Hardware Installation Manual

for the

DataBooster-4
DataBooster-8

(Part of the Zapateado Range)

High Speed Buffered PCI Communication Controllers

April 2004

IT Factor Ltd t/a TCL
24 Thatcham House
Turners Drive, Thatcham
Berkshire RG19 4QD
United Kingdom
Tel : +44 (0) 1635 876754
Fax: +44 (0) 1635 871739
Web: www.TheTCL.com
email: office@teccon.co.uk

Radio Frequency Interference (RFI)

The TCL range of multiport adapter cards have been verified to comply with the following international standards on RFI emissions:-

FCC PART 15 LIMIT A
BS EN 55022 : 1995 CLASS A
BS EN 55082-1 : 1992
CE Approved

WARRANTY

TCL provides a 12-month (from date of purchase) return to base warranty, to cover the Zapateado Series of equipment against defective materials or workmanship.

This warranty does not apply if the adapter has been damaged by neglect, improper handling or by any other causes not arising directly from defective materials or workmanship.

Notice

The information herein has been carefully checked and is believed to be entirely accurate at time of going to press. However no responsibility is assumed for any inaccuracies or typographical errors. Furthermore, no liability is assumed arising from the use of any product detailed within. TCL reserves the right to make alterations without notice and recognises that the information contained within does not convey to the purchaser any license under the patent rights of IT Factor Ltd t/a TCL.

All trademarks acknowledged.

Quick Installation Guide for Windows

DataBooster Adapter Card Installation

Switch power to the computer OFF and disconnect the mains power supply lead from the computer.

Remove the cover from the computer.

Insert the ***DataBooster*** adapter card into a free PCI bus slot.

Screw the ***DataBooster*** adapter card end-plate(s) to the computer chassis.

Connect (if necessary) the serial expansion cable to the ***DataBooster*** adapter card.

Replace computer cover.

Re-connect mains power supply.

To check the card is operational - boot the computer into DOS and run the CCDIAG program from the TCL UTILITIES diskette supplied with the ***DataBooster*** adapter card. (If any problems are encountered see Appendix-2).

Re Boot computer into the Windows 95 / 98 or Windows NT operating System.

Using the TCL 32-Bit Device Drivers disk Install the TCL Device driver.

Table of Contents

1 Introduction

1.1 Features

The ***DataBooster*** range of adapter cards form part of the Technology Concepts Limited ***Zapateado*** series of PCI adapter cards.

The ***Zapateado*** series of serial communication controller cards conform to the PCI bus specification version 2.1 / 2.2. The PCI interface provides a more efficient interface for transferring data between the system CPU and the adapter cards.

The PCI bus system uses the ROM BIOS of the computer to allocate I/O, IRQ and memory resources for the adapter cards. This means the user no longer has to set any switches or jumpers on the adapter cards when installing them into a system.

All the ***Zapateado*** series of adapter cards offer on-board surge protection as standard to protect the serial data and modem control lines for both RS232 and RS485 options.

1.2 Options

The ***Zapateado*** series offers a range of buffered and intelligent adapter cards supporting 2, 4 and 8 port configurations. Each adapter card being available with either RS232 or RS422 line driver options.

2 Installation

2.1 General instructions

Always ensure that the mains supply is disconnected before attempting to connect or disconnect any kind of equipment.

All electronic components are extremely susceptible to damage from an electro-static charge. Always touch a grounded object before handling the ***DataBooster*** adapter card.

Please refer also to the manufacturer's guide supplied with the computer system for instructions on installing an expansion card.

2.2 Installing the TCL controller card

The TCL ***DataBooster*** range of adapter cards are PCI bus cards that require no user configuration.

Switch off the mains supply at the wall socket, then disconnect the mains cable from the computer unit.

Disconnect the keyboard and any peripheral devices. Remove the system-unit cover with reference to the manufacturer's instructions.

The TCL ***DataBooster*** card should be fitted in an available PCI slot. The end bracket of the ***DataBooster*** adapter card should be screwed to the computer chassis.

If an eight port RJ-45 connector option is being installed then the additional four port RJ-45 flying lead end plate should also be screwed to the computer chassis. Confirm that the other end of the four port RJ-45 flying lead is connected to **JP2** on the top edge of the ***DataBooster*** adapter card.

The system-unit cover should then be replaced.

It is now safe to re-connect all the peripheral cables and the power supply cable.

2.3 Connecting the DataBooster Expansion Cable

Two types of expansion cables are available for the ***DataBooster-4 and DataBooster-8*** adapter cards. As standard the ***DataBooster*** end-plate is supplied with a 68 Way SCSI-II type connector attached. TCL supply expansion cables that connect to the SCSI-II connector on the end plate, providing either a 9-Way D-Type (supplied as standard) or 25-Way D-Type (supplied on request) pin out interface.

The ***DataBooster*** adapter is also available with four RJ-45 8-Way connectors projecting through the ***DataBooster*** end plate (in place of the SCSI-II connector). When this type of connector is ordered no expansion cable is required for the ***DataBooster-4*** port adapter.

When the ***DataBooster-8*** is supplied with RJ45 connectors, the first four ports (Ports 1...4)are made available via the four RJ-45 connectors projecting through the adapter card's end plate. The remaining four RJ-45 connectors (Ports 5...8) are supplied, attached to an end plate with a ribbon cable terminated with 34-Way Dual-in-Line (DIL) header, for connection to the ***DataBooster-8*** expansion jumper (JP2).

