

SERVICE MANUAL

COLT 286

OCTOBER, 1989

PN-314118-02

 **Commodore**

SERVICE MANUAL

COLT 286

OCTOBER, 1989

PN-314118-02

INTERNATIONAL EDITION

COMMODORE "INTERNATIONAL EDITION" SERVICE MANUALS CONTAIN PART NUMBER INFORMATION WHICH MAY VARY ACCORDING TO COUNTRY. SOME PARTS MAY NOT BE AVAILABLE IN ALL COUNTRIES.

Commodore Business Machines, Inc.

1200 Wilson Drive, West Chester, Pennsylvania 19380 U.S.A.

Commodore makes no expressed or implied warranties with regard to the information contained herein. The information is made available solely on an as is basis, and the entire risk as to quality and accuracy is with the user. Commodore shall not be liable for any consequential or incidental damages in connection with the use of the information contained herein. The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty as to quality or suitability of such replacement part. Reproduction or use without expressed permission, of editorial or pictorial content, in any matter is prohibited.

This manual contains copyrighted and proprietary information. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of Commodore Electronics Limited.

Copyright © 1989 by Commodore Electronics Limited.
All rights reserved.

TABLE OF CONTENTS

SECTION 1 — SPECIFICATIONS

SECTION 2 — OPERATION NOTES

SECTION 3 — TROUBLESHOOTING GUIDE

SECTION 4 — PARTS

SECTION 5 — SCHEMATICS

TECHNICAL SPECIFICATIONS

COLT 286	AT Compatible
MEMORY	
ROM	Autoconfig BIOS
RAM on board	640 kbytes Base RAM
RAM expandable	
on board	n/a
on slots	Yes; to 15 Mbytes
CPU	
Type	80286-12
Clock speed	6, 8, 12 MHz
80287 Math Co-processor	Socket on board
Number of Slots	Two AT, one XT slots
Operating System	MS-DOS 3.3 included
KEYBOARD	
Number of keys	ASCII 101 — International 102
Type	Enhanced AT
Numeric keypad	Yes
Cursor keys	4 - inverted T layout
Function keys	12
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; or 1 floppy disk drive, one hard disk drive, 1 tape unit, 3 expansion cards
INPUT/OUTPUT PORTS	
RS232C serial	Built in
Centronics parallel	Built in
Mouse port	Built in for 1352 Mouse — Microsoft bus mouse configuration
STORAGE	
Floppy drive	Build in controller supports one or two drives
Hard drive	One AT hard disk built in
Maximum internal configuration	Two half-height 3.5 or 5.25 inch floppy disk drives and one half-height 3.5 inch hard disk drive
VIDEO	
EGA	EGA Wonder800 + video card
CGA	EGA Wonder800 + video card
MDA	EGA Wonder800 + video card
Hercules	EGA Wonder800 + video card
(See <i>EGA Wonder800 + User's Guide</i> for video details.)	
COMPATIBLE MONITORS	
EGA, RGB Color, TTL Monochrome, Multisync Monitors	
OTHER FEATURES	
Built-in real-time clock/calendar with battery backup	
External Configuration switches	
Hardware Reset switch	
Audio connector — (1V peak-to-peak; 1 K ohm impedance) provides external audio for enhanced sound; to be connected to a monitor's pre-amp circuit.	
COMMODORE ADD-ON OPTIONS	
Second floppy disk drive	
1352 mouse	
MPS 1250 printer	
1402 TTL monitor (mono)	
xxxx monitor (mono) with sound	
1084 RGB monitor (color) with sound	

EGA WONDER800®

SPECIFICATIONS

VIDEO DISPLAY BUFFER

256K bytes

SYNC SIGNALS

Separate horizontal and vertical sync in TTL levels

Horizontal

- 35kHz - MultiSync monitors (800x600)
- 31.5kHz - MultiSync monitors (640x480)
- 21.8kHz - EGA monitors
- 15.75kHz - RGB monitors
- 18.432kHz - TTL Monochrome monitors

Vertical

- 56 Hz - MultiSync monitors (800x600)
- 60 Hz - MultiSync monitors (640x480)
- 60 Hz - EGA monitors
- 60 Hz - RGB monitors
- 50 Hz - TTL Monochrome monitors

CONNECTOR

9-pin D shell (Female) IBM standard

MONITOR COMPATIBILITY

- TTL Monochrome Display
- RGB Color Display
- EGA Enhanced Color Display
- MultiSync monitor

SIZE

5.25" x 4.2"

POWER

+5V ± 5%, @ 0.6 AMP typical

ENVIRONMENT

Ambient Temperature 50° to 122° F (10° to 50° C) operation. 32° to 162° F (0° to 70° C) storage
 Relative Humidity 5% to 90% non-condensing operation. 0% to 95% storage

BUS

AT standard

BUS LOADING

No more than 2 LS TTL load

CONNECTOR SPECIFICATIONS

DB9 Connector

Pin No.	Signal
1	Ground
2	Secondary Red/Ground
3	Primary Red
4	Primary Green
5	Primary Blue
6	Secondary Green/Intensity
7	Secondary Blue/Mono Video
8	Horizontal Retrace
9	Vertical Retrace

SECTION 2

NOTES — OPERATIONS GUIDE

OPERATION NOTES

THE COLT 286 HARDWARE CONFIGURATION

USING THE COLT 286 SETUP UTILITY

Once MS-DOS has finished booting and the C> prompt has appeared, you can use the built-in Setup utility to give the system detailed information on your COLT 286 configuration. To run the Setup utility, hold down the Control and Alt keys and simultaneously press the Esc key. The main menu of the Setup utility will appear and will look like this:

Commodore Setup Utility		Hard Disk Type Information						
Date	23.08.88	Type	Cyln	Head	Sect	W-pc	L-zone	Size
Time	14:26:26	1	306	4	17	128	305	10 MB
Diskette 1	1.44M	2	615	4	17	300	615	20 MB
Diskette 2	NONE	3	615	6	17	300	615	30 MB
Hard Disk 1	31	4	940	8	17	512	940	62 MB
Hard Disk 2	NONE	5	940	6	17	512	940	46 MB
Video	SPECIAL	6	615	4	17	NONE	615	20 MB
Coprocessor	NONE	7	462	8	17	256	511	30 MB
Base Memory	640 KB	8	733	5	17	NONE	733	30 MB
Extended Memory	000 KB	9	900	15	17	NONE	901	112 MB
Base memory found:	640 KB	10	820	3	17	NONE	820	20 MB
Extended memory found:	000 KB	11	855	5	17	NONE	855	35 MB
Use ↑, ↓ to select items		12	855	7	17	NONE	855	49 MB
Use →, ← to select predefined values		13	306	8	17	128	319	20 MB
Use <PgDn> to view more hard disk types		14	733	7	17	NONE	733	42 MB
Press <Esc> to abort SETUP		15	0	0	0	0	0	0 MB
Press <End> to exit and update		16	612	4	17	0	633	20 MB
Press F1 for secondary SETUP window								

FIGURE 1. COMMODORE SETUP UTILITY MAIN MENU

As noted on the Setup screen, you can use the cursor keys and the keyboard to define or change the system configuration, as follows:

- Use the up and down cursor keys to move from option to option in the main menu.
- Use the left and right cursor keys to select the predefined entries for each option.
- Use the keyboard to type in any information that is not predefined.
- Use PgDn to display additional hard disk types (see Figure 2).
- Use the F1 key to display the secondary setup window.
- Use the Esc (Escape) key to abort Setup.
- Use the End key to exit Setup and update the settings.

Following is specific information about the various Setup menu options.

Setting the Date and Time for the Real Time Clock/Calendar

The COLT 286 has a Real Time Clock/Calendar with a battery backup. This means that once set, the clock/calendar will keep the correct date and time even when the computer is turned off. You use the first two lines of the Setup Utility to set the Real Time Clock/Calendar, as follows:

Date: Allows you to set the correct date into the Real Time Clock. This option does not have any predefined entries; simply enter the date from the keyboard, in the format *dd/mm/yy*.

Time: Allows you to set the correct time into the Real Time Clock, without invoking MS-DOS. This option also does not have any predefined entries; simply enter the time from the keyboard, in the format *hh:mm:ss.*, where hh = 00-23, mm = 00-59 and ss = 00-59.

Setting the Floppy Disk Drive Options

You can have a maximum of two floppy diskettes configured into your COLT 286. The next two Setup menu options, Diskette 1 and Diskette 2, allow you to tell the system how many floppy drives are available and what type they are.

Here's how to set these options:

Diskette 1: Predefined entries: None, 360 Kb 5.25, 1.2 Mb 5.25, 720 Kb 3.5, 1.44 Mb 3.5.

The floppy drive in your COLT 286 is always considered Diskette 1. Since COLT 286 is equipped with a high density (1.44 Mb) drive, select 1.44 Mb 3.5 for Diskette 1.

Diskette 2: Predefined entries: None, 360 Kb 5.25, 1.2 Mb 5.25, 720 Kb 3.5, 1.44 Mb 3.5.

If you have not installed a second floppy drive in your COLT 286, select *None* for Diskette 2. If you *have* installed a second floppy drive, select whichever drive type (360 Kb 5.25, 1.2 Mb 5.25, 720 Kb 3.5, 1.44 Mb 3.5) applies to the installed drive.

Setting the Hard Disk Drive Options

Hard Disk 1 and Hard Disk 2, the next two options in the Setup utility, define how many hard disk drives are available and what kind of hard disk drives they are. Hard disk drives are identified by a pre-assigned *Drive Type* (1, 2, etc.). This number tells the COLT 286 the *drive manufacturer* and *capacity*.

Commodore Setup Utility										
Date	Default System Speed								12 MHz	Information
Time	6 MHz Hard Disk I/O								DISABLED	L-zone Size
Diskette 1	On Board Mouse								ENABLED	977 40 MB
Diskette 2	On Board COM								3F8H	977 56 MB
Hard Disk 1	On Board LPT								3BCH	1023 59 MB
Hard Disk 2	Press F2 to return to main screen									732 30 MB
Video										732 42 MB
Coprocessor										733 30 MB
Base Memory	640 KB	22	733	5	17	300	733	30 MB		
Extended Memory	000 KB	23	306	4	17	0	336	10 MB		
Base memory found:	640 KB	24	805	4	26	0	820	40 MB		
Extended memory found:	000 KB	25	776	8	33	0	800	100 MB		
Use ↑, ↓ to select items		26	745	4	28	0	800	40 MB		
Use →, ← to select predefined values		27	625	5	27	0	871	41 MB		
Use <PgDn> to view more hard disk types		28	965	5	17	0	1000	40 MB		
Press <Esc> to abort SETUP		29	965	10	17	0	1000	80 MB		
Press <End> to exit and update		30	782	4	28	0	800	42 MB		
Press F1 for secondary SETUP window		31	0	0	0	0	0	20 MB		
		32	0	0	0	0	0	0 MB		

FIGURE 2. SETUP UTILITY PULLDOWN MENU FOR HARD DISK DRIVE TYPE

Here's how to define your hard disk configuration:

Hard Disk 1:

Your COLT 286 comes equipped with a 20 MB hard disk drive. This drive is always considered *Hard Disk 1*. The *Drive Type* for this drive is shown on a sticker located on the back of your System Unit. Find this number and type it in after *Hard Disk 1*.

The COLT 286 Setup utility includes a menu of hard disk drive types with their individual ID numbers. You can page through the menu by pressing the PgDn key. For example, the opening Setup screen in Figure 1 lists drive types 1 through 16. If you press PgDn, the Setup screen will be as shown in Figure 2 with drive types 17 through 32 listed.

Hard Disk 2: This option is not supported by the onboard controller.

Other Setup Options on the Main Setup Screen

Video: Tells system what the default video is. Factory-set default is *special*. This will not change even if the *EGA Wonder800 + Card* setting changes. To change the card setting, see the *EGA Wonder800 + User's Guide*.

Coprocessor: Tells system if an 80287 Numeric Coprocessor (NCP) is installed. Factory-set default is *none*. Select Yes if you have installed an 80287 Numeric Coprocessor.

Base memory: Lets you customize base memory for specific applications.

Extended Memory: Disabled.

Using the Secondary Setup Window

Notice the popup window shown at the top of Figure 2. This menu is known as the secondary Setup window. You can access this window by pressing the F1 key. You can return to the main Setup window by pressing the F2 key. The secondary window provides an easy way to change a number of system parameters that are set at startup by the COLT 286's AUTOCONFIG feature. The secondary Setup window values shown in Figure 2 are the default values normally present at system startup. The following list shows all the possible values for the menu items; the default values are underlined:

Default System Speed	(<u>6</u> / <u>8</u> / <u>12</u> MHz)
6 MHz Hard Disk I/O	(<u>Disabled</u> /Enabled)
On Board Mouse	(<u>Enabled</u> /Disabled)
On Board COM	(<u>3F8H</u> /2F8H/OFF)
On Board LPT	(<u>3BCH</u> /378H/278H/OFF)

Just as with the main Setup screen menu, when you are in the secondary Setup window you can move to an item by using the up and down cursor keys, and you can set the value of the item by using the left and right cursor keys. However, you cannot use the Esc or End keys while you are in the secondary window; before you can use these keys you must first return to the main Setup screen by pressing the F2 key.

The *Default System Speed* item allows you to select whatever system speed best suits the particular hardware/software configuration of your COLT 286. For instance, if you are using some older software programs or if you have installed a slow speed (6 MHz) Numeric Coprocessor, these may not run at all or may be unreliable at a system speed of 12 MHz. In such cases you can simply select the 6 or 8 MHz clock speed as the Default System Speed.

Note that the *6 MHz Hard Disk I/O* value is normally disabled to allow for the fastest possible data transfer to and from the hard disk. You should not have to change this setting unless you are using a hard disk that cannot support high speed data transfer.

You can use the secondary Setup window to enable or disable the on board mouse and to select the serial port (*COM*) and the parallel port (*LPT*).

SETTING THE MICROPROCESSOR CLOCK SPEED

The 80286 microprocessor in the COLT 286 is capable of running at three different clock (i.e., processor or CPU) speeds:

- Standard speed = 6 Mhz
- Turbo speed = 8 Mhz
- Double speed = 12 Mhz

Unless you have changed the Default System Speed item in the secondary Setup window, the COLT 286 is pre-set to run to double speed (12 MHz) whenever it is booted. You can switch between the clock speeds during a session by using special key combinations or by using the ATSPPEED command. (NOTE: If you reboot the COLT 286, the system speed will revert to the default speed specified in the Setup utility. You can reset the default speed by using Ctrl-Alt-Esc to access the Setup utility and then using F1 to call up the secondary Setup window.)

To set the clock speed from the keyboard, use these key sequences:

- CTRL-ALT-S for standard speed (6 MHz)
- CTRL-ALT-T for turbo speed (8 MHz)
- CTRL-ALT-D for double speed (12 MHz)

Note: Some software may require that you select standard or turbo speeds for normal operation.

To set the clock speed using the ATSPPEED command, first make sure the MS-DOS prompt is showing on the screen. Then type the word ATSPPEED, followed by a space, a dash (—), and then a letter (S, T or D) denoting the desired speed. For instance, if you are in standard speed and you want to change to turbo speed (8 MHz), type the following and press Enter:

ATSPPEED —T

To start ECONFIG, type at the DOS prompt:

C>ECONFIG<enter>

ATI TECHNOLOGIES INC ATI TECHNOLOGIES INC A TI TECHNOLOGIES INC ATI TECHNOLOGIES INC AT I TECHNOLOGIES INC ATI TECHNOLOGIES INC ATI © COPYRIGHT 1989	
EGAWONDER800+ ADVANCE CONFIGURATION PROGRAM	
SETUP	VERSION XXX
SELECTION	KEYWORDS
[A] EGA	EGA
[B] CGA	CGA
[C] MDA MONO TEXT 720x348	MDA
[D] MDA MONO GRAPHICS 720x340	H720
[E] MDA MONO GRAPHICS 640X400	H640
[F] 132x25	25
[G] 132x44	44
[H] SCREEN SAVE	SAVE
[I] EXIT	
Current configuration EGA in ce80	Monitor detected EGA
Use <↑↓> or <letter> and <ret> to select option, <esc> to abort.	

MODE SELECTION
COLOR
MONO

As with ESETUP, each of the options in ECONFIG can be selected by typing in the letter to the left of the selection and then depressing the Enter key. As you get familiar with the operation of ECONFIG, you can bypass the menu completely by typing:

C>ECONFIG[KEYWORD]<Enter>

The keywords are indicated on the right hand side of the screen: EGA, CGA, MDA, H720, H640, 25, 44 or SAVE. For a full description of the ECONFIG software and options, see the EGA Wonder800 + User's Guide.

AUTOCONFIG™

AUTOCONFIGuration is a unique feature of the Commodore PC personal computers like the COLT 286, allowing the computer to automatically sense additional peripheral devices plugged into the expansion bus. Once these additional devices are detected, the resident peripherals on the COLT 286 motherboard are adjusted so as not to conflict with expansion peripherals. The AUTOCONFIG™ feature can prevent hardware damage to peripherals and motherboard, as well as ease the installation of expansion cards.

VIDEO

The video configuration process for the COLT 286 is handled by the EGA Wonder800 + video system. See the EGA Wonder800 + User's Guide for full details on the COLT 286 video configuration.

Serial Port (COMn:)

Before the onboard serial port is enabled a scan of the two standard COMn: hardware locations is made. If serial hardware (serial card/modem) is found operational, possible bootup message(s) may be:

EXPANSION COM at 03F8h
and/or

EXPANSION COM at 02F8h

If both available COM: addresses are occupied by expansion boards, then the onboard serial port will not be enabled. The onboard serial port will be configured and tested at I/O address 03F8h if no expansion COM:'s are found and will be configured and tested to the unused COM: address if only one expansion COM: is found.

