Commander.

DIGITAL INTERCOM

INSTALLATION GUIDE

ISSUE 9

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DOCUMENT NUMBER **50096601.doc** **ISSUE 9**

Issue	Date	Reason for Change	Approved
5	12 June 2000	New panel range added	
6	27 Jan 2003	Changed cable types.	
7	29 July 2006	Panel range additions and general updates	
7a	05 August 2006	Draft submitted	
8	27 November 2007	500-07-50 Connections added	
9	18 November 2008	Changes to Beltpacks	

ERRATA SHEET

This sheet contains information regarding errors in this user guide.

Date	Description
-	None

CONTENTS

1. INTRODUCTION

This manual provides installation information for the Commander Digital Intercom system. Cabling and pin-out information is included for all of the Trilogy manufactured items plus some commonly used third party equipment. Other information relating to the hardware configuration will be useful if the system is upgraded or expanded in the future.

- **Section 2** covers the matrix assembly and installation, to the point where the matrix may be powered
- **Section 3** covers all of the cabling necessary to complete the installation.
- **Section 4** provides information on connecting multiple matrices to form a network.
- **Section 5** gives wiring details for the range of Trilogy control panels.
- **Section 6** explains the Commander re-programming software, which may be used to update hardware.
- **Section 7** provides information on installing other equipment (e.g. telephones, radio talkback).
- **Section 8** provides information about hardware which is no longer supplied by Trilogy with new systems.
- **Section 9** gives the system specification for matrix hardware, control panels and the configuration computer.

For further assistance please contact Trilogy Communications Technical Support Department at the address given at the front of this document. You may also contact us by e-mail at:

support@trilogycomms.com

1.1 OPTIONS AVAILABLE AND MODULE TYPE NUMBERS

Please contact our Sales Department for a listing of the current module types.

Due to the nature of talkback systems, any given installation may have some custom items. Trilogy Communications prides itself on its ability to tailor standard components to meet specific requirements and is willing to discuss any other customisation as required.

2. INSTALLATION

2.1 INTRODUCTION

Follow the sequence below, step by step, to install the Commander matrix.

- Unpack the matrix
- Fit the matrix frame and power supplies into the equipment bay
- Load the modules into the matrix frame, in sequence
- Apply power to the system and check basic operation.
- Connect control panels and check operation with the supplied flash ram configuration.
- Set up the configuration PC.

2.2 UNPACKING

Carefully unpack the equipment from its transit material and check each item for signs of damage.

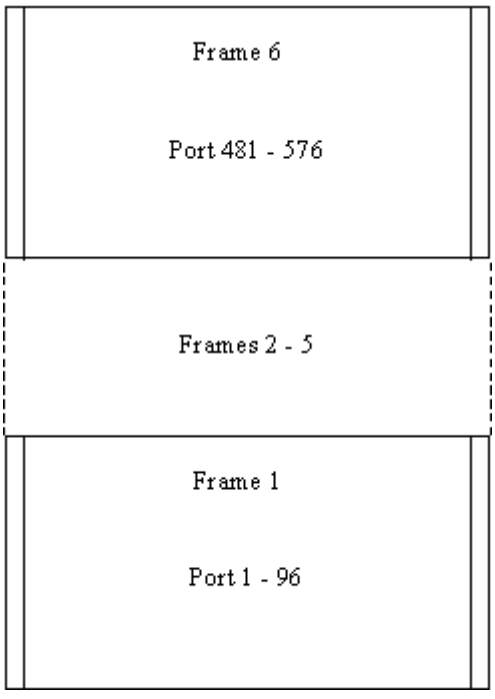
Check the contents of the boxes against our despatch note and your original order to ensure that you have received the correct parts.

In the event that the unit has been damaged or does not match your order, immediately contact Trilogy Communications at the address given at the front of this guide.

2.3 RACK MOUNTING

The Central Matrix is built in multiples of 6U. The depth (excluding mating connectors) is 420mm. Control Panels are standard 19" rack mounting units; most panels are 2U although a series of 1U panel are available and custom panels may be 3U or larger. The Power Supply requires additional space – see Section 2.5 for further details.

It is most likely that a system contractor or Trilogy personnel will install the central matrix. Suitable care should be taken with cooling and ventilation within the equipment bay. There are a number of internal connections between racks of multiple rack systems. Refer to the Technical Guide or Trilogy Communications for further details.



In a multi frame system, the ports are located as follows:

- Frame 6 Ports 481 - 576
- Frame 5 Ports 385 - 480
- Frame 4 Ports 289 - 384
- Frame 3 Ports 193 - 288
- Frame 2 Ports 97 - 192
- Frame 1 Port 1 - 96

2.4 SYSTEM ASSEMBLY

If the system is multi-frame (i.e. > 96 ports), it will be supplied with frame 1 at the bottom and frames 2,3,4 etc. ascending from there. Some earlier systems were supplied with the frames configured in descending order.

The system modules will normally be packed separately for transit. Carefully remove all of the packing materials taking care to leave the modules in their anti-static protection for as long as possible.

Module variants are indicated by the type suffix, e.g. 500-06-**00**. In general, there is complete backward compatibility between all versions of the modules. Modules supplied as part of a complete system are compatible and will have been system checked accordingly.

Identify the modules and fit them into the frame in the following order:

1. 500-08 Changeover Module. See section 2.4.1.
2. 500-02 Talkback Controller (main controller only) See section 2.4.2.

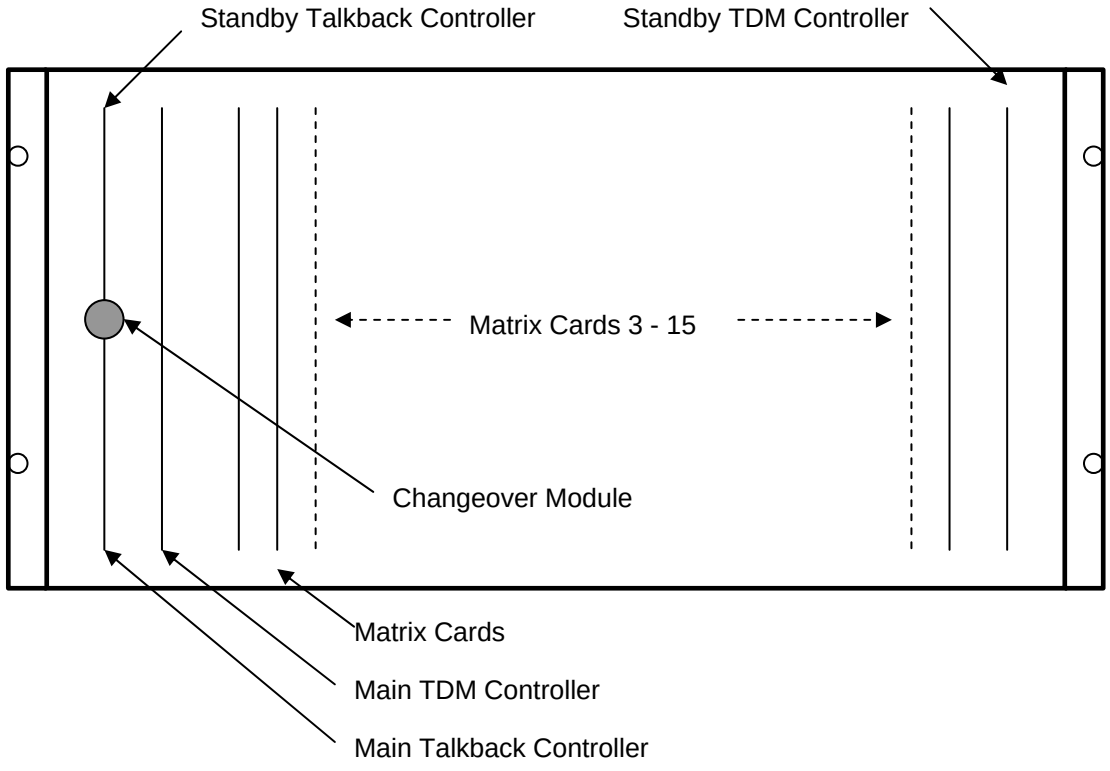
NOTE: Items 1 and 2 may be supplied pre-assembled. Check carefully!

3. 500-01 TDM Controller (main controller only). See section 2.4.3.
4. Optional 500-10 Misc. I/O (GPI) Modules. See section 2.4.5.
5. Optional 500-25 Network Cards. See section 2.4.4.
6. 500-06 Matrix Cards. See section 2.4.6.

The diagram below shows the correct location within each frame.

Please note the positions of the modules. Incorrect location of modules will result in damage to the electronics.

If in doubt, contact Trilogy BEFORE switching on the power.



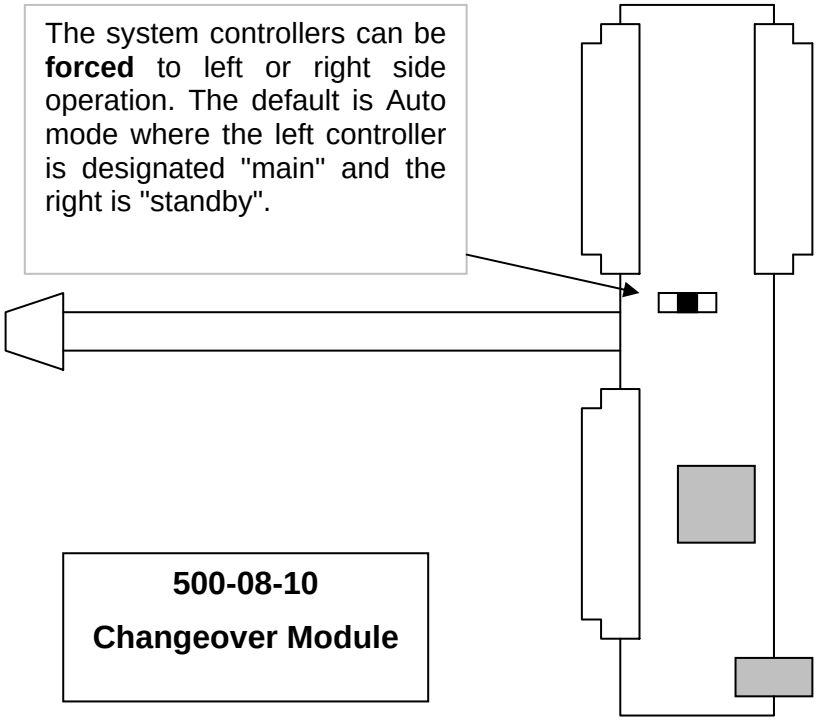
2.4.1 500-08 SERIES CHANGEOVER CARD

The 500-08 Changeover Card is fitted at the left of each frame. Make sure the metal tab is hooked into the clip on the side cheek. Ensure the top and bottom edge connectors are both making good contact. The current version of this card is:

- 500-08-10 dual changeover for fault tolerant systems.

There are no LEDs or other external indicators on these boards.

NOTE: For non fault tolerant systems (i.e. those fitted with only the main talkback and TDM controllers) we recommend that the 500-08-10 link is set to the "left" position.



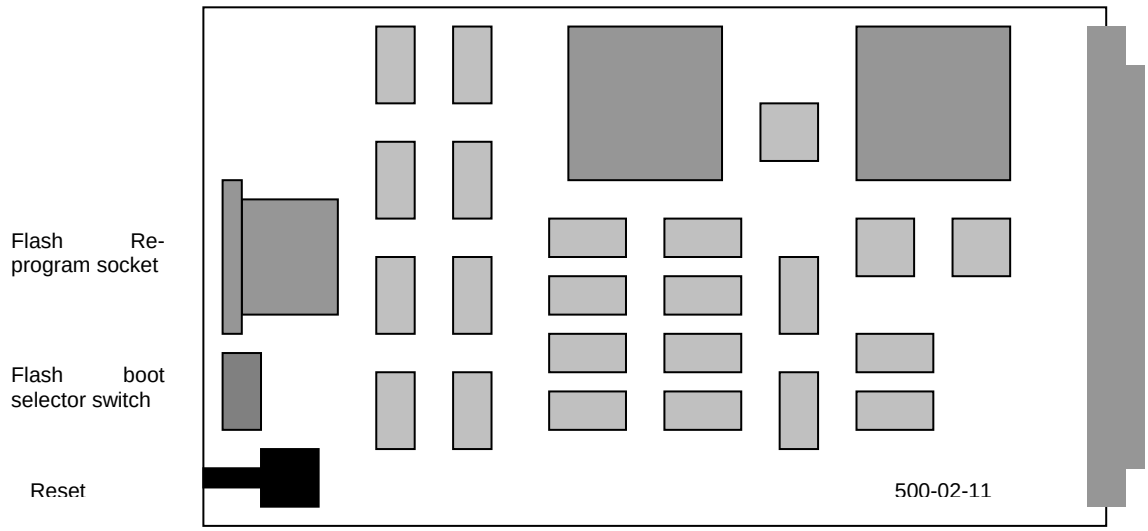
2.4.2 500-02 SERIES TALKBACK CONTROLLER CARD

There are currently two versions of the Talkback Controller: -.

- 500-02-11, which has on-board Flash Ram fitted at all times
- 500-02-12, which updates the 500-02-11 and provides improved serial communication.

They are fitted to the 500-08 (above). Initially, only fit the **lower** 500-02 Talkback Controller. The upper card is used for fault tolerant (redundant) operation if this option has been ordered.

The diagram below shows component layout of the 500-02-11 and -12.



The following key points should be noted:

- The flash bank selector control knob located on the front of the 500-08 series changeover card is inoperative with the 500-02-1x Talkback Controller. The PCB mounted rotary switch located on the front edge of the module itself selects the boot flash bank.
- In fault tolerant (redundant controller) systems fitted with the 500-02-1x Talkback Controller, main and standby controllers in Frame 1 **must** be selected to the same boot flash bank (i.e. position 1,2,3 or 4 on the front rotary switch).
- In multi-frame systems, in frames **other** than Frame 1, the flash bank selector switch should be set to position 6.
- Setting the flash bank selector switch to position 5 on Frame 1 causes the system to start without loading a configuration.
- If 500-01-10 TDM controllers are fitted, they "notify" their frame position to the Talkback Controllers. Thus, for a multi-frame system, the Flash Bank Selector switch setting in frames **other** than Frame 1 is irrelevant.
- The operation of the LEDs on the 500-02 series Talkback Controller is described in the Commander Technical Manual.

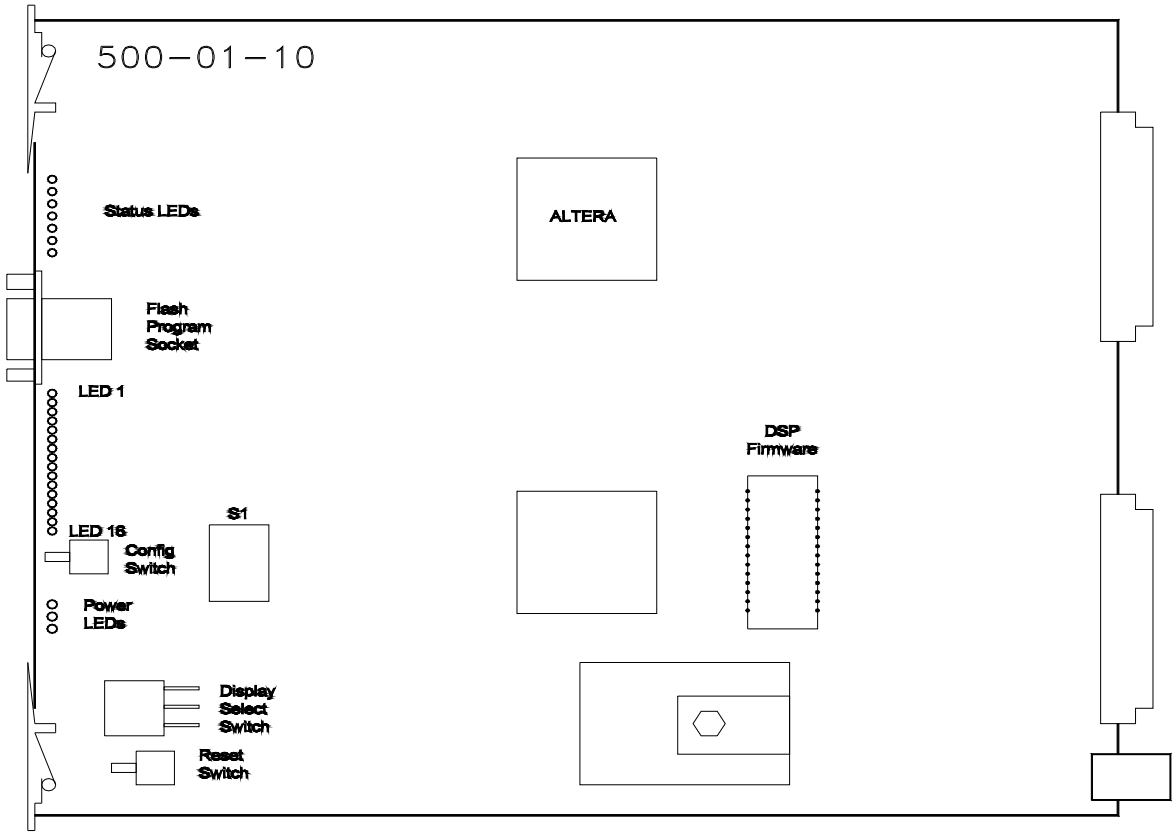
2.4.3 500-01 SERIES TDM CONTROLLER CARD

The current version of the TDM card is:

- 500-01-10 which replaces the 500-01-00.

The main TDM controller is fitted in the left side of the frame, immediately to the right of the 500-08 / 500-02 combination. The standby controller is only applicable in fault tolerant systems when the appropriate modules have been purchased. Do not fit the standby controllers at this stage.

The diagram below shows the position of major components on the 500-01-10.



The following key points should be noted:

- Detailed information about the LEDs on the 500-01-10 TDM Card may be found in the Commander Technical Manual. Contact Trilogy Communications for information about this manual.
- During normal operation, we suggest that the Display Selector switch be set to position 3.

2.4.4 500-25-00 E1 NETWORK LINK CARD

This optional card has a number of front mounted LEDs and a D9 programming socket. The system will normally be assembled by Trilogy with the appropriate rear connector units (RCU). Check the rear of the frame for the Network RCU (500-26-00) which is fitted with two RJ45 connectors and a single BNC. Fit any Network cards in the correct places.

- Inter-system connections are described in Section 4.1..

Operation of the LEDs is described in Section 3.4.5.3.

2.4.5 500-10 SERIES MISC. I/O (GPI) CARDS.

