

Tech Note 015:

TriMag IV Firmware Update

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**ID TECH**

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**Scope**

ID TECH TM4 SPI SecureHead firmware can be updated through SPI communication port.

ID TECH provides Windows-based utility software, and RS-232 to SPI converter board for reference. The customer can also develop their own software to upgrade the firmware.

Prerequisite: The host must already be in communication with SecureHead. It supports regular commands like “read firmware version”. Please refer to user’s manual (doc# 80101502-001) for SPI communication details.

**SPI Operation**

This section describes the SPI (Serial Peripheral Interface), the SPI bus interface timing, communication protocol, timeouts, and data output format. The below table shows the signals used in the SPI interface.

|  |  |  |
| --- | --- | --- |
| **PIN #**  | **SIGNAL**  | **DESCRIPTION**  |
| 1  | SPCK  | Serial Clock Input  |
| 2  | MISO  | Master Input, Slave Output  |
| 3  | MOSI  | Master Output, Slave Input  |
| 4  | DAV  | Data Available (output)  |
| 5  | NCS  | Chip Select, Active Low  |
| 6  | VIN  | Voltage Input  |
| 7  | GND  | Logic Ground  |
| 8  | Head Case GND  | Chassis  |

**Procedure**

TriMag IV firmware can be updated using the following commands.

Except where noted, commands should be wrapped in STX (0x02) and ETX (0x03), followed by a one-byte LRC (calculated as the XOR of all preceding bytes including STX and ETX).

Also, except where noted, a successful response will begin with ACK (0x06).

**Basic steps:**

1. Read firmware version (52 22 88 command). This is to confirm current reader is working

2. Erase firmware (53 7E 0D 31 01 02 03 04 05 06 07 08 04 03 02 01)

The firmware will be erased in about 2 seconds then rise DAV line to request the send of 0x5A. Host needs to read this response.

(Note: The DAV line will be high for 500 mS. If software does not read response, the SecureHead will shift to RS232 communication. In such a case, you must cycle the SecureHead power and read response within the 500 mS DAV high period to get the 5A byte)

We suggest to wait another 3 seconds after reading the response, then perform the following loading sequence.

**Load new firmware**

1. Send hex BD to start loading.

2. Open firmware bin file and send the whole file down to the SecureHead.

**Note:** The new firmware file is a binary file that contains 26K bytes encrypted firmware and 4 bytes CheckSum and LRC. The CheckSum and LRC will be checked by SecureHead. The SecureHead will decide to reject or accept the firmware download. The host does not need to check these bytes. Just send the whole file.

3. Wait for DAV line high, and read one byte response.

4. Wait for 3 seconds.

**Example**

Following is an example when loading firmware with ID TECH *FWUpdate* software.

1. Review current firmware version:

OUT 02 52 22 88 03 f9

IN 06 02 49 44 20 54 45 43 ..ID TEC 250ms

 48 20 54 4d 34 20 53 65 H TM4 Se

 63 75 72 65 48 65 61 64 cureHead

 20 53 50 49 20 52 65 61 SPI Rea

 64 65 72 20 56 31 2e 32 der V1.2

 34 2e 30 34 39 03 17 4.049..

B. Erase current firmware:

OUT 02 53 7e 0d 31 01 02 03 .S..1... 18sc

 04 05 06 07 08 04 03 02 ........

 01 03 1c ...

IN 5a Z 2.2sc

**Note**: It takes about 2 seconds for SecureHead to finish erasing firmware. The host should wait for DAV line rise and read the response 5A. The host might wait another 3 seconds to perform following loading step.

C. Download firmware

C1. Send one byte for getting into download mode: BD.

C2. Send encrypted bin file (new firmware file).

C3. Wait for DAV line rise, get one byte response, ignore it.

C4. Wait a few seconds (about 3 seconds).

D. Check new firmware version

 OUT 02 52 22 88 03 f9 .R"... 5.0sc

 IN 06 02 49 44 20 54 45 43 ..ID TEC 251ms

 48 20 54 4d 34 20 53 65 H TM4 Se

 63 75 72 65 48 65 61 64 cureHead

 20 53 50 49 20 52 65 61 SPI Rea

 64 65 72 20 56 31 2e 32 der V1.2

 34 2e 30 35 30 03 1f 4.050..