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User Manual

Broad Band Switching

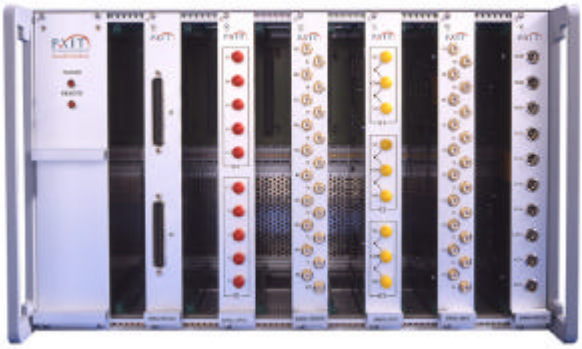
User Manual

Part Number: 603000

PXIT

PX Instrument Technology

Sensible Solutions



CE

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SW3U / SW6U Broad Band Switching User Manual

Document Number: *603000*

Description: *SW3/6U Broad Band Switching User Manual*

Revision History				
Rev	Date	Description	Written by:	Checked by:
0.1	04 June 98	Initial Writing	LD	DK
1.1	21 May 99	Optical amendments and Commands	LD	DK
2.1	26 July 99	Added 16x4 Card	LD	DK
3.0	23 May 01	Added modules	LD	D Costello

Index

Warranty.

The Broad Band Switching products (known as SW6U and SW3U Switching) are warranted against hardware defects in materials and workmanship for a period of one year from the date of delivery as noted on the delivery and/or shipping documentation. PX Instrument Technology is not responsible for any damage caused to its product, or any other equipment caused by misuse of PXIT product or damage caused to PXIT product by the failure to follow the instructions of PX Instrument Technology, or problems caused by other third party equipment, supplies, services, modification to supplied equipment, etc…. PX Instrument Technology will repair/replace at their option any equipment which proves to be defective during the warranty period. This warranty applies to parts and labour. PX Instrument Technology cannot be held responsible for any consequential loss due to defects in supplied product.

Year 2000

Each of the products supplied by PX instrument Technology Ltd., are designed using Y2K Compliant tools and PX Instrument Technology endeavours to ensure that all products are compliant as per "**DISC PD2000-1 *A Definition of Year 2000 Conformity Requirements***" as defined by the British Standards Institution.

PX Instrument Technology is not responsible for any damage or loss caused to its product, or any other equipment caused by the use of PXIT product with any other product or equipment which is not certified as Year 2000 compliant.

Warning

Products designed by PX Instrument Technology Limited are NOT tested for use in medical or clinical applications.

Only properly qualified / trained personnel should use or configure this equipment.

Broad Band Switching modules are designed for use, only under the signal power conditions as defined in this manual.

Safety Notice

DO NOT connect field I/O cables to the I/O connectors on the Cards when the cards are removed from the chassis.

Always ensure that rear of I/O connector are not accessible when field I/O cables are connected.

Precautions

The Broad Band Switching products are shipped in materials which prevent damage from static. The module should only be removed from the packaging in an anti-static area ensuring that correct anti-static precautions are taken.

Safety Notice – Laser

The Broad Band Switching products may be used to switch optical signals. As PXIT do not know what type of light sources will be used in different applications, all un-used ports on optical switches or equipment MUST be covered to prevent accidental leakage of optical signal. When connecting and disconnecting optical cables or equipment, all optical sources MUST be disabled. Failure to take proper safety precautions may result in eye damage.

1. Introduction

1.1 Company description.

PX Instrument Technology Ltd. (PXIT) is an Irish Company situated in a modern manufacturing facility in Bray, Co Wicklow.

PX Instrument Technology designs and manufactures PXI modules and systems. PXIT also produces GPIB optical and electrical switching systems.

1.2 Product Description.

1.2.1 Broad Band Switching.

A large range of 6U Electrical, RF and Optical switching modules are available. They are used with PXIT's SW6U chassis (up to 12 I/O modules) or SW3U chassis (up to 3 I/O modules.

SW6U-CHAS PXIT 6U Switch Chassis.

Takes up to 12 6U Switch Cards
Requires SW6U-CTRL Chassis Controller Module
System Power

Type:	*250 W auto sensing supply*
Input:	*105-115V AC at 60Hz and 210-240V AC at 50Hz*

SW6U-CTRL PXIT IEEE-488 Switch Control Module.

GPIB Controller module for the SW6U Chassis. Inserts into slot 0.

SW3U-MAIN PXIT 3U Switch Mainframe

Takes up to 3 6U Switch Cards (Horizontally)
Integral IEEE488 Controller
System Power

Type:	*40 W auto sensing supply*
Input:	*105-115V AC at 60Hz and 210-240V AC at 50Hz*

SW6U-ACT32 Actuator Card - 32 Channel.

100V 2A SPDT Contacts (Form C)
2 x 62 Way High Density D-Type Connectors (Female Insert)

SW6U-MUX32 32 Channel Mux Card.

32 Channel 2 Pole Multiplexer 250V / 2A

37 Way D-Type Connectors

SW6U-RLY32 Relay Driver Card - 32 Channel

250mA / 30V Open Collector O/P's with internal Diode Protection.
37 Way D-Type Connectors (Male pin)

SW6U-16x4 Relay Matrix Card

16 x 4, two pole contacts 250V, 2A
37 Way D-Type Connectors (Male pin)

SW6U-MUX60 High Density 2 x 30 Channel Mux Card
(Not Currently Available)

Two pole 110V / 1A
Configurable under of software control as a single 60 channel mux.
62 Way High Density D-Type Connectors

SW6U-2M75 75 Ohm RF Multiplexer Module

Six 2:1 Switches , 1000MHz
Type 43 Connectors (18)

SW6U-4M75 75 Ohm RF Multiplexer Module

Four 4:1 Switches , 600MHz
Type 43 Connectors (20)

SW6U-TRIB75 2M/Bit Tributary Switch Module for DS1 / E1

8 Channel RX / TX Mux with daisy chain , 75 Ohm unbalanced
Mux Bandwidth >100MHz; Daisy Chain Bandwidth>30MHz
Type 43 Connectors (20)

SW6U-TRIB75L 2M/Bit Tributary Switch Module for DS1 / E1

Specifications as per Trib 75 with channel loopback

SW6U-4M120 120 Ohm RF Multiplexer Module

Four 4:1 Switches , 50MHz

SW6U-TRIB120 2M/Bit Tributary Switch Module for DS1 / E1

8 Channel RX / TX Mux with daisy chain , 120 Ohm balanced
Mux Bandwidth >100MHz; Daisy Chain Bandwidth>20MHz

SW6U-TRIB120L 2M/Bit Tributary Switch Module for DS1 / E1

Specifications as per Trib 7120with channel loopback

SW6U-4M50 50 Ohm RF Multiplexer Module

Four 4:1 Switches , 600MHz
SMB Connectors (20)

SW6U-OPT2-XX-C

Optical Switch Module 4 x SPDT Switches
Specify mode, fiber and connectors

SW6U-OPT3-XX-C

Optical Switch Module 3 x SPDT Switches
Specify mode, fiber and connectors

SW6U-OPT4-XX-C

Optical Switch Module Dual 4:1 Switches
Specify mode, fiber and connectors

SW6U-OPT5-XX-C

Optical Switch Module Dual 5:1 Switches
Specify mode, fiber and connectors

SW6U-OPT2:2-XX-C

Optical Switch Module Triple 2:2 Switches (Crossover)
Specify mode, fiber and connectors

SW6U-OPT2:4-XX-C

Optical Switch Module Dual 2:4 Switches (DPDT)
Specify mode, fiber and connectors

SW6U-OPT8-XX-C

Optical Switch Module Single 8:1 Switch
Specify mode, fiber and connectors

SW6U-OPT16-XX-LC

Optical Switch Module Single 16:1 Swich

Specify mode and fiber; Available with LC Connectors only

SW6U-OPT32-XX-LC

Optical Switch Module Single 32:1 Switch
Specify mode and fiber; Available with LC Connectors only

Connector and switch type specifier:-

-XX specifies mode / fiber:

-S9 : Single Mode, 9/125mM fiber
-M5 : Multimode, 50/125mM fiber
-M6 : Multimode, 62.5/125mM fiber

-C specifies connector

FC/PC
FC/APC
SC/PC
SC/APC
LC

Note:
Other connector types may be available on request - contact factory.

1.3 Other PXIT Products

1.3.1 PX2000-100 Series.

The PX2000-100 series of modules consists of a range of electrical switching matrix, multiplexer, actuator and driver modules which are used for general purpose and high density switching, ATE applications. It also includes a breadboard development module.

1.3.2 PX2000-200 Series

The PX2000-200 series of modules consists of a range of RF and Optical switching modules for general and specialised applications. 50Ω and 75Ω RF multiplexer modules and various ranges of optical switches are available (Triple 2x1, Single 4x1, Single 8x1 and Dual 2x2 Crossover).

1.3.3 PX2000-300 Series

The PX2000-300 Series of modules is a range of instrument modules for data/signal generation and analysis.

1.3.4 PX2000-500 Series

The PX2000-500 product series is a range of PXI chassis suitable for general purpose and specialised applications.

For more information, visit our web page at **http://www.pxit.com**

2 Initial Setup

2.1 Introduction

The SW6U Chassis is a modular system utilizing the IEEE488 GPIB (General Purpose Interface Bus). It comprises either a 3U high format or a 6U high format, 19 inch rack-mount chassis. The 6U chassis is capable of housing up to 12 I/O cards and one Controller Module. The 3U version accommodates up to 3 I/O cards and includes an integral GPIB controller.

