

Tiny Earth Satellites

➤ THE CHANCES are "very good" that there are one or more small satellites between the earth and the moon, but spotting them will be difficult, Dr. G. M. Clemence, director of the Nautical Almanac office of the U. S. Naval Observatory has stated.

Such tiny objects, which could serve as ready-made space platforms, might have made earth-splashing meteorites if they had not been captured by our planet's magnetic field. A telescopic search for the circling moonlets is being made for the armed forces by Drs. Clyde Tombaugh and Lincoln La Paz, director of the Institute of Meteoritics of the University of New Mexico, Albuquerque, N. M.

Speed of the tiny moons would depend upon their distance from the earth, Dr. Clemence explained. A satellite 1,000 miles away would whiz around the earth in about two and a half hours, which is one reason why such objects have not previously been spotted—they would be moving too fast to be caught on the usual photographic plates.

Another reason tiny satellites have not

been seen is that "most of the time they are in the earth's shadow, and thus do not shine," Dr. Clemence continued. If, however, such an object were not too close to the earth, it would come out of the shadow just a little, and thus could be seen. Solution to the problem of such fast motion, Dr. Clemence said, is to move the camera at the same speed as the satellite being hunted would flash through the sky.

Completion of the sky-sweeping search is expected to take two to three years.

Science News Letter, March 20, 1954

TECHNOLOGY

Fluorescent Light Twice As Bright at Intersection

➤ AN EXPERIMENTAL fluorescent light unit at an intersection of the Sacramento, Calif., highway has been found to give twice the light of the common mercury vapor street light. Furthermore, the light is "glareless."

Highway engineers thought the cool Cali-

only to the early part of this century, re-
Science News Letter, March 20, 1954
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Matter of Fact By Stewart Alsop

And Now, the Satellite

ABOUT TWO years from now—provided all goes according to plan—the United States should be ready to launch into space the world's first artificial earth satellite.

The satellite which is now being planned will be very different from the elaborate space ships usually envisioned. It is likely to be hardly larger than a softball, and it will probably weigh well under 100 pounds. This small object will be hurled into space by means of a two or three-staged rocket, reaching an "escape velocity" of just under 8 miles a second in its final stage.

Thereafter, the tiny satellite will circle the earth, at an altitude of 250 miles or more, like a ball at the end of a string, completing each circle in less than two hours. After some weeks, it will probably drift earthward as a result of slight atmospheric drag, and eventually it will disintegrate when it hits the denser atmosphere below.

Telemetering and other devices which can be built into such a tiny man-made moon can tell technicians on the earth below much about the great unknowns of space. Thus it will have very great scientific value. But, it should be understood, it will have no military application at all—it could not be used to kill anybody, or even to spy on anybody.



Alsop

IT IS FOR precisely this reason that no serious effort to get a satellite into space has heretofore been made, even though seven or eight years ago the technicians of the Air Force's Rand Project ruled that a satellite was technically feasible. Opponents of the satellite project have hitherto argued successfully that first priority must be given to weapons with real military value—above all to the decisive weapon, the intercontinental ballistic missile, or IBM.

There are two main reasons why it has now nevertheless been decided to make a serious effort to achieve a satellite. In the first place, as the missile art has matured, it has become clear that a satellite is a way-station on the road to the IBM, and can be achieved without any great diversion of funds or manpower from the decisive weapon.

One might suppose that the problem of creating a 5000-mile-range ballistic missile would be far easier than the problem of creating an artificial heavenly body. Actually, the satellite—or such a crude, preliminary satellite as that described above—is much easier.

THE TWO worst headaches for the intercontinental missile designer—how to guide the missile accurately to its target half a world away, and how to prevent its disintegrating like a comet when it re-enters the atmosphere—do not exist for the designer of a satellite. The problem of design is also very much simplified because a small satellite like that described above weighs far less than the bulky hydrogen warhead of an intercontinental missile.

The total cost of getting such a small object into space has recently been estimated as low as 20 million dollars—practically nothing compared with previous estimates of one billion dollars or more. And intelligence analyses of Soviet progress in missiles have made a 20-million-dollar investment in a satellite project seem urgently desirable.

In recent months the Soviet press has been filled with boasts about future Soviet triumphs in space. Professor

Nesmeyanov, president of the august Soviet Academy of Sciences, passed the word: "Science has reached a point where it is realistic for us to speak of creating an artificial satellite of the earth." Nesmeyanov's words have been echoed by numerous confident predictions by other Soviet scientists.

THE INTELLIGENCE experts have learned from sad experience, notably with both the atomic and the hydrogen bombs, that this sort of Soviet chest-thumping must be taken very seriously indeed. The prospect of permitting the Soviets to get the first artificial satellite into space seemed more intolerable the more the problem was considered.

The Russians would gain enormous prestige in the scientific world, as well as registering a huge propaganda victory if they were the first to break the bonds of gravity. But that is by no means all. Even assuming that the first Soviet satellite missile lacked a practical military application, it would represent a great first step into an unknowable future.

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tully contrived structure of many different kinds of crystals, has a tensile strength of less than 500,000 lbs. per sq. in.

Besides being monstrously strong, said G.E., the perfect iron crystal does not rust like ordinary iron. The same orderly structure that makes it strong seems to protect it from oxidation.

So far, the perfect crystals have no practical utility. Said Dr. C. G. Suits, G.E. director of research: "We certainly cannot use them to support a suspension bridge. But their discovery is very recent. In time, applied science and technology will find a practical use for this form of metal."

Second Moon?

Astronomer Clyde Tombaugh, who spotted the planet Pluto (1930), is looking for a nearer and even more elusive object: a second satellite of the earth. Since he refuses to give details and refers questioners to Army Ordnance in Washington, it is fair to assume that the famous rocketmen who work for Army Ordnance are interested in the project. They may want merely to know what opposition from nature their rockets are apt to encounter when they climb deep into space. Or they may have a more ambitious interest: a nearby, natural satellite might be a more convenient base in space than the much-discussed artificial satellite.

There is no evidence so far that the earth has a second satellite, but Mars has two satellites, Jupiter has twelve satellites, and Saturn probably has millions of them in its rings. The earth may have picked up a few small ones. The fact that they have not been discovered yet does not prove that they do not exist.*

A small satellite close to the earth would be hard to spot. It might circle near the equator, invisible to most of the world's observatories. In any case, it would spend nearly half its time in the shadow of the earth, where it would be invisible. Most of the rest of the time it would be passing over the sunlit earth, and would look no brighter at best than a tiny fragment of the moon as seen by day. Best time to look for a small satellite would be at dawn or dusk, when it would be shining brightly above the dim-lit earth.

A satellite near the earth would have to move very fast to keep itself out of the clutches of the earth's gravitation, and its speed would make it doubly hard to spot. A miniature moon 1,000 miles above the earth would whiz around the earth in about two and a half hours, too fast for its image to be caught by ordinary photographic plates. Best way to catch it would be with a swinging telescopic camera turned to match its speed. Thousands of small areas in the sky must be examined and completion of such a search could take years. Presumably, that is what Dr. Tombaugh is doing.

* In Jules Verne's *From the Earth to the Moon*, a small satellite of the earth disturbed the course of the space ship and almost kept it from ever returning to earth.



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AFTER 50 YEARS

The unexpected recovery of the lost asteroid 515 Athalia, unobserved for half a century, has just been announced by Dr. Paul Herget, University of Cincinnati. Athalia was discovered photographically on September 20, 1903, by Max Wolf at Heidelberg. The few observations extended only to October 19th, and although its orbit was computed, this faint minor planet was not picked up again in later years.

Since 1949, Dr. Frank Edmondson at the University of Indiana has been systematically searching for lost minor planets with a 10-inch Cooke camera (*Sky and Telescope*, September, 1954, page 373). In recent months 14 "new" minor planets were observed on at least three occasions each—the minimum number of observations for an orbit calculation. At Cincinnati, using the giant electronic computer at General Electric's jet engine plant, Dr. Herget computed the orbits of the 14 asteroids in just 14 minutes—a job that would have taken a week by laborious hand-computing methods.

Comparison of the newly computed orbits with older lists of asteroids was made by Dr. Peter Musen, who found that one of the 14 was the long-lost Athalia. Few other minor planets that have been lost so long are still to be recovered.

"SATELLITE SCARE" UNFOUNDED

On August 23rd, *Aviation Week* published a brief note in which it stated that two objects circling the earth had been identified as natural, not artificial satellites. They were supposed to have orbits 400 and 600 miles above the earth's surface. Dr. Lincoln LaPaz, of the University of New Mexico, was stated to have headed the identification project. This story has proven unfounded, although it has been widely quoted and amplified in the press.

In a statement to the press, on August 23rd, Dr. LaPaz said in part:

"As regards the *Aviation Week* story on the satellite search, summarized in the Associated Press release shown me, it is false in every particular insofar as reference to me is concerned. I have not been sent back and forth between White Sands Proving Ground and the Mount Palomar Observatory, as the story asserts. In fact, my only communication with anyone at Mount Palomar on the matter of nearby satellites has related to a paper on such satellites that I recently published in the journal of the Astronomical Society of the Pacific."

The technical paper referred to was published in February, 1954; Dr. LaPaz

discussed the possibility of testing a point in relativity theory from observations of the advance of perigee of a hypothetical artificial or natural satellite. In a footnote he calls attention to the search for possible natural satellites being carried out for a different purpose by Clyde Tombaugh under U. S. Army sponsorship.

On August 25th, a press release by Col. Walker W. Holler, the commanding officer of the Office of Ordnance Research, Durham, N. C., confirmed the army's sponsorship of the basic research project at White Sands Proving Ground with which Mr. Tombaugh, the discoverer of Pluto, is connected. Part of his activity is in the satellite field. It was further stated that Dr. LaPaz had no connection with the Ordnance Research satellite project. Col. Holler also said:

"As to the success of current efforts to locate an earth satellite of the type described, we are not aware of all the work that may be going on outside of Ordnance auspices. The Ordnance-sponsored work has not as yet located any earth satellites."

RADIO-STAR DISTANCES

A promising method for measuring the distances of radio sources has been developed by D. R. W. Williams and R. D. Davies, of the Jodrell Bank Experimental Station in England. They have applied the method to the strong radio stars known as Cassiopeia A and Cygnus A. Both sources lie in the Milky Way, and over their continuous radio spectra is superimposed the 21-cm. line of interstellar hydrogen.

In each case, the 21-cm. line has two components representing two spiral arms of the galaxy. Comparison of the 21-cm. intensities and the adjacent continuous spectrum of the radio star indicates how much of the radiation of the radio star is absorbed in traversing the spiral arms. From these absorptions, the distance of the radio source can be inferred with the aid of Oort's model of neutral hydrogen distribution in the galaxy.

The Cygnus source is found to be farther than 9,500 parsecs, the distance of the remoter spiral arm in that direction. From optical observations, this source had already been placed by Minkowski at 34 million parsecs, where it appears to be caused by the collision of a pair of galaxies. On the other hand, the Cassiopeia source is either within or nearer than a spiral arm at 500 parsecs; Minkowski had placed it at 300 to 500 parsecs from the sun. The other spiral arm in the direction of Cassiopeia is 2,500 parsecs away.

THE SUN NAVIGATION OF ANIMALS, by Hans Kalmus, *Scientific American*, October, 1954. "This article will describe certain remarkable experiments of the past two years which show that such diverse creatures as birds, bees, ants and crustaceans do possess a direction-finding mechanism. They can navigate by the sun and, in some cases, even by the moon!"

RADIO ASTRONOMY, by A. C. B. Lovell and others, *Occasional Notes of the Royal Astronomical Society*, No. 16, April, 1954. "Many more of these radio stars have since [1948] been discovered; some have been related to extra-galactic nebulae and one or two to unusual objects in the Milky Way. Even so, the paradox remains and the general relationship between the radio stars and the common stars and, in fact, between the universe as revealed by light waves and that revealed by radio waves, remains to be elucidated."

OBSERVING THE COMETS, by Elizabeth Roemer, *Leaflet No. 305*, Astronomical Society of the Pacific, October, 1954. "Comets do not always behave as they are expected to. Periodic Comets Schwassmann-Wachmann I and Pons-Brooks are known to have had sudden outbursts of brightness while Comet Pajdusakova faded out unexpectedly in December, 1953. In order to get more information about such events, it would be useful to have more frequent observations than the professional astronomers can make, especially when the comets are bright."

NEW SITES FOR HARVARD METEOR CAMERAS

During the past summer, the observing stations of the Harvard photographic meteor program, under the direction of Dr. Fred L. Whipple, were moved to permanent sites with commercial power facilities. They had operated for six years as mobile field stations at Soledad and Dona Ana, New Mexico, as described by Dr. Whipple in *Sky and Telescope* for February, 1949.

One station is now located at Sunspot, N. M., at an altitude of 9,200 feet on the grounds of the Sacramento Peak Observatory of the Air Force Cambridge Research Center. The instruments are mounted on the crest of the ridge not far from the new 16-inch coronagraph buildings. The second station is located at Mayhill, N. M., some 22 miles northeast of Sunspot.

The cameras were scheduled to be back in operation during October. Their new locations, about 70 miles from their original sites, are expected to provide excellent weather conditions for meteor observing with the extremely rapid Baker super-Schmidt meteor cameras.

1954

OFFICE OF THE DIRECTOR

Page

J. of Space Flight, Chicago

1954, "The Space Program" by the National Academy of Sciences, 1954, p. 12. This report, which is a summary of the work of the National Academy of Sciences, is a valuable source of information on the current state of the space program. It covers a wide range of topics, including the development of rockets, the design of spacecraft, and the problems of launching and operating satellites. The report is written in a clear and concise style, and is accessible to a wide range of readers. It is a must-read for anyone interested in the space program.

