

digital keying modular  
interface audio  
converters analogue video

# GPI36

GPI card

## USER MANUAL



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# 1 Introduction

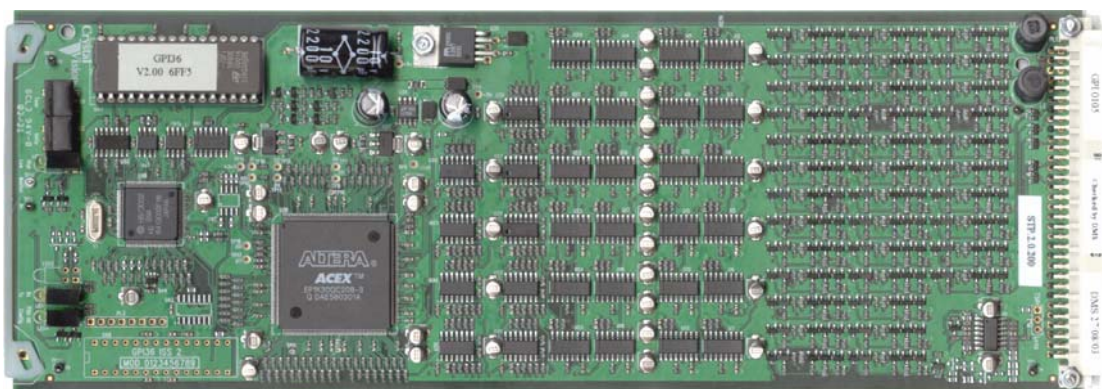
The GPI36 Bi-directional GPI Controller allows the Statesman system to monitor and control GPIs. It allows Statesman to interface to equipment that is not 'Statesman enabled' or which has no serial control interface.

A GPI36 module has 36 GPI lines, each of which may be configured as either a GPI input or a GPI output.

Each GPI connection may be tested individually by Statesman and an alarm or warning raised. The following events will be selectable as alarm/warning triggers:

- Input is inactive
- Connection test detects open circuit on input
- Output error

The GPI36 is a 100mm x 266mm module, which fits in the all standard frames and can be integrated with any boards from the company's full product range. It uses the RM17 and RM37 single height rear connectors.



