CEM60^{TM} Firmware Upgrade

The firmware of an 8407 hand controller, as well as the CEM60 main control board, R.A. and DEC motor control boards can be upgraded by the customer. Please check iOptron's website, www.iOptron.com, under Support Directory, for the most up to date firmware.

There are only slight procedure differences among different firmware upgrading procedures. Please read the instruction carefully.

To upgrade the firmware, you need some or all of the following software/hardware, depends on the upgrading you are performing:

- iOptron Upgrade Utility Program (Version 1.2)

- 8407 hand controller firmware

- CEM60 main board firmware

- CEM60 R.A. /DEC motor control board firmware

- RJ9 serial port to RS232 cable (included)

- USB to RS232 converter and driver. If your computer does not equip a RS232 port (9-pin D-shape connector) except the USB port, you need to buy a USB to RS232 converter, form a computer hardware store or on-line.

After firmware upgrade, the mount needs to be set to zero position either by Searching Zero Position or manually Set Zero Position. Otherwise, the mount may not perform go to properly.

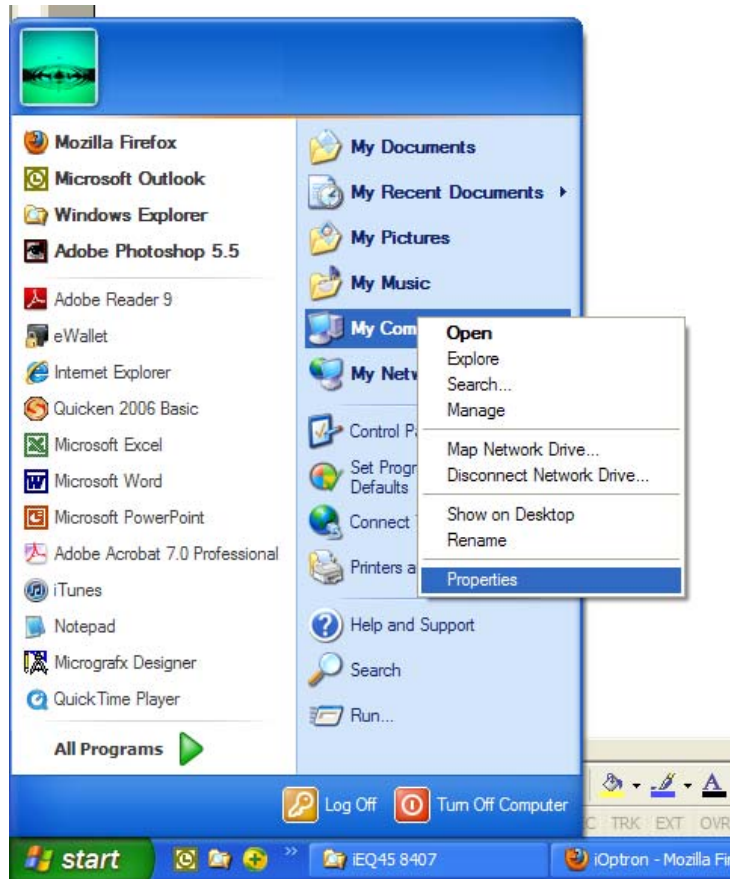## *1. Find the serial port (COM port) number from your computer:*

In order to perform the firmware upgrade (as well as to use planetarium software to control the mount), the communication between the PC and hand controller or mount has to be established.

