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FALCON

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Microcosm

Scorpius[®] Vehicle Family



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April 22, 2004

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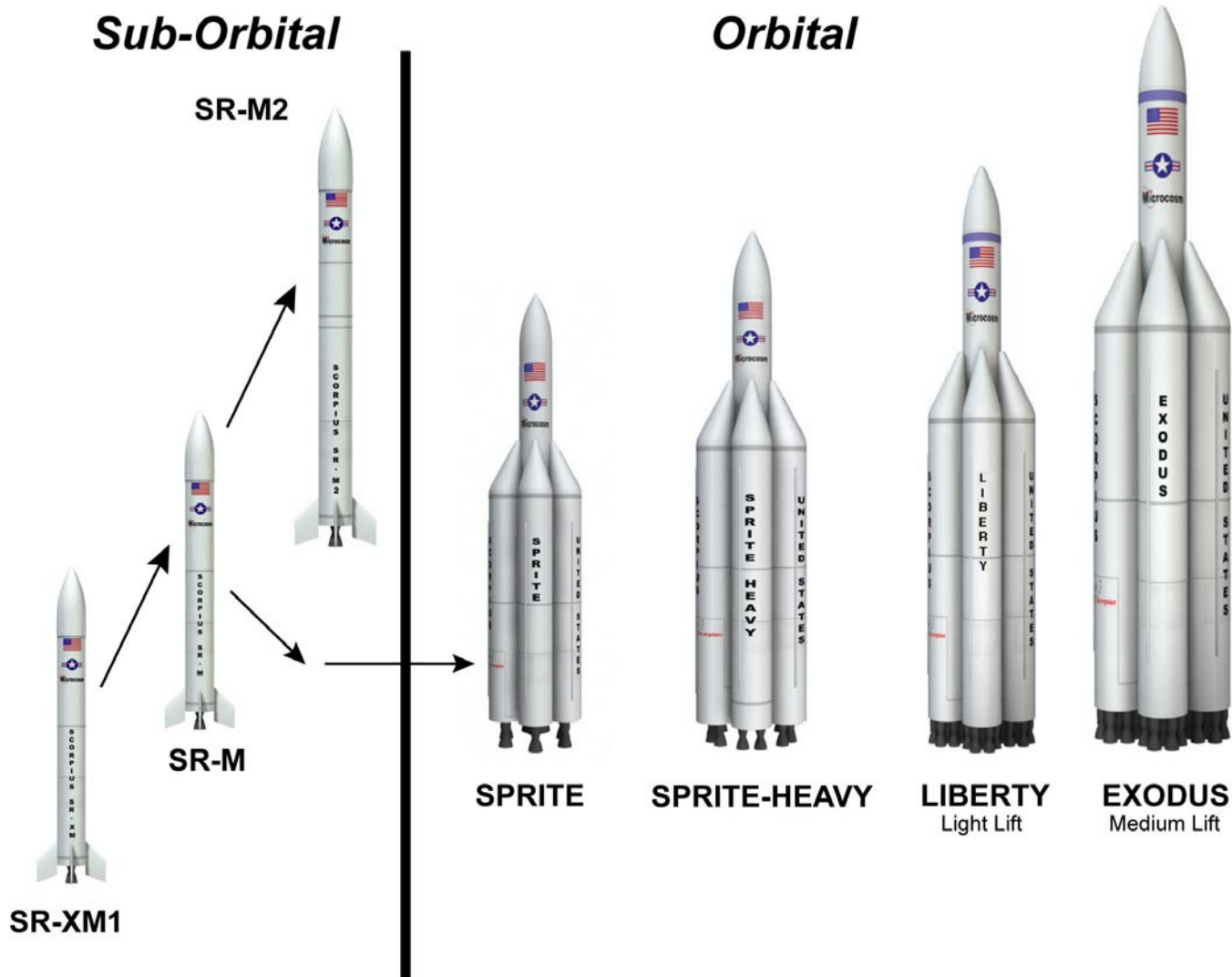


