



# FISCHER & PORTER REBUILD (FPR-E)

## 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 electronic precipitation recorder fits right in place where the mechanical weighing assembly and paper puncher were mounted in the Fischer & Porter (F&P) housing. When you open the access door (Fig 1.1) you will see a clear plastic box (Fig 1.2) which contains the data recorder. This is known as the Zeno Assembly and it must remain closed in its protective, clear plastic shell. Behind the recorder you may see the weighing sensor, an S-shaped metallic bar that measures the weight of the bucket and its liquid contents (Fig 1.3).



**Fig 1.1 FPR-E Recording Rain Gauge**



**Fig 1.2 Zeno Assembly**

1.2. Weighing Sensor: The weight of the catch bucket with liquid pulls on an S-shaped metallic bar that stretches with increased weight. This weighing sensor is very sensitive and can detect changes of one thousandth of an inch of precipitation in a matter of several seconds. Readings from the sensor are processed by the recorder every fifteen minutes and stored. The stored data is transferred to the USB memory stick when you insert it into the socket on the right side of the Zeno Assembly.



**Fig 1.3 Weighing Sensor**

1.3. Rain Gauge Display: The display stays in a sleep mode until you wake it up by pressing the Display button on the Zeno's right side (Fig 1.5).

This display tells you the accumulated rain amount of everything in the bucket, i.e., plus any additives like food grade propylene glycol (FGPG) or oil. The units are hundredths of an inch of rainfall.



**Fig 1.4 Rain Gauge Display**

The amber display will stay lit for about two-minutes before automatically turning off.



Flash Drive Socket

Data Display

Display Button  
(on/off toggle)

**Fig 1.5 Zeno Assembly**

To collect data, your NWS Representative (NWSREP) mails you a Government issued USB Flash Drive, each month. In the first few days of the month unscrew the protective cap and insert the Flash Drive into the recorder. It will collect the data. You mail the flash drive back to your WFO. If you have serviced the gauge then write this into your *FPR Log Sheet* and mail it together with the Flash Drive.



**Fig 1.6 USB Flash Drive**

Expect the recorder to take about fifteen minutes to download the last 100 days of data to the flash drive. Stand by the Zeno Assembly while it conducts the download for any messages that may appear.

## 2. Routine Checks

Each month, when you open the F&P access door, press the Display Button on the right side of the Zeno Assembly, to light-up the display of the current bucket level.



**Fig 2.1 Rain Gauge Display**

2.1. Amount in Gauge: The display gives the current rain equivalent, in inches, of anything in the bucket. This includes rain water, melted snow, oil (to prevent evaporation), food grade propylene glycol (to prevent freezing solid), and possibly anything that fell or crawled into the bucket since it was last serviced.

The Rain display (Fig 2.1) shows the bucket now holds 15.01 inches of rain equivalent.

Phone your NWSREP if the display ever reads a negative value or reports more than 15.00 inches (bucket capacity is 20 inches). This way your NWSREP will know to arrange a visit to service the gauge. Some Observers have an agreement with their NWSREP to drain the bucket; or add oil; or add food-grade propylene glycol. If you have this responsibility then follow Section 5, Journal Responsibilities, to write down your maintenance actions into the Observer's FPR Log Sheet (Appendix D).

2.2 Spare Flash Drive: You should keep a spare Flash Drive inside your house in a ziplock bag – labeled as Spare Flash Drive. Do not leave your spare Flash Drive outdoors – as some may not work at cold temperatures.

2.3. Review the FPR Log Sheet: Certain observers are given the responsibility to drain and recharge the collection bucket. These observers are required to review and update the FPR Log Sheet for any performed maintenance or discrepancies that occurred since the last monthly mailing. Otherwise, all observers should use the FPR Log Sheet to write down any anomalies and then phone the NWSREP.

2.4. Clean Solar Panel: Make sure the surface of the solar panel is free of dust or mildew or snow. Trim any tall grass, bushes, or tree branches that would cast a shadow on the solar panel.

### 3. 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.

3.1 Un-cap the USB Port: First unscrew the cap that covers the Flash Drive socket (Fig 3.1).

3.2 Turn on the Display: Turn on the display by pressing the Display button several inches below the Flash Drive socket (Fig 1.5). The Flash Drive will not work unless the display is on.

3.3 Insert Flash Drive: **Ensure the display is lit-up.** Then insert the Flash Drive into the socket on the right side of the Zeno Assembly (Fig 3.1).

3.4 Display Activates: The display responds with the amount of time the Zeno will be active copying the last 100-days of data onto the Flash Drive. This 'time to complete,' is measured in minutes and seconds (Fig 3.2 shows 3 minutes and 23 seconds to finish).



**Fig 3.2 Time left to finish download**

The display counts down until the download is finished.

