COMMODORE

PC 1

Technical Manual

10/87

Technische Schulung
Commodore Deutschland

Dier
Lau
Krämer

Inhalt

1.
Main Board
Schematic PC 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
1	ADVANCED ENGINEERING RELEASE	05-20-87	
2	UPDATE	06-10-87	
3	UPDATE	06-30-87	
4	UPDATE	08-11-87	

DRAWING FILES:	CONTENTS:
PC_1.DWG	THIS SHEET
PC_2.DWG	CPU SECTION
PC_3.DWG	FE2010 SECTION
PC_4.DWG	MIO CHIP, RAM DECODING
PC_5.DWG	640 KB MAIN RAM
PC_6.DWG	FLOPPY INTERFACE
PC_7.DWG	V.24 INTERFACE
PC_8.DWG	PRINTER INTERFACE
PC_9.DWG	VIDEO CONTROL LOGIG I
PC_10.DWG	VIDEO CONTROL LOGIC II
PC_11.DWG	VIDEO RAM
PC_12.DWG	CONNECTORS I
PC_13.DWG	CONNECTORS II
PC_14.DWG	BLOCK CAPS.

PC-

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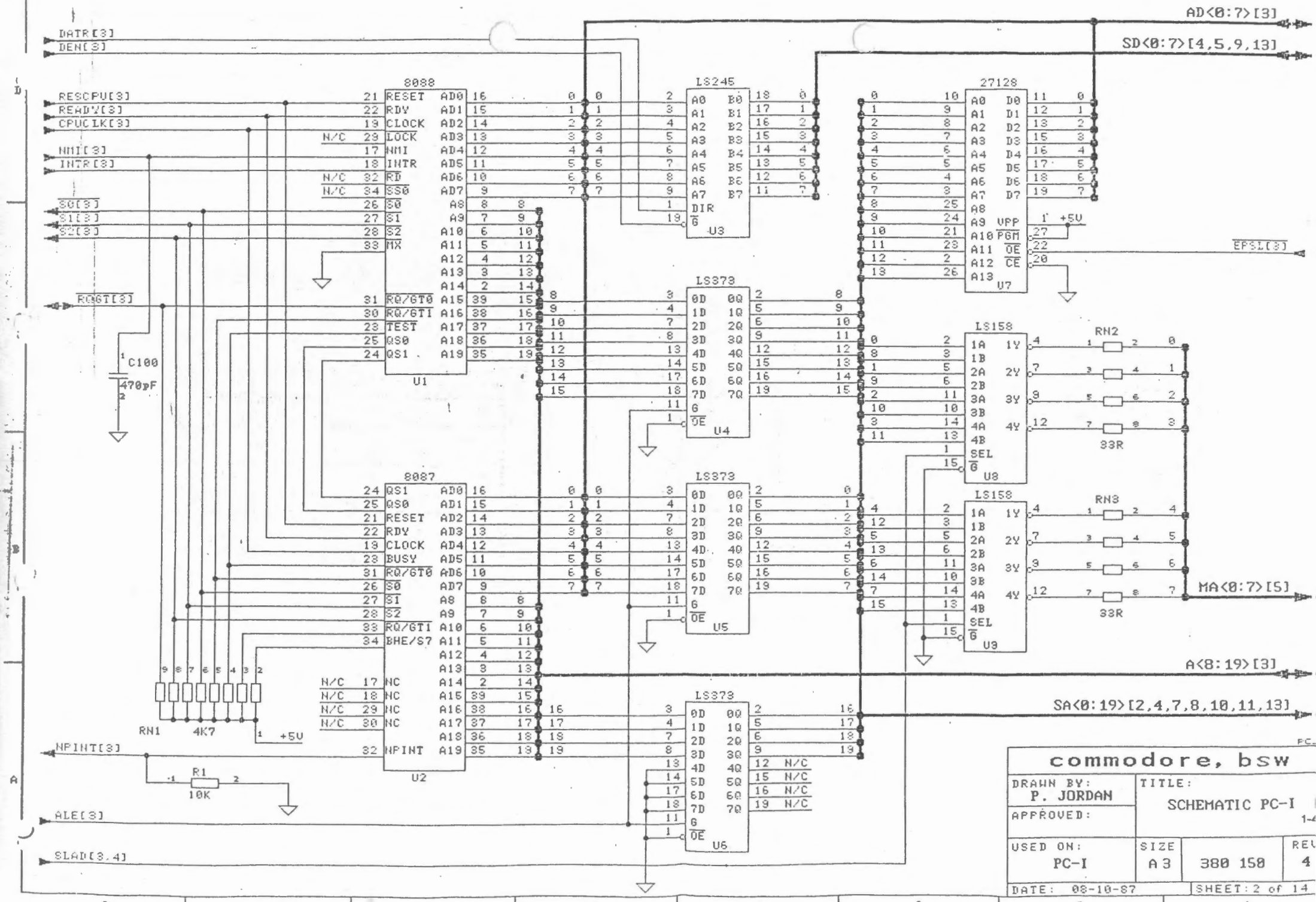
DRAWN BY: H. ULLRICH	TITLE: SCHEMATIC PC-I		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-11-87	SHEET: 1 of 14		



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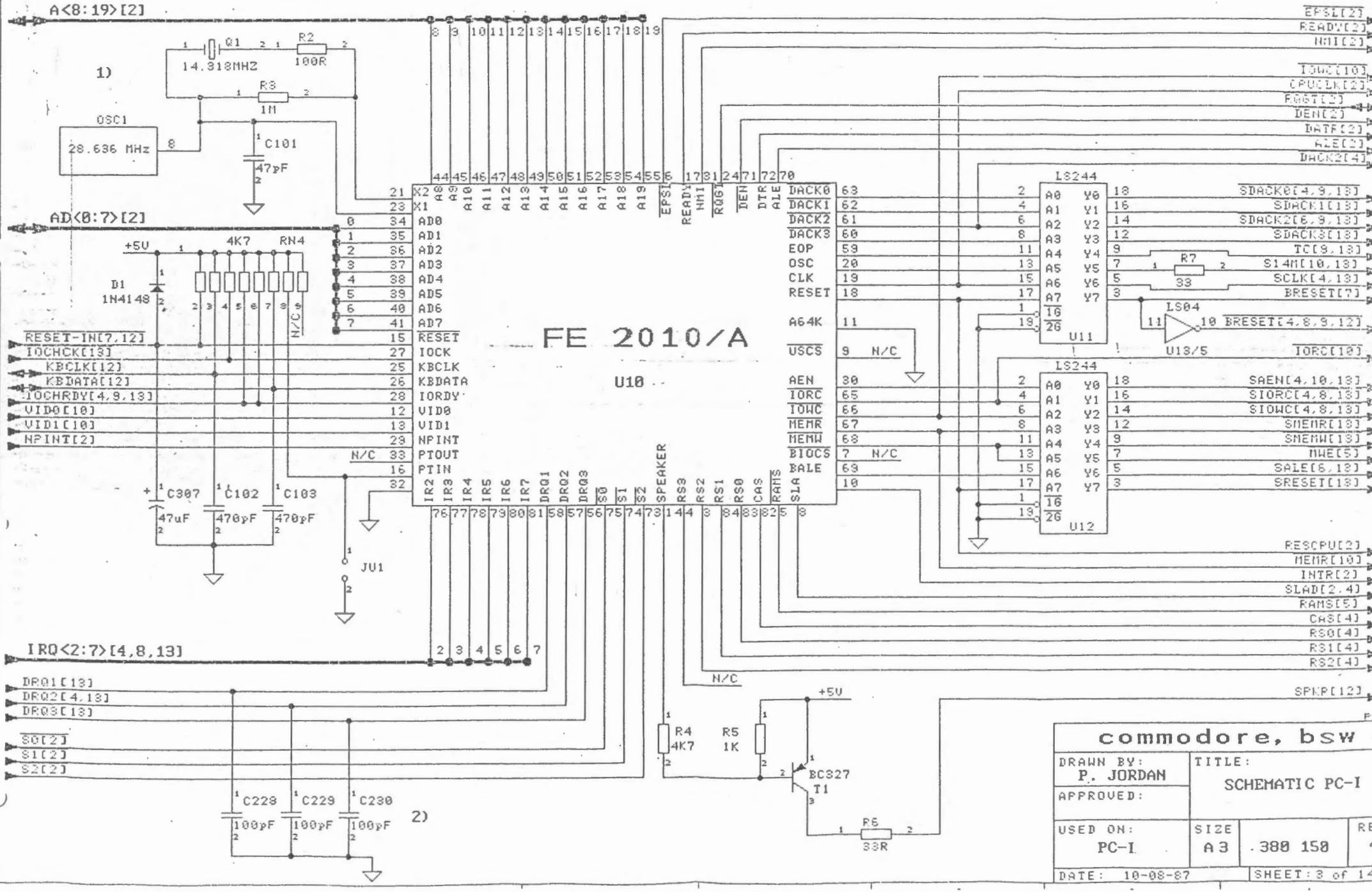
DRAWN BY: P. JORDAN	TITLE: SCHEMATIC PC-I		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-10-87	SHEET: 2 of 14		

NOTES: 1) ASSEMBLED IS EITHER: Q1,R2 R3,C101 AND FE 2010
OR : OSC1 ID FE 2010A
2) C228 TO C230 ASSEMBLED ONLY IF REQUIRED!



