<i></i>				N N N N N N N N N N N N N N N N N N N		
	PLICA	TION		REVISIONS		1000 - 10000 - 10000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -
<u>ر.</u>	HEXT ASSY	USED ON	REV	DESCRIPTION	DATE	APPROVED
		GENL USE				
-					·	
					•	

CONFIDENTIAL PROPRIETARY INFORMATION

€

This item is the property of Datapoint Corporation, San Antonio, Texas, and contains confidential and trade secret information. This item may not be transferred from the custody or control of Datapoint except as authorized by Datapoint and then only by way of loan for limited purposes. It must not be reproduced in whole or in part and must be returned to Datapoint upon request and in all events upon completion of the purpose of the loan.

Neither this item nor the information it contains may be used by or disclosed to persons not having a need for such use or disclosure consistent with the purpose of the loan, without the prior written consent of Datapoint.

SPECIFICATION CONTROL DRAWING

INDEX REV UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AND INCLUDE APPLIED FRIGH DRAW N R.G. RAMSDELL® TOLERANCES COMP. ENGR. APPROVAL	N					
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AND INCLUDE APPLIED FINISH TOLERANCES COMP. ENGR. APPROVAL DATAPOINT CORPORATION 9725 DATAPOINT DRIVE	N					
TOLERANCES COMP. ENGR. APPROVAL 9725 DATAPOINT DRIVE						
TOLERANCES 2 PLACE 3 PLACE ANGLES ± ± ± ENGINEERING APPROVAL 9725 DATAPOINT DRIVE SAN ANTONIO, TEXAS 78284						
ENGINEERING APPROVAL 150 MEGABYTE FIXED MEDIA DISK DRIVE	PROJ					
QUALITY APPROVAL BZE DWG NO. 85-0127-001	REV					
RELEASE SHEET 1 O	5 5					

C. C			
DAT	APOINT CORP.		REVISIONA
PERI	PHERAL PRODUCTS INC.		
HE INFOF	ANATION ON THIS DRAWING IS ARY INFORMATION AND MAY ED NOR THE DRAWING REPRO-	、 、	
UCED WI	THOUT WRITTEN PERMISSION		
	INI	FIAL	
	FUNCTIONAL S	SPEC	IFICATION
	PRODUCT	IXED MED	DIA DISK DRIVE
	DATED6/25	/79	
	ORIGINATOR		
	APPR	OVALS:	
7/18/2	Phil Breeden	6/29	179 000
DATE:	Phil Breeden - Director Control Unit Development	DATE:	V. Poor - Sr. Vice President Research & Development
1767	Gfanc 12 Kull		
ATE:	Frank Ruble - Director Storage Products Development Murk. Jenneus 6/26/79	DATE:	H. Hensley - Vice President General Manager International Operations Division Sponsoring Division
ATE:	Jack Clemens - Vice President Product Development	DATE:	V. Balhorn - Vice President and General Manager Customer Service
ATE :	Ronald Meyers - Assistant General Manager & Vice President Marketing	DATE:	Richard Palermo, Executive Vice President, Data Processing Group
ATE:	John Walker - Sr. Vice President and General Manager POD Implementing Division	·	

RETURNED TO ORIGINATOR FOR DESTRUCTION.

COPY NUMBER

ASSIGNED TO

							DWG	NO.	85-0	127-001		
ATAPOINT CORPORATION tapoint Peripheral Products Inc.						t	ŞHT	2			REV	A
EV	"THIS	PAGE	DELIBE	ERATELY	LEFT	BLANK					lanajounane cireatese a	
									·			
											\$	
										•		-
		-										

		1	DWG NO. 85-0127-001	
atapoint Peripheral Products Inc.			SHT 3	REV A
IV			n an	
r		150 MECADYTE DICK DIL	,	
		TABLE OF CONTENTS	2	
1.0	PURPO	SE	• • • • • • • • • • • • • • • • • • • •	6
2.0	SUMMA	RY OF FUNCTIONAL CHARACTERIST	ICS	6
	2.1	General Specifications		6
	2.2	Operational Considerations .	• • • • • • • • • • • • • • • • • • • •	8
				ı
3.0	PRODL	CT CONFIGURATIONS		10
	3.1	Basic Configurations	• • • • • • • • • • • • • • • • • • • •	10
	3.2	Optional Features - Factory	Installed	10
	3.3	Optional Features - Field In	stalled	,10
4.0	FUNCT	IONAL CHARACTERISTICS		11
	4.1	Major Components	• • • • • • • • • • • • • • • • • • • •	11
	4.2	Description of System	• • • • • • • • • • • • • • • • • • •	11
		4.2.1 Disk System		11
		4.2.2 Storage Organization		11
		4.2.3 Accessor Assembly	•••••	12
		4.3.4 Sectoring	• • • • • • • • • • • • • • • • • • • •	18
		4.2.5 Rotational Position	Sensing	18
		4.2.6 Address Mark	•••••	18 ,
		4.2.7 Unsafe Condition Mon	itor	19
5.0	INTEF	FACE DEFINITIONS	• • • • • • • • • • • • • • • • • • • •	20
	5.1	Line Drivers and Receivers .		20
	5.2	Flat Cable Interface	• • • • • • • • • • • • • • • • • • •	20
	5.3	Interface Signal Definitions		26
		5.3.1 Output Signal Lines		26
		5.3.2 Input Signal Lines .	• • • • • • • • • • • • • • • • • • • •	38

¢

. .

Datapoint Peripheral	Products Inc.		SHT 4	REV	A
EV					
			NOTI TOW AND CODUCCEADIL TOW	43	
	6.0	KELIA	Ditter	43	
		6.1	Duty	10	
		6.2	Mean lime to Repair	44	
		6.3	Preventive Maintenance Action Time	44	
		6.4	Machine Correctable Malfunctions	45	
		6.5	Media Qualification	45	
		6.6	Data Error Rates	45	
		6.7	Seek Error Rate	46	
	7.0	PHYS	ICAL INSTALLATION CHARACTERISTICS	47	
		7.1	Reference Documents	47	
		7.2	Operating Conditions	47	
		7.3	Non-Operating Conditions	48	
		7.4	Storage Conditions	48	
		7.5	Static Discharge	49	
		7.6	Physical Characteristics	49	
		77	Power Requirements	49	
		,.,	Tonor Requiremente		

point Peripheral Products Inc.	SHT 5	REV A		
√ *	kan kana kana kana kana kana kana kana			
	LIST OF FIGURES			
FIGURE	TITLE	PAGE		
1a Head/Disk Ass	embly	. 13		
1b Data Track Fo	ormat	15		
2 Radial Cable	Transmission	24		
3 Cable A Contr Chain Tra	rol/Status Daisy Insmission Line	25		
4 Zero Length S	Zero Length Seek and Offset Timing			
5 Seek and Reca	Seek and Recalibrate Timing			
6 Write Data Ti	Write Data Timing			
7 Read Data Tim	Read Data Timing			
8 Address Mark	Timing	36		
9 Index and Sec	tor Timing	39		
	LIST OF TABLES			
TABLE	TITLE	PAGE		
1 Specification	15	6		
2 Unformatted S	Sector Capacities	16		
3 A-Cable Pin A	Assignment	22		
4 B-Cable Pin A	Assignment	23		
5 Command Decod	le Function	32		

DATAPOINT CORPORATION					
Datapoint	Peripheral	Products	Inc.		

RE♥

37

DWG NO.	85-0127-001
---------	-------------

REV A

1.0 Purpose

This document describes the functional characteristics, performance specifications and interface requirements of a 150 Mbyte OEM disk drive. This OEM disk drive is a fixed media random access mass storage device. This device will be used in a high performance, stand alone mass memory storage subsystem.

- 2.0 Summary of Functional Characteristics
 - 2.1 General Specifications

General specifications for the disk drive are listed in Table 1.