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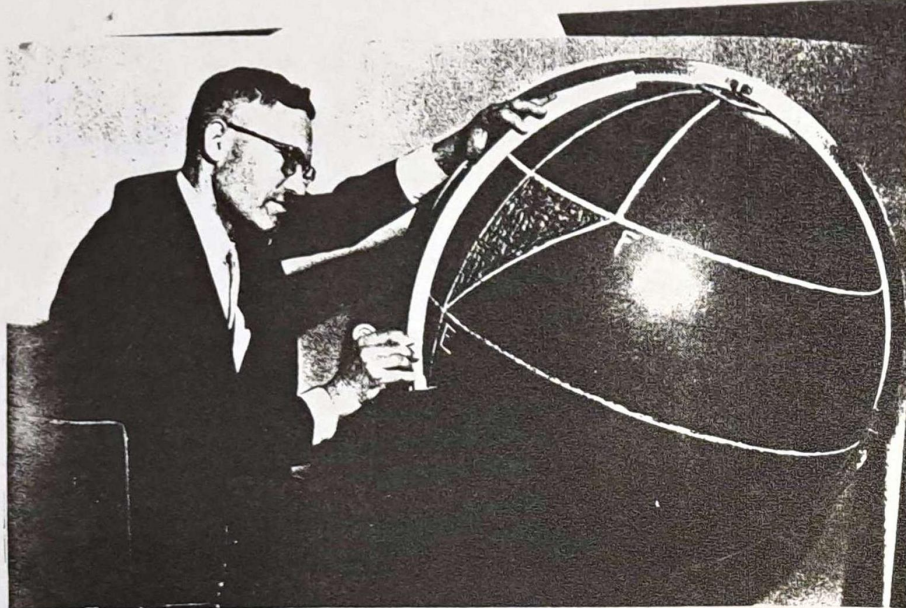
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Professor Tombaugh uses a blank globe to locate, by triangulation, hypothetical satellites of the earth

He Spies on Satellites

By Thomas E. Stimson, Jr.

HHEADQUARTERS, Outer Space Patrol." That's a fitting name for the odd metal shed from which a close watch will be kept on the satellite that the United States plans to launch in 1957-58.

Situated on the grounds of Lowell Observatory in Flagstaff, Ariz., the small building contains telescope-cameras so powerful they can record an object the size of a tennis ball at a distance of 1000 miles.

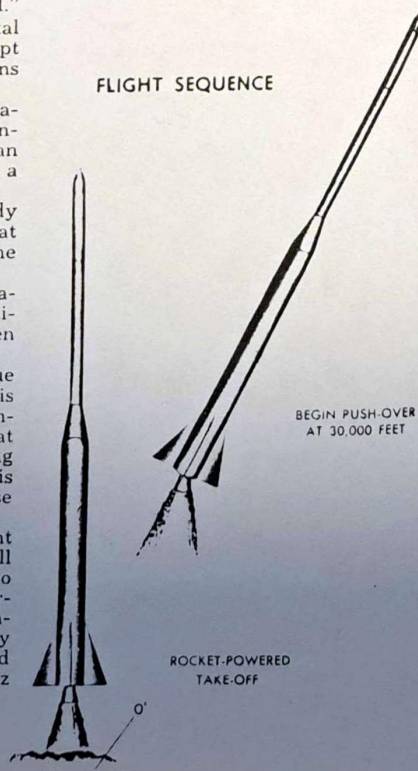
From this shed the United States already is maintaining a surveillance of the space that surrounds the earth, all the way out to the moon.

From here, presumably, regular observations are being made of the earth's first artificial satellite that is rumored to have been launched into space a year ago.

Exclusively reported in the May 1955 issue of *Popular Mechanics*, the existence of this manmade moon has not yet been officially confirmed. But unofficially it is understood that our first artificial satellite is still sweeping around the earth. The latest information is that its orbit is slowly changing into an ellipse because of the pull of the moon.

Possibly the success of this first experiment lies behind the announcement that we will launch an instrument-carrying satellite two years from now, in connection with the International Geophysical Year, to gather new information about outer space. Scientists say that the instrument satellite will be positioned at 200 to 300 miles altitude and will whiz

FLIGHT SEQUENCE



BEGIN PUSH-OVER
AT 30,000 FEET

ROCKET-POWERED
TAKE-OFF

AEROBEE PITCHES DOWN
AND THIRD STAGE FIRES
AT 300 MILES

AEROBEE BURNS OUT
AND BEGINS COASTING
AT 410,000 FEET

AEROBEE FIRED
AT 110,000 FEET

Modified Aerobee rocket has been proposed as a satellite. Right, smoke from booster hides launching tower as rocket zooms up

around the earth every 90 minutes. The satellite, they report, will be about the size of a basketball, though this may refer only to its diameter. Several different sizes and shapes may be launched during the satellite program.

One proposal made by Aerojet Corporation, manufacturers of JATO and other rocket units, is to use a modified Aerobee sounding rocket as the satellite. The Aerobee is 20 feet long and 15 inches in diameter, powered with a liquid-fueled motor and launched by means of a solid-fuel booster unit. One 30-foot version, the Aerobee-Hi, has carried 100 pounds of instruments to an altitude of 123 miles.

Aerojet's idea for the satellite is to use an extra large booster under the rocket. This would lift the Aerobee to about 20 miles, at which point its own motor would take over until it is parallel with the earth. At the peak of its climb, about 300 miles, a small solid-propellant motor in the nose would fire, detaching the nose from the body of the rocket and accelerating the nose to an orbital velocity of about 16,000 miles per hour. There would be room in the nose cone for various measuring instruments plus telemetering circuits that would radio information back to earth.

Data on pressures, temperatures, cosmic rays and other phenomena could be obtained this way. But the actual tracking of the rocket itself will be done by astronomical instruments. The altitude of the satellite, its speed and direction of movement can be measured most precisely by the instruments already in use at Flagstaff. The eventual descent of the satellite into the atmosphere and its disintegration will be forecast

OCTOBER 1955

107



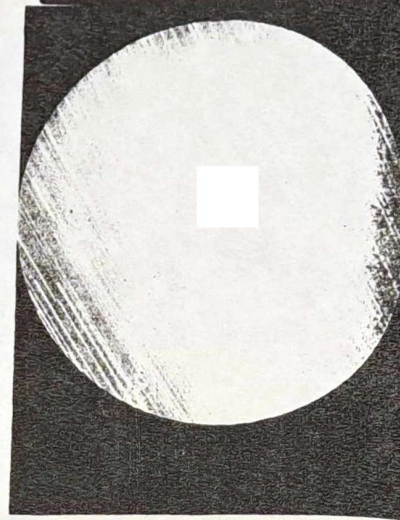
Plain wooden box houses Schmidt telescope so powerful it could spot a tennis ball 1000 miles away

with the aid of the same instruments.

Until now, the principal use of these instruments has been the seeking of any small natural satellites that the earth may possess.

Scientists suspect that these objects may exist, though none has been detected even by the world's most powerful telescopes. Until recently no one cared whether nearby space was totally empty or contained a satellite population, nor had anyone figured out a way of searching for them.

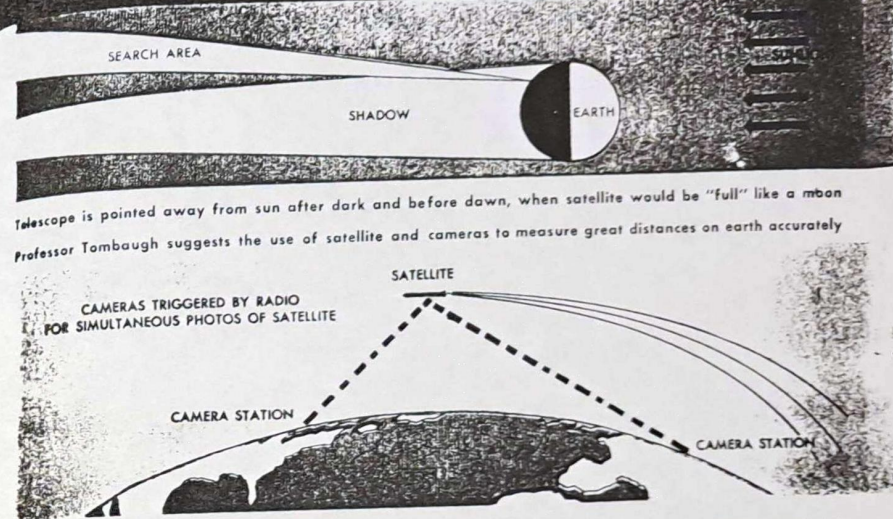
Roof of an unimpressive metal shed is rolled back to expose telescope that now is searching for satellites



Typical film from satellite search shows long star trails. Satellite would appear as two bright dots

Such bodies might be chunks of debris left over from the creation of the moon or they could consist of material captured from an asteroid that had swept through earth's gravitational field.

A small natural satellite might be less than the size of an automobile or it might measure many miles across. It could be a solid mass or simply a loose jumble of rocks. Information about natural satellites, if they exist, would be extremely valuable in mapping out the program for artificial



satellites, their altitudes and orbits.

The search for any such natural objects is being conducted by astronomer Clyde W. Tombaugh for the Army's Office of Ordnance Research. Professor Tombaugh is the discoverer of "Planet X," now known as Pluto, the planet that is farthest from the sun. He is an authority on finding hypothetical objects in the sky. Yet for his satellite search he had to invent brand-new methods. No previous astronomical technique would perform the job.

His discovery of Pluto came about after other astronomers concluded that an unknown object was affecting the motions of some of the outer planets. An undiscovered planet was suspected. Its probable position was worked out and many photographs were made of that part of the sky. But no new object was found. "Planet X" remained a mystery until Professor Tombaugh took up the search. He recalculated, much more precisely, the position that the unknown body would have to occupy. Then he pointed a telescope in that direction. He was rewarded by photographs containing an image of the object.

This method won't work for small earth satellites. If they exist they are too small to affect the motions of the earth and moon, so there is no theoretical way of pinpointing their locations. Nor can they be detected by telescopes that are geared to turn at the same rate at which the stars move across the sky. A small, close-in satellite would move too rapidly to build

up an image on film in a telescope that is turning at the usual rate.

Professor Tombaugh overcame this problem by calculating the speed at which a theoretical satellite would move across the sky, then geared his instruments (a Schmidt reflecting telescope with a 13-degree field and a K-24 aerial camera with a 40-degree field) to move at the same rate. This way, a satellite would literally stand

(Continued to page 332)

Drive mechanism of the telescope is set at speed at which a theoretical satellite would move across the sky at certain altitude



He Spies on Satellites

(Continued from page 109)

still and produce a heavy photo image. Ordinary stars would trail out into long thin lines of light on the film. This explains the odd streaks of starlight on the telescope photo that accompanies this article.

A telescope with normal sidereal drive turns at a constant 15 degrees per hour. The satellite-seeking instruments are geared to turn at rates that range as high as 1500 degrees per hour.

But the problem isn't quite that simple, explains Professor Tombaugh. "The speed of a satellite depends on its distance from earth," he says. "The closer it is, the faster it must move to maintain an orbit."

To overcome this complication, the astronomer divided the space around the earth into numerous concentric spheres or depth zones. He calculated the average orbital speed for each zone, then explored each zone by adjusting the variable-speed drive of the telescope to suit.

"What we seek on the film are two dots of light, one above the other," he explains. "The two dots would show that we had picked up an object moving at an angular rate corresponding to that of the telescope drive. Short streaks would indicate a suspect that was moving at not quite the calculated speed.

"The double image (one dot above the other) is created by making an offset in telescope declination about halfway through the five-minute exposure. This is done on purpose to avoid spurious images such as might be created by a speck of dust on the film. Dust wouldn't produce the offset image and so can easily be identified as spurious."

Occasionally Professor Tombaugh finds a bright diagonal line on a film, running at an angle to the long star trails. It has been produced by a meteor. Another film may show intermittent dashes of light, possibly with a bright white line alongside them. These are made by an aircraft, the short streaks being created by the winking navigation light on the plane's wing tip.

Just as the moon is visible because it reflects the light of the sun, small satellites can be detected only by the sunlight that they reflect toward the earth. This wouldn't be much at best, and part of the time a satellite would be only partly "full" or would be in the earth's shadow.

So in some procedures, the observing staff deliberately searches in a direction away from the sun. They point their instruments east right after the sun sets in the west, and west just before dawn. This gives

(Continued to page 334)

maximum reflection of sunlight from any object that happens to be out in space.

Why not use radar instead of light-gathering instruments for the search? Because, explains Professor Tombaugh, radar is much less effective than light in detecting small objects at great distances. It's true that radar signals have been reflected back from the moon, but the moon is a large body. It bounced back a signal because of its size.

Professor Tombaugh's method of seeking satellites is so sensitive that not only could it detect a white tennis ball 1000 miles away, it would reveal a white-painted rocket the size of a V-2 at the distance of the moon. It could record a dark meteorite about one foot in diameter 1000 miles out in space.

Professor Tombaugh is closemouthed about his results. He won't say whether or not any small natural satellites have been discovered. He does say, however, that newspaper reports of 18 months ago announcing the discovery of natural satellites at 400 and 600 miles out are not correct. He adds that there is no connection between the search program and the reports of so-called flying saucers.

Aside from seeking satellites, the new technique has several other useful applications in astronomy. It lends itself to systematic searching for small planetoids (asteroids) that occasionally cross the earth's orbit. To date only a dozen of them have been discovered, each time by accident, yet it is thought that there may actually be hundreds of these objects. Too, the rapid-drift technique may reveal a great number of small comets that are not now known to exist.