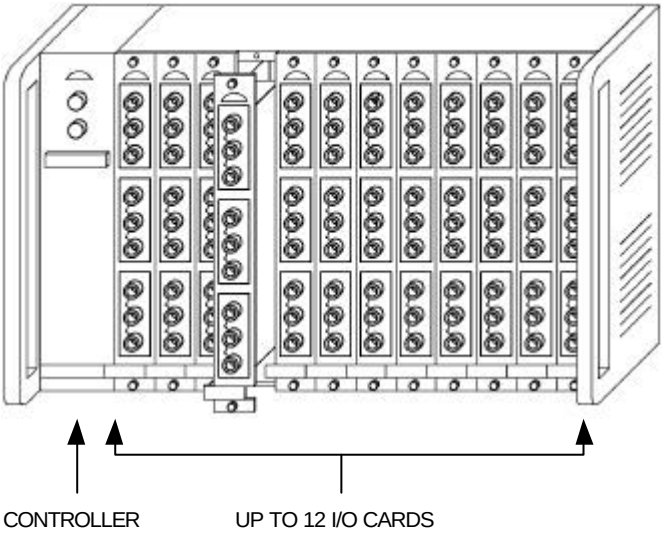


Figure 1 : Chassis Layout

The SW6U GPIB Controller operates in 'Listen Always' mode.

2.2 Power Requirements

The mains power supply for both models of chassis is auto sensing. Ensure that you use the correct power cord for the required voltage.

The unit is fused using a 2A (T) 20mm anti-surge fuse located on the rear panel.

2.3 GPIB Addressing

The SW6U chassis can use GPIB addresses of 1 to 20 and 22 to 30. This address is set up on the system by selecting the address in binary on the

switch at the rear of the chassis. Switch positions 1 to 5 are used. Switches 6 to 8 should always be set to the ON position. When a switch is in the ON position, its Binary value is ZERO. The switch is normally factory set to address 7.

Figure 2 shows an example of how to set the switch up for an address of 19. When the address value has been changed, the new address will not come into effect until the unit has been reset by cycling the mains power.

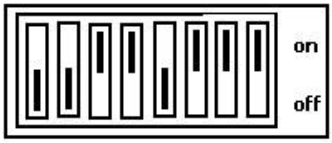


Figure 2 : Address Switch

2.4 Power Up.

Upon Power Up, the GPIB Controller Processor performs an initialisation sequence. This initialisation includes the reading of the GPIB address switch. On the front panel of the SW6U-GPIB module (and the front plate of the 3U version) there are two LEDs. One of these is the POWER led. This led indicates that the main 5 Volt supply is operational. The second LED is called the REMOTE led. This LED will be OFF. The REMOTE LED will turn ON when the SW6U or SW3U system has been addressed to listen by the GPIB bus controller. It will turn OFF when another device (different GPIB address) is addressed.

2.5 6U Slot Positions

The SW6U Chassis can contain a total of 13 modules. These are inserted in SLOT Positions 0 to 12 (0 Hex to C Hex). The first slot MUST always be used for the GPIB Controller module. Slots 1 to 12 contain the I/O modules. Any of the PXIT SW6U series of I/O switching module can be placed in any of the slot positions. There are NO jumpers to be configured. Each I/O module recognizes its unique slot position. Slot positions are numbered 0 to 12 from Left to Right.

2.6 3U Slot Positions

The SW3U Chassis can contain a total of 3 modules. These are inserted in SLOT Positions 1 to 3. The GPIB Controller module is integrated into the backplane. Any of the PXIT SW6U series of I/O switching module can be placed in any of the three slot positions. There are NO jumpers to be configured. Each I/O module recognizes its unique slot position. Slot positions are numbered 1 to 3 from top to bottom.

3 Programming Commands for Relay Cards

3.1 Introduction

The Switching Chassis System parses and executes simple ASCII command strings sent by the Controlling GPIB Computer Device. These commands allow various switches to be turned ON or OFF individually, or a complete card or complete chassis to be reset.

Command structure is as follows:-

[*Slot#*]**:**[*Command*]**:$**[*Relay#*]<*LF*>

where valid slot numbers are **1 2 3 4 5 6 7 8 9 A B C**

where valid commands are **CL OP MU *RST RSCARD**

and Valid relay numbers are

01 02 03 04 05 06 07 08
11 12 13 14 15 16 17 18
21 22 23 24 25 26 27 28
31 32 33 34 35 36 37 38
41 42 43 44 45 46 47 48
51 52 53 54 55 56 57 58
61 62 63 64 65 66 67 68
71 72 73 74 75 76 77 78

CL	Close one relay on selected card
OP	Open one relay on selected card
MU	Reset all relays and then Close one relay on selected card.
RSCARD	Reset all relays on selected card
***RST**	Reset all cards in the chassis

3.2 Command Concatenation

Multiple commands can be concatenated into a single command string using the semicolon character (**;**) as a command separator. Concatenation applies only to the **OP**, **CL** and **RSCARD** commands. It does not apply to the *RST commands.

Examples:	**A:CL:$12**	will close relay 12 on card ten
	2:RSCARD	will open all relays on Card two
	B:CL:$01;B:CL:$18	will close relays 01 and 18 on card eleven
	1:RSCARD;1:CL:$18	will reset card1 and then close relay 18 on card 1

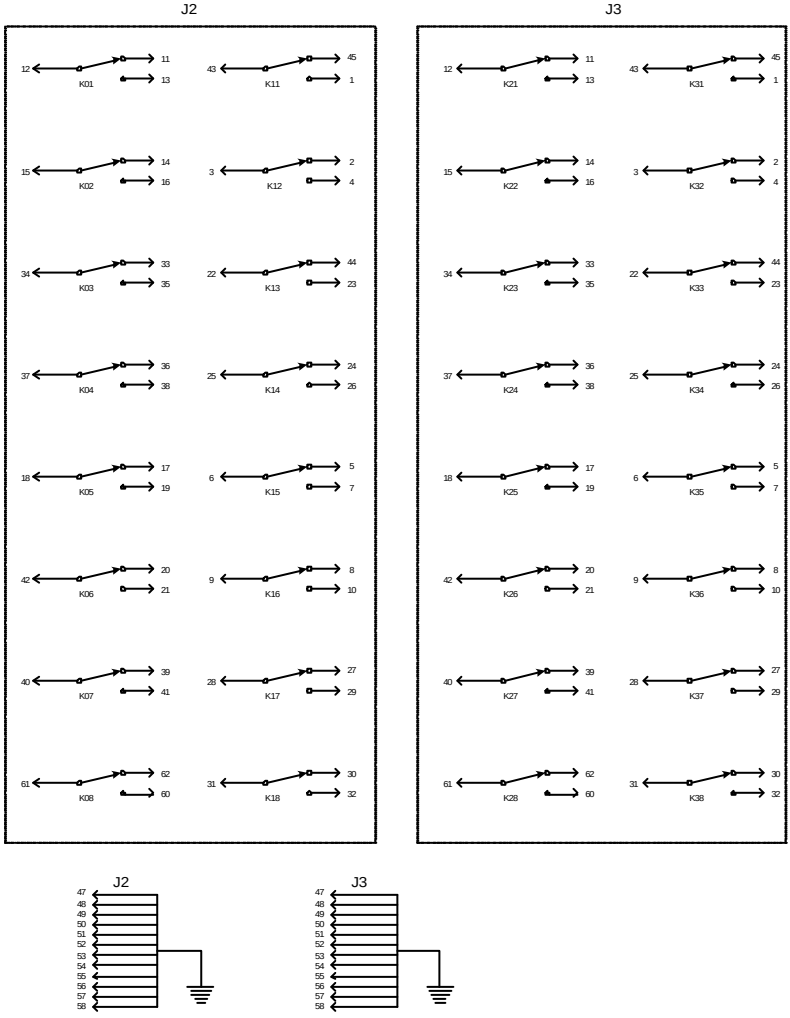
HP Basic Program Example :

```
1190    ! Close Relay 12 on Card 10
1200    OUTPUT 707;"A:CL:$12"
```

Note! ***The Controller requires "Line Feed"(Hex 0A) at end of command terminator.***

4 Broad Band Switching Modules

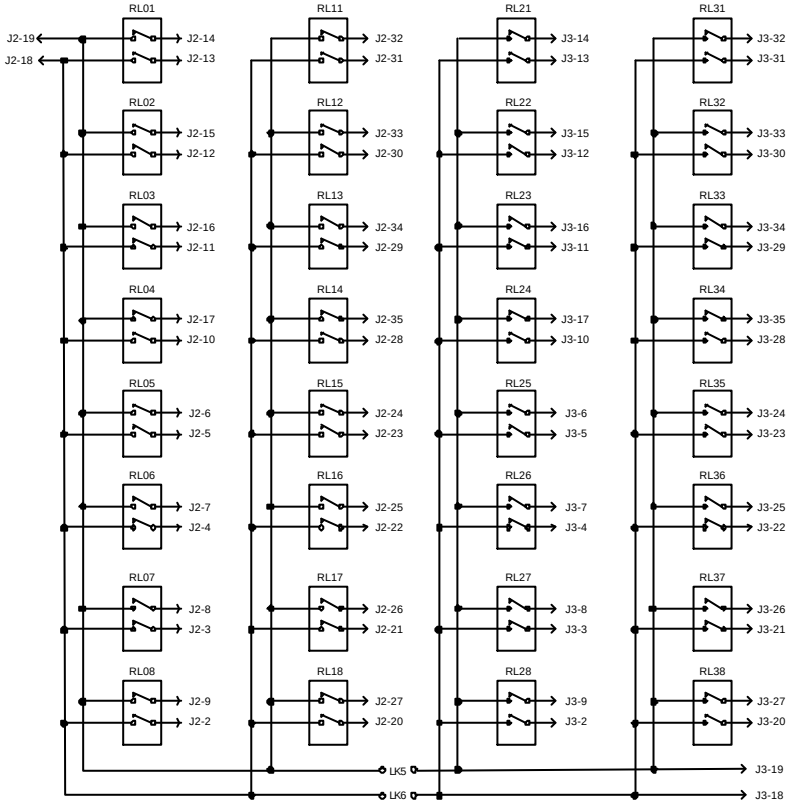
4.1 SW6U-ACT32 : 32 Channel Actuator Card - (100V 2A SPDT Form C contacts)



Relays are organised in four groups of 8 channels.

