

---

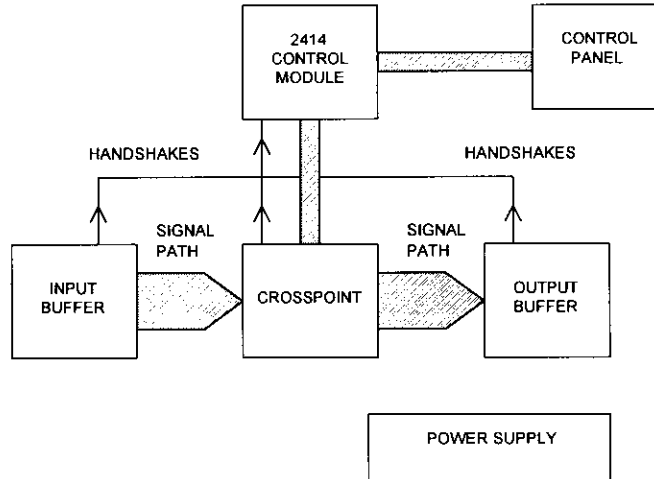
**2414 HD SERIES SWITCHER CONTROL UNIT****CONTENTS**

<b>Paragraph</b>	<b>Title</b>	<b>Page</b>
<b>1</b>	<b>APPLICATION</b>	<b>3</b>
<b>2</b>	<b>SPECIFICATION</b>	<b>4</b>
<b>2.1</b>	<b>Inputs</b>	<b>4</b>
<b>2.2</b>	<b>Outputs</b>	<b>4</b>
<b>2.3</b>	<b>Indications</b>	<b>4</b>
<b>2.4</b>	<b>Power Required</b>	<b>4</b>
<b>2.5</b>	<b>Functional</b>	<b>4</b>
<b>2.6</b>	<b>General</b>	<b>4</b>
<b>3</b>	<b>GENERAL DESCRIPTION</b>	<b>5</b>
<b>4</b>	<b>CIRCUIT DESCRIPTION</b>	<b>7</b>
<b>4.1</b>	<b>Microprocessor</b>	<b>7</b>
<b>4.2</b>	<b>Clock Generator</b>	<b>7</b>
<b>4.3</b>	<b>DUART and Serial Control Interface</b>	<b>7</b>
<b>4.4</b>	<b>Sync Separator</b>	<b>7</b>
<b>4.5</b>	<b>Power On Reset Generator</b>	<b>7</b>
<b>4.6</b>	<b>Indications</b>	<b>7</b>
<b>4.7</b>	<b>Crosspoint Control</b>	<b>7</b>
<b>4.8</b>	<b>Module Handshakes</b>	<b>8</b>
<b>4.9</b>	<b>Power</b>	<b>8</b>
<b>5</b>	<b>INSTALLATION</b>	<b>9</b>
<b>5.1</b>	<b>Link Settings</b>	<b>9</b>
<b>5.2</b>	<b>Mechanical</b>	<b>13</b>

<b>5.3</b>	<b>PL1 Connector Pinout</b>	<b>13</b>
<b>5.4</b>	<b>PL2 Connector Pinout</b>	<b>14</b>
<b>5.5</b>	<b>PL3 Connector Pinout</b>	<b>15</b>
<b>5.6</b>	<b>SK1 Connector Pinout</b>	<b>15</b>

1 APPLICATION

The 2414 is a control module for use with video, audio and machine control routing switchers. It has two serial control ports to receive commands and report status.



