



## Service Bulletin 00.056.092

# SPCe Firmware Download Process Using Bootloader ver. 2.0

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## Document Version

1.0

## Purpose

To explain the process of downloading firmware image to Gamma Vacuum's SPCe controller.

## Scope

Applies to SPCe controllers running Bootloader ver. 2.0 or higher and firmware ver. 1.15.00 or higher. (Factory installed on SPCe controllers s/n 301602001 and higher)

## Warnings

Voltages as high as 8000V may be present in the power supply. These voltages can exist at peak currents of 40 mA. As a result, this power supply can be lethal if certain precautions are not taken.

Never handle any of the external high voltage connections while high voltage is present. Always turn off the power supply and disconnect it from the power source before opening this power supply.

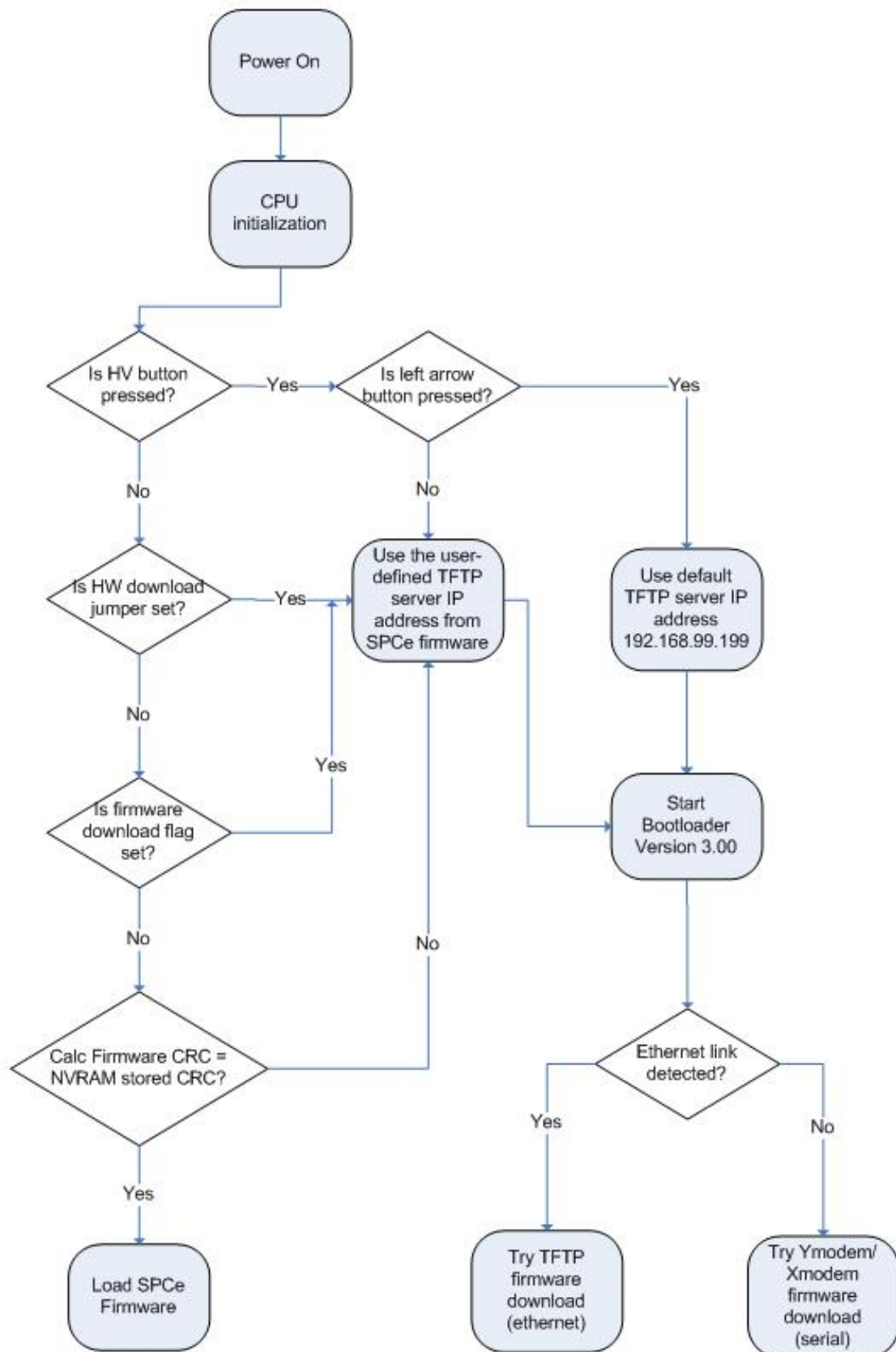
## Procedure

## **SPCe Firmware Download Sequence**

### **Note:**

- Upon starting up the SPCe controller in the Bootloader rev. 2.0 mode, the SPCe controller will try to detect the Ethernet link state. If Ethernet link is present (Ethernet cable is connected to the SPCe controller), the TFTP firmware download process is attempted, otherwise, download process using serial interface, Xmodem or Ymodem file transfer protocol is attempted. For more information refer to the flow chart below.

## SPCe Boot/Firmware Download Sequence (Bootloader v.2.0)



## **Download SPCe firmware using TFTP server (using Ethernet interface)**

### **Note:**

- The step number 1 below is applicable to SPCe firmware version 1.15.00 or higher.

### **1. Set up the TFTP server IP address from where to get the image file**

These can be done in two ways:

a. **Through the controller's front panel.**

On the SPCe controller, open main controller menu by pressing "OK" button. Using left or right arrow button, scroll to "SPC" menu item and using down arrow button scroll to the "Update" menu sub-item. Press "OK" to open the "Update Firmware" window. Specify the IP address of the TFTP server from which to get the image file. Press "OK" button when done setting the IP address.