Another field is the search for the new class of variable stars known as "flare" stars. These suddenly increase in brightness by as much as two magnitudes, then return to normal brilliance within five minutes. It has been suggested that these sudden outbursts of energy represent the detonation of natural equivalents of enormous hydrogen bombs. The processes that cause the outbursts are of very great astrophysical interest.

The best method of seeking flare stars in the past was slow and tedious. It consisted of carefully comparing pairs of photographs of the same region of the sky under a special microscope. The rapid-drift technique gives the same information almost at a glance. A mere bright spot in the long drawn-out trail of a star would indicate that a flare star had been active.

One of Professor Tombaugh's proposals is to use an artificial satellite in measuring

(Continued to page 336)

great distances on earth to within an accuracy of several feet. The oceans never have been spanned by surveyor's instruments, hence no one knows the exact distance and direction from, say, New York City to Rome.

By making simultaneous photographs of an artificial satellite from several locations on earth, accurate azimuth and elevation angles would be obtained for geodetic triangulation over great distances.

"That's one possibility," says Professor Tombaugh, "and there are others. A curious thing about astronomy is that we have explored the universe to a distance of 2,000,000,000 light-years away and yet never before have we made a thorough search of our own immediate neighborhood. Now we are trying to learn what is very close to home for the first time."

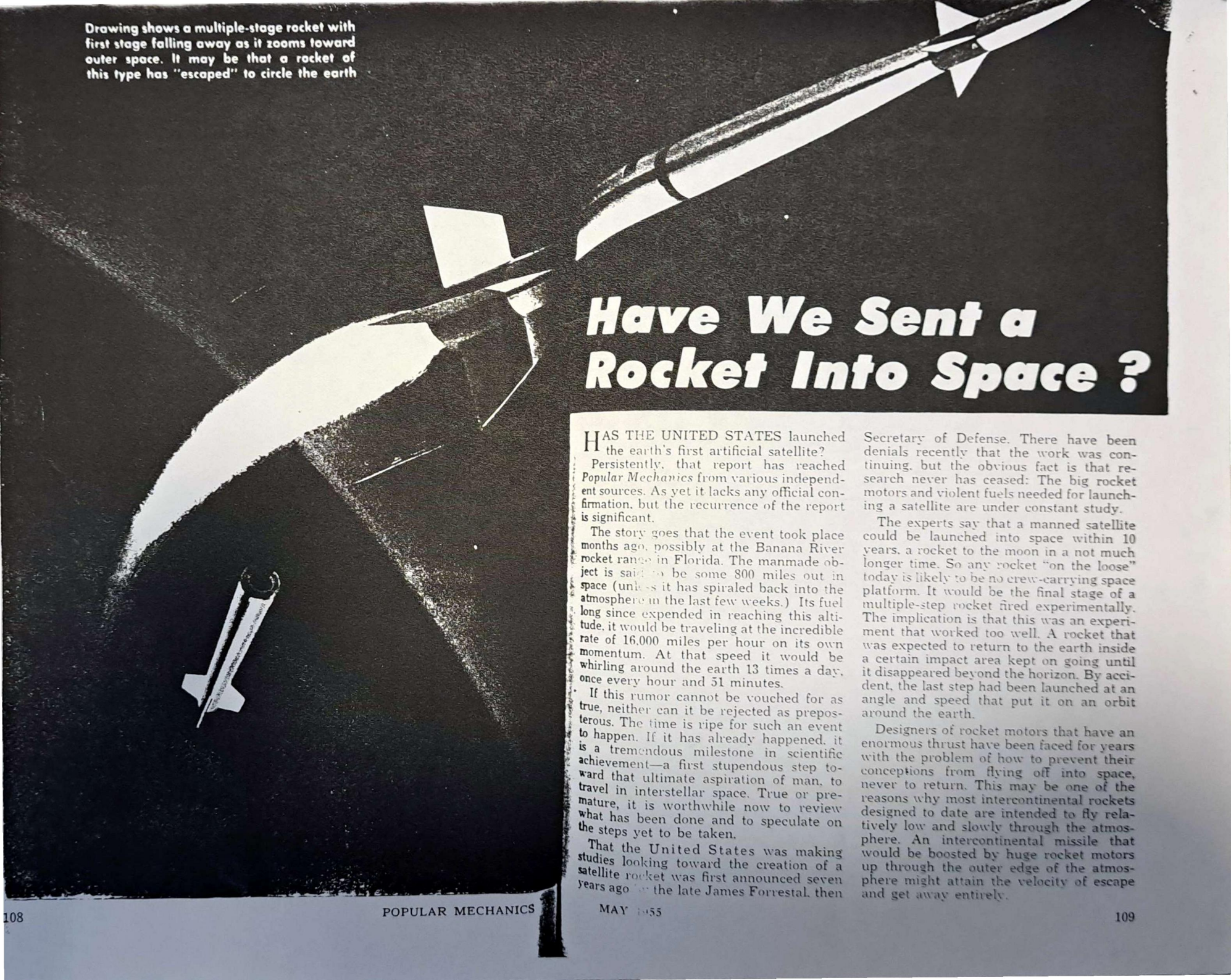
And, now that we are launching a program of artificial satellites, Professor Tombaugh's sky-sweeping telescopes will be used to keep track of them. ★ ★ ★

Rapid-Reading Kit

You can teach yourself to read faster and better with a complete home rapid-reading kit. Included in the kit is a plastic card holder designed to promote reading by phrases instead of by individual words. The device has a spring-powered shutter which is released to expose a phrase on the card for $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$ of a second. A total of 43 cards containing over 900 phrases and numbers are furnished with the device. The kit includes instructions and booklets.



Drawing shows a multiple-stage rocket with first stage falling away as it zooms toward outer space. It may be that a rocket of this type has "escaped" to circle the earth



Have We Sent a Rocket Into Space?

HAS THE UNITED STATES launched the earth's first artificial satellite?

Persistently, that report has reached *Popular Mechanics* from various independent sources. As yet it lacks any official confirmation, but the recurrence of the report is significant.

The story goes that the event took place months ago, possibly at the Banana River rocket range in Florida. The manmade object is said to be some 800 miles out in space (unless it has spiraled back into the atmosphere in the last few weeks.) Its fuel long since expended in reaching this altitude, it would be traveling at the incredible rate of 16,000 miles per hour on its own momentum. At that speed it would be whirling around the earth 13 times a day, once every hour and 51 minutes.

If this rumor cannot be vouched for as true, neither can it be rejected as preposterous. The time is ripe for such an event to happen. If it has already happened, it is a tremendous milestone in scientific achievement—a first stupendous step toward that ultimate aspiration of man, to travel in interstellar space. True or premature, it is worthwhile now to review what has been done and to speculate on the steps yet to be taken.

That the United States was making studies looking toward the creation of a satellite rocket was first announced seven years ago by the late James Forrestal, then

Secretary of Defense. There have been denials recently that the work was continuing, but the obvious fact is that research never has ceased: The big rocket motors and violent fuels needed for launching a satellite are under constant study.

The experts say that a manned satellite could be launched into space within 10 years, a rocket to the moon in a not much longer time. So any rocket "on the loose" today is likely to be no crew-carrying space platform. It would be the final stage of a multiple-step rocket fired experimentally. The implication is that this was an experiment that worked too well. A rocket that was expected to return to the earth inside a certain impact area kept on going until it disappeared beyond the horizon. By accident, the last step had been launched at an angle and speed that put it on an orbit around the earth.

Designers of rocket motors that have an enormous thrust have been faced for years with the problem of how to prevent their conceptions from flying off into space, never to return. This may be one of the reasons why most intercontinental rockets designed to date are intended to fly relatively low and slowly through the atmosphere. An intercontinental missile that would be boosted by huge rocket motors up through the outer edge of the atmosphere might attain the velocity of escape and get away entirely.

sought out and destroyed by a guided missile. What prevents a satellite from plunging back into our atmosphere or from whirling indefinitely out into space? Prof. Samuel Herrick of the University of California at Los Angeles explains that a close-in satellite would be governed by the same principles of celestial mechanics that control our huge natural satellite, the moon. In each case the gravitational pull of the earth is balanced by the centrifugal force of the speeding object. And because there is nothing to slow it, the satellite maintains a perpetual orbit. The closer a satellite is to the earth, the faster it must travel to maintain an orbit. Thus the moon, 238,000 miles away, has an orbital speed of 2700 miles an hour. A satellite only 1000 miles distant

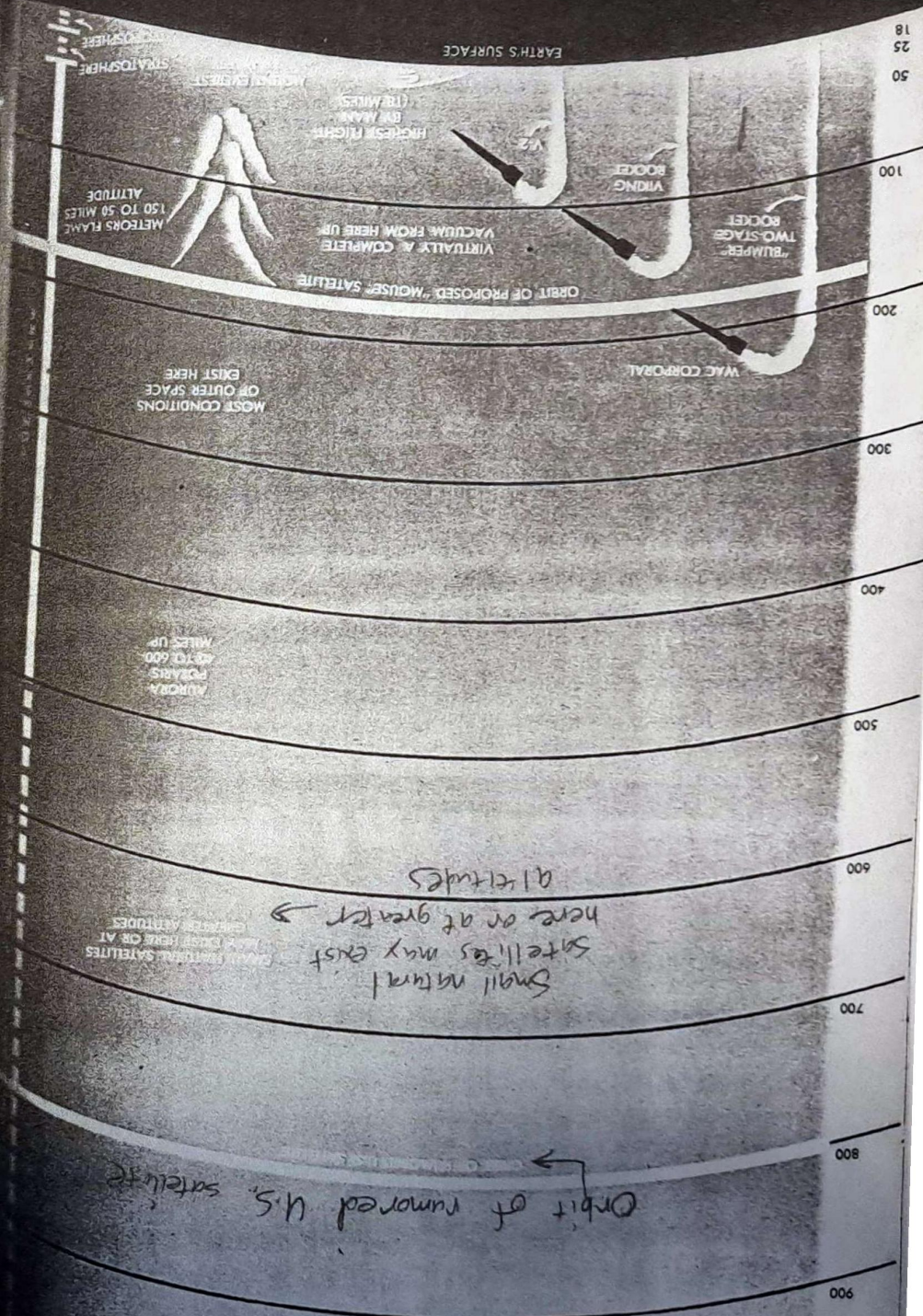
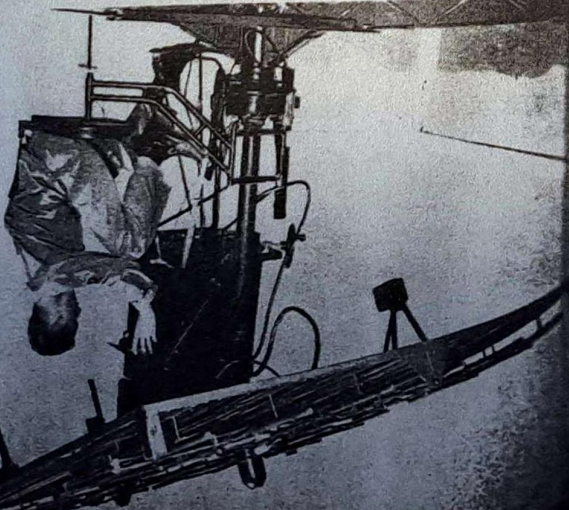
While we are experimenting toward satellites, we are watching the skies for natural satellites—and, no doubt, for evidence that scientists of other countries are experimenting in space. A year ago, astronomer Clyde W. Tombaugh was commissioned by the Army's Office of Ordnance Research to hunt for any natural satellites that may be orbiting around the earth. He devised a special technique for seeking them. One reason for the search is that a study of their tracks would tell a great deal about how artificial satellites would behave. Another is that such an object might, in the indefinite future, be put to use as a space platform for scientific studies. Furthermore, if all natural satellites could be mapped, any new object that suddenly appeared in the sky might be suspected as manmade. Naturally, this poses the problem of defense. Any threatening satellite sent aloft by an enemy would have to be

missiles working for our armed forces. Ground-to-air missiles are being developed to protect our cities against air attack. The latest announcement in this field told of an air-to-air missile which an interceptor plane could fire and steer against an enemy bomber. Still supersecret is Convair's Atlas project, which has been reported in the newspapers as a rocket-powered projectile

"on ice" in the sky, under control, will have a fantastic primary advantage over any possible enemy on our planet.

