

BELL TELEPHONE LABORATORIES, INC.

TOLL SYSTEMS
TELEPHONE REPEATER
"V3" TELEPHONE REPEATER
KEY SHEET

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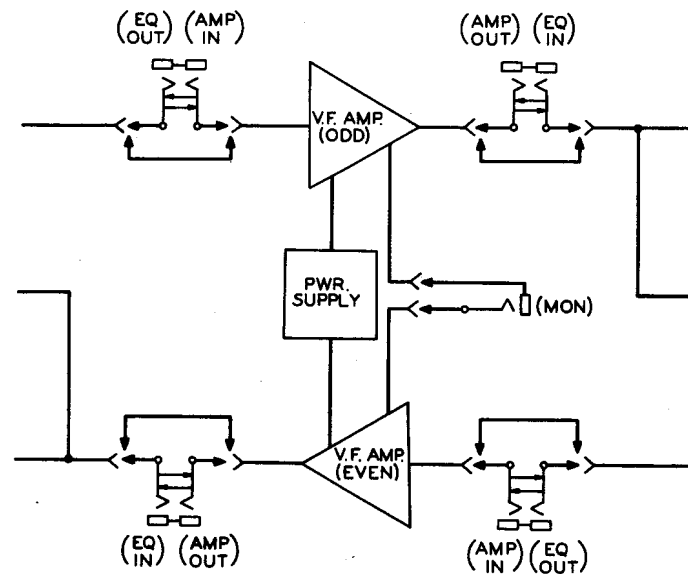
AT & T CO.
STANDARD

SD-59070-02

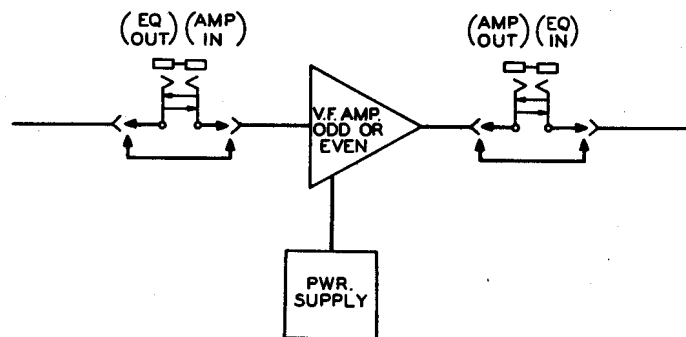
J.J. DARMODX

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"V3" TELEPHONE REPEATER



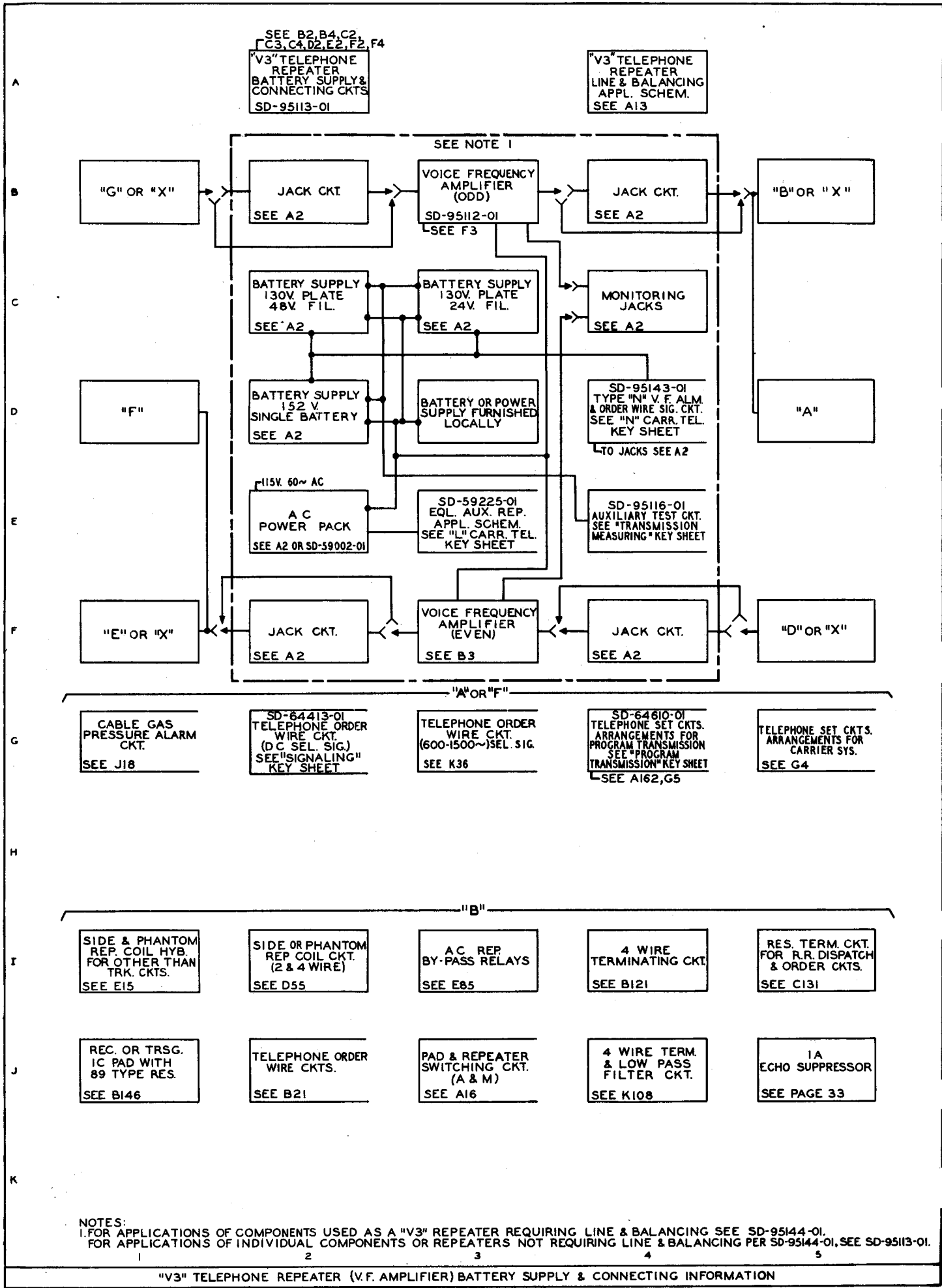
V.F. AMPLIFIER



The V3 Telephone Repeater consists of two one-way, one-stage V.F. amplifiers intended for AC or DC operation with 20V heaters and 130-152 d-c plate voltage. Jacks, used for monitoring or testing circuits or repeaters, may or may not be supplied.

As in the V1 Telephone Repeater, these V.F. amplifiers provide a maximum gain of about 35 db at 1000 cycles, the input and output impedances are about 600 ohms, and the frequency characteristic is substantially flat. Unlike the V1, the gain is continuously adjustable over a 40 db range by means of a potentiometer across the secondary winding of the input transformer. A monitoring winding with pin jacks and a pin jack for measuring cathode current are provided. These amplifiers are considerably smaller than any previous V.F. amplifier occupying about one-sixth the space required for a V1. They are connected to line circuits by means of an eleven pin plug which greatly facilitates maintenance.

Several types of repeater arrangements may be formed by means of associated line and terminating equipment. The repeaters may be used with either 2- or 4-wire line circuits.



NOTES:
 1. FOR APPLICATIONS OF COMPONENTS USED AS A "V3" REPEATER REQUIRING LINE & BALANCING SEE SD-95144-01.
 2. FOR APPLICATIONS OF INDIVIDUAL COMPONENTS OR REPEATERS NOT REQUIRING LINE & BALANCING PER SD-95144-01, SEE SD-95113-01.

"D"

A	AC REP. BY-PASS RELAYS SEE G84	AUX. EQL. FOR PROV. OPEN WIRE & EQL. FOR CKTS. WITH 135~ SIG. SEE F105	FILTER SEE B110	4 WIRE EQL. CKT. SEE C115	FILTER CKT. TO PREVENT OPERATION OF ECHO SPR. BY TELEG. THUMP SEE J115
B	4 WIRE TERMINATING CKT. SEE C122, C123	RES. TERM. CKT. FOR R.R. DISPATCH & ORDER CKTS. SEE D131	REC. OR TRSG. IC PAD WITH 89 TYPE RES. SEE B146	TELEPHONE ORDER WIRE CKTS. SEE B21	PAD & REPEATER SWITCHING CKT. (A & M) SEE A16
C	4 WIRE TERMINATING CKT. SEE K108	REG. NETWORK & TRANSFER CKT. SD-64937-01 * SEE: G10, K14, G108, E115, D129, G127, G136, G148, C158	REG. NETWORK & TRANSFER CKT. SD-64937-02 SEE H6, K15, G109, F111, D130, G128, G137, G149, C157		

"E"

E	SIDE & PHANTOM CKT. REP. COIL HYB. FOR OTHER THAN TRK. CKTS. SEE E15	SIDE OR PHANTOM REP. COIL CKT. (FOR 2 OR 4 WIRE) SEE D55	AC REP. BY-PASS RELAYS SEE G85	1A ECHO SUPPRESSOR SEE PAGE 33
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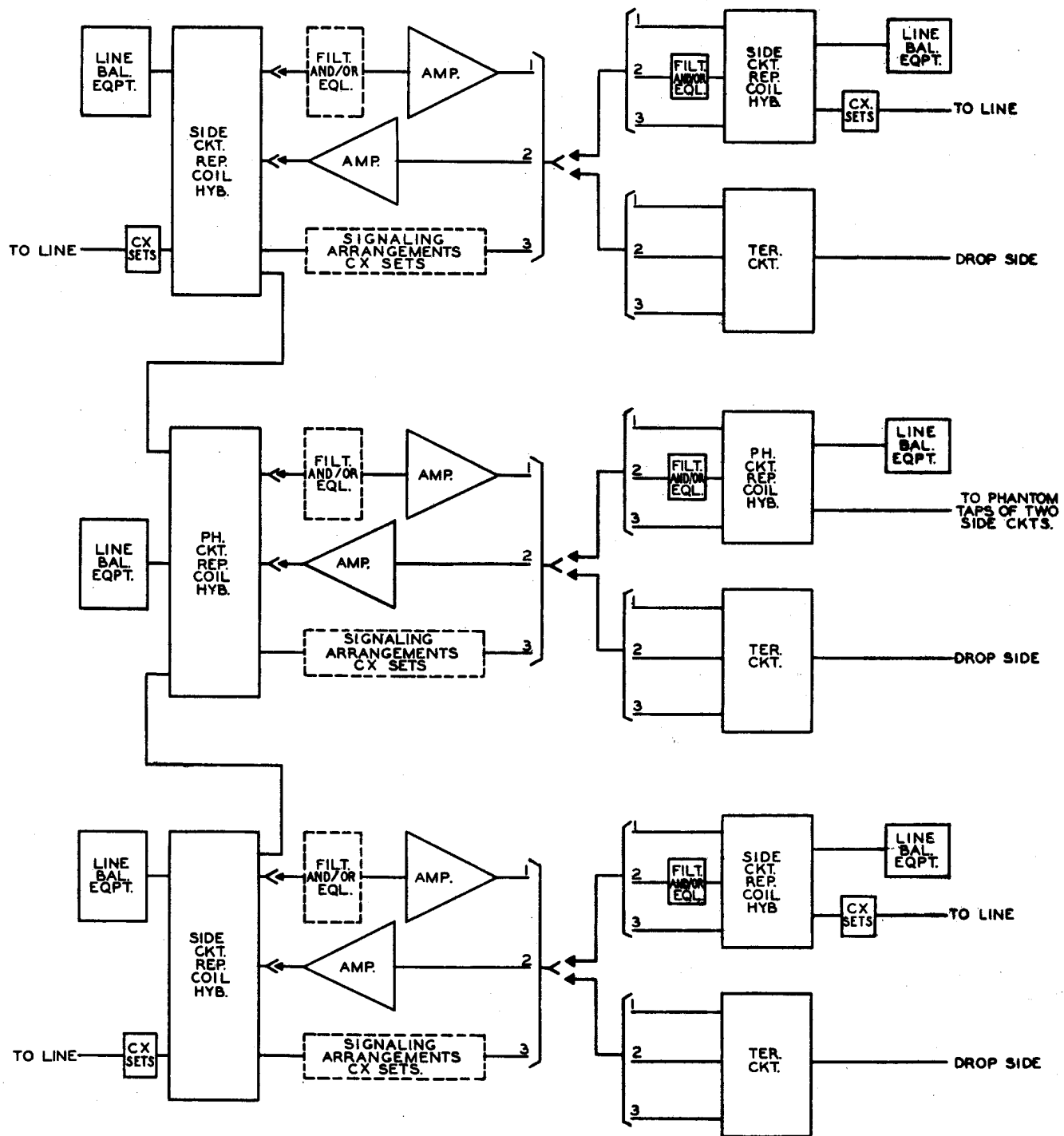
"G"

G	AUX. EQL. FOR PROV. OPEN WIRE & EQL. FOR CKTS. WITH 135~ SIG. SEE F105	FILTER SEE B110	4 WIRE EQL. CKT. SEE C115	FILTER CKT. TO PREVENT OPERATION OF ECHO SPR. BY TELEG. THUMP SEE J115	REG. NETWORK & TRANSFER CKT. SEE C7
H	REG. NETWORK & TRANSFER CKT. SEE C8				

"X"

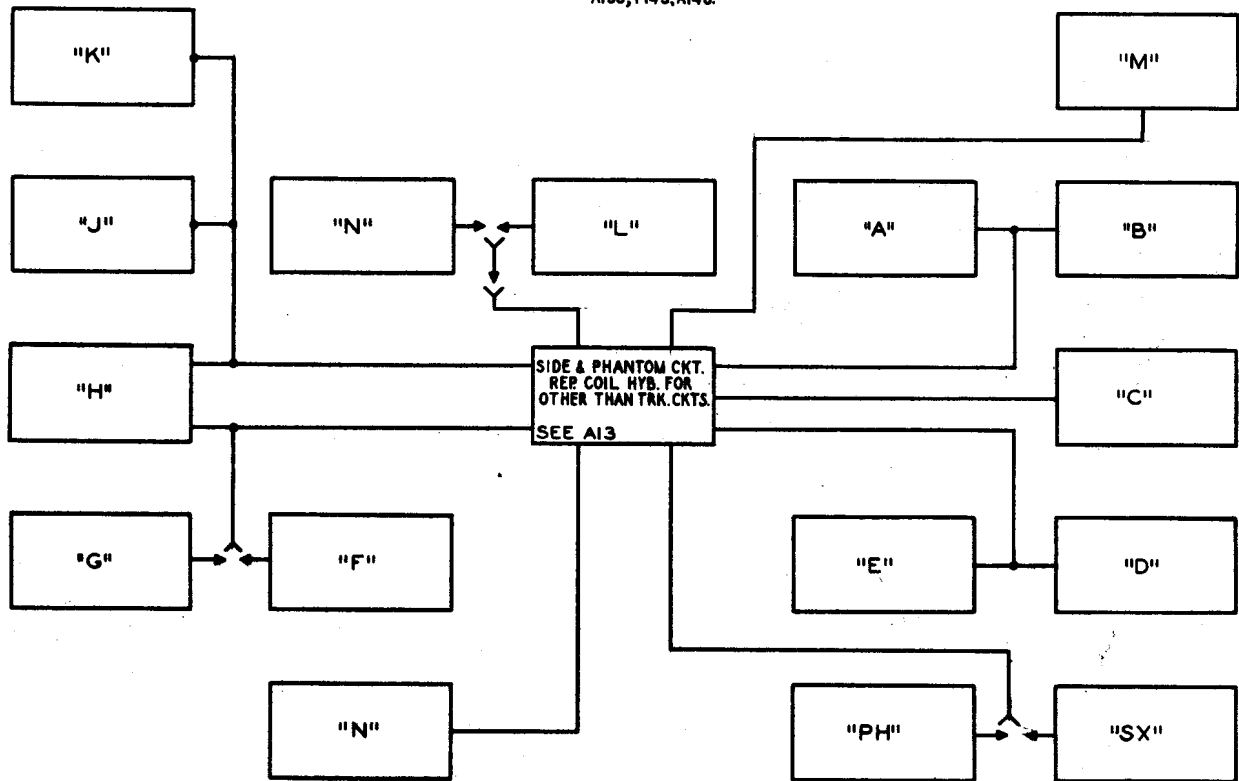
I	PHYSICAL OR PHANTOM CKT. REP. COIL HYB. FOR 2WIRE LINE ARR. FOR TRK. CKT. USE SEE C30, E30	SIGNALING CUT-OFF REL. CKT. SEE D16	TELEPHONE ORDER WIRE BRIDGING ARRANGEMENT SEE F20	TOLL CONFERENCE SERVICE SEE PAGE 33	V.F. PTCH. & MON. JKS. AMP. CONTROL PAD & TRK. CKTS. SEE B60
J	SD-70515-01 INTERCONNECTING CKT. FOR 40 TYPE CARR. TELEG. SEE "CARR. TELEG." KEY SHEET	"V1" & "V2" TEL. REP. (CABLE CKTS.) SEE E19	"V1" TEL. REP. OPEN WIRE LINES) SEE E20	SD-64083-01 CARRIER TRANSFER TERM. & REP. CKTS. SEE KEY SHEET FOR "H" CARRIER TEL.	
K	SD-56227-01 ORDER WIRE CKT. AUX. REP. TO RADIO REL. SEE "SIGNALING" KEY SHEET	SD-56228-01 ORDER WIRE CKT. MAIN REP. TO RADIO REL. SEE "SIGNALING" KEY SHEET	V.F. PTCH. & MON. JKS. AMP. CONTROL PAD & TRK. CKT. SEE H127		

*"A&M ONLY" EXCEPT FOR 2W REGULATED SECTIONS.
EQUIVALENT TO MORE THAN 96 MILES OF AERIAL CABLE.



