

APPARATUS INDEX

DRAWING ISSUE
 12D
 13D
 14D
 17A
 19D

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
RELAYS			
20A	16F7	1	E
AM	16C8	1	F
APS	10C9	G,H	E
CA	16B4	G	G
CAO-3	4A0	5	N
CBO-3	4A1	5	N
CCO-3	4A2	5	N
CDO-3	4A2	5	B
CI	19A7	H	D
CIA	19A5	H	D
CIB	19B5	H	D
CIC	19B5	H	D
CID	1535	H	D
CIE	19B5	13	C
CIF	19B5	13	C
CWO	18F3	2	N
CHI-3	18F3	2	N
DO	5A0	2,10	M
D1	5B0	2,10	M
D2	5C0	2,10	M
D3	5D0	2,10	M
DCK	13B4	E	F
DCT	12E8	1	H
DL	17D6	H	G
EP	13G9	1	F
FA	16F7,88	1	E
FA1	16E8	G,H	E
FB	17D0	A	N
FBA	18C6	9	N
FDA	18G7	9	M
FS	15E0	1	G
GA0	9E8	1	L
GA1	9D5	1	L
GA2	9E5	1	L
GA3	9F5	1	L
GA4	9E5	1	L
GED-4	15G3	1	G
GCO	388	1,12	K
GC1-3	387	1,12	K
GC4	386	1,12	K
GCA0	389	1	B
GCA1-3	388	1	B
GCA4	387	1	B
GK	14A3	1	F
GL	16A9	8	N
GPO	14C0,F2	1	J

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
RELAYS			
GP1	14C1,F3	1	J
GP2	14C1,F3	1	J
GP3	14C2,F3	1	J
GP4	14C3,F4	1	J
GTO-3	21C3	11	C
GTA	21F2	11	C
HO	12B8	E	H
LA	18E7	B	M
MB	17B4	A,B,C,D	E
NPA	6F4	H	G
OL	9B1	G,H	F
OM	16G1	H	F
OT	16E3	H	F
OTP	16E3	H	F
P	10C5	1	G
PO	10E0	1,12	K
P1-9	10D0	1,12	K
PA	6C8	G	G
PA1	6B8	G	G
PFD	2F3	A,C	E
PF1	2D6	B,D	E
PF2	2C2	A,C	E
PF3	2A6	B,D	E
PG	9B5	1	G
PGG	9E7	4	J
PG1	9D5	4	J
PG2	9E5	4	J
PG3	9F5	4	J
PG4	9G5	4	J
PGGT	3E3	1	L
PGK	3C5	1	E
PGK1	3C8	1	E
PGT	3D4	1	K
PBT	3C4	12	K
PK	14A8	1	F
PL	9A0	G,H	L
PP0	14C5,F5	1	H
PP1-8	14C6,F6	1	H
PP9	14C7,F7	1	H
PS	11B2	1	F
PS1	15A6	1	F
PSL	12E6, 13D3	E	F
PSL	13B1	F	F
PSL1	12F6	E	F
PU	16B2	1	F

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
RELAYS			
RCCK	19H1	H	D
RS	13H2	1	G
RS1	13G4	13	C
S	7D9	G	G
SO	7D0	G,H	L
S1-9	7A0	G,H	L
S00-39	SH 7	11	C
SG0	18C5	2	M
SG1-3	18D4	2	M
SGGT	3B3	A,B,C,D	E
SGT	3D0	1	M
SK	13F9	1	F
SPO	13B7	1	J
SP1	13C7	1	J
SP2	13E7	1	J
SP3	13F7	1	J
SPA	12A8, 13D0	F	F
SPN	8A8	IS	IS
SS	7F9, 8B6, 8A4	G	E
SS1	8A4	H	E
SSL	12D0, 13B3	E	B
ST	6F8	H	D
ST0	5D5	10	M
ST1	5B5	10	M
ST2	5D5	10	M
ST3	5A5	10	M
STA	6E8	H	D
TR	16B3	H	D
TRB	19B7	H	D
XP0	2F7	B,D	E
XP1	2D2	A,C	E
XP2	2C7	B,D	E
XP3	2A2	A,C	C

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
CAPACITORS			
MOP	12B8	E	H

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
KEYS			
AR	SEE APP FIG.	3	Q
MLD	APP FIG.	3	Q
MB		3	Q

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
LAMPS			
A	16C6	3	Q
B	16C6	3	Q
FBA	17E0	9,A	Q
FDA	18F9	9	Q
GO	16B8	3	Q
GTA	21E0	11	Q
PS	11C8	1	F
SGD-3	18D9	3	R
SS	11B8	1	F
TR	16B0	H	D

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
RESISTORS			
C	4D1	1	F.P.
CL	4C3	1	F
D	5C2, 5C2, 5F2	H, G, G,H	M, M, M
DCK	13B4	E	F
DCK1	3H2	1	H
DCT	12D8	1	H
DCT1	12E9	E,F	F
FBA	18G7	9	M
GA0	9E9	1	H
GA1	9D5	1	H
GA2	9E5	1	H
GA3	9F5	1	H
GA4	9E5	1	H
GC	3A5	1	F.P.
GCA0	3B9	12	D,C
GCA1,2	3B8	12	D,C
GCA3	3B8	12	B,C
GCA4	3B6	12	B,C
GP	14F1	1	J
GT	21F0	11	C
HO	12B7	E	F
HOB	12B9	E	K
HBL	12B7	E	F

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
RESISTORS			
MCP	12B8	E	H
IP	14E7	13	F.P.
LA	18E6	B	M
P	10C6	1	F.P.
PB	11J6	1	G
PFO	2F4	A,C	E
PF1	2E5	B,D	E
PF2	2C3	A,C	E
PF3	2A5	B,D	E
PG	9B8	1	F.P.
PG0	9C0	1	F.P.
PG1	9D0	1	F.P.
PG2	9E0	1	F.P.
PG3	9F0	1	F.P.
PG4	9G0	1	F.P.
PGK	3C5	1	E
PP	14F5	1	H
PS	11C1	1	M
PSL	13D3, 13B2	E	F
RS	13H1	G	M
SB	11C7	1	G
SGT	3D0	1	M
STB	5C6	9	E
TR	19B7	H	D
XF0	2F5	D	D
XF1	2E4	C	D
XF2	2C5	D	D
XF3	2A4	C	D
XP0	2F6	D	D
XP1	2E3	C	D
XP2	2C6	D	D
XP3	2A3	C	D

DESIG	LOCATION		
	FS	APP FIG	EQUIP.
SWITCHES, CROSSBAR			
PS	SEE APP FIG.	7	-
SS	APP FIG.	6	-

SD-25964-01-A3

STABLO/10/15

CANA
 POSITION LINK AND CONTROLLER
 CIRCUIT
 BELL TELEPHONE LABORATORIES
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SD-25964-01-A3

LEAD INDEX

DESIG	FS LOC	CAD LOC
AISLE PILOT OR AUD AND VISUAL ALARM CKT		
UL	17G0	1D0, 3D7
F	17G0	1E4, 4C0
G	17G0	1G0, 3D7
R	17G0	1B0, 3B7

DESIG	FS LOC	CAD LOC
ALARM TRANSFER CKT		
AR	16D9	1B0, 3F7
AR1	16D9	1B4, 3F7

DESIG	FS LOC	CAD LOC
CHIEF OPERATORS ADMINISTRATION CKT		
GU0-6	9B9	8C5

DESIG	FS LOC	CAD LOC
DOOR ALARM CKT		
G	16A8	1E4, 4C0

DESIG	FS LOC	CAD LOC
INTERRUPTER FR CKT		
A	16B1	1A4, 1H0, 3E7, 4D0, 1E0, 1G0
B	16B1	1A4, 1H0, 3E7, 4D0, 1E0, 1G0
F	16B1	1A4, 1H0, 3E7, 4D0, 1E0
	16E3	4D0, 1E0
	19E7	1E0

DESIG	FS LOC	CAD LOC
MISC CKT FOR TBL RCDR FR		
CB	17C7	4F0, 4H0
FBA	17E7	5E0
LK	17D7	5E0
LTR	17E7	4F0, 4H0
MB	17B7	4F0
TR	17C7	4F0, 4H0

DESIG	FS LOC	CAD LOC
MISC CKT POS LINK FR		
20A	16F8	
FA	16F8	16G8

DESIG	FS LOC	CAD LOC
MISC CKT SDR MB FR		
AB	15A1	1B7
CA	17C1	1B7
RS	15C1	1B7

DESIG	FS LOC	CAD LOC
MISC CKT TBL RCDR FR OR TV GR TBL RCDR CONN CKT		
MM	19C9	5D0

DESIG	FS LOC	CAD LOC
OGT CKT TO CAMA POS OR MF CAMA POS CKT OR AMA POS CKT FOR DSA OR TOLL SWBD		
CW	17B0	1F4, 4C0

DESIG	FS LOC	CAD LOC
POS AND TEL CKT OR AMA POS CKT FOR TOLL GR USA SWBD OR OGT CKT TO CAMA POS OR MF CAMA POS CKT OR POS CONTROL CKT		
0	12A4	2B7
1	12B4	2B7
2	12B4	2B7
4	12B4	2B7
7	12C2	2B7
GB	15G2	2B7, 6B5
H	12A4	2B7, 6B5
IF	12C4	6B5
KPR	12B4	6B5
KPT	12B4	6B5
OJ	12C4	6B5
P00	10E3	2B7, 6B5
P01-09	10D3	2B7, 6B5
P1G	10F3	2B7, 6B5
P11-19	10D3	2B7, 6B5
P20	10F3	2B7, 6B5
P21-29	10D3	2B7, 6B5
P30	10F3	2B7, 6B5
P31-39	10D3	2B7, 6B5
P40	10G3	2B7, 6B5
P41-49	10D3	2B7, 6B5

DESIG	FS LOC	CAD LOC
POS AND TEL CKT OR AMA POS CKT FOR TOLL OR USA SWBD OR OGT CKT TO CAMA POS OR MF CAMA POS CKT OR POS CONTROL CKT		
R	12C4	2B7, 6B5
S	12B4	2B7, 6B5, 8B5
SS	12D4	8B5
T	12C4	2B7, 6B5
TS	12C4	2B7

DESIG	FS LOC	CAD LOC
POS CONTROL CKT		
PBY A-G	13H7	8C5
PC(0-6)(0-9)	14G9	8C5

DESIG	FS LOC	CAD LOC
SENDER CKT		
C	12A0	3B0
1	12A0	3B0
2	12B0	3B0
4	12B0	3B0
7	12C0	3B0
H	12A0	3B0, 7B0
IF	12C0	7B0
KPR	12B0	7B0
KPT	12B0	7B0
J1	12C0	7B0
R	12C0	3B0, 7B0
S	12D0	3B0, 7B0
S1	12B0	7B0
ST00-09	7F5	2C0
ST10-19	7F5	2C0
ST20-29	7F5	2C0
ST30-39	7F5	2C0

DESIG	FS LOC	CAD LOC
SENDER CKT		
STC	5C3	7B3, 7E0, 7F5
T	12C0	3B0, 7B0
TS	12C3	3B0

DESIG	FS LOC	CAD LOC
TBL RCDR CONN CKT		
GT0-3	7G9	7C6
RS1	15C0	7C6
ST00-39	7G9	7C6

DESIG	FS LOC	CAD LOC
TRAFFIC REGULATOR CKT		
CCGA	21C2	7E6
CCGB	21C2	7E6
CCW	21B2	7E6
CPA	15H2	7E6
GBA-G	15H2	8D5

DESIG	FS LOC	CAD LOC
TSP LINK CONTROLLER CKT		
F	9F6	3G4
	9G9	3G4
L	9F6	3G4
	9G9	3G4

DESIG	FS LOC	CAD LOC
TV GR TBL RCDR CONN CKT OR TBL RCDR CONN CKT		
A	19D9	5C0
APS	20D0	4D6
B	19D9	5F0
CI	19B9	4E0
EP	19F6	5F0
FS	19F6	4G3
GK	20C9	4D6
GPO-4	20C9	4D6
IG	20C9	4D6
LC-9	19D3	5D3
MTCE	20D0	4D6
NPA	19F6	5F0
OL	19F6	4G3
ON	19F6	4D6
ONL	20D0	5C0

DESIG	FS LOC	CAD LOC
TV GR TBL RCDR CONN CKT OR TBL RCDR CONN CKT		
P0	20D0	5D3
P1-9	20D0	5D3
PCP	19B9	4E0
PF0	19D3	5C0
PF1	19D3	4D6
PF2	19D3	5C0
PF3	19D3	4D6
PGO-4	19D3	5F0
PGK	20D0	4D6
PGK1	20D0	4D6
PK	20C9	4D6
PL	19F6	4G3
PLC	19D9	4D6
PP0-9	20C9	5E6
PS	20D0	4D6
PS1	20D0	4D6
PSL	19F6	4D6
PS	19F6	4G3
S0,1	19F6	5F0
S2-9	19F6	5D3
SG0-3	20D0	4D6
SK	20C9	4D6
SON	19D3	4D6
SPO-3	20C9	4D6
SPA	20D0	4G3
SS	20D0	4G3
SS1	19F6	4G3
SSL	19F6	4G3
STA	19F6	4D6
STR	19D9	5C0
TO	19D3	5C0
TRB	19B9	4E0
TRB1	19B9	4E0
U-	19D9	4H0
XP0	19D3	5C0
XP1	19D3	5C0
XP2	19D3	5C0
XP3	19D3	5C0

DRAWING ISSUE
13D
140
19D

19

SD-25964-01-A4

CAMA POSITION LINK AND CONTROLLER CIRCUIT

BELL TELEPHONE LABORATORIES INCORPORATED

SD-25964-01-A4

65

OPTION INDEX

APP OR WRG	LOCATION
2	APP FIG. 2
9	APP FIG. 9
10	APP FIG. 10, 1A1, 1C1, 1E1, 1F1, 1G7
11	APP FIG. 11, 5B4, 5D4, 5E4, 7F2, 7F4, 7G7
12	APP FIG. 12, 3A6, 3A7, 3A8, 3A9, 3D3, 10C7, 10E0, 10F0, 20E1
13	APP FIG. 13, 7F9, 7G9, 7G7, 8B7, 8A8, 9G8, 12D4, 12G3, 13H5, 13F2, 13F3, 13A1, 13B1, 13C3, 13D4, 13A5, 14E7, 14E8, 15C1, 15C2, 15A2, 19B5
FIG. A	APP FIG. A, SH 2, 3B2, 4A8, 4C7, 4D1, 4E5, 4E2, 6F2, 6F4, 6G2
FIG. B	APP FIG. B, SH 2, 3B2, 4A8, 4C7, 4D1, 4E5, 4E2, 6F2, 6F4, 6G2
FIG. C	APP FIG. C, SH 2, 3B2, 4B6, 4B7, 4U1, 4D4, 4D6, 6E3, 17B7, 19C2
FIG. D	APP FIG. D, SH 2, 3B2, 4B6, 4B7, 4D1, 4D4, 4D6, 6E3, 17B7, 19E2
FIG. E	APP FIG. E, 11B8, 11C8, 13D2, 13D3
FIG. F	APP FIG. F, 11B1, 11B8, 12D8, 12F6, 12F7, 12F8, 12G3, 13A0, 13H1, 15B3, 15B4, 20F1
FIG. G	APP FIG. G, SH 2, SH 3, 4B0, 6D3, 6D4, 6E3, 6F4, 7B2, 7D2, 9B4, 9B6, 9B8, 10B4, 10B8, 10C3, 10C8, 10C9, 11B6, 11C1, 11F2, 11G1, 11G2, 13E1, 13F4, 13G1, 15A2, 15B2, 16B2, 16C2, 16C3
FIG. H	APP FIG. H, SH 2, SH 3, 6E4, 7B2, 7D2, 9B3, 9B5, SH 10, 11C1, 11D1, 11F1, 11F2, 11H2, 13C3, 13D4, 13E4, 13F4, 13H2, SH 15, 16B2, 16B3, 16F5, 17B7, 18D2
2	9C7

APP OR WRG	LOCATION
Y	9G8
X	16D8
W	12B0, 12B4, 12C0, 12C4
V	12B0, 12B4, 12C0, 12C4, 12D4
T	APP FIG. 3, 8, 3C4, 3D4, 17F3
S	3C4, 3D4, 17F3, 18C5, 18C6, 18C7, 20D7
M	APP FIG. 1
N	APP FIG. 1
K	4E6, 13G1, 15E1, SH 16
J	4E6, 15D2, 16E1, 16F1, 16F3, 16G5
ZA	SH 2
ZB	SH 2
ZE	18D8
ZF	SH 18
ZG	APP FIG. A, 17D2, 18C4, 18D8
ZH	APP FIG. 1, 6E8
ZI	APP FIG. 1
ZJ	8B8, 8C8, 8C9, 9A7, 9B8, 11B6, 15C9, 15D9
ZK	8B8, 8C8, 8C9, 9A7, 11B6, 15C8, 15D8

APP OR WRG	LOCATION
ZL	16F4, 16G3
ZM	16G4
ZN	APP FIG. 1, 3A6, 3A7, 3A8, 3A9, 10E0, 10F0, 20E1
ZO	12D3, 12D4, 15G2, 15H4, 15H2
ZP	9B9, 12D4, 13H6, 14F9, 15G2
ZQ	5A4, 5B4, 5D4, 5E4, 7E4, 7F2, 8B5, 8B7, 12D3, 12D4, 12G3, 13C3, 13D4, 13B5, 13F2, 13F3, 13F4, 14E7, 14E8, 15G2, 17B1
ZR	15H2
ZS	15H2
ZT	15B3
ZU	19B5

DRAWING	ISSUE
130	REV 1
140	REV 2
150	REV 3
17A	REV 4

A
B
C
D
E
F
G
H

A
B
C
D
E
F
G
H

17

CROSSBAR SYSTEMS		SD-25964-01-45
CAMA POSITION LINK AND CONTROLLER CIRCUIT		
BELL TELEPHONE LABORATORIES INCORPORATED		6S

25964-01-45

FS I
CONTROLLER SEIZURE

A CONTROLLER

B CONTROLLER

A
B
C
D
E
F
G

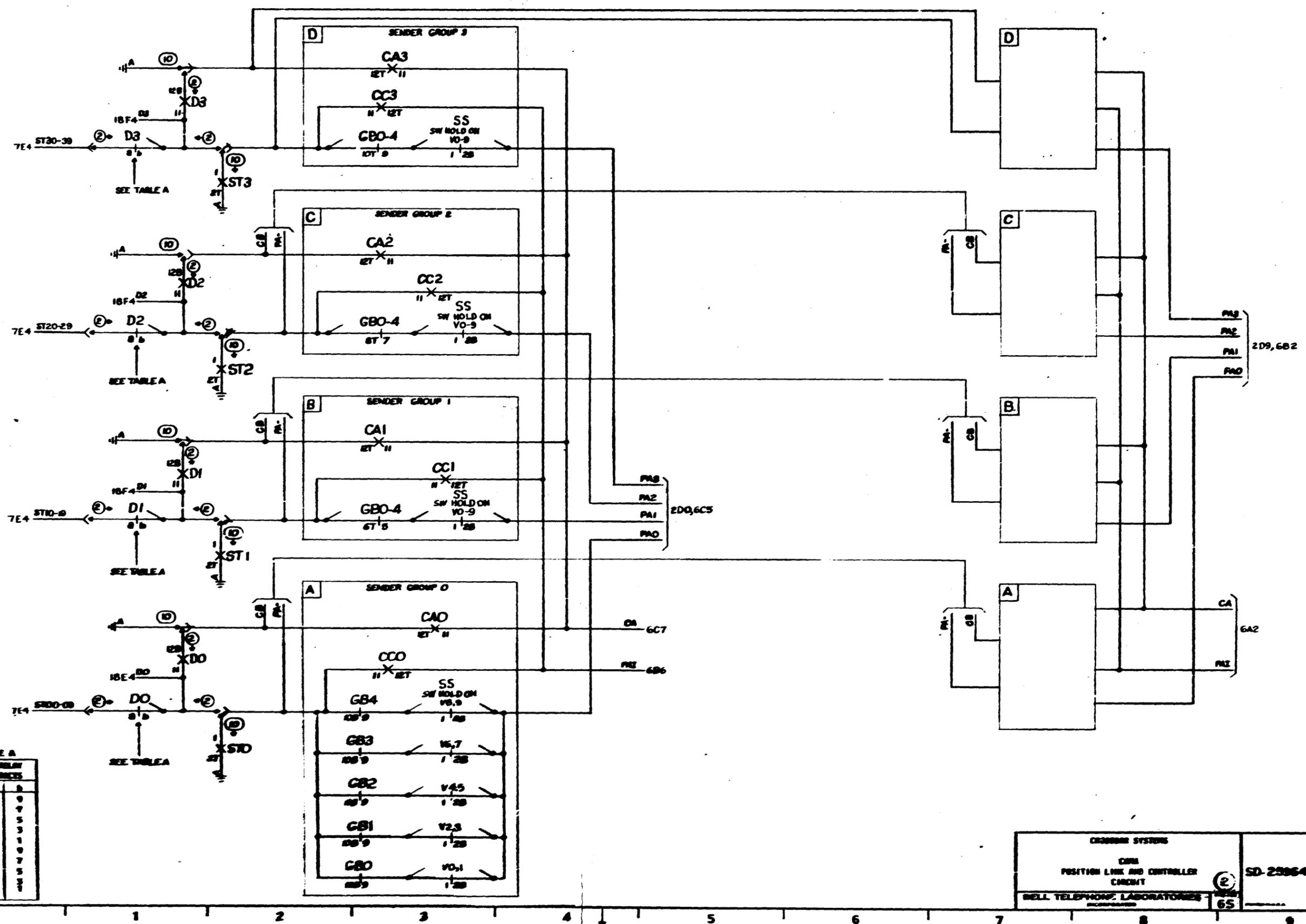


TABLE A

ST	RELAY	CONTACTS
1	ST1	1-2B
2	ST2	1-2B
3	ST3	1-2B
4	ST4	1-2B
5	ST5	1-2B
6	ST6	1-2B
7	ST7	1-2B
8	ST8	1-2B
9	ST9	1-2B
10	ST10	1-2B

SENDER GROUP A

CA0	ET X II
CC0	II X ET
G84	SS SW HOLD ON 10-9
G83	15,7
G82	V45
G81	V2,3
G80	V0,1

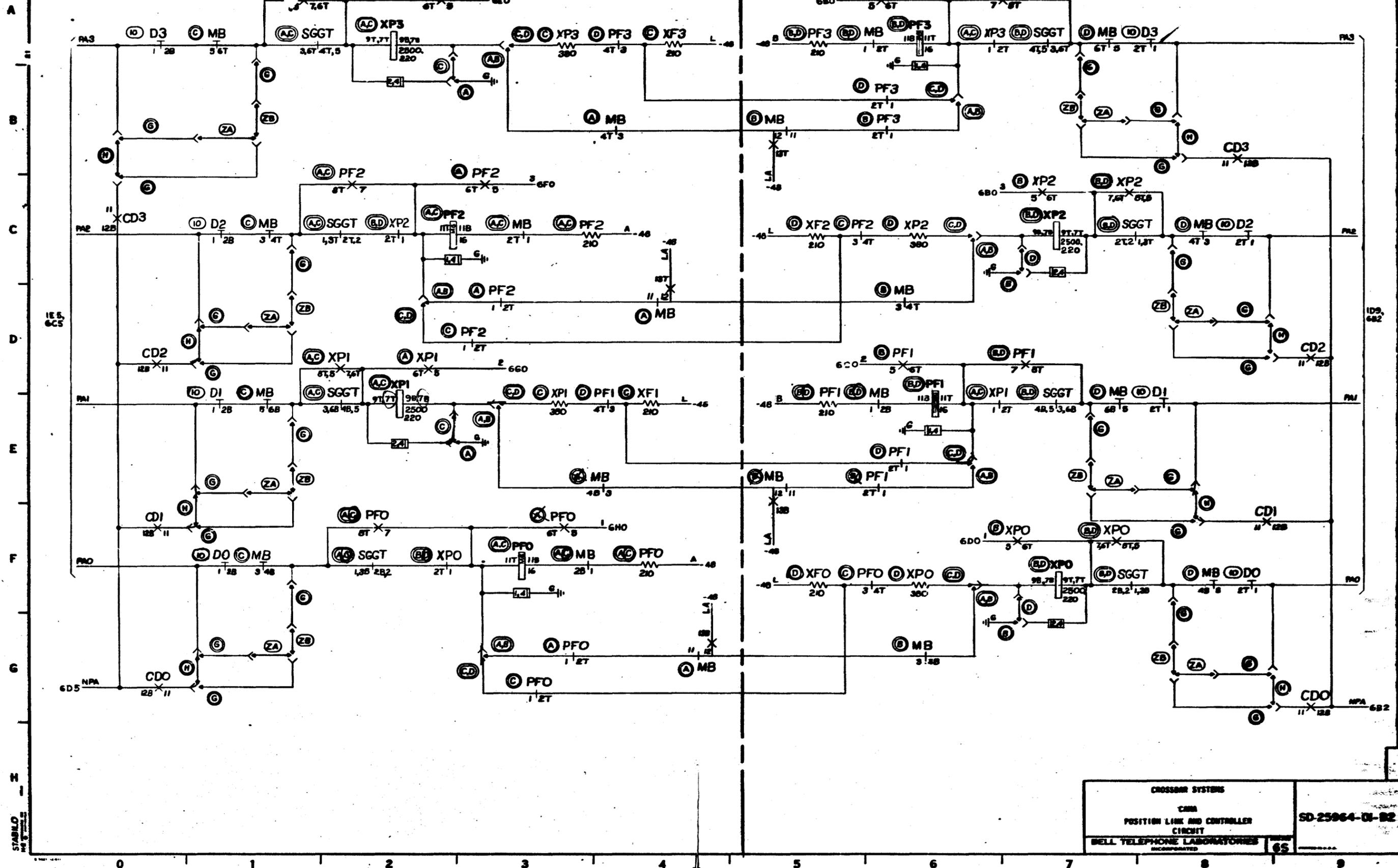
18-10-40003-03

FS 2

CONTROLLER PREFERENCE

"A" CONTROLLER

"B" CONTROLLER

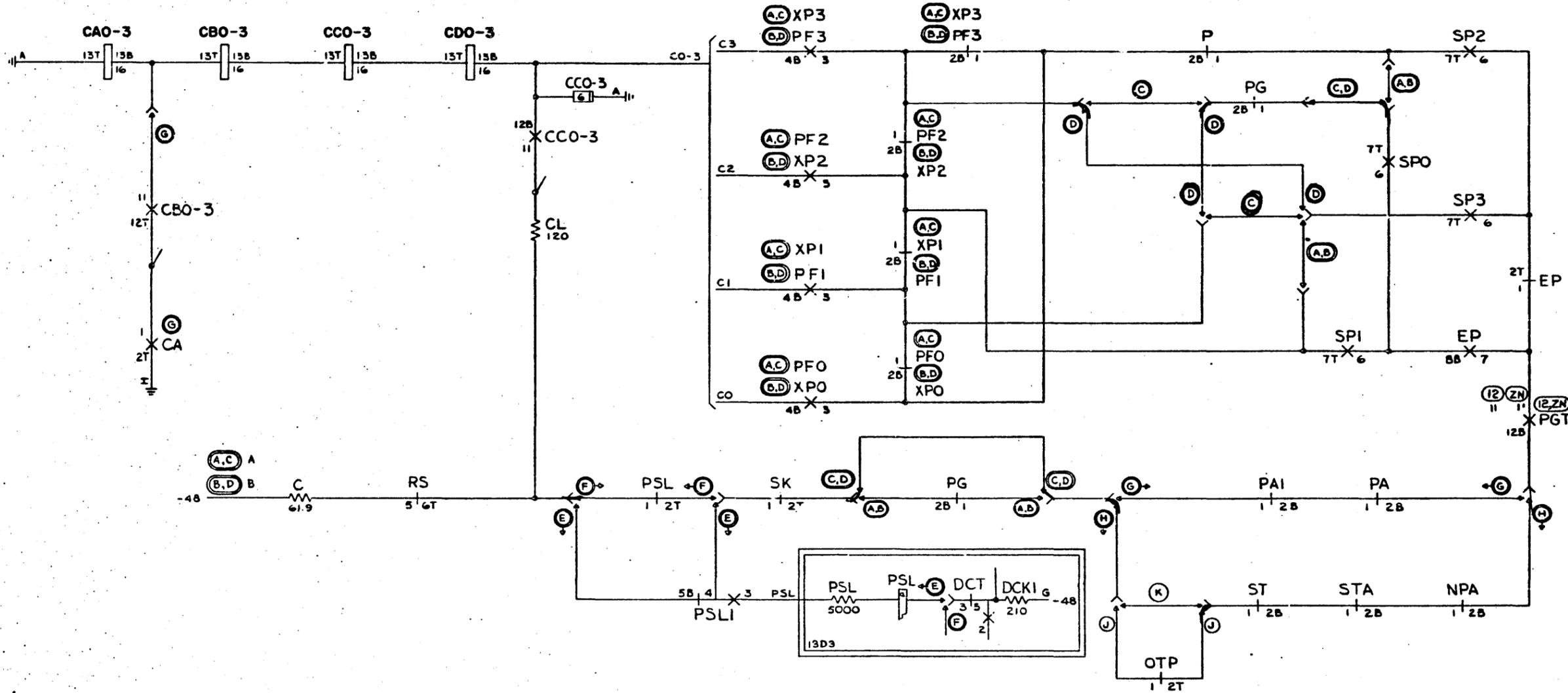


SD-25964-01-82

STABLO

CROSSBAR SYSTEMS	
CMB	
POSITION LINK AND CONTROLLER	
CIRCUIT	
BELL TELEPHONE LABORATORIES	
INCORPORATED	
65	SD-25964-01-82

