

SCSI Subsystem

Small Computer System Interface Subsystem

Getting Started Guide



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SCSI Subsystem

RIT Systems affected: All field installed RITs (v1, v2, & v3)

Introduction to SCSI

Small Computer System Interface (SCSI) is an intelligent device interface specification that permits multiple peripheral devices to be attached to a computer system. A SCSI system must always include at least one SCSI Host Adapter and one SCSI peripheral device. This section discusses the SCSI concepts you should understand and provides general guidance to help you set up your SCSI system.

Every SCSI system requires that you

- provide communication between SCSI devices and your computer
- uniquely identify each SCSI device
- daisy-chain SCSI devices together
- terminate the devices at each end of the daisy-chain

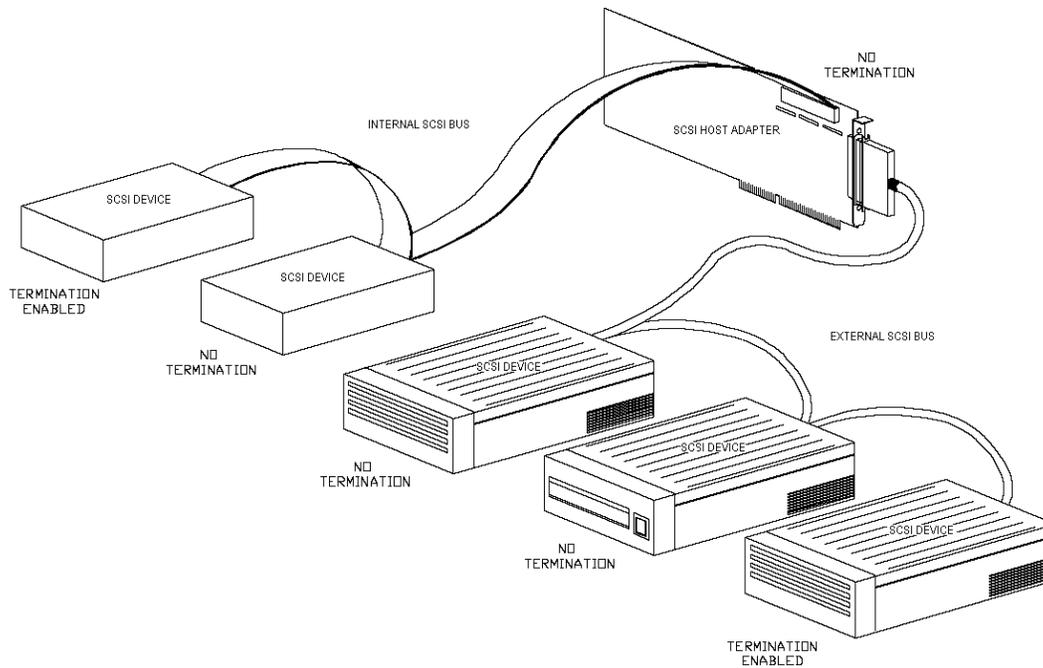


FIGURE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.-1 SCSI Bus

Figure **Error! No text of specified style in document.-1** illustrates the components of a SCSI subsystem that consists of five SCSI devices and a host adapter.

Function of Controllers

Controllers act as mediators between the computer system bus and the SCSI bus. But device-specific controllers are not necessary in SCSI devices. Device

controllers are either built in the device (an embedded controller) or reside in the an external box (a bridge controller).

SCSI Host Adapter Provides Control

The SCSI Host Adapter provides the interface between the SCSI data devices and the operating system. All read and write requests to devices are first made to the SCSI Host Adapter, which then calls the device via the appropriate SCSI address.

True Device Independence

SCSI provides device independence. You can add a different type of device without modifying generic system hardware or software. You do not have to depend on specific hardware because SCSI permits multiple devices to run from a single SCSI Host Adapter. A SCSI system easily integrates new devices.

Intelligent Drives

All SCSI drives are intelligent. They all have a built-in microprocessor. This microprocessor assumes some of the duties of the operating system, increasing overall system performance. You must use at least one SCSI Host Adapter to connect SCSI devices to a system. The host adapter communicates with the devices on the SCSI bus.

SCSI Targets

Logical Unit Number (LUN)

The computer identifies the SCSI Host Adapters by their LUN. A single computer system can host multiple SCSI Host Adapters (LUN 0, LUN 1, etc.). The LUN 0 is the standard industry setting for computers hosting a single SCSI Host Adapter. A host adapter does not support SCSI devices with multiple LUNs.

