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																					
FS1	B1	1	2	2	2																					
	B2	1	2	2	2																					
	B3	1	2	2	4																					
	B4	1	2	2	2																					
APP FIG 1	C1	1	2	2	2																					
CIRCUIT NOTES EQUIPMENT NOTES	D1	1	2	2	4																					
EQUIPMENT NOTES (CONT)	D2	1	2	2	4																					
	D3	1	2	2	2																					
INFORMATION NOTES	D4	1	2	2	2																					
	D5	1	1	1	1																					
	D6	1	2	2	2																					
	D7	1	1	1	1																					
	D8	1	1	3	3																					
	D9	1	1	3	3																					
	D10	1	1	3	3																					
	D11	1	1	3	3																					
	D12	1	1	1	1																					
	D13	1	1	1	1																					
	D14	1	1	3	3																					
	D15	1	1	3	3																					
	D16	1	2	2	2																					
	D17	1	2	2	2																					
	D18	1	1	3	3																					
	D19	1	1	1	1																					
CAD 1 - CAD 3	G1	1	2	2	4																					
CAD 4 - CAD 6	G2	1	2	2	2																					
CAD 7 - CAD 10	G3	1	2	2	2																					

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
CPS 5 MF RECEIVER AND TEST TONE GENERATORS	J1A	1	1	1	1																					
	J1B	1	1	1	1																					
	J1C	1	1	1	1																					
	J1D	1	1	1	1																					
	J1E	1	1	1	1																					
	J1F	1	1	1	1																					
	J1G	1	2	2	2																					
	J1H	1	1	1	1																					
CPS 6 TUT TRANSMIT/RECEIVE AND WIDEBAND FILTERS	J2A	1	1	1	1																					
	J2B	1	1	1	1																					
	J2C	1	1	1	1																					
	J2D	1	1	1	1																					
	J2E	1	2	2	2																					
	J2F	1	1	1	1																					
CPS 7 LOSS AND NOISE MEASUREMENT	J3A	1	1	1	1																					
	J3B	1	1	1	1																					
	J3C	1	1	1	1																					
	J3D	1	1	1	1																					
	J3E	1	1	1	1																					
	J3F	1	2	2	2																					
	J3G	1	1	1	1																					
CPS 12 DATA PORT AND TONE DETECTORS	J4A	1	1	1	1																					
	J4B	1	1	1	1																					
	J4C	1	1	1	1																					
	J4D		2	2	2																					
	J4E	1	2	2	2																					
	J4F	1	2	2	2																					
	J4G		2	2	2																					
CPS 14 32K, 8-BIT WORD CONTROL STORE	J5A	1	2	3	3																					
	J5B	1	2	3	4																					
	J5C	1	1	1	1																					
CPS 15 ROTL PORT	J6A	1	1	3	3																					
	J6B	1	2	3	3																					
	J6C	1	1	1	1																					
CPS 16 105 TEST LINE AND ROTL BUILDOUT	J7A	1	2	3	3																					
	J7B	1	1	3	3																					
	J7C	1	1	1	1																					
CPS 17 3ESS CHANNEL AND MF OSCILLATORS	J8A	1	2	3	3																					
	J8B	1	1	3	3																					
	J8C	1	1	3	3																					
	J8D	1	1	1	1																					
CPS 18 CENTRAL PROCESSING UNIT (CPU)	J9A	1	2	2	2																					
	J9B	1	2	2	2																					
	J9C	1	2	2	2																					
	J9D	1	2	2	2																					
	J9E	1	2	2	2																					
CPS 19 POWER INTERFACE	J10	1	2	2	2																					
CPS 20 PORT TEST ACCESS	J11	1	2	2	2																					
CPS 21 105 TEST LINE LOOP CIRCUIT	J12A	1	1	3	3																					
	J12B	1	1	1	1																					
	J12C	1	1	1	1																					
	J12D	1	1	3	3																					
	J12E	1	1	2	2																					
CMS3	K1	1	1	1	1																					

DWG ISSUE	CD ISSUE	DATE ISSUED	DESIGN	APPD
1	1	3-12-78	ZEM DN	WD EGJ MET
2A	2A	5-14-79	CRZ DN	WD EGJ GJS
3B	2A APP 1B	5-14-79	CRZ DN	WD EGJ GJS
4A	2A APP 2A	5-19-80	GDH DWG	SS KMF RTR

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	J-94055A-( )
EQUIPMENT DESIGN REQT	J-94055 (801-250-174)
DESCRIPTION AND OPERATION	233-135-110
TEST SPECIFICATION	X-79411
STORED PROGRAM INFORMATION	
SPC MINI-ROTL FOR NO. 3 ESS:	
DIAGNOSTIC PROGRAM	PR-350965
RUNNING PROGRAM	PR-350966

ISSUE 4A

1N20

COMMON SYSTEMS
TRANSMISSION MEASURING
MINI-ROTL CIRCUIT
FOR USE WITH
STORED PROGRAM CONTROL OFFICES

AT&TCO STANDARD

(2) SD-99392-01-A1
82 SHEETS

BELL TELEPHONE LABORATORIES INCORPORATED
SWITCHING SYSTEMS 6S

PRINTED IN U.S.A.

P/O FS 1

105 TEST LINE & ROTL BUILDOUT 14 CP16

PORT 7-0 … PORT 7-7 RELAYS CONT CKT

PORT 7 INPUT/OUTPUT LOGIC (PORT 7-0 … PORT 7-7)

105 TEST LINE 1 ACCESS CKT

105 TEST LINE 2 ACCESS CKT

TEST PORT SWITCHING AND BUILDOUT CKT

PORT TEST ACCESS 15 CP20

105 TEST LINE LOOP CKT 13 CP21

PORT 8 INPUT/OUTPUT LOGIC

RINGING AND LOOP CURRENT DETECTOR

RINGING AND LOOP CURRENT DETECTOR

TO NO. 3 ESS

HLD L1

105 TEST LINE

NO. 2 PORT

NO. 1 PORT

MINI-ROTL

SD-99392-01-B1

ISSUE 2A

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

P/O FS1

LOSS AND NOISE MEASUREMENT CKT 12 CP7

LOSS AND NOISE ANALOG DETECTOR
LOGARITHMIC CONVERTER
GUARD ONE SHOT
PORT 12 & PORT 13 INPUT/OUTPUT LOGIC
PORT 12
PORT 13
1 MHZ
MEASUREMENT COUNTER
DATA
TUT
DCIN
TEST
PORT 13
PORT 12
PØDBO
PØDB7
IOW
MEAS
GUARD
PIDBO
PIDB7
NT PATH
NO PATH
LL PATH
LO PATH
NO REF
LL REF
LO REF
DISCHG
CHG
RECYCL
CLK
COUNT ENABL
+5 +12 -12 +15 -15 GRD B

TUT TRANSMIT/RECEIVE & WIDEBAND FILTERS 11 CP6

TRANSMIT TONE CONTROL
PORT 2 & PORT 3 INPUT/OUTPUT LOGIC
RECEIVE BUFFER
WIDEBAND INPUT STAGE
RELAY CKT
6719 PAD
AMPL
2/8 PMD & I/O CKT
MWR J2
T,R J1
DATA
GUARD
SP2A
SP1A
GUARD AC
T TONE
IOW
PORT 2
PORT 3
MF TR
AGC TR
T TONE TR
TPT TR
GUARD TR
SP1 TR
SP2 TR
GDG TR
WBF CNTL
TUT
WBFIN
MF OUT
AGC OUT
TPT
TPT
TMT
SC
TTRT
TTRA
900
TP2
TP67
TMT
SC
DIAG EQ
+5 +12 -12 GRD B

ROTL PORT 10 CP15

ROTL
TUT
INPUT CIRCUIT
MONITOR
MONITOR CIRCUIT
ROTL TR
TXR/RCV CIRCUIT
PORT 4 INPUT/OUTPUT LOGIC
TRANSMIT TONE CONTROL SWITCHES
LT GENERATOR
TPT GEN
GUARD GEN
SPK
SPK GRD
SPK LSI
BIT 2 BAL
TXRTRR
EIAON
BIT 0
BIT 6
LT
TPT
GUARD AC
+5 +12 -12 GRD B

DATA PORT & TONE DETECTOR 08 CP12

WIDEBAND DETECTOR
1300 Hz DETECTOR
DATA PORT
PORT 5 INPUT/OUPUT LOGIC
CAR DET
RX DATA
SPIC
SPI
PIDBO
PIDB7
TX CAR
EIAON
DTR
TXE1A
SGRD
RXE1A
PROGRD
DCD
TO E1A DATA TERMINAL (J5)
R14 1K
WBF IN
ROTL
DIAG EQ
ROTL EQ
TEST
ECHO
+5 +12 -12 =

ISSUE 2A

MINI-ROTL

SD-99392-01-B2

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O FS 1

CENTRAL PROCESSING CKT OF CP18

PERIPHERAL PORTS DECODER

INTERRUPT LOGIC

÷10

÷2000

STATUS REGISTER

ADDRESS BUFFER

MICRO PROCESSOR CIRCUIT

BUS DRIVER/ RECEIVER

RAM (512 8-BIT WORDS)

32K, 8-BIT WORD CONTROL STORE OF CP14

WORD STORE

BUFFER

EPROM SELECT DECODER

3ESS CHANNEL & MF OSCILLATOR 07 CP17

PORT 11 INPUT/OUTPUT LOGIC

MULTI-FREQUENCY TONE GENERATOR

MESSAGE CHANNEL CLOCK

MESSAGE CHANNEL

MULTIFREQUENCY RECEIVER & TONE GENERATOR 09 CP5

INPUT SWITCH & AUTOMATIC GAIN CONTROL CIRCUIT

MF FILTER

THRESHOLD DETECTOR

PORT I INPUT/OUTPUT LOGIC

SELECTABLE TEST TONE GENERATOR

MINI-ROTL

SD-99392-01-B3

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

ISSUE 4A

PRINTED IN U.S.A.

P/O FS 1

POWER INTERFACE
18
CP19

PWR OFF
5 6
PWR OFF SI L KEY
7 8
PWR OFF SI L KEY
4 3
PWR OFF SI L KEY
1 2

-48 18,14 11,12 A
TO FUSE PANEL
-48 GRDA 19,20 17,18 GRDA

A 101,104,105
GRDA 22,23,24 (-48 RTN)
26,27,28 (START)
-48 GRDA 2,3,4 (IN RUSH CONTROL)
6-13 (FR GRD)

PS1
POWER SUPPLY
16
(208B)

OUTPUT
+15 102 +15
±15 RTN 1,21 GRD B
103,106 -15
-15
+5 RTN 211-214 GRD B
+5
19,20 39,40 +5

TO CIRCUIT PACKS

PS2
POWER SUPPLY
17
(208G)

A 101,104,105
-48 GRDA 2,3,4 (IN RUSH CONTROL)
6-13 (FR GRD)
GRDA 22,23,24 (-48 RTN)
26,27,28 (START)

OUTPUT
+12 19,20 39,40 +12
±12 RTN 1,21 GRD B
102 -12
-12
-5 RTN 211,214 GRD B GRDB
103,106 -5
-5

+15 R1 619 +15 DS1
+5 9 1 2

-15 R2 619 -15 DS2
-15 8 2 1

+12 R3 487 +12 DS3
+12 7 1 2

-12 R4 487 -12 DS4
-12 6 2 1

+5 R5 205 +5 DS5
+5 5 1 2

-5 R6 205 -5 DS6
-5 4 2 1

GRDB 1,2

ISSUE 2A

MINI-ROTL

SD-99392-01-B4

BELL TELEPHONE LABORATORIES INCORPORATED

6S

APP FIG. 1

CIRCUIT PACKS

EQPT LOC	9	11	12	8	4	10	14	7	5	18	15	13		
DESIG	CP5	CP6	CP7	CP12	CP14	CP15	CP16	CP17	CP18	CP19	CP20	CP21		
CODE	ED-35117-( )	ED-35118-( )	ED-35119-( )	ED-35131-( )	ED-2C559-( )	ED-2C551-( )	ED-2C552-( )	ED-2C553-( )	ED-35140-( )	ED-2C555-( )	ED-2C556-( )	ED-2C554-( )		
OPTION														
ELEM IDENT														
FS LOC	3E7	2E1	2A2	2E7	3F2	2A7	1A3	3A6	3A2	4A1	1B6	1D6		

CONNECTOR

FUNCT DESIG	REF DESIG	FS LOC	CODE
EIA	J5	1G0	KS-19087,L2
MSG CHAN	J6	1H0	KS-19087,L2

INDUCTOR

FUNC DESIG	REF DESIG	FS LOC	CODE
HLD	L1	1E0	274L

JACK

FUNC DESIG	REF DESIG	FS LOC	CODE
T,R	J1	1F0	238M
MWR	J2	1F0	238H

POWER UNIT

FUNC DESIG	EQUIP LOC	FS LOC	CODE
PS1	16	4B4	208B
PS2	17	4E4	208G

SPEAKER,LOUD

FUNC DESIG	REF DESIG	FS LOC	CODE
SPK	LS1	2A9	761A

MINI-ROTL		DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01		-C1

CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE PER
A	2 AMP	-48	MINI-ROTL CKT

BATTERY SYMBOL: -48V TALK

VOLTAGE RANGE: -44 TO -52

CURRENT DRAIN: 0.90 AMPS

102.

FEATURE OR OPTION	PROVIDE		
	APP FIG.	APP OR WRG	QUANTITY
SPC MINI-ROTL	1		1 PER CKT

CIRCUIT NOTES: (CONT)

103.

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

MINI-ROTL

DWG SIZE 6S

ISSUE 4A

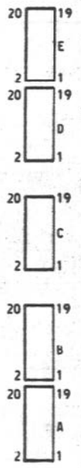
BELL LABORATORIES | SD-99392-01- | D1

EQUIPMENT NOTES:

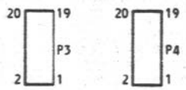
201. UNLESS OTHERWISE SPECIFIED, ALL WIRING SHALL BE AS FOLLOWS:

BATTERY AND GRD WIRING, KS-19194,L1, 20 GAUGE SOLID.
MISCELLANEOUS WIRING, TYPE 26BT SOLID.

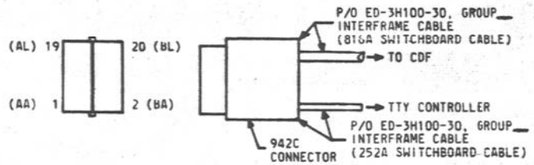
202. TYPICAL 1B-TYPE CONTACT PIN FIELD CONFIGURATION FOR A GROUP OF FIVE 9638-20 CONNECTORS AS VIEWED FROM THE WIRING SIDE OF THE 842186447 BACKPLANE ASSEMBLY.



203. (A) P3 AND P4 PIN FIELD CONFIGURATIONS (1D-TYPE CONTACT) AS VIEWED FROM THE WIRING SIDE OF THE BACKPLANE.



(B) PART OF ED-3H100-30, GROUP__ INTERFRAME CABLE SHOWING THE TWO SWITCHBOARD CABLES AND THE 942C CONNECTOR CONFIGURATION FOR INTERFACING WITH THE P4 PIN FIELD ON THE BACKPLANE OF THE SPC MINI-ROTL UNIT (SEE NOTE 204).



204. THE SPC MINI-ROTL UNIT IS MOUNTED ON A MISCELLANEOUS-TYPE FRAME IN THE NO.3 ESS OFFICE. THIS UNIT INTERFACES DIRECTLY WITH BOTH THE COMBINED DISTRIBUTING FRAME (CDF) AND THE NO.3 ESS TTY CONTROLLER (MAINTENANCE FRAME). THE INTERFACE WIRING REQUIRES THE ED-3H100-30, GROUP__ INTERFRAME CABLE. THIS INTERFRAME CABLE IS NOT INCLUDED AS PART OF THE SPC MINI-ROTL UNIT AND MUST BE ORDERED AS A SEPARATE ITEM. IT CONSISTS OF TWO SEPARATE SWITCHBOARD CABLES CONNECTED TO A 942C CONNECTOR (SEE NOTE 203, PART B). THE 816A SWITCHBOARD CABLE (6 PAIR) IS REQUIRED FOR INTERFACING WITH THE COMBINED DISTRIBUTING FRAME. THIS CABLE SHALL BE OPEN ENDED AT THE CDF END. IT IS AVAILABLE IN SIX DIFFERENT LENGTHS. FOR ED-3H100-30, GROUP_A, THE CABLE IS 66 FEET LONG - THE STANDARD LENGTH. THE OTHER FIVE LENGTHS ARE: GROUP_B, 76 FEET; GROUP_C, 86 FEET; GROUP_D, 96 FEET; GROUP_E, 106 FEET; & GROUP_F, 116 FEET. THE 252A SWITCHBOARD CABLE (6 PAIR) IS REQUIRED FOR INTERFACING WITH THE NO.3 ESS TTY CONTROLLER. THIS CABLE MUST HAVE A KS-19087,L2 CONNECTOR AT THE TTY CONTROLLER END. FOR DEDICATED-TYPE TTY CONTROLLERS THIS CABLE IS A PREDETERMINED LENGTH. FOR NONDEDICATED-TYPE TTY CONTROLLERS THE LENGTH OF THIS CABLE HAS TO BE DETERMINED FOR ORDERING PURPOSES.

EQUIPMENT NOTES: (CONT)

205. THE INTERCONNECTION WIRING INFORMATION FOR THE SPC MINI-ROTL UNIT SHALL BE IN ACCORDANCE WITH THE FOLLOWING NO.3 ESS OFFICE REQUIREMENTS. THESE ARRANGEMENTS REPRESENT THE WIRING CONNECTIONS AT THE COMBINED DISTRIBUTING FRAME (CDF) AND THE TTY CONTROLLER IN THE NO.3 ESS OFFICE (SEE CAD 1).

EXISTING NO.3 ESS OFFICE EQUIPPED WITH THE 105-TYPE TEST LINE FEATURE ONLY:

THE INTERFACE WIRING SHALL ONLY CONSIST OF THE FOUR CONNECTIONS FROM THE TWO, 105-TYPE, TEST LINE PORTS OF THE SPC MINI-ROTL UNIT TO THE NO.3 ESS, 105-TYPE TEST SUBSCRIBER LINE APPEARANCES.

EXISTING NO.3 ESS OFFICE EQUIPPED WITH THE 105-TYPE TEST LINE FEATURE AND UPGRADED TO INCLUDE THE ROTL FEATURE (NO.3 ESS, 3E3 GENERIC):

THE INTERFACE WIRING SHALL CONSIST OF THE THREE PAIRS OF PORT LEAD CONNECTIONS (ROTL,TUT, & CA) AND THE FOUR MESSAGE CHANNEL CONNECTIONS OF THE SPC MINI-ROTL UNIT TO THE NO.3 ESS ROTL NETWORK APPEARANCES AND THE TTY CONTROLLER, RESPECTIVELY; IN ADDITION TO THE FOUR 105-TYPE TEST LINE PORT CONNECTIONS.

NEW NO.3 ESS OFFICE EQUIPPED WITH THE 3E3 GENERIC:

THE INTERFACE WIRING SHALL CONSIST OF ALL FOURTEEN (14) CONNECTIONS OF THE INTERFRAME CABLE FROM THE SPC MINI-ROTL UNIT REQUIRED TO IMPLEMENT THE COMBINED ROTL AND 105-TYPE TERMINATING TEST LINE FEATURES IN THE NO.3 ESS OFFICE.

206. A COMPLETE SET OF SPC MINI-ROTL SPARE CIRCUIT PACKS (INCLUDING THE 208-TYPE POWER UNITS) SHALL BE ORDERED AS FOLLOWS:

J94055A, LIST 2 SPARE CIRCUIT PACKS

207. THE ED-3S136-30 EXTENDER BOARD ASSEMBLY SHALL BE USED AS THE PLUG-IN EXTENDER CARD FOR BOTH SPC MINI-ROTL MAINTENANCE AND TROUBLE-SHOOTING PROCEDURES.

EQUIPMENT NOTES: (CONT)

208.

LEAD DESIGNATIONS FOR PINS ON 927B CONNECTOR				
CONNECTOR PIN NO.	ED-2C555-( ) CP19	208G PS2	208B PS1	ED-2C556-( ) CP20
216				
208				
215				
207				
214		GRDB	GRDB	
206				
213		GRDB	GRDB	
205				
212		GRDB	GRDB	
204				
211		GRDB	GRDB	
203				
210				
202				
209				
201				
40		+12V	+5V	
20	-48 GRDA	+12V	+5V	
39		+12V	+5V	
19	-48 GRDA	+12V	+5V	
38				
18	GRDA			
37				
17	GRDA			TTRT
36				
16				TTRR
35				
15				CAT
34				
14				CAR
33				
13		-48 GRDA	-48 GRDA	TUTT
32				
12	A	-48 GRDA	-48 GRDA	TUTR
31				
11	A	-48 GRDA	-48 GRDA	RT
30				
10		-48 GRDA	-48 GRDA	RR
29				
9	+15V	-48 GRDA	-48 GRDA	TCN2
28		GRDA	GRDA	
8	-15	-48 GRDA	-48 GRDA	RCN2
27		GRDA	GRDA	
7	+12V	-48 GRDA	-48 GRDA	TCN1
26		GRDA	GRDA	
6	-12V	-48 GRDA	-48 GRDA	RCN1
25				
5	+5V			
24		GRDA	GRDA	
4	-5V	-48 GRDA	-48 GRDA	
23		GRDA	GRDA	
3		-48 GRDA	-48 GRDA	
22		GRDA	GRDA	
2	GRDB	-48 GRDA	-48 GRDA	
21		GRDB	GRDB	
1	GRDB	GRDB	GRDB	
106		-5V	-15V	
103		-5V	-15V	
105		A	A	
102		-12V	+15V	
104		A	A	
101		A	A	

* PINS ARE ASSIGNED FOR FUTURE USE.

EQUIPMENT NOTES: (CONT)

LEAD DESIGNATIONS FOR 1D-TYPE (F-60474-SS) PINS ON 842186447 BACKPLANE ASSEMBLY		
CONNECTOR PIN NO.	P3	P4
20	DTR	
19	SPK	
18	SGRDMC	RCN1
17	SPKGRD	TCN1
16	JIT	RCN2
15	GRDB	TCN2
14	JIR	RR
13	J2T	RT
12	HCT	TUTR
11	HCR	TJTT
10	TBUS	CAT
9	RBUS	CAR
8	DCD	DCDMC
7	SGRD	SGRDMC
6	DCDMC	
5	TX3ESS	
4	RX3ESS	
3	TXEIA	TX3ESS
2	RXEIA	RX3ESS
1	PROGRD	

MINI-ROTL		DWG SIZE 6S	ISSUE 4A
BELL LABORATORIES	SD-99392-01		-D2

EQUIPMENT NOTES: (CONT)

209.

LEAD DESIGNATIONS FOR TERMINALS ON 842186447 BACKPLANE ASSEMBLY

CONN	PIN NO.	ED-2C552-( ) CP16	ED-2C554-( ) CP21	ED-35119-( ) CP7	ED-35118-( ) CP6	ED-2C551-( ) CP15	ED-35117-( ) CP5	ED-35131-( ) CP12	ED-2C553-( ) CP17		ED-35140-( ) CP18	ED-2C559-( ) CP14
E	20 19 18 17 16					SPK SPK SPI SPKGRD		SPI DIAGEQ			DIAG AID TSTRST PORT0	DIAGEQ
	15 14 13 12 11	CTPCN2 CTPCN1				SPKGRD			CTPCN2 CTPCN1		PORT1 PORT2 PORT3 PORT4 PORT5	
	10 9 8 7 6										PORT6 PORT7 PORT8 PORT9 PORT10	
	5 4 3 2 1					12/3 LS		ROTLEQ	TX3ESS RX3ESS 12/3 LS DCDMC		PORT11 PORT12 PORT13 PORT14 PORT15	
D	20 19 18 17 16	PIDB1 PIDB0 PIDB5 PIDB4	PIDB1 PIDB0 PIDB5 PIDB4	PIDB1 PIDB0 PIDB5 PIDB4	PIDB1 PIDB0 PIDB5 PIDB4	SP1AC PIDB1 PIDB0 PIDB5 PIDB4	PIDB1 PIDB0 PIDB5 PIDB4	PIDB1 PIDB0 PIDB5 PIDB4	SGRDMC PIDB1 PIDB0 PIDB5 PIDB4		PIDB1 PIDB0 PIDB5 PIDB4	PIDB1 PIDB0 PIDB5 PIDB4
	15 14 13 12 11	PIDB7 PIDB6 PIDB3 PIDB2	PIDB7 PIDB6 PIDB3 PIDB2	PIDB7 PIDB6 PIDB3 PIDB2 PORT13	PIDB7 PIDB6 PIDB3 PIDB2 PORT2	PIDB7 PIDB6 PIDB3 PIDB2	PIDB7 PIDB6 PIDB3 PIDB2	PIDB7 PIDB6 PIDB3 PIDB2	PIDB7 PIDB6 PIDB3 PIDB2		PIDB7 PIDB6 PIDB3 PIDB2 TSTCLK	PIDB7 PIDB6 PIDB3 PIDB2
	10 9 8 7 6	PORT7 PODB0 PODB1 PODB2 PODB3	PORT8 PODB0 PODB1 PODB2 PODB3	PORT12 PODB0 PODB1 PODB2 PODB3	PORT3 PODB0 PODB1 PODB2 PODB3	PORT4 PODB0 PODB1 PODB2 PODB3	PORT1 PODB0 PODB1 PODB2 PODB3	PORT5 PODB0 PODB1 PODB2 PODB3	PORT11 PODB0 PODB1 PODB2 PODB3		PODB0 PODB1 PODB2 PODB3	PODB0 PODB1 PODB2 PODB3
	5 4 3 2 1	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7		IOW PODB4 PODB5 PODB6 PODB7	IOW PODB4 PODB5 PODB6 PODB7
C	20 19 18 17 16							IOR SDB7 SDB6 SDB5 SDB4	IOR SDB7 SDB6 SDB5 SDB4		IOR SDB7 SDB6 SDB5 SDB4	SDB7 SDB6 SDB5 SDB4
	15 14 13 12 11				SP2A SP1A			SDB3 SDB2 SDB1 SDB0	SDB3 SDB2 SDB1 SDB0		SDB3 SDB2 SDB1 SDB0	SDB3 SDB2 SDB1 SDB0
	10 9 8 7 6	HCT HCR TPT	HCT HCR	TUTIN	TPT J1R TUTIN	TPT ROTLIN TUTIN	TUTIN	DCD TXEIA ROTLIN	TSTFF2			
	5 4 3 2 1				AGCOUT TTONE J2T J1T MFOUT	AGCOUT	AGCOUT TTONE 1004	RXEIA DTR	TSTFF1 MFOUT		HLDA MEMR 1004 MEMW HOLD	MEMR
B	20 19 18 17 16	TTRR TTRT CAT TUTT TUTR		GUARD DATA	TTRR TTRT GUARD DATA	RT TXCAR GUARD DATA TXRTRR	Ø2	Ø2 TXCAR TXRTRR	Ø2 AB4		Ø2 RDYIN AB4	AB4
	15 14 13 12 11	CAR TBUS RBUS	RCN2	DCIN	WBFIN	EIAON		EIAON AB4 AB5 AB7 WBFIN	AB5 AB6 AB7		AB5 AB6 AB7 AB8 AB9	AB5 AB6 AB7 AB8 AB9
	10 9 8 7 6	RPK2 TPK2	TCN2 RPK2 TPK2			RR					AB10 AB11 AB12 AB13 AB14	AB10 AB11 AB12 AB13 AB14
	5 4 3 2 1	RPK1 TPK1	RCN1 TCN1 RPK1 TPK1		GUARDAC	LT GUARDAC			AB3 AB2 AB1 AB0		AB15 AB3 AB2 AB1 AB0	AB15 AB3 AB2 AB1 AB0
A	20 19 18 17 16	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA	*A *A *GRDA
	15 14 13 12 11	*GRDA +5V +5V TEST	*GRDA +5 +5 TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST	*GRDA +5V +5V TEST
	10 9 8 7 6	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -.2V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V	+12V +12V -5V -5V -12V	+12V +12V -5V -5V -12V
	5 4 3 2 1	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB	-12V -15V +15V GRDB GRDB

* PINS ARE ASSIGNED FOR FUTURE USE.

MINI-ROTL

DWG SIZE 6S

ISSUE 2A

BELL LABORATORIES

SD-99392-01

-D3

INFORMATION NOTES:

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

302. CONNECTING INFORMATION

SYSTEM		DRAWING NO.
NO. 3 ESS	NETWORK FRAME CKT J-3H001B	SD-3H901-01
	TELETYPEWRITER CONTROLLER UNIT J-1C054A	SD-1C905-01

INFORMATION NOTES: (CONT)

303. THE FOLLOWING TABLE INDICATES THE BIT ASSIGNMENTS FOR THE INPUT/OUTPUT FUNCTION.

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
CP5		01H	ØDB0	ROTL/TUT	CONNECTS AGC INPUT TOWARD CONTROLLING LOCATION OR TRUNK UNDER TEST
			ØDB1	THRESHOLD	CHANGES THRESHOLD LEVEL OF MF RECEIVER TO DETECT 2/6 CODE
			ØDB2	1KH(0)	CAUSES TEST TONE GENERATOR TO OUTPUT A 1KHZ SIGNAL AT 0dB
			ØDB3	1KH(-16)	CAUSES TEST TONE GENERATOR TO OUTPUT A 1KHZ SIGNAL AT -16dB
			ØDB4	-	SPARE
			ØDB5	405(-16)	CAUSES TEST TONE GENERATOR TO OUTPUT A 405HZ SIGNAL AT -16dB
			ØDB6	2804(-16)	CAUSES TEST TONE GENERATOR TO OUTPUT A 2804HZ SIGNAL AT -16dB
			ØDB7	2804(-14)	CAUSES TEST TONE GENERATOR TO OUTPUT A 2804HZ SIGNXL AT -14dB
			BIT INPUT TO CPU FROM PORT		
			IDB0	MF07	HIGH WHEN 700HZ; MF TONE DETECTED
			IDB1	MF09	HIGH WHEN 900HZ; MF TONE DETECTED
			IDB2	MF11	HIGH WHEN 1100HZ; MF TONE DETECTED
			IDB3	MF13	HIGH WHEN 1300HZ; MF TONE DETECTED
			IDB4	MF15	HIGH WHEN 1500HZ; MF TONE DETECTED
			IDB5	MF17	HIGH WHEN 1700HZ; MF TONE DETECTED
			IDB6	-	SPARE
			IDB7	-	SPARE

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
CP6	2		ØDB0	MFTR	ASSERTED HIGH; CONNECTS OUTPUT OF MF GENERATOR TO TUT
			ØDB1	AGCTR	ASSERTED HIGH; CONNECTS OUTPUT OF AGC TO TUT
			ØDB2	TTONETR	ASSERTED HIGH; CONNECTS OUTPUT OF TEST TONE GENERATOR TO TUT
			ØDB3	TPTTR	ASSERTED HIGH; APPLIES TPT (USED AS DATA TONE) TO TUT
			ØDB4	GUARDTR	ASSERTED HIGH; APPLIES GUARD TONE TO TUT
			ØDB5	WBFCNTL	ASSERTED HIGH; CONNECTS WIDEBAND TONE DETECTOR TO TUT
			ØDB6	SP1TR	SPARE TONE SWITCH CONTROL
			ØDB7	SP2TR	SPARE TONE SWITCH CONTROL
			BIT INPUT TO CPU FROM PORT		
			IDB0	-	SPARE
			IDB1		
			IDB2		
			IDB3		
			IDB4		
			IDB5		
			IDB6		
			IDB7		

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
	3		ØDB0	GDGTR	ASSERTED HIGH; ALLOWS GUARD AND DATA TONE TO BE SENT OVER TUT
			ØDB1	TP67	ASSERTED HIGH; INSERTS 67 dB PAD
			ØDB2	TMT	ASSERTED HIGH; TRANSMIT TONES; ASSERTED LOW - RECEIVE TONES
			ØDB3	TP2	ASSERTED HIGH; TRANSMIT AT -2dB; ASSERTED LOW- TRANSMIT AT 0dB
			ØDB4	-	SPARE
			ØDB5	Z900	ASSERTED HIGH=FOR TESTING 900 OHM TRUNKS; ASSERTED LOW FOR 600 OHM TRUNKS
			ØDB6	-	SPARE
			ØDB7	SC	ASSERTED HIGH=FOR SELF CHECK CALIBRATION TEST
			BIT INPUT TO CPU FROM PORT		
			IDB0		SPARE
			IDB1		
			IDB2		
			IDB3		
			IDB4	DATA	ASSERTED HIGH WHEN CP7 IS CAUSING DATA TONE TO BE SENT
			IDB5	GUARD	ASSERTED HIGH WHEN CP7 IS CAUSING GUARD TONE TO BE SENT
			IDB6		SPARE
			IDB7		

MINI-ROTL		DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01		-D4

INFORMATION NOTES (CONT):

303.(CONT)

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
			ØDB0	RECYCL	ASSERTED HIGH = INITIALIZES THE MEASUREMENT CIRCUITS
			ØDB1	-	SPARE
			ØDB2	CHG	ASSERTED HIGH: ALLOWS SIGNAL TO BE MEASURED TO CHARGE MEAS CAP.
			ØDB3	DISCHG	ASSERTED HIGH: CONNECTS CHARGED MEAS CAP. TO TIMING RESISTOR
			ØDB4	NT PATH	ASSERTED HIGH: NOISE WITH TONE MEASUREMENT
			ØDB5	NO PATH	ASSERTED HIGH: NOISE MEASUREMENT
			ØDB6	LL PATH	ASSERTED HIGH: A LOW LEVEL MEASUREMENT
	12	OCH	ØDB7	LO PATH	ASSERTED HIGH: LOSS MEASUREMENT
			BIT INPUT TO CPU FROM PORT		
			IDB0	MB8	MOST SIGNIFICANT BITS (WITH MB15 = MSB) OF THE TRANSMISSION MEASUREMENT
			IDB1	MB9	
			IDB2	MB10	
			IDB3	MB11	
			IDB4	MB12	
			IDB5	MB13	
			IDB6	MB14	
			IDB7	MB15	
CP7					
			BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
			ØDB0	-	SPARE
			ØDB1		
			ØDB2		
			ØDB3		
			ØDB4		
			ØDB5	NO REF	ASSERTED HIGH = PROVIDES VOLTAGE REFERENCE FOR NOISE MEASUREMENTS
			ØDB6	LL REF	ASSERTED HIGH = PROVIDES VOLTAGE REFERENCE FOR LOW LEVEL MEASUREMENTS
	13	ODH	ØDB7	LO REF	ASSERTED HIGH = PROVIDES VOLTAGE REFERENCE FOR LOSS MEASUREMENTS
			BIT INPUT TO CPU FROM PORT		
			IDB0	MB0	LEAST SIGNIFICANT BITS (WITH MB0 = LSB) OF THE TRANSMISSION MEASUREMENT
			IDB1	MB1	
			IDB2	MB2	
			IDB3	MB3	
			IDB4	MB4	
			IDB5	MB5	
			IDB6	MB6	
			IDB7	MB7	
			BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
			ØDB0	-	SPARE
			ØDB1	SPIC	SPARE
			ØDB2		
			ØDB3	-	SPARE
			ØDB4		
			ØDB5	ST	ASSERTED HIGH: PLACES MODEM INTO SELF TEST MODE
			ØDB6	ECHO	ASSERTED HIGH: CAUSES MODEM TO TRANSMIT ECHO SUPPRESSOR DISABLING TONE (2100HZ)
			ØDB7	-	SPARE
CP12	5	05H	BIT INPUT TO CPU FROM PORT		
			IDB0	LT	ASSERTED HIGH-WHEN: LOW TONE IS DETECTED
			IDB1	TPT	ASSERTED HIGH-WHEN: TEST PROGRESS TONE (TPT = 2225HZ) IS DETECTED
			IDB2	CARDET	ASSERTED HIGH-WHEN: CARRIER TONE (1270HZ) IS DETECTED
			IDB3	RXDATA	RECEIVED SERIAL DATA FROM MODEM PROVIDED FOR TESTING PURPOSES
			IDB4	1300R	ASSERTED HIGH WHEN: COMMAND TONE (1300HZ) IS DETECTED
			IDB5	MW	ASSERTED HIGH WHEN: MILLIWATT TEST TONE (100HZ) IS DETECTED
			IDB6	ROTLEQ	NOT IMPLEMENTED
			IDB7	DTAOEQ	NOT IMPLEMENTED

INFORMATION NOTES: (CONT)

303.(CONT)

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
			BIT INPUT TO CPU FROM PORT		
			BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
			ØDB0	LTRTRR	ASSERTED HIGH = APPLIES LOW TONE TOWARD CONTROLLING LOCATION
			ØDB1	AGCRTRR	HIGH = CONNECTS AGC OUTPUT TOWARD CONTROLLING LOCATION
			ØDB2	BAL	HIGH = PROVIDES HYBRID FUNCTION ON ROTL PORT
			ØDB3	GDGRTRR	HIGH = PERMITS GUARD AND DATA TRANSMISSION CONTROLLED BY CP7
			ØDB4	TXRTRR	HIGH = APPLIES CARRIER TOWARD CONTROLLING LOCATION
			ØDB5	TPTRTRR	HIGH = APPLIES TPT TOWARD CONTROLLING LOCATION
			ØDB6	GUARD	HIGH = APPLIES GUARD TONE TOWARD CONTROLLING LOCATION
			ØDB7	ROH	HIGH = REMOVES ROTL PORT CONTINUITY RESISTOR
CP15	4		BIT INPUT TO CPU FROM PORT		
			IDB0		SPARE
			IDB1	12/3	HIGH = 1200 BAUD MESSAGE CHANNEL; LOW = 300 BAUD
			IDB2	LS	LOW = LOW SPEED 110 BAUD MESSAGE CHANNEL
			IDB3	EIAON	LOW = ASCII TERMINAL BID VIA EIA TEST JACK
			IDB4		
			IDB5		
			IDB6		
			IDB7		
			BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
			ØDB0	TC	HIGH = CONNECTS TUT TO TBUS/RBUS
			ØDB1	CCN1	HIGH = CONNECTS 105A TEST LINE (1) TO TBUS/RBUS
			ØDB2	HB3	HIGH = CONNECTS HOLD COIL ACROSS TBUS/RBUS
			ØDB3	CCN2	HIGH = CONNECTS 105B TEST LINE (2) TO TBUS/RBUS
			ØDB4	LCKT	HIGH = CONNECTS CONNECTION APPRAISAL LOOP TO TBUS/RBUS
			ØDB5	PG	HIGH = OPENS RESISTIVE-LOOP FOR DIGIT PULSING
CP16	7		ØDB6	TT	HIGH = CONNECTS TBUS/RBUS TO CP6
			ØDB7	TCS	HIGH = APPLIES TUT PORT CONTINUITY RESISTOR
			BIT INPUT TO CPU FROM PORT		
			IDBØ		
			IDB1		
			IDB2		
			IDB3		
			IDB4		
			IDB5		
			IDB6		
			IDB7		

* PORT OAH, OEH, AND OFH ENABLE LEADS ARE AVAILABLE FROM CP18 FOR FUTURE USE.

