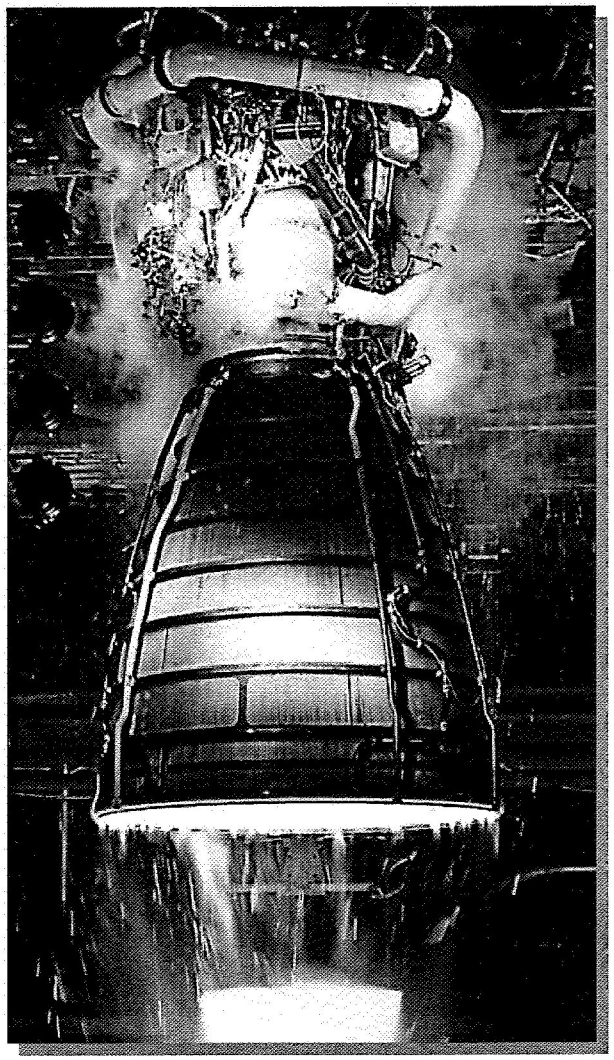
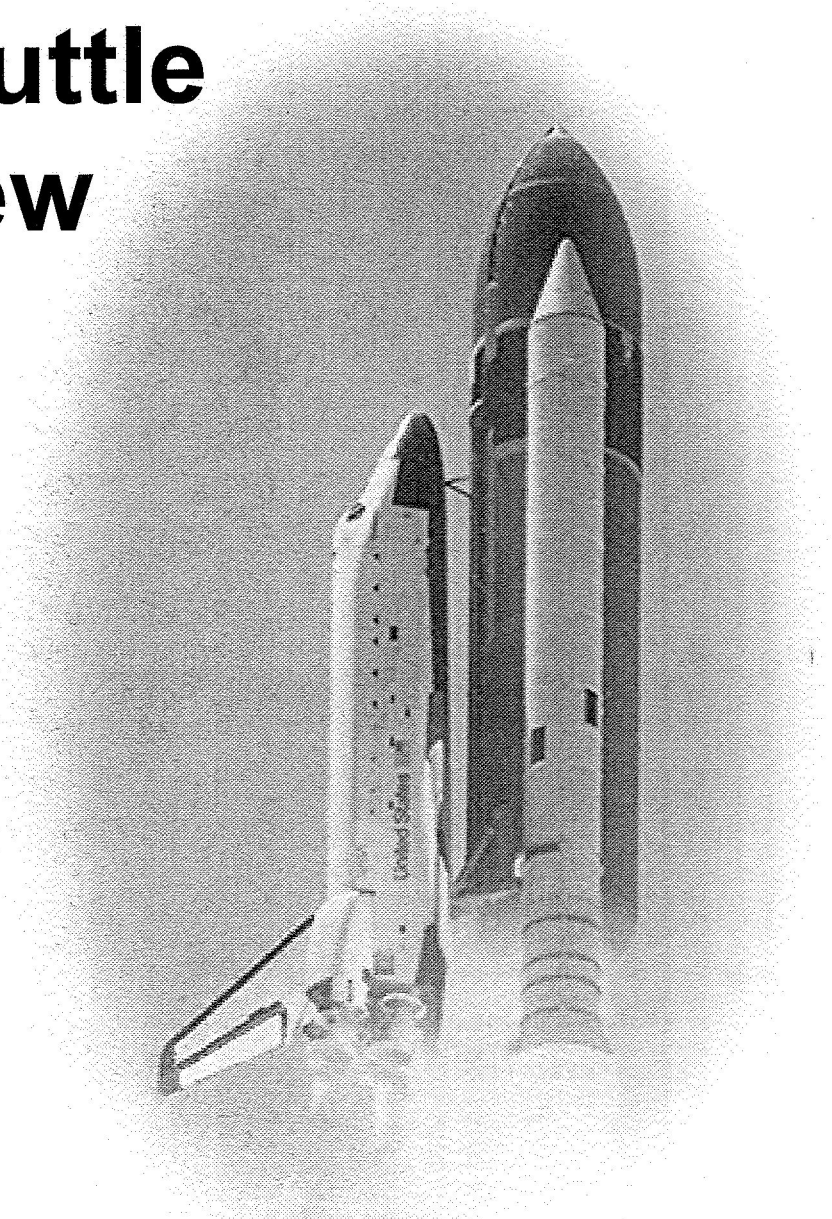
Abstract – Leslie McNutt

Many students are not even aware of the many activities related to the US Space Program. The intent of this presentation is to introduce students to the world of space exploration and encourage them to pursue math, science, and engineering careers. If this is not their particular interest, I want to encourage them to pursue their dream