*The GPI36 Bi-directional GPI Controller*

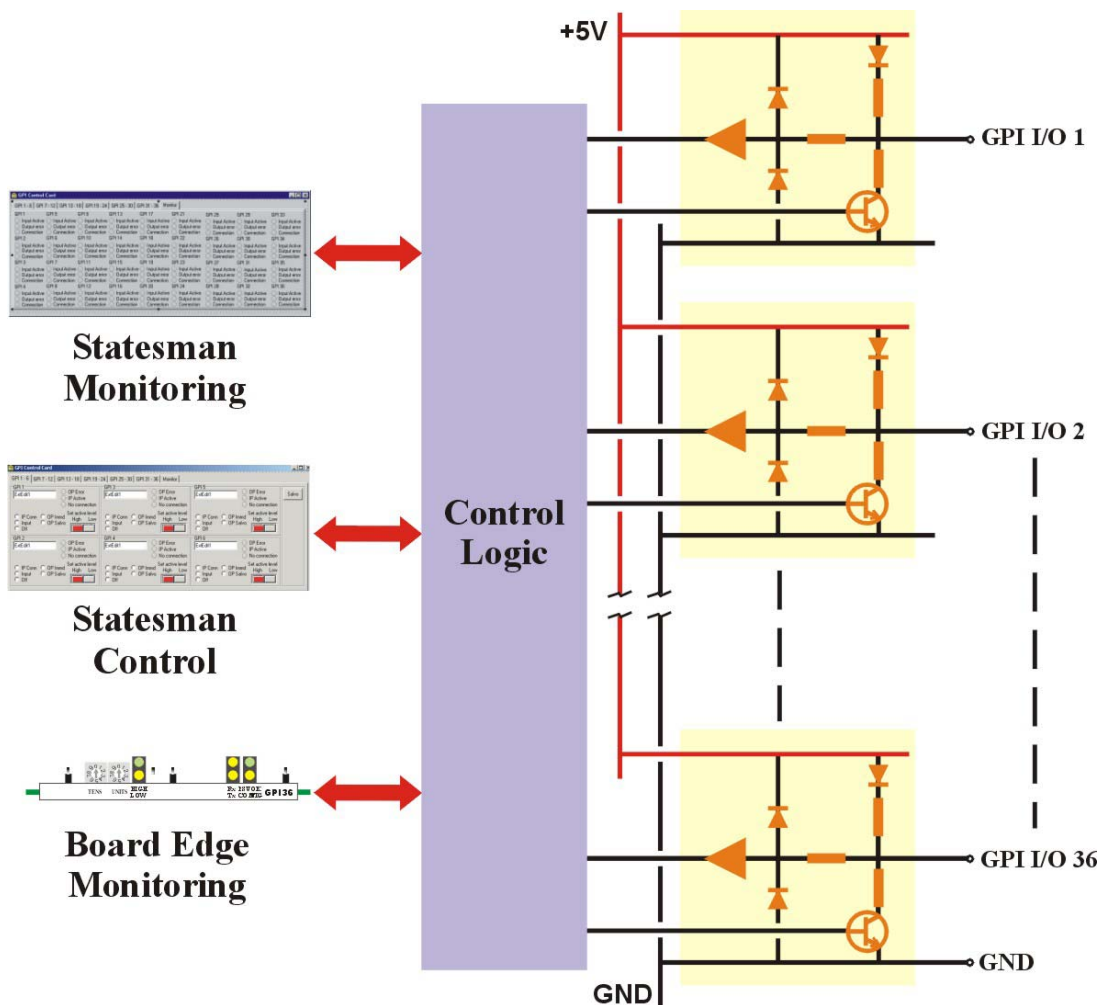
Card edge monitoring is provided to display the state of any selected GPI line.

**Note:** The GPI36 module is intended to be used only with the Statesman system.

Non-volatile storage is provided to return settings to their previous state when it is powered down and back up. A change of setting made less than two seconds before the power is lost may not be restored.

The main features are as follows:

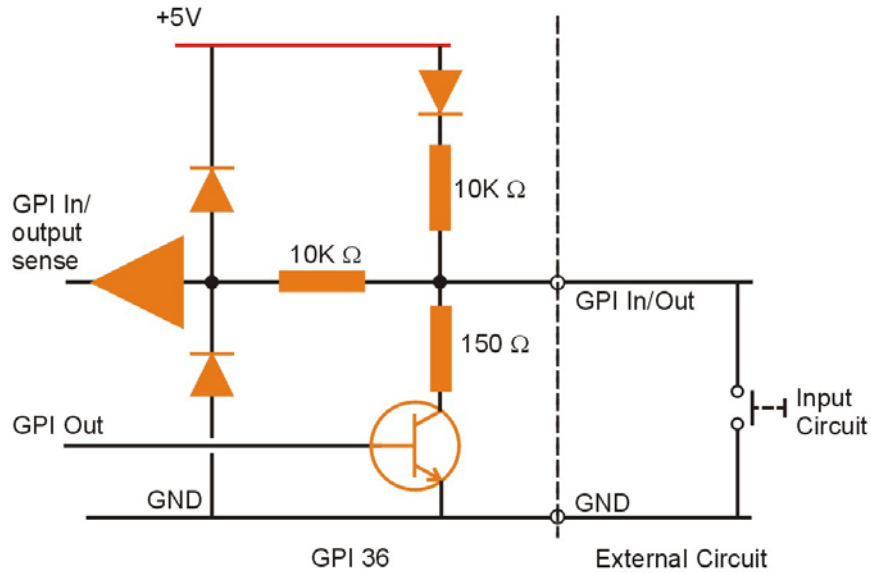
- 36 GPI bi-directional lines assignable as either an input or an output
- Input checking function
- Designed to be used with Statesman
- Set multiple GPIs using salvos
- Output current limiting
- Input protection - may be used with input voltages up to +30 Volts
- May be used with all Crystal Vision frames
- Non-volatile storage for configuration settings
- Card edge GPI line monitoring



