

## VERSAFLOPPY II

### Enhanced Flexible Disk Drive Controller

The Versafloppy II is a low cost versatile state-of-the-art controller board for flexible double or single density disk drives that is compatible with the S-100 Bus computer configurations.

#### General Description

Versafloppy II is a flexible disk drive controller that incorporates a wide range of capabilities into one board. It operates with double density soft-sectored format which provides 985,600 bytes of storage on a double sided 8 inch diskette and 129,920 bytes per side on a 5 inch mini-diskette. A unique feature of the Versafloppy II is that it may be used with mini or full sized floppy drives, single or double density, and single or double side, or in any combination. The Versafloppy II directly controls many popular disk drives. These include: Shugart SA400 and SA450; Shugart SA800 and SA850; Mayflower MFE500 and MFE700; Per Sci 70 and Z77; and Siemens's GSI-105.

The heart of the Versafloppy II controller board is the powerful Western Digital FD1797B-2 NMOS LSI double density controller chip. This device performs most of the timing and control functions required by floppy disk drives such as: head load and unload; track seeking and verification; address mark detection/generation; serial to parallel data conversion for reads; parallel to serial data conversion for writes; CRC error code checking and generation; IBM 3740 Soft Sector compatible recording and signaling for double density recording and precompensation.

The insertion of wait states until the FD1797B-1 is ready for the next word provides synchronization of the data rate with the CPU during sector reading and writing. Optional use of interrupts is available by using V12 and V13 as inputs to an interrupt controller on another board. These controls are not necessary for operation, but are provided for systems requiring priority interrupt signals.

#### Application Data

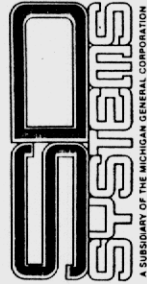
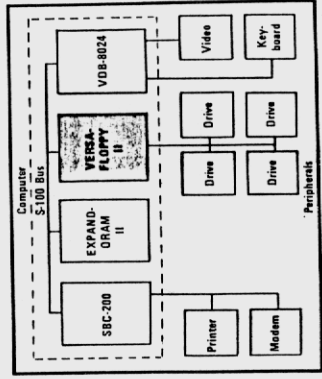
Versafloppy II operates with other S-100 boards to give a complete disk based system. VDB-8024, SBC-200 and the Expando-RAM II from SD SYSTEMS combine with the Versafloppy II to offer a complete data processing system.

The Versafloppy II's control function is evenly distributed between hardware and software to provide flexibility for the user. Software listings are provided with the Versafloppy II for use with the SBC-200/100 single board computer from SD SYSTEMS. This software may be modified to meet the user's specific software interface requirements, such as register usage, parameter handoffs and data formats. Also available from SD SYSTEMS is the SDOOS Operating Systems configured to run with several combinations of SD SYSTEMS boards, terminals and disk drives. This will allow the use of any of several disk based versions of high level language.

SD SYSTEMS recommends the use of DDBIOS (order #39034) to complete all necessary read/write routines for Versafloppy II when it is combined with SBC-100/200. DDBIOS also includes VFDIAC to provide diagnostic functions for the Versafloppy II when it is employed in conjunction with the SBC-100/200. VFDIAC simulates actual disk usage and reports error conditions. The Versafloppy II employs the SD Monitor to control its input/output console functions.

#### Features

- S-100 Bus Compatible
- IBM-3740 Compatible, Soft Sectored Format for Single Density Drives
- Operates with both Standard (8") and Mini (5") Drives Simultaneously
- Provides Control for Double Sided Operation
- Operates with Z80, 8080 and 8085 Central Processing Unit
- Controls up to four drives
- Vectored Interrupt Operation Optional
- Control and Diagnostic Software Available in PROM
- SDOOS Disk Operating System Compatible



Versafloppy II operates with or without interrupts. However, the standard control software does not use interrupts.

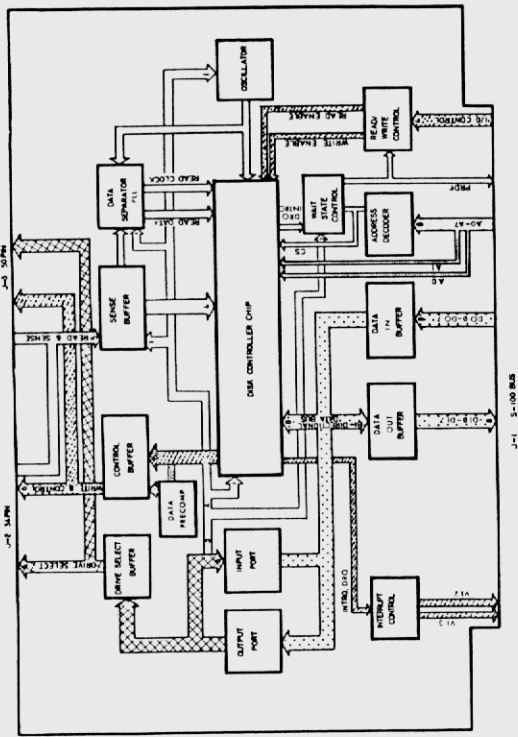
Output Port 63 is an eight bit control register with several functions. Bits 0 through 3 are Drive Select 1, 2, 3, and 4.

Bit 4 selects the side for use with double sided drives. Bit 5 is a control for mini/full drive. Double or single density is controlled through Bit 6, and Bit 7 controls the Wait State Enable.

Input Port 63 reads the present state of Output Port 63. Bits 0—7.

## Specifications

Functional	Value
Bus	S-100
Compatible CPU's	Z80
Storage Capacity	985,600 bytes (Double-Sided) (8" diskette) 129,920 bytes per side (5" diskette)
Physical	
Dimensions (Board Size)	5.0" x 10.10" x 0.65"
Connectors	J1-S-100 Bus; J2-34 Pin; J3-50 Pin
Power Requirements	+8 VDC @ 300mA (max) +16 VDC @ 50mA (max)
Operating Temperature	0 Degrees to 50 Degrees Celsius



## Functional Description

The major functions contained in the Versafloppy II hardware are shown in the block diagram above. The Versafloppy II Disk Controller is comprised of two basic parts: 1) the hardware board and 2) the software which controls the hardware. The hardware allows the computer to control the drive selection, head loading, track seeks, formatting, reading and writing operations. The software directs the hardware in each of the operations.

The Floppy Disk Controller (FD1797B-2) performs track to track stepping timing, serial to parallel data conversion, parallel to serial data conversion, error code checking and generation, and IBM 3740 soft sector compatible recording. After each operation is completed, the chip interrupts the Central Processing Unit. (The interruption feature is optional.) I/O ports 64, 65, 66 and 67 are contained within the FD1791B-1 device.

The 8 bit Data Out Bus is the S-100 path for transferring data from the Central Processing Unit (CPU) to the output ports on the Versafloppy II board.

The 8 bit Data In Bus is the S-100 path for transferring data from the input ports on the Versafloppy II board to the computer (CPU). The computer makes its selection of the various Input/Output on the board through the eight low order address lines (A0-A7). The I/O

control lines consist of  $\overline{PWR}$ ,  $\overline{PDBIN}$ ,  $\overline{SOUT}$ , and  $\overline{SINP}$ . These lines control the input and output operations to and from the I/O ports on the Versafloppy II.

The on-board Wait State Generator delays the input and output operations until the FD1791B-1 is ready to transfer a word. The  $\overline{PRDY}$  line puts the CPU in a wait state during the delay. Wait states are only generated during sector read and write (port 67).

The Address Decode block detects the presence of a port address on the low order address from the CPU (A0-A7). The output of the Address Decoder is used to gate read and write pulses to the I/O ports.

The Data In Buffer isolates the Bi-Directional Data Bus used on the Versafloppy II from the S-100 Data In Bus. This buffer is enabled during the input port reads from ports on the Versafloppy II.

The Bi-Directional Data Bus is a path for all transfers to and from the Input/Output ports on the Versafloppy II.

The Data Out Buffer isolates the Bi-Directional Data Bus used on the Versafloppy II from the S-100 Data Out Bus. This buffer is enabled except during the input port reads on the Versafloppy II.

The Select Buffer supplies the current sinking drive for the drive and side select lines. The Control Buffer supplies the current sinking drive for WRITE DATA, WRITE GATE, DIRECTION, STEP, TRK43 and HLD. The Sense Buffers receive the READ DATA, INDEX, TRK00, READY and WRTPRP signals from the selected disk drive. Each input is a Schmitt Trigger device providing hysteresis noise immunity.

The Data Separator PLL divides the composite FM and MFMI READ DATA into separated Data and Clock Signals required by the FD1791B-1 Controller Chip.

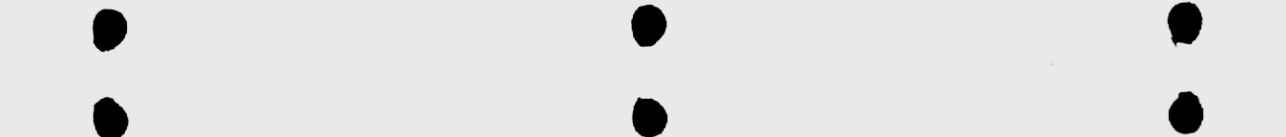
The Oscillator Circuit provides a crystal controlled squarewave used by the Data Separator and FD1797B-2. This may be software configured for mint or full size disk drive data rates.

## J2 Pin Description

Pin No.	Direction	Signal Name
8	In	IP
10	Out	DRV SEL 1
12	Out	DRV SEL 2
14	Out	DRV SEL 3
16	Out	MOTOR ON (HLD)
18	Out	DIR
20	Out	STEP
22	Out	WRT DATA
24	Out	WRT GATE
26	In	TRK00
28	In	WRT PROT
30	In	RD DATA
32	Out	SIDE SELECT
Odd Pins		GROUND

## J3 Pin Description

Pin No.	Direction	Signal Name
6	Out	GT43
14	Out	SIDE SELECT
18	Out	HLD
20	In	IP
22	In	READY
26	Out	DRV SEL 1
28	Out	DRV SEL 2
30	Out	DRV SEL 3
32	Out	DRV SEL 4
34	Out	DIR
36	Out	STEP
38	Out	WRT DATA
40	Out	WRT GATE
42	In	TRK00
44	In	WRT PROT
46	In	RD DATA
50		GROUND



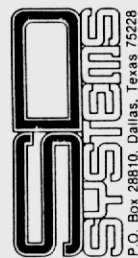
OPERATIONS  
MANUAL

**VERSAFLOPPY II**  
FLOPPY DISK CONTROLLER

VERSAFLOPPY II  
FLOPPY DISK CONTROLLER

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JULY 1979

REVISION C  
JULY, 1980



SD #7140043 REV. C

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SECTION I

GENERAL INFORMATION

1-1 INTRODUCTION

VERSAFLOPPY II™ is the new floppy controller board from SD SYSTEMS. It features the Western Digital FDI795 double density controller. The unique feature of this board is that it may be used with mini or full-size floppy drives, single or double density, single or double sided, in any variation thereof. For example, a mini drive operating single density and a full-size drive operating double density may be utilized at the same time and information may be transferred from one to the other.

VERSAFLOPPY II was designed to be used optimally with SD SYSTEMS' SBC-200, single board computer, and Expandoram boards to form a complete, low cost, disk based computer. The VERSAFLOPPY II is designed for operation with the Z80 CPU and is not recommended for operation with other processors.

