



FUNASSET

Connectivity with Control

The TN Series of Interfaces

Hardware Reference Manual

Publication Number MANTN9805
Issue 4

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Changes are periodically made to this document. Technical updates will be included in subsequent editions.

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TN Series of Interfaces Reader Satisfaction Survey

Notice

This publication describes the hardware of your TN series Interface. The TN Series of Interfaces are host interface devices designed to connect a variety of host computer systems to many different electronic printing systems through most of the industry standard connections. Although some system configuration issues are identified, it is outside this manual's scope to include a full discussion of the host input environment.

The specifications described in this publication are subject to change without notice. The availability of some features will depend on the user's configuration. Contact your FunAsset dealer for details.

WARNING: *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause interference to radio communications. It has been 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 interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to 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.*

The Hardware Reference Manual is current with software versions 2.1, 3.1, 3.1B, 3.2 and 4.2 of the TN 3000, 4000 and 5000 Series Interfaces.

Contents

This manual forms a part of the TN Series of Interfaces documentation suite and has been designed as a reference for those who have to install and initially trouble-shoot the interface hardware.

On delivery of your system, you will receive a Technical Reference Manual and an Operator Guide which is specific to the software and hardware version applicable to your system.

If you would like to purchase additional copies of the Technical Reference Manual or this TN Series of Interfaces Hardware Reference Manual, please contact FunAsset Limited at the address shown in the front of the manual.

Apart from at installation, the manual does not consider configuration issues. Configuration at installation only considers amendment to the supplied configuration batch files.

The Hardware Reference Manual contains the following chapters and appendixes:

- **Chapter 1** - Describes how to use this manual as well as providing you with a basic knowledge of the TN Series of Interfaces.
- **Chapter 2** - Provides a step-by-step procedure for installing the interface and includes the basic configuration steps for an installation.
- **Chapter 3** - Is a number of fault finding procedures which should help you isolate the hardware.
- **Chapter 4** - Provides you with pin-out information for each of the different connection types.
- **Chapter 5** - lists the spare parts available from FunAsset Limited.

NOTE: You can purchase spare parts directly from FunAsset but you may prefer to make these acquisitions through your FunAsset dealer.

Icons

The following indicators are placed in the left margin of the page to indicate warnings, cautions and notes.

WARNING: *Warnings are used to identify where an action or omission may cause injury or permanent damage to people or equipment.*

CAUTION: Cautions are used to identify where an action or omission may cause damage to your equipment, software or data.

NOTE: Notes provide additional information or hints intended to assist you in performing a task or understanding text.

Related publications

You should consult the appropriate host computer system documentation in addition to the manuals which provide specific technical information pertaining to your target output device.

In addition to these publications, you should refer to the following IBM documentation for a full discussion of the IBM host system operation:

- IBM System/360 and System/370 Interface Channel to Control Unit Original Equipment Manufacturers' Information - GA22-6974-7
- IBM 3211 Printer, 3216 Interchangeable Train Cartridge, and 3811 Printer Control Unit Component Description and Operator's Guide - GA24 - 3543-9
- IBM 4245 Printer Model 1 Component Description and Operator's Guide - GA33-1541-1

The following list of publications relate to TCP/IP protocols. These can be obtained on the Internet as well as through your technical suppliers. The documents are:

- IP protocol - RFC791
- TCP protocol - RFC793
- ICMP protocol - RFC792
- FTP protocol - RFC959
- Telnet protocol - RFC854
- LPR protocol - RFC1179

Product Overview

The TN Series Interface comprises hardware and software installed on an IBM PC/AT compatible system. The interface makes dedicated use of the PC.

There are three ranges of the TN Series of Interfaces, the 3000 Series, 4000 Series and 5000 Series. These ranges define the hardware configuration of the base PC.

- **3000 Series** - single floppy disk drive, and a minimum of 640K memory. This series is used to make single host to output connections.
- **4000 Series** - single floppy disk drive, hard disk and expanded memory. This series is used to make multiple host to multiple output connections with PRINTQ Spool Monitoring.
- **5000 Series** - single floppy disk drive, hard disk, mouse and expanded memory. This series is used to make multiple host to multiple output connections with SPOOLQ Spool Management.

All versions are able to connect any of the range of The TN Series Input emulations to any of the range of The TN Series Output emulations.

Features

All software versions of the TN Series of Interfaces features facilities to enable you to:

- Send MS-DOS files to your printer.
- Output diagnostic dump data to the printer, the interface screen, a floppy disk file or to an optional hard disk.

Additional software modules

A number of additional software modules have been developed in order to provide a high degree of job management facilities. Some of these optional features can function together. These optional software modules currently include:

- **Arabisation** - interprets Arabic datastreams such that they can be printed on an Electronic Printing System. This is available with all versions of the TN Series software.
- **Autofilter** - The AutoFilter option is a data stream pre-processor capable of identifying and manipulating Escape sequence based Printer description languages, such as PCL.

This can include passing the escape sequences through to the output untouched, while recognising the effect of the escape sequence within the data stream, substituting individual strings with other strings, and deleting escape sequences to allow a PDL data source to print on an ordinary 'line printer'.

- **Banner Processing** - this option monitors the datastream looking for indicators that identify the data as a banner sheet. Once found, the information on the banner sheet can be used to split jobs and, if required, direct them to specific printers or to defined locations on a print server.
- **Diagnostics** - This software module is provided as a diagnostic tool to help you isolate problems with the final output. It enables the saving of the datastream on the fly.
- **TCP/IP features** - The TCP/IP modules TCPI and TCPO provide additional features to enhance job processing. These are AUTOFTP option (TCPI) and AUTOROUTING (TCPO).

AUTOFTP - The TCP/IP input interface can be configured to examine specific locations on a network host for jobs that conform to specifications. Once found, the interface establishes an FTP session, GETS the files and sends them to the connected output device or place them in the spooling environment.

AUTOROUTING - This feature enables the TCP/IP output module TCPO to route output, on a job-by-job basis, to different places on a network. This job-specific routing can include different servers and/or network printers, different directories on a server, different queues and dynamic creation of sub-directories. Additionally, for UNIX type systems, file names can include user information.

Software

The software, which is provided on a the hard disk for multiple emulations and on 3.5 inch floppy disk for single emulations, is divided internally into three separate modules with optional additional processing modules as described previously:

- Input
- Common
- Output

This modular approach means that any input emulation can be connected to any output driver using the common module as a linking mechanism.

Input

This module handles the interface with the input. Inputs could include a host system, a network connection or a communications link.

Data and commands are received from the host, interpreted and translated as appropriate. Commands are converted to an internal format and transferred to the output module. Data will be translated as configured and, in most cases transferred to memory using DMA.

Common

This module is the linking mechanism between input emulation and output driver.

This mechanism means that any input emulation can be connected to any output driver.

Output

This module handles the interface with the target output device. Outputs could include a printing system, a network connection, a communications link or a disk drive.

Internal format commands are converted to a format required by the output device and merged with the data which, in most cases is transferred from the memory using DMA before being sent to the printer. The structure of the commands and data in the datastream to the printer is created according to the requirements of the targeted output device.

Hardware

The connection hardware is provided on 8 bit cards slotting into the PC with a unique card for the input and a unique card for the output. The exception to this is where the interface uses the serial port of the PC for input at speeds up to 115Kb and outputs at speeds of up to 38.4 Kb (serial) and the parallel port for outputs up to 40 pages per minute (Dataproducts or Centronics).

The number of connections is limited to the capacity of the PC or, in the case of multiple emulations a maximum of sixteen emulations.

Configuration and system set-up is controlled using standard MS-DOS commands.

The range of inputs and outputs is extensive; contact your FunAsset dealer for full details.

NOTE: If no additional facilities are requested by parameters the interface will support the emulated printer(s) fully.

Optionally FunAsset can supply:

- A hard disk drive (where not already supplied).
- Additional serial and parallel ports.
- Connection cables.

Physical characteristics

The interface consists of an IBM compatible PC into which the power, input and output cables attach. All cables are plugged into the rear of the cabinet. Each interface comprises:

Floppy disk drive- For single emulations, this is used to run the software. For multiple emulations, this is used to load additional software and updates, and for making software backups.

Keyboard - Used for entering commands and parameters and as an alternative to the mouse when managing jobs through the SPOOLQ spooler.

Mouse - Used to select tasks and manage spooled jobs within a SPOOLQ system.

Monitor - Displays the MULTITASK, PRINTQ, SPOOLQ or the operational screens which provide status information.

NOTE: You should consult the user documentation supplied with the PC for exact details of the location of these and other PC components.

Specifications

The specifications will vary according to the PC base. You should consult the user documentation supplied with the PC for details of this information.

Placement

There should be sufficient clearance to the rear of the processor to allow for cooling, cables and connections. See the user documentation supplied with the PC for details of this information.

Health and safety

The TN Series Interface is CE certified and conforms to the following:

- Electrical safety conforms to BS5850, IEC 950
- EME conforms to 82/499/EEC, EN55022 and VDE0871 Class B.

For the United States of America and Canada the interface conforms to UL1950
The product is certified to conform to Xerox Corporate Environment Health and Safety Standard (CEHSS) 2.2.0

Maintenance

The interface is self-contained and requires little maintenance, however, the exterior should occasionally be wiped with a lint free cloth and the monitor should be cleaned with an anti-static cleaner which is designated as suitable for monitors. The floppy disk drive should also be cleaned periodically using a cleaning kit designed for that purpose.

Year 2000

All FunAsset software and hardware (excl. pc base units) is Year 2000 Compliant is that performance nor functionality are affected by the date crossing the year 2000, and conforms with BSI DISC PD 2000-1.

The PC base units supplied with all FunAsset software and hardware prior to October 1996 were NOT year 2000 compliant.

In order to resolve this issue, FunAsset can supply new PC base units and board upgrades. Board upgrades are required to accommodate the faster clock speeds of the new PC base units.

All new PC base units and board upgrades must be supplied by FunAsset to maintain a supportable product.

To verify year 2000 compliance see *Section 3 Troubleshooting the Hardware*.

This chapter contains the information required to install the interface. It describes the sequence which should be used to carry out the installation and details the correct operation indications. DO NOT continue to a next step if the current step has an incorrect indication.

WARNING: *These procedures should only be carried out by qualified service personnel.*

NOTE: When the interface is delivered, it will be pre-built and supplied with a default configuration. Because of this, many of the procedures will not be required.

Installation of the interface follows a similar pattern for each configuration. That is:

1. The components required for the installation are checked
2. The input and output board(s) is/are installed and checked (these should be pre-installed)
3. The PC is installed and checked and the interface diagnostics are run
4. Carry out basic configuration.
5. The output device is installed, configured and then connected to the interface. At this time a printer test is run to prove the link between the interface and the output device.
6. The host is connected
7. The interface configured for local needs and a simple job is run

Where there are differences, they will be clearly indicated. Please read each instruction carefully before attempting to make the installation.

Step 1 - Check components and cables

Before proceeding with the installation, ensure that all of the assemblies have been delivered. These are:

- The PC
- Monitor
- Keyboard
- Power cords for the PC and monitor which should be marked as harmonised (showing the <HAR> symbol) for Europe, and be of the voltage and current rating stated on the equipment data plate, as a minimum requirement.
- The correct input and output boards complete with interrupt links and power splitter if necessary (These will normally be pre-installed)
- External connector box and cables where required (IBM channel input and output, PI input and Dataproducts long-line driver)
- Long-line driver/receiver and connecting cables (if applicable)
- The software disk(s).
- Suitable cables and terminators are available.
 - Suitable, customer supplied, input connecting cables
 - Interface to communications device cables for SIRO or SIRL.
 - Suitable, customer supplied, output connecting cable.

Step 2 - Install the input and output board(s)

NOTE: In most cases these boards will be pre-installed, but, if not, these instructions apply to ALL boards both input and output.

WARNING: *You will be carrying out some these activities with the cover off and power connected. In this situation you must not touch hazardous areas with your hands or with tools.*

WARNING: *Your body and clothing normally store small amounts of static electricity. This static electricity does not affect you but can cause permanent damage to electronic components.*

To reduce the possibility of damaging the electronic components you must wear an anti static wrist band before handling the interface hardware.

1. Remove the top cover following the instructions in the PC documentation.
2. If the boards are already installed, check their seating. If not, remove enough blanking plates for the number of input and output boards to be installed and retain the screws. (see the PC documentation for details).

Insert the first boards into any of the free slots on the bus and secure using the screws previously removed with the blanking plates.

