Met One Service Bulletin

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Met One Instruments, Inc.
1600 N.W. Washington Blvd.
Grants Pass, OR 97526
(541) 471-7111
www.metone.com

Updating the Firmware in the BAM-1020 Particulate Monitor

The firmware is the operating system program which controls all of the functions of the BAM-1020. This program is located in the EEPROM chip on the CPU circuit board, and the revision number of the firmware can be seen on the main screen of the BAM-1020 display. The firmware is occasionally revised by Met One to fix minor bugs or to add features. The firmware file can be updated by physically replacing the EEPROM chip with a new one supplied by Met One, or it can be flash updated through the BAM-1020 serial port using a computer and a small update utility program supplied by Met One. Contact the Service Department at (541) 471-7111 if difficulty is encountered.

BAM-1020 Settings Verifications Before and After Firmware Updates:

Depending on what revision of firmware your BAM is currently running, you may need to verify that the calibration and operation settings were not affected by the update process. Identify which version of firmware is currently installed in the BAM, and check the considerations listed below. It is always a good idea to download the System Configuration (Settings) file, or at least write down all of the settings in the SETUP > SAMPLE and SETUP > CALIBRATE menus before the firmware update, then verify them afterwards.

Warning! always download and save the BAM-1020 data and error logs before proceeding with a flash firmware update, because the process will clear the BAM memory.

Firmware update from revision 2.58 to 3.4.X or later:

Before the update process:
1. Record the OFFSET value in the SETUP/SAMPLE menu.
2. Record the BKGD value in the SETUP/CALIBRATE menu.

After the update process:
1. The RS232 baud rate will be set to 38400. Reset as appropriate.
2. Set the CONC UNITS value in the SETUP/SAMPLE menu.
3. Reset the OFFSET value recorded earlier in the SETUP/SAMPLE menu.
4. Set the SETUP/CALIBRATE/CONC TYPE value.
5. Set the SETUP/CALIBRATE/FLOW TYPE value.
6. Reset the SETUP/CALIBRATE/BKGD value recorded earlier.
7. Recalibrate the AT, BP and flow sensors (TEST/FLOW).
8. Recalibrate or reset the filter temperature sensor (TEST/FILTER-T).
9. Recalibrate or reset the RH sensor (TEST/RH).

Firmware updates from revision 3.0.0 to 3.4.X or later:

Before the update process:
1. Record the SETUP/SAMPLE/OFFSET value.
2. Record the SETUP/CALIBRATE/BKGD value.

After the update process:
1. The RS232 baud rate will be set to 38400. Reset as appropriate.
2. Set the SETUP/SAMPLE/CONC UNITS value.
3. Set the SETUP/SAMPLE/COUNT TIME value.
4. Reset the SETUP/SAMPLE/OFFSET value recorded earlier.
5. Set the SETUP/CALIBRATE/CONC TYPE value.
6. Set the SETUP/CALIBRATE/FLOW TYPE value.
7. Reset the SETUP/CALIBRATE/BKGD value recorded earlier.
8. Recalibrate the AT, BP and flow sensors (TEST/FLOW).
9. Recalibrate or reset the filter temperature sensor (TEST/FILTER-T).
10. Recalibrate or reset the RH sensor (TEST/RH).

Firmware updates from revision 3.1.0 to 3.4.X or later:

Before the update process:
1. Record the SETUP/SAMPLE/OFFSET value.
2. Record the SETUP/CALIBRATE/BKGD value.

After the update process:
1. Reset the SETUP/SAMPLE/OFFSET value recorded earlier.
2. Reset the SETUP/CALIBRATE/BKGD value recorded earlier.
3. Recalibrate the AT, BP and flow sensors (TEST/FLOW).
4. Recalibrate or reset the filter temperature sensor (TEST/FILTER-T).
5. Recalibrate or reset the RH sensor (TEST/RH).

Firmware updates from revision 3.2.X to 3.4.X or later:

Simply download and save data and error logs before proceeding with the flash update because the process will clear the memory. None of the calibration settings, operation settings, or field calibrations should be affected by the firmware update. It is a good idea to review all settings anyway.

EEPROM Replacement Procedure:

BAM-1020 units which currently run any revision of firmware prior to Rev 3.0 (such as R2.58 etc) must have the EEPROM chip physically replaced in order to update the firmware. This is because the old EEPROM is not compatible with FLASH updates. *The new chip will already have the new firmware file burned into it*, and future firmware revisions may be flash updated if desired. In some cases, it is more convenient to replace the chip rather than to FLASH update the file in the field, even if the BAM is already running FLASH compatible firmware of R3.0 or higher. You will need access to the back of the BAM-1020 to replace the EEPROM.