"V3" TEL. REP.
LINE & BALANCING
APPLICATION SCHEMATIC
SD-95144-01

SEE A4, D13, A26, A36, A53, A68,
A73, A78, A83, A93, A98,
A103, A108, B113, A118, A123,
A133, F143, A148.



SD-55194-01
TERM. & INTER. SIG.
SEE "SIGNALING"
KEY SHEET

SEE D48, C62, E66, C107, A127,
C128, C136, E136, F146

SD-68135-01
INTERTOLL INC. TRK. CKT.
SEE "TOLL SW. SYS. NO. 4"
KEY SHEET

SEE D17, H16, K106

SD-68154-01
INTERTOLL OR TOLL TDM
INCOMING TRK. CKT.
SEE "TOLL SW. SYS. NO. 4"
KEY SHEET

SEE D18

SD-68005-01
INTERTOLL OUTGOING
RINGDOWN TRK. CKT.
SEE "TOLL SW. SYS. NO. 4"
KEY SHEET

SEE D19

SD-68113-01 (A&M)
INTERTOLL OUTGOING
TRK. CKT. (DIAL) SEE
"TOLL SW. SYS. NO. 4"
KEY SHEET

SEE D20

SD-68155-01 (A&M)
INTERTOLL OUTGOING
TRK. CKT. (CA) SEE
"TOLL SW. SYS. NO. 4"
KEY SHEET

SEE E16

SD-68285-01
PAD SWITCHING CKT.
SEE "TOLL SW. SYS. NO. 4"
KEY SHEET

SEE E18

AC REPEATER
BY-PASS RELS.
SEE E81, F85

5db PAD CKT. FOR
PROV. OPEN WIRE CKTS.
EQUIPPED WITH 3KC
CARR. LINE FILTER
SEE E96

AUX. EQL. FOR R.R.
DISPATCH CKTS.
SEE B101

FILTER
SEE B106

REC. OR TRSG.
PAD CKT.
SEE B150

AUX. EQL. FOR PROV.
OPEN WIRE & EQL. FOR
CKTS. WITH 135~ SIG.
SEE F101

SD-68327-01
CKT. PATCHING BAY
JACK CKTS.
SEE "TOLL SW. SYS. NO. 4
OR 4A" KEY SHEET

SEE F16, H18, K107

REG. NETWORK &
TRANSFER CKT.
SEE C7

REG. NETWORK &
TRANSFER CKT.
SEE C8

SIDE & PHANTOM CKT. REP. COIL HYBRID (FOR OTHER THAN TRK. CKTS)

"B" CONTINUED

SD-68004-01(A&M)
PAD & REP. SW. CKT.
SEE KEY SHEET FOR
TOLL SW. SYS. NO. 4
LSEE G17, K102, J3, B10

2 WAY INTERTOLL
TRK. CKT.
SEE E17

4 WIRE EQL. CKT.
SEE C111

"C"

20~ REPEAT
COIL CKT
SEE A66

3 1/2~ SIGNALING
BY-PASS CKT.
SEE E76, E80

TYPE "D" OR "E"
TERM. CX CKT. OR
TYPE "D" INTER. CX SET
SEE F71

SD-31726-01
INC. TRK. CKT.
SEE KEY SHEETS FOR
NO. "1" "350A" OR
"355A" SXS SYS.
LSEE G40, J45, H54,
160, D122, E131

"D"

SD-55393-01
SIG. CUT-OFF REL. CKT.
SEE "SIGNALING"
KEY SHEET
LSEE C88, D88, J86, D109, F122,
E127, I127, G132, F140, A144, I7

INTERTOLL INCOMING
TRK. CKT
SEE I11

INTERTOLL OR TOLL
TANDEM INC. TRK. CKT
SEE I12

INTERTOLL OUTGOING
RINGDOWN TRUNK CKT.
SEE I13

INTERTOLL OUTGOING
TRUNK CKT. (DIAL)
(A & M)
SEE I14

INTERTOLL OUTGOING
TRK. CKT. (CA)
(A & M)
SEE I15

SD-68102-01
2 WAY INTERTOLL
TRK. CKT. SEE
"TOLL SW. SYS. NO. 4"
KEY SHEET
LSEE H17, A17, J110

PAD
SWITCHING
CKT
SEE J11

SD-64903-01
"VI" & "V2" TEL. REP.
(CABLE CKTS.)
SEE "VI" TEL. REP.
KEY SHEET
LSEE G28, K27, C56,
E107, J7

SD-64903-03
"VI" TEL. REP.
(OPEN WIRE LINES)
SEE "VI" TEL. REP.
KEY SHEET
LSEE G28, K28, C57,
E108, J8

CKT. PTCH. BAY
JACK CKTS.
SEE K13

AC REPEATER
BY-PASS RELAYS
SEE F83, G81

REC. OR TRSG. PAD
SEE B150

"1A" ECHO
SUPPRESSOR
SEE PAGE 33

TELEPHONE ORDER WIRE
BRIDGING ARRANGEMENT
SD-59046-01 C
LSEE A57, B87, E87, G97
E108, I8, A161

"V3" TEL. REP.
SEE B5, F1

PAD & REPEATER
SWITCHING CKT.
(A & M)
SEE A16

"E"

INTERTOLL INCOMING
TRK. CKT.
SEE I11

2 WAY INTERTOLL
TRK. CKT.
SEE E17

CKT. PTCH. BAY
JACK CKTS.
SEE K13

"F"

TO TWO SIDE CKT.
REP. COIL HYBS. FOR
OTHER THAN TRK. CKTS.
SEE F14

TO TWO SIDE CKT.
REP. COIL CKT.
(FOR 2 WIRE)
SEE E40

TO TWO SIDE CKT.
REP. COIL CKT.
SEE E53

"G"

SD-56166-01
TYPE "A" & "C" CX SETS
& CX BAL. SET CKTS.
SEE "SIGNALING"
KEY SHEET
LSEE A22, G41, H43, C61,
D63

SD-64932-01
LINE FILTER CKTS.
SEE KEY SHEET FOR
"U" CARR. TEL.
LSEE B22, I41, E62, C93,
F93, C99

SD-55211-01
CABLE GAS PRESSURE
ALARM CKT.
SEE "TOLL TST. BD"
KEY SHEETS
LSEE H41, D61, F79, G77,
I93, F121, G131, G1

TYPE "C" CX CKT.
& CX BAL. CKT.
SD-60136-02 (A&M) C
LSEE H44, D64

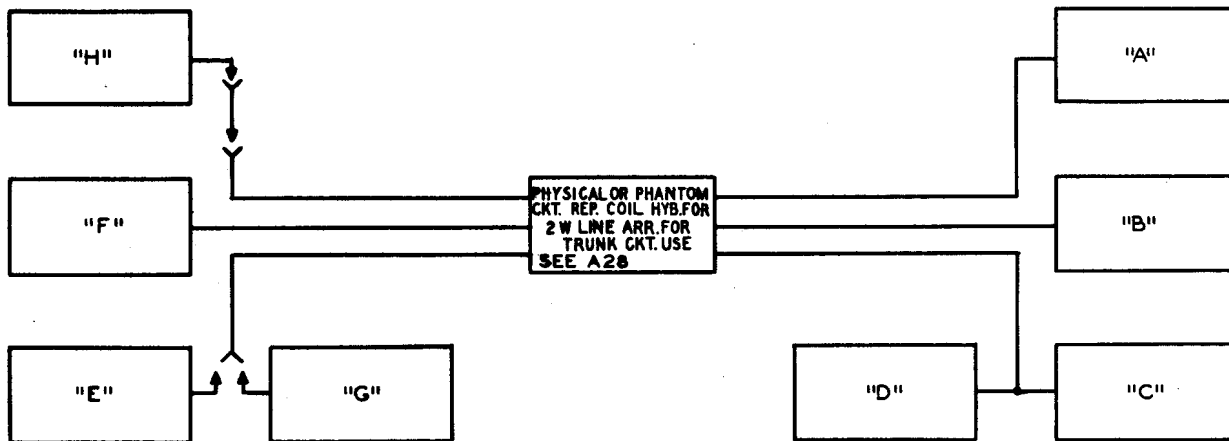
40A
CABLE TERMINAL

TYPE "A" OR "B" CX CKT.
& CX BAL. CKT.
SD-60548-02 C
LSEE C24, H45, D65

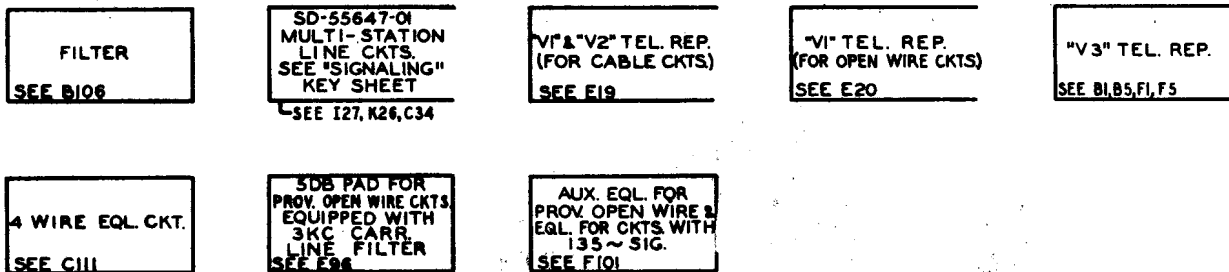
SD-63661-01
PRIMARY JK. CKT.
SEE "TOLL TST. BD"
KEY SHEETS
LSEE B46, E61, E116

A	"H"				
	TYPE "C" CX CKT & CX BAL. CKT. SD-60136-03 C LSEE C23,G42,G62,D116	TYPE "H" & "C" CX SET & CX BAL. SET CKT. SEE J16			
B	"J"				
	SD-55385-01 TELEPHONE ORDER WIRE CKTS. SEE "SIGNALING" KEY SHEET LSEE J38,K54,J2,B9	LINE FILTER CKTS. SEE J17	LINE & BAL. NETWORK FOR TRK. & DISPATCH CKTS. SEE B91	114 TYPE LINE & BAL. NETS. FOR OPEN WIRE CKTS. SEE E91	115 TYPE LINE & BAL. NETS. FOR OPEN WIRE CKTS. SEE B96
C	CABLE LINE & BAL. NETWORK SEE H91	LINE AND BAL. NETWORKS SD-60963-02 C LSEE F31	TYPE "C" CX CKT. & CX BAL. CKT. SEE A21	TYPE "W" OR "B" CX CKT. & CX BAL. CKT. SEE K16	LINE & BAL. NETWORKS FOR USE WITH B-88-50 OR H-88-50 2W LOADED CABLE CKTS. SD-64370-01 (A&M) C LSEE F35
D	"K"				
	PH. CX BAL. FOR TERM. TYPE "E" CX SET SEE B76	PH. CX BAL. BY-PASS CKT. FOR INT. TYPE "E" CX CKT. SEE I76,I80	PH. CX BAL. CKT. FOR TYPE "E" CX BY-PASS CKT. SEE B81		
E	"L"				
	4 WIRE EQUALIZER CKT. SEE D113				
F	"M"				
	AC REPEATER BY-PASS RELAYS SEE E83,G83				
G	"N"				
	SD-95142-01 ORDER WIRE & ALM. CKT. SEE KEY SHEET FOR "N" CARR. TEL. LSEE F56,F112	TYPE "D" OR "E" TERM. CX CKT. OR TYPE "D" INTERMEDIATE CX SET SEE F75			
H	"PH"				
	TO PHANTOM CKT. REP. COIL HYB. FOR OTHER THAN TRK. CKTS. SEE E12	TO PHANTOM CKT. REP. COIL HYB. FOR 2 WIRE LINE ARR. FOR TRK. CKT. USE SEE E27	TO PHANTOM TWO REP. COIL CKT. (FOR 2 WIRE) SEE E36	TO PHANTOM REP. COIL CKT. SEE D51	PHANTOM TAP TIE OR SIDE CKT. RES. CKT. SEE G117,G119
I	"SX"				
	SD-55390-01 ALM. SIG. & 20~ REP. CKT. SEE KEY SHEET FOR "K" CARR. TEL. LSEE K63,G73	TO ANY CKT. REQUIRING SIMPLEX CHANNELS			
J					
K					
	21	22	23	24	25
SIDE & PHANTOM CKT. REP. COIL HYBRID (FOR OTHER THAN TRK. CKTS.) CONTINUED					

"V3" TELEPHONE
REPEATER
LINE & BALANCING
APPL. SCHEM.
SEE A13
SEE D28



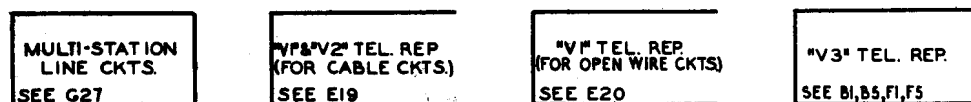
"A"



"B"



"C"



26

27

28

29

30

PHYSICAL OR PHANTOM CKT. REP. COIL HYBRID (ARRANGED FOR TRUNK CKT. USE)

A

"D"

B

2 WAY OPERATOR
OFFICE TRK. CKT.
SEE I28

DIAL LONG LINE CKT.
TYPE "B" CX SIG. SUPPLIES
LINE SUPERVISION WITH
OR WITHOUT REPS.
SEE I26

"E"

C

SD-55038-01
PATCHING, LISTENING &
MAKE BUSY CKT.
SEE KEY SHEETS FOR
NO. 5 TOLL TST. BD. (A & M)
NO. 3CF TOLL SWBD.
SEE J37, K53, FI23, GI33

SD-55123-01
INTER TOLL TRK. CKT.
2 WAY RINGDOWN
20 OR 135 ~ SIG. SEE
KEY SHEET FOR
TOLL SWBD. NO. 3 OR 3CF
SEE J39, K55, FI24, GI34

2 WAY OPERATOR
OFFICE TRK. CKT.
SEE I28

MULTI-STATION
LINE CKTS.
SEE G27

D

DIAL LONG LINE CKT.
TYPE "B" CX SIG. SUPPLIES
LINE SUPERVISION WITH
OR WITHOUT REPS.
SEE I26

SD-59027-01
LONGITUDINAL NOISE
SUPPRESSION CKT.
SEE KEY SHEET FOR
"K" CARR. TEL.
SEE H42, D62

E

"F"

F

LINE BALANCING
NETWORKS
SEE C22

COMPROMISE &
BALANCING NETWORKS
(FOR USE WITH EXCHANGE
AREA CKTS. OR ATT. TELSETS)
SD-90517-01 C
SEE I139

13, 104, 107 & 115 TYPE
CABLE LINE
BALANCING NETWORKS
SEE H91

115 TYPE
LINE BAL. NETWORKS
(FOR OPEN WIRE CKTS.)
SEE B96

LINE BAL. NETWORKS
FOR USE WITH 8-88-50
OR 11-88-50 2W LOADED
CABLE CKTS. (A & M)
SEE C25

G

"G"

H

TO TWO SIDE CKT.
REP. COIL HYBRIDS
SEE FI4

TO TWO SIDE TWO
REP. COIL CKTS.
(FOR 2 WIRE LINE)
SEE E40

TO TWO SIDE
REP. COIL CKTS.
(FOR 2 & 4 WIRE LINE)
SEE E53

"H"

