Replacing the CIMEL Sensor Head and Control Unit

I.   Purpose:

This procedure describes how to replace the CIMEL sensor head and control unit, check and if necessary, level the unit, set the time, latitude and longitude on the CIMEL and check the time on the Vitel (GOES) Transmitter.

The CIMEL consists of an Instrument, a power box, a control box and a GOES antenna. The instrument has a double barrel lens assembly that rotates up and down and periodically scans the sky. The Power Box contains one large Vitel battery and two small CIMEL batteries. The Control Box contains a white CIMEL Electronique unit and a black Vitel VX1004 unit. The instrument includes a stand, the robot, the sensor head and a collimator.

The CIMEL makes three different periodic scans of the sky; 1) The CIMEL points directly at the sun and makes a measurement, 2) The CIMEL points at the sun and makes a 360 degree scan of the atmosphere at the same elevation as the sun, and 3) The CIMEL points at the sun and makes a vertical scan of the atmosphere. The scans are not made continuously, they are spread out through the day, and when not scanning the CIMEL is in the parked state where the sensor is pointed to the ground. The CIMEL data is used to compute aerosol optical depth and total column water vapor.

II.   Cautions and Hazards:

None.

III.   Requirements:

None.

IV.   Procedure:

A.   Steps: Replacing the CIMEL Sensor Head and Control Unit

1.   First, the CIMEL robot must be placed in manual mode.

2.   Go to the Control box and open the box.

3.   On the white Electronique box labeled CIMEL, press the green button to show the display

4.   Press the green (PW) button again to display the password.

5.   Press the red (+) button 4 times to increment the password to 4

6.   Press the green (PW) button; " Auto   yes " will be displayed. Press the red (YES) button to change it to NO.

7. Press the green (PW) button to select ok.

8. Press the red (yes) button. ; a message saying "writing to eeprom" will be shown.

9. The CIMEL is now in manual mode.

10. Disconnect sensor head cable connector. CAUTION: Notice how the cable is routed so it can be reattached the same way. This is important to allow free movement of the robot during the scans.

11. Remove sensor head and collimator from robot (hex bolts). (See Figure 1.)

12. Attach the new collimator to new sensor head by tightening the long thumbscrew that passes through the middle of the assembly. Be careful not to cross thread the long screw. Line up the collimator as shown in Figure 2.
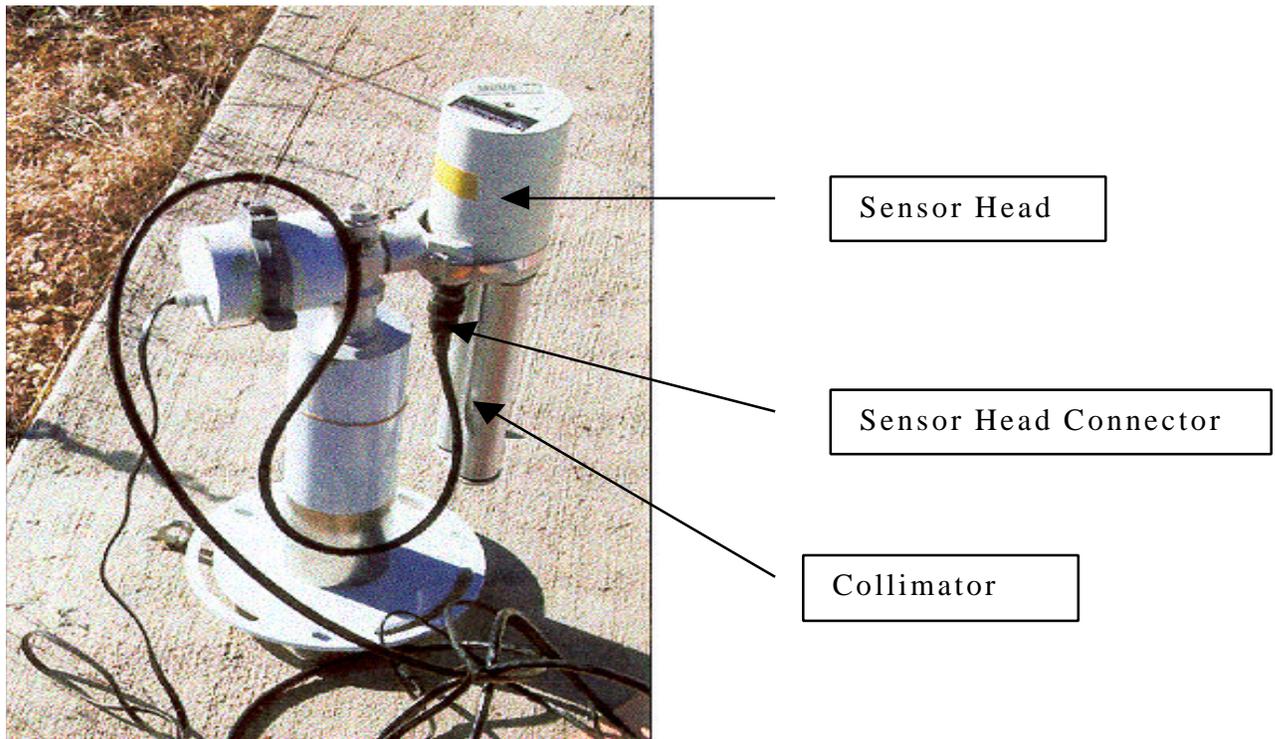
Figure 1. Cable guide with cable loop

