

10

For boards labelled 22 11 77.

BUNDLE "C": 12 pin Burndy socket / 5 crimped female pins / 16 and 22 GA. wires

This bundle is for power. Referring to assembly diagram, the wires should be cut 18" past the edge of the board; then strip 1/8" off the insulation and crimp on female pins. Insert the pins into the socket (CN-18) as follows:

PIN / COLOR	SIGNAL NAME	BOARD LABEL	WIRE GAUGE
1 RED	+15 V	VP	22
2 GRN	Digital ground	DGND	16
3 GRN	Analog ground	AG	22
4 BLK	-15 V	VM	22
5 YEL	+5 V	+5V	16
6-12	N/C		

BUNDLE "D": 24 pin Burndy socket / 15 crimped female pins

This bundle is for the control panel socket; it uses only the first 15 colors of unsheathed 25 conductor cable (see CABLE COLOR CODE chart). Wire length should be 13" past the board; cut, strip, and crimp female pins as above. Then insert pins into a 24 pin socket (CN-19) as follows:

PIN & COLOR #	SIGNAL NAME	BOARD LABEL
1	Portamento master	PM
2	-15 V	-15
3	+15 V	+15
4	+5 V	+5
5	Offset	Q
6	From tape	R
7	Error lamp	S
8	To tape	T
9	Reset pushbutton	U
10	Analog ground	AG
11	Seq rate 2	W
12	Seq rate 1	X
13	Seq clock in	Y
14	Seq clock out	Z
15	Digital ground	DG
16-24	N/C	

For boards labelled 22 11 77.

CABLE A : 24 pin Burndy socket / 24 crimped female pins / 25 conductor cable (cut one wire) / NOTE: save CV 1 - CV 16 wiring until it's time to do kluge wiring.

This cable is one of a pair that carry signals to the output panel. Start with 4' of cable. Strip 13" of the gray jacket off and examine the colors to decide which cable color code to refer to (see chart). Install the cable to the board with tie wraps; see assembly diagrams for top and bottom of the board for details. Route wires and attach to the board as follows (you may decide to use a different order than the one listed here, for instance soldering 'Gate x' wires first, since they're closest to the main tie wraps...):

PIN & COLOR #	SIGNAL NAME	BOARD LABEL	KLUGE IC - PIN #
1	CV 1		113 - 7
2	Gate 1	G	
3	Lamp 1	Lg	
4	CV 2		112 - 7
5	Gate 2	H	
6	Lamp 2	Lh	
7	CV 3		111 - 7
8	Gate 3	F	
9	Lamp 3	Lf	
10	CV 4		110 - 7
11	Gate 4	E	
12	Lamp 4	Le	
13	CV 5		106 - 7
14	Gate 5	M	
15	Lamp 5	Lm	
16	CV 6		107 - 7
17	Gate 6	O	
18	Lamp 6	Lo	
19	CV 7		108 - 7
20	Gate 7	N	
21	Lamp 7	Ln	
22	CV 8		109 - 7
23	Gate 8	P	
24	Lamp 8	Lp	

Cut the cable 24" from the edge of the board after installing all tie wraps; remove about 2" of gray jacketing, strip wires 1/8", and crimp 24 female pins. Insert pins into 24 pin socket (CN-19) using above pin & color numbers as a guide. This procedure is also for cable B.

12
-

For boards labelled 22 11 77.

CABLE B : 24 pin Burndy socket / 24 crimped female pins / 25 conductor cable (cut one wire)

This cable is one of a pair used to send signals to the output panel. Refer to CABLE A for details, and attach as follows :

<u>PIN / COLOR #</u>	<u>SIGNAL NAME</u>	<u>BOARD LABEL</u>	<u>KLUGE IC - PIN #</u>
1	CV 9		113 - 1
2	Gate 9	C	
3	Lamp 9	Lc	
4	CV 10		112 - 1
5	Gate 10	D	
6	Lamp 10	Ld	
7	CV 11		111 - 1
8	Gate 11	B	
9	Lamp 11	Lb	
10	CV 12		110 - 1
11	Gate 12	A	
12	Lamp 12	La	
13	CV 13		106 - 1
14	Gate 13	I	
15	Lamp 13	Li	
16	CV 14		107 - 1
17	Gate 14	K	
18	Lamp 14	Lk	
19	CV 15		108 - 1
20	Gate 15	J	
21	Lamp 15	Lj	
22	CV 16		109 - 1
23	Gate 16	L	
24	Lamp 16	Ll	

Follow instructions for cable A to finish cable B.

13

For boards labelled 22 11 77.

KLUGE WIRE LIST - wire wrapped and/or soldered to specified points on board. Refer to assembly diagram for bottom of board for pictorial details. Note that not every wire is shown on the diagram since it would be hard to read. You may want to copy this page and check things off as you do them; this will help others who may have to pick up where you left off.

LENGTH	WW / SOLDER	FROM	TO
3"	WW / SDR	IC 113 pin 4	VM trace feedthrough
3"	WW / SDR	IC 113 pin 8	VP trace feedthrough
3"	WW	IC 113 - 106 pins 4	each other (7 total)
3"	WW	ICs 113 - 106 pins 8	each other (7 total)
2 1/2"	WW	IC 113 pin 1	IC 113 pin 2
2 1/2"	WW	(as above for ICs 112 - 106 pins 1 & 2; 7 total)	
2 1/2"	WW	IC 113 pin 6	IC 113 pin 7
2 4/2"	WW	(as above for ICs 112 - 106 pins 6 & 7; 7 total)	
7 1/2"	WW / SDR	IC 113 pin 5	Sb
7 1/2"	WW / SDR	IC 113 pin 3	Sa
7 1/2"	WW / SDR	IC 112 pin 5	Sd
7 1/2"	WW / SDR	IC 112 pin 3	Sc
7 1/2"	WW / SDR	IC 111 pin 5	Sf
7 1/2"	WW / SDR	IC 111 pin 3	Se
7 1/2"	WW / SDR	IC 110 pin 5	Sh
7 1/2"	WW / SDR	IC 110 pin 3	Sg
3 1/2"	WW / SDR	IC 109 pin 5	Sj
3 1/2"	WW / SDR	IC 109 pin 3	Si
3 1/2"	WW / SDR	IC 108 pin 5	Sl
3 1/2"	WW / SDR	IC 108 pin 3	Sk
3 1/2"	WW / SDR	IC 107 pin 5	Sn
3 1/2"	WW / SDR	IC 107 pin 3	Sm
3 1/2"	WW / SDR	IC 106 pin 5	Sp
3 1/2"	WW / SDR	IC 106 pin 3	So
3"	WW / SDR	IC 106 pin 1	cable B color 13
3"	WW / SDR	IC 106 pin 7	cable A color 13
3"	WW / SDR	IC 107 pin 1	cable B color 16
3"	WW / SDR	IC 107 pin 7	cable A color 16
3"	WW / SDR	IC 108 pin 1	cable B color 19
3"	WW / SDR	IC 108 pin 7	cable A color 19
3"	WW / SDR	IC 109 pin 1	cable B color 22
3"	WW / SDR	IC 109 pin 7	cable A color 22
3"	WW / SDR	IC 110 pin 1	cable B color 10
3"	WW / SDR	IC 110 pin 7	cable A color 10
3"	WW / SDR	IC 111 pin 1	cable B color 7
3"	WW / SDR	IC 111 pin 7	cable A color 7
3"	WW / SDR	IC 112 pin 1	cable B color 4
3"	WW / SDR	IC 112 pin 7	cable A color 4
3"	WW / SDR	IC 113 pin 1	cable B color 1
3"	WW / SDR	IC 113 pin 7	cable A color 1

14

PARTS LIST - 4067 48K RAM

QTY	PART#	DESCRIPTION	NOTED
1	ID 12	74LS139 DMUX	
2	ID 23	74LS157 MPX	
1	ID 25	74LS24 INV	
3	ID 29	4116 RAM	
1	ID 35	74LS20 NAND	
2	ID 36	8216 FUSEUF	
4	ID 38	74LS28 NOR	
1	ID 40	74LS24 INV	
4	D 1	1N914 SIG	
1	D 6	1N5222	
49	C 13	0.1 UF CER	
3	C 22	10 UF TANT	
2	R 9	1.0K OHM	
6	R 22	12K OHM	
24	CN 25	16PIN LP SKT	
2	CN 26	CARD EDGE CN	
4	H 2	SPACER	
6	H 11	4-40X1/4 EH	
1	CB 21	RAM/DISK CB	

