



SYNRAD Technical Bulletin

0013

Technical Issue: Operating FH Flyer in an Electrically-Noisy Environment

Date: 02 November 2007

Description:

This Technical Bulletin describes precautions to take when operating FH Flyer marking heads in electrically-noisy industrial environments.

This Bulletin covers the following topics:

- CE compliance
- Ethernet connections
- USB connections
- Electrical isolation
 - Ground loop voltage potential
 - Isolating devices
- Product information

CE compliance

FH Series Flyer marking heads are designed and tested to comply with 89/336/EEC, the European Union's Electromagnetic Compatibility (EMC) Directive. In particular, this Directive calls out documents that define emission and immunity standards for specific product categories. FH Flyer and its associated *USB Communication* cable meet European Union (EU) standards related to immunity in radiated or conducted electromagnetic fields. This simply means that FH Flyer is immune to electrical noise that is within the range specified by EU immunity standards.

In cases where another device in the area generates electrical noise exceeding these limits, any electronic equipment in the surrounding area may be affected including personal computers, programmable controllers, lasers, and even FH Flyer. Excessive electrical noise is a concern in any situation where a laser is operating because the laser or control device may be adversely affected by very high levels of radiated or conducted electromagnetic emissions.

Ethernet connections

When operating FH Flyer in an electrically-noisy environment, SYNRAD recommends using Ethernet as your primary communication method. Standard Ethernet cabling incorporates twisted wire pairs that provide some measure of noise immunity. In addition, all Ethernet devices include an isolation transformer that provides immunity to ground loops and further reduces the effects of electrical noise on digital communications.



Note: When marking with FH Flyer in Tethered Mode (where the computer is sending vector data to Flyer in real-time via a USB or Ethernet connection), you must consider Ethernet latency issues when mark cycle times are less than one second because the Ethernet protocol does not always transmit data in real-time. Occasionally, a latency period of 200 milliseconds (ms) will occur between the time a 'start mark' signal is received and lasing begins. When this latency period becomes a significant portion of the cycle time, then you should setup a USB communication connection or operate Flyer in Stand-alone Mode.

USB connections

Every FH Flyer is shipped with a six-foot (1.8 meter) *USB Communication* cable. This cable is double-shielded to prevent electrical noise in normal industrial environments from interfering with communications between Flyer and your computer or controller.

In industrial environments with excessive electrical noise problems, the USB protocol is susceptible to interference from radiated and conducted emissions in excess of EU standards. If your application requires the use of a USB connection in electrically-noisy environments, SYNRAD recommends the installation of an isolated USB link or hub. USB isolation provides immunity to ground loops by converting USB data into optical signals that are transmitted down a fiber optic cable and back into digital USB data at the other end. See the *Isolating devices* section for further information. An optically isolated USB connection may also improve immunity to electrical interference if you expose only the optical cable portion to potential interference AND minimize or shield the rest of the USB cable from the interfering environment.

Electrical isolation

Ground loop voltage potential

In situations where two AC powered devices are connected via an electrical connection, such as a USB cable, a large difference in the ground potential (voltage) can develop between these devices. For example, when the DC power supply for an FH Flyer marking head is connected to a different AC circuit than the circuit powering the personal computer or controller, the *USB Communication* cable can complete a ground loop that may damage the USB port's Electro-Static Discharge (ESD) protection chips in the marking head or in the computer or controller, rendering the USB port unusable.

To minimize any ground loop voltage differential, you should operate FH Flyer's DC power supply and your computer or controller from the same AC circuit. If this is not possible in cases where the laser / Flyer head is powered from a 3-phase AC circuit, then an Ethernet connection or USB isolation is recommended.

Isolating devices

When operating FH Flyer marking heads over a USB connection, SYNRAD recommends the installation of an isolated USB link or hub between the marking head and the computer or controller. Optical USB isolation provides protection from any ground loop voltage differentials that may exist and reduces the possibility that electromagnetic interference may disrupt communication between Flyer and its control device.



When using a USB connection, we recommend an isolated USB link or hub such as the Icron® USB Rover™ 200 or equivalent device to protect your USB ports from damage and to minimize susceptibility to electrical noise in excess of EU standards.

Keep in mind that you may be required to take additional steps to protect the integrity of the laser marking system from excessive electrical interference, including removal of the offending electrical noise source from the immediate area. As mentioned earlier, Flyer's Ethernet connection is recommended for communication in electrically-noisy industrial environments.

Product information

Icron® USB Rover™ 200 Isolated USB Hub

<http://www.icron.com>

Icron® Technologies Corporation
4664 Lougheed Highway, Suite 221
Burnaby, BC V5C 5T5
Canada

Phone: 604.638.3920
Fax: 604.638.3930

For further information contact SYNRAD at 1.800.796.7231; outside the U.S., dial +1.425.349.3500 or fax us at +1.425.349.3667.