If the onboard serial port is configured and tested successfully a message will be output during bootup:

ONBOARD COM at 03F8h
or
ONBOARD COM at 02F8h

Parallel Port (LPTn: or PRN:)

Before the onboard parallel port is enabled, a scan of the three standard LPTn: hardware locations is made. If parallel hardware (e.g., a printer card) is found operational, possible bootup message(s) may be:

EXPANSION LPT at 0378h
and/or

EXPANSION LPT at 0278h
and/or

EXPANSION LPT at 03BCh

If all available LPT: addresses are occupied by expansion boards, then the onboard parallel port will not be enabled. The onboard parallel port will be configured and tested at I/O address 03BCh if no expansion LPT:'s are found and will be configured and tested to the unused LPT: address if two expansion LPT:'s are found. If only one expansion LPT: is found, the onboard parallel port will be enabled to the first available I/O address when searching in the following sequence:

03BCh, 0378h, 0278h

If the onboard parallel port is configured and tested successfully, a message will be output during bootup:

ONBOARD LPT at 03BCh

or

ONBOARD LPT at 0378h

or

ONBOARD LPT at 0278h

Mouse Port

A check is made for a standard Microsoft Bus Mouse. If it is found in the I/O channel then the onboard Microsoft compatible mouse hardware is never enabled. The following message will appear during bootup:

EXPANSION MOUSE at 023Ch

If no expansion mouse is found the onboard mouse is enabled and tested. If the mouse is operational then the following message will appear during bootup:

ONBOARD MOUSE at 023Ch

NOTE: The onboard Mouse hardware is enabled/tested independent of the presence of the actual mouse. The bootup messages will appear even if the Commodore PC Mouse Kit is not attached.

80287 Numeric Coprocessor

A test is made for the presence of an 80287 Numeric Coprocessor during bootup. If an 80287 is detected the following message will be output:

80287 Numeric Coprocessor

USING AN 80287 NUMERIC COPROCESSOR

The Commodore COLT 286 personal computer comes equipped with a 40-pin socket (U302) for installation of an 80287 Numeric Coprocessor (NCP). When used with software or drivers designed to make use of its abilities, the NCP enhances the COLT 286's ability to process floating point mathematics, integer math and transcendental functions. Many language compilers (e.g., "C") have libraries available that support the use of an NCP.

80287 NCPs are available in the following speeds: 5, 6, 8 and 10 MHz. **The units are downwardly compatible only!** This means that a 10 MHz part will function properly if your COLT 286 is running at 6 or 8 MHz, but a 6 MHz part will NOT function at 12 MHz. As a rule the higher the speed of an NCP, the more expensive and harder to find that NCP will be. The 8 MHz 80287s are most readily available and are reasonably priced.

To operate your COLT 286 at clock speeds of 6, 8 and 12 MHz with an NCP, an 80287-8 or 80287-10 is required.

INSTALLING THE OPTIONAL COMMODORE 910, 915 AND 920 FLOPPY DRIVES

In addition to following the general installation instructions given in the manuals for the Commodore 910 and 920 floppy drives, the user must also perform the specific procedures for COLT 286 installation described below.

Commodore 910 Floppy Drive

To install the Commodore 910 3.5 inch 720Kb drive as Drive B: in the COLT 286, the user must do the following:

- Set the drive select jumper to position 1.
- The M jumper should be in position 5.
- The R-D jumper should be in position 6.
- The first time you power up, use the Setup utility to identify your second drive (Diskette 2 on the menu) as a 720Kb 3.5 drive.

Commodore 920 Floppy Drive

To install the Commodore 920 5.25 inch 360Kb floppy drive as Drive B: in the COLT 286, the user must do the following:

- Set the drive select jumper to position 1.
- Cut JP6 (located on the bottom side of JP1) in half.
- The first time you power up, use the Setup utility to identify your second drive (Diskette 2 on the menu) as a 360Kb 5.25 drive.

Commodore 915 Floppy Drive

No special procedures are required to install the Commodore 915 3.5 inch 1.44 Mb as Drive B:; just follow the instructions in the manual. The first time you power up, use the Setup utility to identify your second drive (Diskette 2 on the menu) as a 1.44Mb, 3.5 drive.

USING 720 KB FLOPPY DISKS ON THE COLT 286 SYSTEM

The floppy disk drive (Drive A:) is designed to make full use of 3.5 inch, double-sided high-density disks (DS/HD disks), which can be formatted to store up to 1.44 MB of information. This drive can also read and write the 3.5 inch, double-sided double-density disks (DS/DD disks), which can be formatted to store 720 KB of information.

USING THE SINGLE FLOPPY DRIVE AS TWO DRIVES

Even though the standard COLT 286 configuration includes only one floppy disk drive, you can still type MS-DOS commands as if you had two floppy drives in the system. Just think of the single drive as being two drives — Drive A: and Drive B:. However, instead of A: and B: representing physical drives, they represent *disks*.

SPECIAL KEYBOARDS

The COLT 286 MS-DOS software allows you to select any of the following keyboards, in addition to the U.S. keyboard. Just type the appropriate KEYB xx command at the MS-DOS prompt and press ENTER. In KEYB xx, xx is one of the following two-letter codes:

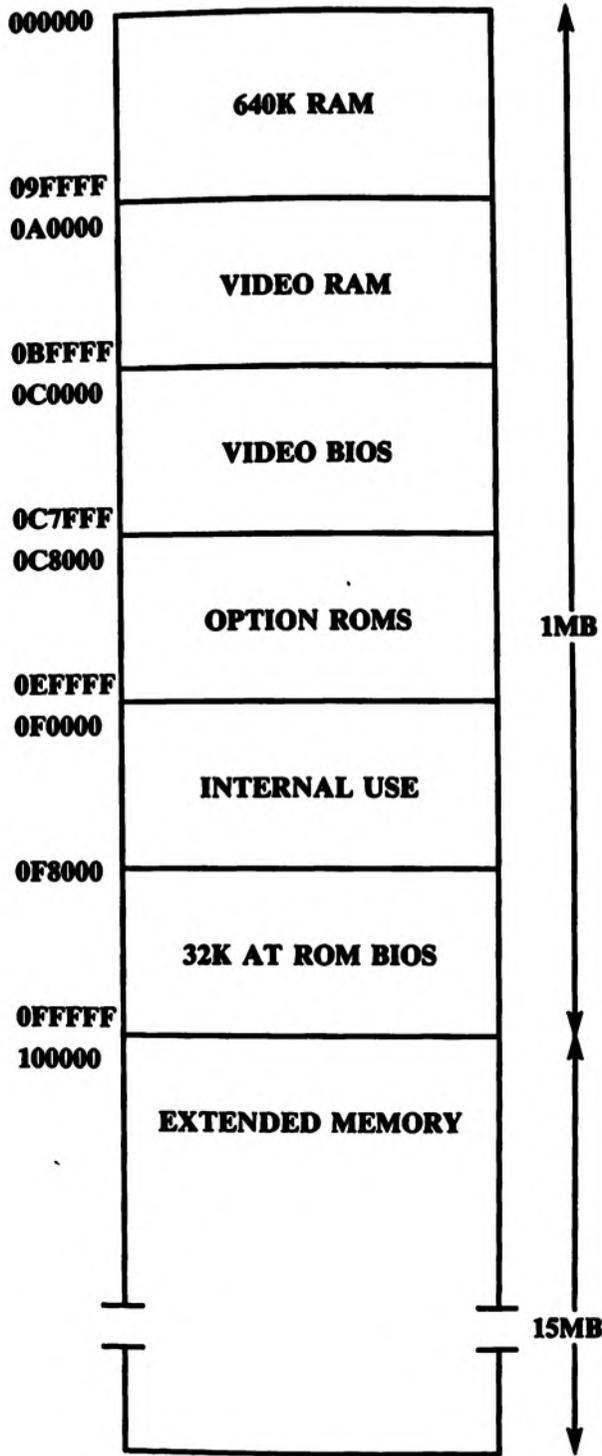
<i>Code</i>	<i>Keyboard</i>	<i>Command</i>
<i>DV</i>	<i>Dvorak</i>	<i>keyb dv</i>
<i>FR</i>	<i>France</i>	<i>keyb fr</i>
<i>GR</i>	<i>Germany</i>	<i>keyb gr</i>
<i>IT</i>	<i>Italy</i>	<i>keyb it</i>
<i>SP</i>	<i>Spain</i>	<i>keyb sp</i>
<i>UK</i>	<i>United Kingdom</i>	<i>keyb uk</i>

You should load only one keyboard program after starting MS-DOS. You can switch from the KEYB program to the default (United States) keyboard format at any time by pressing CTRL-ALT-F1. You can then return to the memory-resident keyboard program by pressing CTRL-ALT-F2.

If you include the appropriate KEYB command in your AUTOEXEC.BAT file, the correct keyboard assignment will be made automatically whenever you boot MS-DOS.

For More Information About the Keyboard. . .

For more information about using the COLT 286's keyboard, see the KEYB command description in the *MS-DOS Commands* chapter of the *MS-DOS User's Reference*. Also see the user's manuals for your software programs.



COLT 286 MEMORY MAP

SECTION 3
TROUBLESHOOTING GUIDE

TECHNICAL SERVICE NOTES

WARNING: COLT 286 PRINTED CIRCUIT BOARD CONTAINS CMOS CIRCUITRY, USE STATIC PRECAUTIONS WHEN HANDLING OR SERVICING THIS PRODUCT.

IMPORTANT:

- **COLT 286 PCB'S RETURNED FOR CREDIT MUST BE SHIPPED IN AN ANTI-STATIC BAG, AVAILABLE THROUGH THE COMMODORE PARTS DEPT. ANY PCBS RETURNED FOR CREDIT BY SERVICE CENTERS WHICH ARE NOT PACKAGED CORRECTLY WILL BE SENT BACK TO THE SERVICE CENTER AND NO CREDIT WILL BE ISSUED.**
- **COLT 286 HARD DRIVES RETURNED FOR CREDIT MUST BE INSERTED IN AN ANTI-STATIC BAG AND PACKED IN A COMMODORE SPECIFIED HIGH DENSITY FOAM SHIPPING BOX, BOTH AVAILABLE THROUGH THE PARTS DEPT. FAILURE TO DO SO WILL VOID WARRANTY.**

COMPONENT REPAIR:

COLT 286 MAIN BOARD IS A MULTI-LAYERED PCB ASSEMBLY. COMPONENT REPAIR BEYOND THE SOCKETTED CHIP LEVEL RESULTING IN NON-REPAIRABLE DAMAGE WILL VOID WARRANTY. USE STATIC PRECAUTIONS WHEN SERVICING THIS PCB ASSEMBLY.

TROUBLESHOOTING ERROR MESSAGES

Troubleshooting Guide

Error Messages	Customer Response	Service POD Test (H)
1. DMA 1 error	See your dealer	Test 0B
2. DMA 2 error	See your dealer	Test 0C
3. Interrupt controller 1 error	See your dealer	Test 0D
4. Interrupt controller 2 error	See your dealer	Test 0E
5. PIO error	See your dealer	Test 0F
6. Parity error	See your dealer	Test 10
7. Real time clock is not working	See your dealer	Test 1E
8. Illegal shutdown code in CMOS	See your dealer	Test 02
9. Virtual Mode CPU error	See your dealer	Test 26
10. Parity error on main circuit board	See your dealer	Misc
11. Parity error on expansion bus	See your dealer	Misc
12. Non-recoverable error-Processor halted	See your dealer	Misc
13. Press F1 key to continue	Press F1 key	Misc
14. Battery Failure	Run Setup Utility/See your dealer	Test 11
15. Base memory configuration error	Run Setup Utility	Test 17
16. Extended memory configuration error	Run Setup Utility	Test 18
17. Floppy 0 configuration error	Run Setup Utility	Test 1A
18. Floppy 1 configuration error	Run Setup Utility	Test 1A
19. Coprocessor (80287) configuration error	Run Setup Utility	Test 1D
20. The realtime clock has not been initialized	Run Setup Utility	Test 1E
21. Keyboard	Check keyboard	Test 14
22. Key switch is off. Turn it on to continue	Turn keylock on	
23. Boot failure, check disk and hit any key to try again	Check for non-MS-DOS disk in Drive A:; run Setup Utility	Misc

POWER ON DIAGNOSTICS

COLT 286 Trouble Shooting — Section 3

The Commodore 80286 ROM bios contains a "Power on Diagnostic" program which tests the functions of hardware and checks the configuration prior to passing control to the operating system.

The number of the test routine being run is passed to addr 03 78 (H) prior to the start of each test section.

The 80286 processor is initialized by the "RESET" signal. Refer to RESET description in IC pinout section, note that "VCC" and "CLK" to CPU must be correct and "HOLD" must not be active for 34 ticks from leading edge to trailing edge of initial reset.

RESET will terminate all instruction execution and local bus activity until it is negated. Prior to fetching, decoding and executing, the first instruction, located at physical address FF FF F0 (H), the 80286, in real address mode, processes some micro code located in its internal ROM, this takes about 38 ticks.

Test 01 (H) 0000 0001 (B)

The first test performed by the power on diagnostic checks the 8088 flags, the arithmetic logical unit, and the CPU registers.

If a failure is detected in Test 01, a "HALT" instruction is executed. This will stop program execution and prevent the CPU from using the local bus. The 80286 can be forced out of the halted state by "RESET", "NMI" or "INTR" (when "INTR" is used for RESTART, the interrupt enable bit of flag register must be on (set to 1), and the effective address computed from CS:IP will point to the next instruction after the halt instruction).

***Failure in test 01 indicates defective 80286.

Test 02 (H) 0000 0010 (B)

This routine checks to see if a "SHUTDOWN" has occurred. A shutdown can indicate a severe error which would prevent the CPU from further processing.

NOTE: A halt or shutdown condition is signaled externally, by the 80286 as a bus operation. Low states on S0', S1', COD/INTA', and a high state on M/IO' indicate a halt or shutdown. The state of address line 1 will indicate which condition, A1 high is halt, A1 low is shutdown.

After the test number is moved to the parallel port a check for keyboard reset is conducted and the program branches to test 04 (H) if it has.

The check for shutdown begins by examining the 8242 keyboard controller status port. In all ten shutdown conditions are tested, of these, three unexpected shutdown conditions, numbers 6, 7 or 8, any one of which if true, will generate the console message:

"Illegal Shutdown Code in CMOS"

NOTE: Branch information for shutdown routines are stored in CMOS memory. The shutdown command is sent to the 8242, the UPI status port, which will halt the CPU. Return depends on the shutdown code in CMOS memory.

An error code, F6, F7 or F8, (HEX) is sent to the parallel port before calling the display routine which generates the above message.

In real address mode a shutdown could occur under the following conditions:

Interrupt number 8, interrupt number 13, or a "CALL INT" or "PUSH" instruction which wraps stack segment when SP is ODD.

Routines also perform valid shutdowns to exit protected mode. During these the DMA page register will be initialized and interrupt control words (ICW) 1, 2, 3 and 4 will be reinitialized. Other routines within the test enable "NMI", parity and set the I/O check bit.

***Failures in test 02 could indicate problems on the local bus, or expansion bus. This would include: 80286, FE3000, FE3010, or any third party cards.

Test 03 (H) 0000 0011 (B)

Eprom checksum test verifies contents of eprom by adding bytes and checking for result of zero. A compensation byte is factored into the addition to make the sum zero.

Detection of an error results in a halt condition and would invalidate tests 01 and 02.

***Failure in test 03 indicates defective ROM.

Test 04 (H) 0000 0100 (B)

Test 04 checks the DMA page registers by writing and reading bits starting at address 80 (H).

***Failure in test 04 indicates possible defective FE3010, or local bus.

Test 05 (H) 0000 0101 (B)

Timer 1 and timer 2 are checked for correct operation. Interrupts are masked off during the test.

***Failure in test 5 indicates possible defective FE3010.

Test 06 (H) 0000 0110 (B)

Memory refresh test. Timer and DMA are setup to initiate refresh cycles every 15.1 microseconds. Size of virtual memory is calculated.

***Failure in test 06 indicates possible FE3010, Refresh logic or memory problem.

Test 07 (H) 0000 0111 (B)

Test 07 checks the 8242 keyboard controller by writing and reading the keyboard buffers.

***Failure in test 07 indicates possible defective 8242 or associated circuitry.

Test 08 (H) 0000 1000 (B)

Test 08 writes and reads the first 128K of RAM and verifies block size is 128K. First pass writes addresses into data, the second pass writes the complement of the address into data. Memory is cleared after test. The battery status is also confirmed in test 08.

***Failure in test 08 indicates possible defective RAM or RAM logic.

Test 09 (H) 0000 1001 (B)

Test and configure video. A search is made to determine if MDA, CGA or a special video adapter is configured, if not the onboard VGA is enabled and a call to VGA bios is executed. The dip switches are read to determine the default video mode.

NOTE: The mode register setting in the 5720 controls the reset signal to the onboard VGA controller chip. If no special video adapters are found on the expansion bus then "NOVID" from the 5720 to the PVGA is negated.

On completion of this test the title and copyright message are displayed.

Test 0A (H) 0000 1010 (B)

Test RAM from 128K to 640K. A display message is generated indicating that the base RAM of 128K, Test 08, is OK. Blocks of 128K, starting at 128K are then tested by writing, reading and verifying RAM. The first pass writes addresses to data, that is, the address which defines the physical location is also used as the bit pattern that is being written. The second pass writes complement of address into data.

The test displays results in blocks of 128K to the console each time a 128K boundary is reached.

At completion of the onboard memory test the CPU is placed in virtual mode and a test for virtual memory (over 1 MEG) is started.

NOTE: See test 26 (H).

***Failure in test 0A indicates a defective RAM.

Test 0B (H) 0000 1011 (B)

DMA controller #1 register check.

NOTE: Error messages beginning with this test appear in the COLT 286 Operators Guide.

Four current address registers (16 bits wide, each) and four current word count registers (16 bits wide, each) for each of the four DMA channels are written to and read from to verify operation.

A failure in test 0B will generate the following display on the console:

"DMA 1 error"

The beeper will sound, and a halt instruction will be executed.

***Failure in test 0B indicates A defective FE3010.

Test 0C (H) 0000 1100 (B)

DMA controller #2 register check. The second functional 8237 containing four current address registers (16 bits wide, each) and four current word count registers (16 bits wide, each) within the FE3010 are written to and read from to verify operation.

Successful completion of the test 0C will set the modes for DMA channels 0 through 3 and enable cascading by channels 4, 5 and 6 (DMA 1).