Table 1 - Specifications

PARAMETER

STORAGE MEDIA Fixed Media Disks per drive 4 Track density (TPI) 476 Data Surfaces: Movable Heads 7 Servo & Fixed Heads 1 **RECORDING TECHNIQUE:** MFM Bit Density (BPI) 6366 Movable Heads per surface 2 Movable Heads per Drive 14 Servo Head 1 Optional Fixed Heads 60 Track per Cylinder 14 Cylinder per Drive (primary + alternate) 550 + 10Tracks per Drive (primary + alternate) 7700 + 100

DATAPOINT CORPORATION		DWG NO. 85-0127-001				
atapoint Peripheral	Products Inc.	SHT 7	REV A			
EV		an magna mala dha manna na an dadha an magna dadha na caoladan na anna dha an				
	Table 1 - Spec	ifications (Con't)				
	PARAMETER	150 MByte Mode l				
	DATA CAPACITY:					
	(Unformatted)					
	MOVABLE HEADS.					
	Bytes/Track	1996 8				
	Bytes/Cylinder	279552				
	Megabytes/Drive (unformatted)	154				
	(aniormaccod),					
	FIXED HEADS (Option):	100/0				
	Bytes/Irack Megabytes/Drive	19968				
	(unformatted)	1.20				
	DATA TRANSFER BATE.					
	(Nominal)					
	Megabytes/Second	1.198				
	Megabits/Second	9.585				
	ACCESS TIME:					
	(Reference Section 4.2.3.1					
	measuring access time).					
		·				
	OneTrack Seek	7 ms				
	Maximum Length Seek	70 ms				
	DISK ROTATIONAL SPEED:	3600 RPM + 4% 16 67 MS + 4%				
	Average latency	8.33 MS + 4%				
	Start Up Time:	- 25 Sec Max				
	-					
	Stop Time:	60 Seconds				

1

i

1

ţ

FULAT 3/17

		DWG NO.	85-0127-001		
Datapoint Pertpheral Products Inc.		SHT	8	REV	A
3EV . 2.2	Operational Considerations	;			
	The Operator controls are drive. The panel contains (Optional), and three indi lamp, when it is illuminat applied to the drive. The illuminated, indicates tha yellow indicator lamp, whe the drive is in WRITE PROT	located or AC Power cator lamp ed, indica green ind at the driv en it is if TECT Mode.	the front p ON/OFF and F os. The red ates the AC p dicator lamp, ye is in READ lluminated, i	anel of ILE PRC indicat ower is when i Y mode. ndicate	the T or t is The es that
2.2.1	Switches				
	2.2.1.1 AC Power ON/OFF S	witch			
	The AC POWER ON/OFF is an a AC POWER switch is position connected to the appropriat lamp shall be illuminated.	lternate a ed to ON a e AC outle	ction switch nd the AC cal t, the Power	. When ble is On ind	the icator
	2.2.1.1.1 When the AC power following conditi	switch is ons will o	in ON posit ccur:	ion, th	e
	2.2.1.1.1.1 Powe	r-On Seque	ence		
	2.2.	1.1.1.1.1	When the AC applied to supply, the will be gen following s	power the pow DC vol erated equence	is er tages in the :
			(1) +5VDC		
		•	(2) -5.2VD -12VDC	C, +12V	DC,
			(3) +24VDC		
			When all the are present their limits POWER OK" st generated to disk motor b and apply th the motor.	e DC vol and wit s, the ' atus is activa prake so ne AC po	tages thin 'DC te the olenoic ower to
	2.2	.1.1.1.1.2	The "POWER-(generated to all control	ON RESE initi flip/f	T" is alize lops
			and counters	5.	

DATA	POINT CORPORATION							
		a a shara na shara a sh		SHT 9	REV A			
REV		2.2.1.1.1.1.3	When the s disk speed the "EMA E are genera heads to c successive UNIT READY READY lamp drive is r	peed monitor circuit is within 80% of th NABLE" and power-up ted to position the ylinder 0. When the ly positioned to cy status becomes true is illuminated to eady for operation.	t detects the ne nominal speed restore command read/write e heads are linder 0, the e and the indicate that the			
	2.2.1.1.1.2	Power-Off Seque	ence					
		When the AC pow conditions will	When the AC power switch is positioned to OFF, the following conditions will occur:					
		2.2.1.1.1.2.1	The AC pow illuminate	er indicator lamp wi d.	ill not be			
		2.2.1.1.1.2.2	The READY	lamp will be exting	ished.			
		2.2.1.1.1.2.3	The read/w landing zo	rite heads will be a ne of the disks.	returned to the			
		2.2.1.1.1.2.4	The motor the brake stop disk	brake solenoid is de is applied to the dr rotation.	e-energized and rive motor to			
	2.2.2 Indicator	rs						
	2.2.2.1	AC Power Indica	tor (Red La	mp)				
		This indicator AC power is app	lamp, when lied to the	it is illuminated in disk drive.	ndicates that the			
	2.2.2.2	READY Indicator	Green Lam	p)				
		This indicator disk drive is r	lamp, when eady for op	it is illuminated in eration.	ndicates that the			
	2.2.2.3	FILE PROT Switc	h and Indic	ator (Yellow Lamp)	(Optional Feature			
		The FILE PROT i PROT switch is illuminated and The read only m drive and activ receipt of a WR an UNSAFE shall	s an altern positioned the drive ode disable iates the W ITE Command be generat	ate action switch. to ON, the indicator shall be placed in a s the write circuits rite Protect status while the drive in ed.	When the FILE c lamp shall be read only mode. s within the line. Upon Read Only Mode			
	n mar an			and a subject of the state of the second state of the state				

	$ \$					DWG NO. 85-0127-001				
DAIAPOINT CORTORATION Datapoint Peripheral Products Inc.						SHT	10		REV	А
REV										
3.0	Produ	ct Coni	igurat:	ions						
	3.1	Basic	Config	uration	S					
		The se the di	elective rives 1:	e featu isted b	res are r elow.	equired f	for the con	figu	ratio	n of
		<u>Model</u>]	Descripti	on			
		150 MH	}yte		Non-remo movable unformat on 550 c supply i selective interfact furnishe	vable med head posi ted stora ylinders s include e feature e cables d with th	lia disk dr tioner ass age capacit on 4 disks ed with the es are requ and termin he drive.	ive embl y is . T dri ired ator	with a y. T 154 b The port tve. ' l. The are t	a he MBytes wer The e not
		3.1.1	Select	tive Fe	atures					
			AC vo	ltage a	nd freque	ncy (Refe	erence Sect	ions	7.7)	
			 10 17 20 20 21 22 22 22 24 Disk I 	00 VAC, 15 VAC, 00 VAC, 08 VAC, 20 VAC, 30 VAC, 40 VAC,	50 or 60 50 or 60	Hz. Hz. HZ. Hz. Hz. Hz. Hz.				
			e 36	500 RPM		ν.				
			Track	Format	:		• · · · · · · · · · · · · · · · · · · ·			
			 Ac us f: 	ddress l sed, the ied.	Mark or So e number o	ector For of Sector	mat. If S s per trac	ecto k mu	or form ist be	mat is speci-
		3.1.2	Option	nal Fea	tures (Re:	ference S	Sections 3.	2 an	d 3.3)
			• Fi	ixed He	ad Option					
	3.2	Option	al Feat	tures -	Factory	Installed	l			
		. (1)	FIXED megaby multi-	HEAD A ytes. ' -elemen	SSEMBLY - The fixed t heads pr	increase head ass roviding	es the data embly cont 60 tracks	cap ains of d	acity 20 r ata (by 1.2 ead/write 1.2 mb).
2	3.3	Option	al Feat	tures -	Field Ins	stalled				
		(1)	FIXED This f an HDA	HEAD A feature Which	SSEMBLY - is field has the s	provides upgradab fixed hea	60 fixed le only by d assembly	head rep ins	elem lacing talle	ents. g with d.

	RPORATION	х. Х		DWG NO.	85-0127-0	001
Datapoint Peripheral	Products Inc.			SHT 1	1	REV A
EV	diguna (Marina Marina di Kanang K			na en	gan an a	
	4.0 <u>Func</u>	ctional Ch	aracterist	tics		
	.4.1	Major C	omponents			
		 Cha He 3 Dri 	ssis ad Disk As PWA Assemb ve motor	sembly (HDA) lies		
	4.2	Descrip	tion of S	vstem		
		4.2.1	Disk Syst	tem		
			4.2.1.1	Media		
				The media consists inches in diameter spindle and enclose case. The disks an oriented ferric oxi	of four dist mounted on ed in a plas re coated wi ide and lubr	ks 14 a single tic and metal th magnetic icant.
			4.2.1.2	Disk Organization		
				The disk drive has Assembly (HDA) whice disks, four movable Assemblies, a fixed (optional) and a size assembly. The HDA enclosed in a shrow electronics and has of the heads and the the media.	a single He ch consists e Data Head/ d head/arm ingle servo is a nonrem ud with nece rdware to al he reading a	ad/Disk of four Arm assembly head/arm hovable module ssary low movement and writing on
		4.2.2	Storage	Organization		

t. F

ì

J,

1

1

0041 3/77

Each moving head data surface is divided into two data bands (outer and inner). Each data band contains 560 tracks (550 and 10 alternates) and a read/write head. Hence, there are 560 cylinders (550 with 10 alternates) for the moving heads on three to seven data surfaces. The bottom surface contains 560 servo tracks and 60 tracks for the optional fixed read/write heads. Figure 1a shows the Head/Disk Assembly.

