CTS 9460

Site Installation and Maintenance Guide

DPS7000/XTA
NOVASCALE 7000

Hardware: Cartridge Tapes

REFERENCE
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Hardware: Cartridge Tapes

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Trademarks and Acknowledgements

Preface

Scope and Objectives

This manual is designed to assist Bull Support Engineers in installing and maintaining the CTS 9490 cartridge subsystem at customer sites. This subsystem is also known as TimberLine and CTC D001. In this manual, these names are used interchangeably.

This guide does not replace the installation and maintenance documentation supplied with the individual components of the subsystem. The guide supplements the existing documentation and explains how to connect the subsystem to DPS 7000 systems via an ACSLS server.

The manual also gives an overview of the subsystem components and references specific product documentation where appropriate.

Intended Readers

To achieve maximum benefit the procedures, design requirements, suggested parameters and recommendations in this manual should be observed, as this will ease future maintenance. A successful subsystem installation also depends on how individual responsibilities are allocated and how overall planning and follow-up work are performed.

A technical publication remarks form is provided at the end of this manual for use by the reader to notify Bull of errors in the manual, or to offer suggestions for its improvement.

Structure

The structure of this manual is as follows:

Chapter 1	**Product Overview:** introduces the CTS 9490 cartridge subsystem and the connection architecture.
Chapter 2	**Preparing for Installation:** details the tools required for installation and the connection cables and adapters required for the connection architecture.
Chapter 3	**Installation:** gives step by step instructions for installing, connecting and testing the CTS 9490.
Chapter 4	**Maintenance:** explains how to support the cartridge subsystem and gives details of remote maintenance capabilities.
Chapter 5	**Reporting:** explains how to report on installation and maintenance tasks.
Appendix A	**Returned Data and Messages:** explains how to analyze the PRLOG and the results of log and request sense.

Bibliography

The following manuals discuss related subjects:

Bull Manuals:

ESTRELLA Series 200 System Installation Guide.....86 A1 17AT
ESTRELLA Series 300 System Installation Guide.....86 A1 06HX

MIC User Guide 77 A7 75UU
MARS Plus General Information and Installation CSS/ESS/95FW37

CTS 9490 Cartridge Subsystem Site Preparation Guide..... 00 A1 41UU

StorageTek Manuals:

9490 Cartridge Subsystem PN Compatibility Listing..... STK P/N: 4929
9490 and SD3 Cartridge Subsystem Diagnostic Guide..... STK P/N: 9632
.....(308771801)
9490 Cartridge Subsystem Illustrated Parts Catalogue..... STK P/N: 9633
9490 Cartridge Subsystem Service Manual..... STK P/N: 9635
.....(310710401)
9490 Cartridge Subsystem Installation Manual..... STK P/N: 9636
9490 Cartridge Subsystem Technical Reference Manual ..... STK P/N: 9638
.....(310710501)
9490 Cartridge Subsystem Operator's Guide..... STK P/N: 9634

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1. Product Overview

1.1 Introduction

The StorageTek® 9490 Cartridge Subsystem (also known as TimberLine and CTC D001) is a high-performance information storage and retrieval system that uses both the Enhanced Capacity cartridge tape (E-Cartridge, also known as E-Tape) and standard length cartridges used in 18-track cartridge subsystem as the storage medium. It is already proposed in ESCON/GCOS 8 and SCSI/AIX connections, and will be proposed by DPS 7000 product line as new offer to be connected on existing or new libraries. In this document, you will find only information relative to the DPS 7000 connection.

1.2 The UNIX Server

For an ACSLS connection the following UNIX servers are available:

- DPX/20 model 155,*
- DPX/20 model 215,*
- Estrella MT 604,
- Estrella 340.

*** NOTE:**
will be replaced by new one, year 2000 compliant.

1.3 Product Technology

The CTC D001 Cartridge Subsystem supports three tape-recording formats:

- 36-track, extended (read and write)
- 18-track, extended (read only)
- 18-track, standard (read only).

All three recording formats are compatible with the ANSI and ECMA specifications.

A CTC D001 Cartridge Subsystem consists of 1 -> 12 cartridge drives (CDs), with a maximum of 24 controller transport units (CTUs), that the subsystem support unit (SSU) communicates with.

CDs are available in three models:

- M32, which contains *two* CTUs in a single frame.
- M34, which contains *four* CTUs in a single frame.
- M44, which contains *four* CTUs and *four* cartridge scratch loaders (CSLs) in a single frame (not offered for the DPS 7000 connection).

The CTC D001 Cartridge Subsystem will be connected to the DPS 7000 through a SCSI-2 Interface, capable of transferring data over a wide SCSI bus at 20 MB/s (subsystem capability).

It also offers an IBM Enterprise System Connection (ESCON) interface, that will not be used in this case.

The subsystem support unit (SSU) is an independent unit that stores the maintenance, functional and diagnostic microcodes on a hard disk and downloads the code to the CTU during the initial program load (IPL). The SSU communicates with all CTUs in the cartridge subsystem over a thin-wire, Ethernet, local area network (LAN). The SSU also records performance, events, and diagnostic statistics and stores that information on the hard drive.

The CTC D001 Cartridge Subsystem can be installed in one of four configurations:

- Stand-alone or manual mount (M32 and M34 - not offered for DPS 7000 connection).
- Stand-alone with an optional CSLs (M32 - not offered for DPS 7000 connection).
- Stand-alone with four CSLs (M44 - not offered for DPS 7000 connection).
- Attached to an automated cartridge subsystem (ACS) such as StorageTek's NearLine (4410/9310 models), WolfCreek (9360 model), or TimberWolf (9740 model) libraries (M32 or M34).

A view of the M34 cartridge drive is shown in Figure 1-1.

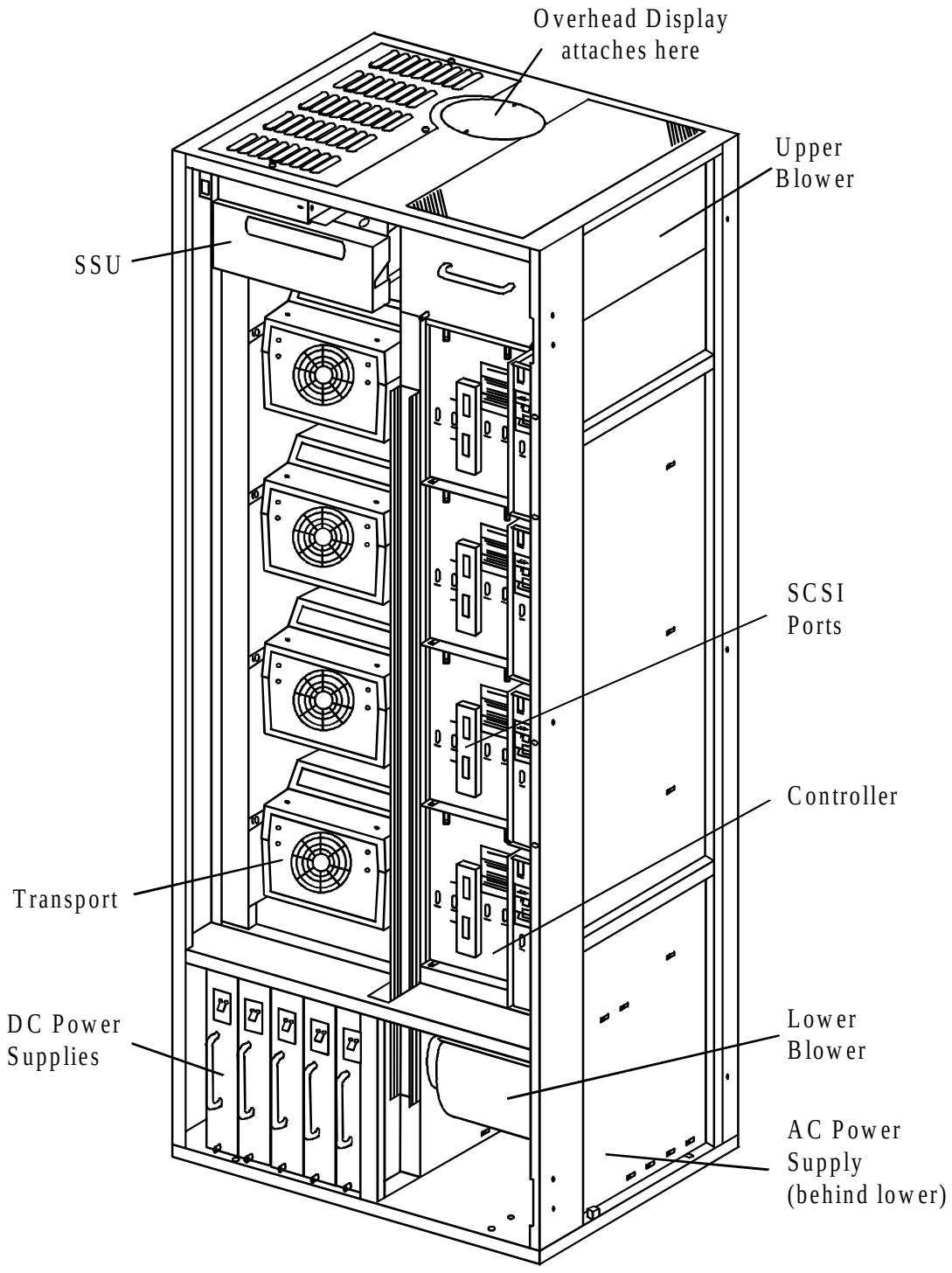

Figure 1-1. Major Components of an M34 Cartridge Drive

1.4 Connection Interface

Connection to DPS 7000 will be done through differential SCSI-2 interface (ANSI standards compliant).

Synchronous transfers are negotiated between the target and the initiator to obtain the optimal rate of transfer that includes fast and wide (16-bit) transfers at rates of up to 20 MB/s.

Asynchronous transfers are the physical transfer of data without a regular or predictable timing relationship following an I/O request.

The SCSI-2 differential alternative has the following characteristics:

- maximum cable length of 25 meters (82 feet),
- minimum cable length of 0.3 meters (12 inches),
- low and high noise rejection,
- elimination of ground loops,
- improved signal quality over the single-ended alternative,
- performs a full parity check on all bus transfer operations,
- uses either the SCSI-3 « P-cable » or the SCSI-2 « A-cable » with an adapter.

All signals will be terminated at each end of the SCSI bus.

The CTC D001 Cartridge Subsystem has the option to supply terminator power.

1.5 Software Architecture

For completeness the figure below shows the software required for the connection architecture. Installation of the software is outside the scope of this manual. For details, refer to the appropriate installation documentation.

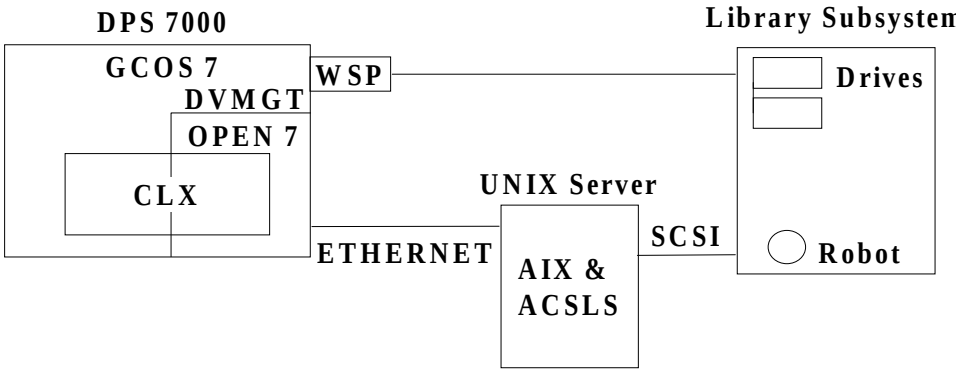

Figure 1-2. Software Associated with the ACSLS Connection Architecture

The version of ACSLS depends on the particular UNIX server.

Table 1-1. Software Versions for the ACSLS Connection Architecture

Server	AIX	ACSLS	CLX	OPEN 7
Estrella	4.2 or later	5.1.1	3.2	V4.2

2. Preparing for Installation

2.1 Tools Required

This section details the physical tools you require for installation and maintenance.

- Static protection wrist band.
  This must be used when repairing or testing the CTC D001 (CTS 9490) alone or in conjunction with the "Static Protective Field Service Kit" provided in the "open me first" of Vega/Auriga Systems.
- CRS Tool Kit (Torx Driver Set).
  This is useful for maintenance purposes.
- Laptop Computer
  You need this to:
  – install the microcode in the subsystem.
  – configure the subsystem.
  – update the Time-Of-Day clock of the subsystem.
  – test the subsystem.
  – display FSCs, FRUs and performance statistics of the subsystem.
  – examine event and diagnostic logs of the subsystem.
  – enter the maintenance device environment to maintain the subsystem.
- Auto-answer modem.
  You use this to accomplish a remote hook-up through a serial CCITT cable with an RJ-45 connector for the LSM connection.
  CCITT modular cable assemblies are available for connecting the adapter to the Machine Activated Routing Switch (MARS).
- Phillips screwdriver
- Torx screwdriver
- Screwdriver
- 7mm wrench
- Cutting pliers
- Flat pliers
- Set of Allen Keys
- Multimeter

2.2 Unpacking and Checking

For detailed instructions on unpacking the CTC D001 (CTS 9490) refer to the specific product installation documentation.

NOTE:
The temperature and humidity of the data cartridges must be allowed to stabilize in the specific ambient environment for 24 hours.

2.3 Cables

The logic connection cables you require are shown in the following table:

Table 2-1. Logic Cables for ACSLS Architecture

From	To	Cable
WSP	Drives	SCSI cable, either 10m or 20m.
UNIX Server	Library	SCSI cable 20m.

