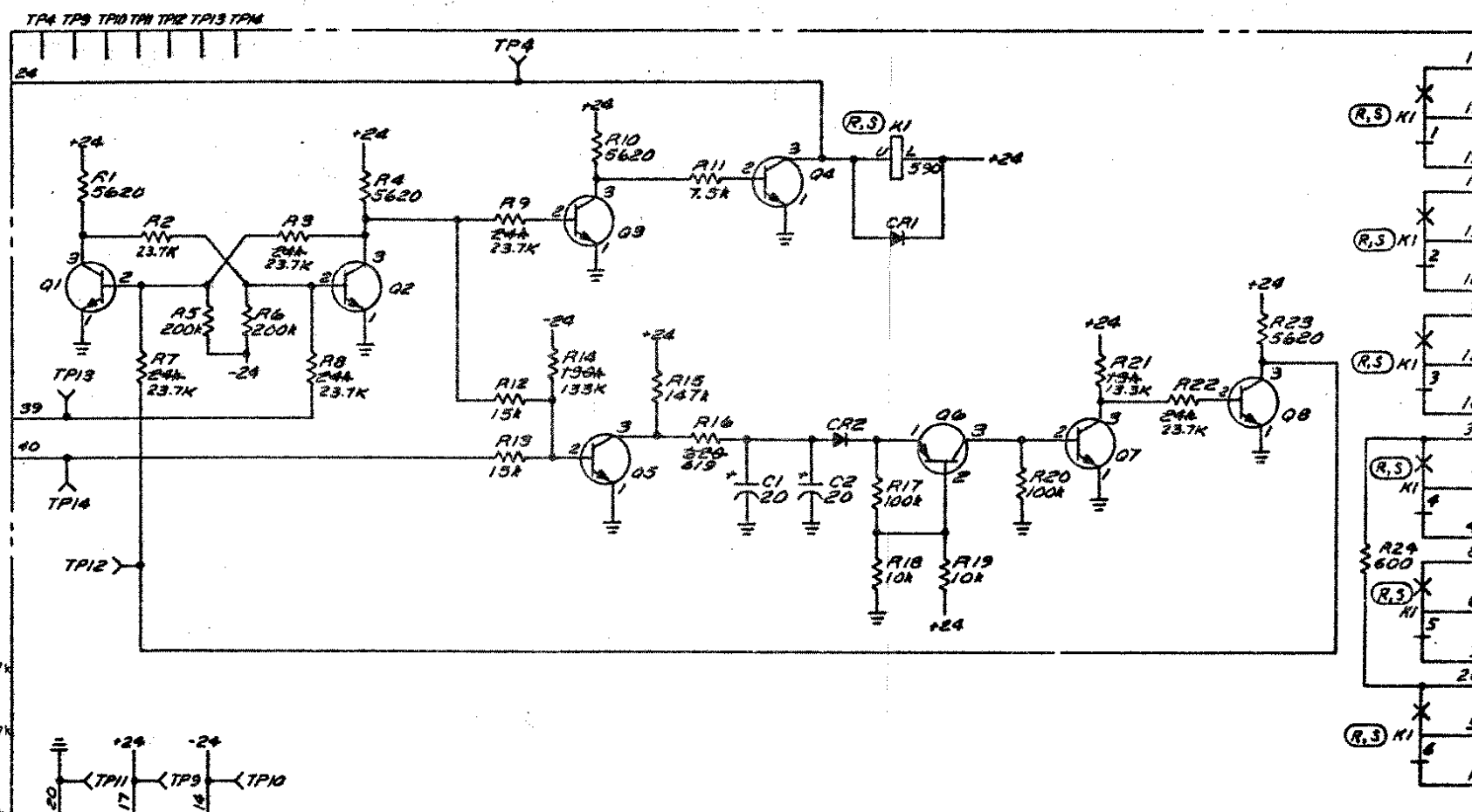
TRANSISTOR

DESIG	CODE
Q1-Q3	66J
Q4	66L
Q5	66J
Q6	2N3254-51A
Q7, Q8	66J

CPS 12
PRE-EMPT CIRCUIT

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-1C312(1)G1 ED-1C312(1)G2
CONNECTOR ON FRAME	Y08C



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS; K FOR KILOHMS;
CAPACITANCE VALUES ARE IN MICROFARADS;
VALUES PRECEDED BY THE SYMBOL + (PLUS)
OR - (MINUS) ARE IN VOLTS.
2. $\frac{1}{2}$ GROUND RETURN.
3. RECORD OF CHANGES

DATE	PREP	STD	A & H	APR	SEE
155	FURN				
70	R				
110	S				
4. RATING CHANGED TO STANDARD FOR USE IN FS 32.

PRE-EMPT CKT
CPS 12

11B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J9

BELL TELEPHONE LABORATORIES
INCORPORATED

6S

MADE IN U.S.A.

CIRCUIT REQUIREMENTS

CPS 13 (MFR DISC.)
CALL-RECALL ALERT CKT

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-1C313
CONNECTOR ON FRAME	908C

SYMBOL

SHOWN IN DETAIL IN F39

DESIG	CODE	OPT	FIG	MECH REQ			CIRCUIT PREPARATION			TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQ			REMARKS
				BSP FIG.	CONT RES	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA	TEST CLIP DATA			TEST WDG	TEST FOR	TEST MA	
RELAY															
K1	BF24			211				L(K1)	U(K1)	GRD	1		0	34.6	33.0
K2	BF24			211				L(K2)	U(K2)	GRD	1		0	34.6	33.0
K3	BF2			1				L(K3)	U(K3)	GRD	1		0	14.0	13.3
K4	BF6			3				L(K4)	U(K4)	GRD	1		0	25.5	24.0
K5	BF6			3				L(K5)	U(K5)	GRD	1		0	25.5	24.0
K6	BF6			3				L(K6)	U(K6)	GRD	1		0	25.5	24.0
K7	BF2			1				L(K7)	U(K7)	GRD	1		0	14.0	13.3
K8	BF6			3				L(K8)	U(K8)	GRD	1		0	25.5	24.0

TEST NOTES:

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST

DESIG	K1	K2	K3	K4	K5	K6	K7	K8
CODE	BF24	BF24	BF2	BF6	BF6	BF6	BF2	BF6
OPTION								
CONV ARR	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC
6	EDM	H3	EDM	BM	G4	BM	C5	BM
5	EDM		EDM	G5	BM	D5	BM	G5
4	EDM		EDM	B	F4	BM	D5	BM
3	EDM	G3	EDM	F3		BM	E4	BM
2	EDM	E3	EDM	G5		BM	C5	BM
1	EDM	F3	EDM	E3	BM	G4	BM	F4
COIL	C4	C4	C4	C4	E4	F4	G4	H4

DIODE

DESIG CODE
CR1-CR3 400J

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES RELAY LOGIC AND MEMORY FUNCTIONS WHEN CONNECTED TO AN EXTERNAL SIGNALLING RECEIVER OR DECODER AND STATION ALARM CIRCUITS.

CIRCUIT DESCRIPTION

THIS CIRCUIT PROVIDES THREE MODES OF OPERATION AS FOLLOWS:

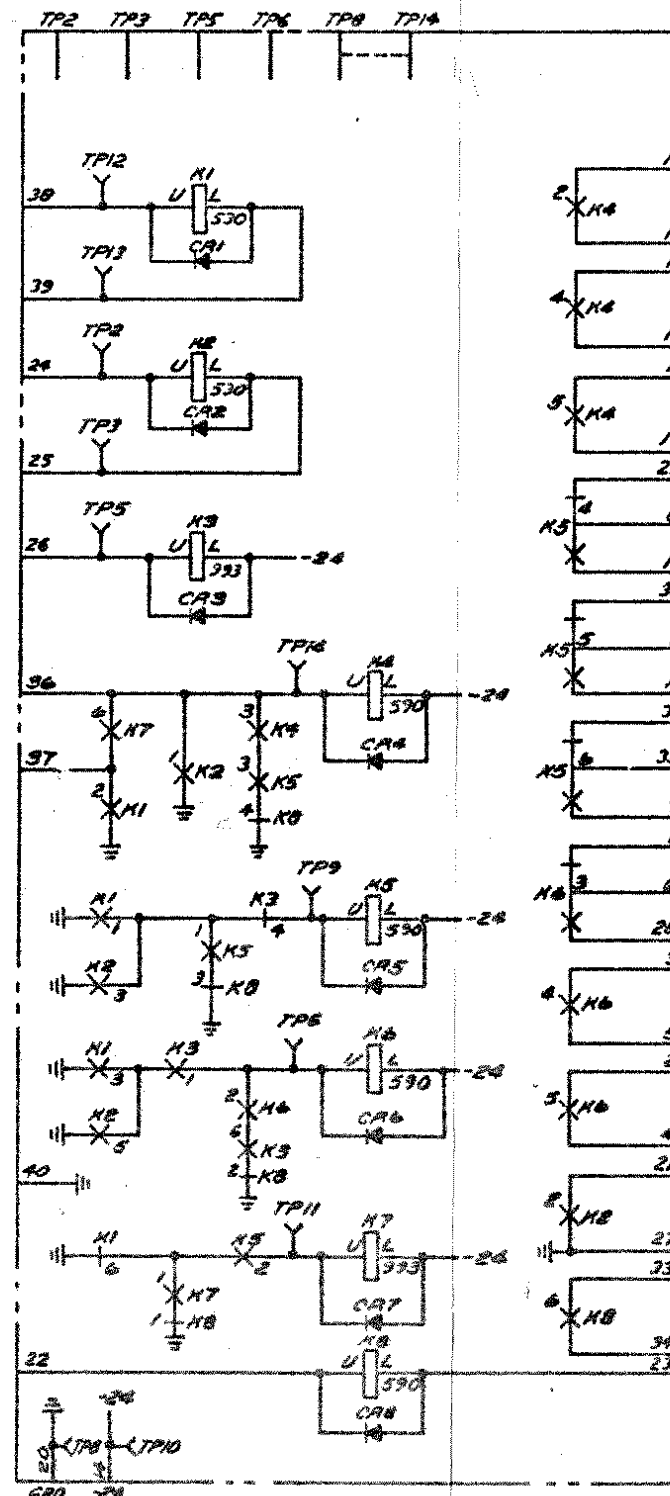
CALL - EXTERNAL OPERATION OF RELAY (K1), WHILE RELAY (K3) IS RELEASED, OPERATES RELAY (K5). THE SUBSEQUENT RELEASE OF (K1) OPERATES RELAY (K7) WHICH SERVES AS A REGISTER TO STORE THE INFORMATION THAT AN UNANSWERED CALL IS PRESENT. EXTERNAL OPERATION OF RELAY (K3) RELEASES (K5) WHICH RELEASES (K7) RESTORING THE CIRCUIT TO NORMAL.

RECALL - EXTERNAL OPERATION OF RELAY (K1), WHILE RELAY (K3) IS OPERATED, OPERATES RELAY (K6). EXTERNAL RELEASE THEN RE-OPERATION OF (K3) RESTORES THE CIRCUIT TO THE INITIAL STATE.

ALERT - THE ALERT OUTPUT, OPERATION OF RELAY (K4) IS A MOMENTARY ADDITION TO THE RECALL STATE OR A LOCKED UP ADDITION TO THE CALL STATE. THE ALERT OUTPUT, PLUS THE CALL OR RECALL, MAY BE ACHIEVED IN ONE OF THREE WAYS:

- (1) EXTERNAL OPERATION OF RELAY (K2).
- (2) TWO SEQUENTIAL OPERATIONS OF RELAY (K1) WITH NO INTERVENING OPERATION OF RELAY (K3).
- (3) A SINGLE OPERATION OF RELAY (K1) DURING THE PERIOD IN WHICH THERE IS AN EXTERNAL CONTACT CLOSURE BETWEEN TERMINALS 36 AND 37. THE ALERT MODE IS RELEASED IN THE SAME MANNER AS THE CALL OR RECALL.

ALL THREE MODES OF OPERATION ARE RENDERED NON-LOCKING BY EXTERNAL OPERATION OF RELAY (K8).



NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS. VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

2. $\frac{1}{2}$ WOUND RETURN

CALL-RECALL-ALERT CKT

CPS 13

ISSUE
7B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J10

BELL TELEPHONE LABORATORIES
INCORPORATED

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CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ			CIRCUIT PREPARATION				TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQ				REMARKS
DESIG	CODE	OPT	FIG.	BSP FIG.	CONT PRES	ARM TRVL	BLOCK OR INSULATE	TEST CLIP DATA					TEST WDG	TEST FOR	TEST AFTER SOAR	TEST READJ	
RELAY																	
K1	BF2	R		1				L(K1)	U(K1)	B/G	1		0		18.0	13.3	
K2	BJ2	R		600				L(K2)	U(K2)	B/G	1		0		35.5	33.5	
K1-K3	MB1	S		200				L REL	U REL	B/G	1		0		25.5	24.0	
								TST	TST								

TEST NOTES:

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST.

COMPONENT LIST

RELAY

DESIG	K1	K2	K1	K2	K3
CODE	BF2	BJ2	MB1	MB1	MB1
OPTION	R	R	S	S	S
	CONT ARR	LOC	CONT ARR	LOC	
12		EMB	OS		
11		B			
10		B	GS		
9		B	ES		
8		B	F5		
7		EBM	C5		
6	BM	EBM	C3	EBM	DS
5		M		EBM	EBM
4	B	G4	M	EBM	G4
3		M		EBM	ES
2		M		EBM	F5
1	BM	E5	EBM	B3	EBM
COIL		D4		E4	

DIODE

DESIG	CODE
CR1, CR2	400J

RESISTOR

DESIG	CODE
R1-R4	259A, KS-20616, L1A, 600

CPS 14

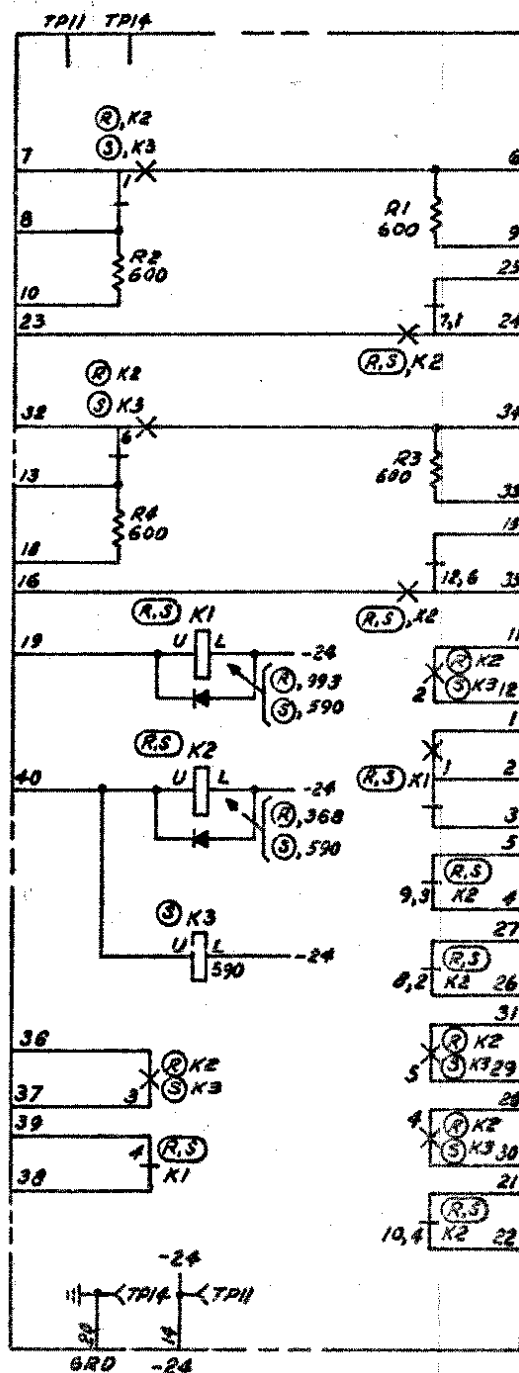
LINE OUT CKT

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	② ED-1C314(1)01
CONNECTOR ON FRAME	⑤ ED-1C314(1)02
	908C

SYMBOL

SHOWN IN DETAIL IN FS 12



NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS. VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. $\frac{1}{2}$ GROUND RETURN.
- 3.

RECORD OF CHANGES				
DWG	PREP	STD	REV	SEE NOTE
153	FUN	S	N	
70	R	S	N	

LINE OUT CKT

CPS 14

ISSUE 10B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

②

SD-1C245-01-J11

BELL TELEPHONE LABORATORIES

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[illegible]

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST

DESIG	K1		K2		K3		K4		K5		K6		K7		K8		K9	
CODE	MB1		MB1		MB1		MB1		MB1		MB1		MB1		MB1		MB1	
OPTION																		
☒	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC
6	EBM	F5	EBM		EBM	F6	EBM		EBM	D7	EBM		EBM	D5	EBM	F7	EBM	G5
5	EBM		EBM	F5	EBM		EBM	C7	EBM	D7	EBM	F7	EBM		EBM		EBM	
4	EBM		EBM		EBM	E6	EBM	97	EBM	C7	EBM	E7	EBM		EBM	D6	EBM	
3	EBM	E5	EBM	E5	EBM		EBM	D6	EBM		EBM	E7	EBM		EBM	E6	EBM	D6
2	EBM	D5	EBM	F7	EBM		EBM	87	EBM		EBM	F6	EBM		EBM	F6	EBM	F6
1	EBM	E5	EBM	D5	EBM	E5	EBM	G5	EBM		EBM	G5	EBM	F5	EBM	F5	EBM	E6
COIL	85		85		C5		D6		F6		E6		F6		G6		D6	

<u>DESIG</u>	<u>CODE</u>
C1	KS16390, L1 25 μ f, 60V

<u>DESIG</u>	<u>CODE</u>
CR1-CR8	400J

<u>DESIG</u>	<u>CODE</u>
RT	KS-20810, L1A, 475

<u>DESIG</u>	<u>CODE</u>
TM	KS-20919

FUNCTION: PROVIDES RELAY LOGIC AND MEMORY FUNCTIONS WHEN
CONNECTED TO AN EXTERNAL SIGNALLING RECEIVER
OR DECODER AND STATION ALARM CIRCUITS.

THIS CIRCUIT PROVIDES THREE MODES OF OPERATION AS FOLLOWS:

CALL - EXTERNAL OPERATION OF RELAY (K1), WHILE RELAY (K3) IS RELEASED, OPERATES RELAYS (K9) AND (K9). THE SUBSEQUENT RELEASE OF (K1) OPERATES RELAY (K7) WHICH SERVES AS A REGISTER TO STORE THE INFORMATION THAT AN UNANSWERED CALL IS PRESENT. EXTERNAL OPERATION OF RELAY (K3) RELEASES (K9) WHICH RELEASES (K7) RESTORING THE CIRCUIT TO NORMAL.

RECALL - EXTERNAL OPERATION OF RELAY (K1), WHILE RELAY (K3) IS OPERATED, OPERATES RELAY (K6). EXTERNAL RELEASE THEN RE-OPERATION OF (K3) RESTORES THE CIRCUIT TO THE INITIAL STATE.

ALERT - THE ALERT OUTPUT, OPERATION OF RELAY (K4), IS A MOMENTARY ADDITION TO THE RECALL STATE OR A LOCKED UP ADDITION TO THE CALL STATE. THE ALERT OUTPUT, PLUG THE CALL ON RECALL, MAY BE ACHIEVED IN ONE OF THREE WAYS:

- (1) EXTERNAL OPERATION OF RELAY (K2).
- (2) TWO SEQUENTIAL OPERATIONS OF RELAY (K1) WITH NO INTERVENING OPERATION OF RELAY (K3).
- (3) A SINGLE OPERATION OF RELAY (K1) DURING THE PERIOD IN WHICH THERE IS AN EXTERNAL CONTACT CLOSURE BETWEEN TERMINALS 36 AND 37. THE ALB MODE IS RELEASED IN THE SAME MANNER AS THE CA OR RECALL.

THE THREE MODES REMAIN LOCKED-UP UNTIL OPERATION OF A RELEASE RELAY. AN EXTERNAL STRAP PROVIDES A 3 MINUTE LOCK-UP LIMIT USING TIMER (TM) AND RELAY (XB). ALL THREE MODES OF OPERATION ARE RENDERED NON-LOCKING BY EXTERNAL OPERATION OF RELAY (XB).

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-10C767 ()
CONNECTOR ON FRAME	908C

SHOWN IN DETAIL

1. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS.
CAPACITANCE VALUES ARE IN MICROFARADS;
VALUES PRECEDED BY THE SYMBOL + (PLUS
OR - (MINUS)) ARE IN VOLTS.

2. 1 GROUND RETURN.

CALL-RECALL-ALERT CRT
WITH TIMED LOCK-UP

CPS 13

GENERAL PURPOSE 8-WIRE ORDER CIRCUIT

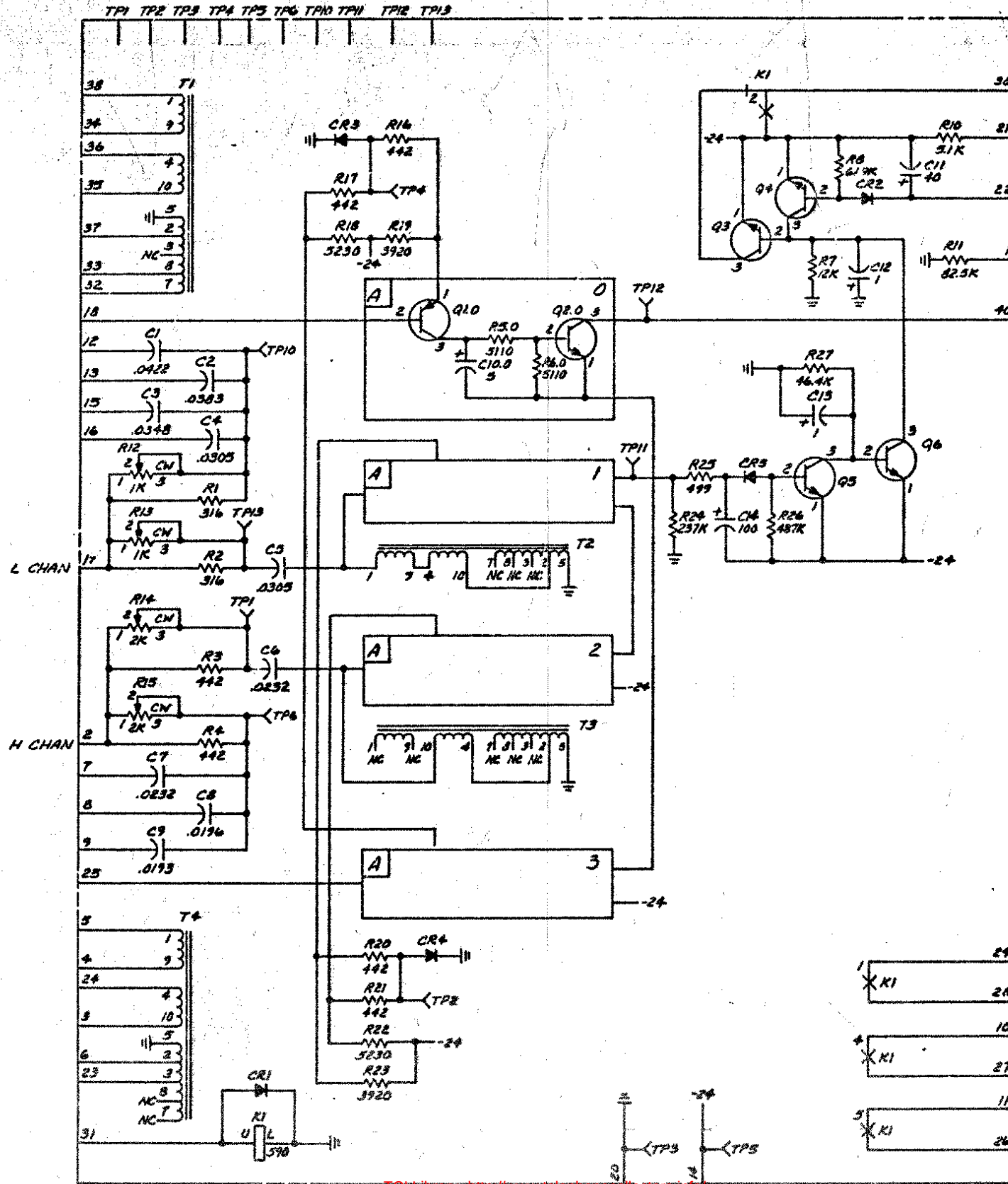
80-10245-01-42

BELL TELEPHONE LABORATORIES

100

2. **CONCLUSIONS**

**SUPPLEMENTARY SIGNAL DETECTOR AND
INHIBIT CIRCUIT**



11B

SD-IC245-01-J13A

PART OF CPS 16 SUPPLEMENTARY SIGNAL DETECTOR AND INHIBIT CIRCUIT

CIRCUIT REQUIREMENTS

CIRCUIT REQUIREMENTS																		
APPARATUS				MECH REQ			CIRCUIT PREPARATION				TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQ					REMARKS
DESIG	CODE	OPT	FIG	BSP FIG.	CONT PRES	ARM TRVL	BLOCK OR INSULATE	TEST CLIP DATA		TEST MOD			TEST FOR	AFTER SOAK PA	TEST MA	READ MA		
								CONN BAT	CONN GRD									
RELAY																		
K1	MB1			200				U(K1)	L(K1)	8/G	1				25.5	24.00		