3. Set the hardware to PC communications.

Before continuing, it is important that you understand how the hardware raises interrupts to the PC. Read the following information concerning interrupts and the TN Series of Interfaces:

When the interface hardware wants the PC to carry out an activity, it raises an interrupt. This can occur when the interface wants to pass the data into memory for example. The PC stops the routine in progress, stores the location of the last program instruction and services the request. On completion of the activity, the PC returns to the program at the stored location.

All TN Series interfaces use the common interrupt number 5, to the PC.

This interrupt to the PC is made through the last or only board in the interface.

When an interrupt request is required by the interface, it is passed from board to board until it reaches the last board. The last board has the responsibility of making that interrupt.

There are four important activities associated with making the interrupt.

- When you install hardware into the interface you have to make a decision as to which board will be the last and which board(s) will be the first or intermediate boards (those that are not the last board). It is recommended, however, that you select an input board as the last board.
- You **must** set switchbank 2 switch 4 to ON (interrupt 5) for ALL boards.
- You **must** set switchbank 2 switch 5 ON only for the board that you have decided is the last board (or the only board if there is only one) and OFF for all others.
- If you have more than one board, you **must** link the interrupt from board to board in the correct manner.

Install the Interrupt link

For interfaces with more than one board installed, each board is connected to the next from the sockets mounted on the top of the board with a supplied short ribbon cable.

Identify the two link sockets.

NOTE: There are two types of interrupt link sockets and cables. The latest hardware has blue keyed sockets while the older versions are brown and unkeyed. The plugs on the cables are blue for the latest hardware and white with a black cover for the older versions. Old style cables will fit the new sockets but the new style cables will not fit the older sockets

CAUTION: For the older style cables, it is possible to connect the ribbon cables round the wrong way. The cables should pass over the back (solder) side of the board.

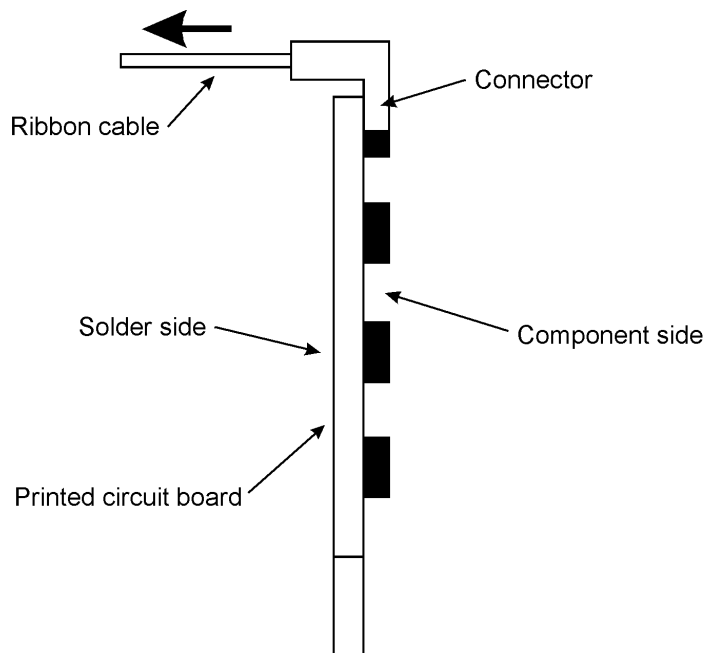


Figure 2-1 Interrupt links

The OUT socket (JP2) of the first board is connected to the IN socket (JP1) of the second and the OUT of the second to the IN of the third. Conventionally the host input board (or the main emulation host input board for multiple emulations) is considered to be the last board and an output board as the first board.

Check the settings of each switch on switchbank 2 as indicated in the diagram.

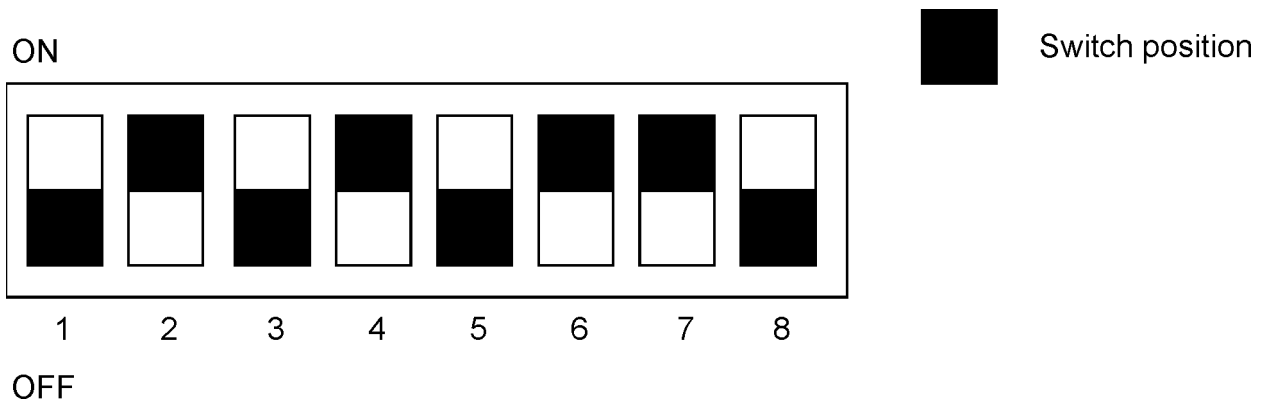


Figure 2-2 Switchbank 2 settings.

Switch	Meaning
1, 2, 3	Board address. This must be different for each installed board. For network boards, all OFF is default and all ON switches the board out of circuit. For all other boards, with the exception of the Serial Communications Boards, all OFF is out of circuit and any one switched ON is the default.
4	ON - interrupt request 5 OFF - interrupt request 3 MUST be ON
5	OFF - 1st or intermediate board in chain. ON - last or only board in chain (termination). (see interrupt links in this procedure)
6	DMA channel 1 is available - MUST be ON
7	DMA channel 3 is available - MUST be ON
8	Sets hexadecimal processing when ON.

Switchbank 1 (SW1) is used for diagnostic purposes and all switches should be set to OFF.

4. Connect the power supply for the external box.
Where an external connection box is used it requires an additional power supply. This power supply is provided by a flying lead which is attached to the interface hardware and connected to any of the spare, 4 pin, disk power supply connections in the PC.
5. Replace the top cover.

Step 3 - Install the PC and run the interface diagnostics

NOTE: Full details of PC installation can be found in the PC documentation.

1. Unpack the PC, monitor and keyboard. Place the PC in a suitable location. Remove the packaging from the disk slot.
2. Place the monitor on the PC and the keyboard to the front of the PC.
3. Connect the monitor and the keyboard to the correct sockets on the PC.
4. Plug the power leads to the mains power connectors on the rear of the PC and monitor. Plug the power leads separately into a properly earthed power socket.
5. **For 3000 series interfaces only:**
 - Insert the software disk in the floppy disk drive and close the shutter.
 - Power on the PC and monitor. The PC will carry out some self checks and then display disk copying instructions.
 - Press the **CTRL** key and type **C** at the same time in order to abort the procedure.
 - Type **Y** and press the **Return** key to confirm your action. The machine will display the **A:>** prompt.
6. Run the PC diagnostics (see *Chapter 3 - Fault Finding Procedures* for details of these tests).
7. Type **TEST** from the MS-DOS prompt and press the **RETURN** key to run the diagnostic tests associated with the input and output hardware (see *Chapter 3 - Fault Finding Procedures* for details of these tests).
8. If the tests are successful, power off the PC.

Step 4 - Carry out basic configuration.

1. Power on the PC and monitor,
2. **For 3000 series interfaces only:**
 - Follow the instructions on the screen to make a security copy of the system disk.

NOTE: You should normally take a single copy and store the Master disk in a secure location. The copy, which is called the “Master Set-up” disk, should be used to initially configure the interface, copied to create an operational disk and then stored in a secure location. In this manner there is always a fall back should an accidental erasure or corruption occur.

- Remove and store the Master disk.
 - Insert the copy disk.
 - Edit the AUTOEXEC.BAT file to remove the security copy instructions and the DISKCOPY command. See the *Technical Reference Manual* for details of editing batch files.
3. Refer to the *Technical Reference Manual* and edit the configuration batch file(s) for a basic installation.

Step 5 - Install output device and connect to printer

1. Install and configure the output device.
2. Before connecting the interface ensure that the output device is functioning correctly by running diagnostics. If it is not, remedy any problems that exist before continuing.
3. Ensure that both the interface and the output device is powered down before connecting the cables.
4. Connect the output device to the interface using the correct cables. The procedure will differ according to the type of output device.

NOTE: The boards are labelled with their type to ensure correct connection where similar connectors are used.

WARNING: *Plugging and unplugging any connectors with power on can cause serious damage to the interface.*

Dataproducts - Connect the printer cable at one end to the printer and the other to the connector on the rear of the DPO board. Refer to the documentation for the printer for details of its configuration.

IBM channel output - Connect the two output ribbon cables on the external connecting box to the BUS in and TAG in sockets on the output device or to the IBM serpentine cables.

- The connectors on the ends of the BUS and TAG cables are shaded dark on one end and light at the other. The dark shaded end is connected to the interface and the light shaded end to the output device.
- Install the IBM Bus and Tag Terminators in the BUS OUT and TAG OUT sockets of the output device.
- Connect the external connecting box to the back of the Interface output board using the 37 to 37 way cable provided.
- Secure the earth connection beneath one of the casing screws at the box end and beneath the socket screw at the interface.

PC Output - Connect a suitable printer cable at one end to the printer and the other to the serial or parallel connector on the rear of the interface.

Remote output - Connect the interface to communications device cables. Each high density D type connector can be connected to either of the connectors on the serial communications board in the interface.

Network - Connect the drop cable and transceiver to the connector at the rear of the output board. You should use a light-weight drop cable and transceiver and the transceiver should not be plugged into the board.

In order to ensure a good connection, you should make sure that the slide locks are fully engaged on both sides and that it is pushed fully over the locked position. Use a small screwdriver to push the slide lock fully home. Finally check that the connector does not disengage by gently pulling it.

If there are several cables, they should be tied together and the weight supported externally if possible.

5. Run PRTEST to check the connection between the interface and the printer. You may want to run PRFILE to check the validity of the characters printed. (see *Chapter 3 - Fault Finding Procedures* for details of PRTEST).

Step 6 - Connect the host

NOTE: This step requires that the interface is connected to, configured for and identified by the host.

1. Check with the host system operator that the interface is unavailable to the host.
2. Connect the host as follows:

Dataproducts - Connect the dataproducts cable between the host and the connector on the rear of the input board.

IBM channel input - Connect the external connecting box to the interface.

- Connect the channel cables from the host to the BUS IN and TAG IN sockets on the external connecting box. If there is a further device on the channel connect these channel cables to the BUS OUT and TAG OUT sockets. If the interface is the only or the last device on the channel, install the IBM Bus and Tag Terminators in the BUS OUT and TAG OUT sockets. The dark shaded end is connected to the host and the light shaded end to external box.
- Secure the earth connection beneath one of the casing screws at the box end and beneath the socket screw at the interface.
- Set the external box according to your requirements (see Chapter 4 for details).

PC Input - Connect the serial cable between the host and the serial port on the PC.

PDSI - Connect the PDSI cable to the connector at the rear of the input board.

Peripheral Interface - Install the host cables between the host and the external connecting box.

- Connect the external connecting box to the back of the Interface output board using the 37 to 37 way cable provided.
- Secure the earth connection beneath one of the casing screws at the box end and beneath the socket screw at the interface.

Remote Input - Connect the interface to communications device cables. Each high density D type connector can be connected to either of the connectors on the serial communications board in the interface.

Network- Connect the drop cable and transceiver to the connector at the rear of the output board. You should use a light-weight drop cable and transceiver and the transceiver should not be plugged into the board.

In order to ensure a good connection, you should make sure that the slide locks are fully engaged on both sides and that it is pushed fully over the locked position. Use a small screwdriver to push the slide lock fully home. Finally check that the connector does not disengage by gently pulling it.

If there are several cables, they should be tied together and the weight supported externally if possible.

Step 7 - Configure the interface

1. Refer to the Technical Reference Manual and configure the interface for local requirements.
2. Run a simple job and check the output.
3. Run a normal job and check the output.

3.

Troubleshooting the Hardware

This chapter provides procedures for running the tools and checks available for isolating hardware problems with the interface.