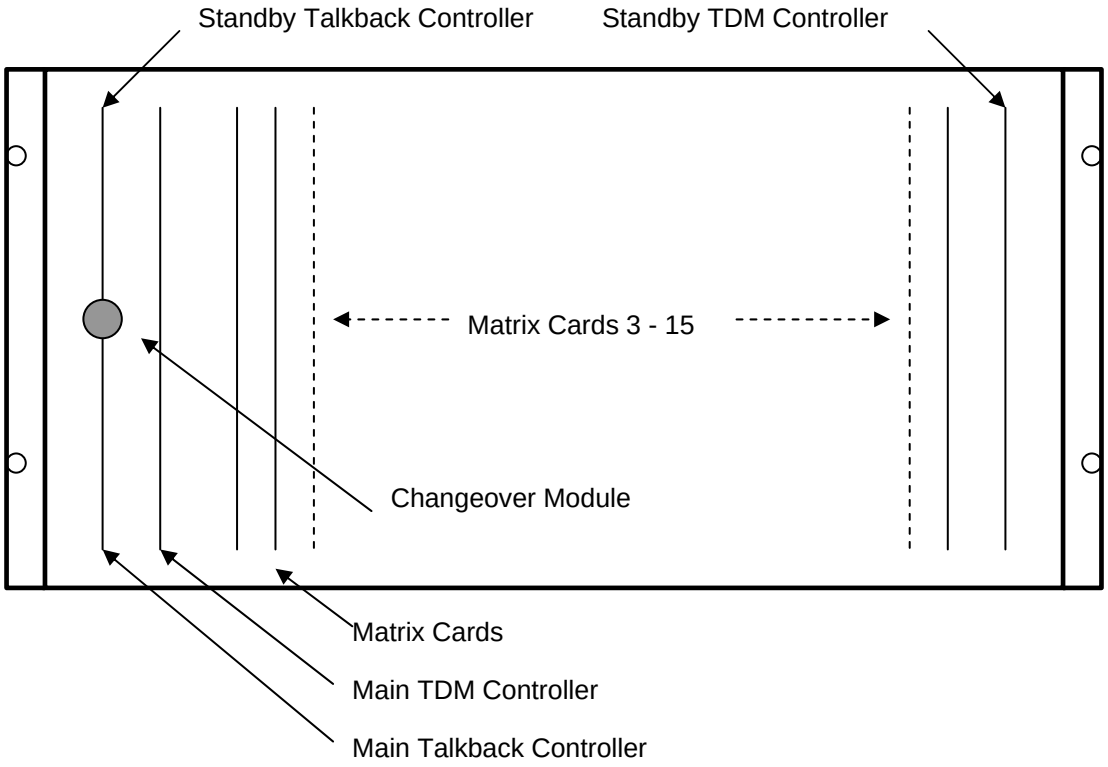
This optional board has an LED bar graph array plus a number of miniature rotary switches on the front panel. The system frame will normally be assembled by Trilogy with appropriate rear connector units (RCU). Check the rear of the frame for the Misc. I/O RCU, which is fitted with 25 way and 37 way connectors, and then fit the 500-10 in the correct places.

- Input and output connector pin-outs are given in Section 3.4.5.
- Suggested external input and output circuitry is shown in Section 3.4.5.2.
- Operation of the front panel rotary switches and LEDs is described in Section 3.4.5.1.
- Further information about the on-board links may be found in the Commander Technical Manual.
- Talkback controller types 500-02-11 and 500-02-12 support a maximum of six 500-10-00 GPI cards.

2.4.6 500-06 SERIES MATRIX CARDS

Finally, fit these in the remaining positions. Depending on the system order, the quantities of matrix cards and RCU's may not match exactly. The current version is part no. 500-06-02; legacy versions are covered in section 8.1.

The following diagram shows the location of these modules within the frame.



The 500-06 modules have an onboard link, which increases the gain of the 6th port on the card, when it is used in conjunction with a "cameras" rear connector unit (RCU). If this option has been ordered the frame will be fitted with an alternative RCU which has a 15 way D type connector in the 6th position. Refer to section 3.5 for information on setting this link.

The 500-06-02 modules also have compatibility links, which allows them to emulate the older 500-06-00 series modules. When 500-06-00 and 500-06-02 modules are fitted together in a single frame, links J8 and J9 on the 500-06-02 should be set to position A. See section 3.5.1 for details.

2.5 MAINS CONNECTION AND FUSING

2.5.1 500-15-30 SERIES POWER SUPPLY

The PSU chassis occupies an additional 2U of rack space below the matrix and is internally wired. The complete assembly therefore occupies 8U for a 96 port system, 14U for a 192 port system etc. The PSU is half rack width allowing two PSU modules to be fitted, thus providing backup operation.

Each power supply is fitted with a D9 socket, which provides a relay contact indicating the PSU status. The table below gives details. Connection should only be made to the pins indicated: any other connections may cause failure of the power supply unit. There is also an auxiliary power connector: details below.

D9 Fixed Plug Pin	Function
1	Relay normally closed
2	Relay normally open
3	Relay common

XLR4 Fixed Socket Pin	Function
1	0V
2	+15V
3	No connection
4	-15V

Note: The Aux power connector is protected by an internal self-resetting thermal fuse. Left and right (main and standby) supplies may be connected in parallel.

The power supplies are switched-mode units and will cope automatically with an input voltage of between 98 and 260 volts AC. This should be wired according to the instructions provided with your mating mains socket using suitable cable. See below for earthing details.

The mains plug has an integral fuse tray fitted with a 20mm glass cartridge slow blow/anti-surge fuse. The fuse rating is marked adjacent to each fuse tray.

2.5.2 EARTHING REQUIREMENTS

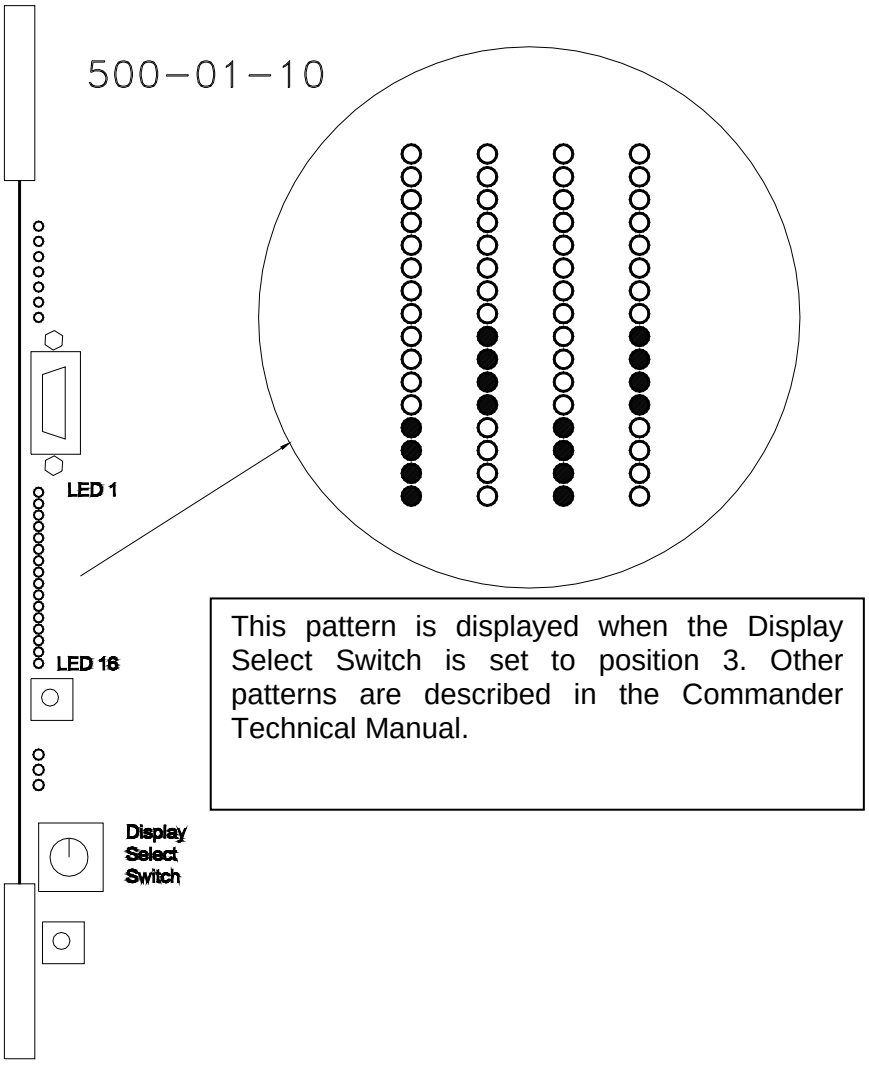
The Trilogy 500-15-30 units are provided with a single 4mm-earthing stud on the rear panel. Incoming mains earth from the IEC connector is internally bonded to both the chassis and technical 0V to meet safety requirements and performance specifications. The stud allows the addition of an earth strap in rack installations.

2.6 STARTING THE SYSTEM

The system may now be powered and will load a configuration from the Flash RAM. The miniature rotary switch on the front edge of the 500-02 Talkback Controller selects the boot configuration bank. In a multi-frame system, this is the 500-02 Talkback Controller in Frame 1 of the matrix. It is not necessary to have the computer operating at this stage.

A few hints:

- Initially, do not fit the redundant (standby) controller modules.
- Remove any 500-10 Misc I/O cards and 500-25 Network Link cards temporarily. If they have not been included in the initial boot configuration (loaded from Flash RAM), the system will appear not to run, or will operate very slowly.
- Turn the flash bank selector switch “out of range” (e.g. position 5). The system will now start without loading a configuration from flash RAM.
- If the system is multi-frame, see Section 2.4.2 for further information about the Flash RAM selector switch.
- Normal operation of the 500-01-10 card is indicated by the alternating LED pattern shown below. The display rotary selector switch should be set to position 3.



This pattern is displayed when the Display Select Switch is set to position 3. Other patterns are described in the Commander Technical Manual.

If this phase is successful and the TDM controller is running correctly, switch off the system. Turn the flash bank selector switch to an active bank (i.e 1,2,3 or 4) and re-start the system. The yellow polling LED on the 500-02 Talkback Controller will start to flash, indicating that a configuration has been loaded from the Flash RAM and is active on the system.

Finally, the standby Talkback and TDM controllers may be added. Switch the system off, carefully add the cards in the positions shown in section 2.4.6 then re-power the system. The main TDM controller (on the left side of the frame) should now initialise and display an LED pattern as on the previous page. The Standby TDM controller (on the right side of the frame) should display the “standby” pattern which is LED 1-8 alternating with LED 9-16.

3. CONNECTING TO THE MATRIX

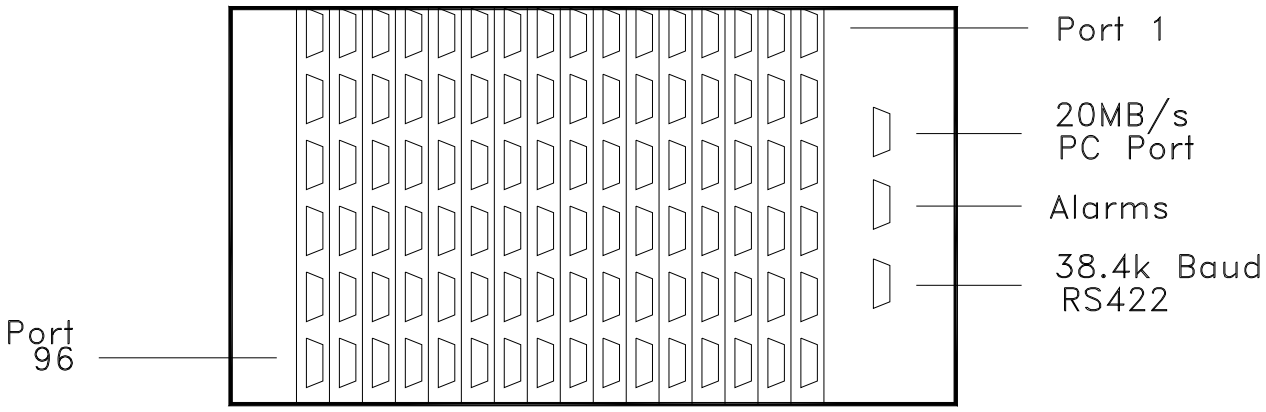
3.1 CONNECTING THE MATRIX PORTS

The following drawing shows the rear view of a fully equipped 6U rack. Connectors are provided for the P.C., status alarms, panels and externals. These connectors are wired as detailed below. Connector types and pinouts for the Commander rack connectors are given.

The numbering of port outputs is indicated on the connector plate on the right hand side of the rear of the rack. Port 1 is the top right connector, port 6 the bottom right; port 91 is the top left and port 96 the bottom left. In systems with more than 1 rack, numbering continues from port 97 in the second rack, as indicated by the printing.

The frame number (1 to 4) is indicated by appropriate marking of the boxes at the bottom of the connector plate.

Early systems did not have printing on this plate. Use this drawing as a guide.



3.2 CONNECTING THE PC TO THE COMMANDER SYSTEM

A number of different options are available, depending on the type of computer and size of the matrix. These are:

- A laptop or desktop PC communicating directly via a free RS232 (COM) port. See section 3.2.1.
- A Trilogy 500-16-03 download converter box. This interfaces the serial port on a laptop or desktop PC to the transputer (high-speed) download port on a Commander matrix. See section 3.2.2..

Connect the PC to the D9 type plug labelled "20MB/s PC link" on the rear right side of the matrix. In a multi-frame system (i.e. >96 ports) the PC may be connected to any of the available PC connectors but we would recommend frame 1 as the default. Initially, we suggest establishing control of the system using the supplied cable.

3.2.1 CONNECTION VIA A PC COM PORT USING RS232

For the later releases of PathFinder 4.16 and all releases of PathFinder 4.2x, provided the system is fitted with 500-02-12 Talkback Controller cards, the matrix may be upgraded to allow serial communication from a free computer COM port. It may be necessary to exchange the matrix rear connection plate: alternatively, an external RS422 to RS232 converter must be fitted. Please contact Trilogy Communications for further information.

The factory default configures the matrix for RS232 communication. See section 3.4.3 for wiring information.

3.2.2 CONNECTION VIA A 500-16-03 DOWNLOAD CONVERTER BOX

A single frame (96 port) Commander system has two interfaces which may be used for downloading configuration data:

- Serial port (RS232/422)
- High speed (20MB/s) transputer port

With a standalone system, the RS232 connection is sufficient (see 3.2.1). In a multi-system environment, this serial port is required to pass networking information, and can no longer be used for configuration data. See section 4.2. Therefore, a 500-16-03 Converter should be used, between the PC serial port and the Commander high speed port.

Two connection cables are required.

The PC cable is a pin to pin 9 way cable with male connecting to the RS232 port on the Interface box and the female connecting to the PC Com port. For short cable runs of a few meters ribbon cable is acceptable, for longer runs please use screened CAT5 cable. Screen is connected to pin 3, cable pairs are 1/6, 2/7, 4/8, 5/9.

Sub D 9 free female	Sub D 9 free male
1	1
6	6
2	2
7	7
4	4
8	8
3	3
9	9
5 (screen)	5

The Link cable for Commander downloads is also a pin to pin 9 way cable, but with a female connector at both ends. For short cable runs of **less than** one meter ribbon cable is acceptable, for longer runs please use screened CAT5 cable. Screen is connected to pin 3, cable pairs are 1/6, 2/7, 4/8, 5/9.

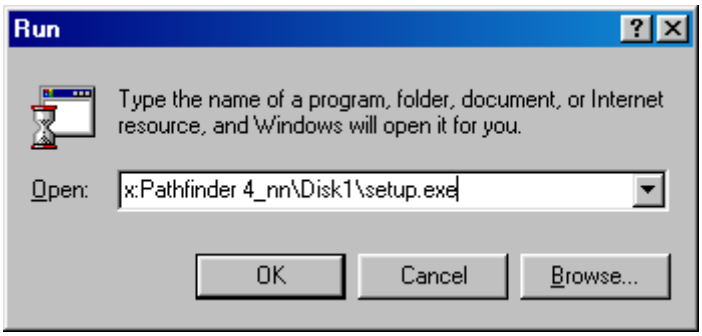
Sub D 9 free female	Sub D 9 free female
1	1
6	6
2	2
7	7
4	4
8	8
5	5
9	9
3 (screen)	3

The 500-16-03 may also be used for flash reprogramming certain types of Commander hardware. See section 6.

Further information on the 500-16-03 is provided in section 11.

3.3 INSTALLING PATHFINDER

PathFinder is the configuration editor for the Trilogy Commander intercom system. Details of PC specification and operating system requirements are given in Section 9.6. Software is supplied on CD-ROM. For a new installation, insert the disk in the PC CD drive.



From the Windows start menu, click Run, then type x:PathFinder 4_nn\Disk1\setup.exe where x is the CD drive letter and nn is the version sub-code (e.g. 21).

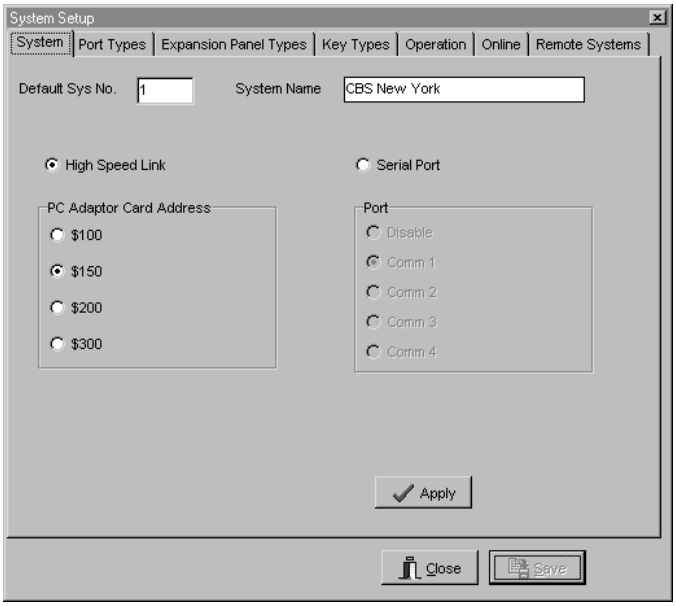
Alternatively, browse to the location using Windows Explorer.

Unless there are exceptional reasons otherwise, we strongly recommend that you accept all the defaults offered during the software installation process. Following this, you will be prompted that a system re-start is required, which again should be followed to provide correct operation.

There are now some important settings to carry out before using PathFinder.

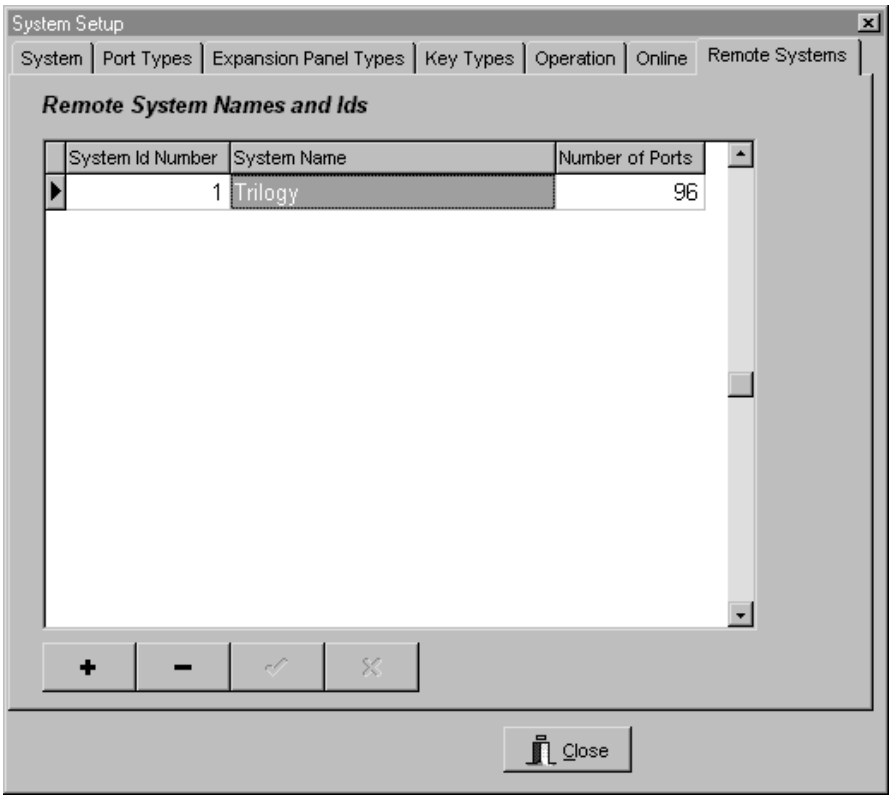
- System name and number
- The matrix size.
- Commander interface method and settings.

