Micro Systems Development Dual Disk Drive Model SD-2

SCHEMATICS

the MSD SD-2 dual 5.25 disk drive, an after-market unit made to be used with the Commodore PET, C64 and VIC-20 computers. The manual totals about 50 pages. There are three drawings in the manual.

The ROM and RAM locations are the only pages I have from an MSD service manual, other than the schematics. They were not part of the owners manual.

All of the text was scanned pages (some difficult even for me to read) and converted with OCR software as much as possible. Some of the pages were in such bad condition that considerable editing (corrections) had to be done. The entire process took about four days. I have gone over it several times for accuracy, but I'm sure a few mistakes have slipped through anyway. You might let me know if you find any glaring errors. Thanks!

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03-18-03

FIGURE 1.1. CONNECTOR LOCATIONS ON THE MSD SUPER DISK DRIVE

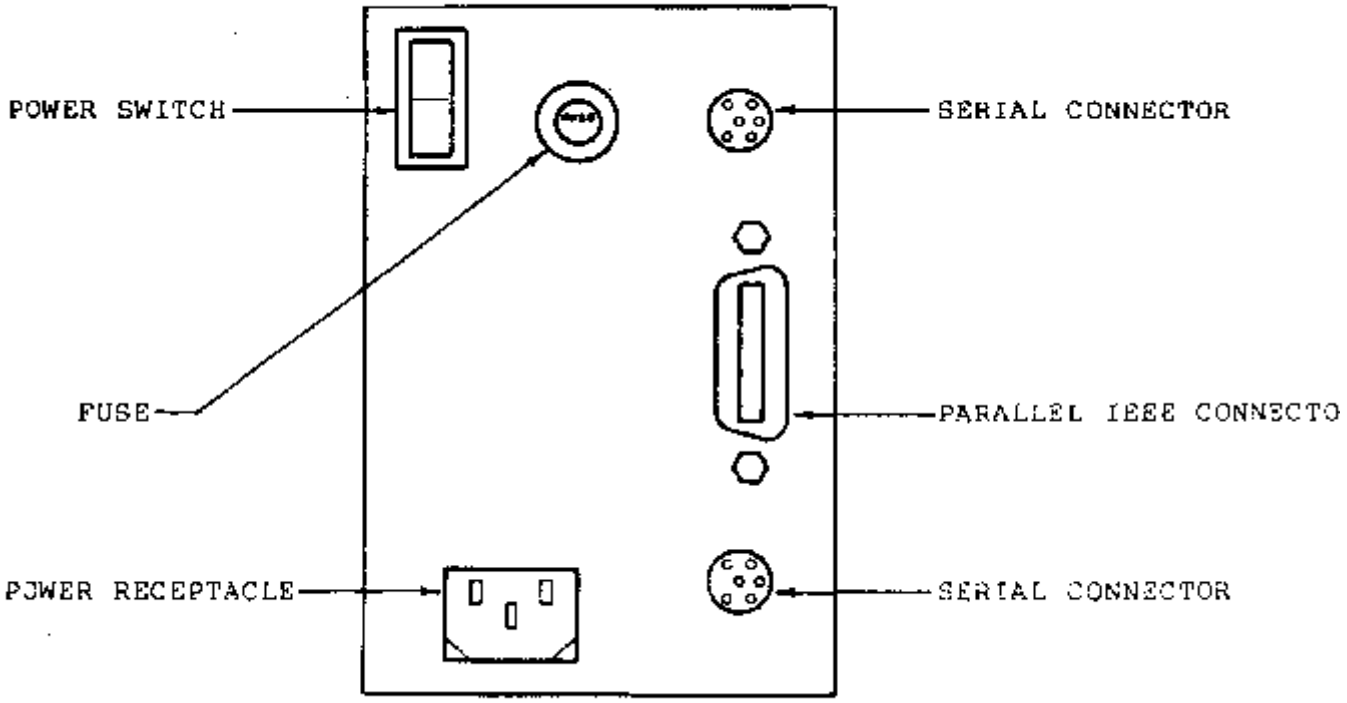
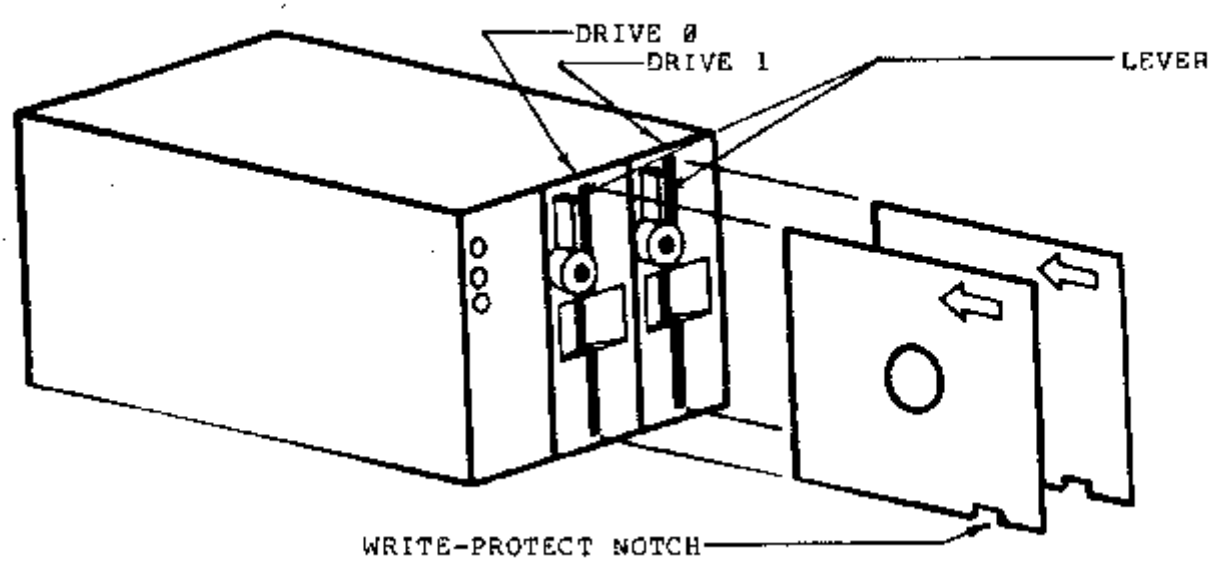


