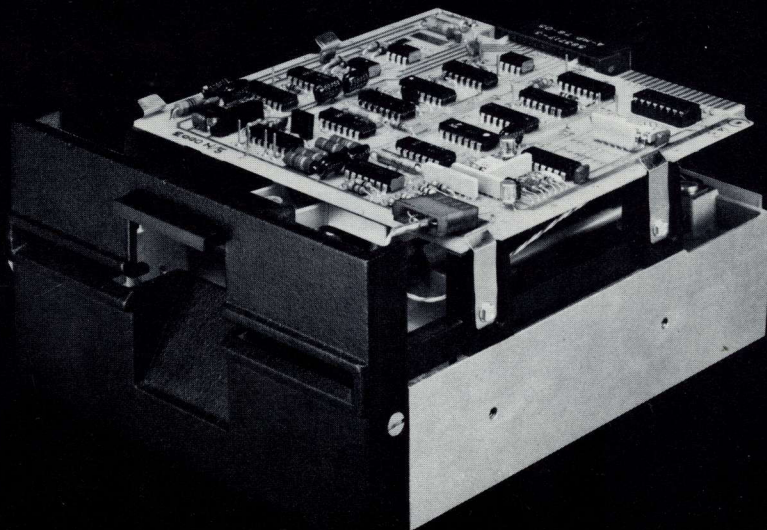


 Shugart Associates

SA 400

minifloppy™ Disk Drive



The compact SA 400 minifloppy Disk Drive offers a reliable, low cost, high performance alternative to OEM data storage applications where tape cassette units would have been previously considered. The minifloppy drive is about one-half the size of Shugart's standard SA 800 floppy disk drive, fitting comfortably in the space allocated for most cassette units.

The minifloppy drive is a direct outgrowth of Shugart's floppy drive experience and technical leadership that has put over 40,000 floppy drives in the field since 1973.

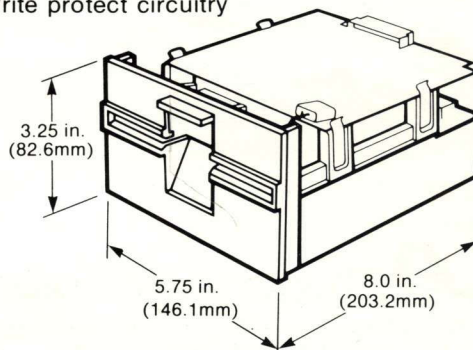
The Shugart minidiskette™ media is just like a standard diskette, except for its smaller size (5.25 inches square). Like the larger flexible diskette, minidiskette media comes either soft or hard sectored.

SA 400 minidiskette drives have these standard features: compact size—just 3.25" high x 5.75" wide x 8.0" deep, and weight of three pounds; lowest heat dissipation of any floppy drive; positive media insertion to keep door from closing on media; DC drive motor with precision servo speed control and integral tachometer; unique stepping motor actuator with direct drive spiral cam and ball bearing V-groove positive detent; same proprietary glass bonded ferrite/ceramic read/write head as used in Shugart's large floppy drives; SA 800-2 style interface for system upgrade; internal write protect circuitry; solid die cast chassis.

Typical applications for the Shugart SA 400 are word processing systems, entry level micro-processor systems, 'intelligent' calculators, program storage, hobby computer systems and other applications where low cost entry level random access data storage is a requirement.

Key features

- Compact size and weight—similar to most tape cassette units
- 110 Kbyte (unformatted) storage capacity
- 125 Kbits/second transfer rate
- Low heat dissipation (15 watts or less)
- Positive media insertion to avoid media damage
- DC drive motor (eliminates AC requirements)
- Proprietary R/W head designed and manufactured by Shugart
- Write protect circuitry



Specifications

Functional Characteristics

The SA 400 Minidiskette Storage Drive consists of read/write and control electronics, drive mechanism, read/write head, and precision track positioning mechanism. These components perform the following functions:

- Interpret and generate control signals.
- Move read/write head to the selected track.
- Read and write data.