But, what if a missile like that is deliberately put on an orbit around the earth? Suppose that it carries an atomic warhead and holds enough unexpended rocket fuel in reserve to be fired back down through the atmosphere to pinpoint a particular target in response to a coded radio signal? The nation that has atomic bombs

Operator "rides along" on antenna of radar apparatus used for tracking rockets. Right: two-stage Bumper rocket combines the small WAC Corporal with a giant V-2.



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and Rocket Newsletter^{v. 8:5}

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NUMBER 5

The Orbit Lifetimes Of The Two New Earth Satellites

Harold Ketchum

Rocket Abstracts

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THE ROCKET NEWSLETTER



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THE ORBIT LIFETIMES OF THE TWO NEW EARTH SATELLITES Part I (Analytical Considerations)

by
H.B. Ketchum

A recent article in this journal by Mr. Wayne Proell discussed the two new terrestrial moons that have been reported as discovered and the need for an American astronautical policy (1). This article states that these two natural bodies have orbits around the earth at altitudes of 640 and 960 kilometers above the equator, which information represents the sum total of that released. Since these bodies are natural and also probably quite small by reason of their having escaped discovery until now, the assumption that they are captured asteroids is the best one possible under the circumstances of such meagre information. Granting this assumption, the relatively low altitudes of these bodies definitely places them in a region where atmospheric resistance effects are possible. With no information available to the contrary, the further assumption that these bodies are moving in essentially circular orbits is justified by reason of the fact that a resisting medium circularizes elliptical orbits over a period of time - ellipses being the usual closed form of orbit for astronomical bodies. The circularization occurs through reduction of the eccentricity to a greater extent in the part of the orbit near perigee, due to higher resistance and faster motion at lower altitudes, than the increase in eccentricity in the part of the orbit near apogee at the highest altitude and slowest motion.

The problem of guesstimating the probable size of such objects in general allows of a rather large range of diameters from which to choose, since most asteroids have diameters from 50 km. down to perhaps 1 km. However since these objects have missed discovery for so long, they must certainly be very small. It will be assumed here that their diameters are of the order of 1 km. Some justification for the assumption of this small size may be had by consideration of the following line of reasoning based upon the author's rough calculations. First because of the relatively low altitudes of these bodies, they would not be visible at night at all since they would be in the darkest part of the earth's shadow in space. Also the 640 km. satellite would not rise above the horizon for inhabitants outside a belt 20° to 25° either side of the equator, and the corresponding belt for the 960 km. satellite would be 25° to 30° either side of the equator. Second, since they are not visible at night due to not being illuminated, they would only be visible on a clear sunny day and then only providing their brightness were sufficient to be seen under these conditions, which really includes the time from sunrise to sunset. The planet Venus at its brightest (-4.3 magnitude) can be seen at day, under the best conditions, if one stands in a shadow and knows precisely where to look. The albedo of these satellites is probably very low, as is the case for most of the asteroids, and this in combination with their small reflecting areas indicates that their magnitudes of brightness are small - in other words they are telescopic objects not

THE JOURNAL OF SPACE FLIGHT

The significant calculated results obtained by numerical integration are given in Table II. All units are in the c.g.s. system being cm., gm., and secs.

In brief the results obtained showed that it would require 5468 years for the 966 km. satellite to drop to the 646 km. level, and an additional 53.3 years to drop to the 317 km. level. Thus the total times required for the satellites to reach the 317 km. level are 5521.3 years and 53.3 years for the 966 km. and 644 km. satellites respectively. Table II shows that the satellites will drop from 317 km. to 222 km. in 26×10^6 sec or 297 days or 0.8 years, using the collision resistance effect. An estimation of Reynold's Number at 240 km. gives

$$Re = Dv\rho/\mu = (1 \times 10^5 \times 7.76 \times 10^5 \times 8.2 \times 10^{-13})/517 \times 10^{-6} = 123$$

The value of C in $F = C\rho(A/2m)v^2$ is about 1.1 for $Re = 123$. Thus

$$F = [(1.1 \times 8.2 \times 10^{-13} \times 1.5708 \times 10^{10})/2.09 \times 10^{15}] (7.76 \times 10^5)^2 \\ = 406 \times 10^{-8}$$

The collision effect value of F at 240 km. is

$$F = (\pi/8)(1/0.81) [(1.5708 \times 10^{10} \times 8.2 \times 10^{-13})/2.09 \times 10^{15}] \\ (8.7 \times 10^4 \times 7.76 \times 10^5) = 20.2 \times 10^{-8}$$

The supersonic drag force is 20 times greater than the collision resistance force so that the 297 days required for a decrease in r of 95 km. is on the high side in this region of change of type of resistance. Performing the exact calculations to obtain such comparatively short times seemed hardly worthwhile, which is the reason that the differential equation of motion applying for this region and below was not derived. The final values for the times that are required for these satellites to come in to collision may be taken as 5522 years for the 966 km. object and 54 years for the 644 km. one.

It was of interest to estimate the size of crater that might be blasted out upon collision of one of these satellites with dry land. A relation between log(kinetic energy) and log(diameter of object) due to Baldwin (3) for collision and blast craters was used. Assuming a loss in velocity from 7.76 km./sec. at 240 km. altitude to 6.21 km./sec upon collision due to friction, the result obtained was 24 miles, which is a crater of considerable size. Should the satellites land in water, a large tidal wave would result. If all this is true, it certainly provides an incentive for a crash program on space operations by the world at large, since there is no predicting where the actual collision will take place.

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Rm 213

THE JOURNAL OF SPACE FLIGHT ^{v. 6:9}

and Rocket news letter

October 1954 ^{v. 7:6}

The Two New Terrestrial Moons and American Astronautical Policy

Wayne Proell

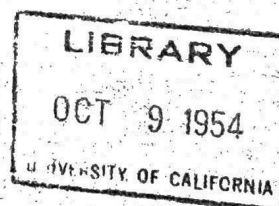
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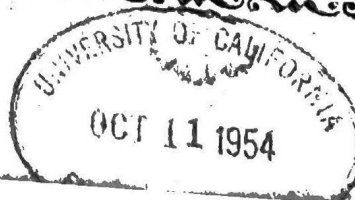
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THE TWO NEW TERRESTRIAL MOONS AND AMERICAN ASTRONAUTICAL POLICY

by
Wayne Proell

In August 1954, the United States government disclosed that two very small new terrestrial satellites had been discovered (1). These satellites are natural bodies, having orbits around earth at altitudes of 640 and 960 kilometers. Apparently great concern was felt that these were Russian space stations, because a secret project headed by Dr. LaPaz of the University of New Mexico was immediately set up to examine the situation, and has just reported that the satellites are natural.

The primary concern of American policy apparently has been to ascertain whether or not a Russian policy (2) of setting up space stations had been carried out. Had these satellites proven to be artificial, the American space flight policy would have been caught in a sadly embryonic state. The relief shown by American planners was therefore justified, even though previous policy declarations on the part of military men had flatly stated that a space station had little military use, and could be shot down easily. As a matter of fact, the American space arm (coining a term for its embryo, the guided missile section of Ordnance) today is incapable of shooting down any space station.

More interesting than the immediate policy is the problems and intriguing possibilities raised by the existence of these new moons. It is the purpose of this report to discuss the factors introduced in American astronautical policy by their discovery.

First, practically no data has been released on the new satellites other than their altitude. At the indicated altitudes, assuming a circular orbit, the respective satellite velocities are 7.53 km/sec and 7.36 km/sec. From the fact that some fairly intensive searches have been made for over 100 years for earth satellites other than Luna, we deduce that the new satellites are very small and probably orbit over the equatorial region of earth, so that they do not commonly traverse areas of the sky studied by northern observatories. If they are very small, they are probably captured asteroids. The very small asteroids are about 10 miles (16 km) in diameter (3) and this seems to be the way the LaPaz group distinguished them from artificial satellites. All these conjectures are subject to revision, as further data is released, but seem an adequate basis for the immediate discussion. With a diameter of 16 km., the mass of such an asteroid would be about 1×10^{18} grams, assuming a density of about 5 (mixed iron-stone asteroid, rich in iron). The volume would be 2.15×10^{11} cubic meters and the area 2.5×10^8 square meters. A perplexing point is the released data on

THE JOURNAL OF SPACE FLIGHT

altitude. These altitudes are well within the earth's atmosphere, and according to the Grimmer model would be 1.1×10^{-8} and 2.4×10^{-9} mm. of pressure. At these pressures one would expect a definite retardation of the satellite and they would hardly remain in a stable orbit for more than a few hundred thousand years.

The obvious use for these satellites is as space stations. Unlike the artificial satellite, they would require no imported steel for structural members. In fact, using cave techniques, they could provide shelter and materials of construction for air locks, greatly reducing the amount of material necessary to set up a station. Weighing some 10^{18} grams as compared to perhaps 10^8 or 10^9 grams for an artificial satellite, they would be vastly more stable - a man walking around the station would not cause telescopes to tremble nor the station to rotate, and a landing rocket would not throw the station out of orbit by a mischance.

The most significant advantage of the natural satellites as space stations would be their mass in relation to shielding. First, the biggest argument against establishing a practically useful (military and economic) base in space is that it can be readily destroyed by a light guided missile, carrying a proximity or shrapnel warhead. A semi-steel asteroid of mass 10^{18} grams will not be affected by any single missile. Even carrying an atomic warhead as heavy as five tons (either hydrogen, lithium, or uranium) a bomb would yield only about 10^{17} calories at 100% efficiency, or more likely 10^{16} calories (4). The missile energy might warm the asteroid up a few tenths of a degree, or volatilize a few tenths of a percent of its mass. But unless the human installation itself suffered a direct hit, the asteroid-satellite would shield the base adequately. By burrowing into the metal satellite, the basemen could make their base almost impregnable even to missiles rained upon the inhabited area itself. This shielding might also be useful to protect inhabitants against cosmic rays. The natural satellite therefore avoids the salient disadvantage of the artificial satellite. It is much more useful than an artificial satellite.

Let us examine some reasonable possibilities for practical uses for these satellite bases. First, the use as stepping stones to the moon and planets is of great interest. For satellite a and b, the potential energies are as follows: (5)

satellite a)	640 km	kinetic energy	2.84×10^{11} ergs/gram
		potential energy	0.57×10^{11} ergs/gram
		total energy	3.41×10^{11} ergs/gram
satellite b)	960 km	kinetic energy	2.72×10^{11} ergs/gram
		potential energy	0.81×10^{11} ergs/gram
		total energy	3.53×10^{11} ergs/gram

Now the escape energy from earth is 6.25×10^{11} ergs/gram, so that to reach station satellite a) would need 54.5% of the escape energy, and to go from a) to b) would need an additional 2.4%. In actual practice, some additional energy would be needed to reach a) in view of the gravitational efficiency factor for subsatellite velocities (6) and of atmospheric resistance, the total probably being about 10 - 15% more

THE JOURNAL OF SPACE FLIGHT

energy. The availability of two satellites is a luxury, permitting transshipping and further stockpiling of fuel from the first, or division of the bases into operations and research. The existence of a natural satellite would permit a few "tanker" ships to make repeated return flights, unloading fuel into satellite tanks to any desired extent, without the need for leaving the tanks up at the station. The station can also contain machine shops, and similar installations, to service, construct, and repair moon ships. The satellite base therefore appears highly practical both from theory and from the standpoint of operations.

From the standpoint of American astronautical policy, the immediate utility of the satellite stations is of less importance than their possible use for military operations and their long range use in commerce. The factors discussed under shielding above stand out. If America were to set up a base as part of its space arm, that base would have a large, nearly impregnable installation capable of storing abundant satellite-to-earth missiles, and abundant fuel to power them. These dangerous missiles would not be out in open space, vulnerable to countermeasures. Their fuel could be stored in profusion, safe for years. For once, the early military thinking could be realized: a platform in the sky, impregnable from below, deadly dangerous to those below.

In addition to being militarily potent, the space satellite base as a weapon is vital because it is cheap. It should permit the substitution of a single expensive base at 640 kilometers altitude for a multitude of terrestrial bases, countries, scattered over the globe. In the aggregate, the lesser manpower and concentrated effectiveness of this should carry out a principle accepted as cardinal in our American military thinking: if we have to compete with mass armies, we shall do it by potent weapons manned by small but trained and effective crews. We shall not meet mass armies with our own numerically inferior masses.

The second factor important in American planning is perhaps redundant, in view of the life-and-death importance of the military aspects in the 1950's, but should be discussed. These "islands in the sky" are the 1950 analog to the Panama Canal, the Golden Horn, the Suez Canal, the Straits of Magellan, and Gibraltar. The country that possesses these islands is in complete control of all foreseeable traffic between earth and space, by the brute force of the step-rocket law. No one can bypass these stations without building his own, at vast expense. We have, with the aid of these stations, the means of reaching into space at once, if we desire. The fact that we do not so desire right now should not stop America from seizing possession of the satellites if it is able. In ten or twenty or thirty years, we will have the fusion energy of hydrogen under control. Energy will be available for space flight. The keys to space are the two earth satellites, and they will be useful for commerce as well as war as time goes on.