FS 5
SENDER GROUP SELECTION



DRAWING	ISSUE
12D	REVISED AND REDESIGNED
13D	REVISED

SD-25964-01-B4

STABLO

13

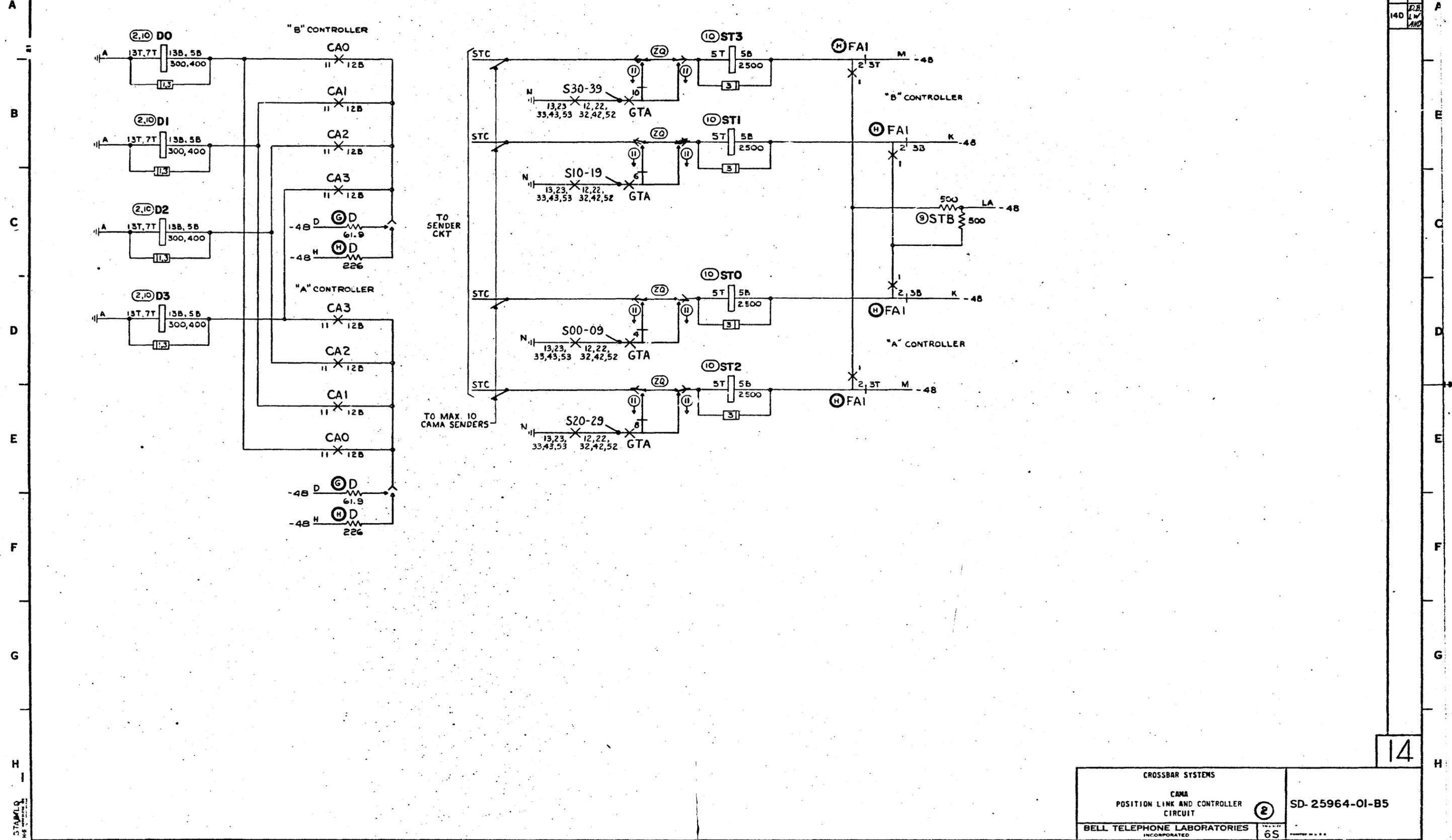
CROSSBAR SYSTEMS	
CAMA POSITION LINK AND CONTROLLER CIRCUIT	
BELL TELEPHONE LABORATORIES INCORPORATED	SD-25964-01-B4
6S	2

0 1 2 3 4 5 6 7 8 9

DRAWING	
120	REV
130	REV
140	REV

FS 6
SENDER DISJOINING

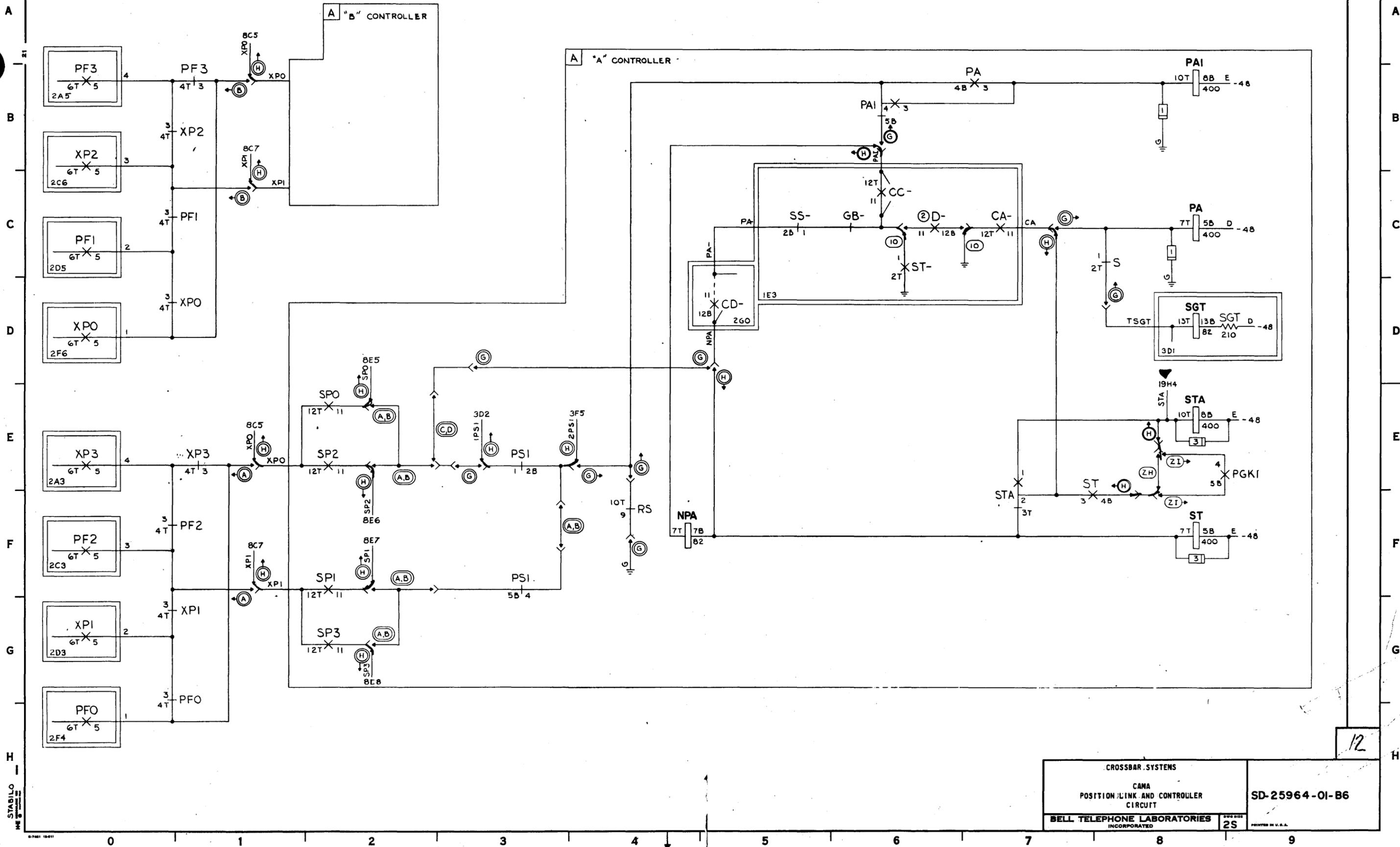
FS 7
COMMON START RELAY



SD-25964-01-B5

FS 8
PATH AVAILABILITY CHECK

DRAWING
ISSUE
12D
REV
AND



SD-25964-01-B6

CROSSBAR SYSTEMS	
CAMA POSITION LINK AND CONTROLLER CIRCUIT	
BELL TELEPHONE LABORATORIES INCORPORATED	SD-25964-01-B6
2S	PRINTED IN U.S.A.

12

PART OF FS 9 SENDER SELECTION

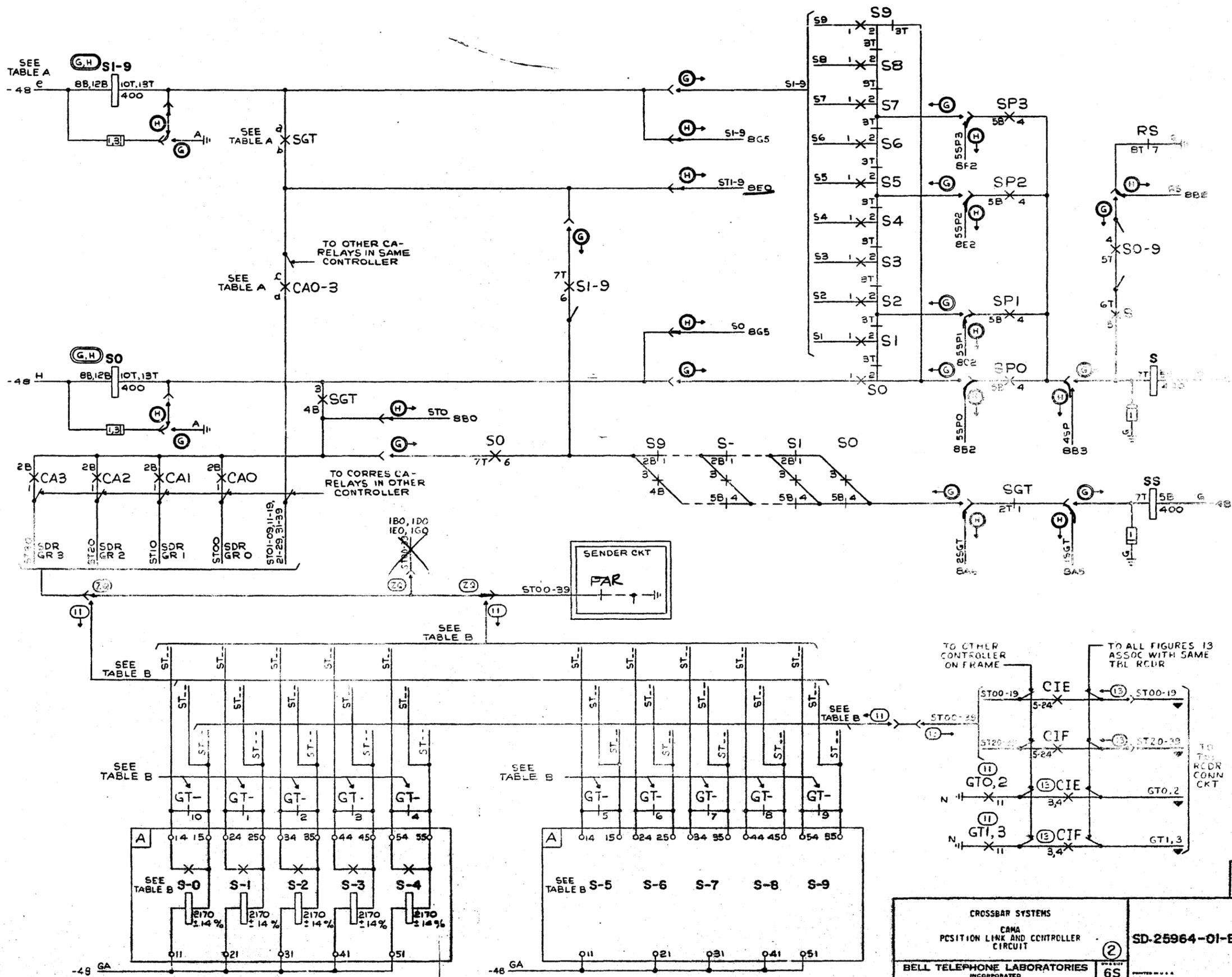
DRAWING ISSUE
13D NR 778
16A L W AND

TABLE A

S-	1	2	3	4	5	6	7	8	9
SGT	a	5	7	9	11	3	5	7	9
CA	b	4B	8B	10B	12B	4T	6T	8T	10T
0-3	c	4B	8B	10B	12B	4T	6T	8T	10T
S-	d	3	5	7	9	1	3	5	7
S-	e	H	J	J	K	K	L	L	M

TABLE B

S -- RELAYS	GT-- RELAYS	ST-- LEADS
S00	GT0	ST00
S01	GT0	ST01
S02	GT0	ST02
S03	GT0	ST03
S04	GT0	ST04
S05	GT0	ST05
S06	GT0	ST06
S07	GT0	ST07
S08	GT0	ST08
S09	GT0	ST09
S10	GT1	ST10
S11	GT1	ST11
S12	GT1	ST12
S13	GT1	ST13
S14	GT1	ST14
S15	GT1	ST15
S16	GT1	ST16
S17	GT1	ST17
S18	GT1	ST18
S19	GT1	ST19
S20	GT2	ST20
S21	GT2	ST21
S22	GT2	ST22
S23	GT2	ST23
S24	GT2	ST24
S25	GT2	ST25
S26	GT2	ST26
S27	GT2	ST27
S28	GT2	ST28
S29	GT2	ST29
S30	GT3	ST30
S31	GT3	ST31
S32	GT3	ST32
S33	GT3	ST33
S34	GT3	ST34
S35	GT3	ST35
S36	GT3	ST36
S37	GT3	ST37
S38	GT3	ST38
S39	GT3	ST39



SD-25964-01-07

CROSSBAR SYSTEMS

CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

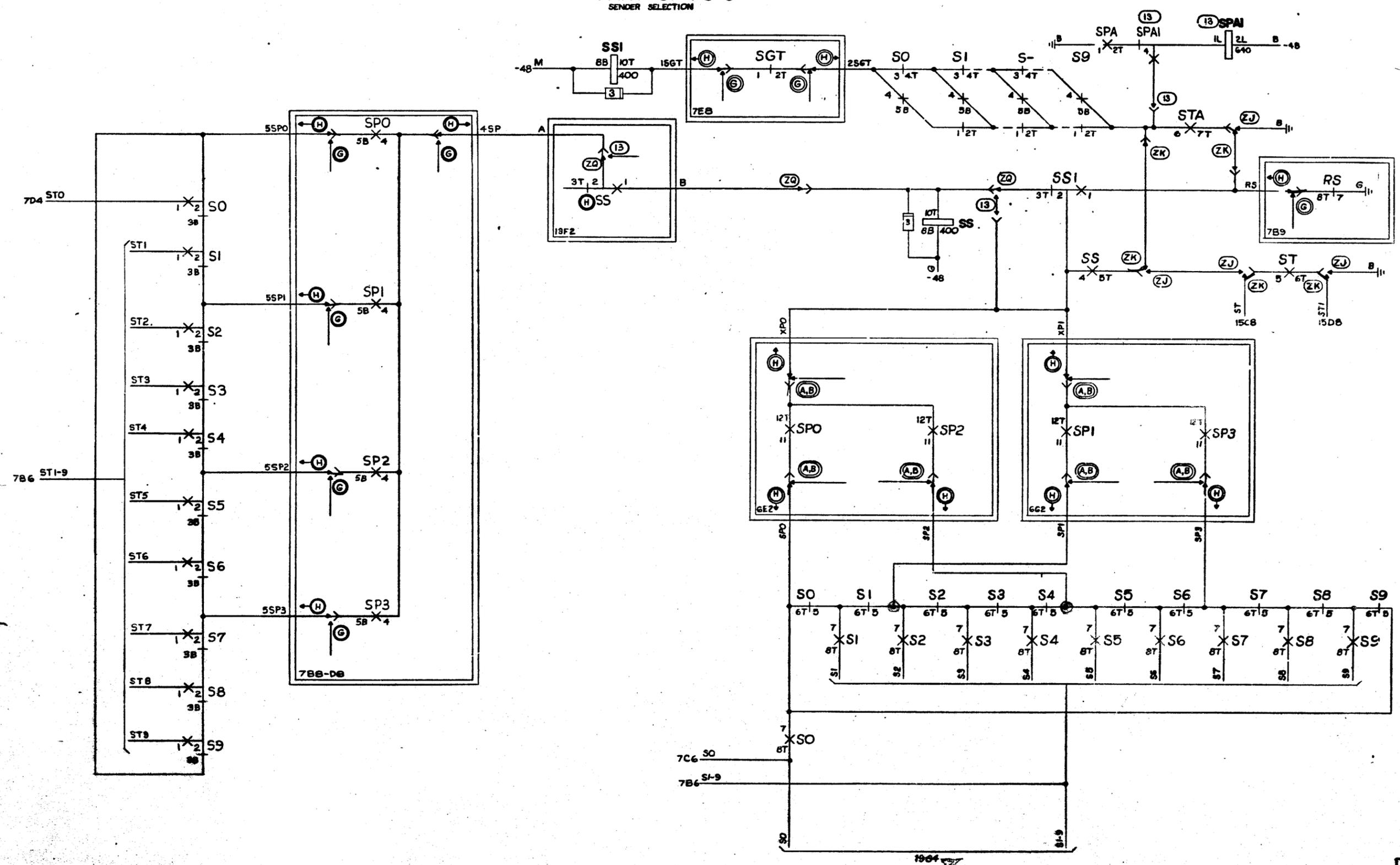
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INCORPORATED

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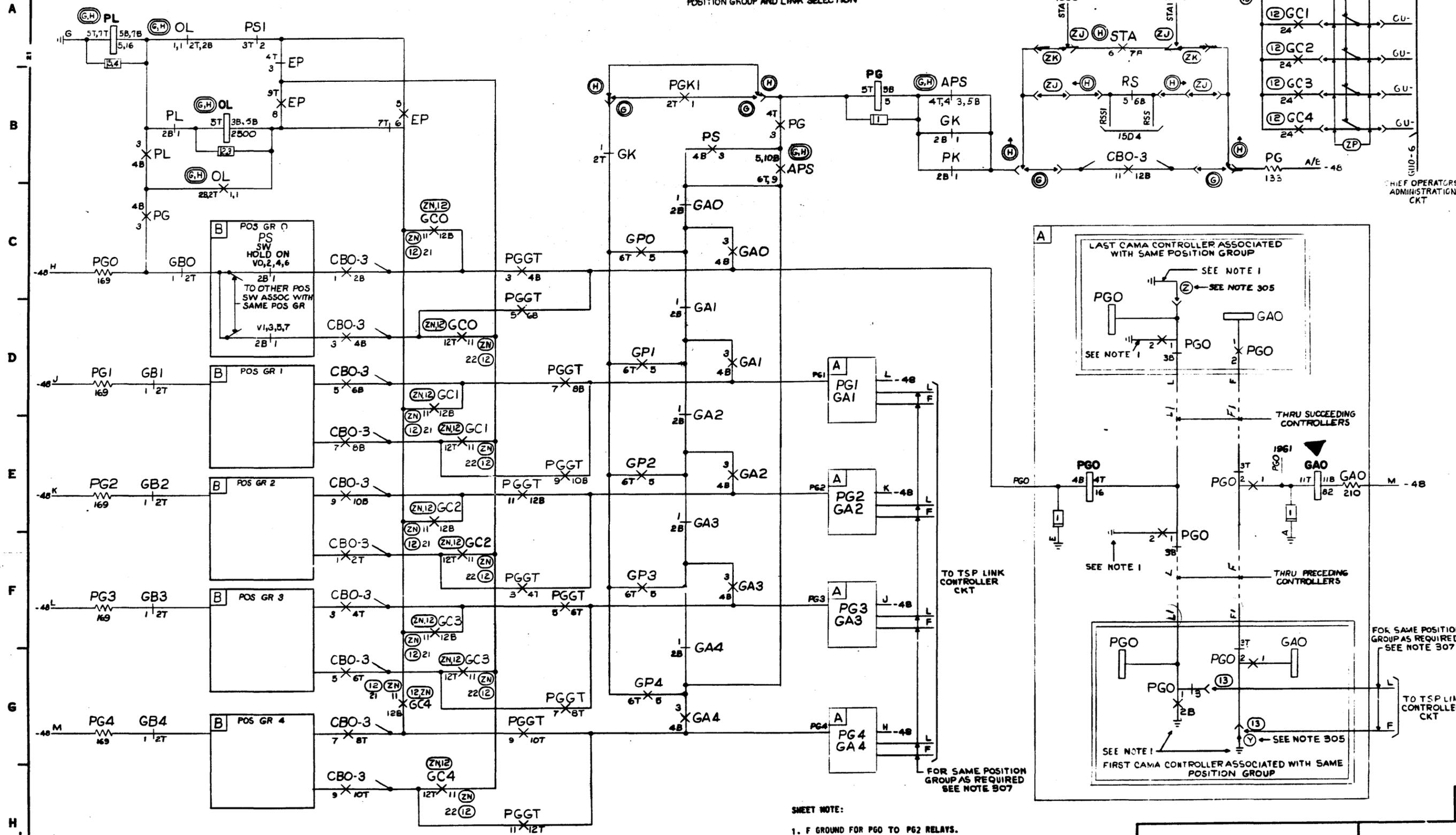
PART OF FS 9
SENDER SELECTION

DRAWING	ISSUE
120	REVISED
130	REVISED
140	REVISED
17A	REVISED



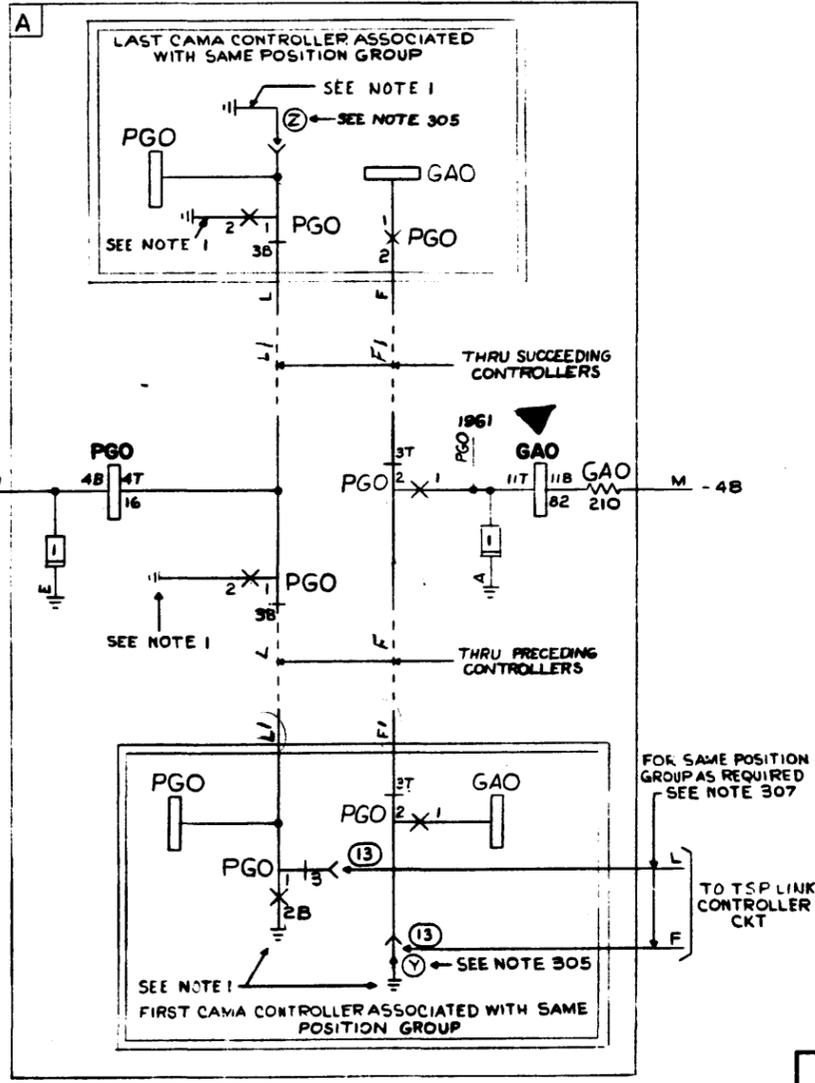
CROSSBAR SYSTEMS
 DATA POSITION LINK AND CONTROLLER CIRCUIT
 BELL TELEPHONE LABORATORIES
 SD-25964-01-88
 65

FS 10
POSITION GROUP AND LINK SELECTION



TO ALL OTHER GC-RELAYS ASSOC WITH SAME TSP GROUP SEE NOTE 307

CHIEF OPERATORS ADMINISTRATION CKT



SHEET NOTE:
1. F GROUND FOR PGO TO PG2 RELAYS.
E GROUND FOR PG3 AND PG4 RELAYS.

SD-25964-01-B9

STABLO

PART OF FS II
POSITION SELECTION

DRAWING
ISSUE
12D
13D

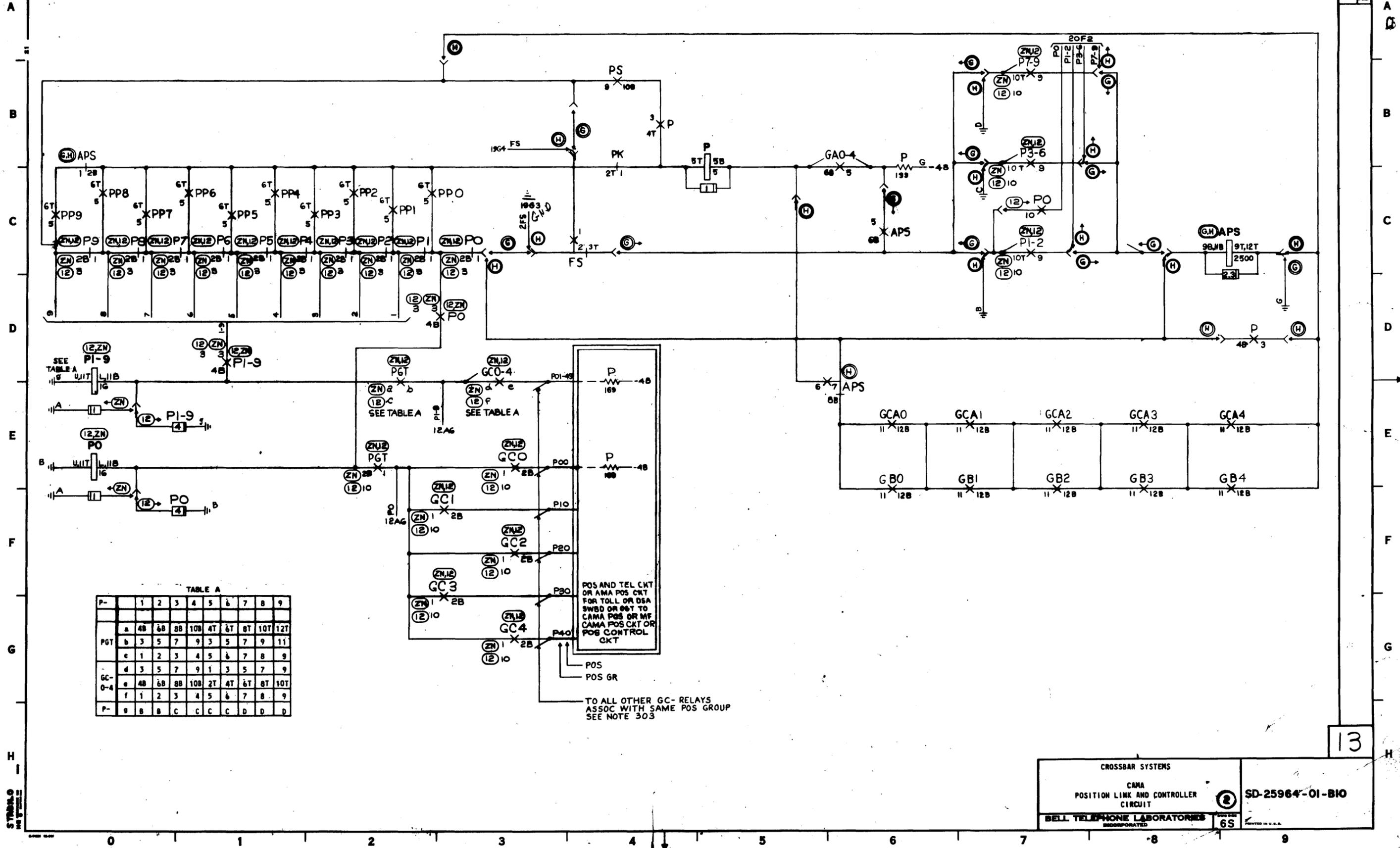


TABLE A

P-	1	2	3	4	5	6	7	8	9
a	4B	6B	8B	10B	4T	6T	8T	10T	12T
PGT	b	3	5	7	9	3	5	7	9
c	1	2	3	4	5	6	7	8	9
d	3	5	7	9	1	3	5	7	9
GC-0-4	e	4B	6B	8B	10B	2T	4T	6T	8T
f	1	2	3	4	5	6	7	8	9
P-	9	B	B	C	C	C	D	D	D

