

SPACE TRAVEL--

WHEN AND HOW?

The opinions of 65 leading men of
science and science fiction on space
flight's possible future

Copyright 1953 by Gerry de la Ree

(A condensed version of this booklet appeared in the
August 22 issue of the Week-End Magazine Section of the
Bergen Evening Record, Hackensack, N. J.)

All Rights Reserved

For permission to reproduce in any form
please contact publisher

Published by Gerry de la Ree, 277 Howland Ave., River Edge, N. J.

CONTRIBUTORS:

- DR. WERNHER von BRAUN, Chief U. S. Guided Missiles Development Division at Redstone Arsenal, Huntsville, Ala. During World War II Director of German's Peenemunde Project, which developed the V-2 rocket.
- DR. FRED L. WHIPPLE, Chairman of Harvard University Department of Astronomy. Expert on meteorites.
- DR. HEINZ HABER, Department of Engineering, U.C.L.A. Formerly with U.S. Air Force's Department of Space Medicine.
- DR. FLETCHER G. WATSON, of Harvard University. A leading authority on meteorites.
- DR. DONALD H. MENZEL, Acting Director of the Harvard College Observatory.
- DR. EUGENE P. WIGNER, Princeton University physicist who worked on the Manhattan Project.
- DR. I. M. LEVITT, Director of the Fels Planetarium, Philadelphia, Pa.
- DR. JOHN R. PIERCE, of the Bell Telephone Laboratories.
- DR. R. S. RICHARDSON, of the Mount Palomar Observatory in California.
- DR. A. LANGLEY SEARLES, of New York University.
- ARTHUR C. CLARKE, Director of the British Interplanetary Society, author of "The Exploration of Space."
- WILLY LEY, leading author on the subjects of rockets and missiles.
- G. EDWARD PENDRAY, founder of the American Rocket Society and for over twenty years a leading figure in the field of rockets.
- ALFRED AFRICANO, former President of the American Rocket Society.
- R. L. FARNSWORTH, founder and President of the United States Rocket Soc.
- JOHN W. CAMPBELL, JR., editor of ASTOUNDING SCIENCE FICTION.
- H. L. GOLD, editor of GALAXY SCIENCE FICTION.
- ANTHONY BOUCHER, co-editor of FANTASY & SCIENCE FICTION
- J. FRANCIS MCCOMAS, co-editor of FANTASY & SCIENCE FICTION
- JACK O'SULLIVAN, editor of PLANET STORIES.
- ROBERT W. LOWNDES, editor of FUTURE FICTION.
- HUGO GERNSBACH, publisher of SCIENCE FICTION PLUS.
- WILLIAM L. HAMLING, editor of IMAGINATION
- PETER HAMILTON, editor of Scotland's NEBULA SCIENCE FICTION.
- LARRY SHAW, editor of IF.
- SAM MINES, editor of STARTLING STORIES and THRILLING WONDER STORIES.
- HARRY WALTON, senior editor of POPULAR SCIENCE.
- H.J. CAMPBELL, editor of England's AUTHENTIC SCIENCE FICTION.
- F. ORLIN TREMAINE, former editor of ASTOUNDING STORIES.
- SAM MERWIN, former editor of several science fiction magazines.
- RAY BRADBURY, one of the leading short story writers, author of "The Martain Chronicles", "The Illustrated Man", etc., etc.
- FLETCHER PRATT, expert on naval history and author of many science fiction stories.
- Plus these other leading science fiction authors: A. E. VAN VOGT, NELSON BOND, JACK WILLIAMSON, L. SPRAGUE DE CAMP, DR. ISAAC ASIMOV, ROBERT BLOCH, CLIFFORD D. SIMAK, WILSON TUCKER, THEODORE STURGEON, DR. E. E. SMITH, RALPH MILNE FARLEY, P. SCHUYLER MILLER, THOMAS CALVERT McCLARY, NAT SCHACHNER, FRANK M. ROBINSON, OTTO BINDER, DR. THOMAS S. GARDNER, FREDERIC BROWN, FREDERIK POHL, JOE GIBSON, KENDELL FOSTER CROSSEN, GROFF CONKLIN, FORREST J. ACKERMAN, DR. DAVID H. KELLER, EDMOND HAMILTON, LEIGH BRACKETT, PHILIP JOSE FARMER, WILLIAM F. TEMPLE, A. J. BUDRYS, ALFRED BESTER, DR. C.L. BARRETT, and D. M. COLE.