Figure 2. Attaching the collimator assembly.

B.   Attaching the Collimator Assembly:

1.   Attach the sensor head/collimator assembly to the robot yoke, aligning the collimator with the bottom of the yoke, as shown in Figure 3.
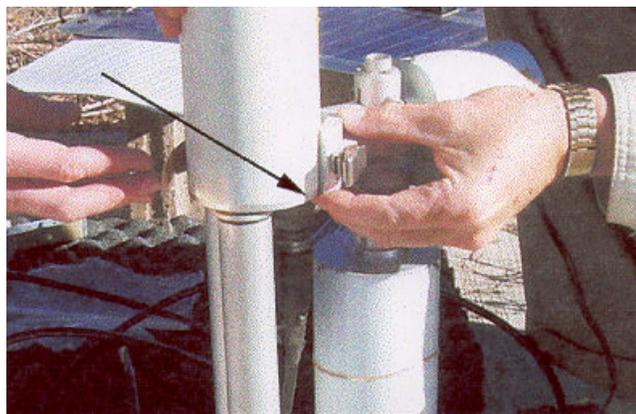
Figure 3. Collimator flush with bottom of yoke.

2.   Reattach the sensor head cable in the same manner as before. Be careful not to add an extra twist in the cable. (See Figure 1.)

3. Replace the CIMEL control unit, which is the white box labeled "CIMEL Electronique Unit" in the control box. There is a battery connection and two control cable connections for azimuth and elevation. Double-check the labels on the azimuth and elevation cables, as we don't want to reverse these connections. Connect the transmitter cable to the DCP port on the CIMEL, and connect the water sensor cable.

4. At this point, check and make sure all connections are secure. We are now ready to check the level and alignment of the unit; go to the next section "Level and align the CIMEL", and begin at step 9.

C. Level and align the CIMEL

This procedure should be followed if the cables become wrapped around the base of the robot, which has happened a few times, or if the robot level and alignment needs to be checked due to component replacement or the unit was moved.

1. First, the CIMEL robot must be placed in manual mode.

2. Go to the Control box and open the box.

3. On the white Electronique box labeled CIMEL, press the green button to show the display.

4. Press the green (PW) button again to display the password.

5. Press the red (+) button 4 times to increment the password to 4.

6. Press the green (PW) button " Auto   yes " will be displayed. Press the red (YES) button to change it to NO.

7. Press the green (PW) button to select ok.

8. Press the red (+) button to select yes; a message saying "writing to eeprom" will be shown.

9. The CIMEL is now in manual mode.

10. If the cables are wrapped around the base of the robot, then unwrap the cables by slowly turning the CIMEL on its base approximately 360 degrees, which will unwind the cables. See Figure 1 for correct orientation of cables.