Start PathFinder, entering the CD key code when prompted. This is attached to the CD jewel case and should be carefully retained for future PC installations. Follow the options to ***create*** a New Database. From the Options pull down menu, select Settings and the form shown below will be displayed.



Make any changes as required. Ensure that there are no system conflicts with other PC hardware by using the Windows Device Manager. Conflicts with other hardware such as sound cards and network cards may prevent the download adaptor from functioning correctly.. Any changes within PathFinder must be matched by changes to the adapter card itself.

Now select the final tab of this form, labelled “Remote Systems”. On installation, only one system is displayed, as shown below.



Since this version of PathFinder is “network ready”, details of all systems within the Commander “Network Domain” must be entered on this view. It is important to ensure that this information is matched on all systems within the domain. For a single “standalone” system, simply edit the details appropriately.

NOTE: The system size must be set to 382 (not 384) for a four frame system and 574 (not 576) for a six frame system.

Make the necessary changes to the System settings, to match hardware and software parameters. Save the Settings, then close and re-start PathFinder. When prompted, it is not necessary to save the database, since the tables are newly created and therefore blank.

3.4 OTHER MATRIX CONNECTIONS

A number of other connections are provided on the rear of the matrix. For legacy Sub D9 matrix connectors, see section 8.4.

3.4.1 MATRIX PORTS – RJ-45

Commander systems delivered from spring - 2003 onwards are fitted with RJ-45 connectors for the matrix ports. Rear connector unit part number is 500-07-50.

RJ-45 Pin	Function		Cable
1	Panel Data out +	Matrix Data In	Pair 1
2	Panel Data out -		
3	Panel Data In +	Matrix Data Out	Pair 2
6	Panel Data In -		
5	Panel Audio out +	Matrix Audio In	Pair 3
4	Panel Audio out -		
7	Panel Audio in +	Matrix Audio Out	Pair 4
8	Panel Audio in -		
shell	Cable Screen		

The 500-07-50 is fitted with a Sub D25 Fixed Socket which provides the 4-wire audio signals for the 6 channels of that rear connector. These are in parallel with the existing signals on pairs 3 and 4 of the corresponding RJ-45.

Input	PIN + (HOT)	PIN - (COLD)
1	24	12
2	22	10
3	20	8
4	18	6
5	16	4
6	14	2
Output	PIN + (HOT)	PIN - (COLD)
1	25	13
2	23	11
3	21	9
4	19	7
5	17	5
6	15	3
Ground	1	

3.4.2 CAMERA CONNECTOR

This option provides a mixing pad for up to 6 camera inputs, and a single feed for audio connection to cameras. The connector may be identified as a D15 socket on the rear connector unit.

Matrix Sub-D15 Fixed Socket Pin (+,-)	Description
8,15	Camera 1 input +,- to matrix
7,14	Camera 2 input +,- to matrix
6,13	Camera 3 input +,- to matrix
5,12	Camera 4 input +,- to matrix
4,11	Camera 5 input +,- to matrix
3,10	Camera 6 input +,- to matrix
1	Ground
2,9	Cameras Output +,- from matrix

NOTE: Since the Camera connector unit performs a passive mix, the gain must be increased on the corresponding 500-06 matrix card. See section 3.5 of this guide.

3.4.3 SERIAL LINK (RS232 / RS422)

The current version of PC connector plate, which is fitted on the rear right hand side of the Commander Matrix frame, provides either RS232 or RS422 connection capability. The factory default setting is RS232: this may be changed by removing the 4 fixing screws, withdrawing the rear connector assembly and moving the PCB mounted jumper links to the alternate position. Most computers are fitted with D9 fixed sockets for the serial COM port. For older models equipped with a D25, suitable adaptors may be easily obtained.

RS232 configuration.

Commander Sub D9 Fixed Socket - Pin	Function	PC COM Port D9 Fixed Socket
1	DCD	1
2	TX	2
3	RX	3
4	DTR	4
5	0V or GND	5
6	DSR	6
7	CTS	7
8	RTS	8
9	n/c	9
Case		

Note: Pin 1 through to Pin 8 MUST be wired 1:1. CAT 5 cable is suitable for most applications.

RS422 configuration.

Commander Sub D9 Fixed Socket Pin (+,-)	Function	Notes
4,8	422 in, +,-	Pair 1 (RX)
6,1	422 out, +,-	Pair 2 (TX)
7,2	422 RTS +,-	Pair 3
5,9	422 CTS +,-	Pair 4
3		Chassis

Connection to external equipment will depend on the manufacturer and model of RS422 card fitted. The table above only relates to the matrix.

3.4.4 ALARMS

These are provided on a 9 way D type fixed socket on the rear of the matrix. The function of the output is software controlled from the 500-08-10 Changeover card. The output is a normally made, solid state relay contact. Maximum current rating is 120mA.

Commander D9 Fixed Socket - Pin	Function	Notes
1,6	Right side OK	Pair 1
2,7	Left side OK	Pair 2
4,8	C/O Card OK	Pair 3
5,9	Left side selected	Pair 4
3		Chassis

3.4.5 MISCELLANEOUS I/O CARD CONNECTOR PIN-OUT

This optional connector back has 2 off D25 fixed sockets for logic outputs, a single D37 fixed plug for logic inputs and a single D9 fixed socket for RS232/422 control and a monitoring audio output.

To activate the logic input, connect the relevant pin to pin 37 (0V ref.).

Miscellaneous I/O Card Input Connections

Commander D37 Fixed Plug - Pin	Description
1	Chassis
2	Input 27
3	Input 25
4	Input 23
5	Input 21
6	Input 19
7	Input 17
8	Input 15
9	Input 13
10	Input 11
11	Input 9
12	Input 7
13	Input 5
14	Input 3
15	Input 1
16 - 19	Not Used
20	Input 28
21	Input 26
22	Input 24
23	Input 22
24	Input 20
25	Input 18
26	Input 16
27	Input 14
28	Input 12
29	Input 10
30	Input 8
31	Input 6
32	Input 4
33	Input 2
34-36	Not Used
37	0V Reference

Miscellaneous I/O Card Output Connections

Commander D25 Fixed Socket Pins	Upper Connector Description
1	Ground
2/14	Output 1
3/15	Output 2
4/16	Output 3
5/17	Output 4
6/18	Output 5
7/19	Output 6
8/20	Output 7
9/21	Output 8
10/22	Output 9
11/23	Output 10
12/24	Output 11
13/25	Output 12

Commander D25 Fixed Socket Pins	Lower Connector Description
1	Ground
2/14	Output 13
3/15	Output 14
4/16	Output 15
5/17	Output 16
6/18	Output 17
7/19	Output 18
8/20	Output 19
9/21	Output 20
10/22	Output 21
11/23	Output 22
12/24	Output 23
13/25	Output 24

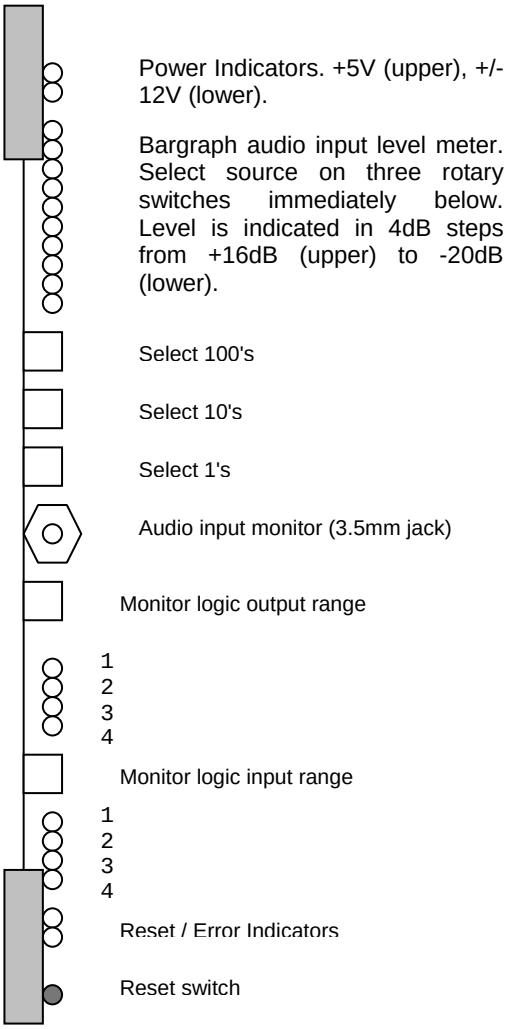
Typical external circuitry for the logic outputs is given on Page 28.

Miscellaneous I/O Card RS422/Monitoring Connections

Commander D9 Fixed Socket Pin	Description
1	Ground
2	RS422 Out-
3	RS422 In-
4	Audio Monitor Out-
5	Not Used
6	RS422 Out+ OR RS232 Out
7	RS422 In+ OR RS232 In
8	Audio Monitor Out+
9	Not Used

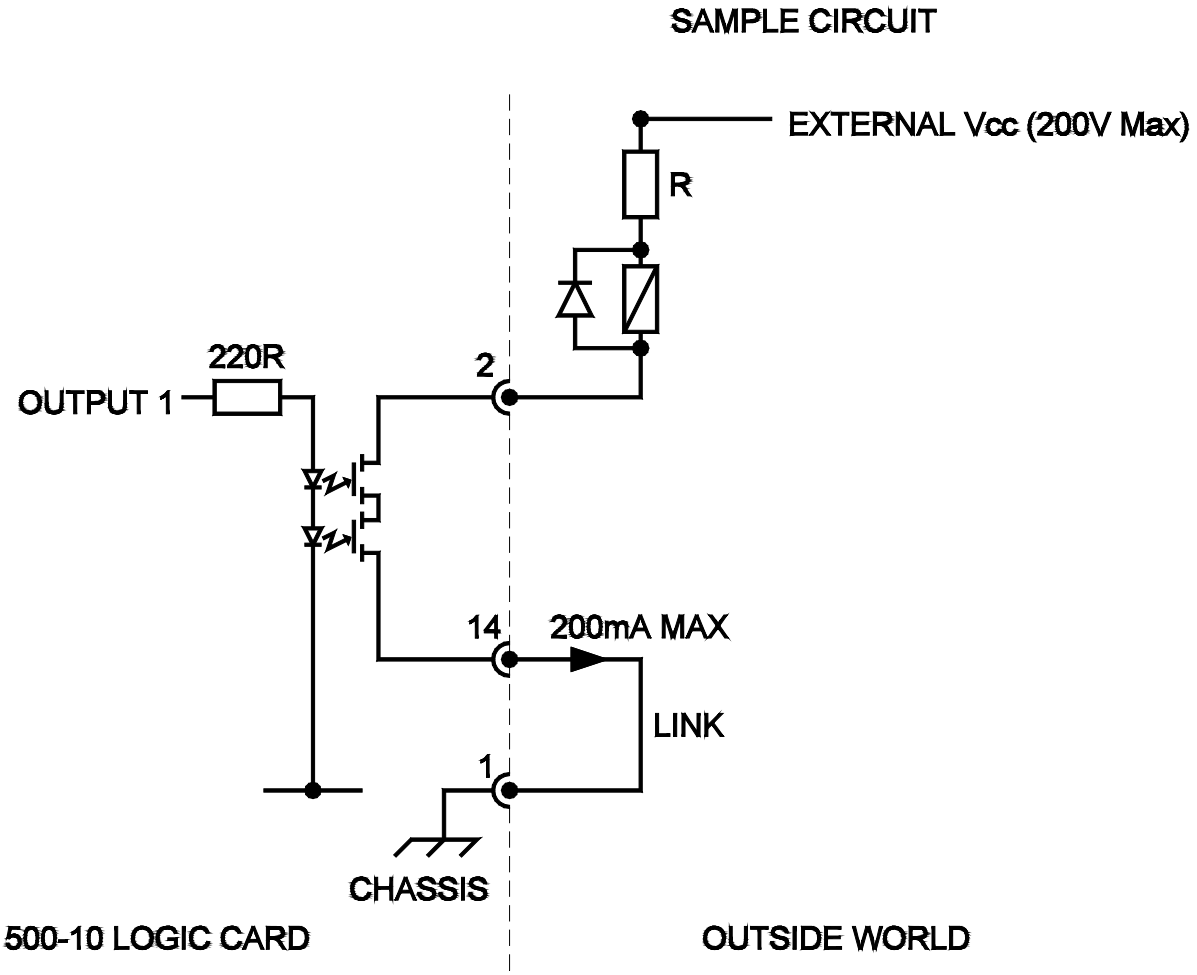
Further information is available in the 500-10 Technical Manual, which is available on request from Trilogy Communications.

3.4.5.1 500-10 Switches and Indicators

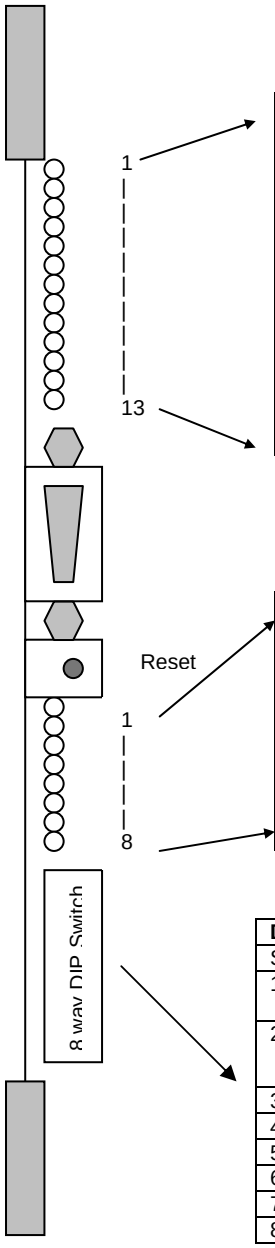


3.4.5.2 Suggested external wiring of Misc I/O card output

The circuit below shows suggested wiring for Output 1 of the 500-10-00 Misc I/O logic card. Maximum current through the output stage must be limited to 200mA and the maximum permitted external voltage is +200V. If these limits are exceeded, the card may be damaged. Connector pin-out is shown in detail on page 24.



3.4.5.3 500-25 Network Card Indicators and Switches



LED	Legend	Activity	Function
D8	+5V	On	+5V
D1	1	1Hz	DSP 1 OK
D2	2	2Hz	DSP 2 OK
D6	RESET	Off	Reset
D3	NO E1 CLK	Off if net available	No E1 Clock
D9	TDM D	Off when started	TDM Disabled
D10	1 DIS	Off when started	DSP Disabled (TDM)
D11	BUSY	Quick flash	TDM Busy
D12	COM1	Quick flash	DSP Comms (TDM)
D13	E1 DIS	Off if data available	E1 Disabled
D14	2 DIS	On when E1 down	NET DSP Disabled
D15	BUSY	On when buffers full	NET DSP Busy
D16	COM2	Unused	NET DSP Comms

LED	Legend	Activity	Function
D17	1	1Hz	DSP 1 & 2 sync'd
D18	2	On when full	IN Buffer full
D19	3	On when full	OUT Buffer full
D20	4	On during start then off	E1 clk & event off command
D21	5	On	Possible RX Data loss
D22	6	On if clk missing	E1 Clock off
D23	7	Normally toggles	Receiving H IP Data
D24	8	Normally toggles	Transmitting H IP Data

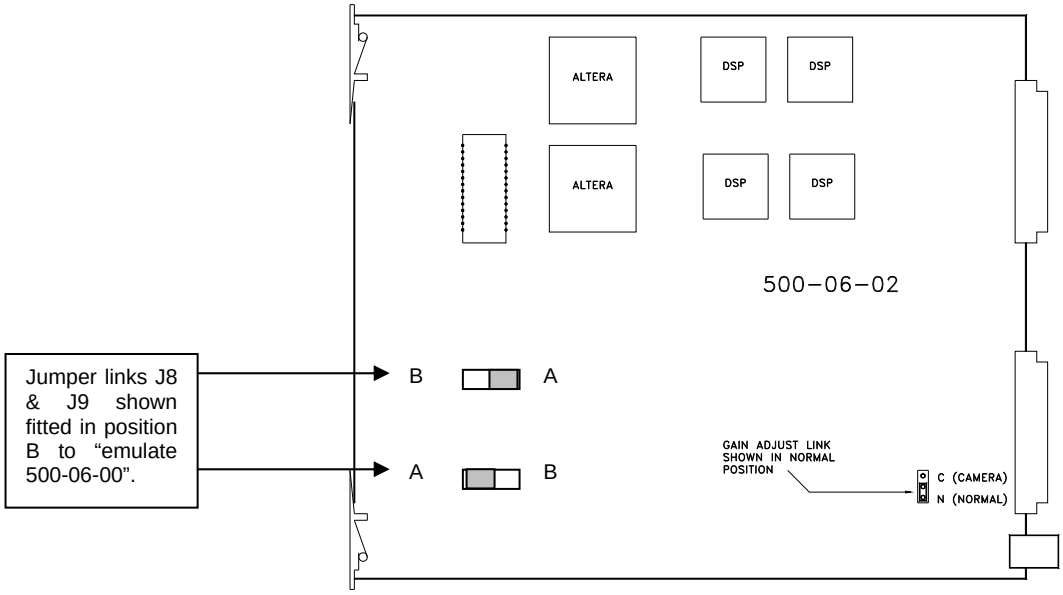
DIP Switch Functions			
Sw	Function	Default	Note
1	Cable Match	OFF= CAT 5	ON = Co-ax
2	Cable Length	ON = norm	OFF = "long"
3	undefined		
4	undefined		
5	undefined		
6	UART IN	OFF	
7	UART OUT	OFF	
8	ERR CORR	OFF	

- D1 and D2 will, under normal operation, flash at 1Hz and 2Hz respectively. If there is a problem during start-up, one or both LEDs will flash considerably faster.
- D13 should be on under normal operating conditions. The LED turns off when data comes in from a remote link but the off duration is very short and not visible. It is therefore only useful to show an error condition.
- D20 is turned on just after power-up then turned off under TDM control shortly afterwards. The LED is also on during a TDM reconfiguration process. The state of the LED is duplicated on a remote 500-25 if connected directly.

3.5 CONFIGURING THE GAIN OF CAMERA INPUTS.

3.5.1 LINK SETTING ON 500-06-02

The gain of port 6 on the 500-06-02-matrix card is set by a jumper link on the board. Jumper J7 should be set to N for normal operation or to C to increase the gain of port 6 by +25dB. If 500-06-02 cards are used in the same matrix as the older 500-06-00 cards, they must be set to emulate the 500-06-00 cards. Fit links J8 and J9 in position B. The diagram below shows the position of on board links.