I/O CONNECTIONS:		*J2, J3 (See above)*	
APPLICABLE COMMANDS:		*OP, CL, RSCARD, *RST*	
VALID RELAY NUMBERS ARE:		*01, 02, 03, 04, 05, 06, 07, 08* *11, 12, 13, 14, 15, 16, 17, 18* *21, 22, 23, 24, 25, 26, 27, 28* *31, 32, 33, 34, 35, 36, 37, 38*	
EXAMPLE	:	“C:CL:$17”	(Turn on relay 17 on card in slot 12)
		“2:OP:$02”	(Turn off relay 02 on card in slot 2)

4.2 SW6U-MUX32 : 32 CHANNEL MULTIPLEXER

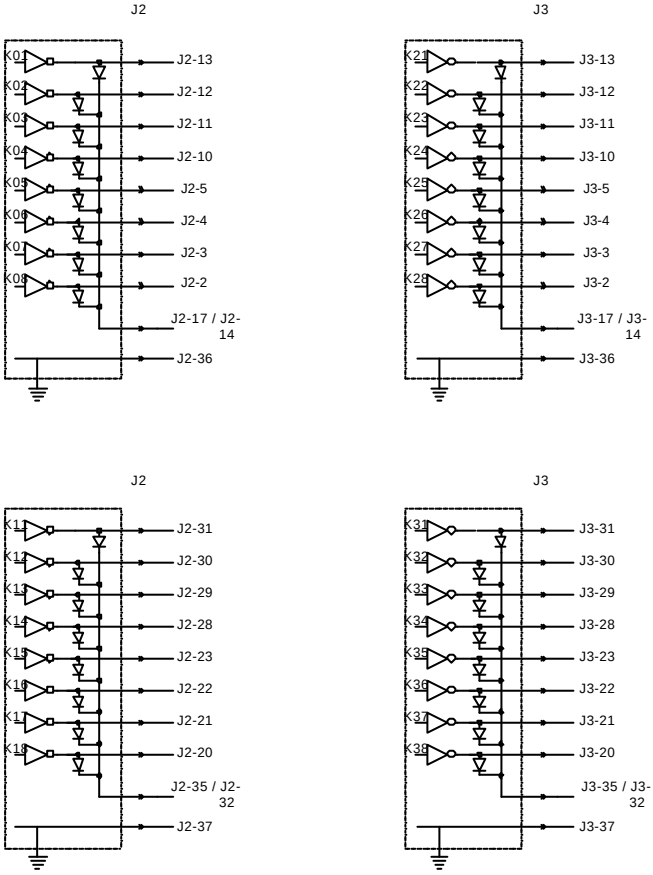


Programming Reference

Relays are organised in two groups of 16 channels. The MUX32 is shipped with links fitted, commoning both groups, to form a single 32 channel multiplexer.

I/O CONNECTIONS:	*See Schematic*
	J2 RELAYS
	01,02,03,04,05,06,07,08, *11,12,13,14,15,16,17,18*
	J3 RELAYS
	21,22,23,24,25,26,27,28, *31,32,33,34,35,36,37,38*
APPLICABLE COMMANDS :	*OP, CL, MU, RSCARD, *RST*
VALID RELAY NUMBERS:	*01, 02, 03, 04, 05, 06, 07, 08* *11, 12, 13, 14, 15, 16, 17, 18* *21, 22, 23, 24, 25, 26, 27, 28* *31, 32, 33, 34, 35, 36, 37, 38*
EXAMPLE:	“6:CL:$27” (Close relay 27)
	“8:MU:$11” (Close relay 11, open all other relays on Card 8)

4.3 SW6U-RLY32 : 32 Channel Relay Driver, 250mA, 30V



Programming Reference

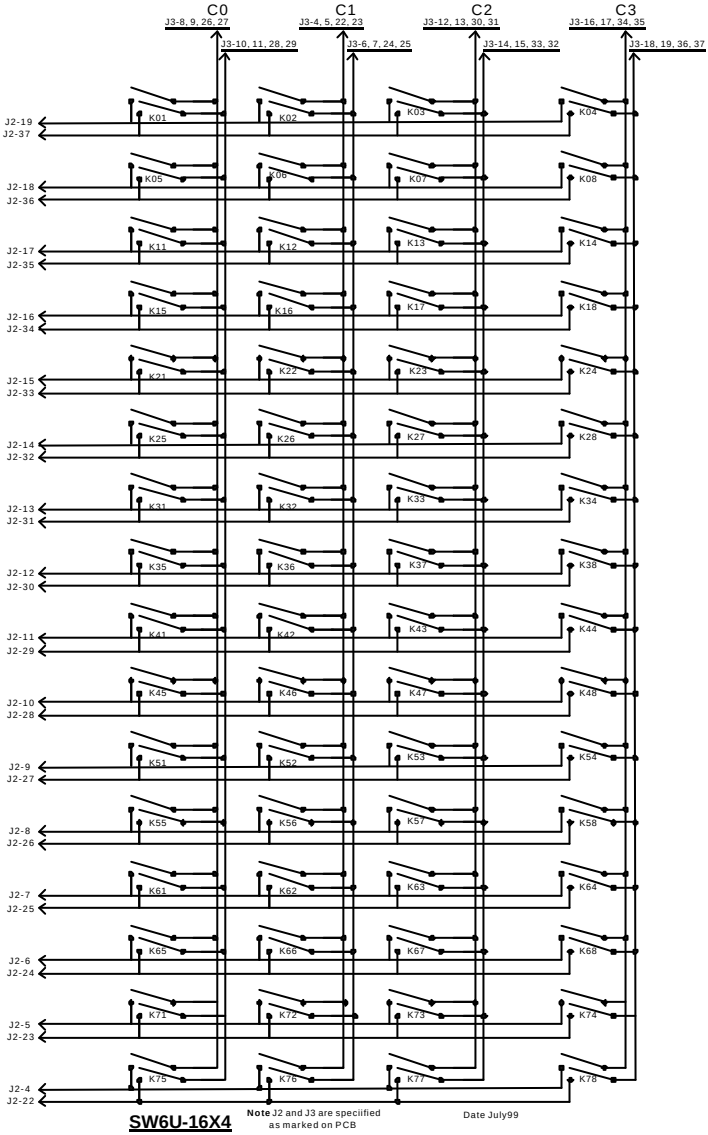
Drivers are organised in four groups of 8 channels. Each group has its own flyback diode connection allowing up to four different relay voltages.

I/O CONNECTIONS: *See above*

APPLICABLE COMMANDS: OP, CL, MU, RSCARD, *RST

VALID RELAY NUMBERS:	*(K01 is represented by 01, K02 by 02, to K38 by 38)*	
	01, 02, 03, 04, 05, 06, 07, 08 *11, 12, 13, 14, 15, 16, 17, 18* *21, 22, 23, 24, 25, 26, 27, 28* *31, 32, 33, 34, 35, 36, 37, 38*	
EXAMPLE:	"6:CL:$27"	(Turn on driver K27)
	"8:MU:$11"	(Turn on K11, turn off all other drivers on Card 8)

4.4 SW6U-16X4 : 16X4 Relay Matrix Switch



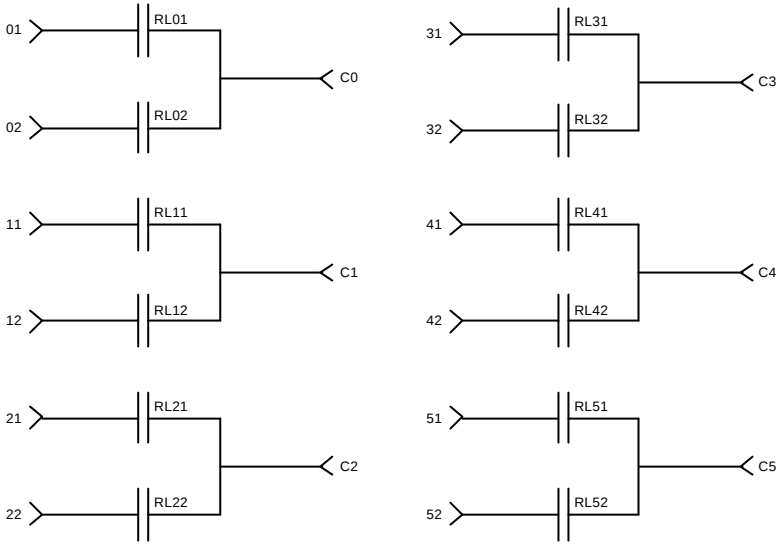
SW6U-16X4 Cont'd…..

