REVISIONS				
MLC		DESCRIPTION	INC BY	APPROVAL & DATE

APPLICABLE DOCUMENTS

Motor Control PCB Assembly 20217-001

Engineering Specifications:

The HDA components shall meet all requirements and specifications set forth in the following documents unless separately specified herein.

Motor Control PCB (Fab drawing)	20218-001
HDA Assembly drawing	58157-001
HDS Electrical interconnect drawing	
Magnetic Disc	30126-001
Read/Write Heads	30134-001
Head Connector	10420-016
Spindle Motor Connector	10417-006
Stepper Motor Connector	10417-005
Index Connector	10417-005

DWG. NO.

MODEL NO. FIRST USE	ST-412.9	NEXT ASSY FIRST USE	FINAL ASSY	

DRAWN		
CHECK		
APPD(E)		
APPD(M)	[illegible]	1.19.81

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX .XXX
ANGLES ±

SEAGATE TECHNOLOGY

ST412.9 HEAD DISC ASSEMBLY

SCALE	SIZE	DWG NO.	REV. EC
	A	30173-001	0292

DO NOT SCALE

SHEET 1 OF 14

APPLICABLE DOCUMENTS (continued)

TK Ø Connector	10417-005
Spin Motor PCB Connector	10419-002
10416-XXX (Ref) Mates with	10417-XXX
10415-XXX (Ref) " "	10420-XXX
10418-XXX (Ref) " "	10419-XXX
Shock & Vibration Spec.	30138-001
Acoustical Specification	30131-001
Shock & Vibration Spec.	30138-001

CONTENTS

I. SCOPE

The Head Disc Assembly (HDA) is a sub-assembly of the ST412.9 Final Disc Drive Assembly. It will undergo all the drive testing before being shipped to the customer. The Head Disc Assembly will be a complete ST412.9 disc drive less the following hardware:

1) Main control PCB

2) Front panel

II. CAPACITY

Unformatted

Mbytes/Drive	12.76
Bytes/Track	10416

Formatted 32 Sectors/Track (Soft)

Mbytes/Drive	10.0
Bytes/Track	8192

	Max recording frequency (MHZ)	2.5
	Transfer Rate	
	Mbits/Second	5.0
	Density	
	Flux Changes/Inch	9074

III. MEDIA

	Tracks	
	Per Inch	345
	Per Surface	306
	Per Drive	1224
	Defects (Hard Errors)	
	Per Drive	12
	Per Cylinder Zero	0

IV. ENVIRONMENTAL

	Operating	Shipping	Storage
Ambient Temperature*	39° - 135°F 10° - 50	25° - 144°F -4° - 62°C	-8° - 176° -22°C - 80°
Max Temperature Gradient/Hour	18°F	18°F	18°
Relative Humidity	20 - 80%	TBD	TBD
Maximum Wet Bulb	78°	No Condensation	
Stray Magnetic Field	(1" from casting)	20 Gauss Max	
Altitude		10,000 ft. Max	

* Ambient Temperature is defined as the HDA casting temperature.

V. RELIABILITY

Error Rate (Excluding defects) - When used with Seagate Technology PCB P/N TBD.

Soft read errors (16 retries min.)	1 per 10^{10} bits transferred
Hard read errors	1 per 10^{12} bits transferred
Seek errors	1 per 10^{6} seeks
MTBF (Meantime before failure)	
Typical usage	11,000 hours
PM (Preventive Maintenance)	None
MTTR (Meantime to Repair)	30 minutes
Component Life	5 years
Media Life	10,000 starts/stops

VI. POWER

DC Voltages (To motor speed control)

+12 VDC ± 10%, .8 AMP running current; 2.7 AMPs typical motor start current. (see ST412 manual for start profile).

BTU/Hr. (1 watt = 3.413 BTU/Hr.)

Watts	25	± 40%
BTU/Hr.	85.3	± 40%

VII. INTERFACE

TBD

VIII. DRIVE

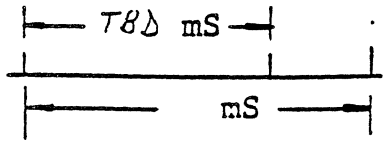
A. Mechanical

Seek Settle Time*

Uncontrolled TBD

Controlled TBD using this step sequence

Track to Track (Seek = 3 ms)



* Using Seagate recommended PCB

Drive Motor Start Time — 15 sec.

