

Space News Roundup

Vol. 21 No. 13

June 25, 1982

National Aeronautics and Space Administration

Dark star?

Pioneers may find 10th planet or a dark solar companion

The two Pioneer spacecraft, the most distant man-made objects in the solar system, may soon detect a tenth planet out beyond Neptune and Pluto, or a dark star companion to the Sun at perhaps 50 billion miles beyond Pluto.

The Pioneers are uniquely suited for such a search, as persistent irregularities in the orbits of Uranus and Neptune strongly suggest that some kind of mystery object is really there — far beyond the outermost planet. Because Pluto's orbit is greatly elongated, Pluto and Neptune take turns being the outermost planet with Pluto currently inside Neptune's orbit for the next 17 years.

Pioneer 10 is now between the orbits of Uranus and Neptune, and

will be beyond all the planets in July of next year. Pioneer 11 is between the orbits of Saturn and Uranus. The Pioneers are managed by NASA's Ames Research Center.

The discovery in 1978 of a satellite of Pluto, since named Charon, reduces the calculated mass of the Pluto-Charon system to only one fifth the mass of the Earth's moon, and gives Pluto a diameter of 1,440 miles. This is far too little mass to account for the unexplained tiny but regular shifts in the orbits of Neptune and Uranus. These orbital changes had been attributed to the pull of Pluto's gravity on the two planets.

A large dark-star type object 50 billion miles beyond the outermost planet could produce the or-

bit shifts measured for Neptune and Uranus. This distance from the Sun is a common one for dark stellar companions of visible stars. A black hole, perhaps ten times the Sun's mass and twice as far out (100 billion miles beyond Neptune) could also account for the measured orbital shifts. Either of these two types of objects would produce a general tidal effect in the solar system — an equal gravitational pull — on all the outer planets.

On the other hand, the pull of an undiscovered planet-sized object at perhaps five billion miles beyond Pluto and Neptune would also be consistent with orbit discrepancies for Neptune and Uranus. But these would be "local effects," and gravitational pull

would vary markedly with planetary positions.

Since Pioneers 10 and 11 are on opposite sides of the solar system, one spacecraft would feel the pull of a small and close planet-sized object far more than the other would. A larger, more distant body would pull on both spacecraft almost equally. Therefore, measurements of the solar system escape trajectories of the two spacecraft over periods of several months could be used to find out whether the Pioneers were being attracted by a relatively close planet or a more distant dark star or black hole. Further observations would allow estimates of size and distance of such a planet — as well as its direction. Calculations for this

would be based on changes with location in space of the gravity field created by such a body outside the known solar system.

It would not be possible, however, to say from Pioneer data which of two sides of the solar system the body was on. Other types of measurement aimed at locating such a big object might soon be developed, once its presence was known.

While almost any dark celestial object is a possibility, Dr. John Anderson of the Jet Propulsion Laboratory, a Pioneer celestial mechanics experimenter, suggests that perhaps a dark stellar companion to the Sun might be the most likely explanation. A tenth planet should be at least five

(Continued on page 2)

STS-4 count underway

MOCR positions being streamlined

With the STS-4 countdown underway and the U.S. on the verge of Space Shuttle operations, flight control has matured to the point where some streamlining will be evident in the Mission Operations Control Room (MOCR).

Two major positions will be consolidated in Mission Control, part of a trend to reduce the number of operators needed for flight control. Responsibilities formerly held by the Electrical Power, Instrumentation and Lighting Systems Engineer, call sign EGIL, will now be handled by the Environmental, Consumables and Mechanical Systems Engineer, call sign EECOM.

Another change will be the appearance of a new console position, call sign RMU, for Remote Manipulator System, Mechanical Systems and Upper Stages Systems Officer. The RMS position which appeared for the first time during STS-2 will be phased out following this flight. No RMS

activities will be conducted on STS-5 or STS-6, and those functions on STS-7 will be the responsibility of the newly-created RMU officer.

Responsibilities added to EECOM's duties by the consolidation include Orbiter fuel cells, AC and DC power distribution systems, instrumentation systems, transducers, caution and warning panels and vehicle lighting systems.

RMU position duties will include mechanical systems such as the auxiliary power units, hydraulic systems, payload bay doors and such systems as doors and vents. RMU will also handle upper stage systems, such as those which will make their first appearance during STS-5 and STS-6 to boost payloads into higher orbits.

The lead flight director for STS-4 will be Charles R. Lewis. He was flight director with the or-

bit team on STS-1 and lead flight director for STS-2. Lewis will direct shifts of the orbit team during the flight next week.

Tommy W. Holloway will serve as flight director during the launch phase, as he did during STS-3. Subsequent shifts of the ascent team will be under the direction of Dr. John T. Cox.

Harold M. Draughon, another STS-3 veteran, will be flight director for the entry team.

Three others will be in training for flight director duties during STS-4 as they understudy the prime flight directors on each shift. They are Jay H. Greene, ascent team; Brock R. Stone, orbit team; and Gary E. Cohen, entry team.

As for the spacecraft these men will be controlling, *Columbia* was in the early stages of a 90-hour countdown with 24 hours of holds built in as of **Roundup** press time. Launch was still scheduled for 10 a.m. CDT Sunday.



A major space policy address

Beggs calls for start on space station

Following is the text of a major space policy address given by NASA Administrator James M. Beggs before the Detroit Economic Club and the Detroit Engineering Society Wednesday:

I am honored to appear before this distinguished audience in this important forum. The Economic Club of Detroit and the Engineering Society of Detroit are making an important contribution to the public by promoting greater awareness of national issues, and in a wider sense, a broader understanding of our complex problems in this increasingly interdependent world.

George Santayana once said: "Those who cannot remember the past are condemned to repeat it."

This is as true today as it has been throughout our history. Because we have learned from the past we have maintained the forward thrust of our young civilization. Indeed, young people are often the first to recognize this fact.

A few years ago a professor at the Wharton School of Finance tried an exercise to promote more crisp and concise expression among his students. He asked them to sum up in two words the outstanding characteristics of American society. What, in other words, has made us tick as a nation?

The best answer came from a young woman. Her two words were "We Advance."

The key to that advancement, I believe, lies in the fact that we have a continuing urge to chart new paths and to explore the unknown. And that is the hallmark of any great nation.

That instinct drove Lewis and Clark to press across the uncharted continent. It guided Admirals Peary and Byrd to the icy wastes of the Poles. It drove Lindbergh alone non-stop across the Atlantic and sustained 12 Americans as they walked on the Moon.