1. **Turn off the BAM-1020.** Remove the CPU cover plate (4 screws) from the back of the unit to access the circuit board as shown below.
2. If the new EEPROM came with an anti-static disposable wrist strap, put it on. If not, then discharge any static electricity buildup on your body by touching the metal case of the BAM-1020.
3. **Note the orientation of the old EEPROM!** The left edge of the chip is beveled, and the bottom left corner of the chip is beveled. The new chip must be inserted in the same orientation!
4. Remove the old EEPROM with the supplied metal extractor tool. The tool inserts into the slots in the corner of the chip socket as shown below. Carefully pry the old chip loose.
5. Carefully snap the new EEPROM into the socket. Turn the BAM on and verify that the display is functional before replacing the cover plate. The new firmware revision will show on the display.
6. The firmware is now completely updated. Verify the BAM-1020 SETUP values, and check the field flow calibrations.
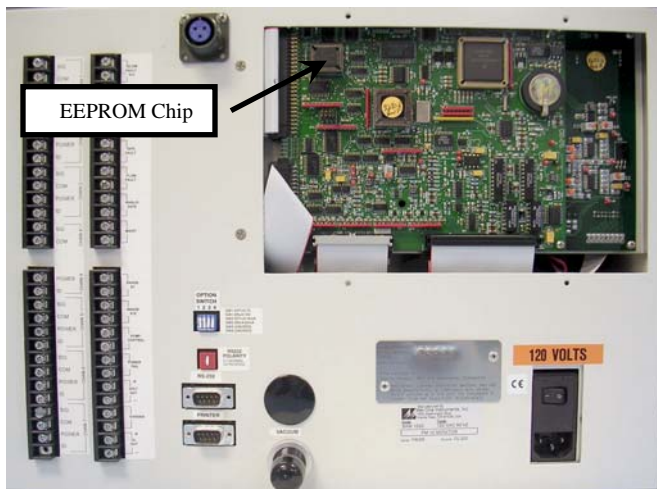
Replacing the EEPROM on a BAM-1020

FLASH Firmware Updates:

BAM-1020 units which currently run firmware of revision 3.0 or higher already have a FLASH compatible EEPROM, and the firmware file can be updated through the serial port. You will need a computer or laptop with an RS-232 (9-pin) serial COM port and the standard BAM serial cable, just like one you might use to download data from the BAM-1020. Newer laptops without a 9-pin COM port will need a reliable USB-to-RS-232 converter. You should not update the firmware over a modem.

Warning! Take great effort to ensure that the power source to the BAM-1020 will not be interrupted during the update process! A power interruption may cause the firmware to become inoperative! If this happens the unit will have to be returned to the factory.

1. Download the BAM data log and error log before performing the update, as these will be erased.
2. A Met One technician will probably e-mail you a link to the FTP file server site where the current Firmware Update Utility program is located. It will look something like the following:
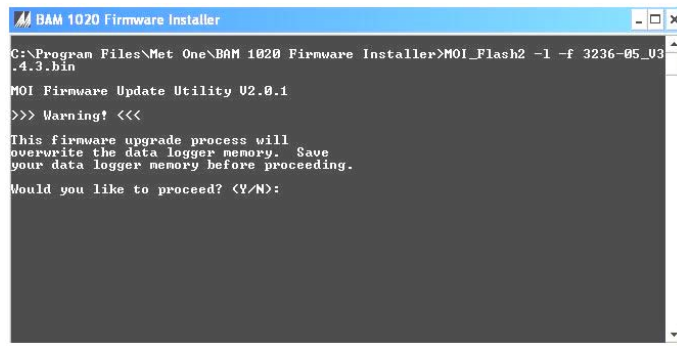
   http://metoneftp.com/service/Firmware_Upgrades/BAM-1020%20Firmware/BAM%201020%20Firmware %20Installer%20PM2.5%203236-05%20V3.4.3.exe

3. Click on the link or paste it into your internet browser address bar. After a moment the following window should appear:

   You can run the executable installer program if this is the same computer you plan to use to update the BAM unit, otherwise click "Save" and save the installer to the hard drive or to a removable drive that you can use to transfer the file to the computer you plan to use for the update.
4. Transfer the executable installer file to the appropriate computer if needed, then run the program to install the Firmware Update Utility. The installer will guide you through the installation steps.
5. Connect the COM port of the computer (usually COM 1) to the RS-232 port on the BAM-1020 with the standard BAM serial cable. The BAM-1020 should be set to 9600 baud in the SETUP menu, if not already. The BAM must be powered on and displaying the main screen.
6. From the Windows **Start** menu, go to `Programs/Met One/BAM 1020/BAM 1020 Firmware Installer` to run the Firmware Update Utility program as shown below. The program will prompt you to save the BAM data. Hit **Y** and the **Enter** key to proceed. The program will then prompt you for the COM port number. Enter the number (usually **1**) and press the **Enter** key to begin the update process.

```
BAM 1020 Firmware Installer                                   _ □ ×

C:\Program Files\Met One\BAM 1020 Firmware Installer>MOI_Flash2 -l -f 3236-05_V3
.4.3.bin

MOI Firmware Update Utility V2.0.1

>>> Warning! <<<

This firmware upgrade process will
overwrite the data logger memory.  Save
your data logger memory before proceeding.

Would you like to proceed? <Y/N>:
```

7. Execution time is approximately 12 minutes. A **"Done!"** message will be displayed at the end of the update process. Verify the BAM settings and flow calibrations as recommended in the beginning of this procedure.