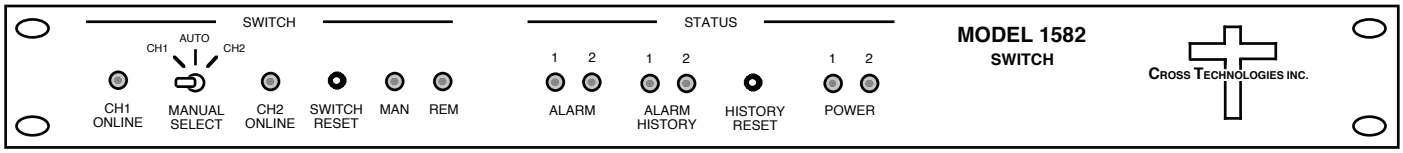
Instruction Manual

Model 1582-42L
Data Switch

February 1999, Rev 0



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INSTRUCTION MANUAL
1582-42L DATA SWITCH

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INSTRUCTION MANUAL 1582-42L DATA SWITCH

1.1 Equipment Description - The 1582-42L Data Switch provides automatic and manual control of RS422 data signals. Automatic control determines switch routing by monitoring alarm inputs on two channels (CH1, CH2) and selecting the initial data source. Local and remote control of data sources is also provided. Latching relays allow the switch to remain in its "current" state independent of power loss.

The 1582-42L detects an external alarm condition on CH1 and CH2 by either a contact closure to ground or an open (selectable). If not operating in the Initial Channel Select (ICS) mode, an alarm on CH1 will cause the 1582-42L to transfer data channels A and B to the CH2 output. If CH2 also has an alarm, the 1582-42L can be programmed for no switching to occur or switching can always be forced to CH2 even if it has an alarm. After switching to CH2, when the CH1 alarm clears, the 1582-42L can be programmed to automatically transfer data channels A and B back to CH1. When placed in the LATCH mode, after switching to CH2, the 1582-42L will stay here until reset by the front panel RESET button or an external closure to ground on the remote RESET pin on J7 if CH1 is good.

If operating in the Initial Channel Select (ICS) mode, the initial channel can be either CH1 or CH2 as selected by switching the front panel Manual Select switch to either CH1 or CH2 and then back to the AUTO position.

Switching is accomplished using latching relays so if power is removed from the 1582-42L, channel A and B data 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 (CH1 or CH2) will be the initial channel when returning the Manual Select switch to AUTO. External REMOTE contact closures can force selection of CH1 or CH2 when the Manual Select switch is in the AUTO position independent of the alarm conditions of CH1 or CH2. Front panel LEDs indicate alarms, alarm history (prior occurrence of alarms which have now cleared), switch conditions for CH1 and CH2, REMOTE or MANUAL operation and presence of power.

Data connectors are DB9, female. Contact closure inputs are via barrier strip. Dual power supplies provide redundant power to the 1582-42L. The chassis is a 1 3/4", rack mount.

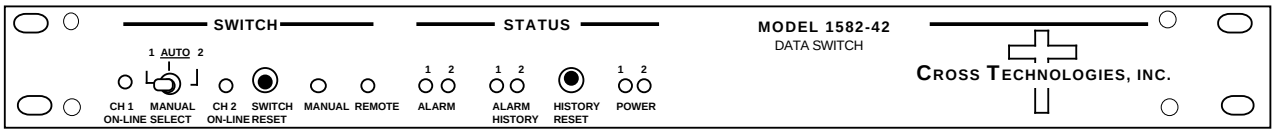
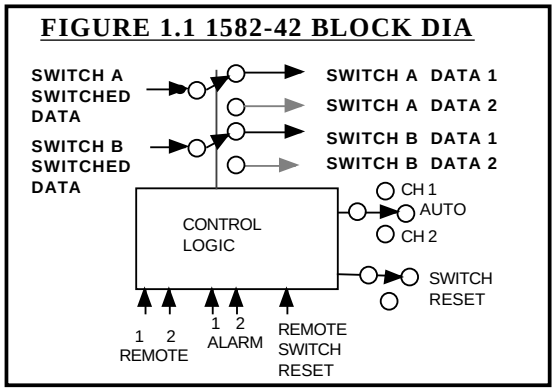


