DEC WANcontroller 720 Installation Guide

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Safety

![Warning triangle symbol]

Any warning or caution that appears in this manual is defined as follows:

Warning	Contains information to prevent personal injury.
Caution	Contains information to prevent damage to equipment.

Vorsicht	Enthält Informationen, die beachtet werden müssen, um den Benutzer vor Schaden zu bewahren.
Achtung	Enthält Informationen, die beachtet werden müssen, um die Geräte vor Schaden zu bewahren.

Danger	Signale les informations destinées à prévenir les accidents corporels.
Attention	Signale les informations destinées à prévenir la détérioration du matériel.

Aviso	Contiene información para evitar daños personales.
Precaución	Contiene información para evitar daños al equipo.

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The warnings and cautions that must be observed for the hardware described in this manual are listed below in English, German, French, and Spanish. The pages on which these safety messages appear are also listed.

⚠

CAUTION	Static electricity can damage modules and electronic components. Digital recommends using a grounded antistatic wrist strap and a grounded work surface when handling any modules. [1-2, 2-4, 2-8, 3-4]
ATTENTION	L'électricité statique peut endommager les modules et les composants électroniques. Digital recommande d'utiliser un bracelet antistatique et de mettre la surface de travail à la masse lors de la manipulation de modules.
Achtung	Geräteteile und elektronische Komponenten können durch statische Aufladung beschädigt werden. Deshalb sollten Sie eine geerdete, antistatische Gelenkmanschette und eine geerdete Arbeitsfläche benutzen, wenn Sie Arbeiten an solchen Teilen vornehmen.
PRECAUCÍON	La electricidad estática puede deteriorar los módulos y los componentes electrónicos. Digital recomienda que se utilice una muñequera antiestática u una superficie de trabajo con toma de tierra cuando se trabaje con cualquier módulo.

CAUTION	Turning off system power during system operation can corrupt the system media. Always shut down the system software first. [2-3, 2-8, 3-2, 3-3]
ATTENTION	La mise hors tension d'un système exécutant un logiciel peut provoquer la corruption du support informatique. Effectuez toujours une procédure d'arrêt avant de mettre un système hors tension.
Achtung	Die Datenträger Ihres Systems können beschädigt werden, wenn Sie die Stromzufuhr zum Gerät während des Betriebs ausschalten. Führen Sie immer zuerst einen Shutdown der Systemsoftware durch.
PRECAUCÍON	Desconectar la toma de corriente del sistema mientras esté funcionando puede afectar a sus componentes. Hay que para el software antes.

CAUTION	When performing the following steps, ensure that any screws or spacers falling into the system are removed to prevent damage to the system. [2-9]
ATTENTION	Après avoir suivi les étapes ci-dessous, retirez toutes les vis et tous les espaceurs qui auraient pu tomber dans le matériel afin d'éviter d'endommager le système.
Achtung	Bevor Sie folgende Schritte ausführen, prüfen Sie, ob Schrauben oder Zwischenstücke in das System gefallen sind. Sie müssen zuerst entfernt werden, sonst könnten sie das System beschädigen.
PRECAUCÍON	Al realizar los pasos siguientes, hay que comprobar que se quitan los tornillos o separadores que haya dentro del sistema, para evitar dañarlo

WARNING   Certain systems are not designed for user installation of TURBOchannel options. Refer to your system documentation before attempting to perform the installation yourself. Personal injury or damage to system components can occur due to improper installation. [2-3]

DANGER   L'installation de modules TURBOchannel dans certains systèmes ne doit pas être effectuée par l'utilisateur. Des blessures corporelles et des dommages matériels peuvent résulter d'une installation inadéquate. Reportez-vous à la documentation du système avant de tenter l'installation vous-même. Il en va de votre sécurité.

Vorsicht   Bei einigen Systemen können Erweiterungen für TURBOchannel nicht vom Benutzer installiert werden. Bevor Sie die Installation selbst vornehmen, lesen Sie in der entsprechenden Dokumentation nach, ob dies möglich ist. Eine unsachgemäße Installation kann Schaden an Personen oder an Systembestandteilen zur Folge haben.

PRECAUCÍON   Algunos sistemas no están diseñados para que el usuario instale las opciones TURBOchannel instalación. Consúltese la documentación del sistema antes de intentar realizar la instalación. Se pueden producir daños personales o a componentes del sistema como consecuencia de una instalación inadecuada.

Preface

This guide explains how to install the DEC WANcontroller 720 kit (part number: DSYT1-AA) into a TURBOchannel slot of a compatible workstation/server.

Intended Audience

The instructions in this guide are for persons trained in installing system hardware. It is recommended that Digital Customer Service or other DIGITAL qualified service personnel install the DEC WANcontroller 720.

How to Use this Guide

It is recommended that you read all of this document in conjunction with the host system documentation before installing the DEC WANcontroller 720.

Structure of this Document

This document is organized as follows:

Chapter 1, Introduction — Provides a general description of the DEC WANcontroller 720 and lists the contents of the DEC WANcontroller 720 kit.

Chapter 2, Installation — Describes how to install and remove, power up, and verify the operation of the DEC WANcontroller 720. This chapter also provides information about how to configure the software.

Chapter 3, Troubleshooting — Describes how to troubleshoot the installation using loopback connectors and how to interpret error messages.

Appendix A, Specifications — Provides the DEC WANcontroller 720 specifications.

Appendix B, Options — Provides a list of optional cables and loopback connectors.

