Parachute Non Volatile Memory (NVM) Devices

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Parachute Non Volatile Memory Devices

- Automatic Activation Devices (AAD)
- Audible and Visual Altimeters
- Cameras
- GPS receivers

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AADs

- Two Types:
  - Mechanical
    - No batteries, no cutters, no memory
  - Electronic computer controlled with pyrotechnic loop cutters
    - NVM which can be accessed by the investigator

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AAD - Mechanical

- FXC 12000

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AADs - Electronic

- Two primary manufacturers
- CYPRES
  - Cybernetic Parachute Release System
  - Made in Germany by Airtec
  - First of the electronic generation of AADs
- Vigil
  - Made by AAD in Belgium
- Both use pyrotechnic loop cutter technologies and computer controlled logic trees to determine jumper altitude and airspeed by reading barometric pressure and time
- Both have user selectable activation altitudes

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CYPRES 2

- CYPRES 2 (CYPRES 1 Has expired its service life)
  - Limited field data download capability
  - Available in 6 Models
    - Expert
    - Student
    - Tandem
    - Speed
    - Changeable Mode
    - Military

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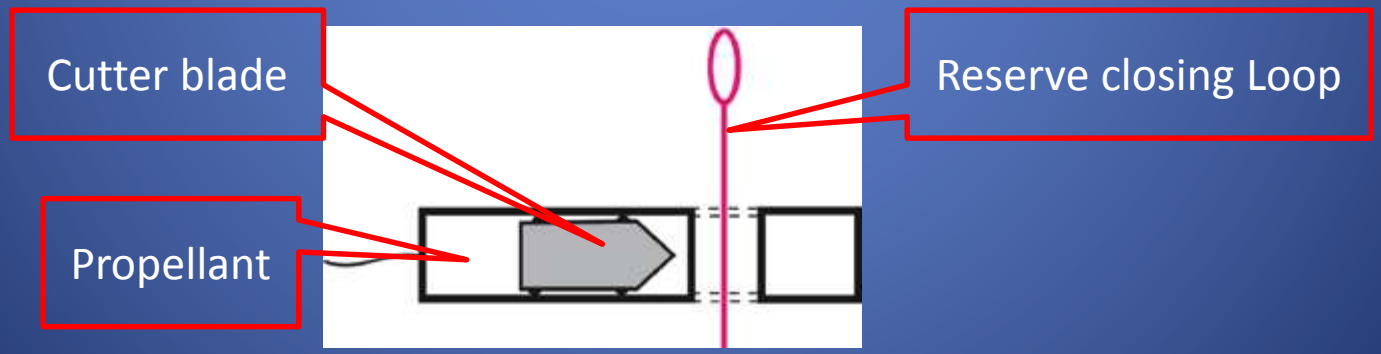
Typical System Components

Control Unit (User Interface)

Processing Unit.

Pyrotechnic Loop Cutter



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Cypres 2 Data Available in the Field

- Number of Jumps
- Serial Number
- Next Maintenance Due Date
- Error Codes

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Cypres Error Codes

- Error code number / error code description:
- 1111 or 2222
  - One or both of the attached release units are not correctly electrically connected to the unit. The reason may be a cable break, the cutter plug could be disconnected, or the release unit(s) may have activated.
- 3333
  - Excessive variations in ambient air pressure have been measured during the self-test period. The unit is unable to obtain consistent values for the ambient air pressure at ground level. Possible reasons could be that an attempt to switch CYPRES on has been made in a car driving uphill or downhill, in an elevator or in a flying aircraft.
- 8998/8999
  - Low Battery

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Cypres Operating Parameters

- Automatically shuts off after 14 hours of operation
- A Student, Expert or Speed CYPRES will not work if the aircraft is exited before it reaches 1500 feet (450m) above the airfield takeoff elevation and 1500 feet (450m) above the intended dropzone elevation. In the case of a Tandem Cypres 3000 feet (900m) has to be reached

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Cypres Operating Parameters

- Expert
  - 78 MPH / 750 feet (35M/Sec / 225 Meters
  - Shuts off below 130 feet (40 Meters)
- Tandem
  - 78 MPH / 1900 feet (580 Meters)
  - Shuts off below 130 feet
- Student
  - 78 MPH / 750 Feet
  - Or 29 MPH (13 M/Sec) below 1000 feet (300 Meters) (Can be activated under canopy!)
  - Shuts off below 130 feet
- Speed
  - 96 MPH (43 M/Sec) / 750 feet
  - Shuts off below 330 feet (100 Meters)

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Vigil

- Vigil 1, 2 and 2^+
  - Manufactured By Advanced Aerospace Designs
    Loop cutter technology
- Vigil 1 and 2 each can be programed to:
  - Expert
  - Novice
  - Tandem
- Xtream (Vigil 2^+)
- Data download capability in the field

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Vigil Data Available

- Error code number / error code description:

«**Bat Low**» Low Battery, the Vigil is still operational, but it is required to replace the dual battery pack as soon as possible.

