COOP D111D NOTE 4, MODIFICATION
Operations Division
W/OPS12: JD/GLD

SUBJECT:	**Fischer and Porter (F&P) Rebuild version D (FPR-D) Firmware Upgrade**
PURPOSE:	To provide the instructions necessary to install firmware version 1.06. Firmware version 1.06 will record battery voltage every 15 minutes, instead of once a day. This will permit more detailed tracking and troubleshooting of the battery health inside FPR-D equipped F&P gauges.
SITES AFFECTED:	All FPR-D rain gauge sites. Installation of this firmware upgrade is highly recommended but not required. The servicing NWSREP determines whether to install or not on a site by site basis.
AUTHORIZATION:	The authority for this note is by National Weather Service Headquarters direction.
VERIFICATION STATEMENT:	This procedure was tested and verified at the Sterling Field Support Center (SFSC), Sterling, VA.
ESTIMATED COMPLETION DATE:	As needed.
TIME REQUIRED:	Approximately 0.5 hour
ACCOMPLISHED BY:	NWS Representative (NWSREP) for local COOP operations.
EQUIPMENT AFFECTED:	D111D-2A1, Sutron FPR-D logger
SPARES AFFECTED:	None
PARTS/MATERIALS REQUIRED:	FPRD_FirmwareUpgFiles.zip 017-B-2-32 - Battery 12V 6.5 Ah , fully-charged battery
SOURCE OF PARTS/MATERIALS:	Surface Implementation Web page at http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm and National Logistics Supply Center (NLSC)
DISPOSITION OF REMOVED PARTS/MATERIALS:	None
TOOLS AND TEST EQUIPMENT REQUIRED:	Personal Computer (PC) with terminal emulation program and serial port (or USB to serial adapter), for access to the FPR-D data logger. Serial Communications Cable (for PC) with 9-pin male end and 9-pin female end (not null modem).
DOCUMENTS AFFECTED:	FPR-D Assembly Procedures
PROCEDURE:	See Attachment A for firmware upgrade installation instructions. See Attachment B for sample CSSA entries.

TECHNICAL ASSISTANCE:	For questions or problems pertaining to this note, contact Sterling Field Support Center (SFSC) at (703) 661-1268.
REPORTING INSTRUCTIONS:	Report the completed modification using a CSSA site inspection report, and update the site metadata on the B-44 Station Information Report. Follow the reporting instructions in the Attachment B, for example forms and entries.

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Director, Operations Division

Attachment A – Firmware Upgrade Installation Instructions for FPR-D
Attachment B – Sample CSSA Report

ATTACHMENT A - Firmware Upgrade Installation Instructions for FPR-D

A.1 Preparation at the WFO

The current FPR-D firmware (version 1.05) should be upgraded to version 1.06 to allow battery voltage to be recorded at the same frequency as the precipitation data (opposed to a single value at midnight of each day). This firmware upgrade requires the use of a Personal Computer (PC), a straight-through (not null-modem) serial data cable with a 9-pin male end and a 9-pin female end, and the file containing the new firmware code.

CAUTION

The FPR-D battery must be fully charged (above 12.2v) prior to the firmware upgrade as the memory flashing process requires a minimum of 12V on the internal Flash Memory for successful writes. If the voltage drops below 12V at any time while the new code is being written, the write will not "take", resulting in an unresponsive FPR-D unit. Although the memory flashing process preserves the station settings and logged data stored in the memory, it may be unrecoverable if the FPR-D cannot boot up with the original firmware in the event the upgrade is not successful. It is recommended that a new, fully charged battery is used during this installation, in case the existing battery is not up to par.

Failure remedy: If the FPR-D becomes unresponsive, then the unit must be returned to National Reconditioning Center (NRC) for reprogramming.

A.1.1 Configuring the PC

If the PC only provides USB ports, attach a USB to Serial adapter and install the appropriate drivers. Make sure to write down the COM port assigned to the USB to Serial adapter device (if it is different from COM1) for Section A.2.

The terminal emulation program used throughout the installation is HyperTerminal. Any terminal emulation program can be used as the commands sent to the FPR-D data logger will be the same. The main differences in terminal emulation programs is in the interface to configure the COM port and steps taken to invoke file transfer for uploading firmware files.

Download the compressed file, `FPRD_FirmwareUpgFiles.zip`, containing the FPR-D firmware files from the NWS headquarters web site: http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm. Extract both firmware files (`v1_05mainFpRain1265.upg` and `v1_06mainFpRain1265.upg`) from the compressed file and save to an easy to remember location on the PC. Both firmware version files (version 1.05 and version 1.06) are included in case the site needs to revert to the original firmware version.

