BBSS Consecutive (Two) RS-90 Launch Procedure

I. Purpose:

The purpose of this procedure is to describe the work process performed by the on-site observers to perform the launch of two consecutive RS-90 GPS Sondes with the BBSS System (Vaisala DigiCORA II MW15) at the TWP ARCS sites. This procedure is for supporting the AIRS satellite ground truth operations in the TWP. Note: this procedure is only to be performed when the AIRS satellite is scheduled to be overhead with an elevation angle greater than 60 degrees (within 30 degrees overhead) and it is not raining.

Note: Updated overpass times and elevation angles will be available from TWP operations when ground truth operations are officially begun.

It is important to be ready to launch on time. The first balloon-borne RS-90 needs to be launched 45 minutes prior to AIRS satellite overpass time. After 30 minutes a new balloon is prepared. After 40 minutes (5 minute prior to overpass) a new RS-90 is prepared and tuned to a frequency away from the first RS-90. The first launch is then terminated and a second launch is performed.

II. Cautions and Hazards:

- Take care in operating the hydrogen generator during balloon filling (see safety procedures for hydrogen generator).
- Launch only under safe meteorological conditions.

III. Requirements:

- Operating DigiCORA.
- GPS Sonde package with calibration tape and water activated battery.
- Meteorological balloon (350 grams).
- Cable ties or string to tie off balloon.
- Bung, nozzle, needle
- Helium or Electrolyser for hydrogen lifting gas.
- Electrolyser enclosure.
- Gas-Flow Valve Box.
- Operating GPS and UHF (either directional or omni-directional) antennas.
- Balloon launching facility w/RBL.
- Aspirated box for pre-launch sonde conditioning.

- Laptop PC with BBSS and PCMF software.
- Small screwdriver for adjusting sonde frequency.

IV. Procedure:

A. PRE RELEASE PREPARATION

(30 minutes before release time):

Check if any airplane flights are scheduled for arrival or departure at Nauru airport. Telephone the tower 10 minutes before the release to ask permission to launch the balloon if air traffic is expected.

B. PREPARE THE FIRST BALLOON TRAIN

(20 minutes before release time):

1. Follow the normal daily launch procedure as described in PRO(BBSS)-002.009 BBSS Launch Operations or latest version thereof.

C. RELEASE the FIRST BALLOON

D. PREPARE A SECOND BALLOON

(30 minutes after First Balloon Release)

1. You will be preparing a balloon while the first sounding is aloft and collecting data. Follow the normal balloon preparation that is done in the Y-Van as described in PRO(BBSS)-002.007, Section IV, Part B, Step 2.

E. FIRST BBSS SOUNDING TERMINATION (5 min. prior to 2nd balloon release):

1. While the battery soaks, you will now terminate the first sounding.
   - Press the **CMD** key on the DigiCORA.
   - Press the **C1** key (STOP).
   - View message:

     "Do you want to terminate the sounding?"
   - Press the **C4** key (YES).

- View Message: “Sounding terminated.”
- View **TEMP**, **PILOT**, **LIST**, **and STATUS** screen and print out messages from each screen.

2. Go to the observers laptop and verify WMO files are being written (printer should be printing files).
3. When you have retrieve all required data, terminate the PCMF12 BBSS program on the laptop. Press ‘**Esc**’. Press ‘**Y’** for yes when asked to terminate program.
4. Connect the special black connector to the DCP. Open the DCP hyperterm on the observers laptop. Type CTRL J then ENTER. Reconnect black DCP/Digicora connector.

F. PREPARE THE SECOND BALLOON SONDE

1. To prepare for a second release (40 minutes after first release)

   a) Get a sonde package out and soak the battery for three minutes.

   b) Restart the PCMF12 program by double-clicking the Balloon icon on the BBSS laptop. Press enter to accept date/time.

   c) It should not be necessary to reset the DigiCORA. Upon termination of the first sounding the display should return to the main menu where you will just repeat the steps as for the first sounding by selecting “SOND”, “STRData”, etc. Prepare the second sonde. Don’t rush because you might forget to do something.

   d) Place the sonde in the Stevenson Screen once the battery is ready.

   e) Do a Pre-Flight Sonde Check as you do with the first sonde and again reject the sonde if it is not within tolerance.

   f) Pull the tape through. Make sure you use the tape for the second sonde (check the numbers on the log sheet if you are unsure).

   g) Enter the temperature, humidity and pressure.

   h) <u>Now most importantly you must change the frequency. To do this push Telem. Push the button Track (you will see on the top line it shows Trk).</u>

      - Open the slot for adjusting the frequency and using the small screwdriver carefully turn the small screw clockwise (in the minus direction). You should see the frequency on the

DigiCora go down. Do this gently and it is not necessary to turn it more then about half a turn.

- Adjust the frequency to about 1Mhz lower then the frequency of the first sonde. For example if the last reading you took of the first sonde frequency was 403.28 you should try to make the second sonde frequency about 402.28. With some sondes this is not possible to achieve due to manufacturing faults but you should try to make the frequency of the second sonde as close as possible to 1 Mhz lower than the first sonde.
- Once you have done this push the Track button again and it should say Afc on the top part of the screen.

i) Now you can fill the balloon and release the second sonde. Remember to read the temperature, humidity and pressure and write this in the proper form.