The first step is to find the COM port number. If your computer has a serial port (9-pin D-shape male connector on the back, next to the 25 pin printer connector), the default assigned number is COM1.
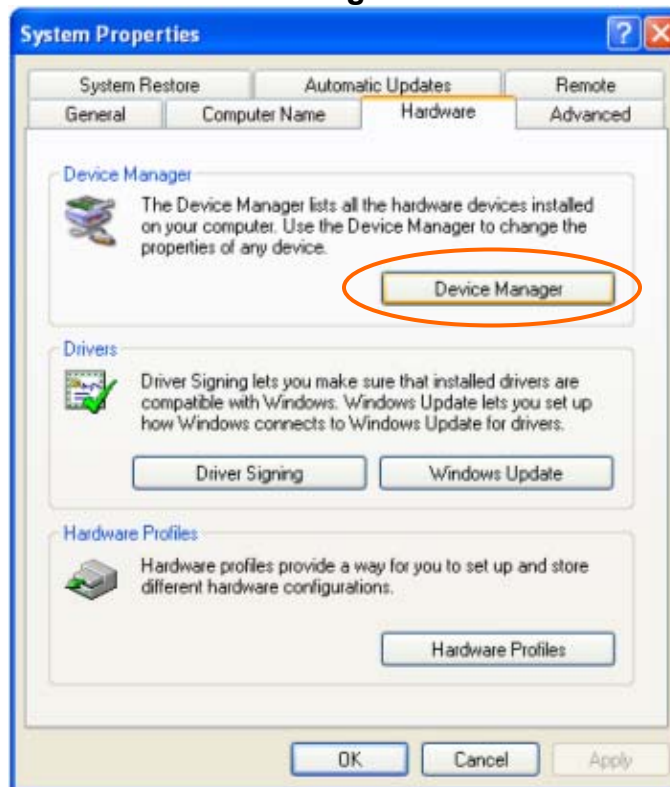
If your computer only has USB ports, like most laptops do, you need a USB to COM converter to convert one USB port to a COM port. Here are two examples of USB2COM converters.
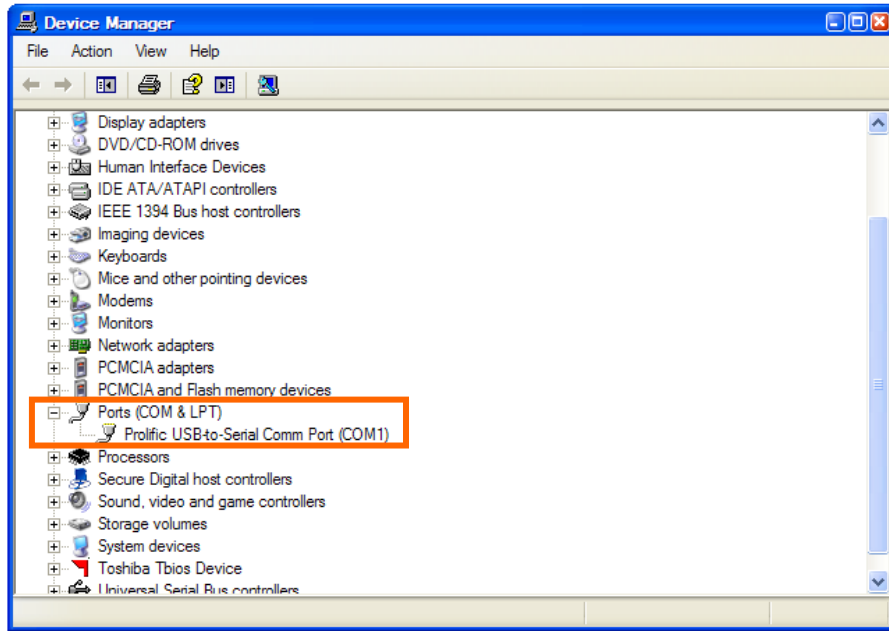

After install the USB2COM driver that comes with the device, click on **Start** located on the left bottom corner of your compute screen. Move the mouse to **My Computer** and right click on it. Move the mouse down and click on **Properties.**

Click on **Hardware** and select **Device Manager**.

Double click on **Ports(COM & LPT),** find out the COM number and write it down (in the following figure, the USB2COM converter uses a Prolific chipset and the assigned port number is COM1)
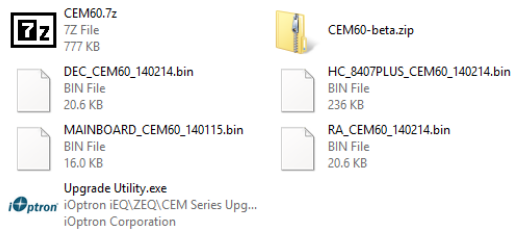
2. Download software and firmware from iOptron wbesite:

Go to iOptron website, www.iOptron.com, click on **Download** tab. Locate **CEM60 Firmware** under **Software/Firmware Upgrades** catalog on the left part of the screen, and click on it.
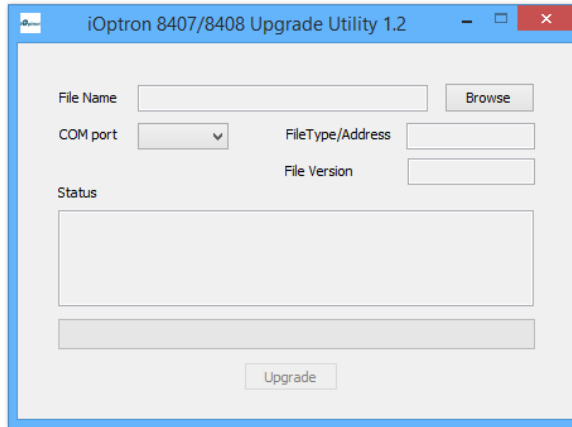
Download and save Upgrade Utility software, 8407 and/or iEQ45 board software as needed.
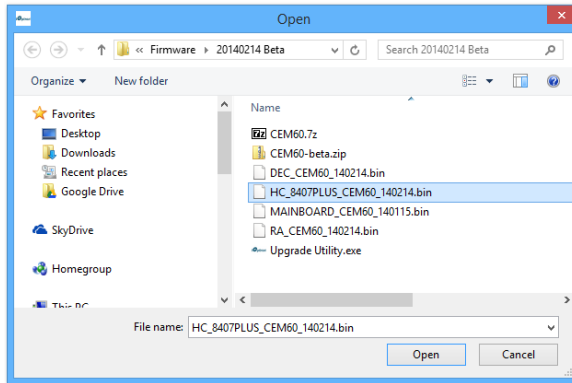
3. Upgrade 8407 hand controller firmware:

(1) Connect 8407 hand controller to the HBX port of a CEM60 mount. Make sure the mount power is OFF;

(2) Connect RJ9 plug into the serial port (the small one with 4 pins) of a 8407 hand controller and the 9-pin RS232 connector to your computer's RS232 port (or RS232 port of the USB2COM converter);

(3) Hold **ENTER** button of the hand controller while switch the ON/OFF button to turn the mount power on;

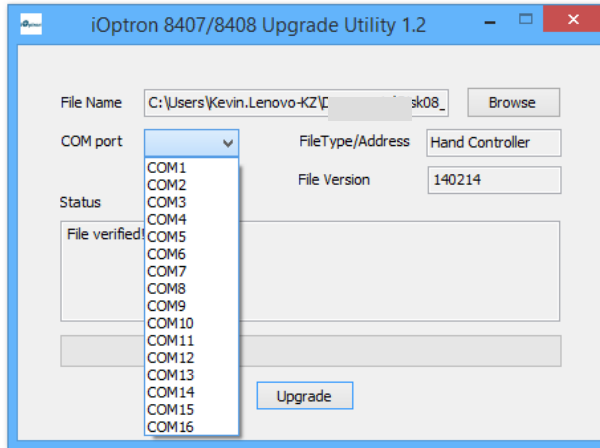(4) Locate download software and click on **Upgrade Utility.exe**:

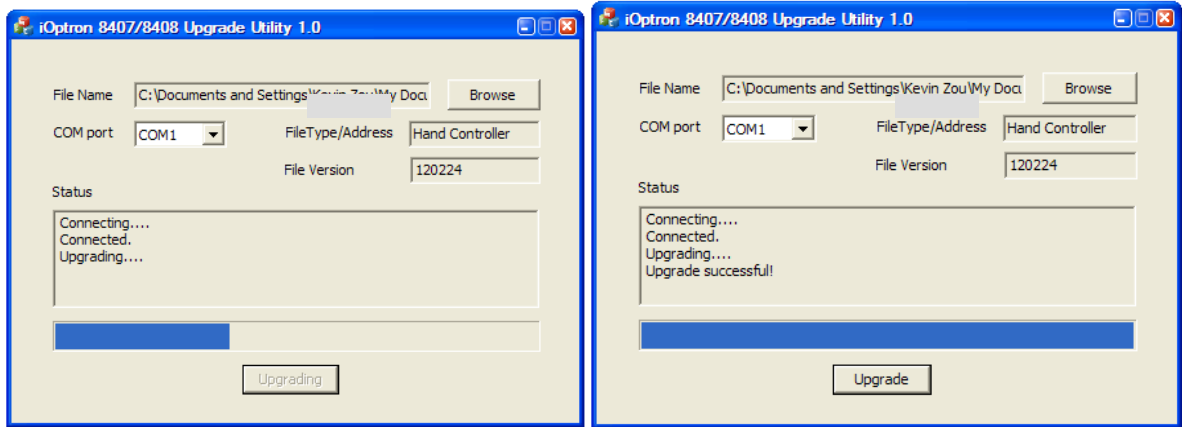(5) An iOptron Upgrade Utility window will display. Click on **Browse**:

(6) Select hand controller firmware HC_8407PLUS_CEM60_140214.bin and click **Open**

(7) The **FileType** and **Version** will be verified and displayed. Click on pull down menu of the COM port and select the COM port number. Here is **COM1**.