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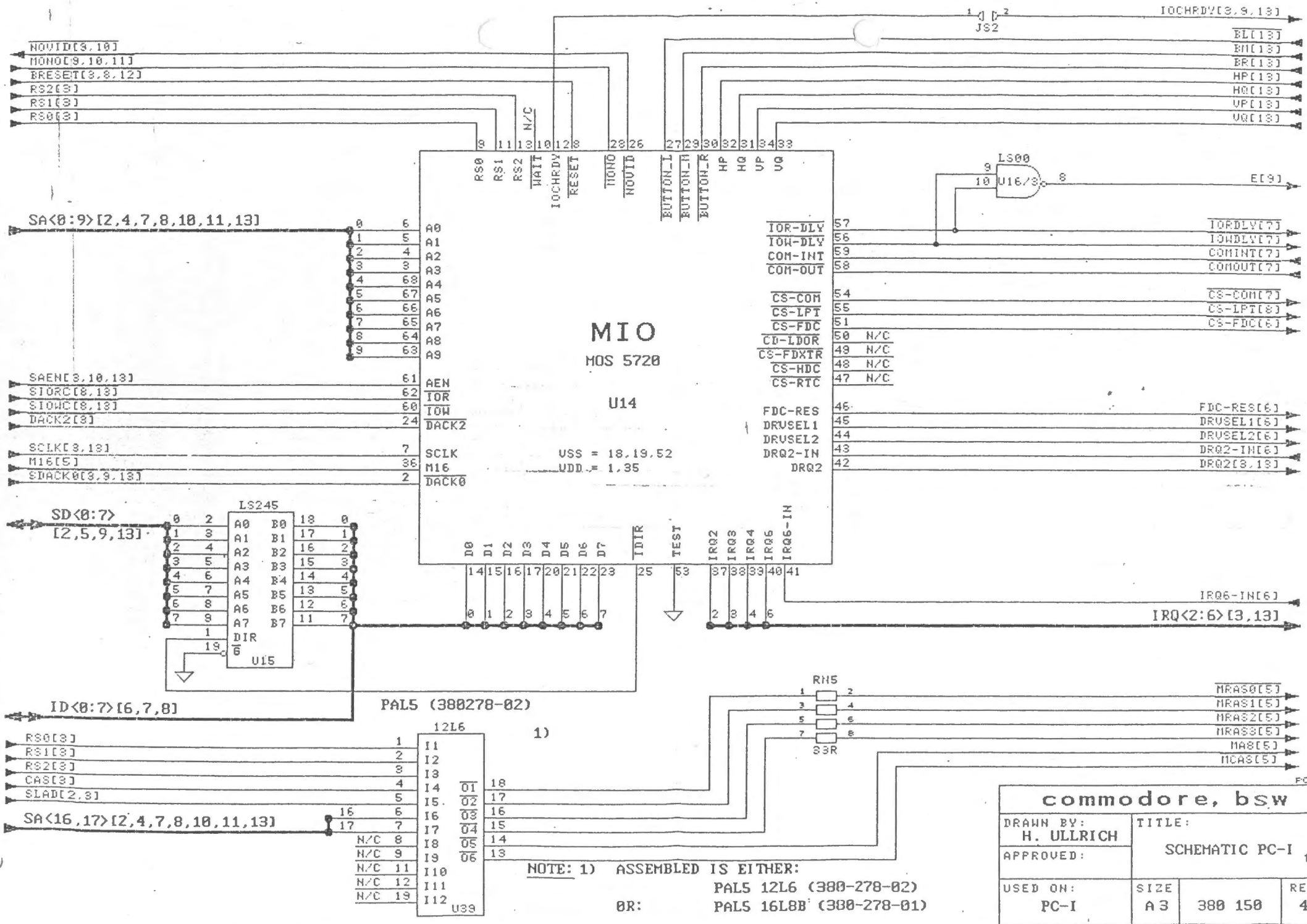
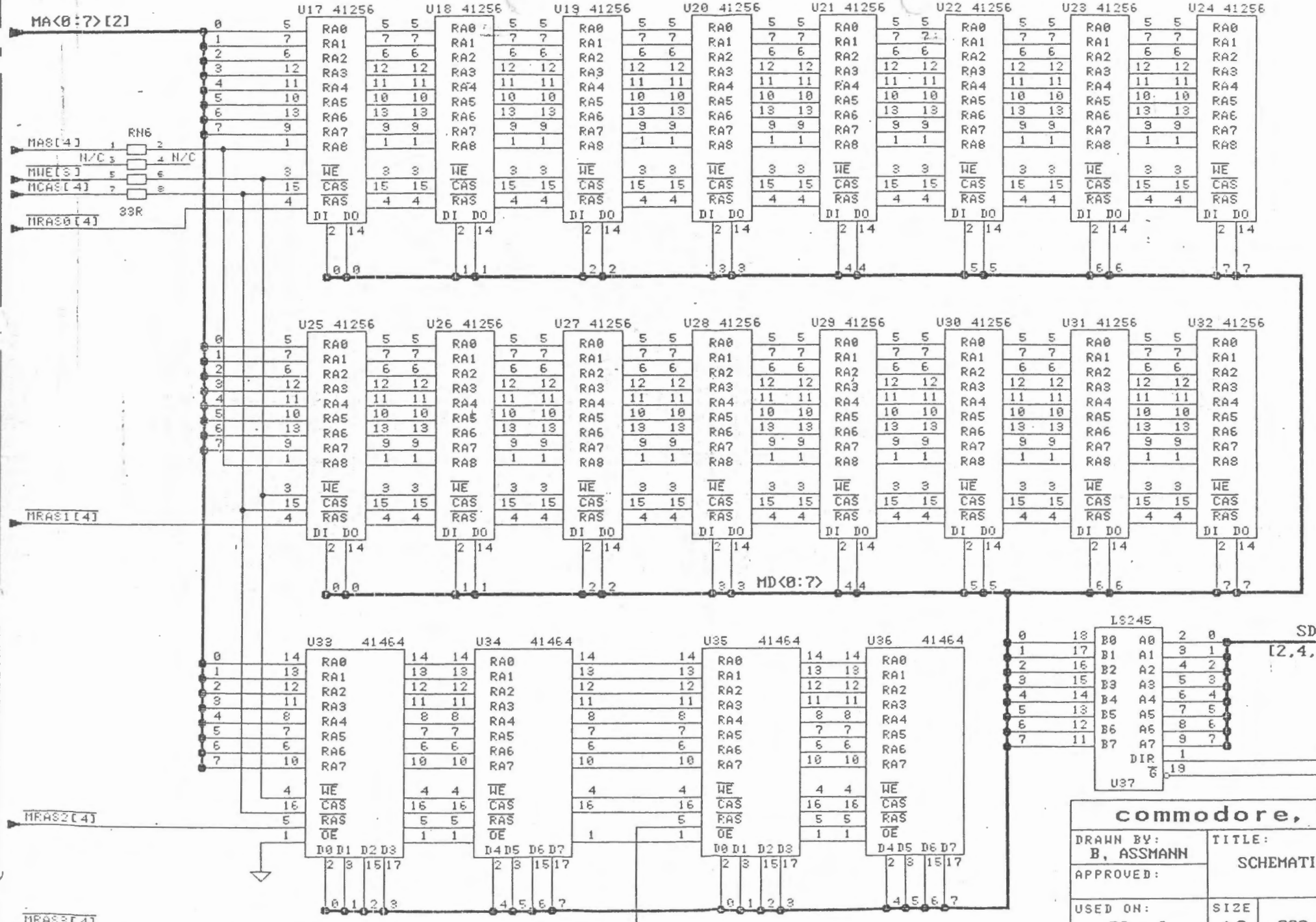
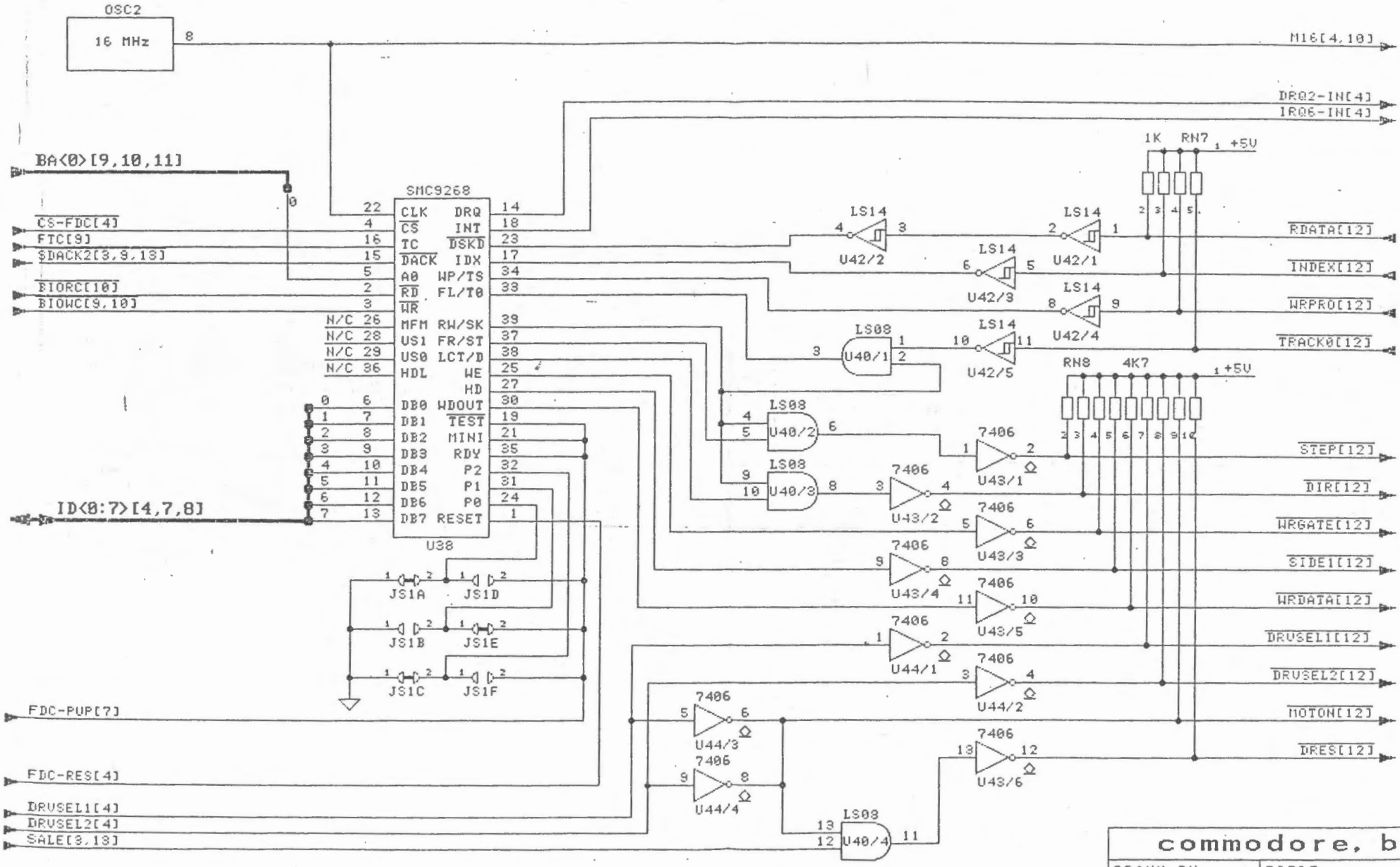
DRAWN BY: P. JORDAN	TITLE: SCHEMATIC PC-I
APPROVED:	
USED ON: PC-I	SIZE A3 · 380 150
DATE: 10-08-87	SHEET: 3 of 14

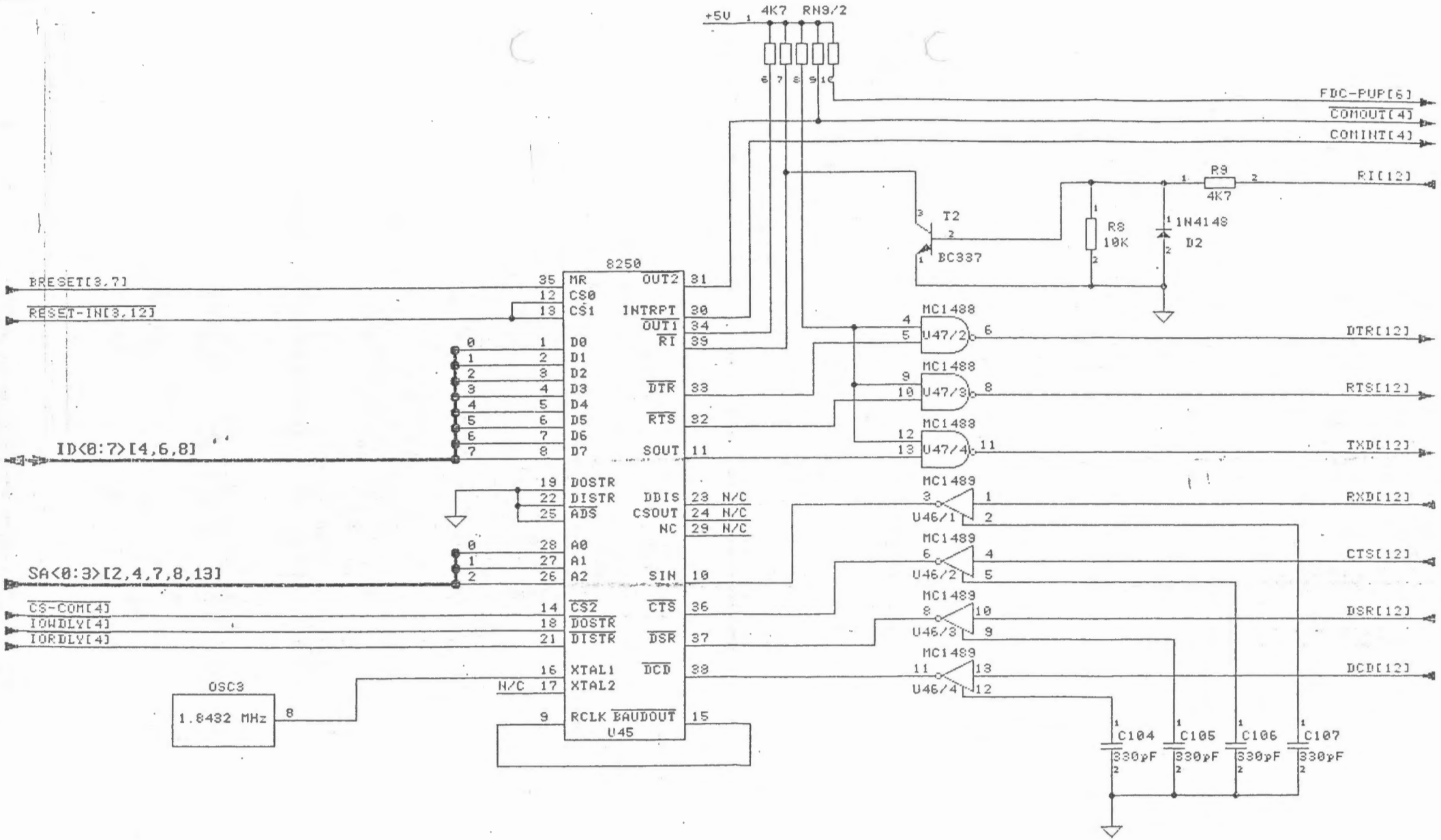

MIO
MOS 5720
U14
VSS = 18,19,52
VDD = 1,35
JS2
LS00
U16/3
LS245
U15
12L6
U39
RN5
33R
PAL5 (380278-02)
1)
NOVID[3,10]
MONO[9,10,11]
BRESET[3,8,12]
RS2[3]
RS1[3]
RS0[3]
IOCHRDY[3,9,13]
BL[13]
BM[13]
BR[13]
HP[13]
HQ[13]
VP[13]
VQ[13]
E[9]
SA<0:9>[2,4,7,8,10,11,13]
IOR-DLY
IOW-DLY
COM-INT
COM-OUT
CS-COM
CS-LPT
CS-FDC
CD-LDOR
CS-FDXTR
CS-HDC
CS-RTC
IORDLY[7]
IOWDLY[7]
COMINT[7]
COMOUT[7]
CS-COM[7]
CS-LPT[8]
CS-FDC[6]
SAEN[3,10,13]
SIORC[8,13]
SIOWC[8,13]
DACK2[8]
SCLK[3,13]
M16[5]
SDACK0[3,9,13]
FDC-RES
DRVSEL1
DRVSEL2
DRQ2-IN
DRQ2
FDC-RES[6]
DRVSEL1[6]
DRVSEL2[6]
DRQ2-IN[6]
DRQ2[3,13]
IRQ6-IN[6]
IRQ<2:6>[3,13]
SD<0:7>
[2,5,9,13]
ID<0:7>[6,7,8]
RS0[3]
RS1[3]
RS2[3]
CAS[3]
SLAD[2,3]
SA<16,17>[2,4,7,8,10,11,13]
MRAS0[5]
MRAS1[5]
MRAS2[5]
MRAS3[5]
MA8[5]
MCAS[5]
NOTE: 1) ASSEMBLED IS EITHER:
PAL5 12L6 (380-278-02)
OR: PAL5 16L8B (380-278-01)
commodore, bsw
DRAWN BY: H. ULLRICH
APPROVED:
TITLE: SCHEMATIC PC-I 1-6
USED ON: PC-I
SIZE A3
380 150
REV 4
DATE: 08-10-87
SHEET: 4 of 14


MA<0:7>[2]
RN6
MAS[4]
N/C
N/C
MWE[3]
MCAS[4]
33R
MRAS0[4]
MRAS1[4]
MRAS2[4]
MRAS3[4]
U17 41256
U18 41256
U19 41256
U20 41256
U21 41256
U22 41256
U23 41256
U24 41256
U25 41256
U26 41256
U27 41256
U28 41256
U29 41256
U30 41256
U31 41256
U32 41256
RA0
RA1
RA2
RA3
RA4
RA5
RA6
RA7
RA8
WE
CAS
RAS
DI DO
MD<0:7>
U33 41464
U34 41464
U35 41464
U36 41464
OE
D0 D1 D2 D3
D4 D5 D6 D7
LS245
B0 B1 B2 B3 B4 B5 B6 B7
A0 A1 A2 A3 A4 A5 A6 A7
DIR
G
U37
SD<0:7>
[2,4,9,13]
BMEMR[10]
RAMS[3]
commodore, bsw
DRAWN BY:
B, ASSMANN
APPROVED:
TITLE:
SCHEMATIC PC-I
USED ON:
PC - I
SIZE
A3
380 150
DATE: 08-10-87
SHEET: 5 of 14

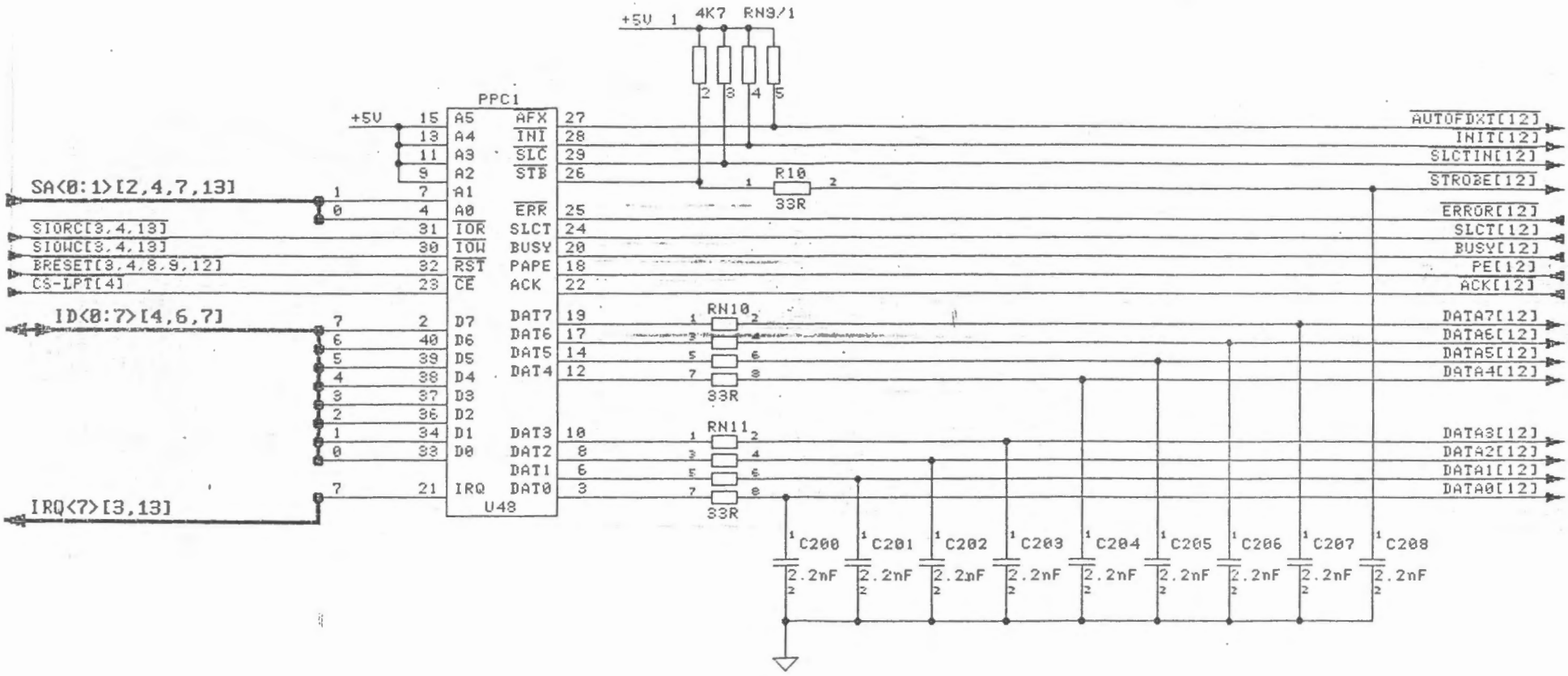


NOTES: 1. JS1A-F SELECT WRITE PRECOMP.