MINI-ROTL			
		DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01		-D5

INFORMATION NOTES: (CONT)

303. (CONT)

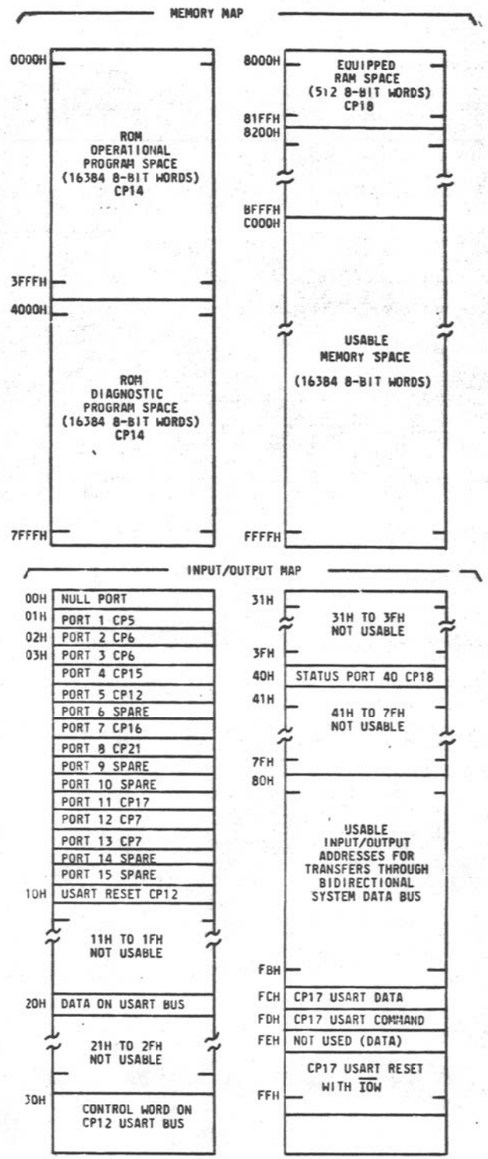
LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
CP17	11	0BH	ØDB0	MFT 7	HIGH = CONNECTS 700HZ MF TONE FOR CP6 CONTROL
			ØDB1	MFT 9	CONNECTS 900HZ MF TONE FOR CP6 CONTROL
			ØDB2	MFT 11	CONNECTS 1100HZ MF TONE FOR CP6 CONTROL
			ØDB3	MFT 13	CONNECTS 1300HZ MF TONE FOR CP6 CONTROL
			ØDB4	MFT 15	CONNECTS 1500HZ MF TONE FOR CP6 CONTROL
			ØDB5	MFT 17	CONNECTS 1700HZ MF TONE FOR CP6 CONTROL
			ØDB6	CTPCN 1	APPLIES TPT TO 105A TEST LINE (1)
			ØDB7	CTPCN 2	APPLIES TPT TO 105B TEST LINE (2)
			BIT INPUT TO CPU FROM PORT		
			IDB0	CNPAD 1	HIGH = 0dB TEST LEVEL; LOW = -2dB TEST LEVEL ON 105A (1)
			IDB1	CNPAD 2	HIGH = 0dB TEST LEVEL; LOW = -2dB TEST LEVEL ON 105B (2)
			IDB2	CNZ 1	HIGH = 600 OHM TEST Z; LOW = 900 OHM TEST Z ON 105A (1)
			IDB3	CNZ 2	HIGH = 600 OHM TEST Z; LOW = 900 OHM TEST Z ON 105B (2)
			IDB4		
			IDB5		
			IDB6		
			IDB7		

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
CP18K	0	40H	ØDB0	TEST	ASSERTED LOW TO TEST I/O PORT LATCHES AND STEERING LOGIC
			ØDB1	DIAG	NOT IMPLEMENTED
			ØDB2	-	SPARE
			ØDB3	RUN	ASSERTED LOW TO LIGHT SYSTEM RUN LED IN OPERATIONAL MODE
			ØDB4		
			ØDB5		
			ØDB6		
			ØDB7		
			BIT INPUT TO CPU FROM PORT		
			IDB0		
			IDB1		
			IDB2		
			IDB3		
			IDB4		
			IDB5		
			IDB6		
			IDB7		

LOCATED ON CP	PORT NUMBER	PORT ADDRESS	BIT OUTPUT FROM CPU TO PORT	BIT DESIG	BIT FUNCTION
CP21	8	08H	ØDB0	TLS 1	HIGH = TRANSFERS 105A (1) SUPERVISION VIA HOLD COIL
			ØDB1	TLS 2	TRANSFERS 105B (2) SUPERVISION VIA HOLD COIL
			ØDB2	TLOH1	CONNECTS 105A (1) TO TEST LINE INPUT PORT 1
			ØDB3	TLOH2	CONNECTS 105B (2) TO TEST LINE INPUT PORT 2
			ØDB4	TLIP	CAUSES 105A (1) LOOP TO GO ON HOOK
			ØDB5	TL2P	CAUSES 105B (2) LOOP TO GO ON HOOK
			ØDB6	-	
			ØDB7	-	
			BIT INPUT TO CPU FROM PORT		
			IDB0	TLLC1	HIGH = 105A (1) LOOP CURRENT IS PRESENT
			IDB1	TLLC2	HIGH = 105B (2) LOOP CURRENT IS PRESENT
			IDB2		
			IDB3		
			IDB4		
			IDB5		
			IDB6		
			IDB7		

INFORMATION NOTES: (CONT)

304. THE FOLLOWING MAPS INDICATE THE MEMORY AND I/O ASSIGNMENTS OF THE MINI-ROTL SYSTEM.

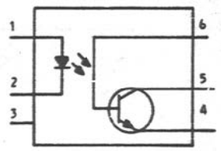


MINI-ROTL		DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01-		D6

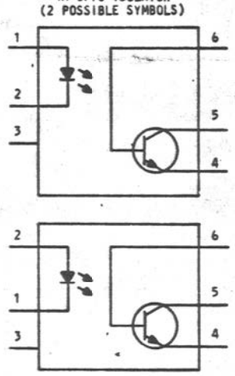
INFORMATION NOTES (CONT):

305. INTEGRATED CIRCUIT UNIT SYMBOLOGY IS AS FOLLOWS:

1A OPTO-ISOLATOR



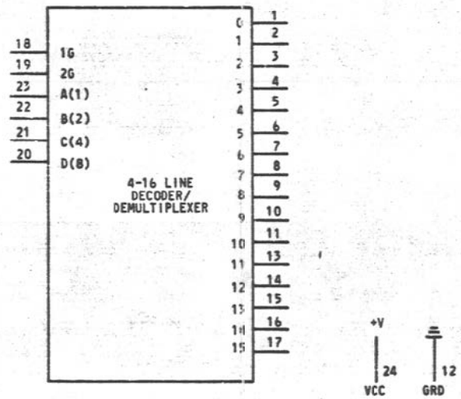
4A OPTO-ISOLATOR
(2 POSSIBLE SYMBOLS)



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

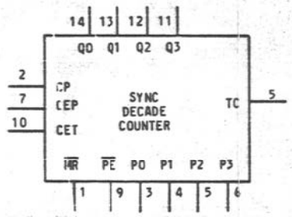
129A DECODER/DEMULTIPLEXER, 4-16 LINE PP
TTL(M)5.0V
129A WECO



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

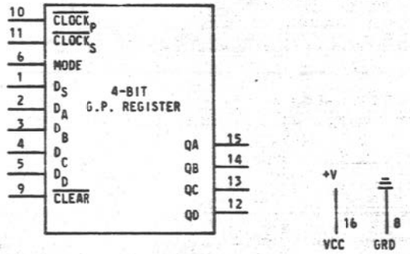
41CH SYNCHRONOUS DECADE COUNTER
WITH ASYNCHRONOUS CLEAR
TTL 5.0V
41CH WECO



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

41CF 4-BIT GENERAL PURPOSE REGISTER
(NEGATIVE EDGE TRIGGERED SHIFT REGISTER)
TTL(M)5.0V
41CF WECO



INPUT/OUTPUT INFORMATION

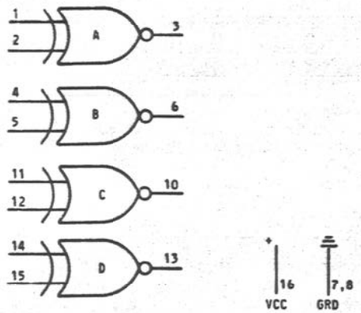
CIRCUIT DESCRIPTION

MINI-ROTL	DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01	-D7

INFORMATION NOTES:(CONT)

305.

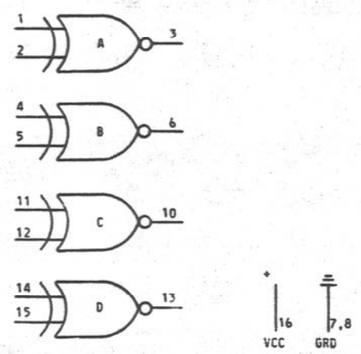
41CS QUAD EXCLUSIVE NOR GATE
TTL(L) 5.0V
41CS WECO.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

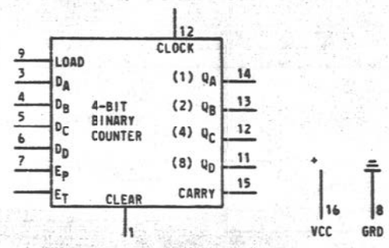
41CT QUAD EXCLUSIVE NOR GATE
WITH OPEN COLLECTOR OUTPUTS
TTL (L) 5.0V
41CT WECO.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

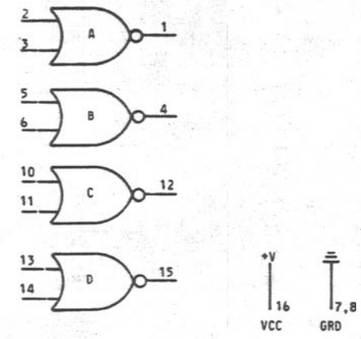
41DT SYNCHRONCUS BINARY COUNTER
WITH ASYNCHRONOUS CLEAR
TTL (M) 5.0V
41DT WECO.



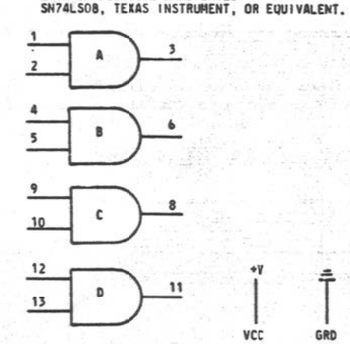
INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

41EE QUAD 2-INPUT NOR GATE
TTL (L) 5.0V
41EE WECO.



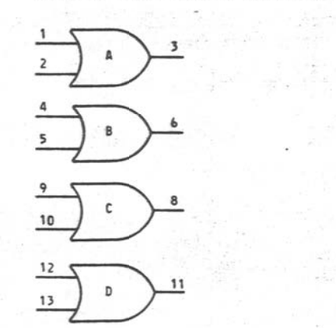
~~74LS00~~ KS-21736,L35
LOW POWER SCHOTTKY QUAD
2 INPUT POSITIVE NAND GATES
SN74LS00, TEXAS INSTRUMENT, OR EQUIVALENT.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

~~74LS32~~ KS-21736,L13
2-INPUT POSITIVE OR GATES,
SN74LS32N, TEXAS INSTRUMENT, OR EQUIVALENT.



INPUT/OUTPUT INFORMATION

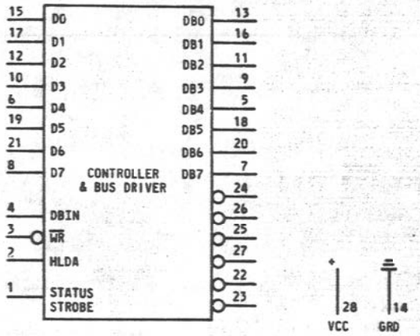
CIRCUIT DESCRIPTION

MINI-ROTL		DWG SIZE 65	ISSUE 3B
BELL LABORATORIES	SD-99392-01		-D8

INFORMATION NOTES: (CONT)

305.

~~8228~~ KS-21758,L1
SCHOTTKY BIPOLAR SYSTEM CONTROLLER
AND BUS DRIVER
TMS8223 INTEL CORP
SN74S428, TEXAS INSTRUMENTS OR EQUIV.

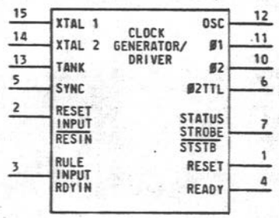


INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

* THIS IS A COMPLEX DEVICE. ANY EXPLANATORY DATA SHOULD BE OBTAINED FROM MANUFACTURES.

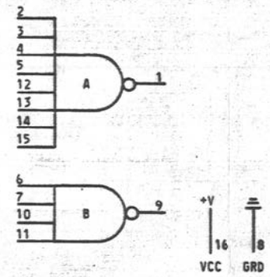
~~8224~~ KS-21757,L1
SCHOTTKY BIPOLAR CLOCK GENERATOR AND
DRIVER FOR 8080 CPU.
TMS8224 INTEL CORP.
SN74LS424 TEXAS INSTRUMENTS OR EQUIV.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

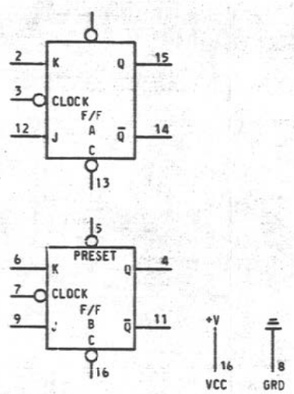
41WA DUAL 8-4 NAND GATE
41WA WECO.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

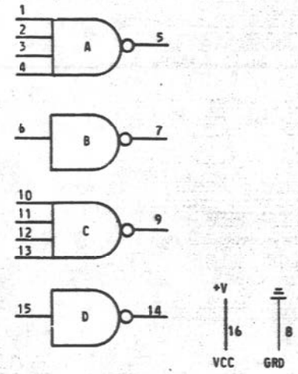
41AB J-K FLIP FLOP
41AB WECO.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

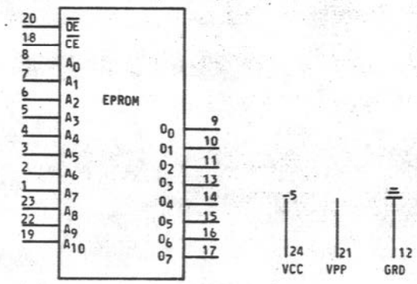
41W QUAD 1-1-4-4 NAND GATE
41W WECO.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

~~2716~~ KS-22060,L1
16K (2KX8) UV ERASABLE PROM
2716 INTEL CORPORATION.



INPUT/OUTPUT INFORMATION

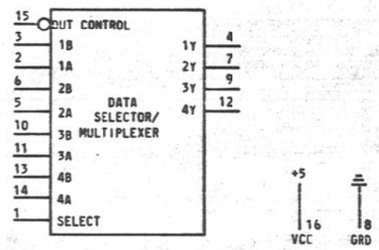
CIRCUIT DESCRIPTION

MINI-ROTL	DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES SD-99392-01		-D9

INFORMATION NOTES: (CONT)

305.

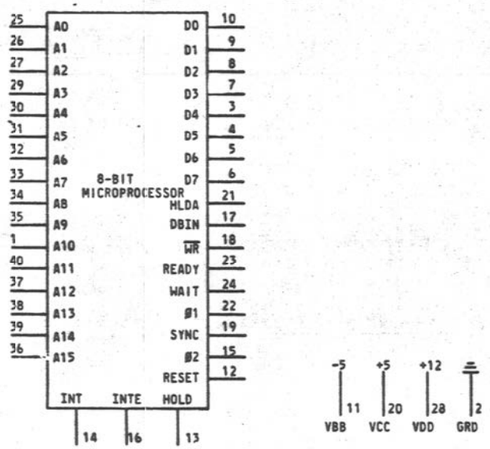
~~74LS257~~ KS-21285,L6
2-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
SN74LS257H, TEXAS INSTRUMENT OR EQUIV.



INPUT/OUTPUT INFORMATION

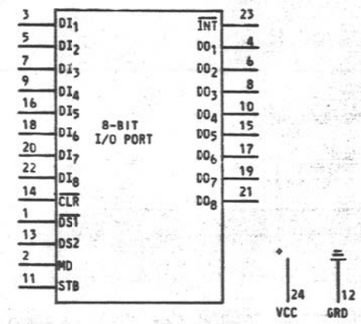
CIRCUIT DESCRIPTION

~~8080~~ KS-21842,L1
8-BIT N-CHANNEL MICROPROCESSOR,
TMS 8080A, INTEL CORP.
TEXAS INSTRUMENT OR EQUIV.



INPUT/OUTPUT INFORMATION

~~8212~~ KS-21754,L1
8-BIT INPUT/OUTPUT PORT
8212, INTEL CORP.
TIM 8212 TEXAS INSTRUMENT OR EQUIV.

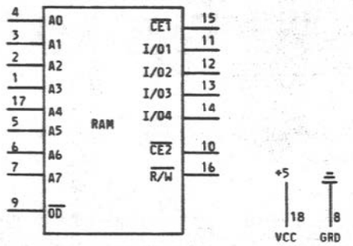


INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

THIS IS A COMPLEX DEVICE. ANY EXPLANATORY DATA SHOULD BE OBTAINED FROM MANUFACTURERS DATA SHEETS.

4042-2 256-WORD BY 4-BIT STATIC RANDOM ACCESS MEMORIES.
TMS4042-2 TEXAS INSTRUMENT OR EQUIV.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

2IRCUIT DESCRIPTION

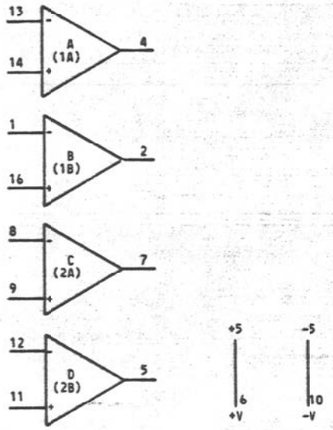
THIS IS A COMPLEX DEVICE. ANY EXPLANATORY DATA SHOULD BE OBTAINED FROM MANUFACTURERS DATA SHEETS.

MINI-ROTL		DWG SIZE 65	ISSUE 3B
BELL LABORATORIES	SD-99392-01		-D10

INFORMATION NOTES: (CONT)

305.

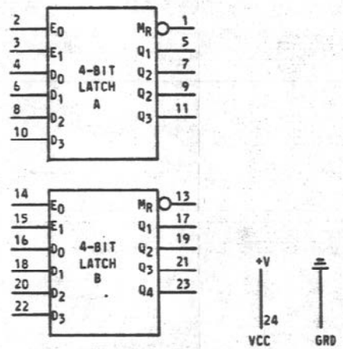
559C QUAD OPERATIONAL AMPLIFIER
559C WECO.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

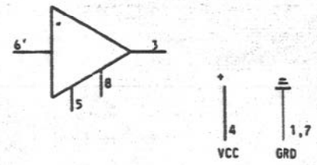
~~93L08~~ KS-21284,L1
DUAL 4-BIT LATCH
93L08DC, FAIRCHILD.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

~~1306~~ KS-22141,L1
AUDIO AMPLIFIER
1306P, MOTOROLA.



INPUT/OUTPUT INFORMATION

CIRCUIT DESCRIPTION

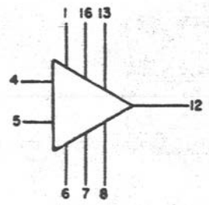
MINI-ROTL		
	DWG SIZE 6S	ISSUE 3E
BELL LABORATORIES	SD-99392-01	-D11

INFORMATION NOTES (CONT):

305.

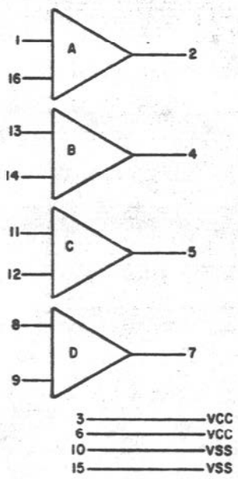
502S VOICE FREQUENCY

DC AND VOICE FREQUENCY
OPERATIONAL AMPLIFIER

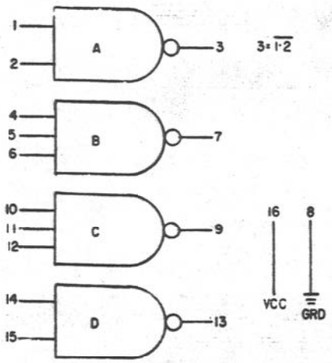


559C QUAD VOICE FREQUENCY

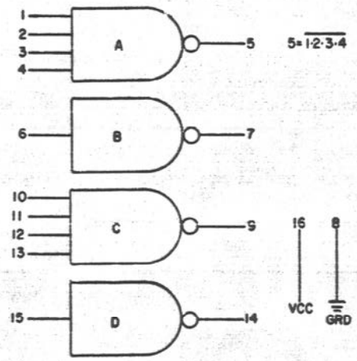
DC AND VOICE FREQUENCY
OPERATIONAL AMPLIFIER



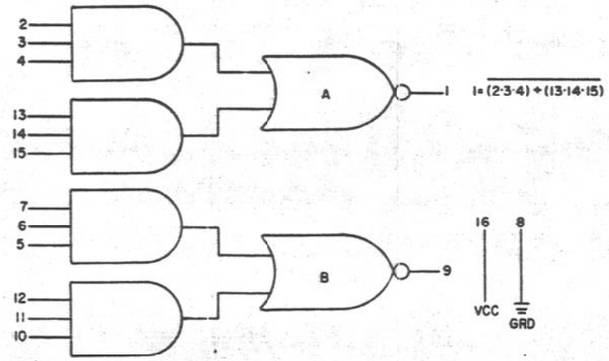
41N QUAD 2-2-3-3 NAND GATE
TTL (L) 5.0V



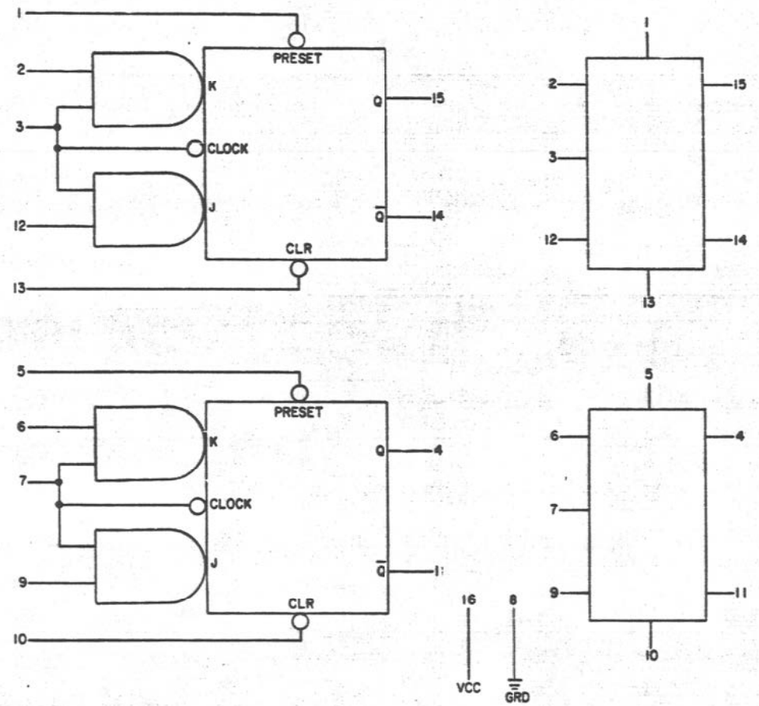
41P QUAD 1-1-4-4 NAND GATE
TTL (L) 5.0V



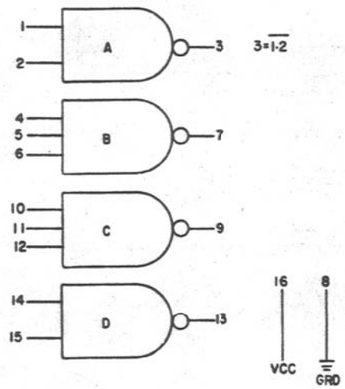
41R DUAL 2-WIDE, 3-INPUT AND-OR-INVERT GATE
TTL (L) 5.0V



41S DUAL J-K FLIP-FLOP
TTL (L) 5.0V



41U QUAD 2-2-3-3 NAND GATE
TTL (M) 5.0V

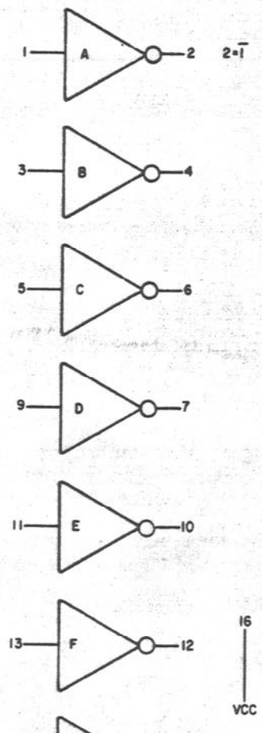


ISSUE /

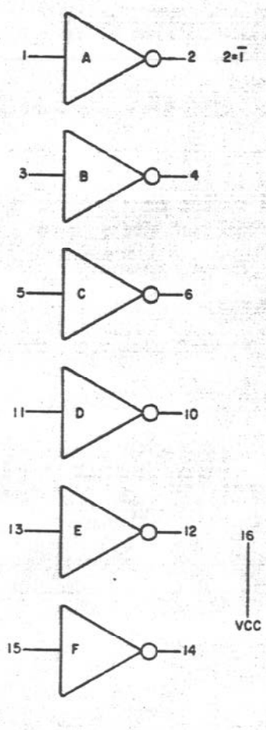
MINI-ROTL (2)	SD-99392-01-D12
BELL TELEPHONE LABORATORIES INCORPORATED	6S

INFORMATION NOTES (CONT):
305.

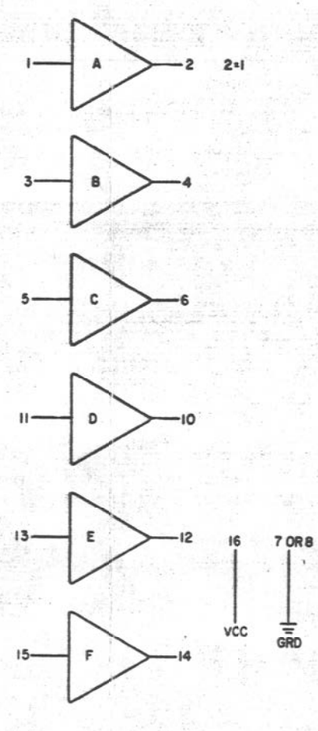
41BP SEVEN INVERTERS
TTL (M) 5.0V



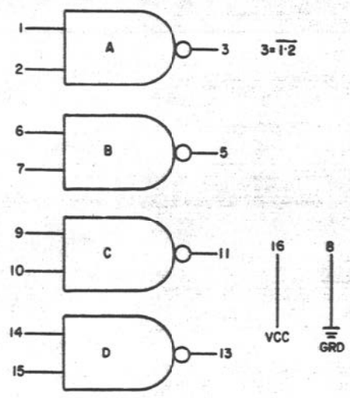
41BS HEX INVERTER BUFFER / DRIVER GATE
(OPEN COLLECTOR, 15 VOLT OUTPUT)
TTL (M) 5.0V



41BT HEX BUFFER / DRIVER GATE
(OPEN COLLECTOR, 15 VOLT OUTPUT)
TTL (M) 5.0V



41CA QUAD 2-INPUT BUFFER NAND GATE
(OPEN COLLECTOR)
TTL (M) 5.0V



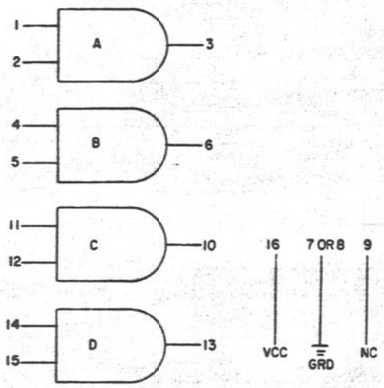
ISSUE 1

MINI-ROTL (2)	SD-99392-01-D13
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S

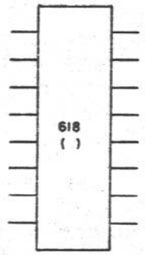
INFORMATION NOTES (CONT):

305.

4IEG QUAD 2-INPUT POSITIVE AND GATE
(OPEN COLLECTOR OUTPUT)
TTL(M)5.0V

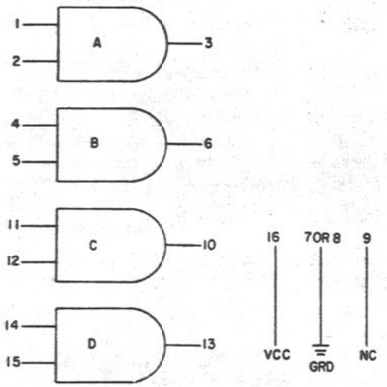


618 SERIES
STAR FILTER

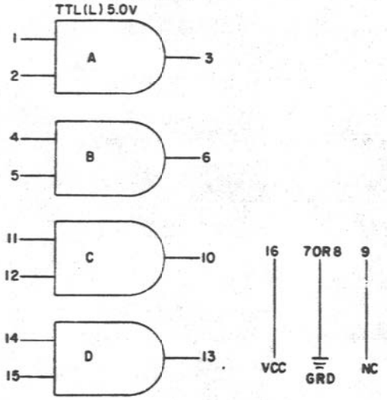


PIN NUMBER POSITIONS
MAY VARY
ON THIS DRAWING

4IEH QUAD 2-INPUT POSITIVE AND GATE
(WITH TOTEM-POLE)
TTL(M)5.0V



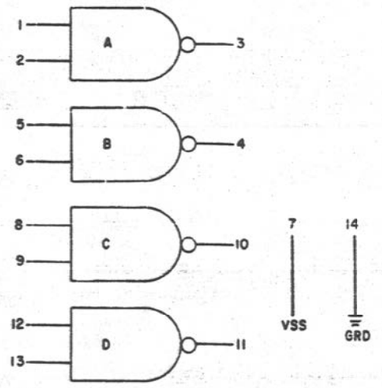
4IFP QUAD 2-INPUT POSITIVE AND GATE
(WITH TOTEM-POLE)
TTL(L) 5.0V



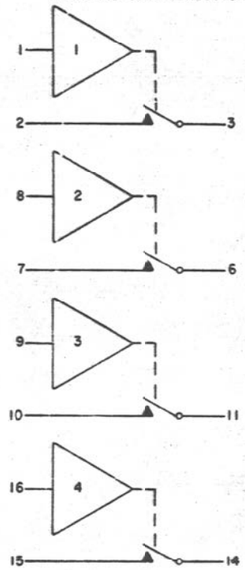
CODE	FILTER SPECIFICATIONS AND FREQUENCIES									
	DB	HZ	DB	HZ	DB	HZ	DB	HZ	DB	HZ
618DK	-9.77 ± .3	900	-22.7 ± 1.5	995	-18 ± 2.0	1030	6.07 ± .3	1180	-2.5 ± .35	3000
618DL	0 ± .15	100	-11.18 ± 1.0	890	3.1 ± .35	940	-20.7 ± 3.0	1020	-11.7 ± 1.0	1100
618DM	-2.5 ± .25	100	-8.26 ± .2	860	-17.7 ± .75	950	-17.5 ± .75	1025	-10.33 ± .25	1080
618DN	4.76 ± .15	623	7.76 ± .15	934	4.76 ± .15	1400				
618DP	11.1 ± .15	1903	14.1 ± .15	2542	11.1 ± .15	3396				
618DR	15 ± .2	2911	18 ± .2	3493	15 ± .2	4190				
618DS	4.85 ± .2	400	-9.26 ± .2	1000	-21.16 ± .2	2000				
618DT										
618DU										
618DW										
618DY										
618EA										
618EB										
618EC										
618ED										
618EE										
618EF										
618KW										
618KY										
618LA										
618FN	-43.2 +1.5 *	500	.15 ± .3	1000	-15.6 +.5 *	2400				
618FP	-15.8 +.7 *	500	12.3 ± .2	1400	-8.9 +.5 *	2400				
618FR	-2.1 ± .5	500	7.4 ± .2	1200	-51.9 + 6.8 *	2400				
618FS	-18.7 + 6.8 *	1200	-1.8 ± .3	1300	-5.9 + .2 *	2000				
618FT	-5.9 + .2 *	1000	1.1 ± .2	1300	-35.5 + 1.8 *	2000				
618FU	-10.2 + .2 *	1000	.91 ± .3	1300	-14.6 + .2 *	2000				
618FW	-34.8 + .6 *	500	-1.9 ± .2	1000	-9.7 + .6 *	1200				
618FY	-8.7 + .2 *	500	2.1 ± .2	1000	-10.6 + .4 *	1200				
618GA	-41.8 + 4.8 *	1500	-.8 ± .3	2200	-9.9 + .2 *	2800				
618GB	-6.6 + .2 *	1500	1.0 ± .3	2200	-39.7 + 11.1 *	2800				
618GC	-2.7 ± .2	200	-1.0 ± .2	1000	-1.1 ± .2	2500				
618GD	-10.5 + .3 *	200	-4.3 ± .2	1000	-.9 ± .2	2500				
618GE	-6.7 + .2 *	200	1.9 ± .2	1000	2.8 ± .2	2500				
618GF	-11.1 + .5 *	200	-.6 ± .2	1000	-.9 ± .2	2500				
618GG	0 ± 2.1	1100	2.97 ± .14	1180	-3.03 ± .28	1300	-36.4 ± .5	2500	-37.3 ± .3	3500
618GH	-.41 ± .47	1260	3.03 ± .31	1300	-7.76 ± .5	1400	-35.1 ± .7	1850	-34.5 ± .4	2250
618GJ	-35.1 ± 1.5	260	-35.2 ± 1.6	410	9.12 ± .4	1020	12.49 ± .25	1060	6.59 ± .25	1135
618GK	-6.55 ± .1	405	-10.96 ± .1	867	-15.03 ± .1	1200	-33 ± .5	2500	-42.2 ± .5	3500
618GL	-.23 ± .1	405	.57 ± .1	550	-.87 ± .1	740	-19.5 ± .4	1150	-21.5 ± .3	1500
618GM	-11.4 ± .1	2804	-21.04 ± .15	5984	-25.4 ± .15	7000	-32 ± .5	8000	-23.2 ± .2	15000
618GN	6.35 ± .1	2804	7.68 ± .1	5133	-2.24 ± .15	8000	-33.7 ± .5	17000	-27.1 ± .5	22000
618GP	-7.12 ± .1	1004	-9.9 ± .1	1440	-14.15 ± .15	2000	-39.1 ± .5	4500	-41.8 ± .5	5500
618GR	.75 ± .1	1004	2.12 ± .1	1440	-2.63 ± .15	1300	-23.3 ± .5	2700	-27.0 ± .5	3300
• 618GS	.28 ± .14	619	3.28 ± .14	656	.28 ± .22	695				
• 618GT	3.02 ± .14	698	6.02 ± .14	739	3.02 ± .22	783				
• 618GU	.36 ± .18	818	3.36 ± .18	856	.36 ± .28	895				
• 618GW	3.02 ± .18	898	6.02 ± .18	940	3.02 ± .28	983				
• 618GY	.43 ± .2	1018	3.43 ± .2	1056	.43 ± .32	1096				
• 618HA	3.02 ± .2	1100	6.02 ± .2	1141	3.02 ± .2	1183				
• 618HB	.51 ± .24	1217	3.51 ± .26	1255	.51 ± .38	1295				
• 618HC	3.02 ± .24	1300	6.02 ± .26	1341	3.02 ± .38	1383				
• 618HD	.55 ± .28	1413	3.55 ± .28	1453	.55 ± .42	1494				
• 618HE	3.02 ± .28	1500	6.02 ± .28	1542	3.02 ± .42	1586				
• 618HF	.64 ± .3	1612	3.64 ± .32	1652	.64 ± .46	1694				
• 618HG	3.02 ± .3	1700	6.02 ± .32	1742	3.02 ± .46	1786				

* IS A SYMBOL FOR (-∞) OR MAXIMUM NEGATIVE VARIATION.
• IS USED TO INDICATE FREQUENCIES ROUNDED TO NEAREST HZ.