4. NETWORKING

4.1 CONNECTING NETWORKED SYSTEMS

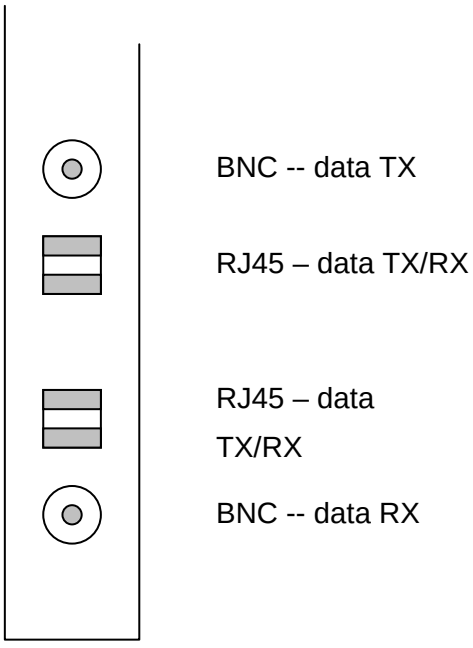
The optional Network hardware comprises two components:

- 500-25 Network Card
- 500-26 Network Rear Connector Unit (RCU)

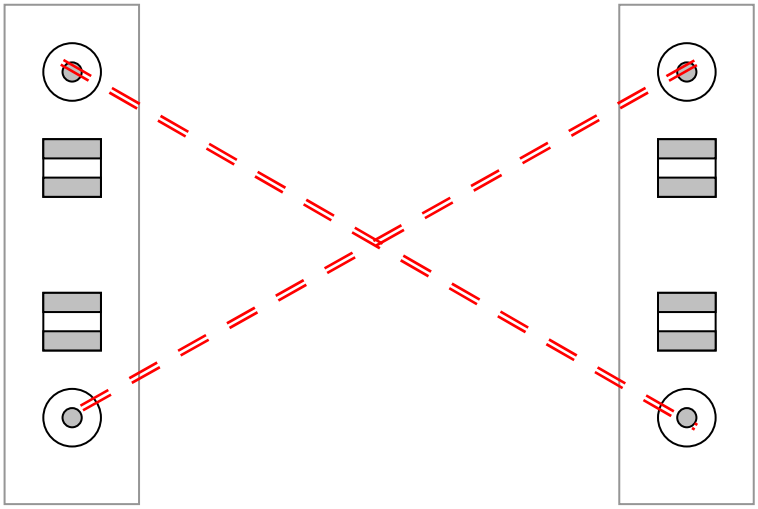
The RCU provides the interface to other networked Commander systems. Note that:

- Interconnection can be made by coax (BNC) or CAT5 (RJ45). It is not possible to “mix” the interconnection methods. Having chosen the means of connection, do not fit any other connectors.
- The coax cable connection requires two separate cables (RX and TX) for each link. The CAT5 connection method requires only a single cable per link.
- Network connections are made on a point to point basis. Therefore, a complete system, comprising a number of matrices, will always contain an even number of network cards. See the diagram below which shows a three matrix LAN.

4.1.1 500-26 NETWORK REAR CONNECTOR UNIT (RCU)

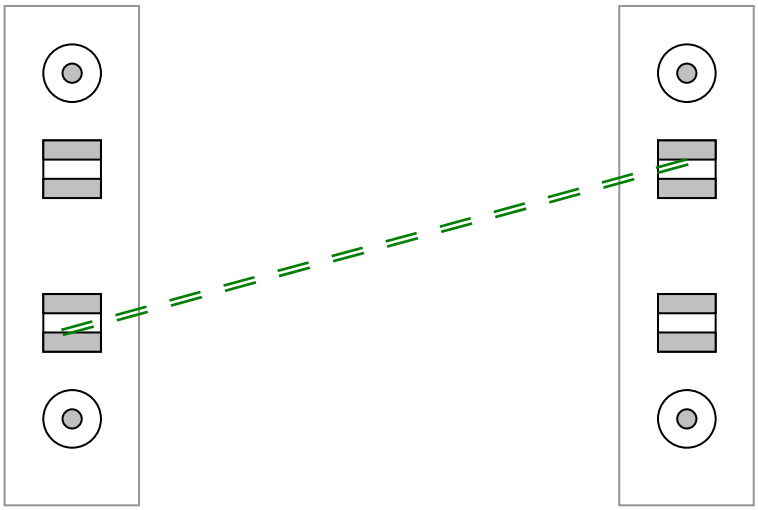


To link two network systems, connect as shown on the following diagrams.



Either

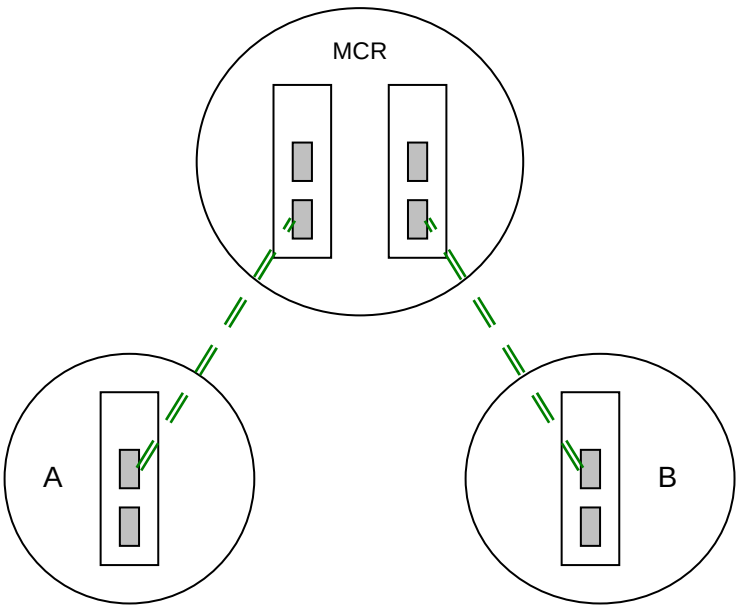
Using two 50R co-axial cables via the BNC connectors.



Or

Connect a single CAT5 cable (non-crossover) between two RJ45 sockets.

A simple 3 matrix LAN is shown below. The MCR matrix is fitted with two Network Cards. Routes from Studio A to Studio B are made via the matrix in MCR. For clarity, only the RJ45 connections are shown.



4.2 SERIAL NETWORKING

Matrices may also be interconnected using a serial communication port (com port) plus a number of audio tie lines (4-wires).

Since a 96 port Commander Matrix has only one com port, if it utilised for networking, then the PathFinder download must be accomplished via the high speed (20MB/s) port. This will require an additional 500-16-03 Download Converter, as explained in section 3.2.2.

This approach is followed when networking multiple matrices over an IP infrastructure by installing an MIU adjacent to each matrix.

5. CONTROL PANELS

5.1 INTRODUCTION

There are now a number of different generations of Trilogy control panels in service. Those which are part of the current range are listed in the following section. Panels which are no longer supplied (legacy range) are covered in section 8.5.

The following general points should be noted:

- All control panels connect to the matrix in point to point topology. Each panel utilises a single matrix port, although on some models, expansion panels may be connected to a single "master" panel using the ***expansion in*** and ***expansion out*** connectors fitted on the rear of the panel. Two standard 24 key panels may be linked together, for example to provide 48 keys for an operator, but only utilising a single matrix port.
- Panel firmware may be re-programmed locally using the appropriate software utility and connection cable. Contact Trilogy Communications for more information.

5.2 CURRENT RANGE

- 500-41-xx series desktop panels. See section 5.4.
- 500-3x-5x series panels. They cannot be connected to panels from another series (e.g. in expansion mode) but they may be used simultaneously on a system. See section 5.5. The associated expansion panels are from the 500-43-5x series. See section 5.6.
- 500-42-50 1U, 10-lever key panel fitted with 5 character LED displays. See section 5.7.
- The 500-31-60 16 lever key control panel. See section 5.9.
- The following control panels introduced in 2006. See section 5.10.
    - 500-33-00 32 key, 2U panel
    - 500-45-00 8 button, 1U panel
    - 500-46-00 10 button, LC key, 1U panel.

5.3 CONTROL PANEL FACILITY COMPARISON TABLE

A series of additional connectors provide the following facilities, on the panel types indicated in the table.

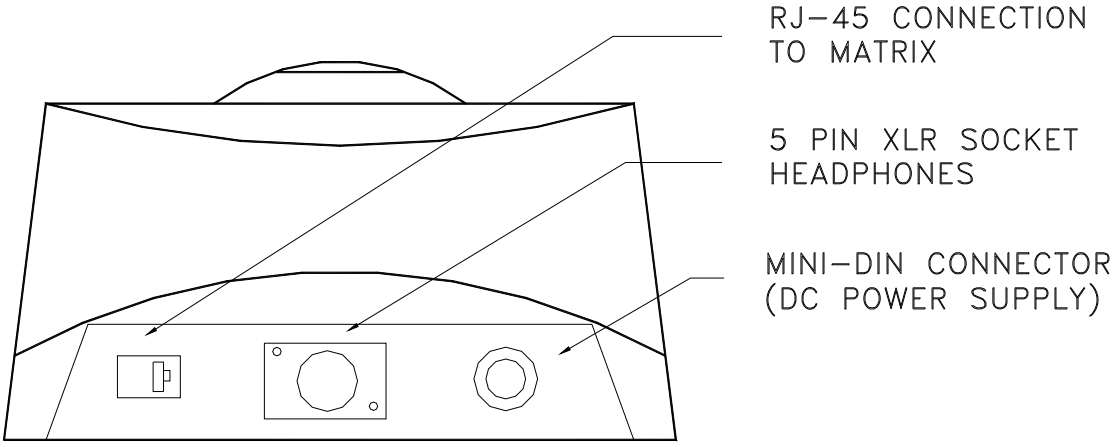
	500-3x-5x Control Panels	500-31-60 16 lever key panel.	500-41-xx Desktop	500-42-50 1U, 10 key with displays	500-43-5x Expansion Panel	500-33-00 / 500-45-00 / 500-46-00
Comprehensive audio inputs and outputs	√	√				√
Expansion ports	1			2	2	†
Local logic inputs and outputs	√	√				√
Remote control footswitch	√	√				√
Software re-programmable	√			√	√	√
External dialpad connector	√			√		
5 character alphanumeric displays	√	√	√	√		†
Fitted front panel microphone	√	√	√	√		√
Built in loudspeaker	√	√	√	√		√
Headset connector	√	√	√	√		√

† Display type varies. Please contact Trilogy for current availability of expansion facility on these panels.

5.4 500-41-XX SERIES DESKTOP PANELS

Early desktop panel were DC powered from a mains power supply unit connected via a mini DIN connector on the rear. From 2003 onwards, panels have an internal mains power supply. The only remaining user connection is to the Headset connector on the rear of the desktop.

The following wiring applies to panels marked "Mod State 2" and later. Earlier panels had pins 4 and 6 transposed internally, with corresponding changes to the interconnecting cable. The later wiring allows operation over longer cable runs.



RJ-45 connection to Matrix

RJ-45 Pin	Function	
1	Panel Data out +	Pair 1
2	Panel Data out -	
3	Panel Data In +	Pair 2
6	Panel Data In -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
n/c	Cable Screen	

Headset - 5 Pin XLR Fixed Socket

(Rear panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

Note: As delivered, 500-41 Series Desktop Panels will not operate with T-Edit (early DOS configuration editor) based systems. An internal link must be changed and full details are given in Section 10.1.

5.5 500-31-51 16 KEY PLUS DIAL PAD CONTROL PANEL

Information about the following legacy panel types is also included here.

- 500-30-50 24 key panel (with internal loudspeaker)
- 500-31-50 16 key panel
- 500-32-50 8 key panel
- 500-32-51 8 key panel with dial pad

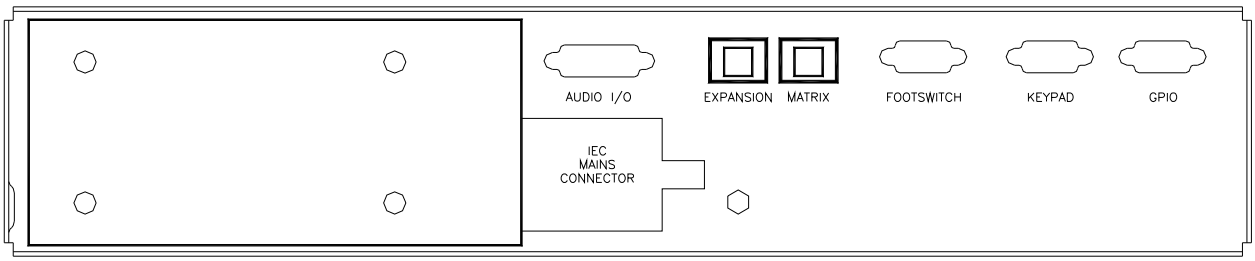
5.5.1 SPECIFICATION

Dimensions	485mm wide x 88.9mm high x 80mm deep (max, excluding connectors). Approx. 110mm deep (max including mating connectors) 19" x 2RU rack mounting
Mains Input	90 – 250 V ac, 50-60Hz
Current Consumption	150mA @ 90V, 50 mA @ 250V

Detail of panel connections is provided in the following tables. Other features may be enabled or disabled by the DIP switches accessible at the top of the panel. These are detailed in section 5.5.4.

One of the key differences between the 500-3x-5x series and earlier versions is the use of the RJ45 connector for matrix and expansion ports. It is also now possible to connect together multiple standard panels in a chain, using the "Matrix" and "Expansion" connectors.

5.5.2 500-3X-5X SERIES STANDARD CONTROL PANEL REAR VIEW



5.5.3 500-3X-5X SERIES CONTROL PANEL CONNECTIONS

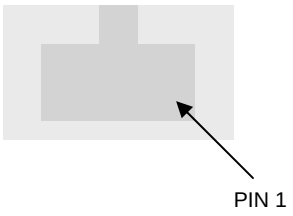
Matrix – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data out +	Pair 1
2	Panel Data out -	
3	Panel Data In +	Pair 2
6	Panel Data In -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

Expansion Port – RJ45 socket

RJ-45 Pin	Function
1	Panel Data in +
2	Panel Data in -
3	Panel Data out +
6	Panel Data out -
5	Panel Audio out +
4	Panel Audio out -
7	Panel Audio in +
8	Panel Audio in -
	Cable Screen

Matrix and Expansion RJ45 socket (view from rear of panel)



Headset - 5 Pin XLR Fixed Socket (front panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

Foot Switch - D9 Fixed Socket

Pin	Function
1	Foot Switch Input
2	No Connection
3	Chassis Ground
4	No Connection
5	No Connection
6	Ground
7	No Connection
8	No Connection
9	No Connection

GPIO (Local logic in and out) - D9 Fixed Socket

Pin	Function	Notes
1	Ground	
2	Logic Input 1	
3	Logic Input 2	
4	Logic 2 Out Common	
5	Internal +5V (Out)	Protected with series 44R & 1N4002 diode.
6	Logic Output 1	
7	Logic 1 Out Common	
8	Logic Output 2	
9	Logic Input +VCC	NB Pin 9 may be driven by external voltage (With dropper resistor if greater than 5V), or by internal +5V via pin 5.

Audio I/O – D15 Fixed Socket

Pin	Function	Notes
1	Slave Mic Input	Line level, un-balanced
2	+15V Out (for slave mic panel)	NOT protected!
3	Clean Mic Out +	Line level, balanced, pair with 11
4	Ext CUT Input (for slave mic panel)	Parallel function to front panel Cut Switch. Ground to activate
5	Chassis Ground	
6	No connection	
7	External Input to LS Amp -	Line level, balanced, pair with 14
8	Matrix Audio Input to Panel / parallel output -	Line level, balanced, pair with 15
9	Ext Mic Cut output (to slave panel)	Normally grounded. O/P is open circuit when front panel cut selected.
10	-15V Out (for Slave mic panel)	NOT protected
11	Clean Mic Out -	Line level, balanced, pair with 3
12	Mic Ground	
13	Loudspeaker Output	8 ohm loudspeaker
14	External Input to LS Amp +	Line level, balanced, pair with 7
15	Matrix Audio Input to Panel / parallel output +	Line level, balanced, pair with 8

NB 15V supplies are also used to derive 12V for panel. (Thermally Fused @ 0.7A)

Keypad D9 Fixed Socket (-51 variant only)

Pin	Function	Notes
1	Column 1	Switch 1,4,7, *
2	Column 3	Switch 3,6,9,#
3	Row 2	Switch 4,5,6
4	Row 4	Switch *,0,#
5	GND	For switch LEDs
6	Column 2	Switch 2,5,8,0
7	Row 1	Switch 1,2,3
8	Row 3	Switch 7,8,9
9	+12V out	Switch

View of Keypad (front panel)

1	**2**	**3**
4	**5**	**6**
7	**8**	**9**
✵	**0**	**#**

5.5.4 500-3X-5X SERIES DIP SWITCH SETTINGS

Within the panel a series of DIP switches determine the correct panel type. These are factory set and are included for reference in Appendix 1.

A further set of DIP switches are user accessible at the rear of the panel and control the action of the front panel CUT switch. The factory default is shown in the table below. Switch position 4 is not used.

Cut Switch Action	DIP 1	DIP 2	DIP 3
No action	OFF	OFF	OFF
Changeover to HSet MIC (default)	***ON***	***OFF***	***OFF***
LS cut	OFF	ON	OFF
Changeover to HSet MIC and LS cut	ON	ON	OFF
MIC cut	OFF	OFF	ON
Changeover to HSet MIC and MIC cut	ON	OFF	ON
LS cut and MIC cut	OFF	ON	ON
Everything	ON	ON	ON

5.6 500-43-50 12 WAY ROTARY ENCODER EXPANSION PANEL

These may only be connected to panels from the 500-xx--5x range.

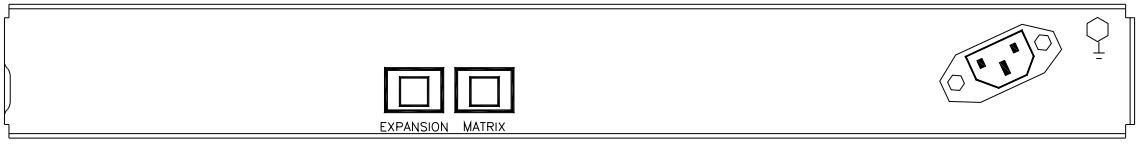
Information about the following legacy panel types is also provided here:

- 500-43-51 1U, 8 REN level control panel

5.6.1 SPECIFICATION

Dimensions	485mm wide x 44.5mm high x 150mm deep (excluding connectors) 200m approx. (including mating connectors) 19" x 1RU rack mounting
Mains Input	90 – 260 V ac, 50-60Hz
Current Consumption	150mA @ 90V ac, 50mA @ 250V ac.

5.6.2 REAR CONNECTOR LAYOUT



The "expansion in" and "expansion out" connections are provided on RJ45 sockets. The pin-out format of these connectors is given below.

Expansion in (Matrix) – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data out +	Pair 1
2	Panel Data out -	
3	Panel Data In +	Pair 2
6	Panel Data In -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

Expansion out (Expansion) – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data in +	Pair 1
2	Panel Data in -	
3	Panel Data out +	Pair 2
6	Panel Data out -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

5.7 500-42-50 1U, 10 LEVER KEY PANEL WITH LED DISPLAYS.