POS AND TEL CKT
OR AMA POS CKT
FOR TOLL OR DSA
SWBD OR 06T TO
CAMA POS OR MF
CAMA POS CKT OR
POS CONTROL
CKT

POS
POS GR

TO ALL OTHER GC- RELAYS
ASSOC WITH SAME POS GROUP
SEE NOTE 303

SD-25964-01-B10

CROSSBAR SYSTEMS

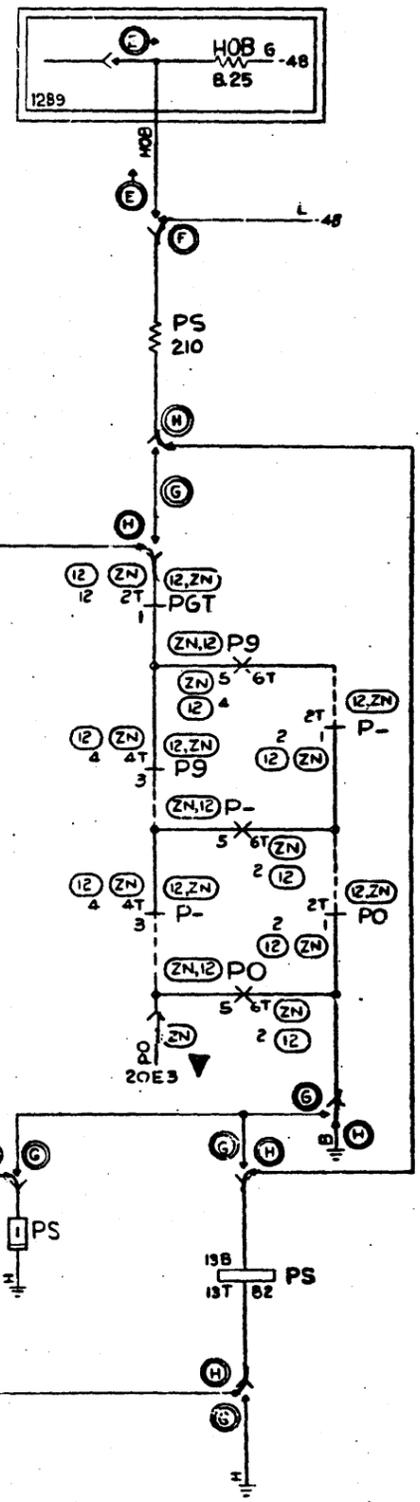
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

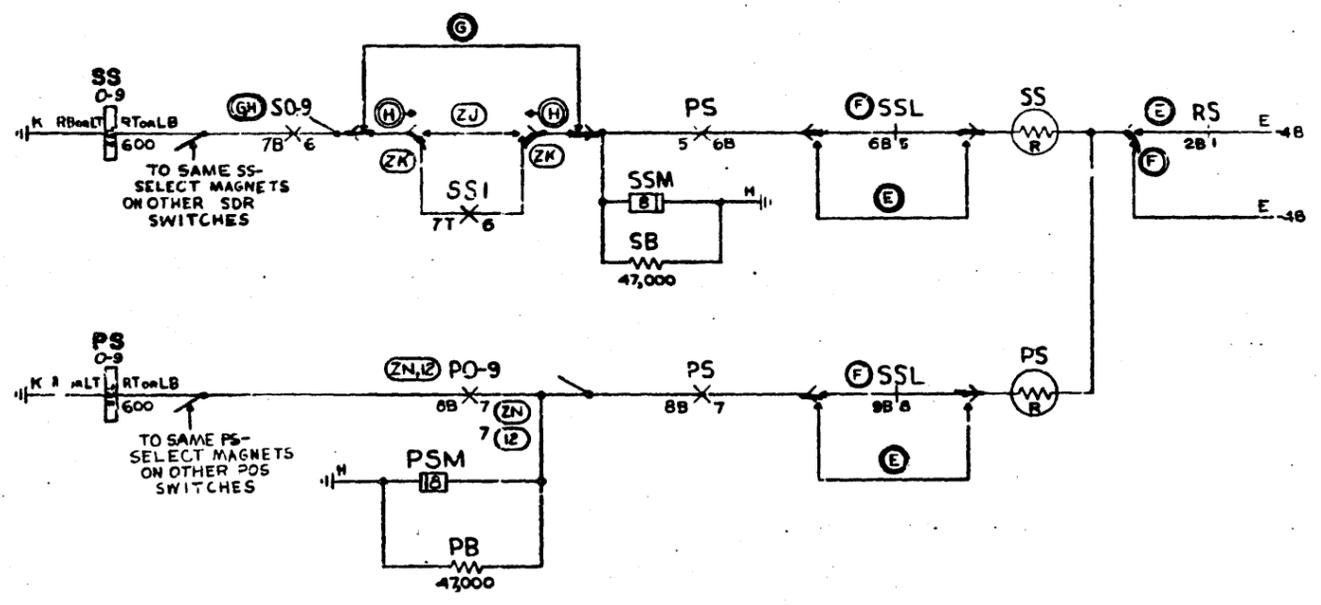
SD-25964-01-B10

6S

PART OF FS II
POSITION SELECTION



FS I2
SELECT MAGNET CONTROL



DRAWING	FILE
ISSUE	DATE
12D	12/15/51
13D	1/15/52

13

CROSSBAR SYSTEMS	
CAMA	
POSITION LINK AND CONTROLLER	
CIRCUIT	
BELL TELEPHONE LABORATORIES INCORPORATED	SD-25964-01-B11

SD-25964-01-B11

STABLO

PART OF FS 13
HOLD MAGNET OPERATION AND
CONNECTION CHECK PATH

DRAWING ISSUE

12D	RLJ
13D	DM
14D	LR
17A	FLC

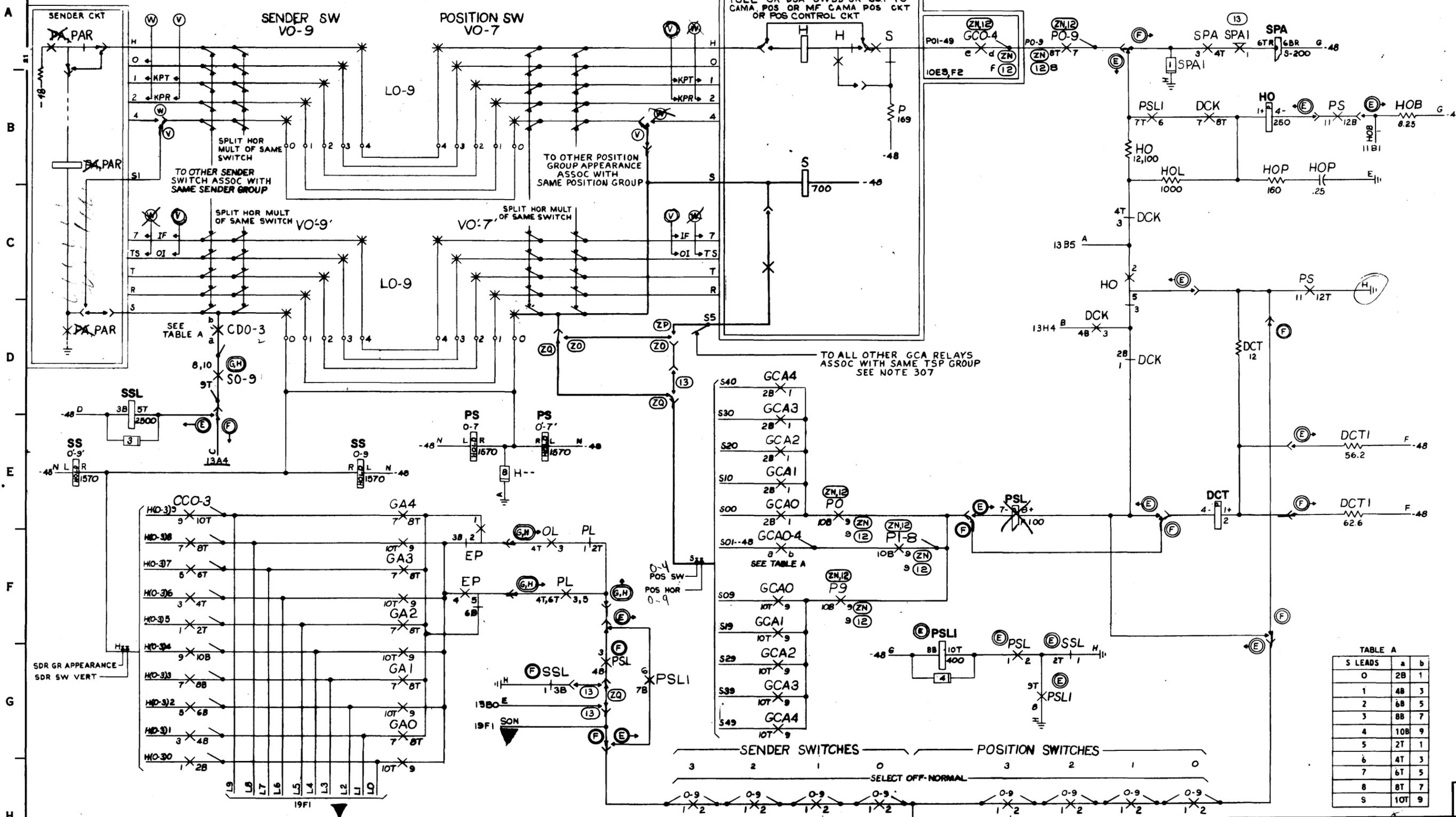


TABLE A

S LEADS	a	b
0	2B	1
1	4B	3
2	6B	5
3	8B	7
4	10B	9
5	2T	1
6	4T	3
7	6T	5
8	8T	7
9	10T	9

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

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6S

SD-25964-01-B12

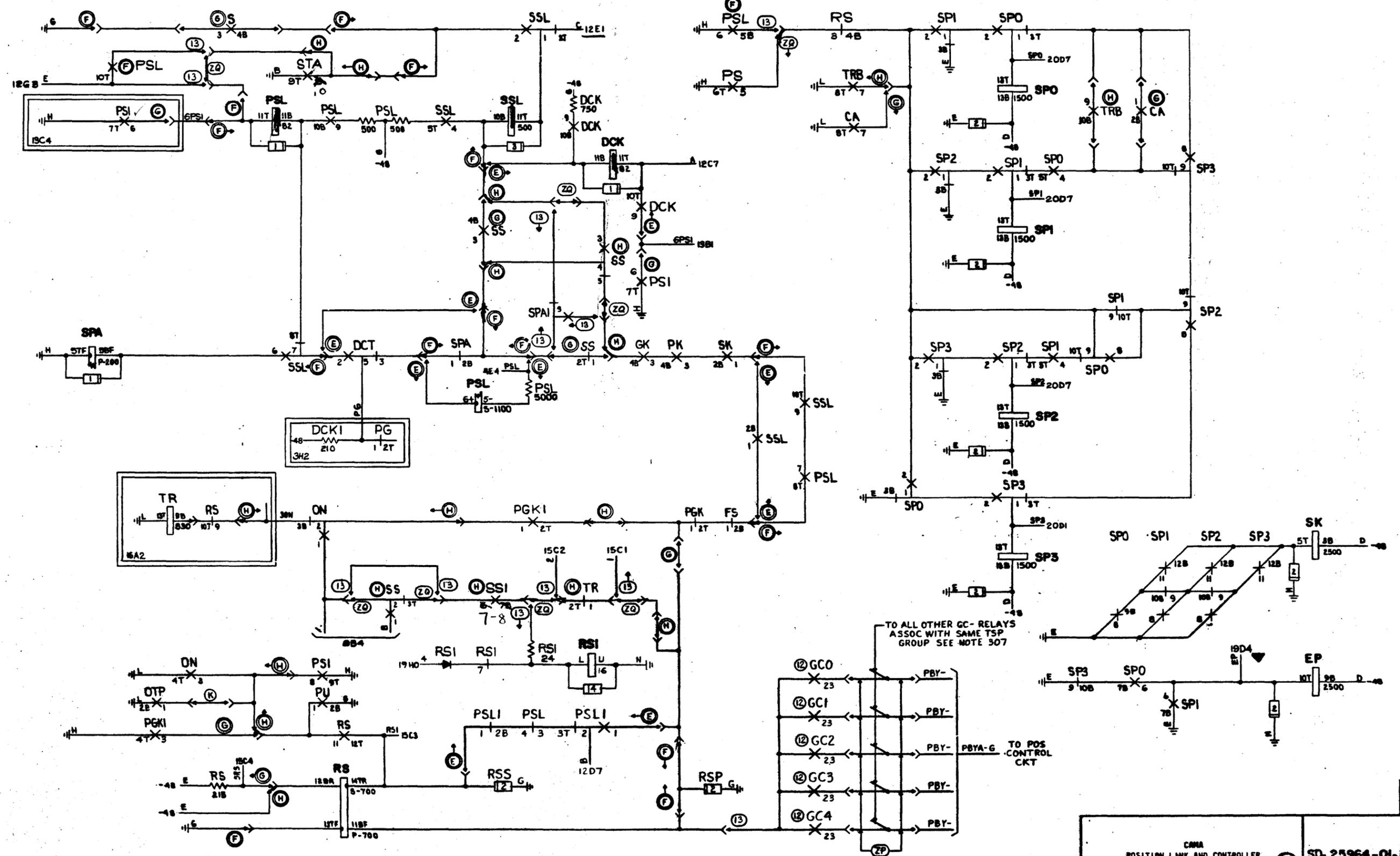
STABLO

17

PART OF FS 13
HOLD MAGNET OPERATION AND COMM
CHECK PATH

FS 14
SENDER PREFERENCE START ALLOTTER

DRAWING	127
ISSUE	130
REV	140
DATE	17A
BY	18AR



CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

SD-25964-01-B13

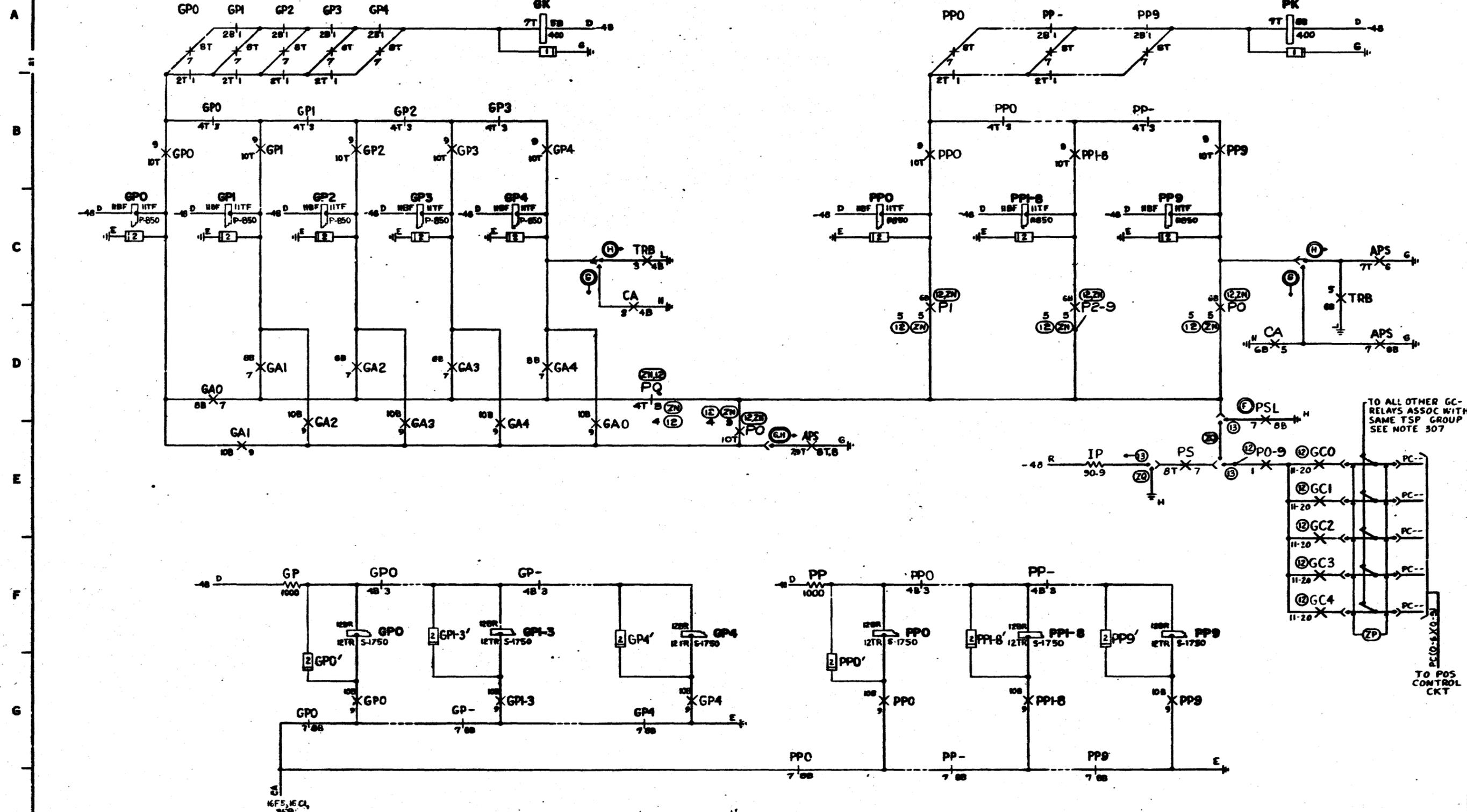
6S

SD-25964-01-B13

STABLO

FS 15

POSITION PREFERENCE START ALLOTTER



SD-25964-01-B14

STABULO

CROSSBAR SYSTEMS		SD-25964-01-B14
CANA		
POSITION LINK AND CONTROLLER CIRCUIT		
BELL TELEPHONE LABORATORIES	65	

FS 16
 POSITION GROUP BUSY
 ABANDONED CALL OR FALSE START

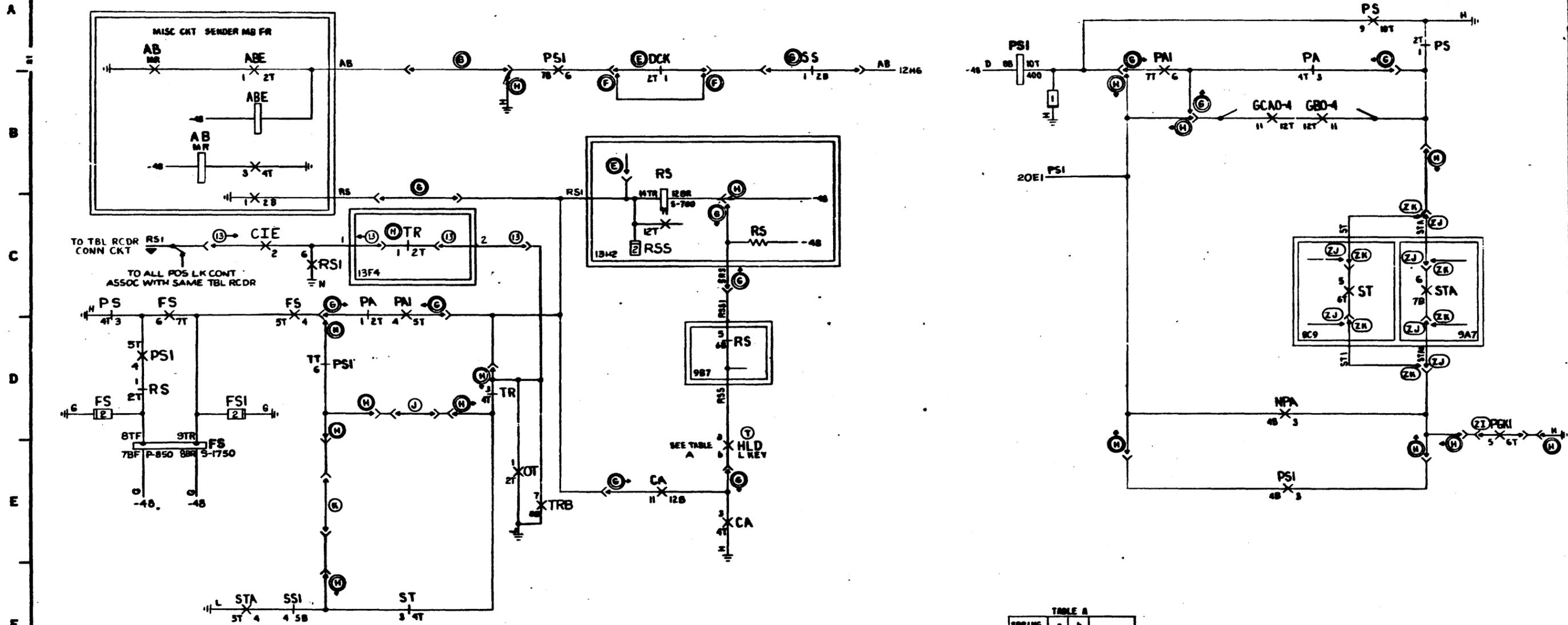
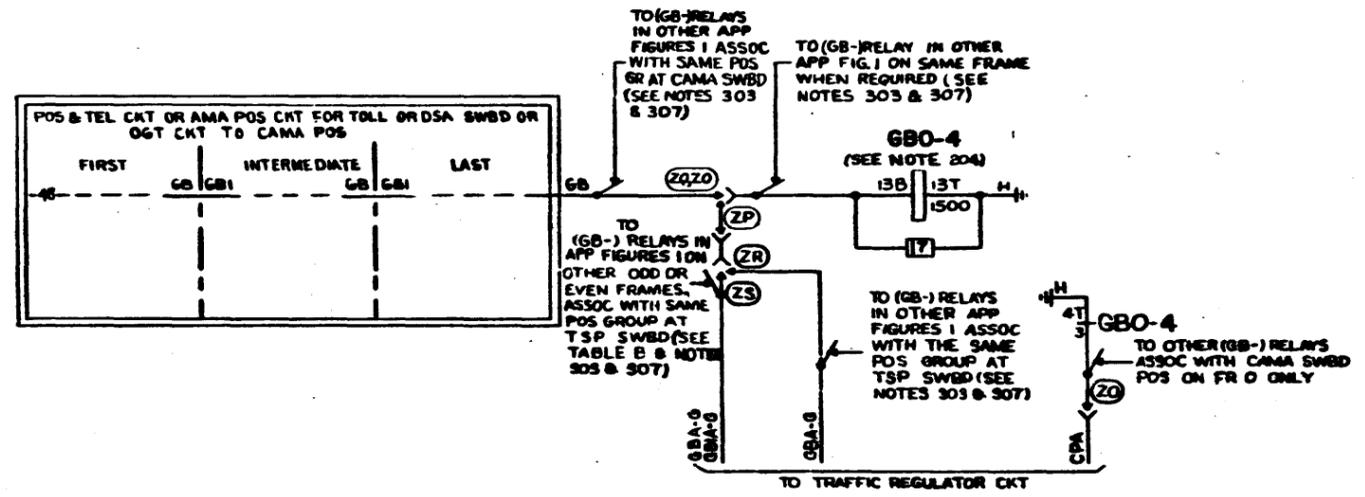


TABLE A

SPRING	a	b	
HLP	4	3	A CONT
L KEY	5	6	B CONT

TABLE B (OPTION 25)

LEAD DESIGNATIONS	CONNECT TO POSITION LINK FRAME NO.
GBA-G (EVEN)	0,4,8,12,16,20
GBA-G (ODD)	1,5,9,13,17,21
GBA-G (EVEN)	2,6,10,14,18,22
GBA-G (ODD)	3,7,11,15,19,23



CROSSBAR SYSTEMS
 CANA
 POSITION LINK AND CONTROLLER
 CIRCUIT

BELL TELEPHONE LABORATORIES
 INCORPORATED

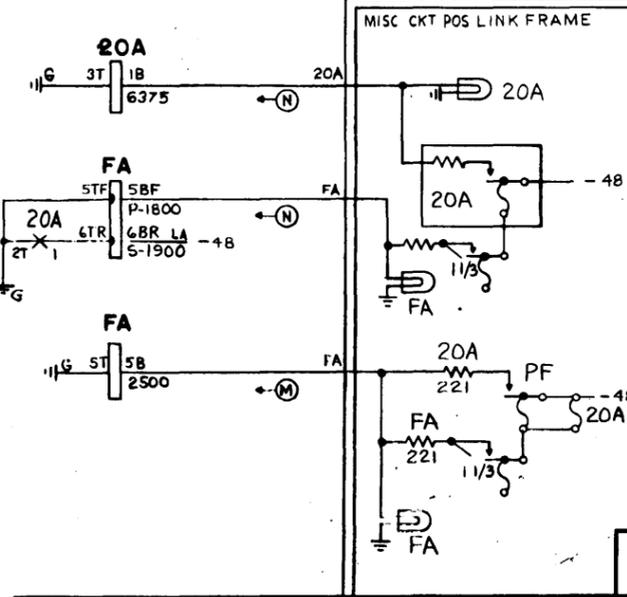
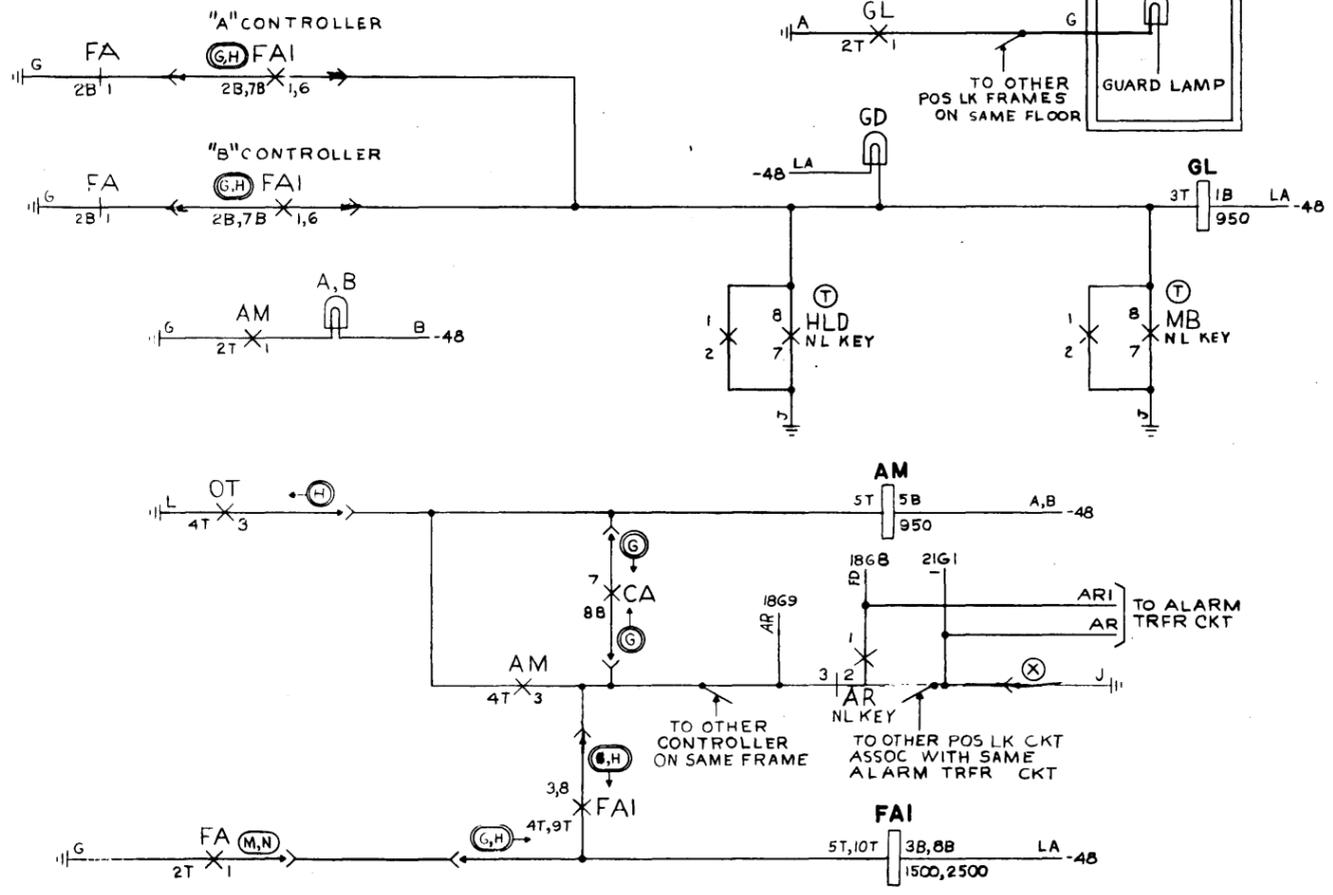
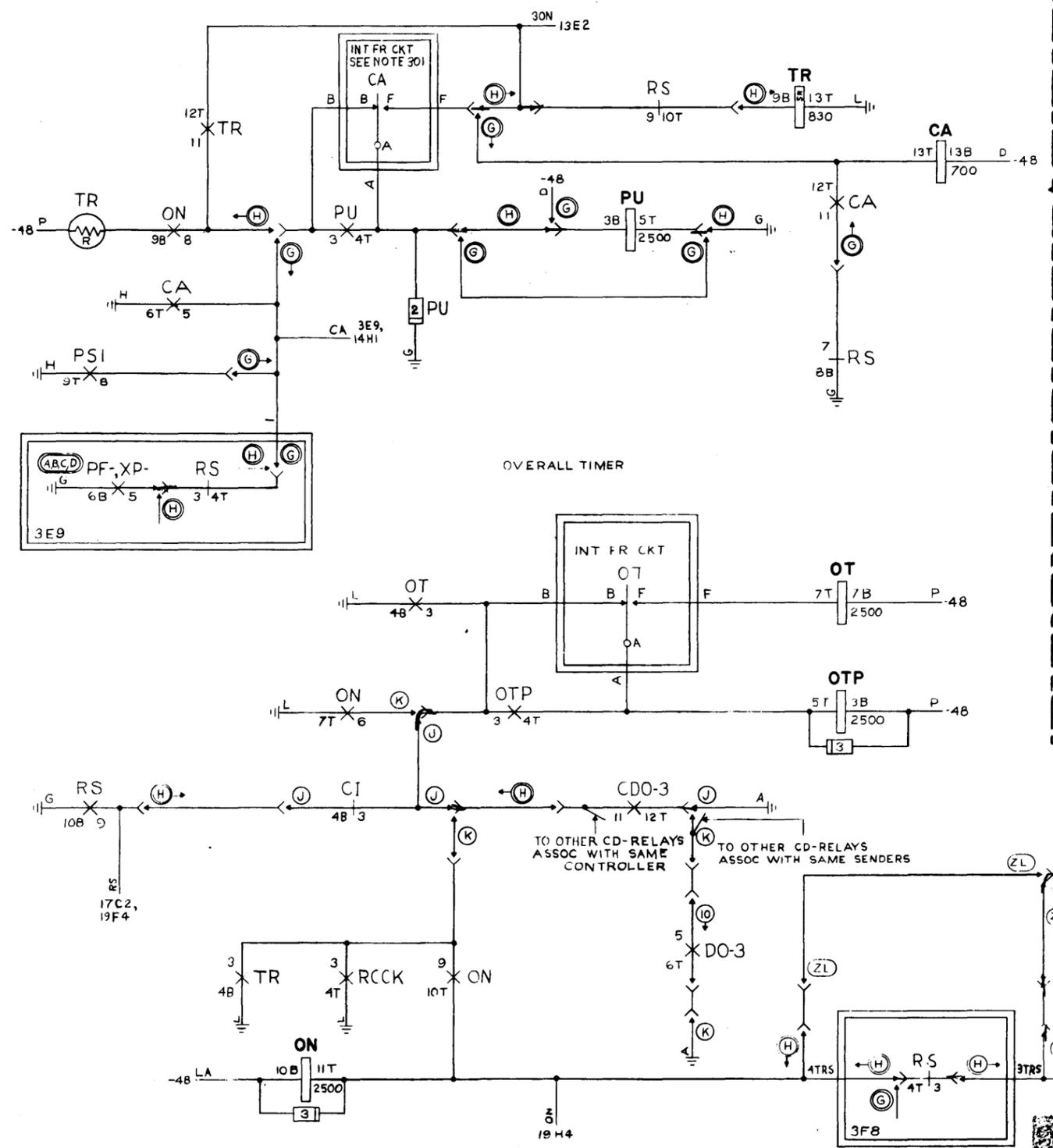
SD-25964-01-B15
 6S