(8) Click on **Upgrade** button to start the process. Exit Upgrade Utility after upgrade successfully.

(9) Power cycle the mount.

If the upgrade process was disrupted, wrong firmware was loaded, or the upgrade was failed, just start this process over again. Make sure a correct COM port is selected.

4. Upgrade CEM60 main control board firmware:

(1) Connect 8407 hand controller to the HBX port of a CEM60 mount. Make sure the mount power is OFF;

(2) Connect RJ9 plug into the RS232 port on the CEM60 mount side panel and the 9-pin RS232 connector to your computer's RS232 port (or RS232 port of the USB2COM converter); **DO NOT plug the RJ9 connector into any other port on the CEM60 panels.** It may damage the control board(s);

(3) Locate download software and click on **Upgrade Utility.exe**;

(4) Click on **Browse** in iOptron Upgrade Utility window. Select main board firmware MAINBOARD_CEM60_140115.bin and click **Open;**

(5) Click on pull down menu of the COM port and select the COM port number. Here is **COM1**. Click on **Upgrade** button;

(6) Switch the ON/OFF button to turn the mount power on. The upgrading process will begin. After the firmware upgraded successfully, exit the Upgrade Utility program;

(7) Power cycle the mount.

5. Upgrade CEM60 R.A. or DEC control board firmware:

You can only upgrade either R.A. or DEC control board firmware at a time. You have to power cycle the mount before upgrading the other board.

Make sure the main board is working properly.

(1) Connect 8407 hand controller to the HBX port of a CEM60 mount. Make sure the mount power is OFF;

(2) Connect RJ9 plug into the RS232 port on the CEM60 mount side panel and the 9-pin RS232 connector to your computer's RS232 port (or RS232 port of the USB2COM converter); **DO NOT plug the RJ9 connector into any other port on the CEM60 panels.** It may damage the control board(s);

(3) Switch the ON/OFF button to turn the mount power on;

(4) Locate download software and click on Upgrade Utility.exe;

(5) Click on Browse in iOptron Upgrade Utility window. Select R.A. or DEC board firmware, such as RA_CEM60_140214.bin and click Open;

(6) Click on pull down menu of the COM port and select the COM port number. Here is **COM1**. Click on Upgrade button. The upgrading process will begin*. Ignore any prompt or error message displayed on the hand controller during firmware upgrading*;

(7) After the firmware upgrade finished, exit the Upgrade Utility program;

(8) Power cycle the mount;

(9) Go proceed for the other control board firmware upgrading.

6. Calibration CEM60-EC High Precision Encoder:

CEM60-EC version needs to perform encoder calibration after the firmware upgrade to ensure precise tracking.

To calibrate the encoder:

1) Turn off the mount;

2) Hold number "2" on the hand controller, then turn the mount power on, keep holding the #2 key until the calibration started automatically;

3) After the mount stopped, turn off the mount, and turn on again.

The calibration mode will perform a "**Search Zero Position**" first. Then the mount will swing to the eastern side and start to calibrate the encoder itself. The mount will stop after the calibration is finished. The total procedure may take a few minutes.

7. Common Errors During Firmware Upgrade:

(1) Can not open COM port:

- Wrong COM port is selected;
- A mount is not connected;
- A USB to RS232 converter driver is not installed or corrupted;
- A USB to RS232 converter does not work properly

(2) Connection failed:

- COM port conflict or used by other program. Close other program and try it again;
- RJ9 plugged into a wrong socket
- Broken RJ9 to RS232 cable
- A USB to RS232 converter does not work properly

(3) Upgrade stopped in the middle or failed

- Broken RJ9 o RS232 cable
- A USB to RS232 converter does not work properly

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