PURPOSE:

This poll was conducted to determine the opinions of a number of interested parties on the subject of space travel -- when and how it may be accomplished. The results prove nothing, save the faith of those contributing that space flight will eventually by a reality.

These gentlemen -- among them leaders in the fields of science and science fiction -- have all, at some time, expressed opinions on the subject of space travel. Some of them, such as Dr. von Braun, have actively worked with rockets. Others have studied the problem of extra-terrestrial flight from various angles, while some have merely speculated on the subject.

On these pages are their views; expressions of their personal opinions. No one can say for certain when we shall go to the moon or how we will do it. But we are presenting the views of men who are seriously interested in the prospect of space flight and are in a far better position to predict its future than possibly any other group in the world today.

Some may question the inclusion of science fiction authors and editors, but we hasten to remind you that these men could well be termed "professional prophets." As science fiction writers they have, figuratively speaking, been to the moon many times. A number of them boast excellent educational backgrounds and are well versed in science.

This booklet, then, should be accepted as a symposium on space flight. It is an expression of opinion; no more, no less. We do not pretend that the results of this poll prove that Man will be on the moon in this or that year. That Man will conquer outer space seems a certainty, but when and how is merely guesswork. Some of these men may well have accurately predicted the answers. But this, only time will tell.

GERRY de la REE,
River Edge, New Jersey,
August, 1953.

RESULTS:

DO you believe that interplanetary travel will eventually be accomplished?

YES: 98.4 percent
NO: 1.6 percent

IF your answer to the above question was "yes", in what year do you think the first unmanned missile will be successfully landed on the moon?

Prior to 1975: 71.4 percent
After 1975: 12.7 percent
No opinion: 15.9 percent

IN what year do you think the first manned flight to the moon or another planet will be attempted?

Prior to 1990: 73.0 percent
After 1990: 14.3 percent
No opinion: 12.7 percent

WHAT country, organization, or group do you think will sponsor the first interplanetary flight?

United States: 54.7 percent
United States or Russia: 14.3 percent
International: 11.1 percent
No opinion: 14.3 percent
Others: 5.6 percent

DO you believe atomic power will be used to propel the first passenger-carrying space craft?

YES: 42.9 percent
NO: 49.2 percent
PARTIALLY: 6.3 percent
NO OPINION: 1.6 percent

IF not, what type of fuel do you think will be used?

Some of the suggestions: VON BRAUN: Hydrazine-ammonia, plus nitric acid; CLARKE: Chemical propellants and orbital refuelling. Probably ozone and metallic hydrate; WILLY LEY: Probably hydrazine plus nitric acid, could be alcohol plus liquid oxygen; FLETCHER PRATT: Chemical fuels for a long time to come, but improved over anything we now have; FLETCHER WATSON: Atomic energy seems to be a long way from being useful for jaunts such as this.

(continued on next page)

Additional fuel suggestions: THOMAS GARDNER: Hydrazine and oxygen; A. LANGLEY SEARLES: An easily oxidized compound and an oxidizing agent (pairs of compounds such as are used today -- example: aniline and red fuming nitric acid); J.R. PIERCE: Chemical fuel; I.M. LEVITT: Chemical fuel; J.W. CAMPBELL: Based on a totally new principle -- not a rocket; H.L. GOLD: Chemical -- probably liquid -- unless atomics advance abruptly, as they are very likely to do; LARRY SHAW: Hydrazine; JACK WILLIAMSON: Liquid chemical; F.M. ROBINSON: Chemical fuel; PHILIP FARMER: Developments of present type chemical fuels; A.E. VAN VOGT: Hydrazine; ISAAC ASIMOV: Some sort of chemical propulsive -- atom-power-heated steam, eventually; HARRY WALTON: Liquid gases in step rocket; E.E. SMITH: Hydrazine; RALPH MILNE FARLEY: Solar heat and/or cosmic rays; NELSON BOND: Liquid propellant, possibly variation of hydrazine fuel; HEINZ HABER: Chemical; H.J. CAMPBELL: Hydrazine derivative; A.J. BUDHYS: Any one of several chemical fuels.