SD-25964-01-B15

FS17
TIMING CIRCUITS
CONTROLLER WORK TIMER

PART OF FS18
ALARM CIRCUITS
FUSE AND TIME ALARM

DRAWING	ISSUE
12D	APL
13D	EDM AND REVISED FOR TRB



25964-01-B16

STABLO

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT
BELL TELEPHONE LABORATORIES
INCORPORATED

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13

PART OF FS18
ALARM CIRCUITS

DRAWING
ISSUE
120
130
140
150

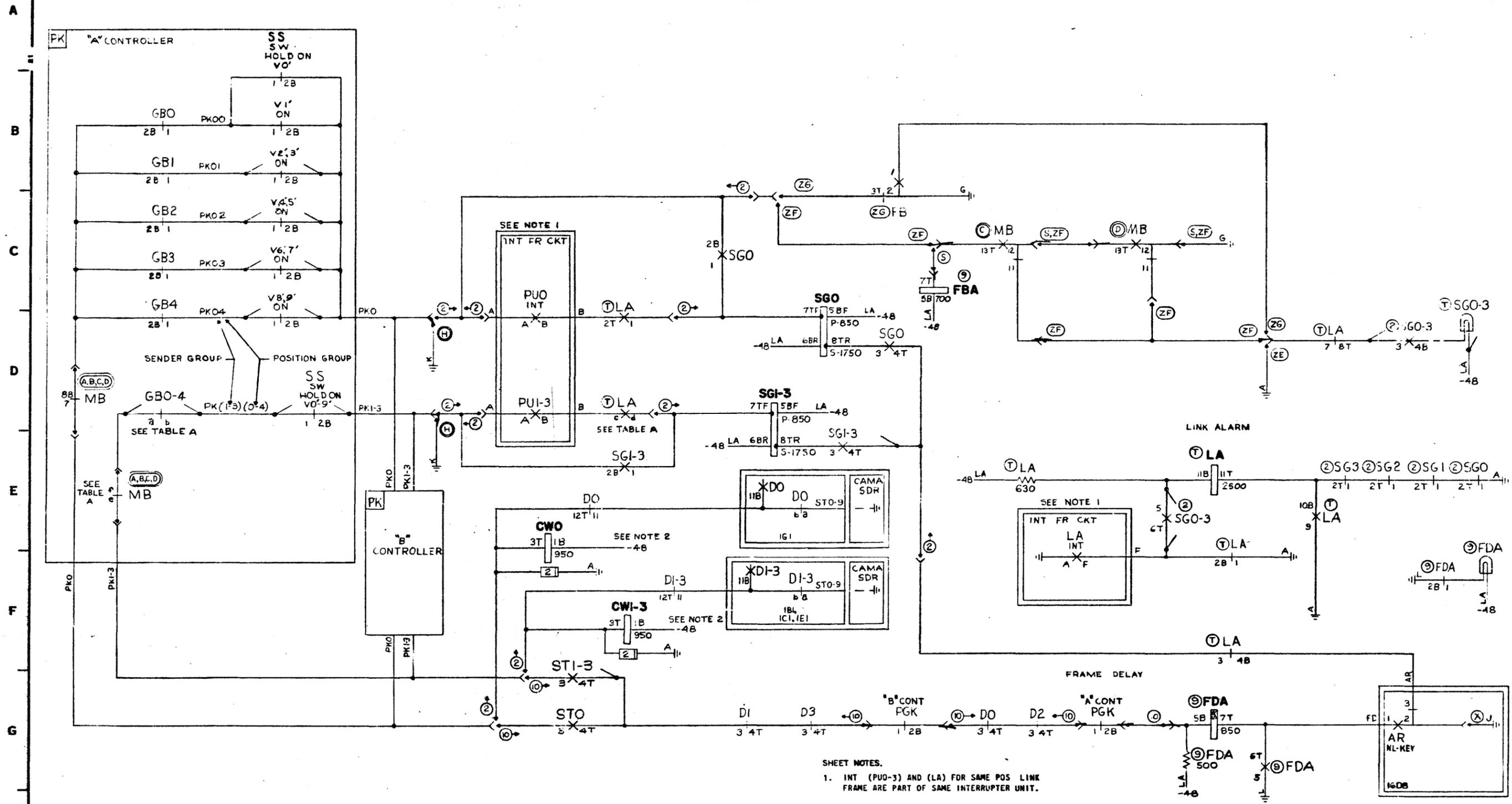


TABLE A

SDR GR	a	b	c	d	e	f
1	4B	3	4T	3	9	10B
2	6Z	5	6T	5	7	8T
3	8B	7	10T	9	9	10T

- SHEET NOTES.
1. INT (PUD-3) AND (LA) FOR SAME POS LINK FRAME ARE PART OF SAME INTERRUPTER UNIT.
 2. BATTERY FUSING DESIGNATION FOR (CW-) RELAYS: USE LA WITH "2C" OPTION, WITH "2D" OPTION USE "A" FOR (CWC,2) AND "B" FOR (CWI,3)

SD-25964-01-B18

STABLO

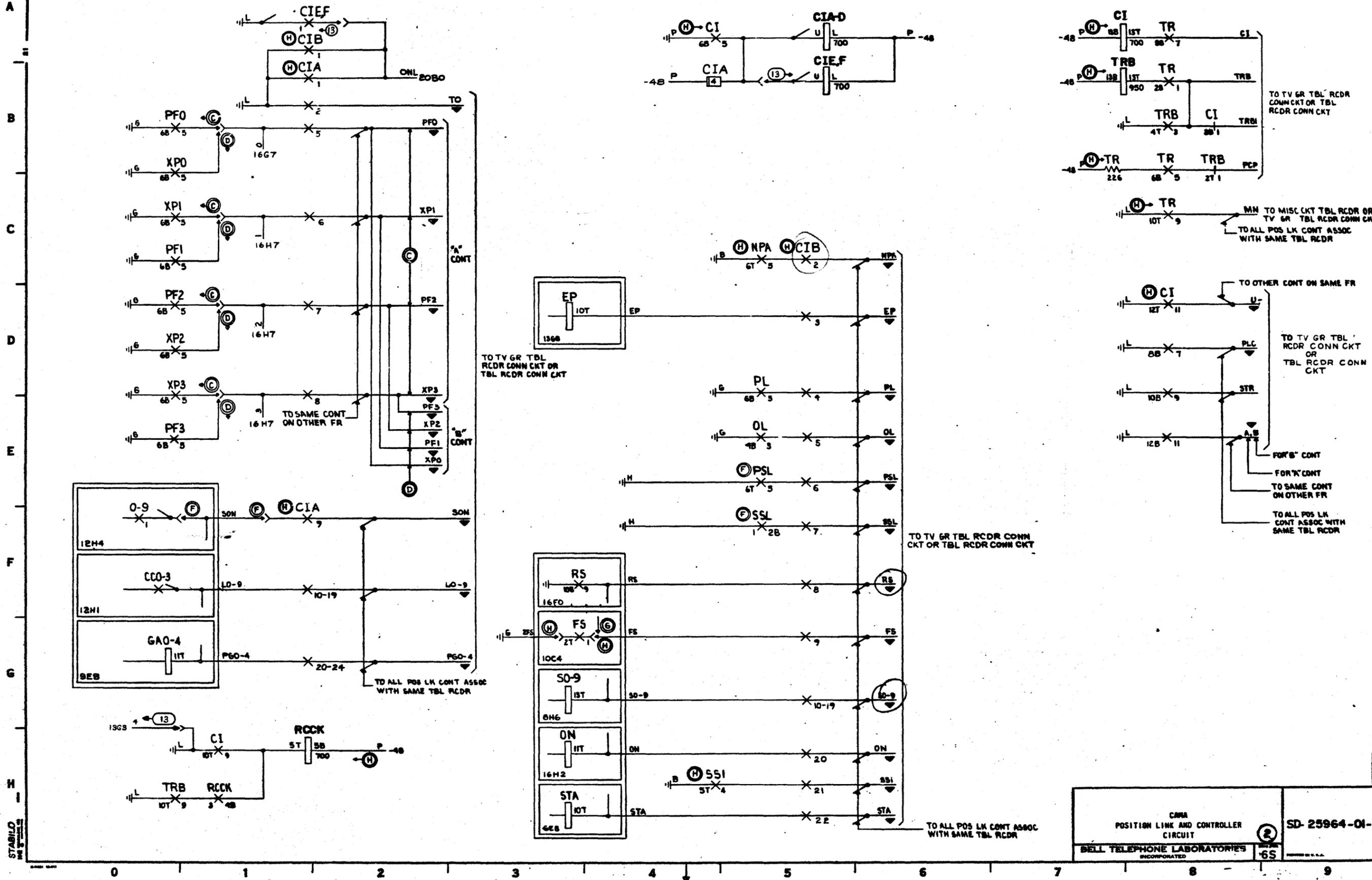
CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

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65

PART OF FS 19
TROUBLE RECORDER



SD-25964-01-B19

STABLO

CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

SD-25964-01-B19

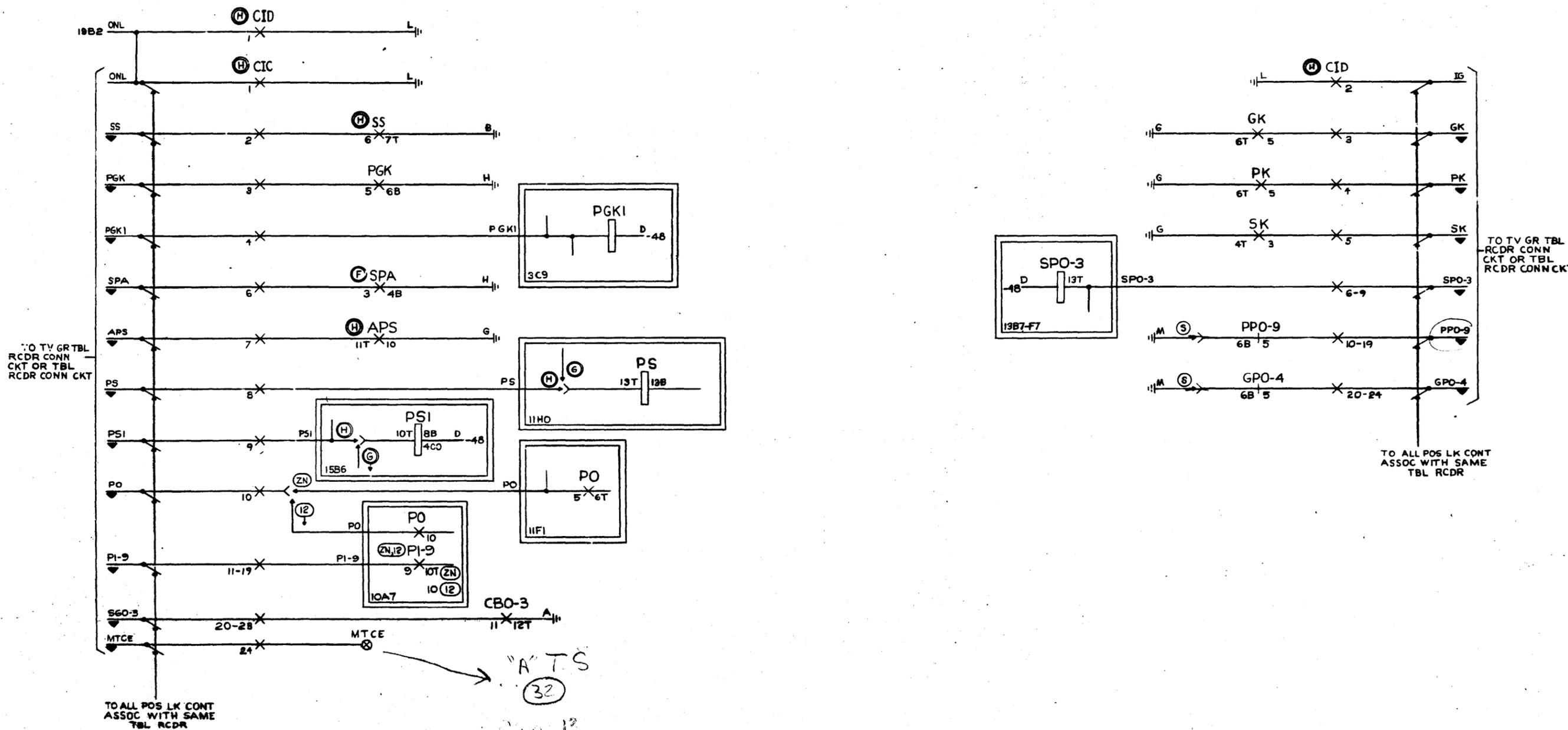
DRAWING NUMBER

12D
13D
14D
17A
18A

18

PART OF FS19
TROUBLE RECORDER

DRAWING	ISSUE
12D	REL
13D	REV
18A	REV



SD-25964-01-B20

STABLO

18

CAMA POSITION LINK AND CONTROLLER CIRCUIT		2	SD-25964-01-B20
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FS 20
TRAFFIC REGULATING AND ALARM CKT

DRAWING
ISSUE
13D
15D

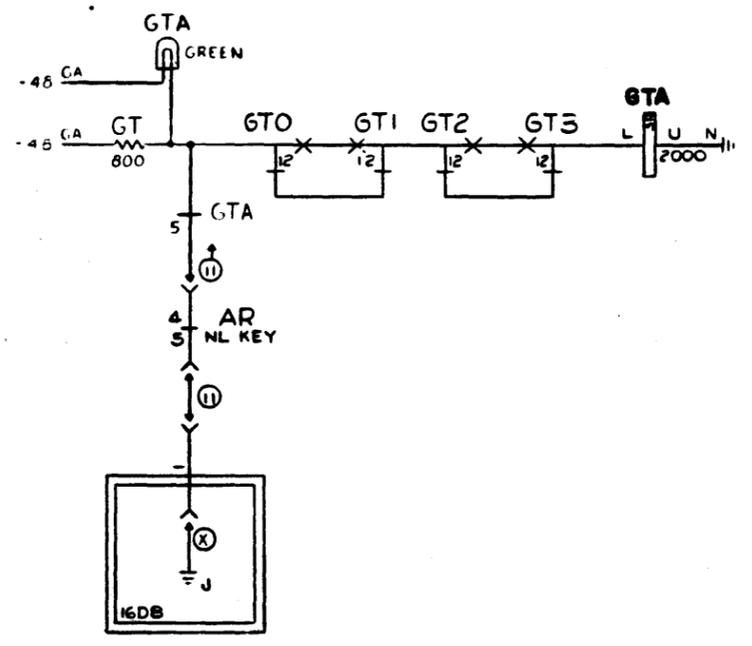
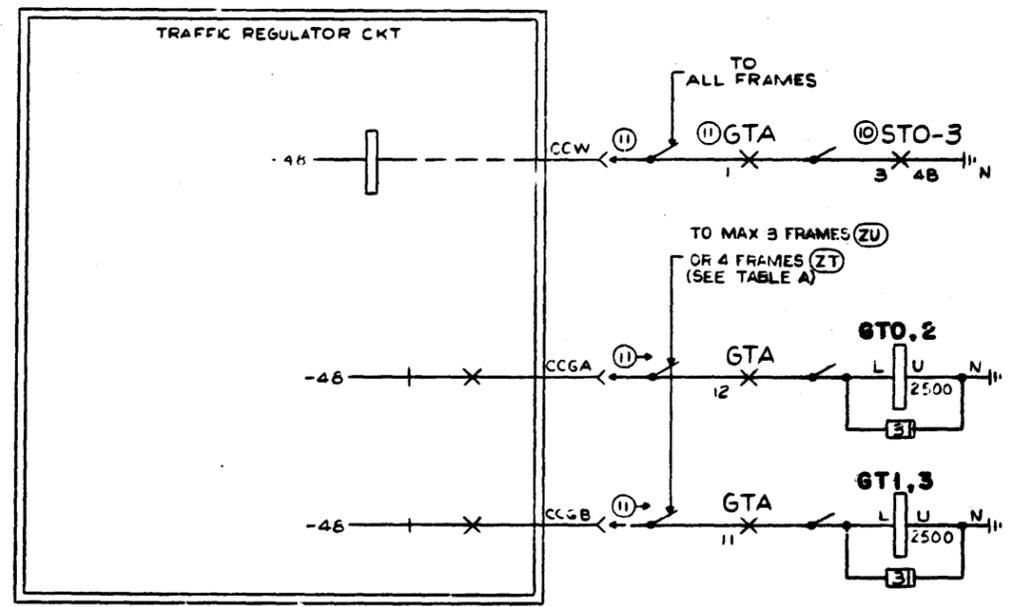


TABLE A
TO CONTROLLER FRAMES

CCGA & CGB LEADS	OPTIONS	
	ZT	ZU
0	0,4,8,12	0,8,16
1	1,5,9,13	1,9,17
2	2,6,10,14	2,10,18
3	3,7,11,15	3,11,19
4		4,12,20
5		5,13,21
6		6,14,22
7		7,15,23

SD-25964-01-B21

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

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INCORPORATED

SD-25964-01-B21

6S

PART OF APP FIG. 1

ISSUE
12D
13D

LAMP			NETWORK			NETWORK (CONT)			NETWORK											
DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE
PS	11C8	13J (RES)	[1/2] EP	13G9	177C	[1/2] GC0	388	177H	GP4	14C3	177C	[1/2] PG	9B5	177H	PP5	14C6	177C	SGT	300	177H
SS	11B8	13J (RES)	[1/2] FS	15D0	177C	[1/2] GC1	387	177H	GP4'	14F3	177C	[1/2] PGGT	3E3	177H	PP5'	14F6	177C	[1/2] SK	13F9	177C
			[1/2] FS1	15D1	177C	[1/2] GC2	387	177H	[1/2] P	10B5	177H	[1/2] PGK1	3C8	177C	PP6	14C6	177C	[1/2] SPO	13B7	177C
			[1/2] GA0	9E8	177H	[1/2] GC3	387	177H	[1/2] P0	10E0	177H	[1/2] PGT	3D4	177H	PP6'	14F6	177C	[1/2] SP1	13C7	177C
			[1/2] GA1	9D5	177H	[1/2] GC4	387	177H	[1/2] P1	10D0	177H	[1/2] PK	14A8	177H	PP7	14C6	177C	[1/2] SP2	13E7	177C
			[1/2] GA2	9E5	177H	GK	14A3	177H	[1/2] P2	10D0	177H	[1/2] PPO	14C5	177C	PP7'	14F6	177C	[1/2] SP3	13F7	177C
			[1/2] GA3	9F5	177H	[1/2] GP0	14C0	177C	[1/2] P3	10D0	177H	[1/2] PPO'	14G5	177C	PP8	14C6	177C	[1/2] SSM	11B7	177A
			[1/2] GA4	9G5	177H	[1/2] GP1	14G1	177C	[1/2] P4	10D0	177H	[1/2] PP1	14C6	177C	PP8'	14F6	177C			
			GB0	15G3	177G	[1/2] GP1'	14C1	177C	[1/2] P5	10D0	177H	[1/2] PP1'	14F6	177C	PP9	14C7	177C			
			GB1	15G3	177G	[1/2] GP2	14C1	177C	[1/2] P6	10D0	177H	[1/2] PP2	14C6	177C	PP9'	14F7	177C			
			GB2	15G3	177G	[1/2] GP2'	14C1	177C	[1/2] P7	10D0	177H	[1/2] PP2'	14F6	177C	PS	11G1	177H			
			GB3	15G3	177G	[1/2] GP3	14C2	177C	[1/2] P8	10D0	177H	[1/2] PP3	14C6	177C	PS1	15A6	177H			
			GB4	15G3	177G	[1/2] GP3'	14F2	177C	[1/2] P9	10D0	177H	[1/2] PP3'	14F6	177C	PSM	11D6	177A			
												[1/2] PP4	14C6	177C	[1/2] PU	16C1	177C			
												[1/2] PP4'	14F6	177C	[1/2] RSS	13H2	177C			

RESISTOR			RESISTOR (CONT)		
DESIG	LOC	CODE	DESIG	LOC	CODE
C	4D1	KS-8512, L24A 61.9	PG0	9C0	KS-8512, L17A, 169
CL	4C3	18D	PG1	9D0	KS-8512, L17A, 169
DCK1	3H2	18FD	PG2	9E0	KS-8512, L17A, 169
DCT	12D8	18HN	PG3	9F0	KS-8512, L17A, 169
GA0	9E9	18FD	PG4	9G0	KS-8512, L17A, 169
GA1	9D5	18FD	PGK	3C5	18DH
GA2	9E5	18FD	PP	14F5	KS-8512, L3A, 1000
GA3	9F5	18FD	PS	11C1	18FD
GA4	9G5	18FD	SB	11C7	KS-13490, L3, 47, 000
[ZN] GC	3A5	KS-8512, L22A, 133	SGT	300	18FD
GP	14F1	KS-8512, L3A, 1000			
P	10C6	KS-8512, L22A, 133			
PB	11D6	KS-13490, L3, 47, 000			
PG	9B8	KS-8512, L22A, 133			

APP FIG. 2

RELAY	CWO-3			D0			D1			D2			D3			SG0			SG1-3		
	DESIG	LOC	CODE																		
	U1373			UA123			UA123			UA123			UA123			U272			U272		
OPTION	CONT NO.	CONT ARR	LOC																		
TOP				12, 11	B	18E3	12, 11	B	18F4	12, 11	B	18F4	12, 11	B	18F4						
				10, 9	B	1G1	10, 9	B	1E1	10, 9	B	1D1	10, 9	B	1B1						
				8, 7	B	1G1	8, 7	B	1E1	8, 7	B	1D1	8, 7	B	1B1						
				6, 5	B	1G1	6, 5	B	1E1	6, 5	B	1D1	6, 5	B	1B1	6, 5	M	18E7	6, 5	M	18E7
				4, 3	B	1G1	4, 3	B	1E1	4, 3	B	1D1	4, 3	B	1B1	4, 3	M	18D5	4, 3	M	18E5
	2, 1	M	17A2	2, 1	B	1G1	2, 1	B	1E1	2, 1	B	1D1	2, 1	B	1B1	2, 1	M	18E9	2, 1	M	18E9
BOT.				2, 1	B	1G1	2, 1	B	1E1	2, 1	B	1D1	2, 1	B	1B1	2, 1	M	18C4	2, 1	M	18E3
				4, 3	B	1G1	4, 3	B	1E1	4, 3	B	1D1	4, 3	B	1B1	4, 3	M	18D9	4, 3	M	18D9
				6, 5	B	1G1	6, 5	B	1E1	6, 5	B	1D1	6, 5	B	1B1						
				8, 7	B	1G1	8, 7	B	1E1	8, 7	B	1D1	8, 7	B	1B1						
				10, 9	B	1G1	10, 9	B	1E1	10, 9	B	1D1	10, 9	B	1B1						
				12, 11	M	1G1	12, 11	M	1E1	12, 11	M	1C1	12, 11	M	1B1						
COIL			18F3			5AC			5B0			5C0			5D0			18C5			18D4

NETWORK		
DESIG	LOC	CODE
[2] CWO-3	18F3	177C
D0	5A0	177H
[4] D1-2	5C0	177H
D3	5D0	177H

SD-25964-01-C3

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

BELL TELEPHONE LABORATORIES
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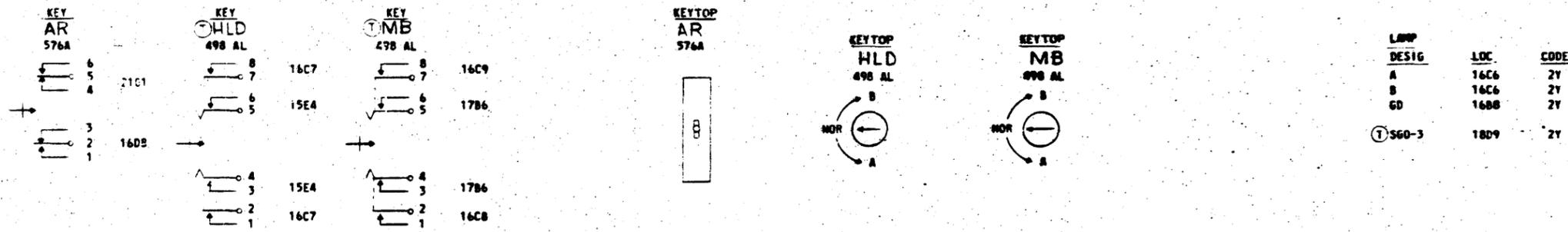
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APP FIG. 3



APP FIG. 4

RELAY			NETWORK									
DESIG	PGO-4		DESIG	LOC	CODE							
CODE	U1384		[3] PGO-4	9E7	177H							
OPTION	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC
TOP												
	3, 2, 1	RM	9E8									
	2, 1, 3	MB	9F7									
COIL			9E7									

PART OF APP FIG. 5

RELAY			CA0			CA1			CA2			CA3			CB0			CB1-3			CC0			
DESIG	U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384			
OPTION	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC
TOP	12, 11	M	1F3	12, 11	M	1E3	12, 11	M	1C3	12, 11	M	1A3	12, 11	M	a	12, 11	M	4B0	12, 11	M	1G3			
	10, 9	M	7C3	10, 9	M	7C3	10, 9	M	7C3	10, 9	M	7C3	10, 9	M	9H2	10, 9	M	9H2	10, 9	M	12E1			
	8, 7	M	7C3	8, 7	M	7C3	8, 7	M	7C3	8, 7	M	7C3	8, 7	M	9G2	8, 7	M	9G2	8, 7	M	12E1			
	6, 5	M	7C3	6, 5	M	7C3	6, 5	M	7C3	6, 5	M	7C3	6, 5	M	9G2	6, 5	M	9G2	6, 5	M	12E1			
	4, 3	M	7C3	4, 3	M	7C3	4, 3	M	7C3	4, 3	M	7C3	4, 3	M	9F2	4, 3	M	9F2	4, 3	M	12E1			
	2, 1	M	7C3	2, 1	M	7C3	2, 1	M	7C3	2, 1	M	7C3	2, 1	M	9F2	2, 1	M	9F2	2, 1	M	12E1			
BOT.	2, 1	M	7E3	2, 1	M	7E2	2, 1	M	7E2	2, 1	M	7E1	2, 1	M	9C2	2, 1	M	9C2	2, 1	M	12E1			
	4, 3	M	7C3	4, 3	M	7C3	4, 3	M	7C3	4, 3	M	7C3	4, 3	M	9D2	4, 3	M	9D2	4, 3	M	12E1			
	6, 5	M	7C3	6, 5	M	7C3	6, 5	M	7C3	6, 5	M	7C3	6, 5	M	9D2	6, 5	M	9D2	6, 5	M	12E1			
	8, 7	M	7C3	8, 7	M	7C3	8, 7	M	7C3	8, 7	M	7C3	8, 7	M	9E2	8, 7	M	9E2	8, 7	M	12E1			
	10, 9	M	7C3	10, 9	M	7C3	10, 9	M	7C3	10, 9	M	7C3	10, 9	M	9E2	10, 9	M	9E2	10, 9	M	12E1			
	12, 11	M	a	12, 11	M	a	12, 11	M	a	12, 11	M	a	12, 11	M	b	12, 11	M	a	12, 11	M	4B3			
COIL			4A0			4A0			4A0			4A0			4A1			4A1			4A1			
			a			a			a			a			a			a			a			
			5A2			5A2			5A2			5A2			5A2			5A2			5A2			
			5E2			5E2			5E2			5E2			5E2			5E2			5E2			

PART OF APP FIG. 5

RELAY			CC1			CC2			CC3			C00			CD1			CD2			CD3			
DESIG	U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384		U1384			
OPTION	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC
TOP	12, 11	M	1 3	12, 11	M	1C3	12, 11	M	1B3	12, 11	M	16F2	12, 11	M	16F2	12, 11	M	16F2	12, 11	M	16F2			
	10, 9	M	12E1	10, 9	M	12E1	10, 9	M	12E1	10, 9	M	12D1	10, 9	M	12D1	10, 9	M	12D1	10, 9	M	12D1			
	8, 7	M	12E1	8, 7	M	12E1	8, 7	M	12E1	8, 7	M	12D1	8, 7	M	12D1	8, 7	M	12D1	8, 7	M	12D1			
	6, 5	M	12E1	6, 5	M	12E1	6, 5	M	12E1	6, 5	M	12D1	6, 5	M	12D1	6, 5	M	12D1	6, 5	M	12D1			
	4, 3	M	12E1	4, 3	M	12E1	4, 3	M	12E1	4, 3	M	12D1	4, 3	M	12D1	4, 3	M	12D1	4, 3	M	12D1			
	2, 1	M	12E1	2, 1	M	12E1	2, 1	M	12E1	2, 1	M	12D1	2, 1	M	12D1	2, 1	M	12D1	2, 1	M	12D1			
BOT.	2, 1	M	12E1	2, 1	M	12E1	2, 1	M	12E1	2, 1	M	12D1	2, 1	M	12D1	2, 1	M	12D1	2, 1	M	12D1			
	4, 3	M	12E1	4, 3	M	12E1	4, 3	M	12E1	4, 3	M	12D1	4, 3	M	12D1	4, 3	M	12D1	4, 3	M	12D1			
	6, 5	M	12E1	6, 5	M	12E1	6, 5	M	12E1	6, 5	M	12D1	6, 5	M	12D1	6, 5	M	12D1	6, 5	M	12D1			
	8, 7	M	12E1	8, 7	M	12E1	8, 7	M	12E1	8, 7	M	12D1	8, 7	M	12D1	8, 7	M	12D1	8, 7	M	12D1			
	10, 9	M	12E1	10, 9	M	12E1	10, 9	M	12E1	10, 9	M	12D1	10, 9	M	12D1	10, 9	M	12D1	10, 9	M	12D1			
	12, 11	M	4B3	12, 11	M	4B3	12, 11	M	4B3	12, 11	M	a	12, 11	M	a	12, 11	M	a	12, 11	M	a			
COIL			4A2			4A2			4A2			4A2			4A2			4A2			4A2			
			2G0			2G0			2G0			2G0			2G0			2G0			2G0			
			2G9			2G9			2G9			2G9			2G9			2G9			2G9			