2.3.1 Connecting the DataBooster D-Type Expansion Cable

The ***DataBooster*** adapter card will have a different expansion cable depending upon the number of ports the card supports and the type of electrical interface specified (RS232 / RS422-RS485). However all the D-Type expansion cables attach to the DataBooster adapter card in the same manner.

- Install the ***DataBooster*** card as described in 2.2.

- The 68-way connector at the end of the expansion cable should be carefully but firmly inserted into the connector on the end-plate of the ***DataBooster*** card. The connector has a self locking latch which operates automatically.

- A slight tug on the connector should be enough to show whether the connector is locked on to the card or not.

  NOTE: To disconnect the 68-way expansion cable press in the two release catches on either side of the connector, then gently pull the connector away from the card end-plate.

2.3.2 Connecting the DataBooster RJ-45 Expansion Cable

The ***DataBooster-8*** adapter card when ordered with RJ-45 connectors is supplied with four RJ-45 Connectors mounted on the adapter card (projecting through the end plate). A flying lead is also supplied with another four RJ-45 ports attached (for Ports 5...8). This flying lead must be connected to the ***DataBooster-8*** adapter card and attached to the computer chassis to provide all 8 port connections.

- Install the ***DataBooster*** card as described in 2.2.

- Connect the 34 Pin DIL header of the flying lead to **JP2** on the installed ***DataBooster-8*** adapter card. Check the key on the 34-Pin ribbon cable connecter is aligned correctly with the key slot in the JP2 connector. (JP2 is situated on the top edge of the ***DataBooster-8*** adapter card).

- Fix the flying lead end plate (supporting the four RJ-45 connectors for Ports 5...8) to a spare slot in the computer. (Typically select the slot next to the ***DataBooster-8*** card if that slot is vacant.) Ensure the end plate is securely screwed to the computer's chassis.

3 DataBooster-4 and -8

3.1 Features

The ***DataBooster*** range of buffered serial communications controllers allows 4, and 8 terminals or other serial devices to be interfaced to an IBM compatible Personnel Computer supporting the PCI bus.

The ***DataBooster*** adapter card incorporates one or two quad channel UARTs with 128 byte buffers per channel. The internal buffering of the UART reducing the interrupt workload on the host PC processor.

Using a host PC with suitable processing capability baud rates of 921.6Kbps are supported with the standard card. Factory fitted options allow the card to operate at data rates up to 15Mbps.

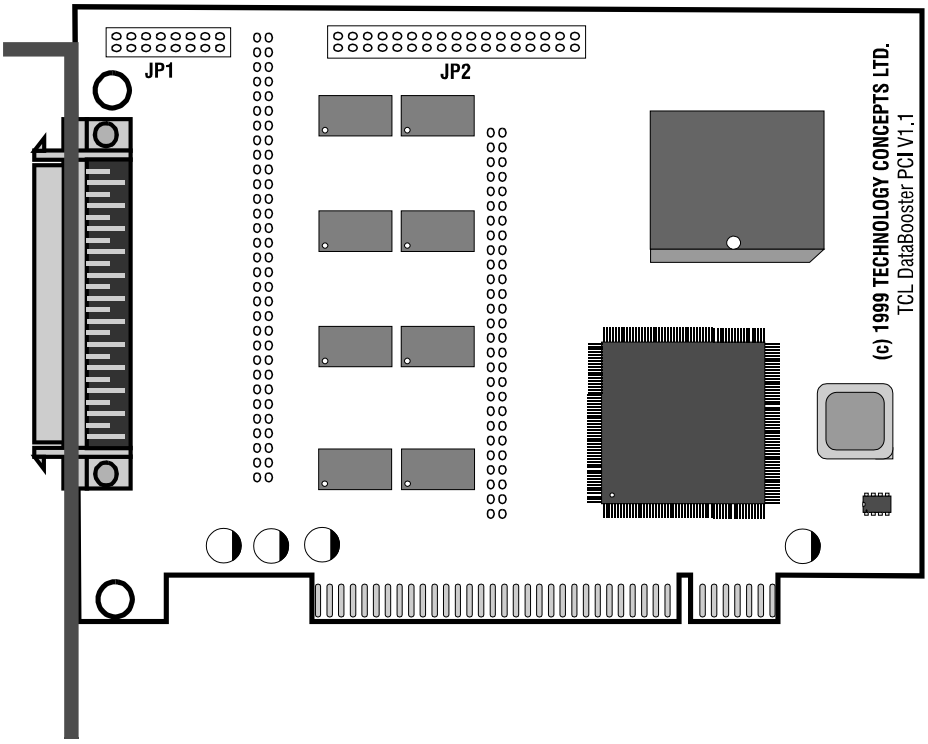
As standard all the ***DataBooster*** range of controllers offer on-board surge protection to protect the serial data and modem control lines (for both RS232 and RS485 options).

The quad UARTs provide software compatibility with the industry standard 16C450, 16C550 and 16C650 UARTs.