OPINIONS:

UNMANNED FLIGHT

MANNED FLIGHT

Farnsworth	1955	1957
Sturgeon	1955	1959
Farley	1955	1960
Lowndes	1956	1960
Brackett	1956	1960
Van Vogt	1956	1966
Shaw	1957	1965
Merwin	1958	1963
P. Hamilton	1958	1965
Ackerman	1958	1963
Whipple	1959	1980
O'Sullivan	1959	1967
Gardner	1960	1970
Barrett	1960	1980
Hamling	1960	1965
Miller	1960	1985
Crossen	1960	1970
Walton	1960	1970
E. Hamilton	1960	1970
Bradbury	1962	1970
Farmer	1963	1970
Mines	1963	1977
Bloch	1963	1987
Conklin	1963	2000 plus
Binder	1960	1965
Gold	1965	1967
Boucher	1965	1970
Asimov	1965	1972
Cole	1965	1970
Pohl	1965	1975
Temple	1965	1985
H. J. Campbell	1965	1980
Williamson	1968	1973
Menzel	1970	1980
Watson	1970	1980
Tremaine	1970	a
Gernsback	1970	1980
McClary	1970	1975-2000
von Braun	1968-1973	1978-1983
Schachner	1972	1985
Clarke	1975	1985
Pierce	1975	2050
de Camp	1975	1990
E. E. Smith	1975	1975-2000
Haber	1975	----
Bester	1975	2000
Wigner	1979	----
Richardson	1980	2000 plus
Simak	1980	2000

UNMANNED FLIGHT

MANNED FLIGHT

Robinson	1980	2000
Gibson	1995	2010
Searles	2000	2100
Africano	2000	2100
Pendray	a	a
Pratt	a	a
Brown	a	a
McComas	a	a
Budrys	a	a
J. W. Campbell	b	1963
Tucker	a	1970
Bond	a	1961
Levitt	c	1978
Ley	a-d	a-e
Keller	f	f

a -- See comments on following pages.

b -- "There may be none."

c -- "Don't think unmanned missile will land successfully on moon."

d -- "Three years from beginning of project," (See comment page 15).

e -- "Five years after space station is built."

f -- "I believe that the entire literature on space travel is simply unscientific fiction." Dr. Keller voted "No" in replying to question No. 1.

COMMENTS:

NELSON BOND:

I do not believe the first unmanned flight will be "successfully landed on the moon", but will be unsuccessfully landed (i. e. crashed) on the moon. My overall view is that I do not see a landing on the moon as a primary objective. The possible sequence of events appears to me to be: (1) Continued space rocket experimentation followed by (2) successful establishment of orbit satellites, finally culminating in (3) construction of artificial satellite space station, from which will be launched scout rocket robots operating by telemeter control, one or more of which will be (4) sent out to examine the moon in controlled flight, but (5) one or more of which will crash on the moon because of presently unknown and unguessable factors. Eventually this should lead to sufficient knowledge of space conditions to permit the launching of a manned craft to encircle the moon some two or three years after the establishment of the first livable space station.

This effort should begin soon. . . perhaps by 1957-1958, and a crude construction may be in the skies by 1960-1961, thus setting a date of 1962-1963 for a Luna operation.

Interplanetary flight should await some definite and satisfactory results from space station and Luna operations. I incline to the belief that the initial Venus or Mars attempts will roughly parallel the history of trans-Atlantic flight, which is to say that while the governments hedge, falter, and dilly-dally, some venturesome Lindbergh will risk his life and crude spaceship in an unauthorized attempt to reach a sister planet. I foresee a number of unsuccessful attempts, with a number of brave and foolish men "lost in space" -- eventually followed by a successful transit of Mars and Venus and the establishment of an outpost on Deimos or Phobos, rather than on Mars itself. The Martian moons would appear to make good landing spots, as their gravitational attraction does not forbid return flight. Early spacecraft would not be able to carry sufficient fuel to land on Mars, take off again, and return to the Terra base.

All replies are qualified by the big IF . . . IF Man does not destroy his culture and himself in an all-out atomic war. The launching of such a war would set all figures back twenty or more years. . . perhaps indefinitely. . . possibly forever.

WILSON TUCKER:

I'm still half convinced that an unmanned flight to the moon has already taken place, at some date (or dates) between 1950 and 1953. I base my suspicions on the fact that in February, 1949, an army-sponsored two-step rocket from White Sands reached an altitude of 250 miles, the highest ever, and since then there has been a virtual blanket of silence on further tests. I find it difficult to believe that the army stopped with that, and did not send more rockets still higher into space. I suspect they have landed some sort of missile on the moon -- but of course it will be several years before such news, if true, is released.