G. CONTINUE SECOND LAUNCH SOUNDING:

1. Follow PRO(BBSS)-002.009 BBSS Launch Operations or latest procedure

H. MONITOR SECOND LAUNCH FREQUENCY

1. Important: Continue to monitor the second sond frequency on the DigiCORA (press Telem). The displayed frequency should be the 402.xx frequency that you adjusted on the sond. **It is possible, though unlikely, that the DigiCORA will track the first sond.** If the Telem display is 403.xxMHz the Afc may have locked on to the first sond. It will be necessary to tune the DigiCORA to receive the second sond signal.
2. If retuning is required follow these steps:
   a) Press ‘TELEM’
   b) Press ‘C5 for ‘more’
   c) Press ‘C1’ for ‘AFC’, this toggles the Afc to off.
   d) Press ‘C5’ again for ‘more’
   e) Press ‘C3’ for ‘Tune dn’. You may have to press and hold to get the frequency display down to 402.xx
   f) Press ‘C5” for ‘more’
   g) Press ‘C1’ for ‘Afc’. This turns on the Automatic Frequency Control (Afc) for 402.xx.

I. FTP DATA back to TWPPO

1. After the daytime sounding is complete (either normal launch or AIRS launch), Send the TWP..sonde…..raw, the MWR…raw and the TEMP observers laptop files from the previous night and the daytime flight to **ftp.twppo.lanl.gov** in the AIRS directory.

V. References:

1. MAN(BBSS)001. – DigiCORA II MW15 User's Guide, Vaisala MW15-U110en-1.5, 11 April 1997.
2. PRO(BBSS)-005. –Accessing Initial SMET Launch Data.
3. Australian BOM recommended procedures from Nauru99.

VI. Attachments:

1. Pre-Flight Sonde Check Form, Release Surface Measurements & Flight Measurements Form; Sample and blank one to copy if needed.

Attachment 1: TWP BBSS Launch Operation Pre-Flight Sonde Check Form (sample)

Site: Manus

			Sonde Measurements					Comparison Measurements			Operator
Stn. No.	Date (UTC) ddmmyy	Flt. No.	Sonde Serial No.	Freq. Mhz (Digi)	Pressure Hpa (Digi)	Temp EC (Digi)	Humidity % (Digi)	Pressure hPa (E-Van)	Temp EC (S.Scrn)	Humidity % (S.Scrn)	Initial
21	240999	1	826100302	403.2	832	24.5	33	832	24.1	31.7	LY
21	240999	2	826100303	402.2	832	24.5	33	832	24.1	31.7	ND

Sonde Measurements & Comparison Measurements should be within; *Humidity - 7%, Temperature - 2°C, Pressure - 6 hPa*. If the details are not within the tolerances, recheck the Comparison Measurements. If one or more of Humidity, Temperature or Pressure are still not with the tolerances reject the Sonde and use another. The rejected Sonde should be tried again at the next scheduled flight. If a Sonde is rejected a second time, place it in the box for return to Vaisala.

Surface Release Conditions & Flight Details Form

Release Time		Surface Release Conditions					Flight Details		
Date (UTC) (ddmmyy)	Time (UTC)	Temp EC (Digi)	Hum % (Digi)	Press. hPa (E-Van)	Wind Dir. deg (H.Held)	Wind Speed m/s (H.Held)	Pressure @ 10 min. hPa (Digi)	Pressure @ Burst hPa (Digi)	Remarks
240900	10:45	23	38	832.9	271	5.2	577	400	The flight went well.

TWP BBSS Launch Operation Pre-Flight Sonde Check Form

Site: _____

Details			Sonde Measurements					Comparison Measurements			Operator
Station # 21=Manus 22=Nauru	Date (UTC) ddmmyy	Flt. No.	Sonde Serial No.	Freq. Mhz (Digi)	Pressure Hpa (Digi)	Temp EC (Digi)	Humidity % (Digi)	Pressure HPa (E-Van)	Temp EC (S.Scrn)	Humidity % (S.Scrn)	Initial

Sonde Measurements & Comparison Measurements should be within; *Humidity - 7%, Temperature - 2°C, Pressure - 6 hPa*. If the details are not within the tolerances, recheck the Comparison Measurements. If one or more of Humidity, Temperature or Pressure are still not with the tolerances reject the Sonde and use another. The rejected Sonde should be tried again at the next scheduled flight. If a Sonde is rejected a second time, place it in the box for return to Vaisala.

Surface Release Conditions & Flight Details Form

Release Time		Surface Release Conditions					Flight Details		
Date (UTCl) (ddMonthyy)	Time (UTC)	Temp EC (Digi)	Hum % (Digi)	Press. hPa (E-Van)	Wind Dir. deg (H.Held)	Wind Speed m/s (H.Held)	Pressure @ 10 min hPa . (Digi)	Pressure @ Burst hPa(Digi)	Remarks