Appendix C, United Kingdom Specifications — Provides information specific to installations in the United Kingdom.

Related Documents

- *DEC WAN Device Drivers for ULTRIX Installation Guide*

- *DEC WAN Device Drivers for ULTRIX Application Programmer's Guide*

- *NCL Reference Manual*

- Documentation for the host system into which the DEC WANcontroller 720 is being installed

- Documentation for the installation and configuration of the network protocol to be used

Conventions

The following conventions are used in this guide.

Convention	Meaning
italic	Italic type in code examples denotes commands entered by the user.
Bold	Denotes a utility in the software installation procedure.
NOTE	Note that calls attention to any item of information that may be of special importance to the reader.
CAUTION	Note that contains information to prevent damage to the equipment.
WARNING	Note that contains information to prevent personal injury.

FCC USER STATEMENT

NOTICE:

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Chapter 1

Introduction

This chapter describes the DEC WANcontroller 720 module and the contents of the DEC WANcontroller 720 kit (part number: DSYT1-AA).

1.1 Overview

The DEC WANcontroller 720 is a two-line synchronous communications interface module that plugs into a TURBOchannel slot of a compatible workstation/server.

The DEC WANcontroller 720 is currently supported on the following systems:

- DECsystem/DECstation 5000 models 120, 125, 133, 200, and 240

- DECsystem 5900

- Personal DECstation 5000 models 20, 25, and 33

Additional information concerning DIGITAL systems that are compatible with the DEC WANcontroller 720, TURBOchannel specifications, and system configurations may be obtained from your local DIGITAL sales office or representative.

The DEC WANcontroller 720 supports X.25, Systems Network Architecture (SNA), Transmission Control Protocol/Internet Protocol (TCP/IP), and DECnet protocols under ULTRIX Version 4.2A or higher. The module provides two synchronous lines at up to 64 kilobits per second (kb/s), or one line at up to 1.544 megabits per second (Mb/s) or up to 2.048

Mb/s. This allows specific standalone workstations to communicate at high speeds over a wide area network (WAN).

1.2 DEC WANcontroller Kit (DSYT1-AA)

Before installing the DEC WANcontroller 720 kit, make sure that you have all the items listed below.

CAUTION

Static electricity can damage modules and electronic components. Digital recommends using a grounded antistatic wrist strap and a grounded work surface when handling any modules.

- DEC WANcontroller 720 module — shipped in an antistatic bag, part number: 70-29654-01

- Adapter cable, part number: 17-03504-01

- 100-pin loopback connector, part number: 12-38217-01

- Bag of hardware containing two screws and two spacers

- *DEC WANcontroller 720 Installation Guide*, part number: EK-DW720-IN

If any item is missing or damaged, immediately contact your DIGITAL sales representative and delivery agent. Save all shipping materials in case any item needs to be returned.

Chapter 2

Installation

This chapter describes:

- Installation prerequisites
- Hardware installation
- Software installation

2.1 Installation Prerequisites

The following sections list the hardware, software, tools and documentation that are required before beginning the DEC WANcontroller 720 installation.

2.1.1 Tools and Documentation

The tools and documentation required to install the DEC WANcontroller 720 kit include:

- Medium flat-blade screwdriver
- Medium, Phillips screwdriver
- Antistatic wrist strap
- Host documentation
- *DEC WAN Device Drivers for ULTRIX Installation Guide*
- Network protocol documentation

The host documentation provides the specific instructions on how to gain access to the TURBOchannel slots where the DEC WANcontroller 720 module will be installed.

2.1.2 Hardware

The hardware required to install the DEC WANcontroller 720 kit includes:

- One of the supported workstations/servers (refer to Section 1.1)
- Access to a load device
- Approximately 100 kilobytes of disk space
- A recommended minimum of 16 megabytes of system memory (for your host system to achieve maximum performance using the DEC WANcontroller 720 product)
- Optional interface cables (see Appendix B)

2.1.3 Software

In order to use this product, the following software must be installed on your system:

- Version 4.2A or higher of ULTRIX
- Version 2.1A or higher of the DEC WAN Device Drivers for ULTRIX

2.2 Hardware Installation

This section describes the following:

- Gaining Access to the TURBOchannel Slots (Section 2.2.1)
- Installing the DEC WANcontroller 720 Kit (Section 2.2.2)
- Removing the Module (Section 2.2.3)

2.2.1 Gaining Access to the TURBOchannel Slots

WARNING

Certain systems are not designed for user installation of TURBOchannel options. Refer to your system documentation before attempting to perform the installation yourself. Personal injury or damage to system components can occur due to improper installation.

Depending on your system, the TURBOchannel slots are located in either the system unit or in a system expansion box. To gain access to the TURBOchannel slots in your system, proceed as follows:

CAUTION

Turning off system power during system operation can corrupt the system media. Always shut down the system software first.

1. Shut down the system software according to your system software documentation.

2. Turn off the system power.

3. Gain access to your system TURBOchannel slots by following the instructions in your host system manual.

2.2.2 Installing the DEC WANcontroller 720 Kit

To install the DEC WANcontroller 720 kit, refer to Figure 2–1 and proceed as follows:

⚠️

CAUTION

Static electricity can damage modules and electronic components. Digital recommends using a grounded antistatic wrist strap and a grounded work surface when handling any modules.