The compulsion to know the unknown built our nation. It impelled the pioneers to extend our frontiers across the wilderness to the Pacific. It was the compelling reason behind the "Yankee ingenuity" that increased our commerce and world trade. It moved our businessmen and our farmers to apply new technology to raise

"...our next logical step is to establish a permanent manned presence in low-Earth orbit."

the productivity of our farms, factories and transportation systems. It challenged our leaders to develop dynamic new corporate, labor and governmental institutions. And it spurred the creativity of our scientists and engineers so that today we lead, and are indeed

envied by the rest of the world in science and technology.

It is clear that if we ever lose this urge to know the unknown, we would no longer be a great nation. We must continue to advance the frontiers of knowledge. Nowhere is that challenge greater than in the continuing exploration of the last frontier — that of space.

Increasing our knowledge of the near-Earth environment, the Solar System and the Universe will eventually help us to unlock the puzzle of why and how we came to be and what our future destiny might be. The spectacular photos of Saturn and the data returned from the remarkable journeys of the Voyager spacecraft have already taught us more about that planet than we knew from centuries of recorded observations. Moreover, in space there are real resources and opportunities for commercialization and industrialization. And space holds the promise of eventual human habitation on a permanent basis.

At NASA we are stretching our horizons to encompass all of these mighty challenges.

In the short lifetime of my agency, which stretches back only 24 years, we have come from an aeronautical base into a magnificent new era of space transportation with the Space Shuttle. This world's first reusable space vehicle will give us routine, reliable and economical access to and from lower Earth orbit and will provide the first step to similar access to geosynchronous orbit, lunar orbit and beyond, to the true exploration of the Solar System itself. Its three test flights have proved that the concept is extremely sound. We are expecting to learn more about the Shuttle and its capabilities in its last test flight in just four days. And in November of this year it will begin operational service as the true workhorse of space transportation.

(Continued on page 3)

Space News Briefs

Earth will eclipse Moon July 5

The shadow of Earth will slowly sweep across the Moon beginning at 11:22 p.m. July 5 and continuing into the early morning hours of July 6, bringing residents of North America their first chance to see a lunar eclipse in seven years. The eclipse will be total because the Moon will pass through the darkest part of Earth's multi-million mile shadow, the umbra. When totality commences at 1:38 a.m. in Houston, the Moon will be 37° above the horizon and almost due south at 184° (due south is 180°). Totality will continue until 3:24 a.m. The last penumbral will be at 5:40 a.m. The event will occur in Sagittarius, with the possibility the eclipsed Moon and the summer Milky Way may be photographed in the same frame.

Rings around Neptune thought likely

Data overlooked since 1968 has now lead scientists to believe that Neptune is encircled by two slim rings of icy material. Villanova University scientists last week announced these conclusions, citing evidence collected at a New Zealand observatory in 1968 and not really noticed until now. The evidence is comprised of starlight analysis and variations therein which suggest the presence of rings. The same type of evidence led to the discovery of rings around Uranus. If the rings are confirmed, Neptune would join the other three gas giants in the Solar System as a ringed planet. The New York Times quoted Jet Propulsion Laboratory spokesman Frank Bristow, who was asked to confirm the discovery, as saying, "Give us about seven years, and we'll tell you." The Voyager 2 spacecraft, controlled by JPL, is scheduled to arrive at Neptune in August 1989.

Langley laminar flow studies progress

An aerodynamic advancement long thought impractical might not be so far-fetched after all, according to evidence gathered by a team at the Langley Research Center. The research team has found that smooth, clean lines of many aircraft built since World War II may offer previously unrecognized advantages in performance and fuel efficiency due to a phenomenon known as laminar flow. Airflow close to the surface of a wing is said to be laminar when its layers are thin and uniform, sliding easily over one another and delaying the onset of drag-producing air turbulence. Laminar flow was all the rage in design circles after very promising wind tunnel and flight tests in the 1930s and 1940s. But natural laminar flow proved to be extremely difficult to achieve on conventional, riveted aluminum airplane designs, and active interest eventually faded. Aircraft construction techniques developed in the last decade are changing that, however. Researchers at Langley predicted that modern techniques now allow full-sized wings to be built that approach the smoothness needed for laminar flow. Recent flight tests with eight different aircraft have borne out those predictions. Langley's laminar flow team now believes those same construction techniques may be applied to aircraft fuselage designs as well, further enhancing the "slipperiness" with which planes can cut through the airstream.

Orion Nebula mapped by observatory

NASA's Gerard P. Kuiper Airborne Observatory, a converted Lockheed C-141 Starlifter, has provided infrared data which was used to construct a map of newly forming stars within the Orion Nebula. The new stars, less than 100,000 years old, are hidden to the eye by the cloud of dust and gas within the nebula. They are detectable in the infrared because they heat the surrounding dust, which re-radiates their power as infrared or "heat" radiation. The new map shows how the nebula would appear through a large telescope sensitive to infrared. Recent observations have shown the gas in the vicinity of the stars to be in a state of violent motion, stirred up by the tremendous energy the emerging suns are radiating. These motions will inevitably lead to the dissipation of the dust cloud, and the stars will emerge in the distant future to become visible to the eye, creating an even larger and more spectacular stellar show within the Orion Nebula.

NASA awards solar telescope contract

The Perkin-Elmer Corp. Optical Group has been selected by NASA for negotiation of a final definition contract for a Solar Optical Telescope. The negotiations could lead to full-scale development of the instrument by mid-1984. The Solar Optical Telescope is intended to make measurements over the visible and much of the ultraviolet wavelength of the Sun using a Gregorian telescope system with extremely high resolution. Primary goals are to study solar mechanical heating and mass transport in the solar photosphere and the origin and evolution of the Sun's magnetic field. The telescope is currently scheduled to be flown aboard Spacelab in the late 1980s, and would be controlled both from the Orbiter and from the Payload Operations Control Center at JSC. Goddard Space Flight Center has been assigned project and mission management responsibility.

History office seeks information, documents

The JSC History Office is attempting to collect samples of various patches, logos and emblems created over the years by JSC organizations, together with documentation on their origin. Historian Ed Ezell says substantial data on astronaut and mission-related patches is already in the files, but other official and unofficial emblems used in the past need more documentation. The History Office is also trying to locate copies of the following documents for its collection and the collection of the Headquarters History Office: Project Mercury post launch reports, Project Mercury mission documents (part of the Mercury Working Papers series), Gemini Program mission reports and Apollo post launch and mission reports. If you can help the History Office, call x2838 or write to Mail Code BE4.