GPI36 Bi-directional GPI controller

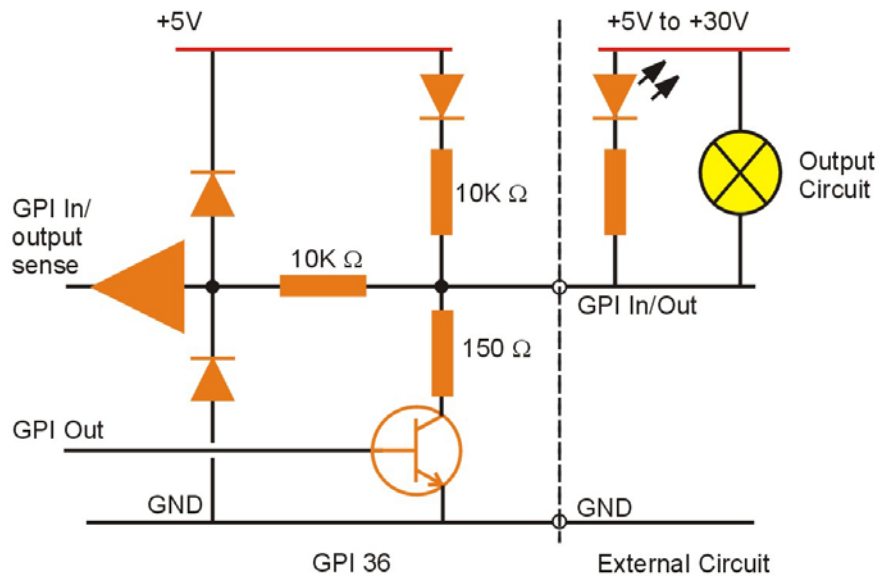
*Example applications*

A GPI line may be configured as either an input or an output using Statesman control.



*Bi-directional GPI line configured as an I/P*

**Note:** A low is detected at voltages below 0.8V, and a high is detected at voltages above 2.4V. Voltages between 0.8V and 2.4V may produce either a high or low input indication.



*Bi-directional GPI line configured as an O/P*

**Note:** A 500mA +5V supply may be found on the remote connectors of the frames in which the GPI36 may be fitted.

## 2 Statesman

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via serial control from a PC. The GPI36 is used with Statesman for control and see-at-a glance monitoring of all 36 GPI lines.

The main Statesman application communicates with each module in a frame through an active control panel with or without an LCD display. Statesman will not be able to detect modules used in a frame with only a passive front panel.

### 2.1 Installing Statesman

#### Minimum pre-requisites:

- A PC running either Windows 2000 or Windows XP is recommended
- A parallel port dongle for Statesman PCs with attached Crystal Vision frames
- An RS422 serial connection from the host PC to the Control/422 RJ45 or Remote/RMT 2 connector on Crystal Vision frames
- An active or Statesman enabled control panel **MUST** be fitted to the frame with version 1.63 or above firmware – if it is an Indigo frame the firmware must be V1.04 or above
- An optional RS422 to RS232 converter if the PC has no RS422 ports

#### Installing Statesman

- Refer to the readme and/or help file on the CD before proceeding
- To view all application windows, set graphics resolution to at least 1024 x 768
- Remove any previous version of the Statesman software using the Add/Remove Programs application in the Windows Control Panel
- Ensure that the Statesman dongle is fitted to the parallel port of the host PC
- Insert the Statesman CD and the installation should start immediately – if it does not, run the setup.exe file on the CD
- Obey any installation program prompts and restart the PC when prompted

#### Running Statesman for the first time

The Statesman PC Control System may be run from the Crystal Vision programs folder via the Start menu or by double-clicking on the Crystal Vision.exe file in the installed program directory.

When the program runs it will require licence information and an administrator name and password. It will also need to know which computer port is being used to connect to a Crystal Vision frame(s).

