Reporting the Space Race

***New York Times,* October 4, 1957**
"Soviet Fires Earth Satellite into Space"

"All the News That's Fit to Print"

The New York Times.

LATE CITY EDITION

NEW YORK, SATURDAY, OCTOBER 5, 1957. FIVE CENTS

SOVIET FIRES EARTH SATELLITE INTO SPACE; IT IS CIRCLING THE GLOBE AT 18,000 M. P. H.; SPHERE TRACKED IN 4 CROSSINGS OVER U. S.

HOFFA IS ELECTED TEAMSTERS' HEAD; WARNS OF BATTLE

IN TOKEN OF VICTORY

COURSE RECORDED

Navy Picks Up Radio Signals—4 Report Sighting Device

560 MILES HIGH

Visible With Simple Binoculars, Moscow Statement Says

Device Is 8 Times Heavier Than One Planned by U.S.

FAUBUS COMPARES HIS STAND TO LEE'S

Flu Widens in City; 10% Rate Predicted; 200,000 Pupils Out

ARGENTINA TAKES EMERGENCY STEPS

SATELLITE SIGNAL BROADCAST HERE

Ex-Premier Mollet Accepts Bid To Form a New French Cabinet

Guy Mollet

City Sifts Charge That Schupler, Brooklyn Councilman, Sold a Job

Warsaw Crushes New Protest; Clubs, Tear Gas Rout Students

Pravda, October 5, 1957
Announcement of the First Satellite

On October 4, 1957, the Soviet Union launched the first earth orbiting satellite to support the scientific research effort undertaken by several nations during the 1957-1958 International Geophysical Year. The Soviets called the satellite "Sputnik" or "fellow traveler" and reported the achievement in a tersely worded press release issued by the official news agency, Tass, printed in the October 5, 1957, issue of Pravda. The United States had also been working on a scientific satellite program, Project Vanguard, but it had not yet launched a satellite.

For several years scientific research and experimental design work have been conducted in the Soviet Union on the creation of artificial satellites of the earth.

As already reported in the press, the first launching of the satellites in the USSR were planned for realization in accordance with the scientific research program of the International Geophysical Year.

As a result of very intensive work by scientific research institutes and design bureaus the first artificial satellite in the world has been created. On October 4, 1957, this first satellite was successfully launched in the USSR. According to preliminary data, the carrier rocket has imparted to the satellite the required orbital velocity of about 8000 meters per second. At the present time the satellite is describing elliptical trajectories around the earth, and its flight can be observed in the rays of the rising and setting sun with the aid of very simple optical instruments (binoculars, telescopes, etc.).

According to calculations which now are being supplemented by direct observations, the satellite will travel at altitudes up to 900 kilometers above the surface of the earth; the time for a complete revolution of the satellite will be one hour and thirty-five minutes; the angle of inclination of its orbit to the equatorial plane is 65 degrees. On October 5 the satellite will pass over the Moscow area twice -- at 1:46 a.m. and at 6:42 a.m. Moscow time. Reports about the subsequent movement of the first artificial satellite launched in the USSR on October 4 will be issued regularly by broadcasting stations.

The satellite has a spherical shape 58 centimeters in diameter and weighs 83.6 kilograms. It is equipped with two radio transmitters continuously emitting signals at frequencies of 20.005 and 40.002 megacycles per second (wave lengths of about 15 and 7.5 meters, respectively). The power of the transmitters ensures reliable reception of the signals by a broad range of radio amateurs. The signals have the form of telegraph pulses of about 0.3 second's duration with a [312] pause of the same duration. The signal of one frequency is sent during the pause in the signal of the other frequency.

Scientific stations located at various points in the Soviet Union are tracking the satellite and determining the elements of its trajectory. Since the density of the rarified upper layers of the atmosphere is not accurately known, there are no data at present for the precise determination of the satellite's lifetime and of the point of its entry into the dense layers of the atmosphere. Calculations have shown that owing to the tremendous velocity of the satellite, at the end of its existence it will burn up on reaching the dense layers of the atmosphere at an altitude of several tens of kilometers.

As early as the end of the nineteenth century the possibility of realizing cosmic flights by means of rockets was first scientifically substantiated in Russia by the works of the outstanding Russian scientist K[onstatin] E. Tsiolkovskii [Tsiolkovskiy].

The successful launching of the first man-made earth satellite makes a most important contribution to the treasure-house of world science and culture. The scientific experiment accomplished at such a great height is of tremendous importance for learning the properties of cosmic space and for studying the earth as a planet of our solar system.

During the International Geophysical Year the Soviet Union proposes launching several more artificial earth satellites. These subsequent satellites will be larger and heavier and they will be used to carry out programs of scientific research.

Artificial earth satellites will pave the way to interplanetary travel and, apparently our contemporaries will witness how the freed and conscientious labor of the people of the new socialist society makes the most daring dreams of mankind a reality.

From *Pravda,* October 5, 1957, F.J. Krieger, *Behind the Sputniks* (Washington, DC: Public Affairs Press, 1958), pp. 311-12. Courtesy NASA History Division, Reference Collection, NASA History Office, NASA Headquarters, Washington, D.C.

Daily Herald, **December 7, 1957**
"Oh, What a Flopnik!"

DAILY HERALD

America's Sputnik dies bleeping on the ground

OH, WHAT A FLOPNIK!