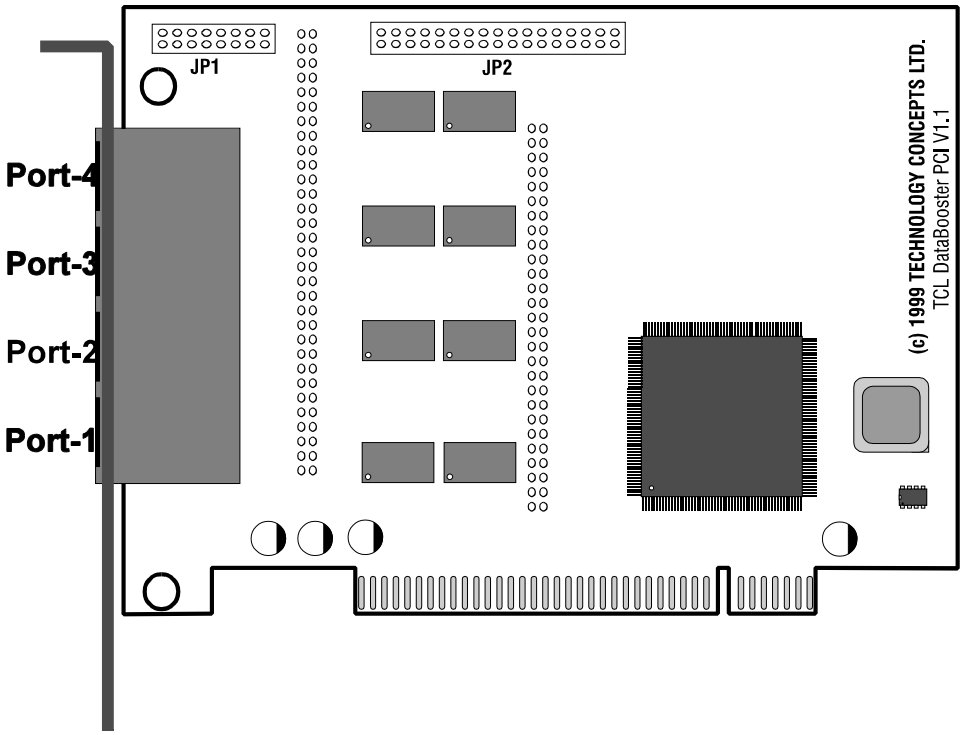
3.2 Options

The ***DataBooster-4*** and ***-8*** port adapters are available in both RS232 or RS422/RS485 options.

The ***DataBooster*** adapters are available with different physical connectors. The RS232 version expansion connectors are available with either 9-Way D-Type male, 25 Way D-Type male or female or 8-Way RJ-45.



DataBooster-8 Adapter card with SCSI-II Expansion connector on end plate.



DataBooster-4 Adapter card with four on board RJ-45 connectors.

3.3 DataBooster-4 and -8 Technical Details

Interface: PCI Bus to version 2.2 specification. Port addresses may be accessed either in I/O address space (32 bytes) or memory address space (4K bytes). The PCI BIOS is responsible for allocating the I/O and memory base addresses.

Interrupts: One Interrupt resource is requested from the PCI BIOS.

External Interface: 68 Way SCSI-II Type connector (for attachment of expansion cable.)
Optional four on board RJ-45 Sockets. (Supporting 4 Ports).
Optional 34 DIL header for RJ-45 expansion lead. (For 8 ports RJ-45)

Serial I/O Controllers: One or Two 16C950 Quad channel Asynchronous Serial Communication Controllers.

Baud Rates: 50, 62.5, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 19200, 38400, 57600, 76800, 115200. 230400, 460800[1], 921600[1] Different data rates are possible with different crystals, data rates up to **10Mbps** may be achieved. (Factory fitted option).

Parity: None, Odd, Even, Mark and Space parity

Data Bits: 5, 6, 7, 8, 9

Stop Bits: 1, 1.5, 2

Handshake Signals: Modem handshaking signals.

DTR, RTS	(Outputs RS232)
DSR, CTS, DCD	(Inputs RS232)

RS422/RS485 Handshaking Signals.

DTR	(Output RS422)
CTS	(Input RS422)

Note: The RTS signal is not connected externally in RS422/485 mode. Instead it is used as the Driver Enable signal for TxD and DTR line drivers. Setting RTS low sets the Transmit and RTS line drivers to a high impedance state.

[1]Baud rates greater than 250Kbps are only supported on RS422/RS485 options.

Serial I/O Interface:

Standard: V.24/RS-232 Serial drivers on all ports.
Supports up to 250Kbps bit speeds.
All serial RS232 I/O lines protected to 10KV (human body model).

Option: RS422 / RS485 Line Drivers.
Supports up to 10Mbps bit speeds.
All serial RS422/RS485 I/O lines protected to 15KV (human body model).

Serial I/O Connectors: Dependent on expansion cable and number of ports. The information given below indicates which cable part is supplied with each model of the ***DataBooster*** range.

Card Name	Model Number	I/F	Type	Cable Number
DataBooster-4	2000	RS232	RJ-45	N/A
DataBooster-4[2]	2010	RS232	9D Male	Part No. 9506
DataBooster-4	2010-1	RS232	25D Male	Part No. 9524
DataBooster-4	2010-2	RS232	25D Female	Part No. 9507
DataBooster-4[2]	2010-4	RS422/485	9D Female	Part No. 9529
DataBooster-8	2020	RS232	RJ-45	Part No. 9539
DataBooster-8[2]	2030	RS232	9D Male	Part No. 9511
DataBooster-8	2030-1	RS232	25D Male	Part No. 9523
DataBooster-8	2030-2	RS232	25D Female	Part No. 9512
DataBooster-8[2]	2030-4	RS422/485	9D Female	Part No. 9521