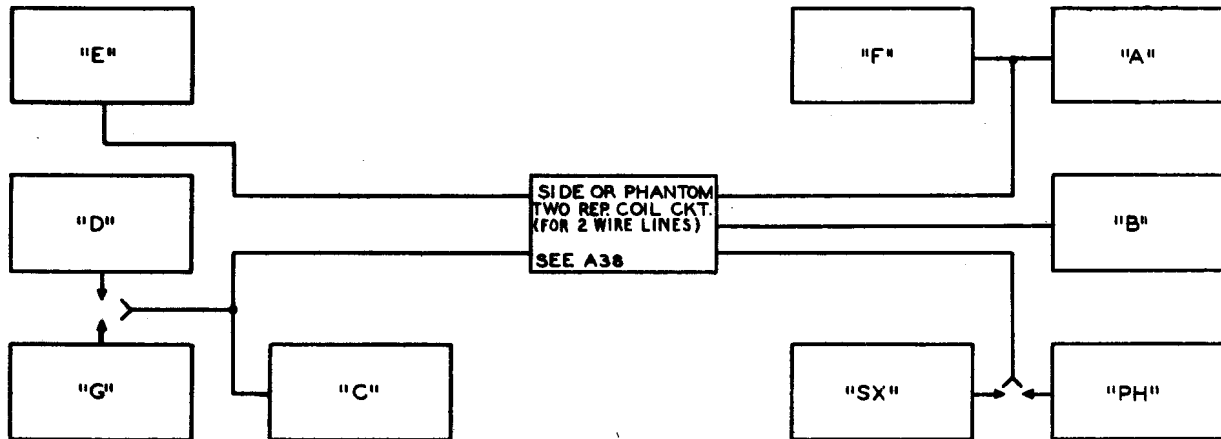
I

4 WIRE
EQUALIZER CKT.
SEE DI13

J

K

"V3" TELEPHONE
REPEATER
LINE & BALANCING
APPL. SCHEM.
SEE A13
SEE D38



"A"

SD-15362-01 OUTGOING TRK. CKT. TO TOLL OFFICE SEE KEY SHEETS FOR SWBD. 1, 1C, 9C, 9D, 10(A&M) AND SWBD. 11 SEE J41, G55, I56	SD-21866-01 OUTGOING TRK. CKT. TO SXS OFFICE FOR USE WITH CX SIG. SEE "PANEL SYSTEMS" KEY SHEET SEE J42, H51, I57	SD-25905-01 D.P. INCOMING TRK. CKT. SX OR CX SUPERVISION ARR. FOR REXING L. REP. D.P. SEE KEY SHEET FOR XBR. SYSTEMS SEE J43, H52, I58	SD-25909-01 TANDEM OFFICE INCOMING TRK. CKT. MULTI-FREQ. PULSING SEE KEY SHEET FOR XBR. SYSTEMS SEE J44, H53, I59	INCOMING TRK. CKT. SEE B19
SD-31865-01 INCOMING TRK. CKT. CX OR SX SIG. SEE KEY SHEET FOR SXS SYSTEMS SEE K41, H55, J58	SD-31887-01 INCOMING TRK. CKT. CX TYPE "B" OR SX SIG. SEE KEY SHEETS FOR NO. 1, 350A, 355A, SXS SYSTEMS SEE K42, I51, J57	SD-31888-01 RECORDING COMPLETING TRUNK CKT. FOR CX SIG. TYPE "B" SEE KEY SHEETS FOR NO. 1, 350A, 355A, SXS SYSTEMS SEE K43, I52, J58	SD-55109-01 INTERTOLL DIALING OUTGOING TRK. CKT. SEE KEY SHEETS FOR NOS. 1 & 3 TYPE TOLL SWBDS. SEE K44, I54, J59	SD-55337-01(A&M) PATCHING JACK CKT. SEE "TOLL TEST BD. NO. 4 OR 5" KEY SHEETS SEE I55, D124, E134
SD-55256-01 2 WAY OPR. OFF. TRK. CKT. K.P. CX OR LOOP SIG. SEE KEY SHEETS FOR TOLL SWBD. NO. 3(A&M), 3C OR 3CL SEE K45, J51, J60	SD-55380-01 TOLL SWITCHING TRK. CKT. REPEATED CX SIG. SEE KEY SHEETS FOR TOLL SWBD. NO. 3(A&M) 3C OR 3CL SEE A49, J52, K58	SD-56202-01 1600 OR 2000 ~ SINGLE FREQ. SIG. CKT. SEE "SIGNALING" KEY SHEET SEE J53, E122, F132	SD-55849-01 INTERTOLL DIALING OUTGOING TRK. CKT. DIAL PULSING FROM SDR. SEE KEY SHEET FOR SWBD. NO. 3C OR 3CL SEE J55, E123, F133	SD-55379-01 INTERTOLL DIALING TOLL SWITCHING TRK. CKT. SX OR CX SIG. TYPE "B" SEE KEY SHEETS FOR NOS. 1 & 3 TYPE TOLL SWBDS. SEE A46, K51, K56
SD-55172-01 135 ~ DC SIG. CKT. THRU & TERM. SEE "SIGNALING" KEY SHEET SEE K52, H96, I101, G106, E124, F134	PATCHING, LISTENING, & MAKE BUSY CKT. SEE C31	TELEPHONE ORDER WIRE CKTS. SEE B21	INTERTOLL TRK. CKT. 2 WAY RINGDOWN 20 OR 135 ~ SIG. SEE C32	2 WAY OPERATOR OFFICE TRUNK CKT. SEE I28
SD-55320-01 TELEPHONE ORDER WIRE CKT. 600-1500 ~ SEL. SIG. SEE "SIGNALING" KEY SHEET SEE A58, G121, H131, G3		SD-64697-01 SIG. CONVERTER CKT. FOR CONN. CX SIG. CKT. TO 20 ~ RINGDOWN CKT. SEE "SIGNALING" KEY SHEET SEE A60, G122, H132	SD-64472-01 INTERTOLL DIALING OUTGOING TRK. CKT. SEE KEY SHEETS FOR NO. 3(A&M), 3B, 3C, 3CL TOLL SWBD. SEE B56, G123, H133	SD-64474-01(A&M) INTERTOLL DIALING OUTGOING TRK. CKT. SEE "TOLL SWBD. NO. 1" KEY SHEET SEE B57, G124, H134

"A" (CONTINUED)

A

SD-64724-01
PATCHING, MONITORING
& TESTING JACKS
SEE KEY SHEET FOR TOLL
TST. BD. NO. 16 (M.D.) 7B OR 18B
SEE B58, G125, H135, G162

SD-64590-01
INTERTOLL DIALING TRK. CKT.
INC. TO SET CKT. OR
OPERATOR WITH SX OR CX SIG.
SEE KEY SHEET FOR TOLL SWBD.
NO. 11 (A&M), 3 (A&M), 3C OR 3CL
SEE B58, H121, I131

SD-63845-01
135-20~ TERM. RINGER
& CUT-OFF RELAY CKT.
SEE "SIGNALING"
KEY SHEET
SEE C58, H122, I132

SD-64824-01
INTERTOLL DIALING TRK. CKT.
FOR CONN. CX SIG. TO LOOP
SIG. CKT.
SEE KEY SHEET FOR TOLL SWBD.
NO. 1 (A&M), 3 (A&M), 3C OR 3CL
SEE A50, K59, H123, I133

SD-62632-02
AUX. INTERTOLL TRK.
& SW. TRANSMISSION PAD
SEE KEY SHEETS FOR TOLL
SWBD. NO. 3 (A&M), 3B OR 3C
AND SWBD. NO. 11
SEE C59, H124, I134

B

SD-62614-01
R.D. INTERTOLL TRK. CKT.
SEE KEY SHEETS FOR TOLL
SWBD. NO. 3 (A&M), 3B, 3C OR 3CL
AND SWBD. NO. 11 (A&M)
SEE C60, H125, I135

SD-64419-01
1000~ RINGER OSCILLATOR
SEE "SIGNALING"
KEY SHEET
SEE D56, I121, J131

SD-62741-01 (A&M)
JACK CKT.
FOR PTCH. MON. TESTING
SEE KEY SHEETS FOR TEST
& CONT. BD. NO. 8 AND TOLL
TST. BD. NO. 16 (M.D.)
SEE D57, I122, J132

SD-64531-01
INTERTOLL DIALING
2 WAY TRK. CKT.
D.P. DIALING
SEE KEY SHEETS FOR NO.
3 (A&M), 3C, 3CL OR NO. 11 (A&M)
SWBD.
SEE D58, I123, J133

SD-64538-01
INTERTOLL DIALING
OUTGOING TRK. CKT.
CX OR SX SUPERVISION
SEE KEY SHEETS FOR TOLL
SWBD. NO. 3 (A&M), 3B, 3C OR 3CL
SEE D59, I124, J134

C

SD-95060-01
2 WAY TRK. CKT.
TO CONNECT LOOP SIG. TRK.
TO CX SIG. CKT.
SEE XBR. KEY SHEETS
SEE E56

SD-96398-01
AUX. TRK. CKT.
CX SIG. TYPE "B"
SEE KEY SHEETS
FOR XBR. SYSTEMS
SEE B47, E57, K60

SD-96252-01
DIAL LONG LINE CKT.
SEE PBX, XBR.
OR SX'S KEY SHEETS
SEE B48, E58, A61,
J122, K132

D

E

"B"

F

20~ REP. COIL CKT.
(SIDE OR PH. CKT.)
FOR 20~ SIG. OR
20~ BY-PASS
SEE A66

TYPE "D" OR "E" TERM. CX CKT.
TYPE "D" INTERMEDIATE
CX SET
SEE F71

G

"C"

TYPE "A" & "C" CX SET.
& CX BAL. SET CKTS.
SEE J16

TYPE "C" CX CKT.
& CX BAL. CKT.
SEE A21

H

"D"

CABLE GAS PRESSURE
ALM. CKT.
SEE J18

LONGITUDINAL NOISE
SUPPRESSION CKT.
SEE D32

TYPE "A" & "C" CX SET
& CX BAL. SET CKTS.
SEE J16

TYPE "C" CX CKT.
& CX BAL. CKT.
SEE J19

TYPE "X" OR "B"
CX CKT. &
CX BAL. CKT.
SEE K16

I

LINE FILTER CKTS.
(FOR JCARR. TEL.)
SEE J17

J

"E"

OUTGOING TRK. CKT.
TO TOLL OFFICE
SEE G36

OUTGOING TRK. CKT.
TO SX'S OFFICE FOR
USE WITH CX SIG.
SEE G37

D.P. INCOMING TRK.
CKT. SX OR CX SUPERVISION
ARR. FOR RERING &
REP. D.P.
SEE G38

TANDEM OFFICE
INCOMING TRK. CKT.
MULTI-FREQ. PULSING
SEE G39

INCOMING
TRK. CKT.
SEE B19

K

INCOMING TRK. CKT.
CX OR SX SIG.
SEE H36

INCOMING TRK. CKT.
CX TYPE "B" OR SX SIG.
SEE H37

RECORDING COMPLETING
TRK. CKT.
FOR CX SIG. TYPE "B"
SEE H38

INTERTOLL DIALING
OUTGOING TRK. CKT.
SEE H39

2WAY OPR. OFF. TRK. CKT.
K.P., CX, OR LOOP SIG.
SEE I36

"E"(CONTINUED)

INTERTOLL DIALING
TOLL SWITCHING TRK. CKT.
SX OR CX SIG. TYPE "B"
SEE I40

SD-55560-01
20~ DC & DC-20~
TERM. & INTERMEDIATE SIG.
SEE "SIGNALING"
KEY SHEET
L-SEE E125,F135

2 WAY OPERATOR
OFFICE TRK. CKT.
SEE I28

TOLL SWITCHING
TRUNK CKT.
SEE I37

INTERTOLL DIALING
TRUNK CKT. FOR COMM.
CX SIG. TO LOOP
SIG. CKT.
SEE A44

PRIMARY
JACK CKT.
SEE K17

AUX. TRK. CKT.
CX SIG. TYPE "B"
SEE C43

DIAL
LONG LINE
CKT.
SEE C44

"F"

TERM. &
INTERMEDIATE SIG.
SEE H11

20~ REP.
COIL CKT.
SEE A70

"G"

TO TWO SIDE CKT.
REP. COIL HYBRIDS
FOR OTHER THAN TRK. CKTS.
SEE F14

TO TWO SIDE CKT.
TWO REP. COIL CKTS.
(FOR 2 WIRE)
SEE E40

TO TWO SIDE CKT.
REP. COIL CKTS.
(FOR 2 & 4 WIRE)
SEE E53

"PH"

TO PHANTOM CKT.
REP. COIL HYBRID
FOR OTHER THAN TRK. CKTS.
SEE E12

TO PHANTOM CKT.
REP. COIL HYBRID
FOR 2 WIRE LINE ARR.
FOR TRK. CKT. USE
SEE E27

TO PHANTOM CKT.
TWO REP. COIL CKT.
SEE E36

TO PHANTOM
REP. COIL CKT.
(FOR 2 & 4 WIRE)
SEE D51

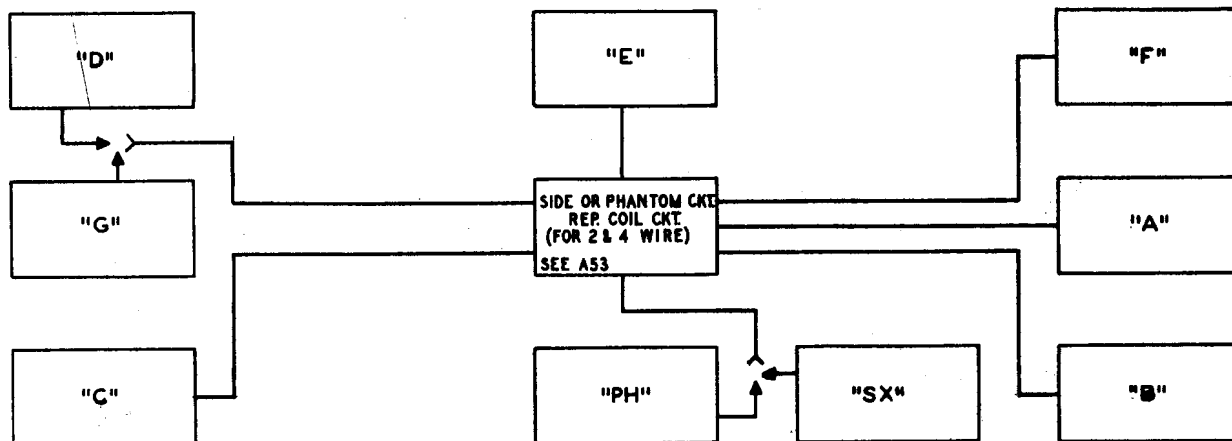
PHANTOM TAP TIE
OR SIDE CKT.
RES. CKT.
SEE G117,G119

"SX"

TO ANY CKT.
REQUIRING
SX CHANNELS

"V3" TEL. REP.
LINE & BALANCING
APPL. SCHEM.
SEE A13

SEE D53



"A"

A-C REPEATER BY-PASS RELAYS SEE F83, G81, F85, E81	4-WIRE EQL. CKT. SEE C111	4 WIRE TERM. CKT. SEE B125	REC. OR TRSG. IC PAD SEE B150	OUTGOING TRK. CKT. TO TOLL OFFICE SEE G36
OUTGOING TRK. CKT. TO SXS OFFICE FOR USE WITH CX SIG. SEE G37	D.P. INCOMING TRK. CKT. SX OR CX SUPERVISION ARR. FOR RERING & REP. D.P. SEE G38	TANDEM OFFICE INCOMING TRK. CKT. MULTI-FREQ. PULSING SEE G39	INCOMING TRK. CKT. SEE B19	INCOMING TRK. CKT. CX OR SX SIG. SEE H36
INCOMING TRK. CKT. CX TYPE "B" OR SX SIG. SEE H37	RECORDING COMPL. TRK. CKT. FOR CX SIG. TYPE "B" SEE H38	SD-55574-01 TEL. ORDER WIRE CKT. 1000~RINGDOWN SIG. SEE "SIGNALING" KEY SHEET SEE E133	INTERTOLL DIALING OUTGOING TRK. CKT. SEE H39	PATCHING JK. CKT. (A & M) SEE H40
2 WAY OPR. OFFICE TRK. CKT. K.P., CX, OR LOOP SIG. SEE I36	TOLL SW. TRK. CKT. REPEATED CX SIG. SEE I37	1600 OR 2000~ SINGLE FREQ. SIG. CKT. SEE I38	1A ECHO SUPPRESSOR SEE PAGE 33	INTERTOLL DIALING OUTGOING TRK. CKT. D.P. FROM SENDER SEE I39
INTERTOLL DIALING TOLL SW. TRK. CKT. SX OR CX SIG. TYPE "B" SEE I40	I35~-DC SIG. CKT. THRU & TERM. SEE J36	PTCH. LISTENING, & MAKE BUSY CKT. SEE C31	TEL. ORDER WIRE CKTS. SEE B21	INTERTOLL TRK. CKT. 2 WAY RINGDOWN 20 OR I35~ SIG. SEE C32

51

52

53

54

55

SIDE OR PHANTOM CKT. REP. COIL CKT. (FOR 2 & 4 WIRE LINES)

"A" (CONTINUED)