I/O CONNECTIONS:	*(See above)*
VALID RELAY NUMBERS:	*01, 02, 03, 04, 05, 06, 07, 08* *11, 12, 13, 14, 15, 16, 17, 18* *21, 22, 23, 24, 25, 26, 27, 28* *31, 32, 33, 34, 35, 36, 37, 38* *41, 42, 43, 44, 45, 46, 47, 48* *51, 52, 53, 54, 55, 56, 57, 58* *61, 62, 63, 64, 65, 66, 67, 68* *71, 72, 73, 74, 75, 76, 77, 78*

APPLICABLE COMMANDS : *OP, CL, MU, RSCARD, *RST.*

EXAMPLE	*"A:CL:$01"*	*(Connect the C1 to N/O 1 and C2 to N/O 2 on relay 01 on module in slot position 10).*
	"B:OP:$01"	*(Connect the C1 to N/C 1 and C2 to N/C 2 on relay 01 on module in slot position 11).*

4.5 SW6U-2M75 Hexad 2:1 Mux - 75W , 1000 MHz

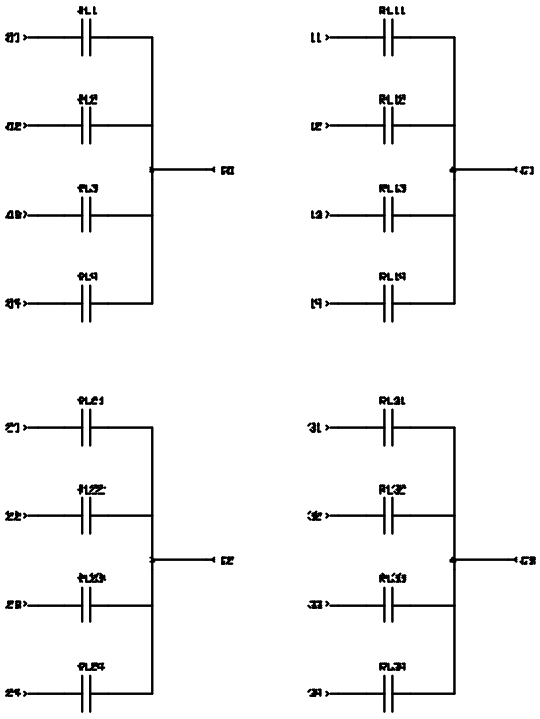


Programming Reference

Relays are organised in six groups, one per multiplexer segment.

I/O CONNECTIONS:	*(signal + shield)* *C0,01,02* *C1,11,12* *C2,21,22* *C3,31,32* *C4,41,42* *C5,51,52*	
VALID RELAY NUMBER:	*01, 02, 11, 12, 21, 22* *31, 32, 41, 42, 51, 52*	
APPLICABLE COMMANDS :	*OP, CL, RSCARD, *RST*	
EXAMPLE:	*"6:CL:$51"*	*(Connect I/P 51 to C5 on Card 6)*

4.6 SW6U-4M75 Quad 4:1 Mux - 75W , 600 MHz

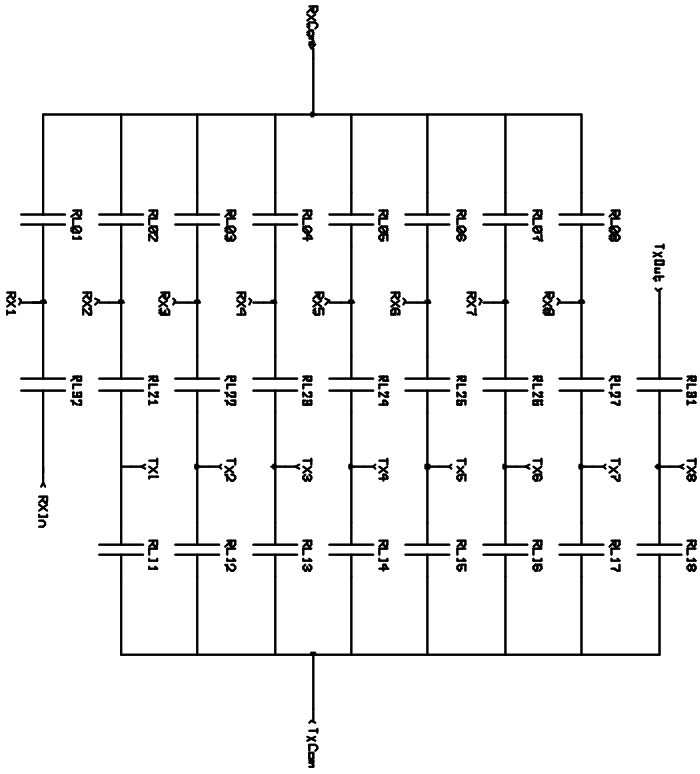


Programming Reference

Relays are organised in four groups, one per multiplexer segment.

I/O CONNECTIONS:	*C0,01,02,03,04* *C1,11,12,13,14* *C2,21,22,23,24* *C3,31,32,33,34*	
VALID RELAY NUMBERS:	*01, 02, 03, 04, 11, 12, 13, 14* *21, 22, 23, 24, 31, 32, 33, 34*	
APPLICABLE COMMANDS :	*OP, CL, RSCARD, *RST*	
EXAMPLE:	“6:CL:$34”	(Connect I/P 34 to C3 on Card 6)

4.7 SW6U-TRIB75 8 Channel Daisy Chain Switch - 75W, 30MHz



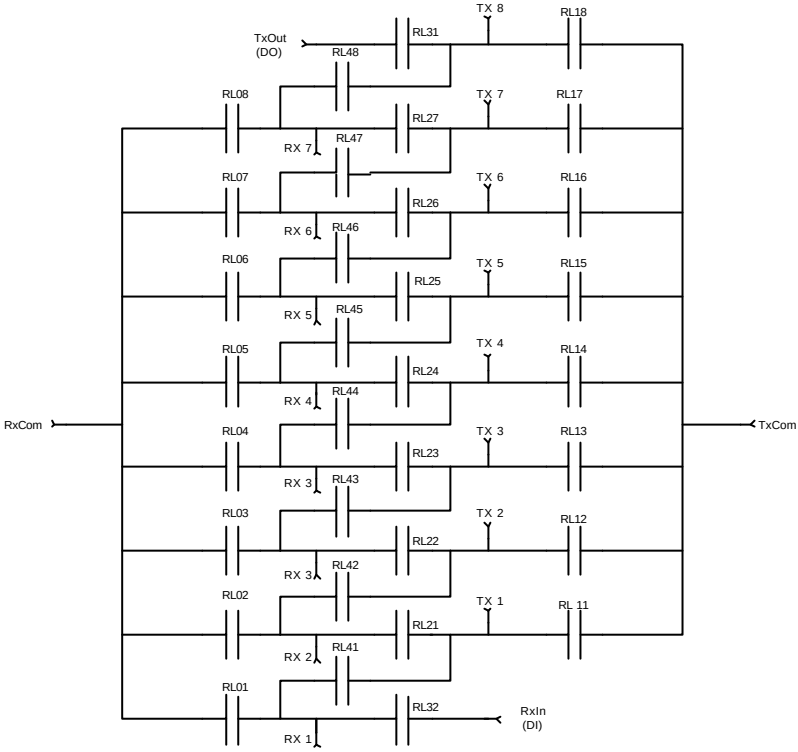
Programming Reference

Relays are organised in four groups : 8 TX inputs, 8 RX outputs, 7 Internal Daisy Chain connections and two Daisy Chain connections.

I/O CONNECTIONS:	*TXcom,T1,T2,T3,T4,T5,T6,T7,T8* *RXcom,R1,R2,R3,R4,R5,R6,R7,R8* *RX In (DI), TX Out (DO)*
VALID RELAY NUMBERS:	*01, 02, 03, 04, 05, 06, 07, 08* *11, 12, 13, 14, 15, 16, 17, 18* *21, 22, 23, 24, 25, 26, 27* *31, 32*

APPLICABLE COMMANDS:	*OP, CL, RSCARD, *RST*	
EXAMPLE:	“6:CL:$27”	(Daisy Chain TX7 to RX8 on Card 6)

4.8 SW6U-TRIB75L - 8 Channel Daisy Chain Switch - 75W, 30MHz with channel loop back



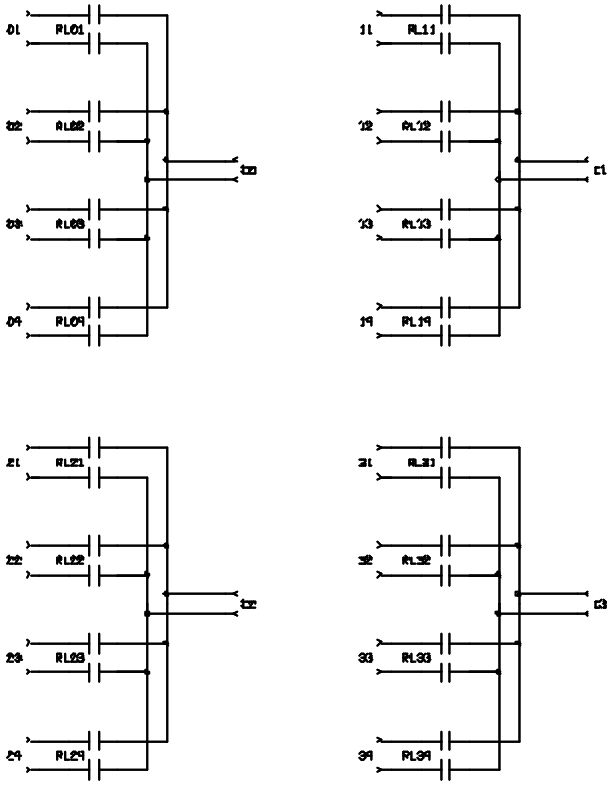
Programming Reference

Relays are organised in five groups : 8 TX inputs, 8 RX outputs, 7 Internal Daisy Chain connections, 8 loop back connections and two Daisy Chain connections.

