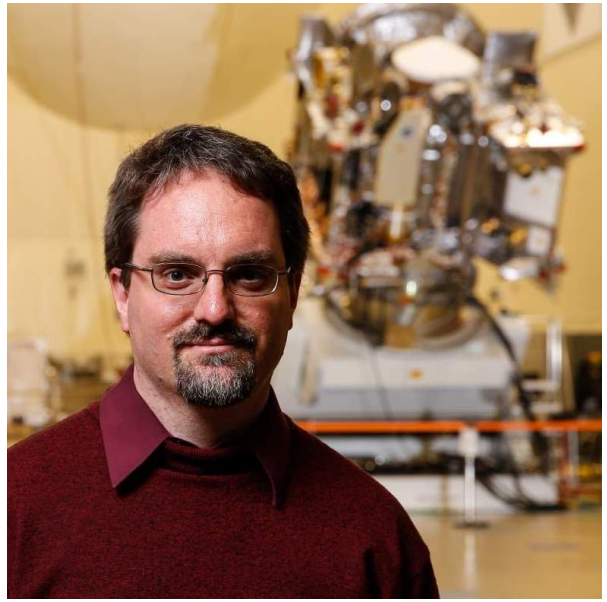
A Brief History of the Martin Company and Waterton Plant

Part 1: Glenn L Martin, seaplanes and bombers

Josh Hopkins

LOCKHEED MARTIN



There are only two lasting bequests we can give our descendants

One is roots, the other is wings

Adapted from a phrase popularized by Hodding Carter in the 1950s.

Lockheed Martin is a combination of many historic aerospace companies. This presentation focuses on the Martin side.

We had our logos first!

LOCKHEED MARTIN

STARK INDUSTRIES

In the Beginning

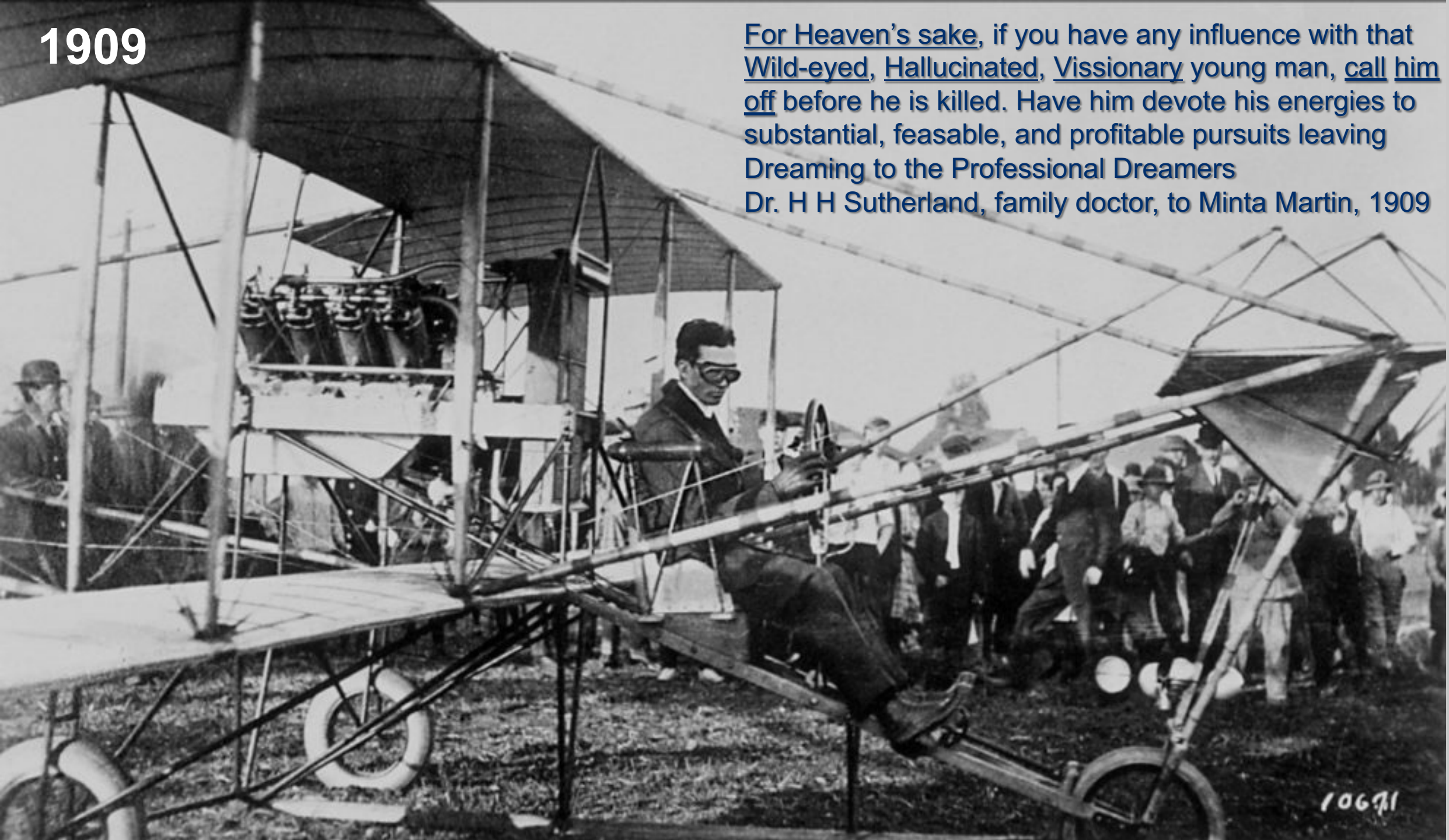
Glenn L Martin was born in 1886 in Iowa, but grew up in Kansas.

Family moved to Santa Ana, California when he was 19

He opened a Ford and Maxwell car dealership and garage at age 20.

First Martin aircraft factory in the Santa Anna Southern Methodist Church

1909



For Heaven's sake, if you have any influence with that Wild-eyed, Hallucinated, Vissionary young man, call him off before he is killed. Have him devote his energies to substantial, feasable, and profitable pursuits leaving Dreaming to the Professional Dreamers
Dr. H H Sutherland, family doctor, to Minta Martin, 1909

Flight to Catalina, 1912

Round trip from Newport Beach, Los Angeles to Catalina Island, 34 miles away

What are airplanes good for?

With Mary Pickford in “A Girl of Yesterday” circa 1915

With “Tiny” Broadwick,
“girl parachutist” circa 1913

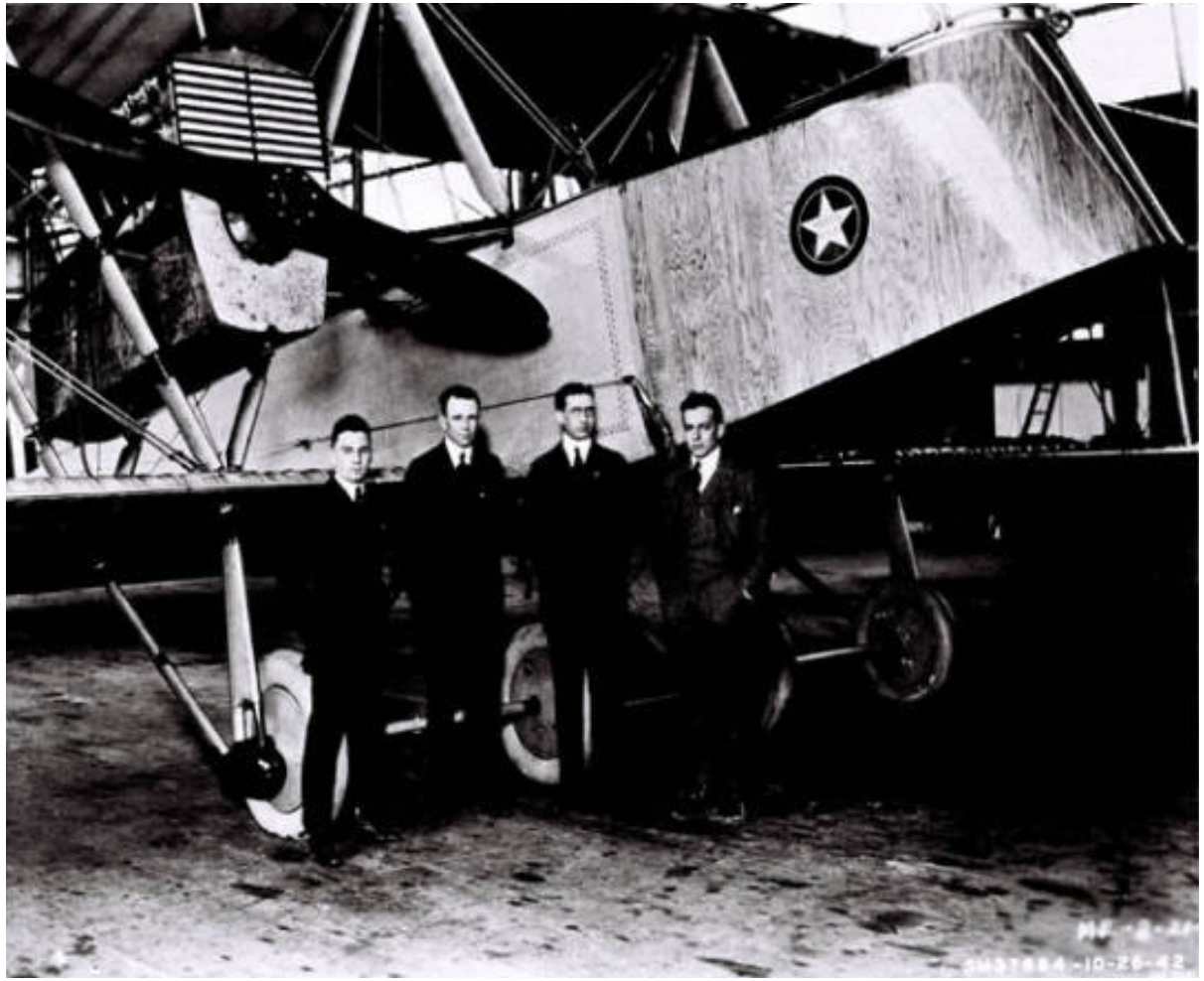
The Cleveland Years – 1917 to 1930

The Martin company moved to Cleveland at the end of World War I

They built trainers, touring planes, torpedo patrol aircraft, and bombers.

It was in Cleveland that Glenn L Martin stopped flying

Training Ground for Future Aviation Leaders



L to R: Larry Bell, Eric Springer, Glenn L Martin, Donald Douglas in front of a Martin MB-2

Donald Douglas, Martin Chief Engineer, later founded Douglas Aircraft

Charles Thompson, largest investor, later of Thompson-Ramow-Wooldridge (TRW)

Larry Bell, Shop Foreman, General Manager at Martin, later VP/GM at Consolidated, then founded Bell Aircraft in 1935.