1. Before handling any modules inside a workstation or removing any static-sensitive materials from an antistatic bag:

   a. Place the antistatic wrist strap around your wrist.

   b. Attach the lead from the wrist strap to the chassis of your system unit for a good ground connection.

2. Remove and save the screws and metal plate (plate not shown in Figure 2–1) covering the opening of the TURBOchannel slot ❹ that you plan to use.

3. Insert the 100-pin connector ❸ end of the module ❷ into the TURBOchannel bulkhead slot ❹. Then plug the connector on the bottom of the module ❷ into the option slot connector ❿, and firmly push down on the module ❷ to ensure a good electrical connection.

4. Fasten the 100-pin connector ❸ end of the module ❷ to the chassis ❾ using the two screws saved in step 2.

NOTE

Ensure that the screws are tight so that there is a good electrical connection between the connector and the chassis of your system unit.

5. Locate the parts bag containing two screws ❶ and two spacers ⓫.

Figure 2–1: DEC WANcontroller 720 Kit Installation
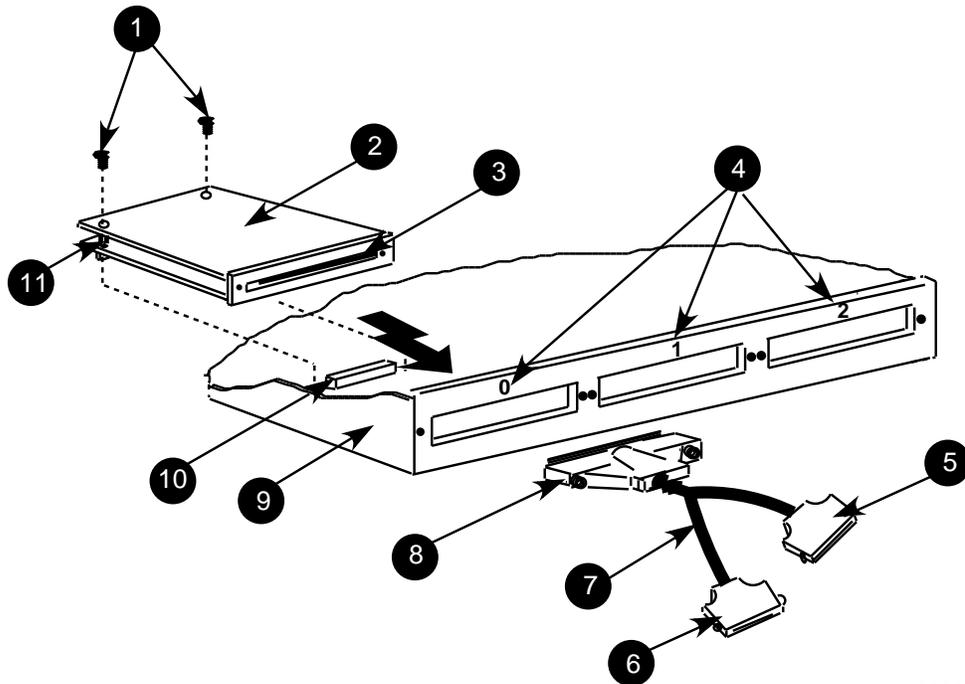
CS–8983

❶ Screws
❷ DEC WANcontroller 720 module

❸ 100-pin connector
❹ TURBOchannel bulkhead slots
❺ Channel 1, 50-pin connector (J3)
❻ Channel 0, 50-pin connector (J2)

❼ Adapter cable
❽ 100-pin adapter connector (J1)

❾ Chassis
❿ Option slot connector
⓫ Spacers

NOTE:
Module ❷ shown is being installed in slot 0 ❹.
Module ❷ can be installed in slot 0, 1 or 2 ❹ if not occupied.

6. Insert two spacers ⓫ between the circuit boards of the module ❷.

7. Insert the two screws ❶ through the circuit boards and spacers ⓫ and fasten down the rear of the module ❷ to two standoffs (not shown) on either side of the option slot connector ❿.

8. Locate the adapter cable ❼ shipped with the DEC WANcontroller 720 module. Plug the 100-pin adapter connector ❽ into the 100-pin connector ❸. Secure the 100-pin adapter connector ❽ using its two screws.

9. If you are installing more than one DEC WANcontroller 720 module, repeat steps 1 through 8 to install each module. Depending on the system, up to three modules can be installed.

10. Close the system following the instructions in your system manual.

11. Turn on the system power and observe the system monitor. The system executes a self-test on each module installed. As each module is tested, a one-line message is displayed indicating the module being tested. The test is successful when there are no error messages and the system monitor displays the boot prompt.

    Example:

    >>

    ### NOTE

    If your system is set to autoboot, you may not see the >> prompt. If so, log in as root and enter the command: *shutdown -h now*. **This brings you back to the >> prompt.**

    To ensure that the system ran the test on the new module, type *cnfg* at the >> prompt. If the system recognized the module and ran the test, a message is displayed.

    Example:

    ```
    0: DSYT1-AA DEC   V1.00   TCF0   (Two-Port Sync WANcontroller)
    ```

    The message above indicates that the system recognized and tested a DEC WANcontroller 720 module (*Two-Port Sync WANcontroller*) in option slot 0 (*0:*).

If a similar message is not displayed, the system **did not** recognize the module. Reinstall or replace the module (refer to Section 2.2.3 for the module removal procedure).