**Note:** For further details of Statesman configuration please refer to the Statesman manual.

## 2.2 Statesman operation

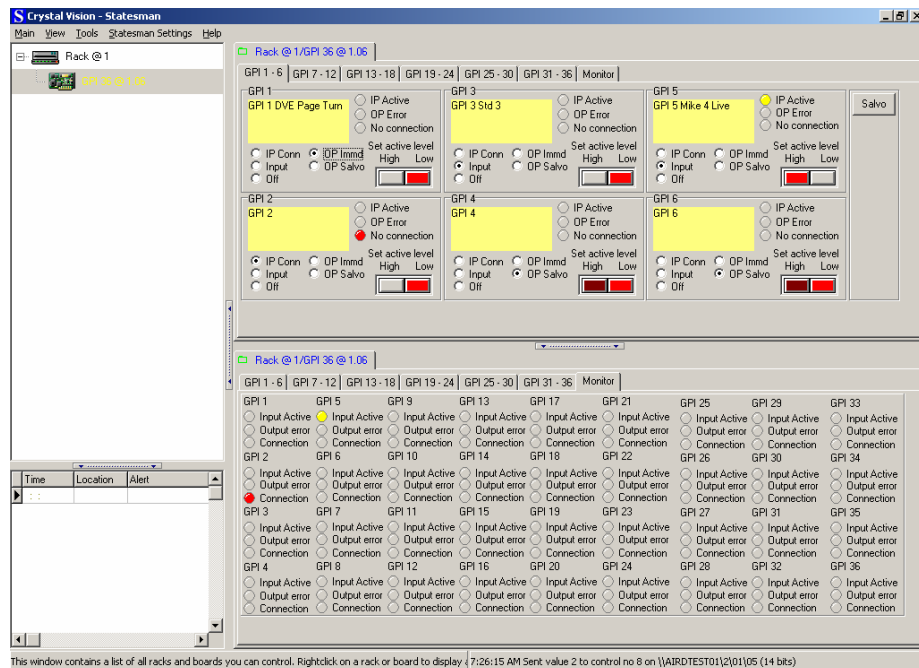
Once Statesman is configured it should automatically detect any statesman compatible modules in the connected frame or frames and display them in the main application left hand explorer-style window.

Open any frame by clicking on the '+' sign or by double clicking on a frame. Installed modules should be shown with module icons. Frame and module icons can be named as desired by right-clicking or using the edit menu and choosing rename.

To aid user recognition of module and frame status quickly, the following colour and size coding is used:

- A module is shown present by full colour and absent by greyed colour
- A module is shown open by large icon size and closed by small icon
- A module is the source of an active alarm if red and not alarmed if green

Double-clicking on a module will enable the display of the main application menus.



*Statesman main application window*

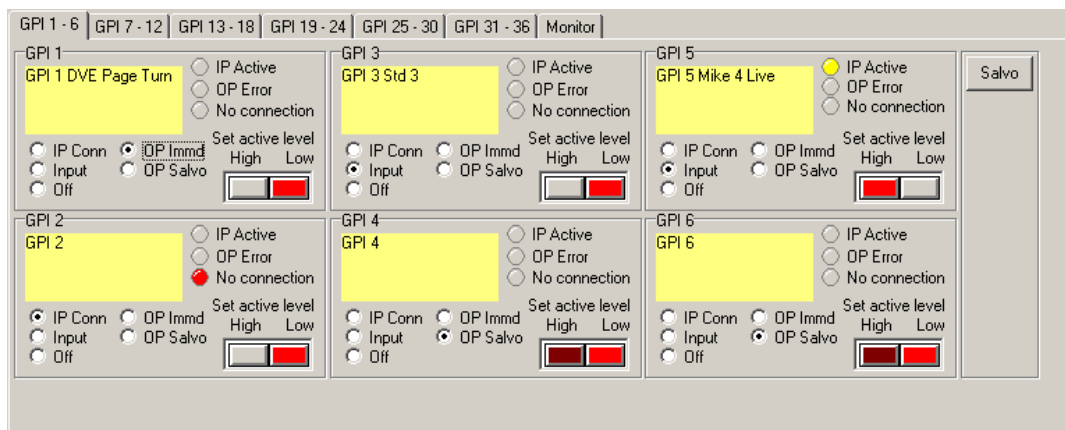
The two large control panes shown in the upper and lower halves of the window may display different menus for the same card, or controls for different cards. Click on the horizontal button-bar between the two panes to close the lower plane or drag the button to vary the size of the panes.