SYSTEM BLOCK DIAGRAM

**2 SPECIFICATION**

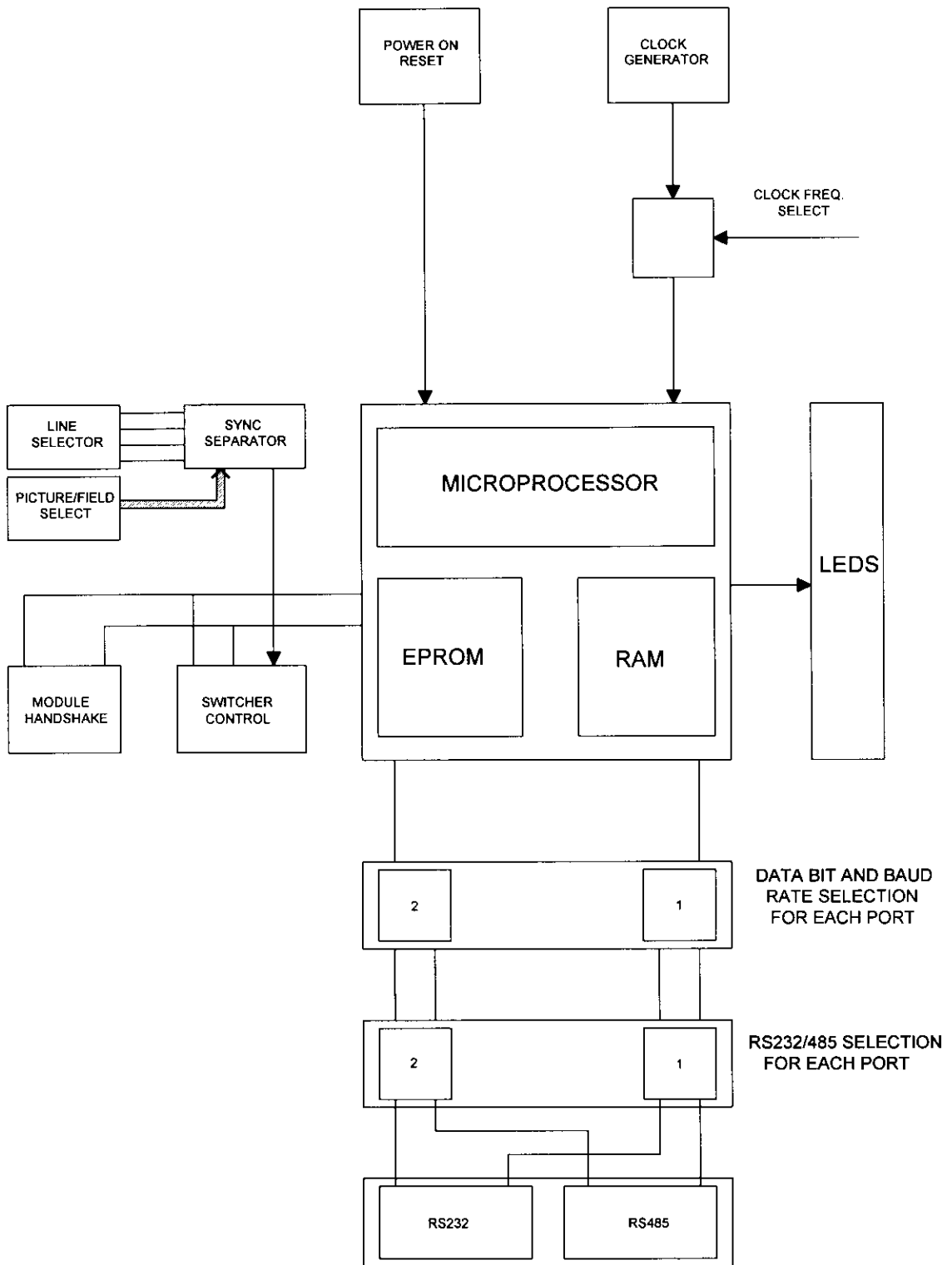
<b>2.1</b>	<b>Inputs</b>	Video sync:	1V reference colour black or 2V mixed sync High impedance (terminate externally)
<b>2.1</b>	<b>Outputs</b>	Crosspoint control:	Source address 7 bits Destination address 7 bits Strobes 2 bits
<b>2.3</b>	<b>Indications</b>	Power: Reset: Process monitoring:	Green LED Red LED, on for reset 16 red LEDs, see H050 for function
<b>2.4</b>	<b>Power Required</b>	Either: Or:	5 Volts at 1 Amp 6 to 9 Volts at 1 Amp (Link selectable)
<b>2.5</b>	<b>Functional</b>	Serial ports: Main: Diagnostic: Protocol:	2 off RS485, 38.4kBaud RS232, 9600 Baud, 8-bit no parity, 1 stop (Not available at same time as both main ports: uses same UART as main port) Pro-Bel SW-P-02
<b>2.6</b>	<b>General</b>	Size: Weight: Temperature range: Operating: Storage: Connectors: Card edge: Main I/O: Diagnostic:	6U x 280mm (Extended Eurocard) 0.38kg 0°C to 50°C -10°C to +70°C 2 x DIN41612 96-way (PL1 & PL3) 1 x DIN41612 30-way (PL2) Via PL1 Via PL1

**3 GENERAL  
DESCRIPTION**

The module comprises the following main blocks:

- Microprocessor
- Clock Generator
- DUART and Serial Control Interface
- Sync Separator
- Power on Reset Generator
- Indications
- Crosspoint control
- Module Handshakes
- Power

The unit is intended for controlling High Density HD series switching systems. It has a battery backed RAM module to retain crosspoint settings in the event of power failure. It communicates with the host over one of two serial ports.