WARNING: *These procedures should only be carried out by qualified service personnel.*

The contents are:

- Fault isolation procedure
- Checking PC power
- Running PC Diagnostics
- Running the TEST program to check the interface hardware
- Running PRTEST to check communications between the interface and the output
- Testing communications with the host

Fault isolation procedure

If there is a problem with the interface, you should follow these procedures in order to break down the fault.

Does the PC power up and load the program?

Y N

Is the power on indicator lit?

Y N

Carry out check 1 - Power check.

Are there any MS-DOS error messages?

Y N

Carry out Check 2 - PC Diagnostics.

Does the message indicate a disk read problem?

Y N

Carry out Check 2 - PC Diagnostics.

Try another disk.

Is the problem resolved?

Y N

Replace the PC.

Continue.

Is the fault with all jobs?

Y N

Take a dump of the job and call for assistance.

Carry out Check 3 - Interface hardware diagnostics for the input board.

Do the diagnostics pass?.

Y N

Replace input board and external connecting box if used.

Carry out Check 3 - Interface hardware diagnostics for the output board.

Do the diagnostics pass?

Y N

Replace output board.

Carry out PRTEST.

Did the test pass?

Y N

Run the printer diagnostics.

Did they pass?

Y N

Repair printer

Replace printer cables.

Carry out PRTEST.

Did the test pass?

Y N

Replace output board and external connecting box if used.

Fault repaired.

Replace input cable.

Is fault repaired?

Y N

Take a dump of the job and call for assistance.

Fault repaired.

Check 1 - Power check

- Check that mains power is available at the mains socket.
- Check that mains power is available at the interface.
- Check for low voltage distribution to the mother board of the interface according to the following table:

Pin 1	Power OK signal
Pin 2	
Pin 3	+ 12vdc
Pin 4	-12vdc
Pin 5	Ground
Pin 6	Ground
Pin 7	Ground
Pin 8	Ground
Pin 9	-5vdc
Pin 10	+5vdc
Pin 11	+5vdc
Pin 12	+5vdc

If the power is OK replace the processor unit.

Check 2 - PC diagnostics

There are many tests available which exercise the PC. These are all documented in the PC documentation which should be used as a reference.

The relevant tests are:

- RAM test - Checks the on board RAM
- Video Test - for checking the monitor
- Keyboard test
- Internal test - checks CMOS memory and the DMA register
- Diskette drive test - checks the floppy drive.

NOTE: The only diagnostics available for PCI and PCO are those contained in the PC documentation.

Check 3 - Interface hardware diagnostics

The tests are run from the TEST program which runs specific tests for the hardware selected.

Test Program

The TEST diagnostic program provided with the TN Series of Interfaces is used to provide a comprehensive series of tests to the interface hardware and report any hardware errors that are found. The program, when loaded, leads you step by step through the test routines applicable to your hardware.

The TEST program is regularly updated to make the tests more comprehensive therefore the version of TEST issued with the system may not match these procedures exactly.

Starting TEST

To run the TEST program:

1. Complete any output jobs and make the interface unavailable to the host system.
2. Exit the emulation program and display the DOS prompt. This procedure will vary according to the version of the interface software, see the Operator Guide for details of how to do this.
3. Type TEST and press the RETURN key the TEST screen will be displayed.

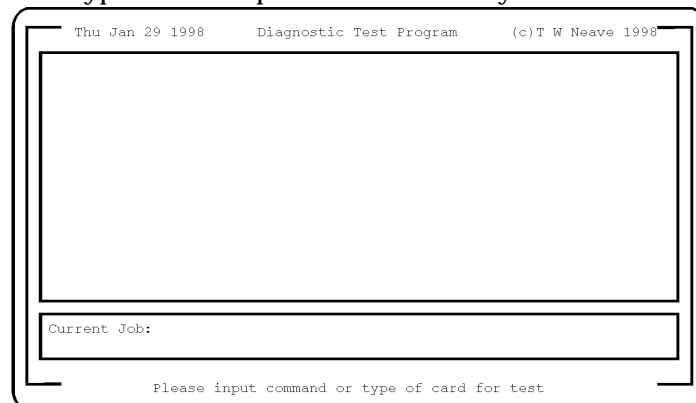


Figure 3-1 Test screen

In the TEST program you are able to use the VERSION and SYSTEM commands. VERSION displays the version numbers of the TEST program and SYSTEM will return you to the MS-DOS prompt.

4. Type LOOK and press the RETURN key to see the mnemonic for the hardware that you want to test.
5. Type the mnemonic and press the RETURN key for example OSI2.
6. When only one FunAsset card is installed, the TEST program will automatically start the first test routine.

The steps for each of the hardware boards are described under the appropriate heading.

The hardware cards are for:

- Dataproducts and Centronics input (see page 3.6)
- Dataproducts output (see page 3.8)
- DSB100 (see page 3.9)
- DSB200 (see page 3.10)
- IBM Channel input (see page 3.11)

- IBM Channel output (see page 3.13)
- ICL OSLAN (see page 3.14)
- PDSI (see page 3.17)
- Serial Remote input (see page 3.17)
- Serial Remote output (see page 3.17)
- TCP/IP input (see page 3.14)
- TCP/IP output (see page 3.14)

Dataproducts and Centronics input

1. Type **DPI** and press the **RETURN** key. The screen will display:

Switch 1 Operational Test

This test checks the data path through the board. At the beginning of the test, all switches should be switched OFF and read 0.

For each switch:

 - Change the position to ON, the value should change to 1.
 - Change the position to OFF, the value should change to 0.

Make sure that you reset all switches to OFF.

At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start.:

All Switches Tested OK

If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:

All Switches NOT Tested

will be displayed and the next test will start.

The program then checks the security byte and confirms that type of hardware installed in the interface. The screen will display:

Security Byte Test
Security byte OK. DPI205 Board
2. Press the **SPACE** bar to move to the next test.

The program then checks the counter that stores the line length.

Line Length Counter Tests

1) Binary down count to (value)
Current count check: (value)
Test Completed OK

2) Terminal count check
Test Completed OK

Both counts start at 11111111 and decrement to 00000001.
3. Press the **SPACE** bar to move to the next test.

The program then tests the Static RAM (SRAM) and displays:

SRAM Load and Readback Test
Current block load address (value)
Current block read address (value)
Test Completed OK

Both counts start at X'00' and increment to X'7F'.

4. Press the **SPACE** bar to move to the next test.

The program then flashes three LEDs in turn on the input hardware and displays:

LED 1 Flashing Test

LED 2 Flashing Test

LED 10 Flashing Test

The corresponding LED on the DPI board will flash, press the **SPACE** bar once you have checked that the LED is flashing.

5. Press the **SPACE** bar to move to the next test.

The program then checks the interrupts for the interface hardware and displays:

Interrupt Output Test

IRQ5: SW2 4 is ON

Interrupt OK

Interrupt Status OK

Test Completed OK

If you get the message:

Interrupt Error

You should check the interrupt links and the position of Switchbank 2 Switch 5. For an interface with two boards the input card is considered to be the last card in the chain and, as such:

- The interrupt link is connected to the IN socket (JP1).
- Switchbank 2 Switch 5 should be set to ON.

If you have more than one interface board installed, check the Installation Section of this manual for details of the interrupt.

6. Press the **SPACE** bar to finish the tests. The display shows:

End of DPI Tests

7. Repeat the test program to verify the results.

8. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.

If there is a problem, hardware may need replacing.

Dataproducts output

1. Type DPO and press the **RETURN** key. The screen will display:
 Switch 1 Operational Test
 This test checks the data path through the board. At the beginning of the test, all switches should be switched OFF and read 0.
 For each switch:
 - Change the position to ON, the value should change to 1.
 - Change the position to OFF, the value should change to 0.
 Make sure that you reset all switches to OFF.
 At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start.:
 All Switches Tested OK
 If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:
 All Switches NOT Tested
 will be displayed and the next test will start.
 The program then checks the security byte and confirms that type of hardware installed in the interface. The screen will display:
 Security Byte Test
 Security byte OK. DPO200 Board
2. Press the **SPACE** bar to move to the next test.
 The program then runs a series of timer tests and displays:
 Timer Reset test
 LED 1 Flashes. Check LED 1 and press the **SPACE** bar. The display now shows:
 Timer Load Test
 Screen will display:
 Test completed OK
 Timer Count Test
 On satisfactory completion of the test, the screen will display:
 Test completed OK
3. Press the **SPACE** bar to move to the next test.
 The program then flashes three LEDs in turn on the output hardware and displays:
 LED 1 Flashing Test
 LED 2 Flashing Test
 LED 10 Flashing Test
 The corresponding LED on the DPO board will flash, press the **SPACE** bar once you have checked that the LED is flashing.
4. Press the **SPACE** bar to move to the next test.
 The program then checks the interrupts for the interface hardware and displays:
 Interrupt Output Test
 IRQ5: SW2 4 is ON
 Interrupt Successful
 If you get the message:
 Interrupt Error

You should check the interrupt links and the position of Switchbank 2 Switch 5. For an interface with two boards the output card is considered to be the first card in the chain and, as such:

- The interrupt link is connected to the OUT socket (JP2).
- Switchbank 2 Switch 5 should be set to OFF.

If you have more than two interface boards installed, check the Installation Section of this manual for details of the interrupt.

5. Press the **SPACE** bar to move to the next test.

The program then carries out a Board Mod Level Check and ask you to enter the value of R2. It will then test the Mod Level of the board by checking U9 and U28 GALS and displays:

U9 and U28 OK

6. Press the **SPACE** bar to finish the tests. The display shows:

End of DPO Tests

7. Repeat the test program to verify the results.
8. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.

If there is a problem, hardware may need replacing.

DSB100

1. Type DSB and press the **RETURN** key.

The program will run the DSB 100 test and the screen will display:

End of DSB Tests

2. Repeat the test program to verify the results.
3. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.

If there is a problem, hardware may need replacing.

DSB200

1. Type **DSB** and press the **RETURN** key. The screen will display:
Switch 1 Operational Test
This test checks the data path through the board. At the beginning of the test, all switches should be switched OFF and read 0.
For each switch:
 - Change the position to ON, the value should change to 1.
 - Change the position to OFF, the value should change to 0.Make sure that you reset all switches to OFF.
At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start.:
All Switches Tested OK
If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:
All Switches NOT Tested
will be displayed and the next test will start.
The program then checks the security byte and confirms that type of hardware installed in the interface. The screen will display:
Security Byte 00000001
2. Press the **SPACE** bar to move to the next test.
The program then flashes LED 1 on the output hardware and displays:
LED 1 Flashing Test
LED 1 on the DSB board will flash.
3. Press the **SPACE** bar to move to the next test.
The program then checks the counter that stores the line length.
Line Length Counter Tests
1) Binary down count to (value)
Current count check: (value)
Test Completed OK
2) Terminal count check
Test Completed OK
4. Press the **SPACE** bar to move to the next test.
LED 2 (yellow) will flash on the rear panel of the DSB board.
Press the **SPACE** bar to move to the next test.
LED 3(green) will flash on the rear panel of the DSB board.
5. Move SW3 towards LED 3 (green).
LED 4 should light.
6. Reset SW3 and ensure LED 4 goes out.
7. Press the **SPACE** bar to move to the next test.
A message requesting you to press the **SPACE** bar again will be displayed.
8. Press the **SPACE** bar.

9. The amber external light should start to flash.
 10. Press the **SPACE** bar to toggle the light on and off.
 11. Press the **ESC** button to complete the test program.
 12. Repeat the test program to verify the results.
 13. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.
- If these is a problem, hardware may need replacing.

IBM Channel input

1. Type **IBMI** and press the **RETURN** key. The screen will display:

Switch 1 Operational Test

This test checks the data path through the board. At the beginning of the test, all switches should be switched OFF and read 0.

For each switch:

 - Change the position to ON, the value should change to 1.
 - Change the position to OFF, the value should change to 0.

Make sure that you reset all switches to OFF.

At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start.:

All Switches Tested OK

If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:

All Switches NOT Tested

will be displayed and the next test will start.

The program then checks the security byte and confirms that type of hardware installed in the interface. The screen will display:

Security Byte Value Test
Security byte OK. IBMI20x Board
2. Press the **SPACE** bar to move to the next test.

The program then checks the WatchDog timer and displays:

Checking WatchDog Timer
WatchDog Timer OK
3. Press the **SPACE** bar to move to the next test.

