

# SYNRAD Technical Bulletin

# 0010c

Technical Issue: Replacing Fenix with a Fenix Flyer Laser Marker

Date: 09 Jul 2012

## Description:

This Technical Bulletin describes the steps involved when replacing an existing Fenix Laser Marker with a new Fenix Flyer Laser Marker. There are several important differences, so please review this document or the *Fenix Flyer Laser Marker Operator's Manual* for details before proceeding. This Bulletin covers the following topics:

- Mechanical
- Electrical
  - I/O Voltage Levels
  - Marking Head I/O Connector (DB-25)
  - Laser I/O Connector (DB-9)
  - Fenix to Fenix Flyer I/O Conversion
  - Fast Acting Safety Interlock (FASI)
- Communications
  - Ethernet
  - USB
- Start-Up
- WinMark Pro v6.3
  - System Requirements
  - Installation
  - Mark File Adjustments
- Automation Features Available on Fenix Flyer Laser Markers
  - New I/O Features
  - New Control Methods

## Mechanical

On Fenix Flyer Laser Markers, the center of the lens (beam exit) is located 0.10" (2.54 mm) closer to the front end of the marker in relation to the T-slot mounting rails.

## Electrical

### I/O Voltage Levels

**Important Note:** The I/O voltage level for Fenix Flyer Laser Markers is 5 V to 24 VDC. This range differs from the I/O voltage level of previous Fenix Laser Markers. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level between 5 V–24 VDC.



## Marking Head I/O Connector (DB-25)

Table 1 lists pin assignments for Fenix Flyer's DB-25 *Marking Head I/O* connection.

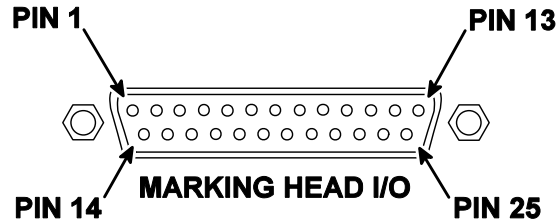
**Table 1 Marking Head I/O (DB-25) pin assignments**

DB-25 Pin #	Signal Name	Signal Description
1	+ 15 V	Internal +15 VDC, 400 mA I/O power supply
2	OUT2–OUT7_B	*B connection point for OUT2 through OUT7
3	OUT6_A	*A connection point for OUT6
4	OUT4_A	*A connection point for OUT4
5	OUT2_A	*A connection point for OUT2
6	OUT1_A	*A connection point for OUT1
7	OUT0_A	*A connection point for OUT0
8	IN0_B	*B connection point for IN0
9	IN1_HI	**High (+V) connection point for IN1
10	IN2_HI	**High (+V) connection point for IN2
11	IN4_A	*A connection point for IN4
12	IN6_A	*A connection point for IN6
13	IN3–IN7_B	*B connection point for IN3 through IN7
14	+ 15 RTN	Return point for internal 15 VDC supply
15	OUT7_A	*A connection point for OUT7
16	OUT5_A	*A connection point for OUT5
17	OUT3_A	*A connection point for OUT3
18	OUT1_B	*B connection point for OUT1
19	OUT0_B	*B connection point for OUT0
20	IN0_A	*A connection point for IN0
21	IN1_LO	**Low (–V) connection point for IN1
22	IN2_LO	**Low (–V) connection point for IN2
23	IN3_A	*A connection point for IN3
24	IN5_A	*A connection point for IN5
25	IN7_A	*A connection point for IN7

\*Bidirectional inputs and outputs are not polarity sensitive—you can connect “A” and “B” connection points to either the low side (– VDC or ground) or high side (+ VDC) of your I/O circuit.

\*\* High-speed (encoder) inputs IN1 and IN2 are polarity sensitive. Connect the high, or positive, side (+ VDC) to the HI connection point. Connect the low, or ground, side (– VDC) to the LO connection point.

Figure 1 shows the physical layout of Fenix Flyer's *Marking Head I/O* connection.



**Figure 1 Physical layout of Fenix Flyer's *Marking Head I/O* connection**

### Internal +15 VDC supply

An internal 15-volt (+15 VDC, 400 mA) isolated power supply is available to drive Fenix Flyer inputs or outputs in lieu of a customer-supplied power source. When powering input/output devices or tracking components such as part sensor and position encoder hardware, remember that the total current demand of these devices cannot exceed 400 mA. On Fenix Flyer's DB-25 *Marking Head I/O* connection, Pin 1 is +15 VDC while Pin 14 is the isolated return side of the supply. Table 2 summarizes +15 VDC pin assignments.

**Table 2 +15 VDC pin assignments**

DB-25 Pin #	Signal Name	Signal Description
1	+ 15 V	Internal +15 VDC, 400 mA I/O power supply
14	+ 15 RTN	Return point for internal 15 VDC supply



### Digital input circuitry

**Important Note:** The I/O voltage level for Fenix Flyer Laser Markers is 5 V to 24 VDC. This range differs from the I/O voltage level of previous Fenix Laser Markers. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level between 5 V–24 VDC.

Fenix Flyer provides eight optoisolated inputs, IN0–IN7, for connecting to external input devices including part sensors, position encoders, relays, and Programmable Logic Controller (PLC) DC output modules. Table 3 summarizes input pin assignments.

**Table 3 Input pin assignments**

DB-25 Pin #	Signal Name	Signal Description	Typical Use
20	IN0_A	*A connection point for IN0	Part sense signal
8	IN0_B	*B connection point for IN0	
9	IN1_HI	**High (+V) connection point for IN1	High-speed input
21	IN1_LO	**Low (–V) connection point for IN1	
10	IN2_HI	**High (+V) connection point for IN2	High-speed input
22	IN2_LO	**Low (–V) connection point for IN2	
23	IN3_A	*A connection point for IN3	Any
11	IN4_A	*A connection point for IN4	Any
24	IN5_A	*A connection point for IN5	Any
12	IN6_A	*A connection point for IN6	Any
25	IN7_A	*A connection point for IN7	Any
13	IN3–IN7_B	*B connection point for IN3 through IN7	

\*Bipolar inputs are not polarity sensitive—you can connect “A” and “B” connection points to either the low side (– VDC or ground) or high side (+ VDC) of your I/O circuit.