FALCON SLVs are Derived from Scorpius® Family of Launch Vehicles

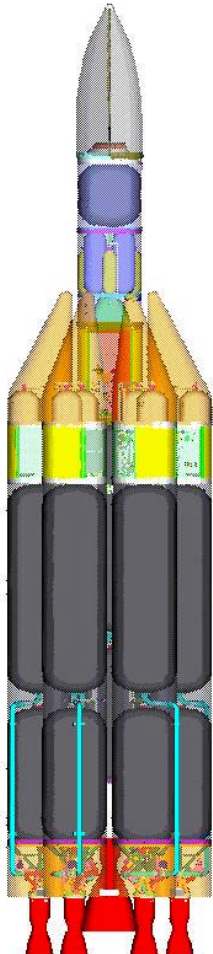
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Sub-Orbital

Orbital



- **Scorpius® Technology is sound, scalable and directly applicable to the FALCON Program**
 - **Simple, robust, and low-complexity LOX/Jet-A, pressure-fed system**
 - **20-klbf engine is a derivative of our flight-proven 5-klbf engines**
 - **High Performance Pressurization System (HPPS) demonstrated**
 - **Low cost TVC system and propellant feedlines already qualified**
 - **All-composite propellant tanks are in final stages of qualification**
 - **42-inch dia Fuel tank successfully flown in SR-XM-2 flight**
 - **42-inch dia LOX tank proof-tested**
 - **Patent pending for all-composite LOX tank**
 - **Low cost avionics with GPS/INS and integrated self test (Much of the avionics have already flown on prior missions)**
- **Cost projections are realistic based on Scorpius® bottoms up cost model**
- **Simple Operations Plan allow:**
 - **Launch on demand**
 - **Launch from a simple flat pad virtually anywhere in the world**



Sprite SLV:

Overall Length: 52 FT
Base Width: 11 FT
Pod Diameter: 42 IN
Payload Capacity:
OS: 700 lbs. (100 NM East)
DS: 551 lbs.
CAV Range:
(L/D:3, 2,000 lbs.):
OS: 4,876 NMI
Propellant: LOX/Jet A
Pressurization: HHPS
First Stage Pods: 6
Engines per Pod: 1
1st Stg Thrust: 120,000 lb.
2nd Stg. Thrust: 20,000 lb.
3rd Stg Thrust: 2,000 lb.
Dry Weight: 12,300
Wet Weight: 83,000
Propellant Tank Press:
1st Stage: 550 PSI
2nd Stage: 550 PSI
3rd Stage: 250 PSI
Pressurization System:
2Tanks, 5600 PSI MEOP

Sprite-Heavy SLV

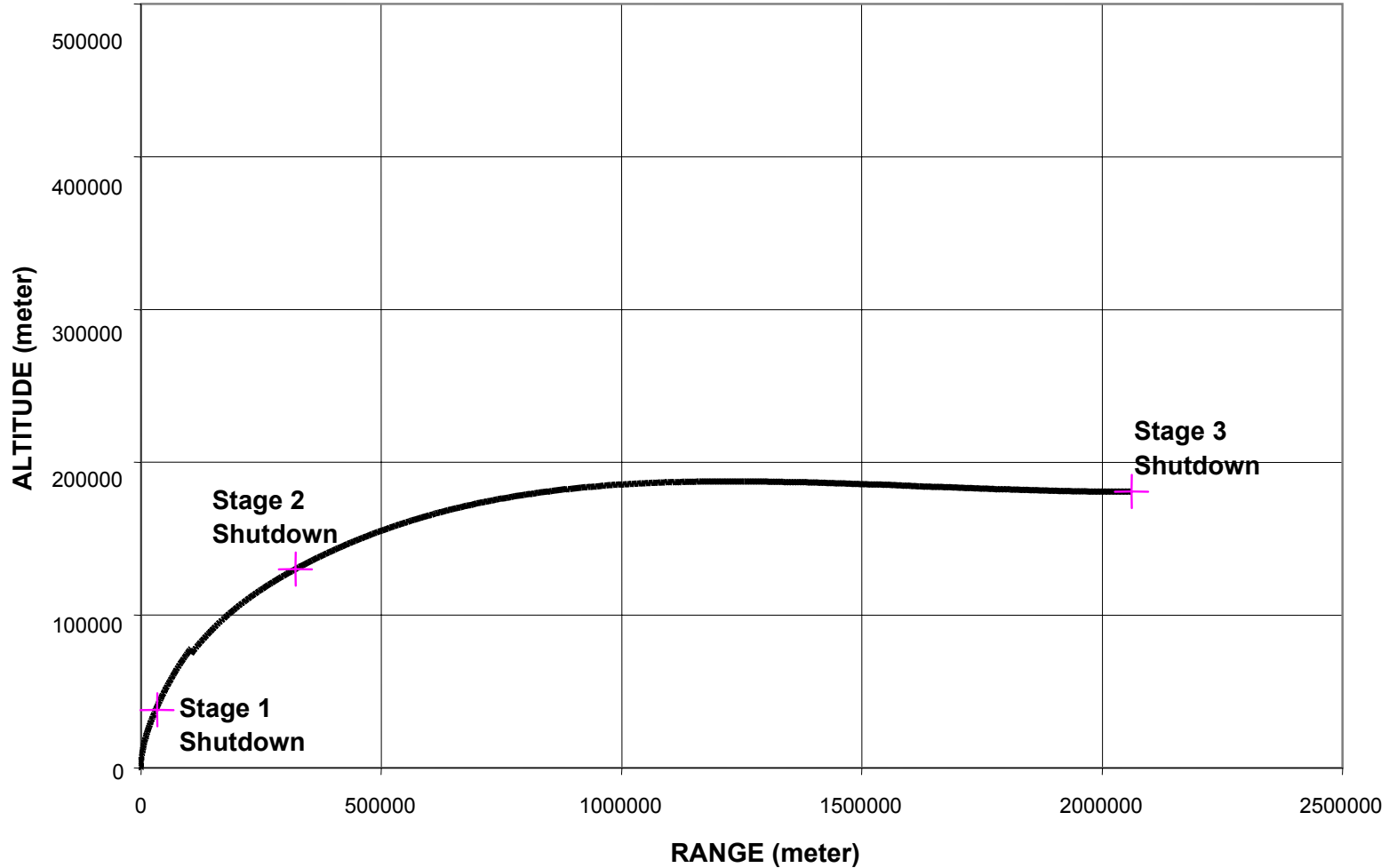
Payload Capacity:
1,349 lbs. (100 NMI East)
CAV Range:
(L/D:3):
OS: 9,114 NMI (L/D =3)