Satellite blows up before take-off

WE SAY

Talking omelette

Warship races to banana colony

QUIT ORDER TO 20,000 DUTCH

'ESCAPED PATIENT MAY HARM CHILDREN'

FATHER STILL HOPES...

'Destroy this letter' Bank chief told 'Leak' witness

MUSTS FOR MONDAY

Ladder saves her from fire

BABYCHAM

Secret Soviet Plan
1956 Synopsis of Report on Development
of Conceptual Design of an Artificial Earth Satellite

This document was signed by Sergey P. Korolev on 25 September 1956. It is the detailed technical plan for the 'Object D,' the first Soviet satellite project. The program was approved by a decree of the USSR Council of Ministers on 30 January 1956 and envisaged the launch of a heavy scientific satellite in 1957 at the start of the International Geophysical Year. The Object D program was a direct result of Korolev and Mikhail K. Tikhonravov's request to the government in May 1954 to launch an artificial Earth satellite. Korolev's position at the time was: Chief Designer and Chief of the Experimental Design Bureau No. 1 (OKB-1).

The Decision of January 30, 1956, stipulates creation in 1957 - 1958 of a non-orientated artificial earth satellite on the basis of a missile under development (Object D), having the following basic characteristics:

- Satellite weight 1,000 - 1,400 kg.
- Weight of scientific research hardware 200 - 300 kg.
- First test launch of Object D scheduled for 1957.

This report will discuss the basic results of development of the conceptual design of a missile to be used as satellite launcher. It should be noted that development of this Conceptual Design had not been conducted by an accident: it is the result of all prior work of the organizations that had taken part in development of the RDD long-range missile. Operations of these organizations included work on the turbopump rocket engines, control systems, a satellite tracking complex, a ground equipment complex, and gyroscopic instrumentation. A number of organizations of the USSR Academy of Sciences also took part: the V. A. Steklov Applied Mathematics Institute, the Institute of Automation and Telemechanics, etc. First works of M. K. Tikhonravov and his team and their participation in the draft plan of the artificial satellite are of a special value. During recent 5 - 7 years operations with DD long-range missiles have been conducted by the OKB and by departments of the Head Scientific Research Institute with development of scientific and research themes, and a number of RDD missiles of increasing range have been built by effort of the whole industry. I am not going to discuss these operations in detail, because everybody here is familiar with these operations.

1. Basic Objectives of Explorations with the Help of the Satellite

The program of comprehensive scientific explorations envisaged to be carried out on board the first satellite is wide-ranging enough.

1. Measurement of density, pressure, and ion composition of the atmosphere at 200 to 500 km altitudes.
2. Investigations into the corpuscular radiation of the sun.
3. Measurement of the positive ion concentration along the orbit.
4. Measurement of the inherent electric charge.
5. Measurement of magnetic fields at 200 to 500 km altitudes.
6. Study of cosmic rays.
7. Study of UV and X-ray solar spectrum areas.
8. Studies of possibility of survival and life of animals during long-term residence on board a spacecraft.

To accomplish all this, the satellite has to accommodate on-board equipment of various types and for various functions for conducting scientific research as follows:

- Telemetry hardware for recording scientific data, having a programmable device controlling conduct of measurements;
- A memory and a radio command line for sending commands from the ground and for transmitting the data recorded during conduct of the scientific research back to the ground for reception at the ground stations when the satellite is orbiting over the territory of the USSR.

In addition to the above-mentioned objectives of scientific research, launches of the first satellite will have to allow the following first experimental data to be obtained. It will be necessary in the future for development of an improved orientated satellite, which will be designed for orbiting at much higher altitudes and will have a much longer orbit life:

1. Data on the character of movement of the satellite, its operation, and accuracy of measurement of coordinates and tracking data;
2. Data on the character of the satellite's movements with respect to the center of gravity;
3. Data on satellite braking in the atmosphere, bearing in mind scarcity of our knowledge in this respect;
4. Data on the thermal conditions of the satellite in orbit;
5. Data on the power supply problems.

Those are in brief our objectives concerning the satellite.

The operations aimed at creating the first artificial earth satellite represent, beyond any doubt, an important step in the way of mankind into the universe, and we are now entering a new field of the missile technology associated with development of the interplanetary missiles.

As a result of a thorough elaboration of the program of research operations to be conducted on board the satellite, the Commission of the Academy of Sciences chaired by Academic M. V. Keldysh has found that one option of the satellite is not enough, and it has been deemed reasonable to have three options with different sets of equipment.

The weight of the satellite, based on components of equipment and bearing in mind availability of the existent power supplies, the radio telemetry system, tracking equipment, etc., is about 1,250 kg. This includes the weight of the shell of about 250 kg.

2. Specifics of the Satellite Design

1. Absolute tightness and air pressurizing to maintain a constant pressure.
2. Severe thermal conditions and the need of thermal control within +5 to 30C (thus a temperature of 10 to 20C is required for operation of the cosmic rays research hardware).
3. A large quantity of structural elements of equipment, modules, mounting assemblies, etc.
4. Numerous pickups on board the satellite, each having its own lines, etc.

To insert a satellite of the necessary weight into orbit, it is necessary and advantageous to modify operating conditions of the propulsion unit of the central module by bringing them closer to those optimal for a given product, based on the available power data of the missile. It is assumed that the central propulsion will be throttled down to about 60 tons of the pull beginning with the lift-up moment. V. P. Glushko will give a more detailed information on the experimental studies aimed at building the propulsion.