1-2 GENERAL DESCRIPTION

At the heart of the VERSAFLOPPY II is the powerful Western Digital FDI795B NMOS LSI double density controller chip. This device performs most of the timing and control functions required by floppy disk drives such as:

1. Head load/unload
2. Track seeking with verification
3. Address mark detection/generation
4. Serial to parallel data conversion during reads
5. Parallel to serial data conversion during writes
6. CRC error code checking/generation
7. IBM 3740 Soft Sector compatible reading
8. Signals for double density recording and precompensation

During sector reading and writing, the data rate is synchronized with the CPU by inserting wait states until the FDI795B is ready for the next word.

The VERSAFLOPPY II employs a phase locked loop in the data recovery circuit which insures a valid readback during double density operation.

#### 1-3 SOFTWARE CONSIDERATIONS

The control function has been designed to be evenly distributed between the hardware circuit and the control software allowing a great deal of flexibility for the user. A version of the control software is supplied with the VERSAFLOPPY II in listing form configured to run on the SBC-100/200 single board computer. This may be modified to meet the user's specific software interface requirements, such as register usage, parameter hand-offs and data formats.

Also available from SD SYSTEMS is a version of SDOS configured to run on the SBC-100/200, VERSAFLOPPY II and 32K Expandoram II board combination. This allows using several disk based versions of high level languages.

## SECTION II FUNCTIONAL DESCRIPTION

### 2-1 INTRODUCTION

Functionally, the VERSAFLOPPY II consists of two main parts: hardware, and the software which controls it. The hardware allows the computer to control the drive selection, head loading, track seeks, formatting, reading and writing operations. The software, as described in Section 3, must direct the hardware in each of these operations. The major functions contained in the VERSAFLOPPY II hardware are shown in the block diagram. (Fig. 2-1) Table 2-1 lists the S-100 Bus signals used by the VERSAFLOPPY II.

### 2-2 FDI791B-1

The FDI797, the floppy disk controller chip, performs track to track stepping timing, head load timing, serial to parallel data conversion; parallel to serial data conversion; error code checking/generation, and IBM 3740 softsector compatible recording. After each operation is completed, the chip can optionally interrupt the CPU. (For complete description, see Western Digital FDI795 specification). I/O ports 64,65,66 and 67 are contained within this device.

The FDI795 also has the necessary signals to implement double density operation including a pin to determine whether the chip is to operate single or double density and a late and an early signal for use in precompensation.. The FDI795

has a negative true data bus.

#### 2-3 DATA OUT BUS

The 8 bit DATA OUT BUS is the S-100 path for transferring data from the computer (CPU) to the output ports on the VERSAFLOPPY II board.

#### 2-4 DATA IN BUS

The 8 bit DATA IN BUS is the S-100 path for transferring data from the input ports on the VERSAFLOPPY II board to the computer (CPU).

#### 2-5 A0-A7

The A0-A7 low order eight address lines are used by the computer (CPU) to select the various input/output ports on the board.

#### 2-6 I/O CONTROL LINES AND READ/WRITE CONTROL

The I/O Control lines consist of PWR, PDBIN, SOUT, SINP. These lines are used to control the input and output operations from/to the I/O ports on the board.

#### 2-7 WAIT STATE CONTROL AND PRDY

The Wait State Generator is used by the VERSAFLOPPY II to delay the input and output operations until the FD1795 chip is ready to transfer a word. This PRDY line puts the CPU in a wait state during the delay. Wait states are only generated during sector reads and writes (which use I/O port 67).

#### 2-8 ADDRESS DECODER

The Address Decoder detects when a port address used on the VERSAFLOPPY II is present on the low order eight bits of address from the CPU (A0-A7). The output of the decoder is used to gate read and write pulses to the I/O ports.

#### 2-9 DATA IN BUFFER

The Data In Buffer isolates the Bi-Directional Data Bus used on the VERSAFLOPPY II from the S-100 Data In Bus. This buffer is enabled during input port reads from ports on the VERSAFLOPPY II. The data is inverted by the Data In Buffer to compensate for the negative true data bus of the FD1795 controller chip.

#### 2-10 DATA OUT BUFFER

The Data Out Buffer isolates the Bi-Directional Data Bus used on the VERSAFLOPPY II from the S-100 Data Out Bus. This buffer is enabled except during input port reads from ports on the VERSAFLOPPY II. The output data is inverted by the Data Out Buffer to compensate for the negative true data bus of the FD1795 controller chip.

#### 2-11 BI-DIRECTIONAL DATA BUS

The Bi-Directional Data Bus is a path for all transfers to and from the I/O ports on the VERSAFLOPPY II.

#### 2-12 INTERRUPT CONTROL

The VERSAFLOPPY II operates with or without interrupts, but the standard control software does not use interrupts.

#### 2-13 OUTPUT PORT 63

Output Port 63 is an 8 bit control register with several functions:

1. Bits 0-3 Drive Select 1,2,3,4
2. Bit 4 Side Select for double sided drives
3. Bit 5 5"/8" drives
4. Bit 6 Double/Single Density
5. Bit 7 Wait State Enable/INUSE STB\*

\*The INUSE STB when set low during drive select activation/deactivation will lock or unlock the drive door if that option is incorporated on the drive. This function can be disabled by cutting the etch between E11 and E12.

#### 2-14 INPUT PORT 63

Input Port 63 is used to read the present state of several control signals:

1. Bits 6-7 State of Output Port 63, as described above

#### 2-15 SELECT BUFFER

The Select Buffer supplies the current sinking drive for the drive and side select lines.

#### 2-16 CONTROL BUFFER

The Control Buffer supplies the current sinking drive for WRITE

DATA, WRITE GATE, DIRECTION, STEP, TRK43, and HLD.

#### 2-17 SENSE BUFFER

The Sense Buffer receives the READ DATA, INDEX, TRK00, READY, and WRTPT signals from the selected disk drive. Each input is a Schmitt Trigger providing hysteresis noise immunity.

#### 2-18 DATA SEPARATOR

The Data Separator circuit divides the composite FM & MFM READ DATA

into separated Data and Clock signals required by the FD1795 controller chip. The data separator uses the 74LS124 VCO coupled with a LM301 OP AMP to dynamically reconstruct the data clock from the input raw data stream.

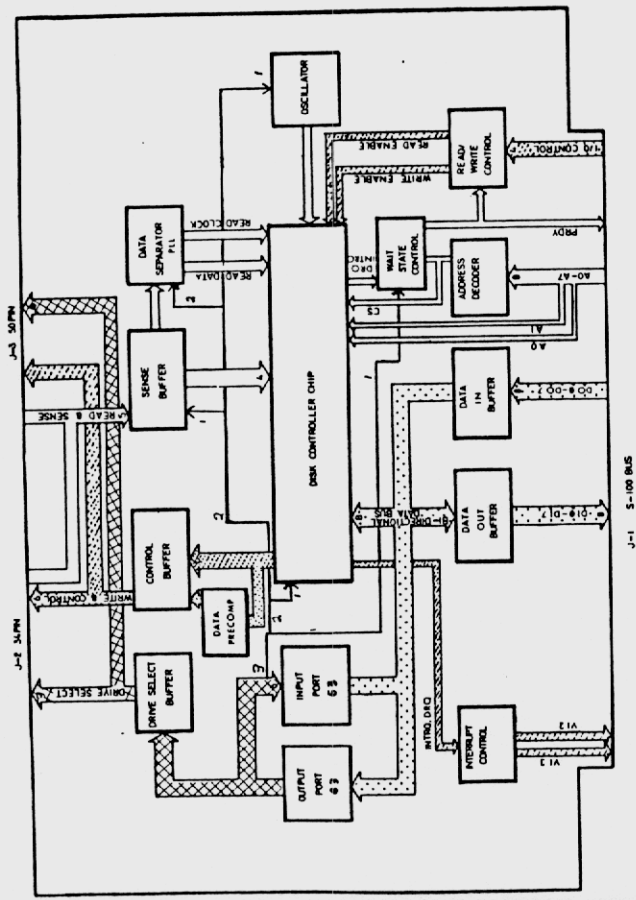
#### 2-19 OSCILLATOR

The Oscillator circuit provides a crystal controlled squarewave (16MHZ) divided down to provide the proper clock frequency to the FD1795 for 8" or 5 1/4" operation.



TABLE 2-1  
S-100 BUS SIGNALS USED BY VERSAFLOPPY II

PIN	SIGNAL NAME	DIRECTION	DESCRIPTION
1,51	+8Volts		
2	+16 Volts		
6	VI2	OUTPUT	INTERRUPT CHANNEL 2
7	VI3	OUTPUT	INTERRUPT CHANNEL 3
24	$\emptyset 2$	INPUT	PHASE 2 CLOCK
25	$\emptyset 1$	INPUT	PHASE 1 CLOCK
29-31, 79-83	A0-A7	INPUTS	OW ORDER ADDRESS
35, 36, 38-40, 88-90	DO $\emptyset$ -D07	INPUTS	DATA OUT BUS
41-43, 91-95	DI $\emptyset$ -DI7	OUTPUTS	DATA IN BUS
45	SOUT	INPUT	PORT OUTPUT CYCLE
46	SINP	INPUT	PORT INPUT CYCLE
72	PRDY	OUTPUT	READY
77	$\overline{\text{PWR}}$	INPUT	WRITE
78	PDBIN	INPUT	DATA BUS IN
99	$\overline{\text{POC}}$	INPUT	POWER ON CLEAR
100, 50	GROUND		



VERSAFLOPPY II BLOCK DIAGRAM

FIGURE 2-1

SECTION III  
CONTROL SOFTWARE

3-1 INTRODUCTION

The versatility of the VERSAFLOPPY II is maintained by its ability to be controlled by software. Certain sequences must be executed to ensure proper operation of the disk drive. These control sequences are supported by the SD SYSTEMS' DBBIOS software program.

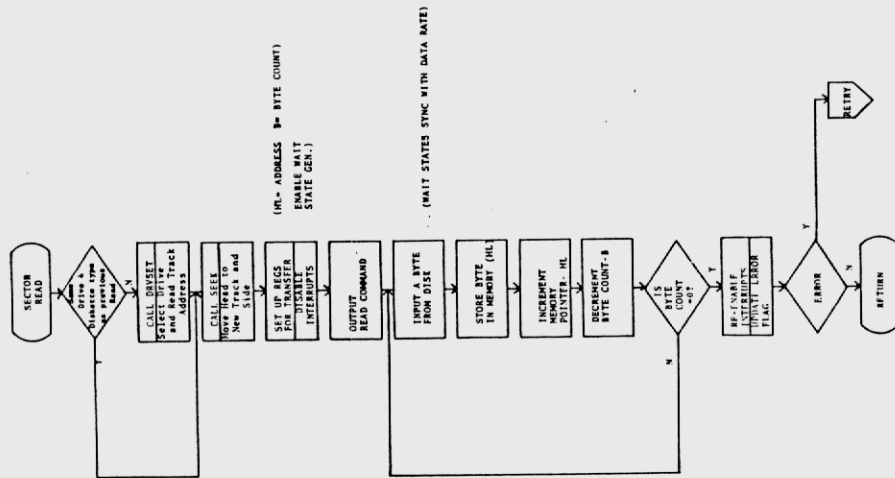
This section will cover these basic software sequences with verbal and graphic description. Program listings of the software in Z-80 source code are included in Appendix E.

The SECTOR READ and SECTOR WRITE sequences are the two main entries into the controlling software. Before these sequences may be entered, the memory transfer address, drive select, track, and sector must have been stored in memory locations. When operating with SDOS Disk Operating System, these parameters are set up when the SETDMA, SELDSK, SETTRK, and SETSEC entries, respectively, are called. The READ and WRITE SDOS entries are linkages to the SECTOR READ and SECTOR WRITE sequences, respectively. If an error is encountered in the Read or Write process, two more attempts will be made to execute the process. After this a Rseek will be executed and then three more Retrys. If an error still exists, program control will be returned to the user with the Z bit reset. If no error exists the Z bit will be set upon Return.

