NWSREP'S

FISCHER–PORTER REBUILD (FPR-D)

OPERATIONS MANUAL

D R A F T

SEP 22, 2009

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service - Cooperative Weather Observer Program
Observing Services Division - W/OS7

This Page Indicates Revisions:

Updated Chapter 2.2.1; on page 24, now reads:

Note: Memory Cards you mail to the Observer are not required to have any type of label or marking. If you label them, mark each with its COOP Site Number. Each card should contain only one CSV file, the last reported month. The file is not required to have originated from the Observer to whom you are mailing. Rather, the purpose is to deliver a nearly blank memory card.

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1.1 IMPLEMENTATION RESPONSIBILITIES:

1.1.1 NWS Headquarters:

The Fischer-Porter Rebuild (FPR) is a modification to existing Fischer & Porter (F&P) gauges and the project is modeled according to a detailed plan, known as the ***FPU Operational Implementation Plan***. For background on F&P modernization management, you are encouraged to read the 2005 documents ***COOP FPU Implementation Plan Text,*** **April 28. 2005**, and it is accessible on the NWS headquarters 'OPS2' page. It is near the end of the listed documents, click on: http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm .

The NWSREP assembles the FPR in his/her WFO and then installs it at the designated COOP site. An installation instruction handbook, ***FPR Assembly Procedural*** shall be used by the NWSREP. It is located on: http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm, it is near the end of the listed documents. Click on, *FPR Assembly Procedural*, April 2009.

The FPR Kit will come delivered to your WFO with the ***F/P Precipitation Gauge Rebuild Kit (Operations & Maintenance Manual), Rev 1.01.*** (Nov 2008) published by the Sutron Corp.

The NWS Office of Operational Systems (OPS22) works with a contractor to display COOP Sites and ASOS Sites on a Geographic Information Systems (GIS) based platform. The F&P network of approximately 2,500 sites are viewable on: http://www.gis.srh.noaa.gov/

1.1.2 Regional Headquarters:

Your Regional Cooperative Program Manager (RCPM) coordinates with OPS22 to identify candidate COOP Stations to receive the FPR modification. Changes to the designated site list are authorized by OPS22. The OS7 coordinates changes with the RCPM for the selection of sites to receive the FPR kit.

Your RCPM coordinates with WFOs with the greatest number of designated sites, to minimize storage and scheduling difficulties at the WFO.

The RCPM participates in bi-weekly or monthly conference calls with OS7 to learn of engineering, procedural, and schedule issues that affect the rate of deployment. Peak rate of deployment will not exceed 100 FPR Kits per month, or approximately 50 units per Region per month.

1.1.3 Field Offices:

Once per week, inform your RCPM via e-mail, of your planned installation schedule and provide a status update on the systems installed. Coordinate with RCPM to determine the ideal number of FPU Kits to be delivered to your WFO in the next four weeks.

Coordinate with Cooperative Observer to schedule a date for the FPR installation work and make time to give the Observer a tutorial in FPR operations. Update your Observer on your planned schedule, at least 14 days in advance. Explain to your Observer how the FPR is very easy to

operate and how your hands-on tutorial should take just 30 minutes. If practical, mail your Observer a printed copy of the ***FPR Observer Instruction*** booklet, two weeks in advance of your visit, so s/he understands the concept of operations.

Receive FPR Kit, disassemble F&P gauge, assemble FPR gauge in your field office.

Each FPR Kit will arrive at your WFO in <u>one</u> cardboard box with an interior box.

- Main box: Data Logger, Solar Panel, and 12V Battery. Enclosed in a 12" zip-lock bag are tools (allen wrenches), washers, screws, and mounting hardware.

- Interior box: Load cell sensor.

NLSC packing slip affixed to each FPR-D Kit.

After you have installed the FPR Kit to the Cooperative Observer site, issued a Technical Implementation Notice (TIN) and updated the CSSA station information report, you are ready to certify the FPR system as implemented.

MIC signs the ***FPR Operational Implementation*** (OI) Certificate to signal the completion of all FPR upgrade activity and successful operation of data logging in the county warning area.

NWSREP will issue a single Technical Implementation Notice (TIN) within 5 days after each FPR data logger is powered-on as an operational system. [Instructions are given in NWSI 10-1805, change in data assimilation method.]

1.3.4. Records Retention Policy for FPR:

The following FPR data records and FPR data media shall be kept on hand at the WFO:

- HPD monthly files (e.g., 41008778_log_20090731.csv) for at least 12 months on the network workstation.
- Any *FPR Event Log Worksheet*, or any *FPR Trouble Report*, keep an electronic copy (i.e., optical scan of printed form) at WFO for 12 months.
- The *30-Day Evaluation Report* and the *Operational Implementation Checklist – Part B* – keep at WFO for 6 months.
- Always keep an ample supply of spare Memory Cards in the WFO. A quantity of twice the number of F&P sites (beyond the Observer's spare card) is advised.

Maintain a bookmark on: http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm for ready access to FPR manuals and FPR policy directives issued by NWS headquarters.

1.2. FPR CONFIGURATION REQUIREMENTS

1.2.1 Precipitation Gauge Type:

The modernization to FPR phase 1, with Sutron Corp kit (FPR-D), shall be made only upon the Fischer-Porter/Belfort punch tape model, as identified in your CSSA equipment description as, "F&P Modification 6, Model 3." There are approximately 1,800 of these gauges sited in the CONUS, Alaska, Hawaii, and Guam, and they are identified in the NWS headquarters 'FPR Designated Sites Spreadsheet (Jan 2009).'

You <u>may not</u> request an FPR modification for any F&P that operates with the following:

- Shaft Encoder with Data Telemetry Device
- Fischer-Porter Upgrade (CES, Inc) * [* Ten sites are exempt]

1.2.2 Precipitation Data Transfer

Instruct your Observer on how to use a Memory Card to transfer his data to you each month, via United States Postal Service (USPS) mail.

Establish strict logistics management of all your sites Memory Cards through use of a Memory Card Log Sheet posted in your WFO.

Inform your Observer he <u>may</u> <u>not</u> e-mail FPR precipitation data files to your WFO.

<u>Note</u>: Each Observer should be issued just two Memory Cards. One comes with the kit as an initial issue, and the other will come from the NWSREP and handed to the Observer during training, as the spare memory card to be kept inside the F&P containment.

1.2.3 Precipitation Data - Electronic Records Collection

Electronic data collection of the Observer's Memory Cards first involves a stand-alone personal computer (PC) or laptop PC computer, one with absolutely no electromagnetic means of communication with any NWS-network workstation within the WFO. The stand-alone PC/laptop shall not in any way directly communicate with any Government furnished workstation or terminal that is capable and used as a link to the NWS-network enterprise (i.e., AWIPS). The stand-alone/laptop serves each month to virus scan and otherwise isolate the COOP Observer's Memory Cards from NOAA/NWS enterprise network systems.

For this reason the stand-alone PC/laptop that scans the memory cards for viruses with McAfee Active Virus Defense (AVD) suite, shall be free of data cables, data wires, infrared signal (wireless), radio, laser signal, or any other similar means of communication with the NWS enterprise systems.

As NWSREP you will ensure the stand-alone PC/Laptop meets the following minimum requirements. If your WFO does not already have a dedicated 'PC' or 'Laptop' devoted to scanning Flash Drives for virus and malware, then you should establish a PC or Laptop to do so for the Fischer-Porter Rebuild data exchange. You will require:

Hardware: Have your IT Specialist remove, erase, and wipe off a surplus microprocessor with the intention of establishing an IT secure platform to run McAfee AVD virus scanning software for the purpose of examining all SD memory cards submitted by the Cooperative Weather Observers. The minimum requirements for a stand alone workstation are:

- 1.5 GB of hard-disk available space
- 128MB RAM; 233 MHz processor
- CD-ROM for WinXP install disks
- USB 2.0 device

Operating System: Use Windows XP, and not Vista. See http://support.microsoft.com for minimum hardware requirements if you wish to install a clean, new, Win XP operating system.

Federal Desktop Core Confriguration (FDCC): Have your IT Specialist install the Federal Desktop Core Configuration (FDCC) Standard Security Configuration. It has over 400 settings.

Virus Scanner: Have your IT Specialist install the home version of the "McAfee Active Virus Defense Suite, also known as the 'AVD Suite.'

NOAA IT Security Resources: If there ever is virus or malware detected, you should contact the the NOAA Computer Incident Response Team (N-CIRT). They can be reached 24 hours on 301-713-9111. Their web-site is: https://www.csp.noaa.gov/noaa/ncirt/itsecreport.html .

File-directory structure: All folder names should be identical to that described in Section 2.2.5, for the NWS-network workstation. For example C:\hpd\2009\month .

Applications Required for NWS Network Workstation: The National Climatic Data Center (NCDC) requires the WFO to send the precipitation data each month in a Zip compressed file, and transmitted via File Transfer Protocol (FTP). The NWSREP should have routine access to an FTP utility. Recommended applications are: WINZIP32, and WsFTP95.

1.2.4. Filename and Storage Standard:

The NWSREP shall ensure the totality of data on each Observer's Memory Card is copied as a single file into the WFO workstation. **Note**: The file shall be saved to a dedicated permanent directory with a sub-directory structure that is organized by year and month (e.g., c:\hpd\2009\jun\ ) for at least 12 months.

Example: **41008778_log_20090702.csv**
Station ID_log_DownloadDate.csv

Format: coopidno_log_yyyymmdd.csv

Note: Ensure all monthly files in your PC directory remain unchanged from their automatically named format!

1.2.5 Precipitation Data Reporting to NCDC

The NCDC, Climate Data Division, Data Ingest and Processing Branch (E/CC11), instructs each WFO to use these software and network standards to prepare and transmit monthly FPR data:

- File compression (ZIP) software, WINZIP32.EXE
- File Transfer Protocol (FTP) executable file, WSFTP95.EXE
- NOAA/NWS Enterprise Network Connection (NOAA Compliant Terminal in WFO), only

1.2.6 Precipitation Data Quality Assurance NCDC

The NCDC quality controls your station's files to prepare the FPR data for publication so the FPR data appear in the same table, same quality control flags, and same units of measure as the F&P data. No decision has been made on whether to make all CSV files viewable on a limited access web site.

Note: NCDC ordinarily does not publish F&P data until 5 months after the F&P data was submitted by the WFO. At which point you may view data on-line in the periodicals: ***Hourly Precipitation Data*** on http://www7.ncdc.noaa.gov/IPS/hpd/hpd.html.

1.3. IMPLEMENTATION CHECKLIST TASKS:

Ensure that you have accessed the April 2009 version of the NWS Operational Implementation Checklist. It is accessible on the NWS webpage, and Click on the document titled, 'OI Check List – FPR-D.' See http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm .

Cooperative Observer Program
Planned Product Improvement
OI Check List – Part B

Planned Product Improvement: Fischer-Porter Rebuild (FPR) .

Location (SID, Name, State): _____

Office Completing this Check List: _____ **Date:** _____

Item #	Item Description	OPR	Date
1.	**Pre-OI Operational Support Activities**		
a.	Select F&P sites to rebuild from HQ 'FPR Designated Sites Spreadsheet'	WFO	
b.	Submit 'FPR Pre-Implementation Worksheet' with Projected Dates, to OS7	WFO	
2.	**OI Installation Activities**		
a.	Assemble FPR-1 Kit in field office	WFO	
b.	Install and checkout FPR-1 in accordance with MOD NOTE	WFO	
3.	**OI Monitoring and Coordination Activities**		
a.	Generate a Site Inspection Report in CSSA	WFO	
b.	Transmit a notification message (PNS) on AWIPS	WFO	
c.	Establish a WFO Log Sheet to track Memory Cards received and mailed.	WFO	
4.	**Post OI Activities**		
a.	Ensure data capture for transition month. Decode final month of F&P data from B-18 (i.e., partial month) and enter hourly and daily totals to Form 791D. E-mail to Stu Hinson (NCDC)	WFO	
b.	Submit new rendition B44 to Workflow to identify the FPR equipment	WFO	
c.	Dispose of old equipment in accordance with installation instructions.	WFO	
d.	Verify NCDC received HPD files – next day after FTP transmission	WFO	
e.	FAX the MIC-signed OI Certificate to Tom Trunk (OS7) only after all FPR-Ds have been implemented and NCDC has received data files.	WFO	

Check List for WFO Action

1.3.1 Training the Observer in Basic FPR Operations and Maintenance

All training for authorized operators and maintenance personnel will be completed prior to operational implementation. Training materials are accessed from NWS Headquarters webpage; http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm, and through the NWSREP delivery of printed ***FPR Observer Instructions Guide*** to the COOP Observer, and eventually through NWSTC training sessions. No later than the day of operational implementation, NWSREP trains and witnesses and validates (i.e., documents) that his Observer has been trained on the FPR.

Field level maintenance training will be the responsibility of the National Weather Service Training Center (NWSTC) and offered through training courses and training modules. Primary instruction will be included within the annual course titled, COOP Network Operations. The OS7 will provide the WFO the necessary training materials for instructing the COOP Observers in the use of the FPR equipment. The WFO will provide local observer training in operation and simple maintenance of the FPR equipment. The following materials will be provided to the WFO:

- *FPR Operations Manual*, (July 2009), printed from headquarters web-site.
- *FPR Observer Instructions*, (July 2009), printed from headquarters web-site.

1.3.2 System Assembly, Installation, and Checkout

Installation and checkout of the FPR will be performed in accordance with the ***FPR Assembly Procedural*** http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm issued by OS7 and available on this web-site. The implementation work is conducted in two locations: 'inside the WFO assembly' and 'at the Observer site installation.' Each activity with require approximately 3 hours, not including the time to transport the F&P gauge to and from the Observer's site.

Key activities include: (a) modify an F&P unit inside WFO to create one FPR unit, (b) configure and calibrate the FPR in WFO, (c) transport FPR to site, (d) remove the F&P from site, (e) replace the removed F&P with the FPR transported to site, (f) check calibration with five inch equivalent weight with data logger's display of 'Precip:' reading, and (g) witness the Observer download data to memory card.

1.3.3 Public Information Statement (PNS)

Upon successful completion of FPR installation and checkout the NWSREP will update the CSSA Station Inspection Report Page, transmit a Technical Implementation Notice (PNS) to announce the equipment modification, update the WS Form B-44 (CSSA Station Report), and conduct a 30-day system and data evaluation.

The PNS shall be transmitted within 5 working days after successful installation and checkout. The NWSREP will prepare and issue a PNS for each FPR implemented location within the WFO's County Warning Area.

The NWSREP should be familiar with the NDS 10-1805, Section 2.1; Local or Regional Service and Technical Changes. Procedures for changing local or regional products are determined by the appropriate Regional Headquarters. The changes are announced via a local PNS transmitted by the appropriate offices, as specified in the following instructions:

- NWSI 10-501, WFO Statements, Summaries, Tables Products Specification
- NWSI 10-1701, Test Product Formats and Codes

The format and style of the PNS should be similar to those of the national service and technical change messages described in the NDS 10-1805.