\*\* High-speed (encoder) inputs IN1 and IN2 are polarity sensitive. Connect the high, or positive, side (+ VDC) to the HI connection point. Connect the low, or ground, side (– VDC) to the LO connection point.

Inputs IN1\_HI and IN2\_HI are high-speed optoisolated inputs with a maximum input frequency of 40 kHz and are the required inputs when connecting a position encoder for tracking purposes. These inputs are unipolar where IN1\_HI and IN2\_HI always connect to the high (+V) side of the input circuit while IN1\_LOW and IN2\_LOW provide the corresponding isolated low side return. Refer to Table 4 for IN1/IN2 input specifications.

When driving Fenix Flyer’s high-speed encoder inputs, IN1 and IN2, your signal device must be capable of providing the maximum current value shown in Table 4 at the appropriate input voltage. IN1/IN2 input lines are protected by 100 mA self-resetting fuses.

**Table 4 Input signal parameters—IN1/IN2**

DB-25 Pin #	Voltage In (VDC)		Current In, max (mA)				Frequency, max (kHz)
	Logic Low	Logic High	@5V	@12V	@15V	@24V	
IN1/IN2	-0.6 to +1.7	+5.0 to 24.0	9	32	47	90	40

The other six bipolar optoisolated inputs, IN0 and IN3–IN7, have a maximum input frequency of 1 kHz. Input IN0, which normally serves as the part sensor or ‘start mark’ input, has an isolated return line. Inputs IN3 through IN7 share a common return line that allows the user to configure either high-side switching on all five inputs or low-side switching on all five inputs. Refer to Table 5 for IN0 and IN3–IN7 input specifications. When driving Fenix Flyer inputs IN0 and IN3 through IN7, your signal device must be capable of providing the maximum current value shown in Table 5 at the appropriate input voltage. Inputs IN0 and IN3–IN7 are protected by 50 mA self-resetting fuses.

**Table 5 Input signal parameters—IN0, IN3–IN7**

DB-25 Pin #	Voltage In (VDC)		Current In, max (mA)				Frequency, max (kHz)
	Logic Low	Logic High	@5V	@12V	@15V	@24V	
IN0, IN3–IN7	-1.0 to +1.0	+3.0 to 24.0	9	23	29	47	1

**DB-25 input field wiring notes**

In electrically noisy environments, we recommend using shielded, multi-conductor I/O cable as well as a shielded backshell when connecting field wiring to Fenix Flyer’s DB-25 *Marking Head* I/O connector.

To minimize ground loop noise, ground the cable shield at the signal source only. The cable shield at the *Marking Head* I/O connector must be left floating unless you are using Fenix Flyer’s +15 VDC auxiliary power output as the I/O signal source.



### Digital output circuitry

Fenix Flyer provides eight bipolar optoisolated outputs, OUT0–OUT7, for operating low-current relays or Programmable Logic Controller (PLC) DC input modules or other parts handling automation devices. Two outputs, OUT0 and OUT1, have isolated return pins that allow them to function independently as high-side (current sourcing) or low-side (current sinking) switches. The remaining six outputs, OUT2–OUT7, share a common return line that allows the user to configure all six outputs as either high-side switches or low-side switches. Table 6 summarizes output pin assignments while Table 7 shows output signal specifications. Fenix Flyer outputs are able to sink or source 30 mA maximum.

**Table 6 Output pin assignments**

DB-25 Pin #	Signal Name	Signal Description	Typical Use
7	OUT0_A	*A connection point for OUT0	Any
19	OUT0_B	*B connection point for OUT0	
6	OUT1_A	*A connection point for OUT1	Any
18	OUT1_B	*B connection point for OUT1	
5	OUT2_A	**A connection point for OUT2	Any
17	OUT3_A	**A connection point for OUT3	Any
4	OUT4_A	**A connection point for OUT4	Any
16	OUT5_A	**A connection point for OUT5	Any
3	OUT6_A	**A connection point for OUT6	Any
15	OUT7_A	**A connection point for OUT7	Any
2	OUT2–OUT7_B	**B connection point for OUT2 through OUT7	

\*Bipolar outputs are not polarity sensitive—you can connect “A” and “B” connection points to either the low side (– VDC or ground) or high side (+ VDC) of your I/O circuit.

\*\*Bipolar outputs are not polarity sensitive—you can connect “A” and “B” connection points to either the low side (– VDC or ground) or high side (+ VDC) of your I/O circuit; however, OUT2–OUT7 share a common return point so outputs OUT2–OUT7 must all connect to either the low side (– VDC or ground) or high side (+ VDC) — they cannot be mixed.

**Table 7 DB-25 output signal parameters**

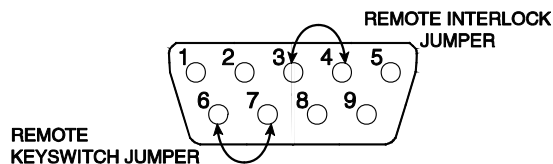
Output Parameter	Specification
Sinking / Sourcing Current, max.	30 mA
Maximum Load Voltage	26 VDC
Output Impedance (On state)	~900 Ohms
Turn-On Time, max.	3.0 ms
Turn-Off Time, max.	0.2 ms
Off State Leakage Current, max.	1.0 $\mu$ A

### Laser I/O Connector (DB-9)

**Important Note:** Signals on the DB-9 *Laser I/O* connector relate only to laser operation; they are not indicative of Flyer marking head operation.

Fenix Flyer’s DB-9 *Laser I/O* connector provides the user with a convenient method of monitoring various laser fault conditions (over temperature, control/RF circuit failure, etc.) and adds remote interlock, remote keyswitch, message output, and remote LED indicator capability. These signals allow you to connect a remote keyswitch, *Lase*, and *Ready* LED indicators to a remote operator’s station or connect a remote interlock safety switch to interlock equipment doors or panels.