A.2 Upgrading Firmware Code at the Site

Verify the FPR-D battery at the site is fully charged. If it is not, swap out the current battery with one that is fully charged before proceeding with this section. In addition, perform a regular download of the precipitation data prior to upgrading the firmware code.

A.2.1 Backup Current Station Settings and Download Entire Log to Memory Card

1. With the keypad display illuminated, insert a memory card into the FPR-D's Memory Card port.
2. Observe the display for indication it has recognized insertion of a memory card.
3. Scroll with **Down-Arrow** button and select **Write setup to card**.
4. Press the **SET** button to write the current station settings to the memory card.
5. Verify the display reads *Setup saved to card:* followed by *SS00NNNN.txt* where *SS00NNNN* is the COOP 8-digit station ID number.
6. Scroll with **Up-Arrow** button and select **Download log to card SET downloads**.
7. Press the **SET** button to proceed.
8. At the *Select download type* prompt, scroll with **Down-Arrow** button and select **Whole Log**.
9. Press the **SET** button to perform a download of the whole log.
10. Watch for rapidly updating numerals in the keypad display – this indicates download has started.
11. Verify the display reads *Download Complete SS00NNNN_log_YYYYMMDD*" (where *YYYYMMDD* is the current date).
12. Eject the Memory Card.

A.2.2 Connecting the PC to the FPR-D Data Logger

1. Locate the FPR-D's serial port (see Figure A-1).

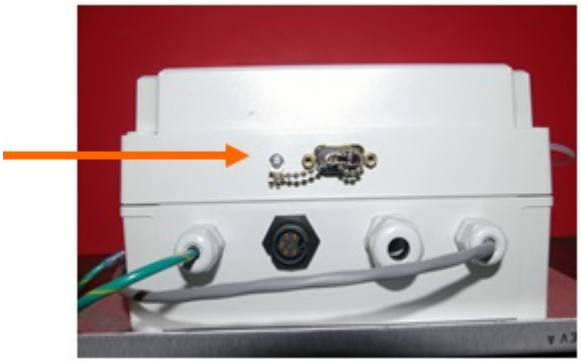

Figure A-1: FPR-D Serial Port

2. Remove the cap from the serial port.
3. Plug in the serial cable 9-pin male end into the FPR-D's serial port and the cable's female end into the PC.

A.2.3 Set up the PC's HyperTerminal Program

1. From the Windows desktop, click on the **Start** button.
2. Click **Programs-Accessories-Communications-HyperTerminal** tab.

NOTE:	Depending on the configuration of the PC, HyperTerminal may be installed in another location. If using a PC with Windows 7 installed, HyperTerminal is not pre-loaded as in previous Windows Operating Systems.

3. Enter a name (e.g., FPR_Link) for the connection at the prompt. Select an icon and click the **OK** tab.
4. At the *Connect To* prompt, select **COM1** and click **OK**.

NOTE:	Depending on the configuration of the PC, choose the appropriate COM port that connects the PC to the FPR-D data logger (e.g. COM3, COM12, etc.).

5. Enter the following Port Settings:
   a. Baud rate**:** **115200** bits per second
   b. Data bits**:** **8**
   c. Parity: **none**
   d. Stop bits: **1**
   e. Flow Control: **Hardware**
6. Click **OK**. The HyperTerminal screen will appear and a connection to COM1 will be established.
7. Press **Enter** to display the prompt (>), in HyperTerminal screen.

A.2.4 Verifying the Firmware Version Number

1. Type **VER[SION] <enter>** at the prompt to verify connection to the FPR-D data logger.
2. Confirm the firmware is version 1.05 (see Figure A-2).

```
Sutron FpRain version 1.05 Dec 15 2008 14:34:45
Bootloader Version 1.21
```

Figure A-2: Firmware Version 1.05 Displayed

A.2.5 Installing New Firmware

1. Type **UPG[RADE] <enter>** and enter the password when prompted.

NOTE:	An upper case *C* will repeat every 1.5 seconds in the HyperTerminal screen until the next step is completed. If completion is not carried out within 30 seconds, the FPR-D data logger times out, and displays ↑↑B↑B0↑↑B↑B0 in the HyperTerminal screen. Press **Enter** to re-initiate the prompt (>) and start over with Step 1.

2. Locate the Transfer menu on the Menu Bar near the top of the HyperTerminal window and select **Send File**. Click **Browse** and find the new firmware file (*v1_06mainFpRain1265.upg*) that was saved on the PC from Section A.1.1. Click **Open** to select the new firmware file. Click on the drop-down menu and select **Ymodem** from the list of choices under *Protocol*. Finally, click **Send** to upload the new firmware file to the FPR-D data logger. The status light on the

data logger will quickly flash green during the data transfer process. Upon completion, the FPR-D data logger will reboot and start sampling with the new firmware.

