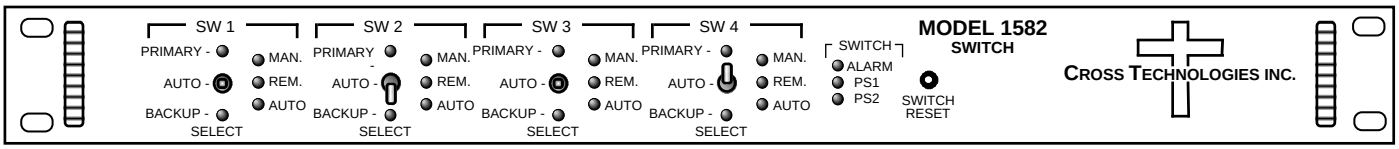
Instruction Manual

Model 1582-421L

Quad 1:1 Switch

October 2020, Rev. B



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INSTRUCTION MANUAL

MODEL 1582-421L, 1:1 Switch, M&C Monitor & Channel Select

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1582-421L Quad 1:1 Switch, DC-2.15 GHz, 2PDT, M&C Monitor & Channel Select

1.0 General

The 1582-421L Quad 1:1 Switch provides **four 2PDT switch pairs (SWITCH 1, 2, 3, and 4). Each switch pair independently provides** Auto, Manual or Remote (M&C) latched relay switching between PRIMARY and BACK-UP, DC - 2.15 GHz RF signals. The M&C provides monitoring of all parameters, Switch Reset, and Channel Selection (when in Auto mode only). Alarm conditions on PRIMARY and BACK-UP are either a contact closure to ground or an open (selectable by a rear panel DIP switch). Auto has three modes:

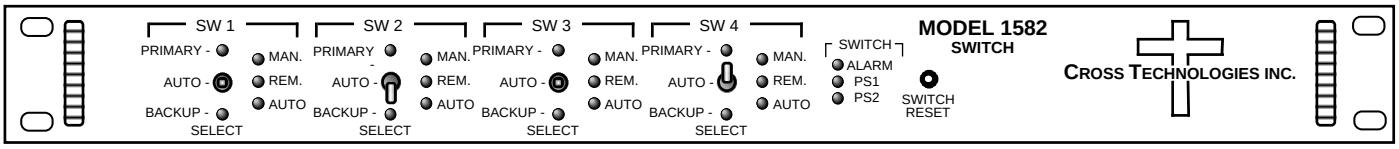
Auto - PRIMARY; The PRIMARY - switches from PRIMARY to BACK-UP only if PRIMARY alarms and BACK-UP is good. The unit switches back to PRIMARY when PRIMARY is no longer in alarm or both PRIMARY and BACK-UP in alarm.

Auto - LATCH BACK-UP; Latch to BACK-UP mode - switches from PRIMARY to BACK-UP if PRIMARY alarms and BACK-UP is good and stays in BACK-UP regardless of PRIMARY or BACK-UP alarm conditions until reset to PRIMARY by the front panel Switch Reset switch or M&C command.

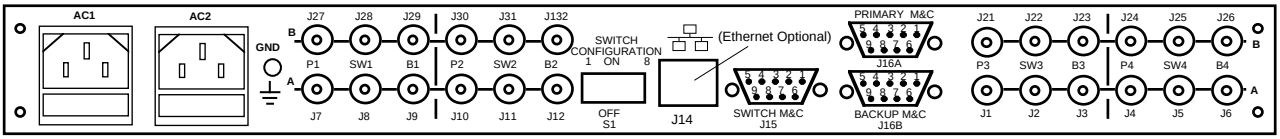
Auto - MIN SW; Minimum **Auto** switching mode - switching occurs if the active channel (set by the front panel Manual Select switch or M&C command) alarms and the other channel is clear. It switches back if this channel then alarms and the other is clear.

When power is lost, the current latched state remains selected. Front panel LEDs indicate PRIMARY and BACK-UP alarms and switch position, Auto, Remote or Manual mode, and indicates redundant power supplies are on and if the 1582-421L has an alarm condition. Rear panel DIP switches set alarm polarity (NO or NC for alarm inputs), M&C interface, and Auto modes (PRIMARY PRIME, LATCHBACK-UP, or MIN SW). The front panel switches manually select the signal path or selects AUTO switching (center off). The RS232 or RS422/485 M&C (Ethernet optional) monitors switch positions, unit and switch alarm status, and selects the RF switch position (when NOT in manual mode only). A contact closure to ground indicates an internal fault condition or loss of power. Connectors are BNC for RF signals and DB9 for M&C and alarm input and output contact closures. It is powered by separately fused, 100-240 ±10% VAC redundant power supplies.

