

Radio Altimeter Test Procedure Using the VIAVI ALT-8000/8015

The VIAVI ALT-8000/8015 RF-Based Portable Radio Altimeter Flight Line Test Set allows replication of in-flight conditions by simulating altitudes, including climb/descend profiles, to verify your installed system and isolate a bad component.

This document provides the basic instructions to test an installed system. With little editing, it can be easily adapted to your aircraft platform for formal procedure development.

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ALT-8000/8015 Test Setup

Radio altimeter: Ensure the aircraft or bench test fixture is energized, however the radio altimeter should be in the OFF condition.

ALT-8000/8015:

1. Press the **Power On** button on the front of the ALT-8000 to power on the test set. See Fig. 1-1.

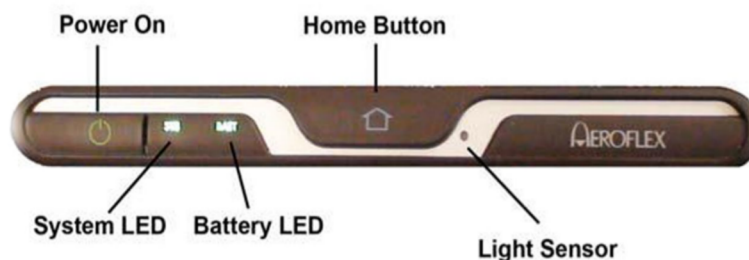


Figure 1-1 Power On Button

- On the launch bar, press the **Test Setup** function key. See Figure 1-2.

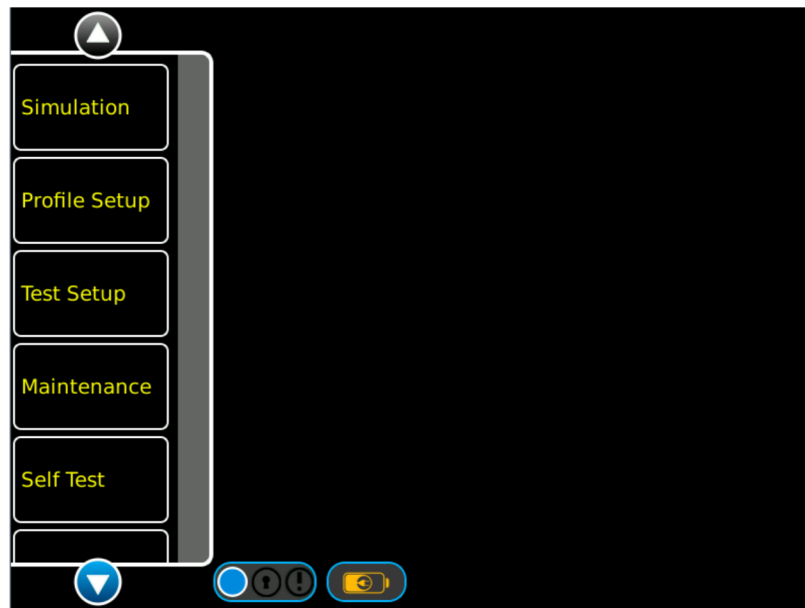


Figure 1-2 Launch Bar

- Locate the two 20 ft cables (P/N 88511 and 89527), the two 4 ft cables (P/N 91253 and 91255) or the 100 ft cable set (P/N 88500), whichever will be used.

NOTE: The 20 ft cables will be referenced in this procedure.

- Connect the cable with the yellow ends (P/N 88511) to the UUT:RX (Yellow) connector on the top panel of the ALT-8000/8015. See Figure 1-3.
- Connect the cable with the red ends (P/N 89527) to the UUT:TX (Red) connector of the ALT-8000/8015. See Figure 1-3.