FIGURE 2.1. DESCRIPTION OF DISKETTE



CHANGING THE DISK DRIVE DEVICE NUMBER

The device number on the MSD SUPER DISK DRIVE (dual: SD2) comes from the factory selected as device number 8, drive number 0 and 1. This is the usual or "default" device number, but if more than one disk drive is to be used with the system, it is necessary to give each disk drive a different device number or drive number. With this disk drive, it is not possible to change the drive numbers (ie 0 and 1), but the device number can be changed using either software (a short BASIC program after power up) or hardware (changing jumpers on the drive PC board).

The disk drive determines its device number from a set of jumpers on the PC board inside the drive. At the time the drive is powered on, the jumper settings are "read" by the microprocessor and the resulting number is stored in a specific memory location. This makes it possible to change the default device number by changing (opening or closing) the jumpers. After power up, the device number can be changed by using a "memory-write" command to the memory location that has the device number stored in it. That command must be used each time the drive is turned on. Each method has advantages and disadvantages which will be detailed below.

CHANGING THE DEVICE NUMBER BY THE JUMPER (HARDWARE METHOD)

1. Turn off the drive and remove all cables from the drive.
2. Remove six screws from the drive case and remove the top cover.
3. Locate the jumper block JB1 on the top of the PC board near the rear of the drive. It is located between ICs U10 and U11. At that location, there are four solder pads with two bare wire "jumpers" soldered in horizontally. This is the factory configuration for device 8. If JB1-1 is cut (or simply unplugged if a "header" with a removable jumper is installed), the drive will respond as device 9 when powered up. If the jumper at JB1-2 is removed, the drive will be device 10, and with both jumpers removed, device 11. A SPST (single pole, single pole) switch can be installed

instead of a jumper to allow the drive to be changed later without opening the case. Note: there is room on the rear of the case for added switches.
4. Replace the case top and install the cabinet screws.