SCSI Id # Target Id	RIT System (v1, v2, v3 & v4)	E-RIT System
7	Host Adapter (term dev.)	Host Adapter
6 (ext bus)	not used	ext. mag-optical drv (term dev.)
5 (ext bus)	not used	ext. mag-optical drv
4 (ext bus)	not used	not used
3 (int bus)	int. tape drv (term dev.)	int. tape drv
2 (int bus)	int. CD-ROM drv	int. CD-ROM drv
1 (int bus)	not used	not used
0 (int bus)	int. boot hard drv C:	int. boot hard drv C: (term dev.)

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.-1 RIT SYSTEM STANDARD SCSI-ID SETTINGS.

Note: Some SCSI tape drive devices have hard-coded SCSI-Id's.

SCSI Identifiers

The SCSI target identifier (0 - 7) identifies the target device on the SCSI bus. Each SCSI device must have a unique SCSI target identifier or SCSI Id. Each SCSI device address (as referenced by the operating system) consists of the SCSI Id and the LUN together.

Example:

A single computer with two host adapters and devices:

adapter #1: LUN 0, SCSI Id 3

adapter #2: LUN 1, SCSI Id 3

The first SCSI Host Adapter in a computer is LUN 0 (zero), SCSI Id #7 (SCSI Id #7 is reserved industry wide for the SCSI Host Adapter).

The boot SCSI hard disk drive is connected to the SCSI Host Adapter, LUN 0, SCSI ID #7. Normally, the boot SCSI hard disk drive is assigned SCSI Id #0 and additional SCSI devices may use the rest of the available SCSI Id's (refer to Table **Error! No text of specified style in document.-1**).

Each RIT System model adheres to the industry standard SCSI-Id settings for the SCSI Host Adapter, and the boot hard drive. Table **Error! No text of specified style in document.-1** lists the SCSI-Id settings for the RIT Systems.

The external bus (ext. bus) and the internal bus (int. bus) SCSI-Id settings are only recommendations for organization purposes only. The computer will usually operate normally if the settings are different for internal or external SCSI devices. Use the default industry settings whenever possible, future upgrades (additional devices) usually assume the industry standard settings which provides for easy installation and technical support.

Types of SCSI Devices

- hard disk drives
- removable hard disk drives (ex. optical disk drives)
- tape drives
- CD-ROM drives
- jukebox
- multifunction drives

SCSI Bus Termination

SCSI is an intelligent device interface specification that permits multiple peripheral devices to be attached to a computer system. A SCSI system must always include at least one the SCSI Host Adapter and one SCSI peripheral device.

With non-SCSI devices, you must add a device controller as well as the device, such as an Integrated Drive Electronics (IDE) hard drive.

Connecting Cables

SCSI devices are cabled together in a single continuous daisy-chain of devices, called the SCSI bus. The bus may have no branches, and must run from device-to-device in a continuous series. The host adapter need not be at the end of the SCSI bus, unless only one device is on the bus.

If the host adapter supports both internal and external SCSI devices, the host adapter will be at the junction between the internal and external SCSI bus (refer to **Figure Error! No text of specified style in document.-1**).

SCSI Bus Termination

The first and last physical devices (not the first and last SCSI Id devices) on the ends of the SCSI bus must have a set of resistors called terminators. All other SCSI devices must have terminators removed/disabled. The host adapters and most SCSI devices come equipped with built-in terminators that can be enabled or disabled.

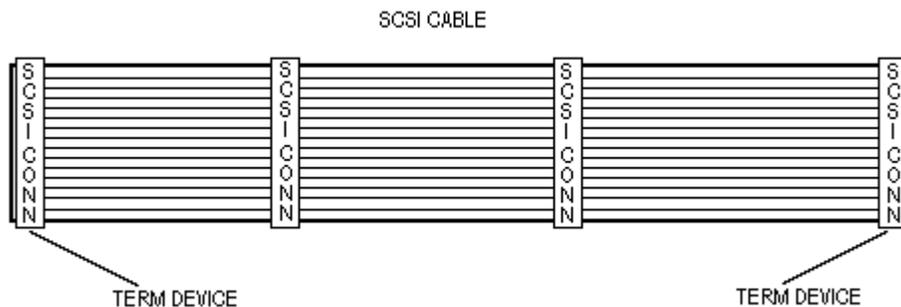


FIGURE **Error! No text of specified style in document.-2** SCSI CABLE

Exactly two devices must be terminated on the SCSI bus, one at each physical end of the cable(s) (refer to regardless of what their SCSI-Id's are. **Table Error! No text of specified style in document.-1** shows the terminating devices (term dev.) for the RIT Systems.