Liberty Vehicle

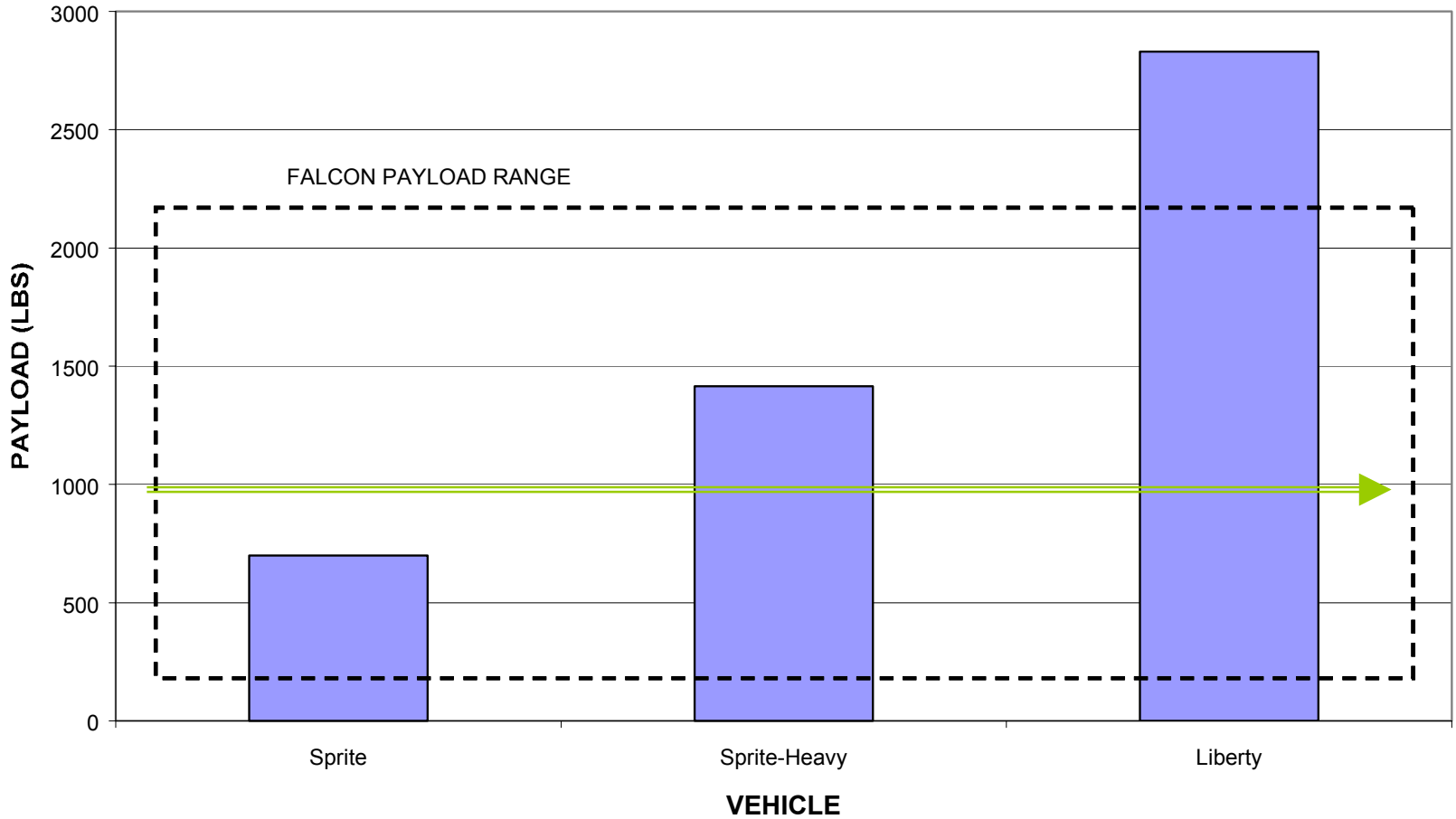
Payload Capacity
2,698 lbs (100 NMI East)
CAV Range:
2,000 lbs to 9000 NMI with L/D=1