Spindle Speed** — 3600 rpm ± 1%

HDA Cleanliness

The air inside the HDA shall be class 100 (0.5) micron particles)

Mounting

See Figures 1 & 2

Vibration and Shock

Shall meet the requirements of Seagate Specification 30138-001

B. Electricial

For purposes of normalized test data, and unless otherwise stated, all test measurements shall be taken at the ambient conditions of 68 + 5°F (20 + 3°C) and 40 to 60% relative humidity after the HDA has been stabilized at the test environment for at least 1½ hour.

Not withstanding this, the HDA shall be capable of meeting all the requirements of this specification over the full operating environment of Paragraph IV, Page 4.

Warm Up Time

The HDA shall meet all operating specifications within 15 seconds after spindle motor has reached 3600 RPM at all operational environmental conditions.

1. Spindle motor speed regulation — 3600 ± 1% RPM

2. Spindle motor current

Start	2.75amps max.
Running	1.0 amps max.

3. Stepper motor/phase — TBD

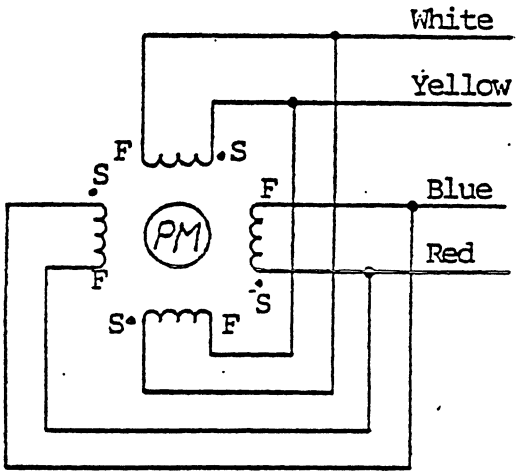
**Adjustments are customer responsibility
***For shipment, the heads shall be moved center track while the spindle is rotating.

4. Performance (Head Disc Asm)

Average 2F amplitude	1.0 mv p-p min.
Inside window margin (without write precomp)	30 ns total
Minimum resolution on any track (without precomp.)	60%

Wide Gap Measurement

1. DC erase tracks 303, 304, 305
2. Write 2F on track 304
3. Write 1F on tracks 303 & 305
4. Measure 1F amplitude relative to 2F amplitude on track 151 using H.P. spectrum analyzer Model No. 3585A or equivalent.
5. Failure is defined as a measurement $\geq$ - 26dB.



S: Start F: Finish

ELECTRICAL REQUIREMENTS

STEPPER MOTOR

Switching Sequence for CCW Rotation
Facing Mounting End

Step	Pin 4 Blue	Pin 5 Red	Pin 2 White	Pin 1 Yellow	Pin 3 Not Us
1	-	+	+	-	
2	+	-	+	-	
3	+	-	-	+	
4	-	+	-	+	
5	-	+	+	-	

SCHEMATIC

SPECIFICATIONS
Step per revolution: 400 (0.9° per step)
Step to step accuracy (Notes 1,2,): ± 6%
Positional Accuracy (1,3): ± 6%
Rotor Inertia: 20 Gcm^2 (.28 MOISS)
DC Phase Resistance: 38 ± 3.8 at 25° C
Phase Inductance: 27 mH ± 20% at 1 KHZ
Phase Voltage: 9.2
Phase Current (Steady State): 240ma
Holding Torque: 720 gcm (10 oz. - IN) Nom.
Pull-out Torque: 360 gcm (5 oz. - IN) NOM.

NOTES:

1. Measurements made at rated current on each phase.
2. Between any two adjacent step positions.
3. Maximum error in 360°.
4. Motor to be driven bipolar.
   The above specifications is of a motor in bipolar mode.
5. Leads: 4, No. 26 AWG PVC insulation UL & CSA approved.

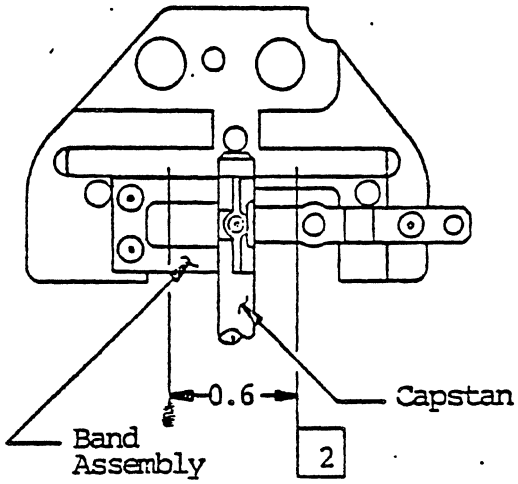
TBD.

