MODEL NO: 605 & 610

PROPRIETARY INFORMATION

FOR TECHNICAL INFORMATION CONTACT: MFE CORPORATION
(603) 893-1921

NO	DATE	REVISION RECORD
	7-81	Preliminary Release

MATERIAL

TREATMENT

TOLERANCES UNLESS OTHERWISE NOTED
DEC. .XX ± .010
DEC. .XXX ± .005
ANGLES ± 1/2°
HOLES:

.013/.185	+ .003 — .002
.187/.248	+ .004 — .002
.250/.750	+ .005 — .002
.765/1.000	+ .007 — .003

DRAWN

CHECKED

APPROVED

MFE CORPORATION
KEEWAYDIN DRIVE
SALEM, NEW HAMPSHIRE 03079
U.S.A.

PRODUCT DESCRIPTION MAGNUM STREAMING CASSETTE TAPE

SHEET NO.

OF

CODE IDENT.	SCALE	SIZE	DRAWING NUMBER	REV.
31252		A		

MFE 5-10 MEGABYTE CASSETTE DRIVE

	5MBYTE	10MBYTE	REMARKS
DATA HANDLING			
Transfer Rate	37.5K byte/sec 112.5K byte/sec	37.5K byte/sec 112.5K byte/sec	@30 ips @90 ips
Capacity, Unformatted (450' cassette)	6.75 Mbytes	13.5 Mbytes	
Capacity, Formatted (450' cassette)	4.968 Mbytes	9.936 Mbytes	GCR
Recording Form	1 Track Serpentine	2 Track Serpentine	
Recording Code	Customer Selectable	Customer Selectable	
Head Format	RAW	RAW	
Number of Tracks	One	Two	
Recording Density	10,000 FCI	10,000 FCI	
Time to Back-Up	3 minutes 1 minute	6 minutes 2 minutes	@30 IPS @90 IPS
DATA RELIABILITY			
Soft Error Rate	10^8 bits	10^8 bits	
Hard Error Rate	10^{10} bits	10^{10} bits	
TAPE MOTION			
Speed, Read/Write	30 or 90 ips	30 or 90 ips	
Speed, Rewind	30 or 90 ips	30 or 90 ips	
Speed Variation	+3% $\overline{+}$2%	+3% $\overline{+}$2%	Short ter Long term
Start/Stop Time	100ms 300ms	100ms 300ms	@30 ips @90 ips

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	5 MBYTE	10MBYTE	REMARKS
POWER			
DC Voltage Requirements	+12V ±5% @ 1.8A	+12V ±5% @ 1.8A	Max.
	+5V ±5% @ 0.7A	+5V ±5% @ 0.7A	Max.
Dissipation - Typical			
Maximum			
ENVIRONMENTAL			
Operating Temperature	+5 to 45°C	+5 to 45°C	
Storage Temperature	-30 to +60°C	-30 to +60°C	
Relative Humidity	20% to 80%	20% to 80%	Non-Condensing
Altitude	-200 to 15,000 ft.	-200 to 15,000 ft.	
MECHANICAL CHARACTERISTICS			
Width	5.75 in.	5.75 in.	
Height	3.25 in.	3.25 in.	
Depth	8.00 in.	8.00 in.	
Form Factor	Mini Flopy	Mini Floppy	Fig. 1
Mounting	Horiz. or Vert.	Horiz. or Vert.	Floppy Compatible
Loading	Front	Front	
Weight	3 lb.	3lb.	
INTERFACE	MFE or Mini Floppy	MFE or Mini Floppy	Mini Floppy Interface Available with Translator
MEDIA	Phillips cassette certified at 10,000 at lengths of 300 450 ft.	Phillips cassette certified at 10,000 fci at lengths of 300 and 450 ft.	
MTBF	3500 hrs.	3500 hrs.	
MTTR	30 min.	30 min.	

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HOST CONTROLLER OR MFE TRANSLATOR		J1	3M CONNECTOR
	CASSETTE LOADED	1	
	SPARE	2	PCB LOGIC GND BUS
	OSC	3	
	FAULT	4	
	RESET	5	
	TSC	6	
	SPARE	7	
	REVERSE GO	8	
	FORWARD GO	9	
	+12 VDC	10	
	+12 VDC	11	
	GND	12	
	GND	13	
	WRITE PERMIT	14	
	SPARE	15	
	GND	16	
	WRITE DATA	17	
	GND	18	
	OPTICAL EOT/BOT	19	
	GND	20	
	READ DATA	21	
	GND	22	
	SPARE	23	BASIC DRIVE INTERFACE
	SPARE	24	
	+5 VDC	25	
	+5 VDC	26	

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1.0 GENERAL INTRODUCTION

The MFE Translator is an intelligent controller that interfaces the MFE cassette drive to a host computer. The translator, together with the cassette drive, is to be used as a low cost, high performance, mass storage device. Typical applications will be to back-up a 5 1/4 inch Winchester disc drive.