1	<u> </u>			P. C.				DWG N	0			
,	DAT. Datap	APOINT CORP point Peripheral F	ORATION roducts Inc.					SHT	12	0127-001	REV	A
•	REV	1	aluan shika ka ka ka ka	antorine, actually any are		a Actor digar Providitor di Sacana di Angele Ancana sport		Sur			Fiber ¥ 	
1.					1 7 7	Accorden	Accomb 1st					
•				÷	4.2.3	Accessor	Assembly					
						4.2.3.1	Positioni	ng Time	S			
							The posit interval the ON CY status tr drive mus issuing a executing of measur second mi receiving next SET include t measured	ioning from tr LINDER ansitio t be at SET CY repeti ing pos nimum d ON CYL CYLINDE he dela positio	time is ue to fa status t n from f zero of LINDER c tive see itioning elay is INDER pr R commar y may re- ning tim	defined alse tran to the Off false to ffset pri- command. eks for to g time, a required rior to ad. Fail	as the nsition N CYLIN true. ior to When the pur a 2 mil d after issuing lure to errone	time of DER The pose li- the ous
							4.2.3.1.1	One	Track Se	eek		
*								The at 1 shal secc	average east 102 1 not ex nds.	position 24 one t cceed 7 n	ning ti rack se milli-	me of ek
•												
,												
•												
- -												
ŧ												
·												
and the second of the second second second second												
						•	x					
1 3/77												
1001												



			DWG NO. 85-012	27-001
Datapoint Peripheral Products Inc.		F	SHT 14	REV A
REV	aan da waar da da ah		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
		4.2.3.1.2	Maximum Length	Seek
			The average pos at least 1024 m seeks (560 cyli exceed 70 milli	aitioning time of maximum length Inders) shall not Seconds.
		4.2.3.1.3	Average Seek	
			The average pos the sum of the do all the poss of seek divided such seeks. Th positioning tin exceed 35 mill:	sitioning time is time required to sible combinations d by the number of he average ne shall not iseconds.
		4.2.3.1.4	Recal	
			The positiong command shall responses to the seconds.	time for a RECAL not exceed 0.6
		4.2.3.1.5	Zero Track See	k
	· ·		The access mech move for a zer- however, an in enabled. The transition of shall not exce from the trail SET CYLINDER c	hanism does not o length seek, ternal delay is false to true ON CYLINDER status ed 15 microseconds ing edge of the ommand.
	4.2.3.2	Rotationa	1 Latency	
		The disk + 4% for and frequ 7.7 Thi revolutio and an av 8.6 milli	pack rotates at a the specified ran ency inputs defin s speed results i n) latency of 17. erage (half revol second.	speed of 3600 RPM ge of AC voltage ed in paragraph n a maximum (full 34 millisecond ution) latency of
	4.2.3.3	Track Off	set	
	•	The 717 O move the center wi Offset Min function	EM disk drive has R/W heads off the th the Servo Offs nus interface com may be used to re	the capability to nominal track et Plus and Servo mands. This cover marginal

•

1

1

+ 6041 3/77

DATAP	NAT CORPORATION	DWG NO. $85-0127-001$ SHT 15REV A302 BytesZEROS GAPS Y CDATAECCWG PADEND OF RECORD GAPrtes: 271260617					
Datapoint	Peripheral Products Inc.			SHT 15	,)		REV A
REV	•						
						•	
	-		302 Bytes				
	ZEROS GAP	S Y N C	DATA		ECC	WG PAD	END OF RECORD GAP
	Bytes: 27	1	260		6	1	7
	ZEROS GAP - 2 SYNC BYTE - B C DATA - 2	7 Bytes yte of ontroll 60 Byte	s of Zeros; 16 Bytes for head Hex 01 for synchronization of ers logic.	l skew an of serial	d 11 Byte read dat	s for a to t	PLO Sync.
	ECC - 6 WG PAD - 1 t	Bytes Byte c urn-off	of Error Correction Code. of zeros written after last E	ECC byte j	prio to W	rite G	Sate
	EOR GAP - 7	Bytes	of zeros.				· ·

DATA TRACK FORMAT Figure 1b.

٠

.

	-			F
DATAPO	XNT COF	PORATI	ON	F
Datapoint	Peripheral	Products	Inc.	E.

į

الجد

.

4

FU041 3/77

REV

SHT 16 REV A

۰. .

Table 2. Unformatted Sector Capacities

			,	•	
×	C	գ	- N	С	գ
5	3993	3996	51	391	418
6	3328	3328	52	384	384
7	2852	2850	· 53 54	370	418
8	2450	2490	55	363	366
10	1996	2004	56	356	388
11	1815	1818	57	350	368
12	1664	1664	58	344	360
13	1536	1536	59	338	304
14	1426	1430	6U 61	332	300
15	1331	1248	62	322	326
10	1174	1184	63	316	376
18	1109	1115	64	312	312
19	1050	1068	65	307	320
20	9 98	1006	66	302	338
21	950	968	6/	298	300
22	907	921 972	- 60 - 60	289	316
25	832	832	70	285	303
25	798	816	71	281	298
26	768	768	72	277	301
27	739	754	73	273	312
28	713	71/	74	209	284
29	588 555	704	75	262	318
31	644	648	77	259	284
32	624	624	78	256	256
33	605	608	79	252	312
34	587	597	80	249	29/
35	570	588	81	240	285
36	554	5/8	83	243	288
3/	525	543	84	237	297
39	512	512	85	234	312
40	499	507	86	232	248
41	487	- 488 -	87	229	2/4
42	475	493	88	220	256
43	464	480	69 Q()	221	299
44	455 AA3	476	91	219	258
46	434	438	92	217	221
47	424	464	93	214	280
48	416	416	94	212	252
49	407	432	95	210	200
50) 399	417	Ар	200	200
N = Sectors	per Track				

C = Bytes per Sector $C_{L} = Bytes per Last Sector$

DATA POINT COPPORATION				DWG NO.	35-0127-001	
Datapoint Peripheral Products Inc.				SHT 17		REV A
EV	Table 2. L	Informatted	Sector Capa	cities (Con	t)	
97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123	C 205 203 201 199 197 195 193 192 190 188 186 184 183 181 179 178 176 175 173 172 170 169 167 166 165 163 162	CL 288 277 267 268 273 282 192 208 252 280 204 239 278 210 256 193 246 188 248 195 262 214 168 245 204	N 124 125 126 127 128	C 161 159 158 157 156	с 165 252 218 186 156	

N = Sectors per Track C = Bytes per Sector C_L = Bytes per Last Sector

ł

. و هد

į

.

1

۰. 2.54

Į

ł

1/12 1700:

			DWG NO. 85-0127-001		
Datapoint Peripheral Products inc.			SHT 18	R	IEV A
REV	4 0 7 7				
	4.2.3.3	Track Offset	(Con't)		
		Data resultin surface. The inches.	ng from small def e offset magnitud	ects on le is 350	the disk micro-
4.2.4.	Sectoring	5			
	Each trac revolution hardware sectors. and Sector start of occur at for defin not an in sector with Drives with	ck on the disk on. The number programmable w The sector be or status sign the first sec the start of the nition of sector negral submult ill be larger a	is divided into r of sectors per within the range bundaries are dif als. The index s tor. A sector si the first sector. or timing. If the tiple of the trac as indicated in T red for Datapoint	"n" sector revolution of 5 to ined by ignal de gnal doe Refer the sector k size to Table 2.	ors per on is 128 the Index fines the s not to Table 2 size is he last
	per track recorded mented as	c on 560 cyling by Datapoint s shown in Fign	ders. The format on the disk pack ure 1b.	: of each : (HDA) i	sector s seg-
4.2.5	Rotationa	al Position Ser	nsing (RPS)		
	The disk sector th response the Atten specified sector co advanced address v	drive has the nat is position to the Set Sec ntion and Record d sector addres bunter is set by the sector vill result in	capability to se ned under the R/W ctor command, the rd Ready status s ss equals the sec to zero by the ir signal. An Inva an Unsafe status	nse the V heads. e drive w signals w stor coun idex sign alid sect 5.	In ill assert hen the t. The al and or
4.2.6	Address N	lark			
	The disk write add interface Mark Enal mark. Du command f acknowled Address M identify track.	drive has the dress marks us command. Du- ole command in uring a read op initiates a sea dged by the AM Mark is a uniqu the beginning	capability to re ing the Address M ring a write open itiates the writi peration the Addre arch for an addre Found status sig ue pattern that co of a formatted o	ad and lark Enab ation th ng of an ress Mark ss mark gnal. Th an be us lata fiel	le e Address address Enable which is e ed to d on the

,

٠

ł

I

DATAPOINT CORPORATION				DWG NO. 85-0	0127-001
Datapoint Peripheral Products Inc.				SHT 19	REV A
REV					
	4.2.7	Unsafe Co	ondition Moni	tor	
		The 150 M continuo condition in asser condition unit (ref qualified	MB disk driv usly monitor ns. The detention of the U ns may be clear Gerence parage l personnel.	e contains circu and identify the ction of an unsa NSAFE status sig ared by the oper caph 2.2) or may	its that will following unsafe fe condition results nal. The unsafe ator or control require service by
		4.2.7.1	DC Power Un	safe	
			DC Power Un voltages. to move to	safe indicates l This condition w the landing zone	oss of any DC Till cause the heads
		4.2.7.2	Pack Speed	Unsafe	
			The pack sp operating s landing zon heads are r	eed is less than peed when the he e. When this co etracted to the	80% of the normal ads are not in the ondition occurs, the landing zone.
		4.2.7.3	PLO Unsafe		
			The write o with the se	scillator is not rvo clock.	in synchronization
		4.2.7.4	Write Unsaf	e	
			No write tr active and	ansition detecte address mark wri	d when Write Gate is ting is inactive.
		4.2.7.5	Write Servo	Offset	
			Write gate anabled.	active with serv	o offset command
		4.2.7.6	Index Error		
			Indicates t its window, index and w is not inst	hat the Index wa or that the win rite gate is act alled.	is detected outside dow occurred with no ive and AM feature
		4.2.7.7	RPS Unsafe		
			Indicates a occurred wi of a Set Se	Record Ready co thin 7 disk revo ctor command.	ndition has not lutions as a result

ľ

1

......