Applications: The 1582-421L, 1:1 Redundant Switch is software defined switch. As such it may be configured in many different ways to support various unique Customer applications. Appendix A - CONFIGURATIONS, provides a number of Configuration Diagrams and Interconnection Tables for each known application.

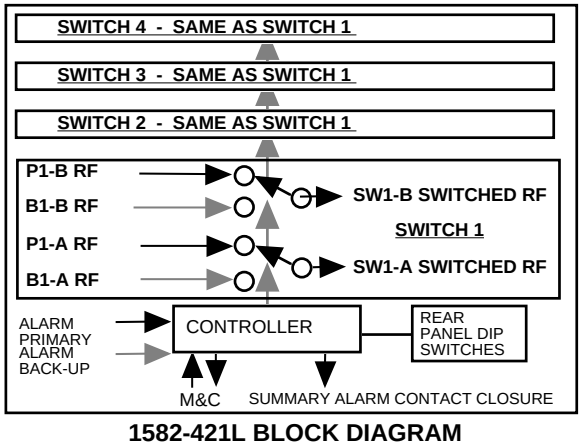


FRONT PANEL



REAR PANEL

FIGURE 1.1 Model 1582-421L Front and Rear Panels



1582-421L BLOCK DIAGRAM

FIGURE 1.2 Model 1582-421L Switch Block Diagram

1.2 Technical Characteristics

TABLE 1.0 1582-421L 1:1 Switch, Specifications*	
IF/L-Band Switch Characteristics	
Impedance / Connectors	75Ω / BNC
Return Loss	12 dB minimum, ≥ 14 dB typical; DC to 1.5 GHz 10 dB minimum, ≥ 12 dB typical; 1.5 to 2.5 GHz
Frequency Response	≤ ±0.5 dB, 40 MHz BW, ≤ ±1 dB, 1 GHz BW
Isolation	55 dB minimum, ≥ 60 dB typical, DC to 1.5 GHz 45 dB minimum, ≥ 50 dB typical; 1.5 to 2.5 GHz
Insertion Loss	1.5 dB maximum, ≤ 1.0 dB typical; DC to 1.5 GHz 2.5 dB maximum, ≤ 2.0 dB typical; 1.5 to 2.5 GHz
Switch Time	≤ 10 milliseconds
DC Switching	48VDC, maximum; 2 Amps, maximum; 60VA maximum
Type, Configuration	Latching Relay, 2PDT, No Termination
Alarm and Control, M&C	
Alarm Output Signal	Form C relay: 30VDC, 0.5A maximum
M&C Interface / Baud Rate	RS232C or RS422/485, Selectable/9600 (Ethernet Optional)
Connectors, Indicators	
Auto/Manual	Front Panel Switch
Switch Reset	Front Panel Switches or M&C
Switch: Power, Auto, Remote, Manual, Alarm	Green, Green, Yellow, Red, Red LED - Form C contact closure, M&C
Unit: Alarm, Good, Online	Red, Green, Blue
Connectors, Other	
RF, Connectors	75Ω BNC (female)
Ext. Alarms In, M&C Connector	DB9 (female)
Size	1 RU, 19 inch Standard Chassis, 1.75” high x 16.0” deep
Power	Redundant 100-240 ±10% VAC, 47-63 Hz., 20 Watts maximum Power Supplies
*10˚C to 40˚C; Specifications subject to change without notice.	Cross Technologies, Inc.

(Technical Characteristics continued on page 5...)

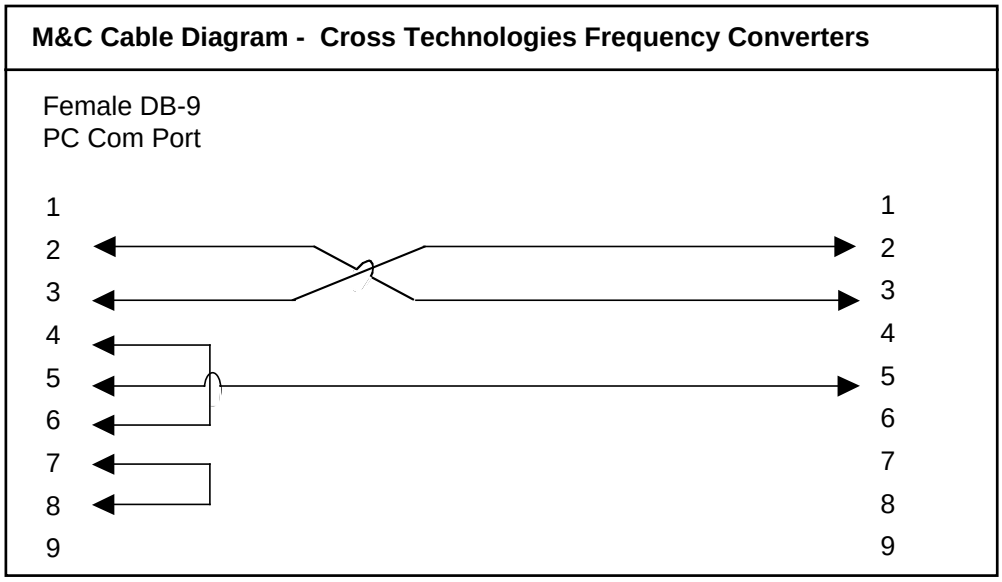
(Technical Characteristics continued from page 4...)