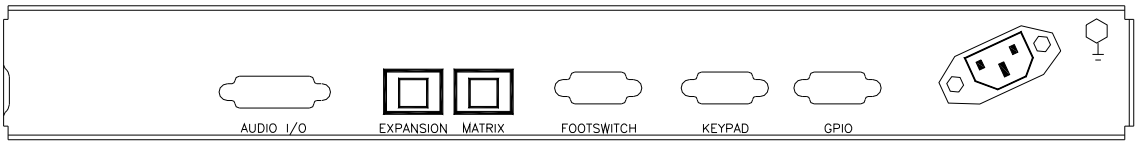
Information about the following legacy panel types is also provided here:

- 500-44-50 1U, 10 lever key reduced facility control panel without displays.
- 500-44-51

5.7.1 SPECIFICATION

Dimensions	485mm wide x 44.5mm high x 150mm deep (excluding connectors) 200m approx. (including mating connectors) 19" x 1RU rack mounting
Mains Input	90 – 260 V ac, 50-60Hz
Current Consumption	150mA @ 90V ac, 50mA @ 250V ac.

5.7.2 REAR CONNECOR LAYOUT



5.7.3 CONNECTIONS

Expansion out – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data in +	Pair 1
2	Panel Data in -	
3	Panel Data out +	Pair 2
6	Panel Data out -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

Matrix – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data out +	Pair 1
2	Panel Data out -	
3	Panel Data In +	Pair 2
6	Panel Data In -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

Headset - 5 Pin XLR Fixed Socket (front panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

Foot Switch - D9 Fixed Socket

Pin	Function
1	Foot Switch Input
2	No Connection
3	Chassis Ground
4	No Connection
5	No Connection
6	Ground
7	No Connection
8	No Connection
9	No Connection

GPIO (Local logic in and out) - D9 Fixed Socket

Pin	Function	Notes
1	Ground	
2	Logic Input 1	
3	Logic Input 2	
4	Logic 2 Out Common	
5	Internal +5V (Out)	Protected with series 44R & 1N4002 diode.
6	Logic Output 1	
7	Logic 1 Out Common	
8	Logic Output 2	
9	Logic Input +VCC	NB Pin 9 may be driven by external voltage (With dropper resistor if greater than 5V), or by internal +5V via pin 5.

Audio I/O – D15 Fixed Socket

Pin	Function	Notes
1	Slave Mic Input	Line level, un-balanced
2	+15V Out (for slave mic panel)	NOT protected!
3	Clean Mic Out +	Line level, balanced, pair with 11
4	Ext CUT Input (for slave mic panel)	Parallel function to front panel Cut Switch. Ground to activate
5	Chassis Ground	
6	No connection	
7	External Input to LS Amp -	Line level, balanced, pair with 14
8	Matrix Audio Input to Panel / parallel output -	Line level, balanced, pair with 15
9	Ext Mic Cut output (to slave panel)	Normally grounded. O/P is open circuit when front panel cut selected.
10	-15V Out (for Slave mic panel)	NOT protected
11	Clean Mic Out -	Line level, balanced, pair with 3
12	Mic Ground	
13	Loudspeaker Output	8 ohm loudspeaker
14	External Input to LS Amp +	Line level, balanced, pair with 7
15	Matrix Audio Input to Panel / parallel output +	Line level, balanced, pair with 8

NB 15V supplies are also used to derive 12V for panel. (Thermally Fused @ 0.7A)

Keypad D9 Fixed Socket

Pin	Function	Notes
1	Column 1	Switch 1,4,7, *
2	Column 3	Switch 3,6,9,#
3	Row 2	Switch 4,5,6
4	Row 4	Switch *,0,#
5	GND	For switch LEDs
6	Column 2	Switch 2,5,8,0
7	Row 1	Switch 1,2,3
8	Row 3	Switch 7,8,9
9	+12V out	Switch

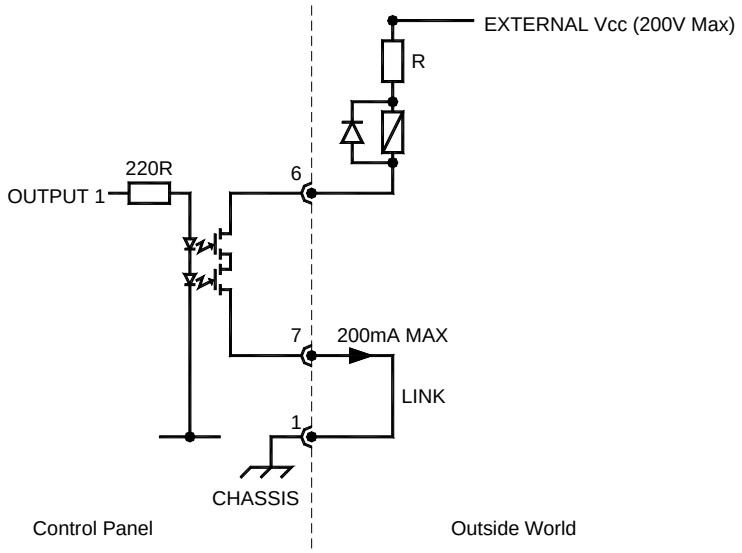
View of Keypad (as seen on front panel)

1	**2**	**3**
4	**5**	**6**
7	**8**	**9**
✵	**0**	**#**

5.8 CONTROL PANEL GPIO EXTERNAL CIRCUITRY

Control panels from the 500-3x-30 and 500-3x-50 range provide 2 local GP inputs and 2 local GP outputs on a D9 fixed socket. The tables in section 8.5.2.2 and 5.5.3 provide pin-out details. The circuit below gives suggested wiring details for Logic Output 1. Like the matrix GPI card (see 3.4.5.2) the maximum current must be limited to 200mA and the maximum external voltage to 200V. Exceeding these limits will damage the panel circuitry.

The circuit below shows suggested wiring for Logic Input 1. If the input circuitry needs to be isolated from the panel voltage, the link between pins 5 and 9 should be removed. An external voltage can now be connected to pin 9 but an additional dropper resistor should be added if this voltage is >5V.



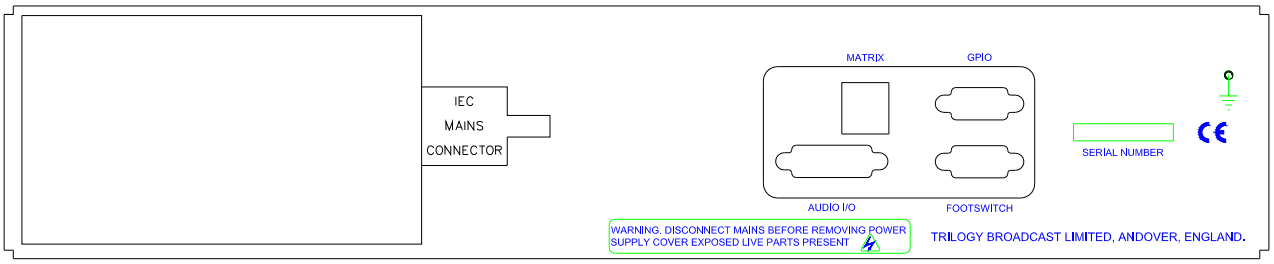
5.9 500-31-60 STANDARD FACILITY 16 KEY CONTROL PANEL

The 500-31-60 panel provides 16 programmable lever keys in a 2U rack mount chassis. For information on programming the software driven “cut switch” operation, see section 10.3.

5.9.1 SPECIFICATION

Dimensions	485mm wide x 88.9mm high x 80mm deep (approx. including PSU and mating connectors). 19” x 2RU rack mounting
Mains Input	90 – 250 V ac, 50-60Hz
Current Consumption	150mA @ 90V, 50mA @ 250V

5.9.2 REAR PANEL LAYOUT



Connector types:

Matrix	RJ 45 socket
GPIO	D9 Fixed Socket
Audio I/O	D15 Fixed Socket
Footswitch	D9 Fixed Socket

Matrix – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data out +	Pair 1
2	Panel Data out -	
3	Panel Data In +	Pair 2
6	Panel Data In -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

Headset - 5 Pin XLR Fixed Socket (front panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

Foot Switch - D9 Fixed Socket

Pin	Function
1	Foot Switch Input
2	No Connection
3	Chassis Ground
4	**Reserved**
5	**Reserved**
6	Ground
7	**Reserved**
8	**Reserved**
9	**Reserved**

GPIO (Local logic in and out) - D9 Fixed Socket

Pin	Function	Notes
1	Ground	
2	Logic Input 1	
3	Logic Input 2	
4	Logic 2 Out Common	
5	Internal +5V (Out)	Protected with 0.5A thermal fuse & 1N4002 diode.
6	Logic Output 1	
7	Logic 1 Out Common	
8	Logic Output 2	
9	Logic Input +VCC	NB Pin 9 may be driven by external voltage (With dropper resistor if greater than 5V), or by internal +5V via pin 5.

Audio I/O – D15 Fixed Socket

Pin	Function	Notes
1	No connection	
2	+12V Out	Fused internally 0.5A
3	Clean Mic Out +	Line level, balanced, pair with 11 – o/p is affected by CUT switch
4	Ext CUT Input	Parallel function to front panel Cut Switch. Ground to activate
5	Chassis Ground	
6	No connection	
7	External Input to LS Amp -	Line level, balanced, pair with 14
8	Matrix Audio Input to Panel / parallel output -	Line level, balanced, pair with 15
9	No connection	
10	No connection	
11	Clean Mic Out -	Line level, balanced, pair with 3
12	Internal Ground	
13	No connection	
14	External Input to LS Amp +	Line level, balanced, pair with 7
15	Matrix Audio Input to Panel / parallel output +	Line level, balanced, pair with 8

5.10 500-33-00 / 500-45-00 / 500-46-00 RANGE

Although offering differing types and numbers of switches and displays, these panels share the same electronics and connectivity.

- 500-33-00 32 way lever key
- 500-45-00 8 way push button
- 500-46-00 10 button, LC key.

5.10.1 SPECIFICATION

Dimensions	o 500-33-00 485mm wide x 88.9mm high x 80mm deep (approx. including PSU and mating connectors). 19" x 2RU rack mounting o 500-45-00 / 500-46-00 485mm wide x 44.5mm high x 80mm deep (approx. including PSU and mating connectors). 19" x 1RU rack mounting
Mains Input	90 – 250 V ac, 50-60Hz
Current Consumption	150mA @ 90V, 50mA @ 250V

5.10.2 CONNECTIONS

Matrix – RJ-45 fixed socket on panel

RJ-45 Pin	Function	
1	Panel Data out +	Pair 1
2	Panel Data out -	
3	Panel Data In +	Pair 2
6	Panel Data In -	
5	Panel Audio out +	Pair 3
4	Panel Audio out -	
7	Panel Audio in +	Pair 4
8	Panel Audio in -	
	Cable Screen	

Foot Switch - D9 Fixed Socket

Pin	Function
1	Foot Switch Input
2	No Connection
3	Chassis Ground
4	**Reserved**
5	**Reserved**
6	Ground
7	**Reserved**
8	**Reserved**
9	**Reserved**

Headset - 5 Pin XLR Fixed Socket (front panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

GPIO (Local logic in and out) - D9 Fixed Socket

Pin	Function	Notes
1	Ground	
2	Logic Input 1	
3	Logic Input 2	
4	Logic 2 Out Common	
5	Internal +5V (Out)	Protected with 0.5A thermal fuse & 1N4002 diode.
6	Logic Output 1	
7	Logic 1 Out Common	
8	Logic Output 2	
9	Logic Input +VCC	NB Pin 9 may be driven by external voltage (With dropper resistor if greater than 5V), or by internal +5V via pin 5.

Audio I/O – D15 Fixed Socket

Pin	Function	Notes
1	No connection	
2	+12V Out	Fused internally 0.5A
3	Clean Mic Out +	Line level, balanced, pair with 11 – o/p is affected by CUT switch
4	Ext CUT Input	Parallel function to front panel Cut Switch. Ground to activate
5	Chassis Ground	
6	No connection	
7	External Input to LS Amp -	Line level, balanced, pair with 14
8	Matrix Audio Input to Panel / parallel output -	Line level, balanced, pair with 15
9	No connection	
10	No connection	
11	Clean Mic Out -	Line level, balanced, pair with 3
12	Internal Ground	
13	No connection	
14	External Input to LS Amp +	Line level, balanced, pair with 7
15	Matrix Audio Input to Panel / parallel output +	Line level, balanced, pair with 8

6. COMMANDER PROGRAMMING KIT

6.1 INTRODUCTION

This utility allows software to be updated on certain hardware items from the Commander range. These are: -

- 500-02-1x Talkback Controller
- 500-01-10 TDM Controller
- 500-08-10 Changeover Controller
- 500-3x-3x Series control panels
- 500-40-0x Series expansion control panels
- 500-41-0x Desktop Control Panels

The program operates in conjunction with: -

- Archipel transputer link adaptor card fitted to a desktop PC
- Sundance SMT104 PCMCIA card fitted to a laptop PC
- Sundance SMT104 plus PCMCIA/ISA adaptor kit fitted to a desktop PC
- 500-16-03 Download Converter

Note that the Programming Kit will only operate when a transputer download adaptor has been supplied. More recent systems use RS422 or RS232 download adaptors. These are not suitable for re-programming.

An alternate connection cable must be used – the supplied cable is manufactured with violet coloured wire. It is not interchangeable with the download lead, which is normally coloured grey. An additional adaptor is required for programming the 500-08-10 Changeover Controller. See 6.2.4.4 for further details.

If the matrix hardware is being reprogrammed, the Intercom system will not operate until the procedure is complete. If the Talkback Controller is to be reprogrammed, a Version upgrade (e.g. 4.15 to 4.16) will also erase the configuration flash RAM. This may not be the case with incremental upgrades (e.g. 4.15c to 4.15d), but it would be wise to ensure that the latest configurations are available on disk, ready for download.

6.2 TTPROG SOFTWARE

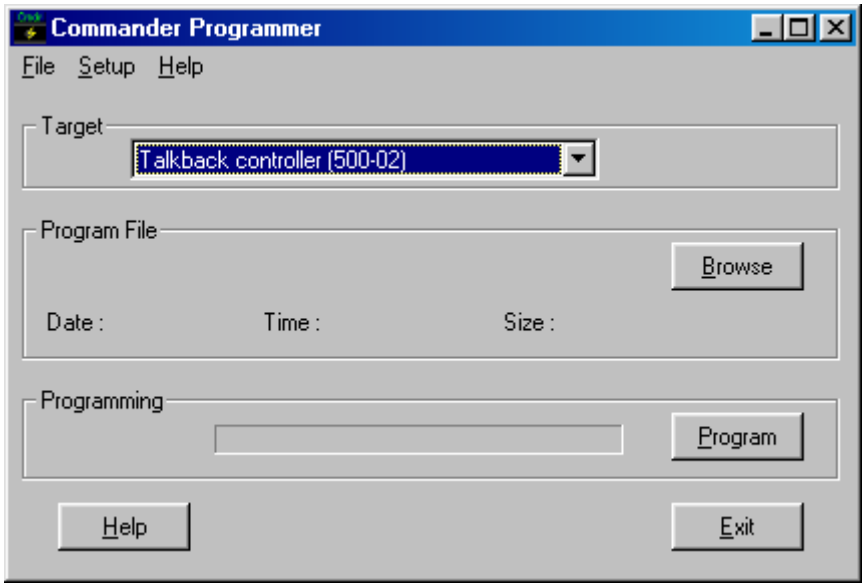
6.2.1 SET-UP ROUTINE

The installation package may be provided on a single floppy disk or as a zip file. For the latter, expand the zip file to a suitable location (e.g. C:\Commprog). From this location, or from the floppy disk, run the program setup.exe.

Follow the on-screen instructions and all necessary files will be installed and an icon added to the computer Start menu.

6.2.2 STARTING THE PROGRAMME

From the Start menu, select the item “TTprog” to launch the program. The window shown below is displayed.

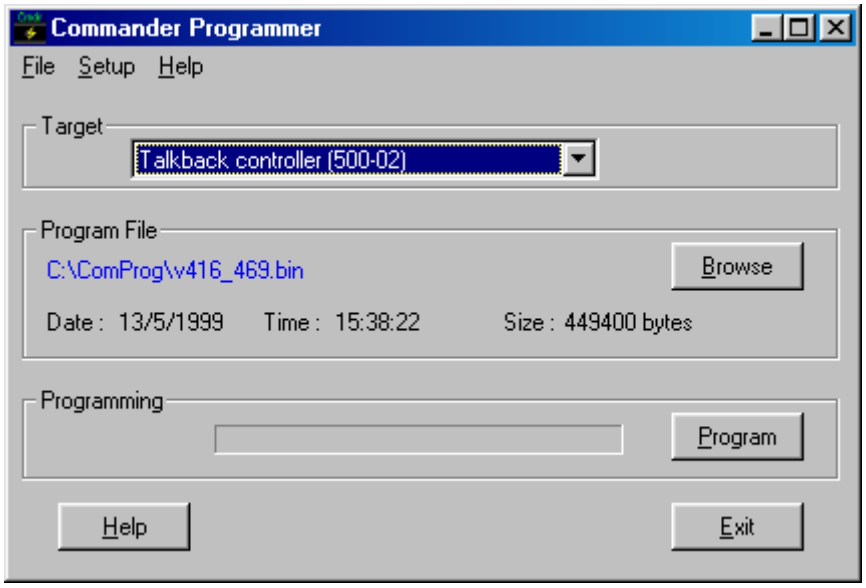


From the drop-down list, select the type of hardware to be reprogrammed (see Section 6.1). To update the hardware, a revised “bin” file is required. This may be supplied: -

- on floppy disk
- by e-mail
- from the internet

If the file has been supplied in zip format, it should be decompressed to a local drive.

Use the “Browse” button to locate the file. The example below shows the program configured to program a 500-02-11 Talkback Controller with a file named 416_469.bin.



6.2.3 CONNECTING THE HARDWARE

The instructions below assume that the PC is currently fitted with a suitable transputer link adaptor card and is in use for the PathFinder application.

- Close PathFinder
- Identify the download interconnection cable.
  - For desktop computers fitted with the **Archipel** link adaptor card, this will normally be a grey coloured D37 (PC) to D9 (Commander).
  - Disconnect the cable at both ends and replace with the violet coloured programming lead. Connect only at the computer.
  - For computers fitted with the **Sundance** SMT104 PCMCIA link adaptor, this will normally be a multi-part cable, with a D25 Male-Female "join". Break this join.
  - Connect the violet D25-D9 cable instead.
- Move the "free" D9 connector to the front of the matrix. This may be connected directly to:-
  - 500-01-10 TDM Controller
  - 500-02-1x Talkback Controller
  - 500-3x-3x and 500-4x Series Control Panels

An additional D9 –Molex adaptor is required to reprogram the 500-08-10 Changeover Card. See section 6.2.4.4.

6.2.4 COMPLETING THE REPROGRAM SEQUENCE

6.2.4.1 500-01-10 TDM Controller

Carry out all the steps detailed in Sections 6.2.2 and 6.2.3. Now ensure that everyone is aware that the intercom system is about to go "off air".

Connect the violet programming lead to the D9 connector on the front of the module.