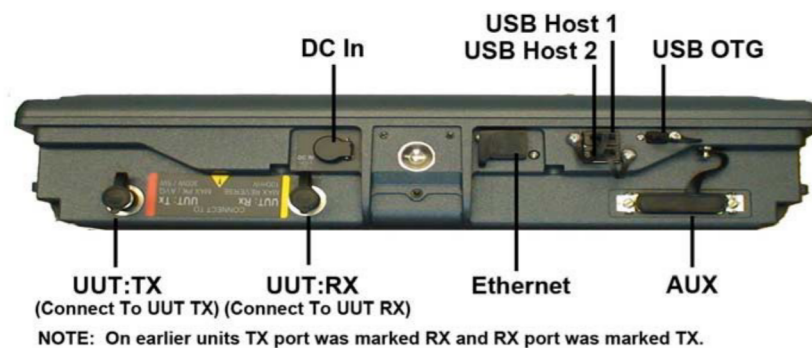


Figure 1-3 ALT-8000/8015 Top Panel

6. Connect the other ends of the 20 ft cables together, using one of the supplied TNC to TNC Adapters (P/N 38353).

NOTE: For the Delay Calibration, the 20 dB attenuators should NOT be installed on the ALT-8000/8015.

7. On the **Test Setup** screen, press the **Delay Calibration** button. See Figure 1-4.



Figure 1-4 Test Setup Screen

8. On the **Delay Calibration** screen, press the **Start** button to start the delay calibration. See Figure 1-5.

NOTE: The calibration process is automatic. When delay calibration is complete, the **Test Setup** screen is displayed.

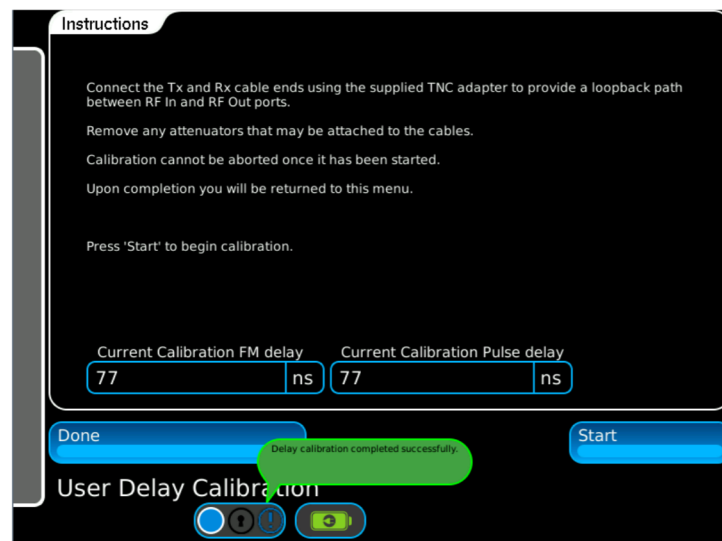


Figure 1-5 Delay Calibration Screen

9. Remove the TNC to TNC Adapter from between the TX and RX cables.
10. Set **UUT Settings – UUT Detect Mode** to **Auto**. See Figure 1-4.
11. Set **RF Settings – Level Mode** to **Auto**. See Figure 1-4.
12. On the **Test Setup** screen, press the **Loss** button to go to the Loss setup page. See Figures 1-4 and 1-6.

