adaptec, inc.

ACB-5580 Tech Brief
SCSI to SMD Controller

August 1985

Additional copies of this manual, or other Adaptec literature may be obtained from:

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.Ø INTRODUCTION

The ACB-558Ø disk controller provides an intelligent interface from an ANSI X3T9.2 SCSI host interface to four SMD compatible disk drives.

1.1 SCOPE

This technical brief describes the features of the ACB-558Ø and theory of operation. An expanded manual is available at cost and contains all of the information necessary to install and operate the ACB-558Ø with an SCSI compatible host adapter and up to four SMD disk drives.

1.2 REFERENCE DOCUMENTS

- ANSI X3T9.2 Small Computer System Interface Specification
- Magnetic Peripherals, Inc.--Flat Cable Interface Specifications for the SMD, MMD, FHT MMD, LMD, WMD, WMD-Ø, CMD, RSD, and FSD families. (Doc. #64712400 Rev. N, Nov. 1983)

1.3 ACB-558Ø FEATURES

- The ACB-558Ø supports four SMD drives. The drives are used in hard sector mode and may transfer data at up to 1.2 Mbytes/sec.
- Software support of the ACB-558Ø is designed to be a superset of the software required for the ACB-55ØØ. All normal ACB-55ØØ instructions operate unchanged on the ACB-558Ø and no additional instructions are required for normal ACB-558Ø operation. This allows systems to be upgraded to the very large capacity and very high performance of the SMD drive families with no software impacts. Advanced Functions supported by the ACB-558Ø will require program extensions.
- The ACB-558Ø, utilizing a 4K dual-ported buffer, eliminates the need for sector interleaving. This allows the host to read a track of data in a single revolution.
- The ACB-558Ø offers complete device independence by auto configuring to any size formatted drive. By storing drive parameters on the drive at format time, the need for host initialization of the controller for various drive types is eliminated.

- The ACB-5580 may handle defects on a sector level by allowing the host to request that spare sectors be reserved on a cylinder basis. This provides formatted disks with constant data capacity and allows cylinder level formatting. An alternative format using maximum capacity and Adaptec's unique defect skipping algorithm may be selected.

- The ACB-5580 guarantees excellent data integrity by utilizing a 32-bit error correction code on both the data and I.D. fields, SCSI bus parity checking and generation, and parity checking on the internal buffer memory.

- The ACB-5580 provides great operating system flexibility by offering sector lengths of 256, 512, or 1024 bytes. The sector length is programmed at format time.

- The ACB-5580 supports direct and relative addressing of logical blocks.

- The ACB-5580 supports a fully arbitrating SCSI system with up to seven other controllers or hosts sharing the SCSI bus.

- The ACB-5580 provides maximum SCSI bus throughput by supporting bus disconnection and reconnection for explicit and implied seeks.

- The ACB-5580 allows the host to reserve an entire logical unit, or particular extents on a logical unit, limiting or prohibiting data access by other hosts on the SCSI bus.

- The ACB-5580 reduces selection overhead by allowing the host to link commands. Once a command is completed, the controller will immediately request and execute the next linked command.

- The ACB-5580 reduces system overhead by queuing commands to the controller. As commands are completed, the next queued command will be executed.

- The ACB-5580 provides a high level of system flexibility and reliability by its support of the dual port option available on certain SMD drives.

- The ACB-5580 is initialized by jumpers to support the following user-selectable functions:

  . Hard or soft SCSI device reset

  . Short or extended sense data

  . Tag 4/5 error information

  . Local or remote power control.