3-2 SECTOR READ SEQUENCE (Figure 3-1)

The function of the SECTOR READ SEQUENCE is to do everything necessary to transfer the previously specified sector (128.BYTES) to the previously specified memory buffer (anywhere in the system RAM):

SECTOR READ SEQUENCE  
FIG 3-1



SECTOR READ SEQUENCE

FIGURE 3-1

The UNIT byte is compared to the unit check byte to determine if the desired drive and diskette type is the same as the previously selected drive and diskette type. If not, the DRVSET routine is called to set up the new drive and determine the diskette type table address to be stored in the IX index register. If DRVSET is called then ID READ is also called to set up the track address of the new drive.

The SEEK and TRINT (section 3-5) subroutines are called to put the Read/Write head on the requested side and track.

The CPU registers are then set up with the memory address and byte count. Data from the disk is input a byte at a time, and stored in memory. This process is synchronized with the disk data rate by hardware inserted wait states. (Interrupts are dis-abled during data transfers).

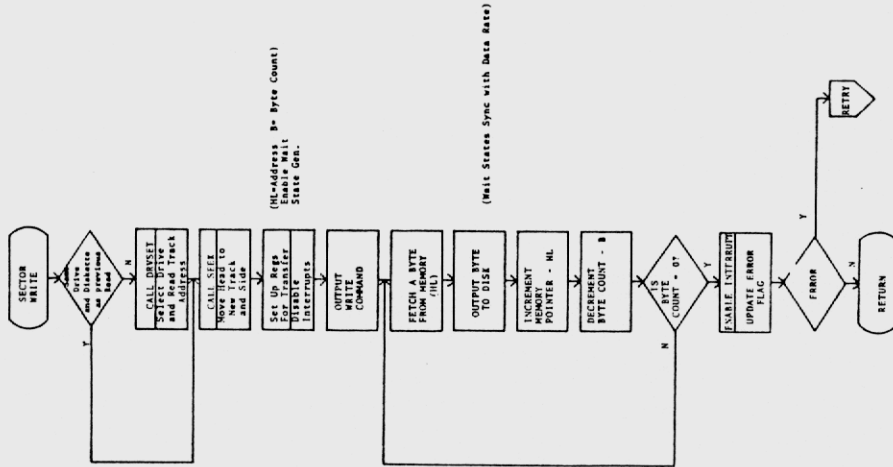
When all 128 bytes of data have been read in, the program waits for the hardware to go "not busy". The End of Command Routine then checks for CRC and other error conditions. If no errors occurred, the program returns to the caller with the error flag cleared.

3-3 SECTOR WRITE SEQUENCE (figure 3-2)

The function of the SECTOR WRITE SEQUENCE is to do everything necessary to transfer the previously specified memory buffer (128 bytes anywhere in the system) to the previously specified disk sector.

The UNIT byte is compared to the unit check byte to determine if the desired drive and diskette type is the same as the previously

SECTOR WRITE SEQUENCE  
FIG. 3-2



selected drive and diskette type. If not, the DRVSET routine is called to set up the new drive and determine the diskette type table address to be stored in the IX index register. If DRVSET is called then ID READ is also called to set up the track address of the new drive.

The SEEK and TRINT (section 3-5) subroutines are called to put the Read/Write head on the requested side and track.

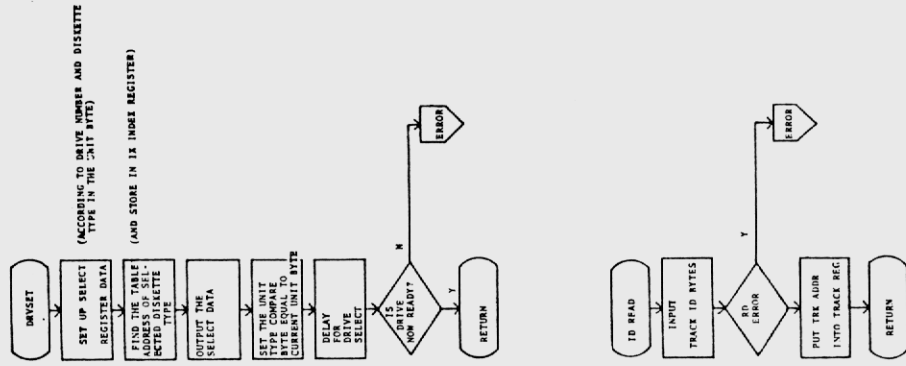
The CPU registers are then set up with the memory address and byte count. The data is output a byte at a time, to the disk. This process is synchronized with the disk rate by hardware inserted wait states. (Interrupt are disabled during data transfers).

When all 128 bytes of data have been output, the program waits for the hardware to go "not busy". The End of Command Routine then checks for CRC and other error conditions. If no errors occurred, the program returns to the caller with the error flag cleared.

SECTOR WRITE SEQUENCE

Figure 3-2

DRIVE SELECTION SEQUENCE  
FIG 3-3



DRIVE SELECTION SEQUENCE

Figure 3-3

### 3-4 DRIVE SELECTION SEQUENCE (Figure 3-3)

The DRIVE SELECTION SEQUENCE translates the data in the unit byte into the format of the select register. The IX index register is then set up with the diskette type table address desired. The new selection is output followed by a delay for Drive Select. This delay is 18 milliseconds for a full-size drive and about 50 milliseconds for a mini.

The status is then read to verify that the drive is ready. If the drive is not ready, the error exit is taken.

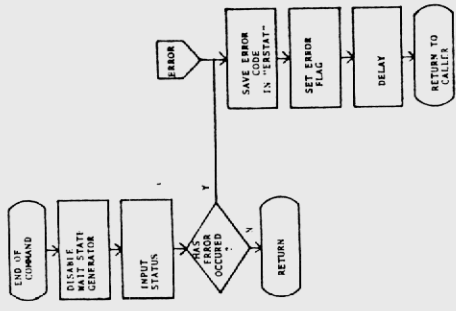
### ID READ

In the ID READ ROUTINE the track address is read from the disk to inform the hardware of what track the new drive's read/write head is presently on. The normal return routine is then executed.

### 3-5 TRACK SEEK AND TRANSFER INITIALIZATION

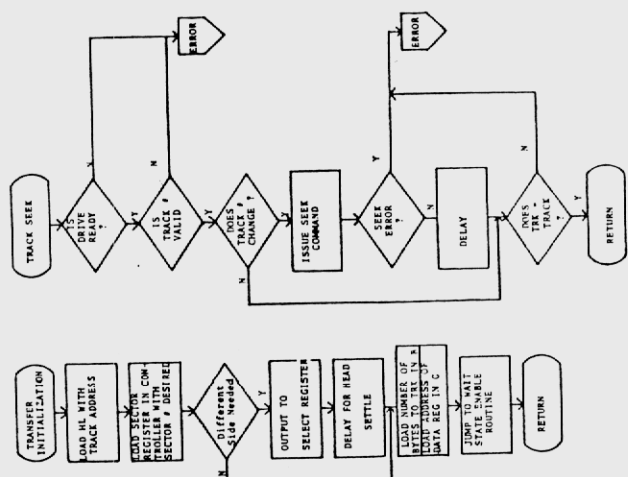
The TRACK SEEK routine moves the head to the proper track, after verifying the track is valid. The TRANSFER INITIALIZATION (TRINT) sequence is responsible for verifying that the requested sector is a valid number and in the case of the double-sided drives, select the proper side of the disk. The Transfer Address is also set up in this routine.

END OF COMMAND ROUTINE  
FIG 3-5



END OF COMMAND ROUTINE  
Figure 3-5

TRACK SEEK AND TRANSFER INITIALIZATION  
FIG 3-4



TRACK SEEK  
Figure 3-4

### 3-6 END OF COMMAND ROUTINE (figure 3-5)

The END OF COMMAND ROUTINE is entered after both normal and error terminations of hardware executed commands. The routine waits for the FD1795 to become "not busy". The wait state generator is then disabled, and the status is input to check for errors. If no error occurred, then a normal return is taken.

If an error condition is detected, then error type is saved, error flag set and a return is taken directly back to the caller after a delay (18 MS-8"; 50 MS-5")

### 3-7 FORMAT ROUTINE

The FORMAT ROUTINE is entered directly through the vector at location F033. This routine expects the UNIT byte to be set up previously according to the type of format desired. See Table 8-1 for valid UNIT byte data.

NOTE 1: The DDBIOS software uses the side byte on the diskette to determine if the diskette is single or double sided. It therefore may mis-read disks formatted double-sided on an SD-100 as single-sided.

NOTE 2: Early boards used a 1791B-1 controller chip, which is not able to read disks formatted with all zeros in the gaps between sectors. Therefore, VersaFloppy II boards with the 1791B-1 cannot read disks formatted by machines with a 1771 controller chip (like the S.D. Systems SD-100).

## SECTION IV

### CONSTRUCTION

#### 4-1 INTRODUCTION

The SD SYSTEMS VERSAFLOPPY II kit is intended for those people who have had some prior experience with kit building and digital electronics. If you do not fall into this category it is highly recommended that you find an experienced person to help you in assembly and check out of the board.

Appendix B shows the parts list for the SD SYSTEMS Floppy Disk Controller board. Double check all parts against this parts list.

#### 4-2 ASSEMBLY PROCEDURE

1. Install and solder the IC sockets in their proper locations as follows: (Do not install sockets in U1 or U2)  
14 Pin at U4, 8, 11, 12, 14-18, 21-26, 32-34  
16 Pin at U5, 7, 13, 19, 20  
20 Pin at U9, 27-31  
40 Pin at U10
2. Install and solder the resistors as follows: All are  $\frac{1}{4}W$ , 1% (except as noted) and the values are given in Ohms.

A.	R15	120	(Brown, Red, Brown)	5%
B.	R3, R6, R7, R8, R9	150	(Brown, Green, Brown)	5%
C.	R31	200		
D.	R32	301		
E.	R33	680		
F.	R4, R22	1K	(Blue, Gray, Brown)	5%
H.	R19	1.1K	(Brown, Black, Red)	
I.	R16, R24	2.2K	(pot)	
J.	R29, R30	4.22K	(Red, Red, Red)	5%
K.	R2, R23	5.11K		
L.	R13	5.6K	(Green, Blue, Red)	5%
M.	R25	7.32K		
N.	R5, R11, R12	10K	(Brown, Black, Orange)	5%
O.	R1, R27	15K		
P.	R10	47K	(Yellow, Violet, Orange)	5%
O.	R18, R26	100K		
R.	R17, R21	9.094K		

3. Install and solder diodes with the banded end as shown on the PC board.

- A. Install and solder CR1 Zener Diode 1N4742A-12V
- B. Install and solder CR2, CR3 Diode 1N270
- C. Install and solder CR4-CR6 Diodes 1N914
- D. Install and solder CR7 5V Zener Diode 1N751A

4. Install and solder the capacitors as follows:

- A. C1, C27 .047 MF
- B. C2, C28 .015 MF
- C. C3 150 pf
- D. C4-C13, C16, C20-C26, C32, C35-37 .1 uf
- E. C14, C17-C19, C34 10 MF
- F. C15 47uf
- G. C29 100 pf
- H. C30 .001 MF
- I. C31 4.7 MF
- J. C33 47 pf

5. Install and solder the voltage regulator with the heatsink using the 6-32 hardware supplied.

VRI +5V 7805 or LM340T-5

6. Install the W/W pins in TP 1-TP 3 and TP 5.

7. Install and solder 100 UH RF choke.

8. Install and solder J2 (34 pin) and J3 (50 pin) connectors.

9. Double check all solder connections for cold solder joints, unsoldered connections or shorted connections.

#### 4-3 VOLTAGE CHECK

1. Install the board in the computer and measure the output of +5V regulator VRI and +12V of CR1.

VRI = +5V (Pin 3)  
CR1 = +12V (Cathode)

2. Measure the power supply voltages in the Floppy Disk Controller chip.

A. Pin 21 U16 = +5V  
B. Pin 40 U16 = +12V

NOTE: Do not proceed with the board check out until all power supply voltages are correct. The TTL and MOS logic can be permanently damaged if improper voltages are applied.