Design Extendable to Larger Vehicles

TYPICAL SPRITE TRAJECTORY 28-DEG, 100-NMI CIRCULAR TARGET ORBIT

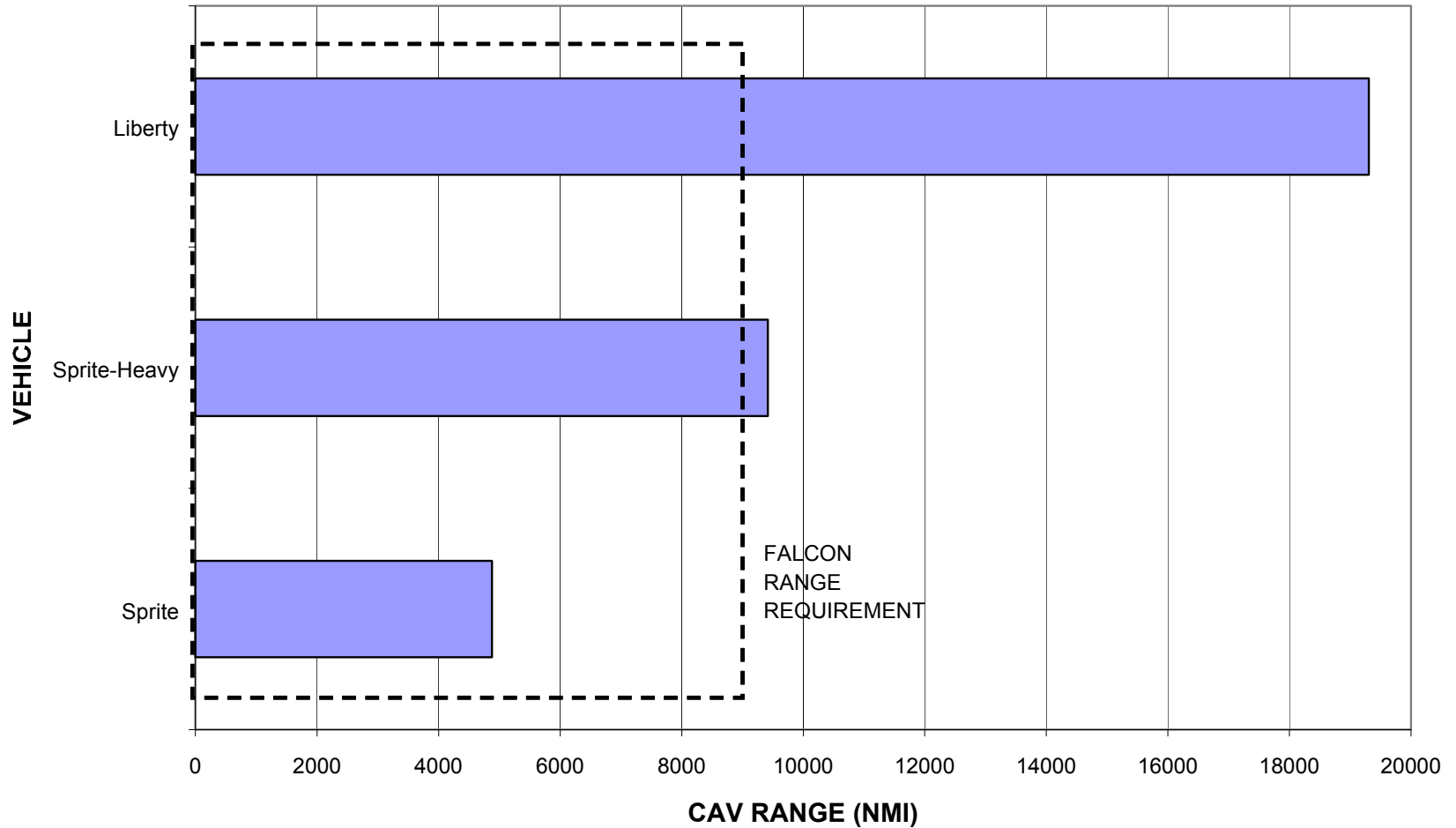


PAYLOAD SIZING FOR FALCON 100-NMI, 28.5-DEG ORBIT



CAV Range Sizing

**CAV RANGE SIZING FOR FALCON
VAFB, WEST, 2000-LB CAV, L/D=3**



Operational Characteristics

- **Air and Road Transportable Launch System**
 - Entire rocket shipped in two standard truck trailers
 - Easily-erected pods weigh less than one ton each
- **Less than 12 Person Pad Crew**
 - Three-person PC-based launch control system
- **Simple Launch Pad with Fly-off Interfaces**
 - Ground-level servicing (Umbilical mast for upper stage)
 - No gantry
 - Flat concrete pad with stool and flame deflectors
 - Enables multiple sites, multiple pads per site
- **Designed for launch in 99% Weather**
 - High structural margins
- **Self-aligning GPS / INS Guidance and Navigation**
- **No Hypergols or Explosive Devices**
- **Thrust-Termination based FTS with GPS tracking**

- **Vehicle major components (i.e., Pods, Second Stage Cores, Upper Stages) assembled in the manufacturing facility, then transported to the Integration facility for build-up into complete vehicles**
 - **Vertical vehicle integration**
