



# SYNRAD Technical Bulletin

# 0009e

Technical Issue: Replacing FH Index/Tracker with an FH Flyer Marking Head

Date: 09 July 2012

## Description:

This updated Bulletin describes the steps involved when replacing an existing FH Series Index or Tracker head with an FH Flyer marking head. There are several important differences, so please review this document or the *FH Flyer Marking Head Operator's Manual, v3.2* for details before proceeding.

This Bulletin covers the following topics:

- Mechanical
  - Mounting
  - Beam Position
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  - I/O Voltage Levels
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- Automation Features Available on Flyer Marking Heads
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## Mechanical

### Mounting

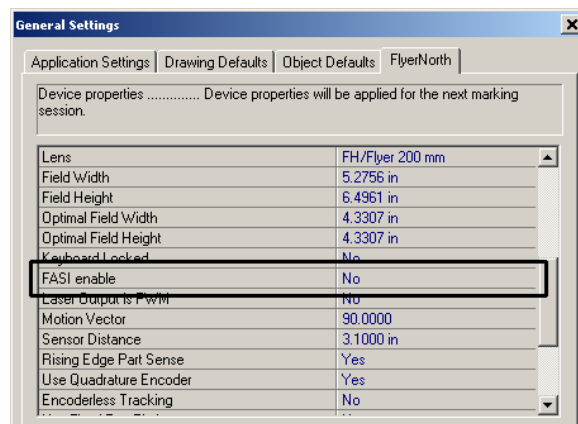
Overall length of the Flyer head has increased by 0.07" due to the addition of a finned heat-sink. Dimensions are 8.45" L x 6.15" H x 5.40" W (including focusing lens mount).

## Beam Position

When mounted to an existing SYNRAD *L-bracket*, the center of Flyer's beam exit is located 0.10" away from the center of the Index/Tracker mark field in the -X direction (to the right, away from the L-bracket, when facing Flyer's membrane panel). If the Index/Tracker *L-bracket* is replaced with a Flyer *L-bracket* (SYNRAD part number 130-18113-02), the center of the mark field is identical; no offset of the part or mark file is required.

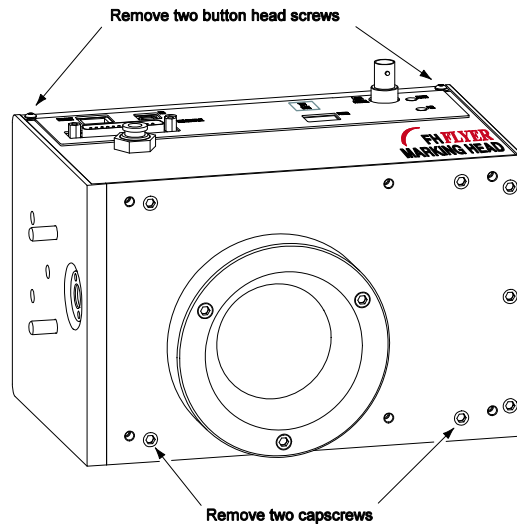
## Electrical FASI

On previous FH Index/Tracker marking heads, the Fast Acting Safety Interlock (FASI), was enabled by setting a DIP switch on the Fiber Link Controller Card. To set FASI for an FH Flyer head, 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 1). If you have previously named your Flyer head, this tab name will display Flyer's current "device name".



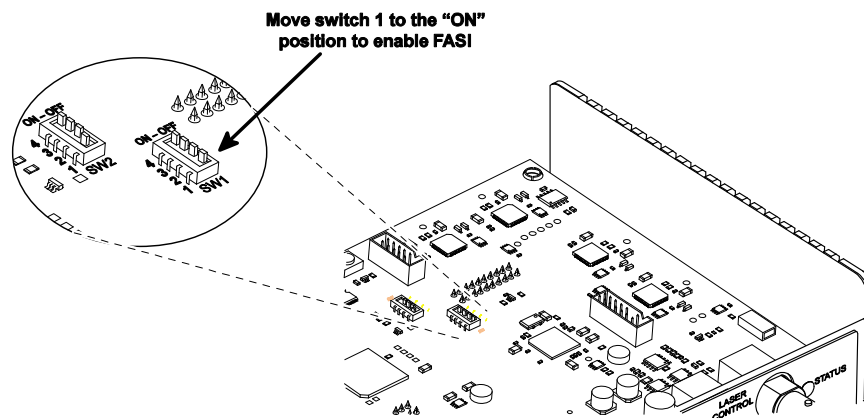
**Figure 1 Current FASI state displayed in WinMark v6.3**

- 1 Remove DC power from the Flyer head or disconnect the *DC Power* cable.
- 2 Refer to Figure 2 and withdraw two button head Allen screws and two Allen head capscrews at the locations shown to remove Flyer's upper cover.



**Figure 2 Opening Flyer to enable FASI**

- 3 Ground yourself by keeping one hand in constant contact with Flyer's lower metal cover.
- 4 Locate the DIP switch bank labeled SW1 on the CPU board (see Figure 3) and move switch # 1 to the "ON" position.



