



37 Broadway
Arlington, Massachusetts 02174

I/O-2 Add-On Card For the HelperCard

Technical Documentation

 **GMAX™ SYSTEMS**
MULTI-AXIS BEAM HANDLING

WARRANTY

General Scanning, Inc. (GSI) warrants this product to be free from defects in materials and workmanship for 12 months from the date of shipment. GSI will, at its option, repair or replace the product if it is defective within the warranty period and returned, freight pre-paid, to a service center designated by GSI.

General Scanning requests that customers obtain a Return Authorization Number prior to returning units, and that they carefully pack units in their original packing or equivalent.

Under warranty, GSI is not obligated to repair damage to any units resulting from the following conditions (customers are responsible for defining which conditions are applicable to their product):

- a) Personnel other than GSI representatives attempting to repair or service the product.
- b) Improper use of the equipment.
- c) Connecting the product to incompatible equipment.
- d) Personnel other than GSI representatives modifying the product.
- e) Scratches and chips on any optical surface after three weeks from the date of receipt.
- f) Damage to any optical surface from improper handling or cleaning procedures. This applies specifically to those items subjected to excess laser radiation, contaminated environments, extreme temperature or abrasive cleaning.

Customers assume all responsibility for maintaining a laser-safe working environment. OEM customers must assume all responsibility for **CDRH** (Center for Devices and Radiological Health) certification.

There is no implied warranty of fitness for a particular purpose, and GSI is not responsible for consequential damages. Individual components manufactured by GSI or others may be covered by their own warranties. Refer to the appropriate manuals for this information.



NOTE

CUSTOMER SUPPORT

General Scanning, Inc. has support services available to you concerning problems with either the product or manual you are using.

Before calling for assistance, please make sure you refer to any appropriate sections in the manual that may answer your questions. The “Technical Outline Drawings” in Appendix C may be particularly helpful. If you need further assistance: Call General Scanning's Customer Service Department Monday through Friday between 8 A.M. and 5 P.M. (Eastern Time).

The customer service personnel will be able to give you direct assistance and answers to your questions.



CALL

In the U. S., (800) 343 - 1167
Outside the U. S., (617) 924 - 1010

... ask for the Customer Service Department

UNPACKING

A packing list is included in the shipment that details the exact items shipped.

- a) CAREFULLY unpack the contents from the box.
- b) Save shipping container and packaging material in case you need to return unit for service.
- c) Check contents of the box against the packing list to assure all parts have been received.
- d) Inspect each item to assure it is not damaged.

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INTRODUCTION

The **I/O-2** card is an add-on board available as an option to the **HelperCard**. The **I/O-2** features include:

Function	HelperCard	HelperCard with I/O-2
Laser Modulation output opto-isolated	No	Yes
External voltage for Laser Modulation (+5 to +18 V)	No	Yes
All outputs (on 9-pin con.) opto-isolated	No	Yes
8 bit D/A conv. for analog Power Control (user definable range)	No	Yes
Gate Signal for First-Pulse-Suppression	No	Yes
Jumper selectable 1st, 2nd,...,4th Pulse Suppression	No	Yes
Additional user programmable 8-bit Input (e.g. for system flags) (opto-isolated)	No	Yes

The **I/O-2** is a strongly suggested addition to the **HelperCard** unless the customer wants to design and implement his own opto-isolation circuitry.

YAG applications require an analog output for lamp power control and a gate signal for first pulse suppressions. The easiest way to get these signals is by using the **I/O-2** card.

INSTALLATION

The **I/O-2** card is mounted piggy-back onto the **HelperCard**. The **HelperCard** will have to be removed from the computer, the **I/O-2** card plugged into the **HelperCard**, after the jumpers on the **I/O-2** card are set; then the card assembly re-installed into the computer.

Refer to the **Technical Documentation** chapter for information on the jumpers.

The I/O-2 Card Jumpers

To Remove the HelperCard

To remove the **HelperCard**:

- 1) With the computer and the monitor power off, remove the computer's cover.
- 2) Remove the cables from the **HelperCard** output connectors.
- 3) Unplug and remove the **HelperCard** from the computer motherboard.

Connect the I/O-2 Card to the HelperCard

The connector on the solder side of the **I/O-2** card mates to the I/O connector on the **HelperCard**.

