Appendix B

SCSI Controller Error Messages

This appendix lists many common error messages. It contains the following sections:

- "Introduction" on page 334
- "Sense Key Information" on page 335
- "SCSI Driver Error Messages" on page 340
- "SCSI Driver Debugging Messages" on page 342
- "SCSI States and Phases" on page 344

This appendix lists the error strings printed by the device drivers *tpsc*, *dksc*, and, in some cases, *devscsi*.

Introduction

In early IRIX releases, the differential SCSI dual-channel controller board and the *dksc* driver printed the information differently; in IRIX 4.0.1, they began to use the same form. In IRIX 5.x and later releases, the differential SCSI dual-channel controller board driver reports the error message in the same format as the integral SCSI controller driver.

The error message format for IRIX 3.x and 4.x was:

```
sense codes. key%x asc%x asq%x
```

Arguments

key	the number from Table B-1.
asc	(additional sense code) from Table B-2.
asq	(additional sense qualifier) sometimes provides additional information.

Note: Sometimes, there is only one possible *asq* for a given *asc*, and many SCSI devices return nonstandard *asq* values.

The *asq* tends to be more vendor-specific, although the IEEE SCSI 2 specification defines the “standard” sense qualifiers.

For IRIX 5.x and 6.x, the *integral* SCSI controller on your system normally prints messages in the forms below, corrected for the two Western Digital bus controllers:

```
WD93 Bus # tarsct # lun # message
```

or

```
wd95_(bus)d(target); sense key {num} ({string}) asc{num}
```

Arguments

- the first # (or *d* for the wd95) is the SCSI adapter involved (0 for all systems except those with the IO3 (input/output board), which supports up to four adapters, numbered 0-3).
- the second #, # pair is printed only if you know which device is causing the problem.

In a number of cases, a phase and, possibly, a state are printed. These error codes come from the files */usr/include/sys/scsidev.h* and */usr/include/sys/scsi.h.*

The state and phase meanings are listed in Table B-5 and Table B-6. A few comments have been added. Some of the messages are also included.

Sense Key Information

Table B-1 and Table B-2 map error codes to sense keys.

Table B-1 Primary Sense Key Information

Message	Sense Key	Most Common Cause(s)
`No sense`	0x0	No error information available
`Recovered error`	0x1	The device recovered by itself
`Device not ready`	0x2	No media or not spun up
`Media error`	0x3	An actual media problem
`Device hardware error`	0x4	Usually a device hardware error
`Illegal request`	0x5	Invalid command or data issued
`Unit attention`	0x6	Device was reset or power-cycled
`Data protect error`	0x7	Usually device is write protected
`Unexpected blank media`	0x8	Tried to read at end of a tape
`Vendor unique error`	0x9	Varies
`Copy aborted`	0xa	Copy cmd aborted by host (not used)
`Aborted command`	0xb	Target aborted command
`Search data successful`	0xc	Search data command OK (not used)
`Volume overflow`	0xd	Tried to write past EOT on tape
`Reserved`	(0xE)	0xe should not be seen
`Reserved`	(0xF)	0xf should not be seen

While Table B-1 helps to identify an error, Table B-2 provides further information on the cause of an error. The ASQ (additional sense qualifier) is printed numerically when its value is not 0 (in 4.0; in 3.3.3, it is always printed by the differential SCSI dual-channel controller). Missing numerical values are not printed either because they are not defined or because the drivers treat them specially.

Table B-2 is provided primarily so you can look up the additional sense codes in the device manual. Some are self-explanatory, others quite obscure.

Table B-2 Additional Sense Code

Addition Sense Qualifier Message	Additional Sense Code
`No index/sector signal`	0x01
`No seek complete`	0x02
`Write fault`	0x03
`Not ready to perform command`	0x04
`Unit does not respond to selection`	0x05
`No reference position`	0x06
`Multiple drives selected`	0x07
`LUN communication error`	0x08
`Track error`	0x09
`Error log overflow`	0x0a
`Write error`	0x0c
`ID CRC or ECC error`	0x10
`Unrecovered data block read error`	0x11
`No address mark found in ID field`	0x12
`No address mark found in Data field`	0x13
`No record found`	0x14
`Seek position error`	0x15
`Data sync mark error`	0x16

Table B-2 (continued) Additional Sense Code

Addition Sense Qualifier Message	Additional Sense Code
Read data recovered with retries	0x17
Read data recovered with ECC	0x18
Defect list error	0x19
Parameter overrun	0x1a
Synchronous transfer error	0x1b
Defect list not found	0x1c
Compare error	0x1d
Recovered ID with ECC	0x1e
Invalid command code	0x20
Illegal logical block address	0x21
Illegal function	0x22
Illegal field in CDB	0x24
Invalid LUN	0x25
Invalid field in parameter list	0x26
Media write protected	0x27
Media change	0x28
Device reset	0x29
Log parameters changed	0x2a
Copy requires disconnect	0x2b
Command sequence error	0x2c
Update in place error	0x2d
Tagged commands cleared	0x2f
Incompatible media	0x30
Media format corrupted	0x31

Table B-2 (continued) Additional Sense Code

Addition Sense Qualifier Message	Additional Sense Code
No defect spare location available	0x32
Media length error	0x33[a]
Toner/ink error	0x36
Parameter rounded	0x37
Saved parameters not supported	0x39
Medium not present	0x3a
Forms error	0x3b
Invalid ID msg	0x3d
Self config in progress	0x3e
Device config has changed	0x3f
RAM failure	0x40
Data path diagnostic failure	0x41
Power on diagnostic failure	0x42
Message reject error	0x43
Internal controller error	0x44
Select/reselect failed	0x45
Soft reset failure	0x46
SCSI interface parity error	0x47
Initiator detected error	0x48
Inappropriate/illegal message	0x49
Command phase error	0x4a
Data phase error	0x4b
Failed self configuration	0x4c
Overlapped commands attempted	0x4e

Table B-2 (continued) Additional Sense Code

Addition Sense Qualifier Message	Additional Sense Code
Media load/unload failure	0x53
Unable to read table of contents	0x57
Generation (optical device) bad‘	0x58
Updated block read (optical device)	0x59
Operator request or state change	0x5a
Logging exception	0x5b
RPL status change	0x5c
Self diagnostics predict unit will fail soon	0x5d
Lamp failure	0x60
Video acquisition error/focus problem	0x61
Scan head positioning error	0x62
End of user area on track	0x63
Illegal mode for this track	0x64
Decompression error	0x70[b]

a. Specified as tape only

b. DAT only; may be in SCSI3

SCSI Driver Error Messages

Table B-3 lists the messages that are printed by the *wd93* SCSI driver. (Messages for the wd95 SCSI driver are similar). After the message is printed, the driver resets the SCSI bus. These messages are from IRIX 5.1, but similar ones are printed by earlier releases.

Table B-3 SCSI Driver Error Messages

Error Message	Comments

`No memory for wd93 device array`
`Not enough memory for WD93 data structures`
`Not enough memory for WD93 DMA maps`
	These messages occur during boot if something is seriously wrong, and memory can't be allocated.

`wd93 SCSI Bus=%d ID=%d LUN=%d: error during abort message, resetting bus`	An upper level driver tried to issue an ABORT message, but the expected bus phases were not followed.
`wd93 SCSI Bus=%d ID=%d LUN=%d: SYNC negotiation error, resetting bus`	An error occurred while trying to negotiated synchronous SCSI rates (usually during an open or mount); the device is left in async mode.
`timeout after %d %ssec`	Any SCSI command that doesn't terminate within the time limit set by the upper level driver will result in this message and a SCSI bus reset. The "%ssec" part will either be "msec" or "sec", depending on whether it is an integral number of seconds or not (timeouts are passed as HZ values). This can be caused by anything from driver errors to hardware errors to SCSI bus problems. The latter is the most common cause. This message is always paired with the standard "wd93 SCSI Bus=%d..." message.
`wd93 controller %d didn't reset correctly`	An attempt to reset the controller chip failed; this is a catastrophic (usually) hardware error.

Table B-3 SCSI Driver Error Messages

Error Message	Comments
`wd93 SCSI Bus=%d ID=%d LUN=%d: SCSI cmd=0x%x <MSG>. Resetting SCSI bus wd93 SCSI Bus=%d: <MSG>. Resetting SCSI bus`	Used with a number of other messages when a SCSI bus timeout or other error on the SCSI bus occurs. The SCSI bus is reset. The long form (with target, and the first byte of the SCSI command) is shown when the driver is connected to a known target. The short form is shown when no target is connected (referred to as "cmdabort" in other messages).
`Spurious wd93 interrupt, no connected channel`	Occurs when the driver is responding to a SCSI bus phase where some device should be connected (active), but in fact, none is.
`wd93 SCSI Bus=%d ID=%d LUN=%d: SCSI bus parity error`	A SCSI bus parity error was detected during a data transfer. Usually a cabling problem.
`wd93 SCSI Bus=%d ID=%d LUN=%d: host memory parity error during DMA`	On command completion (normal or error), the DMA hardware tells us that a parity error occurred during data transfer to memory. Usually a system hardware problem.

SCSI Driver Debugging Messages

The information listed in Table B-4 is sometimes useful for debugging drivers (kernel or **devscsi**). It dumps out information on the current command and the sense info obtained, after a SCSI "check condition" status. Printed only when the variable *wd93_printsense* is set non-zero in *master.d/wd93.*

Table B-4 Error Messages Useful for Debugging

Error Message	Comments
`wd93 SCSI Bus=%d ID=%d LUN=%d: check condition start request sense`	The check condition was detected, a request sense is started.
`wd93 SCSI Bus=%d ID=%d LUN=%d: sense failed wd93 status %d, scsi status 0x%x`	The request sense command failed. Usually bad device firmware, or SCSI bus problems.
`wd93 SCSI Bus=%d ID=%d LUN=%d: sense key=0x%x (%s) ASC=0x%x (%s)`	The request sense succeeded, the driver status and the SCSI status are printed. The ASC is printed if valid, and the ascii strings corresponding to the sense key and the ASC (additional sense code) are also printed, if they are known to the driver.
`Hex sense data:`	If `wd93_printsense is > 1`, then the raw data returned by request sense are dumped in hex with this header.
`reselect without ID`	The SCSI bus phase indicates a reselection, but the reselecting device's ID could not be determined. Usually a cabling problem. Printed with the "cmdabort" message.
`illegal disconnection interrupt: phase %x`	A SCSI bus disconnect was detected at an unexpected point. The wd93 phase register (see *sys/wd93.h*) is printed. Printed with the "cmdabort" message.

Table B-4 Error Messages Useful for Debugging

Error Message	Comments
`unexpected message in %x, phase %x`	A SCSI bus message in phase was found, but the message byte was not expected. Printed with the "cmdabort" message.
`Hardware error`	The wd93 reported no active phase, but should have. Normally a hardware problem. Printed with the "cmdabort" message.
`Too much data %s (probable SCSI bus cabling problem)`	Too many REQ's were received for the amount of data programmed into the SCSI controller. Usually a SCSI bus cabling problem, but can also occur when the byte count passed to the wd93 driver doesn't match the way that the device interprets the bytes in the SCSI command. Followed by either "requested" or "sent", depending on direction of transfer. Printed with the "cmdabort" message.
`Unexpected info phase %x, state %x`	Another unexpected bus phase. The wd93 phase and state registers are printed (see *sys/wd93.h*). Printed with the "cmdabort" message.
`wd93 SCSI Bus=%d ID=%d LUN=%d: Unexpected extended msgin type %x, len %x`	A special case of an unexpected message. Extended messages occur when the first byte is 001; subsequent bytes indicate the length and type. The only extended messages currently handled are synchronous negotiation initiated by the target.
`unexpected reselection`	A reselection of the host was attempted, but the host doesn't think that any target is both disconnected and active. Usually a SCSI bus problem, but might be a firmware bug also. Printed with the "cmdabort" message.

Table B-4 Error Messages Useful for Debugging

Error Message	Comments
`wd93 SCSI Bus=%d ID=%d LUN=%d: I/O address %x not correctly aligned, can't DMA disconnected on non-word boundary (addr=%x, 0x%x left), can't DMA`	Silicon Graphics DMA hardware requires word (32-bit) alignment at start of any DMA (low two bits must be 0 in the address). If not, one of the following two messages is issued, depending on whether this is the start of a command or a data phase continued on a reselection. The latter case can occur if a device disconnects and reselects, even if it doesn't go to data phase, if the DMA count remaining is non-zero. This is because it is too difficult to handle the case where the device disconnects and then reselects just to go to status phase. Such devices are inefficient at best, and, fortunately, are rare. If you must use such a device, your only option is to disable SCSI disconnects altogether (in *master.d/wd93*).
`ID=%d LUN=%d not found in active list`	Typically occurs due to SCSI bus problems or to driver bugs. A reselection occurred with valid data and bus phases at the same time as the driver attempted to select a device to initiate a command, but the reselecting device does not appear to have a command active.

SCSI States and Phases

Several of the SCSI states and phases are listed in Table B-5. There are other possible states and phases, but they rarely occur. The SCSI states and phases are listed in the files */usr/include/sys/wd93.h* and */usr/include/sys/wd95.h* and perhaps in *scsi.h*. The comments below have been extracted from these files and supplemented with additional information.

Note: "Out" is from the CPU to the SCSI device in these descriptions, and "receive" and "send" are also from the SCSI device point of view, since the target controls all the bus phases except for initial selection.

Table B-5 SCSI State Error Messages

State Message	Sense Key	Comments
ST_RESET	0x00	SCSI chip reset by reset command or power-up.
ST_SELECT	0x11	Selection of target complete (after C93SELATN).
ST_SATOK	0x16	Select-And-Transfer completed successfully, that is, all phases have completed in a normal manner.
ST_TR_DATAOUT	0x18	Transfer cmd done, target requesting data.
ST_TR_DATAIN	0x19	Transfer cmd done, target sending data.
ST_TR_STATIN	0x1b	Target is sending status in.
ST_TR_MSGIN	0x1f	Transfer cmd done, target sending msg.
ST_TRANPAUSE	0x20	Transfer cmd has paused with ACK.
ST_SAVEDP	0x21	Save Data Pointers message during SAT normal state when device is disconnecting from the bus.
ST_A_RESELECT	0x27	Reselected after disc (93A).
ST_UNEXPDISC	0x41	An unexpected disconnect device disconnected without sending a disconnect message; sometimes happens when devices with removable media have had the media removed during a transfer.
ST_PARITY	0x43	Cmd terminated due to parity error on the SCSI bus.

Table B-5 (continued) SCSI State Error Messages

State Message	Sense Key	Comments
ST_PARITY_ATN	0x44	Cmd terminated due to parity error (ATN is asserted so that host can send a message to device; the transfer is just aborted).
ST_TIMEOUT	0x42	Time-out during Select or Reselect, that is, the device never responded to an attempt to select it; normally seen only during hardware inventory probing, but sometimes happens after a SCSI bus reset if device takes a long time to recover from the reset or is powered off.
ST_INCORR_DATA	0x47	Incorrect message or status byte.
ST_UNEX_RDATA	0x48	Unexpected receive data phase device tried to send more data than the SCSI chip is programmed to expect. This can be OK, as when a high-level request is made to transfer more data than the DMA hardware can map on a single request. In this case, simply reprogram the DMA hardware for the next chunk of data and restart the transfer (but don't send a new SCSI command to the device). When printed as part of an error message, it can sometimes be caused by a SCSI cabling problem, or (particularly with devscsi user drivers) by a mismatch in the byte count given to the driver and the byte count implied by the SCSI command sent to the device.
ST_UNEX_SDATA	0x49	Unexpected send data phase (same as above, but device is asking for more data).
ST_UNEX_CMDPH	0x4a	Unexpected cmd phase

Table B-5 (continued) SCSI State Error Messages

State Message	Sense Key	Comments
ST_UNEX_SSTATUS	0x4b	Unexpected send status phases occur at the end of SCSI command (that is, byte count remaining is 0); if they happen at other times, the chip interrupts. This can happen when you ask a device for more data than it can give you, and in this case, you just return a short I/O count to the caller. When printed as part of an error message, it usually implies a cabling or termination problem.
ST_UNEX_RMESGOUT	0x4e	Unexpected request message out phase usually indicates a SCSI cabling problem.
ST_UNEX_SMESGIN	0x4f	Unexpected send message in phase usually indicates a SCSI cabling problem; also happens when device sends a disconnect message in normal use when preparing to disconnect from the bus.
ST_RESELECT	0x80	WD33C93 has been reselected.
ST_93A_RESEL	0x81	Reselected while idle (93A).
ST_DISCONNECT	0x85	Disconnect has occurred.
ST_NEEDCMD	0x8a	Target is ready for a cmd.
ST_REQ_SMESGOUT	0x8e	REQ signal for send message out.
ST_REQ_SMESGIN	0x8f	REQ signal for send message in above 3 usually seen only during sync negotiations.

Table B-6 lists phases during Select-and-Transfer commands.

Table B-6 Phases During a Select-and-Transfer Command

Phase Message	Sense Key	Comments
PH_NOSELECT	0x00	Selection not successful.
PH_SELECT	0x10	Selection successful.
PH_IDENTSEND	0x20	Identify message sent (during selection when sending initial command to a device). Phase 30 indicates none of the cmd bytes have yet been sent; every cmd byte sent increments that by one.
PH_CDB_START	0x30	Start of CDB transfers.
PH_CDB_6	0x36	6th cmd byte sent.
PH_CDB_10	0x3a	0xAth cmd byte sent.
PH_CDB_12	0x3c	0xCth cmd byte sent.
PH_SAVEDP	0x41	Save data pointers.
PH_DISCRECV	0x42	Disconnect message received.
PH_DISCONNECT	0x43	Target disconnected.
PH_RESELECT	0x44	Original target reselected.
PH_IDENTRECV	0x45	Correct identify (right LUN) message received (during reselection).
PH_DATA	0x46	Data transfer completed (expect status next).
PH_STATUSRECV	0x50	Status byte received (expect cmd complete next).
PH_COMPLETE	0x60	Command complete message received; SCSI command is finished, and SCSI bus is free.