<div align="center">

NOTE

</div>

> **If the self-test is successful, you may want to verify the 100-pin connector and adapter cable as detailed in Chapter 3 before proceeding to step 12.**

If the self-test is successful, proceed to step 12.

If the self-test detects an error, an error message is displayed indicating which module failed the test. Depending on the system used, the error messages may vary. The following example of an error message was generated by a DECstation 5000 Model 120 system.

Example:

```
?TFL:  0/iram  (B0050000= AA2A, sb AAAA) [DSYT1-AA]
```

The message above indicates that the module (*[DSYT1-AA]*) installed in TURBOchannel slot 0 (*0*⁄) is the failed module. Refer to Chapter 3, Troubleshooting, for additional information.

If the system detects an error, turn off the system power and replace the defective module (refer to Section 2.2.3 for the module removal procedure).

12. Turn off system power.

13. Connect the channel 0, 50-pin connector ❻ and the channel 1, 50-pin connector ❺ to the network interface using the appropriate optional cables (not supplied with the kit). Refer to Appendix B for a list of the optional cables.

14. To complete the installation, proceed to Section 2.3 for software installation.

2.2.3 Removing the Module

Perform the following procedure to remove the DEC WANcontroller 720 module from your system:

⚠

CAUTION

Turning off system power during system operation can corrupt the system media. Always shut down the system software first.

1. If you have software running on your system, shut down the software following the instructions supplied with your system.

2. Turn off system power.

3. Remove the cover from the system (refer to your system manual).

⚠

CAUTION

Static electricity can damage modules and electronic components. Digital recommends using a grounded antistatic wrist strap and a grounded work surface when handling any modules.

4. Place the loop of the antistatic wrist strap around your wrist and attach the lead from the wrist strap to the chassis of your system unit for a good electrical connection.

5. Refer to Figure 2–1, and remove the adapter cable ❼ from the 100-pin connector ❸ end of the module ❷.

6. Remove the two screws fastening the 100-pin connector ❸ end of the module ❷ to the chassis ❾ (see Figure 2–1).

⚠

CAUTION

**When performing the following steps, ensure that
any screws or spacers falling into the system are
removed to prevent damage to the system.**

7. Loosen the two screws ❶ to release the rear of the module ❷ (see
   Figure 2–1). Leave the screws in place through the two circuit boards
   to prevent loosing the spacers ⑪ when removing the board in the
   next steps (see Figure 2–1).

8. Carefully pull the module ❷ straight up enough to unplug it from
   the option slot connector ⑩ (see Figure 2–1).

9. Pull the module away from the TURBOchannel bulkhead slot ❹ and
   remove the module ❷ from the chassis ❾ (see Figure 2–1).

10. If the module is going to be reinstalled or replaced, go to Section 2.2.2.
    If the module is not going to be reinstalled or replaced, reattach the
    metal cover to the empty slot on the rear of the chassis using the two
    screws that attached the 100-pin connector ❸ end of the module ❷
    to the chassis ❾.

2.3 Software Installation

The software installation consists of the following:

1. Installing Version 2.1A or higher of the DEC WAN Device Drivers for ULTRIX. (Refer to the *DEC WAN Device Drivers for ULTRIX Installation Guide*.)

2. Running the DEC WAN Device Drivers Installation Verification Procedure with or without loopbacks. (Refer to the *DEC WAN Device Drivers for ULTRIX Installation Guide*.)

3. Installing and configuring one of the supported network protocols (Refer to the documentation supplied with the protocol you install, for example: X.25, SNA, DECnet, and TCP/IP.)

4. Optionally configuring the line characteristics using the **ncl** utility (Refer to the *NCL Reference Manual*.)

2.3.1 Verifying the Prerequisite and WAN Device Driver Software

To verify that ULTRIX Version 4.2A or higher is installed on the system, proceed as follows:

1. Enter: *strings /vmunix | grep 'Rev\.'*

2. Check the screen display to ensure that the ULTRIX version installed is 4.2A or higher.

After installing the WAN Device Driver software, you can verify that DEC WAN Device Drivers for ULTRIX, Version 2.1A or higher, has been installed as follows:

1. Enter: */etc/setld -i*

2. Check the screen display to see that WDDBASE211 or higher is installed.

2.3.2 Configuring the Lines and Adding a New Module

> **NOTE**
>
> **Every time a new DEC WANcontroller 720 module is added to your system, you must invoke the /usr/etc/wddsetup utility. For more information, refer to the *DEC WAN Device Drivers for ULTRIX Installation Guide.***

When configuring the driver, consider the following information concerning supported datalink protocols, data speed in bits per second (b/s), interfaces, and the guidelines for selecting external and internal clocking.

The datalink protocols supported by the DEC WANcontroller 720 module are HDLC and SDLC.

The DEC WANcontroller 720 module operates only with interfaces complying with one of the following Electronic Industries Association (EIA) interface standards and Comite Consultatif International Telegraphique et Telephonique (CCITT) communications usage standards:

EIA 422, EIA 423, EIA 232, EIA 530, EIA 562, V.10, V.11, V.24, V.35, V.36

You can configure the software to set each DEC WANcontroller 720 line to operate independently using either an external or internal clock. Tables 2–1 and 2–2 list the number of input/output lines (1 or 2) that can be supported by a DEC WANcontroller 720 module, according to the data speed and the interface.

