SERVICE MANUAL

PC 10-1/10-2/10-III

APRIL, 1989

PN-314860-01

Commodore

SERVICE MANUAL

PC 10-1/10-2/10-III

APRIL, 1989 **PN-314860-01**

Commodore Business Machines, Inc.
1200 Wilson Drive, West Chester, Pennsylvania 19380 U.S.A.

CONTENTS

CONTENTS *(continued)*

SPECIFICATIONS

PC10-1

MEMORY	
ROM	PHOENIX BIOS (16K)
RAM	512K WITH PARITY
RAM EXPANDABLE	
ON BOARD	YES
ON SLOTS	YES
CPU	
TYPE	8088
CLOCK SPEED	4.77 MHz
8087 MATH CO-PROCESSOR	SOCKET ON BOARD
NUMBER OF SLOTS	5 FULL LENGTH
OPERATING SYSTEM	MS-DOS 3.2
KEYBOARD	
NUMBER OF KEYS	85
TYPE	TYPEWRITER STYLE
NUMERIC KEYPAD	YES
FUNCTION KEYS	10
POWER SUPPLY	
OUTPUT RATING	112 WATTS
MAXIMUM CONFIGURATION SUPPORTED	TWO FLOPPY DRIVES + 40 MB HARD DRIVE + 5 EXPANSION CARDS
INPUT/OUTPUT PORTS	
RS-232C SERIAL	BUILT-IN
CENTRONICS PARALLEL	BUILT-IN
STORAGE	
FLOPPY DRIVE CONTROLLER	BUILT-IN SUPPORTS FOUR DRIVES
FLOPPY DRIVES	SINGLE HALF-HEIGHT
HARD DRIVE	OPTIONAL BRACKETS FOR HALF OR FULL HEIGHT
VIDEO	
ATI "GRAPHICS SOLUTION" ADAPTER	STANDARD
• MODES	
1) MONOCHORME ADAPTER	
2) COLOR/GRAPHICS ADAPTER	
3) HERCULES MONO GRAPHIC ADAPTER	
4) PLANTRONICS COLORPLUS ADAPTER	
5) EMULATION OF COLOR/GRAPHICS ADAPTER ON MONOCHROME MONITOR	
• TEXT MODES	
40 x 25	
80 x 25	
132 x 25	
132 x 44	
• GRAPHICS MODES	
320 x 200 (4 OR 16 COLORS)	
640 x 200 (2, 4, OR 16 COLORS)	
720 x 348 (HERCULES COMPATIBLE)	
• COMPATIBLE MONITORS	
IBM COMPATIBLE TTL MONOCHROME	
RGBI COLOR	
COMPOSITE COLOR OR MONOCHROME	
AUDIO	
POLYPHONIC TONES	YES

SPECIFICATIONS

PC10-2

MEMORY	
ROM	PHOENIX BIOS (16K)
RAM	620K WITH PARITY
RAM EXPANDABLE	
ON BOARD	N/A
ON SLOTS	N/A
CPU	
TYPE	8088
CLOCK SPEED	4.77 MHz
8087 MATH CO-PROCESSOR	SOCKET ON BOARD
NUMBER OF SLOTS	5 FULL LENGTH
OPERATING SYSTEM	MS-DOS 3.2
KEYBOARD	
NUMBER OF KEYS	85
TYPE	TYPEWRITER STYLE
NUMERIC KEYPAD	YES
FUNCTION KEYS	10
POWER SUPPLY	
OUTPUT RATING	112 WATTS
MAXIMUM CONFIGURATION SUPPORTED	TWO FLOPPY DRIVES + 40 MB HARD DRIVE + 5 EXPANSION CARDS
INPUT/OUTPUT PORTS	
RS-232C SERIAL	BUILT-IN
CENTRONICS PARALLEL	BUILT-IN
STORAGE	
FLOPPY DRIVE CONTROLLER	BUILT-IN SUPPORTS FOUR DRIVES
FLOPPY DRIVES	DUAL HALF-HEIGHT
HARD DRIVE	OPTIONAL BRACKETS FOR HALF OR FULL HEIGHT
VIDEO	
ATI "GRAPHICS SOLUTION" ADAPTER	STANDARD
• MODES	
1) MONOCHORME ADAPTER	
2) COLOR/GRAPHICS ADAPTER	
3) HERCULES MONO GRAPHIC ADAPTER	
4) PLANTRONICS COLORPLUS ADAPTER	
5) EMULATION OF COLOR/GRAPHICS ADAPTER ON MONOCHROME MONITOR	
• TEXT MODES	
40 x 25	
80 x 25	
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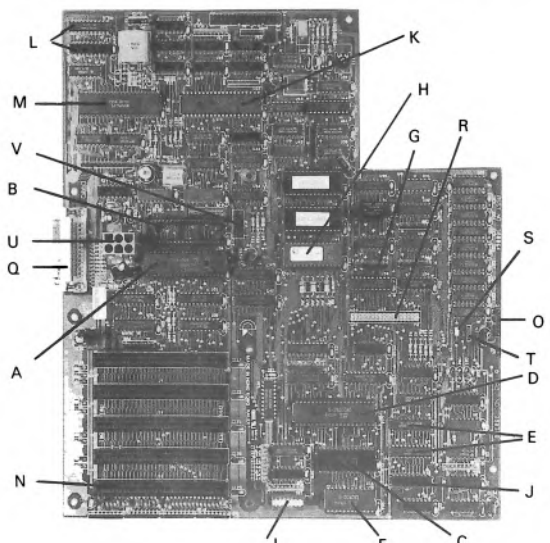
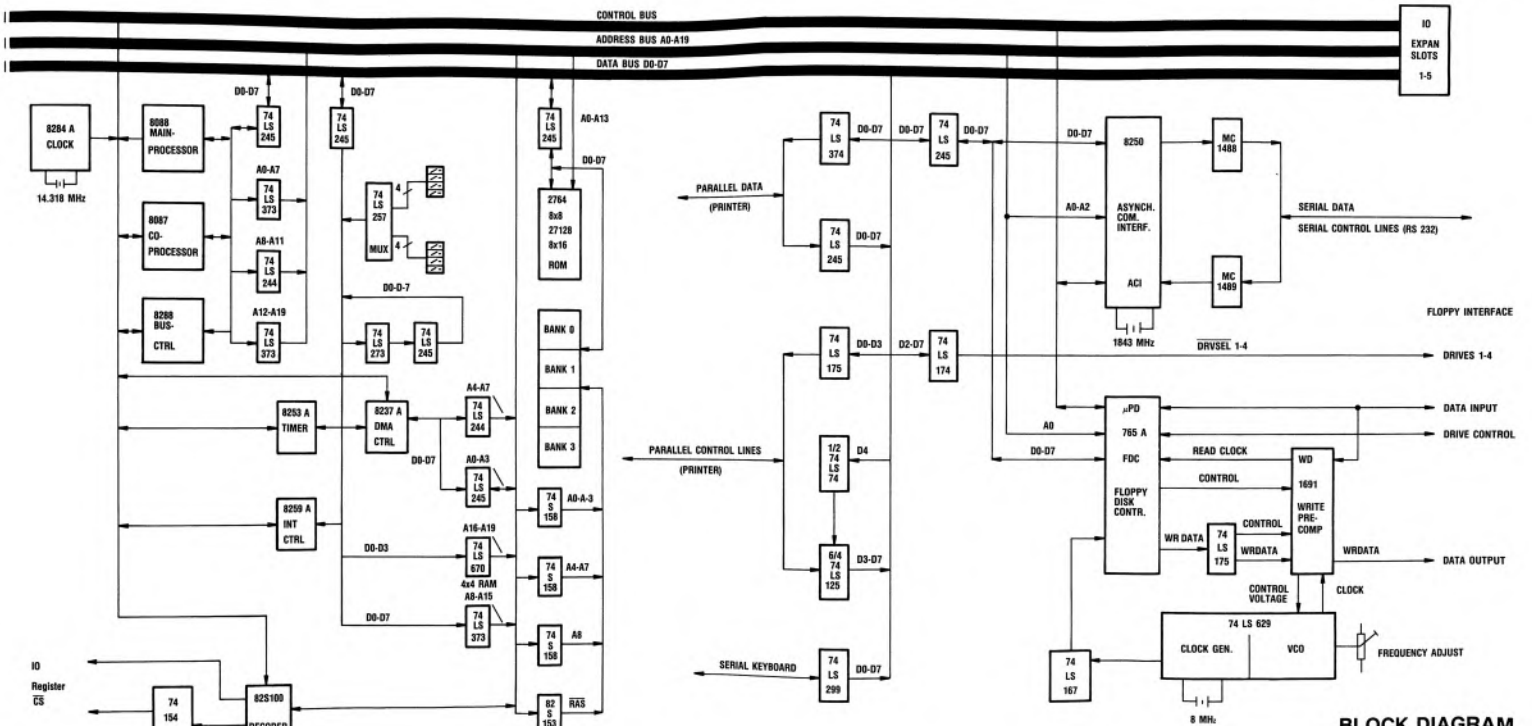
132 x 44	
• GRAPHICS MODES	
320 x 200 (4 OR 16 COLORS)	
640 x 200 (2, 4, OR 16 COLORS)	
720 x 348 (HERCULES COMPATIBLE)	
• COMPATIBLE MONITORS	
IBM COMPATIBLE TTL MONOCHROME	
RGBI COLOR	
COMPOSITE COLOR OR MONOCHROME	
AUDIO	
POLYPHONIC TONES	YES

BOARD LAYOUT

A = 8088 CPU
B = 8087 coprocessor
C = Interrupt controller
D = DMA controller
E = System registers
F = Timer
G = PAL address decoder
H = ROM/EPROM BIOS
I = DIP switch
J = Keyboard interface
K = Floppy controller
L = Parallel interface
M = Serial interface
N = I/O expansion slots
O = Internal keyboard connector
Q = Parallel printer connector
R = Internal serial connector
S = Loudspeaker connector
T = Floppy activity LED connector
U = Power connector
V = J14 Serial, Parallel, and Floppy configuration jumpers





BLOCK DIAGRAM

MAJOR PARTS LIST PC10-1/PC10-2

PC10-1 (SINGLE DRIVE, 512K)	312200-01
PC10-2 (DUAL DRIVE, 640K)	312200-03
MAIN ASSEMBLY	380073-01
TOP HOUSING	380101-01
BOTTOM HOUSING	380100-02
FRONT PANEL	380102-01
POWER CORD	903508-04
KEYBOARD ASSEMBLY	380008-02
PCB ASSEMBLY COMBINED MAIN BOARD	380064-01
PCB ASSEMBLY RAM EXP 384K	380065-01
PCB ASSEMBLY RAM EXP 256K	380065-02
PCB ASSEMBLY ATI (MONO/COLOR VIDEO)	380069-01
FLOPPY DISK DRIVE	380111-01
SPEAKER ASSEMBLY	8256099-03
POWER SUPPLY ASSEMBLY	380021-02
POWER SUPPLY ASSEMBLY SUB:	390138-01
POWER ON LED ASSEMBLY	380016-01
CABLE ASSEMBLY - KEYBOARD CONNECTOR	380017-01
CABLE ASSEMBLY - RS232	312208-01
CABLE ASSEMBLY - DRIVE	380012-02
DOS MANUAL	319905-01
BASIC MANUAL	319906-01

PARTS LIST
PCB ASSY. #380064

Commodore part numbers are provided for reference only and do not indicate the availability of parts from Commodore. Industry standard parts (Resistors, Capacitors, Connectors) should be secured locally. Approved cross-references for TTL chips, Transistors, etc. are available in manual form through the Service Department, order #314000-01.

INTEGRATED CIRCUITS

U1,4,5	—	
11,69,72	74LS74 D Type Flip F	901521-06
U2,45,73	74LS04 Inverter	901521-02
U3	7407 Buffer	901522-30
U6	74LS08 AND	901521-03
U7	74LS155	901521-79
U8	74LS273 8 Bit D-FF	901521-42
U9,17	—	
51,76	74LS244 8 Bit Buffer	901521-13
U10	74LS299 Shift Reg	901521-72
U12	74LS670 Register File	901521-82
U13,52,	—	
55	74LS373 D Latch	901521-29
U14	8237A-5 DMA Cntrl	380203-01
U15	8259A Intrpt Cntr	901874-01
U16	8253A-5 Timer	380202-01
U18,21,	—	
42,56,43	74LS245 Buffer	901521-46
U19	74LS367 6 Bit Buffer	901521-47
U20	74LS257 MUX	901521-57
U22-U30	Dram 256Kx1 150ns	380223-01
U31	74LS11 AND	901521-80
U32,33	74HCT158 MUX	380227-04
	Sub: 74S158 MUX	901525-31
U34	74S280 Parity Gen	901525-29
U35	74HCT32 OR	380227-01
U36	Delay Line 50ns	324667-01
U37	74S00 NAND	901525-04
U38	16L8 PAL	380257-01
U39	7700 PLA Decode2	380212-08
	Sub: FPLA 82S100	380212-08
U40	7700 PLA Decode1	380212-07
	Sub: FPLA 82S100	380212-07
U41	BIOS EPROM 27128	380258-03
U44	74LS02 NOR	901521-21
U46,58,	—	
61	74LS175 4 Bit D-FF	901521-34
U47	74S74 D Type FlipFlop	901525-09
U48	8288 Bus Cntrl	901876-01
U49	8087 Co-Processor	380201-01
U50	8088 CPU 5MHz	380200-01
U53	8284A Clk Gen	901875-01
U54	74ALS11 AND	380230-02
U57	74LS163 Counter	901521-33
U59	74LS629 VCO	901521-84
U60	1691 Data Separator	380207-01
U62	74LS123 Monoflop	901521-49
U63	74LS174 6 Bit D-FF	901521-63
U64	µPD765AC-2 FDC	380206-01
U65	74LS14 Schmitt-Trig	901521-30
U66-68	7438 NAND/OC	901522-09

INTEGRATED CIRCUITS (continued)

U70	74LS125 Buffer	901521-20
U71	8250 ACI	380205-01
U74	74175 4 Bit D-FF	901522-43
U75	74LS365 6 Bit Buffer	901521-48
U77	74LS374 D Type FF	901521-43
U78	MC1489 Line Recvr	901524-07
U79	MC1488 Line Driver	901524-06

DIODES

D2, D3	1 N 4001 1A/50V	900750-01
D1	1N 4148 50mA/50V	900850-01

RESISTORS — All values are in ohms-1/4 W 5% unless noted otherwise.

R1-4,16, 18,29,30	33 ohm	R28	8K2 ohm
R24	68 ohm	R22	10K ohm
R13	220 ohm	R25	47K ohm
R31	510 ohm	R26	82K ohm
R32	820 ohm	R14,15	1M ohm
R17	1K2 ohm	R33	Trimmer 0.1W 2K2 (Valvo, ECP 10 Type "S")
R8-12,19, 20,23,27	2K2 ohm		
R5,21	4K7 ohm		

CAPACITORS

C84-C95	Ceramic 2200 pF, 50V
C96	Ceramic 22 pF, 50V
C97	Ceramic 47 pF, 50V
C102	Ceramic 82 pF, 50V
C81-83, 161-169	Ceramic 100 pF, 100V
C101	Ceramic 150 pF, 50V
C107-114, 126-145	Ceramic 1000 pF, 25V
C1-6,11-13, 17-21,31,35, 37,42-44,46, 47,51,52,54, 58,61,66-70, 73,77,78	Ceramic 0.1 µF, 50V
C14-16,22-30,32,33,34, 36,38-41, 48-50,53,56, 59,60,64,71, 80,99,100, 115-125,146-148,158-160, 170,171	Ceramic 0.22 µF, 50V

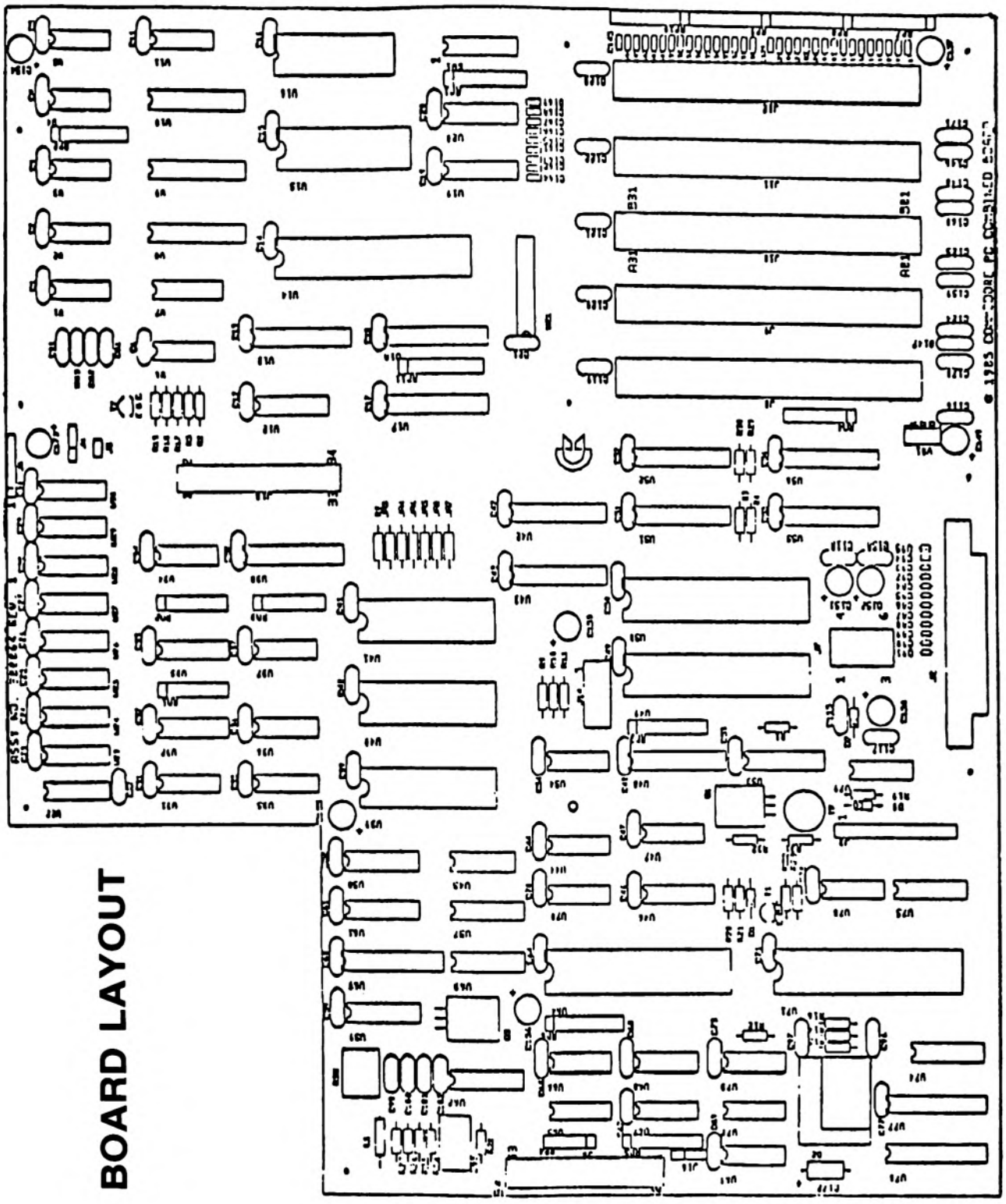
PARTS LIST (continued)