3. Choice of the Orbit Parameters

For these power conditions and for the missile parameters for a given weight of the satellite, the satellite can be inserted into different orbits. The choice of reasonable orbit parameters was made first based on the need to achieve a long enough orbit life (close the maximum), and second, based on the perigee altitudes that are not too small (> 200 km). This is especially important if the density of the atmosphere proves greater than expected.

The projects assumes the procedure of propulsion deactivation by means of an integrator set up two times below the guaranteed propellant reserve (with respect to the nominal reserve).

In this case, the propulsion will be deactivated by the integrator for 90% of all launches, with the velocities at the end of the active leg for the above-mentioned 90% of the products (7915 20 m/s) being 65 to 70 m/s higher than the velocity occurring with the nominal guaranteed reserve. The rest of the products (10%) will have a scatter of velocity within the above mentioned range of 65 to 70 m/s (7850 to 7915 m/s).

This gives the following orbit parameters for two cases, respectively:

a) With deactivation by the integrator, using 50% guaranteed residues $G_{guar.} = 0.5^{nom.}{}_{guar.}$ (90% of launches);
b) With deactivation after burning out propellant in the worst case (corresponding to v_n = 7850 m/s).

It should be noted that about 190 m/s are added owing to the earth rotation during launch to northeast, taking into account the launch point latitude (azimuth 35).

For each of these two cases, the nominal values of the orbit parameters can be determined (in the event there is no scatter of the parameters at the end of the active leg) ,and the limit values of the orbit parameters can be determined (corresponding to the worst combination of scatter of the parameters at the end of the active leg). The ultimate parameters were calculated on the basis of the following deviations:
v_n = 20 m/s; $_n$ = 0.6; h_n = 6 km.

It should be noted that the satellite life span values were calculated based on the Mitre data on density of the atmosphere as recommended by the GeoFIAN.

Based on some other data (e.g., according to Spitzer), density of the atmosphere at 200 to 230 km altitudes is several times as great in comparison with the Mitre data, and it is 10 to 100 times as great at the altitudes of 300 to 400 km. At the same time, the object life span is approximately inversely proportional to the density at the altitudes of 200 to 250 km.

For these reasons, the drag for the object in determining the life-span was assumed to be two times as short as the calculated time so as to have the upper limit value assessment, bearing in mind a potential inaccuracy of the theoretical calculation of aerodynamic coefficients at such altitudes. It will be required to have a perigee altitude of at least 200 km.

A greater fraction of the reserve could be used, or the engines could be even run without deactivation by the integrator, but in such case the scatter of the orbit parameters would increase (the scatter of the one revolution period is seven minutes for the case of deactivation upon propellant burn-out).

4. Specifics of Separation of the Stages

Throttling down the central propulsion impairs the separation process and can result in a risk of collision of the separated stages because of the relatively low acceleration values. This problem is resolved by delaying separation until a high altitude is reached and by throttling down a side-mounted propulsion (to 75% of the initial pull) about 17 seconds before separation. Throttling down the side-mounted propulsion reduces the dynamic head at separation from 145 to approximately 100 kg/m2, but it also results in the velocity v_n being decreased by about 15 m/s. At the same time, throttling down the side-mounted propulsion reduces loads during separation and allows the central object propellant module to be retained.

Therefore, the main differences in the modified product are as follows:

- The central propulsion pull is lowered to about 60 t (in the vicinity of the earth); the side-mounted propulsion is throttled down about 17 seconds before separation;
- The radio control hardware is removed (weight saving of about 300 kg);
- The radio module is replaced by an adapter module for attachment of the product to the satellite;
- The rocket-based measurement system is minimized.

With all the above modifications, the product can be launched with a steady flight, the stages can be separated, and the satellite with a preset weight can be inserted into an orbit with the errors of ; $_{n}$ = 0.6; and v_n = 20 m/s. The pressurization value and the thickness of all load-bearing shells remain the same.

5. Brief Characterization of the Orbit

The satellite orbit will extend over a large area of the earth. The flight altitude and the time of flight over the USSR, North America and especially in the region of Mirny settlement for passage over the region of the magnetic maximum are given in the Table.

Satellite Altitudes and Flight Time over the Territory of the USSR, People's Democratic Countries and North America

Orbit revolution No.																		Total in 24 hours
—	Parameters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	163 min. (11%)
Flight over USSR and People'	Flight time, minutes	20	18	19	13	16	10	6	4	"Mirny"			-	8	16	17	17	163 min. (11%)
Democratic Countries	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12 rev.		Total about 15 rev.
—	Altitude, minimum, km	230	230	230	240	240	260	280	280	-	-	-	-	230	230	230	240	—
—	Altitude, maximum, km	290	310	320	310	310	350	330	300	-	-	-	-	240	260	270	280	—
Flight over North	Flight time, minutes	-	-	-	-	-	-	10	17	14	12	19	20	16	13	3	-	124 min. (8.5%)
America	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9 rev.		—
—	Altitude, minimum, km	-	-	-	-	-	-	220	240	250	230	230	230	240	240	250	-	—
—	Altitude, maximum, km	-	-	-	-	-	-	240	250	330	260	300	320	340	330	260	-	—

6. Basic Problems in Satellite Design

Provision of the required temperature conditions on board the satellite (0 to 30 and 10 to 20 for certain instruments).