AS

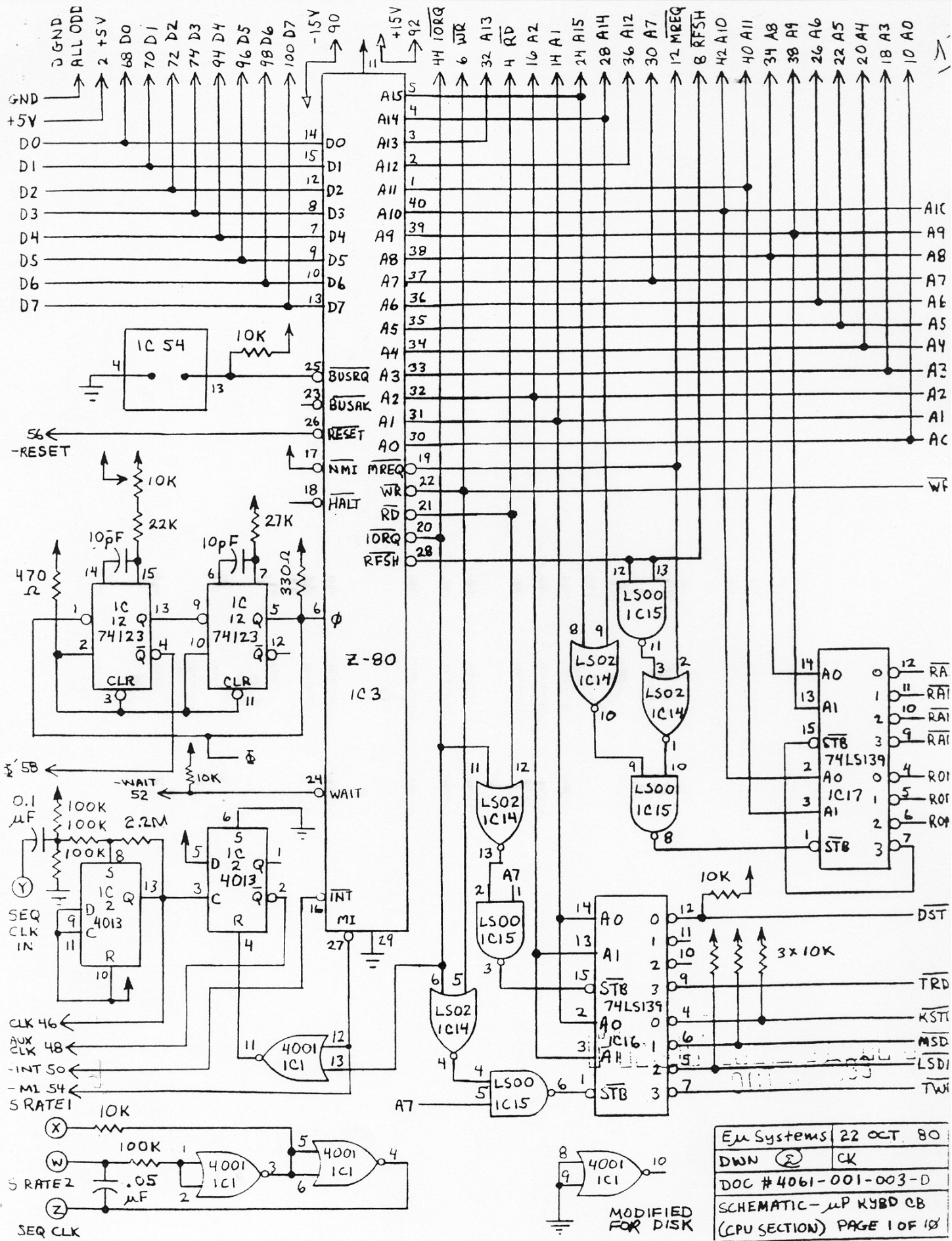
PARTS LIST - 4281 UPKYED SEM

QTY	PART#	DESCRIPTION	NOTES
9	IL 2	1458 D OPAMP	
1	IL 8	511 COMP	
18	IL 12	5283 OTA 3 A	
1	IL 13	723 REGLTR	
18	IL 17	LF353 OPAMP	
1	ID 1	74123 ONESHOT	
3	ID 2	4242 C LATCH	
6	IL 3	4299 APR LCH	
1	ID 5	4228 DECODER	
1	ID 6	7-82 CPU	
8	ID 7	2112 MEMORY	
2	ID 8	74LS00 NAND	
1	ID 9	74LS02 NOR	
2	ID 10	74LS139 DMUX	
1	ID 12	6251 USART	
2	ID 13	14532 DRVR	
1	ID 14	4201 NOR	
1	ID 16	4011 NAND	
4	IL 17	4016 ANLG SW	
3	IL 18	4013 DL F/F	
1	ID 34	4030 XOR	
1	ID 43	4040 ENTR	
1	IL 45	2716 ROM	
2	ID 46	4051 AN MPX	
22	Q 2	2N3924 NPN	
29	Q 4	2N4252 PNP	
17	Q 7	2N4121 PNP	
34	D 1	1N914 SIG	
2	C 3	10 PF CER	
9	C 5	100 PF CER	
1	C 8	470 PF CER	
1	C 9	1000 PF CER	
1	C 11	5000 PF CER	
2	C 12	2.21UF CER S	
30	C 15	2.1 UF CER	
16	C 19	3.01UF POLYS	
3	C 22	10 UF TANT	
1	C 27	0.05 UF CER	
1	R 5	330 OHM	
1	R 6	200K OHM	
2	R 7	470 OHM	
21	R 9	1.2K OHM	
43	R 17	4.7K OHM	
1	R 19	390K OHM	
1	R 21	8.2K OHM	
59	R 22	10K OHM	
6	R 25	22K OHM	
1	R 26	27K OHM	
2	R 28	33K OHM	
6	P 30	47K OHM	
1	R 31	56K OHM	
15	R 33	100K OHM	
18	R 45	1.2M OHM	
1	R 46	1.5M OHM	

16

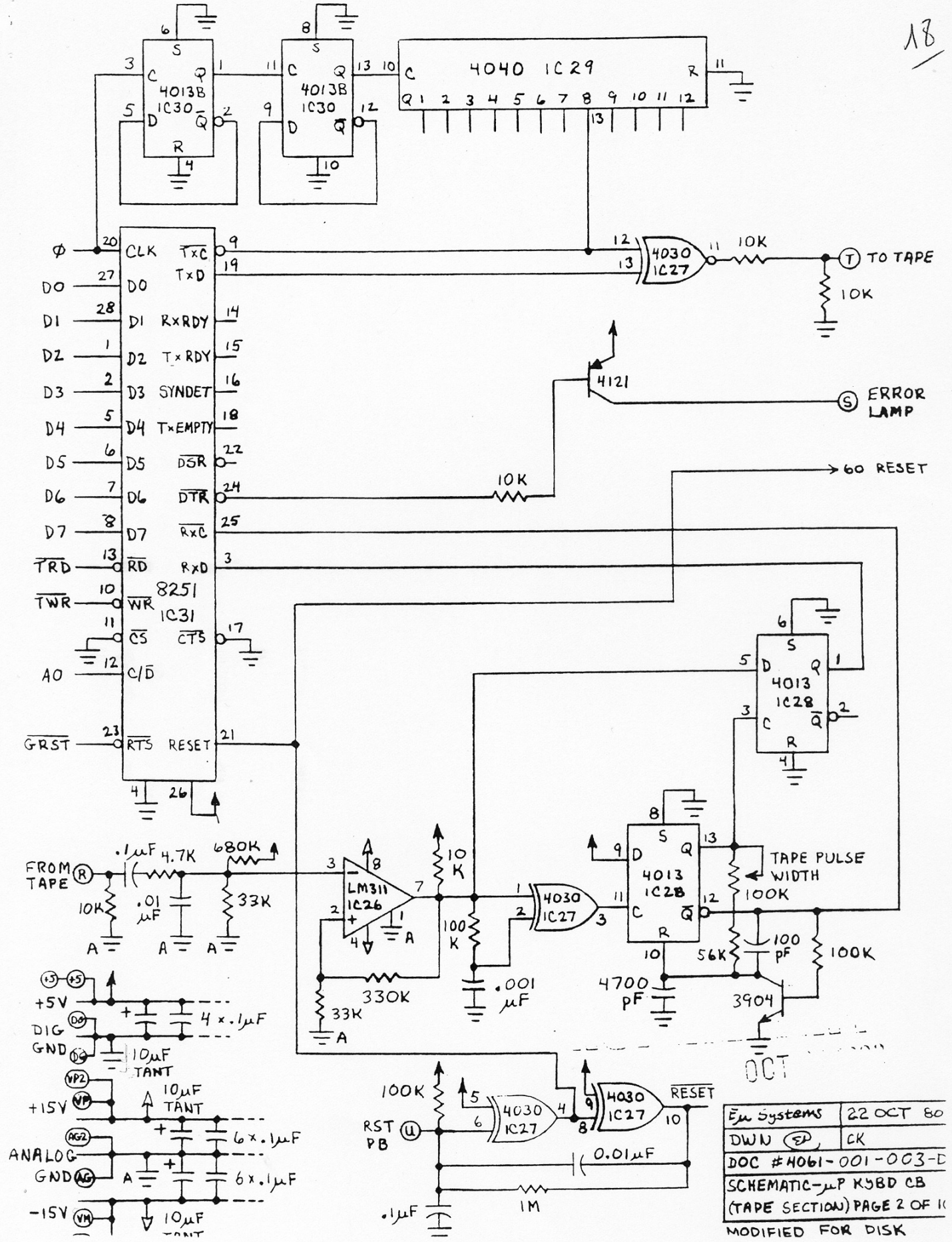
PARTS LIST - 4001 UPKYED CBM

QTY	PART#	DESCRIPTION	NOTES
1	R 46	2.2K OHM	
1	R 50	3.3K OHM	
1	R 50	620K OHM	
2	R 57	1.0M OHM	
1	RP 3	1.00K 1%	
1	RP 4	13.3K 1%	
23	RP 6	100K 1%	
1	RP 13	2.7K 1%	
1	RP 15	3.32K 1%	
1	RP 19	787K 1%	
2	RP 20	10.0K 1%	
1	TR 2	10K TRIMMER	
1	TR 4	22K 12 TURN	
1	TR 5	100K TRIMMER	
2	CN 5	DIP SOCKET	
4	CN 6	DIP SKT W/W	
1	CN 8	28PIN DIPSKT	
1	CN 10	24PIN DIPSKT	
2	CN 12	ML BURN WIRE	
69	CN 13	PM BURN WIRE	
1	CN 15	12P BURN PNL	
3	CN 19	24P BURN PNL	
1	CN 24	40PIN DIPSKT	
13	CN 25	18PIN LP SKT	
34	CN 29	8 PIN SOCKET	
14	CN 30	14 PIN SKT	
8	H 11	4-40X1/4 BE	
4	H 32	NYLON SPACER	
2	W 9	25 COND CBL	
1	CB 22	UPKYED CB	

