
Particle Analysis and Display System (PADS): Telemetry Module Operator Manual

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PADS 2.5.6

Telemetry Module 2.5.3



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1.0 Introduction

The Particle Analysis and Display System (PADS) is a software package that interfaces with all the instruments produced by Droplet Measurement Technologies (DMT) and other leading instruments used in the atmospheric sciences. This manual describes the PADS module for the Telemetry display. The Telemetry display allows you to view and analyze data from several instruments simultaneously. It also allows you to feed selected data to a COM port for use with an external data system.

For an explanation of the basic PADS setup and instructions on how to acquire data using PADS, consult the *PADS Operator Manual*. This manual also gives definitions for all the channels that the Telemetry tab can display.

2.0 Configuring the Display

Because the Telemetry tab displays data from several different instruments, you cannot use the Telemetry screen to configure instruments. Therefore, the **Configure Instrument** option on the **Configure** menu has been grayed out. If you want to configure an instrument that has data displayed in the Telemetry tab, click on that instrument's tab in PADS and select **Configure Instrument**.

To configure the Telemetry display, follow the steps below.

1. Click on the “Telemetry” tab.
2. From the **Configure** menu, select **Configure Display**. You will see the following window.

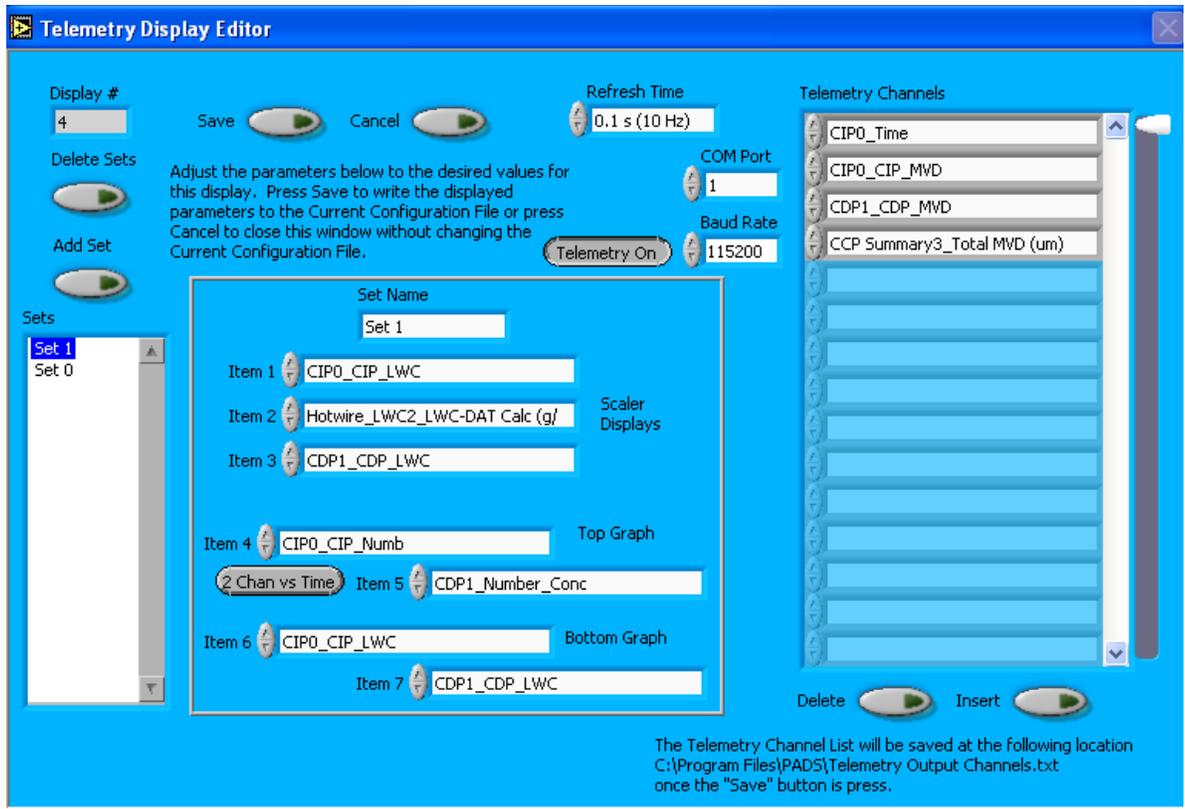


Figure 1: Telemetry Display Editor Window

You do not need to modify the **Display #**. The **COM Port** indicator allows you to specify which COM port on the PADS computer will be used to send out PADS data. **Baud Rate** allows you to specify the baud rate for at which data will be sent. Note that the other serial port settings are fixed and cannot be adjusted. They are No Parity, 8 Data bits, 1 Stop Bit, and No Flow Control.