11. Put the CIMEL into GOSUN mode following the steps below.

12. Press the green (PW) button to show the display.

13. Press the yellow button for SCREEN.

14. Press the red (+) button twice to select PARK and then GOSUN mode.

15. Press the white (X) button for GO. The sensor collimator will be turned to point toward the sun, illuminating the target at the base of the collimator tubes

If the sun is not aligned (the circle of light should be within one half diameter on alignment target at base of collimator (see Figure 4)), loosen the three bolts holding the robot stand to the base and lift the robot by its base and rotate the entire assembly until the target is illuminated.

Figure 4. Circle of Light on Alignment target
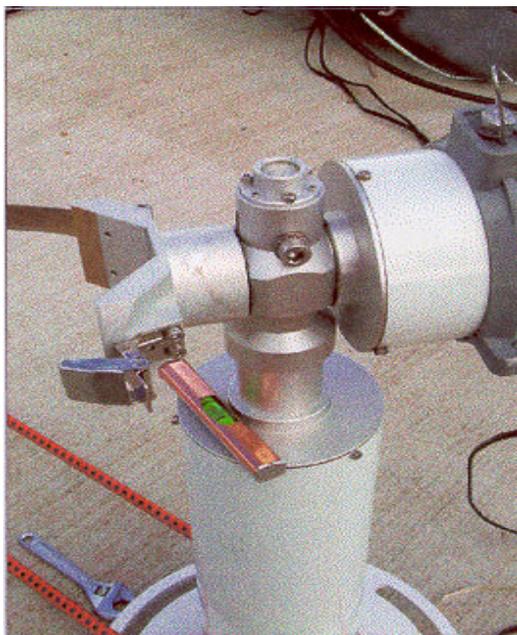
Figure 5. Leveling the robot

D. Leveling the Robot

1. If the CIMEL is turned on its base to adjust the alignment, it will need to be leveled using the three adjusting screws at the base of the CIMEL. Measure the level using a short level (stored in the gray box) on the landing at the top of the robot mounting post. Do NOT use the bubble level at the top of the robot. (See Figure 5.) Orient the level in line with any two of the three robot leveling screws in the base. Turn the base leveling screws to center the bubble between the marks. Repeat the process for the two other combinations of two legs.

2. Put the CIMEL into PARK mode.

   • Press the green (PW) button to show the display.

   • Press the yellow (-) button for screen.

   • Press the red (+) button to select PARK mode,

   • Then press the white (X) button for GO. The robot will be parked with the double barrel pointing down.

3. When in PARK, the yoke that holds the sensor head and the sensor head should be level. If not, use a crescent and hex wrench to loosen the zenith motor mounting clamp until the motor casing can be turned easily by hand. (See Figure 6.) Reassert the park position by performing step D. 2. again and place the level across the top of the sensor head. Without allowing the yoke to turn the motor shaft, rotate the zenith motor casing as shown in Figure 6 until the bubble level indicates that the yoke is horizontal. Tighten the zenith motor clamp until just snug, then re-park the robot and confirm the level of the yoke. Readjust if necessary, and when level, secure the clamp. Check the yoke level after final tightening, and confirm that the clamp is tight enough to prevent the motor casing from turning.

Figure 6. Zenith motor orientation

4. Recheck the sun alignment (Steps 9-14).

5. When both the level and alignment look good, it is okay to continue.

6. Equally, retighten the three bolts holding the robot to the base, being careful not to move the robot or over tighten the bolts.

E. Clock Setting for the Vitel VX1004 Transmiter:

1. Find a GPS, take it outside and press the red button to turn it on.

2. Point the antenna up to the sky where there are no obstructions.

   - It will take a few minutes to acquire the satellites; it is OK to set the GPS on a flat surface while it acquires satellites.

   - Once the time is displayed at the bottom the GPS is ready

   - Go to the Control Box (it should be labeled), open the lid and find the black Vitel VX1004 unit.

3. The Vitel clock needs to be set 5 seconds behind Greenwich Mean Time (GMT), which is what the GPS displays.

   - Set the Vitel clock by pressing the ON/OFF button once.

   - Display should read TIME; if TIME is not displayed, press the button marked SCROLL to step through the menu items until TIME is displayed.

   - Press the button marked SELECT.

   - Press the button marked CHANGE.

   - Press the button marked ENTER until the cursor is on the desired digit.