INTERNAL BLOCK DIAGRAM

---

## 4 CIRCUIT DESCRIPTION

- 4.1 Microprocessor** IC11 is Motorola processor type MC68B02. It reads and executes program stored in IC9 using IC8 to store variables and crosspoint data.  
IC20 buffers the data between LED drivers, switches and the processor. IC21 buffers the data between the processor and the parallel data interfaces to the switcher.
- 4.2 Clock Generator** Processor clock is derived from IC17 a 16MHz oscillator. IC6 divides the frequency and PL4 provides the speed selection of 2MHz in normal mode or 1MHz for emulation.
- 4.3 DUART and Serial Control Interface** IC10 is a DUART providing two serial channels. IC12 and IC14 provide RS485 interfaces. IC5 and IC7 provide the RS232 interfaces. PL5 and PL6 select between RS485 and RS232.
- 4.4 Sync Separator** T1 and T2 buffer the input video reference input, IC44 separates the sync. IC43 counts the lines from the beginning of the field, it is preloaded with data (depending on the setting of PL31 to PL34) by IC54a at the beginning of each field and clocked by IC41b in the second half of each line. At the count of 15 it triggers IC41a which provides a pulse of 2 microseconds. This 'SYNC' pulse is used to change crosspoints. In the absence of reference input this pulse is provided by IC55 through program control.
- 4.5 Power On Reset Generator** T3 detects the 5V power supply, it keeps the processor in the reset state until the power reaches 4.7 volts. IC54 is a watchdog timer which needs to be triggered every 25ms. If for some reason the program fails to trigger it allows the oscillator formed by IC2d and IC2c to free run, which in turn resets the processor so that the program is restarted.
- 4.6 Indications** Power is indicated by green LED D12, reset by red LED D11. D5, 6, 7 and 8 are software driven red 4 LED arrays used for diagnostic purposes whose use is detailed in software handbook H050.

- 
- 4.7 Crosspoint Control** Normally commands to change a crosspoint will be received over one of the serial ports. The processor will then enable one of the crosspoint enable signals (XPEN or XPEN2) IC53. Then the destination address will be written to IC23 followed by the source address written to IC19. Writing the source address also triggers the monostable IC51 which provides a delay of 1 $\mu$ s followed by a strobe of 2 $\mu$ s. The pulse is used to latch crosspoint data onto preselect latches on the crosspoint modules. The preselected data is transferred to the crosspoint latches by the 'SYNC' pulse.
- 4.8 Module Handshakes** Buffers IC18, 24, 29, 30, 33, 34, 37 and 38 are used to provide module handshakes (i.e. module present and powered up). At configuration time this data is stored in the non-volatile RAM. Handshakes are read regularly and compared with the stored configuration. Any changes are treated as an error.
- 4.9 Power** The module is powered via the main edge connector using either the motherboard supply or other unregulated supplies (selectable via links on PL37) via on board regulator IC45.
- In systems which do not use +5V, +6V may be used. This is connected to Pin 2C on PL2. IC45 regulates incoming +6V to +5V. IC7 converts +5V to  $\pm$  9V for the RS232 drivers.

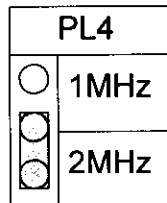


## 5 INSTALLATION

### 5.1 Link Settings

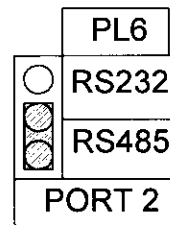
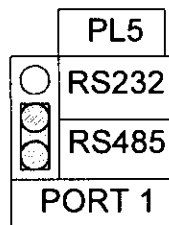
#### 5.1.1 PL4 Clock Frequency Selection

PL4 determines the microprocessor clock frequency. 1MHz is provided for debugging during the software development.