3. Install the IC's in their sockets observing the PIN 1 designation on each socket marked on the PC board. NOTE: U10'S ORIENTATION IS DIFFERENT FROM THE OTHER IC'S. Also, on U1 the manufacturer's symbol designates Pin 1. On U2 the dot below the triangle designates the corner of the chip that contains pin 1.

- A. U21 74LS00
- B. U23, U33 74LS02
- C. U8, U32 7406
- D. U14 74LS09
- E. U24, U26 74LS10
- F. U11, U15, U17 74LS14
- G. U16 74LS21
- H. U12 74LS32
- I. U22, U25, U34 74LS74
- J. U4, U18 74LS93
- K. U6 74LS112
- L. U13 74LS124
- M. U5 74LS153
- N. U20 74LS157
- O. U7, U19 74LS221
- P. U28, U29 74LS240
- Q. U9, U27, U30 74LS244
- R. U31 74LS273
- S. U10 FD1795B
- T. U3 LM 301 AN

4. Install and solder delay line (DDU-4-2400) in location U2.

5. Install and solder 16MHZ oscillator in location U1.

6. Install PCB ejectors using mounting pins (see Assembly Drawing).

#### 4-4 PHASE LOCKED OSCILLATOR ADJUSTMENT

1. Connect an oscilloscope probe to TP 3.

2. Set the timebase to display 500NS/DIV.

3. Adjust the variable resistor R-19 until there are 10 pulses displayed on the oscilloscope screen.

4. Adjust the variable resistor R-19 until the leading edge of the first pulse is exactly lined up on the first division line on the oscilloscope screen and the trailing edge of the last pulse is exactly lined upon the last division line on the oscilloscope screen.



NOTE: Do not proceed with the board check out until all power supply voltages are correct. The TTL and MOS logic can be permanently damaged if improper voltages are applied.

3. Install the IC's in their sockets observing the PIN 1 designation on each socket marked on the PC board. NOTE: U10'S ORIENTATION IS DIFFERENT FROM THE OTHER IC'S. Also, on U1 the manufacturer's symbol designates Pin 1. On U2 the dot below the triangle designates the corner of the chip that contains pin 1.

A. U21  
B. U23, U33  
C. U8, U32  
D. U14  
E. U24, U26  
F. U11, U15, U17  
G. U16  
H. U12  
I. U22, U25, U34  
J. U4, U18  
K. U6  
L. U13  
M. U5  
N. U20  
O. U7, U19  
P. U28, U29  
Q. U9, U27, U30  
R. U31  
S. U10  
T. U3

74LS00  
74LS02  
7406  
74LS09  
74LS10  
74LS14  
74LS21  
74LS32  
74LS74  
74LS93  
74LS112  
74LS124  
74LS153  
74LS157  
74LS221  
74LS240  
74LS244  
74LS273  
FD1795B  
LM 301 AN

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## SECTION V

### INTERRUPT OPTIONS

#### 5-1 INTRODUCTION

There are basically two possible methods of handling interrupts with the VERSAFLOPPY II:

1. Interrupts are not used. (Standard Software)
2. Z-80 Mode 2 using CTC interrupt circuit on SBC-100/200

The Standard Control Software does not use interrupts. However in some cases it may be beneficial to issue a command (such as SEEK TRACK) and be interrupted when it is complete.

## SECTION VI

### SOFTWARE OPTIONS

#### 6-1 INTRODUCTION

The standard control software for the VERSAFLOPPY II is supplied in listing form (Appendix D) and also available in 2716 PROM for an additional charge. This software is called DDBIOS (Double Density Basic I/O System) and is assembled to reside at F000H.

#### 6-2 BOOTING UP THE SDOS

In order to run SDOS, a minimum of 16K of RAM must be in the system starting at address 0000 and the BIOS PROM must be at F000H. Execute BIOS at F000 and SDOS will be booted and prompt with "[A]". Refer to the "SD SYSTEMS DISK OPERATING SYSTEM (SDOS) USER'S GUIDE" for details of the SDOS commands.

## SECTION VII

### CHECK - OUT

#### 7-1 INTRODUCTION

This section will describe some basic checks that should be made on the VERSAFLOPPY II. NOTE: It is assumed at this point that the voltage checks described in Section 4 have been previously made. The following checks require that the CPU board also be plugged into the Bus.

#### 7-2 OSCILLATOR

Apply power to board and verify that there is a 10MHZ clock on U9 - Pin 3.

#### 7-3 RE AND WE PULSES

Verify that U10 Pin 4 pulses low during any Input instruction, and U10 Pin 2 pulses low during any output instruction.

#### 7-4 I/O PORT WRITE/READ VERIFICATION

Using the monitor in the system or a short program, write data to port 65 and read it back. Verify that the data read back is the same as that written. This is done to test the data path to and from the FDI791B-1 as well as the internal register. REPEAT this procedure for ports 66, 67 and 63.

SECTION VIII  
DIAGNOSTIC SOFTWARE

7-5 HEAD LOAD MONOSTABLE

After the diagnostic software is operating, check U20-Pin 3 for a 35 millisecond pulse (low) and U20-Pin 2 for 1.5 sec pulse (low) each time the head loads.

8-1 INTRODUCTION

A diagnostic program for the VERSAFLOPPY II is supplied in the top of the 2716 DDBIOS PROM. The diagnostic program is also on the diskette, when SDOS is purchased, under the file name of "VFDIAG.COM". Once SDOS is operating, the diagnostic may be run by typing VFDIAG (CR). THE SDOS DISKETTE SHOULD NOT BE PLACED IN THE DRIVE UNTIL THE VERSAFLOPPY II AND DISK DRIVES HAVE BEEN THOROUGHLY CHECKED OUT.

When running the diagnostic to check-out the VERSAFLOPPY-II, execute the program starting at address F600. The diagnostic uses the DDBIOS and monitor PROMS for disk and console I/O.

8-2 DIAGNOSTIC TEST START-UP

Upon executing the diagnostic program the following message will print on the console:

TEST# DRV# (TTDD)

The program then waits for the test number and drive number to be entered from the console followed by a carriage return.

NOTE: The test number and drive number are each two digits and MUST NOT be separated by a comma or space. Table 8-1 shows drive numbers.

Type Drive	#Sides Disk Size Density	1		2		1		2		1		2	
		Full Single	Full Double	Mini Single	Mini Double	Full Single	Full Double	Mini Single	Mini Double	Full Single	Full Double	Mini Single	Mini Double
A		00	10	20	30	40	50	60	70				
B		01	11	21	31	41	51	61	71				
C		02	12	22	32	42	52	62	72				
D		03	13	23	33	43	53	63	73				

TABLE 8-1

Note that these unit numbers must also be used with R, W and Z commands in the SD Monitor.

The test routines (except for 05) may be terminated at any time by entering a period (.) on the console keyboard. The diagnostic will then print the above prompting message and wait for further keyboard entries. If the period (.) is entered instead of a command, control will be transferred to the monitor.

8-3 DIAGNOSTIC TEST 00 (SEEK TEST)

Test 00 is a simple routine to verify that the VERSAFLOPPY II is receiving commands properly and that the track seek circuitry is functional. The selected drive should begin moving the head from track 00 to the inside track (76 for full size, 34 for mini) and back again. Enter a period on the keyboard to cause the test to cease.

8-4 DIAGNOSTIC TEST 01 (WRITE/READ)

Diagnostic test 01 writes random data on each sector, reads the

sector back and compares the data to verify that it is identical. Any errors which occur will be printed on the console. (see Section 8) This is done to each sector sequentially, starting at track 00, sector 1, until reaching the innermost track. At that point it prints a "p" on the console, returns to track 00, and continues.

NOTE: Diagnostic tests which read and write to disk may only be run after the diskette has been formatted using diagnostic 05. (see 8-8)

8-5 DIAGNOSTIC TEST 02 (READ TEST)

Test 02 reads every sector on the disk sequentially and checks for CRC errors, and seek errors. Errors will be reported on the console. This test should step from track to track at the same rate as when formatting a diskette.

8-6 DIAGNOSTIC TEST 03 (RANDOM WRITE/READ)

This test is similar to test 01 in that it writes, reads and compares data byte by byte. However, test 03 chooses the sectors and tracks on a random basis in an attempt to simulate actual use. This test exercises only on the specified drive.

8-7 DIAGNOSTIC TEST 04 (MULTI-DRIVE RANDOM WRITE/READ)

This test is identical to test 03 except that it also selects a random drive (0 or 1).

8-8 DIAGNOSTIC TEST 05 (FORMATTING)

Test 05 is actually not a diagnostic, but a program which formats a diskette in accordance with drive and density type. This must be done to all diskettes before further use. Note that on the distributed SDOS diskette there is a program which formats a diskette. This program has the filename "FORMAT.COM" and may be run by entering "FORMAT (CR)". BE SURE TO USE A SCRATCH OR UNFORMATTED DISKETTE WHEN FORMATTING BECAUSE ANY PREVIOUSLY WRITTEN DATA WILL BE LOST.

8-9 DIAGNOSTIC TEST FF (JUMP)

Test code FF allows exiting the diagnostic to anywhere in memory. The following sequence describes this:

CONSOLE INTERACTION

TEST # DRV # (TTDD) : FF00 (CR)  
ADDRESS: 3000 (CR)

COMMENTS

Jump to address 3000H

8-10 DIAGNOSTIC ERROR REPORTING

If any errors occur during diagnostics 1,2,3, or 4, the errors will be reported on the console as follows:

CMD STAT DRV TRK SCIR CC SS DD TT SS

where CC = The controller command being executed  
SS = The error status (type of error)  
DD = The drive being tested  
TT = The track being tested  
SS = The sector being tested

Table 8-1 lists all the various controller commands and Table 8-2 contains the definition of each bit in the error status byte.