The function of the translator is to make the MFE cassette drive appear to the host as a 5 1/4 inch floppy. The standard floppy control lines will be used to monitor and control the cassette drive. The translator will perform such functions as; MFM/GCR encoding, CRC checking, gap detection, and data read/write. The translator will utilize a microprocessor to monitor and control all interface lines. High speed discrete logic will perform data decoding/encoding and CRC check.

The translator will transfer data to tape in streaming mode only. At the end of data transmission, an End of Volume mark will be written on tape. This will allow writing and reading of files. A complete data Save/Restore onto tape of a 5M Byte Winchester disc drive, will be accomplished in less than 2 minutes.

2.0 FEATURES

2.1 Automatic Track Switching

If during a data transfer, the end of a track is reached, the translator automatically switches the data transfer to the next track. When the physical End of Tape (EOT) is reached, the READY line will become inactive.

2.2 Drive Selection

Four DRIVE SELECT lines are issued to select one of four cassette drives. When the host desires to select a cassette drive, it activates one of the four DRIVE SELECT lines.

2.3 Tape Format

The cassette used by the translator does not require a preformatted tape. Data is written on tape as shown in Figure 1. The tape format is very similar to the standard ANSI cassette data format. Each data track is divided into tape sectors. At the beginning of each sector, a one byte preamble (AA) is used to synchronize the UART. This is followed by the data sector which can be set to 128, 256, 512, and 1024 bytes using the two sector size switches. At the end of the data, two bytes of CRC are attached to be used when reading the data. The postamble is then attached followed by an 18 byte gap. The data written on tape will be first encoded in GCR and then written using NRZI technique.

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2.4 End of Block/End of Volume Mark

Whenever data is written on tape at the end of the data transmission, an End of Volume (EOV) will be written on tape. An EOV will consist of two End of Block (EOB) marks which are defined as a sector having all FE data. This EOV will be used by the translator to identify the end of data. Whenever data is read from tape, the translator will pulse the INDEX line whenever an EOB sector is observed. If the host desires to add a block to tape, the host issues a Step Pulse command and the translator will begin reading and transmitting data to the host. When the EOV mark is found, the translator will pulse the INDEX line twice and then will back-up the tape to the beginning of the last EOB mark. The host may then begin transmitting the first sector which will be written in the second EOB mark.

2.5 Rewinding Tape

On power up, or when a cassette is first inserted into the drive, the translator automatically rewinds the cassette to the Beginning of Tape (BOT). When BOT is detected, the translator sets the internal Track 0 bit. When the drive is selected, the translator informs the host that the cassette is at BOT by activating the TRACK 0 line. This will remain active until the tape is moved off BOT, or the drive deactivated.

The translator also performs a rewind function whenever the drive has performed a read/write operation and IN-USE line has become inactive.

2.6 Write Operation

The translator performs the function of writing data received from the host to tape. The data is received in MFM and is translated to GCR. The data is then written to tape in NRZI form.

In a save operation, data is written to tape in a streaming mode. Files may be added to tape at the End of Volume (EOV) mark. Whenever the host desires to write data on tape, the following sequence is followed:

1. The host activates the IN-USE line and the proper DRIVE SELECT lines.

2. The WRITE GATE line is then activated in synchronization with the write data. The host begins transmission of write data.

3. When the first write buffer is filled, the translator begins writing the sector on tape. The host may continue to transmit data which will be stored in the second write buffer.

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4. The host may deselect the drive at any time. Under this condition, host will stop the transmission of data to the translator. The translator will write the next sector in the second read buffer. The host must reselect the drive before the second write buffer is empty, otherwise, an overrun error condition will occur. If an overrun error occurs, the translator drops the ready line, writes on EOV, and backs up before the last data block is written. At this point, READY is reassorted.

5. If no underrun error occurs, the writing process will continue until the host deactivates the IN-USE line. When this occurs, the translator writes an EOV mark and then rewinds the tape to BOT.

2.7 Read Operation

The translator performs the function of reading data from tape and transmitting to the host. The data is read from tape in NRZI form and GCR coded. The data is then translated to MFM and is then transmitted to the host. Data is read from tape in a streaming mode. Whenever the host desires to read data from tape, the following sequence is followed.

1. The host activates the IN-USE line and the proper DRIVE SELECT line.

2. The WRITE GATE line is inactive.

3. The translator will begin to monitor the DIRECTION and STEP line. Whenever the STEP line is activated, the translator will begin reading data from the tape. A one step pulse will result in the reading of block of data. The host may send multiple step pulses which will be buffered by the translator. If more than 1 step is received, only the last block will be sent to the host.

4. The host deselects the drive at any time after a step pulse. Under this condition, the translator will stop the transmission of data to the host but will continue tape movement. The translator will read next sector and store the data in the second read buffer. The host must reselect the drive before the second read buffer is full. Otherwise, an overrun error condition will occur. If an overrun error occurs, the translator drops the READY line, backs up before the last block read, and then resorts READY.