FIGURE 1.0 1582-42L DATA SWITCH

FIGURE 1.1 1582-42 BLOCK DIA



1.2 Technical Specifications

Data Characteristics

Input/Output	RS422
Data rate	15 MB/s, up to 50 MB/s with reduced isolation
Connectors, data	DB9, female
Pins Switched	1,2,4,6,7,9

Switch Characteristics

Type	Latching Relay
Isolation	>40 dB to 40 MHz
Switch time	≤10 milliseconds
Contact resistance	≤5Ω, < 1Ω typ
Configuration	DPDT
Connectors, alarm	Barrier Strip
LEDS	CH1, CH2 ON-LINE; MANUAL; REMOTE; ALARM CH1,CH2; ALARM HISTORY CH1,CH2; POWER CH1,CH2

Controls

MANUAL SELECT	Manually select CH1, CH2, or AUTO operation. If operating in the ICS mode, the last channel manually selected (CH1 or CH2) will be the initial channel.
SWITCH RESET	Resets switch to CH1 if it is good and switch is in the latch mode, Also Resets REMOTE
HISTORY RESET	Resets alarm history (prior occurrence of alarms which have now cleared) LEDs only

Indicators, LEDs

CH1 ON-LINE	Turns green when Channel 1 is selected
CH2 ON-LINE	Turns green when Channel 2 is selected
MANUAL	Turns red when the Manual Select switch manually selects channel 1 or 2.
ALARM CH1	Turns red when Channel 1 alarm input is a closure or open (selectable)
ALARM CH2	Turns red when Channel 2 alarm input is a closure or open (selectable)
ALARM HISTORY 1	Turns red on Channel 1 alarm and stays red until HISTORY RESET is pushed
ALARM HISTORY 2	Turns red on Channel 2 alarm and stays red until HISTORY RESET is pushed
POWER CH1	Turns green when power is applied to AC1 input on the rear panel
POWER CH2	Turns green when power is applied to AC2 input on the rear panel
REMOTE	Turns amber when REMOTE control is active

Other

Mechanical	19 inch standard chassis 1.75"high X 12" deep
Power	Redundant power supplies; 90 - 260 VAC, 47 - 60Hz, 30 watts

*Specifications subject to change without notice

2.0 Installation

2.1 Input/Output Connectors -The following are the input and output connectors.

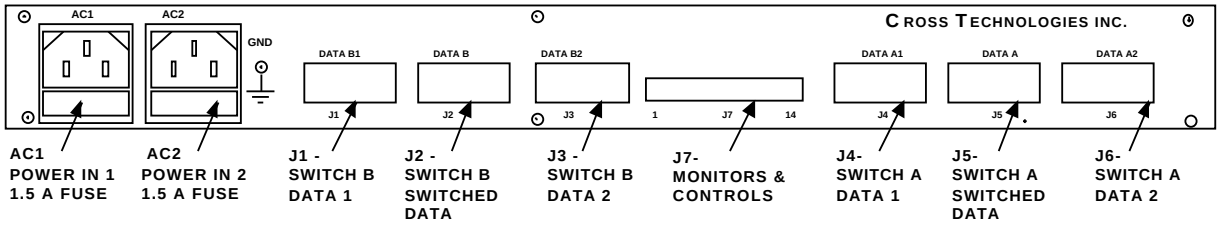


FIGURE 2.0 1582-42L REAR PANEL

TABLE 2.0 INPUT / OUTPUT CONNECTORS

J1, J2, J3, J4, J5, J6 - DATA CONNECTORS (FIGURE 2.1)

Function	Pin #	Description
DATA	1,6	RS422 Data
CLOCK	2,7	RS422 Data
REF CLOCK or AUX	4,9	RS422 Data
GROUND	5	Ground
NO CONNECTION	3,8	No Connection

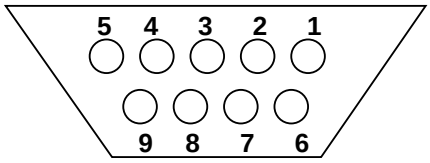


FIGURE 2.1 DB9 PIN OUTS

J7 - MONITORS AND CONTROLS CONNECTOR (FIGURE 2.0)