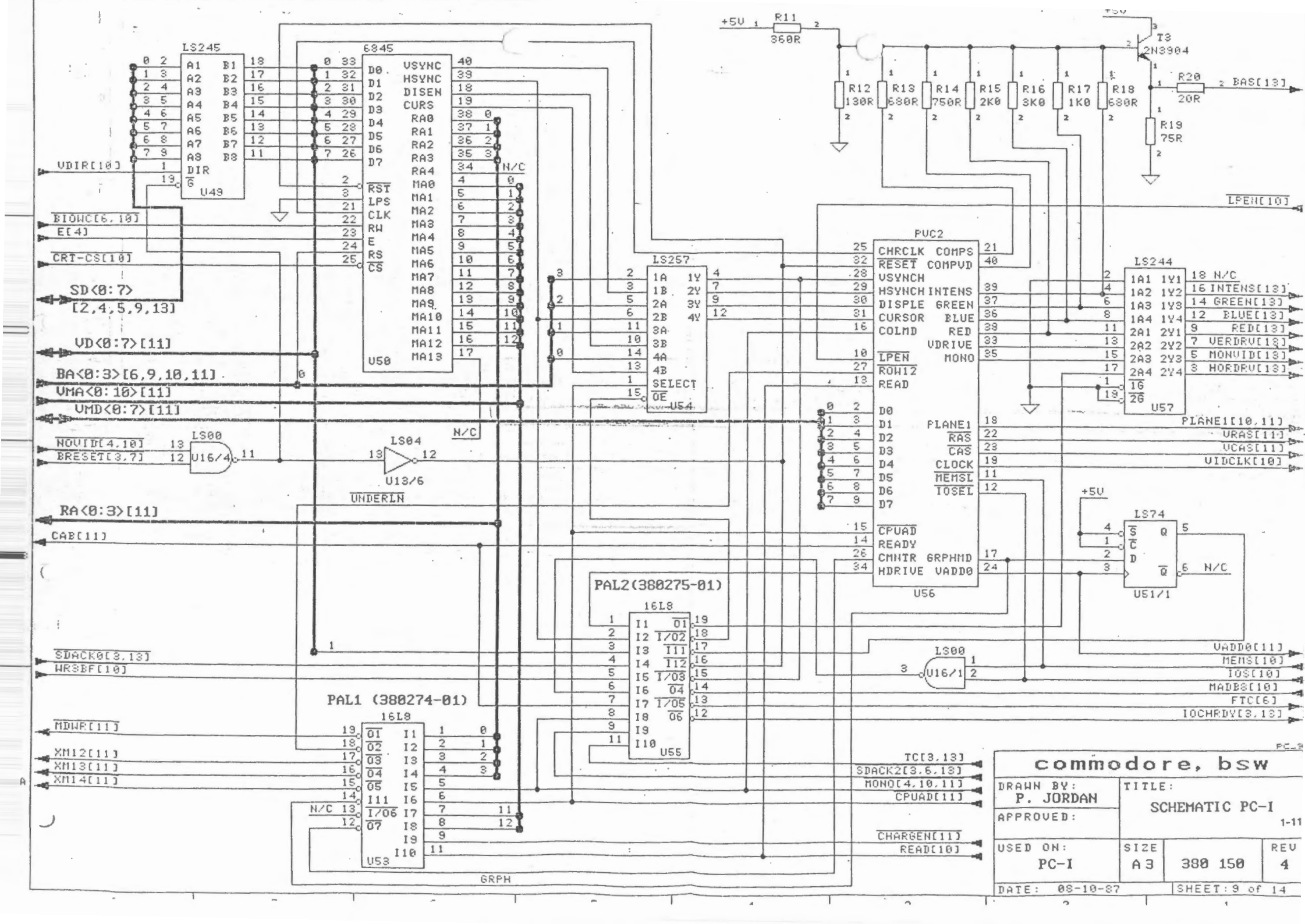
commodore, bsw			
DRAWN BY: H. ULLRICH	TITLE: SCHEMATIC PC-I		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-10-87	SHEET: 6 of 14		



commodore, bsw			
DRAWN BY: H. ULLRICH	TITLE: SCHMATIC PC-I		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-10-87	SHEET: 7 of 14		

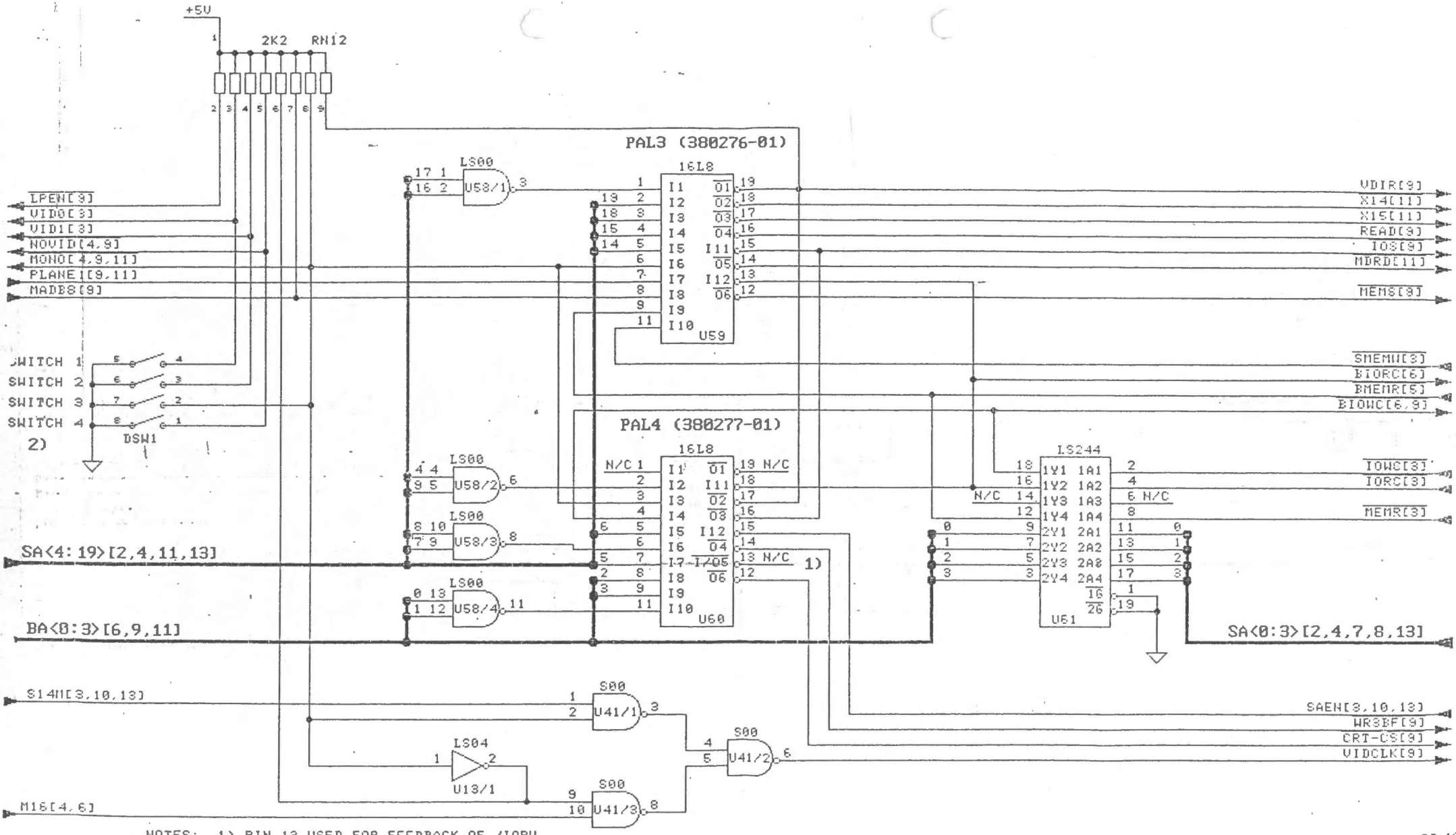


commodore, bsw			
DRAWN BY: H. ULLRICH	TITLE: SCHEMATIC PC-I		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 03-10-87	SHEET: 8 of 14		



commodore, bsw

DRAWN BY: P. JORDAN	TITLE: SCHEMATIC PC-I		
APPROVED:			1-11
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-10-87	SHEET: 9 of 14		



NOTES: 1) PIN 13 USED FOR FEEDBACK OF /IORW SIGNAL

2) SWITCH MEANINGS:

SW1	SW2:	VIDEO STARTUP MODE
OFF	OFF:	MONO
OFF	ON :	COLOR 40 CHARS/LINE
ON	OFF:	COLOR 80 CHARS/LINE
ON	ON :	NO VIDEO

SW3 = ON : INTERNAL VIDEO ADAPTER IN MDA/MGA MODE
SW3 = OFF: " " " CGA MODE
SW4 = ON : INTERNAL VIDEO ADAPTER DISABLED
SW4 = OFF: " " " ENABLED

PC-1S

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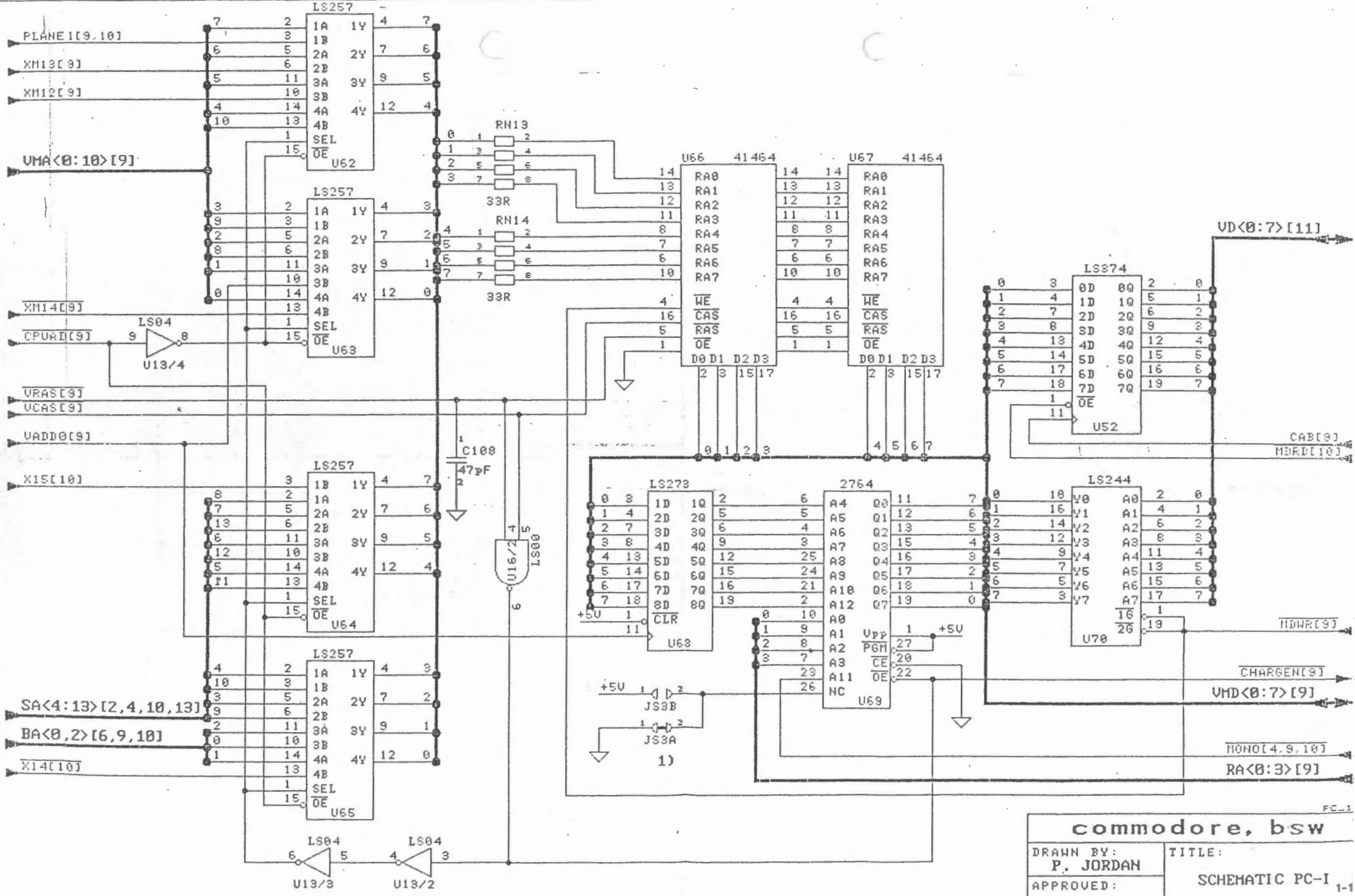
DRAWN BY: P. JORDAN	TITLE: SCHEMATIC PC-I, 1-12		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 03-11-87	SHEET: 10 of 14		