NETWORK
DESIG LOC CODE
[4] CCO-3 4A2 177J

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT
BELL TELEPHONE LABORATORIES
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SD-25964-01-C4
6S

SD-25964-01-C4

APP FIG. 6

SWITCH		
DESIG	SENDER SW	
CODE	325AL	
OPTION		
LEVEL	WIRE	LOC
0-9	0-4	12A1
0-9	0-4	12C1
HOLD	0-9	12E2
MAG	0-9	12E0
SEL MAG	0-9	11B5
HOLD ON		
2T	1	
2B	0-9	1B3, 1D3, 1E5, 1G3
HOLD ON		
2T	1	
2B	0-9	18A1, 18D1
SEL ON		
1	2	
1	0-9	12H5

APP FIG. 7

SWITCH		
DESIG	POSITION SW	
CODE	325AL	
OPTION		
LEVEL	WIRE	LOC
0-7	0-4	12A3
0-7	0-4	12C3
HOLD	0-7	12E2
MAG	0-7	12E3
SEL MAG	0-9	11C5
HOLD ON		
2T	1	
2B	0-7	9C1
HOLD ON		
2T	1	
2B	0-7	
SEL ON		
1	2	
1	0-9	12H6, 12H7

WORK

DESIG	LOC	CODE
[40] H--	12E3	177A

APP FIG. 8

RELAY	GL			LA																		
	DESIG	CODE	OPTION	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	
TOP							10,9	M	18E3													
							8,7	E	18D8													
							6,5	M	18D3													
							4,3	M	18C3													
							2,1	H	16E8	2,1	M	18C3										
							2,1	B	18E8													
							4,3	B	18F7													
BOT.							6,5	B	17H2													
							8,7	B	17G2													
							10,9	M	18E8													
COIL										16B9												

RESISTOR

DESIG	LOC	CODE
① LA	18E6	18EM

APP FIG. 9

RELAY	FBA			FDA																		
	DESIG	CODE	OPTION	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC				
TOP				6,5	M	17E6	6,5	M	18G8													
				4,3	M	17H1	4,3	B	17H1													
				2,1	M	17G1	2,1	B	17G1													
				2,1	M	17E1	2,1	B	18F9													
				4,3	M	-	4,3	M	-													
BOT.																						
COIL										18C6												

LAMP

DESIG	LOC	CODE
FBA	17E0	2Y
FDA	18F9	2Y

RESISTOR

DESIG	LOC	CODE
FDA	18G7	18AC
STB	5C6	19D7

RELAY																						
	DESIG	CODE	OPTION	CONT NO.	CONT ARR	LOC																
TOP																						
BOT.																						
COIL																						

SD-25964-01-C5

APP FIG. 12

RELAY		P0		P1		P2		P3		P4		P5		P6		P7		P8		P9		PGT		DESIG
DESIG	CODE	AJ45		AJ501		CODE																		
OPTION		CONT	LOC	CONT	LOC	OPTION																		
12	EBM	10C7	10C7	12																				
11	EBM	10C7	10C7	11																				
10	EBM	12E5	12E5	10																				
9	EBM	12A7	12A7	9																				
8	EBM	11C6	11C6	8																				
7	EBM	14C8	14C8	7																				
6	EBM	11E1	11E1	6																				
5	EBM	11F2	11F2	5																				
4	EBM	14E8	14E8	4																				
3	EBM	10E0	10E0	3																				
2	EBM	10C3	10C3	2																				
1	EBM	14D4	14E4	14D4	14E4	1																		
COIL																								COIL

RELAY		GC0		GC1		GC2		GC3		GC4	
DESIG	CODE	AJ202									
OPTION		CONT	LOC								
24	9A8	9A8	9A8	9A8	9B8	9B8	9B8	9B8	9B8	9B8	9B8
23	13G5	13G5	13G5	13G5	13H5	13H5	13H5	13H5	13H5	13H5	13H5
22	9D2	9E2	9E2	9E2	9F2	9F2	9F2	9F2	9F2	9F2	9F2
21	9C2	9D2	9E2	9E2	9F2	9F2	9F2	9F2	9F2	9F2	9F2
20	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
19	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
18	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
17	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
16	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
15	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
14	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
13	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
12	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
11	14E8	14E8	14E8	14E8	14F8	14F8	14F8	14F8	14F8	14F8	14F8
10	10F3	10F3	10F3	10F3	10G3	10G3	10G3	10G3	10G3	10G3	10G3
9	10D3	10D3	10D3								
8	10D3	10D3	10D3								
7	10D3	10D3	10D3								
6	10D3	10D3	10D3								
5	10D3	10D3	10D3								
4	10D3	10D3	10D3								
3	10D3	10D3	10D3								
2	10D3	10D3	10D3								
1	10D3	10D3	10D3								
COIL		3B8	3B7	3B7	3B7	3B7	3B7	3B7	3B7	3B7	3B7

NETWORK			RESISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE
P0	10F1	186A	GCA0	3B9	18FD
[9] P1-9	10E1	186A	[3] GCA1-3	3B8	18FD
PGT	3C4	185A	GCA4	3B6	18FD

APP FIG. 13

RELAY		PS1		SPA:		AK30		DESIG	
DESIG	CODE	AJ35		AK30		AK30		CODE	
OPTION		CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC
12	EBM	11D1	11D1						
11	EBM	408	408	408	408	408	408	408	408
10	EBM	10E2	10E2						
9	EBM	10D2	10D2						
8	EBM	10D2	10D2						
7	EBM	10D2	10D2						
6	EBM	10D2	10D2						
5	EBM	10D2	10D2						
4	EBM	10D2	10D2						
3	EBM	10D2	10D2						
2	EBM	10D2	10D2						
1	EBM	10D2	10D2						
COIL									

RELAY		DIODE		NETWORK	
DESIG	CODE	DESIG	LOC	DESIG	LOC
24	7F8	RS1	13G3	RS1	13G4
23	7F8				
22	7F8				
21	7F8				
20	7F8				
19	7F8				
18	7F8				
17	7F8				
16	7F8				
15	7F8				
14	7F8				
13	7F8				
12	7F8				
11	7F8				
10	7F8				
9	7F8				
8	7F8				
7	7F8				
6	7F8				
5	7F8				
4	7F8				
3	7F8				
2	15C1				
1	19A1				
COIL					

APP FIG. A (MFR DISC.)

RELAY		FB		MB		PFD		PF2		SGGT		XP1		XP3	
DESIG	CODE	U440		U1436		UB6002		UB6002		U1018		U1054		U1054	
OPTION		CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC
TOP															
BOT.															
COIL															

LAMP			NETWORK			RESISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE	DESIG	LOC	CODE
Z0	FBA	17E0	1	PF0	2F3	PF0	2F4	18FD
				PF2	2C2	PF2	2C3	18FD
			1/2	SGGT	3B3			
			1	XP1	2D2			
				XP3	2A2			

APP FIG. B (MFR DISC.)

RELAY		MB		PF1		PF3		SGGT		XPD		XP2	
DESIG	CODE	U1436		UB6002		UB6002		U1018		U1054		U1054	
OPTION		CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC	CONT	LOC
TOP													
BOT.													
COIL													

NETWORK			RESISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE
1	PF1	2D6	PF1	2E5	18FD
	PF3	2A6	PF3	2A5	18FD
1/2	SGGT	3B3			
1	XPD	2F			

APP FIG C

RELAY			MB			PFG			PF2			SGGT			XP1			XP3		
DESIG	CODE		CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR
OPTION	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC
	11, 12, 13	BM	18C6																	
TOP	10, 9	B	18E0	10, 9	M	-	10, 9	M												
	8, 7	B	18E0	8, 7	M	2F2	8, 7	M	2C2	10, 9	M									
	6, 5	B	2A1	6, 5	M	-	6, 5	M		8, 7	M	3D3	6, 5	M	2D2	6, 5	M	2A1		
	4, 3	B	2C1	4, 3	B	2F6	4, 3	B	2C5	6, 5, 4	BM	2A1	4, 3	M	3C1	4, 3	M	3C1		
	2, 1	E	2C3	2, 1	B	2G3	2, 1	B	2C3	3, 2, 1	EM	2C2	2, 1	B	2E6	2, 1	B	2A6		
BOT.	2, 1	E	2F3	2, 1	B	4C5	2, 1	B	4E5	3, 2, 1	EM	2F2	2, 1	B	4C5	2, 1	B	4A5		
	4, 3	B	2F1	4, 3	M	4D4	4, 3	M	4E4	6, 5, 4	EM	2E2	4, 3	M	4C4	4, 3	M	4A4		
	6, 5	B	2E1	6, 5	M	0	6, 5	M	0	8, 7	M	-	6, 5	M	0	6, 5	M	0		
	8, 7	B	18D0	8, 7	M	3B1	8, 7	M	3B1	10, 9	M	-								
	10, 9	E	18E0	10, 9	M	-	10, 9	M	-											
COIL	11, 12, 13	BM	17B4			2F3			2C2			3B3			2D2			2A2		
						3G8			3G8			3G8			3G8			3G8		
						19B0			19D0			19C0			19D0			19D0		

RELAY			DESIG			CODE			CONT NO.			CONT ARR			LOC		
OPTION	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	
TOP																	
BOT.																	
COIL																	

NETWORK			RESISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE
1 PF0	2F3	186A	PF0	2F4	18FD
1 PF2	2C2	186A	PF2	2C3	18FD
[1/2] SGGT	3B3	177C	XF1	2E4	18FD
1 XP1	2D2	186A	XF3	2A4	18FD
1 XP3	2A2	186A	XP1	2E3	18AU
			XP3	2A3	18AU

APP FIG D

RELAY			MB			PF1			PF3			SGGT			XFC			XP2		
DESIG	CODE		CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR	CONT NO.		CONT ARR
OPTION	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC
	11, 12, 13	BM	18C7																	
TOP	10, 9	B	18E0	10, 9	M		10, 9	M												
	8, 7	B	18E0	8, 7	M	2D7	8, 7	M	2A7	10, 9	M									
	6, 5	B	2A7	6, 5	M	-	6, 5	M		8, 7	M	3E3	6, 5	M	2F7	6, 5	M	2C7		
	4, 3	B	2C8	4, 3	B	2E4	4, 3	B	2A4	6, 5, 4	BM	2A7	4, 3	M	3C1	4, 3	M	3C1		
	2, 1	B	2A6	2, 1	B	2L6	2, 1	E	2L6	3, 2, 1	EM	2C8	2, 1	B	2F2	2, 1	B	2C2		
BOT.	2, 1	B	2L6	2, 1	B	4C5	2, 1	B	4E5	3, 2, 1	EM	2F7	2, 1	B	4C5	2, 1	B	4B5		
	4, 3	B	2F8	4, 3	M	4C4	4, 3	M	4A4	6, 5, 4	EM	2E7	4, 3	M	4D4	4, 3	M	4B4		
	6, 5	B	2E7	6, 5	M	0	6, 5	M	0	8, 7	M	-	6, 5	M	0	6, 5	M	0		
	8, 7	B	18D0	8, 7	M	3B1	8, 7	M	3B1	10, 9	M	-								
	10, 9	B	18E0	10, 9	M	-	10, 9	M	-											
COIL	11, 12, 13	BM	17B4			2D6			2A6			3B3			2F7			2C7		
						3G8			3G8			3G8			3G8			3G8		
						19B0			19E0			19B0			19D0			19D0		

RELAY			DESIG			CODE			CONT NO.			CONT ARR			LOC		
OPTION	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	
TOP																	
BOT.																	
COIL																	

NETWORK			RESISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE
1 PF1	2D6	186A	PF1	2E5	18FD
1 PF3	2A6	186A	PF3	2E5	18FD
[1/2] SGGT	3B3	177C	XF0	2F5	18FD
1 XP0	2F7	186A	XF2	2L5	18FD
1 XP2	2C7	186A	XP0	2F6	18AU
			XP2	2C6	18AU

SD-25964-01-C8

CROSSBAR SYSTEMS
 CMA
 POSITION LINK AND CONTROLLER
 CIRCUIT
 BELL TELEPHONE LABORATORIES
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 6S

APP FIG. G

DRAWING
ISSUE
120
121
122
123
124
125
126
127
128
129
130

RELAY	APS			CA			FA1			OL			PA			PA1			PL		
DESIG	U1054			U65			U1248			UB27			UB20			UB15			UBEQ04		
CODE																					
OPTION	CONT NO.	CONT ARR	LOC																		
				12,11	M	16B3															
				10,9	M	17C1															
TOP	8,7	M	14E5	8,7	M	13B6							9,8	M							
	6,5	M	9B5	6,5	M	16C0							7,6	M	15A7						
	4,3	B	9B6	4,3	M	15E4	4,3	M	16E7	4,3	M	12F3	4,3	B	15AB	5,4	M	15C2	4,3	M	12F3
	2,1	B	3G4	2,1	M	15C0	2,1	M	17B5	2,1	B	9A0	2,1	B	15C2	3,2,1	BM	-	2,1	B	12F3
	2,1	B	10B0	2,1	M	13B8	2,1	M	16B5	2,1	M	9C1	2,1	B	4D7	2,1	B	4D7	2,1	B	9B0
	4,3	M	3D7	4,3	M	14C4							4,3	M	6B7	5,4,3	BM	6B6	4,3	M	9B0
BOT.	6,5	M	10C6	6,5	M	14D8										7,6	M	3E2			
	8,7	M	14D9	8,7	M	16D7															
				10,9	M	17B6															
				12,11	M	15E4															
COIL			10C9			16B4			16E8			9B1			6CB			6B8			9A0

RELAY	S			S0			S1			S2			S3			S4			S5		
DESIG	UB20			UB15																	
CODE																					
OPTION	CONT NO.	CONT ARR	LOC																		
TOP				9,8	M	12D1															
	6,5	M	7C9	7,6	M	7D5	7,6	M	7C5												
	4,3	B	-	5,4	M	7C9															
	2,1	B	6CB	3,2,1	BM	7D7	3,2,1	BM	7C7	3,2,1	BM	7B7									
	2,1	B	-	2,1	B	-	2,1	B	7D6												
BOT.	4,3	M	13A1	5,4,3	BM	7D7	5,4,3	BM	7D6												
				7,6	M	11B5															
COIL			7D9			7D2			7A2												

RELAY	S6			S7			S8			S9			S5		
DESIG	UB15			UB15			UB15			UB15			UB20		
CODE															
OPTION	CONT NO.	CONT ARR	LOC												
TOP	9,8	M	12D1												
	7,6	M	7C5	6,5	M	-									
	5,4	M	7C9	4,3	B	-									
	3,2,1	BM	7B7	3,2,1	BM	7B7	3,2,1	BM	7A7	3,2,1	EM	7A7	2,1	B	13D4
	2,1	B	7D6	2,1	B	15A4									
BOT.	5,4,3	BM	7D6	4,3	M	13C3									
	7,6	M	11B5												
COIL			7A2			7A2			7A2			7A2			7E9

RELAY	S6			S7			S8			S9			S5		
DESIG	UB15			UB15			UB15			UB15			UB20		
CODE															
OPTION	CONT NO.	CONT ARR	LOC												
TOP															
BOT.															
COIL															

NETWORK			RESISTOR		
DESIG	LOC	CODE	DESIG	LOC	CODE
APS	10C9	177C			
OL	9B1	177C	D	5C2, 5E2	KS-8512, L24A 61.9
PA	6CB	177H			
PA1	6B8	177H			
PL	9A0	177K	RS	13H1	KS-8512, L17A 215
S	7D9				
S0	7D2				
S1	7A2	177H			
S2	7A2				
S3	7A2				
S4-9	7A2				
S5	7E9				

SD-25964-01-C10

13

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT (2) SD-25964-01-C10
BELL TELEPHONE LABORATORIES
INCORPORATED 65

APP FIG H

DRAWING ISSUE
12D
13D
13D
13D

RELAY DESIG CODE OPTION	APS U58			CI U71			DL U624			FA1 U55			NPA U6113			OL U66			ON U1261		
	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC
	TOP	11,10	M	2CD2	12,11	M	19DB													10,9	M
	9,8	M	14E5	8,7	B	16H6				9,8	M	16E7									
	7,6	M	14C9	6,5	B	16H6				7,6	M	17B5	6,5	M	19C5				8,7,6	BM	16E1
	5,4	M	3D7	4,3	B	16H6				5,4	M	-	4,3	M	-	4,3	M	12F3	5,4,3	BM	13G1
	3,2,1	BM	3G4	2,1	B	16G6	2,1	M	17D6	3,2,1	BM	a	2,1	B	-	2,1	M	9C1	2,1	B	17B1
	2,1	B	1GB0	2,1	B	19B8	2,1	M	17E6	3,2,1	BM	b	2,1	B	4EB	2,1	B	9A0	3,2,1	BM	13E2
	5,4,3	BM	4B6	4,3	B	16F1				5,4	M	-	4,3	M	15D8	4,3	M	19E5	5,4	M	17C6
	8,7,6	BM	10E6	6,5	M	19A4				7,6	M	c	6,5	M	-				7,6	M	-
	10,9	M	9B5	8,7	M	19DB													9,8	M	16B0
				10,9	M	19DB															
				12,11	M	19DB															
COIL			10C9			19A7			17D6			16E8			6F4				9B1		16G1

- a 5A5
- 5E3
- b 5B6
- 5D6
- c 16A5
- 16B5

RELAY DESIG CODE OPTION	DT U594			DTP UB27			PL UB6001			RCKK U717			SO U1415			S1 U1415			S2 U1415		
	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC
	TOP													12,11	M	-	12,11	M	-	12,11	M
													10,9	M	12D1	10,9	M	12D1	10,9	M	12D1
													8,7	M	8G5	8,7	M	8F6	8,7	M	8F6
	6,5	M	3B3							6,5	M	12F3				6,5	B	8F5	6,5	B	8F6
	4,3	M	16C5	4,3	M	16E2	4,3	B	-	4,3	M	16G1	4,3	B	8A6	4,3	B	8A6	4,3	B	8A7
	2,1	M	SE3	2,1	B	4F6	2,1	B	12F3	2,1	M	-	2,1	B	-	2,1	B	-	2,1	B	8A7
	2,1	B	-	2,1	M	13G1	2,1	B	9B0	2,1	B	17D6	3,2,1	BM	8B1	3,2,1	BM	8C1	3,2,1	BM	8C1
	4,3	M	16E1							4,3	M	9B0	4,3	M	19H1	5,4	M	8A6	5,4	M	8A7
	6,5	M	-							6,5	M	19D5				7,6	M	11B5	7,6	M	11B5
													9,8	M	-	9,8	M	-	9,8	M	-
													11,10	M	-	11,10	M	-	11,10	M	-
COIL			16E3			16E3			9A0			19H1			7D2			7A2			7A2

RELAY DESIG CODE OPTION	S3 U1415			S4 U1415			S5 U1415			S6 U1415			S7 U1415			S8 U1415			S9 U1415		
	CONT NO.	CONT ARR	LOC																		
	TOP	12,11	M	-	12,11	M															
	10,9	M	12D1																		
	8,7	M	8F7	8,7	M	8F8	8,7	M	8F9	8,7	M	8F9									
	6,5	B	8F7	6,5	B	8F7	6,5	B	8F7	6,5	B	8F8	6,5	B	8F8	6,5	B	8F9	6,5	B	8F9
	4,3	B	8A7																		
	2,1	B	8A7																		
	3,2,1	BM	8D1	3,2,1	BM	8D1	3,2,1	BM	8E1	3,2,1	BM	8E1	3,2,1	BM	8F1	3,2,1	BM	8F1	3,2,1	BM	8G1
	5,4	M	8A7																		
	7,6	M	11B5																		
	9,8	M	-																		
	11,10	M	-																		
COIL			7A2																		

RELAY DESIG CODE OPTION	SS UB15			SS1 UB15			ST UB20			STA UB15			TR Y313			TRB U794					
	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC	CONT NO.	CONT ARR	LOC			
	TOP															12,11	M	16B0	12,11	M	17D5
															10,9	M	19C8	10,9	M	19H0	
	9,8	M	3F3	9,8	M	-				9,8	M	13E2	8,7	M	17C6	8,7	M	13B6	8,7	M	13B6
	7,6	M	20B2	7,6	M	11B6	6,5	M	8C9	7,6	M	8B8	6,5	B	-	6,5	M	3A3			
	5,4	M	8C7	5,4	M	19H4	4,3	B	15F2	5,4	M	15F1	4,3	B	15D2	4,3	M	19B8			
	3,2,1	BM	13F2	3,2,1	BM	8B7	2,1	B	-	3,2,1	BM	6F7	2,1	B	13F4	2,1	B	19B8			
	2,1	B	3D1	2,1	B	3D2	2,1	B	4E7	2,1	B	4E7	2,1	B	-	2,1	B	-			
	5,4,3	BM	13C4	5,4,3	BM	15F1	4,3	M	6E8	5,4,3	BM	3D7	4,3	M	16G1	4,3	M	14C4			
	7,6	M	-	7,6	M	13F3				7,6	M	9A7	6,5	M	19B8	6,5	M	14C8			
													8,7	M	19A8	8,7	M	9C3			
																10,9	M	13B7			
																12,11	M	-			
COIL			8B6			8A4			6F8			6E8			16B3			19B7			

RELAY DESIG CODE OPTION	CONT NO.	CONT ARR	LOC															
TOP																		
BOT																		
COIL																		

RELAY DESIG CODE OPTION	CIA AJ202	CIB AJ202	CIC AJ202	CID AJ202
24	19G1		20F1	20D8
23	19G1		20F1	20D8
22	19G1	19H5	20F1	20D8
21	19G1	19H5	20F1	20D8
20	19G1	19H5	20F1	20D8
19	19F1	19G5	20F1	20D8
18	19F1	19G5	20F1	20D8
17	19F1	19G5	20F1	20D8
16	19F1	19G5	20F1	20D8
15	19F1	19G5	20F1	20D8
14	19F1	19G5	20F1	20D8
13	19F1	19G5	20F1	20D8
12	19F1	19G5	20F1	20D8
11	19F1	19G5	20F1	20D8
10	19F1	19G5	20E1	20C8
9	19F1	19G5	20E1	20D8
8	19C1	19F5	20E1	20C8
7	19C1	19F5	20C1	20C8
6	19C1	19F5	20C1	20C8
5	19B1	19F5	20C8	
4		19G5	20C1	20C8
3		19G5	20C1	20C8
2	19B1	19C5	20B1	20B8
1	19B1	19A1	20B1	20E1
COIL	19A5	19A5	19A5	19A5

LAMP DESIG	LOC	CODE	NETWORK DESIG	LOC	CODE
TR	16B0	13J	APS	10C9	185A
			CIA	19B4	186A
			OL	9B1	185A
			ON	16G1	185A
			OTP	16E3	185A
			PL	9A0	186A
			SO	7D2	185A
			S1-9	7A2	185A
			SS	8B6	185A
			SS1	8A4	185A
			ST	6F8	185A
			STA	6E8	185A

RESISTOR DESIG	LOC	CODE
D	5C2, 5F2	18AG

EQUIPMENT NOTES:

201. THE FIRST CAMA OR TSP POSITION OF THE FIRST POSITION LINE-UP SHALL BE ASSIGNED TO THE FIRST APPEARANCE OF GROUP A, THE SECOND POSITION TO THE FIRST APPEARANCE OF GROUP B, THE THIRD POSITION TO THE FIRST APPEARANCE OF GROUP C, ETC. AFTER ALL FIRST APPEARANCES OF THE ENGINEERED GROUPS ARE FILLED THE PROCESS SHALL BE REPEATED FOR SUCCEEDING APPEARANCES. AFTER THE FIRST POSITION LINE-UP IS ALL ASSIGNED THE PROCESS SHALL BE CONTINUED FOR ALL OTHER CAMA POSITION LINE-UPS. THE AMA POSITION CIRCUITS FOR TOLL OR DSA SWITCHBOARD SHALL BE ASSIGNED IN REVERSE ORDER STARTING WITH THE LAST APPEARANCE OF THE LAST GROUP. IF REMOTE OPERATION IS USED THE OUTGOING TRUNK CIRCUITS TO CAMA POSITIONS SHALL BE ASSIGNED IN A MANNER SIMILAR TO THE ASSIGNMENT OF CAMA POSITIONS. TO MINIMIZE CONTROLLER WEAR THE LIGHT-LOAD POSITIONS SHOULD BE IN THE FIRST POSITION LINE-UP.
202. IN APPLYING THE CONNECTING INFORMATION FOR THE FS RELAYS, THE CONTROLLERS SHALL BE CONSIDERED AS A CLOSED RING SEQUENCE CONSISTING OF ALL "A" CONTROLLERS IN ASCENDING ORDER OF FRAME DESIGNATION NUMBERS FOLLOWED BY ALL "B" CONTROLLERS IN ASCENDING ORDER.
203. THE "ST" LEAD FOR A PARTICULAR SENDER SHALL BE INCLUDED IN THE CABLE FURNISHED PER CAD 6 IN CROSSBAR TANDEM OFFICES, CABLING IS ON A SENDER SUBGROUP BASIS; IN TOLL CROSSBAR OFFICES, THE CABLING TO THE SENDERS IS ON A SENDER FRAME BASIS.
204. WHEN FOUR OR LESS POSITION GROUPS ARE ASSOCIATED WITH THIS CNT, ALL UNUSED (GB-) RELAYS SHALL BE PERMANENTLY OPERATED BY ADJUSTING THE ARMATURE FOR ZERO TRAVEL.

INFORMATION NOTES: (CONT)

303. THE POSITION GROUPS SHALL BE ALLOCATED AMONG THE POSITION GROUP APPEARANCES AS SHOWN IN THE TABLE DEPENDING UPON THE ULTIMATE NO. OF POSITION GROUPS (SEE NOTE 112).

POS GR	5 POSITION GROUPS										6 POSITION GROUPS					7 POSITION GROUPS										FRAME NO.	LINK GROUP											
	0,5,10		1,6,11		2,7		3,8		4,9		0,6,12		1,7,13		2,8		3,9		4,10		5,11		0,7,14,21		1,8,15			2,9,16		3,10,17		4,11,18		5,12,19		6,13,20		
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A			B	A	B	A	B	A	B	A	B	A	B
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
B	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
C	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
D	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
E	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
F																						0	1	2	3	4	0	1	2	3	4	4	3	4	4	4		
G																						4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
H																																						
J																																						
K																																						

POS GR	8 POSITION GROUPS										9 POSITION GROUPS								FRAME NO.	LINK GROUP																	
	0,8,16		1,9,17		2,10,18		3,11		4,12		5,13		6,14		7,15		0,9,18				1,10,19		2,11,20		3,12		4,13		5,14		6,15		7,16		8,17		
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
B	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		
C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
D	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
E	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
F	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
G	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
H	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
J																																					
K																																					

POS GR	10 POSITION GROUPS														FRAME NO.	LINK GROUP																				
	0,10,20		1,11,21		2,12,22		3,13,23		4,14		5,15		6,16				7,17		8,18		9,19															
	A	B	A	B	A	B	A	B	A	B	A	B	A	B			A	B	A	B	A	B														
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
D	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
F	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
G	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
H	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
J	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
K	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

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.

DESIG	APP FIG.	MAKE AND BREAK INTERVALS				
		0.15 SEC	0.98 SEC	0.15 SEC	.02 SEC	0.15 SEC
CA	1	ONE CYCLE				
-OT	8	0.93 SEC	5 SEC	0.93 SEC	0.14 SEC	0.93 SEC
LA*	8	ONE CYCLE				
PUO-3*	2	ONE CYCLE				

304. TO INSURE ACCESS BY ALL LINK GROUPS, THE MINIMUM NO. OF POSITIONS OCCUPIED AT ANY TIME IN AN OFFICE ENGINEERED FOR 6 TO 10 POSITION GROUPS, SHOULD BE 2. THESE POSITIONS SHOULD BE ADJACENT IN THE SAME LINEUP. FOR 5 POSITION GROUPS THE MINIMUM MAY BE 1.

* INTERRUPTERS (LA) AND (PU-) FOR THE SAME LINK AND CONTROLLER FRAME SHALL BE ON THE SAME INTERRUPTER UNIT.

ISSUE
120
140
150

15

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

BELL TELEPHONE LABORATORIES
INCORPORATED

SD-25964-01-D2

6S

SD-25964-01-D2

DRAWING
ISSUE
120
150
160

INFORMATION NOTES: (CONT)

305. THE (PG-) RELAYS PER APP FIG. 4 FOR EACH POSITION GROUP SHALL BE CONNECTED FROM CONTROLLER TO CONTROLLER IN A CHAIN. THE FIRST AND LAST CONTROLLERS IN THIS CHAIN ARE SHOWN IN THE TABLE BELOW UNDER "Y" AND "Z" OPTIONS RESPECTIVELY. THE ORDER OF THE CHAIN IS FROM LEFT TO RIGHT IN NUMERICAL ORDER IN NOTE 305. WHEN THE FARTHEST RIGHT CONTROLLER IS NOT THE LAST ("Z" OPTION) THE CHAIN CONTINUES WITH THE FARTHEST LEFT CONTROLLER.