The program then flashes four LEDs in turn on the input hardware and displays:

LED 1 Flashing Test
LED 2 Flashing Test
LED 5 Flashing Test
LED 7 Flashing Test

NOTE: LED 7 is mounted separately from the other LEDs.

The corresponding LED on the IBMI board will flash, press the **SPACE** bar once you have checked that the LED is flashing. Additionally the ONLINE SEQUENCE LEDs on the external connection box will flash in sequence when LED 7 flashes.

4. Press the **SPACE** bar after each message and to move to the next test.
The program then checks the counter that stores the line length.
Line Length Counter Tests
 - 1) Binary down count to (value)
 - 2) Current count check: (value)Test Completed OK
Both counts start at 11111111 and decrement to 00000001.
5. Press the **SPACE** bar to move to the next test.
The program then tests the Static RAM (SRAM) and displays:
SRAM Load and Readback Test
Current block load address (value)
Current block read address (value)
Test Completed OK
Both counts start at X'00' and increment to X'7F'.
6. Press the **SPACE** bar to move to the next test.
The program then checks the interrupts for the interface hardware and displays:
Interrupt Output Test
IRQ5: SW2 4 is ON
Interrupt OK
Interrupt Status OK
Test Completed OK
If you get the message:
Interrupt Error
You should check the interrupt links and the position of Switchbank 2 Switch 5. For an interface with two boards the input card is considered to be the last card in the chain and, as such:
 - The interrupt link is connected to the IN socket (JP1).
 - Switchbank 2 Switch 5 should be set to ON.If you have more than two interface boards installed, check the Installation Section of this manual for details of the interrupt.
7. Press the **SPACE** bar to move to the next test.
The program then provides a BUS-IN and BUS-OUT loopback test on the hardware and the external box and displays:
BUS-IN Loopback Test
Basic Parity Check In 0
Test Completed OK
Data Loopback Test (value)
Hit any key to Stop Test.
The value continually counts and resets until you press any key to stop the count and move on to the BUS-OUT test.
BUS-OUT Loopback Test
Basic Parity Check On 0
Test Completed OK

- Data Loopback Test (value)
Hit any key to Stop Test.
8. Press the **SPACE** bar to move to the next test.
The program then provides a handshaking test on the board and the external box and displays:
 Main Channel Handshaking Test Routines
 Entry.....DD
 Test Completed OK
 9. Press the **SPACE** bar to finish the tests. The display shows:
 End of IBMI Tests
 10. Repeat the test program to verify the results.
 11. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.
 If there is a problem, hardware may need replacing.

IBM Channel output

1. Type **IBMO** and press the **RETURN** key. The screen will display:
 Switch 1 Operational Test
 This test checks the data path through the hardware. At the beginning of the test, all switches should be switched OFF and read 0.
2. For each switch:
 - Change the position to ON, the value should change to 1.
 - Change the position to OFF, the value should change to 0.
 Note: Make sure that you reset all switches to OFF.
 At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start:
 All Switches Tested OK
 If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:
 All Switches NOT Tested
 will be displayed and the next test will start. If there is a problem, replace the output hardware.
 The program then checks the security byte and confirms that type of hardware installed in the interface. The screen will display:
 Security Byte Value Test
 Security byte OK. IBMO200 Board
 If there is a problem, replace the output hardware.
3. Press the **SPACE** bar to move to the next test.
 This test checks the timer and displays:
 Timer Reset Test
 Flashes LED 1
4. Check LED 1 is flashing and press the **SPACE** bar. The display shows
 Timer Load test
 It will binary countdown

- Current timer check: 00000001
 Test Completed OK
 The count starts at 11111111 and decrements to 00000001.
5. Press **ø**. The display shows:
 Timer Count test
 It will binary countdown
 Current timer check: 00000001
 Test Completed OK
 The count starts at 11111111 and decrements to 00000001.
 If there is a problem, replace the IBMO board.
6. Press the **SPACE** bar to move to the next test.
 This test checks the interrupts for the interface hardware and displays:
 Interrupt Output Test
 IRQ5: SW2 4 is ON
 Interrupt OK
 Interrupt Status OK
 Test Completed OK
 If you get the message:
 Interrupt Error
 You should check the interrupt links and the position of Switchbank 2 Switch 5. For an interface with two boards the output card is considered to be the first card in the chain and, as such:
- The interrupt link is connected to the OUT socket (JP2).
 - Switchbank 2 Switch 5 should be set to OFF.
- If you have more than two interface boards installed, check the Installation Section of this manual for details of the interrupt.
7. Press the **SPACE** bar to move to the next test.
 This provides a handshaking test on the board and the external box and displays:
 Main Channel Handshaking Test Routines
 Entry.....0146
 Test Completed OK
 Hardware Time Test Routines
 Enable Hardware Timeout OK
 Test Completed OK
8. Press the **SPACE** bar to finish the tests. The display shows:
 End of IBMO Tests
9. Repeat the test program to verify the results.
10. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.
 If these is a problem, hardware may need replacing.

OSLAN and TCP/IP

1. Type **OSI** and press the **RETURN** key. The screen will display:

Switch 1 Operational Test

This test checks the data path through the board. At the beginning of the test, all switches should be switched OFF and read 0.
2. For each switch:
 - Change the position to ON, the value should change to 1.
 - Change the position to OFF, the value should change to 0.

Note: Make sure that you reset all switches to OFF.

At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start:

All Switches Tested OK

If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:

All Switches NOT Tested

will be displayed and the next test will start.

The program then checks the security byte and confirms that type of hardware installed in the interface. The screen will display:

Security byte set at 00000100

OSI Security Address Test

Address Value: FF

One of the following messages will be displayed depending on the version of the input hardware.

Original OSI Board. OSI200

Modified OSI Board. OSI201

Any additional features are then listed, then:

Test Completed OK
3. Press the **SPACE** bar to move to the next test which are a series of read/write and DMA tests. A counter of four digits will count up in hexadecimal to FFFF on all except one of the tests which will count to 0501. This process will take approximately 3 minutes. When tests are finished, the screen will display:

Test Completed OK
4. Press the **SPACE** bar to move to the next test which checks the counter that stores the line length. The screen will display:

Line Length Counter Tests

1) Binary down count to (value)

Current count check: (value)

Test Completed OK

2) Terminal count check

Test Completed OK

Both counts start at 11111111 and decrement to 00000001.
5. Press the **SPACE** bar to move to the next test which tests the Static RAM (SRAM) and displays:

SRAM Load and Readback Test

Current block load address (value)

- Current block read address (value)
Test Completed OK
- Both counts start at X'00' and increment to X'7F'.
6. Press the **SPACE** bar to move to the next test which tests the Dynamic RAM (DRAM) and displays:
 - DRAM Load and Readback Test
 - Current load block address (value)
 - Current read block address (value)
 - Test Completed OK

Both counts start at X'00' and increment to X'FF'.
 7. Press the **SPACE** bar to move to the next test which will carry out five tests on the hardware timer and will display:
 - OSI.....Set-Up Complete.....LOCAL
 - STATUS TEST 1.....OK
 - STATUS TEST 2.....OK
 - TIMER TEST 0.....OK
 - TIMER TEST 1.....OK
 - TIMER TEST 2.....OK
 - Test Completed OK
 8. Press the **SPACE** bar to move to the next test which will check the interrupts for the interface hardware and display:
 - Interrupt Output Test
 - IRQ5: SW2 4 is ON
 - Interrupt OK
 - Interrupt status OK
 - Test Completed OK

If you get the message:

 - Interrupt Error

You should check the interrupt links and the position of Switchbank 2 Switch 5. For an interface with two cards the input card is considered to be the last card in the chain and the output card the first in the chain (see the Installation chapter for details).
 9. Press the **SPACE** bar to move to the next test which checks the DMA and translation functions of the hardware and displays:
 - Dip Switch Bank 2, Switch 8 Should be OFF

Make sure that this switch is set to OFF and type Y. The display shows:

 - Dip Switch Bank 2, Switch 8 Should be ON

Switch Switchbank 2, Switch 8 ON and type Y. The display shows:

 - Dip Switch Bank 2, Switch 8 Should be OFF

Switch Switchbank 2, Switch 8 OFF and type Y. The display shows:

 - Test Completed OK
 10. Press the **SPACE** bar to move to the next test which is used to test the network connection and the interface sends a packet to itself across the network. The test displays:
 - OSI Board. Set Up Complete. Local
 - Current loopback value: FF

Loopback Set to NETWORK

Transceiver attached

Make sure the interface is connected to the network and type Y. The display then shows:

Live Network

Make sure the network is live and type Y. The display then shows:

OSI Board. Set Up Complete. NETWORK

Current loopback value: FF

Test Completed OK

If you get an error for this test:

- Check the transceiver is securely connected and the relevant LED is lit. Try another transceiver that you know operates.
- Check the drop cable connection is securely made and locked. Change the drop cable for another that you know operates
- Check with the customer that the network or segment of the network is functional.

11. Press the **SPACE** bar to finish the tests. The display shows:

End of OSI Tests

12. Repeat the test program to verify the results.
13. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.

If there is a problem, hardware may need replacing.

PDSI

The TEST program is not available for PDSI. There is, however a loopback test that requires a special loopback cable for the software to RUN.

If there is a problem, hardware may need replacing.

Serial Remote input and output

1. Type SCB and press the **RETURN** key. The screen will display:

Switch 1 Operational Test

This test checks the data path through the board. At the beginning of the test, all switches should be switched OFF and read 0.

For each switch:

- Change the position to ON, the value should change to 1.
- Change the position to OFF, the value should change to 0.

Make sure that you reset all switches to OFF.

At the end of the Switch 1 test, if the test was successful, the following message will be displayed and the next test will start.:

All Switches Tested OK

If you press the **RETURN** key without changing the state of all of the switches (or if a change of the state of any switch fails and you press the **RETURN** key to move on), the message:

All Switches NOT Tested

will be displayed and the next test will start.

The program then checks the security byte and confirms that type of

hardware installed in the interface. The screen will display:

Security Byte 00000001

2. Press the **SPACE** bar to move to the next test.

The program then flashes LED 1 on the output hardware and displays:

LED 1 Flashing Test

LED 1 on the SCB board will flash.

3. Press the **SPACE** bar to move to the next test.

The program then checks the counter that stores the line length.

Line Length Counter Tests

1) Binary down count to (value)

2) Current count check: (value)

Test Completed OK

Both counts start at 11111111 and decrement to 00000001.

4. Press the **SPACE** bar to move to the next test.

LED 2 will flash.

Press the **SPACE** bar to move to the next test.

LED 4 will flash.

5. Press the **SPACE** bar to move to the next test which will check the interrupts for the interface hardware and display:

Interrupt Output Test

IRQ5: SW2 4 is ON

Interrupt OK

Interrupt status OK

Test Completed OK

If you get the message:

Interrupt Error

You should check the interrupt links and the position of Switchbank 2 Switch 5. For an interface with two cards the input card is considered to be the last card in the chain and the output card the first in the chain (see the Installation appendix for details).

6. Press the **SPACE** bar, the Main Comms Chip Access Test Routines are performed.

A series of Register Load Tests will be performed; if a fault is found, the test will halt and a 'fail' message will be displayed.

7. Press the **SPACE** bar, the Main Comms Chip Internal Loopback Test is performed.

Ensure that there are no external loopback cables fitted.

A series of internal loopback tests will be performed; if a fault is found, the test will halt and a 'fail' message will be displayed.

8. Press the **SPACE** bar, the Main Comms Chip External Loopback Test is performed on Channel 1.

Plug the SCB loopback plug type A into Channel 1.

A series of external loopback tests will be performed; if a fault is found, the test will halt and a 'fail' message will be displayed.

9. Press the **SPACE** bar, the Main Comms Chip External Loopback Test is performed on Channel 2.

- Plug the SCB loopback plug type A into Channel 2.
A series of external loopback tests will be performed; if a fault is found, the test will halt and a 'fail' message will be displayed.
10. Press the **SPACE** bar, the Channel 1 to Channel 2 Link Test is performed.
Connect SCB link cable type A with Plug A to Channel 1 and Plug B to Channel 2.
A series of cross channel link tests will be performed; if a fault is found, the test will halt and a 'fail' message will be displayed.
 11. Press the **SPACE** bar, the Main Comms Chip Internal Loopback Test Routines - variable, is performed.
Ensure that there are no external connections to either channel
A series of internal loopback tests will be performed; if a fault is found, the test will halt and a 'fail' message will be displayed.
 12. Press the **SPACE** bar, the Main Comms Chip (v2.1) Internal Loopback Test Routines are performed.
Ensure that there are no external connections to either channel
A series of internal loopback tests will be performed; The following test sequences will FAIL. This is Due to a modification in the Main Comms Chip (v2.1), the test will halt and a 'fail' message will be displayed.
 13. Press the **SPACE** bar a number of times to terminate the final test routines.
When the last test is completed, the display shows:
End of OSI Tests
 14. Press the **ESC** button to complete the test program.
 15. Repeat the test program to verify the results.
 16. Follow the instructions displayed on the screen recording any error messages that may appear. The record of error messages must accompany any defective boards that are returned for repair.
If these is a problem, hardware may need replacing.

