FISCHER & PORTER REBUILD (FPR-D)

RECORDING RAIN GAUGE

OBSERVER INSTRUCTIONS

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

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1. Introduction

1.1. 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 1.1). 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 1.3).

Fig 1.1

Fig 1.2

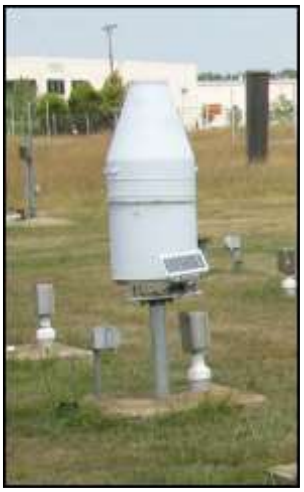

Fig 1.3

1.2. 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 1.5).

1.3. 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.

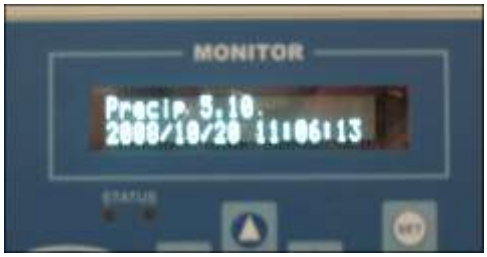

Fig 1.4

The green fluorescent display communicates the running total of precipitation plus any other additive like oil or propylene glycol. 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.

Fig 1.5

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.

Fig 1.6

You insert the Memory Card and the system automatically downloads data to the Memory Card.

Follow instructions on pages 7 and 8, Monthly Data Retrieval, 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.

2. Viewing the Menus

The Home Display (Fig 2.1) 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 2.2.

Fig 2.1

Fig 2.2

The menu revolves back to the Home Display (Fig 2.1) if you keep pressing the down-arrow (▼) key.

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

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 2.3

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 2.4).

Fig 2.4

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. Routine Checks

Whenever you open the F&P access door, 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.

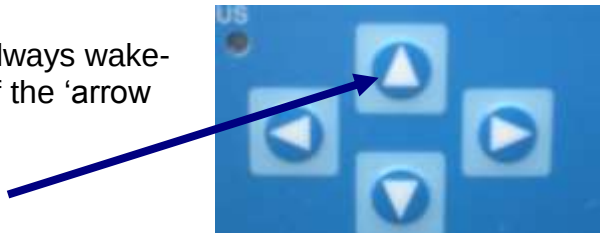

Fig 3.1

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

Fig 3.2

In this example (Fig 3.2), 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 pages 9-10, of Section 7.

3.2 Date and Time: The current date and time appear in the Home Display (Fig 3.2) and also appear one the last menu, the Station Name and Time (Fig 2.4).

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.

3.3 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 1.5.

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, walk out to the Fischer & Porter gauge, and retrieve the precipitation measurements. This outdoor procedure might take 5 minutes.

4.1. Insert Memory Card: Insert the Memory Card into the slot on the right side of the Precip Recorder (Fig 4.1) with the card's label-side facing you. Press it in, until it clicks.

Fig 4.1

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

Fig 4.2

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 4.3

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

Fig 4.4

4.4. Remove Card: Press the **OFF** button several 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 4.5

4.5. Enclose for Mailing: Place the plastic Memory Card into its clear plastic protective cover (Fig 4.6). Then, place the memory card into the standard ten inch, yellow mailing envelope (Fig 6.1), for delivery to your forecast office NWSREP.

Fig 4.6

5. Email the Data File from SD Memory Card (If Capable)

Your WFO prefers you Email your monthly data to your NWSREP. Inform your NWSREP with a phone call and ask permission to begin Email delivery of your monthly precipitation file.

Upon approval, your NWSREP will provide you a designated Email address to reach the WFO. Use Appendix A, to write down this Email Address as you will use it each month.

See **Appendix B** for policy and instructions on how to Email your monthly FPR-D files. Your NWSREP may provide more detailed instructions that correspond to the steps outlined in Appendix B. You are still required to submit the rain gauge monthly record to the WFO in the first 7 days of each month.

Once you have started to Email the CSV files on a routine monthly basis, there is no need to mail the Flash Drive via the postal service. Skip the next section, Section 5.1.