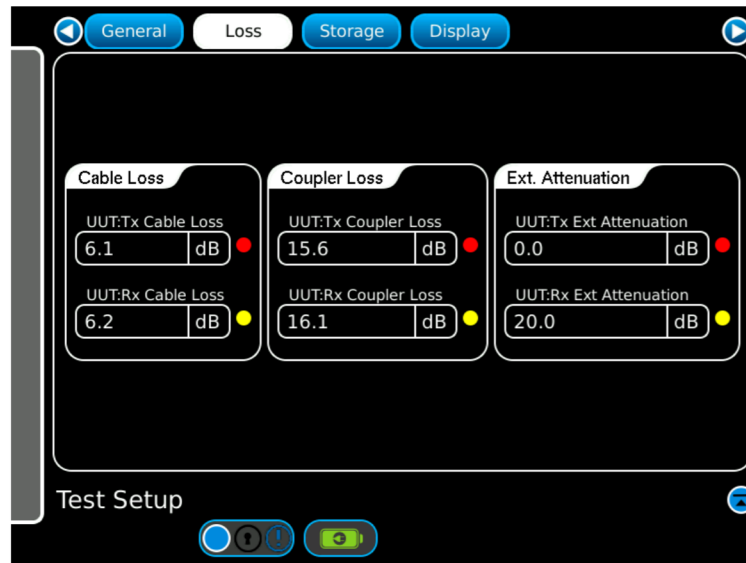


Figure 1-6 Loss Setup Screen

13. Locate the cable loss value listed on the cable connected to the UUT:TX port (Red) and enter this value as **Cable Loss – UUT:TX Cable Loss** (Red). See Figure 1-6.
 14. Locate the cable loss value listed on the cable connected to the UUT:RX port (Yellow) and enter this value as **Cable Loss – UUT:RX Cable Loss** (Yellow) See Figure 1-6.
 15. For coupler testing, enter 20 dB as **Ext. Attenuation – UUT:RX Attenuation** (Yellow) and for direct connect testing, enter 40 dB as **Ext. Attenuation – UUT:RX Attenuation** (Yellow). See Figure 1-6.
- NOTE:** 20 dB attenuators are only required for pulse type radio altimeters. They are not used for FMCW and FMCW-CDF type radio altimeters.
16. Locate the coupler with the red UUT:TX label and then locate the Loss Value label on the coupler. Enter the Coupler Loss Value as **Coupler Loss – UUT:TX Coupler Loss** (Red). See Figure 1-6.
 17. Locate the coupler with the yellow UUT:RX label and then locate the Loss Value label on the coupler. Enter the Coupler Loss Value as **Coupler Loss – UUT:RX Coupler Loss** (Yellow). See Figure 1-6.

Altitude Simulation Test via Direct-Connect

1. Perform the ALT-8000/8015 Test Setup instructions beginning on page 1.
2. Ensure that two of the 20 dB TNC attenuators are connected to the UUT:RX Port (Yellow) of the ALT-8000/8015. Connect one 20 dB attenuator directly to the ALT-8000/8015 and then connect the second 20 dB attenuator directly to the first one. Then connect the coax to these attenuators.

NOTE: 20 dB attenuators are only required for pulse type radio altimeters. They are not used for FMCW and FMCW-CDF type radio altimeters.

3. Connect the red coaxial cable to the TX port of the radio altimeter being tested. Connect the yellow coax to the RX port of the radio altimeter being tested.
4. Apply power to the radio altimeter being tested.
5. Set **RF Settings – Connection Type** to **Direct**. See Figure 2-1.



Figure 2-1 Test Setup - Direct

6. Touch the gray vertical bar on the left side of the display to display the launch bar.
7. On the launch bar, press the **Simulation** function key. See Figure 1-2 and 2-2.

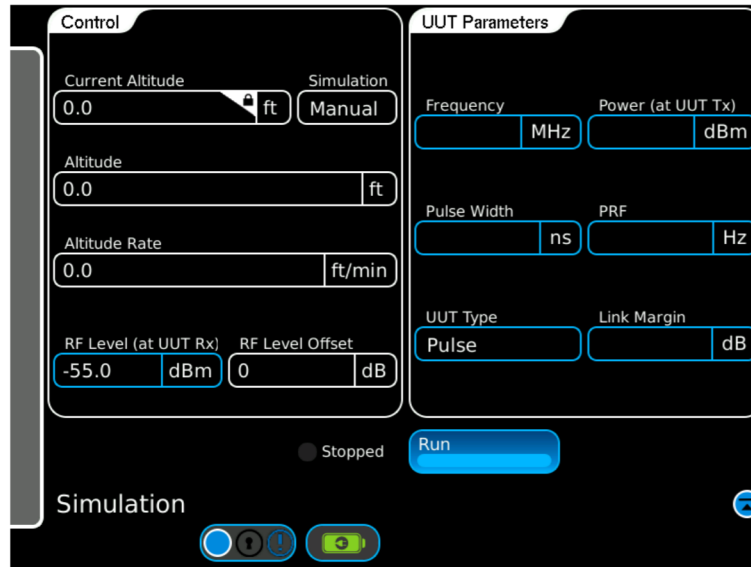


Figure 2-2 Simulation Screen

8. Ensure **Control – Simulation** is set to **Manual**. See Figure 2-2.
9. Set **Control – Altitude** to 100 ft. See Figure 2-2.
10. Press the **Run** button to start the altitude simulation. See Figure 2-2.
11. Ensure that an RF value is displayed in the **UUT Parameters – Power (at UUT)** window. If no power is displayed, check your connections and power to the UUT. See Figure 2-3.
12. Verify that the UUT Parameters are all within the desired range.
13. Verify that the display on the RADIO ALTIMETER displays approximately **100 ft**.