In the day or two prior to transmitting the PNS, the NWSREP must complete the Installation Checkout form to validate that the FPR was logging data. The NWSREP accesses his PNS template, edits it for COOP station name, and enters the 'Implemented Date' which is calendar day (e.g., Aug 26, 2009) when the FPR began logging data operationally.

```
NOUS44
PNSCAE
KSZ025-057-060-102>105-SCZ001>008-011>017-020>025-028>033-037>040-
043>046-053-054-041900-

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE COLUMBIA SC
1105 AM EDT SAT AUG 29 2009

. . . FISCHER-PORTER REBUID /FPR/ NOW IMPLEMENTED AT COOPERATIVE STATION, LANCASTER
3SW, SOUTH CAROLINA, ON AUGUST 26, 2009.

THIS EQUIPIMENT MODIFICATION WILL CHANGE THE WAY THE PRECIPITATION MEASUREMENT IS
TAKEN.  THERE WILL BE NO CHANGE IN THE QUALITY OR THE TIMELINESS OF THIS STATION'S
HOURLY PRECIPITATION DATA /HPD/.  DATA WILL CONTINUE TO BE REPORTED IN MONTHLY HPD
PUBLICATIONS.

THERE ARE A TOTAL OF SEVEN SITES TO RECEIVE THE FISCHER-PORTER REBUILD IN THE WFO-
COLUMBIA COUNTY WARNING AREA /CWA/.  SITES THAT WERE UPGRADED ARE LISTED WITH THEIR
IMPLEMENTATION DATES BELOW.

COOP STATION NAME . . . . . .COOP NUMBER . . .  . . IMPLEMENTED
BISHOPVILLE 1ENE. . . . . .38-0736. . . . . AUG 10 2009
CLARKS HILL 1W . . . . . 38-1726. . . . . AUG 17 2009
LANCASTER 3SW. . . . . 38-4918. . . . . AUG 26 2009
MANNING. . . . . 38-5493. . . . . .2009
ST MATTHEWS.  . . . . . .38-7560. . . . . .2009
WAGENER 1SW. . . . . 38-8879. . . . . .2009
WINNSBORO. . . . . 38-9327. . . . . .2009

THE DATA FROM FPR GAUGES WILL BE REPORTED BY THE NATIONAL CLIMATE DATA CENTER /NCDC/
AS A MONTHLY PRODUCT IN THE HOURLY PRECIPITATION DATA /HPD/ BULLETIN FIVE MONTHS AFTER
THE MONTH OF MEASUREMENT.

INFORMATION ON HPD PRECIPITATION PRODUCTS IS AVAILABLE FROM NCDC.

HTTP://WWW.NCDC.NOAA.GOV/OA/MPP/  USE LOWER CASE LETTERS AND SCROLL DOWN TO /MOST
REQUESTED F/ SECTION - THE SIXTH SECTION ON THE PAGE - AND THEN CLICK ON THE WORD
/SAMPLE/ TO VIEW AN HPD BULLETIN.

IF YOU HAVE ANY QUESTIONS REGARDING THE IMPLEMENTATION OF THE FISCHER-PORTER REBUILD,
AT THE ABOVE LISTED SITES, PLEASE CONTACT:

FRANCIS WELLS
NWS/WFO-CAE...OBSERVATIONS PROGRAM LEADER (OPL)
COLUMBIA, SOUTH CAROLINA
PHONE: 803 765 5501
EMAIL: FRANCIS.WELLS@NOAA.GOV
THIS AND OTHER NWS PUBLIC INFORMATION STATEMENTS ARE AVAILABLE ONLINE AT /USE LOWER
CASE LETTERS/:

   HTTP://WWW.NWS.NOAA.GOV/OM/NOTIF.HTM

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NNNN
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At this time the NWSREP should review the template PNS and update it for any schedule changes to the planned month and year of future FPR site installations. Inquire with the NWS regional focal point to confirm availability of FPR Kits and delivery schedules to the WFOs.

1.3.4 Monitor and Evaluate Routine Operations

There are 3 operational areas each NWSREP shall monitor. First, is FPR data representative of meteorological conditions? Second, is the data complete based on nominal system operations? Third, can you describe any system component that will require maintenance or a situation that might lead to discrepancies in precipitation measurement or the generation of non-valid precipitation records?

For each FPR system conduct an ongoing monitoring and retrospective evaluation of the first 30-days of system and data performance. Each NWSREP will write a short 100 to 300 word summary to outline the general performance of the FPR system. If precipitation events occurred then account for them, including variations in local precipitation amounts, and possible non-representative values attributed to meso-scale phenomena.

1.3.5 Discrepancies: Submit the 30-Day Evaluation Report

If any significant discrepancies were discovered, elaborate them in your '30-Day Evaluation Report' and e-mail your RCPM. If needed, ask the Observer to submit his 'FPR Event Log Worksheet.' The report shall include COOP Station Name, Number, Observer, date of problem and names of anyone who performed maintenance on the FPR system. The final version of the 30-Day Evaluation Report must give a description of how the discrepancy was resolved or who repaired or replaced the component (i.e., Engineering [OPS11], IT, ET, or NWSREP).

Retain both the checklist and the evaluation report in the WFO for 6 months. If there is a significant FPR discrepancy identified in your report, ensure a copy of your 30-Day Evaluation Report is e-mailed to your RCPM within five working days after completion of the 30-day monitoring period.

The RCPM will analyze the issue identified in your 30-day report and e-mail it to the Sterling Field Support Center (SFSC), Jennifer Dover (OPS22), only when problems either cannot be resolved at the Region level or have national implications.

1.3.6 Ensure Continuity of Precipitation Records – Transition Month

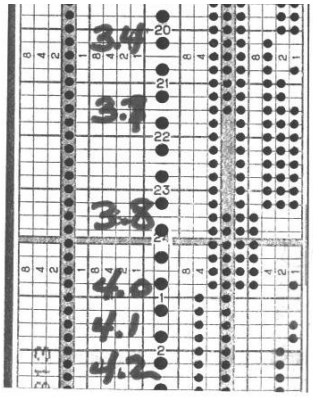
In the transition month when F&P operations are discontinued, the NWS risks losing quality controlled data records from the F&P gauge's final days/weeks due to NCDC's inability to quality control both F&P and FPR datasets for the given month. A gap in NCDC's monthly climate publications would result if it were not for a data recovery method.

For this reason NCDC requests field office's help in recovering the punch tape (WS Form B-18) records from the final month of F&P operation.

Obtain the partial-month B-18 and locate the 12AM to 1AM division for the first day of the month. There are four 15-minute records per hour, decode just the one record closest to the top of the hour for each of the 24-hour divisions. Thus, decode every *fourth* 15-minute record.

Subtract the 12AM value from the 1AM value and enter it to the ‘1AM’ cell in the Form 791D table. Repeat this process for each hour in the WS Form B-18 (illustrated, right), up to the final full hour’s record.

WS Form B-18



Form-791D, below, is an Excel (XLS) formatted file with embedded arithmetic formula.

The spreadsheet will add each hour's value, down the row, and produce a daily-total amount to the 'total' cell at the end of the row.

Edit the Form 791D with a notation, 'END', into the cell that corresponds to the Date and Hour of the B-18's last full hour of 15-minute data perforations.

Name your Excel spreadsheet file according to this convention: 791D_SSnnnn_MonYY.xls for example, 791D_405956_May09.xls; then e-mail the file to Stuart.Hinson@noaa.gov, at the NCDC.

Download a copy of the 79ID from the web site:
http://www.nws.noaa.gov/ops2/Surface/documents/FPU_Form79ID_Rescue.xls

NOAA Form 79-ID																												
									U.S Department of Commerce											STATION NUMBER	40-5956						
August 2001									National Oceanagraphic and Atmospheric Administration																		
									Environmental Data and Information Service											STATION NAME	MemphisWFO						
									National Climatic Data Center																		
	HOURLY PRECIPITATION																			MONTH	MAY				YEAR	2005	
	Recorded by a F&P Weighing Rain Gauge																										
Date	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	0 AM	11 AM	NOON	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	MID	TOTAL	Date	
1																									0.00	1	
2																									0.00	2	
3																									0.00	3	
4																									0.00	4	
5																									0.00	5	
6																									0.00	6	
7																									0.00	7	
8																									0.00	8	
9							0.1					0.1	0.1												0.30	9	
10																									0.00	10	
11																									0.00	11	
12																									0.00	12	
13															0.1										0.10	13	
14						0.4	0.3																		0.70	14	
15											0.1														0.10	15	
16																									0.00	16	
17																									0.00	17	
18																									0.00	18	
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23																									0.00	23	
24																									0.00	24	
25																									0.00	25	
26																									0.00	26	
27																									0.00	27	
28																									0.00	28	
29																									0.00	29	
30																									0.00	30	
31																									0.00	31	
Date	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	0 AM	11 AM	NOON	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	MID	TOTAL	Date	
Amounts in inches,tenths and hundredths for hour ending at observation time; therefore, time distribution of amounts less than one hundredth of an																									1.20		
Times are Local Standard Time (LST)																											
* Amounts included in following measurement; time distribution unknown																											
M = No Record																											

The NWS Training Center (NWSTC) provides us detailed instructions for completing the WS Form 79-1D, (see, above). Reference the **Remote Training Module 630-60** (RTM page 630-60), and page A-36.

RTM 630-60

Page A-36

NOAA Form 79-1 D.1 DATA SHEET, HOURLY RECORD

Description: The 79-1D.1 is the form normally used by the NWSREP to extract hourly precipitation data from punch tapes if it is unlikely that data can be successfully extracted by NCDC's translator. The 79-1 provides a convenient format for manually extracting precipitation data and recording it for processing at NCDC.

Completion:	Fill in the heading of the form as follows, for:
Station Number:	Give same COOP Index Number as on B-44.
Station Name:	Give same COOP Station Name as on B-44.
Month:	Give the month the precipitation was measured.
Year:	Give the year the precipitation was measured.

For partial month data extractions from tape/chart:

Enter "PARTIAL MONTH" on line below HOURLY PRECIPITATION.

Enter BEGINS: Date/Time in Date row before 1st hourly data entry.

Enter ENDS: Date/Time in Date row after last hourly data entry.

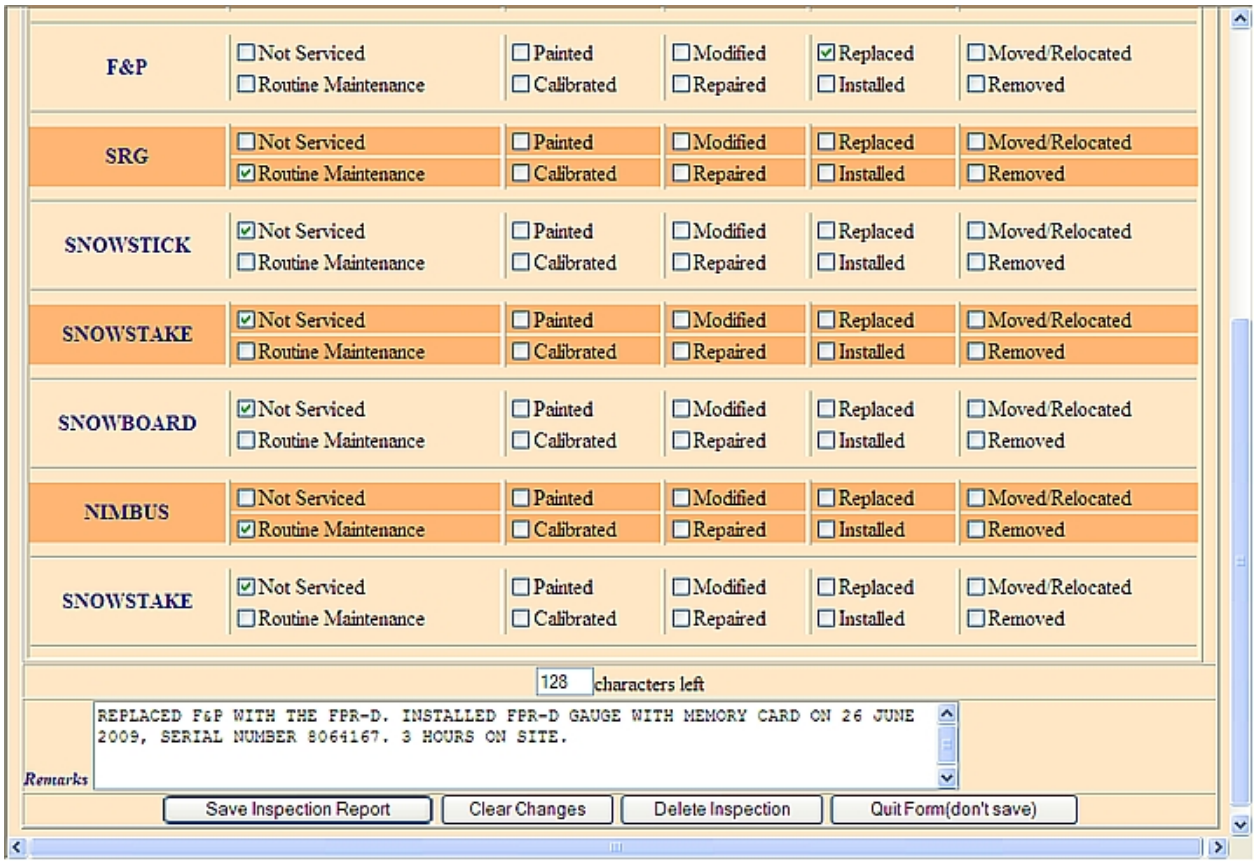
For full month data extraction from tape/chart:

Enter "FULL MONTH" on line below HOURLY PRECIPITATION.

Note that DAYS (1-31) are listed vertically while hours (AM & PM) are listed horizontally across the top of the form. Calculate the differences in punch holes on the punch tape for every consecutive hourly punch (Every 4th punch). Enter this difference in tenths (e.g., 0.3) in the appropriate time block corresponding to the hourly precipitation indicated on the punch tape.

Note: Entry instructions on bottom of form ask for amounts in inches and hundredths. Since punch tape gage only records data to the nearest tenth, extracted data are to be entered on form in tenths, only.

1.3.7 Open a Site Inspection Report in CSSA



Station visits, to install the FPR shall be logged into the CSSA Station Inspection Report. Each visit to the COOP site shall be documented this way by the 10th day of the month following the visit.

Follow the procedures as described in Appendix E of the National Weather Service Manual, 10-1313, dated March 18, 2005, ***Cooperative Station Service Accountability (CSSA) User Manual***. It is accessible on webpage: http://www.nws.noaa.gov/directives/010/pd01013013a.pdf .

Complete all the prompted fields in the Report Screen (see graphic, above).

For Inspection Type, enter "Annual"

For Equipment, Maintenance Performed, go to the third line, F&P, and enter: "Replaced".

In the Remarks window (i.e., free text box), enter "Replaced F&P with FPR." and the time you spent on site, e.g., "2.5 hours on site."

1.3.8 Submit WS Form B-44 to NCDC

Update the CSSA Station Report (e.g., WS Form B-44) for each COOP Station that has completed its modification from F&P Model 3, Modification 6, to Fischer-Porter Rebuild (FPR). Use the terms of reference contained in the document National Weather Service Manual, 10-1313, dated March 18, 2005, Cooperative Station Service Accountability (CSSA) User Manual. It is accessible on webpage: http://www.nws.noaa.gov/directives/010/pd01013013a.pdf

Update the ***Remarks:*** section to explain: "Updated equipment, replaced F&P with Fischer Porter Rebuild (FPR) electronic load sensor."

Update the ***Observed Element:*** section in the appropriate panel with the large block letters "HOURLY PRECIPITATION REPORT". In the first row, with EQUIPMENT, enter the following:

Equipment Code:	FPR-D
Serial Number:	7-digit serial number, located above the UPC bar code on the white decal on the Load Cell Beam. (i.e., 8064177)
Owner:	NWS
Telemetry:	N
Equipment Description:	FPR-D GAUGE WITH MEMORY CARD
Azimuth:	(do not change, unless you have moved the gauge's catch bucket)
Distance:	(do not change, unless you have moved the gauge's catch bucket)

In the second row, with 'REPORTING / PAY' enter the following:

Ob Time:	MID
Rept Method:	ADP
Recipient:	WFO-SID / NCDC
Sponsor:	FC-1 (default, unless otherwise sponsored)
Paid:	N (unless paid)
Data Ingest Via:	MEMORY CARD
Special Network:	-leave blank- (unless Climate Reference Network 'CRN')
Mode:	-leave blank-
Relay:	-leave blank-
When?:	MONTHLY

From the time you submit your Station Information Report (SIR) to Workflow for NCDC approval to the time the CSSA data base is updated will take approximately 15 calendar days. If you have any questions on the CSSA Workflow Process, e-mail or phone your RCPM.

44.5358 | -83.7022 | NAD83 | NAVD88 | EASTERN

Lat/Lon Source: GPS - GARMIN MODEL III PLUS
CPA Rgn: CR
Station Type: COOPERATIVE OBSERVER STN - 92
County: ALCONA
State: MI
Elevation: 894
COOP Network: COOP STATION CLIMATE - HYDRO (AB)

STATION MGMT
CPA: APX
CWA: APX
HSA: APX
ET:
RFC: MSR (NCRFC)

STATION ADMIN
Authorizing Doc: B43
Authorization Date: 03/10/2006
Station Begin Date: 05/01/2006
Primary Auth: KEITH A. BERG
Secondary Auth: DENNIS R. FRU
Reason for Report (see Remarks): 10 CHANGE
Effective Date: 06/26/2009
NWSREP: FF

Topography (maximum 512 characters) — 232 characters left

SITE IS LOCATED 2 MI SE OF VILLAGE OF GLENNIE IN A RURAL FARMLAND AREA. THE AREA IMMEDIATELY SURROUNDING THE SITE IS GENTLY ROLLING FIELDS AND GRASS IN A SAND AND CLAY LOAM. HEAVY FOREST LIES 0.9 MI NW TO 0.4 MI N TO 0.9 MI E. THE AU SABLE RIVER LIES 4.6 MI WEST TO 5.2 MI SOUTH.

Driving Directions (maximum 512 characters) — 154 characters left

FROM THE ONLY INTERSECTION IN THE VILLAGE OF GLENNIE (HWY M-65 AND BAMFIELD RD) FOLLOW SOUTHBOUND M-65 FOR 2.1 MI TO OBSERVER RESIDENCE ON LEFT. LOOK FOR VERY LARGE ROCK NEAR DRIVEWAY ENTRANCE. RESIDENCE IS A LARGE 2-STORY FARM HOUSE WITH A DARK REDDISH-BROWN EXTERIOR AND WHITE TRIM. LARGE PORCH HAS A SWING ON IT. CO-OP EQUIPMENT IS VISIBLE FROM HWY M-65.

Remarks (maximum 512 characters) — 279 characters left

UPDATED EQUIPMENT. UNDER OBSERVED ELEMENT HOURLY PRECIPITATION, CHANGED F&P TO FPR-D. IN REPORTING LINE, CHANGE B18 TO ADP AND DATA INGEST VIA TO MEMORY CARD. THERE ARE SEVERAL DOGS AT THIS RESIDENCE, BUT ALL ARE DOCILE AND FRIENDLY.

Save Work in Progress | Submit for Approval | Clear Changes | Cancel Form

*Items in Red indicate required fields

COOPERATIVE STATION SERVICE ACCOUNTABILITY (CSSA)

STN INFO | OBSERVER DATA | OB INFO | OTHER EQUIP INFO | OBSTRUCTIONS | PUBLICATION DATA

Station Name: GLENNIE 2SE Station Number: 20-3188 Climate Division: 04 Rendition: 4 Other Obs

Observed Element: HOURLY PRECIPITATION REPORT

EQUIPMENT

Equipment Code	Serial Number	Owner	Exp	Tel	Equipment Description	Azimuth	Distance
FPR-D	8064167	NWS		N	FPR-D GAUGE WITH MEMORY CARD	323	20

REPORTING/PAY

Ob Time	Rept Method	Recipient	Sponsor	Paid	Data Ingest Via	Special Network	Mode	Relay	When?
MID	ADP	APX,NCDC	FC-1	N	MEMORY C				MONTHLY

** To delete an observation detail record, set the Ob Time to 'DEL'.

Add Element | Previous Element | 4 of 4 | Next Element | Delete Element

Save Work in Progress | Submit for Approval | Clear Changes | Cancel Form

1.4. POST-IMPLEMENTATION ACTIONS:

1.4.1 Post-Implementation Packet to RCPM:

By the fourth week after your first COOP station has completed its phase-over to FPR operations, review the *Operational Implementation Plan (IOP), Checklist B*, to see if there were any items outstanding or missing, or in some way needed follow-up with the Cooperative Observer. Compile, correct, re-address any Observer submitted documentation for one last WFO Packet to be mailed the RCPM.

Six weeks after phase-over of each FPR gauge, mail your RCPM a copy of the following:

a. NWSREP-signed ***Operational Implementation Checklist B*** that vouches for the proper installation, calibration, and initial operation of the FPR.

b. Print copy of the NCDC inventory of ingested HPD files confirmation receipts: **http://www1.ncdc.noaa.gov/pub/data/hpd/inv/HPD_Received200907.txt**

c. If any one of the FPR systems experienced a significant discrepancy as defined in Section 1.3.5, above, then e-mail your ***'30-Day Evaluation Report***', to your RCPM.

d. E-mail your RCPM if you journalled to an ***FPR Event Log Worksheet***, or an ***FPR Trouble Report***; to account for the 30-Day Evaluation Report.

e. Fax to NWS headquarters the, ***FPR Operational Implementation (OI) Certification form,*** after your MIC signed this form.