CD4093, CMOS QUAD 2-INPUT NAND
SCHMIDTT TRIGGER GATES,
RCA OR EQUIVALENT



~~LF1333~~ KS-22116,LI
QUAD SPST JFET ANALOG
SWITCHES -4 NORMALLY OPEN
SWITCHES WITH DISABLE,
NATIONAL SEMI-CONDUCTOR OR EQUIVALENT



ISSUE
3B

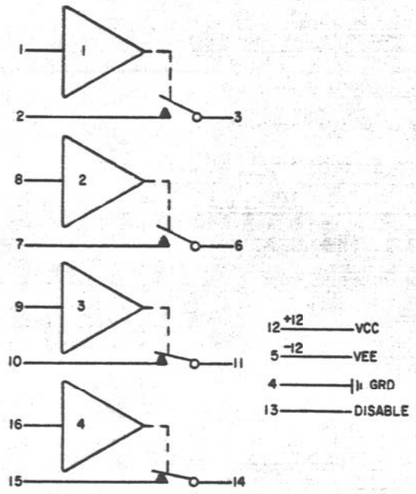
MINI-ROTL
(2)
SD-99392-01-D14

BELL TELEPHONE LABORATORIES
INCORPORATED
SIZE 6S

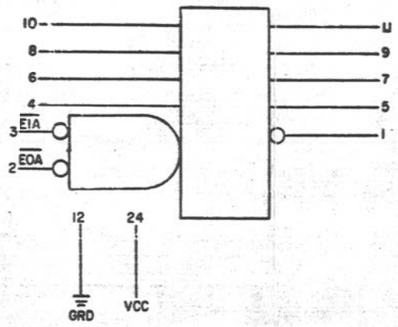
INFORMATION NOTES (CONT):

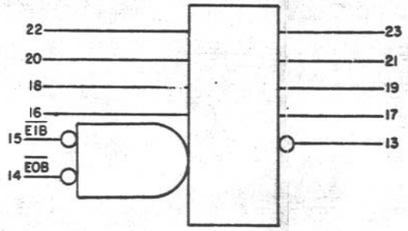
305.

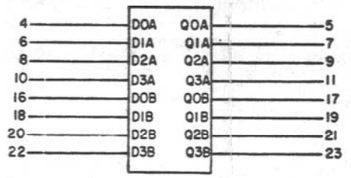
~~LF13333~~ KS-22116,L2
QUAD SPST JFET ANALOG SWITCHES
2 NORMALLY OPEN AND 2 NORMALLY CLOSED SWITCHES WITH DISABLE,
NATIONAL SEMI-CONDUCTOR OR EQUIVALENT



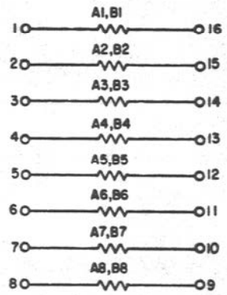
~~93L00PC~~ KS-21284,L12
DUAL 4-BIT D LATCH,
FAIRCHILD OR EQUIVALENT



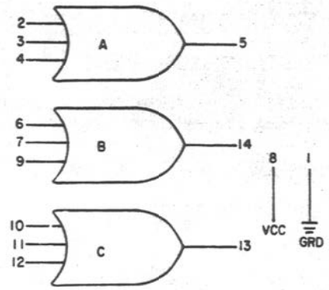




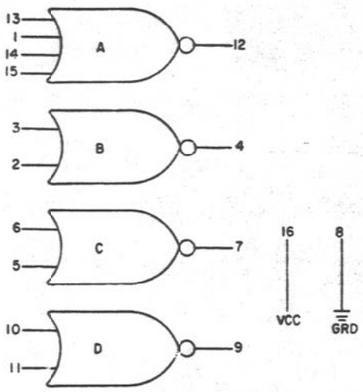
KS-21288,L1, RESISTOR NETWORKS



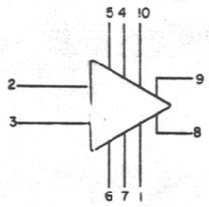
SP374A, TRIPLE THREE INPUT OR GATES,
SIGNETICS OR EQUIVALENT



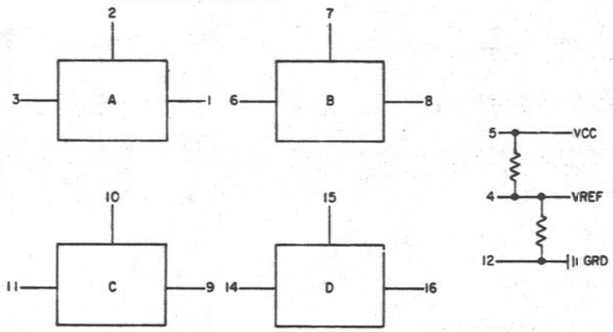
9015DC NOR GATES, FAIRCHILD OR EQUIVALENT



MA727 TEMPERATURE-CONTROLLED
DIFFERENTIAL PREAMPLIFIER,
FAIRCHILD OR EQUIVALENT



NE559, QUADTIMER,
SIGNETICS OR EQUIVALENT



ISSUE 3B

MINI-ROTL

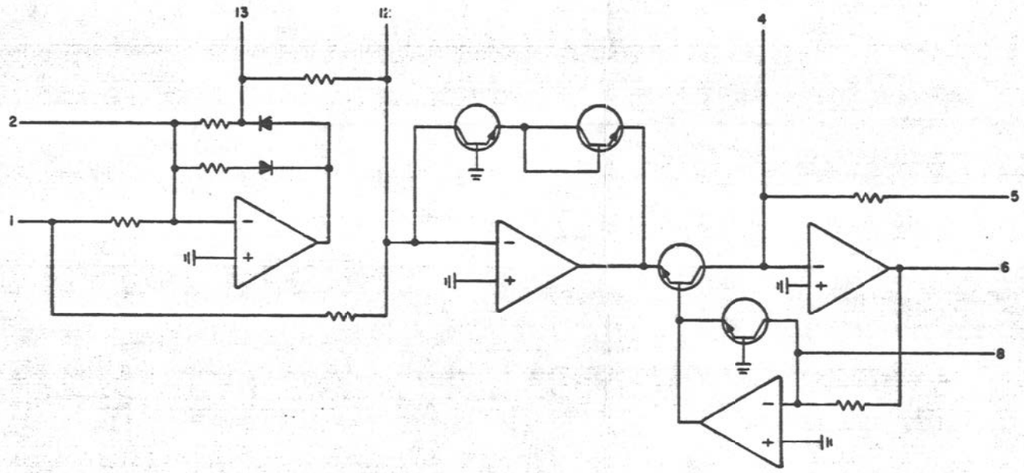
SD-99392-01-D15

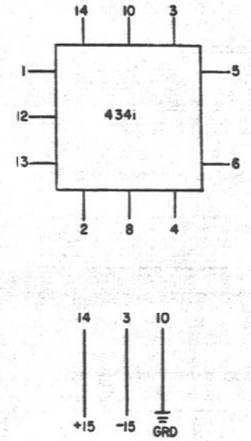
BELL TELEPHONE LABORATORIES INCORPORATED

6S

INFORMATION NOTES (CONT):
305.

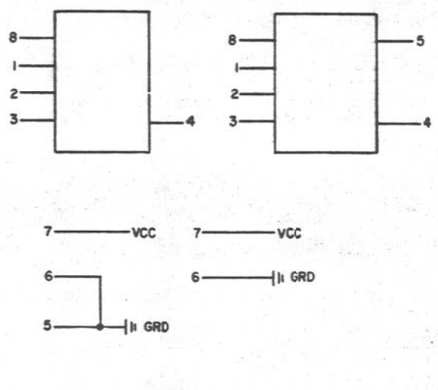
4341, RMS-TO-DC CONVERTER,
BURR-BROWN OR EQUIVALENT



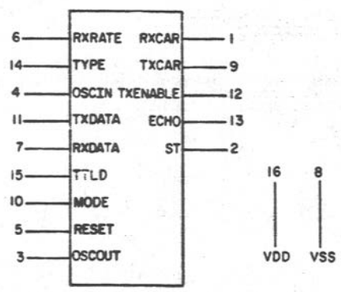


MC3302P, QUAD COMPARATOR,
MOTOROLA OR EQUIVALENT

HP5082-7300, NUMERIC AND HEXADECIMAL INDICATORS,
HEWLETT PACKARD OR EQUIVALENT



MC14412VL, UNIVERSAL LOW SPEED MODEM,
MOTOROLA OR EQUIVALENT
(SEE NOTE 1)



NOTES

1. THIS IS A COMPLEX DEVICE. ANY EXPLANATORY DATA SHOULD BE OBTAINED FROM MANUFACTURERS DATA SHEETS.

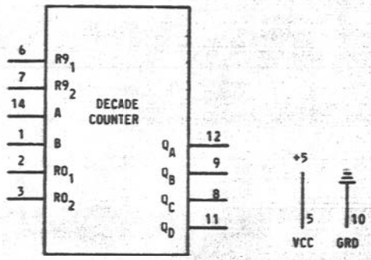
ISSUE 2A

MINI-ROTL (2) SD-99392-01-D16

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

INFORMATION NOTES (CONT):

305. **74L90** HIGH SPEED DECADE COUNTER SN74L90, TEXAS INSTRUMENTS OR EQUIVALENT.



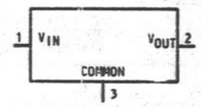
INPUT/OUTPUT INFORMATION

FUNCTION TABLE

RESET INPUTS				OUTPUT			
$\overline{RO}_1$	$\overline{RO}_2$	$R9_1$	$R9_2$	Q_D	Q_C	Q_B	Q_A
H	H	L	X	L	L	L	L
H	H	X	L	L	L	L	L
X	X	H	H	H	L	L	H
X	L	X	L	COUNT			
L	X	L	X	COUNT			
L	X	X	L	COUNT			
X	L	L	X	COUNT			

CIRCUIT DESCRIPTION

614A VOLTAGE REGULATOR, WECO

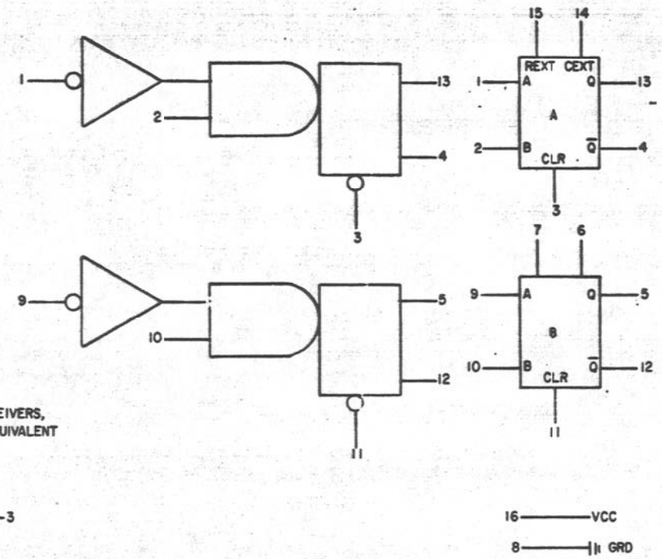


INPUT/OUTPUT INFORMATION

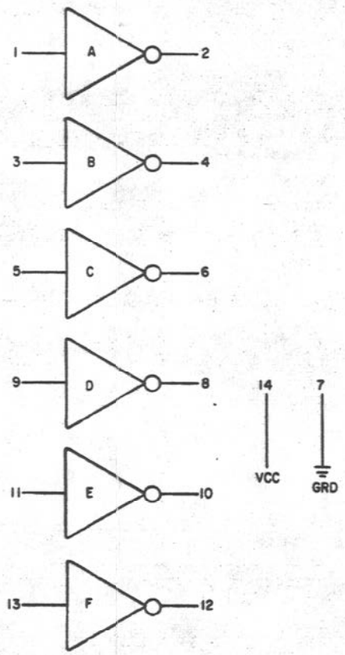
CIRCUIT DESCRIPTION

THE 614A INTEGRATED CIRCUIT IS A THREE TERMINAL, POSITIVE, PRESET VOLTAGE REGULATOR (5 VOLTS ± 3%). THIS REGULATOR HAS INTERNAL CURRENT LIMITING, SAFE AREA COMPENSATION, AND THERMAL SHUTDOWN CAPABILITY.

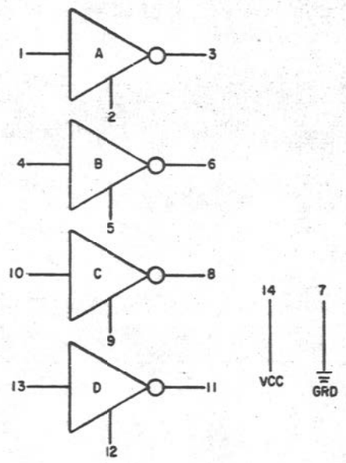
SN74123N, RETRIGGERABLE MONOSTABLE MULTIVIBRATORS WITH CLEAR, TEXAS INSTRUMENTS OR EQUIVALENT



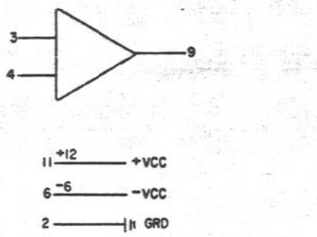
SN74LS14N, HEX SCHMITT-TRIGGER INVERTERS, TEXAS INSTRUMENTS OR EQUIVALENT



SN75189N, QUAD LINE RECEIVERS, TEXAS INSTRUMENTS OR EQUIVALENT



SN72710N, DIFFERENTIAL COMPARATOR, TEXAS INSTRUMENTS OR EQUIVALENT

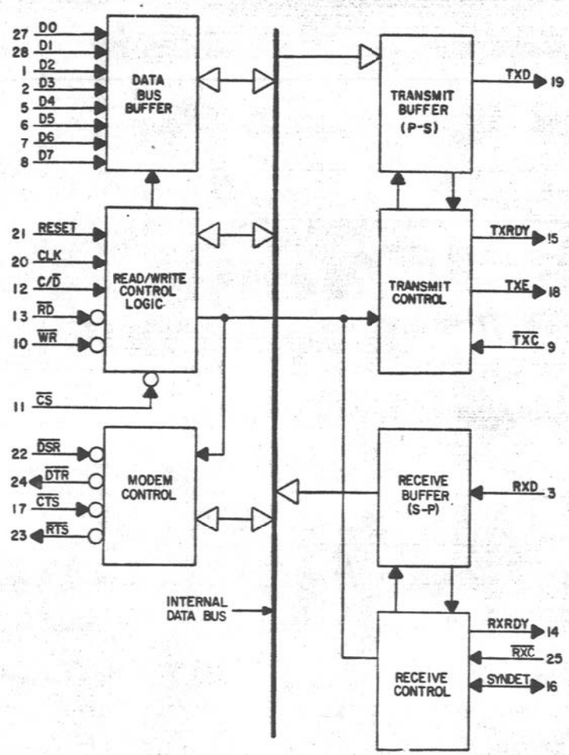


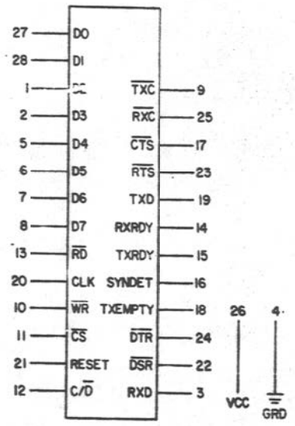
ISSUE 2A

MINI-ROTL	(2)	SD-99392-01-D17
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S	PRINTED IN U.S.A.

INFORMATION NOTES (CONT):

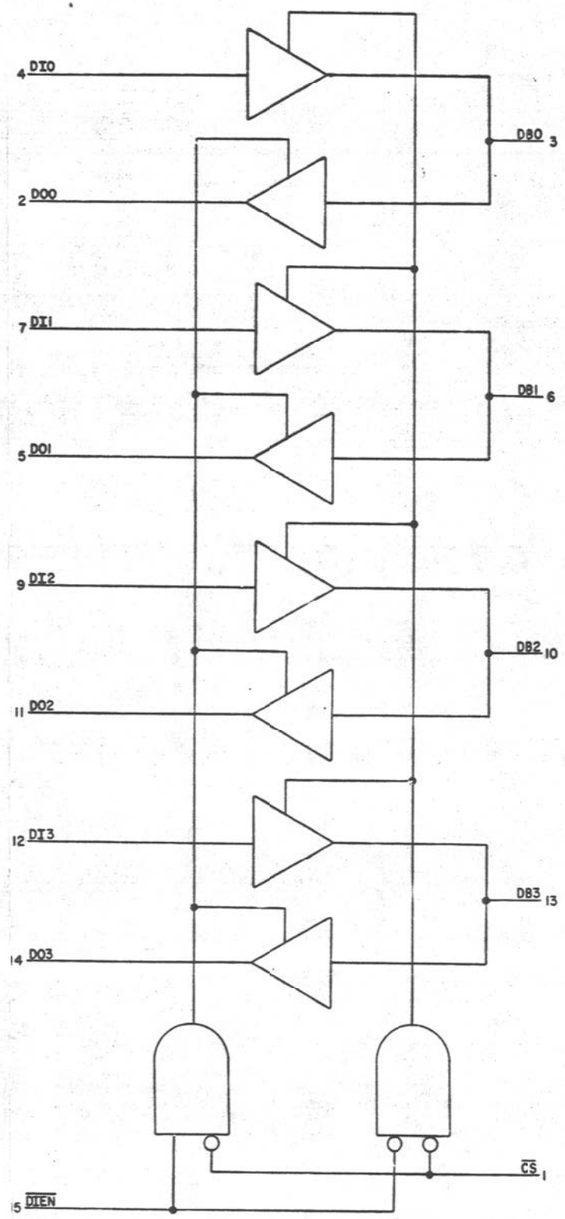
305. ~~8251~~ KS-21921,L1 PROGRAMMABLE COMMUNICATION INTERFACE, INTEL OR EQUIVALENT (SEE NOTE 1)

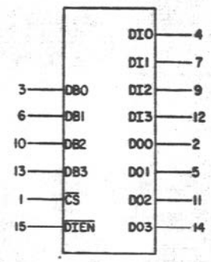




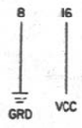
PIN NAME	PIN FUNCTION
D7-D0	DATA BUS (8 BITS)
C/D	CONTROL OR DATA IS TO BE WRITTEN OR READ
$\overline{RD}$	READ DATA COMMAND
$\overline{WR}$	WRITE DATA OR CONTROL COMMAND
$\overline{CS}$	CHIP ENABLE
CLK	CLOCK PULSE (TTL)
RESET	RESET
$\overline{TXC}$	TRANSMITTER CLOCK
TXD	TRANSMITTER DATA
$\overline{RXC}$	RECEIVER CLOCK
RXD	RECEIVER DATA
RXRDY	RECEIVER READY (HAS CHARACTER FOR 8080)
TXRDY	TRANSMITTER READY (READY FOR CHARACTER FROM 8080)
$\overline{DSR}$	DATA SET READY
$\overline{DTR}$	DATA TERMINAL READY
SYNDET	SYNC DETECT
$\overline{RTS}$	REQUEST TO SEND DATA
$\overline{CTS}$	CLEAR TO SEND DATA
TXE	TRANSMITTER EMPTY
VCC	+5 VOLT SUPPLY
GRD	GROUND

~~FM8216~~ KS-21755,L1, 4-BIT PARALLEL BIDIRECTIONAL BUS DRIVER, INTEL, TEXAS INSTRUMENTS OR EQUIVALENT (SEE NOTE 1)





PIN NAME	PIN FUNCTION
DB0 – DB3	DATA BUS BIDIRECTIONAL
DIO – DI3	DATA INPUT
DO0 – DO3	DATA OUTPUT
$\overline{DIEN}$	DATA IN ENABLE DIRECTIONAL CONTROL
$\overline{CS}$	CHIP SELECT



NOTES:

1. THIS IS A COMPLEX DEVICE. ANY EXPLANATORY DATA SHOULD BE OBTAINED FROM MANUFACTURERS DATA SHEETS.

ISSUE 3B

MINI-ROTL (2)

SD-99392-01-D18

BELL TELEPHONE LABORATORIES INCORPORATED

CHNG SIDE 6S

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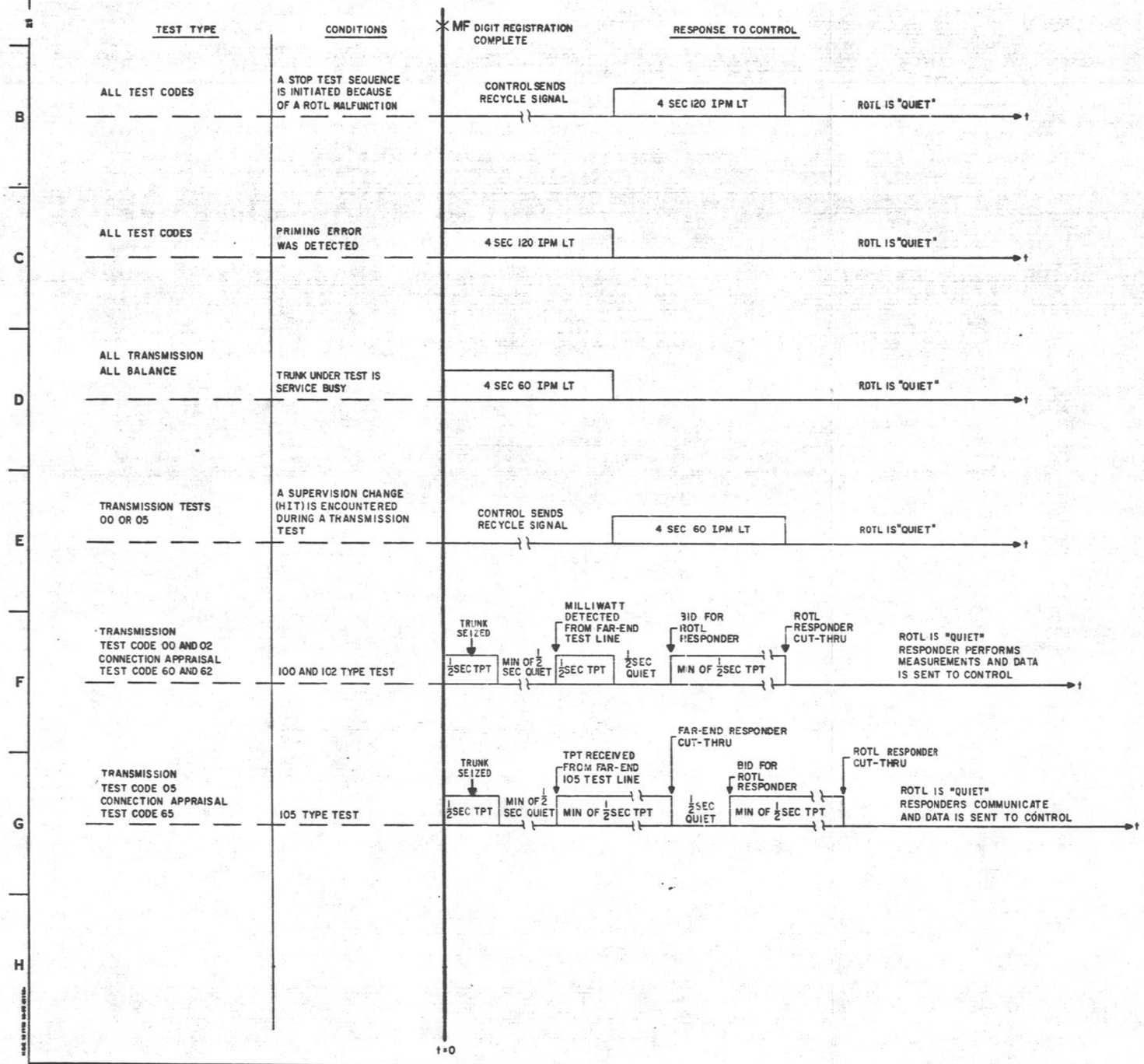
INFORMATION NOTES (CONT):

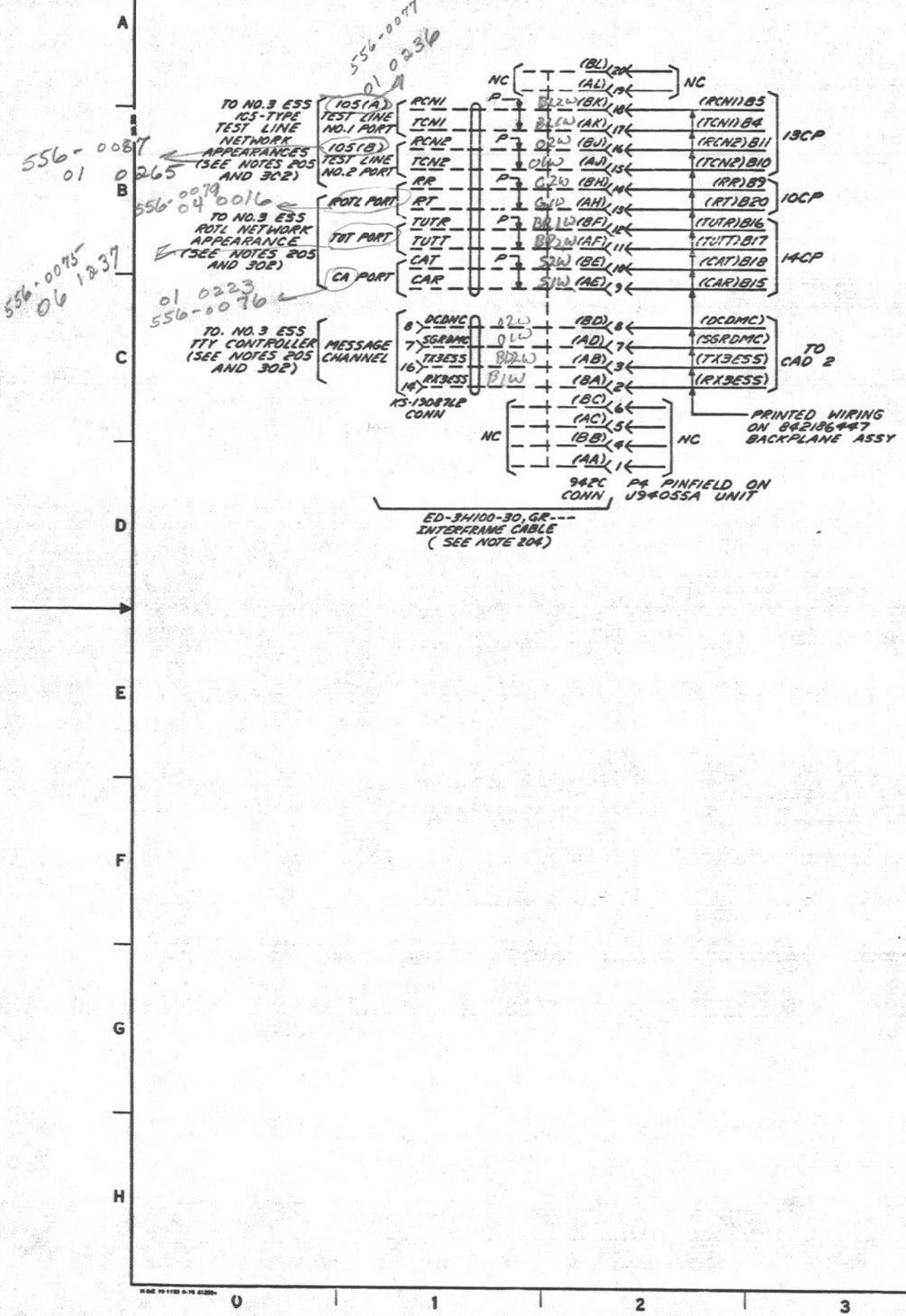
306. SPC MINI-ROTL SIGNALING RESPONSES:



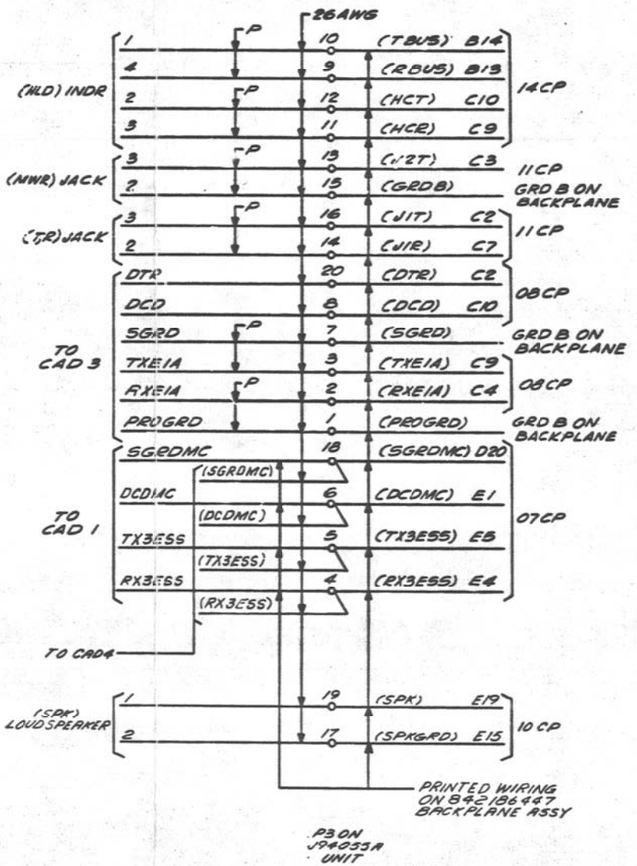
NOTES:
1. THESE TESTING CAPABILITIES SHALL BE PROVIDED BY FIRMWARE SUBSEQUENT TO ISSUE 1.

LEGEND:
LT = LOW TONE.
TPT = TEST PROGRESS TONE (2225 HZ).

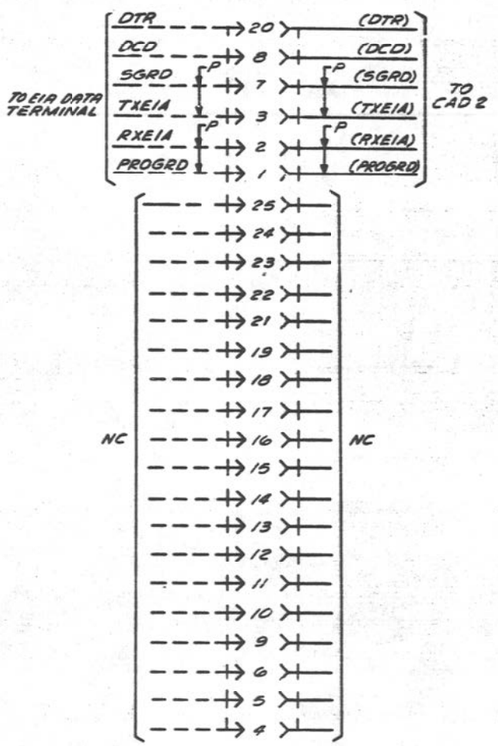
CAD 1



CAD 2

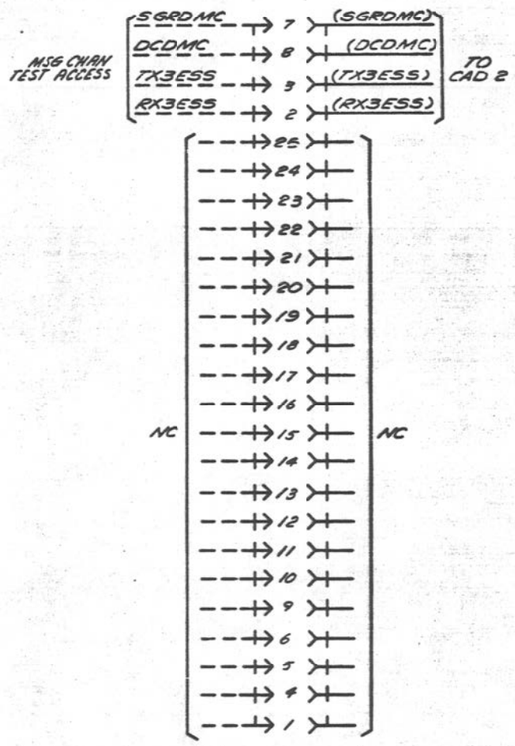


CAD 3

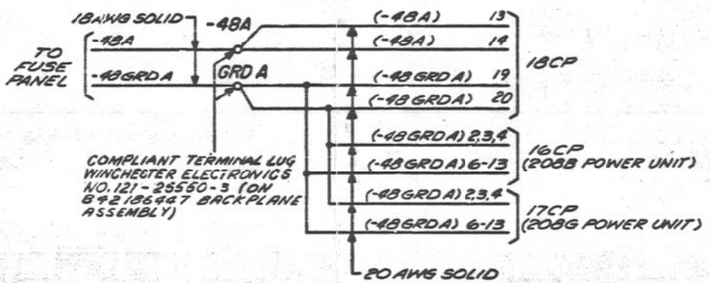


MIN!-ROTL		DWG SIZE 6S	ISSUE 4A
BELL LABORATORIES	SD-99392-01-		G1

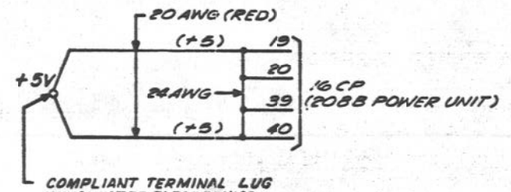
CAD 4



CAD 5

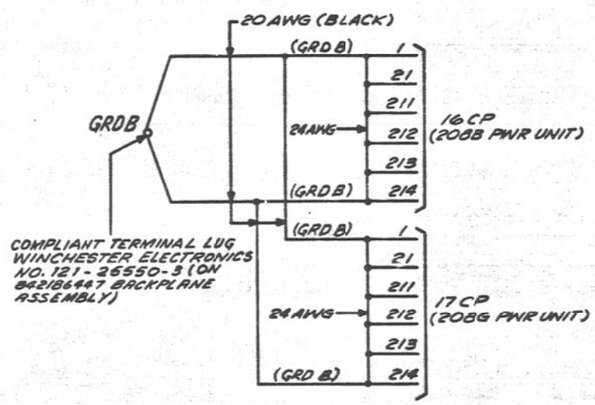


CAD 6

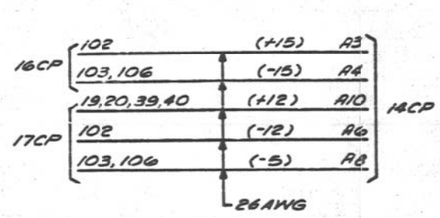


MINI-ROTL		DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01-		G2

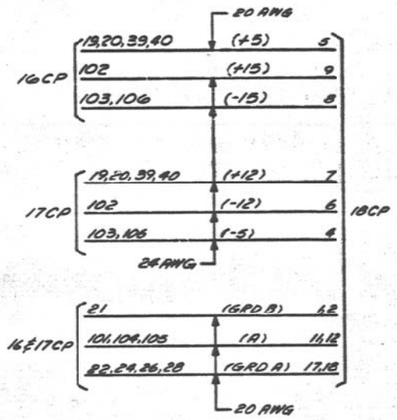
CAD 7



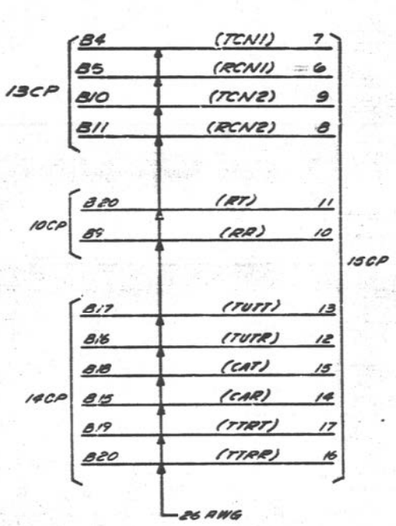
CAD 8



CAD9



CAD 10



MINI-ROTL		DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01-		G3

P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

INPUT / OUTPUT STEERING AND LATCH CIRCUIT

PI
IC38
93L08PC-A

POAI
IC36
SN74LS257N-A

POBI
IC37
SN74LS257N-A

SPARE IC13 MC3302P -D

SPARE IC40 41BP-C

SPARE IC14 MC3302P -B

SPARE IC40 41BP-F

SPARE IC40 41BP-G

SPARE IC29 SN74LS08N-D

TST 41BP-E IC40

TP4

TP5

CPS 5

ISSUE 1

MINI-ROTL

SD-99392-01-JIA

BELL TELEPHONE LABORATORIES INCORPORATED

6S

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P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

AUTOMATIC GAIN CONTROL

INVERTER

TP3

C9 .47

T1

1 MEG R7

600 (1-2)

875

600 (3-4)

R29 10K

R30 10K

R28 10K

R27 10K

CR1

CR2

IOK R8

INV 559C-A IC25

ROTL / TUT 1A/E5

RTL IC28 LF13333N-B

TUT IC28 LF13333N-D

SPARE IC28 LF13333N-C

ROTL C7

TUT C6

R65 6.65K

R66 2.61K

R68 L2IK

BAMP 559C-D IC25

NC

VOLTAGE REFERENCE

LF13333N-A

THD IC28

THRESHOLD 1A/E5

215K R13

18.7K R67

R4 178K

-12

R12 10K

VRA 559C-B IC25

VREF 1C/H3

TP1

FORWARD AMP

R26 10K

R11 402K

R25 10K

R22 10K

FAMP 559C-C IC15

TP2

MFIN 1C/D0

R24 6.6K

R23 10K

OBA 559C-A IC15

C5 AGC OUT

C5 .1

RECTIFIER

21.5K R17

21.5K R18

CR5

CR6

REC 559C-B IC15

21.5K R16

21.5K R19

22.1K R15

R64 562K

-12

LOW PASS FILTER

43.2K R14

CR4

CR3

C4 .1

R10 1.52MEG

LPF 559C-D IC15

R63 12.1K

R20 909

CPS 5

ISSUE 1

MINI-ROTL

SD-99392-01-J1B

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

PRINTED IN U.S.A.