Function	Pin #	Description
ALARM 1 IN	13	Ground or Open (selectable by JP2) is Ch 1 alarm
ALARM 2 IN	14	Ground or Open (selectable by JP2) is Ch 2 alarm
REMOTE 1 IN	1	When in AUTO, momentary ground on this pin selects Ch 1
REMOTE 2 IN	2	When in AUTO, momentary ground on this pin selects Ch 2
REMOTE RESET IN	4	When in LATCH mode, ground resets switch to Ch 1
MANUAL INDICATION	8	*Open collector output (< 5Ω) to gnd when in Manual mode.
SWITCH 1 MON	11	**Relay closure to J7 pin 6 (<5Ω) when selected data is channel 1 data..
SWITCH 2 MON	12	**Relay closure to J7 pin 6 (<5Ω) when selected data is channel 2 data.
SWITCH MON COMMON	6	Common pin for SWITCH 1, 2 MONITOR
REMOTE MON	9	*Open collector (< 5Ω) to gnd when in REMOTE mode
GROUND	3,7,10	Ground
NO CONNECTION	5	Not connected
		*Max voltage able to be connected to this is +20 VDC @ 30ma
		**Max voltage to be connected to this is +30 VDC@ 100 ma

AC1, AC2 - POWER IN - Provides AC inputs for dual power supplies.

2.2 Controls and Indicators -The following are the controls and indicators.

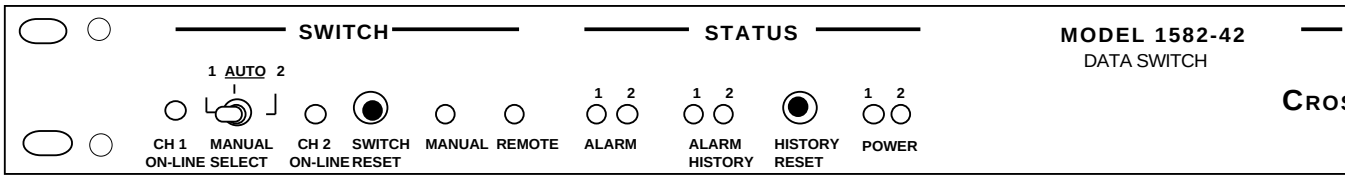


FIGURE 2.2 1582-42L CONTROLS AND INDICATORS

TABLE 2.1 FRONT PANEL CONTROLS AND INDICATORS

Item	Description
CH1 ON-LINE LED	Turns green when Channel 1 is selected
CH2 ON-LINE LED	Turns green when the Channel 2 is selected
MANUAL LED	Turns red when the Manual Select switch manually selects channel 1 or 2.
ALARM CH1 LED	Turns red when Channel 1 alarm input is a closure or open (selectable)
ALARM CH2 LED	Turns red when Channel 2 alarm input is a closure or open (selectable)
ALARM HISTORY 1	Turns red on Channel 1 alarm and stays red until HISTORY RESET is pushed
ALARM HISTORY 2	Turns red on Channel 2 alarm and stays red until HISTORY RESET is pushed
POWER CH1 LED	Turns green when power is applied to AC1 input on the rear panel
POWER CH2 LED	Turns green when power is applied to AC2 input on the rear panel
REMOTE LED	Turns amber when REMOTE control is active
MANUAL SELECT switch	3-position switch as follows: 1 - manually select Channel 1 center - auto - switch position determined by alarm and Remote closures 2 - manually select Channel 2
If operating in the ICS mode, the last channel manually selected (CH1 or CH2) will be the initial channel.	
SWITCH RESET	Resets switch to CH1 if it is good and switch is in the latch mode, Also Resets REMOTE selection to normal AUTO operation
HISTORY RESET	Resets history alarm LEDs only

TABLE 2.2 PC BOARD SETTINGS

NOTE: Dot position means jumper goes from pins 1-2; non-dot means jumper goes from pins 2-3

JP1 - 3-pin jumper

In the dotted position when channel 1 alarms the 1582-42 will switch to channel 2 until channel 2 alarms. At this point, if channel 1 is still in alarm, the switch will stay on channel 2.

When the channel 1 alarm clears if channel 2 is still in alarm, the switch will switch to channel 1.

JP1 normal position - **non-dotted** and operates in conjunction with JP3 as noted below.

JP2 - Input alarm condition 3-pin jumper

In the dotted position open is normal, ground is alarm

In the non-dot position ground is normal, open is an alarm.