«**Bat Rpl**» The dual battery pack must be replaced, the Vigil will not switch on.

«**Cut Err**» Cutter resistance is out of tolerance, the Vigil will not switch on.

«**Ctrl Err**» A discrepancy in one of the electronic circuits is observed, unit will not switch on.

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Vigil Data Available

- Display Note: the number 8 is used for illustration (all segments used in a number)
- **Ver** :8.88 Software Version
- **Lcd** :8.88 LCD version
- #88888 Electronic Unit Serial Number
- ⍰ 88/88 Production week and year
- (for example 26/06 = week 26 in 2006)
- **TJ** :18888 Total Jumps (Total number of jumps with this unit)
- **TFF** :88**h** Total Free Fall - Total free fall time with this unit in hours,
- 88**m**88**s** followed by **m**inutes and **s**econds
- **LFF :188s Last Free Fall -** Duration displayed is seconds
- **888 km/h** maximum speed of the last freefall displayed in km/h or mph
- **Saves** 18 Number of activations on your **Vigil®**
- **T**:+88°**C** or +88°F Temperature of **Vigil®** main unit in °F or °C depending on the configuration
- 88inHg or 8888hPa Atmospheric Pressure in inches of mercury (inHg) or hectopasca**l** (hPa)

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Vigil Operating Parameters

- After switched on, the Vigil stays on for a period of 14 hours and will then switch off automatically if at "ground zero" reference
- The unit re-calibrates itself every 32 sec
- During take-off the Vigil will go to an active status (8 measurements per sec.) when reaching 150 feet (+46 m or -46m) above or under the "GROUND ZERO" reference in a maximum time of 32 sec.

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Vigil Operating Parameters

- PRO Mode
  - The Vigil releases at 840 Ft. (256 Meters) and below until 150 Feet if the freefall speed is equal to or greater than 78 mph (35M/Sec)
- STUDENT Mode
  - The Vigil releases at 1040 Feet and below until 150 Feet if the freefall speed is equal to or greater than 45 mph
- TANDEM Mode
  - The Vigil releases at 2040 Ft. and below until 150 Feet if the freefall speed is equal to or greater than 78 mph
- XTREAM
  - The Vigil releases at 840 Ft. and below until 300 Feet if the freefall speed is equal to or greater than 96.81 mph (43.28 M/Sec)

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AAD Activation Altitudes

- A note about AAD activation altitudes
  - Both the Cypres and Vigil will activate at higher than published altitudes (750 Ft Cypres, 840 Ft Vigil) if the main is opened low or the jumper is on their back.
  - This is due to the location of the pressure sensor on the jumper's back and assumed face to earth body position upon activation

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Pressure Differences

AAD sensor in low pressure area

Difference = approximately 260 ft. (79 Meters)