**Note:** For further details of Statesman configuration and operation please refer to the Statesman manual.

## Controlling GPIs

There are six GPI tabs each of which allows six of the 36 GPI lines to be configured and controlled. The available controls and indicators are:

- Create and edit a name for each GPI line
- Set connection type
- Set active level
- OP error, IP active and No connection status indicators



*Configuration and control for GPI lines 1 to 6*

## Naming GPIs

The contents of the name field will be reflected on all PCs running Statesman that view this card, and when alarms are generated by GPI36 modules in the network.

To change or edit a name, type within the desired name field. Press the F11 key to save the changes.

## Setting the connection type

There is a five-button radio group that sets type of connection. The available selections are:

- IP conn - input with connection checking enabled
- Input - input with connection checking disabled
- Off - the connection will not be driven. The LEDs will remain grey, and the active level locked
- OP immd - the connection is an output, level changes will be output as soon as they are selected
- OP Salvo - the connection is an output, changes will be held pending until a salvo command



## Input testing

A GPI line configured as an input, which is normally connected to a semiconductor output driver, may be tested to determine if the input is open circuit (disconnected).

**Note:** Input testing will not work with a non-semiconductor input such as a simple hardware switch.

## Setting the GPI active level

There is a two-button control that sets the active level of the GPI connection. When the connection is configured as an output in salvo mode the button will indicate a pending condition with a change in colour to dull red.

## Using Salvos

A Salvo consists of a number of 'primed' output state changes that are all changed when the Salvo button is pressed. To set one or more GPI lines using a Salvo proceed as follows:

- Prime one or more GPI lines for Salvo operation by checking 'OP Salvo'
- Select the required output state – the button will change to dark red
- Press the Salvo button – the dark red selections change to bright red and the outputs change state

## Status indicators

The 'OP Error' LED will illuminate red if the connection is set as an output and the setting conflicts with the actual state - the connection is low when set high, or high when set low. Otherwise it will be grey.

The 'IP Active' LED will illuminate yellow if the connection is set as an input and the actual state matches the active state set. Otherwise it will be grey.

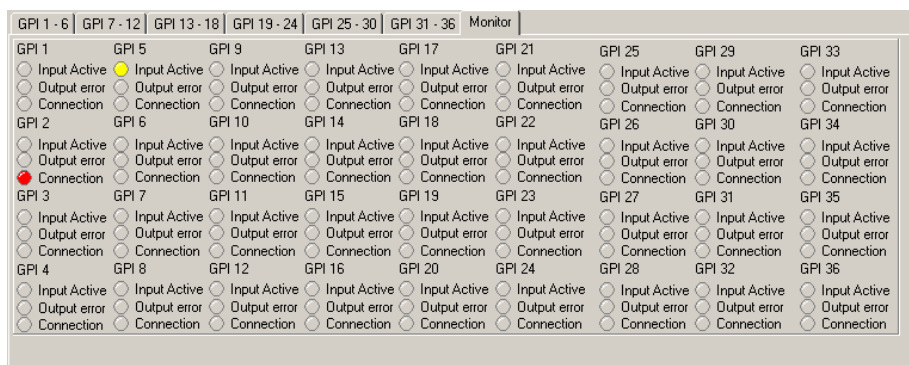
The 'No connection' LED will illuminate red if connection checking is enabled and the check indicates an open circuit. Otherwise it will be grey.