Verifying year 2000 compliance

The TN Series of interfaces software satisfies the year 2000 compliance requirements. It is, however, important to verify that the PC base and DOS version on which the software runs are also compliant. This is especially true with PC platforms running older BIOS versions.

To test the PC for compliance:

1. Exit the emulation program and display the DOS prompt. This procedure will vary according to the version of the interface software, see the Operator Guide for details of how to do this.

2. Type **TEST** and press the **RETURN** key The **TEST** screen will be displayed.

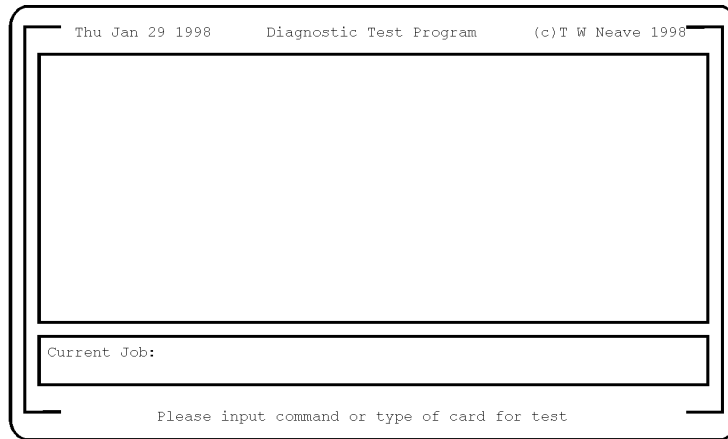


Figure 3-2 Test screen

3. Type **TESTPC** and press the **RETURN** key. The display will show:

```
CMOS Date.....Valid Century cc
                Year yy
                Month mm
                Day dd
DOS Date.....Valid Century eeee
                Year ff
                Month gg
                Day h
```

Where:

cc	The first two digits of the four digit year.
yy	The last two digits of the four digit year.
mm	The number of the month.
dd	The day of the month.
eeee	The four digit year.
ff	The month number.
gg	The day of the month.
h	The number of the day in the week (Monday=1).

4. Check to see that both clocks give the same readings. If the clocks do not give the same reading, you will need to replace the PC. Contact your FunAsset dealer.
5. Close the **TEST** program and use the **DOS TIME** and **DATE** commands to set the PC's clock to 23:59:00 on 31st December 1999. Enter the information using the date and time format displayed when the command is issued.
6. Wait at least one minute to let the PC change its date and time to 1st January 2000.
7. Rerun the **TEST** program with the **TESTPC** command verifying that both dates still read the same and show the correct values.
If there are any discrepancies in the dates or if the display shows "Invalid Century" indicates that the PC is not compliant with year 2000 requirements. If the clocks do not give the same reading, you will need to replace the PC. Contact your FunAsset dealer.
8. Exit the **TEST** program and reset the date and time.

Check 4 - PRTEST

The PRTEST diagnostic tool allows you to test the printer offline to the host. It offers several patterns and printer tests and can be used to verify the output hardware, cables and printer connection as well as data bits and transfer speed.

To start a printer test:

1. Type PRTEST on the command line of the screen and press the **RETURN** key.
2. Type the character of the test that you want to run.
3. The following table lists all the tests available, the code used to invoke the test and the output emulations that use these codes. Press the space bar to stop a test.

Key	Description	DPO	IBMO	PCO	SIRO	TCPO	SPLO SQUO
7	Sets the output to 7 bit data. If the character set is in EBCDIC a restricted character set will be output.	✓	✓	✓	✓		✓
8	Sets the output to 8 bit data. If the character set is ASCII the extended character set will be output.	✓	✓	✓	✓		
A	Prints a line of a single character then a line of the next. You will be requested to input the first character in the sequence and then the RETURN key.	✓	✓	✓	✓	✓	
B	Dataproducts and PC - Clears the print buffer. IBM Channel - Toggles between byte and block modes.	✓	✓	✓			
C	Channel reset. If the printer and the channel are locked up this will separate (Selective reset in IBM terms).		✓				
D	The number of lines printed on the page, default is 66. You will be requested to input the number and then the RETURN key.	✓	✓	✓	✓	✓	✓
E	Sets the output to even parity	✓		✓			
F	Dataproducts - Forces the DPO board to accept the printer as on line even when not. IBM Channel - Full channel reset (System reset)	✓	✓				
G	Allows the Graphic/Character set to be input. These are recognised: ASCII, 64ASC and EBCDIC.	✓	✓	✓	✓	✓	✓
H	Prints a hammer test over the top of a lines containing all the same character. You will be requested to input the first character in the sequence and then the RETURN key.	✓	✓	✓	✓	✓	
I	Invert the buffer clear signal from NORM to INVERT or INVERT to NORM according to its current status.	✓		✓			
J	For DPO allows the control bit used with PI command to be set using the number range 5 to 8. You will be requested to input the number and press the RETURN key. For SPLO and SQUO allows the job description to be output.	✓		✓			✓
K	Allows the control bit used with PI command to be set using the number range 4 to 7. You will be requested to input the number and press the RETURN key.	✓		✓			
L	Dataproducts, PC and Serial Remote - Use linefeeds to print all output single spaced. IBM Channel and TCP/IP - Single line spacing	✓	✓	✓	✓	✓	✓
M	Dataproducts and PC - Use multi-linespace with PI to print all output with spacing as requested. You will be requested to input the number from 1 to 15 and press the RETURN key. IBM Channel and TCP/IP - Multi line spacing	✓	✓	✓		✓	✓

Key	Description	DPO	IBMO	PCO	SIRO	TCPO	SPLO SQUO
N	Sets the output to no parity.			✓			
O	Sets the output to odd parity.			✓			
P	For DPO, adds PI to the parity calculation. For TCPO, SPLO and SQUO selects the output printer number.	✓		✓		✓	✓
Q	Prints a hammer timing test of lines containing all the same character. You will be requested to input the character and then the RETURN key.	✓	✓	✓	✓	✓	✓
R	Prints a repeat pattern. You will be requested to input the character that will appear in column 1 and then the RETURN key.	✓	✓	✓	✓	✓	✓
S	Prints a shifting pattern. The first character of the first line will be a space.	✓	✓	✓	✓	✓	✓
T	Forces the DPO board to operate without a printer attached. This is used to help diagnose faults with the DPO board. You should check that the line number increments.	✓					
V	Loads a VFU to the printer. You will be requested to input the length of the VFU and then the RETURN key.	✓	✓	✓	✓	✓	✓
W	Allows you to change the width of the printed output to any value between 1 and 250. You will be requested to input the value and then the RETURN key. NOTE: For the IBMO emulation, you can set a width of 1024 characters.	✓	✓	✓	✓	✓	✓
X	Removes PI from the parity calculation.	✓					

4. Press **ESC** to exit PRTEST.

DPO current status display

Current status hhhh - 4 hex digits which represent the status where the bits of the left pair indicate status 2 and of the right pair status 1 as follows:

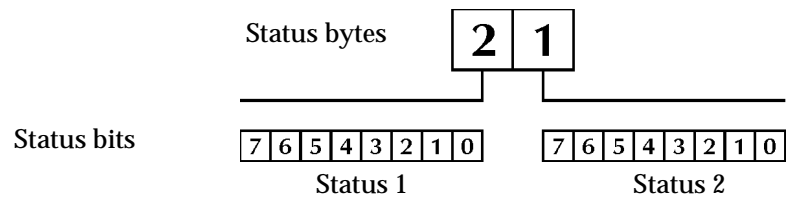


Figure 3-3 Status bytes

Status 2

0 and 1 - normal if 00, hold off (not used) if 01, hold off (not used) if 10 or printer being reset if 11

2 - T state says that printer is off-line but still demanding data

3 - clear printer being actioned

4 - printer not ready or off-line

5 - not used

6 - not used

7 - not used

0 - non-catastrophic transfer failure

1 - time out

2 - end of DMA

3 - input status change

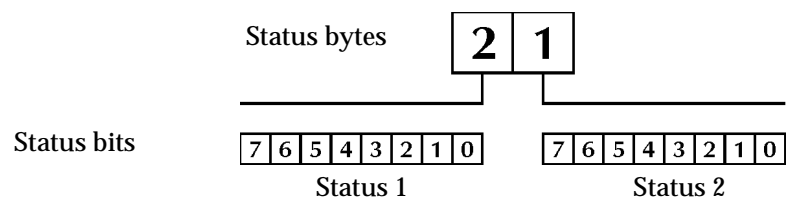
4 - output interrupt

5 - printer on-line initialised hardware

6 - status 2 has relevant information, combination of bits 2, 3 and 4 of status 2

7 - catastrophic transfer failure

- **Printer status hhhh** - 4 hex digits which represent the status where the bits of the left pair indicate status 2 and of the right pair status 1 as follows:



Status 2

0 - VFU ready

1 - paper moving

2 - ID0

3 - ID1

4 - VFU verify

5 - Spare 1

6 - Spare 1

7 - Spare 1

Status 1

- 0 - on-line
- 1 - ready
- 2 - paper empty
- 3 - top of form
- 4 - BOF
- 5 - interface connected
- 6 - parity error
- 7 - printer power

IBMO current status display

Current status is h/w status of board hhhh - 4 hex digits which represent the hardware status where the bits of the left pair indicate status 2 and of the right pair status 1 as follows:

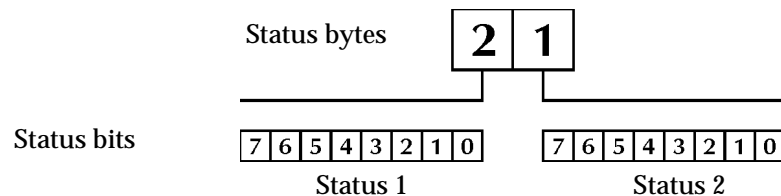


Figure 3-4 Status bytes

status 2

- 0 - incoming status not zero
- 1 - transfer failure on address
- 2 - transfer failure on data
- 3 - parity error on data or status
- 4 - parity error on address
- 5 - printer not as expected
- 6 - transfer currently in place
- 7 - interface disconnected

status 1

- 0 - taking in data if 0 or receiving status if 1
- 1 - normal if 0 or timeout if 1
- 2 - DMA complete
- 3 - input interrupt
- 4 - output interrupt
- 5 - interface connected
- 6 - relevant information in status 2 and is a combination of bits 3, 4 and 5 of status 2
- 7 - transfer failure combination of bits 1 and 2 of status 2

- **TAG value hhhh** - 4 hex digits which represent the channel status where the bits of the left pair indicate the output and of the right pair the input

as follows:

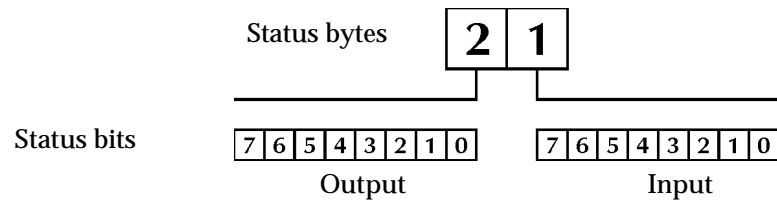


Figure 3-5 Status bytes

Output

- 0 - OP out
- 1 - hold out
- 2 - select out
- 3 - address out
- 4 - command out
- 5 - service out
- 6 - suppress out
- 7 - internal reset inverted (should be 1)

Input

- 0 - request in
- 1 - select in
- 2 - OP in
- 3 - address in
- 4 - status in
- 5 - service in
- 6 - disconnect in
- 7 - internal loopback (should be 0)

NOTE: If the printing system is idle this should read 8100

This chapter describes the IBMI external box and the Long line drivers and receivers used for DPI and DPO.