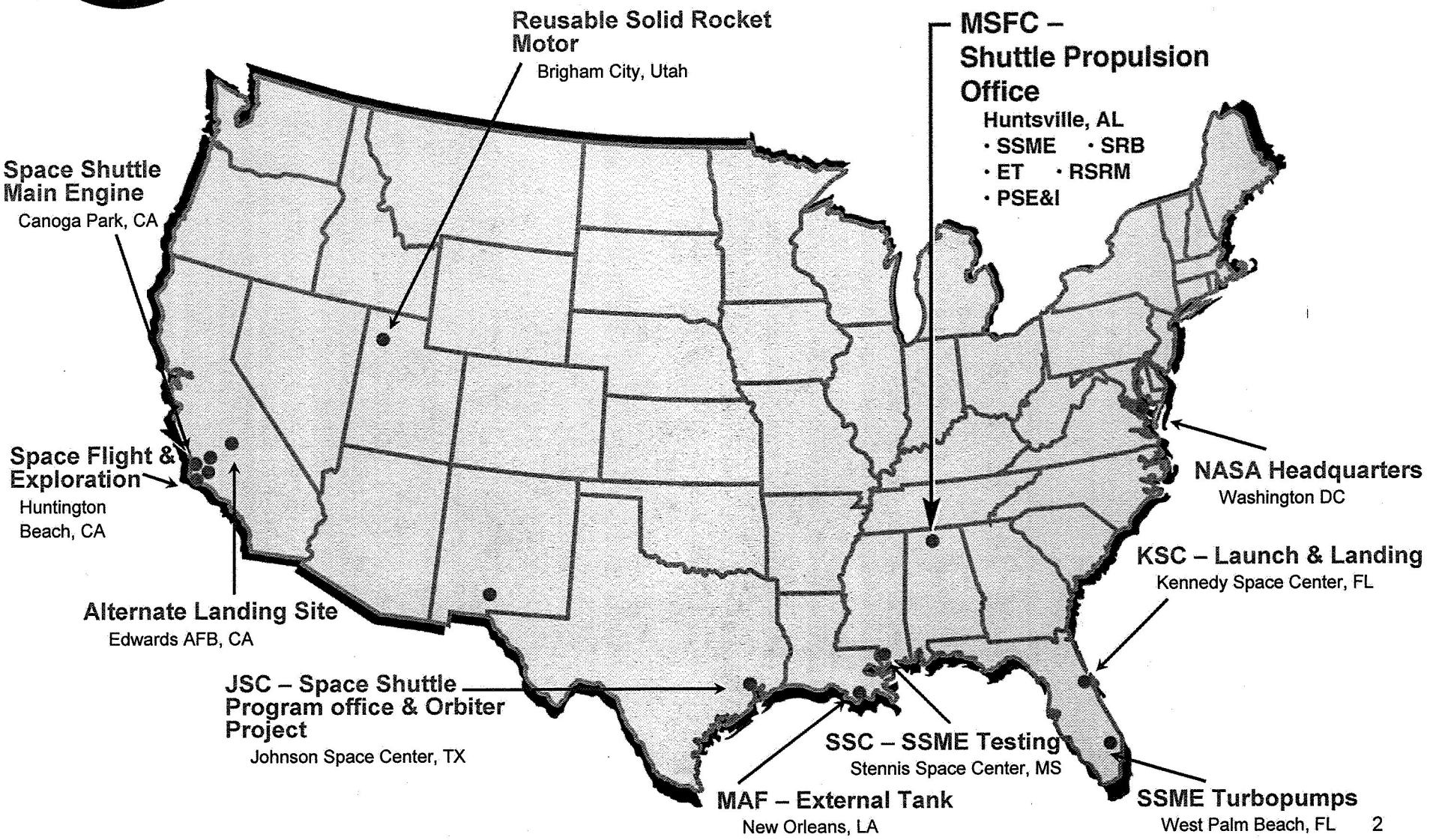
Space Shuttle Overview





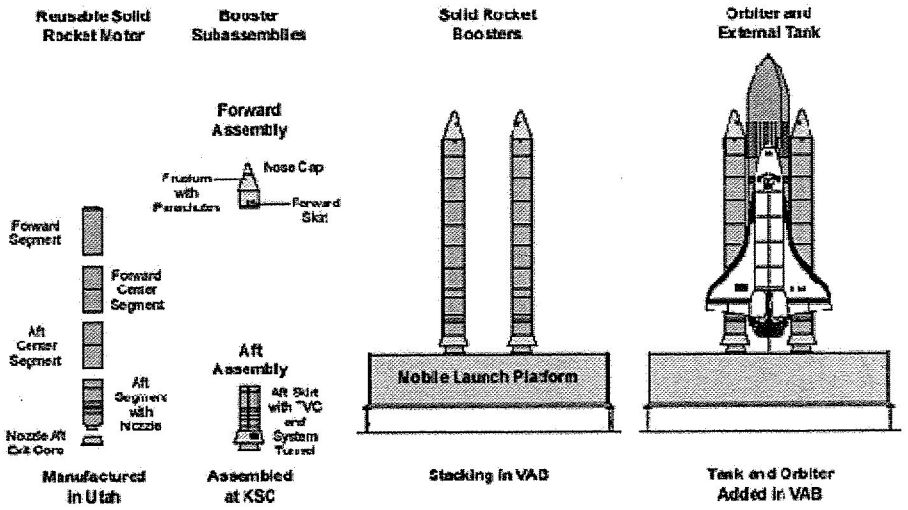
Leslie McNutt

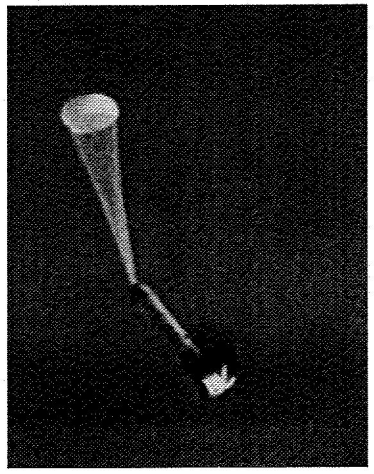
Where is the Shuttle Made?

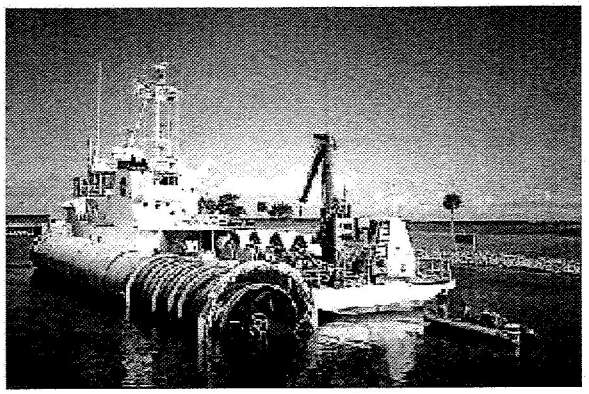


Space Shuttle Solid Rocket Booster (SRB) & Reusable Solid Rocket Motor (RSRM)

Amazing Facts

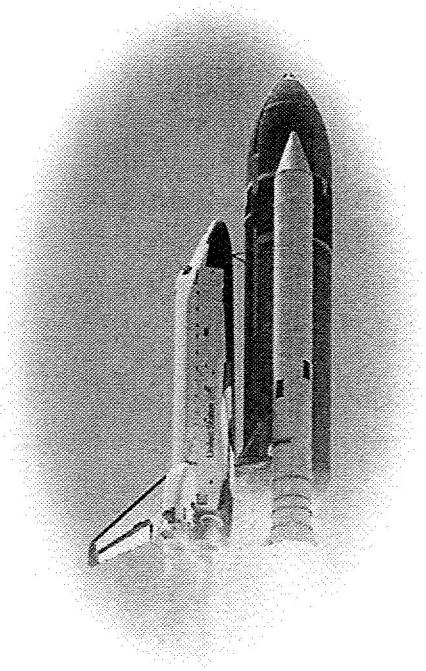




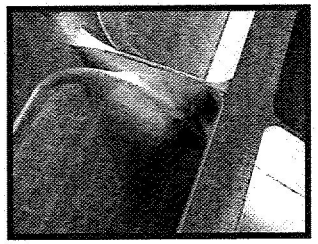


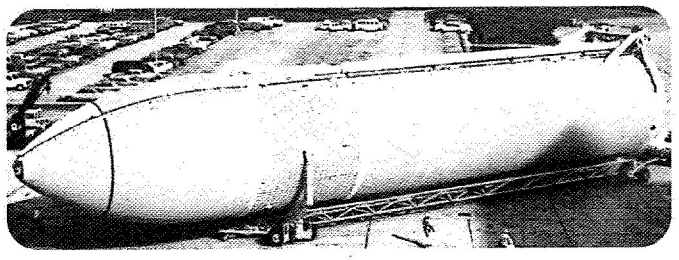
- World's largest solid rocket
- 149.1 feet high and 12.2 feet wide (1/2 football field long)
- After 2 minutes, boosters separate at 28 miles altitude at a speed of 3,100 mph.
- Three 136-foot wide parachutes slow the SRBs to a safe splashdown in the Atlantic Ocean.
- Boosters are recovered, refurbished and reused.
- The boosters are the heaviest object ever to be parachuted safely back to the surface!