NOTES: 1) JS3A,B ARE USED IF 27128 EPROM OR 23128 ROM IS USED (SWITCHING BETWEEN 2 CHAR SETS) FOR U69

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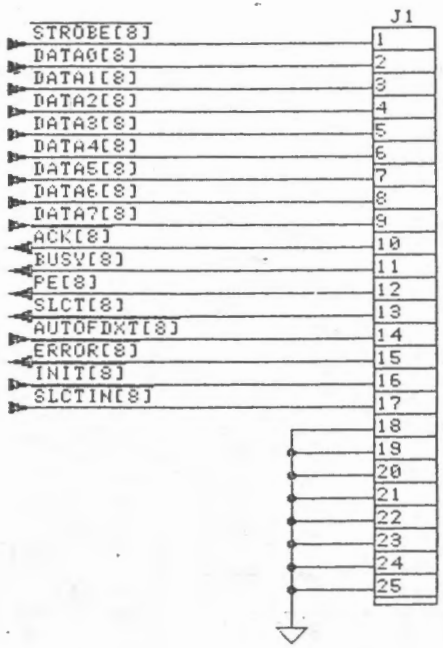
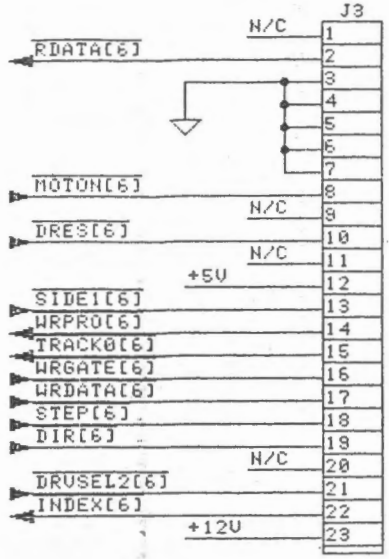
DRAWN BY: P. JORDAN	TITLE: SCHEMATIC PC-I 1-1		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-11-87	SHEET: 11 of 14		

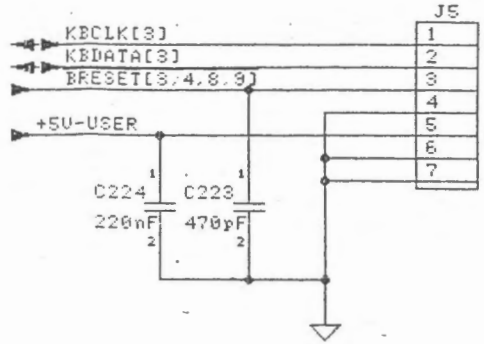
PARALLEL PORT
25 PIN SUBD CONN. FEM



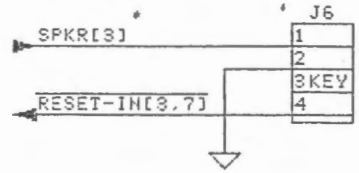
EXTERNAL DRIVE
(DRIVE B:)
23 PIN SUBD CONN.



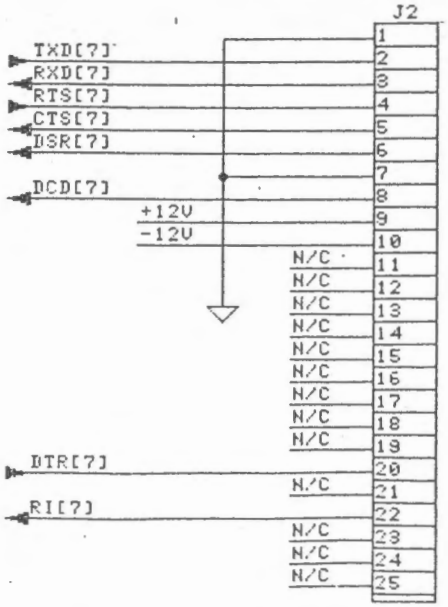
KEYBOARD



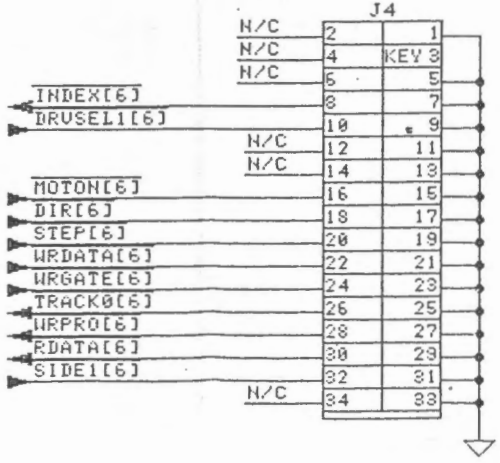
SPEAKER



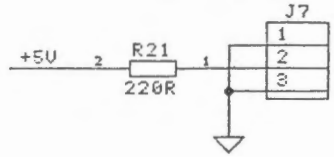
SERIAL PORT
25 PIN SUBD CONN. MALE



INTERNAL DRIVE
(DRIVE A:)



POWER-ON LED



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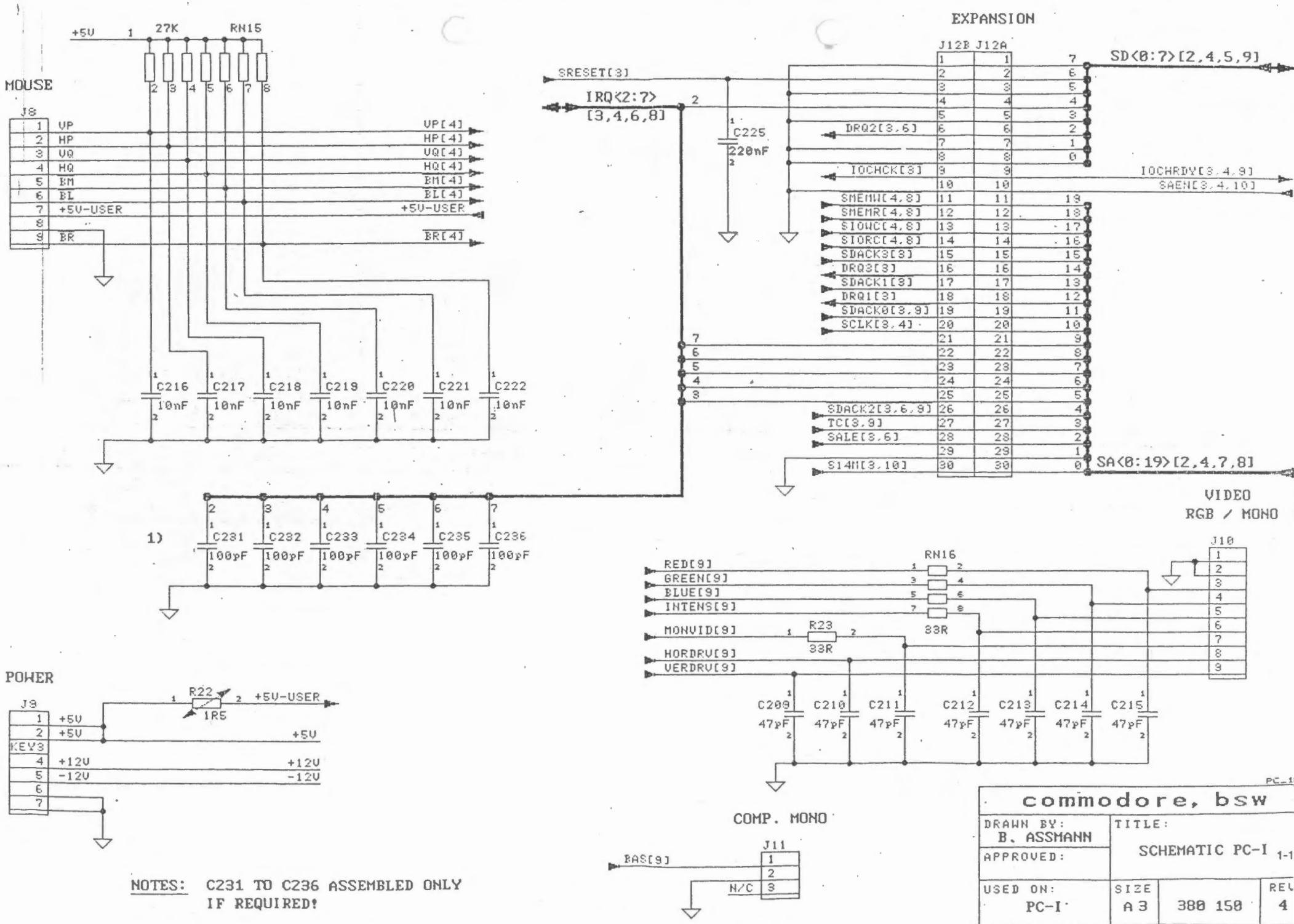
DRAWN BY: P. JORDAN	TITLE: SCHEMATIC PC-I		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-10-87	SHEET: 12 of 14		



NOTES: C231 TO C236 ASSEMBLED ONLY IF REQUIRED!