- 1) Place screws into the two holes on the **I/O-2** card such that the screw heads are on the component side of the board.
- 2) Insert spacers over the screws.
- 3) Align the connector with the I/O connector on the **HelperCard** and press them together.
- 4) The two panels are then secured by placing flat and lock washers then nuts on the solder side of the **HelperCard**.

Re-install the Card Assembly

To install the card assembly, you will need two adjacent 16 bit slots. One slot will house the **HelperCard**, the second slot will be used to mount the two connectors on the ends of the ribbon cable coming from the **I/O-2** card.

- 1) Firmly insert the Card Assembly into one slot.
- 2) Secure the **HelperCard** to the computer with the retaining screw.
- 3) Remove the slot blank from the adjacent slot.
- 4) Secure the Connector assembly to the computer with the retaining screw.
- 5) Replace and secure the computer cover.

TECHNICAL DOCUMENTATION

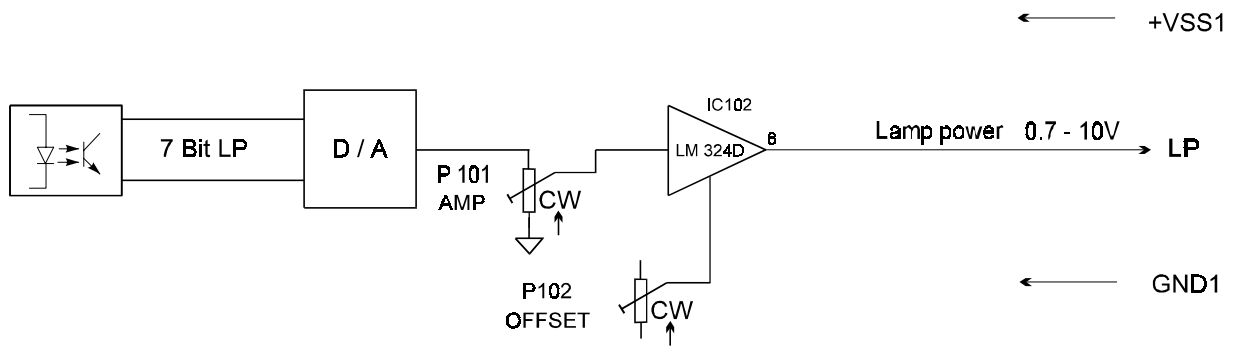
Laser Current Control (LP)

The Laser Current Control circuitry delivers a Voltage between ~ 0.7 to 10V. It is galvanic isolated from the PC and is used to drive lamp current circuitry. The output is controlled through the application software (PC-MARK & JOB EDITOR). The PC-MARK & JOB EDITOR programs send:

- Hex 7F for the lowest output level
- and Hex 00 for the highest output level

via the HelperCard to the I/O-2 Add-On Card.

The lowest output level is adjustable with P102 (min. > 0.7V / max. = 5V).
 The highest output level is adjustable with P101 (max. = 10V).



The standard settings are 2 V low level, 10 V high level.

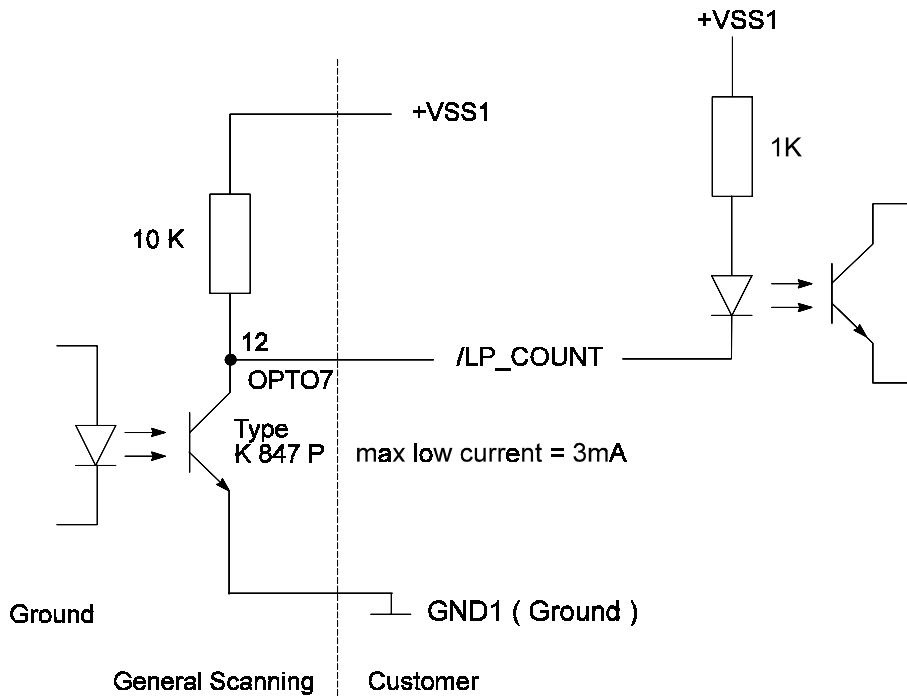
The external power input (+VSS1, GND1) requirement is:

- min. +15 V to max. 24 V at 150 mA current input.

Remote current control flag (/LP_COUNT)

The remote current control flag is an opto-isolated output. It indicates that the lamp current circuitry is being controlled through the HelperCard.

- 0 = control through the HelperCard
- 1 = no control through the HelperCard.



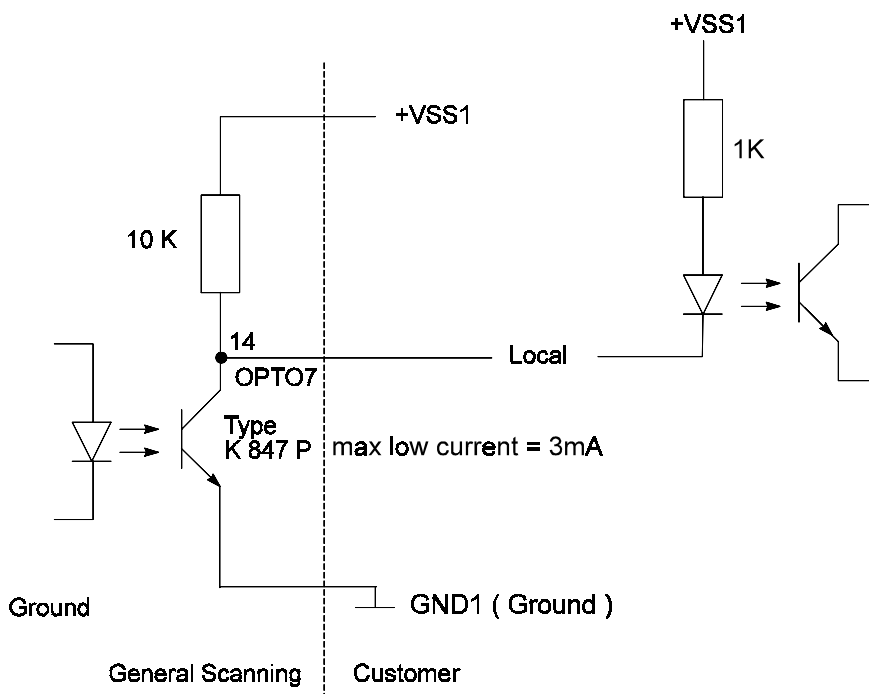
Remote Flag

The remote flag indicates that the mode selection of the HF-driver is used (computer control):

- 0 = Remote
- 1 = Local

This information is available through the HelperCard for application programs (e. g. PC-MARK & JOB EDITOR)

At the same time, the Remote flag is available through an opto-isolator as local flag.

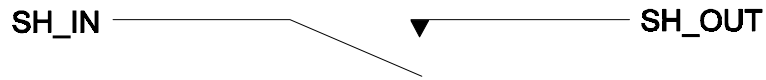


Local = 0V = Remote control through the HelperCard.

Laser safety

To improve the laser safety, the Shutter should be connected in series with SH_IN and SH_OUT.

This enables the Shutter control line only when the computer is switched on.