A failure in test 0C will generate the following display on the console:

“DMA 2 error”

The beeper will sound, and a halt instruction will be executed.

***Failure in test 0C indicates a defective FE3010.

Test 0D (H) 0000 1101 (B)

Interrupt controller #1 test. Patterns are written to, and read from the interrupt mask register (IMR) which controls the interrupt request register (IRR).

A verification is made that no interrupts can occur if “IMR” is set to FF (H). A vector is initialized to a temporary interrupt service routine in the event of a failure.

A test for correct timer 0 interrupt is also made.

A failure in test 0D will generate the following display on the console:

“Interrupt controller 1 error”

The beeper will sound, and a halt instruction will be executed.

***A failure in test 0D indicates a defective FE3010.

Test 0E (H) 0000 1110 (B)

Interrupt controller #2 test. The second functional 8259 contained in the FE3010 is tested as in test 0D, without timer test.

A failure in test 0E will generate the following display on the console:

“Interrupt controller 2 error”

The beeper will sound, and a halt instruction will be executed.

***A failure in test 0E indicates a defective FE3010.

Test 0F (H) 0000 1111 (B)

Check peripheral in/out register. Write and read from PIO register.

A failure in test 0F will generate the following display on the console:

“PIO error”

The beeper will sound, and a halt instruction will be executed.

***A failure in test 0F indicates a defective FE3010.

Test 10 (H) 0001 0000 (B)

RAM parity test. Blocks of RAM are written to and read from, parity check for odd parity is made. Parity disabled after successful test.

NOTE: COLT 286 does not use parity, third parity boards that use parity will enable parity.

“NMI” is enabled and a service routine for a parity error generates the following console message.

“Parity error”

The beeper will sound, and a halt instruction will be executed.

***Failure in test 10 indicates a defective RAM, third party card, NMI, or local bus.

Test 11 (H) 0001 0001 (B)

Test CMOS clock for battery failure and checksum failure.

Beeper will sound if failure is detected. Console will display:

“Battery failure” or “CMOS checksum failure” or both.

***Failure of test 11 indicates a defective battery, defective oscillator, or M146818A.

Test 12 (H) 0001 0010 (B)

This test is disabled. It is used only in manufacturing tests.

The beeper will sound for a set length prior to the start of test 13 (H). In a system which has passed all tests to this point the beeper sound heard now would be the one heard in the power up routine.

Test 13 (H) 0001 0011 (B)

Setup interrupt controller and move vector tables to RAM. Vector addresses are fetched from top 8K module.

NOTE: Vectors for video were setup in test 09.

Master and slave interrupts are enabled at this point.

Test 13 does not create any error messages.

Test 14 (H) 0001 0100 (B)

Keyboard test. Functional test of the 8242 keyboard controller at U203. A test for a stuck key on keyboard is performed. Check is made to see if key lock is locked.

A failure in test 14 will display the following error message on console:

“Keyboard error”

***Error indicates a defective 8242 controller or a defective keyboard.

Test 15 (H) 0001 0101 (B)

Test and configure the parallel port. Parallel port addresses are setup, reads and writes to ports are done. Set time out.

No error messages are generated by this test.

NOTE: PPC1 at U602 controls parallel output.

Test 16 (H) 0001 0110 (B)

Configure serial COM1 and COM2 for 8250 at U604. Read serial interrupt ID, set number of serial channels.

No error messages are generated by this test.

Test 17 (H) 0001 0111 (B)

Configure memory less than 640K. Parity (for EXPANSION RAM) is enabled.

Memory was tested in test 0A, and “CMOS STATUS” set. A check for a warm boot (ALT/CNTRL/DEL) is made and a comparison of the old and new memory configuration is performed. If a memory size mismatch is detected, the beeper will sound and the following non-fatal error message will be displayed on the console:

“Base memory configuration error”

The new configuration is stored.

***Check the settings for RAM size in the setup utility if you encounter this message.

Test 18 (H) 0001 1000 (B)

Configure memory over 1 megabyte (virtual memory). Check is made on address line 20, a low indicates virtual address mode.

CMOS status is checked as in test 17, a memory size mismatch will sound the beeper and generate the following non-fatal error message on the console:

“Extended memory configuration error”

The new configuration is stored.

***Check the settings for RAM size in the setup utility if you encounter this message.

Test 19 (H) 0001 1001 (B)

Configure keyboard test. Setup keyboard buffers, enable keyboard interrupt and test if key switch is turned to the on position.

If the key switch is off the following message will be displayed on the console:

“Key switch is off. Turn it on to continue.”

NOTE: You are in a loop until you turn on the key switch.

Test 1A (H) 0001 1010 (B)

Configure the floppy disk drive. Calculate number of floppy drives present. Check drive type, compare settings stored in CMOS, if a mismatch the following message will be displayed on console:

“Floppy 0 configuration error”

***Check settings in setup utility if above message is displayed.

Test checks second floppy configuration, if a mismatch the following message will be displayed on the console:

“Floppy 1 configuration error”

***Check settings in setup utility if above message is displayed.

New configuration is stored in CMOS. Floppy interrupt is enabled.

NOTE: Refer to installation instructions when adding a second floppy to the system. It may be necessary to change jumpers on drive for proper operation.

Test 1B (H) 0001 1011 (B)

Configure the hard drive. Check configuration if a mismatch hard drive will not be setup.

No error message is generated.

Test 1C (H) 0001 1100 (B)

Test number is not moved to parallel port for this configuration. This routine only turns on the game card bit in the “EQUIP FLAG”.

No error message is generated.

Test 1D (H) 0001 1101 (B)

Configure 80287 coprocessor. Check if 80287 is present. Enable 80287 interrupt and set “EQUIP FLAG” if it is. Compare configuration with CMOS, store new configuration, beep the speaker, and display the following message if setup changed.

“-- Coprocessor (80287) configuration error”

***Check setup utility for correct settings if this message is displayed.

Test 1E (H) 0001 1110 (B)

Check CMOS clock to see if it was initialized and is working. Enable timer interrupt. Sound beeper, and initialize if failure detected, then display one of the following messages on the console:

“-- The Real Time Clock has not been initialized”

OR: “-- Real Time Clock error”

***Check the RTC chip, M146818A at U201 if second message above is displayed.

Test 1F (H) 0001 1111 (B)

Generate a new CMS checksum and save it in CMOS RAM. Call made to auto configuration program at this point.

No error message generated.

Test 20 (H) Not Implemented

Test 21 (H) 0010 0001 (B)

Initialize ROM drivers, including hard drive. Checksum generated, and all ROMS tested.

System will now begin boot up.

System speed is determined, 6 MHz, 8MHz or 12MHz.

***Refer to operations manual for opening screen display.

Tests 22, 23 Not Implemented

Test 24 (H) 0010 0100 (B)

Test operation of the RTC chip. Recheck battery, make sure clock is counting, test memory. System will execute a halt instruction on memory failure. No error message is generated.

Test 25 (H) 0010 0101 (B)

Used in manufacturing to loop through diagnostics.

Test 26 (H) 0010 0110 (B)

Virtual memory test (over 1 megabyte). Call made to this routine from test 09.

Display Message: "Testing Extended RAM"

Display Message: "Total System RAM = XXXX" at finish.

During this test the exception interrupt vector tables and descriptor tables are built, and moved from ROM to RAM. A test of address line 20 is made (controls real or virtual CPU mode). If not in virtual mode display following message:

"Test __ 26: Virtual Mode CPU error"

And send F3 (H) (1111 0011 to parallel port. Then execute a halt instruction.

Test address lines 19 through 23 are tested. Shutdown if error. Exception interrupt codes are moved to the parallel port prior to shutdown. The following list defines the code sent to the port and the type of exception interrupt (EXECPT INT).

81	(H)	EXECPT INT 01	Single Step
82	(H)	EXECPT INT 02	NMI
83	(H)	EXECPT INT 03	Breakpoint
84	(H)	EXECPT INT 04	Into Detect
85	(H)	EXECPT INT 05	Boundary
86	(H)	EXECPT INT 06	Invalid OP Code
87	(H)	EXECPT INT 07	—
88	(H)	EXECPT INT 08	Double Exception
89	(H)	EXECPT INT 09	Processor Segment Error
8A	(H)	EXECPT INT 10	—
8B	(H)	EXECPT INT 11	Segment Not Present
8C	(H)	EXECPT INT 12	Stack Segment Not Present
8D	(H)	EXECPT INT 13	General Protection Error
8E	(H)	EXECPT INT 14	—
8F	(H)	EXECPT INT 15	—
90	(H)	EXECPT INT 16	Processor Extension Error

Power on diagnostic program is finished at the time of boot up (end of test 21).

Note that during execution of "POD" calls are made to auto configure and to miscellaneous interrupt routines.

All error messages are listed in the COLT 286 Operators Guide.

10 "Parity error on main circuit board"

11 "Parity error on expansion bus"

12 "Non-recoverable error - Processor halted"

13 "Press F1 key to continue"

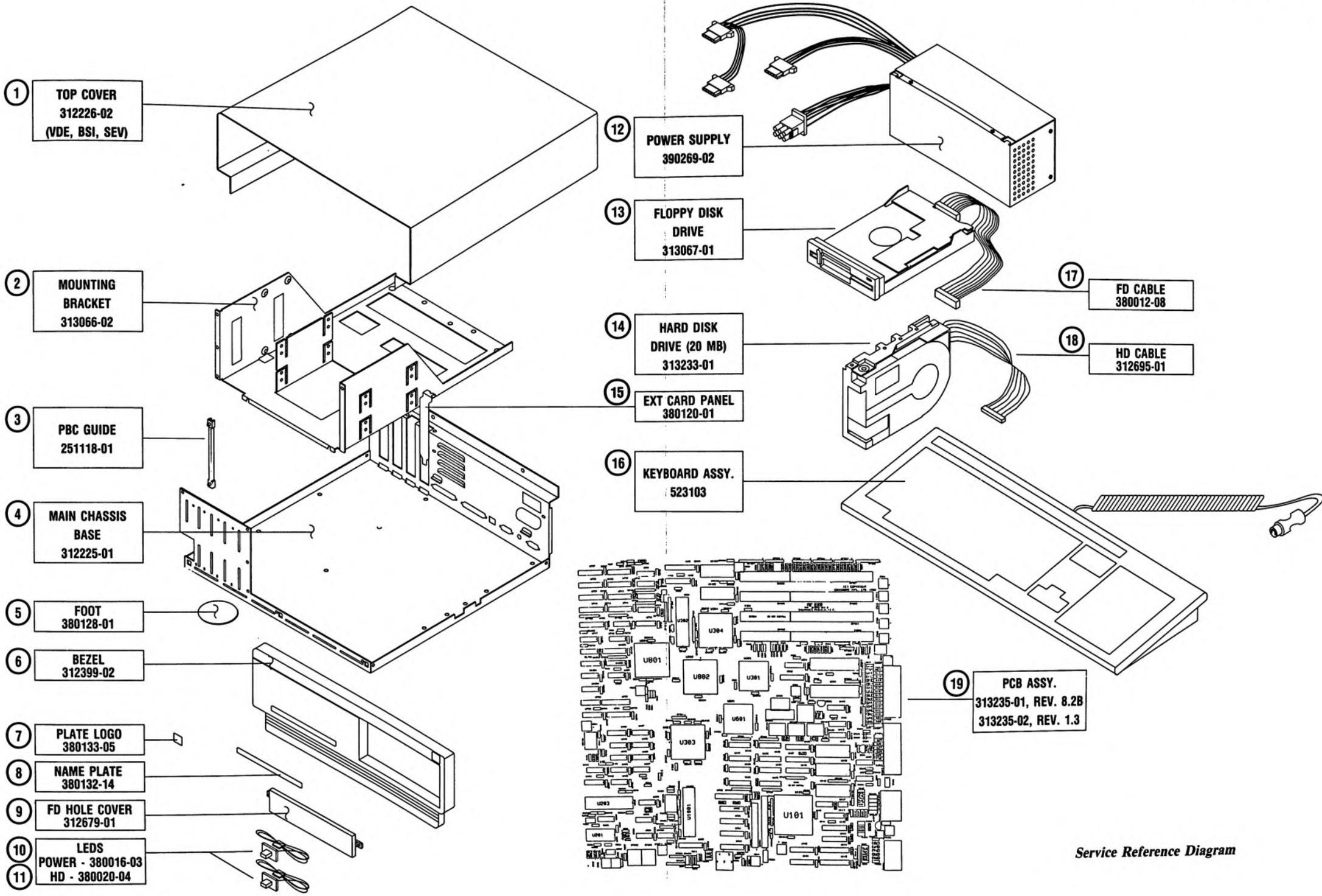
Messages 10, 11 are generated after a parity error has been detected and a memory check has determined that it was on the main board, or the expansion bus. If the check finds the error the CPU is halted and message 12 is displayed. If no error is found after the check, message 13 is displayed and processing will continue.

SECTION 4
PARTS SECTION

COLT 286 MAJOR PARTS LIST

Refer to Service Reference Diagram

1.	Top Cover	312226-02 (VDE, BSI, SEV)
2.	Mounting Bracket	313066-02 Sub:-01
3.	PBC Guide	251118-01
4.	Main Chassis Base	312225-01
5.	Foot	380128-01
6.	Bezel	312399-02
7.	Plate Logo	380133-05
8.	Name Plate	380132-14
9.	FD Hole Cover	312679-01
10.	LED Power On	380016-03
11.	LED Hard Drive	380020-04
12.	Power Supply Assy.	390269-02
13.	Floppy Disk Drive 1.44mb	313067-01
14.	Hard Disk Drive 20mb	313233-01
15.	Extension Card Panel	380120-01
16.	Keyboard Assy.	523103
17.	Floppy Drive Cable	380012-08
18.	Hard Drive Cable	312695-01
19.	PCB Assy.	313235-01/-02
	Ground Cable (HD)	380811-01 (Not shown)
	Power Cord	(Not shown)
	EGA Card	380069-01 (Not shown)
	Standoff	312689-02 (Not shown)
	Hex Standoff	390266-05 (Not shown)
	Standoff 'D' Conn.	390251-01 (Not shown)
	Standoff Video 'D' Conn.	(Not shown)



Service Reference Diagram

COMPONENT PARTS LIST PCB ASSEMBLY #313235-01

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.

IC COMPONENTS		RESISTORS 5% @ 1/4 WATT	
390300-04	80286 12 MHZ PROCESSOR	U301	901550-39 CARBON FILM, 3.9K OHM
390316-01	FE3000A	U801	901550-64 CARBON FILM, 10 OHM
390317-01	FE3010A	U802	901550-105 CARBON FILM, 33 OHM
390319-01	FE3020	U303	901550-94 CARBON FILM, 68 OHM
390318-01	FE3030	U304	901550-45 CARBON FILM, 75 OHM
318091-01	PPC1, PRINTER INTERFACE	U602	901550-124 CARBON FILM, 160 OHM
390304-03	WD37C65, FLOPPY CONTROLLER	U1001	901550-52 CARBON FILM, 220 OHM
380205-01	8250, SERIAL INTERFACE	U604	
390417-01	DS1287 RTC/CMOS RAM	U201	901550-12 CARBON FILM, 22K OHM
390580-01	P8242 KEYBRD CONTROL	U203	901550-01 CARBON FILM, 1K OHM
318087-01	MOS 5720, MOUSE-I/O CONTROL	U601	
390308-01	PAL20L10 I/O DECODER	U401	
390336-02	PAL20L10 HDC DECODER	U905	901550-18 CARBON FILM, 2.2K OHM
390309-02	PAL16L8 DRAM DECODER	U706	901550-19 CARBON FILM, 4.7K OHM
318099-02	DRAM, 256 X 4 (1 MEG BIT DRAM) @ 100NS	U707-U714	
390339-02	EPROM3, PC40 III BIOS - LOW (21728-12)	U1101	
390342-03	EPROM4, PC40-III BIOS - HIGH (27128-12)	U1102	
901521-02	74LS04	U206	901550-03 CARBON FILM, 5.1K OHM
901521-30	74LS14	U501	901550-20 CARBON FILM, 10K OHM
901521-20	74LS125A	U205,U414	
901521-63	74LS174	U113	901550-84 CARBON FILM, 1M OHM
901521-13	74LS244	U901,U902	
901521-46	74LS245	U502,U603	901600-28 CARBON FILM, 2.2 OHM, 1/2W 5%
318066-01	74F00	U415,U720,U721,U807	901550-17 CARBON FILM, 1.2 OHM
390110-01	74F04	U413,U715,	901550-110 CARBON FILM, 51 OHM
390203-01	74F08	U409,U718,U719,U1201	901550-92 CARBON FILM, 20K OHM
390313-01	74F10	U717	901550-70 CARBON FILM, 300 OHM
390279-01	74F20	U1204	901600-28 CARBON FILM, 2.2 OHM
390077-01	74F32	U1204	
390080-01	74F138	U305,U416	
390611-01	74F153	U803,U1202	
390312-01	74F175	U403	
390109-01	74F240	U404	
390314-01	74F253	U704	
390315-01	74F258	U701	
390578-01	74F573	U702,U703	
390198-01	74F86	U705,U1205	
318828-01	74HCT244	U407	
390089-01	74F245	U106	
390310-01	74HCT74	U903,U904	
390579-01	74ALS244A	U412,U411,U716	
901522-06	7406	U402	
390081-01	74F74	U1002	
390323-01	4069	U405,U406,U408	
901527-03	7905	U204	
390364-01	74LS175	VR501	
901882-01	1488	U1203	
901883-01	1489	U605	
		U606	
CRYSTAL, OSCILLATORS		RESISTORS 1% @ 1/4 WATT	
390273-01	OSCILLATOR, 48.00 MHZ	OSC401	901751-44 CARBON FILM, 150 OHM
325566-10	OSCILLATOR 16.00 MHZ	OSC402	901751-70 CARBON FILM, 210K OHM
325566-01	OSCILLATOR, 16 MHZ	SUB	
325566-17	OSCILLATOR, 9.6 MHZ	OSC1001	
900560-01	CRYSTAL, 32.768 KHZ	Y201	
900556-13	CRYSTAL, 1.8 MHZ	Y601	
900558-01	CRYSTAL, 14.318 MHZ	Y801	
RESISTOR NETWORKS		RADIAL CERAMIC CAPACITORS 5% @ 50 VOLT	
902441-11	150 OHM 6P, 5EL SIP	RP1001	900019-13 RADIAL LEAD, 22pF
902442-06	68 OHM, 8PIN, 4 ELEMENT	RP701,702	900019-25 RADIAL LEAD, 27pF
902422-03	33 OHM, 8 PIN, 4 ELEMENT, SIL	RP602,RP703,RP704	900019-17 RADIAL LEAD, 47pF
902422-02	1K OHM, 8 PIN, 4 ELEMENT, SIL	RP801	
902441-31	4.7K 6 PIN, 5 ELEMENT, SIP	RP107,201,304,604	900020-04 RADIAL CERAMIC .0047uF
902442-55	4.7K, 8 PIN, 7 ELEMENT, SIP	RP303,603,605	900019-15 RADIAL LEAD, 100pF
902410-08	4.7K, 10 PIN, 9 ELEMENT, SIP	RP301,302	
902410-07	10K, 10 PIN, 9 ELEMENT, SIP	RP502,507	900019-21 RADIAL LEAD, 1000pF
902441-15	330 OHM, 6 PIN, 5 ELEMENT, SIP	RP508	900022-03 MONO., RADIAL LEAD, .1uF
			900022-05 MONO., RADIAL LEAD, .33uF
			900022-01 MONO., RADIAL LEAD, .22uF
			ELECTROLYTIC CAPACITORS
			390101-08 ELECT., ALUM., RADIAL, 1uF
			390101-05 CAP ELECT., TAN, 10uF
			390101-01 ELECT., ALUM., RADIAL, 47uF
			390101-06 ELECT., ALUM., RADIAL 10uF
			R1203
			R503-R506,R210-R212
			R603,609,701
			R1001,R209
			R801,R411
			R1201
			R804,R902,R507,R207,
			R214
			R1202
			R121,510,R204,407,702,
			1204,412,502,508,1003,
			1004
			R604,R608
			R105,R404,R413,414,
			R606,901,R803,R1002,
			R904,806,R406,R509,
			R903,811
			R805
			R202,R501,R605,905,
			302,R703,R704
			R203,R601,R602,R807,
			205
			R208,R610
			R1205
			R907
			R301
			R809
			R208,R610
			R206,R1005,1006
			R201
			C601,C402
			C202
			C204,C205,C602,C802-
			C804
			C201
			C603,C621-626,C514-
			C532
			C206,C627,C207
			C203,CB2031-2034,
			CB205,CB206,CB3011,
			CB3012,CB302,CB3031-
			3039,CB3041-3048,
			CB401,402,408,412,414,
			CB501,CB502,CB6011,
			CB6012,CB602-605,
			CB6051,CB6052,CB706,
			CB716,CB722,CB8011,
			CB8012,CB8021,
			CB8022,CB902,1001,
			CB901,CB905,116,
			CB1002,1121,CB1101,
			CB1102
			CB723-726,707-714,403-
			407,409-411,CB415,
			CB416,CB701-705,715,
			717-721,803,CB903,
			904,1201-1205,413,
			CB305
			CS11,CB126
			C507,C513
			C208
			C501-C506,C508-C510,
			C512
			C1202

