Documents comparing the American and Soviet space programs
(various 1964-1968)
A COMPARISON OF THE AMERICAN AND SOVIET

SPACE PROGRAMS

On the basis of a comparison of achievements to date, one would have to conclude that the U.S. is presently leading in the "space race". In the fields of manned lunar landing, manned space flight, unmanned lunar and interplanetary exploration, orbital applications, and near and deep-space scientific experimentation the U.S. is in almost every instance ahead of the U.S.S.R. in solid accomplishments. It should be borne in mind, however, that our examination of test programs really compares the results of policy decisions regarding the size and scope of space programs made by the two countries a number of years ago. The funds supporting the U.S. program have been reduced in recent years, and this will have a long-term impact on the U.S. program. If the Soviets have not had to reduce their funding level, then it is entirely possible that their space program will eclipse ours some years from now.

The largest program is of course the manned lunar landing. The U. S. made a first successful test of the Saturn V booster vehicle almost a year ago, a second successful test in April 1968, and will have a third launch, probably manned, this December. The U.S.S.R. has yet to put into orbit a booster vehicle comparable in size to the Saturn V, so that even if they were to successfully orbit a very large payload tomorrow one would have to conclude that our test program leading to a landing is a year ahead of theirs.

The U.S.S.R. made many spectacular "firsts" in manned space flight -- the first manned flight, the first two and three man flights, the first space-walk, etc. However the U.S. has by now logged many more hours of manned space time than the U.S.S.R., has had more missions, has performed more extended space-walks, has repeatedly demonstrated its capability to do space maneuvers, rendezvous, and docking. These achievements give clear testimony to the fact that the Americans have overtaken and passed the Soviets.
In unmanned lunar exploration both countries had their growing pains and problems leading to unmanned soft-landings and lunar orbiters. However the U.S. Surveyor and Orbiter programs have yielded many more pictures of many more parts of the moon than have been obtained by the Soviets with Luna-9 and its successors. Even more important, the quality of the U.S. photographs has been excellent, whereas the Soviet pictures are at best mediocre. The quality and diversity of other U.S. scientific experiments on and near the moon is similarly excellent, easily on a par with that by the U.S.S.R. One interesting mission now under way is the Soviet Zond-5 flight. There has been speculation that this is an unmanned circumlunar flight wherein the probe will return to earth and be recovered. If this proves to be the case, and the mission is successful, then the Soviets will score a lunar "first".

The Soviets have launched a significantly greater number of probes to Mars and Venus than we have. In spite of this the U.S. achievements measure up very well with those of the U.S.S.R. so far. The U.S. Mariner flight is still the only probe to successfully fly by Mars and return data. The American and Soviet probes of Venus were complimentary in nature -- we flew by the planet and they penetrated deep into the Venus atmosphere. It should be noted however, that unmanned interplanetary exploration is one field where the Soviets are very likely to take over world leadership in the view of the lack of any significant U.S. programs presently planned after the 1969 Mars probes.

The U.S. communication satellite programs are operating now around the world. The U.S.S.R.'s Molniya system has demonstrated a feasibility, but has yet to be put to daily use outside Russia. Both countries have meteorological satellite systems which work well, and we are in fact exchanging weather data routinely with the U.S.S.R. For the record, however, our program was under way and operational about 5 years before theirs. The same comment appears to be the case for navigation satellites.

The United States have an overwhelming lead in the scientific exploration of near and deep space. Early Soviet Sputniks received much publicity but sent back less useful scientific information than early U.S. Explorer satellites. Since then our Explorer satellites and
probes have covered the vast region from low earth orbit to deep interplanetary space, much of which has never been crossed by Soviet space vehicles. Even when Soviet scientific satellites are successful they are very slow to publish their findings. Consequently, most of the existing scientific data on outer space is of U.S. origin.