Contact rating:

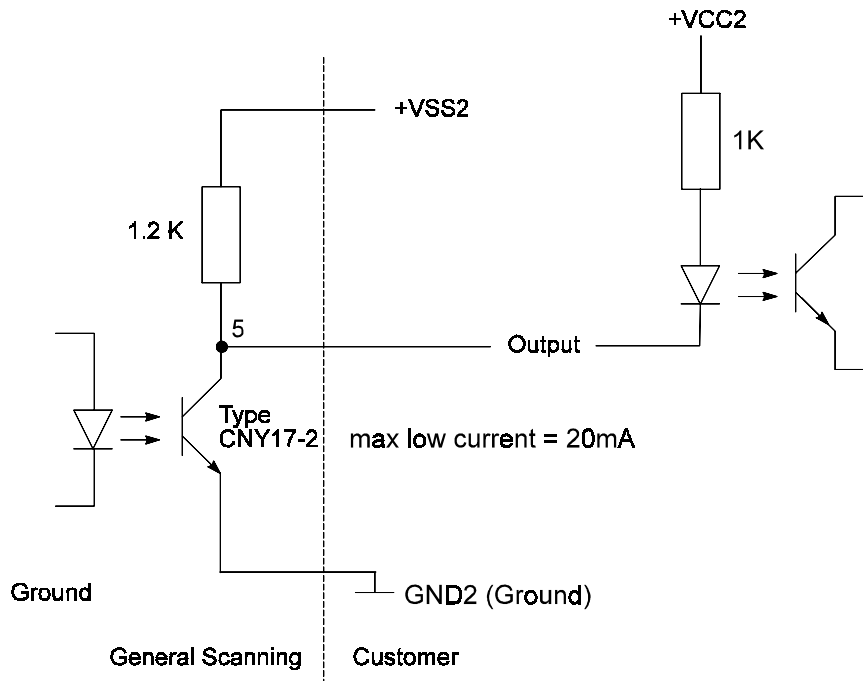
- max. 48V
- max. 0.5A
- switch on resistance max. 200mW

Laser Modulation and First Pulse Suppression

Laser Modulation (LM) and First Pulse Suppression (FPS) outputs have an opto-isolator as driver circuitry.

The external supply +VSS2 may be between +5 V and +18 V relative to GND2.

Configuration of the opto-isolator

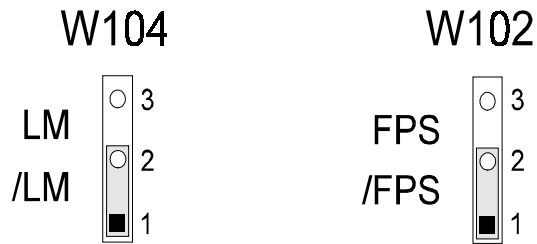


The /LM-signal is opto isolated through the IC OPTO2 and the /FPS signal through the IC OPTO1

Inverting the signals

To meet the need of inverting the signals use bridge W102 for the FPS signal and bridge W104 for the LM-signal.

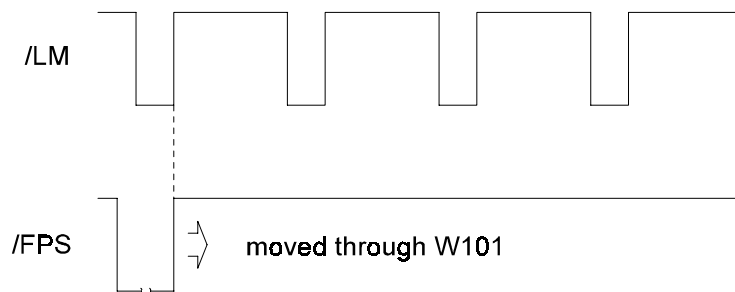
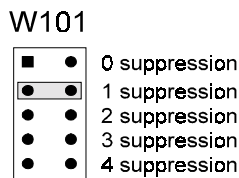
Standard settings for LM and FPS is:



FPS delays

The first pulse suppression can be re configured to a zero, first and second pulse suppression a.s.o. up to a maximum of 4 pulses (with bridge W101).

The default setting is first pulse suppression.