				DWG NO. 85-01	127-001
DATAPOINT. CORPORATION Datapoint Peripheral Products Inc				SHT 20	REV A
REV ·				na kana ana kana kana kana kana kana ka	ng pang kan
			4.2.7.8 AC Unsa	fe	
			This un	safe indicates l	oss of AC power.
5.0	Interfa	ice Defini	tions		
	The int are sum digital signals balance control interfa in cabl function to read	erface si marized i in natur to the c ed, termin function ce signal e A are m ons. The l/write da	gnal connector pin n Tables 3 and 4. e and either provid ontroller. All int ated transmission 1 s and twinax conduc s are grouped in tw ultiplex lines whic signals in cable B ta and clock, and in	assignments and All lines in the e signals to the erface signals a ines; twisted pa tor for data and o cables, A and h are related to are simplex line nterrupt functio	signal polarities interface are drive or provide re transmitted on ir for address and clock lines. The B. The signals address and control s which are related n.
	5.1 L	ine Drive	rs and Receivers		
	T t F t	The interf Tial drive Tigures 2 Tion netwo	ace line drivers an rs and receivers eq and 3 show the line rk.	d receivers shal uivalent to SN75 driver and rece	1 be dual differen- 110 and SN75107B. iver with termina-
	5.2 F	lat Cable	Interface		
	Т	The flat (ribbon) cables are	unshielded.	
	5	5.2.1 A-	Cable (Flat Cable I	nterface)	
		ITEM	DESCRIPTION	BERG P/N	SPECTRA-STRIP P/N
		1 2 3	Connector, 60 Pos Contact, Insert Flat Cable, Twist pair, 30 pair, 28	65043-007 48048 ed AWG -	- - 3CT-6028-7B-05-100
	5	5.2.2 A-	Cable Mating Recept	acle on Drive (F	lat Cable Interface)
		ITEM	DESCRIPTION	AMP P/N	
		1	Vertical Header, 60 Pos	3-87227-0	
	5	5.2.3 B-	Cable Read/Write Si	gnal (Flat Cable	e Interface)
		ITEM	DESCRIPTION	<u>3M P/N</u>	
3/17		1 2 3	Connector, 26 Pos Connector, Pull T Flat Cable, 26 conductor with gr plane and drain w	ab 3399-3000 3490-2 ound ire 3476-26	

			DWC	G NO. 85-0127-	27-001		
ATAPOINT CORPOR atapoint Peripheral [®] Produ	ATION Locial ATION		ŞHT	21	REV A		
		en angen angen direct direc		en an table die versche eine der eine d			
	5.2.	4 B- Cable Ma	ting Receptacle	on Drive (Flat	Cable Interfac		
		ITEM DESCR	IPTION	AMP P/N			
		1 Vertica 26 Pos	al Header,	1-87227-3			
					\$		
					,		

• .

DATAPOINT CORPORATION Datapoint Peripheral Products Inc.

1

÷

...ti

1

4

1

UE

- CULT

REV

DWG	NO.	85-0127-001
-----	-----	-------------

SHT 22

REV

A

Table 3

A-CABLE, CONTROL SIGNAL PIN ASSIGNMENT

SIGNAL NAME	FLAT CAB PIN PC LO(-)	LE INTF DLARITY HI(+)	SOURCE
Device Select 2 ⁰ Device Select 2 ¹ Device Select 2 ² Device Select 2 ³ Device Select Enable Set Cylinder (Tag 1) Set Head (Tag 2) Control Select (Tag 3) Set Sector (Tag 4) Bus Out 0 Bus Out 1 Bus Out 2 Bus Out 2 Bus Out 3 Bus Out 4 Bus Out 5 Bus Out 5 Bus Out 5 Bus Out 6 Bus Out 7 Bus Out 8 Bus Out 9 Interface Enable (Open Cable Detect)	23 24 26 27 22 1 2 3 30 4 5 6 7 8 9 10 11 12 13 14	53 54 56 57 52 31 32 33 60 34 35 36 37 38 39 40 41 42 43 44	
Sector Mark Sector Mark Unsafe Seek Incomplete On Cylinder Unit Ready Write Protected Address Mark Found Busy (Dual Port) Power Pick Power Hold Terminator Ground	18 25 15 16 17 19 28 20 21 29 59 	48 55 45 46 47 49 58 50 51 	Drive Drive Drive Drive Drive Drive Drive CU CU CU

DATAPOINT CORPORATION Datapoint Peripheral Products Inc.

REV

ļ.

-

į

3/1/5

DWG NO.	85-0127-001
---------	-------------

SHT 23

REV A

Table 4

B-CABLE, READ/WRITE SIGNAL PIN ASSIGNMENT

SIGNAL NAME	FLAT C	ABLE IN		
	L0(-)	HI(+)	GROUND	SOURCE
WRITE DATA	8	20	7	ເນ
SERVO CLOCK	2	14	1	Drive
READ DATA	3	16	15	Drive
READ CLOCK	5	17	4	Drive
WRITE CLOCK	6	19	18	ເບ
DEVICE SELECTED	22	9	21	Drive
ATTENTION	10	23		Drive
RECORD READY	12	24	11	Drive
RESERVED	13	26	25	Drive
NOT USED				

i di serie de la companya de la comp En la companya de la c





	RATION				DWG NO. 85-012	7-001	
tapoint Peripheral Pro	ducts Inc.				SHT ²⁶	REV	A
EV							
	5 1	Interf	ace Signal	Definitions			
	5.5	5 7 1		ignal Linos			
		J. J. T		Ignai Lines			-
			transmit	ted to the drive	via A-cable or B-	ntrol unit a cable.	na
			5.3.1.1	Device Select	Lines (2, 2 ¹ ,2 ² ,2 ³)	
				These four lin of sixteen dri DEVICE SELECT nanoseconds pr edge of DEVICE address is det in the drive. duplicate Devi the drives on	es are binary code ves on the control lines must be held ior to and followi SELECT ENABLE. T ermined by the Dev The operator must ce Address switche the same Daisy Cha	d to select cable. The stable for ng the leadi he device ice Address verify that s are instal in.	one 200 .ng swit no .led
			5.3.1.2	Device Select	Enable		
	·			This signal is address is spe (20,2 ¹ ,2 ² ,2 ³). remain stable The DEVICE SEL 0.5 microsecon DEVICE SELECT DEVICE SELECT the Device Add SELECT command leading edge o	used to select th cified in the DEVI The DEVICE SELEC for the duration o ECTED signal becom ds after the leadi ENABLE if the addr lines compares wit ress switch in dri (Bus Out bit 9) i f DEVICE SELECT EN	e device who CE SELECT li T ENABLE mus f DRIVE SELE es true with ng edge of t ess in the h the addres ve. The PRI s strobed by ABLE.	ose nes CT. CT. in the soft CORIT the
		-					

.

•

.

			DWG NO. 85-0127-	001	
Datapoint Peripheral Products Inc.			SHT 27	REV	A
REV	5.3.1.3	Set Cylinde	er (Tag 1)		
		5.3.1.3.1	This signal is a puls 0.5ms) which is used cylinder address spec OUT lines into the cy register of the selec cylinder address cont OUT lines is the abso of a desired cylinder calculation is perfor selected drive to det direction and actual cylinders that the dr order to position the desired cylinder. Up of SET CYLINDER comma drive generates a se initiate the position number of cylinders c difference counter in that was determined b calculation. The dri CYLINDER prior to app CYLINDER. Figures 4 seek operation timing	e (1.0us to to load the ified by th linder addr ted drive. ained in th lute addres . A differ med in the ermine the number of ive must se heads to t on completi nd, the sel ek start to er to seek ontained in the direct y the diffe ve must be lication of and 5 show	e BUS ess The e BUS s ence ek in he on ected the the ion rence ON SET the
		5.3.1.3.2	Drive has Fixed Head fixed head address is the information speci CYLINDER and SET HEAD two highest order bit OUT lines (8 and 9) a during the SET CYLIND drive will decode a F SELECT and store the BUS OUT bits (0 thru Head Address Register bits will form the le bits of the Fixed Hea Fixed Head informatio the SET CYLINDER tag	option. Th derived fr fied in the tags. Whe s of the BU re asserted ER tag, the IXED HEAD four lowest 3) in the F . These fo ast signifi d Address. n contained is as follo	e om SET n the S orde ixed ur cant The in ws:

