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
SHEET INDEX SUPPORTING INFORMATION	A1	1	2	3	4																
LEAD INDEX OPTION INDEX	A2	1	1	1	1																
FS 1 AMPLIFIER, BAND SEPARATION AND LIMITER CIRCUIT	B1	1	2	2	2																
FS 2 FREQUENCY RECOGNITION AND TRANSLATION CIRCUIT	B2	1	1	1	4																
APP FIG. 1	C1	1	2	3	4																
APP FIG. 2	C2	1	2	2	4																
CIRCUIT NOTES INFORMATION NOTES 301-304	D1	1	1	1	1																
INFORMATION NOTES 305 & 306	D2	1	1	1	1																
CIRCUIT REQUIREMENTS	F1	1	1	1	1																

DWG ISSUE	CD ISSUE	DATE ISSUE	DRAWN	APPD
1	1	5-24-72	CDI DR	MS RCC GCB
2D	1 APP 1D	11-17-72	DR -	MS RCC GCB
3B	1 APP 2B	7-15-76	RT JS	GCB OFG JS
4D	1 APP 3D	7-13-77	WWM WWM	MS EGS WWM

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.

ISSUE 4

SD-69906-01 1K03

STATION SYSTEMS

KEY TELEPHONE SYSTEM NO. 1A2
TOUCH-TONE ADAPTER CIRCUIT

TYPE D4

AT&TCO STANDARD

SD-69906-01-A1
9 SHEETS

BELL TELEPHONE LABORATORIES INCORPORATED
DWG SIZE 3S
PRINTED IN U.S.A.

E-74844-2 (7-68)

HNDBK DWG

LEAD INDEX

DESIG	LOCATION	
	FS	CAD
DIAL SELECTIVE INTERCOMMUNICATING LINE CKT		
-24(A)	1E2,2G8	
CG	2A8	
HFT	1C8,2H2	
LFT	1A8,2H3	
PP	2E8	
R	1B2,2H3	
RH	2C8	
RS1	2B8	
T	1C2,2H4	
TTG	1E2,2G8	
XY	2D8	
Y1	2F8	
Y2	2F8	
Y3	2F8	
Y4	2D8	
Y5	2E8	