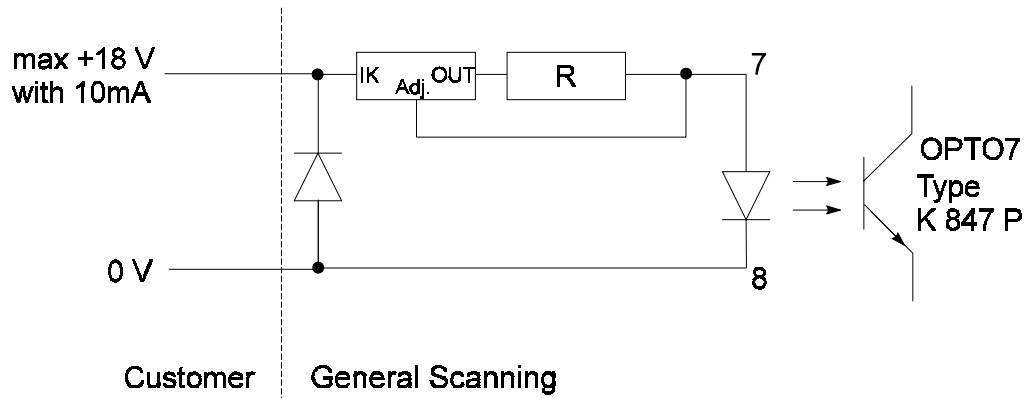
Begin_Mark & Stop_Mark

The STOP_MARK and BEGIN_MARK inputs are opto-isolated.
 The configuration of the opto-isolator is set to react with a minimum of 2.5V between the input lines.
 The maximum voltage between the input line should not exceed 18V.
 The inputs are normally used with an input voltage range from +5 V to 18V.

BEGIN_MARK

The BEGIN_MARK input starts the marking through the application programs (e.g. PC-MARK & JOB EDITOR)

Configuration of the opto-isolator:



STOP_MARK

The rising edge of the input voltage triggers the STOP_MARK function.

Configuration of the opto-isolator:

Error! Objects cannot be created from editing field codes.

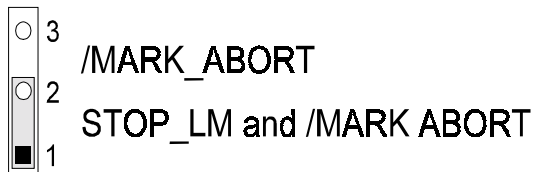
The configuration of the STOP_MARK function can be as follows:

- with the bridge W103 connected between pin 2 & pin 3 used as opto-isolated input for /MARK_ABORT, to stop the marking at the end of the stroke.
- with the bridge W103 connected between pin 1 & pin 2 used to stop the Laser Modulation signal immediately and sets /MARK_ABORT to stop the marking at the end of the stroke.

By using the bridge connected between pin 1 & pin 2 the STOP_MARK input can be used for trimming applications.

The standard setting of bridge W103 is pin 1 to pin 2.

W103



Alarm Flags

All Alarm flags are readable before and after a job is done through the HelperCard from the application programs.

Code definition read back through the HelperCard:

bit	flag
1	/HRP
2	/LFP
3	/MCO
4	/RFO
5	/OPT1
6	/OPT2
7	/OPT3
8	/OPT4

/OPTx= Optional

The bits are always low if they are connected and no alarm flag is set.

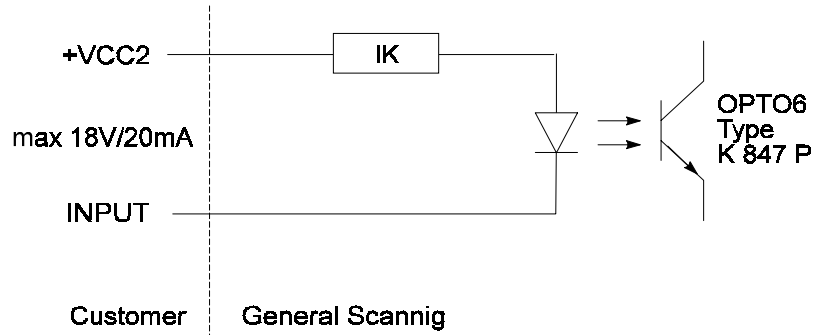
Note:

The optional input flags are only available on request of the customer.

Alarm Flag input

The inputs for the Alarm flags are opto isolated inputs.

The configuration of the inputs are as follows.