TABLE 8-1  
DISK CONTROLLER COMMAND CODES

MINI DISK CMD CODE	FULL SIZE CMD CODE	DESCRIPTION
0B	09	Restore Drive TRK 00
13	19	Track Seek with No Verify
F4	F4	Format Track
88	80	Read Sector
A8	A0	Write Sector
C4	C0	Read Track Address

TABLE 8-2  
ERROR STATUS DEFINITION

BIT #	DEFINITION
BIT 0	Busy
BIT 1	DRQ Bit (Indicates Excessive noise on S-100 Bus)
BIT 2	Data Lost
BIT 3	CRC Error
BIT 4	Sector Not Found
BIT 5	Track Seek Error
BIT 6	Write Protected Diskette
BIT 7	Drive Not Ready
FE	Controller Hang Up
0F	Invalid, Track Error

U2  
DATA DELAY  
000-1-2400

U11  
U12

U10  
U21  
U22

TP5  
R7  
U9  
C11  
R8  
R11  
R12  
U20

U18  
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U16  
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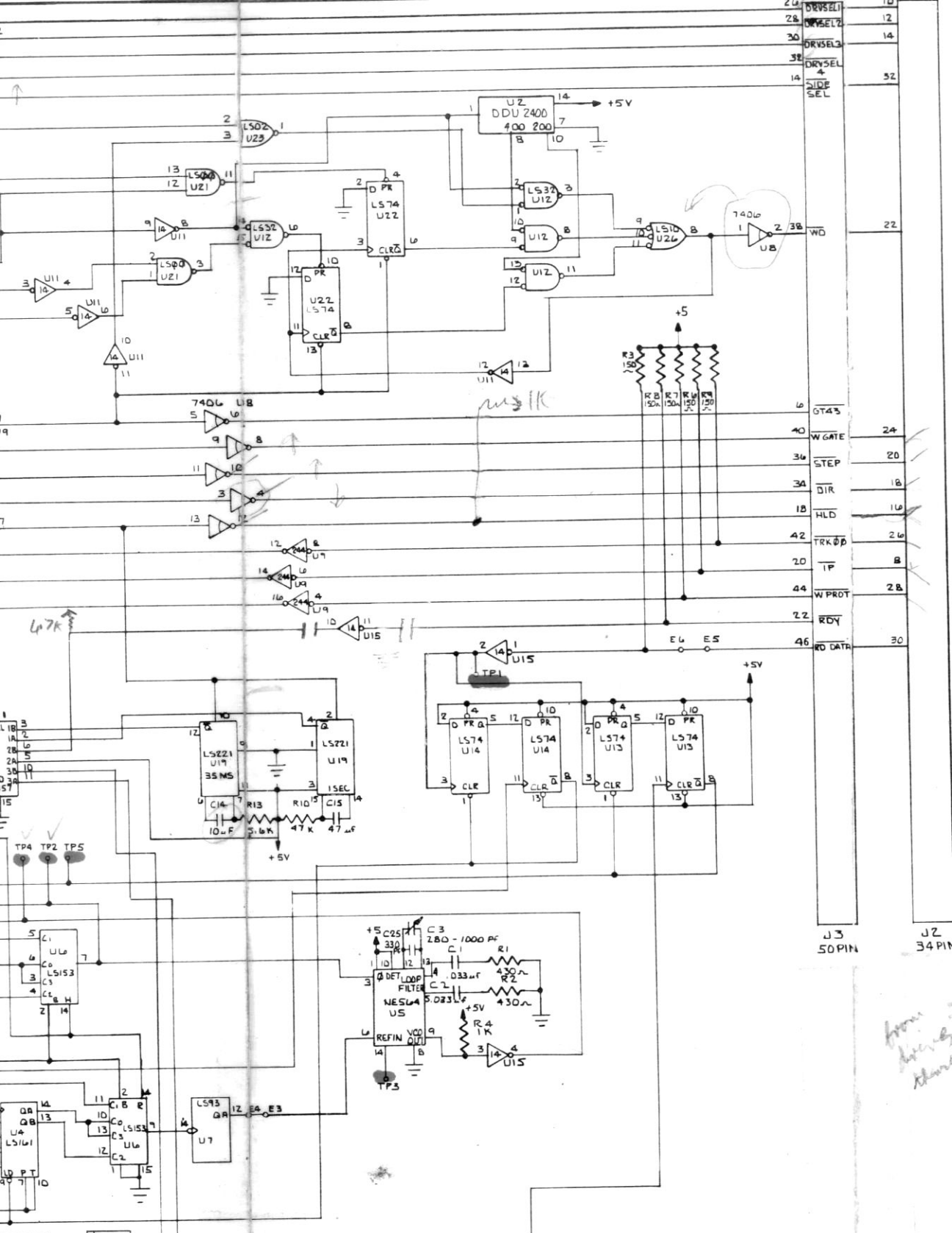
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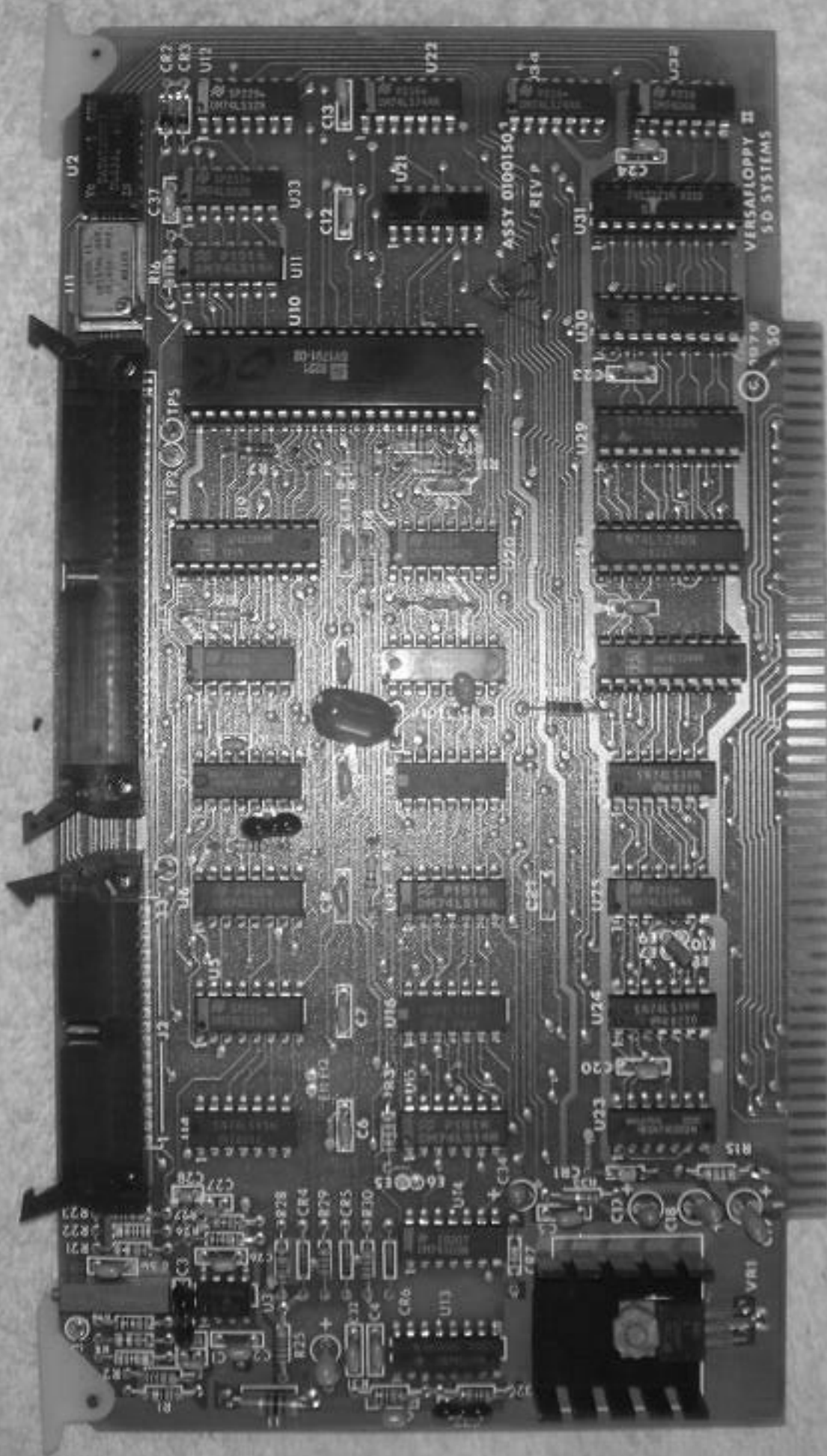


24	DRVSEL1	12
28	DRVSEL2	12
30	DRVSEL3	14
38	DRVSEL4	14
4	SLIP SEL	52
6	ST45	24
40	WGATE	24
36	STEP	20
34	DIR	18
18	HLD	16
42	TRK DP	26
20	TF	8
44	WPROT	28
22	RDY	30
46	RD DATA	30
J3	50 PIN	
J2	34 PIN	

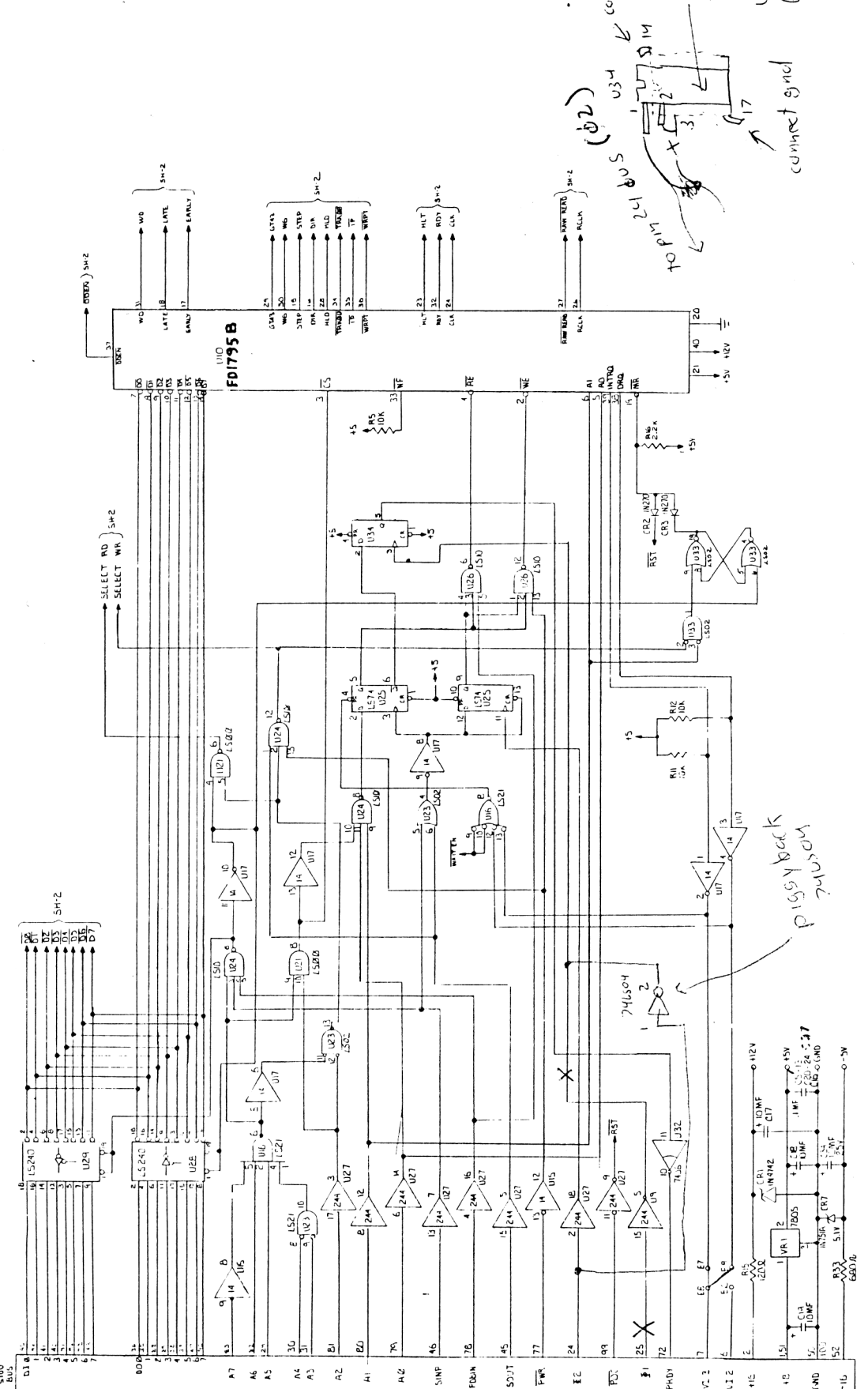
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show*