CLIFFORD D. SIMAK:

Before Man tries to hit the moon with an unmanned rocket, he will attempt to build space stations, for these have far more military value (and some peacetime value as well) than the moon. I doubt as well that Man ever will try to hit the moon with an unmanned rocket. It makes a hell of a lot more sense to send a rocket around, shooting it out and throwing it into an orbit by remote control, then bringing it back to earth with photographs and other data collected by the instruments on the rocket.

Another point that you must consider. Space ships cost a lot of money. No one can afford to build them other than a government. And governments are fairly practical. They are not going to build and operate space ships for the sheer hell of it. Nor is anyone else in their right mind. Before Man goes into space there must be a reason for it. If he is going to continue to go into space there must be an economic reason. For the life of me, I can think of nothing valuable enough to compensate for the cost of operating space ships. If we could find some way in which we could harness atomic energy directly without resorting to the extremely inefficient heat engine or steam plant (which at the moment is the only way we can translate atomic energy into power) we could have a space ship engine which would mean cheap operation and this would cut down the operating overhead to a point where we might just possibly find some economic reason for space travel.

My hunch is that many hundreds of years from now Man will go into space, will explore the planets, find nothing of any economic value to justify space travel or find the planets so climatically hostile that after the solar system has been explored and Man's curiosity satisfied space travel will be abandoned.

The stars? Well, we'd have to prove Einstein wrong and I would be the last to say that couldn't be done, but I certainly would not lay any money on it.

DR. THOMAS S. GARDNER:

You got what you pay for. Money spent on guided missile work does NOT hasten the day for space flight to any major extent. One billion a year on SPACE FLIGHT, such as an orbital station, etc., would put us on the moon in five to ten years. In event of an atomic war in the next ten years, it may be centuries, or never, to get to the moon.

JOE GIBSON:

There's no point in crashing or landing an unmanned missile on the moon's surface; if your missile can't go out, circle the moon, and come back, you'd best design a better missile -- T.V. reception at that distance could never compare with actual evidence on a camera's film, which means you would have to get the camera back.

Any use of atomic power for rocket propulsion entails the use of some other material as a propellant fuel. One suggestion is to use a reactor to heat the propellant fuel until it breaks down into particles -- and also to generate a considerable amount of electricity. Then charge half the fuel particles and snap them through electrical fields -- you'll get a nice exhaust velocity.

FREDERIC BROWN:

My guess -- and it's only a guess; I have neither prescience nor inside information; is that given in my book, "The Lights In The Sky Are Stars", which will be published by E. P. Dutton & Company on December 1 of this year.

It is: work started (by U. S. Government) on a space station project in 1957 -- to be put up there up three-step chemical fuel rockets. First payload put into orbit in 1962. Construction of the station well started in 1964 when (and I quote from my story, which is told -- or this part is -- retrospectively from 1997): "Nineteen sixty-four happened -- and the lid blew off. So suddenly that it seemed overnight, although they'd been working on it for years, the Los Alamos boys came up with the micropile and we had atomic energy for rockets.

"Those old chemical fuel rockets were all of a sudden as obsolete as ox-carts. . . We could go to the moon in one trip, to Mars or Venus with only an orbital refueling. The space station was obsolete and unnecessary before it was a third finished and we landed on the moon five years ahead of schedule.

"Oh, we finished the space station, but on a smaller scale than planned, and mostly as an observation station for the meteorologists. And we put up the second one, the twenty-four hour one, up there just for telecasting. . ."

F. ORLIN TREMAINE:

Present rocket and jet development, while stimulating to the imagination, have little bearing on practical manned space travel. Therefore, speculation as to a year is premature no matter how many articles are written on the subject.

Interplanetary travel will not be possible for Man until an anti-gravity force is discovered and harnessed -- a force such as has been hinted in connection with reports of the "flying saucers." The human body cannot withstand the acceleration required to drive a missile from the earth's attraction by jet propulsion. The shock-absorbing machinery which would be required to protect the crew would be so heavy as to make the flight itself impossible.

The date for manned space flight can be prophesied, therefore, as immediately following discovery of a principle for repelling a space ship from the earth-force without the necessity for fatal acceleration, or the need for vast quantities of fuel. Propulsion through outer space must therefore be generated on the atomic principle.