J "Dutch" Kindelberger, Chief Draftsman, assistant chief engineer in Cleveland, later President then CEO of North American Aviation 1935-1960

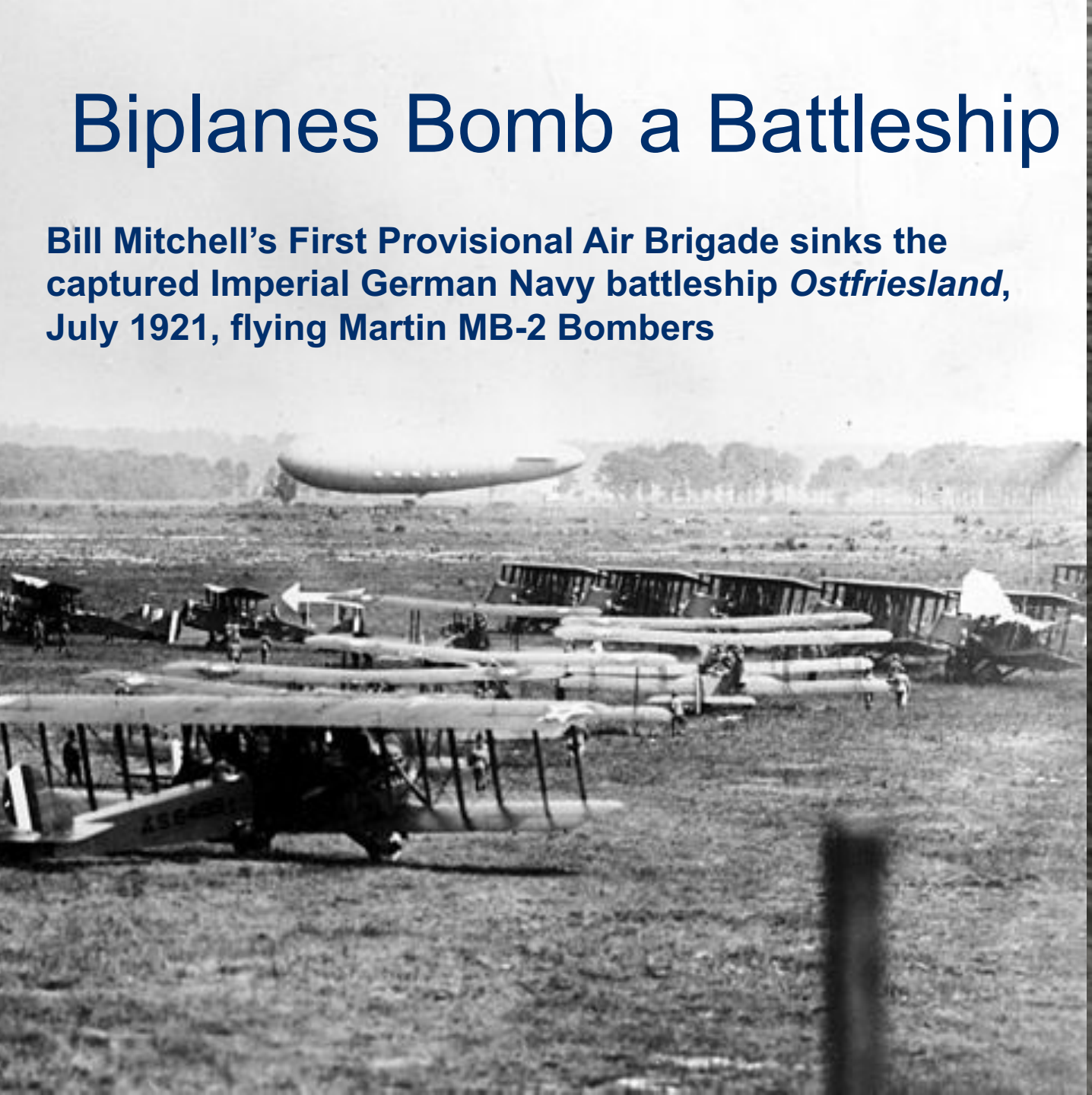
James McDonnell, Later founded McDonnell Aircraft

Chance Vought Later founded Chance Vought Corp which became Ling-Temco-Vought (LTV)

Others became heads of Brewster Aeronautical, General Dynamics, Fairchild Aircraft

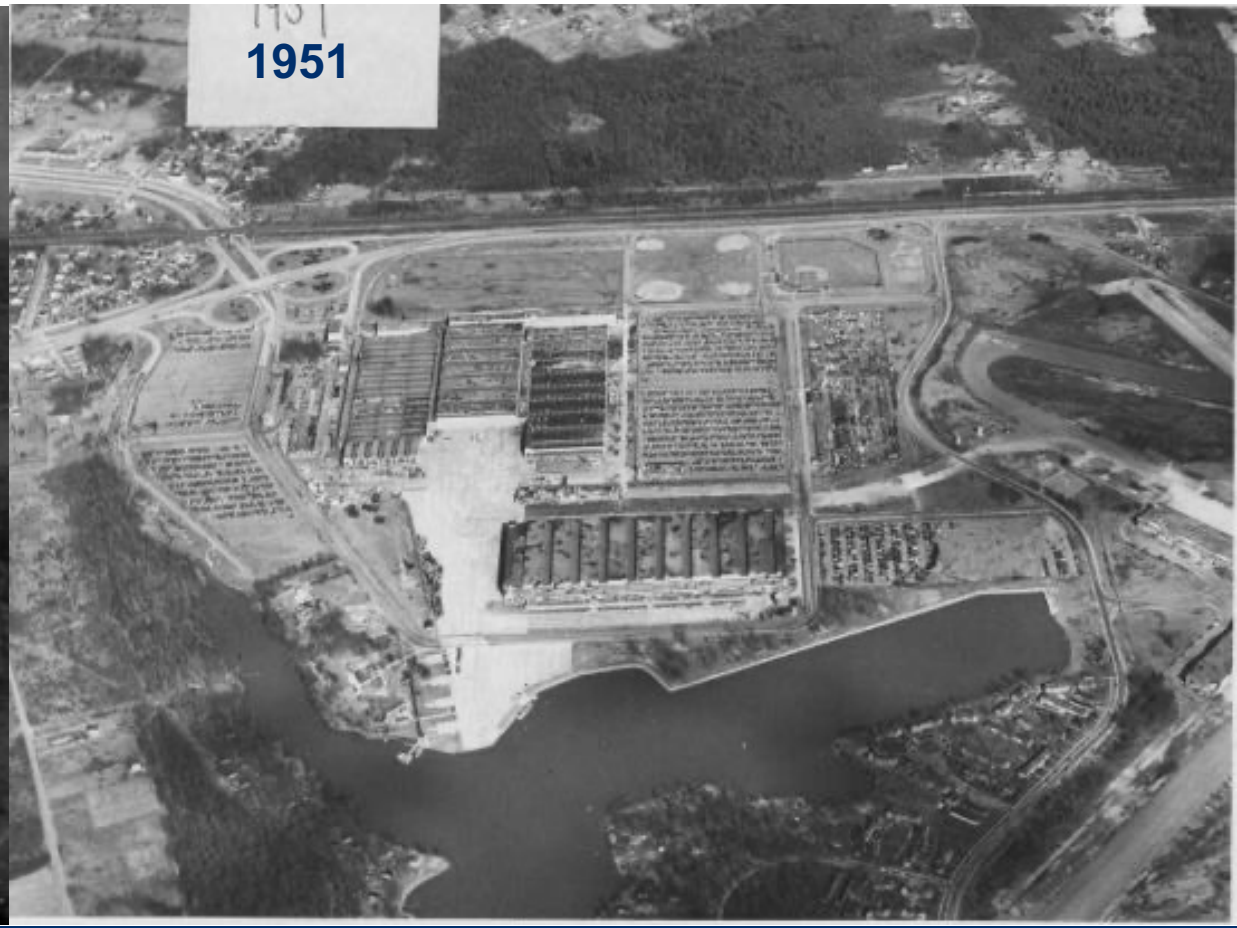
Biplanes Bomb a Battleship

Bill Mitchell's First Provisional Air Brigade sinks the captured Imperial German Navy battleship *Ostfriesland*, July 1921, flying Martin MB-2 Bombers



The Move to Middle River

The Martin company opened a plant on 1200 acres north of Baltimore in October 1929



Martin M-130 China Clipper Crosses Pacific

Martin built M-130 seaplanes for Juan Trippe's Pan American Airways

Range of 2500 miles, enough to fly San Francisco – Honolulu – Midway – Wake – Guam – Manilla in 6 days, for $799. Flights scheduled once a week.

Crew of 6, Slept 18 passengers, or sat 48 on short-haul flights

First trans-Pacific commercial airplane flight November 22, 1935 captained by Ed Musick

World War II

Martin B-26 Marauder light bomber, 5,266 built

More than 1,300 PBM-5 Mariner patrol seaplanes built
Rocket assisted takeoff, Hawai'i October 1944

Martin Mars, large WWII cargo seaplane

Retired (?) around 2018. Image by Alex Juorio, CC-A

Irene Morgan vs Virginia

In 1944, Irene Morgan was returning from visiting her mother in Virginia to her job in Baltimore building bombers at the Martin plant.

When she refused to give up her seat on the Greyhound bus to white passengers, she was arrested and convicted of violating Virginia segregation laws.

Her case went all the way to the Supreme Court, where Thurgood Marshall and the NAACP successfully argued that such restrictions on interstate busses violated the interstate commerce clause of the Constitution.

This case legally (though not in practice) desegrated interstate busses a decade before Rosa Parks.

Martin Sea Master: End of the Seaplane Era

Martin's Last Airplanes: 4-0-4 and B-57

A supposedly airworthy Martin 4-0-4 at the Planes of Fame Museum

Martin built the Martin 2-0-2 airliner as a postwar DC-3 competitor, but suffered manufacturing flaws and a crash

The upgraded 4-0-4 sold 103 aircraft but was Martin's last commercial airplane

In 1950 USAF held a competition for a medium bomber, in which Martin offered the XB-51. However, the British Canberra design won, and Martin was selected to build >400 aircraft under license.

Some B-57 bombers were rebuilt into WB-57 high altitude reconnaissance aircraft. NASA still flies three of them.

Glenn L Martin 1886-1955

“I was closely acquainted with Orville Wright for many years, first as a friend and later as a business associate, and I can say that he was the most honest man I ever met. I am convinced that it was this devotion to truth – in all things – that lay at the root of the Wright brothers’ success in creating the airplane. It has been honest men who have built our great industry and who will guide its sound growth in the future.

The quality of honesty in daily dealings is an infallible guide to a man’s capabilities in the engineering and scientific fields. Structures and machines are unforgiving of the cheater and inevitably indict those who toy with the facts.”

Glenn L. Martin, Wright Brothers Lecture to the Institute of Aeronautical Sciences, December 17, 1953

A Brief History of the Martin Company and Waterton Plant

Part 2: The Space Age

Josh Hopkins

LOCKHEED MARTIN

The Transition to Missiles & Space in 1957-1960

The era of big sea planes mostly ended when long runways were built around the world during and after WWII.

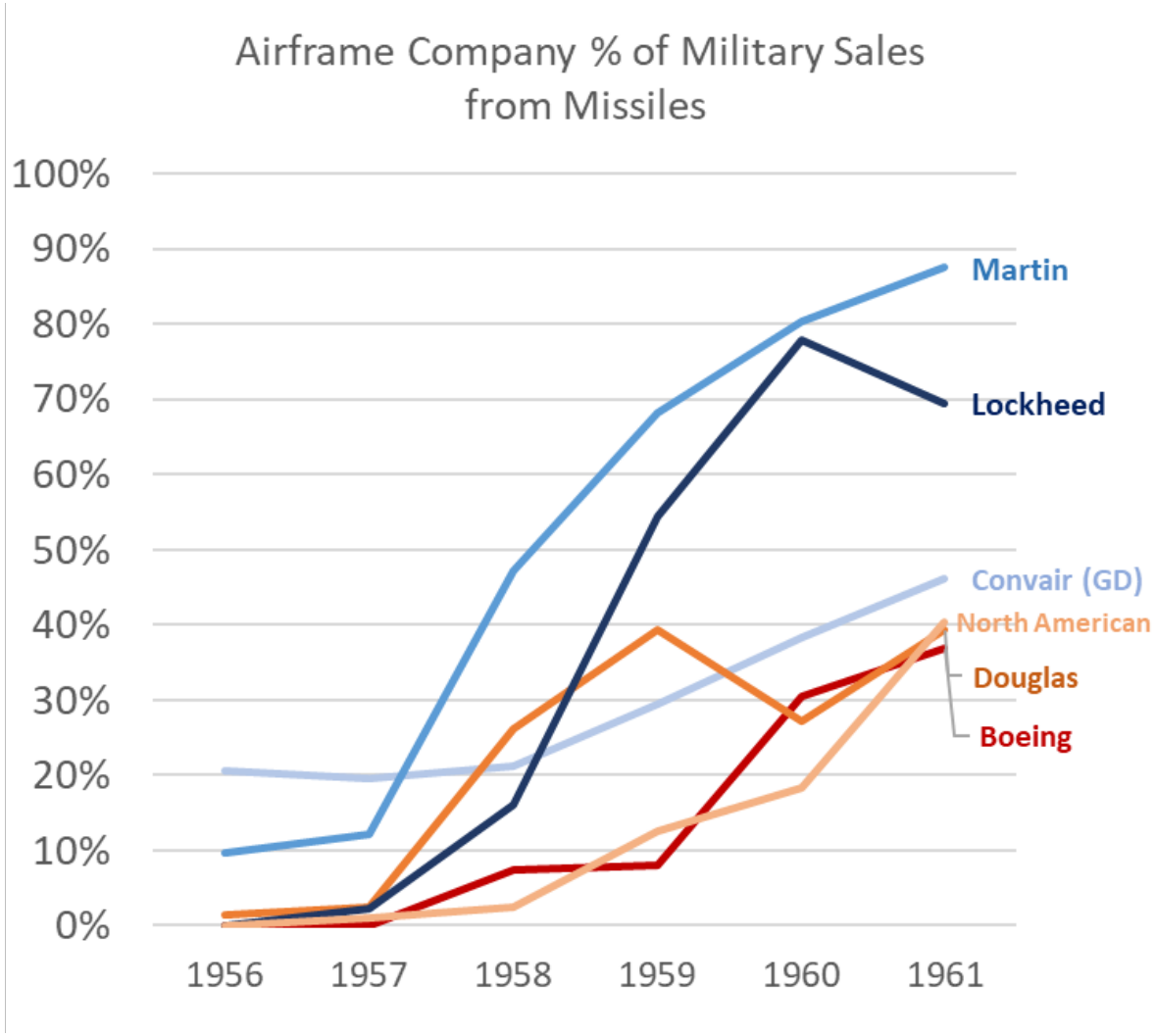
Martin commercial airliners, the 2-0-2 and 4-0-4 weren't particularly successful commercially

Air Force spending shifted from mostly aircraft to mostly missiles after the Korean War. The new NASA very quickly became a major new buyer.