5.1 **Standard Mailing Option:** If you prefer to use the Postal Service to mail your rain gauge precipitation file each month, then enclose the SD Memory Card in the Jiffy Envelope provided by your NWSREP.

Mail the Flash Drive to your NWSREP by the 7th day of the month. See Appendix A for the mailing address of your Weather Forecast Office (WFO).

Use 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 5.1) is sufficient to hold the FPR Log Sheet if you need to mail one. The photo 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 SD Memory Card Drive 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 Flash Drive, you may write: '**Sensitive Magnetic Media, Handle Manually**' on the front of the Jiffy No. 0 mailing envelope.

Fig 5.1 Jiffy No. 0 Envelope

6. Journal Responsibility

6.1 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.

6.2 Bucket Maintenance – Journal Entries: When routine maintenance activity changes the weight of the collection bucket – the precipitation record for the climate program is at risk of data corruption. To avoid damaging the climate data record, changes in the bucket level have to be accounted for with a written entry in the FPR Log Sheet. Each time the NWSREP adds food grade propylene glycol (FGPG) for winter season – this must be accounted, and when your NWSREP adds one half quart of oil to the bucket to prevent evaporation he/she needs to write an entry to the FPR Log Sheet. An example for how to journal this type of interruption in the data record is found in

Appendix D. This is analogous to the "OFF Date/Time" you entered on the F&P Punch Tape.

The Log Sheet is formatted so you can mark with a pen multiple boxes for a given maintenance job, and simply report the Start Time, Stop Time, the corresponding Bucket Level (i.e., display reading), at start and finish of the maintenance.

6.3 Delegated Responsibilities: If you have made an agreement with the NWSREP to assume some routine maintenance activities, then you have a new responsibility to write your maintenance activities into the FPR Log Sheet. For example if you drain, empty, or in any way alter the fluid levels in the bucket with addition of Food Grade Propylene Glycol (FGPG), or add oil to retard evaporation, then you need to update the *FPR Log Sheet*. Follow the directions in Appendix E, at the bottom of the form, to properly complete the *FPR Log Sheet.* Then each month, enclose a hard copy of the *FPR Log Sheet*, in the same-envelope as the SD Memory Card. Or Email a softcopy to your NWSREP, if you routinely email your monthly precipitation file.

Note: For those Observers who have an agreement to drain the bucket when it is full and to replenish levels of oil (to limit evaporation) and propylene glycol (to prevent freezing), 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 propylene glycol and this was not a precipitation event.

Before you Begin Maintenance Activity: Obtain the FPR Log Sheet, and on the next available row, write down the current Date (MM/DD/YYYY), and the Start Time (HH:MM, for local 'standard' hours, i.e., do not use Daylight Time values). Then write down the 'Amount' that appears in the display – this is the bucket level that is about to change.

Maintenance Activities to be Noted Move your pen to Column 3, 'Routine Actions,' and mark off one or more of the Check Boxes that describe this maintenance action.

Types of Maintenance Activities:

- Partial Draining of Bucket: Drain the bucket into a five-gallon sealable container. When finished, return the drain tube to its operational position, and in the same row of the Log Sheet write down the Stop Time, and the Amount that now appears in the display. Make sure you marked the box, "Partial Drain" in the 'Routine Actions' column. See example in Appendix E.

- Emptying of Bucket: Empty the bucket into a five-gallon sealable container. When finished, return the drain tube to its operational position, and in the same row of the Log Sheet write down the Stop Time, and the Amount that now

appears in the display. Make sure you marked the box “Empty Bucket” in the ‘Routine Actions’ column.

- Added FGPG (Winter): Add one or more whole quarts of Food Grade Propylene Glycol (FGPG) to prevent seasonal freezing of the bucket fluids. Make sure you marked the box ‘Add FGPG’ in the ‘Routine Actions’ column.

- Added Oil: Add one half quart of Oil to the bucket to retard evaporation of the collected precipitation liquids. Make sure you marked the box, ‘Add Oil’ in the Routine Actions, column.

- Removed/Installed Funnel: Remove the funnel at start of winter season, and install the funnel at start of summer season. Make sure you marked the box, ‘Funnel In’ when you are installing the funnel. Make sure you mark the box, ‘Funnel Out’ when you are removing the funnel in the Routine Actions column.