The internal SCSI tape drive and the Host Adapter terminate (refer to **Table Error! No text of specified style in document.-1**) the internal SCSI bus in RIT v1, v2, v3 and v4. The tape drive and the SCSI Host Adapter are the last physical devices on the ribbon cable of the internal SCSI bus.

In the E-RIT System, since the internal and external SCSI buses are used, the terminator resistor packs are removed from the Host Adapter. On the internal SCSI bus, the hard disk drive is the terminating device and the magneto-optical drive is the terminating device on the external SCSI bus.

ASPI Managers

The Advanced SCSI Programming Interface (ASPI) managers are software modules that provide an interface between ASPI device drivers, a host adapter,

and the SCSI devices connected to the host adapter. ASPI managers are written for specific operating systems and for specific models of the Adaptec host adapter.

The RIT Systems use the DOS/Windows ASPI managers.

ASPI Manager	Supported Host Adapter	RIT System
ASPI4DOS.SYS	AHA-1540B/1542B	RIT v1
	AHA-1540C/1542C	RIT v2
	AHA-1740A/1742A (in standard mode)	RIT v3, E-RIT
ASPIEDOS.SYS	AHA-1740A/1742A (in enhanced mode)	RIT v3, E-RIT
ASPI8DOS.SYS	AHA-2940	RIT v4

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.-2 ASPI MANAGERS

The RIT System uses several different ASPI managers, refer to Table **Error! No text of specified style in document.-2**.

config.sys statement	RIT System
DEVICE=C:\SCSI\ASPI4DOS.SYS /D	RIT v1
DEVICE=C:\SCSI\ASPI4DOS.SYS /D	RIT v2
DEVICE=C:\SCSI\ASPIEDOS.SYS /D	RIT v3, E-RIT
DEVICE=C:\SCSI\ASPI8DOS.SYS /D	RIT v4

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.-3 ASPI MANAGER SETTINGS FOR RIT

Use the /D switch to display information about the ASPI manager when you boot your computer.

Note: You can change the configuration to load the ASPI manager ASPI managers and the ASPI device drivers in high DOS memory by changing the CONFIG.SYS DEVICE= to DEVICEHIGH=.

ASPI Device Drivers

ASPI device drivers are software programs that enable your computer to communicate with SCSI devices such as hard disk drives, CD-ROM drives, magneto-optical drive, and scanners. Each kind of device requires a different driver. Device drivers reside on your hard drive and when you boot your computer, these files load into memory from command lines in the CONFIG.SYS file.

ASPIDISK.SYS

Each RIT System loads ASPIDISK.SYS DOS/Windows device driver from the CONFIG.SYS file. ASPIDISK.SYS controls DOS-partitioned SCSI disk drives that are not controlled by the SCSI Host Adapter BIOS. ASPIDISK.SYS is required if the host adapter BIOS is disabled, the device is the third or higher hard disk (the BIOS can only control the first two hard drives), or the SCSI-Id is not 0 or 1.

Note: Removable-media must not be installed at SCSI-Id of 0 or 1.

config.sys statement	RIT System
DEVICE=C:\SCSI\ASPIDISK.SYS /D	All RIT Systems

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.-4 ASPIDISK.SYS SETTINGS FOR RIT

Use the /d switch to display information about the ASPIDISK.SYS device drive when you boot your computer. The RIT System CONFIG.SYS, command line is shown in Table **Error! No text of specified style in document.-4**.

If ASPIDISK.SYS finds a removable-media drive that is not controlled by the host adapter BIOS, it loads itself into memory, reserving one DOS logical drive per removable-media device.

RIT Systems have the host adapters BIOS enabled. The host adapter BIOS controls the boot hard drive (SCSI-Id 0). Although, RIT Systems (v1, v2, v3, & v4) do not have removable media, CONFIG.SYS has attempts to load ASPIDISK.SYS. E-RIT has up to two removable-media devices and loads ASPIDISK.SYS into memory.

Note: If a drive is under host adapter BIOS control, the DOS C:\DOS\FDISK.EXE utility can be used to create DOS partitions (compatible with AFDISK.EXE). If the drive is not under host adapter BIOS control, then the C:\SCSI\ AFDISK.EXE utility should be used to create DOS partitions.

ASPICD.SYS

Each RIT System configured with a SCSI CD-ROM drive loads ASPICD.SYS device driver for DOS/Windows from the CONFIG.SYS file.