The IBMI external box

The TN Series IBM Channel Input interface is connected to the Channel by BUS and TAG connectors connected through an external box. The box can be either daisy-chained or terminated. Connection to the interface is made through a 37-pin cable which is plugged directly into the IBMI input hardware.

The Channel BUS and TAG cables (or cables and terminators if the interface is the only or last device on the Channel) are connected to the rear of the unit which also houses a mechanically latching high/low priority switch.

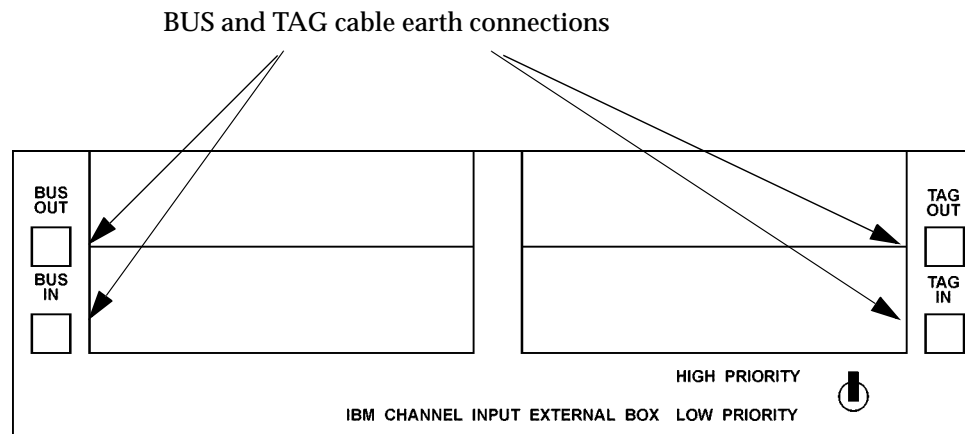


Figure 4-1 IBM Channel input external box back view

NOTE: High priority means that the Channel Select signal will be interrogated on its outward journey, whereas a low priority device will do this on the signal's return journey.

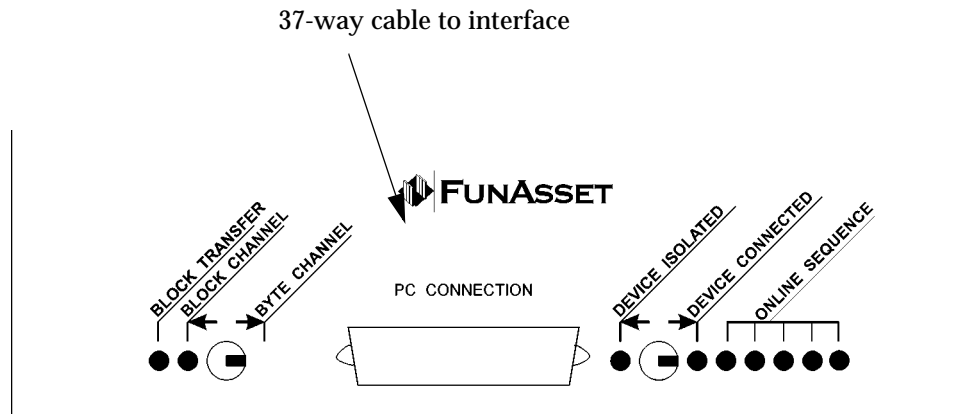


Figure 4-2 IBM Channel input external box front view

The front of the unit has a 37-way D connector which is used to connect the external box to the IBM board within the interface. In addition there are two switches and nine LEDs which are used as follows

- **BLOCK TRANSFER LED (green)** - this LED will light when high speed transfer is set and operational.
- **BLOCK CHANNEL/BYTE CHANNEL switch** when this switch is switched towards BLOCK CHANNEL, the yellow BLOCK CHANNEL LED will light and high speed transfer will be enabled.
- When the switch is switched towards BYTE CHANNEL, the LED is not lit and the interface can work on any byte or selector channel from the host system but will not be able to make use of the high speed transfer option.
- **CHANNEL ISOLATED/CONNECTED switch** - when the switch is towards DEVICE ISOLATED the green LED below it is lit as long as the interface has been powered up and the red LED below DEVICE CONNECTED is extinguished. Under these conditions, the external connecting box is powered down and the interface is isolated from the channel.
- When the switch is towards DEVICE CONNECTED, the green LED below DEVICE ISOLATED is extinguished and the red LED below DEVICE CONNECTED is lit. Under these conditions, the power of the connecting box is controlled by the interface and emulation program.
- **ONLINE SEQUENCE LEDs (yellow)** - these LEDs are lit in sequence, when the IBM input program has been loaded as long as the DEVICE ISOLATED/CONNECTED switch is set to DEVICE CONNECTED.

The sequence, from left to right, indicates the following:

- Low voltage power is functioning.
- BUS driver enabled.
- Select line receiver connected.
- Select line connected through the external box circuitry.
- On-line sequence completed.

After the initialisation sequence all five of these LEDs should remain lit.

Dataproducts long line driver

Many host computer systems and all FunAsset interfaces, through their Dataproducts outputs, provide a Dataproducts short-line connection for use by the attached printer (Short line connections use single ended transistor to transistor logic known as TTL).

The DB1009 is provided to connect a host system or a FunAsset interface with Dataproducts short-line output to any system with a Dataproducts long-line input. Additionally, the DB1009 can be used in combination with the FunAsset long-line receiver, DB1090, to extend Dataproducts short line connections across distances of up to 1Km.

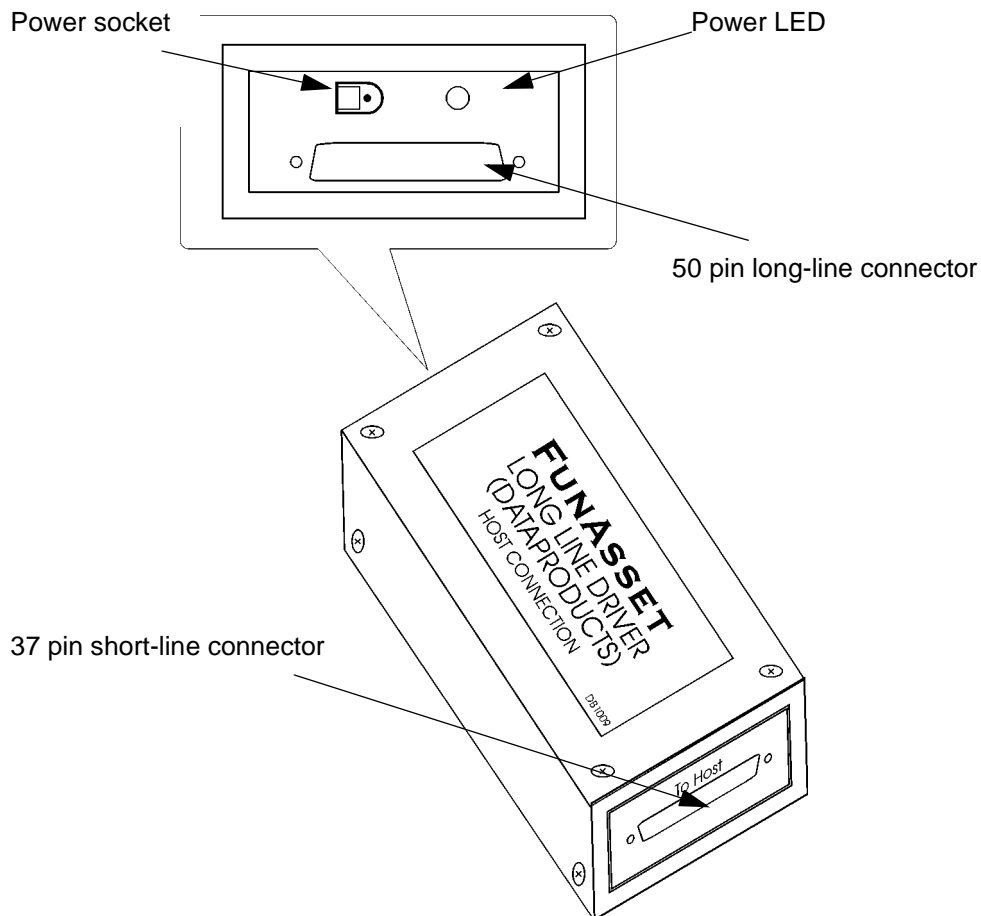


Figure 4-3 Long line driver

Long-line connection

The DB1009 allows for a maximum cable length of 1 Km and makes use of differential drivers/receivers physically linked to drive balanced lines, such as twisted pair cable. This enables the receiver to sense small differential signals.

The DB1009 has three external connections, an external power supply, a 50 way long line female D connector and a 37 way short-line female D connector. The power supply, which must be plugged into a properly earthed mains power socket adjacent to the box, provides a low voltage DC supply to the long line driver box.

When power is connected to the box, a red LED on the side of the box will be illuminated.

The 50 way female D connector is a standard Dataproducts connector using standard Dataproducts signal names and pinouts. The 37 way D connector is a FunAsset connector which supports all Dataproducts short-line signals.

Power consumption

The nominal power consumption of the DB1009 is 1.1 Amps.

Customising the driver

The DB1009 is factory set to pass all 8 data bits with parity generated by the host system. You can customise the driver to generate parity to suit your local requirements by changing the position of any of the jumper links JP3 to JP9. Jumper links JP3 to JP9 are:

- **JP3 Parity** - See table below. When linked produces even parity from the host data, for the long line connection.
- **JP4 Parity** - See table below. When linked produces odd parity from the host data, for the long line connection.
- **JP5 Host Parity Passed** - When linked it allows the parity from the host to pass straight through to the long line connection. This is the default setting.
- **JP6 Select 7 Bit Data** - This includes data bits 1 to 7 in the parity generation (disables signal bit 8).
- **JP7 Select 8 Bit Data** - This includes all 8 data bits in the parity generation.
- **JP8 Paper instruction not in parity** - Excludes PI from the parity generation.
- **JP9 Paper instruction in parity** - Includes PI in the parity generation.
- The following table below shows you which jumpers to set to achieve the required output.

Function	JP3	JP4	JP6	JP7	JP8	JP9
7 bits ODD parity Paper Instruction not in Parity	OUT	IN	IN	OUT	IN	OUT
7 bits EVEN parity Paper Instruction not in Parity	IN	OUT	IN	OUT	IN	OUT
7 bits ODD parity Paper Instruction in Parity	OUT	IN	IN	OUT	OUT	IN
7 bits EVEN parity Paper Instruction in Parity	IN	OUT	IN	OUT	OUT	IN
8 bits ODD parity Paper Instruction not in Parity	OUT	IN	OUT	IN	IN	OUT

Function	JP3	JP4	JP6	JP7	JP8	JP9
8 bits EVEN parity Paper Instruction not in Parity	IN	OUT	OUT	IN	IN	OUT
8 bits ODD parity Paper Instruction in Parity	OUT	IN	OUT	IN	OUT	IN
8 bits EVEN parity Paper Instruction in Parity	IN	OUT	OUT	IN	OUT	IN

The DB1009 can also be set to enable a number of signals to be used when generation READY and ONLINE. This is done using jumpers JP10, JP11, JP12 and JP13. Jumper links JP10 to JP13 are:

- **JP10 Include INTVER in READY** - Includes INTVER in the READY signal. The effect of this is to disable the READY signal if the physical connection link is not complete (see note below).
- **JP11 Include POWER in READY** - Includes POWER in the READY signal. The effect of this is to disable the READY signal if the printer is not powered up (see note below).
- **JP12 Include VFUVER in VFUREADY** - Includes VFUVER in the VFUREADY signal, disabling VFUREADY if the VFUVER (VFU verify) signal is not present.
- **JP13 Include READY in ONLINE** - Includes READY in ONLINE signal, so READY needs to be true to allow the on-line signal to be true.

NOTE: READY may include the signals INTVER and/or POWER set by JP10 and JP11. If all three jumpers are in then the four signals INTVER, power, READY and ONLINE would be combined and passed to the host as the single ONLINE signal where, if any one was untrue, ONLINE would also be untrue.

Changing the settings

To change the settings:

1. Disconnect the power lead, the long-line connector and the short-line connector from the DB1009.
2. Remove and retain the eight screws securing the cover, shown below.