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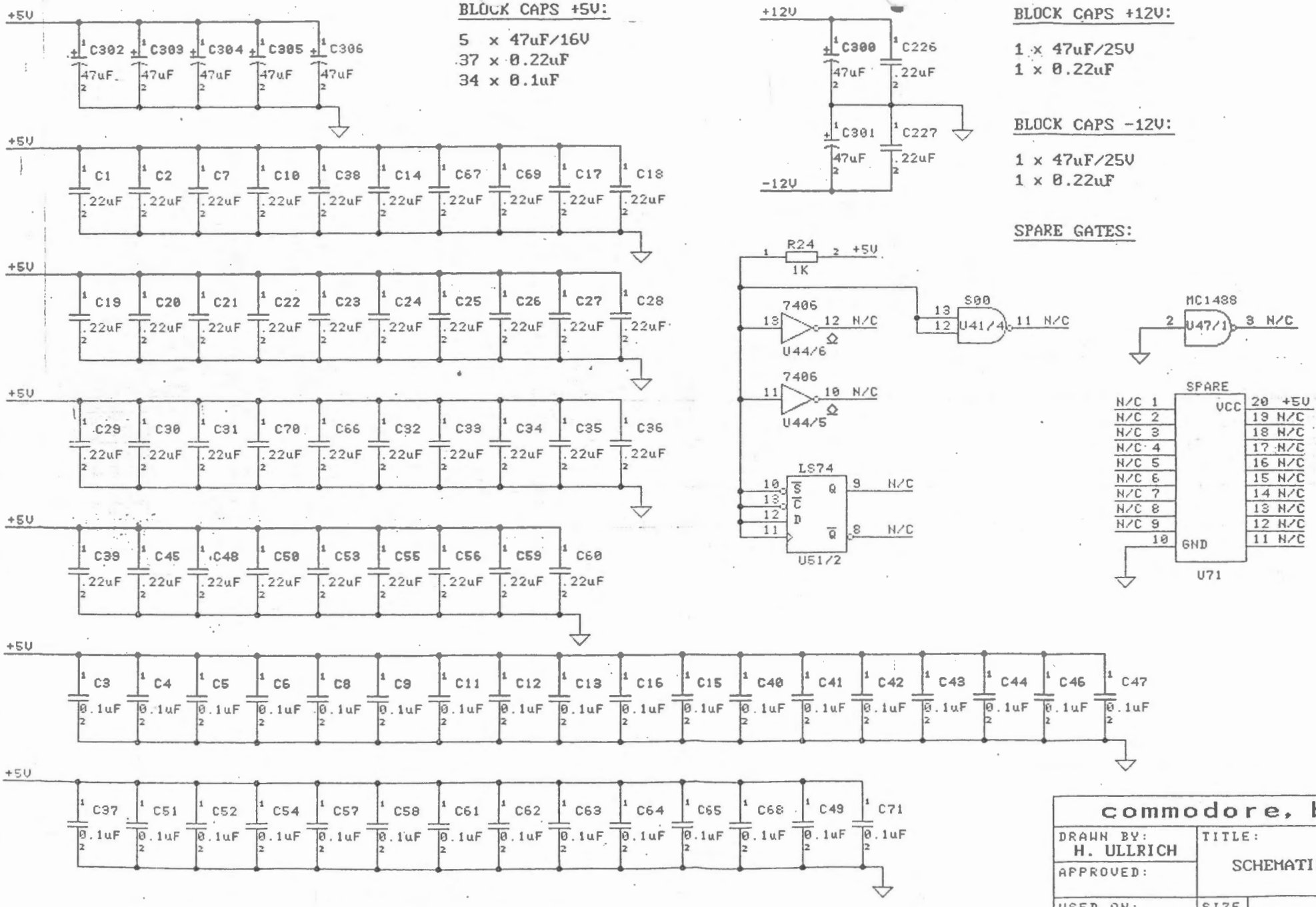
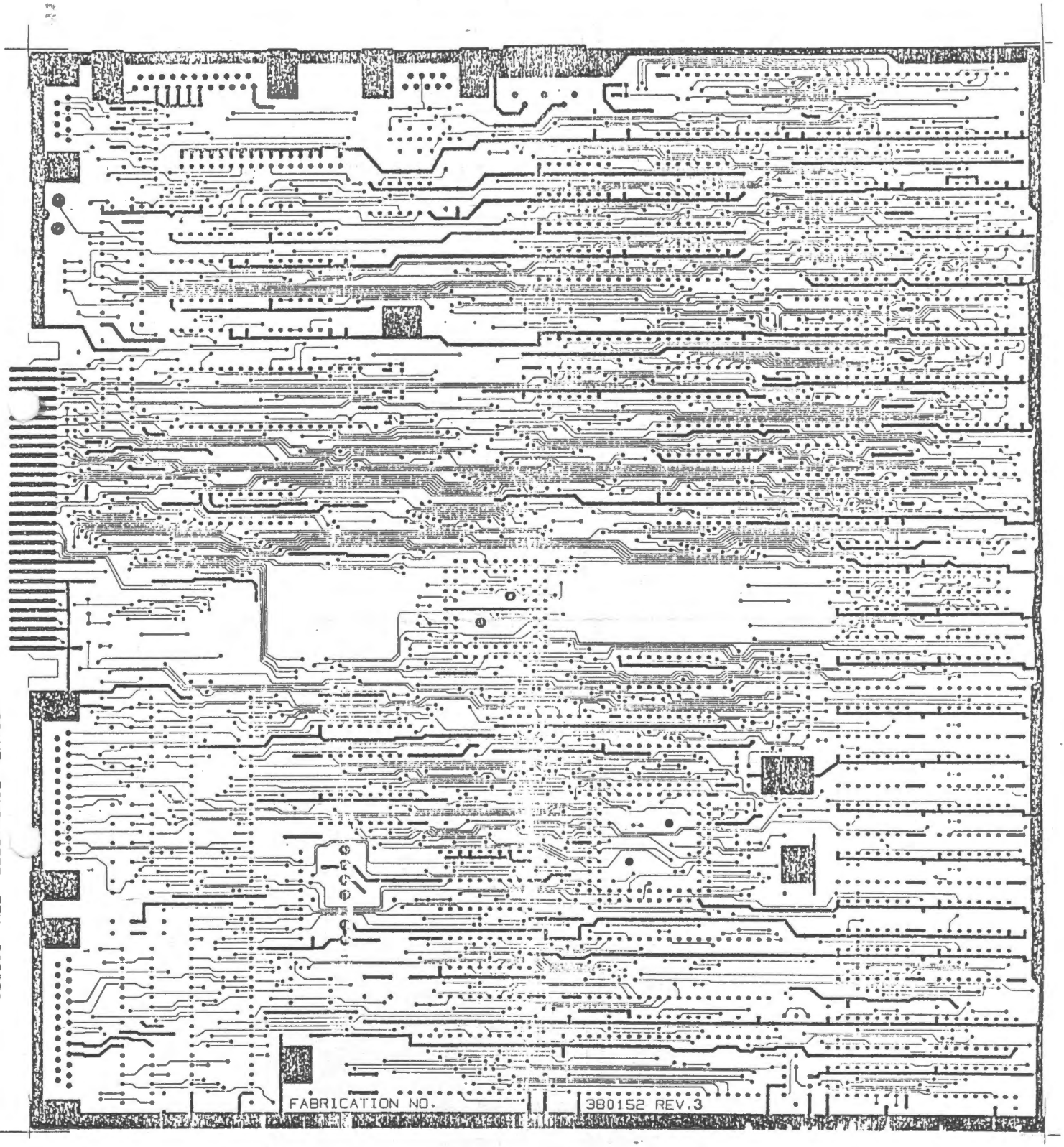
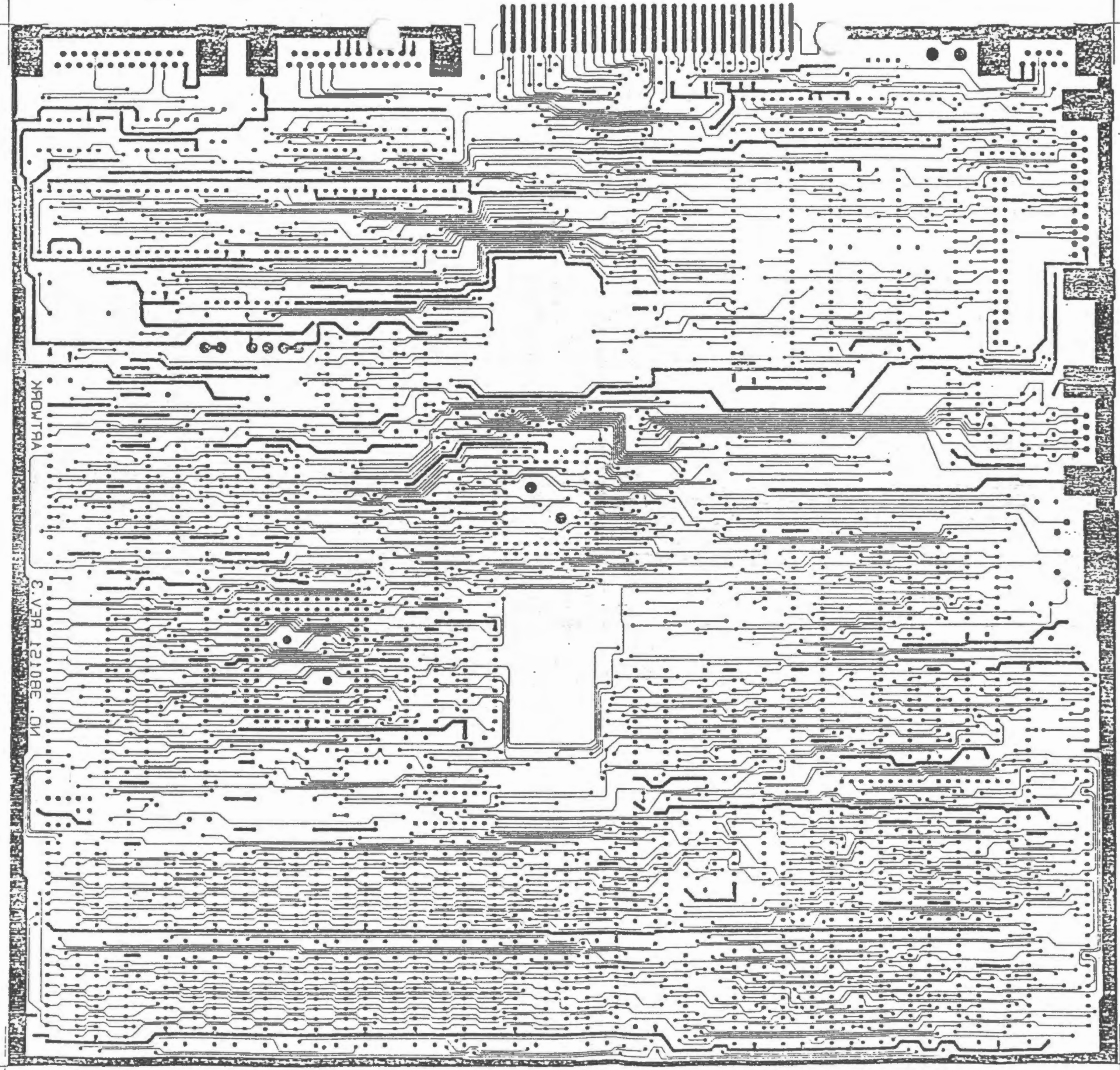
DRAWN BY: B. ASSMANN	TITLE: SCHEMATIC PC-I 1-1		
APPROVED:			
USED ON: PC-I	SIZE A3	380 150	REV 4
DATE: 08-11-87	SHEET: 13 of 14		

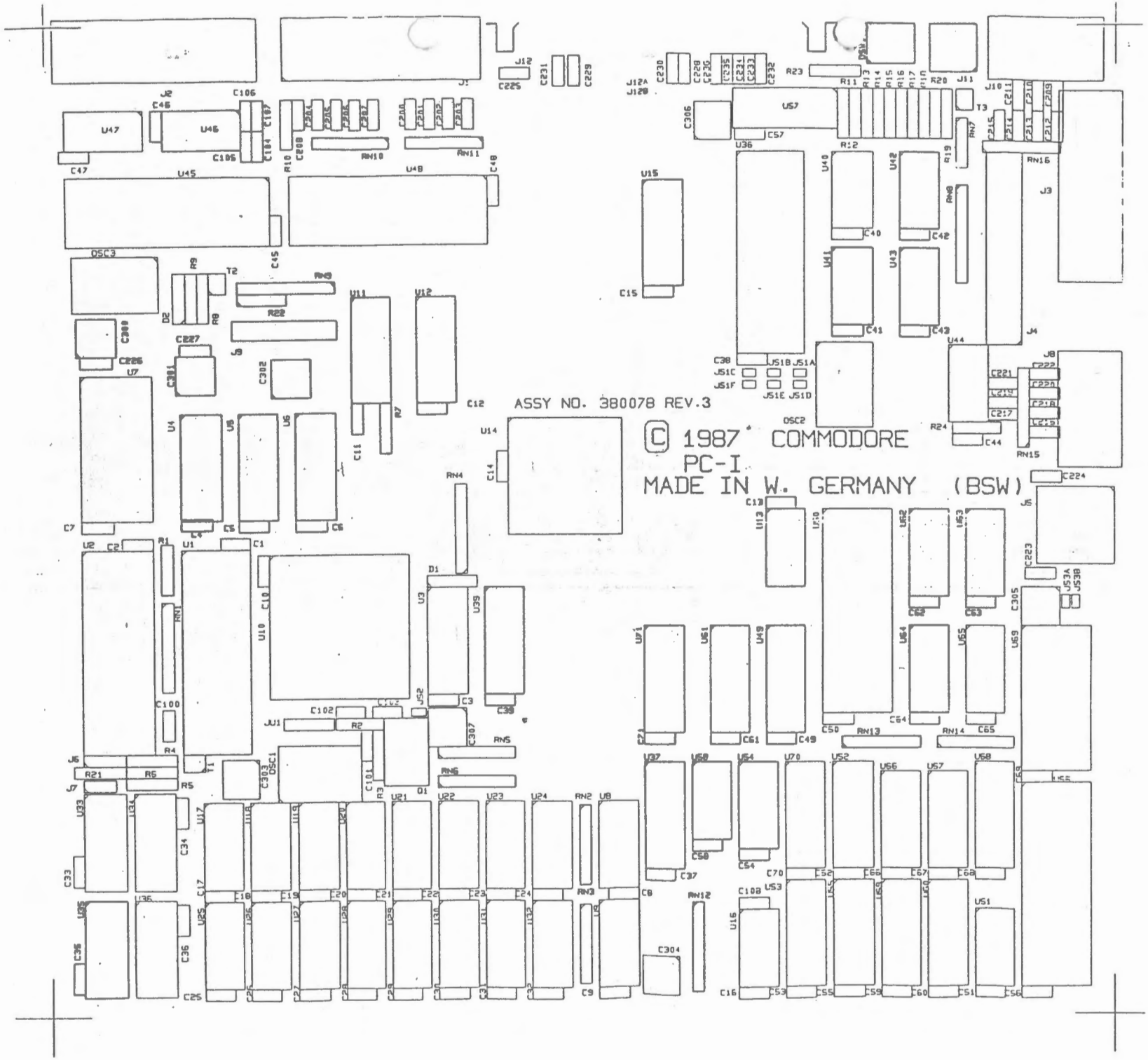

BLOCK CAPS +5V:
5 x 47uF/16V
37 x 0.22uF
34 x 0.1uF
BLOCK CAPS +12V:
1 x 47uF/25V
1 x 0.22uF
BLOCK CAPS -12V:
1 x 47uF/25V
1 x 0.22uF
SPARE GATES:
+5V
+12V
-12V
C302 C303 C304 C305 C306
C300 C226
C301 C227
47uF
.22uF
C1 C2 C7 C10 C38 C14 C67 C69 C17 C18
C19 C20 C21 C22 C23 C24 C25 C26 C27 C28
C29 C30 C31 C70 C66 C32 C33 C34 C35 C36
C39 C45 C48 C50 C53 C55 C56 C59 C60
C3 C4 C5 C6 C8 C9 C11 C12 C13 C16 C15 C40 C41 C42 C43 C44 C46 C47
C37 C51 C52 C54 C57 C58 C61 C62 C63 C64 C65 C68 C49 C71
0.1uF
R24
1K
7406
U44/6
U44/5
S00
U41/4
MC1488
U47/1
LS74
U51/2
SPARE
VCC
GND
U71
N/C
commodore, bsw
DRAWN BY: H. ULLRICH
APPROVED:
TITLE: SCHEMATIC PC-I
USED ON: PC-I
SIZE A3
380 150
REV 4
DATE: 08-11-87
SHEET: 14 of 14



081S01 REL ELECTRONIC LAYOUT

081S0.1 REL ELECTRONIC LAYOUT




ASSY NO. 380078 REV.3
© 1987 COMMODORE
PC-I
MADE IN W. GERMANY (BSW)

PC - I Connectors

J1 Parallel Port - 25 pin SUB-D female

1	/STROBE	14	/AUTOFDXT
2	DATA0	15	/ERROR
3	DATA1	16	/INIT
4	DATA2	17	/SLCTIN
5	DATA3	18	GND
6	DATA4	19	GND
7	DATA5	20	GND
8	DATA6	21	GND
9	DATA7	22	GND
10	/ACK	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT		

J2 Serial Port - 25 pin SUB-D male

1	GND	14	GND
2	TXD	15	GND
3	RXD	16	GND
4	RTS	17	GND
5	CTS	18	NC
6	DSR	19	NC
7	GND	20	DTR
8	DCD	21	NC
9	+12V	22	RI
10	-12V	23	NC
11	NC	24	NC
12	NC	25	NC
13	NC		

J3 ext. Floppy Disk B: - 23 pin SUB-D female

1	NC	13	/SIDE1
2	/RDATA	14	/WRPRO
3	GND	15	/TRACK0
4	GND	16	/WRGATE
5	GND	17	/WRDATA
6	GND	18	/STEP
7	GND	19	/DIR
8	/MOTON	20	NC
9	NC	21	/DRVSEL2
10	/DRES	22	/INDEX
11	NC	23	+12V
12	+5V		

J4 int. Floppy Disk A: - 34 pin

1	GND	2	NC
3	key	4	NC
5	GND	6	NC
7	GND	8	/INDEX
9	GND	10	/DRVSEL1
11	GND	12	NC
13	GND	14	NC
15	GND	16	/MOTON
17	GND	18	/DIR
19	GND	20	/STEP
21	GND	22	/WRDATA
23	GND	24	/WRGATE
25	GND	26	/TRACK0
27	GND	28	/WRPRO
29	GND	30	/RDATA
31	GND	32	/SIDE1
33	GND	34	NC

J5 Keyboard - 5 pin DIN with shield

1	KBCLK keyboard clock
2	KBDATA keyboard data
3	/KBRESET
4	GND
5	+5V-USER
6	GND
7	GND

J6 Speaker - 4 pin

1	SPKR
2	GND
3	key
4	/RESET-IN

J7 Power Led - 3 pin

1	GND
2	Led Anode (+5V)
3	GND

J8 Mouse - 9 pin SUB-D male

1	VERT. QUAL.	6	/BUTTON LEFT
2	HORZ. QUAL.	7	+5V-USER
3	VERT. PULSE	8	GND
4	HORZ. PULSE	9	/BUTTON RIGHT
5	/BUTTON MIDDLE		

J9 Power - 7 pin

1	+5V
2	+5V
3	key
4	+12V
5	-12V
6	GND
7	GND

J10 Video RGB/MONO - 9 pin SUB-D female

1	GND	6	INTENSITY
2	GND	7	MONO (VIDEO)
3	RED	8	HORDRV
4	GREEN	9	VERDRV
5	BLUE		

J11 Composite Video - 3 pin

1	BAS
2	GND
3	NC

J12 PC connector - 60 pin cardedge

B1	GND	A1	BD7
B2	RESETDRV	A2	BD6
B3	GND	A3	BD5
B4	IRQ2	A4	BD4
B5	GND	A5	BD3
B6	DRQ2	A6	BD2
B7	GND	A7	BD1
B8	GND	A8	BD0
B9	/IOCHCK	A9	IOCHRDY
B10	GND	A10	BAEN
B11	/BMEMW	A11	BA19
B12	/BMEMR	A12	BA18
B13	/BIOW	A13	BA17
B14	/BIOR	A14	BA16
B15	/BDACK3	A15	BA15
B16	DRQ3	A16	BA14
B17	/BDACK1	A17	BA13
B18	DRQ1	A18	BA12
B19	/BDACK0	A19	BA11
B20	BCLK (CPU CLOCK)	A20	BA10
B21	IRQ7	A21	BA9
B22	IRQ6	A22	BA8
B23	IRQ5	A23	BA7
B24	IRQ4	A24	BA6
B25	IRQ3	A25	BA5
B26	/BDACK2	A26	BA4
B27	TC	A27	BA3
B28	BALE	A28	BA2
B29	GND	A29	BA1
B30	BOSC (14.318MHz)	A30	BA0