JP2 normal position - **dot**

JP3 - LATCH to CH2 mode on / off - 3-pin jumper effective when JP1 is in the non-dot position.

With JP3 in the dot and JP1 in the non-dot, when channel 1 alarms, the 1582-42 switch switches to channel 2 and stays there until the reset button is pushed on the front panel or by an external closure to ground on the remote RESET pin on J7, and then it switches to channel 1. (If channel 1 alarms are cleared). If in the ICS mode and originally set to CH2 the 1582-42 will not switch if CH2 alarms. Only the RESET functions (front panel pushbutton or J7 closure to ground) will return the switch to CH1.

With JP3 in the non-dot and JP1 in the non-dot, when channel 1 alarms the 1582-42 switches to channel 2 until the alarm on channel 1 clears and then the 1582-42 switches back to channel 1 automatically.

JP3 normally position - **dot** .

JP4 - CH2 alarm enable / ignore - 3-pin jumper

Dotted position - Failure in CH1 will cause the 1582-42 to switch to CH2 even if CH2 is in alarm. LEDs will correctly show CH2 alarm status

Non-dotted position - Failure in CH1 will cause the 1582-42 to switch to CH2 only if CH2 is not in alarm.

JP4 Normal position - **non-dot**

SW4 - Initial Channel Select Mode - 3-pin jumper Selects the Initial Channel Select (ICS) mode.

SW4 positions 1,2 to ON - ICS as selected by the front panel Manual Select switch is enabled. In this ICS mode, the initial channel can be either CH1 or CH2 as selected by switching the front panel Manual Select switch to either CH1 or CH2 and then back to the AUTO position.

SW4 positions 3,4 to ON - ICS as selected by the Remote pins on J7 is enabled. In this ICS mode, the initial channel can be either CH1 or CH2 as selected by grounding either Remote 1 or Remote 2 pins on J7 and then grounding the Remote Reset pin on J7 causing the 1582-42 to go back to the AUTO position.