The practicality of acquiring possession of the two earth satellites may seem open to question. First, as already stated, America right now has no missile able to reach a station at the 640 km level. Second, such analysts as Caidin (7) have indicated that using the more mature proposals for establishing a space station leads to costs of several billion dollars. Third, political considerations enter in the

THE JOURNAL OF SPACE FLIGHT

picture when we consider that the new satellites probably orbit over the equator, where we have little territory. None of these obstacles seems major. While America has no space ships as yet, the investment of Air Force money would from the technical viewpoint, be certain to give us something that would reach to the 640 kilometer mark. The cost estimates reach billions. Even granting that these costs are as great for the satellite as for the Von Braun station (which they probably are not), what is 2 billion dollars - even per year - to establish a satellite? If we can create and maintain a space arm for 2 billion per year, we can save that much for the taxpayers by cutting back the already prodigious guided missile program based on terrestrial bases. A reshuffle rather than additional expenditure seems feasible. And even if we had to spend the extra money - it seems an objective worthy of it. The political considerations seem small - the terrestrial launching site for earth-to-satellite traffic can well be a Pacific island in our possession (8). The low altitude of the station also makes communications by radio and direct traffic quick and certain.

We have perhaps anticipated our conclusions, in the above discussions, since so much of the data point to an American space flight policy directed at acquiring and arming the satellites. The technical facts all point to one conclusion: the two new satellites of earth render the military-trade space station practical and yield a military advantage to the possessor of the base.

What sort of American military policy in astronautics should be built on this? It seems to the writer that it will only be a short time till knowledge of the orbital elements of the new satellites becomes general. Appreciation of the importance of the satellites will follow quickly. At this point, a space race for possession will follow. The nations which have the ability and resources to reach the satellites are probably more numerous than might be guessed, since establishing possession is not extraordinarily expensive. The writer suggests the following: America, Russia, China, Germany, France, England, Sweden, Argentina, Canada, Italy, Japan, and India. Of these, the most likely contenders appear to be America, Russia, India, Germany, and England. When these are ready, some time will elapse before the initial exploratory visits decide which of the satellites is big enough to be useful (perhaps both), and which has the best structure geologically. Probably political claim will be made to any satellite that can actually be visited. American military policy therefore must be based upon the prospect of quick and intense competition for these bases.

Summarizing, American policy should comprise setting up the space arm of its body, to reach the satellites. It should plan to do this as fast as possible. It should integrate such plans into general defense planning so that the overall cost could be reduced below present military budgets. By means of the station, defense will cost less than now. It should build its thinking on American interests, and should not submit American plans to review by international pseudo-governments. Recent experience has illustrated the futility of poly-nation defense alliances. It should not be deterred in its actions by the protests that are sure to follow from the most urgent competitors.

How can a space arm be set up? American literature is filled with plans for space stations. Many of these are useful. A great deal of the thinking is too much along one channel; more extensive consideration of such alternative proposals as the B36 spaceship are in order now (9) as well as many others. More intensive consideration should be

THE JOURNAL OF SPACE FLIGHT

given to solid propellants as fuel, in addition to the conventional liquid systems.

Aside from technical planning, the pressing problem is organization. Few would quarrel with the need to have the space arm run by and for the American military, with perhaps qualification to permit and encourage research work and planetary flights via military bases. The attainment of the bases is however, the immediate goal; other objectives can be deferred. To get the ships, research, development, and prototype construction must be done. The writer thinks that the strength of the military groups is in their staff planning, logistics concepts, and operations ability. The new space arm should be run by the military. The research and construction should at least partly be done by industry. Space ships are going to be like big airplanes and big bombers; airframe manufacturers and propellant manufacturers can do much of the research and development. The forte of industry is the ability to pick out economic ways of doing things, getting them done quickly, and put operations and operational apparatus on a feasible basis. A third group, little noticed till now, should also be put into the picture - small companies, "freelancers", consultants, or "technical mercenaries". These small groups, usually consisting of one or two idea men supported by a technical staff, can contribute the flow of ideas and talent that appears currently lacking in either the military or industrial teams. These three major groups should be able to set up space flight to the satellites - the military to coordinate, purchase, and operate; the large industrial companies to pick out techniques and build the ships; the technical mercenaries to conduct the basic thinking and supply technical support.

In this report, we have pointed out compelling conclusions from the bare news that the new terrestrial satellites are potential space stations. The urgency of the situation demands analysis without waiting for more abundant data. American policy must consider these new factors very carefully, if it is to discharge its duty to the republic.

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Re: MJ-12 and Area 51

From: **Ed Stewart** <egs@netcom.com>

Date: Wed, 11 Dec 1996 19:40:53 -0800

Fwd Date: Fri, 13 Dec 1996 02:38:26 -0500

Subject: Re: MJ-12 and Area 51

> From: rudiak@garnet.berkeley.edu

> Date: Tue, 10 Dec 1996 13:17:57 -0800 (PST)

> To: [UFO UpDates](#) - Toronto <updates@globalserve.net>

> Subject: Re: [UFO UpDate](#): Re: MJ-12 and Area 51

> Yes, it would have been a very lousy cover story, which would have drawn a
> lot of unnecessary attention -- sort of like Roswell base putting out a
> captured flying disc story as a cover for a balloon crash.

Have you ever considered that the captured flying disc story may have had as its purpose something totally separate from flying discs or balloons? Can you think of a quicker way to bring to the attention of the Russians, re-emphasizing that we did indeed have an operational and ready wing capable of delivering atom bombs, the presence of the 509th in every major newspaper in the world without it looking obvious that we were trying to get their attention? I find it interesting that Richard Rhodes discloses in "Dark Sun: The Making of the Hydrogen Bomb" that in April, 1947 "in the heat of the burgeoning Cold War, the US had no assembled atomic bombs in stock" and would not have for quite a few months. The only thing we could do at that time was convince the Russians that we were ready and capable. In other words, bluff them into thinking that we could retaliate with atomic bombs should they move in Europe. A dropped story in the New York Times about the 509th would have been too obvious to an already paranoid Russia and could well have backfired and alerted them of a possible ulterior motive for the Americans to be publicizing the 509th. The Roswell flying disc context may well someday turn out to be a total non-event for ufology. It certainly didn't hurt or slow down Blanchard's career any. He went on all the way to make General. True, he was one of General LeMay's favorites and had his patronage, but doesn't the release of the Roswell crashed disc story suggest a lack of good judgement on Blanchard's part in the first place? Especially for a commander of the only atomic bomb wing in the world which we now know had no bullets to fire throughout the last half of 1947 and early 1948? Just food for thought and speculation on my part. The above is rhetorical on my part.

> **More importantly, Dr. Lincoln La Paz (of N.M. green fireball fame) wrote**
> **an article in the Feb., 1954 issue of the "Astronomical Society of the**
> **Pacific Journal" that astronomer Clyde Tombaugh had undertaken a telescope**
> **search for natural satellites.**

The La Paz article had nothing to do with Tombaugh. The title of the paper was: "Advances of the Perigees of Earth-Satellites Predicted by General Relativity" and related to a suggestion made by Gilvarry for a possible test of General Relativity. La Paz suggested that a possible better test would be using earth-satellites and placed his speculation

into the future by stating:

"Irrespective of whether or not satellites may be discovered at small mean distances from the Earth, the present state of satellite-vehicle research certainly justifies the belief that in the not distant future, artificial satellites can be set in motion in prescribed orbits about the Earth."

The reference to Tombaugh in La Paz's paper was a footnote to his previous sentence:

"That satellites of this sort may exist is strongly suggested by several independent lines of arguments. Furthermore, until extended systematic searches with properly designed equipment have been made at observatories not too far from the equator, failure to discover such bodies can have little significance.*"

The footnote:

"* Clyde Tombaugh has just informed me that U.S. Army Ordnance Research has agreed to sponsor a search for near-by satellites of the earth with especially designed photographic equipment."

La Paz continues in his paper with the mathematics showing his line of argument for inclusion of testing General Relativity using future earth-satellites. That is what his paper was all about. It had nothing to do with Tombaugh, or his efforts.

- > This prompted a White Sands press release
- > in March that Tombaugh would be looking for "moonlets" that have gone into
- > orbit around Earth recently, but are assumed to be natural. [an
- > impossibility!] Allegedly they were being investigated as possible space
- > station sites.

The White Sands press release was not prompted by La Paz's paper. It was prompted by the reaction of the media to La Paz's footnote in the paper.

Also, Dr. La Paz certainly didn't think it was an impossibility for natural objects to be captured in earth orbit. Maybe you know something he didn't back in 1954. Care to elaborate?

- > Donald Keyhoe claimed that what had really happened was
- > that new long range radar had picked up two objects going into orbit
- > around Earth back in 1953.

Keyhoe covers this whole subject from his own personal perspective and speculation in the "The Flying Saucer Conspiracy", Chapter 8 "Satellite Search". Must reading. Lots of good stuff on Keyhoe's mindset including the possibility of us "harming" moon men and indiscriminantly starting an interplanetary war based on Zwicky's project.

- > Keyhoe's allegations are backed up somewhat by a story first reported by
- > "Aviation Week" magazine on August 23. They claimed that there were two
- > objects orbiting Earth 400 and 600 miles out, which caused great
- > consternation in the Air Force during the summer [Twining/Cutler MJ-12
- > meeting, July 16??], until the objects were identified by Dr. Lincoln
- > LaPaz as "natural" (captured meteors) and not artificial objects.

This is the Aviation Week "story" which appeared as one paragraph in the "Washington Roundup" column on August 23, 1954:

"SATELLITE SCARE"

Pentagon scare over the observance of two previously unobserved satellites orbiting the earth has dissipated with the identification of the objects as natural, not

← memo

artificial satellites. Dr. Lincoln La Paz, expert on extraterrestrial bodies from the University of New Mexico, headed the identification project. One satellite is orbiting at about 400 mi. out, while the other track is 600 mi. from the earth. Pentagon thought momentarily the Russians had beaten the U.S. to space explorations."

Nice for the Russians to be so anti-American during the Cold War era. It provided the perfect cover to hide alleged MJ-12 meetings. After all, that was the 50s and we all know now that it was just "Happy Days" with nothing for our government to worry about except for aliens and keeping MJ-12 out of the headlines. (GRIN) What evidence do you have that there was ever a "Twining/Cutler MJ-12 meeting, July 16"? Inquiring minds would like to know.

> In follow-up press stories (e.g., S.F. Chronicle on 8/24 and the N.Y. Times on 8/24 and 10/10/54) LaPaz, denied that he was involved, though not specifically denying the truth of the story, stating that the article "was false in every particular, in so far as reference to me is concerned."

It was after all Tombaugh's project. All he did was report that Tombaugh had notified him of the project. But, we all know that the media never gets anything wrong.

I don't have the S.F. Chronicle article of 8/24/54, but the NYT article is actually longer than the original Aviation Week paragraph. Interesting that they quote the Aviation Week article as stating "Threw the Air Force into a flap". Their quote marks. I keep looking at the Aviation Week article posted above and I simply can't find that in there. They also state that the Aviation Week publication said "The Air Force had kept Dr. La Paz going back and forth between the missile test center at White Sands, NM, and Palomar Observatory in California until the objects were identified as meteors..." I keep looking at the Aviation Week paragraph and I don't find that in there either. I guess the NYT times must of had there own reasons for making their version so much longer and interesting than the original piece in Aviation Week.

The NYT October 10, 1954 piece is entitled "Scientist Denies Space Base 'Find'" and is quite lengthy. It goes into a lot of detail of what Dr. La Paz's research interests were and the significance of having a space platform in earth orbit in terms of world power and military advantage.

> Col. Walker Holler, C/O of the Army Office of Ordnance Research, said the story was false. OOR was looking for such objects, with the aid of famed astronomer Clyde Tombaugh, but none had been discovered. An unidentified source close to the OOR, however, told the Times the story was true and LaPaz was indeed involved. [N.Y. Times, 8/29/54] La Paz reiterated that the purpose of the project was to look for natural space platforms.

Irrespective of every identifiable source stating that La Paz was not involved, UP misquoting the original Aviation Week article and adding a couple more interesting notes not found in the original, we have this unidentified source "close" to the OOR that still gets quoted. What does "close" mean? He sold pizza outside the gates?"

What is imminently clear is that the media recognized that this story of satellites, whether natural or artificial, was a story they wanted to pursue. And all of the above resulted from La Paz stating in a simple footnote in an obscure scientific journal (my apologies to Eric Green if he is reading this) that Tombaugh advised him of a project that Tombaugh was going to do with the Army. I wonder how the media would have reacted SHOULD some government official hiding his true identity as MJ-12 told the media that they had ACTUALLY recovered a "downed satellite"? I think you made my point clear than I could have. Thank you.

> And if one wants to go back even further, ...

I don't, but I find this observation interesting.

> I would have to agree, except for the media stories of "natural objects"
 > in orbit around the earth. The "natural satellites" story could have been
 > used as a cover for a saucer crash. An artificial satellite crash,
 > however, would have been a poor cover, since none existed in 1954 (unless
 > Zwicky had secretly succeeded).

What are suggesting? That the MJ-12 think tank would have disclosed an alleged "secret program" [for which there is nothing to substantiate it] as a cover for their own MJ-12 operation? Well, not even the fabricators of the hoaxed MJ-12 SOM thought that would fly. Read the SOM over again.

> Guess you screwed up, huh Ed? (GRIN)

Yup.