1.4.2 Operational Quality Control

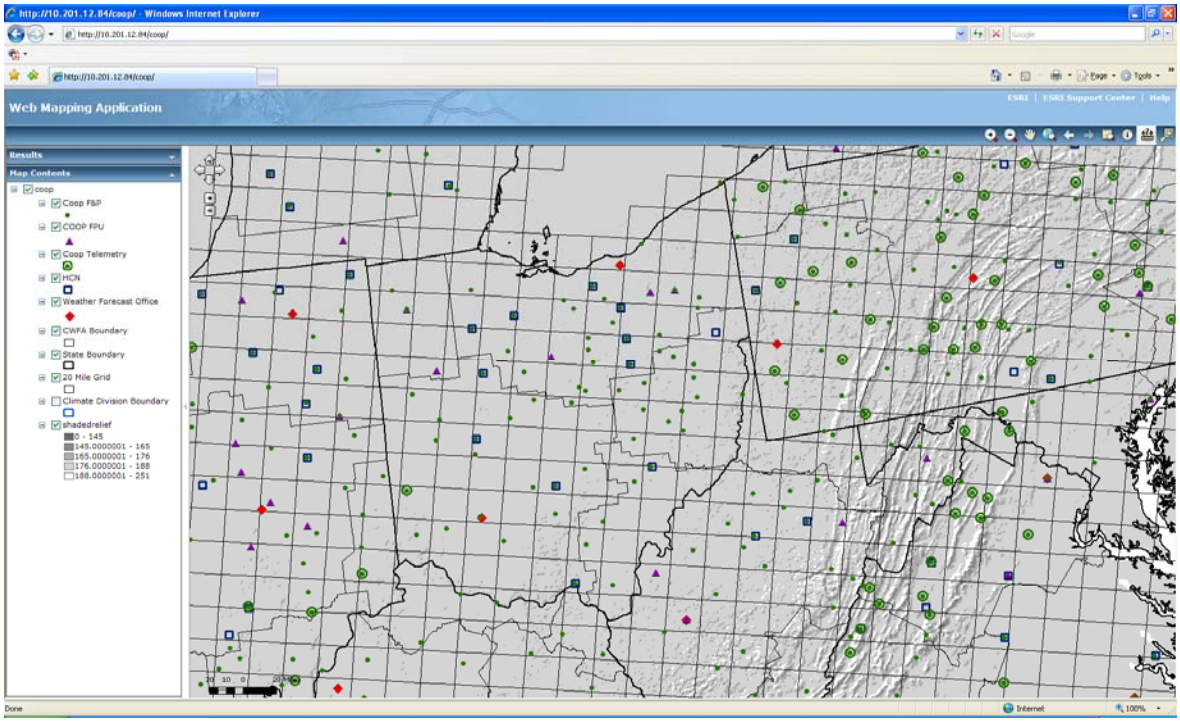
Beyond the initial 30-day evaluation period, continue to monitor the FPR system performance through visual inspection of the CSV data files when you upload each station's monthly reporting key. Also, be vigilant and periodically visit the NCDC inventory webpage, and inquire into the size of each of your FPR station's monthly CSV file (i.e., after NCDC unzips them). Follow the guidelines in Section 2.2.6, of this FPR Operations Manual, "Examine CSV to Confirm Collection Month is Present', if you suspect a meteorological condition has resulted in ambiguous or discrepant precipitation data.

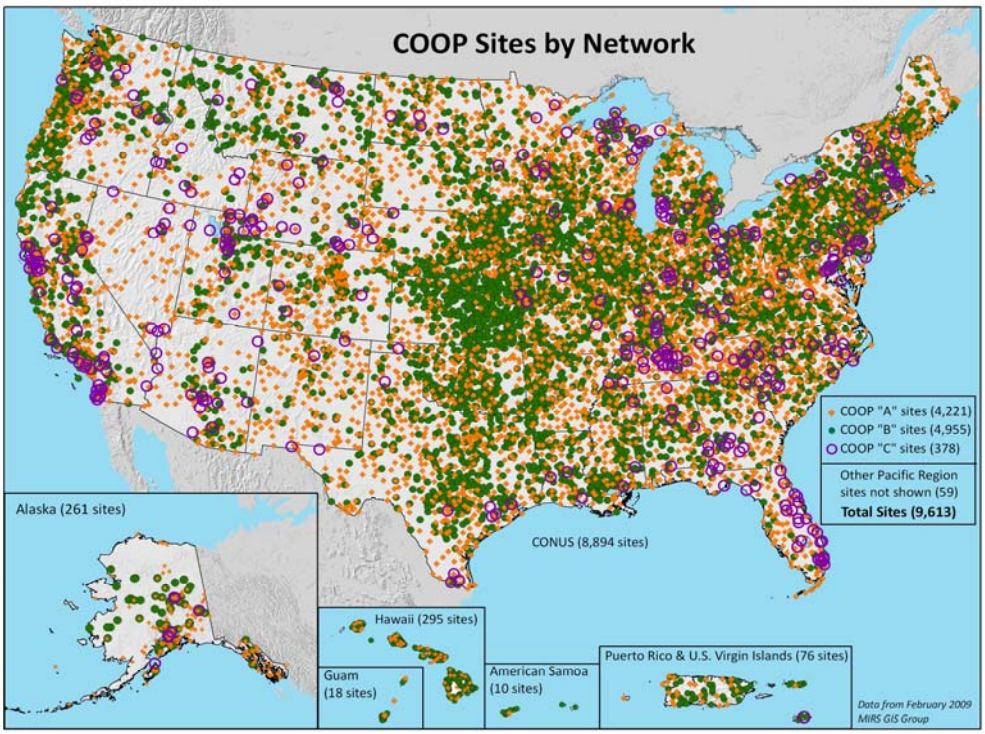
1.4.3 Dispose of Old Equipment

No equipment is to be returned to the National Reconditioning Center (NRC) or the National Logistics Supply Center (NLSC). Rather, the WFO may choose to retain used, undamaged F&P equipment at the WFO. Otherwise, follow policy in Appendix H, of the ***FPR Assembly Procedural (Aug 2009)***, the WFO may dispose of any used F&P 'old equipment' only after the NWS headquarters and your RCPM has stated the FPR Operational Implementation (OI) has officially concluded.

1.4.5 Maps of Fischer-Porter Locations:

All F&P recording rain gauges are plotted on a user-interactive map. Take careful note of telemetry sites. They are symbolized with a green circle surrounding a green dot – they are ineligible for FPR-D modernization. See: http://gis.srh.noaa.gov/coop/ created by OPS13.





CHAPTER 2 – MONTHLY DATA COLLECTION AND TRANSMISSION

2.1 FPR Data File Exchange Requirements and Tasks:

2.1.1. NWSREP Responsibilities:

As NWSREP your major responsibility will be to manage the exchange of the small plastic secure data (SD) memory cards with your Observers. You must return one memory card to each of your Observers on or about the 25th of each month as a matter of priority. This will ensure each Observer has at least one memory card in his/her possession at the start of the new month so the Observer can download new data.

The Observer is instructed to download FPR data anytime in the first five days of the month, yet not before 12AM on the first day of the month. You should work a monthly Memory Card Log Sheet (see template below) to journal the date on which you mailed each of your Observers their new memory card. You will need to log the date you have opened the envelope containing the Observer's reporting card (3rd column in Log Sheet). The term 'Reporting Card' refers to any memory card an Observer sends you, filled with the most recent month's records, but has yet to be Virus scanned. The term 'Outgoing Card' applies to a memory card only after the card has had its CSV file virus scanned and downloaded to your NWS enterprise workstation. Once you complete this transfer, place the 'Outgoing Card' in a zip-lock bag marked 'Outgoing.'

Memory Card Log Sheet

Month Ending	COOP Station Name	Mailed the 'Outgoing Card' to Observer?	Received the 'Reporting' Card?	Virus Scan the 'Reporting Card'	Transfer CSV file to NWS workstation?
AUGUST 31 2009	Clinton Lake	August 25th	Sep 6th	Sep 6th	Sep 25th
	Malvern Lake	August 25th	Sep 8th	Sep 8th	Sep 25th
	Milford Lake	August 25th	Sep 5th	Sep 5th	Sep 25th
	Perry Lake	August 25th	Sep 7th	Sep 7th	Sep 25th
	Pomona Lake	August 25th	**Not In Yet:** Phoned him on 9/20, he'll send in two days.	**NOT as of 9/25.**	**NOT as of 9/25!**

Important: If you have not received the Observer's memory card by the 10th day of month, phone the Observer to inform him you are missing his card and ask if he had any difficulties or was simply behind in mailing. On the 20th review the Memory Card Sheet to identify any card still missing, if so, phone that Observer a second time. If the Observer does not have a phone, or Institution Observer's automated phone attendant prevents direct conversation, then mail a letter to the attention of the Observer, to have him mail the Memory Card.

Note: Memory cards are to be unlabeled when mailed to the Observers, and the Observers do not label their cards for standard operating procedure.

Note: Each incoming Memory Card should contain only two (2) CSV data files. The current reporting month and the preceding reporting month – each were given a filename upon download at the Observer's site. You may not rename any data file either in the current month's or the past month's HPD directory sub-folders.

Note: Keep a log sheet to account for any incoming Memory Card that arrives 'blank.' You may affix a label to these Memory Cards to check them later when you visit the COOP site.

Your next major responsibility is to transmit the monthly FPR precipitation records to the NCDC before the 30th or last day of each month. For rare occasions, when the Observer was unable to mail the card or was instructed by the WFO to postpone a download to memory card, the date of your transmitting the FPR file may be extended by one or two weeks. The intention here is to limit unnecessary FTP transmissions and to simplify your memory card tracking work.

2.1.2. Observer Responsibilities:

Memory Card Exchange: Emphasize to your Observer how his major responsibility is to be the full-time 'keeper' of the FPR Memory Card. He will need the Memory Card at the start of each month to download precipitation for mailing to you in the WFO. His/her full-time awareness of the location of this small plastic Memory Card is essential.

The Observer needs to understand how you will use the United States Postal Service (USPS) to routinely mail a memory card each month to his preferred mailing address. This memory card will be mailed in the familiar looking envelope and will be sent to arrive to accommodate the Observer's scheduled monthly download on or after the 1st day of the month.

To meet this 1st day of month schedule you need to anticipate how each Observer actually receives USPS mail. Where is his/her USPS delivery location?

- Residence?
- Rural highway 'box'?
- PO Box at local Post Office?

Monthly Data Collection: Observer shall download the data to the Memory Card any time after 12:00 AM local time on the first day of the month, through the 5th day of the month. For additional information on how to download data, the Observer should refer to his printed copy of the ***FPR Observer Instruction*** guide.

The 'outgoing card' is likely to have already arrived a day or two before the Observer downloads the monthly records and so he will have two cards in his possession. The Observer should realize that he may use either card to download as they are both considered available 'blanks.' However, once data is downloaded to the card, the Observer needs to immediately package it to the NWS-addressed mailer envelope, to reduce risk of Observer mailing his other card, the one that was intended for his next monthly download.

At the time you install FPR equipment and conduct a familiarization tutorial with the Primary Observer (and Secondary Observer, if possible), make sure he is knowledgeable of the NWS operations and maintenance policy as outlined in the W-OS7 issued, '***FPR Observer Instructions.'*** Encourage their dialogue, solicit their questions, and offer them additional instruction if needed to bring them to a qualified level of experience after two or three months' operating the FPR.

An Observer who is qualified to operate the FPR recording gauge will have demonstrated proficiency in the following tasks:

- Download to memory card (i.e., dry run) on the day you install his FPR system. Observe his level of familiarity with key pad control points and the memory card slot.

- Able to locate and describe the purpose of the: keypad, display, card slot, and the Log Sheet if he conducts maintenance on his F&P rain gauge. Possess a printed copy of the ***FPR Observer Instructions,*** (July 2009).

- Timely operational download to Memory Card on the first five (5) calendar days of the month. The Observer shall not download before 12AM on the first day of month!

- Timely mailing of Memory Card to WFO by the 10th day of month. Observer shall mail you his memory card (i.e., 'Reporting Card') on same day that he downloaded his data.

- Possess a filled-in copy of the ***Mailing Address/WFO POC Sheet*** (Appendix A, *FPR Observer Instructions*, July 2009).

- Identify a secure location where the Observer will keep the memory card during the month.

2.2. General Month-by-Month Responsibilities and Timeline

2.2.1. Mail All Observers a Memory Card:

On or about the 25th of each month mail each Observer a memory card.

Note: Memory Cards you mail to the Observer are not required to have any type of label or marking. If you label them, mark each with its COOP Site Number. Each card should contain only one CSV file, the last reported month. The file is not required to have originated from the Observer to whom you are mailing. Rather, the purpose is to deliver a nearly blank memory card.

Write down to the monthly Log Sheet (Sec 2.1.1) the date you mailed-out the new Cards.

2.2.2 Log-in Each Reporting Card as Received by NWSREP:

All Observers should have mailed you their Reporting Card with the understanding that you have to have them received and positively accounted for between the 10th and 15th of each month. If any card is missing on the 15th, first search your office's incoming mail station, for possible mis-distributed / misplaced envelopes.

Receipt of the Observer's Reporting Card: Check the envelope's self-address to positively identify the location of the COOP Station Observer sending you the enclosed plastic memory card. Check the same mailing envelope to ensure it contains:

- SD Memory Card,
- Possible FPR Event Log, or related printed correspondence.

The same day you open the envelope holding the Observer's mailed card, log the date to the 3rd column of your Memory Card Log Sheet, in the column titled, 'Received the Reporting Card.'

Strive to have all Observers' cards logged as McAfee virus scanned by the 10th of the month. For offices with ten or more FPR sites, strive to have all cards logged and virus scanned by the 20th of the month.

Write down to the Memory Card Log Sheet (Sec 2.1.1) the date you received his Reporting Card.

Phone the Observer if his mailing has not arrived by the 10th day of month.

Virus scan each incoming memory card (i.e., 'Reporting Card') on the same day you receive the card.

Write down to the monthly Memory Card Log Sheet the date you virus scanned the card's contents.

2.2.3. Instructions to Create the Precipitation Data Files:

A. Insert the Memory Card to your WFO flash-drive security workstation.

B Run the McAfee Active Virus Detection (AVD) application and conduct an on-demand scan of the memory card.

C. When done view the Memory Card's contents in a 'Notepad' pop-up window. See Section 2.2.6 for information on how to decode data fields. Then, click **Save to File** button to save the Memory Card's most recent month's CSV file to your NWS enterprise workstation. The file will be saved to a directory path you have configured in (i.e., C:\HPD\2009\JUNE\ ).

Do **not** 'Save to File' if the Reporting Card is missing 15 or more days of the collection month. Phone the Observer to inquire into the problem and ask Observer to perform a download today, and mail the data his earliest convenience. When you receive his card, then mail the Observer a replacement Memory Card because he has none.

Example: **41008778_log_20090702.csv**
StationID_log_DownloadDate.csv

The filename convention is:

coopidno_log_yyyymmdd.csv

Here the 'coopidno' is an 8-digit coop id number where the first 4 digits are the state number (4100 is Texas) and the last 4 are the actual site id number for that station within the state. (e.g., 41008778, is assigned to Swan 4NW, TX)

"yyyymmdd" marks the date of the download of data to memory card, and so the card should contain data up to and including this day of the month.

D. You may click the View Data tab (middle tab at panel's top) to skim the data file inside the Notepad utility, or click the Exit button to leave the program.

E. Do not delete CSV files prior to copying them to NWS workstation.

F. To finish the process, delete the oldest of the three files on the memory card, and remove from reader.

G. Place the memory card in an envelope ready for mailing to the Observer.

In the above process you have successfully uploaded your Observer's memory card data into your NWS workstation.

Note: When seeking to examine the individual 15-minute data elements, use the Notepad program. Never open a file by going to Windows Explorer and double clicking the filename because this will open the file and immediately render a change to the cells' data format settings! The most obvious corruption is a change to each record's date field. Also, for data that end with a '.n0' or '.00' after the decimal point, the Excel-CSV will permanently truncate these trailing '0' numerals and alter the permanent data record!

2.2.4. Filename and Storage Standard:

The following COOP Program standard for filename and file allocation folder-name convention shall apply to each WFO handling the exchange of FPR data files for the NWS and NESDIS.

This standard will apply to both platforms in the WFO where you handle FPR data files:

- Virus Scanner PC with McAfee and Federal Desktop Core Configuration (FDCC)
- NWS network station's (i.e., AWIPS) directory for "HPD" (i.e., C:\HPD\YEAR\month)

After you run McAfee Active Virus Defense (AVD) suite and you have confirmed 'no detections' remove the memory card. Do not save the CSV file to the Virus Scanner PC either its subfolder, or its device drive.

Each memory card should hold just two files: (a) the reporting month – with precipitation data in all 15-minute periods, from every day of the entire calendar month; and (b) a second file, the preceding month's CSV file, preferably from the same Observer's site.

Only the current CSV file shall be saved to a dedicated permanent directory, with a sub-directory structure that is organized by year and month as follows: C:\HPD\2005\JUNE\

Store, and do not delete the CSV data files for at least 12 months. Also, never rename files that are being stored. Always keep the file in its original filename: **41008778_log_20090415.csv ;** (i.e., Station ID_log_DownloadDate.csv).

Important: Never rename a data logger generated filename! And never duplicate, i.e., 'copy-cat', an assigned filename if you generate a mark-up or work-file document for personal use!

Filename Format: The first eight characters give the Station ID number (i.e., 41-8778) with the machine writing two zeros after the state code; then the machine automatically writes the word, 'log' in the middle of the filename, and lastly the machine writes the year-month-day into the filename for the local standard time on which the Observer conducted the download procedure.

2.2.5. Setting the Data Folder-name in NWS Workstation:

In the same NWS workstation you plan to FTP your monthly files to NCDC, you need to establish a directory folder according to the year and month, for easy, ready reference of the precipitation data files.

A good example is to go to root drive C:\ and establish the directory 'HPD' then create several subfolders named by the months.

C:\HPD\2009\JULY

Note: Always keep in mind that Notepad is the only program for viewing and opening the CSV stored in these directory folders! To do otherwise will corrupt the data format of the CSV file!

2.2.6 Examine CSV to Confirm Collection Month is Present:

Give a quick, one minute or so, visual inspection of your Observer's CSV file's contents, to confirm the Reporting Card was holding data records for the collection month. Confirm there is data from the start of the month as accounted for by the 12AM record from the first day of the month: **05/31/2009, 00:00:00**,3.09 ; is valid for the month of June.

Example:

Precip, 05/31/2009, 23:45:00, 3.09
Precip, **06/01/2009, 00:00:00, 3.09**
Precip, 06/01/2009, 00:15:00, 3.09
Precip, 06/01/2009, 00:30:00, 3.09

Scroll to the end of the CSV file and locate the end of the collection month. Confirm there is data from end of the month as accounted for by the first 15-minute record past 12 Midnight of the last day of the month: **07/01/2009, 00:15:00**,3.09, is valid for the month of June.

Example:

Precip, 06/30/2009, 23:45:00, 3.09
Precip, 06/30/2009, 00:00:00, 3.09
Precip, 07/01/2009, 00:15:00, 3.09
Precip, 07/01/2009, 00:30:00, 3.09
Precip, 07/01/2009, 00:45:00, 3.09

In this way you have confirmed the Observer submitted a valid station record for the collection month being reported.

Note: If the beginning and ending lines (fifteen minute records) contain missing data, or skipped readings, then the NWSREP shall note the discrepancy, inquire with the Observer, and then e-mail your RCPM to report the event. Include the CSV file as an e-mail attachment.

Note: Your CSV data will appear in Notepad similar to this example.