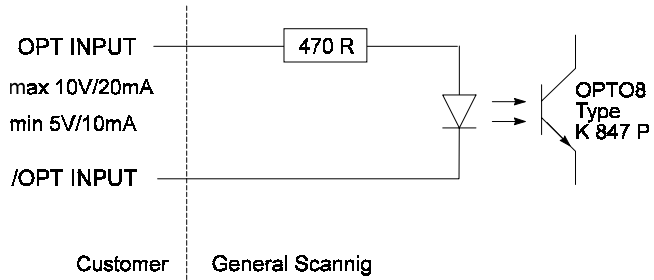
Examples of alarm flags for a Q-switched laser:

Alarm flag	Description
/HRP	high reverse RF power
/LFP	low forward RF power
/MCO	modulator crystal over temperature
/RFO	RF modulator driver (heat sink) over temperature

All alarms are voltage free normally open contacts.
They are closed with no error (closed = healthy, open = on alarm).

Optional input flags

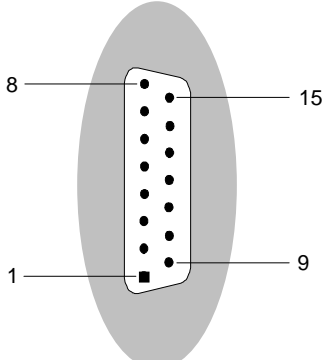
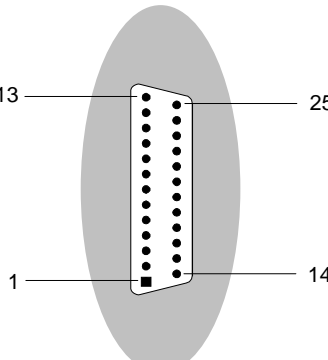
The inputs for the optional input flags are opto-isolated. Configuration of the inputs.



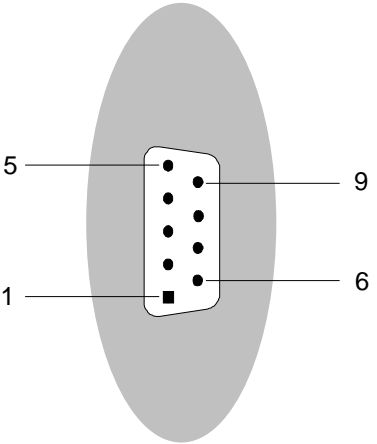
The optional input flags are only available on request of the customer.