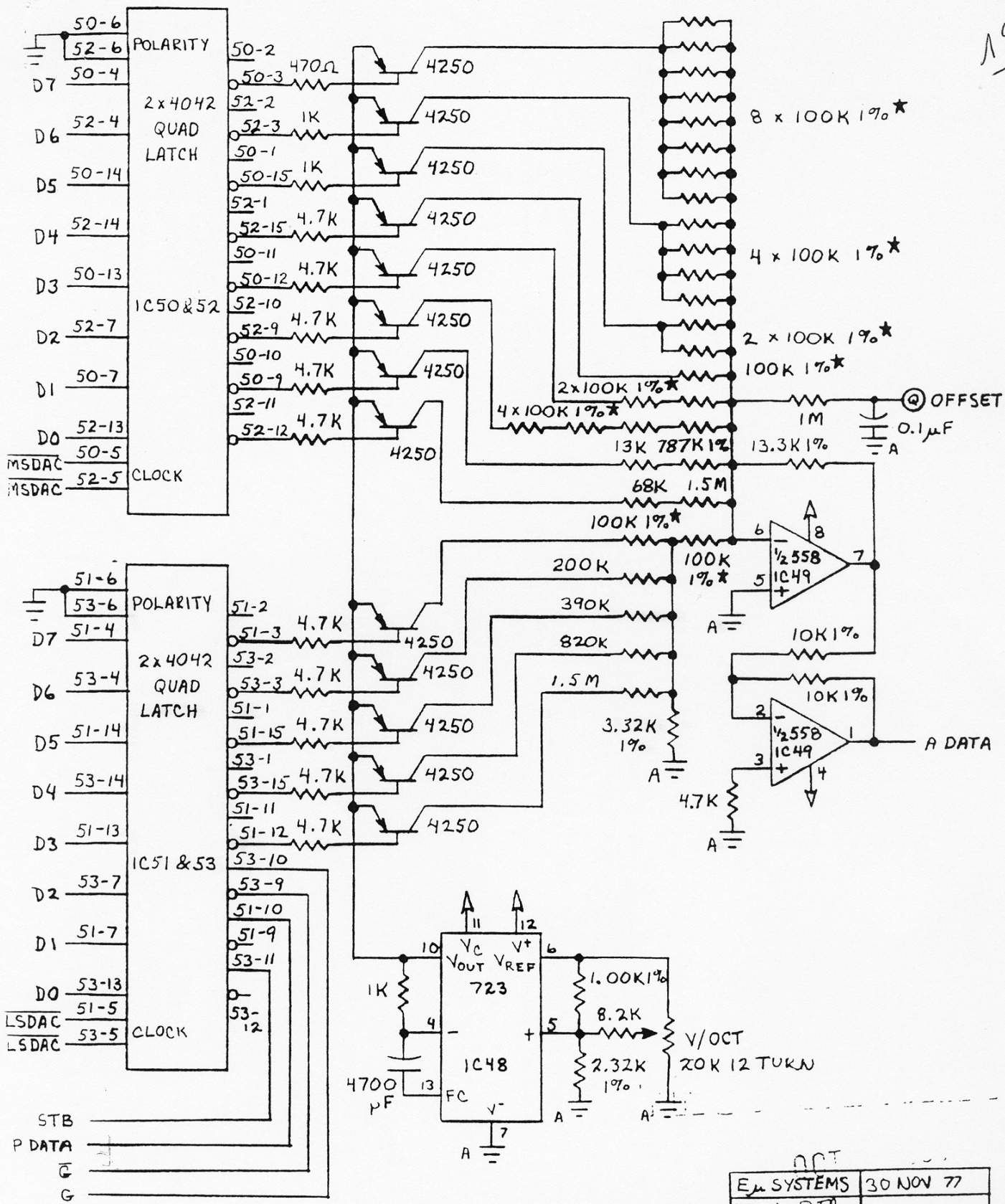


Em Systems	22 OCT 80
DWN $\text{\textcircled{E}}$	CK
DOC # 4061-001-003-D	
SCHEMATIC - μ P KYBD CB	
(CPU SECTION) PAGE 1 OF 18	

MODIFIED FOR DISK

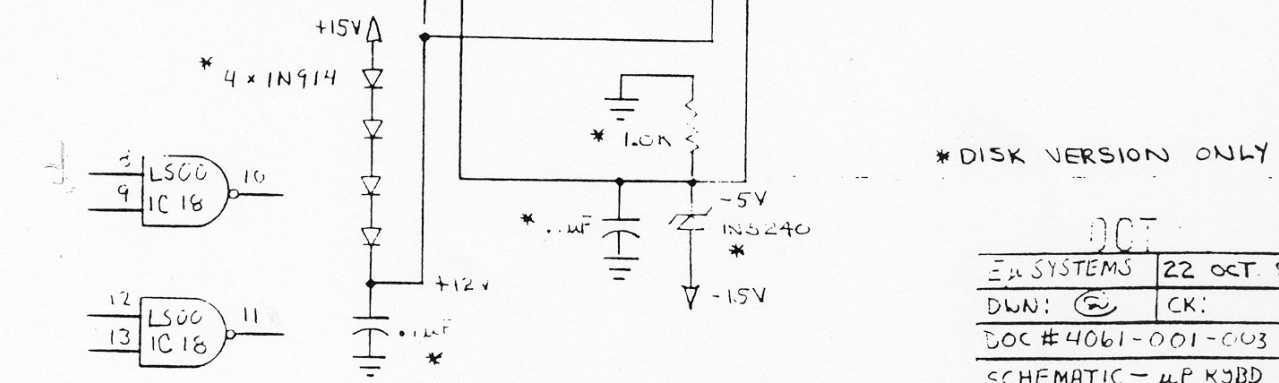
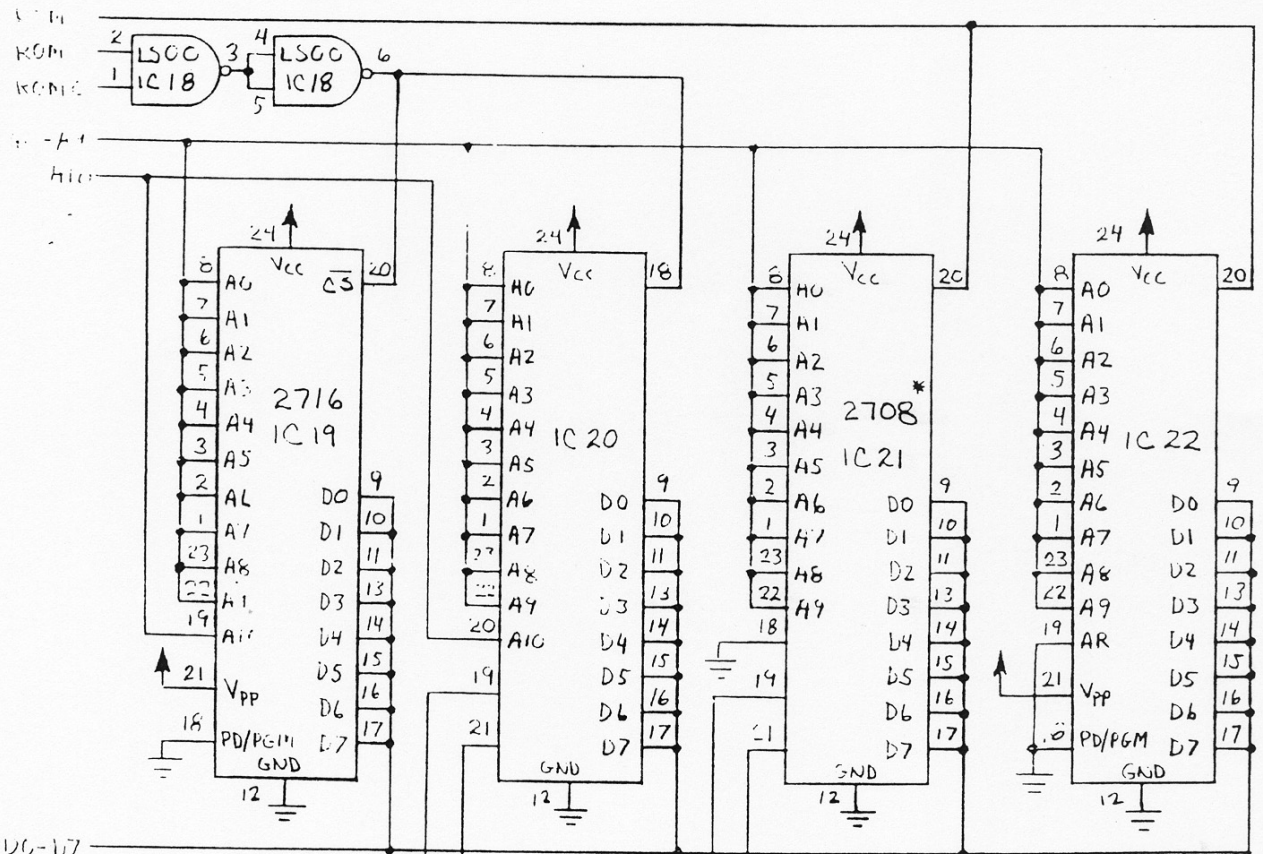
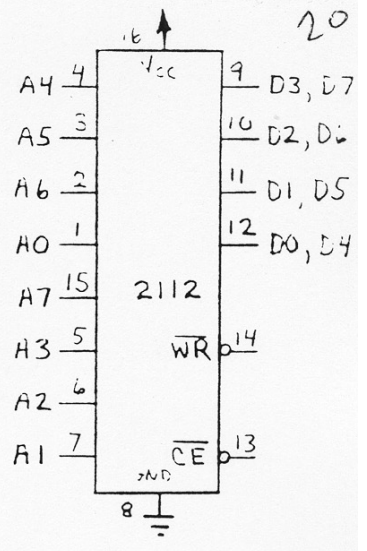
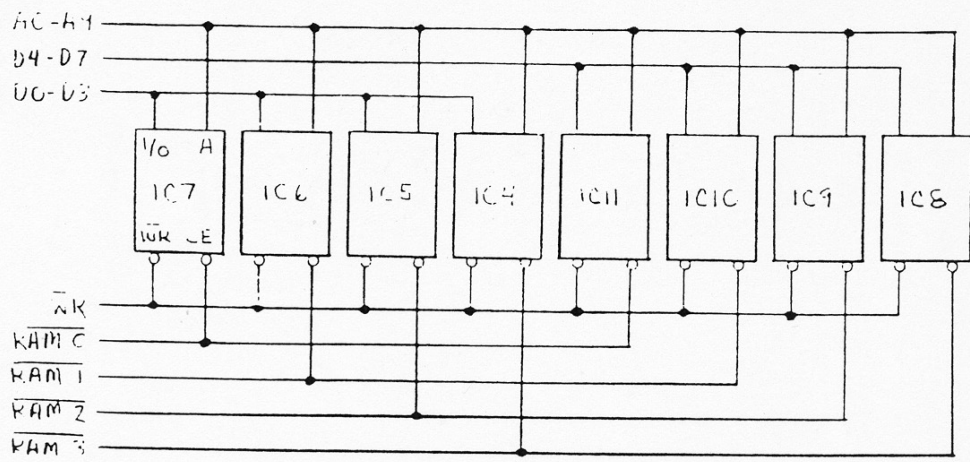


Em Systems 22 OCT 80
 DWN EP CK
 DOC #4061-001-003-D
 SCHEMATIC-μP K58D CB
 (TAPE SECTION) PAGE 2 OF 11
 MODIFIED FOR DISK



* INDICATES PART OF SET OF 23 100K 1% RESISTORS MATCHED TO .1% ACCORDING TO "SELECTION PROCEDURE - DAC RESISTORS FOR 4060 μP KEYBOARD"