Despent Redpond Roders Re SHT 28 REV A BUS OUT BIT Fixed Head Address Bit 1 1 0 Fixed Head Address Bit 2 2 Fixed Head Address Bit 3 3 Fixed Head Address Bit 4 5 Not Used 6 Not Used 7 Not Used 8 Fixed Head Address Bit 4 9 Fixed Head Mode 9 Fixed Head Mode 9 Fixed Head Mode 10 Fixed Head Mode 11 Fixed Head Mode 9 Fixed Head Mode 9 Fixed Head Mode 9 Fixed Head Mode 10 return to active state 15 us 1ater. In order to reset the Fixed Head Mode, the control 1ayropriate movable cylinder address or the Rece Command. The ON CYLINDER and ATTENTION status will return to the controller in the normal seed oparation. 5.3.1.4 This signal is a pulse (1.0us to Sus which is used to load the head address Regitter in the selected drive. Thi command permits selecti	DATAPOINT CORPORATION			DWG NO. 85-0127-0	001
BUS_OUT_BIT FUNCTION 0 Fixed Head Address Bit 1 1 Fixed Head Address Bit 2 2 Fixed Head Address Bit 4 3 Fixed Head Address Bit 4 4 Not Used 5 Not Used 6 Not Used 7 Not Used 8 Fixed Head Mode 9 Interr. 10 roder to reset the Fixed Head Mode, the contrasystem must issue the Set Cylinder with the appropriate movable cylinder address or the Rest Cylinder with the appropriate movable cylinder address or the Rest Cylinder with the appropriate movable cylinder into the Rest Address Set operation. 5.3.1.4 Stisue the Set Cylinder with the approprist movable cylinder address or the Rest Cylinder with the set ope	Datapoint Peripheral Products Inc.			SHT 28	REV A
BUS OUT BIT FUNCTION 0 Fixed Head Address Bit 1 1 Fixed Head Address Bit 2 2 Fixed Head Address Bit 3 3 Fixed Head Address Bit 4 3 Fixed Head Address Bit 4 4 Not Used 5 Not Used 6 Mot Used 7 Not Used 8 Fixed Head Mode 9 S.3.1.4.1 This signal is a pulse (REV.				
 Fixed Head Address Bit 1 Fixed Head Address Bit 2 Fixed Head Address Bit 4 Fixed Head Address Bit 4 Fixed Head Address Bit 8 Not Used Not Used Not Used Not Used Pixed Head Mode Fixed Head Mode		BUS OUT	BIT	FUNCTION	
 Since there is no positioner movement for fixed head selection, the ON CYLINDER and ATTENTION status will become false at the end of the SET CYLINDER tag and return to active state 15 us later. In order to reset the Fixed Head Mode, the contry system must issue the Set Cylinder with the appropriate movable cylinder address or the Rect Command. The ON CYLINDER and ATTENTION status will return to the controller in the normal seed operation. 5.3.1.4 Set Head (Tag 2) 5.3.1.4.1 This signal is a pulse (1.0us to 5us which is used to load the head address contained in the BUS OUT lines (bits through 3) into the Head Address Register in the selected drive. This command permits selection of one of the fourteen (14) heads which will the used to perform a read or write operation. 5.3.1.4.2 Drive has Fixed Head Option. When the tag will be the highest order bits of the SET HE tag will be the highest order bits of the SET HEAD Tag BUS OUT lines is defined as follows: 		0 1 2 3 4 5 6 7 8 9		Fixed Head Address Fixed Head Address Fixed Head Address Fixed Head Address Not Used Not Used Not Used Not Used Fixed Head Mode Fixed Head Mode	Bit 1 Bit 2 Bit 4 Bit 8
In order to reset the Fixed Head Mode, the contrisystem must issue the Set Cylinder with the appropriate movable cylinder address or the Recc Command. The ON CYLINDER and ATTENTION status will return to the controller in the normal seed operation. 5.3.1.4 Set Head (Tag 2) 5.3.1.4.1 This signal is a pulse (1.0us to Sur which is used to load the head addrec contained in the BUS OUT lines (bits through 3) into the Head Address Register in the selected drive. This command permits selection of one of the fourteen (14) heads which will the used to perform a read or write operation. 5.3.1.4.2 Drive has Fixed Head Option. When the Fixed Head Address. The fixed Head address is significant bits of the SET HE tag will be the highest order bits of th			Since there head selecti status will CYLINDER tag later.	is no positioner movem ion, the ON CYLINDER and become false at the end g and return to active s	ent for fixed ATTENTION of the SET tate 15 us
 5.3.1.4 Set Head (Tag 2) 5.3.1.4.1 This signal is a pulse (1.0us to 5us which is used to load the head addre contained in the BUS OUT lines (bits through 3) into the Head Address Register in the selected drive. This command permits selection of one of the fourteen (14) heads which will be used to perform a read or write operation. 5.3.1.4.2 Drive has Fixed Head Option. When the Fixed Head Mode is enabled, the two least significant bits of the SET HE tag will be the highest order bits of the fixed head address. The fixed head address. The fixed head information contained in the SET HE HEAD Tag BUS OUT lines is defined as follows: 			In order to system must appropriate Command. Th will return operation.	reset the Fixed Head Mo issue the Set Cylinder movable cylinder addres he ON CYLINDER and ATTEN to the controller in th	ode, the contro with the as or the Recal TION status he normal seek
 5.3.1.4.1 This signal is a pulse (1.0us to 5us which is used to load the head addre contained in the BUS OUT lines (bits through 3) into the Head Address Register in the selected drive. Thi command permits selection of one of the fourteen (14) heads which will the used to perform a read or write operation. 5.3.1.4.2 Drive has Fixed Head Option. When the Fixed Head Mode is enabled, the two least significant bits of the SET HE tag will be the highest order bits of the fixed head address. The fixed head information contained in the SET HEAD Tag BUS OUT lines is defined as follows: 		5.3.1.4	Set Head (Ta	ag 2)	
5.3.1.4.2 Drive has Fixed Head Option. When the Fixed Head Mode is enabled, the two least significant bits of the SET HE tag will be the highest order bits of the fixed head address. The fixed head information contained in the SE HEAD Tag BUS OUT lines is defined as follows:			5.3.1.4.1	This signal is a pulse which is used to load t contained in the BUS OU through 3) into the Hea Register in the selecte command permits selecti the fourteen (14) heads used to perform a read operation.	(1.0us to 5us) the head addres TT lines (bits ad Address ad drive. This on of one of which will be or write
			5.3.1.4.2	Drive has Fixed Head Op Fixed Head Mode is enab least significant bits tag will be the highest the fixed head address. head information contai HEAD Tag BUS OUT lines follows:	tion. When the led, the two of the SET HEA order bits of The fixed ned in the SET is defined as

¥

			DWG NO. 85-012	27-001
Datapoint Peripheral Products Inc.			SHT 29	REV A
REV				
		BUS OUT BIT	FUNCTION	
		0 1 2 3 4 5	Fixed Head Addr Outer Fixed Hea Not Used Not Used Not Used Not Used	ress Bit 16 ad Group
		6 7 8 9	Not Used Not Used Not Used Not Used	
			If BUS OUT bit 1 is a HEAD tag, it indicate 30 fixed head group i BUS OUT bit 1 is inac that the inner 30 fix selected. These two the Set Cylinder Fixe will enable the contr any one of the 60 fix	active during SET es that the outer is selected. If ctive, it indicate ked head group is bits along with ed Head address roller to select ked heads.
	5.3.1.5	Control Sele	ct (Tag 3)	
		This signal the BUS OUT the control control func	enables the selected lines (bits 0 through functions as listed i tions are described a	drive to sample n 9) which contair in Table 5. The as follows:
		5.3.1.5.1	Bus Out 0 - Write Gat	te
			This line, when true, drivers and the MFM e	, enables the writ encoder.
			The WRITE GATE must b the entire duration o operation. Figure 6 timing for the write	be held stable for of the writing shows the require operation.
		5.3.1.5.2	Bus Out 1 - Read Gate	è
			The READ GATE, when t read drivers and tran DATA (NRZ) and READ (control unit. Figure required timing for 1	true, enables the nsmits the READ CLOCK to the e 7 shows the read operation.



F0041 3/77

.