NOTE: The **Delay Settings – Altitude Offset** setting may be adjusted to make the display read exactly 100 ft. See Figure 2-1.

14. Press the **Control - Altitude Pause** button to change the simulated altitude. See Figure 2-3.
15. Set **Control - Current Altitude** to desired test altitude (i.e. 500 ft, 1000 ft, 1500 ft.) up to maximum altitude capable for your radio.
16. Verify that the UUT Parameters are all within the desired range.

NOTE: Link margin is only displayed for pulse type radio altimeters.

17. Verify that the display on the RADIO ALTIMETER displays approximately the same as the **Control Current Altitude** setting.
18. Press the **Stop** button to stop the altitude simulation. See Figure 2-3.

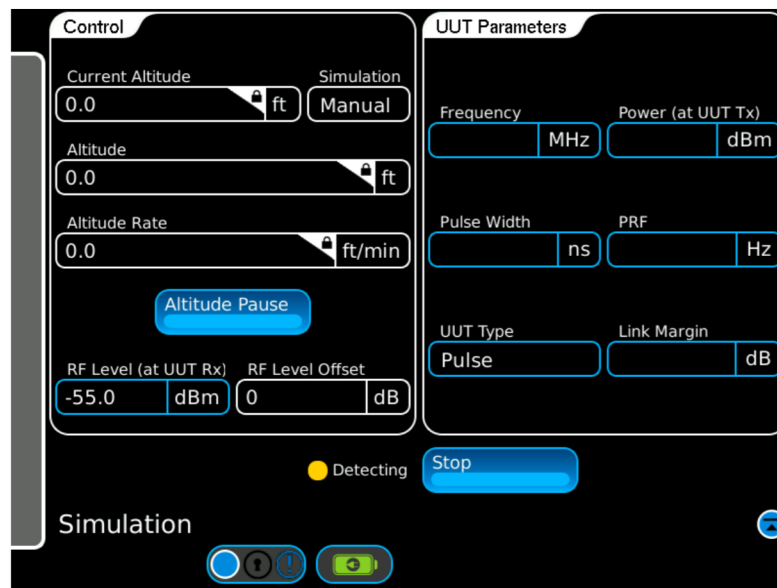


Figure 2-3 Simulation Screen

Altitude Simulation Test via Coupler

1. Perform the **ALT-8000/8015 Test Setup** instructions beginning on page 1.
2. Ensure that one of the 20 dB TNC attenuators is connected to the UUT:RX Port (Yellow) of the ALT-8000/8015. Connect the 20 dB attenuator directly to the ALT-8000/8015 and then connect the coax to the attenuator.

NOTE: 20 dB attenuators are only required for pulse type radio altimeters. They are not used for FMCW and FMCW-CDF type radio altimeters.

3. Locate the UUT:RX (Yellow) coupler and connect it to the UUT:RX (Yellow) cable.
4. Adjust the support poles to a length that will allow the compression poles to press the couplers into the aircraft just tight enough to hold the couplers in place.
5. Place the UUT:TX (Red) coupler over the TX antenna, with the arrow pointing toward the front of the aircraft.

NOTE: Some aircraft may have the antennas oriented toward each other and not toward the front of the aircraft. To determine the orientation, rotate the coupler 90 degrees at a time while watching the output power reading on the ALT-8000/8015. The highest power measurement indicates the correct placement of the coupler and the orientation of the antenna. Leave the coupler in the position that produced the highest power measurement.

6. Place the UUT:RX (Yellow) coupler over the RX antenna, with the arrow pointing toward the front of the aircraft.

NOTE: If the TX antenna coupler is oriented toward the front of the aircraft, then orient the RX coupler toward the front of the aircraft. If the TX antenna coupler is pointed toward the RX antenna, then orient the RX coupler toward the TX antenna coupler.