SW4 normal position - **1,2,3,4 to ON**

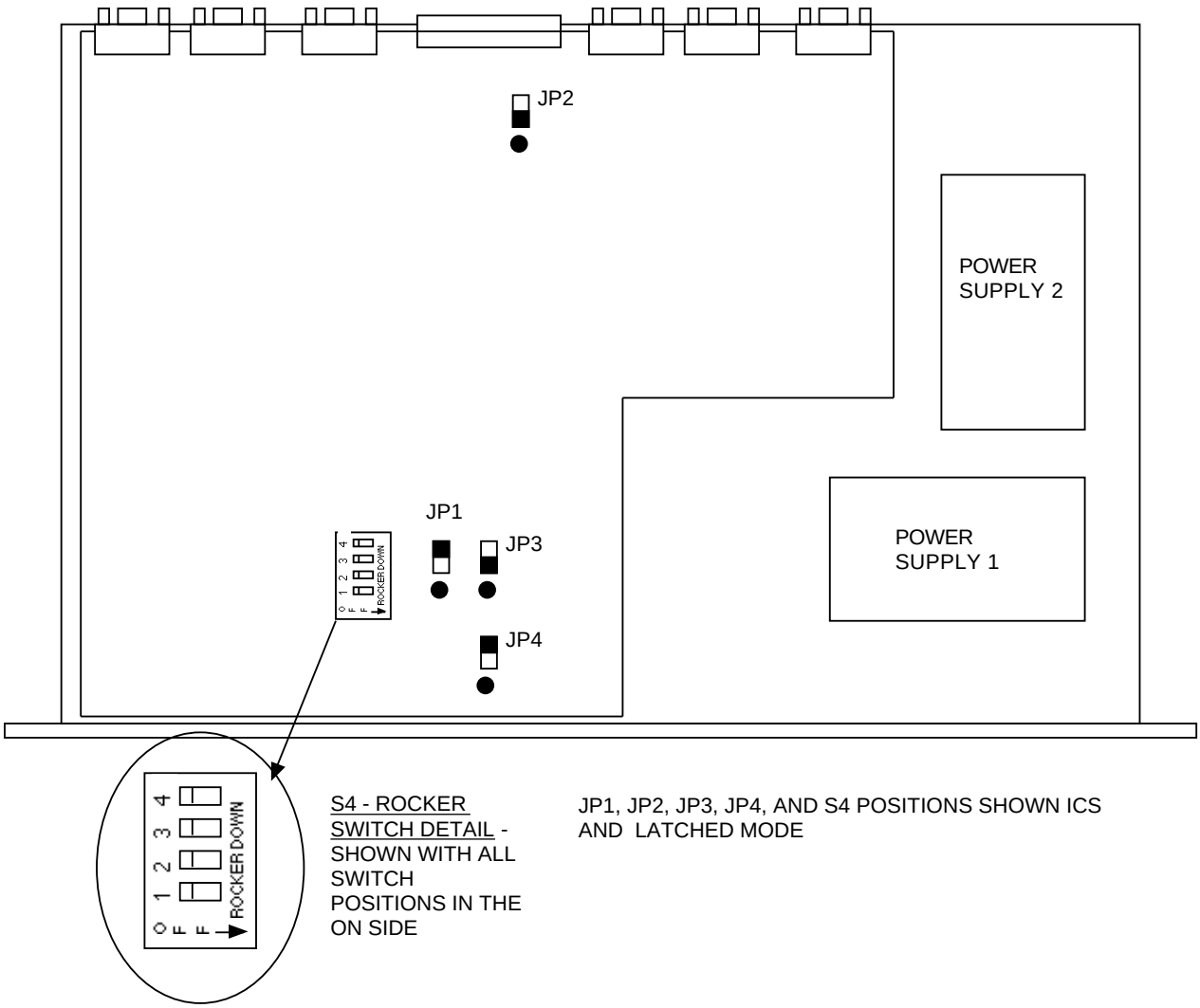


FIGURE 2.3 PCB SETTINGS PARTS LOCATIONS

2.3 Mechanical - The 1582-42L is rack mounted by attaching the front panel to a rack through the four holes at the edges of the panel.

2.4 Installation

a. Set the on board controls as desired (Tables 2.2, 2.3, Figure 2.3).

b. Install the 1582-42 in the equipment rack.

c. Connect data to the RS422 DB-9 DATA connectors (J1 - J3, J4 - J6)).

d. Connect to signals on the MONITORS AND CONTROLS connector, J7, as desired (see Figure 2.0, Table 2.0)

e. Connect power via two power cords

f. Manually switch between channels 1 and 2 and be sure switching occurs

g. Switch to AUTO. Alarm channel 1 and note that automatic switching occurs. Remove alarm to channel 1 and note that the output switches as desired. Push RESET if in LATCH mode. Repeat for Channel 2.

h. Check that Ch 1 and Ch 2 are selected when in AUTO and momentary ground is applied to J7 pins 1 and 2. Momentarily ground remote Reset pin 4 on J7 if in LATCH mode to return to AUTO operation.

TABLE 2.3 Cross Technologies 1582-42 Switch Matrix

Function	JP1	JP2	JP3	JP4	S4-1	S4-2	S4-3	S4-4	RMT-1	RMT-2	RST-S1	R-RST	MAN	HIST RST
1-2 = DOT 2-3 = NON-DOT													-S3	-S2
Auto	1-2	X	X	2-3	X	X	X	X	OPEN	OPEN	OPEN	OPEN	AUTO	X
Alarm Input Normally High	X	1-2	X	X	X	X	X	X	X	X	X	X	X	X
Alarm Input Normally Low	X	2-3	X	X	X	X	X	X	X	X	X	X	X	X
"CH1" Equal Primary Source	2-3	X	2-3	2-3	X	X	X	X	OPEN	OPEN	OPEN	OPEN	AUTO	X
Restore "CH1" on Reset "	2-3	X	1-2	2-3	X	X	X	X	OPEN	OPEN	OPEN	OPEN	AUTO	X
Ignore Alarm "2" (Switching Only)	X	X	X	1-2	X	X	X	X	X	X	X	X	X	X
Disable Latch Power On Reset	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ICS Reset "Auto" Latch Manual "1"	1-2	X	X	X	ON	X	X	X	X	X	X	X	X	X
ICS Reset "Auto" Latch Manual "2"	1-2	X	X	X	X	ON	X	X	X	X	X	X	X	X
ICS Reset "Auto" Latch Remote "1"	1-2	X	X	X	X	X	ON	X	X	X	X	X	X	X
ICS Reset "Auto" Latch Remote "2"	1-2	X	X	X	X	X	X	ON	X	X	X	X	X	X
Remote Select "1"	X	X	X	X	X	X	X	X	CLOSED	OPEN	OPEN	OPEN	AUTO	X
Remote Select "2"	X	X	X	X	X	X	X	X	OPEN	CLOSED	OPEN	OPEN	AUTO	X
Manual Select "1"	X	X	X	X	X	X	X	X	X	X	X	X	"""A"""	X
Manual Select "2"	X	X	X	X	X	X	X	X	X	X	X	X	"""B"""	X
Remote Reset	X	X	X	X	X	X	X	X	OPEN	OPEN	OPEN	CLOSED	X	X
Local Reset	X	X	X	X	X	X	X	X	OPEN	OPEN	CLOSED	OPEN	X	X
Alarm History Reset	X	X	X	X	X	X	X	X	X	X	X	X	X	CLOSED
AUTO, LATCH, & ICS Setting	2-3	X	1-2	2-3	ON	ON	ON	ON	OPEN	OPEN	OPEN	OPEN	AUTO	OPEN

