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UNCLASSIFIED

Technical Report No. F-TR-2274-ND

UNIDENTIFIED AERIAL OBJECTS

PROJECT "SIGN"

SIGN

Release Date:
February 1949

HEADQUARTERS AIR MATERIEL COMMAND

WRIGHT-PATTERSON AIR FORCE BASE

DAYTON, OHIO

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APPENDIX "C"

Some Considerations Affecting the Interpretation of Reports of Unidentified Flying Objects

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The writer has studied summary abstracts and comments pertaining to unidentified flying objects, which were forwarded by Air Force Intelligence. These remarks are divided into three main parts: the first part is a short summary of the reports; the second part consists of a general survey of various possibilities of accounting for the reports; the third part contains certain recommendations for future action.

PART I -- SHORT SUMMARY OF OBSERVATIONS

The reports can be grouped as follows:

Group 1 -- The most numerous reports indicate the daytime observation of metallic disk-like objects, roughly in diameter ten times their thickness. There is some suggestion that the cross section is assymetrical and rather like a turtle shell. Reports agree that these objects are capable of high acceleration and velocity; they often are sighted in groups, sometimes in formation. Sometimes they flutter.

Group 2 -- The second group consists of reports of lights observed at night. These are also capable of high speed and acceleration. They are less commonly seen in groups. They usually appear to be sharply defined luminous objects.

Group 3 -- The third group consists of reports of various kinds of rockets, in general appearing somewhat like V-2 rockets.

Group 4 -- The fourth group contains reports of various devices which, in the writer's opinion, are sounding balloons of unusual shape such as are made by the General Mills Company to Navy contract.

Group 5 -- The fifth group includes reports of objects in which little credence can be placed.

General Remarks

In general, it is noted that few, if any, reports indicate that the observed objects make any noise or radio interference. Nor are there many indications of any material affects or physical damage attributable to the observed objects.

Summary -- PART I

This report will consider mainly the reports of Groups 1 and 2.

PART II -- ON POSSIBLE EXPLANATIONS OF THE REPORTS

Section A -- What can be deduced concerning the nature of an unknown aerial object from a single sighting?

Here, there are two problems: first, how much can be deduced concerning the nature of the objects from geometrical calculations alone; second, how much more can be deduced if, in addition, it is assumed that the objects obey the laws of nature as we know them.

Concerning the first problem, it can be stated that only ratios of lengths, and rates of change of such ratios, can be accurately determined. Thus, the range and size of such objects cannot be determined; and it is noticeable that reports of size of the observed objects are widely at variance. However, angles, such as the angle subtended by the object, can be observed. Likewise there is fair agreement among several observers that the diameter of the objects of Group 1 is about ten times their thickness. Although velocity cannot be determined, angular velocity can be, and in particular the flutter frequency could, in principle, be determined.

All that can be concluded about the range and size of the objects, from geometrical considerations alone, is: 1) from the fact that estimated sizes vary so widely, the objects were actually either of different sizes, or more likely, that they were far enough from the observers so that binocular vision produced no stereoscopic effect; this only means that they were farther off than about thirty feet; 2) since objects were seen to disappear behind trees, buildings, clouds, etc., they are large enough to be visible at the ranges of those recognizable objects.

Now, it is obviously of prime importance to estimate the size and mass of the observed objects. This may be possible to some extent if it is permissible to assume that they obey the laws of physics. Since the objects have not been observed

to produce any physical effects, other than the one case in which a cloud was evaporated along the trajectory, it is not certain that the laws of mechanics, for instance, would be sufficient.

But suppose that mechanical laws alone are sufficient, then the following example is sufficient proof that at least a length could, in principle, be determined: suppose a simple pendulum were observed suspended in the sky; then after observing its frequency of oscillation, we could deduce from the laws of mechanics its precise length.

This suggests that something could be deduced from the observed fluttering motion of some of the objects of Group 1. Assume that we know the angular frequency and angular amplitude of this fluttering motion (they can be measured in principle from a motion picture). Then for purposes of calculation assume the object to be thirty feet in diameter, to be as rigid as a normal aircraft wing of 30-foot span, to be constructed of material of the optimum weight-strength ratio and to be a structure of most efficient design. It is now possible to calculate how heavy the object must be merely to remain rigid under the observed angular motion. Let the calculation be made for a plurality of assumed sizes 1, 2, 4, 8, 16, 32, 64 ----- up to say 200 feet, and let calculated mass be plotted versus assumed size. The non-linear character of the curve should indicate an approximate upper limit to the size of the object.