2.4 Additional Controllers and Drivers

If the installation is a new system, not an upgrade, the server is delivered from the factory pre-fitted with the following SCSI interface cards:

Interphase DE cards are supplied in Estrella servers.

If you are installing onto existing servers, check the appropriate cards are available in the machines. Note that Corvette cards are supplied in the DPX/20 server.

Ensure you have the correct number of WSP cards for the DPS 7000 hosts to support the number of tape drives you are installing. For details refer to the System Configuration in Section 3.

3. Installation

3.1 Overview

Installation of the cartridge subsystem has the following distinct stages:

- Install and Set Up Cartridge Subsystem
  See paragraph 3.2.
- Verify UNIX Server
  See paragraph 3.3.
- Install System (ACSLS only)
  See paragraph 3.4.
- Configure the Library
  See paragraph 3.5.
- Connect and Test The ACSLS System
  See paragraph 3.6.

3.2 Install and Set up Cartridge Subsystem

Installation of the subsystem is detailed in the StorageTek *9490 Cartridge Subsystem Installation Manual*.

The step by step check list below serves as a reminder. Where appropriate step descriptions in this document include additional procedures required to prepare for connecting with an ACSLS server.

At CTL 9490 level before powering-on

The specific installation for the DPS 7000 consists of:

- unpacking the Cartridge Drives,
- preparing the Cartridge Drives for attachment to the library,
- ensuring there is enough Cooling,
- installing the Operator Panel Cables,
- inspecting the 9490 Cartridge Subsystem,
- attaching the Cartridge Drive to the library,
- preparing the Air Box,
- installing the Air Box,
- installing the Overhead Display (if any),
- inserting the Overhead Display Guide (if necessary),
- connecting LAN Cables,
- setting the LAN Address,
- installing SCSI-2 cables,
- connecting the M.A.R.S. Box,
- installing and configuring the remote maintenance modem,
- connecting AC Power.

The duration is between 2 and 3 hours, depending on the configuration ordered.

For further details, refer to the StorageTek *9490 Cartridge Subsystem Installation Manual*.

Table 3-1. Cables for ACSLS Connection

Connection	Type	Maximum Length	Number
DPS 7000 direct to the CTC D001 (CTS 9490)	SCSI	10 m or 20 m	1 per host per WSP (ordered separately)
UNIX ACSLS Server to the CTC D001 (CTS 9490)	SCSI	20 m	1 per server (ordered separately)
Power	120-240 VAC 20 A Standard wall connector or bare wires	3.0 m	1 per unit

3.3 Verify UNIX Server

For details of how to install and setup your UNIX server and the related software refer to the specific documentation for your server.

Verify the appropriate SCSI controller cards are provided on you server:

Table 3-2. SCSI Controller Cards

	SCSI Controller Card
DPX/20 215	CORVETTE
ESTRELLA	INTERPHASE DE

Verify that the necessary software has been provided on your UNIX server.

3.4 Install System (ACSLS only)

Verify that you have the correct number of expansion buses and WSP cards. You need 1 WSP per MFB. A WSP can support up to 2 CTC D001s (CTS 9490s), see *Types of Installation* below for more details.

3.4.1 Types of Installation

The following installations are possible:

- mono installation - single access
- mono installation - dual access
- dual installation - coupled access

3.4.1.1 Mono Installation - Single Access

Mono installation - single access, is the most simple installation. A single DPS 7000 host has a single access path to a CTC D001 (CTS 9490) as shown below.

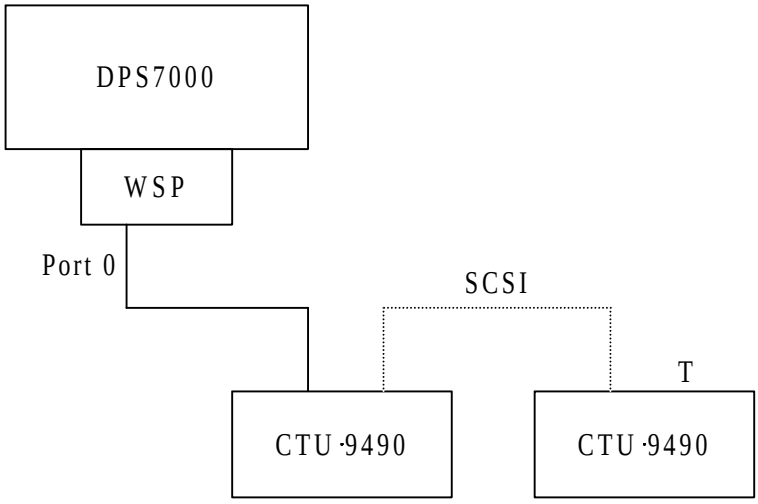

Figure 3-1. Mono Installation - Single Access

3.4.1.2 Mono Installation - Dual Access

Mono installation - dual access requires a single DPS 7000 host to have two alternative access paths to the same CTC D001 (CTS 9490), as shown below:

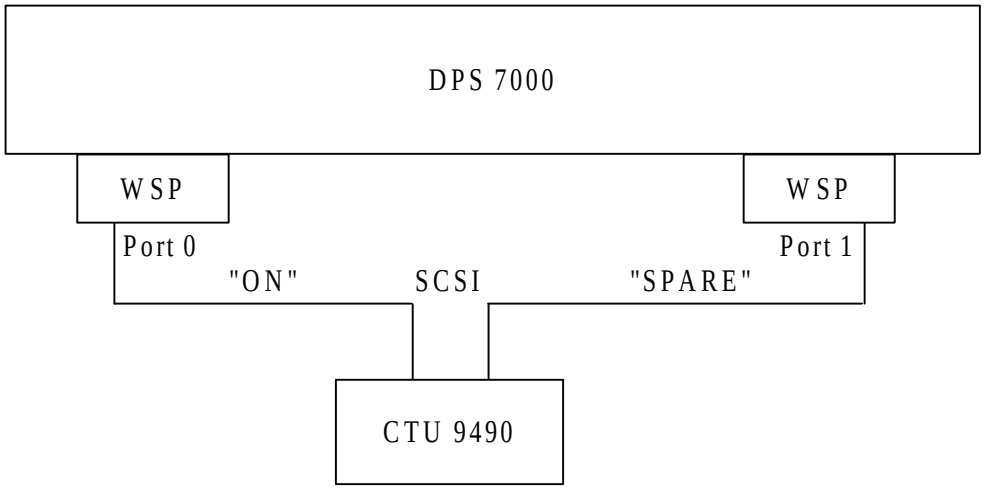

Figure 3-2. Mono Installation, Dual Access

NOTES:

1. The cabling is different for the two WSP boards. One card uses port 0, the other card uses port 1. Refer to the System Configuration example for more details.
2. Remember that the maximum SCSI length is 25 m in total between terminators. Consequently, in this example you are restricted to 10 m cables between the DPS 7000 and the subsystem.

3.4.1.3 Dual Installation - Coupled Access

The Dual Installation - Coupled Access installation is the most complicated, and involves two DPS 7000 hosts sharing access to a single CTC D001 (CTS 9490). The example shown below is for the maximum drive configuration.

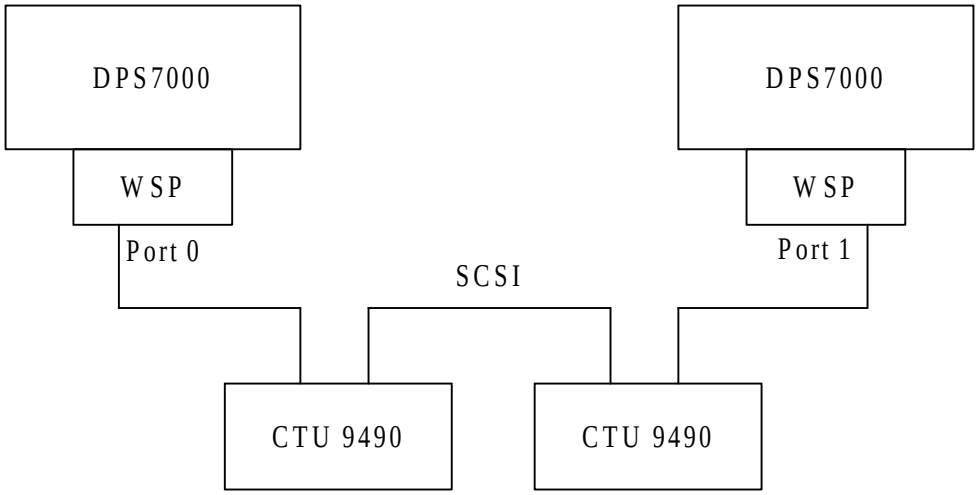

Figure 3-3. Dual Installation - Coupled Access

NOTES:

1. One host machine is identified as installation 0 and the other as installation 1. The cabling for the WSP cards is different in each machine. For more details see System Configuration below.
2. Remember that the maximum SCSI length is 25 m in total between terminators. Consequently in this example you are restricted to 10 m cables between the DPS 7000 and the subsystem.

3.4.2 Installation Process Overview

All three installations involve the following steps to set up the DPS 7000 host(s):

1. System Configuration Generation under FGF: MNCONF, FIRMGEN, BLOAD.
2. Power off both system and library subsystem
3. Install the WSP board(s)
4. Connect the SCSI cable on the WSP board(s)

Total duration is about 2.5 hours.

NOTE:
The system takes the new configuration description into account after the *Configuring the System* phase, when the physical connections are made.

3.4.2.1 System Configuration Generation

You generate the configuration files for the system(s) just once, for all the drives together. You use the DPS 7000 console to do this.

- Launch FGF.
- Search for the name of the current configuration using "DFW".
- Run MNCONF.
- Execute "IOM" to get the system suggestion for the PX and slot to use. The system gives you this, plus the computed load factors for each subsystem.
- Execute the new configuration description from within the current configuration, using "MD". For this subsystem, the type of IOM is WSP-C, refer to *"Examples"* below.
- Remember to execute "PR" to print the new configuration.
- Quit MNCONF.
- Run FIRMGEN with the new configuration.
- Run BLOAD with the new configuration on the system disk.

NOTE:
Be sure to save both the old and new configurations. If the new configuration should fail, the old one can be recovered.

3.4.2.2 Power off the System and Subsystem

Power off the subsystem: Turn off the AC switch.

Power off the system: Under SPV graphic, select POWER OFF.

3.4.2.3 Install the WSP Board(s)

Install the WSP board(s) into the slot(s) defined during configuration by MNCONF.

3.4.2.4 Connect the SCSI Cable(s) on the WSP Board(s)

Connect the SCSI cable(s) on the WSP board(s). The results of MNCONF give the active port on each board. Use this port for the connection.

Remember to label your cables.

NOTE:
In shared or dual access installations, the two WSP cards must use different ports: one card uses port 0 and the other uses port 1.

3.4.3 Examples

3.4.3.1 Mono Installation - Single Access

Below is a step-by-step example for adding a mono installation - single access CTC D001 (CTS 9490) subsystem to an Artemis.

NOTE:
What appears in bold is what you have to type in. To accept the default value offered in parentheses, type <enter>.

```
S0 LN03 S: FGF
S0 LN03   >>> WORKING LIBRARY : SYS.FW.SLLIB
S0 LN03 >>>15:38 FGF   35.00
S0 LN03 F: DFW
S0 LN03           RELEASE - P1
S0 LN03             TS = 44E
S0 LN03         INSTAL_DATE = 94/12/13
S0 LN03            EJR = 1
S0 LN03            CONF = P76LSS
S0 LN03  PREVIOUS CONFIGURATION = NONE
S0 LN03         PREFIX = SYS.FW
S0 LN03  FGF_VOL or BSR_VOLUME = H72A:MS/FSA
S0 LN03  SYS_HUBVOL or BLOAD_VOLUME = S72A:MS/FSA
S0 LN03 F:MNCONF
S0 LN03 <<<15:39
S0 LN03 >>>15:39 CONF 542.0
S0 LN03 N:IOM
S0 LN03 ?
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_IN
S0 LN03 IOM  CONFIG + reference config.name      :P76LSS
S0 LN03  NB_NCC + NUMBER OF NCC TO IMPLEMENT             (0):
S0 LN03  NB_PSM1 + NUMBER OF PSM (STK,CMTS) to implement (0):
S0 LN03  NB_PSM2 + NUMBER OF PSM with MSC4 to implement  (0):
S0 LN03  NB_PNM1 + NUMBER OF PNM with MPC to implement   (0):
S0 LN03  NB_MSP1 + NUMBER OF PNM other to implement      (0):
S0 LN03  NB_MSP2 + NUMBER OF WSP (WSP-C function)        (0):  1
S0 LN03  NB_MSP3 + NUMBER OF MSP (MSP-C function)        (0):
S0 LN03  NB_MSP2 + NUMBER OF MSP/WSP with one EXB10E     (0):
S0 LN03  NB_MSP3 + NUMBER OF MSP/WSP with two EXB10E     (0):
S0 LN03  NB_PRM + NUMBER OF PRM and CPM to implement     (0):
S0 LN03  NB_PRM + NUMBER OF LNM to implement             (0):
S0 LN03 N: IOM P76LSS
S0 LN03 NB_MSP0=1
S0 LN03     Configuration name: P76LSS
   IOMS to be implemented in ADD-ON to your existing configuration
```

```
S0 LN03  List of free PX(s) and slot(s) for WSP (WSP-C function):
S0 LN03  Px : 03
S0 LN03  Slot : 15
S0 LN03  Computed load factor for implementation: 600
S0 LN03  Load factor for IOSS #00 : 300
S0 LN03  Load factor for IOSS #01 :   0
S0 LN03  Load factor for IOSS #02 : 400
S0 LN03  Load factor for IOSS #03 :   0
S0 LN03 N: MD
S0 LN03  ?
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_IN
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_OUT
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD SELECT
S0 LN03  MODIFY
S0 LN03  CONFIG_IN +  Config. to be modified  :P76LSS
S0 LN03  CONFIG_OUT +  Name of the new config.:CONFSTK
S0 LN03   Value authorized ALL, SYS, MSP,LSS,IOM,PC or DRIVE
S0 LN03            (IOM, MSP,LSS) only if MB2 existing
S0 LN03  SELECT+    Part to be modified::IOM
S0 LN03 N:MODIFY P76LSS CONFSTK
S0 LN03 IOM:
S0 LN03 MODIFY_IOM
S0 LN03   Only IOMs defined by this PX list
S0 LN03   will be modified
S0 LN03  PX_LIST +  PX number list (decimal value)? 03
S0 LN03  IOM name for PX03 Slot 15.
S0 LN03           ()              :WSP-C
S0 LN03  External name for TC connected to port 0
S0 LN03            ()             :10
S0 LN03  Do you confirm (Y,N or/ for exit? (Y)    :

S0 LN03 External SCSI linked to WSP-C PX03 slot 15 port 0 (TC10)
S0 LN03   Drive model      (CT-3 )               :
S0 LN03   Dual acces?      (0)                   :
S0 LN03 External names (1 up to 4 ext. names)
S0 LN03                    ()                    : (01 02)
S0 LN03 Library option?    (0)                   : 1
S0 LN03 Do you confirm (Y, N or / for exit)? (Y)  : Y

N: LABEL CONFSTK
     --> See the sysout report for LABEL result
```

3.4.3.2 Example Mono Installation - Dual Access

Below is a step-by-step example for adding a mono installation - dual access CTC D001 (CTS 9490) subsystem to an Artemis.