NO. OF FRAMES	NO. OF POSITION GROUPS	A 0		B 1		C 2		D 3		E 4		F		G		H		J		K		POSITION GROUPS OPTION
		Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	
2	5	OA	1B	1A	OB	OB	OA	1B	1A	OA	1B											
2	6	OA	1B	1B	OB	OB	OA	1A	OB	OA	1B	1A	OB									
2	7	OA	1B	1B	OB	OB	OA	1A	OB	OA	1B	OB	OA	1A	OB							
2	8	OA	1A	1B	OB	OB	1A	1A	OA	OA	1B	1A	OB	1B	1A	OB						
2	9	OA	1A	1B	OB	OB	1A	1A	OA	OB	1B	1A	OA	1B	OB	OA	1A	OB	1B			
2	10	OA	1A	1B	OB	1A	OA	OB	1B	OA	1A	OB	1B	1A	OA	1B	OB	1A	OA	OB	1B	
3	5	OA	2B	1B	1A	1A	OB	2A	1B	OB	OA											
3	6	OA	2B	1B	OB	1A	OB	2B	1B	OB	OA	2A	1B									
3	7	OA	2B	1B	OB	1A	OB	2B	1B	1B	1A	OB	OA	2A	1A							
3	8	OA	2B	1B	OB	1A	OB	2B	1B	OB	OA	2A	1A	1A	OA	2A	1B					
3	9	OA	2A	1B	OB	1A	OB	2B	1B	OB	2A	2A	1A	OB	2B	1A	OB	2B	1B			
3	10	OA	2A	1B	OB	1A	OA	2B	1B	2A	1A	OB	2B	1A	OA	2B	1B	OA	2A	1B	OB	
4	5	OA	3B	2A	1B	1A	OB	3A	2B	OB	OA											
4	6	OA	3A	2A	1B	1A	OB	3A	2B	OB	OA	2B	2A									
4	7	OA	3B	2A	1B	1A	OB	3A	2B	1B	1A	OB	OA	2B	2A							
4	8	OA	3B	3A	2B	2A	1A	1A	OA	1B	OB	OB	3B	2B	1B	3B	3A					
4	9	OA	3A	1B	OB	2A	1A	1A	OA	3A	2A	2A	1A	OB	3A	3B	3A	2B	1B			
4	10	OA	3A	3B	2B	2A	1A	3B	2B	1A	OA	1B	OB	3A	2A	OB	3B	1A	OA	2B	1B	
5	5	OA	4B	2B	2A	1B	1A	3B	3A	OB	OA											
5	6	OA	4B	2B	2A	1A	OB	4A	3B	OB	OA	3B	2B									
5	7	OA	4B	4A	3B	2B	2A	1A	OB	3A	2A	OB	OA	2A	1A							
5	8	OA	4A	2B	1B	1A	OB	4A	3B	OB	OA	3B	2B	1B	1A	4B	3B					
5	9	OA	4B	2B	1B	1A	OB	3B	2B	OB	4A	4B	3B	3A	2B	2A	1A	1B	OB			
5	10	OA	4A	2B	1B	1A	OA	3B	2B	2A	1A	OB	4B	3A	2A	4B	3B	4A	3A	1B	OB	
6	5	OA	5B	3A	2B	2A	1B	4B	4A	1A	OB											
6	6	OA	5B	3A	2B	2A	1A	4B	4A	1A	OB	5B	5A									
6	7	OA	5A	3A	2A	2A	1A	4B	4A	1A	OA	5B	5A	2B	2A							
6	8	OA	5A	3A	2B	2A	1A	4A	3B	1B	OB	3B	2B	2B	1B	5B	4B					
6	9	OA	5B	1B	OB	3A	2A	4B	3B	OB	5A	3B	2B	2B	1B	1A	OA	5A	4A			
6	10	OA	5A	1B	OB	3A	2A	4B	3B	2A	1A	OB	5B	4A	3A	3B	2B	1A	OA	5B	4B	
7	5	OA	6B	3B	3A	2A	1B	5A	4B	1A	OB											
7	6	OA	6A	3B	3A	2A	1A	5B	4B	1A	OB	4B	4A									
7	7	OA	6B	3B	3A	2A	1A	5A	4B	1A	OA	4A	3B	3A	2B							
7	8	OA	6B	4A	3A	2A	1A	5B	5A	4B	4A	1A	OB	3A	2B	6A	5B					
7	9	OA	6B	3B	2B	2A	1A	5B	4B	4A	3A	1A	OA	2B	1B	6B	5B	1B	OB			
7	10	OA	6A	3B	2B	2A	1A	5B	4B	1A	OA	4B	3B	3A	2A	6B	5B	5A	4A	1B	OB	
8	5	OA	7B	4A	3B	2A	1B	6A	5B	1A	OB											
8	6	OA	7B	3B	3A	2A	1A	6A	5B	1A	OB	4B	4A									
8	7	OA	7A	4A	3B	2A	1A	6A	5A	1A	OA	5A	4A	3A	2B							
8	8	OA	7B	4A	3A	2A	1A	6B	5B	1B	OB	5A	4B	3A	2B	7B	7A					
8	9	OA	7B	3B	2B	2A	1A	6A	5B	1B	OB	5B	4B	2B	1B	7B	6B	OB	7A			
8	10	OA	7A	3B	2B	2A	1A	5B	4B	1A	OA	4B	3B	3A	2A	7B	6B	5A	4A	1B	OB	
9	5	OA	8B	5A	4B	2B	2A	7A	6B	1A	OB											
9	6	OA	8B	5A	4B	2B	2A	7A	6B	1A	OB	6B	5B									
9	7	OA	8B	5A	4A	2B	2A	6B	6A	1A	OA	6A	5B	2A	1A							
9	8	OA	8A	4B	4A	2A	1A	6B	5B	OB	OA	6A	5A	3A	2B	8B	7B					
9	9	OA	8B	4B	3B	2A	1A	7A	6A	OB	8B	6B	5B	3A	2B	8A	7B	1B	OB			
9	10	OA	8A	4B	3B	2A	1A	6B	5B	1A	OA	5B	4B	3A	2A	8B	7B	6A	5A	1B	1A	

INFORMATION NOTES: (CONT)

305. (CONT)

NO. OF FRAMES	NO. OF POSITION GROUPS	A		B		C		D		E		F		G		H		J		K		POSITION GROUPS OPTION
		Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	
10	5	OA	9B	5A	4B	2A	1B	7B	7A	1A	OB											
10	6	OA	9A	5A	4B	2A	1A	7B	7A	1A	OB	6B	5B									
10	7	OA	9B	5A	4A	2A	1A	7B	6B	1A	OA	6A	5B	3A	2B							
10	8	OA	9A	4B	4A	2A	1A	7B	6B	1B	OB	6A	5A	3A	2B	8B	7B					
10	9	OA	9A	5A	4B	2A	1A	7A	6A	OB	9B	6B	5B	3A	2B	9A	8A	1B	OB			
10	10	OA	9A	4B	3B	2A	1A	7B	6B	1A	OA	5B	4B	3A	2A	8B	7B	6A	5A	1B	OB	
11	5	OA	10B	5B	5A	2B	2A	8A	7B	1A	OB											
11	6	OA	10B	5B	5A	2B	2A	8B	7B	1A	OB	7A	6B									
11	7	OA	10B	5B	5A	2B	2A	8A	7B	1A	OA	7A	6A	4A	3A							
11	8	OA	10B	5B	4B	3A	2A	8B	7B	1B	OB	6B	6A	4A	3A	9B	8B					
11	9	OA	10A	5A	4B	2A	1A	8A	7A	OB	10B	6B	5B	3A	2B	9A	8A	1B	OB			
11	10	OA	10A	5B	4B	3A	2A	8B	7B	1A	OA	6B	5B	4A	3A	9B	8B	2A	1A	7B	6B	
12	5	OA	11B	6A	5B	3A	2B	8B	8A	1A	OB											
12	6	OA	11B	6A	5B	3A	2B	8B	7B	1A	OB	7A	6B									
12	7	OA	11B	5B	5A	2B	2A	8B	8A	1A	OA	7A	6A	4A	3A							
12	8	OA	11B	5B	4B	3A	2A	9A	8A	1B	OB	6B	6A	4A	3A	10A	9B					
12	9	OA	11A	6A	5A	3A	2A	9A	8A	1B	OB	7A	6B	4A	3A	10A	9A	2B	1B			
12	10	OA	11A	5B	4B	3A	2A	8B	7B	1A	OA	6B	5B	4A	3A	9B	8B	2A	1A	7B	6B	
13	6	OA	12A	6A	5B	3B	3A	10A	9B	1A	OB	7B	7A									
13	7	OA	12A	6B	5B	3B	2B	10A	9B	1B	1A	8A	7B	5B	4B							
13	8	OA	12A	6B	5B	3B	3A	9B	9A	1B	OA	8B	7B	5A	4A	11B	11A					
13	9	OA	12A	6A	5A	4A	3A	10A	9A	2A	1B	8A	7A	5A	4A	11A	10A	3B	2B			
13	10	OA	12A	6B	5B	3A	2A	9B	8B	1A	OA	7B	6B	5A	4A	11B	10B	2B	1B			
14	6	OA	13B	6B	5B	3B	3A	10B	10A	1B	1A	8A	8B									
14	7	OA	13B	7A	6B	3B	2B	11A	10A	1B	1A	9A	8A	5B	4B							
14	8	OA	13A	7A	6B	3B	3A	11B	10B	1B	OB	8B	7B	5B	5A	11B	11A					
14	9	OA	13B	7A	6A	4A	3A	10B	10A	2A	1B	9A	8A	5A	4A	12B	12A	3B	2B			
14	10	OA	13A	7B	6B	4A	3A	11B	10B	2A	1A	9B	8B	5A	4A	12B	11B	3A	2A	10B	9B	
15	7	OA	14A	7B	7A	4A	3B	11A	10A	1B	1A	9B	9A	5B	4B							
15	8	OA	14B	7A	6B	4B	3B	11B	10B	1B	OB	9A	8B	5B	5A	13B	12B					
15	9	OA	14B	7A	6A	4A	3A	10B														

INFORMATION NOTES: (CONT)

305. THE (PG-) RELAYS PER APP FIG. 4 FOR EACH POSITION GROUP (CONT) SHALL BE CONNECTED FROM CONTROLLER TO CONTROLLER IN A CHAIN. THE FIRST AND LAST CONTROLLERS IN THIS CHAIN ARE SHOWN IN THE TABLE BELOW UNDER "Y" AND "Z" OPTIONS RESPECTIVELY. THE ORDER OF THE CHAIN IS FROM LEFT TO RIGHT IN NUMERICAL ORDER, IN NOTE 305. WHEN THE FARTHEST RIGHT CONTROLLER IS NOT THE LAST ("Z" OPTION) THE CHAIN CONTINUES WITH THE FARTHEST LEFT CONTROLLER.

NO. OF FRAMES	NO. OF POSITION GROUPS	A		B		C		D		E		F		G		H		J		K		POSITION GROUPS OPTION
		Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	
19	7	0A	100	9A	00	40	4A	100	130	1B	1A	100	90	70	60							
19	8	0A	100	90	00	5A	40	140	130	2A	10	120	110	7A	60	160	150					
19	9	0A	10A	90	9A	5A	4A	130	120	2A	10	11A	10A	7A	6A	150	140	4A	30			
19	10	0A	10A	90	00	5A	4A	140	130	2A	1A	110	100	7A	6A	160	150	3A	2A	120	110	
20	7	0A	19A	10A	9A	40	4A	15A	140	10	1A	11A	100	8A	70							
20	9	0A	19A	90	9A	50	5A	15A	140	2A	10	110	11A	80	70	18A	17A	4A	30			
20	10	0A	19A	100	90	5A	4A	150	140	2A	1A	120	110	7A	6A	170	160	4A	3A	140	130	
21	7	0A	200	100	10A	50	40	160	150	10	1A	12A	11A	8A	70							
21	9	0A	20A	100	90	50	5A	16A	15A	2A	10	130	120	80	70	18A	17A	4A	30			
21	10	0A	20A	100	90	5A	4A	150	140	2A	1A	120	110	7A	6A	170	160	4A	3A	140	130	
22	7	0A	21A	11A	100	50	40	160	150	10	1A	13A	120	8A	70							
22	10	0A	21A	110	100	6A	5A	170	160	2A	1A	130	120	9A	8A	200	190	4A	3A	150	140	
23	10	0A	22A	110	100	6A	5A	170	160	2A	1A	130	120	9A	8A	200	190	4A	3A	150	140	
24	10	0A	23A	120	110	6A	5A	180	170	3A	2A	150	140	9A	8A	210	200	5A	4A	170	160	

SD-25964-01-038

STANBLO

15

CROSSBAR SYSTEMS
CMA
POSITION LINK AND CONTROLLER
CIRCUIT
BELL TELEPHONE LABORATORIES
INCORPORATED

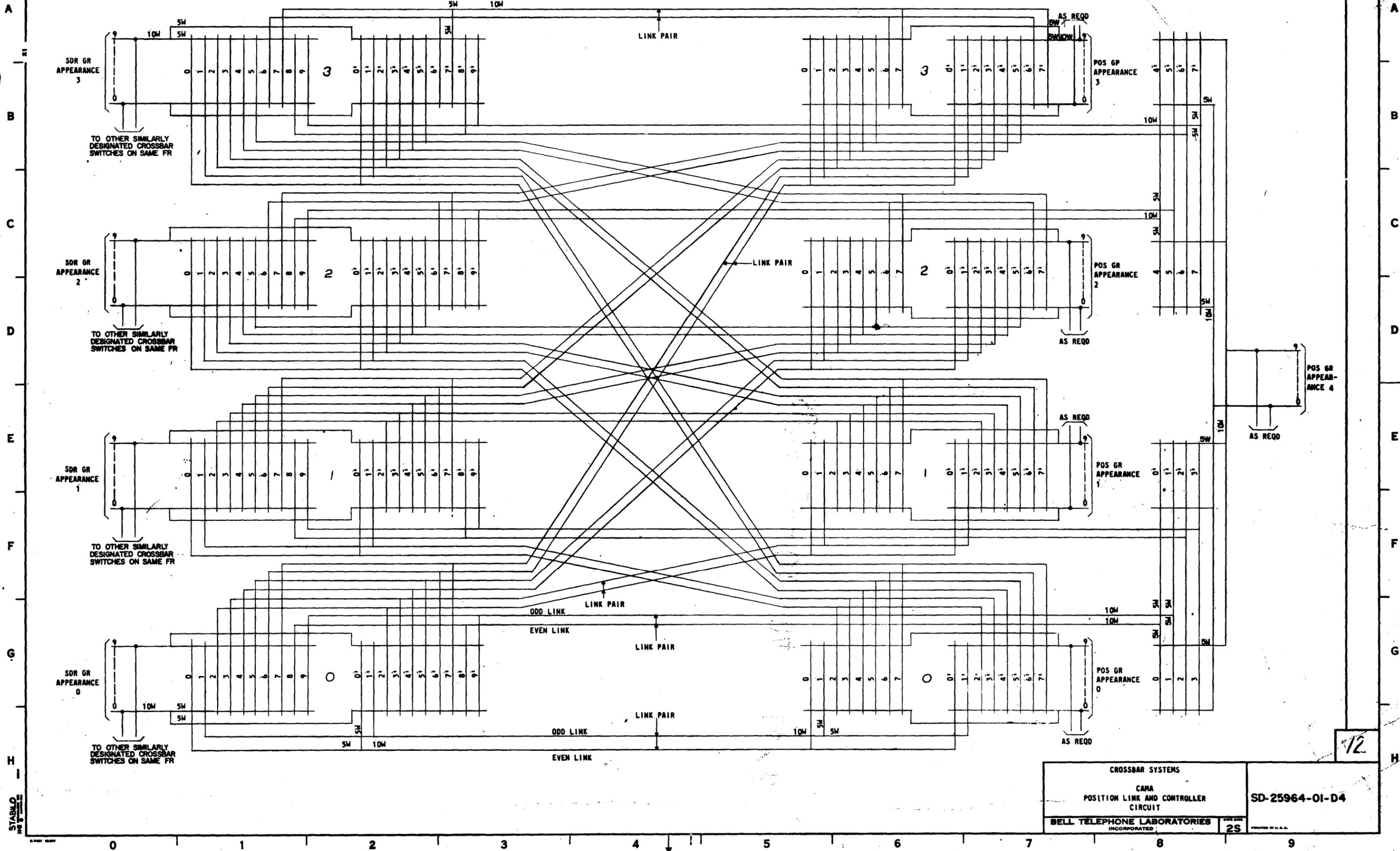
SD-25964-01-038
6S

INFORMATION NOTES: (CONT)

306. THEORY SCHEMATIC. LINK DISTRIBUTION PLAN SHOWS ALL LINKS ASSOCIATED WITH ONE CONTROLLER. SEE NOTE 303.

SENDER SWITCHES

POSITION SWITCHES



DRAWING NUMBER
12D
CLM
AND

12

CROSSBAR SYSTEMS	
CAMA POSITION LINK AND CONTROLLER CIRCUIT	
BELL TELEPHONE LABORATORIES INCORPORATED	SD-25964-01-D4
2S	PRINTED IN U.S.A.

25964-01-D4

STABLO

0 1 2 3 4 5 6 7 8 9

DRAWING
ISSUE
130 MA
728

INFORMATION NOTES: (CONT)

307. WHEN TRAFFIC SERVICE POSITION NO. 100A SERVES CAMA TRAFFIC, POSITION GROUPS ARE DESIGNATED "A" TO "G" AND ALLOCATED AMONG THE POSITION GROUP APPEARANCES AS IN NOTE 303. CAMA SWITCHBOARD GROUPS WORKING JOINTLY ARE DESIGNATED "H" TO "K" FOR USE IN NOTE 303. THE NUMBER OF POSITION GROUPS ARE 7 & 10 RESPECTIVELY. CHAINING OF CONTROLLERS PER NOTE 305 FOR TSP POSITION GROUPS IS EFFECTED BY MEANS OF THE "L" AND "F" LEADS WHICH CONNECT THE CAMA CONTROLLER DESIGNATED AS "FIRST" TO THE TSP CONTROLLER DESIGNATED "LAST" FOR EACH POSITION GROUP OMITTING THE "Y" OPTION AT THE FIRST CAMA CONTROLLER.

A

B

C

D

E

F

G

H

A

B

C

D

E

F

G

H

13

CROSSBAR SYSTEMS		SD-25964-01-D5
CAMA POSITION LINK AND CONTROLLER CIRCUIT		
BELL TELEPHONE LABORATORIES INCORPORATED		25

0 1 2 3 4 5 6 7 8 9

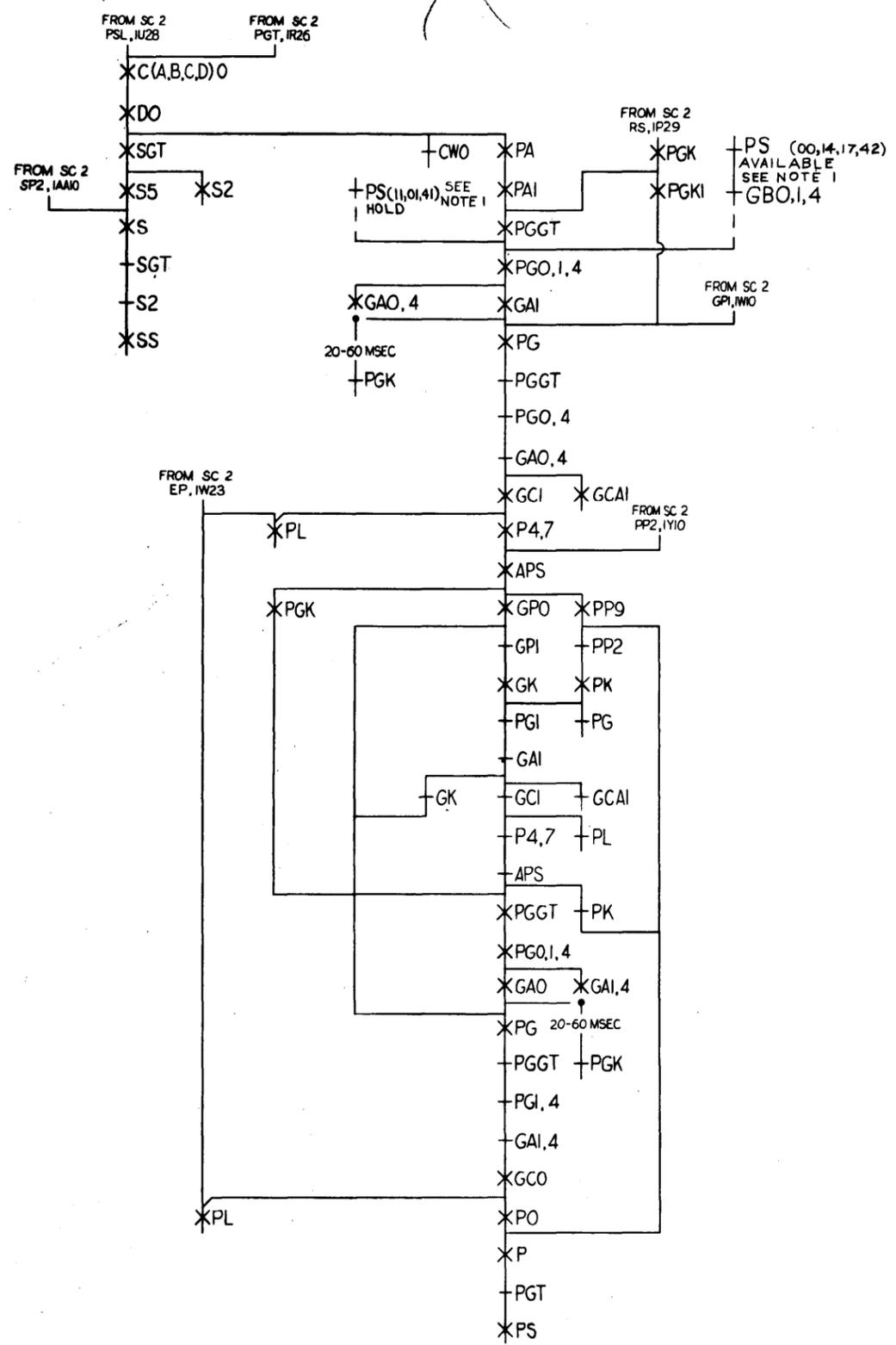
SD-25964-01-D5

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SC 3

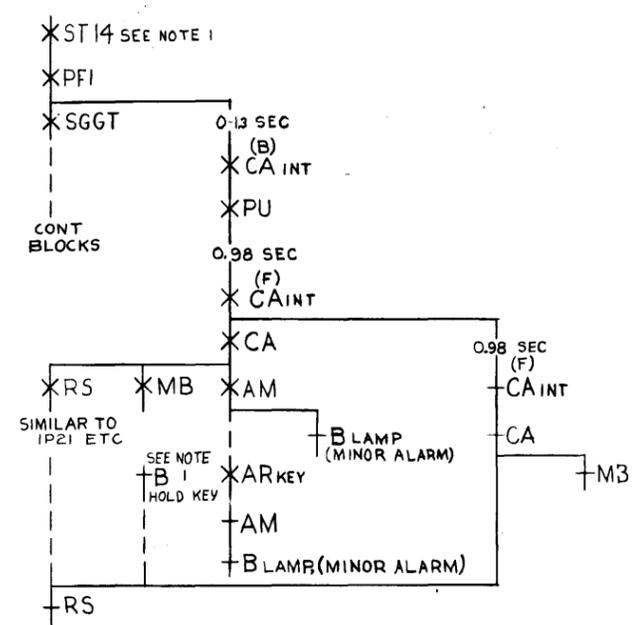
Ⓞ PREFERENCE/RESET (APS) CALL



FURTHER OPERATION SIMILAR TO ISB, ETC

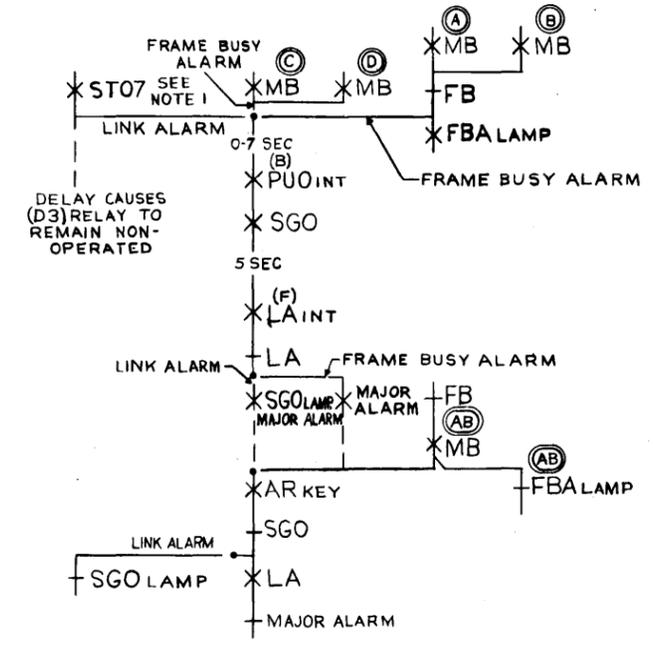
SC 4

Ⓞ CONTROLLER ALARM



SC 5

Ⓞ LINK ALARM AND FRAME BUSY ALARM SEE NOTE 2



SHEET NOTES:
 1. ASSUMED.
 2. BOTH (MB) RELAYS ON FRAME OPERATED FROM FUSE ALARM AND (MB) KEY OPERATION.

120 LAR CLK AHD

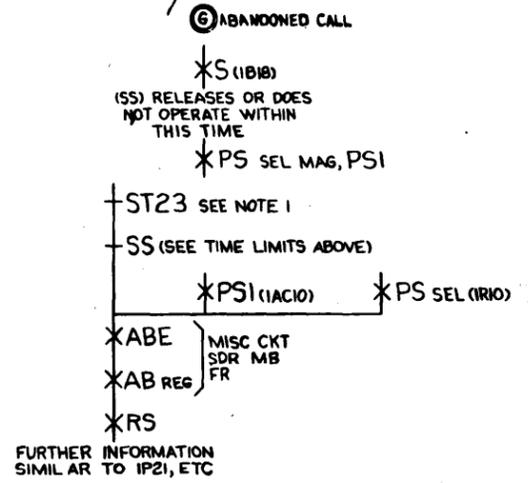
12

CROSSBAR SYSTEMS		SD-25964-01-E2
CAMA POSITION LINK AND CONTROLLER CIRCUIT		
BELL TELEPHONE LABORATORIES INCORPORATED	2S	PRINTED IN U. S. A.

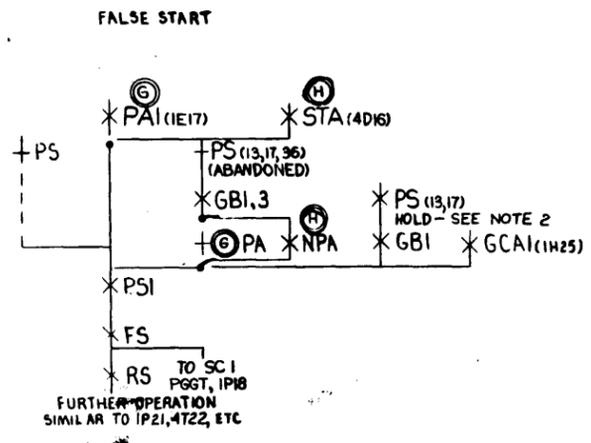
25964-01-E2

STABLO

SC6

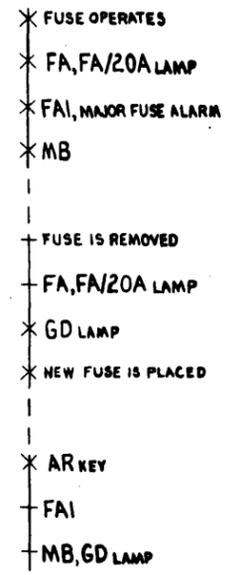


SC7

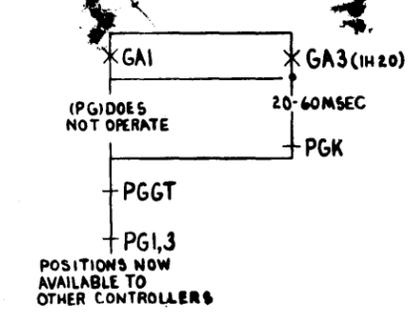


SC8

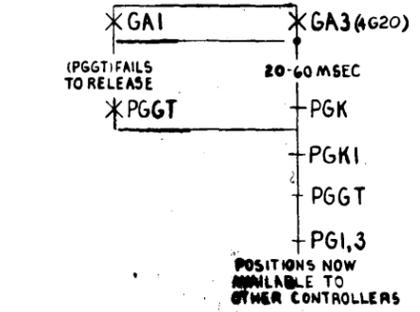
FUSE ALARM



(G) (PGGT) TROUBLE RELEASE



(H) (PGGT) TROUBLE RELEASE



SHEET NOTES:
 1. ASSUMED.
 2. THESE POSITIONS ABANDONED AFTER GROUP IS SELECTED, POSITION 36 IS STILL AVAILABLE.