If, in addition, it is assumed that the flutter is due to aerodynamic forces, it is possible that more precise information could be obtained.

The required angular data can probably be extracted from witnesses most reliably by the use of a demonstration model which can be made to oscillate or flutter in a known way.

Summary -- PART II, Section A

Geometrical calculations alone cannot yield the size of objects observed from a single station; such observation together with the assumption that the objects are essentially aircraft, can be used to set reasonable limits of size.

Section B -- The possibility of supporting and propelling a solid object by unusual means.

Since some observers have obviously colored their reports with talk of rays, jets, beams, space-ships, and the like, it is well to examine what possibilities exist along these lines. This is also important in view of the conclusions of PART II, Section A, of this report.

Method I -- Propulsion and support by means of "rays" or "beams".

By "rays" or "beams" are meant either purely electromagnetic radiation or else radiation which is largely corpuscular like cathode-rays or cosmic-rays or cyclotron-beams.

Now, it is obvious that any device propelled or supported by such means is fundamentally a reaction device. It is fundamental in the theory of such devices that a given amount of energy is most efficiently spent if the momentum thrown back or down is large. This means that a large mass should be given a small acceleration -- a theorem well understood by helicopter designers.

The beams or rays mentioned do the contrary, a small mass is given a very high velocity, consequently enormous powers, greater than the total world's power capacity, would be needed to support even the smallest object by such means.

Method II -- Direct use of Earth's Magnetic Field

One observer (incident 68) noticed a violent motion of a hand-held compass. If we assume from this that the objects produced a magnetic field, comparable with the Earth's field; namely, 0.1 gauss, and that the observer found that the object subtended an angle θ at his position, then the ampere-turns of the required electromagnet is given by:

$$ni = \frac{30R}{\theta^2}$$ where R is the range of the object.

For instance, if R is one kilometer and the object is 10 meters in diameter, then ni $\neq$) billion ampere-turns.

Now, if the object were actually only 10 meters away and were correspondingly smaller; namely, 10 cm in diameter, it would still require 10 million ampere-turns.

These figures are a little in excess of what can be conveniently done on the ground. They make it seem unlikely that the effect was actually observed.

Now, the Earth's magnetic field would react on such a magnet to produce not only a torque but also a force. This force depends not directly on the Earth's field intensity but on its irregularity or gradient. This force is obviously minute since the change in field over a distance of 10 meters (assumed diameter of the object) is scarcely measureable, moreover the gradient is not predictable but changes due to local ore deposits. Thus, even if the effect were large enough to use, it would still be unreliable and unpredictable.

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Method III -- Support of an electrically charged object by causing it to move transverse to the Earth's magnetic field

A positively charged body moving from west to east, or a negatively charged body moving from East to West will experience an upward force due to the Earth's magnetic field.

A sphere 10 meters diameter moving at a speed of one kilometer/second would experience an upward force of one pound at the equator if charged to a potential of 5×10^{12} volts. This is obviously ridiculous.

Section D -- The anti gravity shield

It has been proposed, by various writers, perhaps first by H. G. Wells, that it might be possible to construct a means of shielding a massive body from the influence of gravity. Such an object would then float. Recently, there appeared in the press a notice that a prominent economist has offered to support research on such an enterprise.

Obviously, conservation of energy demands that considerable energy be given the supported object in order to place it on the shield. However, this amount of energy is in no way prohibitive, and furthermore it can be gotten back when the object lands.

Aside from the fact that we have no suggestions as to how such a device is to be made, the various theories of general relativity all agree in assuming that gravitational force and force due to acceleration are indistinguishable, and from this assumption the theories predict certain effects which are in fact observed. The assumption, therefore, is probably correct, and a corollary of it is essentially that only by means of an acceleration can gravity be counteracted. This, we can successfully do for instance by making an artificial satellite, but this presumably is not what has been observed.

Summary -- PART II, Section B

Several unorthodox means of supporting or propelling a solid object have been considered, all are impracticable. This finding lends credence to the tentative proposed assumption of Part II. that the objects are supported and propelled by some normal means, or else that they are not solids. No discussion of the type of Part II, Section B, can, in principle, of course, be complete.