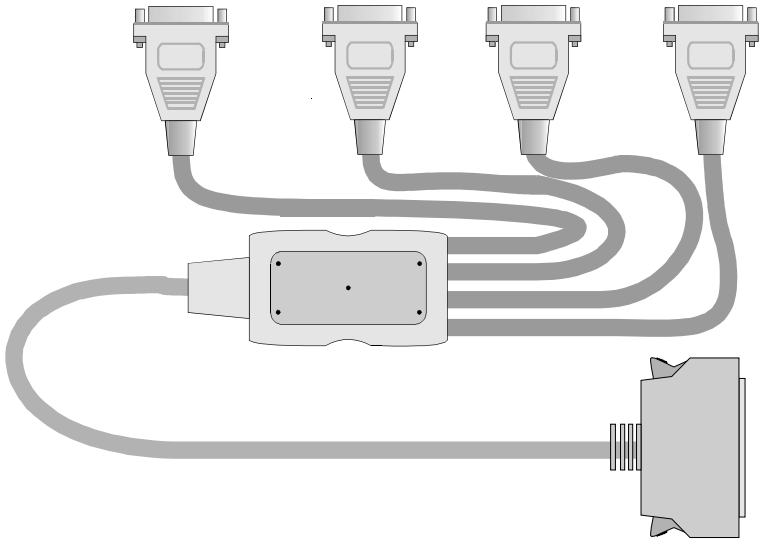
Typical Power (8-Port): [5v, @ 600mA] [+12v, @200mA] [-12v, @200mA]

Size: 158mm x 128mm X 18mm Overall Dimensions
145mm x 107.5mm x 12.4mm PCB Dimensions

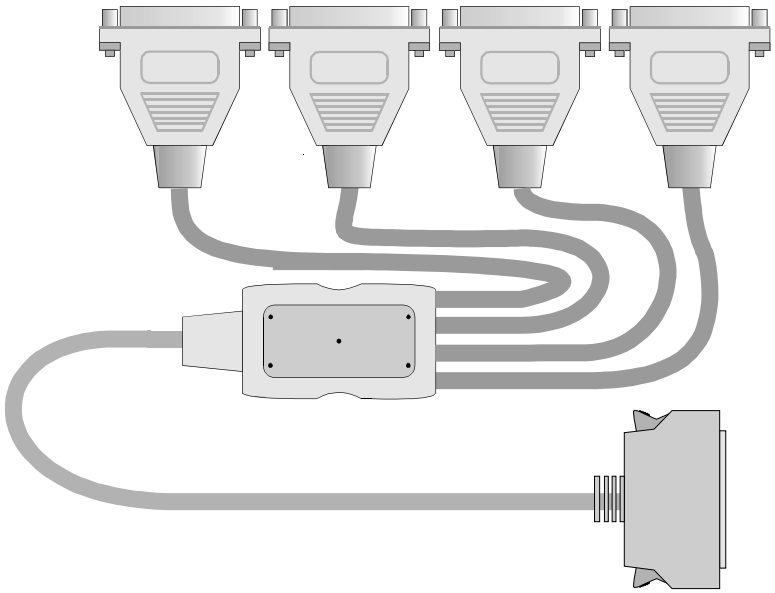
Net Weight: 90g

[2] Standard Products

3.4 DataBooster-4 Distribution Cables

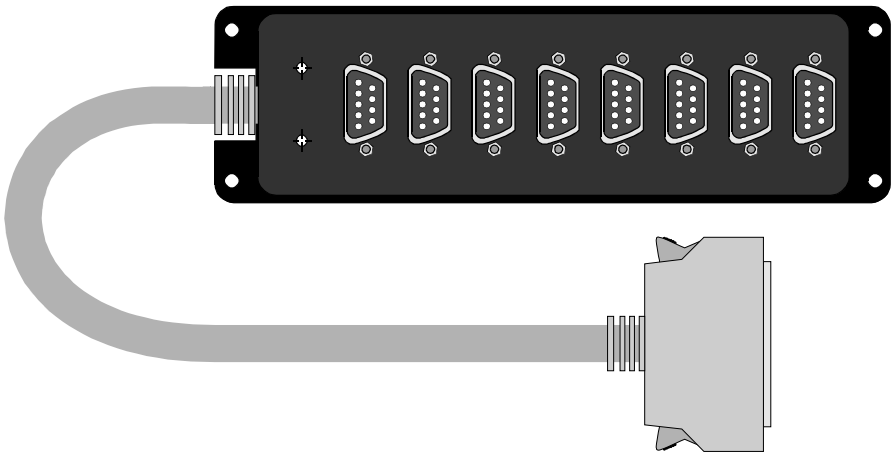


DataBooster-4 RS232 Distribution Cable 9-Way D-Type Male (Part No. 9506)
DataBooster-4 RS422/RS485 Distribution Cable 9-Way D-Type Female (Part No. 9529)