Changing the **Refresh Time** allows you to set the time intervals for data display during acquisition mode; you can choose any time that is equal to or greater than the instruments' sample times. (Choosing a time less than the sample time is not useful, since the same data will be displayed and sent over the Telemetry port multiple times.) If the instruments displayed on the Telemetry tab have different sampling times, setting the refresh time to that of the fastest sample time will give the best results. In addition, the Refresh Time also specifies the time interval at which the Telemetry data is sent over the COM port.

Selectable Chart and Tabular Data Displays

The Display Editor allows you to define sets of data that the Telemetry window displays. A set is basically a single configuration of the Telemetry window. It specifies items 1-7

that PADS uses in this display. (Figure 2 illustrates where these items appear on the Telemetry display.) Note that any set can include channels from any instrument in the system. For instance, you might define a set called “LWC” that displays and graphs LWC readings from various instruments. For information on channels and their definitions, see *Appendix A of the PADS Operator Manual*.

The button to the left of item 5 allows you to specify how a given set should graph items 4 and 5—with respect to each other, or with respect to time.

The box in the bottom left of the Display Editor lists all the available data sets. You can add sets and delete sets using the buttons above the box. When you add a set, you specify the set name and all the item numbers using the controls in the box at the bottom right of the display editor.

Note that all of these parameters are also changeable from the Telemetry display itself, as discussed in section 3.0. Changing the parameters directly on the Telemetry display changes them for the current session only, while changing them on the Display Editor window creates parameter sets that are also available in future sessions.

Telemetry Configurations

The **Telemetry On/Off** button specifies whether the telemetry data should feed to indicated COM Port when PADS begins acquiring data. The setting you select on the **Config Display** window will be the default setting when PADS opens. However, you can change the setting for the current sampling instance only by using the same button on the main Telemetry window.

The **Telemetry Channels** box to the right of the screen allows you to specify channel data to be sent to the COM port specified to the left of the telemetry channels. In the example shown in Figure 1, for instance, CIP0_Time, CIP0_CIP_MVD, CDP1_MVD, and CCP Summary 3 Total_MVD (um) will be sent in the serial data stream to COM port 1. Using telemetry channels allows you to capture these data using an external system. You can add and delete telemetry channels using the buttons beneath the channels list. Note that PADS inserts **Time** as the first channel, even though this channel is not specified in the channels box or in the `Telemetry Output Channels.txt` file described below.

PADS stores the telemetry channel names in `C:\Program Files\PADS\Telemetry Output Channels.txt`. This file is updated every time you change and save the Telemetry Display configuration. The file is a simple ASCII text file, and it is an output file only. The programmer of the data system that will be receiving the Telemetry data can use this file to determine the order of the channels being sent. There is no mechanism for importing this channel list into PADS, so there is no need to edit this file. It is for reference only.

When you are done changing parameters on the **Display Editor** window, click on **Save** to update the configurations or **Cancel** to revert to the previous configurations. After you reset PADS, you will be able to see any changes by viewing the Telemetry display. Note that clicking **Reset Program** will clear out any data currently being displayed.

3.0 The Telemetry Window

The telemetry window provides channel data in numeric and graphical form. It also provides information on the currently selected telemetry channels and whether they are in use.

Numeric Data

The top of the Telemetry window displays three time-specific channels in numeric form. These channels correspond to Items 1 - 3 on the Display Editor window (see Figures 1 and 2). PADS displays the data values just to the right of the field listing the data channel names. In Figure 2, for instance, the CDP's LWC is 0.09 g/m^3 at the sample time shown.

If you have created sets on the Display Editor screen (see section 2.0), you can display these pre-specified channels by selecting the desired set in the **Display Set** control in the upper left of the screen. You can also change the channels being displayed by directly editing the item fields shown in Figure 2. If you modify the item fields this way, the **Display Set** value changes to “User Defined.” You can revert to a pre-defined set by selecting that set in **Display Set**.

For information on specific channels, their definitions, and their acceptable ranges, consult *PADS Operator Manual’s Appendix A: Definitions*.

When you access time-series charts in playback mode, the currently selected moment in time is indicated by a yellow cursor. The y-axis value for this time is indicated by cross (+) on this cursor, as shown in Figure 3. This y-axis value is always for the channel listed on the left side of the graph, i.e. the one that PADS displays in white.