P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

MF FILTERS

THRESHOLD DETECTORS

1B/C8 MFIN

1B/H4 VREF

MF 700A IC2 618GS-A

MF 700B IC1 618GT-A

MF7

R31 10K

CR10

CPR7 IC13 MC3302P-B

R32 10K

R43 10MEG

R49 3.01K

R55 20K

C10 .47

OS7 IC18 SN74123N-B

TP15

MF07 1A/B6

MF 900A IC4 618GU-A

MF 900B IC3 618GW-A

MF9

R33 10K

CR11

CPR9 IC13 MC3302P-A

R34 10K

R44 10MEG

R50 3.01K

R56 16.2K

C11 .47

OS9 IC18 SN74123N-A

TP14

MF09 1A/B6

MF 1100A IC7 618GY-A

MF 1100B IC8 618HA-A

MF11

R35 10K

CR12

CPR11 IC14 MC3302P-A

R36 10K

R45 10MEG

R51 3.01K

R57 13.2K

C12 .47

OS11 IC19 SN74123N-B

TP16

MF011 1A/B6

MF 1300A IC5 618HB-A

MF 1300B IC6 618HC-A

MF13

R37 10K

CR13

CPR13 IC13 MC3302P-C

R38 10K

R46 10MEG

R52 3.01K

R58 11K

C13 .47

OS13 IC19 SN74123N-A

TP17

MF013 1A/B6

MF 1500A IC11 618HD-A

MF 1500B IC12 618HE-A

MF15

R39 10K

CR14

CPR15 IC14 MC3302P-C

R40 10K

R47 10MEG

R53 3.01K

R59 9.53K

C14 .47

OS15 IC20 SN74123N-A

TP13

MF015 1A/C6

MF 1700A IC9 618HF-A

MF 1700B IC10 618HG-A

MF17

R41 10K

CR7

CPR17 IC14 MC3302P-D

R42 10K

R48 10MEG

R54 3.01K

R60 8.06K

C15 .47

OS17 IC20 SN74123N-B

TP18

MF017 1A/D6

NC

+12

-12

+5

CPS 5

ISSUE 1

MINI-ROTL

SD-99392-01-JIC

BELL TELEPHONE LABORATORIES INCORPORATED

6S

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P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

TEST TONE FREQUENCY GENERATOR

1004 C3

IKH(0)
IKH(-16)
ORA SP374A-A IC30

405(-16)

2804(-16)
2804(-14)
ORB SP374A-B IC30

1A/E4, 1A/E5

1004 SN74LS08N-B IC29

405 SN74LS08N-C IC29

2804 SN74LS08N-A IC29

ORC SP374A-C IC30

TP6

FREQ 1E/80

TP7

TP19

ø2 820 9 ø2 41BP-D IC40

CNT1 IC33 41CH-A

CNT2 IC34 41CH-A

CNT3 IC31 41CH-A

C31 470pfd

A 41BP-A IC40

CNT7 IC32 41DT-A

11 (405HZ)

CNT4 IC43 41CH-A

CNT5 IC41 41CH-A

CNT6 IC42 41CH-A

C32 470pfd

B 41BP-B IC40

FFIA IC39 41S-A

15 (2804HZ)

FFIB IC39 41S-B

+5 A13, A14

+12 A9, A10

-12 A5, A6

GRD A1, A2

.1 C8
15 C3
.1 C7
15 C2
.1 C6
40 C1

CPS 5

ISSUE 1

MINI-ROTL

SD-99392-01-JID

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

TEST TONE FILTERS

FREQ 1D/89

FREQ 5025-A IC25

R21 402

CR8 CR9

R9 10K

10K R61

+5

2804A IC27 618GM-A

2804B IC26 618GN-A

1004A IC22 618GP-A

1004B IC21 618GR-A

405A IC17 618GK-A

405B IC16 618GL-A

TP8 TP9 TP10 TP11

R1 31.6K

R2 42.2K

R3 45.3K

R5 6.34K

R6 42.2K

R70 25K

R69 25K

R71 25K

R73 25K

R72 5K

1A/E4 2804(-14) B3 IC23 LF1333IN-C

1A/E4 2804(-16) A3 IC24 LF1333IN-C

1A/E5 1KH(-16) A2 IC24 LF1333IN-B

SPARE IC24 LF1333IN-D

SPARE IC23 LF1333IN-B

1A/E5 1KH(0) A1 IC24 LF1333IN-A

1A/E4 405(-16) B4 IC23 LF1333IN-D

SPARE IC23 LF1333IN-A

R62 10K

TT 559C-C IC25

TP12

C4 T TONE

CPS 5

ISSUE /

MINI-ROTL

SD-99392-01-JIE

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

COMPONENT LIST

INTEGRATED CIRCUITS

LOC ON CP	IC1		IC2		IC3		IC4		IC5		IC6		IC7		IC8		IC9		IC10		IC11		IC12		IC13 (SEE NOTE 1)		IC14 (SEE NOTE 1)		IC15		LOC ON CP
CODE	*618GT		*618GS		*618GW		*618GU		*618HB		*618HC		*618GY		*618HA		*618HF		*618HG		*618HD		*618HE		MC3302P		MC3302P		559C		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	MF700B	1C/A2	MF700A	1C/A1	MF900B	1C/C2	MF900A	1C/C1	MF1300A	1C/E1	MF1300B	1C/E2	MF1100A	1C/D1	MF1100B	1C/D2	MF1700A	1C/G1	MF1700B	1C/G2	MF1500A	1C/F1	MF1500B	1C/F2	CPR9	1C/B5	CPR11	1C/D5	0BA	1B/D8	A
B																									CPR7	1C/A5	SPARE	1A/F7	REC	1B/E6	B
C																									CPR13	1C/E5	CPR15	1C/F5	FAMP	1B/C6	C
D																									SPARE	1A/E7	CPR17	1C/G5	LPF	1B/G6	D
E																															E
F																															F
G																															G

LOC ON CP	IC16		IC17		IC18 (SEE NOTE 2)		IC19 (SEE NOTE 2)		IC20 (SEE NOTE 2)		IC21		IC22		IC23 (SEE NOTE 3)		IC24 (SEE NOTE 3)		IC25		IC26		IC27		IC28 (SEE NOTE 3)		IC29 (SEE NOTE 2)		IC30 (SEE NOTE 4)		LOC ON CP
CODE	*618GL		*618GK		SN74123N		SN74123N		SN74123N		*618GR		*618GP		LF1333IN		LF1331N		559C		*618GN		*618GM		LF13333N		SN74LS08N		SP374A		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	405B	1E/G3	405A	1E/G2	OS9	1C/C7	OSI3	1C/F7	OSI5	1C/F7	1004B	1E/D3	1004A	1E/D2	SPARE	1E/G7	A1	1E/E7	INV	1B/A7	2804B	1E/B3	2804A	1E/B2	THD	1B/F1	2804	1D/B6	ORA	1D/B1	A
B					OS7	1C/A7	OSII	1C/D7	OSI7	1C/G7					SPARE	1E/E7	A2	1E/C7	VRA	1B/H3					RTL	1B/C1	1004	1D/A5	ORB	1D/C1	B
C															B3	1E/A7	A3	1E/B7	TT	1E/G8					SPARE	1B/E1	405	1D/B5	ORC	1D/B8	C
D															B4	1E/F7	SPARE	1E/D7	BAMP	1B/D3					TUT	1B/D1	SPARE	1A/G8			D
E																															E
F																															F
G																															G

LOC ON CP	IC31		IC32		IC33		IC34		IC35		IC36 (SEE NOTE 2)		IC37 (SEE NOTE 2)		IC38 (SEE NOTE 5)		IC39		IC40		IC41		IC42		IC43							LOC ON CP
CODE	*41CH		*41DT		*41CH		*41CH		*502S		*SN74LS257N		*SN74LS257N		*93L08PC		41S		41BP		*41CH		*41CH		*41CH							CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	CNT3	1D/D5	CNT7	1D/D8	CNT1	1D/D1	CNT2	1D/D3	FREQ	1E/C0	POA1	1A/B7	POB1	1A/C7	PI1	1A/C2	FF1A	1D/E7	A	1D/D6	CNT5	1D/E3	CNT6	1D/E5	CNT4	1D/E1							A
B																	FF1B	1D/G7	B	1D/F6												B
C																			SPARE	1A/E8												C
D																			Ø2	1D/C0												D
E																			TST	1A/F1												E
F																			SPARE	1A/F8												F
G																			SPARE	1A/G7												G

*SINGLE ELEMENT IC

CAPACITORS

DESIG	LOC	CODE
C1	1D/G3	602A
C2	1D/H2	602F
C3	1D/H1	602F
C4	1B/F8	KS-19774,L5,.1
C5	1B/D6	
C6	1D/G3	
C7	1D/H2	
C8	1D/H1	
C9	1B/A2	KS-20736,L1,.47
C10	1C/A7	
C11	1C/B7	
C12	1C/C7	
C13	1C/E7	
C14	1C/F7	
C15	1C/G7	
[15] C16-C30	SEE NOTE 3 ON SHEET J 1C	KS-19774,L2,.01
C31	1D/C6	KS-19774,L2,470pfd
C32	1D/E7	KS-19774,L2,470pfd

DIODES

DESIG	LOC	CODE
CR1	1B/B5	4758
CR2	1B/B5	4758
CR3	1B/F7	458C
CR4	1B/G7	
CR5	1B/E7	
CR6	1B/E8	
CR7	1C/G4	IN3666 (SEE NOTE 1)
CR8	1E/C1	IN825 (SEE NOTE 1)
CR9	1E/C1	IN825 (SEE NOTE 1)
CR10	1C/A4	IN3666 (SEE NOTE 1)
CR11	1C/B4	
CR12	1C/D4	
CR13	1C/E4	
CR14	1C/F4	

POTENTIOMETERS

DESIG	LOC	CODE
R69	1E/C6	KS-19646,L3A 25K
R70	1E/B6	
R71	1E/C6	
R72	1E/F8	5K
R73	1E/G6	25K

NOTES:

1. ALL MC AND IN- CODES MAY BE OBTAINED FROM "MOTOROLA" OR EQUIVALENT.
2. ALL SN CODES MAY BE OBTAINED FROM "TEXAS INSTRUMENTS" OR EQUIVALENT.
3. ALL LF CODES MAY BE OBTAINED FROM "NATIONAL" OR EQUIVALENT.
4. MAY BE OBTAINED FROM "SIGNETICS" OR EQUIVALENT.
5. ALL SP CODES MAY BE OBTAINED FROM "FAIRCHILD" OR EQUIVALENT.

CPS 5

ISSUE 1

MINI-ROTL

(2) SD-99392-01-JIF

BELL TELEPHONE LABORATORIES INCORPORATED

6S

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P/O CPS 5

MULTIFREQUENCY RECEIVER AND TONE GENERATORS

COMPONENT LIST (CONT)

RESISTORS

DESIG	LOC	CODE	
R1	1E/B5		31.6K
R2	1E/C5		42.2K
R3	1E/C5		45.3K
R4	1B/H1		178K
R5	1E/F5	KS-20616,L1A,	6.34K
R6	1E/G5		42.2K
R7	1B/B1		1 MEG
R8	1B/B6		10K
R9	1E/C0		10K
R10	1B/F8	KS-20610,L1A,	1.52 MEG
R11	1B/C6		402K
R12	1B/G2		10K
R13	1B/G2		215K
R14	1B/F5		43.2K
R15	1B/F6		22.1K
R16	1B/E5		21.5K
R17	1B/E7		
R18	1B/E8		
R19	1B/E8		
R20	1B/G5		909
R21	1E/C0		402
R22	1B/D6		10K
R23	1B/C7		10K
R24	1B/C8		6.6K
R25	1B/C5		
R26	1B/C5	KS-20616,L1A,	
R27	1B/A7		
R28	1B/A6		
R29	1B/A4		
R30	1B/B4		
R31	1C/A4		
R32	1C/B4		
R33	1C/B4		10K
R34	1C/C4		
R35	1C/D4		
R36	1C/D4		
R37	1C/E4		
R38	1C/E4		
R39	1C/F4		
R40	1C/F4		
R41	1C/G4		
R42	1C/H4		
R43	1C/B5		
R44	1C/C5		
R45	1C/D5	CC1005F (ALLEN-BRADLEY)	10 MEG
R46	1C/E5		
R47	1C/F5		
R48	1C/H5		
R49	1C/B5		
R50	1C/C5		
R51	1C/D5		3.01K
R52	1C/E5		
R53	1C/F5		
R54	1C/H5		
R55	1C/A6	KS-20616,L1A,	20K
R56	1C/B6		16.2K
R57	1C/C6		13.2K
R58	1C/E6		11K
R59	1C/F6		9.53K
R60	1C/G6		8.06K
R61	1E/D0		10K
R62	1E/G8	KS-16312,L4F,	10K
R63	1B/G6	KS-20616,L1A,	12.1K
R64	1B/F8		562K
R65	1B/D2		6.65K
R66	1B/E2	KS-20810,L1A,	2.61K
R67	1B/G1		18.7K
R68	1B/C3		1.21K

TRANSFORMERS

DESIG	LOC	CODE
T1	1B/A3	2564AR

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. DESIGNATED BATTERY AND GROUND RETURN TERM. FOR ICS.

IC CODE	IC LOC	+5V ON TERM.	+12V ON TERM.	-12V ON TERM.	GRD ON TERM.	BY PASS CAP. TO GRD
MF 700B 618GT	IC1		13			
				12		
MF 700A 618GS	IC2		13			
				12		
MF 900B 618GW	IC3		13			
				12		
MF 900A 618GU	IC4		13			
				12		
MF 1300A 618HB	IC5		13			
				12		
MF 1300B 618HC	IC6		13			
				12		
MF 1100A 618GY	IC7		13			
				12		
MF 1100B 618HA	IC8		13			
				12		
MF 1700A 618HF	IC9		13			
				12		
MF 1700B 618HG	IC10		13			
				12		
MF 1500A 618HD	IC11		13			
				12		
MF 1500B 618HE	IC12		13			
				12		
MC3302P	IC13		3		12	
MC3302P	IC14		3		12	
559C	IC15		3			C18
			6			
				10		
				15		C19
405B 618GL	IC16		13			
				12		
405A 618GK	IC17		13			
				12		

NOTES (CONT):
3.

IC CODE	IC LOC	+5V ON TERM.	+12V ON TERM.	-12V ON TERM.	GRD ON TERM.	BY PASS CAP. TO GRD
SN74123N	IC18	2,3,10,11			8	
	IC19	2,3,10,11			8	
	IC20	2,3,10,11			8	
1004B 618GR	IC21		13			
				12		
1004A 618GP	IC22		13			
				12		
559C	IC23		3			C21
			6			
				10		
				15		C20
LF1333IN	IC24		12		4	
				5		
LF1333IN	IC25		12		4	
				5		
2804B 618GN	IC26		13			
				12		
2804A 618GM	IC27		13			
				12		
LF1333IN	IC28		12		4	
				5		
SN74LS08N	IC29	14			7	
SP374A	IC30	8			1	
41DT	IC31	16			8	C30
41CH	IC32	16			8	C22
	IC33	16			8	C23
	IC34	16			8	C24
502S	IC35		13			C17
				6,7,8		C16
SN74LS257N	IC36	16			8	C29
SN74LS257N	IC37	16			8	
93L08PC	IC38	24			12	
41S	IC39	16			8	
41BP	IC40	16			8	
41CH	IC41	16			8	C28
	IC42	16			8	C27
	IC43	16			8	C26

MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-35065-01
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-35117-( )
CONNECTOR ON FRAME	

SYMBOL
SEE SHEET J1H

CIRCUIT DESCRIPTION
SEE CD-35065-01.

INPUT / OUTPUT INFORMATION
SEE NOTE 302.

CPS 5

ISSUE 2A

MINI-ROTL

SD-99392-01-JIG

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

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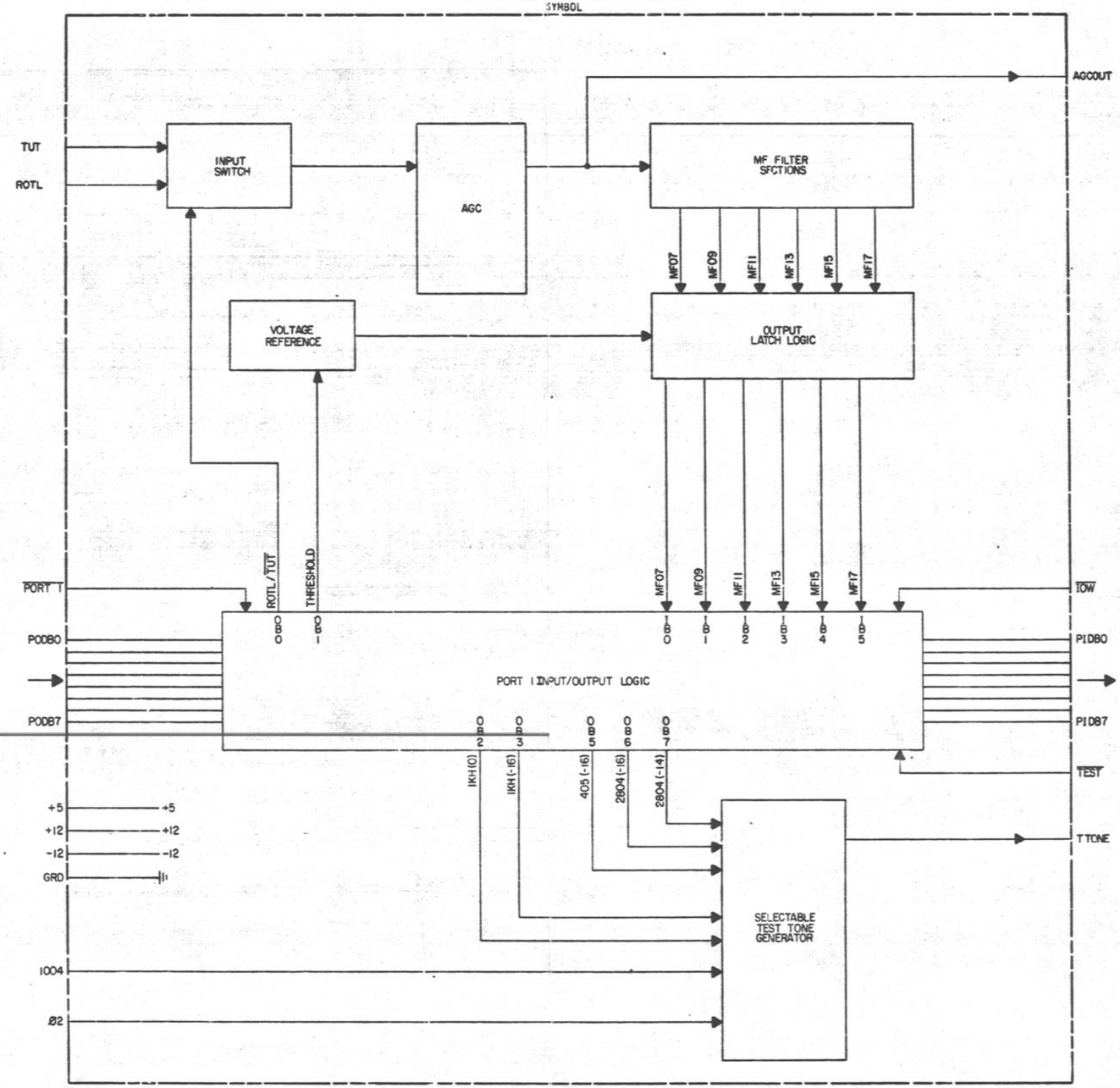
P/O CPS 5

MF RECEIVER AND TEST TONE GENERATORS
SYMBOL



P/O CPS5

ISSUE 1

MINI-ROTL

SD-99392-01-JIH

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

P/O CPS 6

TUT TRANSMIT / RECEIVE AND WIDEBAND FILTERS

PORT 283 STEERING AND LATCH CIRCUIT

PORT 2 DI1

PODB0 D9
PODB1 D8
PODB2 D7
PODB3 D6
PODB4 D4
PODB5 D3
PODB6 D2
PODB7 D1

IOW D5

PORT 3 DIO

PI2 IC4 93L08PC-A

PI3 IC10 93L08PC-A

EOA EOB GRD
DOA DIA D2A D3A D0B D1B D2B D3B
QOA Q1A Q2A Q3A Q0B Q1B Q2B Q3B
VCC +5
MRA +5
MRB +5
EIA EIB

PORT 3 F7

POA2 IC2 SN74LS257N-A

POB2 IC9 SN74LS257N-A

POA3 IC5 SN74LS257N-A

POB3 IC15 SN74LS257N-A

1B 1A 2B 2A 3B 3A 4B 4A OE
1Y 2Y 3Y 4Y S
GRD VCC

R9 1K +5

PORT 3 G1

PIDB0 DI8
PIDB1 DI9
PIDB2 DI2
PIDB3 DI3
PIDB4 DI6
PIDB5 DI7
PIDB6 DI4
PIDB7 DI5

TEST 41S5-A IC1 A11 TEST

2B/FI MFTR
2B/EI AGCTR
2B/DO TTONETR
2B/EO TPTTR
2B/DO GUARDTR
2B/H7 WBFCNTL
2B/DO SP2TR
2B/EO GDGTR
2C/D5 TP67
2C/E5 TMT
2C/D1 TP2
NC Z900
2C/E1 NC SC
2C/F5

DATA
GUARD
2B/EO
2B/DO

CPS 6

ISSUE /

MINI-ROTL

SD-99392-01-J2A

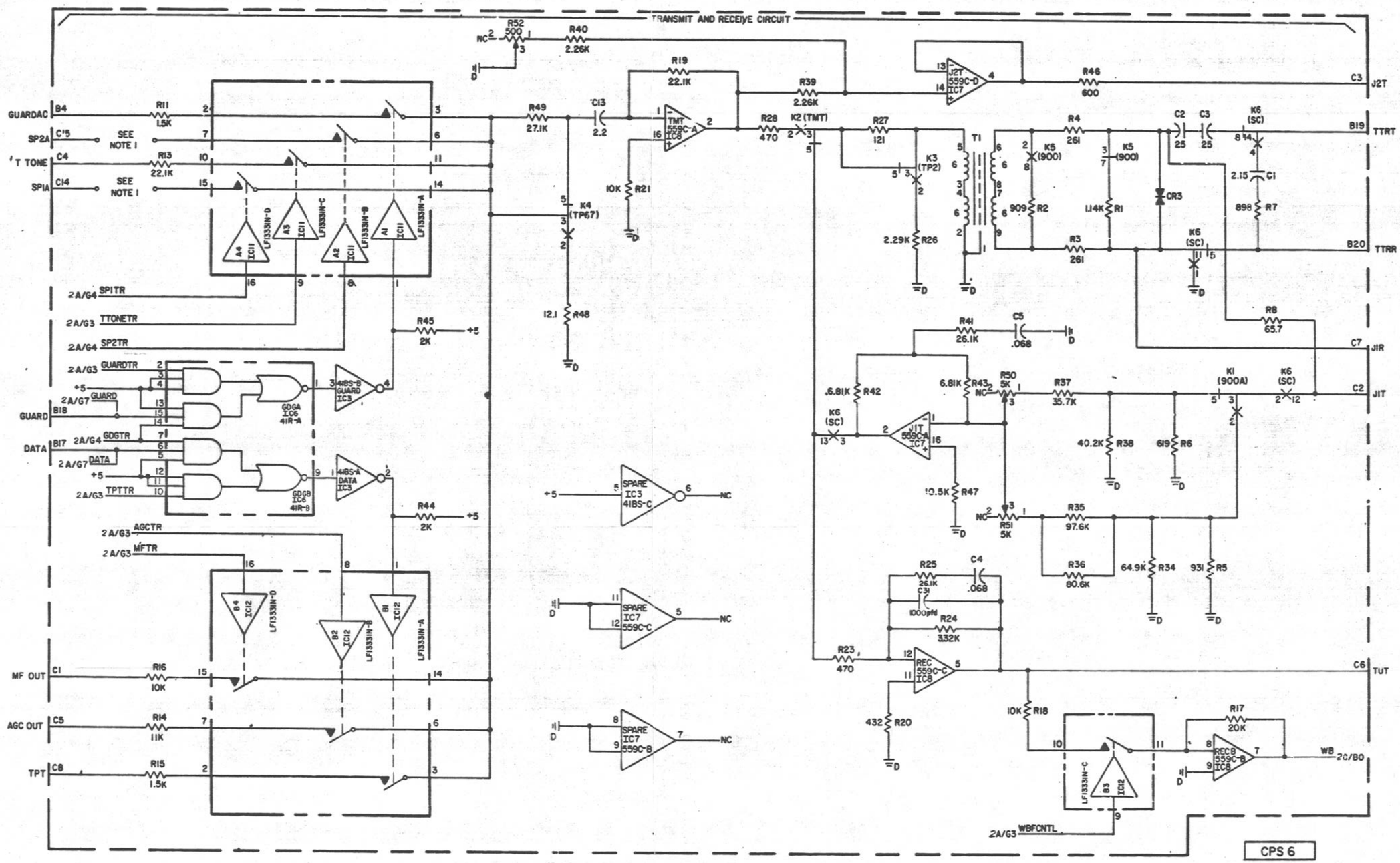
BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 6

TUT TRANSMIT / RECEIVE AND WIDEBAND FILTERS

TRANSMIT AND RECEIVE CIRCUIT



NOTES:

1. PROVIDE SPACE FOR A KS-20616, L1A RESISTOR BUT DO NOT PROVIDE RESISTOR.

CPS 6

ISSUE 1

MINI-ROTL

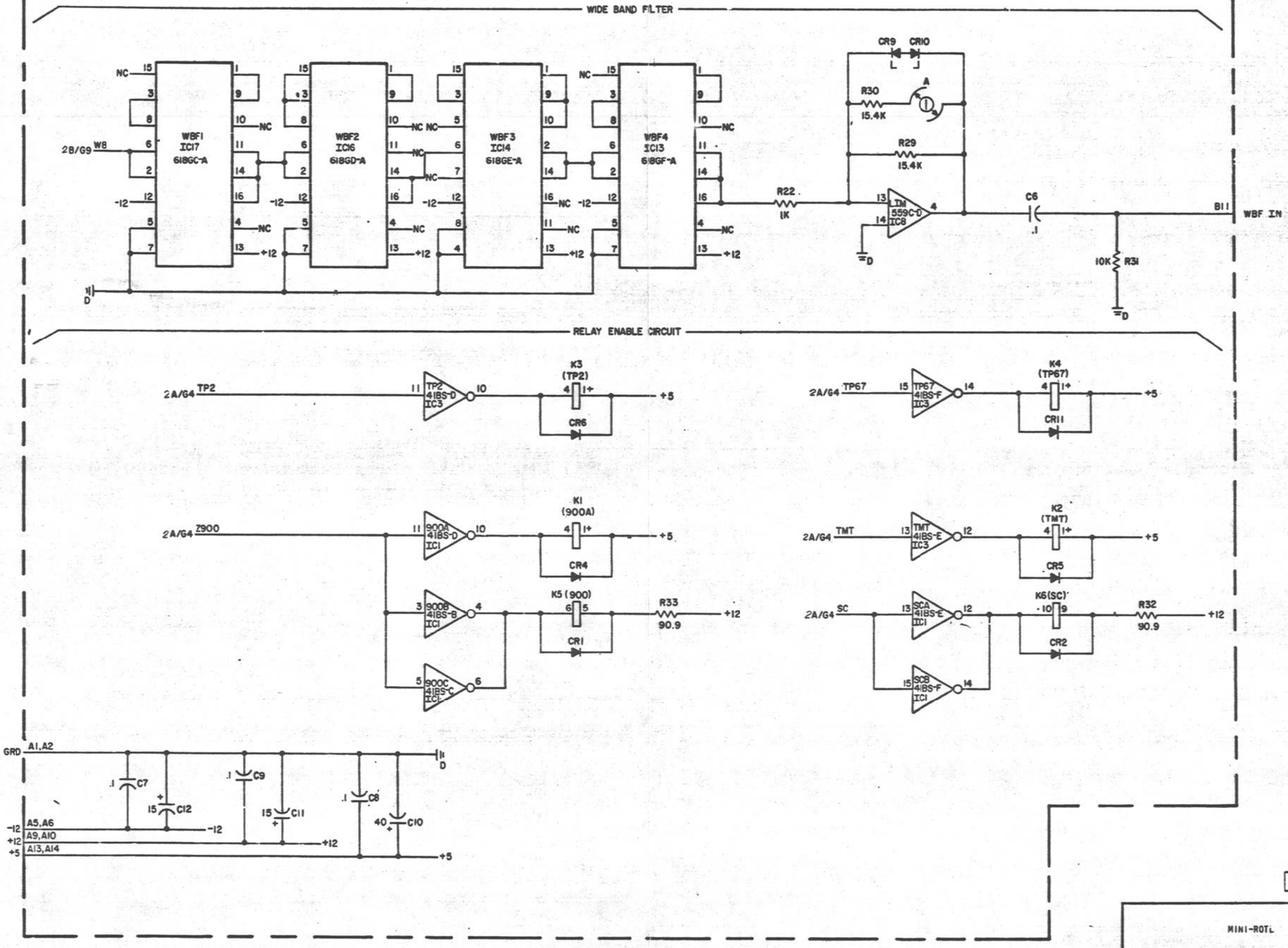
BELL TELEPHONE LABORATORIES INCORPORATED

SD-99392-01-J2B

6S

P/O CPS 6

TUT TRANSMIT / RECEIVE AND WIDEBAND FILTERS



CPS 6			ISSUE 1
MINI-ROTL			SD-99392-01-J2C
BELL TELEPHONE LABORATORIES INCORPORATED		6S	PRINTED IN U.S.A.

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TUT TRANSMIT/RECEIVE AND WIDEBAND FILTERS

COMPONENT LIST

INTEGRATED CIRCUITS

LOC ON CP	IC1		IC2 (SEE NOTE 1)		IC3		IC4 (SEE NOTE 2)		IC5		IC6 (SEE NOTE 1)		IC7		IC8		IC9 (SEE NOTE 1)		IC10 (SEE NOTE 2)		LOC ON CP
CODE	41BS		*SN74LS257N		41BS		*93L08PC		*SN74LS257N		41R		559C		559C		*SN74LS257N		*93L08PC		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	TEST	2A/G8	POA2	2A/B7	DATA	2B/E2	PI2	2A/B2	POA3	2A/E7	GDGA	B/DI	JIT	2B/D6	TMT	2B/B4	POB2	2A/C7	PI3	2A/E2	A
B	900B	2C/F3			GUARD	2B/D2					GDGB	B/EI	SPARE	2B/G4	RECB	2B/G8					B
C	900C	2C/F3			SPARE	2B/E4							SPARE	2B/F4	REC	2B/F6					C
D	900A	2C/E3			TP2	2C/D3							J2T	2B/B6	LIM	2C/C6					D
E	SCA	2C/F6			TMT	2C/E6															E
F	SCB	2C/F6			TP67	2C/D6															F
G																					G

LOC ON CP	IC11		IC12 (SEE NOTE 3)		IC13		IC14		IC15		IC16 (SEE NOTE 1)		IC17		LOC ON CP
CODE	LF1333IN		LF1333IN		*618GF		*618GE		*SN74LS257N		*618GD		*618GC		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	AI	2B/C2	BI	2B/F2	WBF4	2C/B4	WBF3	2C/B5	POB3	2A/F7	WBF2	2C/B2	WBFI	2C/BI	A
B	A2	2B/C2	B2	2B/F2											B
C	A3	2B/C2	B3	2B/G7											C
D	A4	2B/CI	B4	2B/FI											D
E															E
F															F
G															G

* SINGLE ELEMENT IC

CAPACITORS

DESIG	LOC	CODE
CI	2B/B8	701C
C2		KS-16390, LI, 25
C3		KS-16390, LI, 25
C4	2B/F6	KS-19774, L5, .068
C5	2B/D7	KS-19774, L5, .068
C6	2C/C7	542AD
C7	2C/GI	KS-19774,L5, J
C8	2C/G2	
C9	2C/GI	
CI0	2C/G2	602A
CII	2C/G2	602F
CI2	2C/GI	602F
CI3	2B/B4	KS-19774, L9, 2.2
[17] CI4-C30	SEE NOTE 3 ON SHEET J6E	KS-19774,L2, .01
C31	6B/F6	KS-20676,L15, 1000pfd

DIODES

DESIG	LOC	CODE
CRI	2C/F4	458C
CR2	2C/F7	458C
CR3	2B/C8	808JA
CR4	2C/E4	458C
CR5	2C/E7	
CR6	2C/D4	
CR9	2C/A6	808G
CRI0	2C/A6	808G
CRII	2C/D7	458C

POTENTIOMETERS

DESIG	LOC	CODE
R50	2B/D7	KS-19646,L3A,5K 500
R51	2B/E7	
R52	2B/A3	

RESISTORS

DESIG	LOC	CODE
RI	2B/C7	1.14K
R2		909
R3		261
R4	2B/B7	KS-16312,L4F, 261
R5	2B/F8	931
R6	2B/E8	619
R7	2B/C8	KS-20616,LIA, 898
R8	2B/D8	KS-16312,L4F, 65.7
R9	2A/D7	KS-20616,LIA, 1K
RII	2B/BI	KS-20616,LIA, 1.5K
RI3	2B/BI	KS-16312,L4F, 22.1K
RI4	2B/GI	1K
RI5	2B/GI	.5K
RI6	2B/FI	KS-20616,LIA,10K
RI7	2B/G8	20K
RI8	2B/G7	10K
RI9	2B/B4	KS-16312,L4F, 22.1K
R20	2B/G6	432
R21	2B/B4	KS-20616,LIA, 10K
R22	2C/C5	1K
R23	2B/F5	KS-16312,L4F, 470
R24	2B/F6	KS-16312,L4F, 3.32K
R25	2B/F6	KS-20616,LIA, 26.1K
R26	2B/C6	2.29K
R27	2B/B6	KS-16312,L4F, 121
R28	2B/B5	470
R29	2C/B6	15.4K
R30	2C/B5	KS-20616,LIA, 15.4K
R31	2C/C7	10K
R32	2C/F7	KS-20810,LIA, 90.9
R33	2C/F4	KS-20810,LIA, 90.9

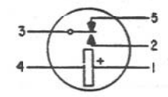
RESISTORS (CONT)

DESIG	LOC	CODE
R34	2B/F8	64.9K
R35	2B/E7	97.6K
R36	2B/F7	80.6K
R37	2B/D7	KS-20616,LIA, 35.7K
R38	2B/E7	40.2K
R39	2B/B5	2.26K
R40	2B/A4	2.26K
R41	2B/D6	26.1K
R42	2B/D5	KS-16312,L4F, 6.81K
R43	2B/D6	6.81K
R44	2B/E3	KS-20616,LIA, 2K
R45	2B/D3	KS-20616,LIA, 2K
R46	2B/B7	KS-16312,L4F, 600
R47	2B/E6	KS-20616,LIA, 10.5K
R48	2B/C4	KS-16312,L4F, 12.1
R49	2B/B3	KS-16312,L4F, 27.1K

TRANSFORMERS

DESIG	LOC	CODE
TI	2B/B6	2578L

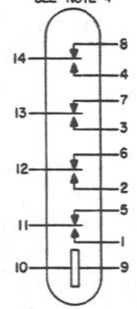
RELAYS



DESIG	KI	K2	K3	K4
IDENT	(900A)	(TMT)	(TP2)	(TP67)
CODE	337A			
OPTION				
5	2B/D8	2B/B5	2B/B6	2B/C4
4	2C/E4	2C/E7	2C/D4	2C/D7
3	2B/D8	2B/B5	2B/B6	2B/C4
2	2B/D8	2B/B5	2B/B6	2B/C4
I	2C/E4	2C/E7	2C/D4	2C/D7

RELAY NOT ADJUSTABLE, REPLACE WHEN THERE IS MALFUNCTION.