5. If no overrun error occurs, the read process will continue until an EOV or EOB mark is detected. If an EOB, the translator will then position the tape to the second EOB mark. An index pulse is issued for each EOB read. When the host drops the IN-USE line, the translator will rewind the tape to BOT and set the TRACK 0 line.

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2.8 Error Recovery

When data is being written on tape, it is imperative that the data is written in a streaming mode and that it be written reliably. These two conditions are in conflict whenever a tape write error occurs due to a bad spot on tape. To accommodate this requirement, the translator performs an error recovery procedure which satisfies both objectives.

Whenever data is being recorded on tape, the translator performs a read-after-write function. The data being written (sector N) is checked for a valid CRC. If the CRC is not valid, the translator will continue writing the next sector (N+1). When this is completed, the translator will rewrite sector N and N+1 with a different preamble (BB). The sector will again be checked for a valid CRC. If the CRC is still not correct, the same procedure will be followed to a maximum of 32 sectors. During this time, READY is dropped until "N" is written correctly.

The process of reading a sector which was rewritten is simply the reverse process of writing. When a sector N is read and a CRC error occurs, the next sector (N+1) is read and buffered. The preamble register is now changed to the new value (BB) and sector N is read. If sector N was successfully read, sector N+1 is read and reading will continue in a normal fashion with preamble set back to AA. However, if another gap is observed before sector N is read, it will imply that the original sector N was read incorrectly. The translator will now back-up the tape and will attempt to read the sector again. If the error persists, the translator will retry three times. If still unsuccessful, the translator will transmit the bad sector, set the FAULT line, and stop the tape at the beginning of the next sector (N+1). The host may resume reading by simply transmitting a step pulse to the translator. This will clear the FAULT line and resume reading of data.