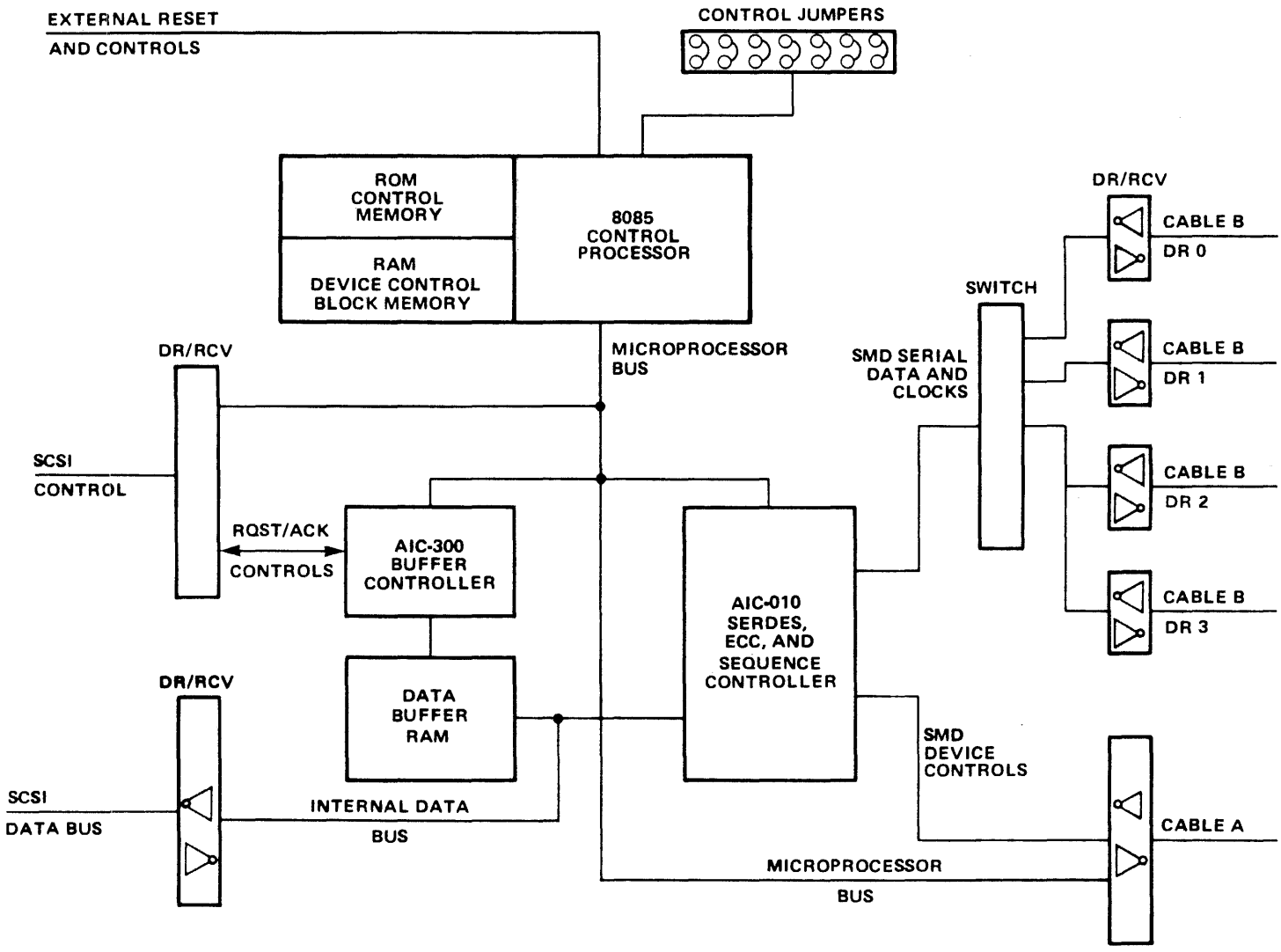

Figure 1-4. Block Diagram of ACB-5580

1.4 HARDWARE/SOFTWARE COMPATIBILITY REQUIREMENTS

The ACB-5580 requires application and system software that will provide correctly structured Command Descriptor Blocks and data and parameter fields. Low level control software or a properly structured host adapter or channel must be provided to control the SCSI protocols that transmit the Command Descriptor Blocks and other fields. Any system that supports the ACB-5500 will support all basic functions of the ACB-5580. Advanced ACB-5580 functions require system software extensions.

The SCSI must meet the arbitration requirements of Revision 14 if the ACB-5580 is installed in an arbitrating system. Certain lower levels of the SCSI may be supported. Contact Adaptec for detailed compatability analysis.

The mode select command implemented by the ACB-5580 requires two bytes more than the ACB-5500 Hard Sector format to provide for the extended function provided by the SMD drives.

The ACB-5580 supports most standard SMD drives. In particular, the following drive families have been tested:

NEC
Fujitsu
Others TBD (Contact Adaptec).