The electronics are packaged on one PCB which contains:

1. Index Detector Circuits
2. Head Position Actuator Driver
3. Head Load Actuator Driver
4. Read/Write Amplifier and Transition Detector
5. Write Project
6. Drive Select Circuits

The Head Positioning Actuator positions the read/write head to the desired track on the diskette. The Head Load Actuator loads the diskette against the read/write head and data may then be recorded or read from the diskette.

Drive Mechanism

The DC drive motor under servo speed control (using an integral tachometer) rotates the spindle at 300 rpm through a belt-drive system. An expandable collet/spindle assembly provides precision media positioning to ensure data interchange. A mechanical

interlock prevents door closure without proper media insertion, thus eliminating media damage.

Positioning Mechanism

The read/write head assembly is accurately positioned through the use of a precision spiral cam. This cam has a V-groove with a ball bearing follower which is attached to the head carriage assembly. Precise track location is accomplished as the cam is rotated in discrete increments by a stepping motor.

Read/Write Head

The SA 400 head is a single element ceramic read/write head with straddle erase elements to provide erased areas between data tracks. Thus normal interchange tolerances between media and drives will not degrade the signal to noise ratio and insures diskette interchangeability. The read/write head is mounted on a carriage which is located on precision carriage ways. The diskette is held in a plane perpendicular to the read/write head by a platen located on the base casting. (This platen, together with the head load bail arm, performs a cleaning action to maximize diskette life.) This precise registration assures perfect compliance with the read/write head. The diskette is loaded against the head with a load pad actuated by the head load solenoid. The head geometry has been designed to obtain maximum signal transfer to and from the magnetic surface of the diskette with minimum head/diskette wear.

Performance Specifications

Capacity		
Unformatted		
Per Disk	109.4 Kbytes	
Per Track	3125 bytes	
Formatted		
Per Disk	80.6 Kbytes	89.6 Kbytes
Per Track	2304 bytes	2560 bytes
Per Sector	128 bytes	256 bytes
Sectors/track	18	10
Transfer Rate	125 kilobits/sec	
Latency (avg)	100 ms	
Access Time		
Track to Track	40 ms	
Average	463 ms	
Settling Time	10 ms	
Head Load Time	75 ms	

Functional Specifications

Rotational Speed	300 rpm
Recording Density (inside track)	2581 bpi (103 bp mm)
Flux Density	5162 fci (206 fcp mm)
Track Density	48 tpi (1.89 tp mm)
Tracks	35
Index	1
Encoding Method	FM
Media Requirements	
SA104	(soft sectored)
SA105	(16 sectors hard sectored)

Industry standard flexible diskette
Oxide on 0.003 in. (0.0008mm) Mylar
5.25 in. (133.4mm) square jacket

Physical Specifications

Environmental Limits	
Ambient Temperature	= 40° to 115°F (4.4°C to 46.1°C)
Relative Humidity	= 20% to 80%
Maximum Wet Bulb	= 78°F (25.6°C)

DC Voltage Requirements	
+ 12 V + 5% @ 1.1A (1.8A max)	
+ 5 V + 5% @ 0.5A (0.7A max)	

Mechanical Dimensions (exclusive of front panel)	
Width	= 5.75 in. (146.1mm)
Height	= 3.25 in. (82.6mm)
Depth	= 8.0 in. (203.2mm)
Weight	= 3 lbs. (1.36 KG) Nominal
Power Dissipation	= 15 Watts (45 BTU/Hr) Continuous (typical)
	7.5 Watts (25 BTU/Hr) Standby (typical)

Reliability Specifications

MTBF: 8000 POH under typical usage
PM: Not required.
MTTR: 30 minutes.
Component Life: 5 years.

Error Rates:

Soft Read Errors: 1 per 10⁸ bits read.
Hard Read Errors: 1 per 10¹¹ bits read.
Seek Errors: 1 per 10⁶ seeks.

Media Life:

Passes per Track: 3.0 × 10⁶
Insertions: 30,000 +



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