OPTION INDEX

APP OR WRG	LOCATION

DRAWING ISSUE

ISSUE

TOUCH-TONE ADAPTER CIRCUIT

SD-69906-01-A2

BELL TELEPHONE LABORATORIES INCORPORATED

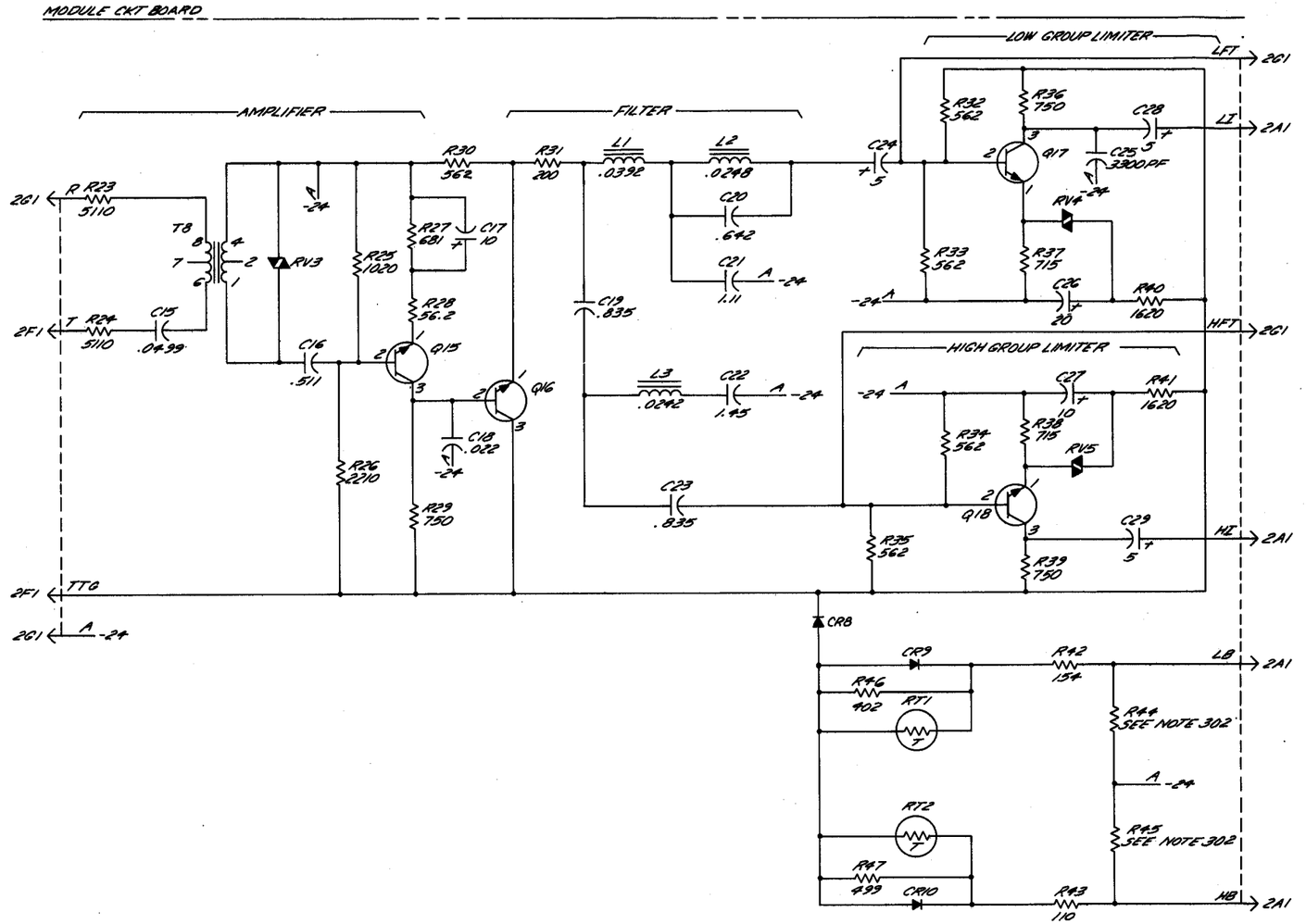
DWG SIZE 3S

PRINTED IN U.S.A.