To recapitalize, an objective appraisal would put the U.S. clearly ahead now, but should also recognize the fact that we have eased off on the throttle and they may not have, and it is entirely possible that the Soviets will catch and pass us.
RELATIVE SPACE ACTIVITY

1. Up to date, the U. S. has made 228 launch attempts to place payloads into earth orbit or out to the moon and planets. This is about three times the 77 launch attempts made by the USSR.

2. During the 228 launch attempts, the U. S. has put 194 payloads into earth orbit and put 7 other payloads out toward the moon or planets. Of the 77 launch attempts by the USSR, 55 payloads have gone into earth orbit and 6 have gone toward the moon or planets.

3. About 1/3 of all Soviet launches have been attempts to go to the moon or the planets. All but 6.5% of U. S. payloads have been aimed at earth orbit. In relative terms, the Soviets have devoted about 5 times as much of their space effort to lunar and planetary exploration as the U. S. has of its space effort.

4. Of the Soviets' 25 attempts toward the moon and the planets, 19 (76%) have failed. The U. S. has made 18 attempts, of which 11 (61%) have failed.

5. While the over-all payload launch records, i.e. successes vs. failures, are comparable as between the U. S. and the USSR, the U. S. has a slightly better record percentagewise since the USSR has devoted so much greater share of its action to the more complex moon and planet launchings than the U. S. has.

E. C. Welsh 4/1/64
SPECIAL REPORT

FORECAST OF SOVIET SPACE SPECTACULARS IN 1964

CENTRAL INTELLIGENCE AGENCY
OFFICE OF CURRENT INTELLIGENCE

SANITIZED
E.O. 13526, Sec. 3.5
NIJ 08-260 appendix
By NARA, Date 11-19-11
E.O. 13526
2, 3 (b)(1)
FORECAST OF SOVIET SPACE SPECTACULARS IN 1964

The coming months are likely to see a number of attempts at Soviet space spectaculars motivated both by scientific interest in furthering the conquest of space and by the need to refurbish the image of the USSR as the leader in space achievements. Several recent Soviet attempts at lunar and Venus probes have failed, no manned satellite has been orbited for almost a year, and the successful unmanned Cosmos, Polet, and Electron satellites have created little stir. Coming space events, in addition to the deep-space probe—Zond I—already en route to Venus, are almost certain to include unmanned vehicles programmed to orbit or land on the moon. A Mars probe is likely to be launched in November. Another prospect for the summer is some new manned space exploit, possibly involving a multimanned or long-duration manned mission in earth orbit.

Zond I

One effort, already underway, will be a striking scientific accomplishment if it succeeds. Zond I was launched on a trajectory toward Venus on 2 April and will reach the vicinity of the planet on 20 July. It is not yet possible to tell whether it will impact on Venus or fly by, perhaps ejecting an instrumented probe to explore the planet's atmosphere.

The mission of Zond I has not been announced, probably because of the failure of past Soviet planetary probes. However, unless it fails altogether, an announcement of its Venus mission will probably be made on or near the date of arrival in an attempt to derive maximum propaganda advantage from the accomplishment.

Manned Satellites

The Soviets will probably undertake a manned space operation in the next few months, as they have for the past three summers. The last manned satellite event, in June 1963, involved the orbiting of two satellites (Vostoks 5 and 6)—one bearing the first woman astronaut. Before that, Vostoks 3 and 4 had been placed in orbit in August 1962. These two events demonstrated Soviet capability to launch and guide a satellite so that it would pass, at high relative crossing speeds, within a few miles of another satellite.

Basically, there are two approaches the Soviets can take
to their next manned space effort. They can make maximum use of existing equipment and proven techniques to carry out manned satellite operations. They may also undertake operations testing new equipment and techniques, which would be larger steps toward more ambitious future manned space accomplishments. Several types of manned space missions appear to be within Soviet capabilities, but it seems highly unlikely that all of these possible missions will be attempted this year.