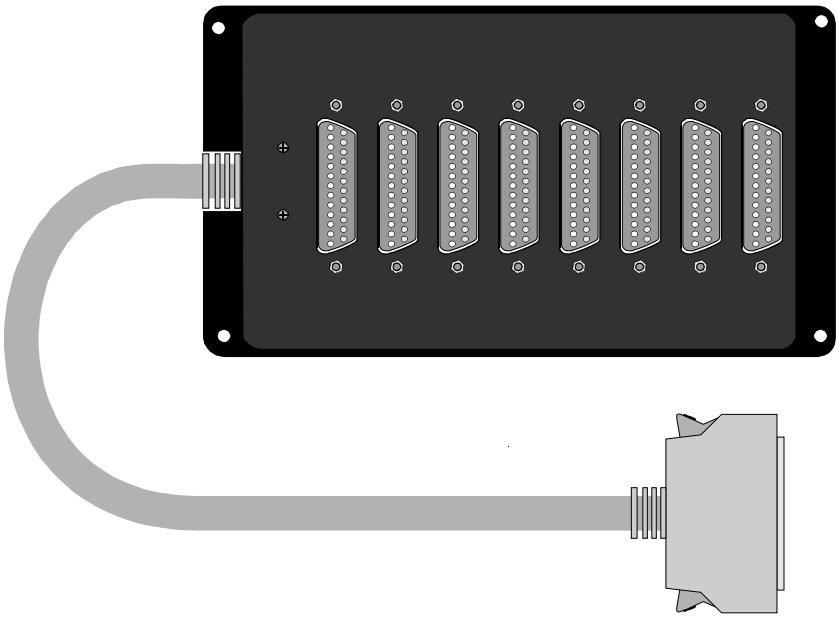


DataBooster-4 RS232 Distribution Cable 25 Way D-Type male (Part No. 9524)
DataBooster-4 RS232 Distribution Cable 25 Way D-Type female (Part No. 9507)

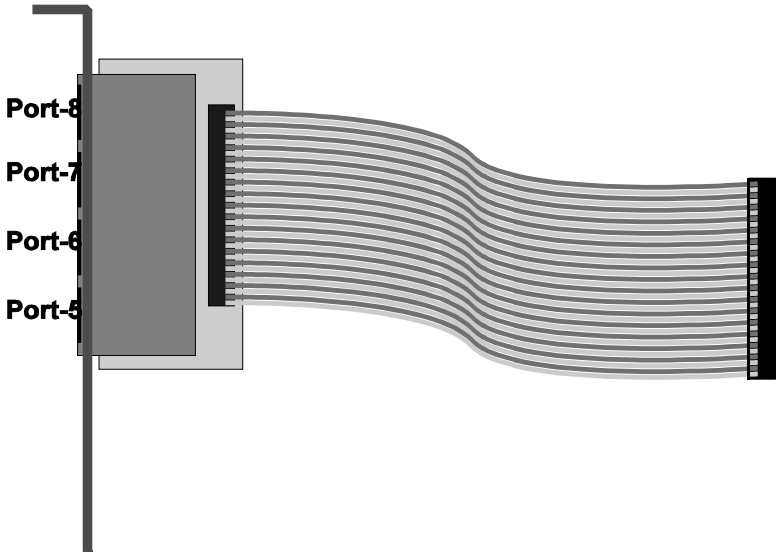
3.5 DataBooster-8 Distribution Cables



DataBooster-8 RS232 Distribution Cable 9-Way D-Type Male (Part No. 9511)
DataBooster-8 RS422/485 Distribution Cable 9-Way D-Type Female (Part No. 9521)



DataBooster-8 RS232 Distribution Cable 25 Way D-Type Male (Part No. 9523)
DataBooster-8 RS232 Distribution Cable 25 Way D-Type Female (Part No. 9512)



DataBooster-8 RS232 Distribution Lead four 8-Way RJ-45 Connectors (Part No. 9539)

3.6 DataBooster Serial Connector Pinouts

TCL RS232 9-Way D-Type Male Pin Out (9506 / 9511)					
Pin	**Signal**	**I/O**	**Pin**	**Signal**	**I/O**
1	Carrier Detect	I/P	6	Data Set Ready	I/P
2	Receive Data	I/P	7	Request to Send	O/P
3	Transmit Data	O/P	8	Clear to Send	I/P
4	Terminal Ready	O/P	9		
5	Signal Ground	---			

RS232 Pin out for Distribution Cables: Part No. 9506, 9511

TCL RS422 9-Way D-Type Female Pin Out (9521 / 9529)					
Pin	**Signal**	**I/O**	**Pin**	**Signal**	**I/O**
1	+Receive Data	I/P	6	-Receive Data	I/P
2	+Clear to Send	I/P	7	-Clear to Send	O/P
3	-Transmit Data	O/P	8	-Terminal Ready	I/P
4	+Terminal Ready	O/P	9	Signal Ground	
5	+Transmit Data	O/P			

RS422 / 485 Pin out for Distribution Cables: Part No. 9529, 9521

TCL RS232 25-Way D-Type (Male & Female) Connector Pin Out					
Pin	**Signal**	**I/O**	**Pin**	**Signal**	**I/O**
1	Ground		14		
2	Transmit Data	O/P	15		
3	Receive Data	I/P	16		
4	Request to Send	O/P	17		
5	Clear to Send	I/P	18		
6	Data Set Ready	I/P	19		
7	Signal Ground		20	Terminal Ready	O/P
8	Data Carrier Detect	I/P	21		
9			22		
10			23		
11			24		
12			25		
13					

RS232 Pin out for Distribution Cables: Part No. 9524, 9512, 9523

TCL RS232 8-Way RJ-45 Pin Out (9539)					
Pin	**Signal**	**I/O**	**Pin**	**Signal**	**I/O**
1	Data Set Ready	I/P	5	Receive Data	I/P
2	Request to Send	O/P	6	Gnd	---
3	Data Carrier Detect	I/P	7	Clear to Send	I/P
4	Transmit Data	O/P	8	Data Terminal ready	O/P

RS232 Pin out for RJ-45 Adapter card sockets.
RS232 Pin out for RJ-45 Distribution Cable: Part No. 9539.