 - **Maximize component commonality**
 - **Minimize integration touch labor**
 - **Integrate vehicle with a portable launch platform in the Integration facility**
 - **Most interfaces at “ground” level (i.e., base of vehicle)**
- **Complete vehicle/platform put into flight-ready storage for call-up when needed**
- **“Canned” mission plans available in mission database to facilitate rapid mission planning and feasibility assessment (range/mission coordination)**

- **Rapid mission planning and feasibility assessment w/ Microcosm 6DOF mission planner**
- **On call-up, vehicle/launch platform are moved vertically to the launch pad on modified flatbed transport trailers. Trailers are towed by standard semi trucks**
- **At pad, vehicle/launch platform are attached to the launch stool**
- **No gantries or on-pad vehicle servicing planned**
- **Launch Platform is connected to ground fluid systems, final vehicle checks are made, final trajectory parameters are uploaded, propellants are loaded, and vehicle is launched**

Operational Sprite Baseline Concept Permanent Operation

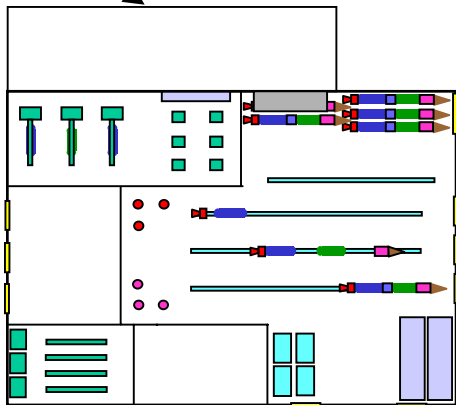
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Launch Pad