```
Station Name,Sensor Serial Num,model and version,Slope,Offset,Averaging Time,Sampling Interval
41005678,7050030,FpRain ver 1.01,-2.4657340 ,-3.7107741 ,2.000 sec,0 ms
Time After Change,07/01/2008,10:33:50,267875280,
Precip,01/05/2000,01:00:00,33.09,Missing samples,
Air Temp,01/05/2000,01:00:00,160.46,
Batt Voltage,01/05/2000,23:59:59,12.8,
Precip,08/26/2008,23:30:00,3.09,
Precip,08/26/2008,23:45:00,3.09,
Batt Voltage,08/26/2008,23:59:59,13.3,
Precip,08/27/2008,00:00:00,3.09,
Precip,08/27/2008,00:15:00,3.09,
Precip,08/27/2008,00:30:00,3.09,
Precip,08/27/2008,00:45:00,3.09,
Precip,08/27/2008,01:00:00,3.09,
Precip,08/27/2008,01:15:00,3.09,
```

After you have examined the CSV file for proper dates and times to verify the full reporting month is present, you may wish to confirm the Precip values are consistent in that they contain data and not 'zeroes.'

Precip or Event	Date	Time	Value	* Description *
Precip Bucket Level or Log Event	**Month/Day/Year**	**HH:MM:SS**	**Units will vary.**	*** This is not a field in log! ***
Precip	07/10/2009	22:30:00	3.09	3.09 inches of fluid
Batt Voltage	07/10/2009	23:59:59	12.8	12.8 volts in logger
Display On	07/10/2009	22:03:23	3.09	Display wake-up
Display Off	07/10/2009	22:05:47	3.09	Display fell asleep
Slope Before	07/10/2009	23:38:22	- 2.8686	Prior calibration Slope
Slope After	07/10/2009	23:38:33	- 2.4167	New calibration Slope
Offset Before	07/10/2009	23:12:34	- 3.5378	Prior calibration Offset
Offset After	07/10/2009	23:12:34	- 3.1459	New calibration Offset
Log Download	07/10/2009	23:18:51	-blank-	Download last 60 days

Note: The logger marks the precipitation and system events in a Month/Day/Year format.

2.2.7 Virus Scan the CSV Files prior to upload to AWIPS Workstation:

Do not transfer any CSV files from the Memory Card until you have used McAfee Active Virus Defense (AVD) on your WFO designated workstation. See instruction section 1.2.5 of this manual for hardware and software required for such a Virus Scan PC.

You may want to wait until the 15-25th of the month until all Memory Cards have arrived, and scan that at the same time. Then when you have received all Observers' reporting cards, as accounted for by the ***Memory Card Log Sheet*** (Sec 2.1.1), run the McAfee software on each memory card. Ensure the Memory Card is free with no detections. When the McAfee shows a 'none detected' message, dismount the Memory Card from its reader. Insert the Memory Card to the NWS workstation that will FTP the file to NCDC.

Before you transfer these CSV files, ensure the enterprise workstation's file structure was incremented for the current collection month in accordance with the convention stated in Section 2.2.4 of this manual (e.g., C:\HPD\2009\JUNE\).

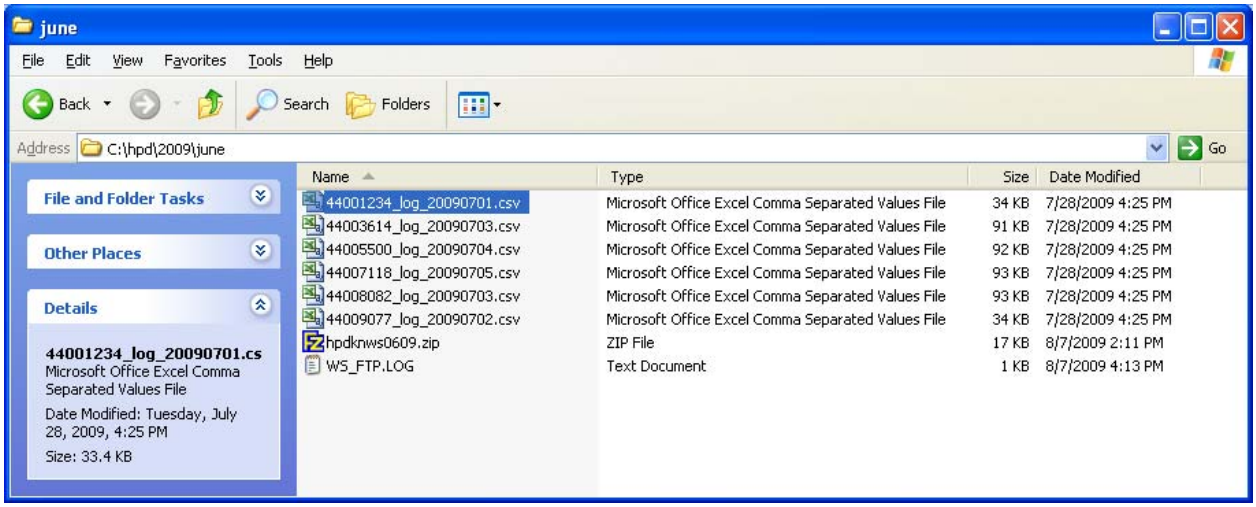
Portable Media: Data transfer should be done as directly as possible while constrained by the requirement to Virus Scan every memory card. Your WFO management may permit use of a secure Laptop PC to conduct the McAfee virus scanning should you have 20 or more F&P sites to scan each month.

Note: Never rename the CSV files when you upload them to the NWS workstation. Always leave the filename untouched and it its CSV format. See the note labeled 'Important:' back in Section, Sec 2.2.4.

2.2.8 Examine CSV file in Windows Notepad:

The best practice for examining a recently received Reporting Card is to open the CSV file, after you have completed virus scanning, and after you have up-loaded and saved the CSV file to your HPD folder in the NWS enterprise workstation.

In this way, any problems with missing data, or the wrong month's data can be diagnosed soon enough for you to document the problem and phone the Observer for a resend. Remember, the Observer should always have a spare Memory Card kept in his rain gauge for such a contingency.

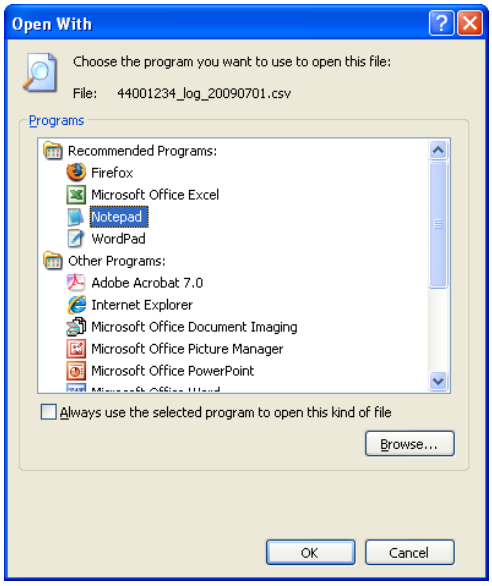


Always use Notepad as it should be available in your NWS enterprise workstation and WinXP virus scanning PC. At no time shall not open the CSV file at any time within an Excel application!

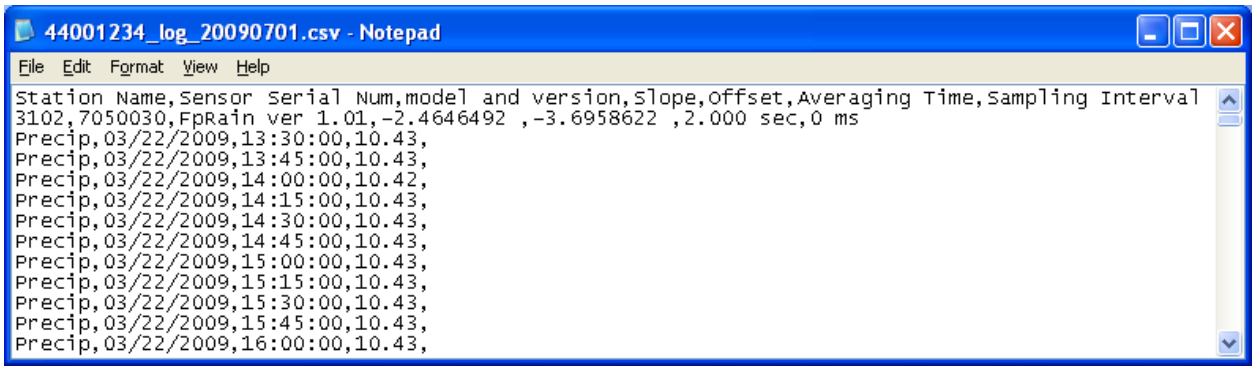
Follow these Windows procedures to call up the Notepad application to view the CSV contents.

Access your Network station's file directory containing these FPR data files and carefully single click the right-mouse-button to select the CSV file for a controlled application opening within **Notepad** and not Excel.

Important: Be careful not to double click the CSV file as this will open it within the Excel spread-sheet applications program and you risk losing the date/time data format!



Now, click the right-mouse-button once to expand the drop down menu (see graphic, below), and notice the option "Open With". Slide the cursor to the word, 'Notepad' it is the second application listed on this pop-out menu. Single click on it to open a Notepad text screen viewer window and conduct your examination of the 15-minute data records as you have done earlier in Section 2.2.7 of this manual.



2.2.9. Zip Compress FPR Data File :

On or about the 15th of the month, go to the Memory Card Log Sheet and take inventory of the memory cards you have transferred to the NWS-network workstation. When all the Observers have sent their memory cards, and you have successfully Virus Scanned all cards, now you are ready to 'zip' together all the CSV data files into a single file on the NWS network workstation.

Use only the NWS network workstation to zip together <u>all</u> CSV files from the <u>observed</u> month.

a. Using Windows Explorer, select all files in folder by selecting one file in the folder and then using (Ctrl-A),

b. Right-Click on files and select "add to ZIP"

c. The file should now be re-named hpdkxxxMMyy.zip

You must always use this NCDC filename convention, hpdkxxxMMyy.zip , for all files transmitted to NCDC. Code explanation: >kxxx= is your 4-letter WFO identification (e.g., kmeg for Memhpis, TN), and >MM= is the data-month (i.e., 06), and >yy= is the data-year (i.e., 09).

<u>Cards Delivered Late to WFO</u>: If any Observers have not yet sent you their memory card, phone and remind them, and wait until the 25th of the month. Then, on or about the 25th of the month use WinZIP to bundle-zip the full complement of CSV files into one ZIP file.

In certain rare cases of lateness, you may postpone the ZIP process and FTP transmission for six weeks beyond the 15th. August 31, 2009, is seven weeks 'late' from the Observer's reporting date for the June 1-30, 2009, precipitation report. Further lateness from the Observer will cause confusion in your account of HPD transmissions to NCDC. Remind the Observer to download and mail the card the first week of each month.

NCDC Advice on Zip Compresssion:

- The CSV data file must contain the **entire** month's data being reported in the file name of the zip file.

- For example, a ZIP file named **hpdkxxx0609.zip** must contain all data for the month of June. The Observers shall download the data logger to their key only after midnight on June 30, 2009. Since NCDC will be processing the June data, if any data is missing, it will not appear in the publication or archive databases, and will be marked "missing".

Caution: Do not right-click on the folder and "add to zip" as this causes your PC's folder name to appear to NCDC as the path name from which to extract data. Then, your data will never get processed by the ingest program!

Caution: Make sure that the "save full path info" is not checked under the Folder Option. This creates a separate sub-folder. Then, your data will never get processed by the ingest program!

Caution: Do not send a self-extracting executable file (.exe). The files must be zipped with a file compression utility such as winzip or pkzip.

2.2.10. Transmit Precipitation Data to NCDC:

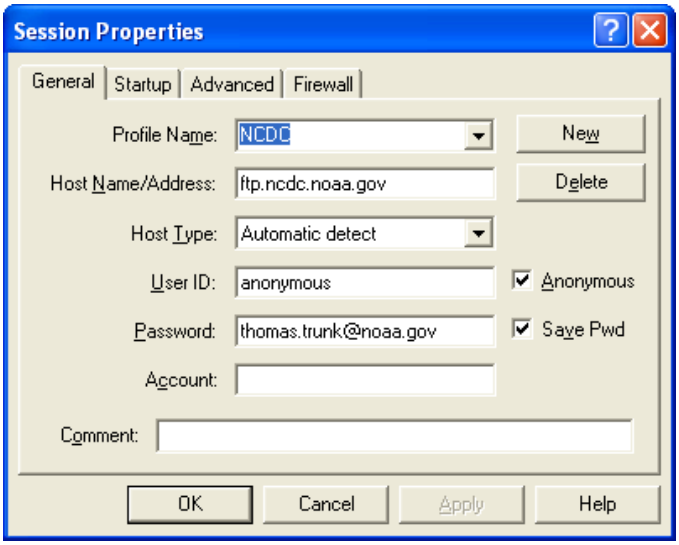
Between the 15th or 25th of month, you should have zipped together all your current CSV files at your NWS-network workstation (Sec 2.2.9, above). Now you are ready to start an FTP session.

Double-click the desktop icon for WsFTPLE (i.e., Ipswich WSFTP95.exe) on your network workstation. If there is no icon, run the executable file that is located in C:\Program_Files\WS_FTP Windows\. The Session Properties 'General' panel will open immediately (graphic, below). Confirm it is configured properly with each NWSRSEP to use 'anonymous' as his User ID, and each NWSREP shall use his NWS-network e-mail address as his Password.

Host Name / Address:
ftp.ncdc.noaa.gov
User ID: anonymous

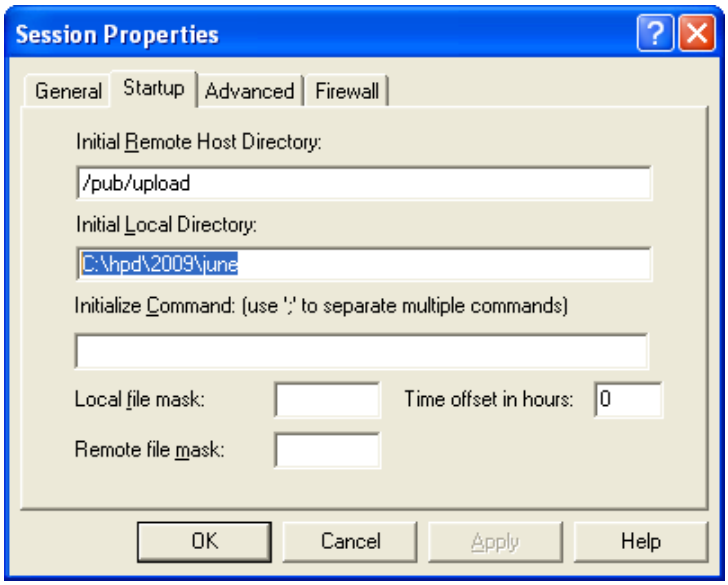
your.name@e-mail.address.

The general session properties do not change, except for the Password field, which will show the e-mail address of the person who most recently transmitted an FTP data file to NCDC. Also, about half of all offices send upper-air observations this same way. So, now update the Password: dialogue box with your name.



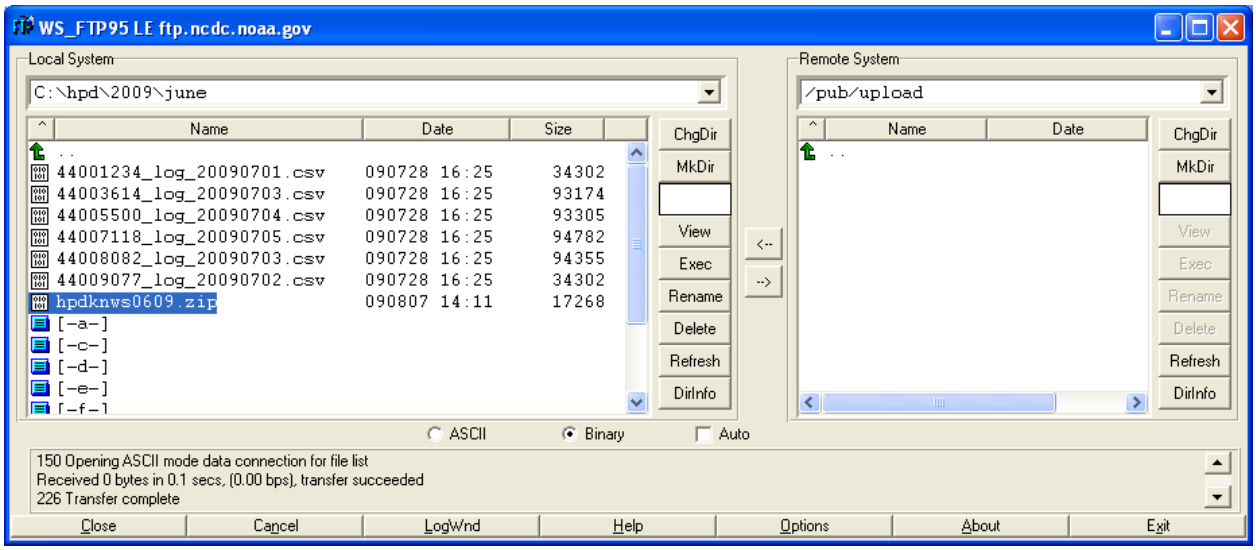
Click on the Apply button on the lower portion of the 'General' panel to enter your password (do not click on OK, yet call-up the 'Startup' tab immediately to the right of 'General' in the same Session Properties screen.

Place your mouse cursor inside the second dialogue box, marked 'Initial Local Folder:' (see graphic, right) and update the default local folder from C:\hpd\2009\may, to C:\hpd\2009\june, by typing in the letters 'june' (below) and clicking on the button Apply.



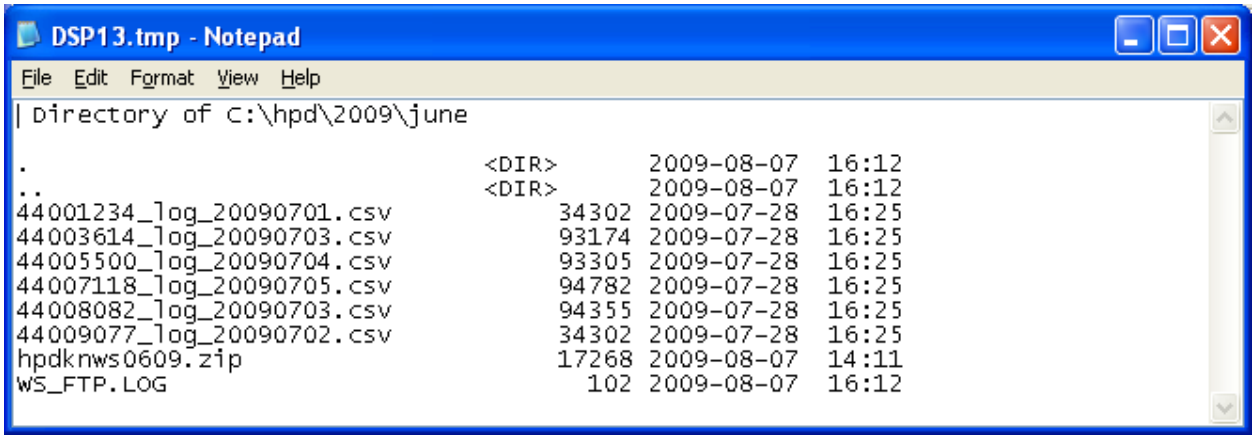
Finally, while still in 'Session Properties', click on the OK, expect sound-effects (i.e., train-whistle), and the program will quickly update your FTP user-control panel (see graphic, below) as the Session Properties windows closes.

The FTP twin-pane user-control panel (see, below) is a standard design with the left-pane titled 'Local System', and the right-pane titled, 'Remote Site'. Your Observers' monthly data files are visible in the Local System's left-pane view arranged by filename as they appear in your NWS-network (AWIPS) workstation. The NCDC directory path for data file ingestion appears in the right-pane, under the title, Remote Site.



Note: Verify that your ZIP filename is properly coded and spelled: **hpdkxxxMMyy.zip** is the proper code, where 'kxxx= is your 4-letter WFO identification (e.g., kmeg for Memphis, TN), and 'MM' codes for data-month (i.e., 06), and yy= codes for data-year (i.e., 09). For zip files the year 'yy' is always on the end of the filename!

Note: Always name the ZIP file with the same month designation as the Collection Month of the observed precipitation data being reported to NCDC! You may call-up a full view of the precipitation data files to understand which CSV files you have just zipped. Use your mouse – locate the lowest tab in the median of the double-pane window – labeled 'DirInfo'. Click on this 'DirInfo' tab to open the viewer as seen in the illustration, below.

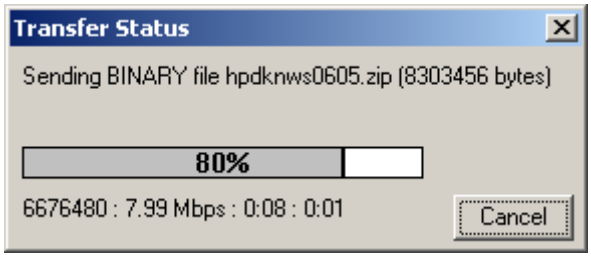


Ensure that the Local System window displays the relevant month's FPR zip files (e.g., hpdkxxx0609.zip) along with the CSV filenames of each COOP station that sends you monthly FPU data. The Remote Site window will show no files having been uploaded as of this session.

a. **Select** the ZIP file (e.g., hpdknws0609.zip) you will send to NCDC. This is the one file that encapsulates all your FPR stations' precipitation data for the most recent collection month (e.g., June 1-30, 2005). Click (single click with left mouse button) the ZIP filename in the left-side window.

b. Locate the two small square buttons [←] and [→] that **control** the direction of FTP file transfer. They are located in the vertical median of the twin-pane panel.

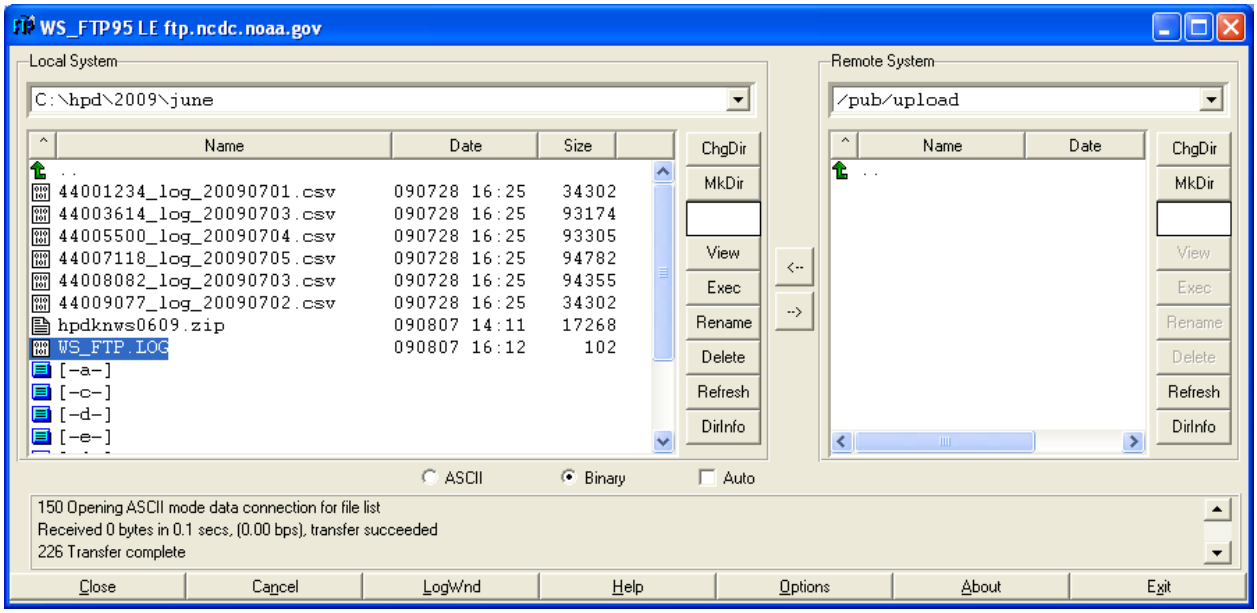
c. Click on the right pointing button [→] and you will **transmit** your monthly FPR-ZIP file to the NCDC's data ingest port. Your task is now completed.



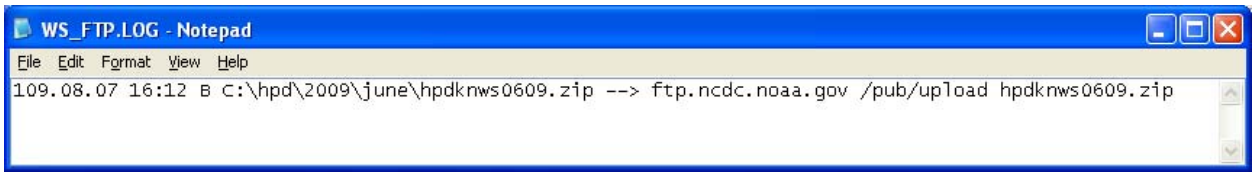
At the 100% transfer complete, audio effects will sound (i.e., several rapid chirps).

d. Click on '**Exit**', on the menu bar at the bottom-right of the twin-pane panel.

Click on the receipt file that arrived upon successful transmission, titled "WS_FTP.LOG", highlighted in the graphic, below. Note: It has been discovered some versions of Ipswitch FTP will not produce this *log* file.



Select the WS_FTP.LOG in your subfolder C:\hpd\2009\june\ with mouse cursor (so it highlights), then click on the 'View' tab, to the right, the fourth tab from top of the center median. To produce an 'FTP transmission receipt'. Note the date and time 16:12 Aug 07, 2009.



At NCDC an automated program (Cron job) will be looking for the "hpdknws0605" and the "zip" when it runs once each hour. Any files located will be automatically processed.

Note: NWSREPs should e-mail or phone Stuart Hinson (NCDC), on 828-271-4437, if there are any questions on the prescribed FPU data compression and FTP transmission procedures.

Remember: If you have two or more COOP Stations who routinely send you monthly Data Keys, then Zip together the CSV files, one from each COOP Station, to form a single Zip file.

Immediately after you have FTP'd transmitted your Zip file, use the same utility to call up the 'message log' to confirm your Zip file was successfully received to the /upload/ folder. See the screen display, of the FTP-LE Message Log (see illustration, below).

2.2.11 Confirm NCDC Has Ingested Your Monthly Precipitation File:

Call up the NCDC website, 'HPD-Received,' the day after you have transmitted your monthly ZIP file. You must check for the successful arrival of your monthly FPR data files at the NCDC point of ingest.

To access the current month's web site (i.e., HPD_Received_200907.txt), say it was data collected in July 2005, then you type the following site address:

http://www1.ncdc.noaa.gov/pub/data/hpd/inv/HPD_Received_200907.txt

making care to revised the YYYYMM.txt portion of the folder name; if the month you transmitted your Zip file to NCDC was July 2009, then you revise your web-folder to show 'Received_**200907**.txt.'

Scroll through the reports, until you locate your office ID (e.g., **`hpdkcle0609.zip`**) with the unzipped files. (*Notice the '0609' in the zip file's name…this is proper - you must use the month '06'because this is the month the precipitation was measured…you hand type this zip filename*!)