			DWG NO. 85-	0127-001
oint, Peripheral Products In			SHT 32	REV A
	<u>TA</u> <u>COMMAN</u>	ABLE 5 ND DECODE FUNCTION		
COMMAND LINES BUS OUT BITS	SET CYLINDER (TAG 1)	SET HEAD (TAG 2)	CONTROL SEL (TAG 3)	SET SECTOR (TAG 4)
BUS OUT O	CYL ADDR BIT 1	HEAD ADDR BIT 1	WRITE GATE	STR ADDR BIT 1
BUS OUT 1	CYL ADDR BIT 2	HEAD ADDR BIT 2	READ GATE	STR ADDR BIT 2
BUS OUT 2	CYL ADDR BIT 4	HEAD ADDR BIT 4	SERVO OFFSET PLUS	STR ADDR BIT 4
BUS OUT 3	CYL ADDR BIT 8	HEAD ADDR BIT 8	SERVO OFFSET MINUS	STR ADDR BIT 8
BUS OUT 4	CYL ADDR BIT 16		FAULT CLEAR	STR ADDR BIT 16
BUS OUT 5	CYL ADDR BIT 32		ADDRESS MARK ENABLE	STR ADDR BIT 32
BUS OUT 6	CYL ADDR BIT 64		RECAL	STR ADDR BIT 64
BUS OUT 7	CYL ADDR BIT 128			
. T	CYL ADDR BIT 256			
BUS OUT 8	· · ·		1	

F0041 3/77



Figure 6: Write Data Timing (3600 RPM Drive)



FIGURE 7: Read Data Timing

3/7

			DWG NO. 85-0127-001		
DATAPOINT CORPORATION Datapoint Peripheral Products Inc.			SHT 35	REV A	
REV					
		5.3.1.5.3	Bus Out 2 - Servo Offs	et Plus	
			The servo offset provi of positioning the rea from the normal track aiding data recovery. OFFSET PLUS is active, heads shall be position microinches toward the	des a means d heads away center for When SERVO the read oned by 350 e spindle.	
			The servo offset canno accomplished and cause condition during a wri	t be s an UNSAFE te operation.	
		5.3.1.5.4	Bus Out 3 - Servo Offs	et Minus	
			This control function SERVO OFFSET PLUS, exc heads are positioned a spindle.	is the same as ept the away from the	
		5.3.1.5.5	Bus Out 4 - Fault Clea	ır	
			The FAULT CLEAR signal (250 ns to 1.0 ms) whi reset the UNSAFE state unsafe condition is no present.	is a pulse ch is used to is provided the longer	
		5.3.1.5.6	Bus Out 5 - Address Ma (With AM feature insta	ark Enable alled only)	
			The ADDRESS MARK ENAB conjunction with WRIT the control unit to w mark on the disk.	LE signal is E GATE allows rite an address	
			The ADDRESS MARK ENAB conjunction with the initiates a search op address mark. The AD FOUND status notifies unit when the drive d address mark. Refer AM timing requirement	LE signal in READ GATE eration for an DRESS MARK the control etected an to Figure 8 fo: s.	
			•		
41 3/77					



			DWG NO. 85-	0127-001
Datapoint Peripheral Products Inc.			SHT 37	REV A
?EV				n an fan de f Einste fan de
	5.3.1.5.7	Bus Out 6 -	Recal	
		The RECAL si width of 200 commands the zero (provid zone, UNSAFE process) and The RECAL al address, dif address regi	gnal is a pulse nsec. The REC selected drive led the heads ar is false and n reset any seek so sets the hea ference calcula sters to zero.	with a minimum AL, when true, to seek to cylind re not in the landi to seek is in c error conditions. ad address, cylinde ator and sector
	5.3.1.5.8	Bus Out 9 -	Release	
		For a dual p the reserved the drive av after DEVICE	oort drive,this 1 latch in the d vailable to eith 5 SELECT ENABLE	command will reset drive, thus making her control unit is inactivated.
5.3.1.6	Set Sector	(Tag 4)		
	The SET SEC selected dr: Bus Out Line Register and ATTENTION in notifies the the desired	TOR Tag (1.5us ive to load th es (bits 0 th) d initiate a s n conjunction e control unit sector.	s + 0.5us pulse ne sector addres rough 6) into th sector search op with the RECORD t that the read/	width) enables the ss specified in the ne Sector Address peration. The D READY status /write head is over
5.3.1.7	Interface E	nable (Open Ca	able Detector)	
	This signal allows the unit.	, when active drive selectio	, enables the dr on and operation	rive's receivers an n from the control
5.3.1.8	Write Data			
	This line t write data	ransmits the s is converted a	serial write da to MFM within th	ta to the drive. A he drive.
			•	

			DWG NO. 85-01	27-001	
Datapoint Peripheral Products Inc.			SHT 38		REV A
REV	5.3.2.9	Write Clock This line is the drive. T	the SERVO CLOCK The WRITE CLOCK i	retrans	mitted to
		the drive to data. The WF the WRITE DAT transmitted w	permit reliable NITE CLOCK must b NA as shown in Fi when write gate i	encodin be synch igure 6 is activ	ng of MFM pronized with and be ve.
5.3.2	Input Sig	gnal Lines			
	Thèse sig controlle Cable A (be select	gnal lines are g er. To activate (Control Cable) ted.	generated by the the input signa to the interface	disk dr als defi e, the d	rive to the .ned in lrive must
	5.3.2.1	Index			
		The INDEX is a occurs once fo leading edge o the sector cou	a pulse (2.5us <u>+</u> or each disk pach of the index puls unter.	0.5us) k revolu se is us	which ution. The sed to reset
	5.3.2.2	Sector Mark			
		The SECTOR MAR is used to ide track on the o sectors per re are arranged h of 5 to 128 se length sector 13,16,24,26,32 is no sector p therefore the 0 pulse. Figu timing.	RK is a pulse(1.9 entify the sector disk is divided evolution. The by jumpers which ectors. The fol- counts are avai 2,39,48,52,64,78 pulse to identify INDEX pulse is ure 9 shows the	5us <u>+</u> 0. r bounda into n = number c provide lowing u lable: 6 ,104,anc y sector consider INDEX ar	5us) which ary. Each number of of sectors the selection iform 5,8,10,12, 128. There of and red as sector and Sector
			•		



FIGURE 9 - Index and Sector Timing

ידאת				DWG NO. 85-01	27-001
DATA	oint Peripheral Products Inc.			SHT 40	REV A
REV					
		5.3.2.3	Unsaf	e	
			The U contr drive liste statu	NSAFE, when active, ind coller, that a malfunction e electronics. Any one of ed in paragraph 4.2.7 with us line to become active	icates to the on has occured in t of the conditions 11 cause the UNSAFE
			The d prese	rive must be selected for the selected for the interface.	or this status to be
			Unsaf the F bit 4 unsaf	Fe shall be reset by a port AULT CLEAR command (Set b) provided the condition Fe is no longer present.	ower-up reset, or Control and BUS OU n that caused the
		5.3.2.4	Seek	Incomplete	
			The S indic error activ exist	BEEK INCOMPLETE status 1: sates to the controller has occurred. This state when one of the follow ss:	ine, when active, that a positioning atus line becomes wing conditions
			(1)	Failure tocomplete a s in 216 milliseconds as	Seek operation with fter initiation.
			(2)	An off-track condition not seeking or recali	n is detected while brating.
			(3)	Guard band 1 or guard under invalid conditio	band 2 is detected ons.
			(4)	An invalid cylinder a by the drive.	ddress was received
			The stat	RECAL command will rese	t SEEK INCOMPLETE
		5.3.2.5	On Cy	linder	
			The d	rive will indicate ON C	YLINDER:
			(1)	As a result of a succe sequence	ssful power-up
			(2)	When the drive arrives executing a valid non- command or recalibrate	on track after zero length seek command.
			(3)	10 ms (nominal) after offset command.	the acceptance of a
			(4)	15 microseconds maximu of a zero length seek.	m after the accepta

DATA DONT COPPODATION		DWG NO. 85-01	27-001
DAIAIOINI CORPORATION Datapoint Peripheral Products Inc.		<u>SHT 41</u>	REV A
REV			
	The drive will indicate not	ON CYLINDER:	
	(1) When a valid or inval has been accepted.	id seek command or a m	recalibrate command
	(2) When an accepted offs	et command goes true.	
	(3) When an internally ge SEEK INCOMPLETE or to	enerated motion is made a SERVO UNSAFE.	e due to either a
5.3.2.6	Unit Ready		
	This status indicates that following-conditions are me	the drive is ready for et:	r operation and the
	(1) Drive Selected		
	(2) No UNSAFE condition e	exists	
	(3) The drive has complet recovery from a SEEK	ed a successful power- INCOMPLETE.	-up sequence or
5.3.2.7	Address Mark Found		
	This signal is asserted tru a result of an AM Search co the ADDRESS MARK ENABLE lin ADDRESS MARK FOUND.	ae when an address mar ommand. The controlle ne from the interface	k is identified as r should remove upon receiving
5.3.2.8	Servo Clock		
	This line transmits the pha derived from the servo trac with device select and is a The SERVO CLOCK shall be us control unit. Figure 6 sho CLOCK and WRITE DATA.	ase-locked 9.58 MHz (n ck monopulses. This 1 available at the inter sed to generate the NR ows the timing relatio	ominal) clock ine is not gated face at all times. Z write data in the nship of the SERVO
5.3.2.9	Read Data		
	This line transmits the set to the controller. Figure	rial READ data recover 7 shows the timing re	red from the disk equirement.

