



# SYNRAD Technical Bulletin

# 0001

Technical Issue: Additional Marking Head I/O Capability for SH, DH, and FH Series Marking Heads and for Fenix Laser Markers

Date: 18 October 2000

### Description:

Because of the increasing use of SYNRAD marking heads and WinMark Pro in automated laser marking applications, additional I/O capability is sometimes required to communicate with parts handling controllers such as stand-alone computers or Programmable Logic Controllers (PLC's). Table 1 below shows the I/O capability of each marking head and its associated control card.

**Table 1 Marking Head I/O Capability**

### Marking Head Input/Output (I/O)

Model	Inputs			Outputs (See Note 1)		
	On DAC	On FLCC	Built-in	On DAC	On FLCC	Built-in
<b>SH</b>	<b>8</b> (Input 0-7)	--	--	<b>6</b> (Output 1, 3-7)	--	--
<b>DH</b>	-	<b>6</b> (Input 0-5)	--	-	<b>5</b> (Output 1, 3-6)	--
<b>Fenix</b>	-	<b>6</b> (Input 0-5) See Note 2	<b>4</b> (IN0-3)	-	<b>5</b> (Output 1, 3-6) See Note 3	<b>4</b> (OUT 4-7)
<b>FH</b>	-	<b>6</b> (Input 0-5) See Note 2	<b>4</b> (IN0-3)	-	<b>5</b> (Output 1, 3-6) See Note 3	<b>4</b> (Out 4-7)

Note 1: Output 0 and Output 2 reserved for laser power control.

Note 2: Fiber Link Controller Card (FLCC) Inputs 0-3 are OR'ed with Fenix/FH IN0-IN3 bits. FLCC input bits 4 & 5 provide two additional inputs. FASI Input #3 (IN3) must be on the marking head, not the FLCC.

Note 3: FLCC Outputs 4-6 mirror the state of Fenix/FH OUT4-OUT6 bits. FLCC output bits 1 & 3 provide two additional outputs.

I/O capability may be expanded by adding one or more DAC cards (8 inputs, 6 outputs each) or additional FLCC cards (6 inputs, 5 outputs each) to the computer running WinMark Pro. This is possible because the digital I/O commands in WinMark's Event Builder provide the ability to specify a unique address location for each individual I/O command. Each additional card must be set to an address that does not conflict with the primary DAC or FLCC card controlling the marking head.



**Note:** In applications where an FH Series or Fenix Marking Head is using the Fast Acting Safety Interlock (FASI) feature, the FASI input, IN3, must be connected directly to the marking head input, not the FLCC input.

Tables 2 and 3 below illustrate Input and Output bit relationships between WinMark Pro, DAC and FLCC cards, and FH/Fenix I/O terminals.

**Table 2 Input Table**

WinMark Pro Input	DAC Input	FLCC Input	FH/Fenix Input
Input Bit 0	0	0	IN0
Input Bit 1	1	1	IN1
Input Bit 2	2	2	IN2
Input Bit 3	3	3	IN3
Input Bit 4	4	4	--
Input Bit 5	5	5	--
Input Bit 6	6	--	--
Input Bit 7	7	--	--

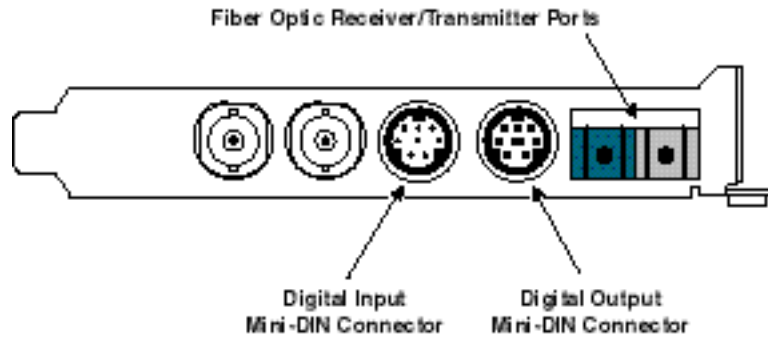
**Table 3 Output Table**

WinMark Pro Output	DAC Output	FLCC Output	FH/Fenix Output
Output Bit 0	--	--	--
Output Bit 1	1	1	--
Output Bit 2	--	--	--
Output Bit 3	3	3	--
Output Bit 4	4	4	OUT4
Output Bit 5	5	5	OUT5
Output Bit 6	6	6	OUT6
Output Bit 7	7	--	OUT7

### FLCC I/O

Figure 1 illustrates the location of input and output connectors on the Fiber Link Controller Card (FLCC).

There is an important difference between FH/Fenix and FLCC I/O that must be considered. Each built-in FH/Fenix input or output has an isolated ground and so can sink or source current. On the FLCC however, five of the six inputs and four of the five outputs are tied to a common ground. In this case the common FLCC inputs can only sink, not source, current.



**Figure 1 Fiber Link Controller Card I/O Ports**

Digital input and output connectors are available from:

Kycon, Inc.  
 1810 Little Orchard St.  
 San Jose, CA 95125  
 USA  
 1-800-544-6941

The input Mini-DIN 8 connector is part number KMDLA-8P. The output Mini-DIN 7 connector is part number KMDLA-7P. Be sure to request assembly instructions.

The FLCC provides six digital input lines, 5 of which share a common ground or return line. The sixth line is referenced to an independent ground or return. The voltage level required to activate, or turn on, inputs is individually user-selectable by jumpers. The factory default, no shorting jumpers installed, enables the high voltage (28 V nominal) input voltage setting. Placing a shorting jumper across any jumper, JP1 through JP6, changes that input to accept a low voltage (5 V nominal) CMOS or TTL input signal. Refer to Table 4 for input signal parameters.

**Table 4 Input Signal Specifications**

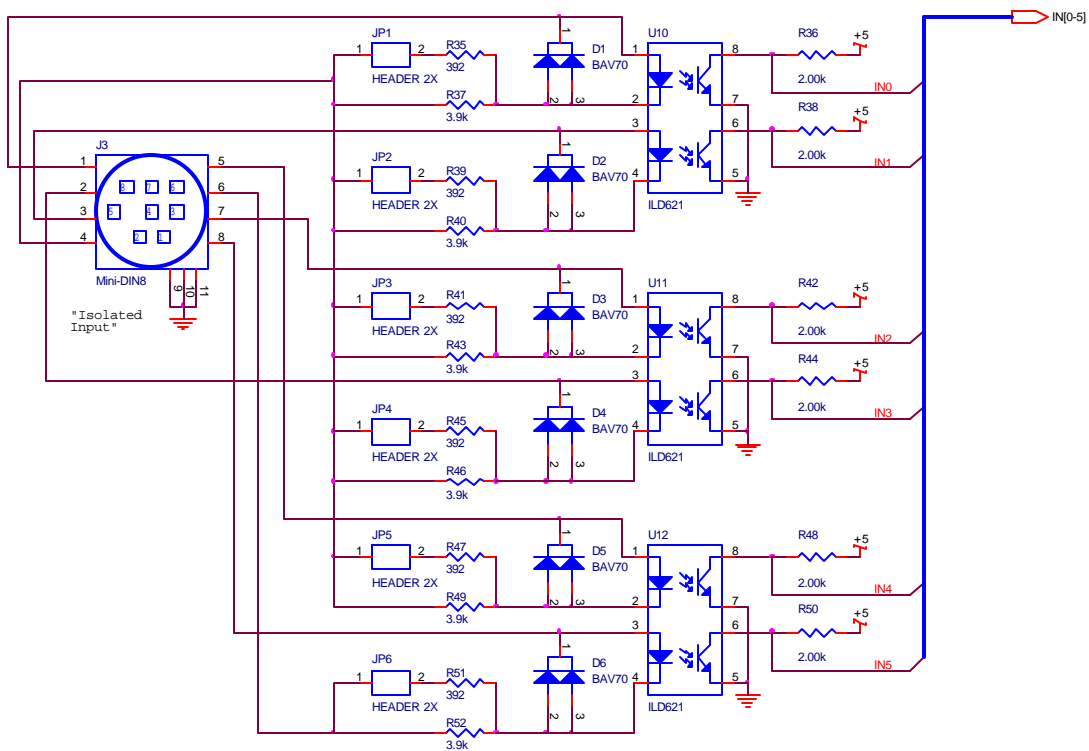
Parameter	Min	Typ	Max
<b>Low Voltage Inputs (CMOS/TTL compatible)</b>			
V <sub>IL</sub> – Low level input voltage	-0.6 V	0 V	1.0 V
V <sub>IH</sub> – High level input voltage	2.0 V	5.0 V	6.0 V
I <sub>F</sub> – LED forward current			15 mA
<b>High Voltage Inputs</b>			
V <sub>IL</sub> – Low level input voltage	-0.6 V	0 V	5.0 V
V <sub>IH</sub> – High level input voltage	15.0 V	28.0 V	40.0 V
I <sub>F</sub> – LED forward current			15 mA

Table 5 shows input connector pin numbers and wire color-coding.

**Table 5 Input Connector Pinouts**

Pin #	Pin Description	Wire Color
1	Input 0	Brown
2	Input 3	Red
3	Input 1	Orange
4	Common Ground (Return) for Inputs 0-4	Yellow
5	Input 4	Green
6	Isolated Ground (Return) for Input 5	Blue
7	Input 2	Violet
8	Isolated Input 5	Grey

The input circuit is shown in Figure 2.