CAPACITORS (Continued)		
C98	Polyester	0.68 μF, 63V
C149-157, 173	Electro. Rad	47μF, 25V
C172	Electro. Axial	47μF, 16V
TR	Var	2-40 pF

MISCELLANEOUS		
Q2	1.8432 Crystal	900555-02
Q3	8.0000 Crystal	900556-01
Q1	14.31818 Crystal	900558-01
VR1	7905 Volt Reg −5V	901527-03
L1	Coil 100 μH 3 ohm	380329-01
SW1	Dip Switch	903349-01

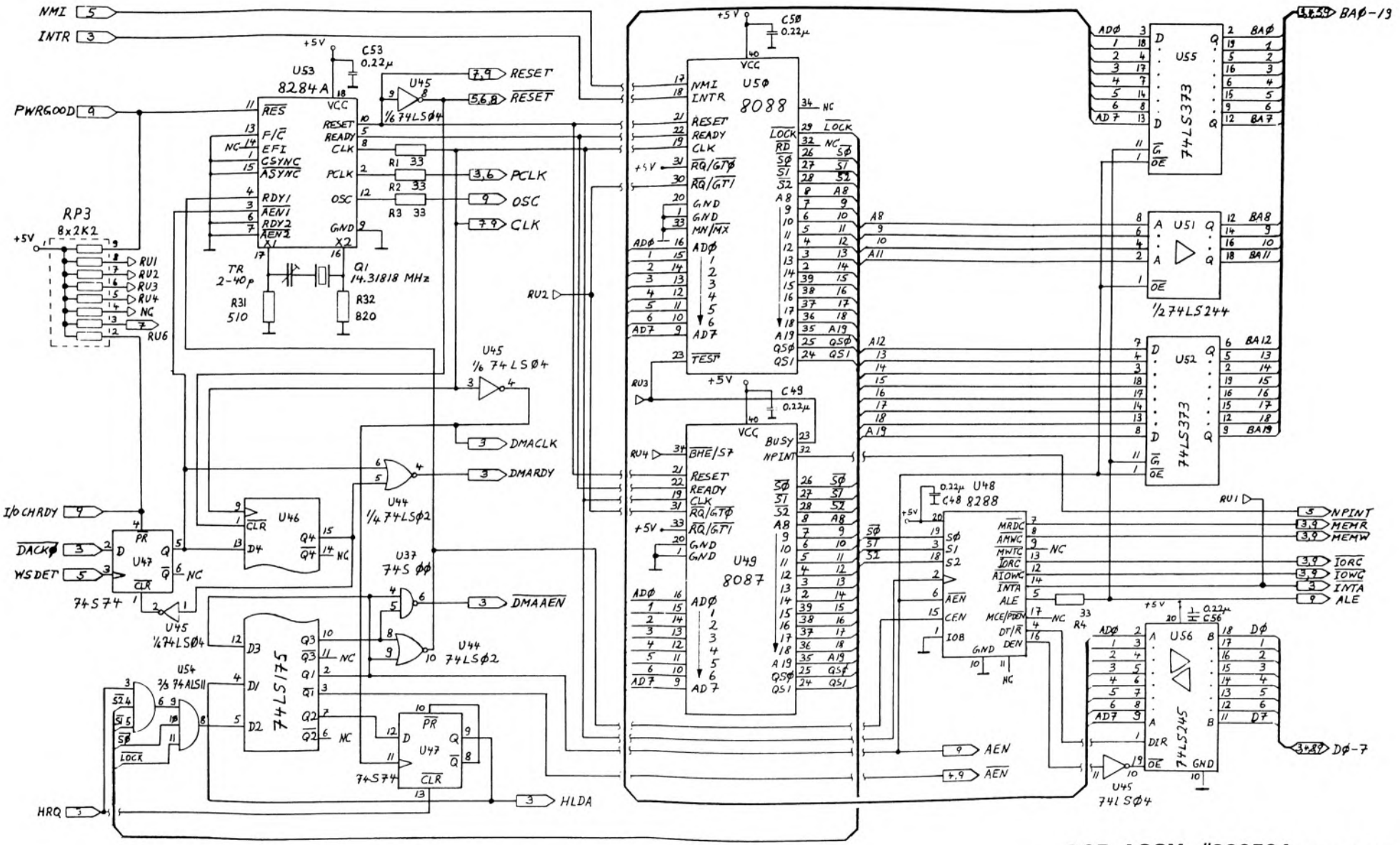
CONNECTORS		
J2	CNNT 25P Mini Din (Female, Amp 167131-1)	380307-02
J8-J12	CNNT 2x31P Edge (TI or TRW Equiv. .100 Center)	903446-02
J7	CNNT 6P Female (Amp 350 827-01)	903349-01

TRANSISTORS		
T1, T2	NPN BC 337-16	324220-01

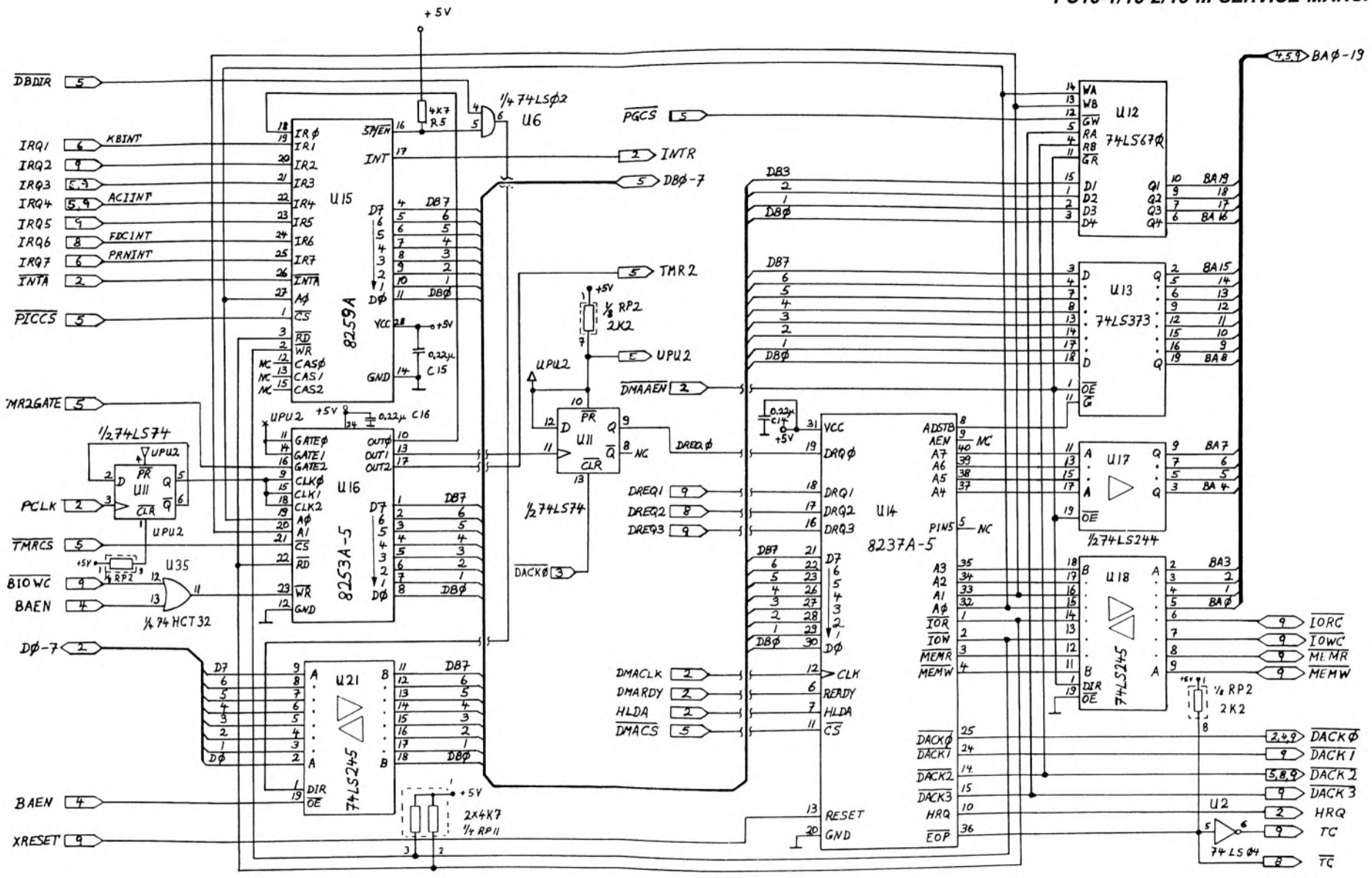


BOARD LAYOUT

PCB ASSY. #380064



PCB ASSY. #380504 (sheet 1 of 8)



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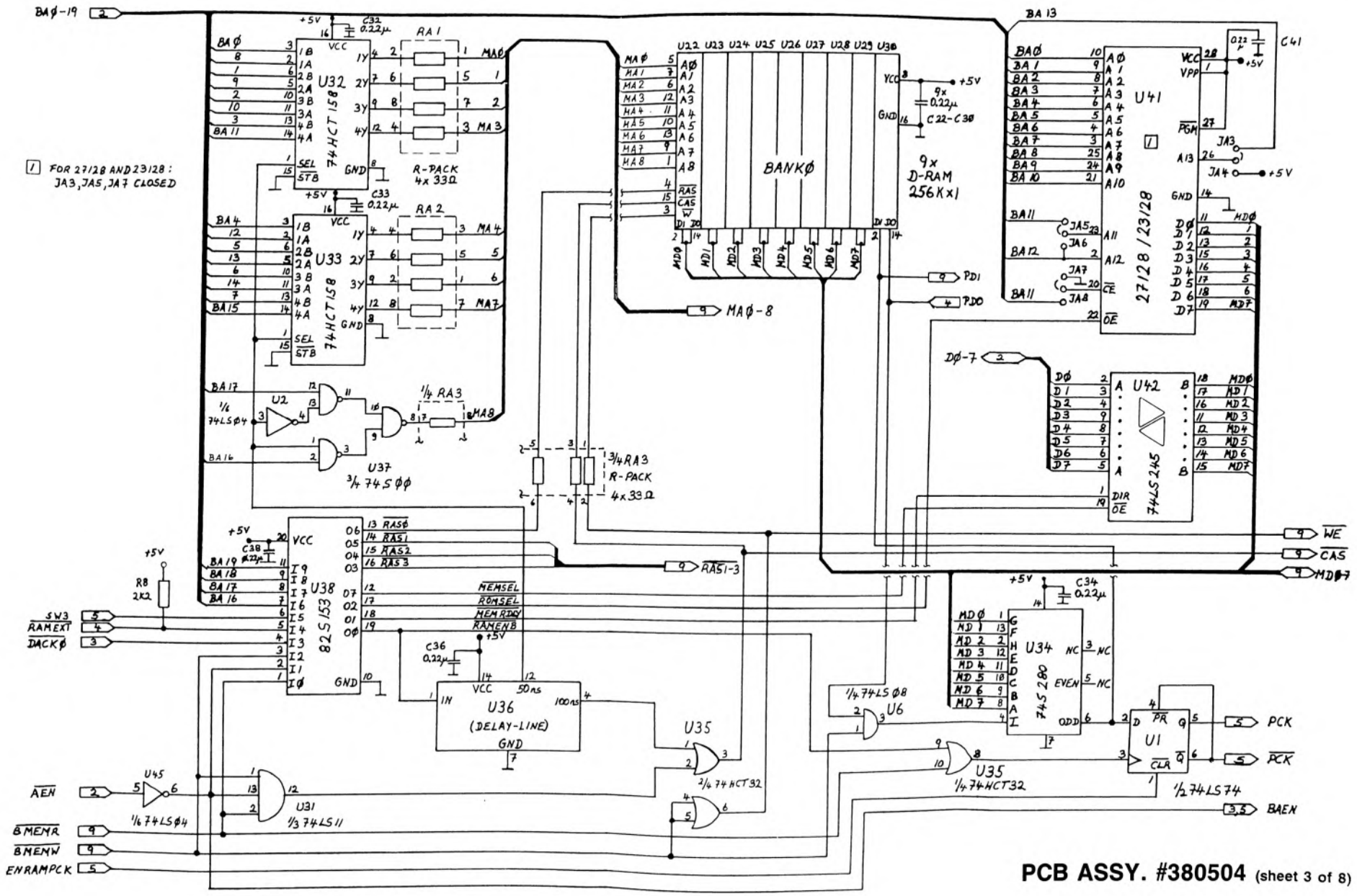

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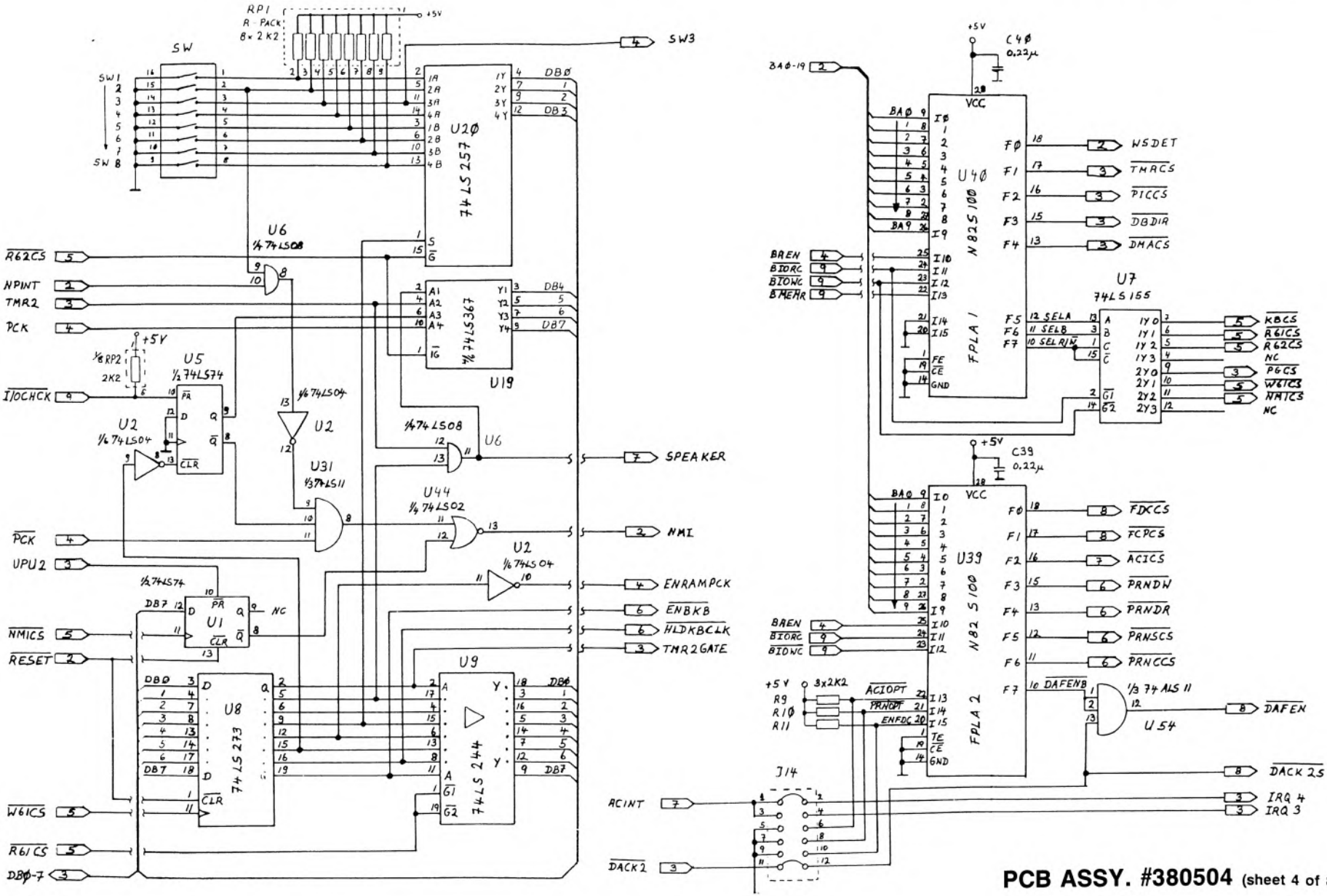
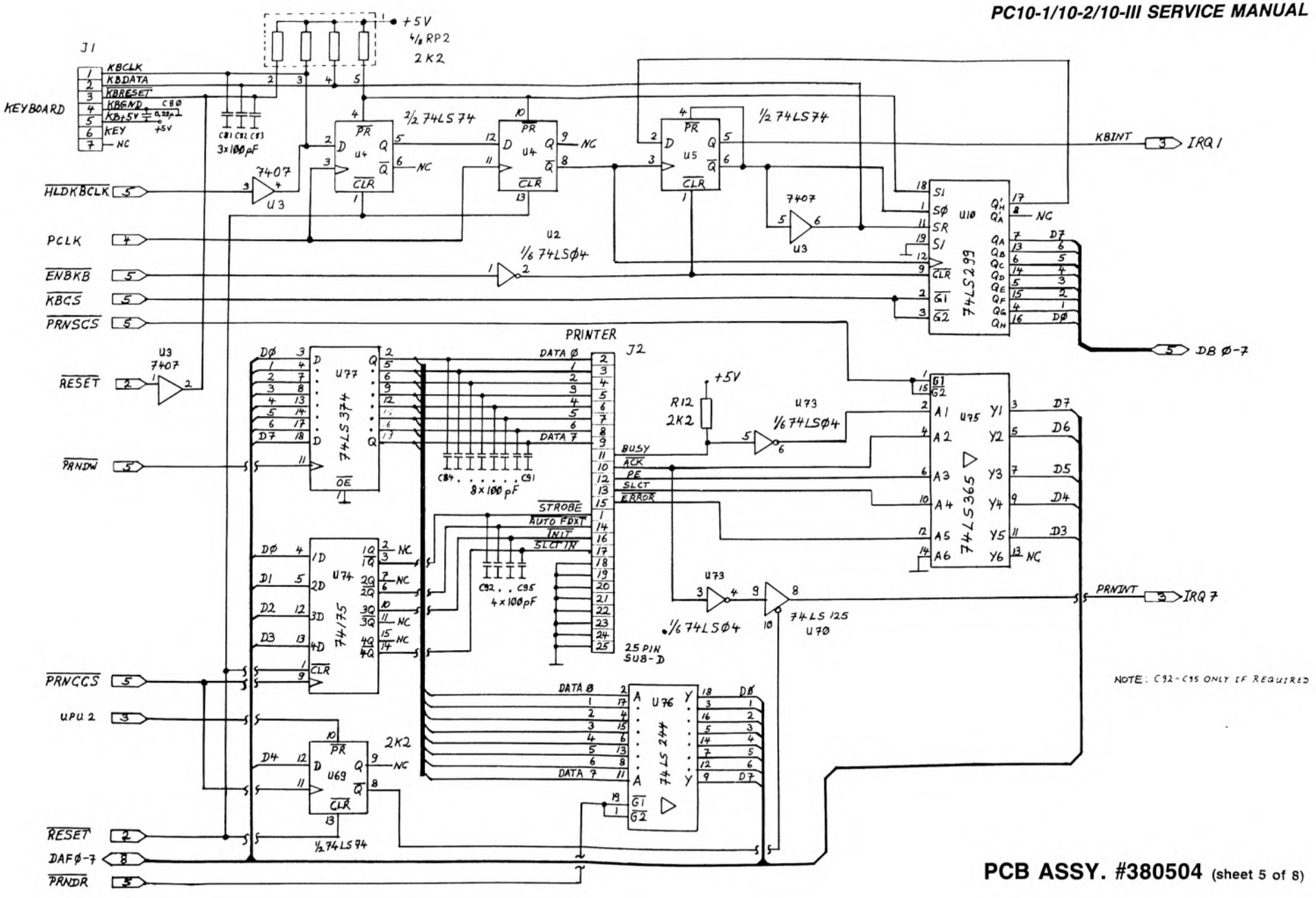