COMPONENT PARTS LIST
PCB ASSEMBLY #313235-01 (Continued)

MISCELLANEOUS		MISCELLANEOUS (Continued)		
251842-02	EMI FILTER 100PF	EM1624-1631,1201	390242-01 D-SUB, 9 PIN, RT. ANGLE MALE	
390257-01	EMI FILTER 2200PF	EM11203	390242-05 D-SUB, 25 PIN, RT. ANGLE MALE	
390297-03	EMI FILTER 2200PF	EM1201,202	390241-05 D-SUB, 25 PIN, TR. ANGLE FEMALE	
390275-04	EMI FILTER 150 PF	EM1607-623	903446-25 EXPANSION CONNECTOR, 62 PIN	
903025-08	FERRITE BEADS (AXIAL)	FB403,404,1001	903446-04 EXPANSION CONNECTOR, 36 PIN	
903025-01	FERRITE BEADS (AXIAL)	FB405-409,FB205,207, FB902,FB1201,FB501, FB502,FB801,FB802, FB901,601-608	252166-03 DIN, TK PIN, ROUND, FEMALE	
390253-02	FERRITE BEADS THREE TURN	FB201-204	252122-01 JACK, RCA RT. ANGLE, FEMALE	
900850-01	DIODE IN4148	CR201,CR202,CR501, CR502,CR601-CR603	903326-03 HEADER, 3 PIN, SIL	
380393-01	BATTERY, NICAD 3.6V	BT201,BT202	903326-02 HEADER, 2 PIN, SIL	
390280-01	FUSE, PICO, 4A	FU601	903345-17 HEADER, 34 PIN, DIL	
390321-01	DELAY LINE 10 TAP @ 20 NS	DL701	903345-20 HEADER, 40 PIN, DIL	
902658-01	TRANSISTOR 2N3904	Q601,Q801,Q1201	903349-01 POWER CONNECTOR, 6 PIN.	
312680-01	PIEZO BEEPER QMB12	PZ801	390043-01 SHORTING BLOCKS, 2 POS.	
251260-01	PUSH BUTTON N.O. SWITCH	PB501	390186-01 JUMPER	
904775-01	PIANO DIP SWITCH, 1 PIN, 4 POS.	SW101	SUBSTITUTE PARTS	
904150-05	SOCKET, 28 PIN, DIP	U108,109,U1101,U1102	390341-01 IC, 8742 MICROCNTL EPROM	U203 SUB:
904150-06	SOCKET, 40 PIN, DIP	U302	390317-01 IC, FE3010A	U802 SUB:
390185-02	SOCKET, 68 PIN, PLCC	U301,U601	390304-01 IC, WD37C65	U1001 SUB:
390185-01	SOCKET, 84 PIN, PLCC	U303,304,801,802	390304-02 IC, WD37C65A	U1001 SUB:
			380259-01 IC, M146818A RTC/CMOS RAM	U201 SUB:

PCB ASSEMBLY #313235-02

PCB ASSEMBLY 313235-02 has the same components as -01 with the following additions or omissions.

ADDITIONS AND OMISSIONS		
390083-04	IC, DRAM 64 x 4 100 NS	U709,710,713,714
390083-05	IC, DRAM 64 x 4 80NS	SUB: -04
901550-19	RESISTOR, CARBON FILM 4.7K OHM	R109,110
901550-01	RESISTOR, CARBON FILM 1K OHM	
	FOR -01 LIST OMIT	R1204,R120
	ADD FOR -01	R720,R106
	OMIT FROM -01	R1205,EM11201, Q1201,CN1201

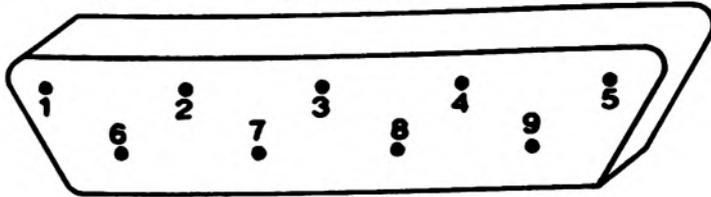
SOFTWARE SUB-ASSEMBLY (US)

- 315900-01 COLT 286 SOFTWARE SUB-ASSY (US)**
- 319293-01 DOS 3.30A MANUAL (ENGLISH)
- 319292-01 BASIC 3.22 MANUAL (ENGLISH)
- 363204-01 OPERATIONS GUIDE (ENGLISH)
- 318896-01 PROGRAM LICENSE AGREEMENT
- 314877-02 SERVICE CENTER LIST (US)
- 318980-01 MANUAL COLT 286
- 317812-01 DISK ASSY (DOS3.30/BASIC3.22/EGA800OUTIL)

SECTION 5

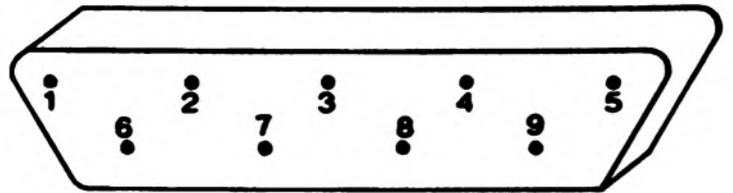
- **CONNECTOR PINOUTS**
- **SCHEMATICS**
 - **PCB ASSEMBLY 313235-01**
SCHEMATIC 313056-01, REV. 8.1
 - **PCB ASSEMBLY 313235-02**
SCHEMATIC 313236-01, REV. 1.4

MOUSE PORT
CN601 (5mm)



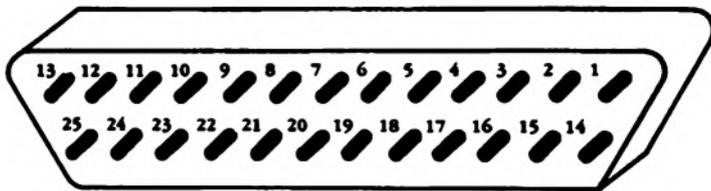
Pin No.	Signal
1.	Vertical
2.	Horizontal
3.	Vertical Q
4.	Horizontal Q
5.	Button (3)
6.	Button (1)
7.	+ 5V
8.	Ground
9.	Button (2)

VIDEO PORT



Pin No.	Signal
1.	Ground
2.	Secondary Red/Ground
3.	Primary Red
4.	Primary Green
5.	Primary Blue
6.	Secondary Green/Intensity
7.	Secondary Blue/Mono Video
8.	Horizontal Retrace
9.	Vertical Retrace

SERIAL PORT
CN603 (5mm)

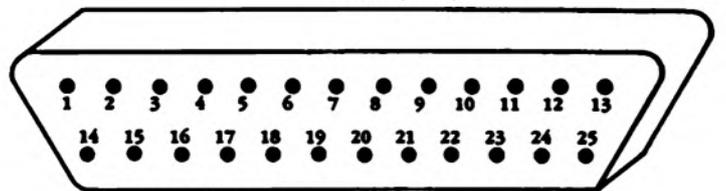


Computer Side

Peripheral Side

1	CHASSIS GROUND
2	T x D
3	R x D
4	RTS
5	CTS
6	DSR
7	SIG GND
8	DCD
9	+ 12V
10	- 12V
20	DTR
22	Ri

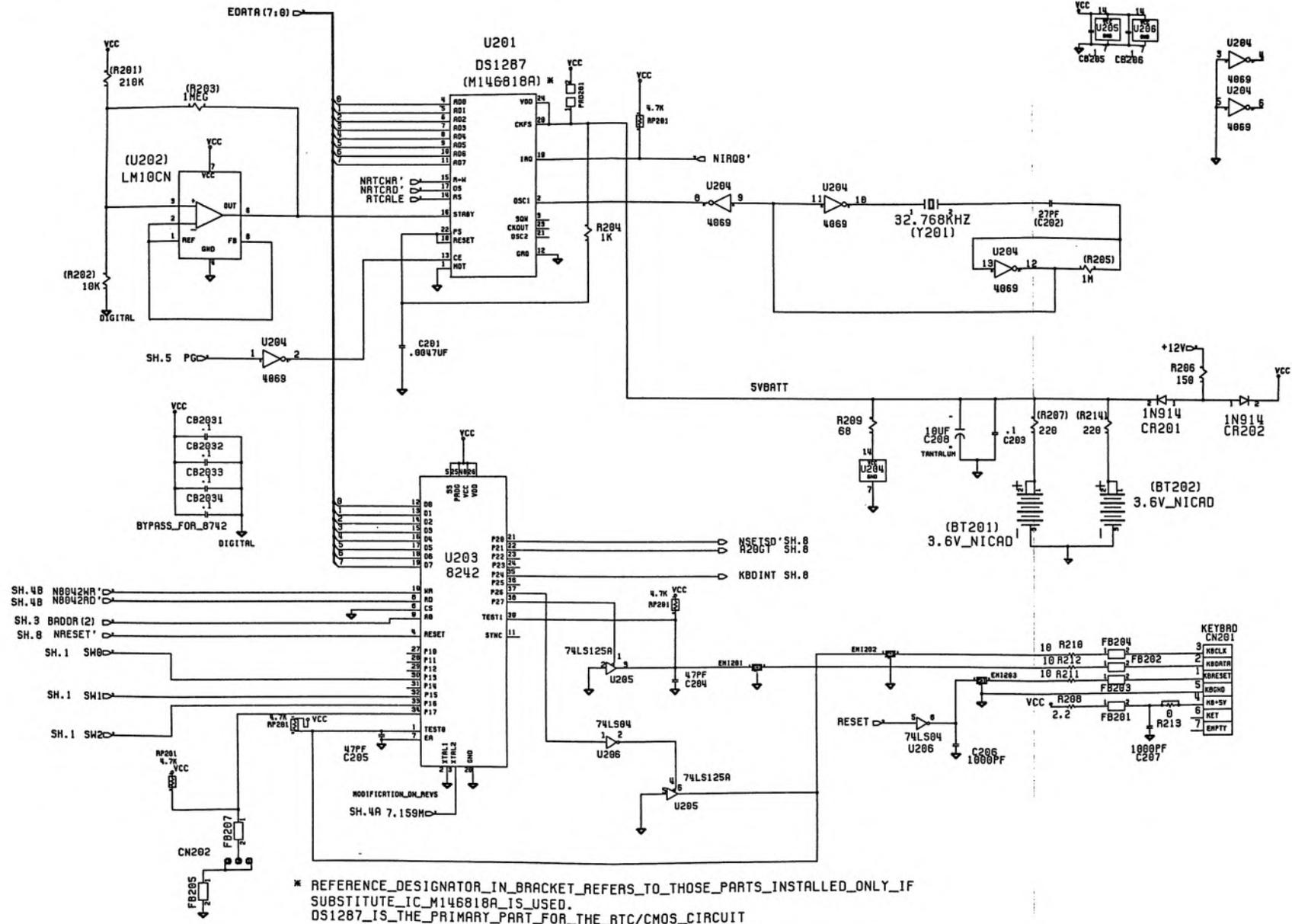
PARALLEL PORT
CN602 (5mm)

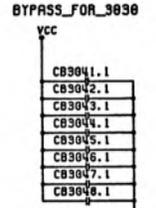
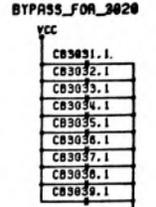
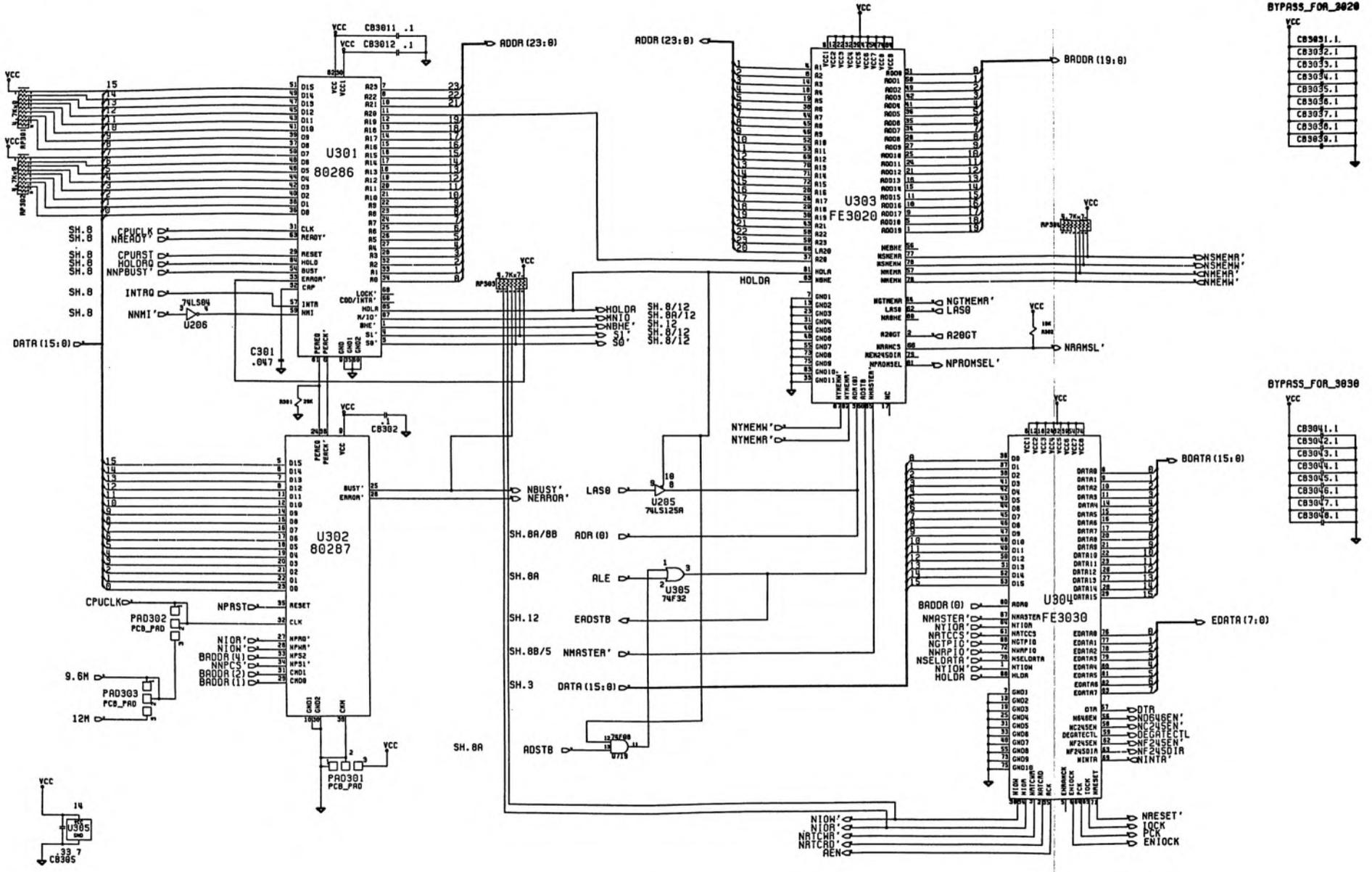