If you want to initiate the firmware download process right away, select "Yes" under "Update SPCe software?" question and press "OK" button, otherwise, select "No" and press "OK" button, this way you just updated the TFTP server IP address and the Bootloader code will not be invoked upon next controller power up.

b. **Issuing command, either through serial or Ethernet interface.**

Command code CMD\_SYS\_TFTP\_SRV\_ADDR, value 0x4F, lets you specify the IP address of the TFTP server from which to get the image file. For example, "4F x.x.x.x", where 'x.x.x.x' is the IP address sets of the TFTP server.

For full command syntax, please consult "SPCe User Manual", Gamma Vacuum p/n 900026.

NOTE: The command code CMD\_SYS\_TFTP\_SRV\_ADDR value is 0x4F in SPCe firmware versions 1.15.02 and higher. In SPCe versions 1.15.00 and 1.15.01, the command code CMD\_SYS\_TFTP\_SRV\_ADDR value is 0x8E.

### **2. Start the SPCe in the Bootloader ver. 2.0 mode.**

### **Note:**

- Make sure the Ethernet cable is connected to the SPCe, otherwise, if no Ethernet link is detected, the Bootloader mode will try to download new firmware using serial interface.
- Once the Bootloader is started, the SPCe will automatically try to download the "SPCe.bin" firmware image file from the specified TFTP server IP address.
- The SPCe firmware image file on the TFTP server has to be named "SPCe.bin" as this is the file name the SPCe controller will look for to download.
- On the SPCe screen, the star ("\*") characters will indicate the firmware download progress. One star character is added to the screen every 32KB of downloaded file data.
- Once the complete firmware image file is downloaded, the SPCe will automatically quit the Bootloader mode and start up the new downloaded firmware.

There are several ways to do this:

a. Through the controller's front panel from the SPCe firmware already running.

On the SPCe controller, open main controller menu by pressing "OK" button. Using left or right arrow button, scroll to "SPC" menu item and using down arrow button scroll to the "Update" menu sub-time. Press "OK" to open the "Update Firmware" window. Specify the IP address of the TFTP server from which to get the image file. Press "OK" button when done setting the IP address.