- On-board hardware power supply.
- On-board hardware operation control (according to a preset timed program).
- Provision of a radio telemetry system with a memory.
- Provision of a tracking complex.
- Sealing of the satellite for a prolonged period.
- Provision of a system of omnidirectional antennas.

7. Specifics of the Thermal Conditions

The thermal conditions are characterized by material changes in the thermal exposure factors: solar radiation, solar radiation reflected by the earth, and substantial heat release from the on-board hardware.

The components of the thermal balance sheet are as follows:

- Direct solar radiation [about 1160 kcal/(m2hr)];
- Solar radiation reflected by the earth (about 40% of the direct solar radiation);
- Earth radiation;
- Atmospheric air friction;
- Heat of recombination of atomic oxygen on the satellite surface;
- Heat release from operating on-board hardware (from 200 to 1600 kcal/hr).

The thermal conditions are controlled by means of a radiation wall of the sealed module, irradiating heat into space owing to a high degree of opacity (>0.8) in the infrared spectrum area (is the coefficient of opacity for the overall normal radiation). A special coating of this wall assures low absorption of the solar radiation (the coefficient of absorption A_s 0.3 for the visible and ultraviolet areas of the spectrum, in which the solar radiation energy has its peak value).

Transfer of internal heat release is assured by forced circulation (by a fan) of nitrogen in the sealed module through a passage adjacent to the radiation wall. When temperature decreases, this passage is closed by a valve to cause a material reduction of heat removal to the space environment. An additional thermal control device is in the form of louvers on the radiation wall. Weight of the thermal control system of the main sealed module is 60 to 70 kg together with power supplies.

Bearing in mind special requirements imposed upon cosmic ray research hardware, a special thermostatic module is provided and isolated from external exposure.

The sealed module surface will be protected on the insertion leg against aerodynamic heating by means of a drop shield with panels. The thermal conditions of the satellite on the launch pad will be controlled by ground equipment because there are no weight resources for an additional on-board device.

The above mentioned coating (> 0.8; A_s 0.3) is crucial for assuring the thermal conditions. It is necessary to investigate its properties in orbit. Research in this area has not been very extensive.

The calculation shows that preset thermal conditions can be realized with the chosen layout of the satellite.

8. On-Board Hardware Power Supply

Power supply is assured by using electrochemical current sources: silver-zinc storage batteries and mercury oxide batteries.

At the same time, the weight characteristics of the power supply system are poor (a weight of up to 450 kg) and the operation time is short. The reason is both a low power capacity of the batteries (50 to 70 Whr per 1 kg on the average) and high energy consumption of the on-board hardware.

It is necessary to expedite development of a solar array and to work for lowering energy consumption of the hardware.

9. Experimental Debugging of the Satellite Design

1. Experimental debugging of functioning of all hardware and telemetry equipment.

2. Debugging of sealing, lead-outs, etc.

3. Experimental debugging of thermal control:
   - Building a full-scale thermal mock-up with real operating hardware;
   - Experimental investigations into heating of the satellite structures in the insertion leg;
   - Experimental investigations into properties of special coatings for the radiation surface.

   The thermal mockup for studying the internal thermal conditions will be tested in a special plant assuring the design temperature of the sealed module shell, thus reproducing the internal thermal conditions within the satellite.

   The external thermal radiation exposure factors that determine temperature of the shell can be calculated accurately enough.

4. The experiments aimed at studying properties of special coatings in orbit are also crucial, bearing in mind high vacuum, collisions with molecules and ions of rarefied gas at velocities greater than 10 km/s, ultraviolet radiation of the sun, etc. These experiments can be conducted by specialized institutions of the USSR Academy of Science.

5. Debugging the electrochemical power supply sources (hydrogen release and explosion safety.

American Reactions to Crisis:
Examples of Pre-Sputnik and Post-Sputnik Attitudes
and of the Reaction to other Events Perceived as Threats
1958

Courtesy International Affairs Seminars of Washington, 15-16 October 1958, U.S. President's Committee on Information Activities Abroad (Sprague Committee) Records, 1959-1961, Box 5, A83-10, Dwight D. Eisenhower Library, Abilene, Kansas.

Meetings of October 15-16, 1958

Topic: AMERICAN REACTIONS TO CRISIS:

Examples of pre-sputnik and post-sputnik attitudes and of the reaction to other events perceived as threats

Consultants:

DONALD N. MICHAEL, social psychologist and physicist; Senior Research Associate, Dunlap and Associates. He has served as staff social scientist for the Weapons System Evaluation Group of the Joint Chiefs of Staff, advisor on attitude and motivation studies on national science policy for the National Science Foundation, and consultant to the National Research Council Committee on Disaster Studies

RAYMOND A. BAUER, Ford Foundation Visiting Professor, Graduate School of Business Administration, Harvard University. He has been at the Harvard Russian Research Center and at the Center for International Studies at M.I.T. He is a social psychologist whose research is generally concerned with international attitudes.