#### 5.1.2 PL5 and PL6 Ports 1 and 2 Serial Communication Port Selection

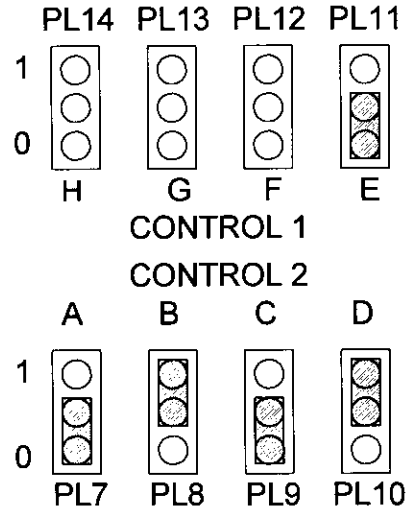
PL5 and PL6 select between RS485 and RS232 for Port 1 and Port 2.



5.1.3 PL7 to PL14 Control Selection

The function of these links is detailed in the software user manual H050.

PL11 sync input enabled  
 PL12, 13 and 14 not used



PL7 Baud rate range set 1  
 PL8 General switcher protocol  
 PL9 Crosspoint update enabled  
 PL10 Tally error response enabled

5.1.4 PL18 to PL30 Ports 1 and 2 Data bits and Baud Rate Selection

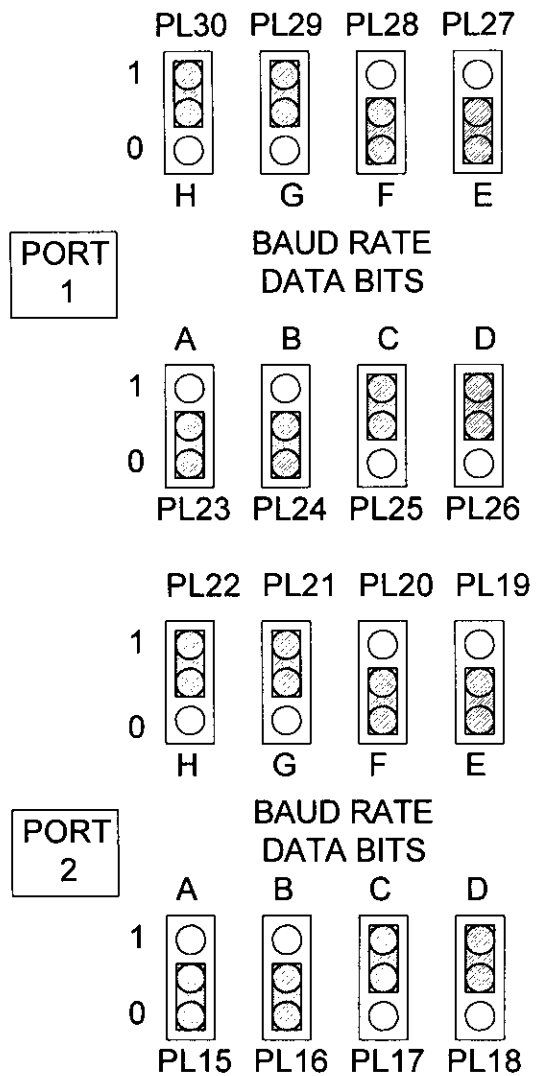
The function of these links is detailed in the software user manual H050.

PL27 to PL30 select the Baud rate for Port 1. Shown set to 38.4k Baud (see PL7).

PL23 to PL26 control the control format for Port 1. Shown set to 1 stop bit even parity, no handshake (i.e. no RTS/CTS).

PL19 to PL22 select the Baud rate for Port 2. Shown set to 38.4k Baud (see PL7).

PL15 to PL18 control the control format for Port 2. Shown set to 1 stop bit even parity, no handshake (i.e. no RTS/CTS)

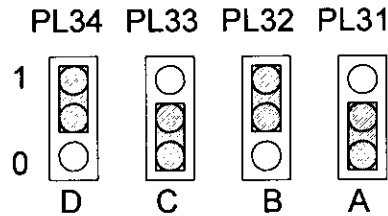


5.1.5 PL31 to PL34  
Line Number  
Selection

The function of these links is detailed in the software user manual H050.

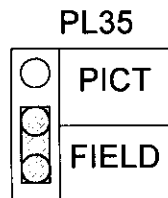
PL31 to PL34 control the line number at which the crosspoint changes take place.

Selection for line 9 shown



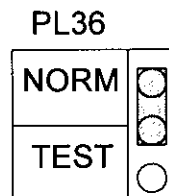
5.1.7 PL36 TEST/NORMAL  
Mode Selection

Test mode disables the watchdog. It is used for de-bugging during software development.