Section C -- Possible causes for the reports.

Classification I -- Natural terrestrial phenomena

1. The observations may be due to some effect such as

ball lightning. The writer has no suggestions on this essentially meteorological subject.

2. The objects may be some kind of animal.

Even in the celebrated case of incident 172 where the light was chased by a P51 for half an hour and which was reported by the pilot to be intelligently directed, we can make this remark. For considering that an intelligence capable of making so remarkable device would not be likely to play around in so idle a manner as described by the pilot.

In this connection, it would be well to examine if some of the lights observed at night were not fire-flies.

3. The observed objects may be hallucinatory or psychological in origin. It is of prime importance to study this possibility because we can learn from it something of the character of the population: its response under attack; and also something about the reliability of visual observation.

One would like to assume that the positions held by many of the reported observers guarantee their observations. Unfortunately, there were many reports of curious phenomena by pilots during the war -- the incident of the fire-ball fighters comes to mind. Further, mariners have been reporting sea-serpents for hundreds of years yet no one has yet produced a photograph.

It would be interesting to tabulate the responses to see how reliable were the reports on the Japanese balloons during the war. There we had a phenomenon proven to be real.

It is interesting that the reports swiftly reach a maximum frequency during the end of June 1947 and then slowly taper off. We can assume that this is actually an indication of how many objects were actually about, or, quite differently, we can take this frequency curve as indicating something about mass psychology.

This point can be tested. Suppose the population is momentarily excited; how does the frequency of reports vary with time? A study of crank letters received after the recent publicity given to the satellite program should give the required frequency distribution.

It is probably necessary but certainly not sufficient that the unidentified-object curve and the crank-letter curve should be similar in order for the flying disks to be classed as hallucinations.

A large-scale experiment was made at the time of Orson Welles' "Martian" broadcast. Some records of this must persist in newspaper files.

Classification II -- Man-made terrestrial phenomena

1. The objects may be Russian aircraft. If this were so, then the considerations of Sections A and B indicate that we would have plenty to worry about. It is the author's opinion that only an accidental discovery of a degree of novelty never before achieved could suffice to explain such devices. It is doubtful whether a potential enemy would arouse our curiosity in so idle a fashion.

Classification III -- Extra terrestrial objects

1. Meteors: It is noteworthy that the British physicist Lovell writing in "Physics Today" mentions the radar discovery of a new daytime meteorite stream which reached its maximum during June 1947. The reported objects lose little of their interest, however, if they are of meteoritic origin.

2. Animals: Although the objects as described act more like animals than anything else, there are few reliable reports on extra-terrestrial animals.

3. Space Ships: The following considerations pertain:

a. If there is an extra terrestrial civilization which can make such objects as are reported then it is most probable that its development is far in advance of ours. This argument can be supported on probability arguments alone without recourse to astronomical hypotheses.

b. Such a civilization might observe that on Earth we now have atomic bombs and are fast developing rockets. In view of the past history of mankind, they should be alarmed. We should, therefore, expect at this time above all to behold such visitations.

Since the acts of mankind most easily observed from a distance are A-bomb explosions we should expect some relation to obtain between the time of A-bomb explosions, the time at which the space-ships are seen, and the time required for such ships to arrive from and return to home-base.

PART III -- RECOMMENDATIONS

1. The file should be continued.

2. A meteorologist should compute the approximate energy

required to evaporate as much cloud as shown in the incident 26 photographs. Together with an aerodynamicist he should examine whether a meteorite of unusual shape could move as observed.

3. The calculations suggested in Part II, Section A, should be estimated by an aerodynamicist with such changes as his more detailed knowledge may suggest.

4. The mass-psychology studies outlined in Part II, Section C, Classification I 3 should be carried out by a competent staff of statisticians and mass-paychologists.

5. Interviewing agents should carry objects or moving pictures for comparison with reporter's memories. These devices should be properly designed by a psychologist experienced in problems pertaining to aircraft and design of aircraft-control equipment so that he shall have some grasp of what it is that is to be found out. If the Air Force has reason to be seriously interested in these reports, it should take immediate steps to interrogate the reporters more precisely.

6. A person skilled in the optics of the eye and of the atmosphere should investigate the particular point that several reports agree in describing the objects as being about ten times as wide as they are thick; the point being to see if there is a plurality of actual shapes which appear so, under conditions approaching limiting resolution or detectable contrast.