APPARATUS				MECH REQ			CIRCUIT PREPARATION				DIRECT CURRENT FLOW REOT			REMARKS	
DESIG	CODE	OPT	FIG.	BSP FIG	CONT PRESS	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA	TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA.		TEST MA.
MAGNETS															
HOLD	325AL		7	6								0	17.5	16.5	WDG ALONE
	BW							R(HOLD)	GRD		0	85	80	PAR. COMB.	
RELAYS															
20A	UA125	N	1	101/136	H	SPL	(FA)NO	B(20A)	BAT.	5	0	1.7	1.6		
AM	U1334		1	111/111	H	29	3T(AM)	T(AM)	GRD	3	0	14.3	13.6		
APS	U58		H	127/150	H	50	1T(PK), 12B(G80)	B(APS) T(APS)	B/G	8	0	11.3	10.7		
APS	U1054		G	151/134		41		B(APS)	BAT.		0	8.7	8.2		
CA	U65		G	113/113	H	29	6T(CA), (RS) 0, (AM) NO, 1B (PGK1)	4T(PU)	GRD	1	0	20.5	19.5	WDG ALONE	
											0	28	26.5	PAR. COMB. (CA) & (PU)	
CAO-3	U1384		5	113/113	H	29	12B REL TEST	B REL TEST	BAT.		0	155	145		
CBO-3	U1384		5	113/113	H	29	(ON) NO	B REL TEST T REL TEST	B/G		0	155	145		
CCO-3	U1384		5	113/113	H	29	(RS) 0, (OTP) NO	B REL TEST T REL TEST	B/G		0	155	145		
CI	U71		H	168/162	H	50	9B(CI)	T(CI)	GRD	6	0	25.5	24		
CIA-D	AJ202		H	500	H					6	0	43	40.5	WDG ALONE	
CIE,F			13					U REL TST	GRD	6	0	305	290	PAR. COMB.	
CWO-3	U1373		2	101/136	H	29		T REL TEST	GRD	4	0	13.2	12.5		
DO-3	UA123		2	125/124	H	62		B REL TEST	BAT.	2	0	35	33		
DO-3	UB20		10	501/506	H	32		B REL TEST	BAT.	2	0	37.5	35.5		
DCK	UB6000		E	503/504	H	32		T(DCK)	GRD	7	0	52.5	50		

TEST NOTES:

- CONN T(CA) TO T(PU).
- MAKE BUSY THE ASSOC SENDERS BEFORE TESTING THIS RELAY.
- ALARM SOUNDS WHEN THIS RELAY OPERATES.
- INSULATE 12T ASSOC (DO-3) AND ASSOC 1,3,5 OR 9T (LA).
- REMOVE LAMP (20A) CONT MAKE 6 READJ, 4 TEST. ARM. TRAVEL 23.
- TAKE TROUBLE RECORDER OUT OF SERVICE.
- CONN 48V TO B(DCK).
- INSULATE 1B(PD) WITH ZN OPTION, 3(PD) WITH FIG. 12.

CAMA POSITION LINK AND CONTROLLER CIRCUIT

SD-25964-01-FI

BELL TELEPHONE LABORATORIES INCORPORATED

DRAWING ISSUE 12D 13D PAGE 1

APPARATUS				MECH REQ			CIRCUIT PREPARATION				DIRECT CURRENT FLOW REOT			REMARKS		
DESIG	CODE	OPT	FIG.	BSP FIG	CONT PRESS	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA	TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA.		TEST MA.	READJ MA.
DCT	280CH		1					11T (PS)	B/G	8	0	-180		4.3		
								11T (PS)	B/G	8	0	-180		3.1		
								11T (PS)	B/G	6.8	0	-180	22	20.5	REMOVE FUSE (F)	
								11T (PS)	B/G	6.8	0	-180	5.1	5.4		
															WILL BE CHANGED ON NEW ISSUE BY 4-9-68	
DL	U624		H	101/101	H	29	1T (DL)	T (DL)	GRD		0		6.7	6.3		
EP	U1208		1	149/118	H	50	6B (SPO,I)	T (EP)	GRD		0		11.3	10.7		
FA	U66	M	1	111/110	H	35		B (FA)	BAT.	2	0	6.3	6	REMOVE LP (FA)		
FA	U751	N	1	111/110	H	35		BF (FA)	BAT.	2	P	0	9.2	8.7	REMOVE LP (FA)	
								TR (FA)	GRD	2	S	0	14.2			
FA1	U55		H	117/145	H	47	9T (FA1)	T (FA1)	GRD		0	9.3	8.8			
FA1	U1248		G	111/101	H	29	4T (FA1)	T (FA1)	GRD		0	8.1	7.7			
FB	U440	ZG	A	132/132	H	47	2T (FB) 5T (MB)	T (FB)	GRD	4	0	8.8	8.3			
FBA	U112		9	123/111	H	29		T (FBA)	GRD	2	0	12.2	11.6			
FDA	Y281		9	201/188	H	41	6T (FDA)	T (FDA)	GRD	3	0	FS	19	18		
							6T (FDA)	T (FDA)	GRD		H	FS	2.8	2.6		
							6T (FDA)	T (FDA)	GRD		R	FS	0.8	1		
FS	U984		1	145/137	H	47	(PS) 0, (PS1) NO	TF (FS)	GRD		P	0	22	20.5		
								TR (FS)	GRD		S	0	18			
GAO-4	UB6000		1	503/504	H	32		T REL TST	GRD		0	52.5	50			
GBO-4	U826		1	124/124	H	59		B REL TST	BAT.	1	0	20	19	WDG ALONE		
											0			PAR. COMB.		
GCO-4	AJ202		12	500	H		(PGK1) NO	L REL TST U REL TST	B/G		0	43	40.5	WDG ALONE		
											0	165	155	PAR. COMB. WITH FIG. 1 (GCAO-4)		
GCO-4	UB35	ZN	1	510/510	H	32					0	62	59	WDG ALONE		
GCAO-4			1				(PGK1) NO	B REL TEST T REL TEST	B/G		0	145	135	PAR. COMB.		
											0	95	90	PAR. COMB. WITH FIG. 12 (GCO-4)		
GK	U820		1	501/506	H	32	1T, 7T (GPO)	T (GK)	GRD		0	37.5	35.5			
GL	U1373		8	101/136	H	29		T (GL)	GRD		0	13.2	12.5	REMOVE LP (GO)		
GPO-3	U1178		1	193/157	H	50	(GPA) 0; 7T 9T, 10B (GPA)	TF REL TR TEST	GRD		P	0	27	25.5		
									GRD	5	S	H	14.2			
GPA	U1178		1	193/157	H	50	(GPO) 0 (GPO) 0	TF (GPA) TR (GPA)	GRD		P	0	27	25.5		
									B/G	5	S	H	14.2			
GTO-3	AJ5		11	220	H						0	13.3	12.6	WDG ALONE		
							11, 12 (GTA) (GTA) 0	L REL TST	BAT.		0	29.5	28	PAR. COMB.		
GTA	AG48		11	230B	H		12(GT3)	L(GTA)	BAT.	7	0	10.8	10.2			
											H	2	1.9			
											R	20	1	1.2		

TEST NOTES:

- MULTIPLY CURRENT FLOW VALUE BY NO. OF RELAYS IN PARALLEL. BLOCK OPERATED RELAYS IN PARALLEL WITH RELAY UNDER TEST. OPEN THE "6B" LEAD IN ONE OF ASSOC POS OR TRK CIRCUITS.
- ALARM SOUNDS WHEN THIS RELAY OPERATES.
- ALARM SOUNDS WHEN REL RELEASES. MAKE BUSY CONT (A). INSULATE 1B (PGK) OF CONT (A).
- INSULATE 5T (MB) OF CONT (B).
- OPERATE ELECTRICALLY ON PRI WDG.
- WITH FUSE INSULATE 1B(DCK).
- ALARM SOUNDS WHEN THIS RELAY RELEASES.
- CONNECT BAT. 9B(PD) WITH ZN OPTION 9(PD) WITH FIG. 12.

CROSSBAR SYSTEMS

CAMA POSITION LINK AND CONTROLLER CIRCUIT

SD-25964-01-FI

BELL TELEPHONE LABORATORIES INCORPORATED

DRAWING ISSUE 12D 13D PAGE 2

SD-25964-01-FI

CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ			CIRCUIT PREPARATION				DIRECT CURRENT FLOW REQ				REMARKS	
DESIG	CODE	DPT	FIG.	BSP FIG.	CONT PRESS.	ARM. TRVL.	BLOCK OR INSULATE	TEST CLIP DATA	TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA.	TEST MA.		READJ MA.
ND	2807	S					(DCK) 0	11B (PS) BT (DCK)	B/G			0	-16	0.4		
							(DCK) 0	11B (PS) BT (DCK)	B/G			NO	-16	0.3		
							(DCK) 0	11B (PS) BT (DCK)	B/G			0	-16	1.5		
							(DCK) 0	11B (PS) BT (DCK)	B/G			R	16	0.3	0.4	
LA	U130	B		172/157	H	50	(SCO-3) NO.					0		12.2	11.6	
							1T (SGO), 10B (LA)	T (LA)	GRD	1						
MB	U1436	A, B, C, D		241/241	H	65	(SGGT) 0							36.5	34.5	
								T (MB)	GRD	3						
NPA	U6113	H		120/120	H	35	(ST) NO							38	36	
								T (NPA)	GRD							
OL	U66	H		111/110	H	35		B(OL)	BAT.			0		6.3	6	
OL	UB27	G		506/527	H	32		B(OL)	BAT.			0		7.7	7.3	
ON	U1261	H		156/117	H	50	(PU) NO, 3T (RS)					0		13.3	12.6	
								T (ON)	GRD							
OT	U594	H		123/120	H	35						0		6.9	6.5	
							(AM) NO, (OTP) NO, (ON) NO	T (OT)	GRD	2		0		15.5	14.5	
																WDG ALONE
OTP	UB27	H		506/527	H	32						0		7.7	7.3	
							(OT) NO	T (OTP)	GRD	2		0		17.5	16.5	
																WDG ALONE
P	UB604	F		506/506	H	32		B(P)	T(P)	B/G		0		155	145	
PO-9	UB6002	ZN	1	503/504	H	32	2T (FS)	B REL TEST	BAT.			0		135	125	
PO-9	AJ45	12		249	H		2T(FS)	L REL TST	BAT.			0		130	120	
PA	UB20	G		501/506	H	32	(S)0					0		37.5	35.5	
								T (PA)	GRD							
PA1	UB15	G		513/523	H	41	(RS)0					0		47	44.5	
								T (PA1)	GRD							
PFO.2	UB6002	A		503/504	H	32	(GB0-4) 0, (CA) NO	B REL TEST	T REL TEST	B/G		0		135	125	
PF1.3		B						B TEST	T TEST	B/G		NO		46	48.5	
PFO.2	UB6002	C		503/504	H	32	(SGGT) NO, (ON) NO, (PGK) NO	B REL TEST		GRD	4.5	0		135	125	
PF1.3		D						B TEST		GRD	4.5	NO		46	48.5	
PG	UB6004	F		506/506	H	32		B (PG)	T (PG)	B/G		0		155	145	
PGO-4	U1336	4		132/106	H	47		B REL TEST	T REL TEST	B/G	6	0		130	120	
																CONN 48V TO ASSOC B (GB-)

TEST NOTES:

- ALARM SOUNDS WHEN THIS RELAY IS NORMAL.
- PAR. COMB. (OT) AND (OTP). CONN T(OT) TO T(OTP).
- REMOVE ASSOC (MB) PLUG AT TROUBLE RECORDER FRAME OR RESTORE (MB) KEY TO NORMAL.
- CONN 48V TO T (REL TEST).
- CONN 48V TO ASSOC B (XP-) RELAY.
- THE ASSOCIATED POSITION CIRCUITS ARE OUT OF SERVICE DURING THIS TEST.

CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

SD-25964-01-F2

BELL TELEPHONE LABORATORIES
INCORPORATED

PAGE 3

CIRCUIT REQUIREMENTS

APPARATUS				MECH REQ			CIRCUIT PREPARATION				DIRECT CURRENT FLOW REQ				REMARKS	
DESIG	CODE	DPT	FIG.	BSP FIG.	CONT PRESS.	ARM. TRVL.	BLOCK OR INSULATE	TEST CLIP DATA	TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA.	TEST MA.		READJ MA.
PGGT	UB6007		1	507/507	H	32								44.5	41	
																CONN 48V TO T(PGGT)
PGK	U729		1	120/120	H	35								13.8	13.1	
							(PGK1) 0, (GB4) 0							30	28.5	WDG ALONE PAR. COMB
PGK1	U1120	ZT	1	123/130	H	44	2B(PGK1)							18.9	17.5	
PGK1	U1306	ZH	1	111/106	H	44	2B(PGK1)							10.1	9.6	
PGT	U1281	ZN	1	119/113	H	35	(P) 0							47	44.5	
PGT	AJ501	12		249	H		(P)0							43	40.5	
PK	UB20		1	501/506	H	32	1T, 7T (PP0)							37.5	35.5	
PL	UB6001	H		501/502	H	32		B(PL)	BAT.					95	90	
PL	UB6004	G		506/506	H	32		B(PL)	BAT.					153	143	
PP0-8	U1178		1	193/157	H	50	(PP9) 0; 7T, 9T, 10B(PP9)							27	25.5	
														14.2		
PP9	U1178		1	193/157	H	50	(PP0)0							27	25.5	
														14.2		
PS	UB6006		1	508/507	H	32	(PS1) NO							42.5	39.5	
PS1	UB15		1	513/523	H	41	(CA) NO							47	44.5	
PSL	UB6000	F		503/504	H	32								32.5	30	
																CONN 48V TO B(PSL)
PSL1	UB15	E		513/523	H	41		B(PSL1)	T(PSL1)	B/G	3			47	44.5	
PU	UB27		1	506/527	H	32	(RS) NO, (CA) NO, 1B (PGK1)	B(PU)	BAT.	5		0		7.7	7.3	
														41	39	PAR. COMB (PU) & (CA)
RCCK	U717	H		111/110	H	35								16	15	
RS	UB30		1	517/525	H	32	(OTP) NO							30.5		
														30	28.5	
RS1	AJ35	13		9	H			L(RS1)	BAT.					63	60	
														51	54	

TEST NOTES:

- CONNECT T(CA) TO T(PU).
- OPERATE ELECTRICALLY ON PRIMARY WDG.
- REMOVE (PSL) FROM SOCKET.
- WITH "H" OPTION USE GRD PREP AND CONN GRD TEST CLIP TO T(PS). WITH "G" OPTION USE BATTERY PREP AND CONN BATTERY TEST CLIP TO B(PS).
- REQD FOR USE WITH "H" OPTION OR WINDING ALONE REQD WITH "G" OPTION.

CROSSBAR SYSTEMS

CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

SD-25964-01-F2

BELL TELEPHONE LABORATORIES
INCORPORATED

PAGE 4

13

SD-25964-01-F2

CIRCUIT REQUIREMENTS																		DRAWING ISSUE	
APPARATUS				MECH REQ			CIRCUIT PREPARATION				TEST SET PREP		DIRECT CURRENT FLOW REQ			REMARKS	12D	CLA CLK AND STR	
DESIG	CODE	OPT	FIG.	BSP FIG.	CONT PRESS.	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA		TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA.	TEST MA.				READJ MA.
S	UB20		G	501/506	H	32			T(S)	GRD			0		37.5	35.5		12D	CLA CLK AND STR
SO-9	UB15		G	513/523	H	41	4B(SPO-3)		T	REL TEST	GRD		0		47	44.5		13D	CLA CLK AND STR
SO-9	U1415		H	154/127	H	47	2T(SS1)		T	REL TEST	GRD		0		45	42.5		17A	CLA CLK AND STR
S00-39	293A		11								1		0		10			18AR	CLA CLK AND STR
S00-3	U272		2	120/111	H	35	1B(REL TEST) (LA)0;1T, 3T,5T,9T (LA)		TF	REL TEST	GRD	P	0		14.2	13.5			
									TR	TEST	GRD	S	0		11.6				
SGGT	U1018	A,B		137/137	H	41	(P)0		T(SGGT)	GRD			0		20.5	19.5			
SGGT	U1113	C,D		114/114	H	50	(P)0 (PGT)0 (SS1)0		T(SGGT)	GRD			0		30.5	29			
									T(SGGT)	GRD			NO		17.5	18.5			
SGT	UB4007		1	507/507	H	32			T(SGT)	GRD	2		0		64.5	61			
SK	UB27		1	506/527	H	32			T(SK)	GRD			0		7.7	7.3			
SPA	U1056		F	111/110	H	35		BF(SPA)	TR(SPA)	M		P,S	0		20	19			
SPD-3	U188		1	161/161	H	53	1B(SUCC REL) (PREC REL)NO		T	REL TEST	GRD	3		0	18.5	17.5			
SPAI	1/2AK30		13	202					IL(SPAI)	GRD			0		23.1	22			MTD WITH SPARE
SS	UB15		H	513/523	H	41	(SS1)0		T(SS)	GRD			0		47	44.5			
SS	UB20		G	501/506	H	32			T(SS)	GRD			0		37.5	35.5			
SS1	UB15		H	513/523	H	41			T(SS1)	GRD			0		47	44.5			
SSL	UAS		F	141/126	H	59			T(SSL)	GRD			0		22.5	21			CONNECT 48V TO B(SSL)
SSL	UB27		E	506/527	H	32			T(SSL)	GRD			0		7.7	7.3			
ST	UB20		H	501/506	H	32	(STA)0		T(ST)	GRD			0		37.5	35.5			
STA	UB15		H	513/523	H	41			T(STA)	GRD			0		47	44.5			
STO-3	U543		10	111/111	H	29	11(ON)		T	REL TEST	GRD	4		0	5.7	5.4			
TR	Y313		H	154/212	H	47	1B(TRB), 9T(TR)		B(TR)	BAT.			0	40	27.5	26			
									B(TA)	BAT.			H	40	5.9	5.3			
									B(TR)	BAT.			R	40	1.9	2.3			
TRB	U794		H	119/119	H	35	(DL)NO, (ON)NO		T(TRB)	GRD			0		22.5	21			

TEST NOTES:

- MAKE BUSY 40 SENDERS ASSOCIATED WITH FRAME. BLOCK (GTO-3) OPERATED (ALARM SOUNDS WHEN THESE RELAYS OPERATE).
PROCEDURE FOR DRY REED RELAYS.
PREPARATION:
CONNECT TEST SET GROUND TO TERMINAL OF RELAY UNDER TEST (15,25,35,45,55 RESPECTIVELY) FOR DESIGNATION SHOWN.
PLACE L KEY IN NEUTRAL POSITION.
CONNECT DIRECT BATTERY TO TERMINAL L2 OF TEST SET.
CONNECT SLEEVE OF T & R JACK TO TERMINAL 12 OF PACKAGE UNDER TEST.
CONNECT THE TIP OF 4W JACK TO TERMINAL 14 OF PACKAGE UNDER TEST.
ADJUST NO. 4 RHEOSTAT & SWITCHES FOR MINIMUM RESISTANCE.

STEP	PROCEDURE	INDICATION	CHECK
A	CLOSE KEY 1	LAMP LIGHTS	CLOSURE OF LOAD CONTACT
B	CLOSE KEY 4 & OPEN KEY 1	LAMP REMAINS LIGHTED	CLOSURE OF LOCKING CONTACT
C	OPEN KEY 4	LAMP EXTINGUISHED	OPENING OF LOAD CONTACT
D	CLOSE KEY 4	LAMP REMAINS EXTINGUISHED	OPENING OF LOCKING CONTACT
E	OPEN KEY 4		

- BLOCK (SS1)0 OR (S)0.
- AFTER TEST MAKE SURE THAT ONE(SP-) RELAY IS LOCKED OPERATED.
- MAKE BUSY ALL SENDERS ASSOC WITH RELAY UNDER TEST BLOCK ASSOC (D-0).

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POSITION LINK AND CONTROLLER
CIRCUIT
BELL TELEPHONE LABORATORIES
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SD-25964-01-F3

BELL TELEPHONE LABORATORIES
INCORPORATED

CIRCUIT REQUIREMENTS																		DRAWING ISSUE	
APPARATUS				MECH REQ			CIRCUIT PREPARATION				TEST SET PREP		DIRECT CURRENT FLOW REQ			REMARKS	12D	CLA CLK AND STR	
DESIG	CODE	OPT	FIG.	BSP FIG.	CONT PRESS.	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA		TEST SET PREP	SEE TEST NOTE	TEST WDG	TEST FOR	AFTER SOAK MA.	TEST MA.				READJ MA.
XPO-3	U999		C,D	120/120	H	35	(SGT)NO, (ON)NO, (PGK)NO		I	REL TEST	GRD	1		0	20.5	19.5			
XPO-3	U1054		A,B	151/134	H	41	(GBO-4)0, (CA)NO		B	REL TEST	B/G			0	8.7	8.2			
MISCELLANEOUS																			
DIODES																			
RSI	426F		13				7(RS1)				2								

TEST NOTES:

- CONNECT 48V BATTERY B OF RELAY UNDER TEST.
- REFER TO BSP 032-173-301 TEST PROCEDURE NO. 2

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POSITION LINK AND CONTROLLER
CIRCUIT
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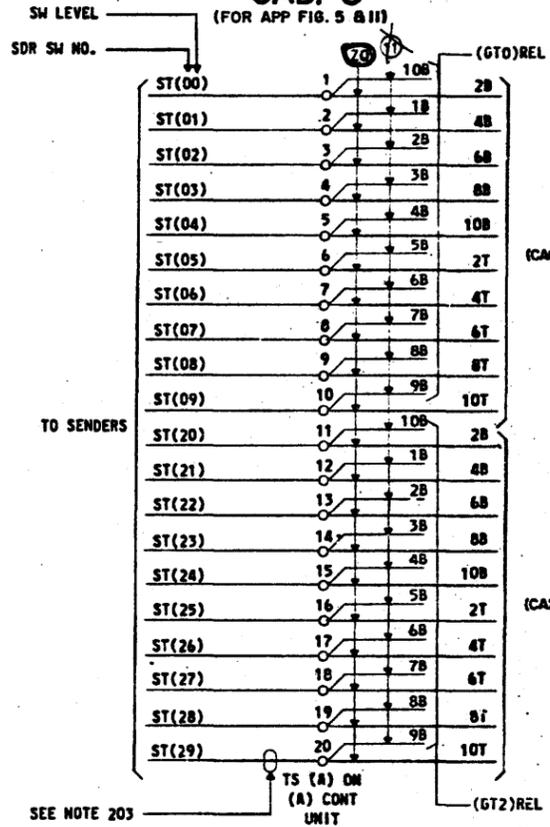
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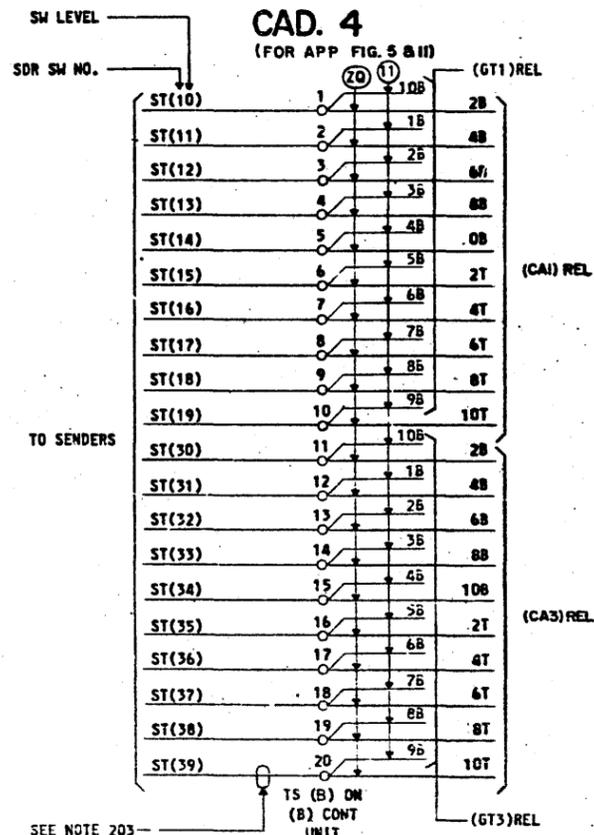
CAD. 3

(FOR APP FIG. 5 & 11)



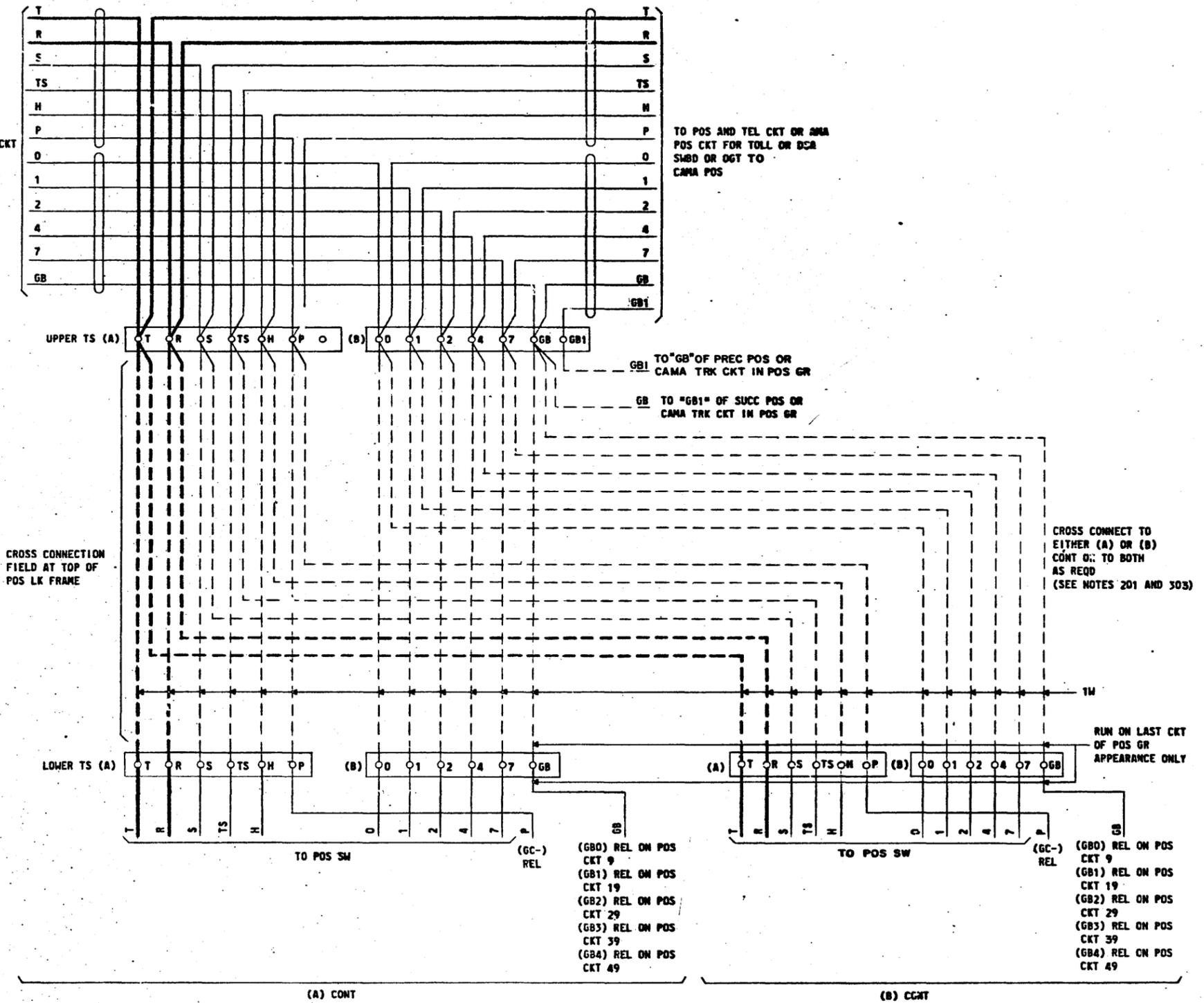
CAD. 4

(FOR APP FIG. 5 & 11)



CAD. 5

(FOR APP FIGURES 1,7)
(FOR USE WITH CAMA POSITIONS ARRANGED FOR DC PULSING)



DRAWING ISSUE	
12D	CA1
13D	CA2
14D	CA3
15D	CA4
16D	CA5
17D	CA6
18D	CA7
19D	CA8
20D	CA9
21D	CA10

SD-25964-01-G2

STABLO

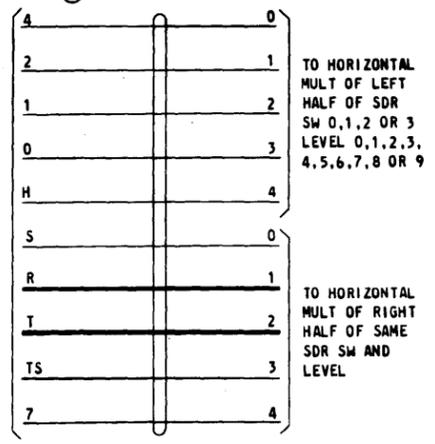
CAMA POSITION LINK AND CONTROLLER CIRCUIT