Table 2–1:   Guideline for Using External Clocking

I/O Lines	Data Speed	Interface
1 only	1.2 kb/s to 64 kb/s or 1.544 Mb/s or 2.048 Mb/s	EIA 422/V.11/V.36 EIA 530
2	Above 19.2 kb/s to 64 kb/s	EIA 422/V.11 EIA 423/V.10 EIA 530 EIA 562/V.24, V.35
2	1.2 kb/s to 19.2 kb/s	EIA 232/V.24 EIA 422/V.11 EIA 423/V.10 EIA 530 EIA 562/V.24, V.35

Table 2–2:   Guideline for Using Internal Clocking

I/O Lines	Data Speed	Interface
1 only	1.536 Mb/s or 2.000 Mb/s	EIA 422/V.11/V.36 EIA 530
2	64 kb/s	EIA 422/V.11/V.36 EIA 423/V.10 EIA 530 EIA 562/V.24, V.35
2	19.2 kb/s	EIA 232/V.24 EIA 422/V.11 EIA 423/V.10 EIA 530 EIA 562/V.24, V.35

To run **wddsetup**, issue the following command:

```
# /usr/etc/wddsetup
```

The utility prompts for information on how you want the subsets con-
figured on your system. Full details of this procedure are provided in
Section 2.2 of the *DEC WAN Device Drivers for ULTRIX Installation
Guide*.

Example 2–1 shows a sample run of **wddsetup**.

**Example 2–1: Sample Run of WDDSETUP with Two DEC WANcon-
troller 720 Modules Installed**

```
# /usr/etc/wddsetup

DEC WAN Device Drivers for ULTRIX, V2.1 MUP 1 Configurator.
Copyright (c) Digital Equipment Corporation. 1992. All Rights Reserved.

    You must now specify the hardware device(s) on which you
    want the WAN Device Drivers and Datalink Protocols (WDD)
    software to be run.

    Note that with the LLC2 datalink protocol, no synchronous
    drivers are necessary as this protocol operates over a LAN!

The synchronous devices supported on your system are:

  scc   - DECsystem-5000 100/300 or Personal DECstation synchronous line
  dsyt1 - DECsystem family TURBOchannel synchronous line option

  none  - No synchronous device driver is required

1. Please specify the WDD device(s) {dsyt1 scc none}. [scc]: dsyt1

   The dsyt1 driver will be built into the kernel.

   Is this correct? (y/n) [y]:

Select one of the following datalink protocol options:

   (1)  No Level 2 datalink protocol is required.
   (2)  The HDLC/LAPB Synchronous datalink protocols are required.
   (3)  The LLC2 (LAN) datalink protocol is required.
   (4)  All datalink protocols (HDLC/LAPB/LLC2) are required.

2. Required datalink(s) [2]:

   You have selected the HDLC/LAPB synchronous CONS datalinks.

   Is this correct? (y/n) [y]:

Saving /etc/rc.local.device --> /etc/rc.local.device.save
```

Example 2–1 Cont'd on next page

Installation 2–13

Example 2–1 (Continued): Sample Run of WDDSETUP with Two DEC WANcontroller 720 Modules Installed

```
Saving /etc/rc.local.wdd --> /etc/rc.local.wdd.save

You must now specify the number of dsyt1s.
```

4. Please specify the number of dsyt1 devices. [1]: 2

```
   Your system has 2 dsyt1s.

   Is this correct? (y/n) [y]:

   If you intend to use Internet connections (e.g. TCP/IP)
   over HDLC you must now specify the MAXIMUM number of
   HDLC links over which you might run Internet protocols.
   Note that all HDLC links can be dynamically setup to
   support the desired protocol via management commands.
```

6. Please specify the MAXIMUM number of HDLC Internet lines. [0]:

```
   Your system will have no HDLC Internet connections.

   Is this correct? (y/n) [y]:

Modifying /etc/rc.local

   This configuration procedure has included commands to create
   the driver's management entities in /etc/rc.local at system
   boot time.  After you have rebooted the system and have run
   the installation verification procedure edit /etc/rc.local
   and remove the comments from the lines

#/etc/wdd_loader
#/usr/bin/ncl < /etc/rc.local.device > /dev/console
#sleep 3
#/usr/etc/npl -l1 -d1             > /dev/console
#/usr/bin/ncl < /etc/rc.local.wdd   > /dev/console

   so that the entities will be created on subsequent reboots.

   If you wish, you can perform an automated kernel build
   procedure by answering 'y' to the next question.  The
   kernel will be built using the /sys/conf/mips/machine_name
   configuration file.

   You have the following amount of free disk space available
   on /sys: (/sys is usually on the /usr filesystem).

df /sys
Filesystem   Total    kbytes   kbytes   %
node         kbytes   used     free     used   Mounted on
/dev/rz2g    313918   234672   47855    83%    /usr
```

