INTERORBITAL SYSTEMS' NEPTUNE DEDICATED SMALLSAT LAUNCHER:

2013 Test and Launch Manifest Updates

Cal Poly San Luis Obispo CubeSat Developers' Workshop, April 25, 2013

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Interorbital Systems

www.interorbital.com

CPM TEST VEHICLE on MOBILE ROCKET LAUNCHER

Storable Propellant Rocket Engine Technology

-- Successful test of attitude-control thruster and rocket controller

-- IOS is first in the US to use high-density nitric acid and turpentine as propellants of choice

GPRE 7.5KNTA CPM Main Engine Static Firing

-- Bi-propellant storable, high-density, hypergolic liquid rocket system: Nitric Acid / Turpentine

-- Thrust = 7,500 pounds at sea level

-- ISP 235 seconds (sea level); Density specific impulse 316 seconds (sea level); Vacuum ISP = 295 sec

-- Blowdown propellant feed; no ignition system or turbopumps required

-- State-of-the-art, all-composite combustion chamber and nozzle

-- Replaceable ablative chamber cartridge yields plug-and-play engine reusability

-- Designed for rapid mass production

COMMON PROPULSION MODULE (CPM)

-- Basic building block/construction element of the modular N-Series Rockets

-- Bi-propellant storable, hypergolic liquid rocket system

-- Blowdown propellant feed

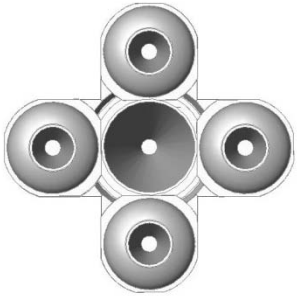
-- All-composite propellant tanks

-- Single gimbaled rocket engine; roll-control thrusters on single CPM units (3rd stage of N7 or 2nd stage of N5)

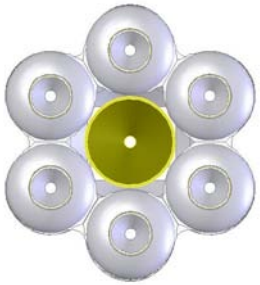
-- CPMs clustered together in multiples to meet mission requirements for both small and large payloads

-- Stand-alone sounding rocket SR145: 145 KG to 310km: Want to test your ion engine? Payload Space Available!

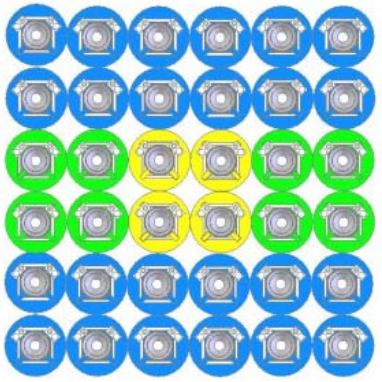
SELECT CPM CONFIGURATION EXAMPLES



N5
5 CPMs
Three stages
Payload: 30 kg



N7
7 CPMs
Three stages
Payload: 50 kg



N36
36 CPMs
Three stages
Payload: 1,000 kg

Three-Stage Orbital Launch Vehicle with Parallel Staging

-- Seven (7) Common Propulsion Modules (CPMs)

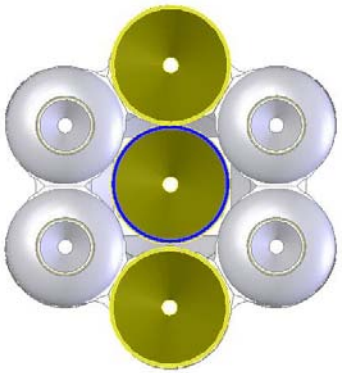
-- Stage 1: 4 CPMs: Thrust = 30,000 pounds

-- Stage 2: 2 CPMs: Thrust = 17,000 pounds

-- Stage 3: 1 CPM: Thrust = 8,500 pounds

-- Length: 36 feet (10.97 m); Maximum diameter: 6.2 feet (1.89 m)

-- Payload: 110.25 lbs (50 kg) to a 192 mile (310 km) polar orbit



Advantages of Canister Ocean Launch: How To…

Ocean Launch Flexibility Advantage

-- Allows the customer to set the launch schedule

-- Safer for manned launches

-- Allows rocket to be positioned for any orbit

-- Doesn’t set a limit on the size of a launch vehicle

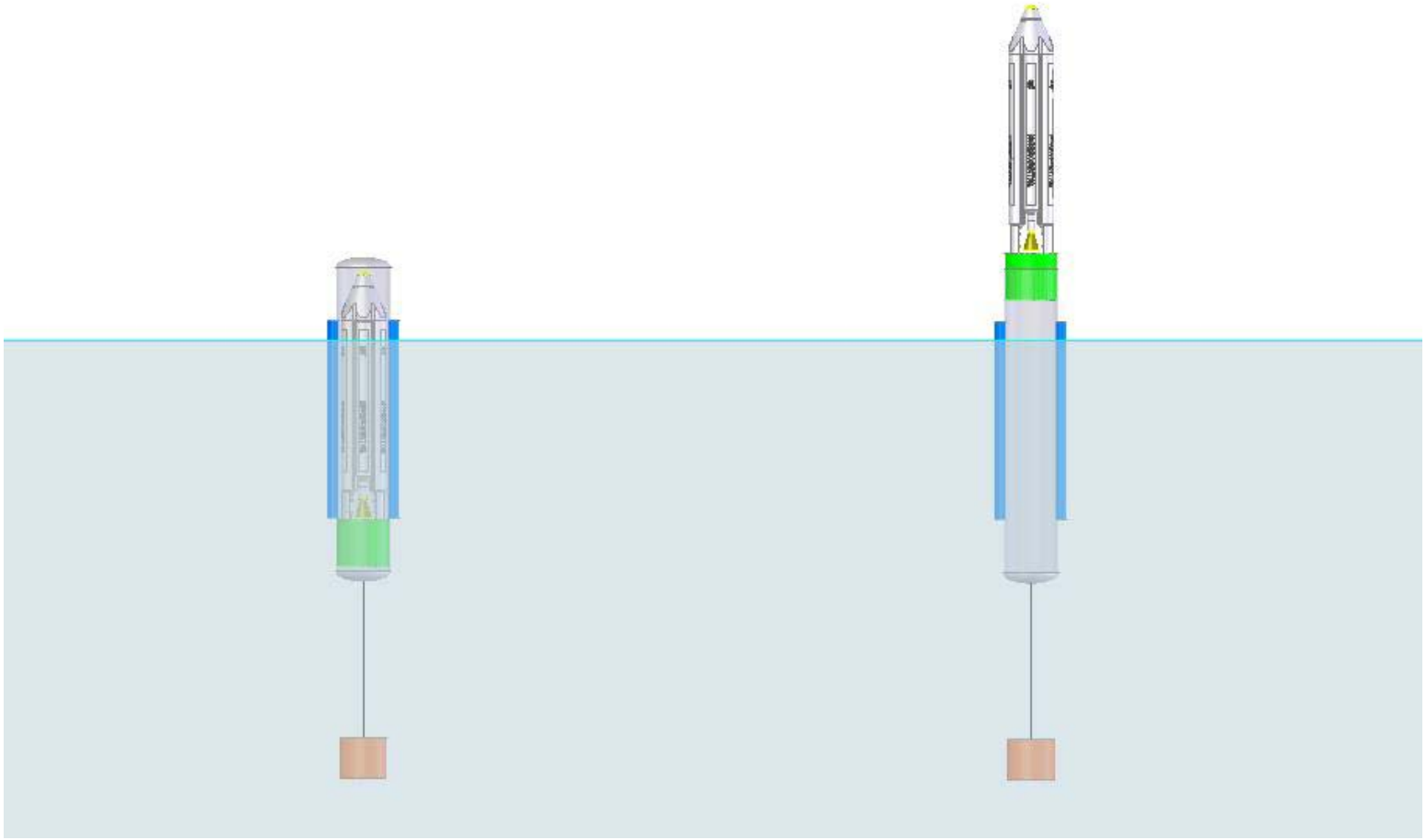
-- Requires only a minimum of launch support hardware

-- Rapid-response; no waiting in a spaceport line

-- The most cost-effective launch option

N7 Canister Ocean Launch

N7 Canister Ocean Launch Sequence



Ocean-Based Launch Site

-- Pacific Ocean off the coast of Southern California

-- 135 to 175 miles west of Los Angeles on the open ocean

-- Launch direction is to the south for both polar and sun- synchronous orbits

-- The launch site and orbit can be modified according to the customer's requirement

-- Dedicated to small sat polar and SSO launches

-- Makes Launch-on-Demand Possible!

Hawai’i Ocean Launch Option

Canister ocean-launch staged from the Big Island of Hawai’i is ideal for near-equatorial and lunar missions---and no ITAR issues! Interorbital’s Google Lunar X PRIZE Team SYNERGY MOON launches are likely to originate from this location, which is also well-suited for interplanetary small-sat launches.

INTERORBITAL'S UPCOMING MISSIONS

Completed Phase I NASA SBIR Small Business Innovative Research Award 2012

CPM TV: Low-altitude suborbital test flights 2013 under FAA Class 3 Waiver
SR 145: High-Altitude Sounding Rocket Launch: 145kg to 310km

Olav Zipser High-Altitude Jump Record Attempt from SR 145 CPM

NEPTUNE Small-Sat Orbital Missions I and II 2014
Google Lunar X PRIZE Lunar Missions 2015
Private-Sector Lunar Sample/Return Mission 2015-16
Orbital Expeditions Space Tourism Flights 2015-16

Interorbital Systems
www.interorbital.com

IOS TUBESAT/CUBESAT PERSONAL SATELLITE KITS

-- PCB Gerber Files

-- Spectrolab TASC solar cells

-- A Li-ion battery pack (3.7 V 5200 mAh)

-- Microcomputer (NetMedia BasicX-24 or Arduino Mini)

-- Transceiver (Radiometrix)

-- Antennas,

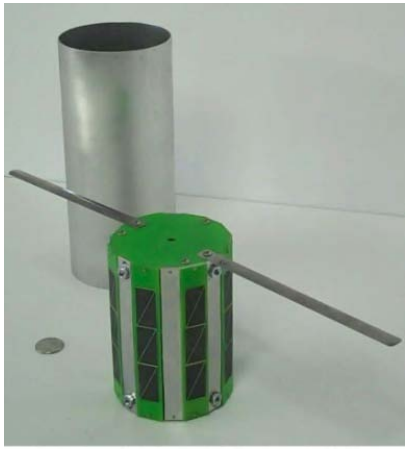
-- Fasteners

-- Complete instructions and assembly guide

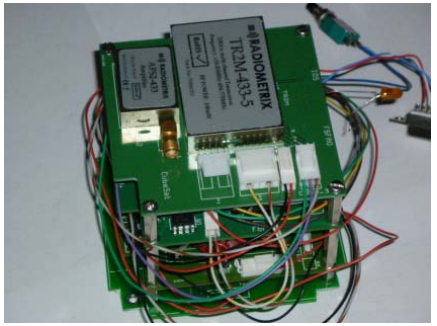
-- Academic base-price for IOS TubeSat kit is $8,000

-- Academic base-price for IOS CubeSat kit is $19,125

IOS CubeSat Kit



TubeSat with Sample Ejection Cylinder

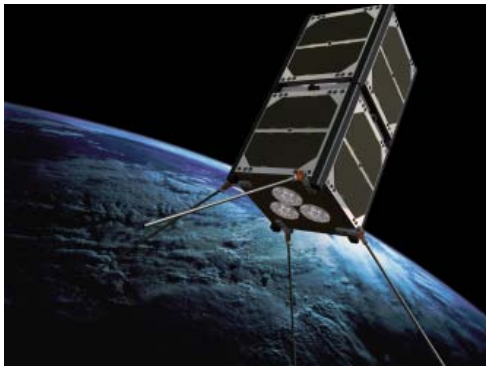


All kit prices include a launch to orbit on a NEPTUNE rocket!

CubeSats

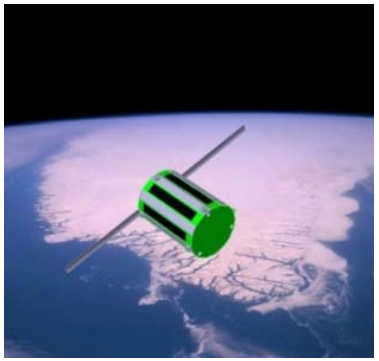
UC Irvine, UCISAT1
FPT University, Vietnam, F-1 CubeSat
Nanyang Technological University, Singapore VELOX-P CubeSat,
Google Lunar X PRIZE(GLXP) Team PLAN B (Canada)
GLXP Team EuroLuna, Romit 1 (2-Unit CubeSat from Denmark)
New! GLXP Team SYNERGY MOON: Tesla Telescope Project (3U)
NASA Independent Verification and Validation (IV&V) Facility, 1 CubeSat & 2 TubeSats
King Abdullah University, Saudi Arabia (KAUST) (2 IOS CubeSats;1TubeSat; 1 suborbital payload)
The Golden iPod: Voyager revisited! Earth-to-Sky/spaceweather.com; Bishop, CA, STEM Program
Pakistan's Islamabad Institute of Science and Technology
New! Taiwan's National Cheng Kung University, 2U TARO-2

Denmark's GLXP Team Euroluna: *Romit 1,* 2U (2-Unit Double) CubeSat



TubeSats

Morehead State University (Kentucky Space) (TubeSat and 2 suborbital payloads)
InterAmerican University of Puerto Rico; STEM Program
University of Sydney (Australia) (2) *i-INSPIRE (initial-INtegrated SPectrograph, Imager & Radiation Explorer)*
Aslan Academy (Private LA High School) STEM Program
Project Calliope (Space Music Project) Dr. Sandy Antunes' Mission to Sonify the Ionosphere
Universidad de Puerto Rico / Marcelino Canino Canino Middle School, STEM micro-meteoroid impact study
GLXP Team SYNERGY MOON Space-Qualifying Rover Team Astronomska Udruga Vidulini's (AUV) Comms
GLXP Team Part-Time Scientists / Fluid & Reason Software (2) (US/Germany): Wes Faler's FRETS 1
Naval Postgraduate School (3) (TubeSats as ad-hoc orbital communication nodes) and 2 suborbital payloads
Defense Science and Technology Lab (DSTL) United Kingdom; Earth Observation/Remote Sensing
Austrian Arts Group mur.at with MURSAT-1: Earth-as-Art Project
United States Military Academy at West Point (2) STEM Program
Brazilian Space Institute/108 5th-7th Grade Students, Ubatuba, Sao Paulo, Brazil STEM Program
Mexican Satellite Project ULISES-1 Sat from PLAY Festival's Arts/Soccer Opera from Space
TriVector Services (Huntsville) TRACsat – TriVector Radiation and Attitude Control Satellite
Diverbo.es/Iniciativas en Idiomas (Madrid, Spain)
NASA Independent Verification and Validation (IV&V) Facility (2); STEM Program
Galaxy Global, 1 TubeSat, donated to NASA Educational Program
Institute of Advanced Media Arts & Sciences (IAMAS)/The Science Project, Inc. Japan (7)
AKQA (All Known Questions Answered) Advertising, San Francisco
Universidad de Chile, Santiago
New! University of Sao Paulo, Laboratory of Integrated Systems, Brazil (2)
New! David Lawrence K-8 School, North Miami, Florida; STEM Program Curriculum
New! RADG--- Undisclosed Advertising Project
New! OMNI LABS (Brazil): 'Project Transcendence' Celebration of Art, Science, and Humanity
New! 4-H/Ute Mountain Youth/Colorado State University Extension STEM Satellite Project
New! KEN KATO, Private Satellite Project, Japan



INTERORBITAL'S ROCKET TECHNOLOGY TESTING, FIELD TRIALS, and LAUNCH CREW TRAINING