```
HPD UnZipped: hpdkcle0609.zip: 767,202 Received: 20090711 1338
  33003021_log_20090704.csv Ok: y
  33006949_log_20090702.csv Ok: y
  33000059_log_20090703.csv Ok: y
```

Now ensure each of your F&P sites appear beneath this heading. Look for their COOP number (e.g., 33003021; 33006949; etc). Each line should end with an "Ok: y" status and not a "Ok: n." If "Ok: n" appears analyze your Zip file to see if you accidentally zipped the folder rather than just the data file. If so, then re-Zip, and transmit data.

If any problems are encountered with data or with FTP transmission of data to NCDC, then inform NCDC (stuart.hinson@noaa.gov) and NWS (thomas.trunk@noaa.gov).

2.3. Inform the RCPM of any *FPR Event Log* item reported by Observer:

Phone the Observer and inquire into the nature of the event s/he reported on the *FPR Event Log Worksheet.* Analyze and understand the history of installation, implementation, calibration data, maintenance actions, and seasonal weather conditions that might have contributed to the reported event. Does the event involve a faulty or broken system component that could be resolved with a maintenance visit? E-mail or Fax your RCPM a scanned copy of the FPR Event Log Worksheet and propose the action you will take to resolve this issue.
See Chapter 4, Maintenance, of this *FPR Operations Manual*, for general policy on trouble shooting and procedures for ordering replacement parts.

2.4 Quality Assurance Checklist:

Use these 'best practices' to prevent transmission of incorrect monthly files, improperly named files, and disorganized exchange of data keys. These guidelines need to be stressed when you train a new person on FPR tasks.

2.4.1. Log-in the Memory Cards that Arrive each Month
- Establish a Memory Card Log Sheet template; update and print it monthly
- Consider a QA Log Sheet for broader, more general FPR responsibilities
- Establish firm time-table, routine
- Establish criteria for acceptance.

2.4.2. Transmit to NCDC
- Assure all FPR data files are FTP'd to NCDC in sufficient time to meet the deadline of the 25th day of Month.
- Do not e-mail the FPR data files.
- Check NCDC Inventory web site to confirm NCDC receipt of all of your FTP'd files. http://www1.ncdc.noaa.gov/pub/data/hpd/inv/HPD_Received200507.txt (see Section 2.2.11 of this Manual).

2.4.3. Set a 'Best Practice Policy' for your WFO to handle all the FPR stations.
- Establish expectations with Cooperative Institutions.
- Establish consistency.
    - Schedule firm cut off for routine receipt
    - Follow-up on missing Keys consistently.
    - Establish deadlines, patterns with Observers

2.4.4. Perform Quality Assurance Review:
- Properly identified the date/time of the start and end points of the data file?
- Confirm the data possesses proper filename, station number, Year /Month/ Day ?
- Any data missing problems, any garbled data?, any zeros data filling the pages?
- If a problem in the data file does this problem fit a pattern from the same Observer?
- Have there been quality improvements (observer) for same site?
- Log problems at the WFO to establish patterns.
- Read and take action on any FPR Event Log Form that is submitted by the Observer.

  - Do you need to check the File to confirm Notation codes are properly entered?
  - If they are not entered, then advise the NCDC via e-mail)
- Determine QC corrective procedures. Is there something NCDC can do, recover?
- Schedule QC-Does NCDC need to be specially notified about this Station's data?
- Follow-up with your Observer, and with NCDC if needed.

2.4.5 Records Retention Guidelines from OS7

The following FPR data records and FPR meta-data shall be kept on hand in the WFO:

- O Electronic copy of the month's FPR files (CSV) shall be stored for at least 12 months on an NWS-network workstation. Do build a primary storage folder or archive on a laptop PC.

- O Print or electronic copy of the '***Memory Card Log Sheet'*** for 12 months.

- O Print copy of Observer-submitted ***FPR Event Log Worksheets*** and print of any e-mail correspondence on subject matter shall be kept for 12 months.

- O Print or electronic copy or electronic bookmark for each of the FPR documents that appear in Appendix C, of this ***FPR Operations Manual***. This includes the relevant administrative and procedural directives for the FPR program (i.e., Mod-Note, NWSI Directive 10-1315, EHB-1 (equipment catalog), EHB-10 (Hydrologic Equipment), Sutron Corp Technical Manual, and any memos issued by NWSHQ).

2.5 Monthly Timeline of FPR Tasks:

Day of Month	Countdown to FTP X-mission	Task to perform.
Jun 25th	T – 31 days	Access the **/hpd/inv/HPD_Received200906.txt** website to confirm NCDC has received your FPR stations' monthly CSV files. (**Sec 2.2.11**)
25th	T – 31	Mail each of your Observers their new Memory Card.
July 1st	T - 24	Prepare a new Memory Card Log Sheet for month ending June 30th.
3rd	T – 22	Log first Memory Card arrival into your ***Memory Card Log Sheet***. Did the Observer enclose any operational log-sheet or notes?
3rd	T – 22	McAfee virus scan each Memory Card on same day it arrives. Then plug card into NWS enterprise workstation's reader. Now examine CSV file's date/time headings to confirm proper month.
10th	T – 15	Virus scan any outstanding 'Reporting Cards' and update the ***Memory Card Log Sheet***. Identify any missing (late) cards. Check WFO mail inbox to reduce risk of envelopes getting misplaced. Phone the Observer to prompt for the missing (late) card.

15th	T – 10	Check WFO inbox and retrieve Observer envelopes to reduce risk of being misplaced. Upload any outstanding Memory Cards and update the ***Memory Card Log Sheet***.
15th	T – 10	Take inventory of CSV files on your enterprise workstation. Examine the date/time fields to ensure the first and last days of the reporting month are present with no missing data.
20th	T – 5	Upload any outstanding Memory Cards and update the ***Memory Card Log Sheet***. There should be no missing or late cards now. Check WFO mail inbox for any 'found' memory card envelopes. Phone the Observer a second time (first time was on the 10th) to prompt him to mail it!
25th	T – 0	Confirm all Memory Cards were received and McAffee virus scanned (PC/laptop) - then update the ***Memory Card Log Sheet*** as necessary. Ensure all CSV files were saved to your proper month HPD folder in the NWS enterprise workstation.
25th	T – 0	ZIP all the CSV files submitted this month, to form a single bundled ZIP file.
25th	T – 0	Important: Ensure the filename is spelled properly. **Example: hpdkxxx0609.zip** Where the **kxxx** is the WFO site ID (e.g., kohx); the **06** is the data-filled month (June); and **09** represents year 2009.
July25th	T – 0	FTP Transmit the **June 2009** FPR-ZIP file to NCDC.
25th	T – 0	Access the **/hpd/inv/HPD_Received200907.txt** website to confirm NCDC has received your FPR sites' monthly CSV files. (**Sec 2.2.11**)
25th	T – 0	Delete the older of the two files from each memory card. Attempt to keep each Memory card holding at maximum two files, the most recently two files (months) downloaded by the Observer.
25th	T – 0	Mail each of your Observers his new Memory Card ensure it has just one file on .

T = Denotes the day on which you FTP'd the monthly file to NCDC.

CHAPTER 3 – ROUTINE OPERATIONS

3. Introduction

Fischer & Porter Rain Gauge: The new recording rain gauge is housed entirely within the body of the original Fischer & Porter (F&P) containment shell (Fig 3.1). Once you open the access door (Fig 1.2) you will see a blue and white plastic box that contains the data recorder. This is the Precip Recorder and it takes the place of the paper-tape assembly for the purpose of recording the weight of the liquid in the bucket (Fig 3.3).

Fig 3.1

Fig 3.2

Fig 3.3

Weighing Sensor: The weight of the catch bucket with liquid rests upon a metallic bar that bends with increased weight. This weighing sensor is very sensitive and can detect changes of one hundredth of an inch of precipitation in a matter of several seconds. Readings from the sensor are processed by the Precip Recorder. Fifteen minute data, based on weighing sensor measurements, are available when you insert a memory card to the slot on the right side of the Precip Recorder (Fig 3.3).

Precip Recorder Display: The Precip Recorder stays in a 'sleep' mode until you wake it up by pressing any one of the key pad's buttons. The blinking green lamp tells you the rain gauge recorder system is working properly.

Fig 3.4

The green fluorescent display communicates the running total of precipitation plus any other additive like oil or anti-freeze. It also shows the current date and time.

Your National Weather Service (NWS) representative has pre-programmed the Precip Recorder for automated operation.

The four Arrow buttons allow you to scroll through six menus to view rain gauge status and view a log of times you checked the recorder and downloaded precipitation data.

Arrow Buttons

Fig 3.5

To collect data, the NWS mails you a small Memory Card, once per month. In the first few days of the month you insert the card to the slot in the right side of the Precip Recorder (Fig 1.6) and download the rain gauge data.

The Memory Card

Fig 3.6

You insert the Memory Card and the system automatically downloads data to the Memory Card. Follow instructions for Monthly Data Retrieval in Section 3.4, to understand how the system responds and when to eject the Memory Card.

Expect the rain gauge to take about five minutes to download the last 60 days of data. Always wait nearby the Precip Recorder while it conducts the download – and never conduct the download when the weather is raining or snowing.

3.2 Viewing the Menus

The Home Display (Fig 3.7) will always appear when you wake-up the system. It gives you the Precip value in hundredths of an inch together with the current date and time. When you press the keypad's down arrow key (▼) you advance to the next menu of the six menus. All six menus are listed in Figure 3.8.

Fig 3.7

Fig 3.8

Primary Menus	Description
Precip 15.00 2009/02/13 10:52:30	This is the 'home menu' it appears on power-up.
Battery Now 12.6V	Battery voltage.
Logged Data	Stored 15-min data.
Station Setup	Password protected
Diagnostic	Calibration
Station Name & Time	COOP site number

The menu revolves back to the Home Display (Fig 3.7) if you keep pressing the down-arrow (▼) key.

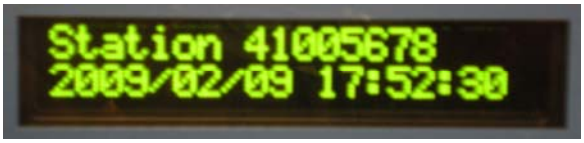
Observers are not required to access any of these six menus. If your NWSREP asks you, you may conduct a routine check of battery voltage, or perhaps a quick check of the Logged Data. See Appendix B, for a table that shows the Precip Recorder's menu and sub-menus.

Press the ▼ (down) key twice, and you advance to the parameter 'Battery Now' – this informs you of the battery's voltage.

Fig 3.9

Press ▼ (down) four more times and your COOP station name and number appear on the screen, this is the Station Name and Time, menu (Fig 3.10).

Fig 3.10



No action is required. To return to the home display, simply press the ▼ (down) button one more time and you revolve back to the first of the six menus.

3.3 Routine Checks

Whenever you open the F&P containment shell, always wake-up the green fluorescent display. Use any of the 'arrow buttons' or either the 'Set,' or 'Off' button.

The ▲(up) button will wake-up the display.

Fig 3.10

Precip Parameter: This **Precip** display gives the current weight of liquid in the bucket. This includes rain water, melted snow, mineral oil, antifreeze, and possibly anything that fell into the bucket since it was last serviced.

Fig 3.11

In this example (Fig 3.11), the Precip shows 15.00 inches of liquid in bucket.

If the display ever reads a negative value or reports more than 15.00 inches (bucket capacity is 20 inches), phone your NWS Representative (NWSREP) so he/she can service the gauge. Your responsibility is to journal any maintenance action (if delegated by NWSREP) or a data discrepancy, to the Log Sheet, as described in Section 3.7.

Date and Time: The current date and time appear in the Home Display (Fig 3.11) and also appear one the last menu, the Station Name and Time.

The year, month, and day, appear on the left side: **2009/02/13.** Shows Feb 13, 2009.

The time in hours, minutes, and seconds, appears next: **10:52:30.** This is 10:52am local Standard time in a 24 hour convention.
Understand that the time is always kept in **Standard** time. Our policy is to never adjust to daylight savings time. If you notice the **minutes** are off by more than 10 minutes, then phone your NWSREP to inform him/her of the error. Discrepancies on the display may indicate a system problem that requires a station visit by your NWSREP.

Spare Memory Card: You should keep a spare Memory Card in its plastic protective case resting on the support stage several inches below the memory card slot. right beside the Precip Recorder. The support stage is visible in Fig 3.3.

3.4 Monthly Data Retrieval

In the first five days of each month, but never before 12am on the first day of month, at a time when it is not raining or snowing, the Observer walks out to the Fischer & Porter gauge, and retrieve the precipitation measurements. This outdoor procedure might take 5 minutes.

3.4.1. Insert Memory Card: **Keep the display asleep.**
Insert the Memory Card into the slot on the right side of the Precip Recorder (Fig 3.12) with the card's label-side facing you. Press it in, until it clicks.

Fig 3.12

3.4.2 Display responds: Auto Log Download of 60 days in 8 seconds.

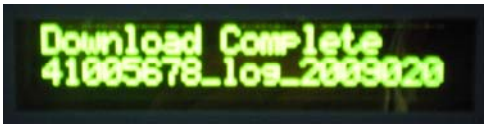
Fig 3.13

Then the display gives a running percentage of the portion of data copied to the memory card until 100% complete. This process might take five minutes to complete.

. Fig 3.14

3.4.5. Verify the End of Download: View the display to confirm the download has completed.

Fig 3.15



3.4.6 Remove Card: Press the **OFF** button three times to return to the Home Menu. Then eject the card by pressing it in and then releasing it gently. Place the plastic protective plug back into its slot.

Fig 3.16

Place the plastic Memory Card into its clear plastic protective cover.

3.5 Data Acquisition Requirement:

Your responsibility is to obtain from each Observer the monthly report of precipitation – and not permit your reporting to NCDC to lapse, by even one month.

Instruct your Observer to download always in the first five days of each month at a time when it is not raining or snowing. Remind them to never download before 12am local standard, on the first day of the month! Have them refer to their printed copy of the *FPR Observer Instructions*, the most recent copy is on http://www.nws.noaa.gov/ops2/Surface/coopimplementation .

Remember, the Observer shall always keep a spare Memory Card. So there is ample opportunity, in the event your forecast office is missing, or loses, his/her Memory Card, you need to request the Observer download the last 60 days to his/her spare Memory Card. Then, the same day, mail this Observer a New memory card, to replace the one lost/missing.

3.6 Review the Log Sheet

Certain Observers are given the responsibility to perform gauge/bucket maintenance. These Observers are required to review and update the Log Sheet for any performed maintenance or discrepancies that occurred since the last monthly submission.

If your Observer's Log Sheet contains any entries, then update your CSSA Site Inspection Report. You may also inspect the contents of the CSV file on the memory card, to validate there were discontinuities in the data records that correspond to the F&P Log Sheet remarks.

3.7 Journal Responsibility

3.7.1 Continuous Automated Logging: Previously, any time you suspended the F&P gauge from its 15-minute timer or each month when you removed the Punch Tape from the sprockets, you were required to write down the 'OFF Date/Time', as well as your Station ID (i.e., 23-4652), your Station Name (i.e., Lake City), and your State (i.e., MO) in felt tip marker to your Punch Tape. You then had to draw a straight line (i.e., a "time line") across the width of the Punch Tape, to stand as an unmistakable reference to show where the interruption began. When you rethreaded the paper you would mark 'ON Date/Time.'

With the FPR however, the recorder continues to run un-interrupted while you perform the critical monthly task of downloading precipitation data to the Memory Card. So, you do not need to document the date or time (i.e., OFF date/time) when you download the monthly data.

Each time you wake-up the display or download data to memory card, the Precip Recorder will self-log the date and time of the event as, 'Display On, 09/20/2008, 10:12:54.' This way a permanent record is made to the electronic data, much in the same way your pen-on-paper notations worked.

3.7.2 Bucket Maintenance – Journal Entries: When the bucket is emptied or when anti-freeze and oil are added, the weight of the collection bucket will change and produce a discontinuity in the 'Precip' record. For these actions you must write a journal entry into the Log Sheet to show the date and time when you conducted these tasks. This is analogous to the "OFF Date/Time" you entered on the F&P Punch Tape.

For example, anytime you partially drain the bucket, the statement: 'partially drained bucket' shall be written into the log sheet (see Fig 3.19).

Likewise, anytime antifreeze is added, the statement: 'antifreeze added to bucket' shall be written to the log sheet (see Fig 3.19).

F&P OBSERVER LOG SHEET
REQUIRED ENTRIES

COOP Station Number: _____ **Your Name:** _____ **Institution Name:** _____

LOG DATE	BUCKET LEVEL?	OIL ADDED?	ANTIFREEZE ADDED?	FUNNEL IN / OUT?	SPECIAL NOTES:
Date of Journal Entry	Date and time bucket was partially drained or completely emptied.	Date and time oil was last added. Typical is half-quart (16oz).	Date and time antifreeze was last added. Typical is 2 quarts (64oz).	Date and time funnel was removed for winter; or installed for summer.	Any anomaly or outage event? Give date and the elapsed time of outage. Describe the problem.
Apr 15, 2009	2pm Apr 15, 2009 - partially drained – New level is 2.37 inch	11am May 5, 2008	11am Oct 9, 2008, for winter.	Installed 2pm Apr 15, 2009, for summer.	This log-sheet is being mailed to NWS with memory card on or about May 3, 2009.

Fig 3.19

Note: For those Observers who have an agreement to drain the bucket when it is full, and to replenish levels of mineral oil and antifreeze, certain additional procedures apply. Before taking any action on the bucket, you must first wake-up the display by pressing any of the arrow buttons. Then, drain and add fluids to the bucket. When you are finished, press a button to wake-up the display a second time. This second wake-up should be done as you are ready to close the door and leave the gauge. In this way by lighting the display screen twice, the system writes an internal record into the data, so that everyone understands the Observer changed the 'Precip' level and added oil and/or antifreeze and this was not a precipitation event.

3.7.3 Log Sheet Requirements: If delegated to the Observer, there are twelve examples of actions and events that are necessary for Observers to journal in the F&P Log Sheet. They are listed in Appendix C, of this instruction guide. For most sites the NWSREP conducts these actions and may use a different form to document them.

You may keep a printed copy of the F&P Log Sheet in a protective clear plastic envelope in the containment shell next to the Precip Recorder. If you need additional F&P Log Sheets like the one in Appendix H, please phone your NWSREP.

3.8 Receive the Memory Card

By the 10th day of month, ensure your WFO has received the USPS envelopes containing your Observers' memory cards. The Observers are instructed to mail you the Memory Card in its plastic protective case, in the same type of envelope you used to mail the Punch Tape records to your WFO.

The Jiffy No. 0 (zero) padded mailing envelope (see Fig 3.20) is the appropriate envelope because it can hold the F&P Log Sheet.
The photo (Fig 3.20) shows the standard ten inch square, darker color envelope. Newer, bubble-pack square envelopes have thinner paper and tear more easily and can result in the Memory Card being lost in the mail.

Fig 3.20

Certain United States Postal Service (USPS) centers might use electro-magnetic scanning devices to screen materials coming through the mail. To avoid potential damage to the Memory Card, you may write: '**Sensitive Magnetic Media, Handle Manually**' on the front of the Jiffy No. 0 mailing envelope.

Note: The Memory Card was purchased by the National Weather Service and is considered Government property – therefore please do not use it other than to download data from the Fischer-Porter rain gauge.

3.9 Monthly Data Transmission:

You are required to 'FTP transmit' the data (i.e., StationNumber_log_yyyymmdd.csv) to the NCDC each month.

a. By 10th day of month phone your Observer if you have not received his memory card.

b. Scan the Card on the 'External non-NWS memory device scanning workstation. If the virus checker gives a 'clean' report of the memory card, then download the contents of the memory card to your NWS workstation

c. Display the contents of the file in a Notepad file - Read the card and scroll thru top and bottom lines of the 15-minute data to ensure the full calendar-month of data was sent. Phone the Observer. If his card is missing the totality of the complete calendar-month (i.e., even if it is missing the first several days), phone the Observer and direct him to download to his spare Memory Card the last 60 days of precipitation data from his rain gauge's Precip Recorder.

d. Save each CSV file in its respective file-folder, named according the month the precipitation was measured (i.e., /HPD/JUNE/33001234_log_20090704.csv)

e. No later than 25th of month, mail back your Observer one Memory Card, per routine.

f. By 25th of month, transmit to NCDC all of your sites' FPR data in one Zip file.

Note: For detailed instructions on how to transmit your FPR data see Chapter 2, of this *FPR Operations Manual*.

3.10 Recovery from Hardware Error Message 4027:

If your Observer does not fully insert the Memory Card and begins the Download sequence the display will respond: "Hardware failure - RIGHT shows details." The logger system considers the Memory Card as the hardware and the failure is easy to remedy. Follow these procedures to recover from this interruption. For a list of other possible error codes, see Appendix E.

a. If the Memory Card is not in its proper placement.

The display responds with a hardware failure message (below).

b. Instruct the Observer to press the RIGHT arrow button.

The display should read: "Err 4027, 001 times 2009/08/10 13:09:26" (below).

c. Instruct the Observer to press the DOWN arrow button.