Example 2–1 Cont'd on next page

Example 2–1 (Continued): Sample Run of WDDSETUP with Two DEC WANcontroller 720 Modules Installed

```
7. Should we rebuild your kernel now? (y/n) [y]:

Modifying /sys/conf/mips/DNA.script (wddsetup)
Modifying /sys/conf/mips/DNA.script (Deleting WDD)
Modifying /sys/conf/mips/DNA.script (Adding WDD)

The rest of the procedure may take from 10 to 40 minutes
to rebuild your new kernel.

Starting kernel rebuild...

Do you want to edit the configuration file? (y/n) [n]:

*** PERFORMING SYSTEM CONFIGURATION ***
    working ..... Tue Jun  2 14:25:12 EST 1992
    working ..... Tue Jun  2 14:27:12 EST 1992
    working ..... Tue Jun  2 14:29:13 EST 1992
    working ..... Tue Jun  2 14:31:13 EST 1992
    working ..... Tue Jun  2 14:33:14 EST 1992


The new kernel is /sys/MIPS/machine_name/vmunix

There is not enough space in / for the new kernel.  Please
move your new kernel from /sys/MIPS/machine_name to root after
clearing enough space for it.

   After verifying that the system is operating properly with WDD
   installed you may wish to remove the following saved files:

      - ./sys/conf/mips/machine_name.sav[n]

   (b) Move the new kernel to /.
   (c) Boot the new kernel to use WDD.

NOTE:  To use this release of the WAN Device Drivers and Datalinks,
       a Product Authorization Key (PAK) license must be installed!
```

In the sample above, there was not enough disk space to save the old kernel, vmunix. In this case, the next step would be to overwrite the old kernel, vmunix, with the new kernel by issuing the following command:

   # mv /sys/MIPS/your_machine_name/vmunix /vmunix

Chapter 3

Troubleshooting

As described in Chapter 2, a problem with the DEC WANcontroller 720 module is easily detected by the system self-test feature. However, this does not check the 100-pin input/output connections on the module, the adapter cable connections, or the adapter cable itself, unless they are installed with loopback connector(s).

You can test the 100-pin input/output connections on the module by using the self-test feature in conjunction with the 100-pin loopback connector supplied in the kit. The adapter cable connections and the adapter cable itself can be tested using 50-pin loopback connectors (part number: H3199).

Note

H3199 50-pin loopbacks are not part of the kit. They are only available through your local DIGITAL Field Service representative.

As described in the following procedures (Section 3.1 and Section 3.2), you first test the input/output connections on the module using the 100-pin loopback connector. Then you test the input/output connections of the module and adapter cable using two 50-pin loopback connectors.

Information concerning error messages and other troubleshooting tech-
niques are provided in Section 3.3.

Note

If a problem with the DEC WANcontroller 720 module cannot
be resolved, contact your local DIGITAL branch office.

3.1 Loopback Connector Test

To determine if any input/output connections on the DEC WANcontroller 720 module are defective, proceed as follows:

⚠

CAUTION

**Turning off system power during system operation
can corrupt the system media. Always shut down
the system software first.**

1. Shut down the system software according to your system software manual.

2. Turn off the system power.

3. Disconnect the adapter cable attached to the module input/output connector.

4. Plug the 100-pin loopback connector into the module input/output connector in place of the adapter cable.

NOTE

**Ensure that the screws are tight so that there is
a good electrical connection between the connector
and the chassis of your system unit.**

5. Turn on the system power and observe the system monitor as the system goes through its self-test. If a failure is detected as described in Chapter 2, replace the module. If there is no failure, test the adapter cable as described in Section 3.2.

3.2 Adapter Cable Test

After verifying the module connections using the 100-pin loopback connector, proceed as follows to verify the adapter cable and connections:

⚠

CAUTION

Turning off system power during system operation can corrupt the system media. Always shut down the system software first.

1. Turn off the system power.

2. Remove the 100-pin loopback connector and reconnect the adapter cable to the DEC WANcontroller 720 module.

NOTE

Ensure that the screws are tight so that there is a good electrical connection between the connector and the chassis of your system unit.

3. Install two 50-pin loopback connectors on the opposite ends of the adapter cable.

4. Turn on the system power and observe the system monitor as the system goes through its self-test. If a failure is detected as described in Chapter 2, replace the adapter cable. If there is no failure, then the DEC WANcontroller 720 module and the adapter cable test is successful.

5. Proceed to Section 2.2.2 and continue at step 12.

3.3 Self-Test Error Messages

As described in Chapter 2, the system self-test feature reports any errors
detected during self-test to the monitor in the system's error message
format. The following provides an example of an error message, an
interpretation of the message, and a troubleshooting procedure to help
isolate a problem.

```
?TFL: 0/rom (address:be8003f8 = AAA5 sb AAAA) [DSYT1-AA]
```

- *?TFL:* — indicates that this is an error message.

- *0/* — indicates the slot number of the module that failed. In this
  example, the module in slot 0 failed.

- *rom* — indicates the individual test that failed. In this example, the
  ROM test failed.

- *(address:be8003f8 = AAA5 sb AAAA)* — provides additional informa-
  tion concerning the error. In this example, a data error occurred at
  address be8003f8.

- *[DSYT1-AA]* — is the identification number of the module that failed.
  In this example, the module is a DSYT1-AA.

If the results of the self-test indicate a failure on the DEC WANcontroller
720 option (DSYT1), use the following procedure to help isolate the
problem.

$$\triangle\!\!\!\!\!\;!$$

CAUTION

**Static electricity can damage modules and electronic
components. Digital recommends using a grounded
antistatic wrist strap and a grounded work surface
when handling any modules.**

1. Ensure that the module is properly inserted in its slot and that
   anything connected to it is secure.

2. If you have another option module that you know is good, try it in that option slot. If the test no longer fails, the problem is in the DEC WANcontroller 720 module. If the test continues to fail, the problem is probably in the system module.

3. If you do not have another optional module that you know is good, move the DEC WANcontroller 720 module to another option slot and run the test again. If the test no longer fails, the problem is in the system module. If the test continues to fail, the problem is in either the DEC WANcontroller 720 module or the system module.