Electrically, the two jumpers ground two pins of an IC, namely U22 buffer (74LS240) pins 11 and 17. With a jumper at JB1-1, pin 17 of U22 is grounded, and with a jumper at UB1-2, pin 11 is grounded. This info is helpful in case the solder pads or board traces become damaged and cannot be used.

CHANGING THE DEVICE NUMBER BY SOFTWARE

The device number can be changed by performing a memory-write to locations $0077 and $0078. The memory-write command is performed after the command channel has been opened with a BASIC statement, usually:
OPEN 15,8,15
The memory-write has the following format:
PRINT#<file#>,"M-W"CHR$(119)CHR$(0)CHR$(2)CHR$(dv+32)CHR$(dv+64)
The dv represents the device number that is desired. An example routine for changing the drive from device 8 to device 9 is:
10 OPEN 15,8,15
20 PRINT#15,"M-W"CHR$(119)CHR$(0)CHR$(2)CHR$(9+32)CHR$(9+64)
30 CLOSE 15
To make it easier, this little program can be written to a disk and run each time the number change is needed rather than typing it out every time. The program can be written all on one line by using a colon between statements.

It is usually desirable to change the device number in hardware unless a temporary change is all that is needed. In order to use the software method, only one drive can be powered on, its device number changed, then the next drive powered on and its device number changed, until all drives are on. If this procedure is not followed, there will be a device "conflict" on the serial bus and the drives will not work reliably or at all.

SOME ADDED NOTES FOR THE MSD-SD2 DRIVE

In my SD2, the PC board tends to bow outward physically towards the metal case. I didn't want a short circuit to damage the drive, so I installed a 6" X 6" cardboard spacer to keep the board away from the case top. A sheet of thick plastic glued to the inside of the case top would work as well.

The original cabinet screws were missing when I got my SD2. I noticed that if the replacement screws were any longer than about 1/4", they would hit the PC board inside. The important ones are the three on the side of the case away from the drive mechanisms and closest to the PC board inside.

ERROR FLASH CODES FOR THE SD2 (seen at power up if there is a fault)

Number of flashes	Suspected component failure
1	Micro U7
2	RAM U1
3	RAM U2
4	RAM U3
5	ROM U5
6	ROM U6
7	Drive mechanism

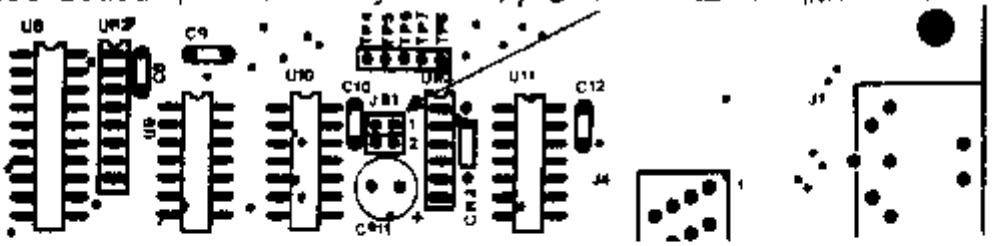
CHANGING THE DEVICE NUMBER BY THE JUMPER (HARDWARE METHOD)

In order to change the device number by the hardware method several steps must be followed:

1. Turn off the disk drive and remove all cables from the drive.

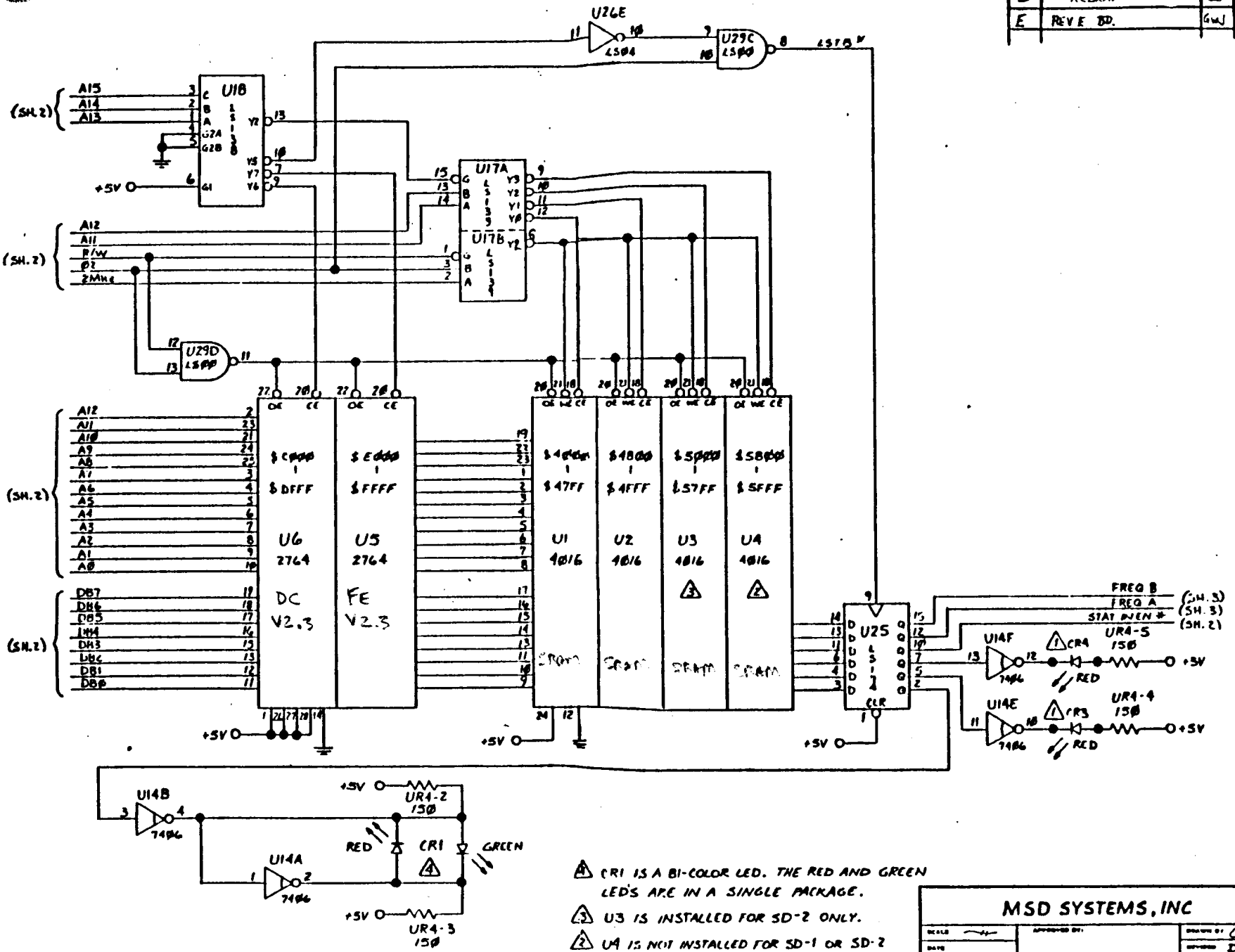
2. Remove the screws from the disk drive cover and remove the cover.

3. Locate the jumper block JB1 at the top rear of the printed circuit board (see drawing below), between IC U10 and U11.



4. A jumper is located on JB1-1 and a jumper is located on JB1-2 when it is shipped from the factory. This is the configuration for the disk to respond as device 8. If JB1-1 is unplugged and JB1-2 is installed, the device number will become 9. If JB1-2 is removed but JB1-1 is installed, the device number will be 10. Removing both jumpers will set the device number to 11.

REV	DESCRIPTION	APPR	DATE
D	REDRAW	CJ	
E	REV E BD.	GWJ	



NOTES:

1. CR1 IS A BI-COLOR LED. THE RED AND GREEN LED'S ARE IN A SINGLE PACKAGE.
2. U3 IS INSTALLED FOR SD-2 ONLY.
3. U4 IS NOT INSTALLED FOR SD-1 OR SD-2
4. CR3 AND CR4 LED'S ARE INSTALLED FOR SD-2 ONLY.