There are four(4) Ethernet Options Available	
W- 8	Ethernet M&C Remote Interface. Provides Web Browser user interface.
W-18	Ethernet M&C Remote Interface. Provides BOTH Web Browser & SNMP Ethernet user interfaces. Includes SNMP MIB File.
W-28	Ethernet M&C Remote Interface. Provides Direct TCP/IP and Telnet® addressability Ethernet interface.
W-828	Ethernet M&C Remote Interface. Provides All three (3) - Web Browser, SNMP Ethernet and Direct TCP/IP and/or Telnet® addressability Ethernet interfaces.
Connectors/Impedance	
D4	50Ω BNC
SS4	50Ω SMA
* 10˚C to 40˚C; Specifications subject to change without notice	

1.3 Monitor and Control Interface

A) Remote Serial Interface

Protocol: RS232C, 9600 baud rate, no parity, 8 data bits, 1 start bit, and 1 stop bit. (RS232C, RS-422, or **RS-485**)



Connector: Rear panel, DB-9 Female:

J15 PINOUT (RS-232C/422/485):

J15 Pinouts (RS-232C/422/485)	
Pin	**Function**
1	Rx-
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Tx-
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Open
8	Not Used
9	Alarm Relay: Normally Closed

<u>Connector</u>: **J16 PINOUT (W102):**
(J16A = PRIMARY, 16B = BACKUP)

J16 Pinouts (W102)	
Pin	**Function**
1	Unit #1 Alarm Input
2	Unit #2 Alarm Input
3	Unit #3 Alarm Input
4	Unit #4 Alarm Input
5	Unit #1 Alarm Ground
6	Unit #2 Alarm Ground
7	Unit #3 Alarm Ground
8	Unit #4 Alarm Ground
9	Ground

<u>Connector</u>: **J16 PINOUT (W103):**
(J16A = PRIMARY, 16B = BACKUP)

J16 Pinouts (W103)	
Pin	**Function**
1	DO NOT USE
2	UNIT #1 RS232 TX
3	UNIT #1 RS232 RX
4	DO NOT USE
5	GROUND
6	GROUND
7	GROUND
8	DO NOT USE
9	Alarm Input

1.4 M&C Commands

The following tables summarize the M&C Commands applicable to the 1582-421L Switch.

* **PLEASE NOTE:** The two character {aa} prefix, shown in the table below, is present ONLY when RS485 is selected.

Commands specific to a switch must be preceeded by *i where i is the switch number.

Table 2.0 Model 1582-421L - M&C Commands

Table 2.0: Model 1582-421L 1:1 Switch, M&C Commands		
Command Function	**Syntax**	**Command Description**
Set RF Switch Position	{aa*iCPx}	where i = 1, 2, 3, or 4 designating the switch number:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		P = Command Code
		x = desired switch position, P or BU. Once the switch position is selected remotely, the switch is in "Remote Mode" and the front panel remote indicator will light. The unit will remain in Remote Mode until one of the following occurs:
		1. A Switch Reset command ({aa*iCR}) is issued.
		2. The front panel Switch Reset button is pressed.
		3. The switch position is manually selected via the front panel Manual Select toggle switch.
		If the switch is already in manual mode (i.e, the front panel toggle switch is in the PRIMARY or BACKUP position) then the switch will ignore this command.
		example: {*3CPB}
		Will (remotely) set Switch 3 to BACK-UP. The unit will ignore this command if the switch is in manual mode. The unit will reply with the '>' character if the command is sucessfully processed.
Switch Reset	{aa*iCR}	where: i = 1, 2, 3, or 4 designating the switch number.
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		R = command code
		This command has the same effect as pressing the front panel Switch Reset button.
		example: {aa*iCR2}
		Will return Switch 2 to Auto mode if it is in Remote mode. Also, this command will reset the switch position if it is currently "latched" to the BACK-UP position (and if PRIMARY is not alarmed).
		The unit will reply with the '>' character if the command is sucessfully processed.

(M&C Commands continued on page 9)...

(M&C Commands continued from page 8)...

Table 2.0: Model 1582-421L 1:1 Switch, M&C Commands continued...