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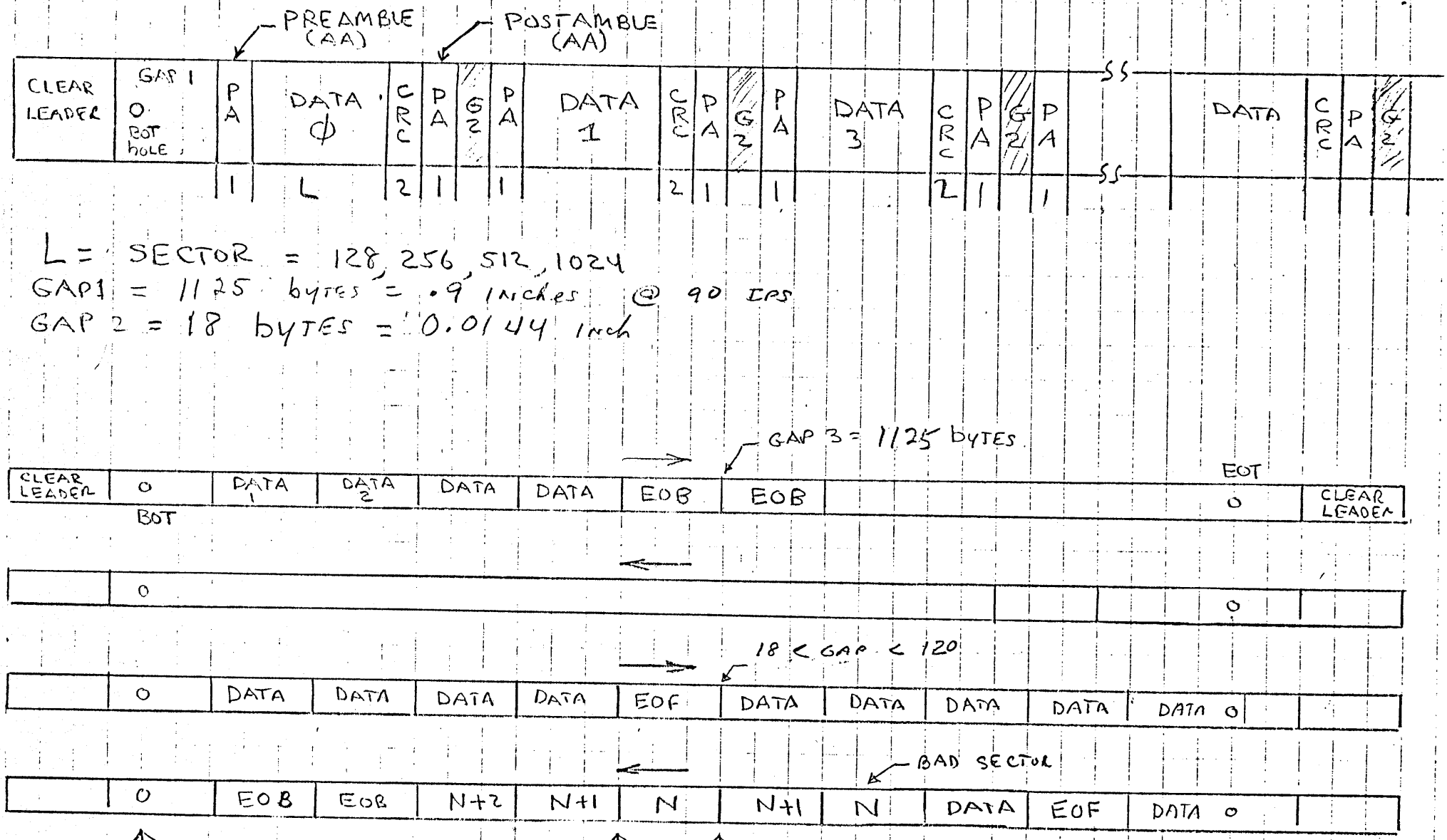
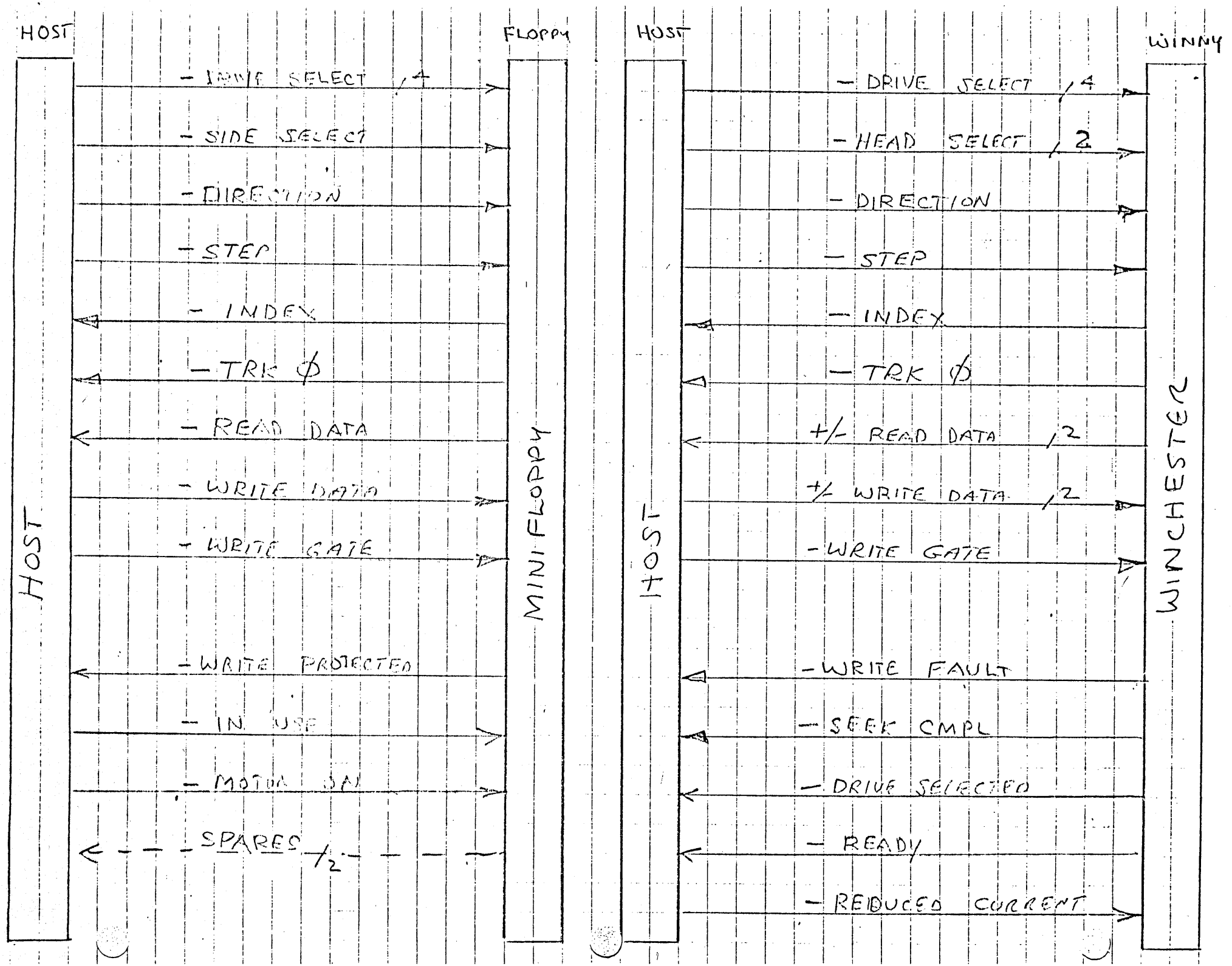


1 byte = 0.0008 inch
188 bytes = .15 inch

FIGURE 1 - TAPE FORMAT


HOST
FLOPPY
HOST
MINI FLOPPY
- DRIVE SELECT /4
- SIDE SELECT
- DIRECTION
- STEP
- INDEX
- TRK ϕ
- READ DATA
- WRITE DATA
- WRITE GATE
- WRITE PROTECTED
- IN USE
- MOTOR ON
- SPARES /2
HOST
WINNY
HOST
WINCHESTER
- DRIVE SELECT /4
- HEAD SELECT /2
- DIRECTION
- STEP
- INDEX
- TRK ϕ
+/- READ DATA /2
+/- WRITE DATA /2
- WRITE GATE
- WRITE FAULT
- SEEK CMPL
- DRIVE SELECTED
- READY
- REDUCED CURRENT

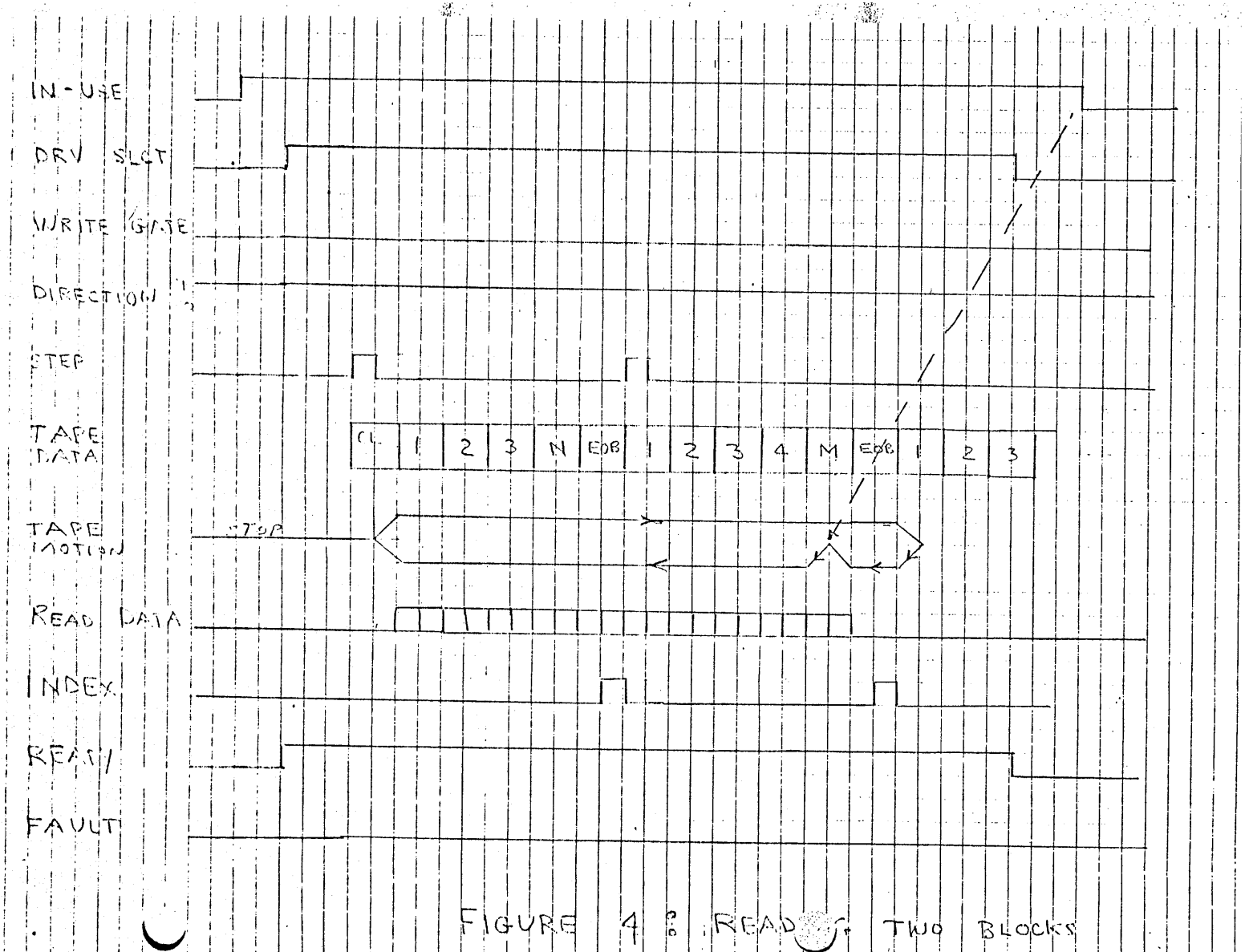


FIGURE 4 : READ TWO BLOCKS