MSD SYSTEMS, INC

SCHEMATIC, SUPER DISK DRIVE

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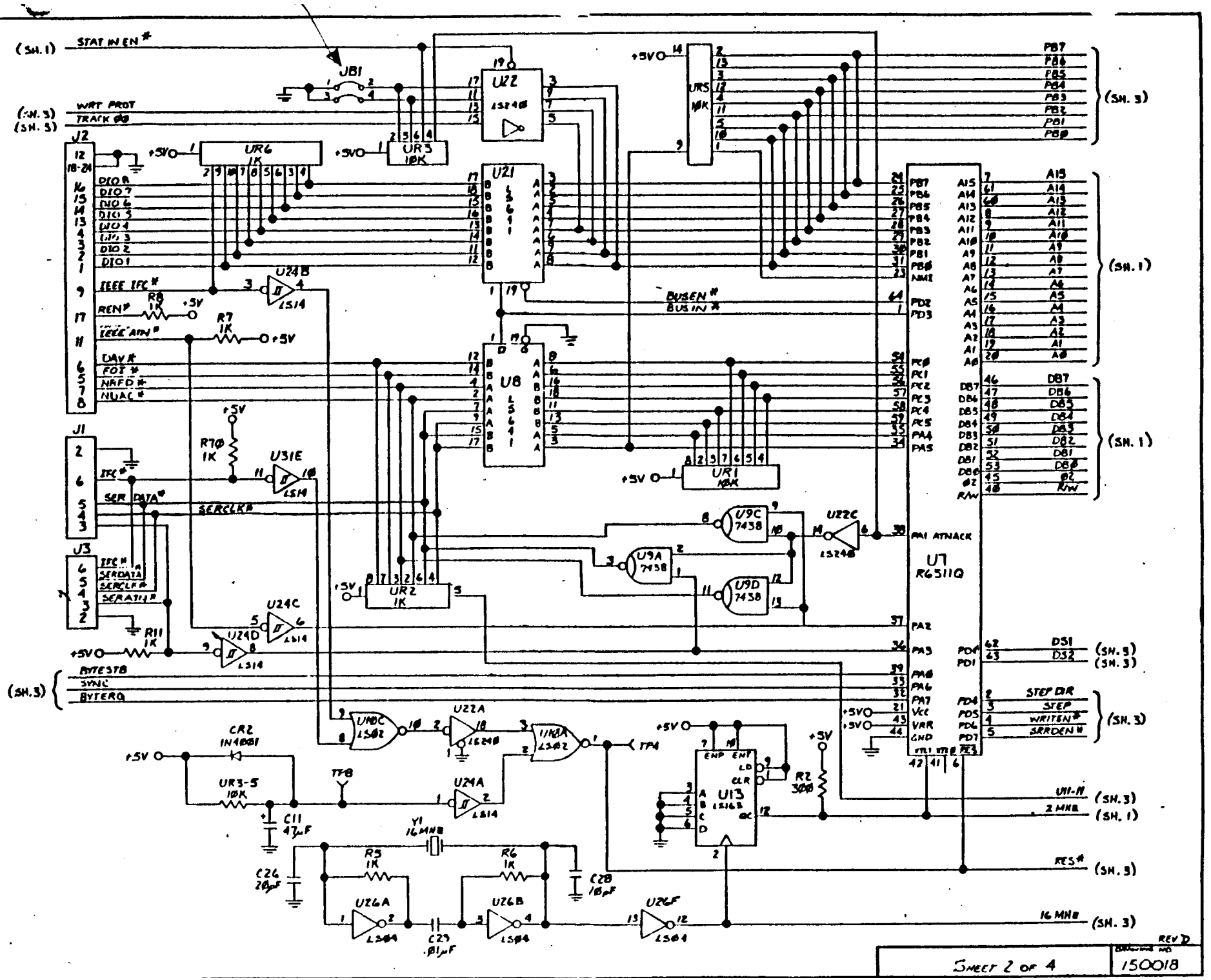
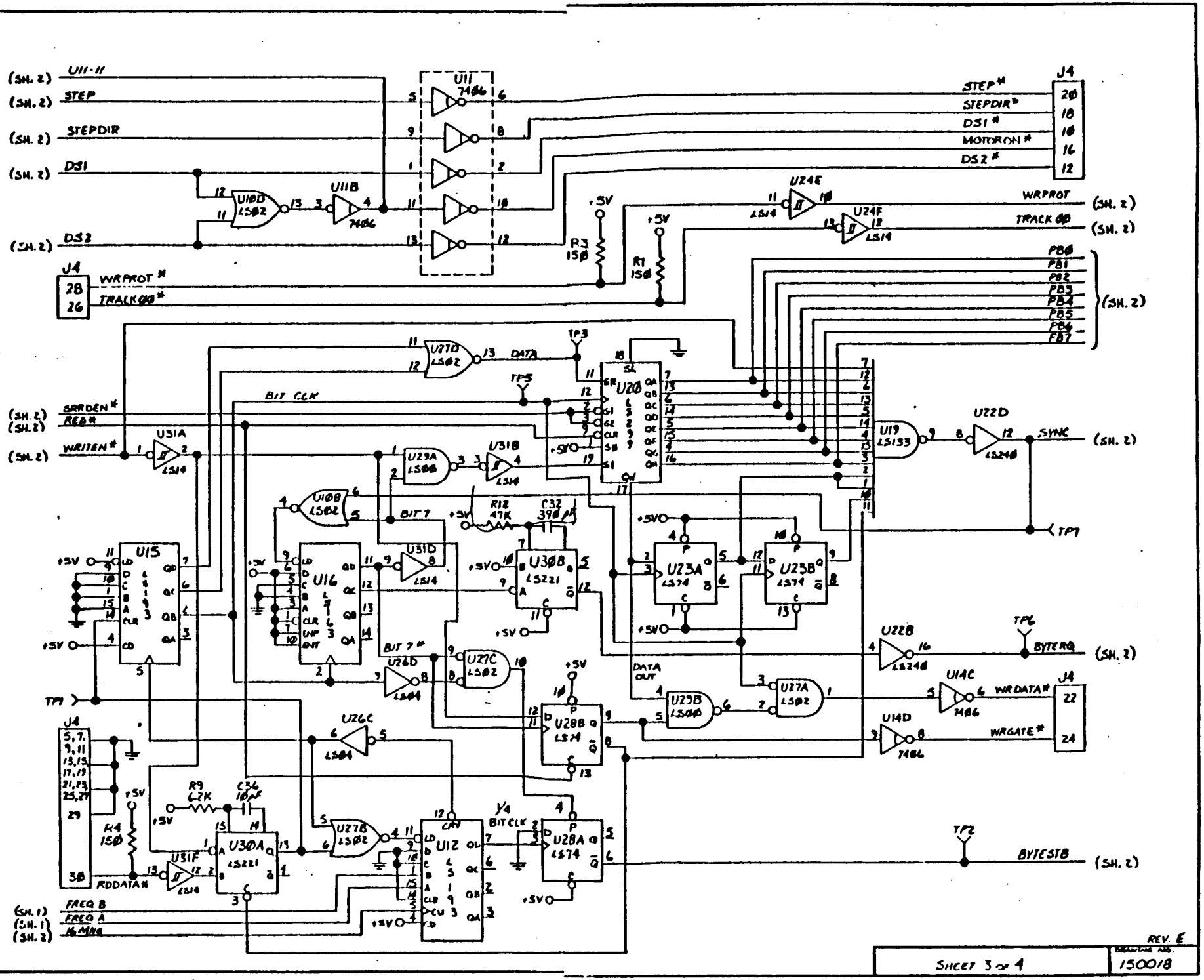
1500018