> >Love can be blinding.
 > So can wanton, unjustified Friedman bashing. (GRIN)
 > David Rudiak

Last I looked, this thread was entitled "MJ-12 and Area 51", not Friedman. If you wish to start a thread on "Friedman", be my guest. In the meantime, if you wish to serve as an apologist for Friedman's claims, this would be the place to post any arguments you wish to present that you feel would provide his claims a vestige of supportive real evidence. Friedman has yet to provide any himself. He simply keeps ignoring the requests. Don't you think that the many Friedman supporters on this list deserve some tangible evidence to support Friedman's claims that MJ-12 is real? Inquiring minds would like to know.

Ed Stewart

 Ed Stewart - egs@netcom.com - | So Man, who here seems principal alone,
 "There is | Perhaps acts second to some sphere
 unknown.
 Something Going On!" ,>'?'<, | Touches some wheel, or verges to some
 goal,
 -Salvador Freixedo- (O O) | 'Tis but a part we see, and not a whole.
 -----ooOO-(_)---OOoo----- Alexander Pope, Essay on Man-----

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UFO UpDates Mailing List

Re: MJ-12 and Area 51

From: rudiak@garnet.berkeley.edu
 Date: Wed, 11 Dec 1996 17:31:00 -0800 (PST)
 Fwd Date: Fri, 13 Dec 1996 02:37:34 -0500
 Subject: Re: MJ-12 and Area 51

On Wed, 11 Dec 1996, UFO UpDates - Toronto wrote:

> From: egs@netcom.com (Edward G. Stewart)
 > Subject: Re: UFO UpDate: Re: MJ-12 and Area 51

> > From: fsphys@brunswickmicro.nb.ca
 > > Date: Tue, 10 Dec 96 12:04:45 -0400

> > Re Ed Stewart and downed satellite. At least do your homework and read my
 > page
 > > 164 in TOP SECRET/MAJIC . how in the world can you say nary a peep
 > about
 > > sattelite.. "Another obvious concern was the mention of "downed
 > satellites"...
 >
 > My apologies.
 >
 > This is what you wrote on page 164:
 >
 > "Considering that the first Sputnik wasn't launched until 1957, was
 > this a goof by a forger? I dug out some pre-1954 books about space flight and
 > checked back issues of the Readers' Guide to Periodical Literature for uses
 > of the term SATELLITE. I found several articles that used the term for a
 > manufactured object in orbit around the earth prior to April 1954. There had
 > also been an active program led by Clyde ombaugh, who had discovered Pluto
 > as a very young amateur astronomer in 1930, to search for artificial
 > satellites near Earth."
 >
 > Any reason why you failed to provide your readers with the actual references?

Please see my original response to your post in which I extensively
 reference the story of Tombaugh's search and an earlier attempt by
 astronomer Fritz Zwicky to launch projectiles into orbit with explosives,
 dating clear back to 1946.

The first public reference to Tombaugh's search was by Dr. Lincoln La Paz
 in the Feb., 1954 Astronomical Society of the Pacific Journal. La Paz

said Tombaugh was searching for NATURAL satellites, not artificial ones. On March 3, the public information office at White Sands, put out a story that Tombaugh was looking for "moonlets" which had recently gone into earth orbit, with the idea of using them for natural space stations. This would imply that these alleged natural satellites were in near earth orbit.

> I strongly suspect that each and every one of these articles you found are in
> the context of what could be done in the future and not in the context that
> it was an acceptable fact that artificial satellites were in orbit.

These 1954 articles were about NATURAL objects having taken up orbit RECENTLY around the earth. That goes back to at least the March, 1954 White Sands press statement. The Aviation Week story in August said that there were two objects, 400 and 600 miles out, which had thrown the Air Force into a panic during the summer. The story was immediately denied by the Air Force, but the N.Y. Times claimed that a source close to the project told them the story was true. More on this below.

> There is no doubt that there were plenty of papers in the scientific
> community as well as the popular literature that discussed the placing in
> orbit of artificial satellites during the first 57 years of this century.
> The concept was not invented in 1957. But 1957 was the first year that an
> artificial satellite was placed in orbit.

All this is true, but as I mentioned in my other post, attempts had been made to blast projectiles into orbit from New Mexico starting back in 1946. After August, 1947, public comment on the project ceased -- at least I can't find any further articles on it in the N.Y. Times Index. It was the unsubstantiated belief of Los Alamos chemist Leon Davidson (best known for his critique of Blue Book Special Report #14), that these "artificial meteors" were responsible for the green fireball sightings that started over New Mexico in late 1948.

> But how you rationalize that to vindicate the SOM reference to "downed
> satellite" is simply beyond my comprehension. There was also a lot of press
> in the fifties to what was commonly referred to as "mystery satellites"
> which was mostly based on conjectures and speculation. Rumors were rampant,
> but none ever panned out.

However, a story had been put out there in March, 1954, that natural objects had entered orbit around earth. The "downed satellite" in SOM isn't specific about natural or artificial satellites. Not that it makes any difference. It would be a lot easier to say an ordinary meteor had impacted that to mention one of those "natural satellites" crashing to earth.

> My original point remains valid. Any such "cover story" of a "downed
> satellite" by a government agency would not have kept the media away. It
> would have brought the media down on any alleged "recovery operation" as
> flies on honey. It sounds to me that the MJ-12 think tank were nothing but
> a bunch of idiots.

I have to agree. Using a satellite cover, "natural" or artificial, would have invited massive inquiry. That's the same reason I think the theory that Roswell base issued a flying disc recovery press release as "cover" for a Mogul balloon crash is idiotic as well.

> In regards to Clyde Tombaugh, the program he was involved in was tasked to
> find ANY satellite previously undetected in Earth orbit. The Moon is a
> satellite. We all know of that one. Please cite the
> specific reference you failed to mention that states "artificial satellites"
> in connection with Clyde Tombaugh's work?

Friedman got the "artificial" part wrong. But there was definitely something a little weird about Tombaugh looking for natural "moonlets" in near earth orbit. With the discovery of two predicted, cloudlike natural "moons" in the gravity-neutral "Lagrangian points" out at lunar orbit, the New York Times on June 22, 1961 (p.33) reported:

"In 1953 a search of the heavens for natural minor satellites of the earth was initiated by Dr. Clyde Tombaugh ... who is now at the New Mexico State University's research center. He scanned the skies, going farther and farther out and getting "nibbles" now and then, as he said in a telephone interview last night. None of the nibbles proved out, and the study was terminated in 1958. Dr. Tombaugh's search did not extend as far out as the moon's orbit, however, except for the inspection of another astronomer's photographs of one of the two regions there where minor satellites "ought" to be if they were anywhere, he said."

"These regions are known as Lagrangian points, after Count Joseph Louis Lagrange, the French geometer and astronomer who in 1772 calculated the behavior of an infinitesimal body in relation to two larger ones in a three-mass gravitational system. He found two points where the gravitational force is weak, allowing a body -- the infinitesimal one -- to remain in them quite stably. These are the points in the earth-moon system lying sixty degrees fore and aft of the moon in its orbit."

The point here is that astronomers had known for nearly 200 years that natural "satellites" would be expected out at the moon's orbit in the Lagrangian points, but had no reasonable expectation of finding something like an asteroid taking up orbit closer in, where Tombaugh concentrated his search. The odds against this happening are mathematically very remote. But instead of searching the likely spots and making a new discovery, Tombaugh searched the unlikely regions closer to earth.

*write with
connection*

Back on Aug. 29, 1954, the N.Y. Times reported that Tombaugh's search was being supported by the Army Office of Ordnance Research, with the purpose of finding natural satellites that could serve as ready-made space stations, but that nothing had been found. In the same article, the Times said a person close to the project (whom they didn't identify), stated that two objects had indeed been found in near-earth orbit and Dr. Lincoln La Paz had been involved in trying to identify them, just as the Aviation "Leak" story on Aug. 23 had originally reported. La Paz denied being involved (even though he originally described Tombaugh's search back in February), but didn't deny the truth of the rest of the story. [As many of us already know, La Paz was deeply involved in New Mexico UFO investigations for the Air Force, perhaps dating clear back to the original Roswell crash. La Paz's first UFO sighting was just two days after the Roswell story broke and just 80 miles away.]

★

I might add, that when Dr. Hynek did his astronomer survey for Blue Book back in June, 1952, and Tombaugh related his three UFO sightings, Tombaugh told Hynek that he was willing to put his New Mexico telescopes at the disposal of the Air Force. Tombaugh meant this originally for transient UFO sightings. But it indicated Tombaugh's willingness to use his scopes to search for UFOs. [Hynek's report is reprinted in "Project Blue Book" by Brad Steiger.]

A month after the Aviation Week story, on Sept. 18, 1954, Ed Ruppelt stated that the green fireballs reappeared over Colorado and northern New Mexico. La Paz was called back into investigate. Ruppelt also reported that back in 1952, he visited Los Alamos, and the scientists there opined that the green fireballs were probes coming from spaceships orbiting several hundred miles above.

NO find

And in Oct. 1954, Donald Keyhoe ("Aliens From Space") said NACA issued a press statement that they had picked up strange signals from an unknown

orbiting object. [Unfortunately, I haven't had an opportunity to run this story down to see if Keyhoe got this right. Maybe somebody else out there knows.]

I think this stories of mystery orbiting objects taking up recent residence near Earth goes somewhat beyond mere press rumor. And for what little it's worth, they started coming out at about the same time as the date on the SOM, with its mention of a "downed satellite" cover story.

David Rudiak

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INCIDENT 6: PHOTOS FROM PERU SHOW V-FORMATION OF OBJECTS FLYING ON WING OF TRANSPORT.

Few photographs of "saucers" exist, but Mr. James Moseley of Ft. Lee, New Jersey who recently returned from an extended trip to Lima, Peru, managed to procure two photos with negatives that look "genuine." Mr. Moseley should know. His experience in saucer investigations is extensive and he says "I have seen a good number of saucer pictures in the course of my investigations, but this is the first time I am sure that I have the genuine article."

Moseley received the photos from a Panagra pilot based in Lima, whose name was Captain George Zimmer. The pictures were taken by a passenger whose name was Quinn on Flight 320, Lima to Panama on August 6, 1952. Time about 5:30 a.m. just before sunrise. The pictures show a V-formation of five "blobs" just off the wing of the plane. In sight only a few seconds, the objects are in a slightly different position in each of the two pictures.

Two professional photographers consulted in Lima, say there is no evidence of negative tampering, but Moseley plans further photo-analysis in the U.S.A. "The great thing about the pictures," say Moseley, "is that they are neither day or night shots. A night shot shows only a light of some sort which could easily be anything, whereas a day shot usually shows a solid object which could be a deceptive model of a saucer."

Upon writing the Air Force of his "find" he was told that since the sighting is outside of the continental U.S. they were not interested. They are permitted to examine only cases inside the U.S.

INCIDENT 7: WASHINGTON, D. C. REVISITED. STORY SMOTHERED.

The nation's capital was again visited by unidentified flying objects. Shortly after midnight on May 12, 1954 Air Police at Washington National Airport watched two large, glowing objects which zipped into view at high speed, made three passes between 12:45 and 2:08 the following morning. The objects came across the nation's capital at high altitude from the northeast, veered off and swung southward. One air policeman watched the objects through night glasses. He reported that they were apparently circular in shape ... and that they glowed with a pulsating light that faded as they sped away. Said the Air Force spokesman ... "Don't call them flying saucers ... they are Unidentified ~~Identified~~ Flying Objects." (UFO's)

That incident occurred in the early morning hours of May 12. On the following afternoon, an electronics expert was checking some special equipment in Washington. Shortly after one o'clock, the equipment picked up some sort of huge object at great altitude, approaching the city at a speed of about 150-170 miles per hour. Whatever it was it came over the capital at an altitude of more than ten miles. It was tremendous in size, moved slowly about and was recorded by the equipment for almost three hours before it suddenly swung about and moved out of range. Said the electronics expert who tracked it ... "It was like nothing I had ever experienced before." (Item used with permission of Frank Edwards)

INCIDENT 8: LOW, HOVERING OBJECTS CLOSING IN ON EUROPE, TOO.

Stockholm -- Swedish military authorities are sending special crews into northern Sweden where scores of residents have reported strange, glowing objects maneuvering over the forests at low altitude during the week of May 10. Military men who have seen the things say they were not planes of any type. (Item used with permission of Frank Edwards)

P. 116

SCIENTIST DENIES SPACE BASE 'FIND'

Hunt Goes On for 'Platforms',
La Paz Says, but None Has
Been Discovered Yet

Special to The New York Times.

ALBUQUERQUE, N. Mex., Oct. 9.—Discover a nice stable meteorite, revolving around our earth in satellite fashion, 400 to 600 miles above our sea level and big enough to be used as a scientific and military space platform, and you can save all of us taxpayers a few billion dollars in the coming years.

The authority for the above is Dr. Lincoln LaPaz, noted mathematician and astronomer, who has headed the Institute of Meteoritics at the University of New Mexico since 1945. Dr. LaPaz was referring to a recent magazine article that quoted him as authority for confirmation that two such natural space platforms already had been discovered. He said the article was "false in every particular, in so far as reference to me is concerned."

But, he added at the same time, the space platform search was not new and it was entirely possible that some such satellites might be discovered at any time, here or in foreign lands. Such discoveries if made in Iron Curtain countries very likely would be kept secret for a time.

At any rate, he noted, no one in any country denied the search was on for such natural platforms. In fact, explicit reference to such a search, sponsored by United States Army Ordnance research, was given in a paper. Dr. LaPaz published in February, 1954, in the journal of the Astronomical Society of the Pacific.

Search for such "platforms," started purely as scientific investigation, is now recognized as of the highest military importance. The nation that has the only such space base could control the world, Dr. LaPaz said.