Michael told how on the morning following the launching of the first Russian sputnik, the *New York Times* announced the event in an unusual three-row headline with much supplementary information, while the *Milwaukee Sentinel* relegated it to a small headline and short article on the third page. These two responses represented the extremes in the responses of the American public itself, but Americans generally tended toward the attitude of the Milwaukee newspaper. For the purpose of describing these responses, one might divide Americans into I) the policy-makers in Washington, 2) the "issue-makers" of the mass media and other "authoritative" sources, and 3) the public at large. In general, the first two categories assumed that the public at large was much more aroused then it actually was. The statements of Administration and military leaders were contradictory and ambiguous. Many persons in groups I and 2 made use of the occasion to indulge in personal axe-grinding, and only some of them were able to appraise the situation calmly. The issue-makers used the occasion to launch their own accusations at the Administration and the military establishment. Furthermore, many in both groups responded with a ritualistic evocation of Puritan virtues, saying, for example, that we must pull in our belts and work harder. This response was similar to that of a large segment of the public at large, but the meaning for either group was unclear in the light of their ignorance about scientific and engineering matters vis-a-vis missile development.

Knowledge about earth satellites in general did not increase significantly after the first Russian sputnik, in spite of the large amount of scientific information published in popular form; and the news media regularly confused science with engineering. The Survey Research Center found that 6 months before this first launching, half of the American public had never heard of an earth satellite. A survey in Baltimore by Sidney Hollander Associates showed that while 60 percent of the population had heard of earth satellites, only about 17 percent had any realistic idea of what they were. Just about the same proportion understood what keeps a satellite in orbit. These percentages did not change to any considerable extent following the first sputnik, in spite of the immense volume of information already mentioned.

Reactions to the first sputnik are equally interesting. The Baltimore survey asked the public to explain how the Russians had managed such a feat. Fifty-four percent did not know at all, 25 percent said that the "Russians try harder," and 10 percent that the Russians are just better at that kind of thing. A Gallup poll showed that 30 percent ascribed the Russian success to the fact that the Russians worked harder, 20 percent to the work of German scientists, and 15 percent to better organization. One-fourth of the sample had no explanation. Gallup also found that only about half the people were surprised at the sputnik, even though many of those asked in this sample knew nothing about it previous to its launching. Two months after the launching, only an estimated 4 percent of the U.S. population had seen either sputnik.

Interpretations of the sputnik's significance likewise show that public concern was not great. Gallup found that. only 50 percent of a sample taken in Washington and Chicago regarded the sputnik as a blow to our prestige. Sixty percent said that we, not the Russians, would make the next great "scientific" (actually technological) advance. A poll by the *Minneapolis Star and Tribune* found that 65 percent of a sample in that state thought we could send up a satellite within 30 days following the Russian success, a statistic which included 56 percent of the college-educated persons asked. In the sample of the Opinion Research Corporation, 13 percent believed that we had fallen behind dangerously, 36 percent that we were behind but would catch up, and 46 percent said that we were still at least abreast of Russia.

Anecdotal material tends to support these figures. An AP reporter in Sheboygan found that the typical response was a grin and a joke, meaning a refusal to admit that we were falling behind in any way. Allen Hynek of the Smithsonian Institution's Astrophysical Observatory gathered the impression that Americans felt we had lost the ball on our own 40-yard line but would still win the game. Samuel Lubell, however, felt that people in New Jersey, beneath a facade of unconcern, had certain misgivings and believed we must do something now to catch up.

If there was any trauma following the Russian sputnik, it occurred in Washington and not among the general public. Washington, for its part, took its cue from the newspapers and other issue makers. The misevaluation by leadership of the extent of public interest, as measured by the amount of news, coverage and the words of the issue makers, led to words and actions which further confused the issue. This situation points up the general problem for a democracy of: who is the "public" to which leadership attends and who in fact do the issue makers represent?

Bauer told of a study of public opinion during the debate on the Reciprocal Trade Act in I953-55, which likewise illustrates public reaction to a fairly important national problem. In this case it was hard to know from the opinion polls just what public opinion was. Much depended on the kind of questions that were asked. In 1945, for example, polls showed that a majority favored the maintenance of tariffs. But at the same time a majority (75 percent) favored the extension of the Trade Agreements Act. Curiously, only 57 percent favored lowering tariffs under the Act. Many had no idea what tariffs are. The heads of business firms reacted as the broad public did. On the other hand, 90 percent of the mail addressed to Congress on this subject favored protection. What indices can a policy-maker use?

In 1953-55 the polls show a majority in favor of the Reciprocal Trade Act. But no such majority turned up when people were asked if they would favor the Act even if it hurt American firms. The Gallup poll showed some increase during 1953-55 in the number of people who knew about the controversy over the Reciprocal Trade Act, from 32 percent to 52 percent. These percentages are not impressive, however, and some of the answers given to questions about the Act have no particular meaning. Answers of "leave tariffs where they are" were in many cases equivalent to no opinion at all.

Congress, for its part, paid little attention to public opinion on the subject. A few Congressmen were sending out questionnaires of their own, but in many cases the questions on them were hopelessly slanted. One Congressman found support for his protectionist stand at a meeting called on a weekday morning, ignoring the fact that at such a time it would be largely business representatives who could attend. It turned out that many people in this same locality did not attend the meeting or even communicate with the Congressman on this subject because they believed him to be inflexible. Another Congressman from a protectionist constituency sent out a newsletter so violently one-sided that it discouraged any answers or rebuttal from those who disagreed with him.