Command Function	Syntax	Command Description
Clear Alarm History	{aa*iCH}	where i = 1, 2, 3, or 4 designating the switch number.
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		R = command code
		This command will clear the state of the designated switch's alarm history.
		example: {aa*iCH}
		The unit will reply with the '>' character if the command is sucessfully processed.
Set RS485 Address	{aaCXxx}	where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		X = command code
		XX = unit address, range = 00 to 31
		example: {CX12} will set the unit's RS485 address to 12.
		The unit will reply with the '>' character if the command is sucessfully processed.

1.5 Status Requests/Inquiries

The following tables summarize the status requests/queries applicable to the 1582-421L Switch.

*** PLEASE NOTE:** The two character {aa} prefix, shown in the table below, is present ONLY when RS485 is selected.

Status Requests specific to a switch must be preceeded by *i where i is the switch number.

Table 2.1 Model 1582-421L - Status Requests/Inquiries

Table 2.1: Model 1582-421L 1:1 Switch Status Requests/Inquiries		
Command Function	**Syntax**	**Command Description**
Get Switch State	{*iaaSS}	returns: {*iaaSSbc}
		where i = 1, 2, 3, or 4 designating the switch number.
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		S = command code
		b = Switch Position: P (primary) or B (backup)
		c = Switch Mode: 'M' if in Manual Mode, 'R' if in Remote Mode, and 'A' if in Auto Mode.
		The unit will append the '>' character if the command is successfully processed.
Get Switch Alarm Status	{*iaaSA}	returns: {*iaaSAbcde}
		where i = 1, 2, 3, or 4 designating the switch number.
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		A = command code
		b = PRIMARY alarm status: 0 if alarm is off, 1 if alarm is on.
		c = PRIMARY alarm history status: 0 if no alarm history, 1 if an alarm occured
		d = BACK-UP alarm status: 0 if alarm is off, 1 if alarm is on
		e = BACK-UP alarm history status: 0 if no alarm history, 1 if an alarm occured
		The unit will append the '>' character if the command is successfully processed.
Get Auto Switching Mode Status	{aaSM}	returns: {aaSAx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		M = command code
		X = 1 for CH1 Prime Mode, X = 2 for Latch to CH2 Mode, X = 3 for Minimum Auto Switching Mode.
		The unit will append the '>' character if the command is successfully processed.

(M&C Status Requests/Inquiries continued on page 11)...

(M&C Status Requests/Inquiries continued from page 10)...

Table 2.1: Model 1582-421L 1:1 Switch M&C Status Request/Inquires (continued)...

Command Function	Syntax	Command Description
Get Power Supply Status	{aaSY}	returns: {aaSYxy}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		Y = command code
		x = 1 if Power Supply 1 is on, 0 if Power Supply 1 is off.
		y = 1 if Power Supply 2 is on, 0 if Power Supply 2 is off.
Get IP Address	{aaSi}	returns: {aaSixxx.xxx.xxx.xxx}
(Ethernet Option only)		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		i = command code
		xxx.xxx.xxx.xxx = unit IP Address
		The unit will append the '>' character if the command is sucessfully processed.
Get Subnet Mask	{aaSs}	returns: {aaSsxxx.xxx.xxx.xxx}
(Ethernet Option only)		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		s = command code
		xxx.xxx.xxx.xxx = unit Subnet Mask
		The unit will append the '>' character if the command is sucessfully processed.

2.0 Installation

2.1 Mechanical

The 1582-421L consists of one RF./Controller PCB, two IF piggyback PCBs and a Front Panel control and indication PCB housed in a 1 RU (1 3⁄4 inch high) by 12 inch deep chassis.
Redundant switching power supplies provide power for the assembly.
The 1582-421L can be secured to a rack using the 4 holes on the front panel.