- Removed Object from Bucket: Twice yearly inspection of the contents of the bucket is advised. If you find an object, such as a pinecone, bird, or small animal, proceed to empty, rinse, and towel dry the bucket. Then describe the object that was removed, with a written entry to the ‘Special Notes’ section (Log Sheet, Column 5).

F&P LOG SHEET

COOP Number: 01-5678 Your Name: Walter Roberts, Pinetree St Park NWSREP Name: Michael Jones (TAE) .

Date MM/DD/YY	Time hh:mm am/pm	Amount NN.cc	Routine Actions	Special Notes (i.e., displayed error messages, etc.)
03/28/2011	Start: 10:15 am Stop: 10:45 am	15.47 02.75	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☒ Partial Drain Funnel - ☒ In ☐ Out	
06/14/2011	Start: 4:15 pm Stop: 4:45 pm	8.72 8.72	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐ In ☐ Out	'Err 12' message displayed. Phoned NWSREP.
09/28/2011	Start: 2:30 am Stop: 2:45 am	10.39 10.39	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐ In ☒ Out	Wiped down the F&P shell to remove dust.

Fig 6.1 This Log Sheet is required if Observer is authorized to add Propylene Glycol, Oil, Drain the Bucket, or change the funnel.

APPENDIX A – EMAIL AND NWSREP CONTACT INFORMATION

1. Name of my NWSREP? _____.

First and Last Name

_____.

Phone Number

_____.

E-mail at WFO

2. Email to Send Monthly Data?

_____.

E-mail to Send Monthly File

3. Name of my NWSREP's Backup?

_____.

First, Last Name

4. Address of my local WFO? _____.

WFO Name

_____.

Street Address

_____.

Town, State, Zip Code

_____.

Phone Number

Note: Always email or phone your NWSREP if you encounter an FPR error message, false looking reading, power outage, or if supplies are needed. Observers who have the responsibility to drain or maintain the collection bucket, will still need to mail a printed copy of the FPR Log Sheet (See Appendix E) to their NWSREP within two weeks of the bucket maintenance action.

APPENDIX B : EMAIL TRANSFER OF FPR-D DATA

Due to the many different operating systems and email clients in use, specific instructions will not be attempted. These are generic instructions for sending your FPR-D monthly data file to your local WFO. Refer to Appendix A for point of contact information.

1. Download the data from the gauge by established methods.

2. Insert the SD Memory Card into an SD Card Reader port on your Observer computer.

3. Open your email client program.

4. Create a new message.

5. Address the email message to your NWS Representative's with the address s/he has given you for these monthly FPR data submissions.

6. Give the message a subject line: "**FPR Data: <station number>.** "
   Insert your COOP Station Number (i.e., 41-1234) in place of <station number>.

7. You may pass along any pertinent information in the body of the email.

8. Attach the data file DIRECTLY FROM THE ELECTRONIC MEDIA. It is important that you DO NOT OPEN THE FILE OR COPY IT TO YOUR COMPUTER FIRST. If there is more than one file on the Flash Drive, select the file with the most recent date.

9. Send the email with attachment.

10. Since the data logger does not erase files from the SD Memory Card, it will eventually become full. You may delete the file(s) from the SD Memory Card after the email gets sent.

APPENDIX C : PRECIP RECORDER MENU TREE

Primary Menus	Second Level	Third Level
Precip and Time (Home Menu)	- none -	- none -
Battery Now 12.6V	- none -	- none -
Logged Data ▶	Precip ▶	Fifteen-minute data.
	Logged Events ▶	Ie., 'Display on', etc.
	All Logged Data ▶	Data and events.
Station Setup ▶	Measurement Setup	Password Protected
	Temperature Setup	Password Protected
	Other Settings	Password Protected
Diagnostic ▶	Two Point Calibration ▶	Instructions
	Precip Details ▶	Parameters
	Temp Details ▶	Parameters
	Software Version	- none -
Station Name & Time	- none -	- none -

The six primary menus revolve back to the Home Display (shaded-box) if you keep scrolling with the down-arrow (▼) key. To exit any of the second or third level menus, simply press the 'off' button.