FS 1

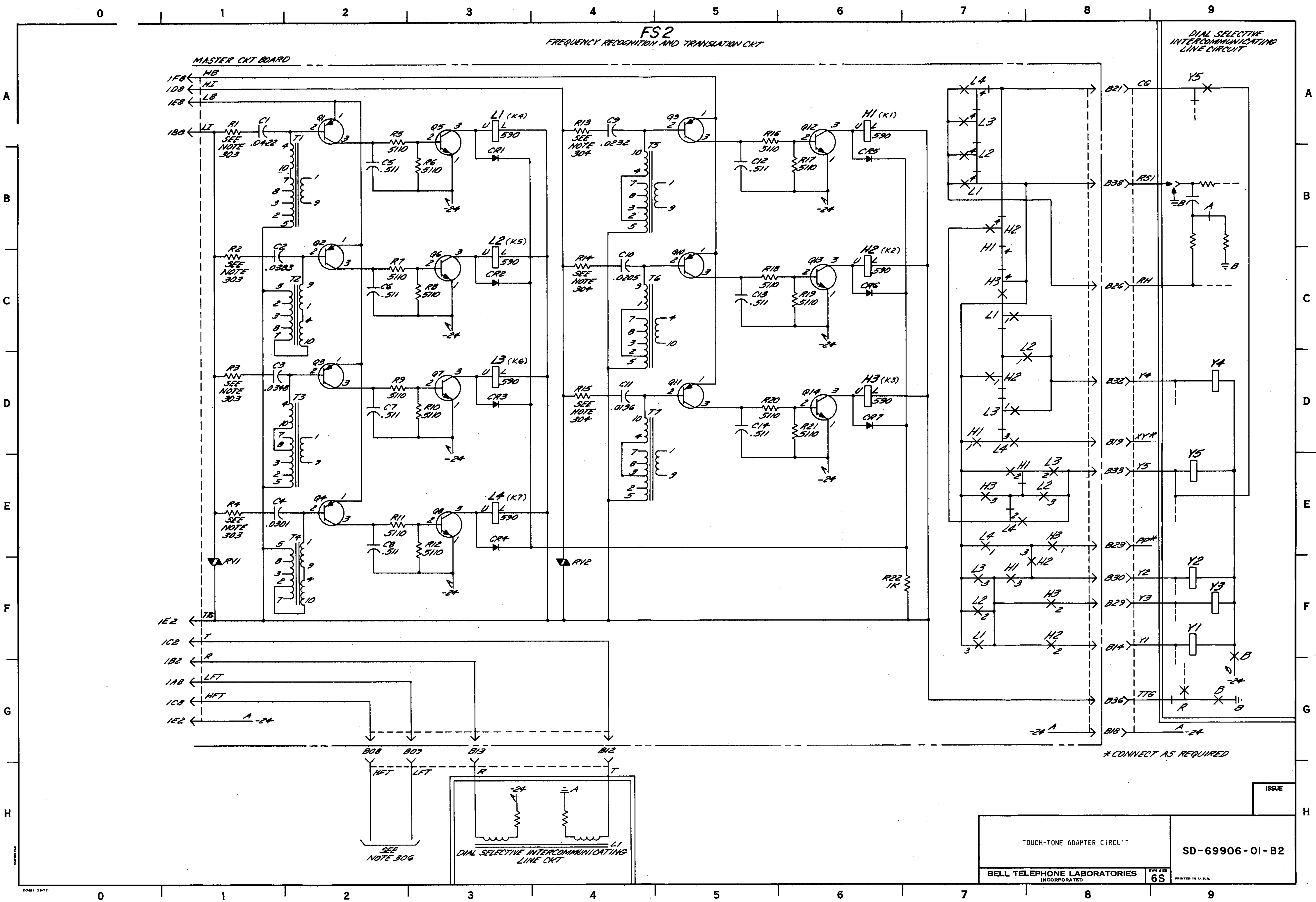
AMPLIFIER, BAND SEPARATION, & LIMITER CKT

MODULE CKT BOARD



ISSUE	
TOUCH-TONE ADAPTER CIRCUIT	SD-69906-01-BI
BELL TELEPHONE LABORATORIES INCORPORATED	DWG SIZE 6S

PRINTED IN U.S.A.


FS2
FREQUENCY RECOGNITION AND TRANSLATION CKT
MASTER CKT BOARD
DIAL SELECTIVE INTERCOMMUNICATING LINE CIRCUIT
*CONNECT AS REQUIRED
SEE NOTE 306
DIAL SELECTIVE INTERCOMMUNICATING LINE CKT
ISSUE
TOUCH-TONE ADAPTER CIRCUIT
SD-69906-01-B2
BELL TELEPHONE LABORATORIES INCORPORATED
DWG SIZE 6S
PRINTED IN U.S.A.

APP. FIG. 1

MODULE CKT BOARD
440A KTU

DRAWING ISSUE

CAPACITOR

DESIG	LOC	CODE
C15	1C2	570GP
C16	1C3	~~575B~~ 702C, 0.511UF
C17	1B4	601B
C18	1D4	KS-19066 L1, KS-20977 L4 OR KS-19774 L16, .022
C19	1C4	535GS
C20	1B5	535GR
C21	1C5	535GT
C22	1C5	535CJ
C23	1D5	535GS
C24	1B6	601A
C25	1B7	KS-19066 L1, KS-20977 L4 OR KS-19774 L16, 3300 PF
C26	1C7	602C
C27	1C7	601B
C28	1B7	601A
C29	1D7	601A