Appendix A

Specifications

This appendix provides the specifications for the DEC WANcontroller 720.

Table A–1:   DEC WANcontroller 720 Specifications

Item	Specification
PERFORMANCE	
Operating Mode:	
Dual Port	64 kb/s
Single Port	1.544 Mb/s or 2.048 Mb/s
ENVIRONMENTAL	
Temperature	10°C (50°F) to 40°C (104°F)
Relative Humidity	20% to 80% (noncondensing)
Altitude	8,000 ft (2.4 km), maximum
ELECTRICAL	
Operating Voltages:	
5 volts (±5%)	4.0 amperes (maximum), 1.0 ampere (nominal)
12 volts (±5%)	0.5 amperes (maximum), 0.3 ampere (nominal)

Appendix B

Options

Optional cables are needed to bring signals from the 50-pin connectors of the DEC WANcontroller 720 adapter cable out to standard interface connectors. The optional cables available are listed in Table B–1 along with the maximum data speed, cable part number, and associated loopback connector.

NOTE
Loopback connectors can be used for troubleshooting the system out to the end of the optional cables.

Table B–2 identifies the pinouts of the 50-pin D-sub connectors of the DEC WANcontroller 720 adapter cable according to pin number and standards: V.35, V.24/V.28 (232-E), V.11/V.36 (422-A), V.10 (423-A) and 530-A.

Table B–1:   Cable Options

Cable	Part Number	Maximum Data Speed	Loopback
BC19B-02 EIA 422-A/V.11 /V.36	17-01118-01	1.544 Mb/s[1] or 2.048 Mb/s[1]	Not available
BS19D-02 EIA 232-E/V.24	17-01110-01	19.2 kb/s	H3248
BS19D-02 EIA 562-E	17-01110-01	64 kb/s	H3248
BC19E-02 EIA 423-A/V.10	17-01111-01	64 kb/s	Not available
BC19Q-02 EIA 530-A	17-03091-01	1.544 Mb/s[1] or 2.048 Mb/s[1]	Not available
BC19F-02 V.35	17-01112-01	64 kb/s	H3250
BC55D-50[2] EIA 422-A/V.11 /V.36	17-00372-04	1.544 Mb/s[1] or 2.048 Mb/s[1]	Not available
BC22F-10[3] EIA 232-E/V.24	17-00323-01	19.2 kb/s	H3248
BC22F-25[3] EIA 232-E/V.24	17-00323-02	19.2 kb/s	H3248

[1]Only one line can be used at this data speed.
[2]Extension cable for BC19B-02.
[3]Extension cable for BS19D-02.

The 50-pin loopback connector (part number: H3199) is also available as a troubleshooting aid, as described in Chapter 3.

Table B–2: D-Sub Full Function Connector Pinouts

50-Way Pin	Signal Name	V.35 Pin	V.24/V.28 (232–E) Pin	V.11/V.36 (422–A) Pin	V.10 (423–A) Pin	530-A Pin
1	Code ground	†	†	†	†	†
2	Code 0	†				
3	Code 1		†		†	
4	Code 2			†		†
5	Code 3					
6	TX Data A			4		2
7	TX Data B			22		14
8	TX Data		2		4	
9	RTX/CA			7		4
10	RTS/CB			25		19
11	RX Data A		3	6	6	3
12	RX Data B		‡	24	24	16
13	Local Loop		18	10	10	18
14	Speed Indicate					
15	Test I		25	18	18	25
16	Rem Loop		21	14	14	21
17	RI	J	22	15	15	22
18	RX Clock A		17	8	8	17
19	RX Clock B		‡	26	26	9
20	TX Clock A		15	5	5	15
21	TX Clock B		‡	23	23	12
22	Clock		24		17	
23	V.35 TX Clock A	Y				
24	V.35 TX Clock B	a				
25	V.35 Clock A	U				
26	V.35 Clock B	W				
27	V.35 RX Data A	R				
28	V.35 RX Data B	T				
29	V.35 TX Data A	P				
30	V.35 TX Data B	S				
31	V.35 RX Clock A	V				
32	V.35 RX Clock B	X				
33	DTR	H	20		12	20
34	DSR A	E	6	11	11	6

†Connected to DCE ground (pin 41)
‡Connected to Code ground (pin 1); Code ground does not run down the cable.

Table B–2 (Continued):   D-Sub Full Function Connector Pinouts

50-Way Pin	Signal Name	V.35 Pin	V.24/V.28 (232–E) Pin	V.11/V.36 (422–A) Pin	V.10 (423–A) Pin	530-A Pin
35	DSR B	‡	‡	29	29	7
36	RTS	C	4		7	
37	DCD/I A	F	8	13	13	8
38	DCD/I B	‡	‡	31	31	10
39	CTS A	D	5	9	9	5
40	CTS B	‡	‡	27	27	13
41	DCE Ground	‡	7‡	20	20	23
42	TEST1					
43	TEST2					
44	DTE Ground	B‡	‡	19,37	19, 22,25, 30,35,37	7
45	DTR A			12		
46	DTR B			30		
47	Clock A			17		24
48	Clock B			35		11
49	TEST3					
50	Speed Select		23	16	16	

‡Connected to Code ground (pin 1); Code ground does not run down the cable.

B–4   Options

Appendix C

United Kingdom Specifications

This appendix is for use with Digital's DEC WANcontroller 720 module option in the United Kingdom.