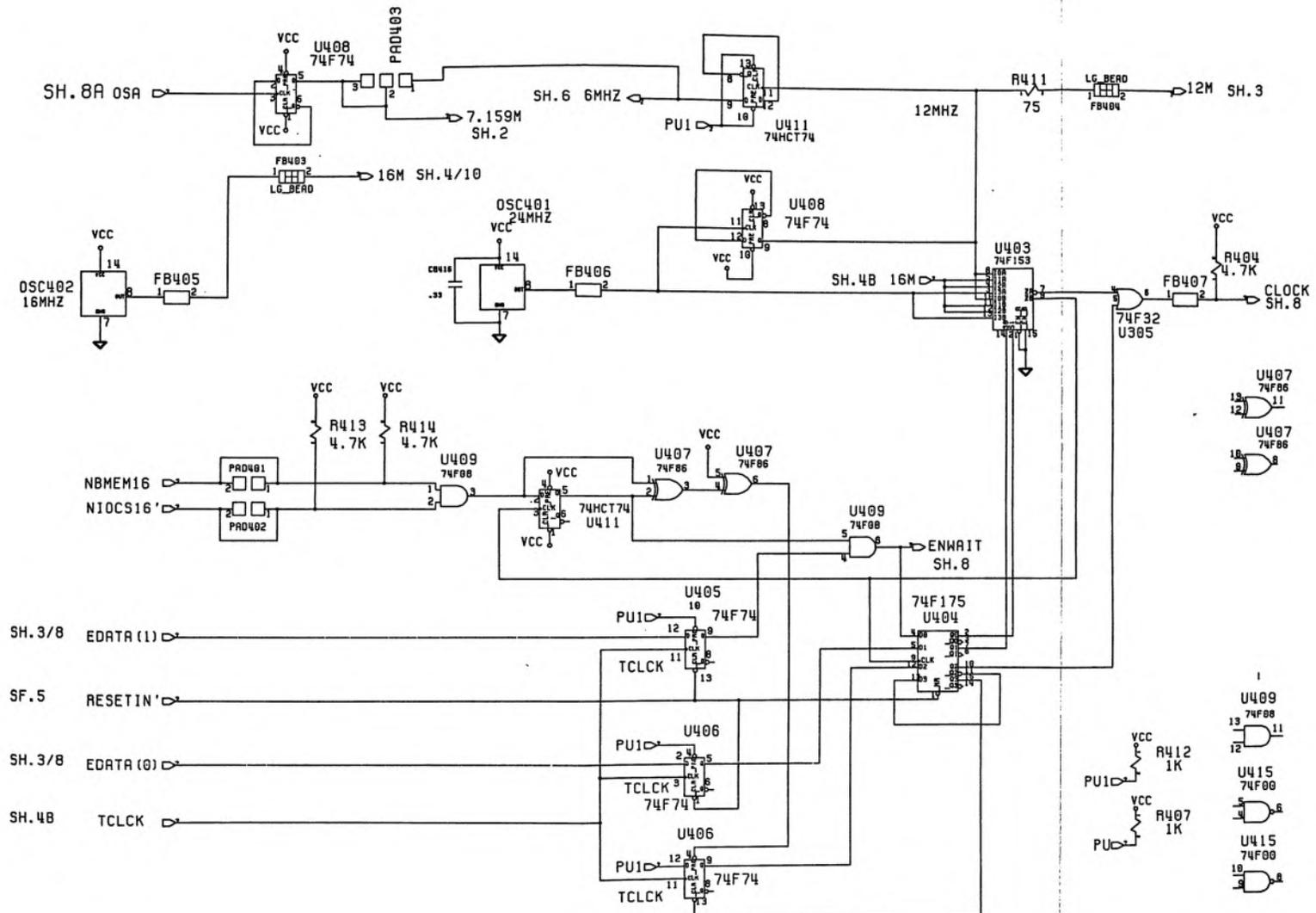
Computer Side

Printer Side

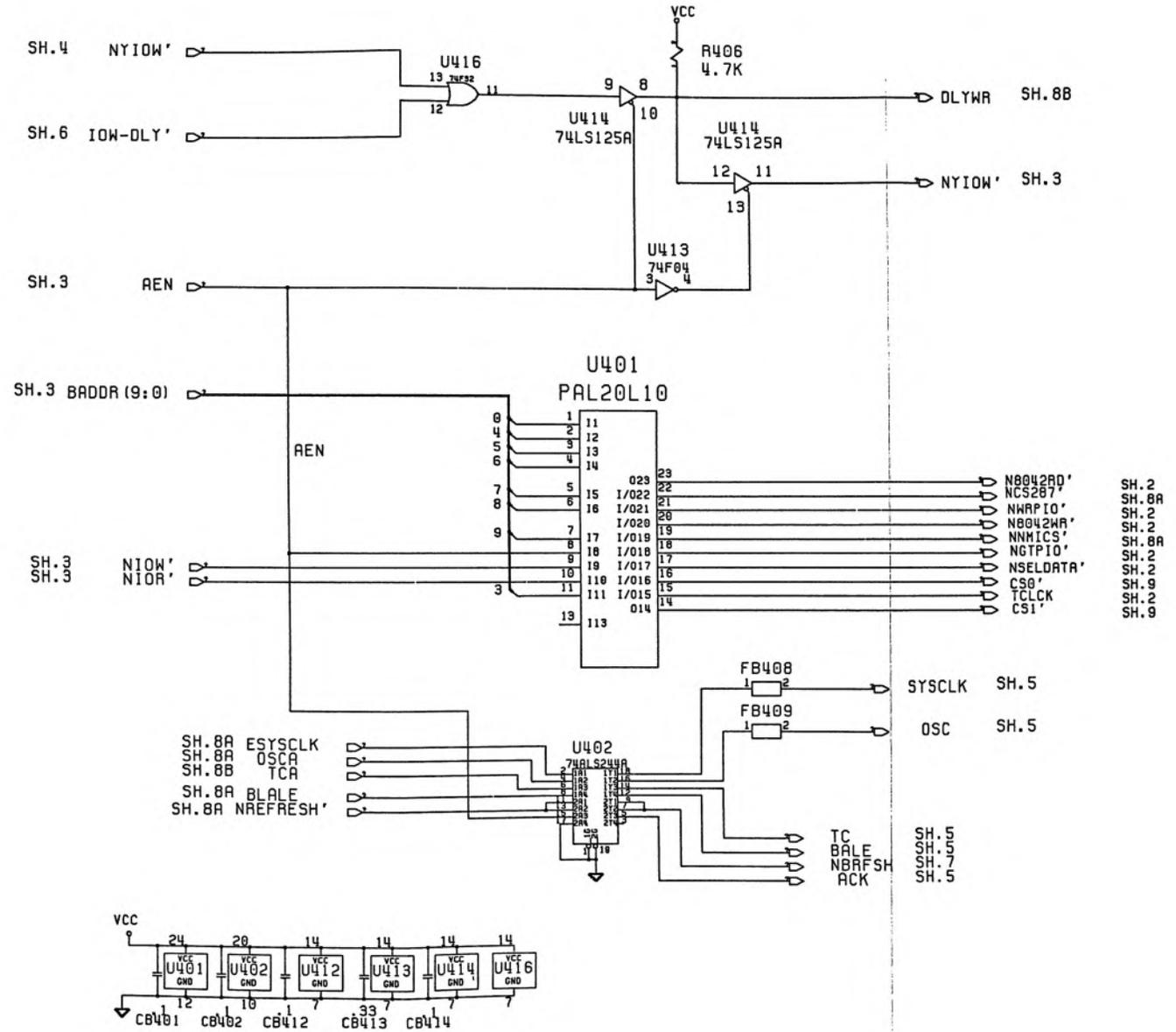
1	STROBE
2	DO
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	ACK
11	BUSY
12	PE
13	SLCT
14	AUTO FDXT
15	ERROR
16	INIT
17	SLCT IN
18-25	GND