5.1.6 PL35 PICT/FIELD  
Selection

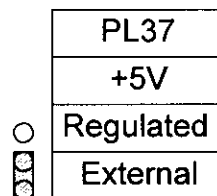
PL35 determines if the crosspoints are switched at field or picture rate.



Note: Test for internal use only.

5.1.8 Regulated/External  
Mode Selection

PL37 selects the power source to the module. Normally in external mode. For HD digital audio switchers with +6V supply the on board regulator is used and PL37 link set to 'Regulated'.



Normally in External

**5.2 Mechanical**

The module is removed and replaced with the system powered or unpowered using card ejectors. When replacing modules care should be taken to push them fully home with reset and configure switches SW1 and SW2 both pressed in whilst doing so. Once the module is fully home first release SW1 and then SW2.

**5.3 PL1 Connector Pinout**

PCB main edge connector, 96 way PCB plug DIN41612.

Pin	Row		
	C	B	A
1	GND	GND	GND
2	RS485TX1-	N/C	RS485TX1+
3	RS485RX1+	BLOCKS0	RS485RX1-
4	GND	BLOCKS1	N/C
5	N/C	BLOCKS2	GND
6	RS485TX2-	BLOCKS3	RS485TX2+
7	RS485RX2+	BLOCKD0	RS485RX2-
8	GND	BLOCKD1	N/C
9	N/C	BLOCKD2	N/C
10	RS232RX1	BLOCKD3	N/C
11	RS232TX1	H/S1	N/C
12	DTR1	H/S2	N/C
13	RTS1	H/S3	N/C
14	DSR1	H/S4	N/C
15	GND	H/S5	CTS1
16	N/C	H/S6	N/C
17	RS232RX2	H/S7	N/C
18	RS232TX2	H/S8	N/C
19	DTR2	H/S9	N/C
20	RTS2	H/S10	N/C
21	DSR2	H/S11	N/C
22	GND	H/S12	CTS2
23	H/S13	MBID0	H/S14
24	H/S15	MBID1	H/S16
25	H/S17	MBID2	H/S18
26	H/S19	MBID3	H/S20
27	H/S21	N/C	H/S22
28	H/S23	N/C	H/S24
29	SA6-	N/C	N/C
30	DA6-	N/C	N/C
31	N/C	N/C	GND
32	GND	N/C	REFI/P

**5.4 PL2 Connector Pinout**

PCB main edge connector, 30 pin right angle plug type 41612.

Pin	Row		
	C	B	A
1	GND	GND	GND
2	+VIN	N/C	SA6
3	N/C	SA5	SA4
4	SA3	SA2	SA1
5	STROBE	XPEN	SA0
6	MONEN	SYNC	DA0
7	DA3	DA2	DA1
8	N/C	DA5	DA4
9	N/C	N/C	DA6
10	GND	N/C	GND

**5.5 PL3 Connector Pinout**

PCB main edge connector, 96 way PCB plug DIN41612.

Pin	Row		
	C	B	A
1	BSTROBE	XPEN2	BXPEN1
2	BSYNC	N/C	BMONEN
3	BSA5	OP6	BSA6
4	BSA3	OP7	BSA4
5	BSA1	N/C	BSA2
6	BDA0	IP6	BSA0
7	BDA2	N/C	BDA1
8	BDA4	N/C	BDA3
9	BDA6	N/C	BDA5
10	N/C	N/C	N/C
11	H/S57	N/C	H/S58
12	H/S55	N/C	H/S56
13	H/S53	N/C	H/S54
14	H/S51	N/C	H/S52
15	H/S49	N/C	H/S50
16	H/S47	N/C	H/S48
17	H/S45	N/C	H/S46
18	H/S43	N/C	H/S44
19	H/S41	N/C	H/S42
20	H/S39	N/C	H/S40
21	H/S37	N/C	H/S38
22	H/S35	N/C	H/S36
23	H/S33	N/C	H/S34
24	H/S31	N/C	H/S32
25	H/S29	N/C	H/S30
26	H/S27	N/C	H/S28
27	H/S25	N/C	H/S26
28	BDA6-	N/C	BSA6-
29	XPEN4	+5VIN	XPEN3
30	XPEN5	+5VIN	N/C
31	REFO/P	+5VIN	GND
32	GND	+5VIN	GND

**5.6 SK1 Connector Pinout**

Test interface, Molex 4pin PCB plug type 6410.

Pin	Function	Pin	Function
1	+5V	3	+9V
2	GND	4	-9V

**This page intentionally left blank**