**Figure 3 Flyer DIP switch locations**

- 5 Do not change any other DIP switch settings; all switches must remain at their default settings!

- 6 Carefully replace Flyer's upper cover and tighten the screws removed in Step 1. Ensure that no cables are pinched or disturbed as the cover is replaced.
- 7 To enable lasing with FASI switched "On", apply a 5 V–24 VDC signal to 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.

## I/O Voltage Levels

**Important Note:** The voltage level for FH Flyer inputs is between 5 V and 24 VDC. Note that this range differs from the input voltage range of previous FH Series marking heads. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level of 5 V–24VDC.



## User Interface Connector (DB-25)

Table 1 lists pin assignments for Flyer's DB-25 *User Interface* connection.

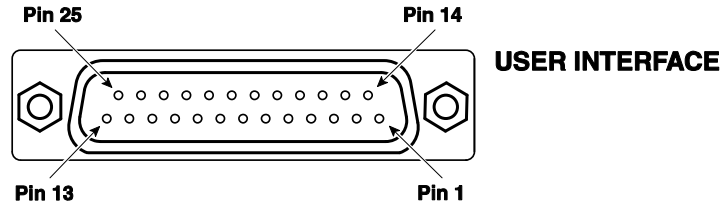
**Table 1 User Interface pin assignments**

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 4 shows the physical layout of FH Flyer's *User Interface* connection.



**Figure 4 Physical layout of Flyer's User Interface connection**

### Internal +15 VDC supply

An internal 15-volt (+15 VDC, 400 mA) isolated power supply is available to drive FH 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 Flyer's *User Interface* 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 voltage level for FH Flyer inputs is between 5 V and 24 VDC. Note that this range differs from the input voltage range of previous FH Series marking heads. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level of 5 V–24VDC.

FH 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 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 FH Flyer input signal parameters—IN1/IN2**

Input #	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. 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 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 FH Flyer input signal parameters—IN0, IN3–IN7**

Input #	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

**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 Flyer's DB-25 *User Interface* connector.

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





### Digital output circuitry

FH 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. FH 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 FH Flyer output signal parameters

<b>Output Parameter</b>	<b>Specification</b>
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



### Index/Tracker to Flyer I/O Conversion

In order to retrofit a Flyer head into an existing FH Index or Tracker application, you must make changes to your physical field wiring. Refer to input circuit and output circuit conversion sections for specific details. Table 8 lists pin to pin connections for converting the Index/Tracker dual inline 18-pin connector to Flyer's DB-25 *User Interface* connector.

**Important Note:** The voltage level for FH Flyer inputs is between 5 V and 24 VDC. Note that this range differs from the input voltage range of previous FH Series marking heads. If your existing equipment interface uses voltages above 24.0 VDC you must adapt your circuit or components to a voltage level of 5 V–24VDC.

**Table 8 Index/Tracker to FH Flyer I/O conversion**

FH Index/Tracker I/O Connector			Flyer DB-25 I/O Connector	
Pin #	Wire Color	Function	Pin #	Function
1	Black	RTN4	*2	OUT2–7_B
2	White	OUT4	4	OUT4_A
3	Red	OUT5	16	OUT5_A
4	Green	RTN5	*2	OUT2–7_B
5	Orange	RTN6	*2	OUT2–7_B
6	Blue	OUT6	3	OUT6_A
7	White/Black	OUT7	15	OUT7_A
8	Red/Black	RTN7	*2	OUT2–7_B
9	Green/Black	IN0	20	IN0_A
10	Orange/Black	RTN0	8	IN0_B
11	Blue/Black	IN1	9	IN1_HI
12	Black/White	RTN1	21	IN1_LO
13	Red/White	IN2	10	IN2_HI
14	Green/White	RTN2	22	IN2_LO
15	Blue/White	IN3	23	IN3_A
16	Black/Red	RTN3	13	IN3–IN7_B
17	— —	NC	— —	— —
18	— —	NC	— —	— —

\*On the Flyer DB-25 *User Interface* 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 DC supply's ground (return) side.



Input circuit conversion

Table 9 shows pin to pin connections for converting existing Index/Tracker input signals to Flyer’s DB-25 *User Interface* connector.

**Table 9 Index/Tracker input conversion**

FH Index/Tracker I/O Connector			Flyer DB-25 I/O Connector	
Pin #	Wire Color	Function	Pin #	Function
9	Green/Black	IN0	20	IN0_A
10	Orange/Black	RTN0	8	IN0_B
11	Blue/Black	IN1	9	IN1_HI
12	Black/White	RTN1	21	IN1_LO
13	Red/White	IN2	10	IN2_HI
14	Green/White	RTN2	22	IN2_LO
15	Blue/White	IN3	23	IN3_A
16	Black/Red	RTN3	13	IN3–IN7_B

Output circuit conversion

Tables 10 and 11 show pin to pin connections for converting existing Index/Tracker output signals to Flyer’s DB-25 *User Interface* connector. Use Table 10 when all return lines (RTN4-RTN7) are connected to the I/O circuit’s DC ground or return (FH outputs function as low-side switches and are sinking current). Refer to Table 11 when all output lines (OUT4-OUT7) are connected to the I/O circuit’s DC voltage supply (V+) (FH outputs function as high-side switches and are sourcing current).