3.0 Theory of Operation Cross Technologies 1582-42L RS422 Data Switch

3.1 Introduction - The 1582-42L Data Switch provides automatic and manual control of data sources or loads depending on the user's application. Automatic control is facilitated by monitoring of alarm inputs and selecting the initial data source. Local and remote control of data sources is also provided. LED indicators are provided for Alarm and Alarm History ("CH1" and "CH2"), Power ("CH1" and "CH2"), Remote, Manual as well as "CH1" and "CH2" Select. Latching relays are an option that allows the switch to remain in its "current" state independent of power loss.

3.2 Circuit Description (Refer to Switch Matrix)

3.2.1 Auto Operation

Assume that the jumper and switch settings are configured for "Normal Auto Switch Setting" as shown at the bottom of the matrix unless otherwise specified..

Alarm inputs "1" and "2" are monitored by the "Auto Latch" (U4). This latch will only change states when the selected source is in an alarm state and the unselected source is in a not alarmed state. The alarm inputs first pass through U1A and U1B where they are either inverted (Low = Alarm - JP1 1-2) or not inverted (High = Alarm - JP1 2-3). The output of U1A (pin 3) is the Alarm 1 status where High = Alarm. The output of U1B (pin 6) is the Alarm 2 status where High = Alarm. These outputs then go to inputs on U6 and U4. A logic Low on the output of U4A (pin 3) = "1" is alarmed AND "2" is not alarmed. In this case the Auto Latch (U4) will be set to select "CH2". A logic Low on the output of U4B (pin 6) = "1" is not alarmed AND "2" is alarmed. In this case the Auto Latch (U4) will be set to select "A". If both alarm inputs are alarmed or both alarm inputs are not alarmed, the Auto Latch will not be affected. The output of the Auto Latch (U4 - pin 6) determines which data source will be selected (in auto mode only) where a logic High = Select "CH2".

The Auto Latch logic then passes through the remote control circuitry, which without remote control asserted, will not affect the logic levels. After the remote circuitry the logic signal passes through the manual control circuitry, which without manual control asserted, will not affect the logic levels. After the manual control circuitry, the logic is either applied directly to the relay drivers (High = Select "CH2") for non-latching relays or is routed through U9A and U10 for latching relay versions.

For models with latching relays the logic signal first passes through U9A that provides a relay pulse to ensure that the relays will all be set to the same state on power-up. R28 and C7 provide a pulse to the dual "one-shot" (U10) The outputs of U10 provide the relay set (U10 pin 6) and reset (U10 pin 10) pulses for the latching relays. A "Set" pulse selects "CH1" and a reset pulse selects "CH2". U12A and U12B provide a "lock out" that eliminates the possibility of a set and reset pulse occurring simultaneously by "resetting" each other's "one-shot" during a set or reset pulse.

3.2.2 "CH1" As Primary Source Operation (JP1 2-3 and JP3 2-3)

With the jumpers in this configuration the Auto Latch will always select "CH1" unless "CH1" is alarmed and "CH2" is not alarmed. This is accomplished by grounding the reset on the Auto Latch via JP1 and JP3.