**This process may take 15-minutes to complete. Please be patient and wait for the "UFdC" to display, as seen in Figure 3.3 (below).**

3.5 Verify the End of Download: When the download is finished the code, **UFdC** will display.



**Fig 3.3 Monthly data saved and done**

3.6 Remove Flash Drive: Pull the Flash Drive gently from its socket. Recap the Flash Drive.

3.7 Re-cap the USB Port: Place the circular cap which is kept on its chain, onto the USB socket, and screw it closed to a finger-tight level.

Then, place the Flash Drive into the designated durable padded envelope supplied to you by your NWSREP. Ensure the Flash Drive is either capped or in a closed position.

**Note:** The Flash Drive 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.

#### 4. Email your Flash Drive File Each Month (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-E 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 TXT files on a routine monthly basis, there is no need to mail the Flash Drive via the postal service. Skip the next section, Section 4.1.

4.1 **Standard Mailing Option:** If you prefer to use the Postal Service to mail your rain gauge precipitation file each month, then enclose the USB Flash Drive in the Jiffy Envelope provided by your NWSREP.

Mail the Flash Drive to your NWSREP by the 7<sup>th</sup> 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 4.1) 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 Flash Drive being lost in the mail.



**Fig 4.1 Jiffy No. 0 Envelope**

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.

## 5. Journal Responsibility

5.1 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 Flash Drive. So, you do not need to document the date or time (i.e., OFF date/time) when you download the monthly data.

5.2 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 a Half Quart of oil to the bucket to prevent evaporation he/she needs to write an entry to the FPR Log Sheet. An example with instructions on how to journal these important interruptions 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.

5.3 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 D, 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 Flash-Drive. Or Email a softcopy to your NWSREP, if you routinely email your monthly precipitation file.

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 D.
- ❖ 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.)
<u>03/28/2011</u>	Start: <u>10:15 am</u> Stop: <u>10:45 am</u>	<u>15.47</u> <u>02.75</u>	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input checked="" type="checkbox"/> Partial Drain Funnel - <input checked="" type="checkbox"/> In <input type="checkbox"/> Out	
<u>06/14/2011</u>	Start: <u>4:15 pm</u> Stop: <u>4:45 pm</u>	<u>8.72</u> <u>8.72</u>	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	'Err 12' message displayed. Phoned NWSREP.
<u>09/28/2011</u>	Start: <u>2:30 am</u> Stop: <u>2:45 am</u>	<u>10.39</u> <u>10.39</u>	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input checked="" type="checkbox"/> Out	Wiped down the F&P shell to remove dust.

**Fig 5.1 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 D) to their NWSREP within two weeks of the bucket maintenance action.

## APPENDIX B : EMAIL TRANSFER OF FPR-E 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-E 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 Flash Drive into an available USB port on your Observer computer.
3. Open your email client program.
4. Create a new message.
5. Address the message to your NWS Representative.
6. Give the message a subject of "**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 Flash Drive, it will eventually become full. You may delete the file(s) from the Flash Drive after the email gets sent.

## APPENDIX C : 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 D.

<b>Report these actions on your FPR-E Log Sheet:</b>
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 D, 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 D 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.)
<u>03/28/2011</u>	Start: <u>10:15 am</u>  Stop: <u>10:45 am</u>	<u>15.47</u>  <u>02.75</u>	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input checked="" type="checkbox"/> Partial Drain Funnel - <input checked="" type="checkbox"/> In <input type="checkbox"/> Out	
<u>06/14/2011</u>	Start: <u>4:15 pm</u>  Stop: <u>4:45 pm</u>	<u>8.72</u>  <u>8.72</u>	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	'Err 12' message displayed. Phoned NWSREP.
<u>09/28/2011</u>	Start: <u>2:30 am</u>  Stop: <u>2:45 am</u>	<u>10.39</u>  <u>10.39</u>	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input checked="" type="checkbox"/> Out	Wiped down the F&P shell to remove dust.
<u>10/15/2011</u>	Stop: <u>11:15 am</u>  Stop: <u>12:15 pm</u>	<u>14.35</u>  <u>0.75</u>	<input checked="" type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input checked="" type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	Removed pinecone, cleaned bucket, and then added one Half-Quart of oil.
<u>12/21/2011</u>	Start: <u>9:30 am</u>  Stop: <u>9:30 am</u>	<u>6.14</u>  <u>6.43</u>	<input type="checkbox"/> Add Oil <input checked="" type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> 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 <small>MM/DD/YYYY</small>	Time <small>hh:mm am/pm</small>	Amount <small>NN.cc</small>	Routine Actions	Special Notes (i.e., displayed error messages, etc.)
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	
_____.	Start: _____.  Stop: _____.	_____.  _____.	<input type="checkbox"/> Add Oil <input type="checkbox"/> Add FGPG <input type="checkbox"/> Empty Bucket <input type="checkbox"/> Partial Drain Funnel - <input type="checkbox"/> In <input type="checkbox"/> Out	