PCB ASSY. #380504 (sheet 4 of 8)



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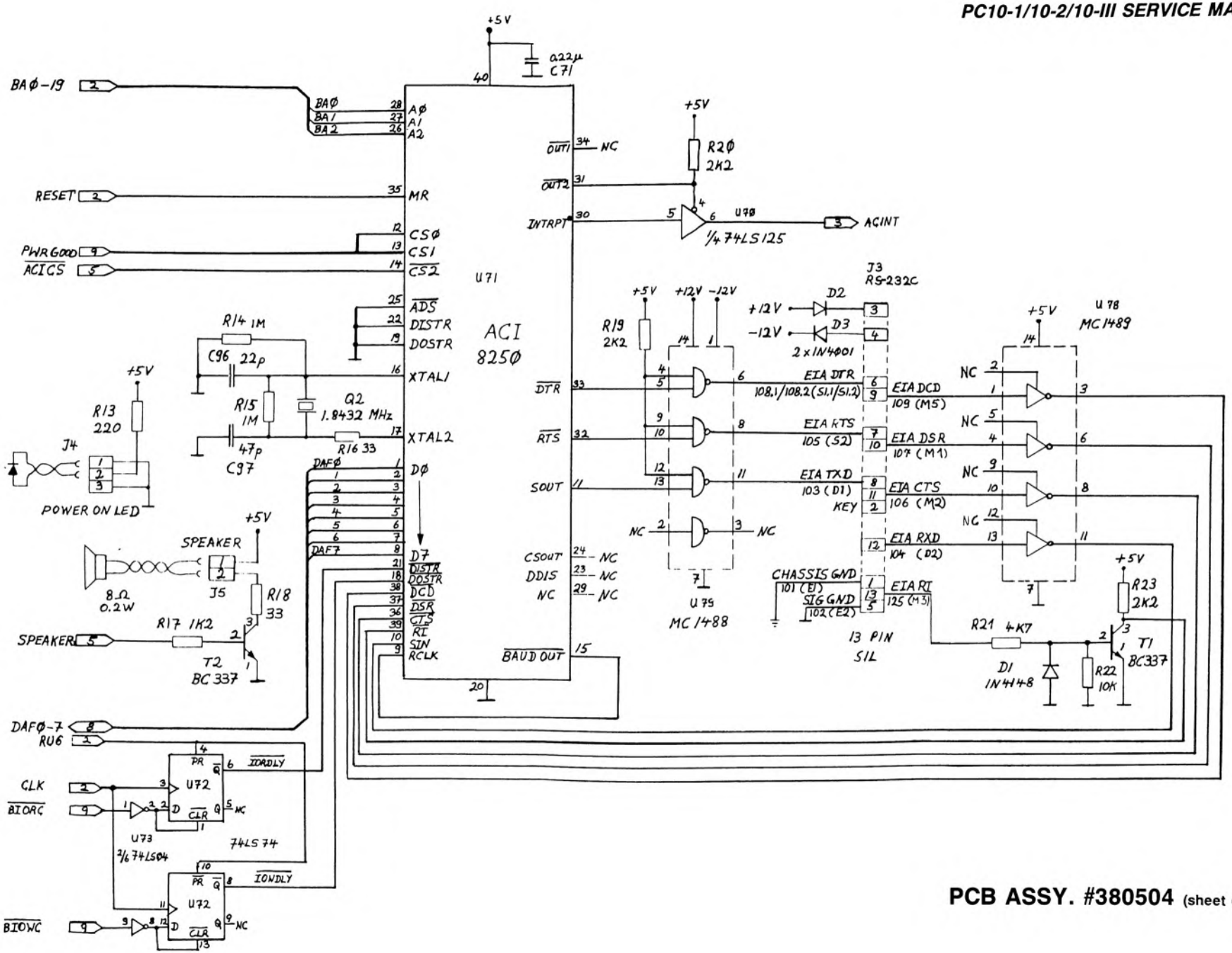
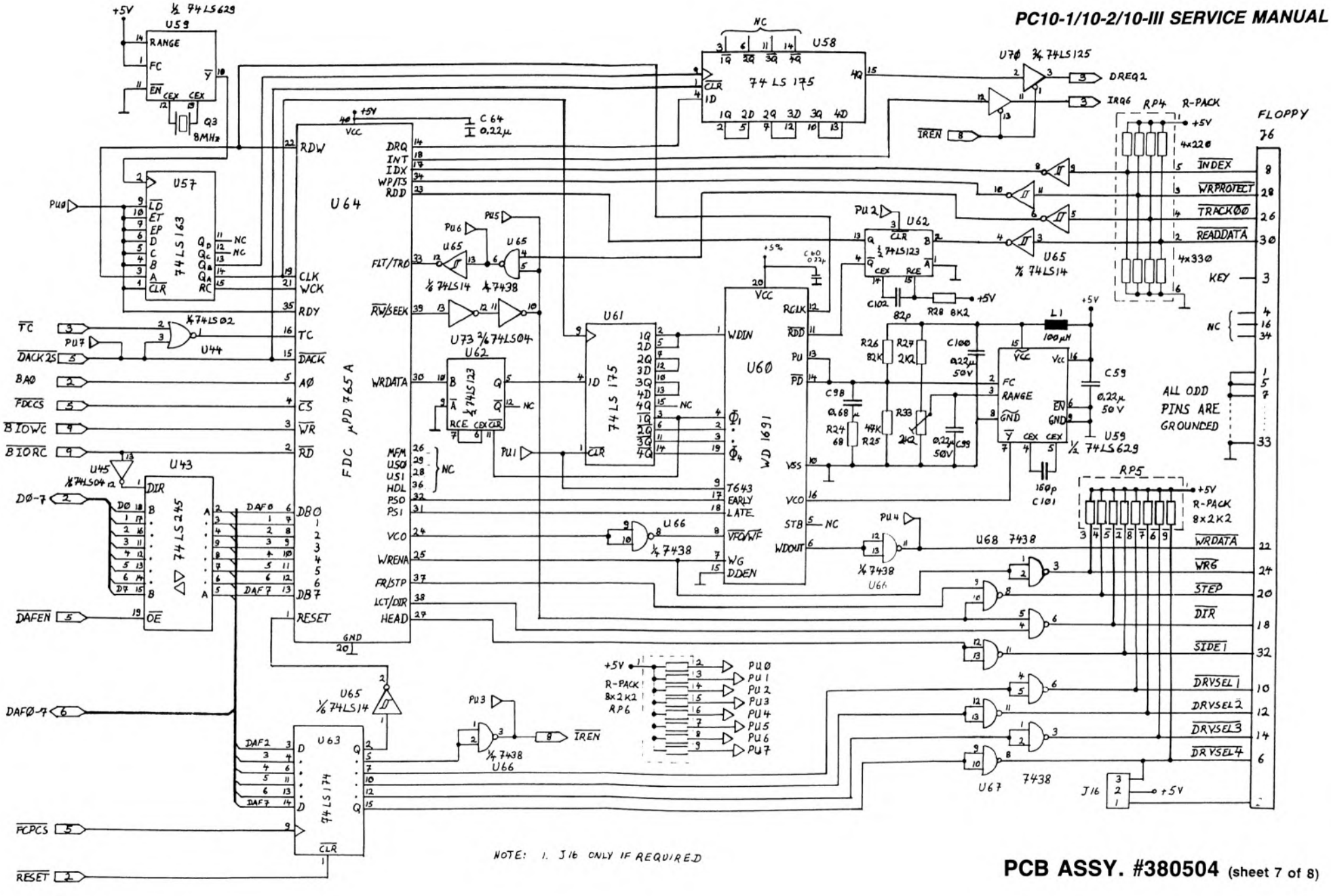


PCB ASSY. #380504 (sheet 6 of 8)



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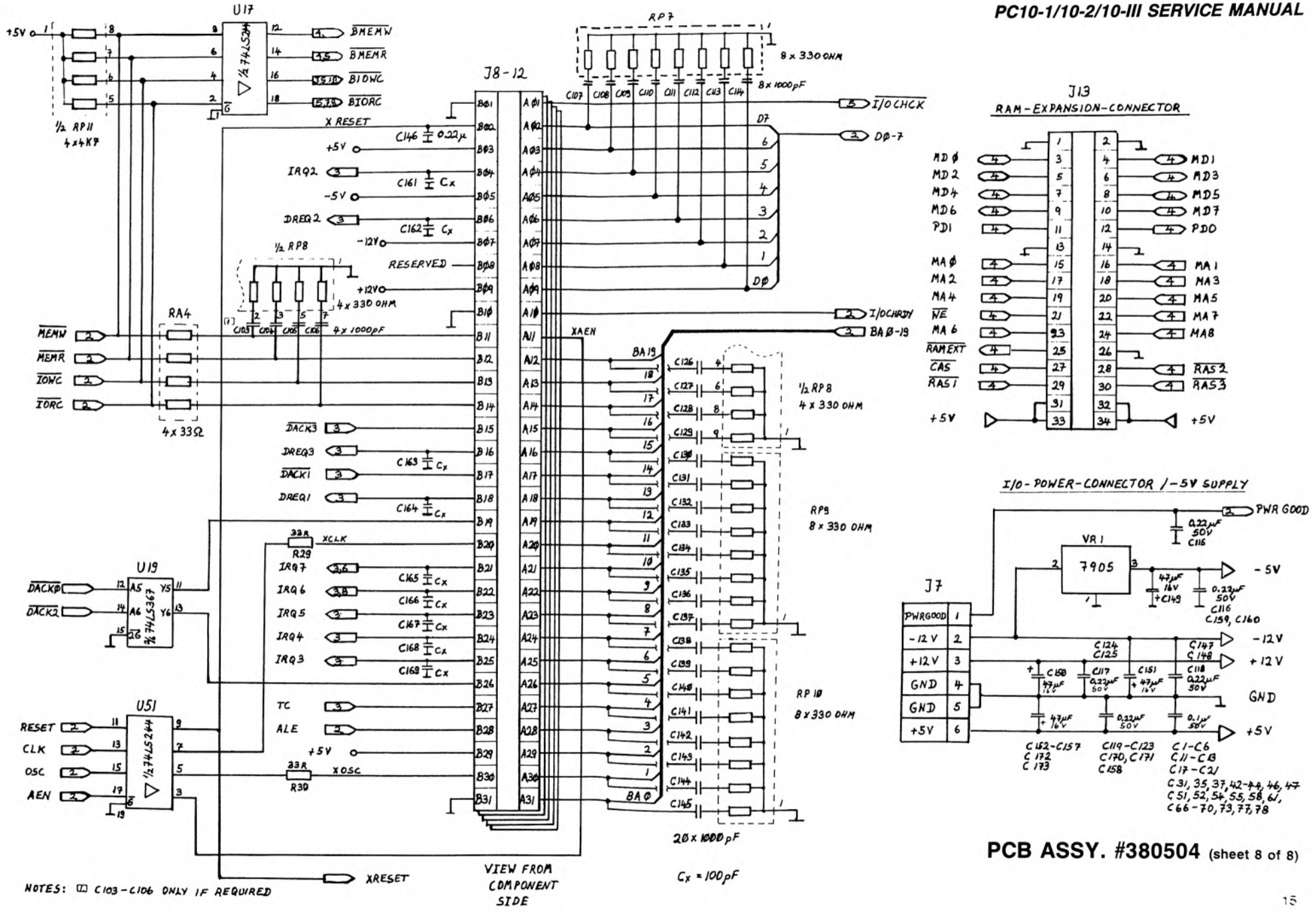

PCB ASSY. #380504 (sheet 8 of 8)

PARTS LIST
RAM EXPANDER

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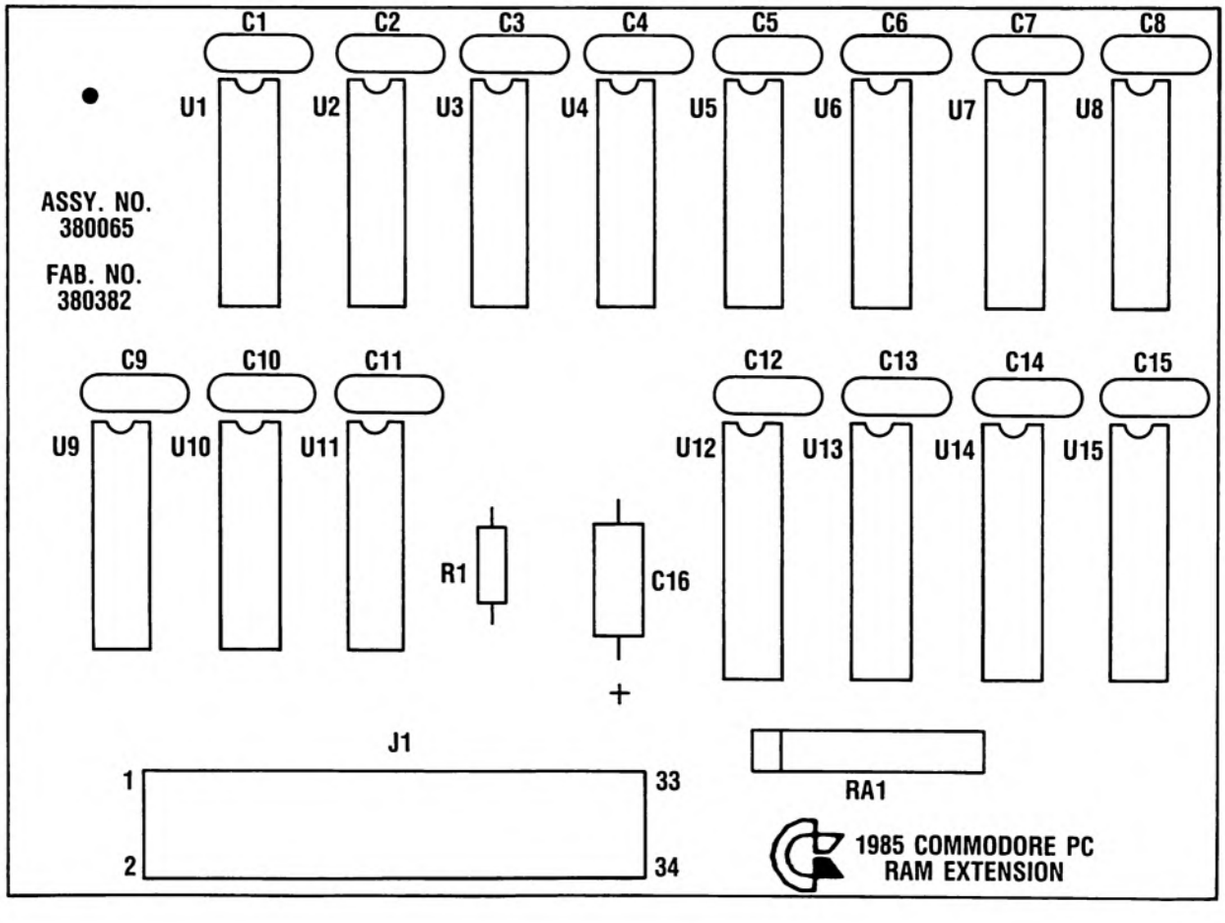
INTEGRATED CIRCUITS		
U1-9	4256 256Kx1 Dram	380223-01
U12-15	4464 64Kx4 Dram	380256-01
U10,11	4164 64Kx1 Dram	904150-02