TEST NOTES:

1. REMOVE CIRCUIT PACK FROM EQUIPMENT UNIT TO TEST.

COMPONENT LIST

RELAY

DESIG	KT			
CODE	MB1A			
OPTION				
	CONT ARR	LOC	CONT ARR	LOC
5	EBM			
5	EBM	A/H6		
4	EBM	A/H6		
3	EBM			
2	EBM	A/B6		
1	EBM	A/G6		
COIL		A/H3		

CAPACITOR

DESIG	CODE
C1	577D, .0422
C2	577D, .0383
C3	577D, .0348
C4	577D, .0309
C5	577D, .0305
C6	577D, .0232
C7	577D, .0232
C8	577D, .0196
C9	577D, .0193
[4] C10.0-C10.3	601A
C11	602A
C12	600A
C13	600A
C14	602A

DIODE

DESIG	CODE
CR1	400J
CR2	446D
CR3	446B
CR4	446B
CR5	446B

POTENTIOMETER

DESIG	CODE
R12	KS-20231, L2A, 1K
R13	
R14	KS-20231, L2A, 2K
R15	

COMPONENT LIST (CONT)

RESISTOR

DESIG	CODE
R1	KS-20616, L1A, 316
R2	KS-20616, L1A, 316
R3	KS-20616, L1A, 442
R4	KS-20616, L1A, 442
[4] R5.0-R5.3	KS-20616, L1A, 316
[4] R6.0-R6.3	KS-20616, L1A, 3110
R7	KS-13490, L1, 12K
R8	KS-20616, L1A, 61.9K
R10	KS-20616, L1A, 9.1K
R11	KS-20616, L1A, 82.5K
R16	KS-20616, L1A, 442
R17	KS-20616, L1A, 442
R18	KS-20810, L1A, 3230
R19	KS-20810, L1A, 3920
R20	KS-20616, L1A, 442
R21	KS-20616, L1A, 442
R22	KS-20810, L1A, 3230
R23	KS-20810, L1A, 3920
R24	KS-20616, L1A, 237K
R25	KS-20616, L1A, 499
R26	KS-20616, L1A, 487K
R27	KS-20616, L1A, 46.4K

TRANSFORMER

DESIG	CODE
T1-T4	2597A

TRANSISTOR

DESIG	CODE
[4] Q1.0-Q1.3	51C
[4] Q2.0-Q2.3	66F
Q3	66L
Q4	66J
Q5	66J
Q6	66J

INPUT/OUTPUT INFORMATION

FUNCTION: PROVIDES TWO DIGIT DETECTORS WHICH RESPOND TO VALID TOUCH-TONE DIGITS WHEN USED IN CONJUNCTION WITH CP3. A TIMER CIRCUIT PROVIDES AN INTER-DIGITAL TIME-OUT PERIOD OF APPROXIMATELY 2.5 SECONDS.

A TIMER INHIBIT CIRCUIT BLOCKS THE TIMER CIRCUIT FOR APPROXIMATELY FIVE SECONDS AFTER THE RECEIPT OF THE TOUCH-TONE DIGIT (X).

INPUT: SQUARE WAVE SIGNAL OF APPROXIMATELY 1.25 VOLTS PEAK-TO-PEAK.

CIRCUIT DESCRIPTION

TWO HIGH CHANNEL AND TWO LOW CHANNEL TUNED CIRCUITS ARE PROVIDED WHICH ARE DRIVEN FROM THE HIGH AND LOW LIMITERS, RESPECTIVELY, OF CP3. ONE HIGH CHANNEL (T3) AND (C6) AND ONE LOW CHANNEL (T2) AND (C5) ARE CONNECTED TO RESPOND TO TONES L4 (941 HZ) AND H1 (1209 HZ). THE OTHER TWO TUNED CIRCUITS MUST BE STRAPPED IN ACCORDANCE WITH NOTE 218. OPERATION OF THE DETECTORS IS IDENTICAL WITH THAT OF CP3. THE TIMER CIRCUIT CONSISTS OF TRANSISTORS (Q3) AND (Q4), REFERENCE DIODE (CR2), AND ASSOCIATED RESISTORS AND CAPACITORS. IT PROVIDES AN INTERDIGITAL TIME-OUT PERIOD OF APPROXIMATELY 2.5 SECONDS WHEN USED WITH CP3. WITH RELAY (K1) RELEASED AND PINS 21 AND 22 CONNECTED EXTERNALLY, CAPACITOR (C11) IS DISCHARGED, TRANSISTOR (Q4) IS OFF AND (Q3) IS ON. THIS APPLIES -24 VOLTS TO PIN 30. WITH THE CONNECTION BETWEEN PINS 21 AND 22 REMOVED AND PINS 22 AND 1 CONNECTED EXTERNALLY, CAPACITOR (C11) CHARGES THROUGH RESISTOR (R11). IN APPROXIMATELY 2.5 SECONDS THE REFERENCE VOLTAGE OF DIODE (CR2) IS OVERCOME. THIS FORWARD BIASES (Q4) WHICH TURNS OFF (Q3) REMOVING VOLTAGE FROM PIN 30, RECONNECTING PINS 21 AND 22 DISCHARGES (C11) THROUGH (R10) PROVIDING A TIMER RECOVERY TIME OF APPROXIMATELY 0.2 SECONDS. WITH RELAY (K1) OPERATED CONTACT 2 CONNECTS -24 VOLTS TO PIN 30 DIRECTLY.

THE TIMER INHIBIT CIRCUIT CONSISTS OF TRANSISTORS (Q5) AND (Q6), REFERENCE DIODE (CR3), AND ASSOCIATED RESISTORS AND CAPACITORS. NORMALLY, TRANSISTOR (Q5) IS ON AND TRANSISTOR (Q6) IS OFF. WHEN THE L4-H1 TONE COMBINATION IS DETECTED, TRANSISTOR (Q2.1) APPLIES -24 VOLTS TO THE INHIBIT CIRCUIT, CAPACITOR (C13) DISCHARGES THROUGH RESISTOR (R24) AND TRANSISTOR (Q2.1). WHEN THE VOLTAGE ACROSS CAPACITOR (C13) GOES BELOW THE REFERENCE LEVEL OF DIODE (CR3), TRANSISTOR (Q3) TURNS OFF AND TRANSISTOR (Q4) TURNS ON. TRANSISTOR (Q4) APPLIES -24 VOLTS TO THE BASE OF TRANSISTOR (Q3) HOLDING TRANSISTOR (Q3) OFF. WHEN THE L4-H1 TONE IS GONE, TRANSISTOR (Q2.1) TURNS OFF ALLOWING CAPACITOR (C13) TO RECHARGE THROUGH RESISTORS (R24) AND (R25). WHEN THE VOLTAGE ACROSS CAPACITOR (C13) REACHES THE REFERENCE LEVEL OF DIODE (CR3), TRANSISTOR (Q5) TURNS ON, TRANSISTOR (Q6) TURNS OFF, AND THE TIMER CIRCUIT IS RESTORED TO NORMAL.

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-16307-() 62
CONNECTOR ON FRAME	908C

SYMBOL

SHOWN IN FS31

NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS; VALUES PRECEDED BY THE SYMBOL + (PLUS) ARE - (MINUS) ARE IN VOLTS.
2. $\frac{1}{\infty}$ GROUND RETURN.

SUPPLEMENTARY SIGNAL DETECTOR AND INHIBIT

PART OF CPS 16

111B

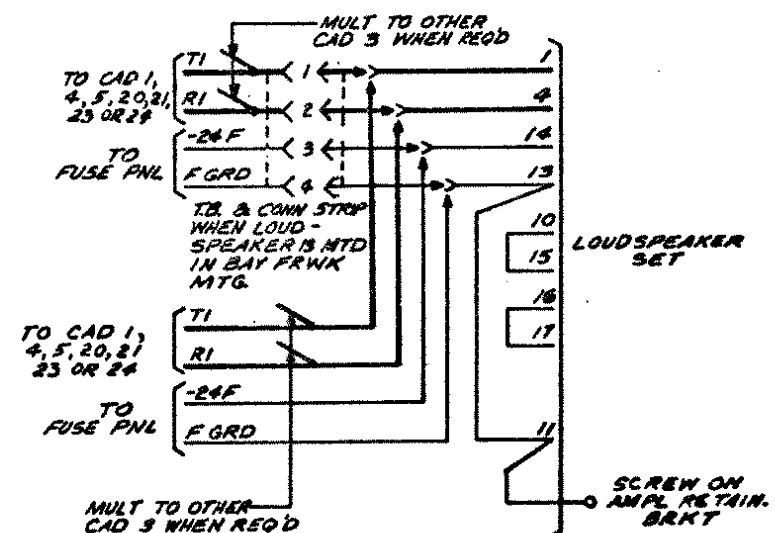
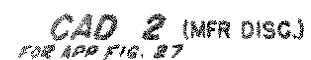
GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