"Aviation" became "aerospace"

Airplane companies created new Missile & Space divisions, and new factories

New competitors joined the fray from outside aviation, such as the electronics and automotive industries.



Viking (no, not that Viking)

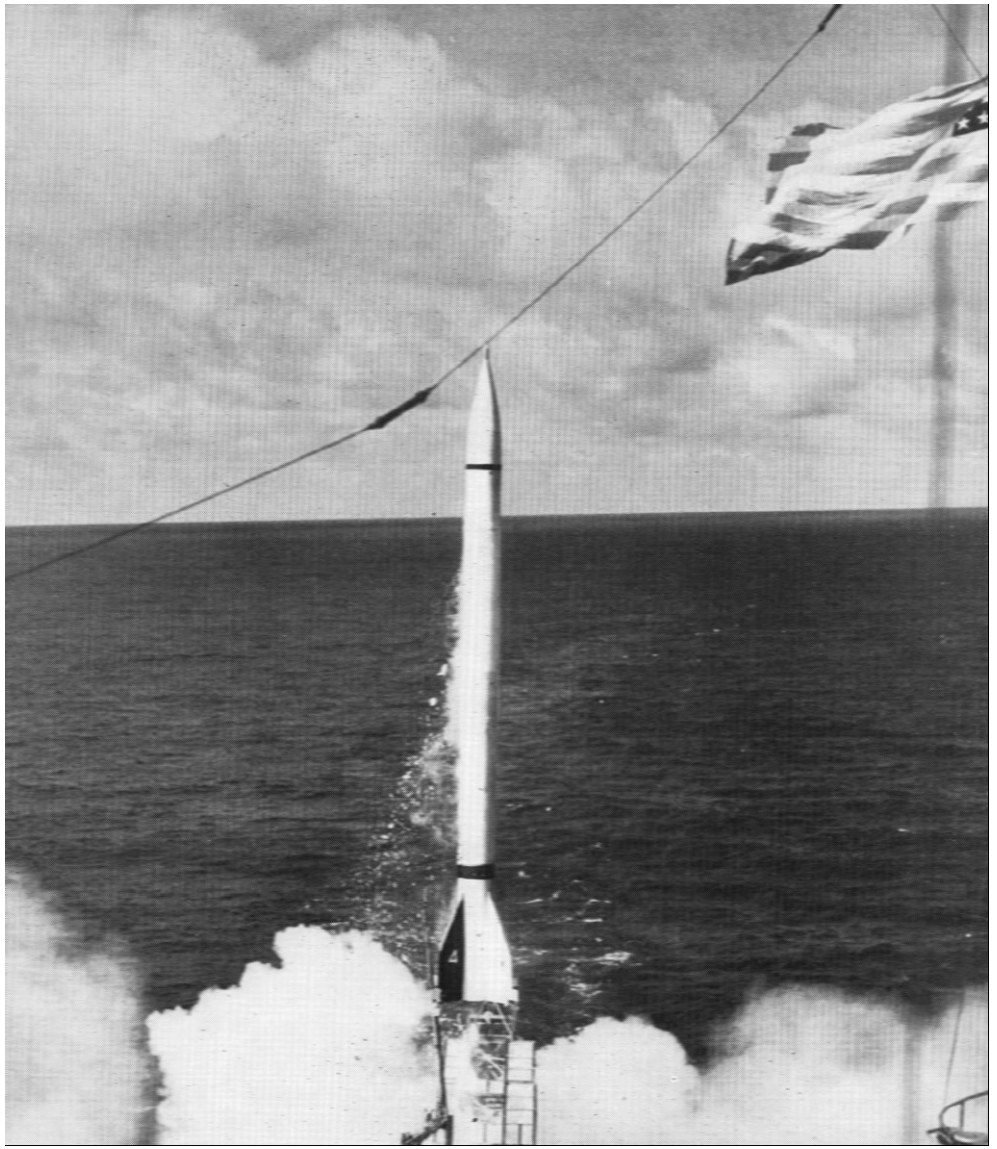
The Navy's Viking sounding rocket was one of the first large liquid rockets built in the US, and arguably the first rocket designed to go to space.

Among other technologies, Viking tested the new concept of gimballing rocket engines to steer.

12 Viking rockets were launched 1949-1955

"Rockets are just another name for trouble. Either you just had trouble, you are having trouble, or you are going to have trouble."

Milt Rosen, Viking Program Director, White Sands Missile Test Range



Viking #4, first Viking flight above 100 km, 1950.

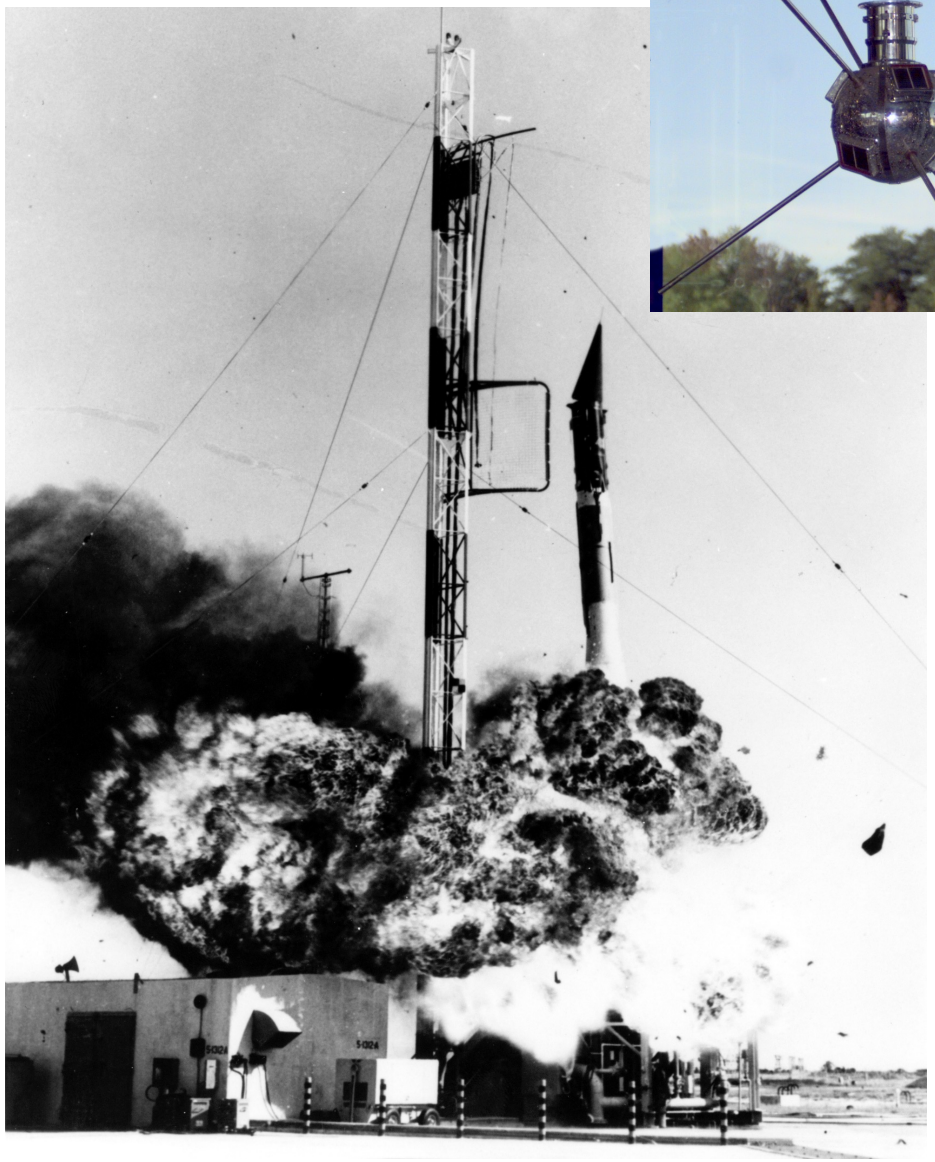
Vanguard

The Navy's Vanguard was intended to launch the world's first satellite during the International Geophysical Year (1957-1958)

Martin designed Vanguard, with a Viking-derived first stage

The surprise launch of Sputnik in October 1957 put enormous pressure to accelerate Vanguard, leading to very public failures.

However, Vanguard did successfully launch America's 2nd satellite. Vanguard 1 is the oldest artifact still in orbit.



Vanguard TV-3, Cape Canaveral Dec 6 1957

Moving to Denver

“The design, development and construction of the missile is to be accomplished in the central part of the United States, well away from either seacoast.”

USAF plan for XSM-68 ballistic missile contract (Titan)

Martin purchased 4300 acres south of Denver from rancher C K Verdos and others in pursuit of the contract

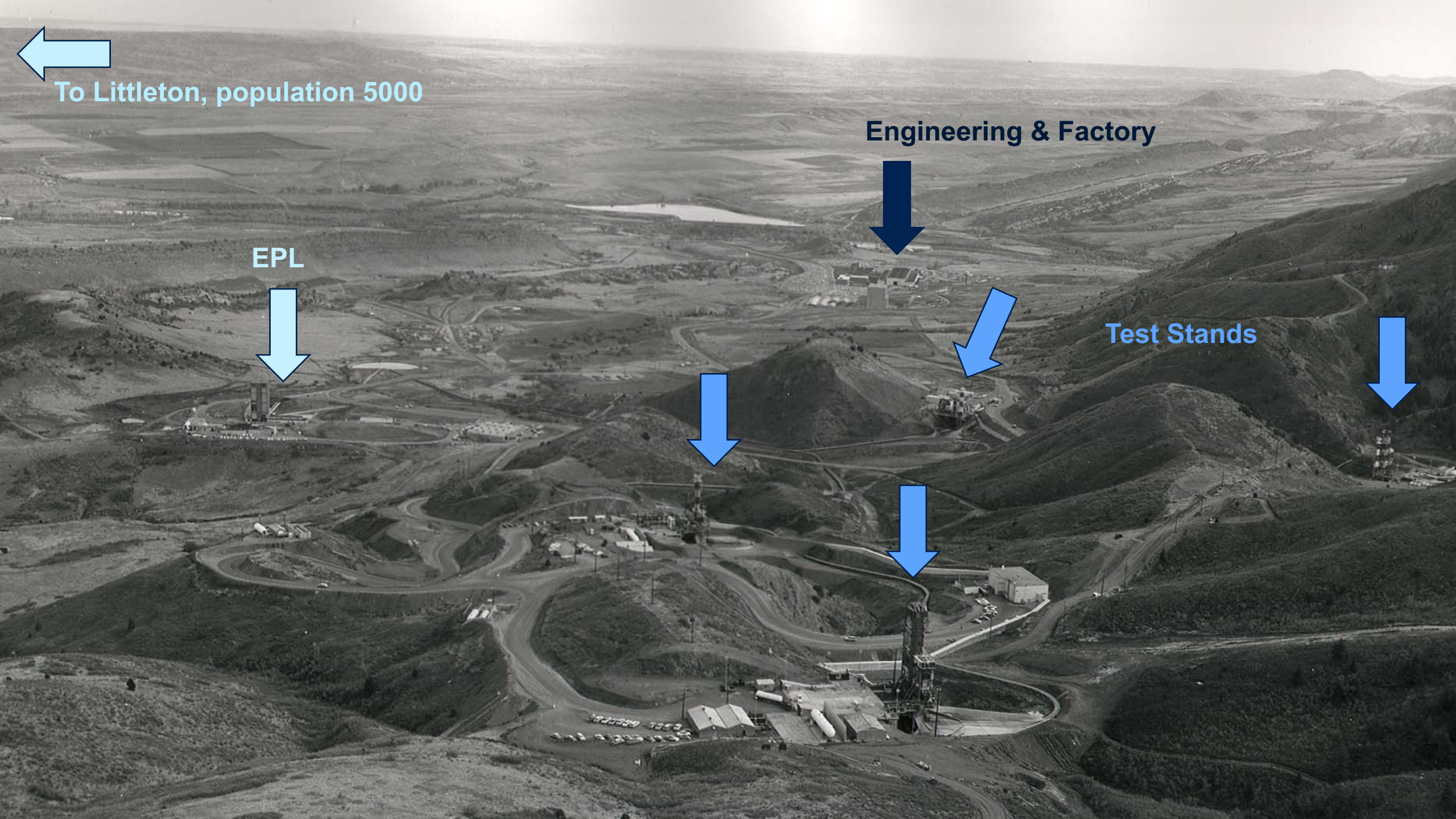
Martin broke ground at Waterton in Feb 1956, and delivered the first Titan I to the Cape in late 1958