7. Touch the gray vertical bar on the left side of the display to display the launch bar.
8. On the launch bar, press the **Simulation** function key. See Figures 1-2 and 2-2.
9. Ensure **Control – Simulation** is set to **Manual**. See Figure 2-2.
10. Set **Control – Altitude** to 100 ft. See Figure 2-2.
11. Press the **Run** button to start the altitude simulation. See Figure 2-2.
12. Ensure that an RF value is displayed in the **UUT Parameters – Power (at UUT)** window. If no power is displayed, check your connections, coupler positioning, and power to the UUT. See Figure 2-3.
13. Verify that the UUT Parameters are all within the desired range.
14. Verify that the display on the RADIO ALTIMETER displays approximately 100 ft.

NOTE: The **Delay Settings – Altitude Offset** setting may be adjusted to make the display read exactly 100 ft. See Figure 2-1.

15. Press the **Control - Altitude Pause** button to change the simulated altitude. See Figure 2-3.
16. Set **Control - Current Altitude** to desired test altitude (i.e. 500 ft, 1000 ft, 1500 ft.) up to maximum altitude capable for your radio.
17. Verify that the UUT Parameters are all within the desired range.
18. Verify that the display on the RADIO ALTIMETER displays approximately the same as the **Control– Current Altitude** setting.
19. Press the **Stop** button to stop the altitude simulation. See Figure 2-3.

Profile Test – Direct or Coupler

1. Perform the **ALT-8000/8015 Test Setup** instructions beginning on page 1.
2. Perform one of the two following steps depending upon whether you are direct-connecting or using a coupler.
 - **Direct-Connect:** Locate two of the 20 dB TNC attenuators and connect both to the UUT:RX Port (Yellow) of the ALT-8000/8015. Connect one 20 dB attenuator directly to the ALT-8000/8015 and then connect the second 20 dB attenuator directly to the first one. Then connect the coax to these attenuators. Ensure that 40 dB is entered as the **Test Setup – Loss – Ext. Attenuation – UUT:RX Ext Attenuation** value.
 - **Coupler:** Locate one of the 20 dB TNC attenuators and connect it to the UUT:RX Port (Yellow) of the ALT-8000/8015. Connect the 20 dB attenuator directly to the ALT-8000/8015 and then connect the coax to the attenuator. Ensure that 20 dB is entered as the **Test Setup – Loss – Ext. Attenuation – UUT:RX Ext Attenuation** value.
3. Set **RF Port Settings – Connection Type** to **Direct** or **Coupler**. See Figure 2-1.
4. Touch the gray vertical bar on the left side of the display to display the launch bar.
5. On the launch bar, press the **Profile Setup** function key. See Figures 1-2 and 4-1.

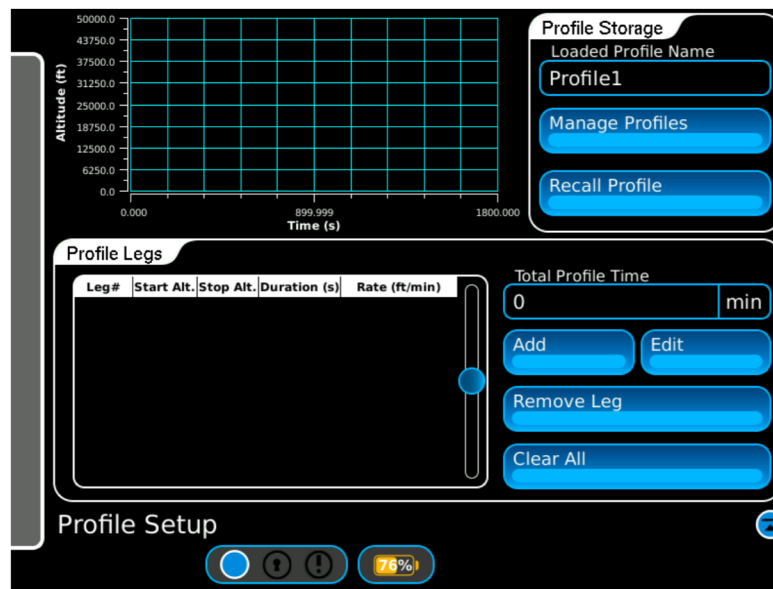


Figure 4-1 Profile Setup Screen

6. To add a leg to the profile, press the **Add** button and the **Add Leg** pop-up window will be displayed. See Figures 4-1 and 4-2.