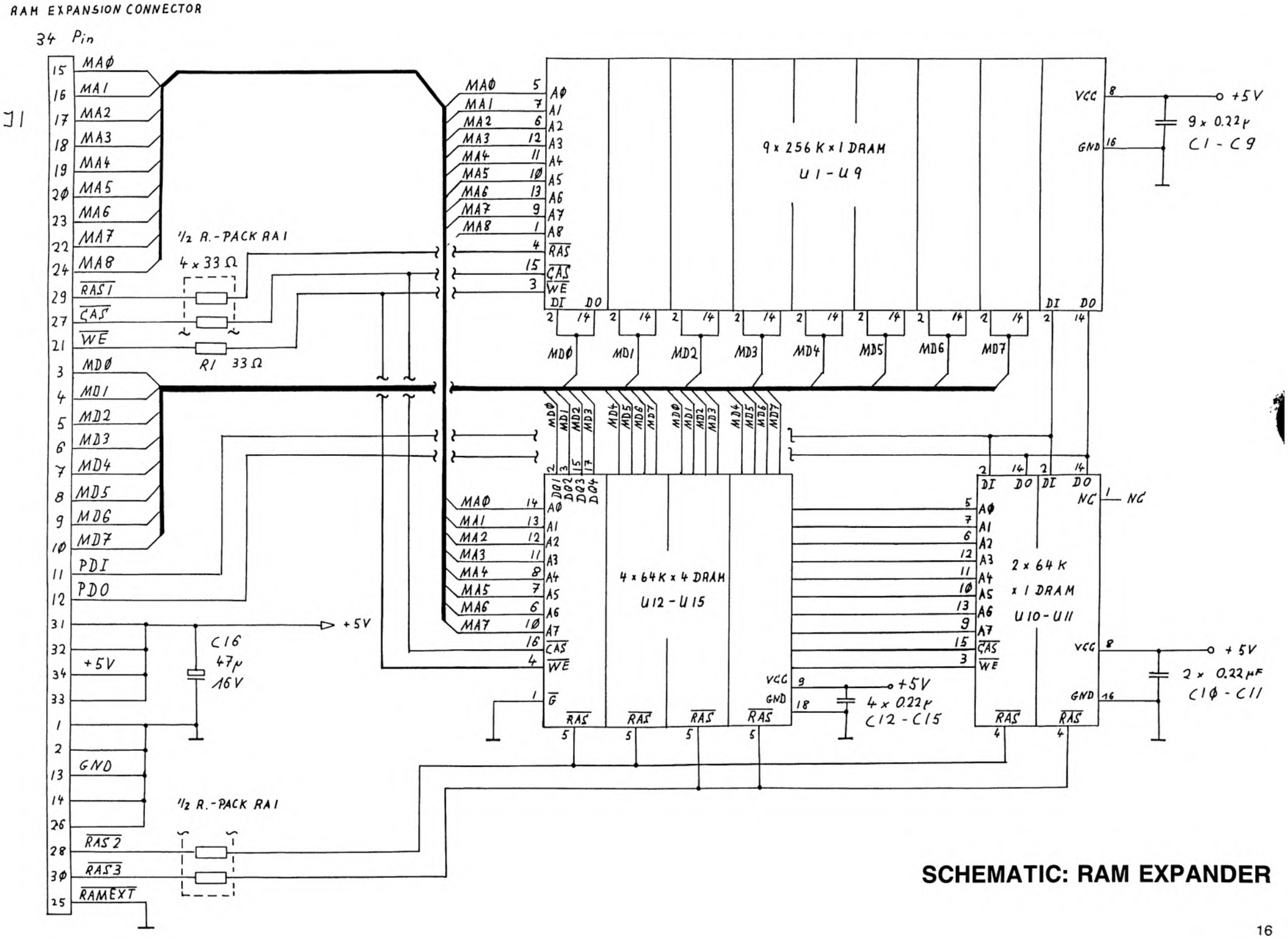
CAPACITORS	
C16	Electrol Axial 47μF 16V
C1-15	Ceramic 0.22μF 50V

RESISTORS	
R1	33 ohm 1/4W
RA1	4x33 ohm SIP

CONNECTORS		
J1	CNNT 34P Female (Amp 1-166 592-7)	380311-01

BOARD LAYOUT





SCHEMATIC: RAM EXPANDER

APPROVED VENDORS LIST

PCB ASSY. COMBINED MAIN BOARD

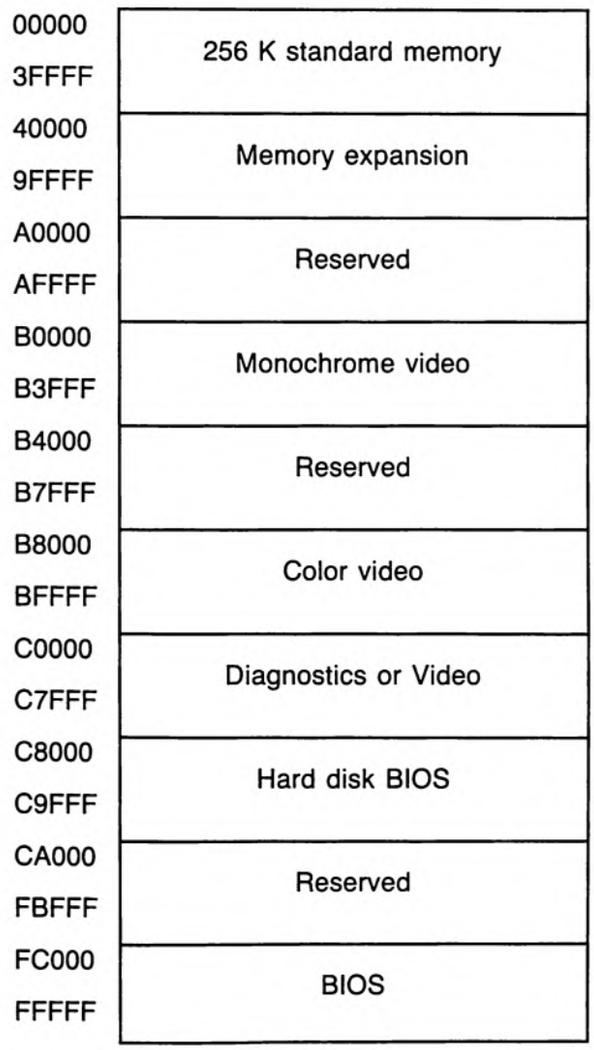
PART NUMBER	DESCRIPTION	VENDOR NAME	VENDOR PART NO.
380200-01	IC LSI MPU 8088 5MHZ	AMD	AM8088
		INTEL	8088
		NEC	4PD8088
		SIEMENS	SAB8088
380202-01	IC LSI PRGM INTVAL TIMER 8253	AMD	P8253-5
		INTEL	P8253-5
		NEC	VPD8253C-2
		NEC	VPD8253C-5
380203-01	IC LSI DMA-CNTRL D8237AC-5	NEC	D 8237 AC-5
380205-01	IC LSI ACI 8250	NSC	INS8250AN
		WESTERN DIGI	WD8250PL
380206-01	IC LSI FDC UPD765	NEC	VPD 765AC-2
380223-01	IC MEM DRAM 256KX1BIT 150NS	FUJITSU	MB81256-15
		HITACHI	HM50256P-15
		MATSUSHITA	MN41256-15
		NEC	D41256C-15
		OKI	MSM41256-15
		SAMSUNG	KM41256-15
		SHARP	LH21256-15
		TI	TMS4256-15NL
		TOSHIBA	TMM41256P-15
324667-01	IC DIGITAL DELAY LINE	BEL	0447-0250-02
		DATATRONIC	DL6310
		NYTRONICS	DDL-250F
		PCA ELECT	EP8205
		PULSE ENG	21214
380207-01	IC LSI DATA SEPARATOR 1691	WESTERN DIGI	WD1691
901524-06	IC LIN LINE DRIVER MC1488	FAIRCHILD	UA1488PC
		MOTOROLA	MC1488
		SIGNETICS	MC1488
901524-07	IC LIN LINE DRIVER MC1489	MOTOROLA	MC1489
		NSC	MC1489
		SIGNETICS	MC1489

PCB ASSY. RAM EXPANSION CARD

PART NUMBER	DESCRIPTION	VENDOR NAME	VENDOR PART NO.
380223-01	IC MEM DRAM 256KX1BIT 150NS	FUJITSU	MBB1256-15
		HITACHI	HM50256P-15
		MATSUSHITA	MN41256-15
		NEC	D41256C-15
		OKI	MSM41256-15
		SAMSUNG	KM41256-15
		SHARP	LH21256-15
		TI	TMS4256-15NL
		TOSHIBA	TMM41256P-15
380256-01	IC MEM DRAM 64KX4BIT	TI	TMS 4464 JL-15
		TI	TMS 4464 NL-15
901505-02	IC MEM DRAM 64KX1BIT 150NS	FUJITSU	MB8264-15P-G
		HITACHI	HM4864-2
		MICRON	MT4264-2
		NEC	UPD4164C-15
		OKI	MSM3764-15RS
		SHARP	LH2164-15
		TOSHIBA	TMM4164P-3

PC10-1, PC10-2 MEMORY MAP

Usage	Address	Size
00000-003FF	1K	Interrupt vectors
00400-004FF	256	BIOS/DOS data area
00500-3FFFF	255K	DOS/User RAM
40000-7FFFF	256K	User RAM
80000-9FFFF	128K	User RAM
A0000-AFFFF	64K	Reserved
B0000-B0FFF	4K	Monochrome video RAM
B1000-B3FFF	12K	Additional monochrome video RAM
B4000-B7FFF	16K	Reserved
B8000-BFFFF	32K	Color video RAM
C0000-C7FFF	32K	Reserved (diagnostics or video ROM)
C8000-C9FFF	8K	Hard disk BIOS (on controller card)
CA000-FBFFF	200K	Reserved
FC000-FFFFF	16K	BIOS ROM (version 1D is only 8K)



PC10-1, 10-2 MAIN PCB SWITCH SETTINGS

System DIP Switches (Located on Main PCB)

Switch No.	Function
1	OFF: Boot ON: System diagnostic
2	OFF: 8087 installed ON: 8087 not installed
3,4	System RAM configuration
5,6	Default video mode
7,8	Number of floppy drives installed

System RAM Installed

Switch No. 3,4	Ram Size
ON, ON	128 KB
OFF, ON	256 KB
ON, OFF	512 KB
OFF, OFF	640 KB

Default Video Mode

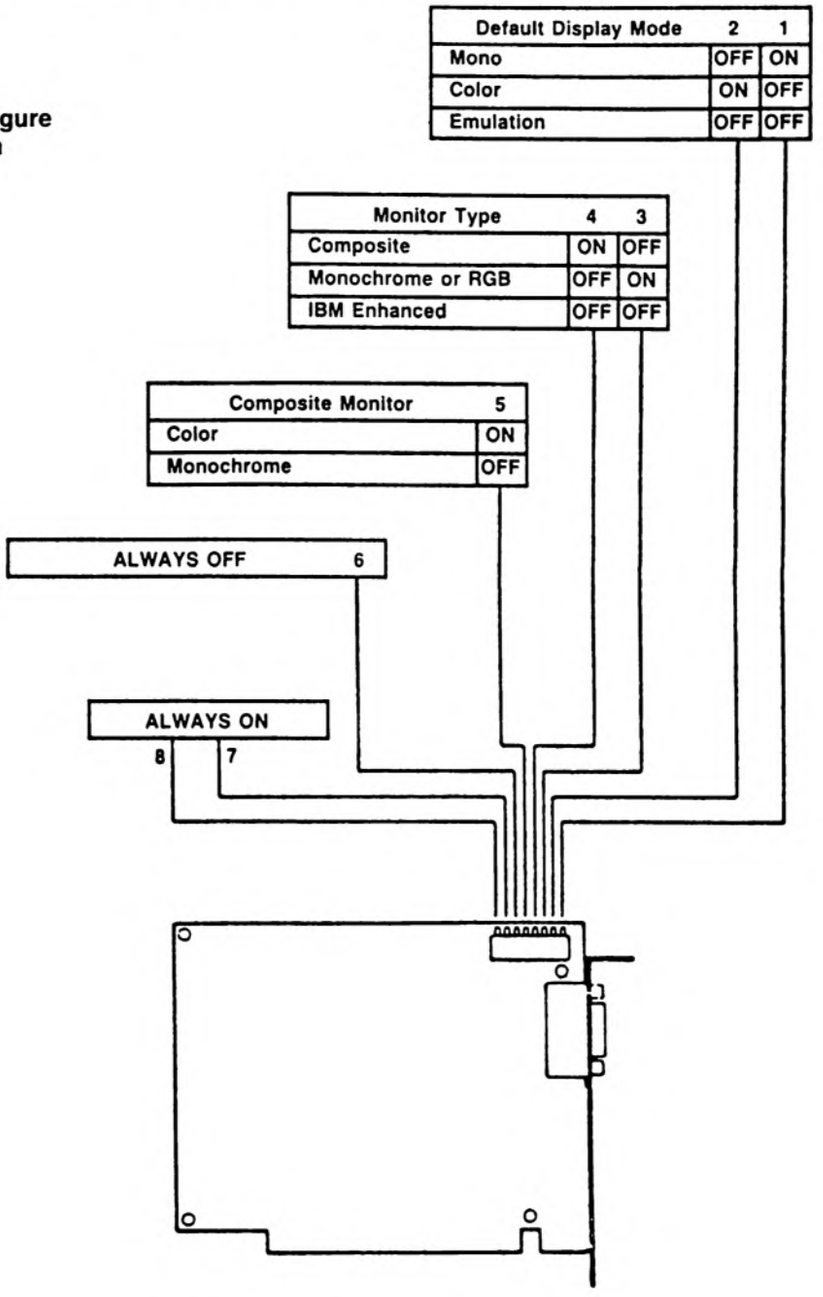
Switch No. 5,6	Function
ON, ON	Monochrome 40 x 25
OFF, ON	Color 40 x 25 (B&W mode)
ON, OFF	Color 80 x 25 (B&W mode)
OFF, OFF	Monochrome 80 x 25

Number of Floppy Drives Installed

Switch No. 7,8	Number of installed drives
ON, ON	1
OFF, ON	2
ON, OFF	3
OFF, OFF	4

PC10-1, 10-2 ATI VIDEO CARD SWITCH SETTINGS

Note: Numerals on figure indicate switch numbers.

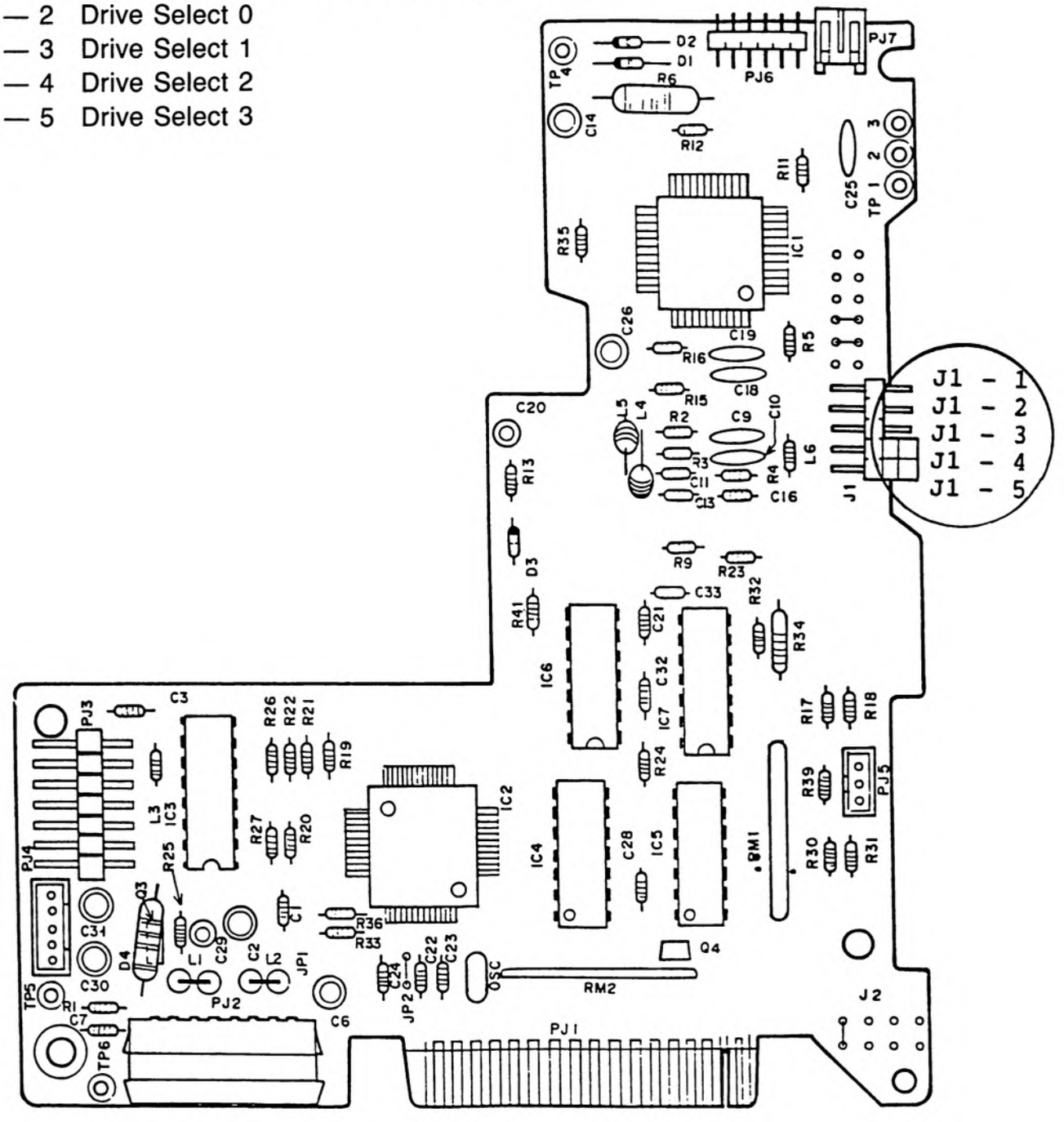


ATI Graphics Solution Switch Settings

	DIP — Switch	
Default Video Mode	SW5	SW6
Emulation Mode	ON	OFF
Color/Graphics	ON	OFF
Monochrome	OFF	OFF

Commodore PC Switch Settings on Motherboard.