Remnants of Waterton before the Rocket Ranch

Stagecoach stop

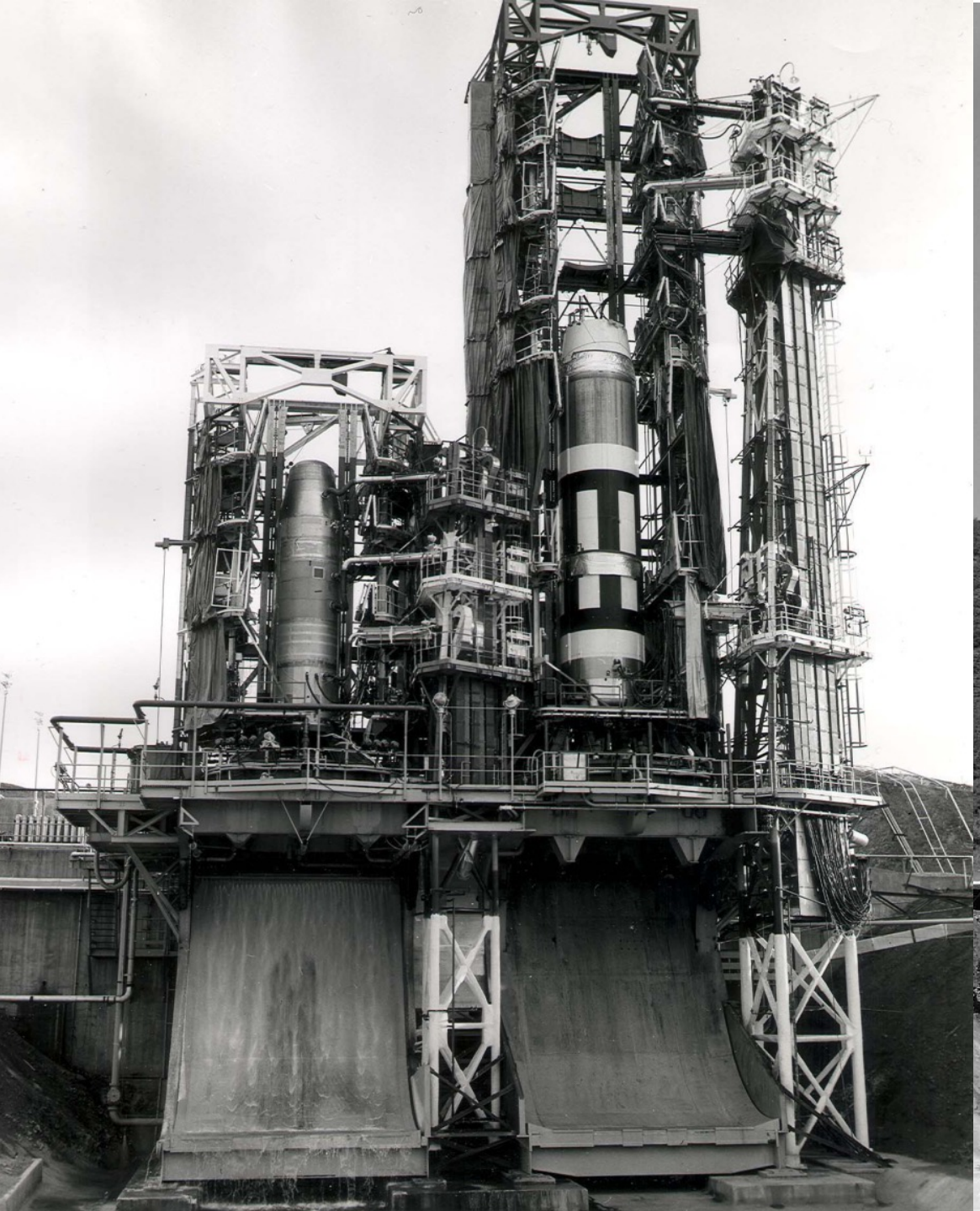
Family cemetery

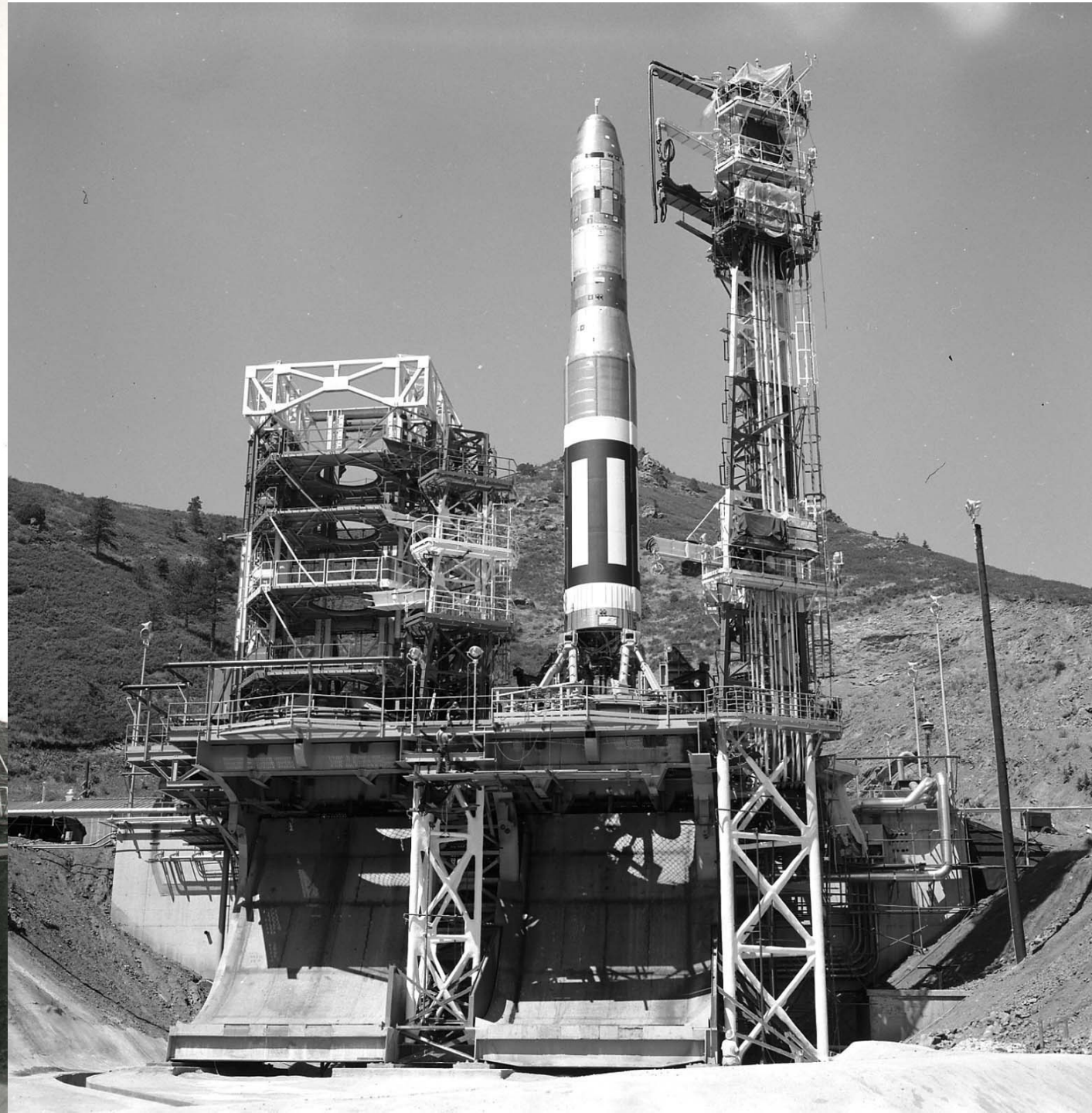
Slocum family cabin at Chatfield


To Littleton, population 5000
Engineering & Factory
EPL
Test Stands

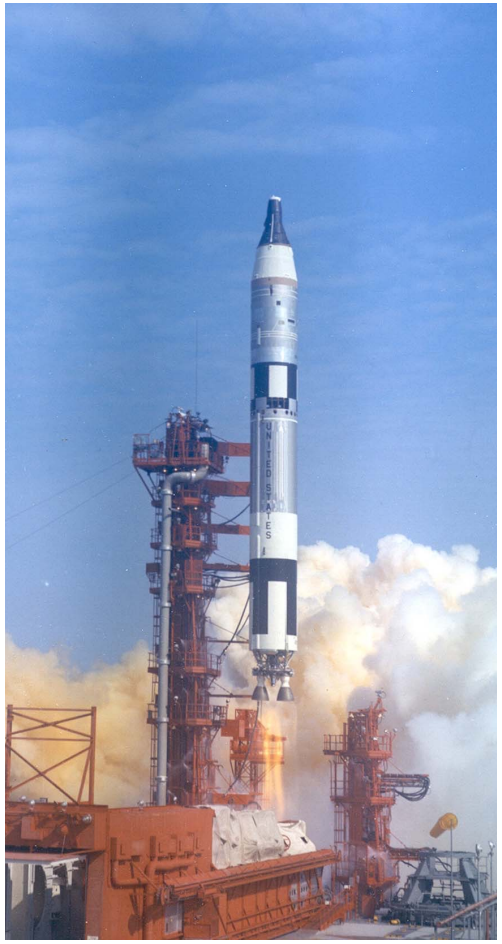
In addition to development testing, all 101 Titan I ICBMs were acceptance test fired at the Waterton plant before being shipped to the Cape for flight test or to operational silos.

Some Titan II and III development test firings also occurred in Waterton.