AAD sensor in higher pressure area

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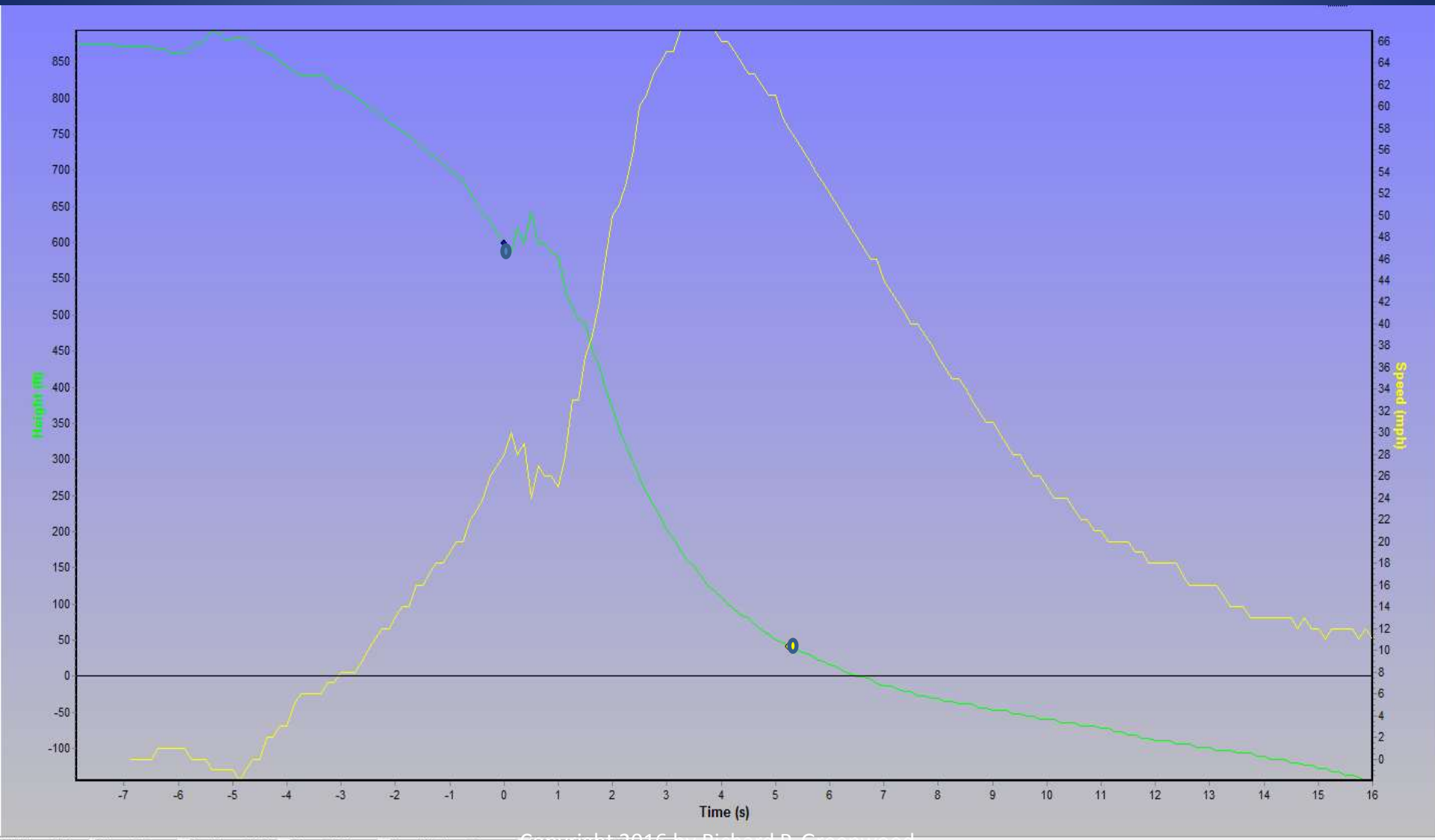
Examples of Vigil Downloaded data



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Height : -27 ft	Time : 7.8 sec	Serial nr : 20079	Start : 599 ft	Free fall time : 5 sec	Activated at 600 ft
Speed : 39 mph		Student	End : 51 ft	Max speed : 67 mph	No altitude correction

Audible Altimeters (AKA “Dirt Alert”)

PRO-TRACK

- Digital - Downloadable
  - Exit altitude
  - Opening Altitude
  - Freefall Speed
    - Average and Max
  - Opening Altitude
  - Stores detailed info for last 200 jumps
  - Stores number of jumps up to 9,999
- Contact manufacturer for downloading details

