

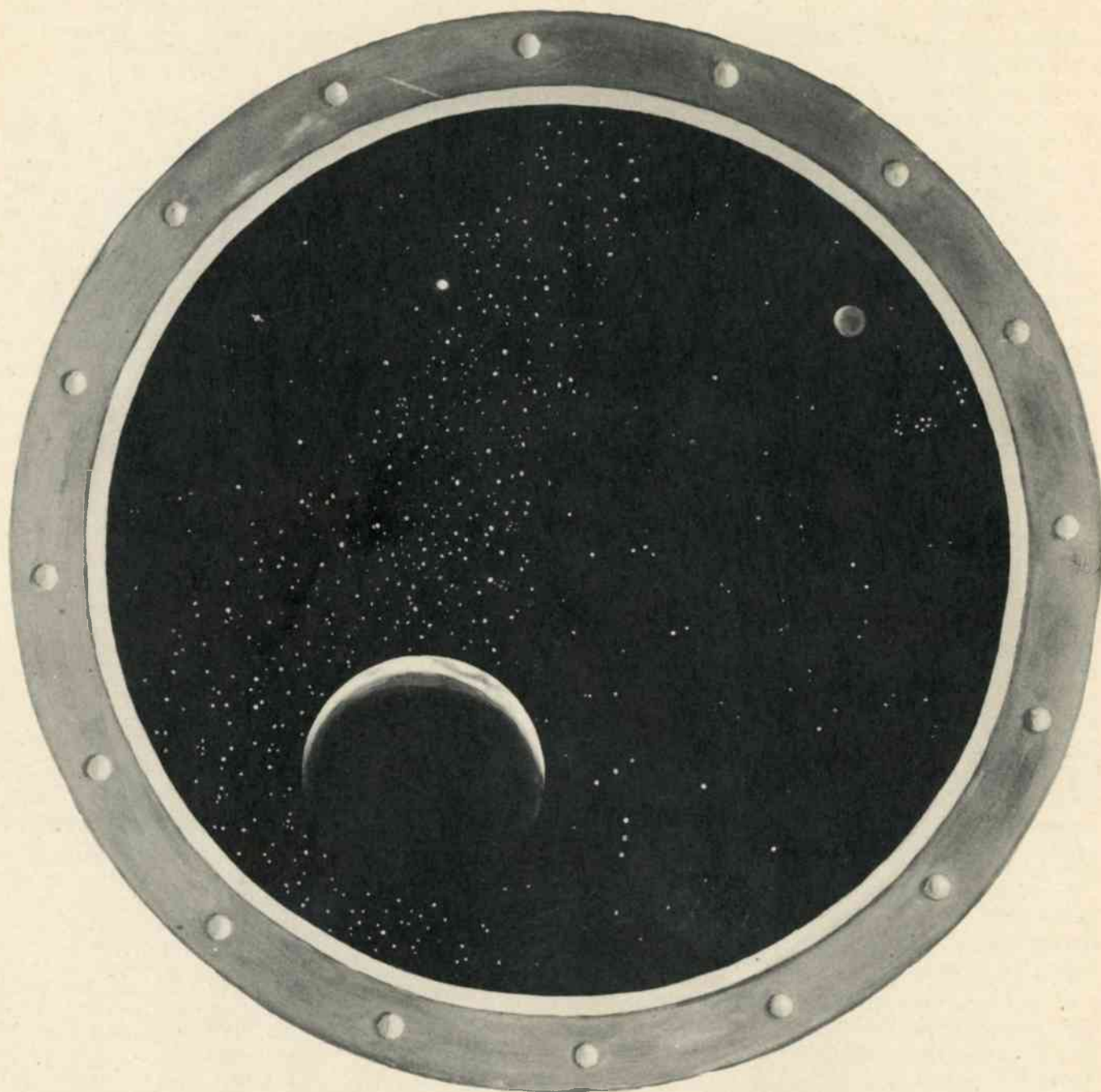
ROCKETS

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THE MAGAZINE OF SPACE FLIGHT

MAY - AUGUST, 1946



VIEW FROM INFINITY

In this striking illustration, done for "ROCKETS" by a famous Astronomer, you are gazing, enthralled, from a porthole of your Moon bound space Rocket. You are 10,000 miles directly above the North Pole of the Moon. On your right your homeland, Earth, turns in ponderous majesty about the distant flaming Sun. Within your scope are Saturn, the Pleiades, Uranus, Aldebaran, Bellatrix, and Betelgeuse. Before you lies the splendor of the Milky Way. The question is, what time is it? Earth reckoning. The date, as you can easily figure out, is For the correct answer we will give you your choice of any book listed on the enclosed book list free. If you know your astronomy, and are going to be an astrogator of space, you should be able to give the day, month and year in which the above configuration could be seen!

Artwork in the above done by Kay Edler, of the Chicago branch, from the original sketch.

EDITORIAL

Mystic Barriers

Any mind which takes the dream-boat ride thru history must be intrigued and awesomely puzzled on observing the mystic barriers which seemingly hedged in the people of antiquity. For example; Thutmosis III, a Pharaoh of the great Egyptian civilization, never ventured farther east than the Euphrates and evidently no mentionable distance to the west; and, while his push to the Blue Nile antedated later explorers by 4000 years, yet even then he did not find the source of the Nile. The source of the Nile was not found until our times, though many millions lived and died in Egypt during historic ages. Again, while not a seafaring people, it is nonetheless remarkable that the powerful ancient Chinese Dynasties did not cross the Pacific. Of all ancient peoples only India could know that rival empires bounded her on the east and west. Still, here again we are forced to wonder why the great cultures of India and Ceylon did not discover Australia.

In the world that was ruled by Imperious Rome, manpower, wealth, technology and peace all were available for exploration. Yet all that has come down to us are tenuous tales of fleets that sailed around Africa and penetrations to Eire and Britain. And the clanking tread of Trojans Legions.

Again, as far as we know, the Aztec, the Inca and the Mayan strayed not far from the Americas, during the historical epoch.

Of all the powers of earth during sixty centuries only one man had both the power, the position, the initiative and the wealth to indulge in unlimited exploration. Only one was able to gratify his desire to see and conquer all that lay beyond the hills and the seas of his tiny native land. And Alexander the Great was stricken down at the age of thirty years! And even today, in the populous Orient, which never has noticed the succession of occidental con-

querors, the names of Genghis Khan and Alexander are enshrined in legend.

What has this mystic barrier against exploration been?

We know that it did not exist in the dim eras before history, because man is found in all regions of the earth! We must say then that Neolithic, Paleolithic and Pleistocene man found his raw way around the globe, but that the mighty oar and sail driven galleys of Rome, far superior to the barks of the Vikings or the toy ships of Columbus, never ventured beyond the coast of Britain!

Every empire and every race of the past has had it in its power to push to the far corners of the earth. What prevented them? The Vikings usurped every ruling house in the western world during the turbulent 10th and 11th centuries, yet it is one of the greatest tragedies of history that they failed to make a permanent settlement on the coast of America, tho there is some evidence to the effect that they penetrated as far west as Minnesota.

Today we have it in our power to explore the far reaches of the Universe. The means are at hand, the willing crews number thousands. Vaster sums are wasted daily by near-sighted politicians than would be required to blaze a thousand fiery trails thru the depths of space to bonanzas beyond conception.

What mystic barrier holds us back?

Two thousand years hence will some philosopher, from his summer palace on Mars, speculate on why 20th century man did not conquer space?

Today, and all thru history, only two interpretations can be placed on the failure of advanced cultures to spread beyond their narrow confines. The one; and it seems unsatisfactory in the face of the fact that man has, sometime, from somewhere, spread to every part of his globe, is mental inertia. But even granting such stupendous inertia, it would seem that sometime in the wild centuries of history, a Roman could have veered

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his mighty galleys from the path to Britain and crossed the Atlantic. A fleet of Ptolemy's could have done the same. Or a fleet of the as yet undaunted Carthage. A Grecian fleet could easily have reached Brazil,—and mayhaps they did! There are blue-eyed natives in the Amazonian depths. Surely the Vikings could have founded a settlement in Virginia. Surely the Hindus or the Chinese could have found Australia.

The other alternative is peculiarly repugnant. Charles Fort faced it! He often claimed, "Maybe we are being kept!" It may be that in this year of the Christian Diety 1946 our "keepers" again refuse to let the men and the money come together—for the Conquest of Space!