IX. PHYSICAL REQUIREMENTS

The HDA can be mounted on any side except upside down or front and back. (See Figures 1 & 2)

The HDA is shock mounted for vibration isolation. In the final mounting configuration, care shall be taken to insure that the operation of the three shock mounts is not restricted.

BAND ASSEMBLY

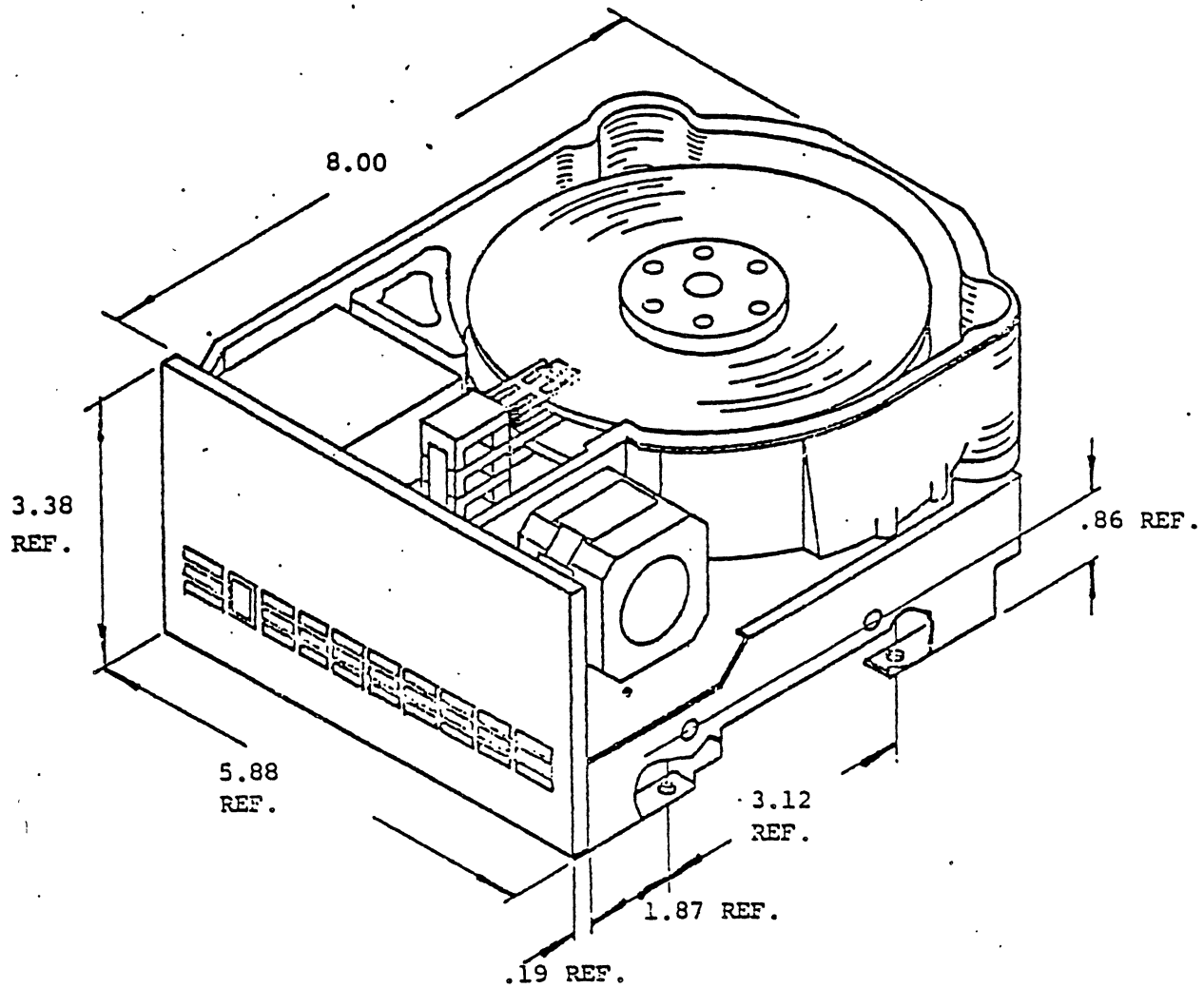


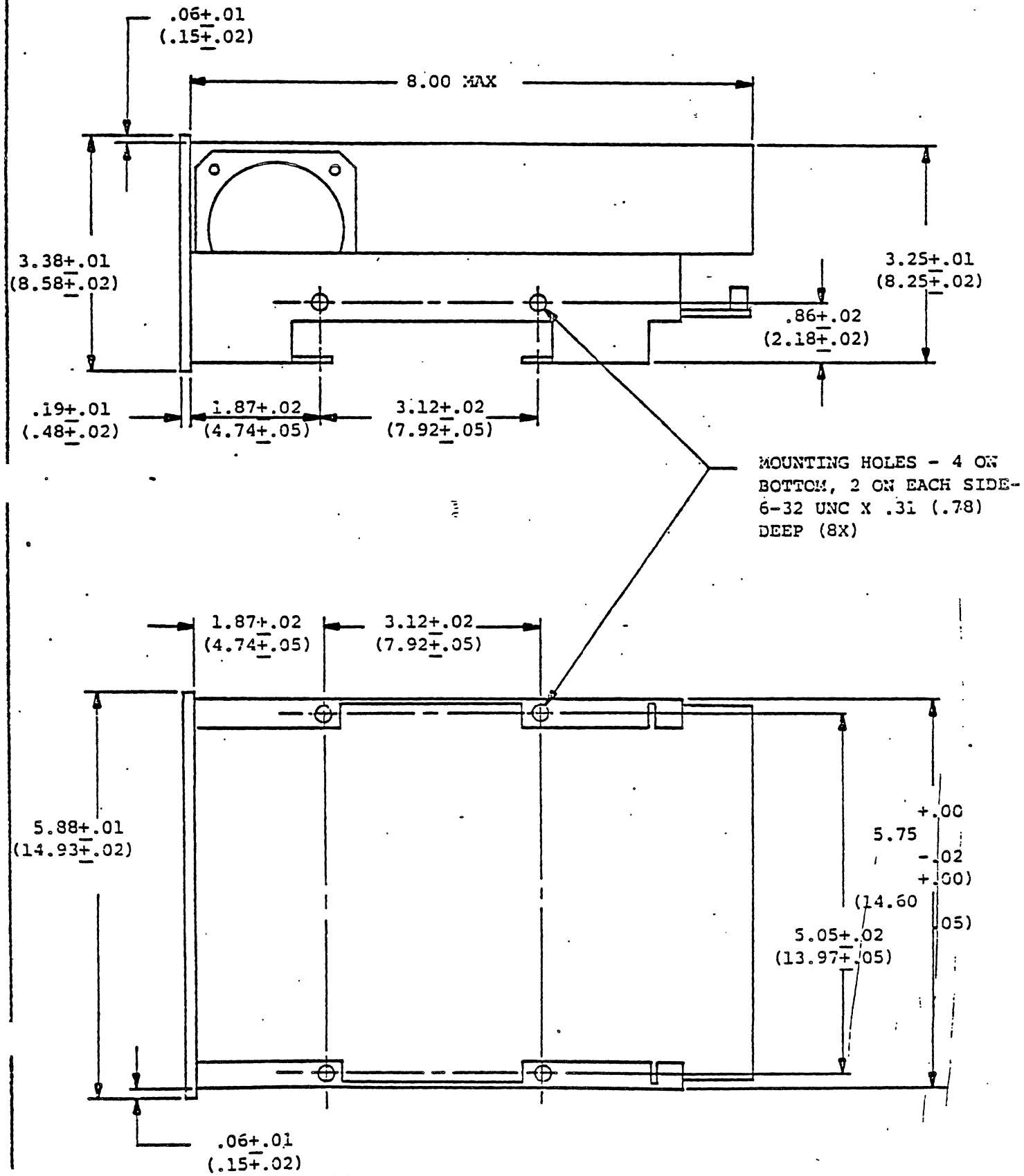
BAND SPECIFICATIONS

1. Band shall be capable of withstanding 2.5 lbs. Max. tension.

2. There shall be no creases on the active portion of the band.

3. Band shall be free of contaminants that would decrease it's life, such as finger prints and edge nicks.


8.00
3.38
REF.
.86 REF.
5.88
REF.
3.12
REF.
1.87 REF.
.19 REF.


.06±.01
(.15±.02)
8.00 MAX
3.38±.01
(8.58±.02)
3.25±.01
(8.25±.02)
.86±.02
(2.18±.02)
.19±.01
(.48±.02)
1.87±.02
(4.74±.05)
3.12±.02
(7.92±.05)
MOUNTING HOLES - 4 ON BOTTOM, 2 ON EACH SIDE- 6-32 UNC X .31 (.78) DEEP (8X)
1.87±.02
(4.74±.05)
3.12±.02
(7.92±.05)
5.88±.01
(14.93±.02)
+.00
5.75
-.02
+.00)
(14.60
05)
5.05±.02
(13.97±.05)
.06±.01
(.15±.02)