I/O CONNECTIONS: *Txcom (TC),T1,T2,T3,T4,T5,T6,T7,T8 Rxcom (RC) ,R1,R2,R3,R4,R5,R6,R7, R8, RX In (DI), TX Out (DO)*

VALID RELAY NUMBERS:	*01, 02, 03, 04, 05, 06, 07, 08* *11, 12, 13, 14, 15, 16, 17, 18* *21, 22, 23, 24, 25, 26, 27* *31, 32* *41, 42, 43, 44, 45, 46, 47, 48*	
APPLICABLE COMMANDS:	*OP, CL, RSCARD, *RST*	
EXAMPLE:	"6:CL:$27"	(Daisy Chain TX7 to RX8 on Card 6)

4.9 SW6U-4M120 Quad 4:1 Mux - 120W Balanced, 50 MHz



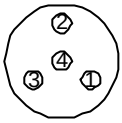
Programming Reference

Relays are organised in four groups, one per multiplexer segment.

I/O CONNECTIONS:	*C0,01,02,03,04* *C1,11,12,13,14* *C2,21,22,23,24* *C3,31,32,33,34*
APPLICABLE COMMANDS :	*OP, CL, RSCARD, *RST*
EXAMPLE:	*"6:CL:$34"* *(Connect I/P 34 to C3)*
VALID RELAY NUMBERS:	*01, 02, 03, 04, 11, 12, 13, 14* *21, 22, 23, 24, 31, 32, 33, 34*

SW6U-4M120 Cont'd…

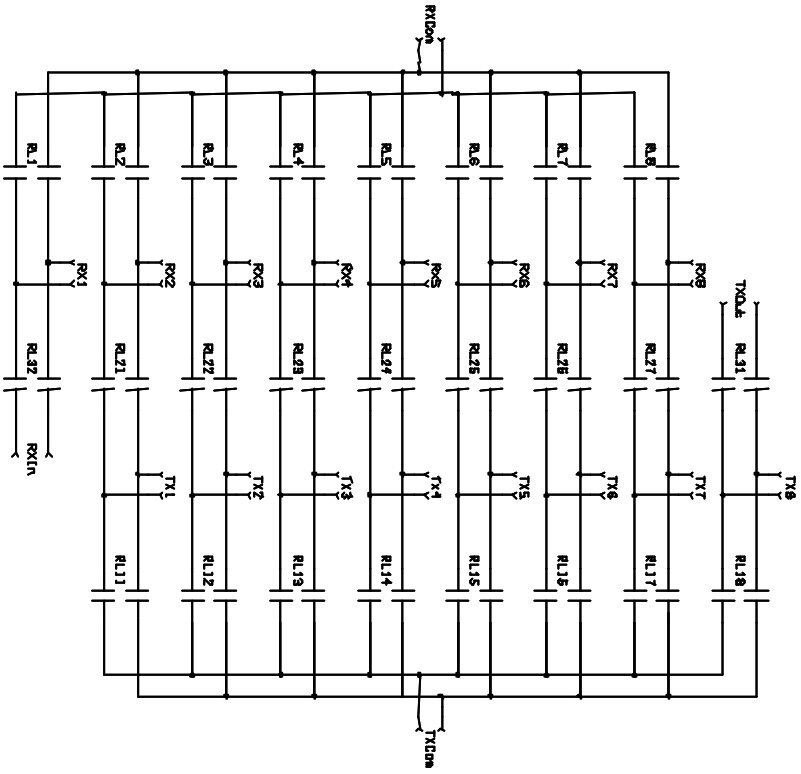
The SW6U-4M120 card uses Tini-Q Connectors.



Front panel 4 pin Tini-Q MINI
DIN PLUG
(Viewed from Front)

4M120			
Signal	Pins	Signal	Pins
01	3 & 4	02	1 & 2
03	3 & 4	04	1 & 2
C0	3 & 4	C1	1 & 2
11	3 & 4	12	1 & 2
13	3 & 4	14	1 & 2
21	3 & 4	22	1 & 2
23	3 & 4	24	1 & 2
C2	3 & 4	C3	1 & 2
31	3 & 4	32	1 & 2
33	3 & 4	34	1 & 2

4.10 SW6U-TRIB120 - 8 Channel Daisy Chain Switch - 120W , 30 MHz



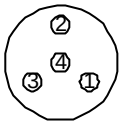
Programming Reference

Relays are organised in four groups : 8 TX inputs, 8 RX outputs, 7 Internal Daisy Chain connections and two Daisy Chain connections.

I/O CONNECTIONS:	TXcom,T1,T2,T3,T4,T5,T6,T7,T8 RXcom,R1,R2,R3,R4,R5,R6,R7,R8 RX In, TX Out
APPLICABLE COMMANDS :	OP, CL, RSCARD, *RST
EXAMPLE:	“6:CL:$27” (Daisy Chain TX7 to RX8)

SW6U-TRIB120 Cont'd…

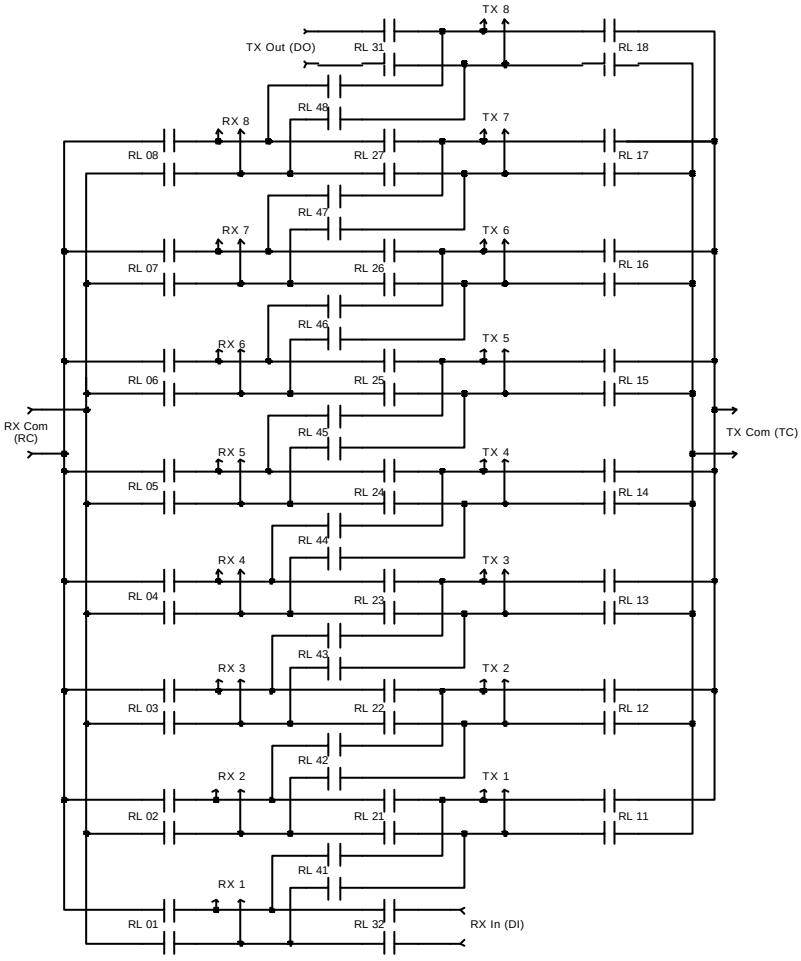
The SW6U-TRIB120 card uses Tini-Q Connectors.



Front panel 4 pin Tini-Q MINI
DIN PLUG
(Viewed from Front)

TRIB120			
Signal	Pins	Signal	Pins
DI (RX in)	3 & 4	DO (TX out)	1 & 2
T8	3 & 4	R8	1 & 2
T7	3 & 4	R7	1 & 2
T6	3 & 4	R6	1 & 2
T5	3 & 4	R5	1 & 2
T4	3 & 4	R4	1 & 2
T3	3 & 4	R3	1 & 2
T2	3 & 4	R2	1 & 2
T1	3 & 4	R1	1 & 2
TC (TX com)	3 & 4	RC (RX com)	1 & 2

4.11 SW6U-TRIB120L - 8 Channel Daisy Chain Switch - 120W , 30 MHz



Programming Reference

Relays are organised in four groups : 8 TX inputs, 8 RX outputs, 7 Internal Daisy Chain connections, 8 Loop Back relays and two Daisy Chain connections.