**Note:** Input testing will not work with a non-semiconductor input such as a simple hardware switch.

## System monitoring

The Monitor tab provides access to the following:

- Input active status for each GPI line
- Output error status for each GPI line
- Connection status for each GPI line configured as an input with the connection test enabled



*GPI and error settings*

The Monitor tab allows all the LEDs associated with all the GPI connections to be seen at once. The colours and functions of the LEDs are identical to those for the individual control panels.

# Hardware installation

The GPI36 single height module uses the RM17 and RM37 rear connectors and fits into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

## 2.3 Rear modules and signal I/O


The FR2AV and Indigo 2U frame will house up to 12 single height modules and dual power supplies.

The FR1AV and Indigo 1U frame will house 6 single height modules and a single power supply.

The DTBAV and Indigo 1U high Desk Top Box has built-in power supply and will house up to 2 single height modules.

The modules can be plugged in and removed while the frame is powered without damage.

### Rear module connections with RM17

RM17	Description
	<b>RM17</b> <ul style="list-style-type: none"> <li>• 12 modules per 2U frame, 6 per 1U frame &amp; 2 per DTB</li> <li>• All frame slots can be used</li> </ul>

**For details of fitting rear connectors please refer to the appropriate frame manual.**

*GPI I/O - 15 pin 'D' connector (cable has plug on it)*

Pin	Signal	Pin	Signal
1	Ground	9	GPI 05
2	GPI 01	10	GPI 06
3	GPI 02	11	GPI 07
4	GPI 03	12	GPI 08
5	GPI 04	13	Ground
6	Ground	14	Ground
7	No Connection	15	Ground
8	No Connection		

*GPI I/O - 44 pin high density 'D' connector (cable has plug on it)*

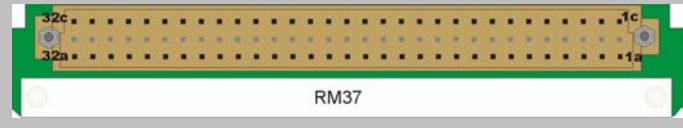
Pin	Signal	Pin	Signal	Pin	Signal
1	Ground	16	GPI 17	31	GPI 28
2	GPI 09	17	GPI 18	32	GPI 29
3	GPI 10	18	GPI 19	33	GPI 30
4	Ground	19	Ground	34	Ground
5	GPI 11	20	GPI 20	35	GPI 31
6	GPI 12	21	GPI 21	36	GPI 32
7	Ground	22	GPI 22	37	GPI 33
8	GPI 13	23	Ground	38	Ground
9	GPI 14	24	GPI 23	39	GPI 34
10	GPI 15	25	GPI 24	40	GPI 35
11	Ground	26	GPI 25	41	Ground
12	Reserved for future use	27	Ground	42	GPI36
13	Reserved for future use	28	GPI 26	43	Ground
14	GPI 16	29	GPI 27	44	Ground
15	Ground	30	Ground		

A 500mA +5Volt supply may be found on the remote connectors of the frames in which the GPI36 is fitted.

**Note:** On Desktop boxes, 1U and 2U frames, Remote 1 and Remote 3 are 26 way high density 'D' type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case. On 2U frames Remote 2 and Remote 4 are 26 way high density 'D' type male plugs. Frame ground is pin 6 and +5V @500mA is pin 15 in each case.

Refer to the appropriate frame manual for further information.

Rear module connections with RM37

RM37	Description
	<p><b>RM37</b></p> <ul style="list-style-type: none"> <li>12 modules per 2U frame, 6 per 1U frame &amp; 2 per DTB</li> <li>All frame slots can be used</li> </ul>