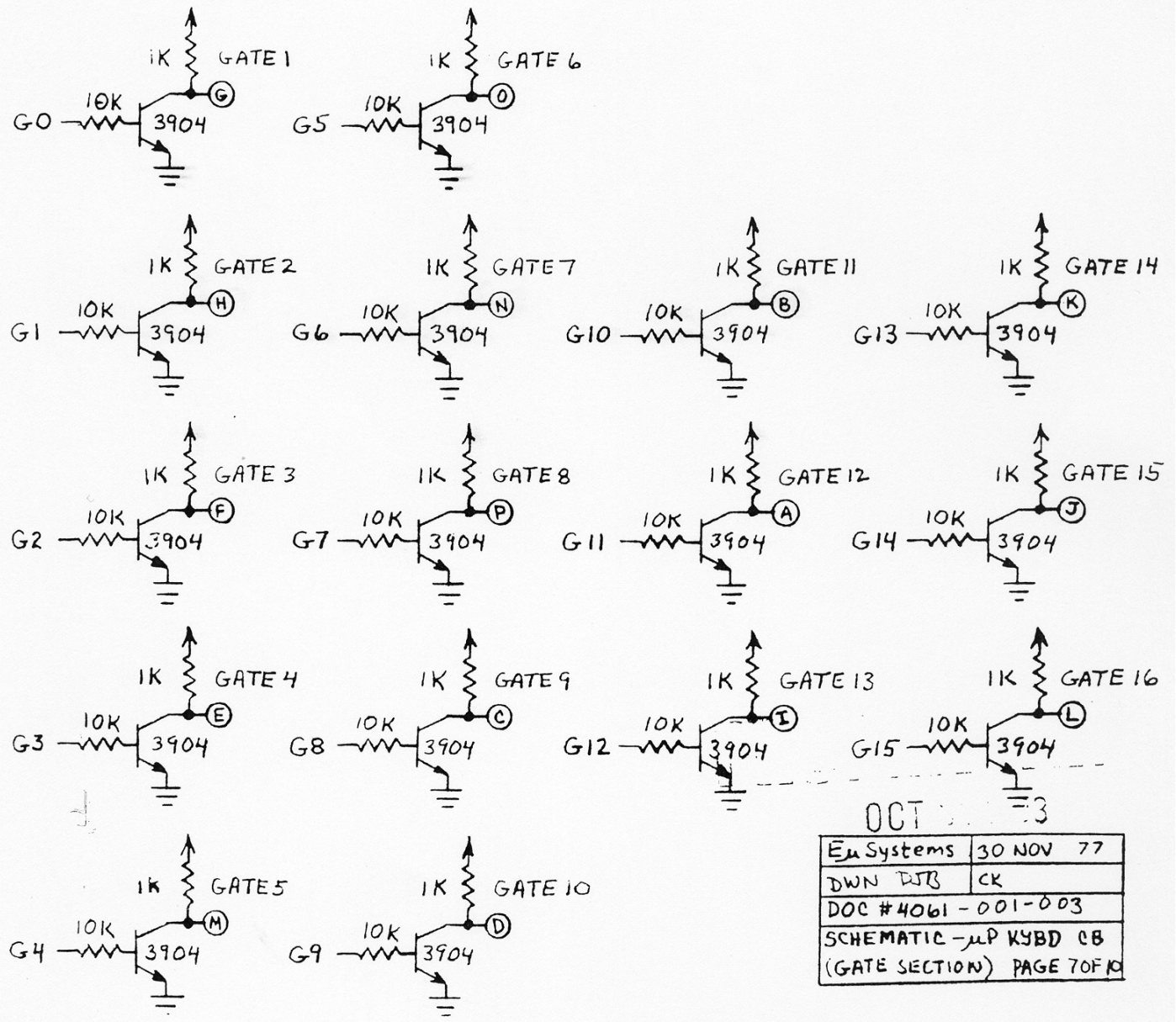
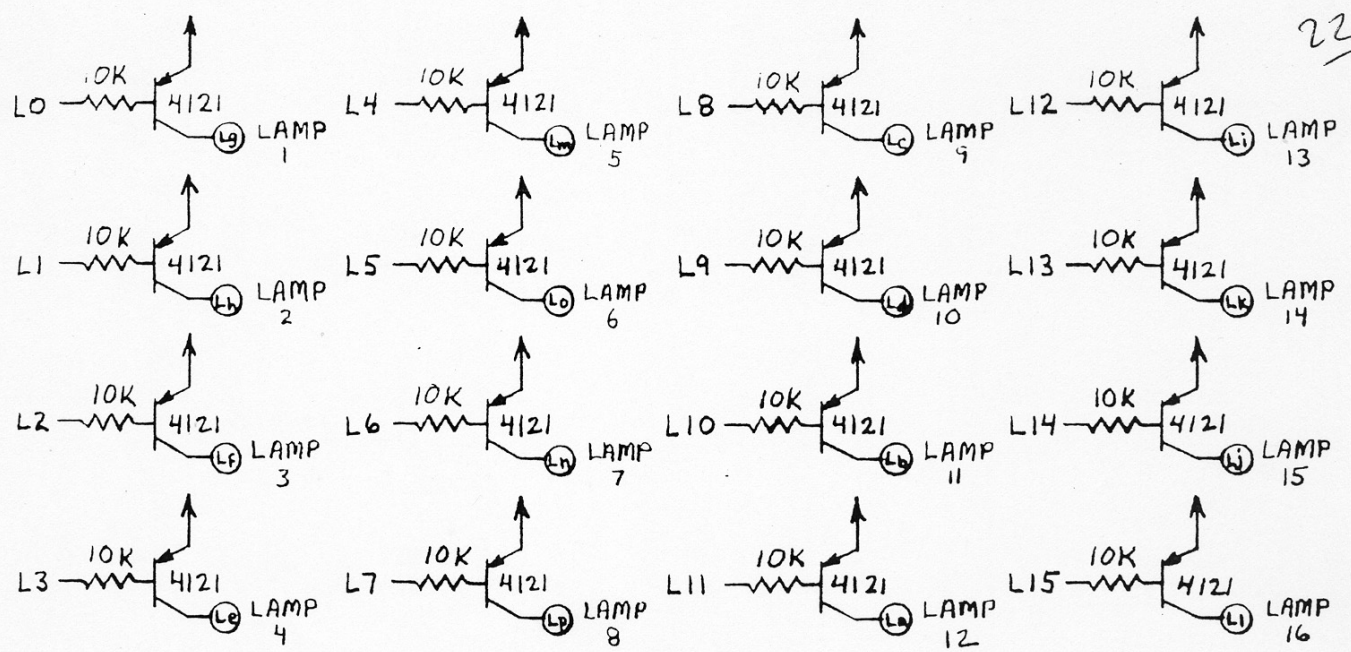
Eμ SYSTEMS	30 NOV 77
DWN PJB	
DOC #4061-001-003	
SCHEMATIC - μP KEYBOARD (DAC SECTION), PAGE 3 OF 10	