The public can be educated and led. The problem of the policy-makers is that of posing real issues, the issues which they themselves see. At the same time a growing body of data now indicates that behavior is apt to change attitudes more than the reverse situation. In daily life we do often operate by tapping something in individuals which will produce actions first, then eventually change their attitudes.

Bauer said that in our present program of space exploration we face a crisis in attitudes which could be described as a "crisis of identity." The present age has brought the kind of situation in which man ordinarily begin to ask who they are and what the purpose of their lives is. Eric H. Erikson is at work on a study of this same problem as it occurred in the age of Martin Luther. That age had its own East-West struggle, its crisis in the moral order, its revolution in economic life, and other events parallel to those of our century. In response to these events, men were seeking and finding a new identity. Our present reaching into outer space may pose for us the problem of finding a new identity to match the new dimensions of our world. Even the people engaged directly in building space vehicles often justify their work - or have to justify it - as a way of "keeping ahead of the Russians." It is true that space exploration is one form of pure scientific research, a well-established concept in our modern world, and that the resources spent on this research in excess of those needed for military rocketry are modest in comparison with the wealth of the country. Nevertheless, the problem of identity remains and will assume larger proportions with time.

Impact of U.S. and Soviet Space Programs on World Opinion
1959

Courtesy U.S. Information Agency, Office of Research and Analysis, 7 July 1959, U.S. President's Committee on Information Activities Abroad (Sprague Committee) Records, 1959-1961, Box 6, A83-10, Dwight D. Eisenhower Library, Abilene, Kansas.

USIA Office of Research Analysis
IMPACT OF US AND SOVIET SPACE PROGRAMS ON WORLD OPINION
A Summary Assessment
July 7, 1959

I. Awareness: Awareness of US and Soviet space activities, though still high in general, appears to have declined since the days following the launching of the first sputnik. The dramatic appeal of that event generated a breadth of interest rarely paralleled; while subsequent events have continued to attract wide attention, both coverage and comment, particularly the latter, have fallen off substantially.

2. The Nature of Coverage: The nature of coverage, as well as its extent, appears to have changed from the days of the first space efforts. The tendency to sensationalism has modified, and reporting is more sober and more factual. This seems to stem in large measure from the fact that the novelty of space ventures has begun to wear thin, and in part from the fact that audiences are increasingly sophisticated, and fewer projects are such sharply pioneering and unprecedented efforts. As audiences and commentators have begun to acquire sophistication and more informed bases for judgment and responses, implications have been more complexly seen, assessments have been less gross and sweeping, and reactions more qualified. Along with the increase in general sophistication has gone a tendency to discuss events with greater detachment and a marked awareness of their propaganda effects, and even their assumed propaganda intentions.

3. Military Implications: Reaction to space developments, from all audiences, shows a clear tendency to equate achievements in this field with military power. Although thinking about the military implications of space experiments is not in general very precisely or elaborately developed, concern with the military implications of space activities is prominent. While there is some interest in peaceful potential, this tends to be subordinate and unspecified.

4. Effects of Military Linkage: Two reactions flow directly from the widespread conviction that space projects are for the present and for the immediate future essentially military exercises:

- The view that achievements in space science and technology may bring or have brought vital changes in the relative balance of military power between East and West;
- Widespread concern over the implications of an unchecked space-race between the US and the USSR ("third power" issues are not felt to be material), and widespread stress on the need for international agreements, controls, or restrictions that would limit the dangers felt to stem from such a race.

5. The Competitive Aspect: Space activities, and especially new ventures, are very generally seen within the framework of US-USSR competition. Comparative and competitive aspects are stressed in comment and press treatment, and the concept of a space-race appears to be almost automatically injected into responses.

6. Involvement and Non-Involvement: Although the dramatic aspects of space ventures continue to have strong appeal to popular imagination, reaching as almost no developments have both illiterate and literate audiences, there is a feeling in some areas that this conquest of the cosmos will not have any immediate practical consequences for them. This feeling may explain in part the lessening of recent interest in the subject and the tendency to dwell upon the military implications. At the same time, a contrary tendency is

discernible, for example, in the whole area of Southeast Asia, where uneasiness has increased about the likelihood that an East-West conflict would inevitably involve them, given the new dimensions that space developments have given to modern weapons. Soviet propaganda and diplomacy have sought assiduously to cultivate this uneasiness among Western allies, especially among those harboring US bases. The effects of this campaign are difficult to assess, since they have called forth both expressions of uneasiness and neutralist sentiment, and at the same time have led to a certain amount of extravagant welcoming of US space successes in the press of areas dependent upon US military power.

7. The Changed Soviet Image: The most significant and enduring result, for world public opinion, of the launching of the first earth satellite by the USSR was a revolutionary revision of estimates of Soviet power and standing. Prior to the launching of Sputnik I there was very general belief that the Soviet Union was a long way from offering a serious challenge to the US lead in science, technology, and productive power. Sputnik and subsequent Soviet space achievements appeared as a dramatic demonstration that the USSR was able to challenge the US successfully in an endeavor where US pre-eminence had been widely taken for granted. Sputnik worked a major modification in the world image of the USSR; at one stride it appeared to close the gap between the US and the USSR, in terms of relative power, and gave new dimensions and new formidableness to that power, a fact which the USSR has vigorously exploited in its propaganda and diplomacy, with greatly enhanced credibility.