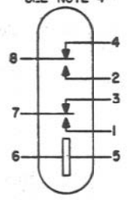
RELAYS SEE NOTE 4



DESIG	K6
IDENT	(SC)
CODE	LZN4-UA-DC6
OPTION	
14	2B/B8
13	2B/D5
12	2B/D8
11	2B/C8
10	2C/F7
9	2C/F7
8	2B/B8
7	
6	
5	2B/C8
4	2B/B8
3	2B/D5
2	2B/D8
I	2B/C8

RELAY NOT ADJUSTABLE REPLACE WHEN THERE IS MALFUNCTION.

RELAYS SEE NOTE 4



DESIG	K5
IDENT	(900)
CODE	LZN2-UA-DC6
OPTION	
8	2B/B7
7	2B/B7
6	2C/F4
5	2C/F4
4	
3	2B/B7
2	2B/B7
I	

RELAY NOT ADJUSTABLE REPLACE WHEN THERE IS MALFUNCTION.

NOTES:
1. ALL SN CODES MAY BE OBTAINED FROM "TEXAS INSTRUMENTS" OR EQUIVALENT.
2. MAY BE OBTAINED FROM "FAIRCHILD" OR EQUIVALENT.
3. ALL LF CODES MAY BE OBTAINED FROM "NATIONAL" OR EQUIVALENT.
4. ALL LZN- CODES MAY BE OBTAINED FROM "OMRON" OR EQUIVALENT.

CPS 6

ISSUE 1

MINI-ROTL

(2)

SD-99392-01-J2D

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

P/O CPS 6

TUT TRANSMIT/RECEIVE AND WIDEBAND FILTERS

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. DESIGNATED BATTERY AND GROUND RETURN TERM. FOR ICS.

IC CODE	IC LOC	+5V ON TERM.	+12V ON TERM.	−12V ON TERM.	GRD ON TERM.	BY PASS CAP. TO GRD
418S	IC1	16			7,8	C14
SN74LS257N	IC2	16			8	C15
418S	IC3	16			7,8	C24
93L08PC	IC4	24			12	C19
SN74LS257N	IC5	16			8	C16
41R	IC6	16			8	C30
559C	IC7		3			C22
			6			
				10		
				15		C21
	IC8		3			C27
			6			
				10		
				15		C26
SN74LS257N	IC9	16			8	C17
93L08PC	IC10	24			12	C20
LF13333IN	IC11		12	5	4	C23
	IC12		12	5	4	C25
WBF4 618GF	IC13		13			
				12		
WBF3 618GE	IC14		13			
				12		
SN74LS257N	IC15	16			8	C18
WBF2 618GD	IC16		13			
				12		
WBF1 618GC	IC17		13			C28
				12		C29

MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-35065-01
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-35118-( )
CONNECTOR ON FRAME	

SYMBOL

SEE SHEET J2F

CIRCUIT DESCRIPTION

SEE CD-35065-01.

INPUT / OUTPUT INFORMATION

SEE NOTE 302.

CPS 6

ISSUE 2A

MINI-ROTL

SD-99392-01-J2E

BELL TELEPHONE LABORATORIES INCORPORATED

6S

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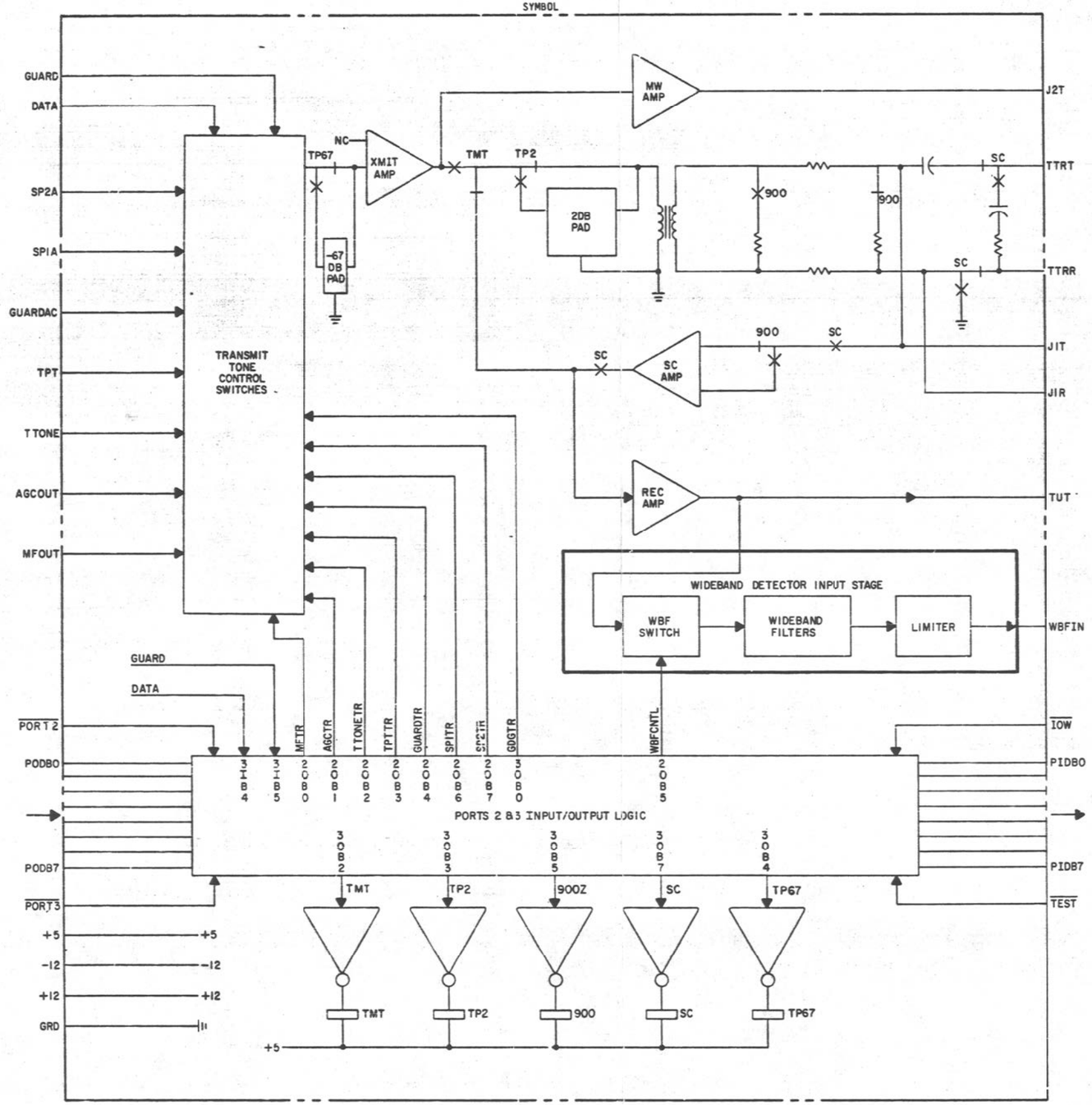
TUT TRANSMIT/RECEIVE AND WIDEBAND FILTERS
SYMBOL



P/O CPS 6

ISSUE 1

MINI-ROTL

SD-99392-01-J2F

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT

PORT 12 AND 13 STEERING AND LATCH CIRCUIT

PORT 12 D10

PI12 IC18 93L08PC-A

PODB0 D9
PODB1 D8
PODB2 D7
PODB3 D6
PODB4 D4
PODB5 D3
PODB6 D2
PODB7 D1
IOW D5

PI13 IC29 93L08PC-A

PORT 13 D11

POA12 IC17 SN74LS257N-A

POB12 IC15 SN74LS257N-A

POA13 IC28 SN74LS257N-A

POB13 IC26 SN74LS257N-A

PID80 D18
PID81 D19
PID82 D12
PID83 D13
PID84 D16
PID85 D17
PID86 D14
PID87 D15

MB8 MB9 MB10 MB11 MB12 MB13 MB14 MB15 MB0 MB1 MB2 MB3 MB4 MB5 MB6 MB7

3B/C7 3B/C9 3B/C4 3B/C6

PORT 13 G8

PORT 13 G1

RECYCL 3E/C0 3D/B0

3D/C0 CHG DISCHG
3D/D0 NT PATH
3C/F0 NO PATH
3C/E0 LL PATH
3C/D3 LO PATH

3D/E0 NO REF
3D/F0 LL REF
3D/G0 LO REF

TST 41BP-E IC19 TEST

CPS 7

ISSUE 1

MINI-ROTL

SD-99392-01-J3A

BELL TELEPHONE LABORATORIES INCORPORATED

6S

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P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT

MEASUREMENT COUNTER

CNT1 IC8 41CH-A
CNT2 IC9 41CH-A
CNT3 IC27 41CH-A
CNT4 IC25 41CH-A
CNT5 IC16 41CH-A
CNT6 IC14 41CH-A

IMHZ
TP11
TP12
RCY 41BP-D IC19
3A/G2 RECYCL
3A/G6
3A/G7

DATA BI7
MEAS 3D/F9
DATA IC30 SN74123N-B
CR2
C7
R2 34K

GUARD BI8

TUT C6
TUT 3C/B0

A13, A14
A9, A10
A5, A6
A3
A4
A1, A2
GRD
C8 C9 C10 C11 C12 C1 C2 C3 C4 C5

C MESSAGE FILTERS

CMF1 IC22 618DN-A
CMF2 IC23 618DP-A
CMF3 IC12 618DR-A
CMF4 IC6 618DS-A

CFIL 3C/H3

NOTCH FILTERS

3C/F3 NFIL
NF3 IC24 618DM-A
NF2 IC13 618DL-A
NF1 IC7 618DK-A

CPS 7

ISSUE 1

MINI-ROTL

SD-99392-01-J3B

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT

HIGH PASS FILTERS

38/F1 TUT

HPF1 IC21 618KW-A

HPF2 IC11 618KY-A

HPF3 IC5 618LA-A

LOSS AND NOISE ANALOG DETECTOR

C21 .33

CR22

Q12

R10 1 MEG

R51 5K

R43 32.4K

3.4K R11

LO PATH 3A/G3

LOSS 559C-B IC2

R19 20K

CR8

Q4

R18 1 MEG

+2.5V 3D/G0

R15 1 MEG

NOISE 559C-C IC3

R14 20K

CR6

Q3

2.94K R16

-15

R44 43.2K

3A/G3 LL PATH

LLP 418P-B IC19

R45 10K

Q13

R46 6K

+5

3A/G3 NO PATH

NOP 418P-C IC19

NOISE IC20 41U-C

3A/G3 NT PATH

NTP 418P-G IC19

R8 21.8K NFIL 3B/G5

NOP 559C-B IC3

R17 20K

CR7

Q2

R9 1 MEG

+2.5V 7D/G0

R6 1 MEG Q1

NTP 559C-D IC3

R4 20K

CR5

R7 5.76K CFIL 3B/E9

R5 169K

R52 50K

C20 4.7

NPTH 559C-A IC3

17.8K R13

SEE NOTE 1

B15 DC IN

R48

R12 15K

5K

NC

ACTN 559C-C IC2

2.49K R20

C19 4.7

NC SPARE IC19 418P-A NC

+5 SPARE IC20 41U-B NC

3D/B0 TRMS R42 6.81K

C1 C2

RMS CONV 4341

R1 R2 R6 R10 R3 R4 R5 R9 R7 R8

1.5 C18

K3/D4

NOTES:

1. PROVIDE SPACE FOR A KS-20616, L1A RESISTOR BUT DO NOT PROVIDE RESISTOR.

CPS 7

ISSUE 1

MINI-ROTL

SD-99392-01-J3C

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT

LOGARITHMIC CONVERTER

3A/G2 RECYCL
3C/D8 TRMS
3A/G3 CHG
3A/G3 DISCHG
G6 DISCHG
3A/G3 NO REF
3A/G4 LL REF
3A/G4 LU REF
3C/E3,3C/G1 +2.5V

RCY 559C-A IC2
CHG 559C-D IC2
DISC 559C-B IC1
NOR 559C-C IC1
LLR 559C-A IC1
LOR 559C-D IC1

R21 20K
R23 20K
R29 20K
R34 20K
R35 20K
R33 20K
R30 1.2K
R31 4.42K
R32 162
R36 75
R49 500
R50 50
R37 10K
R38 72.61
R40 529.12
R39 448.49
R41 523
R25 12.6K
R26 107K
R47 10K
R27 2 MEG
R28 10K
R43 2 MEG
R1 6.19K

C13 .768
C14 .768
C16 .33
C17 .33
C15 .33
C6 2.2

CR9 CR10 CR11 CR18 CR17 CR15 CR12 CR16 CR3 CR4 CR19 CR1 CR21 CR14 CR13 CR20

Q5 Q6 Q7 Q8 Q10 Q9 Q11

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10

MEAS MA727-A IC10
MEAS SN72710N-A IC4
MEAS 4IBP-F IC19

M1 IC20 4IU-D
M2 IC20 4IU-A
MEAS 3B/D1

DSCG IC30 SN74123N-A
D0 DISCHG
+5
NC

+12 -12 -6V -15

CPS 7

ISSUE 1

MINI-ROTL

SD-99392-01-J3D

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT

COMPONENT LIST

INTEGRATED CIRCUITS

LOC ON CP	IC1		IC2		IC3		IC4 (SEE NOTE 1)		IC5		IC6		IC7		IC8		IC9		IC10 (SEE NOTE 2)		IC11		IC12		IC13		IC14		IC15 (SEE NOTE 1)		LOC ON CP
CODE	559C		559C		559C		*SN7271ON		*618LA		*618DS		*618DK		*41CH		*41CH		*MA727		*618KY		*618DR		*618DL		*41CH		*SN74LS257N		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	LLR	3D/F1	RCY	3D/A1	NPTH	3C/G4	MEAS	3D/C8	HPF3	3C/B4	CMF4	3B/D8	NF1	3B/G8	CNT1	3B/B1	CNT2	3B/B3	MEAS	3D/C7	HPF2	3C/B2	CMF3	3B/D7	NF2	3B/G7	CNT6	3B/B8	POB12	3A/C7	A
B	DISC	3D/D1	LOSS	3C/E3	NOP	3C/G1																									B
C	NOR	3D/E1	ACIN	3C/E6	NOISE	3C/F3																									C
D	LOR	3D/G1	CHG	3D/C1	NTP	3C/H1																									D
E																															E
F																															F
G																															G

LOC ON CP	IC16		IC17		IC18 (SEE NOTE 1)		IC19 (SEE NOTE 2)		IC20		IC21		IC22		IC23		IC24		IC25		IC26 (SEE NOTE 1)		IC27		IC28		IC29 (SEE NOTE 2)		IC30 (SEE NOTE 1)		LOC ON CP
CODE	*41CH		*SN74LS257N		*93L08PC		418P		41U		*618KW		*618DN		*618DP		*618DM		*41CH		*SN74LS257N		*41CH		*SN74LS257N		*93L08PC		SN74123N		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	CNT5	3B/B7	POA12	3A/B7	PII2	3A/B2	SPARE	3C/F5	M2	3D/F8	HPF1	3C/B1	CMF1	3B/D5	CMF2	3B/D6	NF3	3B/G6	CNT4	3B/B6	POB13	3A/F7	CNT3	3B/B4	POA13	3A/E7	PII3	3A/E2	DSCG	3D/G6	A
B							LLP	3C/E1	SPARE	3C/G5																			DATA	3B/D2	B
C							NOP	3C/F1	NOISE	3C/F1																					C
D							RCY	3B/C1	M1	3D/E8																					D
E							TST	3A/G8																							E
F							MEAS	3D/C9																							F
G							NTP	3C/F1																							G

*SINGLE ELEMENT IC

CAPACITORS

DESIG	LOC	CODE
C1	3B/G1	602F
C2	3B/G1	
C3	3B/G2	
C4	3B/G3	
C5	3B/G3	602A
C6	3D/G6	605G
C7	3B/E2	601F
C8	3B/G0	KS-19774,L5,.1
C9	3B/G1	
C10	3B/G2	
C11	3B/G2	
C12	3B/G3	
C13	3D/C3	578D
C14	3D/C3	578D
C15	3D/G2	KS-19774,L5,.33
C16	3D/E2	
C17	3D/G2	
C18	3C/F9	KS-19774,L9,1.5
C19	3C/E7	KS-20736,L2,4.7
C20	3C/G4	KS-20736,L2,4.7
C21	3C/D0	KS-19774,L5,.33
[27] C22 - C48	SEE NOTE 3 ON SHEET J3F	KS-19774,L2,.01

DIODES

DESIG	LOC	CODE
CR1	3D/G7	458C
CR2	3B/E2	
CR3	3D/B7	
CR4	3D/B7	
CR5	3C/H2	
CR6	3C/F3	
CR7	3C/G2	
CR8	3C/E3	
CR9	3D/A2	
CR10	3D/C2	

DIODES (CONT)

DESIG	LOC	CODE
CR11	3D/D2	458C
CR12	3D/C6	
CR13	3D/H2	
CR14	3D/H2	
CR15	3D/G3	
CR16	3D/D6	
CR17	3D/F3	
CR18	3D/E3	
CR19	3D/D8	808B
CR20	3D/H2	808G
CR21	3D/H4	IN938B (SEE NOTE 3)
CR22	3C/D1	458C

OSCILLATORS

DESIG	LOC	CODE
1MHZ	3B/B0	1038

POTENTIOMETERS

DESIG	LOC	CODE
R47	3D/B6	KS-19646,L3A, 10K
R48	3C/D6	5K
R49	3D/G4	500
R50	3D/G4	50
R51	3C/D3	5K
R52	3C/G4	50K

RESISTORS

DESIG	LOC	CODE
R1	3D/G7	KS-20516,L1A,6.19K
R2	3B/E2	KS-20616,L1A,34K
R3	3D/C7	KS-20810,L1A, 2MEG
R4	3C/H1	KS-20616,L1A, 20K
R5	3C/G4	KS-20616,L1A, 169K
R6	3C/H2	1MEG
R7	3C/H3	KS-16313,L4F, 5.76K
R8	3C/F3	KS-16313,L4F, 21.8K
R9	3C/G2	KS-20616,L1A, 1MEG
R10	3C/D2	1MEG
R11	3C/D4	3.4K
R12	3C/D5	KS-20616,L1A, 15K
R13	3C/H4	17.8K
R14	3C/F3	20K
R15	3C/E4	1MEG
R16	3C/F4	KS-16313,L4F, 2.94K
R17	3C/G1	KS-20616,L1A, 20K
R18	3C/E4	1MEG
R19	3C/E3	20K
R20	3C/E5	2.49K
R21	3D/A2	KS-20616,L1A, 20K
R22	3D/A3	1MEG
R23	3D/C2	20K
R24	3D/B3	1MEG
R25	3D/C6	KS-20321,L1F, 12.6K
R26	3D/B6	KS-20616,L1A, 107K
R27	3D/C5	KS-20810,L1A, 2MEG
R28	3D/C5	KS-20616,L1A, 10K
R29	3D/D2	20K
R30	3D/G0	1.27K
R31	3D/G1	4.42K
R32	3D/H1	KS-20616,L1A, 162
R33	3D/G2	20K
R34	3D/E2	
R35	3D/F2	75
R36	3D/G3	
R37	3D/G4	DAVEN ± .01% ,10K OR EQUIVALENT 1301

RESISTORS (CONT)

DESIG	LOC	CODE
R38	3D/D4	DAVEN ± .02%, OR EQUIVALENT 1301 72.61
R39	3D/F4	448.49
R40	3D/E4	529.12
R41	3D/D7	523
R42	3C/D9	KS-20616,L1A, 6.81K
R43	3C/D4	32.4K
R44	3C/E0	KS-16313,L4F,43.2K
R45	3C/E1	KS-20616,L1A,10K
R46	3C/E1	KS-20616,L1A,6K

TRANSISTORS

DESIG	LOC	CODE
Q1	3C/H2	2N4859 (SEE NOTE 3)
Q2	3C/G2	
Q3	3C/F4	
Q4	3C/E4	
Q5	3C/A4	
Q6	3D/C4	
Q7	3D/C5	
Q8	3D/C6	
Q9	3D/F4	
Q10	3D/E4	
Q11	3D/G4	
Q12	3C/D2	
Q13	3C/E2	518

NOTES:

1. ALL TMS CODES MAY BE OBTAINED FROM "TEXAS INSTRUMENTS" OR EQUIVALENT.
2. MAY BE OBTAINED FROM "FAIRCHILD" OR EQUIVALENT.
3. ALL IN- AND 2N-CODES MAY BE OBTAINED FROM "MOTOROLA" OR EQUIVALENT.

CPS 7

ISSUE 1

MINI-ROTL (2)

SD-99392-01-J3E

BELL TELEPHONE LABORATORIES INCORPORATED 6S

PRINTED IN U.S.A.

P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT

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. DESIGNATED BATTERY AND GROUND RETURN TERM. FOR ICS.

IC CODE	IC LOC	+5V ON TERM.	-6V ON TERM.	+12V ON TERM.	-12V ON TERM.	+15V ON TERM.	-15V ON TERM.	GRD ON TERM.	BY PASS CAP. TO GRD
559C	IC1					3			C46
						6			
							10		
							15		C45
	IC2					3			C44
						6			
							10		
							15		C43
	IC3					3			C42
						6			
							10		
							15		C41
SN72710N	IC4		6					2	C40
				11					C38
HPF3 618LA	IC5			13				5,7	C37
					12				C36
CMF4 618DS	IC6			13				5,8	C35
					12				C34
NF1 618DK	IC7			13				5,7	C33
					12				C32
4ICH	IC8	16						8	
	IC9	16						8	
MA727	IC10				5			2	C39
				1,7					
HPF2 618KY	IC11			13				5,7	
					12				
CMF3 618DR	IC12			13				4,7	
					12				
NF2 618DL	IC13			13				2,5,7	
					12				
4ICH	IC14	16						8	C47
SN74LS257N	IC15	16						8	
4ICH	IC16	16						8	
SN74LS257N	IC17	16						8	
93L08PC	IC18	1,13,24						12	C31
4IBP	IC19	16						8	
4IU	IC20	16						8	
HPF1 618KW	IC21			13				5,7	C30
					12				C29
CMF1 618DN	IC22			13				4,7	C28
					12				C27
CMF2 618DP	IC23			13				4,7	C26
					12				C25
NF3 618DM	IC24			13				5,7	C24
					12				C23
4ICH	IC25	16						8	C48
SN74LS257N	IC26	16						8	
4ICH	IC27	16						8	
SN74LS257N	IC28	16						8	
93L08PC	IC29	1,13,24						12	C22
SN74123N	IC30	3,16						1,8	
		10,11							

MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-35065-01
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-35119-( )
CONNECTOR ON FRAME	

SYMBOL

SEE SHEET J3G

CIRCUIT DESCRIPTION
SEE CD-35065-01.

INPUT/OUTPUT INFORMATION
SEE NOTE 302.

CPS 7

ISSUE 2A

MINI-ROTL

SD-99392-01-J3F

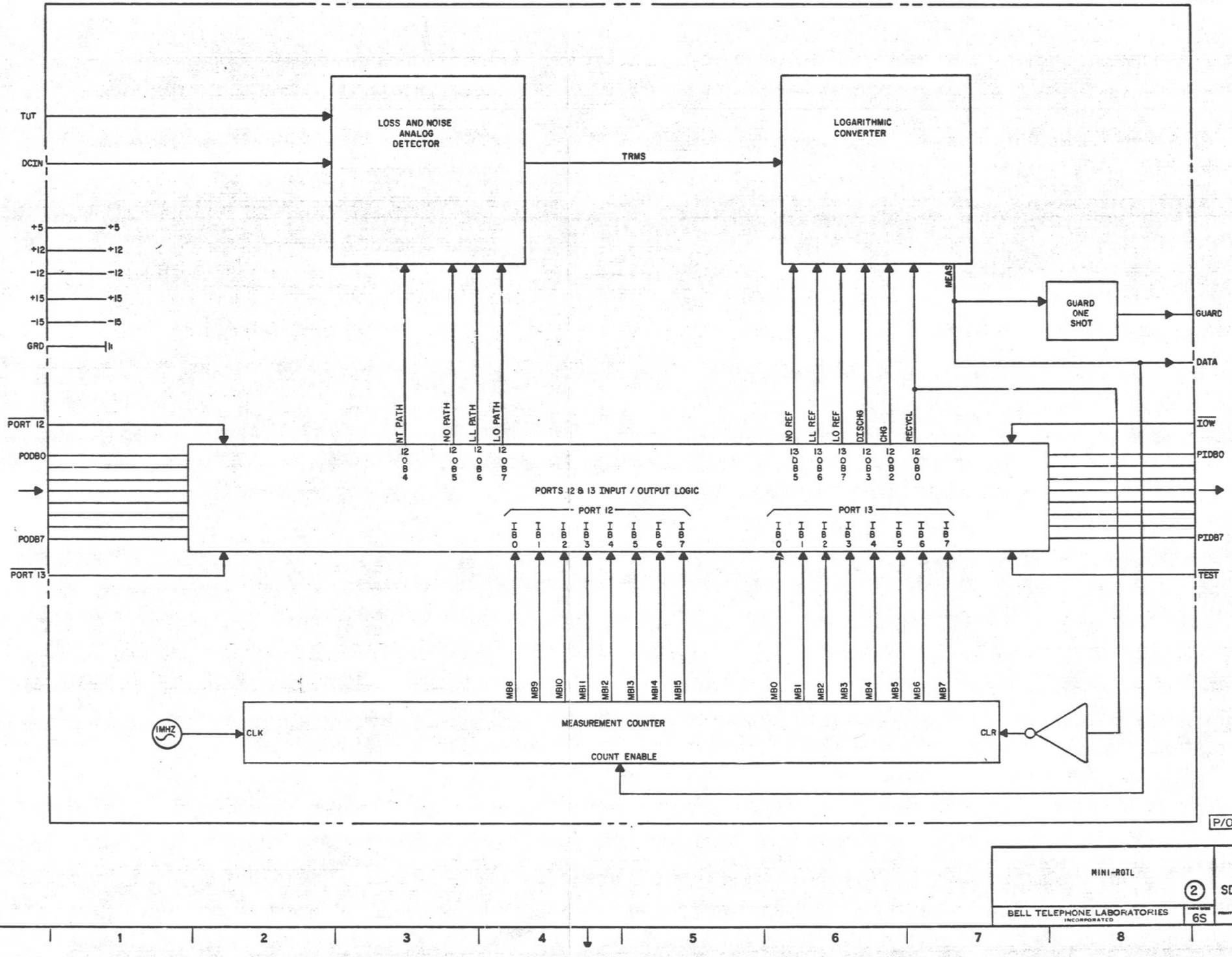
BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

P/O CPS 7

LOSS AND NOISE MEASUREMENT CIRCUIT
SYMBOL



P/O CPS 7

ISSUE 1

MINI-ROTL

(2)

SD-99392-01-J3G

BELL TELEPHONE LABORATORIES INCORPORATED

6S

PRINTED IN U.S.A.

P/O CPS 12

DATA PORT AND TONE DETECTORS

PORT 5 INPUT / OUTPUT STEERING AND LATCH CIRCUIT

SPI
SN75189N-C
IC24

PI5
IC29
93L08PC-A

POA5
IC27
SN74LS257N-A

POB5
IC28
SN74LS257N-A

TST
41BP-F
IC18

ST
IC32
41FP-A

ECHO
IC32
41FP-B

SPARE
IC32
41FP-C

SPARE
SN75189N-D
IC24

SPARE
IC4
559C-C

SPARE
IC4
559C-B

R32 1K

R34 1K

C8 40

C9 15

C10 15

C11 .1

C12 .1

C13 .1

CPS 12

ISSUE 1

MINI-ROTL

SD-99392-01-J4A

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

P/O CPS 12

DATA PORT AND TONE DETECTORS

1270HZ CARRIER FILTERS

ROTL

C7

ROTL 4C/B1

CAR1 IC19 6I8GG-A

CAR2 IC20 6I8GH-A

CAR3 IC21 6I8GJ-A

NC -12 +12

1K R49

CARRIER DETECTOR

R46 30.1K

R50 1K

BUF IC16 559C-A

C14

R48 10K

R47 10K

+5

3.83K R5

R4 1.1K

R3 5.11K

RECT IC16 559C-B

CR1

COMP IC16 559C-C

5.9K R

R2 12.1K

1.45 C1

R8 10K

R6 4.02K

CR3

CAR DET IC23 4IN-A

CAR DET 4A/D6

EIA ON G5

B15 EIA ON

CR2

LIM IC16 559C-D

R9 1K

CR6

R7 1K

USART ADDRESS DECODER

SDB0 C12
SDB1 C13
SDB2 C14
SDB3 C15
SDB4 C16
SDB5 C17
SDB6 C18
SDB7 C19
IOR C20
Ø2 B20

4C/G6 Ø2

4A/D1 IOW

USART 8251-A IC30

D0 D1 D2 D3 D4 D5 D6 D7 RD CLK WR CS C/D RESET RXC TXC DSR GRD VCC TXD RXRDY TXRDY SYN DET TX EMPTY DTR

TXC RXC 4C/G1

TXD IC18 4IBP-E

RXD IC23 4IN-D

NCS IC17 9015DC-C

CS IC18 4IBP-C

ADI IC17 9015DC-B

RESET IC17 9015DC-A

AB5 B13
AB7 B12
AB4 B14

ADI IC18 4IBP-A

AD2 IC17 9015DC-D

AD2 IC32 4IFP-D

MODEM CONTROL AND LOCAL EIA INPUT

E9 ECHO

AD3 IC18 4IBP-D

4C/H4 OSCIN

TXD IC23 4IN-C

RDX IC23 4IN-B

RXDATA 4A/D6

AD2 IC18 4IBP-B

B9 EIA ON

EIAON IC24 SN75189N-B

-12 20K R12

MODEM IC22 MC14412VL-A

VDD RXRATE TYPE OSCIN TXDATA RXDATA TTLD VSS MODE RESET OSCOUT RXCAR TXCAR TXENABLE ECHO ST

ECHO E5

ECHO 4A/F5

ST 4A/F4

B19 TXCAR

B16 TXRTRR

+12 R14 1K C10 DCD

C2 DTR

C9 TXEIA

C4 RXEIA

IC19 TXEIA 559C-A

+5 R 4.02K

4.02K R11

-12 R13 10K

RXEIA IC24 SN75189N-A

NC

CPS 12

ISSUE 1

MINI-ROTL

SD-99392-01-J4B

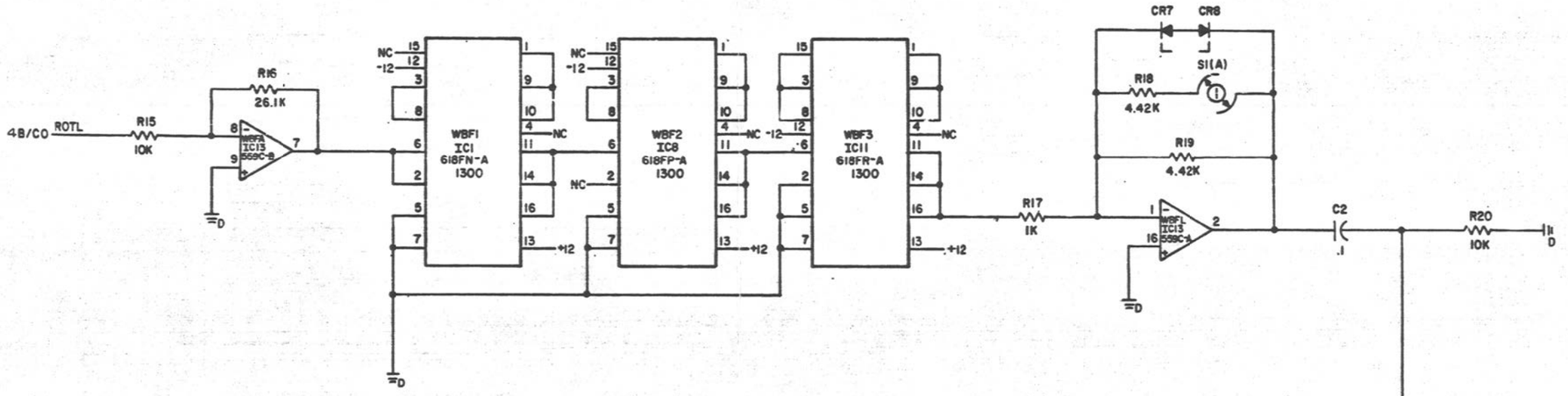
BELL TELEPHONE LABORATORIES INCORPORATED