Pin-configuration

Standard Pin-configuration

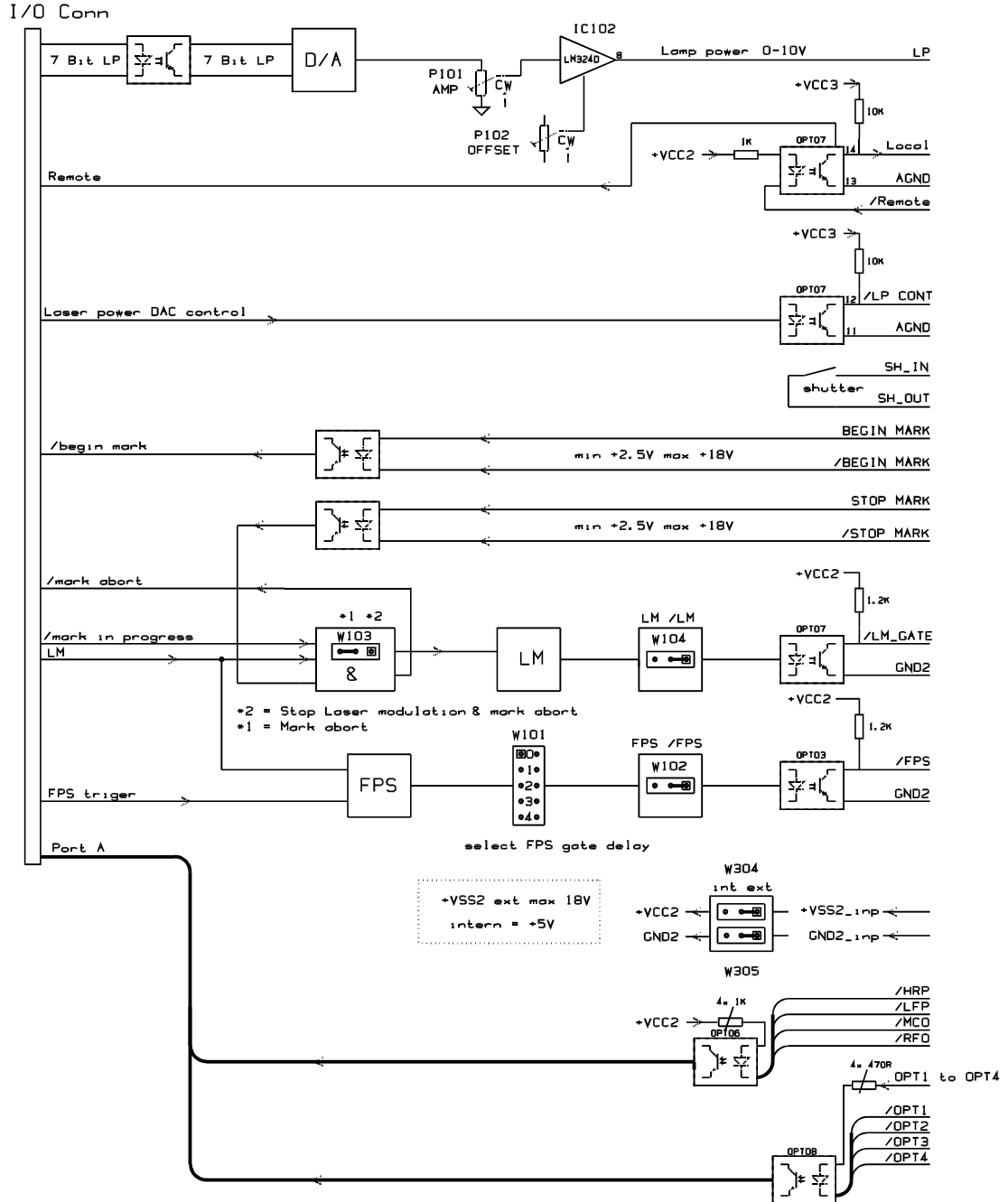
Interface	Pin	Assignment	Notes
 <p>15 Pin D-Sub male connector</p>	1	+VSS1	External input (+15 to +18 V)
	2		
	3	LP	Lamp current (0 to 10 V)
	4	/LP_COUT	0 V = Remote current control
	5	SH_IN	Shutter relay contact
	6	+5 V	+5 V output
	7	BEGIN_MARK	
	8	STOP_MARK	
	9	GROUND1	External input return
	10	LP_RETURN	Signal Ground output
	11	LOCAL	0 V = Remote control
	12	SH_OUT	Shutter relay contact
	13	GROUND	Signal Ground output
	14	/BEGIN_MARK	
	15	/STOP_MARK	
Interface	Pin	Assignment	Notes
 <p>25 Pin D-Sub male connector</p>	1	+VCC2	Pin 1,2,3,4,5 are connected together.
	2	+VCC2	
	3	+VCC2	
	4	+VCC2	
	5	+VCC2	
	6		
	7	/REMOTE	Remote flag
	8	+VSS2	External input (+15 to +18 V)
	9	/HRP	High reverse power flag
	10	/LFP	Low forward power flag
	11	/MCO	Modulator crystal over temp.
	12	/RFO	RF modulator over temp.
	13	GROUND	
	14	XA (+VCC2)	Pin 14 and Pin 15 are for Mode GATED-CW
	15	XB (GROUND)	
	16	/GATE	
	17	/FPS	First pulse suppression
	18	GROUND	
	19		
	20	/REMOTE RETURN	Signal Ground
	21	GROUND	External Ground return
	22	/HRP RETURN	Signal Ground
	23	/LFP RETURN	Signal Ground
	24	/MCO RETURN	Signal Ground
	25	/RFO RETURN	Signal Ground