8. Restoring a Balance: US post-sputnik space activities have served to restore confidence in general US scientific and technological leadership. They have brought about a much more cautious and qualified assessment of the permanence of the Soviet lead in space. But they have not succeeded in restoring the pre-sputnik gap in the general consensus regarding relative US and USSR capabilities, or in erasing the new image of the USSR and Soviet society. Lost ground has been regained to a point where the space race is, by and large, viewed as neck-and-neck: the expectation is now less that one side or the other will demonstrate clear "victory" and more that for the foreseeable future there will be a see-sawing, with no single achievement viewed as a decisive index of superiority. How long a suspended judgment — or an equilibrium of oscillating judgments — can be maintained will depend upon the nature and tempo of future space developments. It is unlikely that any but the most massive or spectacular successes will, given present tendencies in public reactions, substantially modify current judgments.

9. Relative Standing: The dominant pattern in reactions, as noted, appears to be the tendency to expect space competition to be a neck-and-neck affair, with temporary successes accruing first to one side, then the other. But there are apparent certain regional differences.

— In Western Europe, opinion is still confident about the general superiority of American scientific technology over Soviet scientific technology. This confidence, however, is tempered by the feeling that the Soviet Union is currently ahead in outer space research. (The Soviet lead is widely attributed to a refusal by the US administration to engage in a all-out, crash space program, a criticism sharpened by Western Europe's sense of the dependence of its security to a large measure on US military strength.)

— In Latin America, initially greatly impressed by Soviet success in 1957, opinion — at least articulate opinion — generally appears to be that the two nations are about equal in space science. The US appears to have regained much if not all of the prestige lost following the original Soviet achievements, when many in the area felt the USSR to be ahead in at least the field of space, although not in the general level of scientific development.

— In the Far East, although a wide gap exists between Japan and Southeast Asia in degree of interest in and understanding of the space contest and the issues involved, the dominant view appears to be that the contest is a near toss-up, now and for the immediate future. In Japan, where the USSR was seen as enjoying some superiority, there is growing conviction that the two powers are evenly matched, with the US enjoying qualitative, and the Soviets quantitative, superiority.

— In Africa, it is probable that most opinion views East and West as about equal in technical accomplishments in the field of space — an assessment, however, that represents a very significant revision of views concerning the nature of Soviet society, and with some opinion believing that the balance of power "has shifted to the East."

— Near East and South Asian opinion cannot be categorized, and for some parts of the area evidence for a reliable assessment is lacking. In India, Soviet dramatic successes appear to have decisively implanted the opinion that the Soviet Union is now the world scientific leader. In Afghanistan and Pakistan, Soviet achievements in space appear to hold the dominant position, although it is difficult to judge the depth and durability of this reaction, and whether it is accompanied by the conviction that the USSR also enjoys a lead in general scientific and technical reputation. Greek and Turkish belief in the overall scientific pre-eminence of the US has been sustained, but the Greeks probably still consider the USSR ahead of the US in space research. Turkish comment reflects the view that the US, caught napping by the crafty Russians, has now overtaken the USSR; US space achievements have been greatly applauded, but it is possible that popular Turkish evaluations are colored by a tendency--clearly visible among strongly pro-Western and anti-Communist audiences, especially in countries with high dependence upon US support--toward self-induced reassurances regarding US and Western power. (Turkish students, in a survey at Ankara University, voiced a majority view that the USSR was ahead of the US in space science.)

In sum:

- Interest in space developments continues strong, but has shown a sharp decrease from the intense excitement that marked the first year or so following Sputnik I. Reactions have become more sophisticated, informed, and detached.
- Sensitivity to military implications is marked, and has produced strong concern over the possibility that the USSR now enjoys military superiority over the West, and a belief in some quarters that this is a fact.
- The US and the USSR space programs are generally assessed as competitive efforts, and there is notable concern regarding the need to limit the dangers seen in this rivalry. Soviet successes in space have produced a major revision in the image of the USSR and to some degree of the Soviet system, and lent greatly enhanced credibility to Soviet propaganda claims. The USSR, by appearing to have spectacularly overtaken the US in a field in which the US was very generally assumed to be first by a wide margin, is now able to present itself as fully comparable to the US and able to challenge it in any field it chooses — perhaps the most striking aspect of the propaganda impact of space developments. Although most opinion still considers the US as probably leading in general scientific and technical accomplishments, the USSR is viewed in most quarters as leading in space science. The expectation is, however, that, for the foreseeable future, leadership will see-saw.
- There is a widespread tendency for wishful thinking and political sympathy and dependence to color estimates of achievements in space. It is probable that only the most massive or spectacular achievements are likely to modify substantially or durably the current pattern of reactions. It should be added, however, that space achievements will continue to be followed closely by world attention; their military implications will be closely scrutinized; and they will continue to be equated with military power and viewed as an index of a country's general level of scientific and technological advancement.

Introduction to Outer Space
1958

President's Science Advisory Committee, March 26, 1958, pp. 1-2, 6, 13-15. Courtesy NASA History Division, Reference Colleciton, NASA History Office, NASA Headquarters, Washington, D.C.

An initial assignment for the President's Science Advisory Committee, which was formed in the aftermath of the launches of Sputnik 1 and 2, was to assess the appropriate direction and pace for the U.S. space program. PSAC focused heavily on the scientific aspects of the space program. With the president's endorsement, on March 26, 1958, it released a report outlining the importance of space activities, but recommended a cautiously measured pace.