ASIC - MIO - Mouse & Input/Output

INP = INPUT, OUT = OUTPUT

PIN#	SIGNAL NAME	DIRECTION	
14	BD0	I/O	with pullup
15	BD1	I/O	with pullup
16	BD2	I/O	with pullup
17	BD3	I/O	with pullup
20	BD4	I/O	with pullup
21	BD5	I/O	with pullup
22	BD6	I/O	with pullup
23	BD7	I/O	with pullup
6	BA0	INP	
5	BA1	INP	
4	BA2	INP	
3	BA3	INP	
68	BA4	INP	
67	BA5	INP	
66	BA6	INP	
65	BA7	INP	
64	BA8	INP	
63	BA9	INP	
36	M16	INP	Schmitt trigger
62	/BIORC	INP	
60	/BIOWC	INP	
57	/IOR-DLY	OUT	
56	/IOW-DLY	OUT	
61	BAEN	INP	
37	IRQ2	OUT	tristate
38	IRQ3	OUT	tristate
39	IRQ4	OUT	tristate
40	IRQ6	OUT	tristate
43	DRQ2-IN	INP	
42	DRQ2	OUT	tristate
41	IRQ6-IN	INP	
24	/BDACK2	INP	
25	/IDIR	OUT	
26	/NOVID	OUT	open drain with pullup
28	/MONO	INP	with pullup
8	/RESET	INP	Schmitt trigger
59	COM-INT	INP	Schmitt trigger
58	/COM-OUT	INP	Schmitt trigger
55	/CS-LPT	OUT	
54	/CS-COM	OUT	
51	/CS-FDC	OUT	
50	/CS-LDOR	OUT	
49	/CS-FDCXTR	OUT	
48	/CS-HDC	OUT	
47	/CS-RTC	OUT	

46	FDC-RESET	OUT	
45	DRV-SEL1	OUT	
44	DRV-SEL2	OUT	
27	/BL	INP	Schmitt Trigger with pullup
29	/BM	INP	Schmitt Trigger with pullup
30	/BR	INP	Schmitt Trigger with pullup
31	HQ-I	INP	Schmitt Trigger with pullup
32	HP-I	INP	Schmitt Trigger with pullup
33	VQ-I	INP	Schmitt Trigger with pullup
34	VP-I	INP	Schmitt Trigger with pullup
9	RS0	INP	
11	RS1	INP	
13	RS2	INP	
7	SCLK	INP	
12	IOCHRDY	OUT	open drain
10	/WAIT	INP	with pullup
2	/BDACK0	INP	
53	TEST	INP	
18	GND		
19	GND		
52	GND		
1	VDD		
35	VDD		
68 pins		I/O	

PIN#	SIGNAL NAME	DIRECTION	
1	VDD		
2	/BDACK0	INP	
3	BA3	INP	
4	BA2	INP	
5	BA1	INP	
6	BA0	INP	
7	SCLK	INP	
8	/RESET	INP	Schmitt trigger
9	RS0	INP	
10	/WAIT	INP	with pullup
11	RS1	INP	
12	IOCHRDY	OUT	open drain
13	RS2	INP	
14	BD0	I/O	with pullup
15	BD1	I/O	with pullup
16	BD2	I/O	with pullup
17	BD3	I/O	with pullup
18	GND		
19	GND		
20	BD4	I/O	with pullup
21	BD5	I/O	with pullup
22	BD6	I/O	with pullup
23	BD7	I/O	with pullup
24	/BDACK2	INP	
25	/IDIR	OUT	

26	/NOVID	OUT	open drain with pullup
27	/BL	INP	Schmitt trigger with pullup
28	/MONO	INP	with pullup
29	/BM	INP	Schmitt trigger with pullup
30	/BR	INP	Schmitt trigger with pullup
31	HQ-I	INP	Schmitt trigger with pullup
32	HP-I	INP	Schmitt trigger with pullup
33	VQ-I	INP	Schmitt trigger with pullup
34	VP-I	INP	Schmitt trigger with pullup
35	VDD		
36	M16	INP	Shmitt trigger
37	IRQ2	OUT	tristate
38	IRQ3	OUT	tristate
39	IRQ4	OUT	tristate
40	IRQ6	OUT	tristate
41	IRQ6-IN	INP	
42	DRQ2	OUT	tristate
43	DRQ2-IN	INP	
44	DRV-SEL2	OUT	
45	DRV-SEL1	OUT	
46	FDC-RESET	OUT	
47	/CS-RTC	OUT	
48	/CS-HDC	OUT	
49	/CS-FDCXTR	OUT	
50	/CS-LDOR	OUT	
51	/CS-FDC	OUT	
52	GND		
53	TEST	INP	
54	/CS-COM	OUT	
55	/CS-LPT	OUT	
56	/IOW-DLY	OUT	
57	/IOR-DLY	OUT	
58	/COM-OUT	INP	Schmitt trigger
59	COM-INT	INP	Schmitt trigger
60	/BIOWC	INP	
61	BAEN	INP	
62	/BIORC	INP	
63	BA9	INP	
64	BA8	INP	
65	BA7	INP	
66	BA6	INP	
67	BA5	INP	
68	BA4	INP	

MIO - Mouse and I/O Chip

1) Map of I/O's

/CS-COM	:	2F8 - 2FF	serial interface
		3F8 - 3FF	serial interface
/CS-LPT	:	278 - 27B	parallel interface
		378 - 27B	parallel interface
		3BC - 3BF	parallel interface
/CS-FDC	:	3F4 - 3F5	floppy disk controller
/CS-LDOR	:	3F2	floppy drive select register
/CS-FDCXTR	:	3F6	floppy disk extra register
/CS-RTC	:	2C0 - 2CF	real time clock
/CS-HDC	:	320 - 323	hard disk controller
/CS-RMODE	:	230	read mode register
/CS-WMODE	:	230	write mode register
/CS-RHCVC	:	23C	read horizontal or vertical count register
/CS-RDUMMY	:	23D	read dummy register
/CS-WDUMMY	:	23D	write dummy register
/CS-RSTAT	:	23E	read mouse status register
/CS-WCONT	:	23E	write mouse command register

2) Register description

a) MODE-REGISTER

I/O-address: 230 hex
access-mode: I/O read/write

all bits are cleared to 0 by applying /RESET = L

read/write 230

BIT	7	6	5	4	3	2	1	0
	video	clock		mouse	serial		parallel	
write	off/on	off/on	n.u.	off/on	COM1	COM2	LPT1	LPT0
read	mon/col	off/on	n.u.	off/on	COM1	COM2	LPT1	LPT0

Bit 0 to 6 can be read back, on write bit 7 enables/disables the video, on read bit 7 holds the content of the video DIP - switch

BIT #	function
0	select LPT interface bit LPT 0
1	select LPT interface bit LPT 1
2	select COM interface bit COM 0
3	select COM interface bit COM 1
4 = 0	disable mouse interface and IRQ2
= 1	enable mouse interface and IRQ2
5	not used
6 = 0	RTC disabled
= 1	RTC enabled
7 write	0: video disabled
write	1: video enabled
read	0: monochrome video selected
read	1: color video selected

LPT 1	LPT 0	LPT chip select
0	0	none
0	1	3BC - 3BF hex
1	0	378 - 37B hex
1	1	278 - 27B hex

COM 1	COM 0	COM chip select
0	0	none
0	1	2F8 - 2FF hex
1	0	3F8 - 3FF hex
1	1	none

b) MOUSE-CONTROL-REGISTER

I/O-address: 23E hex
access-mode: I/O write

all bits are cleared to 0 by applying /RESET = L
that is, after /RESET the mouse interrupt is enabled and
the low nibble of the horizontal counter is selected

*) the mouse interface must be enabled also (see Bit 4)

```
BIT #      function
  0        not used
  1        not used
  2        not used
  3        not used
  4  = 0   mouse interrupt enabled  *)
     = 1   mouse interrupt disabled *)
  5  = 0   select low  nibble (bit 0 - 3)
     = 1   select high nibble (bit 4 - 7)
  6  = 0   select horizontal counter
     = 1   select vertical counter
  7  = 0   enable all mouse inputs
           the falling edge clears mouse counters
     = 1   disable all mouse inputs
```

c) MOUSE-STATUS-REGISTER

```
I/O-address:  23E hex
access-mode:  I/O read

BIT #      function
  0        always 1
  1        always 1
  2        always 1
  3        IRQ2 inverted, squarewave 32.8 msec *)
  4        always 0
  5        always 0
  6        always 0
  7        always 0
```

*) The mouse interface has to be enabled,
MOUSE-CONTROL-REGISTER bit 4 has to be 0
bit 3 is always 1 if MOUSE-CONTROL-REGISTER bit 4 is 1

d) HORIZONTAL-VERTICAL-COUNTER REGISTER

I/O-address: 23C hex
access-mode: I/O read

BIT #		function
0		bit 0 or bit 4 of mouse counter *)
1		bit 1 or bit 5 of mouse counter *)
2		bit 2 or bit 6 of mouse counter *)
3		bit 3 or bit 7 of mouse counter *)
4		always 0
5	= 0	left button depressed
	= 1	left button ~~depressed~~ released
6	= 0	middle button depressed
	= 1	middle button ~~depressed~~ released
7	= 0	right button depressed
	= 1	right button released

*) see bit 5 and 6 of the MOUSE-CONTROL-REGISTER

e) DUMMY REGISTER

I/O-address: 23D hex
access-mode: I/O read/write

The MicroSoft driver uses this register to recognize the mouse interface

Anschluß von Video-Monitoren an PC 1:

1. **PC 1 im Monochrom-Modus (MDA, MGA)**
   DIP-Schalter 3 ist ON

   An den Video RGB/Mono-Anschluß (9-Pin SUB-D Buchse) muß ein TTL-Monochrom-Monitor (H-Sync = 18.4 kHz, V-Sync = 50 Hz) angeschlossen werden.

   Der Composite-Video-Anschluß (Cinch-Buchse) ist in diesem Modus nicht benutzbar!

2. **PC 1 im Farb-Modus (CGA)**
   DIP-Schalter 3 ist OFF

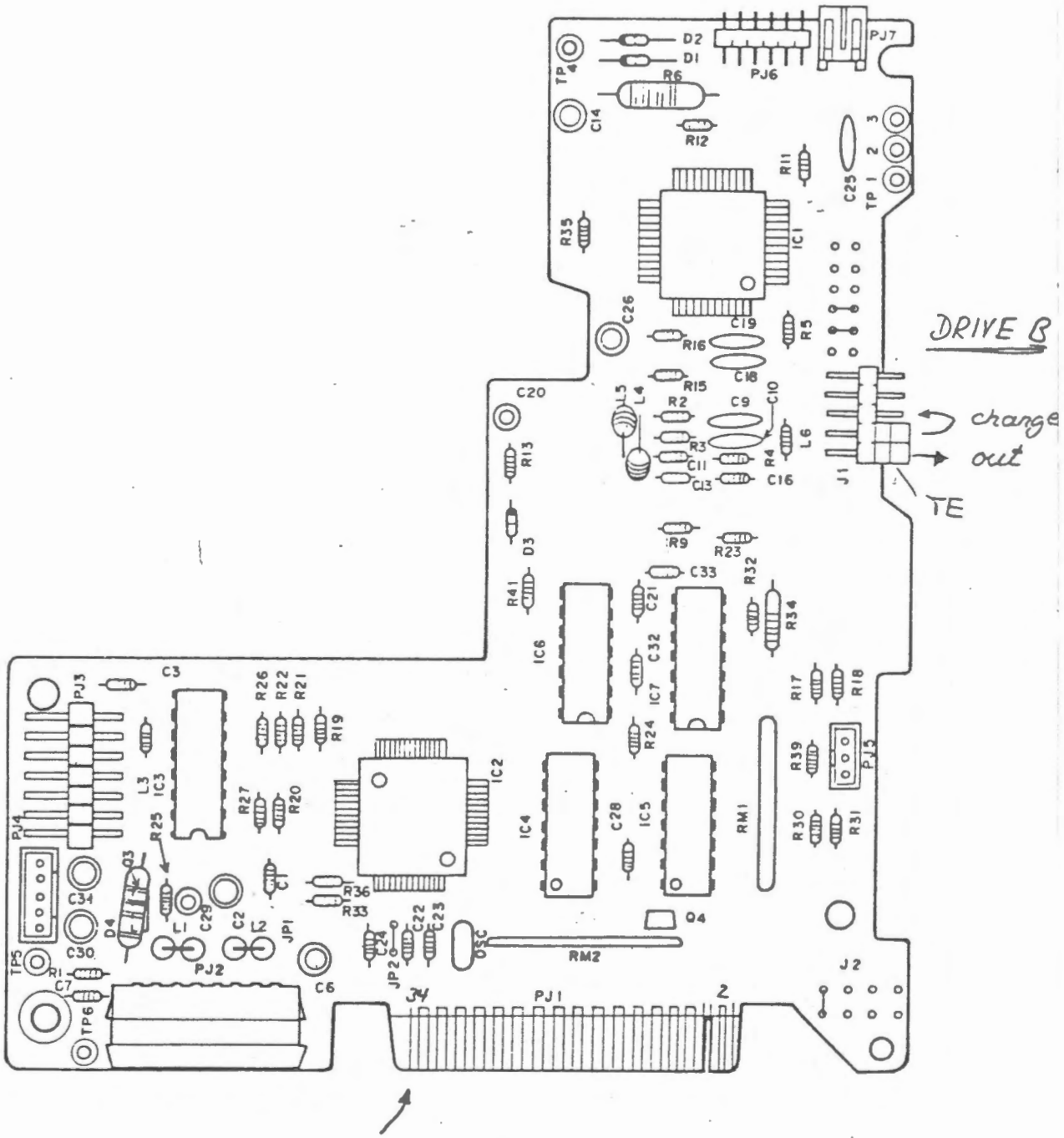
   a) An den Video RGB/Mono-Anschluß muß ein TTL RGBI-Farbmonitor (H-Sync = 15.6 kHz, V-Sync = 60 Hz) angeschlossen werden.

   b) An den Composite-Video-Anschluß kann ein Monochrom-Monitor angeschlossen werden (Farben werden als Graustufen wiedergegeben).

Schalter 1	2	3	4	Bedeutung
OFF	OFF	--	--	einfarbige Anzeige
OFF	ON	--	--	Farbe, 40 Zeichen/Zeile
ON	OFF	--	--	Farbe, 80 Zeichen/Zeile
ON	ON	--	--	kein Videoteil (für Wartung)
--	--	ON	OFF	internes Videoteil einfarbig
--	--	OFF	OFF	internes Videoteil Farbe
--	--	--	ON	internes Videoteil abgeschaltet
--	--	--	OFF	internes Videoteil eingeschaltet

2.
Chinon Disk
Service Manuel

PC-FDD CHINON F502-L (Double Density)

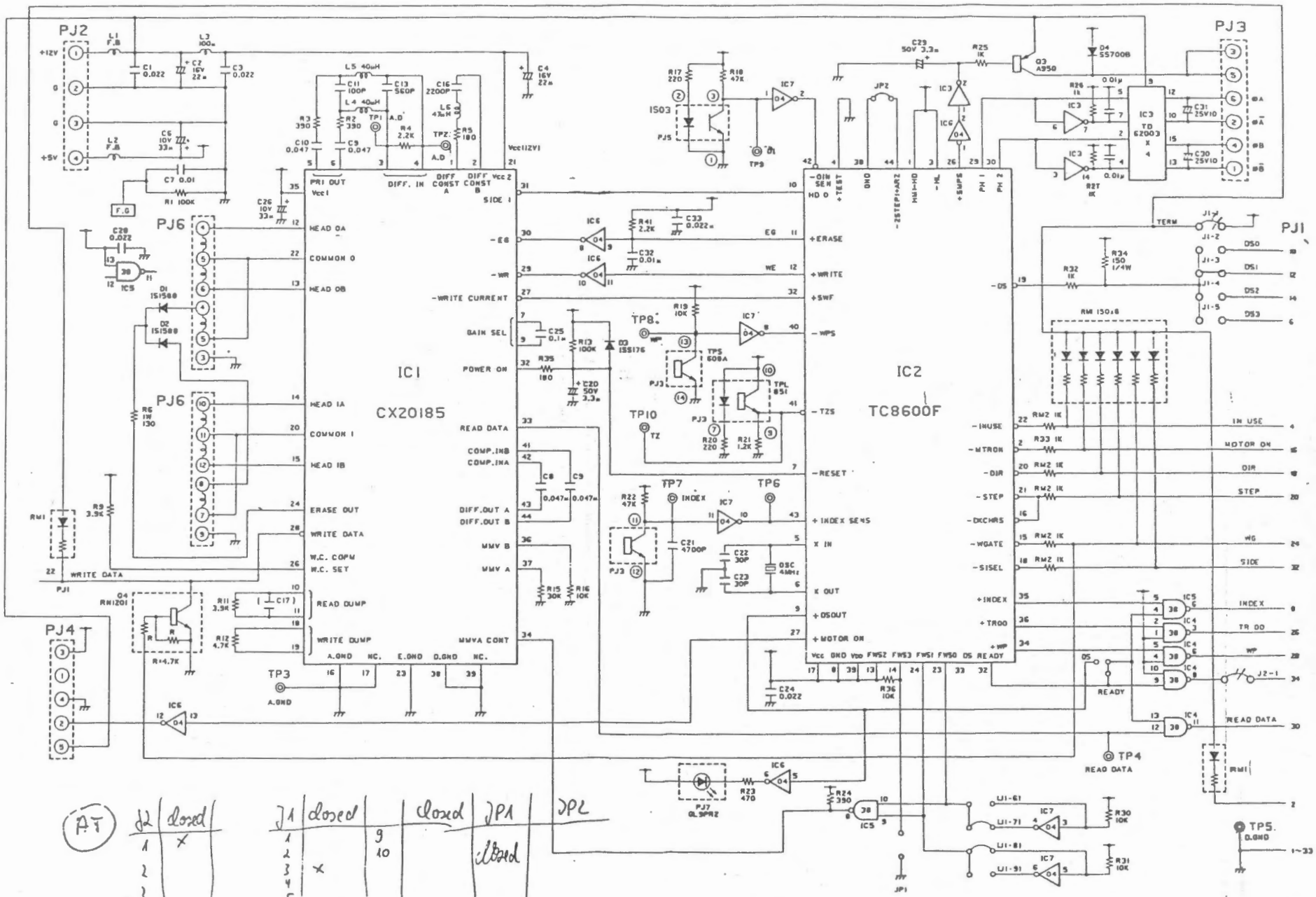


– MEMO –

TP1 TP2	} Differenzieller Ausgang (cateyes)	Alignment	
TP3	A. GND		
TP4	READ DATA	} Asymmetry	siehe 3.7.
TP5	D. GND	} Speed - Messung	200 ± 3ms
TP6	+ INDEX SENSE		
TP7	INDEX		
TP8	WP	- Write Protect Sensor	
TP9	DJ	- Disk indicator (disk change)	siehe 3.4.
TP10	TZ	- Track 00 sensor	siehe 3.10

TP8 ⇒ nicht gedrückt ist LOW

5-6. Schematic Diagram for F-502II/F-502LII

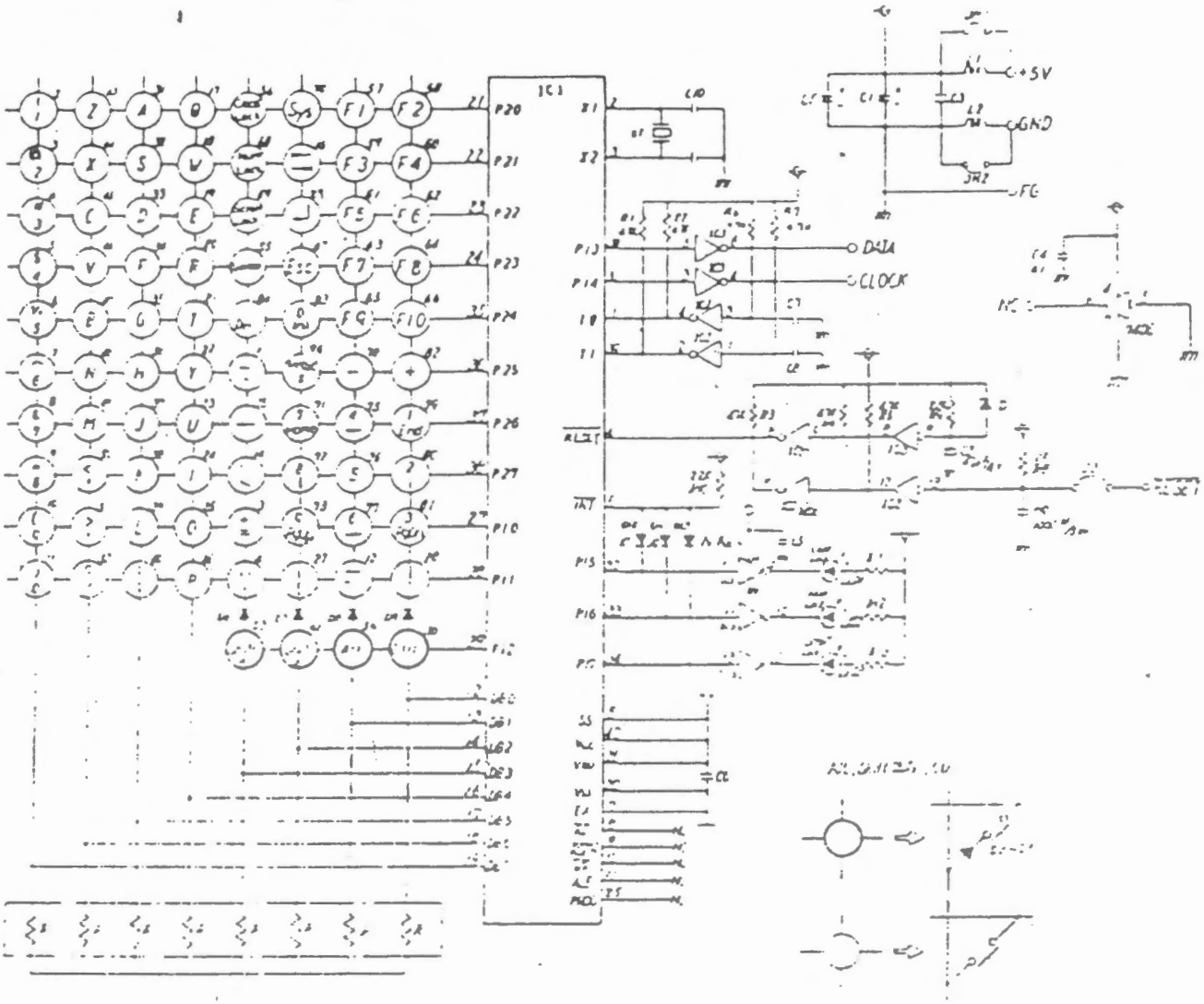


J2	closed
1	X
2	
3	
4	

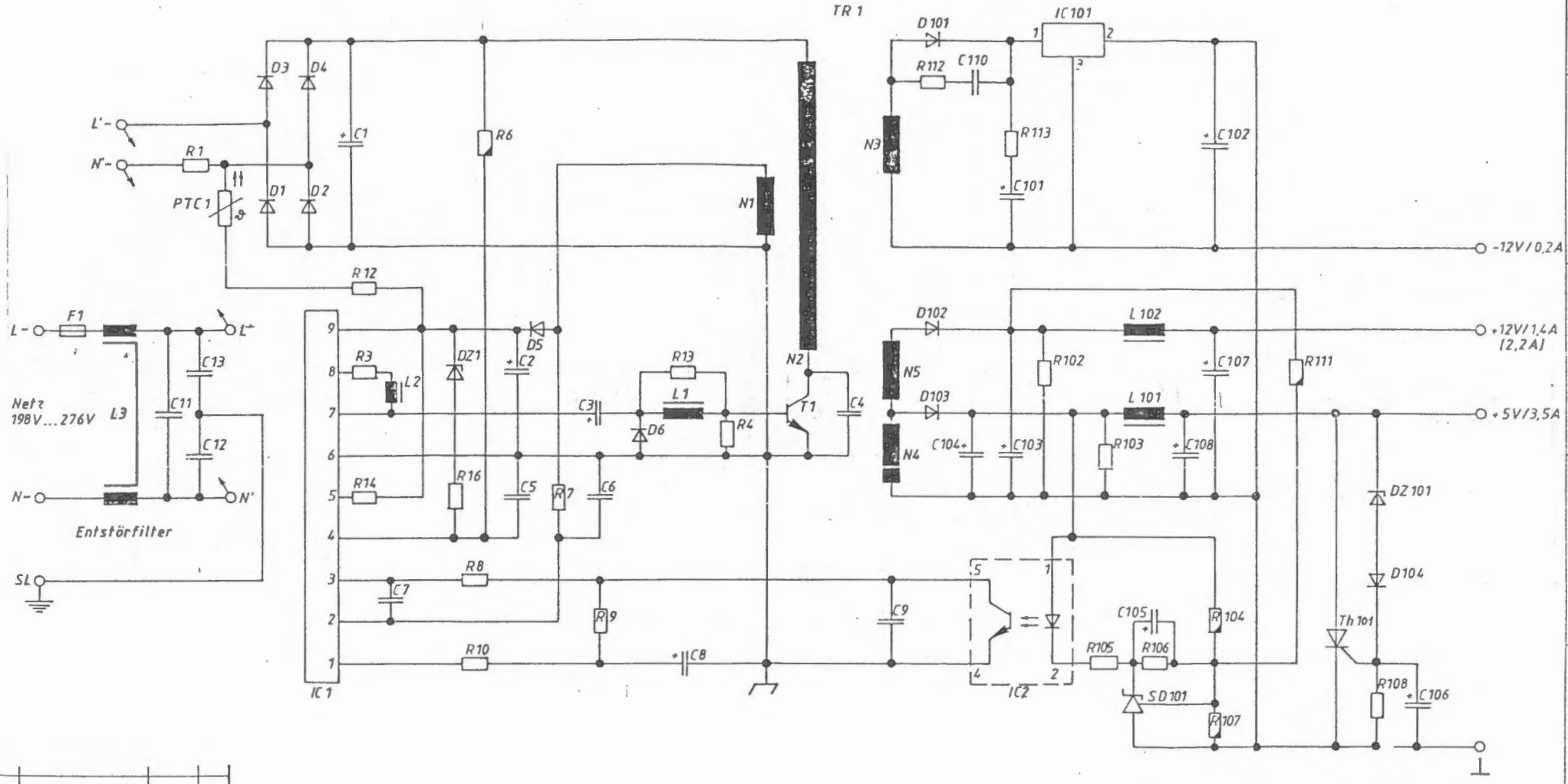
J1	closed		closed	JP1	JP2
1		9			
2		10		closed	
3	X				
4					
5					
6					
7					
8					

3.
Keyboard
Service Manual

10. Circuit Diagram



4.
Power Supply
Schematic



Pos.	Änderung	Datum	Name

Werkstoff	Oberfläche	Gezeichnet	13.8.87	Br.
		Geprüft		
Maßstab	Stromlauf	BV 223-5-04014		

4-1

Layout 9-1390-476

5.
Diagnostic
PC 1

1. DIAGNOSTIC

1.1 PRODUCTION-DIAGNOSTIC PC1

1.2 BURN-IN PC1

1.3 SYSTEM-DIAGNOSTIC PC1

1.1 PRODUCTION-DIAGNOSTIC

These DIAGNOSTIC checks following subsystems of PC1:

1.1.1 LSI Chips
1.1.2 Memory Section
1.1.3 Keyboard Connector
1.1.4 Disk-drive Interface
1.1.5 Parallel Interface
1.1.6 Serial Interface
1.1.7 Mouse Interface
1.1.8 Expansion Slot
1.1.9 Video Section

For testing printer, acia and mouse ports two jumpers are required.

