Dave Lozier's Scrapbook

"Could I please have the first viewgraph"……?

To Those Who would make the Study of the Universe Their Life's Work

Socrates, the Greek philosopher, was acquainted with Astronomy but warned against further study because he felt it could use up a man's whole life and prevent him from doing many useful things.

TRW Pioneer to Jupiter

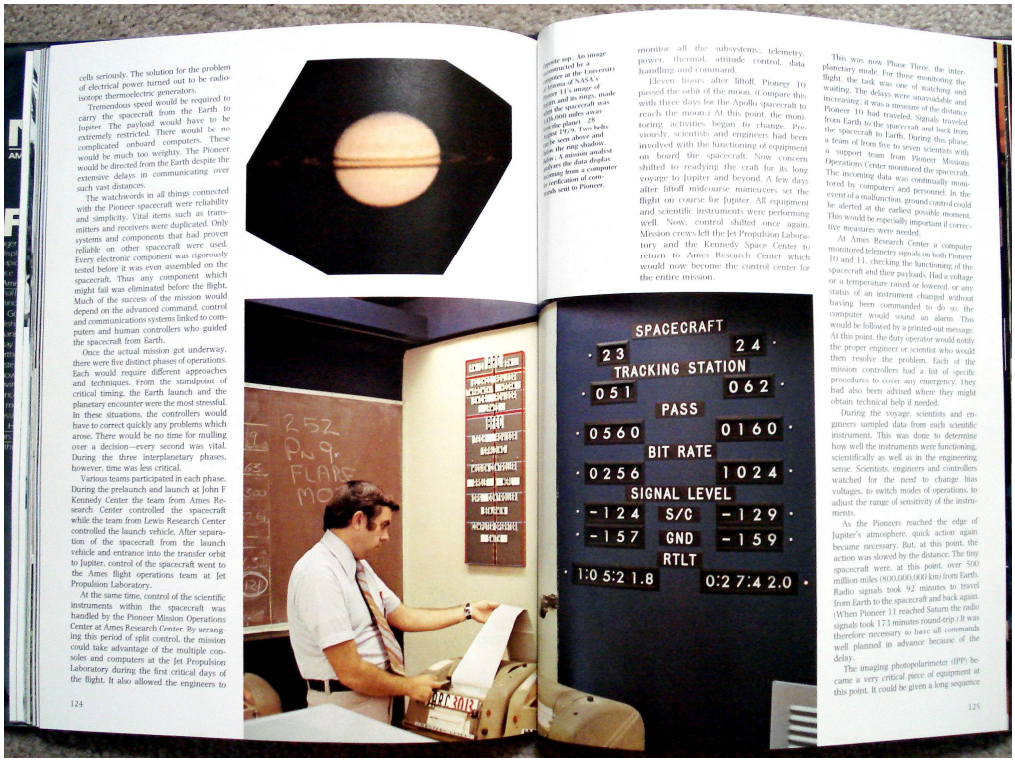
This scrapbook is just a compendium of ragtag memories, recollections, pictures and artifacts from a great adventure. I don't believe my career in the space program used up my "whole life" like Socrates warned and I think I did some useful things but as Dennis Hopper said in a movie once "just because it happened to you, does not make it interesting". Well, I am writing these things down just for my benefit and if some of it is "interesting" so be it.

So what's a "viewgraph"? Dan Chathcart, an Ames guy, was always telling jokes. He told this one often. The son of a retiring government man asked his father what he did for 40 years. The father looked to his right, then to his left and finally behind him and said "could I please have the first viewgraph." To the government man it was the Powerpoint of its time.

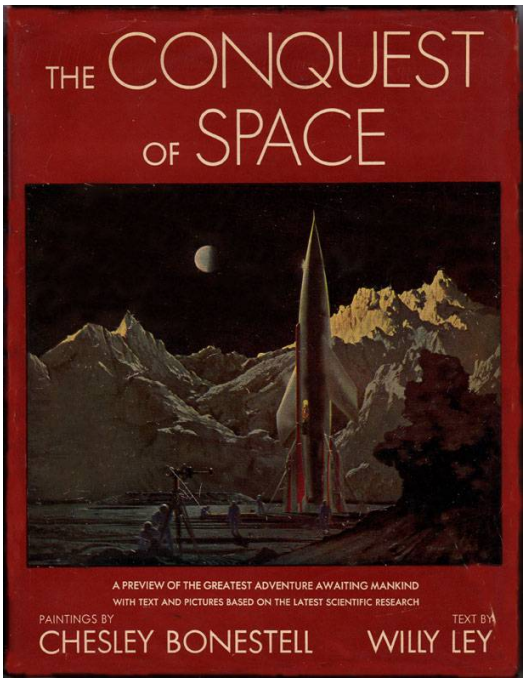
As George C. Scott said in the movie Patton, “All glory is fleeting”

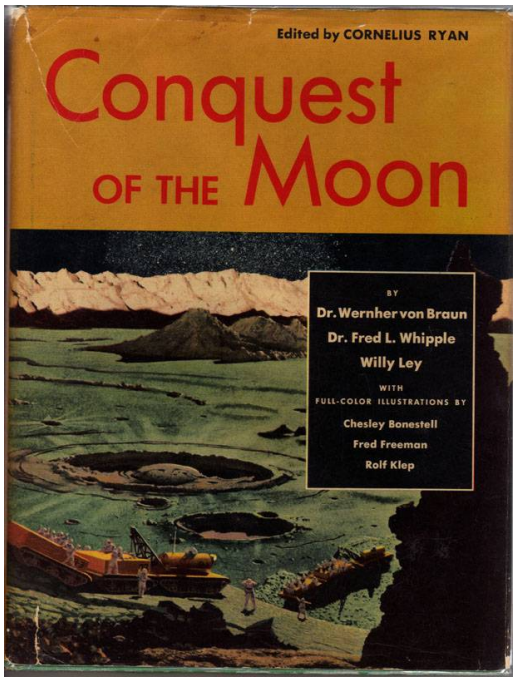
Marci Smith came into the office one day and said “you’re in the history books”. I asked, “what do you mean”? She said she was in a bookstore and found this book in the marked down clearance section. It was a commercial publication from England. History of NASA, and in one section there were pictures and a discussion of the Pioneer 10/11 missions. For some unknown reason they had selected a photograph of me looking at some printout from a teletype. Not many people remember what a teletype is but that’s not the point. I was in the history books and now I am in immortal. Need I say more, but right away I bought ten of them, gave some to my best friends, kept a few for myself and I look at the picture of and on.

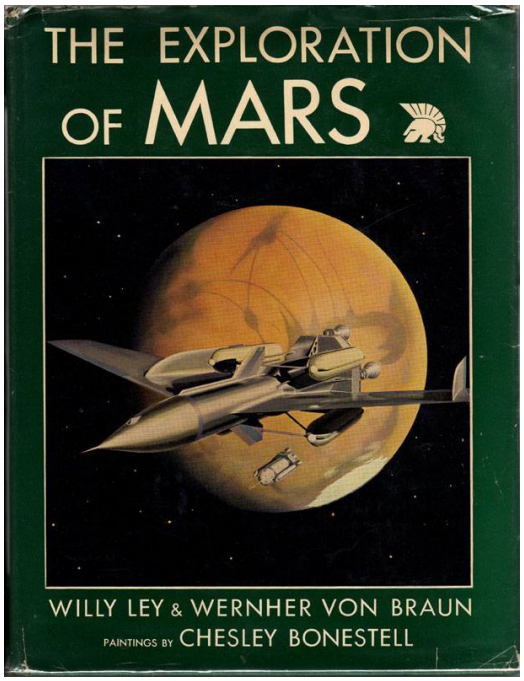
Look on page 124.



July 29, 1958 was the day that President Eisenhower signed the bill that created the National Aeronautics and Space Administration. In the 50 years since that day, much of the near-Earth environment, a lot of the solar system, and a smidge of deep space have been explored. The conquest of space was possible by the dedication and firm belief in the manifest destiny of man's greatest adventure. The publications, scientific breakthroughs, art and the imaginations of science fiction were turned into science fact. These advancements were prophetically predicted in four publications in the early 1950s. Excerpts from these books, published in Collier's magazine, were available to the public at minimal cost thus capturing the imagination of the taxpayer who would be needed to pay the cost of such exploration. These books are shown below.







Most of my interest in science came from science fiction magazines, DC comics and the Flash Gordon early TV serials when I was in grade school. I watched Mr. Wizard, Don Herbert on our grainy black and white TV during the 50s. Oh how I wanted to be that young boy he demonstrated the experiments to on the program.

I was a freshman at Lewis and Clark High School in Spokane Washington on October 4, 1957 the day that the Soviet Union launched Sputnik. Sputnik thrust the nation into the "space age" and the nation responded.

My mother had read some of the Collier's articles. She hauled me out of bed in the middle of that cold 1957 October night, took me out in the backyard, and told me to stare up at the heavens. Amongst all the stationary stars there was a little point of light moving across the sky from one horizon to the other. Sputnik, man's first artificial satellite, was reflecting the light from the sun as it traveled in its 90 minute orbit around the Earth. My mother pointed up at the moving light and said "Look, this is your future." All I remember was the desire to go back to bed.

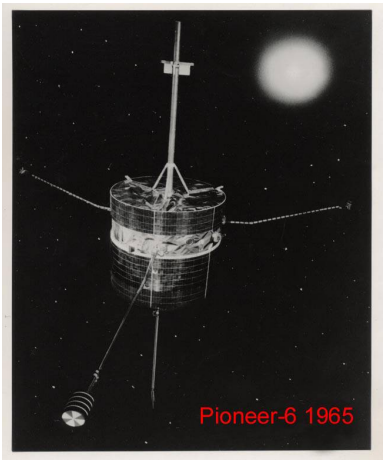
I majored in Mathematics/Computer Science and towards the end of 1965 I was completing my studies at WSU and since I wasn't going on to graduate school I knew I would soon need to find a job. The WSU placement office gave me a list of the companies that would be interviewing around this time and one of them was NASA. I signed up and that's how I met Don Shilling from the Ames personnel division. Don was interviewing for electrical engineering positions but after he heard I was a programmer he asked me to fill out a SF-57 application for Federal employment and send it back to him anyway. There might be openings since computer science was just starting to be the cutting edge technology field. I really didn't have any desire to go to California. I didn't know anyone there and working for the Federal government wasn't the most desirable thing but I took the form anyway and after I got back to my dorm room, tossed it on my desk.

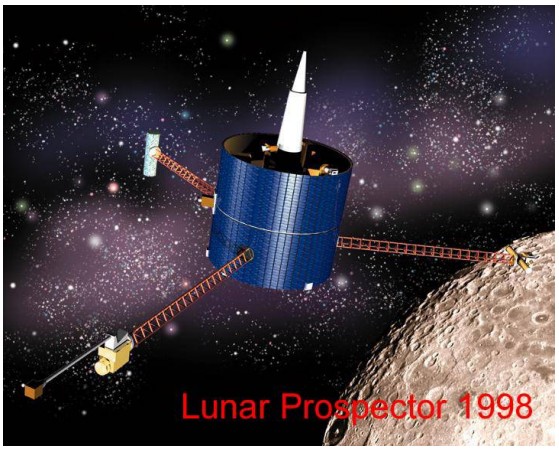
Later in November I got a call from Don and he was wondering where that application was. I told him I still had it but never filled it out and he said "please" complete it and send it right away. The idea of working for NASA was seductive so I did. So I quickly and not too carefully filled it out and sent it to Ames. It was Christmas vacation and I was home at my parents when a call came in from Ames. It was Bob Hofstetter from the Pioneer Project. They had launched Pioneer 6 on December 16 but they still needed a computer programmer to debug and finish their trajectory codes. They were planning additional Pioneer launches and he asked "How would you like to go to work for us?" I said it sounds great. Bob said they would send an offer and he hung up. What the hell was a "trajectory?"