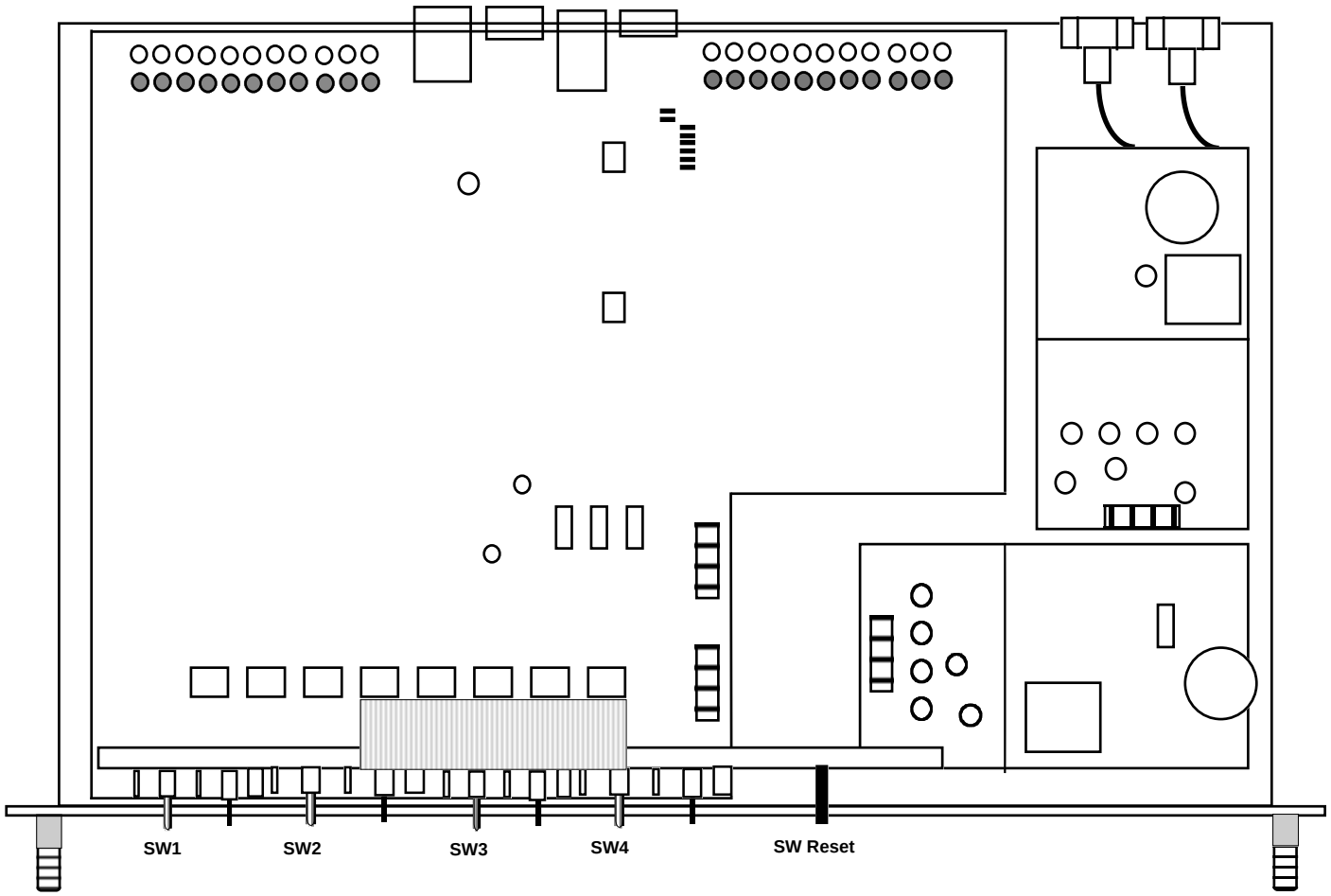


FIGURE 2.1 1582-421L RF Switch Assembly

2.2 Input and Output Signals

Figure 2.2 shows the input and output connectors on the rear panel.