7. Enter a **Start Altitude** of 100 ft.
8. Enter a **Stop Altitude** of 100 ft.
9. Enter a **Leg Duration** of 30 s.
10. Press the **Enter** button to add Leg 1 to the profile. See Figures 4-2 and 4-3.

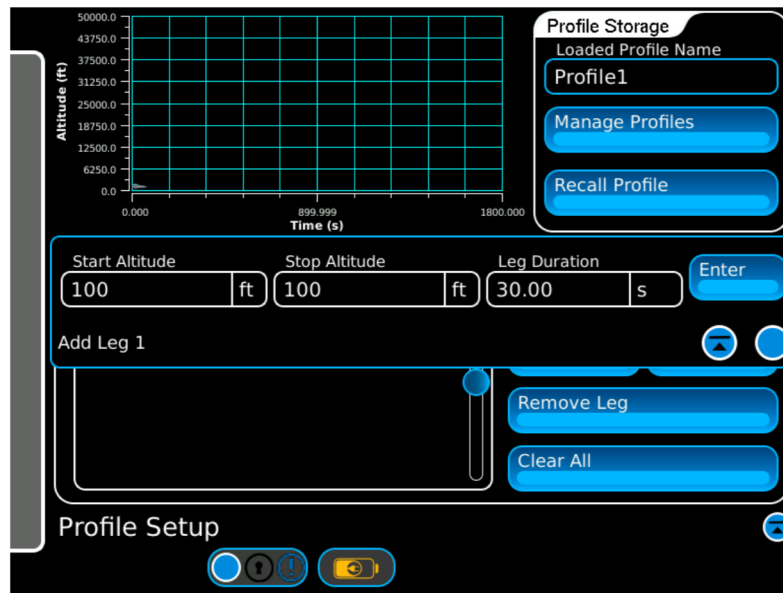


Figure 4-2 Profile Setup

11. Press the **Add** button and the **Add Leg** pop-up window will be displayed again. See Figures 4-1, 4-2 and 4-3.
12. Enter a **Start Altitude** of 100 ft.
13. Enter a **Stop Altitude** of 500 ft.
14. Enter an **Altitude Rate** of 1000 ft/min.
15. Press the **Enter** button to add leg to the profile. See Figures 4-2 and 4-3.