HARRY WALTON:

Mine is only a round-number guess. The uncertainty of the world situation is the great unknown factor in any such estimate, and one that cannot be separated from the questions you ask. What the effect of war might be is itself problematical -- far from impeding, military stringency might hasten the launching of a ship to the moon, or as a satellite base.

WILLIAM F. TEMPLE:

I've just finished writing a book, "The True Book About Space Travel", for British Publishers Frederick Muller, Ltd., and in consequence of the research entailed am not so optimistic about the early advent of space travel as once I was. If present-day chemical fuels are improved, or rather the technique of their use in rockets is improved, to increase all-around efficiency by half as much again as now, then a three-step rocket of great size and cost could get perhaps one man to the moon -- but not back again. But such an improvement would appear likely to come but slowly. Present techniques are nearly bankrupt.

My friend Arthur C. Clarke, in his "The Challenge of the Spaceship" (1946) said: "The first guided missile to reach the moon will probably crash into it around 1950." Nearly twice the period of prophecy has elapsed, and we're not really a great deal farther on the way to that event than we were then. I venture another 12 years, and feel I may be optimistic, too, at that.

I think a chemical rocket will lift man first into space, but I can't see that enormous three-step rocket being built to carry him to the moon. I fancy that particular trip will have to wait upon the solution of the problem of heat transfer from an atomic reaction in sufficient quantity, and at sufficient speed to some kind of working fluid, which will be the propellant.

ROBERT BLOCH:

It is my personal belief that all too often the article one sees dealing with the problems posed by your questionnaire is slanted, with a deliberate eye to selling possibilities. For that reason the "facts" we get regarding interplanetary travel are usually handed us in a vacuum tube: i. e., the problems are discussed and "solved" as though they involved only one set of factors -- the scientific.

Whereas I tend to regard interplanetary travel developments as being subject to the pressures of political and sociological factors as well as those of the physical sciences.

A physical scientist, given certain equations, comes up with the answer that we can do thus and so "in ten years" or "in five years." And we can -- in the vacuum, where there is no war scare, peace scare, dependency on congressional grant, security problems, industrial pre-occupation with internal economy, etc.

Unfortunately, we live in a world where we cannot divorce our thinking on one subject from corollary considerations. Hence my 24-year lapse between the landing of an unmanned missile and a manned one. Let us hope we'll all be around to see it happen.

EDMOND HAMILTON:

Qualifying the answers -- I believe successful space flight is wholly conditional upon the possible utilization of atomic energy for rocket flight. The above dates (1960 and 1970) represent merely my guess as to when such adaptation of atomic energy might be practicable.

JOHN W. CAMPBELL, JR.:

Be it remembered, this is, necessarily, completely a guess-work job. Believe that present line of official research -- rockets -- is a blind alley. Like the helicopter, it can be done only after a different and simpler method has been developed.

I believe the new method will be worked out by an amateur -- not by an official organization. Maybe a bicycle shop owner! Most of Man's great advances have, if you check back, come from amateur outsiders. E. g.: Pasteur, chemist, solved germ disease. Marconi, not Hertz, developed communication radio. De Forest, not Bell Labs or Marconi Co., discovered the triode amplifier. Hall, a kid, not a professor of chemistry, got aluminum metal.

My bet, therefore: Joe Zilch, nobody-in-particular, not the U. N., or White Sands, or the Russian Government, will develop the interplanetary ship.

OTTO BINDER:

I've set 1960 for unmanned rockets and 1965 for manned, but this I'd qualify by saying only under peacetime conditions. Under war conditions, the problem becomes more complex. It will, in my opinion, either advance or retard the date. If, for instance, the moon is thought desirable and practicable as a war base of any sort, it would advance the dates by several years due to all-out concentration and unlimited funds for the project.

If, on the other hand, the exigencies of warfare tie up both sides with a desperate race to atom bomb each other out of existence, they might have no time to "waste" on the unproved possibilities of reaching and using the moon, requiring prodigious efforts, material, and brains. An example of the latter is that the Germans, in World War II, let slide their own attempts to develop the atom bomb, which might have won for them, and concentrated on "classic" war efforts. Also, they developed their V-2 rockets too late to do any good. In the midst of war, who is to decide which is the best course? And this leaves it up to pure chance.