1.5 PRODUCT SPECIFICATION

1.5.1 PHYSICAL DIMENSIONS

Length: 14.0 inches
Width: 7.0 inches
Height: .8 inches

1.5.2 POWER REQUIREMENTS

Voltage (volts)	Tolerance (Units)	Current (max amps)	Ripple (volts, RMS)
+5	4.75 to 5.25	2.0	.150
-12	-13.8 to 10.8	1.5	.150

1.5.3 ENVIRONMENTAL REQUIREMENTS

	Operating	Storage
Temperature (F/C):	32/0 to 131/55	-40/-40 to 167/75
Humidity:	10% to 95%	10% to 95%
Altitude (ft.):	Sea Level to 10,000	Sea Level to 20,000

Exhaust air flow may be required to keep the air on both sides of the board at or below the maximum operating temperature if adequate convective ventilation is not available.

1.6 QUALITY ASSURANCE

The ACB-5580 has been processed through Adaptec's extensive quality control procedure. All Adaptec custom ICs have been fully tested at temperature and voltage margins. All boards have been fabricated and assembled under close quality inspection. All boards have passed complete incircuit test procedures, have endured burn-in testing, and have been fully functionally tested. Adaptec should be notified immediately of any deviations from our high standard of quality.

2.Ø THEORY OF OPERATION

The ACB-558Ø provides a powerful mechanism for connecting up to four SMD compatible disk drives to a host computer via the Small Computer Systems Interface (SCSI). The SCSI provides a powerful general purpose device-independent connection usable by a wide range of computing systems.

The ACB-558Ø provides all required formatting and data synchronizing functions for SMD compatible disk drives. The formatting function is provided by Adaptec's proprietary 1Ø MH_Z sequencer chip, the AIC-ØlØ.

The ACB-558Ø provides up to 4K bytes of buffering to allow high performance data access even if the attached host system can only accept data at very low rates. Adaptec's AIC-3ØØ buffer controller provides full dual porting for the buffer memory.

The data transfer path is fully checked, using ECC and buffer parity checking to assure data integrity. Data integrity is not compromised by the unchecked control microprocessor.

All low-speed control operations are managed by a powerful 8-bit microprocessor executing instructions from a 16K read-only control memory. The large control memory allows the implementation of several optional functions as well as a diagnostic self-tst capability.

The FORMAT command stores device dependent parameter information on the attached disk drives. When the ACB-558Ø is powered up, it automatically configures all internal tables from the stored parameters so that no drive configuration commands are required from the host system.

2.1 SYSTEM CONFIGURATION

The ACB-558Ø supports systems with a wide range of complexity. Figures 2-1, 2-2, and 2-3 demonstrate the wide variety of configurations supported.