A

2 WAY OPR.
OFF. TRK. CKT.
SEE I28

TELEPHONE ORDER
WIRE BRIDGING
ARRANGEMENT
SEE F20

TELEPHONE ORDER
WIRE CKT.
600-1500~SEL. SIG.
SEE K36

SIG. CONVERTER CKT.
FOR CONN. CX SIG. CKT. TO
20~ RINGDOWN CKT.
SEE K38

B

INTERTOLL DIALING
OUTGOING TRK. CKT.
SEE K39

INTERTOLL DIALING
OUTGOING TRK. CKT.
(A & M)
SEE K40

PATCHING, MONITORING,
AND TESTING JACKS
SEE A41

INTERTOLL DIALING TRK. CKT.
INC. TO SET CKT. OR
OPR. WITH CX OR SX SIG.
SEE A42

SD-64303-01
V.F. PATCHING & MON.
JACKS AMP. CONTROL,
PAD & TRK. CKTS.
SEE KEY SHEETS FOR
"C" & "H" CARR. TEL.
SEE E126, G129, I128,
G138, A145, I110

C

"V1" & "V2" TEL. REP.
(CABLE CKTS.)
SEE E19

"V1" TEL. REP.
(OPEN WIRE LINES)
SEE E20

135-20~ TERM. RINGER
& ASSOC. CUT-OFF RELAY
SEE A43

AUX. INTERTOLL TRK.
& SW. TRANSMISSION PAD
SEE A45

R.D. INTERTOLL
TRK. CKT.
SEE B41

D

1000~
RINGER OSCILLATOR
SEE B42

JACK CKT.
FOR PATCHING, MONITORING
AND TESTING
(A & M)
SEE B43

INTERTOLL DIALING
2 WAY TRK. CKT.
D.P. DIALING
SEE B44

INTERTOLL DIALING
OUTGOING TRK. CKT.
CX OR SX SUPERVISION
SEE B45

E

INTERTOLL DIALING
INCOMING TRK. CKT.
WITH CX OR SX SIG. TYPE "B"
SEE C42

AUX. TRK. CKT.
CX SIG. TYPE "B"
SEE C43

DIAL LONG LINE
CKT.
SEE C44

"V3" TEL. REP.
SEE B5 OR F1

SD-95121-C1
"N1" CARR. TEL.
APPL. SCHEMATIC
SEE KEY SHEET FOR
"N" CARR. TEL.
SEE E128, G130,
I129, D150

F

TYPE "M" CARR. ORDER
WIRE AND ALM. CKT.
SEE H21

G

H

"B"

I

OUTGOING TRK. CKT.
TO TOLL OFFICE
SEE G38

OUTGOING TRK. CKT.
TO SXS OFF. FOR
USE WITH CX SIG.
SEE G37

D.P. INCOMING TRK. CKT.
SX OR CX SUPERVISION
ARR. FOR RERING & REP. D.P.
SEE G38

TANDEM OFF.
INCOMING TRK. CKT.
MULTI-FREQ. PULSING
SEE G39

INCOMING TRK.
CKT.
SEE B19

J

INCOMING TRK. CKT.
CX OR SX SIG.
SEE H36

INCOMING TRK. CKT.
CX TYPE "B" OR SX SIG.
SEE H37

RECORDING COMPLETING
TRK. CKT.
FOR CX SIG. TYPE "B"
SEE H38

INTERTOLL DIALING
OUTGOING TRK. CKT.
SEE H39

2 WAY OPR. OFF. TRK. CKT.
K.P., CX, OR LOOP. SIG.
SEE I36

K

INTERTOLL DIALING
TOLL SWITCHING TRK. CKT.
SX OR CX SIG. TYPE "B"
SEE I40

2 WAY OPERATOR
OFF. TRK. CKT.
SEE I28

TOLL SWITCHING TRK. CKT.
REPEATED CX SIG.
SEE I37

INTERTOLL DIALING TRK. CKT.
FOR CONN. CX SIG. TO LOOP
SIG. CKT.
SEE A44

AUX. TRK. CKT.
CX SIG. TYPE "B"
SEE C43

"B" (CONT.)

A

DIAL
LONG LINE CKT.
SEE C44

4 WIRE
EQL. CKT.
SEE D113

B

C

TYPE "A" & "C"
CX SET & CX BAL.
SET CKTS.
SEE J16

TYPE "C" CX CKT.
& CX BAL. CKT.
SEE A21

TYPE "D" OR "E"
TERM. CX CKT.
TYPE "D" INTERMEDIATE
CX SET
SEE F71

D

CABLE GAS
PRESSURE
ALARM CKT.
SEE J18

LONGITUDINAL NOISE
SUPPRESSION CKT.
SEE D32

TYPE "A" & "C"
CX SET & CX BAL.
SET CKTS.
SEE J16

TYPE "C" CX SET
& CX BAL. CKT.
SEE J19

TYPE "A" OR "B"
CX SET & CX
BAL. CKT.
SEE K16

E

PRIMARY
JACK CKT.
SEE K17

LINE FILTER
CKTS.
SEE J17

"E"

F

20~ REP. COIL CKT.
FOR 20~ SIG. OR
20~ BY-PASS
SEE A66

TYPE "D" OR "E"
TERM. CX CKT.
TYPE "D" INTERMEDIATE
CX SET
SEE F71

"F"

G

20~ REP. COIL CKT.
FOR 20~ SIG. OR
20~ BY-PASS
SEE A70

TERM. &
INTERMEDIATE SIG.
SEE H11

"G"

H

TO TWO SIDE CKT.
REP. COIL HYBRIDS
FOR OTHER THAN
TRK. CKTS.
SEE F14

TO TWO SIDE CKT.
TWO REP. COIL CKTS.
(FOR 2 WIRE)
SEE E40

TO TWO SIDE CKT.
REP. COIL CKTS.
(FOR 2 & 4 WIRE)
SEE E53

"PH"

I

TO PHANTOM CKT.
REP. COIL HYBRID
FOR OTHER THAN
TRK. CKTS.
SEE E12

TO PHANTOM CKT.
REP. COIL HYBRID
(FOR 2 WIRE LINE ARR.
FOR TRK. CKT. USE)
SEE E27

TO PHANTOM CKT.
TWO REP. COIL CKT.
(FOR 2 WIRE)
SEE E36

TO PHANTOM CKT.
REP. COIL CKT.
(FOR 2 & 4 WIRE)
SEE D51

PHANTOM TAP TIE
& SIDE CKT.
RES. CKT.
SEE G117, G119

J

SD-64310-01
TEL. TRK. CKT.
SEE KEY SHEET
FOR "K" CARR. TEL.

SEE K61

"SX"

K

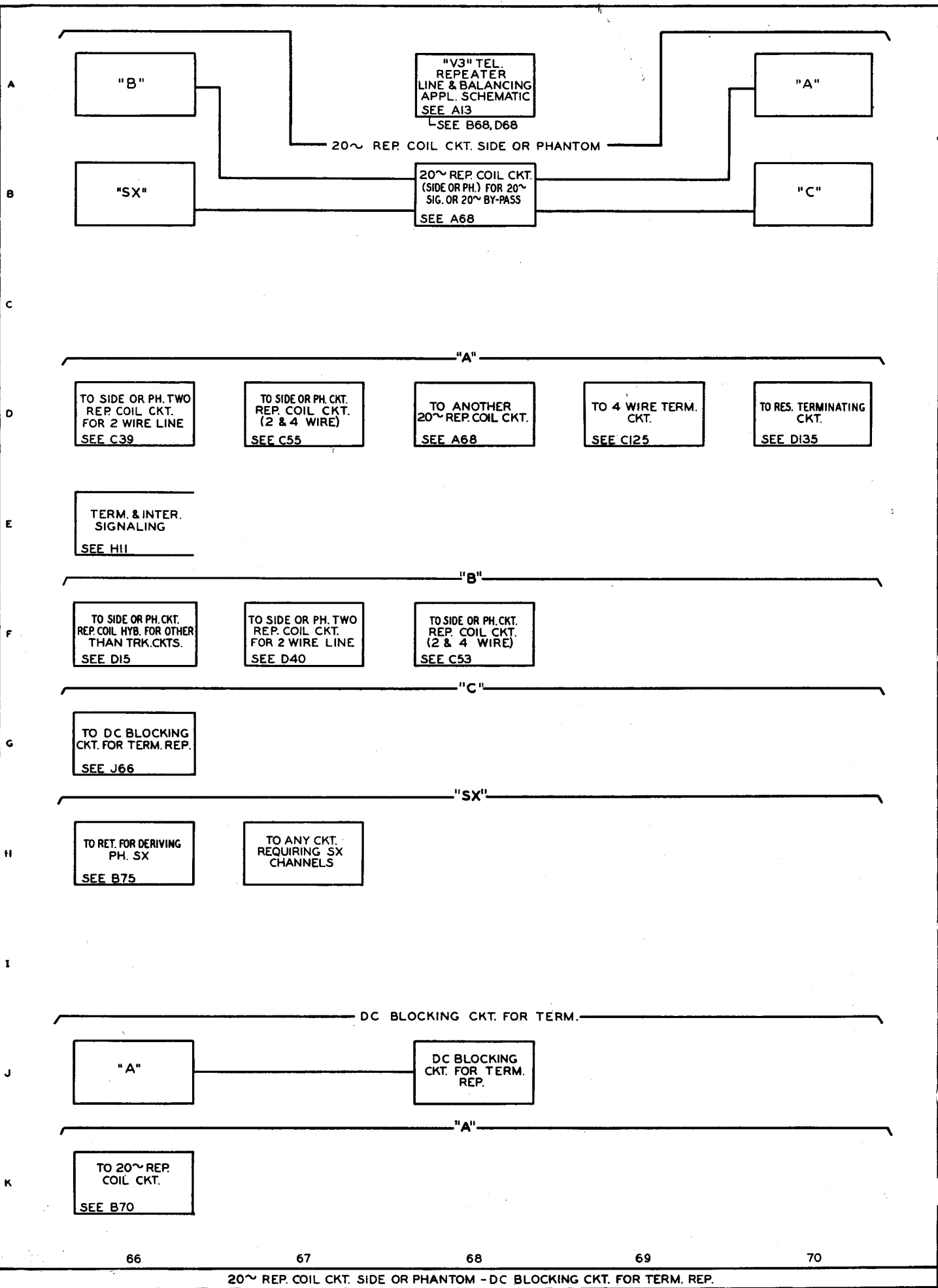
TEL. TRK.
CKT.
SEE J61

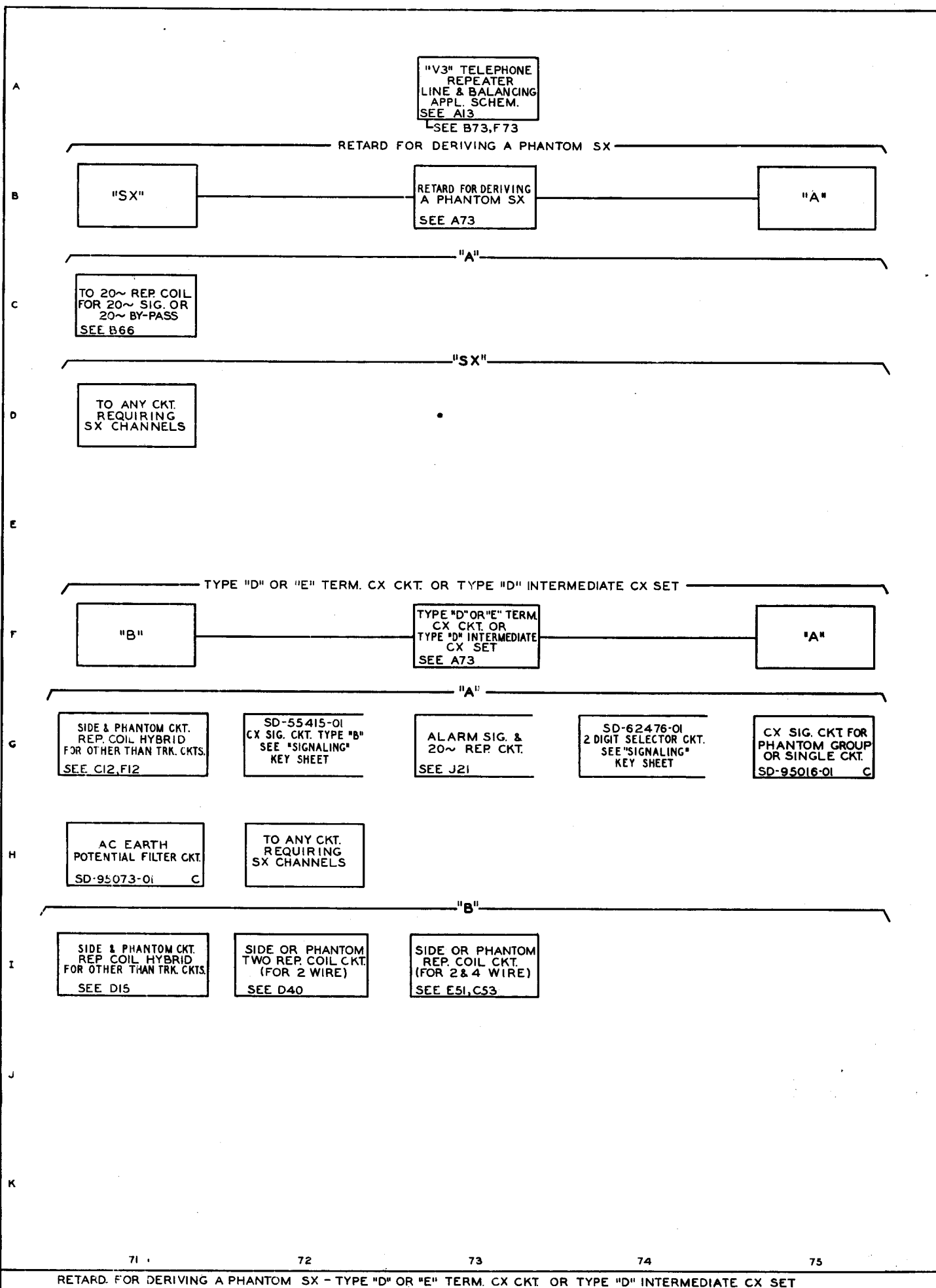
ALARM TRK.
CKT.

SD-64542-01 C
SEE C161

ALARM SIG. &
20~ REP. CKT.
SEE J21

TO ANY CKT.
REQUIRING
SIMPLEX CHANS.





A

"V3" TEL.
REPEATER
LINE & BALANCING
APPL. SCHEMATIC
SEE A13
SEE B78, E78, I78

PH. CX BAL. CKT.

B

"A"

PH. CX BAL. FOR
TERM. TYPE "E" CX SET
SEE A78

"A"

C

PH. CKT. REP. COIL
HYB. FOR OTHER
THAN TRK. CKTS.
SEE B11

D

$3\frac{1}{2}$ ~ SIG. BY-PASS CKT.

E

"B"

$3\frac{1}{2}$ ~ SIG. BY-PASS CKT.
FOR R.R. DISPATCH REP.
INTER. TYPE "E" CX CKT.
FOR 20~ AND CX SIG.
SEE A78

"A"

"A"

F

TO SIDE OR PH. CKT.
REP. COIL HYB. FOR
OTHER THAN TRK. CKTS.
SEE D15

RES. TERM. CKT. FOR
R.R. DISPATCH AND
ORDER CKTS.
SEE D135

SD-55747-01
TEL. ORDER
WIRE CKT.
(DC LOOP SIG.)
SEE "SIGNALING"
KEY SHEET

CABLE GAS PRESSURE
ALM. CKT.
SEE J18

"B"

G

TO SIDE OR PH. CKT.
REP. COIL HYB. FOR
OTHER THAN TRK. CKTS.
SEE D15

CABLE GAS PRESSURE
ALM. CKT.
SEE J18

H

PH. CX BAL. BY-PASS CKT.

I

"B"

PH. CX BAL. BY-PASS
CKT. FOR INTER. TYPE "E"
CX BY-PASS CKT.
SEE A78

"A"

"A"

J

TO PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE B11

"B"

K

TO PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE B11

76

77

78

79

80

PH. CX BAL. CKT. - $3\frac{1}{2}$ ~ SIG. BY-PASS CKT. - PH. CX BAL. BY-PASS CKT.

A
B
C
D
E
F
G
H
I
J
K

"V3" TELEPHONE
REPEATER
LINE & BALANCING
APPL. SCHEM.
SEE A13
L-SEE B83,F82

PH. CX BAL. CKT.