SD-1C245-01-J138

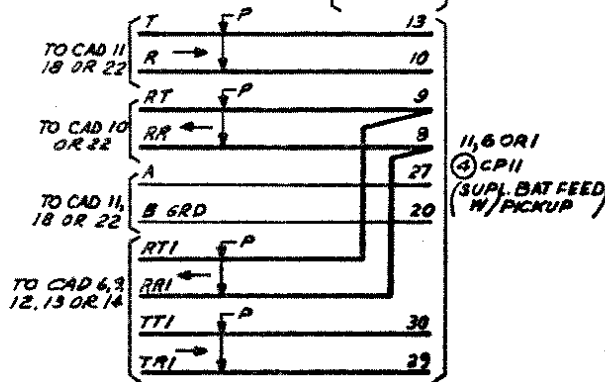
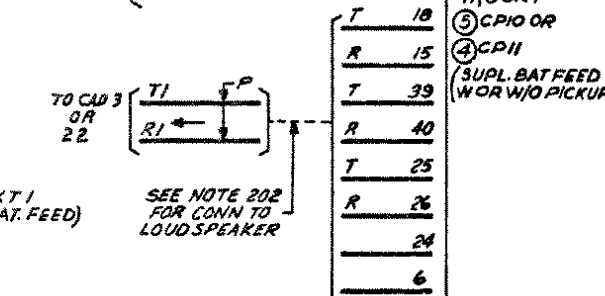
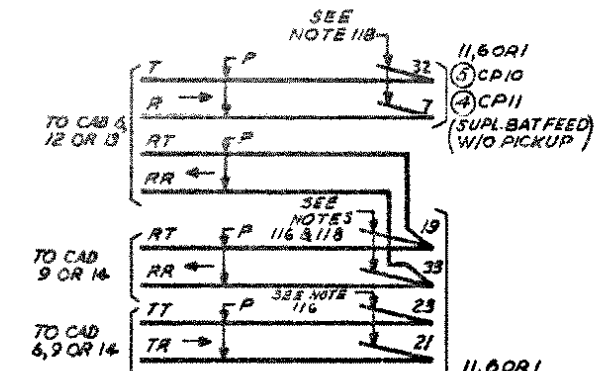
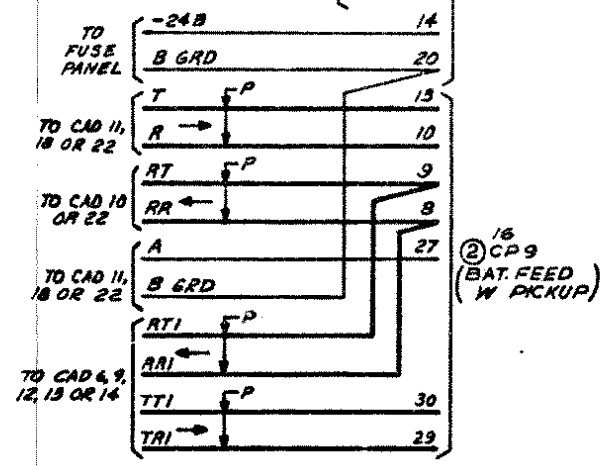
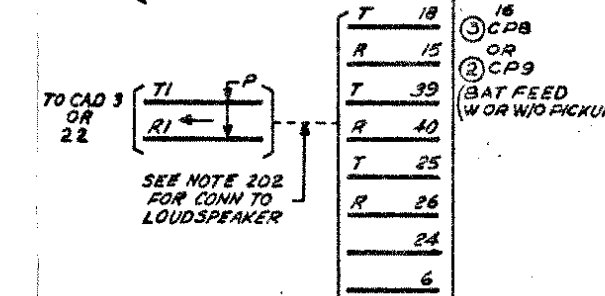
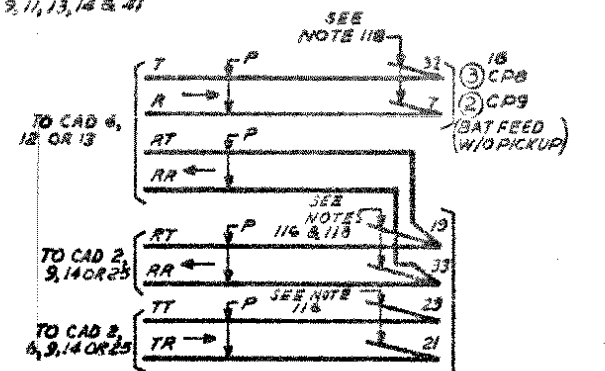
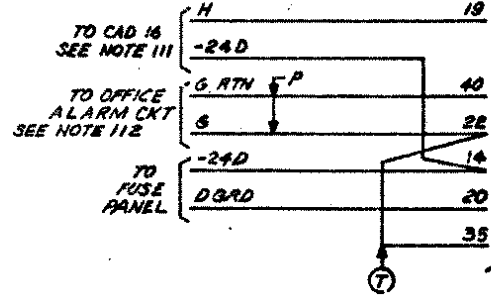
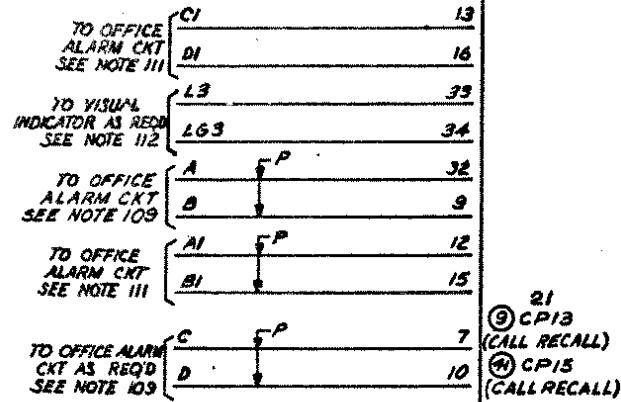
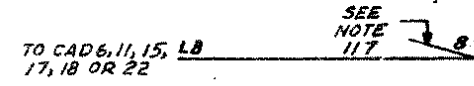
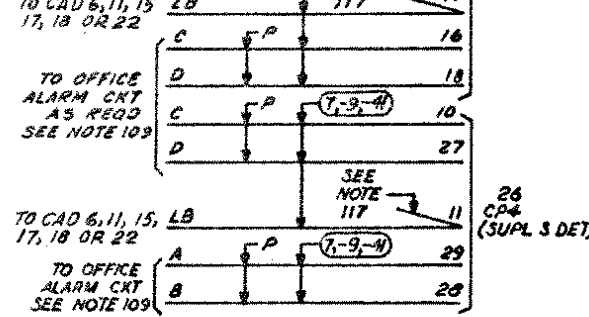
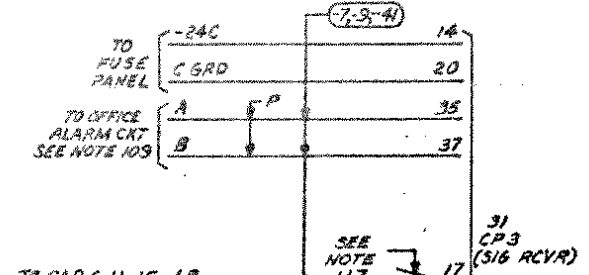
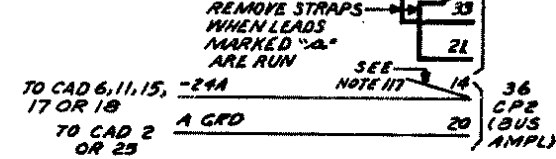
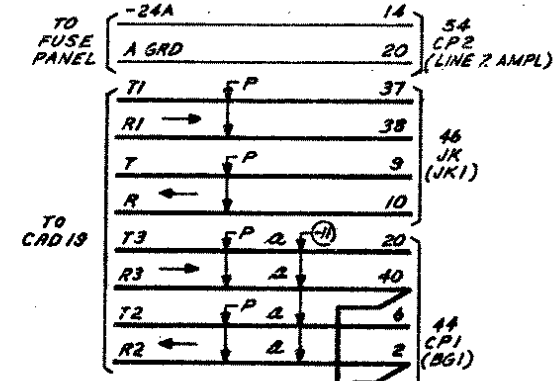
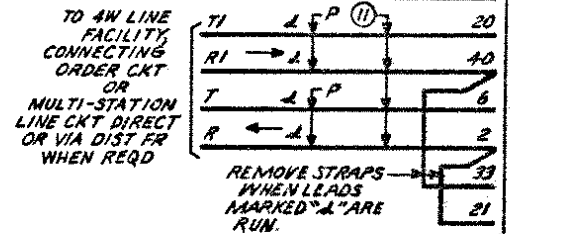
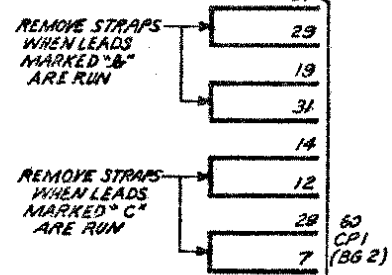
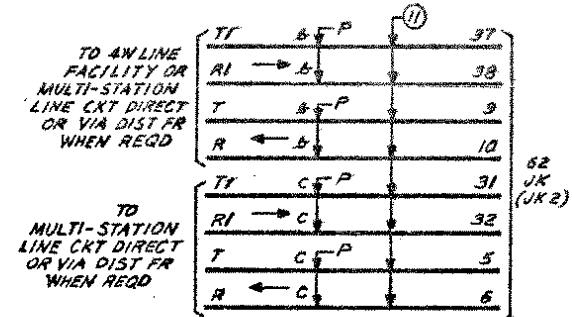
SELL TELEPHONE LABORATORIES
INCORPORATED

65

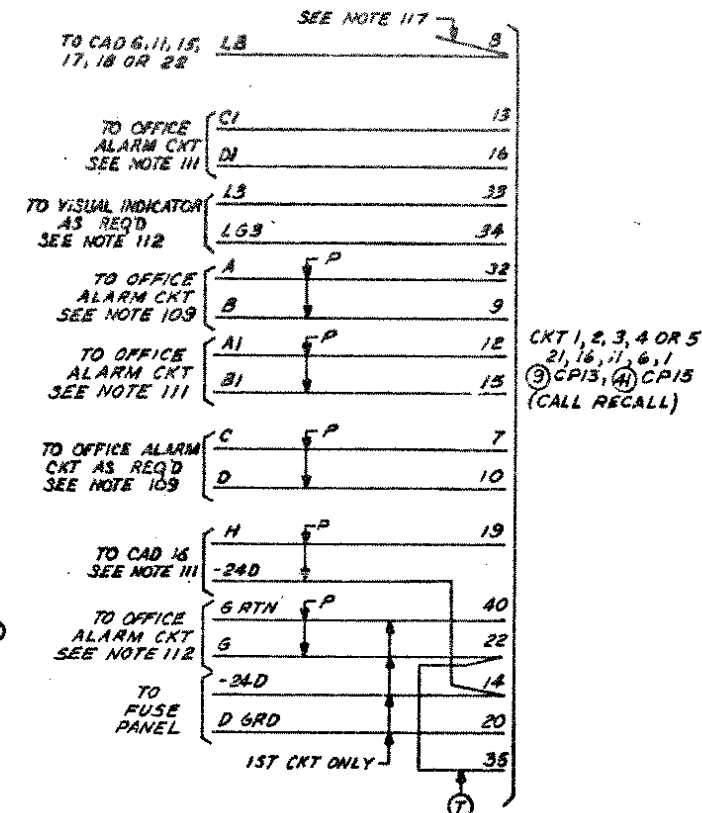
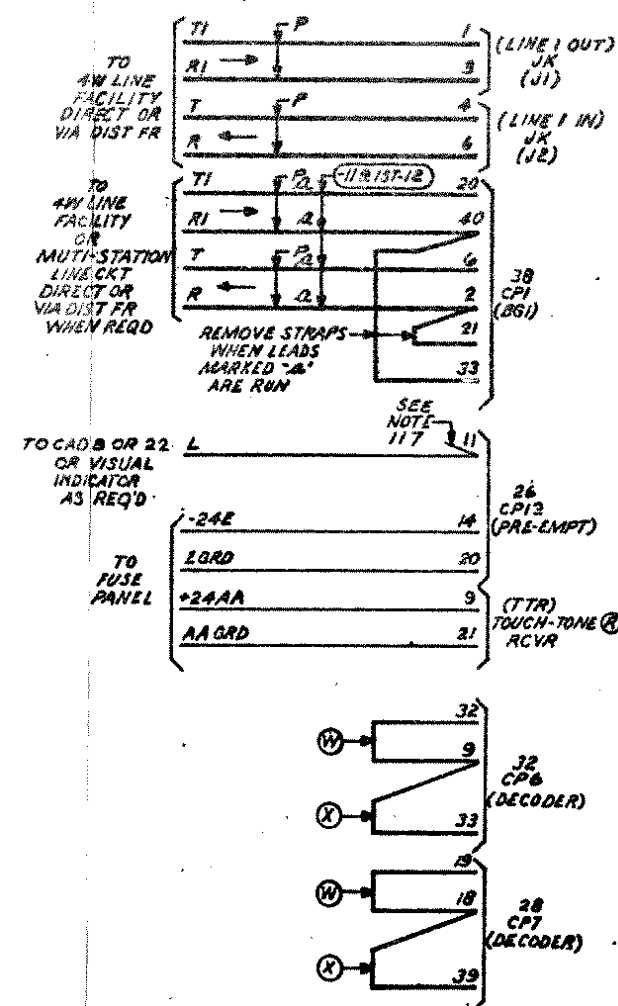
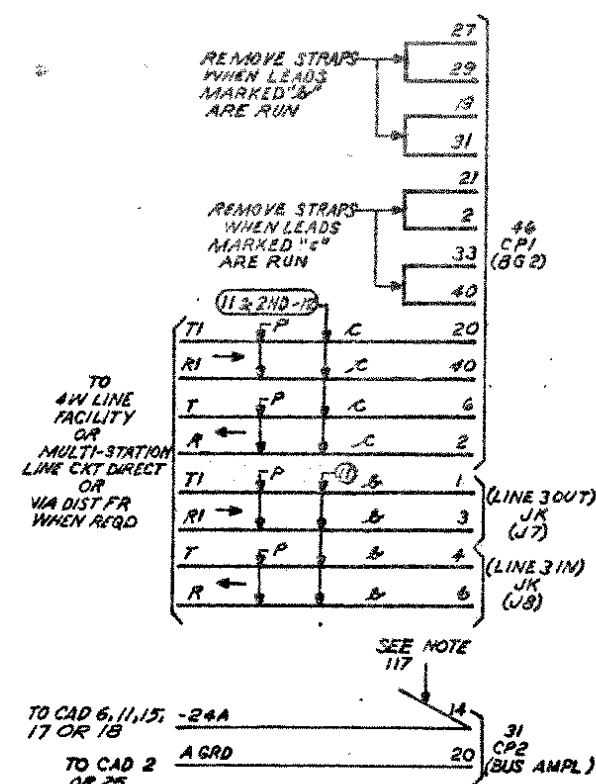
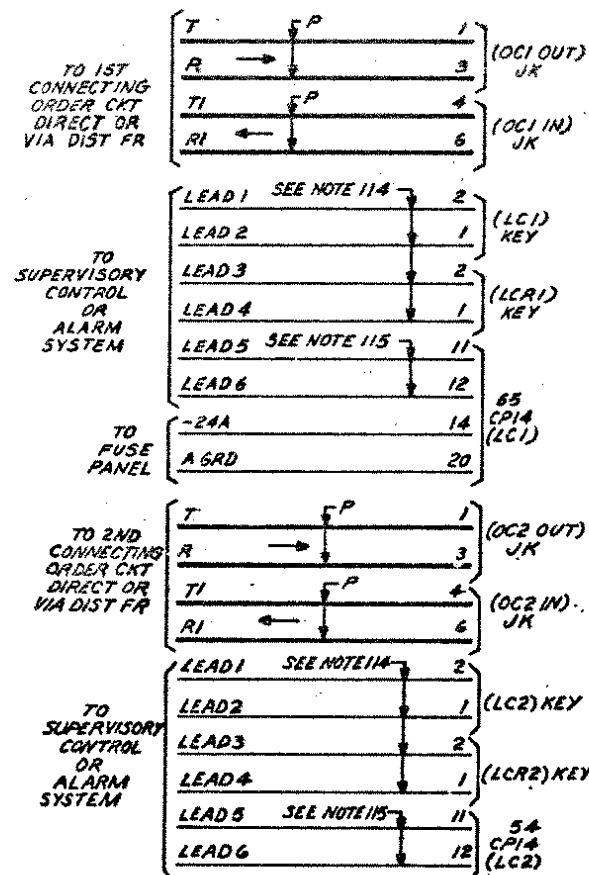
PRINTED U.S.A.