Appendices

Appendix 1 Wiring details

Part No. 9603 Standard Terminal to ***TCL Serial Port***
5 Metre Length
25D-Type male to 9D-Type female

Part No. 9606 PC COM1/COM2 to ***TCL Serial Port*** or
NyCE Terminal to ***TCL Serial Port***
5 Metre Length
9D-Type female to 9D-Type female

Standard Terminal to TCL Serial Port				
Terminal 25 Way D-Type male (Set for DTR flow control)			TCL 9 Way D-Type Female (Set for CTS flow control)	
TX	2	<---------->	2	RX
RX	3	<---------->	3	TX
GND	7	<---------->	5	GND
DTR	20	<---------->	8	CTS

Standard Terminal to ***TCL Serial Port*** Wiring Details TCL Part No 9603.

PC COM1 or COM2 (25 Way) to TCL Serial Port				
COM1/COM2 25 Way D-Type male (Set for DTR flow control)			TCL Serial Port 9 Way D-Type Female (Set for CTS flow control)	
TX	2	<---------->	2	RX
RX	3	<---------->	3	TX
GND	7	<---------->	5	GND
DTR	20	<---------->	8	CTS

PC COM Port (25 Way) to ***TCL Serial Port***

PC COM1 or COM2 (9 Way) to TCL Serial Port				
COM1/COM2 9 Way D-Type female (Set for DTR flow control)			TCL Serial Port 9 Way D-Type Female (Set for CTS flow control)	
TX	3	<---------->	2	RX
RX	2	<---------->	3	TX
GND	5	<---------->	5	GND
DTR	4	<---------->	8	CTS

PC COM1/COM2 port (9 Way) to ***TCL Serial Port*** Wiring Details TCL Part No. 9606

Modem to TCL Serial Port			
Modem 25 Way D-Type male			TCL Serial Port 9 Way D-Type Female
DCD 8	<---------->	1 DCD	
RX 3	<---------->	2 RX	
TX 2	<---------->	3 TX	
DTR 20	<---------->	4 DTR	
GND 7	<---------->	5 GND	
DSR 6	<---------->	6 DSR	
RTS 4	<---------->	7 RTS	
CTS 5	<---------->	8 CTS	
RI 22	<---------->	9 RI	

Modem (25 Way) to ***TCL Serial Port***

Note: The Modem wiring details represent a general specification for standard DCE to DTE connections. In certain cases various modifications may need to be made, as all the signals shown above are not supported by some modems. Please contact your dealer or modem supplier for details.

Appendix 2 Trouble Shooting

The CCDIAG program uses the PC's ROM BIOS functions to search for and return information about the identity and parameters of all PCI adapters in the system. However it will only display information on PCI adapters matching the ***DataBooster*** ID code.

There are no user settings for PCI bus adapter cards. If the card is operational the TCL utility CCDIAG program will display the PCI slot, allocated base address and interrupt number for the TCL ***DataBooster*** adapter card.

If the adapter card is identified by the CCDIAG program but fails ALL loop back tests then check:

If using a fan-out cable check that it is the correct fan out cable for the type of line drivers (RS232 or RS422) installed on the board. As standard the ***DataBooster*** board is fitted with RS232 drivers. **If the DataBooster card is fitted with a daughter board it is a RS422 version of the *DataBooster.***

Cable Nos. 9506, 9524, 9507, 9611, 9523, 9512 should be used with RS232 line drivers.

Cable No. 9529, 9521 should be used with RS422 line drivers.

If the adapter card is identified by the CCDIAG program but fails only some of the loop back tests then check:

If using a fan out cable attached to the end plate of the ***DataBooster***, check that the SCSI-II connector is correctly locked in place by both the top and bottom latch locking mechanisms.

If more than one ***DataBooster*** card is installed in the system check the base addresses allocated by the PCI ROM BIOS to each card are unique and do not conflict. (The CCDIAG program will report the base address values for each identified ***DataBooster*** card.)

Appendix 3 Technical Information (for Device Driver Writers)

AP3.1 Base Address Registers

The ***DataBooster*** adapter card is a multi-functional PCI device. Logical Function-0 provides the first four ports (Ports 1...4) on the ***DataBooster*** adapter card. Logical Function-1 provides access to the second group of four ports (Ports 5...8) on the ***DataBooster-8*** adapter card.

The UARTs on the ***DataBooster*** adapter card may be accessed either through I/O address space or memory address space. Each logical function will be allocated an I/O and Memory base address by the PCI ROM BIOS when the system is powered up. (NOTE: It is possible that each time the system is powered up a different base address value may be allocated.)

Logical Function-0 PCI Configuration Register *"Base Address Register 0"* (BAR0) defines the I/O base address of the first four UARTs. Logical Function-0 PCI Configuration Register *"Base Address Register 1"* (BAR1) defines the memory base address for the first four UARTs.

Function-0 BAR0 and BAR1 UART Register Offset Mapping Table								
UART Register Address (hex)	PCI Offset from **Base Address 0** (BAR0) for Function-0 in **I/O** space (hex)				PCI Offset from **Base Address 1** for (BAR1) Function-0 in **Memory** space(hex)			
	UART1	UART2	UART3	UART4	UART1	UART2	UART3	UART4
0	00	08	10	18	00	20	40	60
1	01	09	11	19	04	24	44	64
2	02	0A	12	1A	08	28	48	68
3	03	0B	13	1B	0C	2C	4C	6C
4	04	0C	14	1C	10	30	50	70
5	05	0D	15	1D	14	34	54	74
6	06	0E	16	1E	18	38	58	78
7	07	0F	17	1F	1C	3C	5C	7C

When accessing the first four UARTs in I/O address mode, the I/O address of the first register of the first UART is the I/O address defined in the *BAR0* register. Other UART registers (for Function-0) are accessed by adding the relevant offset to the I/O address stored in *BAR0*. There are 32 consecutive I/O byte addresses for Function-0.