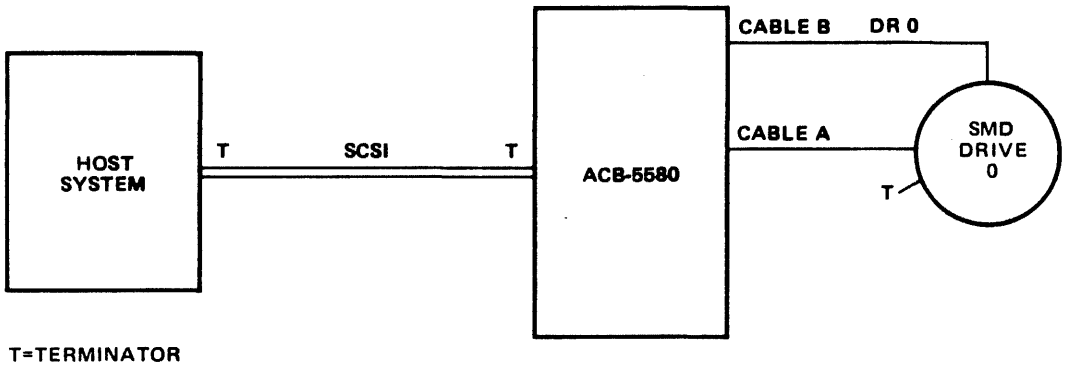

Figure 2-1. Minimum System

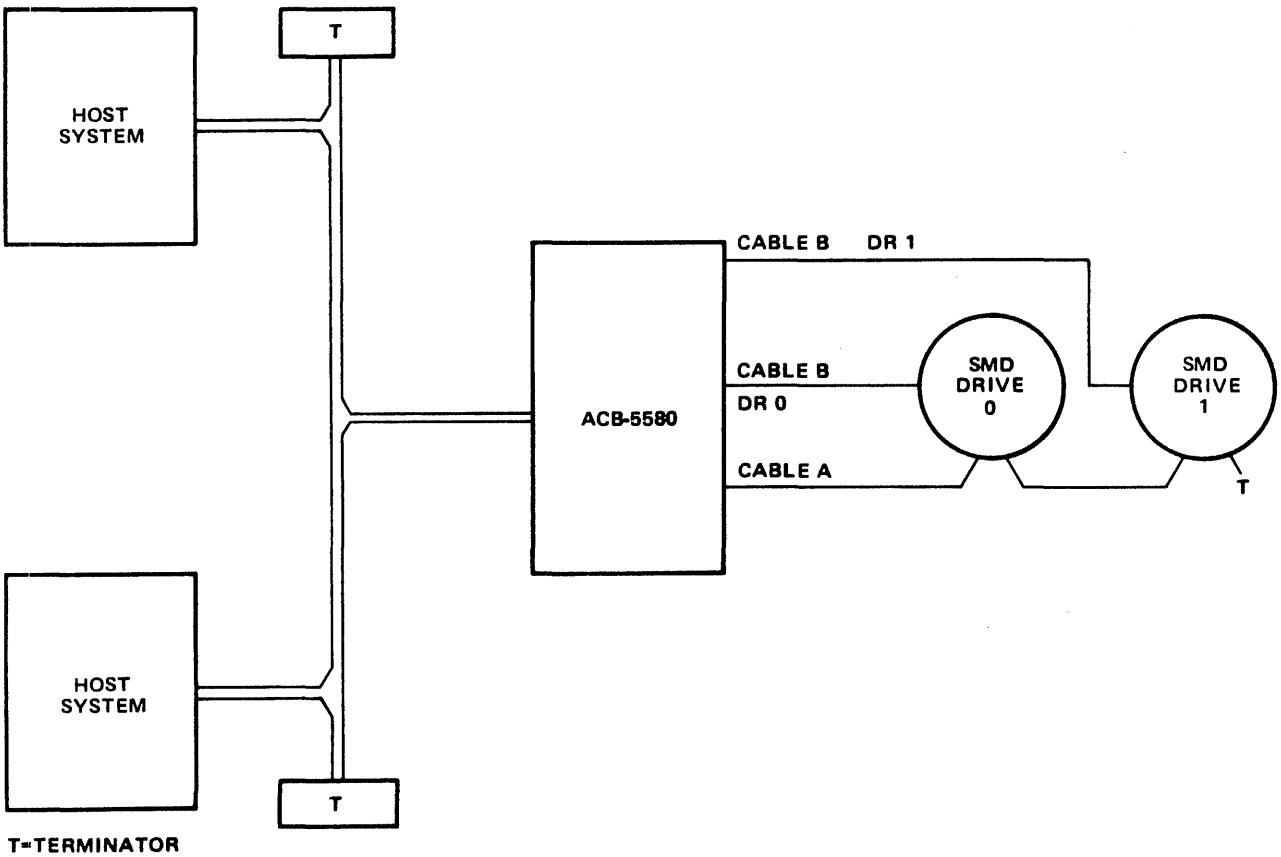

Figure 2-2. Simple Multi-Processor System

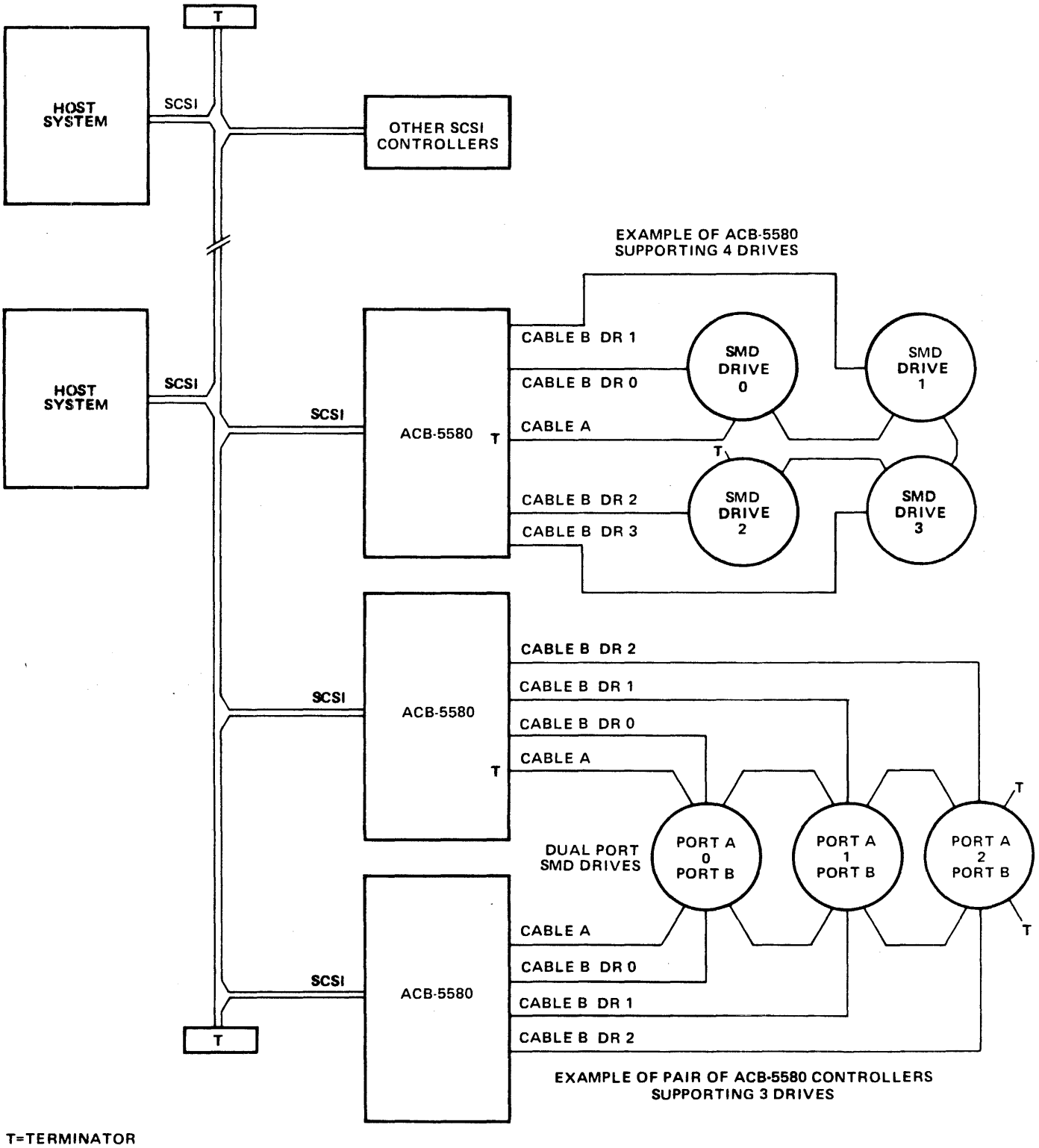

Figure 2-3. Complex Multi-Processor System

3.Ø COMMAND DESCRIPTIONS

The following section lists the command set of the ACB-558Ø. Adaptec has followed the ANSI X3T9.2 SCSI Specification where possible. Deviations occur only to support special Adaptec functions or to clarify certain commands with a very large number of possible implementations. Each command contains a list of possible conditions and the exception Sense Error Code.

Table 3-1. Command Code Summary

Command Code	Command Name	Data/Parameter	Source*
ØØ	Test Unit Ready	---	S
Ø1	Rezero Unit	---	S
Ø3	Request Sense	Sense Info In	S
Ø4	Format Unit	Defect List Out	SA
Ø8	Read	Data In	S
ØA	Write	Data Out	S
OB	Seek	---	S
OF	Translate	Info In	A
1Ø	Set Threshold	Info Out	A
11	Read/Reset Usage Counter	Info In	A
12	Inquiry	Info In	S
13	Write Buffer	Data Out	A
14	Read Buffer	Data In	A
15	Mode Select	Info Out	SA
16	Reserve	---	S
17	Release	---	S

Table 3-1. Command Code Summary
(Continued)

Command Code	Command Name	Data/Parameter	Source*
1A	Mode Sense	Info In	SA
1B	Start/Stop Unit	---	S
1C	Receive Diagnostic	Info In	SA
1D	Send Diagnostic	Info Out	SA
25	Read Capacity	Info In	S
28	Read (Extended)	Data In	S
2A	Write (Extended)	Data Out	S
2E	Write and Verify	Data Out	SA
2F	Verify	---	SA
31	Search Data Equal	Data Out	SA
33	Set Limits	---	S

* S = SCSI Standard Command
A = Adaptec Special Function
SA = SCSI Standard Command with Adaptec Subset.

To receive a copy of the expanded manual, send $5.00 and the form below to:

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