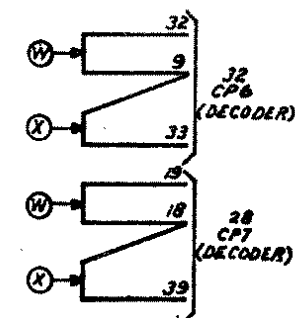
CAD 4 FOR J99340B, L1-L12 FOR APP FIG. 1-7, 9, 11, 13, 14 & 41



PART OF CAD 5 FOR J99340C FOR APP FIG. 1-3, 8-12, 15-18 & 41



CKT 1, 2, 3, 4 OR 5
21, 16, 11, 6, 1
(3) CP13, (4) CP15
(CALL RECALL)



DRAWING	ISSUE
1	1
2A	1
3A	1
4B	1
5B	1

ISSUE
11B

FOR J93340C
FOR APP FIG. 1-3, 8-12, 15-18 & 41



1

2013

10

1

1

1.

[illegible]

19

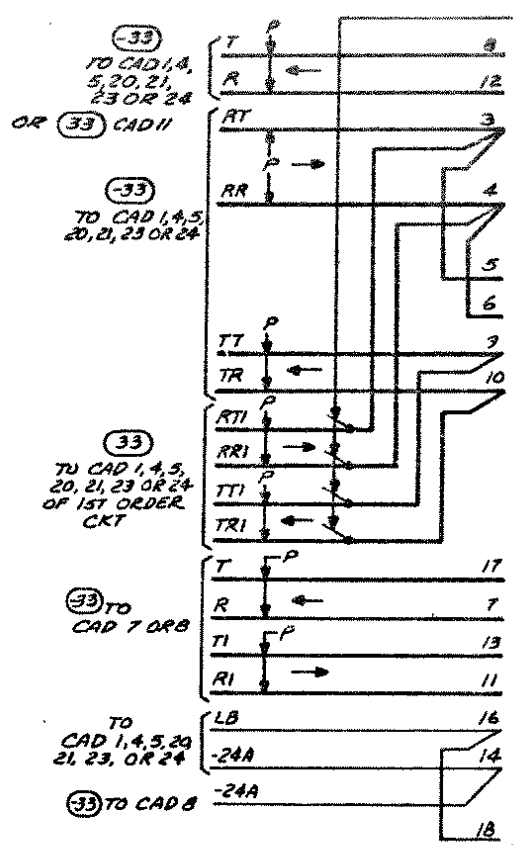
ISSUE
11B

SD-1C245-01-G4

BELL TELEPHONE LABORATORIES
INCORPORATED

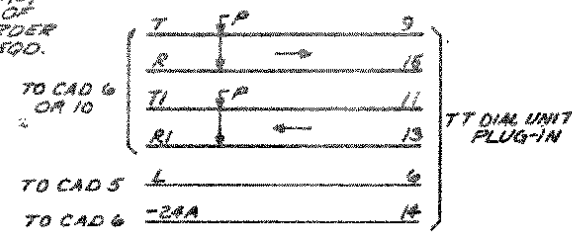
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CAD 6
FOR APP FIG. 19