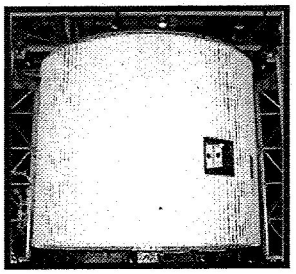
Space Shuttle External Tank (ET) *Amazing Facts*



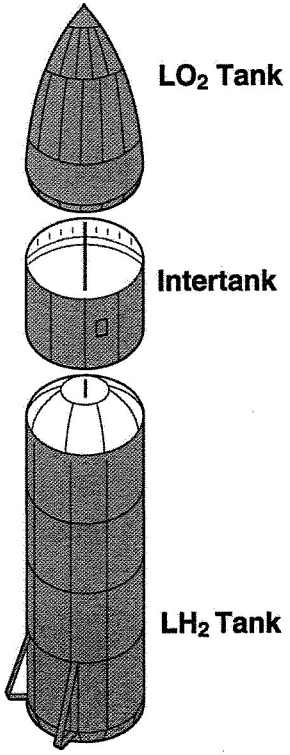
- Holds 380,000 gallons of liquid hydrogen (–423° F)
- 140,000 gallons of liquid oxygen (–300° F)
- Only major expendable Shuttle element





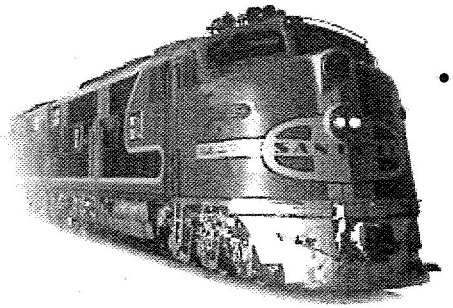


- ET covered with spray-on foam insulation that keeps the LH_2 at –423° F even in the hot sun

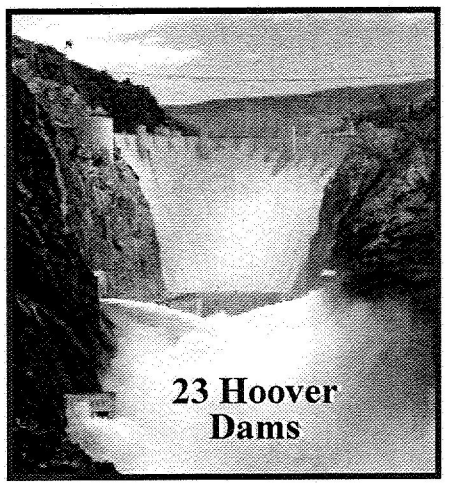


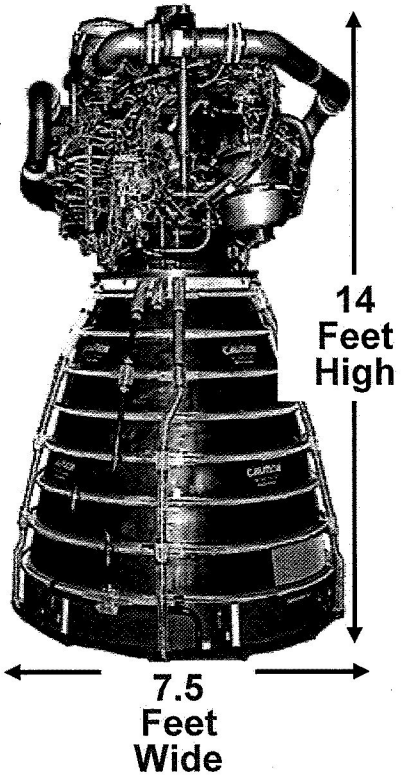
- Skin of the ET is less than 0.25 inches thick

Space Shuttle Main Engine
Amazing Facts

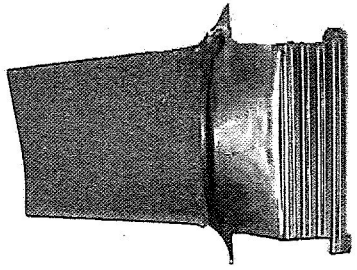


- High Pressure Fuel Turbopump (HPFTP) alone delivers as much horsepower as 28 locomotives