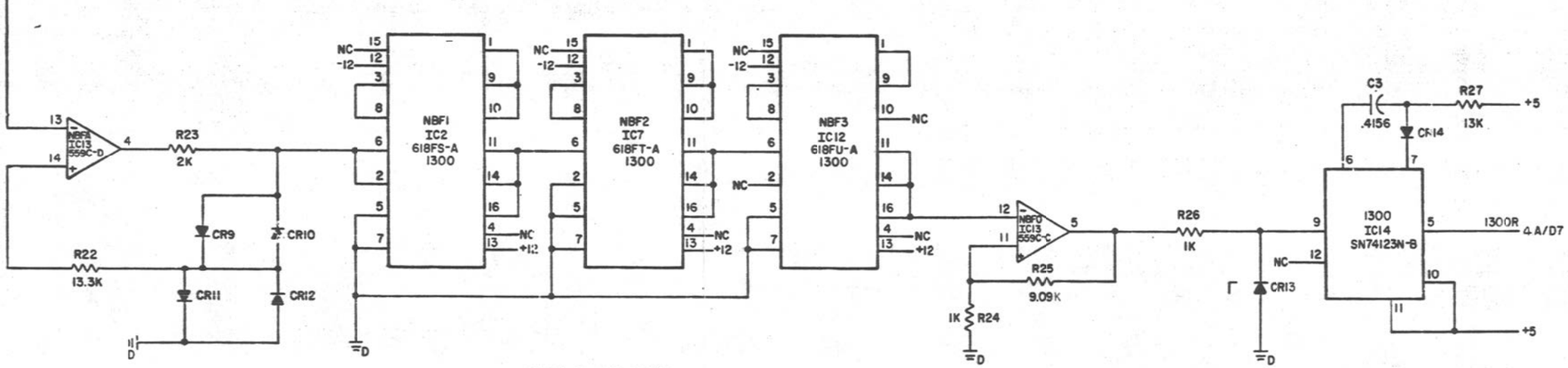
SIZE 6S

P/O CPS 12

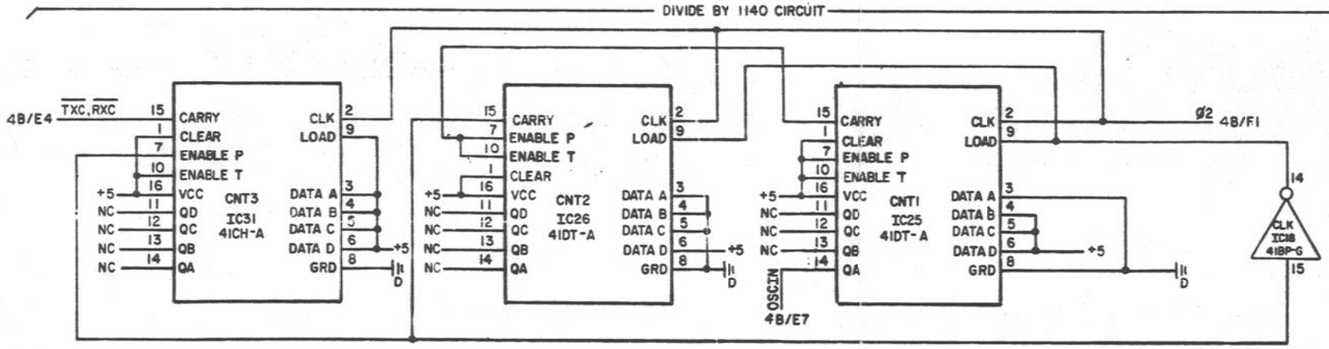
DATA PORT AND TONE DETECTORS

1300 HZ DETECTOR





DIVIDE BY 1140 CIRCUIT



CPS 12

ISSUE 1

MINI-ROTL

SD-99392-01-J4C

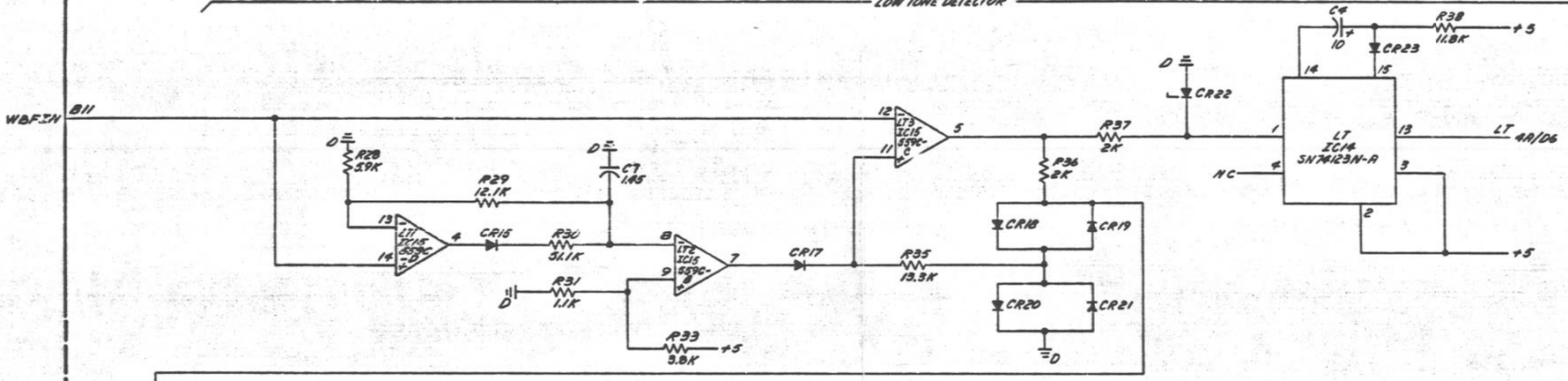
BELL TELEPHONE LABORATORIES INCORPORATED

6S

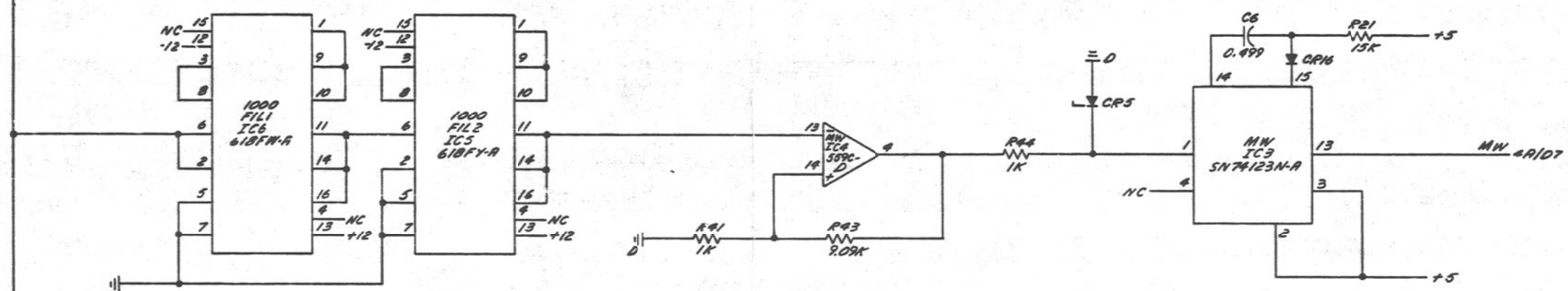
P/O CPS12

DATA PORT AND TONE DETECTORS

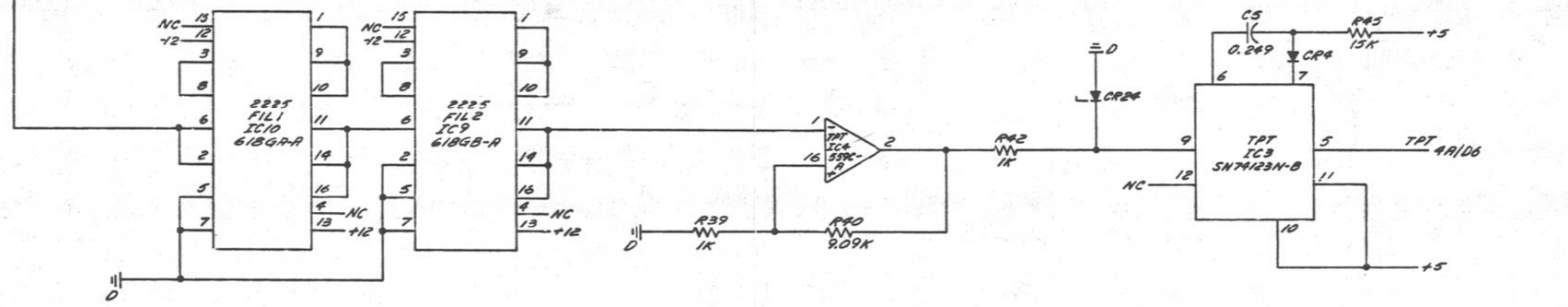
LOW TONE DETECTOR



MILLIWATT DETECTOR



TPT DETECTOR



CPS12

MINI-ROTL		DWG SIZE 65	ISSUE 2A
BELL LABORATORIES	SD-99392-01-		J4D

(5-7001 (5-75) PRINTED IN U.S.A.

P/O CPS 12

DATA PORT AND TONE DETECTORS

COMPONENT LIST

INTEGRATED CIRCUITS

LOC ON CP	IC1		IC2		IC3 (SEE NOTE 3)		IC4		IC5		IC6		IC7		IC8		IC9		IC10		IC11		IC12		IC13		IC14 (SEE NOTE 3)		IC15		IC16		LOC ON CP
CODE	*618FN		*618FS		SN74123N		559C		*618FY		*618FW		*618FT		*618FP		*618GB		*618GA		*618FR		*618FU		559C		SN74123N		559C		559C		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	WBFI	4C/B3	NBFI	4C/E3	MW	4D/E7	TPT	4D/G5	8000 FIL2	4D/D3	8000 FIL1	4D/D2	NBF2	4C/E4	WBF2	4C/B4	2225 FIL2	4D/G3	2225 FIL1	4D/G2	WBF3	4C/B5	NBF3	4C/E5	WBFL	4C/C6	LT	4D/B7	TXEIA	4B/G6	BUF	4B/A4	A
B					TPT	4D/G7	SPARE	4A/G7																	WBFA	4C/B2	1300	4C/E8	LT2	4D/C3	RECT	4B/B4	B
C							SPARE	4A/G6																	NBFO	4C/E6			LT3	4D/B4	COMP	4B/B6	C
D							MW	4D/E5																	NBFA	4C/E1			LT1	4D/C2	LIM	4B/C7	D
E																																	E
F																																	F
G																																	G

LOC ON CP	IC17 (SEE NOTE 1)		IC18		IC19		IC20		IC21		IC22 (SEE NOTE 2)		IC23		IC24 (SEE NOTE 3)		IC25		IC26		IC27		IC28 (SEE NOTE 3)		IC29 (SEE NOTE 1)		IC30 (SEE NOTE 4)		IC31		IC32		LOC ON CP
CODE	9015DC		41BP		*618GG		*618GH		*618GJ		*MC4412VL		41N		SN75189N		*41DT		*41DT		*SN74LS257N		*SN74LS257N		*93L08PC		*8251		*41CH		41FP		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	RESET	4B/G2	ADI	4B/H0	CARI	4B/B1	CAR2	4B/B2	CAR3	4B/B3	MODEM	4B/F8	CAR DETI	4B/B7	RXEIA	4B/H6	CNTI	4C/G4	CNT2	4C/G3	POA5	4A/B7	POB5	4A/C7	PI5	4A/C2	USART	4B/F3	CNT3	4C/G1	ST	4A/E4	A
B	ADI	4B/G1	AD2	4B/F5									$\overline{RDX}$	4B/F5	EIAON	4B/G6															ECHO	4A/E5	B
C	NCS	4B/F2	CS	4B/F2									TXD	4B/E6	SPI	4A/A3															SPARE	4A/F6	C
D	AD2	4B/H4	AD3	4B/E6									RXD	4B/G4	SPARE	4A/G4															AD2	4B/H5	D
E			TXD	4B/E4																													E
F			TST	4A/C8																													F
G			CLK	4C/H6																													G

*SINGLE ELEMENT IC

CAPACITORS

DESIG	LOC	CODE
C1	4B/C6	535CJ
C2	4C/C7	542AD
C3	4C/E8	535L
C4	4D/A7	603E
C5	4D/F7	542C
C6	4D/D7	535KN
C7	4D/B3	535CJ
C8	4A/G3	602A
C9	4A/G2	602F
C10	4A/G1	602F
C11	4A/G2	KS-19774,L5,.1
C12	4A/G1	
C13	4A/G0	
C14	4B/A5	
[23]C15-C37	SEE NOTE 3 ON SHEET J4E	KS-19774,L2,.01

DIODES

DESIG	LOC	CODE
CR1	4B/B5	458D
CR2	4B/C6	458D
CR3	4B/B7	808B
CR4	4D/F7	458D
CR5	4D/D6	808CE
CR6	4B/C8	808B
CR7	4C/A6	
CR8	4C/A7	
CR9	4C/F2	458D
CR10	4C/F2	
CR11	4C/F1	
CR12	4C/F2	
CR13	4C/F7	808CE
CR14	4C/E8	458D
CR15	4D/C2	
CR16	4D/D7	
CR17	4D/C4	

DIODES (CONT)

DESIG	LOC	CODE
CR18	4D/B5	458D
CR19	4D/B5	
CR20	4D/C5	
CR21	4D/C5	
CR22	4D/B6	808CE
CR23	4D/A7	458D
CR24	4D/G6	808CE

RESISTORS

DESIG	LOC	CODE	
R1	4B/C4	KS-20616,L1A,	5.9K
R2	4B/C5		12.1K
R3	4B/B5		51.1K
R4	4B/B5		1.1K
R5	4B/B6		3.83K
R6	4B/B6		4.02K
R7	4B/C7		1K
R8	4B/D5		10K
R9	4B/C8		1K
R10	4B/G5		4.02K
R11	4B/H5		4.02K
R12	4B/F7		20K
R13	4B/H6		10K
R14	4B/G9		1K
R15	4C/B1		10K
R16	4C/B2		26.1K
R17	4C/C6		1K
R18	4C/B6		4.42K
R19	4C/B6		4.42K
R20	4C/C8		10K
R21	4D/D7		15K
R22	4C/F1		15.3K
R23	4C/E1		2K
R24	4C/F6		1K
R25	4C/F6		9.09K

RESISTORS (CONT)

DESIG	LOC	CODE	
R26	4C/F7	KS-20616,L1A,	1K
R27	4C/E8		13K
R28	4D/B1		5.9K
R29	4D/B2		12.1K
R30	4D/C3		5L1K
R31	4D/C3		1.1K
R32	4A/E8		1K
R33	4D/C3		3.8K
R34	4A/E8		1K
R35	4D/C4		13.3K
R36	4D/B5		2K
R37	4D/B5		2K
R38	4D/A7		11.8K
R39	4D/H4		1K
R40	4D/H5		9.09K
R41	4D/E4		1K
R42	4D/G5		1K
R43	4D/E5		9.09K
R44	4D/E5		1K
R45	4D/F7		15K
R46	4B/A4		30.1K
R47	4B/B4		10K
R48	4B/A5		10K
R49	4B/B4		1K
R50	4B/A4		1K

NOTES:

1. MAY BE OBTAINED FROM "FAIRCHILD" OR EQUIVALENT.
2. ALL MC CODES MAY BE OBTAINED FROM "MOTOROLA" OR EQUIVALENT.
3. ALL SN CODES MAY BE OBTAINED FROM "TEXAS INSTRUMENTS" OR EQUIVALENT.
4. MAY BE OBTAINED FROM "INTEL" OR EQUIVALENT.

CPS 12

ISSUE 2A

MINI-ROTL

SD-99392-01-J4E

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 12

DATA PORT AND TONE DETECTORS

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. DESIGNATED BATTERY AND GROUND RETURN TERM. FOR ICS.

IC CODE	IC LOC	+5V ON TERM.	+12V ON TERM.	-12V ON TERM.	GRD ON TERM.	BY PASS CAP. TO GRD
WBF1 618FN	IC1		13		5,7	
				12		
NBF1 618FS	IC2		13			
				12		
SN74123N	IC3	2,3,10,11,16			8	C20
559C	IC4		3,6			C25
				10,15		C26
1000 FIL2 618FY	IC5		13		2,5,7	
				12		
1000 FIL1 618FW	IC6		13		5,7	
				12		
WBF2 618FP	IC7		13			
				12		
NBF2 618FT	IC8		13		2,5,7	
				12		
2225 FIL2 618GB	IC9		13			
				12		
2225 FIL1 618GA	IC10		13		5,7	
				12		
WBF3 618FR	IC11		13		2,5,7	
				12		
NBF3 618FU	IC12		13		5,7	
				12		
559C	IC13		3			C16
			6			
				10		
				15		C15
SN74123N	IC14	2,3,10,11,16			18	C21
559C	IC15		3			C27
			6			
				10		
				15		C28
559C	IC16		3			C23
			6			
				10		
				15		C22
9015DC	IC17	16			8	C30
41BP	IC18	16				C29
CAR1 618GG	IC19		13		5,7	
				12		
CAR2 618GH	IC20		13			
				12		
CAR3 618GJ	IC21		13			
				12		
MC14412VL	IC22	16			8	C24
41N	IC23	16				C32
SN75189N	IC24	14			7	C31
41DT	IC25	16			8	C33
	IC26	16				C34
SN74LS257N	IC27	16				C18
	IC28	16				C19
93L08PC	IC29	1,13,24			12	C17
8251	IC30	26			4	C37
41CH	IC31	16			8	C35
41FP	IC32	16				C36

MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-35065-01
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-35131-( )
CONNECTOR ON FRAME	

SYMBOL
SEE SHEET J4G

CIRCUIT DESCRIPTION
SEE CD-35065-01.

INPUT/OUTPUT INFURMATION
SEE NOTE 302

CPS 12

ISSUE 2A

MINI-ROTL

SD-99392-01-J4F

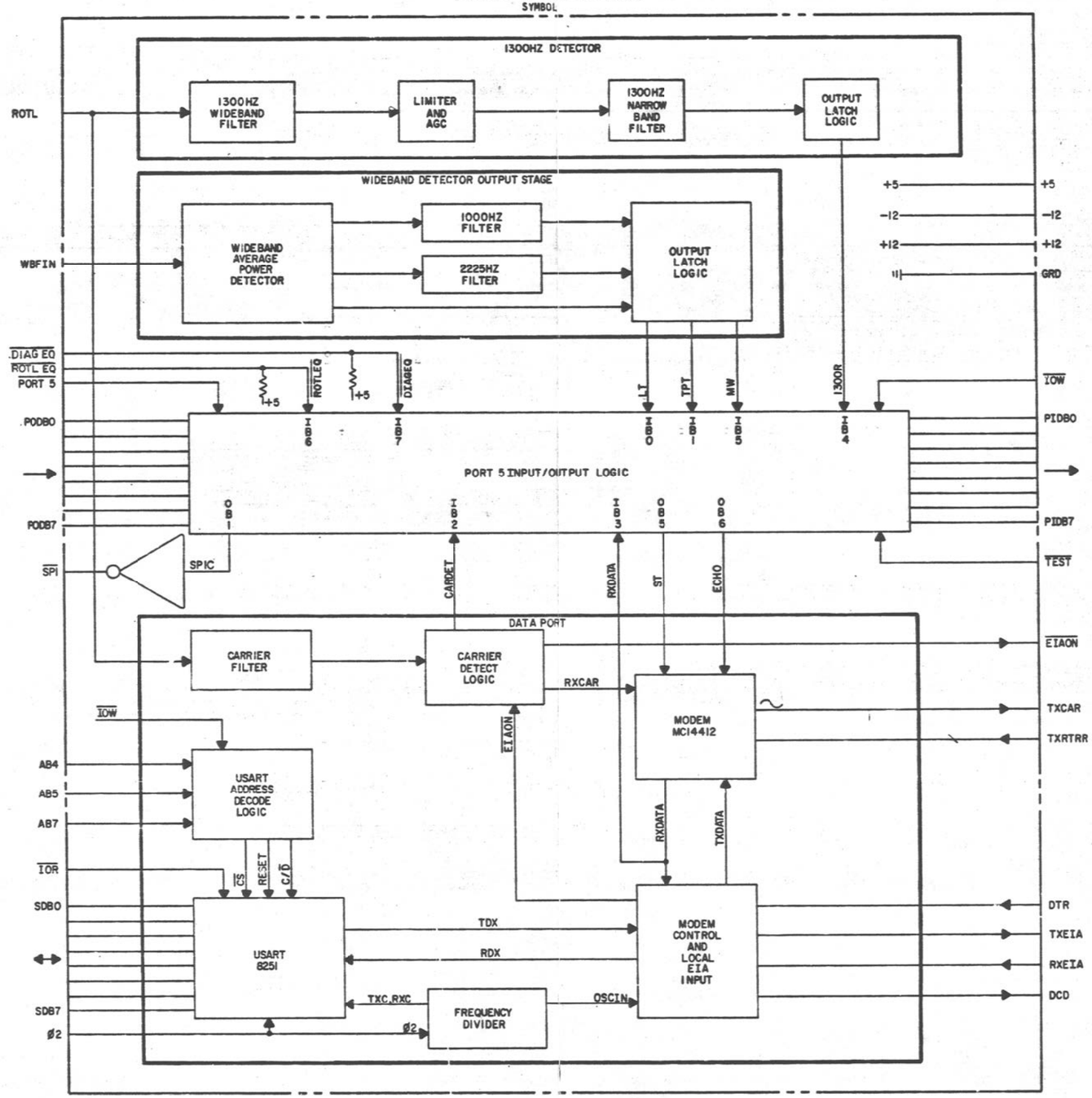
BELL TELEPHONE LABORATORIES INCORPORATED

6S

PRINTED IN U.S.A.

P/O CPS 12

DATA PORT AND TONE DETECTORS
SYMBOL



P/O CPS 12

ISSUE 2A

MINI-ROTL

(2)

SD-99392-01-J46

BELL TELEPHONE LABORATORIES INCORPORATED

6S

PART OF CPS 14

32K, 8 BIT WORD CONTROL STORE

IC1 D10 2716 EPROM
IC2 F10 2716 EPROM
IC3 H10 2716 EPROM
IC4 K10 2716 EPROM
IC5 D07 2716 SPARE (SEE NOTE 4)
IC6 F07 2716 SPARE (SEE NOTE 4)
IC7 H07 2716 SPARE (SEE NOTE 4)
IC8 K07 2716 SPARE (SEE NOTE 4)
IC9 D04 2716 EPROM
IC10 F04 2716 EPROM
IC11 H04 2716 EPROM
IC12 K04 2716 EPROM
IC13 D01 2716 EPROM
IC14 F01 2716 EPROM
IC15 H01 2716 EPROM
IC16 K01 2716 EPROM
IC17 P04 8212 8 BIT OUTPUT BUFFER
IC18 805 41W-A
IC18 805 41W-B
IC18 805 41W-C
IC18 805 41W-D
IC19 B07 ONE OUT OF SIXTEEN DECODER 129A
IC20 B10 614A VOLTAGE REGULATOR
IC21 B01 614A VOLTAGE REGULATOR

R1 P02 8B,L1 — 8 × 20K

CHIP SELECT DECODER

ADDRESS BITS

DATA BITS

MEMR

DIAGEQ

PART OF CPS14
32K, 8 BIT WORD CONTROL STORE

MINI-ROTL		DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-		J5A

PART OF CPS14

32K, 8 BIT WORD CONTROL STORE

COMPONENT LIST

INTEGRATED CIRCUIT

LOC ON CP	IC18 B05				IC19 B07		IC13‡ D01		IC9‡ D04		IC5‡ D07		IC1‡ D10		IC14‡ F01		IC10‡ F04		IC6 F07		IC2‡ F10		IC15‡ H01		IC11‡ H04		IC7 H07		IC3‡ H10		LOC ON CP
CODE	41W 41W, WECO				129A ✱ 129A, WECO		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		SEE NOTE 4		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		SEE NOTE 4		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		5A/G4				5A/F2		5A/E2		5A/D4		5A/B6		5A/B2		5A/E3		5A/D5		5A/B7		5A/B3		5A/E4		5A/D6		5A/D2		5A/D4	A
B		5A/F4																													B
C		5A/G4																													C
D		5A/H4																													D
E																															E
F																															F
BYPASS CAP.							C1						C2		C3						C4		C5						C6		BYPASS CAP.

LOC ON CP	IC16 K01		IC12‡ K04		IC8 K07		IC4‡ K10				IC17 P04				IC20 B10		IC 21 B01														LOC ON CP
CODE	~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1		SEE NOTE 4		~~2716 ✱~~ ~~2716, INTEL~~ KS-22060,L1				~~8212 ✱~~ ~~8212, INTEL~~ KS-21754,L1				614A ✱ 614A WECO		614A ✱ 614A WECO														CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		5A/E5		5A/D7		5A/D3		5A/B5				5A/F8				5A/G6		5A/G7													A
B																															B
C																															C
D																															D
E																															E
F																															F
BYPASS CAP.	C7						C8				C9																				BYPASS CAP.

✱ SINGLE ELEMENT IC
‡ SEE NOTE 4

CAPACITOR

DESIG	CODE
[9] C1-C9	KS-19774,L7, 0.01
C10,C12	KS-20736,L4, 0.1
C11,C13	KS-19774,L5, 0.33

NETWORK, RESISTOR

REF DESIG	R1			
LOC ON CP	P02			
DESIG	86,L1			
CODE	KS-21288,L1, 20K			
ELEM IDENT	DESIG	LOC	DESIG	LOC
A	1,16	5A/E7		
B	2,15	5A/E6		
C	3,14	5A/E7		
D	4,13	5A/E6		
E	5,12	5A/E7		
F	6,11	5A/E7		
G	7,10	5A/E7		
H	8,9	5A/E8		

CIRCUIT DESCRIPTION

SEE CD-99392-01

INPUT/OUTPUT INFORMATION

SEE CD-99392-01

NOTES: (CONT)

4. IC1 THROUGH IC5 PROGRAMMED PER 3 ESS ROTL RUNNING PROGRAM PR-350966, ISSUE 3. IC9 THROUGH IC16 PROGRAMMED PER 3 ESS ROTL DIAGNOSITC PROGRAM PR-350965, ISSUE 3. PF-350965 AND PF-350966 HAVE NOT BEEN ISSUED. SOCKETS ARE PROVIDED FOR IC6, IC7, AND IC8 FOR POSSIBLE FUTURE USE IN THE 3 ESS ROTL RUNNING PROGRAM PER PR-350966.

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-2C559-( )
CONNECTOR ON FRAME	

SYMBOL

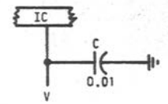
SHOWN ON J5C

NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS, INDUCTANCE VALUES ARE IN MICROHENRIES, VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.
3. DESIGNATED BATTERY AND RETURN TERM. FOR IC'S:

IC ✱✱ CODE	IC ✱✱ LOC	+5A ON TERM.	GRD ON TERM.	+5B ON TERM.
41W	IC18	16	8	
129A	IC19		12	
	IC1			
	IC2			
	IC3			
	IC4	24		
	IC5			
~~INTEL 2716~~ KS-22060,L1			12	
	IC9			
	IC10			
	IC11			
	IC12			
	IC13			24
	IC14			
	IC15			
	IC16			
~~INTEL 8212~~ KS-21754,L1	IC17	24	12	

✱✱ WHEN A BYPASS CAPACITOR IS SPECIFIED ON THE COMPONENT LIST TABLE FOR AN IC, CONNECT BETWEEN THIS TERMINAL AND GROUND AS SHOWN BELOW.



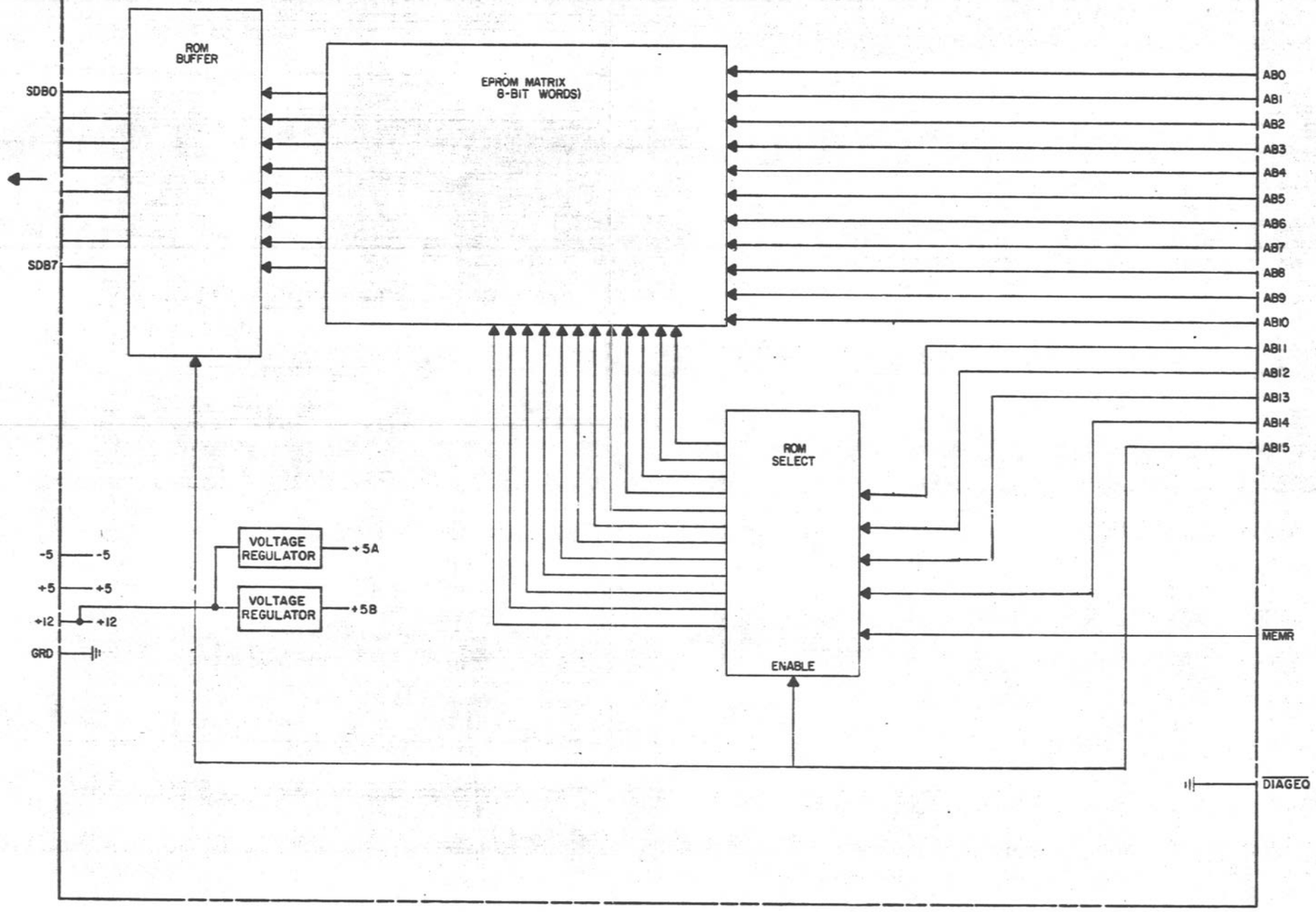
PART OF CPS14

32K, 8 BIT WORD CONTROL STORE

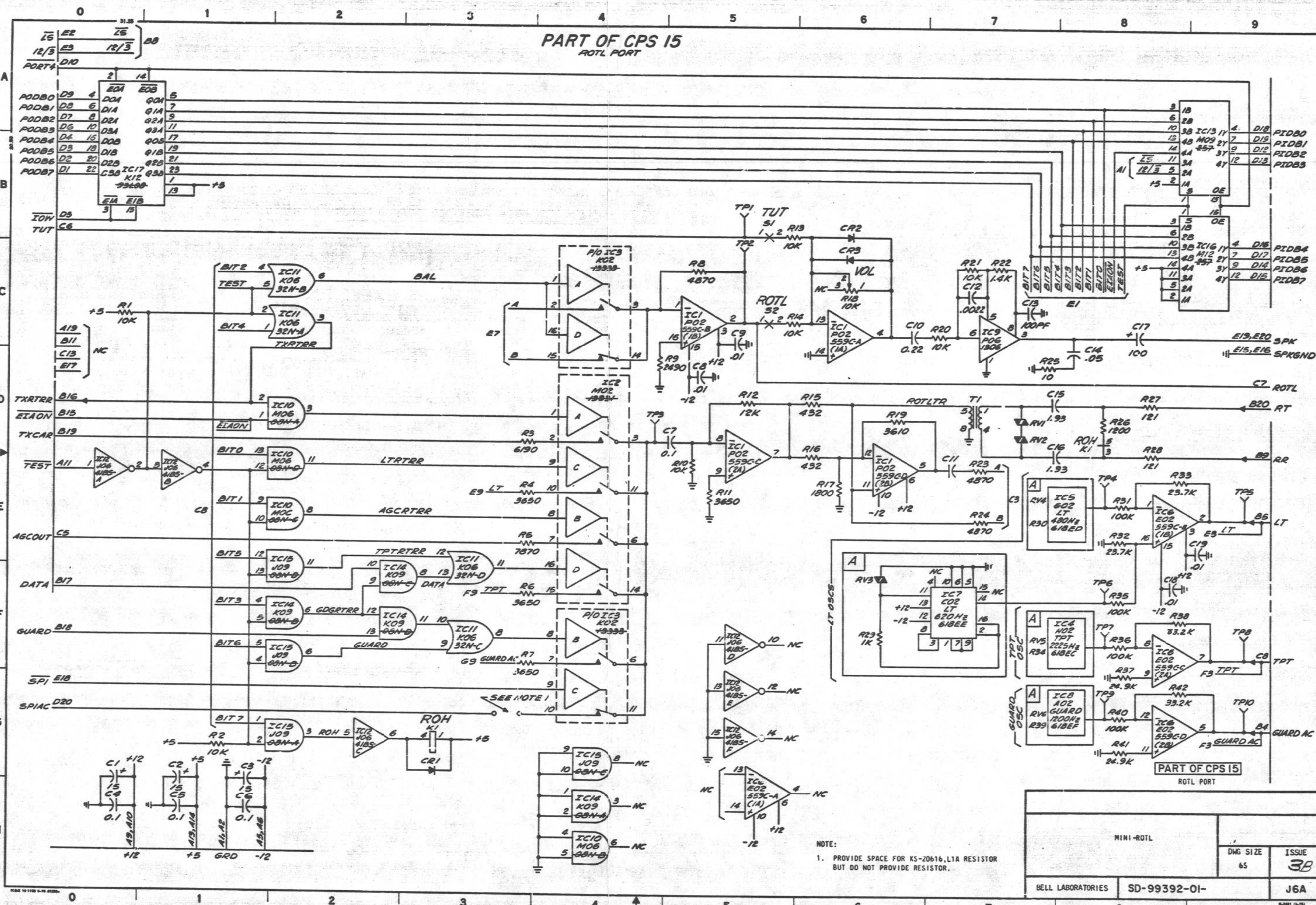
MINI-ROTL	DWG SIZE 6S	ISSUE 4A
BELL LABORATORIES	SD-99392-01-	J5B

P/O CPS 14

32K, 8 BIT WORD CONTROL STORE
SYMBOL



P/O CPS 14		ISSUE 1	
MINI-ROTL	(2)	SD-99392-01-J5C	
BELL TELEPHONE LABORATORIES INCORPORATED		CAGE CODE 6S	



NOTE:

1. PROVIDE SPACE FOR KS-20616,L1A RESISTOR BUT DO NOT PROVIDE RESISTOR.

MINI-ROTL	DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-	J6A

PART OF CPS 15

ROTL PORT

COMPONENT LIST

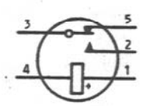
INTEGRATED CIRCUIT

LOC ON CP	IC12 J06			IC6 E02		IC1 P02			IC4 H02		IC5 G02		IC7 C02		IC8 A02			IC15 J09		IC14 K09		IC10 M06		IC11 K06			LOC ON CP
CODE	418S 418S, WECO			559C 559C, WECO		559C 559C, WECO			618EC * 618EC, WECO		618ED * 618ED, WECO		618EE * 618EE, WECO		618EF * 618EF, WECO			~~-08N~~ ~~SN74LS08N,TI~~ KS-21736,L35		~~-08N~~ ~~SN74LS08N,TI~~ KS-21736,L35		~~-08N~~ ~~SN74LS08N,TI~~ KS-21736,L35		~~-32N~~ ~~SN74LS32N,TI~~ KS-21736,L13			CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		6A/E0				6A/G5		6A/C6				6A/F8				6A/F7		6A/G8				6A/G2		6A/H4		6A/D2		6A/C2			A
B		6A/E1				6A/E8		6A/C5														6A/F2		6A/F2		6A/H4		6A/C2			B
C		6A/G2				6A/F8		6A/D5														6A/G4		6A/F2		6A/E2		6A/F3			C
D		6A/F5				6A/G8		6A/D6														6A/E2		6A/F2		6A/D2		6A/E3			D
E		6A/G5																													E
F		6A/G5																													F
BYPASS CAP	C20								C21	+12	C23	+12	C25	+12	C27	+12				C29		C30		C31						BYPASS CAP
									C22	-12	C24	-12	C26	-12	C28	-12															

LOC ON CP	IC13 M09		IC16 M12			IC2 M02		IC3 K02			IC17 K12			IC9 P06													LOC ON CP
CODE	~~257-X~~ ~~SN74LS257N,TI~~ KS-21285,L6		~~257-X~~ ~~SN74LS257N,TI~~ KS-21285,L6			~~13331~~ ~~LF13331, NAT.~~ KS-22116,L1		~~13333~~ ~~LF13333, NAT.~~ KS-22116,L2			~~93L08X~~ ~~93L08PC, FAIR~~ KS-21284,L12			~~1306-X~~ MC1306P, MOT. KS-22141,L1											CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		6A/A9		6A/B9				6A/D4		6A/C4				6A/B0				6A/C7									A
B								6A/E4		6A/F4																	B
C								6A/E4		6A/G4																	C
D								6A/E4		6A/C4																	D
E																											E
F																											F
BYPASS CAP	C32		C33			C34	+12	C36	+12		C38			C39													BYPASS CAP
						C35	-12	C37	-12																		

* SINGLE ELEMENT IC

RELAY



REF DESIG	K1
LOC ON CP	ROH
CODE	337A
OPTION	LOC
5	6A/D8
4	6A/G3
3	6A/D8
2	
1	6A/G3

CAPACITOR

DESIG	CODE
[3] C1-C3	602F
[4] C4-C7	KS-19774,L13, 0.1
[2] C8,C9	KS-19774,L7, .01
C10	KS-20736,L5, .22
C11	KS-19774,L9, 2.2
C12	KS-19774,L7, .0022
C13	KS-16958,L32, 100PF
C14	KS-13814,L1, .05
[2] C15,C16	535LY
C17	KS-16390,L6, 100
[22] C18-C39	KS-19774,L7, .01

CONNECTOR

DESIG	CODE
[10] TP1-TP10	KS-20417,L3

DIODE

DESIG	CODE
CR1	KS-16986,L2M
[2] CR2,CR3	458D

POTENTIOMETER

DESIG	CODE
R18	CLAROSTAT, 389N, 10K

RESISTOR

DESIG	CODE
[2] R1,R2	KS-20616,L1A, 10K
R3	KS-20616,L1A, 6190
R4	KS-20616,L1A, 3650
R5	KS-20616,L1A, 7870
[2] R6,R7	KS-20616,L1A, 3650
R8	KS-20616,L1A, 4870
R9	KS-20616,L1A, 2490
R10	KS-20616,L1A, 10K
R11	KS-20616,L1A, 3650
R12	KS-20616,L1A, 12K
[2] R13,R14	KS-20616,L1A, 10K
[2] R15,R16	KS-20616,L1A, 432
R17	KS-20616,L1A, 1800
R19	KS-20616,L1A, 3610
R20	KS-20616,L1A, 10K
R21	KS-20616,L1A, 10K
R22	KS-20616,L1A, 1.4K
[2] R23,R24	KS-20616,L1A, 4870
R25	KS-20616,L1A, 10
R26	KS-20289,L6C, 1200
[2] R27,R28	KS-20616,L1A, 121
[2] R29,R30	KS-20616,L1A, 1K
R31	KS-20616,L1A, 100K
[2] R32,R33	KS-20616,L1A, 23.7K
R34	KS-20616,L1A, 1K
[2] R35,R36	KS-20616,L1A, 100K
R37	KS-20616,L1A, 24.9K
R38	KS-20616,L1A, 33.2K
R39	KS-20616,L1A, 1K
R40	KS-20616,L1A, 100K
R41	KS-20616,L1A, 24.9K
R42	KS-20616,L1A, 33.2K

SWITCH

DESIG	CODE
[2] S1,S2	KS-19963,L8

TRANSFORMER

DESIG	CODE
T1	2564N

VARISTOR

DESIG	CODE
[2] RV1,RV2	103A
[4] RV3-RV6	100A

CIRCUIT DESCRIPTION

SEE CD-99392-01

INPUT/OUTPUT INFORMATION

SEE CD-99392-01

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-2C551-( )
CONNECTOR ON FRAME	

SYMBOL

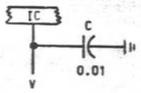
SEE SHEET J6C

NOTES:

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

IC ** CODE	+5 BAT. TERM.	+12 BAT. TERM.	-12 BAT. TERM.	GRD TERM.	TERM.	TERM.
418S	16			7,8		
~~-08N~~ KS-21736,L35	14			7		
~~-32N~~ KS-21736,L13	14			7		
~~257-~~ KS-21285,L6	16			8		
~~13331~~ KS-22116,L1		12	5	4		
~~13333~~ KS-22116,L2		12	5	4		
~~93L08~~ KS-21284,L12	24			12		
~~1306-~~ KS-22141,L1		4				
559C		6	10			

** WHEN A BYPASS CAPACITOR IS SPECIFIED ON THE COMPONENT LIST TABLE FOR AN IC CONNECT BETWEEN THIS TERMINAL AND GROUND, AS SHOWN BELOW.



