

SPACE: 1978

BY JONATHAN EBERHART

Even without the diversity of satellites and probes scheduled to be launched during the next 12 months, 1978 would be a busy year for the National Aeronautics and Space Administration, as well as for the numerous others who use its science, technology and services. To cite just a few examples, the Viking spacecraft will continue to study Mars at least through April, Voyager 1 will begin looking at Jupiter in mid-December, and a new batch of astronauts (to be named this month) will start training for the 1979 coming of the space shuttle. Other programs — space, aeronautics, energy — are being developed for the future, and quantities of data continue to arrive daily from the scores of “payloads” already aloft.

In addition, however, as many as 25 new payloads may be sent into space from NASA's launchpads, notably including:

- The first U.S. attempt to probe the atmosphere of Venus — at *five* different locations — while, in another U.S. first, an orbiter sets out to spend a full Venusian year circling the planet.

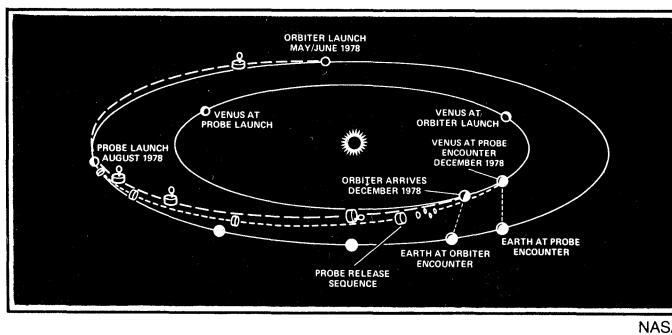
- The first satellite to be built on NASA's Modular Multi-Mission Spacecraft frame, promising savings to future programs through the use of one basic “core” design and standardized, interchangeable parts, and capable of either servicing in space by the shuttle or retrieval for on-the-ground servicing and relaunch.

- The first in each of *four* major new generations of weather satellites, including the long-awaited Seasat series of ocean monitors.

- A banner year for astronomy from outside the earth's atmosphere, with new observatory spacecraft to look at the ultraviolet sky (hardly seen at all until recently), select X-ray sources and earth-directed emissions from the sun.

Scientific payloads, in fact, account for eight of the 25 launches; ten more are communications satellites (including one that's optional in case its predecessor fails), and five are weather-watchers. The other two are Landsat C, latest in the successful series of earth-resources monitors, and another of the U.S. Navy's Transat navigational beacons.

An equally significant way to look at the list is by “user,” since it reflects the degree to which NASA is fulfilling its role of conducting space research and development, rather than merely providing a freight service for others. In 1976, for example,



NASA

A busy new year in space will be highlighted by the two Pioneer Venus spacecraft, to be launched in May and August for a December arrival only six days apart.

only *one* payload — the laser-reflecting LAGEOS geodetic satellite — was entirely NASA's, though the agency also played cooperative roles in projects with Germany and Canada. Last year NASA had three launches of its own (a fourth — Landsat C — was held over to 1978), with one “co-op” (and again with another one — the International Ultraviolet Explorer — delayed into this year). The 1978 list, however, shows *eight* NASA launches and a pair of co-ops. For the other 15 flights, the agency will be reimbursed by diverse customers including two other U.S. government agencies, Japan, Canada, the United Kingdom, the European Space Agency, NATO, the International Telecommunications Satellite consortium and its U.S. member, Comsat Corp. In upcoming years, NASA (devoutly) hopes, the numbers of both NASA's and others' payloads should grow, as the space shuttle makes launch costs a smaller chunk of program budgets.

The major NASA launches of 1978 will be those of the two Pioneer Venus craft. An orbiter will be launched in May, followed in August by a “bus” carrying three small detachable probes and one large one. The

orbiter will take up its planet-circling position in December, followed six days later by the bus, which will send all four probes — and itself — into the atmosphere to measure composition and structure all the way down to the surface. (The probes are not landing craft, and their arrival at the surface is anticipated by NASA to be “non-survivable.”)

Also this year, the second of the High-Energy Astronomy Observatory satellites will be sent up to concentrate on specific X-ray sources identified by its predecessor, HEAO-1, which was launched on August 12, 1977. The first in a planned series of International Ultraviolet Explorers may fly as early as January 25, carrying experiments from NASA, ESA and Great Britain's Science Research Council. July is the target month for launching the last of three International Sun-Earth Explorers, this one to be posted at a Lagrange libration point on the sun-earth line, monitoring solar emissions while the other two ISEE's study their effects on earth's magnetic field. Europe's GEOS-B is to study radiation and charged particles from geosynchronous orbit, and Britain's UK-6 will conduct similar tasks at lower altitude.

The Heat Capacity Mapping Mission satellite, built on NASA's new multi-purpose frame, will make thermal maps of the atmosphere, while a flock of new probes chart the weather: Nimbus G, from a sun-synchronous orbit, will monitor pollution, storms, ozone concentrations and other phenomena, also carrying a newly developed color sensor to observe chlorophyll concentrations in coastal waters as an indicator of potential rich fishing grounds. TIROS-N will support the Global Atmospheric Research Program (GARP), and is newly equipped to obtain data from other sensors on moving platforms such as ships. Seasat A will concentrate on wave heights and other ocean conditions, while GOES-C and NOAA-A (to be renamed NOAA 6) will join existing geosynchronous and polar networks respectively.

Communications satellites will be launched for Intelsat and the Navy (two each), as well as for Comsat, NATO, ESA (a backup for the Orbiting Technology Satellite that blew up just after launch on Sept. 13), Canada and Japan (with a second launch slot reserved — just in case).

It's a promising list — and the shuttle hasn't even seen space yet. □

1978 NASA LAUNCHES

Date	Satellite	User
Jan.	Intelsat IV-A (F3)*	Intelsat
Jan.	FLTSATCOM-A*	USN
Jan.	IUE-A	NASA/ESA
Feb.	Intelsat IV-A (F6)*	Intelsat
Mar.	Landsat C	NASA
Mar.	BSE*	Japan
Apr.	HCMM	NASA
Apr.	Comstar C*	Comsat
Apr.	OTS backup*	ESA
May	GOES-C*	NOAA
May	TIROS-N	NASA
May	Pioneer Venus A	NASA
May	Seasat A	NASA
June	GEOS-B*	ESA
June	BSE backup*	Japan
July	UK-6*	UK
July	ISEE-C	NASA/ESA
Aug.	Nimbus G	NASA
Aug.	Pioneer Venus B	NASA
Sept.	Transat*	USN
Sept.	NATO-III-C*	NATO
Sept.	NOAA-A*	NOAA
Oct.	HEAO-B	NASA
Nov.	Fltsat D*	Canada
Nov.	FLTSATCOM-B*	USN

*NASA reimbursed for launch costs