Huge sums will have to be expended before man can create and fly his own artificial space islands. And there are major problems of maintenance, once such man-made objects are created and placed outside the earth's atmosphere. One is the protection of man from the dangers of cosmic rays, to which he then would be subject directly without benefit of the filtering effect of our atmosphere.

A second real danger, for which defense preparations must be made, is from bombardment by meteoritic particles which, lacking a dense atmosphere to retard and evaporate them, would be expected to strike at devastat-

ing speed. As a simple illustration of this, Dr. LaPaz cites the comparatively small and light anti-tank shell, the high velocity of which allows it to penetrate thick, hardened steel armor. It is estimated thousands of tons of meteoritic material daily zoom into the earth's atmosphere, most of it being consumed by heat generated by its own drag through our air.

However, in establishing himself in space, man should plan for a "century satellite," Dr. LaPaz believes. It is hoped that once actuated and attuned to the earth's speed, the satellite would continue to revolve without danger of sinking into the earth's atmosphere for at least 100 years before requiring any additional "lift" or propulsion. That is assuming of course it was not knocked out of position by a meteoritic shower. Perhaps devices to create its own atmosphere could be built for the platform.

Part of the basis for the work of Dr. LaPaz, who has established an international reputation as a fireball chaser, has been his search for clues to the effect of cosmic radiation upon meteorites. Such investigation required speedy recovery of fallen meteorites, since the radioactivities induced by cosmic radiation generally have brief half-lives.

For that reason he has attempted, by publicity when a fireball or shower has been reported, to find their landing places and recover them before

their radiation has been greatly reduced in intensity.

Dr. LaPaz and his fellow-workers make frequent field trips following tips on meteoritic displays. In one recent trek they investigated four reported meteorite craters in Colorado. None of these proved out, but the expedition gathered twenty-seven meteorites with weights up to five pounds from an ancient fall in the Chaco Hills, of northwest New Mexico, where a 231-pound one was recovered by the Institute of Meteoritics in April of this year.

The writings of astronomical societies of many nations, including those which occasionally come from the Iron Curtain countries, indicate the worldwide interest in possible satellites. So the international race to be the first to use a space platform obviously is on, says Dr. LaPaz.

With this, the economical importance of fireball study grows. If instead of sending expensive rockets into the upper atmosphere to bring back data, one can get the same information from the study of meteorites that are free, the taxpayer will get a real break.

The false reports of Dr. LaPaz shuttling back and forth between White Sands Proving Ground and Mount Palomar Observatory and identifying two usable satellites where possibly hundreds are available, might be more amusing, he asserts, if the search for and need for such space bases were not so real.

EPISCOPAL LUMBER FOR BAPTIST CHURCH

Special to The New York Times.

GARDEN CITY PARK, L. I., Oct. 9. Lumber that once formed the framework for the parish hall of the Protestant Episcopal Church of the Redeemer at Merrick will some day shelter members of Bethel Baptist Chapel here.

The building material, salvaged after the parish hall partly burned a year ago, was donated to the congregation, which was formed last January and had been holding Sunday services in a field.

Beams and siding boards were carted to the proposed site today in an all-day operation in which all men parishioners took part. A truck was lent by Dade Brothers, a Mineola trucking firm.

The Rev. Fred Pattison, pastor of Bethel Chapel, said that the site had not yet been bought, but that his congregation had hopes of raising money soon for a 90-by-100-foot plot. In five months it has accumulated almost half the purchase price of \$1,800.

"In May we had just 76 cents in our building fund," Reverend Pattison said. "Today we have \$887 and all this fine lumber."

The Rev. William C. Godfrey, rector of the Church of the Redeemer said his parishioners decided to give the lumber to the struggling Baptist congregation after voting to build a new and larger parish hall.

AFTER 50 YEARS

The unexpected recovery of the lost asteroid 515 Athalia, unobserved for half a century, has just been announced by Dr. Paul Herget, University of Cincinnati. Athalia was discovered photographically on September 20, 1903, by Max Wolf at Heidelberg. The few observations extended only to October 19th, and although its orbit was computed, this faint minor planet was not picked up again in later years.

Since 1949, Dr. Frank Edmondson at the University of Indiana has been systematically searching for lost minor planets with a 10-inch Cooke camera (*Sky and Telescope*, September, 1954, page 373). In recent months 14 "new" minor planets were observed on at least three occasions each—the minimum number of observations for an orbit calculation. At Cincinnati, using the giant electronic computer at General Electric's jet engine plant, Dr. Herget computed the orbits of the 14 asteroids in just 14 minutes—a job that would have taken a week by laborious hand-computing methods.

Comparison of the newly computed orbits with older lists of asteroids was made by Dr. Peter Musen, who found that one of the 14 was the long-lost Athalia. Few other minor planets that have been lost so long are still to be recovered.

"SATELLITE SCARE" UNFOUNDED

On August 23rd, *Aviation Week* published a brief note in which it stated that two objects circling the earth had been identified as natural, not artificial satellites. They were supposed to have orbits 400 and 600 miles above the earth's surface. Dr. Lincoln LaPaz, of the University of New Mexico, was stated to have headed the identification project. This story has proven unfounded, although it has been widely quoted and amplified in the press.

In a statement to the press, on August 23rd, Dr. LaPaz said in part:

"As regards the *Aviation Week* story on the satellite search, summarized in the Associated Press release shown me, it is false in every particular insofar as reference to me is concerned. I have not been sent back and forth between White Sands Proving Ground and the Mount Palomar Observatory, as the story asserts. In fact, my only communication with anyone at Mount Palomar on the matter of nearby satellites has related to a paper on such satellites that I recently published in the journal of the Astronomical Society of the Pacific."

The technical paper referred to was published in February, 1954; Dr. LaPaz

discussed the possibility of testing a point in relativity theory from observations of the advance of perigee of a hypothetical artificial or natural satellite. In a footnote he calls attention to the search for possible natural satellites being carried out for a different purpose by Clyde Tombaugh under U. S. Army sponsorship.

On August 25th, a press release by Col. Walker W. Holler, the commanding officer of the Office of Ordnance Research, Durham, N. C., confirmed the army's sponsorship of the basic research project at White Sands Proving Ground with which Mr. Tombaugh, the discoverer of Pluto, is connected. Part of his activity is in the satellite field. It was further stated that Dr. LaPaz had no connection with the Ordnance Research satellite project. Col. Holler also said:

"As to the success of current efforts to locate an earth satellite of the type described, we are not aware of all the work that may be going on outside of Ordnance auspices. The Ordnance-sponsored work has not as yet located any earth satellites."

RADIO-STAR DISTANCES

A promising method for measuring the distances of radio sources has been developed by D. R. W. Williams and R. D. Davies, of the Jodrell Bank Experimental Station in England. They have applied the method to the strong radio stars known as Cassiopeia A and Cygnus A. Both sources lie in the Milky Way, and over their continuous radio spectra is superimposed the 21-cm. line of interstellar hydrogen.

In each case, the 21-cm. line has two components representing two spiral arms of the galaxy. Comparison of the 21-cm. intensities and the adjacent continuous spectrum of the radio star indicates how much of the radiation of the radio star is absorbed in traversing the spiral arms. From these absorptions, the distance of the radio source can be inferred with the aid of Oort's model of neutral hydrogen distribution in the galaxy.

The Cygnus source is found to be farther than 9,500 parsecs, the distance of the remoter spiral arm in that direction. From optical observations, this source had already been placed by Minkowski at 34 million parsecs, where it appears to be caused by the collision of a pair of galaxies. On the other hand, the Cassiopeia source is either within or nearer than a spiral arm at 500 parsecs; Minkowski had placed it at 300 to 500 parsecs from the sun. The other spiral arm in the direction of Cassiopeia is 2,500 parsecs away.

THE SUN NAVIGATION OF ANIMALS, by Hans Kalmus, *Scientific American*, October, 1954. "This article will describe certain remarkable experiments of the past two years which show that such diverse creatures as birds, bees, ants and crustaceans do possess a direction-finding mechanism. They can navigate by the sun and, in some cases, even by the moon!"

RADIO ASTRONOMY, by A. C. B. Lovell and others, *Occasional Notes of the Royal Astronomical Society*, No. 16, April, 1954. "Many more of these radio stars have since [1948] been discovered; some have been related to extra-galactic nebulae and one or two to unusual objects in the Milky Way. Even so, the paradox remains and the general relationship between the radio stars and the common stars and, in fact, between the universe as revealed by light waves and that revealed by radio waves, remains to be elucidated."

OBSERVING THE COMETS, by Elizabeth Roemer, *Leaflet No. 305, Astronomical Society of the Pacific*, October, 1954. "Comets do not always behave as they are expected to. Periodic Comets Schwassmann-Wachmann 1 and Pons-Brooks are known to have had sudden outbursts of brightness while Comet Pajdusakova faded out unexpectedly in December, 1953. In order to get more information about such events, it would be useful to have more frequent observations than the professional astronomers can make, especially when the comets are bright."

NEW SITES FOR HARVARD METEOR CAMERAS

During the past summer, the observing stations of the Harvard photographic meteor program, under the direction of Dr. Fred L. Whipple, were moved to permanent sites with commercial power facilities. They had operated for six years as mobile field stations at Soledad and Dona Ana, New Mexico, as described by Dr. Whipple in *Sky and Telescope* for February, 1949.

One station is now located at Sunspot, N. M., at an altitude of 9,200 feet on the grounds of the Sacramento Peak Observatory of the Air Force Cambridge Research Center. The instruments are mounted on the crest of the ridge not far from the new 16-inch coronagraph buildings. The second station is located at Mayhill, N. M., some 22 miles northeast of Sunspot.

The cameras were scheduled to be back in operation during October. Their new locations, about 70 miles from their original sites, are expected to provide excellent weather conditions for meteor-observing with the extremely rapid Baker super-Schmidt meteor cameras.

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THE NEW YORK TIMES, WEDNESDAY, DECEMBER 22, 1954.

UNTIL 9
(Friday
until 5:30)

STRIJDOM HINTS GO-SLOW POLICY

**Denies South Africa Drifts
Toward Police State—Bars
Racial Partition Now**

Special to The New York Times.
JOHANNESBURG, South Africa, Dec. 21—His supporters call him "Die Leeu" (the lion). However, South Africa's new Prime Minister Johannes G. Strijdom is acting as placidly as a dove. Statements made by him today contained the following points:

¶The South African Navy will take over the Simonstown naval base near Capetown from Britain in peace time but would share defense of the base in a world war.

¶Southern Africa's defense should be planned by South Africa, Britain, France, Portugal and Belgium.

¶South Africa is not drifting toward a police state. Mr. Strijdom said the Government had not curbed trade union leaders and had used the anti-Communist law against Communists only.

¶A predominantly British Natal province will not be allowed to secede from the union if South Africa eventually becomes a republic.

¶South Africa should not be partitioned between Negroes and whites. He said complete separation had to be left to future generations to decide if it was necessary.

In a Christmas message to South Africa's 8,600,000 Negroes Mr. Strijdom said:
"The Government will as in the

Military Services Push 'Earth Satellites' Study

WASHINGTON, Dec. 21 (UP)—The Defense Department said today the combined efforts of the military services were being devoted to studies of "earth satellites."

An earth satellite, when and if built, would be a form of space ship that long has been of fascination to scientists. The satellite would swing in an elliptical pattern around the earth.

A two-sentence Defense Department comment was made available following a recent news conference remark by Secretary Charles E. Wilson that there were no space ship studies going on.

The late Defense Secretary, James Forrestal, referred to an "earth satellite vehicle program" in a report in 1948. Today the department said studies on that program were still active. It added that the studies were being coordinated in Mr. Wilson's office and he approved today's statement.

To become a satellite, a vehicle would have to be launched several hundred miles out and attain a speed of 18,000 miles an hour.

COAL-STEEL POOL TIE IS SIGNED BY BRITAIN

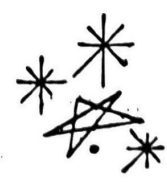
Special to The New York Times.
LONDON, Dec. 21—Britain bound herself today to a formal association for the next fifty years with the six-nation European Coal and Steel Community.

The community is the agency that France, Italy, West Germany, Belgium, the Netherlands and Luxembourg created in early 1953 to organize and operate a common market in steel and coal.

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INVING-BERREY'S
THERE'S NO BUSINESS LIKE SNOW BUSINESS

IN SCIENCE FIELDS

DERMATOLOGY

Cortisone Affects Skin Layers Differently

CORTISONE, adrenal gland hormone for its anti-arthritis action, affects face skin differently from the way it affects the dermis, or true skin lying in the surface layers.

Studies of cortisone's action on the surface of the epidermis, is an indirect one resulting from its action on the under skin.

Findings, made in studies of healing, hair regeneration and external skin cancers, are reported by Theodore Gillman, Jack Penn, Doris and Marie Roux of the University of Natal, and the Brent Clinic, Johannesburg, South Africa, *Nature* (Nov. 12).

Cortisone delays but does not stop the growth of skin cancers experimentally induced by painting cancer-causing chemicals on the skin of laboratory animals, the researchers found. Microscopic examination of the skin of cortisone-treated animals showed no malignant change within the surface layers, even though examination with a microscope failed to show any changes.

When the hair is plucked from the skin and cortisone is applied, the hair regrows. The reason, apparently, is that cortisone has suppressed the growth of the under skin by new surface layers, and has also made it impossible to see the underlying connective tissue to which hair roots are attached.

Science News Letter, December 3, 1955

ANTHROPOLOGY

Environment May Count More Than Once Thought

FOR BROWN SKIN, prominent hooked nose, kinky or straight hair, are very anatomical traits commonly distinguishable in one race from another. But they can be changed by influence from the environment, Dr. Russell W. Newman of the American Anthropological Association meeting in Boston.