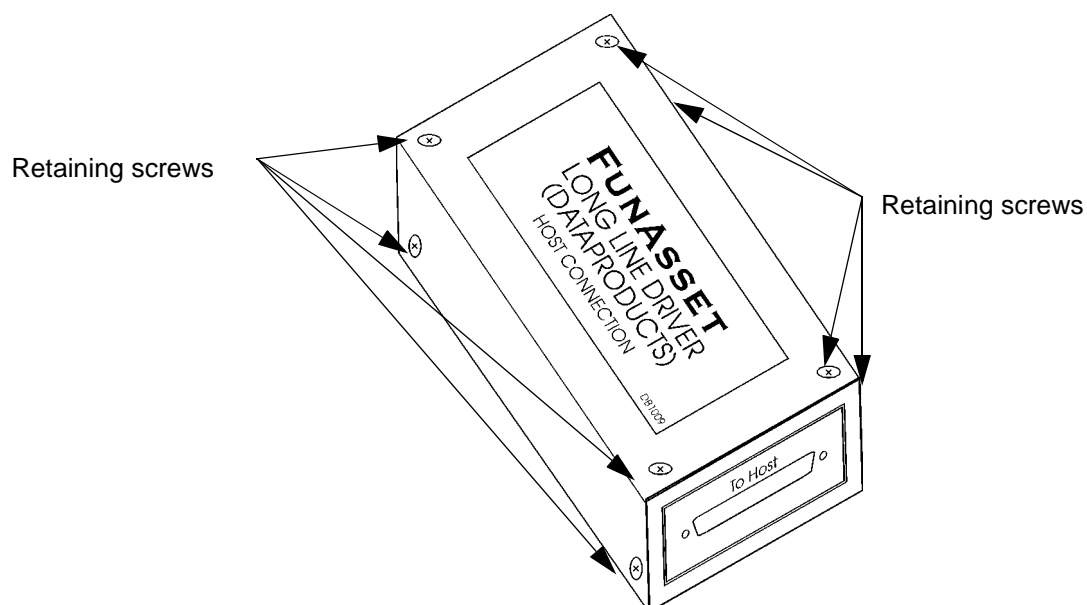


Figure 4-4 Screw location

3. Locate the jumpers that you need to move. Shown in the illustration below

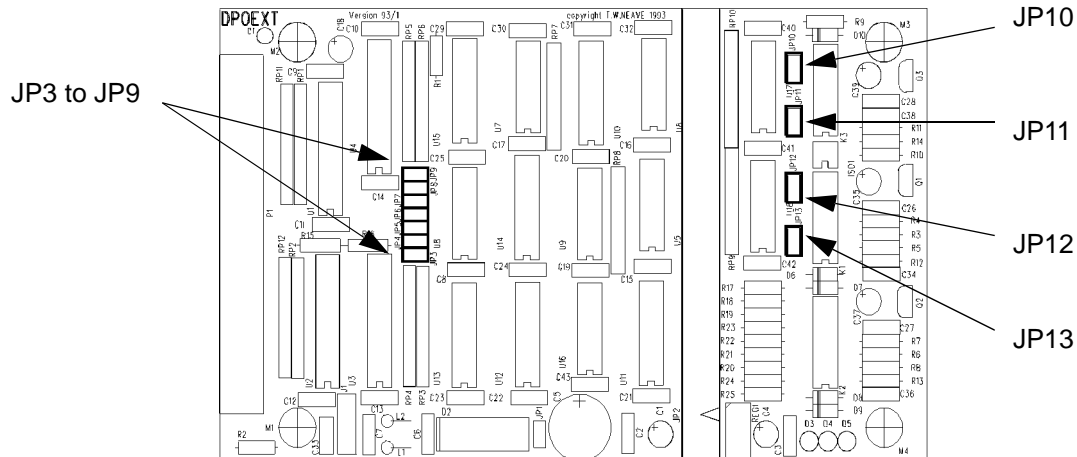


Figure 4-5 Jumper location

4. Reposition the jumpers according to your requirements.

NOTE: The jumper links are made when the jumper block straddles both pins of the jumper position.

5. Replace the top cover and the eight retaining screws.
6. Reconnect the power lead, the long-line connector and the short-line connector from the DB1009.

Dataproducts long-line receiver

Some host computer systems, where a high noise immunity or connection over a greater distance is required, provide a Dataproducts long-line connection for use by the attached printer (Long line connections use balanced differential driver/receiver circuits).

The DB1090 will connect a host system with a standard Dataproducts long-line output to either a FunAsset Dataproducts input interface or any printing system with a standard Dataproducts short-line input connection. Alternatively, a DB1090 can be used in combination with a FunAsset long-line driver, DB1009, to provide a short line extension across distances of up to 1Km.

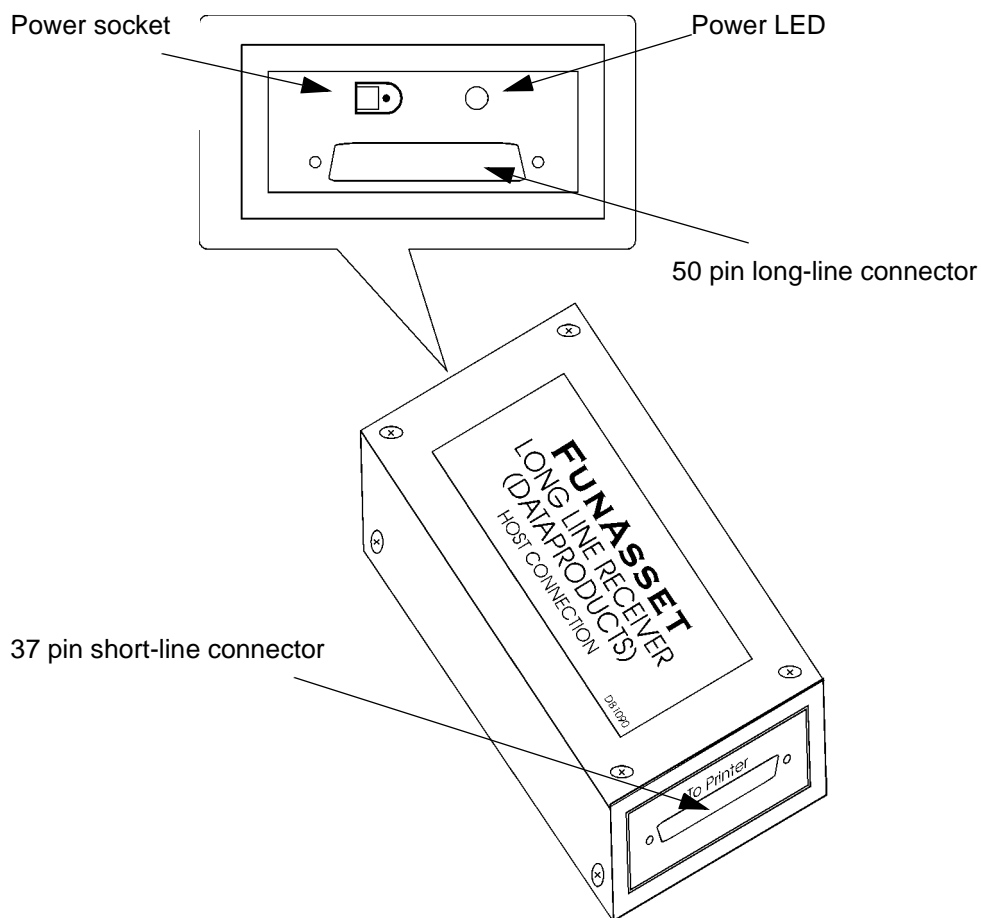


Figure 4-6 Long line driver

Long-line connection

The DB1090 allows for a maximum cable length of 1 Km and makes use of differential drivers/receivers physically linked to drive balanced lines, such as twisted pair cable. This enables the receiver to sense small differential signals.

The DB1090 has three external connections, an external power supply, a 50 way long line female D connector and a 37 way short-line female D connector. The power supply, which must be plugged into a properly earthed mains power socket adjacent to the box, provides a low voltage DC supply to the long line driver box.

NOTE: The long-line receiver box only requires an external power supply when it is not connected to the TN Series Dataproducts input interface.

When power is connected to the box, a red LED on the side of the box will be illuminated.

The 50 way female D connector is a standard Dataproducts connector using standard Dataproducts signal names and pinouts. The 37 way D connector is a FunAsset connector which supports all Dataproducts short-line signals.

Power consumption

The nominal power consumption of the DB1090 is 920mA.

Customising the driver

The DB1090 can be customised to indicate a "printer power fail" to the host (or FunAsset DB1009) - only one jumper can be set. The jumper links are:

- **JP3 Printer Power Fail** - Allows the connected host to detect whether or not the external box has power.
- **JP4 Emulation on or off** - Allows the connected host to detect whether the emulation is on or off.
- **JP5 Interface powered up** - Allows the connected host to detect whether or not the interface PC is powered up.

Changing the settings

To change the settings:

1. Disconnect the power lead, the long-line connector and the short-line connector from the DB1090.
2. Remove and retain the eight screws securing the cover. Shown below.

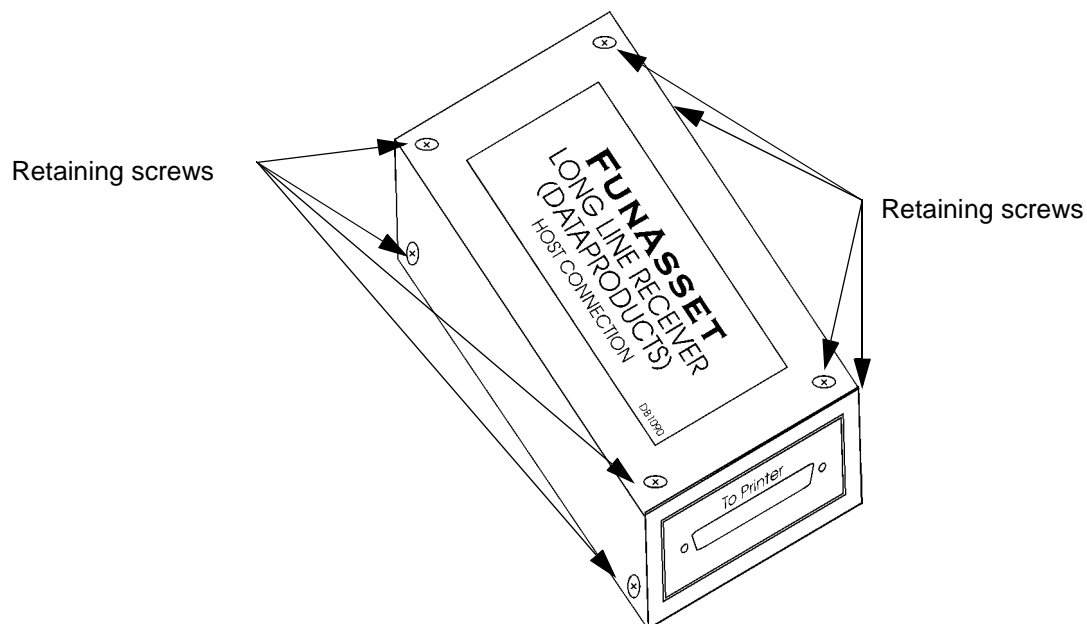


Figure 4-7 Screw location

3. Locate the jumpers that you need to move. Shown in the illustration

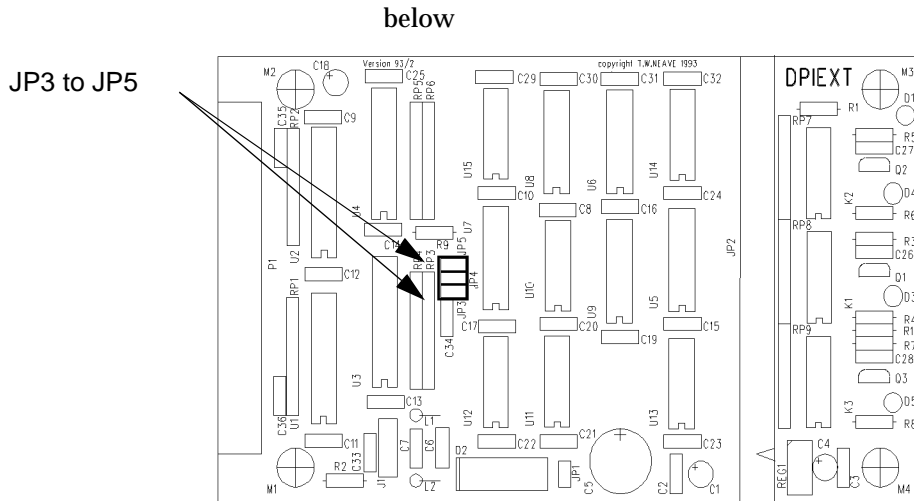


Figure 4-8 Jumper location

4. Reposition a jumper according to your requirements. Remember that you can only select one of the facilities.

NOTE: The jumper links are made when the jumper block straddles both pins of the jumper position.