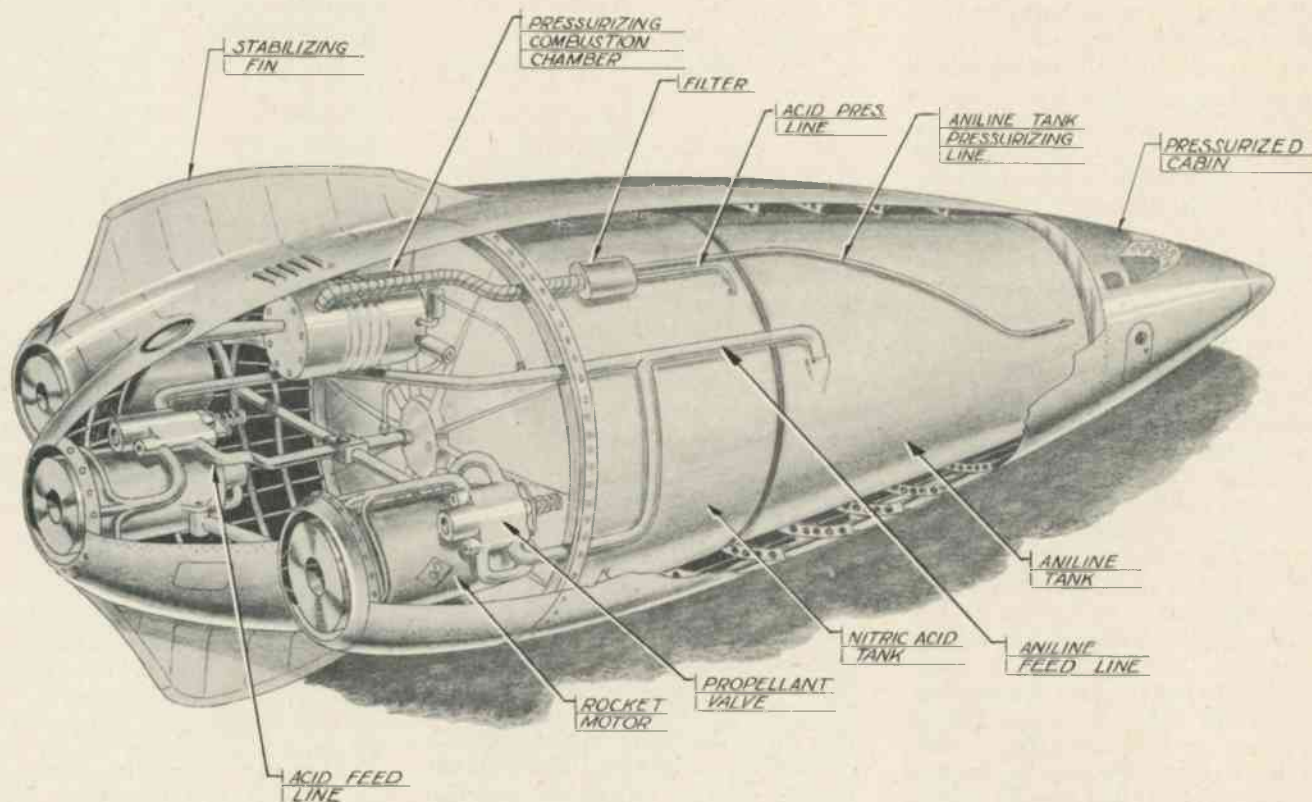
We can change the weary roundelay of history. We can break the mystic barriers. We can Conquer Space—it's up to YOU!

RENEWAL OF MEMBERSHIP

Members whose memberships have expired are requested to renew as soon as possible. In this way you will be sure to keep your number. It is only through consistent renewals that your Society can grow. We are often tardy in sending out notices, so check your card occasionally and keep yourself up to date.

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R. L. FARNSWORTH, Editor.



ACID AND ANILINE AS A ROCKET FUEL

By Donald J. Ritchie

Red Fuming Nitric Acid and Commercial Aniline as a Rocket fuel is not well-known among rocket experimenters although it has been successfully applied to many rockets tested in the United States. The Army Air Forces jet assist take off rockets use acid and aniline as propellants. These packaged units were rated at 1,000 pounds thrust for sixty seconds and proved very satisfactory. I witnessed tests of these 1,000-pound units and I admired the compactness and the simplicity of these assemblies. A 1,000-pound thrust rocket, using this same fuel combination, was also installed in a flying wing airplane. This rocket airplane was tested at Murpc Army Air Base and proved to be quite successful although not as powerful as the German Me-163 Rocket Interceptor. The German aircraft had a much higher thrust rating.

Acid and aniline as a rocket fuel combination has many advantages over the liquid oxygen and carbon fuel types. It can be stored and handled at normal temperatures in contrast to the necessary subzero temperatures of the liquid gases. It has another characteristic which is

both an advantage and a disadvantage. This combination of acid and aniline when mixed, ignite spontaneously, eliminating bulky ignition equipment. This spontaneous combustion also precludes faulty ignition which is a prevalent danger of other fuels. This property of spontaneous ignition although a great advantage contributes a danger to the motor system. The slightest leakage in the motor system or propellant lines would lead to disaster. The two extremely active chemicals would ignite in the motor compartment with explosive results. A system using acid and aniline must be leakproof.

This combination makes a very simple motor installation. Nitrogen pressure tanks or pumps are unnecessary because the fuels themselves can be made to maintain a constant feed pressure. A small auxiliary combustion chamber is fed by capillary lines from the main tanks. The products of combustion thus produced are filtered and passed through pressure regulators back into the main tanks. The combustion chamber is a small fraction of what Nitrogen pressurizing equip-

ment or turbine pumps would weigh. This makes a great advantage in saving weight.

The disadvantages are few and almost all are created by the dangerous property of spontaneous combustion of the two chemicals. These objections can almost wholly be nullified by care and caution in handling these substances and in the designing of safe fuel systems. The lines carrying these enemy fluids must be of a strength to preclude accidental bursting and precautions must be taken to prevent any possible fumes from collecting in the motor compartment. This means a suitable means of ventilation must be provided. It is in this danger of ignition that acid and aniline has its chief disadvantage.

The acid must be handled with care. Like other acids it burns or reacts with almost everything, the skin not excluded. When filling tanks, care must be maintained to keep it from spilling on metals of the rocket not impervious to its action. Otherwise it would weaken structural members and may be the cause of accidents. The acid must be tightly covered at all times, other-

wise the dissolved Nitrogen Dioxide will boil off. If this happened the acid would lose much of its power.

This combination of fuel is not as powerful as some liquid Oxygen and Carbon fuels although its advantages offset this to a certain extent. Its experimentally determined exhaust velocity is about 6,400 feet per second while gasoline and liquid oxygen is rated 1,200 feet per second higher.

Red Fuming Nitric Acid is an oily reddish brown fluid very similar to hydraulic fluid except that it boils and fumes when exposed to the air. Reddish brown fumes of Nitrogen Dioxide are given off which are very poisonous. Pure concentrated Nitric Acid is known as HNO_3 although the fuming type has 13% of NO_2 by weight dissolved in it. It is this component that makes it such a potent oxidizing agent.

Its specific gravity at 25° C. (77° F.) is 1.55. It boils at 86° C. (185° F.), slightly less than the boiling temperature of water. It is this characteristic that gives it an edge over the liquid Oxygen. The freezing point is -43.6° F. and it weighs 12.9 pounds per gallon. Its density is 98.5 pounds per cubic foot. Once the necessary weight of acid is determined the dimensions of the tanks can be computed from this density figure.

Nitric Acid is extremely corrosive to all metals except stainless steel and aluminum, therefore due to its lightness, aluminum would be ideal for the acid tanks.

Commercial Aniline, a colorless oily liquid, is derived from Benzene and its chemical formula is $\text{C}_6\text{H}_5\text{-NH}_2$. Its specific gravity is 1.02 at 25° C. and its boiling point is 184.4° C. It freezes at 7° C. (21° F.). It weighs 8.35 pounds per gallon and has a density of 63.7 pounds per cubic foot.

Immediately upon contact, these two chemicals react to form gaseous products such as steam, Nitrogen and Carbon Dioxide. A great deal of heat is generated also as this is an exothermic reaction. The Nitric Acid oxidizes the Aniline, breaking it down into gases and is itself reduced. The reaction is quite violent.

In calculating the amounts of each component necessary in a given weight of propellant, a numerical ratio is handy. For each pound of Aniline used, 2.75 pounds of Nitric Acid is necessary. For example, suppose we have estimated we need 1,000 pounds of propellant:

Then let X = the amount of Aniline and setting up an equation we

$$\begin{aligned} \text{get,} \\ X + 2.75X &= 1,000 \\ \text{solving for X we get,} \\ 3.75X &= 1,000 \end{aligned}$$

X =

$$\begin{aligned} \frac{1,000}{3.75} &= 266.5 \text{ lbs.} \\ &\text{of Aniline} \end{aligned}$$

To find the amount of acid multiply X by 2.75 or,
 $2.75 \times 266.5 = 733.5$ pounds of acid.
 Then to calculate the fuel tank size:

The Aniline tank must contain
 266.5
 density of Anil. 63.7
 = 4.18 cubic feet.

The acid tank must contain
 733.5
 density of acid 98.5
 = 7.44 cubic feet

There are many ways to calculate the proportions of acid and Aniline necessary. By weight, 73.3% of acid is needed to 26.7% of Aniline. By volume, the proportion is 64% acid to 36% Aniline. In computing the functions of the rocket as a whole it is often necessary to consider the propellants combined. The average density of the propellants is 89.3 pounds per cubic foot. The weight is 11.93 pounds per gallon.

Exhaust velocities vary with the pressures in the combustion chamber. The variation of this chamber pressure is dependent upon the flow of propellants per time and the restricting size of the nozzle. With a chamber pressure of 300 pounds per square inch (measured with a gage) the exhaust velocity, determined by a manometer, measures 6,000 feet per second. Raising the chamber pressure to 500 pounds per square inch increases the exhaust velocity to 6,400 feet per second.

In designing a rocket, the first thing that may be considered is the thrust required to accomplish the mission set for the missile. From this estimated thrust, the amount of fuel can be computed by use of the specific fuel consumption figures of fuel being considered. The following experimentally determined fuel consumption data is based on an injection velocity of 5,400 feet per second and therefore may be a trifle low when used in conjunction with higher exhaust figures.