The display should read: "End of error list Press SET to clear" (below).

d. Instruct the Observer to press SET button, the errors are cleared and you get this message:

The display should respond: "Errors Cleared" (below).

e. Instruct the Observer to press the OFF button until the display goes off.

CHAPTER 4 – SEMI-ANNUAL AND RESTORATIVE MAINTENANCE

4.1 Semi-Annual Site Visitation:

For general policy on COOP site visits, access Appendix B, **Visitation Procedures**, in NWSI 10-1307, *Cooperative Station Management* (Jan 2008). The policy is located on the NWS web site: http://www.nws.noaa.gov/directives/sym/pd01013007curr.pdf.

SEMIANNUAL CHECK BY NWSREP

What to Check	How to Check	Precautions and Remarks
1. Overall Appearance	Observe paint finish, or evidence of vandalism.	Clean oil film from the outside of gauge using GSA nonflammable liquid detergent.
2. Weather Stripping around Base Plate and Cylindrical Door.	Check for breaks or general deterioration. Weather stripping is used around Base Plate of the Model 1558 and 1559 gauges only.	Replace as needed: Weather Stripping or Door Gasket. Cut base plate weather stripping to about 50 inches in length.
3. Horizontal Flexures in the FPR Weighing Mechanism.	A casual glance will reveal the condition of all four horizontal flexures. If any are bent, broken, or binding it might effect gauge calibration. Horizontal flexures which are 'v-shaped' must be replaced. The upper-rear flexure is most susceptible to bending.	Use the smallest test weight of the D111-500TE set to ensure the **`Precip`** parameter shows a change in current reading. If it does not change, the flexure should be repaired. Under no circumstances should any flexures, except the upper-rear flexure be replaced at the observer site.
4. Collection Bucket	The collection bucket is to be emptied whenever the keypad **`Precip`** display reads in excess of **`15.00 inches`**.	First, before you start any action on bucket, press a button on **Precip Recorder**, to **wake-up** the display (i.e., creates a record in data file).
A. Emptying and charging collection bucket	Collection bucket is charged for warm weather operation by adding approximately ½ quart of Mineral Oil , or alternately ½ quart SAE 10 non-detergent oil; to retard evaporation.	Remove any foreign material in the collection bucket and clean. Journal to, ***FPR Maintenance Log Sheet,*** 'Cleaned Bucket,' before charging collection bucket.

		Mineral Oil. If not available you may use SAE10, non-detergent oil. Journal to, ***FPR Maintenance Log Sheet,*** 'Bucket completely emptied'; or journal, 'Partially drained bucket'. And/or 'Added oil to bucket'.
B. Charging Collection Bucket – Cold Weather Operation	When collection bucket is emptied and charged for cold weather operation, add two quarts of antifreeze/water solution, then add ½ quart of Mineral Oil.	Finally, when done with all bucket actions, press any button on **Precip Recorder**, to **wake-up** the display. (i.e., creates record in data file). Antifreeze, propylene glycol base. Less antifreeze may be required if temperature is mild and precipitation is expected to be light. Journal to, ***FPR Maintenance Log Sheet,*** 'Added antifreeze to bucket', and 'Added oil to bucket.'
5. Funnel	During the period of year when snow or freezing weather is expected, remove funnel from the conical upper housing and store.	Journal to, ***FPR Maintenance Log Sheet,*** 'Removed Funnel'. Reinstall funnel after cold weather season ends. Reminder: All the ***FPR Maintenance Log Sheet*** entries should be entered to CSSA Site Inspection Report.

Table 4.1: Semi-Annual Maintenance (Refer to EHB-10; Section 4.2, April 1976)

4.2 Observer Delegated Activities:

Some offices have an unwritten agreement with Institution Sites to have their Observers assist in basic works of maintenance for the F&P legacy gauge. You should give careful consideration as to which Institution Sites may be qualified to perform the following activities with the FPR gauges:

a. Conducting a power-on reset of FPR data logger

b. Resetting the date/time at FPR keypad

c. Draining and recharging the collection bucket

d. Installing/removing funnel

e. Cleaning the solar panel

If you have an Institution Site you are fully confident can assist you then advise them to avoid carrying any electrical instrument or tool that could interfere with the system performance. All check-ups and bucket discharges shall be conducted in dry weather only.

4.3 Review CSSA Station Inspection Report:

4.3.1 Last Visit to Site: A day or two prior to your trip, call up this site's CSSA Inspection Report (Form B-23) and review the results of your last inspection. Review the 'Remarks' section to view the calibration "Slope" and "Offset" coefficients. Realize that all updates of these coefficients should be saved to CSSA Inspection Report, and that the B-44 Station Report, should *not* hold coefficients. Print out the 'Slope' and 'Offset' values and note the date the last time a calibration reset was performed. The calibration check shall be performed once per year, though you may check it any time you schedule a site visit.

Some NWSREPS have ten or more FPR to monitor and maintain a collection of the metadata that is saved to the CSSA inspection report. So call up any other ready reference you may have, such as an electronic FPR Event Logbook. In it you might have journalled any operational anomalies or maintenance performed on the FPR that involved an interruption to the data logger of any length of time. See Appendix H, of this handbook, *F&P Maintenance Log Sheet*, for an example of what to keep in an FPR Event Logbook.

Phone the Observer and ask if his site requires any supplies, including mailing envelopes (e.g., Jiff #0), or any printed instructions, or *F&P Log Sheet*. Also, ask if a general cleaning is required for the exterior surfaces, and most importantly, for the solar panel.

4.3.2 Rain Gauge Supplies: These quantities will vary as a function of the amount of precipitation a site receives in a given season. Phone your Observer and ask him if his gauge requires a certain type of servicing this visit. For example:

a. One quart of Mineral Oil might be consumed each year.

b. A two-quart container of Propylene Glycol antifreeze might be consumed each year.

c. One 5 gallon sealable plastic container available to discard bucket fluids.

4.3.3 Prepare for Cold Season: Partially drain the FPR bucket (journal to *Maintenance Log Sheet*) so as to retain the oil layer in the bucket. Remember to recharge with two quarts of antifreeze (journal to *Maintenance Log Sheet*). Then if necessary, add oil (journal to *Maintenance Log Sheet*). You never need more than ¼ inch surface oil layer in the Fischer Porter's fourteen-inch diameter bucket. Add one half quart of oil when completely replacing the charge (journal to *Maintenance Log Sheet*). Before you add oil and after you add oil, always **wake-up** the display by pressing any button on **Precip Recorder**. This is all you need to do – it generates a data file flag for NCDC.

Remove funnel: Remove the cone-shaped hood, tip it upside down and set it down. Rotate the funnel so its slots allow it to slide free from the three pins located on the base of the hood assembly. Write down, 'Removed Funnel' to the *FPR Maintenance Log Sheet*

Further Considerations: Snowfall and high-rate rainfall events can lead to a layer of snow, ice, or fresh rainwater that rests on top of the oil layer. For these events stir the bucket with a mixing stick. This will prevent freezing and possible equipment damage.

4.3.4 Prepare for Warm Season: Remove the cone-shaped hood and inspect the contents of the bucket with a mixing stick (i.e., paint stirrer). Remove and properly dispose of any leaves or debris that might have collected when the funnel was removed at start of winter season. Then with the stick, ensure there is still a ¼ inch film of oil on the surface to inhibit evaporation. If the **`Precip`** value exceeds **`15.00 inches`** on the day you are installing the funnel then perform a partial emptying of the bucket by keeping the oil from running out the drain tube. Add antifreeze if local conditions require. Before you partially empty the bucket, always **wake-up** the display by pressing any button on **Precip Recorder**. This is all you need to do – it generates a data file flag for NCDC.

Install the funnel: Remove the conical housing, turn it upside down, and fasten the funnel by rotating its three slots onto the three pins of the cone shaped hood. Return this hood assembly to the gauge (Fig 3.1). Write into the Log Sheet, 'Installed Funnel.' and then write: 'Start of Valid Data'.

4.3.4 Rain Bucket Draining: The bucket's capacity is about 20 inches of precipitation or 4.9 gallons. Advise the Observer to daily monitor the **`Precip`** readings and to phone you when it surpasses **`15.00 inches`**, at that time the collection bucket needs to be drained. Always schedule the bucket draining to be done when weather is dry, when no precipitation is forecast for either the day before, or the day of, this important maintenance.

If your Observer has agreed to conduct the bucket draining or emptying, then remind him/her to always **wake-up** the display by pressing any button on **Precip Recorder**. This is all she/he needs to do on the logger – this generates a data file flag for NCDC. To ensure you become aware of this maintenance, the Observer must update her/his ***FPR Maintenance Log Sheet***, the Day/Hour/Minute she/he finished the Bucket activity, along with a reading of the Precip level.

Note: Remind your Observer to mail you the ***FPR Maintenance Log Sheet*** as soon as the next monthly Memory Card is mailed. You should enter his maintenance actions to your CSSA site inspection report… for continuity of records.

4.3.5. Visual Check List: Ensure there are no obstructions that block the opening of the collection bucket. Ensure that all access doors and their hinges, latches, and locks, are working properly. After clearing obstructions, use a damp cloth or paper towel with gloves to wipe clean exterior surfaces.

a. F&P Hood, Funnel and Bucket: each free and clear of debris.

b. Data Logger Access Door, hinges, latch, and lock is functional.

c. Solar Panel, fastened tight, free and clear of debris. Ensure the cable and cable plugs are properly positioned and appear in good condition. Ensure the solar panel is not covered by dust, bird droppings, or obstructed by any loose objects.

Note: Always remind the Observer, he never needs to calibrate the FPR sensor. However, if there is a problem reported to the NWSREP, and the NWSREP has delegated maintenance responsibility, then the Observer can reset the load sensor calibration.

4.3.6 Multiple Actions on Gauge: When you perform multiple actions, before taking the first action always press the Up-Arrow button (Display On). Check Appendix E, of this handbook, for the list of required journal entries for the ***FPR Maintenance Log Sheet***.

All the entries you make to the ***FPR Maintenance Log Sheet*** shall be entered into the CSSA Site Inspection Report. For this reason you need to note the Date and Time (perhaps to the minute) to produce an accurate Inspection Report.

Here are ten common entries to the ***FPR Maintenance Log Sheet*** during a Semi-annual visit:

Display Wake-up (Start Maintenance)
Precip Level Before
Semi-annual Visit
Partially emptied bucket
Calibration Check – No Changes
Added antifreeze to bucket
Removed Funnel for Winter
Cleaned Solar Panel
Precip Level After
Display Wake-up (End Maintenance)

Note: You are required to **wake-up** the Precip Recorder twice: first, before your activity, and again after you have completed all maintenance. This will ensure the precipitation data file has a marker (i.e., Display On) for NCDC algorithm to convey rain gauge levels were altered by maintenance. Otherwise you introduce ambiguity to the data file that might be missed by NCDC quality control and degrade the official precipitation record.

4.4 Battery Voltage Too Low – Repeated:

The battery for FPR weighs four pounds, and is a 12V, lead-acid, rated at 7 Amp-Hours. Battery voltage is a problem when it runs below 11.5V. Repeated battery discharge is defined as the

battery needing a charge or replacement more than once every six months. Frequent recharge or replacement may be due to a failure to properly charge the battery or a battery-internal fault.

There are three (3) steps to check in order to determine if there is some type of battery-charging failure. Remove all power from system before starting this process. Disconnect the solar cable first, then the battery cable plug from the white plastic receptacle. Diagnose in the proper sequence: first the fuse, then solar panel, then solar cable, then solar panel circuit, and then the regulator board.

a. Solar Panel Shaded (Check B-44's final page 'Obstructions' for accuracy.)

b. Solar Cable Shorted (D111C-3W1)

c. Solar Panel – Internally Shorted (D111C-3)

SOLAR PANEL EXPOSURE PROBLEM: Are there any structures, trees, satellite-tv dishes, phone or utility cables that could cast a shadow onto the FPR solar panel? At your office call up the CSSA Form B-44 and review the obstructions information under 'Equipment Exposure.'

Phone the Observer to ask if there are any new structures installed, or trees or shrubs that have grown into the area. Ask the Observer if the panel is ever partially shaded from a nearby wire, cable, or satellite dish, then inform him/her how the rain gauge performance is adversely affected. Discuss with Observer how you could remount the solar panel to a nearby fence or antenna mast, if possible, so it receives full sun in all seasons.

If necessary, and only when the solar cable presence would not become a safety hazard, relocate the panel by adding more cable. At the site always ensure the solar panel is securely mounted and properly angled toward the sun according to Section 17, *FPR Assembly Procedures* (Apr 2009).

DEAD BATTERY: Measure battery voltage at the terminal lugs. If voltage reads less than ~~9.05V,~~ then it has one or more dead cells and you must replace the battery. Otherwise a good battery in field operation will read 11.5V to 13~~.0~~Volts.

Replace a dead battery with a new battery with ASN part number D111D-2B1. When you receive a new 12V battery at your WFO, use an AC battery charger and place the new battery on charge overnight or until it reads at least 13.0V. Follow the instructions in Section 6, of the *FPR Assembly Procedural*.

Caution: Be familiar with the safety precautions when you are charging a lead-acid battery. Access https://www.ops1.nws.noaa.gov/Secure/SAFETY/Safety_manual.htm and click on chapter 15, to read, NWSM 50-1115, Procedure 15.3, *Battery Charging and Storage Operations*.

Background Discussion: If any part of the solar panel is shaded, the panel may shutdown and not deliver any real power to the application. The solar panels we use are made up from multiple solar cells connected in series to give the voltage needed and then in parallel to give the power needed. When a solar cell is shaded it becomes a high resistance to any current impressed upon it. Thus, if any individual cell of a series string is shaded, that cell will block the current generated by the other cells in that string, effectively shutting off the output. Mount the solar

panels where they are in full sun, not in the fringe area under trees or behind guy wires or tower supports. Also, problems have been reported where construction or farming resulted in a lot of dust on the panel (charging always improved after a good rain!).

So, train the Observer to inspect and clean the solar panel on an 'as needed basis'. The FPR is supplied with a 15 foot connecting cable. The cable can be extended as far as you need, provided you use good outdoor rated wire of the same size or larger, and make waterproof connections above ground. If you need to trench the cable, use direct burial rated cable.

Battery voltage levels in the Precip Recorder can be tracked through the days and months of seasonal operation. These voltages should range 12.0V to ~~12.8V~~ with the higher values recorded during daytime with solar charging.

For more information access the Lessons Learned web site, and read the third article; http://www.nws.noaa.gov/ops2/Surface/documents/A_PDFLessonFILE.pdf . "Battery Not Charging … Solar Panel All Okay?"

4.5 Display Screen Will Not Illuminate:

It is normal for the display to completely dim-out after approximately two minutes of inactivity. We refer to the display as being 'asleep'.

Wake-up the display by simply pressing any of the six buttons on the Precip Recorder and the screen will illuminate. (photo, right).

If it the display fails to respond use your multi-meter and measure the voltage at the battery terminals. If it is lower than 11.5V then check the solar charging. See the procedures described in the FPR Assembly Procedures, Section 19, 'Check Solar Charging.' Unless the battery is dead, or the solar panel has failed to recharge the battery. Review a recent data file from this site and examine the logged Battery Voltage, it is recorded once per day at 23:59:59, just before the 15-minute precipitation record ending Midnight, 00:00:00.

4.6 FPR Site Visitation – Restorative Maintenance:

When you visit a station to perform FPR restorative maintenance consider conducting preventative maintenance including a check on sensor calibration, and draining the collection bucket if needed. Follow the procedures given in Section 4 for practical examples of tasks you perform while at the site.

Reminder: Whenever you open the rain gauge door, always wake-up the display – and just after you complete all your maintenance, also wake-up the display! Waking up the display generates a permanent flag in the precipitation file. Then NCDC algorithms can recognize the flag and exclude the ambiguous data that results when you replaced FPR parts, changed settings in the FPR rain gauge, or installed updates to the data logger software. Always journal these restorative activities to your ***F&P Maintenance Log Sheet***, see App I, of this manual.

4.7. Reference Table for User Selectable Menus. The 'Home Menu' is shaded in top-left.

Primary Menus		Second Level		Third Level	Details
Precip and Time		- none -		- none -	- none -
Battery Voltage		- none -		- none -	- none -
Logged Data	►	Precip	►	Fifteen-minute data.	15-min records
		Logged Events	►	Ie., 'Display on', etc.	Various records
		All Logged Data	►	Data and events.	Both types
Station Setup	►	Measurement Setup	►	11 parameters	Numerous
		Temperature Setup	►	6 parameters	Numerous
		Other Settings	►	Sets the password	Password entry point
Diagnostic	►	Two Point Calibration	►	Instructions (3)	Several
		Precip Details	►	Parameters (7)	Numerous
		Temp Details	►	Parameters (3)	Several
		Software Version		- none -	- none -
Station Name & Time		- none -		- none -	- none -

Table 4.2 Menu Structure of the FPR-D rain gauge.

4.8 Confirm Measurement Setup:

Confirm these settings by accessing the 'Measurement Setup' menus (Table 4.2) and pressing the Right-Arrow button, then scroll down with the Down-Arrow button. If Automeasure Interval, Automeasure Time, Averaging Time, or Sampling Interval, do not match these values below – then enter the proper numerical values with the SET command, and press the SET button again to save them.

The Precip Recorder's display window should give these responses as you scroll down the 'Measurement Setup' menu.

Table 4.3 (below) illustrates the factory installed default settings for the measurement of precipitation. Access these details by calling up the 'Station Setup' it is the fourth menu of the six primary menus listed in Table 4.2 (above).

Realize how the '**Station Setup**' menu has three sub-menus we consider as the 'second level.'

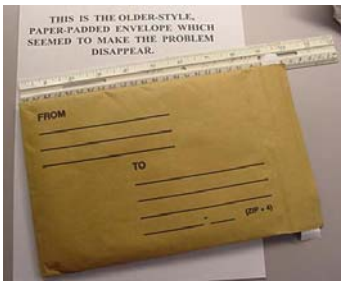
Ensure the Observer's system gives you 'Details' that are consistent with the values contained in the 'Required Details' column of this Table 4.3 (below).

Primary Menus	Second Level	Third Level	Required Details
Station Setup ►	Measurement Setup	Automeasure Interval	**00:15:00**
		Automeasure Time	**00:00:00**
		Averaging Time	**2.000 sec**
		Sampling Interval	**0 ms**
		Slope	**-2.4525017** example
		Offset	**-3.5502753** example
		Precip Right Digits	**2**
		Log Precip Details	**Disabled**
		Log Every Sample	**Disabled**
		Sensor Serial Number	**8064177** example
		Sensor Warmup	**8000 ms**
	Temperature Setup	Parameters (7)	Air Temp: **Disabled**
	Other Settings	Password	{ **FPRSUTRON** }

Table 4.3 Measurement Setup Details for standard operating procedure.

4.9 Protecting the Memory Card:

The Jiffy No. 0 (zero) padded mailing envelope (photo, right) is the appropriate package for exchanging the Memory Card between the Observers and the NWSREP. This is the standard, ten inch square, darker color envelope. Newer, bubble-pack square envelopes have thinner paper and tear more easily and can result in the Memory Card being lost in the mail.



Certain United States Postal Service (USPS) centers might use electro-magnetic scanning devices to screen materials coming through the mail. To avoid potential damage to the Memory Card, you may write: **"Sensitive Magnetic Media, Handle Manually**." on the front of the Jiffy No. 0 mailing envelope.

CHAPTER 5 – SENSOR CALIBRATION POLICY

5.1 Rain Gauge Accuracy:

At least once per year, and preferably at the time of the semi-annual site visitation, conduct a Calibration Check-Up on the FPR rain gauge. This requires the use of the large brass test weights. You may use one, two, or three test weights, so long as each is the 4,111 gram size. Each is equivalent to five inches of rain water.

If the rain gauge tests within the standard calibration range (Table 5.1) you will *not* have to conduct a complete reset of calibration of the FPR system.

Follow the steps in 'Sensor Check-Up Procedures,' given in section 5.2, below. If the keypad display returns you **`Precip:`** values that fall into the acceptable range as called for by Table 5.1 (below), then you will *not* need to re-calibrate the load cell sensor. If the display gives values outside the standards given in Table 5.1, then calibrate the sensor through the Zeno data logger's Test Menu. The full calibration instructions are also given in Appendix D, of this manual.

Remember, whenever you conduct the Semi-Annual maintenance, you should check the calibration. If the Calibration Check-up fails to come into tolerance of ±0.25 inch of 15.00 inches, you need to enter the Precip Recorder menu, 'Calibration' and reset the calibration with an empty bucket. Otherwise, you should not perform a calibration reset.

5.2 Calibration Check-Up Procedure:

Always take the un-weighted measurement first, and then place the weight(s) upon the carpenter's level to produce the weighted **`Precip:`** value.