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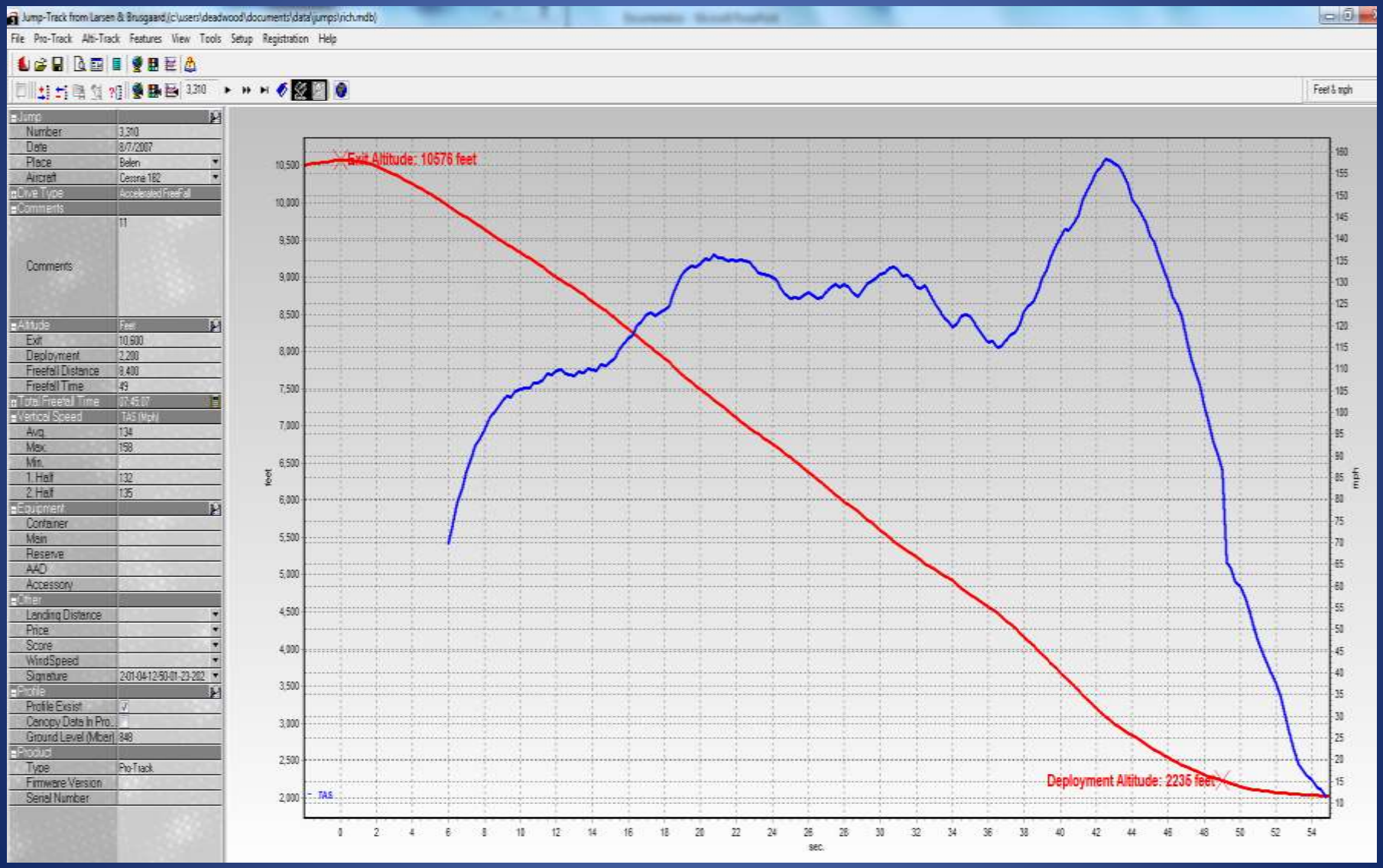
Pro-Track - Accelerated Freefall