NASA
Lyndon B. Johnson Space Center

Space News Roundup

The *Roundup* is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. *Roundup* deadline is the first Wednesday after publication.

Editor: Brian Whelan

Dark star?

(Continued from page 1)

billion miles beyond Neptune, unless it was completely out of the pattern of spacing for the other solar system planets as prescribed by Bode's law.

A black hole, another possibility, belongs to a somewhat exotic class of objects, and only one black hole has been tentatively identified, while dark stellar companions to stars like our Sun appear to be relatively common.

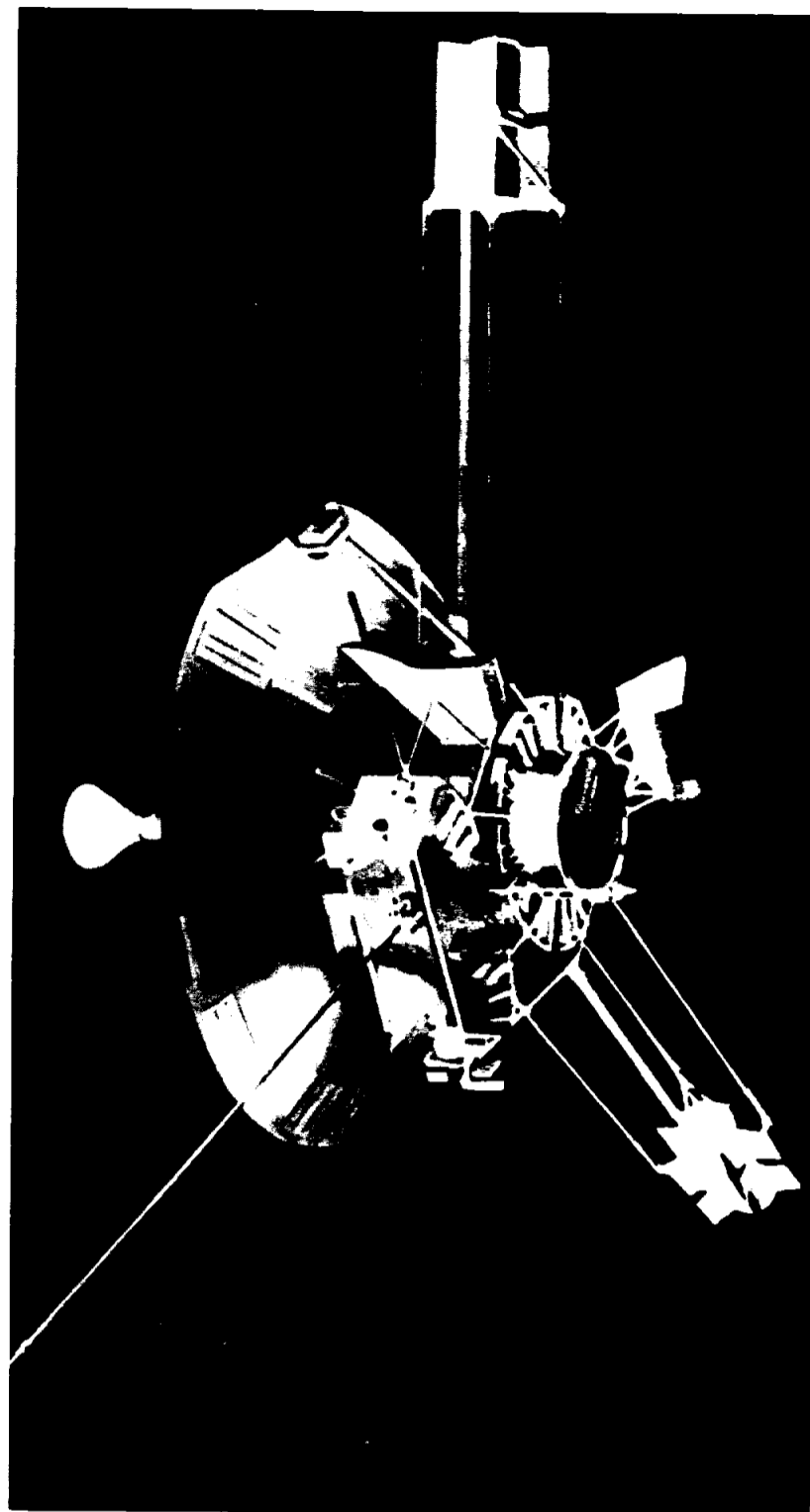
"There is a whole class of objects ranging between a planet and a dark star. It could be any of these, and we are keeping an open mind," says Dr. Anderson. "We know there is a source of systematic variations in the orbits of the two outer planets. Work demonstrating these orbit variations has been done largely at the U.S. Naval Observatory, the Massachusetts Institute of Technology, and JPL," he adds.

The Pioneer measurements should be much more effective than continuing measurements of outer planetary orbits, since at least 30 to 50 years of observations would be required, and probably several complete orbits. Pluto requires 249 years to complete an orbit, Neptune, 165 years, and Uranus, 84 years. All these are time periods so lengthy that they provide difficulties for practical observations. Several years of Pioneer measurements should provide essentially the same information.

The Pioneers have a further advantage in that they are stabilized by their five rpm spin, rather than by the orbit-changing push of thruster systems. This means their precisely-known trajectories are shaped almost entirely by natural forces, and have been for many years.

Anderson believes measurements of the Pioneer orbits could detect a gravity force from outside the solar system as minute as one trillionth of a kilometer per second per second, or even one ten trillionth.

Measurements of Pioneer's position are made by two-way Doppler. A two-way radio signal is sent to the spacecraft at a known frequency. Changes in frequency of the returning signal due to the Doppler effect give changes in spacecraft velocity away from Earth to a fraction of a millimeter per second. Plotted continuously, these velocity changes give the exact spacecraft trajectory relative to the known exact locations



Shown above is an artist's conception of the Pioneer spacecraft. There are now two — Pioneer 10, launched in 1972, and Pioneer 11, launched in 1973 — in the outer reaches of the Solar System. Scientists believe the spacecraft may be able to detect a large object beyond the orbits of Pluto and Neptune by as early as next year.

of the Sun and planets. Unexpected velocity changes suggest the presence of another body.