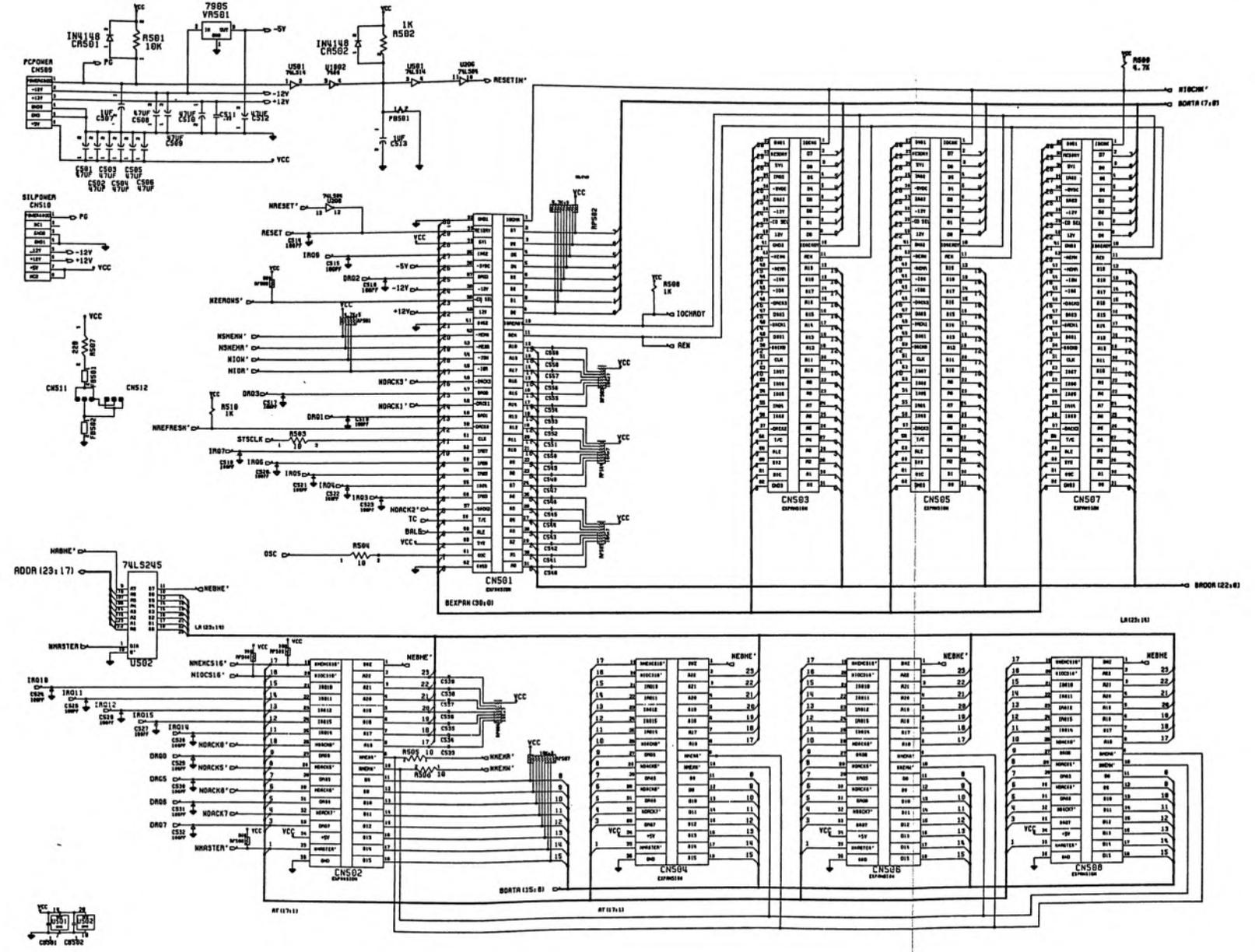


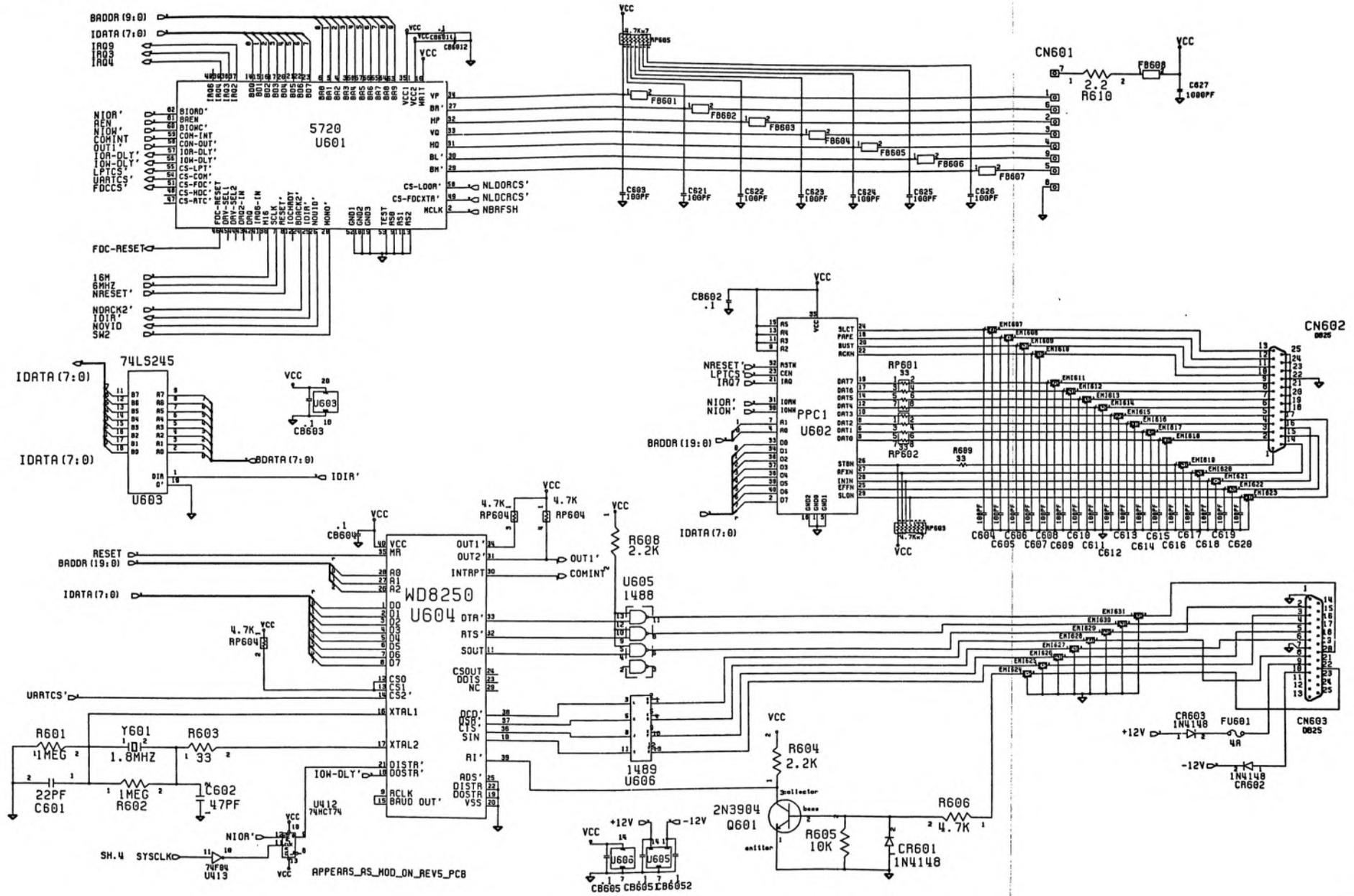


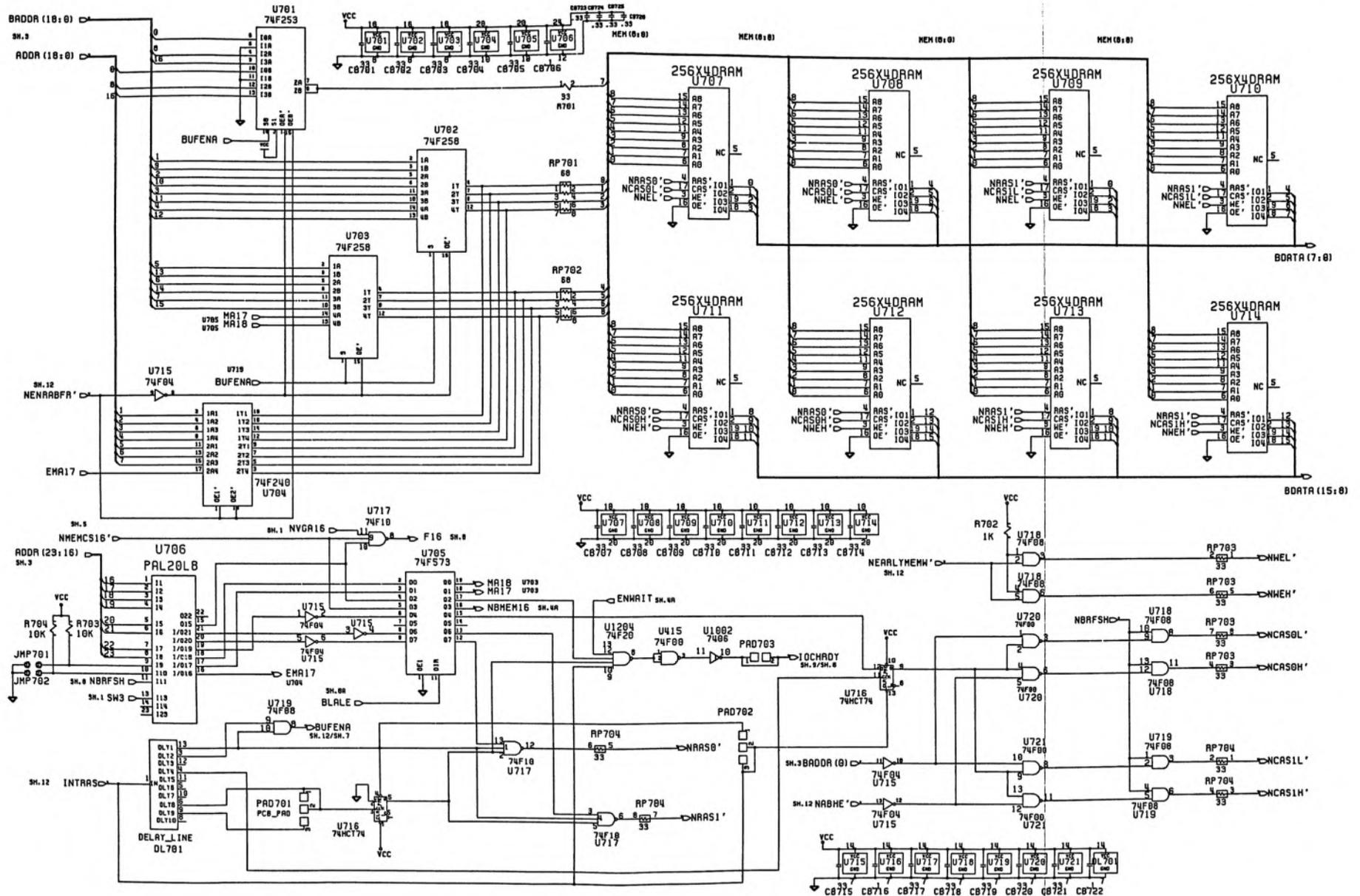


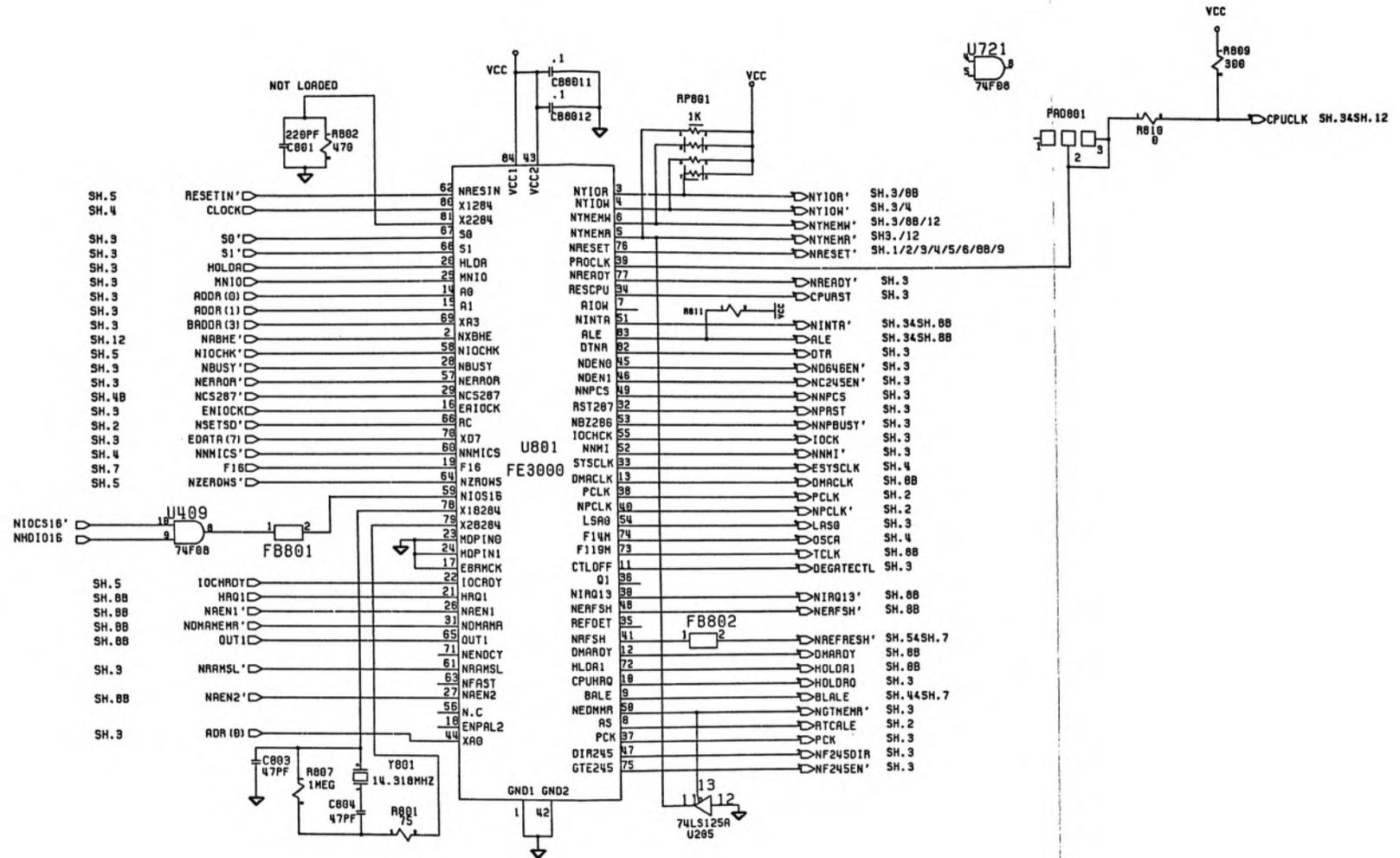
- U413
13 74F04 12
- U501
5 74LS14 6
- U807
1 74F00 3
- U416
1 74F32 3
- U416
4 74F32 6
- U416
10 74F32 8