* DISK VERSION ONLY

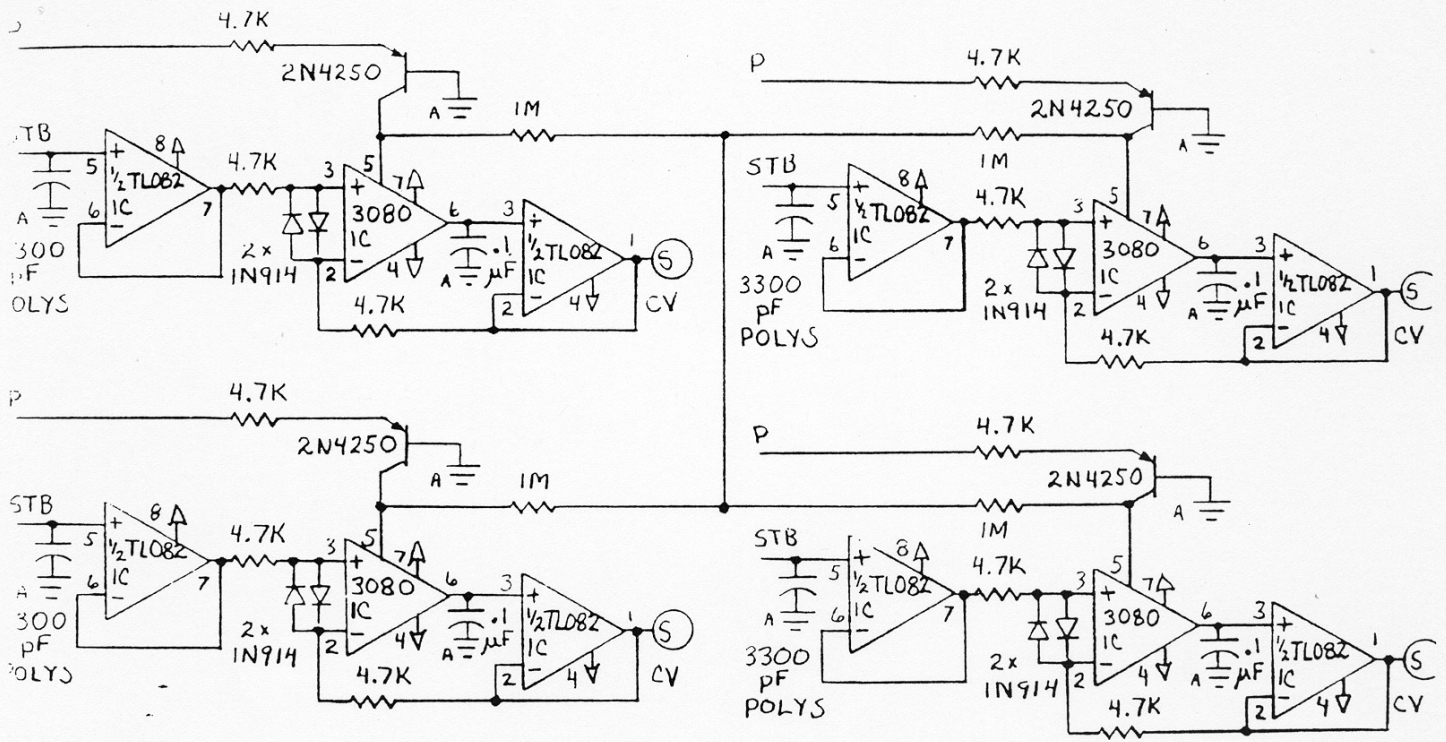
DOCS

EM SYSTEMS	22 OCT. 80
DWN:	CK:
DOC #4061-001-003	
SCHEMATIC - uP KBBD CB 1 (MEM SECTION) PAGE 4 OF 10	



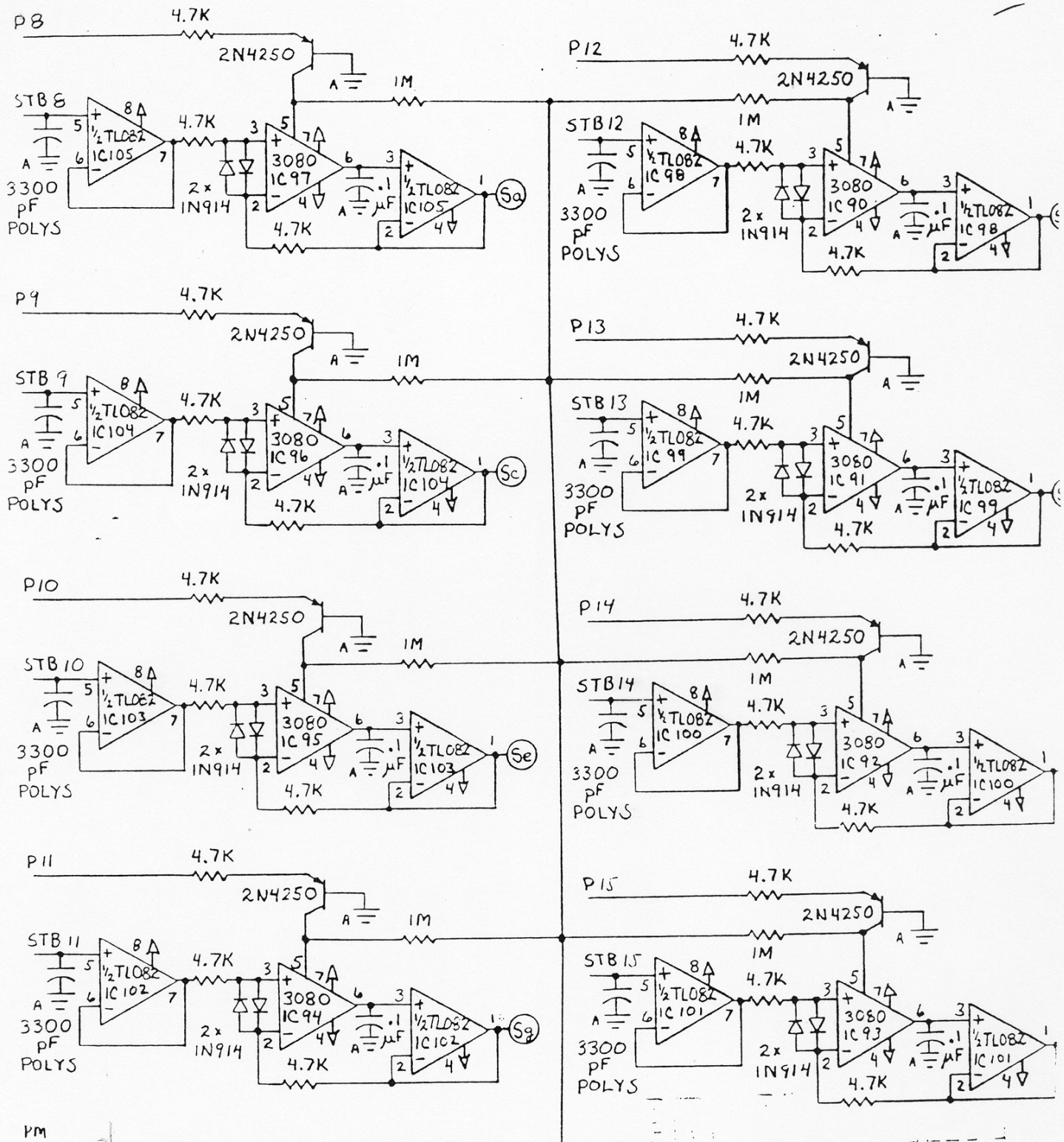
OCT 1977

EM Systems	30 NOV 77
DWN DJB	CK
DOC #4061-001-003	
SCHEMATIC - μ P KYBD CB	
(GATE SECTION) PAGE 70F10	



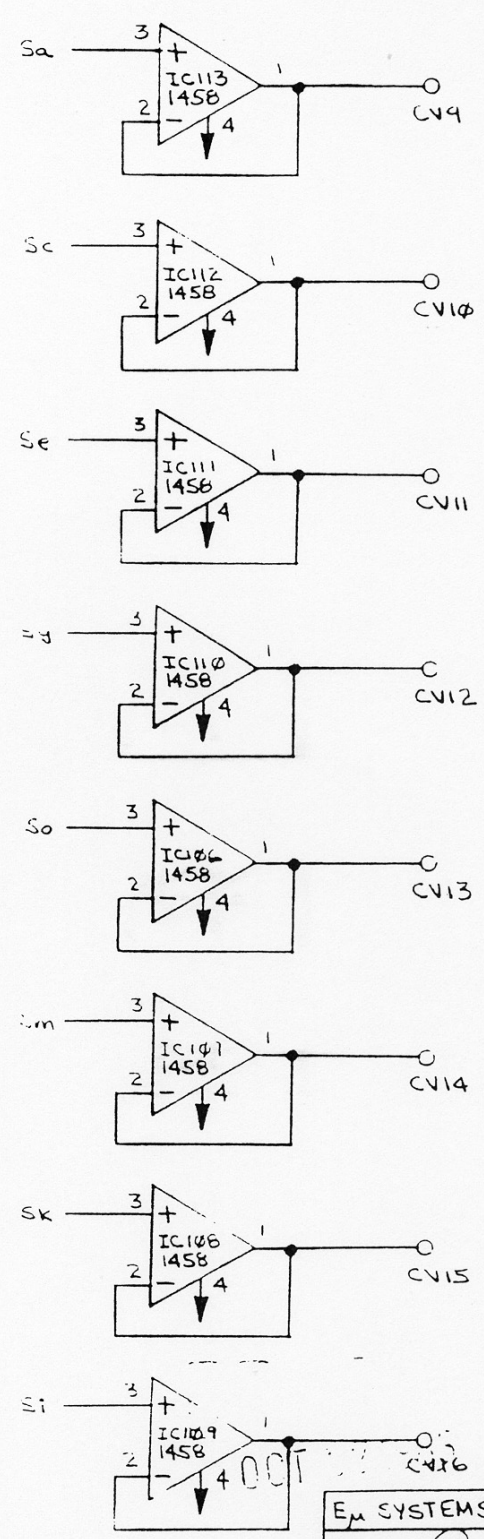
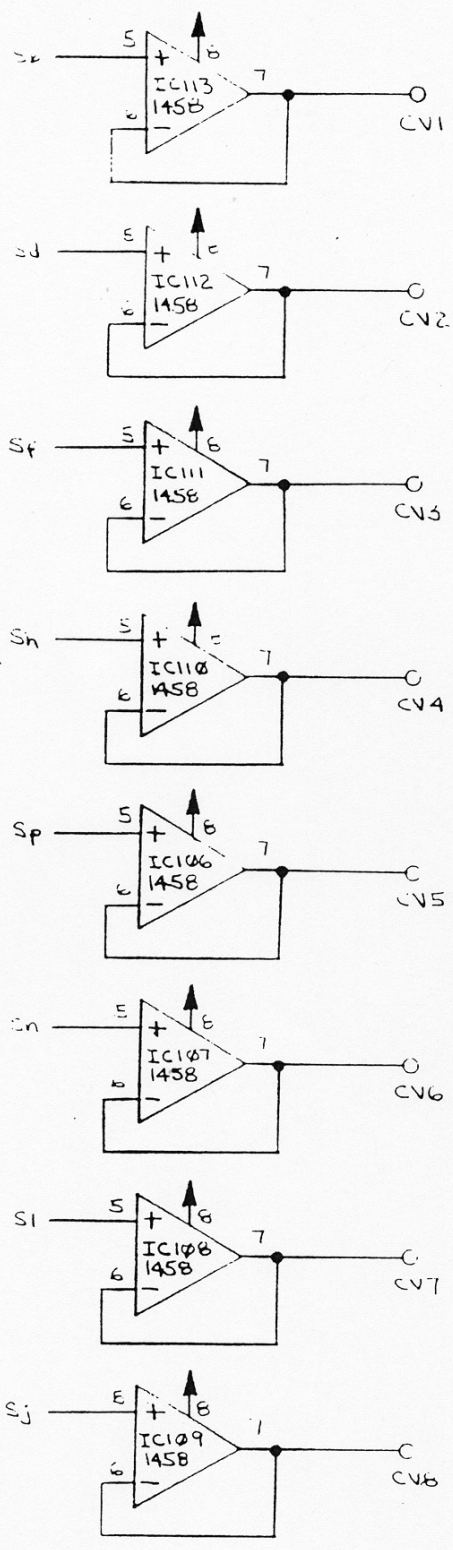
EM SYSTEMS	1-5-78
DWN: (2)	CK:
DCC 1: 4061-001-003	
SCHEMATIC ~ MP KYBD	
CB (USED FOR PP 8 & 9)	

- DO NOT INCLUDE IN DOCUMENT PACKAGES -
 - USED BY DRAFTING DEPT. ONLY -



OCT 27 1973

EM SYSTEMS	30 NOV 77
DWN: PJB	CK:
DOC #4061-001-003	
SCHEMATIC - μ P KYBD CB	
(S & H SECTION) PAGE 9 OF 10	



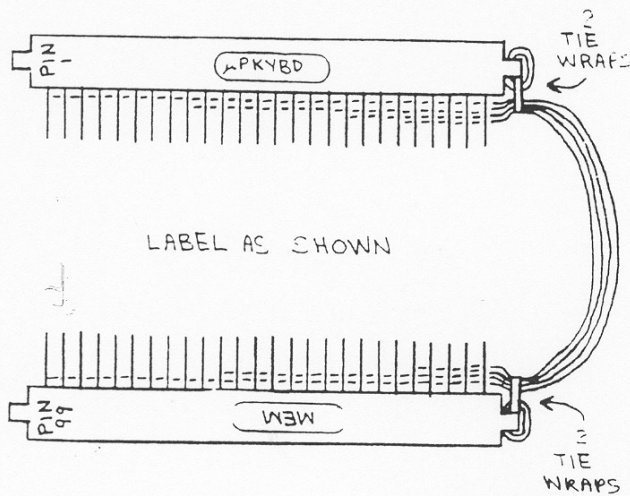
EM SYSTEMS	20 MAR 80
DWN: (S)	CK:
DOC. N° 4061-001-003	
SCHEMATIC - PKYBD (OUTPUT BUFFERS) P. 10 of 10	

Use 26 gauge Kynar insulated twisted pair; strip one inch from each end before wire-wrapping (listed lengths allow for this). A harness board with nails to hold the connectors in place is available to simplify assembly.