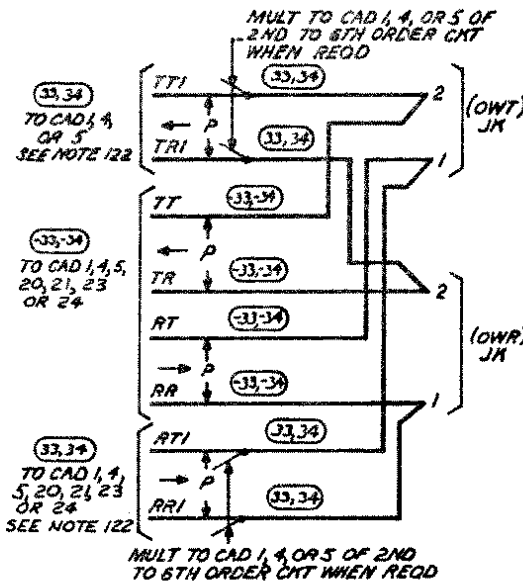


HANDSET UNIT
PLUG-IN

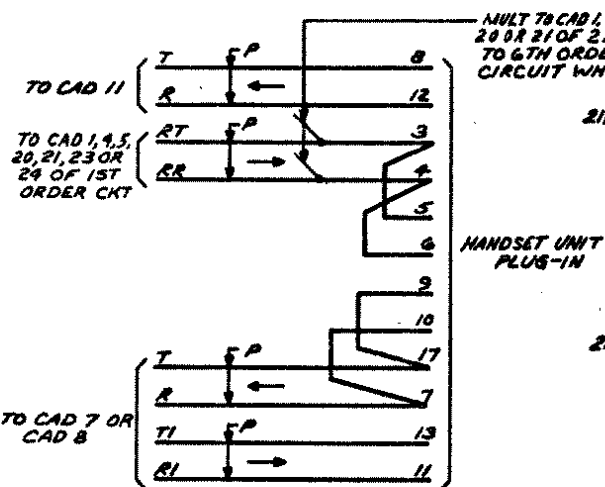
CAD 8
FOR APP FIG. 22



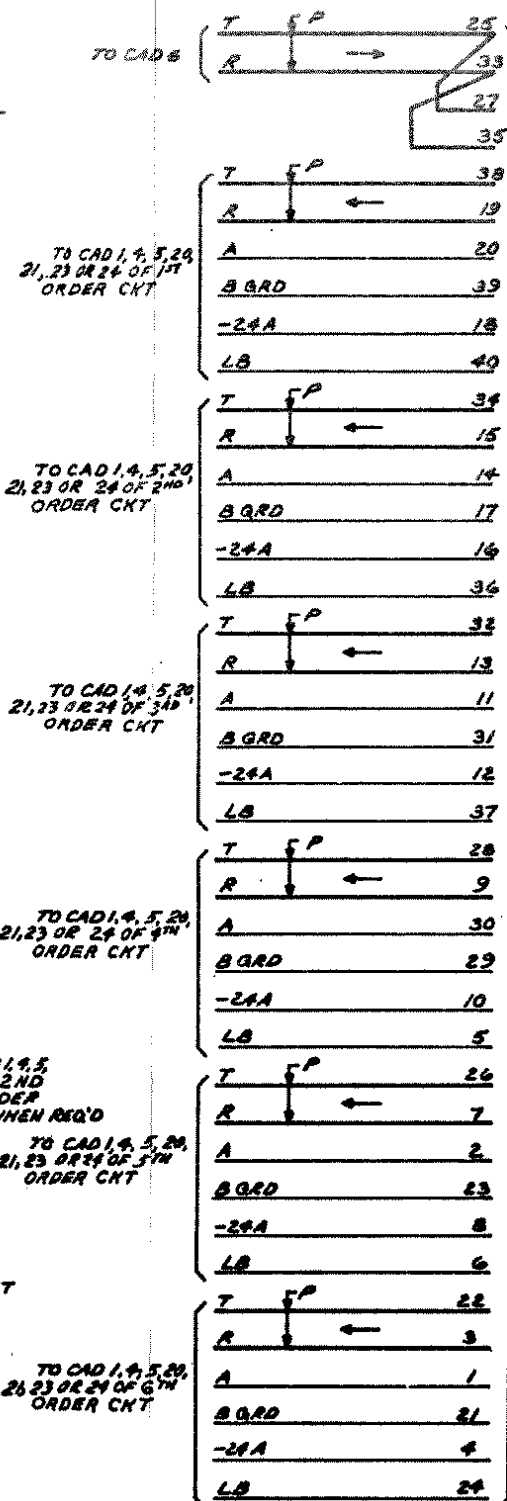
CAD 9
FOR APP FIG. 23



CAD 10 (MFR DISC.)
FOR APP FIG. 21

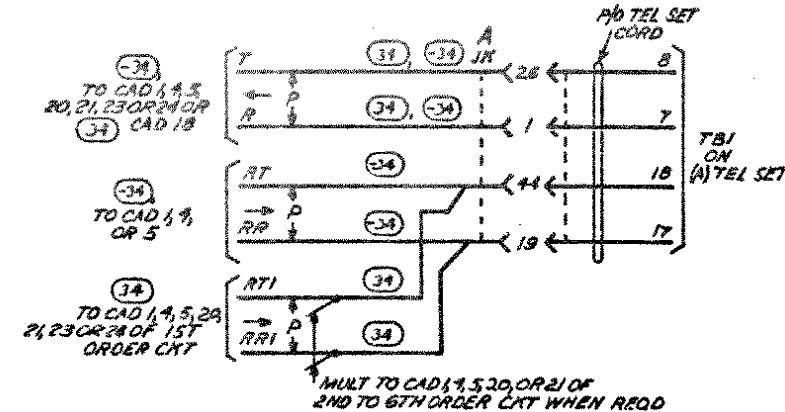


CAD 11
FOR APP FIG. 33

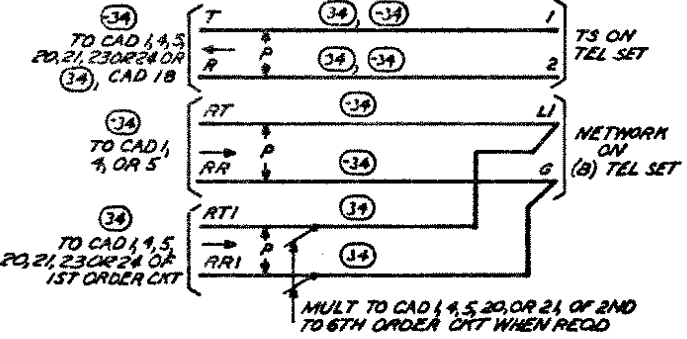


KEY UNIT
PLUG IN

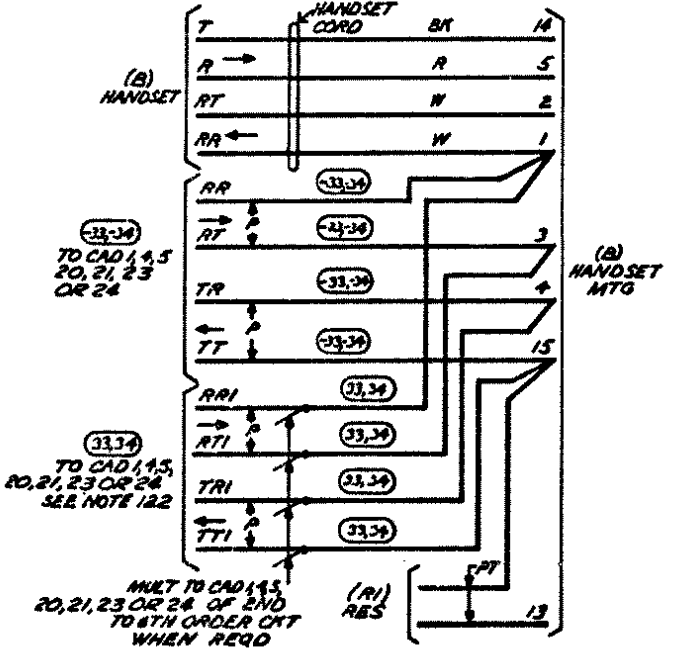
CAD 12
FOR APP FIG. 28
SEE NOTE 209



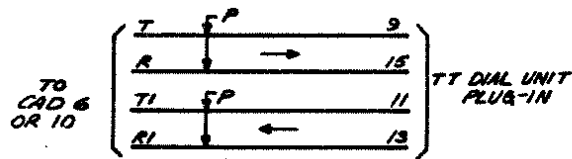
CAD 13
FOR APP FIG. 29
SEE NOTE 210



CAD 14
FOR APP FIG. 30



CAD 7
FOR APP FIG. 20



DRAWING
ISSUE
48
58
11B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

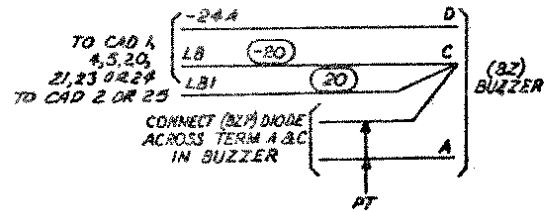
SD-IC245-01-65

BELL TELEPHONE LABORATORIES
INCORPORATED

6S

A
B
C
D
E
F
G
H

CAD 15
FOR APP FIG. 31



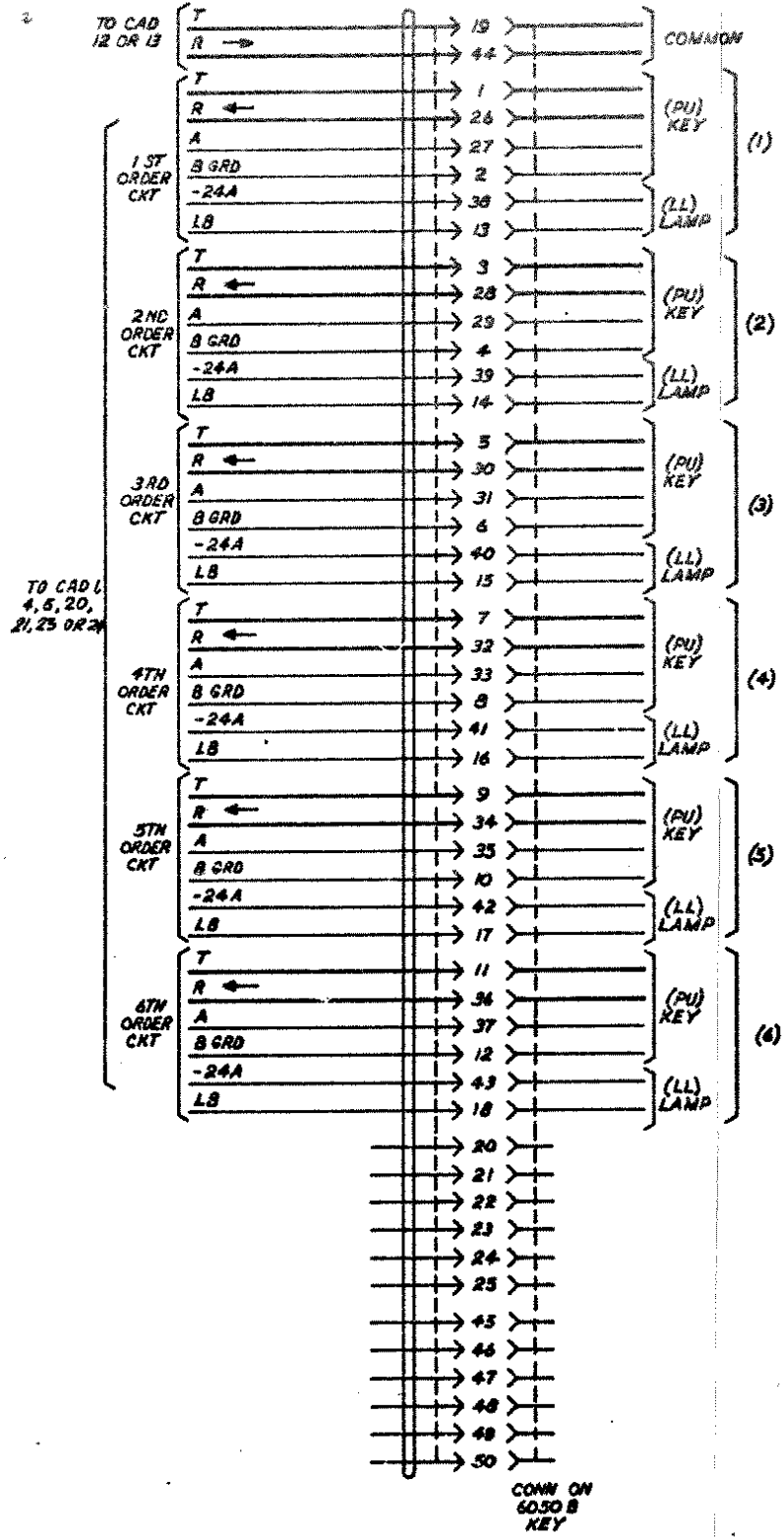
CAD 16
FOR APP FIG. 26



CAD 17
FOR APP FIG. 32

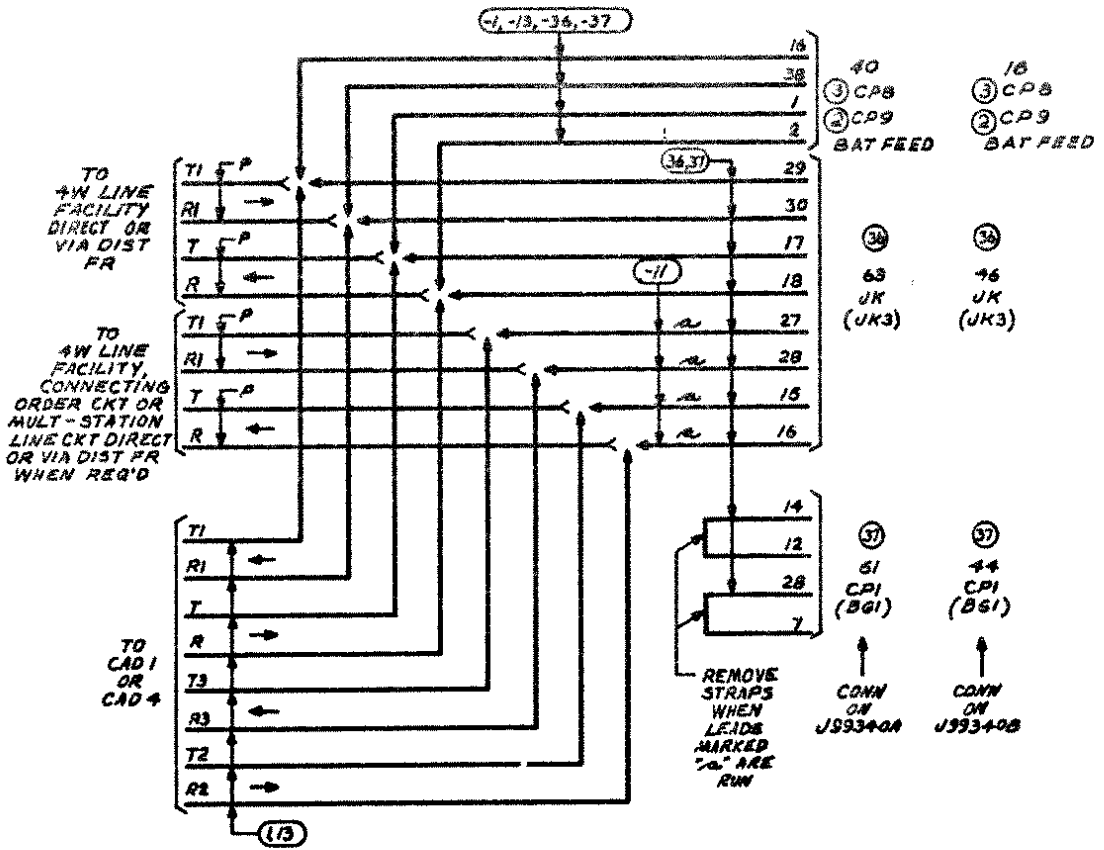


CAD 18
FOR APP FIG. 34



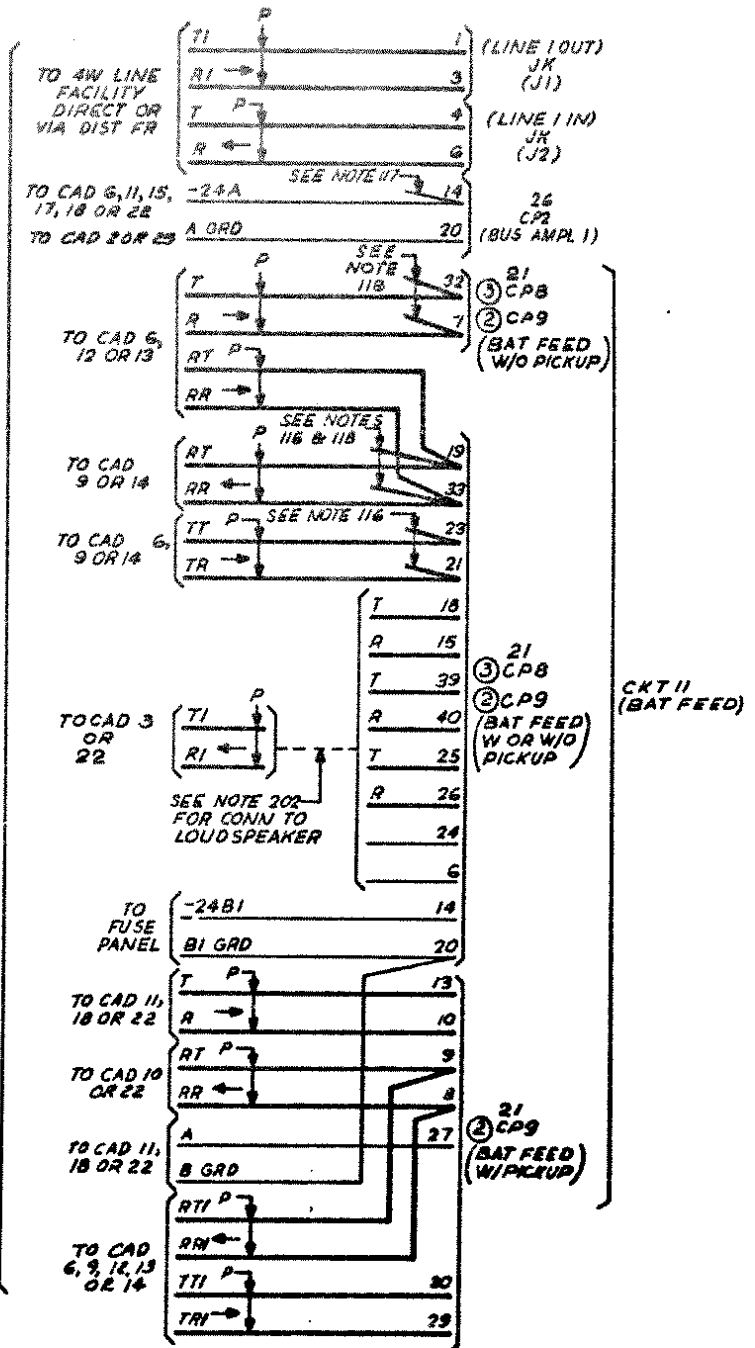
CAD 19

FOR J99340 A, L11-L15 OR
FOR J99340 B, L13-L17
FOR APP FIG. 36, 37



DRAWING
ISSUE
48
58
A
B
C
D
E
F
G
H

FOR 1993400
FOR APP FIG. 1-5, 8, 9, 15, 39, 40 & 41



ISSUE
11B

GENERAL PURPOSE 4-WIRE ORDER CIRCUIT

②

SD-IC245-01-G7

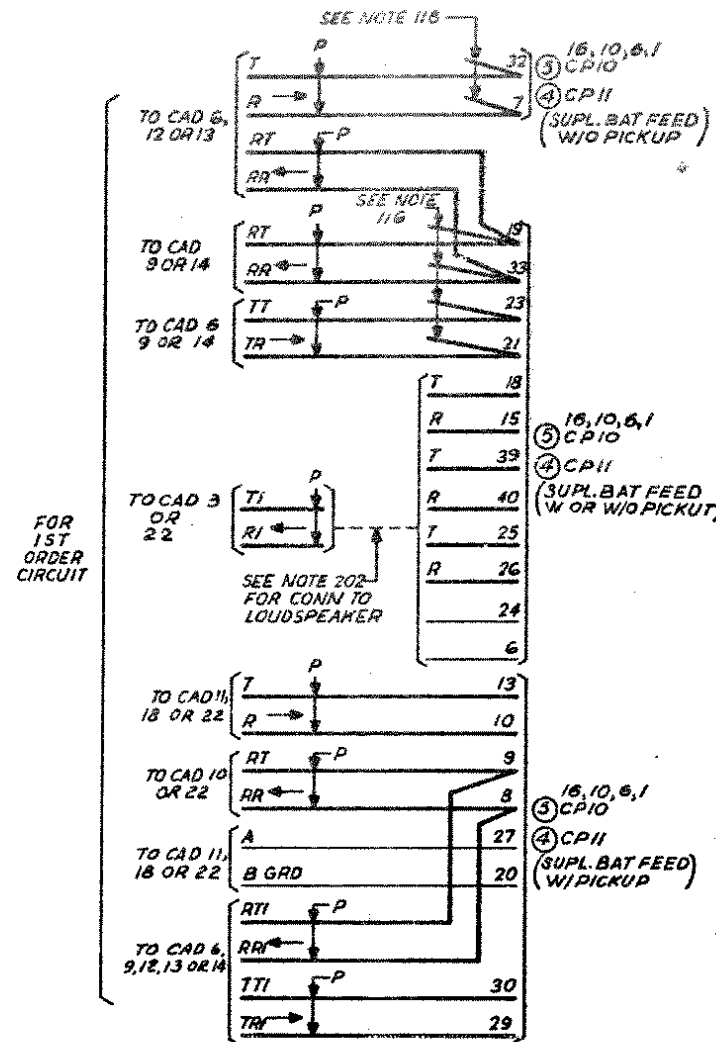