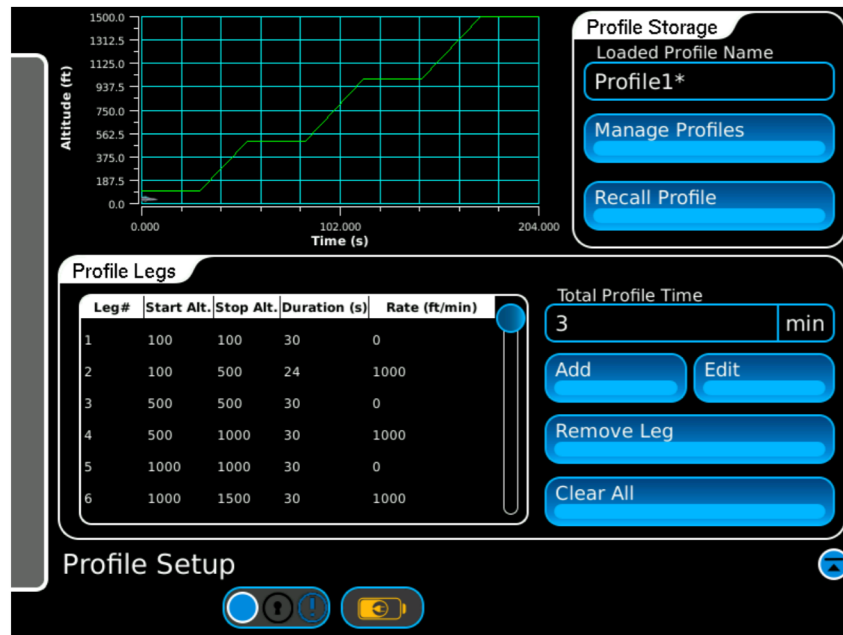


Figure 4-3 Complete Setup

16. Press the **Add** button and the **Add Leg** pop-up window will be displayed. See Figures 4-1 and 4-2.
17. Enter a **Start Altitude** of 500 ft.
18. Enter a **Stop Altitude** of 500 ft.
19. Enter a **Leg Duration** of 30 s.
20. Press the **Enter** button to add leg to the profile. See Figures 4-2 and 4-3.
21. Press the **Add** button and the **Add Leg** pop-up window will be displayed again. See Figures 4-1, 4-2 and 4-3.
22. Enter a **Start Altitude** of 500 ft.
23. Enter a **Stop Altitude** of 1000 ft.
24. Enter an **Altitude Rate** of 1000 ft/min.
25. Press the **Enter** button to add leg to the profile. See Figures 4-2 and 4-3.
26. Press the **Add** button and the **Add Leg** pop-up window will be displayed. See Figures 4-1 and 4-2.
27. Enter a **Start Altitude** of 1000 ft.
28. Enter a **Stop Altitude** of 1000 ft.
29. Enter a **Leg Duration** of 30 s.

30. Press the **Enter** button to add leg to the profile. See Figures 4-2 and 4-3.
31. Press the **Add** button and the **Add Leg** pop-up window will be displayed again. See Figures 4-1, 4-2 and 4-3.
32. Enter a **Start Altitude** of 1000 ft.
33. Enter a **Stop Altitude** of 1500 ft.
34. Enter an **Altitude Rate** of 1000 ft/min.
35. Press the **Enter** button to add leg to the profile. See Figures 4-2 and 4-3.
36. Touch the gray vertical bar on the left side of the display to display the launch bar.
37. On the launch bar, press the **Simulation** function key. See Figures 1-2 and 2-2.
38. Set **Control – Simulation** to **Profile**. See Figure 4-4.
39. Press the **Run** button to start the profile simulation. See Figure 4-4.

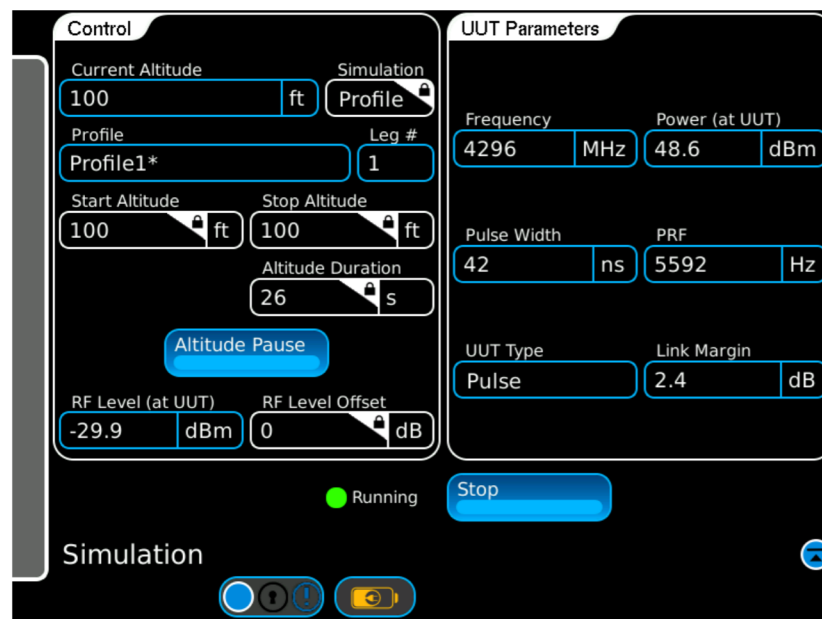


Figure 4-4 Simulation – Profile Screen

40. Verify that the UUT Parameters are all within the desired range. You will have 30 seconds to verify the parameters.
41. Verify that the displayed altitude on the RADIO ALTIMETER display tracks the altitude displayed in the **Control – Current Altitude** window. See Figure 4-4.
42. Press the **Stop** button to stop the profile simulation.