Wrap the colored wire of the pair to the appropriate even numbered pin as listed below, and the black wire of the pair to the odd numbered pin opposite the even pin (ground).

SUMMARY OF LENGTHS: 2-11.5" 2-12" 5-12.5" 17-13" 4-13.5"
 3-14" 1-15" 3-16" 2-16.5" 2-17.5"

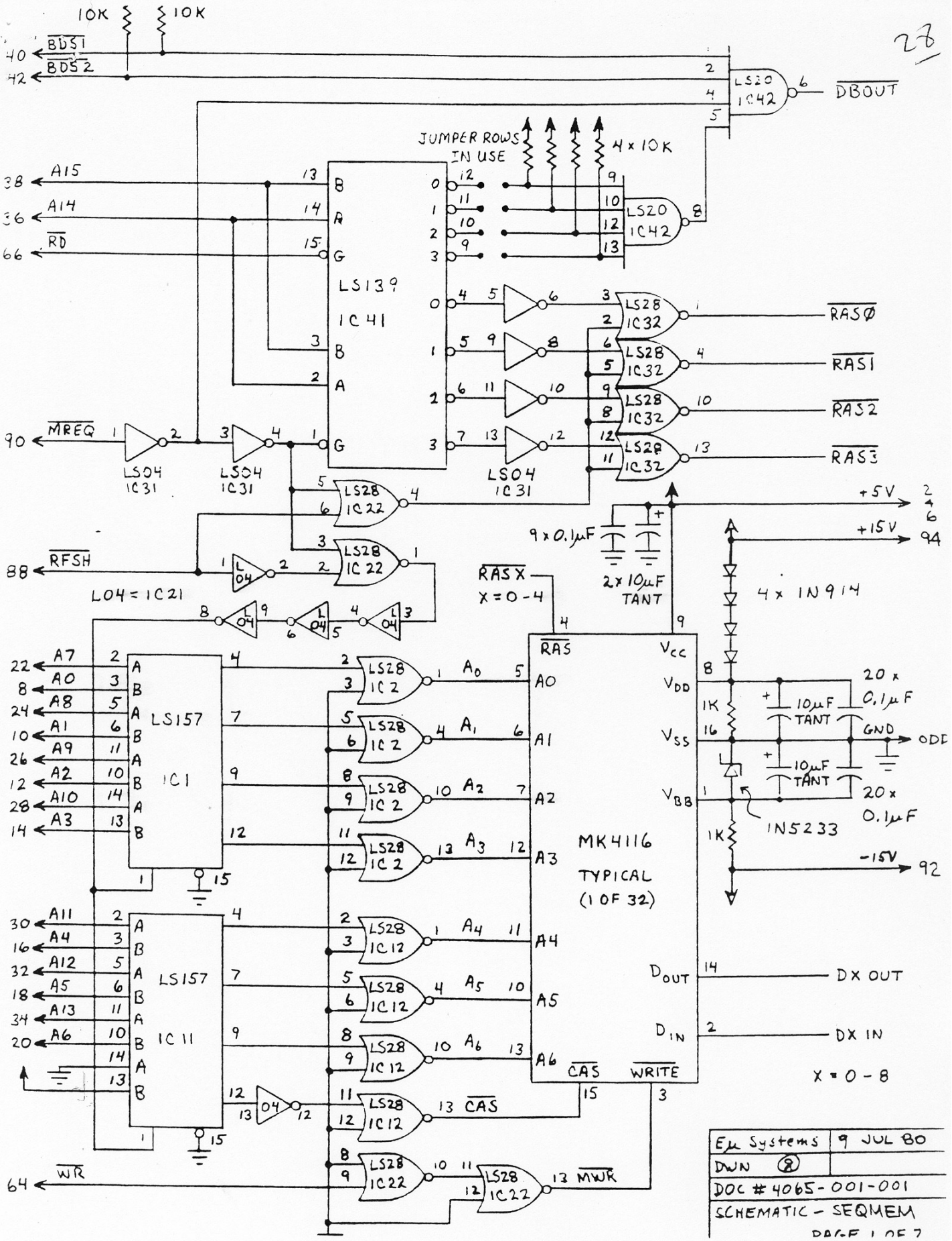
Inches	uPKYBD	SEQMEM	SIGNAL	Inches	uPKYBD	SEQMEM	SIGNAL
13	2	2	+5V	12.5	40	30	A11
13	2	4	+5V	14	42	28	A10
13	2	6	+5V	12.5	68	84	DO
16.5	4	66	-RD	13.5	70	82	D1
16.5	6	64	-WR	13.5	72	80	D2
17.5	8	88	-RFSH	13	74	78	D3
13	10	8	A0	13	90	92	-15V
17.5	12	90	-MREQ	13	92	94	+15V
13	14	10	A1	12	94	76	D4
13	16	12	A2	12	96	74	D5
13	18	14	A3	11.5	98	72	D6
13	20	16	A4	11.5	100	70	D7
13	22	18	A5	16	56	98	-RST
14	24	38	A15	13	54	56	-M1
13	26	20	A6	14	44	58	-IORQ
13.5	28	36	A14	16	58	100	PHI'
12.5	30	22	A7	13.5	50	54	-INT
13	32	34	A13	16	46	96	CLK
12.5	34	24	A8	13	60	60	RST
13	36	32	A12	15	52	86	-WAIT
12.5	38	26	A9				