- jumper for printer and mouse port :

P 1 - P13
P 2 - P15
P10 - P16
P11 - P17
P12 - P14
P 3 - M3
P 4 - M4
P 5 - M5
P 6 - M6
P 7 - M9
P 8 - M1
P 9 - M2

- jumper for acia port :

1 - 7
2 - 3
4 - 5 - 8
6 - 20

Preparation of test:

- PC1 in standard configuration
- Insert DIAGNOSTIC disk into drive A (5.25")
- Insert DIAGNOSTIC disk into drive B (3.5")
- Hook up jumper on printer, acia and mouse port
- Connect monitor (MultiSync)
- Switch on

All test results will be displayed in the following format:

test code, version, subsystem, test result, (error status)

An error status will only be displayed when an error occured. It will be headed by the error code of the faulty component (as in the diagnostic test) and will then give the essential status of the subsystem under test, as specified in the following list. So the error status can be noted as a short message for further analysis.

Testroutines for Production-Diagnostic :

1.1.1 LSI Chips

- CPU
  has been done during power-up

- FE2010
  has been done during power-up

- MIO
  check different printer base offsets
  check different acia base offsets
  check different mouse modes (on,off)

- Math-Co-Processor
  PC1 comes without 8087

1.1.2 Memory Section

- Address bus test
- Check memory refresh logic
- Extended memory R/W test

1.1.3 Keyboard Interface

- Check keyboard reset function
- Check correct scancode transfer

1.1.4 Disk-drive Interface

For testing disk drive interface a 3.5"-Floppy drive (A1010) and special formatted disks are required.

- Reset disk system
- Linear and random seek test
- Read test (prepared disks required)
- Write/Verify test (formatted disks required)

1.1.5 Parallel Interface

For testing printer port special jumper is required.

- R/W test of printer data register
- Check handshake lines
- Check printer interrupt

1.1.6 Serial Interface

For testing acia port special jumper is required.

- Check acia lines at 1200Bd and 9600Bd
- Check handshake lines
- Check acia interrupt

1.1.7 Mouse Interface

For testing mouse port special jumper is required.

- Check mouse lines with printer port lines connected to mouse port

1.1.8 Expansion Slot

For testing expansion slot special HW (PC1 Expansion Dummy) is required.

- Check address and data bus lines
- Check status and control lines

1.1.9 Video Section

For test video section two B/W monitors (RGBI-, Comp.-input) and one COLOR monitor (RGBI-input) are required.

- Video memory R/W test
- Test pictures for monochrome mode:
  - Attributes
  - Character set (80x25)
  - Square boxes (Hercules)
- Test pictures for color modes:
  - Attributes 40 Col/Line
  - Attributes 80 Col/Line
  - Page 0,2,5,7
  - 320x200 16 Colors
  - 640x200 1st Color set
  - 640x200 2nd Color set
  - 640x200 B/W

```
 Diskette/Platte, Laufwerk A:, hat den
 Namen T-PC1
Verzeichnis von A:\

COMMAND  COM     23612   7.07.86  12.00
T-RAM640 COM       552   7.08.87  14.23
T-RAM512 COM       552  12.08.87  18.16
T-KEYB   COM       376   7.08.87  14.24
T-FDC    COM      2376   7.08.87  14.23
DEBUG    EXE     15647   7.07.86  12.00
AUTOEXEC BAT       169  16.09.87  15.45
DISKCOPY EXE      4096   7.07.86  12.00
T-PR     COM       548  15.09.87  12.33
T-ACIA   COM      1326  15.09.87  12.33
T-MIO    COM       686  16.09.87  17.11
T-MOUSE  COM       788  16.09.87  17.12
T-MONO   EXE     42850  15.09.87  14.28
T-COLOR  EXE     42818  15.09.87  15.03
DIAG     DOC       332  16.09.87  17.54
PC1DIAG  DOC      6138  12.08.87  16.20
       16 Datei(en)     166912 Byte frei
```

6.
Ersatzteil
Liste

		01	380 150 - 01	SCHEMATIC		
		02	380 151 - 01	PCB ARTWORK		
1	1	03	380 152 - 01	FABRICATION, PCB		
		04				
		05				
1	1	06	380 267 - 01	IC, PPC 1 PARALLEL CHIP	U 48	VENDOR: PARADISE
1	1	07	380 268 - 01	IC, PVC 2 VIDEO CHIP	U 56	VENDOR: PARADISE
		08				
0	1	09	380 786 - 01	IC, FE 2010	U 10	VENDOR: FARADAY
1	0	10	380 786 - 02	IC, FE 2010A	U 10	VENDOR FARADAY
		11				
1	1	12	380 269 - 01	IC, 5720 MIO, I-O-DECODER	U 14	VENDOR: MOS, 68 PIN PLCC
		13				
1	1	14	380 787 - 01	IC, SMC 9268	U 38	VENDOR: SMC
1	1	15	380 208 - 02	IC, MC 6845 P	U 50	VENDOR: MOTOROLA
0	0	16	380 201 - 01	IC, 8087	U 2	OPTIONAL
		17				
0	1	18	380 200 - 01	IC, 8088, 5 MHZ	U 1	
1	0	19	380 200 - 02	IC, 8088, 10 MHZ	U 1	
		20				
		21				
1	0	22	380 278 - 01	IC, PAL, V (10MHZ)	U 39	PROD OF 16L8 5
0	1	23	380 278 - 02	IC, PAL, V (5MHZ)	U 39	PROD OF 12L6
1	1	24	380 205 - 01	IC, 8250	U 45	
1	1	25	380 274 - 01	IC, PAL I	U 53	PROD OF 16L8 P/N:380219-01
1	1	26	380 275 - 01	IC, PAL II	U 55	PROD OF 16L8 P/N:380219-01
1	1	27	380 276 - 01	IC, PAL III	U 59	PROD OF 16L8 P/N:380219-01
1	1	28	380 277 - 01	IC, PAL IV	U 60	PROD OF 16L8 P/N:380219-01
		29				
		30				
0	16	31	380 223 - 01	IC, DRAM 256 K X 1, 150NS	U 17 - U32	
16	0	32	380 278 - 02	IC, DRAM 256 K X 1, 120NS	U 17 - U 32	
2	2	33	380 256 - 01	IC, DRAM 64 K X 4, 150NS	U 66,67	
		34				
		35				
0	1	36	380 270 - 01	IC, 23128 ROM, BIOS, 250NS	U 7	VENDOR: MOS, EPROM 27128
1	1	37	380 271 - 01	IC, 23128 ROM, CHARACTER, 200NS	U 69	VENDOR: MOS, EPROM 2764

0	S	38	380 270 - 01	IC, EPROM 27128, 250NS, BIOS	U 7	SUBST. FOR ITEM 36,PROD. OF 324746-
S	S	39	380 271 - 01	IC, EPROM 2764, 200NS, CHARACTER	U 69	SUBST. FOR ITEM 37,PROD. OF 324489-02
1	0	40	380 270 - 02	IC, 23128 ROM, BIOS, 150NS	U 7	
S	0	41	380 270 - 02	IC, EPROM 27128, BIOS, 150NS	U 7	SUBST. FOR ITEM 40,PROD. OF 324746-04
		42				
1	1	43	901 882 - 01	IC, MC 1488	U 47	
1	1	44	901 883 - 01	IC, MC 1489	U 46	
		45				
2	2	46	901 522 - 06	IC, 7406	U 43,44	
2	2	47	901 521 - 01	IC, 74 LS 00	U 16,58	
1	1	48	901 521 - 02	IC, 74 LS 04	U 13	
1	1	49	901 521 - 03	IC, 74 LS 08	U 40	
1	1	50	901 521 - 30	IC, 74 LS 14	U 42	
1	1	51	901 521 - 06	IC, 74 LS 74	U 51	
		52				
0	2	53	901 521 - 87	IC, 74 LS 158	U 8,9	
		54				
1	1	55				
5	5	56	901 521 - 13	IC, 74 LS 244	U11,12,57,61,70	
2	4	57	901 521 - 46	IC, 74 LS 245	U 3,15,37,49	
5	5	58	901 521 - 57	IC, 74 LS 257	U54,62-65	
1	1	59	901 521 - 42	IC, 74 LS 273	U68	
3	3	60	901 521 - 29	IC, 74 LS 373	U4-6	
1	1	61	901 521 - 43	IC, 74 LS 374	U52	
1	1	62	901 525 - 04	IC, 74 S 00	U 41	
1		63				
		64				
2	0	65	252 208 - 01	IC, 74 F 245	U 3,37	
2	0	66	390 092 - 08	IC, 74 F 158	U 8,9	
		67				
1	0	68	325 566 - 14	OSCILLATOR 28.636 MHZ	OSC1	
0	1	69	900 558 - 01	QUARZ, 14.31818 MHZ	Q 1	HC 18-U HOUSING
1	1	70	380 312 - 01	OSCILLATOR 1.8432 MHZ	OSC3	
1	1	71	325 566 - 01	OSCILLATOR 16 MHZ	OSC 2	
		72				
2	2	73	900 850 - 01	DIODE, 1N4148	D1,D2	
1	1	74	324 219 - 01	TRANSISTOR BC 327-B	T1	

1	1	75	324 220 - 01	TRANSISTOR BC 337-B	T2	
1	1	76	902 650 - 01	TRANSISTOR 2N 3904	T3	
		77				
		78				
4	4	79	904 150 - 07	IC SOCKET	U 33-36	18 PIN DIP
2	2	80	904 150 - 05	IC SOCKET	U 7,69	28 PIN DIP
3	3	81	904 150 - 06	IC SOCKET	U 1,2,56	40 PIN DIP
1	1	82	390 185 - 02	IC SOCKET	U 14	68 PIN PLCC
1	1	83	390 185 - 01	IC SOCKET	U 10	84 PIN PLCC
		84				
		85				
1	1	86	902 417 - 03	RES PACK 4 X 1K	RN 7	SINGLE LINE, 5 PIN, SP:2.54MM
1	1	87	902 442 - 40	RES PACK 7 X 27K	RN 15	SINGLE LINE, 8 PIN, SP:2.54MM
2	2	88	902 412 - 05	RES PACK 8 X 4K7	RN 1,4,	SINGLE LINE, 9 PIN, SP:2.54MM
2	2	89	902 410 - 08	RES PACK 9 X 4K7	RN 8,9	SINGLE LINE 10 PIN, SP:2.54MM
9	9	90	902 422 - 03	RES PACK 4 X 33 OHM	RN 2,3,5,6,10, 11,13,14,16	SINGLE LINE, 5 PIN, SP:2.54MM
1	1	91				
1	1	92	902 412 - 04	RES PACK 8 X 2K2	RN 12	SINGLE LINE, 9 PIN, SP:2.54MM
1	1	93	903 781 - 01	WIRE JUMPER	R 22	
S	S	94		RES PTC 1R5	R 22	SUBST. FOR ITEM 93
1	1	95	901 550 -126	RES CARBON 20 OHM .25W, 5%	R 20	
4	4	96	901 550 -105	RES CARBON 33 OHM .25W, 5%	R 6,7,10,23	
1	1	97	901 550 - 45	RES CARBON 75 OHM .25W, 5%	R 19	
0	1	98	901 550 - 49	RES CARBON 100 OHM .25W, 5%	R 2	
1	1	99	901 550 -135	RES CARBON 130 OHM .25W, 5%	R 12	
1	1	100	901 550 - 52	RES CARBON 220 OHM .25W, 5%	R 21	
1	1	101	901 550 -108	RES CARBON 360 OHM .25W, 5%	R 11	
2	2	102	901 550 - 31	RES CARBON 680 OHM .25W, 5%	R 13,18	
1	1	103	901 550 - 88	RES CARBON 750 OHM .25W, 5%	R 14	
3	3	104	901 550 - 01	RES CARBON 1 K .25W, 5%	R 5,17,24	
1	1	105	901 550 - 53	RES CARBON 2 K .25W, 5%	R 15	
		106				
1	1	107	901 550 - 33	RES CARBON 3 K5 .25W, 5%	R 16	
2	2	108	901 550 - 19	RES CARBON 4K7 .25W, 5%	R 4,9	
2	2	109	901 550 - 20	RES CARBON 10K .25W, 5%	R 1,8	
0	1	110	901 550 - 84	RES CARBON 1 M .25W, 5%	R 3	
		111				

		112					
9	9	113	324 204 - 03	CAP CER RAD 2.2 NF	C200-208	SP: 5 MM +/- 10%	
7	7	114	324 204 - 09	CAP CER RAD 10 NF	C216-222	SP: 5 MM +/- 10%	
		115					
		116					
8	9	117	251 070 - 18	CAP CER RAD 47 PF/50V	C209-215,101,108	SP:5MM +/-10%	
4	4	118	251 069 - 02	CAP CER RAD 330 PF	C104-107		
4	4	119	251 071 - 30	CAP CER RAD 470 PF/50V	C100,102,103,	SP:5MM +/-10%	
		120			223		
43	43	121	324 204 - 10	CAP CER RAD 0.22 uF	C1,2,7,10,14,17-36,38,39,45,48,50,53,55,56,59,62,		
		122			C66,67,69,70,224-227		
32	32	123	900 020 - 01	CAP CER RAD 0.1 UF	C3-6,8,9,11-13,15,16,37,40-44,46,47,49,51,52,54,		
		124			C57,58,61-65,68,71		
		125					
8	8	126	900 100 - 27	CAP ELECTROL. RAD 47 UF 16V	C 300-307	-10/+50%	
		127					
1	1	128	904 775 - 01	DIP SWITCH 4 X 1, 90	DSW1		
		129					
		130					
1	1	131	903 326 - 03	HEADER ASSY SINGLE ROW .100 CTR.	J 7	3 PIN/LED	
1	1	132	903 326 - 04	HEADER ASSY SINGLE ROW .100 CTR.	J 6	4 PIN/SPEAKER-RESET.REMOVE PIN 3	
		133					
1	1	134	327 032 - 01	CONN. 9 PIN SUB MINI "D" MALE	J 8		
1	1	135	327 033 - 01	CONN. 9 PIN SUB MINI "D" FEMALE	J 10		
1	1	136	327 033 - 03	CONN.23 PIN SUB MINI "D" FEMALE	J 3		
		137					
1	1	138	327 032 - 05	CONN.25 PIN SUB MINI "D" MALE	J 2		
1	1	139	327 033 - 05	CONN.25 PIN SUB MINI "D" FEMALE	J 1		
		140					
1	1	141	252 122 - 01	RCA PHONE JACK	J 11		
1	1	142	380 722 - 01	CONN. 5 PIN DIN FEMALE	J 5		
		143					
1	0	144	903 781 - 01	WIRE JUMPER	JU 1		
		145					
1	1	146	903 345 - 17	HEADER ASSY DUAL ROW , .1 CENTER	J4	34 PIN FLOPPY, REMOVE PIN 3	
1	1	147	903 328 - 07	HEADER ASSY FRICT, .156 CENTER	J9	7 PIN POWER, REMOVE PIN 3	
		148					