CAUTION

Do not disconnect the fully charged battery or interrupt the power at any time during the file transfer/memory flashing process.

Do not use Send Text File from HyperTerminal. Always use Send File. Failing to do so may cause unexpected operation of the terminal emulation program.

3. Press **Enter** to display the prompt (>), in the HyperTerminal screen.
4. Type **VER[SION] <enter>** to confirm that firmware version 1.06 is loaded (see Figure A-3).

Sutron FpRain version 1.06 Aug 20 2010 10:27:29
Bootloader Version 1.21

Figure A-3: Firmware Version 1.06 Displayed

5. Make sure to leave the FPR-D data logger connected to the PC. Do not close the HyperTerminal window.

A.2.6 Restoring the Current Station Settings to the FPR-D Data Logger

1. With the keypad display illuminated, insert the memory card used in Section A.2.1 into the FPR-D's memory card port.
2. Observe the display for indication it has recognized insertion of a memory card.
3. Scroll with **Down-Arrow** button and select **Read setup from card**.
4. Press the **SET** button to proceed.
5. At the *Really change whole setup* prompt, press the **SET** button to confirm changing the setup.
6. Press the **SET** button to select the default setup file of `SS00NNNN.txt`, created in Section A.2.1, Step 5, and to write the current station settings back to the FPR-D data logger.
7. Verify the display reads *Setup changed*.
8. Eject the memory card.

A.2.7 Configuring for Battery Voltage Tracking

The new firmware code adds a parameter called *Log Health* which is currently *Disabled*. The following steps show the required settings for enabling battery voltage tracking with the FPR-D.

1. Press **Enter** to display the prompt (>), in the HyperTerminal screen.
2. Type **`LOG HEALTH = 1`**, and press **Enter**. Enter the password if prompted. After the FPR-D data logger confirms that this setting is enabled, the FPR-D will record battery voltage after the precipitation data in the log file.

3. Type **`LOG DAILY VALUES = 0`**, and press **Enter**. Since the battery voltage is now recorded with the precipitation data every 15 minutes, there is no need for another daily battery voltage entry at 23:59:59 without a precipitation record.
4. Type **`EXIT`**, and press **Enter** to exit.
5. Remove the serial cable from the FPR-D data logger.
6. Replace the cap on the serial port.

NOTE: On the FPR-D, the *Log Health* parameter is located in the *Other Settings* menu under the *Station Setup* menu. Thus, there are now 8 parameters instead of the 7 stated in Section 8 of the FPR-D Assembly Procedures. Table A-1 shows the revised *Other Settings* menu entries and the result of Steps 1 through 6.

Table A-1: Revised 'Other Settings' Menu Entries

Primary Menus	Second Level	Third Level	Required Details
Station Setup ►	Measurement Setup ▼		
	Temperature Setup ▼		
	Other Settings ►	Station Name (SID) ▼	
		Password	
		Log Health	Enabled
		Log Daily Values	Disabled
		Auto Output	
		Baud Rate	
		SDI-12 Address	
		Default Setup	

A.2.8 Verifying Battery Voltage Tracking

1. Wait until the next recorded data is available at the quarter of the hour of the FPR-D data logger system clock (may take up to 15 minutes).
2. Access the *Logged Data* menu from the *Home* menu and scroll with **Down-Arrow** button and select the **All Logged Data** parameter.
3. Press the **Right-Arrow** button and then scroll with **Down-Arrow** button to confirm there is an entry for *Batt Voltage* data with the most recent timestamp.
4. Press the **Down-Arrow** button and verify the entry for *Precip* data has the same timestamp.
5. Be sure to exit the configuration sub-menus to avoid battery drain by pressing the **OFF** button repeatedly until the FPR-D data logger keypad display is extinguished.

ATTACHMENT B - Sample CSSA Report

B.1 Metadata Requirements on FPR-D Firmware Upgrade Implementation

B.1.1 Creating a CSSA Site Inspection Report

After completing the FPR-D firmware upgrade installation and returning to the office; access the site's CSSA and call up the CSSA Station Name/CSSA Station Number to generate a new *Site Inspection Report*. Account for the total hours of work and total dollars of expense incurred to install the FPR-D firmware upgrade.