DIODE

DESIG	LOC	CODE
CR8	1F5	446B OR 808B
CR9	1E6	449A
CR10	1F6	449A

INDUCTOR

DESIG	LOC	CODE
L1	1B4	1592C, .0392
L2	1B5	1592C, .0248
L3	1C5	1592C, .0242

RESISTOR

DESIG	LOC	CODE
R23	1B2	KS-20810 L1A, 5110
R24	1C2	KS-20810 L1A, 5110
R25	1C3	KS-20810 L1A, 1020
R26	1D3	KS-20810 L1A, 2210
R27	1B3	KS-20810 L1A, 681
R28	1C3	KS-20810 L1A, 56.2
R29	1D3	KS-20810 L1A, 750
R30	1B4	~~KS-13491 L1, 560,~~ KS-20289 L6C, 562
R31	1B4	KS-20810 L1A, 200
R32	1B6	KS-20810 L1A, 562
R33	1C6	KS-20810 L1A, 562
R34	1D6	KS-20810 L1A, 562
R35	1D6	KS-20810 L1A, 562
R36	1A7	KS-20810 L1A, 750
R37	1C7	KS-20810 L1A, 715
R38	1D7	KS-20810 L1A, 715
R39	1D7	KS-20810 L1A, 750
R40	1C7	KS-20810 L1A, 1620
R41	1C7	KS-20810 L1A, 1620
R42	1E7	KS-20810 L1A, 154

RESISTOR (CONT)

DESIG	LOC	CODE
R43	1F7	KS-20810 L1A, 110
R44	1E7	SEE NOTE 302
R45	1F7	SEE NOTE 302
R46	1E6	KS-20810 L1A, 402
R47	1F6	KS-20810 L1A, 499

THERMISTOR

DESIG	LOC	CODE
RT1	1F6	17A
RT2	1F6	17A

TRANSFORMER

DESIG	LOC	CODE
T5	2B4	2597A
T8	1B2	2564W

TRANSISTOR

DESIG	LOC	CODE
Q15	1C4	66F
Q16	1C4	66F
Q17	1B6	66F
Q18	1D6	66F

VARISTOR

DESIG	LOC	CODE
RV3	1B3	100A
RV4	1B7	100D
RV5	1B7	100D

ISSUE

TOUCH-TONE ADAPTER CIRCUIT

SD-69906-01-C1

BELL TELEPHONE LABORATORIES
INCORPORATED

DWG SIZE 3S

PRINTED IN U.S.A.

E-74264-3 (7-68)

APP FIG. 2

RELAY — MASTER CKT BOARD

DESIG	H1(K1)		H2(K2)		H3(K3)				L1(K4)		L2(K5)		L3(K6)		L4(K7)				DESIG
CODE	MA9		MA9		MA9				MA9		MA9		MA9		MA9				CODE
OPTION																			OPTION
X	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	X
6																			6
5																			5
4	EMB	2C7	EMB	2B7	EMB	2C7			EMB	2B7	EMB	2B7	EMB	2A7	EMB	2A7			4
3	EBM	2F7	EBM	2F8	EBM	2E7			EBM		EBM	2E8	EBM	2F7	EBM	2E7			3
2	EBM	2E7	EBM	2F8	EBM	2F8			EBM	2F7	EBM	2F7	EBM	2E8	EBM	2E7			2
1	EBM	2E7	EBM	2D7	EBM	2F8			EBM	2C7	EBM	2D7	EBM	2D7	EBM	2E7			1
COIL	X	2A6	X	2C6	X	2D6	X		X	2A3	X	2C3	X	2D3	X	2E3	X		COIL

FIELD ADJUSTMENT OF RELAY CONTACTS IS NOT RECOMMENDED.