**Table 10 Index/Tracker output conversion—all RTN lines grounded (sinking current)**

FH Index/Tracker I/O Connector			Flyer DB-25 I/O Connector	
Pin #	Wire Color	Function	Pin #	Function
1	Black	RTN4	*2	OUT2–7_B
2	White	OUT4	4	OUT4_A
3	Red	OUT5	16	OUT5_A
4	Green	RTN5	*2	OUT2–7_B
5	Orange	RTN6	*2	OUT2–7_B
6	Blue	OUT6	3	OUT6_A
7	White/Black	OUT7	15	OUT7_A
8	Red/Black	RTN7	*2	OUT2–7_B

\*On the Flyer DB-25 *User Interface* 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 (FH outputs are sinking current).



Use Table 11 when all output lines (OUT4-OUT7) are connected to the I/O circuit's DC voltage supply (V+).

**Table 11 Index/Tracker output conversion—all OUT lines tied to V+ (sourcing current)**

FH Index/Tracker I/O Connector			Flyer DB-25 I/O Connector	
Pin #	Wire Color	Function	Pin #	Function
1	Black	RTN4	4	OUT4_A
2	White	OUT4	*2	OUT2-7_B
3	Red	OUT5	*2	OUT2-7_B
4	Green	RTN5	16	OUT5_A
5	Orange	RTN6	3	OUT6_A
6	Blue	OUT6	*2	OUT2-7_B
7	White/Black	OUT7	*2	OUT2-7_B
8	Red/Black	RTN7	15	OUT_A

\*On the Flyer DB-25 *User Interface* 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+) voltage (FH outputs are sourcing current).

If your existing FH Index/Tracker outputs are mixed, for example—one or more outputs are tied to the high side (V+) 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 to you:

- A** Flyer supports two bipolar outputs—OUT0 and OUT1. If one or two of your existing FH Index/Tracker outputs are wired to the high (V+) side—sourcing current—and the other three or two outputs are wired to the low (return) side—sinking current—then wire those one or two outputs to Flyer outputs OUT0 and OUT1 and wire the other outputs as shown in Table 10.

If one or two of your existing FH Index/Tracker 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 Flyer outputs OUT0 and OUT1 and wire the other outputs as shown in Table 11.

- 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.



## Communications

FH Flyer marking heads communicate to WinMark Pro through an Ethernet or USB port connection; there is no provision for a fiber optic interface.

### Ethernet

Flyer marking heads can communicate with the WinMark Pro computer over an Ethernet or USB communications link; however, an Ethernet connection is required if 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 Flyer directly to a computer using a peer-to-peer connection. To connect the *Ethernet Crossover* cable, perform the following steps:

- 1 Remove DC power from the Flyer marking head.
- 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 Flyer and your Ethernet router or hub.

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

### Peer-to-peer Ethernet configuration

FH Flyer marking heads 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 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 Flyer marking head

- 1 Connect Flyer to your computer using an Ethernet crossover cable.
- 2 Power up 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 *FH Flyer Marking Head Operator's Manual, v3.2*. 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 Flyer and your Windows® development workstation.

**Important Note:** Install WinMark Pro v6 **before** you connect Flyer to your computer's USB port and power it up. If WinMark Pro is not installed first, the Windows® operating system will arbitrarily assign a USB driver that is **not** compatible with 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 side of the Flyer marking head.

**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 Flyer or your computer when connecting or disconnecting the *USB* cable; the USB protocol allows the ability to “hot plug” USB devices.

## Start-Up

Applying power to Flyer begins a 25–30 second boot-up sequence. During this time, the *Status* LED blinks green at a slow (2 Hz) rate. A solid green Status LED indicates that Flyer is ready for operation. When WinMark Pro v6.3 is opened, and the USB cable is connected between Flyer and the host, Flyer’s *USB* LED illuminates red to indicate that communication is established.





## WinMark Pro v6.3

When operating an FH Flyer marking head, you must use WinMark Pro v6.3 or later. WinMark Pro version 6.x software is not tested or recommended for older marking heads 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 Flyer's optical scanners exhibit a much quicker response time than previous FH Series marking heads, 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. As a starting point, use the values below to obtain the best quality marks. Some experimentation may be 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 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 Flyer Marking Heads

FH Flyer marking heads incorporate many new features compared to previous FH heads. The following paragraphs briefly describe a few of 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, Flyer output OUT6 activates when the 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 *FH Flyer Marking Head Operator’s Manual, v3.2* for details.

### New Control Methods

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

For 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 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 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 Flyer to operate autonomously—communicating to automation equipment using discrete I/O signals—with no connection to the WinMark computer. See the *FH Flyer Marking Head Operator’s Manual, v3.2* for details.

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

When 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 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 *FH Flyer Marking Head Operator's Manual, v3.2* for details.

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

Flyer marking heads 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® PC on the Production floor.

There are two options for implementing the Modbus I/P protocol on Flyer marking heads. 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 *FH Flyer Marking Head Operator's Manual, v3.2* 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 Flyer marking head 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).