For each pound of thrust per second, .0061 pounds of propellant is necessary. The same thing stated a little differently is, that for each 1,000 pounds of thrust per minute, 365 pounds of propellant must be used. For example if a rocket under consideration is to have 4,000 pounds

of thrust for two minutes, the amount or propellant required is:
 $4000 \times 2 \times 365$
 1000

= 2920 lbs. propellant.

Then by the method already described the proportions of acid and Aniline and their tank size can be calculated.

Handling and working with these chemicals can be safe if caution is used at all times. The simplest method and safest method to fill fuel tanks is to pressurize the storage tank and force the propellants out and into the fuel tank of the rocket. In this way the drums of liquids are always closed and can be left on the ground or in racks, minimizing the chances of tipping and spilling. If by any chance some liquids are spilled they must be washed away with large quantities of water.

It is necessary to wash down the engine installation with water and to flush out the fuel system with water before disassembling or working on the motor. Any chemical left in or on the pipes would inflict severe burns if it got on the hands. At last it might be well to mention some equipment that should be used in handling of the acid and Aniline. A chemical respirator should be worn to protect against poisonous acid fumes. A strong face shield should protect the face from spattering. Rubber gloves, boots, and an all-covering rubber apron should be worn to give all-over protection.

I have dealt long with the dangers of this fuel combination but it should cause no more difficulty than the use of gasoline and its danger of ignition by a spark. Acid and Aniline is a simple combination to use and the future should see many aerological, meteorological, and perhaps some space rockets powered with this or a similar derivative of this fuel.

CHICAGO BRANCH NEWS

Recent talks of great interest to the members of the Chicago Branch of the Society were those given by Roy E. Balboa, a member who is a professional instrument maker, and Branch Society Vice-President Henry Edler. These were, "Precision Instruments Suitable for Ascent and Descent in a 400-mile altitude rocket", and, "Possible Life Forms which might be encountered on other Planets by Rocketeers".

Anyone interested in contacting the Chicago Branch may address their inquiries to:

The Chicago Rocket Society
 1328 Rosedale Ave. Chicago 40, Ill.



NEW WORLD TO CONQUER!

In the accompanying illustration we see a view of the planet Mars. Here before your eyes swings another World! In all its grandeur, all its massive bulk and all its engrossing mystery; This photo was taken Oct. 4 and Nov. 3, 1909, with the 60-inch telescope at Mt. Wilson. Incidentally it is a commentary on the great strides taken in astronomy that these are the only photos available of the Fourth Planet from the Sun. No astronomer rides to work in a 1909 automobile but that seems to be about as far as celestial photography has progressed, in this, the greatest industrial Empire on Earth.

While recent news releases tell us that the French are constructing an Earth to Mars atom powered rocket, we must take the stand that the logical approach to the Red Planet is from the Moon. Thus the great importance of our Satellite; it will serve as the shuttle station between Earth and the Universe!

To survive as a great nation it is necessary for us to find huge stores of raw materials within the next thirty years. Outside of the sea bottoms and the sea water itself we have no other source except the Planets!

The logical candidate for colonization is the planet Mars. Here is a World awaiting the touch of the hand of Man. Is it habitable? Here are a few facts: Mars is 141 million miles from the Sun, roughly averages 43 million miles from the Earth, has a diameter of 4,220 miles, a surface gravity of .38 of Earth's and a density of 71 percent. Its year is 687 days in duration and its surface area is .285 of Terra's. Its day is 24 hrs. and 37 min. The surface appears to be smooth in comparison with ours, clouds are undoubtedly present and oxygen and water vapor are said to have been detected

in the atmosphere. As to the "canali" (lines) popularly termed "canals," it now seems pretty well established that markings exist on the entire surface of Mars which are far different from anything on Earth or the Moon. While Schiaparelli and Lowell were long contested, recent photos taken in FRANCE at the Pic du Midi observatory show that such lines exist. The fact is that all of our observations, visual, spectroscopic and photographic, are taken through 300 miles of atmosphere and can be no more than intelligent guesses.

It is, of course, an entrancing thought to wonder if this strange world is already inhabited by thinking creatures. Practically, that does not concern us; the task is to reach the Moon, and from there—the UNIVERSE!

INTER-PLANETARY ARCHAEOLOGY

It might be thought, at casual glance, that archaeology has no place in the field of rockets, large though it may be; but it must be remembered that the scientists dealing with the modern aspects of life: physics, astronomy, meteorology, etc., are not the only ones to benefit from the exploration of other planets. It all hinges upon whether some of these planets are inhabited by life, intelligent or not. Mars, with her light but adaptable-to-life atmosphere and high summer temperature, approximating 60 degrees F. at the warmest, and Venus—warm, thick of atmosphere, and cloudy—certainly hope, if not necessary proof, for such life as we know it.

Ever since it was known by the Greeks—the most intelligent of 'em—that those bodies in the sky were other worlds, man has fluctuated between the belief that they were inhabited or that they were not. But what does modern man know about Mars and Venus that the ancient star-gazers did not? Well, Mars has become known with considerable clarity, while the knowledge of Venus has progressed little since those days, because of her eternal cloud night-cap, which seems to be composed mostly of poisonous formaldehyde.

We do know that Mars is criss crossed with straight lines of . . . something, and that our best telescopes show, when coupled with a spectroscope, great areas of something which appears to be plant life, changing with the seasons. If it is true that there is plant life on the deserts (?) of Mars, then it must fol-

low that there is animal life in the inevitable course of events to balance the terrarium—or should I say "Mararium."

All of the fore-going small talk as a prelude brings us to the original subject, archaeology. In a recent letter to me, Mr. Farnsworth has asked me an unanswerable question. Unanswerable because science has just not enough information nor enough facts to make any answer truly fit the need. Mr. Farnsworth says that it seems odd to him "that paleontologists can give us a nice little display showing the development of the horse down through the millenniums, from the one-foot high, four-toed eohippus to the present racer. But where is the display showing a similar progression of man?" Well, there are numerous theories on the origin of the species of man, and not one of them have been proven and yet all are logical. Nor do any of these theories, Darwin's included, state where and under what conditions man came to this planet with definite proof to back them up. Concerning the latest scientific fad, Darwin's; people have looked for the "missing link" between man and the monkey ever since the Cro-Magnon race was discovered in Spain. The search continued with the Heidelberg man (Germany), and traces of human-appearing races were found in Peking (*Sinanthropus*, 500,000 B. C.) and in Java (*Pithecanthropus Erectus*, same approximate time), but each proved not to be the sought after "missing link." Just before the war, a new one was brought to light who seems to have been a real giant in Java (*Meganthropus*, 700,000 years extinct) and who has been estimated to have been 12 to 18 feet tall (one of the legendary Titans?) but with still no proof of direct Simian origin. Now here I wish to state that I am not trying to reform science, but only pointing out that there is a vast question about where man came from.

It has always been strange to me that man should know so much about his surrounding universe and yet so little about things connected directly to that one greatest of enigmas—himself. Now we are at the critical and most important part of this matter: intelligent or man-like life on the two other planets? The ancient peoples have been said, by not a few authorities, to have possibly had greater civilizations than our own, namely because the most advanced cultures: Egypt, Greece, the Mayans, and the Pre-Incas, seem-

ed to have had no definite "early cultures," that is, they look like colonist empires of some other broader civilizations, and they had several secrets which we of today have not and a few that we can only imitate. These ancients left us so little in the way of writings to show about mechanical advancements or inter-planetary travel; but I will give some examples of what has been found. The best and most direct rumor concerning space travel (I have not yet been able to trace its source) is an old legend which states that the Chinese came from the moon in the ages before history was written. About halfway through that greatest of Hindu epics, the *Ramayana* (6,000 B.C. (?) author unknown) is a reference to an airship. Ravan, the King of Ceylon, steals Sita from her husband, Rama, and "seats her in his Car Celestial, yoked with asses (Hindu horsepower?) winged with speed." Later in the battle, Rama shoots down the "celestial car," killing Ravan, with the help of a machine which is "wrapped in smoke and flaming flashes" (Hmmm, machine gun?) and Sita is returned to him. If one is a Christian instead of a Hindu, one might look at the book of Ezekiel in the Bible (Ezekiel 1, III; 4-27,13) where one will find a distinct rocket ship. Our Christian will find that the ship is run by 'coals of fire and light-

nings," that it has four wings, carvings of four beasts in its front, tires with "soles like unto the soles of a calf's foot," windows, wheels, it is of metal construction, and—of all things—retractable landing gears.

Now, what are existing ideas which permit man-like and intelligent life on Mars and Venus? Since the formation of the planets, Mars has long ago passed the point where intelligence becomes a step in evolution, if there is life at all. Because of her greater distance from the Sun, Mars has cooled faster than Earth and thus has grown old faster. For the same reason, Venus would now be in the approximate period before giant animal life (near, or following the Carboniferous Era). Would that not mean that life on Mars would have progressed to the point where the inhabitants already should have developed space-travel and come to Earth? "Tain't necessarily so"; the Martians, if any, might have visited the Earth in the distant past. We might be their descendents, we might be related by having stemmed from the same human source, or there is the very great possibility that such a civilization, as might develop on Mars, developed along lines totally different from our own: a mental or a quasi-mechanical culture. It might equally be possible that their culture has long ago

reached a pinnacle and then degenerated to a state of savagery. Then too, the hand of intelligent-being could have touched all of the planets, providing that they could adapt themselves to the differences of them, either naturally or by scientific means.

In any case, mankind is in for an enlightenment. With the opening of the era of inter-planetary travel, the archaeologist of the future will be able to piece together not only the history of life on earth, but the relationship of the solar system and that greater riddle of his own—man's origin. . . .