		TOLERANCES .XX = ±.020 ANGLE .XXX = ±.010 ±1/2 .XXXX = ±.005	DRAWN BY J. J. J.
		MATERIAL	CHECKED BY
			DESIGN ENGR
			PROJ ENGR
		FINISH	APPROVED
NEXT ASSY	USED ON		
APPLICATION			





REV	DESCRIPTION	DATE	APP

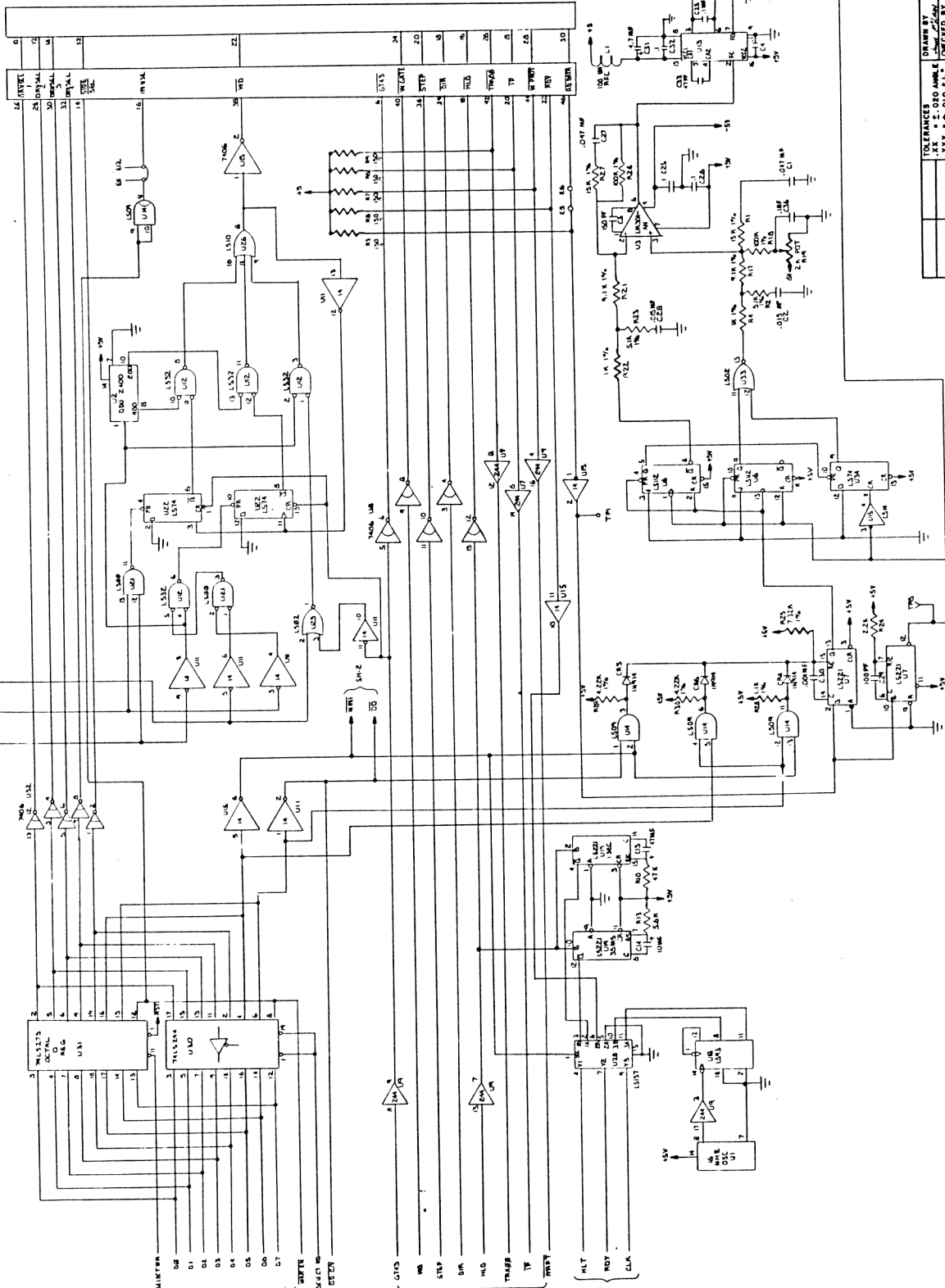


SD SYSTEMS SARLAND, TEXAS			
DATE	DATE	DATE	DATE
DRAWN BY	DESIGNED BY	DESIGN ENGR	APPROVED
VERSAFLOPPY II			
SCHEMATIC			
SIZE CODE	DRAWING NO.	REV	REV
D	0100151	0	K
SCALE	DO NOT SCALE DRAWING	SHEET	OF 2

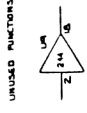
TOLERANCES		DATE	DATE
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XXX ± 0.00	XXX ± 0.00	DATE	DATE
MATERIAL			
FINISH	USED ON	APPLICATION	
NEXT ASSY	USED ON	APPLICATION	

RESISTORS ARE 1/4 WATT 5% EXCEPT AS NOTED  
LS PARTS ARE 7M SERIES  
LS AND 2M'S ARE LS

ES:



REF DES	LAST USED	UNUSED
C	C-3A	
A	R-33	R-40
J	U-3	U-4
CR	CR-7	
L	L-1	
VR	VR-1	
E	E-12	E-12.3
TP	TP-5	TP-4



**SD SYSTEMS**  
BALDWIN, ILLINOIS

**YERKS FLOPPY II** SCHEMATIC

DATE: 11-2-71  
DRAWN BY: J. J. AMLE  
CHECKED BY: J. J. AMLE  
DESIGN ERROR: NONE  
MATERIAL: NONE  
FINISH: NONE

SIZE CODE IDENT: 0100151  
DATE: 11-2-71  
APPROVED: J. J. AMLE

SCALE: 100 NOT SCALE DRAWING SHEET 2 OF 2

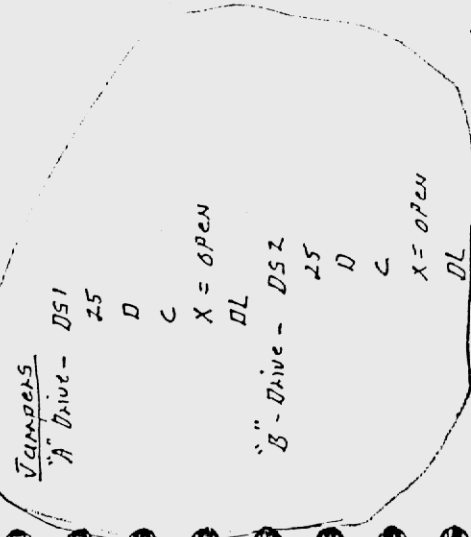
APPLICATION: FLOPPY II

NOTES:

Head Alignment - Track 0 - Drive Drives

For Alignment

1. Test points - 1A + 1B on PCB Board (conv dir)
2. Jumper - Test Point 3 - Jumper on HA for HL
3. Loosen two screws holding down stepper motor,  
Turn motor back or forth for optimum alignment,  
Re-tighten screws.



HA - For Head Load Align - only

Pin #9 out on Bottom Terminator

"B" drive only

Jumper from input pin #6 to L-1 on Both drives.

**1795 COMPATIBILITY WITH DDBIOS**

SD Systems is presently delivering Revision F Versafloppy II boards equipped with the 1795 Western Digital controller chip to the field. Earlier boards included the 1791 Western Digital controller chips. DDBIOS versions 3.0 and later operate with either the 1791 or 1795. However, earlier versions of DDBIOS only operate with the 1791 controller chip.

**To Identify Condition**

Check Versafloppy II boards when swapping boards within your system. The Versafloppy II board equipped with the 1795 Western Digital controller chip will only operate with DDBIOS version 3.0 and beyond.

Early versions of DDBIOS (2.0 - 2.3) that ran with the 1791 Western Digital controller chip will not operate with the 1795 Western Digital chip.

**To Resolve Condition**

Use only DDBIOS version 3.0 or beyond in combination with Rev. F Versafloppy II boards equipped with the 1795 Western Digital Controller Chips.



# SD Systems

P.O. Box 28810 • Dallas, Texas 75228 214-271-4887

## BILL OF MATERIALS

Title: VERSAFLOPPY II      PL No. 0100150      Rev. N  
 Date Released: \_\_\_\_\_      Approved: \_\_\_\_\_      Sheet 4 of 4

Item No.	QTY	SD-P/N	Description	Unit Cost	Extension
73	1	7030041	4.7 MF 25V CAPACITOR C31		
74	1	7030042	150 PF CAPACITOR C3		

# SD Systems

P.O. Box 28810 • Dallas, Texas 75228 214-271-4887

## BILL OF MATERIALS

Title: VERSAFLOPPY II      PL No. 0100150      Rev. N  
 Date Released: \_\_\_\_\_      Approved: \_\_\_\_\_      Sheet 1 of 4

Item No.	QTY	SD-P/N	Description	Unit Cost	Extension
1	1	7000013	VERSAFLOPPY II PCB # 0100152		
2	18	7060002	14 PIN IC SOCKET U4,8,11,12,14, THRU 18, 21 22, 24 THRU 26, 32, 33, 23, 34		
3	6	7060003	16 PIN IC SOCKET U5,6,7,13,19, 20		
4	6	7060005	20 PIN IC SOCKET U9,27 THRU 31		
5	1	7060009	40 PIN IC SOCKET U10		
6	2	7010007	7406 TTL IC U8 f U32		
7	1	7010160	74LS00 TTL IC U21		
8	2	7010162	74LS02 TTL IC U23 f U33		
9	2	7010168	74LS10 TTL IC U24 f U26		
10	3	7010172	74LS14 TTL IC U11, U15 f U17		
11	1	7010175	74LS21 TTL IC U16		
12	1	7010181	74LS32 TTL IC U12		
13	3	7010195	74LS74 TTL IC U22, U25 f U34		
14	2	7010205	74LS93 TTL IC U18 f U4		
15	1	7010225	74LS153 TTL IC U5		
16	1	7010228	74LS157 TTL IC U20		
17	3	7040001	IN914 DIODE CR4, CR5 f CR6		
18	2	7010259	74LS221 TTL IC U7 f U19		
19	2	7010260	74LS240 TTL IC U28 f U29		
20	3	7010264	74LS244 TTL IC U9, U27 f U30		
21	1	7010276	74LS273 TTL IC U31		
22	1	7080006	16 MHZ CRYSTAL U1		
23	1	7010371	DOJ 4-2400 DELAY LINE U2		
24	1	7060001	8 PIN IC SOCKET		

# SD Systems

P.O. Box 28810 • Dallas, Texas 75228 214-271-4667

## BILL OF MATERIALS

Title: **VERSAFLOPPY II** PL No. **0100150** Rev. **N**  
 Date Released: \_\_\_\_\_ Approved: \_\_\_\_\_ Sheet **2** Of **4**