- Launch Stool
- Water Suppression (Acoustic limit/temp) – Not needed with flat pad operations
- Pressurant, Propellant, electrical lines & connections
- Hardened propellant shelter
- Launch stand
- Lightning/weather protection

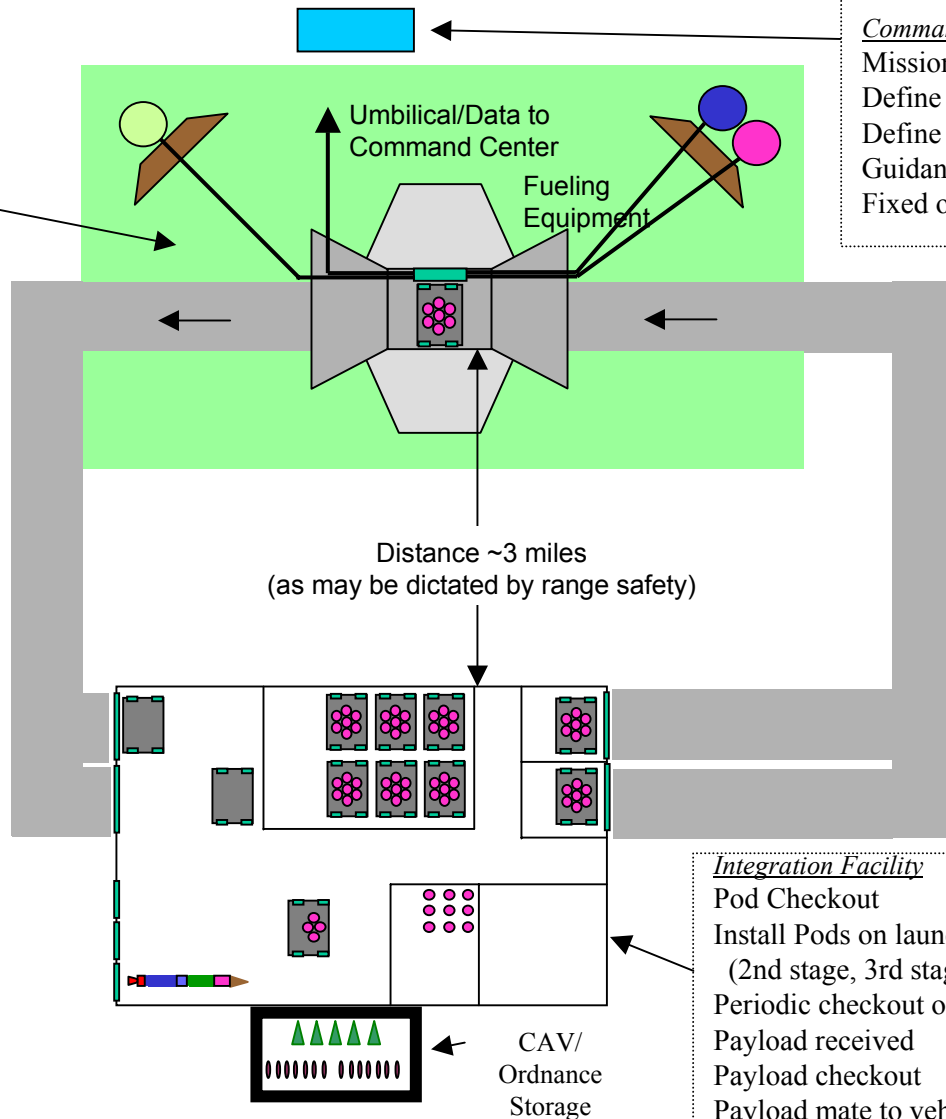
Production/Administrative Facility

- Engineering, management, clerical
- Receive Components
- Assemble Component
- Fabricate Tanks and TCA
- Pod Assembly
- 2nd and 3rd stage assembly
- Pod storage and conditioning