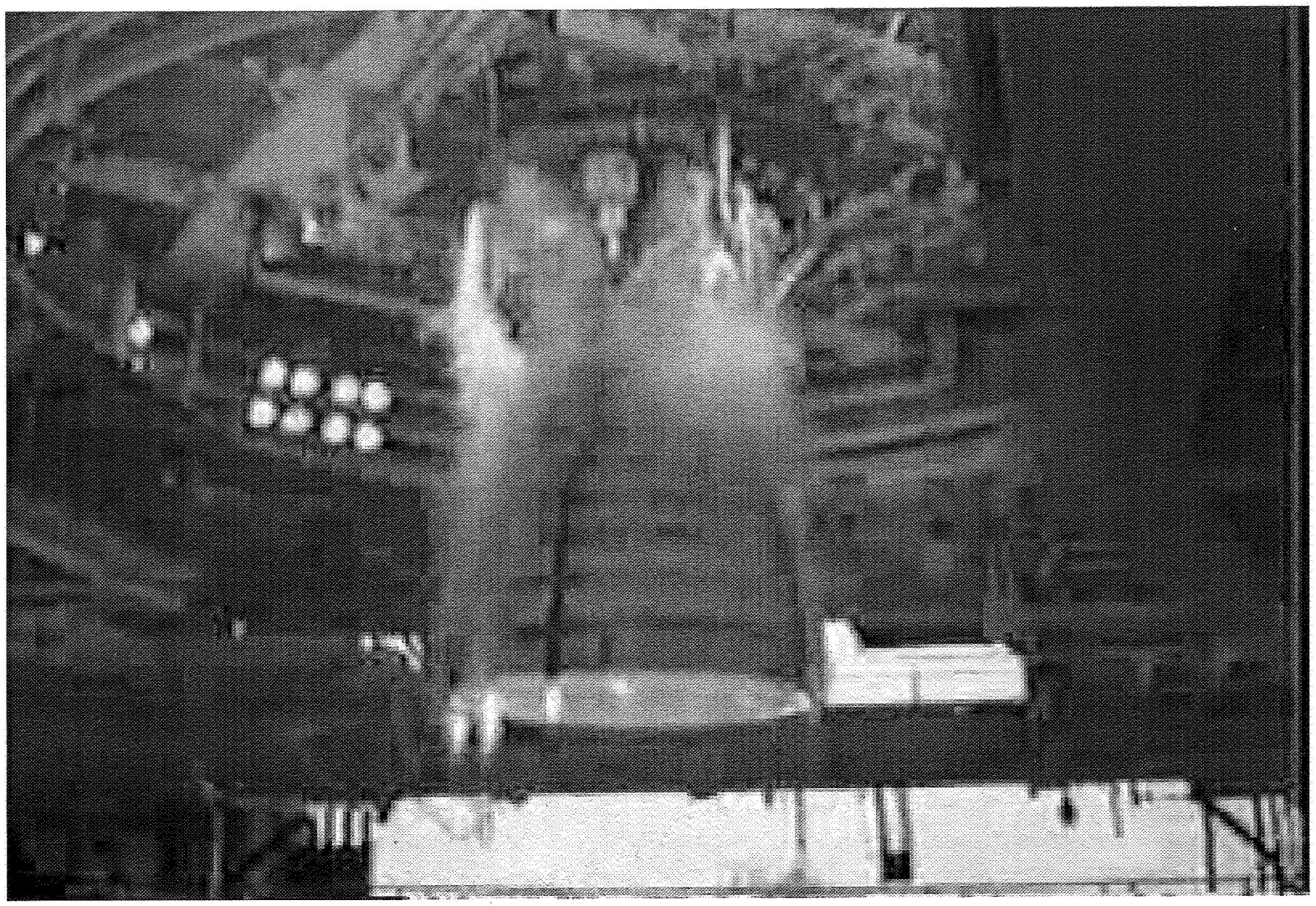
First Stage Turbine Blade



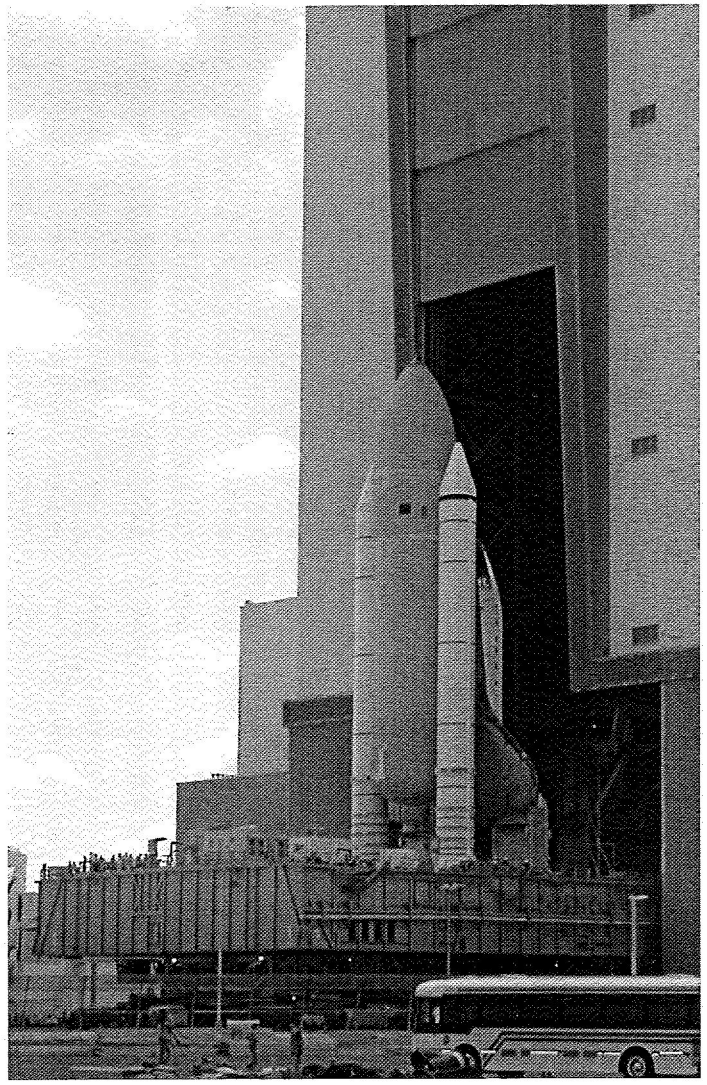
- Turbine Blades are one of the most critical components on the Shuttle

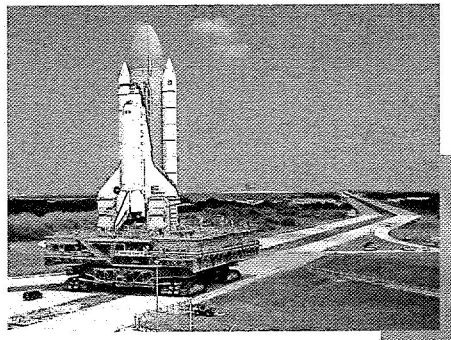
- Three main engines operate for 8 minutes, 40 seconds for each flight
- Combustion Chamber reaches +6,000 °F (hotter than the boiling point of iron)
- Three engines produce equivalent power of 23 Hoover Dams

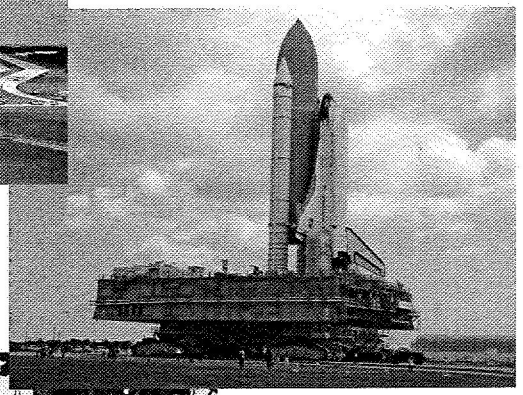
Space Shuttle Main Engine Test @ SSC

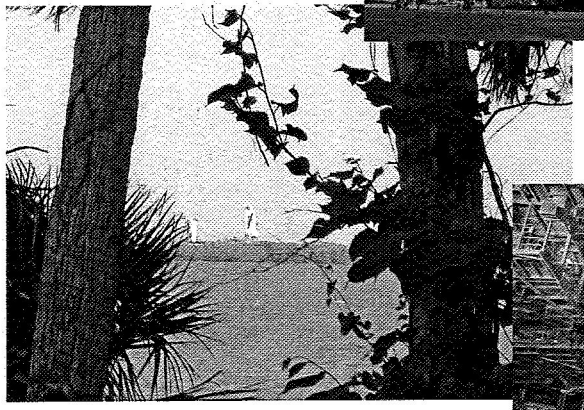


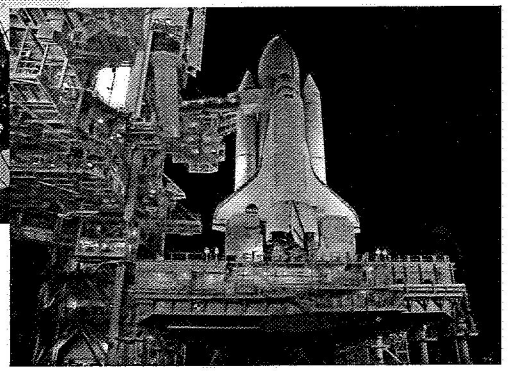
Space Shuttle
Going to the Pad (Rollout)