Pin	Signal	Pin	Signal	Pin	Signal
1c	GPI 01	22c	GPI 13	25a	GPI 25
2c	GPI 02	21a	GPI14	28c	GPI 26
1a	GPI 03	22a	GPI15	27a	GPI 27
2a	GPI 04	28a	GPI 16	9c	GPI 28
4c	GPI 05	9a	GPI 17	13c	GPI 29
5c	GPI 06	10a	GPI 18	13a	GPI 30
5a	GPI 07	12c	GPI 19	16c	GPI 31
4a	GPI 08	15c	GPI 20	16a	GPI 32
10c	GPI 09	18a	GPI 21	19a	GPI 33
12a	GPI 10	18c	GPI 22	21c	GPI 34
15a	GPI 11	24c	GPI 23	21a	GPI 35
19c	GPI 12	25c	GPI 24	27c	GPI 36
6a 8a 11a 14a 17a 20a 23a 26a 29a 31a 3c 6c 8c 11c 14c 17c 20c 23c 26c 29c 31c				Ground	
7a 30a 32a 7c 30c 32c				No connection	

A 500mA +5Volt supply may be found on the remote connectors of the frames in which the GPI36 is fitted.

**Note:** On Desktop boxes, 1U and 2U frames, Remote 1 and Remote 3 are 26 way high density ‘D’ type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case. On 2U frames Remote 2 and Remote 4 are 26 way high density ‘D’ type male plugs. Frame ground is pin 6 and +5V @500mA is pin 15 in each case.

Refer to the appropriate frame manual for further information.

## 3 Trouble shooting

### Card edge monitoring

Once the start-up initialisation procedure is complete, the GPI36 card can be monitored from the card edge and controlled or configured from the Statesman PC interface. This chapter will concentrate on the card monitoring edge controls.

The front edge of the card provides useful power rail and Comms status, in addition to monitoring of any one of the 36 GPI lines.

The two binary rotary switches select one of the GPI lines to monitor using the High/Low LEDs and the monitor test point.



*GPI36 front edge view*

To select a GPI line with the rotary switches turn the Tens control to 0, 1 2 or 3 and the Units control to the required position from 0 to 9.

For example to select GPI line 17, turn the Tens control so that the arrow lines up with 1 and the Units control so that the arrow lines up with 7.

LED	Colour when lit	Action
<b>HIGH</b>	Yellow	Selected GPI line is at a logic high
<b>LOW</b>	Green	Selected GPI line is at a logic low
<b>Rx</b>	Yellow	Comms data received from Statesman
<b>Tx</b>	Yellow	Comms data sent to Statesman
<b>PSU OK</b>	Green	Power normal
<b>CONFIG</b>	Yellow	Initialising – goes off once power-up initialisation complete

*LED assignments*

#### *Using the test point*

The test point mimics the high/low state of a selected GPI connection and may be monitored using a suitable device such as a multi-meter or oscilloscope.

**Note:** The test point is capable of driving a 1M Ohm, 100pF load with a bandwidth of 100KHz and is current limited to survive an indefinite short to ground.

## Basic fault finding guide

### The Power OK LED is not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information

Check that the card is seated correctly in the frame

### The card no longer responds to Statesman/front panel control

Check that the card is seated correctly and that the Power OK LED is lit

Check that the card-edge Rx and Tx LEDs flash (Comms LED in an Indigo frame) when Statesman communication control is attempted

Check any active control panel/Statesman cabling

Check if the control panel/Statesman can control another card in the same rack

If necessary re-set the card

### One or more GPI input lines do not change state

Use the input testing function for semiconductor driver inputs

Check the affected cabling and external devices

### How does the input test work?

The input function can be set to detect the presence of an open-collector (or open-drain) output even when the output is inactive (not pulling down to ground). If IP Conn is selected, the input is periodically connected to a negative voltage and sensed whether it pulls below -1V (assumed to be an open circuit) or whether it clips at -0.7V (assumed to be an open collector/open drain parasitic diode). The test current is limited to less than 50mA. When the connectivity test is enabled it will be performed at least two times every second.

### Re-setting the card

If required, the card may be reset by simply removing the rack power and re-applying power after a few seconds or by removing the card from the rack and then re-inserting the card

It is safe to re-insert the card whilst the rack is powered

### The output error LED lights when there is no output error

The Statesman output error LED in GPI output mode will be in an undefined state at currents above 5mA when the output state is set low. This may cause the LED to illuminate inappropriately.

This is because the voltage at the sense terminal approaches the maximum TTL input low voltage (0.8V) when sinking more than 5mA through a GPI output set low. There is no problem when a GPI output is set high.

## 4 Appendix

### The GPI36 and active control panels

Although the GPI36 will appear in the front panel 'device' menu selection there is no front panel control available.

At power up, the two line 20-character screen of an active panel will display 'Crystal Vision' followed by the firmware version number for the control panel. All eight control panel key LEDs will illuminate. 'Control Panel' will then briefly replace the version number display.

If the control panel firmware has been updated for Statesman control (version 1.5.0 or higher), Statesman Mode will be entered and the message, 'Press CAL to Exit' will be displayed and the CAL LED will light.

To continue with control panel operation or configuration, press the 'CAL' key once. A second press of the 'CAL' key will return to Statesman control.

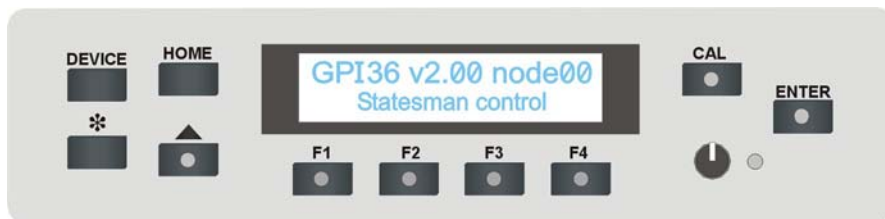
Upon exiting Statesman mode the control panel will display the name of the card that first responds to the polling request together with its location number. An installed GPI36 module can be selected from the Device menu using the shaft encoder:



*The active panel Device menu*

The GPI36 will be shown together with its location number and module firmware version number. The location number consists of the frame number plus the card position in the frame.

Press enter to view the module's home menu.



*The GPI36 home menu*

In the case of the GPI36, no further menus will be displayed and card monitoring and control is not available.



## 5 Specification

### General

Dimensions	100mm x 266 mm module with DIN 41612 connector
Weight	183 g
Power consumption	1 W
Available GPIs:	36 bi-directional GPI I/O lines

### Control interface

PC software	Statesman control only
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### Output characteristics

Open collector (or drain):	Pull down to 0 Volts (GND) when ON or open circuit when OFF
Max off voltage:	30V
Current limit:	200mA
Pull up when off:	10K $\Omega$ resistor to internal +5V

### Input characteristics

Max voltage:	30 V
Pull-up:	10K $\Omega$ resistor to internal +5V
Typical impedance:	10K $\Omega$
Level discrimination:	A low is detected at voltages below 0.8V, and a high is detected at voltages above 2.4V. Voltages between 0.8V and 2.4V may produce either a high or low input indication.
Disconnection testing:	Semiconductor inputs can be tested by checking for the presence of an open-collector (or open-drain)

### Monitoring

LED display and test point	2 x rotary switches (Tens/Units) on front of card to select GPI line to monitor on LEDs and test point Yellow LED lights when selected GPI line is low Green LED lights when selected GPI line is high The test point is capable of driving a 1M Ohm, 100pF load with a bandwidth of 100KHz and is current limited to survive an indefinite short to ground.
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**Ordering information**

GPI36	Bi-directional GPI controller
RM17	Single height rear connector
RM37	Analogue audio rear module with easy solder 64 way audio connector
Indigo 2	2U frame without active control panel for up to 12 modules
Indigo 1	1U frame without active control panel for up to 6 modules
Indigo DT	1U Desk top box without active control panel for up to 2 modules
Indigo 2A	2U frame with active control panel for up to 12 modules
Indigo 1A	1U frame with active control panel for up to 6 modules
Indigo DTA	1U Desk top box with active control panel for up to 2 modules
Indigo 2S	Statesman enabled only 2U frame for up to 12 modules
Indigo 1S	Statesman enabled only 1U frame for up to 6 modules
Indigo DTS	Statesman enabled only 1U Desk top box for up to 2 modules