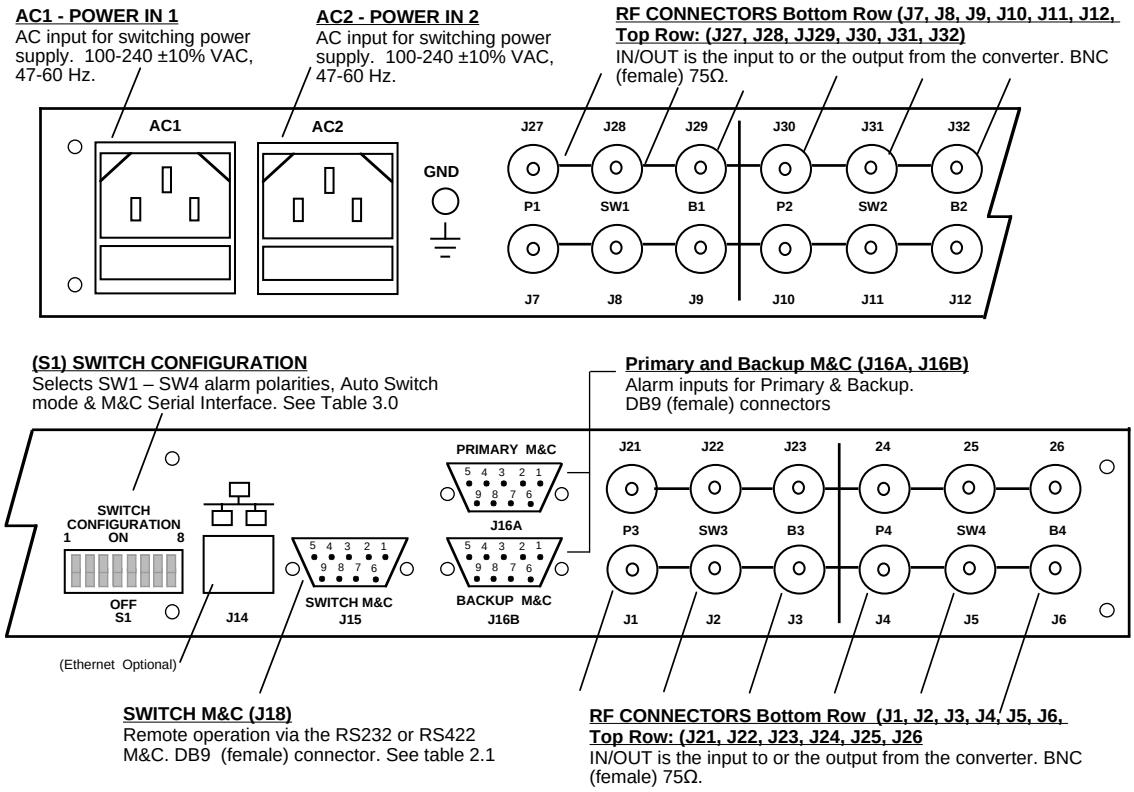


FIGURE 2.2 1582-421L Switch Rear Panel Inputs/Outputs

2.3 Controls and Indicators

Figure 2.3 shows the front panel controls and indicators.

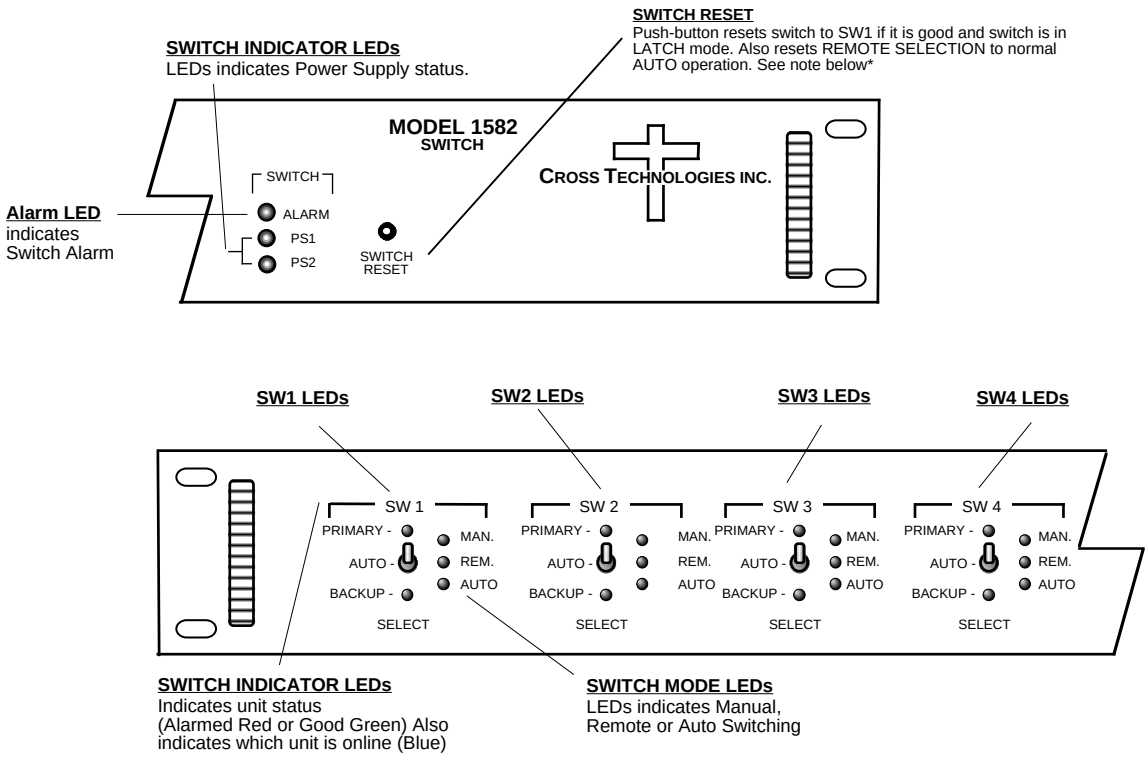


FIGURE 2.3 1582-421L Switch, Front Panel Controls and Indicators

*** NOTE: Restore Ethernet Settings to factory default:**
Press and hold the Switch Reset for approximately ten 10) seconds to initiate the Ethernet reset process. The Primary and Backup status LED's on all four switches will flash white during the reset process, which should last approximately one (1) minute. Once the LEDs begin flashing you can release the Switch Reset switch.The Ethernet device will be restored to factory default settings (IP address 192.168.123.2)