٠

			DWG NO. 85-0127-00	1
Datapoint Peripheral Products Inc.			SHT 42	REV A
REV				
5.3	.2.10	Read Clock		
		This line transmits t by the control unit t (NRZ). The READ CLOC the drive is selected	the READ CLOCK which sh to clock-in the serial XK is transmitted conti 1.	all be used READ DATA nuously when
5.3	.2.11	Device Selected		
		This line indicates t drive is selected. T active within 0.5 us of the DEVICE SELECT if the drive is resen SELECTED status will	to the controller that The DEVICE SELECTED lin after receipt of the 1 ENABLE tag. For a dua rved to the other port not be asserted.	the addressed e becomes eading edge 1 port drive, the DEVICE
5.3	.2.12	Attention		
		The ATTENTION signal CYLINDER, SEEK INCOME signal informs the co completed an operation attention.	is a logical combinati PLETE and RECORD READY. Introller that the drivion and/or requires cont	on of ON This ve has croller's
5.3	.2.13	Record Ready		
		This signal is used t desired sector is pas heads. This line wil duration of the desi: SECTOR command for ea READY detection will CLEAR or RECAL comman	to inform the control u ssing under the Read/Wn 11 remain active for th red sector specified in ach disk revolution. T be reset by READ, WRIT nds.	mit that the rite ne entire n the SET The RECORD TE, FAULT
5.3	5.2.14	Busy		,
		This line is function BUSY with UNIT READY the drive is establi	nal only with a dual po true indicates that th shed by another contro	ort drive. ne control of ller.

	DWG NO. 85-0127-001	
Datapoint Peripheral Products Inc.	SHT 43	REV A
REV		

6.0 Reliability and Serviceability

6.1 Duty

6.1.1 Duty for purposes of MTBF determination is taken to be the accessor moving not more than 50 percent of total operating time. Total operating time is the same as power on time.

6.1.2 Failure

For the purposes of calculating MFBF a failure is an inability of the unit to perform its specified function, requiring adjustment or replacement on an unscheduled basis. This excludes installation failures, operator errors, improper maintenance, adverse environment, cable failure, or failures not caused by the unit. Failures shall be classified as occurring in the "Infant Mortality" and random period.

DATAPO	XNT O	ORF	ORATI	ÓN
Datapoint	Feriphe	ral I	roducts	Inc.

REV

DWG NO.	85-0127-001
	T

SHT 44

REV A

6.1.3 Mean Time Between Failures (MTBF) & Field Performance

The MTBF over a population of machines is defined by the following expression:

MTBF = POWER ON HOURS

of Confirmed Failures

For confirmation of MTBF specified in 6.1.4 the measurement of MTBF will occur during the 13th through 15th month inclusive of operation after the first ship of production level disks. This period may be reasonably extended to meet minimum operating time requirements.

Each unit will complete an infant mortality period of 90 days prior to the measurement of MTBF. A minimum of 80 units distributed on five or more customer sites will comprise a population.

6.1.4 Mean Time between Failure Numerics

Excluding an infant mortality period of 90 days, field demonstrated MTBF TBF shall exceed 10,000 hours provided that specified maintenance philosophy and procedures are followed. For purposes of demonstration and calculation of MTBF, definition of 6.1.2 and 6.1.3 shall apply.

6.2 Mean Time to Repair (MTTR)

The MTTR is defined as the time for an adequately trained, experienced, and competent serviceman to diagnose and correct a malfunction. The MTTR assumes that the malfunction has been isolated by system diagnostics, etc., and the specified test equipment, online exercise programs and adequate spares are available at all sites where the MTTR must conform to this specification.

6.2.1 MTTR Numerics

The MTTR shall not exceed 1.0 man hour.

6.3 Preventive Maintenance Action Time (PMAT)

Routine schedule preventive maintenance should be performed by suitably trained and competent Customer Engineering personnel at intervals as specified below.

			DWG NO. 85-0127-001	
DATATOIN CONTORATON Datapoint Peripheral Products Inc.			SHT 45	REV A
EV ·			анын алар алар алар алар алар алар алар ала	
		6 3 1 DMAT & Duration		
		o.o.i ima q bulación		
		Routine, scheduled, not exceed one man h time per unit or six	preventive maintenance nour per 4000 hours of months, whichever com	should operating es first.
	6.4	Machine Correctable Malfunct	cions (MCM)	
		A Machine Correctable Malfur machine correctable and can by software routines and/or operator intervention. The Machine correctable.	action is a malfunction be automatically recov hardware. It does not following malfunctions	that is ered from/ require are
		Malfunction	Corrective Action	
		Read	Re-read	
		Write	Re-write	,
		Seek Incomplete	Restore to cylinder z	ero & Re-seek
		Fault	System Retry (see Sec	tion 7.4.1.5.5
	6.5	Media Qualification		
		Each data track (560 per sur errors. A listing of all ar shipped with each unit. An has low or marginal amplitud follows:	rface) will be scanned reas that have errors i error is defined as an e. Errors will be per	for media s to be y area that nitted as
		o No read errors of any ty head 01.	pe at cylinder O, head	00 and
		o No more than one error p	er track.	
		o Error bursts can be a ma: (1 to 100 bits)	ximum of 100 bits in le	ength
	6.6	Data Error Rates		
		The error rate specification capabilities of the drive in recovering techniques applic enable achievement of the sp use of carriage offset, alter coding (ECC) techniques. Sys system software for the host	s apply to the read/wri cluding the media. Spe able to this drive are ecified performance inc rnate track and error o stem architecture and o system must be designed	te functional ecial data used to cluding the correcting operating ed to

.

				DWG NO. 85-0127-	-001
DATAPOINT CORPORATION Datapoint Peripheral Products Inc.				SHT 46	REV A
REV			and a second		
	implement th subsystem.	e above me	ethods o	f error recovery i	n the drive
	The error re defined as a specificatio nominal trac positions. limits will recover the due to compo	covery rou "Recovera n shall be k and a fu Successful indicate a data will nent malfu	atine, re able Erre a tota arther 10 a acquis a recove indicate anction,	equired for a data or" for the purpos 1 of 10 rereads us 0 rereads at each ition of the data rable or soft erro e a nonrecoverable write error, or m	error to be es of this ing ECC at of two offset within these r. Inability to (hard) error media blemish.
	Error rates recovering e in excess of errors.	as defined rrors of 5 5 bits wi	l below a 5 bits o: 11 reduc	are based on ECC c r less. Any corre ce the number of n	apability of cting capability on-recoverable
	Where:				
		R =	Error Ra	ate	
		Rt =	Total E:	rror Rate	
		Rnr =	Nonrecov	verable Error Rate	
		B =	Total nu	umber of bits read	
		Er =	Number of and ECC	of errors recovere techniques	d using offset
		Enr =	Number o	of errors nonrecov	erable.
	Therefore:				
		Rt =	Er + En: B	<u>r</u> = an error rat one soft err of data tran sured in sam bits minimum ferred.	e of less than or in 10 ⁸ bits sferred and mea- ple (B) of 10 ⁹ of data trans-
	and:	Rnr =	Enr B	= an error rat one nonrecov 10 ¹² bits of and measured 10 ¹³ bits mi transferred.	e of less than erable error in data transferred in sample (B) of nimum of data
6.7	Seek Error R	ate			
	The access p fication err	ositioning ors shall	error not exce	rate as indicated eed one seek error	by header veri- in 10 ⁶ seeks.

Physical Env: 7.1 Refe 1-9: Thes Prod are 7.2 Ope: Temp	Installation Characteristics ironmental Specifications erence Documents 30-806 Environmental Design S se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. rating Condition (Ref. 1-930- Operating Environment perature	SHT 47 REV pecification or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
Physical Env. 7.1 Refe 1-9 Thes Prod are 7.2 Ope: Temp	Installation Characteristics ironmental Specifications erence Documents 30-806 Environmental Design S se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. rating Condition (Ref. 1-930- Operating Environment	pecification or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
Physical Env. 7.1 Refe 1-9 Thes Prod are 7.2 Oper Temp	Installation Characteristics ironmental Specifications erence Documents 30-806 Environmental Design S se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. rating Condition (Ref. 1-930- Operating Environment	pecification or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
Env. 7.1 Refe 1-9 Thes Prod are 7.2 Oper Temp	ironmental Specifications erence Documents 30-806 Environmental Design S se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. rating Condition (Ref. 1-930- Operating Environment	pecification or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
7.1 <u>Ref</u> 1-9 Thes Prod are 7.2 <u>Oper</u> Temp	erence Documents 30-806 Environmental Design S se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. rating Condition (Ref. 1-930- Operating Environment	pecification or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
1-9 The: Prod are 7.2 <u>Ope</u> Temp	30-806 Environmental Design S se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. <u>rating Condition (</u> Ref. 1-930- Operating Environment	pecification or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
The: Prod are 7.2 <u>Oper</u> Temp	se documents form the basis f ducts, Ins. desighs. Any exc called out in this document. <u>rating Condition (Ref. 1-930-</u> Operating Environment	or all Datapoint Peripheral eption to the above standard 806 Sect. 4.0) Limits (^O C/ ^O F)
7.2 <u>Ope</u> : Temp I	rating Condition (Ref. 1-930- Operating Environment	806 Sect. 4.0) Limits (⁰ C/ ⁰ F)
Tem <u>r</u> I T	Operating Environment	Limits (⁰ C/ ⁰ F)
Temp I I	perature	(^o C/ ^o F)
I		
T	Dry Bulb, Maximum Dry Bulb, Minimum Dry Bulb, Linear	40/104 15/59
ľ	Gradient/Hour Wet Bulb, Maximum	5/9 26/78.8
V	Vet Bulb, Minimum	7/44.6
Rela	ative Humidity	(%)
Ν	Maximum	80
N C	Gradient/hour	8 20
Atmo	ospheric Pressure	(mm Hg)
M M	faximum finimum	780 562
Vibr	cation and shock	
E f c	equipment, as normally instal full specified performance wh conditions injected from the s	led and positioned, shall me ile subject to the following floor in a vertical directio
	Rela N Atmo Vibr E f	Gradient/Hour Gradient/Hour Wet Bulb, Maximum Wet Bulb, Minimum Relative Humidity Maximum Minimum Gradient/hour Atmospheric Pressure Maximum Minimum <u>Vibration and shock</u> Equipment, as normally instal full specified performance whi conditions injected from the star