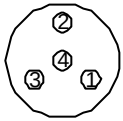
I/O CONNECTIONS: *Txcom (TC),T1,T2,T3,T4,T5,T6,T7,T8 Rxcom (RC), R1,R2,R3,R4,R5,R6,R7, R8, RX In (DI), TX Out (DO)*

APPLICABLE COMMANDS: *OP, CL, RSCARD, *RST*

VALID RELAY NUMBERS: *01, 02, 03, 04, 05, 06, 07, 08*
11, 12, 13, 14, 15, 16, 17, 18
21, 22, 23, 24, 25, 26, 27
31, 32
41, 42, 43, 44, 45, 46, 47, 48

EXAMPLE: "6:CL:$27" (Daisy Chain TX7 to RX8)

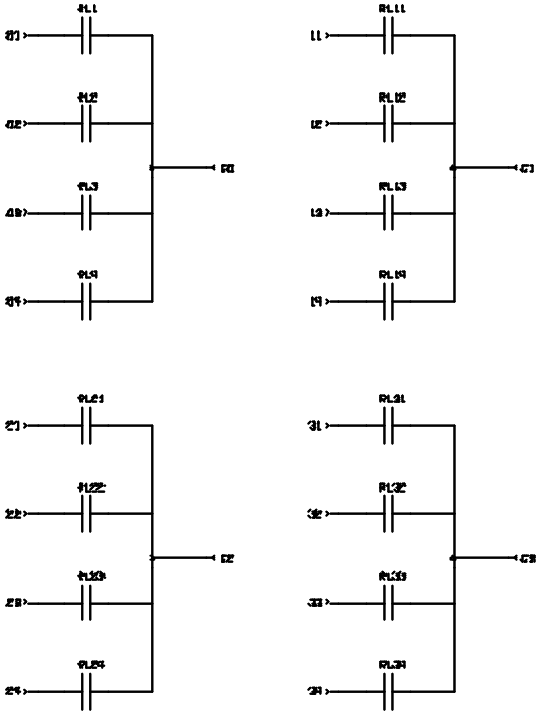
The SW6U-TRIB120L card uses Tini-Q Connectors.



Front panel 4 pin Tini-Q MINI
DIN PLUG
(Viewed from Front)

TRIB120L			
Signal	Pins	Signal	Pins
DI (RX in)	3 & 4	DO (TX out)	1 & 2
T8	3 & 4	R8	1 & 2
T7	3 & 4	R7	1 & 2
T6	3 & 4	R6	1 & 2
T5	3 & 4	R5	1 & 2
T4	3 & 4	R4	1 & 2
T3	3 & 4	R3	1 & 2
T2	3 & 4	R2	1 & 2
T1	3 & 4	R1	1 & 2
TC (TX com)	3 & 4	RC (RX com)	1 & 2

4.12 SW6U-4M50 Quad 4:1 Mux - 50W , 600 MHz – SMB Connectors.

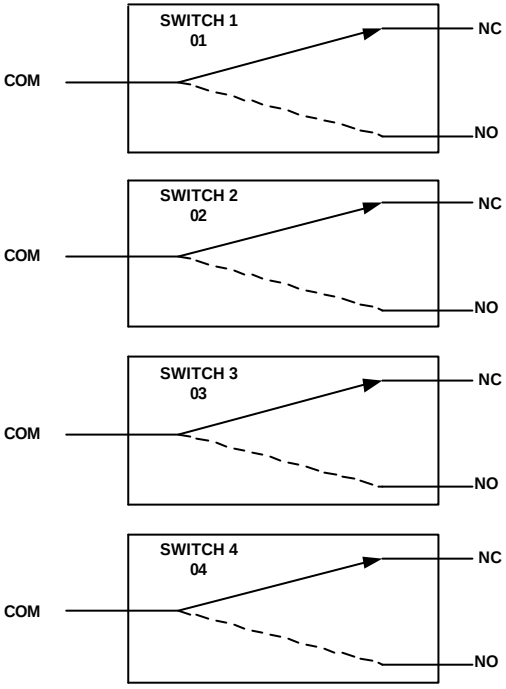


Programming Reference

Relays are organised in four groups, one per multiplexer segment.

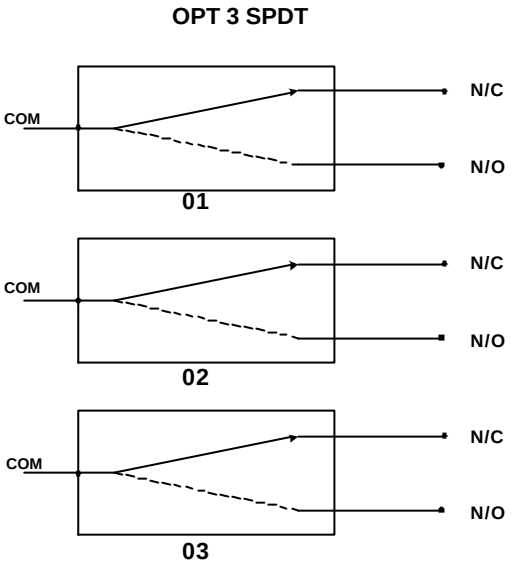
I/O CONNECTIONS:	*C0,01,02,03,04* *C1,11,12,13,14* *C2,21,22,23,24* *C3,31,32,33,34*
VALID RELAY NUMBERS:	*01, 02, 03, 04, 11, 12, 13, 14* *21, 22, 23, 24, 31, 32, 33, 34*
APPLICABLE COMMANDS :	*OP, CL, RSCARD, *RST*
EXAMPLE:	“6:CL:$34” (Connect I/P 34 to C3 on Card 6)

4.13 SW6U-OPT2 : Optical Switch Module (Four SPDT Switches)



I/O CONNECTIONS:	*(See above)*	
APPLICABLE COMMANDS:	*OP, CL, RSCARD, *RST*	
VALID RELAY NUMBERS:	*01, 02, 03, 04*	
EXAMPLE:	*"A:CL:$01"*	*(Connects the Common to N/O position on relay 01 on module in slot position 10.)*
	"3:OP:$02"	*(Connects the Common to N/C position on relay 02 on module in slot position 3.)*

4.14 SW6U-OPT3 : Optical Switch Module (Three SPDT Switches)

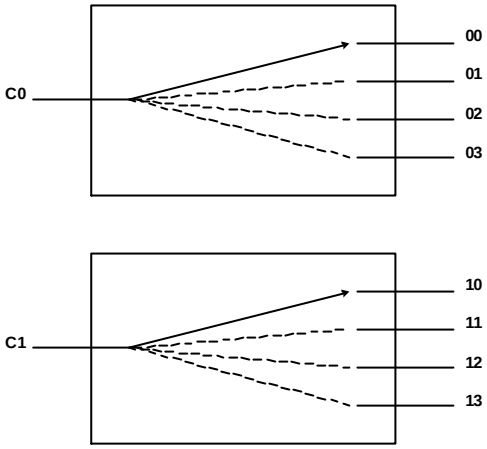


Optical Relays are organised in one group of 3 SPST Switches.

I/O CONNECTIONS:	*(See above)*	
APPLICABLE COMMANDS :	*OP, CL, RSCARD, *RST*	
VALID RELAY NUMBERS:	*01, 02 and 03*	
EXAMPLE:	*A:CL:$01"*	*(Connect the Com to N/O position on relay 01 on module in slot position 10.)*
	"3:OP:$02"	*(Connect the Com to N/C position on relay 02 on module in slot position 3.)*

4.15 SW6U-OPT4 : Optical Switch Module (Dual 4:1 Optical Switch)

OPT 4 SP4T



Optical Relays are organised in two groups of 4:1 Switches.

I/O CONNECTIONS: *(See above)*

APPLICABLE COMMANDS: *OP, CL, RSCARD, *RST*

VALID RELAY NUMBERS: *01, 02, 03 AND 11, 12, 13*

APPLICATION NOTES: *Before writing a CL command to a switch group, any currently closed positions MUST be OPENED. Commands may be concatenated as shown in the example below. All relays open connects C0 to 00 and/or C1 to 10.*

EXAMPLE: *"A:OP:$01;A:OP:$02;A:CL:$03"*

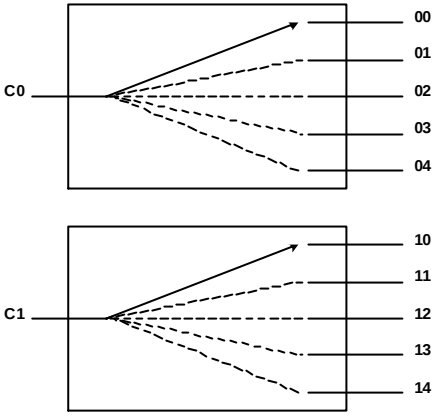
(Connect the C0 to the 03 position on the first Switch on module in slot position 10).

"A:OP:$11;A:OP:$12;A:OP:$13"

(Connect the C1 to the 10 position on the first Switch on module in slot position 10).

4.16 SW6U-OPT5 : Optical Switch Module (Dual 5:1 Optical Switch)

OPT 5 SPST



Optical Relays are organised in two groups of 5:1 Switches.