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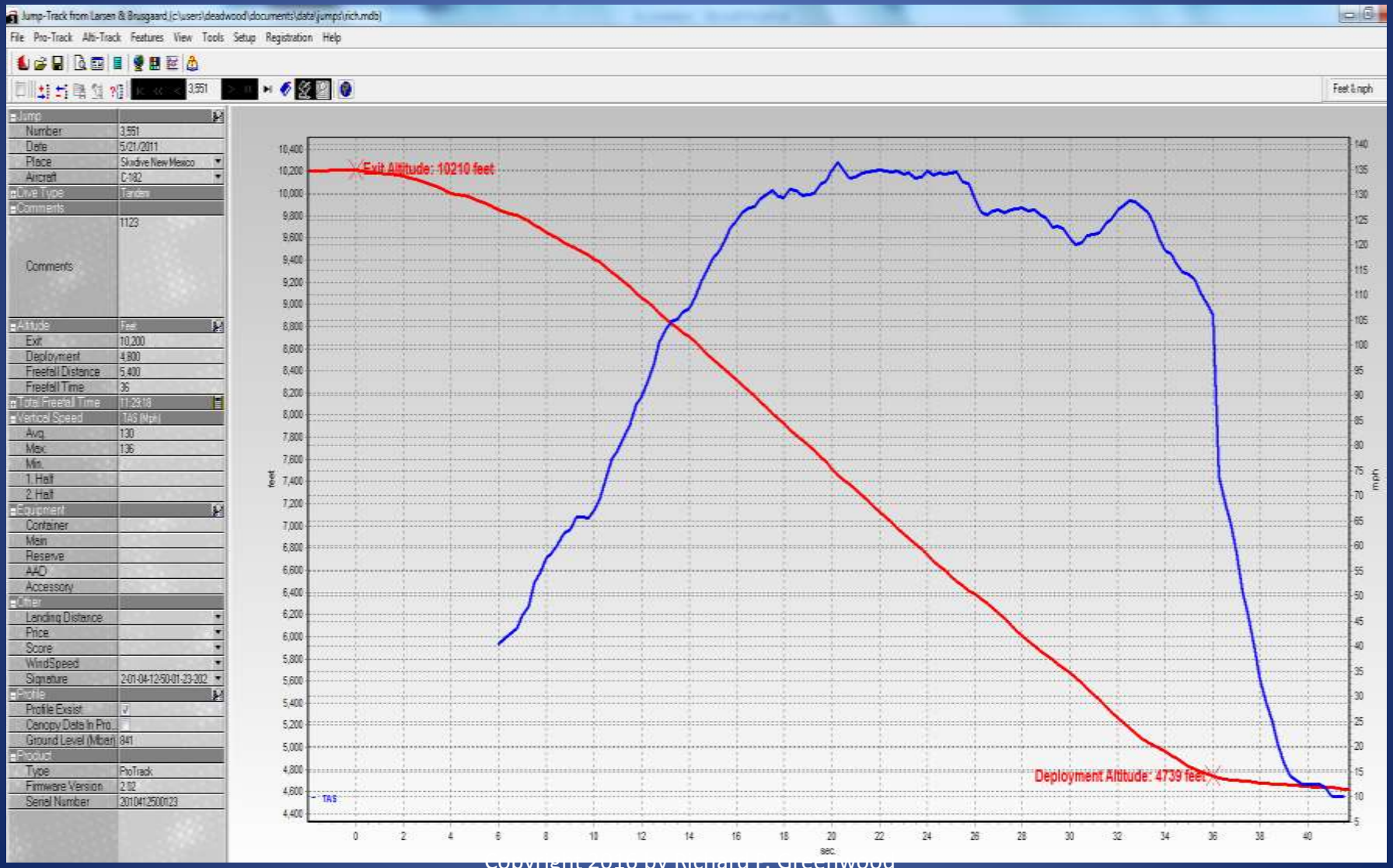
Pro-Track - Tandem