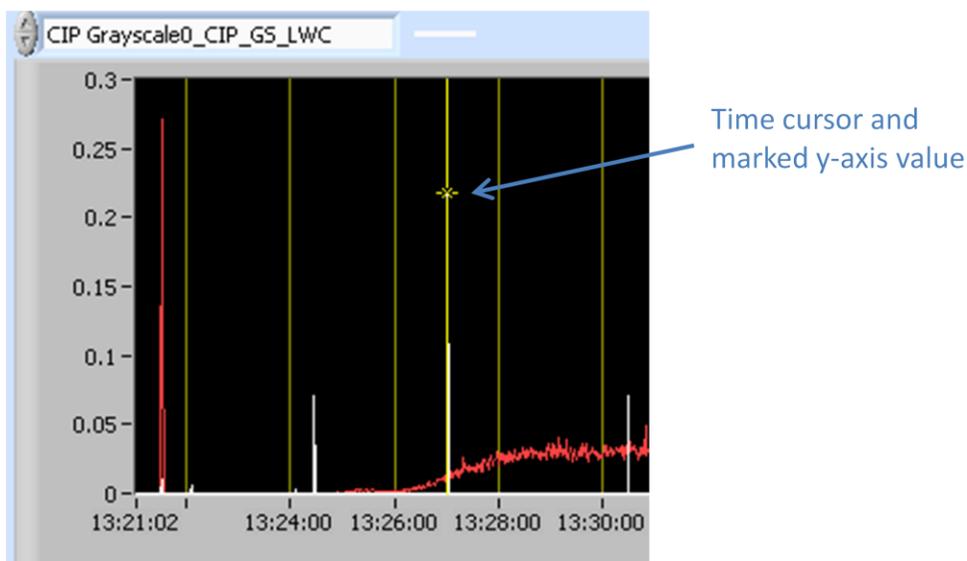


Figure 3: Time Cursor

Note that when you display a large range of time-series data, the chart display does not have sufficient resolution to display each individual time point. To increase resolution, zoom in on the data by changing the time interval to a smaller range.

On both the top and bottom charts, you can change the scale by typing a different number into the starting and ending values on each axis. For instance, if you want to change the time period in the graph above to start at 13:26:00, you simply select the field that currently says 13:21:02 and type in 13:26:00.

The charts also show you options for scaling and copying the data when you right-click on the graph. These options are as follows:

Autoscale X / Autoscale Y Right-clicking on an axis brings up an autoscaling option for that axis, which allows you to enable or disable autoscaling. Note that on the Telemetry charts, it is possible to enable autoscaling on one y-axis and disable it on the other. If you disable autoscaling, the scale of the axis will remain constant. In this case, the range will always be the same as it was when autoscaling was disabled. The minimum and maximum Y values can then be changed manually by typing new numbers into these fields. In playback mode, autoscaling will not take effect until you change the time using the time controls.

Copy Data This copies the histogram chart to the clipboard using a screen capture.

Export Simplified Image This copies a simplified image of the data to the clipboard or an output file. You can choose the format you desire—bitmap (.bmp), encapsulated postscript (.eps), or enhanced metafile (.emf). Note that when you select the .eps option, you must copy the data to a file. Unless you specify otherwise, output files will be saved in the time-and-date-specific output file directory for the current session.

Clear Graph This lets you clear the graph of the currently displayed data points.

Telemetry Channels

Telemetry channel data appear to the right of the chart displays. During acquisition mode, the **Telemetry On/Off** button at the top of the screen allows you to start or stop the telemetry data feeding to the com port. (Clicking this button during playback mode has no effect.) When the button is on and the system instruments are sampling, any channels listed in the **Telemetry Channels** fields are fed in a serial data stream to the COM port indicated. You can then capture this data using an external system. PADS also displays the current values for these channels in the **Data** field on the far right of the Telemetry screen.

To add and delete telemetry channels, go to **Configure > Configure Display** and modify the telemetry channels listed on the right of the **Display Editor** screen.

For more information on the format of the telemetry data sent to the COM port, see *Appendix A: Telemetry Data Stream Format*.

Note that while the PADS telemetry module does not generate its own output file, any channels listed as telemetry channels will have their data stored in the relevant instrument output file.

Appendix A: Telemetry Data Stream Format

The PADS telemetry module is designed to send telemetry channel data to a user-specified COM port. This data stream has the following format:

Channels

Though not explicitly specified in the Telemetry Channels list, the first channel is the PADS time stamp for when the Telemetry data was sent. The remaining channels follow in the order specified in the `C:\Program Files\PADS\Telemetry Output Channels.txt` file. See the section entitled “Telemetry Configurations” for details.

Delimiters

Channels are comma-delimited format. The end of the data stream is denoted by a <CR><LF> (carriage-return line-feed).

Data format

The data for each channel is formatted using the “%#g” C-style formatting command, which uses automatic formatting to ensure adequate resolution for all channels regardless of their individual values. As a result, the data stream is not of fixed length but can vary from one record to the next.