Item No.	Qty	SD-P/N	Description	Unit Cost	Extension
25	1	7020051	120 OHM RESISTOR 5% 1/4 WATT R15		
26	5	7020053	150 OHM RESISTOR 5% 1/4 WATT R3,R6,R7,R8,R9		
27	2	7130072	PCB EJECTOR		
28					
29	1	7020091	5.6 K OHM RESISTOR 5% 1/4 WATT R13		
30	3	7020097	10K OHM RESISTOR 5% 1/4 WATT R5,R11,R12		
31	1	7020113	47K OHM RESISTOR 5% 1/4 WATT R10		
32	22	7030045	1MF CAPACITOR C4 TO C13, C16, C20 TO C26, C32,C35 TO C37		
33	5	7030009	10MF 25V CAPACITOR C14,C17,C18, C19,C34		
34	1	7030010	47 MF CAPACITOR C15		
35					
36					
37	1	7040004	IN4742 12V ZENER DIODE CRI		
38	1	7160001	LM340T-5 VOLTAGE REGULATOR VR1		
39	1	7130005	HEATSINK		
40	1	7130015	6-32 x 5/16 PPH SCREW		
41	1	7130007	6-32 HEX NUT		
42	4	7170001	WIRE WRAP PINS TP1,2,3,5		
43	1	7090043	CONNECTOR 34 PIN J2		
44	1	7090042	CONNECTOR 50 PIN J3		
45	4	7130078	FLOPPY CABLE EJECTOR CLIPS		
46	1	7010391	FD-1795B FLOPPY CONTROLLER U10		
47	2	7040011	DIODE CR2,R CR3, IN270		
48	2	7020081	2.2 K OHM RESISTOR 5% 1/4 WATT R16,R24		

# SD Systems

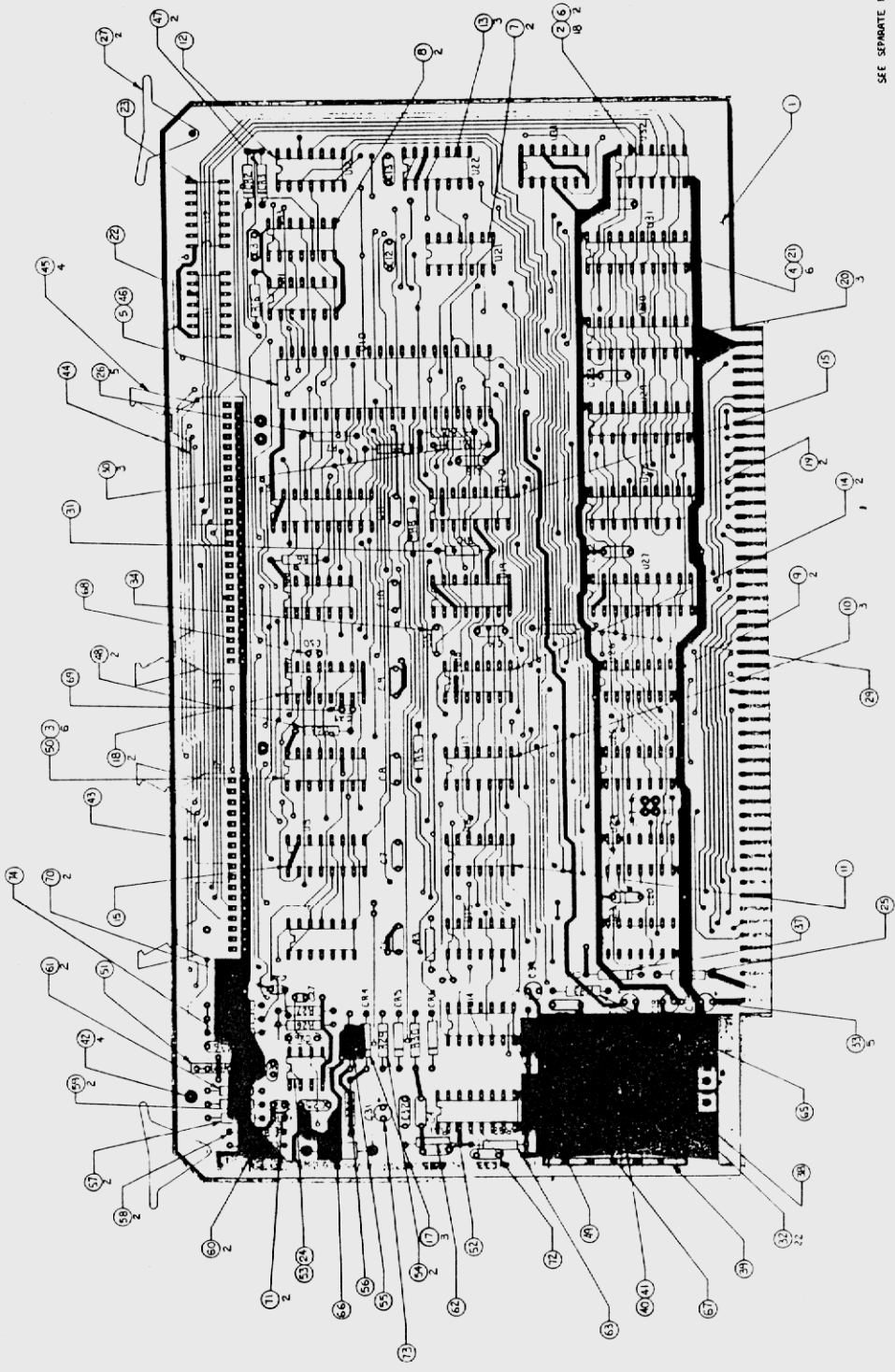
P.O. Box 28810 • Dallas, Texas 75228 214-271-4667

## BILL OF MATERIALS

Title: **VERSAFLOPPY II** PL No. **0100150** Rev. **N**  
 Date Released: \_\_\_\_\_ Approved: \_\_\_\_\_ Sheet **3** Of **4**

Item No.	Qty	SD-P/N	Description	Unit Cost	Extension
49	1	7010401	74S09 TTL IC U14		
50	1	7010210	74LS112 TTL IC U6		
51	1	7020200	2KΩ POT R19		
52	1	7010404	74LS629 TTL IC U13 (OR 74LS124)		
53	1	7160009	LM 301AN OPERATION U3		
54	2	7020193	4.22 K 1% 1/4 WATT RESISTOR R29,R30		
55	1	7020192	1.1K 1% 1/4 WATT RESISTOR R28		
56	1	7020195	7.32K 1% 1/4 WATT RESISTOR R25		
57	2	7020191	1K 1% 1/4 WATT RESISTOR R4,R22		
58	2	7020194	5.11K 1% 1/4 WATT RESISTOR R2,R23		
59	2	7020196	9.094K 1% 1/4 WATT RESISTOR R17,R21		
60	2	7020197	15K 1% 1/4 WATT RESISTOR R1,R27		
61	2	7020198	100K 1% 1/4 WATT RESISTOR R18,R26		
62	1	7020189	200Ω 1% 1/4 WATT RESISTOR R31		
63	1	7020190	301Ω 1% 1/4 WATT RESISTOR R32		
64					
65	1	7020069	680Ω 5% 1/4 WATT RESISTOR R33		
66	1	7120002	100 UH RF CHOKE WEE-WEE-100 L1		
67	1	7040003	IN751A 5.1 ZENER DIODE CR7		
68	1	7030035	.001 MF CAPACITOR C30		
69	1	7030004	100 PF CAPACITOR C29		
70	2	7030037	.015 MF CAPACITOR C2,C28		
71	2	7030038	.047 MF CAPACITOR C1,C27		
72	1	7030004	100 PF CAPACITOR C33		

REVISIONS		
LTR	DESCRIPTION	DATE APP
K	PER E.C.N. 130	1/10/74
L	PER E.C.N. 131	1/10/74
M	PER E.C.N. 152/174	1/10/74



SEE SEPARATE BLOW 0000150

TOLERANCES		DRAWN BY		DATE	
XX	±0.00 ANGLE				
XXX	±0.00				
XXXX	±0.00				
XXXXX	±0.00				
MATERIAL		DESIGNED BY		DATE	
		DESIGN ENGR		DATE	
		APPROVED		DATE	
FINISH		DRAWING NO.		REV	
		0100150		D	
MATERIAL USED ON		SCALE		SHEET 1 OF 5	
APPLICATION		SD SYSTEMS		VERSIFLOPPY II	
		SARLINO, J. J.		ASSY DRAWING	

NOTES:

### SD-100 AND SD-200

SD-100 and SD-200 systems are originally shipped with a pair of Mod 4 MFE or Mod 5 MFE drives. Field usage has determined that system problems can occur when a Mod 4 MFE drive is mixed with a Mod 5 MFE drive. This is a potential problem only if a system has required a MFE drive replacement and that MFE drive Mod replacement does not match the original. If a SD-100/200 contains mixed drives due to drive replacement, log on failures can occur.

**TO IDENTIFY PROBLEM:**

Check the MFE drives for uniformity.

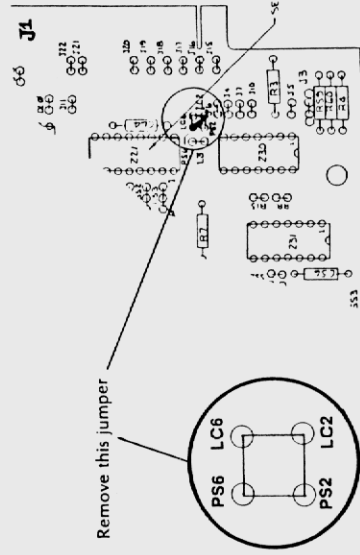
Mod 4 chassis is smooth, obviously machine casted and has no seam.

Mod 5 chassis is a darker cast and has a seam edge.

**TO MODIFY SYSTEM:**

(1.) Cut straps PS6 and LC2 on Mod 5 drives, as this solves the problem which can occur due to an option strap on this drive between PS2 and PS6 near J1. Note diagram below.

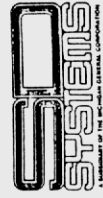
(2.) If assistance is required, call our Technical Assistance hot line number: 1-800-527-4121.



### VERSAFLOPPY II

SD Systems was notified by Western Digital that a mask modification was made to the 1795 controller chip to improve performance and error recovery capability. In our continuing effort to provide and maintain products of the highest quality, we strongly recommend that anyone having 1795 chips with the 801 designation call our customer service department and arrange for immediate replacement with a 1795 chip having the 802 designation.

The information contained herein is intended to be a general advisory only and is subject to change without product involvement.





OPTIONS JUMPERS FOR 8" DRIVES:

QUME

- C
- D
- DL
- DS1 For A drive
- DS2 For B drive
- 2S

Cut X  
Add jumper from pin 6 of J1 to L1

MFE

- DL-2
- DS-1 For A drive
- DS-2 For B drive
- HL-1
- HL-2
- HL-4
- HS-1
- J-12
- L-1
- RHL
- SE-2

SHUGART 8 in.

- A
- B
- C
- HL
- T1
- T2
- T3 - T6 on B drive only
- 800
- Y
- DS1 For A drive
- DS2 For B drive

SHUGART 5 1/2 in.

- HM
- DS-1 For A drive
- DS-2 For B drive
- E-1 Terminator pack for last drive

MEMO

TO: Fred Friedrichs  
FROM: Dan Hammond  
DATE: January 31, 1980  
SUBJECT: JUMPERS ON SHUGART DRIVES

The following is a complete list of jumpers for the Shugart SA800R drives used in the SD-100A.

- A
- B
- C
- HL
- T3-T6 (Drive B only)
- T1
- T2
- 800
- Y (Drive A only)
- DS1 (Drive B only)
- DS2 (Drive B only)
- ~~DS3~~ (Drive A only)
- X for AT, last only.