The Soviets can undertake multimanned space operations and single-man missions of longer duration than any attempted to date. They may try to capitalize on their large space payload capability by putting a capsule with two men into orbit. They could do this either by modifying their present 10,000-pound capsule or by taking advantage of their ability to place 15,000 pounds into orbit with a more powerful upper stage. If they choose the latter course, the Soviets will probably undertake unmanned tests before a manned attempt because of their recent planetary probe failures using the 15,000-pound package.

Long-range Soviet interest in establishing manned space stations may prompt a manned space operation of longer duration—say, 10 to 15 days—which can be accomplished with existing
equipment. Aside from the propaganda aspects of such a mission, it would provide unique data on the physiological effects of prolonged periods of weightlessness on humans and on the life-support system such missions require.

Despite the propaganda and scientific yield that multi-manned or long-duration missions would have, the Soviets may elect this year to try more technically ambitious feats. Their Polet series has demonstrated a capability to alter the orbit of a satellite. The next big step is to effect a rendezvous of two orbiting space vehicles.

In space terminology, rendezvous is the operation of modifying the orbit or trajectory of one or more space vehicles, for the purpose of bringing and maintaining them in close proximity. This operation requires some maneuvering while in orbit, in contrast to co-orbiting by precise launching of the second vehicle. Docking means establishing a physical contact between two orbiting vehicles, and a transfer is the physical movement of persons or equipment from one orbiting vehicle to another.

A rendezvous test will probably be attempted as soon as possible in view of the importance of such an achievement to more ambitious future missions. A logical outgrowth of a successful rendezvous operation would be a mission to dock two vehicles in space. Because the technology required for docking is not substantially more difficult than that required for rendezvous—and because the propaganda value would be great—there is some chance that the Soviets would attempt a docking and transfer operation concurrent with or soon after their first manned rendezvous effort.

Unmanned Lunar Probe

We expect the Soviets to try once more to send an unmanned probe to the moon either to land on it or to go into orbit around it. They have attempted five lunar probes in the past 17 months, with only one partial success.

If the Soviets elect to launch when conditions are identical to their previous five tries, they will wait until 12-14 December; however, generally similar conditions will exist on 17-19 July and 16-18 August.

The probe used by the Soviets in their lunar attempts weighs about 3,100 pounds when it escapes the earth. This weight permits soft-landing a significant payload of scientific instruments on the moon or televising pictures of the moon from a lunar orbit.

Mars Probe

The Soviets almost certainly will seize the opportunity—which occurs at about two-year intervals—to launch one or more probes to Mars this
year. Their efforts at favorable times in 1960 and 1962 netted only one partial success in five tries. The next favorable period comes in mid-November. If the launch is successful, the Soviets will probably characterize the object as a "deep space probe" in the Zond series, waiting until its seven-month trip to Mars is nearly completed before announcing its true destination.

**Emergence of Larger Booster**

The space spectacles discussed above might involve, in some instances, new upper stages and spacecraft, but all are feasible with existing boosters. If a booster of substantially greater thrust (say 1.5 million pounds or more) becomes available in the course of the year, the Soviets could place satellites at least twice as heavy as present ones into earth orbit. While there is some evidence to suggest that larger boosters are being developed, the information is inconclusive and probably will remain so until test firings begin. In any event, initial Soviet space missions employing a new and unproved booster would be unmanned.
MEMORANDUM TO THE PRESIDENT

Subject: Comparison of U. S. and U. S. S. R. Rockets

Questions have been raised as to the true comparison between U. S. and Soviet accomplishments in launching weights into space.

The following information is unclassified, and hence incomplete, but is substantially in accord with the best classified data available:

1. Saturn I put up a gross weight of 37,700 pounds into orbit, clearly the statistical record for any flight to date. This included the empty, attached S-IV rocket casing. The assigned payload capability of this Saturn is about 20,000 pounds.

2. The regular Soviet launch vehicle has, on a number of occasions, put into orbit 14,300 pounds of payload. This is exclusive of the separated accompanying rocket casing whose weight was not stated.