J1 — 1 Terminator (Last device on cable)
J1 — 2 Drive Select 0
J1 — 3 Drive Select 1
J1 — 4 Drive Select 2
J1 — 5 Drive Select 3

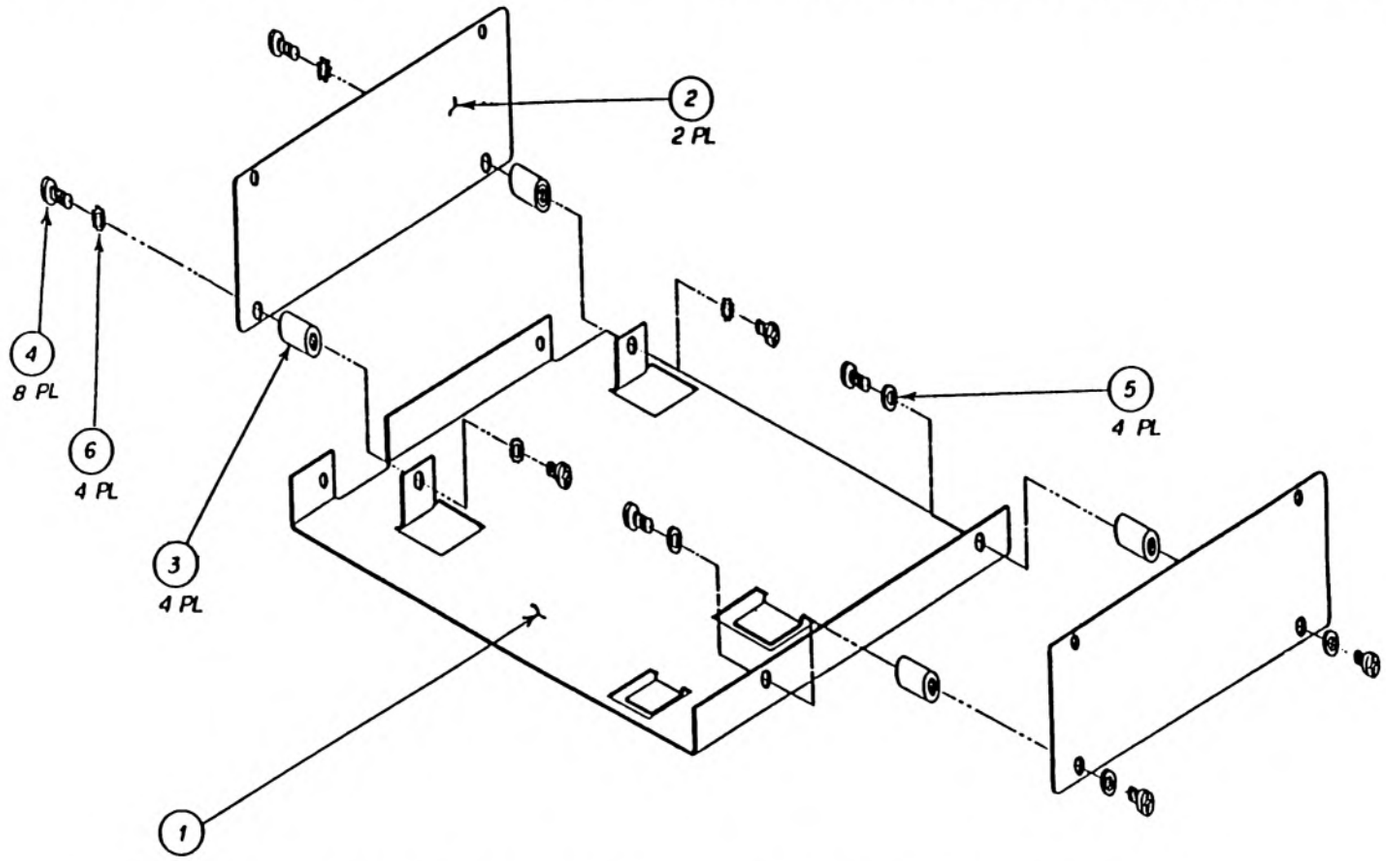


PC10-1, 10-2 Drive — Chinon F502 Type

PC10-1, 10-2 Hard Drive Mounting Instructions For HD Mounting Kit #380042-01

A) Assemble hard disk bracket according to installation diagram enclosed with this section.
B) Remove top cover of PC10 (5 screws on rear and 2 screws on sides).
C) Remove Ram expansion card from main board.
D) Mount hard drive onto brackets with 4 screws.
E) Slide hard drive and bracket into housing space provided next to the floppy drive and fasten to the chassis with two screws.
F) Connect all necessary cables (These are supplied with third party hardware).
G) Reinstall Ram expansion card.
H) Test unit. Software installation and initialization procedures are included with third party hard disk units.
I) Reassemble top housing.

PLEASE NOTE: Commodore Service will not issue any credits for installation labor of third party hardware.



Mounting Assembly PC10-1, 10-2 Hard Drive (Revision A) Kit #380042-01

ITEM	PART NUMBER	DESCRIPTION
1	380124-01	SUB CHASSIS HARD DISK
2	380125-01	PLATE HOLDING HARD DISK
3	312219-01	SHOCK ABSORBER RUBBER
4	906800-03	SCREW PHL PAN HD M3
5	907272-06	WASHER FLAT M4.3
6	905635-04	WASHER LOCK EXT TOOTH M4

PC10-1, 10-2 BIOS SELF TEST DIAGNOSTICS

The Commodore PC carries out a number of self checks when it is switched on. When all the tests are completed satisfactorily the PC will boot the MS-DOS operating system. Failure of a test that is essential to the operation of the PC results in the output of an error code and a system halt. Failure of non essential functions result in the output of an error code but the system continues with the test.

All errors below 62 (hex) are fatal system errors and cause a system halt. Errors above 61 (hex) are treated as warnings so power up continues. DIP switch 1 on the system board is used to loop the diagnostic tests (see error code FF).

The various diagnostic tests are as follows:

ERROR CODE	TEST CAUSE OF ERROR
00	CPU/SYSTEM BUS This error occurs if the CPU is faulty, or the system bus is bad (data, addr. etc.), or the ROM is faulty. Action: system HALT.
10	TIMER 0,1 Occurs if Timer outputs 0 or 1 are too slow or too fast. Action: system HALT.
20	SYSTEM PORT, TIMER 2 System port (61H) does not store control bits or timer 2 cannot be controlled (GATE 2, OUTPUT 2). Action: system HALT.
30	ROM CHECKSUM BAD The BIOS ROM does not checksum to 00. The ROM itself is faulty, or the address logic, or the data bus is bad. Action: system HALT.
40	DMA CONTROLLER R/W ERROR Registers of the DMA controller do not store parameters. Action: system HALT.
50	PROGRAMMABLE INTERRUPT CONTROLLER Interrupt controller does not respond to timer interrupt. Action: system HALT.
60	ADDRESS FAILURE All locations up to 640 K (if present) are filled with address dependent contents and then afterwards read back and checked. Faults in address decoding will cause a write to one location to destroy other locations. Action: system HALT.
61	BASE RAM A R/W storage failure in the lower 16 K RAM. Action: system HALT.

PC10-1, 10-2 BIOS SELF TEST DIAGNOSTICS *(continued)*

ERROR CODE	TEST CAUSE OF ERROR
62	MAIN RAM R/W storage failure in the RAM size specified by DIP switches 3 and 4. Either the RAM is bad or the DIP switches reflect the wrong RAM size. Action: Print RAM segment in error followed by the bit pattern (e.g. AA or 55) or 00 (for parity error) followed by the words RAM. Memory size is adjusted downwards.
80	VIDEO RAM R/W storage failure in the video RAM section. As set by DIP switches. Action: Issue one long and two short beeps.
81	VIDEO RETRACE No video signal found or retrace pulses missing. Action: Issue one long and two short beeps.
A0	KEYBOARD No keyboard present, or key struck, or bad keyboard. Action: Print scan code of stuck key (if any) followed by the word KEY.
C1	ROM SEARCH 1 An extension ROM at C0000 to C7FFF (hex) is found with a bad checksum. Action: Issue two short and one long beep. Print segment of ROM on screen followed by the word ROM.
C2	ROM SEARCH 2 - HD BIOS An extension ROM at C8000 to EFFFF (hex) is found with a bad checksum. Indicates ROM on HD controller failure. Action: Issue two short and one long beep. Print segment of ROM on screen followed by the word ROM.
1701	HARD DISK CONTROLLER The hard disk controller contains BIOS code for operating the hard disk. If the ROM checksum is OK it is called at powerup for checking the hard disk and controller. An error is indicated by printing 1701 on the screen.
D0	FLOPPY DISK CONTROLLER Bad status response after controller initialization. Action: Print the word FDC on the screen.
E1	PRINTER Printer port data lines do not read back same contents. Action: Print the word PRN on screen.
E2	SERIAL INTERFACE - ACIA Fault with serial interface. Action: Print the word ACIA on screen.
FF	SYSTEM OK, END OF DIAGNOSTICS. Actions: Attempts to bootstrap if DIP switch 1 is OFF. If this switch is ON the system performs a cold start and loops the diagnostics until an error is found. Even if an error is above 61 (hex) the system halts. Note: This message will not be printed on the screen.

PC10-1, 10-2 TROUBLESHOOTING NOTES

REPAIR TIP: PC PARITY ERRORS

THE PC USES A NINTH BIT TO DETERMINE PARITY. IF A BYTE CONTAINS AN EVEN NUMBER OF "1" BITS, THEN A "1" WILL BE GENERATED IN THE PARITY BIT. IF THE BYTE CONTAINS AN ODD NUMBER OF "1" BITS, THEN A "0" WILL BE GENERATED IN THE PARITY BIT. THE SYSTEM MAINTAINS THIS "ODD PARITY" TO INSURE THAT DATA HAS NOT BEEN CORRUPTED DURING DATA TRANSFERS.

REFER TO YOUR PC SERVICE MANUAL PN #319914. PAGES 10 AND 11 TO LOCATE THE IC'S LISTED.

A) CHECK U30 — THIS IS WHERE THE PARITY OR NINTH BIT IS STORED

B) CHECK U9 — RAM EXPANSION BOARD, UP TO 512K. CHECK U10 & U11 FOR 512 TO 640K.

C) CHECK U1 — PINS 5 & 6 FOR PCK AND $\overline{\text{PCK}}$ ALSO CHECK PIN 1, $\overline{\text{CLR}}$.

D) CHECK SIGNAL FROM U8 PIN 12 TO U2 PIN 11, OUT PIN 10, ENRAMPCK

E) CHECK U9 — PINS 5 AND 15 (BUFFER) MAY GIVE FALSE VALUE BACK ON DB3. IF THIS CHIP IS BAD A MESSAGE OF "UNEXPECTED SWITCH INTERRUPT" WILL OCCUR AND MAY ALTER SIGNALS SENT FROM U20 (SWITCH SETTINGS).

COMPUTE EFFECTIVE ADDRESS

UNDER CERTAIN ERROR CONDITIONS AN ADDRESS WILL BE DISPLAYED ON THE SCREEN INDICATING WHERE IN MEMORY A PROBLEM HAS OCCURRED.

THE ADDRESS IS EXPRESSED IN THE FORM OF REGISTER CONTENTS.

EXAMPLE: CS:IP = 83AB:1010

CS, THE SEGMENT REGISTER CONTAINS HEX 83AB
IP, THE INSTRUCTION POINTER CONTAINS HEX 1010

TO COMPUTE THE EFFECTIVE ADDRESS, SHIFT THE CONTENTS OF THE SEGMENT REGISTER 4 BITS LEFT. THEN ADD.

EXAMPLE: SHIFT LEFT 4 BITS CS = 83AB0
ADD IP = 1010

RESULT EFFECTIVE 20 BIT ADDRESS 84AC0

NOTE: BYTE HOLDS TWO HEX DIGITS.

TECHNICAL SPECIFICATIONS

PC10-III	
SPECIFICATION	
PC10/PC20	XT COMPATIBLE
MEMORY	
ROM	AUTOCONFIG BIOS
RAM	640KB
RAM EXPANDABLE	
ON BOARD	N/A
ON SLOTS	YES
CPU	
TYPE	8088-1
CLOCK SPEED	4.77, 7.16, 9.54 MHz
8087 MATH CO-PROCESSOR	SOCKET ON BOARD
NUMBER OF SLOTS	THREE FULL SIZE (XT)
OPERATING SYSTEM	MS-DOS 3.2 INCLUDED
KEYBOARD	
NUMBER OF KEYS	ASCII 101 INTERNATIONAL 102
TYPE	ENHANCED AT
NUMERIC KEYPAD	YES
CURSOR KEYS	4 - INVERTED T LAYOUT
POWER SUPPLY	
TYPE	HIGH-EFFICIENCY SWITCHING POWER SUPPLY WITH INTEGRATED COOLING FAN
MAXIMUM CONFIGURATION SUPPORTED	2 FLOPPY DISK DRIVES, ONE HARD DISK DRIVE, 3 EXPANSION CARDS
INPUT/OUTPUT PORTS	
RS-232C SERIAL	BUILT IN
CENTRONICS PARALLEL	BUILT IN
MOUSE PORT	BUILT IN FOR 1352 MOUSE
STORAGE	
FLOPPY DRIVE	BUILT-IN CONTROLLER SUPPORTS TWO DRIVES
HARD DRIVE	BIOS BUILT IN FOR "XT" HARD DISK INTERFACE
MAXIMUM INTERNAL CONFIGURATION	TWO HALF-HEIGHT 5.25 INCH FLOPPY DISK DRIVES AND ONE HALF-HEIGHT 3.5 INCH HARD DISK DRIVE
VIDEO	
CGA	BUILT IN
80 COLUMN COLOR ALPHA/NUMERIC	
40 COLUMN COLOR ALPHA/NUMERIC	
640 x 200 BLACK AND WHITE GRAPHICS	
320 X 200 4 COLOR GRAPHICS	
MDA	BUILT IN
80 COLUMN MONOCHROME ALPHA/NUMERIC	
HERCULES	BUILT IN
720 x 348 MONOCHROME GRAPHICS	
PLANTRONICS COLOR PLUS	BUILT IN
640 x 200 4 COLOR	
320 x 200 16 COLOR GRAPHICS	
COMPATIBLE MONITORS	
TTL MONOCHROME	
RGBI	
COMPOSITE NTSC COLOR	
COMPOSITE NTSC/PAL MONOCHROME	

DIP SWITCH SETTINGS AND THE RESET SWITCH

DIP SWITCH SETTINGS

These switch settings refer to the CONFIG switch area on the back of the system unit.

SWITCH #1

UP(OFF) USA/Europe Character Set
DOWN(ON) Scandinavian Character Set

SWITCH #2

UP(OFF) Onboard Video Adapter is MONO
DOWN(ON) Onboard Video Adapter is COLOR

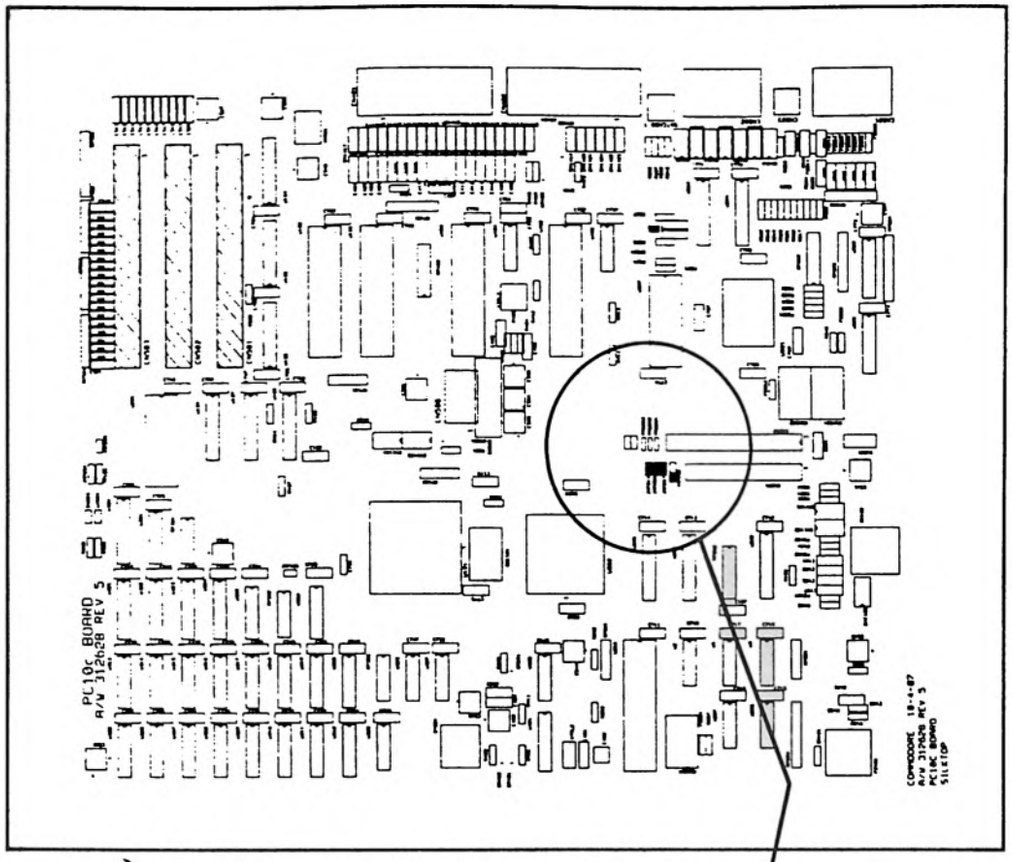
SWITCH #3	SWITCH #4	DEFAULT VIDEO MODE	SAMPLE SETTING
UP(OFF)	UP(OFF)	Monochrome	
UP(OFF)	DOWN(ON)	80 Column Color	
DOWN(ON)	UP(OFF)	40 Column Color	
DOWN(ON)	DOWN(ON)	NO MONITOR	

THE RESET SWITCH

The Reset switch protrudes slightly on the right side of the machine just behind the keyboard connector. Pressing this switch will effectively re-boot the computer as if the power had been cycled OFF and then ON. All information in the computer's RAM memory, as well as information being written to mass storage devices such as hard disks or floppy disks while the switch was depressed may also be lost.

The intent of the switch is to provide an alternative to cycling power when an application program may have "crashed" the computer.