Such celestial mechanics methods have been used to find other outer planets. Differences between the real orbit of Uranus and its calculated orbit led to find-

ing Neptune in the 19th century. Percival Lowell and William Pickering used Uranus-Neptune data to compute a hypothetical orbit for Pluto, although Clyde Tombaugh actually found Pluto in 1930 through a painstaking search of thousands of star photos.



Amy Kusski, center, a student experimenter on the STS-4 mission, met with the crew recently at JSC. Kusski, shown with Pilot Henry W. Hartsfield, left, and Commander Thomas K. Mattingly, right, will have an experiment aboard to determine if the effects of exercise are the same in micro-gravity as they are on Earth. She was one of 10 winners in the first Space Shuttle Student Involvement Project for secondary schools.

Station could be international, Beggs says

(Continued from page 1)

We are proud of the successful performance of this remarkable aerospacecraft and look forward to the time when it will demonstrate its versatility to the utmost — as a launch vehicle, as a spacecraft, as a base for scientific research, as a transport for commercial spacecraft, as a repair facility for satellites in trouble, and as the provider of routine roundtrip transportation to and from Space.

Needless to say, we are also heartened by public backing for the Shuttle program. A recent Associated Press/NBC News poll indicated 60 percent of the public believe the Shuttle is a good investment for America. Other polls tell us that 40 percent of the public think that the United States should be spending more on the space program. This is the greatest public support in the history of the agency — higher even than in the halcyon Apollo years, when we were very popular.

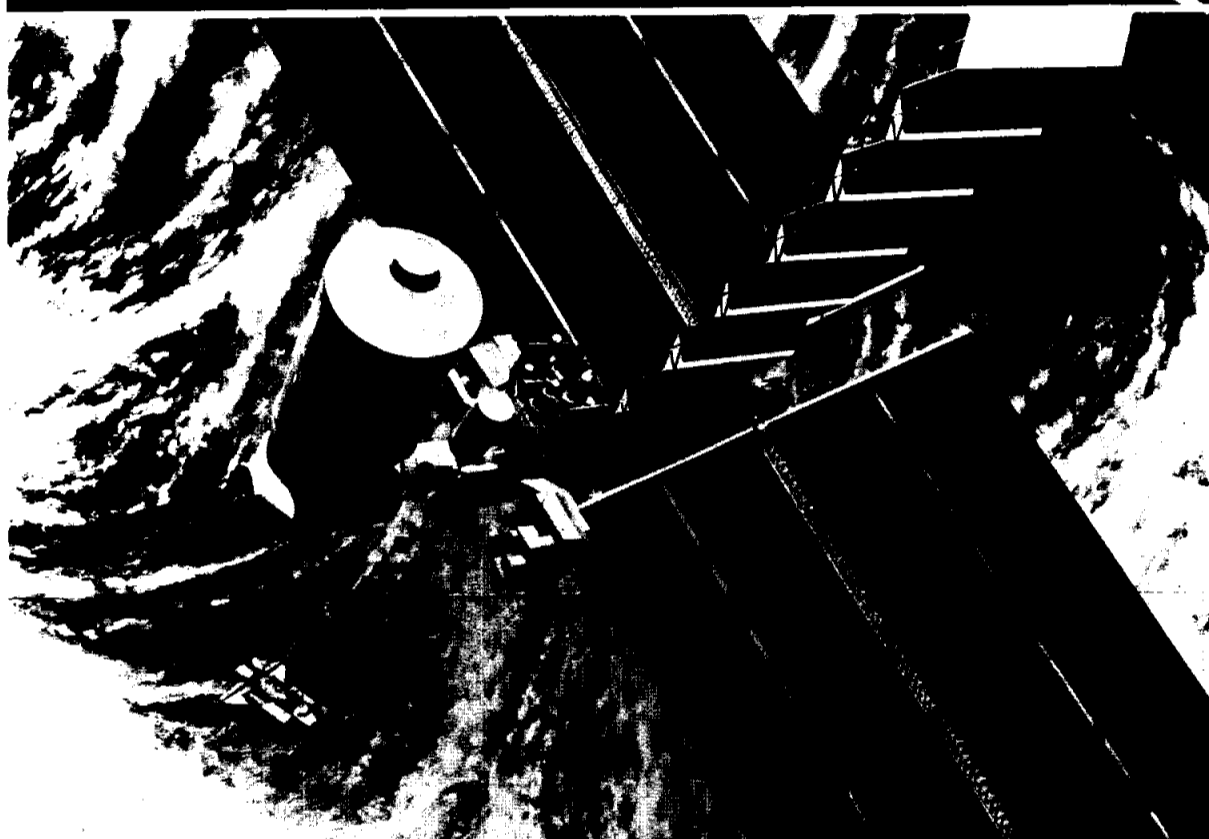
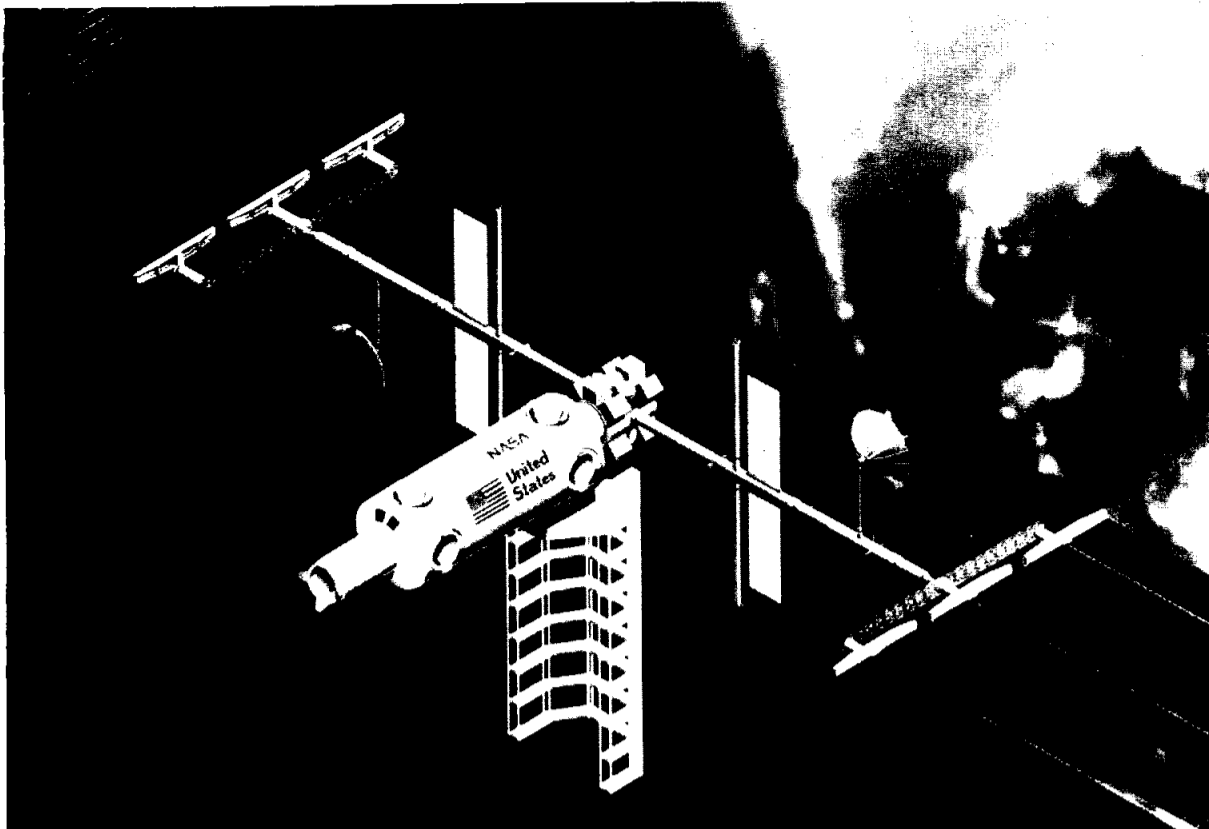
To me this support means two things. The first is that Americans are becoming increasingly aware of how crucial a vigorous high technology program is in keeping us ahead of our competitors in space. The second is that there is a growing realization that the national investment in the type of research and development that NASA does so well is more than worth it. The payoffs include new industries, new jobs, new products, new knowledge and new spirit of national pride. Indeed, many have argued that the single transfer of NASA-developed communications satellite technology alone could suffice as payoff for our entire expenditures on the space program to date.