PART OF CPS15
ROTL PORT

ISSUE 3B

MINI-ROTL

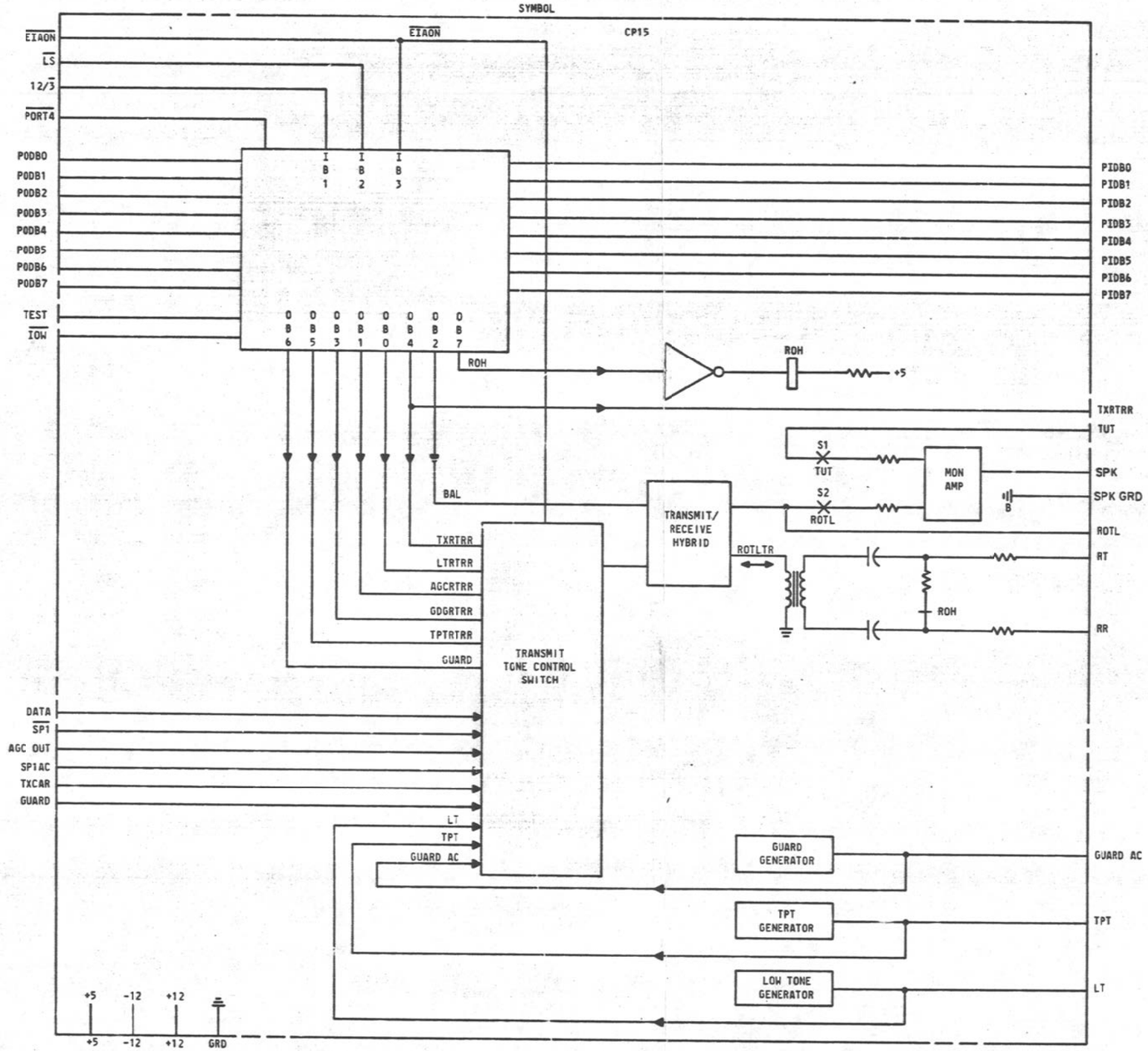
SD-99392-01-J6B

BELL TELEPHONE LABORATORIES INCORPORATED

SHEET 6S

PART OF CPS 15

ROTL PORT



PART OF CPS 15

ROTL PORT

MINI-ROTL		DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01-		J6C

PART OF CPS 16

105 TEST LINE & ROTL BUILDOUT

INPUT CKT

RELAYS CONTROL CKT

105 TEST LINE 1 CONN ACCESS CKT

TPT AMPL 1

105 TEST LINE 2 CONN ACCESS CKT

TPT AMPL 2

ROTL PORT CONN ACCESS CKT

OUTPUT CKT

PART OF CPS 16

105 TEST LINE & ROTL BUILDOUT

MINI-ROTL

DWG SIZE 6S

ISSUE 3B

BELL LABORATORIES

SD-99392-01-

J7A

PART OF CPS16

1G, TEST LINE & ROTL BUILDOUT

COMPONENT LIST

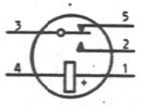
INTEGRATED CIRCUIT

LOC ON CP	IC1		IC7		IC2		IC5				IC8				IC3		IC6				IC4				IC9						LOC ON CP
	L01		L08		L03		L05				B08				P04		P07				A04				M11						
CODE	41BS		41BS		41EH		41EH				559C				~~257 *~~		~~257 *~~				~~1331~~				~~93L08 *~~						CODE
	41BS, WECO		41BS, WECO		41EH, WECO		41EH, WECO				559C, WECO				~~SN74LS257N,T1~~ KS-21285,L6		~~SN74LS257N,T1~~ KS-21285,L6				~~LF13331,NAT.~~ KS-22116,L1				~~93L08PC,FAIR~~ KS-21284,L12						
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		7A/D0		7A/D3		7A/C3		7A/D3				7A/B7				7A/G5		7A/G3				7A/D6				7A/C1					A
B		7A/E1		7A/E3		7A/B3		7A/D3				7A/D7										7A/D6									B
C		7A/B3		7A/F3		7A/A3		7A/D3				7A/E7										7A/B6									C
D		7A/C3		7A/C3		7A/B3		7A/C3				7A/F7										7A/B6									D
E		7A/B3		7A/D3																											E
F		7A/A3		7A/D3																											F
BYPASS CAP.				C15		C16												C17								C18					BYPASS CAP.

* SINGLE ELEMENT IC

RELAY

REF DESIG	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
FUNC DESIG	HB3	LCKT	LCKTA	LCKTB	PG	TCA	TCB	TCS	TTA	TTB
CODE	345A, 345B	345A, 345B	345A, 345B	345A, 345B	345A, 345B	345A, 345B	345A, 345B	345A, 345B	345A, 345B	345A, 345B
OPTION	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC	LOC
4	7A/G1	7A/G1	7A/E1	7A/F2	7A/F1	7A/F1	7A/G1	7A/F1	7A/F1	7A/G1
3	7A/G1	7A/G1	7A/E1	7A/F2	7A/F1	7A/F1	7A/G1	7A/F1	7A/F1	7A/G1
2	7A/B4	7A/C4	7A/C4	7A/C5	7A/D4	7A/A4	7A/A4	7A/E4	7A/D4	7A/D4
1	7A/B4	7A/C4	7A/C4	7A/C5	7A/D4	7A/A4	7A/A4	7A/E4	7A/D4	7A/D4



REF DESIG	K11	K12	K13	K14	K15
FUNC DESIG	CCN1A	CCN1B	CCN2A	CCN2B	HB3A
CODE	337A	337A	337A	337A	337A
OPTION	LOC	LOC	LOC	LOC	LOC
5	7A/A8	7A/C8	7A/D8	7A/E8	7A/G2
4	7A/B4	7A/B4	7A/C4	7A/C4	7A/B4
3	7A/A8	7A/C8	7A/D8	7A/E8	7A/G2
2	7A/A8	7A/C8	7A/D8	7A/E8	
1	7A/B4	7A/B4	7A/C4	7A/C4	7A/B4

CAPACITOR

DESIG	CODE
[2] C1,C2	535AB,0.1
[2] C3,C4	KS-19774,L2, .01
[4] C5-C8	KS-20736,L1, 1
[3] C9-C11	KS-19774,L5, 0.1
[3] C12-C14	602F
[4] C15-C18	KS-19774,L2, .01

DIODE

DESIG	CODE
[8] CR1-CR8	458C

POTENTIOMETER

DESIG	CODE
[3] R2,R12,R19	KS-19646,L3, 100

RESISTOR

DESIG	CODE
R1	KS-20616,L1A, 10K
R3	KS-20289,L6C, 1.4K
R4	KS-20616,L1A, 24Ω
R5	KS-20616,L1A, 47Ω
R6	KS-20616,L1A, 249
R7	KS-20616,L1A, 1K
R8	KS-20616,L1A, 10K
R9	KS-20616,L1A, 133K
R10	KS-20616,L1A, 10K
R11	KS-20616,L1A, 1K
R14	KS-20616,L1A, 1K
R15	KS-20616,L1A, 10K
R16	KS-20616,L1A, 133K
R17	KS-20616,L1A, 10K
R18	KS-20616,L1A, 1K
R21	KS-20616,L1A, 10K

VARISTOR

DESIG	CODE
[2] RV1,RV2	103A

CIRCUIT DESCRIPTION

SEE CD-99392-01

INPUT/OUTPUT INFORMATION

SEE CD-99392-01

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-2C552-( )
CONNECTOR ON FRAME	

SYMBOL

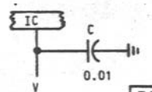
SEE SHEET J7C

NOTES:

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

IC ** CODE	+5 BAT. TERM.	+12 BAT. TERM.	-12 BAT. TERM.	GRD TERM.	TERM.	TERM.
41BS	16			7,8		
41EH	16			7,8		
~~257~~ KS-21285,L6	16			8		
559C						
~~1331~~ KS-22116,L1		12	5	4		
~~93L08~~ KS-21284,L12	24			12		

** WHEN A BYPASS CAPACITOR IS SPECIFIED ON THE COMPONENT LIST TABLE FOR AN IC, CONNECT BETWEEN THIS TERMINAL AND GROUND, AS SHOWN BELOW.



PART OF CPS 16

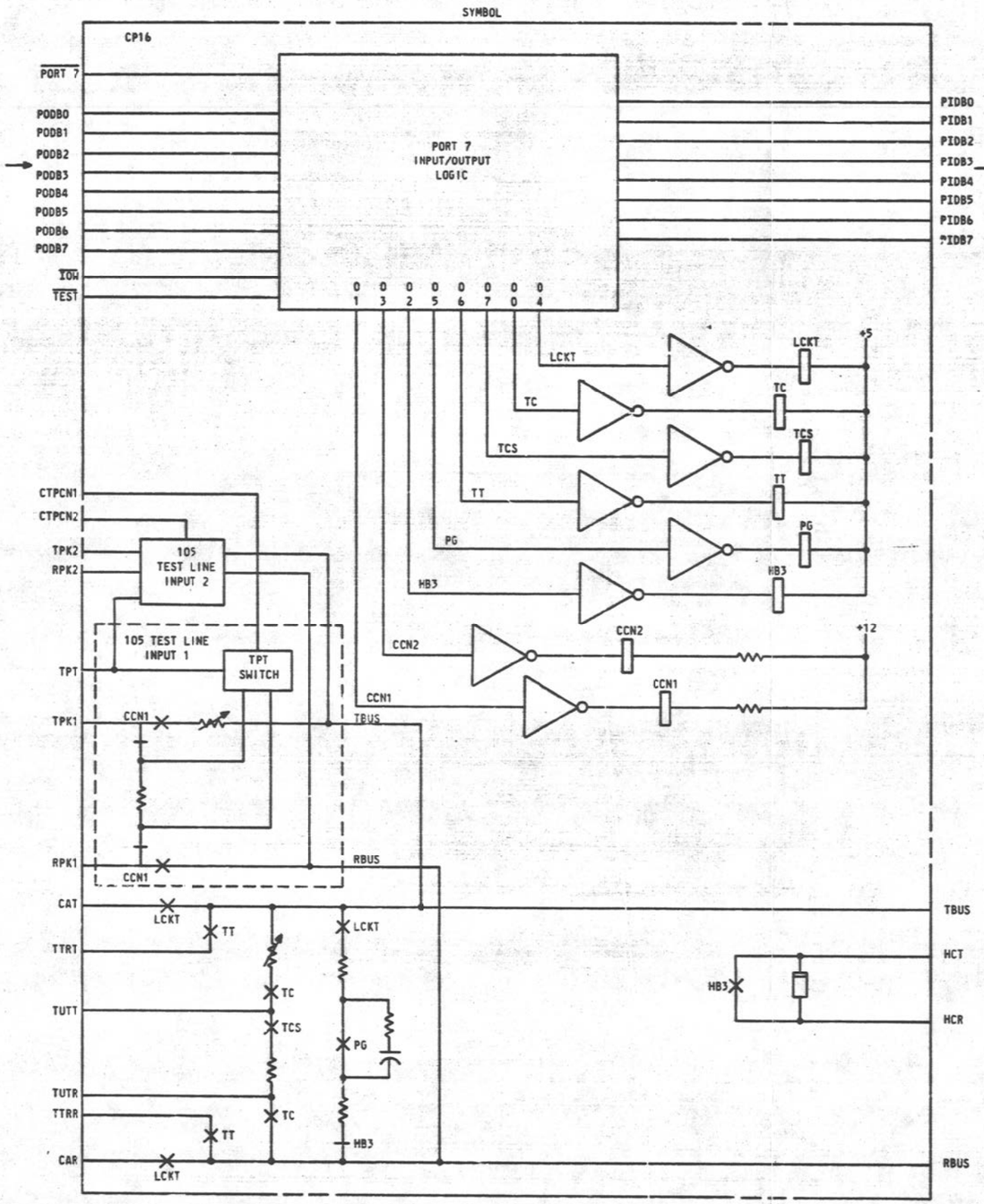
105 TEST LINE & ROTL BUILDOUT

MINI-ROTL		
	DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-	J7B

PART OF CPS 16

105 TEST LINE & ROTL BUILDOUT

SYMBOL



PART OF CPS 16

105 TEST LINE & ROTL BUILDOUT

MINI-ROTL		DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01-		J7C

PART OF CPS 17
3 ESS CHANNEL & MF OSCILLATORS

MESSAGE CHANNEL CLOCK CKT (÷284 OR ÷104)

IC19 B09 -08N-B

IC23 F12 9IDT 4-BIT BINARY (÷16)

IC24 D12 9IDT 4-BIT BINARY (÷16)

IC18 D09 41W-A

IC18 D09 41W-C

300 OR 1200 BAUD

110 BAUD

3/12

110

STRAP AFTER TEST

TSTFF1

TSTFF2

IOR

IOW

IC16 B07 41AA-A

IC16 B07 41AA-B

IC18 D09 41W-D

IC18 D09 41W-B

IC19 B09 -08N-A

IC19 B09 -08N-D

IC19 B09 -08N-E

FC=CS

FF=RST

C = FD (FF = DON'T CARE) — D = FC (FF = D.C.)

IC17 F09 FF ÷2 41AB-A

IC17 F09 FF ÷2 41AB-B

IC12 USART D06 8251

IC6 D03 5025

IC7 B03 5025

INPUT AMPLIFIER

OUTPUT AMPLIFIER

R23 F07 288,LI

PART OF CPSI7
3 ESS CHANNEL & MF OSCILLATORS

MINI-ROTL		DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-		J8A

PART OF CPS 17

3ESS CHANNEL & MF OSCILLATORS

MF OSCILLATORS

IC3 L01 1100 Hz 618DW — R13 1K — CR2 CR3

IC4 J01 1300 Hz 618DY — R14 1K — CR4 CR5

IC2 N01 900 Hz 618DU — R15 1K — CR6 CR7

IC1 P01 700 Hz 618DT — R16 1K — CR8 CR9

IC11 H04 1500 Hz 618EA — R17 1K — CR10 CR11

IC5 Q01 1700 Hz 618EB — R18 1K — CR12 CR13

OUTPUT AMPLIFIER

IC8 P04 4233A

P/O R20 L04 28B, L1 — 10K C, 10K D, 10K B, 10K A, 10K

C13 0.01 — C14 0.01

IC10 J04 559C-C (2A) — R12 178Ω — C1 MF OUT

IC10 J04 559C-D (2B) — NC

IC10 J04 559C-A (1A) — NC

IC10 J04 559C-B (1B) — NC

MFT 7 — MFT 9 — MFT 11 — MFT 13

IC13 P07 41EH-A — IC13 P07 41EH-B — IC18 P07 41EH-C — IC18 P07 41EH-D

TEST

PORT11-0
PORT11-1
C2 PORT11-2
PORT11-3

D2 PORT11-4
PORT11-5

D2 PORT11-6 — IC14 M07 41EH-C — E12 CTPCH1

D2 PORT11-7 — IC14 M07 41EH-D — E13 CTPCH2

IC14 M07 41EH-B — IC14 M07 41EH-A — MFT 17 — MFT 15

P/O R20 L04 28B, L1 — F 10K, E 10K, H 10K, G 10K

NC

IC9 M04 4233A

CNZ2 E3 E4 (90Ω)
CNZ1 E1 E2 +5 (60Ω)
CNPADE E7 E8 (-27Ω)
CNPADI E5 E6 +5 (OTL)
STRAP AS REQD

PORT11 — DI0

IC22 L10 8816B

PODB0 D9 — PORT11-0
PODB1 DB — PORT11-1
PODB2 D7 — PORT11-2
PODB3 D6 — PORT11-3
D5, F4

8A/F1 IOW

PODB4 D4 — PORT11-4
PODB5 D3 — PORT11-5
PODB6 D2 — PORT11-6
PODB7 D1 — PORT11-7
D5, F3 — D7, F3 — E7, F3

TEST A11

IC15 K07 4185-F — R11 10K — IC15 K07 4185-A — R19 10K

INPUT CKT

IC15 K07 4185-B — IC15 K07 4185-C — IC15 K07 4185-D — IC15 K07 4185-E — NC

OUTPUT CKT

TEST PORT11

D2 PORT11-7 PORT11-6 PORT11-5 PORT11-4

C2 PORT11-3 PORT11-2 PORT11-1 PORT11-0

IC21 M11 8B7 — IC20 P11 8B7 — SEL — OE

PIDB7 PIDB6 PIDB5 PIDB4 PIDB3 PIDB2 PIDB1 PIDB0

PART OF CPSI7

3 ESS CHANNEL & MF OSCILLATORS

MINI-ROTL	DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-	J88

E-7401 (5-79) PRINTED IN U.S.A.

PART OF CPS 17

3 ESS CHANNEL & MF OSCILLATORS

COMPONENT LIST

INTEGRATED CIRCUIT

LOC ON CP	IC18 D09		IC16 B07		IC17 F09		IC15 K07		IC24 D12		IC23 F12		IC14 H07		IC13 P07		IC10 J04								IC1 P01		IC2 N01		IC3 L01		LOC ON CP
CODE	41W 41W WECO		41AA 41AA, WECO		41AB 41AB, WECO		41BS 41BS, WECO		41DT* 41DT, WECO		41DT* 41DT, WECO		41EH 41EH, WECO		41EH 41EH, WECO		559C 559C, WECO								618DT * 618DT, WECO		618DU * 618DU, WECO		618DW * 618DW, WECO		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		8A/D4		8A/E2		8A/E5		8B/E1		8A/B3		8A/B2		8B/E6		8B/C6		8B/C8								8B/C5		8B/C4		8B/A4	A
B		8A/F4		8A/E3		8A/E7		8B/F0						8B/E6		8B/C6		8B/D8													B
C		8A/D4						8B/G0						8B/D8		8B/C6		8B/B8													C
D		8A/F3						8B/G0						8B/E8		8B/C7		8B/C8													D
E								8B/H0																							E
F								8B/E0																							F
BYPASS CAP	C15		C16		C17		C18		-		-		-		C19		-								C21		-		C22		BYPASS CAP

LOC ON CP	IC4 J01		IC11 H04		IC5 G01		IC19 B09		IC21 M11		IC20 P11		IC7 B03		IC6 D03		IC12 D06		IC9 M04		IC8 P04		IC22 L10								LOC ON CP
CODE	618DY * 618DY, WECO		618EA * 618EA, WECO		618EB * 618EB, WECO		~~08N~~ ~~SN74S08N,T1~~ KS-21736,L35		~~257 *~~ ~~SN74LS257N,T1~~ KS-21285,L6		~~257 *~~ ~~SN74LS257N,T1~~ KS-21285,L6		502S* 502S WECO		502S* 502S WECO		~~0251 *~~ ~~0251~~,INTEL KS-21921,L1		~~13331~~ ~~LF13331,NAT.~~ KS-22116,L1		~~13331~~ ~~LF13331,NAT.~~ KS-22116,L1		~~93L08 *~~ ~~93L08C,FAIR~~ KS-21284,L12								CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		8B/A5		8B/E4		8B/E5		8A/F2		8B/G3		8B/G4		8A/G2		8A/E7		8A/E6		8B/F6		8B/C6		8B/D1							A
B								8A/F3												8B/F6		8B/C6									B
C								8A/F4												8B/F7		8B/C6									C
D								8A/B1												8B/F7		8B/C7									D
E																															E
F																															F
BYPASS CAP	-		-		C23		C24		C25		-		-		C26		C27		C28		C29		-								BYPASS CAP

* SINGLE ELEMENT IC

CAPACITOR

DESIG	CODE
C1	602F
C2	KS-19774,L13, 0.1
C3	602F
C4	KS-19774,L13, 0.1
C5	602F
C6	KS-19774,L13, 0.1
C7	602F
C8	KS-19774,L13, 0.1
[21] C9-C29	KS-19774,L2, 0.01

DIODE

DESIG	CODE
CR1	80BB
[12] CR2-CR13	458C

RESISTOR

DESIG	CODE
[2] R1,R2	KS-20616,L1A, 10K
R3	KS-20616,L1A, 2K
R4	KS-20616,L1A, 1.4K
R5	KS-20616,L1A, 100K
R6	KS-20616,L1A, 499Ω
R7	KS-20616,L1A, 1K
R8	KS-20616,L1A, 100K
R9	KS-20616,L1A, 301Ω
R10	KS-20616,L1A, 1K
R11	KS-20616,L1A, 10K
R12	KS-20616,L1A, 178Ω
[6] R13-R18	KS-20616,L1A, 1K
R19	KS-20616,L1A, 10K
[3] R21,R22,R24	KS-20616,L1A, 10K

RESISTOR,NETWORK

LOC ON CP	R23 F07		R20 L04	
DESIG	8B,L1		8B,L1	
CODE	KS-21288,L1 10K		KS-21288,L1 10K	
ELEM IDENT	DESIG	LOC	DESIG	LOC
A	1,16	8A/G8	1,16	8B/B7
B	2,15	8A/G8	2,15	
C	3,14	8A/G8	3,14	
D	4,13	8A/G7	4,13	8B/F8
E	5,12		5,12	
F	6,11		6,11	
G	7,10		7,10	
H	8,9		8,9	
BYPASS CAP.	C20			

SWITCH

DESIG	CODE
S1	76DD2,GRAYHILL,INC.

CIRCUIT DESCRIPTION

SEE CD-99392-01

INPUT/OUTPUT INFORMATION

SEE CD-99392-01

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-2C553-( )
CONNECTOR ON FRAME	

SYMBOL

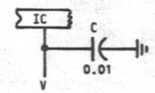
SEE SHEET J8D

NOTES:

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

IC ** CODE	-5 TERM.	+12 TERM.	-12 TERM.	GRD TERM.	TERM.	TERM.
41W	16			8		
41AA	16			8		
41AB	16			8		
41BS	16			7,8		
41DT	16			8		
41EH	16			7,8		
~~08N~~ KS-21736,L35	14			7		
~~257~~ KS-21285,L6	16			8		
~~0251,INTEL~~ KS-21921,L1	26			4		
~~13331~~ KS-22116,L1		12	5	4		
~~93L08~~ KS-21284,L12	24			12		

** WHEN A BYPASS CAPCITOR IS SPECIFIED ON THE COMPONENT LIST TABLE FOR AN IC, CONNECT BETWEEN THIS TERMINAL AND GROUND, AS SHOWN BELOW.



PART OF CPSI7
3 ESS CHANNEL & MF OSCILLATORS

ISSUE 3B

MINI-ROTL

SD-99392-01-J8C

BELL TELEPHONE LABORATORIES INCORPORATED 6S

PART OF CPS 17

3 ESS CHANNEL & MF OSCILLATORS

SYMBOL

CP17

(900Ω) E4
(600Ω) +5 E2
(-2TL) E8
(OTL) +5 E6

E3 CNZ2
E1 CNZ1
E7 CNPAD2
E5 CNPAD1

+5

PORT T1
IOW
PODB0
PODB1
PODB2
PODB3
PODB4
PODB5
PODB6
PODB7
TEST

IB0 IB1 IB2 IB3 IB4 IB5 IB6 IB7

PORT 1

OB7 OB6 OB5 OB4 OB3 OB2 OB1 OB0

PIDB0
PIDB1
PIDB2
PIDB3
PIDB4
PIDB5
PIDB6
PIDB7

700Hz
900Hz
1100Hz
1300Hz
1500Hz
1700Hz

MULTIFREQUENCY TONE GENERATOR

MF OUT

CTPCN1
CTPCN2

IOW
IOW

AB0
AB1
AB2
AB3
AB4
AB5
AB6
AB7
IOR

MESSAGE CHANNEL USART ADDRESS DECODE LOGIC

CS
WR
RST
C/D
IOR

SB0
SB1
SB2
SB3
SB4
SB5
SB6
SB7
Ø2
12/3

MESSAGE CHANNEL USART

USART BAUD RATE FACTOR
110 BAUD = 64X
300 BAUD = 64X
1200 BAUD = 16X

+12

DCDMC

TXD

OUTPUT AMPL

TX3ESS

SGRDMC

RXD

INPUT AMPL

RX3ESS

+5

300 BAUD
1200 BAUD

100 BAUD
HS

LS

MESSAGE CHANNEL CLOCK

TXC,RXC

MESSAGE CHANNEL CLOCK INFORMATION

3X16 = 48 Ø2 PULSES
3 Ø2 PULSES
1 Ø2 PULSE TO LOAD ZEROS.
52 Ø2 PULSES X 2 (÷2 F/F) = 104

8X16 = 128 Ø2 PULSES
13 Ø2 PULSES
1 Ø2 PULSE TO LOAD ZEROS
142 Ø2 PULSES X 2 (÷2 F/F) = 284

Ø2 = 2 MHZ
Ø2÷284 = 7.04 KHZ = 110 BAUD WITH LS = 0
Ø2÷104 = 19.2 KHZ = 300 BAUD WITH LS = 1, 12/3 = 0
Ø2÷104 = 19.2 KHZ = 1200 BAUD WITH LS = 1, 12/3 = 1

PART OF CPS17
3ESS CHANNEL & MF OSCILLATORS

MINI-ROTL		DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01-		J8D

P/O CPS 18

CENTRAL PROCESSING UNIT (CPU)

NOTES:
1. AFTER TEST, STRAP.

P/O CPS18

ISSUE 2A

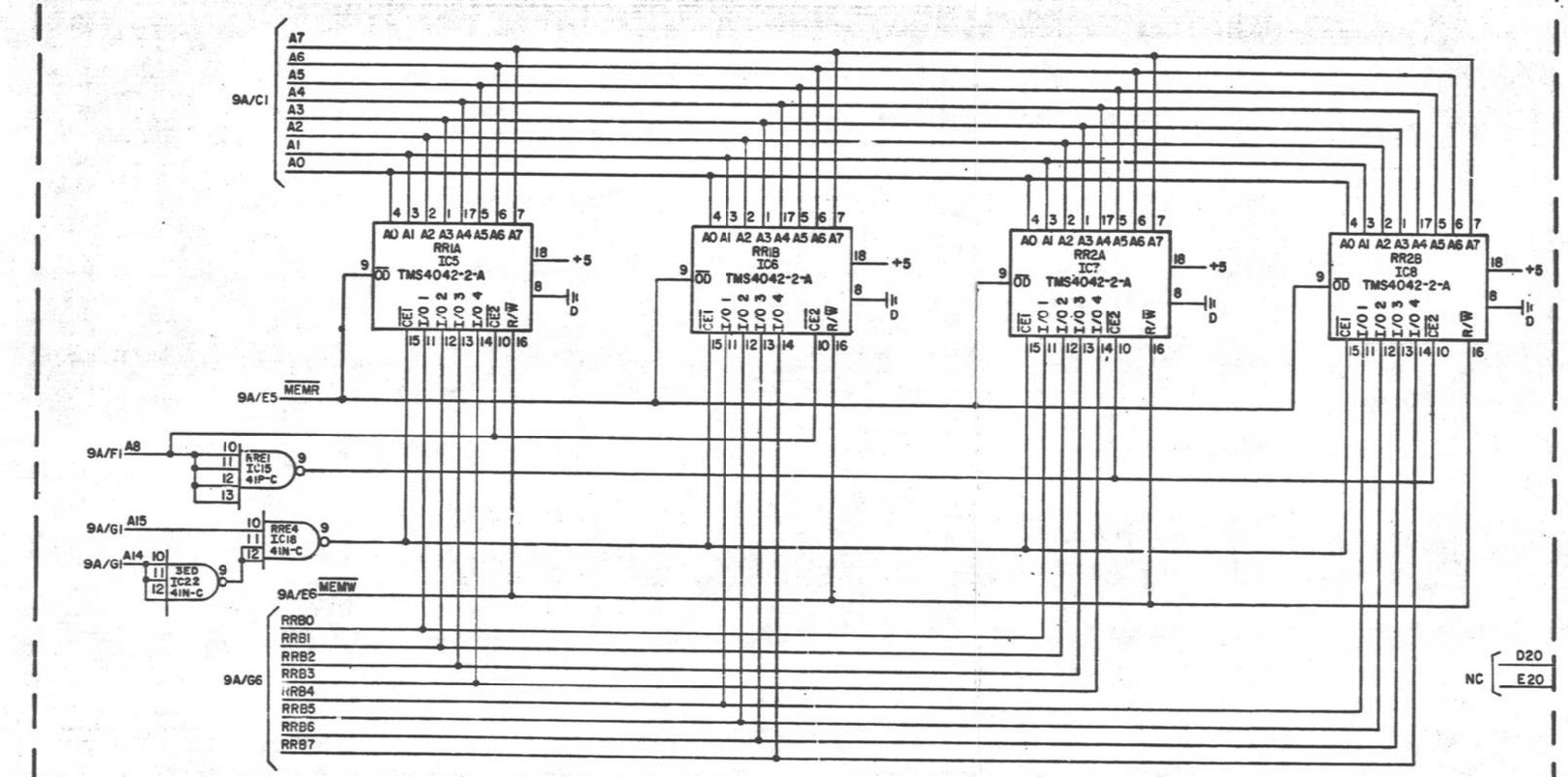
MINI-ROTL

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-99392-01-J9A

P/O CPS 18
CENTRAL PROCESSING UNIT (CPU)



CPS 18

ISSUE 2A

MINI-ROTL

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE 6S

SD-99392-01-J9B

PRINTED IN U.S.A.

P/O CPS 18

CENTRAL PROCESSING UNIT (CPU)

COMPONENT LIST

INTEGRATED CIRCUITS

LOC ON CP	IC1		IC2		IC3		IC4		IC5		IC6		IC7		IC8		IC9		IC10		IC11		IC12		IC13		IC14		LOC ON CP
CODE	*41CH		*41CH		*41CH		*41CH		*TMS4042-2		*TMS4042-2		*TMS 4042-2		*TMS4042-2		41S		*TMS8224		*TMS8228		*41CF		*TMS8212		*129A		CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A	DIOA	9A/B2	DIOB	9A/B3	DIOC	9A/B4	DIOD	9A/B7	RRIA	9B/D2	RRIB	9B/D3	RR2A	9B/D5	RR2B	9B/D6	D2	9A/A6	CLK	9A/G3	B CNTRL	9A/E4	a	9A/C8	ABI	9A/D2	PED	9A/A1	A
B																	IOMS	9A/B6											B
C																													C
D																													D
E																													E
F																													F
G																													G
BYPASS CAP	C10		C15		C16		C17		C24		C28		C26		C31		C11		C18		C21		C13		C29		C14		BYPASS CAP.