BELL TELEPHONE LABORATORIES
INCORPORATED

69

2009年12月31日

PART OF CAD 20

FOR J93340B
FOR APP FIB. F-5, 8, 9, 15, 39, 40 & 41



CKT 12, 13, 14, 15
(SUPL. BAT FEED)

FOR 1ST ORDER CKT

TO 4W LINE FACILITY OR MULTISTATION LINE CKT DIRECT OR VIA DIST FR WHEN REQ'D

TO CAD 6, 11, 15, 17, 18 OR 22

TO OFFICE ALARM CKT SEE NOTE 111

TO VISUAL INDICATOR AS REQ'D SEE NOTE 112

TO OFFICE ALARM CKT SEE NOTE 109

TO OFFICE ALARM CKT SEE NOTE 111

TO OFFICE ALARM CKT AS REQ'D SEE NOTE 109

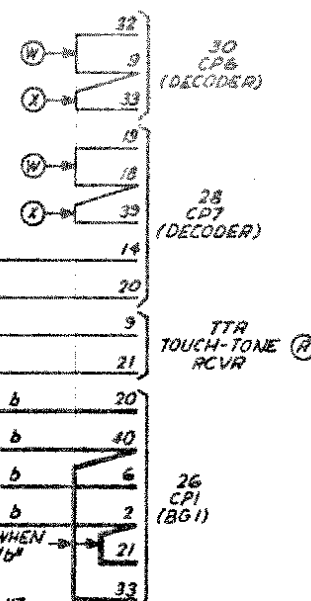
TO CAD 16 SEE NOTE 111

TO OFFICE ALARM CKT SEE NOTE 112

TO FUSE PANEL

1ST CKT ONLY

⑦



SEE NOTE 117

TO CAD 6, 11, 15, 17, 18 OR 22

TO OFFICE ALARM CKT SEE NOTE 111

TO VISUAL INDICATOR AS REQ'D SEE NOTE 112

TO OFFICE ALARM CKT SEE NOTE 109

TO OFFICE ALARM CKT SEE NOTE 111

TO OFFICE ALARM CKT AS REQ'D SEE NOTE 109

TO CAD 16 SEE NOTE 111

TO OFFICE ALARM CKT SEE NOTE 112

TO FUSE PANEL

1ST CKT ONLY

⑦

CKT 1, 2, 3, 4 OR 5
21, 16, 11, 6 OR 1
③ CP13, ④ CP15
(CALL RECALL)

ISSUE 118

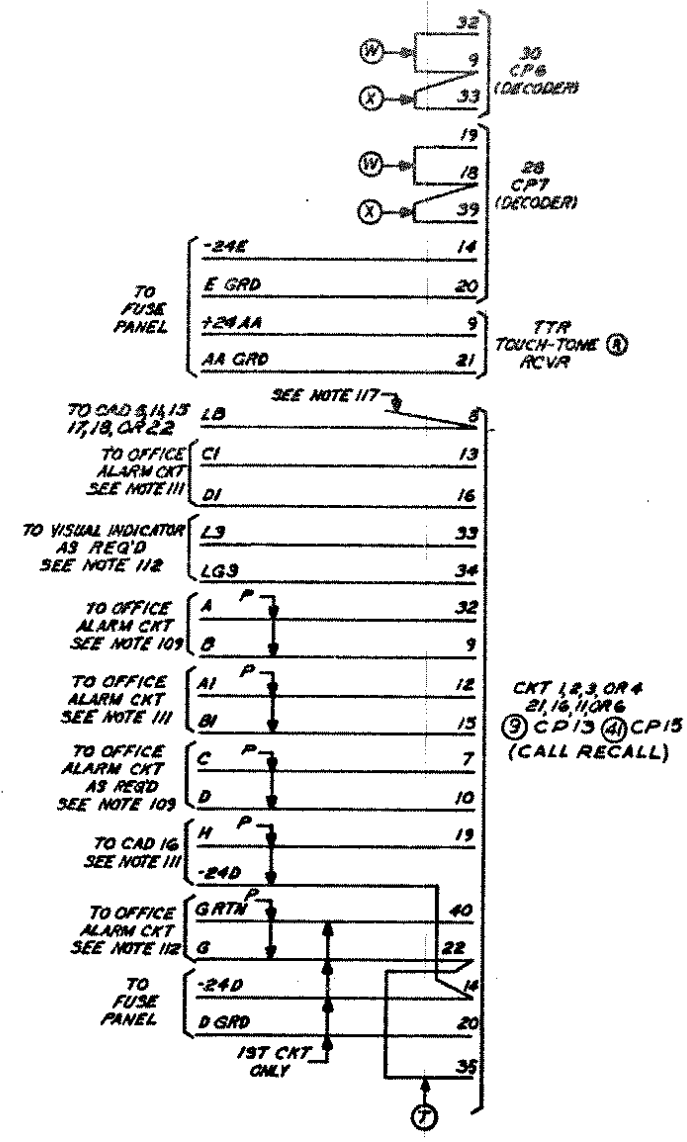
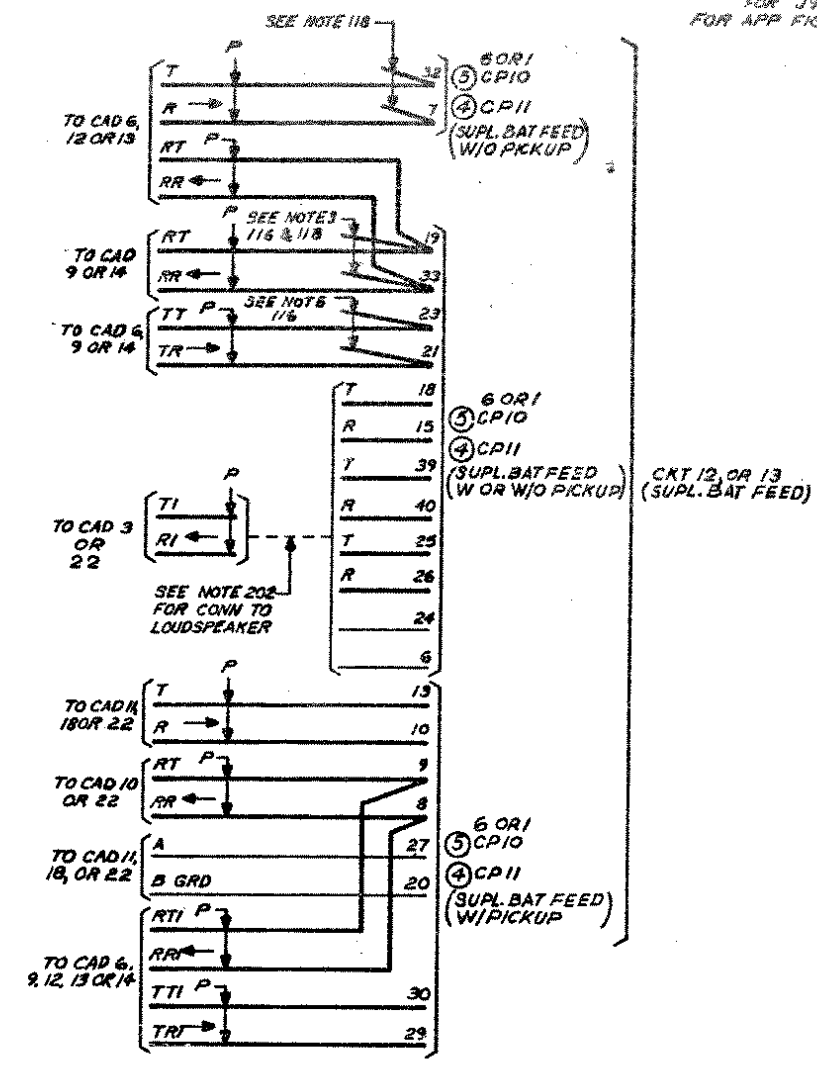
GENERAL PURPOSE 4-WIRE ORDER CIRCUIT ②

SD-1C245-01-G8

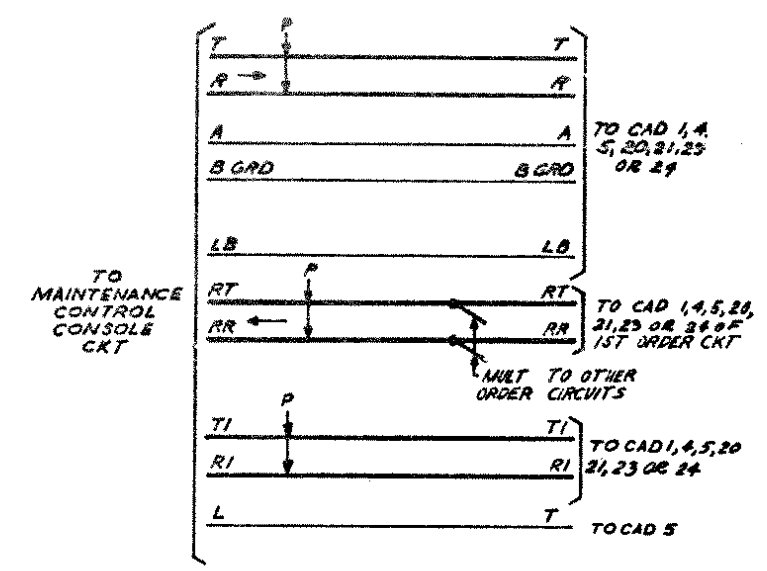
SELL TELEPHONE LABORATORIES INCORPORATED