I am pleased that President Reagan and his Administration fully understand how important our work is to the nation. Even in these times of budget austerity, Administration support is strong. It resulted in a request for an eleven percent increase in real-year dollars over last year in NASA's Fiscal 1983 budget. This means that the Administration is committed to bringing the Shuttle to full operational capability and will support progress in all NASA major program areas.

In a few years a fleet of at least four Shuttles will be flying routinely to and from space, ferrying into orbit commercial, scientific and national security payloads. The Shuttle has given us a head start in the commercialization, utilization and exploration of space. But as we look to the future, we must begin to secure that leadership in space through the end of the century and beyond. The way to do this is to set a fruitful new direction for the space program, one which would make the best use of the Shuttle's capabilities. And the time to do it is now.

I believe that our next logical step is to establish a permanent manned presence in low-Earth orbit. This can be done by developing a manned space station. At NASA we have begun to focus on that goal. We think that such a station could be built and placed in orbit by 1990. It would be small at first, assembled in orbit with modules carried to space by the Shuttle. Once there, the station would make a vital contribution to our nation's future, by opening new vistas of science and technology, new possibilities for commercial applications of space, and new opportunities to enhance economic security and the national defense.

To many, the idea of a space station may seem a bit far-fetched, an esoteric science fiction fantasy that could only be realized centuries from now. But they forget that once before the United States developed and launched a space station, although one not designed for a permanent presence in orbit.



Shown above are two of the basic reference concepts under study by NASA. At top is the Space Operations Center concept being studied under contract to JSC. At bottom is a space platform concept being studied under contract to the Marshall Space Flight Center. The recently formed Space Station Task Force will use these and other studies to develop mission requirements through future contracts with major aerospace companies. Final systems definition and construction would depend on Presidential and Congressional approval.

It was called Skylab, and it was launched almost ten years ago, in May of 1973.

Skylab served as home for nine astronauts during its active life of one and a half years in orbit. On three separate occasions, men lived and worked in this United States space station, for periods of 28, 58 and 84 days. Skylab not only demonstrated that humans could function comfortably and effectively in space for extended periods, but it showed how important man is to our activities in space. On several occasions astronauts had to perform critical repairs on the spacecraft, both internally and externally. Indeed, the Skylab program nearly failed on its launch day but a skilled flight crew was able to rig an emergency thermal protection system and then two astronauts went outside the spacecraft to release a stuck solar array. These repairs permitted the mission to continue as originally planned.

Skylab also demonstrated the utility of an orbiting scientific laboratory. Its eight different solar telescopes greatly increased our knowledge of the Sun, the stars and the galaxies; its Earth sensing instruments revealed data about our Earth otherwise unobtainable.

Now that we have the Space Shuttle, we owe it to the nation to make optimum use of this new capability of routine and reliable access to and from space. What better way to make full and complete use of the Shuttle than to

develop a manned space station in orbit tended and supplied by the *Columbia* and her sister ships?

In fact, the Shuttle program originally was conceived to include a space station. More than a decade ago a total system was envisaged in which the Shuttle would transport payloads routinely to such a station. Today we see the station functioning in many roles. It would serve as a scientific laboratory, and as a

“ Space, we now know, is not just a place to visit. It is a place to work. ”

space operations facility for assembling, resupplying and servicing satellites, and for launching spacecraft to higher orbit. And, of course it would play a role in national defense.

No doubt the Australians will be glad to hear that this time the station would have a reboost capability and controlled de-orbit mechanism to enable it to stay in space for as long as we want it there.

There is much to do and much to learn in space — much that we would like to do and would be able to do with a space station. With a permanent human presence in orbit, we will much more effectively support those instruments which

will probe further and further in space in our quest to more thoroughly understand our universe. We would look down, and through the technology of remote sensing, improve our understanding of our own Earth, the natural resources it possesses and the impact of man upon those resources. With a space station, we would find it easier and more economical to launch planetary probes to study the surface chemistry of Mars and the geology of Venus. This knowledge would give us a much better idea of how all the terrestrial planets evolved from the solar nebula so that we might more accurately chart the course of Earth's future evolution.