Radio Altimeter Sensitivity Test – Direct or Coupler

1. Perform the ALT-8000/8015 Test Setup instructions beginning on page 1.
2. Perform one of the two following steps depending upon whether you are Direct Connecting or using a Coupler.
 - **DIRECT CONNECT:** Locate two of the 20 dB TNC attenuators and connect both to the UUT:RX Port (Yellow) of the ALT-8000/8015. Connect one 20 dB attenuator directly to the ALT-8000/8015 and then connect the second 20 dB attenuator directly to the first one. Then connect the coax to these attenuators. Ensure that 40 dB is entered as the **Test Setup – Loss – Ext. Attenuation – UUT:RX Ext Attenuation** value.
 - **COUPLER:** Locate one of the 20 dB TNC attenuators and connect it to the UUT:RX Port (Yellow) of the ALT-8000/8015. Connect the 20 dB attenuator. Ensure that 20 dB is entered as the **Test Setup – Loss – Ext. Attenuation – UUT:RX Ext Attenuation** value.
3. Perform the 100 ft altitude setup steps from Step 2 (Direct Connect) or Step 3 (Coupler) above.
4. Touch the gray vertical bar on the left side of the display to display the launch bar.
5. On the launch bar, press the **Test Setup** function key. See Figure 1-2.
6. Set **RF Settings – Level Mode** to **Manual**. See Figure 5-1.



Figure 5-1 Test Setup – RF Settings - Manual

7. Touch the gray vertical bar on the left side of the display to display the launch bar.
8. On the launch bar, press the Simulation function key. See Figure 1-2.

9. Touch the Control – RF Level window to bring up the RF Level adjustment window.

NOTE: You may enter the values manually; use the adjustment dial; or use the slide bar to change the RF Level. See Figure 5-2.

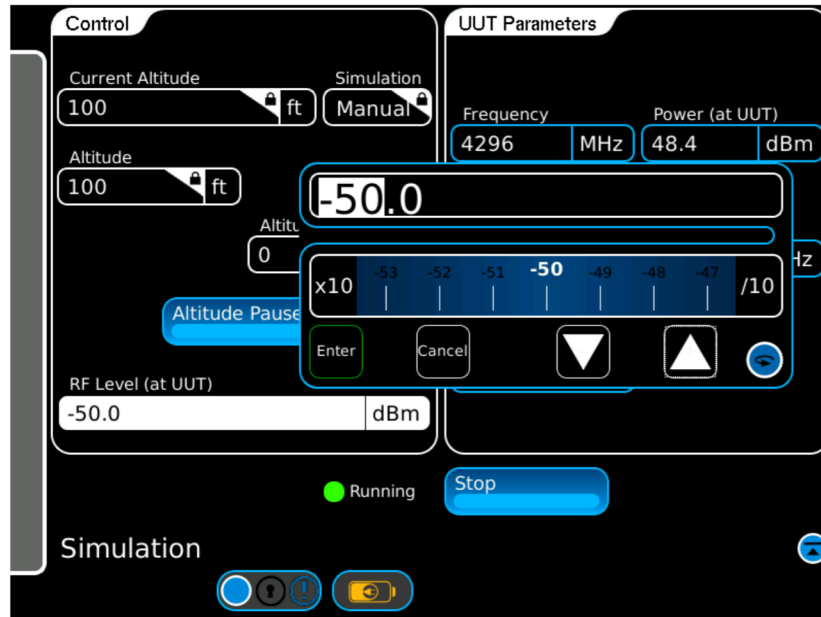


Figure 5-2 Simulation – RX Sensitivity

10. Adjust the RF level downward until the RADIO ALTIMETER display stops reporting the 100 ft altitude.
11. The RF level where the RADIO ALTIMETER stops reporting the correct altitude is the sensitivity level of the receiver.
12. Press the **Stop** button to stop the profile simulation.

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