Halt the system by pressing the reset switch on the TDM controller.

On the PC, click the Program button. The progress bar indicates that the Flash RAM is being erased, then reprogrammed. A message box indicates that the procedure is complete.

If the frame is fitted with additional TDM controllers (either >96 ports or fault tolerant), then move the D9 to the next module and repeat the process.

When all modules have been reprogrammed, switch the power off, wait 10 seconds, then turn the power back on. Check that the system is running by observing the LED pattern on the TDM controllers.

6.2.4.2 500-02-1x Talkback Controller

Follow the instructions in the preceding section. Always ensure that the correct hardware type is selected in the drop down list box and the appropriate programming code is loaded.

6.2.4.3 500-3x-3x Control Panels

Control panels may be re-programmed without disruption to the matrix. Connect the violet programming lead to the rear connector labelled "Test/Debug". After completing the programming sequence, re-start the panel by removing the mains power for a few seconds. Check that the panel re-initialises correctly by observing the LCD screen, which will display the current software version briefly. For panels without an alphanumeric display, check for correct operation.

6.2.4.4 500-08-10 Changeover Card

An additional adaptor cable must be fitted between the D9 on the mauve re-programming cable and the 10 pin Molex connector (J6) that is the connection point on the 500-08-10. Wiring details are given below.

10 way IDT Header (500-08-10)	D9 Free socket
1	1
2	6
3	2
4	7
5	3
6	8
7	4
8	9
9	5

Follow the instructions in section 6.2.4.1. Always ensure that the correct hardware type is selected in the drop down list box and the appropriate programming code is loaded.

6.3 PROGRAMMING WITH THE 500-16-03 DOWNLOAD CONVERTER

For programming Commander cards and panels, the connector is 9 way male to female with the following connections. Note, not all pins are wired.

Commander Programming Cable	
9 way D Male	**9 way D Female**
1 – Not used	1 – Not used
2	2
3	3
4	5
5	4
6 – Not used	6 – Not used
7 – Not used	7 – Not used
8	9
9	8

To program Commander cards you must set the changeover card (500-08-10) jumper J7 to left and issue a reset on both the TDM (500-01-10/11) and Talkback controller (500-02-11/12) cards beforehand. For cards in the rack, this means pressing the relevant reset button.

Remember that the link cable from the unit to be programmed to the link adapter must be present before issuing a reset.

Panels do not have a reset button and must be reset by briefly shorting pin 3 to pin 7 on the 9 way connector.

7. OTHER EQUIPMENT

7.1 BELTPACKS

Beltpacks may be connected to the Commander matrix on ports configured as 4-wire. They require an external voltage supply, either +15V or ± 15V depending on the type number. The Commander PSU (500-15-30) provides a 4 pin XLR socket with ± 15V protected by an internal self resetting fuse. See section 2.5 for connector details. The tables below show the different belt box types available.

Type	No. of input channels (from matrix)	Fixed Connector type	Mating Connector type required	Supply voltage required	Headset connector (socket)
410-50-02	1	XLR6 Male	XLR6 Female	+15V	B-gauge ¼" jack
410-50-03	2	Hirose 12 Way Plug RM15TRD-12P	Hirose 12 Way Socket RM15TPD-12S	± 15V	B-gauge ¼" jack
410-50-12	1	XLR6 Male	XLR6 Female	+15V	XLR5 Female
410-50-13	2	Hirose 12 Way Plug RM15TRD-12P	Hirose 12 Way Socket RM15TPD-12S	± 15V	XLR5 Female

Notes:

1. All Beltpacks have one output channel (i.e. return to the matrix).
2. The Beltpack PTT (talk) switch is normally momentary action. The -12 and -13 types may be ordered with a latching talk switch, using part codes -12-L and -13-L.
3. The -02 and -03 variants are discontinued with effect December 2008.

The following tables give individual connector pin-outs for each type.

410-50-02 / 410-50-12 Single Channel Beltpack – Matrix Connection

Pin	Function
1,2 (+,-)	Audio from box
3,4 (+,-)	Audio to box
5	0V
6	+15V

410-50-03 / 410-50-13 Two Channel Beltpack– Matrix Connection

Pin	Function
1	Chassis
2,3 (+,-)	Audio 1 to box (PTB)
4,5 (+,-)	Audio 2 to box (Prog Snd)
6,7 (+,-)	Audio from box
8	+15V
9	-15V
10	0V to box
11,12 (+,-)	N/c

410-50-12 & 410-50-13 Headset Connector (XLR5 Socket on Beltpack)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

7.2 TELEPHONE INTERFACES

The Trilogy 500-19 range of equipment provides full DTMF telephone facilities when used in conjunction with the Telos ONE "smart" telephone hybrid. To obtain the full facilities available with the Commander system, the Telos ONE should be fitted with the Telos Super Auto Answer (SAA) option. During the installation it is important to remember that the Telephone Interface must be connected to the matrix via a panel port wired with 4 pair cable. The connection is not just audio / 4-wire, there is a data exchange between the matrix and telephone interface. Each 500-19-10 Rack Mounting Frame can contain a maximum of three 500-19-00 Telephone Interface Cards. An installation specification for the frame is given below.

Trilogy 500-19-10 Telephone Interface Frame

Dimensions	485mm wide x 44.5mm high x 440mm deep (excluding connectors) 19" x 1RU rack mounting
Mains Input	90 – 250 V ac, 50-60Hz
Power Consumption	45VA

Connector Detail (per channel)

Active link to matrix	D9 Fixed Plug
Audio to Telos Hybrid	3 pin XLR Fixed Plug
Audio from Telos Hybrid	3 pin XLR Fixed Socket
Control link to Telos Hybrid	D15 Fixed Plug

Each connection to a telephone line requires a separate Telos ONE hybrid. An installation specification is given below.

Telos ONE Telephone Hybrid

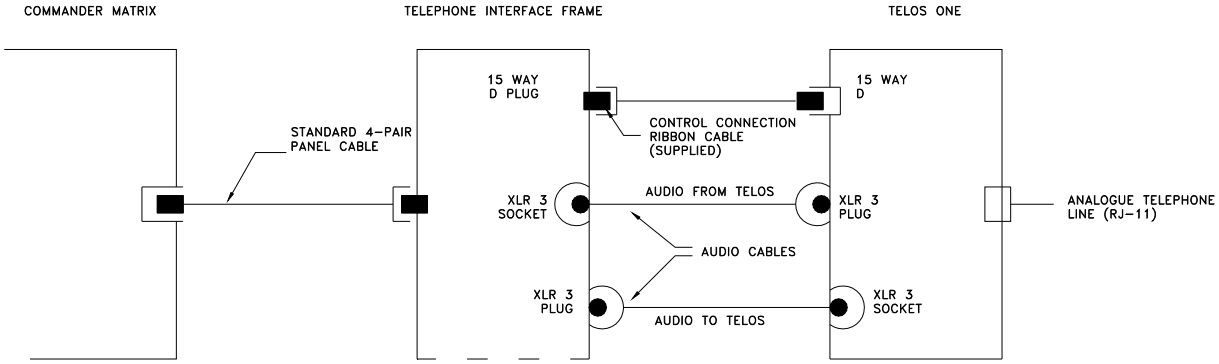
Dimensions	485mm wide x 44.5mm high x 240mm deep (excluding connectors) 19" x 1RU rack mounting
Mains Input	100 – 240 V ac, 50-60Hz
Power Consumption	90mA – 50mA

Connector Detail

Audio to Trilogy Telephone Interface	3 pin XLR Fixed Plug
Audio from Trilogy Telephone Interface	3 pin XLR Fixed Socket
Control link to Trilogy Telephone Interface	15 way D Fixed Socket
Telephone Line	RJ-11

If the Telos equipment is purchased separately (i.e. not via Trilogy) it is important to specify to your supplier that the equipment is for connection to a Trilogy Commander system. This allows the correct software versions and hardware modifications to be fitted.

A typical system interconnection diagram is given below.



7.2.1 TELOS ONE ALIGNMENT

The level adjustment of the Telos ONE hybrid unit is fairly critical. Slight variations can cause the unit to fail to initiate outgoing calls. The usual symptom will be failure to break the dial-tone when pressing keys on the dial-pad of a Trilogy panel. All units supplied via Trilogy are factory tested but this cannot take account of variations in local telephone lines and switchboards. To quickly re-align the levels, use the LED array on the front of the Telos unit.

To adjust the outgoing level:

- Initiate an outgoing call from a control panel equipped with a dial-pad, such that dialling tone can be heard on the panel loudspeaker.
- Press and hold a key on the dial pad, so that the DTMF tone is heard.
- Select the in/out monitor switch on the Telos to “in”.
- Adjust the multi-turn control labelled “Gain In” so that the 0 level LED is just illuminated. This is the last green LED: the red LED should not be lit.

To adjust the incoming level:

- Call the Telos hybrid from another telephone line (e.g a mobile phone).and pick up the call.
- Select the in/out monitor switch on the Telos to “out”.
- While the line is active, press a key on the other telephone so that the DTMF tone is heard.
- Adjust the multi-turn control labelled “Gain Out” so that the 0 level LED is just illuminated. This is the last green LED: the red LED should not be lit.

Trilogy recommends that these levels be checked from time to time, to ensure that the Telos hybrids remain correctly aligned.

NOTE: The Telos hybrid has an intelligent dimming circuit built into the unit, therefore we recommend that the port assigned to the telephone hybrid from the PathFinder GUI is set to 0dB dimming. Please refer to the PathFinder User Guide for more information.

7.3 RT EQUIPMENT

Radio Talkback equipment may be supplied by Trilogy as part of a complete system. It is not manufactured by Trilogy and will be supplied with the original equipment manuals.

The usual configuration consists of one or more Base Stations and a number of portable transceivers. The Base Stations are connected to the matrix using normal 4 wire audio ports according to the pin-out information in Section 2.

7.4 500-22-00 ICIS-1 ISDN INTERFACE

The 500-22 ICIS-1 ISDN interface is connected in the same manner as the Telos Hybrid (see Section 0). The 1U package contains two 64k-bandwidth channels, which may be used independently or as a single ISDN2 (128k) bandwidth channel.

To make correct use of the available bandwidth, two separate telephone interface cards (500-19-10) should be allocated, along with two matrix ports. It is possible to request two independent incoming telephone numbers, either via your in-house switchboard of (if appropriate) from your telco. In this way, incoming calls can be directed to either Bearer 1 or 2 and outgoing calls will be connected to the first available Bearer. Careful programming within the telephone groups area of PathFinder is required to obtain the best results.

7.4.1 500-22-00 ICIS-1 ISDN INTERFACE CONNECTOR PIN-OUTS

7.4.1.1 Bearer 1 & Bearer 2

Audio Input – XLR3 fixed socket	Pin 1	Ground
	Pin 2	Balanced input 1
	Pin 3	Balanced input 2
Audio output – XLR3 fixed plug	Pin 1	Ground
	Pin 2	Balanced output 1
	Pin 3	Balanced output 2
D15 fixed socket	Pin 1	AUTO control input
	Pin 2	DROP control input
	Pin 3	+5VDC
	Pin 4	D8 DTMF output
	Pin 5	D4 DTMF output
	Pin 6	D2 DTMF output
	Pin 7	D1 DTMF output
	Pin 8	Not connected
	Pin 9	SIEZE control input
	Pin 10	Ground
	Pin 11	Line Mode output
	Pin 12	Automode output
	Pin 13	DTMF data valid
	Pin 14	Not connected
	Pin 15	Not connected

7.4.1.2 ISDN Interface RJ45 Connector

RJ45 Fixed Socket	Pin 1	Not connected
	Pin 2	Not connected
	Pin 3	Tx to network A/Rx from terminal A
	Pin 4	Rx from network A/Tx to terminal A
	Pin 5	Rx from network B/Tx terminal B
	Pin 6	Tx to network B/Rx from terminal B
	Pin 7	Not connected
	Pin 8	Not connected

7.4.1.3 Com Port

D9, not yet supported, for future development.

7.4.1.4 Remote Ports

Each input is the cathode of the LED on an opto-isolator. The anode is connected through a 470R resistor to +5VDC. Therefore to activate a control input, short the pin to ground, i.e. pin 10. Each output is the open collector of a ULN2003 driver chip. Therefore connect the pin through load to +5VDC.

7.4.1.5 RJ45

This is the ISDN 2 connector. This must only be connected to an approved ISDN 2 connection or serious damage may occur.

7.5 500-23-00 ICIS-2 ISDN INTERFACE

The ICIS-2 ISDN interface provides complete remote panel functionality over an ISDN2 link. It is connected directly to the matrix at the studio end, then to the control panel at the remote end. No additional interfaces are required. Using both bearers of the ISDN2 circuit, two control panels or a single panel plus an additional 4 –wire circuit may be installed.

D15 Fixed Plug on ICIS-2 (DTE)

Pin	Function
1	Shield
2	TX data (a)
3	Control (a)
4	RX data (a)
5	Indication (a)
6	Clock (a)
7	Not used
8	Signal Ground
9	TX data (b)
10	Control (b)
11	RX data (b)
12	Indication (b)
13	Clock (b)
14	Not used
15	Not used

8. LEGACY HARDWARE

The following hardware is no longer supplied by Trilogy Communications.

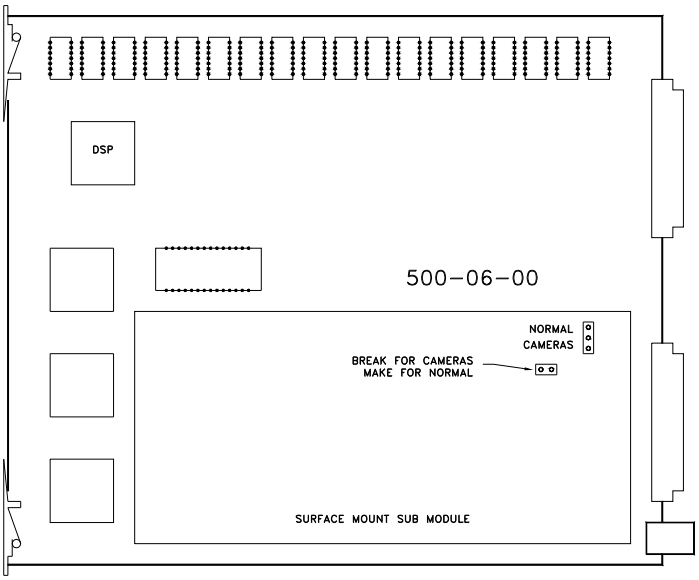
8.1 MATRIX CARDS

- 500-06-00 is marked 5510 on the card ejector since the base card is manufactured by Pro-Bel. It carries a Trilogy designed sub board.
- 500-06-01 replaced the 500-06-00 and is a single board Trilogy design.

8.1.1 GAIN SETTING ON 500-06-00

Ports intended for use with cameras will have the appropriate rear connector back fitted in the correct position, as per your requirements. The camera RCU has a passive-mixing pad fitted, which necessarily inserts a 25dB loss into the 6th port of the associated matrix card.

The 500-06-00 6 port interface module has a sub-module fitted on which are the analogue input and output buffers. The drawing below shows the layout of the 500-06-00 module, with its sub-module.

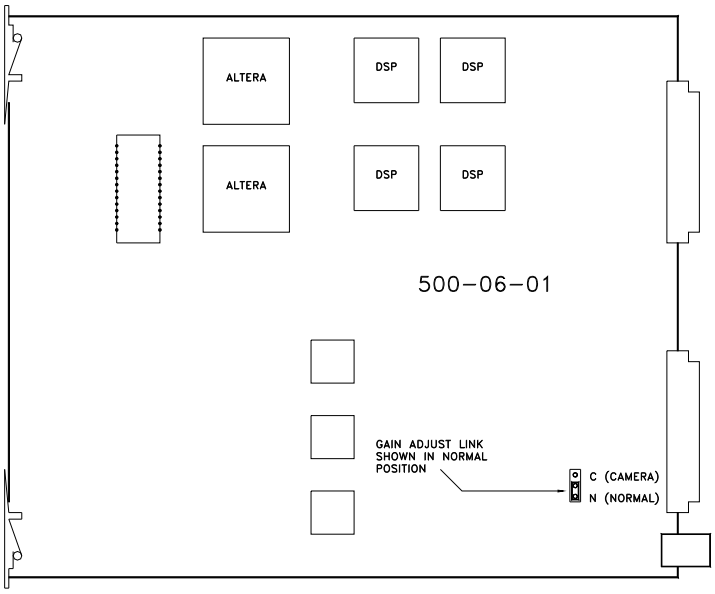


Note that the 500-06-00 module is based on a Pro-Bel module numbered 5510. The card ejector is marked with the number 5510, not 500-06-00.

On the sub-module are two links, which must be set correctly to provide gain compensation for the loss of the mixing pad. Two positions are provided - “NORM” and “CAMS”. One link must be moved to the CAMS position; the second link should be removed for operation with cameras.

8.1.2 GAIN SETTING ON 500-06-01

The gain of port 6 on the 500-06-01 matrix card is set by a jumper link on the board. Jumper J6 should be set to N for normal operation or to C to increase the gain of port 6 by +25dB. The diagram below shows the position of J6.



8.2 POWER SUPPLIES

- A modular assembly using Pro-Bel parts. The 6U rack is type 1178 and it will be fitted with sufficient 1150 PSU modules to supply the matrix. To allow some redundancy, this is usually based on a quantity (n+1), where n = number of frames in system. Each PSU has an independent IEC style mains inlet connector.

8.3 MATRIX DOWNLOAD

- A desktop PC fitted with an ISA slot type Archipel link adaptor card. See Section 8.3.2. This card is no longer supplied on new systems.
- A desktop PC fitted with a CardPort ISA to PCMCIA carrier and a Sundance card as below. See Section 8.3.3.
- A laptop PC fitted with a Sundance SMT104 PCMCIA style adaptor card. See Section 8.3.4.
- A laptop or desktop PC fitted with the Black Box IC114A PCMCIA serial adaptor card. See Section 8.3.5. The desktop option will use the CardPort converter as in Section 8.3.3.

8.3.1 COMPUTER OPERATING SYSTEMS – IMPORTANT NOTE

Microsoft Windows NT4 does not include any native support for PCMCIA cards. Many laptop computers include a third party add-on such as SystemSoft Card Wizard to add this functionality. For download operation using the Sundance or Black Box PC card, this additional software must be installed. Trilogy Communications does not supply the software but will be pleased to advise on availability and offer support for use with PathFinder.