Command Center

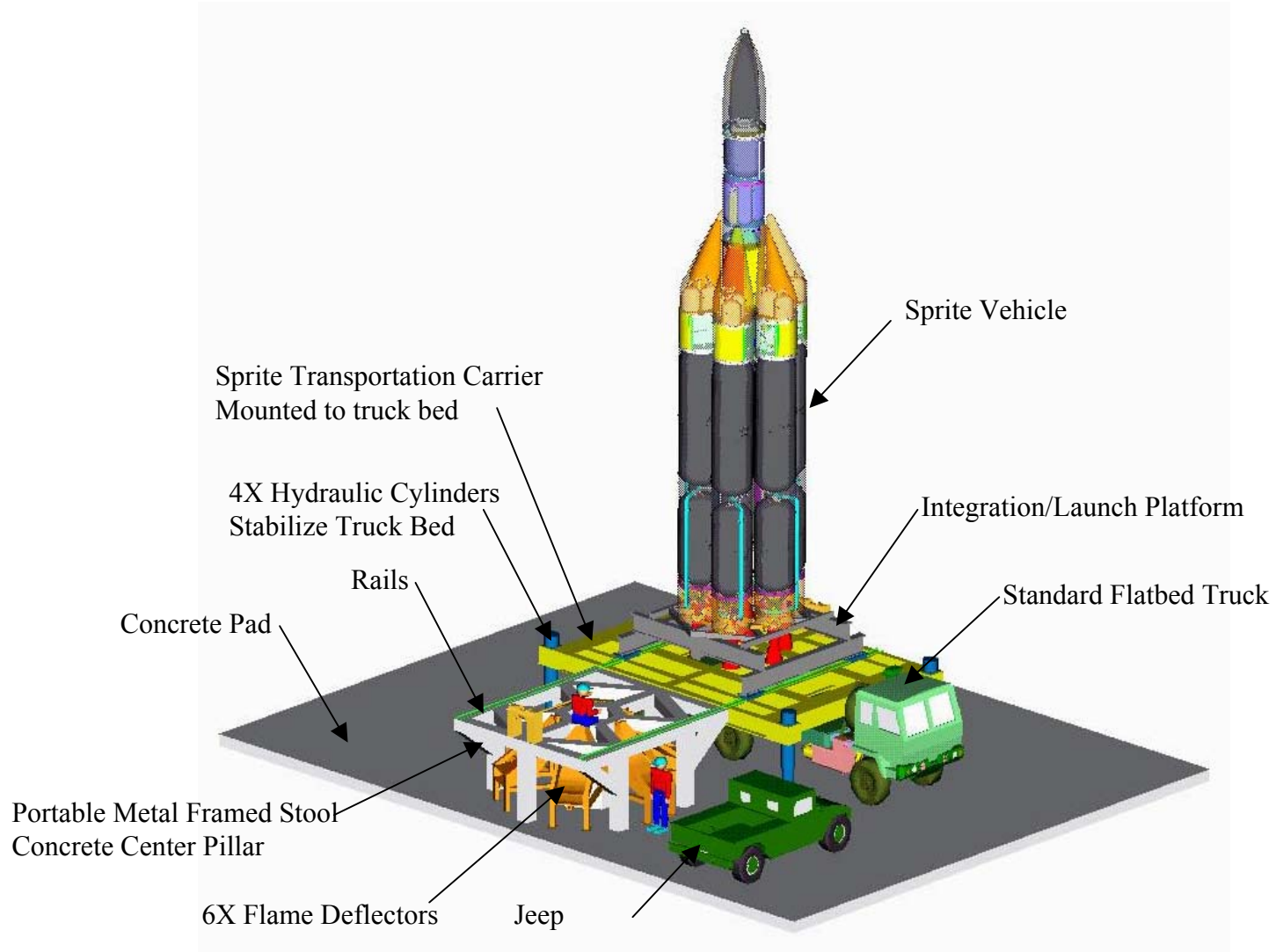
- Mission Planning
- Define Launch window
- Define Trajectory options
- Guidance Input
- Fixed or transportable



Integration Facility

- Pod Checkout
- Install Pods on launch platform (2nd stage, 3rd stage)
- Periodic checkout of vehicle
- Payload received
- Payload checkout
- Payload mate to vehicle

Operational Sprite Remote Site Concept of Operation



- **FALCON represents a new and challenging opportunity for the Small Launch Vehicle community**
- **The possibility now exists to create the new generation of affordable, responsive Small Launch Vehicles**
- **Rapidly launched, affordable Small Launch Vehicles will create new possibilities and greatly increased utility for small satellites and responsive missions**
- **Creation of the launch infrastructure for the ability to launch on demand has begun**