APPENDIX D : REQUIRED JOURNAL ENTRIES

If your NWSREP has delegated certain maintenance activities for you, the Observer, then you are required to write down these activities in the Log Sheet provided you in Appendix E.

Report these actions on your FPR-E Log Sheet:
Added Oil to Bucket
Added Food Grade Propylene Glycol (FGPG) to Bucket
Partially Drained Bucket – Some liquid (i.e., oil) left in bucket
Emptied Bucket – Bucket completely emptied
Installed Funnel – for summer
Removed Funnel – for winter
Routine Gauge Check
Foreign Object Found in Bucket. Also phone your NWSREP.
Time is more than 15 minutes fast/slow
Non-routine download to Flash Drive

This table gives the minimum list of activities required to be reported on the FPR Log Sheet. On occasion, your NWSREP may request a routine check of the rain gauge.

Instructions for how to journal these activities are provided in Appendix E, on how to complete the FPR Log Sheet.

The FPR Log Sheet needs to be completed and mailed to the NWSREP once per month with your Flash Drive, in the same mailing envelope.

The FPR Log Sheet becomes a vital way for the NWSREP to anticipate supplies and maintenance needs for times he/she conducts the semi-annual station visitation.

The FPR Log Sheet will serve as a reference to the NWSREP upon station inspection, and also for times when he/she conducts restorative maintenance.

APPENDIX E
FPR LOG SHEET EXAMPLE AND INSTRUCTIONS

Forecast Office (SID): TAE **COOP Station Name:** Pinetree State Park (01-5678) **Your NWSREP Name:** M. Jones .

Date MM/DD/YYYY	**Time** hh:mm am/pm	**Amount** NN.cc	**Routine Actions**	**Special Notes (i.e., displayed error messages, etc.)**
03/28/2011	Start: 10:15 am Stop: 10:45 am	15.47 02.75	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☒ Partial Drain Funnel - ☒ In ☐Out	
06/14/2011	Start: 4:15 pm Stop: 4:45 pm	8.72 8.72	☐Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	'Err 4027' message displayed. Phoned NWSREP.
09/28/2011	Start: 2:30 am Stop: 2:45 am	10.39 10.39	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☒Out	Wiped down the F&P shell to remove dust.
10/15/2011	Stop: 11:15 am Stop: 12:15 pm	14.35 0.75	☒ Add Oil ☐ Add FGPG ☒ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	Removed pinecone, cleaned bucket, and then added one half quart of oil.
12/21/2011	Start: 9:30 am Stop: 9:30 am	6.14 6.43	☐ Add Oil ☒ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	Very cold month – had to add 2 quarts of FGPG to prevent ice damage.

Instructions: Before you start your action, enter the date and then at time of maintenance, enter current time (standard time, not daylight time) on the 'Start' line in Column 2. Then press the Display button to view the Amount in bucket. Write this value in Column 3 (Amount). Then mark appropriate box(es) in Column 4 (Routine Actions) to indicate your actions. If not a routine action, write your comments in Column 5 (Special Notes). When you have completed your action, go back to Column 2, and enter current time (standard time, only) into the 'Stop' line. Always phone your NWSREP if an error message displays or display fails to light-up on command. Always mail your Log Sheets to your NWSREP. Keep spare sheets inside shelter.

FISCHER-PORTER REBUILD (FPR) LOG SHEET

Forecast Office (SID): ________ **COOP Station Name:** ______________________________ **Your NWSREP Name:** _______________.

Date MM/DD/YYYY	**Time** hh:mm am/pm	**Amount** NN.cc	**Routine Actions**	**Special Notes (i.e., displayed error messages, etc.)**
________.	Start: ________. Stop: ________.	______. ______.	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	
________	Start: ________. Stop: ________.	______ ______	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	
________	Start: ________. Stop: ________.	______ ______	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	
________	Start: ________. Stop: ________.	______ ______	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	
________	Start: ________. Stop: ________.	______ ______	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	
________	Start: ________. Stop: ________.	______ ______	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	
________	Start: ________. Stop: ________.	______ ______	☐ Add Oil ☐ Add FGPG ☐ Empty Bucket ☐ Partial Drain Funnel - ☐In ☐Out	