I/O CONNECTIONS: *(See above)*

APPLICABLE COMMANDS: *OP, CL, RSCARD, *RST*

VALID RELAY NUMBERS: *01, 02, 03, 04 AND 11, 12, 13, 14*

APPLICATION NOTES: *Before writing a CL command to a switch group, any currently closed positions MUST be Opened. Commands may be concatenated as shown in the example below. All relays open connects C0 to 00 and / or C1 to 10.*

EXAMPLE *:"1:OP:$01;1:CL:$02;1:OP:$03; 1:OP:$04"*

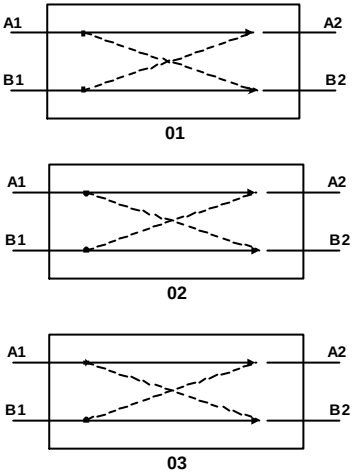
(Connect the C0 to the 02 position on the first Switch on module in slot position 1).

"A:OP:$11;A:OP:$12;A: OP:$13;OP:$14"

(Connect the C1 to the 10 position on the second Switch on module in slot position 10).

4.17 SW6U-OPT2:2 : Optical Switch Module (Triple 2:2 Crossover Switch)

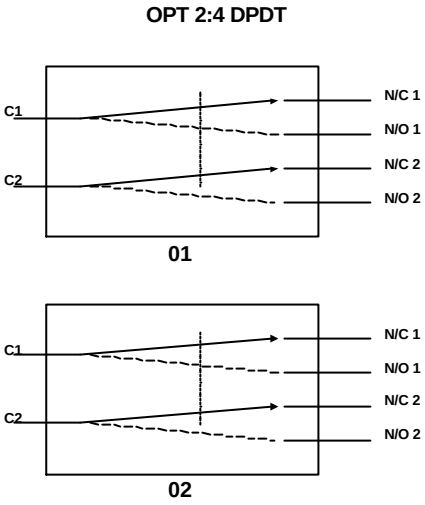
OPT 2:2 Cross Over



Optical Relays are organised in one group of 3 Crossover Switches.

I/O CONNECTIONS:	*(See above)*	
APPLICABLE COMMANDS:	*OP, CL, RSCARD, *RST*	
VALID RELAY NUMBERS:	*01, 02 and 03*	
EXAMPLE:	*"A:CL:$03"*	*(Connect the A1 to B2 and A2 to B1 on relay 03 on module in slot position 10).*
	"A:OP:$03"	*(Connect the A1 to B1 and A2 to B2 on relay 03 on module in slot position 10).*

4.18 SW6U-OPT2:4 : Optical Switch Module (Double DPDT Optical Switch)



Optical Relays are organised in one group of two DPDT Switches.

I/O CONNECTIONS: *(See above)*

APPLICABLE COMMANDS: *OP, CL, RSCARD, *RST*

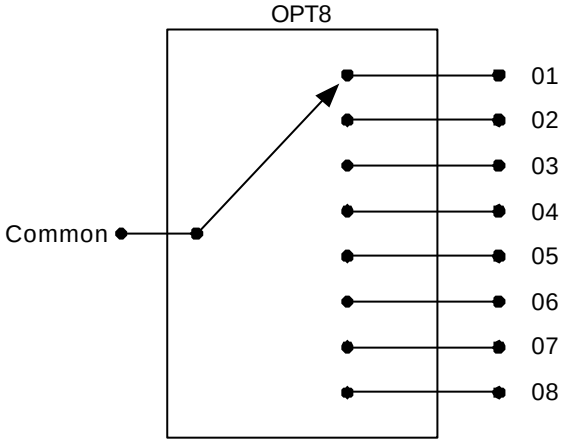
VALID RELAY NUMBERS: *01, 02*

EXAMPLE *"A:CL:$01"* *(Connect the C1 to N/O 1 and C2 to N/O 2 on relay 01 on module in slot position 10).*

"B:OP:$01" *(Connect the C1 to N/C 1 and C2 to N/C 2 on relay 01 on module in slot position 11).*

4.19 SW6U-OPT8 8:1 Optical Multiplexer

The SW6U-OPT8 Optical 8:1 multiplexer uses a Lightech LT 800 1X8 optical switch unit. This switch unit is an opto-mechanical switch that allows selection of an individual fibre channel direct alignment with a selected output fibre.



Using the Switch:

After power is applied to the switch, the module requires a 1 Second initialisation period while the PCA logic resets. When in the RESET position, the LED display should display '1' and channel 1 should be selected. While the switch is resetting, or while the switch is moving from one position to another, the LED should display 'B' to indicate Busy. If a switch error occurs, 'E' will be displayed. To clear, cycle the power on the Chassis. Allow a minimum of 50mS between commands when changing switch positions.

Programming Reference:

The switch is operated by using the MU command.

To comply with current SW6U-GPIB Controller command structures, the switch positions are organised in one group, 01-08. These positions are identified on the front panel connectors of the module.

When a channel is closed, its number will be displayed.

I/O CONNECTIONS: Common to

01,02,03,04,05,06,07,08 (positions 1-8)

APPLICABLE COMMANDS: MU, RSCARD, *RST

VALID RELAY NUMBERS: 01, 02, 03, 04, 05, 06, 07, 08

EXAMPLE:

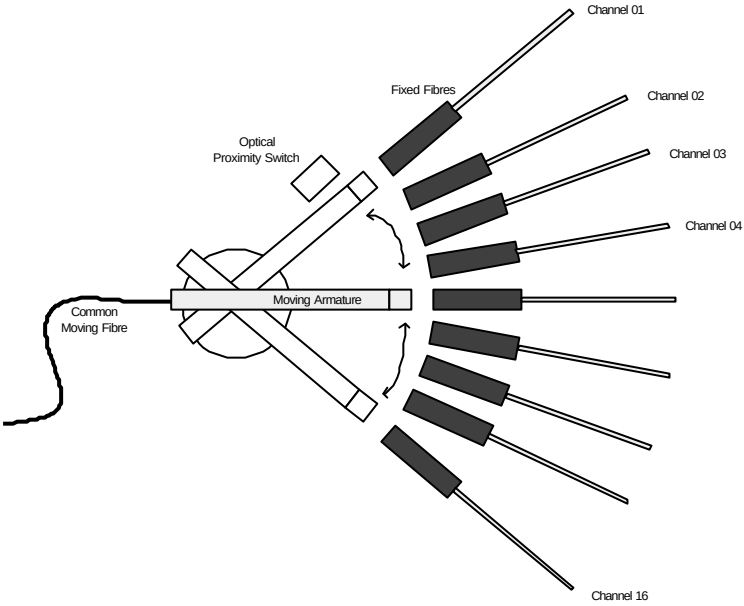
"6:MU:$04"	(Connect Card 6 Channel 4 To Common – Displays 4)
"A:MU:$08"	(Connect card 10 Channel 8 to common – Displays 8)
"6:RSCARD"	(Resets card 6 to park position – Displays 1)

Important Information:-

As the switch travels, optical noise may be transmitted through some of the optical channels. Allow a minimum of 50 mSec between commands to the switch from the controller.

4.20 SW6U-OPT16 - 16:1 Optical Multiplexer

The SW6U-OPT16 Optical 16:1 multiplexer uses a DiCon VX500 optical switch unit. This switch unit is an opto-mechanical switch that allows selection of an individual fibre channel by means of a high-resolution stepper motor. The stepper motor moves a common fibre into



direct alignment with a selected output fibre. The VX500 is optically passive, operating independently of data rate, data format, and optical signal direction.

Using the Switch

After power is applied to the switch, the switch requires a 1 second initialisation period while the switch armature returns to the reset position. When in the RESET position, the LED display should display ‘OC’. While the switch is resetting, or while the switch is moving from one position to another, the LED should display ‘BB’ to indicate Busy. If a switch error occurs, ‘EE’ will be displayed. To clear, cycle the power on the Chassis.

Programming Reference:

The switch is operated by using the MU command.

To comply with current SW6U-GPIB Controller command structures, the switch positions are organised in four groups, 01-08 and 11-18, covering all 16 switch positions. These positions are identified on the front panel of the module. Allow 1 second between commands to ensure that the switch has completed its previous command before sending a new command.

When a channel is closed, its number will be displayed.

I/O CONNECTIONS : Common to

01,02,03,04,05,06,07,08 (positions 1-8)

11,12,13,14,15,16,17,18 (positions 9-16)

VALID RELAY NUMBERS: *01, 02, 03, 04, 05, 06, 07, 08*
11, 12, 13, 14, 15, 16, 17, 18

APPLICABLE COMMANDS : MU, RSCARD, *RST

EXAMPLE : "6:MU:$04" (Connect Card 6 Channel 4 To Common – Displays 04)

"A:MU:$11" (Connect card 10 Channel 11 to common – Displays 11)

"6:RSCARD" (Resets card 6 to park position – Displays OC)

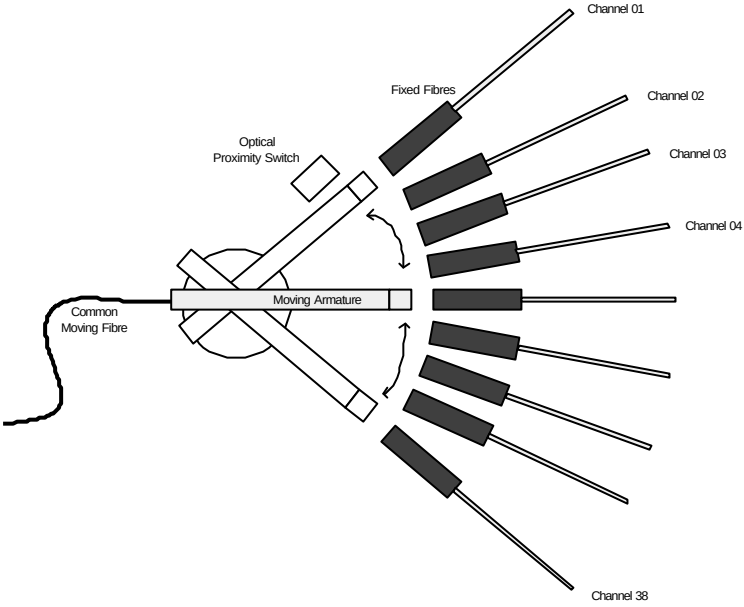
Important Information:-

The switch may not perform correctly if it is allowed to overheat (50°C max.). Under some circumstances, a vented airflow may be necessary in order to keep the housing temperature within range.