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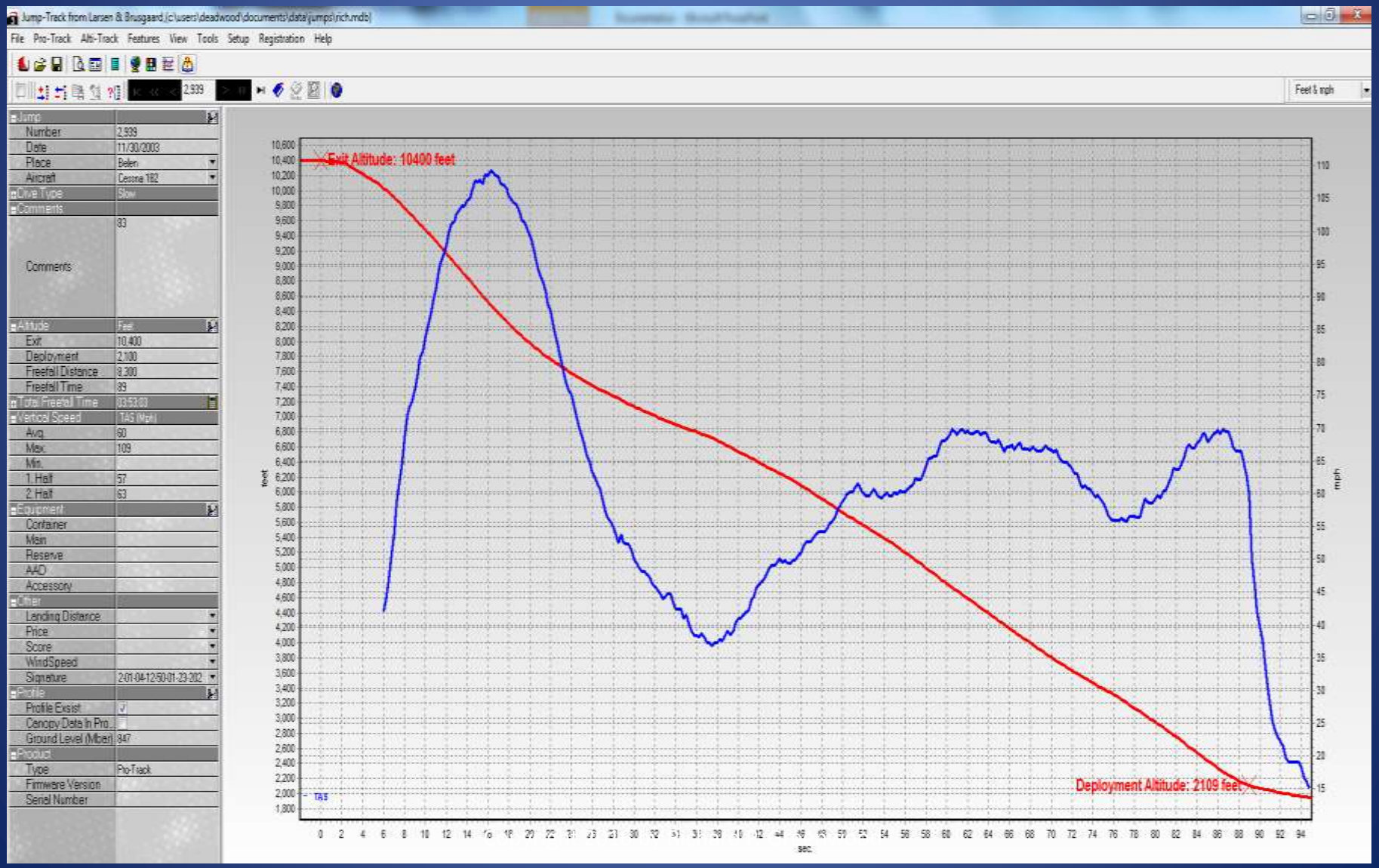