   - Press the button marked CHANGE until the desired value appears under the cursor, then press the button marked ENTER to move to the next digit.

   - Repeat the two previous steps for each digit.

   - Press ON/OFF to return to the main display.

   - When the cursor is over the right-most digit in the seconds field press the button marked ENTER, and the clock will start incrementing.

4. Double-check the time to make sure it is correct.

   - If the time is off by 2-3 seconds don't worry about it.

5. For the sake of information, some of the other parameters for the Vitel transmitter are as follows:

- Baud: 1200

- Channel number: 86

- Platform ID: 131383E6

- Transmit Interval (TXT INTV): 60

- Time of Transmission (FIRST TX): 13 (minutes after the hour)

F. Clock Setting for the Electronique Unit

6. Use the following steps to change the time on the Electronique unit. This is the white unit located inside the Control Box.

7. If the display is inactive, press the green button to turn the display on.

8. Press the green (PW) button; increment the password to 1 using the red (+) button, and then press the green (PW) button again.

9. Press the yellow (Dat) button.

10. Use the yellow (-) and red (+) buttons to decrease or increase the values.

11. Use the white (X) button to move to the next parameter. You will be presented with the values for Year, Month, Day, Hour, and Minute, in that order.

12. When entering the time, set it for the next incremental minute, then press the green (Ok) button at the minute hack, which sets the seconds to zero and starts the clock.

- It is important to set the Electronique clock to within a few seconds of GMT.

NOTE: Each access of the DAT menus will set the seconds to zero upon exit, even if no modifications are made.

G. Setting the Latitude and Longitude for the CIMEL

1. Accessing the configuration menu.

- If the display is inactive, press the green button to activate it.

- Press the green (PW) button again to display the password.

- Press the red button to increment the password to 1.

- Press the green (PW) button.

2. Press the red (PAR) button; the display will briefly read "reading eeprom," and parameters will be displayed. Note that the (+) and (-) buttons will increment or decrement through options. The (X) button will accept the parameter and move to the next parameter, and the OK option will accept the parameter and exit the configuration list.

3. Press the (X) button once or twice until NUMBER is displayed; our instrument number is **98**; enter if needed.

4. Press the (X) button until "Lat mn" is displayed (approx. 11 times), enter –31 (the minus sign is needed).

5. Press the (X) button and "Lon.HH" is displayed; enter **E 11**.

6. Press the (X) button and "Lon.MM" is displayed; enter **7**.

7. Press the (X) button and "Lon.SS" is displayed; enter **40**.

8. At this point, no other parameters need to be entered. Press the green (PW) button to accept, then validate with the red (PAR) button for YES.

H.   Turn on CIMEL and Check for Proper Operation

1. Before turning on the CIMEL, run the GOSUN and PARK commands (steps C. 9. through 14.) a few times to make sure the cables are not getting tangled, snagged or wrapped around the base of the robot.

2. To put the CIMEL in automatic mode, go to the control box and open the box.

   - On the white electronics box labeled CIMEL. Press the green button to show the display.

   - Press the green (PW) button again to display the password.

   - Press the red (+) button 4 times to increment the password to 4.

   - Press the green (PW) button; " Auto   no " will be displayed.

   - Use the red button to change the "NO" to "YES".

   - Press the green (OK) button to accept the entry.

   - Press the red (YES) button; a message saying "writing to eeprom" will be shown.

   - The CIMEL is now in automatic mode.

3. When the CIMEL is in automatic mode, it will periodically make its scans. The trick here is to keep an eye out and watch for when the CIMEL is making its scans. When the scans begin, watch the movement of the robot and look for any resistance that occurs due to cables that are snagging or preventing a smooth motion. It is best to check the scans at various times of the day, morning, mid-day, afternoon to make sure there are no problems.

    - Look to see if the cables are wrapped around the base of the robot; if this happens, follow the procedure above to unwrap the cables.

4. Upon completion, contact CIMEL Mentor to verify that data is being received properly. Early installation allows time to observe CIMEL operation and allows time for troubleshooting if necessary.

V.   References:

1. CIMEL Mentor – Rangasayi Halthore 631-344-7920
    halthore@aerosol.das.bnl.gov

VI.   Attachments:

None.