"A"

PHANTOM CX BAL. CKT.
FOR TYPE "E"
CX BY-PASS CKT.
SEE A83

"A"

TO PHANTOM CKT.
REP. COIL HYBRID
FOR OTHER THAN TRK. CKTS.
SEE B11

AC REP. BY-PASS RELAYS

"M"

"A"

"B"

"D"

AC REP.
BY-PASS RELAYS
SEE A83

"E"

"L"

"K"

"F"

"J"

"H"

"G"

"A"

SIDE & PHANTOM CKT.
REP. COIL HYBRID
FOR OTHER THAN TRK. CKTS.
SEE B15

"B"

TO 5 db PAD FOR PROV.
OPEN WIRE CKTS.
EQUIPPED WITH
3KC. CARR. LINE FILTER
SEE E96

TO AUX. EQL. FOR
RAILROAD
DISPATCH CKTS.
SEE B101

TO AUX. EQL. FOR
PROV. OPEN WIRE
& EQL. FOR CKTS.
WITH 135~ SIG.
SEE F101

TO FILTER
SEE B106

TO 4 WIRE
EQL. CKT.
(ALSO FOR SOME 2 WIRE)
SEE C111

81

82

83

84

85

PHANTOM CX BALANCING CKT. FOR TYPE "E" CX BY-PASS CKT. — AC REPEATERS BY-PASS RELAYS

A
B
C
D
E
F
G
H
I
J
K

"D"

"V3" TEL.
REPEATER
SEE B5

TEL. ORDER
WIRE BRIDGING
ARRANGEMENT
SEE F20

"E"

SIDE & PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE E15

SIDE OR PH. REP.
COIL CKT.
(FOR 2 & 4 WIRE)
SEE D55

SIG. CUT-OFF
REL. CKT.
SEE D16

"F"

SIDE & PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE E15

SIDE OR PH. REP.
COIL CKT.
(FOR 2 & 4 WIRE)
SEE D55

SIG. CUT-OFF
REL. CKT.
SEE D16

"G"

"V3" TEL.
REPEATER
SEE F1

TEL. ORDER
WIRE BRIDGING
ARRANGEMENT
SEE F20

"H"

5db PAD FOR PROV.
OPEN WIRE CKTS.
EQUIPPED WITH 3KC CARR.
LINE FILTERS
SEE E96

AUX. EQL. FOR R.R.
DISPATCH CKTS.
SEE B101

AUX. EQL. FOR PROV.
OPEN WIRE & EQL. FOR
CKTS. WITH 135" SIG.
SEE F101

FILTER
SEE B106

4 WIRE EQL. CKT.
(ALSO FOR SOME 2 WIRE)
SEE C111

RES. TERM. CKT. FOR
R.R. DISPATCH &
ORDER CKTS.
SEE B135

"V3" TEL.
REPEATER
SEE F5

"J"

SIDE & PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE B15

"K"

SIDE & PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE C15

SIDE OR PH. REP.
COIL CKT.
(FOR 2 & 4 WIRE)
SEE D55

RES. TERM. CKT. FOR
R.R. DISPATCH &
ORDER CKTS.
SEE B135

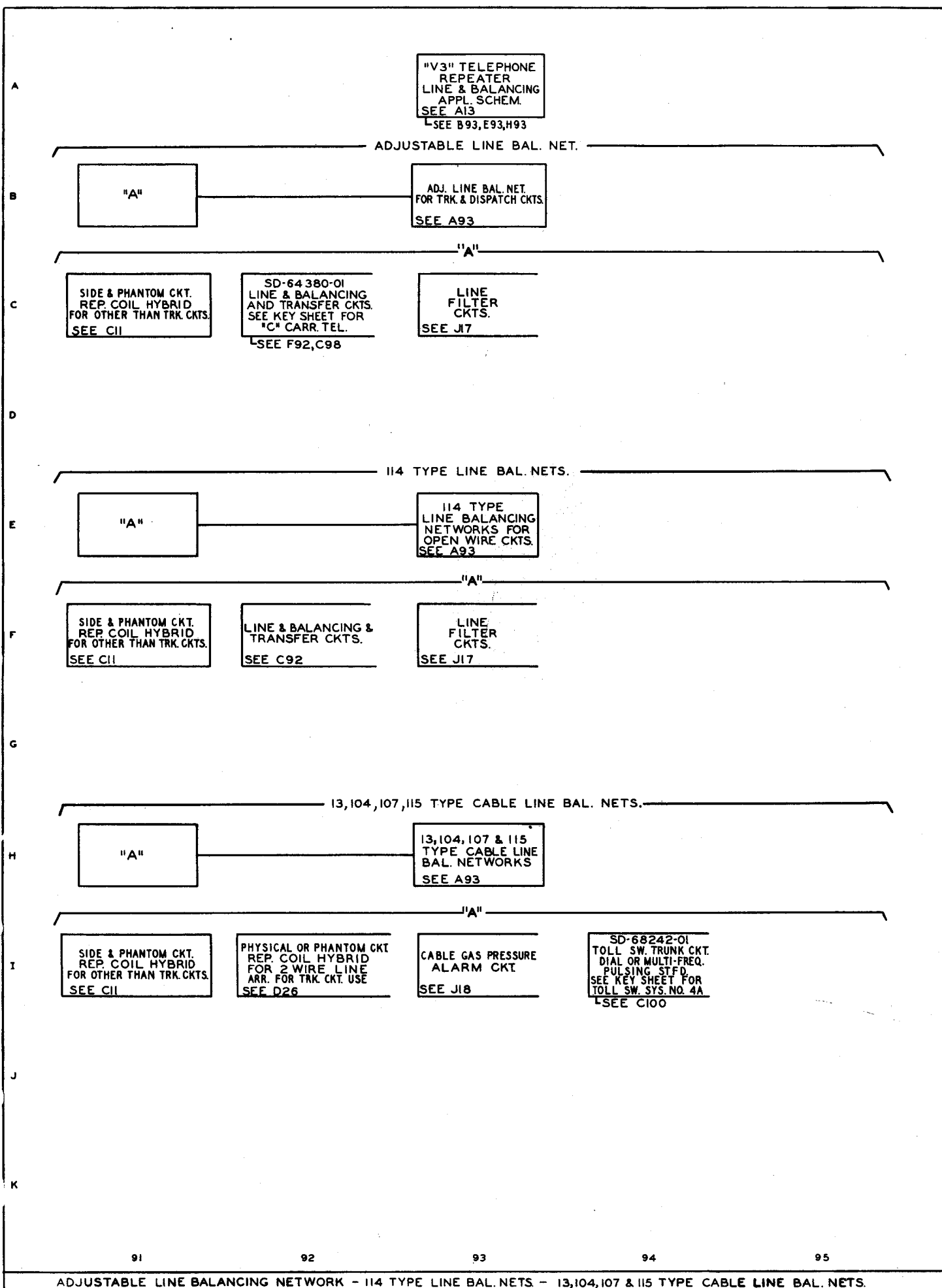
"L"

SIG. CUT-OFF
REL. CKT.
SEE D16

"M"

SIDE & PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE C15

SIDE OR PH. REP.
COIL CKT.
(FOR 2 & 4 WIRE)
SEE D55



A
B
C
D
E
F
G
H
I
J
K

"V3" TEL. REP.
LINE & BALANCING
APPL. SCHEM.
SEE A13

SEE B98, E98

115 TYPE LINE BAL. NETS.

"A"

115 TYPE
LINE BAL. NETS. FOR
OPEN WIRE CKTS.
SEE A98

"A"

SIDE & PH. CKT.
REP. COIL HYB.
FOR OTHER THAN
TRK. CKTS.
SEE C11

PHYSICAL OR PH.
CKT. REP. COIL HYB.
FOR 2W LINE ARR.
FOR TRK. CKT. USE
SEE D26

LINE & BALANCING
& TRANSFER CKTS.
SEE C92

LINE FILTER
CKTS.
SEE J17

TOLL SW. TRK.
CKT. DIAL OR MF
PULSING STFD.
SEE I94

5db PAD FOR PROV. OPEN WIRE CKTS.

"C"

5db PAD FOR PROV.
OPEN WIRE CKTS.
EQUIPPED WITH 3 KC.
CARR. LINE FILTER
SEE A98

"A"

"B"

"A"

AUX. EQL. FOR
PROV. OPEN WIRE
& EQL. FOR CKTS.
WITH 135~ SIG.
SEE F101

TEL. ORDER
WIRE BRIDGING
ARRANGEMENT
SEE F20

"B"

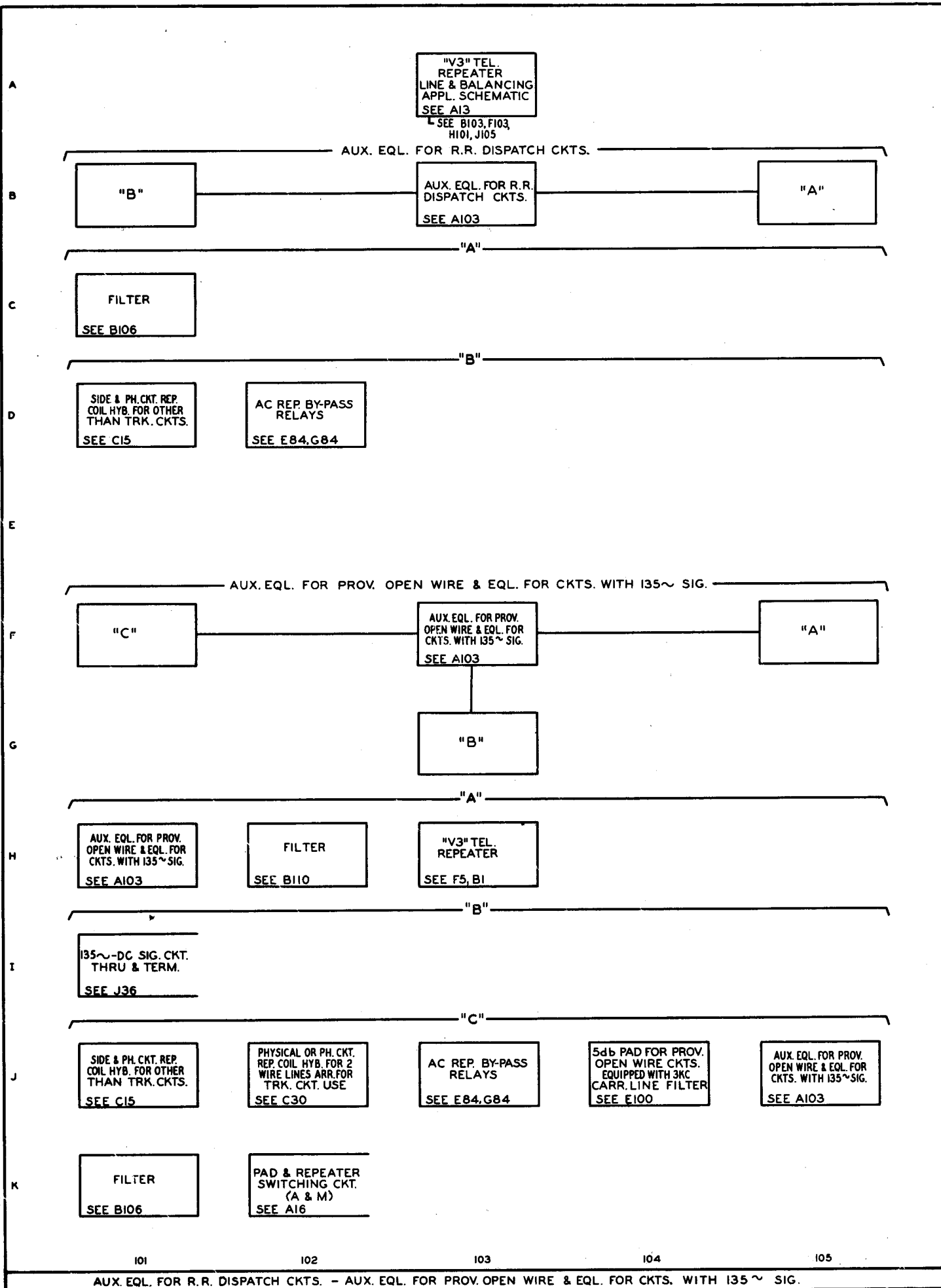
135~-DC SIG. CKT.
THRU & TERM.
SEE J36

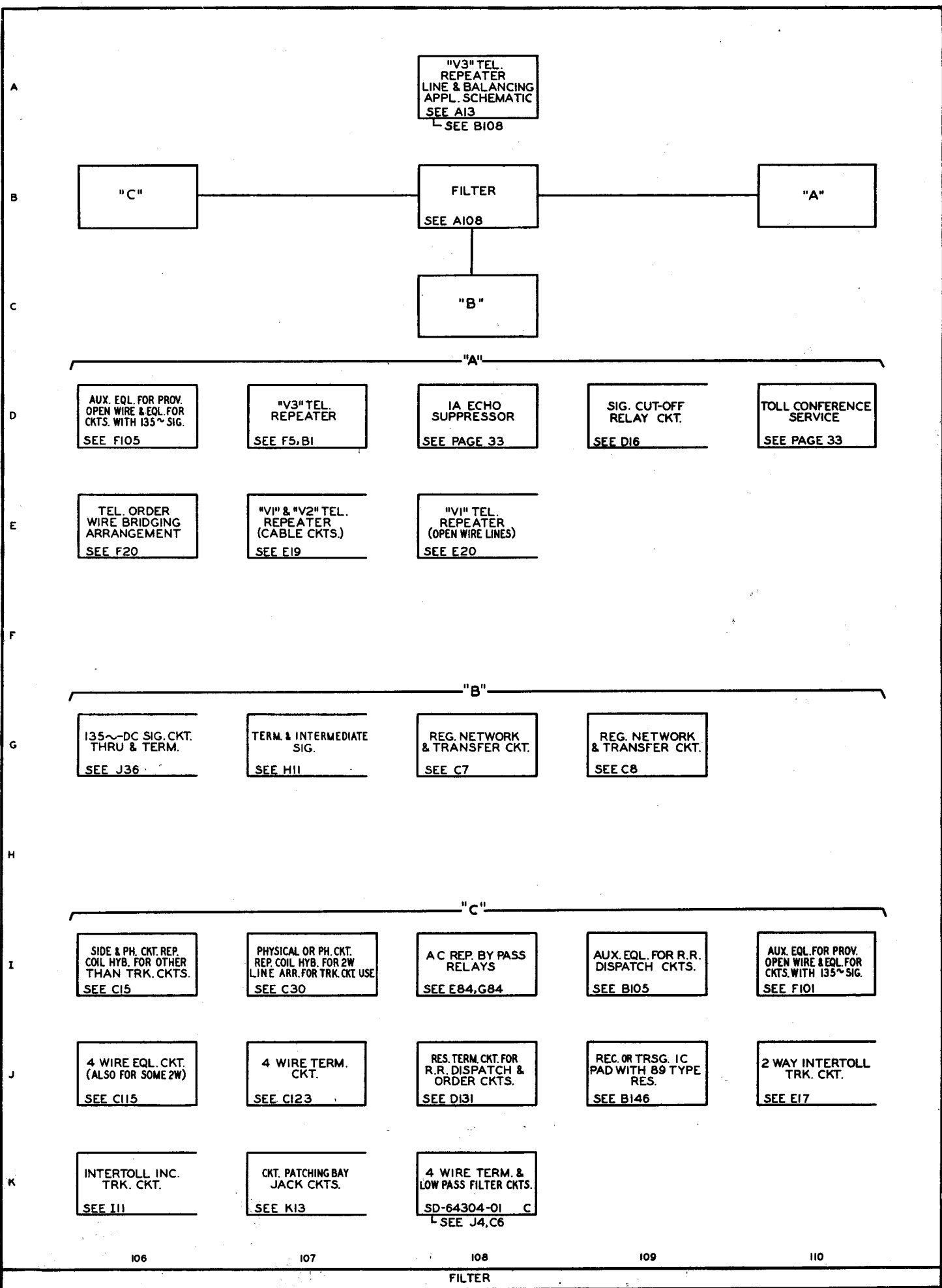
"C"

