

2161 16 x 16 FOUR WIRE RS422 CROSSPOINT CARD

For four wire RS422 machine control mounting, with active crosspoints and buffered inputs and outputs.

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Approved [TS]

1. General Description

The 2161 is a 16 x 16 bidirectional 4 wire RS422 crosspoint module. Signals are received and transmitted using standard RS422 interface chips. The switch matrix is 2 wire using 16 x 1 HCMOS analogue switches. On board logic enables unused drivers to be made high impedance to allow for use in systems. On power up all crosspoints and drivers are high impedance. The signal naming convention on this module is as follows:

Signal SAn and DAN are the forward (source to destination) path, while SBn and DBn are the reverse (destination to source) path.

This module may only be used for point to point connections i.e. only one source can be connected to one destination.

2. Circuit Description

Note: *AAAA* indicates active low (barred) signal.

On power up, C74/R2 clear all latches which ensures that all crosspoints and drivers are off. If the supply voltage is above 4.5V D6/T2 will light the "power" LED and set the H/SHAKE output high.

The six lines IOCS4,5,6 and LOCD4,5,6 are pulled high or low when the 2161 is plugged into a motherboard. These provide the module address. To set a crosspoint the source and destination e.g. S4 & D2 are written by the controller on to the address bus, and the ENABLE line is set high. The module address is compared with the crosspoint address by IC6 and if they are identical IC5D sets the EN line high and pulls the *DISABLE* and *BDISABLE* lines low. *BDISABLE* primes the decoders IC7 and IC8.

The *STROBE* line is then set low by the controller. This allows the CK2 line out of IC7 and SCK4 line out of IC8 to be set low as defined by the source and destination address on IDO-3 and ISO-3. The decoded destination address CK2 latches the source address and the high EN into the preselect latch IC25. The decoded source address SCKn from IC8 clocks the high level EN into the source preselect latch IC53A.

Any number of crosspoint settings may be loaded into the preselect latches in sequence.

The *SYNC* line is then pulsed low by the controller. This latches the source addresses and EN signals into the "take" latch IC26. The four bit source address is wired to the crosspoint chips IC12 and IC18 address pins, and the *BEN2* line is taken to the enable of IC2 and 18. The crosspoints will therefore be enabled with SA4 linked to DA2, and DB2 linked to SB4. The EN2 output from IC26 goes to the C3 enable on the output buffer IC14. This sets the buffer active and removes the previously tristate condition on DA2+ and DA2-. The EN2 line also lights an LED to show destination 2 active.

The *SYNC* line also clocks the source buffer latches, clocking a high level through IC53B to the C1 enable of source output buffer IC39, removing the tristate condition on SB4+ and SB4-. This provides a pair of routes through the module, from SA4+/- to DA2+/-, and from DB2+/- to SB4+/-.

Switching off (parking) a route is achieved by routing the same crosspoint setting e.g. S4 -D2, but with a source offset of 64 (i.e. IS6 set high). This sets *BDISABLE* and *DISABLE* low via IC105A and T1, but EN remains low. When clocked by CK2 and SCK4, followed by *SYNC*, this tristates DA2+/- and SB4+/-, and disables IC12 and IC18.

3. Specification

Inputs:

Number and Type:	16 balanced, 4 wire (bidirectional) to EIA Std. RS422A
Input Impedance:	12K Ohm min.
Input Sensitivity:	+/-200mV
Input Common Mode Signal:	+/-12V max.

Outputs:

Number and Type:	16 balanced, 4 wire (bidirectional) to EIA Std. RS422A
Max Output Current:	+/-40mA
Power:	+5V @ 1.0A typ. 1.4A with all buffers on and outputs loaded with 200 ohms.