C.1 Safety Warning for UK Installations

The DEC WANcontroller 720 module has a label regarding safety require-
ments of communications modules installed in the United Kingdom. The
label states:

**SAFETY WARNING: See instructions for use before
making any connection to this module.**

The following warning applies in the UK:

WARNING

**Ports indicated by the safety warning label do not pro-
vide sufficient isolation to satisfy the requirements of
the relevant parts of BS6301. Therefore, apparatus con-
nected to these ports must comply with one of the fol-
lowing:**

- **The apparatus is covered by OFTEL's General Ap-
proval NS/G/1234/J/100003. (All products supplied by
Digital comply with this General Approval.)**

- **The apparatus has been approved to BS6301.**

- **The apparatus has been evaluated against British
Telecom (Post Office) Technical Guides 2 or 26 and
been given permission to attach.**

**Other usage will invalidate any approval given to this
apparatus.**

**Interconnection directly, or by way of other apparatus,
of ports marked "SAFETY WARNING - See instructions
for use before making any connection to this module."
with ports marked or not so marked may produce haz-
ardous conditions on the network. Advice should be ob-
tained from a competent engineer before such a connec-
tion is made.**

Products complying with the OFTEL's General Approval NS/G/1234/J /100003 may be connected to the DEC WANcontroller 720 module and need not carry the BS6301 warning test or label. **All products supplied by Digital comply with the General Approval.**

C.2 Service Category Specifications

Table C–1 lists the service categories (SC) and their specifications.

Table C–1: Specifications for Service Categories (SC) 1 and 2

SC	Interface Type	Data Rate	Service Requirements		PTO [1]		
			Physical	Electrical	BT[2]	Hull[3]	MCL[4]
1	CCITT	2400	ISO 2110	V.24[5]/V.28	Yes	Yes	Yes
	recommend	4800	BS.6623:	Cables:	Yes	Yes	Yes
	X.21bis	9600	Part 1 1985	BS19D-02,	Yes	Yes	Yes
		19200		BC19V-02	No	No	No
2	CCITT	48000	ISO 2593	V.35[6]	Yes	Yes	Yes
	recommend	56000	BS.6623:	Cable:	Yes	No	Yes
	X.21bis	64000	Part 4 1986	BC19F-02	No	No	Yes

[1]PTO — Public Telecommunications Operators
[2]BT — British Telecommunications plc
[3]Hull — Kingston Communications (Hull) plc
[4]MLC — Mercury Communications Limited
[5]2 ft for adapter cable BS19D-02 and BC19V-02; 25 ft for extension BC22F-25
[6]2 ft for adapter cable BC19F-02; 25 ft for extension BC19L-25

NOTE

The total length of cable (adapter cable and extension) must not exceed 27 feet.

C.3 Supported Cables

Refer to Appendix B for a list of the cables supported by the DEC WANcontroller 720 module. The supported cables actually connect to the DEC WANcontroller 720 adapter cable and not to the module itself.

C.4 Module Isolation

Except at the connector, which plugs into the host expansion slot, clearance and creepage distances (Xmm and Ymm in Table C–2) must be maintained between the DEC WANcontroller 720 module and other parts of the host, including any expansion cards fitted. Clearance is the shortest distance in air between two points. Creepage is the shortest distance along a continuous surface between those same two points.

Table C–2: Module Clearance and Creepage

Clearance Xmm	Creepage Ymm[1]	V rms or V dc[2]
2.0	2.4(3.8)	up to 50
2.6	3.0(4.8)	up to 125
4.0	5.0(8.0)	up to 250
4.0	6.0(10.0)	up to 300

[1]The creepage distance applies when the installation is in a normal office environment. The creepage distance in ( ) applies when the host computer is subjected to conductive pollution or dry nonconductive pollution, which could become conductive due to condensation.
[2]Voltage used or generated by other parts of the host or expansion card.

If in doubt, seek advice from a competent telecommunications safety engineer. Failure to install the DEC WANcontroller 720 module in accordance with these instructions will invalidate the British Approvals Board for Telecommunications (BABT) approval.

C.5 Apparatus Between the Approved Host System and Digital Circuit (PTT)

If any other apparatus, including cable or wiring, is to be connected between the approved module and the point connection to any particular digital circuit, then all the other apparatuses shall conform as follows:

1. The overall transmission characteristics of all other apparatuses shall introduce no material effect upon the electrical conditions presented to one another by an apparatus and a digital circuit.

2. All the other apparatus shall comprise only:

    •   Apparatuses approved (such apparatuses may be subject to limitations on their use) for the purpose of connection between the apparatus and a particular digital circuit.

    •   Cable or wiring complying with code of practice for installation of apparatuses covered by this standard or other applicable requirements.

C.6 Host Power Rating

You must ensure that the total power drawn by the approved module, the host, and other auxiliary equipment drawing power from the host, is within the rating of the host power supply.

Digital has designed all permutations of the host configuration to operate within the limits of the host power rating. The module power ratings are:

+5 V at +4.0 A
+12 V at +0.5 A

The permissible power supply variation to the module is:

+5 V ±5%
+12 V ±5%

C.7 Cable Approval

The module is approved for direct connection to a particular digital circuit. This approval includes an interconnecting cable with mating connectors that conform to the British standard BS6623 parts 1 and 4. If the module is connected to the service with anything other than its own approved cables, those cables must benefit from the relevant General Approval NS/G/1235/100009 and/or conform to any other applicable requirements.