SIDE & PH. CKT.
REP. COIL HYB.
FOR OTHER THAN
TRK. CKTS.
SEE C15

PHYSICAL OR PH.
CKT. REP. COIL HYB.
FOR 2W LINE ARR.
FOR TRK. CKT. USE
SEE C30

A-C REP. BY-PASS
RELAYS
SEE E84, G84





A

B

C

D

E

F

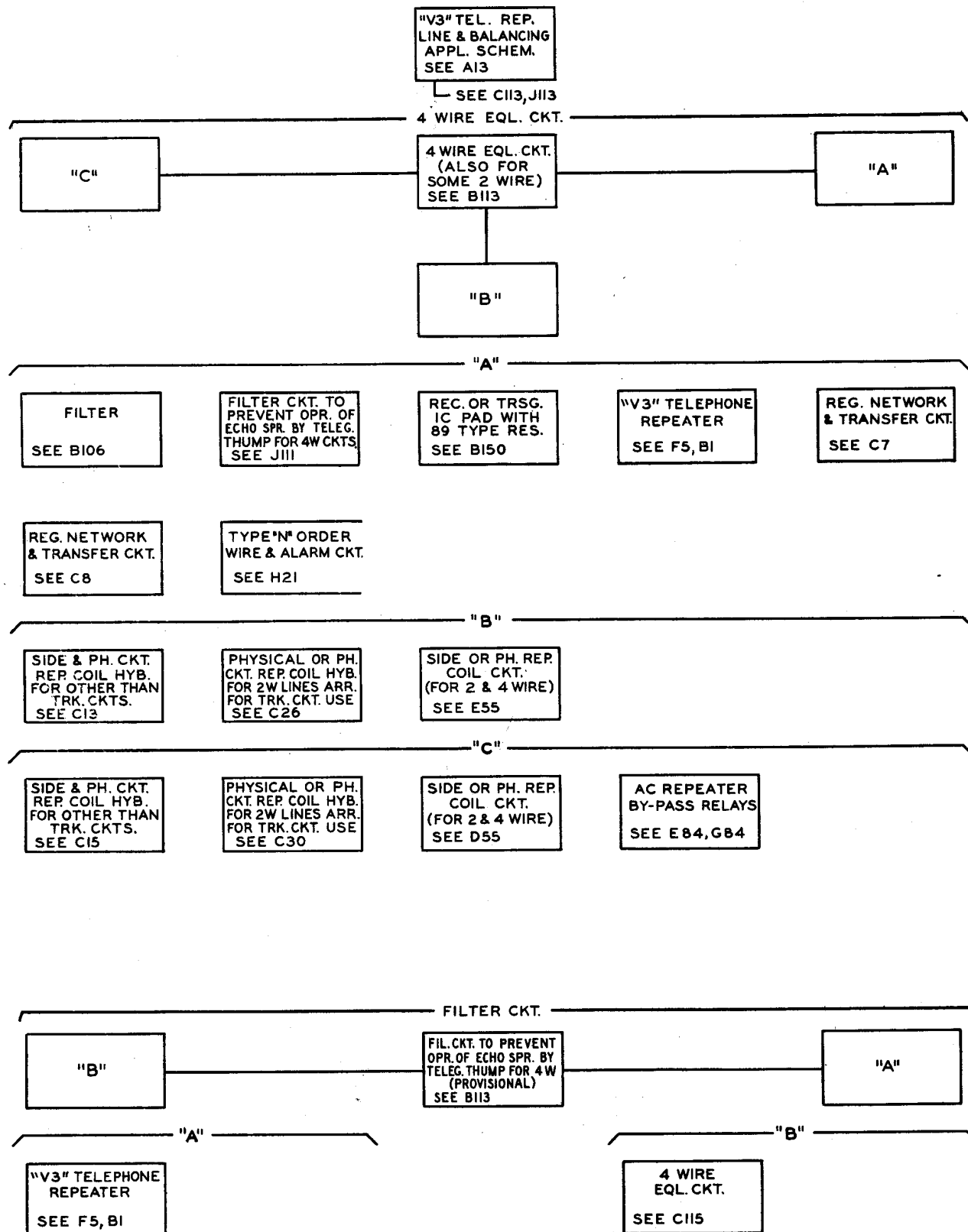
G

H

I

J

K



III

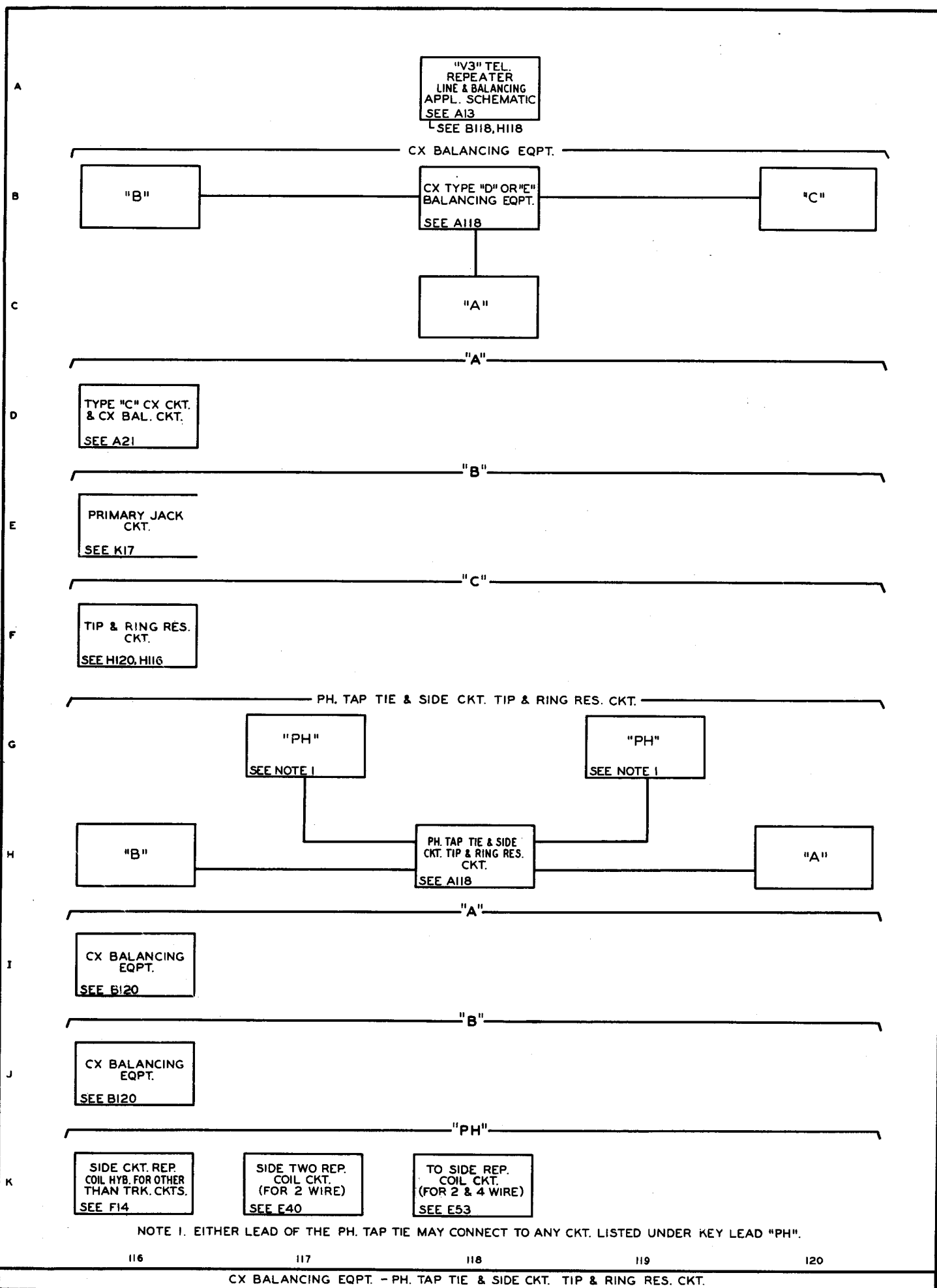
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113

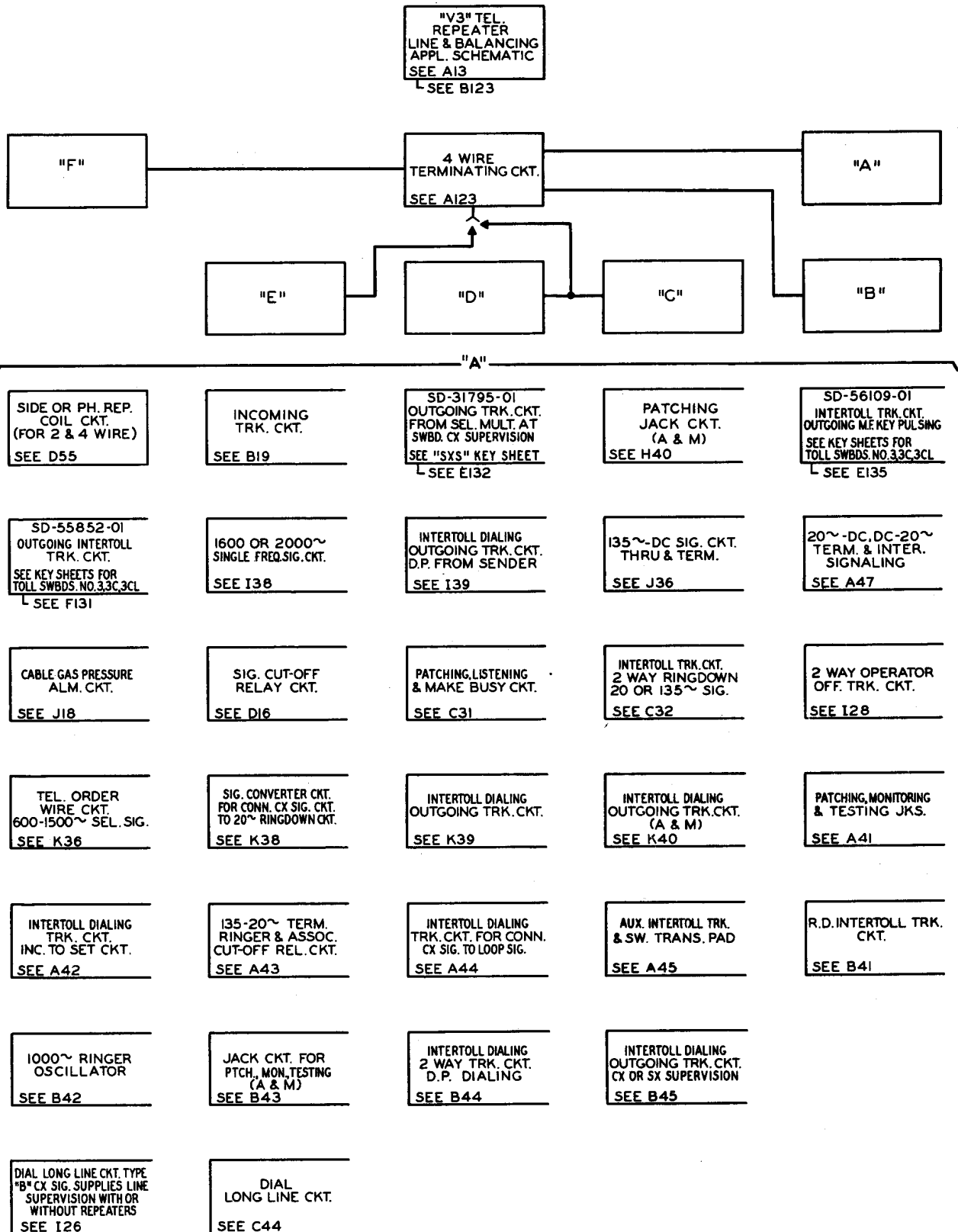
114

115

4 WIRE EQL. CKT. — FILTER CKT. FOR PREVENTING OPERATION OF ECHO SUPPRESSOR BY TELEGRAPH THUMP



A
B
C
D
E
F
G
H
I
J
K



121

122

123

124

125

4 WIRE TERMINATING CKT.

"B"

20~ REP. COIL
CKT. FOR 20~ SIG.
OR 20~ SIG.
BY-PASS
SEE A70

TERM. &
INTERMEDIATE
SIGNALING
SEE H11

"C"

TERM. &
INTERMEDIATE
SIGNALING
SEE H11

"D"

FILTER
SEE B106

"V3" TELEPHONE
REPEATER
SEE F5

1A ECHO
SUPPRESSOR
SEE PAGE 33

REG. NETWORK &
TRANSFER CKT.
SEE C7

REG. NETWORK &
TRANSFER CKT.
SEE C8

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE B60

SIGNALING CUT-OFF
RELAY CKT.
SEE D16

"N1" CARRIER TEL.
APPL. SCHEMATIC
SEE E60

"E"

1A ECHO
SUPPRESSOR
SEE PAGE 33

REG. NETWORK &
TRANSFER CKT.
SEE C7

REG. NETWORK &
TRANSFER CKT.
SEE C8

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE B60

"N1" CARRIER TEL.
APPL. SCHEMATIC
SEE E60

"V3" TELEPHONE
REPEATER
SEE F5

SD-59329-01
V.F. PTCH. & MON. JKS. AMP.
CONT. PAD & TRK. CKTS.
SEE KEY SHEET FOR
TYPE "N" CARRIER TEL.
LSEE J126, G139, B141,
G150, K8

"F"

1A ECHO
SUPPRESSOR
SEE PAGE 33

SIGNALING CUT-OFF
RELAY CKT.
SEE D16

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE B60

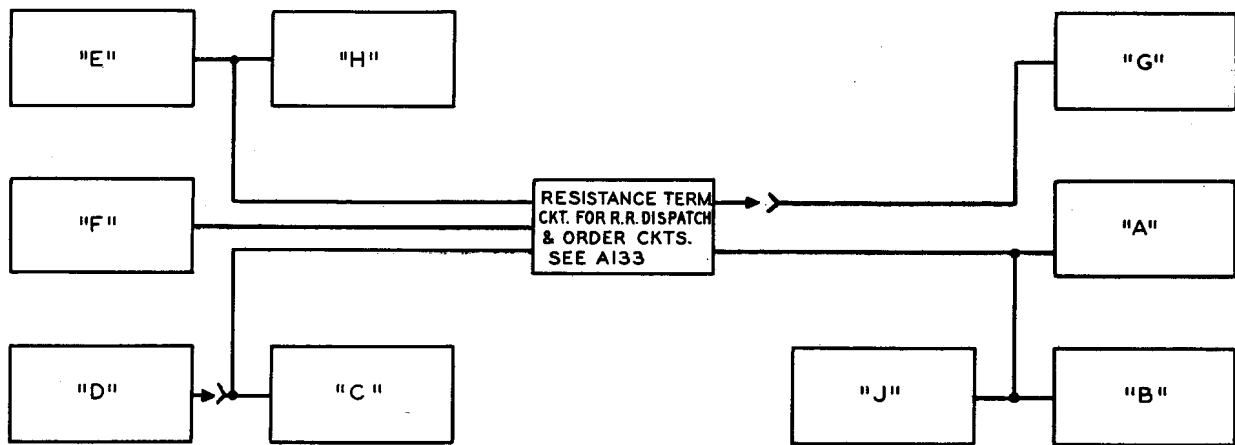
"N1" CARRIER TEL.
APPL. SCHEMATIC
SEE E60

"V3" TELEPHONE
REPEATER
SEE B5

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE H127

A
B
C
D
E
F
G
H
I
J
K

"V3" TELEPHONE
REPEATER
APPL. SCHEM.
SEE A13
L SEE C133



INCOMING
TRK. CKT.
SEE B19

OUTGOING TRK. CKT.
FROM SEL. MULT. AT
SWBD. CX SUPV.
SEE D123

TELEPHONE ORDER
WIRE CKT.
SEE I53

PATCHING
JACK CKT.
(A & M)
SEE H40

INTERTOLL TRK. CKT.
OUTGOING M.F. KEY
PULSING
SEE D125

OUTGOING
INTERTOLL TRK. CKT.
SEE E121

1600 OR 2000~
SINGLE FREQ.
SIG. CKT.
SEE I38

INTERTOLL DIALING
OUTGOING TRK. CKT.
D.P. FROM SENDER
SEE I39

135~-DC SIG. CKT.
THRU & TERM.
SEE J36

20~-DC, DC-20~
TERM. & INTER.
SIGNALING
SEE A47

CABLE GAS
PRESSURE
ALARM CKT.
SEE J18

SIG. CUT-OFF
RELAY CKT.
SEE D16

PATCHING,
LISTENING, &
MAKE BUSY CKT.
SEE C31

INTERTOLL TRK. CKT.
2 WAY RINGDOWN
20 OR 135~ SIG.
SEE C32

2 WAY OPERATOR
OFFICE TRK. CKT.
SEE I28

TELEPHONE ORDER
WIRE CKT.
600-1500~ SEL. SIG.
SEE K36

SIG. CONVERTER CKT.
FOR CONN. CX SIG. CKT.
TO 20~ RINGDOWN CKT.
SEE K38

INTERTOLL DIALING
OUTGOING TRK. CKT.
SEE K39

INTERTOLL DIALING
OUTGOING TRK. CKT.
(A & M)
SEE K40

PATCHING,
MONITORING, &
TESTING JKS.
SEE A 41

INTERTOLL DIALING
TRK. CKT. INCOMING
TO SET CKT.
SEE A42

135-20~ TERM.
RINGER & ASSOC.
CUT-OFF REL. CKT.
SEE A43

INTERTOLL DIALING
TRK. CKT. FOR CONN.
CX SIG. TO LOOP SIG.
SEE A44

AUX. INTERTOLL TRK.
& SW. TRANS. PAD
SEE A45

R.D. INTERTOLL
TRK. CKT.
SEE B41

1000~ RINGER
OSCILLATOR
SEE B42

JACK CKT. FOR
PTCH, MON, TESTING
(A & M)
SEE B43

INTERTOLL DIALING
2 WAY TRK. CKT.
D.P. DIALING
SEE B44

INTERTOLL DIALING
OUTGOING TRK. CKT.
CX OR SX SUPV.
SEE B45

DIAL LONG LINE CKT.
TYPE "B" SIG. SUPPLIES
LINE SUPV. WITH OR
WITHOUT REPS.
SEE I26

DIAL
LONG LINE CKT.
SEE C44

2 W. TERM. CKT. FOR
USE WITH INTERTOLL
TRKS. TERM. AT SUB.
POS. OF NO. 11 SWBD.
SD-64636-01 C
L SEE I137

REP. COIL &
COMPROMISE NET. CKTS.
FOR USE WITH TRK.
& LONG LINE CKTS.
SD-95015-01 C
L SEE I138

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RESISTANCE TERM. CKT. FOR R.R. DISPATCH & ORDER CKTS.