85

PART OF CAD 21 FOR J93340E FOR APP FIG 1-3, 5, 9, 13, 18, 20 & 41

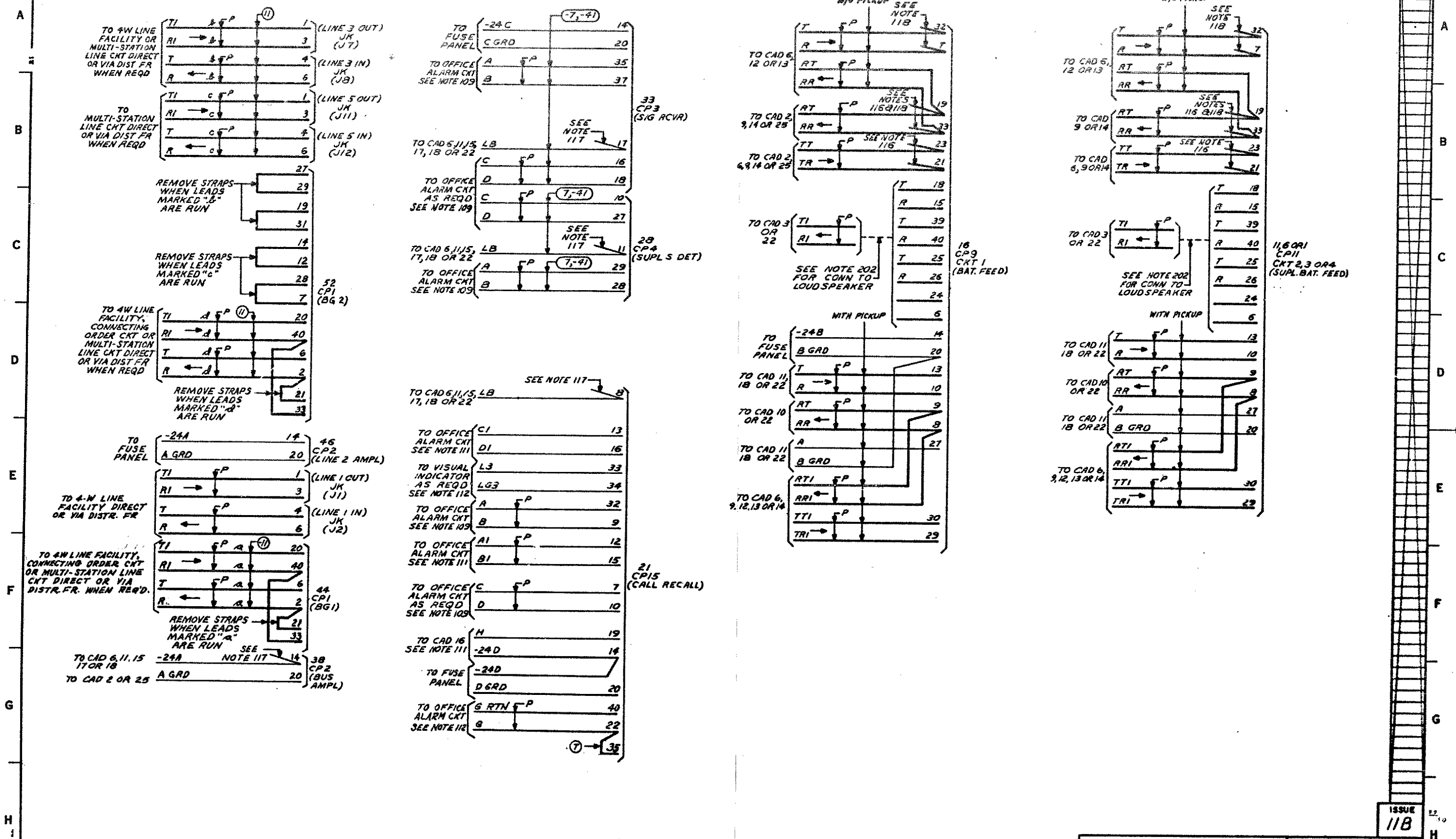


CAD 22



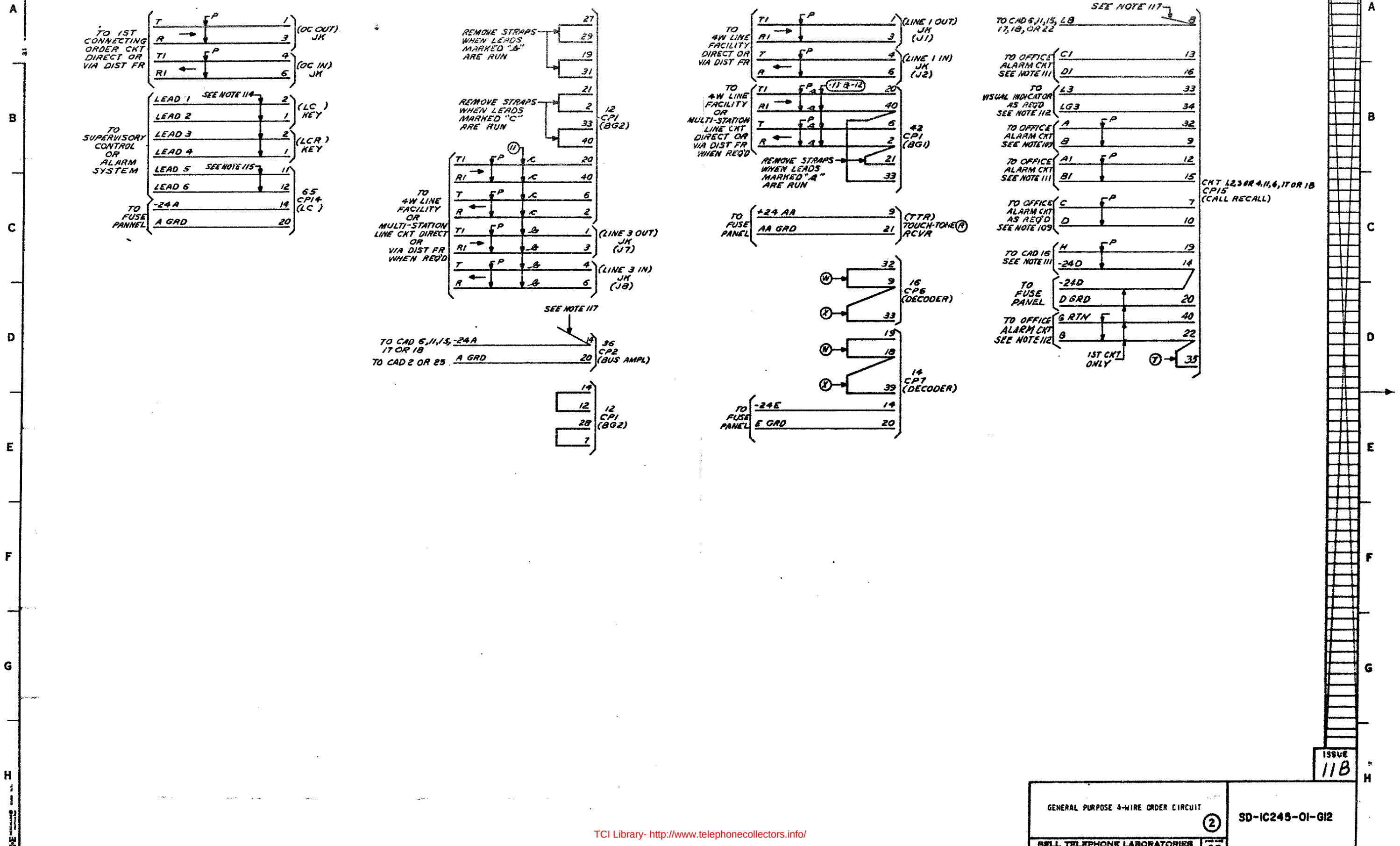
ISSUE
11B

CAD 23 FOR J99340 F, LI-L7 FOR APP FIG. 1, 2, 4, 6, 7, 11, 13, 15, 41



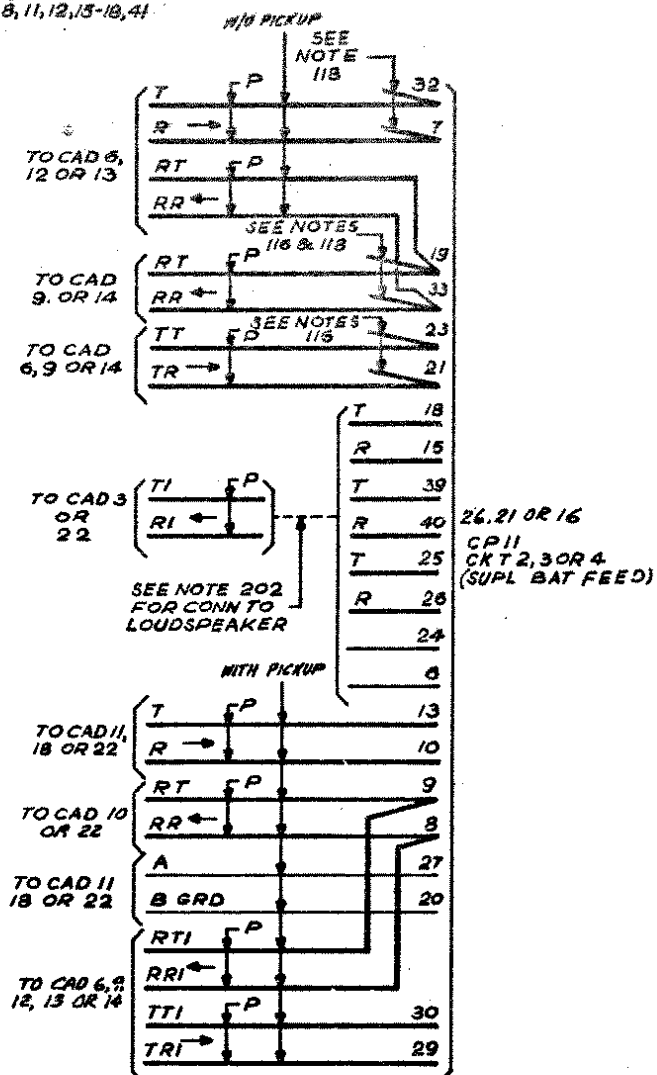
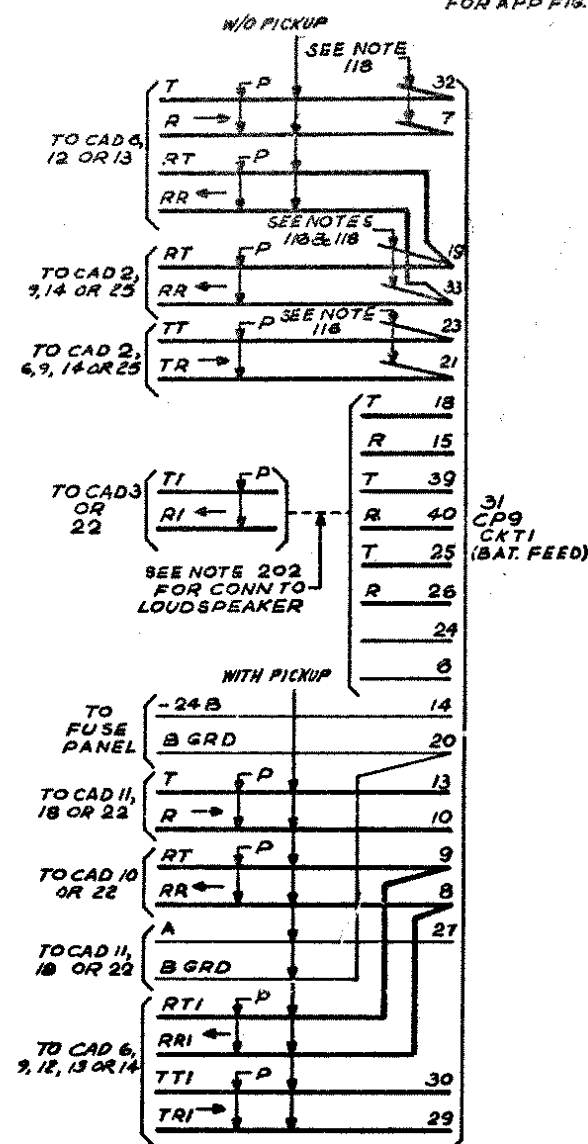
SD-IC245-01-G11

FOR J99340G
FOR APP FIG. 1,2,4,8,11,12,15+18,41



PART OF CAD 24

FOR J993406
FOR APP FIG. 1, 2, 4, 8, 11, 12, 13-18, 41



CAD 25

FOR APP FIG 45