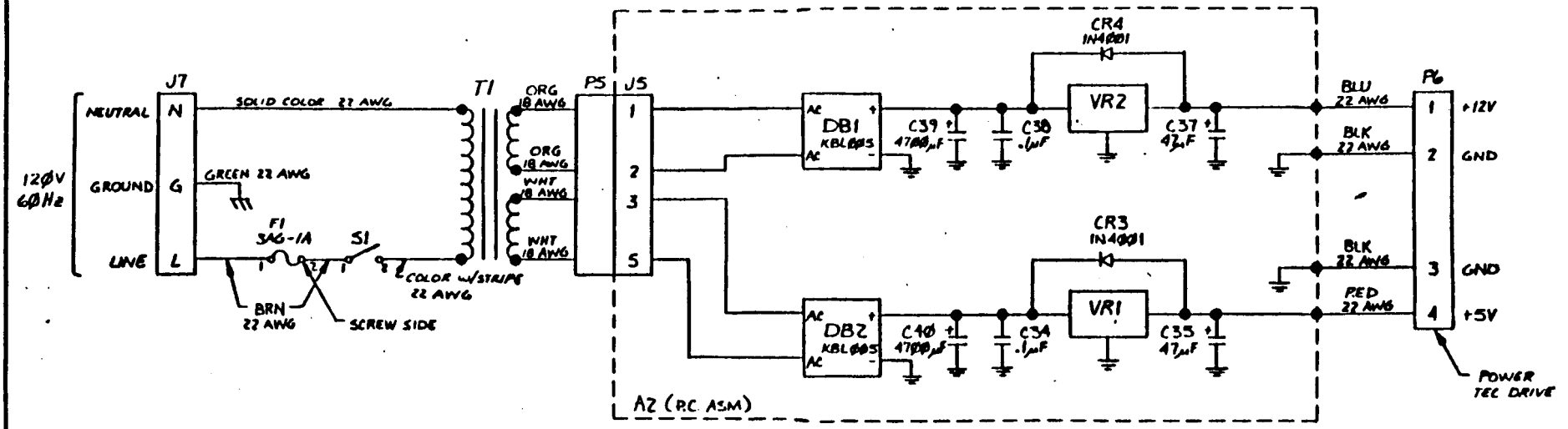


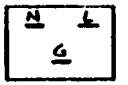
REV D

SHEET 2 OF 4

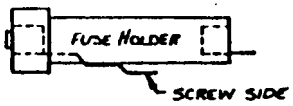
DRAWING NO 150018

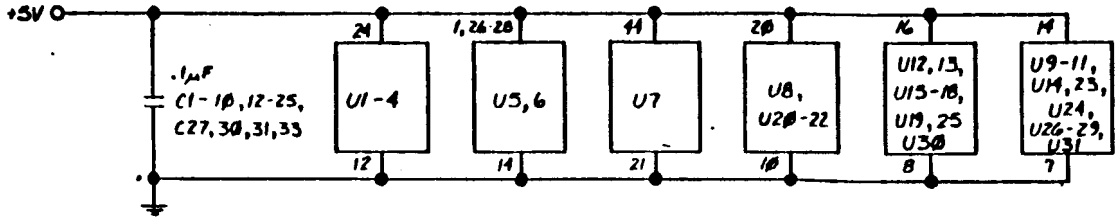

(SH. 2) U11-11
(SH. 2) STEP
(SH. 2) STEPDIR
(SH. 2) DS1
(SH. 2) DS2
U11 7406
U10D LS02
U11B 7406
J4
STEP*
STEPDIR*
DS1*
MOTRON*
DS2*
+5V
R3 150
R1 150
U24E LS14
U24F LS14
WRPROT
TRACK 00
(SH. 2)
J4
28
26
WRPROT*
TRACK00*
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
U27D LS02
DATA
TP3
U20
TP5
BIT CLK
SARDEN*
READ*
WRITEN*
U31A LS14
U29A LS08
U31B LS14
U10B LS02
BIT 7
R12 47K
C32 390 pF
U19 LS153
U22D LS240
SYNC
TP7
U15
U16
U31D LS14
U30B LS221
U23A LS74
U23B LS74
U22B LS240
TP6
BYTERQ
U26D LS04
U27C LS02
BIT 7*
DATA OUT
U25B LS08
U27A LS02
U14C 7406
WRDATA*
U14D 7406
WRGATE*
J4
22
24
U26C LS04
U28B LS74
U4
R9 62K
C36 100 pF
U30A LS221
U31F LS14
RDDATA*
R4 150
U27B LS02
U12
Y4
BIT CLK
U28A LS74
TP2
BYTESTB
(SH. 2)
(SH. 1) FREQ B
(SH. 1) FREQ A
(SH. 2) MMMM
REV. E
SHEET 3 OF 4
150018





J7 - TERMINAL VIEW





Number of Flashes	Component
1	Microprocessor U7
2	RAM U1
3	RAM U2
4	RAM U3
5	ROM U5
6	ROM U6
7	Drive Mechanism

REV D

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Drawing No. 150018