A factory-installed jumper plug is attached to the *Laser I/O* connector on each Fenix Flyer to enable normal operation on initial start-up. Two jumpers are wired into the plug as shown in Figure 2. The jumper between Pin 6 and Pin 7 closes the *Remote Keyswitch* input and the jumper between Pin 3 and Pin 4 closes the *Remote Interlock* input. If the jumper plug is removed, then you must connect the appropriate external remote interlock or remote keyswitch circuitry in order to enable lasing. To take advantage of the *Laser I/O* functions described in Table 8, you must manufacture a connecting cable that properly integrates the DB-9 signals into your automated marking system. A spare male DB-9 connector is included with each Fenix Flyer Laser Marker to facilitate cable manufacture.



**Figure 2 Factory-installed DB-9 jumper plug wiring**

**Caution:** Do not ground *Remote Keyswitch* or *Remote Interlock* inputs to external circuits—this will damage Fenix Flyer laser circuitry. Any “dry circuit” (zero voltage) external switches or relay circuitry connected to these inputs must be wired back to the appropriate Pin(s) on the DB-9 *Laser I/O* connector.

**Caution:** Do not apply voltage to the *Remote Interlock* input on DB-9 Pin 3 as this will damage Fenix Flyer’s internal circuitry. The *Remote Interlock* input on Pin 3 is a “dry circuit” (zero voltage) input and must connect only to Pin 2 or Pin 4 to complete the interlock circuit.

Figure 3 shows the physical layout of Fenix Flyer’s DB-9 *Laser I/O* connection while Table 8 explains *Laser I/O* pin descriptions.

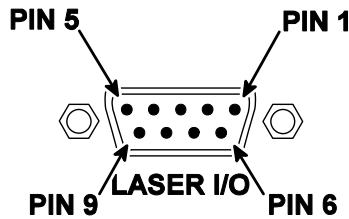


Figure 3 Physical layout of Fenix Flyer’s *Laser I/O* connection

Table 8 Laser I/O pin assignments

DB-9 Pin #	Function	Description
1	Fault Shutdown Output	Indicates failure of internal laser circuitry or existence of laser over temperature (> 60 °C ±2 °C), over voltage, or under voltage fault. This active low signal (referenced to Pin 2 or Pin 4) transitions from +15 V (normal operation) to 0 VDC when a fault occurs. Use this output signal to disable external processes during a fault. See <b>Note 1</b> and Table 10 for output signal specifications.
2	Signal Ground	Signal ground/chassis ground for Pins 1, 3, 5, 8, and Pin 9.
3	Remote Interlock Input	Disables laser output when an interlock switch wired to this input from an equipment door or panel is opened. Ground this input to Pin 2 or Pin 4 only. Do <b>not</b> apply a voltage to this pin—see <b>Note 2</b> and Table 9 for input signal specifications. As shipped, Pins 3 and 4 are connected by the factory-installed DB-9 plug to disable the <i>Remote Interlock</i> function.
4	Signal Ground	Signal ground/chassis ground for Pins 1, 3, 5, 8, and Pin 9.



DB-9 Pin #	Function	Description
5	Message Output	This active low signal (referenced to Pin 2 or Pin 4) transitions from +15 V (normal operation) to 0 VDC when the laser initiates a pre-shutdown temperature warning (when laser temp reaches 54 °C ±2 °C) and remains low until temperature falls 2 °C. Use this output to notify user of need to increase laser cooling or risk laser shutdown. See <b>Note 1</b> and Table 10 for output signal specifications.
6	Remote Keyswitch Input	Connect a remote relay or switch in series with physical <i>Keyswitch</i> to control laser On/Off/Reset functions. Connect Pin 6 to Pin 7 to run; open this connection to halt lasing or reset faults. As shipped, Pins 6 and 7 are connected by the factory-installed jumper plug to disable the <i>Remote Keyswitch</i> function. See <b>Note 2</b> , <b>Note 3</b> , and Table 9 for input signal specifications.
7	Remote Keyswitch Output	Connect Pin 7 to Pin 6 to disable the <i>Remote Keyswitch</i> function (See Pin 6 description above). Pin 7 is at DC line potential (+30 VDC) only when the physical <i>Keyswitch</i> on the rear panel is set to ON. This output is protected by a self-resetting fuse. As shipped, Pins 6 and 7 are jumpered by the factory-installed DB-9 plug. See <b>Note 3</b> , <b>Note 4</b> , and Table 10 for output signal specifications.
8	Remote Lase LED Output	Connect an LED or LED-optoisolator between Pin 8 and Signal Ground for a remote <i>Lase</i> indication. See <b>Note 5</b> , <b>Note 6</b> , and Table 10 for output signal specifications.
9	Remote Ready LED Output	Connect an LED or LED-optoisolator between Pin 9 and Signal Ground for a remote <i>Ready</i> indication. See <b>Note 5</b> and Table 10 for output signal specifications.

- Note 1–** Pin 1 and Pin 5 are active low outputs. Signal specs are— OFF: +15 VDC, 5 mA into 3 kOhm. ON: < 1 VDC, sinking 100 mA.
- Note 2–** We recommend using “dry circuit” (zero voltage) switching because current into Remote Interlock Input and Remote Keyswitch Input connections is negligible.
- Note 3–** Install an external current-limiting resistor, if wiring an LED or LED-optoisolator between Pin 6 & 7 to indicate *Keyswitch* status.
- Note 4–** The Remote Keyswitch Output is protected by a self-resetting fuse. Output is active (+30 VDC, 50 mA max) only if *Keyswitch* is ON.
- Note 5–** Pin 8 or Pin 9 can connect directly to anode of LED or LED-optoisolator without external current limiting devices. Wire LED cathodes to Pin 2 or Pin 4. Output current is internally limited to 11 mA @ 2.4 V maximum.
- Note 6–** The output of Pin 8, the Remote Lase LED Output, is a Pulse Width Modulated (PWM) signal based on the PWM Command input signal. It is **not** a steady state (on/off) output.