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C
D
E
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J
K

"B"

TERM. &
INTERMEDIATE
SIGNALING
SEE H11

20 ω REP. COIL
CKT. FOR 20 ω SIG.
OR 20 ω SIG.
BY-PASS
SEE A70

3 $\frac{1}{2}$ " SIG. BY-PASS CKT.
FOR R.R. DISPATCH REP.
INTER. TYPE "C" CK. CKT.
FOR 20 ω & CK SIG.
SEE E80

"C"

TERM. &
INTERMEDIATE
SIGNALING
SEE H11

"D"

FILTER
SEE B106

REC. OR TRSG.
IC PAD WITH
89 TYPE RES.
SEE B150

"V3" TELEPHONE
REPEATER
SEE F5

1A ECHO
SUPPRESSOR
SEE PAGE 33

SIGNALING CUT-OFF
RELAY CKT.
SEE D16

REG. NETWORK &
TRANSFER CKT.
SEE C7

REG. NETWORK &
TRANSFER CKT.
SEE C8

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE B60

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE H127

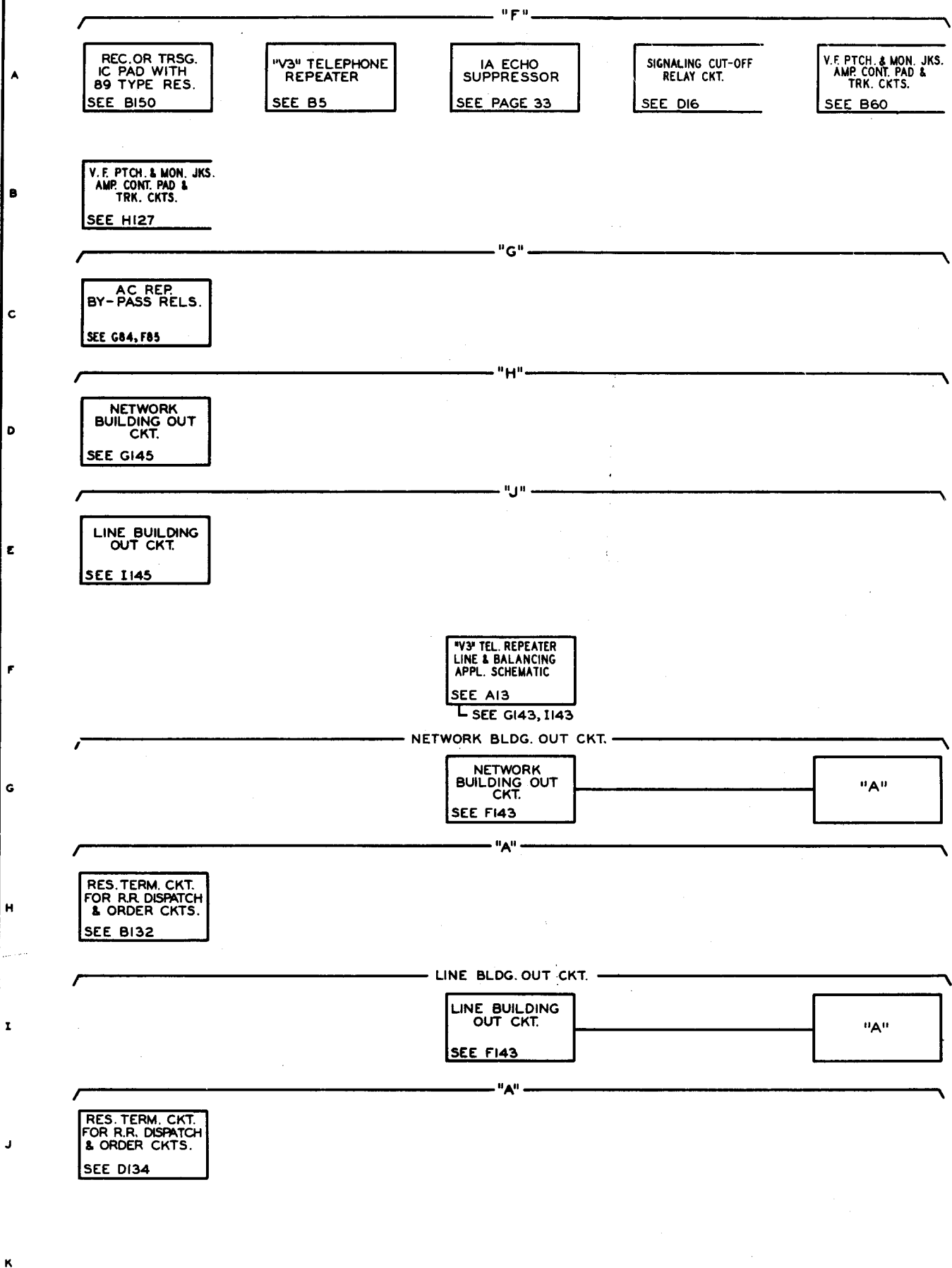
"E"

COMPROMISE BAL.
NETWORK CKT.
SEE I150

2 WIRE TERM. CKT.
FOR USE WITH INTERTOLL
TRKS. TERM. AT SUBSCRIBER
POSITIONS OF NO.11 SWBD.
SEE K133

REP. COIL &
COMPROMISE NET. CKT.
FOR USE WITH TRK.
& LONG LINE CKTS.
SEE K134

COMPROMISE &
BALANCING NETS.
(FOR USE WITH EXCHANGE
AREA CKTS. OR ATT. TEL SETS)
SEE F32



A
B
C
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K

"V3" TEL. REPEATER
LINE & BALANCING
APPL. SCHEMATIC
SEE A13

SEE B148, I148

REC. OR TRSG. IC PAD

"C"

REC. OR TRSG.
IC PAD WITH
89 TYPE RES.
SEE A148

"A"

"B"

"A"

SIDE & PH. CKT. REP.
COIL HYB. FOR OTHER
THAN TRK. CKTS.
SEE C15, E15

SIDE OR PH. REP.
COIL CKT.
(FOR 2 & 4 WIRE)
SEE D55

4 WIRE EQL.
CKT.
SEE C115

RES. TERM. CKT.
FOR R.R. DISPATCH
& ORDER CKTS.
SEE D131, C131

"N" CARRIER TEL.
APPL. SCHEMATIC
SEE E60

"B"

TERM. &
INTERMEDIATE
SIG. CKT.
SEE H11

"C"

FILTER
SEE B106

"V3" TELEPHONE
REPEATER
SEE B5, F5

REG. NETWORK
& TRANSFER CKT.
SEE C7

REG. NETWORK
& TRANSFER CKT.
SEE C8

V.F. PTCH. & MON. JKS.
AMP. CONT. PAD &
TRK. CKTS.
SEE H127

COMPROMISE BAL. NET

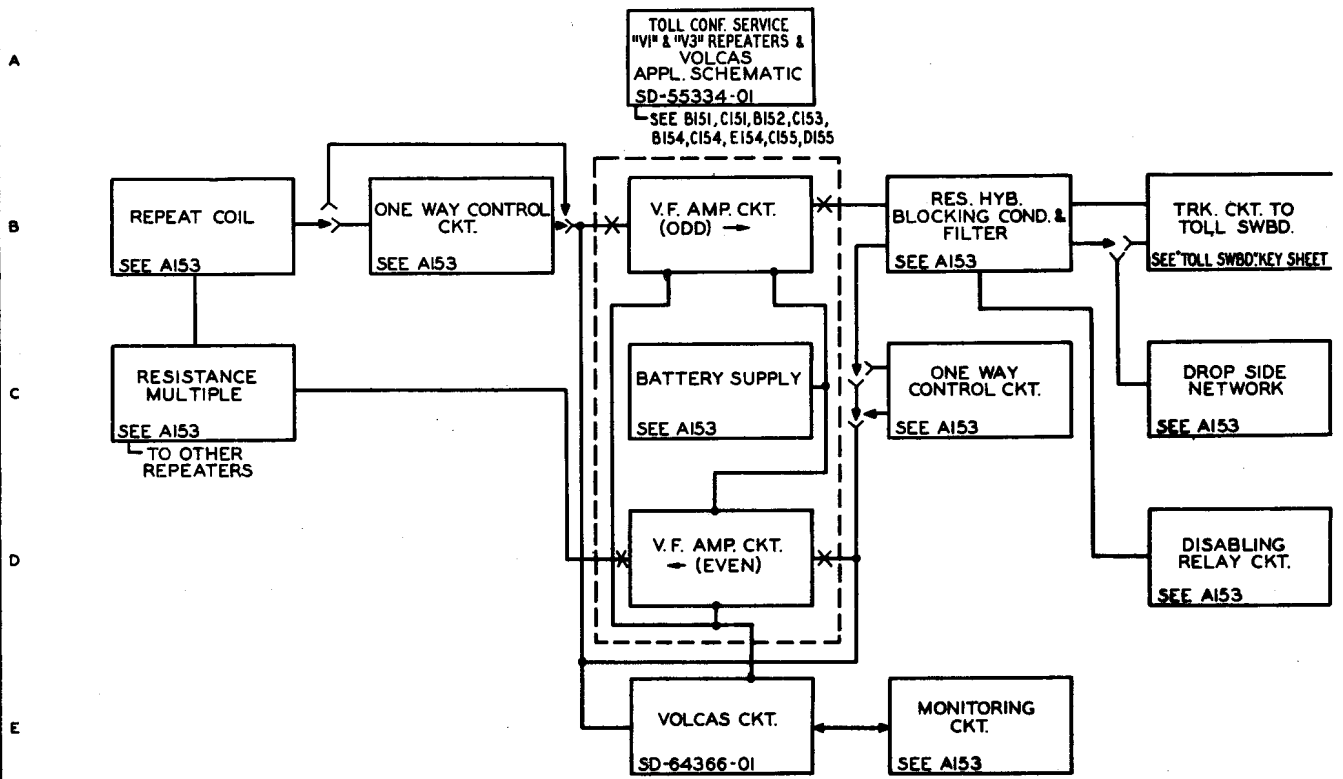
COMPROMISE
BALANCING
NETWORK
SEE A148

"A"

"A"

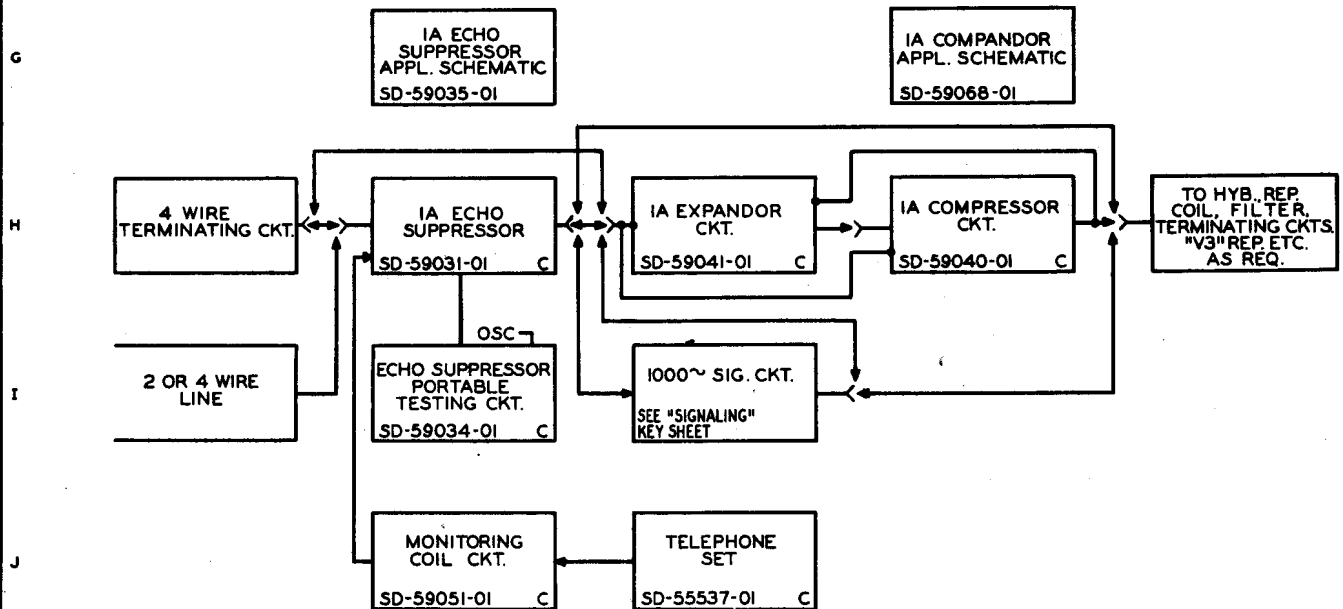
RES. TERM. CKT.
FOR R.R. DISPATCH
& ORDER CKTS.
SEE B131

TOLL CONFERENCE SERVICE



NOTE:
"X" INDICATES JACKS.

ECHO SUPPRESSOR AND COMPANDOR



151

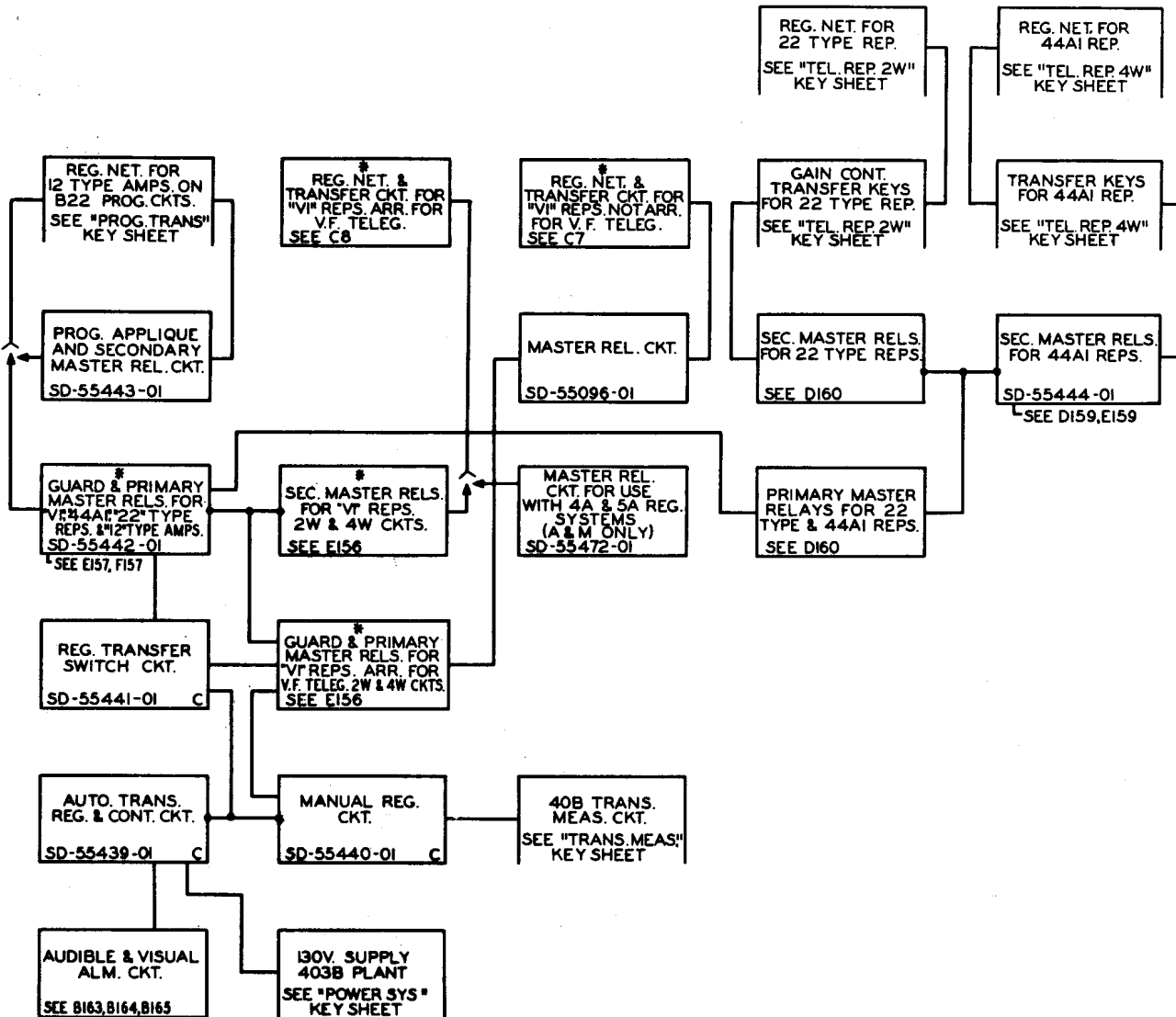
152

153

154

155

5B PILOT WIRE
REGULATING
APPL. SCHEMATIC
SD-55445-01 C



* IT MAY BE ASSUMED THAT THESE CIRCUITS ALSO APPLY TO "V3" TELEPHONE REPEATER.

156

157

158

159

160

TESTING & MAINTENANCE

A

TEL. ORDER
WIRE BRIDGING
ARRANGEMENTS
SEE F20

TEL. SET CKTS.
ARRANGEMENTS FOR
PROGRAM TRANS.
SEE G4

TRANS. MEAS. EQPT.
SEE "TRANS. MEAS."
KEY SHEET

B

ALM. TRK. CKT.
ARR. TO EXTEND
ALARMS
SD-95310-01 C

INDIVIDUAL ALM. CKT.
FOR V.F. AUX. STA. WITH
152V. OR 24V. & 152V. BAT.
SD-55378-01 C

AUDIBLE & VISUAL
ALM. CKT. WITH
AISLE PILOT &
DISTINCTIVE ALM.
SD-96188-01 C

AUDIBLE & VISUAL
ALARM & ALARM
TRANSFER CKT. FOR
24V. ABS
SD-95063-01 C

AUD. & VIS. ALM. & ALM.
TRANSFER CKT. FOR
COMB. TOLL & SXS 355A
WITH 48V. ABS
SD-95075-01 C

C

ALARM TRK.
CKT.
SEE K62

POWER DISCHARGE
CKT. SEE
"POWER SYSTEMS"
KEY SHEET

TO TDM. PTCH. BAY
TDM. PTCH. TRK.
SD-62488-01 C

JACKS AT REP. BAY
FOR TRANS. MEAS. TST.
TRK. TO MULTI-FREQ.
TEST BAY
SD-95100-01 C

JACK & KEY CKT.
AT REP. BAYS
FOR 40B
TRANS. MEAS.
SD-64355-01 C

PATCHING CORDS

D

E

F

MISCELLANEOUS

G

MISCELLANEOUS
JACK & PTCH.
CORD CKTS.
SD-59446-01 C

S.F. TEST TONE
TRK. JKS. AT
TST. BD.
SEE A41

H

I

J

K

161

162

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164

165

TESTING & MAINTENANCE - MISCELLANEOUS

**CURRENT DRAIN
AMPERE HOURS PER BUSY HOUR**

CIRCUIT DRAWINGS		SEE NOTE NO.	REMARKS	DRAINS LIST 1 AND 2									
CIRCUIT TITLE	CIRCUIT NO.			24 VOLTS				48 VOLTS		130 VOLTS		152 VOLTS.	
				SIG. BAT.	FIL. BAT.	R. R. GRD.	F. BD. GRD.	FIL. BAT.	F. BD. GRD.	BAT.	F. BD. GRD.	BAT.	F. BD. GRD.
TELEPHONE REPEATER													
V3 (V. F. AMPLIFIER)	SD-95113-01		24V. REG. BAT. - PER AMP.		.050		.044			.006			
			PER 2 AMPS. OR PER REP.		.100		.088			.012			
			48V. REG. BAT. - PER AMP.					.050	.044	.006			
			PER 2 AMPS. OR PER REP.					.050	.038	.012			
			130V. PLATE & FIL. - PER AMP.							.056	.056		
			PER 2 AMPS. OR PER REP.							.062	.062		
			152V. PLATE & FIL. - PER AMP.									.056	.056
			PER 2 AMPS. OR PER REP.								.062	.062	
REGULATING NETS. & TRANSFER	SD-64937-01			.082			.034						
	SD-64937-02			.034			.098						
PILOT WIRE REGULATING													
MASTER RELAY	SD-55096-01		PER FIG. 2	.072			.072						
		2	PER FIG. 2				.048						
GUARD & MASTER RELAY	SD-55442-01		PER FIG. 1	.096			.096						
		2	PER FIG. 1				.120						
			PER FIG. 4	.136			.136						
		2	PER FIG. 4	.064									
PROG. APPLIQUE & SEC. MASTER	SD-55443-01			.40			.40						
		2					.12						
MASTER RELAY	SD-55444-01		PER FIG. 1	.08			.08						
		2	PER FIG. 1				.143						
			PER FIG. 2	.192			.192						
		2	PER FIG. 2				.132						
			PER FIG. 3	.288			.288						
		2	PER FIG. 3				.143						
MASTER RELAY	SD-55472-01	3	PER FIG. 1	.064									
		4	PER FIG. 2	.064									
TOLL CONFERENCE SERVICE													
APPLICATION SCHEMATIC (EXCLUSIVE OF REPS.)	SD-55334-01			NEGL			NEGL						
VOLCAS	SD-64366-01			NEGL	.640		NEGL	.589			.051		
ECHO SUPPRESSOR													
(1A) APPLICATION SCHEMATIC	SD-59035-01		24V. REG. BAT. OFFICE	.096	.640		.096	.630			.010		
			24V. NON-REG. BAT. OFFICE	.096	.850		.096	.840			.010		
COMPANDOR													
(1A) APPLICATION SCHEMATIC													
1A COMPRESSOR	SD-59068-01	1	24V. REG. BAT. OFFICE	A.440	.640		A.440	.624			.016		
			24V. NON-REG. BAT. OFFICE	A.440	.850		A.440	.834			.016		
1A EXPANDOR				24V. REG. BAT. OFFICE	A.440	.640		A.440	.624			.016	
			24V. NON-REG. BAT. OFFICE	A.440	.850		A.440	.834			.016		

NOTES:

1. WHEN FIL. BAT. IS NOT AVAILABLE, FIL. BAT. SHALL BE CONSIDERED AS SIG. BAT.
2. ADD PER CONNECTING NETWORK.
3. PER CONNECTED REG. NET. OR PER SEC. MASTER RELAY CKT. (FIG. 2) AS SPEC.
4. PER CONNECTED REG. NET.

A. ADD WHEN OVEN IS HEATED BY 24V. SIG. BAT.

GENERAL DESCRIPTION AND EXPLANATIONS

1. EXPLANATION OF KEY SHEET

In order to cover the greatest amount of information as clearly as possible, the form of this Key Sheet deviates from the usual, as follows:

Instead of connecting one circuit to another, each circuit has been shown diagrammatically connected to a Key Lead (in block) designated "A", "B", "C", etc. Immediately following each diagram is a breakdown of those circuits which may connect at each individual Key Lead, i.e. all those circuits which connect at Key Lead "A", are listed under the heading "A" for the diagram in question.

These Key Leads cover one specific diagram at a time and do not follow through from one diagram to another; i.e. Key Lead "A" of one diagram does not necessarily connect to the Key Lead "A" of another diagram.

If the information shown in the breakdown for one Key Lead carries over to another Key Lead of the same or different diagram, those diagrams connect directly through the leads indicated. If this is not the case, the information contained in the breakdown will show the circuit drawing number and, in the case of a drawing covered in another system, indicate the Key Sheet showing additional connecting information.

2. GENERAL DESCRIPTION

Several types of repeater arrangements may be formed by means of associated line and terminating equipment. The line and terminating equipment may also be used for non-repeatered circuits. These circuits are intended for use with 2- or 4-wire (toll and exchange area) cable, 2-wire open wire, and 2- or 4-wire order wire circuits and shows application of line and 2-wire balancing equipment for repeatered and non-repeatered circuits, and for physical, phantom group, and split phantom group circuits.

These circuits provide means for employing repeaters for the purpose of inserting amplification in a 2- or 4-wire circuit, terminating a 2- or 4-wire circuit with or without repeaters, adapting standard message circuit arrangements to dispatch and order wire circuits, by-passing A-C operated repeaters in case of power failure, signaling, compositing, and associated network balancing.

Toll conference service arrangements consist essentially of six repeaters connected on one side to a resistance multiple and on the other side to individual multiple jack appearances at a toll switchboard over special trunk circuits which provide switching pads and terminations for the conference repeaters when not in use. Associated with

these trunks is a holding and disabling circuit and an optional feature which permits the operator to provide one-way transmission from one of the connected lines to all others connected to the conference circuit. A volcas (voice operated loss control and suppressor) may be permanently associated with any conference repeater to reduce objectionable echo effects. This device serves to decrease losses in the transmitting direction and increase losses in the reverse direction.

The 1A Echo Suppressor is provided for use on 2- or 4-wire circuits at terminal or intermediate points. This circuit, in addition to suppressing echoes, provides a "break-in" feature which allows the listening subscriber to break in by talking at a higher level than the talking subscriber. A portable test set is provided with which sensitivity, time and filament activity tests may be made when connected to the echo suppressor by means of a 15 conductor patching cord. Facilities for monitoring and talking are provided as required. Connection to the 1A Compandor circuits may be made to reduce the effects of noise and crosstalk which originate on the line side of the compandor equipment.

The 5B Pilot Wire Transmission Regulating System controls the gain of cable repeaters connected to it to compensate for resistance changes in the cable due to temperature variations. A regulator and master relay circuit is provided with keys so that either a regulator or manual dial switch can be used with the master relay circuit. Connection is provided to regulating network and transfer circuits in which variable attenuators connected in the repeater circuit are adjusted automatically by the master regulator circuit. A manual control dial can be connected to the idle master relay circuit for testing and controlling the office equipment in an emergency.

The current drain information is to be used in determining the size of the toll power plant, and the power leads. These data shall be used in all cases, except for those deviations specifically authorized by the Bell Telephone Laboratories, Inc. in accordance with the routing set-up covering special practices.

The drains are on an equipment basis, i.e., the drain given for each circuit represents the average throughout the busy hour. Therefore, the number of units of a given type of equipment multiplied by its drain will give the busy hour drain of all the units of that type of equipment. The total busy hour drain will be the sum of all the drains of the various types of equipment in the office.

No current drain information is given for drawings forming part of other systems.

INDEX OF DRAWINGS
FORMING PART OF "V3" (V.F. AMPLIFIER) & LINE & BALANCING

<u>Drawing No.</u>	<u>Description</u>	<u>Location</u>	<u>Drawing No.</u>	<u>Description</u>	<u>Location</u>
SD-55096-01	Master Relay Ckt.	D158	SD-59446-01	Misc. Jack & Ptch. Cord Ckts.	G161
SD-55334-01	Toll Conf. Service V1 and V3 Repeaters and Volcas Appl. Schematic	A153	SD-60136-02	Type "C" CX Ckt. & CX Bal. Ckt.	J19
SD-55378-01	Individual Alm. Ckt. for V.F.Aux. Sta. with 152V or 24V and 152V Batt.	B162	SD-60136-03	Type "C" CX Ckt. & CX Bal. Ckt.	A21
SD-55439-01	Auto Transmission Reg. and Cont.Ckt.	G156	SD-60548-02	Type "A" or "B" CX Ckt. & CX Bal. Ckt.	K16
SD-55440-01	Manual Reg. Ckt.	G157	SD-60963-02	Line and Bal. Nets.	G22
SD-55441-01	Reg. Transfer Switch Ckt.	F156	SD-62488-01	Tandem Patch Trunk Ckt.	G163
SD-55442-01	Guard and Primary Master Rels.	E156	SD-64304-01	4-Wire Term. and Low Pass Filter Ckts.	K108
SD-55443-01	Prog. Applique and Secondary Master Rel. Ckt.	D156	SD-64355-01	Jack and Key Ckt. at Rep. Bays for 40B TMS	G165
SD-55444-01	Secondary Master Rels. Ckt.	D160	SD-64366-01	Volcas Ckt.	E153
SD-55445-01	5B Pilot Wire Regulating Ckt.	A158	SD-64370-01	Line Bal. Nets. for Use with B-88-50 or H-88-50 2-W Loaded Cable Ckts.	G25
SD-55472-01	Master Relay Ckt.	E158	SD-64542-01	Alarm Trk. Ckt.	K62
SD-55537-01	Telephone Set Ckt.	J153	SD-64636-01	2-Wire Term. Ckt. for Use with Intertoll Trks. Terminating at Subscriber Positions of #11 Sw.Bd.	K133
SD-59002-01	A-C Power Supply Telephone Repeater Appl. Schem. "V1" Tel. Rep.	E2	SD-64937-01	Reg. Network and Transfer Ckt.	C7
SD-59031-01	1A Echo Suppressor Ckt.	H152	SD-64937-02	Reg. Network and Transfer Ckt.	C8
SD-59034-01	Echo Suppressor Portable Testing Ckt.	I152	SD-90517-01	Compromise and Balance Nets	F32
SD-59035-01	1A Echo Suppressor Appl. Schem.	G152	SD-95015-01	Rep. Coil and Comp. Net Ckts. for Use with Trunk and Long Lines Ckts.	K134
SD-59040-01	1A Compressor Ckt.	H154	SD-95016-01	CX Sig. Ckt., For PH Group or Single Ckt.	G75
SD-59041-01	1A Expander Ckt.	H153	SD-95063-01	Audible and Visual Alarm and Alarm Trans.Ckt.for 24V AES	B164
SD-59046-01	Telephone Order Wire Bridging Arrangement	F20			
SD-59051-01	Monitoring Coil Ckt.	J152			
SD-59068-01	1A Compander Appl. Schem.	G154			

INDEX OF DRAWINGS (Cont'd.)

<u>Drawing No.</u>	<u>Description</u>	<u>Location</u>	<u>Drawing No.</u>	<u>Description</u>	<u>Location</u>
SD-95073-01	A-C Earth Potential Filter Ckt.	H71	SD-95113-01	"V3" Telephone Re- peater Battery Supply and Con- necting Ckt.	A2
SD-95075-01	Audible and Visual Alarm and Alarm Transfer Ckt. for Comb. Toll and SXS 355A with 48V ABS	B165	SD-95144-01	"V3" Telephone Re- peater Line and Balancing Appli- cation Schematic	A13
SD-95100-01	Jacks at Rep. Bay for Trans. Meas. Tst. Trk. to Multi-Freq. Test Bay	C164	SD-95310-01	Alm. Trk. Ckt. Arr. to Extend Alms.	B161
SD-95112-01	Voice Frequency Amplifier	B3	SD-96188-01	Audible and Visual Alm. Ckt. With Aisle Pilot and Distinctive Alm.	B163

INDEX OF DRAWINGS
FORMING PART OF OTHER SYSTEMS

<u>Drawing No.</u>	<u>Description</u>	<u>Location</u>	<u>Drawing No.</u>	<u>Description</u>	<u>Location</u>
SD-15362-01	Outgoing Trk. Ckt. to Toll Office	G36	SD-55256-01	2-Way Operator Office Trk. Ckt. KP CX or Loop Sig.	I36
SD-21866-01	Outgoing Trk. Ckt. to SXS Office for use with CX Sig.	G37	SD-55320-01	Telephone Order Wire Ckt. 600-1500 Cycle Sel. Sig.	K36
SD-25905-01	DP Incoming Trk. Ckt. SX or CX Supervision Arr. for Re-aring and Repeat Dial Pulses	G38	SD-55337-01	Patching Jack Ckt.	H40
SD-25909-01	Tandem Office Incoming Trk. Ckt. Multi-Freq. Pulsing	G39	SD-55379-01	Intertoll Dialing Toll Sw. Trk. Ckt. SX or CX Sig. Type B	I40
SD-31726-01	Incoming Trk. Ckt. for Use with Type B CX or SX Sig.	B19	SD-55380-01	Toll Switching Trk. Ckt. Repeated CX Sig.	I37
SD-31795-01	Outgoing Trk. Ckt. From Sel. Mult. at Swbd. CX Supervision	D123	SD-55385-01	Telephone Order Wire Ckts. Appl. Schem.	B21
SD-31865-01	Incoming Trk. Ckt. CX or SX Sig.	H36	SD-55390-01	Alm. Sig. and 20 Cycle Rep. Ckt.	J21
SD-31887-01	Incoming Trk. Ckt. CX, Type B, or SX Sig.	H37	SD-55393-01	Signaling Cut Off Rel. Ckt.	D16
SD-31888-01	Recording Completing Trk. Ckt. for CX Sig. Type B	H38	SD-55415-01	CX Sig. Ckt. Type B	G72
SD-55038-01	Patching, Listening, and Make Busy Ckt.	C31	SD-55560-01	20 Cycle-DC and DC-20 Cycle Term. and Intermed. Sig.	A47
SD-55109-01	Intertoll Dialing Outgoing Trk. Ckt.	H39	SD-55574-01	Telephone Order Wire Ckt. 1000 Cycle Ringdown Sig.	I53
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SD-55172-01	135 Cycle-DC Sig. Ckt. Thru and Term.	J36	SD-55747-01	Telephone Order Wire Ckt. DC Loop Sig.	F78
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