FOR THE CONQUEST OF SPACE!

Gordian I. Armstrong,
13 Bradford St.,
Bradford, Pa.

Editor's Note—Archaeology on alien planets will no doubt be an intensely interesting study; as will all of the other Earthly sciences transported to entirely different environments. As regards Man we would like to point out that our skeletal structure is similar in every detail to that of other mammals. This raises the question in our mind of a common origin for all Earthly mammals. The emergence of the mammal as the dominant life form on Earth offers some very puzzling problems. The "links" between reptile, fish, insect and birdlife—and mammalian life, are very inconclusive. Finally, conjecture is useless; we must bridge the celestial gaps, tread the soil of other worlds, and bring back answers, and, probably, a new host of puzzlers!



SHOWING THE YOUNG IDEA HOW AND WHERE TO SHOOT!

We do not like the word "teach" as it connotes an instillation, so we say that in the photo above young Americans are being shown the possibilities inherent in the rocket, for the exploration of space, particularly for the attainment of the surface of the Moon. These young men may some day tread the soil of alien worlds. Today, John M. Griggs, well known stage and radio artist, is outlining to them some of the more romantic aspects of rocketry. The locale is Manhattan but we rather imagine that John has them manning the deceleration apparatus as they prepare to land on the Moon after the thrilling journey through the depths of space.

GERMAN ROCKET FUELS

Information gathered from Germany and released by the Chemical Warfare Service shows an amazing variety of fuels were tested in that country. Two types were used, the conventional double fuel—an oxidant and a reductant—and the novel mono-fuels, which are essentially "liquid gunpowders" requiring only an initiating stimulus to burn. All these fuels were apparently designed for a rocket chamber pressure of 30-40 atmospheres, so that changes in proportions might be feasible with other chamber pressures.

The following list describes the fuels used in Germany.

Type A—Double Fuels

OXIDANT

1. 98%-100% nitric acid
2. 95%-90% nitric acid
5%-10% concentrated sulphuric acid
3. Liquid oxygen
4. 80%-85% hydrogen peroxide
5. Ditto, with a little calcium or sodium permanganate
6. No. 4, plus ammonium nitrate

REDUCTANT

1. Methyl alcohol
2. Ethyl alcohol
3. Hydrazine hydrate
4. No. 1 plus No. 3
5. 60% xylidene
40% triethylamine
6. 8 hydroxyquinoline

7. Furfuryl alcohol
8. Vinyl ethyl ether
9. Gasoline
10. Diesel fuel
11. Hydrogenated lignite tar
12. Tetrahydrofuran
13. Furfuryl alcohol plus aniline

Type B—Monofuels

1. 65%-85% methyl nitrate in methanol
2. Ammonium nitrate in liquid ammonia
3. Ammonia and nitrous oxide
4. Tetranitromethane and 8-hydroxyquinoline in 80%-85% hydrogen peroxide

Not very much has been said as to which fuel was best. In general, the main drive on the rockets appears to have been the double fuels, liquid oxygen-methyl alcohol or liquid oxygen-ethyl alcohol, and less often mixed acid (concentrated nitric acid with a little sulphuric acid—item 2) with a convenient reductant. Hydrogen peroxide seems to have been used as the initial starting oxidant, shifting to liquid oxygen after the rocket chamber was hot. Hydrogen peroxide was used with hydrazine hydrate-alcohol as reductant. Inasmuch as German plant capacity for 85% peroxide was about 1,700 tons per month, with additional capacity under construction, it seems likely that peroxide was planned to be used in the main drive at times. Its inferior oxidizing capacity is bal-

anced by the convenience with which it can be handled, as contrasted with liquid oxygen. Currently a better peroxide, 90% assay, is available in this country through Buffalo Electro-chemicals Co. For enthusiasts in this country, hydrogen peroxide might well be considered as an oxidant as it is much safer and possibly cheaper than liquid oxygen.

All the monofuels were considered very dangerous to handle; the methyl nitrate-methanol fuel was apparently most promising.

From an American viewpoint, the oxidants listed are all available. FOR AMATEUR WORK ALL ARE HAZARDOUS. The peroxides perhaps being least dangerous if carefully handled. The nitric acid combinations are probably cheapest but are corrosive and dangerous in pressure systems in that any leak may squirt a stream of destructive acid.

The reductants listed include many which were used in Germany apparently because they were available as by-products. Thmus Nos. 7, 8, 11, and 12 are not cheap in this country, yet would appear to be no better than gasoline. Reductants Nos. 3, 4, 5, and 13 are available but relatively expensive.

The most promising reductants would appear to be Nos. 1, 2, 9, 10, and possibly other alcohols.

Wayne Proell,
Chicago Rocket Society.

ASBESTOS SUITS!

If you are handling chemicals, liquid or solid fuels, do not take chances! Best thing to do when filling rockets, etc., is to wear an asbestos suit. We have a few available with feet, and gloves attached. Helmet inside and quartz window in the headpiece. Hooks and appurtenances for carrying objects on the suit. Price of these fine Government suits, prepaid, \$24.50. Rocket Associates, Inc., Box 29, Glen Ellyn, Illinois.

THE FORTEAN SOCIETY

The last stronghold of realistic, analytical thought, "The Fortean Society," can be easily contacted by writing to them at: The Fortean Society, Box 192, Grand Central Annex, New York 17, N. Y. Many members have written in to tell us that they have tried reaching them at the old address given in "Rockets—New Trail to Empire" and have had their letters returned. Well, try again—you will enjoy the able literary style of Tiffany Thayer, the Society Secretary who edits "Doubt," The Fortean Society tongue-in-cheek, publication.

THE BRITISH INTERPLANETARY SOCIETY

Rejuvenated and reorganized since the War the British Interplanetary Society, (limited by guarantee) seems to be making very substantial progress. Home offices are at "Albemarle House, Piccadilly, London, W.1." The Secretary is L. J. Carter, who may be addressed at "157 Friary Rd., London, S.W. 15." We do not seem to have a list of officers at hand but the following are names probably well known to you and you will be pleased to hear that they are active in the new organization. C. Fleisher, E. Burgess, L. Gilbert, F/O A. C. Clarke, Val Cleaver, and many, many others whose names we may have omitted here. They have branches at Manchester, Birmingham, Farnborough, Eccles, Barrow, etc. They are out and out interested in the inter-spacial aspects of rocketry and deserve our moral support and we hope that members with interests abroad will contact them upon occasion.

Some of their papers on practical spacial navigation problems are most interesting. No doubt copies of their "Bulletin" may be purchased through the Secretary.

MEMBERSHIP BUTTONS

Many members have requested that we supply them with membership buttons. During the war it was impossible to obtain them but they are now again available. The question is how many of the members are willing to buy buttons, as the unit price is greatly dependent upon the number ordered. As near as we can get an estimate, without knowing how many will be required, is around \$3.00 to \$4.50 for a 10K gold button of our design. If you want a button drop us a postcard authorizing us to send you one C.O.D., then, if we get enough requests we will order buttons. If we do not have enough orders we will advise you in the next issue of "ROCKETS." If we do have buttons they will be well worth wearing, you may depend upon that!

THE GOLDEN MOON

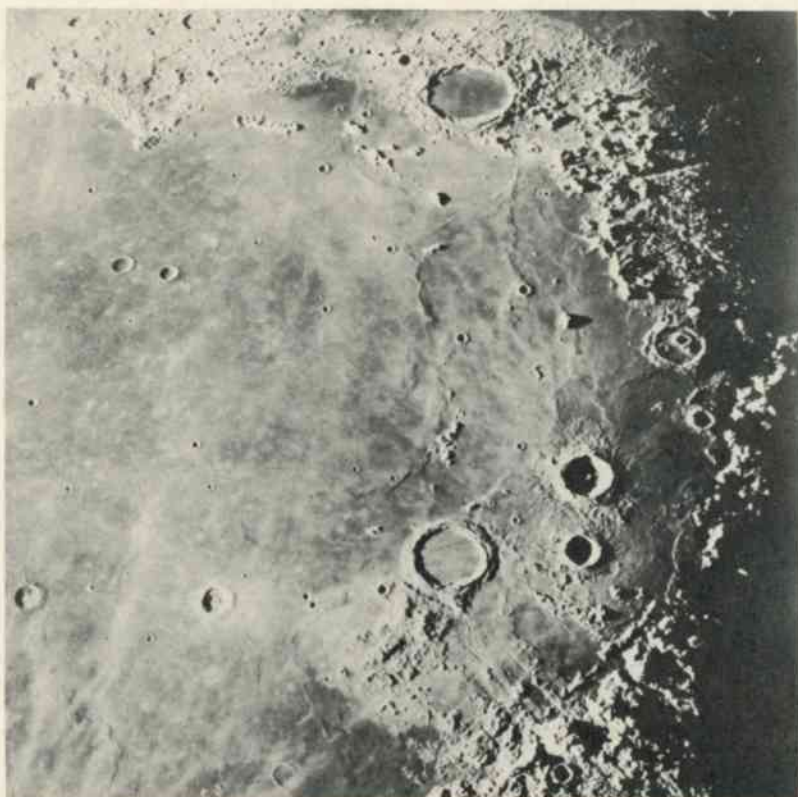
(Excerpts from a talk at a gathering of businessmen by R. L. Farnsworth, President of the United States Rocket Society, Inc.)

