D M A   S Y S T E M S

3 6 0   D R I V E

P R E L I M I N A R Y   O E M   M A N U A L

P/N 01004255

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APPLICATION NOTE
CONTROLLER INTERFACE TO
DMA 360

REFERENCE DOCUMENT: 360 DRIVE PRELIMINARY OEM MANUAL
                       P/N 01004255 JULY, 1984

INTRODUCTION

As described fully in the reference OEM Manual, the DMA 360 Disk Drive is a half height 5 1/4" hard disk removable cartridge disk drive. The very fact of removable media raises several issues that differentiate the 360 Drive from the standard ST506 controller interface. All these differences need to be considered in controller hardware and firmware in order to achieve successful integration of the 360 Drive.

COMMAND LINES

The following control lines have been added to the DMA 360 interface:

    J2 Pin 3   -REINITIALIZE   NC
    J2 Pin 5   -WRITE PROTECTED   ✓ (in)
    J2 Pin 9   -CARTRIDGE CHANGED   TIMING CLOCK + (out)

The following control lines have been functionally redefined to the DMA 360 interface:

DMA 360		ST506
J1 Pin 2	-CHANGE CARTRIDGE	-REDUCED WRITE CURRENT (out)
J1 Pin 18	-WRITE SERVO	-HD SELECT 2'

The selection of these lines in terms of send/receive hardware is in full agreement with the Enhanced Small Disk Interface (ESDI) standardization effort.

In order for the controller/system to achieve full utility from the cartridge drive all these functions should be utilized. If application to an existing ST506 type controller is made, care must be exercised not to inadvertently activate the REINITIALIZE, CHANGE CARTRIDGE OR WRITE SERVO commands

SERVO

Again related to the hardware issues of interchangable media, the DMA 360 incorporates servo information on both serfaces of the cartridge disk. This relates to two controller complications:

1.   Index Burst Servo - Since servo information is embedded at index time on the 360, the RPM has been reduced to 3473 and a servo wedge of $426\pm182\mu s$ inserted just prior to the drive index pulse.

2.   Head Switch Seek - Since servo information is present on both sides of the disk, a head switch must be treated like a seek command in that seek complete will be desserted during the time required to move the new head over rack center. It is also important to adhere to the timing requirements on the head select line at the time of drive select (see figure 4-8 of OEM Manual).

SPIN UP TIME

The 360 Drive incorporates a clean air purge cycle to insure reliable cartridge operation. Since the drive requires 30 seconds to come ready on a normal power-on start, the controller should incorporate this delay into the ready time out logic.

SEEK COMPLETE

During a seek, the drive will not output Index Pulses and will activate Write Protected on the interface. Some controllers use an index timeout feature to sense failure of the drive so that loss of Index Pulses may cause inadvertent shut down.

RECALIBRATE (REZERO)

The DMA 360 incorporates hardware sensing of track zero from servo information written on the disk. Because of this, the drive Track 0 response is not identical to the simple micro switch implementation of an ST506. The drive does not respond with TRACK 000 at the interface on a normal seek to track 0. If the internal control microprocessor senses a request from the controller to recalibrate (rezero) then the drive performs a hardware search for track zero and issues TRACK 000 at the interface when complete.

DMA recommends that upon sensing a seek error, the controller issues a burst step pulse seek of -613 steps. This is much more time efficient than a single step and look algorithum.

WRITE PRECOMPENSATION

Since the 360 drive is designed for 612TPI and 10,894 FCI, a 12 nano second write precompensation is required beyond track 400 in order to achieve the specified error rates.

2.0 Product Specification

2.1 Performance:

	17-Sector Format	32-Sector Format	Unformatted
Drive (per cartridge	10.6 MB	10.0 MB	12.75 MB
Surface	5.3 MB	5.0 MB	6.37 MB
Track	8,704 B	8,192 B	10,416 B
Per sector	512 B	256 B	NA

Access Times:

Move time - one track	3 ms maximum
204 tracks	85 ms maximum
612 tracks	210 ms maximum
Head switch	3 ms maximum
Settling time	13 ms maximum
Average latency	8.64 ms average

2.2 Functional:

Rotational	3,473 RPM+1%
Recording density	10,894 BPI
Flux density	10,894 FCI
Track density	612 TPI
Cylinders	612
Tracks	1,224
Heads	2
Purge cycle	20 seconds
Reinitialization cycle	10 seconds
Stop time	10 seconds