SEE NOTE 1

a STATUS REG

SEE NOTE 1

LOC ON CP	IC15		IC16		IC17		IC18		IC19		IC20		IC21		IC22	
CODE	41P		*TMS8216		*TMS8080A		41N		*TMS8216		*TMS8212		41EE		41N	
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC
A	RDYA	9A/H5	PBI	9A/D6	MPC	9A/E3	NIOW	9A/C6	PB2	9A/E6	AB2	9A/F2	AID	9B/G6		9A/D4
B	RDYB	9A/H5					CLOBR	9A/C7					AID2	9B/G5		9A/D5
C	RREI	9B/EI					RRE4	9B/EI					AIDI	9B/G5		9B/FO
D	HLDA	9A/G7					NA7	9A/D6					NRPO	9A/D5		9A/D3
E																
F																
G																
BYPASS CAP	C19		C22		C25,C27		C20		C23		C30		C12		C32	

* SINGLE ELEMENT IC

CAPACITORS

DESIG	LOC	CODE
C1	9A/H2	KS-20676,L15, .001UF
C2	9A/G3	KS-20676,L17, 5UF
C3	9B/G0	602A
C4	9B/H0	602A
C5	9B/H1	602F
C6	9B/G1	KS-19774,L5,0.1
C7	9B/H1	
C8	9A/H3	
C9	9B/H2	

RESISTORS

DESIG	LOC	CODE
R1	9A/H2	4.02K
R2	9B/H5	274
R3	9A/F5	KS-20616,L1A, IK
R4	9A/D8	267
R5	9A/H3	22.1
R6	9A/H7	IK
R7	9A/C5	10K

[23] C10-C32 SEE NOTE 3 KS-19774,L7, .01 ON SHEET J9D

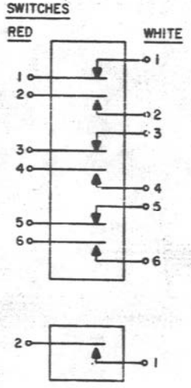
CRYSTALS

DESIG	LOC	CODE
(XTAL) Y1	9A/G3	106AR(18.072 MHz)

DIODES, LIGHT EMITTING

DESIG	LOC	CODE
(DIAG ENAB) DS1	9B/H6	5[illegible]
(RL) DS2	9A/D8	541H

SWITCHES



DESIG	S2	
IDENT	(DIAG ENAB)	
CODE	7095-006-012	
COLOR	RED	WHITE
6		9A/H4
5	9A/H4	9A/H4
4	9B/H7	
3		9B/H7
2		9A/H6
1	9A/H6	9A/H6

(SEE NOTE 3)

DESIG	S1
IDENT	(RST)
CODE	39-1 (SEE NOTE 2)
2	9A/H2
1	9A/H2

NOTES:
1. ALL TMS CODES MAY BE OBTAINED FROM "TEXAS INSTRUMENTS" OR EQUIVALENT.
2. MAY BE OBTAINED FROM "GRAYHILL" OR EQUIVALENT.
3. MAY BE OBTAINED FROM "TRW CORPORATION" OR EQUIVALENT.

P/O CPS 18

ISSUE 2A

MINI-ROTL (2)

SD-99392-01-J9C

BELL TELEPHONE LABORATORIES INCORPORATED

6S

P/O CPS 18

CENTRAL PROCESSING UNIT (CPU)

MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-35065-01
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-35140-( )
CONNECTOR ON FRAME	

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. DESIGNATED BATTERY AND GROUND RETURN TERM. FOR ICS.

IC CODE	IC LOC	+5V ON TERM.	-5V ON TERM.	+12V ON TERM.	GRD ON TERM.	BY PASS CAP. TO GRD
41CH	IC1	16			8	C10
	IC2	16			8	C15
	IC3	16			8	C16
	IC4	16			8	C17
TMS4042-2	IC5	18			8	C24
	IC6	18			8	C28
	IC7	18			8	C26
	IC8	18			8	C31
41S	IC9	16			8	C11
TMS8224	IC10	16			8	C18
TMS8228	IC11	28			14	C21
41CF	IC12	16			8	C13
TMS8212	IC13	24			12	C29
129A	IC14	24			12	C14
41P	IC15	16			8	C19
TMS8216	IC16	16			8	C22
TMS8080A	IC17	20			2	
			11			C25
				28		C27
41N	IC18	16			8	C20
TMS8216	IC19	16			8	C23
TMS8212	IC20	24			12	C30
41EE	IC21	16			8	C12
41N	IC22	16			8	C32

SYMBOL
SEE SHEET J9E

CIRCUIT DESCRIPTION
SEE CD-35065-01.

INPUT / OUTPUT INFORMATION
SEE NOTE 302.

P/O CPS 18

ISSUE 2A

MINI-ROTL

SD-99392-01-J9D

BELL TELEPHONE LABORATORIES INCORPORATED

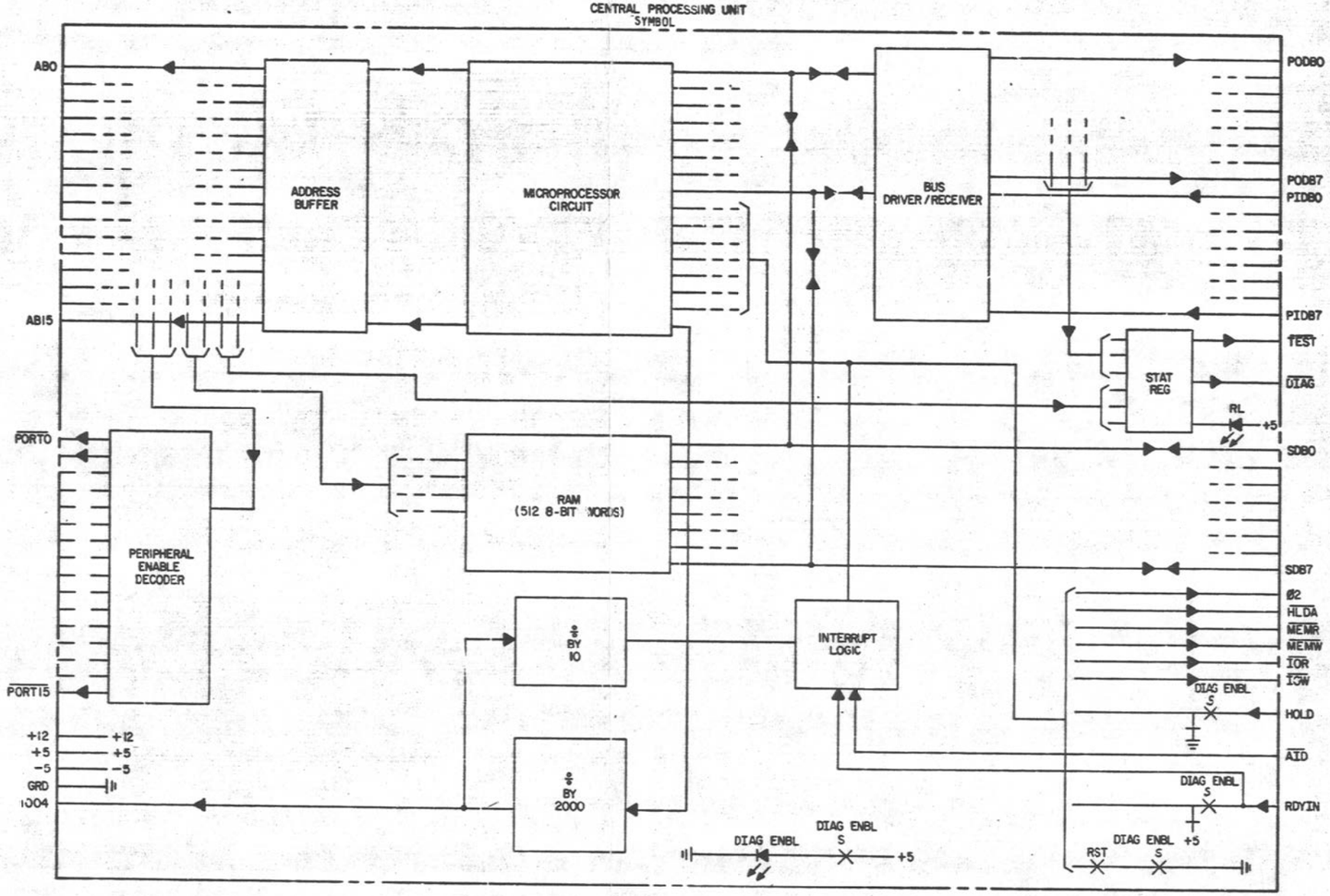
CODE 6S

PRINTED IN U.S.A.

THE FOLLOWING BLOCK DIAGRAM IS PROVIDED TO CONVEY A GENERAL KNOWLEDGE OF THE FUNCTIONS PROVIDED BY THE CIRCUIT PACK.

P/O CPS 18

CENTRAL PROCESSING UNIT SYMBOL



P/O CPS 18

ISSUE 2A

MINI-ROTL

(2)

SD-99392-01-J9E

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.

CPS 19
POWER INTERFACE

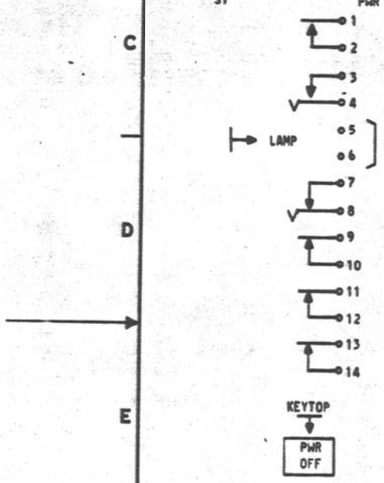
COMPONENT LIST

DIODE, LIGHT EMITTING

REF DESIG	FUNCT DESIG	CODE
DS1	+15	534B
DS2	-15	534B
DS3	+12	534B
DS4	-12	534B
DS5	+5	534B
DS6	-5	534B

KEY

REF DESIG	FUNCT DESIG	CODE
S1	PWR OFF	630AG4



RESISTOR

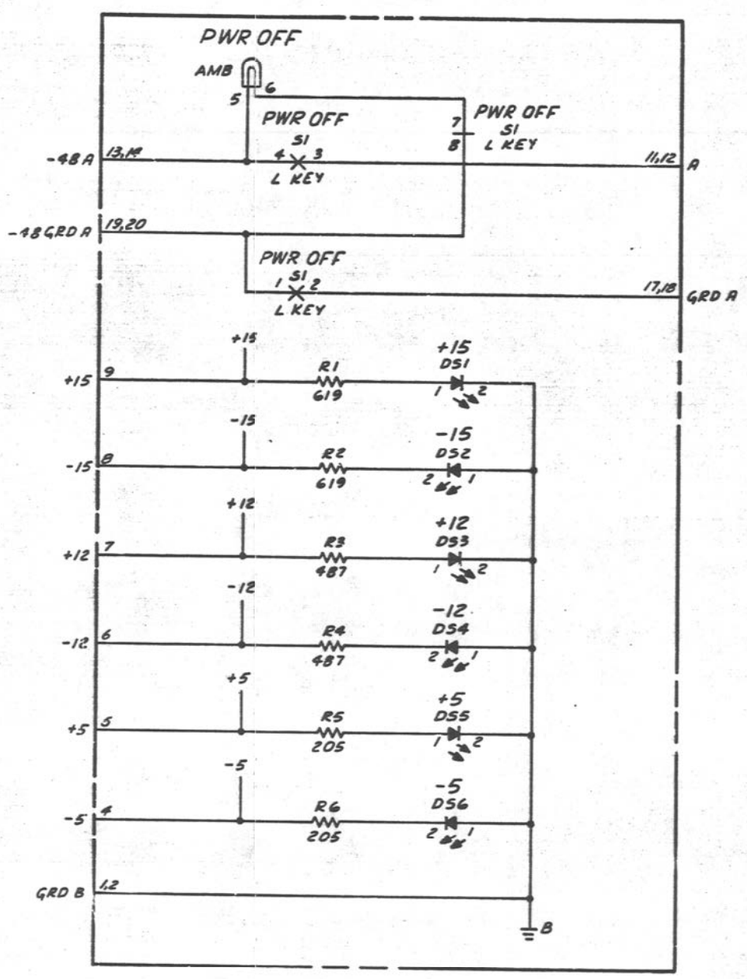
DESIG	CODE
[2] R1,R2	KS-20810,L1A, 619
[2] R3,R4	KS-20810,L1A, 487
[2] R5,R6	KS-20810,L1A, 205

CIRCUIT DESCRIPTION

SEE CD-99392-01

INPUT/OUTPUT INFORMATION

SEE CD-99392-01



MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DWG	ED-2C555-( )
CONNECTOR ON FRAME	

SYMBOL
SHOWN IN FS

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE SHOWN IN OHMS, INDUCTANCE VALUES ARE IN MICROHENRIES, VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.

CPS19
POWER INTERFACE

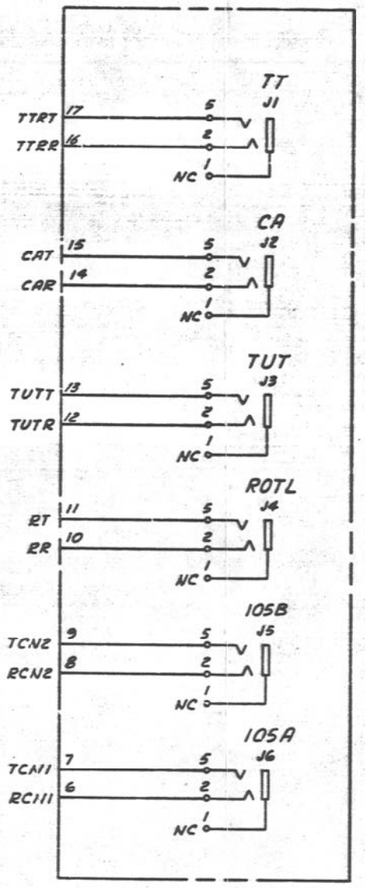
MINI-ROTL	DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01-	J10

CPS 20
PORT TEST ACCESS

COMPONENT LIST

CONNECTOR

REF DESIG	FUNC DESIG	CODE
J1	TT	KS-21004,L1
J2	CA	KS-21004,L1
J3	TUT	KS-21004,L1
J4	ROTL	KS-21004,L1
J5	105B	KS-21004,L1
J6	105A	KS-21004,L1



MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-2C556-( )
CONNECTOR ON FRAME	

SYMBOL
SHOWN IN FS

NOTES:

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

CIRCUIT DESCRIPTION

SEE CD-99392-01

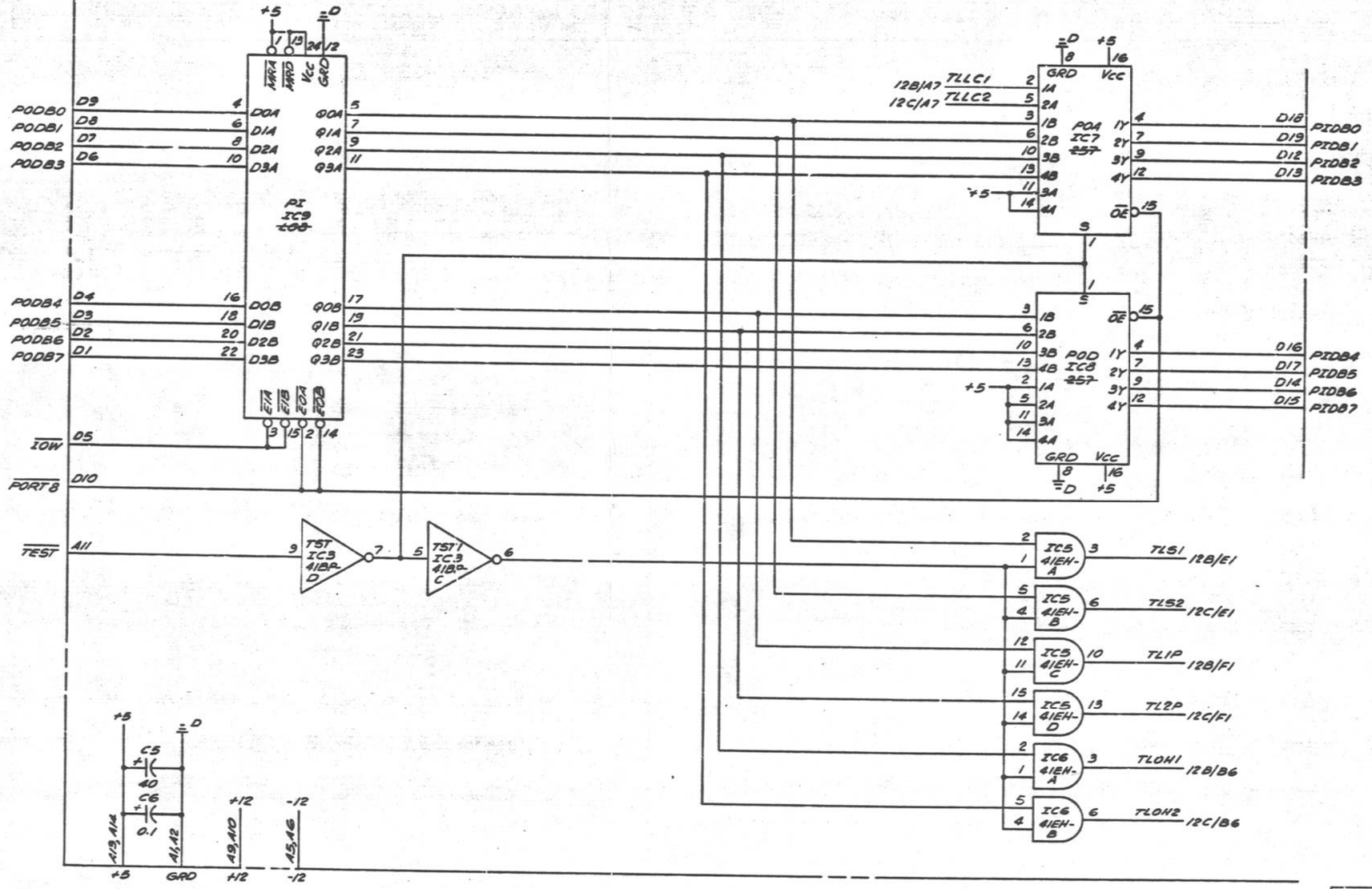
INPUT/OUTPUT INFORMATION

SEE CD-99392-01

CPS20
PORT TEST ACCESS

MINI-ROTL	DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01-	J11

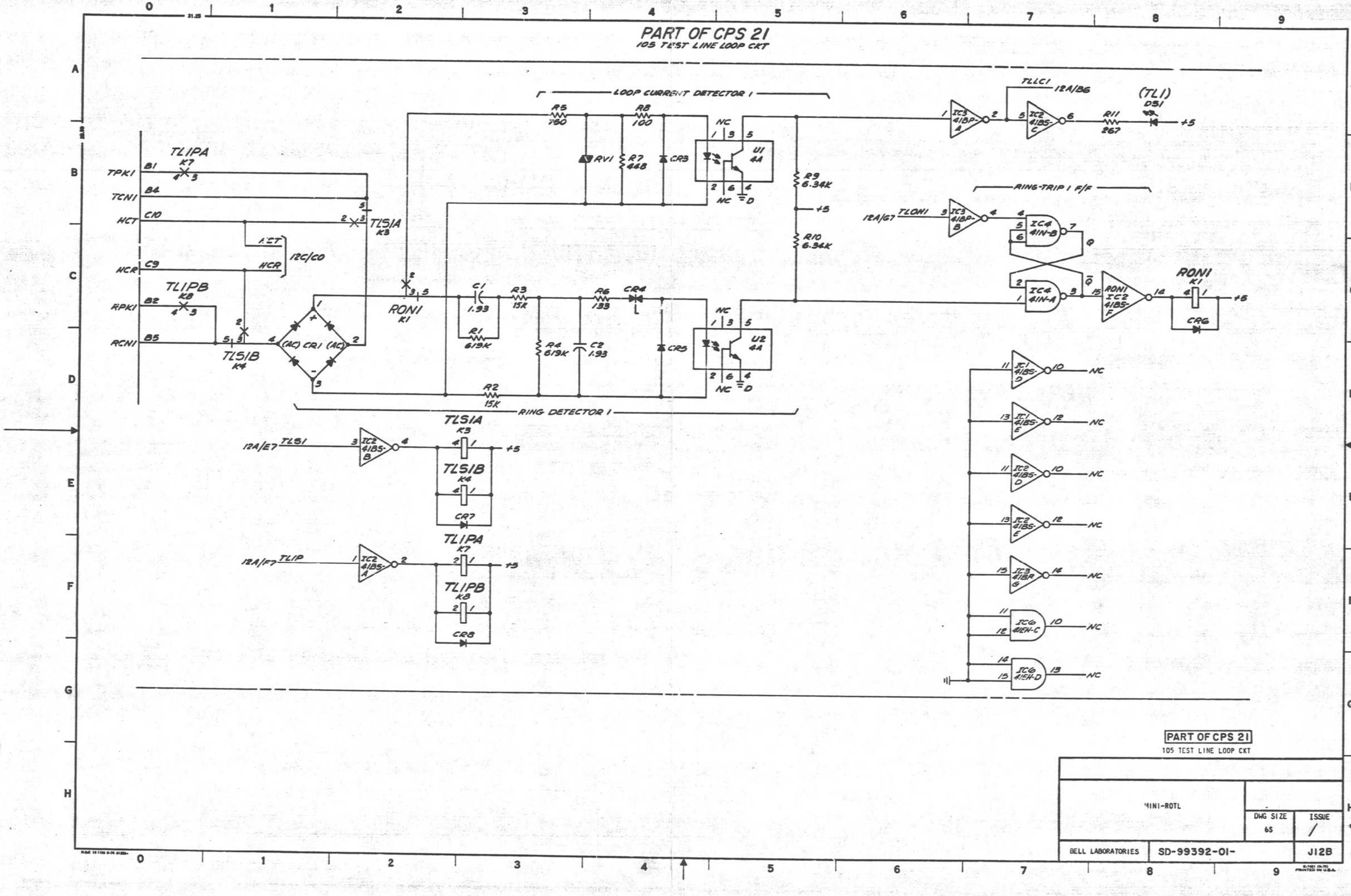
PART OF CPS 21
105 TEST LINE LOOP CKT



PART OF CPS 21
105 TEST LINE LOOP CKT

MINI-ROTL		DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-		J12A

PART OF CPS 21
105 TEST LINE LOOP CKT



PART OF CPS 21
105 TEST LINE LOOP CKT

MINI-ROTL		DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01-		J12B

PART OF CPS 21
105 TEST LINE LOOP CKT

LOOP CURRENT DETECTOR 2

R13 750 · R19 100 · RV2 · R18 448 · CR9 · U3 4A · NC · R20 6.94K · +5 · R21 6.94K

TLLC2 12A/B6 · IC3 4IBP-E · IC1 4IBS-C · R22 267 · (TL2) DS2 · +5

RING-TRIP 2 F/F

12A/G7 TLCN2 · IC3 4IBP-F · IC4 4IN-C · IC4 4IN-D · Q · $\overline{Q}$ · RON2 IC1 4IBS-F · RON2 K2 · CR12 · +5

TL2PA K9 · TPK2 B7 · TCN2 B10 · TL2PB K10 · RPK2 B8 · RCN2 B11 · HCT · HCR · 12B/C1 · TL2SA K5 · TL2SB K6 · (AC) CR2 (AC) · RON2 K2

C3 1.93 · R14 15K · R17 133 · CR10 · R12 619K · R15 619K · C4 1.93 · CR11 · U4 4A · NC · R13 15K

RING DETECTOR 2

TL2SA K5

12A/F7 TLS2 · IC1 4IBS-B · TL2SB K6 · CR13 · +5

TL2PA K9

12A/F7 TL2P · IC1 4IBS-A · TL2PB K10 · CR14 · +5

PART OF CPS 21
105 TEST LINE LOOP CKT

MINI-ROTL	DWG SIZE 6S	ISSUE /
BELL LABORATORIES	SD-99392-01-	J12C

PART OF CPS21

105 TEST LINE LOOP CKT

COMPONENT LIST

INTEGRATED CIRCUIT

LOC ON CP	IC8		IC7		IC2		IC1		IC9		IC5		IC6		IC3		IC4												LOC ON CP
CODE	~~257 *~~ ~~SN74LS257N,T1~~ KS-21285,L6		~~257 *~~ ~~SN74LS257N,T2~~ KS-21285,L6		41BS WECO		41BS WECO		~~L08~~ ~~93L08DC,FAIR~~ KS-21284,L12		41EH WECO		41EH WECO		41BP WECO		41N WECO												CODE
ELEM IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	ELEM IDENT
A		12A/D7		12A/B7		12B/F2		12C/F2		12A/C2		12A/E7		12A/F7		12B/A6		12B/C7											A
B						12B/E2		12C/E2				12A/E7		12A/G7		12B/B6		12B/B7											B
C						12B/A7		12C/A7				12A/F7		12B/F7	TST1	12A/E3		12C/B7											C
D						12B/E7		12B/D7				12A/F7		12B/G7	TST	12A/E2		12C/C7											D
E						12B/E7		12B/D7								12C/A6													E
F					RON1	12B/C8	RON2	12C/C8								12C/B6													F
G																12B/F7													G
BYPASS CAP.	C14		C13		C8		C7		C15		C11		C12		C9		C10												BYPASS CAP.

* SINGLE ELEMENT IC

RELAY

337A

	K1	K2	K3	K4	K5	K6
3 2 5	12B/C2	12C/C2	12B/C2	12B/D1	12C/B2	12C/D1
1 4	12B/C8	12C/C8	12B/E3	12B/E3	12C/D3	12C/E3

345A

	K7	K8	K9	K10
4 3	12B/B0	12B/C0	12C/B0	12C/C0
1 2	12B/F3	12B/F3	12C/F3	12C/F3

VARISTOR

DESIG	CODE
RV1	106A
RV2	106A

CAPACITOR

DESIG	CODE
C1	535LY
C2	535LY
C3	535LY
C4	535LY
C5	602A
C6	KS-19774,L13,0.1
[9] C7-C15	KS-19774,L7,.01

DIODE

DESIG	CODE
CR1	460M
CR2	460M
CR3	458C
CR4	D32021,RCA
CR5	458C
CR6	458C
CR7	458C
CR8	458C
CR9	458C
CR10	D32027,RCA
CR11	458C
CR12	458C
CR13	458C
CR14	458C

DIODE, LIGHT EMITTING

DESIG	CODE
DS1	541H
DS2	541H

OPTO-ISOLATOR

DESIG	CODE
U1	4A
U2	4A
U3	4A
U4	4A

RESISTOR

DESIG	CODE
R1	KS-20616,L1A,619K
R2	KS-20616,L1A,15K
R3	KS-20616,L1A,15K
R4	KS-20616,L1A,619K
R5	KS-20289,L6C,750
R6	KS-20616,L1A,133
R7	KS-20616,L1A,448
R8	KS-20616,L1A,100
R9	KS-20616,L1A,6.34K
R10	KS-20616,L1A,6.34K
R11	KS-20616,L1A,267
R12	KS-20616,L1A,619K
R13	KS-20616,L1A,15K
R14	KS-20616,L1A,15K
R15	KS-20616,L1A,619K
R16	KS-20289,L6C,750
R17	KS-20616,L1A,133
R18	KS-20616,L1A,448
R19	KS-20616,L1A,100
R20	KS-20616,L1A,6.34K
R21	KS-20616,L1A,6.34K
R22	KS-20616,L1A,267

CIRCUIT DESCRIPTION

SEE CD-99392-01

INPUT/OUTPUT INFORMATION

SEE CD-99352-01

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE AND ASSEMBLY DRAWING	ED-2C554-( )
CONNECTOR ON FRAME	

SYMBOL

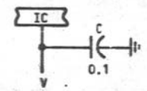
SHOWN ON SHEET J12E

NOTES:

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

IC CODE **	+5 TERM.	GRD TERM.		
41N	16	8		
41BP	16	8		
41BS	16	7,8		
41EH	16	7,8		
~~257~~ KS-21285,L6	16	8		
~~93L08~~ KS-21284,L12	24	12		

** WHEN A BYPASS CAPACITOR IS SPECIFIED ON THE COMPONENT LIST TABLE FOR AN IC, CONNECT BETWEEN THIS TERMINAL AND GROUND AS SHOWN BELOW.



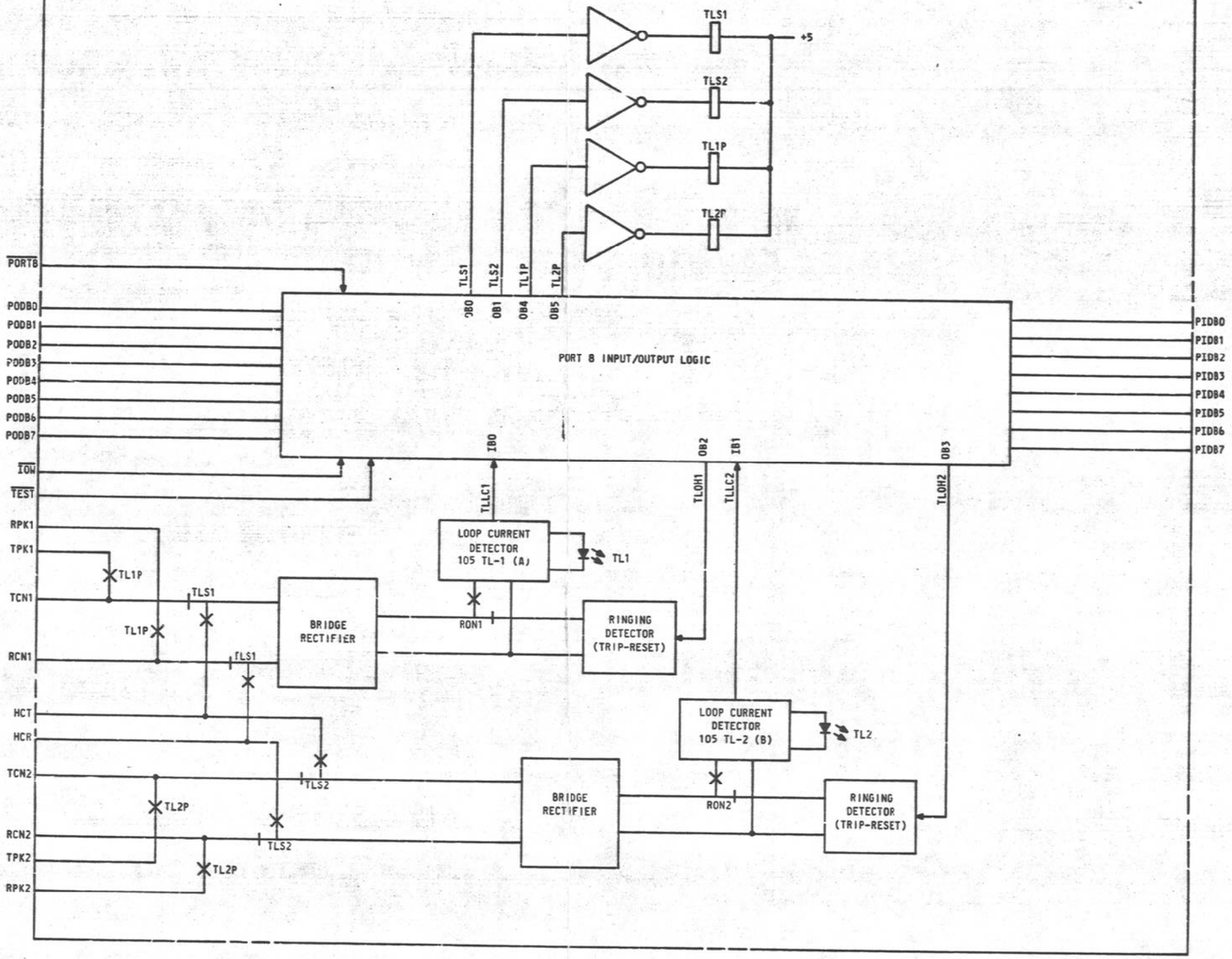
PART OF CPS21

105 TEST LINE LOOP CIRCUIT

MINI-ROTL		DWG SIZE 6S	ISSUE 3B
BELL LABORATORIES	SD-99392-01-		J12D

PART OF CPS21
105 TEST LINE LOOP CIRCUIT

SYMBOL



PART OF CPS 21
105 TEST LINE LOOP CIRCUIT

MINI-ROTL	DWG SIZE 6S	ISSUE 2A
BELL LABORATORIES	SD-99392-01-	J12E

CMS 3

LOSS AND NOISE MEASUREMENT CIRCUIT

AUXILIARY BOARD NO. 1

COMPONENT LIST

INTEGRATED CIRCUIT

DESIG	LOC	CODE
* RMS CONV	D4	BURR-BROWN MODEL 4341 OR EQUIVALENT (SEE NOTE 2)

* SINGLE ELEMENT IC

CAPACITORS

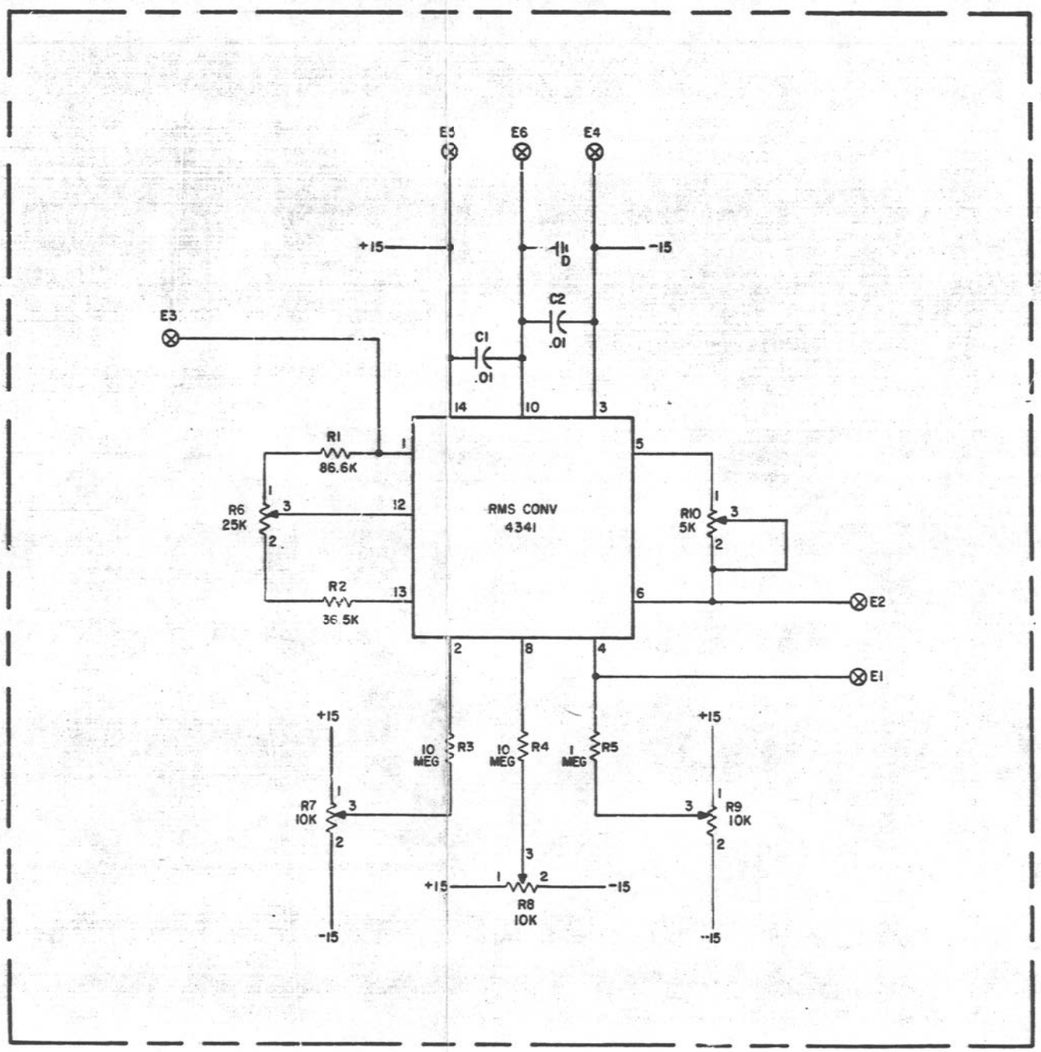
DESIG	LOC	CODE
C1	D4	KS-19774,L2, .01
C2	C5	

POTENTIOMETERS

DESIG	LOC	CODE	
R6	E3	KS-19646,L3A,	25K
R7	F4		10K
R8	F4		10K
R9	F5		10K
R10	E5		5K

RESISTORS

DESIG	LOC	CODE	
R1	D4	KS-20616,L1A,	86.6K
R2	E4		36.5K
R3	F4	CC1005F (ALLEN-BRADLEY)	10 MEG
R4	F4		10 MEG
R5	F5	KS-20616,L1A,	1 MEG



MANUFACTURING REFERENCES

CATEGORY	NO.
CONTROLLING DRAWING	SD-35065-01
CIRCUIT PACK CODE	ED-35132-( )
ASSEMBLY DRAWING	

SYMBOL

SEE SD-35065-01-J7C.

CIRCUIT DESCRIPTION

SEE CD-35065-01.

INPUT / OUTPUT INFORMATION

SEE NOTE 302.

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. POWER CONNECTIONS FOR THE INTEGRATED CIRCUITS ARE SHOWN IN THE POWER DATA TABLE BELOW.

POWER DATA TABLE

IC	GRD TERM.	+15 TERM.	-15 TERM.
RMS-CONV	E6	E5	E4

3. ⏚ GROUND RETURN.

CMS 3

ISSUE 1

MINI-ROTL (2)

SD-99392-01-K1

BELL TELEPHONE LABORATORIES INCORPORATED

DWG SIZE 6S

PRINTED IN U.S.A.