Accessing the first four UARTs in Memory address mode, the memory base address of the first register of the first UART is the address defined in the *BAR1* register. Other UART registers (for Function-0) are accessed by adding the relevant offset to the memory address stored in *BAR1*. There are 32 consecutive DWORD memory addresses for Function-0. (See Memory section of Function-0 BAR0 and BAR1 UART Register Offset Mapping Table)

Similarly Ports 5...8 supported by Logical Function-1 will also have a Configuration Register BAR0 and BAR1 used to define the I/O and Memory base address of ports 5...8. (Note the addresses for Function-1 are not necessarily consecutive to the addresses defined for Function-0.)

NOTE: The memory address range of Function-0 and Function-1 each only require 128 bytes of memory address space. However the minimum address decode for the PCI bus specification v2.2 is a decode range of 4096 bytes of memory address space. Thus the ***DataBooster*** cards will take up 4Kb + 4KB of PCI memory decode space.

Function-1 BAR0 and BAR1 UART Register Offset Mapping Table

UART Register Address (hex)	PCI Offset from **Base Address 0** (BAR0) for Function-1 in **I/O** space (hex)				PCI Offset from **Base Address 1** for (BAR1) Function-1 in **Memory** space(hex)			
	UART5	UART6	UART7	UART8	UART5	UART6	UART7	UART8
0	00	08	10	18	00	20	40	60
1	01	09	11	19	04	24	44	64
2	02	0A	12	1A	08	28	48	68
3	03	0B	13	1B	0C	2C	4C	6C
4	04	0C	14	1C	10	30	50	70
5	05	0D	15	1D	14	34	54	74
6	06	0E	16	1E	18	38	58	78
7	07	0F	17	1F	1C	3C	5C	7C

Both sets of UARTs share the same interrupt which uses the INTA# PCI interrupt pin.

A driver would normally find the cards using the BIOS Find Next PCI Device function (or equivalent system call) to obtain the PCI configuration structure. Note that since each quad UART is provided as a separate function, each quad UART has its own PCI Configuration Register set.

AP3.2 PCI Configuration Registers

The PCI configuration space for Function-1 is similar to Function-0. The main difference being the Device ID field which is 0x9511 (as opposed to 0x9501 for Function-0). The addresses returned in the Base Address registers of Function-0 and Function-1 will also be different.

NOTE: If a four port ***DataBooster*** card is found, the driver should use the Base Address registers from the Function-0 configuration space and just ignore the Function-1 configuration space.

Although the addresses returned in BAR2 and BAR3 are different in Function-0 and Function-1, they do in fact access the same (shared) set of registers.

Function 0 PCI Configuration Registers				
Name	**Offset**	**Size**	**Value**	**Description**
Vendor ID	0x00	WORD	0x1415	Vendor ID
Device ID	0x02	WORD	0x9501	Identifies Function 0 as a quad 950 UART
Base Address 0	0x10	DWORD	-	(BAR0). Address for access to internal UARTs in I/O space
Base Address 1	0x14	DWORD	-	(BAR1). Address for access to internal UARTs in memory space.
Base Address 2	0x18	DWORD	-	(BAR2). Address for access to Local Configuration registers in I/O space.
Base Address 3	0x1C	DWORD	-	(BAR3). Address for access to Local Configuration registers in Memory space.
Subsytem Vendor ID	0x2C	WORD	0x5443	Identifies TCL Serial Adapter
Subsystem ID	0x2E	WORD	0xDB04	Four port ***DataBooster***
			0xDB08	Eight port ***DataBooster***
Interrupt Line	0x3C	BYTE	-	Indicates which PC interrupt the card is using.

Function 1 PCI Configuration Registers				
Name	**Offset**	**Size**	**Value**	**Description**
Vendor ID	0x00	WORD	0x1415	Vendor ID
Device ID	0x02	WORD	0x9511	Identifies Function 1 as a quad 950 UART
Base Address 0	0x10	DWORD	-	(BAR0). Address for access to local bus UARTs in I/O space
Base Address 1	0x14	DWORD	-	(BAR1). Address for access to local bus UARTs in memory space.
Base Address 2	0x18	DWORD	-	(BAR2). Address for access to Local Configuration registers in I/O space.
Base Address 3	0x1C	DWORD	-	(BAR3). Address for access to Local Configuration registers in Memory space.
Subsytem Vendor ID	0x2C	WORD	0x5443	Identifies TCL Serial Adapter
Subsystem ID	0x2E	WORD	0xDB04	Four port ***DataBooster***
			0xDB08	Eight port ***DataBooster***
Interrupt Line	0x3C	BYTE	-	Indicates which PC interrupt the card is using.

AP3.3 Local Configuration Registers

The Local Configuration Registers can be accessed via the address in BAR2 (I/O) or BAR3 (memory). **NOTE: When accessing these registers through I/O, only BYTE accesses may be made.** (e.g. To read the GIS register the low 8 bits are read from BAR2(I/O)+0x1C and the upper 8 bits are read from BAR2(I/O)+0x1D etc.) These registers are defined as follows :

Offset from BAR	Register Name
0x00	Local Configuration and Control Register (LCC)
0x04	Multi-purpose IO Configuration Register (MIC)
0x08	Local Bus Configuration Register (LT1)
0x0C	Local Bus Configuration Register 2 (LT2)
0x10	UART Receiver FIFO Levels (URL)
0x14	UART Transmitter FIFO Levels (UTL)
0x18	UART Interrupt Source Register (UIS)
0x1C	Global Interrupt Status Register (GIS)

A device driver should not modify the first four registers (LCC, MIC, LT1 and LT2).