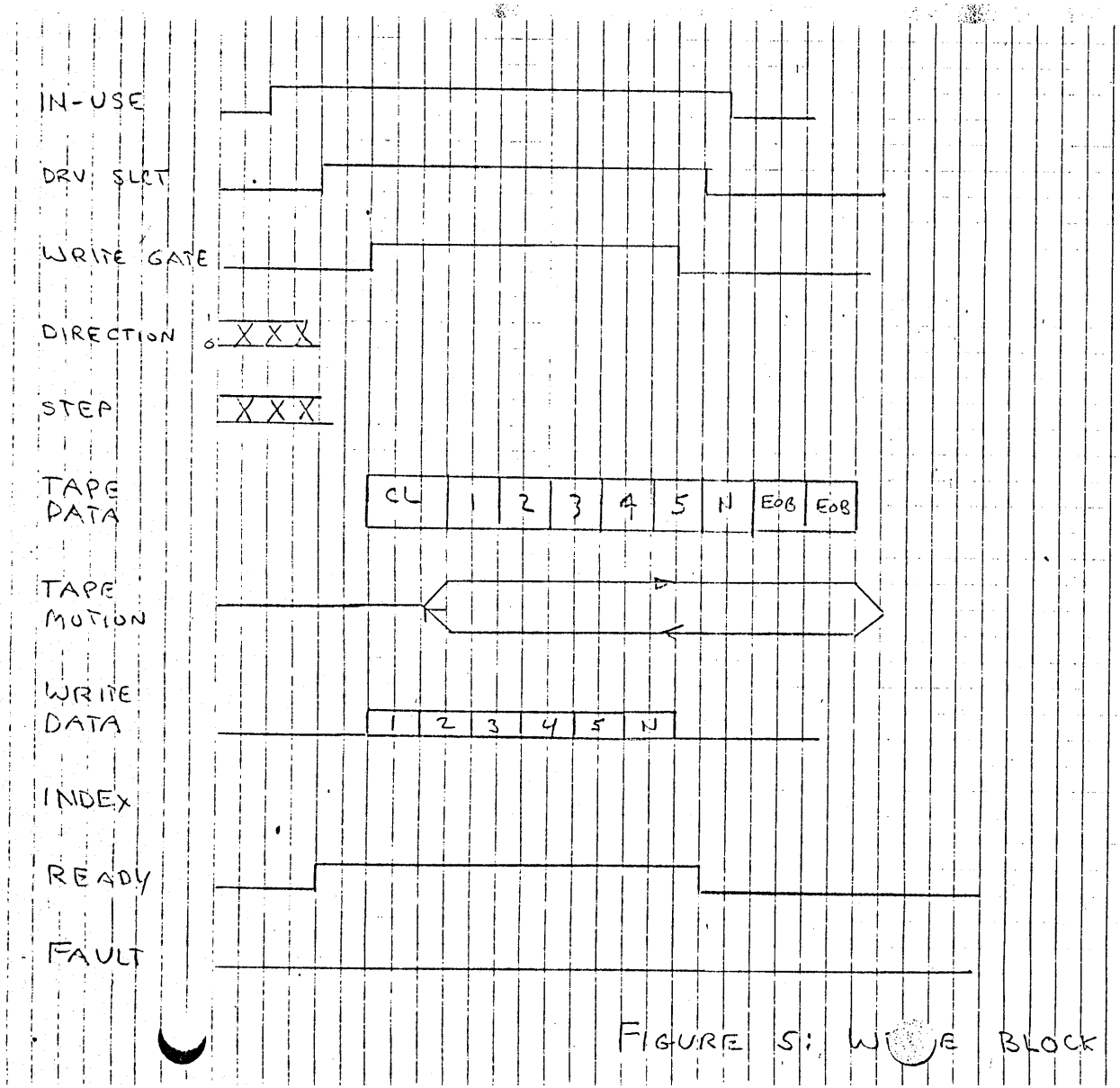
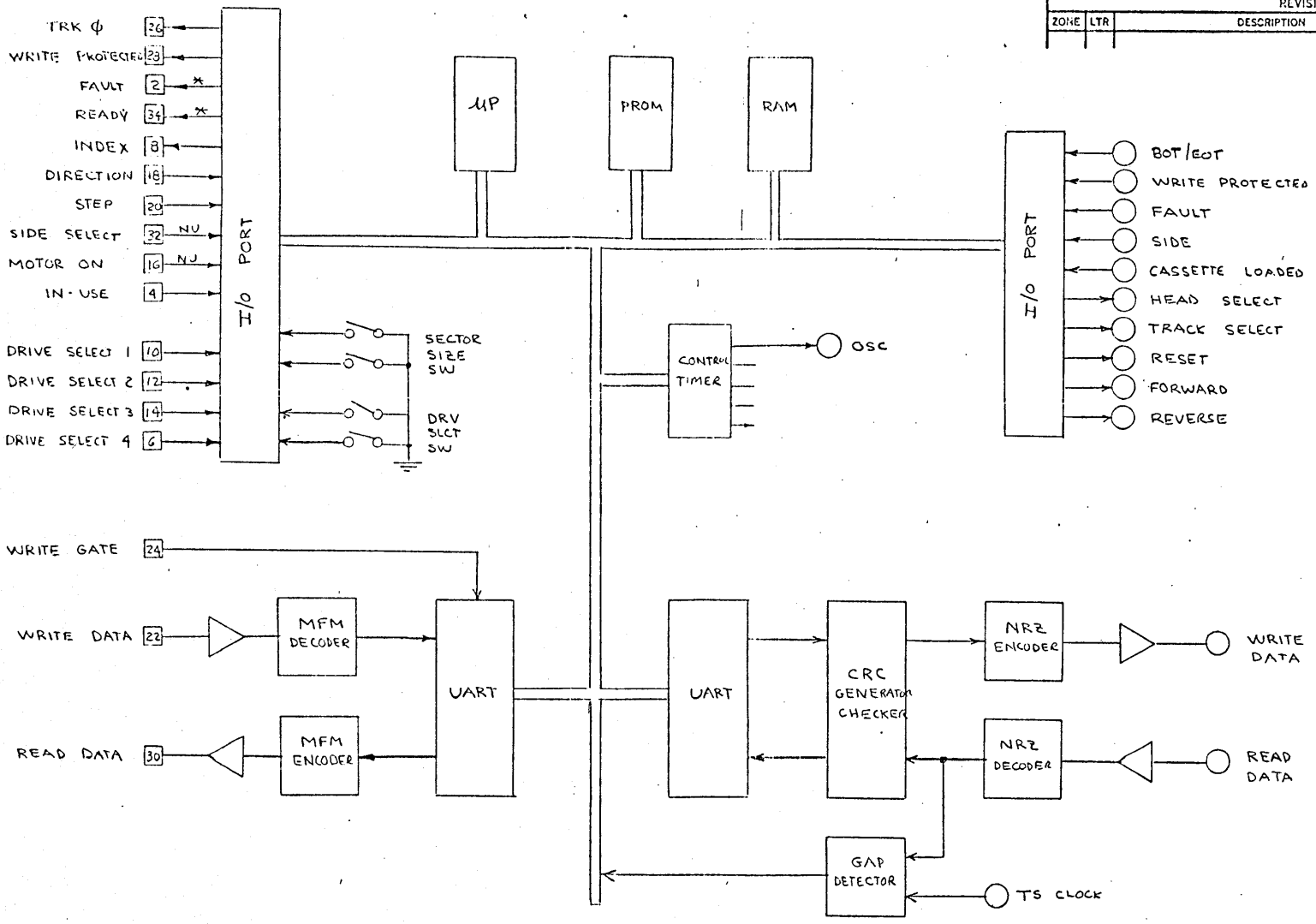