DATAPOINT CO	RPORATION			DWG NO. 85-012	27-001
Datapoint Peripher	al Products Inc.			SHT 48	REV A
REV					
		a)	Continuous Vibration as fol	lows:	•
			5-10 Hz.004 in D.A.10-15 Hz.02 g's15-50 Hz.0016 in D.A.50-500 Hz.2 g's		,
		b)	Intermittent shocks of up to in duration. The time betwo be less than 0.5 seconds.	o 2.0 g's and not een consecutive s	exceeding 10 msec hocks shall not
	7.	3 <u>No</u>	on-Operating Conditions (Ref :	1-930-806 Sec. 5.	0)
			Temperature 5-45 [°] C (41 [°] F to	o 113 ⁰ F) dry bulb	
			Relative Humidity 10-90% w	ith a 20%/hour gr	adient
		Vi	ibration and Shock		
			Equipment as normally instal stand the following condition injected from the floor in a	lled and position ons of vibration a vertical direct	ed, shall with- and shock ion:
		aj	Continuous Vibration as fol:	lows:	
			5-10 Hz .05 in D.A 10-500 Hz .2 g's	Α.	· .
		b)	Intermittent shock of up to duration. The time between than .5 seconds.	3.0 g and not ex consecutive shoc	ceeding 10 msec ks will not be le
	7.	4 <u>St</u>	corage Conditions (Ref 1-930)	-806 Sec. 6.0)	
			Temperature -35 to 65 ⁰ C da	ry bulb	•
			Relative Humidity 10% to 90	% with a 20%/hour	gradient
		Vi	bration and Shock		
			In transit, as packaged for normal upright position, the following conditions of vibu floor in the three major mut	shipment, with t e equipment shall ration and shock tually perpendicu	he equipment in i withstand the injected from the lar axes:
		a)	Continuous vibration as fold	lows:	
			5-50 Hz .01 in D.A. 50-500 Hz 20 g's		
				· · · ·	

DATAPC	NT COF	PORATI	ON	ŀ
Datapoint	Peripheral	Products	Inc.	i.

REV

DWG NO.	85-0127-001
---------	-------------

SHT 49

REV A

7.4 St	corage	Conditions	(con't)
--------	--------	------------	--------	---

Vibration and Shock

- b) Shock of up to 5 g, not to exceed 10 msec in duration. The time between consecutive shocks shall not be less than 5 seconds.
- c) Shipping container and packaging design shall be adequate to insure cosmetic and functional acceptability after intercontinental shipment.
- 7.5 Static Discharge

Disk Subsystem will meet the simulated operator discharge requirements as stated in 88-0005-801 specification, except that a failure is defined as any failure that requires operator intervention when operating under control of an operating system incorporating error recovery procedures contained in this document.

7.6 Physical Characteristics

Width -	17.75 inches (excluding front panel)
Height -	approximately 8.75 inches
Depth -	approximately 27.75 inches (excluding front panel)
Weight -	approximately 125 lbs with power supply
Mounting -	the drive is rack mountable on slides in a standard 19 inch rack
HDA Weight-	approximately 28 lb. (excluding shipping container)

7.7 Power Requirements

7.7.1 Reference Documents

1-930-805 Utility supplied primary power
1-930-807 Electromagnetic Compatibility Design Spec.
1-930-505 Transient Conducted Noise Test

These documents form the basis for all Datapoint Peripheral Products Inc. designs. Any exception to the above standards are called out in this document.

DATAPOINT CORPORATION Datapoint Peripheral Products Inc.	DWG NO	• 85-0127-001		
	SHT	50	REV A	
OF M				1

7.7.2 60 Hz Configuration

The disk drives with a 60 Hz AC power configuration will operate from the following single phase power sources. Conversion of the drive between the voltage ranges of 200 and 230 VAC or between 100 and 120 VAC is accomplished by moving wires on the power transformer terminal block. The drive cannot be readily converted from the 200 volt ranges to 120 VAC. The 200 VAC ranges to 120 VAC conversion requires replacement of the drive motor.

	VOLTAGE RANGE			VOLT.	AGE TAP	FREQUENCY		
a.	200	VAC	+	10%	-	15%	200V	60 Hz + 2%
b.	208	VAC	+	6%	-	15%	215V	60 Hz + 2%
c.	230	VAC	+	10%	-	15%	230V	60 Hz + 2%
d.	120	VAC	+	10%	-	15%	115V	60 Hz + 2%
e.	100	VAC	+	10	-	15%	100V	60 Hz + 2%

7.7.3 50 Hz Configuration

The disk drives with 50 Hz AC power configuration will operate from the following single phase sources. Conversion of the drive between the voltage ranges of 200 and 240 VAC or between 100 and 120 VAC is accomplished by moving wires on the power transfer terminal block. The drive cannot be readily converted from the 200 VAC ranges to 120 VAC. The 200 VAC conversion requires replacement of drive motor.

	VOLTAGE RANGE	VOLTAGE TAP	FREQUENCY
a.	200 VAC +10% -	15% 200V	50 Hz + 2%
b.	220 VAC +15% -	15% 215V	50 Hz + 2%
c.	230 VAC +10% -	15% 230V	50 Hz + 2%
d.	240 VAC + 6% -	15% 230V	50 Hz + 2%
e.	120 VAC +10% -	15% 115V	50 Hz + 2%
f.	100 VAC +10% -	15% 100V	50 Hz $+$ 2%

7.7.4 Current Requirements

7.7.4.1 120 VAC Range 50/60 Hz Power

The surge current is less than 23 amps and the running current is 9.0 amps nominal at 115 VAC.

The nominal power requirement is 1.04 KVA and the maximum is 1.2 KVA.

1				DWG NO.	85-0127-001		
	Datapoint Peripheral Products Inc.			SHT	51	REV	A
	REV			,			
		7.7.4.2	200 VAC Range	50/60 Hz H	ower		
			The surge cur running curre	rent is les nt is 5.0 a	ss than 18 an amps nominal	nps and at 208	the VAC.
-			The nominal p maximum is 1.	ower requin 4 KVA	rement is 1.1	. KVA an	d the
1		7.7.4.3	Heat Dissipat	ion			
			The heat diss 4000 Btu/hr. 3200 Btu/hr.	ipation sha The nomina	all be less t il heat dissi	han pation	is
	7.	7.5 AC Power	Cables				
		AC power wrapped w tinned co	cables consis with aluminize opper braid an	ts of three d polyeste: d PVC jacke	e 16 AWG cond r tape and co et.	luctor overed w	vith
25		7.7.5.1	60 Hz Power	Cable			
-			For cable le AC connector	ngths in e: will not l	xcess of 15 d be provided.	feet, an	1
4			7.7.5.1.1	100 to 120	VAC Range Ca	able	
1			,	For cables length, a 1 with ground will be pro	less than 1 15 amp paral ding connecto ovided on the	5 feet i lel blac or plug e cable.	in le -
			7.7.5.1.2	200 to 230	VAC Range Ca	able	
				For cables length, a connector j the cable.	less than 1 15 amp tandor plug will be	5 feet i n blade provide	in ed on *
		7.7.5.2	50 Hz Power	Cable			
			No connector power cables	plugs wil regardles	l be provided s of cable lo	d for th ength.	ne
unin Linnigeneration		•					
3/17 -				، بر ۲۰ می از این			
FU041							
ية م ا		Mallagan pelangkalkakan kenghasik nangkan kenghan sangka	. 				

;

Substitution Statement:

ent: Only the item described on this drawing when procurred from a Suggested Source(s) is approved by Datapoint Corporation for use in application(s) specified. A substitute item shall not be used without prior approval from Datapoint Peripheral Products, 686 W. Maude Avenue, Sunnyvale, California 94086.

Note: When referring to Datapoint part numbers, specify complete Part Number including applicable dash numbers.

SUGGESTED SOURCE LIST:

MANUFACTURERS '	MANUFACTURERS' PART/NO.	DATAPOINT PART/NO.		
Information Storage Systems	717-03	85-0124-001		

NOTE: This Document will not be modified without the approval of the Vice President of Product Development, Datapoint Peripheral Products, Inc., Sunnyvale, California.

 DATAPOINT CONFIDENTIAL INFORMATION					NFORMATION	PROJ
	SIZE			DWG NO.		REV
DATAPOINT CORPORATION 9725 DATAPOINT DRIVE SAN ANTONIO, TEXAS 78284	A		85-0127-001		E	
	SCALE				SHEET 2	