a. **Wake-up** the display right before you take the following steps.

b Place just a carpenter's level flat-side, across the top of the collection bucket.

c. Wait ten seconds and take a reading of the **`Precip:`** value and write it down to a piece paper.

d. Then place one, two, or three large brass weights (4111g each) upon the carpenter's level.

e. Wait ten seconds, now take a new reading of **`Precip:`** and write down this weighted **`Precip:`** value.

f. Subtract the first reading written in Step 3, from the second reading taken in Step "e". Write down this difference in hundredths of an inch.

g. If this difference comes into the acceptable range (Table 5.1), then calibration is acceptable and no further action is necessary. Journal the words, 'Cal Check –

Good Readings,' into the ***Maintenance Log Sheet***. However, if the difference falls outside of the range, you must Reset the calibration as described in the next section.

h. Remove the weight(s) from the carpenter's level, and then remove the carpenter's level.

i. **Wake-up** the display upon completing the Check-Up to generate a second flag to mark the end of the disrupted portion of data. This is an important step!

Cal Check Table

CAL TEST OPTIONS	WEIGHTS REQUIRED	ACCEPTABLE RANGE
5.0" equivalent rain	1 large weight	4.75 " thru 5.24"
10.0" equivalent rain	2 large weights	9.75" thru 10.24"
15.0" equivalent rain	3 large weights	14.75" thru 15.24"

Table 5.1 Acceptable tolerances for FPR calibration.

5.3 Reset Calibration of FPR System:

When the **`Precip:`** reading fails to come within range of ±0.25 inches for any of the test weights described in the previous section, then take the following steps to perform a complete Reset of calibration. The FPR System is calibrated completely through the Precip Monitor in the steps below.

There are just two calibration parameters, Slope and Offset, and their values are dependent on the bucket you use. If you have installed a different bucket, then you always need to perform a calibration Reset, as soon as the bucket is seated to its post.

Note: You will need to drain and dry the bucket to perform this Reset.

a. **Wake-up** the display before you take the next steps.

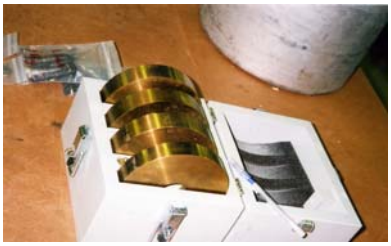
b. From the Home Menu press the Down-arrow four times until you reach the 'Diagnostic' menu and then press the Right-arrow. The display will show, "**Two Point Cal, Press SET to Cal.**"

c. Press the SET button and the sensor will prompt, '**Put Empty Dry Bucket, Press SET to proceed**."

d. Place an empty dry bucket on the sensor and press SET. The sensor will display the message, '**Calculating, Please Wait'** while it takes a measurement. The

sensor will use the current settings for making the measurement.

e. When the sensor completes its measurement, the sensor will prompt, "**Put 15" of Weight, Press SET to Proceed."**



f. Load the bucket with 15 inch weight set. These are the three brass weights marked "4111G." Then press the SET button.

g. The sensor will ask "**Enter Weight in Inches**" and prompt an entry of a number. Enter the numerals, 15, with Up- and Down-arrow buttons.

h. This number corresponds to the weight placed in bucket. The weight will be expressed in inches of water. The sensor will display, "**Calculating, Please Wait**" while it takes a measurements. The sensor will then use the two measurements to compute a calibrated slope and offset.

i. The sensor displays the computed Slope and Offset with the prompt "**Press SET to accept.**"

j. Press the SET button. Values of Slope and Offset may vary among sites.

The Offset equates to the weight of the bucket/weighing mechanism in inches of water.

k. If the displayed values of Slope and Offset are in their respective ranges, then press the SET button.

If not, press CANCEL/OFF button, and investigate the cause of the problem.

l. After pressing SET the sensor displays, '**Calculating, Please Wait**" while it updates the Slope and Offset and begins a new measurement.

m. The sensor displays the last measurement using the new Slope and Offset. The values of the new Slope and Offset are automatically stored into the data logger. Every data file generated upon download, reports the values of Slope and Offset in the top-most line.

n. Once completed, journal the words "Calibration Check – Reset Performed" to the ***FPR Maintenance Log Sheet.***

o. **Wake-up** the display upon completing the Calibration Reset to generate a second flag to mark the end of the disrupted portion of data. This is an important step!

5.4 Retrieve the 'Slope' and 'Offset' Values:

From the Home Menu, scroll down to the 'Station Setup' menu, and press Right-arrow button to call up the 'Measurement Setup' submenu. Press Right-arrow again. Scroll down to the fourth and fifth parameters, to access the values for 'Slope' and 'Offset.'

Write down the 'Slope' and 'Offset' for ready reference for when you are conducting the calibration **check** at the Observer's site. If the check fails to show a measurements within ±0.25inch of 15.00 inches you need to understand why and by how much Slope and Offset changed.

5.5 Site Inspection Report (CSSA):

Open up the edit panel of the CSSA Site Inspection Reports and obtain the ***FPR Maintenance Log Sheet*** with your notes of 'Slope' and 'Offset' values.

Access the first page, look for the rows of check-boxes under Equipment – Maintenance Performed; and located third row titled, "F&P." Mouse-click on the box "Calibrated," if you performed any type of Cal Check Procedure. Then, on the same page, in the Remarks, free-text box, describe the outcome of the Cal-Check Procedure. Write either of these two outcomes:

- Cal Check – Good Readings
- Cal Check – Reset Performed, Slope is now –N.nnnn (i.e., -2.4536); and the Offset is now –N.nnnn (i.e., -3.8163).

CHAPTER 6 – METADATA REQUIREMENTS

6. Metadata Requirements:

There are three categories of metadata:

- Station Equipment Data (Form B44) – Once upon implementation and any retrofits.
- Maintenance Data (Inspection Report) - Several times per year (i.e., Emptied Bucket)
- Data Logger Events (CSV File) - Several times per month (i.e., Display On, Display Off)

The NWSREP shall produce metadata to account for these FPR actions:

- Initial installation of FPR system accounted by Form B-44.
- Seasonal Maintenance (draining) accounted by CSSA Inspection Report.
- Routine check of calibration accounted by CSSA Inspection Report.
- Restorative Maintenance accounted by CSSA Inspection Report and FPR Logbook.
- Equipment Modification Notes actions accounted by Form B-44 and Inspection Report.

The NWSREP shall store FPR metadata in these locations:

- CSSA Station Information Report (SIR) also known as Form B44 gets saved to database.
- CSSA Site Inspection Report saved locally at WFO - yet Regional HQ may have access. (if necessary, Form B-23, Station Inspection, is the backup printed form.)
- *FPR Logbook*, electronic file (unrelated to CSSA), holds just FPR information, in a condensed format – some of which overlaps information already stored in the CSSA.

Secondary metadata that is tracked in an *FPR Logbook*, is saved and updated because it is useful for HMTs to quickly track which sites (i.e., up to 30 per WFO) are in need of a site visit.

6.1 Station Equipment Metadata:

The Cooperative Station Service Accountability (CSSA) system is the single authoritative source for COOP station information for all the FPR sites in the cooperative network. The information it contains describes site location, exposure, dates of changed equipment, and method of data reporting. These elements of information constitute 'metadata' that are then used by the NCDC to create a permanent archive of station information.

When an FPR recording gauge is implemented, it is critical to update the B44 Station Information Report's Equipment Description field with the following text: "FPR-D GAUGE WITH MEMORY CARD." The "D" suffix in the FPR-D acronym identifies this equipment as manufactured by Sutron Corp. Both the weighing sensor assembly and data logger were manufactured by Sutron Corp.

The serial number of the weighing sensor is saved The outcome of the check shall be reported in the CSSA site inspection report as secondary metadata. Secondary metadata is not required to be reported to Workflow nor does it require Form B-44 to be updated.

Policy on how metadata shall be accounted by the NWSREP is spelled out in the ***Cooperative Station Service Accountability (CSSA) Manual*** (NDS 10-1313). It is useful to review the changes the FPR program brought to the CSSA terms of reference in 2005. To view it online, access: http://www.nws.noaa.gov/directives/sym/pd01013013curr.pdf .

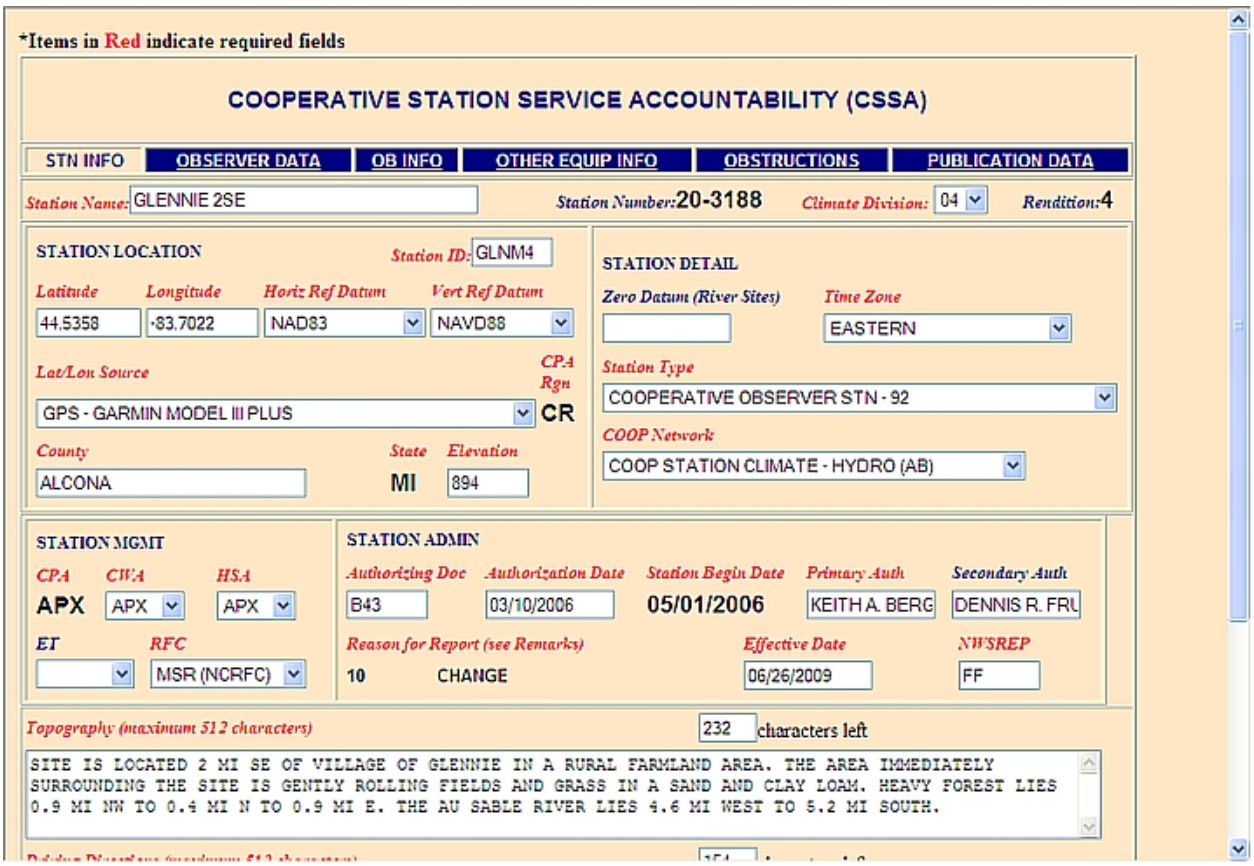
6.3 CSSA Station Report, Form B-44:

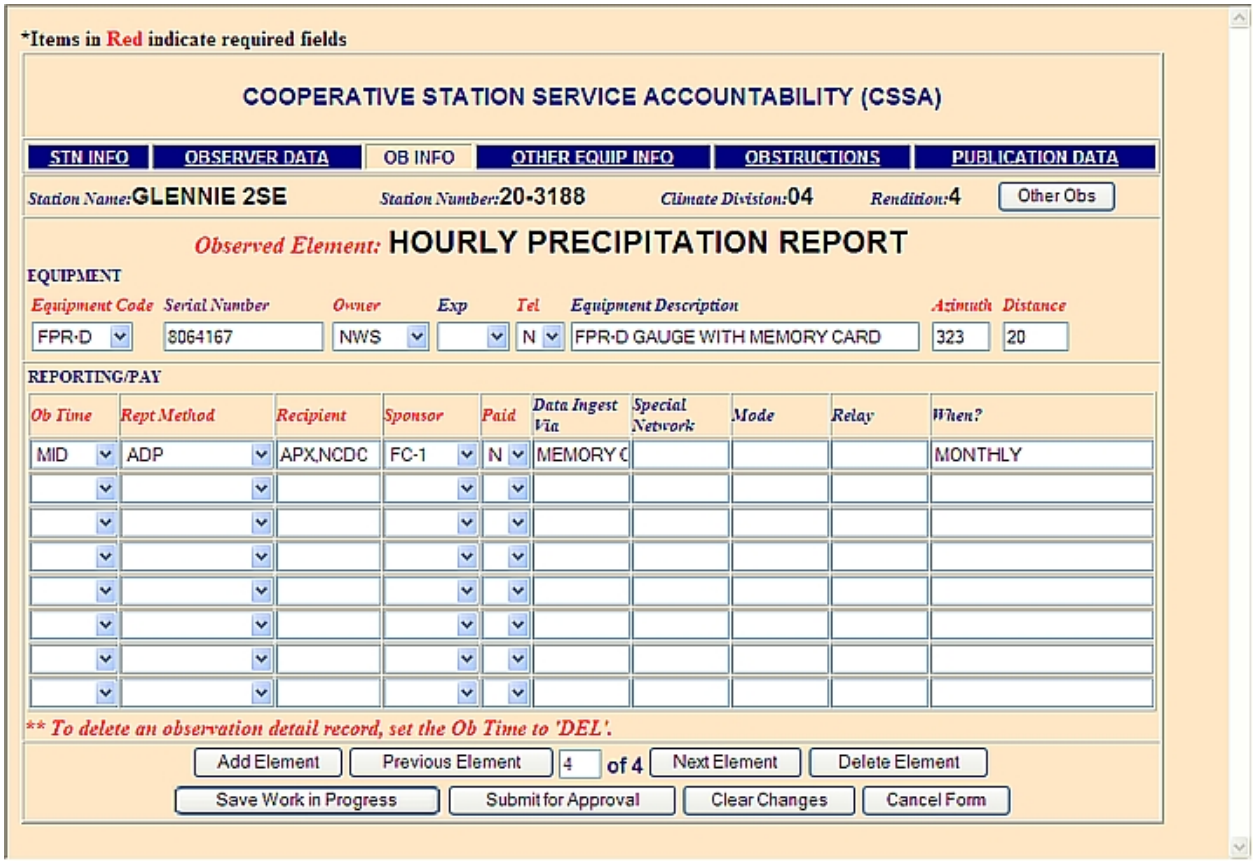
The first page of the Station Information Report (Form B-44), give the reason why a new Rendition of B-44 was necessary. There are several codes for "Reason for Report."

Select " 10 " which signifies "CHANGE."

Enter a short description to the Remarks box (free text up to 512 characters) to explain in plain English the change you have made.

For example: "**Replaced paper tape assembly in F&P gauge with electronic load cell and data logger. This system is referred to as the Fischer-Porter Rebuild, type D (FPR-D). The observer uses an SD Memory Card to download data.**" See figure, below.





Make the following changes in the Station Information Report (Form B-44):

1. ***Equipment Code***, enter '**FPR-D'**, this replaces, F&P.

2. ***Serial Number*** (see, above example) enter the Load Cell's serial number (i.e., 8064167).

The serial number appears on the end of the Load Cell Beam. Look for a small white UPC bar code on a white decal on the cable-end of the beam.

Serial Number
i.e., 8064177

3. ***Equipment Description*** enter text "**FPR-D GAUGE WITH MEMORY CARD**".

4. ***Ob Time***, keep 'MID' this refers to midnight, retain 'MID.

5. ***Report Method***, enter '**ADP**' this replaces B18.

6. ***Recipient***, keep 'Your WFO, NCDC' no changes.

7. ***Sponsor***, keep the same. If there is none use "**FC-1**" as the default. For a list of sponsor codes, see p. G-12 in the *CSSA Manual*, NDS 10-1313, and p. C-61, in Section 2.4.3.13, Sponsor.

8. ***Data Ingest Via*** enter text "**MEMORY CARD**" this replaces a blank field.

9. ***Special Network***, default is a 'blank' field.

10. ***Mode***, default is a 'blank' field.

11. ***Relay***, default is a 'blank' field.

12. ***When?*** Keep the word "MONTHLY".

References: Access: http://www.nws.noaa.gov/directives/010/010.htm NDS 10-1313, ***CSSA User Manual***, Sec 2.4.3, Ob Info (p. C-48) and notice there is a left-most drop-down window, and select, **FPR-D.** Also, see the revised instructions in the NDS 10-1313, ***CSSA User Manual***, Sec 2.4.3.7, Equipment Description, (p. C-54).

6.3 CSSA Site Inspection Report: When you have completed site visitation and are back in the office, access your CSSA and call up the CSSA Station Name/CSSA Station Number to generate a new Site Inspection Report.

Account for the following in the 'Inspection Data' portion on the first page:

a. Your title (from drop-down menu)

b. Inspection type (from drop-down menu)

c. Inspection Date (free text)

d. Staff Hours (free text)

e. Miles Driven (free text)

f. Per Diem (drop-down)

g. Trip Number (free text)

h. Supplies Cost (free text)

i. Trip Cost (free text)

Next, account for the following in the next portion of the first page: 'Maintenance Performed.' On the row marked "F&P" mouse-click the box "Calibrated" if you have conducted any type of

Calibration Check Procedure.

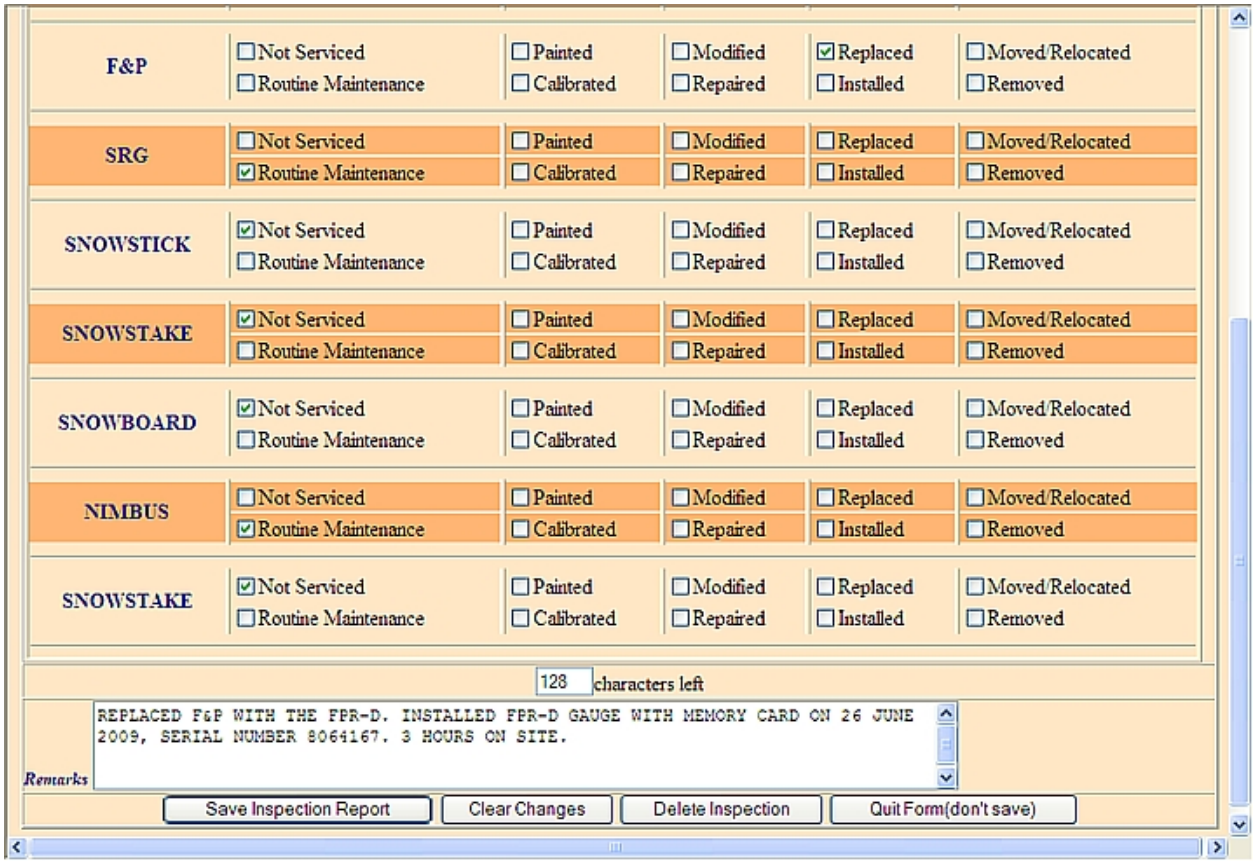
Next, in the bottom panel of the first page, in the section: 'Remarks.'

State one of the following:

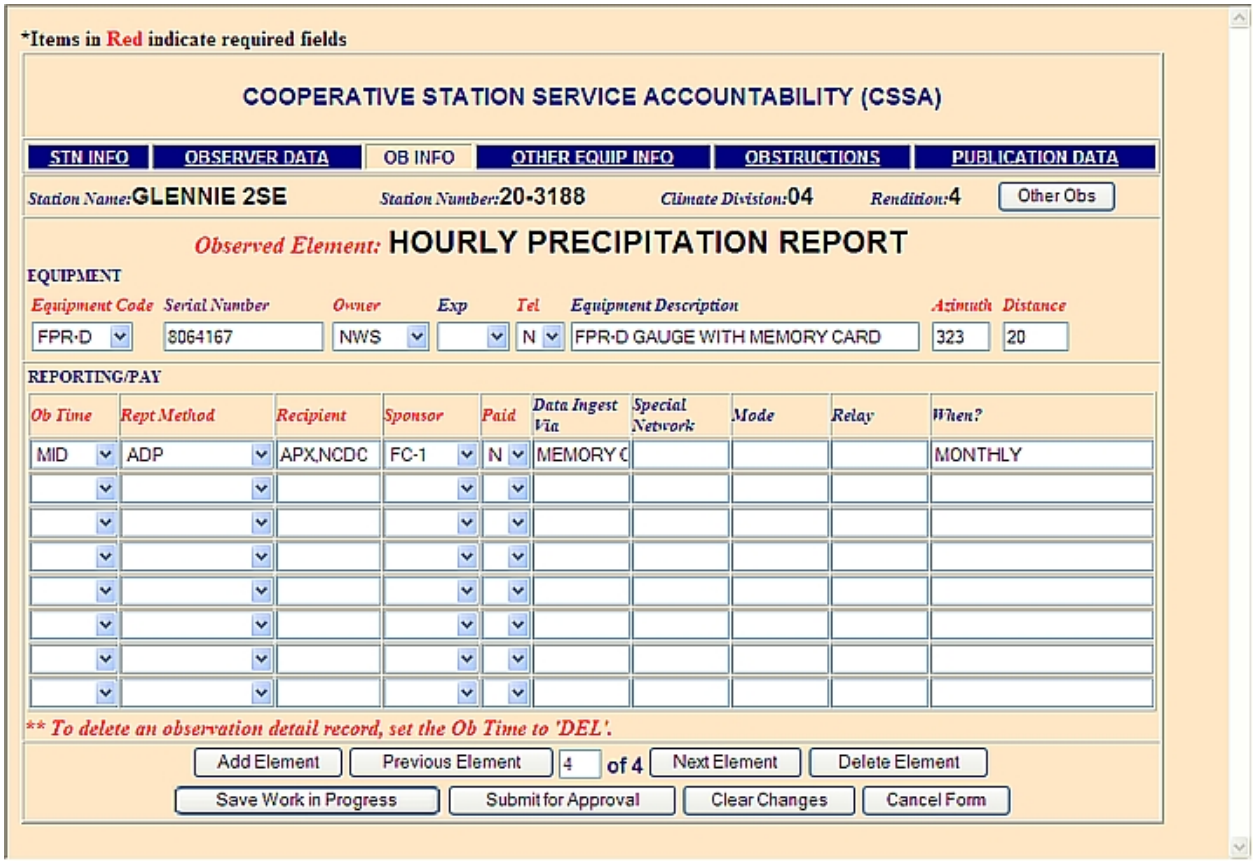
FPR Calibration Check – Good Readings.

FPR Calibration Reset: Slope now: -2.4567; Offset now: -3.4456.

State amount of time spent on site: **i.e., 3.0 hours.**



F&P	☐ Not Serviced ☐ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☑ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed
SRG	☐ Not Serviced ☑ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☐ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed
SNOWSTICK	☑ Not Serviced ☐ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☐ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed
SNOWSTAKE	☑ Not Serviced ☐ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☐ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed
SNOWBOARD	☑ Not Serviced ☐ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☐ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed
NIMBUS	☐ Not Serviced ☑ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☐ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed
SNOWSTAKE	☑ Not Serviced ☐ Routine Maintenance	☐ Painted ☐ Calibrated	☐ Modified ☐ Repaired	☐ Replaced ☐ Installed	☐ Moved/Relocated ☐ Removed



*Items in Red indicate required fields

COOPERATIVE STATION SERVICE ACCOUNTABILITY (CSSA)

STN INFO | OBSERVER DATA | OB INFO | OTHER EQUIP INFO | OBSTRUCTIONS | PUBLICATION DATA

Station Name: GLENNIE 2SE Station Number: 20-3188 Climate Division: 04 Rendition: 4 Other Obs

Observed Element: HOURLY PRECIPITATION REPORT

EQUIPMENT

Equipment Code	Serial Number	Owner	Exp	Tel	Equipment Description	Azimuth	Distance
FPR-D	8064167	NWS		N	FPR-D GAUGE WITH MEMORY CARD	323	20

REPORTING/PAY

Ob Time	Rept Method	Recipient	Sponsor	Paid	Data Ingest Via	Special Network	Mode	Relay	When?
MID	ADP	APX,NCDC	FC-1	N	MEMORY C				MONTHLY

** To delete an observation detail record, set the Ob Time to 'DEL'.

Add Element | Previous Element | 4 of 4 | Next Element | Delete Element

Save Work in Progress | Submit for Approval | Clear Changes | Cancel Form

In a past example from 2005, the DAPM made the following entries:

Inspector:…….. Network Program Manager
Inspection Type:…….. Annual
Inspection Date:…… 05/06/2005
Staff Hours:…….. 6
Miles Driven:…… 183
Per Diem:…….. N
Trip Number:…… 2WT0B3804&05
Supplies Cost:…… 75.50
Trip Cost:…….. 113.75

6.4 FPR Station Logbook :

After you create a Site Inspection Report in CSSA and after your Form B-44 update was successfully processed by NCDC and is accessible in the data base, consider the benefits of organizing an FPR Logbook (electronic), particularly if you have more than ten COOP sites with FPR equipment.

The FPR Logbook will account for your installation work, expenses, calibration coefficients, calibration check dates, semi-annual visitation, maintenance trips, and any delegated maintenance responsibility given to the Observer. In this way you will have a ready reference from which to retrieve detailed information on FPR system and Observer correspondence, and not be limited to the 250 characters in the Site Inspection Report's 'Remarks' box.

CHAPTER 7 – SYSTEM MODIFICATION POLICY

7.1 Management Responsibilities:

Unlike ASOS managers, national managers who maintain COOP observing systems are *not* governed by the instructions covered in NWSI 30-1203, *Configuration Management Policy for Operational Systems*. However, instructions in the NWS Directives System written by the Office of Climate, Water, and Weather Services (OCWWS), for the surface observing program, do apply to the cooperative observing program. Specifically, field and regional managers follow the policies outlined in the, *Cooperative Station Management* (NWSI 10-1307) procedural.

The Observing Services Division (OS7), of OCWWS, will:

a. Evaluate existing and new requirements for FPR systems.

b. Delegate to the Office of Operational Systems, Engineering Design Branch, the creation of Maintenance Notes to keep systems properly working.

c. Delegate to the Office of Operational Systems, Engineering Design Branch, the determination of costs for proposed changes.

d. Authorize Maintenance Notes to be issued, coordinates FPR change actions with Regional Managers, and maintains change status information on-line on a NWS Headquarters site: http://www.nws.noaa.gov/osp2/Surface/coopimplementation

e. Verify completion of maintenance actions with effected field offices through the Cooperative Station Service Accountability (CSSA) system B-44 reports.

7.2 Policy on Cooperative Station Management:

The driving directive that governs the implementation, operation, maintenance, and modification of any type of meteorological or hydrological observing equipment, is the NWSI 10-1307, http://www.nws.noaa.gov/directives/sym/pd01013007curr.pdf, *Cooperative Station Management*.

Field and region managers who make equipment and service changes at the volunteer Observer sites whether in response to Observer requests, or in compliance with national headquarters directives, then have to comply with the policies in the Cooperative Station Management, Section 3.1.2. In that section, managers are instructed to use the Cooperative Station Service Accountability (CSSA) system – an online data base to track numerous minor and major modifications to each of the approximately ten thousand observation stations. The CSSA document is NWSM 10-1313: http://www.nws.noaa.gov/directives/sym/pd01013013curr.pdf.

The project to modify the F&P rain gauges was initiated with the *FPU Operational Implementation Plan* (OIP). It was developed in 2004 by the Office of Operational Systems (OPS22). All field managers involved in the FPU project had to abide by the OIP's management and administrative instructions.

A technical manual, the ***FPR Assembly Procedural,*** was written to give a detailed description of the authorized configuration of the FPR system with an account of the Part Numbers and Software versions used in the FPR modification kit.

For the management of the FPR systems, including operations, maintenance, and issuance of Mod Notes for the FPR system, this handbook, the *FPR Operations Manual*, will be the governing document.

7.3 FPR System Modifications:

7.3.1 Hardware:

Hardware components that may be affected by modifications appear in Appendix G, of this manual. The significant hardware groupings are:

- Load Cell Sensor Assembly (including chassis)
- Sutron Data Logger
- Solar Panel
- 12V Battery

Hardware modifications shall be issued as Mod-Notes by the NWS headquarters to be filed within this ***FPR Operations Manual***. For example the first FPU Mod-Note, dealt with an enhancement to the electrical grounding of the FPU system. The "Bond FPU Chassis to Gauge Chassis," is authorized as a routine maintenance action, effective September 2006.

7.3.2 Software:

Software may be affected by upgrades issued by NWS Headquarters, refer to Chapter 2, of this manual to identify the version number. The significant software groupings in the FPR are:

- Sutron operating system in the data logger
- FTP (WinFTP) for monthly transmissions to NCDC
- WinZIP (WinZip81) for monthly file compression for transmission to NCDC

7.3.3 Priority of Mod-Note Implementation:

There are three levels of Mod-Note priority for the FPR program:

a. Routine: make the change within 12 months or by the next regularly scheduled visit to the site. An example is the 'Bond FPU Chassis to Gauge Chassis' Mod Note.

b. High: make the change within 1 to 6 months of the release of the Mod-Note as distributed on the COOP-MOD list server.

c. Emergency: make the change as soon as practical (within 1 to 4 weeks) after the announcement. Inform your RCPM by phone and e-mail to coordinate before action.

7.4 What is a Sutron Firmware Update?

As of this time there is no anticipation of manufacturer updates of firmware that would require the NWSREP to install firmware to the Precip Recorder. Should there be one, policy in Section 7.6 will apply.

7.5 Prohibition Against Local Change:

Each FPR system comes delivered with a manufacturer developed firmware already installed. Write down the version number of the data logger firmware (i.e., FpRain ver 1.05 Sutron Corp).

This FPR firmware is standardized and configuration controlled. No one has authority to change the data logger configuration software without the express and written direction from the W/OS7, the Observing Services Division, Cooperative Observer Program, of the NWS.

The FPR data logger will produce two types of measurements by default: the precipitation level and battery voltage. While the logger is capable of temperature sensor input, the FPR-D will not be configured to input the MMTS thermistor readings.

As of August 2009, with the initial FPR kit deployments, only the precipitation data is certified for operational use. In the future, if a temperature sensor becomes certified for use, updates will be given to the NWS field offices to install configuration software.

7.6 Modification Notes:

All Modification Notes issued from headquarters shall take into consideration the length of time that may be required to implement the Modification Note, due to the following: FPR site unique properties, difficult site exposures, harsh climates, difficult electrical grounding, and temporary interruption to institutional site activities, and interruptions to agreements with network users.

Emergency modification work is authorized for immediate restorative maintenance, when hardware or software has been damaged or at risk as described in the Modification Note. Preventative actions will only be authorized on a case by case basis, after the OPS11, Engineering Design Branch has been informed of site history and reviewed system outages or degradation from: (a) damaged hardware or software, or (b) hardware/software failures with damaged equipment.

Issue Date:	Title of Modification Note:	Regions/ Sites Effected	Complete-by Date:
09/2006	FPU Mod-note 01; Bond FPU Chassis to Gauge Chassis.	All	09/2007

Table 7.1 An example of a Fischer-Porter Upgrade modification dated Sep 20, 2006.

Implementation of a Maintenance Note must be completed by the 'Complete-by Date' specified in Table 7.1, in this ***FPR Operations Manual***. Within two weeks of completion of the maintenance action, the NWSREP shall update the CSSA Report (Form B-44) in the Remarks section to account for the change to FPU equipment.

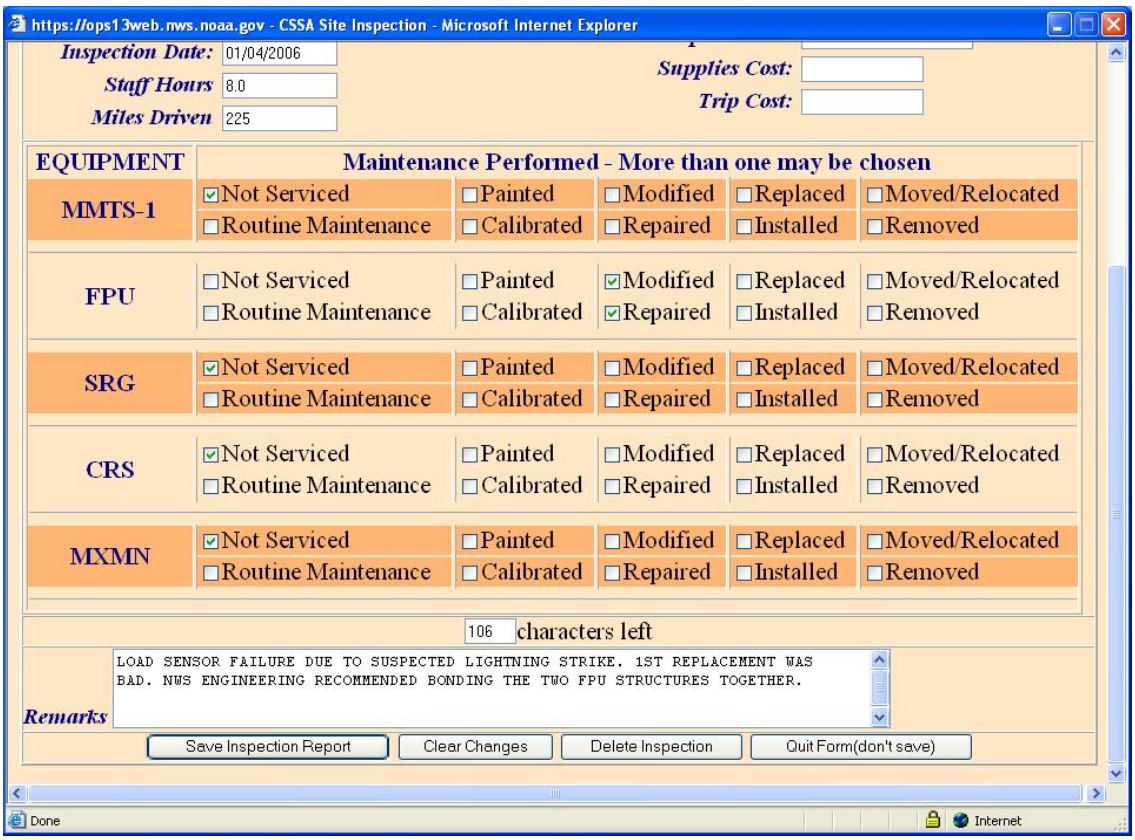
Then you shall report the completed modification via CSSA, Inspection Report. Include the following information in the report:

In the ***EQUIPMENT*** block of the Inspection Report under the heading ***Maintenance Performed*** locate the line for F&P equipment and check the box "Modified". Then, in the ***Remarks*** section, enter: "Completed FPU Mod Note 01, to reduce the risk of electrical damage to FPU."

See illustration (below) for an actual example of an Inspection Report, saved to CSSA.

7.6.3 <u>Reporting Instructions:</u>