*[Signature]*  
(Signature)

DDH:kyh

cc: Robert Montoya

To OPEN  
P63 Return  
FF Return

WHITE  
MFE  
6-F-600  
1. 550 = 0  
2. 551 = 1  
00-Track sect  
01- " "

Test Points for A1

Trigger Pin #12

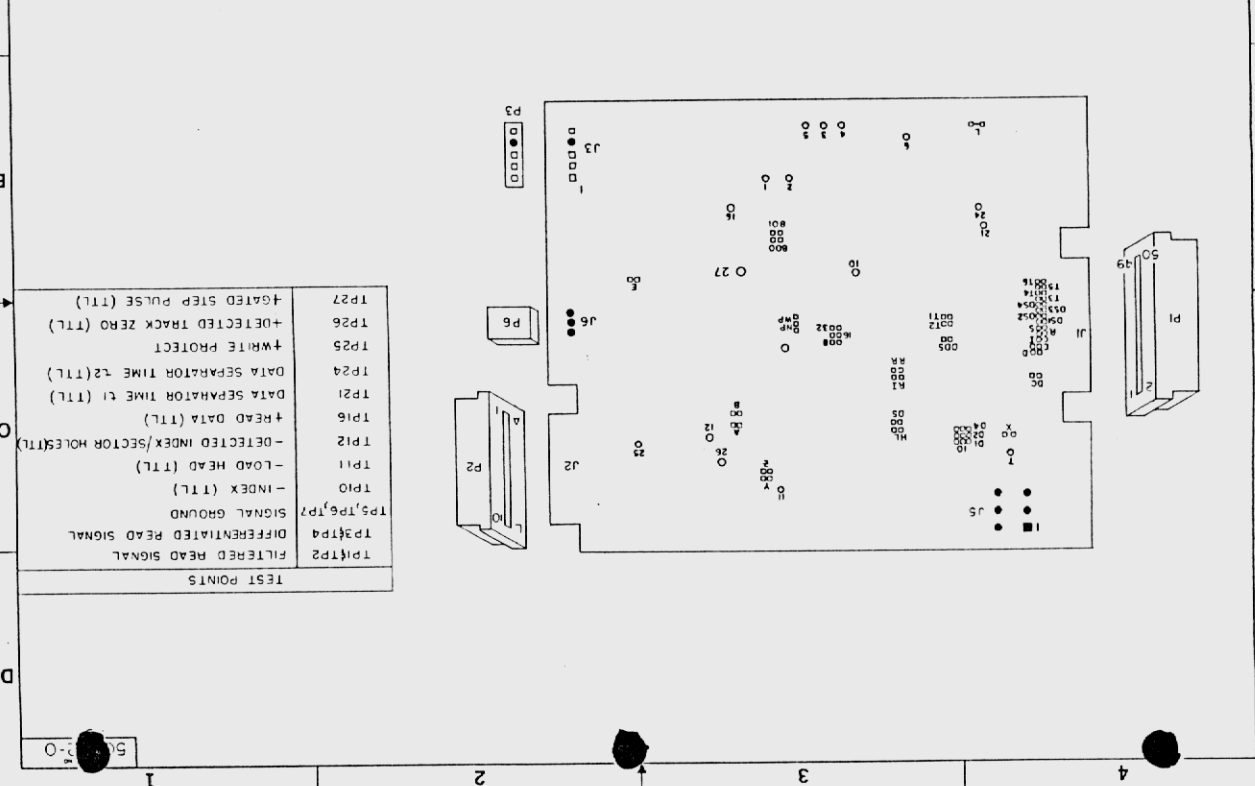
A- #1  
B- #2

WHITE  
1. 6-F-600  
2. 5500 C.D. Sing Side  
Read  
Z11

press - stop

MATERIAL		DATE		REV	
DESCRIPTION		DATE		REV	
DRAWING NO.		DATE		REV	
DRAWING TITLE		DATE		REV	
DRAWING NO.		DATE		REV	
DRAWING TITLE		DATE		REV	
DRAWING NO.		DATE		REV	
DRAWING TITLE		DATE		REV	
DRAWING NO.		DATE		REV	
DRAWING TITLE		DATE		REV	

NOTE: 1. D-D/D-D DENOTES CUT TRACE/JUMPER OPTION.  
2. O DENOTES TEST POINTS.



TEST POINTS

TP1P2	FILTERED READ SIGNAL
TP3P4	DIFFERENTIATED READ SIGNAL
TP5,TP6,TP7	SIGNAL GROUND
TP10	-INDEX (TTL)
TP11	-LOAD HEAD (TTL)
TP12	-DETECTED INDEX/SECTOR HOLE(TTL)
TP16	+READ DATA (TTL)
TP21	DATA SEPARATOR TIME t1 (TTL)
TP24	DATA SEPARATOR TIME t2 (TTL)
TP25	+WRITE PROTECT
TP26	+DETECTED TRACK ZERO (TTL)
TP27	+GATED STEP PULSE (TTL)

INDEX

PCB TRACE "BOO" TRACE "BOO" TRACE "BOO"

FACTORY CUT TRACE OPTIONS

25107	OPEN	SHORTED	OPEN
25106	SHORTED	SHORTED	OPEN
25105	OPEN	OPEN	SHORTED
25104	SHORTED	SHORTED	OPEN
25103	OPEN	OPEN	SHORTED
25102	SHORTED	OPEN	SHORTED

TABLE II FACTORY CUT TRACE OPTIONS

WRITE PROTECT CAN BE ORDERED WITH ANY OF THE ABOVE

PCB ASM NO.	-7 TO DATA SECTOR	-5V	-15V	-7 TO DATA SECTOR
25102	X			
25103		X		
25104			X	
25105		X	X	
25106			X	X
25107	X	X	X	X

TABLE I OPTIONAL FEATURES

LOGIC MANUAL P/N 50590 - I

INDEX

PCB TRACE AND TEST POINT LOCATIONS

READ/WRITE/INDEX/SECTOR

STEPPER CONTROL

DETECTORS

MOTORS SOLENOID SWITCH

TABLE III CUSTOMER CUT TRACE OPTIONS

DESIGNATOR	DESCRIPTION	SHIPPED FROM FACTORY	OPEN	SHORT
13,14,15 & 16	TERMINATIONS FOR MULTIPLEXED INPUTS	X		
17	SPARE TERMINATOR FOR RADIAL HEAD LOAD	X		
18	TERMINATION FOR DRIVE SELECT	X		
19	DRIVE SELECT INPUT - ALTERNATE PINS:02,03,05,04	X		
20	RADIAL READ	X		
21	RADIAL INDEX AND SECTOR	X		
22	HEAD,INDEX,SECTOR ALTERNATE OUTPUT PROVISION	X		
23	RADIAL HEAD LOAD	X		
24	STEPPER POWER FROM HD LD	X		
25	STEPPER POWER FROM DRIVE SELECT	X		
26	INHIBIT WHITE WHEN WHITE PROTECTED	X		
27	ALLOW WHITE WHEN WHITE PROTECTED	X		
28	B16 OR 32 SECTORS	X		
29	ALTERNATE INPUT - IN USE	X		
30	NINE ALTERNATE I/O PINS	X		
31	CUSTOMER INSTALLABLE DECODE DRIVE SELECT OPTION	X		
32	ALTERNATE INPUT - HEAD LOAD	X		
33	INUSE LED FROM DRIVE SELECT	X		
34	INUSE LED FROM HD LD	X		
35	ALTERNATE OUTPUT-DISK CHANGE	X		

FACTORY CUT TRACE OPTIONS AND HISTORY CHART

L 5 OR -7 TO -16V SEE TABLE D

BOO INDEX ONLY (BOO) SEE TABLE D

BOI INDEX AND SECTOR(BOI) SEE TABLE D

DC

ALTERNATE INPUT - DISK CHANGE

INUSE LED FROM HD LD

INUSE LED FROM DRIVE SELECT

ALTERNATE INPUT - HEAD LOAD

CUSTOMER INSTALLABLE DECODE DRIVE SELECT OPTION

NINE ALTERNATE I/O PINS

ALTERNATE INPUT - IN USE

B16 OR 32 SECTORS

ALLOW WHITE WHEN WHITE PROTECTED

INHIBIT WHITE WHEN WHITE PROTECTED

STEPPER POWER FROM DRIVE SELECT

STEPPER POWER FROM HD LD

RADIAL HEAD LOAD

RADIAL INDEX AND SECTOR

HEAD,INDEX,SECTOR ALTERNATE OUTPUT PROVISION

RADIAL HEAD LOAD

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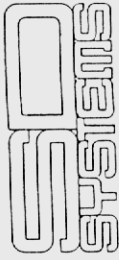
RADIAL INDEX AND SECTOR

HEAD,INDEX,SECTOR ALTERNATE OUTPUT PROVISION

RADIAL HEAD LOAD

STEPPER POWER FROM DRIVE SELECT

ALLOW WHITE WHEN WHITE PROTECTED



January 15, 1980

VERSAFLOPPY II

ADDENDUM VERSAFLOPPY II  
OPERATIONS MANUAL

FIRMAPE: INSTALLED ON THE SBC 100/200

FOR REV. F BOARDS

- 39034 DBBIOS V3.1 - FOR USE WITH MFE DRIVES
- 39034 DBBIOS V3.1Q - FOR USE WITH QUME DRIVES
- 39106 DBBIOS V3.2S - FOR USE WITH SHUGART DRIVES
- 39034 DBBIOS V3.2Q - FOR OASIS OPERATING SYSTEM

- \* VF II WITH 1791 CONTROLLER CHIP WILL ONLY WORK WITH DBBIOS V2.3 OR EARLIER VERSIONS.
- \* VF II WITH 1795 CONTROLLER CHIP WILL ONLY WORK WITH DBBIOS V3.0 OR LATER.
- \* VF II WITH 1795 CHIPS SHOULD BE B-02 TYPE.

JUMPERS: FACTORY SET AND CHANGEABLE WITHOUT ETCH CUTS E8 TO E9 - CONNECTS DRQ TO VI3.

(needed for COSMOS & SDOS 1.8B)

PORTS:

- 60 (0) - RESET CONTROLLER
  - 63 (I) - READS STATUS OF OUTPUT PORT 63
  - 63 (0) - BIT
- |   |   |                                    |                            |
|---|---|------------------------------------|----------------------------|
| 0 | } | DRIVE SELECT                       |                            |
| 1 |   |                                    |                            |
| 2 |   |                                    |                            |
| 3 | } | SIDE SELECT 0 = SIDE 0, 1 = SIDE 1 |                            |
| 4 |   |                                    |                            |
| 5 |   |                                    | 5 1/8" 0 = 8", 1 = 5 1/8"  |
| 6 |   |                                    | DENSITY 0 = S.D., 1 = D.D. |
| 7 |   | WAIT ENABLE                        |                            |
- 64 (0) - COMMAND
  - 64 (I) - STATUS
  - 65 (0) - TRACK
  - 66 (0) - SECTOR
  - 67 (0) - DATA WRITE
  - 67 (I) - DATA READ

The following changes must be noted when assembling the Versafloppy II kit.

- 1) R 12 is a 100 K OHM resistor.
- 2) You must add a 330 pf. cap to GND from pin 38 end of R12.
- 3) You must add a 47K OHM resistor to ground from pin 1 of U10.

Note: If the board in your kit is REV. C (see the silk screen on the board) the following changes must also be made.

- 4) Cut the etch between pins 3 and 4 of ICU3.
- 5) Add jumpers between pins 16, 5, 7 and 10.

The 1791B-1 controller chip is not capable of reading formats with zeroes only in the gaps. Therefore, until the 1795B-1 becomes available, disks previously formatted with all zero gaps must be converted to the 3740 format with 0's and 1's in the gaps. This can be accomplished by formatting a new diskette with the VF II board. Then insert this diskette in the system where the diskette was created and transfer the desired data to the new diskette.