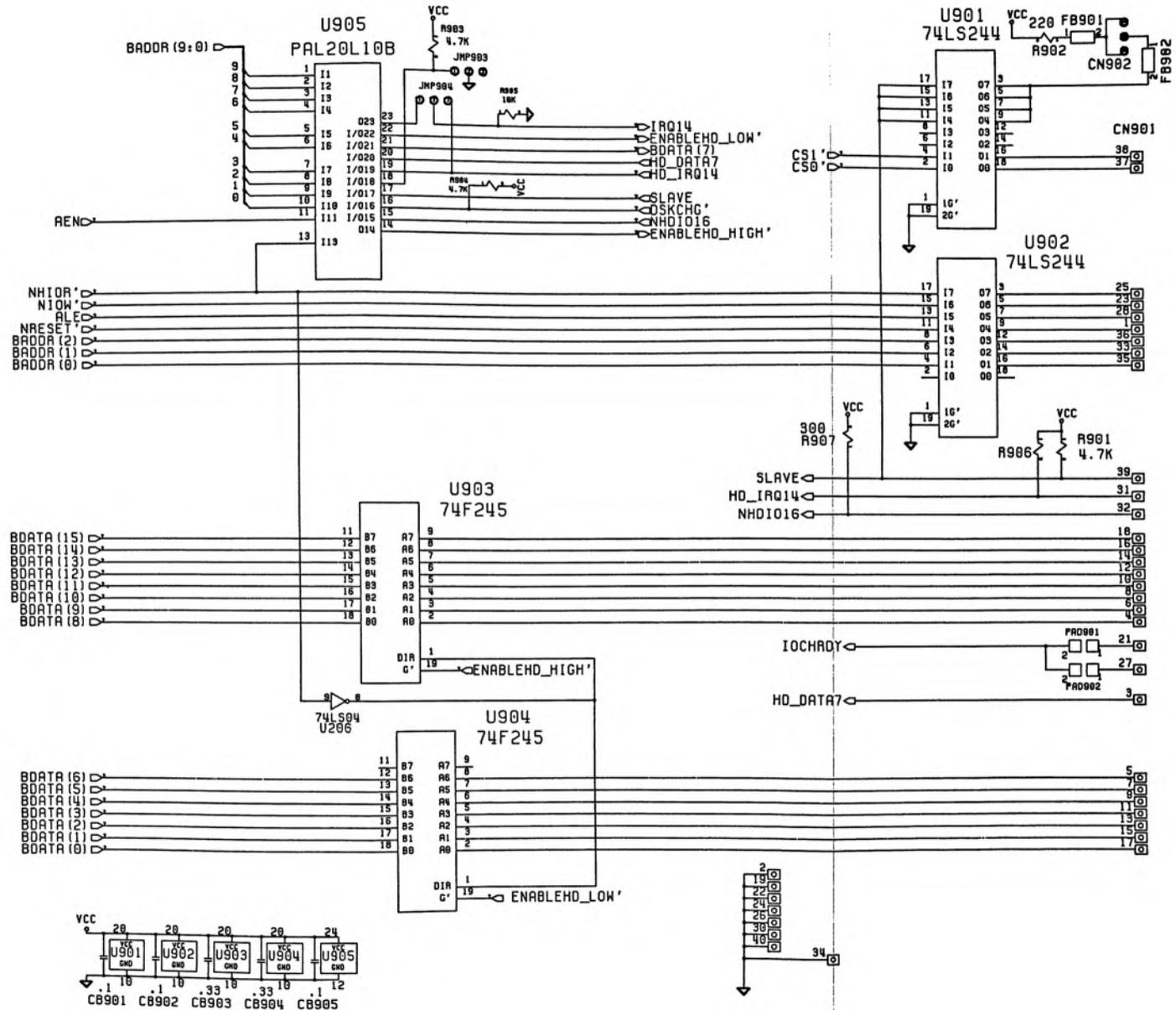


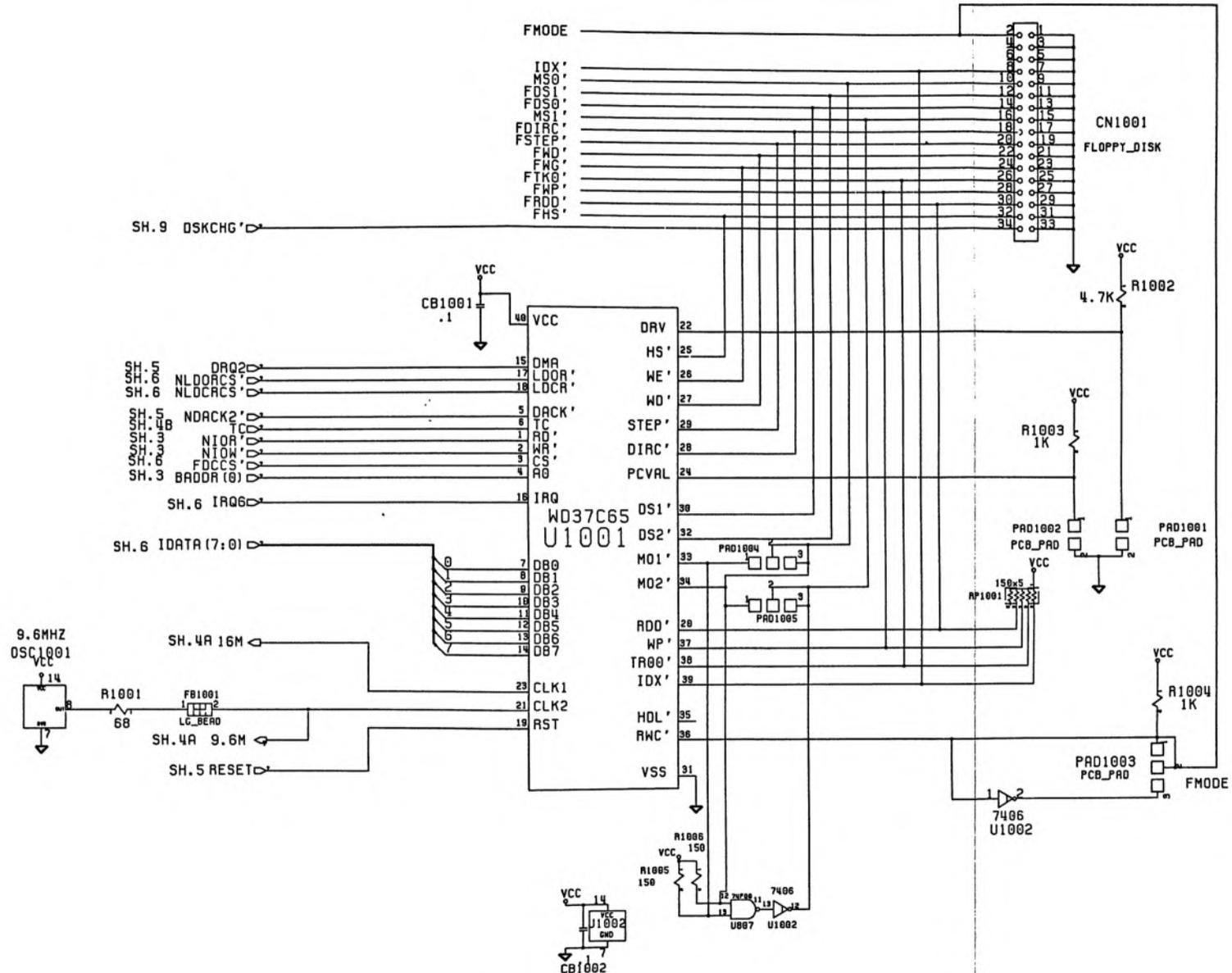


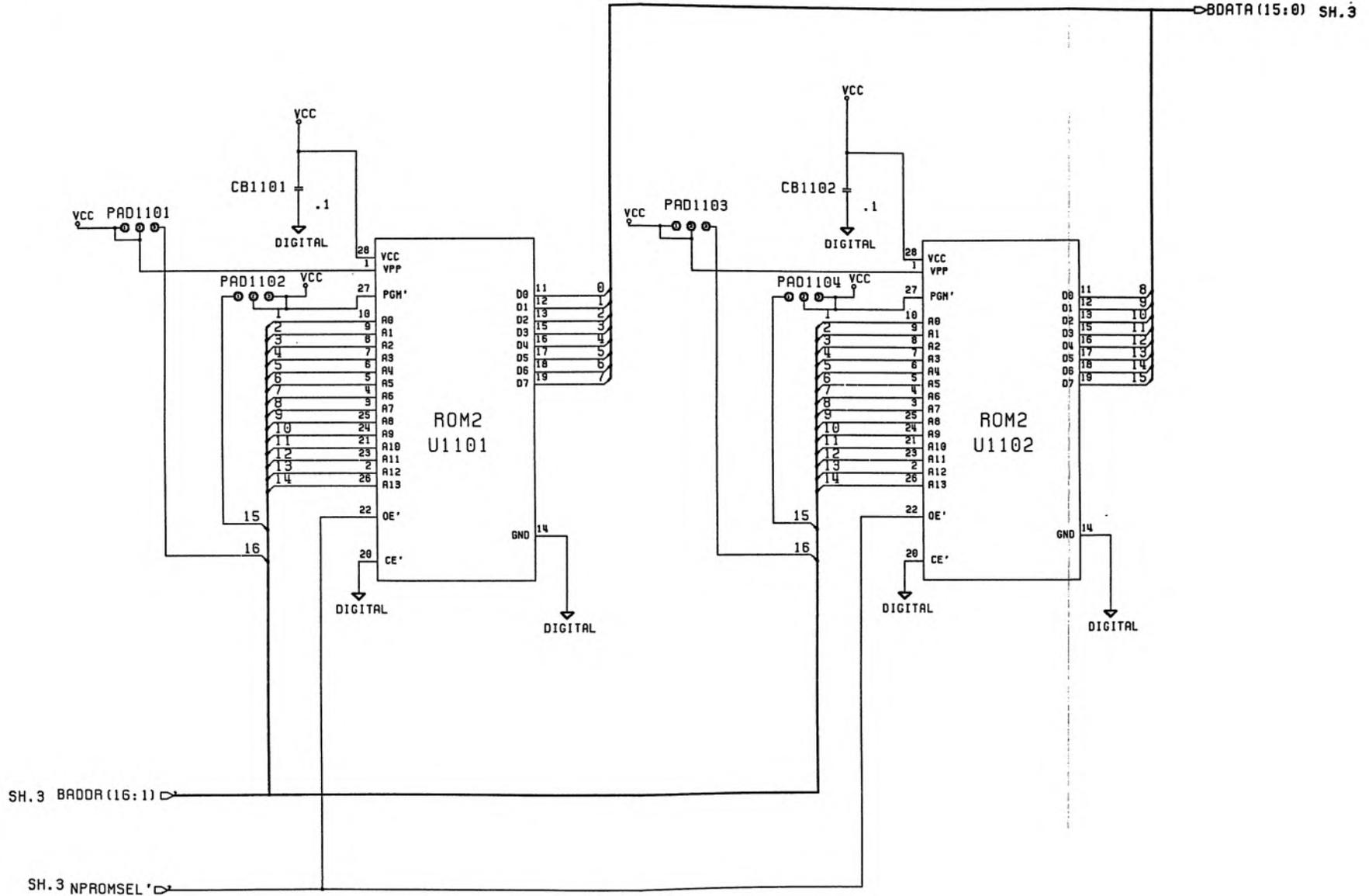


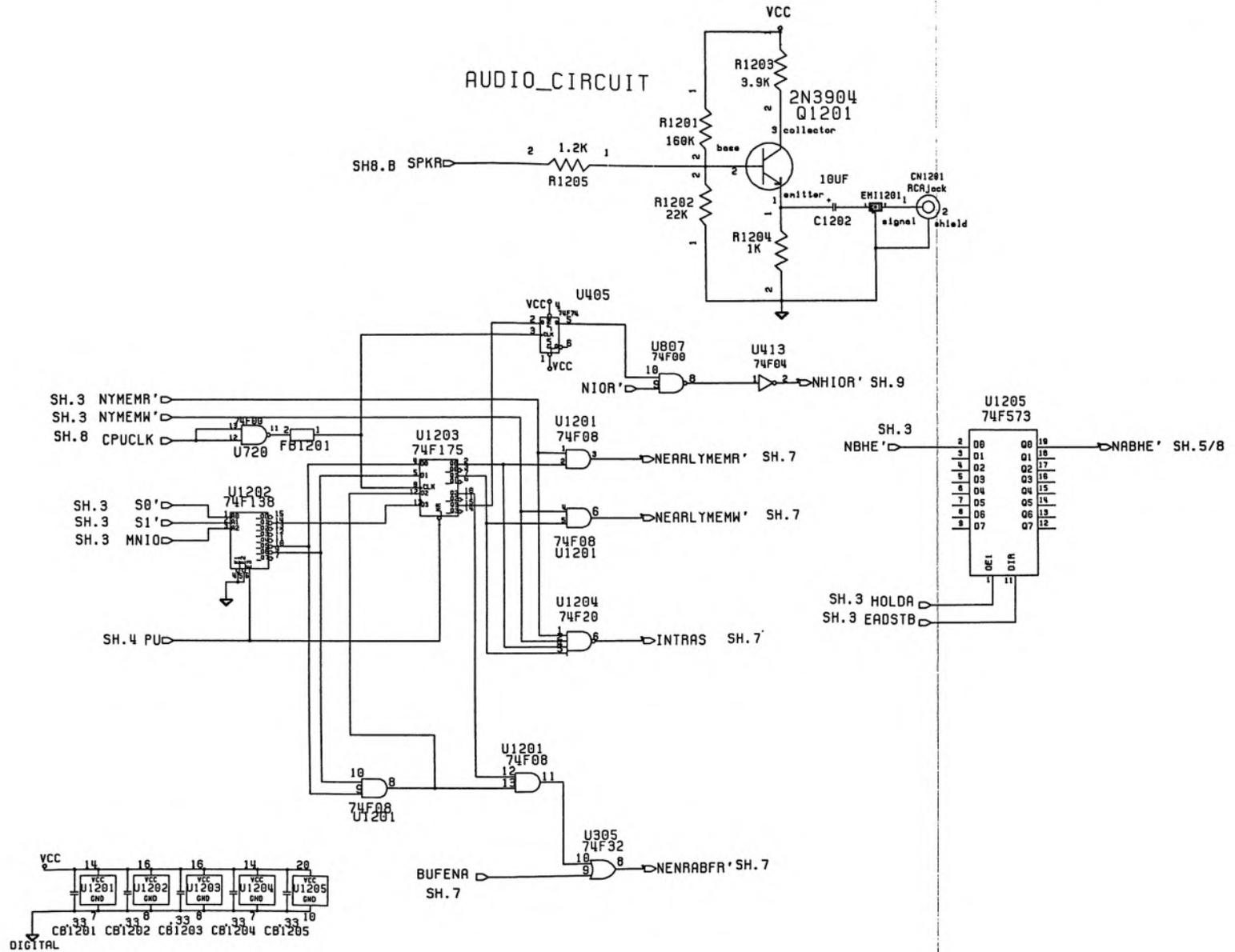




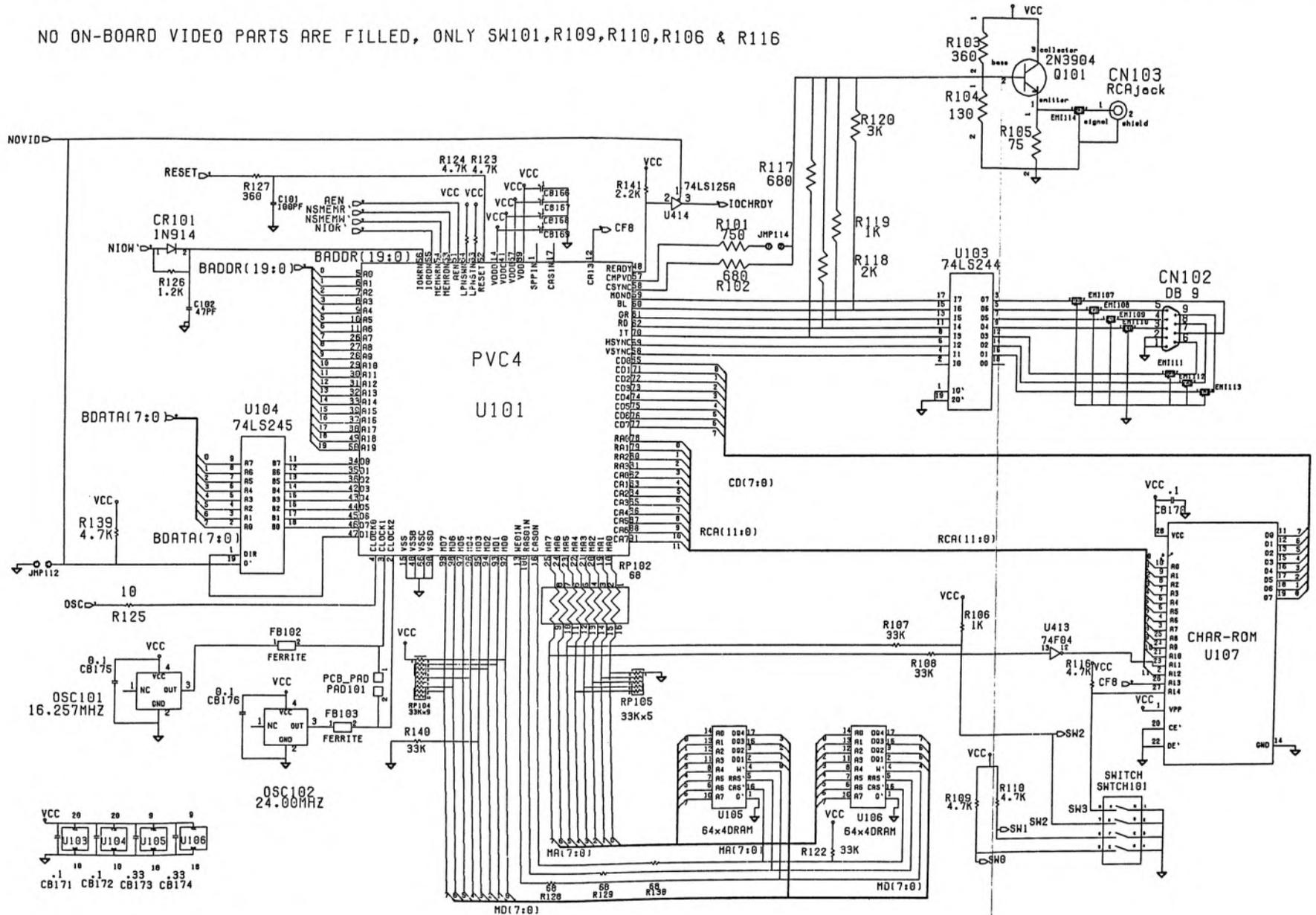


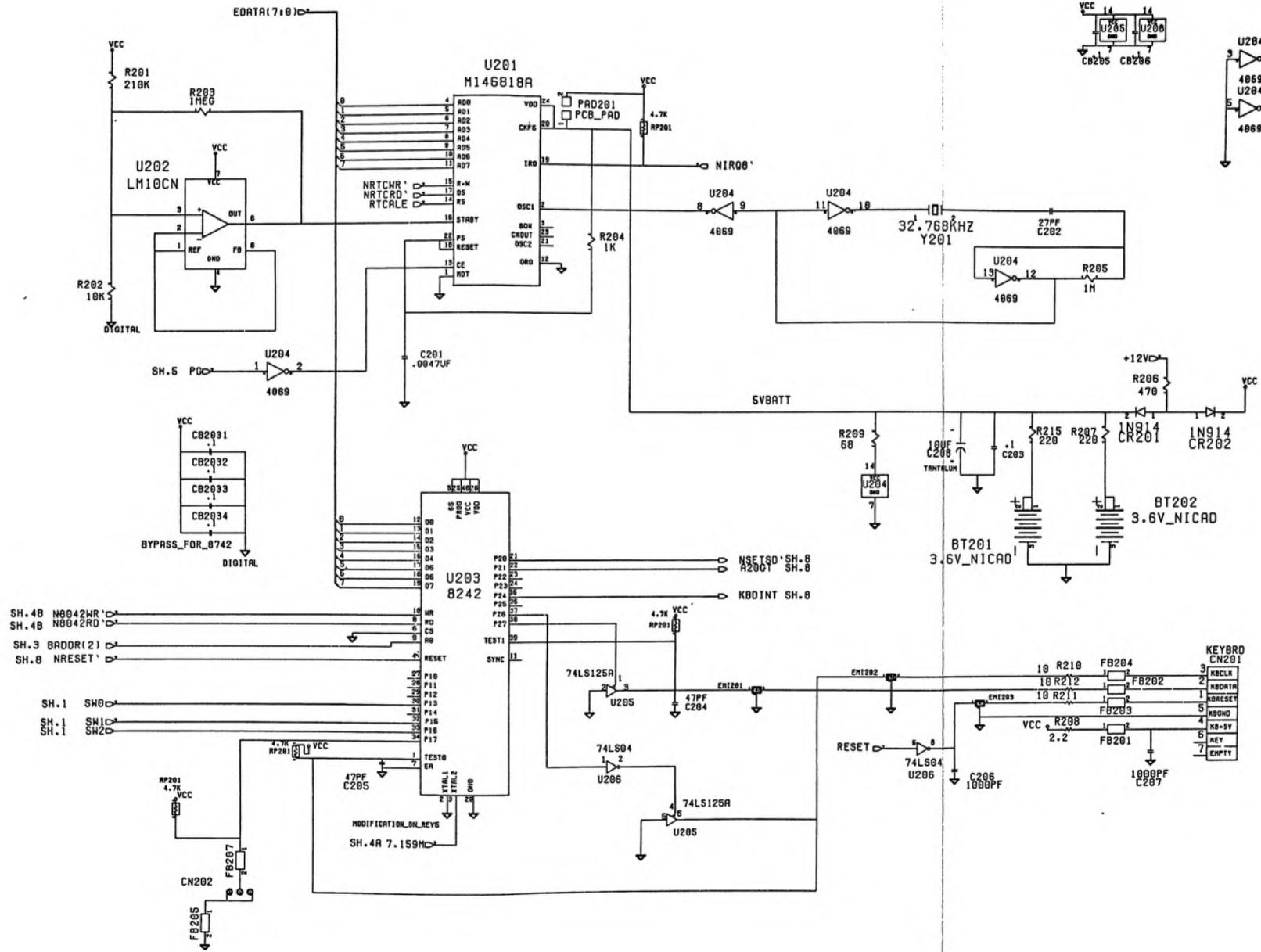


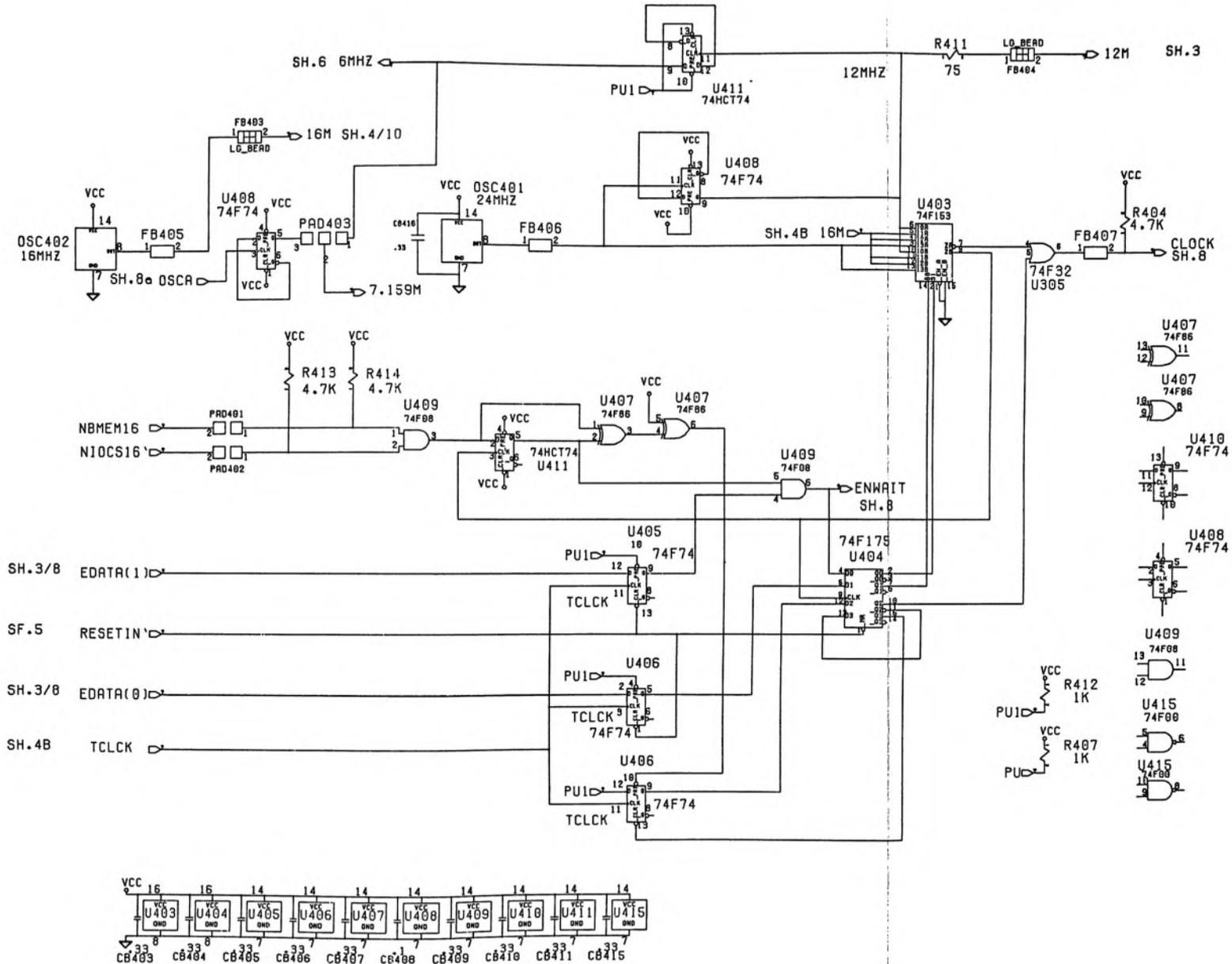


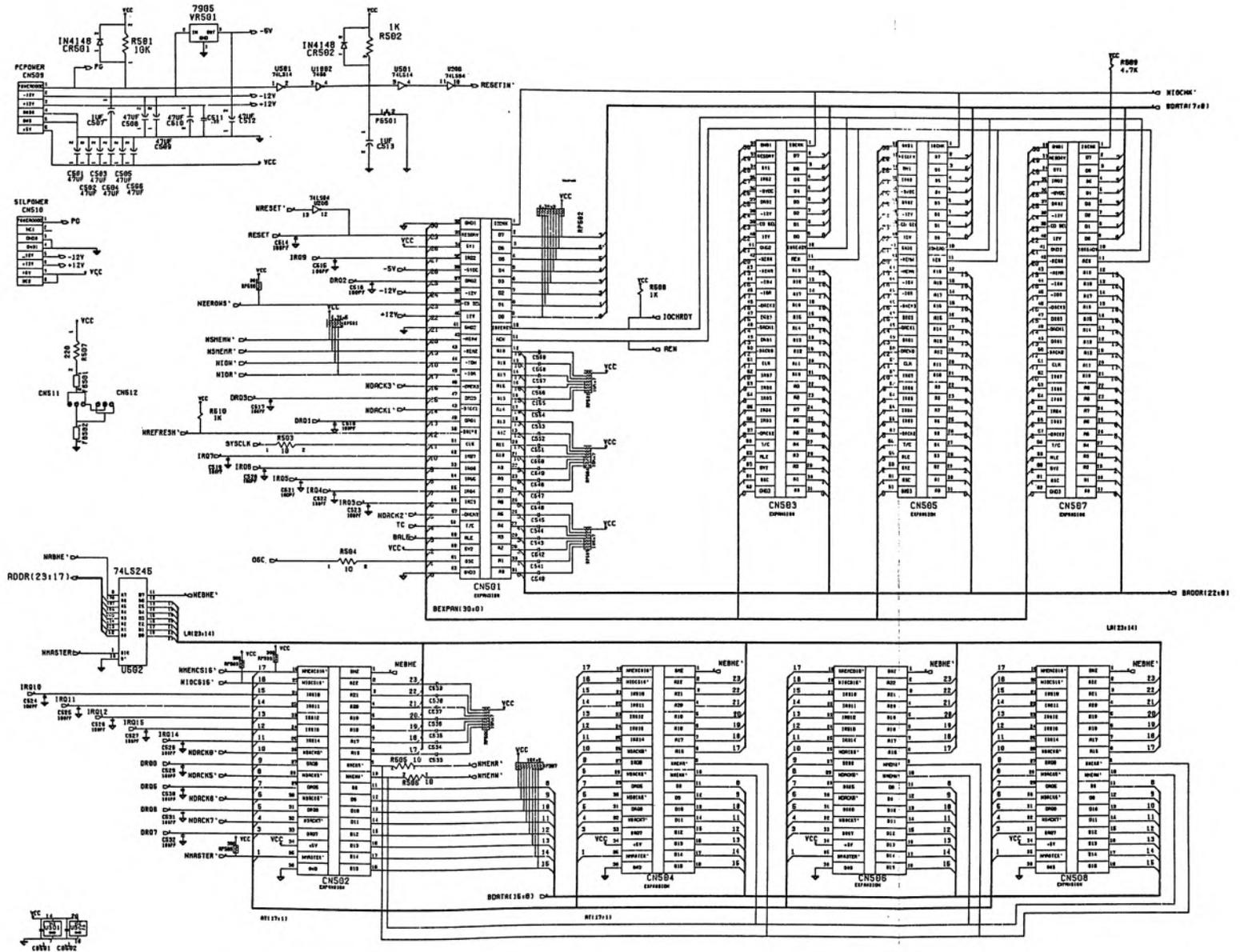


