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USCRN Weighing Precipitation Gauge Drain Pump

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1. Introduction

A component of the Climate Reference Network (CRN) stations is a Geonor model T-200B weighing precipitation gauge.¹ The weighing gauge accumulates precipitation as it falls. The gauge is charged with an anti-freeze/oil solution as appropriate for the climate of the location of the installation. The nominal capacity of the gauge is 600 mm (23.6”), including the anti-freeze/oil mixture.² The depth of the anti-freeze/oil mixture depends on the minimum expected temperature at the installation. The depth can range from less than 50 mm at a location that does not experience freezing temperatures (and therefore has only oil), to 300 mm at locations where the potential minimum temperature is -35° or lower. This means the effective capacity of the gauge ranges from 300 mm (11.8”) to 550 mm (21.7”).

Emptying the Geonor gauge must be done in a manner that minimizes the possibility of damage to the gauge. The Geonor, as installed in the USCRN network, has three vibrating wires on which the catch bucket is suspended.³ Removing the Geonor cover to empty the bucket greatly increases the possibility of damaging the vibrating wire assemblies. In addition, the USCRN program relies on the site host, whenever possible, to perform much of the routine maintenance. Emptying the Geonor gauge is included in the Site License Agreement (SLA) as a function to be accomplished by the site host.⁴

With the above considerations in mind, the engineers at the NOAA Atmospheric Turbulence and Diffusion Division (located in Oak Ridge, TN), who are responsible for the installation and maintenance of the USCRN network, developed a pump that can be used to empty the Geonor bucket without removing the Geonor cover. This greatly minimizes the chance of damaging the Geonor vibrating wire weighing mechanism and makes emptying the bucket a simple task.

¹ Meyers, Tilden P, M. E. Hall, et. al, 2004, January 12-16: Current conguration of US Climate Reference Network stations, Proceedings: Eighth Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land, American Meteorological Society, Seattle, WA, Session 5.5.

² For algorithms and manufacture’s details on the Geonor precipitation gauge, see USCRN Web site at: <http://www.ncdc.noaa.gov/oa/climate/uscrn/in-dex.html> under headings “Instruments - Site Hardware”.

³ Hall, Mark E., and Marjorie McGuirk, Vibrating wire fall protection device for the USCRN Geonor weighing-bucket precipitation gauge, NOAA Technical Note NCDC No. USCRN-04-2, March 2004.

⁴ USCRN Field Site Maintenance Plan, NOAA/NESDIS CRN Series X041, NOAA-CRN/OSD-2003-00010R0UD0 (November 2003) .

2. Materials Required for the Geonor Drain Pump

The materials needed to construct the Geonor drain pump are as follows:

- PVC conduit, 0.75 in. diameter, 69.5 in. long, cut as follows:
 - One (1) piece conduit 30.5 in. long
 - One (1) piece conduit 24 in. long
 - One (1) piece conduit 15 in. long
- One (1) 0.75 in. diameter PVC conduit 90° sweep with flare
- One (1) 0.75 in. diameter PVC conduit 90° sweep
- Three (3) 0.75 in. diameter PVC conduit male coupling
- Three (3) 0.75 in. diameter PVC conduit female coupling
- One lip assembly constructed of the following:
 - One (1) 1 in. diameter PVC conduit 7 in. long cut in half diagonally
 - One (1) PVC block of 0.75 in. thickness and 1 in. wide and 7 in. long
 - One (1) PVC block of 0.25 in. thickness and 1 in. wide and 3 in. long
- One (1) pump, “Guzzler” (by the Bosworth Company), catalog # 400-H (1” hand pump, threaded 3/4” male end connection)
- PVC glue

3. Description of the Geonor Drain Pump

The USCRN weighing rain gauge drain pump is constructed with off-the-shelf PVC pipe and assembled with glue and screws. The short leg goes into the gauge, resting on a narrow shelf. (see Figure 1). The pump is connected by a 3/4” male coupling.

4. Assembly Procedure

The parts listed in Section 2 are assembled as shown in Figure 1. The measurement for the distance from the bottom of the left side of the assembly to the section that fits over the lip of the Geonor case (shown on the left side of Figure 1) must be exactly as shown – 25 inches. This ensures that the pump will be able to extract nearly all the fluid in the bucket, but not touch the bottom of the bucket. Approximately one inch of fluid is left in the bucket to ensure that the oil film in the bucket will remain there.