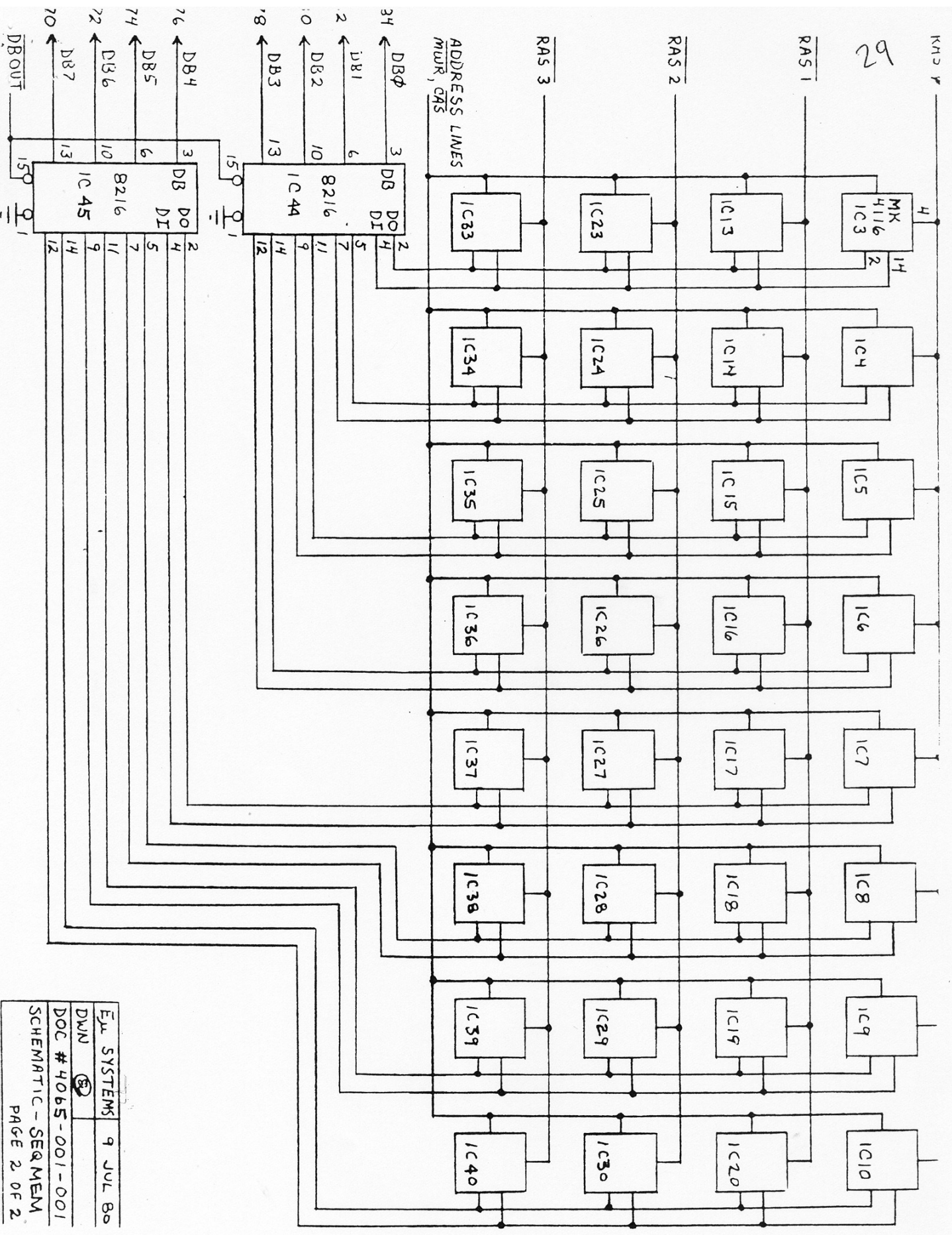
27

PARTS LIST - 4305 16K RAM

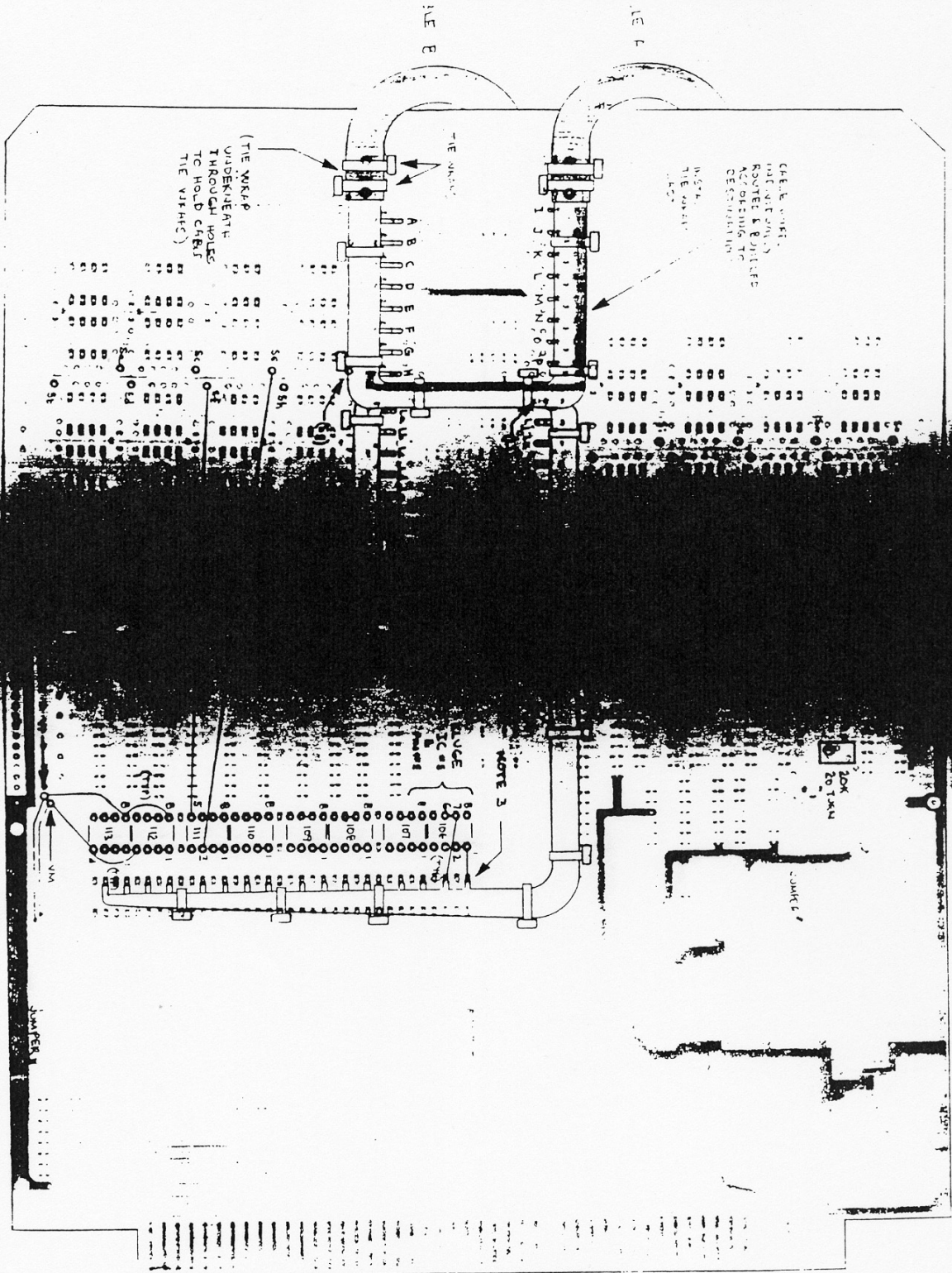
QTY	PART#	DESCRIPTION	NOTES
1	ID 10	74LS139 DMUX	
2	ID 23	74LS157 MPX	
1	ID 23	74LS24 INV	
6	ID 29	4116 RAM	
1	ID 35	74LS20 NAND	
2	ID 38	8216 BUSEUF	
4	IL 38	74LS28 NOR	
1	ID 40	74LS24 INV	
4	D 1	1N914 SIG	
1	D 6	1N5232	
49	C 15	0.1 UF CER	
3	C 22	10 UF TANT	
2	R 9	1.0K OHM	
6	R 22	10K OHM	
24	CN 25	16PIN LP SKT	
2	CN 26	CARD EDGE CN	
4	E 2	SPACE	
6	H 11	4-42X1/4 PH	
1	CE 21	RAM/DISK CP	



EM Systems	9 JUL 80
DWN	②
DOC # 4065-001-001	
SCHEMATIC - SEQMEM	
PAGE 1 OF 7	



29



ATTEND WIRE W/SPARE
 NEW BOLDER, (TYPE PLCS.)


NOTE 1:
 SEE WIRE CONNECTOR
 WORKING FOR DETAILS
 NOTE 4:
 THE WIRE IS WRAPPED
 TO BE IN THE BUNDLE

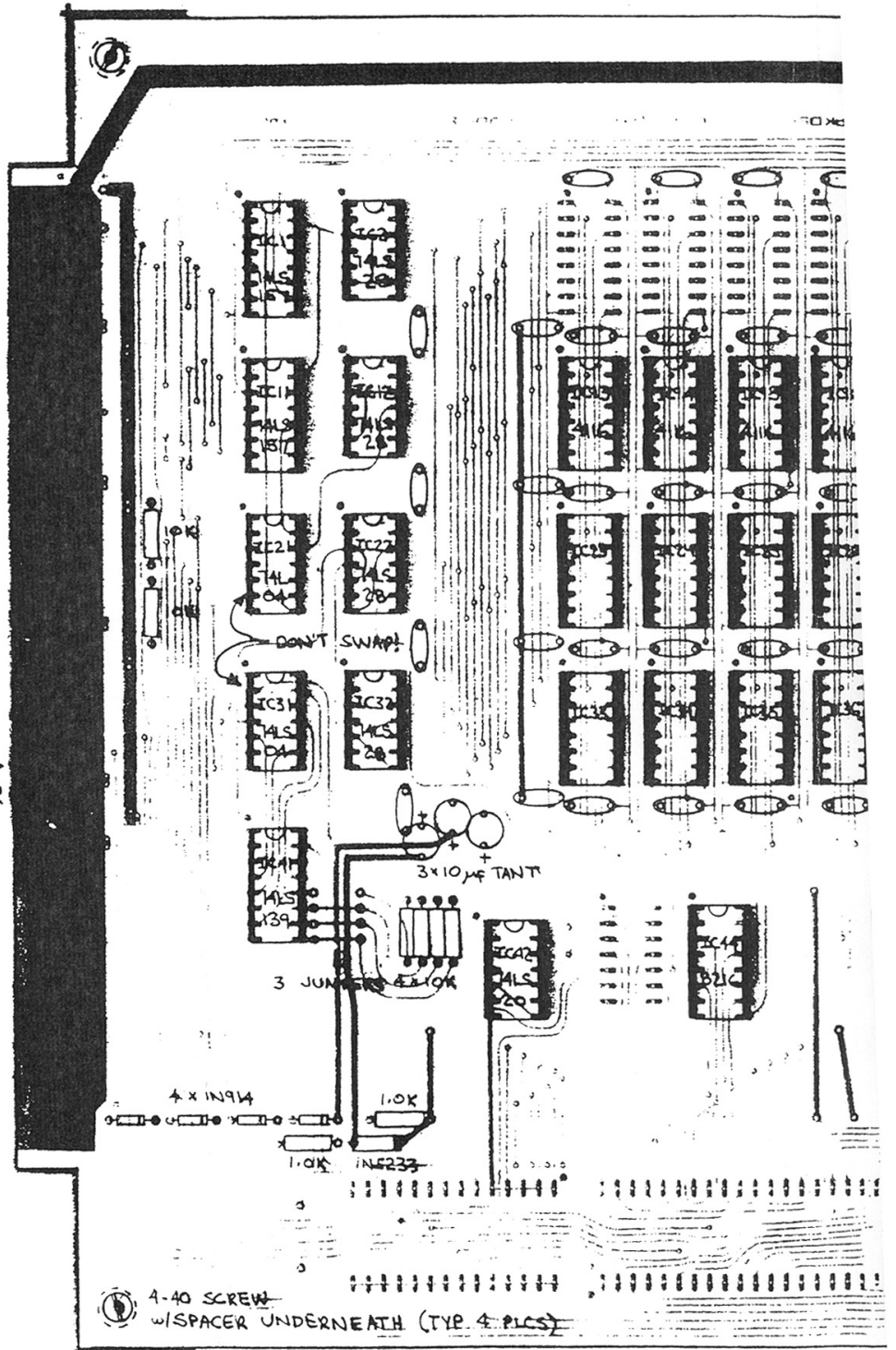
EM SYSTEMS	10 DEC 80
CMV: E	CK:
DOC NO: A-6041-011-03	
ASSEMBLY DIAGRAM	
MFRBD CB - BOTTOM	

1343

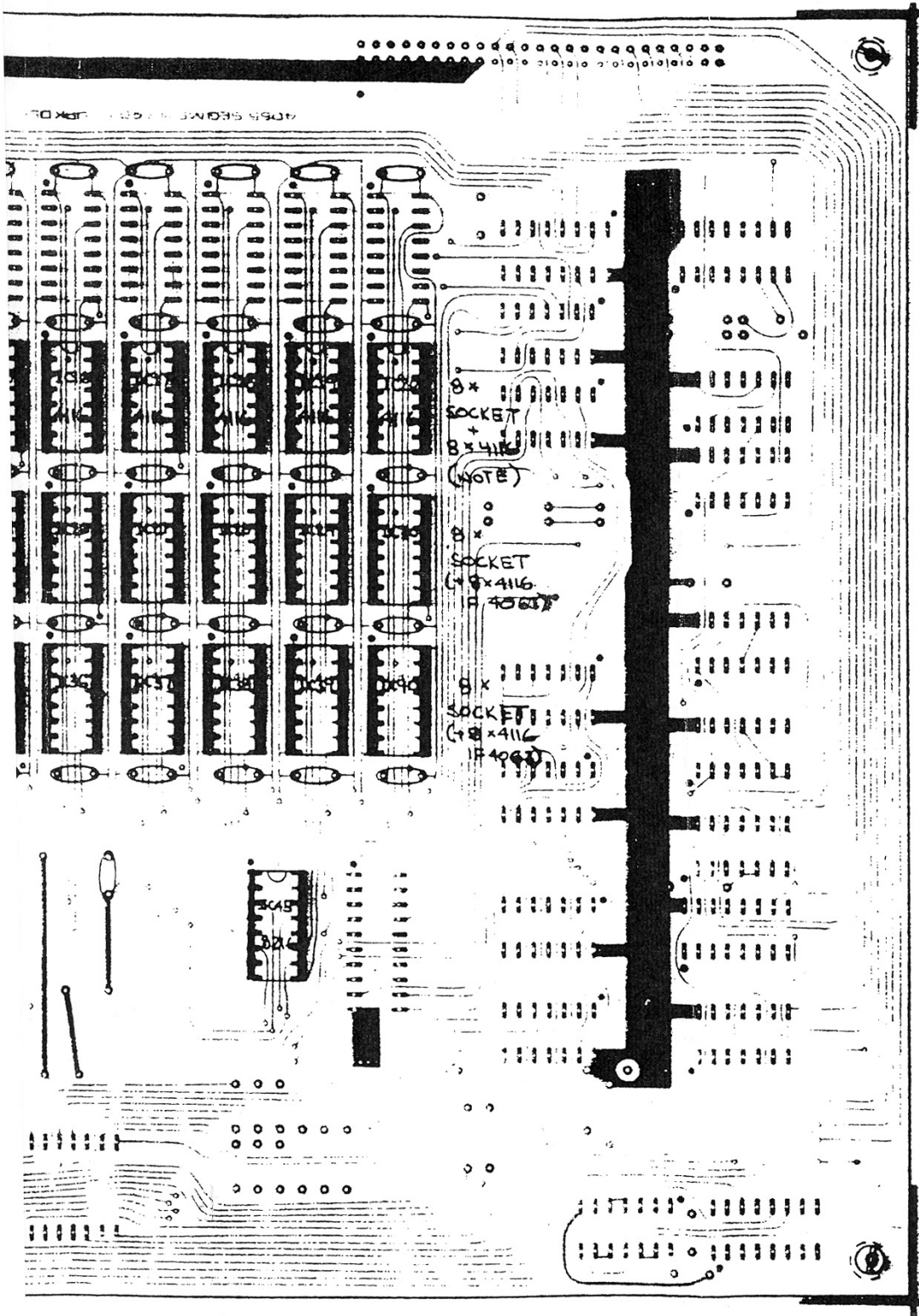
31

NOTES:

1.  = 0.1 μ f (TYP 49 PLCS)
2. ALL 4116's TO BE INSTALLED BY Q.C. (LEAVE OUT OF SOCKETS)
3. ALL IC'S IN SOCKETS. SOCKET BEVELED CORNER = PIN 1 (NOTCH)



TOP (COMPONENTS)



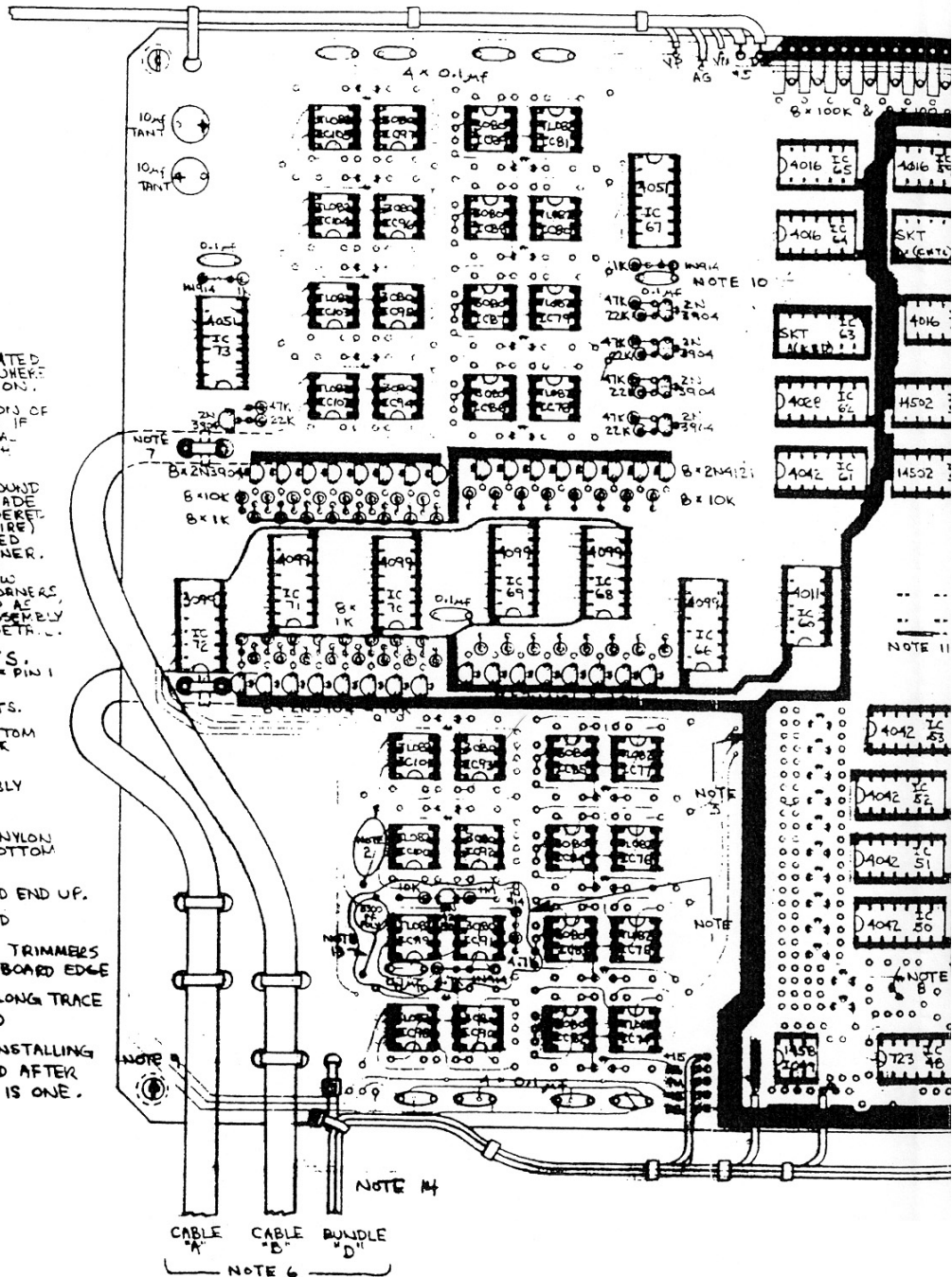
COMPONENT) VIEW

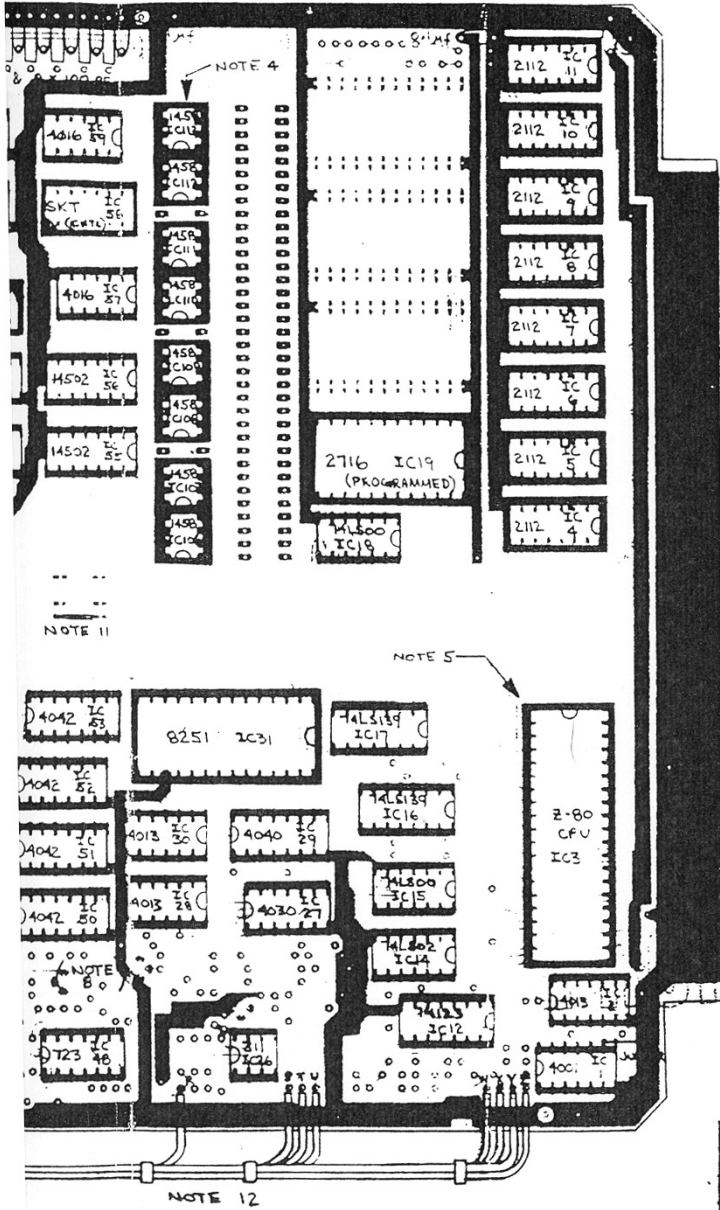
EM SYSTEMS	10 DEC 80
DWNS <i>CK</i>	CKE
DOC. NO A-9065-011-02	
ASSEMBLY DIAGRAM - 4065/1000 K20000/400000	

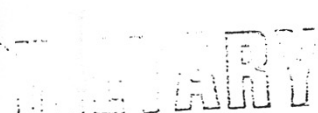
BUNDLE
"C"
NOTES

NOTES:

- 1 - TYPICAL S/H CELL, REPEATED 16 TIMES. ROTATE 180° WHEN SHOWN BY IC ORIENTATION.
- 2 - ALTERNATE INSTALLATION OF 3300 P. POLYETHYLENE CAP IF AXIAL LEAD TYPE. (NORMAL TYPE IS GREEN. CAP WITH RADIAL LEADS.)
- 3 - SHIELD SOLDERED TO GROUND TRACE AS INDICATED. MADE FROM FLATTENED & SOLDERED RG-59/U (PATCH CORD WIRE) OUTER BRAID OR SHAPED & TRIMMED BOARD STIFFENER.
- 4 - KLUGE: A 16 PIN DIP W/4 SOCKETS SOLDERED AT CORNERS, WITH 1458'S INSTALLED AS SHOWN. SEE BOTTOM ASSEMBLY DIAGRAM FOR WIRING DETAIL.
- 5 - ALL IC'S IN SOCKETS. SOCKET BEVELED CORNER = PIN 1
- 6 - CABLES & BUNDLES: SEE CONNECTOR WIRING LISTS.
- 7 - CABLES A & B: SEE BOTTOM ASSEMBLY DIAGRAM FOR WIRING DETAIL.
- 8 - SEE ENLARGED ASSEMBLY DIAGRAM OF THIS AREA FOR DETAIL.
- 9 - 4-40 - 1/4 BHMS WITH NYLON SPACER MOUNTED TO BOTTOM OF BOARD, 4 PLACES
- 10 - ALL DIODES MOUNT BAND END UP.
- 11 - "G+" JUMPER, INSULATED
- 12 - WIRES SHOULD CLEAR TRIMMERS AND BE EVEN WITH BOARD EDGE
- 13 - SOLDER CAP LEAD ALONG TRACE IF GREEN CAPS USED
- 14 - DEGREASE BEFORE INSTALLING WIRES & CABLES, AND AFTER DISKLOGE IF THERE IS ONE.






 OCT 29 1983

EMSYSTEMS	10 DEC 80
DWN: @/DD	CKC
DOC. NO A-6091-011-03	
ASSEMBLY DIAGRAM -	
MPKBD CB - TOP	