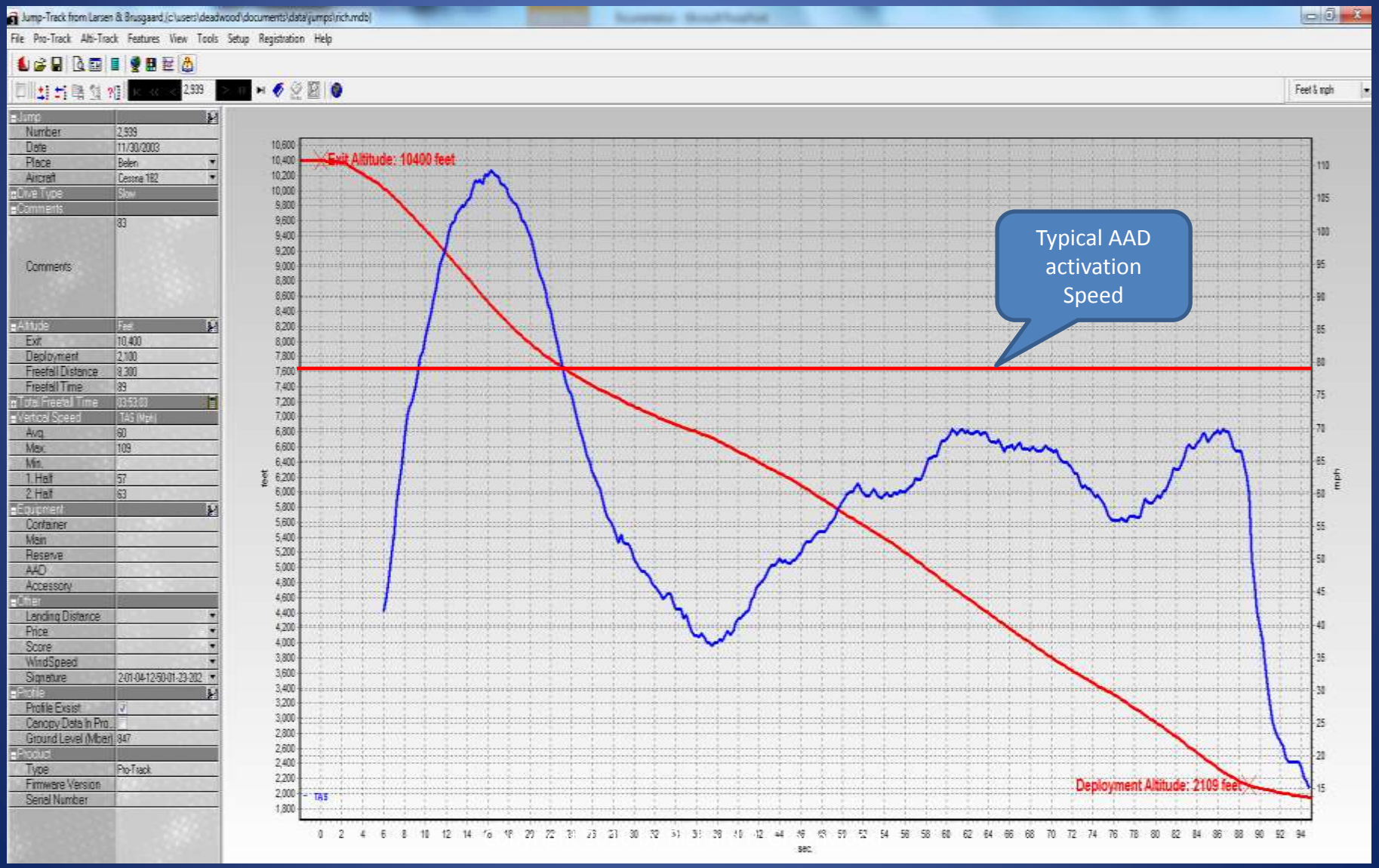
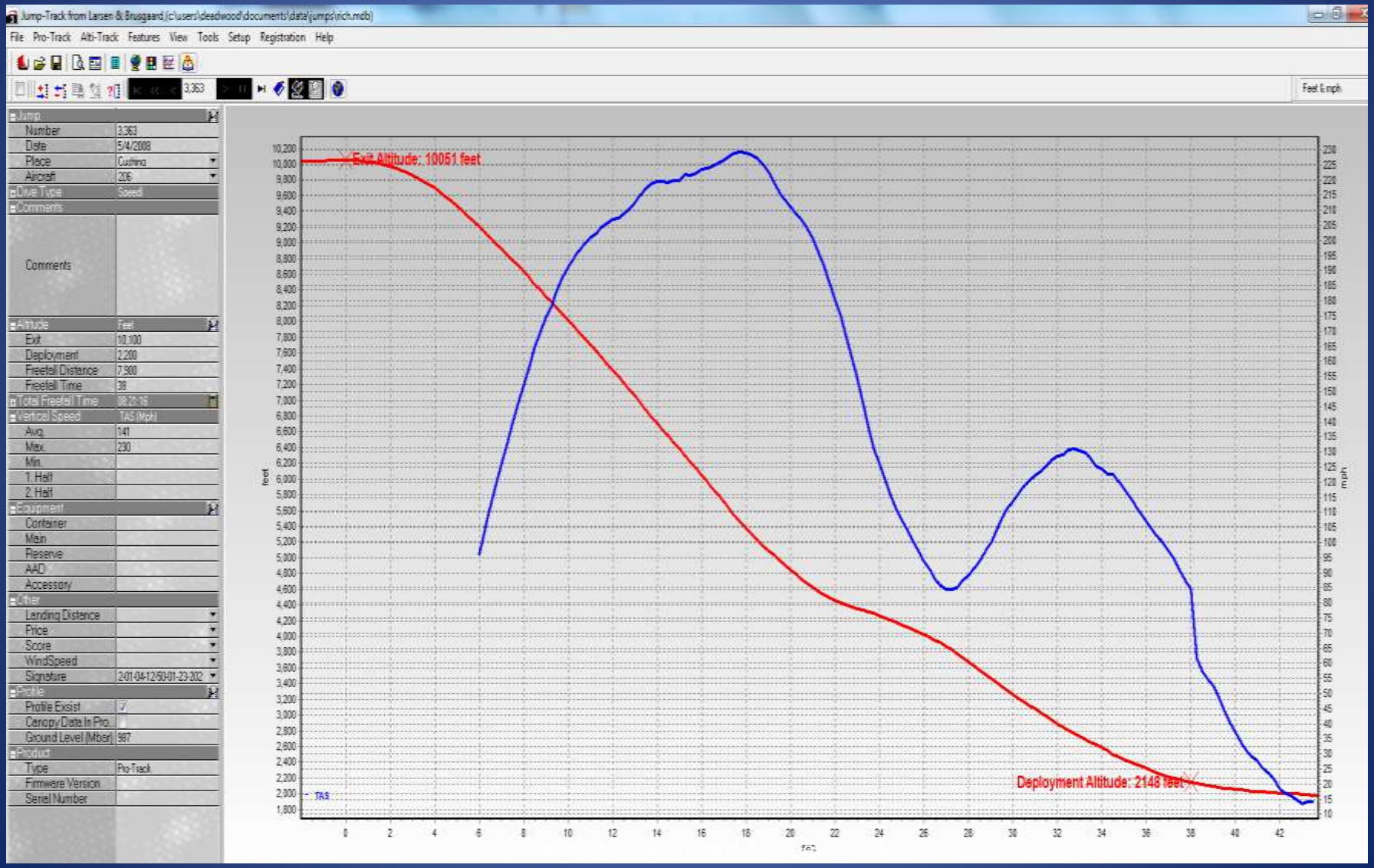
Pro-Track - Wingsuit