USCRN Rain Gauge Pump Assembly

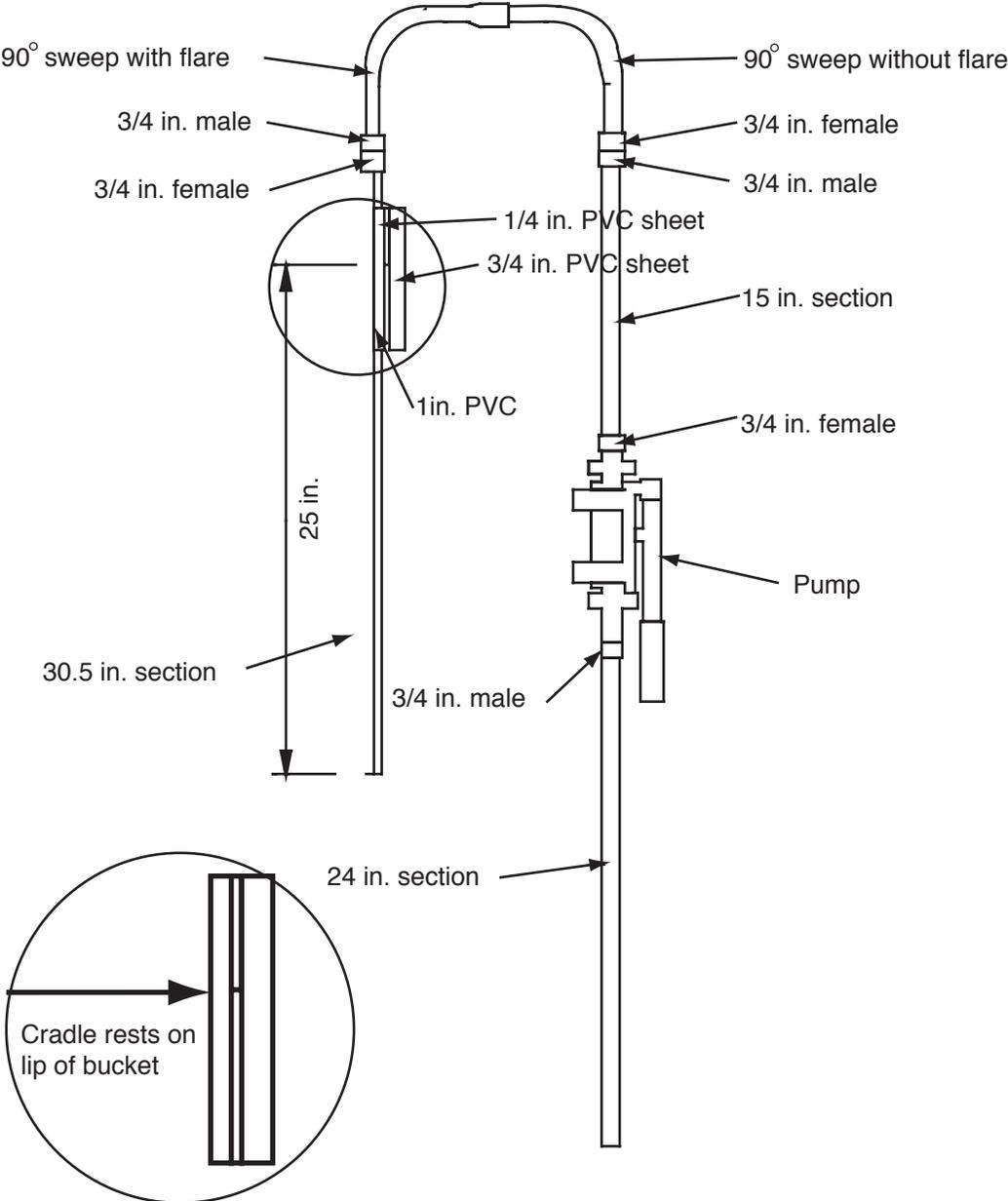


Figure 1: Depiction of assembled parts of the Geonor drain pump. The 25-inch measurement on the left leg of the pump is a critical measurement since that is the section inserted into the Geonor bucket and the length ensures the pipe will not strike the bottom of the bucket.

5. Operation of the Geonor Drain Pump

The pump is operated by carefully lowering the short leg of the pump into the inlet of the Geonor gauge until the cradle rests on the lip of the inlet. The fluid in the gauge is then pumped out - either onto the ground, if it is water only, or into a container for proper disposal if it is an anti-freeze/water mixture. Figures 2 and 3 show the pump in operational position.



Figure 2: The Geonor drain pump placed on the lip of the gauge inlet.



Figure 3: Closeup view of the placement of the pump on the lip of the inlet.

6. Disclaimer

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