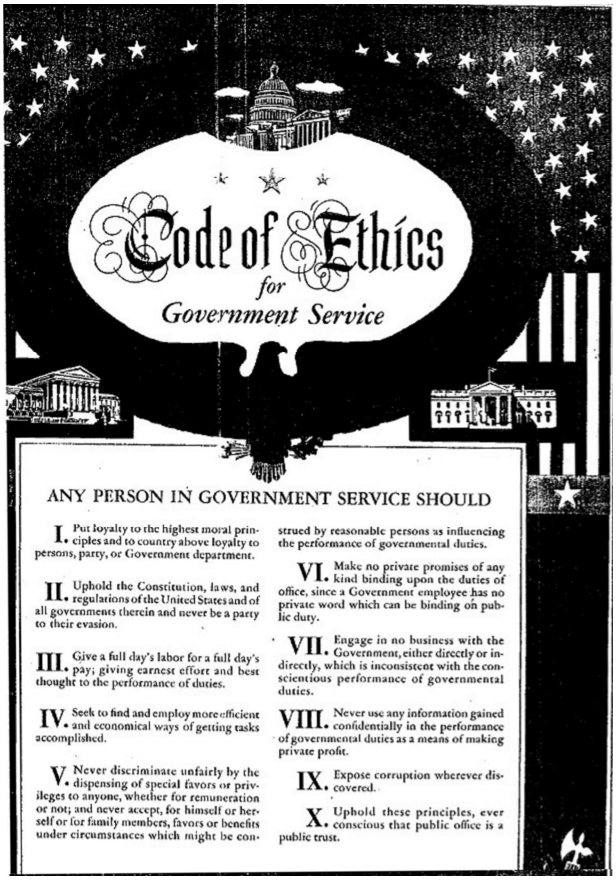
Well the short history is that I filled out the SF-57, sent it in, received an offer,

accepted the offer, packed up my bags and went to California. When I arrived in Mountain View, California there was a massive thunderstorm with rain and wind that greeted me. I wasn't sure I was really in California. It never rained in California, did it?

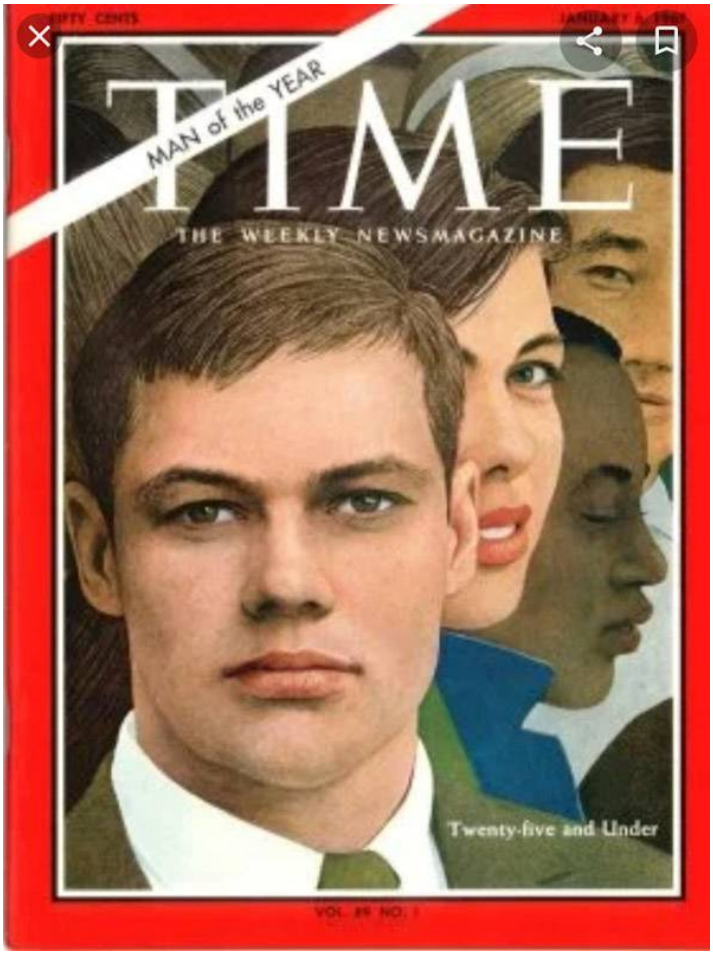
On February 7, 1966 I became a civil servant in the Pioneer Project working for NASA at Ames Research Center, Moffett Field, California. For the next 38 years I had the great fortune to be part of the Golden Age of Space Exploration. We sent four spacecraft around the Sun, two to Jupiter and Saturn, a Venus orbiter that lasted 14 years and four probes into the atmosphere of Venus. Lunar Prospector was my last mission before I retired. A small spinning spacecraft with three booms that looked much like Pioneer 6, orbited the Moon for 1.5 years. I had returned to the future. It was a great career.





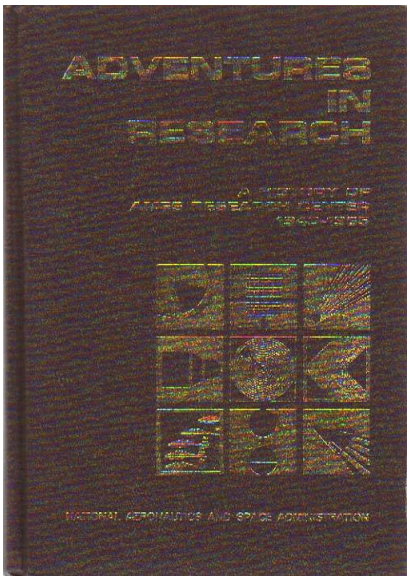


At the end of the year Time magazine always chose a person to recognize as having a profound impact on the world during the year. Heroes, Visionaries, Statesmen, and Tyrants, the good and the bad. Time's Man of the Year for 1966 was myself. I was 23 at the time I went to work for NASA and I had indeed inherited my folks legacy of survival from the Great Depression, World War II, and their sacrifices to see that I went to college.

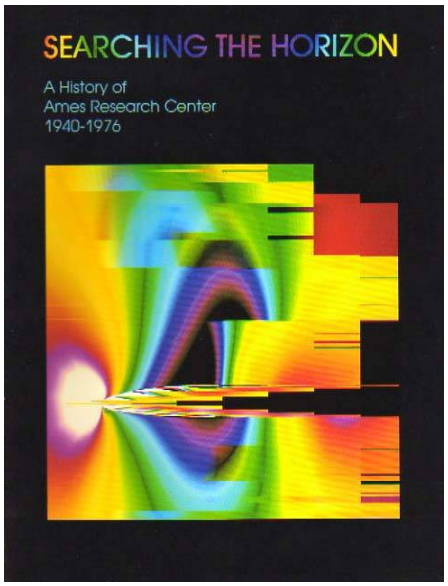


The Inheritor		Representing a generation of American men and women, aged 25 and under.

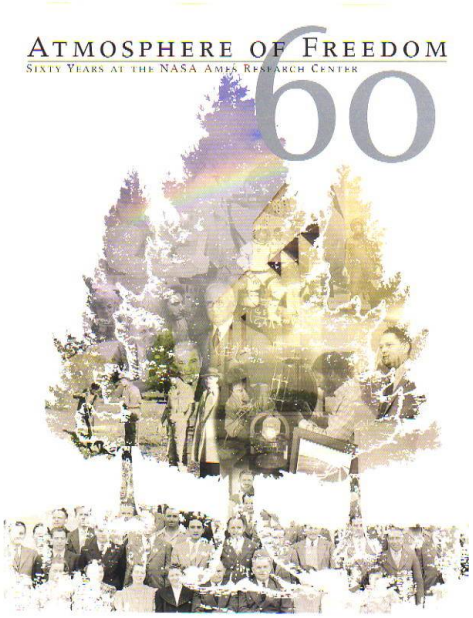
Ames Research Center
Home of the Pioneer Missions



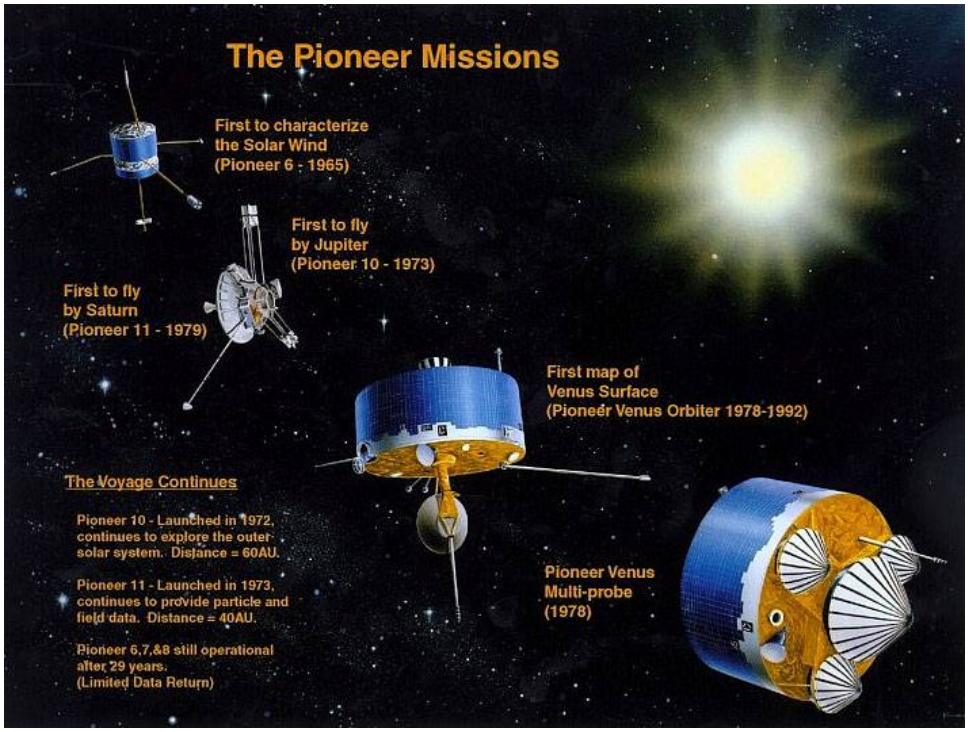
SP-4302



SP-4304



SP-4314



The decade between the assassination of JFK and the launch of Pioneer-11 (1963-1973) marked a profound period in my life. Like most people in the world, I can remember exactly where I was when President Kennedy was killed. It shocked our protected collegiate life and showed us the world was a dangerous place but our dream in the New Frontier continued. I did not realize it then but my interest in mathematics and computer science would lead me to some of the greatest experiences in the space program that one could ever imagine.

Ten Years of Spaceflight and Social Change

Vietnam War

Cold War

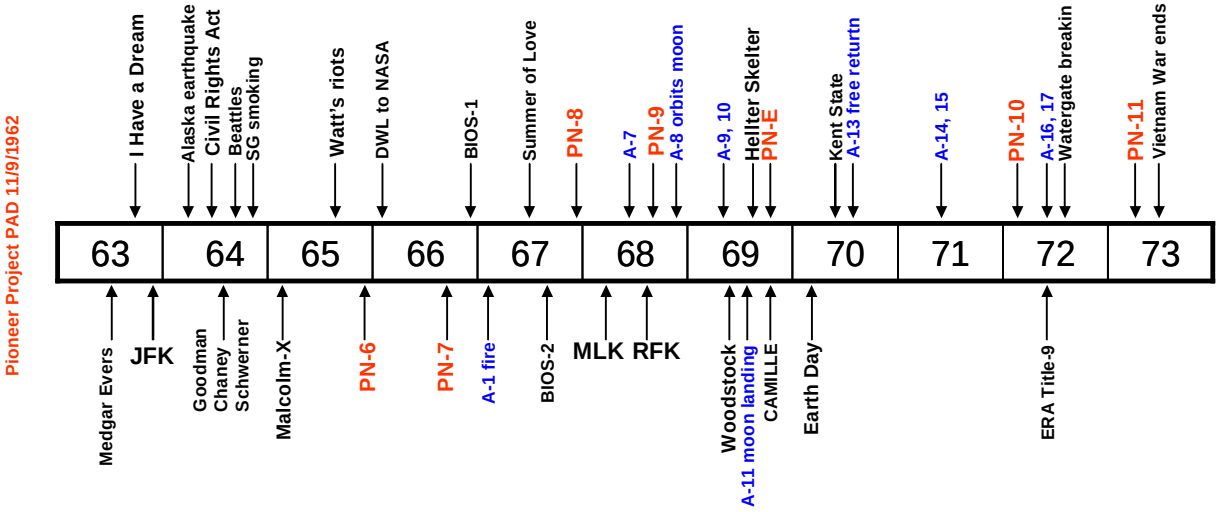
Space Race

Civil Rights Movement

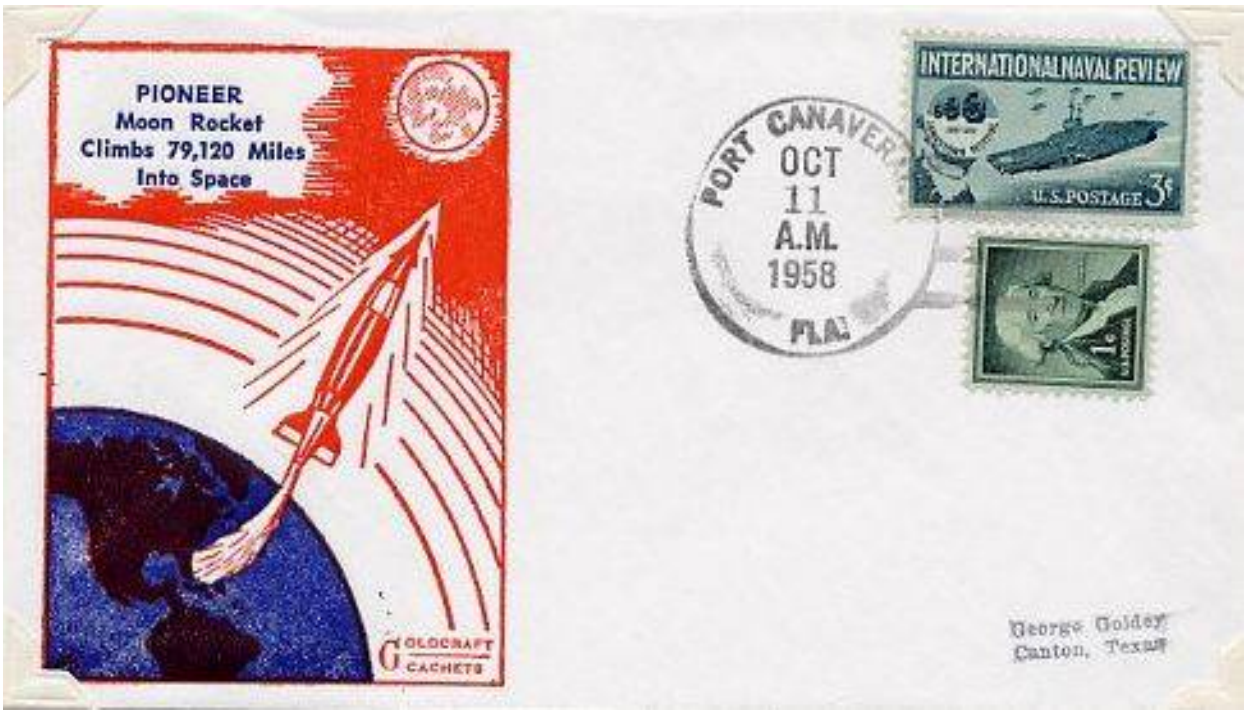
Environmental Movement

Women's ERA Movement

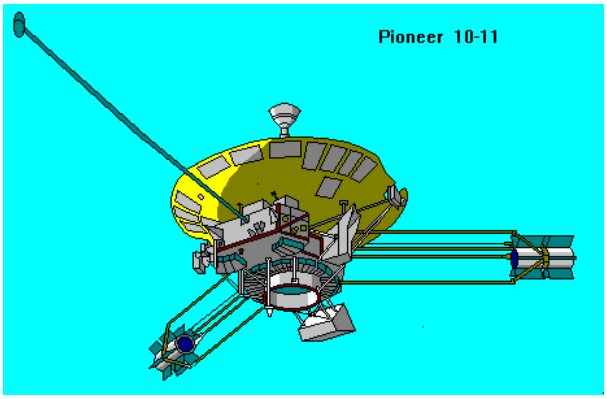
Rocket Launch and Cocoa Beach Pier

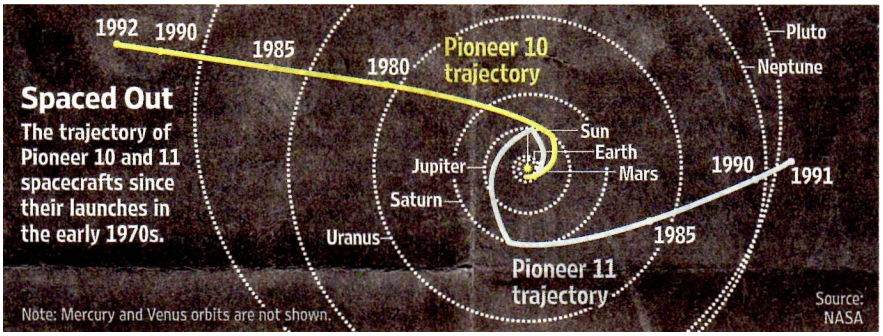


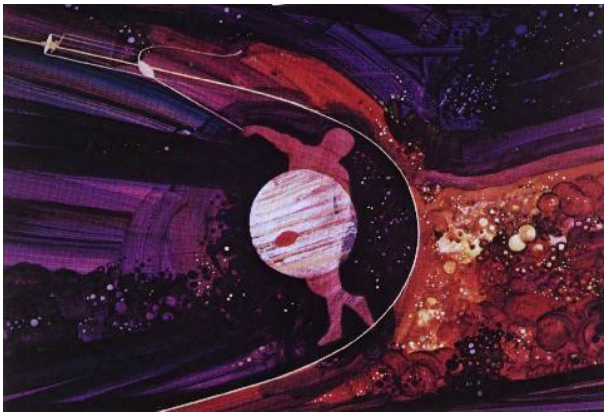
Pioneer Project Approval Document (PAD) Signed by NASA Headquarters 11/9/1962.



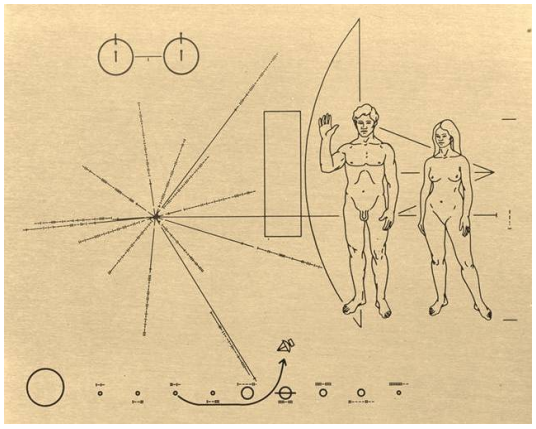
First NASA launch.

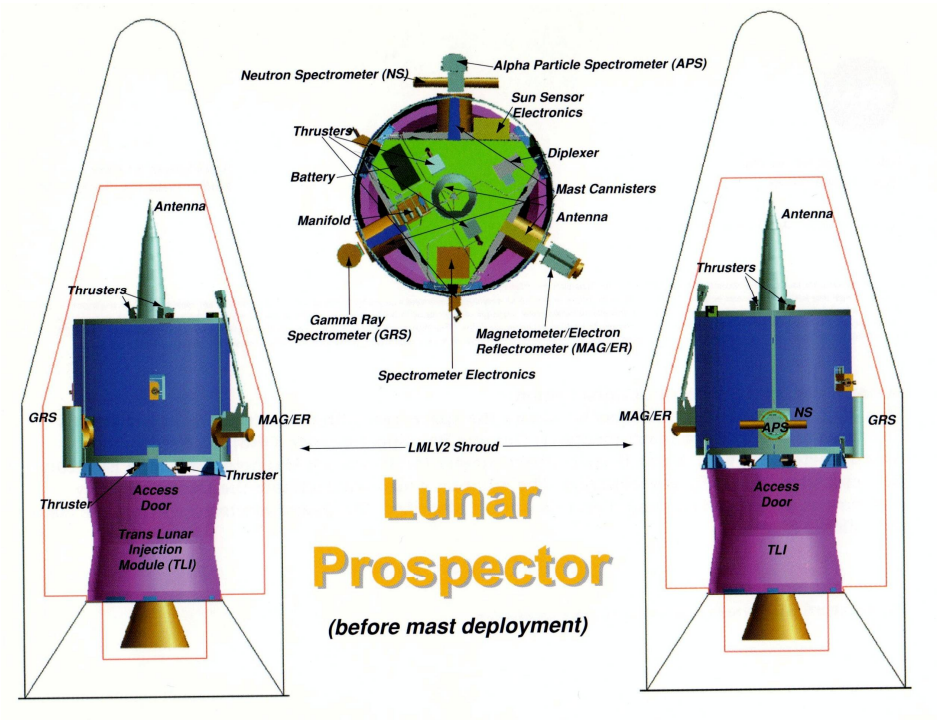

Pioneer 10-11


1992
1990
1985
1980
Pioneer 10 trajectory
Pluto
Neptune
Spaced Out
The trajectory of Pioneer 10 and 11 spacecrafts since their launches in the early 1970s.
Sun
Earth
Mars
Jupiter
Saturn
Uranus
1990
1991
1985
Pioneer 11 trajectory
Note: Mercury and Venus orbits are not shown.
Source: NASA




PIONEER 10
Leaves the SOLAR SYSTEM
JUNE 13, 1983




Neutron Spectrometer (NS)
Alpha Particle Spectrometer (APS)
Sun Sensor Electronics
Thrusters
Diplexer
Battery
Mast Cannisters
Manifold
Antenna
Antenna
Thrusters
Gamma Ray Spectrometer (GRS)
Magnetometer/Electron Reflectometer (MAG/ER)
Spectrometer Electronics
GRS
MAG/ER
LMLV2 Shroud
Thruster
Thruster
Access Door
Trans Lunar Injection Module (TLI)
Lunar Prospector
(before mast deployment)
Antenna
Thrusters
MAG/ER
NS
APS
GRS
Access Door
TLI

References

Adventures in Research: A History of Ames Research Center, 1940-1965
http://history.nasa.gov/SP-4302/sp4302.htm

Searching the Horizon: A History of Ames Research Center, 1940-1976.
http://history.nasa.gov/SP-4304/sp4304.htm

Atmosphere of Freedom: Sixty Years at the NASA Ames Research Center.
http://history.nasa.gov/SP-4314/sp4314.htm

http://history.nasa.gov/SP-480/sp480.htm

http://history.nasa.gov/SP-349/sp349.htm

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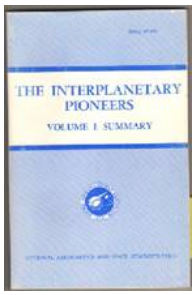
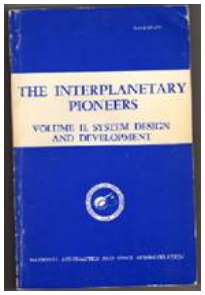
"30…and Counting: Pioneer 10" - *StarDate,* March/April 2002

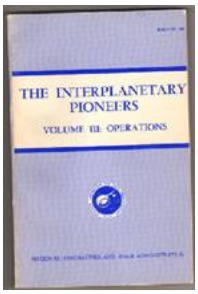
The Spacecraft That Will Not Die" - *American Heritage of Invention & Technology,* Winter 2001

"Pathfinding the Rings" - *Quest: History of Spaceflight Quarterly,* Spring 2000

Pioneers 6,7,8,9,E







The Interplanetary Pioneers
Volume I: Summary NASA SP-278
Volume II: System Design and Development NASA SP-279
Volume III: Operations NASA SP-280
By William R. Corliss 1972

Pioneer VI Mission
May 22, 1967
Prepared by the Pioneer Project Office
National Aeronautics and Space Administration
Ames Research Center
Moffett Field, California

Pioneer 6-E Spacecraft Project
Final Project Report
December 1969
NASA contract NAS2-1700 TRW

Wolverton, Mark, "Pathfinding the Rings: The Pioneer Saturn Trajectory Decision." *Quest: The History of Spaceflight Quarterly* 7/4 (Spring 2000) 5-11.

Colin, L. "The Pioneer Venus Program." *Journal of Geophysical Research*. 85 (30 December 1980): 7575-7598. Abstract: The major aspects of the Pioneer Venus orbiter and multiprobe missions are documented. Specific topics covered include a program history, the scientific payloads, spacecraft descriptions, launch and interplanetary cruise features, encounter features, nominal mission descriptions, instrument anomalies, and the orbiter extended mission. The key scientific questions addressed by the missions are listed.

Craig, R.A. "The Pioneer Venus Extended Mission." *Spaceflight*. 27 (December 1985): 445-450. This source contains a history of the Pioneer Venus Orbiter as well as a presentation of the ongoing and future missions (through reentry 1992).

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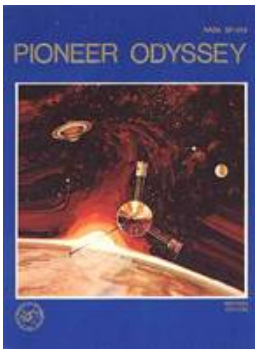
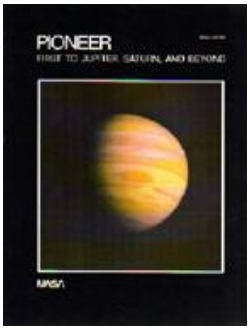
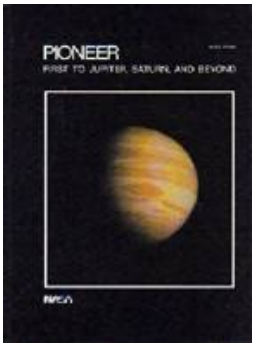
Pioneer Odyssey
Encounter with a Giant
NASA SP- 349
1974



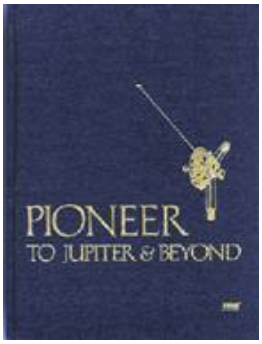
Pioneer Odyssey
NASA SP-349
Pioneer Odyssey (NASA SP-349, revised edition, 1977)
by Richard O. Fimmel, William Swindell, and Eric Burgess.



Pioneer
The First to Jupiter, Saturn and Beyond
SP-446

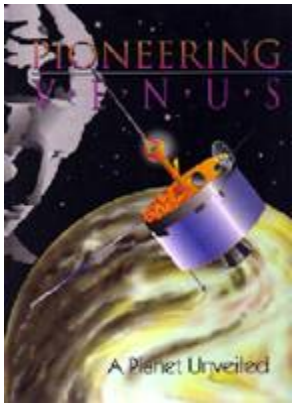


Pioneer
The First to Jupiter, Saturn and Beyond
SP-448

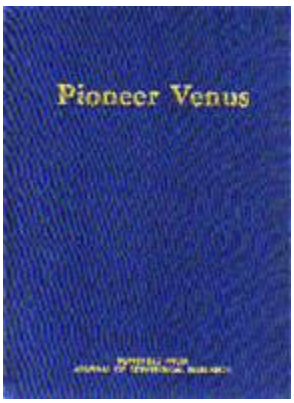


TRW

SP-461

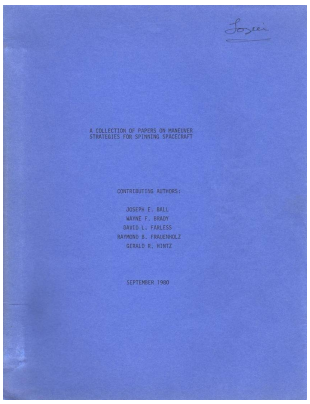


SP-518



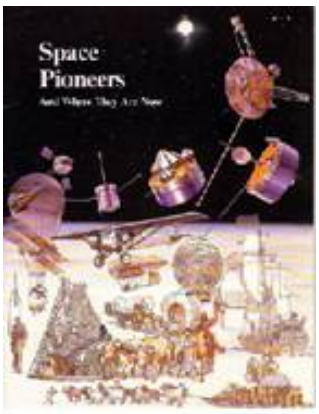
reprints

PVO Reentry

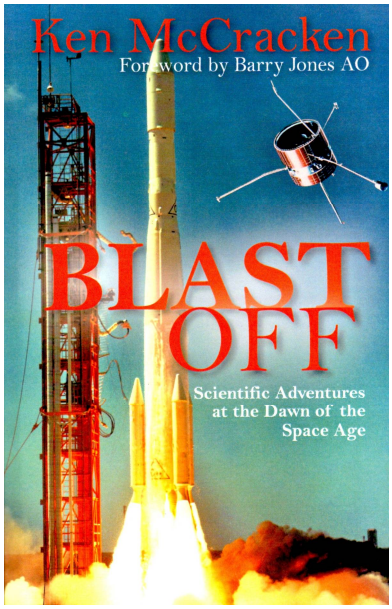


Pioneer 10/11 and PV papers

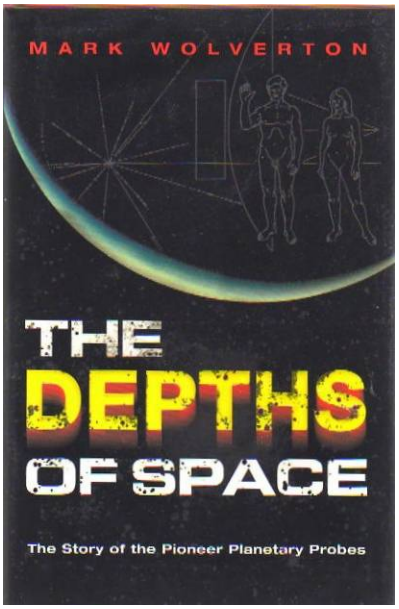
PV Final Report

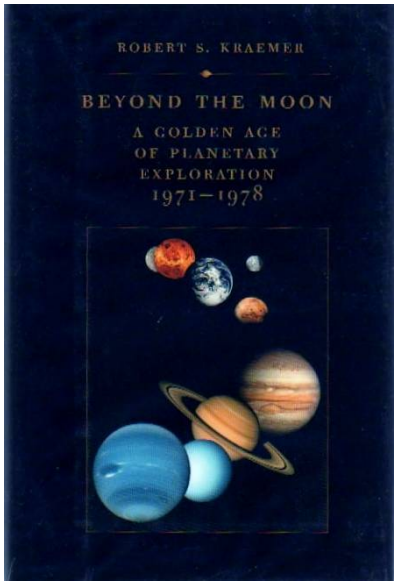


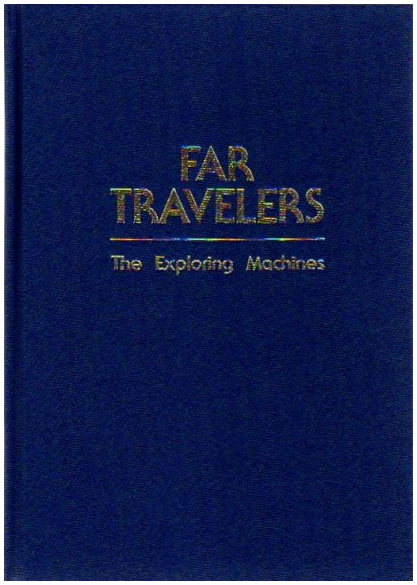
Montoya, Earl J. and Richard Fimmel. *Space Pioneers and Where They Are Now.* NASA Ames Research Center, Moffett Field, CA: NASA EP-264 (Technical Report), 1 January 1987. This contains a description of the Pioneer project, its history and achievements.

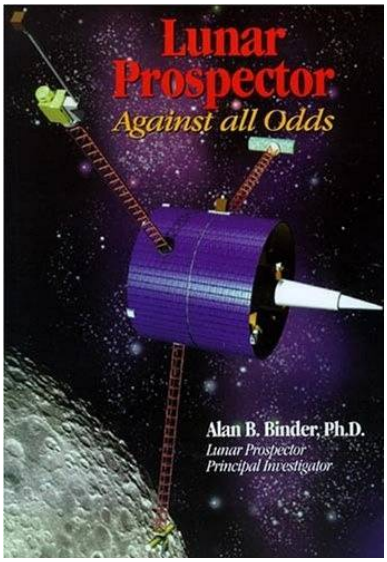

Ken McCracken
Foreword by Barry Jones AO
BLAST OFF
Scientific Adventures at the Dawn of the Space Age

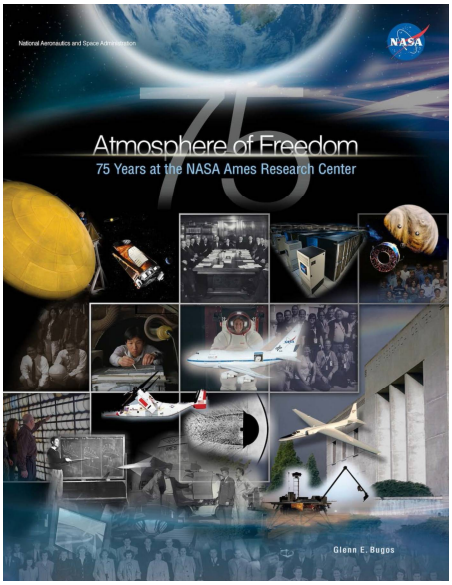

JAMES VAN ALLEN
THE FIRST EIGHT BILLION MILES
TO SUN
VAN ALLEN
ABIGAIL FOERSTNER


MARK WOLVERTON
THE DEPTHS OF SPACE
The Story of the Pioneer Planetary Probes


ROBERT S. KRAEMER
BEYOND THE MOON
A GOLDEN AGE OF PLANETARY EXPLORATION
1971–1978


FAR TRAVELERS
The Exploring Machines

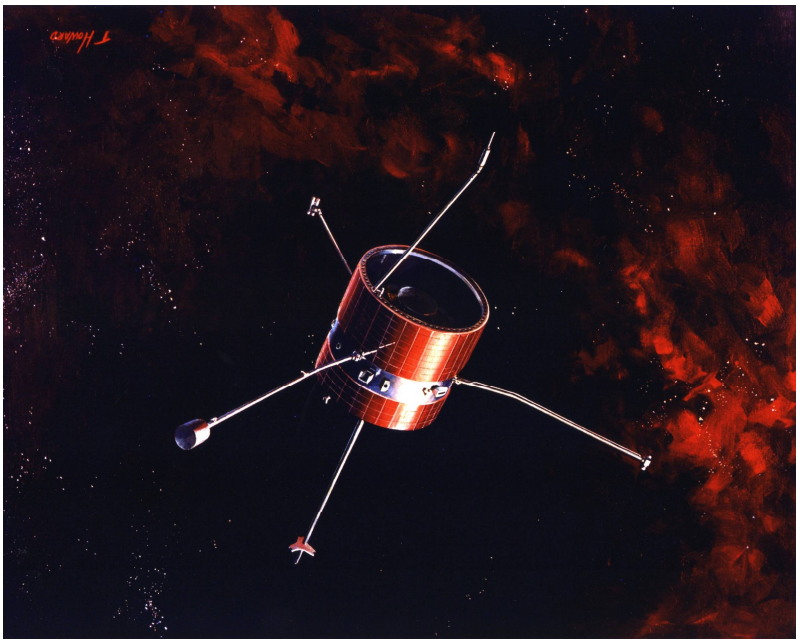

Lunar Prospector
Against all Odds
Alan B. Binder, Ph.D.
Lunar Prospector
Principal Investigator


NASA
75
Atmosphere of Freedom
75 Years at the NASA Ames Research Center
Glenn E. Bugos

Pioneers 6,7,8,9,E

Hamish Lindsay and David Lozier

The solar orbit interplanetary Pioneers were managed at Ames Research Center during the 1960s. During the period from 1965 through 1969 a series of five spacecraft were launched from KSC. Four of the five were successfully inserted into orbits around the Sun with the fifth suffering a failure of the launch vehicle and thus was lost.



The Pioneer solar orbiters were a spin stabilized, solar cell powered, 150 lb. spacecraft.

Pioneers 6-E were launched using the thrust augmented Delta with a third stage.

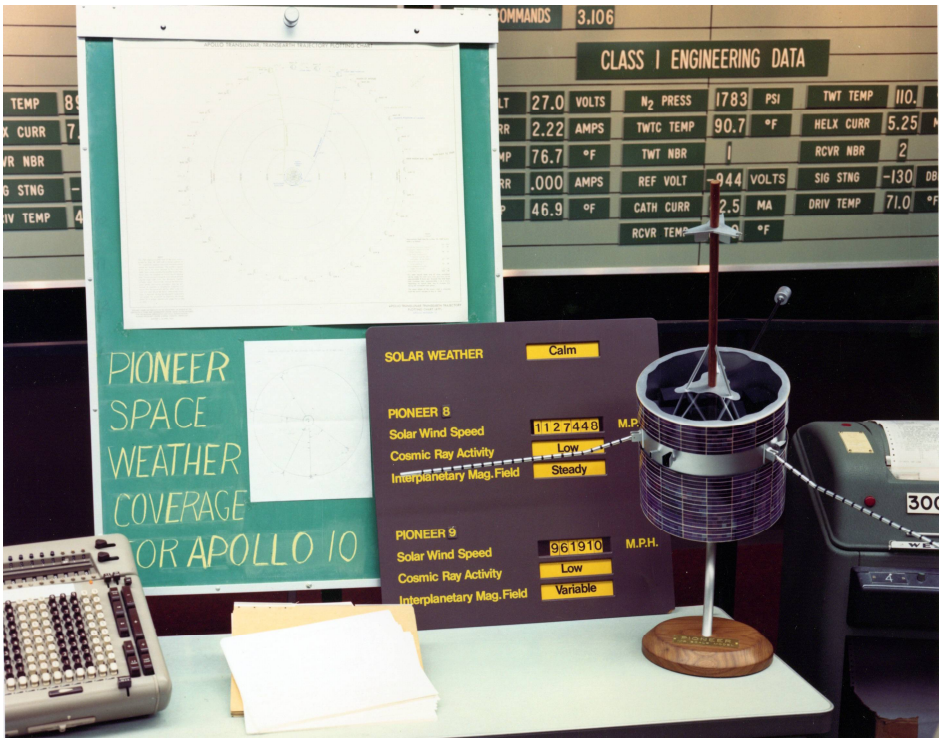
Pioneers 6, 7, 8, 9 and E were created to make the first comprehensive measurements of the solar wind, solar magnetic field and cosmic rays.

Designed to measure large scale magnetic phenomena and particles and fields in interplanetary space, data from the spacecraft ~~was~~ ***were*** used to better understand stellar processes as well as the structure and flow of the solar wind. Four spacecraft also acted as the world's first space-based solar weather network, providing warning of solar storms which impact communications and power on Earth.

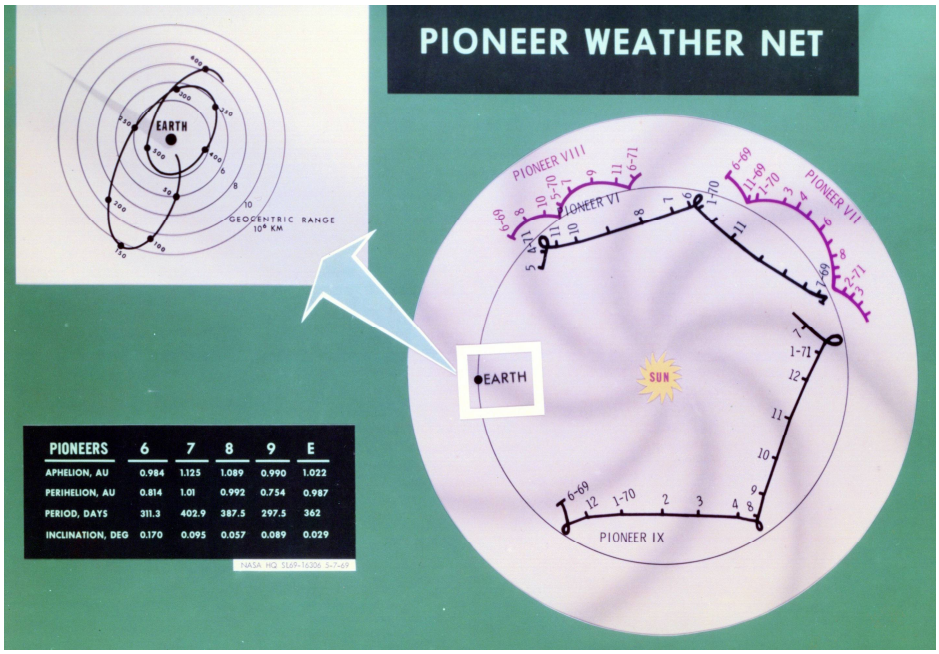
Pioneer 6-9 Spacecraft Operations Center
Ames Research Center, Bldg 244, circa 1967
From left to right, two controllers, Charlie Hall, Norm Martin, Ralph Holtzclaw

Where are the PCs, the calculators, the cable video flat panel TVs, the internet and the wireless telephones? In the picture you can see the teletypes and a paper punch machine. The TTY is the internet of the time connected to the telephone line but only able to receive and print 3 characters per second. The paper punch machines punch holes that can be read later for final processing. The consoles where Norm and Ralph are setting contain voice lines to JPL and a telco black phone… the only telephone device available at the time. It may just have push buttons by this time but my guess it is a rotary dial.

During the Apollo lunar landings, NASA used the fleet of Pioneers to provide hourly updates on the Sun's activity to Mission Control in Houston. Their data guarded against the otherwise unexpected blast of intense showers of solar protons that could have endangered the lives of astronauts. **Look at that Friden calculator…. does division….wow!**



Pioneer 6-9 Apollo Solar Weather Coverage
Ames Research Center circa 1969



Earth-Sun-line-fixed solar orbits and orbital elements for Pioneers 6,7,8,9 and E.

The four spacecraft, spin stabilised at 60 revolutions per minute, were launched into Solar orbits between 1965 and 1968. After their prime mission to study the Sun's environment was completed, the spacecraft were then tracked only occasionally.

Pioneer 6 was launched on 16 December 1965 **(02:31:20 EST night)**, one day after the successful Gemini VI/VII rendezvous. Some time after 15 December 1995 (30 years after it was launched) the primary transmitter (TWT) failed. During a track on 11 July 1996 the spacecraft was commanded to switch to the backup TWT, and the downlink signal was re-acquired. The spacecraft and a few of the science instruments were again functioning. Pioneer 6 holds the record for the longest active spacecraft when Goldstone managed to lock on to its signal for about two hours on 8 December 2000 to commemorate its 35th anniversary.

Pioneer 7 was launched on 17 August 1966 **(10:20:17 EST day).** It was last tracked successfully on 31 March 1995. The spacecraft and one of the science instruments were still functioning**. Pioneer-7 could only be tracked around perihelion because the electrical output from the solar array was degraded.**

Pioneer 8 was launched on 13 December 1967 **(09:08:00 EST day)**. Its primary transmitter (TWT) failed several years ago, but on 22 August 1996 the spacecraft was commanded to switch to the backup TWT, and the downlink signal was re-acquired. The spacecraft and one of the science instruments were again functioning**. Sometime in the early 90s Ames turned over control of Pioneer-8 to the JPL DSN for use as a radio source in the training of new station operators and spacecraft controllers**.

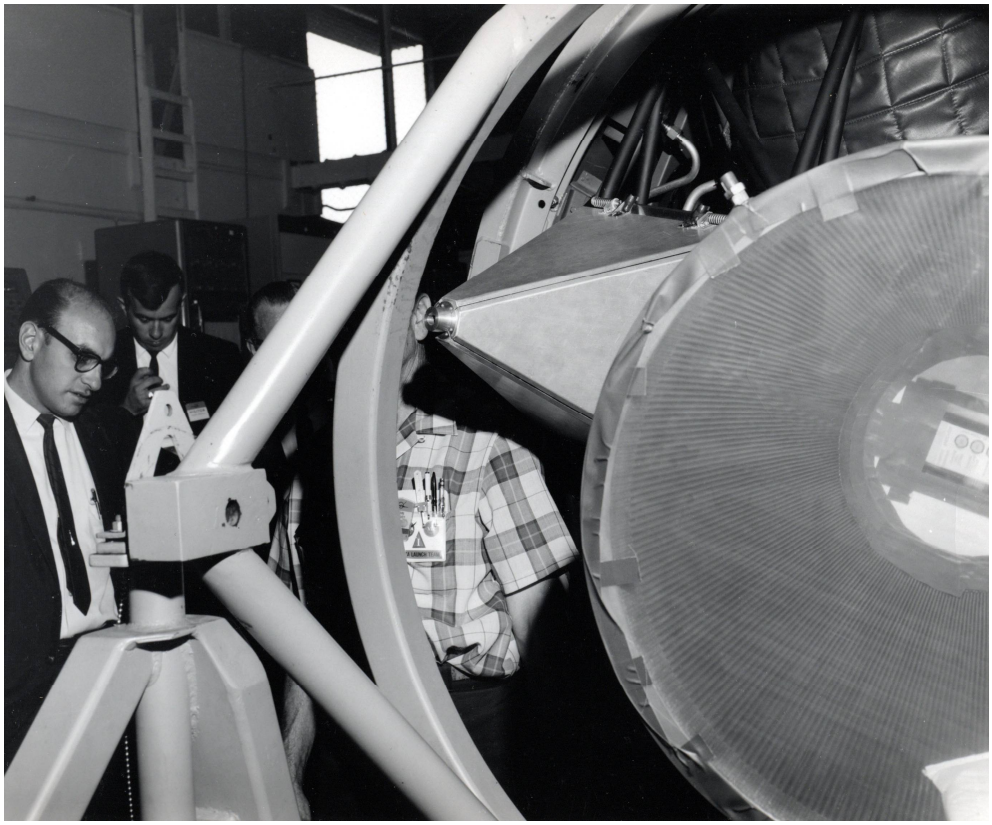
Pioneer 9 was launched on 8 November 1968 **(04:46:29 EST night).** The spacecraft failed in 1983. **Many attempts to contact Pioneer-9 after the last track in 1983 were never successful. On March 5, 1987 NASA declared the spacecraft lost.**

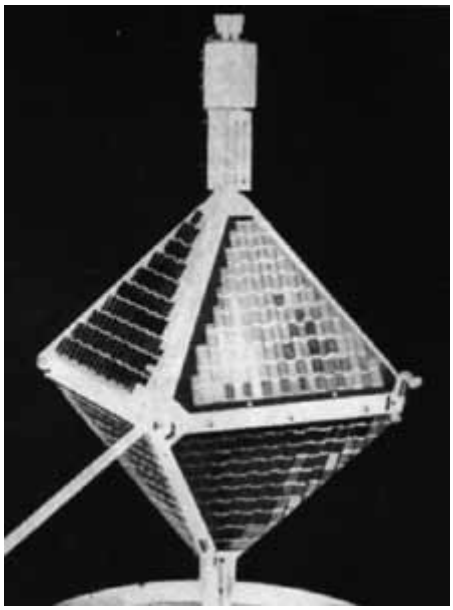
Pioneer E, a fifth spacecraft in the series was launched on August 27, 1969 (17:59:00 EDT) but failed to reach orbit when, at 229 seconds into the flight, the launch vehicle was destroyed after a hydraulics line rupture on the main engine bell control system of the Delta.

PEOPLE OF THE PIONEER PROJECT

The Pioneer 9 launch crew, starting at the top with Charlie Hall (Pioneer Project manager), below Charlie, Bob Hofstetter (Launch Vehicle Integration), to the left and around, George Nothwang (Integration and Test manager), Al Wihelmi (Instrument Engineer), Dave Lozier (Launch Vehicle and Trajectories), Joe Lepitich (Instruments Manager), Ralph Holtzclaw (Spacecraft Manager), and Bob Edens (Ground Data System engineer). Circa 1968

What is often overlooked is the fact that for Pioneers 8,9, and E, two spacecraft per launch were to be orbited. Goddard, the Delta launch vehicle management center, came to the Pioneer Project and asked if they could include another small 40 lb payload on the rocket. It would be placed on the second stage down by the engine bell in a spring loaded deployment container. After second stage shutdown and separation from the third stage/Pioneer combination, a timed command to eject the TETR (Test and Training) would be executed. The small payload was intended to provide a radio beacon for the Apollo Tracking Network to test and train the station equipment and personnel. Both TETRs for Pioneer 8 and 9 were successfully deployed but although the Delta-E for Pioneer E was equipped with a TETR, both spacecraft were lost when the launch vehicle failed. Mike Dinn in his recollections of the HSK operations stated that the TETRs were never used because they had the Surveyors and the Lunar Orbiters radio links to train on before the Apollo missions were ever launched.

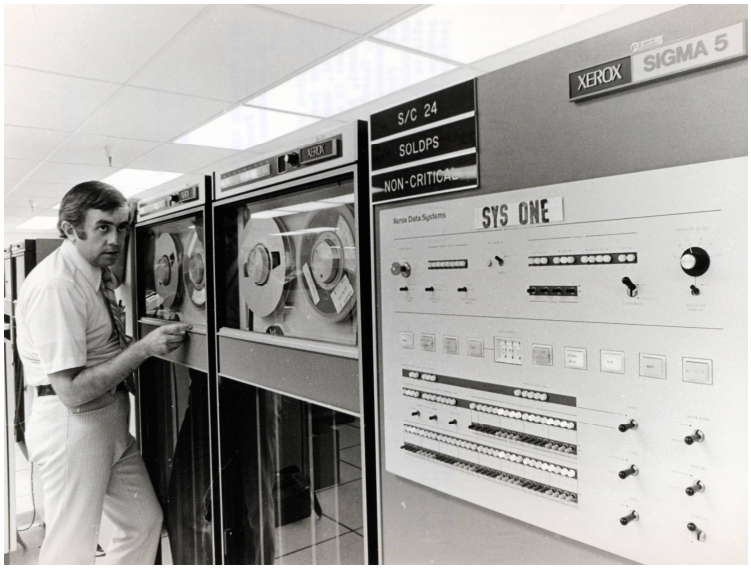




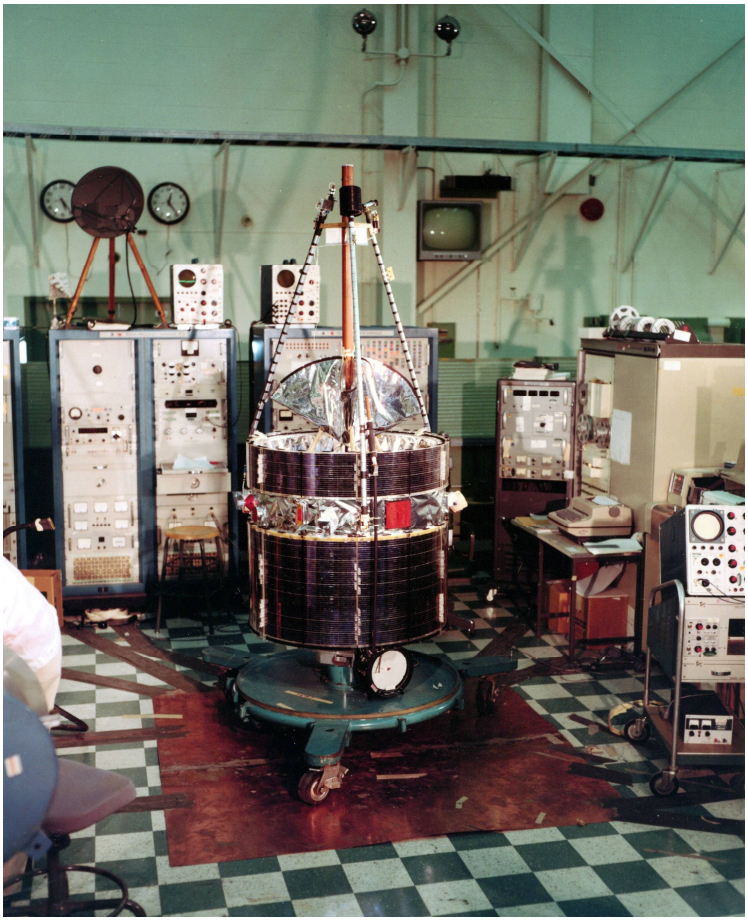
Pyramidal TETR deployment canister near engine bell and TETR spacecraft rendition (Dave Lozier in the back disinterested and looking at his fingers, Ugh)

From memory Honeysuckle Creek did track these spacecraft at various times. We tracked Pioneers 10 and 11 for many hours, particularly from 1974 when we joined the Deep Space Network until we closed down in 1981. Tidbinbilla continued tracking them until they ran out of consumables and began to drift.

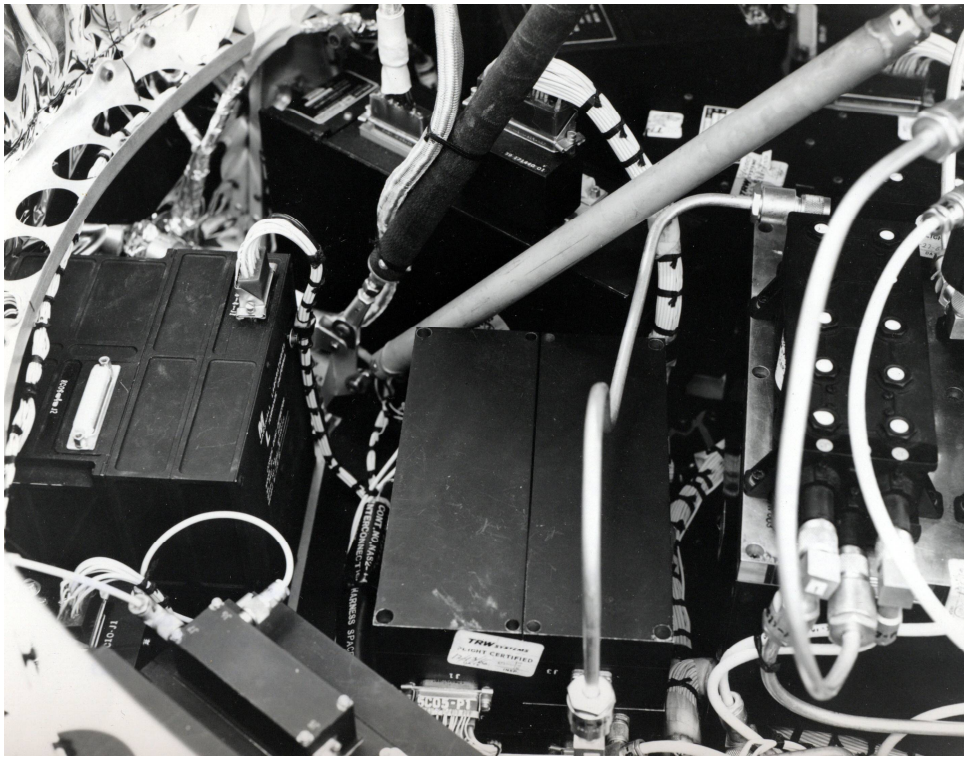
In these days of sophisticated technology and high speed computers it is interesting to note that between 1964 to 1968 the spacecraft real-time data from the tracking stations was sent by teletype to twenty machines clattering away producing octal codes with a group of operators standing by converting the coded data with slide rules to plot the results. By the time Pioneer 10 appeared on the scene they had Xerox Sigma 5 computers generating the engineering and scientific data for the displays and recording on magnetic tapes. **Ames also had Sigma 5s to offline process telemetry tapes received from the tracking stations as well as real-time display of spacecraft and instrument health in the Pioneer Ops center.**



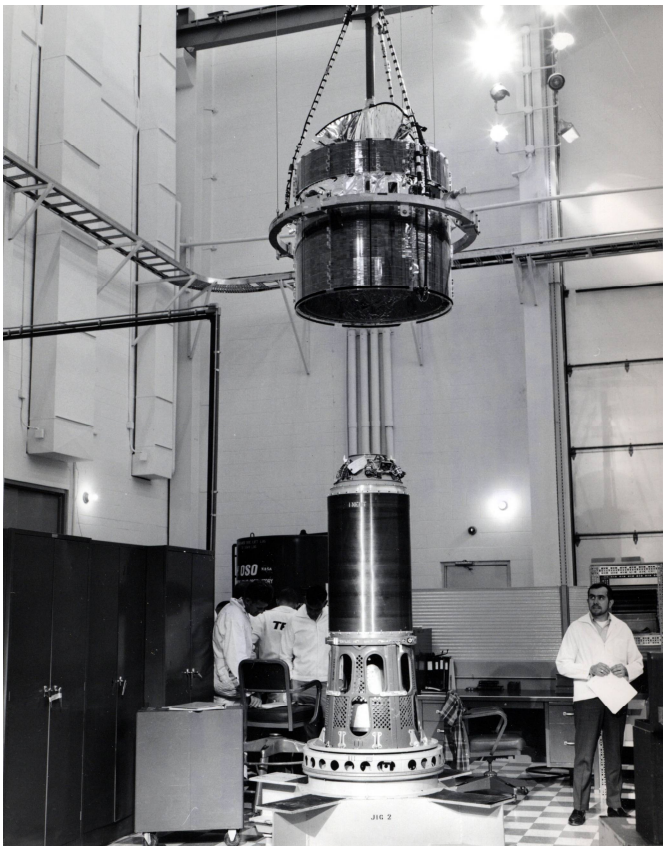
Dave Lozier at the teletypes, the CRT, and the Sigma 5 Ames Research Center circa1973



PN-9 in hangar AE at CCAFS undergoing pre-launch checkout before mating with the Delta LV.



Scientific instrument and subsystem "black boxes" on spacecraft equipment platform.



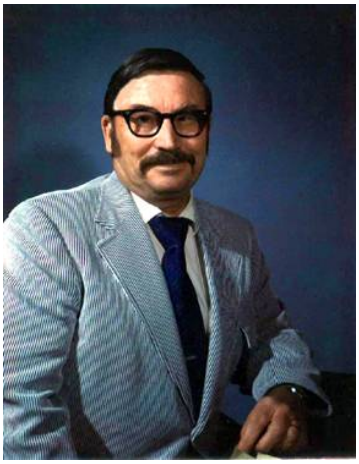
***Dave* Lozier at the Cape in Hanger AE for the Pioneer 9 fit check with the third stage.**

Dave Lozier at the Cape in the Mission Director's Center during the countdown for Pioneer 9.

Pioneer Project 1969

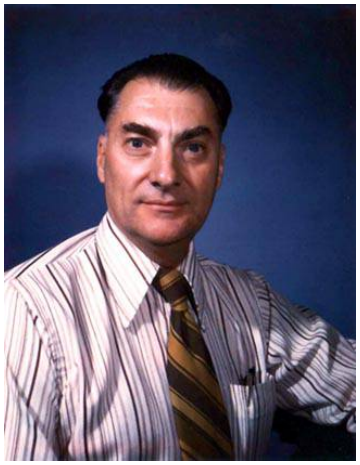
Charlie Hall
Project Manager

Eva Somer
Secretary

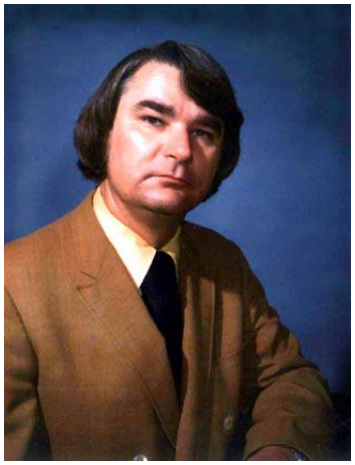


Ralph Holtzclaw
Spacecraft

Bob Hofstetter
Launch Vehicle



Joe Lepitich
Experiments

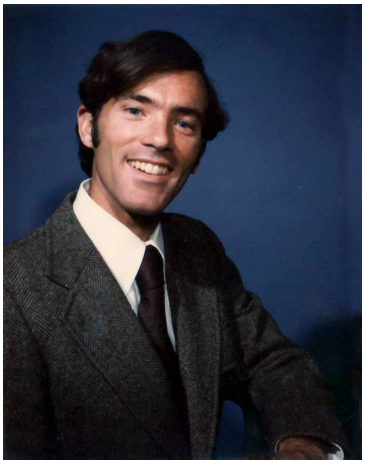


Skip Nunamaker
Mission Operations

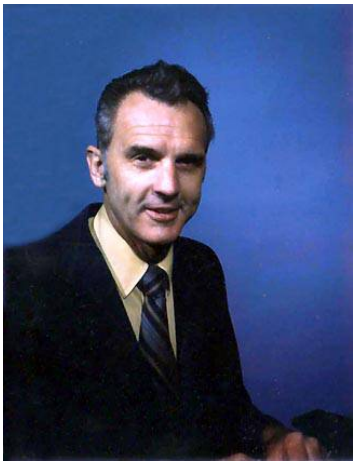
Pioneer Project 1969

Ellen Zimmerman
Secretary

Jim Phillips
Mission Analysis

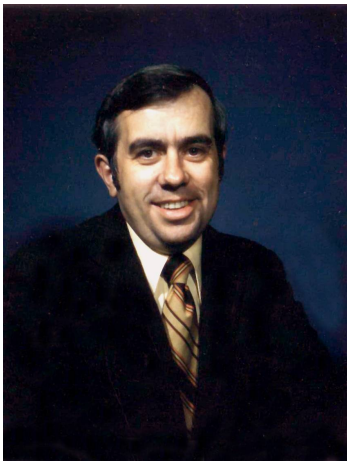


John Cowley
Mission Design



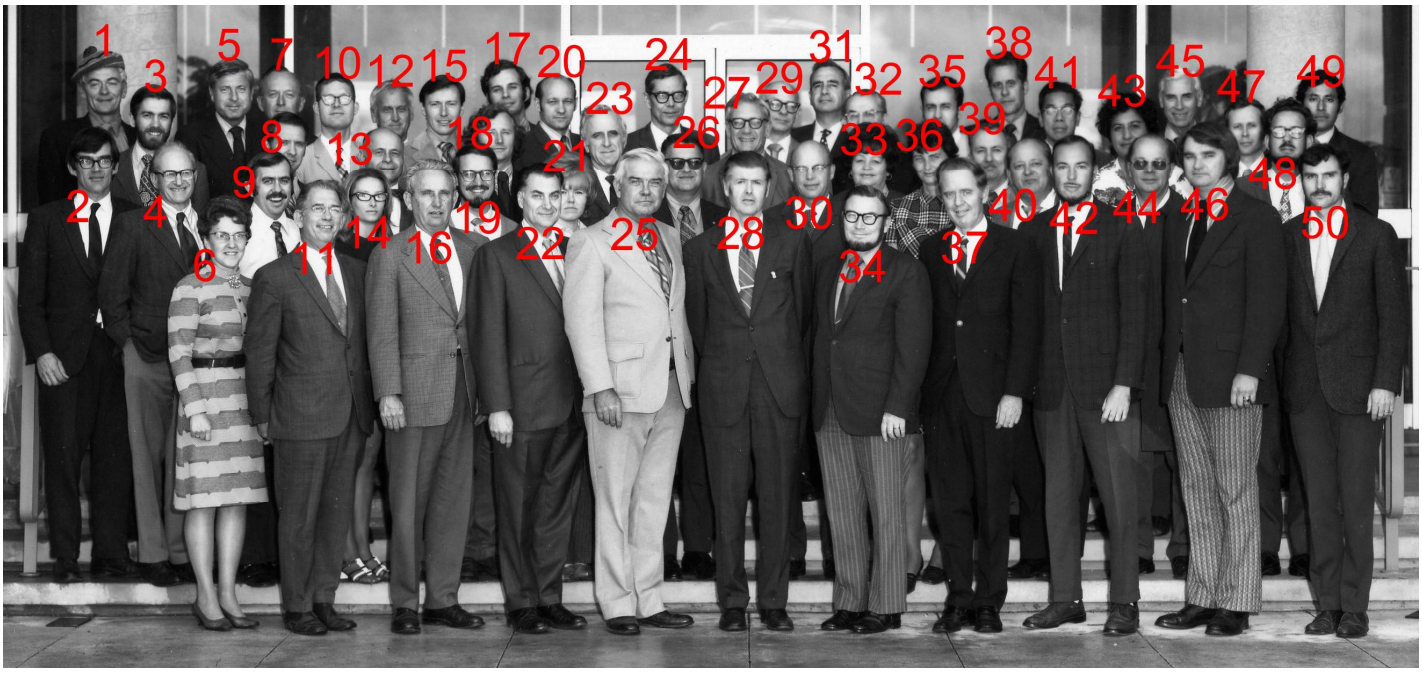
Jack Dyer
Midcourse and Navigation

Richard Johnson
Mission Analysis



Dave Lozier
Launch Operations

Launch Vehicle and Operations (PAL)



"The Fab 50"
Pioneer Project 1972

1. Skip Gross
2. Pete Waller
3. Larry Hofman
4. Brad Mortski
5. Gil Schroeder
6. Lu Pecham
7. Dean Chisel
8. Bill Garden
9. Dave Lozier
10. Bob Jackson
11. Carl Kellar
12. Miles Erikson
13. Charlie Frosolone
14. Sandy Pollock
15. Ted Weber
16. Howard Mathews
17. Richard Johnson
18. Don McKellar
19. Ed Tischler
20. Jim Phillips
21. Linda Marianthal
22. Joe Lepitich
23. Joe Frank
24. Lew Dickerson
25. Charlie Hall
26. Richard Fimmel
27. George Nothwang
28. John Foster
29. Bob Edens
30. Norm Martin
31. George Schimmel
32. Gene Jesse
33. Eva Somer
34. Ralph Holtzclaw
35. Al Wilhemi
36. Jeanne Clemson
37. Bob Hofstetter
38. Bill Kimball
39. Brad Gibbs
40. Arv Natwick
41. Tom Wong
42. John Wolfe
43. Winifred Malloy
44. Bob DeRenzy
45. Eldon Kaser
46. Skip Nunamaker
47. Dale Lumb
48. Ernie Iufer
49. Ruben Ramos
50. Dave Sinnott

Dave Lozier with the Pioneer 6/9 engineering model at the Ames History office July 7, 2010.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The Astrogram

AMES RESEARCH CENTER, MOFFETT FIELD, CALIFORNIA

VOLUME VIII AUGUST 18, 1966 NUMBER 22

New Pioneer Added; Life of Present One Extended

A fifth Pioneer spacecraft has been added to the current block of four interplanetary survey craft in the Ames-managed Pioneer Project. And the life of all the Pioneers has been extended a year to 18 months or more through use of NASA's new long-range tracking antenna.

Pioneer VI, launched last December, was the first of the new Pioneer series. As of August 15 it was about 80 million miles from the Earth and has returned man's first detailed picture of the structure and composition of the solar atmosphere. The solar atmosphere extends at least as far as Mars, and is formed by the million-mile-an-hour solar wind blown out by the Sun.

Pioneer VI has just been switched over to the new 210-foot diameter antenna of NASA's Deep Space Network (DSN). As a result, it will be able to return data out to 130 million miles, and its mission can be extended to mid-1967.

The original limit on the operating life of the Pioneers was around six months and 50 million miles. The new DSN capability means that on some trajectories, Pioneer operating lifetimes can be over two years. This will greatly increase the total scientific data returned by each spacecraft as well as the amount of interplanetary space it can survey.

Addition of the fifth spacecraft, Pioneer E, plus added useful life of each spacecraft means the Pioneers will be able to monitor solar events through the maximum period of solar storm activity in 1969.

Pioneers C and D are planned for launch in the latter half of 1967 and in early 1968. Tentative launch date for Pioneer E has not been chosen.

Decision to assemble and launch the fifth spacecraft reflects in part the success of Pioneer VI.

The DSN is operated for NASA by the Jet Propulsion Laboratory.

Ames-Managed Pioneer Launch Successful

The Ames-managed Pioneer VII was launched successfully yesterday morning(August 17) at 8:20 a.m. PDT from Cape Kennedy, and was injected into orbit 25 minutes later.

In the first two hours after launch Sun orientation was completed, with full power (60 watts) from the solar cells, and an information readout of 512 bits per second was reported.

A crucial Earth acquisition will be made today (August 18) on the spacecraft's second pass over Goldstone. Controllers will command the spacecraft to change its position gradually over a period of several hours until its high-gain antenna points precisely at the Earth to maintain a strong, two-way radio signal for the life of the mission.

After this, if the spacecraft should drift from either Sun or Earth orientation, commands can be sent to reacquire.

The spacecraft is expected to pass close to the Sun-Earth line about 3.5 million miles from Earth, where it may detect the Earth's magnetosphere tail.

Observations of atomic and subatomic particles and magnetic fields will be coordinated with other NASA spacecraft: Pioneer VI, Mariner IV, Explorer XXXIII, and three Orbiting Geophysical Observatories.

(Continued on Page 6)

PIONEER CONTROL CENTER . . . at Ames has teletype and voice links with the Space Flight Operations Facility at JPL and with stations of NASA's Deep Space Network (DSN) at Goldstone; Johannesburg, South Africa; and Tidbinbilla, Australia. A duplicate set of data readout and command equipment has been installed for the Pioneer B spacecraft. This will allow simultaneous control of two interplanetary spacecraft from this facility. Commands are sent out to Pioneer spacecraft via teletype, and samples of experiment data plus engineering data are received at the DSN station currently tracking Pioneer. They are then teletyped to Ames. Pictured in the Control Center are Robert N. Nunamaker, Pioneer Flight Operations and Data Processing Manager, and Charles F. Hall, Pioneer Project Manager.

PIONEER (Continued from Page1)

Pioneer VII was launched ahead of the Earth, but the Earth catches it in 38.5 days, passing between the Sun and the spacecraft. At this point, about 3.5 million miles beyond the Earth's orbit, Pioneer VII will look for the magnetic tail.

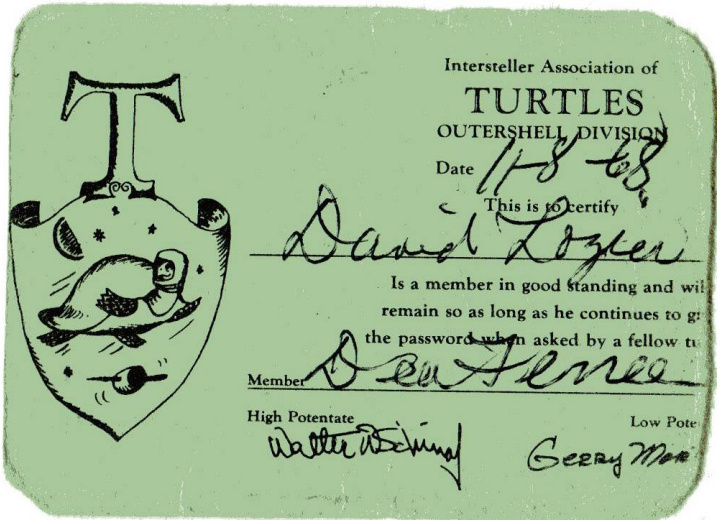
Locating the tail and measuring its thickness could answer an important question regarding the shape of the magnetosphere, and how the interplanetary and Earth's magnetic fields are related.

By studying the tail, Pioneer experiments may help identify the source of charged particles in the Van Allen belts inside the magnetosphere.

Six scientific experiments on board the spacecraft were provided by four universities and the Ames and Goddard centers.


ARE YOU
A TURTLE?

YBYSAIA


Intersteller Association of
TURTLES
OUTERSHELL DIVISION
Date 11-8-68
This is to certify
David Lozier
Is a member in good standing and wil
remain so as long as he continues to g
the password when asked by a fellow t
Member
High Potentate
Low Pote
Geezy Mo


NASA



A. **Date and Place of Birth:** March 11, 1943 Olympia, Washington

B. **Education:**

School	Dates	Major	Degree and Date Awarded
Washington State University	9/61 - 2/66	Mathematics	BA – 2/66

C. **Professional Experience:**

1998 to present	Ames Research Center, Mission Design Engineer, Advanced Missions Branch
1995 to 1998	Ames Research Center, Trajectory Team Leader, Lunar Prospector Mission
1989 to 1997	Ames Research Center, Flight Director, Pioneer Project
1984 to 1989	Ames Research Center, Assistant Flight Director, Pioneer Project
1983 to 1984	Lewis Research Center, Mission Design Engineer, Shuttle Centaur Project
1982 to 1983	Ames Research Center, Flight Operations Planning Engineer, Galileo Probe Mission
1980 to 1982	Ames Research Center, Mission Design Engineer, Space Operations Office
1979 to 1980	Ames Research Center, Geobased Information Systems Project Manager, Remote Sensing and IR Imaging Technology Utilization branch
1976 to 1979	Ames Research Center, Mission Analysis and Midcourse Maneuver Operations Planning Engineer, Pioneer Venus Orbiter and Multiprobe Project
1966 to 1976	Ames Research Center, Payload Integration and Launch Operations Engineer, Pioneer 6-9 and Pioneer 10/11 Projects

D. **Membership on Technical Committees:** none

E. **Honors and Awards:**

Honor Excellence in Category – Engineer	1999
Lunar Prospector Navigation Team	1999
Lunar Prospector Team	1999
Shuttle Centaur Project Team	1996
Pioneer Venus Comet Halley Observation Team	1986
Pioneer Venus Project and Mission Operations Team	1980
Pioneer 11 Saturn Mission Team	1979
Pioneer 10 Mission Operations Team	1974
Pioneer 10 Mission Analysis and Launch Operations Team	1974
Pioneer 6-9 Project Team	1972
Various cash and sustained performance awards over the years	

F. **Publications:**

An Affordable Mission Design for Emplacement of a Global Network on Mars
March 2003 IEEE Aerospace Conference, Big Sky Montana
Daniel D. Miller, D. Lozier, etal.

An Explorer-class Astrobiology Mission: SPIE-4013 March 2000
S. Sanford, D. Lozier, etal.

Lunar Prospector and Beyond: AIAA-2000-5094 Sept. 2000
K. Galal, S. Cox, D. Lozier, and M. Smith

The Lunar Prospector Mission: Results of Trajectory Design, Quasi-Frozen Orbits,
Extended Mission Targeting, and Lunar Topography and Potential Models
AAS 99-397 Girdwood, Alaska 16-19 August 1999
Dave Folta, Mark Beckman GSFC Dave Lozier, Ken Galal ARC

Lunar Prospector Extended Mission
GSFC Flight Mechanics Symposium May 18-20, 1999
Dave Folta, Mark Beckman, GSFC Ken Galal, Dave Lozier, ARC

Lunar Prospector Frozen Orbit Mission Design
AIAA-98-4288 Boston, MA Aug, 1998
Dave Folta, GSFC Ken Galal, Dave Lozier, ARC

Lunar Prospector Mission Design and Trajectory Support
AAS-98-323 GSFC International Flight Mechanics Conference, May 1998
Dave Lozier, Ken Galal, ARC Dave Folta, Mark Beckman, GSFC

Lunar Prospector Mission Design
Flight Mechanics Symposium, GSFC May 19-21, 1997
Dave Folta, Mark Beckman, GSFC Dave Lozier, Ken Galal, ARC

Lunar Prospector Mission Design
IAA-L-0404P International Conference of Low-Cost Planetary Missions
April 61-19, 1996 APL
Dave Lozier, Robert Jackson, ARC Dave Folta, Ken Galal, Mark Beckman, GSFC

Observing Halley From Venus, Jan. 1987.
R.W. Jackson, D.W. Lozier, J.R. Phillips and M.A. Smith,
NASA Ames Research Center AIAA-87-0500,

A Pioneer-Class Mars Climatology Mission, Jan. 1983.
K. Nishioka, D.W. Lozier, J.P. Murphy, G.W. Thorley and
R.M. Haberlee, NASA Ames Research Center AIAA-83-0521,

G. Engineering and Technology Competencies

1. Systems Engineering
1.1 Mission Analysis and Planning (MAP)
Knowledge and ability to analyze requirements of current and near-term missions.
Manage integration of technical elements such as vehicle design, flight trajectories,
and operational and ground-based infrastructure requirements in order to meet mission and
programmatic objectives.

2. Systems Analysis and Mission Planning

2.1 Advanced Mission Analysis (ADVMIS)

Knowledge, capabilities, and practices associated with the conception, development, and planning of advanced missions and systems synthesizing science, commercial, military and exploration requirements and considering feasibility, performance, cost, reliability/safety and environmental effects. Also includes understanding of architecture analysis methods and optimization.

2.2 Mission Flight Design (FLTDSG)

Knowledge and ability to conduct computational analysis of air and space vehicle flight design for mission requirements, including sequencing, trajectory optimization, orbital mechanics, flight mechanics and celestial mechanics. Use flight design modeling and simulation tools that determine optimum trajectory solutions for the appropriate mission and vehicle constraints. Includes in-depth analysis of air borne and ground-based trajectory predictions, automated trajectory planning and modeling and trajectory negotiation and data exchange as well as optimization tools which take into account environmental and design constraints. Involves analysis of flight dispersion variables once trajectories are established.

Computing facilities at Ames were further augmented during 1958 and their uses expanded. A powerful 704 computer was leased from IBM to serve the needs of theoretical research. It was planned that any time remaining to the machine after performing its principal function would be devoted to off-line wind-tunnel-data reduction. A beginning was made during this period in the application of computer techniques to administrative accounting. The EAM (Electronic Accounting Machines) system used for this application involved a combination or a mechanical card sorter and an electronic computer.

The use of digital electronic computers for theoretical computations and data workup had become so extensive as to require a separate building for that purpose. A proposal for the construction of such a building, at a cost of about $2.5 million, was approved in 1959. The approved facility, named the "data reduction building," was constructed in 1960-1961 and occupied early in 1962.

In 1961 the Center's IBM 7040 was replaced by an IBM 7090 (later modified to 7094), and during the same year a Honeywell H 800 machine was leased. The H 800 had hard-wire connections to the 6- by 6-foot, the 14-foot, and the Unitary wind tunnels and was used exclusively for data workup. With the procurement of the H 800, the Electrodata machines were retired.

The use of electronic computers for administrative work at the Center was increasing steadily, and in 1962 an IBM 1401 machine was leased to handle this load. Additionally, the IBM 7094 was used for certain administrative tasks.