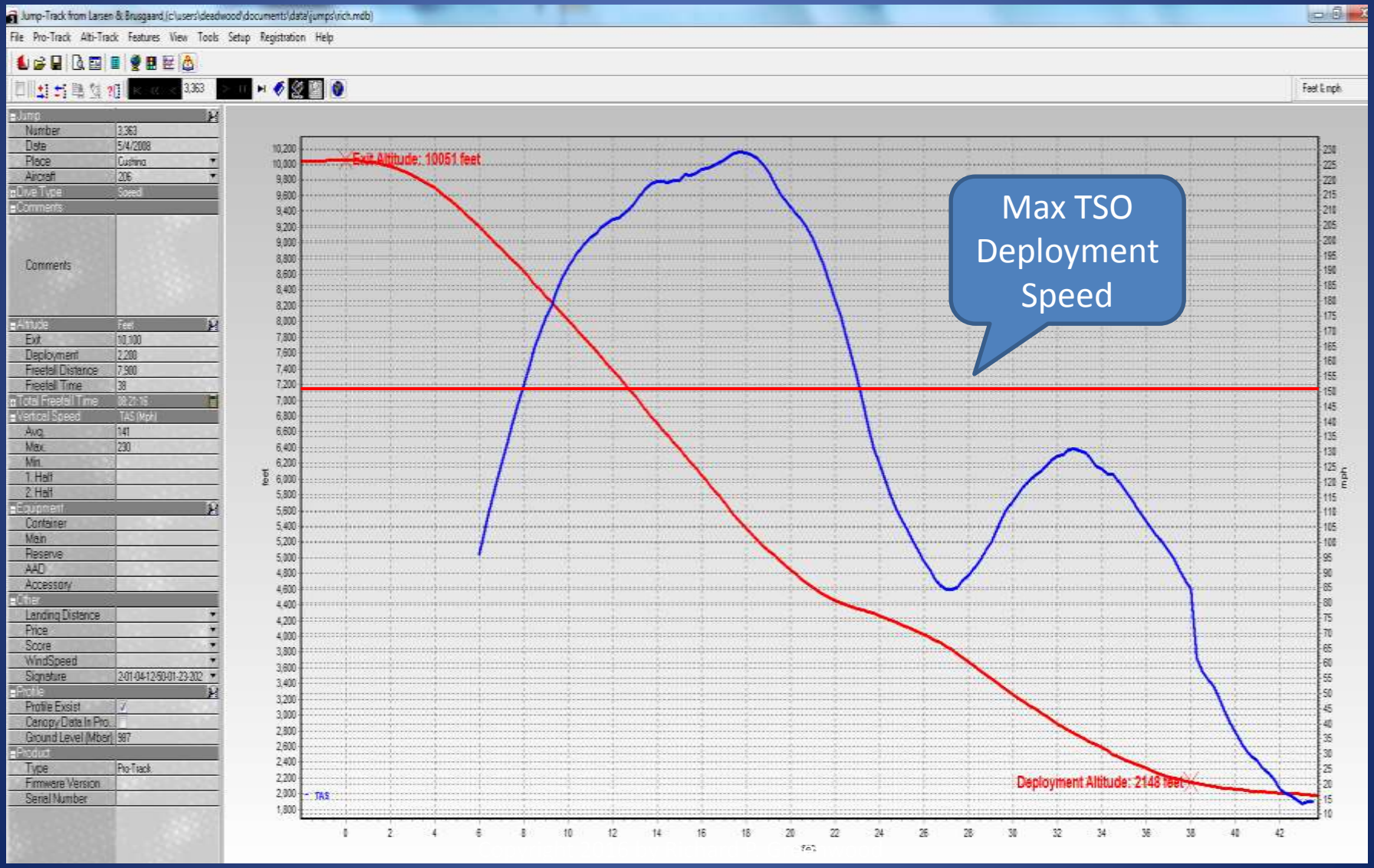
Pro-Track - Wingsuit



Pro-Track - Speed



Pro-Track - Speed



Altimeters

- Analog vs. Digital
  - Analog - No download capability but are testable in a pressure chamber
  - May show impact marks from needle slap
- Digital with Analog readout - Downloadable
  - May show impact marks from needle slap
- Digital with Digital readout- Downloadable
  - Exit altitude
  - Freefall speed
  - Opening altitude
  - Jump number tracking

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Altimeters - Analog

- No down load capability
- May be tested in a pressure chamber
- May have “Needle Slap” from impact

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Altimeters Digital

Digital with Analog display

Digital with Digital display

- May or may not be downloadable
- Usually does record jump information which the user can access on the display

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Cameras

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Parachute NVM

Questions?

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