FIGURE 5: WRITE BLOCK



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

NO	DATE	REVISION RECORD

MATERIAL

TREATMENT

TOLERANCES UNLESS OTHERWISE NOTED
DEC X.X ± .010
DEC X.XX ± .005
ANGLES ± 1°
HOLES ±

0-12/100	± .003
101/250	± .004
251/500	± .005
501/750	± .007
751/1000	± .010

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TRANSLATOR BLOCK DIAGRAM

SHEET NO. OF

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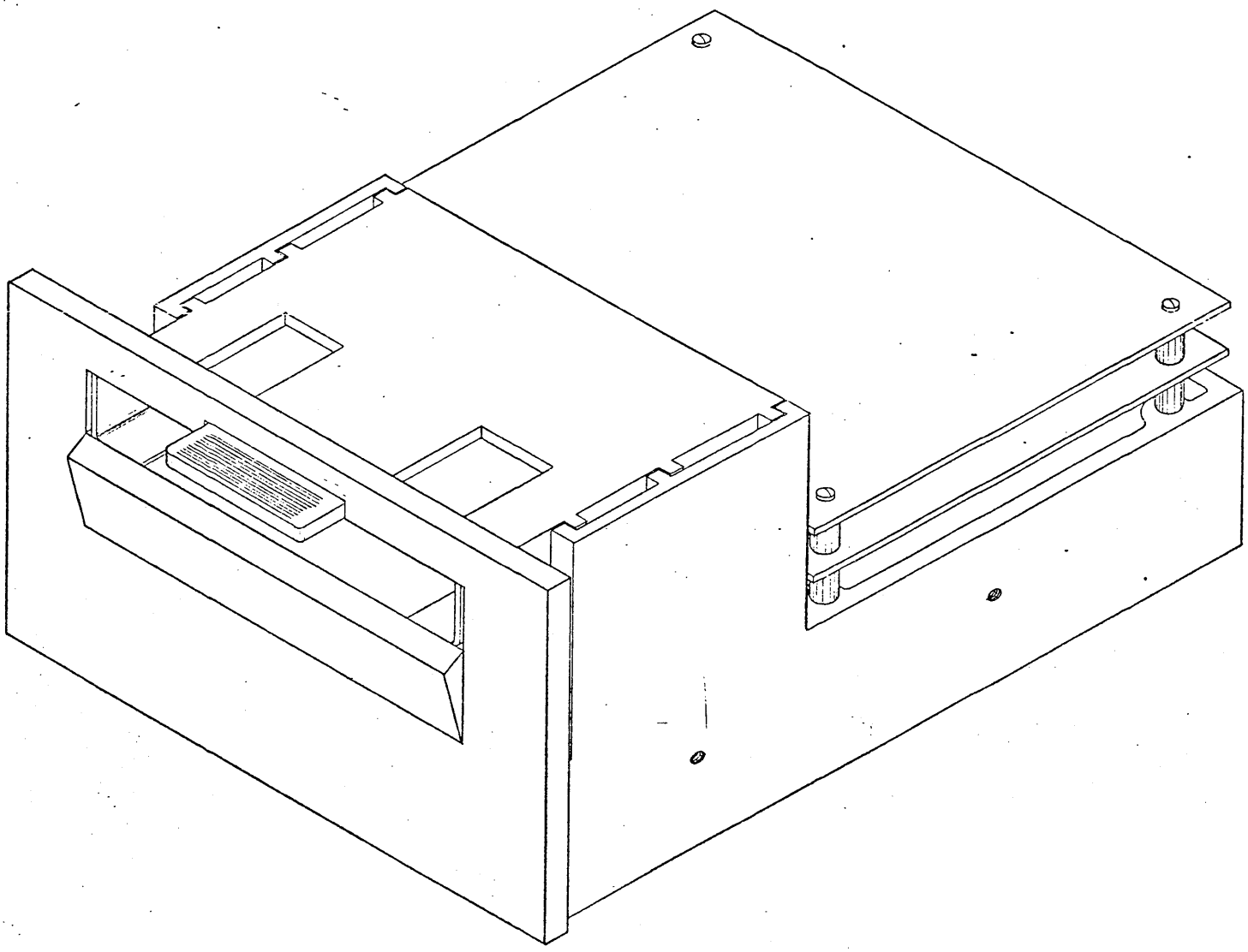
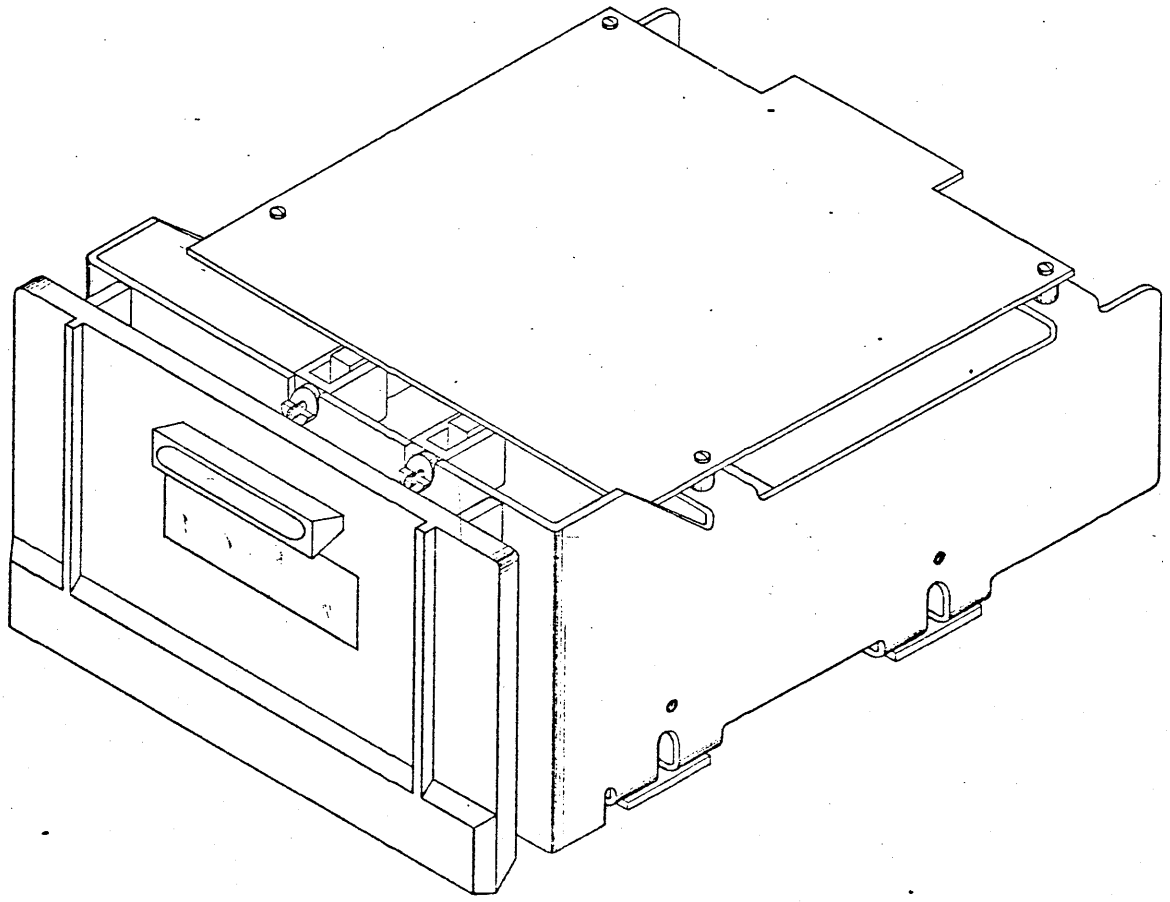


EDGE LOAD



DOOR LOAD