3. The payload capability of the Soviet vehicle is about two-thirds that of the Saturn I, and its first stage thrust is approximately half that of the Saturn I (around 300,000 as against 1,500,000 pounds).

4. The Soviet launch vehicle has been in regular operational use since 1958, while the Saturn I is still at an early stage of testing.

5. The current situation is that the Soviet Union continues to hold the record for weight lifting in operational use, but that the United States holds the all-time record without regard to operational status. When and if a new Soviet rocket appears, it will probably exceed the Saturn I in order to afford a reasonable step in progress above the present Soviet vehicle.

6. We also have under development the Saturn IB (32,000 pounds of payload), the Titan III (25,000 pounds of payload), and the Saturn V (220,000 pounds of payload). The payloads cited are estimated and at minimum altitude orbits.

7. There is reason to take pride in our very real accomplishment of the January Saturn flight and its flawless performance provided we do not misinterpret the early status of its testing and the continuing possibility of larger Soviet vehicles appearing on the world scene.

E. C. Welsh
MEMORANDUM FOR THE PRESIDENT

Subject: Space Activities

1. Gemini. A freak lightning strike at Cape Kennedy damaged electronic gear aboard the Titan II launch vehicle that was to place an unmanned Gemini spacecraft in orbit later this year. Repairs may postpone the first manned Gemini flight from December into early 1965.

2. U. S. Launches

   a. Syncom III communications satellite, launched successfully on August 19, has been positioned into a synchronous orbit and will be available for TV transmission of the Japanese Olympics to the United States.

   b. On August 26, the Department of Defense is scheduled to launch a Titan III-A booster test vehicle from Cape Kennedy.

   c. NASA is scheduled to launch on August 25 a 97 pound ionosphere monitoring satellite from the Pacific Missile Range.

   d. A 182 pound package successfully launched into a ballistic trajectory by a Scout launch vehicle August 18 reentered the atmosphere at 18,850 miles per hour to test Apollo heat shield materials.

   e. The Department of Defense successfully launched a military payload into polar orbit August 14.

3. Soviet Launches

   a. Indications are that Cosmos 37 was a Vostok-sized spacecraft in a low altitude orbit, and could portend a Soviet manned launch.

   b. August 18, the USSR launched three payloads (Cosmos 38, 39, and 40) into orbit, using what they claimed was a new booster.

   c. As of August 21, USSR has placed twice as many payloads into earth orbit as they had by this time last year.
4. **ComSat**

   a. The international communications satellite agreements were given formal approval by 11 States in Washington August 20.

   b. The companies holding ComSat Corporation stock have thus far nominated a total of nine individuals for the six carrier director positions on the Corporation's board. Election of these and the six public directors is scheduled for September 17.

   c. ComSat Corp. has asked the FCC for an exclusive grant to operate ground terminals in the U. S. This could provoke opposition from other potential operators and in Congress.

5. **SPACE PAYLOAD SUCCESS BOX SCORE**
   (August 21)

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<th></th>
<th>USA</th>
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<th>USSR</th>
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<tr>
<td></td>
<td>1963</td>
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<td>1963</td>
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<tr>
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   [Signature]

   E. C. Welsh
MEMORANDUM FOR THE PRESIDENT

Subject: Manned Space Flight

The following comparative data, as of September 10, 1965, gives a statistical picture of the U.S. and the USSR manned space flight progress:

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<tr>
<td>Number of flights</td>
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<tr>
<td>Number of pilots</td>
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<tr>
<td>Number of orbits</td>
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<tr>
<td>Number of orbits</td>
<td>406 (all pilots)</td>
<td>341</td>
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<tr>
<td>Number of man hours</td>
<td>640 (all pilots)</td>
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<td>Number of flight hours</td>
<td>347 (all spacecraft)</td>
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<td>Longest flight-hours</td>
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<td>119 (June 1963)</td>
</tr>
<tr>
<td>Longest flight-orbits</td>
<td>120 (August 1965)</td>
<td>81 (June 1963)</td>
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E. C. Welsh

Time: 9:30 a.m.
THE VICE PRESIDENT
WASHINGTON

July 29, 1966
6:30 p.m.

MEMORANDUM

To: The President

From: The Vice President

I know you will be interested in the record of our manned space flights as compared to the Soviet record. It is impressive.

The current record reveals that the United States has more successful experience in manned space flight than has had Soviet Russia. The following is factual evidence of this relative advantage:

1. The U.S. has had seven effective rendezvous during Gemini flights between December, 1965 and July, 1966 (the USSR has had none).

2. The U.S. has had two instances of actual docking between spacecraft in flight, in March and July, 1966 (the USSR has had none).

3. The U.S. has engaged in substantial and effective maneuvering of manned spacecraft, including one instance when the Gemini docked with and was propelled by an Agena (the USSR has had none).

4. Statistical data:

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<tr>
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<tr>
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<tr>
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<td>Number of revolutions</td>
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<td>Number of flight hours</td>
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<td>Longest flight (hours)</td>
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<td>Longest flight (revolutions)</td>
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<td>76 (June 1963)</td>
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<tr>
<td>Space rendezvous</td>
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<tr>
<td>Spacecraft docking</td>
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<tr>
<td>EVA exposure</td>
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MEMORANDUM FOR THE PRESIDENT

March 29, 1968
10:50 A.M.

Subject: Space and Aeronautics Activities.

1. Cosmonaut Death. Yuri Gagarin, first human to travel in space, was killed in a jet aircraft training accident on March 27. Radio Moscow reported the crash also took the life of a second officer. Gagarin's historic flight took place on April 12, 1961. The President, the Vice President, other high-level officials connected with the U.S. space program, and the NASA astronauts as a group sent condolences.

2. Launch. The Soviet Union launched Cosmos 209 into a near-circular low-altitude orbit on March 22. On the following day, the satellite's engine was restarted and it was elevated into a circular orbit of about 600 miles altitude.

3. Pending Launch. The second unmanned launch of an Apollo spacecraft by a Saturn V vehicle is scheduled for 7:00 A.M. EST April 3. The purpose of the flight is to qualify the launch vehicle, the spacecraft, and the tracking facilities for a manned flight later this year.

4. NASA Authorization. House consideration of the NASA FY 1969 authorization is planned for April 4. The Committee already cut $153,000,000 and further cutting action is expected when the bill reaches the House floor.

5. Space Hearings. The Senate Aeronautical and Space Sciences Committee heard the Director of Defense Research and Engineering in closed session on March 26. The Committee has tentative plans to hear nuclear rocket experts and other scientist witnesses.

6. Jet Engine Air Pollution. The Department of Transportation has announced a three-year program to work with other government laboratories and industry to develop cleaner jet engine operations. The objective is to establish acceptable engine emission levels.
7. **Earth Resources Survey.** Senator Carlson asserts that the potential benefits from earth resources observation satellites alone would justify the cost of the entire U. S. space program. He said the program should be a boon to farmers, geologists, and even forest fire wardens.

8. **Weather.** The ESSA III satellite photographed a tropical storm in the South Indian Ocean on March 24-25. Advisories were sent.

9. **Space Payloads Successfully Launched**
   (March 29)

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<td>Escape</td>
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E. C. Welsh

COPY LBJ LIBRARY
MEMORANDUM

THE WHITE HOUSE
WASHINGTON

Monday, December 2, 1968
2:00 pm

MEMORANDUM FOR

THE PRESIDENT

SUBJECT: Assessment of the Soviet Space Program

The Space Science and Technology Panel of your Science Advisory Committee has given me a very good, concise assessment of the Soviet space program and its probable future course. It is attached, and I commend it to you. It is the judgment of a group of experts who have been involved in this problem for some time and who have had access to high level intelligence data.

Although the report makes no recommendations, several additional observations appear pertinent:

-- If the U. S. is to accept the challenge of space competition with the Soviet Union as a symbol of our relative technical strengths, a continuing vigorous space program will be required.

-- Since the Soviets utilize their space program for political objectives by achieving "firsts", overt cooperation in the selection of important missions and objectives is not likely in the foreseeable future.

-- Effective competition does not require that the U.S. challenge the probable Soviet program on a mission-by-mission basis since the effect of individual space spectacles is becoming less significant as an indication of leadership in space.

Attachment
a/s

Donald F. Hornig
SPACE SCIENCE AND TECHNOLOGY PANEL

REPORT

AN ASSESSMENT OF THE SOVIET SPACE PROGRAM

The Soviet Union has pursued space exploration together with space science and technology in a manner that indicates commitment to a long term planned effort expanding in a planned relationship to its gross national product. Its effort relative to that of the U.S. is characterized by certain patterns of which the following are particularly significant:

1. Pursuit of an objective until achieved in spite of repeated failures.

2. Substantial development difficulties with attendant frequent flight failures for a considerable period in the early phases of a program followed by program maturity with very high reliability thereafter.

3. An apparent plan for a gradually increasing funding level over a period of several years which is consistently adhered to and can be counted on by the space program managers.

4. Selection of objectives with emphasis upon achieving simply described and easily visualized "firsts" of high public interest.

5. An exploratory effort deliberately directed at expanding its knowledge of the solar system and the universe.

6. Selective exploitation of space applications on the basis of utility to the Soviet Union.
At the present time the dynamic drive of the Apollo program and
the leadership of the United States in electronics and instrumentation has
enabled the United States to attain the lead position in space. Recent
successes by the Soviet Union in probing the atmosphere of Venus and in
circling the moon followed by lifting reentry recovery portend a threat to
the U.S. leadership, in planetary exploration and possibly in exploration
of the moon as well.

Based on the presently approved U.S. program and the assumption
that the Soviet program will continue in its past pattern, the following
predictions are made:

1. The United States is leading in its manned lunar landing
   program by at least a year relative to the Soviets.

2. The Soviets are likely to try to minimize the effect of this
   leadership by attempting
   a. a manned circumlunar flight within the next three months.
   b. an unmanned lunar soft landing with the return of a
      lunar sample to earth before the U.S. manned lunar
      landing.

3. Following the U.S. manned lunar landing, the Soviet Union
   is likely to rebuild its prestige in space and move towards
   a position of world leadership by dominance in planetary
   exploration, parity in manned lunar exploration, and
   competition in space astronomy.
   a. We expect an aggressive Soviet program of planetary
exploration during 1969-73 including landings on Mars and Venus, exploiting newly available large launch vehicles. U.S. decisions already made make it impractical to have a competitive landing program prior to '73.

b. With the present trend towards stretchout of manned lunar exploration by the United States following the first successful Apollo mission, it is probable that the Soviet Union will at least equal U.S. efforts in manned lunar exploration in the early 70's. The mode of accomplishment of the manned lunar landing that we expect the U.S.S.R. to adopt will be particularly well adapted to follow on exploration after the first landing.

c. In addition, the Soviet Union is likely to undertake a substantial program of earth orbital, manned or unmanned astronomy.

d. Considerations of the pace of the Soviet lunar landing program, manned spacecraft systems and launch vehicle availability suggest to us that the Soviets have the capability for an early space station consistent with extended earth-orbital operations. In this event we can expect a substantial expansion in space biomedical research, in which the Soviets have taken a broad and basic interest.
In summary, when we compare the relative balance within the U.S.S.R. and U.S. space programs we find: (a) the U.S.S.R. places greater emphasis on planetary exploration, (b) the U.S.S.R. can be expected to become fully competitive in lunar exploration within a few years following the initial U.S. landings, (c) the nature of Soviet manned and unmanned earth orbital work cannot be predicted with confidence, but existing Soviet capabilities make possible the development of earth orbiting space stations.