*PRIMARY/BACKUP LED INDICATION	
Color	**Function**
RED	Unit Alarmed & OFFLINE
GREEN	Unit Good & OFFLINE
BLUE	Unit Good & ONLINE
RED/BLUE*	Unit Alarmed & ONLINE
	*Alternating Red/Blue

2.4 Operation

1. Set the on board controls as desired (Tables 2.0, 2.1, Figure 2.3).
2. Install the 1582-421L in the equipment rack.
3. Connect RF to the BNC connectors as required for your application (J1- J12 and J21-J32).
4. Connect to signals on the MONITORS AND CONTROLS (DB9 connectors), J16A & J16B, as desired (see Figure 2.2, Table 2.1).
5. Connect power via two power cords to AC1 and AC2.
6. Manually switch between channels Primary and Backup and be sure switching occurs.
7. Switch to AUTO. Alarm Primary channel 1 and note that automatic switching occurs. Remove alarm from Primary and note that the output switches as desired. Push RESET if in LATCH mode. Repeat for Switch 2 through Switch 4.

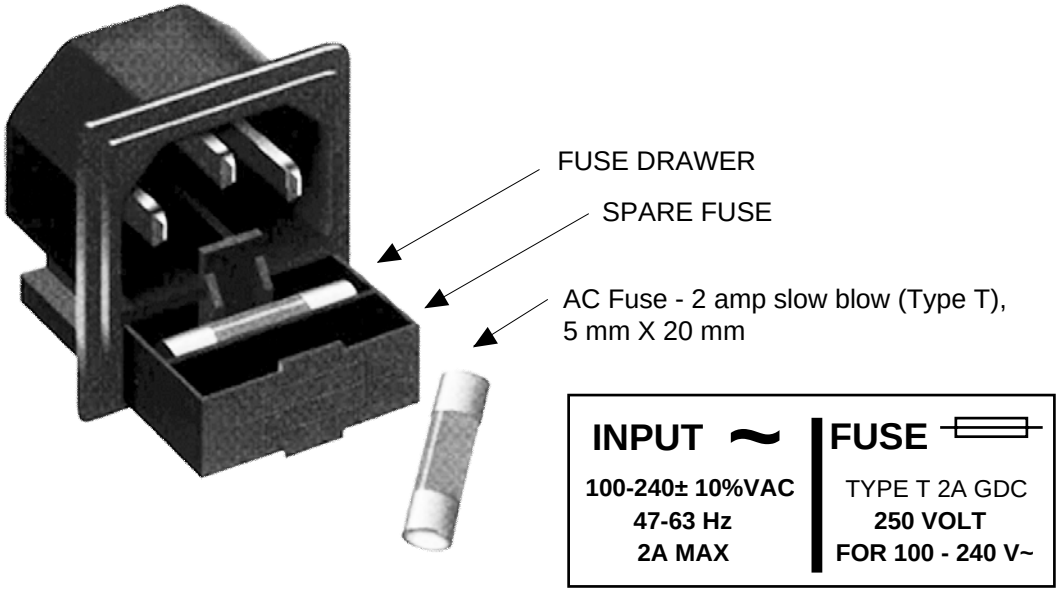


FIGURE 2.4 Fuse and Spare Fuse Locations

2.5 Auto Switching Description

Automatic control determines switch routing by monitoring alarm inputs on up to eight units (SW1–SW4) and selecting the initial source. Local and remote control of RF sources is also provided. Latching relays allow the switch to remain in its "current" state independent of power loss. The 1582-421L detects an external alarm condition on Primary and Backup units by either a contact closure to ground or an open (selectable). Switching logic can
be selected as follows:

1) Primary Prime Mode - Switches from Primary to Backup only if Primary alarms and Backup is good Switches back to Primary when it is no longer in alarm or when both Primary and Backup are in alarm
2) Latch to Backup Mode - Switches to Backup if Primary alarms and Backup is good. Latches to Backup. Push Manual Reset or ground Remote Reset pin to return to Primary if it has no alarm or both Primary and Backup are in alarm.
3) Minimum AUTO switching, Initial Channel Select (ICS) Mode - Switch stays on channel last selected by Manual or Remote selection after return to AUTO. AUTO switching occurs only if current channel alarms and the other channel is clear.