Pin-configuration of the I/O-2 Add-On Card optional Interface

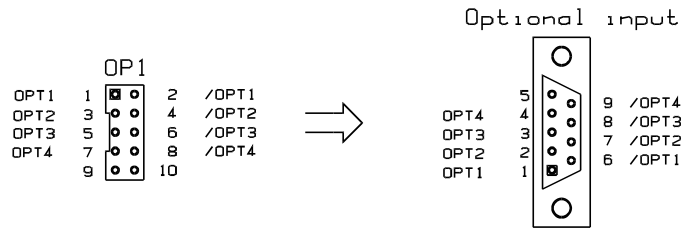
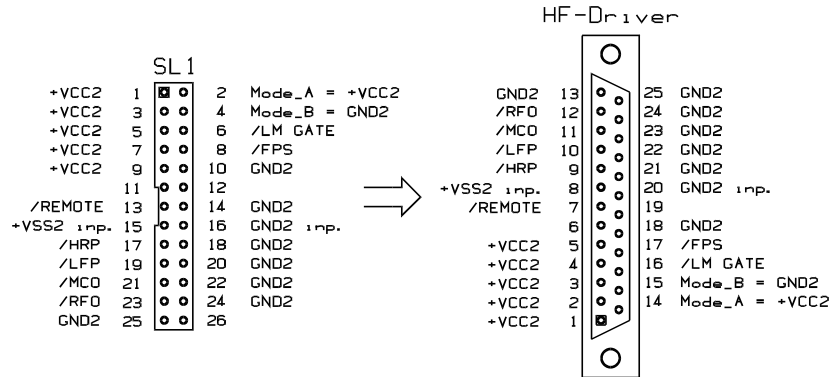
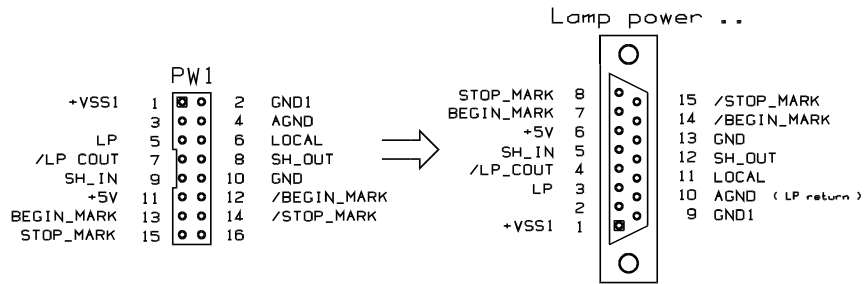
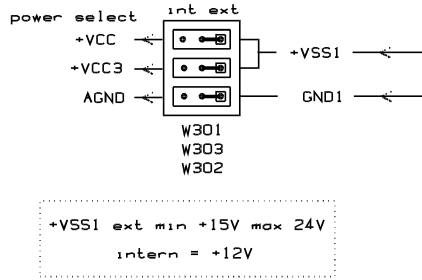
Interface	Pin	Assignment
 <p data-bbox="483 924 787 955">9 Pin D-Sub male connector</p>	<p data-bbox="909 483 933 913">1 2 3 4 5 6 7 8 9</p>	<p data-bbox="990 483 1136 913">OPT1 OPT2 OPT3 OPT4 not connected /OPT1 /OPT2 /OPT3 /OPT4</p>

Circuit drawing of the I/O-2 Add-On Card

Circuit function



Circuit pinning



Appendix

This appendix gives information on the HF-driver and I/O-2 card settings for the use of a Spectron Laser HF-driver

1. Spectron Laser HF-driver

1.1 Mode selection for the Spectron Laser HF-driver.

To control the HF-driver through the HelperCard, it is necessary to select the GATED CW mode on the HF-driver.

This is done with the external mode selection inputs,

- /A = +VCC2
- /B = GND2

When "REMOTE" is selected on the mode switch (HF-driver) then the external mode selection is activated.

2. Input power selection

The standard of the I/O-2 Add-On Card is using:

- external power input +VSS1 (+15 to +18 V) on the 15 Pin D-Sub Connector
+VCC2 (+5 to +18 V) on the 25 Pin D-Sub Connector

To use the computer 12V supply (internal power input) connect the bridges W301 & W302 & W303 from pin 2 to pin 3.

P101 may need to be adjusted if the bridges are changed from external to internal.

Note:

The optional power input selection is only available after a modification of the I/O-2 Add-On Card done by General Scanning or a consultant of GS.