8.3.2 INSTALLING AN ARCHIPEL DOWNLOAD CARD IN A P.C.

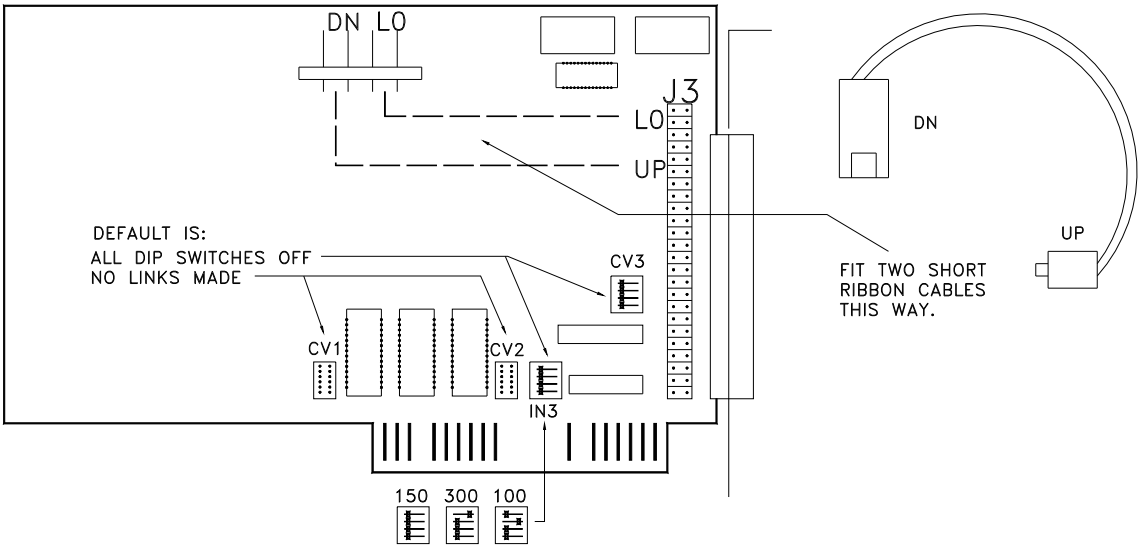
The Archipel card is a proprietary, half-length ISA bus adaptor card that allows data to be converted into the 20Mbit/s serial data link used by Commander.

If Trilogy Communications has supplied a P.C., an Archipel download card will have been pre-installed. Otherwise, install the card in accordance with the instructions provided with your PC. The card is not “Plug and Play” and will not show in the Windows 95 system dialogue found under Control Panel. Conflicts with other devices will cause the Archipel card to fail to connect to the matrix. This will first become apparent during the system “download” operation. If the card is fitted correctly and all cables are connected, check for system conflicts with CD-ROM drives, sound cards and network cards.

In the configuration used with the Commander system, the Archipel card is not interrupt driven: it operates by writing to specified memory blocks. The base memory address is set on switch IN3: the default is150. Other options are shown in the diagram below. Any change to the hardware settings needs to be matched in the PathFinder software “settings” dialogue. See Section 3.3 for details.

The card has a number of jumper link settings and short ribbon cable assemblies that must be set and connected correctly. The card is illustrated below.

NOTE: Max download cable length is 20 metres using RS422 screened cable.



The connections given below are for the Desktop PC link. Cable is twin twisted pair, with overall screen.

PC D37 Fixed Socket Pin	Commander D9 Fixed Plug Pin	Notes
2, 20	4, 8 (+,-)	Pair 1. From PC (+,-)
5, 23	5, 9 (+,-)	Pair 2. To PC (+,-)
(21)	3	Cable screen - not connected at PC.

In some installations, communications problems have arisen from the PC and Commander not having a common earth reference. It is important to ensure that both the PC and Commander system have proper earth connections, or at least that the PC and Commander earths are connected together. Sometimes connecting the cable screen at the PC end of the cable can solve the problem.

8.3.3 INSTALLING A CARDPORT ISA TO PCMCIA ADAPTOR INTO A DESKTOP PC

The CardPort adaptor will normally be supplied by Trilogy although similar units by other manufacturers are available. Comprehensive instructions are included with the CardPort unit but the list below provides a summary. You will require access to the Windows 95/98/NT4 installation media (floppy disks or CD).

- Switch off the PC and remove the cover.
- Fit the CardPort adaptor into a free ISA slot.
- Re-start the PC.
- From the Start menu, select Settings >> Control Panel >> Add New Hardware. The "Add New Hardware Wizard" now appears.
- Choose the option to "Specify the type of hardware" and pick "PCMCIA socket" from the list.
- Now choose a Manufacturer (Standard PCMCIA driver) and Model (PCIC or compatible).

This completes the first phase. The PC card wizard will now start, allowing the easy removal of any existing DOS or Windows 3.1 drivers, which may be present on your PC. Read the prompts carefully. In most cases with modern hardware it will be safe to answer "No" to the first question. Once any 16 bit drivers have been removed, you will be prompted to shut down ***and completely turn off*** your PC. A soft re-start (ie ctrl + alt + del) is not sufficient at this point.

If you now intend to install the SMT104 Transputer adaptor, fit the PCMCIA card into the adaptor prior to switching the PC back on. Follow the instructions in Section 8.3.4 below.

8.3.4 INSTALLING A SUNDANCE SMT104 PCMCIA DOWNLOAD CARD IN A LAPTOP COMPUTER.

The Trilogy part number for the PCMCIA link adaptor card is 500-16-01. It is supplied with a short link cable, which may be extended as necessary to a suggested maximum of 5 metres of RS422 cable. The card can be fitted in a PCMCIA slot, on a laptop PC running Windows 95/98 or into the CardPort adaptor on a desktop PC if appropriate.. Windows 95 will normally detect the addition of new hardware when the system is re-booted and prompt for the manufacturers' disk. The original manufacturer is Sundance, and the card is type SMT104. If the card is being installed into a brand new laptop PC the PCMCIA support must be enabled according to the manufacturers' instructions.

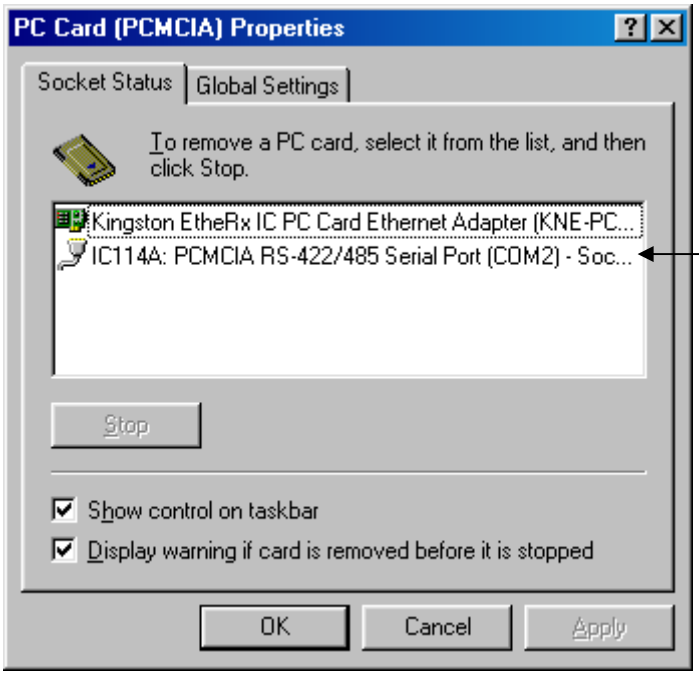
On re-booting the PC with the link adaptor card fitted, follow this sequence:

- Windows should now detect "Applied Transputer Ltd. ATT PC B004 PCMCIA"
- Select the option "Install driver from disk provided". Insert the supplied disk and press Enter.
- A PCMCIA icon should now appear on the taskbar at the lower right of screen.
- Finally, from the Start menu, select Settings >> Control Panel >> System >> Device Manager to check for system conflicts indicated by a yellow ! symbol. The default base address adopted by the link adaptor card to 150 which matches PathFinder software. Any hardware address changes must be matched by corresponding changes to the PathFinder setup. See section 3.3 for further details.

The PCMCIA link adaptor used with laptop PC's is supplied with a short PCMCIA cable which may be extended to a maximum of 5 metres if required.

8.3.5 BLACK BOX IC114A PCMCIA SERIAL ADAPTOR CARD.

This adaptor card may be provided with single frame Commander systems, fitted with the current 500-02-12 Talkback Controller. It provides full RS422 communication at 38.4kBaud. The adaptor is supplied with installation instructions and software on 3.5" disk. Follow the instructions carefully, taking care to install the system drivers on the PC first. Following a successful installation, the adaptor will appear on the system toolbar (adjacent to the clock) as a PCMCIA resource. Double click the PC card icon and the dialogue box below will appear.



The adaptor card now appears on the taskbar, showing that COM2 has been allocated as a resource attached to the serial adaptor.

8.4 MATRIX PORTS – D9

The same connector pin-out applies to ports used for panels or externals. External (4-wire) connections will not use the data pairs. Cable is quad twisted 100Ω pair, with overall screen. STP or FTP cables should be used for all installed cables. See Specification for maximum cable length. We suggest a CAT 5 type cable, from a recognised supplier such as Beldon.

Matrix D9 Fixed Socket Pin	Description	Notes
1	Cable screen	
2	Pair with pin 6, Data - from panel.	Only applies to ports used for panels
3	Pair with pin 7, Data – to panel.	Only applies to ports used for panels
4	Pair with pin 8, Audio - from panel.	
5	Pair with pin 9, Audio - to panel	
6	Pair with pin 2, Data + from panel.	Only applies to ports used for panels
7	Pair with pin 3, Data + to panel.	Only applies to ports used for panels
8	Pair with pin 4, Audio + from panel	
9	Pair with pin 5, Audio + to panel	

Thus, the panel cables should be wired “pin to pin” with the pairs as follows.

Pair	D9 Pin (+,-)	Function
1	6,2	Data from panel to matrix
2	7,3	Data to panel from matrix
3	8,4	Audio from panel to matrix
4	9,5	Audio to panel from matrix
	1	Cable Screen

8.5 LEGACY CONTROL PANELS

- 500-3x-10 series formed the original series. The electronics is modular based. These panels fall outside the scope of this manual but any technical queries may be addressed to Trilogy Communications.
- 500-3x-3x series were supplied from 1996 until late 2000. See section 8.5.2. The associated expansion panels are from the 500-40-0x series. See section 8.5.4.
- The simple 1U, 12 key panel, type 500-39-30 which has no alphanumeric displays. See section 8.5.6 for details.
- Many variants from the 500-3x-50 series have now been discontinued. However, some models are still current so information is provided in section 5.5
- A simplified version of the 500-42-50 which has no active displays and other reduced facilities. The part number is 500-44-50: See section 5.7.

8.5.1 LEGACY CONTROL PANEL FACILITY COMPARISON TABLE

A series of additional connectors provide the following facilities, on the panel types indicated in the table.

	500-3x-3x Control Panels	500-3x-5x Control Panels	500-39-30 1RU 12 key	500-39-31 1RU 12 key + expansion	500-43-5x Expansion Panel	500-44-50 1U, 10 key simple panel	500-40-0x Expansion Panel
Comprehensive audio inputs and outputs	√	√	√	√			
Expansion ports	1	1		1	2		2
Local logic inputs and outputs	√	√		√			
Remote control footswitch	√	√					
External connector for re-programming	√	√	√	√	√	√	√
External dialpad connector		√		√			
5 character alphanumeric displays	√	√					
Fitted front panel microphone	√	√	√	√			
Built in loudspeaker	√	√	√	√		√	
Headset connector	√	√	√	√		√	

8.5.2 500-3X-3X SERIES CONTROL PANELS

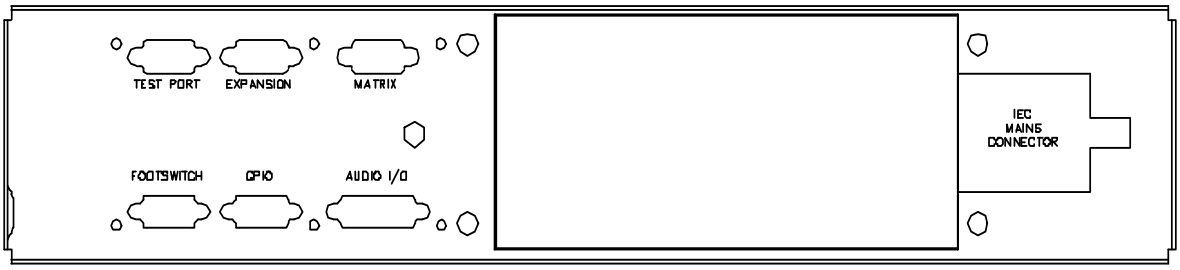
The following detail refers to these panel types:

- 500-30-30 24 key panel
- 500-31-30 16 key panel
- 500-31-31 16 key panel with dial pad
- 500-32-30 8 key panel
- 500-32-31 8 key panel with dial pad

Dimensions	485mm wide x 88.9mm high x 80mm deep (max, excluding connectors). Approx. 110mm deep (max including mating connectors) 19" x 2RU rack mounting
Mains Input	90 – 250 V ac, 50-60Hz
Current Consumption	150mA @ 90V ac, 50mA @ 250V ac.

Details of panel connections are provided in the following tables. Other features may be enabled or disabled by the DIP switches accessible at the top of the panel. These are detailed in section 8.5.3.

8.5.2.1 500-3x-3x Series Standard Control Panel Rear View



8.5.2.2 500-3x-3x Series Control Panel Connections

Matrix – D9 Fixed Plug

Pin	Function
1	NC (Screen)
2	Data Out-
3	Data In-
4	Audio Out-
5	Audio In-
6	Data Out +
7	Data In +
8	Audio Out
9	Audio In +

Expansion Port– D9 Fixed Socket

Pin	Function
1	Analyse Input
2	Enable Remote Boot
3	Ground
4	Transputer Link Out +
5	Transputer Link In +
6	Error signal in
7	Reset Out
8	Transputer Link Out-
9	Transputer Link In-

Test Port– D9 Fixed Socket

Pin	Function
1	Analyse Input
2	Enable Remote Boot
3	Ground
4	Transputer Link Out +
5	Transputer Link In +
6	Error signal Out
7	Reset In
8	Transputer Link Out-
9	Transputer Link In-

Foot Switch - D9 Fixed Socket

Pin	Function
1	Foot Switch Input
2	No Connection
3	Chassis Ground
4	No Connection
5	No Connection
6	Ground
7	No Connection
8	No Connection
9	No Connection

Headset - 5 Pin XLR Fixed Socket

(Front panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

GPIO (Local logic in and out) - D9 Fixed Socket

Pin	Function	Notes
1	Ground	
2	Logic Input 1	
3	Logic Input 2	
4	Logic 2 Out Common	
5	Internal +5V (Out)	Protected with series 44R & 1N4002 diode.
6	Logic Output 1	
7	Logic 1 Out Common	
8	Logic Output 2	
9	Logic Input +VCC	NB Pin 9 may be driven by external voltage (With dropper resistor if greater than 5V), or by internal +5V via pin 5.

Audio I/O – D15 Fixed Socket

Pin	Function	Notes
1	Slave Mic Input	Line level, un-balanced
2	+15V Out (for slave mic panel)	NOT protected!
3	Clean Mic Out +	Line level, balanced, pair with 11
4	Ext CUT Input (for slave mic panel)	Parallel function to front panel Cut Switch. Ground to activate
5	Chassis Ground	
6	No connection	
7	External Input to LS Amp -	Line level, balanced, pair with 14
8	Matrix Audio Input to Panel / parallel output -	Line level, balanced, pair with 15
9	Ext Mic Cut output (to slave panel)	Normally grounded. O/P is open circuit when front panel cut selected.
10	-15V Out (for Slave mic panel)	NOT protected
11	Clean Mic Out -	Line level, balanced, pair with 3
12	Mic Ground	
13	Loudspeaker Output	8 ohm loudspeaker
14	External Input to LS Amp +	Line level, balanced, pair with 7
15	Matrix Audio Input to Panel / parallel output +	Line level, balanced, pair with 8

NB 15V supplies are also used to derive 12V for panel. (Thermally Fused @ 0.7A)

8.5.3 500-30 SERIES DIP SWITCH SETTINGS

Within the panel a series of DIP switches determine the correct panel type. These are factory set and are included for reference in section 10.1

A further set of DIP switches is user accessible at the top side of the panel and control the action of the front panel CUT switch. The factory default is shown in the table below.

Cut Switch Action	DIP 1	DIP 2	DIP 3
No action	OFF	OFF	OFF
Changeover to HSet MIC (default)	***ON***	***OFF***	***OFF***
LS cut	OFF	ON	OFF
Changeover to HSet MIC and LS cut	ON	ON	OFF
MIC cut	OFF	OFF	ON
Changeover to HSet MIC and MIC cut	ON	OFF	ON
LS cut and MIC cut	OFF	ON	ON
Everything	ON	ON	ON

8.5.4 500-40-0X SERIES EXPANSION PANELS

Control Panels may be linked together to provide additional facilities at one operating position. Additional level controls (RENs) or switches may be added. Alternatively, two standard panels from the 500-30 series may be linked together and will only utilise a single matrix port.

The following detail refers to expansion panel types:

- 500-40-00 8 way encoder panel
- 500-40-01 12 way encoder panel
- 500-40-02 15 key switch panel
- 500-40-04 32 way encoder panel

An installation specification is given below.

Dimensions	485mm wide x 44.5mm high x 100mm deep (excluding connectors) 150mm deep (maximum including mating connectors) 19" x 1RU rack mounting
Mains Input	90 – 260 V ac, 50-60Hz
Current Consumption	150mA @ 90V ac, 50mA @ 250V ac.

8.5.4.1 Connector Pin Out

Expansion In - D9 Fixed Socket

Pin	Function
1	Analyse Input
2	Enable Remote Boot
3	Ground
4	Transputer Link Out +
5	Transputer Link In +
6	Error signal Out
7	Reset In
8	Transputer Link Out-
9	Transputer Link In-

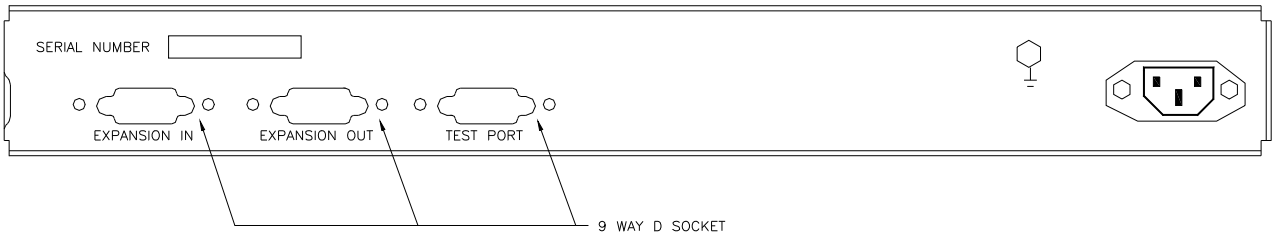
Expansion Out– D9 Fixed Socket

Pin	Function
1	Analyse Input
2	Enable Remote Boot
3	Ground
4	Transputer Link Out +
5	Transputer Link In +
6	Error signal in
7	Reset Out
8	Transputer Link Out-
9	Transputer Link In-

Test Port– D9 Fixed Socket

Pin	Function
1	Analyse Input
2	Enable Remote Boot
3	Ground
4	Transputer Link Out +
5	Transputer Link In +
6	Error signal in
7	Reset Out
8	Transputer Link Out-
9	Transputer Link In-

8.5.4.2 500-40-0x Series Control Panel Rear View



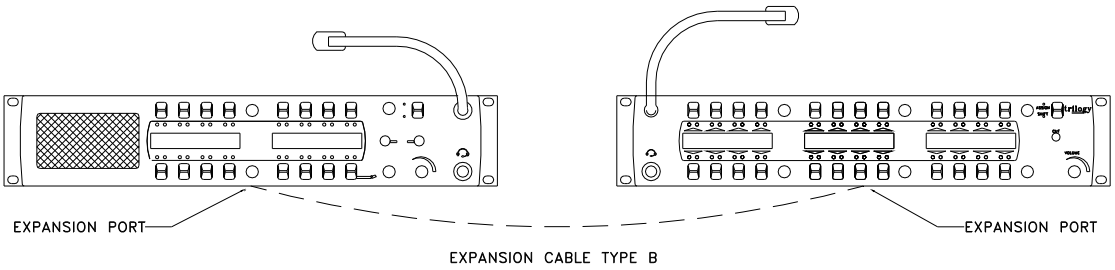
8.5.4.3 Typical expansion panel configuration

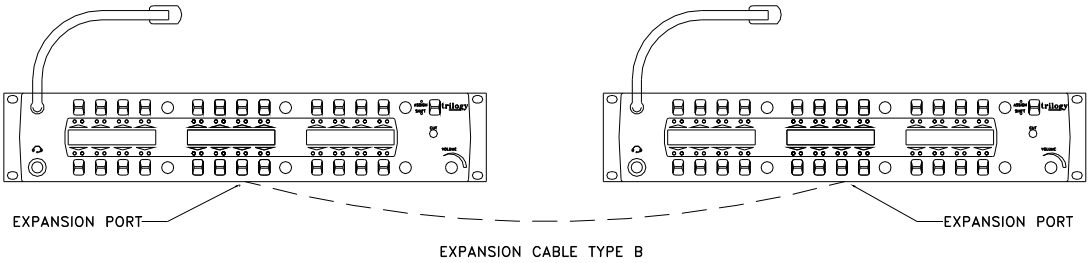
Since the 500-3x-3x series panels ("Standard" 8 / 16 / 24 key) only have a single expansion connection, they must form either the first or last panel in a chain. Expansion panels from the 500-40 range have both Expansion In and Expansion Out connectors, allowing them to be connected in a chain. The PathFinder configuration software includes full expansion panel support (from version 4.12 onwards). This controls the sequence in which the panels should be added to the configuration editor and the electrical interconnection sequence. Obviously, the panels may be assembled into the control desk in any preferred positions, cable lengths permitting. Two different cable types are required, Type A and Type B which are detailed in section 8.5.4.4.