The space station would serve as the assembly point for manned or unmanned missions to Mars and for probes to the asteroids and comets, which scientists believe contain a chemical record of the evolutionary phases of the Solar System. With the station, ultimately, we could send to the nearby planets unmanned probes which could be programmed to return samples of planetary surfaces. Analysis of these samples would help us better to understand why life evolved on Earth and probably nowhere else in the Solar System.

There are exciting and important opportunities, too, in commercial applications research in a space station.

Commercial applications of space technology, such as

materials processing development and communications satellites, hold promise of development into markets far beyond those we see today. And many will see their origins in a space station of the type we have in mind. The span of these commercial possibilities is limited only by the boundaries of our imagination. And these boundaries would be vastly expanded by the experience we will gain from early use of the space station.

The development of a space station would also open new opportunities for international cooperation in space. Indeed, a space station could be the logical catalyst for a great new international cooperative venture for the Free World. It could serve to focus the intense interest and capabilities in space that our allies in Europe and this continent as well as in Japan already have. And it could provide a mutually beneficial cooperative project to cement Free World ties.

We already have a long history of international cooperative ventures in space stemming from the 1958 National Aeronautics and Space Act, which created NASA. Already we have more than 1,000 agreements with over 100 nations covering the full range of cooperative activities. Among the most visible of these are the \$100 million Canadian-built Remote Manipulator System, the essential remote arm of the Shuttle; and the \$1 billion European-built Spacelab, an orbiting laboratory which will be launched next year in the Shuttle's cargo bay.

An international cooperative effort on a space station would continue to link other countries' space programs to the Shuttle, strengthening the overall space program of the United States. But as you and I know, there are many who would decry a new program of expansion into space. They would argue that we cannot afford to apply our limited resources to such goals as space stations and the like. The problems we face on Earth, they say, must come first; and never mind the planets and the stars. They will always be there.

I would remind these naysayers of the lessons of history. Since 1957 when Sputnik first shocked the United States into a space program, we have not been alone in space. Today although we still lead the world in space technology, and the Shuttle gives us perhaps a decade of breathing space to maintain that leadership, we have been joined by many nations and we now face growing and serious competition in space.

That competition comes not only from our friends in Europe and Japan, but from the Soviet Union, which has repeatedly stated its intention to construct a permanently manned orbital facility.

Although many tend to debunk Soviet technology and accomplishments in space, the Russians have already demonstrated an impressive operational space station capability. Their Salyut 6, presently unmanned, was launched in 1977, and was home to five main crews and eleven visiting crews from Eastern Europe, Cuba and Vietnam. Indeed, the Vietnamese cosmonaut who flew aboard Salyut 6 has more flight time in space than our second *Columbia* crew — Joe Engle and Dick Truly — combined. Salyut was resupplied periodically by the unmanned Progress spacecraft, an impressive technological achievement. And its crews were busily engaged not only in military activities, but in such civil functions as remote sensing, materials processing, space biology and medicine, astronomy and astrophysics.

The Soviets recently launched Salyut 7, to replace Salyut 6. Salyut 7 is now occupied by cos-

(Continued on page 4)

Bulletin Board

Alley Theatre subscription drive underway

The Alley Theatre corporate subscription program is again being offered to all NASA employees and contractors. Season tickets are available for next year's series of six performances for \$36. Brochures and order forms are available at the Bldg. 11 Exchange Store or from your EAA representative. Subscription checks should be made payable to the Alley Theatre and sent to Doris Wood at mail code SN1. Subscription deadline is Sept. 22. Subscription coupons will be mailed just prior to the opening of the 1982-83 season in October.

Spaceweek poster available in Bldg. 11

The 1982 Spaceweek posters have arrived and are available in the Bldg. 11 Exchange Store for \$4.95 each, according to Spaceweek-Houston Director Joe Bufkin. Tickets for the July 20 Spaceweek Banquet at the Gilruth Center are also available for \$15 per person at the Exchange Store.

JSC Aero Club accepting applications

The JSC Aero Club is now accepting new membership applications for flying at the club rates. Members may rent a Cessna 150 for \$20 an hour (wet) or a four-place Piper Archer II, with auto-pilot, air conditioning and full IFR panel for \$30 an hour (wet). Member dues are \$25 per month. The planes are based at Houston Gulf Airport in League City. For more information or membership application forms, call J.D. Haptonstall at x5285, Dennis Morrison at x5281 or B. Marcantel at x2314.

Gilruth Center News

Call x3594 for more information

Defensive driving — Learn to drive safely and qualify for a 10 percent reduction in your insurance for the next three years. Class is held from 8 a.m. to 5 p.m. July 24 at the Recreation Center. Cost is \$18 per person.

Children's movie — The next movie will be "Last Flight of Noah's Ark". Cartoons will also be shown. Time for the movie will be 10 a.m. to noon July 10, at the Rec Center. Cost is \$1 per person and this includes popcorn and cokes. Tickets are on sale at Bldg. 11 Exchange Store.

Creative stained glass — Learn the basics of stained glass art in this six week course that begins on Tuesday, July 6. Class meets from 7 to 9 p.m. and cost is \$30. Class is limited to 15 persons, first come, first serve.

Tennis lessons — These classes are designed for the person who has never had lessons or those who desire to refine a particular aspect of their game. Beginning tennis is on Tuesdays, starting July 6 for eight weeks. Class goes from 5:15 to 6:45 p.m. A Saturday beginning class will be offered for six weeks. Time will be 9 to 11 a.m. Intermediate tennis will be on Wednesdays, starting July 7, from 5:15 to 6:45 p.m. for eight weeks. All classes will cost \$24.

Race — Sign up now to run in the Lunar Rendezvous 5km race at the Recreation Center. T-shirts will be given. Starting time is 8 a.m. July 24. Cost is \$6 per person for early registration. Late registration will be \$8 and no shirts awarded. Refreshments will be served and blank forms can now be picked up here at the center.

Softball tourney — Enter now for our 14th Annual Moon-Walk Tourney. Openings will be in men's and women's categories. Limit is 24 teams in each, first come, first serve. Tourney will be held July 16, 17 and 18 at the Recreation Center. Cost is \$65 per team.

Space station

(Continued from page 3)

monauts and has been reported to represent a larger, more sophisticated system that would move the Soviet Union another step forward in its quest for dominance in near-Earth space. It is imperative that the United States and the Free World meet that challenge effectively and soon.

To paraphrase Shakespeare, if "we do not take the current when it serves," we will "lose our ventures." I believe the current serves us well now. The door to space has been opened and it could no more be slammed shut than could the doors opened by Gutenberg's printing press, Galileo's telescope, Fulton's steam engine or the Wright Brothers' first flight. And that door leads inevitably to the extension of the human environment into space.

Three factors make a space station a logical step in mankind's

inevitable evolution into a space-faring civilization.

The first factor is that the station would build on the capability of the Shuttle to exploit the human presence in space effectively and economically. It would represent a major step towards the goal of true exploitation of the opportunities which space provides for improving our nation's position in the world and for improving the quality of life for all mankind.

The second factor is utility. The space station would give us a place to do important, indeed, essential work in the areas of space science and exploration, technology development, space applications and national security. Space, we now know, is not just a place to visit. It is a place to work.

The third factor is one less tangible, but equally important. As a highly visible permanent United States presence in space, a space station would serve to enhance

national pride at home and national prestige abroad. The Shuttle has done this for us today. The space station can do it for us tomorrow.

More than two hundred years ago, when our nation was founded, we were weak in arms, poor in goods, but rich in spirit. Thomas Jefferson was able to say then after he drafted the Declaration of Independence that "we act not just for ourselves alone, but for the whole human race."

Today, the United States is strong in arms and rich in goods and still rich in spirit. We have built a magnificent new Space Transportation System. It holds unlimited opportunities for reinvigorating our economy, inspiring our youth, amassing new scientific knowledge, strengthening our defense and enhancing our national pride and prestige.

And we have an opportunity to act again, not just for ourselves, but for the whole human race.

Cookin' in the Cafeteria

Week of June 28 - July 2, 1982

Monday: French Onion Soup; Beef Chop Suey, Polish Sausage w/German Potato Salad, Breaded Veal Cutlet (Special); Okra & Tomatoes, Green Peas. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Salisbury Steak, Shrimp Creole, Fried Chicken (Special); Mixed Vegetables, Beets, Whipped Potatoes.

Wednesday: Seafood Gumbo; Fried Catfish w/Hush Puppies, Braised Beef Rib, BBQ Plate, Weiners & Beans, Shrimp Salad, Stuffed Bell Pepper (Special); Corn O'Brien, Rice, Italian Green Beans.

Thursday: Chicken Noodle Soup; Beef Stroganoff, Turkey & Dressing, BBQ Smoked Link (Special); Lima Beans, Buttered Squash, Spanish Rice.

Friday: Seafood Gumbo; Broiled Turbot, Liver & Onions, Fried Shrimp, Meat Sauce & Spaghetti (Special);

Green Beans, Buttered Broccoli, Whipped Potatoes.

Week of July 5 - 9, 1982

Monday: Holiday.

Tuesday: Celery Soup; Fried Shrimp, Pork Chop w/Applesauce, Turkey a la King, Chinese Pepper Steak (Special); Au Gratin Potatoes, Braided Squash, Buttered Spinach.

Wednesday: Seafood Gumbo; Fried Catfish w/Hush Puppies, Braised Beef Ribs, Mexican Dinner (Special); Spanish Rice, Ranch Beans, Buttered Peas.

Thursday: Green Split Pea Soup; Corned Beef w/Cabbage & New Potatoes, Chicken & Dumplings, Tamales w/Chili, Hamburger Steak w/Onion Gravy (Special); Navy Beans, Buttered Cabbage, Green Beans.

Friday: Seafood Gumbo; Deviled Crabs, Broiled Halibut, Liver & Onions, BBQ Link (Special); Buttered Corn, Green Beans, New Potatoes.



Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property & Rentals

Jamaica Beach cottage, \$230/wk or \$35/day. Make reservations now for summer season. Call 480-0220 after 6 p.m.

Six lots at Big Thicket Lake Estates, 50 x 125 each, \$1,000 each. Call 333-4614 or 337-3401, evenings.

For sale: 5.3 acres in Seabrook, \$60K total, \$20K down, finance \$40K at 12%. Call Bob Parker, x3551 or 334-2987.

For rent: Galveston By-The-Sea Condominium, two BR, furnished apartment for rent by day, week or month. Call Clements, 474-2622.

For lease: 3-2-2 at Bayridge, League City, den with fireplace, dining room, new paint, no pets, \$600/mo. plus deposit. Call 488-1301.

For lease: House in Wedgewood near Baybrook Mall, 3-2 1/2-2, two story, fireplace, fenced, \$500/mo. plus deposit. Call 486-9562.

Cars & Trucks

1970 Pontiac Catalina, needs work, \$200. Call Alan, 538-1672 after 6 p.m.

1981 Camaro Z28, dark metallic blue w/gold pin striping, fully loaded, T-tops, excellent condition, \$10,000. Call Darren, 534-4906, evenings.

1978 Honda Civic, 2 door, \$2,195. Call 488-4089.

1969 Plymouth Satellite, 318 V-8, 2 dr., AC, PS, auto, new paint, needs oil pump, \$500. Call 554-7306.

1977 Olds Cutlass Salon, 72,000 miles, rebuilt engine, V-8, 2 dr., auto, PS, PB, AM-FM stereo, tilt, \$3,625. Call 488-1326 after 5 p.m.

1972 Mustang 351, \$2,750. Call Wood, 333-2373, x2267 or x4464.

1972 Chevy pickup, 6 cyl., standard, excellent condition, \$1,250. Call Harry St. John, x5835.

1978 Ford LTD II, 2 door hardtop, super clean, new carpet and upholstery, AM/FM/8-track, Michelin tires, \$3,200. Call Burton, 471-0778.

1979 Ford Fairmont, auto, air, PS, PB, 6 cyl., 4 dr., AM/FM/Cassette, 33,000 mi., \$3,300. Call Anne, x5348.

1974 Ford E-200 van, 302 V-8, 3 spd., PB, cruise, AM/FM/Cassette, \$1,995. Call J. Erickson, x2447 or 488-1901.

1980 Fiat convertible 124/2000, metallic blue, tan interior, new top, AM/FM stereo, luggage rack and extended warranty, asking \$6,900. Call Kirk, 333-5556 or 333-1984.

1976 Datsun 280Z 2+2, air turbine mags, new tires, AM/FM, runs great, \$4,000 neg. Call Mike, 483-4231 or 480-2222 after 6 p.m.

1971 Olds 4 dr. hardtop, good running condition, great work car, \$850. Call Lew, x2541 or 488-1222 after 7 p.m.

Video & Audio

For sale: Two Realistic stereo speakers, walnut veneer, \$30. Call Gorman, x2447.

For sale: Scott AM/FM mono tube tuner, Lafayette 4-channel amp., 1 each acoustic suspension spkr., all units excellent, \$60. Call 488-3966.

Photography

Mamiya super press 23 camera w/100mm 3.5 lens, 2-120 roll film holders, focusing screen holder & rubber eye piece, \$350 cash. Call Frank, x3836.

Accura 135 mm f. 3.5 telephoto lens, Pentax screw mount, good condition, \$25. Call 488-3966.

Household

Matching set foam mattress and box springs, full size, good condition, \$50. Call 488-4788.

Round swivel chair, oyster color, acrylic "fur-feel" fabric, \$40. Call Sharon, 488-5083 after 5:30 p.m.

For sale: 38 by 28 fireplace screen with glass frame \$20: 480-6536 after 5 p.m.

Blue/red checkerboard sofa, \$50; 2 blue chairs, \$25 each; twin bed with headboard, box spring and mattress, \$65; swimming pool leaf sweeper, \$20. Call 488-1326 after 5 p.m.

Cycles

1976 Honda GL-1000 Ltd., new air shocks, loaded. Call Ann, x5827 or 1-925-6634 after 5 p.m.

Twenty-inch dirt bike, banana seat, \$25. Call Coleman, 488-0323.

1970 Honda 350, no title, \$200. Call 487-8633.

Yama-Suki trail bike, needs work. Call Jerry, x2576 or 554-6093.

1974 Suzuki GT 750, excellent condition, low mileage. Call Mike, x3286.

Boats & Planes

Hydra Hoist boat hoist and parts, perfect for floating dock, three submersible or floating 30" x 18" fiberglass tanks. Best offer. Call 333-2974.

20' Wellcraft center console fisherman w/full canvas 150 and 20 hp Merc outboard w/trailer. Excellent. Call John, x2151 or 944-4048.

Older but excellent 14' aluminum run-about, so-so 35 hp Johnson, sorry trailer. See and make offer. Call 538-1728.

Pets

Cocker pups, AKC, buff, \$150. Call 538-1369.

Collie/Shepherd cross, female 4 mo. old, summertime markings, disciplined, loves children, wormed, all shots w/records, free to good home. Call Dan, x5091.

German Shepard/Black Lab mixed puppies, 14 wks. old, 2 males and 1 female, very affectionate and smart, Call Laurie, x2426 or Martha, 481-4809 evenings.

Labrador pups, AKC, yellow, whelped 3-9-82, parents on premises, both good hunters, hips guaranteed, \$150. Call 534-2488 after 6 p.m. or anytime Saturday and Sunday.

Free kittens, your choice of color: tan, grey, white, black, mottled; many available. Call Jean, 559-2325 after June 29.

Found

Black leather keycase at Ave. B crossing near 3rd St. Contains GM plus Samsonite and other keys. Call Dan, x5091 and identify.

Wanted

Would like to share apartment in Clear Lake area. Call James, x6406 or x5073.

Want good used SCUBA mask for small face, prefer silicon and/or shorty wet suit, med.- female. Call Amanda, 333-5511 or 486-9605.

Would like to carpool to San Jacinto College from Nassau Bay Saturday mornings to arrive at 8:30 a.m. and leave around 12:50 p.m. Call Mae, x5814.

Want set of women's golf clubs in good condition, reasonable. Call Beverly, x2593 or 997-1131.

Need carpool pickup at Mr. Gatti's, NASA Road 1 for ride to NASA, ride for 7:30 a.m. only. Call Connie, x2838.

Want Sunfish sailboat w/trailer, \$600; without trailer, \$400. Call Bill Hill, x4153 or 481-6181 after 5 p.m.

Want Time-Life Foods of the World cook books. Call 485-7436 evenings.

Professional couple, ages 34 & 26, desire living accommodations, preferably furnished, until Aug. 13. Call Bob Schwirian, x4193 or 480-2041 after 5:30 p.m.

Miscellaneous

Large wrought iron grate, 5' x 7', free. Call Gorman, x2447.

Older 7.5 hp outboard motor, \$85. Call Jerry, x2576 or 554-6093.

Swimming pool, 10' diam. x 2' deep, with pump and filter, \$25; men's down filled jacket, \$20; vegetable juicer, \$40; grain grinder, \$45; Christmas decorations and lights, \$25. Call 487-8633.

Riding lawn mower, attachments, front end loader, front blade and good mower deck. Call Jerry, x2576 or 554-6093.

Exercise bicycle, \$50; Olds trombone, \$150; men's Wrangler jeans, never worn, 32 x 39, \$15. Call 333-3133 or 334-5090.

Winnabago 20' motor home for rent, fully self-contained, reasonable rates. Call Reeves, x2991.

Double kitchen sink and electric stove cooktop, great for camp or cottage, \$10 takes all. Call 486-1089.

Go cart for sale, 5 hp., good working condition, \$200 firm. Call 332-8188 after 5:30 p.m.

LED stopwatch, \$15; baby scale, \$15; 2 new 20" motocross bike wheels, \$15 each; bike seat, \$8; ornate gold mirror, 25" x 52", \$45. Call Lacy, x3235 or 488-6948.

Tasco 66T, 180X telescope, 2.4" refractor, metal tripod, many accessories, \$85; 16" Mars globe, \$65; 16" Moon globe, \$25; 3 vol. Burnham's Celestial Handbook, \$25. Call Gary, x2156 or 482-1290.

Windsurfer, \$800; men's wet suit, large, \$75; women's wet suit, medium, \$35. Call George, x3035 or 488-0604.

World Fair tours, Aug. 11-15, if interested call by July 1, 486-5748 after 5 p.m.

Ladies pant and skirt suits, size 5 & 7, men's pants, shirts and jackets, size 32, ladies wool and leather jackets, size 32. Call 486-5748.

Belt massager, 1/6 hp., 3" web belt, fully assembled, freestanding, compact, \$50. Call Sharon, 488-5083 after 5:30 p.m.

Four 15" wire wheels and Sears Roadhandler tires, HR-78-15, \$100. Call Gary, 946-0111 after 5 p.m.

Like new Hr-78-15-B Uniroyal steel radial whitewall tire, best offer over \$30. Call J. Erickson, x4017.

Hi-Lo 16' travel trailer, self contained, good condition. Call Wally, x2727 or 332-5721.