3.2.3 Restore "CH1" On Reset (JP1 2-3 and JP3 1-2)

This configuration will cause the switch to remain in the "Select CH2" state, after an "CH1" is alarmed and "CH2" is not alarmed condition occurs, until a remote or manual reset is actuated. This is accomplished by tying the Auto Latch reset to the internal reset logic of the switch via JP1 and JP3.

3.2.4 Remote Operation

Remote "CH1" and Remote "CH2" inputs are used for control of the switch from a remote location. These inputs will override the Auto Latch and therefore any switching that is a result of alarm conditions. The remote inputs will not override Manual operation.

The remote inputs are latched by U4C and U5A (Remote "A") and U4D and U5B (Remote "CH2"). These latches allow the remote operation of the switch using a momentary contact closure to ground. A momentary closure on the Remote "CH1" input will set the latch causing a logic Low to be present on U5 pin 12. This low is applied to pin 2 on U7 forcing its output high (U7 pin 12). U1 pin 10 is high, inverting the output on U7 pin12 causing a logic low to appear on U1 pin 8. A logic low at this point equal "Select CH1". A momentary closure on the Remote "CH2" input will set the latch causing a logic Low to be present on U5 pin 6. This low is applied to pin 13 on U7 forcing its output high (U7 pin 12). The logic Low from U5 pin 6 is also applied to U1 pin 10 pin which cause the XOR gate to not invert the output on U7 pin12 causing a logic high to appear on U1 pin 8. A logic high at this point equal "Select CH2". A momentary contact closure to the remote reset or a manual reset will reset both latches restoring the data switch to Auto operation. If either remote latch is set U8 pin 6 will be high. If the Manual switch is in the Auto position, U8 pin 8 will also be at a logic high. In this condition U8 pin 8 will be low causing a remote LED indication as well as providing a remote open collector output on Q2.

3.2.5 Manual Operation

The Manual switch on the front of the data switch provides local control of the data switch. The Manual operation overrides Auto and Remote operation of the switch. When the Manual switch is in the Auto position, U1C and U7B have no affect on the logic level from the auto and remote circuitry. When the Auto switch is in the "Select CH1" position, U7 pin 4 is forced low causing U7 pin 6 to a logic high. Because U1 pin 13 is high, U1D inverts the logic high on U7 pin 6 cause a logic low to appear at U1 pin 11. A logic low at this point equals "Select CH1". When the Auto switch is in the "Select CH2" position, U7 pin 5 is forced low causing U7 pin 6 to a logic high. Because U1 pin 13 is also forced low, U1D does not invert the logic high on U7 pin 6 causing a logic high to appear at U1 pin 11. A logic high at this point equals "Select CH2". If either Manual position is selected, either pin 1 or pin 2 on U8 is forced low causing U8 pin 3 to be forced high. The logic high on U8 pin 3 will provide a Manual LED indication as well as a Manual open collector output on Q1.

3.2.5 Initial Channel Select (ICS) or Auto Latch Tracking

S4 provides the user with a method to force the Auto Latch to follow the remote or manual inputs. This feature eliminates unnecessary switching when moving between either Manual or Remote operation back to Auto operation.

The Remote and Manual logic signal are routed to inputs on the Auto Latch that cause it to "track" the data switch state. This feature can be enabled or disabled by opening or closing the switches on S4. Normally S4-1 and S4-2 would be both open (disabled) or both closed (enabled) to cause the Auto Latch to track the Manual switch control. Additionally, S4-3 and S4-4 would both be open (disabled) or both be closed (enabled) to cause the Auto Latch to track the Remote control operation.

3.2.6 Reset Operation

Remote Reset and Manual Reset are combined by U7C and then inverted by U8C. This reset signal is used to reset the Auto Latch (See Restore "CH1" on Reset) and to reset the remote control latches (See Remote Operation).

3.2.7 Alarm History Reset

The Alarm history is maintained by U2A (Alarm "1") and U2B (Alarm "2"). Any momentary alarm condition will be latched by this circuitry providing an alarm history indication. These alarm history indicators will remain illuminated, once latched, until the alarm history reset is actuated. It should be noted that the "Ignore B Alarm" configuration has no affect on the "CH2" alarm history indicator.

3.2.8 Power Indicators

Power indicators DS9 and DS10 are provided to show the presence of DC power.