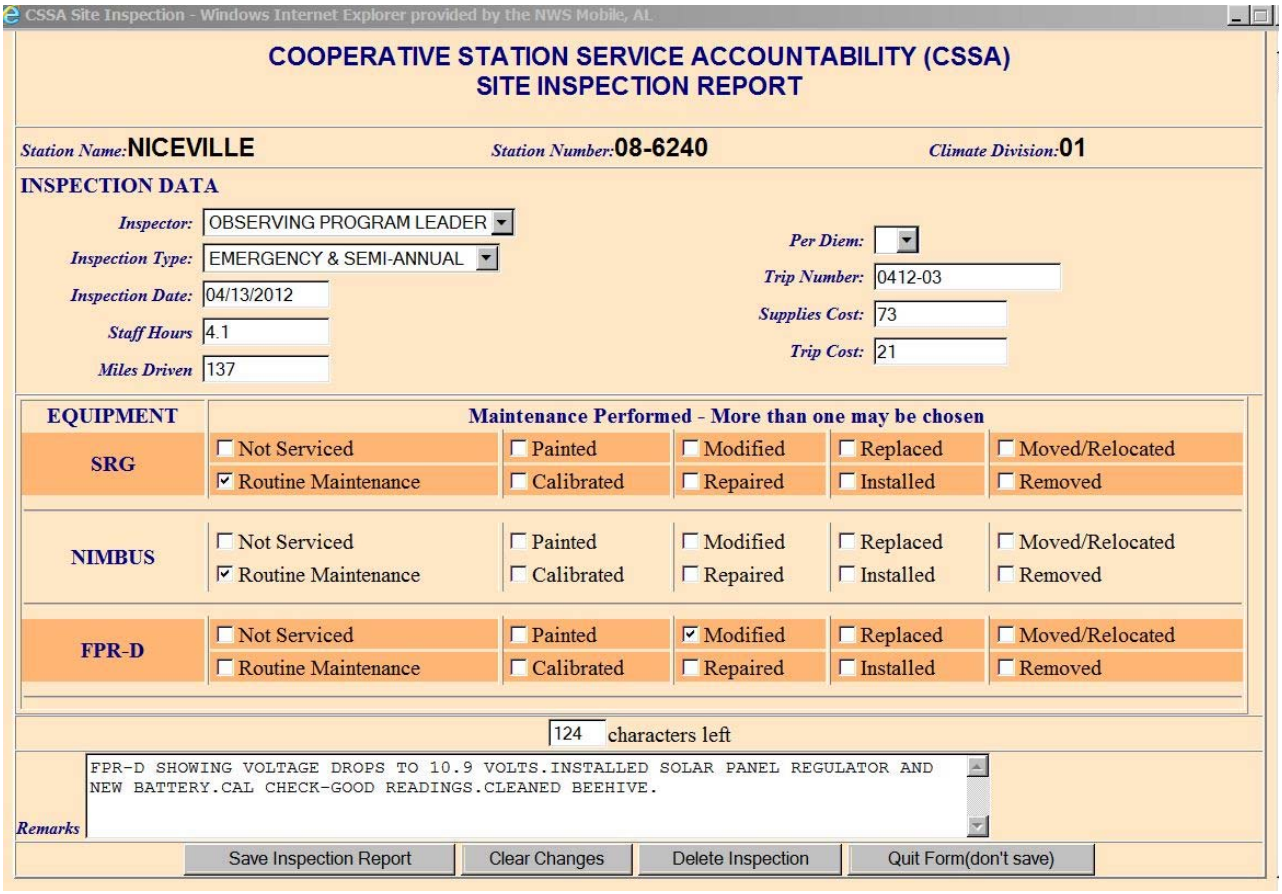

Figure B-1: Site Inspection Report

Be sure to complete the following fields to account for the FPR-D firmware upgrade installation:
Inspector:……..“Installer's title”
Inspection Type:……Emergency & Semi-annual
Inspection Date:……mm/dd/yyyy
Staff Hours:……...x
Miles Driven:……xxx
Per Diem:……..as applicable
Trip Number:……“Installer's trip number”
Supplies Cost:……..xx.xx
Trip Cost:……..xxx.xx
Be sure to select the check box labeled *Modified* under *Maintenance Performed* for the Equipment

category FPR-D. In the bottom of the CSSA Site Inspection Report, in the free text field, enter the following: "**Installed the FPR-D Version 1.06 Upgrade, per COOP D111D NOTE 4, MODIFICATION**" and any other explanatory text necessary for the installation.

B.2 Updating the B-44 for FPR-D Firmware Upgrade to FPR-D Equipment

Make the following changes in the Station Information Report (B44):

Equipment Description append "**FPR-D Version 1.06 Upgrade**" after the text in the field

B.3 Updating the Remarks Section, B-44

In the *Remarks* section enter the following: "**Updated FPR-D, installed Version 1.06 Upgrade, per COOP D111D NOTE 4, MODIFICATION.**"