**Table 9 Input signal parameters**

DB-9 Pin #	Input Function Name	Input Signal Usage
3	Remote Interlock Input	Connect to Signal Ground (Pin 2 or Pin 4) to enable laser operation. When connecting an external interlock circuit between Pin 3 and Pin 2 (or Pin 4) use “dry circuit” (zero voltage) switches that are capable of handling 30 VDC. Do <b>not</b> apply voltage to this input!
6	Remote Keyswitch Input	Connect to Remote Keyswitch Output (Pin 7) to enable laser operation. When connecting a remote relay or switch between Pin 6 and Pin 7 use relay contacts or switches that are capable of handling 50 mA @ 30 VDC max.

**Table 10 DB-9 output signal parameters**

DB-9 Pin #	Output Function Name	Output Signal Parameters
1	Fault Shutdown Output	Active low output signal. Off: +15 VDC, 5 mA into 3 kOhm; On: < 1 VDC, sinking 100 mA.
5	Message Output	Active low output signal. Off: +15 VDC, 5 mA into 3 kOhm; On: < 1 VDC, sinking 100 mA.
7	Remote Keyswitch Output	50 mA maximum @ 30 VDC. Fused by self-resetting fuse. Output active (+30 VDC) only when <i>Keyswitch</i> is ON.
8	Remote Lase LED Output	Current-limited to 11 mA @ 2.4 VDC maximum. Voltage output is pulse width modulated at input PWM Command signal frequency, <u>not</u> a steady state on/off signal.
9	Remote Ready LED Output	Current-limited to 11 mA @ 2.4 VDC maximum.



### Fenix to Fenix Flyer I/O Conversion Auxiliary Signal terminal conversion

If the *Auxiliary Signal* terminal on your existing Fenix Laser Marker has jumpers installed on RMT KEY and RMT INT connections, then leave the factory-installed DB-9 *Laser I/O* jumper plug on your Fenix Flyer Laser Marker in place.

If you have field wiring connected to the *Auxiliary Signal* terminal on your Fenix marker, then move wiring from the 8-pin *Auxiliary Signal* terminal to the DB-9 *Laser I/O* connector on your Fenix Flyer Laser Marker as described in Table 11 below.

**Table 11 Auxiliary Signal terminal wiring to DB-9 Laser I/O connector**

Fenix Aux. Signal Terminal		Fenix Flyer DB-9 Laser I/O Connector	
Terminal #	Signal Name	Pin #	Signal Name
1	RMT KEY (IN)	6	Remote Keyswitch Input
2	RMT KEY (OUT)	7	Remote Keyswitch Output
3	LASE	8	Remote Lase LED Output
4	GND	2	Signal Ground
5	RDY	9	Remote Ready LED Output
6	GND	2	Signal Ground
7	RMT INT (IN)	3	Remote Interlock Input
8	RMT INT (GND)	4	Signal Ground



### Input Terminal conversion

**Important Note:** The I/O voltage level for Fenix Flyer Laser Markers is 5 V to 24 VDC. This range differs from the I/O voltage level of previous Fenix Laser Markers. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level between 5 V–24 VDC.

If the *Input* terminal on your existing Fenix Laser Marker is unused (no wires are connected) then no further wiring is required to operate your Fenix Flyer Laser Marker.

If you have field wiring connected to the *Input* terminal on your Fenix marker, then move wiring from the 8-pin *Input* terminal to the DB-25 *Marking Head I/O* connector on your Fenix Flyer Laser Marker as described in Table 12 below.

**Table 12 Input terminal wiring to DB-25 Marking Head I/O connector**

Fenix Input Terminal		Fenix Flyer DB-25 Marking Head I/O Connector	
Terminal #	Signal Name	Pin #	Signal Name
1	IN3	23	IN3_A
2	RTN3	13	IN3-IN7_B
3	IN2	10	IN2_HI
4	RTN2	22	IN2_LO
5	IN1	9	IN1_HI
6	RTN1	21	IN1_LO
7	IN0	20	IN0_A
8	RTN0	8	IN0_B



**Output Terminal conversion**

**Important Note:** The I/O voltage level for Fenix Flyer Laser Markers is 5 V to 24 VDC. This range differs from the I/O voltage level of previous Fenix Laser Markers. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level between 5 V–24 VDC.

If the *Output* terminal on your existing Fenix Laser Marker is unused (no wires are connected) then no further wiring is required to operate your Fenix Flyer Laser Marker.

If you have field wiring connected to the *Output* terminal on your Fenix marker, then move wiring from the 8-pin *Output* terminal to the DB-25 *Marking Head I/O* connector on your Fenix Flyer Laser Marker as described in Table 13 or Table 14 below. Use Table 13 when all return lines (RTN4–RTN7) are connected to the I/O circuit’s DC ground or return (when Fenix outputs function as low-side switches and are sinking current) Refer to Table 14 when all output lines (OUT4–OUT7) are connected to the I/O circuit’s DC (V+) voltage supply (when Fenix outputs function as high-side switches and are sourcing current).

**Table 13 Output terminal wiring to DB-25 Marking Head I/O connector—  
all RTN lines grounded (sinking current)**

Fenix Output Terminal		Fenix Flyer DB-25 Marking Head I/O Connector	
Terminal #	Signal Name	Pin #	Signal Name
1	OUT7	15	OUT7_A
2	RTN7	*2	OUT2-7_B
3	OUT6	3	OUT6_A
4	RTN6	*2	OUT2-7_B
5	OUT5	16	OUT5_A
6	RTN5	*2	OUT2-7_B
7	OUT4	4	OUT4_A
8	RTN4	*2	OUT2-7_B

\*On the Fenix Flyer DB-25 *Marking Head I/O* connector, outputs OUT2-OUT7 share a common return—OUT2-7\_B on Pin 2. This wiring scheme assumes that RTN4-RTN7 are all tied to the I/O supply’s DC ground or return side (Fenix Flyer outputs are sinking current).



Use Table 14 when all output lines (OUT4–OUT7) are connected to the I/O circuit's DC voltage supply (V+).

**Table 14 Output terminal wiring to DB-25 Marking Head I/O connector— all RTN lines tied to V+ (sourcing current)**

Fenix Output Terminal		Fenix Flyer DB-25 Marking Head I/O Connector	
Terminal #	Signal Name	Pin #	Signal Name
1	OUT7	*2	OUT2-7_B
2	RTN7	15	OUT7_A
3	OUT6	*2	OUT2-7_B
4	RTN6	3	OUT6_A
5	OUT5	*2	OUT2-7_B
6	RTN5	16	OUT5_A
7	OUT4	*2	OUT2-7_B
8	RTN4	4	OUT4_A

\*On the Fenix Flyer DB-25 *Marking Head* I/O connector, outputs OUT2-OUT7 share a common return—OUT2-7\_B on Pin 2. This wiring scheme assumes that OUT4-OUT7 are all tied to the I/O supply's positive DC (V+) side (Fenix Flyer outputs are sourcing current).

If your existing Fenix outputs are mixed, for example—one or more outputs are tied to the high (V+) side AND one or more outputs are tied to the low side (return or I/O supply's DC ground)—the following wiring options are available:

- A** Fenix Flyer supports bipolar outputs—OUT0 and OUT1. If one or two of your existing Fenix outputs are wired to the high (V+) side—sourcing current—and the other two or three outputs are wired to the low (return) side—sinking current—then wire those one or two outputs to Fenix Flyer outputs OUT0 and OUT1 and wire the other outputs as shown in Table 13.

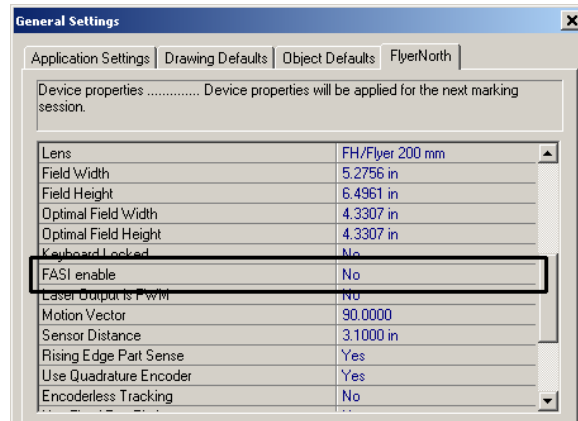
If one or two of your existing Fenix outputs are wired to the low (return) side—sinking current—and the other three or two outputs are wired to the high (V+) side—sourcing current—then wire those one or two outputs to Fenix Flyer outputs OUT0 and OUT1 and wire the other outputs as shown in Table 14.

- B** Re-wire your output circuit(s) so that all outputs are tied high and share a common return OR wire your circuit so that all outputs are tied low and share a common return.

**Note:** For cases A or B above, you must change mark file automation accordingly.

## Fast Acting Safety Interlock (FASI)

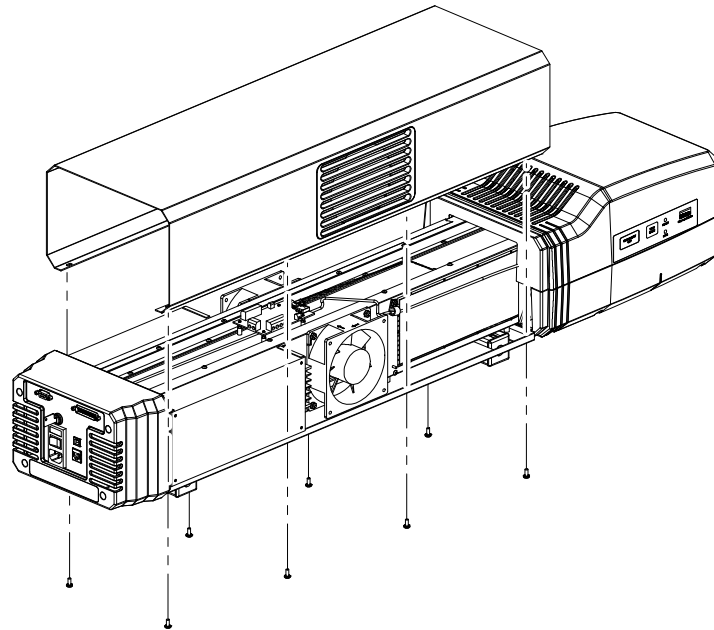
On previous Fenix Laser Markers, the Fast Acting Safety Interlock (FASI) was enabled by setting a DIP switch on the Fiber Link Controller Card (FLCC). Because Fenix Flyer Laser Markers are USB/Ethernet devices, they do not use, or require, FLCC cards. To enable or disable FASI for a Fenix Flyer marker, refer to the directions below. Note that WinMark Pro v6.3 shows the current FASI state (*FASI Enable*) on the Tools / General Settings... / “Flyer” tab (see Figure 4). If you have previously named your Fenix Flyer head, the tab name will display Flyer’s current “device name” (in this example, the device name is “FlyerNorth”).



**Figure 4 Current FASI state displayed in WinMark Pro v6.3**

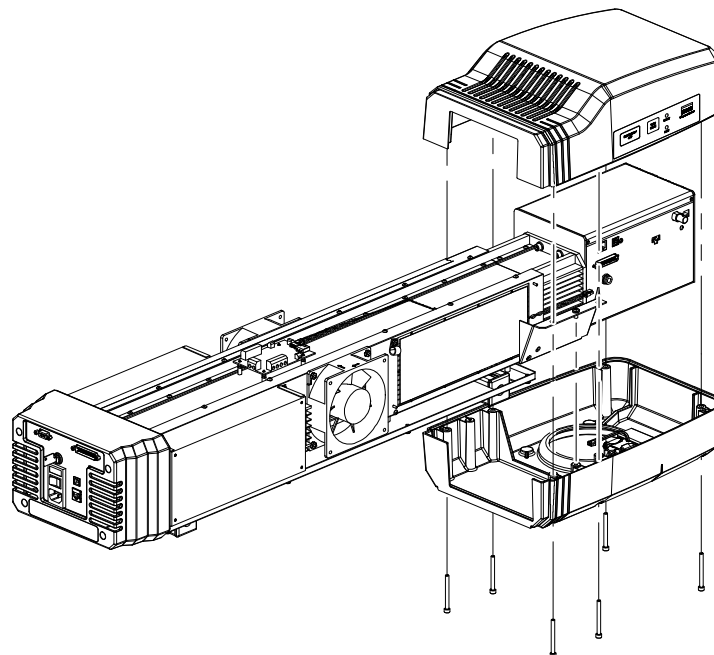
### Step A – Access Fenix Flyer’s marking head assembly

- A1** Remove AC power from the Fenix Flyer Laser Marker by disconnecting the *AC Line Cord*.
  
- A2** See Figure 5 and loosen the Fenix Flyer body cover by removing eight (8) Phillips head screws located along the bottom edges of the chassis. Remove the cover by spreading the left and right sides apart far enough to clear the internal chassis as you lift it off.



**Figure 5 Removal of the Fenix Flyer body cover**

**A3** See Figure 6 and remove the two-piece front cap by removing six (6) Allen head capscrews holding the two halves of the front cap together. Screw access is from the lens side (bottom) half of the cap.



**Figure 6 Removal of the two-piece Fenix Flyer front cap**



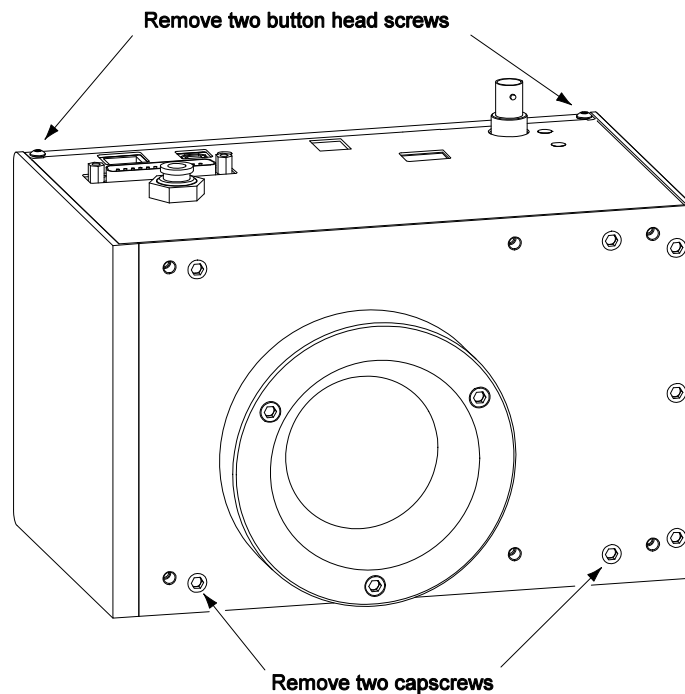
**Caution:** The upper front cap is connected to the Flyer marking head by two (2) cables. Take care to not damage or dislodge the cables as you lift and stow the upper front cap.

**A4** Carefully lift the upper half of the front cap up and away from the chassis. Place it on top the Fenix Flyer chassis and secure it temporarily. The cap is connected to the Flyer marking head by two cables. Do not damage or dislodge the cables!.

**A5** Remove two (2) Phillips screws holding the lower half of the front cap to the chassis.

### Step B – Access the FASI function switch

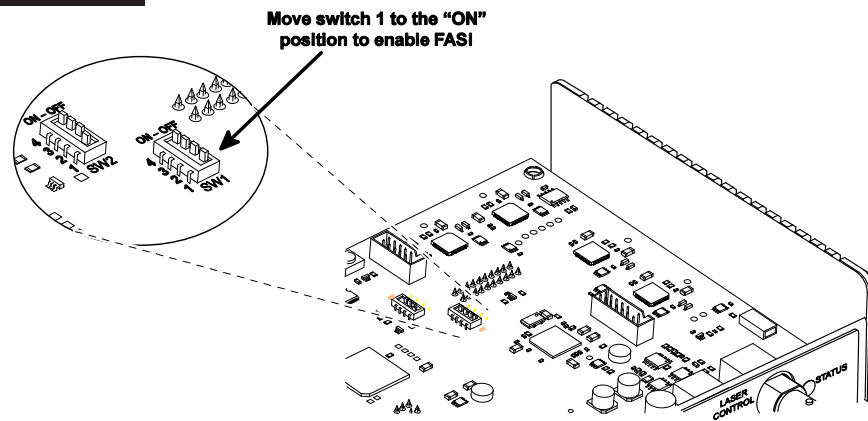
**B1** Refer to Figure 7 and withdraw two button head Allen screws and two Allen head capscrews at the locations shown to remove Flyer's upper cover.



**Figure 7** Opening Flyer to enable/disable FASI

**B2** Ground yourself by keeping one hand in constant contact with Flyer's lower metal cover.

**B3** Locate the DIP switch bank labeled SW1 on the CPU board (see Figure 8) and move Switch # 1 to the "ON" position.



**Figure 8 Flyer DIP switch locations**

- B4** Do not change any other DIP switch settings; all switches must remain at their default settings!
- B5** Carefully replace Flyer's upper cover and tighten the screws removed in Step B1. Ensure that no cables are pinched or disturbed as the cover is replaced.
- B6** Carefully replace Fenix Flyer's front cap and body cover by reversing the order of Steps A1 through A5. Ensure that no cables are pinched or disturbed as the cover is replaced.
- B7** To enable lasing with FASI switched "On", apply a 5 V–24 VDC signal to Fenix Flyer input IN3.

When FASI is enabled, IN3 must be active before the laser will fire. If the FASI feature is enabled, but IN3 is inactive (no current flow), then no marking will occur. In FASI mode, even manual firing of the laser using the *Test Mark* pushbutton requires an active input signal on IN3.

## Communications

Fenix Flyer Laser Markers communicate to WinMark Pro through an Ethernet or USB port connection; there is no provision for a fiber optic interface.

### Ethernet

Fenix Flyer Laser Markers can communicate with the WinMark Pro computer over an Ethernet or USB communications link; however, an Ethernet connection is required if Fenix Flyer will operate over a network in WinMark control mode or access a network share file in Stand-alone mode.

***In manufacturing environments we highly recommend the use of Ethernet communications instead of USB. The Ethernet protocol is better designed for noise immunity and error-free data transfer between devices.***



### **Ethernet crossover cable**

An Ethernet crossover cable (included in the ship kit) is required when connecting Fenix Flyer directly to a computer using a peer-to-peer connection. To connect the *Ethernet Crossover* cable, perform the following steps:

- 1 Remove AC power from the Fenix Flyer Laser Marker.
- 2 Locate the *Ethernet Crossover* cable in the ship kit. This shielded CAT 5e Ethernet cable is approximately 3 meters (10 ft) long with RJ45 plugs on each end.

**Important Note:** The Ethernet cable included in the ship kit is a shielded crossover-type cable. If your application requires a straight-thru (patch) cable or you supply your own crossover cable, be sure the Ethernet cable is an industrially-shielded CAT 5e or CAT 6 cable.

**Note:** When connecting to a local network, use a straight-thru (patch) Ethernet cable between Fenix Flyer and your Ethernet router or hub.

- 3 Connect the crossover cable between your computer and Fenix Flyer's *Ethernet* port.

### **Peer-to-peer Ethernet configuration**

Fenix Flyer Laser Markers are pre-configured at the factory to a fixed address of 192.168.100.100 that allows you to make a simple peer-to-peer Ethernet connection, which eliminates the need to first establish a USB connection and pre-set network settings.

The procedure described below may require the assistance of your IT Department because your computer's Ethernet settings are determined by your facility's computer network. This procedure requires a connection to a computer with a static IP address that is not connected to a local network. To setup Fenix Flyer for the Ethernet using a peer-to-peer Ethernet connection, perform the steps in the following sections:

#### **Set your computer's static IP address**

- 1 Disconnect the WinMark computer from your local network.
- 2 Turn off Dynamic Host Configuration Protocol (DHCP), if enabled, and create a static IP address for your computer:

**Note:** The exact steps may vary depending on your operating system.

- a From the *Start* menu, go to *Settings* and choose *Network Connections*.
- b Double-click on the appropriate Local Area Network (LAN).
- c Locate the LAN's *Internet Protocol (TCP/IP)* properties.
- d Select "Use the following IP address:" and enter the following information:  
IP Address: 192.168.100.101  
Subnet Mask: 255.255.255.0
- e Click *OK* to apply the changes.

### Connect to the Fenix Flyer Laser Marker

- 1 Connect Fenix Flyer to your computer using an Ethernet crossover cable.
- 2 Power up Fenix Flyer and wait 30 seconds for the head to boot-up.
- 3 Open WinMark Pro.
  - a If the *Device Simulation* dialog opens, click “Enter IP Address for Flyer Head”, click in the text box and type 192.168.100.100, and then click *OK*.
  - b If WinMark Pro launches, go to the *Devices* menu and select Connect to Ethernet Flyer. In the *Select Ethernet Flyer IP Address* dialog, click in the text box and type 192.168.100.100, and then click *OK*.

For Ethernet related information, refer to the *Fenix Flyer CO<sub>2</sub> Laser Marker Operator’s Manual, v2.1*. See *Ethernet configuration* in the Getting Started chapter for information about connecting to a network and setting up Ethernet security. To set-up a network share folder, see the *WinMark Pro/FH Flyer interface* section in the Stand-alone Operation chapter and review the *Flyer web interface* section in the Technical Reference chapter for details on accessing Flyer’s web page.

## USB

Use the Universal Serial Bus (USB) cable to establish a communications link between Fenix Flyer and your Windows<sup>®</sup> development workstation.

**Important Note:** Install WinMark Pro v6 ***before*** you connect Fenix Flyer to your computer’s USB port and power it up. If WinMark Pro is not installed first, the Windows<sup>®</sup> operating system will arbitrarily assign a USB driver that is ***not*** compatible with Fenix Flyer’s USB port protocols.

**Important Note:** ***After project development is complete, we highly recommend the use of Ethernet communications instead of USB in production situations where you are operating in WinMark control mode. The Ethernet protocol is better designed for noise immunity and continuous data transfer between devices.***

To connect the *USB* cable, perform the following steps:

- 1 Locate the *USB* cable in the ship kit. This double-shielded cable is approximately 1.8 meters (6 ft) long with a USB “A” plug on one end and a USB “B” plug on the other.

**Important Note:** If you provide your own USB cable, you must ensure that it is double-shielded. Do not use unshielded or single-shielded cables in industrial environments!

- 2 Plug the USB “A” connector (the flat rectangular end) into one of the USB “A” ports on your computer.
- 3 Plug the USB “B” connector (the square end) into the *USB* port on the rear of the Fenix Flyer Laser Marker.



**Note:** When both USB and Ethernet cables are connected, the *USB* port takes precedence over the *Ethernet* port for control purposes.

It is not necessary to power down Fenix Flyer or your computer when connecting or disconnecting the *USB* cable; the USB protocol allows the ability to “hot plug” USB devices.

## Start-Up

Apply AC power to Fenix Flyer to start the 25–30 second boot-up sequence. There is no external indication that the marking head is ready after the 30-second boot sequence.

Cycling the *Keyswitch* (or *Remote Keyswitch*) after AC power is applied causes the *Ready* LED to illuminate green, which signals only that the laser is ready for operation.