2.3 Interface:

ST 506 compatible	
Transfer rate	5 Mbit/second
Encoding	MFM

2.4 Cartridge:

o ANSI Standard (X3B7-1983; April 1983)
   5.25-inch mechanical compatibility
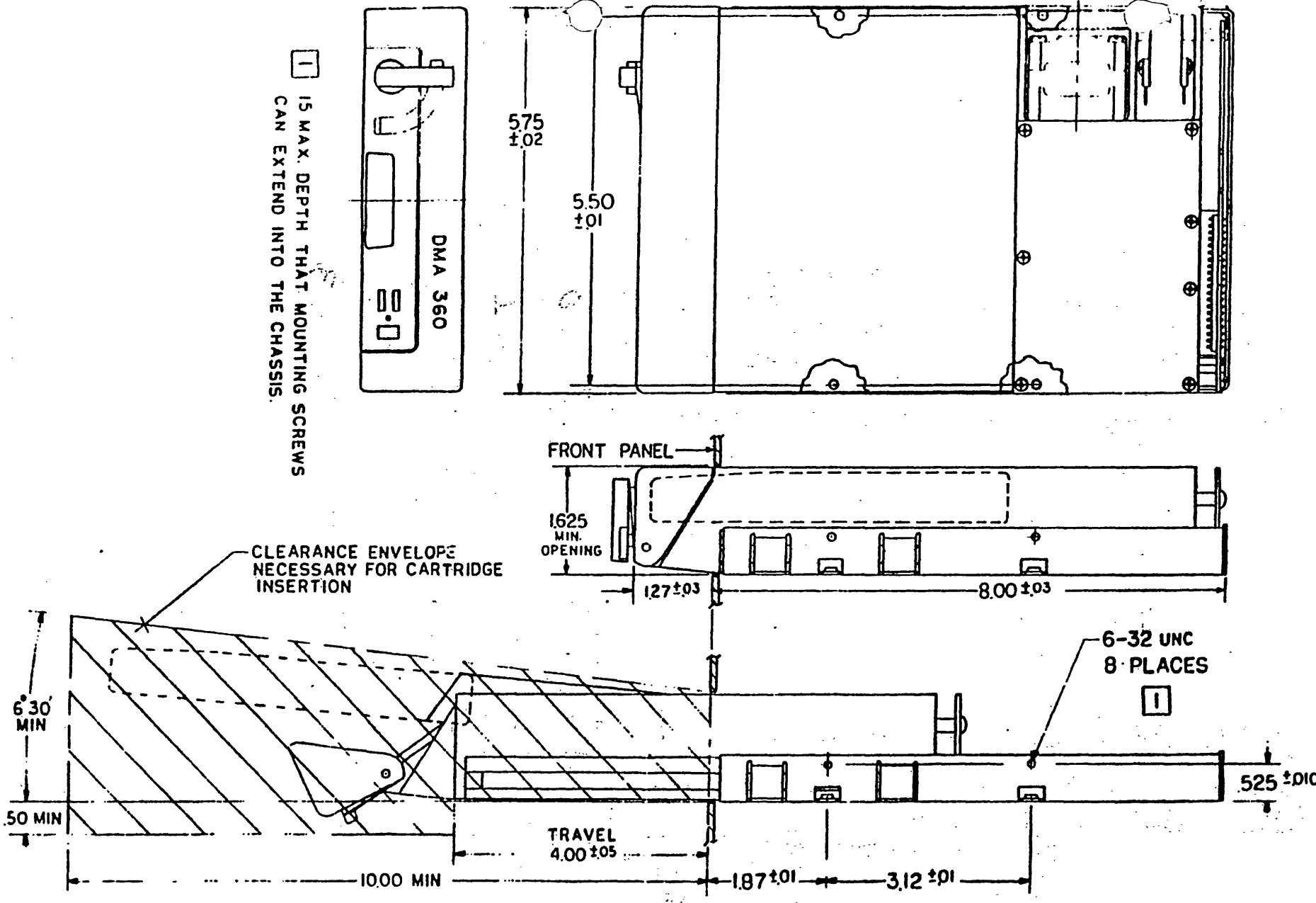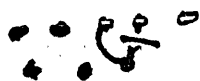
o Standard oxide media

Figure 1-1. Drive dimensions and mounting hole locations.
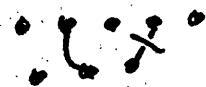
20 PIN
CARD EDGE

34 PIN
CARD EDGE

Physical Drive 0

Physical Drive 1

Physical Drive 2

Physical Drive 3