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SD-25964-01-G2

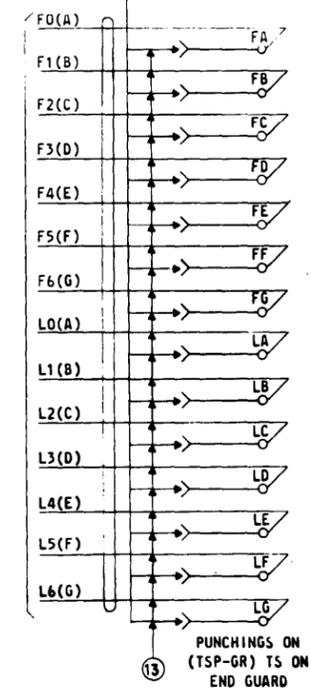
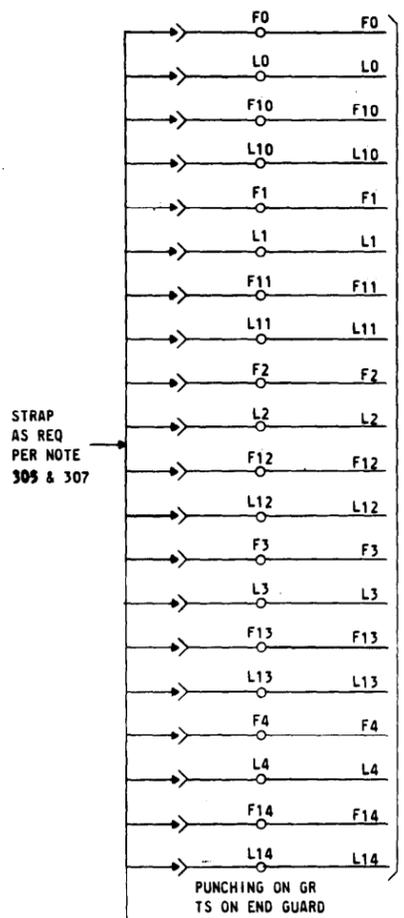
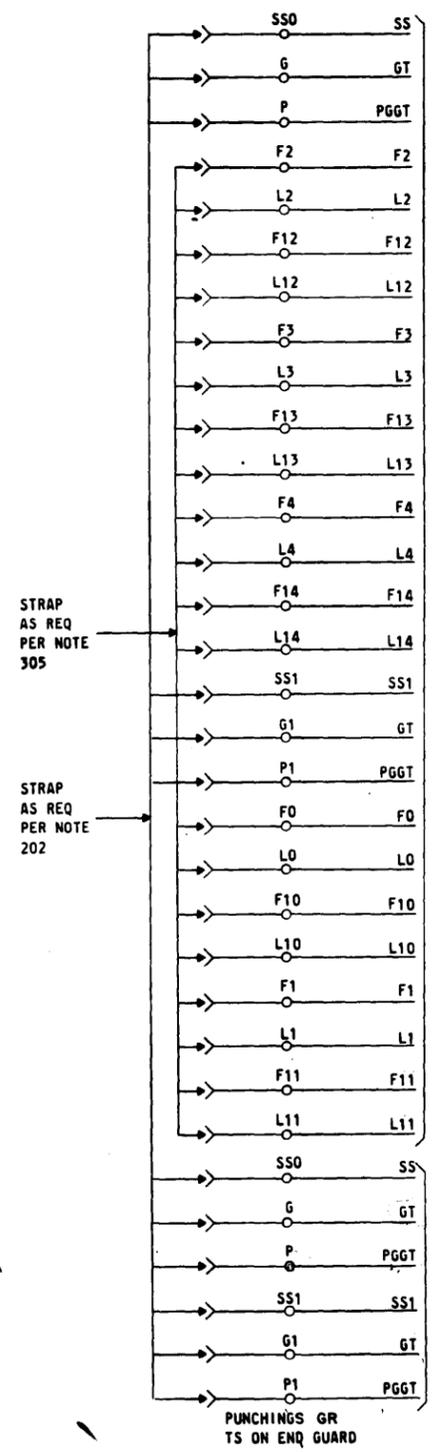
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CAD. 6
(FOR APP FIG. 6)
(W)DC PULSING POS

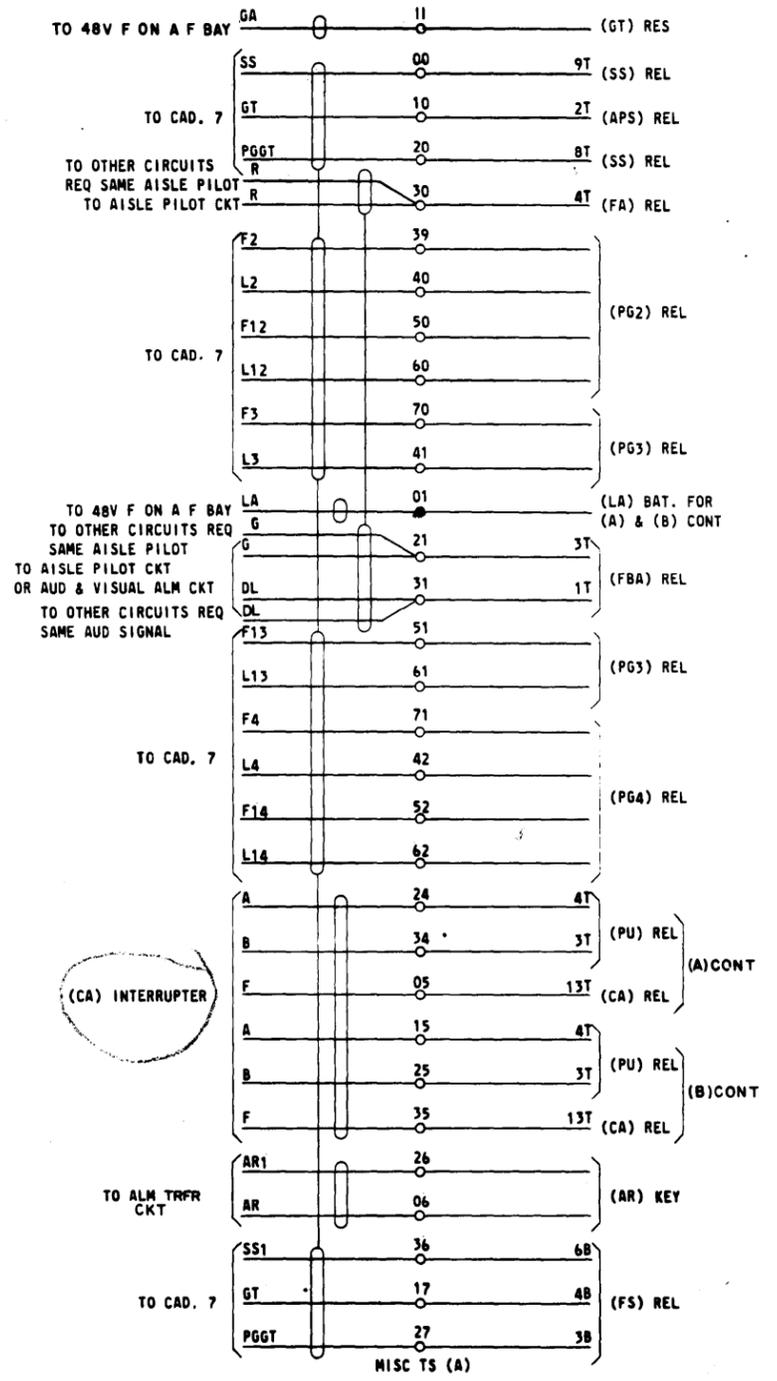


TO SDR FR
(FOR ONE SDR)

CAD. 7



PART OF CAD. 8
(FOR APP FIGURES 1,3,4,8,9,10,11,C,D & H)



DRAWING	ISSUE
12D	CLK
13D	H/M
15D	REL
	LA
	M/R

CROSSBAR SYSTEMS
CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

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INCORPORATED

SD-25964-01-63

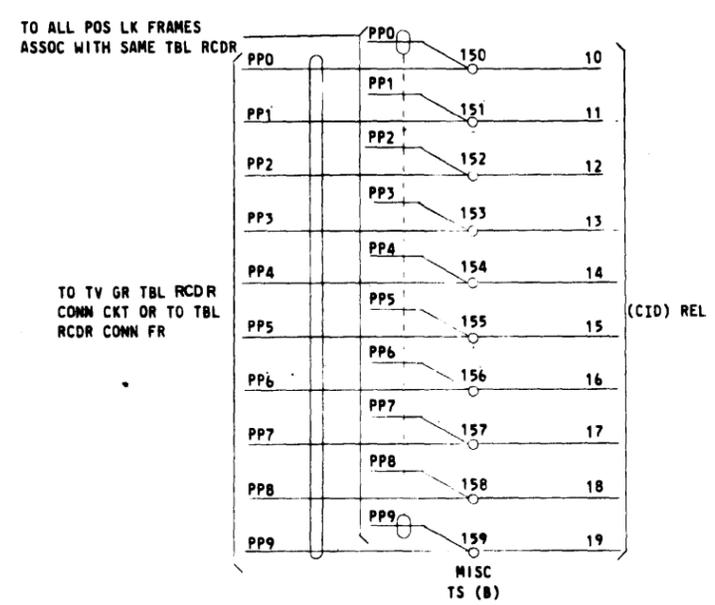
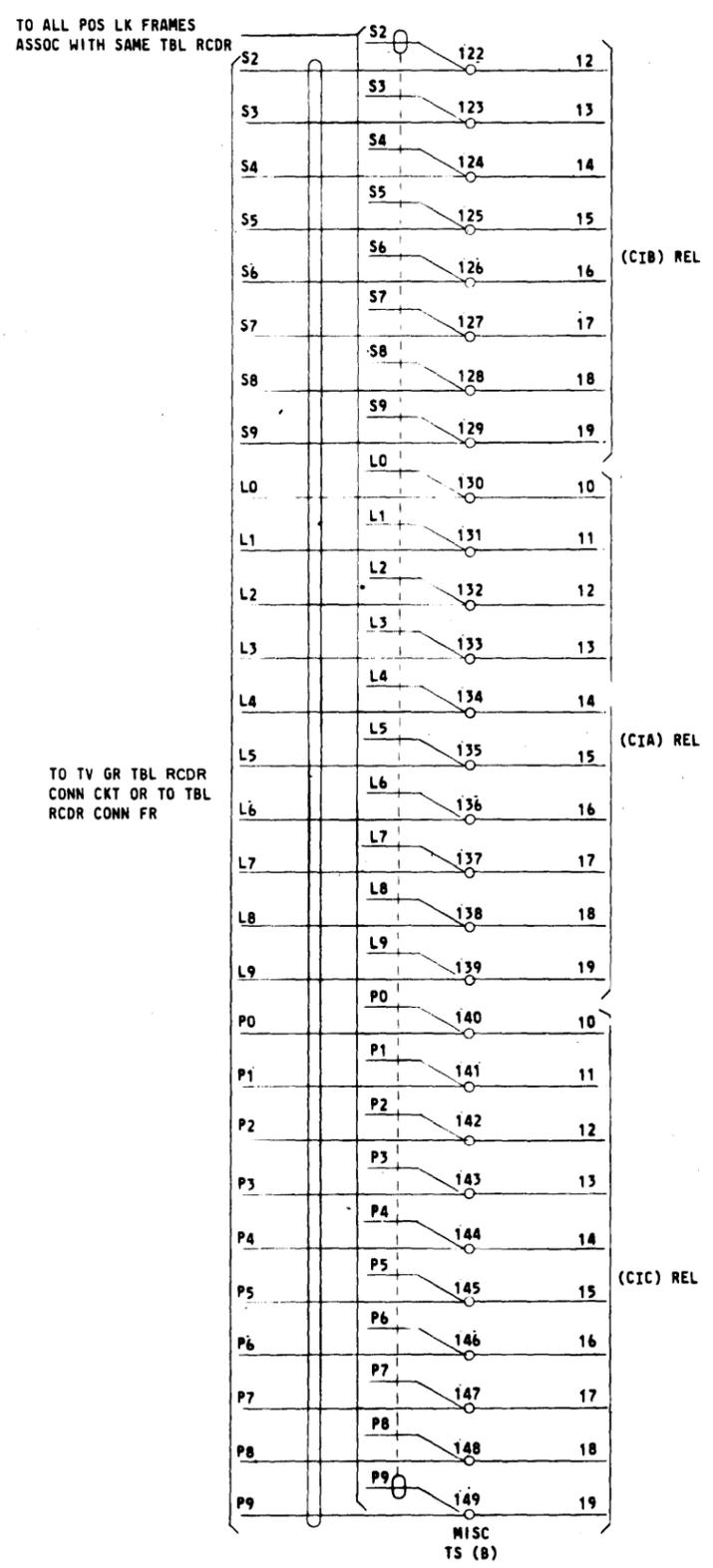
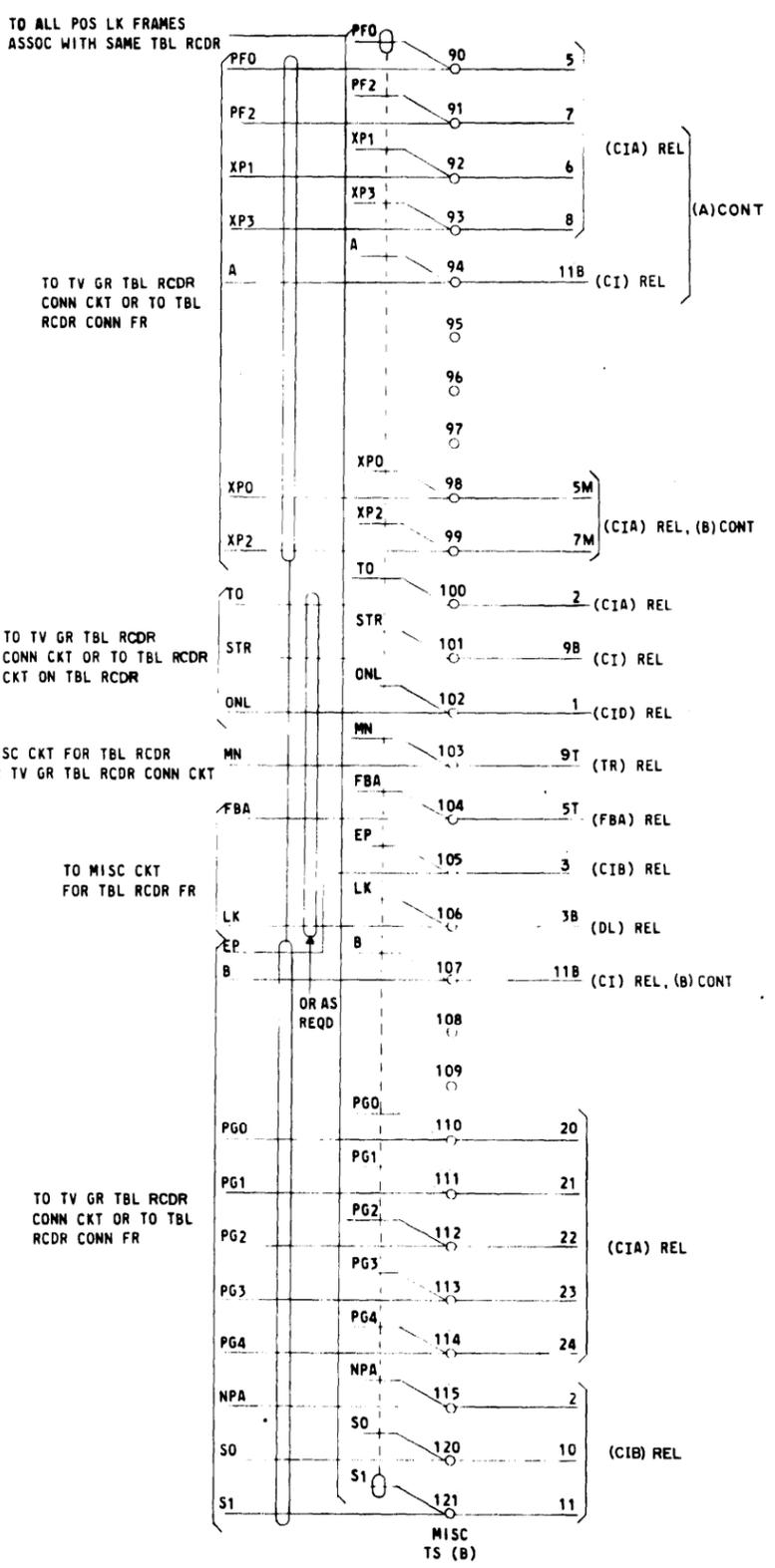
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SD-25964-01-63

15

PART OF CAD 9
(FOR APP FIGURES I, 4, & H)

ISSUE
12D CLK AND
18AR MLR



SD-25964-01-G5

STABLO

CAMA
POSITION LINK AND CONTROLLER
CIRCUIT

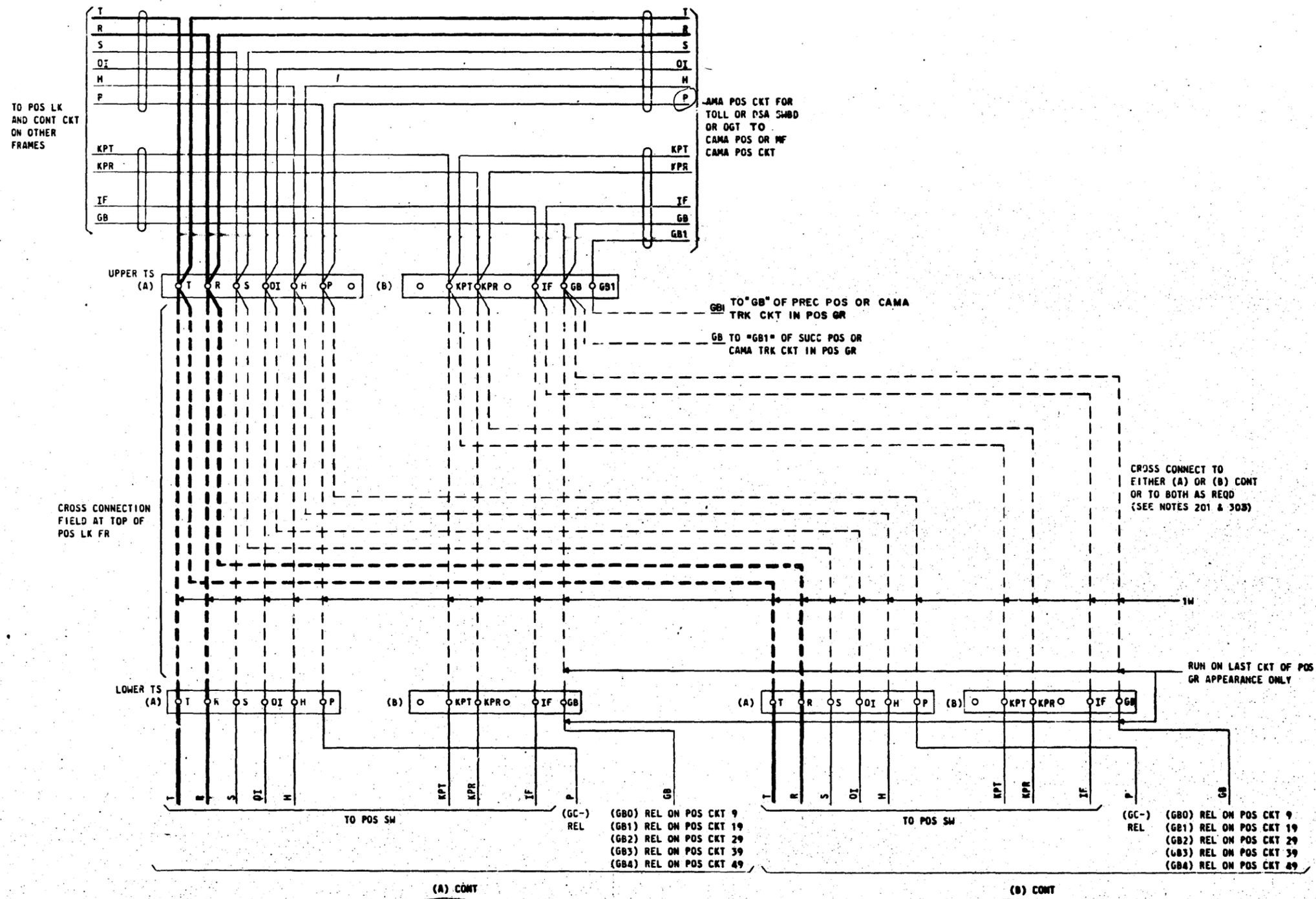
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SD-25964-01-G5

6S

18

CAD 10
 (FOR APP FIGURES 1 & 8)
 FOR USE WITH CAMA POS ARRANGED FOR MF PULSING



(A) CONT

(B) CONT

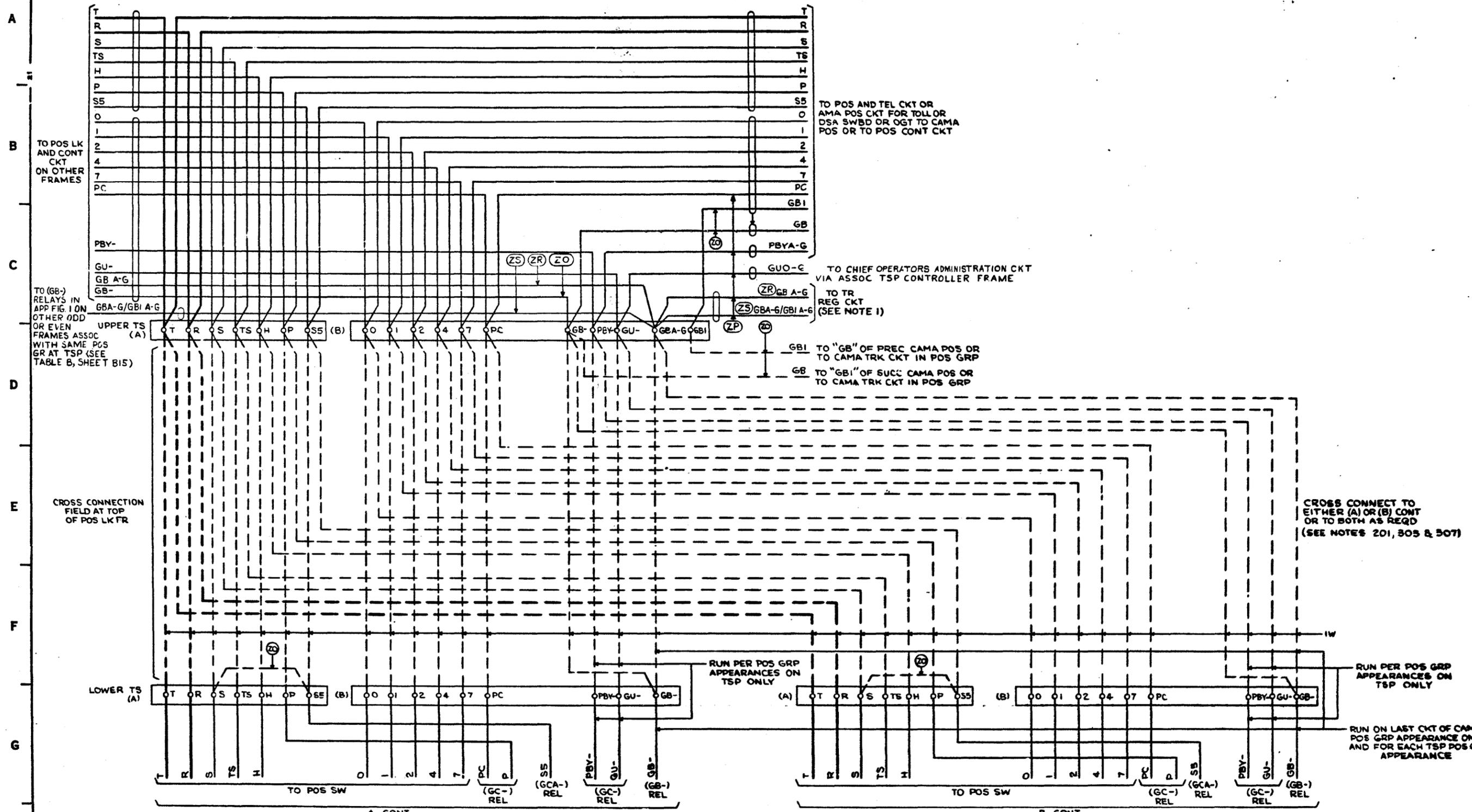
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CHARLO

CROSSBAR SYSTEMS		② SD-25964-01-66 65
CAMA POSITION LINK AND CONTROLLER CIRCUIT		
BELL TELEPHONE LABORATORIES INCORPORATED		

13

CAD.15
 (FOR APP FIG. 1, 7 & 12)
 FOR USE WITH CAMA & TSP 100A ARRANGED
 FOR DC PULSING



NOTES
 1. THE GB- LEADS FROM THE TRAFFIC REGULATOR CKT FOR "ZS" OPTION ARE ASSOCIATED WITH (GB-) RELAYS ON ODD AND EVEN FRAMES PER NOTES 303, 307 AND THE FOLLOWING TABLE:

OPTION "ZS"	
LEAD DESIGNATION	POSITION LINK FRAME
GBA-G EVEN	0, 4, 8, 12, 16, 20
GBA-G ODD	1, 5, 9, 13, 17, 21
GBIA-G EVEN	2, 6, 10, 14, 18, 22
GBIA-G ODD	3, 7, 11, 15, 19, 23

CROSS CONNECT TO EITHER (A) OR (B) CONT OR TO BOTH AS REQD (SEE NOTES 201, 305 & 307)

RUN PER POS GRP APPEARANCES ON TSP ONLY

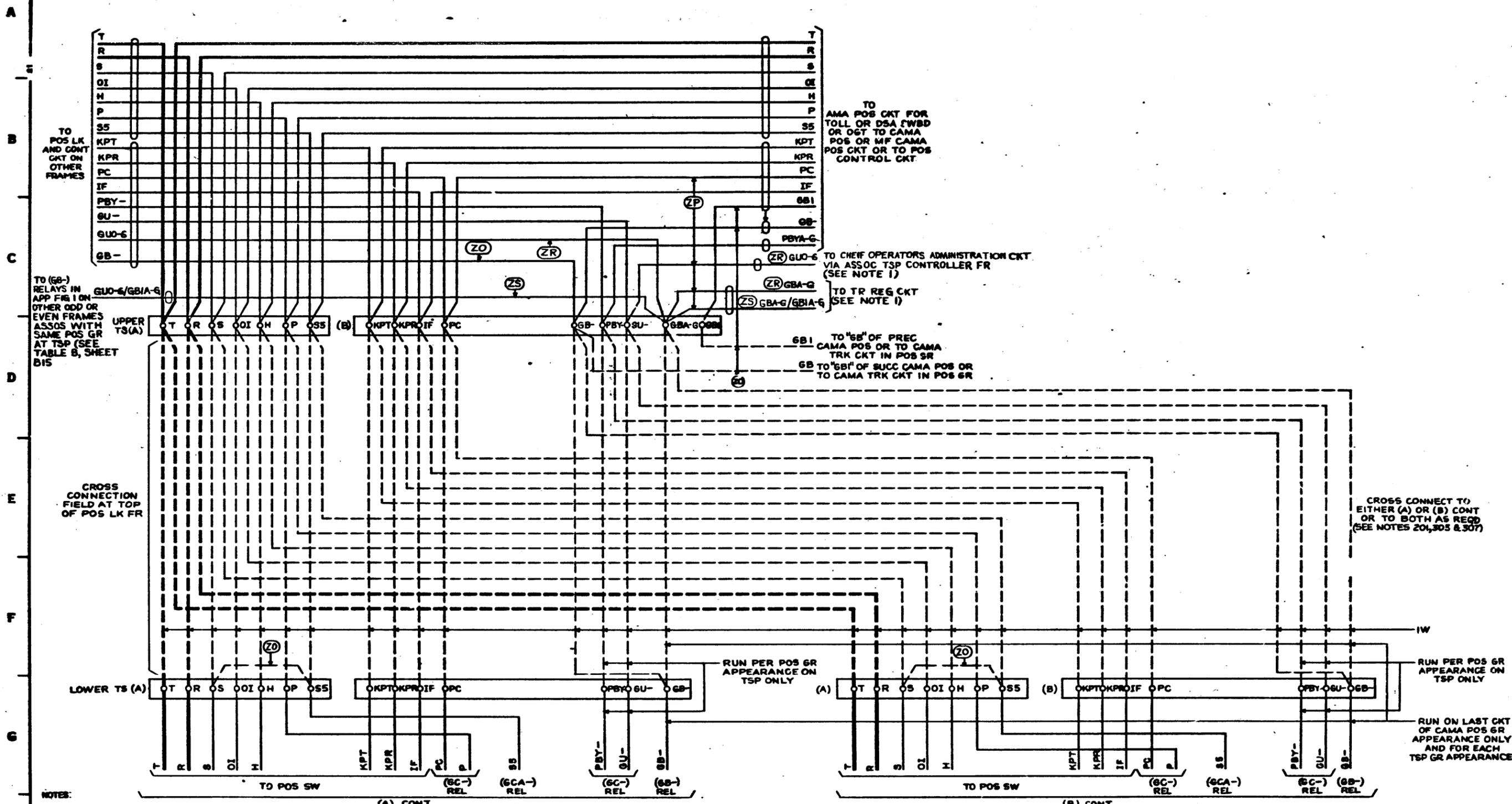
RUN ON LAST CKT OF CAMA POS GRP APPEARANCE ONLY AND FOR EACH TSP POS GRP APPEARANCE

SD-25964-01 68

CAMA POSITION LINK AND CONTROLLER CIRCUIT		SD-25964-01-68
BELL TELEPHONE LABORATORIES INCORPORATED		6S

CAD. 16
 (FOR APP FIG. 1, 8 & 12)
 FOR USE WITH CAMA AND TSP 100A
 ARRANGED FOR MF PULSING

DRAWING INDEX
 150
 160
 170
 180



TO (6B-) RELAYS IN APP FIG 1 ON OTHER ODD OR EVEN FRAMES ASSOS WITH SAME POS GR AT TSP (SEE TABLE B, SHEET B15)

TO AMA POS CKT FOR TOLL OR DSA FWBD OR OCT TO CAMA POS OR MF CAMA POS CKT OR TO POS CONTROL CKT

TO CHIEF OPERATORS ADMINISTRATION CKT VIA ASSOC TSP CONTROLLER FR (SEE NOTE 1)
 TO TR REG CKT (SEE NOTE 1)

6B1 TO "6B" OF PREC CAMA POS OR TO CAMA TRK CKT IN POS SR
 6B TO "6B" OF SUCC CAMA POS OR TO CAMA TRK CKT IN POS SR

CROSS CONNECTION FIELD AT TOP OF POS LK FR

CROSS CONNECT TO EITHER (A) OR (B) CONT OR TO BOTH AS REQD (SEE NOTES 201, 305 & 307)

RUN PER POS GR APPEARANCE ON TSP ONLY

RUN PER POS GR APPEARANCE ON TSP ONLY

RUN ON LAST CKT OF CAMA POS GR APPEARANCE ONLY AND FOR EACH TSP GR APPEARANCE

NOTES:
 1. THE 6B- LEADS FROM THE TRAFFIC REGULATOR CKT FOR "ZS" OPTION ARE ASSOCIATED WITH (6B-) RELAYS ON ODD AND EVEN FRAMES PER NOTES 303, 307, AND THE FOLLOWING TABLE.

OPTION "ZS"	
LEAD DESIGNATION	POSITION LINK FRAME
6BA-6 EVEN	0, 4, 8, 12, 16, 20
6BA-6 ODD	1, 5, 9, 13, 17, 21
6BIA-6 EVEN	2, 6, 10, 14, 18, 22
6BIA-6 ODD	3, 7, 11, 15, 19, 23

SD-25964-01-09

CAMA
 POSITION LINK AND CONTROLLER
 CIRCUIT

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