Particle Analysis and Display System (PADS):

Air Data Probe (ADP) Module

Operator Manual

DOC-0206 Rev A-2

PADS 2.5.6

AIMMS-20 Module 2.7.5

DROPLET MEASUREMENT TECHNOLOGIES

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C O N T E N T S

L i s t   o f   F i g u r e s

1.0 Introduction

The Particle Analysis and Display System (PADS) is a software package that interfaces with instruments produced by Droplet Measurement Technologies (DMT) and other leading instruments used in the atmospheric sciences. This manual describes the PADS module for the Air Data Probe (ADP).

For an explanation of the basic PADS setup and instructions on how to acquire data using PADS, consult the *PADS Operator Manual*. Definitions and calculations used in the ADP module are also described in the *PADS Operator Manual*.

Note that PADS also has an AIMMS-20 module that displays a superset of the data displayed in the ADP module. The ADP is a component of the AIMMS-20 that can be purchased as a stand-alone instrument. Customers who purchase the complete AIMMS-20 with PADS receive the AIMMS-20 module. Both the AIMMS-20 and the ADP component are made by [Aventech Research, Inc.](#)

2.0 Configuration

Using PADS, you can configure both the software for the instrument and the instrument's data display in PADS. The following two sections explain how to do this.

Configuring the ADP

Your ADP and data system should arrive preconfigured from DMT. In some cases, however, you may want to change the software configuration for the instrument. To do this, follow the steps below. *Note: Droplet Measurement Technologies STRONGLY recommends that customers contact our office prior to changing any of the parameters in the instrument configuration. Improper changes can result in communication failure and/or changes in PADS computation algorithms, which can compromise data validity.*

1. Click on the "ADP" tab.

2. From the **Configure** menu, select **Configure Instrument.** You will see the following window.
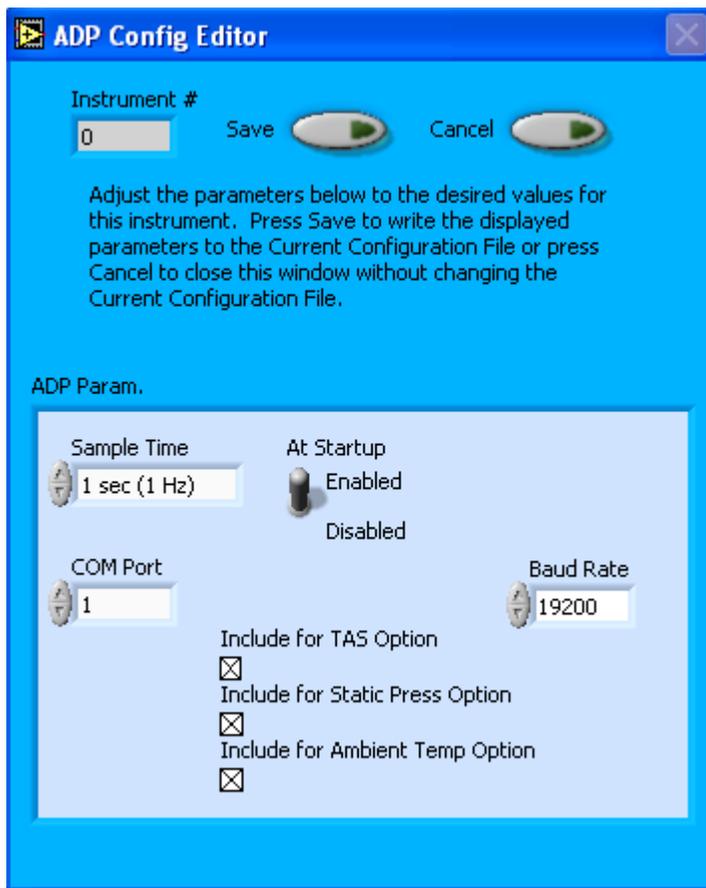
Figure 1: ADP Configuration Editor Window

3. Now you can configure the instrument parameters to your desired specifications. You will find a list of the parameters you may want to reconfigure in the two sections below, "Occasionally Reconfigured ADP Parameters" and "Rarely Reconfigured ADP Parameters." If at any time you would like to revert to the previously saved values for the ADP parameters, press **Cancel** to exit the window without saving changes.

4. When you are done configuring the ADP parameters, press **Save** at the top of the Config editor window. (If you would instead like to revert to the previously saved values, click **Cancel**.) Then press the green **Reset Program** button for the new configuration to take effect. Note that pressing the **Reset Program** button will clear any data currently being displayed.

Occasionally Reconfigured ADP Parameters

At Startup Enabled / Disabled: If you want the ADP to acquire data when PADS begins sampling, make sure this parameter is in the "Enabled" mode. In some cases, such as if the

ADP is inoperative, you may want to use this control to disable the probe. Disabling the ADP allows data to transmit from other instruments without interference.

COM Port: This is the serial communications port that the ADP uses to connect with the computer. This number should match the computer hardware configuration for the particular computer you are using. If you are not using multiple computers, this number should not be changed.

You will notice that there are other parameters listed on the **ADP Config Editor** window. You should not need to change these, and changing them may compromise your data. If you are curious about these parameters or think you do need to modify them, see the section titled "Rarely Reconfigured ADP Parameters" below or consult with a DMT technical representative.

Rarely Reconfigured ADP Parameters

The ADP configuration editor displays several parameters that you will rarely need to modify. The following is a list of these parameters and an explanation of what they do.

Instrument #: This lists the number corresponding to the instrument you are viewing, in this case the ADP. If your ADP has been assigned instrument number one, you will see "1" in this field. You should not need to modify the instrument number, and in fact you are unable to do so from within PADS.

Sample Time: This parameter indicates the time interval at which the ADP relays sample data. The ADP's sample time should always be set to one Hertz. Note that the instrument does collect data at a shorter interval than one Hertz; wind speed and direction readings, for instance, are gathered at a rate of five Hertz and then averaged over the past four seconds. For channels that store instantaneous rather than averaged data, such as wind components, PADS displays the most recent data the ADP has relayed.

Baud Rate: The Baud rate for the probe is defined at manufacture, and you should not need to change it. PADS lists this parameter because some probes can run at different baud rates. So if you reconfigure your hardware, the baud rate may change. In general, a higher baud rate means that the probe can transmit data more quickly to the computer. However, higher baud rates may not work with some computers and can result in unreliable data transmission.

Include for TAS Option: When checked, this box tells PADS to use the ADP's True Air Speed measurement as the TAS Source on the Setup window.

Several different instruments are capable of providing True Air Speed to PADS. If more than one such instrument is installed in your system, only one of them can be used as the global source for True Air Speed for calculations. When your system comes from DMT, one instrument will be selected as the Master TAS.

On most instrument tabs, this parameter is called "Use as Master TAS." "Use as Master TAS" better describes the parameter's functionality, and future versions of the PADS ADP module will use this name.

Include for Static Press Option: When checked, this box tells PADS to use the ADP's static pressure measurement as the default master source for static pressure. This source appears on the PADS Setup window upon startup. While multiple instruments can potentially provide this measurement, only one instrument should be selected as the source.

On most instrument tabs, this parameter is called "Use as Master Press." "Use as Master Press" better describes the parameter's functionality, and future versions of the PADS ADP module will use this name.

Include for Ambient Temp Option: When checked, this box tells PADS to use the ADP's ambient temperature measurement as the default master temperature source on the Setup window. While multiple instruments can potentially provide this measurement, only one instrument should be selected as the source.

On most instrument tabs, this parameter is called "Use as Master Temp." "Use as Master Temp" better describes the parameter's functionality, and future versions of the PADS ADP module will use this name.

After making changes in the instrument configuration window, you will need to press the **Save** button and then click the green **Reset Program** to activate these changes. Clicking **Reset Program** will clear any data PADS is currently displaying.

Configuring the ADP Display

To configure the ADP display, click on the ADP tab if you have not already done so. Then select **Configure** from the menu bar and click on **Configure Display.** This will bring up the following window.
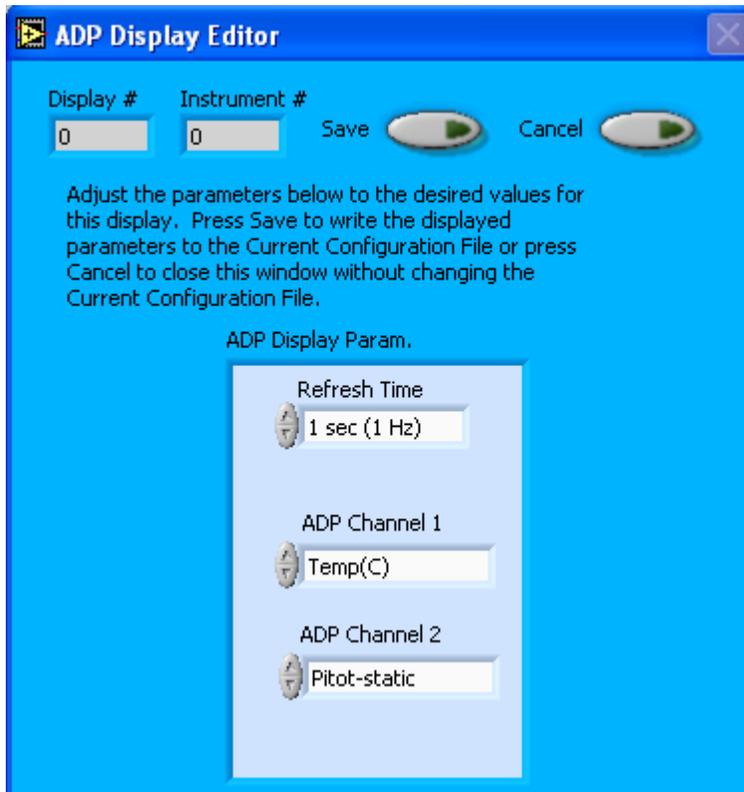

Figure 2: ADP Display Editor Window

You do not need to modify the **Display #** or **Instrument #**. 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 sample time. (Choosing a time less than the sample time is not useful, since the same data will be displayed multiple times.)

The two fields at the bottom of the window allow you to configure the channels on the ADP's two selectable graphs. For information on specific channels and their definitions, consult *Appendix A: ADP Channels* and the *PADS Operator Manual's Appendix A: Definitions*. To change the channels in the Display Editor, you can click on the arrow buttons to scroll between available options. You can also click on the white fields to bring up a list of available channels, from which you can then choose the one you want.

When you are done, 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 clicking on the **ADP Selectable Charts** tab. Note that clicking **Reset Program** will clear out any data currently being displayed.

Configuring channels in the Configuration Display Editor will change the display upon start-up. Once PADS has started, you can select any channels to be displayed directly from the ADP Window.

3.0 The ADP Window

The different parts of the ADP window are discussed below. For explanations of the **Enable** button, **COM Port** indicator, and **Fault/No Fault** button, see the "Instrument Tabs" section of the *PADS Operator Manual*.

Channel Data

The channel data appear on the left side of the ADP window. They are shown in Figure 3.
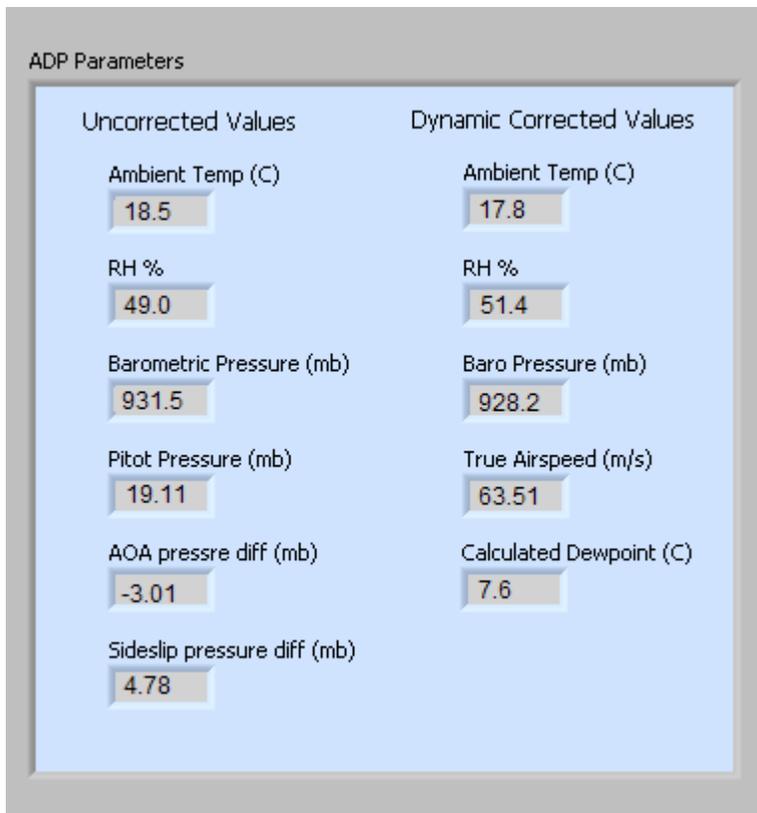

Figure 3: ADP Channel Data

Chart Displays

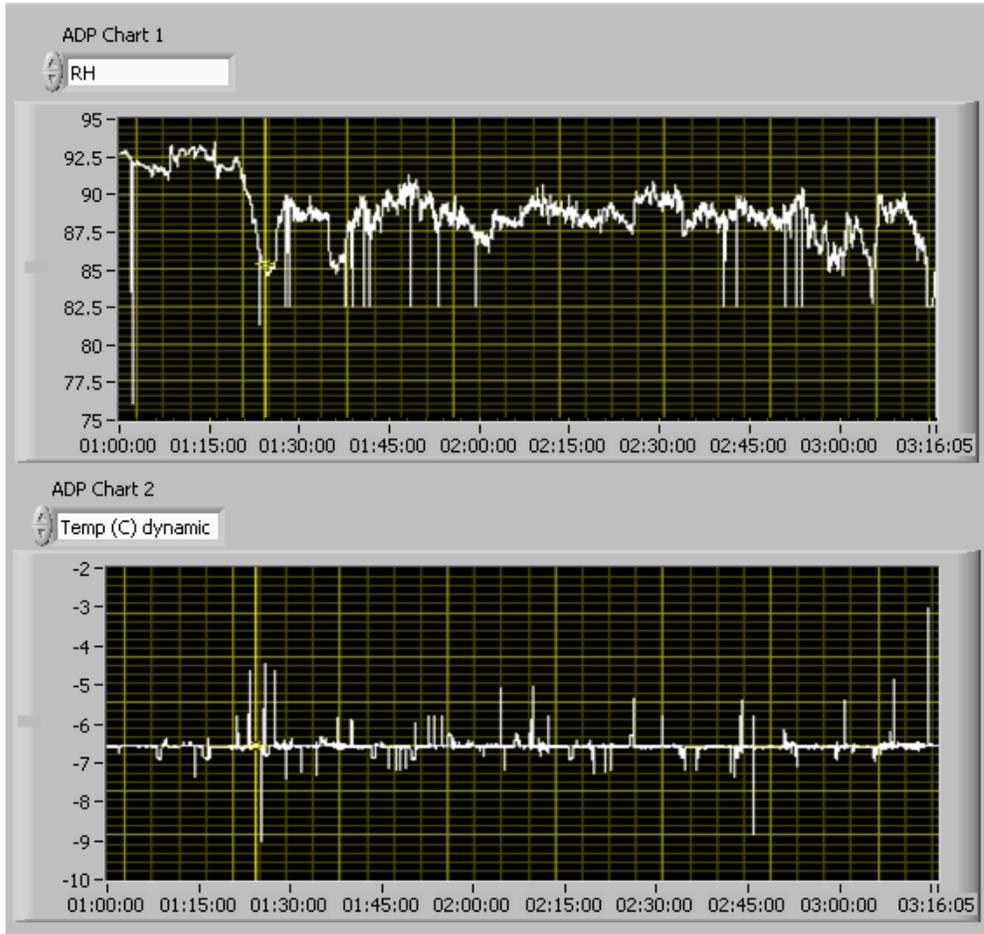**ADP Charts 1** and **2** plot two user-selectable channels with respect to time.

Figure 4: ADP Time Charts

When you access time-series charts in playback mode, the currently selected moment in time is indicated by a yellow cursor, as shown above. The y-axis value for this time is indicated by cross (+) on this 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 all the charts with x and y axes, 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 one of the graphs above to end at 02:30:00, you simply select the field that currently says 03:16:05, type in 02:30:00, and hit the <Enter> key. In

acquisition mode, you must disable autoscaling (see below) before you modify fields in this way.

Many charts also show you options for scaling and copying the data when you right-click on them, which brings up a drop-down menu. These options are as follows:

Autoscale   This autoscales the relevant axis. In autoscaling mode, the minimum and maximum values of the axis are set automatically so that all data points can be seen in the display. Note that on charts that have autoscale buttons, like the large histogram chart on some instrument tabs, the buttons override the Autoscale options in the drop-down menu. To see autoscaling options in the drop-down menu, position the cursor over the relevant axis before right-clicking. Note that you may not always be able to autoscale the x-axis.

Copy Data   This copies the chart to the clipboard using a screen capture. This chart can then be pasted into other documents like Word or PowerPoint presentations.

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 erases the currently displayed data points from the graph.

More information about each of the tabs on the chart displays section is given below.

Appendix A: ADP Channels

A complete list of ADP data channels appears below. The ADP output file will contain data values for each channel for each sampling instance. You can also plot each of these channels against time using ADP Charts 1 and 2.

For definitions of the channels, see *Appendix A* in the *PADS Operator Manual*.

> Time
> Temp(C)
> RH
> Baro Pressure(mB)
> Pitot-static Pressure (mBar)
> AOA Pressure diff (mBar)
> Sideslip Pressure(mBar)
> Temp (C) dynamic
> RH dynamic
> Baro Pressure dynamic
> TAS (m/s)
> Calculated Dewpoint(C)
> Status
> GPS Time

ADP channels fall into several broad categories:

Time Channels: The time channels store time data. Time is generated by the PADS computer clock and is the time when the program receives the ADP data. It is given in seconds after midnight on the day the program was started. GPS Time is included in every instrument's list of channels whenever a GPS is included as one of the PADS instruments. GPS Time will be collected from an instrument other than the ADP, even though it appears as a channel in the ADP output file.

Raw Data channels: Temp(C), RH, Baro Pressure (mBar), Pitot-static Pressure (mBar), AOA Pressure diff (mBar), and Sideslip Pressure (mBar) store raw data gathered by the ADP. No corrections for dynamic heating or other factors have been made to these channels.

Corrected Data channels: Temp (C) dynamic, RH dynamic, Baro Pressure dynamic, and TAS (m/s) store data that the ADP has gathered and corrected for dynamic heating.

Calculated Channel: Calculated dewpoint stores the result of a PADS calculation.

Statistical Channel: Status stores information on the communications between the ADP and the probe. Specifically, a value of 1 indicates good communication, which means that the checksum values contained within the ADP data packets match those that PADS computes; if these match, presumably no data have been lost. A Status of 0 indicates the checksums do not match, suggesting a communications failure.