CAPACITOR

DESIG	LOC	CODE
C1	2A1	570GS
C2	2C1	570GW
C3	2D1	570LE
C4	2E1	570HF
C5	2B2	~~575B~~ 702C,0.511
C6	2C2	
C7	2D2	
C8	2E2	
C9	2A4	570PF,KS-20676 L7 OR 577A,0.0232
C10	2C4	570KR,KS-20676 L7 OR 577A,0.0205
C11	2D4	570HM
C12	2B5	~~575B~~ 702C,0.511
C13	2C5	
C14	2D5	

DIODE

DESIG	LOC	CODE
CR1	2B3	400J
CR2	2C3	
CR3	2D3	
CR4	2E3	
CR5	2B6	
CR6	2C6	
CR7	2D6	

RESISTOR

DESIG	LOC	CODE
R1	2A1	KS-20810 L1A SEE NOTE 303
R2	2C1	
R3	2D1	
R4	2E1	
R5	2B2	KS-20810 L1A 5110
R6	2B3	
R7	2C2	
R8	2C3	
R9	2D2	
R10	2D3	
R11	2E2	
R12	2E3	
R13	2A4	KS-20810 L1A SEE NOTE 304
R14	2C4	
R15	2D4	
R16	2B5	
R17	2B6	KS-20810 L1A 5110
R18	2C5	
R19	2C6	
R20	2D5	
R21	2D6	
R22	2F6	KS-20810 L1A, 1K

TRANSFORMER

DESIG	LOC	CODE
T1	2B2	2597A
T2	2C2	
T3	2D2	
T4	2E2	
T6	2C4	
T7	2D4	

TRANSISTOR

DESIG	LOC	CODE
Q1	2A2	12G
Q2	2C2	
Q3	2D2	
Q4	2E2	
Q5	2A3	66G
Q6	2C3	
Q7	2D3	
Q8	2E3	
Q9	2A5	12G
Q10	2C5	
Q11	2D5	
Q12	2A6	66G
Q13	2C6	
Q14	2D6	

VARISTOR

DESIG	LOC	CODE
RV1	2F1	100D
RV2	2F4	100D

DRAWING ISSUE

ISSUE

TOUCH-TONE ADAPTER CIRCUIT

SD-69906-01-C2

BELL TELEPHONE LABORATORIES INCORPORATED — DWG SIZE 3S — PRINTED IN U.S.A.

E-74264-3 (7-68)

CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE PER
A		-24V TALK	FUSE PROVIDED ON ASSOC KSU OR PANEL CIRCUIT

BATTERY SYMBOL	VOLTAGE RANGE
-24A	18-26

102.

FEATURE OR OPTION	PROVIDE		
	APP FIG.	APP OR WRG	QUANTITY
"TOUCH-TONE" ADAPTER CIRCUIT	1,2		1 PER SYS

103.

RECORD OF APP FIGURES, WIRING AND APPARATUS CHANGES							
CHANGED ON ISS	IF JOB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT			
				STD	A&M	MD	

INFORMATION NOTES:

301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS,
K IS FOR KILOHMS,
CAPACITANCE VALUES ARE IN MICROFARADS,
INDUCTANCE VALUES ARE IN HENRIES,
VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.

302. THE VALUES OF RESISTORS R44 AND R45 SHOULD BE SELECTED FROM THE FOLLOWING LIST TO PROVIDE REQUIRED BIAS:

DIODE VOLTAGE CR8	RESISTANCE VALUE R44	R45
5.8V TO 6.0V	3120	4020
6.0V TO 6.3V	3650	4810
6.3V TO 6.6V	4480	6420

303. TO PROVIDE THE REQUIRED CHANNEL CIRCUIT BANDWIDTH, THE VALUES OF RESISTORS R1-R4 SHOULD BE SELECTED FROM THE FOLLOWING LIST:

14.7, 31.6, 48.7, 64.9, 80.6, 95.3, 110, 124, 140, 156, 172, 187, 203, 218, 234.

304. TO PROVIDE THE REQUIRED CHANNEL CIRCUIT BANDWIDTH, THE VALUES OF RESISTORS R13-R15 SHOULD BE SELECTED FROM THE FOLLOWING LIST:

80.6, 95.3, 110, 124, 140, 156, 172, 187, 203, 218, 234, 249, 267, 284, 301, 316, 332, 348.