If you want to initiate the firmware download process right away, select "Yes" under "Update SPCe software?" question and press "OK" button. Cycle power to start the SPCe controller in the Bootloader mode.

b. Through the controller's front panel upon controller power up.

While holding down the "HV" button, power up the SPCe controller by pressing the "Power" button. This will cause SPCe to start up in the Bootloader mode.

c. Issuing command, either through serial or Ethernet interface.

Command code CMD\_SYS\_RESET\_SPC, value 0xFF, lets you restart and boot the SPCe controller in the Bootloader mode. For example, "FF 1", will reboot the SPCe controller immediately and start the Bootloader mode upon power up.

For full command syntax, please consult "SPCe User Manual", Gamma Vacuum p/n 900026.

## **Download SPCe firmware using Xmodem or Ymodem file transfer protocol (using serial interface)**

### **1. Start the SPCe in the Bootloader ver. 2.0 mode.**

**Note:**

- Make sure the Ethernet cable is NOT connected to the SPCe, otherwise, the TFTP download process will be attempted.
- The SPCe serial comm. parameters in the Bootloader ver. 2.0 mode are fixed and cannot be changed. The serial port is set to RS-232, 115200 baud rate, 8 data bits, no parity, 1 data bit, and no flow control. These have to match on the computer used in the firmware download process in order for download to work properly.
- On the SPCe screen, the star ("\*") characters will indicate the firmware download progress. One star ("\*") character is added to the screen every 32KB of downloaded file data.
- Once the complete firmware image file is downloaded, the SPCe will automatically quit the Bootloader mode and start up the new downloaded firmware.

There are several ways to do this:

a. Through the controller's front panel from the SPCe firmware already running.

On the SPCe controller, open main controller menu by pressing "OK" button. Using left or right arrow button, scroll to "SPC" menu item and using down arrow button scroll to the "Update" menu sub-time. Press "OK" to open the "Update Firmware" window. There is no need to specify the IP address of the TFTP server here, so just press "OK" button once to switch selection focus to "Update SPCe software?" question.

If you want to initiate the firmware download process right away, select "Yes" under "Update SPCe software?" question and press "OK" button. Cycle power to start the SPCe controller in the Bootloader mode.

b. Through the controller's front panel upon controller power up.

While holding down the "HV" button, power up the SPCe controller by pressing the "Power" button. This will cause SPCe to start up in the Bootloader mode.

c. Issuing command, either through serial or Ethernet interface.

Command code CMD\_SYS\_RESET\_SPC, value 0xFF, lets you restart and boot the SPCe controller in the Bootloader mode. For example, "FF 1", will reboot the SPCe controller immediately and start the Bootloader mode upon power up.

For full command syntax, please consult "SPCe User Manual", Gamma Vacuum p/n 900026.

2. Connect the null-modem (crossover) serial cable between the computer and the SPCe controller. Crossover cable or null modem cable has pins 2 and 3 reversed at one end.

3. On the computer, launch the terminal emulation program (TEP), i.e. in Windows: go to Start, Programs, Accessories, Communications, Hyper Terminal or TEP program of your choice.

4. Make sure computer serial port comm. parameters, configured in the terminal emulation program (TEP) match the SPCe serial communication parameters, 115200 baud rate, 8 data bits, no parity, 1 data bit, and no flow control.

5. The character "C" should appear in (approximate) 2-second intervals in the TEP window. This is an indication that the SPCe unit is ready to accept new firmware image. The transfer of the firmware image file has to be performed using either YModem or XModem file transfer protocols. YModem is faster.

6. From the TEP, select file transfer options, select Ymodem for file transfer protocol, specify desired firmware image to be transferred and start the transfer process.

For question or comments please contact Gamma Vacuum at:

Gamma Vacuum

2915 133rd Street West

Shakopee, MN 55379

USA

(t) 800.237.3603

(p) 952.445.4841

(f) 952.445.7615

[info@gammavacuum.com](mailto:info@gammavacuum.com)

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