In talking before a group of businessmen I am always the victim of two very strong and conflicting emotions. To begin with, I am enthusiastic over the benefits that will accrue to the American businessman and to the American people if we Americans are first on the Moon! Then I am seized with a feeling of great annoyance over the fact that I have been, to now, unable to get across to businessmen the idea that a rocket to the Moon is a business proposition and not a fantastic stunt. For many years it has been possible, theoretically, to reach the Moon with liquid hydro-carbon fuels. Understand, it would have been dreadfully expensive, but it could have been done! Now, with atomic energy available, it passes from the realm of the probable into the present reality of the inevitable. I want everyone of you to realize that atomic energy was thought beyond the scope of our generation, and it was beyond our scope, until the necessity of WAR removed two billions of dollars from your pockets in taxes and made the energy from the atom a tool of American Armed Forces.

When the Moon, and the Universe, was unobtainable, it was the practice to laugh off any rocket to the Moon enthusiasts with the statement, "Well, suppose you do get to the Moon, what good is it?"

Today you read of Russian rockets zooming over Finland and Sweden. Tomorrow you will read of rockets on the Moon! If the only thing that appeals to you in interplanetary space is business, I will give you a glimpse of the business of the future, our future, if you wish to make it an American venture.

Circling the Earth at a distance of 240,000 miles the Moon has a diameter of 2,160 miles. Gravity is but $1/6$ of that on the Earth while density is about $6/10$. Airless, and subject to great extremes of temperature, it will be possible in spite of these difficulties to build or tunnel into the Lunar crust very easily, due to the gravity and density. Also, here is a vast globe, which can become the entire property of the first human who sets his foot upon its alien soil. From spectroscopic analysis we think we know that all bodies of the Solar



system are composed of practically the same elements. This means, gentlemen, that the Moon is an unmined world! On the Moon power can well be the cheapest thing available. Untempered by an atmosphere the Moon receives the unbridled energies of the Sun. The Sun, alone, would furnish sufficient power to mine, construct habitable dwellings and laboratories, and perhaps synthesize elements needed for the restoration of the satellite.

Motion pictures of the first trip to the Moon and the landing, would be worth enough to probably pay the cost of development of the rocket. There is no good reason why the Moon should not be the Hollywood of the future, here our entire World could be served by one television station. Then there is a grimmer note. The German V-2 rocket which devastated Britain during the war achieved a velocity of $1\frac{1}{2}$ miles per second. This is the escape velocity from the Moon! This means that with rockets already in existence the power holding the Moon would be able to bomb any point on Earth with impunity. And, since the Moon turns but one side toward the Earth, factories and controls could be located on the side never seen from Earth. Foundations, universities and corporate research laboratories on Earth would pay whatever the cost and profit would be to obtain laboratory space on the Moon. No scien-

tist actually knows how elements behave under a different gravity. No astronomer has ever scanned the heavens through an airless "sky"! From an observatory on the Moon weather on Earth could be forecast with exceptional accuracy. Maps could be made which would be perfect. Today there is no such thing as a perfect map of any large portion of the Earth's surface. All of these activities would mean financial activity on a vast scale. Then, too, we do not know what effect lessened gravity might have on the human structure. If harmful, artificial gravity could be induced in necessary buildings. But it might be possible that lessened gravity and sterile, controlled air might make the ideal health resort. You have heard of meteors, and the theory that the craters of the Moon have been caused by them, or volcanoes! Yet no astronomer has ever seen a meteor hit the Moon! Doubtless they do, and perhaps in aeons past our system passed through a vaster swarm, but if so, why is not the Earth similarly pockmarked? We do not know these things, but we do know that here at our cosmic doorstep, now atomically available, is a trove of riches more vast than those ever conceived of by explorers of the past. Not only is the Moon in itself a valuable prize but it just so happens that the Moon is the key to the exploration of the entire Solar system! Due to its les-

sened gravity the Moon is very likely to become the shuttle station to flights from the Moon to Mars, Venus and beyond. We know that Mars is probably a world fit for human colonization. The power that controls the Moon will, for many ages, control the far flung trade of the Solar system. These few facts should give you some idea of the financial benefits to be had when we reach the Moon. Now I want to show you how to get there. And get there before someone else does. "Git thar fustest with the mostest!"

The financial part of the Moon rocket divides itself into three parts: 1. Research; 2. Development; 3. The Trip.

1. Research:

Should any American Corporation think that they might be interested in financing a rocket to the Moon, we would at once call a meeting with their advertising department, with their research division, and with their executive staff at ownership levels. Through them we would obtain permission to utilize Atomic energy. We would cooperate with their research division so that we might enjoy large scale facilities. The initial funds we would require would depend entirely upon how much of the research would be assumed by their own organization. Let us suppose that United Gadget Mfg. Co. has become interested in our project. They would open to us the facilities of their machine shops. We would

then acquire, possibly with their aid, a large tract of experimental ground. From 5,000 to 50,000 acres of arid land. We would by then be sending up high altitude rockets, perhaps fabricated in their shops. Their advertising department would then be called in. The tie-ups possible are innumerable. Ads showing rocket ascents and experimentation. Blurbs stating that "United Gadget Mfg. keeps ahead by looking ahead. The vision and skill that make the world's best gadgets keeps in the forefront of progress by sponsoring the United States Rocket Society in its daring rocket - to - the - Moon venture." We have enjoyed splendid relations with the Press and should we accomplish more under sponsorship I am sure that favorable publicity would rebound to the credit of the sponsor. This experimental period would not be as expensive as you may think. Being a not-for-profit corporation, much of the machine shop aid to us could be donated and thus a deductible item from Federal Corporate Taxes. We have estimated a probable research cost of from \$5,000 to \$25,000 depending upon the nature of the sponsor's products.

2. Development:

Once the high altitude rocket is constructed, which would ascend from 500 to 2,000 miles into space and bring back the information we need to build the Moon rocket, we would begin development of the major project. We believe that num-

berless advertising endorsements could be secured for many of the items needed on the Moon Rocket. We are also confident that much of the material would be donated. It would be the task of the sponsor's advertising department to handle this contact, which would, of course, reimburse the sponsor for much of his expense. We place an estimate on development cost of \$350,000, not counting the income which could be derived from the project. It should not be overlooked that the possibilities of Government funds might be very good, depending again on the nature and influence of the sponsor. Any development cost could be charged off to advertising and to donations to this Society.

3. The Trip:

I do not think that there is anyone here tonight, who, if they knew that a rocket was leaving for the Moon tomorrow, would not move every obstacle aside in order to get his company representation. You all remember the storm aroused by Lindbergh's trip to Paris. Alongside of a rocket trip to the Moon, this was a Sunday stroll through the Park! The only financial question is in building the rocket. Once it is constructed, and the trip accomplished—Boys! You will have struck it rich!

United States Rocket Society, Inc.,

Box 29, Glen Ellyn, Illinois, U.S.A.
August 26, 1946.

Extra copies of this talk may be had by writing the Society.

CORPUS CHRISTI CHAPTER

Toward the middle of May we received word from the Corpus Christi Chapter that due to rapid de-mobilization they were breaking up and a list of home addresses was appended. While it seems unfortunate now we are sure that like scattered embers each member of this most enterprising chapter will no doubt ignite interest in inter-planetary penetration in his home stamping grounds. Some of the members, and their new addresses are listed below. If they are in your locality we know that you will want to look them up. Chapter Leader Charles E. Shedd, Jr., is now located at 5314 Ridgedale Ave., Dallas 6, Texas. Chapter Secretary J. T. Huston is now at 729 East 31st St., Anderson, Indiana. Other members whose changes we have are as follows: C. W. Moores, Jr., Box 221, Glen Rock, Wyoming. S. J. Gullotti, 129 Charles St., Waltham, Massachusetts. Henri Silz, 27 Prospect St., Great Neck, Long Is-

land, N. Y. Arthur Perlenfein, 4247 Monroe Ave., Los Angeles, Cal. William R. Case, 516 4th St., Niagara Falls, New York. Miss Ahlquist, we think, is still at the Photo Lab., N.A.S., Corpus Christi, Texas. Look these members up if they live in your vicinity. They are the nucleus of a chapter in your town.

CHEMICAL LABORATORY IN DETROIT

I have a small and well-equipped chemical laboratory where I am carrying on research on rocket propellants. I would like to meet Rocket Society members in Detroit and vicinity. In particular I am interested in someone here in Detroit who has a metallurgical lab and perhaps machine shop facilities.

Alfred J. Zaehringer

682 S. Waterman Ave.

Detroit, Mich.



PHILATELIC PAGE



DUTCH ROCKET FLIGHT COVER — 1935

By William A. Fiorenza

MORE ROCKET COVERS!

We just received the covers below from Mr. Fiorenza, and managed to get them in this issue of "Rockets." You can see why we think them so important if you will look at the dates. 1946! If you think that your country is way ahead in rocket development—guess again!

Above is an excellent Dutch Rocket Mail Flight cover dated January 24, 1935, showing that considerable interest existed in rockets in Holland at that time. While the War is given credit for developing the rocket to its present state the number of rocket mail flights which were going on all over world prior to the War makes one wonder if much greater progress might not take place in a slower, more peaceful manner. It was soon after these early flights that the rocket entered the dark corridors of the military, and amateur rocket enthusiasts were labeled "nuts." However, with the scarlet eruption of total War the rocket came into an inglorious notoriety.