ALFRED BESTER:

I believe that most big technological advances are made during wars or immediately following wars, and always by the nation that wins the war. The first manned flight attempted, circa 2000 A.D., will be made by the country which has won the most recent war preceding that date. If (as is probable) no country wins that war, no attempt will be made for a long time.

ROBERT W. LOWNDES:

I suspect that atomic power will be used in the sense that an atomic pile will be used to generate the power -- rather than the old science fiction idea of an atomic engine running directly on atomic power.

DR. A. LANGLEY SEARLES:

On questions two and three: It is my opinion that most fans are too optimistically close to this subject to give unbiased answers to these questions. Merely because it is possible to send a rocket to the moon, for example, does not mean that it will be done. After all, the technical know-how has been in existence for over twenty years (and plausible details were described by P. E. Cleator's and David Lasser's books in the early 1930's). There has to be both a good reason for a moon rocket to be built and no reasons for it not to be. I know of no vitally pressing reason for sending out a moon rocket; and I know of many reasons why it wouldn't be -- not the least of which are the international tension between us and Russia and the little matter of \$300-400 million of cost involved. I'll go so far as to venture the feeling that until astronomy is of more importance as a science, until it attains an everyday importance, let us say, comparable to physics or chemistry, sending moon rockets out involves a type of research we might term purely confirmative: that is, merely doing something that is 99 percent certain can be done. In our present economic system such research, when it would be as expensive as this would, is done with decreasing frequency.

On question five: Contrary to the beliefs of many, atomic power is not a panacea for all power problems. Its use in submarines, aircraft, cars, etc., is simply one of turning released atomic energy into mechanical energy, with the secondary problem of controlling the weight of the installation. Rocket propulsion depends on discharge of matter, not merely mechanical motion of some part of the moving vehicle. In space there is no medium, of course, to push against, so the rocket will never constitute as great an advancement over known power sources as would, for example, its substitution for diesel oil in a submarine. In a rocket, moreover, the mass of an atomic installation -- especially if it must be shielded to protect passengers -- would be a major problem to overcome.

ALFRED AFRICANO:

Even a small payload for the unmanned "toy" target rocket will require a large degree of development not likely to be supported until the present world unrest ceases. I believe some new development in atomic power (and its application) is needed to accomplish manned space travel. And, unless the world is united, no one nation could afford it separately. War effort diverted to interplanetary problems might do it.

J. FRANCIS McCOMAS:

There are too many complex economic and political factors for me to even hazard a guess at questions 2, 3, and 4. An immediate large scale war or depression -- either of which is very likely -- would, I think, preclude any extra-terrestrial flight in this century. On the other hand, a long period of peace and prosperity (most unlikely) might land us on the moon by 1970. No single nation now has the financial resources necessary for such a project. Western European nations need every cent they can get for their own economic recovery; U. S. A. and Russia need their money for offense/defense. . . It all looks very remote right now.

A. E. VAN VOGT:

My tendency, in view of military appropriations cuts coming up, would be to put the first unmanned rocket flight off to 1958 or even later. But it is possible that work now being done will bear fruit anyway. . . My 1949 guess in last poll was based on the belief that there were bold men in the U. S. Air Force; men with imagination. But, as it turned out, those in control were amused and contemptuous of space flight enthusiasts. Lacking imagination, they effectively stopped the possible.

WILLY LEY:

The unmanned missile to the moon (Moon Messenger) could have been started in 1945 or 1946 and would have been a reality by now if there had been such a project. The general feeling seems to be that we won't learn enough from such a shot to make the expense worthwhile.

FLETCHER PRATT:

The project is one which would be interesting only to an armed service, and for military purposes. Navy and Air Force, or possibly the two working together, could start on it tomorrow. But I decline to guess at when they will be interested enough.

DR. FLETCHER G. WATSON:

I am more skeptical now than formerly -- also the obvious cost is a major factor to be pondered.

G. EDWARD PENDRAY:

In the present state of the technology, all of the foregoing questions, except the first, are absolutely unanswerable, except as more or less idle speculation. I believe space flight will be attained ultimately, perhaps (I hope) in our lifetimes -- but a mountain of technical and economic problems have to be answered first.

JACK WILLIAMSON:

I am confident that the very grave problems involved in propelling a ship with atomic energy will ultimately be solved, but not before somebody has tried to reach the moon in a chemically propelled ship.