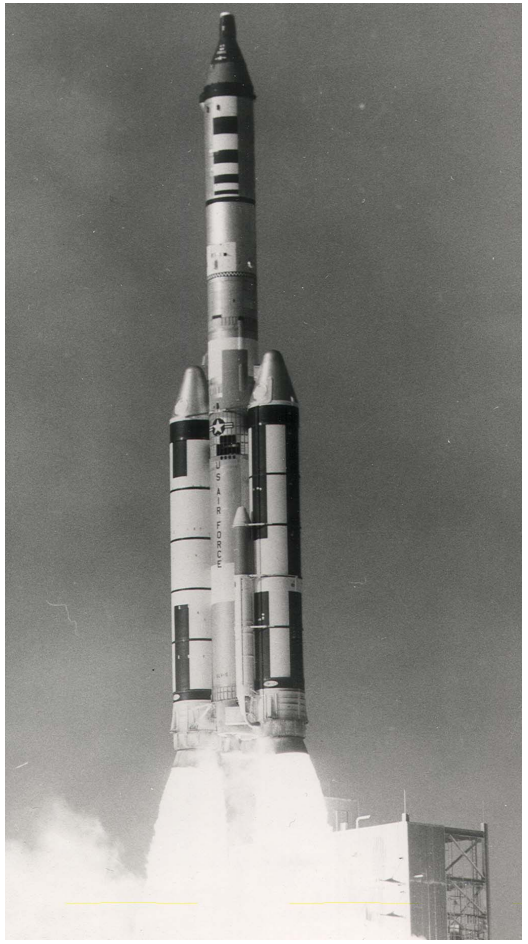




Titan II and III Space Launch Vehicles



Titan II/Gemini



Titan IIIC/ Blue Gemini/MOL

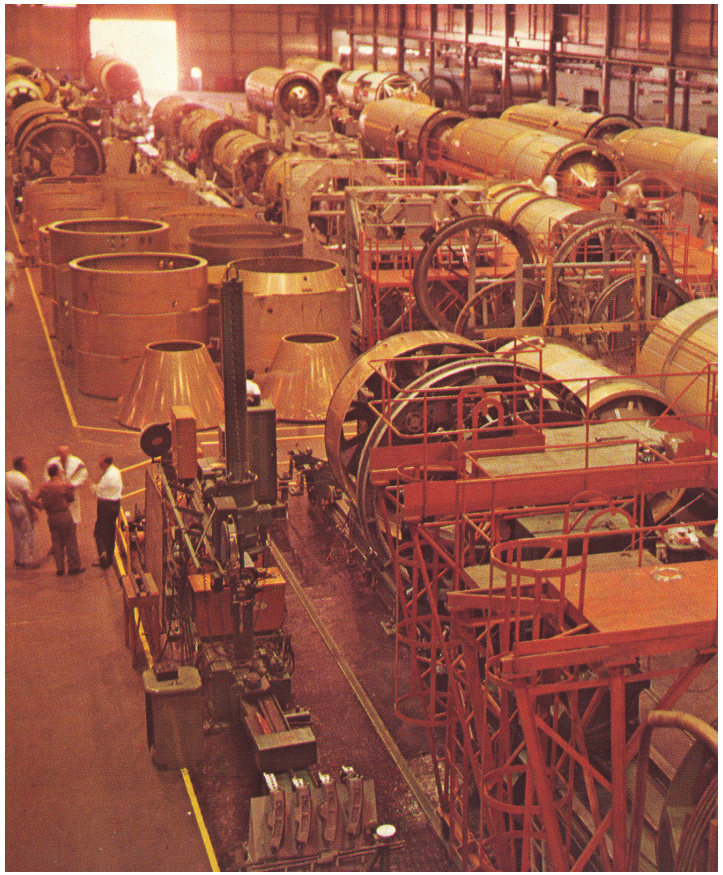
Titan IIIE (Viking, Voyager)

Titan 34D

Home of the Titans

A total of 368 Titan missiles and space launch systems were launched between 1959-2005

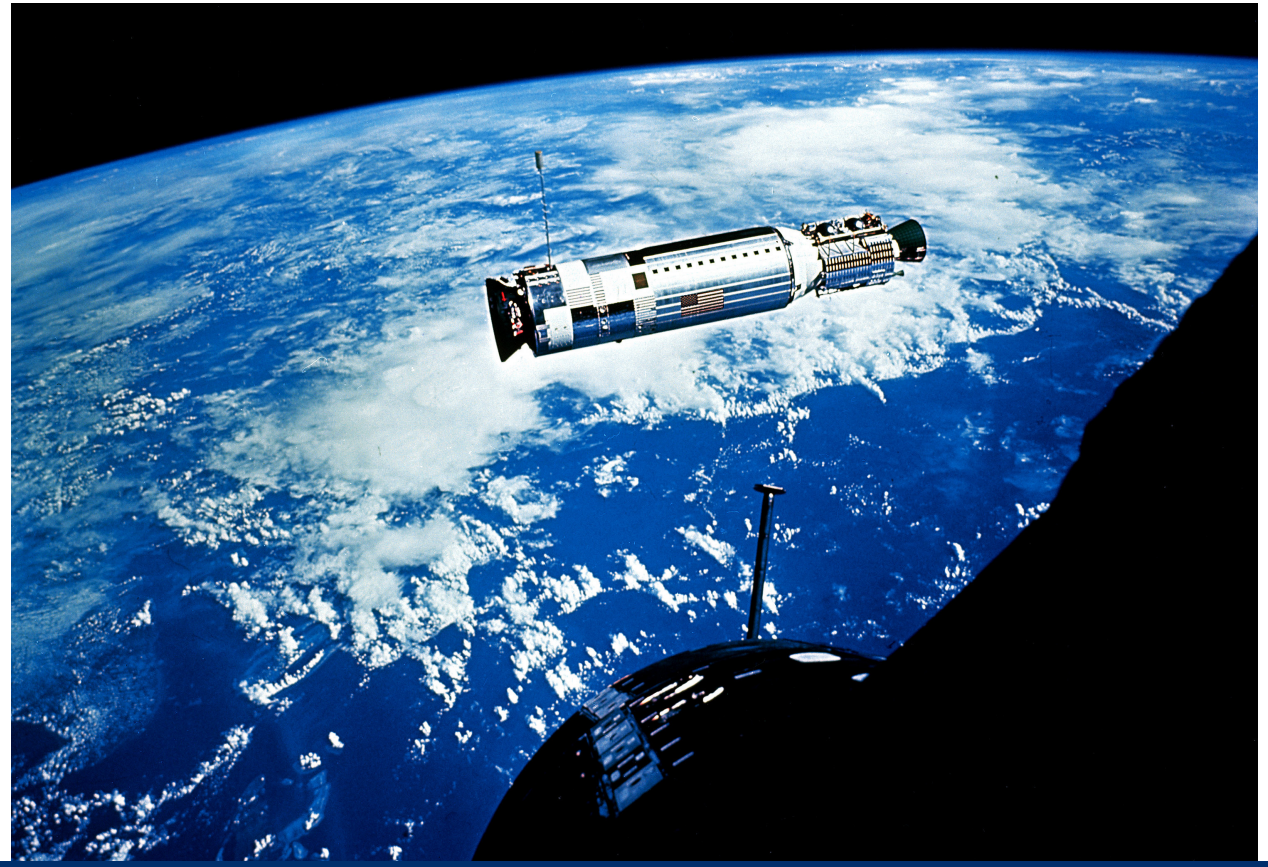
A handful remain on display, eg Titan IV at USAF Museum in Dayton, and Titan II in silo near Tucson



Lockheed Missiles and Space

Lockheed created a Missiles and Space division in 1953 (?)

Initial projects included the Polaris submarine-launched ballistic missile and the Agena upper stage



Mary Golda Ross, Lockheed's first woman engineer and one of the 40 initial engineers at Lockheed Missiles and Space

General Dynamics

Consolidated + Vultee = Convair → General Dynamics

In San Diego, Karel (Charlie) Bossart's team was building the Atlas missile, a competitor to Titan.

Like Titan, Atlas would soon be repurposed for space launch

Atlas launched the first comsat in 1958, and John Glenn into orbit in 1962

Atlas carried a variety of upper stages including Agena, but eventually settled on the groundbreaking Centaur LOX/hydrogen upper stage first used for the Surveyor program scouting ahead of the Apollo Moon landings.

Much later, in the 1990s, Martin Marietta bought the space division of GD, combining Atlas and Titan in Denver

The signature Atlas steel balloon tank, with hammer

Image courtesy San Diego Air & Space Museum

7 pound lead mallet on 0.03” thick steel

Von Braun

Bossart

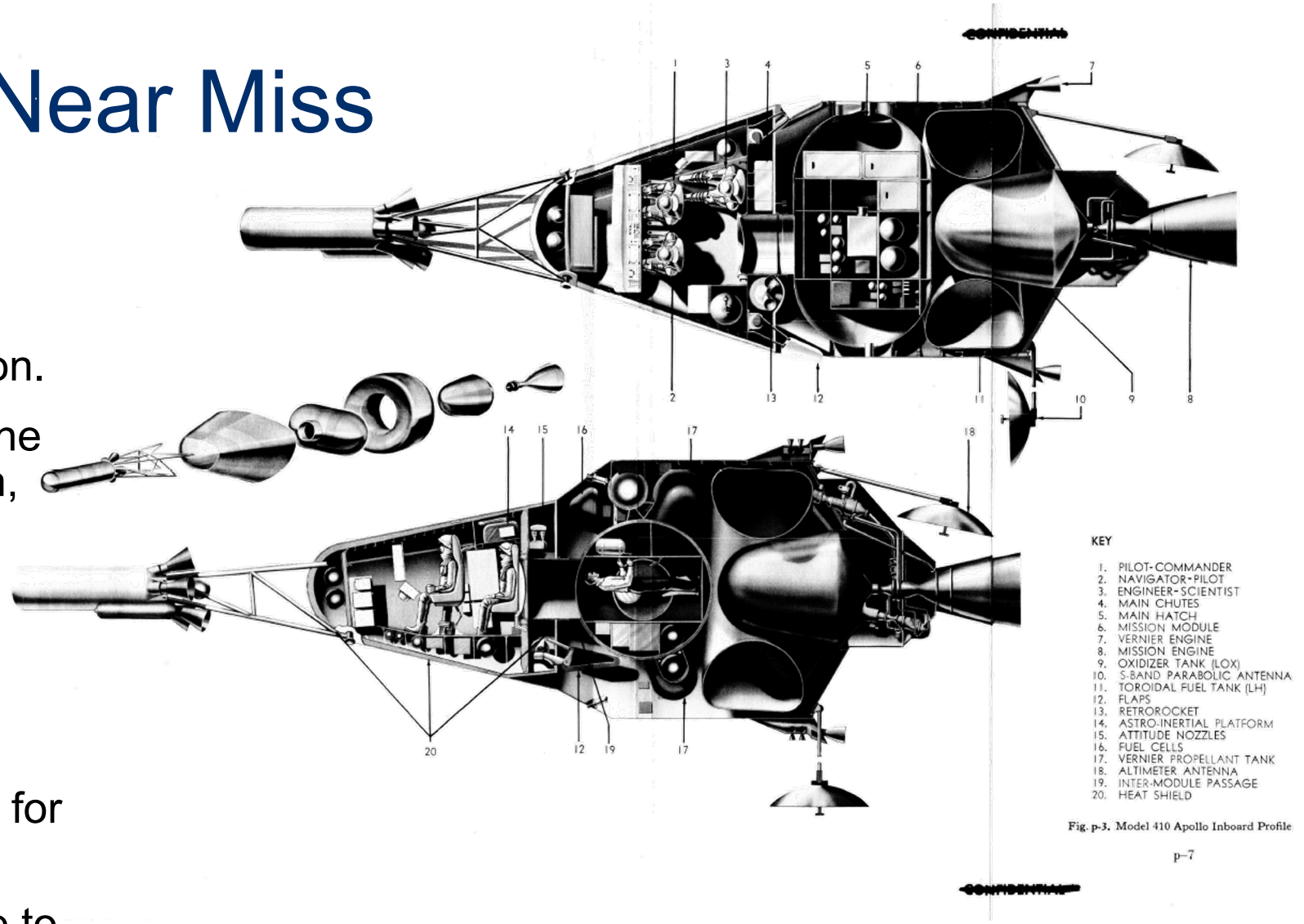
Apollo: A Martin Near Miss

Martin had the highest ranked proposal for the Apollo, and word leaked that the Martin team had won.

However, NASA leaders selected the runner-up, North American Aviation, either because of cost, NAA's successful history with NASA (e.g. X-15), or because they thought Martin was too busy with Titan II

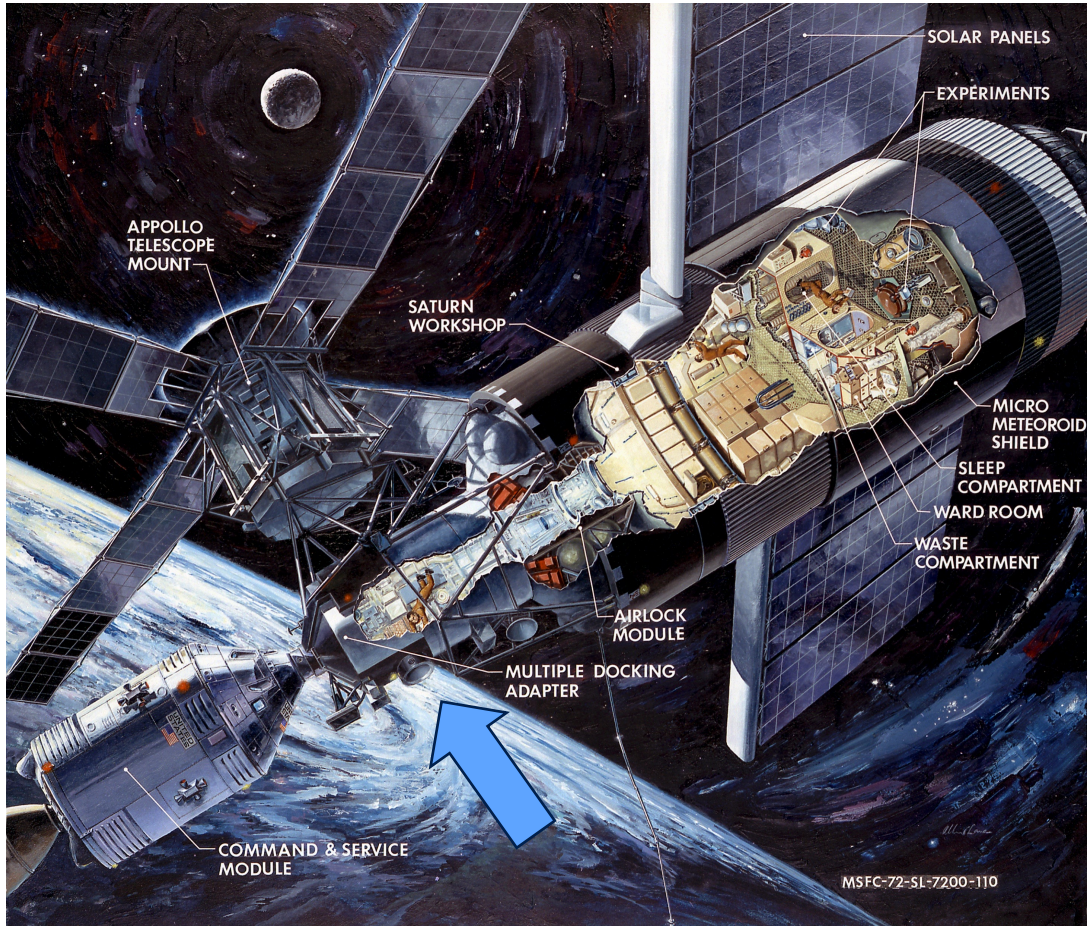
Ultimately, Martin only built the drill for Apollo moonwalks.

However, this left the company free to focus on other things in late 1960s

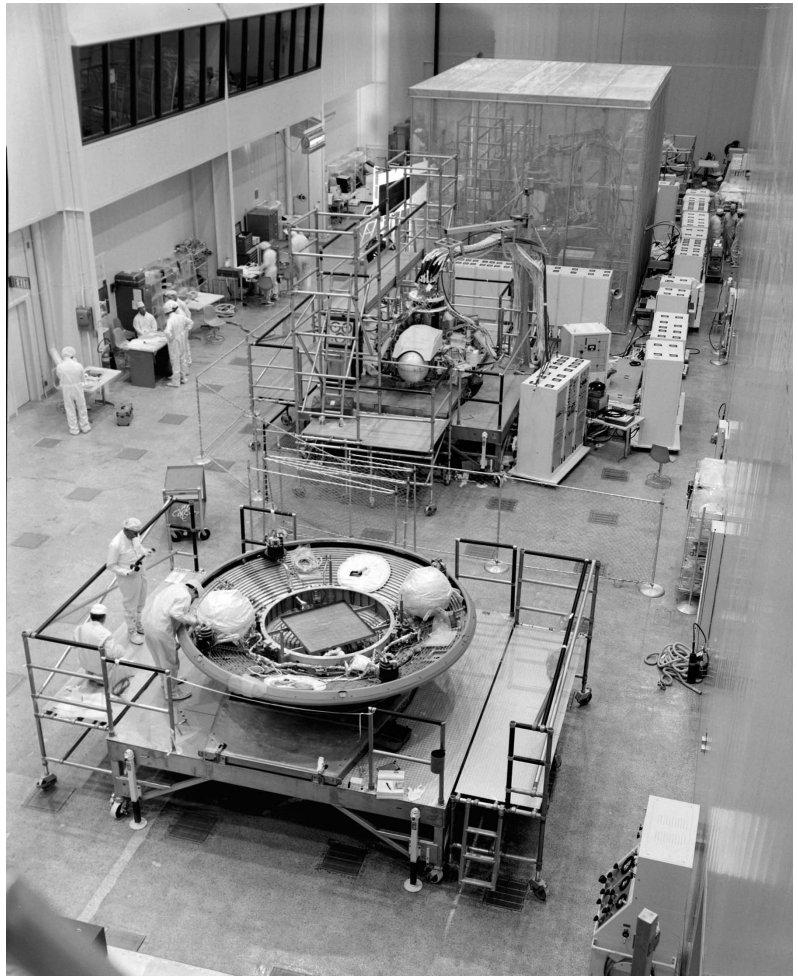


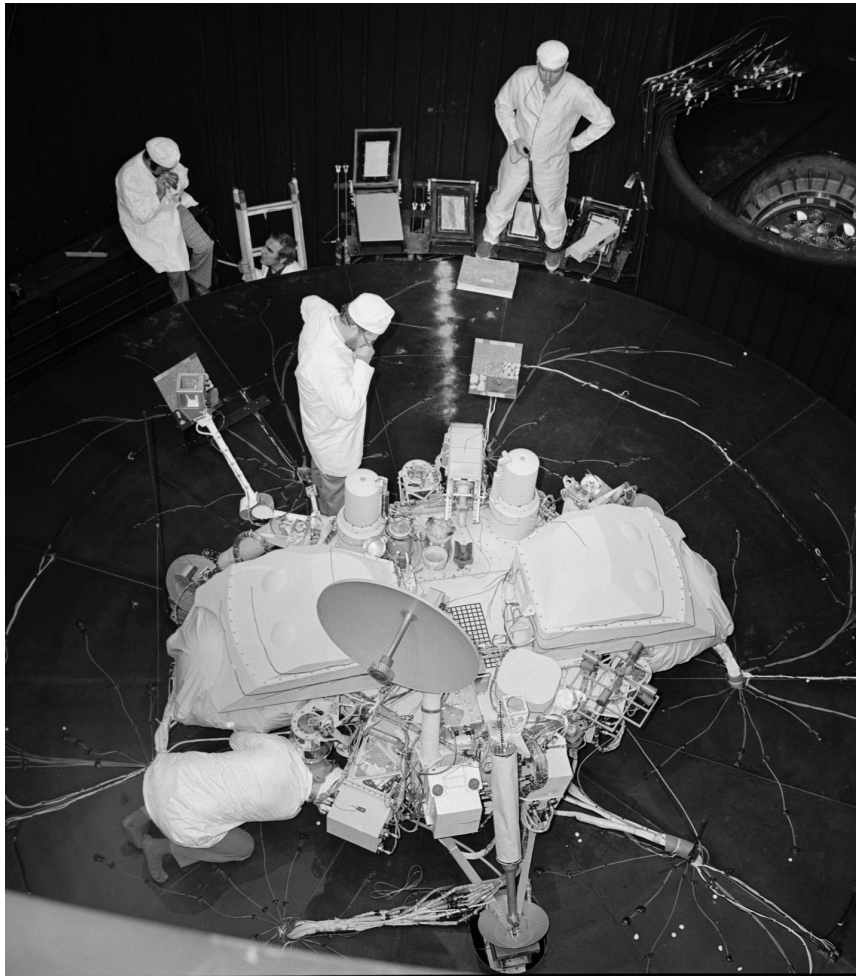
Martin Mid-term study configuration for Apollo, from June 1961 "Apollo Final Report"

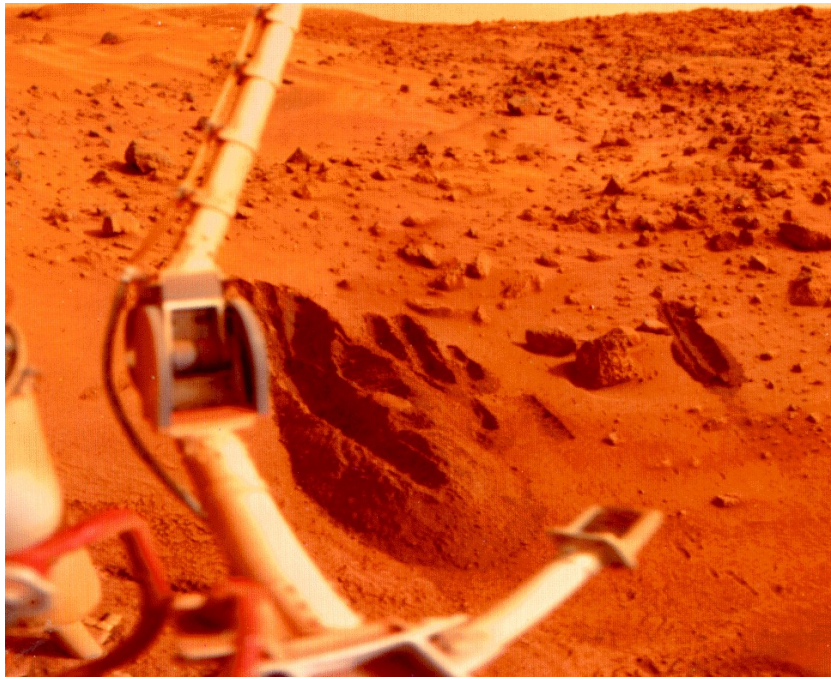
Skylab


SOLAR PANELS
EXPERIMENTS
APPOLLO TELESCOPE MOUNT
SATURN WORKSHOP
MICRO METEOROID SHIELD
SLEEP COMPARTMENT
WARD ROOM
WASTE COMPARTMENT
AIRLOCK MODULE
MULTIPLE DOCKING ADAPTER
COMMAND & SERVICE MODULE
MSFC-72-SL-7200-110

Viking (yes, that Viking this time)





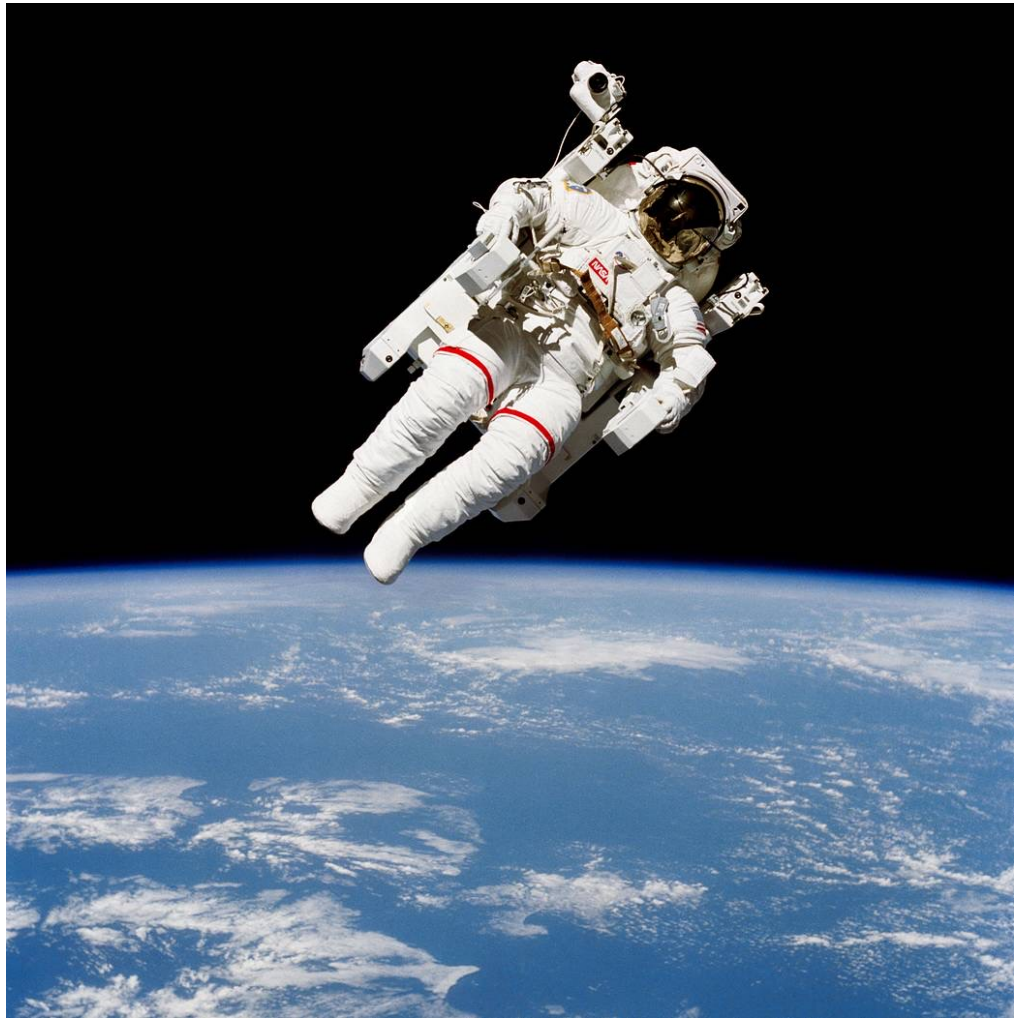


Viking 1, first successful landing on Mars, July 20, 1976

Space Shuttle External Tank

135 Space Shuttle external tanks flown 1981-2011

Bruce McCandless and the MMU



Manned Maneuvering Unit jetpack for EVAs was designed and built in Denver by Martin Marietta in the early 1980s

First flown by its chief advocate, Bruce McCandless. Bruce was also Capcom for the Apollo 11 moonwalk

After retiring from NASA in 1990, Bruce came to work at LM in Denver until his death in 2017

Titan IV and Titan II Revival

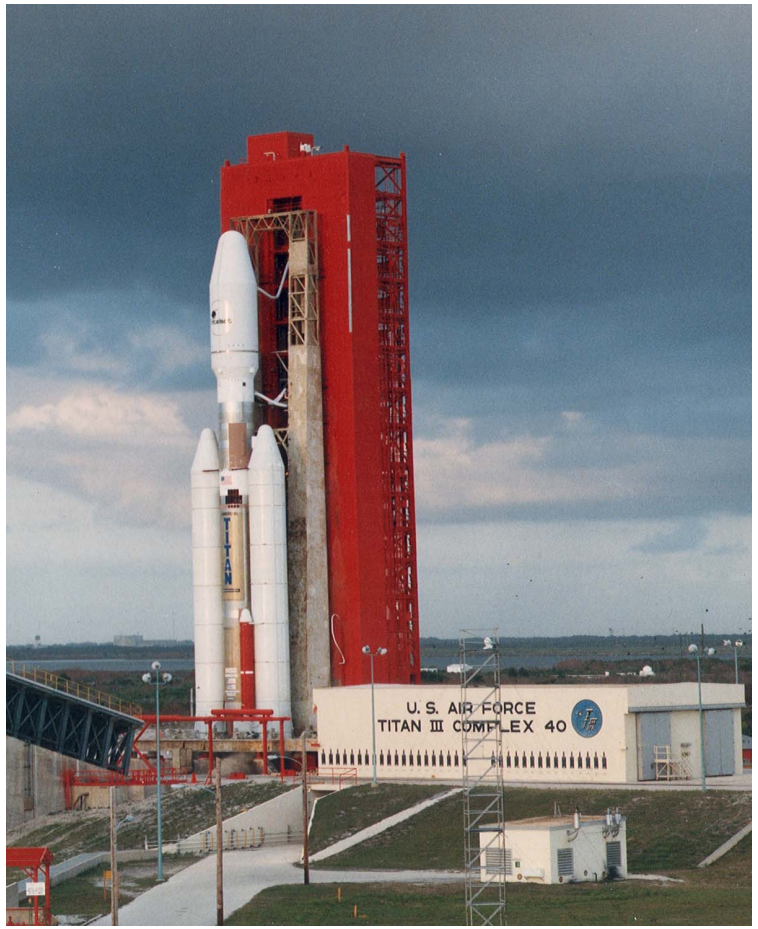
Titan Centaur TC-8

Titan IVB-36

Titan IIG-5

Commercial Space Launch After *Challenger*

Commercial Titan
(Martin Marietta)



Commercial Atlas
(General Dynamics)

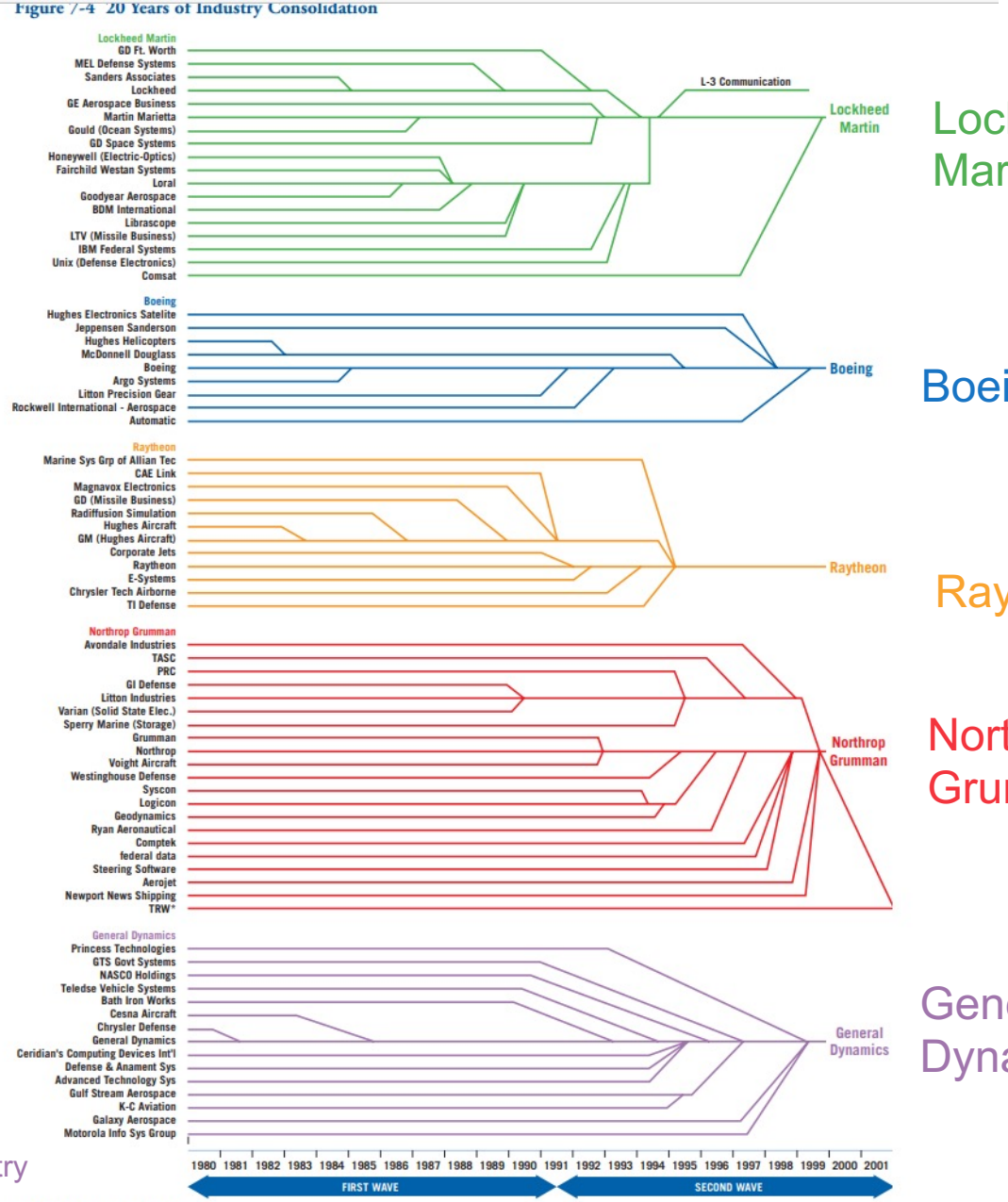
Lockheed Launch Vehicle / Athena
(Lockheed)

The “Last Supper,” 1993

In 1993, Secretary of Defense Les Aspin invited executives from 15 defense contractors to dinner at the Pentagon. He told them that with the end of the Cold War, defense acquisition budgets would shrink and would not keep them all in business. This triggered a wave of mergers.

Martin Marietta bought General Electric’s satellite division (comsats) and General Dynamic’s space division (Atlas and Centaur).

Then, Martin Marietta and Lockheed merged, spinning out the Marietta gravel business and parts of Loral



Lockheed Martin

Boeing

Raytheon

Northrop Grumman

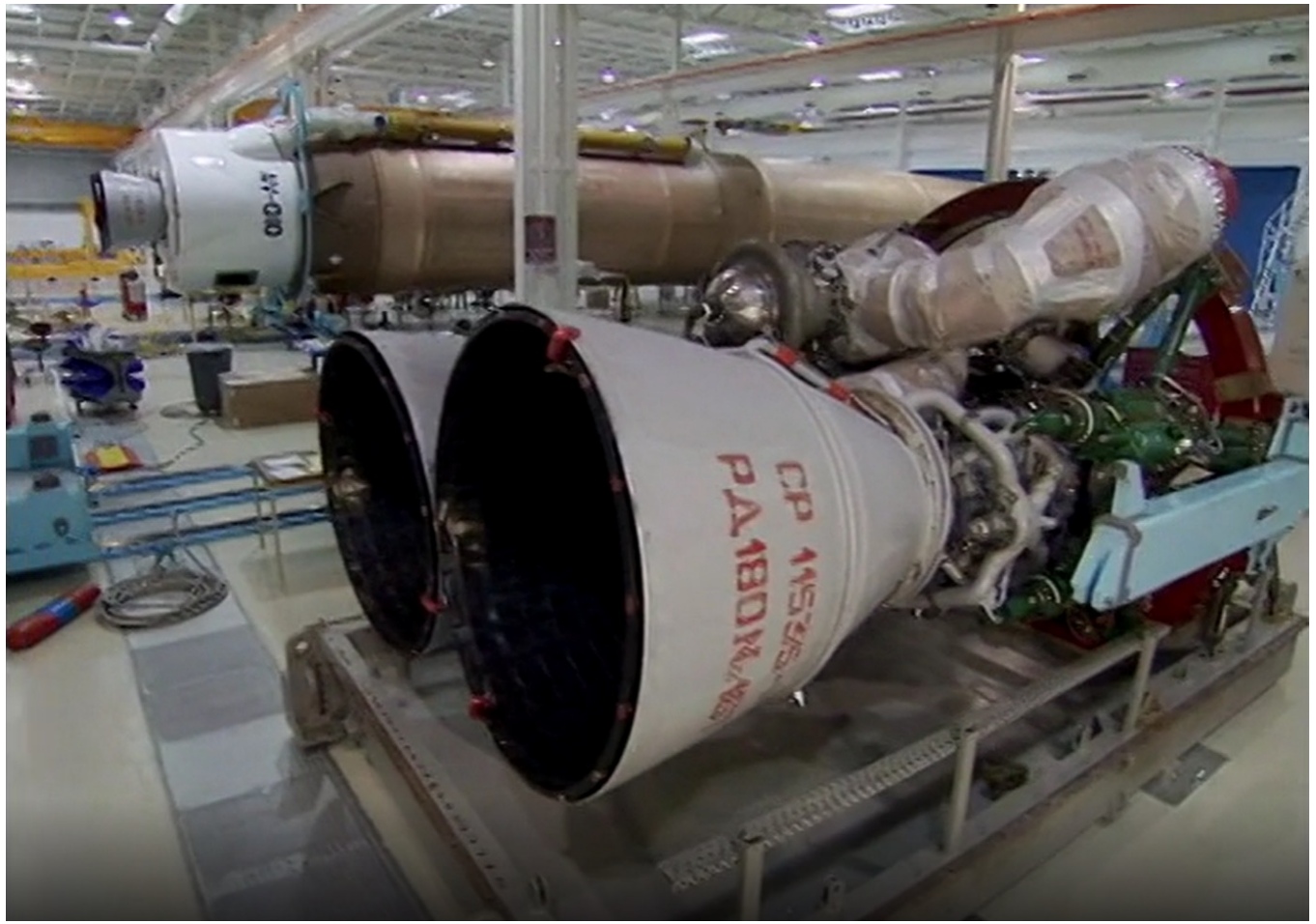
General Dynamics

Figure from the Final Report of the Commission on the Future of the Aerospace Industry

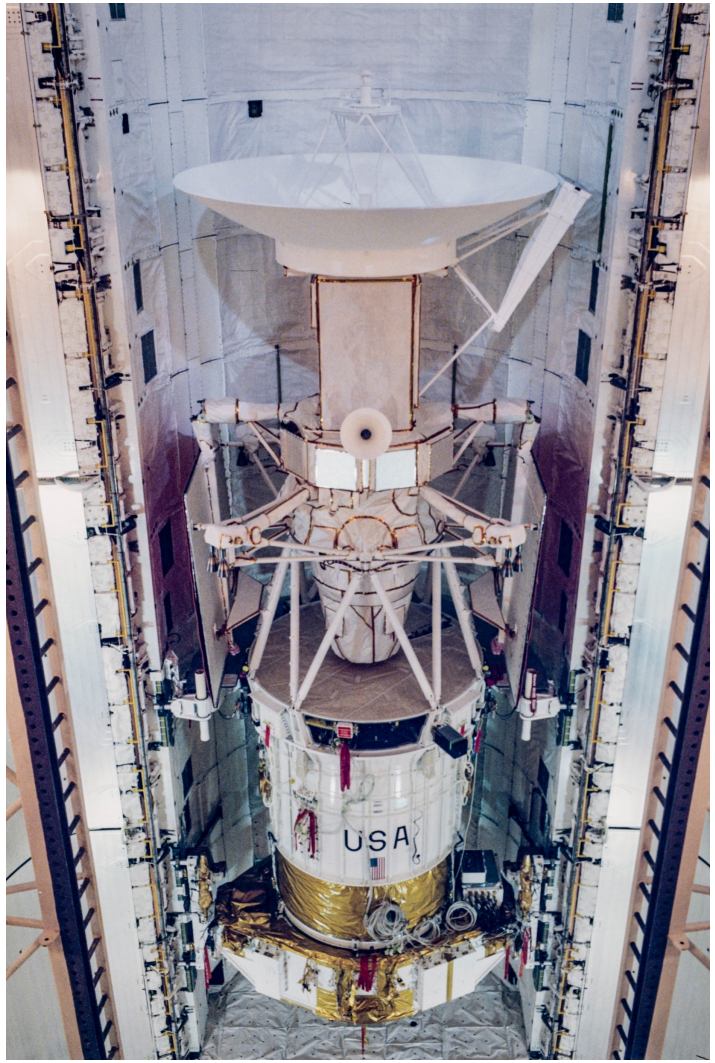
The Russians are Coming

Proton Launch Services (Lockheed/ILS)

Russian RD-180 Engines on Atlas (GD/ Martin Marietta)



Reinvigorating Planetary Missions

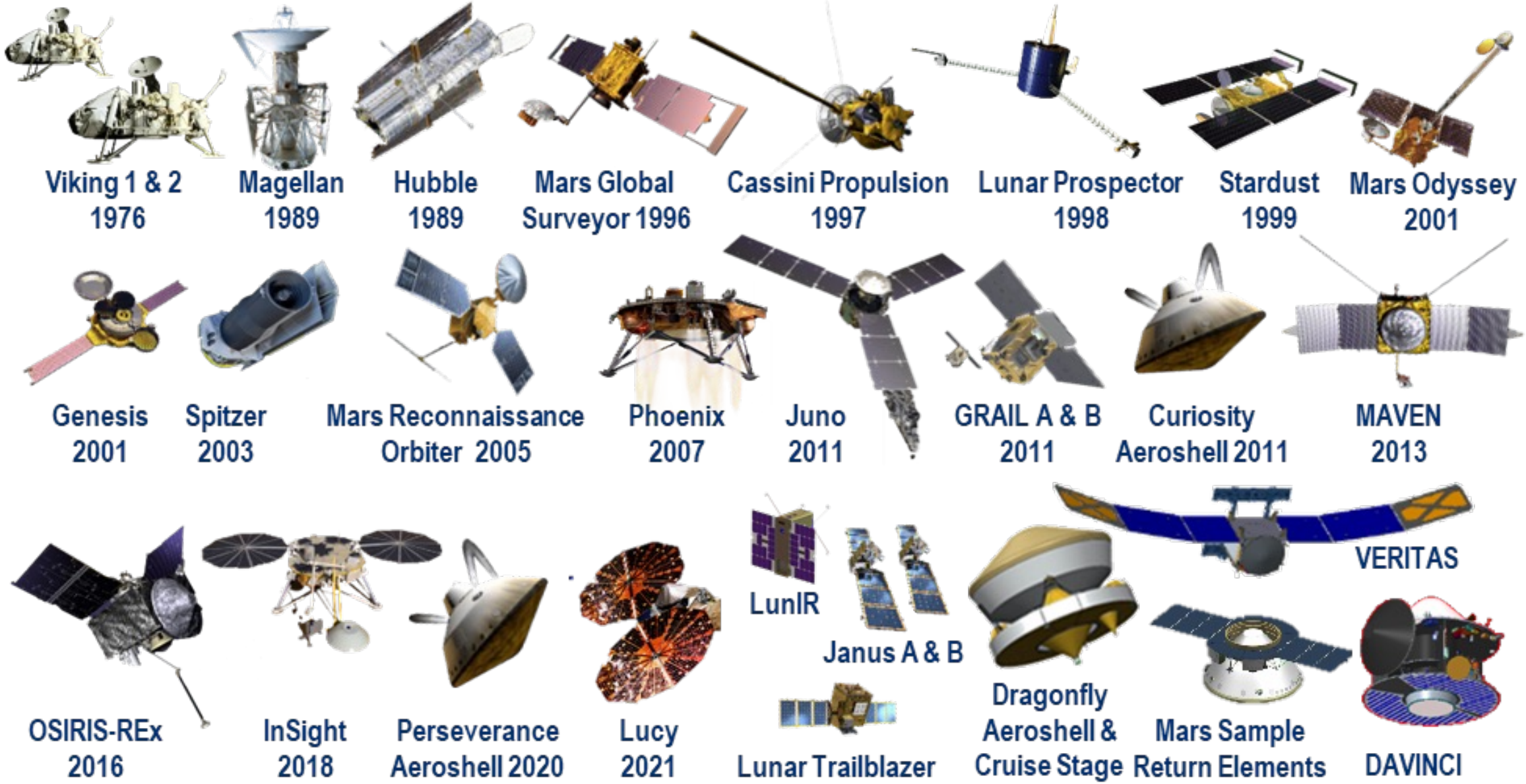


The Magellan Venus radar mapping mission, launched in 1989 was part of a resurgence of planetary exploration. Magellan was the first planetary spacecraft operated at Waterton.

In the early 1990s, NASA began to compete planetary science missions starting with the Discovery program, and later expanding to New Frontiers

The 1993 failure of Mars Observer also started a more vigorous Mars exploration program

This led to a more frequent cadence of planetary missions which LM has been very successful in competing for

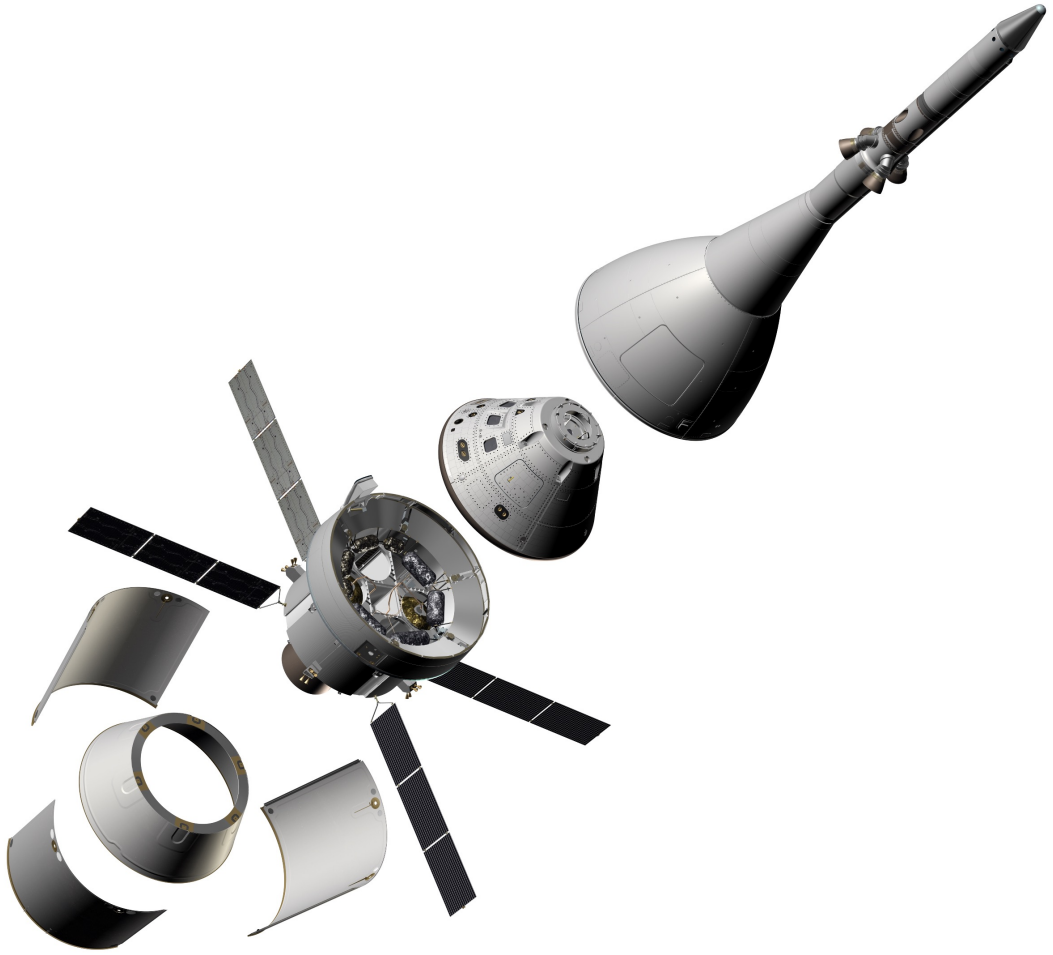

Viking 1 & 2
1976
Magellan
1989
Hubble
1989
Mars Global
Surveyor 1996
Cassini Propulsion
1997
Lunar Prospector
1998
Stardust
1999
Mars Odyssey
2001
Genesis
2001
Spitzer
2003
Mars Reconnaissance
Orbiter 2005
Phoenix
2007
Juno
2011
GRAIL A & B
2011
Curiosity
Aeroshell 2011
MAVEN
2013
OSIRIS-REx
2016
InSight
2018
Perseverance
Aeroshell 2020
Lucy
2021
LunIR
Janus A & B
Lunar Trailblazer
Dragonfly
Aeroshell &
Cruise Stage
VERITAS
Mars Sample
Return Elements
DAVINCI

Changes in 2006: ULA Spinoff and Orion Win

In 2006, Lockheed Martin and Boeing created a joint venture, United Launch Alliance, to merge the Atlas V and Delta IV launch vehicles.

Also in 2006, Lockheed Martin won the contract for Orion, after several years of pursuing the next human spaceflight vehicle in programs like CRV, CTV, OSP.

These two major shifts led to LM Denver exiting the launch vehicle business after 50 years and greatly increasing work on human spaceflight and exploration

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