## WinMark Pro v6.3

When operating a Fenix Flyer Laser Marker, you must use WinMark Pro v6.3 or later. WinMark Pro version 6.x software is not tested or recommended for older Fenix markers using a PCI-bus Fiber Link Controller Card (FLCC).

## System Requirements

WinMark Pro v6.3 Laser Marking Software has the following minimum requirements. See the Microsoft web site for a list of minimum hardware requirements for your particular OS.

- Windows® 7, Windows® Vista, or Windows® XP Operating System
- 16-MB RAM
- 30-MB Available Hard Drive Space
- CD-ROM Drive
- Two Open USB Ports

## Installation

Refer to Chapter 2 – Installation in the *WinMark Pro User Guide, v6.3*, for installation or upgrade instructions.



## Mark File Adjustments

### Object Delays

Because Fenix Flyer's optical scanners exhibit a quicker response time than previous Fenix markers, you will need to adjust marking delays in existing mark files. If you have performed a clean install, recommended delay values will appear on the *Marking* tab when a *New* file is opened. As a starting point, use the values below to obtain the best quality marks. Some experimentation is required to optimize mark quality.

<i>Pline Start Delay</i>	—	0 $\mu$ s
<i>Pline End Delay</i>	—	200 $\mu$ s
<i>Interseg Delay</i>	—	75 $\mu$ s
<i>Off Vector Delay</i>	—	250 $\mu$ s
<i>Off Vector Velocity</i>	—	200 in/sec

### Drawing Automation

If your pre-existing output wiring was changed to accommodate Fenix Flyer's common return scheme for OUT2 through OUT7 (OUT2-7\_B on Pin 2), then modify your mark file automation as required.

## Automation Features Available on Fenix Flyer Laser Markers

Fenix Flyer markers incorporate many new features compared to previous Fenix Laser Markers. The following paragraphs briefly describe a few of Fenix Flyers advanced operating capabilities when used in conjunction with WinMark Pro v6.3 or later.

### New I/O Features

#### Enable Abort Input (Input 7) property

Use the *Enable Abort Input (Input 7)* property to configure input IN7 in one of two ways – as a normal input read by WinMark Pro or as an 'abort marking' input controlled by your automation controller.. See the *WinMark Pro User Guide, v6.3* for details.

#### Enable Marking Head Ready Output (Output 6) property

When the *Enable Marking Head ready Output (Output 6)* property is set to Yes, Fenix Flyer output OUT6 activates when the Fenix Flyer head is booted up and ready to accept commands. See the *WinMark Pro User Guide, v6.3* for details.

#### Switch IO Output 7 property

The *Switch IO Output 7* property allows you to configure output OUT7 in one of two ways – as a normal output controlled by WinMark Pro or as an over-temperature warning. See the *WinMark Pro User Guide, v6.3* or the *Fenix Flyer CO<sub>2</sub> Laser Marker Operator's Manual, v2.1* for details.



## New Control Methods

### **Circular File feature (WinMark control mode)**

For Fenix Flyer/WinMark Pro applications marking files with text objects where *Auto Text Type* set to *Disk File text (Seq)* or *Disk File Text (Fixed)*, the Fenix Flyer head allows you to sequentially read up to ten specially named data (.TXT) files. This feature provides the ability to update network data files using a third-party software process while WinMark is marking the current data file contents. See the *WinMark Pro User Guide, v6.3* for details.

### **Stand-alone control mode**

In addition to the normal method of operating Fenix Flyer using WinMark Pro (WinMark control mode) or a custom ActiveX application running on a personal computer, the Stand-alone feature (Stand-alone control mode) allows Fenix Flyer to operate autonomously—communicating to automation equipment using discrete I/O signals—with no connection to the WinMark computer. See the *Fenix Flyer CO<sub>2</sub> Laser Marker Operator's Manual, v2.1* for details.

### **Stand-alone, Master Control File operation**

When Fenix Flyer is configured to operate in Master Control File mode, the head loads and reads a text file named *master.ctf* on boot-up. The Master Control File's keyword-based text script instructs the Flyer head to load and mark multiple mark files (stored in the head's Filestore or on a network share) in an order determined by Fenix Flyer's input bit status, which is set/cleared by the PLC. This feature allows a PLC or other type of automation controller to control marking of many different mark files non-sequentially without the need for a Windows-based user interface. See the *Fenix Flyer CO<sub>2</sub> Laser Marker Operator's Manual, v2.1* for details.

### **Modbus I/P protocol**

Fenix Flyer Laser Markers running firmware version 3.08 or above have the ability to be controlled by Modbus-capable devices like Programmable Logic Controllers (PLCs) to eliminate the need for a Windows<sup>®</sup> PC on the Production floor.

There are two options for implementing the Modbus I/P protocol on Fenix Flyer Laser Markers. The first option is a basic set of register-based commands using Modbus function codes 3, 4, 6, and 16 that are supported by many PLCs. The second option is an extended set of commands using a Modbus user-defined function code in the range of 65–72 or 100–110. This extended (user-defined) command set includes advanced Filestore and head management options, but is less widely supported by PLC manufacturers.

Using the Modbus protocol, a PLC can perform operations such as reading input/output status and writing outputs, start/stop a mark session, read (get) mark status, load Filestore or network mark files into RAM for marking, get/set mark file properties, and get/set Flyer head parameters.

For complete details on the Modbus I/P protocol, see the *Fenix Flyer CO<sub>2</sub> Laser Marker Operator's Manual, v2.1* and WinMark Pro Application Note #05g, located on the WinMark Pro web site at [http://www.winmark.com/products/winmark\\_ApplicationsNotes.html](http://www.winmark.com/products/winmark_ApplicationsNotes.html). Application Note #05g describes all the information necessary to control a Fenix Flyer marker using register-based or user-defined Modbus protocols.

For further information contact SYNRAD at 1.800.796.7231; outside the U.S., dial +1.425.349.3500 or email us at [synrad@synrad.com](mailto:synrad@synrad.com).