All we know about the above miniature envelope is that it was carried by a rocket from Newark to New York. Just where this parachute rocket was launched from, and where it landed, we do not know. This was in 1935 and someone went to the trouble of making a canceling rubber stamp and sent the cover air mail to Chicago. The essential point is that several enterprising people had the vision of rockets capable of traversing distances which make mail carrying practical. Incidentally, Herman Oberth printed his "Wege zur Raumschiffahrt" in 1929. It was, in essence, the V-2. And, at the same time, earnest people were experimenting with little flying stovepipes and being ridiculed!

QUESTION AND ANSWER DEPARTMENT

THE QUESTION

Senator Wayland C. Brooks
Senate Office Building
Washington, D.C.

Dear Senator:

Being by nature and nativity one of your constituents, I am going to claim a moment of your time. I wish to speak to you in my own name, for all civilians. I will speak to you also in the name of the thousand members of the United States Rocket Society, Inc., the largest not-for-profit amateur rocket society in the world.

In the last several years I have had the privilege of being associated with a great number of men, most of whom have been members of the Armed Forces, in the development of this rocket society. Our main task has been the widest possible dissemination of factual rocket information with the objective in mind of preparing the public for the great adventure of sending a rocket to the Moon. Most of our members are technically minded and we have distributed material which has been in demand by countless industrial corporation, libraries, colleges and technical schools as well as by the Army, Navy and foreign governments. During many of these years we have been the object of ridicule. None-the-less we were confident that a rocket could be put on the surface of the Moon and also confident that the secret of atomic energy was merely a matter of expending enough funds to achieve its release. In material we are sending under separate cover you will note that we were on record in these respects long before the public was in an acceptable frame of mind comparable to that which exists today.

We are proud of the role our society has played in bringing about this public acceptance. Due to the fact that our material reached so many minds in key research positions it reacted with great rapidity. When research admitted the possibilities of inter-planetary travel all other branches of industry and government also were convinced. Now the dream is taking coherent form and the United States Army is considering an atom powered rocket to the Moon.

The United States Army is, of course, the logical group to engage in this grand enterprise. However it cannot fairly be denied that the rocket to the Moon was practically thrown in their lap!

Possessing the power of the atom and unlimited funds, the Army can put a rocket on the Moon. But we amateur rocket enthusiasts cannot forget that a German scientist, Herman Oberth, wrote a book in 1929, (Wege zur Raumschiffahrt) which outlined all that was needed, in theory, to build the V-2! No doubt it was in all the military libraries of the world, but the Germans built the V-2's. Prof. Goddard in America pointed out the vast potentialities of the rocket in 1920, and while he worked for the U.S. Government in both wars, his genius could not have been fully capitalized on by the Army.

It is the feeling among our members that now the day of accomplishment is here it is no more than fitting that representatives of the public have a place in the Army rocket program.

There are a number of technicians who deserve a place in this program and among the various amateur groups are many who have dreamed the great dream and for many years have worked constantly to bring it about. We feel very definitely that civilians should have a place in this project and we will co-operate with you to the fullest extent in supplying you with capable civilian coworkers.

We would appreciate any suggestions that you might care to make.

Yours for the Conquest of Space!
**UNITED STATES ROCKET
SOCIETY, INC.**

THE ANSWER

My dear friend Farnsworth:

Thank you for your kind letter outlining the activities of the United States Rocket Society. I also appreciate receiving your material and the newspaper tear sheets on the proposed rocket trip to the Moon.

I have read this material with interest as it is a fascinating subject.

With sincere regards,

Yours very truly,
(signed) C. WAYLAND BROOKS.

Editor's Note—FASCINATING!

COMMUNICATIONS

EXPERIMENTERS

By the way, I would like to get in touch with any radio amateurs or experimenters concerning the problem of interplanetary communications, or any rocket enthusiasts in or near Covington or Cincinnati.

Thomas A. Lawson,
3003 Decoursey Ave.,
Covington, Kentucky.

PORT OF MISSING MEN!

In the days to come there will be new Ports of Missing Men! Throughout the vast reaches of space there will be derelicts and abandoned hulks. In far-off outposts of man's galactic empire there will be tales whispered among the men who will rove the space lanes; tales not often believed by scientists at "home base"; but how else account for "missing men"?

At this time we feel that our missing legions are from a cause more prosaic; that of Army and Navy addresses and a failure to give us a permanent or home address. At any rate . . .

A roll call of the missing! Let us know promptly if you know the address of any of these members. Their mail has been returned.

Pvt. Mike Ancik
June W. Bain
Edward S. Bednar
Charles R. Biteman
Jim Boyd
Clayton E. Burke
Thomas N. Cairney
Sue Chadwick
Charles E. Carson
Fred L. Cochran
Richard S. Crial
Cpl. Antonio DiPattio
Roger Q. Denny
Earl A. Dillwith
John Decker
George W. Dehut
Rolls B. Ferree
Pfc. Robert E. Forrest
Elgin T. Gates
Richard Geckler
S/Sgt. Ernest J. Gendron
R. S. Gilbert
Edward F. Grant
Marvin G. Helsper
James D. Harold
Frank Hepsak
Arthur Jolley
Igor Karpenko
Walter Krouchuk
Arthur E. LaFrentz
Laughlin
Richard Litton
Wm. Kenneth McKellips
Major Ralph W. Muchow
Robert E. Perkin
Milton A. Pounds
Wilfred H. Rawlings
Ward Sanders
A. A. Schlichting, AOM 2/c
Kenneth L. Severson
Pvt. Henderson G. Sigler
Ralph W. Smith
C. L. Snodgrass, Jr.
V. M. Stanley
Cpl. James W. Thomas
John E. Terry
John W. Tracy
Paul Wade
John A. Watkins
Eugene Weissman
George S. White, Jr.
Robert Willis
Philip Wood
William J. Young, S2/c
Milton J. Zimmerman

THE "STATION IN SPACE"

"... In the last two weeks I have read a lot about a rocket to the Moon trip and absolutely nothing about a terminal in space. A permanent base rotating about the earth would be much easier to materialize and would be much more practical for economic and scientific reasons. The Moon rocket is more or less a novelty. ... this terminal in space would materialize as soon as possible for the progress of science.

Yours truly,
Philip Haggemann,
(no address)

We agree with you, Mr. Heggemann, that a space station should be constructed. But the main purpose would be to afford a better launching site for the Moon rocket than we can obtain on Earth. We prepared an article and member Donald Ritchie did some airbrush paintings of the proposed station. His illustration was one of the finest things of its kind which I have ever seen. We sent it out to several national magazines and publications but none of them, to date, would run the picture or the story. However, since they have now all seen what the space station might look like you may expect to see articles on it appear in the future. The Germans were contemplating using the V-9-V10 combination to get rockets up to the required height, 500 miles, and start them about the Earth in fixed orbits, as the first step in the construction of this grandiose conception. We understand from correspondents abroad that English newspapers have carried articles to the effect that the U. S. Army has been granted funds for the construction of such a station. We have not had any verification of this rumor.

THE RUMOR FACTORY

BENJIE claims that Ray Palmer writes the "Richard Shaver" stories appearing in "Amazing Stories" and that John W. Campbell, Jr., does the "George O. Smith" electronic opus called "Venus Equilateral," as well as others. If this is so, (how about it, Science-Fiction Fans?) it may explain the monotonous sameness of the Science-Fiction diet. Thank Heavens for Van Vogt! Too bad a Science-Fiction magazine cannot exist apart from a group of pulps.

QUESTION

Should we open "ROCKETS" to a little fiction? If the Editors promise not to print any of their own stories?

HARD RADIATIONS IN SPACE

"... No one, as far as I know, has ever mentioned the problem of screening a rocket against cosmic radiation. Once the heaviside layer is passed the ship and crew will be up against 100% cosmic rays. If their action is like that of most hard radiation, you will be in pretty bad shape! A third degree gamma burn is nothing to fool with. I would suggest giving the problem to Canning. He seems to be strong on wave theory. It may be possible that cosmic rays can be reinforced until they reach the range, and I hope, the properties of visible light. Sound will do this very thing. Perhaps the theory will carry across. The magazine is swell. You're doing a great job! See you on the Moon!

Harry G. Bickford,
729 Pine St.,
Manchester, N. H.

Editor's Note—You have raised a good question but you cannot guard against a thing until you know what the thing is! The reason we need a high altitude rocket, to ascend 500-2,000 miles into the heavens is to bring back information of just what rays, and what intensity, we will have to insulate against. It may be possible to insulate with the structural material of the ship itself. That is, to build the rocket out of the necessary insulating material. At any event it is fairly certain that the crew will needs be protected, if not against unknown rays of space then surely against their own atomic power plants.

THE SMITHSONIAN SPEAKS!

Mr. R. L. Farnsworth, Pres.
United States Rocket Society, Inc.
469 Duane St., Glen Ellyn, Ill.

Dear Mr. Farnsworth:

Your communication of August 13, asking contributions for the important work of the United States Rocket Society has been duly received and noted with much interest. I regret that we are not in a situation to give you financial aid as our available funds are taken up with our own commitments.

Your investigations in the fields initiated by Dr. Goddard are highly important. The Smithsonian considers it a privilege to have participated in some of the early phases of that work. It is sad that Dr. Goddard's death has interrupted his own investigations.

Very sincerely yours,
(signed) A Wetmore, Secretary.

Editor's Note—What is this? Ancestor worship? We do not think that the good doctor would have liked the idea of all interest in rockets ceasing at his demise! Sad! FLASH! Benjie just telemented us that the Finns say the Russians couldn't have heard that Goddard is gone as the giant Russian rockets are falling all around, over and beyond them!