Report the completed modification (e.g., FPR-D Mod-Note 01) via CSSA, Inspection Report. Include the serial number of the FPR-D system, the SID, and the plain English name of the site which has been modified.



Station Information Report (Form B-44): When a Mod Note is installed to change an FPR-D system, you must also update the CSSA, Form B-44.

This is accomplished by editing the *Equipment Description* field on the Observed Element page. The Equipment Description field already contains this text, 'FPR-D GAUGE WITH MEMORY CARD." from when you first installed the FPR system. Now simply add these words immediately after them: 'With FPR-D Mod Note #01'

See the actual example illustrated below under the italicized heading, '*Equipment Description*.'

Observed Element: **HOURLY PRECIPITATION REPORT**

EQUIPMENT

Equip	*Serial Number*	*Owner*	*Exp*	*Tel*	*Equipment Description*	*Azimuth*	*Distance*	*Backup?*
FPR-D	8064167	NWS		N	FPR-D GAUGE WITH MEMORY CARD	323	20	N

REPORTING/PAY

Ob Time	*Rept Method*	*Recipient*	*Sponsor*	*Paid*	*Data Ingest Via*	*Special Network*	*Mode*	*Relay*	*When?*
MID	ADP	APX,NCDC	FC-1	N	MEMORY CAR				MONTHLY

7.6.1 Records Retention - Modification Notes:

The Appendix G, 'Modification Notes, of this ***FPR Operations Manual***, is updated periodically http://www.nws.noaa.gov/ops2/Surface/coopimplementation (i.e., every 6 months) and posted on-line to instruct the NWSREP to make changes in the FPR system as authorized by the NWS Headquarters, Office of Climate, Water, and Weather Services (OCWWS).

APPENDIX A – FPR IMPLEMENTATION CERTIFICATE

FISCHER-PORTER REBUILD (FPR-D)

OPERATIONAL IMPLEMENTATION CERTIFICATE

WFO - _____.

The WFO (SID) _____ hereby certifies the completion of all Fischer-Porter Rebuild (FPR-D) operational implementation activities in accordance with the NWS COOP Modification Note #_____, as of (Month/Day/Year) _____. Documentation listed below was submitted to the Meteorologist In Charge to validate the fully successful implementation of FPR-D in our County Warning Area.

Required Documents — Initials / Date

A. ***FPR Operational Implementation Checklist – Part B*** completed by the NWSREP one per each F&P site converted to FPR-D in the County Warning Area. _____

B. ***FPR Thirty-Day Report*** provided by NWSREP if necessary to document any FPR-D system outages and/or HPD data file handling problems, that could not be resolved during the 30-day evaluation period. Documentation of follow-on remedial actions taken to resolve the problems, and results achieved, should also be included. COOP Station Number: _____

Meteorologist in Charge (MIC)

_____ _____

MIC Signature Date

Instructions: The NWSREP completes an ***FPR OI Checklist-Part B*** for each FPR-D site and notifies the MIC of each. In addition the NWSREP submits a supplemental ***Thirty-Day Report*** to document those problems at each FPR site where they could not be resolved locally in the 30-day evaluation period. Note: The evaluation period starts on the date the FPR was installed and activated. The NWSREP submits all ***Checklists-Part B*** and ***Thirty Day Reports*** to the MIC. When all checklists and reports have been reviewed to ensure remedial actions have corrected all documented problems, then the MIC signs and dates the Certificate. The NWSREP faxes just this ***FPR OI Certificate*** to your RCPM and must FAX 301-713-1598, to Tom Trunk (OS7).

APPENDIX B – WFO IMPLEMENTATION CHECKLIST

Cooperative Observer Program
Planned Product Improvement
OI Check List

Planned Product Improvement: Fischer-Porter Rebuild (FPR-D) .

Location (SID, Name, State): _____

Office Completing this Check List: _____ **Date:** _____

Item #	Item Description	OPR	Date
1.	**Pre-OI Operational Support Activities**		
a.	Select F&P sites to rebuild from HQ 'FPR Designated Sites Spreadsheet'	WFO	
b.	Submit 'FPR Pre-Implementation Worksheet' with Projected Dates, to OS7	WFO	
2.	**OI Installation Activities**		
a.	Assemble FPR-D Kit in field office	WFO	
b.	Install and checkout FPR-D in accordance with MOD NOTE	WFO	
3.	**OI Monitoring and Coordination Activities**		
a.	Generate a Site Inspection Report in CSSA	WFO	
b.	Transmit a public notification message (PNS) on AWIPS	WFO	
c.	Establish a WFO Log Sheet to track Memory Cards received and mailed.	WFO	
4.	**Post OI Activities**		
a.	Ensure data capture for transition month. Decode final month of F&P data from B-18 (i.e., partial month) and enter hourly and daily totals to Form 791D. E-mail to Stu Hinson (NCDC)	WFO	
b.	Submit new rendition B44 to Workflow to identify the FPR equipment	WFO	
c.	Dispose of old equipment in accordance with installation instructions.	WFO	
d.	Verify NCDC received HPD files – next day after FTP transmission	WFO	
e.	FAX the MIC-signed OI Certificate to Tom Trunk (OS7) only after all FPR-Ds have been implemented and NCDC has received data files.	WFO	

Instruction: The NWSREP fills-out one checklist per each rain gauge he/she modernizes and notes the date of the completed action. When all designated gauges are modernized to FPR-D then NWSREP submits them to MIC with OI Certificate, for signature.

APPENDIX C – ON-LINE RESOURCES AND REFERENCE MANUALS

1. Primary Resources On-Line:

a. http://www.nws.noaa.gov/ops2/Surface/coopimplementation
- ***FPR Assembly Procedures*** *– August 2009*
- ***FPR Observers Guide*** *- July 2009*
- ***FPR Operations Manual*** *– August 2009*

b. http://www.srh.noaa.gov/ohx/dad/coop/FPR.html
- NWSTC Training Class – Clear, labeled photos of the new rain gauge, produced by Ralph Troutman (OHX).

c. http://www.srh.noaa.gov/ohx/dad/coop/f-p_images
- Clear photos of the original F&P rain gauge.

d. https://apps.weather.gov/fp/fp.php
- Headquarters tracking table of F&P conversion status.

2. Support Resources – NWS Policy and Procedures:

a. *NWSI 10-1315, COOP Station Observations* (Aug 2009) *****
http://www.nws.noaa.gov/directives/sym/pd01013015curr.pdf

b. *NWSI 10-1313, CSSA User Manual* (Mar 18, 2005) *****
http://www.nws.noaa.gov/directives/sym/pd01013013curr.pdf

c. Proposed: IT Security Statement (by FPR Project Leader to OS chief).

d. *EHB-1: Instrumental Equipment Catalog*
http://www.ops1.nws.noaa.gov/ehbs/ehb1.htm

e. *NWSM 50-1115: Occupational Safety and Health Manual*
https://www.ops1.nws.noaa.gov/Secure/SAFETY/Safety_manual.htm

f. *Integrated Logistics Support Planning* NDS 30-3102
http://www.nws.noaa.gov/directives/030/030.htm

g. *Supply Manual and Catalog* NDS 30-3101
http://www.nws.noaa.gov/directives/030/030.htm

h. *Technical Information Notice (TIN) Template* (for each effected WFO) *****

***** The Observing Services Division (W-OS7) of the Office of Climate, Water, and Weather Services (OCWWS) is the Office of Primary Responsibility (OPR) for these

asterisked documents. A PDF formatted version of each is available on the NWS Surface Program's webpage: http://www.nws.noaa.gov/ops2/Surface/coopimplementation.htm.

3. Vendor's Manual Supplied with the NLSC Kit:

a. *Fischer/Porter Precipitation Gauge Rebuild Kit – Operations & Maintenance Manual v1.01* (Nov 12, 2008), delivered with kit is published by Sutron Corp.

Note: The NWSHQ issued '*FPR Assembly Procedures (Apr 2009)*' is the primary assembly manual, http://www.nws.noaa.gov/ops2/Surface/coopimplementation. You may reference *F/P Gauge Rebuild Kit – Operations & Maintenance Manual*, for detailed information on sensor measurements and data logger controls.

4. Engineering Handbooks (NWS):

The following content in EHB-10 is superseded by the, ***FPR Operations Manual*** (Apr 2009), and, ***FPR Assembly Procedures*** (April 2009), issued by the NWS, Observing Services Division:

Section 1.2: Items 10-204, 10-206, 10-207, and 10-208.

Section 4.2: Revised maintenance schedule for Fischer & Porter Punched Tape Precipitation Gage, April 30, 1976.

The following content in EHB-1, Issuance Number 02-11 (Nov 1, 2002), needs to be supplemented for the new Fischer-Porter Rebuild (FPR) equipment

Section D: Hydrologic Equipment; Instrumental equipment listings.

The NWS Logistics Branch (W/OPS14) has assigned Agency Stock Number (ASN), a National Stock Number (NSN), a Source, Maintenance and Recoverability (SM&R) Code, and will list this equipment in the EHB-1, Instrumental Equipment Catalog.

5. Sterling Field Support Center (SFSC)

For operational support when you implement the Fischer-Porter Rebuild (FPR) modification, you may phone the Sterling Field Support Center, 8:30am – 5:00pm, Monday – Friday, on 703-661-1268; or e-mail them, nws.sfsc@noaa.gov . Before calling SFSC, write down the issue or question and inform your Regional COOP Manager by phone or email.

The Sterling Field Support Center (SFSC) is located approximately 30 miles west of Washington, DC in Sterling, Virginia. The SFSC operates as an extension of National Weather Service (NWS) Headquarters to provide operational support to field personnel through a combination of sensor testing, sensor system analysis, and contact center support. Sterling provides a critical service to the NWS field community by using their years of knowledge and experience gained through extensive sensor/system testing and maintenance in assisting the field with sensor and system failures. When these failures arise in the field, the SFSC is there to provide assistance and help solve these problems.

The SFSC has been a critical component of the Fischer Porter Rebuild (FPR) Program. The SFSC will play a major role in assisting the field if issues arise when the FPR kits are installed at COOP sites around the country. The facility has created a contact center and should be the first point of contact made by NWS WFO's if there are questions or issues with the FPR kits. If the SFSC is unable to determine the correction for the issue, the SFSC will elevate it to NWS Headquarter level.

The contact center at the SFSC was established to troubleshoot potential issues in the field with the installation and usage of the FPR kits. The contact center is open Monday through Friday 8:00 AM to 5:00 PM Eastern Time. The SFSC is closed for all federal holidays. All emails and phone calls received during the hours of operation will be responded to in a timely manner. Emails received during non-operation hours will be returned in the order they are received on the following day in which the facility is open.

SFSC Contact Center Information

Main Line: 703-661-1268
Back-up Line: 703-661-1293
Email: nws.sfsc@noaa.gov

APPENDIX D : CALIBRATION RESET

Calibrate the FPR-D System: Use the keypad of Precip Monitor and the F&P brass weights.

1. **Wake-up** the display before you take the next steps. This produces the first of two log entries to delimit the start and end of irregular data values caused by the brass weights.

2. From the Home Menu, press the Down-arrow four times until you reach the 'Diagnostic' menu and then press the Right-arrow. The display reads, "**Two Point Cal, Press SET to Cal.**"

3. Press the SET button and the sensor will prompt, '**Put Empty Dry Bucket, Press SET to proceed**."

4. Place an empty dry bucket on the sensor and press SET. The sensor will display the message, '**Calculating, Please Wait'** while it takes a measurement. The sensor will use the current settings for making the measurement.

5. When the sensor completes its measurement, the sensor will prompt, "**Put 15" of Weight, Press SET to Proceed."**

6. Load the bucket with 15 inch weight set. These are the <u>three</u> brass weights marked "4111G." Then press the SET button.

7. The sensor will ask "**Enter Weight in Inches**" and prompt an entry of a number. Enter the numerals, 15, with Up- and Down-arrow buttons.

8. This number corresponds to the weight placed in bucket and is expressed in inches of water. The sensor will display, "**Calculating, Please Wait**" while it takes a measurements. The sensor will then use the two measurements to compute a calibrated slope and offset.

9. The sensor displays the computed Slope and Offset in one display, together with the Prompt: "**Press SET to accept.**"

10. Press the SET button. Write down the Slope <u>and</u> Offset values into your notes for later entry into the Site Inspection Report, in your CSSA system.

11. If not, press CANCEL/OFF button, and investigate the cause of the problem. After pressing SET the sensor displays, '**Calculating, Please Wait**" while it updates the slope and offset and begins a new measurement.

12. The sensor displays the last measurement using the new slope and offset. The calibration 'slope' and 'offset' are stored into the data logger. The most current values of the calibration's slope and offset, will be posted along with other meta data on the top line of every data file.

13. Once completed, journal the words, “Calibration Check – Reset Performed” to the ***FPR Maintenance Log Sheet.***

14. **Wake-up** the display upon completing the Calibration Rest to generate the second flag to mark the end of the disrupted portion of data. This is an important step!

APPENDIX E – HARDWARE ERRORS

The Sutron Precip Recorder is a microprocessor controlled instrument. It can detect and report malfunctions. When the Precip Recorder detects an error the display will show:

Most of the possible errors are internal hardware errors that are non-fixable in the field.
The following errors relate to hardware failures within the Precip Recorder. If you see any of these, note the error number and try to clear the error following the procedure below. If the error will not clear, repeats after another attempted use of that part of the system, or prevents/affects system operation the unit will need to be replaced. When you return the unit to National Reconditioning Center (NRC), include a note stating the unit is reporting errors and the error number.

-Display errors,	numbers 1001 to 1008
-Real Time Clock errors,	numbers 1101 to 1104
-Keypad errors,	numbers 1201 to 1204
-RS232 errors,	numbers 1301 to 1316
-Flash Memory errors,	numbers 1401 to 1403
-SDI-12 errors,	numbers 1501 to 1506
-Miscellaneous errors,	numbers 3001 to 3201
-Load Cell errors,	numbers 7001 & 7002

The following error relates to the SD card operation. It covers hardware errors as well as issues that can be caused by the user, such as improper insertion or removal, write-protect ON, card full, etc. If you see this error, remove the SD card, make sure the write protect switch found on some SD cards is in the OFF, RW, or UNLOCK position, clear the error as shown below, and retry downloading to the SD card. Observers should note in their log that they saw (and cleared?) this error, so you are aware of it. If the error will not clear or data will still not download, the unit will need to be replaced.

-SD Card Fail error, Number 4027

The SD Card Fail error can easily be caused by operator fumbling, but does include hardware failures. It is not possible to determine what caused the 4027 error from the display. However, if you can get to the logged data - a test message will be logged along with the error message as shown in this example:

Precip,07/13/2009,14:15:00,1.38,
Precip,07/13/2009,14:30:00,1.38,
Display On,07/13/2009,14:37:16,
Test,07/13/2009,14:41:13,16.0000,
Hardware Fail,07/13/2009,14:41:13,4027,

The test message will contain a value between 1 and 27. The example above indicates a Test 16 condition. Anything other than the following is a hardware failure and the unit may need replacing. Unfortunately if it is a hardware failure you will not be able to get a SD card download to remotely check the test message. You will have to connect a laptop to the unit and review the data to see the code.

Test Codes	Meaning
3	card not formatted
8	card is full
16	No init function available/error in init - i.e. card not inserted properly
17	card not detected
19	a sector has developed an error
21	error writing file to volume - i.e. card pulled out before finish
22	media not recognized
23	card is busy
24	card is write protected
25	FAT not recognized

To CLEAR ERRORS

When you get an error:

Press the RIGHT arrow to see the error.

Pressing the DOWN arrow (repeatedly) will show you all errors.

When you get to the end of the error list you will see this message:

Press SET, to clear the errors and the display will briefly show: "**Errors Cleared**"

The unit will automatically revert back to the normal precip, date and time screen.

Then you may press OFF until the display goes off.

APPENDIX F - NOTES REQUIRED FOR INSPECTION REPORT

This table gives the range of potential notes you should enter to the Remarks field of the CSSA Site Inspection Report. While at the rain gauge the NWSREP (and Observer, if delegated) shall journal to the ***FPR Maintenance Log-Sheet*** any maintenance action that appears in this table. Reminder: While at the rain gauge you must wake-up the data logger display (i.e., Up-Arrow) twice: once before the start of maintenance and once after maintenance has ended.

CSSA Site Inspection Report – Valid Entries for FPR-D Maintenance:

Fischer-Porter Rebuild (FPR-D) Valid Entries for Site Inspection Report
Annual Visit
Semi-Annual Visit
Emergency Visit
Awake Display – Start
Awake Display – End
Precip Level Before Bucket Serviced
Precip Level After Bucket Serviced
Calibration Check – Good Readings
Calibration Check – Reset Performed
Partially drained bucket – some liquid remains in bucket
Emptied bucket
Added Oil to bucket
Added Antifreeze to bucket
Emptied and cleaned bucket
Installed Funnel
Removed Funnel
Foreign Object Found in Bucket

Data downloaded to Memory Card
Cleaned F&P Housing
Cleaned Solar Panel
Cleaned Precip Recorder (display and keypad)
Slope Before – Value before Calibration
Slope After – Value after Calibration
Offset Before – Value before Calibration
Offset After – Value after Calibration
Installed Auto-Syphon
Removed Auto-Syphon
Time is more than 15 minutes slow.
Time is more than 15 minutes fast.
Replaced one or more Flexures
Replaced FPR-D Precip Recorder – With same model Precip Recorder
Replaced FPR-D Load Sensor Assembly – With same model Load Sensor Assembly
Gauge moved to a compatible location – equipment move
Gauge moved to a non-compatible location – station relocation
Gauge removed from service – placed in storage
Gauge put back in service after being in storage

APPENDIX G – FPR-D MODIFICATION NOTES

Issue Date:	Title of NWS Engineering Mod Note:	Regions/ Sites Effected	Complete-by Date:
05/2009	FPR-D Installation Instructions, Engineering ~~Note 4,~~ May 2009	All	05/2011

APPENDIX H - FPR PARTS AND AGENCY STOCK NUMBERS (ASN)

General Name	Short Description	Long Description	ASN	SMR *
Load Cell Assembly	Load Cell Assembly, FPR	Load Cell Assembly, FPR, complete with load cell block, cell, and 4 long allen head machine screws. Sutron, Corp.	**D111D-1A1**	PADDD
Screws, Load Cell Mounting	Screws, Load Cell mounting, FPR	Screws Load Cell mounting, FPR, set of 4 with washers.	**D111D-1A1M1**	PAOZZ
Plunger	Post, FPR, load cell.	Anvil or post for FPR load cell, mates F&P gauge to load cell. Sutron Corp.	**D111D-1A2**	PAOZZ
Precip Recorder	Precip Recorder with Bracket.	Precip Recorder Assembly for F&P Gauge Rebuild, includes Sutron datalogger, solar panel regulator, display keypad, SD card interface, manual, housing and mounting bracket. Sutron Corp.	**D111D-2A1**	PAODD
Sutron FPR Manual	Manual, FPR, OEM, Sutron	Manual, FPR, OEM, Sutron	**D111D-2A1D1**	PAOZZ
Battery	Sealed 12V Battery	Battery, 12V, 7AH, Sealed Lead Acid, spade terminals, 4 lbs, Genesis. (Sutron or Open Market)	**D111D-2B1**	PAOZZ
Solar Panel	Solar Panel, 2W, 12V nom, @0.133A, no regulator.	Solar Panel, 2W, with Diode, 12V nom. @0.133A, no regulator, metal frame, with 15 feet cable, hardware and mounting bracket (two hose clamps, SS, #24, series 68). (Sutron or PowerUp Co.)	**D111D-3**	PAODD

* The FPR unit has just three types of Source, Maintenance, and Recoverability (SMR) codes assigned to its parts: PADDD, PAODD, and PAOZZ.

Reference: **EHB-1, *Instrumental Equipment Catalog* (Issuance 1996-1),** Section 2.3, Source, Maintenance and Recoverability Code (SM&R).

PADDD: You must return these parts (i.e., faulty regulator) to National Reconditioning Center (NRC) in exchange for a replacement.
The 'PA' signifies item procured and stocked for anticipated or known usage that is not deteriorative in nature; the 'DD' signifies the part must be shipped to the depot (NRC) together with its integral component(s) for disassembly and be repaired by the depot (NRC); and the final 'D' signifies that just the depot (NRC) is authorized to repair, condemn, or dispose of this part.

PAODD: You must return these parts (i.e., faulty GMA) to NRC in exchange for a replacement.
The 'PA' signifies item procured and stocked for anticipated or known usage that is not deteriorative in nature; the 'OD' signifies this part shall be isolated and removed by the field and shipped to the depot (NRC) where the depot (NRC) will perform the repair; and the final 'D' signifies that just the depot (NRC) is authorized to repair, condemn, or dispose of this part.

PAOZZ: A non-repairable part. You may dispose of these parts (i.e., 5 Amp fuse) at the Weather Forecast Office (WFO).
The 'PA' signifies item procured and stocked for anticipated or known usage that is not deteriorative in nature; the 'OZ' signifies the field level shall remove and replace this part, however it is non-repairable and no repair to the item is authorized. The final 'Z' signifies that the field office is authorized to condemn and dispose of the part when it becomes unserviceable.

APPENDIX I - F&P MAINTENANCE LOG SHEET

COOP Station Number: i.e., 23-4377 **Your Name:** i.e., John Williams **Institution Name:** i.e., US Army Corp of Engineers.

LOG DATE	BUCKET LEVEL?	OIL ADDED?	ANTIFREEZE ADDED?	FUNNEL IN / OUT?	SPECIAL NOTES:
Date of Journal Entry	Date and time bucket was partially drained or completely emptied.	Date and time oil was last added. Typical is half-quart (16oz).	Date and time antifreeze was last added. Typical is 2 quarts (64oz).	Date and time funnel was removed for winter; or installed for summer.	Any anomaly or outage event? Give date and the elapsed time of outage. Describe the problem.
Apr 15, 2009	2pm Apr 15, 2009 - partially drained – New level is 2.37 inch	11am May 5, 2008	11am Oct 9, 2008, for winter.	Installed 2pm Apr 15, 2009, for summer.	This log-sheet is being mailed to NWS with memory card on or about May 3, 2009.

NWSREP Name: _____ **NWSREP Phone:** _____.

Instructions: Write only the maintenance actions or check-ups you have taken as an Observer. Always phone your NWSREP if there is an FPR system outage or an anomaly that might adversely affect the integrity of the power system, the data recorder, or the data itself. Your Observing Station may design its own worksheet to suit its needs with the intention to account for the same areas of operation as indicated above. If NWSREP approves, you may regularly mail your Observer Log Sheets to your NWSREP. You may store this Log Sheet beside the Precip Recorder, inside the gauge.