5. Replace the top cover and the eight retaining screws.
6. Reconnect the power lead, the long-line connector and the short-line connector from the DB1090.

The following tables show the pinouts for each of the interface connections.

The tables are for:

- Centronics input (see page 5.2).
- Dataproducts (see page 5.4).
- IBMI and IBMO BUS connectors (see page 5.5).
- IBMI and IBMO TAG connectors (see page 5.7.)
- ICL Peripheral Interface (see page 5.9).
- OSLAN and TCP/IP (see page 5.9).
- PC Serial (see page 5.10).
- PC Parallel Centronics output (see page 5.11).
- PC Parallel Dataproducts output (see page 5.11).
- Serial Remote (see page 5.12).

Centronics input

There are two versions of the Centronics cable. At the interface end, there is a 37-way connector for both cables. At the host end you will be supplied with a 36-way or a 25-way cable according to your requirements.

36-way connector

The following table shows the pinout for 36-way host connector.

Signal	Pin	Signal	Pin
Strobe	1	Ground	19
Data 0	2	Ground	20
Data 1	3	Ground	21
Data 2	4	Ground	22
Data 3	5	Ground	23
Data 4	6	Ground	24
Data 5	7	Ground	25
Data 6	8	Ground	26
Data 7	9	Ground	27
Ack	10	Ground	28
Busy	11	Ground	29
Paper empty	12	Ground	30
Online	13	Prime	31
Autofeed	14	Fault	32
	15	Aux	33
	16		34
	17	Power	35
+5V	18	Select in	36

25-way connector

The following table shows the pinout for the 25-way host connector.

Signal	Pin	Signal	Pin
Strobe	1	Autofeed	14
Data 0	2	Fault	15
Data 1	3	Prime	16
Data 2	4	Select in	17
Data 3	5	Ground	18
Data 4	6	Ground	19
Data 5	7	Ground	20
Data 6	8	Ground	21
Data 7	9	Ground	22
Ack	10	Ground	23
Busy	11	Ground	24
Paper empty	12	Ground	25
Online	13		

37-way connector

The following table shows the pinout for the 37-way interface connector.

Signal	Pin	Signal	Pin
+12V (optional)	1	Ground	20
+5V (optional)	2		21
Data 0	3	Aux	22
Data 1	4		23
Data 2	5		24
Data 3	6	Select in	25
Data 4	7	Autofeed	26
Data 5	8		27
Data 6	9		28
Data 7	10		29
	11		30
	12		31
Strobe	13	Power	32
Ack	14		33
Busy	15		34
Online	16	Paper empty	35
Fault	17	Prime	36
	18	+5V	37
Ground	19		

Dataproducts

The following table shows the pinout for the Dataproducts input and output boards.

Signal	Pin	Signal	Pin
+12v (optional)	1	GND	20
+5V (optional)	2	VFU Verify +	21
Data0	3		22
Data1	4		23
Data2	5		24
Data3	6	VFU Verify -	25
Data4	7	IFCON -	26
Data5	8	ID0	27
Data6	9	ID1	28
Data7	10	TOF	29
Data8 (PI)	11	BOF	30
Data9 (Par)	12	PError	31
Strobe	13	Power	32
Demand	14	VFU Ready	33
	15	Moving	34
ONLINE	16		35
READY	17	Buffer Clear	36
IFCON +	18	PC Power	37
GND	19		

IBMI and IBMO

The following tables show the signal names and associated pins for the IBM Channel BUS and TAG connectors.

There are two types of cables, GREY and BLUE. Grey cables have a lower specification and can only be used for connection lengths up to 61 metres (200 ft). Blue cables can be used up to 122 metres (400 ft). Both cables should be the same colour.

Connecting cables to each other, through a device or a channel switch reduces the available cable length by 3 metres (10 ft) for each connection.

Bus connectors

The dark shaded connector is connected to the host system and the light shaded connector to the interface.

Dark shaded end

Signal	Pin	Signal	Pin
Ground	B2		D2
Bus 0 Out P	B3	Ground	D3
Ground	B4	Bus 0 Out 0	D4
Bus 0 Out 1	B5	Ground	D5
	B6	Bus 0 Out 2	D6
Ground	B7	Ground	D7
Bus 0 Out 3	B8	Ground	D8
Ground	B9	Bus 0 Out 4	D9
Bus 0 Out 5	B10	Ground	D10
Ground	B11	Bus 0 Out 6	D11
Bus 0 Out 7	B12	Ground	D12
Ground	B13	Mark 0 Out	D13
Ground	G2		J2
Bus 0 In P	G3	Ground	J3
Ground	G4	Bus 0 In 0	J4
Bus 0 In 1	G5	Ground	J5
	G6	Bus 0 In 2	J6
Ground	G7	Ground	J7
Bus 0 In 3	G8	Ground	J8
Ground	G9	Bus 0 In 4	J9
Bus 0 In 5	G10	Ground	J10
Ground	G11	Bus 0 In 6	J11
Bus 0 In 7	G12	Ground	J12
Ground	G13	Mark 0 In	J13

Light shaded end

Signal	Pin	Signal	Pin
	D2	Ground	B2
Ground	D3	Bus 0 Out P	B3
Bus 0 Out 0	D4	Ground	B4
Ground	D5	Bus 0 Out 1	B5
Bus 0 Out 2	D6		B6
Ground	D7	Ground	B7
Ground	D8	Bus 0 Out 3	B8
Bus 0 Out 4	D9	Ground	B9
Ground	D10	Bus 0 Out 5	B10
Bus 0 Out 6	D11	Ground	B11
Ground	D12	Bus 0 Out 7	B12
Mark 0 Out	D13	Ground	B13
	J2	Ground	G2
Ground	J3	Bus 0 In P	G3
Bus 0 In 0	J4	Ground	G4
Ground	J5	Bus 0 In 1	G5
Bus 0 In 2	J6		G6
Ground	J7	Ground	G7
Ground	J8	Bus 0 In 3	G8
Bus 0 In 4	J9	Ground	G9
Ground	J10	Bus 0 In 5	G10
Bus 0 In 6	J11	Ground	G11
Ground	J12	Bus 0 In 7	G12
Mark 0 In	J13	Ground	G13

Tag connectors

The dark shaded connector is connected to the host system and the light shaded connector to the interface.

Dark shaded end

Signal	Pin	Signal	Pin
Ground	B2		D2
Operational In	B3	Ground	D3
Ground	B4	Status In	D4
Address In	B5	Ground	D5
	B6	Service In	D6
Ground	B7	Ground	D7
Select In	B8	Ground	D8
Ground	B9	Select Out	D9
Address Out	B10	Ground	D10
Ground	B11	Command Out	D11
Suppress Out	B12	Ground	D12
Ground	B13	Service Out	D13
Ground	G2		J2
Clock Out	G3	Ground	J3
Ground	G4	Metering Out	J4
Metering In	G5	Ground	J5
	G6	Request In	J6
Ground	G7	Ground	J7
Data In	G8	Ground	J8
Ground	G9	(Special Use)	J9
Data Out	G10	Ground	J10
Ground	G11	Disconnect In	J11
Hold out	G12	Ground	J12
Ground	G13	Operational Out	J13

Light shaded end

Signal	Pin	Signal	Pin
	D2	Ground	B2
Ground	D3	Operational In	B3
Status In	D4	Ground	B4
Ground	D5	Address In	B5
Service In	D6		B6
Ground	D7	Ground	B7
Ground	D8	Select In	B8
Select Out	D9	Ground	B9
Ground	D10	Address Out	B10
Command Out	D11	Ground	B11
Ground	D12	Suppress Out	B12
Service Out	D13	Ground	B13
	J2	Ground	G2
Ground	J3	Clock Out	G3
Metering Out	J4	Ground	G4
Ground	J5	Metering In	G5
Request In	J6		G6
Ground	J7	Ground	G7
Ground	J8	Data In	G8
(Special Use)	J9	Ground	G9
Ground	J10	Data Out	G10
Disconnect In	J11	Ground	G11
Ground	J12	Hold out	G12
Operational Out	J13	Ground	G13

OSLAN and TCP/IP

The following tables show the signal names and associated pins for the MAU connector (15-way D female).

Signal	Pin	Signal	Pin
Ground	1	Collision -	9
Collision +	2	Transmit -	10
Transmit +	3	Ground	11
Ground	4	Receive -	12
Receive +	5	+ 12v	13
Ground	6	Ground	14
No connect	7	No connect	15
Ground	8		

PC connectors

The interface can make an input connection through the PC's serial port and output connections through the PC's serial and parallel ports. Parallel connections can be either Centronics or Dataproducts protocols.

PC Serial

The following tables show the signal names and associated pins for the serial connectors.

RS232 (25 way D)

Signal	Pin
Not connected	1
TX (transmit data)	2
RX (receive data)	3
RTS (request to send)	4
CTS (clear to send)	5
DSR (data set ready)	6
GND (signal ground)	7
DCD (data carrier det)	8
+ transmit current loop data	9
Not connected	10
- transmit current loop data	11
Not connected	12
Not connected	13
Not connected	14
Not connected	15
Not connected	16
Not connected	17
+ receive current loop data	18
Not connected	19
DTR (data terminal ready)	20
Not connected	21
RI (ring indicator)	22
Not connected	23
Not connected	24
- receive current loop data	25

RS232 (9 way D)

Signal	Pin
DCD (data carrier det)	1
RX (receive data)	2
TX (transmit data)	3
DTR (data terminal ready)	4
GND (signal ground)	5
DSR (data set ready)	6
RTS (request to send)	7
CTS (clear to send)	8
RI (ring indicator)	9

PC Parallel Centronics

The following tables show the signal names and associated pins for the Centronics connector.

Signal	Pin	Signal	Pin
Strobe	1	Ack	10
Data 0	2	Busy	11
Data 1	3	Paper end	12
Data 2	4	Select/Online	13
Data 3	5	Auto feed	14
Data 4	6	Error	15
Data 5	7	Init printer	16
Data 6	8	Select input	17
Data 7	9	Ground	18-25

PC Parallel Dataproducts

The following tables show the signal names and associated pins for the Dataproducts connector.

Signal	Pin	Signal	Pin
Strobe	1	IF connect	10
Data 0	2	Demand	11
Data 1	3	VFUR	12
Data 2	4	Online	13
Data 3	5	Not Used	14
Data 4	6	Ready	15
Data 5	7	Buff Clear	16
Data 6	8	Power	17
Paper Inst	9	Ground	18-25

Serial Remote

The TN Series Remote Input serial communications board has two high density, 26 way D type connector, one for each communications channel. The cable connecting the interface to the communications device will vary according to the type of communications required. When the interface is installed it will be supplied with the correct cable to the required length. This pinout table is provided should you need to change the cable in the future.

The cables can plug in to either of the two high density connectors on the rear of the serial communications board.

The connector at the communications device end will be standard for that communications type. The pinout for both of the high density connectors is as follows.

Signal	Pin	Signal	Pin
RI/TI (RS232)	1	Tx (RS422 B)	14
Tx (RS232)	2	Rx (RS422 B)	15
Rx (RS232)	3	RTS (RS422 B)	16
RTS (RS232)	4	CTS (RS422 B)	17
CTS (RS232)	5	DCD/BT (RS422 B)	18
DSR (RS232)	6	RLOOP/OxC (RS232)	19
Ground	7	TxC/OxC (RS422 B)	20
DCD (RS232)	8	RxC (RS422 B)	21
DTR/LOOP (RS232)	9	Tx (RS422 A)	22
TxC (RS232)	10	Rx (RS422 A)	23
RxC (RS232)	11	RTS (RS422 A)	24
TxC/OxC (RS422 A)	12	CTS (RS422 A)	25
RxC (RS422 A)	13	DCD/BT (RS422 A)	26

NOTE: Cables should only be made up by qualified personnel.

Spare parts may be obtained through your dealer. Contact your FunAsset dealer if you require spare parts.

Spare parts include:

- Printed circuit boards (replacements will include all connecting hardware).
- Connecting cables.
- Power cord.
- External connecting boxes.
- PC sub-assemblies (keyboard, mouse, monitor and processor).

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