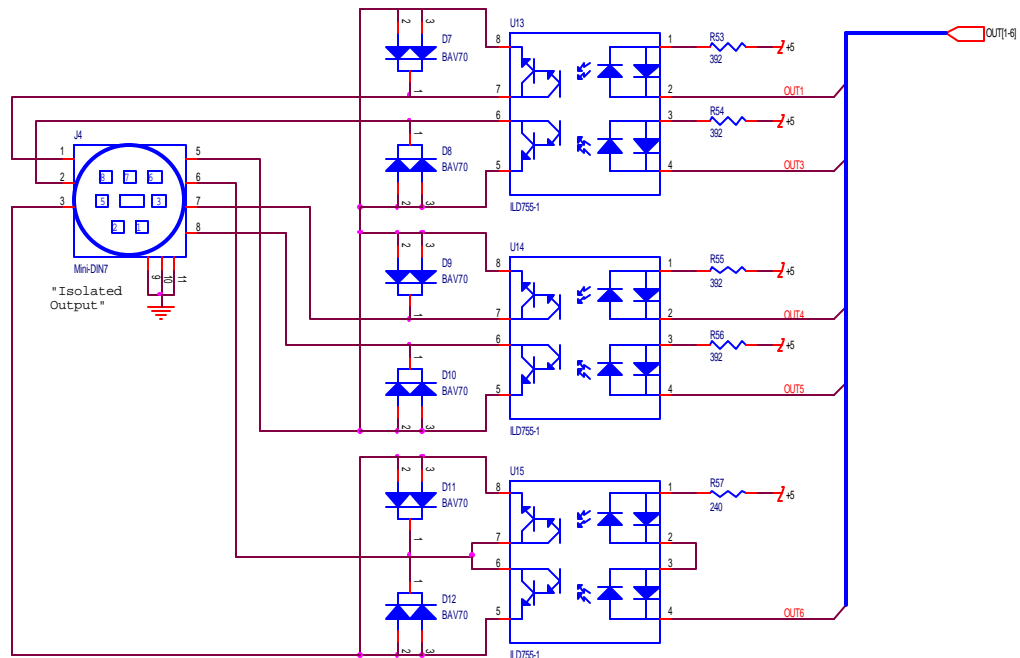
**Figure 2 Digital Input Circuit**

There are five digital output lines, four of which are designed to sink 50 mA of current. The fifth output line is designed to sink 100 mA. Breakdown voltage of the photo-Darlington is 60 V, and  $V_{CE\text{SAT}}$  is 1 V. These outputs are only meant to operate small relays, or toggle inputs on parts handling equipment. Table 6 shows output connector pin numbers and wire color-coding.

**Table 6 Output Connector Pinouts**

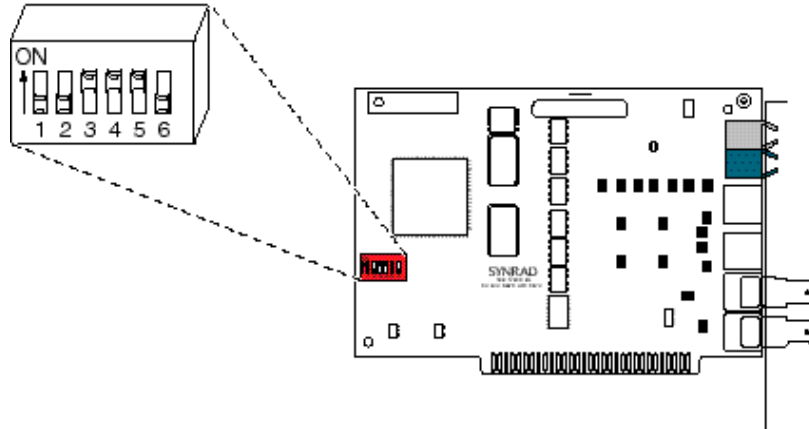
Pin #	Pin Description	Wire Color
1	Output 1	Brown
2	Output 3	Red
3	Isolated Ground (Return) for Output 6	Orange
4	No connection	
5	Common Ground (Return) for Outputs 1, 3-5	Green
6	Output 6	Blue
7	Output 4	Violet
8	Output 5	Grey

The output circuit is shown in Figure 3.



**Figure 3 Digital Output Circuit**

Figure 4 shows the factory default settings of the FLCC's DIP switches.



**Figure 4 DIP switch settings**

The FLCC address is 3x0 hex (816 decimal), where the first four DIP switches set the x value. When using a second FLCC for additional I/O, remember to set an address different from the FLCC controlling the marking head and when configuring I/O in WinMark, you must select the correct FLCC board address in the Event Builder dialog. Table 7 lists factory DIP switch settings.

**Table 7 DIP switch settings**

DIP SW#	Default Switch Position	Switch Function
1	OFF	FLCC address MSB
2	OFF	(Binary address 0011 equals decimal 3)
3	ON	
4	ON	FLCC address LSB
5	ON	Used only with SYNRAD DH Series Marking Heads
6	OFF	Fast Acting Safety Interlock.

### DAC I/O

A CIO-DDA06 Card, available from Computer Boards, Inc. is depicted in Figure 5 and shows required switch and jumper settings. The Wait state is enabled as recommended by the manufacturer. Consult the manufacturer's manual for a complete description of D/A Card performance, signals, and operating requirements.

**Important Note:** All DDA06 Inputs and Outputs are TTL voltage levels only! The Low state ranges from 0 V to 0.45 V; the High state ranges from 2.4 V to 5 V. Consult the board manufacturer for information on cards providing 15–40 V inputs and outputs.

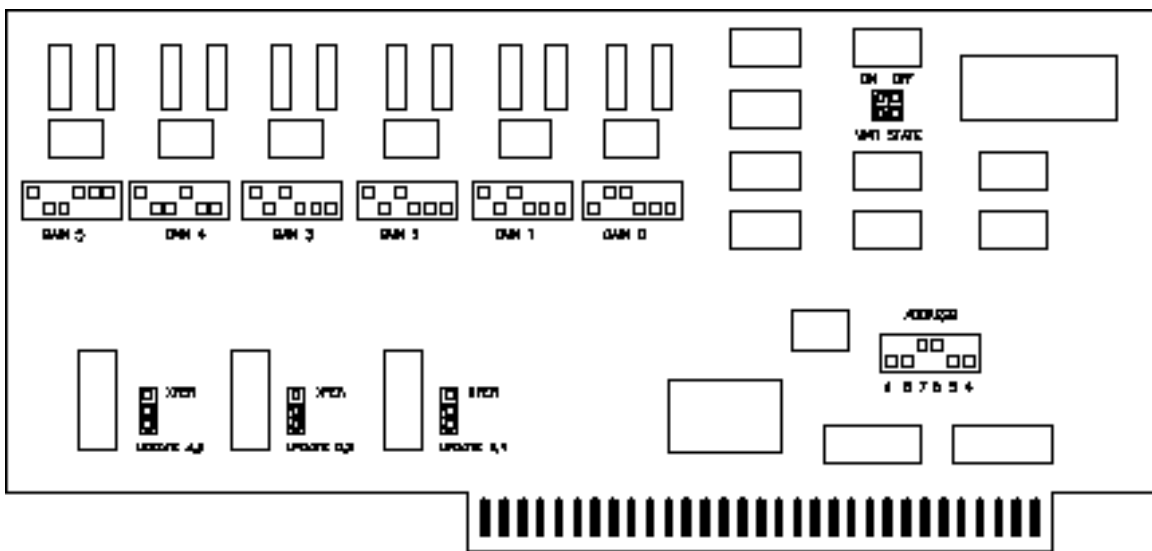


Figure 5 CIO-DDA06 Switch/Jumper Settings

I/O connections to the CIO-DDA06 DAC Card are made through a standard 37-pin D-type female connector that connects to the board's male 37-pin connector. Table 8 shows the DAC card's Input pinouts.

Table 8 Input Pinouts

Pin #	Input Pin
37	0
36	1
35	2
34	3
33	4
32	5
31	6
30	7
11	Ground



Table 9 shows the DAC card's Output pinouts.

**Table 9 Output Pinouts**

Pin #	Output Pin
10	0
9	1
8	2
7	3
6	4
5	5
4	6
3	7
11	Ground

The default DAC address is 330 hex (816 decimal). Refer back to Figure 6 for the Address DIP switch settings. When using a DAC for additional I/O, remember to set an address different from the FLCC controlling the marking head and when configuring I/O in WinMark, you must select the correct DAC board address in the Event Builder dialog. Table 10 lists address DIP switch settings.

**Table 10 DAC Address DIP switch settings**

DIP SW #	Default Switch Position	Decimal Value	Hex Value
9	Dn	512	200
8	Dn	256	100
7	Up	128	80
6	Up	64	40
5	Dn	32	20
4	Dn	16	10

The CIO-DDA06 DAC card is available from:

Computer Boards, Inc.  
44 Wood Avenue  
Mansfield, MA 02040  
Tel: (508) 261-1123  
Fax: (508) 261-1094

For further information contact SYNRAD at: 1-800-796-7231 (in the U.S.) or 1-425-349-3500.