FORTEAN DATA

Excerpts from a letter from an archaeologist, now in the U. S. Marine Corps.: "... before I go into details I must give you the names of two witnesses to this phenomena, both of them buddies of mine. They are Richard ——— and T. ———. (Locale, S. Carolina.) It all started on Wednesday morning, June 28, 1946, about 2:05 A.M., when these two friends of mine and I were standing 4 hour guard duty. There appeared an object in the sky about that time which was exactly like a star of the 3rd magnitude. It was located one degree to the east and 3 degrees to the south on the far side of the star Polaris. Very soon after its appearance the star (?) started to oscillate, i.e., it moved in circles, up and down, etc., within 1 degree of its original position, as though searching for something. Its movements must have been many miles per second because of its obvious height. It was not only obviously high but since it flickered exactly as any other star it seemed to me that it must have been above the atmosphere. After approximately 7 minutes a new object made its appearance to the direct east at a distance of 2 degrees. It was like a huge half wheel of light which looked like a thick rimmed half wheel. It traveled at an impossible velocity at that distance from the wavering star in an arc of 190° and then just disappeared. At 2:23 A.M. the stellar phenomena vanished—just blanked out—that's all! What can you make of it?"

SOLID FUEL DATA

Enclosed please find three pictures of my recent experiment on solid conventional type fuel with an aluminum tube as the body. The fuel consisted of a mixture of Sodium Chlorate, Lampblack and Sulphur hardened by mixing Dextrine with the powder. Care must be taken on the fuel because type is very explosive. It may be tested by burning a small amount in a piece of paper rolled up tightly, if found too potent it may be thinned by adding sulphur to the powder. The may be poured into the tube after sufficient alcohol is added to the mixture to be in a liquid state. The rocket is then left to dry out thoroughly for about two or three weeks.

John Decker
432 Campton Road
Eureka, Cal.

FALLACIOUS

It is too difficult to refrain from the presentation of a few facts when the space of two pages in "ROCKETS" is devoted to an idea as fallacious as that of using the ultra-violet catalyzed reaction of hydrogen and chlorine to drive a rocket. (See October, 1945, "ROCKETS".)

Without even wasting time on the obvious technical difficulties of incorporating a quartz lens in a rocket chamber, a great expanse of quartz in the rocket body, and the fact that no light will enter when heading directly toward the sun (according to the sketch), there are just two points it will be worthwhile to consider.

First, and least important, is the fact that the U.V. catalyzed reaction is purely a demonstration stunt. As any basic chemistry book will tell you, a spark will work as well. A jet of hydrogen will burn as well in an atmosphere of chlorine as in an atmosphere of oxygen. In other words, wouldn't a spark plug be simpler as a means of ignition?

Secondly—and this point makes the above superfluous, hydrogen and chlorine are a darn poor fuel if from no other consideration than their efficiency. Pre-supposing at least a

cursory knowledge of chemistry by your readers, here are the figures:

Heat of combination of hydrogen and chlorine:

22,000 calories per mal. of HCL,
or
22,000 ÷ 603 calories per gm. of
36.5 total constituents. (H
and CL)

This can be compared to the standby gasoline, which, for purposes of calculation, is assumed to be hexane:

Heat of combustion of hexane*
990,600 calories per mol of hexane

or:
990,000
390

equals 2,540 calories
per gm. of total constituents, (hexane and oxygen)

Thus the common fuels, gasoline and oxygen, have over four times the energy of combination of hydrogen and chlorine. Since the exhaust velocity of a rocket motor is directly related to the heat of combustion, it may be readily seen that hydrogen and chlorine are relatively valueless as fuels.

There is little excuse, with the number of books on the subject, for

anyone to be completely ignorant of the basic fundamentals of rocket fuels.

John S. Harris,

1700 S. 2nd St.

St. Louis, Mo.

Editor's Note—We think the trouble is, Mr. Harris, that many rocket enthusiasts do not take the trouble to buy and read the books!

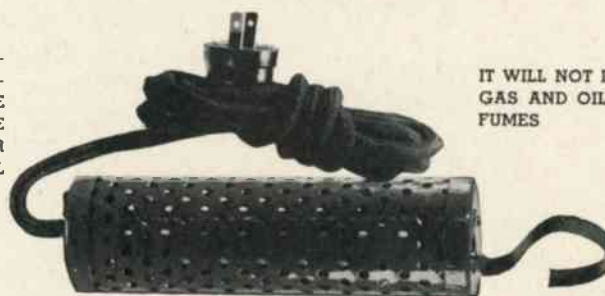
CHEMICAL AND ELECTRICAL LABORATORY

John A. Lizon, of 210 Jackson Ave., North Towanda, New York, tells us that he has a chemical and electrical laboratory and would like to work on rocket problems in cooperation with other members. Some of you will no doubt want to write him and get to working together on some aspect of rocketry. Our suggestion, since he has electrical equipment, is to do a little delving into the nature of gravity. While atom power may make gravity nullification unnecessary it is a very interesting line of investigation.

DRIVER MOTOR HEATER

PRICE 150 WATT - \$3.64 EACH

A NINE FOOT ELECTRIC CORD IS ATTACHED FOR CONVENIENCE IN PLUGGING THE ELECTRIC MOTOR HEATER IN THE WALL SWITCH.



IT WILL NOT IGNITE GAS AND OIL FUMES

Manufactured in 110 Volts 150 Watt—7 Hours—3 cents

Just hang the hook on any convenient place under the hood so that the DRIVER MOTOR HEATER will circulate the heat around the car engine. This will keep the chill off the battery, carburetor and motor, will save the wear and tear of the cylinder walls, lengthen the life of the battery and cause the gas to vaporize more quickly.

RESULT: Easy start.

Absolutely no danger in using the DRIVER MOTOR HEATER as it is termed "Black Heat" and this insures almost an everlasting element.

The DRIVER MOTOR HEATER is unconditionally guaranteed against defective workmanship and materials. Order from: Rocket Associates, Glen Ellyn, Ill.

NEW MEMBERSHIP IDEA

Gordian L. Armstrong came up with the best idea we have heard of for reaching more people who would be interested in joining the Society, if they knew anything about it! He ran an ad in his local paper. In smaller towns and cities a classified ad does not cost much and may bring to your attention people who you would be very glad to know. Here is the type of ad Armstrong ran:

JOIN THE UNITED STATES ROCKET SOCIETY!

Era of Space and Travel Is Here!

For information write to
Gordian L. Armstrong, Box 00

It strikes us that this is a good stunt and one that many members will find it interesting to try. If you have been wishing you knew someone else that was interested in the same things you are, ADVERTISE! We are living in an age where a great number of distractions occur to everyone. You must beat the drum to gain your point.

NO COMMENT DEPARTMENT

G. Edward Pendray, of the American Rocket Society, in NEW YORK DAILY MIRROR, May, 1938:

"Let's get this straight. Neither you nor I will ever go to the moon or any other planet in any rocket. Nor will our children. Our grandchildren might—we can't tell now. Any fairy tales you read about rockets hovering in space or being steered in and out of nests of stars is all bilge. . ."

G. Edward Pendray, of the American Rocket Society, in COLLIER'S, Sept. 7, 1946. Article entitled, "Next stop the moon, all aboard for the planets!"

PUBLICITY

Lately the doings of our Society and its many members have become items of public interest. Due to this we are going to have to adopt the stand which is taken by the British Interplanetary Society, the American Rocket Society and the great majority of other engineering and technical groups and society organizations. NO MEMBER SHOULD MAKE ANY STATEMENTS TO THE PRESS WITHOUT MAKING IT VERY CLEAR THAT PRIOR APPROVAL OF ALL STATEMENTS BY MEMBERS MUST BE SECURED FROM THE HEADQUARTERS OFFICE BEFORE RELEASE TO PRESS, RADIO, MAGAZINES OR OTHER NEWS GATHERING GROUPS. In the last two months we have

had several instances where members have been mis-quoted and unauthorized stories released. You MUST regard your Society as a unit and clear all publicity through headquarters to avoid misleading material.

IN MEMORIAM

H. G. WELLS

The passing of this modern seer makes the writer think at once of the motion picture, "The Shape of Things to Come." We knew at the time that Wells was right again; though how helpless the knowledge made us feel; particularly when, on asking someone after the show how they liked the picture, they replied, "very amusing!"

Again, "The War of the Worlds," though we always had a sneaking

suspicion that Wells really thought of Man in the role in which he placed the monsters from Mars.

While Wells had a great technical advantage over Jules Verne he never eclipsed that great prophet in a mechanical sense. He tried valiantly, however, to fit what he knew of men into the new world science was forging; and he failed to find a solution, as all intellectuals always fail because they try to people a world with minds equal to their own; then, when they realize the absurdity of doing this they fall a victim to extreme intellectual frustration. Wells suffered greatly from this impasse.

Yet he kept up the good fight and it will be long before another as talented achieves as much success.

ADVERTISING RATES—"ROCKETS"

Advertising in "ROCKETS" pays. Key your ad so you will know what "ROCKETS" can do for your service or product. Send ads in promptly. Page size, 8½ x 11. We reserve the right to reject unsuitable ads.

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25% discount for 4 insertions. Agency commissions of 20% paid.

Classified Advertising

Minimum—10 words. Rate—5c per word. Members are urged to use the classified page to buy, sell or swap books, stamps, coins, telescopes, lenses, war souvenirs, scientific equipment of all kinds, cameras, typewriters, sporting goods, models, etc. A classified ad will amaze you in what it can do for your collection of "stuff" which you wish to sell or swap. Our medium is particularly good for "fanzine" ads.

"ROCKETS"

Has the Largest Individual Reader Circulation

PER COPY, of any publication in the United States! Libraries order, and re-order, the same editions, due to the terrific reader interest. Circulation of this issue up 1,196 copies OVER February, 1946!

FOR SALE

Rocket Associates, Inc.

TIRE LOCKS—Protects new tires. Set of four locks, enough for four wheels. \$3.50 value; while they last, \$1.00 per set. BE SURE TO GIVE MAKE OF CAR WHEN ORDERING.

TENNIS BALLS—A limited number, packed 3 to a pressure-packed metal container. \$1.50 for three. Only a few available. Order immediately.

CLASSIFIED ADVERTISING

DRAFTING—To your sketches and specifications. By a qualified professional mechanical engineering draftsman, a member of the U.S.R.S., with a knowledge of the basic principles of rocket propulsion and some of the problems confronting experimenters. Also offered is confidential blueprinting at approximately stand-

ard rates. Estimates free upon receipt of sketches and specifications. If five dollars money order is enclosed work will begin immediately and estimate will be returned by air mail. Should estimate not be satisfactory a 50% return of deposit is guaranteed regardless of the amount of work completed. Remember—All services Strictly Confidential. R. F. Cole, 40 Woodbridge St., New London, Connecticut.

EXCLUSIVE LINE WANTED—Salesman now calling on Chicago Mail Order, Department Stores and Jobbers wishes exclusive line. If you have a good product and can give an exclusive for Chicago territory, large volume sales are guaranteed. Write B-2, c/o "Rockets."

POSITION WANTED—Advertising copy writer with illustrating and art work contacts wishes promotional position with company with whom he can devote 100% of his time. Can handle house organ and dealer promotion as well as write and plan

Cont. on Page 15

NEW PUBLICATIONS

EMBER—"A weekly journal of muse, news and views."

This is a junior edition of "Doubt," put out by our good friend Donn Brazier at 1329 North 33rd St., Milwaukee 8, Wisconsin. Put out at first as one of these one-sheet mailing pieces, with slim prospects of a withered old age, it is now becoming commercial, selling at 2c per copy and accepting advertising at 25c per 2 inches. All kidding aside it is one of the new ones and, we think, very, very well done. Anyone putting out a magazine without advertising has succumbed to a very violent sort of virus. In other words, it's like building Eiffel Towers out of toothpicks or papering the wall with the spots punched out of commuters' tickets, some people, (ourselves included) just can't help it!

ASTRO-JET—"Journal of the REACTION RESEARCH SOCIETY."

On March 31, 1946, the Glendale Rocket Society changed its name to the Reaction Research Society and is carrying on a program of experimentation with dry powder fuel rockets. In addition they publish material of general interest to rocketeers. Address of the Society is 3262 Castera Ave., Glendale 8, California. As we have said before, anyone getting out a magazine on Science-Fiction, Semi-Science or Rocket progress, has our full endorsement and support. If a better world is made, these entrepreneurs and their supporters will have a great deal to do with the foundations.

SUN SPOTS—A "Fanzine"

Edited by Gerry de la Ree, 9 Bogert Place, Westwood, N. J. One of the finest "Fan Mags" we have seen in a long time. Tho, of course, it is impossible for us to keep up with all of these publications which are again popping up after the War.

A very interesting point is made in the Fall issue of this Mag concerning the fact that the young minds which for so many years have been intrigued by the objective possibilities of inter-planetary travel, are, now that such travel becomes possible, leaving it up to the extroverts and are turning to pure fantasy, horror and mysticism. This was the fatal dreamland into which the ancient Aztec philosophy wandered, to be rudely snatched from their dreams and beheaded by the Spaniards. Today the situation is slightly different in that we have the extroverts in our own Society. Those of you who have read our "Rockets—New Trail to Empire," will remember that we forecast this very development.

If, when special navigation becomes a reality, our young and free thinkers would anticipate and start a real mental and moral renaissance, aimed at the proper utilization and control of our new found powers, that would be a vital and stimulating line of thought; but, to wander off into the land of fantasy—that is the land of the Lotus eaters. And—pigs are fattened only to be slaughtered.

POSITION WANTED—

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copy and layout. Free to move to any part of the country where substantial opportunity is offered. Married. Write B-3, c/o "Rockets."

BOOK LIST

We list below books which are available through the United States Rocket Society, Inc. Prices are based on market and availability. These books are the keys to tomorrow. Some of them are for the Scientist, some for the Engineer, some for the Rocket experimenter and some are for the Dreamer! Taken all together, you might make a door out of them; hang the door on the hinges of possibility and probability; set it in the solid wall of inertia and ridicule. Then open these books — and peer into the FUTURE!

TITLE	AUTHOR	DESCRIPTION	PRICE
ROCKETS—By Robert H. Goddard.....		The two famous Goddard papers in one binding.	\$3.50
ATOMIC ENERGY FOR MILITARY PURPOSES—By Henry D. Smyth.....		The primer of atomic energy. Should be read by every taxpaying citizen.	2.00
THE "PARTICLES" OF MODERN PHYSICS—By J. D. Strathan, Ph.D.....		What the student and engineer wants to know about the atom.	4.00
APPLIED NUCLEAR PHYSICS—By E. Pollard & W. L. Davidson, Jr.....		Methods of accelerating particles, and applicable tables, charts and formulae for experimentation.	3.00
THE MODERN GAS TURBINE—By R. Tom Sawyer.....		What the engineer wants to know about the gas turbine.	3.00
ROCKETS—By Willy Ley.....		Still the best all-around book on rockets.	3.00
ROCKET RESEARCH—By Constantin Lent.....		A rocket primer and a "must" for your library.	4.00
ROCKETS, DYNAMOTORS, JET MOTORS—By A. L. Murphy.....		A fine book for the experimenter.	2.00
"WEGE ZUR RAUMSCHIFFFAHRT"—by Herman Oberth.....		German Rocket Classic by the man who made the V-2's. Collectors' item.	7.75
"RAKETENFLUGTECHNIK"—By Eugen Sanger.....		German rocket calculations. Collectors' item.	3.75
THE COMING AGE OF ROCKET POWER—By G. Edw. Pendray.....		A rocket prophet speaks.	3.00
CHARLES FORT OMNIBUS—By Charles Fort.....		"The Book of the Damned," "Lo," "Wild Talents" and "New Lands." The four books of Charles Fort. The gold mine of science-fiction and reading to give you a new slant on life! RECOMMENDED.	4.50
THE BEST OF SCIENCE FICTION—Edited by Groff Conklin.....		Forty science fiction classics.	3.00
THE DAY DAWNS FOR JET PROPULSION.....		Westinghouse Elec. Co. pamphlet hinting at interplanetary travel. Interesting chart.	.25
YOU AND THE UNIVERSE—By John J. O'Neill.....		An intensely interesting book giving an outline of what we know and do not know about ourselves and the Universe.	3.50
SKY AND TELESCOPE.....		Monthly astronomical journal published by the Harvard Observatory. For the professional and amateur astronomer.	3.00 (per year)
BACK ISSUES OF ROCKETS:			
1st Issue, May, 1945.....			each 3.00
2nd Issue, October, 1945, (SORRY, OUT OF PRINT!)			
3rd Issue, February, 1946.....			each 2.00
(Prices subject to change or withdrawal)			

CELESTIAL PHOTOGRAPHS

These are 8 x 10 glossy prints suitable for framing. Taken by telescopes at Mt. Wilson and Yerkes observatory. Make fine decorations for your den or study. We advise buying now as we cannot guarantee prices.

Seven splendid views of the Moon, Jupiter, Saturn, Mars, Venus, Mercury, Uranus, Neptune and Pluto. 75 cents each.

You cannot contemplate these photos without a feeling of awe. Here before your eyes swim vast masses of matter that are worlds! What conditions exist on these alien orbs? What thoughts energize the life forms on these myriad globes, which, through all eternity have accompanied us around the Sun, through the immeasurable depths of space!

NOTE—When ordering books or photographs a 10% discount will be given when three or more items are ordered. We save this much in reduced wrapping and mailing costs. All books and photos sent prepaid. Make check or money order out to "Rocket Associates, Inc.," Box 29, Glen Ellyn, Illinois.

ROCKET ASSOCIATES, INC.

After many delays our experimental workshop was completed and when electrical service is run in could be available for research if it were not for the fact that in the meantime subdivisions have been laid out immediately adjacent to our site. Due to this the directors decided to sell the building and locate

elsewhere. Sale of the building should realize more than enough to locate in a more desirable (for rocket purposes) area.

A few shares of stock are still obtainable for \$10.00 per share. Anyone interested in Rocket Associates may obtain more information by dropping us a line. A stockholders' meeting will be held in the near future.

MEMBERSHIP LISTS

If your name does not appear on these lists, and you are a resident of one of these States, it means that your membership has expired and this is the last issue of "Rockets" which you will receive. Please check your membership to remain in good standing. If you are not a member of one of these States, and your membership has expired, this will be the last issue of "Rockets" you will receive until your membership is restored to good standing.

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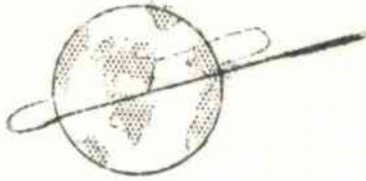
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You must be a Citizen of the
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can only issue a non-voting
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