The FIFO level registers report the transmit and receive FIFO levels of the four internal UARTs only (i.e. Function 0 UARTs). The following tables show the Receiver FIFO level register and the Transmit FIFO Level register :

URL : UART Receiver FIFO Levels (Offset 0x10 of BAR)	
Bits	Description
7:0	UART0 Receiver FIFO Level
15:8	UART1 Receiver FIFO Level
23:16	UART2 Receiver FIFO Level
31:24	UART3 Receiver FIFO Level

UTL : UART Transmitter FIFO Levels (Offset 0x14 of BAR)	
Bits	Description
7:0	UART0 Transmitter FIFO Level
15:8	UART1 Transmitter FIFO Level
23:16	UART2 Transmitter FIFO Level
31:24	UART3 Transmitter FIFO Level

AP3.4 Interrupt Registers

The UART Interrupt Source Register (UIS) indicates the interrupt status of the four internal UARTs only. The bit fields are copies of bits 5:0 of the Interrupt Status Register of each internal UART.

UIS : UART Interrupt Source Register (Offset 0x18 of BAR)	
Bits	Description
5:0	UART0 Interrupt Source Register (ISR[5:0])
11:6	UART1 Interrupt Source Register (ISR[5:0])
17:12	UART2 Interrupt Source Register (ISR[5:0])
23:18	UART3 Interrupt Source Register (ISR[5:0])
26:24	Reserved
27	UART0 Good-Data Status
28	UART1 Good-Data Status
29	UART2 Good-Data Status
30	UART3 Good-Data Status
31	Global Good-Data Status. Logical AND of bits 30:27

The Good-Data Status bits indicate that there is no receive break, parity, or framing error in the receive FIFO. The driver can read the number of bytes indicated by the Receive FIFO Level Register without having to check the line status for that channel if the Good-Data status bit is set..

The Global Interrupt Status Register indicates whether interrupts are pending for both the internal UARTs (Function 0) and the local bus UARTs (Function 1). Although this register is a 32-bit register, the device driver will normally only access the lower 16-bit word (using BAR3 Memory access) to obtain the interrupt status. An interrupt is pending if the interrupt status bit is set. **NOTE:** The bit-mask for the 8 interrupt status bits is **0x780F** when read as a word. (**See Section AP3.3**).

GIS : Global Interrupt Status Register (Offset 0x1C of BAR)	
Bit	Description
0	UART0 Interrupt Status
1	UART1 Interrupt Status
2	UART2 Interrupt Status
3	UART3 Interrupt Status
11	UART4 Interrupt Status
12	UART5 Interrupt Status
13	UART6 Interrupt Status
14	UART7 Interrupt Status

AP3.5 UART Registers

The 16C950 UARTs can be set to be compatible with the 16C450, 16C550, 16C654 or 16C750 UARTs. The actual compatibility depends on the mode set by the driver. Following a hardware reset, the UARTs are 16C450 compatible. In this mode, the receive and transmit FIFO depth is one.

Each UART consists of 35+ independent registers, but to maintain backward compatibility, it has only 8 unique I/O locations. The standard register set is as follows :

Offset	Register	Description	R/W
000	THR	Transmitter Holding Register	W
000	RHR	Receiver Holding Register	R
001	IER	Interrupt Enable Register	R/W
010	FCR	FIFO Control Register	W
010	ISR	Interrupt Status Register	R
011	LCR	Line Control Register	R/W
100	MCR	Modem Control Register	R/W
101	LSR	Line Status Register	R
110	MSR	Modem Status Register	R
111	SPR	Scratch Pad Register	R/W
Access to the following registers requires LCR[7] = 1			
000	DLL	Divisor Latch Low-byte	R/W
001	DLM	Divisor Latch High-byte	R/W

To enable the 128 byte FIFOs, FCR[0] should be set to 1 which then provides a 550 device with 128 byte deep FIFOs.

AP3.6 Baud Rate Generation

The ***DataBooster*** card is fitted with a 14.7456MHz crystal which allows the generation of async baud rates of up to 921.6K.

The following table lists two sets of divisors which can be used to obtain various standard baud rates with this crystal frequency. The divisors are programmed in the DLL and DLM registers using the equation : *Divisor = DLL + 256*DLM*.

Divisor	CPR = 0x40 MCR[7] = 1	CPR = 0x20 MCR[7] = 0	Divisor	CPR = 0x20 MCR[7] = 0
2304	50	400	1536	600
1536	75	600	768	1200
768	150	1200	384	2400
384	300	2400	192	4800
192	600	4800	96	9600
96	1200	9600	64	14K4
48	2400	19K2	48	19K2
32	3600	28K8	32	28K8
24	4800	38K4	24	38K4
16	7200	57K6	16	57K6
12	9600	76K8	12	76K8
6	19K2	153K6	8	115K2
3	38K4	307K2	4	230K4
2	57K6	460K8	2	460K8
1	115K2	921K6	1	921K6

Note that to enable the Clock Prescaler (CPR), the UART must be in enhanced mode (EFR[4] = 1) and MCR[7] must be set. By default, MCR[7] is cleared and therefore the clock prescaler is bypassed which allows the baud rates above 115K2 to be obtained.

NOTES:

NOTES: