DataRam 4 Dummy's Operating Instructions

Plug in the heater only when you reach the stage of the set-up when it is listed. The heater is the tube marked 'hot.' Plugging it in is the last step because the heater can overheat if it is plugged in for a long time with no air being drawn through it.

What to Bring

- 1. The black soft case has the DataRam that measures particulate concentration.
- 2. If the unit is to be run for more than a few hours (these instructions assume it is), you will also need a surge protector strip and extension cords long enough to reach where the unit will be set up.
- 3. It is best to set up the DataRam a few feet off the ground, so it doesn't measure a lot of kicked-up dust. If possible, bring a folding table or other support. It should be sturdy enough to trust with \$10,000+ of equipment, and big enough for a bit less than 2 square feet of surface.
- 4. Permission to use someone's land and power. Consider
 - a. proximity to concentrated smoke and to receptors
 - b. permission to place the equipment and use power. We think each unit draws about as much power as a 100-watt light bulb.
 - c. Try to put the equipment at least a few dozen yards from a dirt road, preferably with a house or other blockage to ready air movement in between. Each car kicks up enough dust on a dirt road to register clearly as an increase in particulates.
- 5. Some of the Data Rams have a red nylon fabric jacket to protect the particulate monitor from rain and dew. Others APCD's included don't. You can build a makeshift cover if you bring some plastic trash bags and duct tape.

DataRams used to have associated satellite transmitters. The expensive contract is defunct and the machines must be downloaded manually to a computer.

What to Do

STARTING THE RUN

1. Set up the Data Ram. At the back of the monitor, move the toggle switch to the middle or 'off' position. If it doesn't want to switch positions, pull on it a bit as you raise or lower it.

The next three steps may or may not be necessary.

2. If there is any doubt about the machine's recent past, make sure it has a pre-filter in place. Turn the DataRam on its back and unscrew the 2" round port in the center of its belly. There should be a white scrunched-up filter. The filters need changing about every 5 years.

- 3. Again if there is doubt, know whether the machine is measuring PM 2.5 or PM 10. That is determined by the innards of an attachment. The attachment is a cup on a stick, and the cup is about as wide as tall, and has a slightly cone-shaped base. There should be a hex wrench in the bag too. Unscrew the 3 hex nuts that hold the cover on the cup. When they come apart, turn the lid upside down. If the lid has an inner steel cup that is almost 1" across, the machine is measuring PM 10. If you prefer PM2.5, screw into the inner cup a steel nozzle also from the bag.
- 4. While the intake cup is open, check whether the round filter looks dirty. The filter is white and barely an inch across. If a new one is needed, put it up with the fuzzier fluffy side up. Look closely the difference between the sides of the filter isn't exactly obvious.
- 5. If you want the DataRam's control panel easier to see, prop the unit up at an angle using its 'handle.' To move the handle, push in the round knobs on the side of the handle to release and then rotate the handle so it is under the bottom side of the Data Ram.
- 6. Remove the inlet port cover. The cover is a round steel knurled knob in the top center of the machine. To remove the cover, slide the sleeve up, then pull the whole. Store the cover on the back panel of the Data Ram, attached to a secure knob placed there for this use.
- 7. Attach the 3 pieces that build an intake stack at the top of the DataRam. Closest to the machine, put on the heater, which is labeled 'hot'. The heater evaporates air so humid it has water droplets, so it is more important on cold nights and in other parts of the country. Next attach the grain-elevator-shaped cup referred to in step 3 above. Finally put on the flat-topped inlet. Be sure each connection is secure by tugging on it lightly. One more piece, a flexible clear plastic hose, won't be used. It is to let the monitor suck air out of a smoke stack.
- 8. Attach the power cord to the back of the Data Ram, plug it into the surge protector, and connect extension cords. Turn on the surge protector.
- 9. If needed, protect the DataRam from rain by dressing it up in its red nylon bag, zipper down. If you build a cover from plastic bags, leave the stack exposed and out of the bag, especially the heating element.
- 10. Move the same toggle switch mentioned in step 1 to the up or 'on' position. Don't worry that it says 'int' for internal battery and you are using an outside power source. The 'external' setting is for a remote battery, and we don't own the hardware to use it.
- 11. Now switch attention from the back of the Data Ram to the front. Turn the machine on by holding down the button labeled 'on.' The Main menu should appear.
- 12. Push Next once to get Edit menu.
- 13. Push Enter for the Logging menu. Check the following settings, adjusting as needed. Make changes with the plus and minus buttons then press enter to save the changes.

Log Data Enabled [that is, save the data]

Log Period 00:05:00 [means to record particulate reading every 5 minutes]

Tag # 0 or any low # ['tag' is a run number, or label. Each time a user tells the machine to start logging data, the machine advances to the next sequence tag. Or you can tell it what tag to use next. After data is safely downloaded, via

either computer or satellite, the old tags can be cleared. To do that, choose Select view/transfer Data, Enter, down arrow twice for Delete logged data, and Enter.]

Auto Start disabled [This lets the machine start itself up in a power plant smoke stack.]

14. Press Exit to return to the Edit menu. Press down arrow once then Enter to choose Setup. Check/enter these settings:

Display Average 60 seconds

Calibration Factor .34 [The Missoula fire lab has figured out that real PM levels are only 34.4 % of what the machine measures.]

Units $\mu g/m^3$ [micrograms per cubic meter]

Size Correct enabled

Press Next to proceed to more choices within Setup.

RH Correct disabled

Temp units F [Fahrenheit]

Flow 2 l/m [Take in two liters per minute through the inlet.]

Next

Analog Out $1.00 \mu g/m^3$ [? what this means]

Serial Mode RS-232 [the kind of computer connection to use in talking to a

computer]

Device # 1, or any other number you like [a way to record which DataRam this is, when more than one is in use.]

Next

[Set the date and time correctly.]

Next

Alarm disabled

Level 0

AutoZero enabled [Good to have on if the machine will be running for more than a day. At a time interval set in the next step, the machine will stop collecting data for 5 minutes and instead run internally filtered air across the sensors to give them a good scrub. The sensors are cleaned constantly but at a lower intensity by a small diverted airflow that is filtered then recirculated over the sensors.]

Interval 00:11:00 [Tells the machine how often to run AutoZero. By setting it to a umber of hours that doesn't divide evenly into 24, the autozero will run at a different hour on sequential days and any data that might recur at the same time each day won't consistently be missed.]

- 15. Finish the Setup by pushing Exit, then Next and down arrow once to get Zero/initialize. Press Enter. Wait until the machine says it is ready. **It can take up to 10 minutes.** When it is, press Exit.
- 16. Choose Start run then Enter.
- 17. NOW plug in the heater.

ENDING A RUN

Shutting the unit down is essentially a reverse of setting it up. There is no need to be careful about sequence.

- 1. Press 'on/off' for a moment and let the unit say when it has finished shutting down.
- 2. Unplug the heater if the DataRam will not be running for several minutes.
- 3. Disconnect and disassemble everything else, and put it away. In packing, try to protect the 'hat' that is at the very top of the DataRam inlet stack. The hats tend to break off, in which case it's time for more SuperGlue.

START A NEW RUN at the same location

If a run is terminated or something has happened to the power, you can restart the machine. You can download the data and reuse the Tag number. If you do not want to download the data, you can restart the DataRAM and store the run on a new tag number. *The DataRAM should automatically advance to the next tag number, but double check.*

- 1. Repeat Steps 12 through 17 in the **Starting the Run** section.
- 2. If the heater was unplugged, plug it back in.

DOWNLOADING and DELETING DATA

To download from DataRam to computer:

- 1. Do Steps 1 and 2 only if the DataRam has meanwhile been shut down and put away. Remove the air intake outlet cover. Secure it on back of machine. This is a precaution in case the wrong buttons get hit and turn on a run. It's bad for the DataRam to try to suck any air against an intake blocked by the cover.
- 2. Push 'on' button on Data Ram to start it.
- 3. Connect the back of the DataRam to the back of any computer. Use the special serial-pin cable in the kit. Each Data Ram case should have a cable, including a gender adapter on one end. The cable looks like an ordinary serial connector for a computer but it has some special switched wires. Downloading can be done while the DataRam continues to run.
- 4. Steps 4 through 14 are done from the computer, using the DataRam software. Two floppy disks to install the special software to a computer are in the DataRam carrying

case.

Start the Data Ram software program.

- 5. Choose the correct COM port. Good luck, but start with COM1 if you're guessing.
- 6. Verify that the computer and machine are communicating by choose the button on the computer screen (below 'COM port') that says 'show display panel.' If they aren't, try a different COM port.
- 7. Choose 'Configure instrument' tab.
- 8. Uncheck 'log data.'
- 9. At bottom of screen, choose button that says 'set new figuration.' Wait for it to finish.
- 10. Choose the 'data text' tab.
- 11. Choose the left icon that eventually will label itself 'get new data.'
- 12. Choose the correct tab number, usually the last one. The data rolls onto the screen. If it doesn't, but only appears in the grey view panel, it hasn't registered.
- 13. Look at the data in the graph tab.
- 14. Choose File, Save as, and a location in your computer's filing structure.
- 15. Disconnect the DataRam from the computer.
- 16. On the Data Ram, delete any data tags that are extra. A 'tag' is a set of data from a run.
- 17. If a run has not just ended and you want the DataRam to continue to operate, confirm in Setup that Log Data is enabled.
 - o From the main menu choose View/Transfer Data with the enter key.
 - o Down arrow twice to Delete Logged Data
 - o Down arrow once to Delete All Data (or choose Delete Tag for only one), then Enter
 - Enter to confirm.

If you are done with collecting new data, turn off the machine and replace the inlet port cover.

- 2. Back on the computer, import the text file in Excel as a delimited, comma only file
- 3. Use the start time and time interval to create an actual hour-of-observation column.
- 4. Save the data as a Microsoft Excel 4.0 worksheet.

The data has big 25% confidence bands.

Troubleshooting

No one in the Colorado fire community knows much about troubleshooting Data Rams, so please pass along what works for you.

Go through the menus to see whether the DataRam is measuring data. Wiggle all the little white plastic wiring connections inside to see they are snug. Some are hidden under the zipper case near the two batteries.