DRAWING ISSUE

ISSUE

TOUCH-TONE ADAPTER CIRCUIT

SD-69906-01-D1

BELL TELEPHONE LABORATORIES INCORPORATED

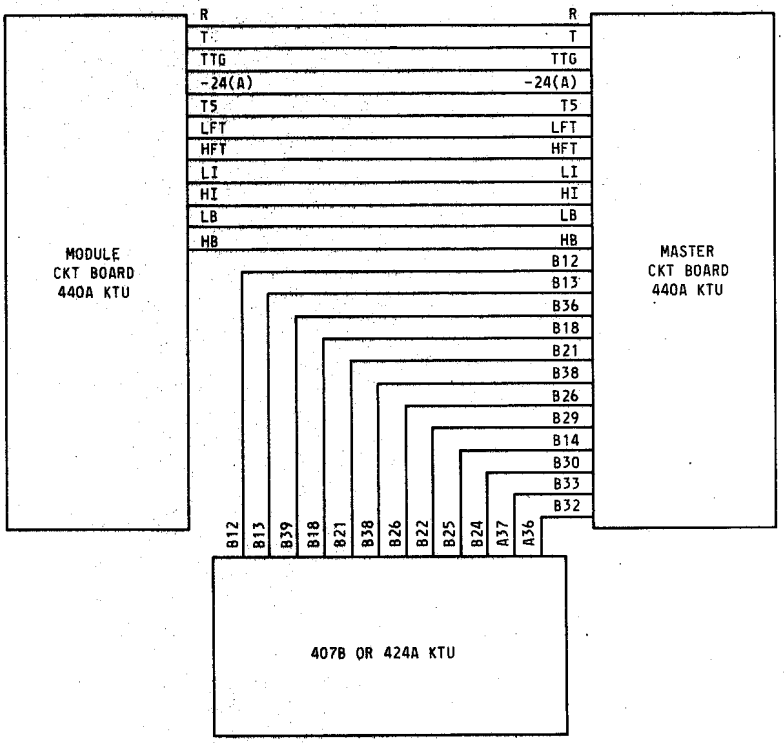
DWG SIZE 3S

PRINTED IN U.S.A.

E-74264-3 17-091

INFORMATION NOTES: (CONT)

305. TOUCH-TONE ADAPTER CIRCUIT, TYPE D4.



306. TEST POINTS USED IN MANUFACTURING TESTS.

DRAWING ISSUE

ISSUE

TOUCH-TONE ADAPTER CIRCUIT

SD-69906-01-D2

BELL TELEPHONE LABORATORIES
INCORPORATED

DWG SIZE 3S

PRINTED IN U.S.A.

SD-69906-01

CIRCUIT REQUIREMENTS

TOUCH-TONE ADAPTER CIRCUIT

DRAWING ISSUE

APPARATUS					MECH REQT			CIRCUIT PREPARATION			TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT					REMARKS
DESIG	CODE	OPT.	FIG.		BSP FIG.	CONT PRES	ARM. TRVL	BLOCK OR INSULATE	TEST CLIP DATA				TEST WDG	TEST FOR	AFTER SOAK	TEST	READJ	
									CONN BAT.	CONN GRD					MA	MA	MA	
RELAYS																		
	440A KTU																	
H1	MA9	2,3			101				U	L	B/G	1		0		22.5		
H2	MA9	2,3			101				U	L	B/G	1		0		22.5		
H3	MA9	2,3			101				U	L	B/G	1		0		22.5		
L1	MA9	2,3			101				U	L	B/G	1		0		22.5		
L2	MA9	2,3			101				U	L	B/G	1		0		22.5		
L3	MA9	2,3			101				U	L	B/G	1		0		22.5		
L4	MA9	2,3			101				U	L	B/G	1		0		22.5		

TEST NOTES:

1. THE CURRENT FLOW INFORMATION APPLIES ONLY WHEN THE RELAY TO BE TESTED IS REMOVED FROM THE PRINTED CIRCUIT BOARD.

ISSUE

TOUCH-TONE ADAPTER CIRCUIT

SD-69906-01-F1

BELL TELEPHONE LABORATORIES INCORPORATED

PRINTED IN U.S.A.

E-7433 (3-63)