CONFIG.SYS statement	RIT System
DEVICE=C:\SCSI\ASPICD.SYS /D:ASPICD0	All RIT Systems

TABLE ERROR! NO TEXT OF SPECIFIED STYLE IN DOCUMENT.-5 ASPICD.SYS SETTINGS FOR RIT

The /D:<name> option must be included in the CONFIG.SYS command line to assign a name to the CD-ROM driver so that MSCDEX.EXE (Microsoft CD-ROM Extensions) can install the CD-ROM as a DOS logical drive letter. This option

must match the syntax of the /d:<name> option in the AUTOEXEC.BAT command that executes MSCDEX.EXE. The RIT System CONFIG.SYS, command line is shown in Table **Error! No text of specified style in document.-5**.

The Microsoft CD-ROM Extensions

The Microsoft CD-ROM Extensions (MSCDEX.EXE) enables your computer system to recognize a CD-ROM drive as a single logical drive letter under DOS. Each RIT System configured with a SCSI CD-ROM drive executes the MSCDEX.EXE command from the AUTOEXEC.BAT file.

AUTOEXEC.BAT statement	RIT System
C:\DOS\MSCDEX.EXE /D:ASPICD0 /M:12 /L:E	All RIT Systems

TABLE **Error! No text of specified style in document.-6** MSCDEX.EXE SETTINGS FOR RIT

The /D:<name> option must be included in the CONFIG.SYS command line to assign a name to the CD-ROM driver so that MSCDEX.EXE (Microsoft CD-ROM Extensions) can install the CD-ROM as a DOS logical drive letter. This option must match the syntax of the /d:<name> option in the CONFIG.SYS command line that loads the ASPICD.SYS device driver. The RIT System AUTOEXEC.BAT, command line is shown in Table **Error! No text of specified style in document.-6**.

The /M:<number of cache buffers> option specifies how much memory is allocated as sector buffers for caching CD-ROM data. Each buffer uses 2048 bytes of RAM.

The /L:<drive letter> option is the logical drive letter that DOS will assign to the CD-ROM drive. This letter must be less than the value specified by the LASTDRIVE= command in CONFIG.SYS.

Using Removable Media

Removable media is disk media such as the cartridges used with the magneto-optical drives, that can be removed from the disk drive after data is copied to them. The media can then be stored or can be inserted in another removable-media drive. Removable media should be controlled by ASPIDISK.SYS, not by the host adapter BIOS.

The E-RIT System is currently the only RIT model that utilizes removable magneto-optical (MO) disk cartridges to record radar data files that are later transported and analyzed on another system.

Partitioning and Formatting New Media Disks

New media disks need to be partitioned and formatted before use. AFDISK.EXE is a DOS partitioning and high-level formatting utility for SCSI hard disks and removable media disks. Each side of the media disks must be partitioned and formatted using AFDISK.EXE

E-RIT System users must partion and format each new magneto-optical drive disk on both sides before use.

All RIT Systems are delivered with AFDISK.EXE located in the C:\SCSI subdirectory.

Warning ! Use AFDISK.EXE utility to partition and format the MO disks. Do not use the DOS FDISK.EXE or FORMAT.EXE utilities.

Running AFDISK.EXE

AFDISK.EXE is a DOS partitioning and a high-level formatting utility for removable SCSI media devices, such as the MO drives. Before running AFDISK.EXE be sure the disk device you want to format is connected to the host adapter, is powered-up and the media is inserted in the drive. Run AFDISK.EXE from the DOS prompt.

Note: Before running AFDISK.EXE, Windows must be closed completely. The AFDISK.EXE utility can not run from under MS Windows in the Windows MS-DOS Prompt.

STEP 1. At the DOS prompt type:

```
A F D I S K < ↵ ENTER >
```

STEP 2. AFDISK.EXE lists all the installed SCSI disk devices, including removable media drives. Use the **↑** and **↓** keys to highlight the desired disk device, then press **< ↵ ENTER >** to select.

STEP 3. To create a new partition, press the **< I N S >** key.

STEP 4. For one partition on the disk, press the **< E S C >** key.

STEP 5. To create the partition, select yes, then press **< ↵ ENTER >**.

STEP 6. If you have more disks to format repeat steps 3 thru 5 otherwise to exit press **< E S C >**.

STEP 7. To quit AFDISK utility, press **< E S C >** and select yes when asked to quit? You will be reminded to reboot your computer before you can access the newly-created partitions.