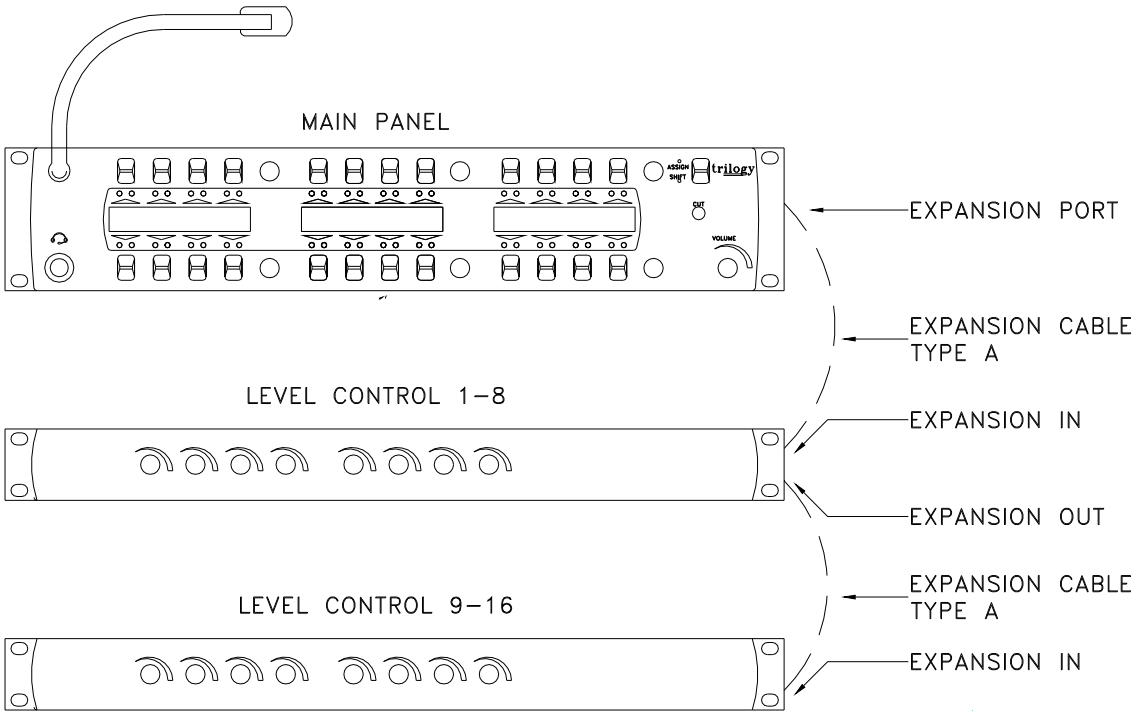
The following rules need to be observed when connecting expansion panels onto a system:

- The standard series panels have only a single expansion port, used as "EXPANSION IN" or "EXPANSION OUT". Therefore, these panels must be connected on the beginning or end of a chain only.
- Standard control panels (500-3x series) used in expansion mode need the internal DIP switch 1 set to "ON". If the panels are supplied as part of a pre-configured system, this will be carried out by Trilogy and the panels marked accordingly. See Section 10.1.
- When a standard panel appears at the end of a chain, it must be connected using cable type B (see section 8.5.4.3).
- The audio only operates on the first panel of the chain: if required, the microphone may be removed from the second "standard" panel. Trilogy can supply a blank plug for the microphone fixing.
- The maximum suggested cable length for interlinking cables is 10 metres.
- A maximum of 5 panels may be configured within PathFinder. The other controlling limits are either 63 keys or 63 rotary encoders – whichever is reached first.

A number of different arrangements are shown below; others are possible.


EXPANSION PORT
EXPANSION PORT
EXPANSION CABLE TYPE B


EXPANSION PORT
EXPANSION PORT
EXPANSION CABLE TYPE B


MAIN PANEL
EXPANSION PORT
EXPANSION CABLE TYPE A
LEVEL CONTROL 1–8
EXPANSION IN
EXPANSION OUT
EXPANSION CABLE TYPE A
LEVEL CONTROL 9–16
EXPANSION IN

8.5.4.4 500-3x-3x Series Expansion panel interconnection cables

Type A (max. length 10 metre)

D9 Free Plug - Pin	Function		Function	D9 Free Plug - Pin
4	Transputer Data out +	Pair 1	Transputer Data in +	4
8	Transputer Data out -		Transputer Data in -	8
5	Transputer Data In +	Pair 2	Transputer Data out +	5
9	Transputer Data In -		Transputer Data out -	9
3	Ground		Ground	3

Type B (max length 10 metres)

D9 Free Plug - Pin	Function		Function	D9 Free Plug - Pin
4	Transputer Data out +	Pair 1	Transputer Data in +	5
8	Transputer Data out -		Transputer Data in -	9
5	Transputer Data In +	Pair 2	Transputer Data out +	4
9	Transputer Data In -		Transputer Data out -	8
3	Ground		Ground	3

8.5.5 CONNECTING VIA STRUCTURED CABLING

All control panel types may be connected to the matrix by Category 5 structured cabling systems. Suitable adaptors are available from most electronic component distributors. The RS part numbers are listed below.

Panel Connection: RJ45 to D9 socket. RS 818-700

Matrix Connection: RJ45 to D9 plug. RS 818-693

As supplied, these adaptors require the pins to be inserted into the D type housing. Use the following table as a guide. The colour codes may not be correct for other brands.

D9 pin	RJ 45 pin	Colour (see above)
1	No connection	No connection
2	2	Yellow
3	6	Brown
4	4	Red
5	8	Blue
6	1	Black
7	3	Orange
8	5	Green
9	7	Grey

8.5.6 500-39-30 / 31 1U 12 KEY PANEL WITH LOUDSPEAKER

This panel provides more basic facilities than the 500-30 range. It does not have LCD displays and only provides connection to the matrix, audio I/O and the test port at the rear. An installation specification is given below.

Dimensions	485mm wide x 44.5mm high x 150mm deep (excluding connectors) 200m approx. (including mating connectors) 19" x 1RU rack mounting
Mains Input	90 – 260 V ac, 50-60Hz
Current Consumption	150mA @ 90V ac, 50mA @ 250V ac.

8.5.6.1 500-39-30 Connector Pin Out

Matrix – D9 Fixed Plug

Pin	Function
1	NC (Screen)
2	Data Out-
3	Data In-
4	Audio Out-
5	Audio In-
6	Data Out +
7	Data In +
8	Audio Out +
9	Audio In +

Test– D9 Fixed Socket

Pin	Function
1	Analyse Input
2	Enable Remote Boot
3	Ground
4	Transputer Link Out +
5	Transputer Link In +
6	Error signal Out
7	Reset In
8	Transputer Link Out-
9	Transputer Link In-

Headset - 5 Pin XLR Fixed Socket (front panel)

Pin	Function
1	Mic IN (Screen)
2	Mic IN
3	Headset Gnd
4	Headset Out
5	Headset Out

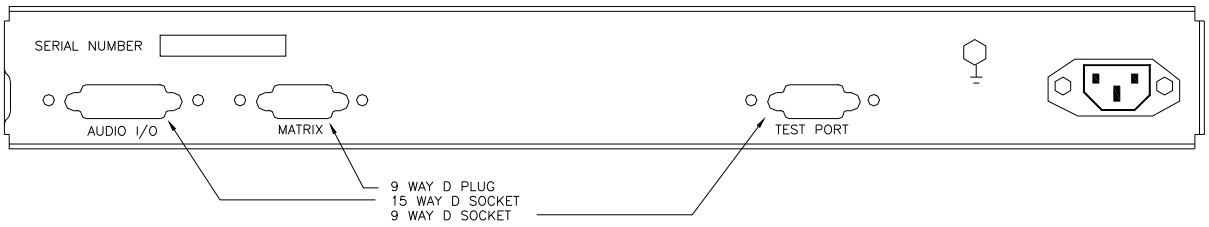
Audio I/O – D15 Fixed Socket

Pin	Function	Notes
1	Slave Mic Input	Line level, un-balanced
2	+15V Out (for slave mic panel)	NOT protected!
3	Clean Mic Out +	Line level, balanced, pair with 11
4	Ext CUT Input (for slave mic panel)	Parallel function to front panel Cut Switch. Ground to activate
5	Chassis Ground	
6	No connection	
7	External Input to LS Amp -	Line level, balanced, pair with 14
8	Matrix Audio Input to Panel / parallel output -	Line level, balanced, pair with 15
9	Ext Mic Cut output (to slave panel)	Normally grounded. O/P is open circuit when front panel cut selected.
10	-15V Out (for Slave mic panel)	NOT protected
11	Clean Mic Out -	Line level, balanced, pair with 3
12	Mic Ground	
13	Loudspeaker Output	8 ohm loudspeaker
14	External Input to LS Amp +	Line level, balanced, pair with 7
15	Matrix Audio Input to Panel / parallel output +	Line level, balanced, pair with 8

NB 15V supplies are also used to derive 12V for panel. (Thermally Fused @ 0.7A)

The **500-39-31** panel includes an additional expansion connector, logic GPIO signals and footswitch connector in the same format as the 500-3x-3x series expansion panels. It is only available to special order. See section 8.5.2.2 for connector details.

8.5.6.2 500-39-30 Rear View



8.5.7 500-3X-5X SERIES CONTROL PANELS

For information on the following legacy panels, please refer to section 5.5.

- 500-30-50 24 key panel (with internal loudspeaker)
- 500-31-50 16 key panel.
- 500-32-50 8 key panel.
- 500-32-51 8 key panel with dial pad.

8.5.8 500-43-51 1U, 8 REN LEVEL CONTROL PANEL

For information on the following legacy panels, please refer to section 5.6.

9. SPECIFICATION

9.1 GENERAL

Max. Number of Ports 384, 96 per 6U Frame, expandable in 6 port units

9.2 MATRIX AUDIO SPECIFICATION (USING 500-06-02 MATRIX CARDS)

Port Type	4 wire electronically balanced
Frequency Response	-3dB @ 25Hz and 15.5kHz
Nominal Gain	0dB ± 1dB
Gain Adjustment Range	+12dB / -37dB from PathFinder
Maximum Input Level	+20dBu
Crosstalk	< -60dB worst case
Noise	< -55dBu CCIR weighted, quasi-peak
Distortion	< 0.2% THD @ 0dB gain
Input Impedance	~10kR
Output Impedance	Low (<20R)

9.3 REAL TIME PERFORMANCE

Transmission time delay <50ms (defined as time taken from a key press to the audio reaching the destination). Based on statistical analysis of the likely number of keys presses etc. at any given instant.

9.4 PANELS

Panel Communication	Balanced RS422 at 230.4 kbaud
Power	See individual sections
Maximum cable run	>600m.
Connection to Matrix	4 twisted pair cable. STP or FTP only:
L/S Volume Control	Max attenuation or hold off adjustable from -20 to -76dB in PathFinder
Microphone amplifier gain adjustment	+14 to -16dB from PathFinder
Loudspeaker amplifier	Nominal 5W into 8R

9.5 MISCELLANEOUS I/O CARD

Number of physical Inputs	28, grounding contact
Number of physical Outputs	24, earth-free opto-isolated mosfet
Loopback I/O	Outputs 29-40 internally loped back to inputs 29 to 40.
Tone Generator	3 tones generated, 315Hz, 1kHz, 1.9kHz
“Blip” Generator	3 off 450ms blips generated, triggered from outputs 25, 26 and 27 respectively
Input Logic Monitoring	4 LEDs with card edge selector to allow any state of inputs in blocks of 4 to be monitored
Output Logic Monitoring	4 LEDs with card edge selector to allow any state of outputs in blocks of 4 to be monitored
Input Audio Source Monitoring	Any 1 of 384 system audio sources monitored by card edge bar-graph display, card edge 3.5mm headphone socket, and rear connector output.
Remote Control	Selectable RS232/422 and baud rate. Remote control of logic inputs, and output dump when logic outputs made - please ask Trilogy Communications for further details.

9.6 P.C.

Type	Any IBM PC or compatible computer running Windows 2000 or later We suggest a Pentium 1GHz (or better) with a minimum 512MB of RAM.

10. CONTROL PANEL CONFIGURATION

10.1 500-3X-5X SERIES INTERNAL PANEL SWITCH SETTINGS

Id	DIP Switch Action	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7 Legacy Emul.	DIP 8 5/8 Char
0	8 Key or Desktop	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	8 Key Expansion	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	16 Key	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	16 Key Expansion	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	24 Key	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
5	24 Key Expansion	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
8	8 REN Expansion	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
9	12 REN Expansion	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
10	32 Channel Level Control	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
11	12 Key 1U	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
12	15 Key 1U Expansion	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF

10.2 500-41 DESKTOP PANEL INTERNAL SETTINGS

A three way connector inside the panel may be fitted with links in any of the three positions labelled H, L or M. These provide the same functionality as the switches accessible from the top edge of the 500-30 series control panel.

Cut Switch Action	H	L	M
No action	**X**	**X**	**X**
Changeover to HSet MIC (default)	√	**X**	**X**
LS cut	**X**	√	**X**
Changeover to HSet MIC and LS cut	√	√	**X**
Panel MIC cut	**X**	**X**	√
Changeover to HSet MIC and MIC cut	√	**X**	√
LS cut and MIC cut	**X**	√	√
Everything	√	√	√

√ indicates link fitted

X indicates link not fitted

In addition, the 500-41 desktop panel is factory configured to operate with PathFinder systems. To set the panel software to emulate T-Edit systems, solder a shorting link in the position labelled R130. This requires surface mount soldering tools: contact Trilogy for further advice.

10.3 500-31-60 – PROGRAMMING CUT SWITCH OPERATION

The cut switch operation is set by via the assign mechanism: press the assign switch, depress any key, turn the Rotary Encoder (REN) until **CutSw** is displayed and then press the same key again.

The LCD will display as follows, with the on/off labels above the switches 5, 6 and 7 respectively.

HSMic LSCut MCCut
On On Off

Name	Function when **Off**	Function when **On**
HSMic	The headset microphone is not selected, panel microphone is always used	The headset microphone is selected instead of the panel microphone when the cut switch is used
LSCut	The panel loudspeaker is always active	The panel loudspeaker is muted when the cut switch is pressed
MCCut	The panel microphone is always active	The panel microphone is muted when the cut switch is pressed

To change the setting press the associated key below (5, 6 or 7) to toggle the current state. Note the settings are preserved during power down.

10.3.1 TEST FUNCTION

If switches 5 and 7 are up and switch 6 down when the unit is powered up, the unit will enter test mode. Note in this mode the panel will no longer operate as a normal panel and must be re-powered to do so. When connected to a matrix system, the test mode can also be entered via the assign switch: press the assign switch, depress any key, rotate the REN until Test is displayed and then press the same key again.

In test mode, the following features are available:

- When cut switch is up:
  - Adjusting the REN will light each of the LEDs in turn
  - Pressing each switch down will highlight the block of LCD characters associated with that switch

- When cut switch is down:
  - Cut switch LED will light.
  - Pressing each switch up/down will light associated red/yellow led.
  - Pressing each switch down will display text “12345” on LCD next to switch.
  - Pressing assign/shift will fire GPO1/GPO2 respectively.
  - Closing footswitch and logic 1 or 2 will report messages on LCD switch positions 1, 2, and 3. Note these messages can get jumbled with LCD test messages. The display will read: **F1 x L1 x L2 x.** where x is either ‘O’ or ‘C’ (open or closed).

11. 500-16-03 DOWNLOAD CONVERTER SUPPLEMENTARY INFORMATION

11.1 SAFETY PRECAUTIONS

This equipment has been designed and tested to the highest safety standards. The following precautions should be covered to ensure safe operation of the apparatus.

11.2 TRANSPORTATION AND STORAGE

Careful inspection of the unit must be made after it has been subject to transportation or storage. Any serious damage which could render it dangerous must be acted upon to safeguard any potential user.

11.3 MAINS CONNECTOR AND PLUG

The supply lead plug shall only be inserted into a supply socket equipped with an earth contact. Extension of the lead must include a suitable conductor for the protective earth.

This equipment must be earthed.

11.4 FUSES

Only the specified value and type of fuse must be fitted in the event of a replacement.

The brown supply lead (live) is fitted with a series fuse located in the mains connector located on the rear panel and should the unit be fitted with a two pin plug then it is possible, if the supply is reversed, for parts of the equipment to remain at supply potential after the fuse has ruptured.

11.5 REMOVAL OF COVERS

Care must be exercised if the covers of the unit are removed. All internal live parts are covered but the equipment should be disconnected from the supply source before repair or maintenance.

Should it be necessary to carry out adjustments with the supply voltage connected then this work must be done by suitably qualified personnel.

11.6 BAUD RATE

The unit is set to work at 38400 as default, but can be configured to operate at 115200 baud. To change to this, the bottom link of J2 must be made (the link adapter must be de and re-powered).

You can tell the current operating baud rate of the link adapter by turning the unit off and back on. D3 will flash once for 38400 baud and twice for 115200 baud.

11.7 LOOP BACK TEST MODE

To confirm that the PC end is working, link J2 top link and re-power the link adapter. The adapter will now echo any sent characters straight back. To use this, run up HyperTerminal configured for 38400 (or 115200), eight bit, 1 stop, no parity, hardware flow control. Disable local echo. Any characters typed should be echoed back to the screen.

Remember to unlink J2 when finished with the test.