NOTE:
What appears in bold is what you have to type in. To accept the default value offered in parentheses, type <enter>.

```
S0 LN03 S: FGF
S0 LN03   >>> WORKING LIBRARY : SYS.FW.SLLIB
S0 LN03 >>>15:38 FGF   35.00
S0 LN03 F: DFW
S0 LN03          RELEASE - P1
S0 LN03            TS = 44E
S0 LN03        INSTAL_DATE = 94/12/13
S0 LN03           EJR = 1
S0 LN03           CONF = ES1
S0 LN03  PREVIOUS CONFIGURATION = NONE
S0 LN03        PREFIX = SYS.FW
S0 LN03  FGF_VOL or BSR_VOLUME = H72A:MS/FSA
S0 LN03  SYS_HUBVOL or BLOAD_VOLUME = S72A:MS/FSA
S0 LN03 F:MNCONF
S0 LN03 <<<15:39
S0 LN03 >>>15:39 CONF 542.0
S0 LN03 N:IOM
S0 LN03 ?
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_IN
S0 LN03 IOM  CONFIG + reference config.name     :ES1
S0 LN03  NB_NCC + NUMBER OF NCC TO IMPLEMENT  (0):
S0 LN03  NB_PSM1 + NUMBER OF PSM (STK,CMTS) to implement (0):
S0 LN03  NB_PSM2 + NUMBER OF PSM with MSC4 to implement  (0):
S0 LN03  NB_PNM1 + NUMBER OF PNM with MPC to implement   (0):
S0 LN03  NB_MSP1 + NUMBER OF PNM other to implement      (0):
S0 LN03  NB_MSP2 + NUMBER OF WSP (WSP-C function)        (0): 2
S0 LN03  NB_MSP3 + NUMBER OF MSP (MSP-C function)        (0):
S0 LN03  NB_MSP2 + NUMBER OF MSP/WSP with one EXB10E     (0):
S0 LN03  NB_MSP3 + NUMBER OF MSP/WSP with two EXB10E     (0):
S0 LN03  NB_PRM + NUMBER OF PRM and CPM to implement     (0):
S0 LN03  NB_PRM + NUMBER OF LNM to implement (0):
S0 LN03 N: IOM ES1
S0 LN03 NB_MSP0=1
S0 LN03     Configuration name: ES1
   IOMS to be implemented in ADD-ON to your existing configuration
S0 LN03  List of free PX(s) and slot(s) for WSP (WSP-C function):
S0 LN03  Px   : 03 13
S0 LN03  Slot : 15 05
S0 LN03  Computed load factor for implementation: 600
```

```
S0 LN03  Load factor for IOSS #00 : 300
S0 LN03  Load factor for IOSS #01 : 300
S0 LN03  Load factor for IOSS #02 : 100
S0 LN03  Load factor for IOSS #03 :   0
S0 LN03 N: MD
S0 LN03  ?
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_IN
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_OUT
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD SELECT
S0 LN03  MODIFY
S0 LN03  CONFIG_IN +  Config. to be modified :ES1
S0 LN03  CONFIG_OUT +  Name of the new config.:CONFSTK
S0 LN03   Value authorized ALL, SYS, MSP,LSS,IOM,PC or DRIVE
S0 LN03            (IOM, MSP,LSS) only if MB2 existing
S0 LN03  SELECT+    Part to be modified::IOM
S0 LN03 N: MODIFY ES1 CONFSTK
S0 LN03 IOM:
S0 LN03 MODIFY_IOM
S0 LN03   Only IOMs defined by this PX list
S0 LN03   will be modified
S0 LN03  PX_LIST +  PX number list (decimal value)? 03
S0 LN03  IOM name for PX03 Slot 15.
S0 LN03           ()                                : WSP-C
S0 LN03  External name for TC connected to port x
S0 LN03            ()                               : 01 10
S0 LN03  Do you confirm (Y,N or/ for exit? (Y)      :
S0 LN03  IOM name for PX13 Slot 05.
S0 LN03           ()                                : WSP-C
S0 LN03 External SCSI linked to WSP-C PX03 slot 15 port x (TC01)
S0 LN03   Drive model      (CT-3 )                  :
S0 LN03   Dual acces?      (0)                      : 1
S0 LN03   Other instal?    (0)                      :
S0 LN03   2nd port TC name (  )                     : 10
S0 LN03 External names (1 up to 4 ext. names)
S0 LN03                    ()                       :(11 12)
S0 LN03 Library option?    (0)                      : 1
S0 LN03 Do you confirm (Y, N or / for exit)? (Y)    :
N: pr CONFSTK
        Configuration name: CONFSTK
  8889                                          (128 Mb)
   MU    2*64Mb
  EPU    (01)
  IPU    (00)
  IO-MB2 (02 03 00 01)
  PX iom (27 03 13)
  MSP            PX27     Slot 19              port 0->MCK1
   Rack  (K) cab #01 (MCK1)                    (PC5C)
    FSA  (K1 K2 K3 K4)
          MCK ACCESS #1 LCN=(01-04)
 WSP-C          PX03     Slot 15              port 0->TC01
  SCSI   external          (TC01)              (PC0D)
```

```
 WSP-C          PX13     Slot 05              port 1->TC10
  SCSI   external          (TC10)             (PC2F)
   CT-3  (11 12)
         (TC01,TC10) LCN=(01-03)
                                              With library option
                                              (PCFE)
AUSP     UC01
--> List of free PX(s) and slot() for IOM:
 Px   : 02 12 01 11 00 10 23 33 22 32 21 31 20 30 14 04 15 05 16
        06 17 07 34
Slot  : 14 06 13 07 12 08 15 05 14 06 13 07 12 08 04 16 03 17 02
        18 01 19 04
+++
 PX   : 24 35 25 36 26 37
 Slot : 16 03 17 02 18 01
Load factor for IOSS #00 : 300
Load factor for IOSS #01 : 300
Load factor for IOSS #02 : 100
Load factor for IOSS #03 :   0
N:

N: LABEL CONFSTK
     --> See the sysout report for LABEL result
```

3.4.3.3 Example Dual Installation - Coupled Access

Below is a step-by-step example for adding a Dual Installation - Coupled Access CTC D001 (CTS 9490) subsystem to an Artemis. You must run MNCONF on each machine. Remember to call one machine installation 0, and the other installation 1.

NOTE:

What appears in bold is what you have to type in. To accept the default value offered in parentheses, type <enter>.

```
S0 LN03 S: FGF
S0 LN03   >>> WORKING LIBRARY : SYS.FW.SLLIB
S0 LN03 >>>15:38 FGF   35.00
S0 LN03 F: DFW
S0 LN03          RELEASE - P1
S0 LN03            TS = 44E
S0 LN03        INSTAL_DATE = 94/12/13
S0 LN03           EJR = 1
S0 LN03           CONF = ESB2
S0 LN03  PREVIOUS CONFIGURATION = NONE
S0 LN03        PREFIX = SYS.FW
S0 LN03  FGF_VOL or BSR_VOLUME = H72A:MS/FSA
S0 LN03  SYS_HUBVOL or BLOAD_VOLUME = S72A:MS/FSA
S0 LN03 F:MNCONF
S0 LN03 <<<15:39
S0 LN03 >>>15:39 CONF 542.0
S0 LN03 N:IOM
S0 LN03 ?

S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_IN
S0 LN03 IOM  CONFIG + reference config.name     :ESB2
S0 LN03  NB_NCC + NUMBER OF NCC TO IMPLEMENT  (0):
S0 LN03  NB_PSM1 + NUMBER OF PSM (STK,CMTS) to implement  (0):
S0 LN03  NB_PSM2 + NUMBER OF PSM with MSC4 to implement   (0):
S0 LN03  NB_PNM1 + NUMBER OF PNM with MPC to implement    (0):
S0 LN03  NB_MSP1 + NUMBER OF PNM other to implement       (0):
S0 LN03  NB_MSP2 + NUMBER OF WSP (WSP-C function)         (0): 1
S0 LN03  NB_MSP3 + NUMBER OF MSP (MSP-C function)         (0):
S0 LN03  NB_MSP2 + NUMBER OF MSP/WSP with one EXB10E      (0):
S0 LN03  NB_MSP3 + NUMBER OF MSP/WSP with two EXB10E      (0):
S0 LN03  NB_PRM + NUMBER OF PRM and CPM to implement      (0):
S0 LN03  NB_PRM + NUMBER OF LNM to implement              (0):
S0 LN03 N: IOM ESB2
S0 LN03 NB_MSP0=1
S0 LN03     Configuration name: ESB2
   IOMS to be implemented in ADD-ON to your existing configuration
```

```
S0 LN03  List of free PX(s) and slot(s) for WSP (WSP-C function):
S0 LN03  Px : 03
S0 LN03  Slot : 15
S0 LN03  Computed load factor for implementation: 600
S0 LN03  Load factor for IOSS #00 : 300
S0 LN03  Load factor for IOSS #01 :   0
S0 LN03  Load factor for IOSS #02 : 400
S0 LN03  Load factor for IOSS #03 :   0
S0 LN03 N: MD
S0 LN03  ?
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_IN
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD CONFIG_OUT
S0 LN03 ***MANDATORY VALUE MISSING FOR KEYWORD SELECT
S0 LN03  MODIFY
S0 LN03  CONFIG_IN +  Config. to be modified :ESB2
S0 LN03  CONFIG_OUT +  Name of the new config.:CONFSTK
S0 LN03   Value authorized ALL, SYS, MSP,LSS,IOM,PC or DRIVE
S0 LN03             (IOM, MSP,LSS) only if MB2 existing
S0 LN03  SELECT+    Part to be modified::IOM
S0 LN03 N: MODIFY ESB2 CONFSTK
S0 LN03 IOM:
S0 LN03 MODIFY_IOM
S0 LN03   Only IOMs defined by this PX list
S0 LN03   will be modified
S0 LN03  PX_LIST +  PX number list (decimal value)? 03
S0 LN03  IOM name for PX03 Slot 15.
S0 LN03            ()                              :WSP-C
S0 LN03  External name for TC connected to port 0
S0 LN03             ()                             :10
S0 LN03  Do you confirm (Y,N or/ for exit? (Y)    :

S0 LN03 External SCSI linked to WSP-C PX03 slot 15 port x (TC01)
S0 LN03   Drive model       (CT-3 )                :
S0 LN03   Dual acces?       (0)                    : 1
S0 LN03   Other instal?     (0)                    : 1
S0 LN03   Instal # <0 or 1> (0)                    :
S0 LN03 External names (1 up to 4 ext. names)
S0 LN03                     (01 02)                :
S0 LN03 Library option?    (1)                     :
S0 LN03 Do you confirm (Y, N or / for exit)? (Y)  :
```

```
N: pr CONFSTK
       Configuration name: CONFSTK
  8889                                          (128 Mb)
   MU    2*64Mb
  EPU    (01)
  IPU    (00)
  IO-MB2 (02 03 00 01)
  PX iom (27 03)
  MSP            PX27     Slot 19              port 0->MCK1
   Rack  (K) cab #01 (MCK1)                    (PC5C)
    FSA  (K1 K2 K3 K4)
          MCK ACCESS #1 LCN=(01-04)
 WSP-C          PX03     Slot 15              port 0->TC01
  SCSI   external          (TC01)              (PC0D)

N: LABEL CONFSTK
     --> See the sysout report for LABEl result

{for the second host, installation 1:
 from ESB3 during MODIFY ESB3 CONFSTK1

S0 LN03 External SCSI linked to WSP-C PX13 slot 05 port x (TC01)
S0 LN03   Drive model       (CT-3 )                 :
S0 LN03   Dual acces?       (1)                     :
S0 LN03   Other instal?     (1)                     :
S0 LN03   Instal # <0 or 1> (0)                     : 1
S0 LN03 External names (1 up to 4 ext. names)
S0 LN03                     (01 02)                 :
S0 LN03 Library option?     (1)                     :
S0 LN03 Do you confirm (Y, N or / for exit)? (Y)    :
N: pr CONFSTK1
       Configuration name: CONFSTK1
  8889                                       (  128 Mb)
   MU    2*64Mb
  EPU    (01)
  IPU    (00)
  IO-MB2 (02 03 00 01)
  PX iom (27 03)
  MSP            PX27     Slot 19              port 0->MCK1
   Rack  (K) cab #01 (MCK1)                    (PC5C)
    FSA  (K1 K2 K3 K4)
          MCK ACCESS #1 LCN=(01-04)
 WSP-C          PX13     Slot 05              port 1->TC01
  SCSI   external          (TC01)              (PC2F)
}
```

3.4.3.4 Example Sysout Report for Mono Installation - Dual Access

```
*** LABELs and LSS connections
  Iom MSP slot 19 PX27 cab #01 rack ident K
   J21 to MSP(19)J2
 * MB2-0-19-2    * * MCK1  BL-P21 *
 *               * * MS K1        * * MS K2  * * MS K3   * * MS K4
*** LABELs for other ID controllers
 * MB2-1-15-P02  * * TC01   (PC0D)  *
 * MB2-1-05-P03  * * TC10   (PC2F)  *
 *               * * CT 11          * * CT 12     * * CT 13
***LAST LINE
```

3.5 Configure the Library

Refer to the documentation specific to the library concerned.

3.6 Connect and Test the ACSLS System

3.6.1 Making the ACSLS Connection

In the ACSLS connection architecture:

- the data communication path to the LSM goes directly from the DPS 7000 Host machine to the drives.
- the control communication path is via the ACSLS server.

There are (at least) two physical connections, both are SCSI links:

- DPS 7000 Host to drives.
- Server to Library.

Refer to the appropriate *Installation Manual* for full details of the library side of the connection process.

NOTE:
Remember to check that you have turned off the power to the host DPS 7000 system before making the SCSI connections.

3.6.2 Configuring the System

The subsystem must be configured and connected to the DPS 7000 host prior to this system configuration generation being performed. The following steps are involved:

1. Power on the system and subsystem.
2. Update the CPSF.
3. Perform the INIT IND, RESTORE, CONFIG, Stop GCOS, Reload System, RESTORE, RESTART (COLD).
4. Perform a MIC Remake.

3.6.2.1 Power on the System and Subsystem

Power on the subsystem.

Power on the DPS 7000 system: under SPV Graphic, select POWER ON.

3.6.2.2 Update the CPSF

Remake the CPSF file with TSH service.

3.6.2.3 Perform the INIT IND, RESTORE, CONFIG, RESTORE, RESTART (COLD)

Step 1:	First Initialization --> SYC : IND
Step 2:	GCOS options --> RESTORE
Step 3:	GCOS configuration --> CONFIG Job
Step 4:	Shutdown GCOS --> TSYS command
Step 5:	Reload System --> SYC : RL command
Step 6:	GCOS options --> RESTORE, RESTART (COLD)

NOTE:
The **first** time you power on the system with the newly-attached subsystem, initialize with IND (INIT and DIAGNOSTIC mode) to run the TEMIOM test on the new IOM WSP. **Do not use the INR**.

3.6.2.4 Perform a MIC remake

See *MIC User's Guide* for details.

3.6.3 Performing the OLTDs

The preparation and procedures for the OLTDs are given below.

3.6.3.1 Host System

Use the STKCONF, STKCOMP tests under OLTDs (OLTD 71.46) to verify that the SCSI control connections are all functioning correctly.

IMPORTANT:
Using STKCONF or STKCOMP in write mode will erase customer data.

Online help is available on the system to explain the diagnostic test.

Prepare the drives:

Under GCOS 7, check the system can see the drives, using the command:

DC CT/LIB/36T

System response takes the format: `CTxx HELD` or `CTXX STANDBY`

(`xx` signifies the number of the drive)

If there are drives in the HELD state, try to turn them to STANDBY using the command:

RDV CTxx

Verify that each drive is now in the STANDBY state using the command:

DC CTxx

If this command does not release the drives check for problems with either: the connection, the WSP, the firmware configuration or the drive itself.

When you have resolved the problem, release each drive with the command:

RDV CTxx

Perform the OLTDs:

For each drive to be tested, issue the command:

HDV CTxx
(`xx` represents the number of the drive, for example `01`)

Insert a cartridge tape in each drive to be tested. To do this:

- if ACSLS is **NOT** running, open the library and manually insert a cartridge into each drive to test. Alternatively load the Diagnostic Cartridge using the library test `Mount to Drive x` (where x is the number of the drive id to be tested).
- if ACSLS is running, under ACSSA, for each drive issue the command:

  `mount VOLid  0,0,2,x`

  (`x` represents the drive to test for example `0`, and `VOLid` is the barcode of the cartridge to insert into the drive)

IMPORTANT:
Using STKCONF or STKCOMP in write mode will erase customer data.

Under GCOS 7, as the user OPERATOR, run the test(s) for each drive, using the command:

```
EJ TD VL=(CTxx CONF)
```

Return the drives to the host:

Having completed the tests, release each drive to GCOS 7 using the command:

```
RDV CTxx
```

Verify that this has worked, and that each drive has returned to STANDBY mode using the command:

```
DC CTxx
```

In the event of failure

See the documentation of the OLTD test and the StorageTek *Diagnostics Guide*.

3.6.3.2 ACSLS Connection

The test described below, verifies that ACSLS is functioning.

Preconditions for this test:

- ACSLS is installed, configured and running on UNIX server.
- CLX is installed, configured and running on DPS 7000 host.
- Drives are in STANDBY mode (if not use the command **`RDV CTxx`** to release them)

Perform the test:

Under GCOS 7, as a user with appropriate privileges to perform a list_volume command issue the command:

```
LSV VOLid:CT/LIB/36T
```

Verify that the cartridge is mounted correctly, even if it is unmounted again immediately.

If the cartridge is not mounted, contact your ACSLS and CLX support people.

4. Maintenance

4.1 Maintenance Strategy

The maintenance strategy for the CTC D001 (CTS 9490) subsystem can be divided into three areas as shown in Figure 4-1.

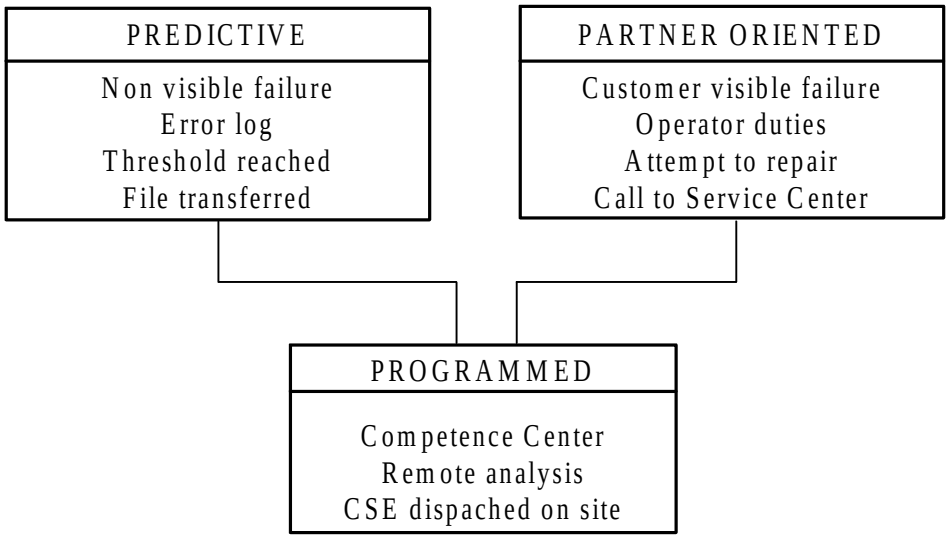

Figure 4-1. Maintenance Strategy

An important part of the maintenance for the CTC D001 (CTS 9490) subsystem is based on remote capabilities. Remote Maintenance is done by B.I.I.C./STK. It comprises running diagnostic tests remotely and monitoring actions such as dispatch of the local CSR.

It also assumes the use of « Auto-Call » capability of the CTC D001 (CTS 9490) Subsystem: the device(s) place a call upon detection of a MIM (Machine Initiated Maintenance) event. These events can be triggered either locally or remotely. The calls will be routed to B.I.I.C. STK through the Remote Maintenance Links (cables, M.A.R.S. Box +, modem).

4.2 Predictive Maintenance

Predictive maintenance is based on the Error Log File.

This error log file collects maximum information about errors, retries, marginal conditions, etc. These errors are analyzed and stored by the system itself.

TeleContol and TeleAlarm are also used. For each product error, a threshold is set and may be modified either locally or using Remote Maintenance. When an errors occurs, a notification is sent and the System transfers the information, according to the result of the analysis, to the appropriate Competence Center.

The Competence Center either uses Remote Maintenance to collect more information or to start T&Ds in order to diagnose and localize the problem remotely.

4.3 Programmed Maintenance

In many cases, as a result of the early warning given by the Error Log, the Competence Center knows about a problem and understands its origin *before* the Customer sees an error or the subsystem fails.

When an on-site intervention is necessary, the Competence Center asks the Service Center to program the appropriate on-site assistance.

4.3.1 UNIX Server

The maintenance strategy for the CTC D001 (CTS 9490) assumes the use of part of the remote maintenance tools provided with the system:

RSF (Remote Service Facility) which is used for AIX standard and unstructured text error log scanning, alarm message sending and remote connecting.

4.3.2 CTC D001 (CTS 9490)

Procedures will be defined for handling error messages sent by the library or the drives to ensure that information is passed to an Affiliate Hardware Technical Support Remote Center or the B.I.I.C./STK. The Affiliate Hardware Technical Support Remote Center must be ready to receive the calls coming from any system, and depending on its analysis of the error, inform B.I.I.C./STK.

4.4 Partnership Maintenance

Customer co-operation is a key factor to increase System availability.

4.4.1 Initialization of Call

In case of failure occurring without pre-alert through TeleAlarm or TeleControl, the operator must execute the appropriate T&D and transmit results to the Service Center at call time, in order to:

- schedule the response time to the service and determine the profile of the CSR required
- identify the faulty FRU/ORU
- diagnose those cases where the problem is due to operation error
- initiate a remote connection for error log analysis.

4.4.2 Remote Maintenance

Remote maintenance allows you to:

- run T&Ds
- collect logging information
- collect and analyze dumps
- collect identification and technical status of the server components.

The customer must accept remote maintenance.

4.5 Preventive Maintenance

The subsystem does not require preventive maintenance beyond normal and periodic tape path cleaning either by the customer or automatically by the library itself.

Tape Path Cleaning

This operation varies widely, depending on the quality of the cartridges used and the room's environment.

The need for cleaning is determined when a « CLEAN » message appears on the overhead display or library operator panel, or at periodic intervals such as:

- after 100 hours of operation,
- every seven days.

This operation is mainly under the responsibility of the operator or of the ACSLS cleaning utility.

Cartridge Cleaning

Before inserting a cartridge into a transporter, inspection the cartridge for damage or dirt. Damaged or dirty cartridges reduce the subsystem reliability. To clean cartridges, use a lint-free cloth, or cleaning fluid Bull Express references: 6226 and 6220.

4.6 Maintenance Teams

4.6.1 Organization of Maintenance Teams

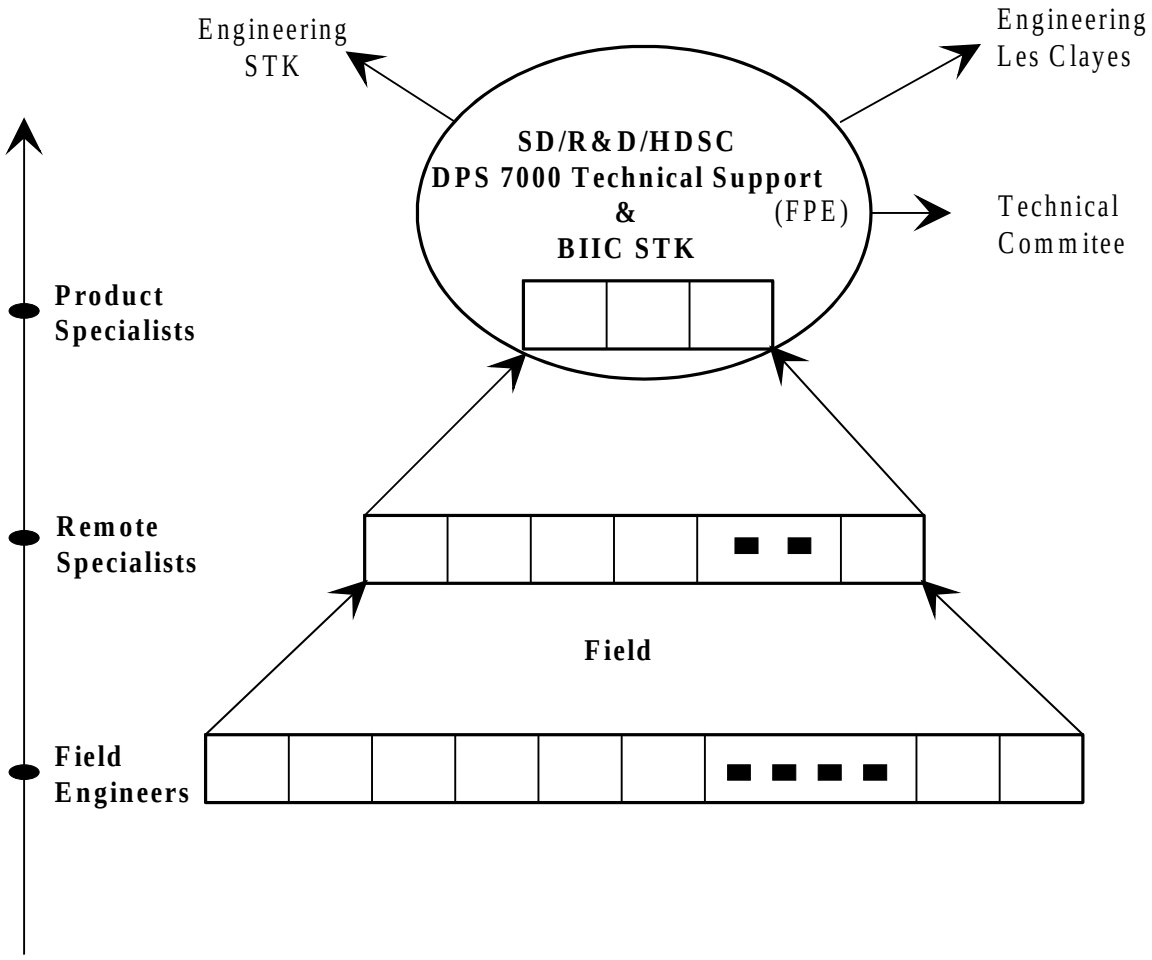

Figure 4-2. Organization of Maintenance Teams

4.6.2 Remote Specialists

Remote Specialists major duties are:

- maintaining the Remote Center equipment.
- following the recommended procedures using developed tools.
- on site monitoring of the library installation team for the first installation.
- recording every site profile in the Remote Center file and keeping it up-to-date with associated maintenance coverage.
- operating Preventive Maintenance (RMS session) and appropriate actions.
- handling the reception of library autocalls, and then performing, when required, additional RMS connection to the CTL or to the host, in order to obtain necessary information to complete the diagnostic.
- initializing the CSR intervention and the logistic dispatch via the local Maintenance Base.
- performing the tests after repair.
- escalation to the Product Specialists according to defined criteria.
- answering questions for CSR and helping to solve problems which cannot be diagnosed remotely.
- keeping accurate logs of calls and diagnostic actions. This keeps track of all events and the associated data for the FPE, and is necessary for follow-up.

4.6.3 Product Specialists

Product Specialists major duties are:

- Bull last level support for CTC D001 (CTS 9490).
- covering the whole library subsystem, including the robot, the drives and the whole subsystem architecture.
- providing support to the Remote Specialist to fix the problems as fast as possible, remotely or on site.
- providing the Remote Specialist with enhanced tools to accelerate their analysis of the part of the subsystem in which they specialize.

4.6.4 Intervention Scenario

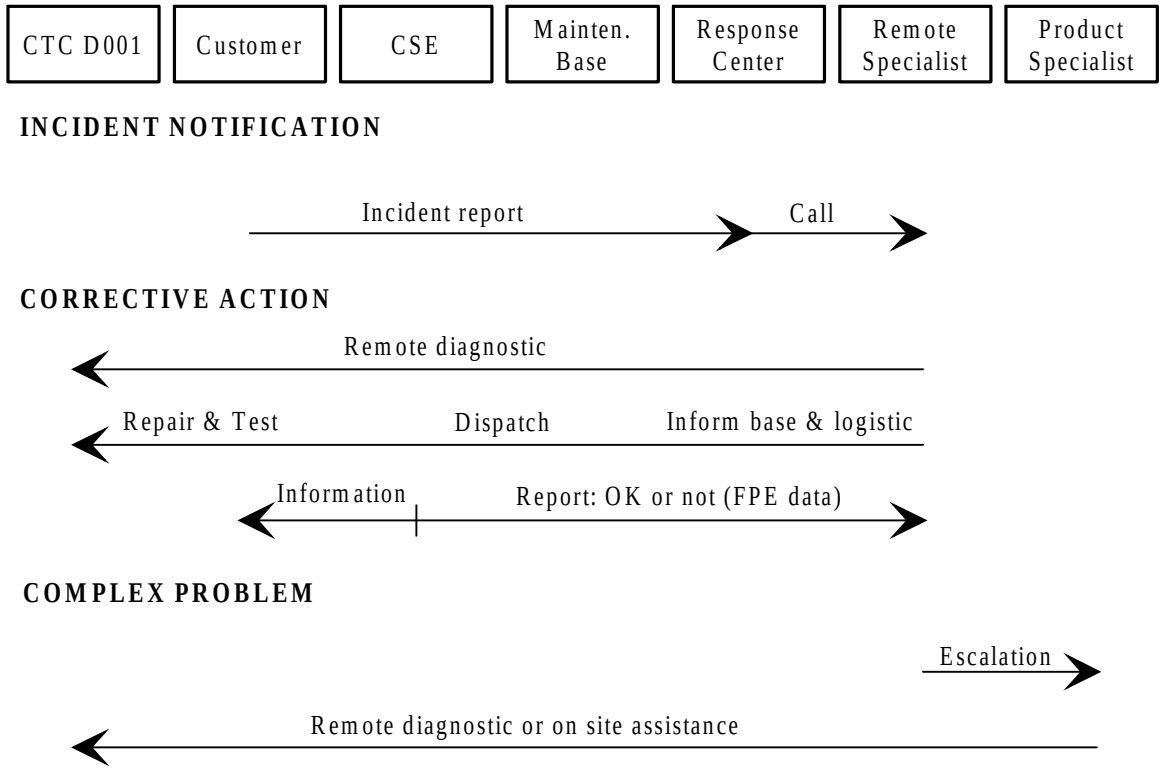

Figure 4-3. Maintenance Intervention Scenario

4.7 Maintenance Tools

4.7.1 CTC D001 (CTS 9490)

See the StorageTek *Diagnostics Guide*.

4.7.2 DPX/20 and Estrella Maintenance Tools

The following maintenance tools are available:

- Hardware diagnostic tools - BIST, Online and Offline tests
- System diagnostic tools - debuggers, load analysis and tuning utilities, selective dump utilities
- AIX System Trace
- Communications diagnostic tools - load analysis and tuning utilities, selective dump utilities, trace facilities
- Remote maintenance tools through a serial modem and M.A.R.S. box connection
- Product administration tool - SMIT (System Management and Installation Tool)

4.7.3 Other Tools

- Static protection wrist band
  Part referenced with spare parts list. Must be used when repairing or testing the CTC D001 (CTS 9490).
- Laptop computer
  You need this to:
  – install the microcode in the subsystem.
  – configure the subsystem.
  – update the Time-Of-Day clock of the subsystem.
  – test the subsystem.
  – display FSCs, FRUs and performance statistics of the subsystem.
  – examine event and diagnostic logs of the subsystem.
  – enter the maintenance device environment to maintain the subsystem.
- Auto-answer modem
  Will be needed to accomplish a remote hook-up, through a serial CCITT cable with an RJ-45 connector for the M.A.R.S. box connection. Note that CCITT modular cable assemblies are available for connecting the adapter to the M.A.R.S. box.

4.8 Spare Parts Strategy

4.8.1 Repair Strategy

Maintenance tools will lead to the FRU/ORU being replaced.

No single component has to be replaced on a logic or analogic FRU/ORU.

All the repairable defective parts will be returned to the STK/local or distributor.

4.8.2 Spare Parts List

The global spare parts strategy takes advantage of STK's existing spare parts logistics in accordance with the agreement between Bull and STK.

STK Present

In those countries where STK is present, STK handles spare parts (this is in order to avoid cost duplication in both companies). Stocking, handling, and repairing of spare parts are done by STK at no cost for Bull, but the maintenance revenue is shared between the two companies.

STK Not Present

In those countries where STK is not present or where STK is represented by a distributor, specific agreements have been signed between Bull and/or STK affiliates.

4.9 Consumables

The following parts will be available from BULL EXPRESS:

Reference	Description
3205	400 MO cartridge tape (550 feet)
3235	500 MO cartridge tape (650 feet)
3260	800 MO cartridge tape (1100 feet)
6247-2	Cleaning cartridge

5. Reporting

5.1 Installation and Maintenance Reporting

Fill in the Installation Report according to the local procedure.

5.2 Assessment

5.2.1 Field Performance Evaluation (FPE)

Use the Field Performance Evaluation (FPE) in the usual way:

- Specific "StorageTek Cartridge Tape Systems" (as delivered with previous 1/2" STK libraries) 90 day Installation Report. This is to be completed at installation time, then every 30 days whether there is a problem or not, regardless of whether the CTC D001 (CTS 9490) was delivered with the DPS 7000 System or not.
- Intervention Report, contained in the 90 day Installation report.

These reports must be completed and sent to SD/R&D/HDSC DPS 7000 Technical Support for analysis and recording. Two cases may occur:

- Installation Report (with or without trouble): one copy is transmitted to Quality (Industrial Management and Angers factory) organization.
- Intervention Report: after specialist analysis, this report is systematically transmitted to Quality (Industrial Management) and may be sent to the concerned organization for diagnostic and/or correction purposes.

5.2.2 Quality Measurement

Quality is measured using the following metrics:

- results comparison with maintenance P&L, in terms of traveling, intervention number, MTBF, MTTR, replaced parts number
- installation follow-up through launching group ("Groupe de Lancement")
- quantity and type of calls (Oscar)
- answering delay measure

A. Returned Data and Messages

A.1 PRLOG Analysis

A.1.1 Channel Exceptions

At the beginning of the PRLOG there is an area called *History Report for Channel Exception*, which is the log for channel exceptions that you can use to find out the reason for the channel exception together with complementary information on the origin of the problem.

At address 400h in this area there are 16 bytes with the following format:

LC#0 log format

Bytes 400-401	Verstab	WSP-C Firmware revision level
Bytes 402-403	RFU	
:		
Byte 404	Type	1st aborted Channel process
Byte 405	Reason	
Byte 406	Job Number	
Byte 407	Process Number	
Byte 408	Type	2nd aborted Channel process
Byte 409	Reason	
Byte 40A	Job Number	
Byte 40B	Process Number	
Byte 40C	Type	Aborted Driver process
Byte 40D	Reason	
Byte 40E	Job Number	
Byte 40F	Process Number	

If type equals 10, it is the auto-termp.

The possible Termp codes on abnormal execution of a GPOS primitive are:

01h	RC_RQTM	Request timer
02h	RC_DELRQT	Delete timer
03h	RC_SEPM	P operation
04h	RC_SEPMTST	P operation test
05h	RC_SEVM	V operation
06h	RC_NOTIFY	Notify (attention)
07h	RC_GETDATA	
08h	RC_PUTDATA	
09h	RC_GETCMD	
0Ah	RC_ENDCB	End
0Bh	RC_RESGET	
0Ch	RC_CRCTRL	Create controller
0Dh	RC_CRSERV	Create server
0Eh	RC_TERMP	
0Fh	RC_INITSEM	Reset flags
10h	RC_STARTP	Start process
11h	RC_SETCTRL	
12h	RC_IDS	Automatic Detailed Status
13h	RC_SEPMT	P operation with timer
14h	RC_DLSERV	Delete server
15h	RC_SCTDESC	SCT descriptors
16h	RC_GETSCT	Primitive getsct

The possible Termp codes on abnormal execution detected by a channel process are:

50h	DEV_TYPE_UNKNOWN	Unknown device type
51h	ERR_MES_P0_DRV	Error message from driver or P0
52h	ERR_CS_TESTSEM	No longer used
53h	ERR_CS_CCE	Internal error, incorrect return code for CCE processing
54h	ERR_CS_DP_SUPSCSI	Internal dp_supscsi function error
55h	ERR_RC_CMDSCSI	Internal cmdscsi function error
56h	ILLEGAL_TAG	Tag message error detected
57h	TAG_NOT_EXPECTED_HERE	Unexpected tag
58h	ILLEGAL_TAG_IN_MS_IN_CNL	Tag error detected
59h	ILLEGAL_CCE_CODE	Illegal CCE from P0 received.
5Ah	ILLEGAL_CMD_SCSI_ASKED	Internal error, unexpected SCSI command
5Bh	ILLEGAL_MSG_SCSI_ASKED	Internal error, unexpected SCSI message
5Ch	ILLEGAL_SCSI_REQUEST	No longer used
5Dh	SCSI_COMMAND_ERROR	No longer used
5Eh	TIMER_START_SUP_EXPECTED	
5Fh	TIMER_DELAY_SUP_EXPECTED	
60h	TIMERQUEUE_EXPECTED	

61h	TIMERBUSY_EXPECTED	
62h	ILLEGAL_PAGE_SELECTED	Internal error, select page mode is unexpected
63h	ERR_DRIVER_UNKNOWN	Unexpected driver error
64h	RC_GPOS_UNKNOWN	Unknown or unexpected GPOS return code
65h	SENDER_UNKNOWN	Message from unknown sender
66h	SENDER_NOT_EXPECTED	Unexpected message from this sender
67h	SRC_SID_UNKNOWN	Unknown source ID
68h	SRC_SID_NOT_EXPECTED	Unexpected source ID
69h	ILLEGAL_DEVICE_STATUS	Unexpected status
6Ah	SENSE_CODE_UNKNOWN	Incorrect or unknown additional sense code (SCSI)
6Bh	ILLEGAL_SENSE_KEY	Undefined sense key (SCSI)
6Ch	ILLEGAL_ERROR_CODE	Undefined sense code (SCSI)
6Dh	ILLEGAL_ERROR_CLASS	No longer used
6Eh	SCSI_PARAMETERS_ERROR	Internal error, incorrect parameter in SCSI command
6Fh	ILLEGAL_P0_REQUEST	
70h	ILLEGAL_P0_REQUEST_TYPE	
71h	ERR_STATEDEV	
72h	TERMP_DRIVER	Driver performed termp
73h	DELETE_SERVER	Abnormal delete server processing
74h	NO_REVISION_LEVEL	WSP revision is 00 (00 = illegal)
75h	ILLEGAL_ID_TAPE_POSITION	
76h	ILLEGAL_PARTITION_ID	Illegal partition ID received
77h	QUEUEP0_OVERFLOW	
78h	ILLEGAL_ASC	Illegal or unknown additional sense code
79h	ILLEGAL_ASCQ	Illegal or unknown additional sense code qualifier
7Ah	ILLEGAL_SVID	Illegal server ID
7Bh	TIMEOUT_ABORT	Timeout on abort message request
7Ch	ILLEGAL_COM_NB	Driver error: incorrect command number
7Dh	ERROR_ABORT	Incorrect abort SCSI command
7Eh	UNEXPECTED_ DRIVER_ERR	

The possible Termp codes on abnormal execution detected by a driver process are:

20h	ERR_PIOPROC	Abnormal value in pioproc
21h	ERR_INMESS	Unidentified message
22h	ERR_VALTAG	Unknown message type
23h	QUEUE_MESS_FULL	Message queue overflow
24h	PROC_OVF	Too many executing channel processes
25h	DRIV_OVF	Driver table overflow
26h	VRAM_OVF	VRAM data overflow
27h	SCRIPT_OVF	VRAM script overflow
28h	ERR_SCHEDULE	Incorrect number of scheduler entries
29h	ERR_SCRIPTLCA	Script parity error detected by CA
2Ah	ERR_DATALCA	Data buffer parity error detected by LCA
2Bh	ERR_VRAMLCA	VRAM parity error detected by LCA
2Ch	ERR_DIFFSENS	Single-ended device connected to the SCSI bus
2Dh	ERR_UNKNOWN	Unknown LCA interrupt
2Eh	ERR_MESSLEN	Outgoing message too long
2Fh	ERR_CONFIG	Transfer configuration error
30h	ERR_MESSIDENT	Identification message error
31h	ERR_MESSREF	Configuration message error
32h	UNEXPECTED_ITNCR	Current NCR IT with no command on device
33h	ITNCR_LOOP	Loop in IT sequence

A.1.2 I/O Errors

The PRLOG contains an area for each logical device called *History report for CTxx*.

It contains all types of I/O error (NT with marginal condition, ASR, ANR, AMR) and Attention messages.

NOTE:

Certain I/O errors and Attention messages from WSP-C are filtered by GCOS (AVAIL and PIARS) and do not appear in the PRLOG.

A.1.2.1 PSB/DSB Termination Reports

PSB and DSB terminations are listed below.

PSB1

bit 0	Modifier Always 1	
bit 1	Status Control (origin of status)	
bit 2	Channel Program Check (programming error)	
bit 3	Detailed Status Pending	
bit 4	Data Error	
bit 5	Hardware Condition	Hardware fault
bit 6	Operational Check	
bit 7	Device Condition	

PSB2 in Termination is defined as follows:

PSB2 (bit)	EVENT Type	PSB1 (bit)	Error description	Remarks
0	ASR	0,1,4	CHANNEL parity error A parity error has been detected in data transmission on the channel interface.	
1	ASR	0,4	Tape positioning error (1) LOCATE BLOCK has failed (2) An error in the block ID sequence has been detected.	Detail in DSB3
2			Zero (RFU)	
3			zero (RFU)	
4	ASR	0,4	ID burst error Writing of the ID mark on BOT was unsuccessful (read after write error)	
5	ASR	0,4	READ/WRITE error An error has been detected during the read check after a write operation	DSB7 bits 4 and 5
6	ASR	0,6	Path switch request The CTC requests that access to the device be made through the other CTC in dual LOS configuration: - because there is data in the buffer of the other CTC, or - for better load distribution.	
7			Zero (RFU)	

PSB3 is defined as follows:

PSB3 (bit)	EVENT Type	PSB1 (bit)	Error description	Remarks
0	NT ASR	0,1,6	Unequal length check The length of the data field read on the media is different from the CCE count, or discrepancy between specified length of control command and CCE count. **NOTE:** This bit is not set to one when a Tape Mark is encountered during a Read command.	
1	ASR ANR	0,6 0,5,6	Reserved The drive is seized by another path (caused by explicit seize, implicit seize, status pending, or diagnostic mode), or has been unlocked from another path.	
2	AMR	0,5	Off-line The subsystem could not execute the channel program because the device was in the off-line state or the subsystem could not complete the command because the device entered the off-line state.	
3	AMR ASR	0,6	Write protect The subsystem could not execute a write operation because the cartridge or the drive was write protected either manually (AMR) or by Function mask (ASR).	
4	AMR	0,5	Standby The subsystem could not execute (or complete) the channel program because the device was in (or entered) the standby state.	
5	ASR	0,5	Tape time out No block was detected in reading after x meters of tape movement. "x" is subsystem specific.	
6	NT ASR	0,7	End of file A tape mark was detected during a READ or SPACE command. If the command was not a SPACE TO TM command, ASR is generated. If the command was a SPACE TO TM, a normal termination is generated.	

PSB3 (bit)	EVENT Type	PSB1 (bit)	Error description	Remarks
7	NT ASR	0,7	EOT/BOT This indication is set whenever the tape is positioned: - in the EOT** zone [zone defined as starting at beginning of logical EOT marker and ending at physical end of tape], - or on the BOT marker. **ABN. TERM.** is generated in the following cases: Logical EOT** and execution of a WRITE*, WRITE TM, ERASE. The operation is completed normally. Physical EOT** and execution of the same commands. The operation cannot be completed. Physical EOT** and execution of FWD SPACE or READ command. BOT and BCK SPACE command. EOD*** and READ, FWD SPACE or LOCATE command. In the last three cases the operation cannot be completed normally. **NORMAL TERM.** is generated in the following cases: Logical EOT** and WRITE with command modifier bit = 1, FWD SPACE, READ, and all commands involving backward tape motion: BACKSPACE, REWIND, UNLOAD. Physical EOT** and SECURITY ERASE BOT and REWIND, or UNLOAD.	

* Write with command modifier bit = 0.

** Using 36 tracks tapes Logical (Physical) EOT status is sent when the R/W head reaches Logical (Physical) EOV. EOV (End Of Volume) is then the functional equivalent of EOT.

*** EOD (End Of Data).

A.1.2.2 Detailed Status for All TCA Sub-Systems

The detailed status is an extension of the summary status. Transmission of these statuses is made:

- through the automatic detailed status mechanism, or
- in response to a Store detailed status command.

A maximum count of 128 bytes of detailed status may be sent by a Cartridge Tape Subsystem. TCA standard bytes are described here, other bytes are considered as TCA subsystem specific.

The standardized bytes are as follows :

DSB0 (bit)	EVENT Type	PSB1 bit	Error description	Remarks
0	ASR	0,1,2	Illegal command This bit is set to one on the following conditions : - Command with illegal encoding - Invalid flag field - Command valid only for a controller was issued to a device - Command valid only for a device was issued to a controller	
1	ASR	0,1,2	Illegal argument An illegal count has been detected by the CTC	
2	ASR	0,1,2	Illegal data An illegal data was detected by the CTC	
3	ASR	0,1,2	Illegal sequence An illegal CCE sequence was detected by the CTC	
4	ASR	0,1,2	Resume error RESUME command (IOC instruction) has been issued to an active LC	
5	ASR	0,1,2	Function mask reject A function not existing in the details of the subsystem has been specified or an invalid combination of bits in DSB3 has been sent	
6	ASR	0,1,2	Function mask violation A command requiring an operation not allowed by the function mask was issued	
7	ASR	0,1,2	Programmed release The termination of the channel program was caused by an ABORT command or a DISCONNECT (IOC instruction)	

DSB1 (bit)	EVENT Type	PSB1 bit	Error description	Remarks
0			Zero (RFU)	
1	ANR	0,5	Device fault A fault was detected in the device	
2	ANR	0,5	Overrun Data overrun/underrun occurred during data transmission	
3			Zero (RFU)	
4	ANR	0,5	Cartridge fault Non standard cartridge or loosely wound tape	
5	ANR	0,5	Retry failure A second error in the retry process resulted in an unrecoverable state	
6			Zero (RFU)	
7			Zero (RFU)	

DSB2 (bit)	EVENT Type	PSB1 bit	Error description	Remarks
0	ASR	0,6	Accessor parameter error	Currently NA
1	ANR	0,5	Cell fault	Currently NA
2			Zero (RFU)	
3	ASR	0,5	Buffer empty No data block remains in the CTC buffer when a READ BUFFER command is received (in this case the CTC transfers one byte of non significant data)	
4			Zero (RFU)	
5			Zero (RFU)	
6	ASR	0,6	Buffer busy No buffer segment is available because they are all allocated to other drives and contain data	
7	ANR	0,5	Controller fault A fault or a time out has been detected in some part of the CTC	See details in DSB3

A.1.2.3 CTC D001 (CTS 9490) Specific DSBs

DSB3	Description
00	No error
01-5F	SCSI ERPA code (4220/4280)
82	Channel hardware time out
91	Formatter time out
D3	Device busy
BC	Lost position
Cx	Function mask error :
C1	- Illegal parameter in function mask
C2	- Illegal combination in function mask
C4	- Illegal tape position
C5	- Request not allowed in standby
C8	- Write protect by function mask
FF	4890/9490 : Formatter or device error

DSB4	Last CCE received

DSB5 bit #	Description
0	Successful HW error retry
1	Successful data error retry
2	Successful sequence error retry
3	Successful device error retry
4	History counter overflow
5	Error corrected in data buffer
6	History counter read request
7	Unlock executed

DSB6 bit #	Description
0	Illegal block size
1	Positioning command request
2	Incompatible format
3	Zero
4	Read density ID failed
5	Incompatible cartridge
6	Zero
7	Invalid block ID

DSB7 bit #	Description
0	Tape synchronous mode
1	Zero
2	Error (same) path retry request
3	Compacted data in buffer
4	Deferred check event
5	Buffered data (= 0 for 4220/4280)
6	zero
7	Alternate drive retry request

DSB8	Zero

DSB9 bit #	Description
0	Block Id valid (=0 for 4220/4280)[33]
1	No repositioning needed
3	Zero
4	BOT
5	Physical EOT
6	End of Data mark
7	Zero

DSB10 bit #	Description	Remarks
0	Formatter status valid	
1-3	DSB's>3 format - 000 : controller/formatter/drive status - 010 : history counter status	0x84: DSB>32 = formater status 0xA4: DSB>32 = history counter status
4-7	Controller type = 0100	

DSB11-14	First block Id
DSB15-18	Second block Id
DSB19	= zero if no data in the buffer not zero otherwise
DSB20-21	Firmware revision level
DSB22	Product Identification (Same as DSB91)

DSB23 bit #	Description
0	Zero
1	IDRC capability feature
2	zero
3	SCL autoloader installed
4-7	Zero

DSB24-31	Description
bit 0-6	zero
bit 7	write protect switch is set

DSB3-127	Description
	If DSB10 bits 1-3 = 000 : Controller / formatter / drive status If DSB10 bits 1-3 = 010: History counter status

(i) Controller / Formatter / Drive Status
(DSB10 bits 1-3 = 000)

DSB32 bit#	Description
0-3	Zero
4	Tape mark detected
5	BOT
6	EOT
7	Write protected cartridge

DSB33 bit#	Description
0	=1 if SCSI sense bytes are valid
1-7	NFS

DSB #	Description	Remarks
DSB34-59	Device SCSI sense bytes 2-N: - N=27 for 4220/4280 - N=21 for 4890 - N=17 for 9490	See Request sense DATA in this Appendix
DSB60-71	Last failed SCSI command	
DSB72-75	Device sense bytes 28-31 (Physical block ID) for 4220/4280	
DSB76-89	Reserved (zero)	
DSB90	Vendor identification (STK = 82_{16})	

DSB91	Product identification 4890 = 91_{16}, 9490 = 92_{16}

DSB #	Description
DSB92-95	**Product revision level (as returned by device)**
DSB96-107	Current SCSI command
DSB108	Device status
DSB109	Driver status
DSB110	Last message in on SCSI
DSB111	Last message out on SCSI
DSB112-115	Last event on SCSI

DSB #	Description
DSB116	GPOS return code if primitive is unsuccessfully executed
DSB117	Microcode procedure in terminate process code
DSB118	Order code in procedure of terminate process
DSB119	GPOS return code if IDS primitive is unsuccessfully executed
DSB120	GPOS return code if ENDCB primitive is unsuccessfully executed
DSB121-126	Reserved (zero)
DSB127	End command block (GPOS primitive) processing error

(ii) History Counters
(DSB10 bits 1-3 = 010)

Statistical information content of history counters (DSB34 to DSB127)

DSB	Description	Remarks/related status
DSB33	This byte is set to a non-zero value if one or several track error counters exceed a specified value. Execute the specific T&D TWPLOG to retrieve the information stored in the SCSI WSP_Controller. DSB33 prevents reset of this complementary logging by Read Buffered Log CCE. The event will be reported (without complementary logging reset) once per hour until: - a specific Native Command is executed through the T&D: TWPLOG (*) - or until the next REPCH is executed on the controller (*) (*) : After this event, complementary logging is reset	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010 (See DATA Logging format and meaning in this Appendix)
DSB34-37	Read Forward Data Checks This count indicates the number of records which had a data check while reading forward, that were later recovered. Each record can only have one data check even if recovery took several retries. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB38-41	Write Forward Data Checks This count is the same as Read Forward Data Checks except for records which are written instead of read. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB42-45	Read Data Checks without Hardware Indicators Count of data check errors detected by software only during reads. This count is a subset of Read Forward and Read Reverse data checks. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB46-49	Write Data Checks without Hardware Indicators Count of data check errors detected by software only during writes. This count is a subset of Write Forward and Write Reverse data checks. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010

DSB50-53	Read Recovery Retry Count Count of the number of times an attempt to read a record was retried before recovery failed or succeeded. This count only applies to the last block read with a data check. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB54-57	Write Recovery Retry Count Count of the number of blocks which have to have prefix erase written before the block in order for the record to be successfully written to tape. This count does not contain the erase gaps written. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB58-61	Read Transient Conditions The number of times read blocks were retried but resulted in unsuccessful recovery after one retry. The first recovery step usually changes no parameters in order to see if the error is transient. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB62-65	Write Transient Conditions Same as Read transient Conditions except for Writes. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB66-69	Buffer Read Blocks Corrected The number of read blocks in the buffer which the hardware corrected on the fly. Updated by Host Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB70-73	Device Read Blocks Corrected The number of blocks read from the tape which the hardware corrected on the fly. This includes corrections from tape and corrections from the buffer memory. Updated by Host Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB74-77	Buffer Write Blocks Corrected Same as Read blocks Corrected but for write blocks. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010

DSB78-81	Device Write Blocks Corrected Same as Read blocks Corrected but for write blocks. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB82-85	Data Transfer Errors - excluding data request timeouts - The number of errors detected transferring data between the controller and the host. Data request timeouts are not included in this count. Updated by Host Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB86-89	Temporary Driver errors The number of errors which were detected by the Servo and subsequently recovered from after retry. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB90-93	Permanent Errors Logged The count of all permanent errors reported that were also logged in event log. Note that this does not include requests for read opposite recovery, which are reported as permanent but not logged. Updated by the Host Side for errors generated by either the Device or the Host Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB94-101	Channel Read Bytes Processed 64-bit count of the number of non-compressed bytes transferred to the host from the common controller. Updated by the Host Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB102-109	Device Read Bytes 64-bit count of the number of bytes that were read from the tape to the common controller. This count does not include any read ahead data including super blocks. Updated by the Host Side after successful read data transfer.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010

DSB110-117	Channel Write Bytes Processed 64-bit count of the number of bytes that were transferred from the host to the common controller. This represents the non-compressed bytes. This count is updated after every successful write transfer from the host. Updated by the Host Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB118-125	Device Write Bytes Processed 64 bit count of the number of bytes that were written to tape from the common controller. This count represents the compressed bytes. This count is updated after a successful write from the host to the common controller. If the data could not be written to tape, then the counts will be off by the amount of data buffered within the common controller. Updated by the Device Side.	Event= NT PSB1 bit 0, 5 =1 DSB5 bit 6 = 1 DSB10 bits 1-3 = 010
DSB126-127	Zero (RFU)	

A.2 Triggering Remote Control (Telecontrol)

A.2.1 All TCA Sub-Systems

Event	Information	Severity Level	Probable Cause	Intervention Required ASAP
PSB2/bit 0	Channel parity error	* * *	SCSI cables or connector	Yes
PSB2/bit 1 & DSB3 = 0xBC	Tape positioning error. Lost position	* * *	Media defective	No Change the media.

A.2.2 CTC D001 (CTS 9490 - TimberLine)

A.2.2.1 Formatter Errors

Event	Information	Severity Level	Probable Cause	Intervention Required ASAP
PSB2/bit 1 & DSB3 = 0x91	Formater time-out	* * *	If not transient: SCSI cable, connector, or device interface	Yes
DSB10=84 & DSB35 bit4-7=3	Device Fault: Medium Error	* * *	Media defective	Yes, if fault persists after change of media
DSB10=84 & DSB35 bit4-7=4	Device Fault: Hardware error	* * *	Device fault	Yes, if several errors of same type
DSB10=84 & DSB35 bit4-7=B & DSB45:2 = 4700	Aborted command	* * *	SCSI cable or connector	Yes
DSB10=84 & DSB45:2 = 3300	Tape length error	*	Wrong cartridge type	No
DSB10=84 & DSB35 bit4-7 = 7 & DSB45:2 = 3000	Write attempt to 18-track cartridge	*		No

A.2.2.2 Statistics

Event	Information	Severity Level	Probable Cause	Intervention Required ASAP
DSB10=A4	Statistics Threshold exceeded	* * *	Media or cartridge device problem	Yes Look at the statistics
DSB10=A4 and DSB33 not equal to 00	Statistics Threshold exceeded beyond counter n° 21	* * *	Media or cartridge device problem	Yes Run the OLTD TWPLOG

Counter threshold = 25 events read for MB (except PC30 for which the threshold is 50 events). For counters counters >21 , see *Log Sense Results* in this appendix.

A.3 Request Sense Results

Table A-1 shows the data returned for a sense request.

Table A-1. Sense Request Data Returned

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Valid	Error Code						
Byte 1	0	0	0	0	0	0	0	0
Byte 2	FM	EOM	ILI	0	Sense Key			
Byte 3 Byte 4 Byte 5 Byte 6	msb Information Bytes lsb							
Byte 7	Additional Sense Length (= 0Eh)							
Byte 8	0	0	0	0	0	0	0	0
Byte 9	0	0	0	0	0	0	0	0
Byte 10	0	0	0	0	0	0	0	0
Byte 11	0	0	0	0	0	0	0	0
Byte 12	Additional Sense Code							
Byte 13	Additional Sense Code Qualifier							
Byte 14	0	0	0	0	0	0	0	0
Byte 15	0	0	0	0	0	0	0	0
Byte 16	0	0	0	0	0	0	0	0
Byte 17	0	0	0	0	0	0	0	0
Byte 18 Byte 19	msb Fault Symptom Code lsb							
Byte 20		CCTU Detailed Status Code						
Byte 21	0	0	0	CLND	CLN	0	0	0

Explanation of Bytes

Byte 0

The VALID bit when set indicates that bytes 3, 4, 5 & 6 contain valid information (see below).

The Error Code bits are used to indicate whether the CHECK CONDITION and Sense Data apply to the command that returned the CHECK CONDITION (error code set to 70h) or to a previous command, such as a buffered WRITE, which had already returned GOOD status (deferred error, error code 71h).

Byte 1

This byte is always set to zero.

Byte 2

The Filemark (FM) bit indicates that the LUN encountered a filemark when executing the last command. This may or may not be the cause of the CHECK CONDITION status.

The End of Medium (EOM) bit indicates that tape is in one of the 3 positions shown in Table A-2. Again this bit may or may not be the cause of the error.

Table A-2. Request Sense EOM Positions

	Additional Sense Code	Additional Sense Code Qualifier
Beginning of medium	00	04
Early warning	00	00
End of medium	00	02

The Illegal Length (ILI) bit indicates that the size of the block read from tape did not match the length specified in the CDB.

The SENSE KEY bits are as defined in Table A-3.

Table A-3. Sense Key Codes

Code	Meaning
0h	No Sense Data available. CHECK CONDITION likely to have been caused by FM, EOM or ILI being set.
1h	Not supported.
2h	Not Ready. Addressed LUN is not ready to execute tape related commands.
3h	Medium Error. Non-recoverable tape error was encountered.
4h	Hardware Error: a. Parity error on SCSI bus, and retry capability exhausted, b. RAM error detected during power-on self-test, c. Hardware error detected during LUN diagnostic checks, or while performing the command.
5h	Illegal Request: indicates an illegal parameter in the CDB (e.g. an unsupported command), or in the additional parameters supplied as data; can also indicate an illegal Identify message.
6h	Unit Attention. This status is set to indicate that the LUN's cartridge may have been removed or exchanged, or the CTU reset since the last command was given. When set, the current command is effectively aborted (except INQUIRY) and no further action taken. All subsequent commands are then implemented as normal. Note that all INITIATORs will be informed in turn if and when they attempt to address the LUN for which the condition was detected. The CTU sets the ATTENTION status in response to: a. power-on, b. BUS DEVICE RESET message, c. RESET on SCSI bus, d. unit has been detected off-line at some time since last command issued.
7h	File Protected. Set if any WRITE/ERASE command is requested to a write protected cartridge.
8h	Blank Tape. The logical end of media has been detected, or a previously unused or unrecognized tape has been loaded.
9h	Reserved.
Ah	Reserved.
Bh	Aborted Command. Indicates that the TARGET has aborted the command.
Ch	Reserved.
Dh	Volume Overflow. Indicates that the last command has left data in the buffer which hasn't been written to tape. The data can be retrieved by the RECOVER BUFFERED DATA command.
Eh	Reserved.
Fh	Reserved.

Bytes 3, 4, 5, 6

The Information Bytes are used to indicate any difference (residue) between the requested length (bytes or blocks) and the actual length in any given command.

The CTU supports negative residues which are represented in twos-complement notation (see SPACE command).

Byte 7

The ADDITIONAL SENSE LENGTH byte indicates the amount of additional Sense Data available. This is always set to 14.

Bytes 8, 9, 10, 11

These bytes are always set to zero.

Bytes 12, 13

The Additional Sense Code and Additional Sense Code Qualifier bytes will often contain further information related to the error or exception condition that has occurred. The codes supported are shown in Table A-4.

Table A-4. ASC and ASCQ of Request Sense(1/2)

Sense Key	ASC	ASCQ	Meaning
0	00	00	No additional sense data
	00	01	Filemark detected
	00	02	Logical end of tape detected
	00	04	Beginning of medium detected
	33	00	Tape length error, non-standard cartridge
	40	00	Diagnostic failure
2	04	00	LUN not ready, cause unknown
	04	01	Drive Not Ready, coming Ready
	04	03	LUN not ready, manual intervention required
	3A	00	LUN not ready, no cartridge present
3	00	00	Permanent error on a write (write data may be trapped in the buffer)
	11	01	Permanent error on a read
	14	04	Invalid or out-of-sequence block ID
	31	00	Format corrupted
	50	00	Write append error
	51	00	Erase failure
	00	02	End of medium detected
4	00	00	No additional sense data
	44	00	Target failure, general hardware error
	4B	00	SCSI bus Data phase error detected
	53	00	Media load or eject failed
	53	01	Unload error
	40	00	Diagnostic failure

Table A-4. 4. ASC and ASCQ of Request Sense (2/2)

Sense Key	ASC	ASCQ	Meaning
5	00	00	No additional sense data
	20	00	Invalid operation code in command from host
	24	00	Invalid field in CDB
	25	00	logical unit not supported
	26	00	Invalid field in parameter list
	3B	0E	Source empty
	3B	0D	Destination full
	3D	00	Error in Identify message
6	28	00	Transition from Ready-to Not Ready
	29	00	Power-on reset occurred
7	27	00	Write operation to file-protected tape
	30	00	Write inhibited, incompatible medium
8	00	00	Media void encountered (blank tape)
	00	05	End-of-data detected
	30	01	Unknown format
B	08	00	Internal LUN communication failure
	15	02	Position error
	43	00	Error detected during Message phase
	45	00	Select or Reselect failure
	47	00	SCSI bus parity error
	48	00	Initiator-detected error message received
	49	00	invalid message error
	3D	00	Invalid field in Identify message
D	00	02	End-of-medium detected

Byte 14

Not supported.

Bytes 15, 16, 17

Always set to zero.

Byte18, 19

These are vendor unique fault symptom codes that help to define the fundamental cause of the CHECK CONDITION where appropriate.

Byte 20

This is the internal fault code from which the Sense Key and qualifiers have been derived. They are detailed in Table A.5.

Byte 21

Bit	Meaning
7,6,5	Not used.
4	CLND. Set to 1 when the CTU has been cleaned. Reset to 0 on receipt of the next REQUEST SENSE command.
3	CLN. Set to a 1 when it is time to clean the CTU. Reset to 0 when a successful cleaning cycle has been performed.
2,1,0	Not used.

A.4 DSC Meanings

Table A-5. Byte 20 DSC Meanings (1/4)

DSC	Meaning
01	DSC_WRITE_ID_MARK_CHECK
	The ID Burst could not be written to tape successfully. The error is probably media related. The ID Burst includes the zeros on wrap 2, the Density ID pattern on wrap 1, and the ID Separator pattern which is immediately after the Density ID pattern.
02	DSC_PEOT_OR_PEOV_ENCOUNTERED
	A motion command in the forward direction encountered PEOT on an 18 track drive, or PEOV on a 36-track drive. Excluded from the forward motion commands is DATA SECURITY ERASE. The tape has run out of room for a write, or there is no more data on the tape for a read.
03	DSC_WRITE_DATA_CHECK
	The error was a data check (media related) during a write operation. The error could be on a record, tape mark, reversal mark, or host erase gap. This code is not reported for ID Burst errors.
04	DSC_END_DATA_RECORD_SEEN
	An end data record was read from tape. This always means that the data on the logical EOT side of the mark is from a previous write pass, and is therefore not guaranteed to be in sequence with the records before the end data record.
05	DSC_READ_DATA_CHECK
	The record, tape mark, end data mark, or reversal mark could not be read successfully. The error is probably media related.
06	DSC_TAPE_LENGTH_ERROR
	The Servo detected that the tape is too short, and the Servo cannot reliably generate the positions on tape (LEOV, PEOT etc.) that the host expects it to do. This error means the Servo detected that the tape radius was too short.
07	DSC_TAPE_VOID
	The tape appears to be erased or never recorded in this area. The error is probably media related, unless someone is holding the tape off the tape head. This error is not given if the ID Burst cannot be read. NOT_CAPABLE is given instead.