KENDELL FOSTER CROSSEN:

Sponsorship of the first interplanetary flight: If the U. N. is strengthened, within the next few years, then it will be that organization. Otherwise, I'd say it will be a toss-up between United States and Russia, and possibly Germany. All answers are subject to international conditions. A war might well throw the answers off by as much as 25 years or even more.

P. SCHUYLER MILLER:

Cost is the main consideration. If military values and military tensions are high, interplanetary flight will come this soon (1960 and 1985) or sooner. Otherwise no one will pay.

ALGIS BUDRYS:

What's a "successful" unmanned moon missile? One that hits? Then it can be done as soon as money is appropriated and construction is completed -- at the price of a tremendous drain on materials, men and man-hours. Why do it? Why not build a space station, at a far greater return on the investment, and then lob a Viking or V-2 over, instead of going to the bother of constructing the special missile that would be required to take off from Earth? Why do it at all? Send a recording robot around the moon, if you want to -- but, again, do it from station, or, better yet, a few hundred miles ahead of a manned ship, as a pilot. In any case, the importance of such a missile is negligible -- even for publicity. As I've said, what you want is a space station. The missile-to-the-moon was a nice idea when we were chuntering around with the basically silly idea of taking off directly from Earth. I fear that now it's become obsolete. I think some fool may actually authorize it, someday -- for one reason or another -- but that's a human equation, and therefore unpredictable.

And, I don't think anyone can answer the succeeding questions with any degree of certainty. If everything else stops dead still; i.e., if no new factors are introduced, we (e.g., the representatives of the race of Men) will be on the moon sometime in the 1980's. But, if you'll look around, we're not exactly living in a vacuum. When, how, and who are no longer questions which can be applied to anything with any significant degree of certainty -- and particularly not to a long-range project, and emphatically not to such a project when its very nature may be construed as a threat to the security of several nations which are already restless. It is my particular belief that no purely national space station will ever be built -- and you can read "moon rocket" or "orbiting missile" for "space station" with equal validity. Obviously, no armed man is going to let you get away with pointing a possible weapon at his head. He's liable to shoot back first and ask questions of the dead. And by "purely national," I mean "purely national" by any definition. May I point out that the Communist bloc considers the U. N. to be a Western mechanism?

Therefore, the dates you request and the agencies you ask us to select are more dependent on socio-political situations than on the status of the rocketry. And socio-political situations are dependent on human equations -- and are therefore unpredictable.

DR. C. L. BARRETT:

Space flight may be accompanied by some as yet unknown or unsuspected type of power or propulsion, being neither applied as electricity, atomic power, jet propulsion, or rocket propulsion is, and not related to any of these.

HENRY KUTTNER:

C. L. Moore (Mrs. Kuttner) and I will be interested in seeing the results of your poll. We'll be more interested if the results are contributed by competent experts in the field -- those who have the necessary background in physics, engineering, politics, etc. to arrive at their conclusions on grounds of empirical evidence. Many science fiction editors and authors are well grounded in fields which would give high probability to their judgments on the questions you pose. But we aren't.

ADDENDA:

ARRIVING after the bulk of this booklet had been completed were two additional contributions from:

DR. GUSTAV ALBRECHT, Physicist of Taft College and a well known author of science articles.

ROBERT HEINLEIN, one of the most widely read of all science fiction authors. Among his numerous books are "The Green Hills Of Earth", "The Man Who Sold The Moon", "Sixth Column", and "The Puppet Masters", all currently available in both hard cover and pocketbook editions. The recent movie, "Destination Moon", was an adaptation of one of Mr. Heinlein's books.

* * * *

OPINIONS:

	UNMANNED FLIGHT	MANNED FLIGHT
Heinlein	1960	1965
Albrecht	1975	1977

* * * *

COMMENTS:

GUSTAV ALBRECHT:

This whole question is a matter of money. If the U. S. today allotted as much money (and scientists) to the problem as it did to the atomic energy program, I feel we would be on the moon within 10 years. But it seems unlikely that any country would sacrifice its war program and its best scientists to a project of this type, and unless some very wealthy man should leave his entire fortune to such an endeavour, I doubt that much headway could be made until the world situation is resolved. There is always the possibility that reaching into space will assume military importance of some kind, in which case we might get to the moon earlier as a by-product of such research. I feel my figure of 1975 is on the optimistic side and 2000 is more likely.