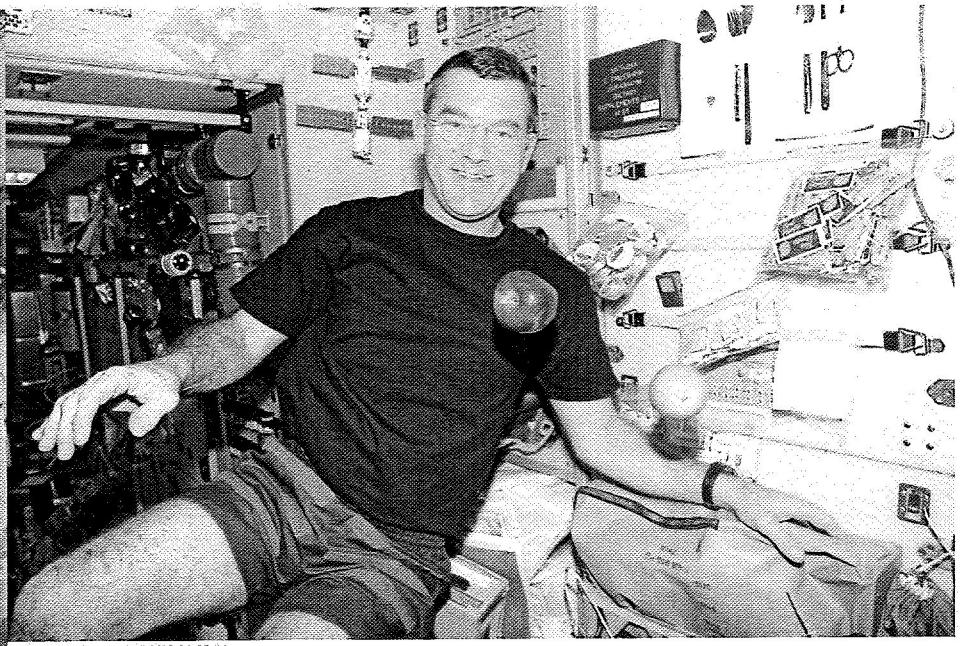






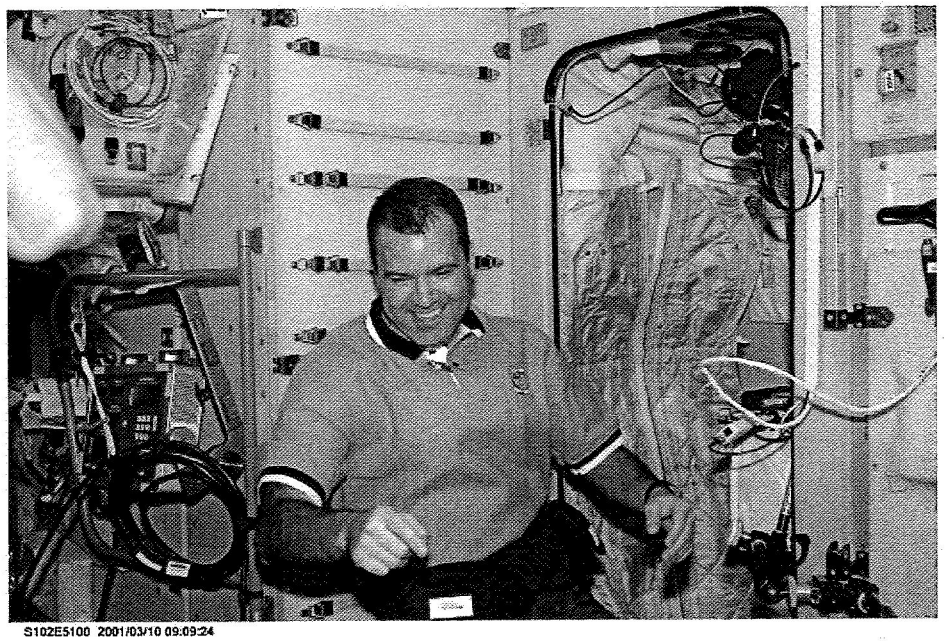


S102E5310 2001/03/19 01:45:37



ISS002E5710 2001/03/22 21:22:41

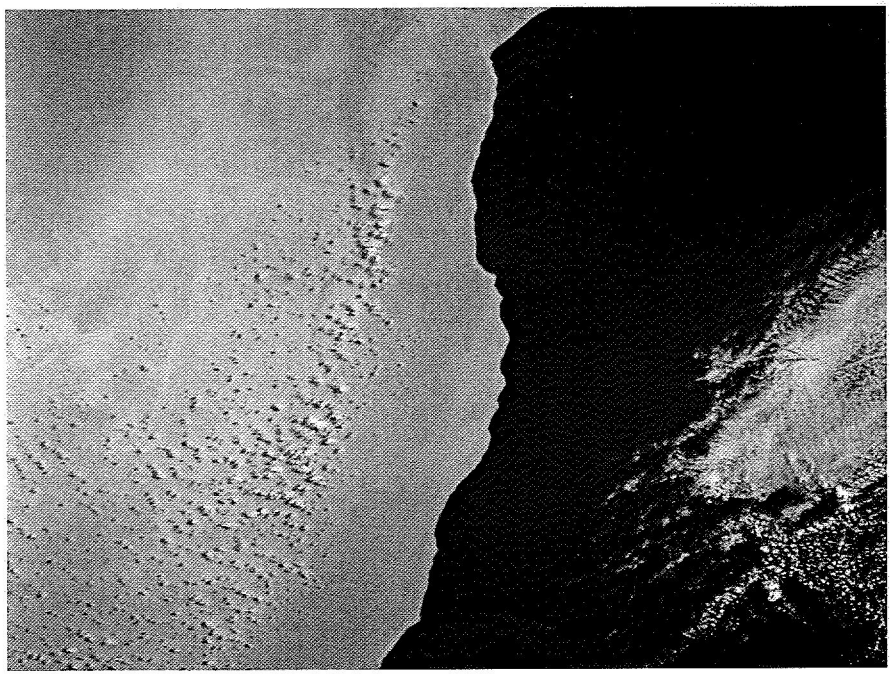
Living in Space



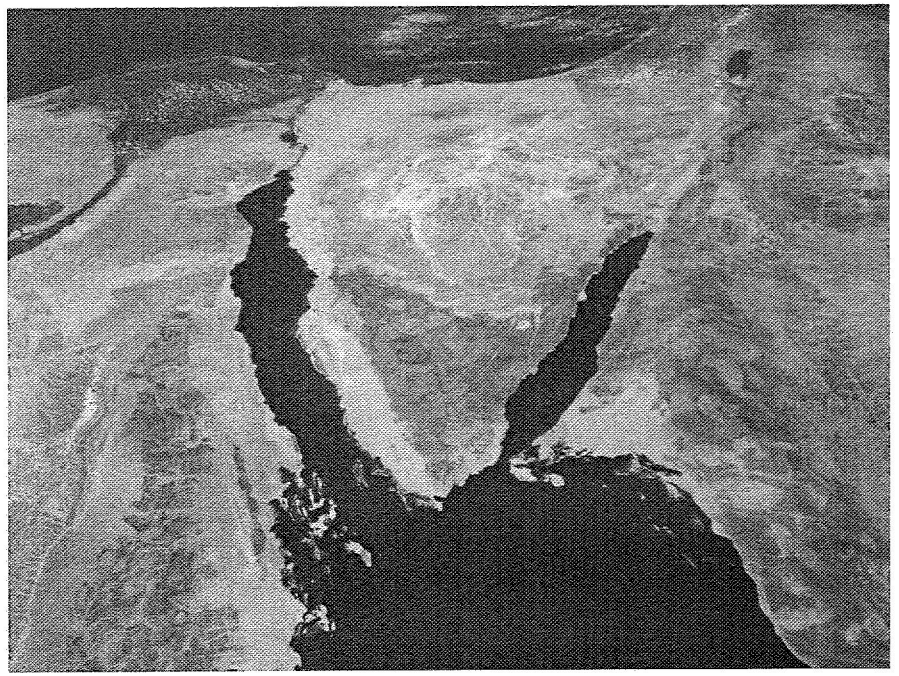
S102E5100 2001/03/10 09:09:24

ISS002E6526 2001/05/08 12:56:39

Pictures of Earth from Space

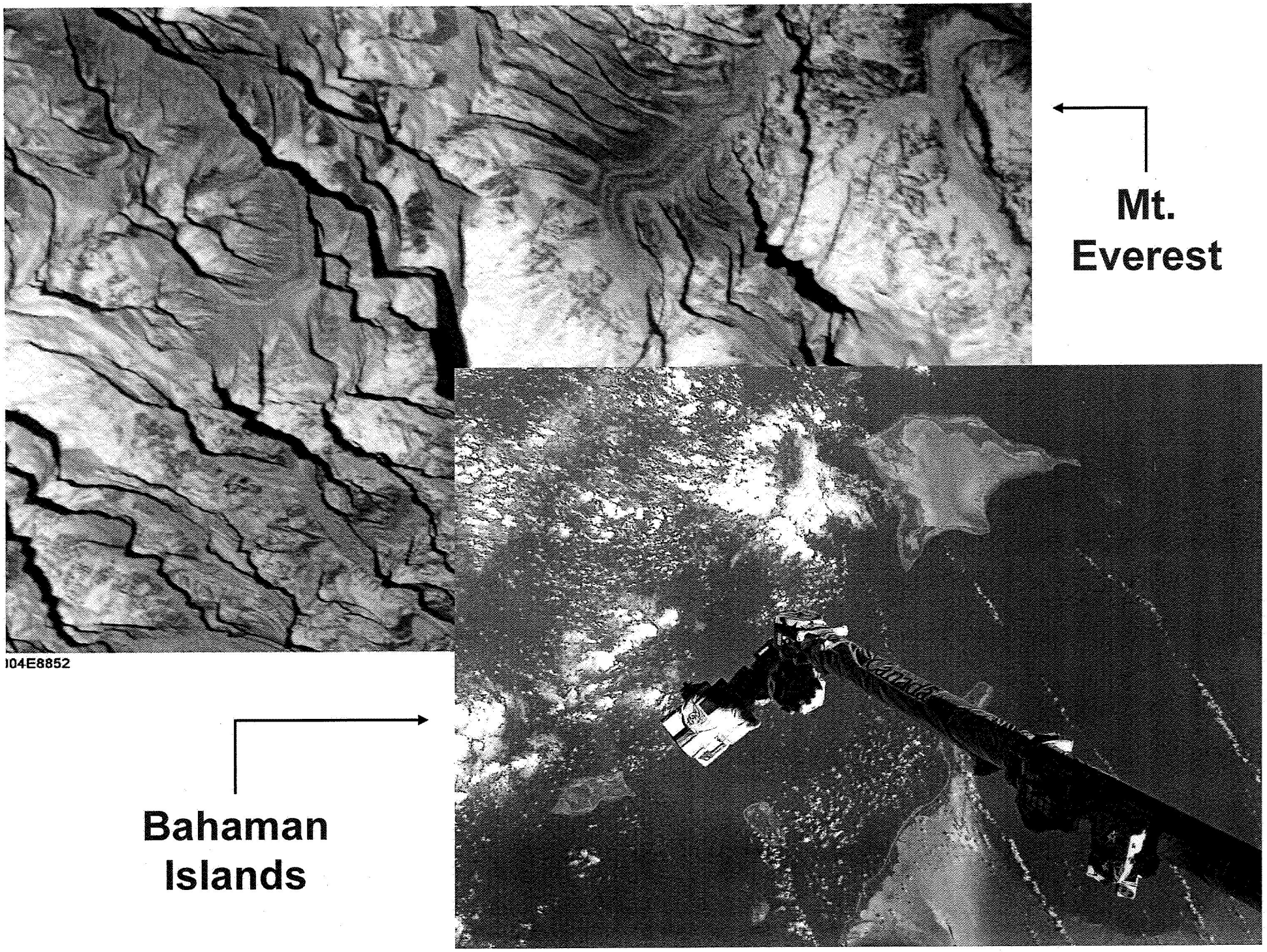


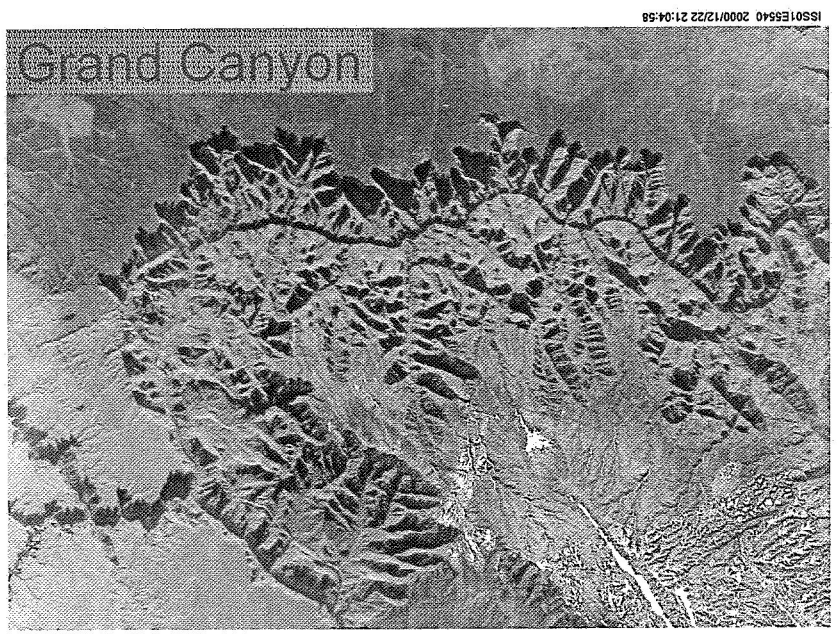
Coast of the Sahara Desert

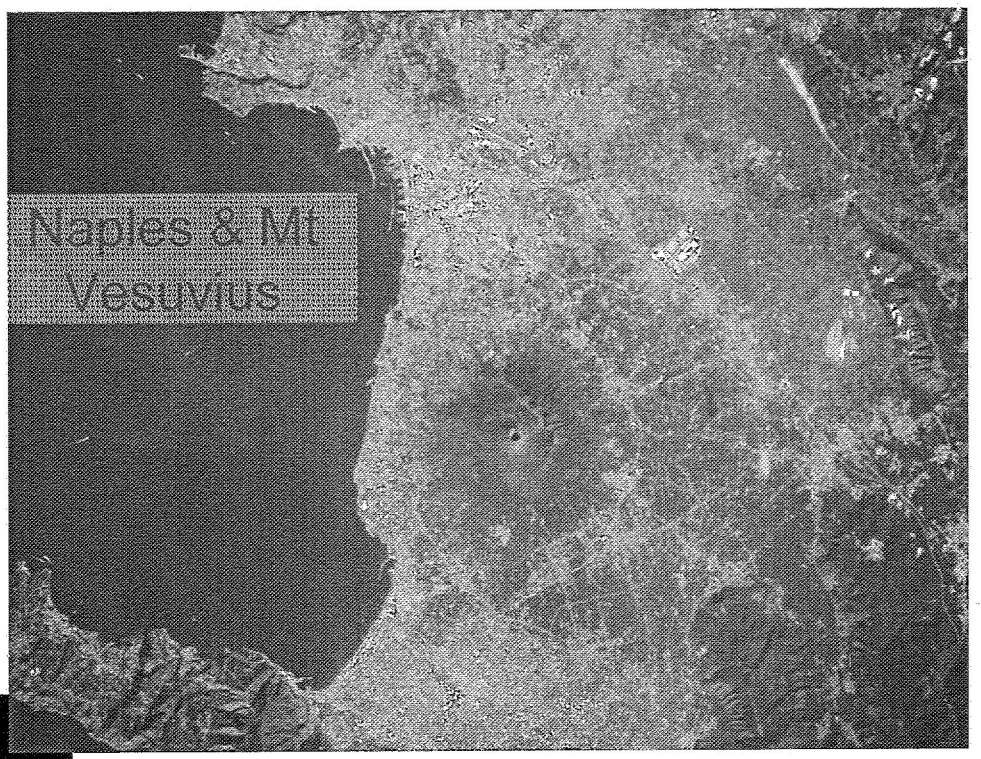


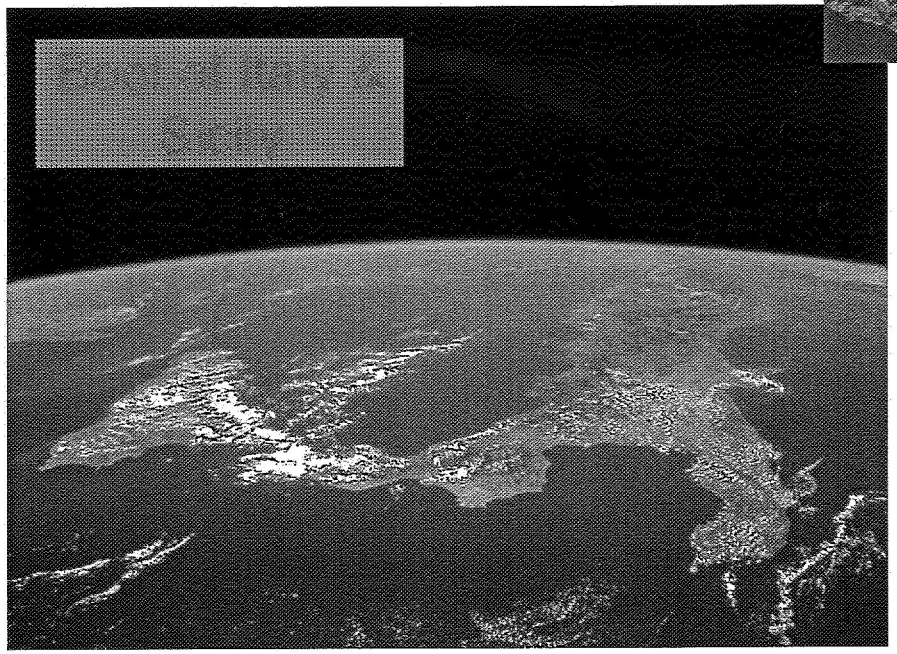
Sinai Peninsula