Table A-5. Byte 20 DSC Meanings (2/4)

DSC	Meaning
08	DSC_READ_OPPOSITE_RECOVERY
	The data cannot be read in the direction originally asked for, but can be read in the opposite direction. This detailed status code is sent when the time it takes to uncompress a record is longer than the time for the host to reissue the command in the other direction, or in the process of uncompressing the record, there is an error.
09	DSC_PATH_EQUIPMENT_CHECK
	The hardware in the CTU (excluding Servo) has reported an error, or the code detects an error (via CRC, or LRC checks, etc.) that is related to hardware malfunction. This type of equipment check is related to the data path in the CTU.
0A	DSC_DRIVE_EQUIPMENT_CHECK
	The hardware in the CTU Servo has reported an error, or the code detects an error (sensor not working, etc.) that is related to hardware malfunction.
0B	DSC_PERMANENT_EQUIPMENT_CHECK
	This means the hardware in the CTU has detected an error with the operation of the CTU itself. A piece of hardware (like an interrupt) is not working, and the CTU cannot continue on. The error is caused by hardware malfunction or some wise guy grounding pins to see what will happen.
0C	DSC_TAPE_LOST_TENSION
	The hardware in the CTU Servo has dropped tape tension. The tension is out of specification such that motion commands from the host cannot be performed. This is also referred to as tape is no longer loaded. This error means the hardware failed to keep the tape properly tensioned, or someone pulled the tape such that the Servo could not maintain tension.
0D	DSC_TAPE_LOAD_FAILURE
	The hardware in the CTU Servo was unable to load the tape properly. The tension is out of specification such that motion commands from the host cannot be performed. This error means the hardware failed to load the tape in the tape path, or someone prevented the load from completing by obstructing the tape path.
0E	DSC_CSL_TAPE_LOAD_FAILURE
	The hardware in the CTU CSL was unable to load the tape properly. The tension is out of specification such that motion commands from the host cannot be performed. This error means the CSL hardware failed to load the tape in the tape path, or someone prevented the load from completing by holding the tape in the CSL.

Table A-5. Byte 20 DSC Meanings (3/4)

DSC	Meaning
0F	DSC_DATA_SECURITY_ERASE_FAILURE
	This means the error was during a DATA SECURITY ERASE command.
10	DSC_COMMAND_REJECT
	This means the command has invalid parameters, or is out of context.
11	DSC_BLOCK_ID_SEQUENCE_ERROR
	A block was read that was out of sequence: its block ID was not in sequence from the last block read. The user has read beyond the point were good data exists on the tape.
12	DSC_ILLEGAL_DATA_FORMAT
	An illegal sequence of data records, or an illegal data value has been seen. The error is possibly media related, (an intervening record may have been dropped), but the tape may have been written incorrectly.
13	DSC_BACKWARD_AT_BOT
	A READ REVERSE was requested while the drive was positioned at beginning of the tape.
14	DSC_CONTROL_UNIT_ERP_FAILED
	Can occur when a superblock is read that doesn't make sense, or Error Recovery becomes hopelessly lost.
15	DSC_NOT_CAPABLE
	The ID Burst could not be read from tape successfully. The error is probably media related. The ID Burst read is the Density ID pattern and the ID Separator.
16	DSC_TAPE_LENGTH_VIOLATION
	A tape longer than the e-tape maximum was detected at tape load time. There is no guarantee that once written, all the data on the tape may be read back on another drive. There is also the possibility that all of the tape may not fit on the take-up reel, resulting in tape damage.
17	DSC_LOAD_DISPLAY_CHECK
	A check message is already on the display, and a LOAD DISPLAY was received. If the LOAD DISPLAY were allowed to continue, the check message would be overwritten, so this is not allowed until the check message is cleared.

Table A-5. Byte 20 DSC Meanings (4/4)

DSC	Meaning
18	DSC_TAPE_UNLOAD_FAILURE
	This means the hardware in the CTU Servo was unable to unload the tape properly. The tension is out of specification such that motion commands from the host cannot be performed. This error means the hardware failed to unload the tape in the tape path, or someone prevented the unload from completing by obstructing the tape path.
19	OSC_CSL_TAPE_UNLOAD_FAILURE
	This means the hardware in the CTU CSL was unable to unload the tape properly. This error means the hardware failed to unload the tape in the CSL or someone prevented the unload from completing by inserting something in the CSL.
1A	DSC_COMPACTION_ALOG_NOT_SUPPORTED
	Byte 13 of the packet header indicated a compaction algorithm that is not supported by the hardware. This byte is normally ignored, and is only checked by the CC when decompression fails.
1B	DSC_LOCATE_BLOCK_UNSUCCESSFUL
	The LOCATE operation failed. This DSC is substituted for the following normally generated DSCs: DSC_READ_DATA_CHECK DSC_TAPE_VOID DSC_PEOT_OR_PEOV_ENCOUNTERED
1C	DSC_MAX_BLOCK_SIZE_EXCEEDED
	The host tried to write a record of length greater than the maximum allowed by the ANSI standard.
1D	DSC_INFORMATIONAL_DATA
	Unsolicited Informational Data. The ASC should re-issue the command. Any DSCs that are not informational should be added above this DSC. This DSC should have the lowest priority.

A.5 Log Sense Results

Table A-6 shows the meaning of log sense data. In this table, PC means Parameter Code.

Table A-6. Log Sense Data (1/4)

Byte Numbers	Meaning	
4-7	Read Forward Data Checks This count indicates the number of records which had a data check while reading forward, and were later recovered. Each record can have only one data check even if recovery took several retries. Updated by the Device Side.	PC=0
8-11	Read Reverse Data Checks This count is the same as above, except that the records were recovered during Read Reverse. Updated by the Device side.	PC=1
12-15	Write Data Checks This count is the same as Read Forward Data Checks except that it applies to records which were written instead of read. Updated by the Device Side.	PC=2
16-19	Read Data Checks without Hardware Indicators Count of Data Check errors detected only by software during reads. This count is a subset of Read Forward and Read Reverse data checks. Updated by the Device Side.	PC=3
20-23	Write Data Checks without Hardware indicators Count of Data Check errors detected only by software during writes. This count is a subset of Write Forward and Write Reverse data checks. Updated by the Device Side.	PC=4
24-27	Read Recovery Retry Count Count of the number of times a read record was retried before recovery failed or succeeded. This count only applies to the last block read with a data check. Updated by the Device Side.	PC=5
28-31	Write Recovery Retry Count Count of the number of blocks which had to have prefix erase gaps written before the block for the record to be successfully written to tape. This count does NOT contain the total erase gaps written. Updated by the Device Side.	PC=6
32-35	Read Transient Conditions The number of times read blocks were retried and resulted in successful recovery after one retry. The first recovery step usually changes no parameters in order to see if the error is transient. Undated by the Device Side.	PC=7

Table A-6. Log Sense Data (2/4)

Byte Numbers	Meaning	
36-39	Write Transient Conditions Same as Read Transient Conditions except for writes. Updated by the Device Side.	PC=8
40-43	Buffer Read Blocks Corrected The number of read blocks in the buffer which the hardware corrected on the fly. Updated by Host side.	PC=9
44-47	Device Read Blocks Corrected The number of blocks read from tape which the hardware corrected on the fly. This includes corrections from tape and corrections from the buffer memory. Updated by the Host Side.	PC=10
48-51	Buffer Write Blocks Corrected Same as Read Blocks Corrected but for write blocks. Updated by the Device Side.	PC=11
52-55	Device Write Blocks Corrected Same -as Read Blocks Corrected but for write blocks. Updated by the Device Side.	PC=12
56-59	Read Data Request Timeouts These bytes are always set to 0.	PC=13
60-63	Write Data Request Timeouts These bytes are always set to 0.	PC=14
64-67	Data Transfer Errors (excluding data request timeouts) The number of errors detected transferring data between the controller and the host. Data request timeouts are NOT included in this count. Updated by the Host side.	PC=15
68-71	Temporary Driver Errors The number of errors which were detected by Servo and subsequently recovered from after retry. Updated by the Device Side.	PC=16
72-75	Permanent Errors Logged The count of all permanent errors reported that were also logged in the event log. NOTE that this does not include requests for read opposite recovery, which are reported as Permanent but not logged. Updated by the Host Side for errors generated by either the Device or Host Side.	PC=17
76-83	Channel Read Bytes Processed 64-bit count of the number of non-compressed bytes transferred to the host from the Common Controller. Updated by the Host Side.	PC=18

Table A-6. Log Sense Data (3/4)

Byte Numbers	Meaning
84-91	Device Read Bytes PC=19 64-bit count of the number of bytes that were read from the tape to the Common Controller. This count does not include any read ahead data including super blocks. Updated by the Host Side after a successful read data transfer.
92-99	Channel Write Bytes Processed PC=20 64-bit count of the number of bytes that were transferred from the host to the Common Controller. This represents the non-compressed bytes. This count is updated after every successful write transfer from the host. Updated by the Host Side.
100-107	Channel Write Bytes Processed PC=21 64-bit count of the number of bytes that were written to tape from the Common Controller. This count represents the compressed bytes. This count is updated after a successful write from the host to the Common Controller. If the data could not be written to tape, then the counts will be off by the amount of data buffered within the Common Controller. Updated by the Device Side.
108-111	Channel Read Blocks Processed PC=22 The number of blocks (records and tape marks) which were successfully read by the host. A record is a 3480-style record, or a superblock packet. Updated by the Host Side after a successful host Read data transfer.
112-115	Channel Write Blocks Processed PC=23 The number of blocks (records and tape marks, but not erase gaps or data security erase) which were successfully sent from the host to the common Controller. Updated by the Host Side after a successful host write data transfer.
116-119	Device Read Blocks Processed PC=24 The number of blocks (superblocks, records and tape marks, but not erase gaps) which were successfully read by the host. This count is updated when a record (whether a 3480 record, or a packet from a superblock) or tape mark is successfully read by the host. This count is only updated once for all the packets in a superblock which the host reads. This count with the Count of Channel Read Blocks Processed gives an approximate re-blocking factor, Updated by the Host Side.

Table A-6. Log Sense Data (4/4)

Byte Numbers	Meaning	
120-123	Write Blocks Processed The number of blocks (superblocks, records and tape marks, but not erase gaps) which were successfully sent to tape. This count is updated when a tape mark is sent from the host or a superblock is closed out for write to tape. This count is only updated once for all the packets in a superblock which the host writes. This count with the Count of Channel Write Blocks Processed gives an approximate re-blocking factor. Updated by the Device Side.	PC=25
124-267	Times Track in Error - 36 Individual Counts The number of times a track has an error during reading or writing of a block. This count is updated after each successful read or write of a block from or to tape. Updated by the Device Side.	PC=26
268-411	Times Track was Found Dead - 36 Individual Counts The number of times a track could not be synched up to (considered dead) during the reading or writing of a record. This count is updated after a successful Read or Write to or from tape. Updated by the Device Side.	PC=27
412-555	Times Track had Run Length Corrections - 36 Individual Counts The number of times a track had to be corrected with Run Length encoding information. This count is updated after a successful Read or Write to or from tape. Updated by the Device Side.	PC=28
556-699	Times Tracks had Post Compensation Circuit Corrections - 36 Individual Counts The number of times a track had to be corrected with PCC Corrections. Updated by the Device Side,	PC=29
700-843	Times Track was Flagged for Quality Pointer - 36 Individual Counts The number of times a track was flagged as being of dubious quality. Updated by the Device Side.	PC=30

A.6 OLTDS

See also the on-line integrated documentation available in the OLTD menus.

Glossary

18-tracks/36-tracks
A characteristic of magnetic recordings. Data is recorded along the tape on 18 or 36 tracks. The 36 track recording is supported by CTC D001.

A

ANSI
American National Standard Information.

B

BIST
Built-In power-on Self-Tests.

BOT
Beginning of Tape.

BSR
Basic System Release. GCOS 7 files containing the DPS 7000 firmware components.

C

Cartridge Library
Cartridge Storage Module equipped with a robot to perform the mount/unmount operations. Allows unattended cartridge operations.

CSR
Customer Service Representative.

CTS
Cartridge Tape Subsystem. Magnetic tape subsystem using a tape enclosed in a container named cartridge. There are several classes of CTS depending on the format of the cartridge, the physical characteristics of the tape, and the characteristics of the magnetic recording.

D

Daisy chain
Method of connecting several peripheral units on the same SCSI bus.

E

ECCST
Extended Capacity Cartridge System Tape.

ECMA
European Computer Manufacturer Association.

EOT
End of Tape.

EOV
End Of Volume Labels at the end of a volume indicating that the rest of the file is to be found on the following volume of the media list used for the multi-volume files.

F

Foreign Tape processor
The foreign tape processor processes the file in non standard file format. It interfaces at the physical block level.

FRU
Field Replaceable Unit.

I

ICRC
Improved Cartridge Recording Capability (Trademark of STK).

IDRC compaction
Improved Data Recording Capability (Trademark of IBM).

IPL
Initial Program Load.

IPS
Inch Per Second.

IRT
Initialization Resource Table.

L

Leader Block
The mechanism used to load the tape through the tape path of a transport.

LC
Logical Channel number. Number identifying a (path of a) device when several devices are connected to a (real or virtual) controller.

LSM
Library Storage Module.

M

MARS
Machine Activated Routing Switch.

MFB
Multi-Function bus (Multibus 2).

P

PEOT
Physical End Of Track.

R

RMS
Remote Maintenance System.

S

SCSI
Small Computer System Interface.

Software compactio
Blank characters compaction performed by the GCOS 7 Access method (optional).

SRST
System Resource and Status Table.

T

tape length
Normal tape, long tape, extra long tape. Characteristic of the 1/2" tapes influencing the cartridge tape capacity.

T&D
Tests and Diagnostics.

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Technical publication remarks form

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