4. Connector Details

PL1A		PL1C		PL2A	PL2C		
1A	SA0+	1C	SB0+	1A	LOC S6	1C	GND
2A	SA0-	2C	SB0-	2A	IS6	2C	N/C
3A	SA1+	3C	SB1+	3A	IS4	3C	+5V IN
4A	SA1-	4C	SB1-	4A	IS1	4C	IS3
5A	SA2+	5C	SB2+	5A	IS0	5C	*STROBE*
6A	SA2-	6C	SB2-	6A	ID0	6C	H/SHAKE
7A	SA3+	7C	SB3+	7A	ID1	7C	ID3
8A	SA3-	8C	SB3-	8A	ID4	8C	*DISABLE*
9A	SA4+	9C	SB4+	9A	ID6	9C	LOC S4
10A	SA4-	10C	SB4-	10A	LOC D6	10C	GND
11A	SA5+	11C	SB5+				
12A	SA5-	12C	SB5-				
13A	SA6+	13C	SB6+				
14A	SA6-	14C	SB6-				
15A	SA7+	15C	SB7+				
16A	SA7-	16C	SB7-				
17A	SA8+	17C	SB8+				
18A	SA8-	18C	SB8-				
19A	SA9+	19C	SB9+				
20A	SA9-	20C	SB9-				
21A	SA10+	21C	SB10+				
22A	SA10-	22C	SB10-				
23A	SA11+	23C	SB11+				
24A	SA11-	24C	SB11-				
25A	SA12+	25C	SB12+				
26A	SA12-	26C	SB12-				
27A	SA13+	27C	SB13+				
28A	SA13-	28C	SB13-				
29A	SA14+	29C	SB14+				
30A	SA14-	30C	SB14-				
31A	SA15+	31C	SB15+				
32A	SA15-	32C	SB15-				

PL2B	
1B	LOC S5
2B	+5V OUT
3B	IS5
4B	IS2
5B	ENABLE
6B	*SYNC*
7B	ID2
8B	ID5
9B	LOC D5
10B	LOC D4

4. Connector Details (continued)

PL3A		PL3C	
1A	DA0+	1C	DB0+
2A	DA0-	2C	DB0-
3A	DA1+	3C	DB1+
4A	DA1-	4C	DB1-
5A	DA2+	5C	DB2+
6A	DA2-	6C	DB2-
7A	DA3+	7C	DB3+
8A	DA3-	8C	DB3-
9A	DA4+	9C	DB4+
10A	DA4-	10C	DB4-
11A	DA5+	11C	DB5+
12A	DA5-	12C	DB5-
13A	DA6+	13C	DB6+
14A	DA6-	14C	DB6-
15A	DA7+	15C	DB7+
16A	DA7-	16C	DB7-
17A	DA8+	17C	DB8+
18A	DA8-	18C	DB8-
19A	DA9+	19C	DB9+
20A	DA9-	20C	DB9-
21A	DA10+	21C	DB10+
22A	DA10-	22C	DB10-
23A	DA11+	23C	DB11+
24A	DA11-	24C	DB11-
25A	DA12+	25C	DB12+
26A	DA12-	26C	DB12-
27A	DA13+	27C	DB13+
28A	DA13-	28C	DB13-
29A	DA14+	29C	DB14+
30A	DA14-	30C	DB14-
31A	DA15+	31C	DB15+
32A	DA15-	32C	DB15-

5. Parts List

Capacitors

C1	47UF 6.3V 20% Tantalum Bead
C2 TO C73	100NF -20 +80% Ceramic
C74	1UF -20 +20% Ceramic

Diodes

D1	TVS505 Transient Diode
D2 TO D5	HLMP 6204 Red LED Array
D6	C3V9 5% 0.4W Zener (D035)
D7	HLMP 6500 Green LED Min.

Fuses

FS1	Fuse 1A Anti-Surge 20MM
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Integrated Circuits

IC1 TO IC4	4050 BCP CMOS 6XBuffer
IC5	4049 UBCP CMOS 6XINV. Buffer
IC6	74HC688 8 Bit Magnitude Comp
IC7, IC8	74HC154N 1 OF 16 Decoder
IC9, IC20, IC33, IC44, IC57, IC68, IC81, IC92	SN75175 Quad Diff Line Recvr.
IC10 TO IC13, IC16 TO IC19, IC34 TO IC37, IC40 TO IC43, IC58 TO IC61, IC64 TO IC67, IC82 TO IC85, IC88 TO IC91	74HC4067 16 X 1 MUX. 0.3 Inch
IC14, IC15, IC38, IC39, IC62, IC63, IC86, IC87	SN75151 Quad RS422 DRV.3-State
IC21 TO IC28, IC45 TO IC52, IC69 TO IC76, IC93 TO IC100	74HC174 HEX D Type Latch
IC29 TO IC32, IC53 TO IC56, IC77 TO IC80, IC101 TO IC104	74HC74 Dual D Type Latch
IC105	74HC08 4 X 2 I/P AND
IC106, IC107	74HC240 CMOS Octal Inverter

Resistors

R1, R3 TO R18, R23	2K2 1% 0.5W Standard Film
R2	100K 1% 0.5W Standard Film
R19 TO R22	4K7 1% 0.5W Standard Film
R24	1K0 1% 0.5W Standard Film
RN1	4K7X8 5% 0.19W SIL Network

Transistors

T1, T2	2N3904 NPN Transistor
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