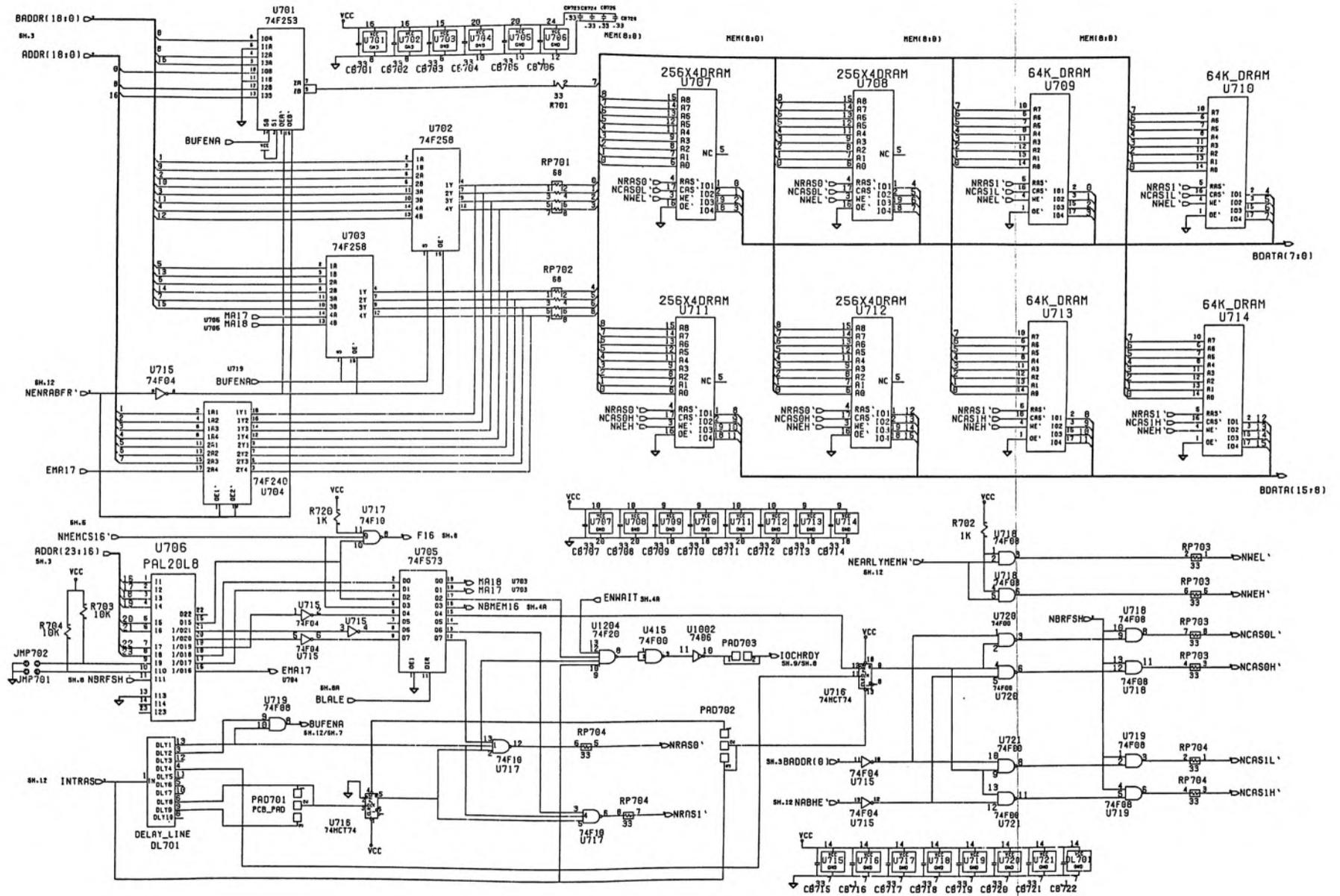
NO ON-BOARD VIDEO PARTS ARE FILLED, ONLY SW101,R109,R110,R106 & R116

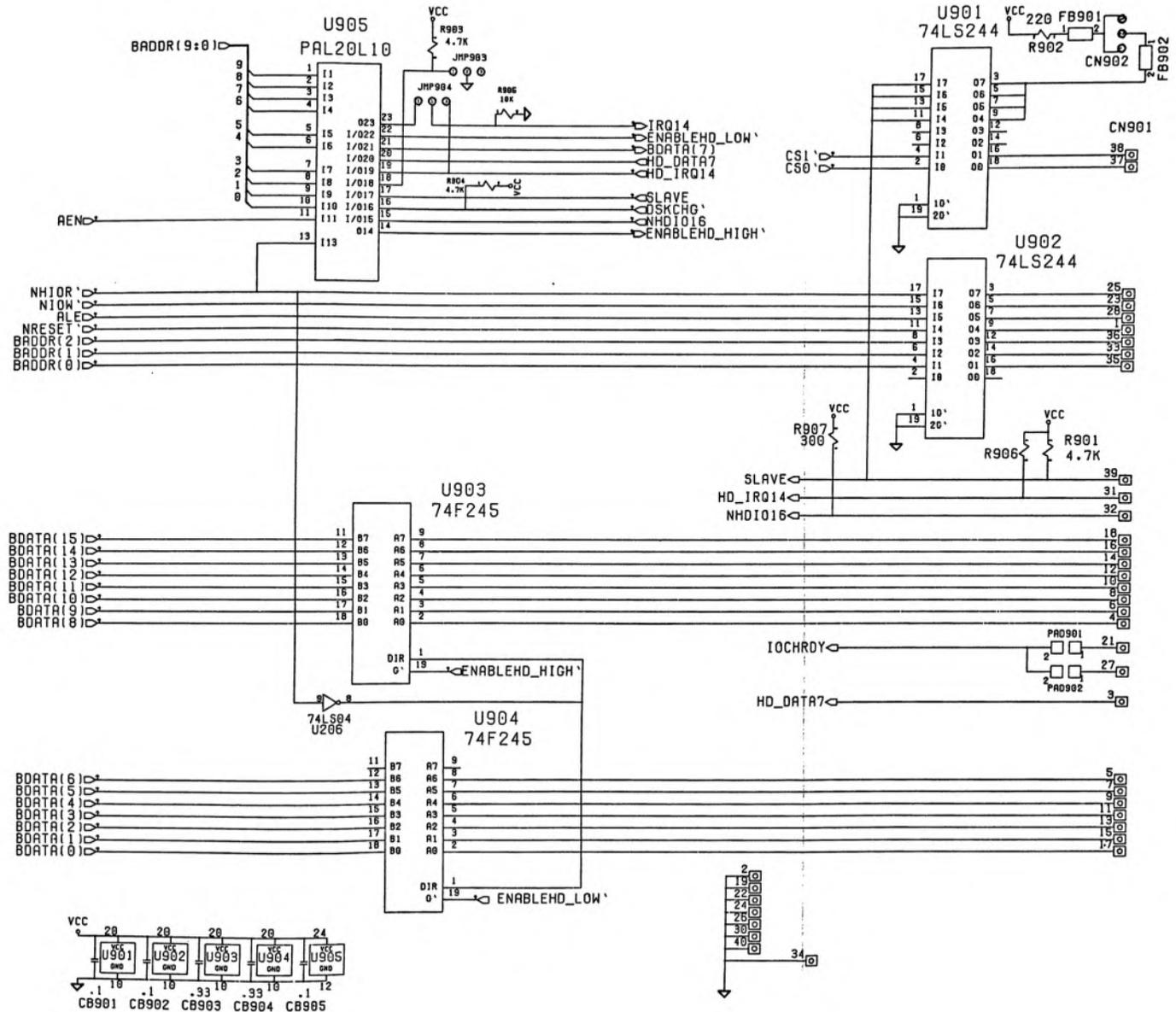


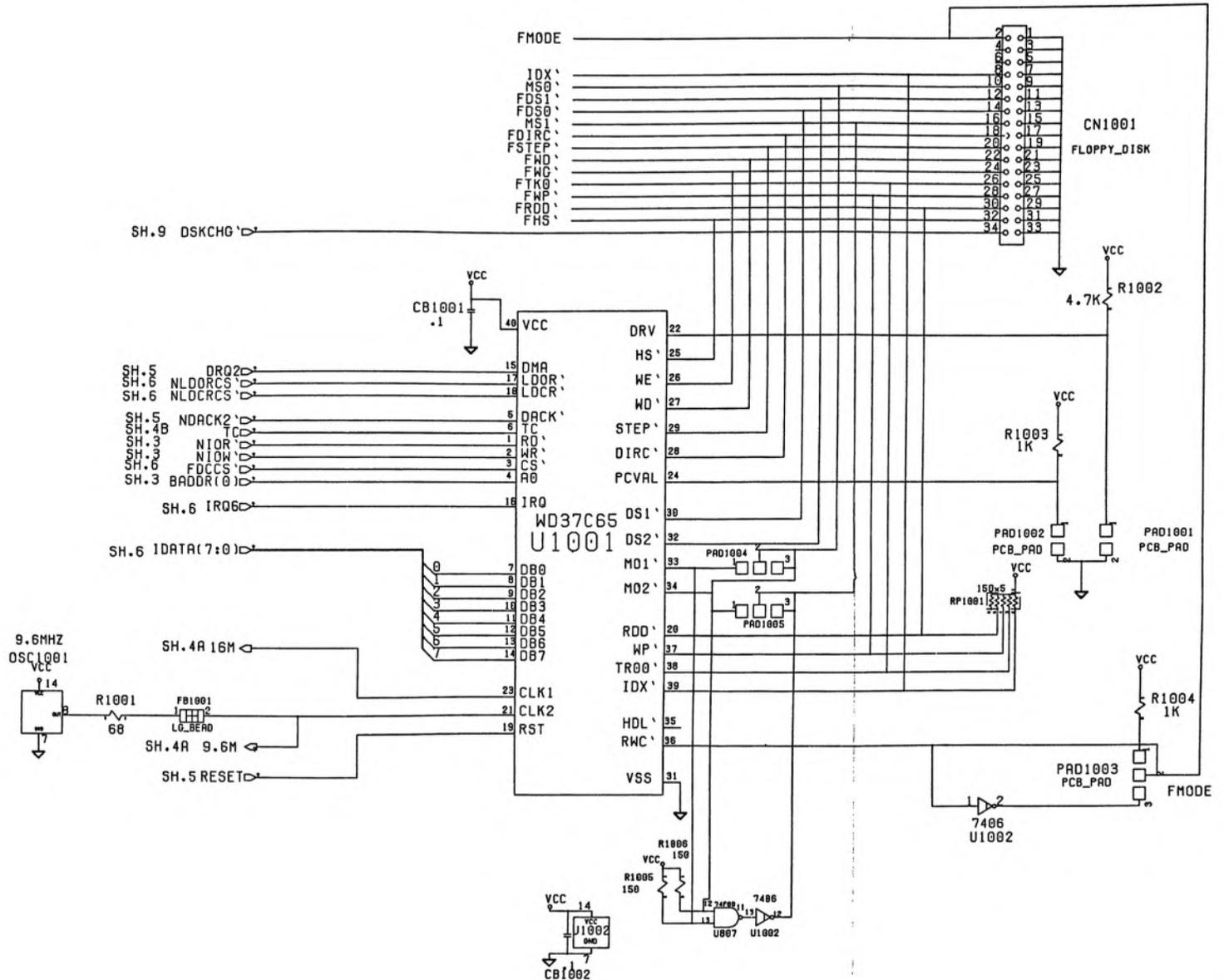


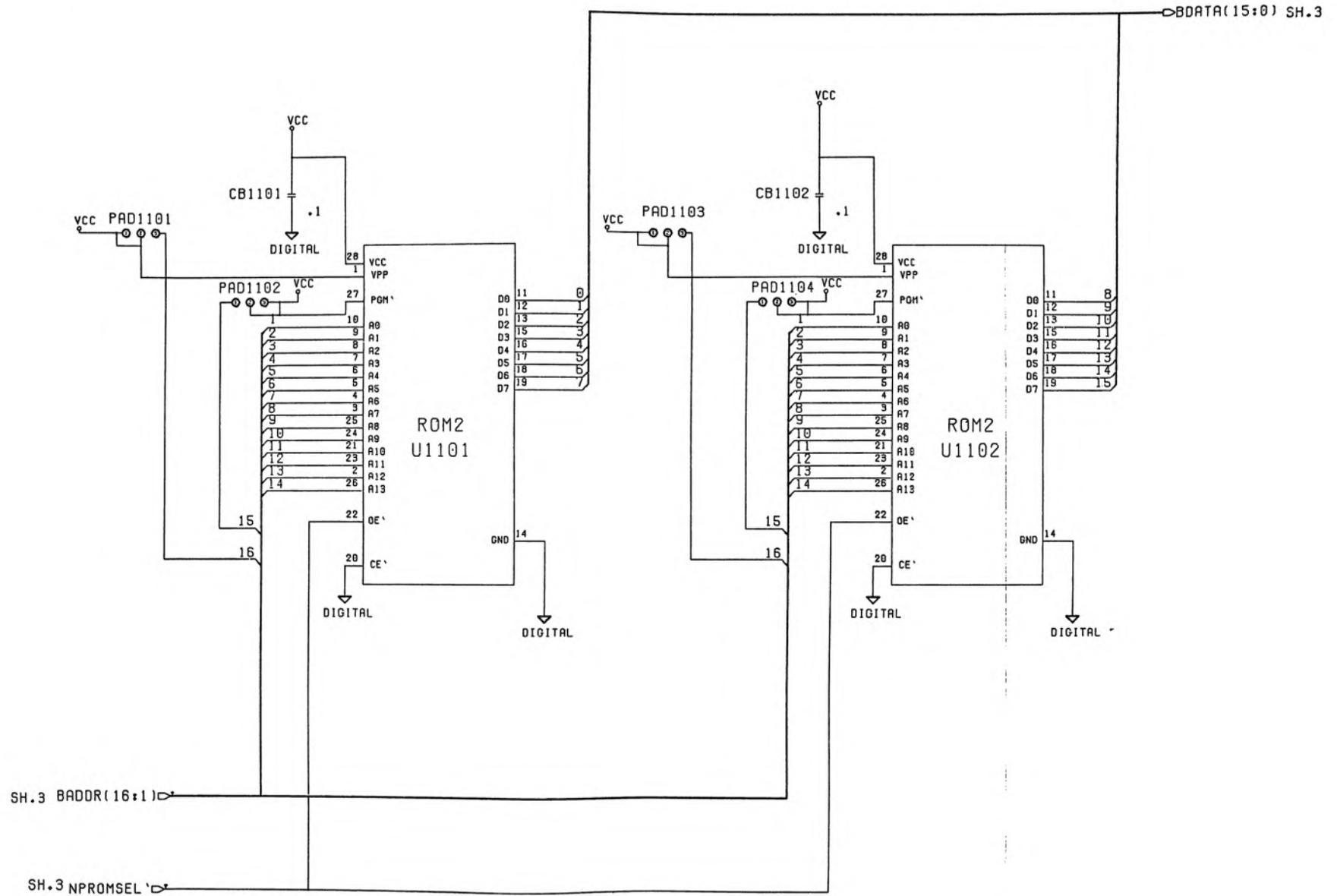


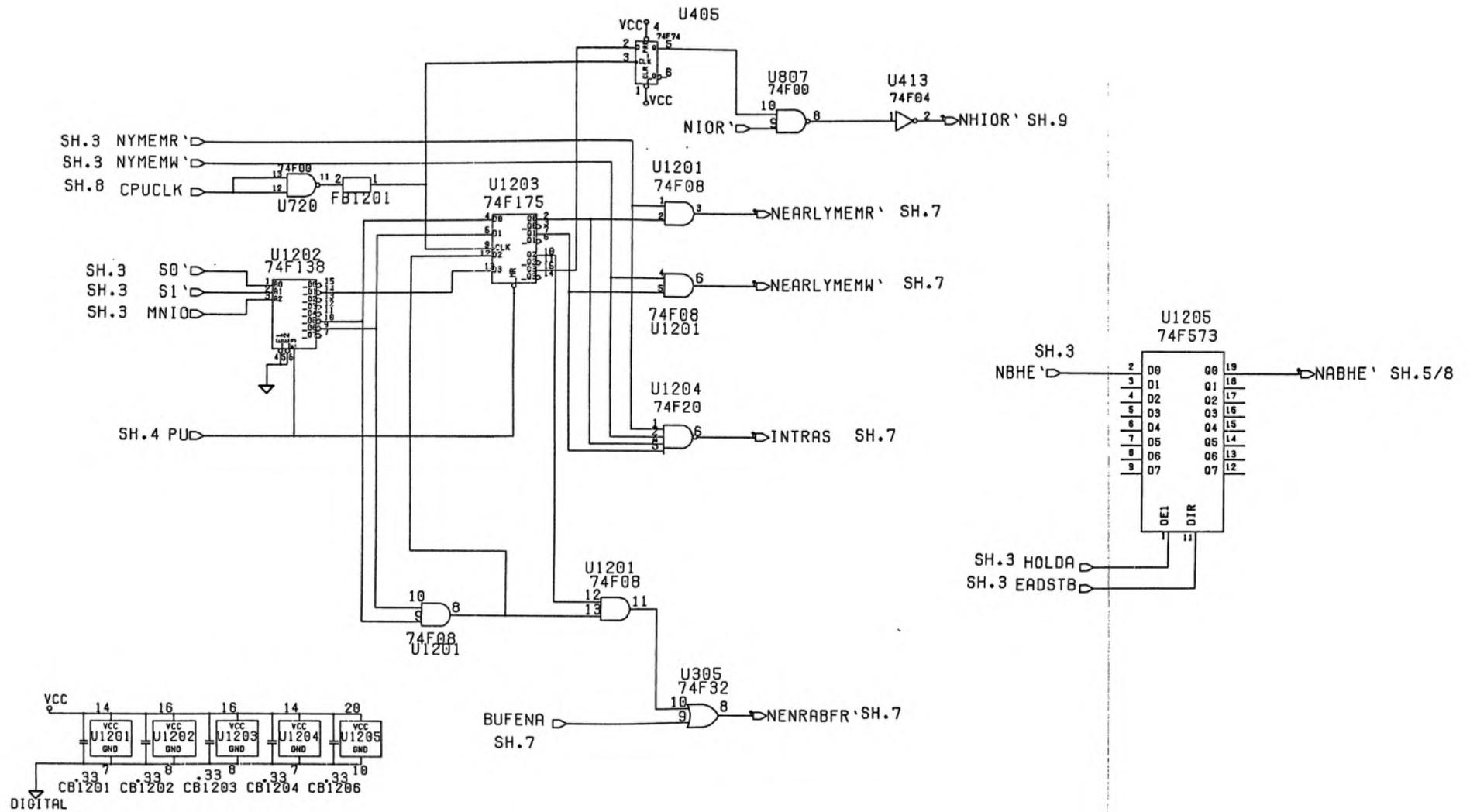














Computer Systems Division
1200 Wilson Drive
West Chester, PA 19380