Switching is accomplished using latching relays so if power is removed from the 1582-421L, Primary and Backup RF will continue to go to the output selected prior to power loss and will remain there when power is applied assuming no change in alarm status from when power was lost. The channels can be manually switched by the front panel Manual Select switch. If operating in the ICS mode, the last channel manually selected (Primary or Backup) will be the initial channel when returning the Manual Select switch to AUTO. External REMOTE contact closures can force selection of Primary or Backup when the Manual Select switch is in the AUTO position independent of the alarm conditions of Primary or Backup. Front panel LEDs indicate alarms, alarm history (prior occurrence of alarms which have now cleared), switch conditions for Primary and Backup, REMOTE or MANUAL operation and presence of power.

RF connectors are 75Ω BNC, female standard (see connector options). Contact closure inputs are via DB-9. Dual power supplies provide redundant power to the 1582-421L. The chassis is a 1 3/4” rack mount.

Table 3.0 Model 1582-421L Switch - Configuration DIP Switch

Table 3.0 Model 1582-421L Configuration DIP Switch								
Select Serial M&C Interface (SW1, SW2)	**SW1**	**SW2**	**SW3**	**SW4**	**SW5**	**SW6**	**SW7**	**SW8**
RS232	OFF	OFF	X	X	X	X	X	X
RS422	ON	OFF	X	X	X	X	X	X
RS485	OFF	ON	X	X	X	X	X	X
Ethernet (Optional) (W102 - Ethernet always enabled.)	ON	ON	X	X	X	X	X	X
Select Auto Switching Mode (Switch A if Dual) (SW3, SW4)	**SW1**	**SW2**	**SW3**	**SW4**	**SW5**	**SW6**	**SW7**	**SW8**
CH1 Prime	X	X	ON	OFF	X	X	X	X
Latch to CH2	X	X	OFF	ON	X	X	X	X
Minimum Auto Switching	X	X	OFF	OFF	X	X	X	X
* **Select Alarm Input Polarity (Switch 1 = SW5...Switch 4 = SW8)**	**SW1**	**SW2**	**SW3**	**SW4**	**SW5**	**SW6**	**SW7**	**SW8**
Normally Closed (Open = Alarm) (Logic High = Alarm)	X	X	X	X	OFF	OFF	OFF	OFF
Normally Open (Closed = Alarm) (Logic Low = Alarm)	X	X	X	X	ON	ON	ON	ON

* Alarm Polarity does not apply to option W103

3.0 Environmental Use Information

A. **Rack-Mounting** - To mount this equipment in a rack, please refer to the installation instructions located in the user manual furnished by the manufacturer of your equipment rack.

B. **Mechanical Loading** - Mounting of equipment in a rack should be such that a hazardous condition does not exist due to uneven weight distribution.

C. **Elevated Operating Ambient Temperature** - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack may be greater than room ambient temperature. Therefore, consideration should be given to Tmra (Maximum Recommended Ambient Temperature).

D. **Reduced Air Flow** - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Additional space between units may be required.

E. **Circuit Overloading** - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits could have on over current protection and supply wiring. Appropriate consideration of equipment name plate rating should be used, when addressing this concern.

F. **Reliable Earthing** - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connection to the Branch (use of power strips).

G. **Top Cover** - There are no serviceable parts inside the product so, the Top Cover should not be removed. If the Top Cover is removed the ground strap and associated screw MUST BE REINSTALLED prior to Top Cover screw replacement. FAILURE TO DO this may cause INGRESS and/or EGRESS emission problems.

APPENDIX A

1582-421L 1:1 SWITCH CONFIGURATIONS

1582-421L Switch Description

The 1582-421L switch contains four independent 1 for 1 protection switch channels in a single chassis. Each channel is a double pole double throw RF switch for IF and RF signals of L-band frequency converters. The 1582-421L is configured with one of two (***at no charge***) Switching Options (either Opt. W102 or Opt. W103) which are described below.

Option W102: Separate Alarm contact inputs

Option W102 configures the 1582-421L to monitor the contact closure Alarm contacts of four pairs of frequency converters. Each pair of frequency converters consist of a primary unit and a matching backup unit. The frequency converter pairs may be L-band upconverters, (like our 2015-xx series) L-band downconverters (like our 2016-xx series), or L-band translators (like our 2083-xx series).

Option W102 is internally wired to accept a total of eight Alarm contact inputs.

Option W103: One common Primary Alarm input and one common Backup Alarm input

Option W103 is configured specifically for a pair of Cross Technologies Quad-Channel frequency converters. The matching pair may be upconverters (model 2415-xx), downconverters (model 2416-xx), or translators (model 2483-xx). Each converter chassis provides a single contact closure to the 1582-421L switch. The switch then queries the converter to see which channel or channels are alarmed and then proceeds to switch those channel(s) to their respective backup channel(s).

Option W103 also monitors the primary unit's configuration settings and automatically duplicates those settings on the backup unit before switching.

Option W103 is internally wired to accept a total of two Alarm contact inputs

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