STATEMENT BY THE PRESIDENT

In connection with a study of space science and technology made at my request, the President's Science Advisory Committee, of which Dr. James R. Killian is Chairman, has prepared a brief "Introduction to Outer Space" for the nontechnical reader.

This is not science fiction. This is a sober, realistic presentation prepared by leading scientists. I have found this statement so informative and interesting that I wish to share it with all the people of America, and indeed with all the people of the earth. I hope that it can be widely disseminated by all news media for it clarifies many aspects of space and space technology in a way which can be helpful to all people as the United States proceeds with its peaceful program in space science and exploration. Every person has the opportunity to share through understanding in the adventures which lie ahead.

This statement of the Science Advisory Committee makes clear the opportunities which a developing space technology can provide to extend man's knowledge of the earth, the solar system, and the universe. These opportunities reinforce my conviction that we and other nations have a great responsibility to promote the peaceful use of space and to utilize the new knowledge obtainable from space science and technology for the benefit of all mankind.

[Signed]

Dwight D. Eisenhower

[1] INTRODUCTION TO OUTER SPACE

What are the principal reasons for undertaking a national space program? What can we expect to gain from space science and exploration? What are the scientific laws and facts and the technological means which it would be helpful to know and understand in reaching sound policy decisions for a United States space program and its management by the Federal Government? This statement seeks to provide brief and introductory answers to these questions.

It is useful to distinguish among four factors which give importance, urgency, and inevitability to the advancement of space technology. The first of these factors is the compelling urge of man to explore and to discover, the thrust of curiosity that leads men to try to go where no one has gone before. Most of the surface of the earth has now been explored and men now turn to the exploration of outer space as their next objective.

Second, there is the defense objective for the development of space technology. We wish to be sure that space is not used to endanger our security. If space is to be used for military purposes, we must be prepared to use space to defend ourselves.

Third, there is the factor of national prestige. To be strong and bold in space technology will enhance the prestige of the United States among the peoples of the world and create added confidence in our scientific, technological, industrial, and military strength.

Fourth, space technology affords new opportunities for scientific observation and experiment [2] which will add to our knowledge and understanding of the earth, the solar system, and the universe.

The determination of what our space program should be must take into consideration all four of these objectives. While this statement deals mainly with the use of space for scientific inquiry, we fully recognize the importance of the other three objectives.

In fact it has been the military quest for ultra long-range rockets that has provided man with new machinery so powerful that it can readily put satellites in orbit and, before long, send instruments out to explore the moon and nearby planets. In this way, what was at first a purely military enterprise has opened up an exciting era of exploration that few men, even a decade ago, dreamed would come in this century. . . .

[6] WILL THE RESULTS JUSTIFY THE COSTS?

Since the rocket power plants for space exploration are already in existence or being developed for military need, the cost of additional scientific research, using these rockets, need not be exorbitant. Still, the cost will not be small, either. This raises an important question that scientists and the general public (who will pay the bill) both must face: Since there are still so many unanswered scientific questions and problems all around us on earth, why should we start asking new questions and seeking out new problems in space? How can the results possibly justify the cost?

Scientific research, of course, has never been amenable to rigorous cost accounting in advance. Nor, for that matter, has exploration of any sort. But if we have learned one lesson, it is that research and exploration have a remarkable way of paying off--quite apart from the fact that they demonstrate that man is alive and insatiably curious. And we all feel richer for knowing what explorers and scientists have learned about the universe in which we live.

It is in these terms that we must measure the value of launching satellites and sending rockets into space. . . .

[13] the scientific opportunities are so numerous and so inviting that scientists from many countries will certainly want to participate. Perhaps the International Geophysical Year will suggest a model for the international exploration of space in the years and decades to come.

The timetable . . . suggests the approximate order in which some of the scientific and technical objectives mentioned in this review may be attained.

The timetable is not broken down into years, since there is yet too much uncertainty about the scale of the effort that will be made. The timetable simply lists various types of space investigations and goals under three broad headings: Early, Later, Still Later. . . .

[14] EARLY

1. Physics
2. Geophysics
3. Meteorology
4. Minimal Moon Contact
5. Experimental Communications
6. Space Physiology

LATER

1. Astronomy
2. Extensive Communications
3. Biology
4. Scientific Lunar Investigation
5. Minimal Planetary Contact
6. Human Flight in Orbit

STILL LATER

1. Automated Lunar Exploration
2. Automated Planetary Exploration
3. Human Lunar Exploration and Return

AND MUCH LATER STILL

1. Human Planetary Exploration

[15] In conclusion, we venture two observations. Research in outer space affords new opportunities in science, but it does not diminish the importance of science on earth. Many of the secrets of the universe will be fathomed in laboratories on earth, and the progress of our science and technology and the welfare of the Nation require that our regular scientific programs go forward without loss of pace, in fact at an increased pace. It would not be in the national interest to exploit space science at the cost of weakening our efforts in other scientific endeavors. This need not happen if we plan our national program for space science and technology as part of a balanced national effort in all science and technology.

Our second observation is prompted by technical considerations. For the present, the rocketry and other equipment used in space technology must usually be employed at the very limit of its capacity. This means that failures of equipment and uncertainties of schedule are to be expected. It therefore appears wise to be cautious and modest in our predictions and pronouncements about future space activities--and quietly bold in our execution. . . .