As the switch travels, optical noise may be transmitted through some of the optical channels. Allow a minimum of 1 Sec between commands to the switch from the controller.

4.21 SW6U-OPT32 32:1 Optical Multiplexer

The SW6U-OPT32 Optical 32:1 multiplexer uses a DiCon VX500 optical switch unit. This switch unit is an opto-mechanical switch that allows selection of an individual fibre channel by means of a high-resolution stepper motor. The stepper motor moves a common fibre into



direct alignment with a selected output fibre. The VX500 is optically passive, operating independently of data rate, data format, and optical signal direction.

Using the Switch

After power is applied to the switch, the switch requires a 970-ms initialisation period while the switch armature returns to the reset position. When in the RESET position, the LED display should display ‘OC’. While the switch is resetting, or while the switch is moving from one position to another, the LED should display ‘BB’ to indicate Busy. If a switch error occurs, ‘EE’ will be displayed. To clear, cycle the power on the Chassis.

Programming Reference:

The switch is operated by using the MU command.

To comply with current SW6U-GPIB Controller command structures, the switch positions are organised in four groups, 01-08, 11-18, 21-28 and 31-38, covering all 32 switch positions. These positions are identified on the front panel of the module. Allow 1 second between commands to ensure that the switch has completed its previous command before sending a new command.

When a channel is closed, its number will be displayed.

I/O CONNECTIONS : Common to

01,02,03,04,05,06,07,08 (positions 1-8)

11,12,13,14,15,16,17,18 (positions 9-16)

21,22,23,24,25,26,27,28 (positions 17-24)

31,32,33,34,35,36,37,38 (positions 25-32)

VALID RELAY NUMBERS: *01, 02, 03, 04, 05, 06, 07, 08*
11, 12, 13, 14, 15, 16, 17, 18
21, 22, 23, 24, 25, 26, 27, 28
31, 32, 33, 34, 35, 36, 37, 38

APPLICABLE COMMANDS : MU, RSCARD, *RST

EXAMPLE : "6:MU:$34" (Connect Card 6 Channel 34 To Common – Displays 34)

"A:MU:$11" (Connect card 10 Channel 11 to common – Displays 11)

"6:RSCARD" (Resets card 6 to park position – Displays OC)

Important Information:-

The switch may not perform correctly if it is allowed to overheat (50°C max.). Under some circumstances, a vented airflow may be necessary in order to keep the housing temperature within range.

As the switch travels, optical noise may be transmitted through some of the optical channels. Allow a minimum of 1 Sec between commands to the switch from the controller.

5 Optical Fibre Care

When using modules with optical fibre, care should be taken to ensure that the connections on the modules and on the connecting cables are kept clean and free of dust and dirt. It is important that persons handling fibre optic cables and equipment are suitably trained in the handling and use of fibre optic equipment. All un-connected cables and modules must be protected with DUST COVERS at all times.

Warning!
It is dangerous to look into the end of fibre connector and cables as optically hazardous signals may be present which may cause damage to eyesight.

5.1 Cleaning Procedure

5.1.1 Introduction

Fibre optic connectors should be inspected and cleaned before every mating to ensure optimum performance. If a connector is mated while contaminated, especially with hard contaminant particles, ferrule end-face damage may occur, or the contaminant may get firmly bonded to the ferrule end-face. It then becomes necessary to employ a polishing technique to remove the contamination.

5.1.2 Cleaning Equipment

Cletop™ reel supplied by NTT International is a dry tissue dispenser especially suited to quick and efficient cleaning of the ferrule end-face by using a dry alcohol-free cloth. A number of types are available to suit different connector designs. The type suitable for SC,FC,ST,D4 and DIN connectors has a Code Number 14100500 CLETOP™ (Type A) - 5 piece set for type SC,FC,ST,DIN and D4

Isopropyl alcohol and lint-free cloths may also be used if cleaning using the Cletop™ reel is unsuccessful. Isopropyl alcohol is stored in a pump action solvent container designed to allow a small amount of alcohol to be dispensed on demand. The container also incorporates a cap to prevent evaporation of the alcohol. Isopropyl alcohol should be stored and used in a clean, cool and ventilated area. Avoid inhalation of vapours and repeated or prolonged contact of the liquid with skin or clothing. Wash thoroughly after handling. Cleaning cloths should be of a lint free variety (RS558-795 or equivalent).

5.1.3 Cleaning Procedure (Cletop™ reel)

Clean only one fibre optic connector end at a time. Remove the dust cap from the fibre cable connector, being careful not to touch or contaminate the end-face of the connector ferrule. Store the caps in an ESD bag so that they do not attract contamination.

Clean the connector end using the cartridge cleaner by advancing the tape belt , exposing a fresh film section and using a figure 8 motion clean the ferrule.

Inspect the ferrule and if not satisfactory repeat the steps above.
If several attempts to clean the connector are not successful, clean with isopropyl alcohol and lint free cloths.

5.1.4 Cleaning Procedure (Isopropyl alcohol and lint free cloths)

Clean only one fibre optic connector end at a time. Moisten a small section of a lint free cloth with IPA and place the cloth on a clean dry flat surface. Holding the connector vertically and using light downward pressure, inscribe several figure 8 motions on the cloth for about 4-5 seconds (about 10 figure 8 motions). Using a dry portion of the cloth dry the ferrule immediately. Failure to do this will result in a residue on the ferrule and/or fibre end-face. Inspect the ferrule and if not satisfactory repeat the steps above. If this is not successful then the cable must not be used. Dispose of the cloth immediately after use and do not use it to clean another connector.

5.1.5 Handling procedures for connectors

Connectors should be handled carefully. The ferrule and ferrule end-face should not be touched as this can cause contamination by dirt and/or skin residues and oils. When in storage or not attached to an adapter a connector ferrule must have its dust cap attached to avoid contamination/damage. Connector dust caps must be kept clean to ensure that contamination / damage of the end-face of connectors is minimised and optimum performance is maintained. Where a ferrule is touched accidentally it should be cleaned and inspected.

Mating a connector to an adapter should be undertaken carefully. Rotate the connector body between the fingers to determine where the alignment key is on the connector body and line this key up with the slot on the adapter. When inserting the ferrule into the adapter do so slowly and steadily so as to avoid contact between the ferrule end-face and outer part of the adapter body. Ensure that the connector is securely attached to the adapter by tightening the connector body.

5.1.6 Fibre Optic Cable Handling

The most common forms of optical fibre are made of silica glass with a cladding with an outer diameter of 125 microns. This is commonly referred to as “bare fibre”. Because of the risk of breakage bare fibre is always protected by a buffer coating which has either a 250 micron or 900 micron diameter. In turn buffered fibre is protected within fibre optic cable, for example in a patchcord cable 900 micron buffered fibre is protected by a combination of kevlar and an outer plastic jacket, typically 2.5 mm in diameter. Bare fibre should always be contained within some form of protection, for example a buffer coating or a component housing, such as that of an optical coupler. Bare fibre should never be exposed within equipment enclosures in such a way that it can be handled or touched. For this reason handling refers specifically to buffered fibre and fibre optic cables.

Buffered fibre and fibre optic cable handling requirements are similar across all fibre categories. Buffered fibre and cable should be handled with care as excessive stress can damage the fibre resulting in breaks, long term reliability problems or a reduction in transmission properties. Buffered fibre and fibre optic cables shall be handled and stored in such a way as to ensure the fibre is not kinked, compressed, crushed, twisted or stretched.

Warning!
Fragments from broken fibre cables should NOT be handled with bare hands. If fragments enter the blood stream, they can cause serious medical problems.

Should a buffered fibre or fibre optic cable break any small fragments should be handled and disposed of carefully, particularly bare fibre fragments. Bare fibre fragments should be picked up using a suitable tweezers or adhesive tape and should not come into contact with skin. Bare fibre fragments should be disposed of in a suitable container designed for sharp objects.

When routing cables, cables should not be kinked, compressed, crushed , twisted or stretched. Avoid tight bends at all points and for cables ensure that the minimum bend radius is always about 10-20 times the outer diameter of the cable. The minimum bend radius for buffered fibre should be at least 25 mm, preferably 40 mm or more. Pay particular attention to the points where buffered fibre or fibre optic cable enters a component, a connector strain relief jacket or passes through a support clip. At these points micro bends which have very small radii can occur that may be missed in a cursory inspection. When physically installing components and

other assemblies slack buffered fibre and fibre optic cable should be stored in permanent supported loops within the enclosure, paying particular attention to the need to maintain minimum bend radii and minimise stress at all points.

Connectors and optical components shall be supported during installation so as to minimise stress at the points where fibre enters or leaves the component

Notes: