SD-97736-01-AI

SHEET INDEX

CONTENTS	SHEET NO.	ISSUE NO. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
SHEET INDEX SUPPORTING INFORMATION	A1	1	2	3	4	5	6	7	8																	
APPARATUS INDEX OPTION INDEX	A2			3	4	4	4	7	7																	
FS1 INTERNAL CONNECTION OF THE KS-21447, LIST 1	B1A	1	2	3	4	4	4	7	8																	
	B1B		2	3	3	3	3	7	7																	
FS2 INTERNAL CONNECTION OF THE KS-21447, LIST 2,LIST 7, & LIST 9 MINI-RECORDER	B2A	1	2	3	4	4	4	7	8																	
	B2B			3	3	3	3	7	7																	
	B3	1	2	3	3	3	3	3	8																	
FS3 TOR,EOT,BOT,LPEW SENSING & STATUS GENERATION FOR THE KS-21447,LIST 1 MINI-RECORDER FS4 TOR,EOT,BOT,LPEW SENSING & STATUS GENERATION FOR THE KS-21447,LIST 2 MINI-RECORDER	B4	1	2	3	3	3	3	3	3																	
FS5 MOTOR CONTROL ELECTRONICS FOR LIST 1 AND LIST 8	B5	1	2	2	2	2	2	2	2																	
FS6 MOTOR CONTROL ELECTRONICS FOR LIST 2 THRU LIST 7, LIST 9 & LIST 10	B6	1	2	2	2	2	2	2	2																	
FS7 INTERNAL CONNECTION OF KS-21447 LIST 3 AND LIST 4	B7A	1	2	3	4	4	4	7	8																	
	B7B		2	3	3	3	3	7	7																	
	B8	1	2	3	3	3	3	3	8																	
FS8 INTERNAL CONNECTION OF KS-21447 LSIT 5, LIST 6 AND LIST 10	B9A		2	3	4	4	4	7	8																	
	B9B		2	3	3	3	3	7	7																	
	B10		2	3	3	3	3	3	8																	
FS9 INTERNAL CONNECTION OF KS-21447 LIST 8	B11A		2	3	4	4	4	7	8																	
	B11B			3	3	3	3	7	7																	
	B12		2	3	3	3	3	3	8																	
APP FIG. 1 KS-21447,LIST 1	C1	1	2	3	3	3	3	7	8																	
APP FIG. 2 KS-21447,LIST 2, LIST 7, AND LIST 9	C2	1	2	3	3	3	3	7	8																	
APP FIG. 3 KS-21447,LIST 3, LIST 4	C3	1	2	3	3	3	3	7	8																	
APP FIG. 4 KS-21447,LIST 5, LIST 6, AND LIST 10	C4		2	3	3	3	3	7	8																	
APP FIG. 5 KS-21447,LIST 8	C5		2	3	3	3	3	7	8																	
NOTES CIRCUIT EQUIPMENT INFORMATION	D1	1	2	3	4	5	6	7	8																	
CAD 1 CAD 2	G1	1	2	3	3	3	3	7	8																	
CAD 3 CAD 4	G2	1	2	2	2	2	2	7	8																	
CAD 5	G3		2	3	3	3	3	7	8																	

CONTENTS	SHEET NO.	ISSUE NO. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
CPS1-1 & CPS1-2 LOGIC & CONTROL CIRCUIT	J1A	1	2	3	3	3	3	3	8																	
	J1B	1	2	3	3	3	3	3	3																	
	J1C	1	2	3	3	3	3	7	8																	
CPS2 SERVO CIRCUIT	J2A	1	2	3	4	4	4	4	4																	
	J2B	1	1	3	3	3	3	3	3																	
	J2C	1	2	3	4	4	4	4	8																	
CPS3-1 THRU CPS 3-5 WRITE CIRCUIT	J3A	1	2	3	3	3	3	3	3																	
	J3B	1	2	2	2	2	2	2	8																	
	J3C	1	2	2	2	2	2	2	8																	
(B) CPS4-1 THRU CPS4-4 READ CIRCUIT	J4A	1	2	3	3	5	6	7	8																	
	J4B	1	2	3	3	3	3	7	7																	
	J4C	1	2	3	3	5	6	7	7																	
(A) CPS4-1 THRU CPS 4-4 READ CIRCUIT	J4D							7	8																	
	J4E							7	6																	
	J4F							7	8																	
	J4G							7	7																	
CPS5 LOGIC & WRITE CIRCUIT	J5A	1	1	3	3	3	3	3	3																	
	J5B	1	2	3	3	3	3	3	8																	
	J5C	1	2	3	3	3	3	7	8																	
CM1 - ANALOG DETECTION CIRCUIT	K1A					5	5	CANCELLED																		
	K1B					5	5	CANCELLED																		

DWG ISSUE	CD ISSUE	DATE ISSUED	Drawn	Appd
1	1	3-27-75	CGP	RAG RDT FMS
2B	2B	3-19-76	— JEH	RAG RTS FMS
3B	2B APP 1B	3-10-77	— JEH	RAG RTS FMS
4B	2B APP 2B	1-6-78	— JEH	RAG RTS FMS
5A	2B APP 3A	1-6-78	JEH	RAG RTS FMS
6A	2B APP 4A	2-13-79	CGP JEH	DM RTS RMS
7B[illegible]	2B APP 5A[illegible]	2-13-79	CGP JEH	DM RTS RMS
8B1	2B APP 6B1	2-13-79	CGP JEH	DM RTS RMS

SHEET INDEX NOTES

1. WHEN CHANGES ARE MADE IN THIS DRAWING, ONLY THOSE SHEETS AFFECTED WILL BE REISSUED.
2. THIS SHEET INDEX WILL BE REISSUED AND BROUGHT UP TO DATE EACH TIME ANY SHEET OF THE DRAWING IS REISSUED, OR A NEW SHEET IS ADDED.
3. THE ISSUE NUMBER ASSIGNED TO A CHANGED OR NEW SHEET WILL BE THE SAME ISSUE NUMBER AS THAT OF THE SHEET INDEX.
4. SHEETS THAT ARE NOT CHANGED WILL RETAIN THEIR EXISTING ISSUE NUMBER.
5. THE LAST ISSUE NUMBER OF THE SHEET INDEX IS RECOGNIZED AS THE LATEST ISSUE NUMBER OF THE DRAWING AS A WHOLE.

SUPPORTING INFORMATION

CATEGORY	NO.
EQUIPMENT DRAWING (ASSEMBLY)	L-51009[illegible]
REQUIREMENTS	L-510108
REQUIREMENTS (CPS)	L-510109
WIRING DIAGRAM	L-510137

ISSUE 8B1

1-79

COMMON SYSTEMS
KS-21447 MINI-RECORDER CIRCUIT
FOR RECORDING AND REPRODUCING DIGITAL DATA

AT&TCO STANDARD

(2)

SD-97736-01-Ai
47 SHEETS

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-97736-01-AI

APPARATUS INDEX

DESIG	APP FIG NO	APP FIG SH NO
CIRCUIT PACKS		
CP1-1	2	C2
CP1-1	3	C3
CP1-1	4	C4
CP1-2	5	C5
CP2	1	C1
CP2	2	C2
CP2	3	C3
CP2	4	C4
CP2	5	C5
CP3-1	2	C2
CP3-2	3	C3
CP3-2	4	C4
CP3-2	5	C5
CP3-5	2	C2
CP4-1	1	C1
CP4-2	2	C2
CP4-2	3	C3
CP4-2	4	C4
CP4-2	5	C5
CP4-3	2	C2
CP4-3	3	C3
CP4-3	4	C4
CP4-4	4	C4
CP5	1	C1

DESIG	LOCATION FS	APP FIG	EQPT
ASSEMBLY, BACK PLANE			
A1	1A/A2	1	
A1	2A/A2	2	
A1	7A/A2	3	
A1	9A/A2	4	
A1	11A/A2	5	

ASSEMBLY, HEAD TWO TRACK			
A3	1A/FO, 1A/D9	1	

ASSEMBLY, HEAD FOUR TRACK			
A3	2A/D8, 2A/FO, 3F8	2	
A3	7A/D8, 7A/FO	3	
A3	9A/D8, 9A/FO	4	
A3	11A/D8, 11A/F1	5	

ASSEMBLY, SENSOR HOUSING			
A2	1B/A0-1B/FO	1	
A2	2B/A0-2B/FO	2	
A2	7B/A0, 7B/C0 7B/FO	3	
A2	9B/A0-9B/FO	4	
A2	11B/A0, 11B/C0	5	

DESIG	LOCATION FS	APP FIG	EQPT
BEADS, FERRITE			
-	1A/B1	1	
-	2A/B1	2	
-	7A/B1	3	
-	9A/B1	4	
-	11A/B1	5	

CAPACITORS			
C1	1A/B2	1	
C1	2A/B2	2	
C1	7A/B2	3	
C1	9A/B2	4	
C1	11A/B2	5	
C2	1A/B2	1	
C2	2A/B2	2	
C2	7A/B2	3	
C2	9A/D2	4	
C2	11A/B2	5	

COMPONENT ASSEMBLIES			
CA1	1A/C0	1	
CA1	2A/C0	2	
CA1	2A/E0	2	
CA1	7A/C0	3	
CA1	9A/C0, 10E0	4	
CA1	9A/C0, 10E0	4	
CA1	11A/C0	5	

MOTOR ASSEMBLIES			
B1	1A/B1	1	
B1	2A/B1	2	
B1	7A/B1	3	
B1	9A/B1	4	
B1	11A/B1	5	

DESIG	LOCATION FS	APP FIG	EQPT
SWITCHES			
S1	1A/A2	1	
S1	2A/A2	2	
S1	9A/A2	3	
S1	9A/A2	4	
S1	7A/A2	5	
S2	3G2	2	
S2	10F2	3	
S2	10G2	4	

SWITCH ASSEMBLIES			
S3	3D1	2	
S3	10D1	3	
S3	10D1	4	
S4	3D1	2	
S4	10D1	3	
S4	10D1	4	

OPTION INDEX

APP OR WIR	RATED ON ISSUE	REF NOTES	LOCATION
P			APP FIGS. 1,2,3,4,5 1A/B2,2A/B2,7A/B2, 9A/B2,11A/B2
N			APP FIGS. 1,2,3,4,5 1A/B2,2A/B2,7A/B2, 9A/B2,11A/B2
M			APP FIGS. 2,4,5 3E0,10E0,12E0
L			APP FIGS. 2,4,5 3E0,10E0,12E0
K			1A/F2,2A/F2,7A/F2, 9A/F2,11A/F2
J			1A/F2,2A/F2,7A/F2, 9A/F2,11A/F2
G			1B/C3,1B/D4,1B/F0, 2B/C3,2B/D4,2B/F0, 7B/C3,7B/D3,7B/E0, 9B/C3,9B/D4,9B/F0, 11B/C0,11B/C3, 11B/D3

APP OR WIR	RATED ON ISSUE	REF NOTES	LOCATION
Z			APP FIG 1,2,3,4 1A/B3,1A/G3,1B/C0, 1B/C3,1B/D4, 2B/C0, 2B/C3 2B/D3, 2B/D4 7B/C0,7B/C3,7B/D3 9B/C0,9B/C3,9B/D4
Y			APP FIG 1,2,4 1B/A0, 2B/D0 1B/C3, 1B/D4 2B/C3,2B/D3,2B/D4, 9B/D0,9B/C3,9B/D4
X			APP FIG 1,2,3,4,5 1B/A0 1B/C3, 1B/D4 2B/A0 2B/C3, 2B/D3 2B/D4,7B/A0 7B/C3, 7B/D3,9B/A0,9B/C3, 9B/D4, 11B/A0 11B/C3, 11B/D3
W			APP FIG 2,4 3C0, 3E1, 3F1, 10D0, 10E1
V			APP FIG 2,4 3E0, 3E1, 2F1 10E0, 10E1
T			APP FIG 1,2,3,4,5 1B/C3, 1B/D4 1B/F0, 2B/F0 7B/D0, 7B/C3, 7B/D3, 9B/F0 9B/C3, 9B/D4, 11B/C0,11B/C3, 11B/D3
S			1A/C4, 1AG3, 2A/B3 3H3, 7A/C3, 8H3, 9A/C3, 10H4, 11A/C3, 12H3
R			1A/B3, 1A/G3, 2A/B3, 3H3, 7A/B3, 8H3, 9A/B3, 10H4, 11A/B3, 12H4

ISSUE 7A(C)

KS-21447 MINI-RECORDER CIRCUIT

BELL TELEPHONE LABORATORIES INCORPORATED

6S

SD-97736-01-A2

PART OF FS I

INTERNAL CONNECTION OF THE KS-21447, LIST 1
MINI-RECORDER

A1

P/O TB1

P/O J6

CIP — 46 — TO CONNECTING CIRCUITS

P/O CP4-1

P/O J4

P/O J5

SEE NOTE 10B	TEST POINTS	15	
+5		7	
-9		29	
+9		27	
		8	
		28	
19	POS PEAKS	34	NC, SEE NOTE 10B
20	NEG PEAKS	33	
35	RAO	20	TO CONNECTING CIRCUITS
36	RAI	22	NC
17	READ DATA	30	TO CONNECTING CIRCUITS
40	READ DATA CLOCK	31	
16	DATA DETECT	32	
13	READ TP	17	NC, SEE NOTE 10B

P/O J6

	TACK BK	1	NC
2	TOR	37	TO CONNECTING CIRCUITS
3	LPEW	45	

CP2

P/O J2

	V REF	28	
TEST POINT	PQAE	18	
		38	
-48		19	
		39	
	PQBE	15	
		35	
-48 RTN		20	
		40	
	PQAB	34	
	PRESB	13	
		33	
		10	
	PREST	30	
	PQBB	36	
		8	
		9	
+5		5	
+5		25	
S1		4	
S2		21	
+9		24	
-9		31	
STOP		7	
FOR		22	
REV		3	
INIT		23	

P/O J7

19	TK1	21	
1		1	
2	TK2	22	
		2	
20		3	
5		4	
		5	
		25	

P/O J6

24	+5		
48	+9		
23	-9		
22	-48 RTN		
25	-48		

TO CONNECTING CIRCUITS

P/O J5

24	WRITE DATA	14	
25	WRITE DATA CLOCK	33	
29	WRITE ENABLE	12	
21	WA1	32	
19	WAO	13	

P/O J6

NC	2	STOP	7
TO CONNECTING CIRCUITS	27	FOR	22
	29	REV	3
	31	INIT	23

P/O J6

	21	TM	39
	5	BOT	41
TO CONNECTING CIRCUITS	26	EOT	43

P/O J3 TK1 P/O J7

	20		27
	40		28
	39		29
	38		11
	19		30
	18		31
NC			5
			6
			7
			8
			23
			24
			25
			26

TK2

P/O CP5

P/O J3

-9		2	
+5		7	
+9		27	
		8	
		28	
29	TACK BK	1	
1	BOTM	25	
22	EOTM	6	
26	REVB	24	
27	FORB	4	

P/O CP4-1

P/O J4

	23	FAST	
NC	32	TPQ4C	
	37	TPQ5C	

P/O J4

	14		
	15		
	7		
	29		
	27		
	8		
	28		

P/O J4

	21		
	1		
	22		
	2		
	3		
	4		
	5		
	25		

P/O J4

	26		

P/O A3

P/O PU2 READ

TRK1	+	BR-R	
	-	BR-G	
	+	R-O	
	+	R-Y	
TRK2	-	R-BL	

P/O P7

P/O A3

P/O PU2 WRITE

	BR-W	CT	
TRK1	BR	+	
	BR-BK	-	
	R-W	CT	
TRK2	R	+	
	R-BK	-	

P/O P7

P/O J7

	BR-W	27	
	BR	28	
	BR-BK	29	
	R-W	11	
	R	30	
	R-BK	31	

P/O P7

P/O J7

	BR-R	13	
	BR-G	14	
	R-O	15	
	R-Y	16	
	R-BL	17	

P/O J5

	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		

P/O J6

	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21		

TO CONNECTING CIRCUITS

B1 — MOT TACH — R, BK — FERRITE BEADS

C1: (PN) 1000 PF — W-BK-BR

C2: (PN) 1000 PF — W-BK-O

W-O-G

W-BK-BR

CA1

Q2, Q1

R1 16.7 Ω

C1 1.36 μf

	W-BR	6	PQAB
	W-Y	14	PRESB
	W-BL	13	PREST
	W-G	4	PQBB
+5	W-R	15	+5
18/DS S1	BL	9	S1
S2	G	10	S2
GRD	W-BK	3	

	BK	31	W-R
	BK	8	
	R	12	
	BK	17	
		11	W-BK-BR
		5	W-BK-O

C NO

PT

ISSUE 881

KS-21447 MINI-RECORDER CIRCUIT

BELL TELEPHONE LABORATORIES INCORPORATED

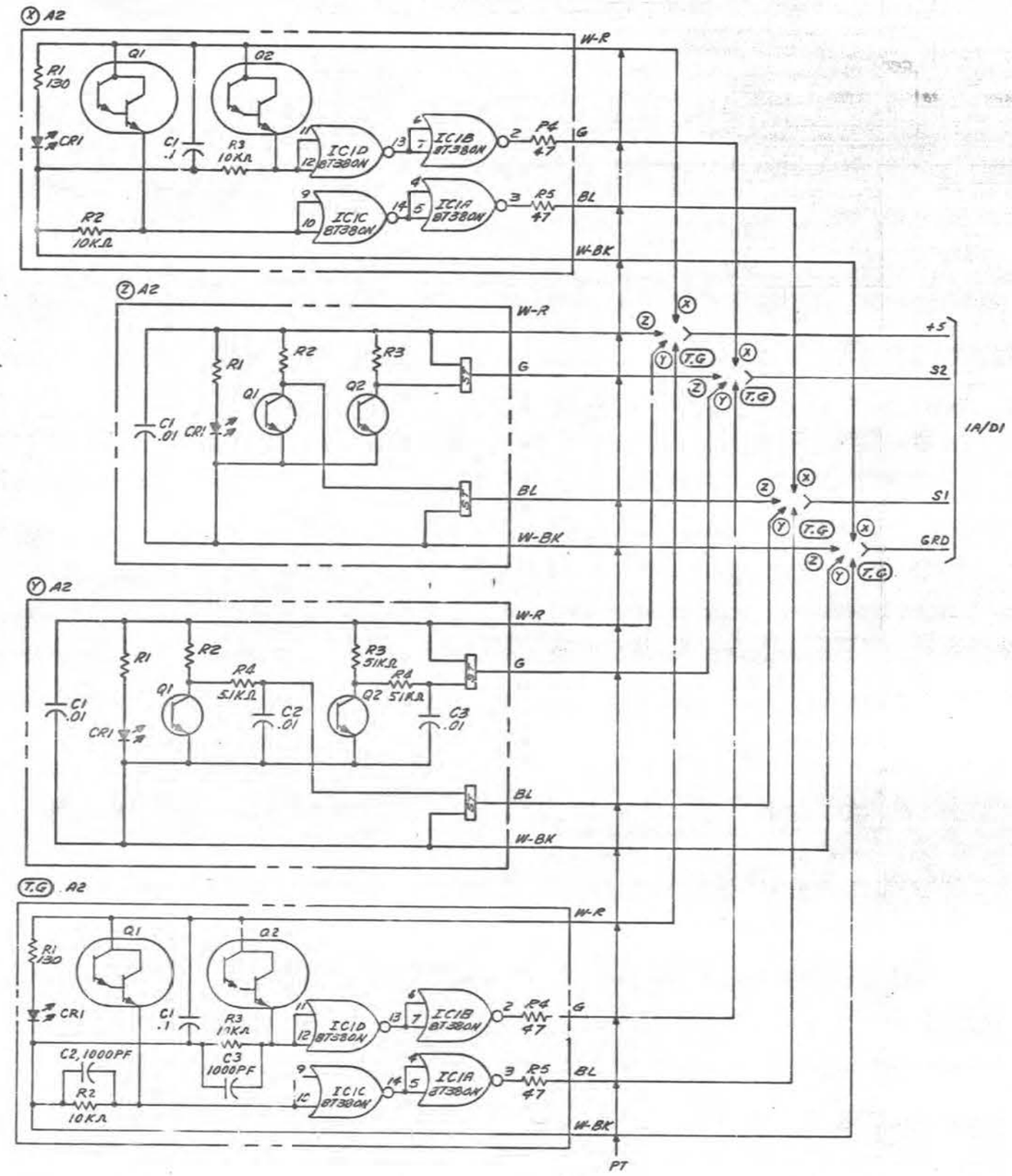
SIZE 6S

SD-97736-01-BIA

SD-97736-01-BIA

PART OF FS 1

INTERNAL CONNECTION OF THE KS-21447, LIST 1
MINI-RECORDER



ISSUE 7A1(C)

KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-BIB
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S

PART OF FS 2

INTERNAL CONNECTION OF THE KS-21447, LIST 2, LIST 7, AND LIST 9 MINI-RECORDER

A1

P/O TB1

CP2

P/O J2

P/O J6

P/O J5

P/O J7

P/O J4

P/O J3

P/O CA1

P/O A3

P/O P7

P/O PU2 READ

P/O PU2 WRITE

PU1 ERASE

B1 MOT/TACH

C1 1000PF

C2 1000PF

FERRITE BEADS

Q1 Q2

R1 14.7Ω

C1 1.96μF

TEST POINT V REF

PQAE

-48

PQBE

-48 RTN

PQAB

PPESB

PREST

PQBB

+5

S2

S1

+9

-9

STOP

GRD

TK1 TK2 TK3 TK4

WRITE DATA

WRITE ENABLE

WA1

WA0

CIP

TACK BK

TOR

LPEW

POS PEAKS

NEG PEAKS

RAO

RAI

READ DATA

READ DATA CLOCK

DATA DETECT

READ TP

TRK1 TRK2 TRK3 TRK4

TR1 TR2 TR3 TR4

TO CONNECTING CIRCUITS

NC SEE NOTE 10B

NC

2B/C4

3A4

FOR REV INIT

FAST EOTM TACK BK CIP LPEW TOR REV B FOR B BOTM

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-B2A

BELL TELEPHONE LABORATORIES INCORPORATED

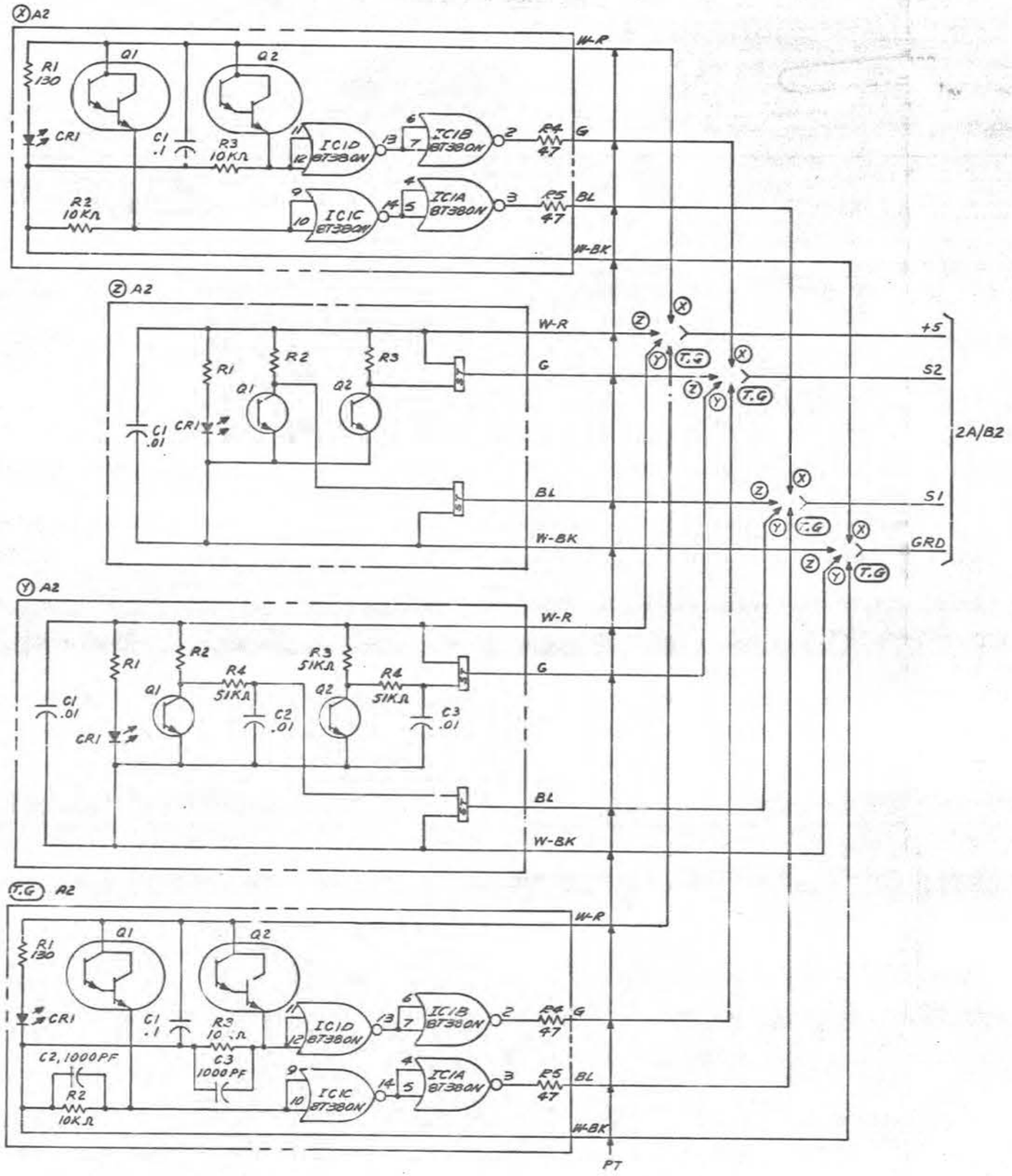
SIZE 6S

ISSUE 881

SD-97736-01-B2A

PART OF FS 2

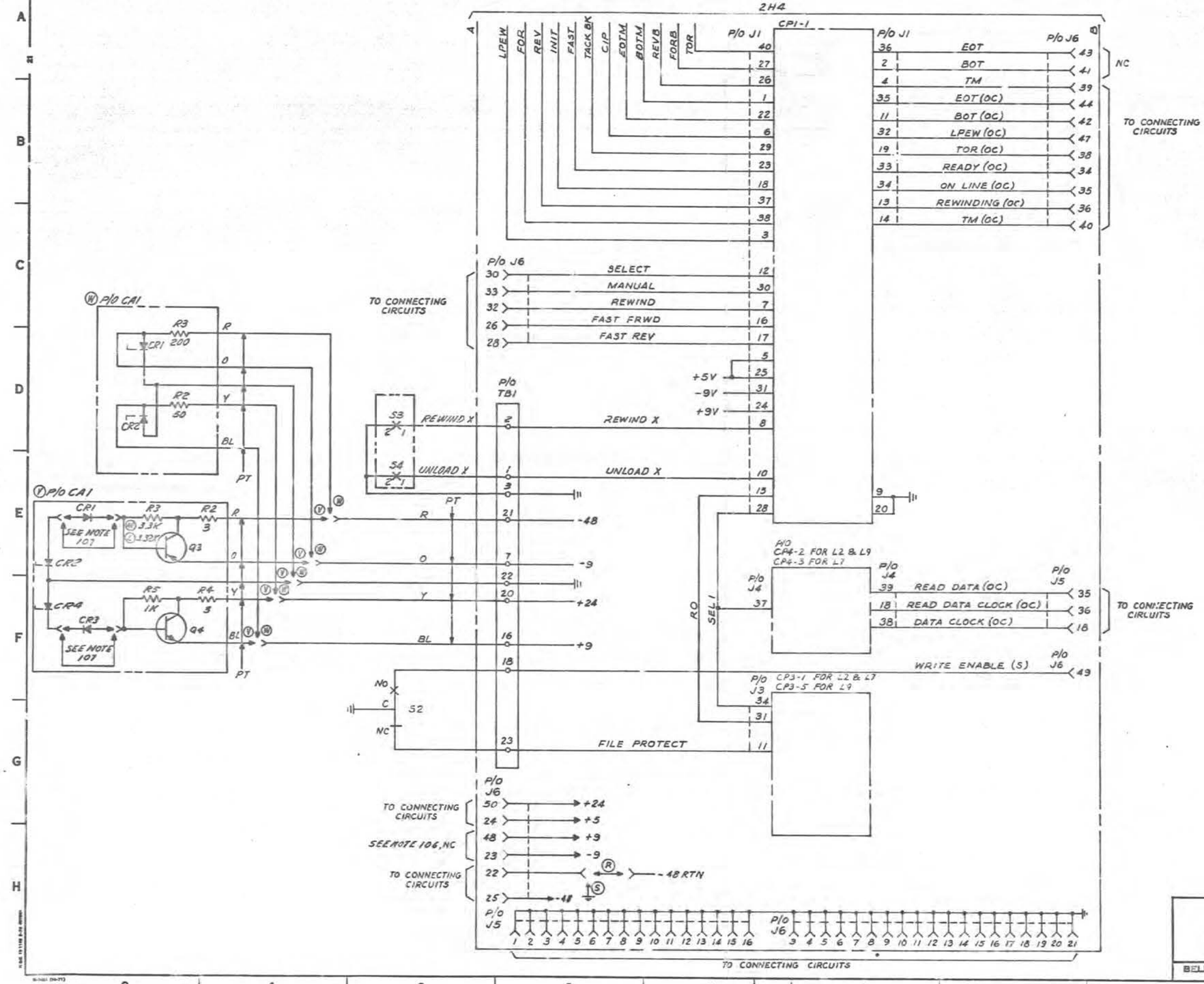
INTERNAL CONNECTION OF THE KS-21447, LIST 2, LIST 7, AND LIST 9 MINI-RECORDER



KS-21447 MINI-RECORDER CIRCUIT	ISSUE 7AH(C)
BELL TELEPHONE LABORATORIES INCORPORATED	SD-97736-01-B2B
	SIZE 6S

PART OF FS 2

INTERNAL CONNECTION OF KS-21447, LIST 2, LIST 7, AND LIST 9 MINI-RECORDER



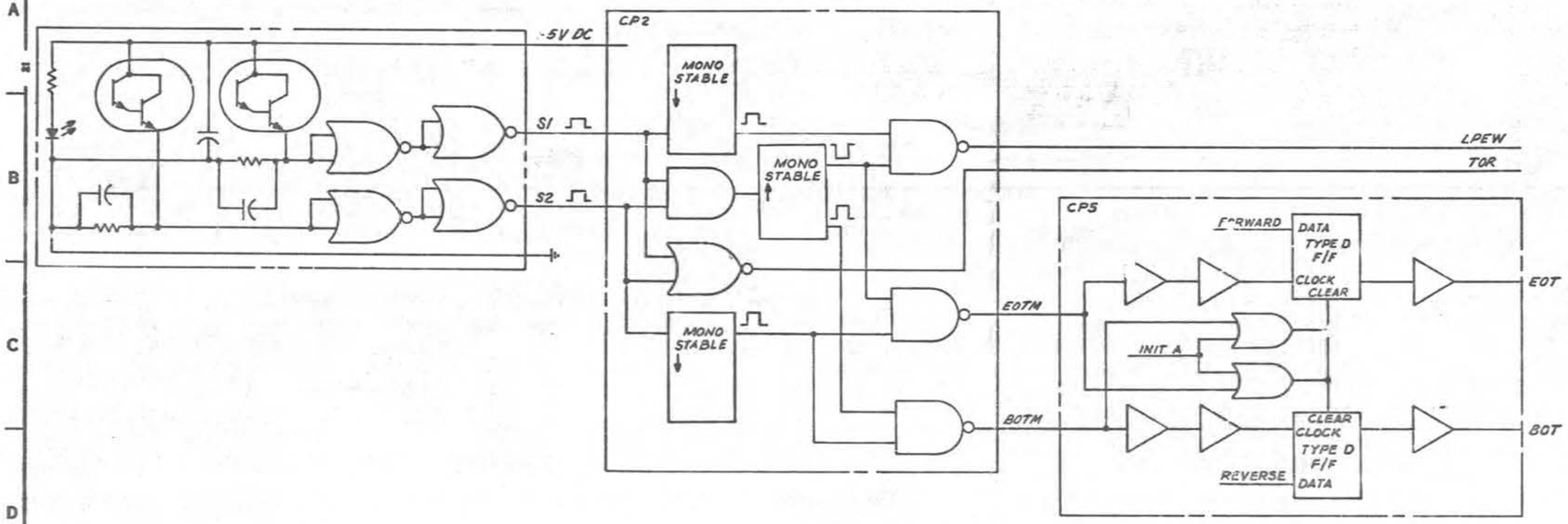
KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-B3
BELL TELEPHONE LABORATORIES INCORPORATED	6S

881

SD-97736-01-B3

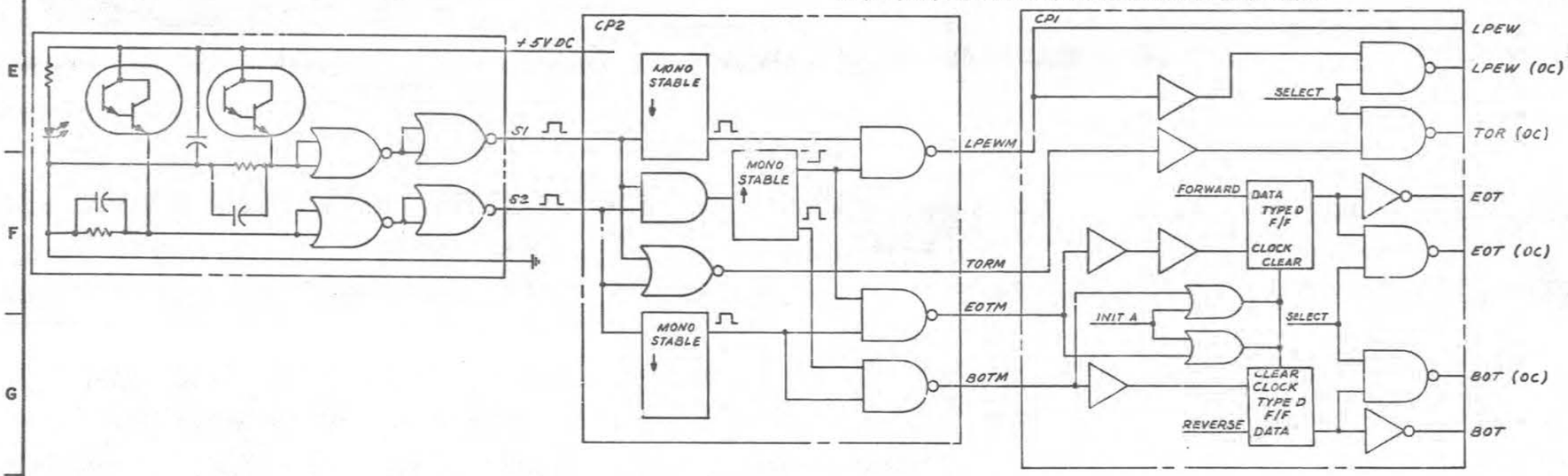
FS 3

TOR, EOT, BOT, LPEW SENSING & STATUS GENERATION FOR LIST I



FS 4

TOR, EOT, BOT, LPEW SENSING & STATUS GENERATION EXCEPT LIST I



SD-97736-01-B4

ISSUE 3B

KS-21437 MINI-RECORDER CIRCUIT

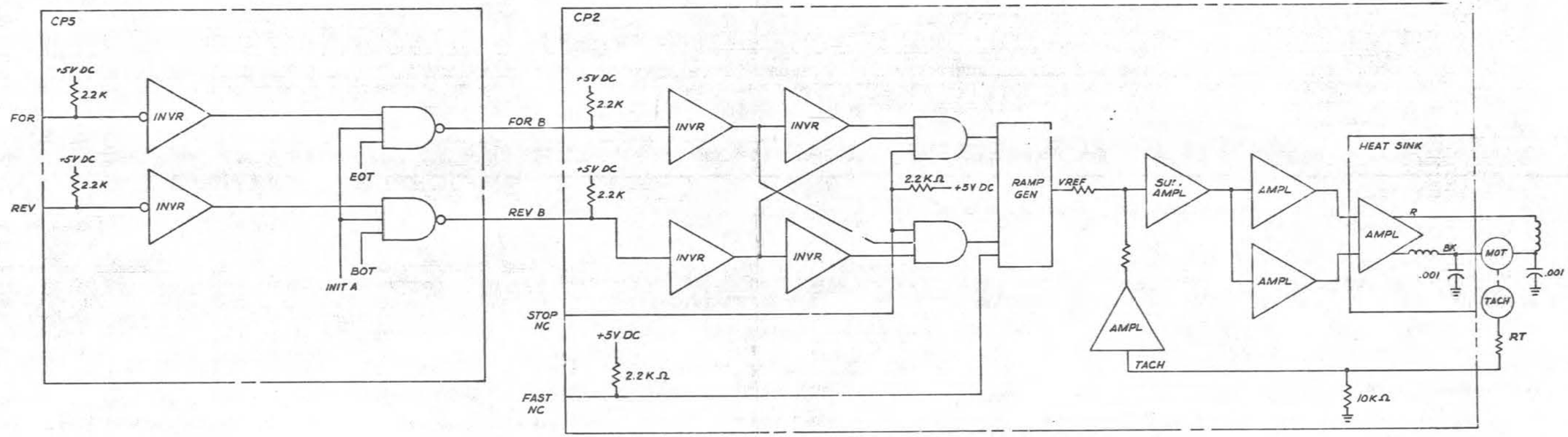
SD-97736-01-B4

BELL TELEPHONE LABORATORIES INCORPORATED

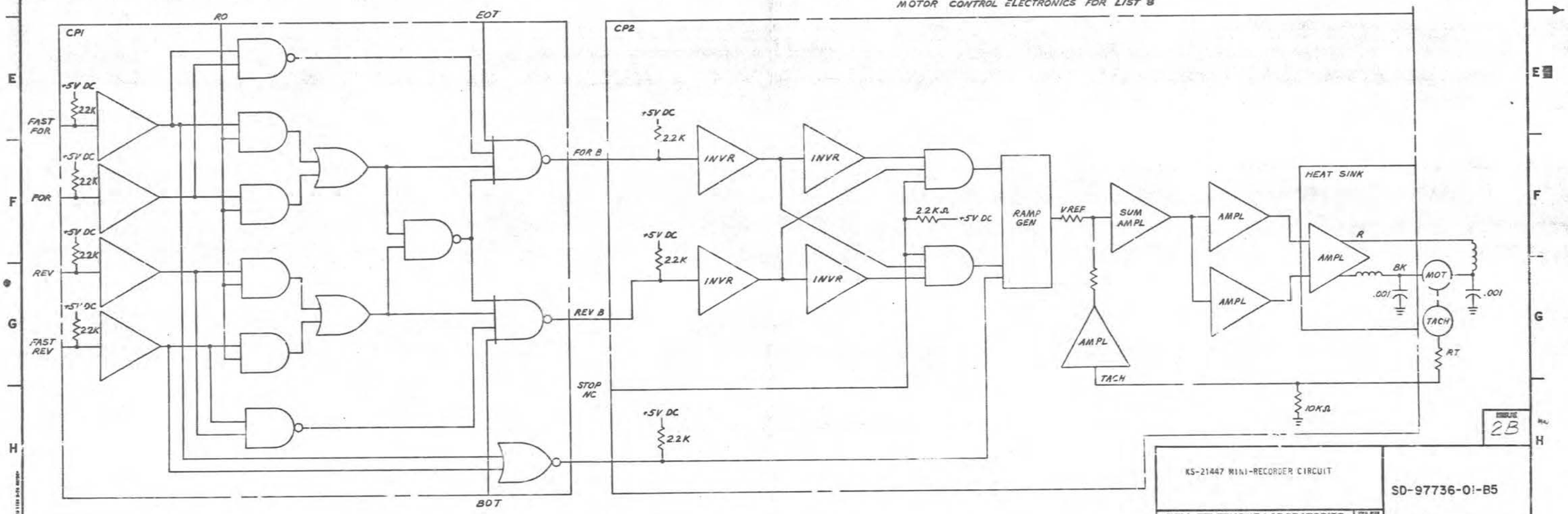
6S

FS 5

MOTOR CONTROL ELECTRONICS FOR LIST 1



MOTOR CONTROL ELECTRONICS FOR LIST 8



ISSUE 2B

KS-21447 MINI-RECORDER CIRCUIT

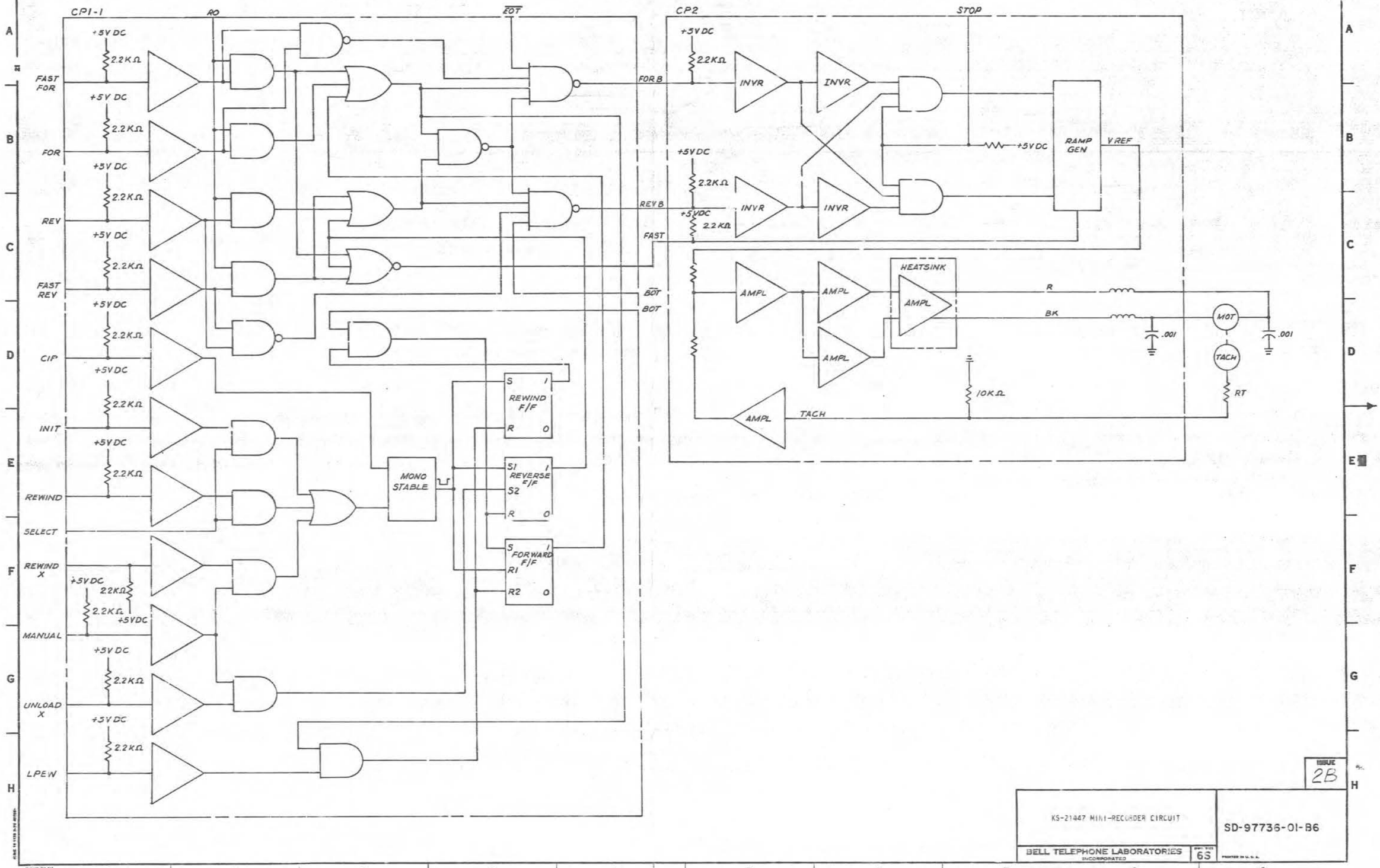
SD-97736-01-B5

BELL TELEPHONE LABORATORIES INCORPORATED

6S

FS 6

MOTOR CONTROL ELECTRONICS FOR LIST 2 THRU LIST 7, LIST 9 AND LIST 10



SD-97736-01-86

ISSUE 2B

KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-86
BELL TELEPHONE LABORATORIES INCORPORATED	SHEET 63

PART OF FS 7

INTERNAL CONNECTION OF THE KS-21447 LIST 3 AND LIST 4 MINI-RECORDER

A1

P/O TB1

PT · BK · S1 C NO W-R · PT

BK 19 · BK 8 · R 12 · BK 17

B1 · MOT TACH · R · BK · PT

(PN) C1 1000PF · (PN) C2 1000PF

W-BK-BR · W-BK-C · W-O-G · W-BK-BR

FERRITE BEADS

CA1 · Q2 · Q1 · R1 14.7Ω · C1 1.96μF

W-B 6 · W-Y 14 · W-BL 13 · W-G 4 · W-R 15 · BL 9 · G 10 · W-BK 3

+5 · S1 · S2 · GRD

TO CONNECTING CIRCUITS

P/O J2 · CP2

TEST POINT V REF 28 · PQAE 18 · -48 19 · 39 · PQBE 15 · 35 · -48 RTN (R) (S) 20 · 40 · PQAB 34 · PRESB 13 · 33 · 10 · PREST 30 · PQBB 36 · 8 · 9 · +5 5 · 25 · S1 4 · S2 21 · +9 24 · -9 31 · STOP 7

P/O J6 2 · 31 · 29 · 17

P/O A3 · TRK1 · TRK2 · TRK3 · TRK4 · P/O PU2 READ · PT

BR-R · BR-G · R-O R-Y · R-BL · BK · O-V · Y-G · Y-S

P/O P7 · P/O J7 19 · 1 · 2 · 20 · 21 · 3 · 4 · 22 · 5 · TK1 · TK2 · TK3 · TK4

P/O CP4-2 FOR LIST 4 CP4-3 FOR LIST 3 · P/O J4 21 · 1 · 22 · 2 · 23 · 3 · 24 · 4 · 25 · 5 · 25 · P/O J4 26

P/O J5 25 · 24 · 23 · 21 · 19 · EXTERNAL CLOCK · WRITE DATA · WRITE ENABLE · WAI · WAO

TO CONNECTING CIRCUITS

FOR · REV · INIT

P/O J2 32 · 37 · TPQAC · TPQBC NC · 29 · 1 · 27 · 26 · 22 · 23

FAST · EOTM · TACK BK · CIP · LPEW · TDR · REV B · FOR B · BOTM

33 · 14 · 12 · 32 · 13

BA4

CIP · P/O J6 46 · TO CONNECTING CIRCUITS

P/O CP4-2 FOR LIST 4 CP4-3 FOR LIST 3 · P/O J4 14 · SEE NOTE 10B · TEST POINTS 15 · +5 7 · -9 29 · +9 27 · 8 · 28

P/O J4 · P/O J5

19 POS PEAKS 34 · 20 NEG PEAKS 33 · NC SEE NOTE 10B

35 RAO 28 · 36 RAI 22 · 17 READ DATA 30 · 40 READ DATA CLOCK 31 · 16 DATA DETECT 32 · TO CONNECTING CIRCUITS

13 READ TP 17 · NC SEE NOTE 10B

TACK BK P/O J6 1 · NC

2 TDR 37 · 3 LPEW 45 · TO CONNECTING CIRCUITS

P/O J3 CP3-2 · -9 2 · +5 7 · +9 27 · 28

P/O J7 5 · 6 · 7 · 8 · 23 · 24 · 25 · 26 · NC

P/O A3 · PT · P/O P7

G-BK + TRK1 · G − · BL-BK + TRK2 · BL − · V-BK + TRK3 · V − · S-BL + TRK4 · S − · PU1 ERASE X

P/O J3 · TR1 · TR2 · TR3 · TR4

BR-W CT 10 · BR + 40 · BR-BK − 28 · TRK1

R-W CT 29 · R + 30 · R-BK − 31 · TRK2

O-W CT 15 · O + 33 · O-BK − 34 · TRK3

W CT 18 · Y + 35 · Y-BK − 36 · TRK4 · P/O PU2 WRITE

381

KS-21447 MINI-RECORDER CIRCUIT

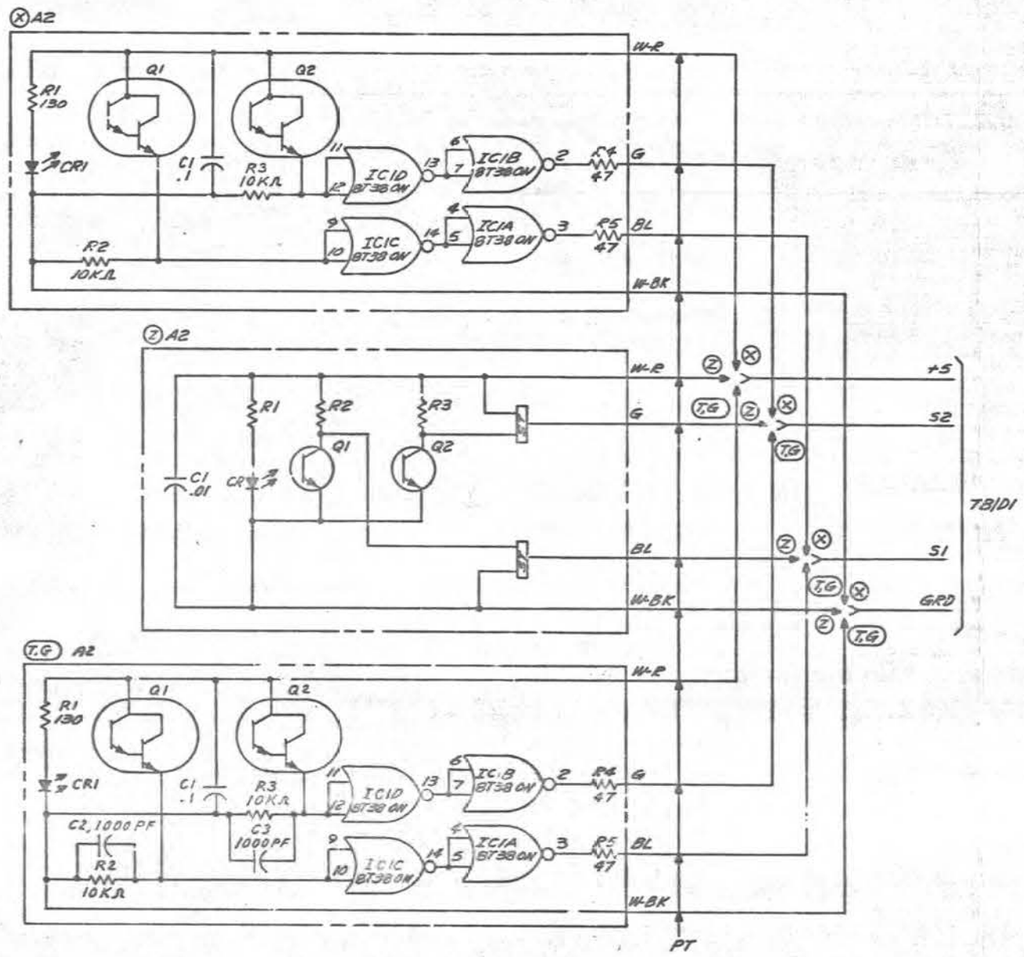
SD-97736-01-B7A

BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-97736-01-B7

PART OF FS 7

INTERNAL CONNECTION OF THE
KS-21447 LIST 3 AND LIST 4 MINI-RECORDER



ISSUE	7A1 (C)
KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-B7B
BELL TELEPHONE LABORATORIES INCORPORATED	6S

PART OF FS 7

INTERNAL CONNECTION OF KS-21447, LIST 3 AND LIST 4
MINI - RECORDER

7A/H4

CPI-1

P/O J1

LPEW 40
FOR 27
REV 26
INIT 1
FAST 22
TACK BK 6
C/P 29
EOTM 23
BOTM 18
REVS 37
FORS 38
TOR 3

P/O J1

		P/O J6
36	EOT	43
2	BOT	41
4	TM	39
35	EOT (OC)	44
11	BOT (OC)	42
32	LPEW (OC)	47
19	TOR (OC)	38
33	READY (OC)	34
34	ON LINE (OC)	35
13	REWINDING (OC)	36
14	TI (OC)	40

TO CONNECTING CIRCUITS

P/O J6

30	SELECT	12
33	MANUAL	30
32	REWIND	7
26	FAST FRWD	16
28	FAST REV	17

TO CONNECTING CIRCUITS

5
+5V 25
-9V 31
+9V 24
8
9
20
10
15
28

P/O TB1

S3 2
REWIND X 2 — REWIND X

S4 2 1
UNLOAD X 1 — UNLOAD X
3

P/O CP6-2 FOR LIST 4
CP6-3 FOR LIST 3

P/O J4 37
RO
SEL I

P/O J4

		P/O J5
39	READ DATA (OC)	35
18	READ DATA CLOCK (OC)	36
38	DATA CLOCK (OC)	18

TO CONNECTING CIRCUITS

18 — WRITE ENABLE (3) — P/O J6 49

NO
C
NC
S2

P/O J3 CP3-2
34
31
11

23 — FILE PROTECT

P/O J6

24	→	+5
48	→	+9
23	→	-9
22	↔ (R)	-48 RTN
25	→ (S)	-48

TO CONNECTING CIRCUITS

P/O J5: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
P/O J6: 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

TO CONNECTING CIRCUITS

SD-97736-01-B8

BSU 881

KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-B8
BELL TELEPHONE LABORATORIES INCORPORATED	SYS ORG 6S

PART OF FS ℰ

INTERNAL CONNECTION OF THE KS-21447, LIST 5, LIST 6, AND LIST 10, MINI-RECORDER

A1

P/O TB1

P/O CP2

P/O J2

P/O J6

P/O J5

P/O J4

P/O J7

P/O J3

CP3-2

P/O J1

P/O A3

P/O CA1

P/O CP4-2 FOR LIST 5
CP4-3 FOR LIST 6
CP4-4 FOR LIST 10

P/O CR4-2 FOR LIST 5
CR4-3 FOR LIST 6
CR4-4 FOR LIST 10

B1 (MOT/TACH)

C1 (P/N) 1000 PF

C2 (P/N) 1000 PF

FERRITE BEADS

Q1, Q2

R1 14.7Ω

C1 .196μf

S1 W-R C NO BK

-48 RTN

TEST POINT VREF

PQAE

-9B

PQBE

PRESB

PQAB

PREST

PQBB

+5

+9

-9

S1

S2

STOP

9B/C5 S1 BL

S2 G

GRD W-BK

W-BK-BR

W-O-G

W-BR

W-Y

W-BL

W-G

W-R

W-BK

TK1

TK2

TK3

TK4

TRK1 BR-R / BR-G

TRK2 R-O (A) / R-Y (J) / R-BL

TRK3 BK / O-Y

TRK4 Y-G / Y-S

P/O PU2 READ

TO CONNECTING CIRCUITS

EXTERNAL CLOCK

WRITE DATA

WRITE ENABLE

WAI

WAO

FOR

REV

INIT

CIP

TO CONNECTING CIRCUITS

TPQ4C

TPQ5C

NC

SEE NOTE 10B TEST POINTS

POS PEAKS

NEG PEAKS

RAO

RAI

READ DATA

READ DATA CLOCK

DATA DETECT

READ TP

NC SEE NOTE 10B

TACK BK

TOR

LPEW

TO CONNECTING CIRCUITS

NC

NC SEE NOTE 10B

LIST 10 ONLY

FAST

EOTM

TACK BK

CIP

LPEW

TOR

REV B

FOR B

BOTM

10A4

TR1

TR2

TR3

TR4

TRK1

TRK2

TRK3

TRK4

PU1 ERASE

P/O PU2 WRITE

ISSUE 681

KS-21447 MINI-RECORDER CIRCUIT

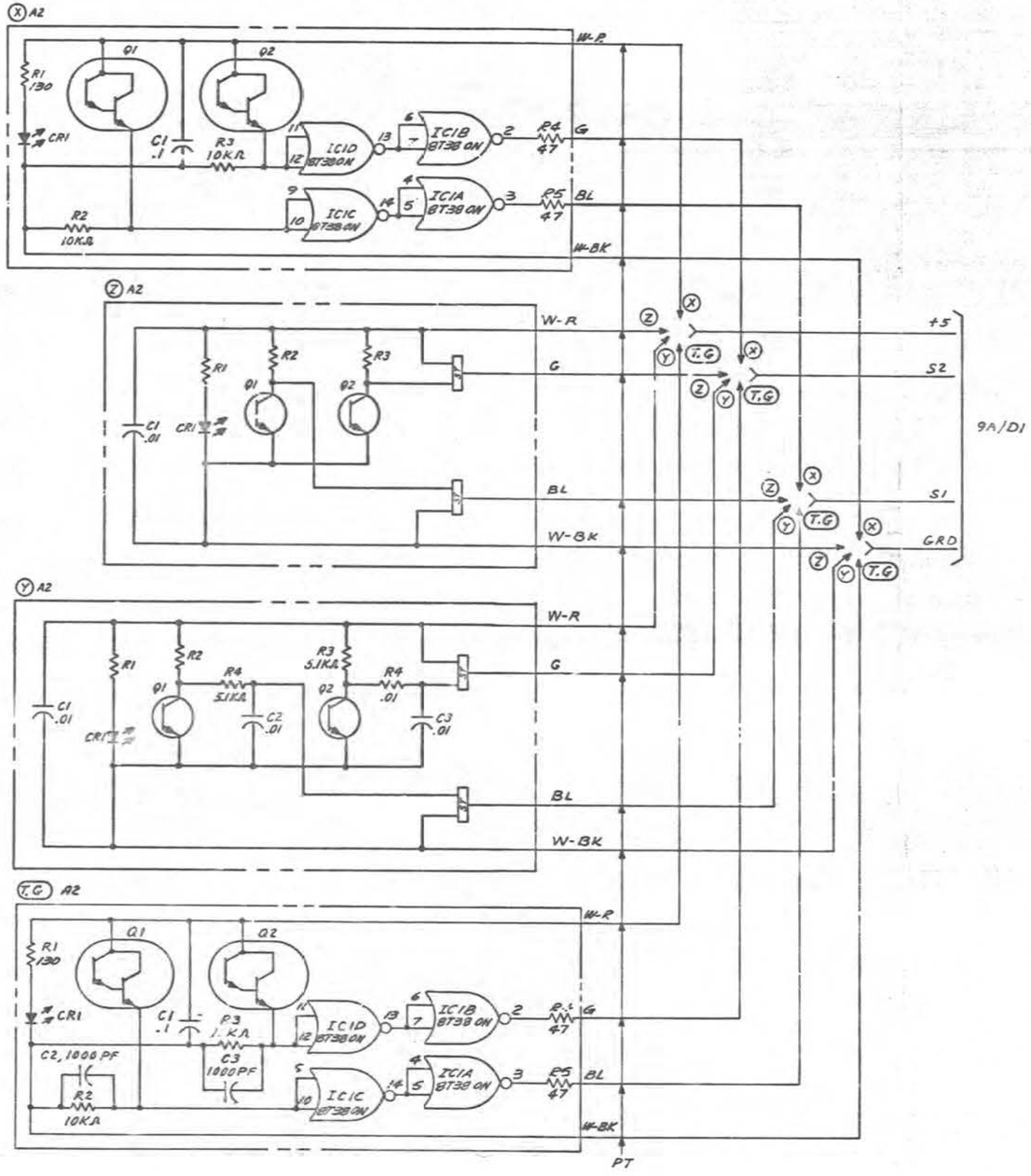
SD-97736-01-B9A

BELL TELEPHONE LABORATORIES INCORPORATED

6S

PART OF FS 8

INTERNAL CONNECTIONS OF THE KS-21447, LIST 5, LIST 6 AND LIST 10
MINI-RECORDER



ISSUE 7A1(C)	
KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-B9B
BELL TELEPHONE LABORATORIES INCORPORATED	DWG SIZE 6S

PRINTED IN U.S.A.

PART OF FS 8

INTERNAL CONNECTION OF KS-21447, LIST 5, LIST 6, AND LIST 10 MINI-RECORDER

9H4

CP1-1

P/O J1 — LPEW 40, FOR 27, REV 26, INIT 1, FAST 22, TACK BK 6, CIP 29, EOTM 23, BOTM 18, REVB 37, FORB 38, TOR 3

P/O J1 / P/O J6:
- EOT 36 — 43
- BOT 2 — 41
- TM 4 — 39
- EOT (OC) 35 — 44
- BOT (OC) 11 — 42
- LPEW (OC) 32 — 47
- TOR (OC) 19 — 38
- READY (OC) 33 — 34
- ON LINE (OC) 34 — 35
- REWINDING (OC) 13 — 36
- TM (OC) 14 — 40

TO CONNECTING CIRCUITS

P/O J6 — TO CONNECTING CIRCUITS:
- SELECT 30 — 12
- MANUAL 33 — 30
- REWIND 32 — 7
- FAST FRWD 26 — 16
- FAST REV 28 — 17

+5V — 5, 25
-9V — 31
+9V — 24
8

P/O T81:
- S3 REWINDX: 2 — REWIND X
- S4 UNLOAD 1: 1 — UNLOAD X — 10
- 3 — 15
- 21 — 28 — -48
- 7 — 9 — -9
- 22 — 20
- 18 — WRITE ENABLE (S) — P/O J6 49
- 23 — FILE PROTECT — 11

9 — 20

RO, SEL 1

P/O CP4-2 FOR LIST 5
CP4-3 FOR LIST 6
CP4-3 FOR LIST 10

P/O J4 — 37

P/O J4 / P/O J5:
- READ DATA (OC) 39 — 35
- READ DATA CLOCK (OC) 8 — 36
- DATA CLOCK (OC) 38 — 18

TO CONNECTING CIRCUITS

P/O J3 — CP3-2 — 34, 31, 11

NO, C, NC — S2

P/O CA1:
- -48 0
- R3 200, -9 R, CR2, GRD

P/O CA1:
- R3 3.3K (M), 3.32K (L), R2 3, Q3
- R, 0
- CR1, CR2
- SEE NOTE 107
- PT

SEE NOTE 106 NC

P/O J6 — TO CONNECTING CIRCUITS:
- 23 — -9
- 48 — +9
- 24 — +5
- 22 — -48 RTN (R, S)
- 25 — -48

P/O J5: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

P/O J6: 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

TO CONNECTING CIRCUITS

ISSUE 8B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-B10

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

PRINTED IN U.S.A.

PART OF FS 9

INTERNAL CONNECTION OF THE KS-21447, LIST 8 MINI-RECORDER

A1

P/O TB1

P/O J6

CIP — TO CONNECTING CIRCUITS

P/O CP4-2

P/O J5

POS PEAKS — NC SEE NOTE 108

NEG PEAKS — NC SEE NOTE 108

RAD, RAI, READ DATA, READ DATA CLOCK, DATA DETECT — TO CONNECTING CIRCUITS

READ TP — NC SEE NOTE 108

TEST POINTS — SEE NOTE 109

+5, -9, +9

TPQ4C, TPQ5C — NC

TACK BK — NC

TOR, LPEW — TO CONNECTING CIRCUITS

P/O CP3-2

P/O J7 — NC

P/O A3

TRK1 G-BK +, G −

TRK2 BL-BK +, BL −

TRK3 V-BK +, V −

TRK4 S-BL +, S −

P/O PU1 ERASE

TRK1 BR-W CT, BR +, BR-BK −

TRK2 R-W CT, R +, R-BK −

TRK3 O-W CT, O +, O-BK −

TRK4 W CT, Y +, Y-BK −

P/O PU2 WRITE

TR1, TR2, TR3, TR4

P/O CP2

P/O J2

V REF, TEST POINT PQAE, -48, PQBE, -48 RTN, PQAB, PRESB, PREST, PQBB, +5, S2, S1, +9, -9, STOP

P/O CA1

Q1, Q2

R1 14.1Ω, C1 1.96μf

B1 MOT/TACH

C1 1000 PF, C2 1000 PF

FERRITE BEADS

W-BK-BR, W-BK-O, W-O-G, W-BR, W-Y, W-BL, W-G, W-R, W-BK

BK, R

S1 W-R C NO BK

PT

118/CS

P/O A3

P/O PU2 READ

TRK1 BR-R, BK-G, R-O, R-Y

TRK2 R-BL

TRK3 BK, O-V

TRK4 Y-G, Y-S

P/O J4

P/O J3

TK1, TK2, TK3, TK4

P/O J5

EXTERNAL CLOCK, WRITE DATA, WRITE ENABLE, WAI, WAO

TO CONNECTING CIRCUITS

FOR, REV, INIT

FAST, EOTM, TACK BK, CIP, LPEW, TOR, REV B, FOR B, BOTM

12A4

ISSUE 8B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-B11A

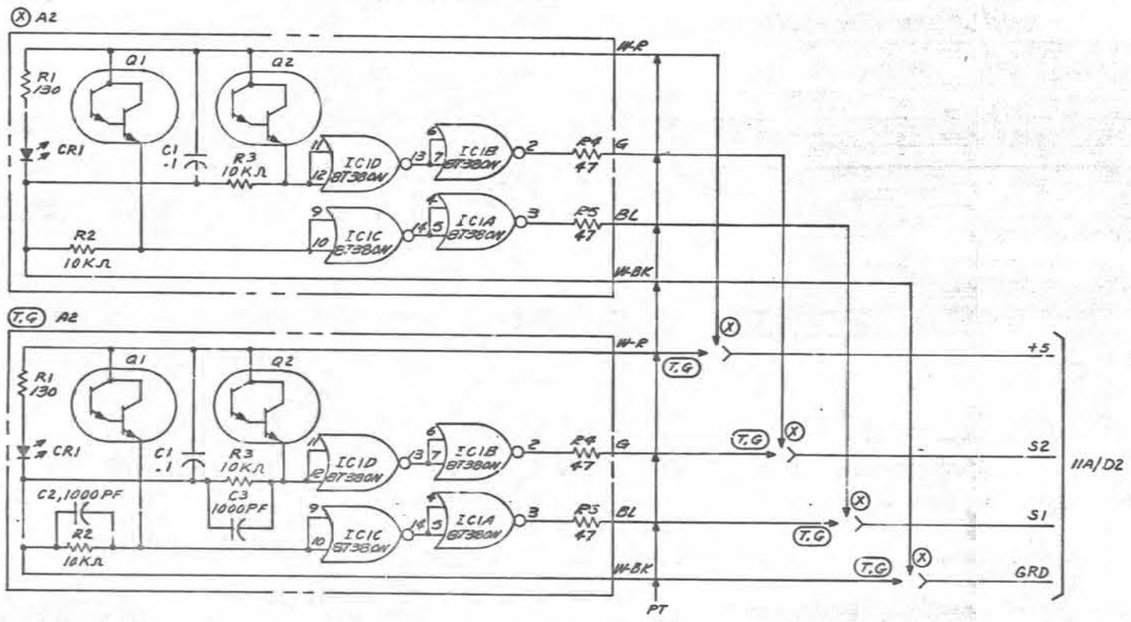
BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

PART OF FS 9

INTERNAL CONNECTION OF THE KS-21447 LIST 8 MINI-RECORDER



KS-21447 MINI-RECORDER CIRCUIT	ISSUE 7A(C)
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S
	SD-97736-01-B11B

PART OF FS 9

INTERNAL CONNECTION OF KS-21447, L8
MINI-RECORDER

11114

CP1-2

P/O J1 40 — LPEW
27 — FOR
26 — REV
1 — INIT
22 — FAST
6 — TAPE BK
29 — C/P
23 — BOTM
18 — EOTM
37 — REVB
38 — FORB
3 — TOR

P/O J1 36 — EOT — P/O J6 43
2 — BOT — 41
4 — TM — 39
35 — EOT (OC) — 44
11 — BOT (OC) — 42
32 — LPEW (OC) — 47
19 — TOR (OC) — 38
33 — READY (OC) — 34
34 — ON LINE (OC) — 35
13 — REWINDING (OC) — 36
14 — TM (OC) — 40

TO CONNECTING CIRCUITS

P/O J6
30 — SELECT — 12
26 — FAST FRWD — 16
28 — FAST REV — 17
TO CONNECTING CIRCUITS

5
+5V — 25
-9V — 31
+9V — 24
8
10
15
28
9
20

P/O CA1

R2 3
R3 (H) 3.3K (L) 332K
Q3
SEE NOTE 107
CR1
CR2
R4 3
R5 100
Q4
SEE NOTE 107
CR4
CR3

PT

P/O T81
R — 21 — -48
O — 7 — -9
22
Y — 20 — +12
BL — 16 — +9

P/O CP4-2
P/O J4 37
P/O J4 39 — READ DATA (OC) — P/O J5 35
18 — READ DATA CLOCK (OC) — 36
38 — DATA CLOCK (OC) — 18
TO CONNECTING CIRCUITS

A0
SEL 1

P/O J3 34
31
P/O CP3-2

P/O J6
TO CONNECTING CIRCUITS
50 — +12
24 — +5
SEE NOTE 106 NC
48 — +9
23 — -9
TO CONNECTING CIRCUITS
P/O J6
22 — -48 RTN
25 — -48

P/O J5 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
P/O J6 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
TO CONNECTING CIRCUITS

ISSUE 881

KS-21447 MINI-RECORDER CIRCUIT — SD-97736-01-812

BELL TELEPHONE LABORATORIES INCORPORATED — DWG SIZE 6S — PRINTED IN U.S.A.

APP FIG. 1

KS-21447, L1 MINI-RECORDER

CIRCUIT PACK

EQPT LOC.			
DESIG.	CP2	CP4-1	CP5
CODE	L510100	L510103-1	L510101
OPTION			
ELEM. IDENT.	TERM.	TERM.	TERM.
TERM. FS. LOC.	40-1A/D5	40-1A/C7	40-1A/E7
CONNECTION ON FRAME	J2	J4	J3
	SEE A1 BACK PLANE ASSEMBLY		

ASSEMBLY, BACK PLANE

DESIG.	LOC.	CODE
A1	1A/A2	L510104-1

E/W

CONNECTOR, (JACK)

DESIG.	J2	J3	J4	J5	J6	J7
CODE	908L	908L	908L	KS-16786, L17	KS-16786, L12	KS-16786, L17
OPTION						
TERM	LOC	LOC	LOC	LOC	LOC	LOC
50						
49						
48						1A/G2
47						
46						1A/A8
45						1A/C8
44						
43						1A/G8
42						
41						1A/G8
40	1A/C4	1A/D7	1A/B7			
39	1A/B4	1A/E7				1A/G8
38	1A/B4	1A/E7				
37						1A/C8
36	1A/D4		1A/B7			
35	1A/B4		1A/B7			
34	1A/C4			1A/B8		
33	1A/C4	1A/H6		1A/B8		
32		1A/H6		1A/C8		
31	1A/E4			1A/B8	1A/F2	1A/E8
30	1A/D4			1A/B8		1A/E8
29	1A/D5		1A/B6		1A/E2	1A/E8
28	1A/D4	1A/D6	1A/B6			1A/D8
27	1A/E5	1A/D6	1A/B6		1A/E2	1A/D8
26	1A/E5	1A/G7				1A/F8
25	1A/D4	1A/D6	1A/G4	1A/H2	1A/G2	1A/F8
24	1A/E4	1A/E6		1A/H2	1A/G2	1A/F8
23		1A/F6		1A/H2	1A/G2	1A/F8
22	1A/E5	1A/E6	1A/F4	1A/B8	1A/G2	
21	1A/E4	1A/F7	1A/F4	1A/H2	1A/H6	
20	1A/C4	1A/D7	1A/B7	1A/B8	1A/H6	1A/F2
19	1A/B4	1A/E7	1A/B7	1A/H2	1A/H6	1A/F2
18	1A/B4	1A/E7			1A/H6	
17			1A/B7	1A/C8	1A/H6	
16			1A/C7	1A/H4	1A/H6	
15	1A/B4		1A/B6	1A/H4	1A/H6	
14		1A/H6	1A/B6	1A/H4	1A/H6	
13	1A/C4	1A/H6	1A/C7	1A/H4	1A/H5	
12		1A/H6		1A/H4	1A/H5	
11				1A/H4	1A/H5	1A/E8
10	1A/C4			1A/H4	1A/H5	
9	1A/D4			1A/H3	1A/H5	
8	1A/D4	1A/D6	1A/B6	1A/H3	1A/H5	1A/F8
7	1A/E4	1A/D6	1A/B6	1A/H3	1A/H5	1A/E8
6		1A/E6		1A/H3	1A/H5	1A/E8
5	1A/D4	1A/F7	1A/G4	1A/H3	1A/H5	1A/E8
4	1A/D4	1A/E5	1A/F4	1A/H3	1A/H5	
3	1A/C5	1A/E6	1A/F4	1A/H3	1A/H4	
2	1A/C5	1A/D6	1A/F4	1A/H3	1A/E2	1A/F2
1	1A/D5	1A/D6	1A/F4	1A/H3	1A/C8	1A/F2

TERMINAL BOARD

DESIG.	TB1
CODE	*
OPTION	
TERM.	LOC
23	
22	
21	
20	
19	1A/A3
18	
17	1A/B3
16	
15	1A/D3
14	1A/C3
13	1A/D3
12	1A/A3
11	1A/B3
10	1A/E3
9	1A/D3
8	1A/A3
7	
6	1A/C3
5	1A/B3
4	1A/D3
3	1A/E3
2	
1	

* 520-23 KULKA ELECTRIC CORP.

ASSEMBLY, HEAD TWO TRACK

DESIG.	LOC.	CODE
A3	1A/F0, 1A/D9	L510094

E/W

CONNECTOR, (PLUG)

DESIG.	P7
CODE	KS-16785, L3
OPTION	
TERM.	LOC
36	
35	
34	
33	
32	
31	1A/E8
30	1A/E8
29	1A/E8
28	1A/E8
27	1A/D8
26	1A/F8
25	1A/F8
24	1A/F8
23	1A/F8
22	
21	
20	1A/F2
19	1A/F2
18	
17	
16	
15	
14	
13	
12	
11	1A/E8
10	
9	
8	1A/F8
7	1A/F8
6	1A/F8
5	1A/F8
4	
3	
2	1A/F2
1	1A/F2

ASSEMBLY, SENSOR HOUSING

DESIG.	LOC.	CODE
A2	1B/C0	L510114, SPECTRONICS, INC. PART NO. (P) SPX1820
	1B/E0	(T) SPX1820M
	1B/A0	(O) SPX1820A
	1B/F0	(T) SPX1820B
	1B/F0	(S) SPX1820C, SEE NOTE 205

BEADS, FERRITE

DESIG	LOC	CODE
-	1A/B1	2673021801, FAIR-RITE PRODUCTS, INC.

CAPACITOR

DESIG	LOC	CODE
C1	1A/B2	(P) KS-16509, L1, 1000PF
C2	1A/B2	(N) KS-20977, L3, 1000PF

COMPONENT ASSEMBLY

DESIG	LOC	CODE
C41	1A/C0	L510098

E/W

CAPACITOR

DESIG	LOC	CODE
C1	1A/C1	596G, 1.96

RESISTOR

DESIG	LOC	CODE
R1	1A/C1	KS-8512, L17A, 14.7

TRANSISTOR

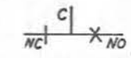
DESIG	LOC	CODE
Q1	1A/C1	2N3792
Q2	1A/C1	2N3792

MOTOR ASSEMBLY

DESIG	LOC	CODE
B1	1A/B1	L510097, SEE NOTE 206

SWITCH
L510093-1

S1



ISSUE 881

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-C1

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-97736-01-C1

APP FIG. 2

KS-21447, L2, L7, AND L9 MINI-RECORDER

CIRCUIT PACK

EQPT. LOC.						
DESIG	CP1-1	CP2	CP3-1	CP3-5	CP4-2	CP4-3
CODE	L510099-1	L510100	L510102-1	L510102-5	L510103-2	L510103-3
OPTION	—	—	LIST 2 & LIST 7	LIST 9	LIST 2 & LIST 9	LIST 7
ELEM. IDENT.	TERM	TERM	TERM	TERM	TERM	TERM
TERM FS LOC	40-3A4	40-2A/C4	40-2A/F7	40-2A/F7	40-2A/87	40-2A/87
CONNECTION ON FRAME	J1	J2	J3		J4	
	SEE A1 BACK PLANE ASSEMBLY					

ASSEMBLY, BACK PLANE

DESIG. A1 — LOC. 2A/A2 — CODE L510104-2

E/W

CONNECTOR, (JACK)

DESIG	J1	J2	J3	J4	J5	J6	J7
CODE	908L	908L	908L	908L	KS-16786, L17	KS-16786, L12	KS-16786, L17
OPTION							
TERM	LOC	LOC	LOC	LOC	LOC	LOC	LOC
50						3G3	
49						3F7	
48						3G3	
47						3B6	
46						2A/A7	
45						2A/C7	
44						3B6	
43						3A6	
42						3B6	
41						3A6	
40	3A4	2A/C4	2A/F6	2A/B6		3C6	
39		2A/B4	2A/F6	3F5		3B6	
38	3B4	2A/B4	3F6	3F5		3B6	
37	3B4		2A/G6	3F4		2A/C7	
36	3A5	2A/C4	2A/G6	2A/B6	3F6	3B6	2A/F7
35	3A5	2A/B4	2A/G6	2A/B6	3F6	3B6	2A/F7
34	3B5	2A/C4	3F4		2A/B7	3B6	2A/F7
33	3B5	2A/C4			2A/B7	3C3	2A/E7
32	3B5		2A/H6		2A/C7	3C3	3G6
31	3D4	2A/E4	3G4		2A/B7	2A/E3	2A/E7
30	3C4	2A/D4			2A/B7	3C3	2A/E7
29	3A4	2A/D5		2A/B6		2A/E3	2A/E7
28	3E4	2A/B4	2A/D6	2A/B6		3C3	2A/D7
27	3B4	2A/D5	2A/D6	2A/B6		2A/E3	3G6
26	3B4	2A/E5				3C3	2A/E9
25	3D4	2A/D4		2A/G4		3H3	2A/G9
24	3D4	2A/E4		2A/G4	2A/H3	3G3	2A/G9
23	3B4	2A/E5		2A/F4	2A/H3	3H3	2A/G9
22	3B4	2A/E5		2A/F4	2A/B7	3H3	2A/G3
21		2A/E4		2A/F4	2A/H3	3H6	2A/F3
20	2A/D5	2A/C4	2A/F6	2A/B6		3H6	2A/F3
19	3B5	2A/B4	2A/F6	2A/B6	2A/H3	3H6	2A/F3
18	3B4	2A/B4	2A/F6	3AF	3F6	3H6	2A/F7
17	3C4		2A/G6	2A/B6	2A/C7	3H6	3H6
16	3C4		2A/G6	2A/C6	3H4	3H6	3G6
15	3E4	2A/B4	2A/G6	2A/B6	3H4	3H6	2A/E7
14	3C5		2A/H6	2A/B6	3H4	3H6	3G6
13	3B5	2A/C4	2A/H6	2A/C6	3H4	3H6	2A/E7
12	3C4		2A/H6		3H4	3F6	3G6
11	3B5		3G4		3H4	3H5	3G6
10	3E4	2A/D4			3H4	3H5	2A/D7
9	3D5	2A/D4			3H3	3H5	3F6
8	3D4	2A/D4	2A/D6	2A/B7	3H3	3H5	2A/G9
7	3C4	2A/E4	2A/D6	2A/B6	3H3	3H5	2A/G9
6	3A4	2A/D4			3H3	3H5	2A/G9
5	3D4	2A/D4		2A/G4	3H3	3H5	2A/G3
4	3A5	2A/D4		2A/G4	3H3	3H5	2A/G3
3	3C4	2A/C5		2A/G4	3H3	3H5	2A/F3
2	3A5	2A/C5	2A/C6	2A/F4	3H3	2A/E3	2A/F3
1	3B4	2A/D5		2A/E4	3H3	2A/C7	2A/F3

TERMINAL BOARD

DESIG	TB1
CODE	*
OPTION	
TERM.	LOC
23	3G3
22	3E3
21	3E3
20	3F3
19	2A/A3
18	3F3
17	2A/B3
16	3F3
15	2A/D3
14	2A/C3
13	2A/D3
12	2A/A3
11	2A/B3
10	2A/E3
9	2A/D3
8	2A/A3
7	3E3
6	2A/C3
5	2A/B3
4	2A/D3
3	2A/E3, 3E2
2	3D3
1	3D3

* 520-23 KULKA ELECTRIC CORP.

ASSEMBLY, SENSOR HOUSING

DESIG. A2 — LOC. 2B/C0, 2B/D0, 2B/A0, 2B/F0, 2B/F0 — CODE. L510114, SPECTRONICS INC. PART NO. (Z) SPX1820, (Y) SPX1820M, (X) SPX1820A, (T) SPX1820B, (C) SPX1820C

ASSEMBLY, HEAD FOUR TRACK

DESIG. A3 — LOC. 3F8, 2D8, 2F0 — CODE L510095

E/W

CONNECTOR, (PLUG)

DESIG	P7
CODE	KS-16785, L3
OPTION	
TERM	LOC.
36	2A/G3
35	2A/G8
34	2A/G8
33	2A/G8
32	2A/E8
31	2A/F8
30	2A/F8
29	2A/F8
28	2A/F8
27	2A/D8
26	2A/D8
25	2A/D8
24	2A/D8
23	2A/D8
22	2A/G2
21	2A/F2
20	2A/F2
19	2A/F2
18	2A/G8
17	2A/E8
16	2A/E8
15	2A/G8
14	2A/E8
13	2A/F8
12	2A/E8
11	2A/E8
10	2A/F8
9	2A/D8
8	2A/D8
7	2A/D8
6	2A/D8
5	2A/G2
4	2A/G2
3	2A/F2
2	2A/F2
1	2A/F2

BEADS, FERRITE

DESIG	LOC.	CODE
-	2A/B1	26730218O1, FAIR-RITE PRODUCTS INC.

CAPACITOR

DESIG	LOC.	CODE
C1	2A/B2	(P) KS-16509, L1, 1000 PF
C2	2A/B2	(N) KS-20977, L3, 1000 PF

COMPONENT ASSEMBLY

DESIG.	LOC.	CODE
(W) CA1	2A/C0	L510058

E/W

CAPACITOR

DESIG	LOC	CODE
C1	2A/C1	596G, 1.96

DIODE

DESIG	LOC	CODE
CR1	3D0	UZ 709 UNITRODE CORP
CR2	3D0	UZ 709 UNITRODE CORP

RESISTOR

DESIG	LOC	CODE
R1	2A/C1	KS-B512, L17A, 14.7
R2	3F1	RH10, 50 DALE ELECTRONIC CORP
R3	3E1	RH10, 200 DALE ELECTRONIC CORP

TRANSISTOR

DESIG	LOC	CODE
Q1	2A/C1	2N3792
Q2	2A/C1	2N3792

COMPONENT ASSEMBLY

DESIG	LOC	CODE
(V) CA1	2A/E0	L-5115000-1

E/W

CAPACITOR	LOC	CODE
C1	2A/C1	596G, 1.96

DIODE

DESIG	LOC	CODE
CR1	3F0	458C
CR2	3F0	444Y 808F
CR3	3E0	458C
CR4	3E0	444Y 808F

RESISTOR

DESIG	LOC	CODE
R1	2A/C1	KS-B512, L17A, 14.7
R2	3F1	KS-16645, L1, 3
(M) R3	3E0	KS-20289, L6A, 3.3K
(L) R3	3E0	KS-20219, L6C, 3.32K
R4	3E1	KS-16645, L1, 3
R5	3F0	KS-20810, L1A, 1K

TRANSISTOR

DESIG	LOC	CODE
Q1	2A/C1	2N3792
Q2	2A/C1	2N3792
Q3	3E1	2N5680
Q4	3F1	2N5631

MOTOR

DESIG	LOC	CODE
B1	2A/B1	L510097, SEE NOTE 204 AND 206

SWITCH

L510093-2

C	S1	S2
NC / NO	2A/A2	362

SWITCH ASSEMBLY

DESIG	LOC	CODE
S3, S4	3D1	L510107

ISSUE 6B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-C2

BELL TELEPHONE LABORATORIES INCORPORATED — DWG SIZE 6S

SD-97736-01-C2

APP FIG. 3

KS-21447, LIST 3 AND LIST 4, MINI-RECORDER

CIRCUIT PACK

EQPT. LOC.								
DESIG	CP1-1		CP2		CP3-2		CP4-2	CP4-3
CODE	L-510099-1		L-510100		L-510102-2		L-510103-2	L-510103-3
OPTION			–				LIST 4	LIST 3
ELEM IDENT.	TERM		TERM		TERM		TERM	TERM
TERM FS LOC	40-8A4		40-7A/C4		40-7A/F7		40-7A/B7	40-7A/B7
CONNECTION ON FRAME	J1		J2		J3		J4	
	SEE A1 BACK PLANE ASSEMBLY							

ASSEMBLY, SENSOR HOUSING

DESIG.	LOC	CODE
A2	7B/C0	L-510114, SPECTRONICS INC. PART NO. (Z) SPX1820
	7B/A6	(X) SPX1820A
	7B/E0	(Y) SPX1820B
	7B/E0	(G) SPX1820C

BEADS, FERRITE

DESIG	LOC	CODE
–	7A/B1	2673021801, FAIR-RITE PRODUCTS, INC.

CAPACITOR

DESIG	LOC.	CODE
C1	7A/B2	(P) KS-16509, L1, 1000PF
C2	7A/B2	(N) KS-20977, L3, 1000PF

COMPONENT ASSEMBLY

DESIG	LOC	CODE
CA1	7A/C0	L-510098

CAPACITOR

DESIG	LOC	CODE
C1	7A/D1	596G, 1.96

ASSEMBLY, BACK PLANE

DESIG	LOC	CODE
A1	7A/A2	L-510104-2

E/W

CONNECTOR, (JACK)

DESIG	J1	J2	J3	J4	J5	J6	J7
CODE	908L	908L	908L	908L	KS-16786, L17	KS-16786, L12	KS-16786, L17
OPTION							
TERM	LOC	LOC	LOC	LOC	LOC	LOC	LOC
50						8G3	
49						8F7	
48						8G3	
47						8B6	
46						7A/A7	
45						7A/C7	
44						8B6	
43						8A6	
42						8B6	
41						8A6	
40	8A4	7A/C4	7A/F6	7A/B6		8C6	
39		7A/B4	7A/F6	8F5		8B6	
38	8B4	7A/B4	7A/F6	8F5		8B6	
37	8B4		7A/G6	8F4		7A/C7	
36	8A5	7A/D4	7A/G6	7A/B6	8F6	8B6	7A/G7
35	8A5	7A/B4	7A/G6	7A/B6	8F6	8B6	7A/G7
34	8B5	7A/C4	8F4		7A/B7	8B6	7A/G7
33	8B5	7A/C4	9G3		7A/B7	8C3	7A/G7
32	8B5		7A/H6		7A/C7	8C3	7A/E7
31	8D4	7A/E4	8G4		7A/B7	7A/E3	7A/F7
30	8C4	7A/D4			7A/B7	8C3	7A/F7
29	8A4	7A/D3		7A/B6		7A/E3	7A/F7
28	8E4	7A/B4	7A/D6	7A/B6		8C3	7A/F7
27	8B4	7A/D5	7A/D6	7A/B6		7A/E3	7A/E7
26	8B4	7A/E5				8C3	
25	8D4	7A/D4		7A/G4		8H3	
24	8D4	7A/E4		7A/G4	7A/H3	8H3	
23	8B4	7A/E5		7A/F4	7A/H3	8H3	
22	8B4	7A/E5		7A/F4	7A/B7	8H3	7A/G3
21		7A/E4		7A/F4	7A/H3	8H6	7A/F3
20	8D5	7A/C4	7A/F6	7A/B6		8H6	7A/F3
19	8B5	7A/B4	7A/F6	7A/B6	7A/H3	8H6	7A/F3
18	8B4	7A/B4	7A/F6	8A5	8F6	8H6	7A/F7
17	8C4		7A/G6	7A/B6	7A/C7	8H6	7A/E7
16	8C4		7A/G6	7A/C6	8H4	8H6	7A/E7
15	8E4	7A/B4	7A/G6	7A/B6	8H4	8H6	7A/G7
14	8C5		7A/H6	7A/B6	8H4	8H6	7A/E7
13	8B5	7A/C4	7A/H6	7A/C6	8H4	8H6	7A/F7
12	8C4		7A/H6		8H4	8F6	7A/E7
11	8B5		8G4		8H4	8H5	7A/E7
10	8E4	7A/D4			8H4	8H5	7A/F7
9	8D5	7A/D4			8H3	8H5	7A/E7
8	8D4	9G6		7A/B7	8H3	8H5	
7	8C4	7A/E4	7A/D6	7A/B6	8H3	8H5	
6	8A4	7A/D4			8H3	8H5	
5	8D4	7A/D4		7A/G4	8H3	8H5	7A/G3
4	8A5	7A/D4		7A/G4	8H3	8H5	7A/G3
3	8C4	7A/C5		7A/G4	8H3	8H5	7A/F3
2	8A5	7A/C5	7A/C6	7A/F4	8H3	7A/E3	7A/F3
1	8B4	7A/D5		7A/F4	8H3	7A/C7	7A/F3

TERMINAL BOARD

DESIG		TB1
CODE		*
OPTION		
TERM		LOC
23		8G3
22		–
21		–
20		–
19		7A/A3
18		8F3
17		7A/B3
16		–
15		7A/D3
14		7A/C3
13		7A/D3
12		7A/A3
11		7A/B3
10		7A/E3
9		7A/D3
8		7A/A3
7		–
6		7A/C3
5		7A/B3
4		7A/D3
3		7A/E3, 3E3
2		8E3
1		8D3

* 520-23 KULKA ELECTRIC CORP.

ASSEMBLY, HEAD FOUR TRACK

DESIG	LOC	CODE
A3	7A/F0, 7A/D1	L-510095

E/W

CONNECTOR, (PLUG)

DESIG	P7
CODE	KS-16785, L3
OPTION	
TERM	LOC
36	7A/G8
35	7A/G8
34	7A/G8
33	7A/G8
32	7A/E8
31	7A/F8
30	7A/F8
29	7A/F8
28	7A/F8
27	7A/E8
26	7A/D8
25	7A/D8
24	7A/D8
23	7A/D8
22	7A/G2
21	7A/F2
20	7A/F2
19	7A/F2
18	7A/G8
17	7A/E8
16	7A/E8
15	7A/G8
14	7A/E8
13	7A/F8
12	7A/E8
11	7A/E8
10	7A/F8
9	7A/E8
8	7A/D8
7	7A/D8
6	7A/D8
5	7A/G2
4	7A/G2
3	7A/F2
2	7A/F2
1	7A/F2

RESISTOR

DESIG	LOC	CODE
R1	7A/D1	KS-8512, L17A, 14.7

TRANSISTOR

DESIG	LOC	CODE
Q1	7A/C1	2N3792
Q2	7A/C1	2N3792

MOTOR

DESIG	LOC	CODE
B1	7A/B1	L-510097, SEE NOTE 206

SWITCH

L-510093-2

	S1	S2
C		
NC		
NO	9A/A2	10G2

SWITCH ASSEMBLY

DESIG.	LOC	CODE
S3, S4	10D1	L-510107

ISSUE 8B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-C3

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE A3

SD-97736-01-C3

APP FIG. 4

KS-21447 LIST 5, LIST 6 AND LIST 10 MINI-RECORDER

CIRCUIT PACK

EQPT. LOC.						
DESIG	CP1-1	CP2	CP3-2	CP4-2	CP4-3	CP4-4
CODE	L-510099-1	L-510100	L-510102-2	L-510103-2	L-510103-3	L-510103-4
OPTION	-	-	-	LIST 5	LIST 6	LIST 10
ELEM. IDENT.	TERM	TERM	TERM	TERM	TERM	TERM
TERM FS LOC	40-10A4	40-9A/C4	40-9A/E6,10G5	40-9A/F4, 9A/B6,10F5	40-9A/F3, 9A/B6,10F5	40-9A/F4,9A/B6,10F5
CONNECTION ON FRAME	J1	J2	J3	J4		
	SEE A1 BACK PLANE ASSEMBLY					

ASSEMBLY, BACK PLANE

DESIG	LOC	CODE
A1	9A/A2	L-510104

CONNECTOR, (JACK) — E/W

DESIG	J1	J2	J3	J4	J5	J6	J7
CODE	908L	908L	908L	908L	KS-16786,L17	KS-16786,L12	KS-16786,L17
OPTION							
TERM	LOC	LOC	LOC	LOC	LOC	LOC	LOC
50						10G3	
49							
48						10G3	
47						10B6	
46						9A/A7	
45						9A/C7	
44						10B6	
43						10A6	
42						10B6	
41						10A6	
40	10A4	9A/C4	9A/F6	9A/B6		10C6	
39		9A/B4	9A/F6	10F5		10B6	
38	10B4	9A/B4	9A/F6	10F5		10B6	
37	10B4		9A/C5	10F4		C7	
36	10A5	9A/D4	9A/G6	9A/B6	10F6	10B6	9A/G7
35	10A5	9A/B4	9A/G6	9A/B6	10F6	10B6	9A/G7
34	10B5	9A/C4	10F4		9A/B7	10B6	9A/G7
33	10B5	9A/C4	9A/G3		9A/B7	10C3	9A/G7
32	10B5		9A/H6		9A/C7	10C3	9A/E7
31	10D4	9A/E4	10G4		9A/B7	9A/E3	9A/F7
30	10C4	9A/D4			9A/B7	10C3	9A/F7
29	10A5	9A/D5		9A/B6		9A/E3	9A/F7
28	10E4	9A/B4	9A/D6	9A/B6		10C3	9A/F7
27	10B4	9A/D5	9A/D6	9A/B6		E3	9A/E7
26	10B4	9A/E5				10C3	
25	10D4	9A/D4		9A/G4		10H3	
24	10D4	9A/E4		9A/G4	9A/H3	10G3	
23	10B4	9A/E5		9A/F4	9A/H3	10H3	
22	10B4	9A/E5		9A/F4	9A/B7	10H3	9A/G3
21		9A/E4		9A/F4	9A/H3	10H6	9A/F3
20	10D5	9A/C4	9A/F6	9A/B6	9A/H3	10H6	9A/F3
19	10B5	9A/B4	9A/F6	9A/B6	9A/H3	10H6	9A/F3
18	10B4	9A/B4	9A/F6	10F5	10F6	10H6	9A/F7
17	10C4		9A/G6	9A/B6	9A/C7	10H6	9A/E7
16	10C4		9A/G6	9A/C6	10H4	10H6	9A/E7
15	10E4	9A/B4	9A/G6	9A/B6	10H4	10H6	9A/G7
14	10C5		9A/H6	9A/B6	10H4	10H6	9A/E7
13	10B5	9A/C4	9A/H6	9A/C6	10H4	10H6	9A/F7
12	10C4		9A/H6	9A/G5	10H4	10F6	9A/E7
11	10B5		10G4		10H4	10H5	9A/E7
10	10E4	9A/D4			10H4	10H5	9A/F7
9	10D5	9A/D4			10H3	10H5	9A/E7
8	10D4	9A/D4	9A/G6	9A/B7	10H3	10H5	
7	10C4	9A/E4	9A/D6	9A/B6	10H3	10H5	
6	10B4	9A/D4			10H3	10H5	
5	10D4	9A/D4		9A/G4	10H3	10H5	9A/G3
4	10A5	9A/D4		9A/G4	10H3	10H5	9A/G3
3	10C4	9A/C5		9A/G4	10H3	10H5	9A/F3
2	10A5	9A/C5	9A/C6	9A/F4	10H3	9A/E3	9A/F3
1	10B4	9A/D5		9A/F4	10H3	9A/C7	9A/F3

TERMINAL BOARD — E/W

DESIG	TB1
CODE	*
OPTION	
TERM	LOC
23	10G3
22	10E3
21	10E3
20	
19	9A/A3
18	10F3
17	9A/B3
16	
15	9A/D3
14	9A/C3
13	9A/D3
12	9A/A3
11	9A/B3
10	9A/E3
9	9A/D3
8	9A/A3
7	10E3
6	9A/C3
5	9A/B3
4	9A/D3
	9A/E3,4E2
2	10E3
1	10D3

* 520-23 KULKA ELECTRIC CORP.

ASSEMBLY, SENSOR HOUSING

DESIG	LOC	CODE
A2	9B/C0	L-510114, SPECTRONICS INC. PART NO. (Z) SPX1820
	9B/E0	(Y) SPX1820M
	9B/A0	(X) SPX1820A
	9B/F0	(T) SPX1820B
	9B/F0	(U) SPX1820C

ASSEMBLY, HEAD FOUR TRACK

DESIG	LOC	CODE
A3	9A/F0,9A/D8	L-510095

CONNECTOR (PLUG) — E/W

DESIG	P7
CODE	KS-16785,L3
OPTION	
TERM	LOC
36	9A/G8
35	9A/G8
34	9A/G8
33	9A/G8
32	9A/E8
31	9A/F8
30	9A/F8
29	9A/F8
28	9A/F8
27	9A/E8
26	9A/D8
25	9A/D8
24	9A/D8
23	9A/D8
22	9A/G3
21	9A/F2
20	9A/F2
19	9A/F2
18	9A/G8
17	9A/E8
16	9A/E8
15	9A/G8
14	9A/E8
13	9A/F8
12	9A/E8
11	9A/E8
10	9A/F8
9	9A/E8
8	9A/D8
7	9A/D8
6	9A/D8
5	9A/G2
4	9A/G2
3	9A/F2
2	9A/F2
1	9A/F2

BEADS,FERRITE

DESIG	LOC	CODE
-	9A/B1	2673021801,FAIR-RITE PRODUCTS, INC.

CAPACITOR

DESIG	LOC	CODE
C1	9A/B2	(P) KS-16509,L1,1000pF
C2	9A/B2	(N) KS-20977,L3,1000pF

COMPONENT ASSEMBLY

DESIG	LOC	CODE
(W) CA1	9A/C0,10E0	L-510098-3

E/W

CAPACITOR

DESIG	LOC	CODE
C1	9A/C1	596G,1.96

DIODE

DESIG	LOC	CODE
CR2	10D0	UZ709 UNITRODE CORP.

RESISTOR

DESIG	LOC	CODE
R1	9A/C1	KS-8512,L17A,14.7
R3	10D0	RH-200 DALE ELECTRONICS

TRANSISTOR

DESIG	LOC	CODE
Q1	9A/C1	2N3792
Q2	9A/C1	2N3792

COMPONENT ASSEMBLY

DESIG	LOC	CODE
(V) CA1	9A/C0,10E0	L-515000-2

E/W

CAPACITOR

DESIG	LOC	CODE
C1	9A/C1	596G,1.96

DIODE

DESIG	LOC	CODE
CR3	10E0	456C
CR4	10E0	~~446T~~ 808F

RESISTOR

DESIG	LOC	CODE
R1	9A/C1	KS-8512,L17A,14.7
R2	10C1	KS-16645,L1, 3
(M) R3	10E0	KS-20289,L6A,3.3K
(L) R3	10E0	KS-20289,L6C,3.32K

TRANSISTOR

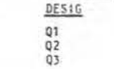
DESIG	LOC	CODE
Q1	9A/C1	2N3792
Q2	9A/C1	2N3792
Q3	10E0	2N5680

MOTOR

DESIG	LOC	CODE
B1	9A/B1	L-510097, SEE NOTE 206

SWITCH

L-510093-2



	LOC	
S1	9A/A2	S2
		10G7

SWITCH ASSEMBLY

DESIG	LOC	CODE
S3,S4	10D1	L-510107

ISSUE 881

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-C4

BELL TELEPHONE LABORATORIES INCORPORATED

6S

APP FIG. 5

KS-21447, LIST 8 MINI-RECORDER

CIRCUIT PACK

EQPT.LOC.				
DESIG	CP1-2	CP2	CP3-2	CP4-2
CODE	L-510099-2	L-510100	L-510102-2	L-510103-2
OPTION	-	-	-	-
ELEM. IDENT.	TERM	TERM	TERM	TERM
TERM FS LOC	40-12A4	40-11A/C4	40-11A/F6,12G5	40-11A/F4,12F5
CONNECTION ON FRAME	J1	J2	J3	J4
	SEE A1 BACK PLANE ASSEMBLY			

ASSEMBLY, BACK PLANE

DESIG	LOC	CODE
A1	11A/A2	L-510104-2

E/W

CONNECTOR, (JACK)

DESIG	J1	J2	J3	J4	J5	J6	J7
CODE	908L	908L	908L	908L	KS-16786,L17	KS-16786,L12	KS-16786,L17
OPTION							
TERM	LOC	LOC	LOC	LOC	LOC	LOC	LOC
50						12G3	
49							
48						12G3	
47						12B6	
46						11A/A7	
45						11A/C7	
44						12B6	
43						12A6	
42						12B6	
41						12A6	
40	12A4	11A/C4	11A/F6	11A/B6		12C6	
39		11A/B4	11A/F6	12F5		12B6	
38	12B4	11A/B4	11A/F6	12F5		12B6	
37	12B4		11A/G6	12F4		11A/C7	
36	12A5	11A/B4	11A/G6	11A/B6	12F6	12B6	11A/G7
35	12B5	11A/B4	11A/G6	11A/B6	12F6	12B6	11A/G7
34	12B5	11A/C4	12F4		11A/B7	12B6	11A/G7
33	12B5	11A/C4			11A/B		11A/G7
32	12B5		11A/H6		11A/C7		11A/E7
31	12D4	11A/E4	12G4		11A/B7	11A/E3	11A/F7
30	12C4	11A/D4			11A/B7	12C3	11A/F7
29	12A4	11A/D5		11A/B6		11A/E3	11A/F7
28	12E4	11A/B4	11A/E6	11A/B6		12C3	11A/F7
27	12B4	11A/D5	11A/D6	11A/B6		11A/E3	11A/E7
26	12B4	11A/E5				12C3	
25	12D4	11A/D4		11A/G4		12H3	
24	12D4	11A/E4		11A/G4	11A/H3	12G3	
23	12B4	11A/E5		11A/F4	11A/H3	12H3	
22	12B4	11A/E5		11A/F4	11A/B7	12H3	11A/G3
21		11A/E4		11A/F4	11A/H3	12H6	11A/F3
20	12D5	11A/C4	11A/F6	11A/B6	11A/H3	12H6	11A/F3
19	12B5	11A/B4	11A/F6	11A/B6	11A/H3	12H6	11A/F3
18	12B4	11A/B4	11A/F6	12A6	12F6	12H6	11A/F7
17	12C4		11A/G6	11A/B6	11A/C7	12H6	11A/E7
16	12C4		11A/G6	11A/C6	12H4	12H6	11A/E7
15	12E4	11A/B4	11A/G6	11A/B6	12H4	12H6	11A/G7
14	12C5		11A/H6	11A/B6	12H4	12H6	11A/E7
13	12B5	11A/C4	11A/H6	11A/C6	12H4	12H6	11A/F7
12	12C4		11A/H6		12H4	12F6	11A/E7
11	12B5		12G4		12H4	12H5	11A/E7
10	12E4	11A/D4			12H4	12H5	11A/F7
9	12D5	11A/D4			12H3	12H5	11A/E7
8	12D4	11A/D4		11A/B7	12H3	12H5	
7	12C4	11A/E4	11A/D6	11A/B6	12H3	12H5	
6	12A4	11A/D4			12H3	12H5	
5	12D4	11A/D4		11A/G4	12H3	12H5	11A/G3
4	12A5	11A/D4		11A/G4	12H3	12H5	11A/G3
3	12C4	11A/C5		11A/G4	12H3	12H5	11A/F3
2	12B5	11A/C5	11A/C6	11A/F4	12H3	11A/E7	11A/F3
1	12B4	11A/D5		11A/F4	12H3	11A/C7	11A/F3

TERMINAL BOARD

DESIG	TB1
CODE	*
OPTION	
TERM	LOC
23	12G3
22	12E3
21	
20	12F3
19	11A/A3
18	12F3
17	11A/B3
16	12F3
15	11A/D3
14	11A/C3
13	11A/D3
12	11A/A3
11	11A/B3
10	11A/E3
9	11A/D3
8	11A/A3
7	
6	11A/C3
5	11A/B3
4	11A/D3
3	11A/3E
2	12E3
1	12D3

* 520-23 KULKA ELECTRIC CORP.

ASSEMBLY, SENSOR HOUSING

DESIG	LOC	CODE
A2	11B/A0	L-510114, SPECTRONICS INC. PART NO. (X) SPX1820A
	11B/C0	(T) SPX1820B
	11B/C0	(G) SPX1820C

ASSEMBLY, HEAD FOUR TRACK

DESIG	LOC	CODE
A3	11A/D8,11A/F1	L-510095

E/W

CONNECTOR, (PLUG)

DESIG	P7
CODE	KS-16785,L3
OPTION	
TERM	LOC
36	11A/G8
35	11A/G8
34	11A/G8
33	11A/G8
32	11A/E8
31	11A/F8
30	11A/F8
29	11A/F8
28	11A/F8
27	11A/E8
26	11A/C8
25	11A/D8
24	11A/D8
23	11A/D8
22	11A/G2
21	11A/F2
20	11A/F2
19	11A/F2
18	11A/G8
17	11A/E8
16	11A/E8
15	11A/G8
14	11A/E8
13	11A/F8
12	11A/E8
11	11A/E8
10	11A/F8
9	11A/E8
8	11A/D8
7	11A/D8
6	11A/D8
5	11A/G2
4	11A/G2
3	11A/F2
2	11A/F2
1	11A/F2

BEADS, FERRITE

DESIG	LOC	CODE
-	11A/B1	2673021801, FAIR-RITE PRODUCTS, INC.

CAPACITOR

DESIG	LOC	CODE
C1	11A/B2	(P) KS-16509,L1, 1000pF
C2	11A/B2	(N) KS-20977,L3, 1000pF

COMPONENT ASSEMBLY

DESIG	LOC	CODE
CA1	11A/C0	L-515000-3

E/W

CAPACITOR

DESIG	LOC	CODE
C1	11A/C1	5966, 1.96

DIODE

DESIG	LOC	CODE
CR1	12F1	458C
CR2	12F1	~~446F~~ 808F
CR3	12F0	458C
CR4	12F0	~~446F~~ 808F

RESISTOR

DESIG	LOC	CODE
R1	11A/C1	KS-8512,L17A, 14.7
R2	12F1	KS-16645,L1, 3
(M) R	12E0	KS-20289,L6A, 3.3KΩ
(L) R3	12E0	KS-20289,L6C,3.32KΩ
R4	12E0	KS-16645,L1,3
R5	12F1	KS-20810,L1A,1G

TRANSISTOR

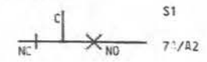
	DESIG	LOC	CODE
[2]	Q1,Q2	11A/C1	2N3792
	Q3	12E0	2N5680
	Q4	12F1	2N5681

MOTOR

DESIG	LOC	CODE
B1	11A/B1	L-510097, SEE NOTE 206

SWITCH

L-510093-1



ISSUE 881

KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-C5
BELL TELEPHONE LABORATORIES INCORPORATED	DWG SIZE 6S

PRINTED IN U.S.A.

CIRCUIT NOTES:

101.

DESIG	AMP FUSE	POTENTIAL	ONE PER

102.

FEATURE OR OPTION	PROVIDE APP FIG.	PROVIDE APP OR WRG	PROVIDE QUANTITY
KS-21447, L1 MINI-RECORDER CKT	1		1 PER CKT
KS-21447, L2 MINI-RECORDER CKT	2		1 PER CKT
KS-21447, L3 MINI-RECORDER CKT	3		1 PER CKT
KS-21447, L4 MINI-RECORDER CKT	3		1 PER CKT
KS-21447, L5 MINI-RECORDER CKT	4		1 PER CKT
KS-21447, L6 MINI-RECORDER CKT	4		1 PER CKT
KS-21447, L7 MINI-RECORDER CKT	2		1 PER CKT
KS-21447, L8 MINI-RECORDER CKT	5		1 PER CKT
KS-21447, L9 MINI-RECORDER CKT	2		1 PER CKT
KS-21447, L10 MINI-RECORDER CKT	4		1 PER CKT

103.

RECORD OF BAR FIGS., WIRING AND APPARATUS CHANGES						
CHANGED ON ISS.	IF JCS RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT		
				S&D	A&M	MD
2B		Z		X	Z	
2B		Y		X	Y	
2B		W		V	W	
3B		X		T	X	
3B		S		R	S	
3B		P		N	P	
3B		M		L	M	
4B		K		J	K	
7A1(C)	T	T	203	G,T		

CIRCUIT NOTES: (CONT)

104. THE BACKPLANE PRINTED WIRING BOARD IS IDENTICAL FOR ALL OPTIONS.

105. DO NOT EXTERNALLY LOAD THE TACHOMETOR (J6-1) TEST POINT.

106. PRIOR TO ISSUE 8B1, -9VDC AND +9VDC WERE PROVIDED AT PINS 23 AND 48 OF THE J6 CONNECTOR FOR LIST 2, 7, 8, AND 9 AND -9VDC WAS PROVIDED AT PIN 23 OF THE J6 CONNECTOR FOR LIST 5, 6, AND 10. ON ISSUE 8B1 PIN 23 AND 48 OF THE J6 CONNECTOR FOR LIST 2, 7, 8 AND 9 AND PIN 23 OF THE J6 CONNECTOR FOR LIST 5, 6, AND 10 ARE REMOVED.

107. IN LIST 2, 7, 8 AND 9 MINI-RECORDERS A WIRE STRAP(S) MAY BE USED IN PLACE OF CR1 AND/OR CR3. SELECTION OF EITHER THE STRAP(S) OR THE DIODE(S) PERMITS THE SHOP ADJUSTMENT OF THE INTERNALLY GENERATED "PLUS" AND "MINUS" 9 VDC SUPPLIES TO BE SET BETWEEN ±8.40 AND ±9.60 VDC.

108. PRIOR TO ISSUE 7A1(C) TEST SIGNALS WERE PRESENT AT PINS 13, 14, 15, 19 AND 20 OF THE J4 CONNECTOR AND PINS 17, 33 AND 34 OF THE J5 CONNECTOR. ON ISSUE 7A1(C) THE SIGNALS WERE REMOVED FROM THE J4 AND J5 CONNECTOR.

EQUIPMENT NOTES:

201. THE L-510097 CAPSTAN MOTOR CALLS OUT A SET OF RESISTOR VALUES TO NORMALIZE THE TACHOMETER VOLTAGE TO THE DC SERVO. FOR THE ELECTRO-CRAFT 538-10-XXX OR 538-82-XXX MOTOR AND OPTIONS G AND W OF CPS2, THE VALUES ARE:

TACH VOLTAGE	KS-20616,L1A R(KΩ)
2.80-2.82	4.02
2.82-2.85	4.17
2.85-2.88	4.32
2.88-2.91	4.48
2.91-2.93	4.59
2.93-2.96	4.70
2.96-3.00	4.87
3.00-3.04	5.05
3.04-3.07	5.23
3.07-3.10	5.36
3.10-3.13	5.49
3.13-3.16	5.62
3.16-3.20	5.76

202. THE ELECTRO-CRAFT 584-10-XXX MOTOR IS USABLE ONLY WITH OPTION F OF CPS2 AND A RESISTOR VALUE ON THE CAPSTAN MOTOR DRAWING OF KS-20616,L1A, 1.33KΩ.

203. IF ELECTRO-CRAFT 538-82 XXX OR TORQUE SYSTEMS MT-2105-XXXHR MOTORS ARE USED WITH OPTION F OF CPS2, THE FOLLOWING TABLE OF RESISTOR VALUES MUST BE USED:

TACH VOLTAGE(V)	KS-20616,L1A R(KΩ)
$2.70 \leq V < 2.73$	1.43
$2.73 \leq V < 2.76$	1.47
$2.76 \leq V < 2.81$	1.54
$2.81 \leq V < 2.84$	1.62
$2.84 \leq V < 2.88$	1.69
$2.88 \leq V < 2.92$	1.78
$2.92 \leq V < 2.98$	1.87
$2.98 \leq V < 3.03$	1.96
$3.03 \leq V < 3.08$	2.05
$3.08 \leq V < 3.14$	2.15
$3.14 \leq V < 3.20$	2.26
$3.20 \leq V < 3.26$	2.37
$3.26 \leq V < 3.30$	2.49

204. TORQUE SYSTEMS MOTOR MT-2105-XXX-HR IS NOT APPROVED FOR L2, L7, AND L9 MINI-RECORDER USE.

205. SENSOR PER DRAWING L-510114, SPELTRONICS PART SPX1820B AND SPX1820C MAY BE USED INTERCHANGEABLY ON LIST 1 MINI-RECORDERS. SENSOR SPX1820C MUST BE USED WITH LIST 2 THROUGH LIST 10 KS-21447 MINI-RECORDERS.

206. TORQUE SYSTEMS MOTOR MT-2105-XXX-HR IS RATED MANUFACTURE DISCONTINUED FOR NEW PRODUCT ON ALL LIST NUMBER RECORDERS. APPROXIMATELY 2500 L1 MINI-RECORDERS IN THE FIELD CONTAIN THIS MOTOR. THESE NEED NOT BE REPLACED UNLESS THEY ARE FOUND TO BE FAULTY. AUTHORIZATION TO USE THE LAST 500 MOTORS WAS GRANTED ON 3/28/78.

INFORMATION NOTES:

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

302. ISSUE 5A OF THIS DRAWING CORRELLATES TO ISSUE 4 OF KS-21447 SPECIFICATION.

303. ISSUE 8B1 OF THIS DRAWING CORRELATES TO ISSUE 5 OF KS-21447 SPECIFICATION.

SD-97736-01-01

ISSUE 8B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-D1

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

CAD 1

OUTPUT CONNECTIONS AVAILABLE
FOR KS-21447, LIST 1 MINI-RECORDER

J5

36			
35			
SEE NOTE 108 NC	34	POS PEAKS	19
NC	33	NEG PEAKS	20
	32	DATA DETECT	16
	31	READ DATA CLOCK	40
	30	READ DATA	17
29			
28			
27			
26			
	25	EXTERNAL CLOCK	33
	24	WRITE DATA	14
	23	WRITE ENABLE	12
	22	RAI	36
	21	WAI	32
	20	RAO	35
	19	WAO	13
18			
SEE NOTE 108 → NC	17	READ TP	13
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

(CP4-1) CKT PACK

(CP5) CKT PACK

(CP4-1) CKT PACK NC
(CP5) CKT PACK NC
(CP4-1) CKT PACK
(CP5) CKT PACK

(CP4-1) CKT PACK NC

J6

NC	1	TACH TP	29
	2	STOP	7
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
	22	-48V RTN	20
	23	-9VDC	24
	24	+5VDC	5
	25	-48VDC	19
26			
	27	FOR	22
28			
	29	REV	3
30			
	31	INIT	23
32			
33			
34			
35			
36			
	37	TOR	2
38			
	39	TM	21
40			
	41	BOT	5
42			
	43	EOT	26
44			
	45	LPEW	3
	46	CIP	19
47			
	48	+9VDC	31
49			
50			

(CP2) CKT PACK

(CP2) CKT PACK

(CP5) CKT PACK

(CP2) CKT PACK

(CP5) CKT PACK

(CP2) CKT PACK
(TB1) TS

(CP2) CKT PACK

CAD 2

OUTPUT CONNECTIONS AVAILABLE FOR KS-21447
LIST 2, LIST 7, AND LIST 9 MINI-RECORDER

J5

	36	READ DATA CLOCK (OC)	18
	35	READ DATA (OC)	39
SEE NOTE 108 NC	34	POS PEAK	19
NC	33	NEG PEAK	20
	32	DATA DETECT	16
	31	READ DATA CLOCK	40
	30	READ DATA	17
29			
28			
27			
26			
25			
	24	WRITE DATA	14
	23	WRITE ENABLE	12
	22	RAI	36
	21	WAI	32
	20	RAO	35
	19	WAO	13
	18	DATA DETECT (OC)	38
SEE NOTE 108 NC	17	READ TP	13
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

(CP4-2) CKT PACK

(CP3-1) CKT PACK

(CP4-2) CKT PACK
(CP3-1) CKT PACK
(CP4-2) CKT
(CP3-1) CKT PACK
(CP4-2) CKT PACK

J6

NC	1	TACH TP	29
	2	STOP	7
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
	22	-48V RTN	20
SEE NOTE 106 NC	23	-9V DC	31
	24	+5VDC	5
	25	-48VDC	19
	26	FAST FOR	16
	27	FOR	38
	28	FAST REV	17
	29	REV	37
	30	SELECT	12
	31	INIT	18
	32	REWIND	7
33		MANUAL	30
	34	READY (OC)	33
	35	ON LINE (OC)	34
	36	REWINDING (OC)	13
	37	TOR	2
	38	TOR (OC)	19
	39	TM	4
	40	TM (OC)	14
	41	BOT	2
	42	BOT (OC)	11
	43	EOT	36
	44	EOT (OC)	35
	45	LPEW	3
	46	CIP	19
	47	LPEW (OC)	32
SEE NOTE 106 NC	48	+9V DC	24
	49	WRITE ENABLE (S)	18
	50	+24V DC	2

(CP2) CKT PACK

(CP2) CKT PACK

(CP1-1) CKT PACK

(CP2) CKT PACK NC

(CP1-1) CKT PACK

(CP2) CKT PACK NC
(TB1) TS
(CP1-1) CKT PACK

(TB1) TS

SD-97736-01-GI

KS-21447 MINI-RECORDER CIRCUIT		SD-97736-01-GI
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S	

BRSLY 881

CAD 3

OUTPUT CONNECTIONS AVAILABLE FOR KS-21447, LIST 3 AND 4
MINI-RECORDER

J5

36	READ DATA CLOCK (OC)	18	
35	READ DATA (OC)	39	
SEE NOTE 10B NC 34	POS PEAK	19	
NC 33	NEG PEAK	20	(CP4) CKT PACK
32	DATA DETECT	16	
31	READ DATA CLOCK	40	
30	READ DATA	17	
29			
28			
27			
26			
25	EXTERNAL CLOCK	33	
24	WRITE DATA	14	(CP3) CKT PACK
23	WRITE ENABLE	12	
22	RAI	36	(CP4) CKT PACK
21	WAI	32	(CP3) CKT PACK
20	RAO	35	(CP4) CKT PACK
19	WAO	13	(CP3) CKT PACK
SEE NOTE 10B → NC 18	DATA DETECT (OC)	38	(CP4) CKT PACK
17	READ TP	13	
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

J6

NC 1	TACH TP	29	(CP2) CKT PACK
2	STOP	7	
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22	-48V RTN	20	
23	-9V DC	31	(CP2) CKT PACK
24	+5V DC	5	
25	-48V DC	19	
26	FAST FOR	16	
27	FOR	38	
28	FAST REV	17	
29	REV	37	(CP1) CKT PACK
30	SELECT	12	
31	INIT	18	
32	REWIND	7	
33	MANUAL	30	
34	READY (OC)	33	
35	ON LINE (OC)	34	
36	REWINDING (OC)	13	
37	TOR	2	(CP2) CKT PACK
38	TOR (OC)	19	
39	TM	4	
40	TM (OC)	14	
41	BOT	2	(CP1) CKT PACK
42	BOT (OC)	11	
43	EOT	36	
44	EOT (OC)	35	
45	LPEW	3	(CP2) CKT PACK
46	CIP	19	(TB1) TS
47	LPEW (OC)	32	(CP1) CKT PACK
48	+9V DC	24	
49	WRITE ENABLE	18	(TB1) TS
50			

CAD 4

OUTPUT CONNECTIONS AVAILABLE FOR KS-21447, LIST 5, LIST 6, AND LIST 10
MINI-RECORDER

J5

36	READ DATA CLOCK (OC)	18	
35	READ DATA (OC)	39	
SEE NOTE 10B NC 34	POS PEAK	19	
NC 33	NEG PEAK	20	(CP4) CKT PACK
32	DATA DETECT	16	
31	READ DATA CLOCK	40	
30	READ DATA	17	
29			
28			
27			
26			
25	EXTERNAL CLOCK	33	
24	WRITE DATA	14	(CP3) CKT PACK
23	WRITE ENABLE	12	
22	RAI	36	(CP4) CKT PACK
21	WAI	32	(CP3) CKT PACK
20	RAO	35	(CP4) CKT PACK
19	WAO	13	(CP3) CKT PACK
18	DATA DETECT (OC)	38	(CP4) CKT PACK
SEE NOTE 10B NC 17	READ TP	13	
16			
15			
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

J6

NC 1	TACH TP	29	(CP2) CKT PACK
2	STOP	7	
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22	-48 RTN	20	(CP2) CKT PACK
SEE NOTE 10G NC 23	-9V DC	31	
24	+5V DC	5	(CP2) CKT PACK
25	-48V DC	19	
26	FAST FOR	16	
27	FOR	38	
28	FAST REV	17	
29	REV	37	(CP1) CKT PACK
30	SELECT	12	
31	INIT	18	
32	REWIND	7	
33	MANUAL	30	
34	READY (OC)	33	
35	ON LINE (OC)	34	
36	REWINDING (OC)	13	
37	TOR	2	(CP2) CKT PACK
38	TOR (OC)	19	
39	TM	4	
40	TM (OC)	14	
41	BOT	2	(CP1) CKT PACK
42	BOT (OC)	11	
43	EOT	36	
44	EOT (OC)	35	
45	LPEW	3	(CP2) CKT PACK
46	CIP	19	(TB1) TS
47	LPEW (OC)	32	(CP1) CKT PACK
48	+9V DC	24	
49	WRITE ENABLE	18	(TB1) TS
50			

ISSUE 2B1

KS-21447 MINI-RECORDER CIRCUIT

BELL TELEPHONE LABORATORIES INCORPORATED

DWG NO. 6S

SD-97736-01-G2

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SD-97736-01-G2

CAD 5

OUTPUT CONNECTIONS AVAILABLE FOR KS-21447, LIST 8
MINI-RECORDER

J5

36	HEAD DATA CLOCK (OC)	18		
35	READ DATA (OC)	39		
SEE NOTE 108 NC 34	POS PEAK	19		
NC 33	NEG PEAK	20	(CP4-2) CKT PACK	
32	DATA DETECT	16		
31	READ DATA CLOCK	40		
30	READ DATA	17		
29	—			
28	—			
27	—			
26	—			
25	EXTERNAL CLOCK	33		
24	WRITE DATA	14	(CP3) CKT PACK	
23	WRITE ENABLE	12		
22	RAI	36	(CP4-2) CKT PACK	
21	WAI	32	(CP3) CKT PACK	
20	RAO	35	(CP4-2) CKT PACK	
19	WAO	13	(CP3) CKT PACK	
18	DATA DETECT (OC)	38		
SEE NOTE 108 NC 17	READ TP	13	(CP4-2) CKT PACK	
16				
15				
14				
13				
12				
11				
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				

J6

NC 1	TACH TP	29	(CP2) CKT PACK
2	STOP	7	
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22	-48V RTN	20	(CP2) CKT PACK
SEE NOTE 106 NC 23	-9V		
24	+5V DC	5	
25	-48V DC	19	(CP2) CKT PACK
26	FAST FOR	16	
27	FOR	38	
28	FAST REV	17	(CP1-2) CKT PACK
29	REV	37	
30	SELECT	12	
31	INIT	18	
32			
33			
34	READY (OC)	34	
35	ON LINE (OC)	34	(CP1-2) CKT PACK
36	REWINDING (OC)	13	
37	TOR	2	(CP2) CKT PACK
38	TOR (OC)	19	
39	TM	4	
40	TM (OC)	14	
41	BOT	2	(CP1) CKT PACK
42	BOT (OC)	11	
43	EOT	36	
44	EOT (OC)	35	
45	LPEW	3	(CP2) CKT PACK
46	CIP	19	(TB1) T5
47	LPEW (OC)	32	(CP1) CKT PACK
SEE NOTE 106 NC 48	+*V		
49			
50	+12V	2	(TB1) T-5

ISSUE 851

KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-G3
BELL TELEPHONE LABORATORIES INCORPORATED	DWG SIZE 6S

PRINTED IN U.S.A.

PART OF CPSI-1 & CPSI-2

LOGIC AND CONTROL CIRCUIT

TACH (BK) 29
GRD 9
CR1
R28 6.8KΩ
R1 33KΩ
180KΩ
IC12 502A
-9V +9V
R2 33KΩ
CR2
R6 68KΩ
R3 6.8MΩ
R4 1KΩ
R5 1KΩ
IC14B 41BP
TAPE MOTION 4
IC16C 41CA
TAPE MOTION (OC) 14
1B/H1
SEE NOTE 7
INIT 18
IC18E 41BP
R10 2.2KΩ
+5V
IC6B 4IN
IC6D 4IN
IC10D 4IN
SEE NOTE 7
R25 2.2KΩ
Q1
Q2
C8 .22
R11 220KΩ
C9 220PF
IC1 41CC
2F3
2E3
CARTRIDGE POSITION 6
R29 10
1B/C6
R14 2.2KΩ
IC17A 41BP
C21 0.1
IC16A 41CA
ON LINE (OC) 34
SELECT 12
R18 2.2KΩ
IC17B 41BP
1B/D6 C
IC6C 4IN
IC8D 4IN
IC14A 41BP
SEL 1 28
TOR 40
R19 2.2KΩ
IC10B 4IN
IC16D 41CA
TOR (OC) 19
1B/E8 E
IC11B 41BP
I14D 41BP
IC14G 41BP
RECORD OVERRIDE 15
1B/A1 F
IC16B 41CA
READY (OC) 33
C2 .1
C6 .1
C1 40
C4 .1
+9V GND -9V +5V
24 22 31 25 5

PART OF CPSI

KS-21447 MINI-RECORDER CIRCUIT

BELL TELEPHONE LABORATORIES INCORPORATED

SD-97736-01-JIA

ISSUE 9B1

SD-97736-01-JIA

PART OF CPSI-1 & CPSI-2

LOGIC AND CONTROL CIRCUIT

FAST FORWARD — R15 2.2K +5V — IC18A 41BP
FORWARD — R8 2.2K +5V — IC18B 41BP
REVERSE — R9 2.2K +5V — IC18C 41BP
FAST REVERSE — R16 2.2K +5V — IC18D 41BP
REWIND — R21 2.2K +5V — IC17C 41BP
REWIND X — R22 2.2K +5V — IC17D 41BP
MANUAL — R23 2.2K +5V — IC17E 41BP
UNLOAD X — R24 2.2K +5V — IC17F 41BP
BOTM — R12 2.2K +5V — IC18F 41BP
EOTM — R13 2.2K +5V — IC18G 41BP
LPEW — R7 2.2K +5V — IC17G 41BP

1A/66 F

IC5A 4IN, IC5C 4IN, IC9A 4IN, IC9B 4IN, IC5D 4IN, IC5B 4IN
IC10C 4IN, IC9C 4IN, IC9D 4IN
IC6A 4IN, IC2B 4IN, IC8A 4IN, IC6C 4IN
1A/D7 C
IC2A 4IN, IC3A 4IN, IC5A 4ICA
1D7
IC11, IC11, IC13A 4IP, IC13B 4IP
IC10A 4IN
IC13D 4IP
C10 220PF, +5V
IC4 41CC
R26 2.2K +5V
FF IC7A 41AE (PRE, CLK, D, C, Q)
FF IC7B 41AE (PRE, CLK, D, C, Q)
IC14C 41BP
IC13C 4IP
R27 2.2K +5
SEE NOTE 7
1A/D1 D
IC11A 41BR
IC3C 4IN, IC3D 4IN, IC2C 4IN, IC2D 4IN
1A/E3 C
IC8C 4IN, IC8A 4IN
IC3B 4IN, IC15B 41CA
SEE NOTE 7
1A/F4 E
IC15D 41CA
IC14E 41BP
IC14F 41BP
IC15C 41CA

FAST — 23
FORB — 27
REVB — 26
REWINDING (OC) — 13
BOT (OC) — 11
BOT — 2
EOT — 36
EOT (OC) — 35
LPEW (OC) — 32

PART OF CPSI

ISSUE 3B

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-JIB

BELL TELEPHONE LABORATORIES INCORPORATED — SIZE 6S

SD-97736-01-JIB

PART OF CPSI-1 & CPSI-2

LOGIC & CONTROL CIRCUIT

COMPONENT LIST

CAPACITOR

DESIG	CODE
C1	602A,40
C2	KS-19774,L14,.1
C4	KS-19774,L14,.1
C6	KS-19774,L14,.1
C8	KS-19774,L14,.22 (SEE NOTE 9)
C9,C10	KS-19774,L8,220PF
C11-C20	KS-19774,L14,.1
C21	(S) KS-19774,L13, .1

INTEGRATED CIRCUITS

DESIG	CODE
IC1	41CC
IC2A,B,C,D	41N
IC3A,B,C,D	41N
IC4	41CC
IC5A,B,C,D	41N
IC6A,B,C,D	41N
IC7A,B	41AE
IC8A,B,C	41N
IC9A,B,C,D	41N
IC10A,B,C,D	41N
IC11A,B,C,D	41BR
IC12	502A
IC13A,B,C,D	41P
IC14A,B,D,G	418P
IC15A,B,C,D	41CA
IC16A,B,C,D	41CA
IC17A,B,C,D,E,F,G	41BP
IC18A,B,C,D,E,F,G	41BP

RESISTORS

DESIG	CODE
R1	(W) KS-16645,L1,100KΩ
	(V) KS-16645,L1,33KΩ
R2	KS-16645,L1,33KΩ
R3	KS-16645,L1,6.3MΩ
R4,R5	KS-16645,L1,1KΩ
R6	KS-16646,L1,68KΩ
R7-R10	KS-16645,L1,2.2KΩ
R11	KS-16645,L1,220KΩ
R12-R16,R18,R19,R21-R27	KS-16645,L1,2.2KΩ
R28	(V) KS-16645,L1,68KΩ
R29	(S) KS-16645,L1,10

TRANSISTOR

DESIG	CODE
Q1,Q2	665

DIODE

DESIG	CODE
CR1,CR2	458C

INPUT/OUTPUT INFORMATION

THE MOTOR CONTROL COMMANDS FORB (FORWARD), REVB (REVERSE), AND FAST ARE DECODED FROM MOTION INPUT COMMANDS FAST REVERSE, REVERSE, FAST FORWARD OR FORWARD. THE MOTOR CONTROL COMMANDS ARE ALSO A FUNCTION OF THE COMMANDS REWIND, INITIALIZE, AND THE DEPRESSING OF THE REWIND AND UNLOAD PUSHBUTTON WHILE A MANUAL COMMAND IS TRUE. THE MOTOR COMMANDS ARE ALSO INITIATED BY THE +5 VOLT SUPPLY BEING RESUMED AFTER ITS LOSS OR THE INSERTION OF A TAPE CARTRIDGE (CIP). THE MOTOR CONTROL COMMANDS WILL BE INHIBITED IF NO CARTRIDGE IS IN THE MACHINE OR IF TWO OR MORE MOTION INPUT COMMANDS ARE TRUE. THE MOTION INPUT COMMANDS, REWIND, AND THE INITIALIZE COMMAND ARE INHIBITED IF A CARTRIDGE IS NOT IN THE MACHINE OR IF THE SELECT INPUT IS HIGH. THE MOTOR COMMANDS MAY ALSO BE INHIBITED IF THE EOTM OR BOTM SIGNALS OCCUR. THE MOTOR CONTROL COMMANDS WILL BE SEQUENCED BASED ON THE BOTM AND LPEWM SIGNALS, IF A REWINDING SEQUENCE WAS INITIATED.

THE SEL 1 OUTPUT, IF HIGH, PREVENTS THE WRITE ELECTRONICS (CP3) OR READ ELECTRONICS (CP4) OPEN COLLECTOR OUTPUTS FROM GOING TRUE. THIS OUTPUT IS A FUNCTION OF THE SELECT AND CARTRIDGE IN POSITION INPUTS, THE RECORD OVERRIDE FUNCTION, IF TRUE (LOW) PREVENTS WRITING ON THE TAPE BY INHIBITING CP3.

THE SELECT INPUT HIGH (NOT SELECTED) INHIBIT THE OPEN COLLECTOR OUTPUTS – TAPE MOTION, ON LINE, READY, LPEW, EOT, BOT, REWINDING, AND TAPE OFF REEL (TOR).

TAPE MOTION MAY BE TRUE ONLY IF THE TACH (BK) SIGNAL FROM THE MOTOR TACHOMETER REACHES A LEVEL FOR THE AMPLIFIER IC12 TO REACH A LOGICAL ZERO LEVEL ON ITS OUTPUT.

THE EOT LEVEL WILL GO TRUE IF * EOTM PULSE IS RECEIVED WHILE FORB IS TRUE. THE EOT LEVEL IS SET FALSE BY THE INITIALIZE COMMAND OR BY AN EOTM PULSE RECEIVED WHILE FORB IS FALSE.

THE BOT LEVEL WILL GO TRUE IF A BOTM PULSE IS RECEIVED WHILE FEVB IS TRUE. THE BOT LEVEL IS SET FALSE BY THE INITIALIZE COMMAND OR BY A BOTM PULSE RECEIVED WHILE REVB IS FALSE.

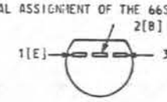
THE LPEW LEVEL WILL GO TRUE IF A LPEWM PULSE IS SENT AND SELECT IS TRUE. THE LPEWM PULSE ALSO ENDS THE REWINDING SEQUENCE IF FORB IS TRUE.

CIRCUIT DESCRIPTION

THE PURPOSE OF CP1 IN THE KS-21447 MINI RECORDER IS TO DECODE MOTION COMMANDS FROM THE CONTROLLER AND INDICATE THE STATUS OF THE SYSTEM. THE DECODED MOTION COMMANDS ARE SENT TO CP2. THE STATUS INDICATORS ARE SENT TO CP3 AND CP4 TO CONTROL READING AND WRITING OF THE TAPE CARTRIDGE AS WELL AS TO THE I/O CONNECTOR FOR USE BY THE TAPE CONTROLLER. BY CONFIGURING THE CIRCUIT PACK AS DASH ONE, THE CARTRIDGE IN POSITION, INITIALIZE, AND POWER RESUMPTION WILL REPOSITION THE TAPE AT LOAD POINT; BY CONFIGURING THE CIRCUIT PACK A, DASH TWO, THE TAPE WILL NOT BE REPOSITIONED AT LOAD POINT BY POWER RESUMPTION CARTRIDGE IN POSITION OR INITIALIZE.

NOTES: (CONT)

5. THE TERMINAL ASSIGNMENT OF THE 665 TRANSISTOR IS



6

HIGHEST CAP AND RES USED ON THIS DRAWING	
C27	R26
NOT USED	
C3	R20
C5	R17

7. CP1-1 L510099-1. STRAP A-B,D-E,J-K,F-H. DO NOT STRAP B-C,C-D,R-S,S-T,K-L,F-G. OMIT R27.

   CP1-2 L510099-2. STRAP B-C,C-D,F-G,R-S,S-T, S-T,K-L. DO NOT STRAP A-B,F-H,D-E, AND J-K. OMIT IC1-IC4,IC8 AND C9-C11,C14-C16.

8.

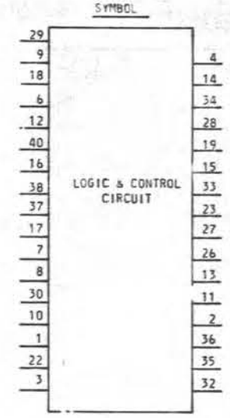
RECORD OF CHANGES					
DWG ISS	PREV FURN	STAND	A&M ONLY	MFR DISC	SEE NOTE
2B	Z	Y	Z		
2B		X			
3B	W	V	W		
7A1(C)					9
881	T	S		T	

9. SAN FERNANDO ELECTRONICS IS NO LONGER AN APPROVED SUPPLIER FOR KS-19774,L14 0.22 UF CAPACITORS.

MANUFACTURING REFERENCE

CATEGORY	NO.
CIRCUIT PACK CODE	L-510099
CONNECTOR ON FRAME	908L

SYMBOL

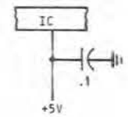


NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, VALUES PRECEDED BY THE SYMBOL +(PLUS) OR -(MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.
3. BATTERY AND GROUND TERMINALS FOR ICS:

IC	+5V BAT TERM	GRD TERM
IC1	16	7,8
IC2,IC3	16	8
IC4	16	7,8
IC5,IC6	16	8
IC7	16	7,8
IC8-IC10	16	8
IC11	16	7,8
IC13-IC18	16	8

4. ALLOW BYPASS CAPACITORS FROM +5V TO GRD AS SHOWN BELOW.



PART OF CPSI

ISSUE 881

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-JIC

BELL TELEPHONE LABORATORIES INCORPORATED 6S

SD-97736-01-JIC

PART OF CPS2

SERVO CIRCUIT

FORB
REVB
STOP
FAST
TACH BK
+5V DC
GRD
+9V DC
-9V DC
48V RTN
VREF
TPQ4C
PQAB
PRESB
MDTRD
PQBE
PQBB
MOTBK
PQAE
TPQ5C
-48V RTN
J2BA3

IC9A 4IN
IC9B 4IN
IC9C 4IN
IC9D 4IN
IC8A 4IN
IC8B 4IN
IC8C 4IN
IC8D 4IN
IC7C 41BR
IC7D 41BR
IC4A 559A
IC4B 559A
IC4C 559A
IC1A 559A
IC1B 559A
IC1C 559A
IC2A 559A
IC2B 559A
IC2C 559A

R46 2.2KΩ
R47 2.2KΩ
R51 2.2KΩ
R48 2.2KΩ
R4 10KΩ
R5 470KΩ
R6 10KΩ
R7 470KΩ
R8 10KΩ
R9 82
R10 Ⓡ470 Ⓠ511 Ⓟ487
R12 10KΩ
R13 10KΩ
R11 Ⓡ220 Ⓠ215
R22 2.2KΩ
R15 8.25KΩ
R16 6.81KΩ
R17 100KΩ
R14 4.7KΩ
R18 1KΩ
R19 47KΩ
R20 Ⓨ.392 MEG Ⓧ.383 MEG Ⓝ.357 MEG
R21 33.2KΩ
C7 .249
CR1
CR2 CR3 CR4 CR5
Q1 Q2 Q3
R25 Ⓨ4.64KΩ Ⓧ21.5KΩ
R24 Ⓨ4.64KΩ Ⓧ21.5KΩ
R28 2.2KΩ
R30 2.2KΩ
R32 2.2KΩ
R31 2.2KΩ
R23 2.2KΩ
R29 2.2KΩ
R34 47KΩ
R35 4.7KΩ
R36 220KΩ
R49 100KΩ Ⓚ47KΩ
R52 100KΩ
R39 220KΩ
R37 47KΩ
R38 4.7KΩ
R40 3.32KΩ
R41 3.32KΩ
R42 22KΩ
R43 22KΩ
C10 .01
C11 .01
C8 Ⓩ1 Ⓧ.47
C9 .1
R26 Ⓨ10KΩ Ⓧ21.5KΩ
R27 Ⓨ470KΩ Ⓧ750KΩ
R50 Ⓨ100 Ⓧ215
C22 Ⓦ0.1 Ⓕ0.27
R23 Ⓔ10KΩ Ⓕ3.61 KΩ
C5 40
C13 .1
C4 .1
C12 .1
C16 .1
C6 .5
CR6 CR7 CR8 CR9 CR11
Q4 Q5 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 QF
R53 100KΩ
R54 21.5KΩ
R55 2.15KΩ
R44 2.15KΩ
R56 1.47KΩ

PART OF CPS2

ISSUE 4B

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J2A

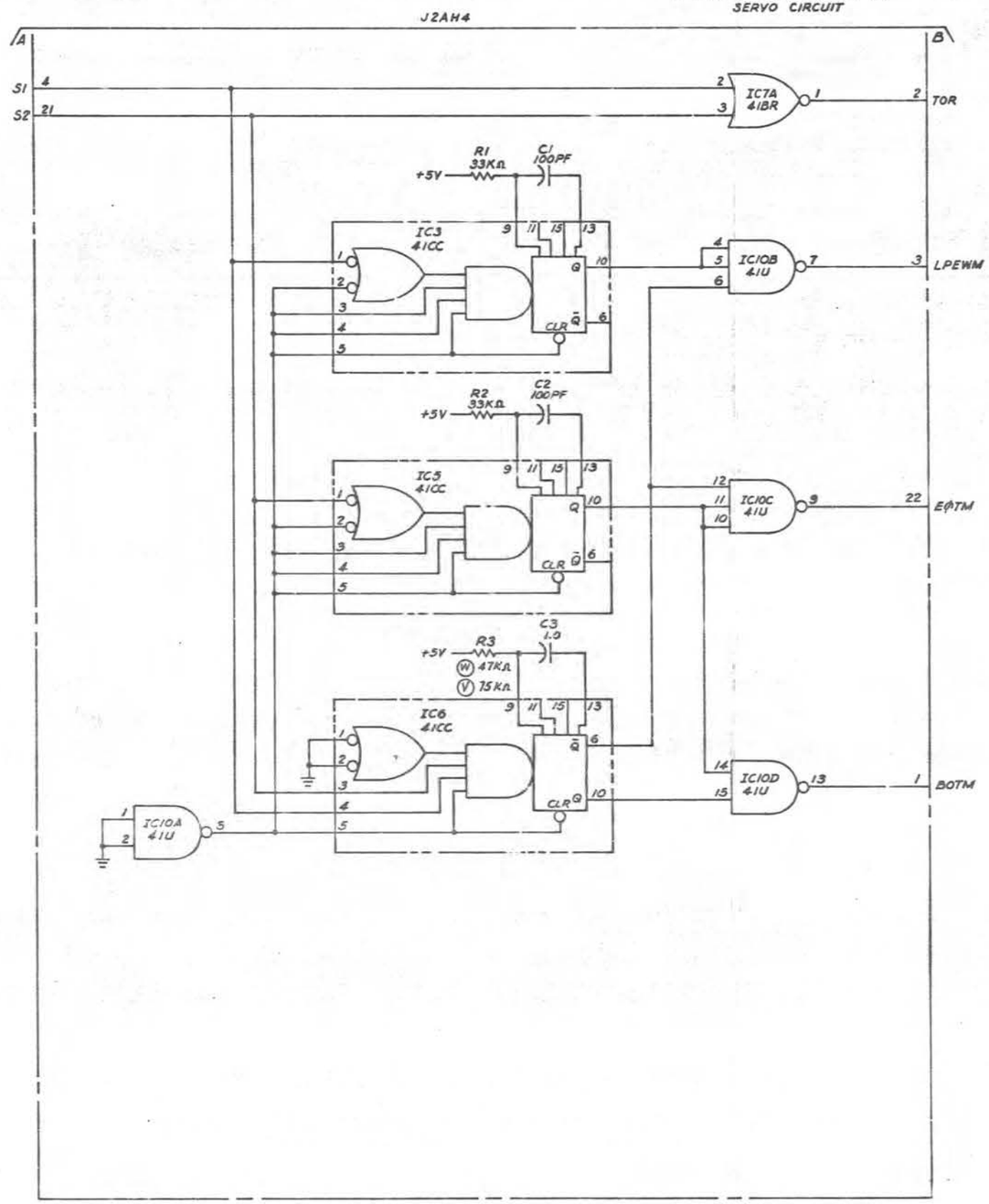
BELL TELEPHONE LABORATORIES INCORPORATED

6S

PRINTED IN U.S.A.

SD-97736-01-J2A

PART OF CPS 2
SERVO CIRCUIT



PART OF CPS2

ISSUE 3B

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J2B

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-97736-01-J2B

PART OF CPS2

SERVO CIRCUIT

COMPONENT LIST

CAPACITOR

DESIG	CODE
C1,C2	KS-19774,L8 ,100PF
C3	KS-19774,L10,1.0
C4	KS-19774,L14,.1
C5	602A,40
C6	542A,.5
C7	594C ,249
C8 (Z)(Y)	KS-19774,L10,1.0
C8	KS-19774,L9,1.0
C8 (X)	KS-19774,L5,0.47
C9	KS-19774,L14,.1
C10,C11	KS-19774,L8 ,.01
C12,C13	KS-19774,L14,.1
C15-C21	KS-19774,L14,.1
C22	(N)KS-19774,L14,.1
C22	(F)KS-19774,L14,0.27

DIODE

DESIG	CODE
CR1	458C
CR2	458C (J)
CR3	459B (J)
CR4	808CJ (H)
CR5	459B (J)
CR5	808CJ (H)
[4] CR6-CR9	458C
CR11	459B

INTEGRATED CIRCUIT

DESIG	CODE
IC1A,B,C	559A
IC2A,B,C	559A
IC3	41CC
IC4A,B,C	559A
IC5	41CC
IC6	41CC
IC7A,C,D	418R
IC8A,B,C,D	41N
IC9A,B,C,D	41N
IC10A,B,C,D	41U

POTENTIOMETER

DESIG	CODE
R12,R13	KS-20945,L1,10KΩ

RESISTOR

DESIG	CODE
R1,R2	KS-16645,L1,33KΩ
R3	(H)KS-16645,L1,47KΩ
	(V)KS-16645,L1,75KΩ
R4	KS-16645,L1,10KΩ
R5	KS-16645,L1,470KΩ
R6	KS-16645,L1,10KΩ
R7	KS-16645,L1,470KΩ
R8	KS-16645,L1,10KΩ
R9	KS-16645,L1,82
(B) R10	KS-20616,L1A,470
(Q) R10	KS-20616,L1A,511
(P) R10	KS-20616,L1A,487
(R) R11	KS-16645,L1A,220
(Q) R11	KS-20616,L1A,215
R14	KS-20616-L1A,4.7KΩ
R16	KS-20616,L1A,6.81KΩ
R17	KS-20616,L1A,100KΩ
R18	KS-16645,L1,1KΩ
R19	KS-16645,L1,47KΩ
(N) R20	KS-20616,L1A,.357MEGΩ
(V) R20	KS-20616,.1A,.392MEGΩ
(X) R20	KS-20616,L1A,.383MEGΩ
R21	KS-20616,L1,33.2KΩ
R22	KS-16645,L1,2.2KΩ
R23	(F) KS-20616,L1A,3.61KΩ
R23	(G) KS-20616,L1A,10KΩ
(V) R24,R25	KS-20616,L1A,4.64KΩ
(X) R24,R25	KS-20616,L1A,21.5KΩ
(Y) R26	KS-20616,L1A,10KΩ
(X) R26	KS-20616,L1A,21.5KΩ
(Y) R27	KS-20616,L1A,470KΩ
(X) R27	KS-20616,L1A,750KΩ
R28-R33	KS-16645,L1,2.2KΩ
R34	KS-16645,L1,47KΩ
R35	KS-16645,L1,4.7KΩ
R36	KS-16645,L1,220KΩ
R37	KS-16645,L1,47KΩ
R38	KS-16645,L1,4.7KΩ
R39	KS-16645,L1,220KΩ
R40,41	KS-20289,L6C,3.32KΩ
R42,R43	KS-16645,L1,22KΩ
R44,R45	KS-20616,L1A,2.15KΩ
(M) R49	KS-16645,L1,100KΩ
(L) R49	KS-16645,L1,47KΩ
R46-R48	KS-16645,L1,2.2KΩ
R52	KS-16645,L1,100KΩ
(Y) R50	KS-16645,L1,100
(Z) R50	KS-20616,L1A,215
R51	KS-16645,L1,2.2KΩ
R53	KS-20616,L1A,1.00KΩ
R54	KS-20616,L1A,21.5KΩ
R56	KS-20616,L1A,1.47KΩ

TRANSISTOR

DESIG	CODE
Q1	665
Q2,Q3	61A
Q4-Q9	(T) 51K
	(S) 51B
	(E) F60675
Q10,Q11	2N3792
Q12-Q14	(T) 51K
	(S) 51B
	(E) F60675

INPUT/OUTPUT INFORMATION

FOR THE DC MOTOR VELOCITY CONTROL, THE INPUTS ARE THE OUTPUT OF THE TACHOMETER, PROVIDING A VOLTAGE LEVEL PROPORTIONAL TO THE MOTOR SPEED AND MOTION COMMANDS FORWARD, REVERSE, FAST AND STOP THAT ARE TTL LEVELS. THE TACH OUTPUT IS COMPARED TO A REFERENCE VOLTAGE TO PRODUCE THE ERROR VOLTAGE, WHICH IS THEN AMPLIFIED TO DRIVE THE MOTOR. THE OUTPUTS OF THE VELOCITY CONTROL SECTION CONSIST OF TWO VOLTAGE LEADS AND TWO CURRENT SINK LEADS TO DRIVE THE MOTOR BIDIRECTIONALLY FROM A SINGLE POLARITY VOLTAGE SUPPLY (-48 VOLT).

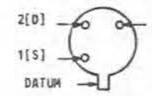
THE INPUTS FOR THE MARKER DESKEW AND DECODE CIRCUIT ARE TTL LEVELS FROM EACH OF THE TWO MARKER SENSORS S1 AND S2. THE INPUT IS HIGH WHEN A MARKER IS PRESENT. THE OUTPUTS ARE TTL MEDIUM POWER GATES THAT ARE NOMINALLY 1 MICROSECOND NEGATIVE GOING PULSE THAT SIGNAL OCCURENCE OF BOTM (LPEWM, EOTM) THE TAPE OFF REEL (TOR) OUTPUT IS LOW WHENEVER EITHER SENSOR INPUT IS HIGH.

CIRCUIT DESCRIPTION

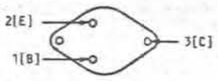
CP2 PERFORMS 2 FUNCTIONS IN THE MINI-RECORDER DIGITAL CARTRIDGE SYSTEM: 1) IT CONTROLS THE SPEED OF THE DC MOTOR WHICH DRIVES THE TAPE CARTRIDGE,AND 2). IT DESKEWS AND DECODES THE MARKER DETECTORS TO PROVIDE THE INDICATIONS OF BEGINNING OF TAPE MARKER (BOTM), LOAD POINT-EARLY WARNING MARKER (LPEWM), AND END OF TAPE MARKER (EOTM).

NOTES (CONT):

6. THE TERMINAL ASSIGNMENT OF THE 61A TRANSISTOR IS:



7. THE TERMINAL ASSIGNMENT OF THE 2N3792 TRANSISTOR IS:



8.

HIGHEST CAP AND RES USED ON THIS CPS	
C21	R56
NOT USED	
	R45

9.

RECORD OF CHANGES

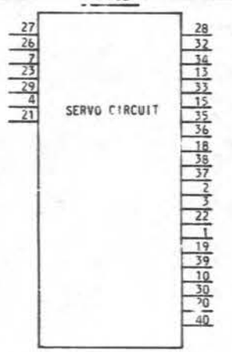
DWG ISSUE	PREV FURN	STAND	A&M ONLY	MFR DISC	SEE NOTE
2B	Z,Y	X	Z,Y		10
2B		W			
3B	S	T	S		
3B	W	V	W		
3B	R	Q	R		
3B	Q	P	Q		
3B	Y	N	Y		
3B	M	K	M		
4B	J	H	J		
5A	G	F	G		10
8BI	S OR T	E		S & T	

10. OPTION Z (C3, KS-19774, L10, 1.0 UF WAS CHANGED TO KS-19774, L9, 1.0 UF TO IMPROVE MANUFACTURABILITY. OPTION X WAS MADE TO ALLOW USE OF A NEW MOTOR-TACHOMETER PACKAGE. THIS NEW CONFIGURATION CAN BE USED WITH THE OLD MOTOR-TACHOMETER (E538/110) BUT THE OLD CONFIGURATION SHOULD NOT BE USED WITH THE NEW MOTOR-TACHOMETER PACKAGE (E538/300). OPTION T REPLACED THE PREVIOUS TRANSISTORS (OPTION S) WITH ONES WITH HIGHER BREAKDOWN VOLTAGE. OPTIONS Q,P,N, AND K IMPROVED MANUFACTURABILITY. OPTION F REQUIRES DIFFERENT TACHOMETER RESISTOR VALUES THAN PREVIOUSLY FURNISHED. THE 584/010 MOTOR REQUIRED PRECISION LOADING OF THE TACHOMETER. OPTION H PROVIDES USEAGE OF AN IMPROVED VOLTAGE REFERENCE CIRCUIT.

MANUFACTURING REFERENCE

CATEGORY	NO.
CIRCUIT PACK CODE	L-510100
CONNECTOR ON FRAME	908L

SYMBOL

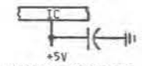


NOTES:

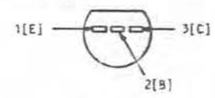
1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, VALUES PRECEDED BY THE SYMBOL +(PLUS) OR -(MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN
3. BATTERY AND GROUND TERMINATIONS FOR ICS:

IC	+5V BAT TERM	GRD TERM
IC3,IC5, IC6,IC7	16	7,8
IC8,IC9,IC10	16	8

4. ALLOW BYPASS CAPACITORS FROM +5V TO GRD FOR IC3,5,6,7,8 & 9. AS SHOWN BELOW:



5. THE TERMINAL ASSIGNMENT OF THE 51B & 66S TRANSISTOR IS:



PART OF CPS2

ISSUE 8B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J2C

BELL TELEPHONE LABORATORIES INCORPORATED

6S

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SD-97736-01-J2C

PART OF CPS3-1 THRU CPS3-4

WRITE CIRCUIT

WA1
WA0
WE
FP
RO (FROM MOTION LOGIC)
DATA
WRITE DATA CLOCK
R19 2200
R18 2200
R17 2200
R20 2200
R16 2200
R14 2200
R15 2200
+5V
IC10A 41BP
IC10B 41BP
IC10C 41BP
IC10F 41BP
IC10G 41BP
IC10E 41BP
IC10 41BP
IC6 41CD
IC3D 41U
IC3A 41U
IC3B 41U
IC3C 41U
STRAP 1 (SEE NOTE 5)
IC1A FF 41AE
(SEE NOTE 5)
IC2A 41BR
IC2B 41BR
IC2C 41BR
IC2D 41BR
IC8A 41BR
IC8B 41BR
IC8C 41BR
IC8D 41BR
IC11A 41BS
IC11B 41BS
IC11C 41BS
IC11D 41BS
IC11E 41BS
IC11F 41BS
IC9A 41BS
IC9B 41BS
CR8 SEE NOTE 5
CR7 SEE NOTE 5
CR6
CR5
CR4
CR3
CR2
CR1
+9V
R13 294 SEE NOTE 5
R12 294
R11 294
R10 294
TR1
TR2
TR3
TR4
3B/B2
3B/C2
3B/C2
3B/D2
3B/D
WEB

PART OF CPS3

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J3A

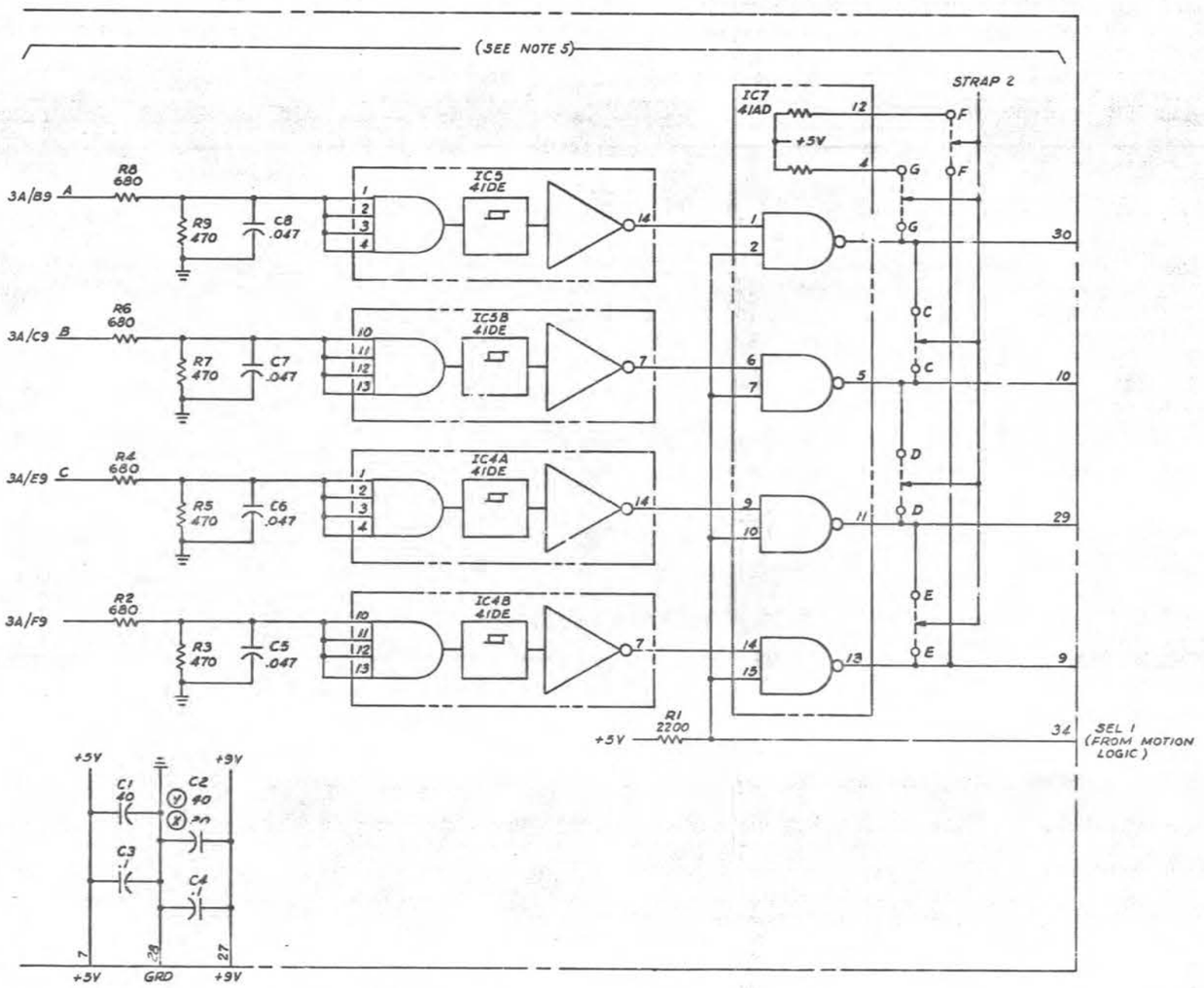
BELL TELEPHONE LABORATORIES INCORPORATED

3B

SD-97736-01-J3A

PART OF CPS3-1 THRU CPS3-4

WRITE CIRCUIT



PART OF CPS3

ISSUE 381

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J3B

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-97736-01-J3B

PART OF CPS3-1 THRU CPS3-4

WRITE CIRCUIT

COMPONENT LIST

CAPACITOR

DESIG	CODE
C1	602A,40
C2	(Y) 602A,40
	(X) 602C,20
C3,C4	KS-19774,L14, .1
C5-C8	KS-19774,L6, .047
C9-C19	KS-19774,L14, .1

DIODE

DESIG	CODE
CR1-CR8	458A

INTEGRATED CIRCUITS

DESIG	CODE
IC1A	41AE
IC2A,B,C,D	41BR
IC3A,B,C,D	41U
IC4A,B	41DE
IC5A,B	41DE
IC6	41CD
IC7	41AC
IC8A,B,C,D	41BR
IC9A,B	41BS
IC10A,B,C,E,F,G	41BP
IC11A,B,C,E,F,G	41BS

RESISTOR

DESIG	CODE
R1	KS-16645,L1,2200
R2	KS-16645,L1, 680
R3	KS-16645,L1, 470
R4	KS-16645,L1, 680
R5	KS-16645,L1, 470
R6	KS-16645,L1, 680
R7	KS-16645,L1, 470
R8	KS-16645,L1, 680
R9	KS-16645,L1,470
R10-R13	KS-20810,L1A,294
R14-R20	KS-16645,L1,2200

INPUT/OUTPUT INFORMATION

ALL INPUTS ARE TTL COMPATIBLE WHERE A LOGIC ONE IS DEFINED TO BE LESS THAN 0.4 VDC AND A LOGIC ZERO IS GREATER THAN 2.4 VDC. THE OUTPUT TO THE HEAD IS DRIVEN BY OPEN COLLECTOR-HIGH VOLTAGE TTL DRIVERS (IC9,11).

CIRCUIT DESCRIPTION

THE PURPOSE OF CP3 IN THE KS-21447 MINI-RECORDER IS TO DECODE THE WRITE TRACK SELECTED AND PROVIDE WRITE CURRENT TO THE WRITE HEAD IN SERIAL PHASE ENCODED FORMAT. IT IS POSSIBLE VIA STRAP WIRES AND COMPONENT DELETIONS TO WRITE TWO OR FOUR TRACKS; TO SELECT THE TYPE OF INPUT, I.E., CLOCKED DATA OR PHASE ENCODED; OR SELECT A TRACK POWER DETECTION OPTION. INPUT FROM THE LOGIC AND CONTROL ELECTRONICS (CP1) CAN INHIBIT WRITING OF DATA, AS WILL THE WRITE ENABLE COMMAND AND FILE PROTECT SWITCH. INPUT DATA CAN BE CLOCKED INTO THE BOARD, IN WHICH CASE STRAP 1 IS REMOVED. IF PHASE ENCODED DATA IS PRESENTED DELETE IC1 AND INSERT STRAP 1.

TO DRIVE ONLY A TWO TRACK HEAD IC8, IC9, CR1-CR4, R10 & R11 CAN BE DELETED.

TO CHOOSE ANOTHER OPTION OF TRACK POWER DETECTION INCLUDE IC4, IC5 AND IC7. IF THE WIRED OR OPTION IS DESIRED FOR OUTPUT PRESENTATION, JUMPERS C-C, D-D, E-E, F-F AND G-G.

IF WRITE PROTECTION OF TRACK ONE IS DESIRED, DELETE R13,CR7 AND CR8.

NOTES (CONT):

5. CP3-1 L510102-1
   ADD STRAP 1
   REMOVE STRAP 2, R1-R9, C5-C8, IC1, IC4, IC5, IC7 AND ASSOCIATED LEADS.

   CP3-2 L510102-2
   REMOVE STRAP 1 AND 2, R1-R9, C5-C8, IC4, IC5, IC7 AND ASSOCIATED LEADS.

   CP3-3 L510102-3
   REMOVE STRAPS 1 AND 2

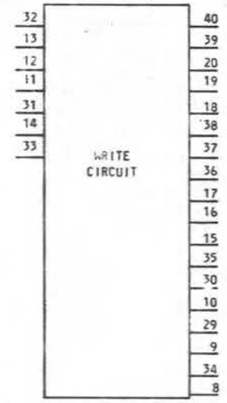
   CP3-4 L510102-4
   REMOVE STRAP 2 AND IC1
   ADD STRAP 1

   CP3-5 L510102-5
   ADD STRAP 1.
   REMOVE STRAP 2, R1-R9, R13, C5-C8, IC1, IC4, IC5, IC7, CR7, AND CR8 AND ASSOCIATED LEADS.

MANUFACTURING REFERENCE

CATEGORY	NO.
CIRCUIT PACK CODE	L-510102 -1 THRU -4
CONNECTOR ON FRAME	908L

SYMBOL



6.

HIGHEST CAP AND RES USED ON THIS CPS	
C8	R20
NOT USED	

7.

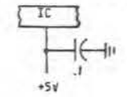
RECORD OF CHANGES					
DWG ISS	PREV FURN	STAND	A&M ONLY	MFR DISC	SEE NOTE
ZB		Z			
BBI	Y	X		Y	

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS,
   CAPACITANCE VALUES ARE IN MICROFARADS.
   VALUES PRECEDED BY THE SYMBOL +(PLUS) OR -(MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.
3. BATTERY AND GROUND TERMINATIONS FOR ICS:

IC	+5V BAT TERM	GRD TERM
IC1-IC3	16	8
IC4-IC8	16	7,8
IC9-IC11	16	8

4. ALLOW BYPASS CAPACITORS FROM 5 TO GRD FOR IC2, 3,6,9 & 11 AS SHOWN BELOW.



SD-97736-01-J3C

PART OF CPS3

881

KS-21447 MINI-RECORDER CIRCUIT

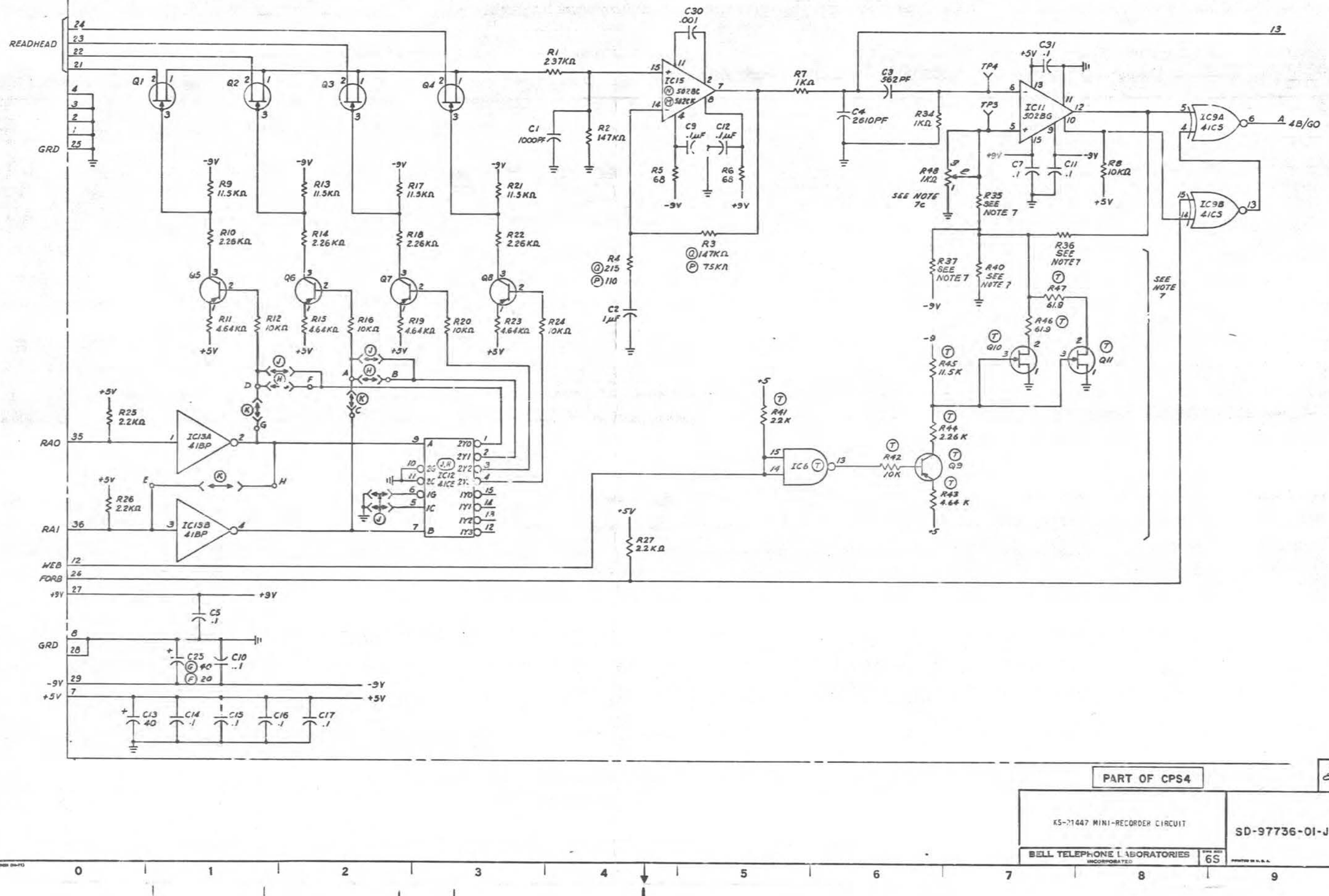
SD-97736-01-J3C

BELL TELEPHONE LABORATORIES INCORPORATED

65

⑧PART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
SEE NOTES 9 & 10



PART OF CPS4

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J4A

BELL TELEPHONE LABORATORIES INCORPORATED

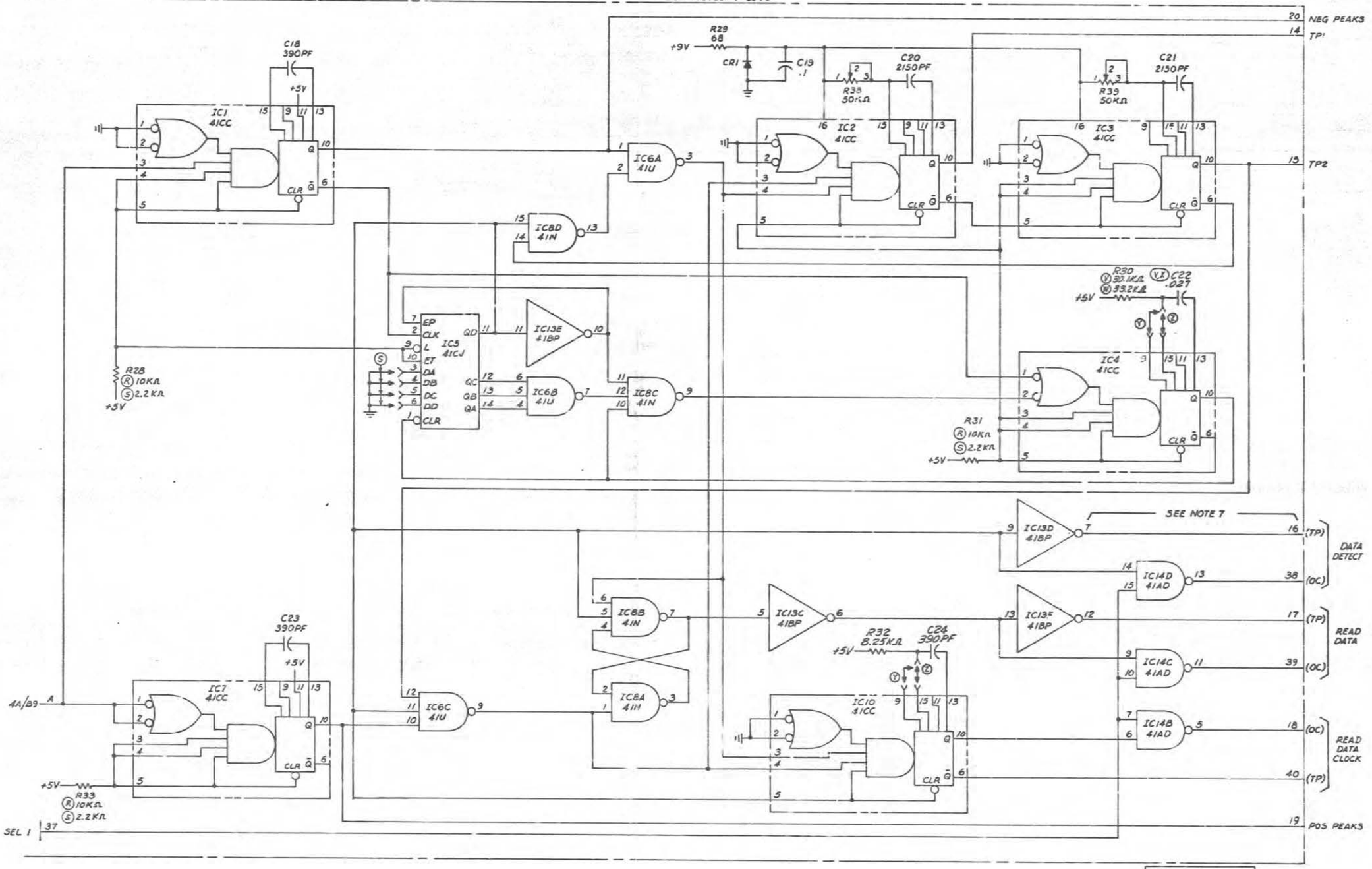
6S

881

SD-97736-01-J4A

ⓗ PART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
SEE NOTES 9 & 10



PART OF CPS4

ISSU 7AN(C)

KS-21447 MINI-RECORDER CIRCUIT	SD-97736-01-J4B
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S

SD-97736-01-J4B

Ⓑ PART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
(SEE NOTES 9 & 10)

COMPONENT LIST

CAPACITORS

DESIG	CODE
C1	719A,1000PF
C2	KS-19774,L10,1.0
C3	719A,562PF
C4	719A,2610PF
C5	KS-19774,L14,.1
C7	KS-19774,L14,.1
C8	KS-19774,L14,.1
C9	KS-19774,L14,.1
C10	KS-19774,L14,.1
C11	KS-19774,L14,.1
C12	KS-19774,L14,.1
C13	602A,40
C14	KS-19774,L14,.1
C15	KS-19774,L14,.1
C16	KS-19774,L14,.1
C17	KS-19774,L14,.1
C18	KS-19774,L8,390PF
C19	KS-19774,L14,.1
C20	719A,2150PF
C21	719A,2150PF
Ⓥ C22	KS-19774,L11,.027
Ⓧ C22	KS-20977,L4, .027
C23	KS-19774,L8,390PF
C24	KS-19774,L7,390PF
Ⓕ C25	602C,.20
Ⓖ C25	602A,40
C30	KS-19774,L2,.001
C31	KS-19774,L14,.1

DIODES

DESIG	CODE
CR1	448C

INTEGRATED CIRCUITS

DESIG	CODE
IC1	41CC
IC2	41CC
IC3	41CC
IC4	41CC
IC5	41CJ
IC6A,B,C	41U
IC7	41CC
IC8A,B,C,D	41N
IC9A,B	41CS
IC10	41CC
IC11	502BG
IC12	41CE
IC13A,B,C,D,E,F	41BP
IC14B,C,D	41AD
Ⓝ IC15	502BC
Ⓜ IC15	502CK

POTENTIOMETERS

DESIG	CODE
R38	KS-19093,L8A,50KΩ
R39	KS-19093,L8A,50KΩ
R48	KS-19093,L7A,1KΩ (SEE NOTE 7C)

COMPONENT LIST (CONT)

RESISTORS

DESIG	CODE
R1	KS-20616,L1A, 2.37KΩ
R2	KS-20616,L1A, 147KΩ
Ⓠ R3	KS-20616,L1A,147KΩ
Ⓟ R3	KS-20616,L1A,75KΩ
Ⓠ R4	KS-20616,L1A,215
Ⓟ R4	KS-20616,L1A,110
R5,R6	KS-16645,L1,68
R7	KS-20616,L1A,1.0KΩ
R8	KS-20616,L1A,10KΩ
R9	KS-20616,L1A, 11.5KΩ
R10	KS-20616,L1A, 2.26KΩ
R11	KS-20616,L1A,4.64KΩ
R12	KS-20616,L1A,10KΩ
R13	KS-20616,L1A,11.5KΩ
R14	KS-20616,L1A,2.26KΩ
R15	KS-20616,L1A,4.64KΩ
R16	KS-20616,L1A,10KΩ
R17	KS-20616,L1A,11.5KΩ
R18	KS-20616,L1A,2.26KΩ
R19	KS-20616,L1A,4.64KΩ
R20	KS-20616,L1A,10KΩ
R21	KS-20616,L1A,11.5KΩ
R22	KS-20616,L1A,2.26KΩ
R23	KS-20616,L1A,4.64KΩ
R24	KS-20616,L1A,10KΩ
R25	KS-16645,L1,2.2KΩ
R26	KS-16645,L1,2.2KΩ
R27	KS-16645,L1,2.2KΩ
R28	Ⓡ KS-16645,L1,10KΩ Ⓢ KS-16645,L1,2.2KΩ
R29	KS-13490,L1,68
Ⓥ R30	KS-20616,L1A,30.1KΩ
Ⓜ R30	KS-20616,L1A,33.2KΩ
R31	Ⓡ KS-16645,L1,10KΩ Ⓢ KS-16645,L1,2.2KΩ
R32	KS-20616,L1A,8.25KΩ
R33	Ⓡ KS-16645,L1,10KΩ Ⓢ KS-16645,L1,2.2KΩ
R34	KS-20616,L1A,1.0KΩ
R35	KS-20616,L1, SEE NOTE 7
R36	KS-20616,L1A, SEE NOTE 7
R37	KS-20616,L1A, SEE NOTE 7
R40	KS-20616,L1A, SEE NOTE 7
Ⓤ R41	KS-16645,L1, 2.2KΩ
Ⓣ R42	KS-20616,L1A, 10KΩ
Ⓤ R43	KS-20616,L1A, 4.64KΩ
Ⓣ R44	KS-20616,L1A, 2.26KΩ
Ⓒ R45	KS-20616,L1A, 11.5KΩ
Ⓕ R46	KS-20616,L1A, 61.9
Ⓕ R47	KS-20616,L1A, 61.9

TRANSISTORS

DESIG	CODE
Q1-Q4,Q10,Q11	61A
Q5-Q8	51F
Ⓕ Q9	51F SEE NOTE 7
Ⓕ Q10,Q11	61A SEE NOTE 7

INPUT/OUTPUT INFORMATION

THE TRACK SELECT INPUTS AND ALL OUTPUTS ARE TTL COMPATIBLE, WHERE A LOGIC 1 IS DEFINED TO BE LESS THAN 0.4 VDC AND A LOGIC ZERO IS GREATER THAN 2.4 VDC. THE HEAD INPUT IS A LOW LEVEL ANALOG SIGNAL.

CIRCUIT DESCRIPTION

THIS CP IS INTENDED FOR USE IN THE KS-21447 MINI-RECORDER, THE CP READS INFORMATION OFF TAPE, DECODING IT INTO DIGITAL DATA. IT IS INTENDED ONLY FOR READING THE 1600 bpi, (3200 frpi) PHASE ENCODED, FORMAT FROM A TAPE RUNNING AT 30 INCHES PER SECOND, EITHER FORWARD OR REVERSE.

THE CIRCUIT SELECTS 1 OUT OF 4 TRACKS, BASED ON THE STATE OF THE INPUTS RA0 AND RA1. DATA IS DETECTED (DATA DETECT OUTPUT GOES LOW), ONLY WHEN AT LEAST 8 NEGATIVE TRANSITIONS ARE DETECTED IN LESS THAN 200 USEC. WHEN STARTING TO READ A BLOCK OF DATA, THE FIRST SEVEN CHARACTERS ARE STRIPPED FROM THE OUTPUT STREAM. DATA DETECT GOES FALSE WHEN NO TRANSITIONS ARE DETECTED FOR A PERIOD OF 200 USEC. WHEN DATA DETECT IS HIGH, THE READ DATA AND READ DATA CLOCK OUTPUTS ARE HELD HIGH. WHEN DATA DETECT IS LOW, THE READ DATA LINE MAY BE READ ON EACH POSITIVE TRANSITION OF THE READ DATA CLOCK LINE. THIS CLOCK IS A NORMALLY HIGH NEGATIVE GOING PULSE OF APPROXIMATELY 1 USEC IN DURATION. THE SELT INPUT WILL DISABLE ALL THREE (DATA DETECT, READ DATA AND READ DATA CLOCK) OUTPUTS (FORCE THEM HIGH) WHEN HELD LOW.

THE UNIT CAN BE CONFIGURED FOR A TWO TRACK SYSTEM WITH TOTEM POLE OUTPUTS BY DELETING IC14, Q3, Q4, Q7-Q11, R17-R24, R42-R47, AND BYPASS CAPACITOR FOR IC12 & IC14.

THE UNIT CAN BE CONFIGURED FOR STANDARD FOUR TRACK OPERATION WITH OPEN COLLECTOR OUTPUTS DELETING R42-R47, Q9-Q11. A CERTIFIER CONFIGURATION CAN BE BUILT BY ADDING R48 IN PLACE OF R35 AND R40 AS PER NOTE 7C.

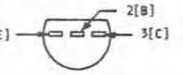
NOTES: (CONT)

10. THE "B" OPTION ENCOMPASSES ALL CIRCUITRY, COMPONENTS AND OPTIONS SHOWN ON SHEETS J4A, J4B & J4C PRIOR TO ISSUE 7A1(C). DUE TO NUMEROUS CHANGES ON ISSUE 7A1(C) THE READ CIRCUIT WAS REDRAWN ON ADDED SHEETS J4D, J4E, J4F & J4G WITHOUT REPEATING CHANGED VALUES OPTIONS ETC.

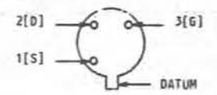
NOTES ARE CONTINUED ON SHEET J4F.

NOTES (CONT):

5. THE TERMINAL ASSIGNMENT OF THE 51F & 665 TRANSISTOR IS:



6. THE TERMINAL ASSIGNMENT OF THE 61A TRANSISTOR IS:



7. a. CP4-1 L510103-1
REMOVE IC14, Q3, Q4, Q7-Q11, R17-R24, R42-R47 AND C8. R35 IS 953Ω, R37 IS 44.2KΩ, R40 IS 61.9Ω, AND R36 IS 8.66KΩ.

b. CP4-2 L510103-2
REMOVE Q9-Q11 AND R42-R47, R35 IS 953Ω, R37 IS 44.2KΩ, R40 IS 61.9Ω, AND R36 IS 8.66KΩ.

c. CP4-3 L510103-3
REMOVE Q9,Q10,Q11 AND R42-R47. R37 IS 44.2KΩ, R36 IS 8.66KΩ. R48 IS 1KΩ AND IS USED IN PLACE OF R35 AND R40 TO ACHIEVE A 20% THRESHOLD.

d. CP4-4 L510103
R37 IS 56.2KΩ, R35 IS 866Ω, R36 IS 11.5KΩ
R40 IS 215Ω. (OPTION T)

e.

PART NO.	INSTALL STRAPS*	DELETE STRAPS*
L510103-1	A-B, D-F	A-C,D-G,E-H,J,H
L510103-2	A-B, D-F	A-C, D-G, E-H
L510103-3		
L510103-4		

* LATER ARTWORK DELETES STRAPS (ISSUE 9)

8.

HIGHEST CAP AND RES USED ON THIS CPS	
C31	R47
NOT USED	
C26,C27	
C28,C29	
C6	

9.

RECORD OF CHANGES					
DWG ISSUE	PREV FURN	STAND	A&M ONLY	MFR DISC	SEE NOTE
2B	Y	Z	Y		
2B	V	W,X	V		
2B		T			7
3B	R	S	R		
3B	Q	P	Q		
3B	N	M	N		
3B	K,H	J	H		
7A1(C)				B	10
8B1	G	F		G	

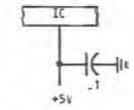
OPTION LETTERS B & D NOT USED.
RECORD OF CHANGES CONTINUED ON SHEET J4F.

NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS VALUES PRECEDED BY THE SYMBOL +(PLUS) OR -(MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.
3. BATTERY AND GROUND TERMINATIONS FOR ICS:

IC	+5V BAT TERM	GRD TERM
IC1-IC4	16	7,8
IC5,IC6	16	8
IC7	16	7,8
IC8	16	8
IC9	16	7,8
IC10	16	7,8
IC11	13	11
IC12-IC14	16	8

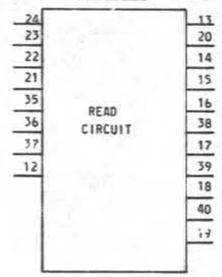
4. ALLOW BYPASS CAPACITORS FROM +5V TO GRD FOR IC1-IC7, IC10, IC12



MANUFACTURING REFERENCE

CATEGORY	NO.
CIRCUIT PACK CODE	L-510103
CONNECTOR ON FRAME	908L

SYMBOL



PART OF CPS4

ISSUE 7A1(C)

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J4C

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

SD-97736-01-J4C

ⓐPART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
SEE NOTES 9, 10, 15 & 16

READHEAD
GRD
READ/WRITE AMPLIFIER
IC15 502CK
IC11 502BG
IC9A 4ICS
IC9B 4ICS
IC9C 4ICS
IC9D 4ICS
IC13A 4IBP
IC13B 4IBP
IC12 4ICE
IC6D 4IU
Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11
R1 2.37KΩ
R2 147KΩ
C1 1000 PF
C2 2.2UF
R3 75KΩ
R4.0 215
R4.1 215
SEE NOTE 17
C4 2610PF
C6 562PF
R7 1KΩ
R8 2.21KΩ
R9 R13 R17 R21 11.5KΩ
R10 R14 R18 R22 1.47KΩ
R11 R15 R19 R23 3.83KΩ
R25 R26 R27 2.21KΩ
R34 1KΩ
R35 953
R36 8.66KΩ
R37 44.2KΩ
R40 61.9
R41 2.21KΩ
R43 3.83KΩ
R44 1.47KΩ
R45 11.5KΩ
R46 61.9
R47 61.9
R48 1KΩ
R49 215
R50 R51 R52 R53 1KΩ
R54 1KΩ
R55 10KΩ
R57 383KΩ
R59 1KΩ
C7 C11 .1
C8 .1
C9 C12 .1
C10 .1
C13 40
C14 .1
C25 20
C27 .1
C30 470PF
C31 .1
C33 C34 C35 C36 .1
C37 .1
C38 100PF
C39 10PF
C40 20
SEE NOTE 19
SEE NOTES 13, 16
RV1
RV2
+5V
+9V
-9V
WEB
FORB
RAO
RA1
TP3
TP4
TP7
TP8
TP9
B 4E/A3
A 4E/G0

PART OF CPS4

ISSUE 681

KS-21447 MINI-RECORDER CIRCUIT

SD-91736-01-J4D

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

ⓐ PART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
SEE NOTES 9, 10, 15 & 18

40/A9 B

+9V C32 .27 IC16 6/4A

TP10

SEE NOTE 19

R38 50KΩ CW
R56 5.11KΩ
R56 18.7KΩ
C17 .1
C20 2150PF
C28 .1
R39 27.4KΩ
C21 2150 PF

C17 .1 +5V R58 14.7KΩ C18 100 PF
IC1 4/CC

TP5
IC6A 4/0
IC6D 4/N

IC2 4/CC
TP1
IC3 SN/C54122J
TP2

EP CLK L ET DA DB DC DD CLR QD QC QB QA
IC5 4/CJ
IC13E 4/BP
IC6B 4/U
IC8C 4/N
C26 .1 +5V
R28 2.21KΩ +5V

C29 .1 +5V R30 33.2KΩ C22 .027
IC4 4/CC
R31 2.21KΩ +5V

IC13D 4/BP
SEE NOTE 7
DATA DETECT
IC14D 4/AD

IC8B 4/N
IC13C 4/BP
IC13F 4/BP
C15 .1 +5V R32 8.25KΩ C24 390 PF
IC10 4/CC
IC13G 4/B
IC14C 4/AD
READ DATA
IC14B 4/AD
READ DATA CLOCK
IC14A 4/AD

C16 .1 +5V R49 14.7KΩ C23 100PF
IC7 4/CC
4R/B9 A
R33 2.21KΩ +5V
IC8A 4/N
IC6C 4/U
TP6
SEL 1 37

PART OF CPS4

ISSUE 881

KS-21647 MINI-RECORDER CIRCUIT

SD-97736-01-J4E

BELL TELEPHONE LABORATORIES INCORPORATED

6S

⊘PART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
SEE NOTES 9,10,15 & 18

COMPONENT LIST

DESIG	CODE
C1	719A, 1000PF
C2	KS-19774 L9, 2.2
C3	719A, 562PF
C4	719A, 2610PF
C5	KS-19774,L14, .1
C7	KS-19774,L14, .1
C8	KS-19774,L14, .1
C9	KS-19774,L14, .1
C10	KS-19774,L14, .1
C11	KS-19774,L14, .1
C12	KS-19774,L14, .1
C13	602A, 40
C14	KS-19774,L14, .1
C15	KS-19774,L14, .1
C16	KS-19774,L14, .1
C17	KS-19774,L14, .1
C18	KS-16958,L32, 100PF
C19	KS-19774,L14, .1
C20	719A, 2150PF
C21	719A, 2150PF
C22	KS-20977,L4, .027
C23	KS-16958,L32, 100PF
C24	KS-19774,L7, 390PF
C25	602C, 20
C26	KS-19774,L14, .1
C27	KS-19774,L14, .1
C28	KS-19774,L14, .1
C29	KS-19774,L14, .1
C30	KS-19774,L1, 470PF
C31	KS-19774,L14, .1
C32	KS-19774,L14, .27
C33	KS-19774,L14, .1
C34	KS-19774,L14, .1
(ZA) C35	KS-19774,L14, .1
(ZA) C36	KS-19774,L14, .1
(ZB) C37	KS-19774,L14, .1
C38	KS-16958,L32, 100PF
C39	KS-19774,L1, 10PF
C40	602C, 2C

INTEGRATED CIRCUITS

DESIG	CODE
IC1	41CC
IC2	41CC
IC3	SNC54122J, TEXAS INSTR
IC4	41CC
IC5	41CJ
IC6A,B,C,D	41U
IC7	41CC
IC8A,B,C,D	41N
IC9A,B,C,D	41CS
IC10	41CC
IC11	5028G
IC12	41CE
IC13A,B,C,D,E,F,G	41BP
(ZJ) IC14A,B,C,D	41AD
IC15	502CK
IC16	614A

POTENTIOMETERS

DESIG	CODE
(ZT) *R38	KS-19646,L3, 50KΩ
(ZV) R38	KS-19646,L3, 15KΩ
(ZC) R48	KS-19093,L8A, 1KΩ
*R55	KS-19646,L3, 10KΩ

*SEE NOTE 19 & 20

COMPONENT LIST (CONT)

RESISTORS

DESIG	CODE
R1	KS-20616,L1A, 2.37KΩ
R2	KS-20616,L1A, 147KΩ
R3	KS-20616,L1A, 75KΩ
R4.0	KS-20616,L1A, 215
R4.1	KS-20616,L1A, 215 (SEE NOTE 17)
R7	KS-20616,L1A, 1.0KΩ
R8	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R9	KS-20616,L1A, 11.5KΩ
R10	KS-20616,L1A, 1.47KΩ
R11	KS-20616,L1A, 3.83KΩ
R13	KS-20616,L1A, 11.5KΩ
R14	KS-20616,L1A, 1.47KΩ
R15	KS-20616,L1A, 3.83KΩ
(ZA) R17	KS-20616,L1A, 11.5KΩ
(ZA) R18	KS-20616,L1A, 1.47KΩ
(ZA) R19	KS-20616,L1A, 3.83KΩ
(ZA) R21	KS-20616,L1A, 11.5KΩ
(ZA) R22	KS-20616,L1A, 1.47KΩ
(ZA) R23	KS-20616,L1A, 3.83KΩ
R25	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R26	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R27	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R28	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R30	KS-20616,L1A, 33.2KΩ
R31	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R32	KS-20616,L1A, 8.25KΩ
R33	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R34	KS-20616,L1A, 1.0KΩ
(ZD) R35	KS-20616,L1A, 953
(ZE) R35	KS-20616,L1A, 866
(ZH) R36	KS-20616,L1A, 8.66KΩ
(ZJ) R36	KS-20616,L1A, 11.5KΩ
(ZL) R37	KS-20616,L1A, 44.2KΩ
(ZM) R37	KS-20616,L1A, 56.2KΩ
R39	KS-20616,L1A, 27.4KΩ
(ZQ) R40	KS-20616,L1A, 51.1
(ZF) R40	KS-20616,L1A, 61.9
(ZD) R40	KS-20616,L1A, 215
R41	~~KS-16645,L1, 2.2KΩ~~ KS-20616,L1A,2.21KΩ
R43	KS-20616,L1A, 3.83KΩ
R44	KS-20616,L1A, 1.47KΩ
(ZB) R45	KS-20616,L1A, 11.5KΩ
R46	KS-20616,L1A, 61.9
R47	KS-20616,L1A, 61.9
R49	KS-20616,L1A, 14.7KΩ
R50	KS-20616,L1A, 1KΩ
R51	KS-20616,L1A, 1KΩ
(ZA) R52	KS-20616,L1A, 1KΩ
(ZA) R53	KS-20616,L1A, 1KΩ
(ZB) R54	KS-20616,L1A, 1KΩ
(ZT) R56	KS-20616,L1A, 5.11KΩ
(ZV) R56	KS-20616,L1A, 18.7KΩ
(ZA) R57	KS-20616,L1A, 383KΩ
R58	KS-20616,L1A, 14.7KΩ
(ZP) R59	KS-20616,L1A, 1KΩ

TRANSISTORS

DESIG	CODE
Q1,Q2	61E
(ZA) Q3,Q4	61E
Q5,Q6	51F
(ZH) Q9	51F
(ZB) Q10,Q11	61E
(ZA) Q7,Q8	51F

VARISTORS

DESIG	CODE
RV1,RV2	100J

INPUT/OUTPUT INFORMATION

THE TRACK SELECT INPUTS AND ALL OUTPUTS ARE TTL COMPATIBLE, WHERE A LOGIC 1 IS DEFINED TO BE LESS THAN 0.4 VDC AND A LOGIC ZERO IS GREATER THAN 2.4 VDC. THE HEAD INPUT IS A LOW LEVEL ANALOG SIGNAL.

CIRCUIT DESCRIPTION

THIS CP IS INTENDED FOR USE IN THE KS-21447 MINI-RECORDER. THE CP READS INFORMATION OFF TAPE, DECODING IT INTO DIGITAL DATA. IT IS INTENDED ONLY FOR READING THE 1600 bpi, (3200 (rpi) PHASE ENCODED, FORMAT FROM A TAPE RUNNING AT 30 INCHES PER SECOND, EITHER FORWARD OR REVERSE.

THE CIRCUIT SELECTS 1 OUT OF 4 TRACKS, BASED ON THE STATE OF THE INPUTS RA0 AND RA1. DATA IS DETECTED (DATA DETECT OUTPUT GOES LOW), ONLY WHEN AT LEAST 8 NEGATIVE TRANSITIONS ARE DETECTED IN LESS THAN 200 USEC. WHEN STARTING TO READ A BLOCK OF DATA, THE FIRST SEVEN CHARACTERS ARE STRIPPED FROM THE OUTPUT STREAM. DATA DETECT GOES FALSE WHEN NO TRANSITIONS ARE DETECTED FOR A PERIOD OF 200 USEC. WHEN DATA DETECT IS HIGH, THE READ DATA AND READ DATA CLOCK OUTPUTS ARE HELD HIGH. WHEN DATA DETECT IS LOW, THE READ DATA LINE MAY BE READ ON EACH POSITIVE TRANSITION OF THE READ DATA CLOCK LINE. THIS CLOCK IS A NORMALLY HIGH NEGATIVE GOING PULSE OF APPROXIMATELY 1 USEC IN DURATION. THE SEL1 INPUT WILL DISABLE ALL THREE (DATA DETECT, READ DATA AND READ DATA CLOCK) OUTPUTS (FORCE THEM HIGH) WHEN HELD LOW.

NOTES: (CONT)

14.

HIGHEST CAP AND RES USED ON THIS CPS	
C40	R59
NOT USED	
C6	R5,R6,R12
	R16,R20, R24
	R29,R42

15.

RECORD OF CHANGES (CONT FROM J4C)					
DWG ISS'E	PREV FURN	STAND	A&M ONLY	MFR DISC	SEE NOTE
7A1(C)	B	A	B		10,18
881	ZN	ZO		ZN	
	NONE	ZP			
	ZF,ZG	ZG,ZQ		ZF	
	ZR	ZS		ZR	
	ZT	ZV		ZT	

16. FEATURE OPTION DEFINITIONS

OPTION DESIG	FEATURE DESCRIPTION	COMPONENTS AFFECTED
ZA	CHANGES TWO TRACK CIRCUIT TO FOUR TRACK OPERATION.	ADDS: Q3,Q4,Q7 Q8,C35, C36,R17. 18,R19, R21,R22,R23,R52, & R53.
ZB	PROVIDES CAPABILITY TO HAVE DIFFERENT THRESHOLDS DURING READING AND WRITING	ADDS: Q9,Q10,Q11,C37, R43,R44,R45,R46, R47 & R54.
ZC	PROVIDES CAPABILITY TO ADJUST THRESHOLD FOR CERTIFIER CONFIGURATION	ADDS: R48 POTENTIO-METER (OMIT R35 & R40)
ZD,ZE, ZF,ZG ZQ	PROVIDES FIXED THRESHOLD	ZD ADDS R35 = 953Ω ZE ADDS R35 = 866Ω ZF ADDS R40 = 61.9Ω ZG ADDS R40 = 215Ω ZQ ADDS R40 = 51.1Ω (OMIT R48)
ZH,ZI	PROVIDES FIXED FEEDBACK RESISTORS.	ZH ADDS R36 = 8.66KΩ ZI ADDS R36 = 11.5KΩ
ZJ	PROVIDES OPEN COLLECTOR OUTPUTS.	ADDS IC14
ZK	PROVIDES POSITIVE OFFSET VOLTAGE.	ADDS R57
ZL,ZM	PROVIDES NEGATIVE OFFSET VOLTAGE	ZL ADDS R37 = 44.2KΩ ZM ADDS R37 = 56.2KΩ

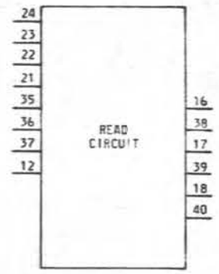
17. IF THE HEAD OUTPUT IS HIGH THE CONNECTION TO R4.1 MAY BE CUT TO REDUCE AMPLIFIER GAIN. THIS IS DETERMINED AT TIME OF MANUFACTURE.

NOTES ARE CONTINUED ON SHEET J4G.

MANUFACTURING REFERENCES

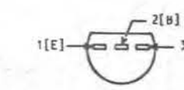
CATEGORY	NO.
CIRCUIT PACK CODE	L-510103
CONNECTOR ON FRAME	908L

SYMBOL

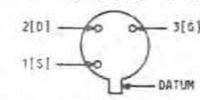


NOTES: (CONT): FROM SH J4C

11. THE TERMINAL ASSIGNMENT OF THE 51F TRANSISTOR IS:



12. THE TERMINAL ASSIGNMENT OF THE 61E TRANSISTOR IS:



13. SEE RECORD OF CHANGES TABLE (NOTE 15) FOR MFR. DISC OPTIONS

CP DESIG	PART NO.	PROVIDE OPTIONS	TYPE OF READ CIRCUIT
CP4-1	L510103-1	ZD,ZF,ZH, ZK,ZQ	TWO TRACK SYSTEM WITH TOTEM POLE OUTPUTS.
CP4-2	L510103-2	ZA,ZD,ZF, ZH,ZJ,ZK, ZQ	FOUR TRACK SYSTEM WITH OPEN COLLECTOR AND TOTEM POLE OUTPUTS.
CP4-3	L510103-3	ZA,ZC,ZH, ZJ,LL	CERTIFIER CONFIGURATION WITH OPEN COLLECTOR AND TOTEM POLE OUTPUTS. FOUR TRACK SYSTEM.
CP4-4	L510103-4	ZA,ZB,ZE, ZG,ZI,ZJ, ZM	FOUR TRACK SYSTEM WITH DIFFERENT THRESHOLDS DURING READING AND WRITING. OPEN COLLECTOR AND TOTEM POLE OUTPUTS.

KS-21447 MINI-RECORDER CIRCUIT

DWG SIZE 6S | ISSUE 881

BELL LABORATORIES | SD-97736-01- | -J4F

@PART OF CPS4-1 THRU CPS4-4

READ CIRCUIT
SEE NOTES 9,10,15 & 18

NOTES: (CONT) FROM SH J4F

18. THE "A" OPTION ENCOMPASES ALL CIRCUITRY COMPONENTS AND FEATURE OPTIONS SHOWN ON SHEETS J4D, J4E, J4F. DUE TO NUMEROUS CHANGES THE READ CIRCUIT WAS REDRAWN FOR CLARITY WITHOUT SHOWING CHANGES AS OPTIONS. PREVIOUS CIRCUIT COMPONENT VALUES, OPTIONS, ETC., HAVE BEEN RETAINED ON SHEETS J4A, J4B, J4C.

19. POTENTIOMETERS R38 AND R55 ARE INITIALLY SET AT TIME OF MANUFACTURE AND SHALL NOT BE READJUSTED IN THE FIELD.

20. KS-19646,L3A MAY BE SUBSTITUTED FOR KS-19646,L3.

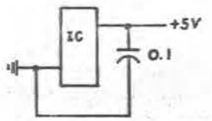
21. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS,
CAPACITANCE VALUES ARE IN MICROFARADS,
VALUES PRECEDED BY THE SYMBOL + (PLUS)
OR - (MINUS) ARE IN VOLTS.

22. ⏚ GROUND RETURN.

23. BATTERY AND GROUND TERMINATIONS FOR ICS:

IC	+5V BAT. TERM.	GRD TERM.
IC1,IC2	16	7,8
IC3	14	7
IC4	16	7,8
IC5,IC6	16	8
IC7	16	7,8
IC8	16	8
IC9	16	7,8
IC10	16	7,8
IC11	13	11
IC12-IC14	16	8

24. ALLOW BYPASS CAPACITORS FROM +5V TO GRD FOR IC1-IC7, IC10, IC12 AT AT IC.



KS-21447 MINI-RECORDER CIRCUIT

DWG SIZE 6S

ISSUE 7A1(C)

BELL LABORATORIES SD-97736-01 -J4G

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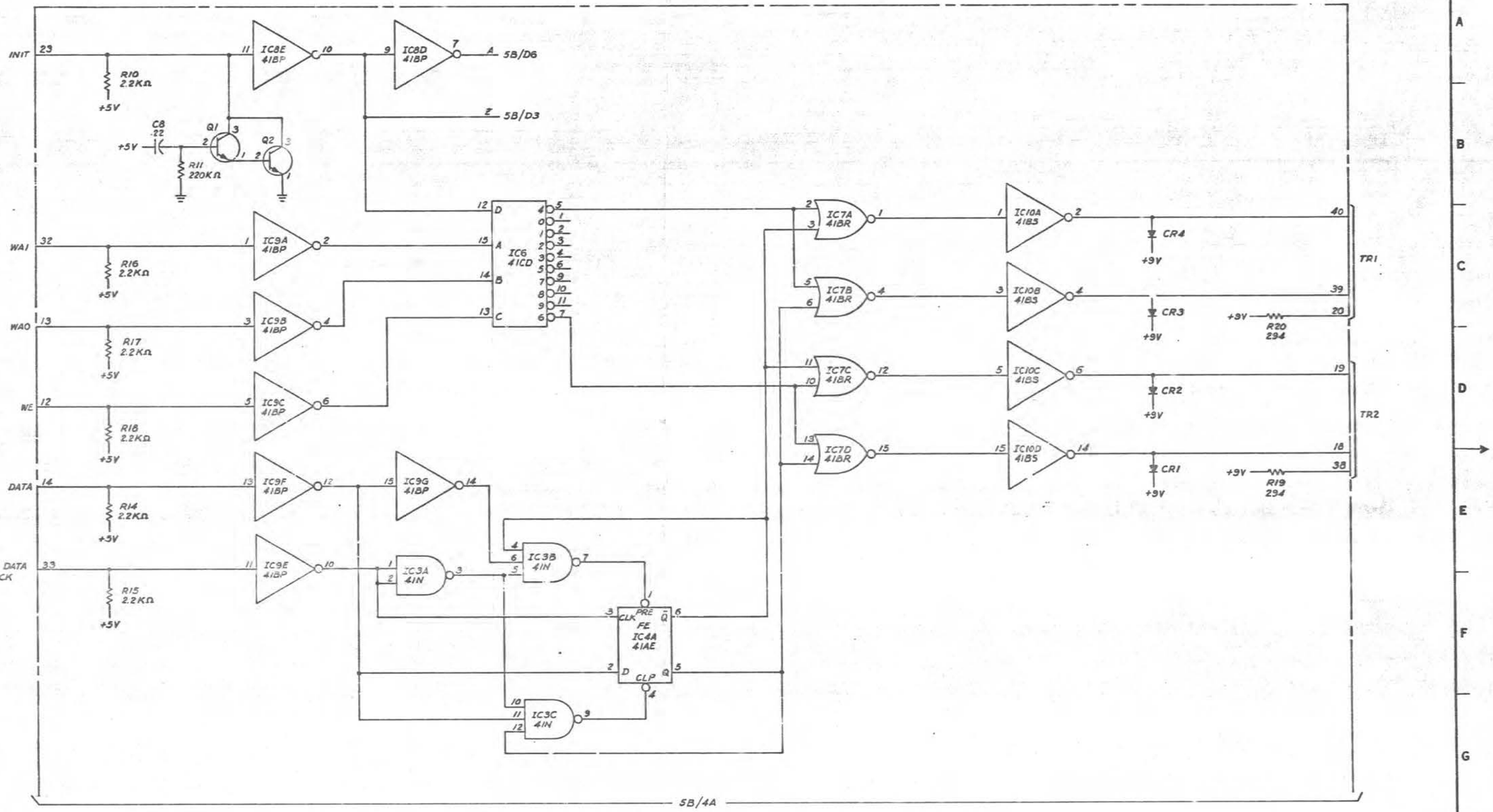
PART OF CPS5

LOGIC AND WRITE CIRCUIT



PART OF CPS5

ISSUE 3B

K5-21447 MINI-RECORDER CIRCUIT	SD-97736-01-J5A
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S

SD-97736-01-J5A

PART OF CPS5

LOGIC AND WRITE CIRCUIT

5A/4G

TACH BK

R21 68KΩ

R1 100KΩ / 33KΩ

-9V +9V

IC1 502A

R2 33KΩ

R3 6.8MΩ

CR6

R6 68KΩ

R4 1KΩ

R5 1KΩ

IC8A 41BP

TAPE MOTION

REV

IC8C 41BP

R9 2.2KΩ

+5V

R7 2.2KΩ

FF IC2A 41AE

IC5C 41N

REVB

BOTM

IC8F 41BP

R12 2.2KΩ

IC5A 41N

IC9 41BP

BOT

IC11D

5A/B3

IC11C

5A/A3

EOTM

IC8G 41BP

R13 2.2KΩ

IC5D 41N

FF IC2B 41AE

IC3D 41N

EOT

FOR

IC8B 41BP

R8 2.2KΩ

IC5B 41N

FORB

C2 40 / 20

C1 40

C3 .1

C4 .1

C6 .1

+5V +9V -9V GRD

PART OF CPS5

ISSUE 3B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J5B

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

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SD-97736-01-J5B

PART OF CPS5

LOGIC & WRITE CIRCUIT

COMPONENT LIST

CAPACITOR

DESIG	CODE
C1, C2	602A,40
	(X) 602A, 40
	(W) 602C, 20
C3,C4	KS-19774,L14, .1
C6	KS-19774,L14, .1
C8	KS-19774,L14, .22 (SEE NOTE 8)

INTEGRATED CIRCUITS

DESIG	CODE
IC1	502A
IC2A,B	41AE
IC3A,B,C,D	41N
IC4A	41AE
IC5A,B,C,D	41N
IC6	41CD
IC7A,B,C,D	41BR
IC8A,B,C,D,E,F,G	41BP
IC9A,B,C,D,E,F,G	41BP
IC10A,B,C,D	41BS
IC11C,D	41BR

DIODE

DESIG	CODE
[4]CR1-CR4	458A
CR5 CR6	458C

RESISTOR

DESIG	CODE
R1	(Z) KS-16645,L1,100KΩ
	(Y) KS-16645,L1,33KΩ
R2	KS-16645,L1,33KΩ
R3	KS-16645,L1,6.8MΩ
R4,R5	KS-16645,L1,1KΩ
R6	KS-16645,L1,68KΩ
[4]R7-R10	KS-16645,L1,2.2KΩ
R11	KS-16645,L1,220KΩ
[7]R12-R18	KS-16645,L1,2.2KΩ
R19,R20	KS-20810,L14,294
R21	KS-16645,L1 68KΩ

TRANSISTOR

DESIG	CODE
Q1,Q2	66S

INPUT/OUTPUT INFORMATION

THE T4CH(BK) INPUT IS THE OUTPUT OF THE DC TACHOMETER PROVIDING A VOLTAGE LEVEL PROPORTIONAL TO SPEED. ALL OTHER INPUTS ARE TTL COMPATIBLE WHERE A LOGIC ZERO IS DEFINED TO BE A VOLTAGE LEVEL GREATER THAN 2.4 VDC AND A LOGIC ONE IS LESS THAN 0.4 VDC.

THE OUTPUTS TO THE WRITE HEAD ARE FROM AN OPEN COLLECTOR, HIGH VOLTAGE TTL GATE. ALL OTHER OUTPUTS ARE TTL COMPATIBLE.

CIRCUIT DESCRIPTION

THE PURPOSE OF CP5 IS TO PROVIDE A VERY SIMPLIFIED MOTION CONTROL AND STATUS INDICATOR CIRCUIT COMBINED WITH A TWO-TRACK CLOCKED INPUT WRITE CIRCUIT. THE MOTION COMMANDS ARE AFFECTED BY THE STATUS OF EOT, BOT, AND THE INITIALIZE COMMAND AND THEN SENT TO CP2.

NOTES (CONT.):

6.

HIGHEST CAP AND RES USED ON THIS CPS	
C8	R20
NOT USED	
C5,C7	

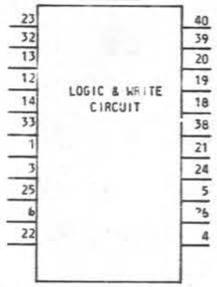
MANUFACTURING REFERENCE

CATEGORY	NO.
CIRCUIT PACK CODE	L-510101
CONNECTOR ON FRAME	908L

7. RECORD OF CHANGES

DWG ISSUE	PREV FURN	STAND	A&M ONLY	MFR DISC	SEF NOTE
3B	Z	Y	Z		
7AI(C)					8
8B*	X	W		X	

SYMBOL



8. KS-19774,L14, 0.22UF CAPACITORS MAY NOT BE PURCHASED FROM SAN FERNANDO ELECTRONICS DUE TO HIGH LEAKAGE CURRENT.

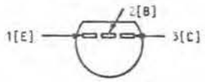
NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, VALUES PRECEDED BY THE SYMBOL +(PLUS) OR -(MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.
3. BATTERY AND GROUND TERMINATIONS FOR ICS:

IC	+5V BAT TERM	GRD TERM
IC2	16	7,8
IC3	16	8
IC4	16	7,8
IC5,IC6	16	8
IC7-IC10	16	7,8

4. ALLOW BYPASS CAPACITORS FROM +5V TO GRD FOR IC2,3,7,8 AND IC9.

5. THE TERMINAL ASSIGNMENT OF THE 66S TRANSISTOR IS:



PART OF CPS5

ISSUE 8B1

KS-21447 MINI-RECORDER CIRCUIT

SD-97736-01-J5C

BELL TELEPHONE LABORATORIES INCORPORATED

CHG SIZE 6S

SD-97736-01-J5C