



Flight Navigation Unit



SpaceShipOne is **hand flown** along a very precise trajectory to reach it's maximum altitude. To fly this optimal trajectory the Astronauts depend on **accurate flight path information** provided by the Flight Navigation Unit.

Scaled Composites contracted Fundamental Technology Systems (FTS) to help us develop an avionics system to guide the Astronaut on this mission. FTS developed all the hardware for this system and the software was jointly developed by Scaled and FTS.

Flight Navigation Unit

The Flight Navigation Unit is a **GPS inertial navigation system** comprised of the System Navigation Unit (SNU) and color LCD Flight Director Display (FDD).



System Nav Unit (SNU)



Flight Director Display (FDD)

- The System Navigation Unit provides full **six degree of freedom navigation** and guidance data to the Flight Director Display and to the ground via an RF telemetry downlink.
- In addition to navigation functions, the SNU also acquires and stores space ship system health information.
- The Flight Navigation Unit is installed in and performs similar functions for both the White Knight and SpaceShipOne.


- The FDD provides the Astronauts with **several display modes** depending on the phase of the flight (see graphic below). The data displayed includes:
 - Trajectory guidance
 - System health and status
 - Detailed moving map
 - Warning messages
- COTS software was leveraged when possible, particularly in the operating system and other development tools.

Data Reduction System (DRS)



- White Knight and SpaceShipOne data is received in Mission Control using a dual channel TM receiver in the Data Reduction System. The DRS can support downlink functions to 150 nm from the aircraft.
- The DRS provides data storage, display, and processing capability. The DRS commands the TM antenna toward SpaceShipOne or White Knight. Other output from the DRS is ported to the Mission Control computer network.

FDD Display Modes



Initialize

Boost

Entry

Glide