JUMPER SETTINGS ON MOTHERBOARD

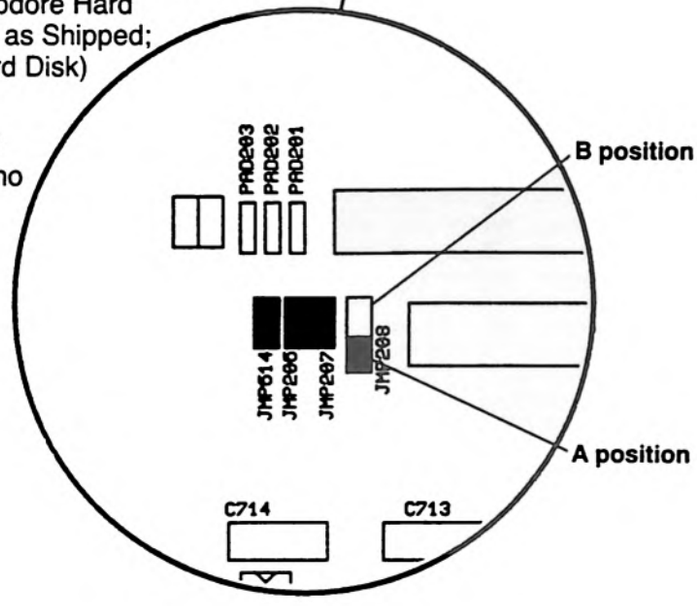


JMP 208 — A position = No Commodore Hard Disk installed (PC10 as Shipped)—Use this position if a hard disk is installed in an expansion slot.
B position = Commodore Hard Disk installed (PC20 as Shipped; PC10 w/optional Hard Disk)

JMP 614 In—Composite Color
Out—Composite Mono

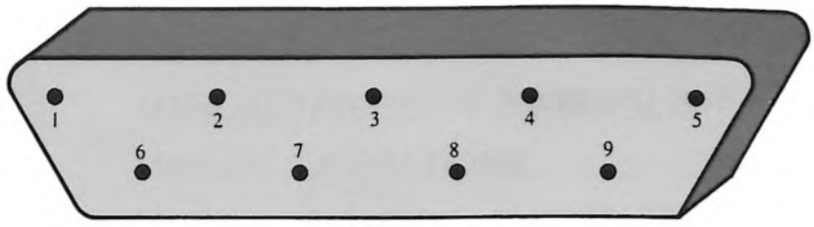
All other jumpers are for factory use only

JMP 206 In
207 In



CONNECTOR - PIN OUTS

MOUSE PORT

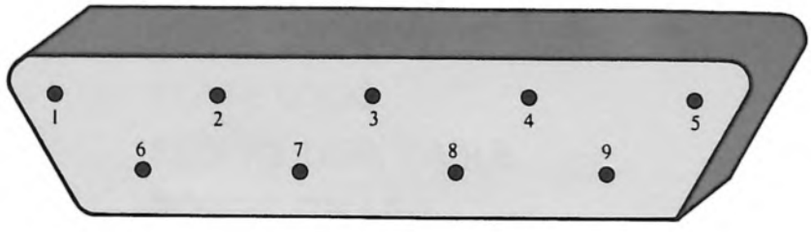


Pin No.	Signal
1	Vertical
2	Horizontal
3	Vertical Q
4	Horizontal Q
5	Button (3)
6	Button (1)
7	+ 5 volts
8	Ground
9	Button (2)

SERIAL PORT

Computer Side		Peripheral Side
1	CHASSIS GND	
2	T×D	→
3	R×D	←
4	RTS	→
5	CTS	←
6	DSR	←
7	SIG GND	
8	DCD	←
9	+ 12 V	
10	− 12 V	
20	DTR	→
22	RI	←

VIDEO PORT



Video Connector

DB9 Female Connector

Color/Graphic Modes		Monochrome Mode	
Pin No.	Signal	Pin No.	Signal
1	GND	1	GND
2	GND	2	GND
3	RED	3	not used
4	GREEN	4	not used
5	BLUE	5	not used
6	INTENSITY	6	INTENSITY
7	MONO	7	VIDEO
8	H SYNC	8	H SYNC
9	V SYNC	9	V SYNC

PARALLEL PORT

Computer Side		Printer Side
1	STROBE	→
2	DO	→
3	D1	→
4	D2	→
5	D3	→
6	D4	→
7	D5	→
8	D6	→
9	D7	→
10	ACK	←
11	BUSY	←
12	PE	←
13	SLCT	←
14	AUTO FDXT	→
15	ERROR	←
16	INIT	→
17	SLCT IN	→
18-25	GND	

MAJOR PARTS LIST PC10-III

POWER CORD	903508-15
KEYBOARD ASSEMBLY	312702-02
MANUAL USER/DOS 3.2 (ENGLISH)	319953-01
MANUAL OPERATIONS	319964-02
MANUAL BASIC 3.2 (ENGLISH)	319906-01
DISK OPERATING SYSTEM DOS 3.2	380538-01
DISK UTILITIES DOS 3.2	380538-02
MOUNTING BRACKET	312233-01
BEZEL	313010-01
BEZEL F.D. HOLE COVER	312679-01
EXTENSION CARD PANEL	380120-01
PCB GUIDE	251118-01
FLOPPY DISK DRIVE	380111-01
POWER SUPPLY (UL/CSA)	312637-02
FOOT	380128-01
NAMEPLATE	380132-10
STANDOFF	312689-02
PLATE LOGO	380133-05
FLOPPY DISK CABLE	380012-04
POWER ON LED	380016-01
HARD DISK LED	380020-02
PCB MAIN ASSEMBLY	312625-01
TOP COVER	312226-01
BASE CHASSIS	312225-01

COMPONENT PARTS LIST

Commodore part numbers are provided for reference only and do not indicate the availability of parts from Commodore. Industry standard parts (Resistors, Capacitors, Connectors) should be secured locally. Approved cross-references for TTL chips, Transistors, etc. are available in manual form through the Service Department, order #314000-01.

INTEGRATED CIRCUITS		
U101	FE2010A	318048-01
U102	8088 10MHZ	380200-02
U104,204, 205,304, 604	74LS245	901521-46
U108,109 202,603	74LS244	901521-03
U105,106 107	74LS373	901521-29
U1	74LS04	901521-02
U2	74LS08	901521-03
U3	74LS14	901521-30
U325	74S04	901525-01
U328	74LS00	901525-04
U326	74S08	901525-05
U301,302 303	74LS158	318089-01
U327	74S10	901525-06
U207	7406	901522-06
U203	SMC9268	312710-01
U401	OKI6242	318073-01
U402	8250	380205-01
U404	1488 Driver	901882-01
U405	1489 Receiver	901883-01
U601	PVC4 Video	318088-01
U403	PPC1	318091-01
U602	Custom 5720	318087-01
U605,321-324	64Kx4 Drams 100ns	390083-04
	Sub: 64Kx4 Drams 80ns	390083-05
U305-320	256Kx1 Drams 80ns	380223-05
	Sub: 256Kx1 Drams 100ns	380223-04
	Sub: 256Kx1 Drams 120ns	380223-03
U607	Video Character ROM	318086-01
	Sub: EPROM Char ROM 27256	317066-02
U201	Bios ROM	318085-01
	Sub: EPROM Bios ROM 27256	317066-01
U102,103	Socket, 40 Pin Dip	904150-06
U201,607	Socket, 28 Pin Dip	904150-05
U602	Socket, 68 Pin PLCC	390185-02
U101	Socket, 84 Pin PLCC	390185-01

DIODES		
CR401-405 501,601 201,602	1N4148	900850-01

RESISTORS — All values are in ohms-1/4 W 5% unless noted otherwise.		
R105	5.1K ohm	901550-03
R403,405	1M ohm	901550-84
R625,207	10 ohm	901550-64
R103,104, 201-204,408, 412,616,623, 644,639,101, 413,414	4.7K ohm	901550-19
R404,109, 421	33 ohm	901550-105
R401,402, 205,504	470 ohm	901550-58
R407,410	2.2K ohm	901550-18
R409,411 501,641	10K ohm	901550-20
R619,606	1K ohm	901550-01
R601	750 ohm	901550-88
R602,617	680 ohm	901550-31
R603,627	360 ohm	901550-108
R604	130 ohm	901550-134
R605	75 ohm	901550-45
R608,622 607,640	33K ohm	901550-06
R618	2K ohm	901550-53
R620	3K ohm	901550-33
R626	1.2K ohm	901550-17
R628,629 630	68 ohm	901550-94
R505,102	220 ohm	901550-52
R106	1 ohm, ½ Watt	901600-36
R107,108 502,503	47 ohm	901550-56
R206	8.2K ohm	901550-05
R645	2.2 ohm, ½ Watt	901600-28
RP602	68 ohm, 16Pin 8El Dip	252134-03
RP301,302 303	33 ohm, 14Pin 7El Dip	318867-01
RP202,402	33 ohm, 16Pin 8El Dip	252134-04
RP101,102 501	4.7Kx5 6Pin, SIP	902441-31

COMPONENT PARTS LIST *(continued)*

RESISTORS (Continued)		
RP201	220/330x4 6Pin, SIP	380388-01
RP401,603	4.7Kx7 8Pin, SIP	902442-55
RP502,503		
504	10Kx7 8Pin, SIP	902442-35
RP203	3.3Kx9 10Pin, SIP	902410-06
RP505	10Kx9 10Pin, Sip	902410-13
RP604	33Kx9 10Pin, SIP	902410-17
RP605	33Kx5 6Pin, SIP	902442-42
	Sub: 33Kx7 8Pin, SIP	902441-41

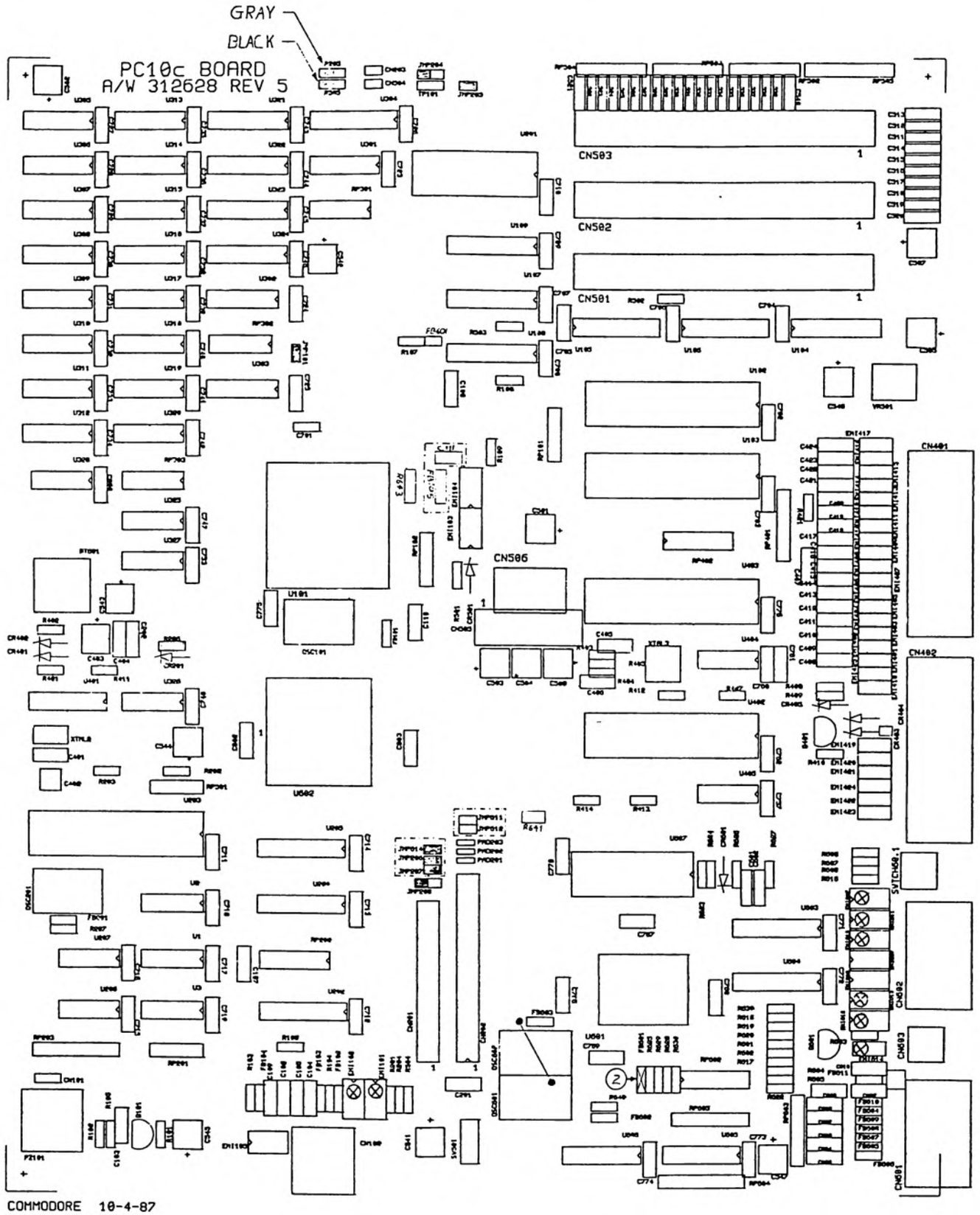
CAPACITORS		
C103,406,		
602	47pF, MLC, Radial, Cog	900019-17
C111	39pF, MLC, Radial, Cog	900019-14
	Sub: 33pF, MLC, Radial, Cog	900019-XX
C405,401	22pF, MLC, Radial, Cog	900019-13
C202	220pF, MLC, Radial, Cog	900019-19
C408-424		
601,110	100pF, MLC, Radial, Cog	900019-15
C511-540,		
104,105,		
106,109,		
603-610	1000pF, MLC, Radial, X7R	900014-06
C802,803		
760,761,		
762,766-		
776,800,		
748,753,		
757,404,		
701-719,		
723-726,		
747	.1μF, MLC, Radial, Z5U	900020-01
C701 only	Sub: .1μF, MLC, Axial, Z5U	390082-01
C727-746		
107,108,201	.33μF, MLC, Radial, Z5U	900020-09
C508	.22μF, MLC, Radial, Z5U	900020-08
C403	4.7μF, Alum, Elec, Rad	390101-05
C501,502		
504,505,		
507,542-		
547	47μF, Elect, Rad 16V	390101-01
C503,541	1μF, Elec, Rad, 50V	390101-08
C402	Varcap, 4-20pF	251029-01

MISCELLANEOUS		
XTAL2	Crystal 32.768 KHZ	900560-01
XTAL3	Crystal 1.832 MHZ, HC18U	900556-13
OSC201	OSC 16MHZ	325566-10
OSC601	OSC 16.257 MHZ	325566-13
OSC602	OSC 24000 MHZ	325566-15
OSC101	OSC 28.63636 MHZ	325566-12
VR501	Regulator 7905 –5V	901527-03
PZ101	Piezo Beeper	312680-01
EMI401-425,		
608,609	EMI Filter, 100pF	251842-02
BT601	Battery, Nicad 3.6V	380393-01
JMP204,208	Header 3 Pin Sil	903326-03
JMP101,205-		
207,614,		
CN504,203	Header 2 Pin Sil	903326-02
	Shorting Blocks 2 Pos	390043-01
CN201	Header 34 Pin Dil	903345-17
CN202	Header 40 Pin Dil	903345-20
FB104,101,		
201,601-611,		
105	Ferrite Bead	903025-01
FB601	Ferrite Bead (Loose)	390268-01
SW501	Switch No, PB	251260-01
SW601	Switch 4 Pos 8 Pin Dip Levr	252144-04
FB102,103	Ferrite Bead (Three Turn)	390253-02
EMI101,102,		
105,607,	EMI Filter,	
610-614	DSS310-5Y5S101M	390257-02
EMI101,102,		
607,610-614	PC10-III EMI ASSEMBLY (1)	312777-01
EMI105	PC10-III EMI ASSY (2)	312777-02

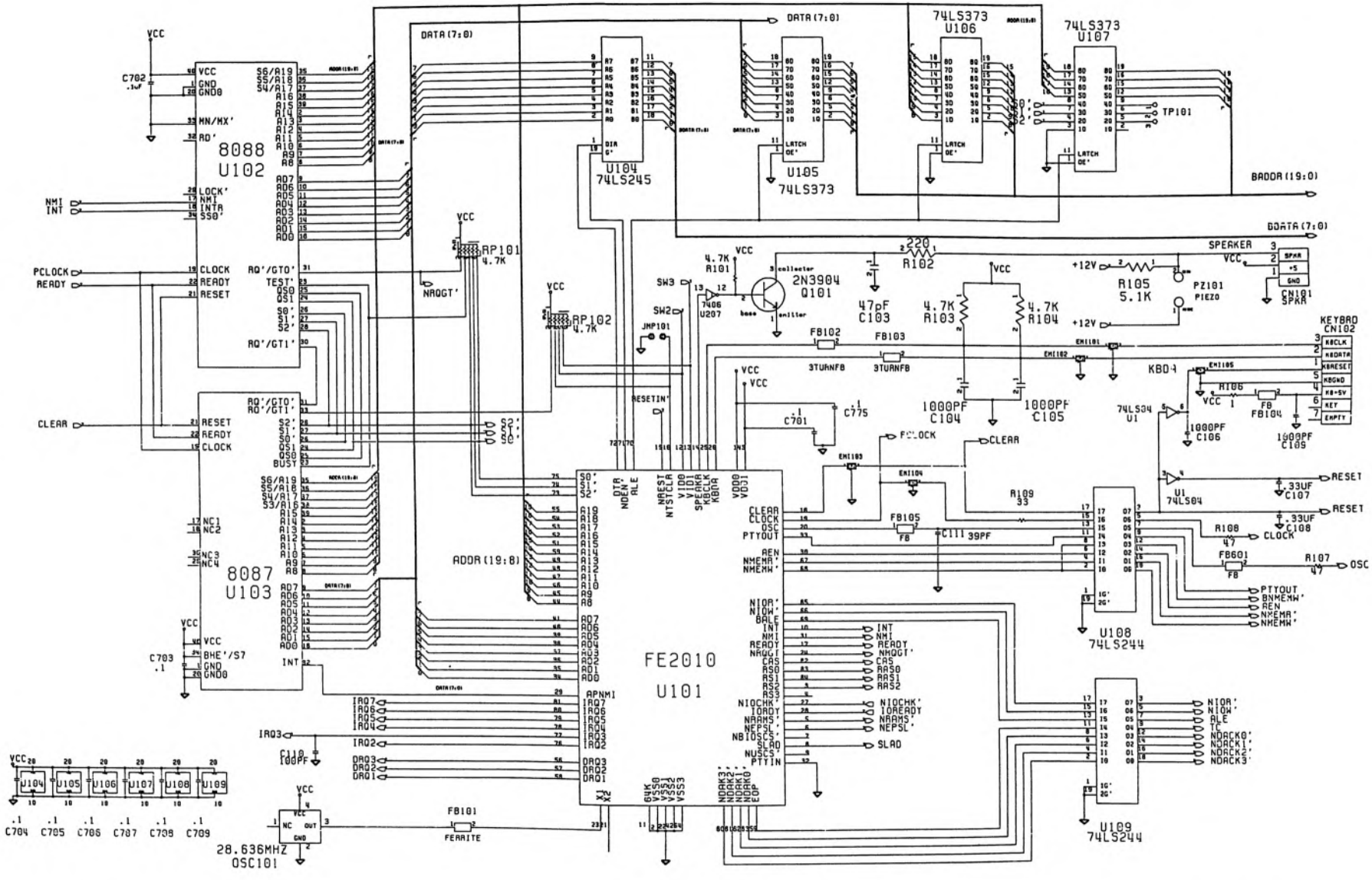
CONNECTORS		
CN102	Din 5 Pin Round Female	252166-01
CN401	D-Sub 25 Pin Female	390241-05
CN402	D-Sub 25 Pin Male	390242-05
CN601	D-Sub 9 Pin Male	390242-01
CN602	D-Sub 9 Pin Female	390241-01
CN603	Jack RCA Female RT4	252122-01
CN501-503	Conn 62 Pin	903446-02
CN12	Conn Power	903349-01