The shape of the skull, much used in describing people, can be changed by either under- or over-nutrition.

Studies of the world-wide distribution of various human characteristics show that a great many previously thought to be determined by the racial type of the person are really related to the environment he lives in, Dr. Newman said.

Science News Letter, December 3, 1955

BIOCHEMISTRY

Canals in Body Cells Act as Storage Cisterns

SOME CELLS of the body have within their microscopic selves systems of canals. These canals apparently serve as cisterns for temporary storage of materials destined for distribution to other parts of the body.

The materials might be the hormones and enzymes that play vital roles in body chemistry and functioning.

Such canals in some cells of the pancreas, big gland best known because part of it produces anti-diabetic insulin, have been made visible under the microscope by a method developed by Dr. Owen Lewis Thomas of Napier, New Zealand.

The method was to inject the canals with a mass consisting of laked blood medium. After the cells were sliced thinner than paper, they were stained and examined under the microscope. Details of the method and findings are reported by Dr. Thomas in *Nature* (Nov. 19).

Science News Letter, December 3, 1955

ASTRONOMY

Ask Search for Moons Of Earth and Planets

THE EARTH and other planets may have small moons not yet discovered, Dr. Robert S. Richardson of Mt. Wilson and Palomar Observatories believes.

Searching for the satellites by eye rather than through telescopes might be the most likely way of finding them, he reports in the *Bulletin of the Astronomical Society of the Pacific* (Sept.).

Small moons of other planets, such as Phobos and Deimos that circle Mars, are valuable for revealing a planet's mass more accurately than otherwise possible.

"Among the most useful discoveries that could be made in the solar system would be satellites for Mercury, Venus and Pluto," Dr. Richardson says. The masses of these planets can be found only by their effects on other bodies, extremely difficult to spot.

Dr. Richardson has calculated the maximum distances and periods of satellites for each of the sun's nine planets. The greatest distance at which the earth's gravity would keep a natural satellite circling and prevent it from escaping into the sun would be 927,000 miles. The moon's distance varies from 221,463 miles to 252,710 miles.

A search for small satellites between the earth and the moon is being made for the Defense Department by Dr. Clyde Tombaugh, who discovered the ninth planet, Pluto.

Tiny earth satellites, if they exist, would not have been spotted before because of

their extremely rapid motion, too fast to be caught on the usual photographic plates.

Another reason possible small earth moonlets have not been seen yet is that they would spend most of their time in the earth's shadow, and would not shine since they have no light of their own.

Although the chances of finding undiscovered satellites of planets are not great, they are "not quite as dim" as might be thought, Dr. Richardson states, noting that three have been spotted in the last six years.

Dr. Gerard P. Kuiper of Yerkes Observatory, Williams Bay, Wis., discovered a close satellite of Uranus in 1948 and a distant satellite of Neptune in 1949. In 1951, Dr. Seth B. Nicholson of Mt. Wilson and Palomar Observatories discovered the twelfth satellite of Jupiter, the fourth he had found since 1914.

Science News Letter, December 3, 1955

ANTHROPOLOGY

People of Inland Asia Are Pretty Much Alike

INLAND ASIANS, of which there are more than 15,000,000, have a surprising uniformity of body build, Dr. Marshall T. Newman of the U. S. National Museum told the American Anthropological Association meeting in Boston.

Nearly all inland Asians are shorter than average in height, heavy in body weight, with long trunks and short legs.

It is difficult to separate the influence of environment from that of race, Dr. Newman suggested. Thus, the inland Asians of the core area are large-headed and large-faced, because they are predominantly Mongoloids.

Mongoloids probably have large heads and large faces, just as they have small noses and padding of fat on their faces, because such features have a survival value in extremely cold climate.

Some parts of inland Asia are colder than others. Average January temperatures range from 27 degrees Fahrenheit in the Fergana Valley Kirghiz to minus 39 degrees in the Viliui Yakut. This is greater than the temperature difference between Salt Lake City, Utah, and Churchill, Hudson Bay, Canada.

Yet Dr. Newman noted no gradations in body build. He accounts for uniformity of body size and shape by the extraordinary amount of large and recent movements of peoples. The people did not stay long enough for natural selection to bring about adaptation to the specific climatic conditions.

Although new environmental conditions can produce definite physical changes, these are limited, Dr. Newman said. The major agency for gross change is natural selection. This takes generations.

The movement of the peoples of inland Asia would also lead to racial intermixture that would tend to have a leveling effect on the physical characteristics.

Science News Letter, December 3, 1955

ENTOMOLOGY

Scientist Tricks Into Revealing

A FEMALE'S TRUE COVERED AT LAST.

The new technique, worked out by a zoologist with the University of England, requires complete dissection of the female. Up to now it has been only for flies and mosquitoes.

Determining the age of flies is important in studies, especially those connected with disease transmission. To make this possible, zoologist L. Davies has discovered that black-flies, *Simulium ornatum*, shed the blood of cattle.

He found the younger flies have a large fat-body, particularly in the abdominal segments; while older flies had none, except in small last abdominal segments.

Up to 10% of the females maintained their feminine shape into neither group. Examination of known age showed that older flies' bodies were not more than 10 days old, Dr. Davies reported (Nov. 19).

Residual ripe eggs were found among the older females. A dissection is necessary before ripe eggs are produced in this species, the scientist found. That some, and probably many, without fat-bodies had taken a blood meal, while none of the younger flies had.

Science News Letter,

ANTHROPOLOGY

Teen-Agers Are In Africa as Well

TEEN-AGERS are present in Africa as well as in New York, Dr. Powell M. Ziskin, anthropologist at the College of Arts and Sciences, New York, told the American Anthropological Association meeting in Boston.

In Africa, the difficulty is in distinguishing between a conscious desire for change and a convenient conscious longing for a simple life in their native tribes.

Dr. Ziskin collected data on teen-agers by boys and girls in elementary schools in Northern Rhodesia, in the high copper mining area.

Both boys and girls said they would live where they could have sports and movies, an automobile in other words, in one of the towns of Africa.

On the other hand, when asked what they would prefer to be if they could change human life, three-fourths of the girls said they would be a bird. This was interpreted by Dr. Ziskin as an unconscious desire for a tribal, life with less pressure.

Science News Letter,

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Letter, January 19, 1957

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Letter, January 19, 1957

Questions

AGRICULTURE—In the drought of the 30's with what did birds build their nests? p. 35.

□ □ □

ENGINEERING—What is the new fuel being used in submarines? p. 42.

□ □ □

GENERAL SCIENCE—What is one advantage of underground storage of water for use during "water short" years? p. 38.

□ □ □

MEDICINE—From what are the fatty acids used in treating multiple sclerosis extracted? p. 38.

How can the measles virus be made harmless? p. 40.

□ □ □

PUBLIC SAFETY—What class of compounds is being used to prevent skidding on highways? p. 41.

□ □ □

PHOTOGRAPHS: Cover, Woods Hole Oceanographic Institution; p. 35, British Information Services; p. 37, All American Engineering Company; p. 39, New York University; p. 42, U. S. Navy; p. 48, Eastman Chemical Products, Inc.

ASTRONOMY

Find No Natural Satellite In Space Around Earth

► WHEN MAN FLINGS the first artificial satellite into space later this year, the chances are high the tiny sphere will not compete with any natural earth satellites farther out in space than it is.

Three years of an intensive search of much of the space around earth by Clyde

W. Tombaugh, discovered of the solar system's most distant planet, Pluto, show it is empty of relatively large material from 1,600 to 22,200 miles above the earth's surface. The space from 300 miles out to 1,600 miles is now being scanned for possible natural earth satellites from a site in Ecuador.

The first major phase of the work, supported by the Army's Office of Ordnance Research in Durham, N. C., was conducted at Lowell Observatory, Flagstaff, Ariz.

The equipment used by Mr. Tombaugh was so sensitive it could detect a clean white tennis ball only half illuminated to the observer at 1,000 miles above the earth's surface, or record a dark meteorite about one foot in diameter at the same height.

Mr. Tombaugh reported that his search disclosed a few "suspects," most of which were later found not to be natural satellites. Those not yet eliminated are being checked again from Ecuador.

The basic principle of Mr. Tombaugh's technique is the use of a Schmidt or other fast camera of wide field, moved at a rate to conform with the angular speed the supposed satellite would have across the sky. If a satellite actually existed, its image on the photographic film would be concentrated in a point image or dot, or a short trail.

The techniques he developed are expected to have definite significance in making observations of man-made satellites, which the United States and probably Russia are planning to launch in connection with the International Geophysical Year starting next July 1.

A determination that the space near the earth is free of debris up to a certain size would also be useful to long-range missile experts and to proponents of space travel.

Mr. Tombaugh's report notes that the surface of the moon may provide "grim evidence" of scars produced by collisions with matter flying about in space. Whether these scars were produced by asteroids or left-over debris from some process involved in the birth of the moon, or by some other method, is not known.

The earth has probably suffered from a comparable number of hits in the past, but vigorous action of water erosion has erased most of the evidence. On the moon, there is no appreciable erosion and thousands of craters, whose origin is still not settled, are easily seen with small telescopes.

Science News Letter, January 19, 1957

PALEONTOLOGY

Its Hoots Long Stilled, Fossil Owl Gets Name

► SOME long dead owl bones have been named and identified as a new fossil species closely related to the Barn Owl.

Dr. Loye Holmes Miller, emeritus professor of biology at the University of California at Los Angeles, has proposed as the scientific name of the bird, *Lechusa stirtoni*.

The fossilized bones of Stirton's Owl were among a collection of bone fragments

discovered by Joseph Arndt in a Pliocene age formation in San Diego, thought to represent a shallow-water marine accumulation on tidal sand bars that serve as a resting ground for marine birds. The owl probably roosted in a nearby cliff.

Dr. Miller gives his reasons in the *Proceedings of the California Academy of Sciences* (No. 26, 1956) for choosing name, *Lechusa stirtoni*:

"In northern Mexico and Arizona the name *Lechusa* (Latin-American spelling) is applied to the Barn Owl in distinction from the eared owls that are called *scops*. I have therefore chosen a generic name from the Spanish instead of the Greek. The specific name honors the collector in paleontology, Dr. R. A. Stirton.

Science News Letter, January 19, 1957

Do You Know.

The *sponge*, a relatively simple animal, has the ability to reassemble itself broken into tiny pieces.

A new type *face shield* has been developed for use by troops or others required to work in extremely cold climates.

Next to the cereal crops, the *potato* is of major importance in Colombia and is grown widely at altitudes from 4,500 to almost 12,000 feet.

About one-third of world *wheat exports* for 1955-56 were made by the United States.

Connoisseurs claim the finest *pate de foie gras*, the goose liver delicacy, comes from Strasbourg in Alsace.

Chromite from low-grade domestic deposits, such as those in Oregon and Montana, can be treated to yield satisfactory alloying material for steelmaking.

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Tombaugh

Clyde Tombaugh - Discoverer of Planet
 Pluto. David H. Levy, University of Arizona
 Tucson 1991

White Sands.

worked with Von Braun - friends
developed optical instrumentation for Project Outcasts (Von
Braun's satellite proposal)
and equivalent to lieutenant colonel - in charge of 75 people
SD V-2 German rockets - sent to 100 miles up with
upper atmosphere experiments
- got into the track V-2 flight with high quality optical telescopes
(optical tracking)

March 23, 1931

- idea for small, natural earth satellites came in 1943.

Tombaugh & Henry Giclas attempts to (reverse) outward 2101 Adams

- Tombaugh figured if men were to go into space around the earth
he should just know if there were any objects there that might
be in the way

- figured deep 't of balance research might find it.

- goal was a search to about the thirtieth magnitude (mag 17 foot
apart at 10,000 miles or a 380 foot apart at the Moon's distance.

- discovery began in 1951, proposal completed in June 19, 1952

- 1) space research & intent to receive
- 2) military would develop procedures for tracking "extremely
high altitude rockets

153

- 3) find smaller comets not known than to exist
- 4) find earth approaching asteroids
- 5) "aid as a base in the establishment of an artificial satellite
or space station, if the characteristics of such a base are
favorable"

Tombaugh 2.

Tombaugh boasted the equipment and stellar strategy were good enough to detect a "clean white tennis ball" at a distance of 1000 miles

- program began at Lowell Observatory (Flagstaff) Dec 1953
- from 53 to 56 13,450 photographs
- Tombaugh thought best chance of finding near earth objects helped by observing from the equator
- NOV. 55 travelled to Quito, Ecuador.
- Tombaugh resigned from White Sands in fall 55
- moved management of satellite search to N.M. State University
- extended till March 58 to photograph Sputnik

Conclusion "after taking 15,000 films, plus the visual looking, we concluded that we could send rockets out into space with very little risk of collision with natural objects..." 7.157.
Final report June 1959 few dozen suspects - none confirmed
film defects or small asteroids passing earth

O'Keefe had heard the rumors (closer to earth)

Army mapping Service

- communication between Ordnance Research and Army Map Services did not allow O'Keefe to find out whether or not an object had been found.

(using object for triangulation precise distances of land masses)

At White Sands from 46 to 55 (p. 166)

Moved to New Mexico State to finish search

Tombaugh, C.; Robinson, J.C.; Smith B.A.; and Muwrel, A.S. "The Search for Small Natural Earth Satellites: Final Technical Report
Las Cruces, New Mexico State University Physical Science Laboratory 1959
Tombaugh, C. "Interim Report on Search for Small Earth Satellites. Las Cruces. N.M. College of Agriculture and