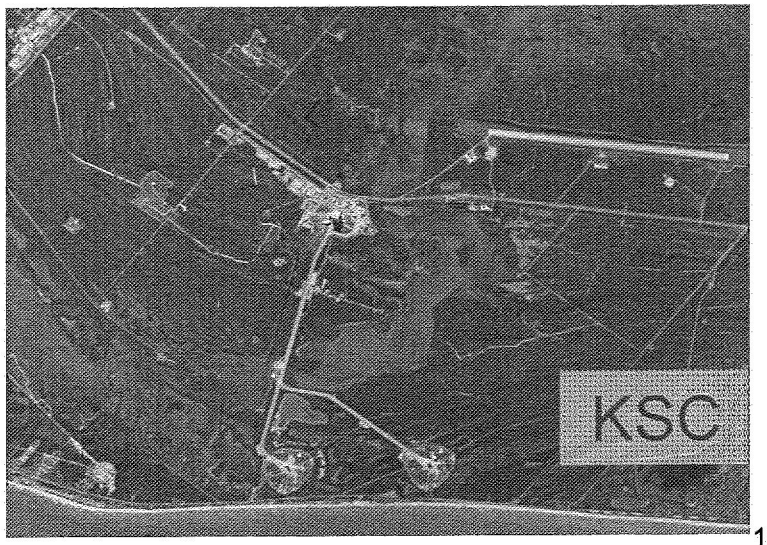
Manhattan in the snow


Mt.
Everest
104E8852
Bahaman
Islands


ISS01E5540 2000/12/22 21:04:58
Grand Canyon


Naples & Mt
Vesuvius




KSC

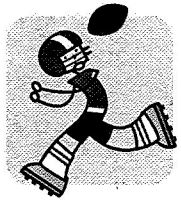
New York City - Sept 11th

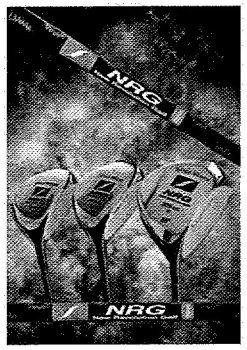
NASA Spin-offs

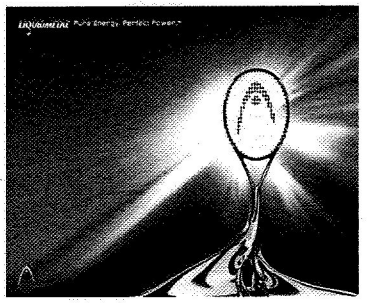
- Bar coding 

- Joystick controllers 
  - Computer games
  - vehicles for people with disabilities
- Smoke detector 
- Invisible Braces
-  Cordless Tools
- Portable Computer 
-  Satellite TV
- Non-Chlorine Water Purifier
- Video Stabilizer and Picture Extraction 
-  Thermal Gloves and Boots

- Space Pens 
- Laser Angioplasty
- Fire Fighter equipment 
  - Air tanks
  - Fire protection suits
- Improved Sports equipment
  - The Wave Shaft
  - Liquidmetal used in tennis rackets and baseball bats
  - Shock Absorbing Helmets

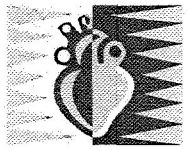
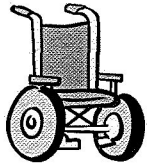




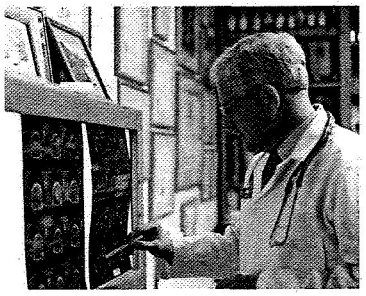


NASA Spin-offs

- Advanced Pacemaker
- Implantable Heart Aid
- Implantable and External Pumps
- Temperature Pill
- Infrared Thermometer
- Body Imaging

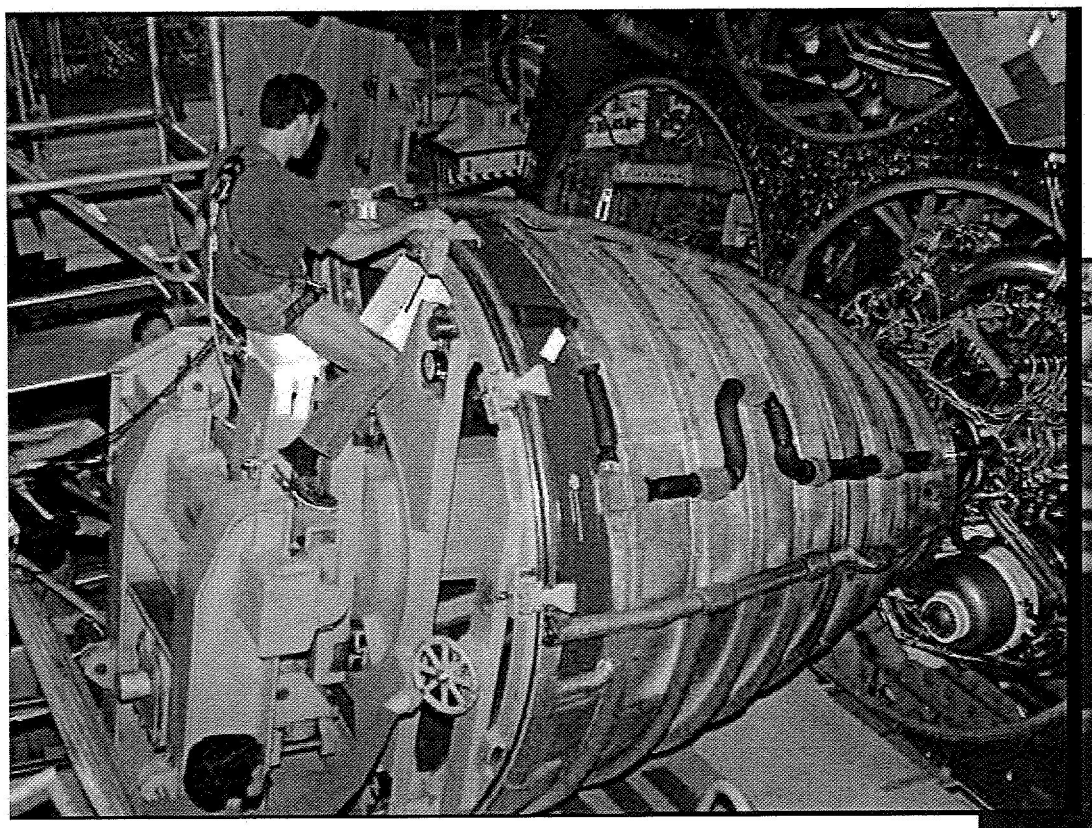


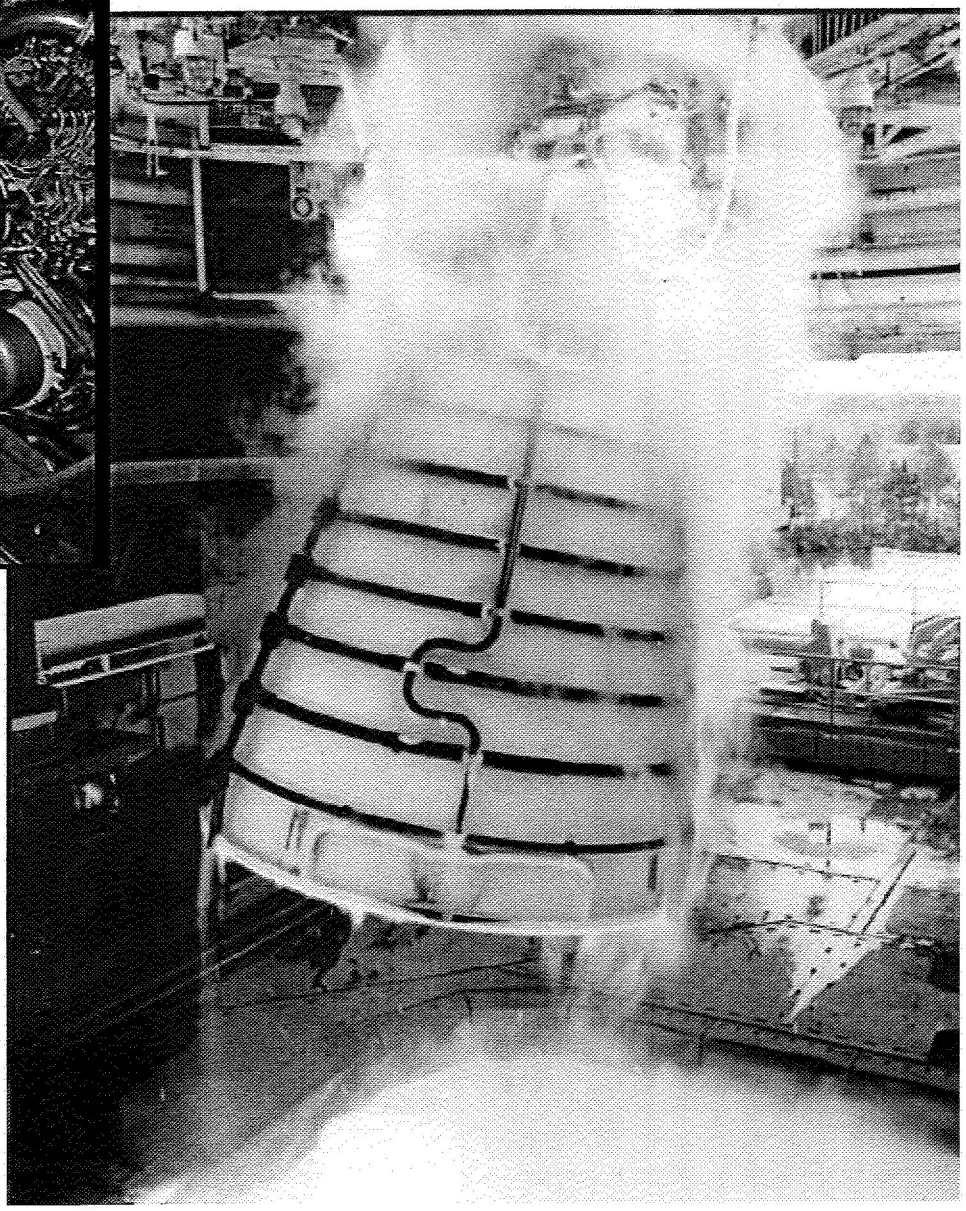



- Computer Reader for the Blind
- Cool Suit
- Advanced Wheelchair
- Food Processing Control
- Radiation-Blocking lenses
- Safety Grooving
- Lightning Protection





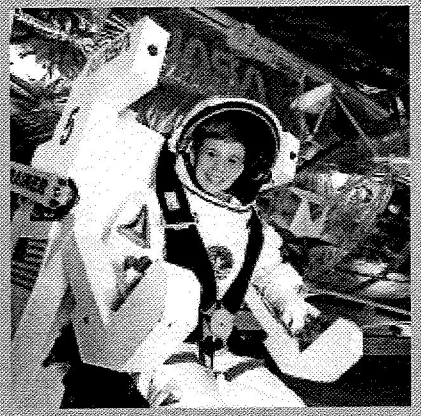


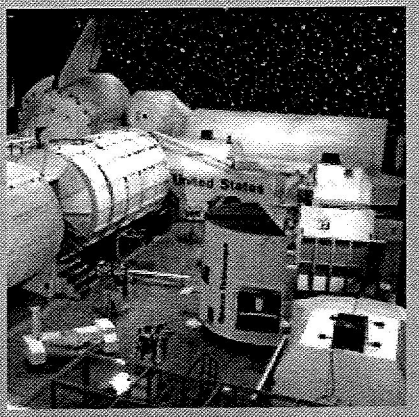


SSME Hardware

STS-114 Crew of Discovery

U.S. Space and Rocket Center
Space Camp





I have learned to use the word impossible with the greatest caution

- Wernher von Braun