TRANSISTORS		
Q602	2N3906 PNP	902707-01
Q101,104,		
106	2N3904 NPN	902658-01

BOARD LAYOUT

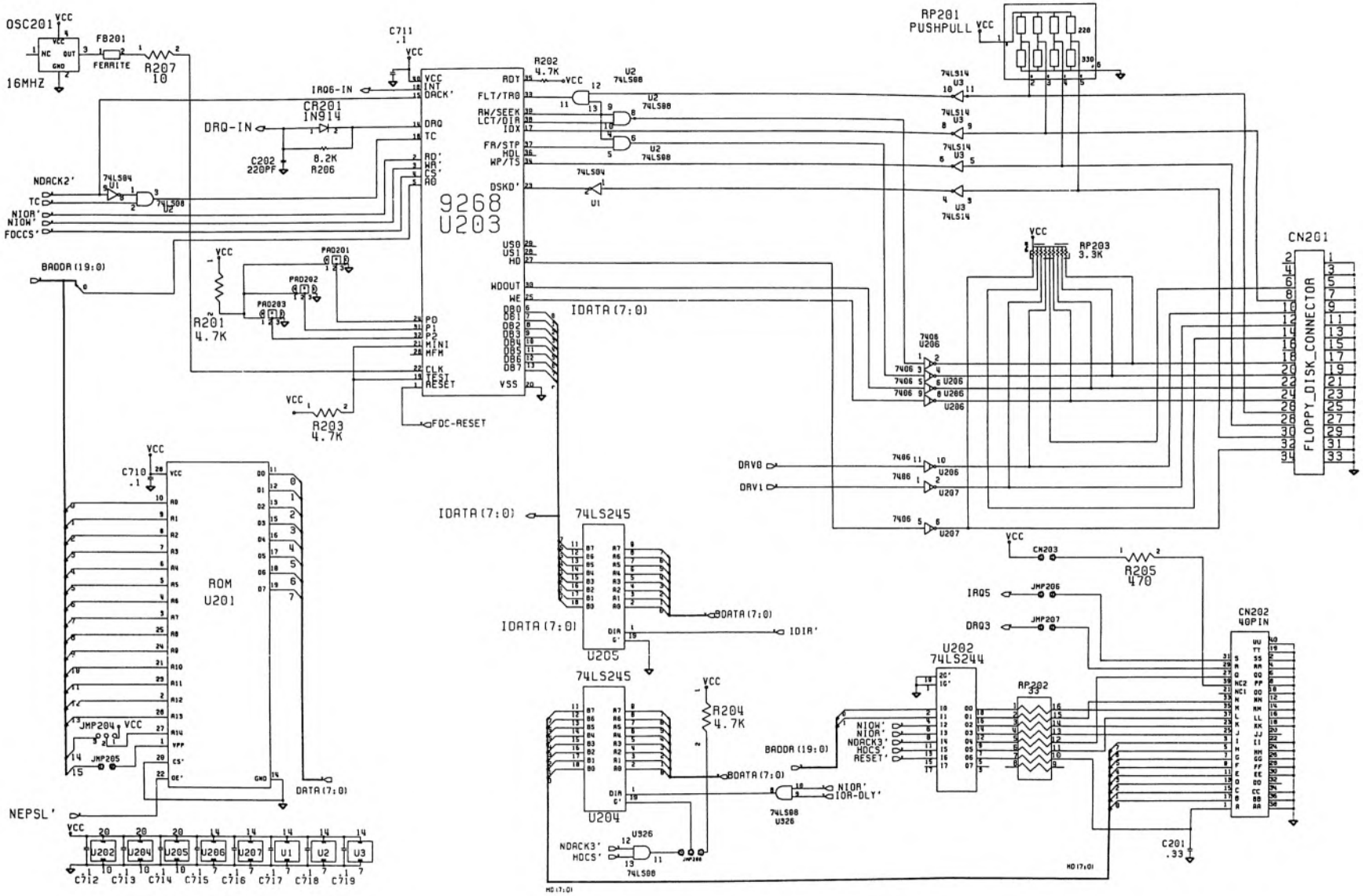


COMMODORE 10-4-87
A/W 312628 REV 5
PC10C BOARD
SILKTOP



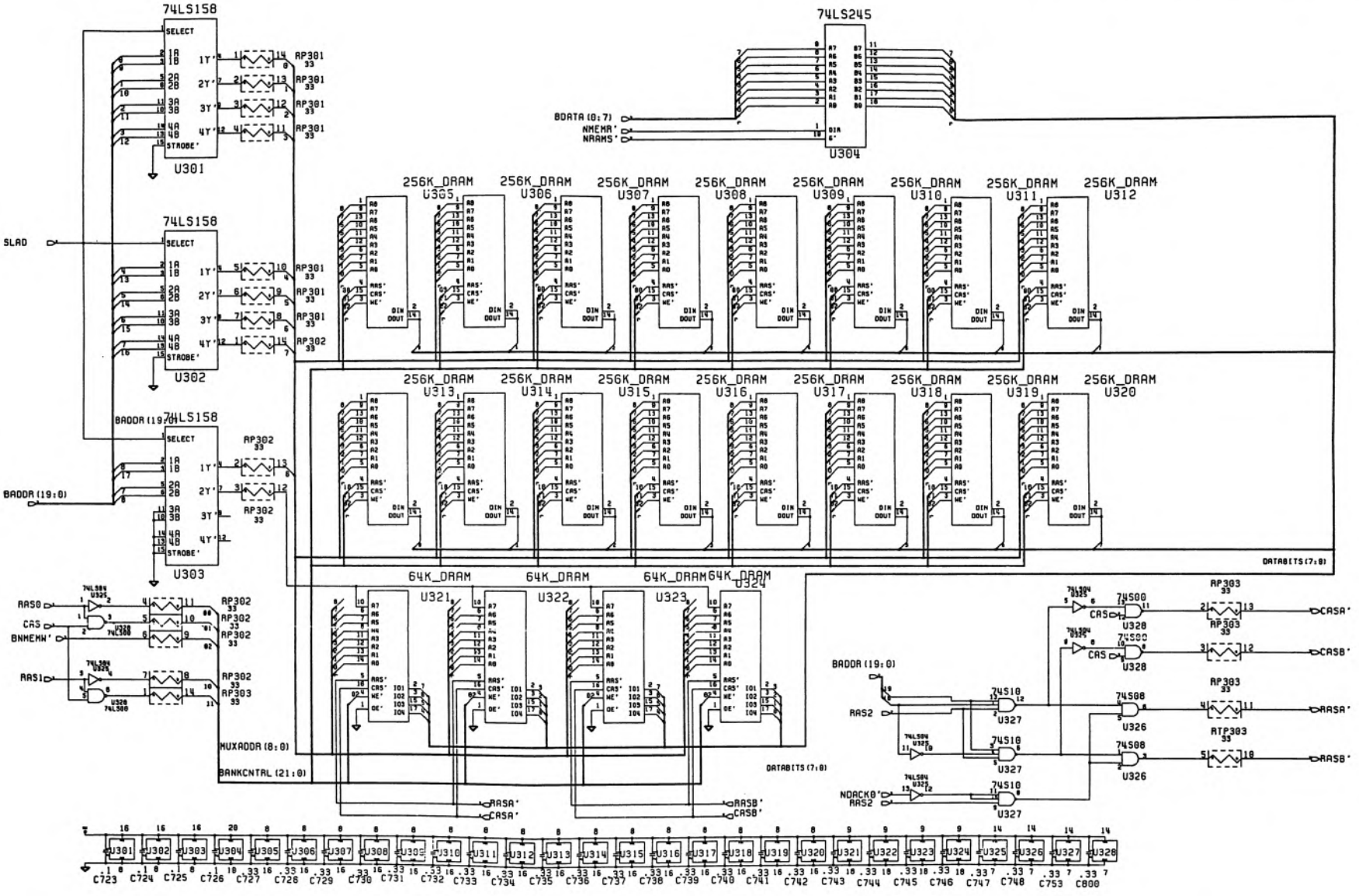
Schematic #312626

Sheet 1 of 6



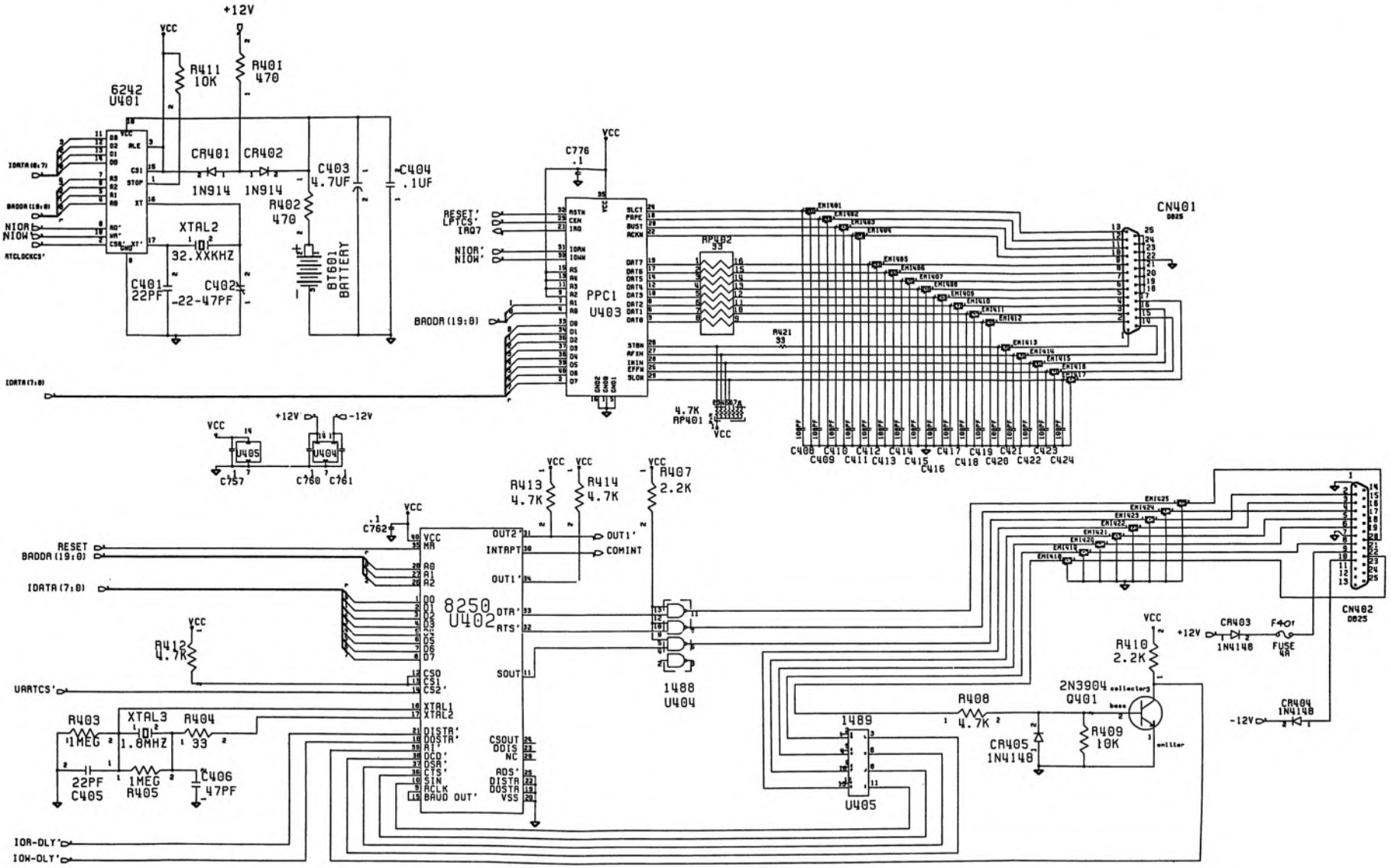
Schematic #312626

Sheet 2 of 6



Schematic #312626

Sheet 3 of 6



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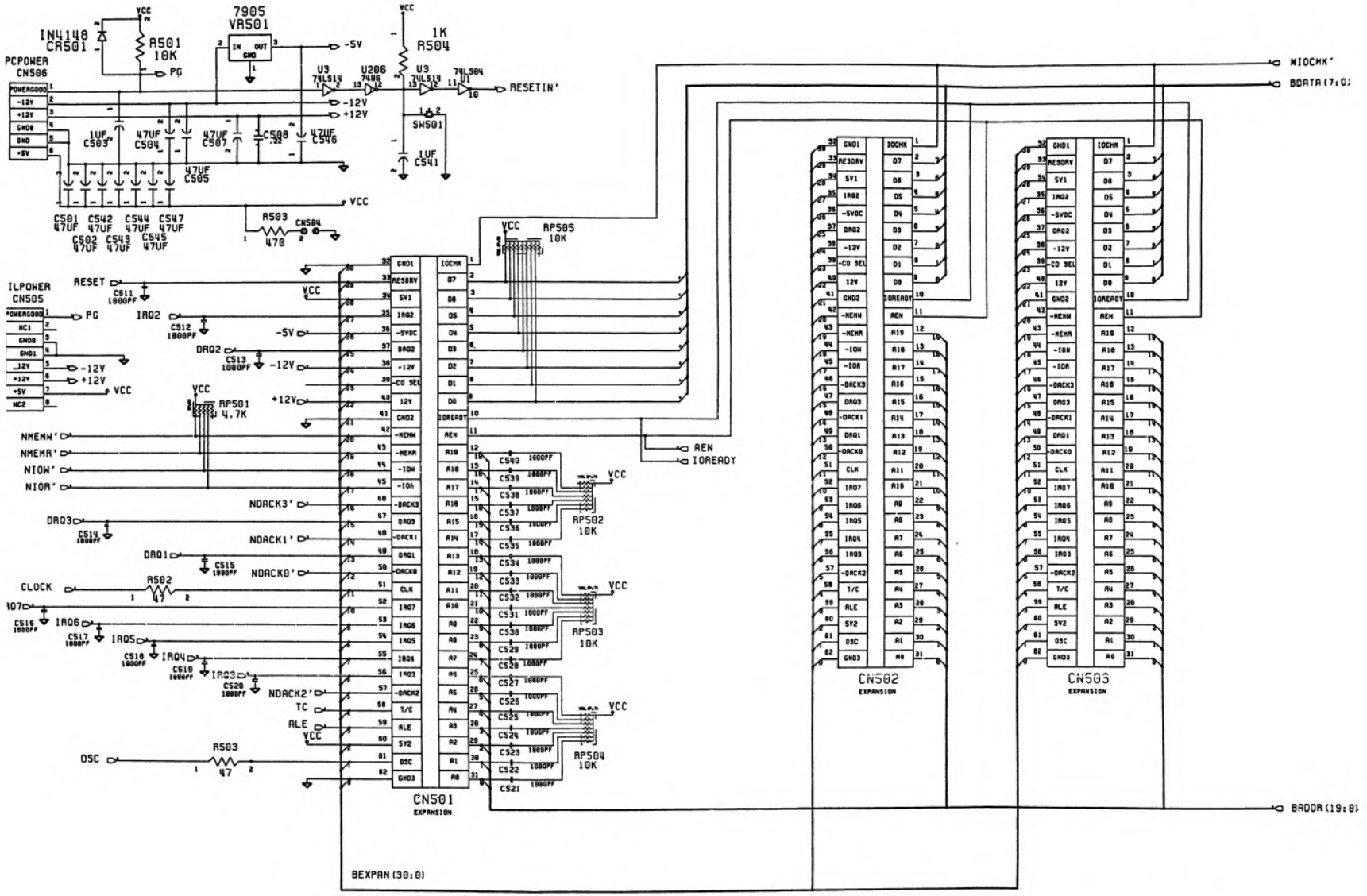
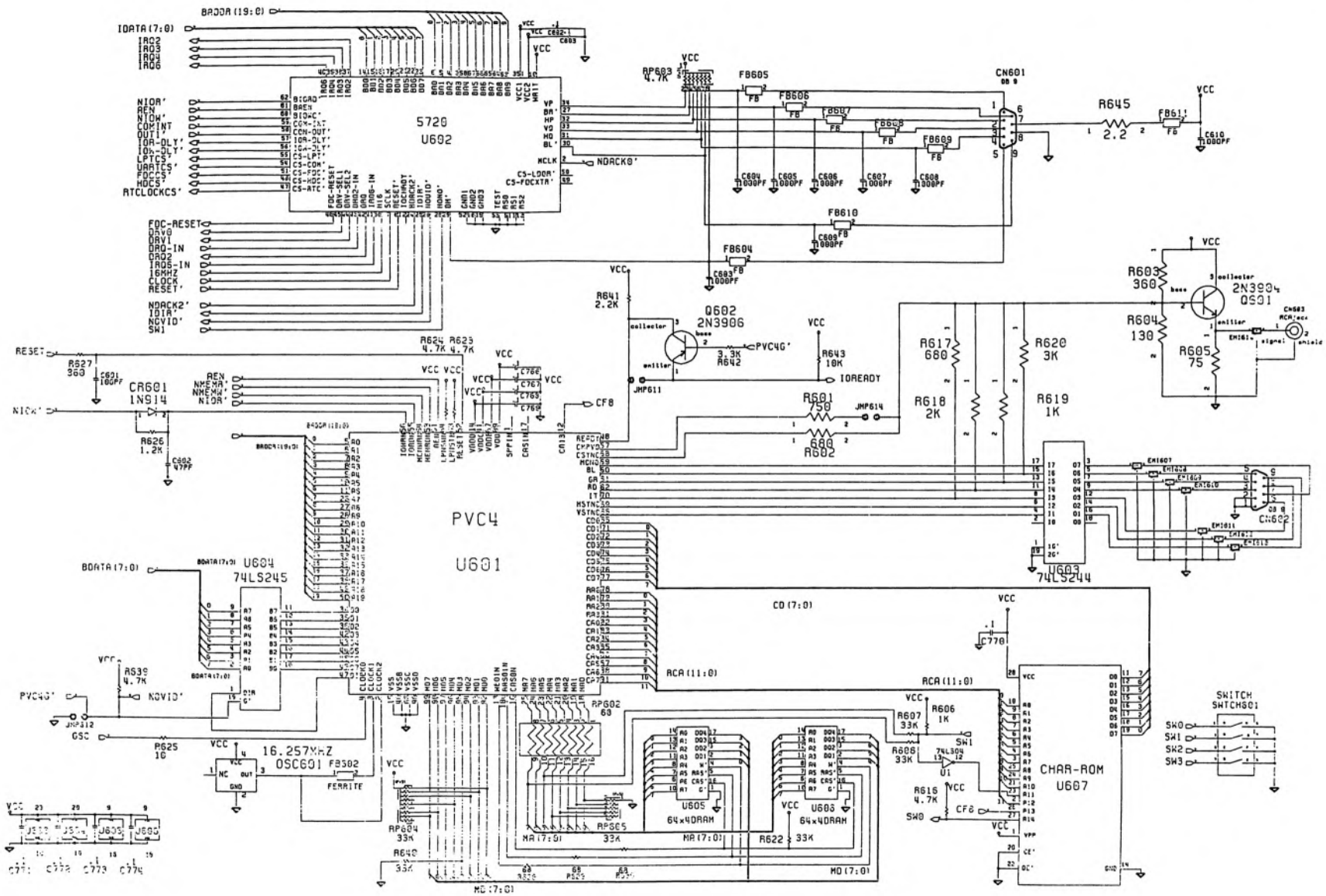
Sheet 4 of 6



Schematic #312626
Sheet 5 of 6



Schematic #312626

Sheet 6 of 6

PC10-III, PC20-III, MEMORY MAP

MEMORY ADDRESS (HEX)			CONTENTS
00	00	00	640K Base Ram
03	FF	FF	
04	00	00	
09	FF	FF	
0A	00	00	EGA/VGA Video Ram
0A	FF	FF	
0B	00	00	Monochrome Video
0B	3F	FF	
0B	40	00	Reserved
0B	7F	FF	
0B	80	00	Color Video
0B	FF	FF	
0C	00	00	Reserved for EGA Bios
0C	7F	FF	
0C	80	00	Available
0C	9F	FF	
0C	A0	00	Reserved
0F	7F	FF	
0F	80	00	CBM 8088 Monitor
0F	9F	FF	
0F	A0	00	Hard Drive Bios
0F	BF	FF	
0F	C0	00	16K Main Bios
0F	FF	FF	

PC10-III, PC20-III, COLT CBM 8088 MONITOR

The PC10-III, PC20-III and Colt have a built in monitor, in addition to the debug monitor in the operating system.

The Commodore 8088 monitor may be entered when an error condition is detected on power up tests by pressing the control key in combination with the 'M' key (cntrl M).

You may examine the monitor by leaving the boot disk out of system at power up, a system message will appear on console:

Boot disk failure. Type key to Retry.

Press control 'M' to enter CBM monitor.
System will respond with:

Commodore 8088 Monitor
Pre-release version 2.0
Copyright 1987 Commodore Technology Group

Use ? for help

Responding with a question mark, return, will generate the following monitor options:

Dump [starting addr]

Fill [starting addr] [count] [data]

Goto [addr] break point1] [break point2]

Input port [byte : word] [port addr]

Output port [byte : word] [port addr] [data]

iNterrupt [#hex]

Move [source addr] [dest addr] [count]

Substitute memory [addr]

Trace

eXamine [register]

Boot

Register addresses conform to PC industry standards for compatibility.

PC10-III, PC20-III BIOS 4.36 RELEASE NOTES

A new bios ROM for the PC10-III, PC20-III and Colt is being released. New part number is 318085-02. This is an in-line upgrade and must be purchased by the end user directly through an authorized service center. Installation of this IC must be done by a Commodore authorized technician.

The following summary details changes in bios 4.36.

1) 9600 Baud problem
   Terminal and communications software packages which used interrupt-driven COM:, dropped characters.
   FIX: Code intented to simulate the keyclick corrected

2) Equipment check
   Bios int 11h returns 40 column status when in 80 column mode and 80 column status when in 40 column mode when running in CGA mode.
   FIX: Bios modified to return correct color mode number.

3) F11 and F12 keys
   Bios int 16h returns incorrect scan codes for function keys F11 and F12.
   FIX: Keyboard table was corrected.

4) New microsoft bus mouse
   Bios autoconfig(TM) did not recognize newest microsoft bus mouse. Result incorrect operation of entire system.
   FIX: Bios now tests for either type of mouse before enabling on board mouse.

5) EGA board problems
   Several EGA cards exhibited memory conflicts with PVC4 controller.
   FIX: PVC4 video controller will be disabled if a special video adapter bios module (EGA, VGA, ETC.) is found.

6) IBM 3270 card
   IBM 3270 cards did not function
   FIX: Patch code in int 1A.

7) HD Boot speed
   Hard drive takes too long to boot.
   FIX: Latest bios improves load time.

8) IBM 5250 card
   Upload, download problems with 5250 emulator to IBM system 38.
   FIX: Patch code in int 1A.

9) OKI Real-time clock chip problems
   RTC register altered by unauthorized system code.
   FIX: RTC initialization code modified.

10) Cold boot from S/W
    Programs which issue a call to the bios cold boot location (F00:E05B) or the hardware reset vector (FFFF:0000) will hang (EXAMPLE — MSDOS FDISK).
    FIX: Cold and warm boot code modified.

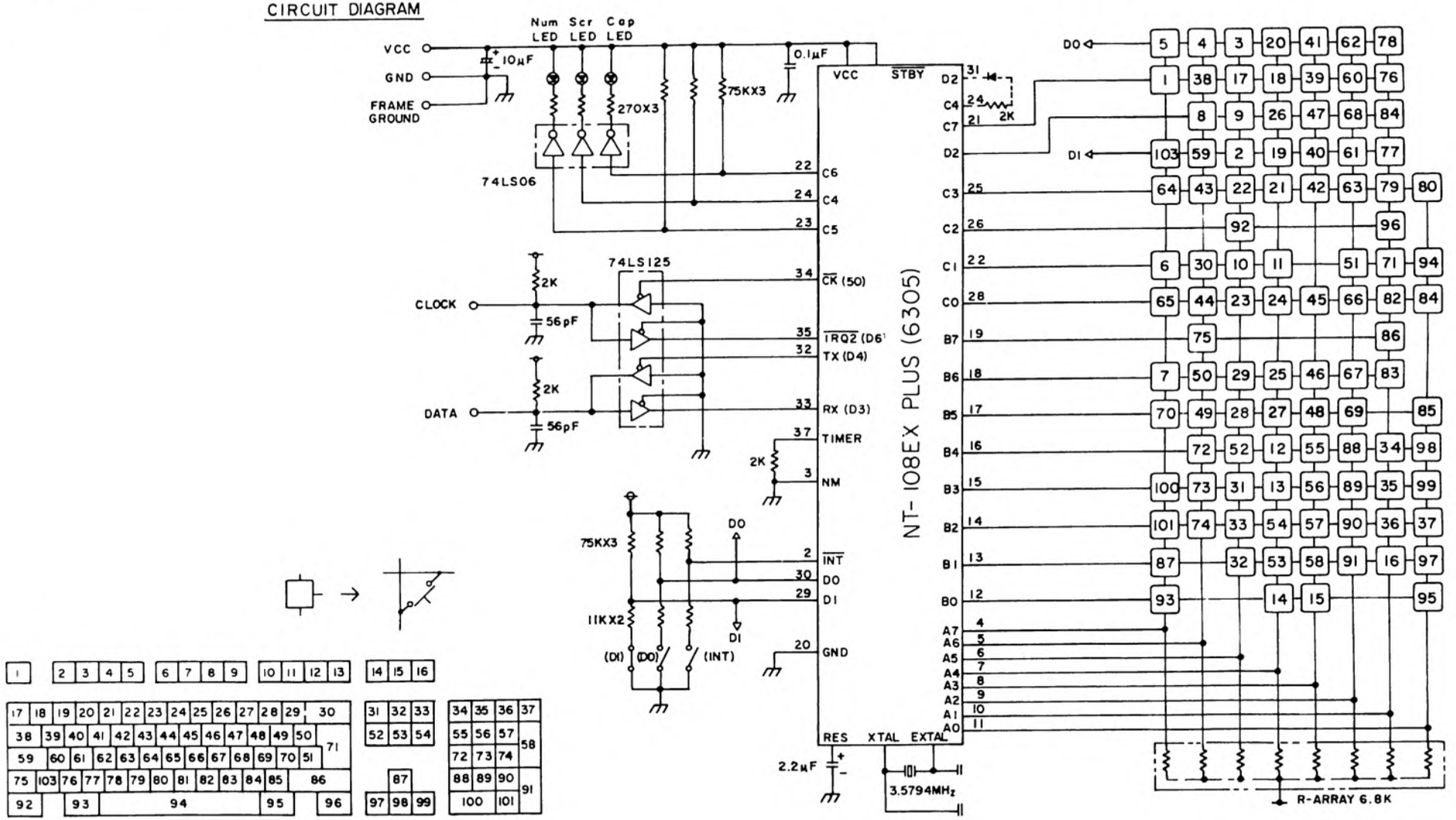
11) System crash
    Unexpected interrupt causes system to crash or hang up after prolonged use.
    FIX: Modified unexpected interrupt code.

12) Enhancement of onboard base memory configuration if offboard memory is found from 0K to 640K the corresponding onboard memory bank is disabled. If no offboard memory is found, then onboard memory is configured to 640K.

FOR REFERENCE ONLY

OEM SCHEMATIC

CIRCUIT DIAGRAM

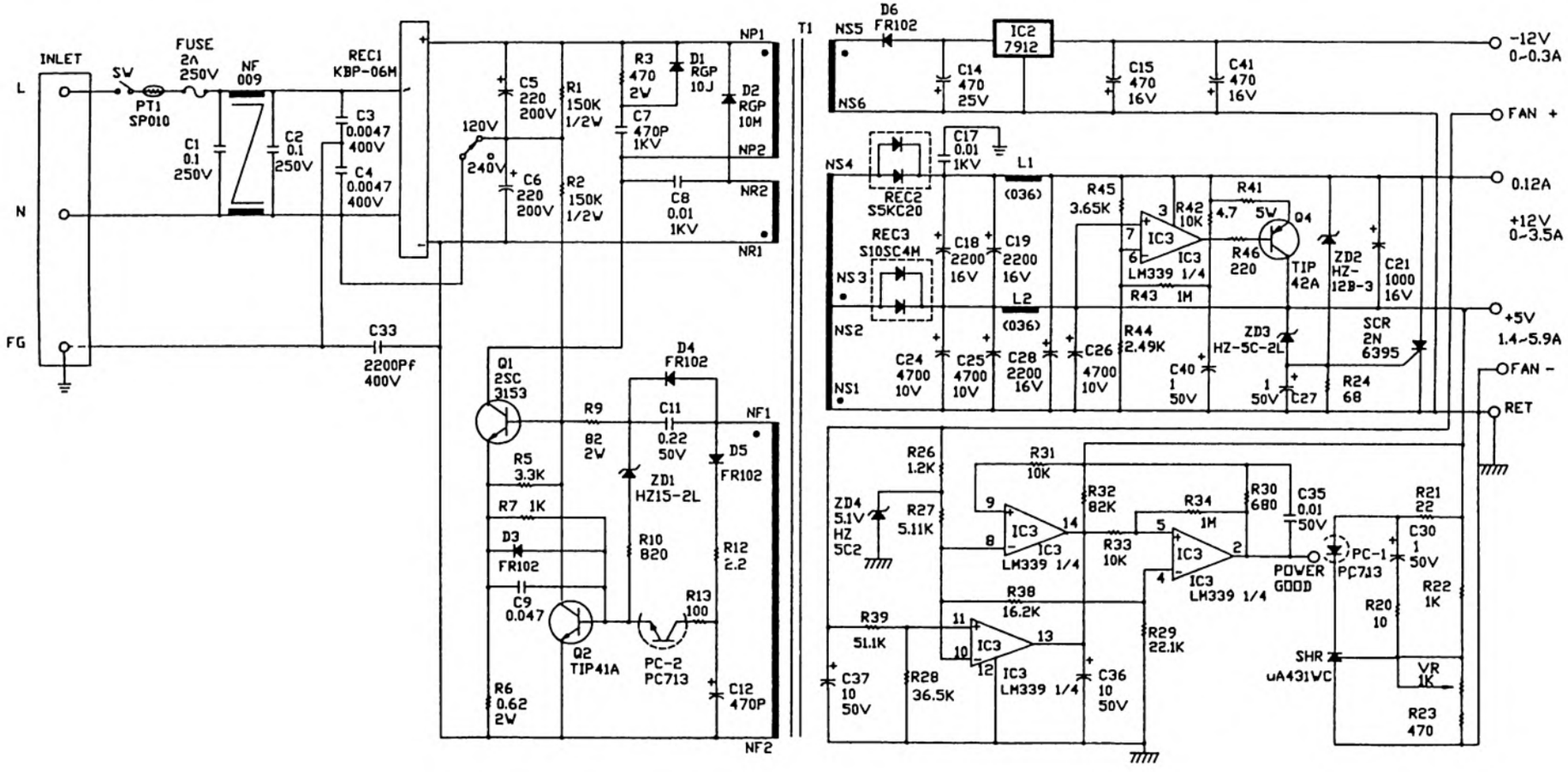


PC10-III KEYBOARD

Assembly #312702-02

FOR REFERENCE ONLY

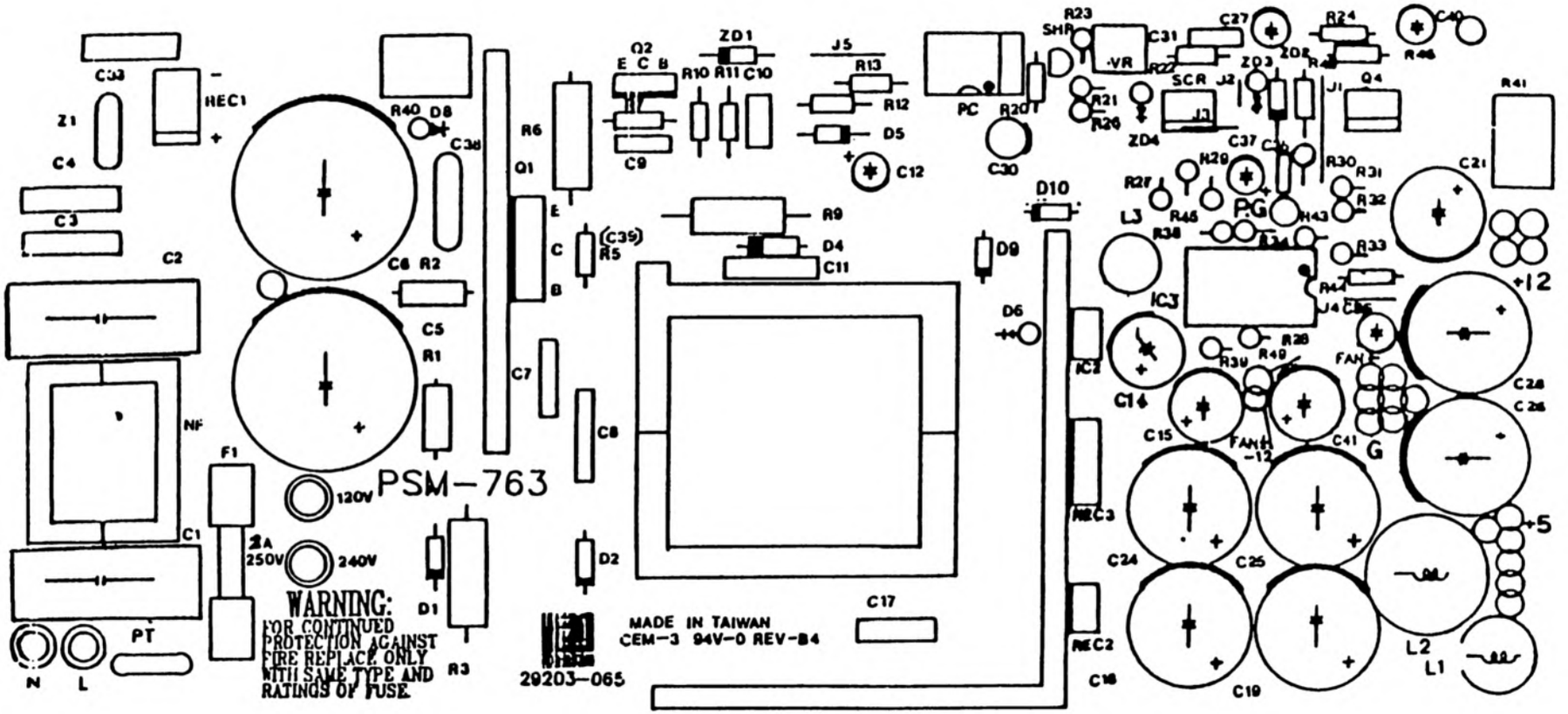
OEM SCHEMATIC



PC10-III POWER SUPPLY
Assembly #312637-02

FOR REFERENCE ONLY

PSM-763 P.C.B. LAYOUT COMPONENT SIDE



PC10-III POWER SUPPLY
Assembly #312637-02
(PHIHONG PSM-763)

PARTS LIST
POWER SUPPLY #312637-02 (PHIHONG PSM-763) PC10-III

OEM Part #	Description	Loc.
001052000	Rectifier FD S5KC20	REC2
001010500	Rectifier STKD S10SC4M	REC3
001004201	Transistor TIP 42A	Q4
900756-06	Rectifier BD-2KBP06M	REC1
001063951	SCR 2N6395	SCR
901523-12	IC LM339N	IC3
901527-05	IC UA7912UC	IC2
001004101	Transistor TIP 41A	Q2
001071301	Photo Coupler PC-713V2	PC
001043101	IC TL431CLP	SHR

NOTE: COMPONENT PARTS NOT AVAILABLE FROM COMMODORE PARTS DEPARTMENT.

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