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Unidentified Aerial Phenomena in the UK Air Defence Region: Executive Summary

SCIENTIFIC & TECHNICAL MEMORANDUM - No. 55/2/00

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December 2000

Defence Intelligence Analysis Staff



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AN EXAMPLE UAP FORMATION OF THE TRIANGULAR TYPE

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not relevant

INTRODUCTION

1. Reports of UAP (popularly known as 'UFOs') are usually described as coloured lights and sometimes as shapes. They are typically spherical, disc, torroidal or cigar shaped. Very occasionally they are reported with sound and even with smell. Reports occur because they comprise unfamiliar and unexpected lights, shapes and patterns, in the context in which the observer sees them. The phenomena occur on a daily, world-wide basis. The UK annual reporting rate, which is for a relatively small part of the earth's total airspace, is summarised at Figure 1. That UAP exist is indisputable. Credited with the ability to hover, land, take-off, accelerate to exceptional velocities and vanish, they can reportedly alter their direction of flight suddenly and clearly can exhibit aerodynamic characteristics well beyond those of any known aircraft or missile - either manned or unmanned. (R)
2. The topic has, hitherto, defied credible description as to its actual cause. Any worthwhile study of UAP, while maintaining the study aim, has inevitably required a multi-disciplinary approach and an understanding of the interaction of all the contributory factors. It is believed that the correlation of the overview of information reported over a period of about 30 years, with a more detailed examination of the last 10 years, together with the probable underlying science, may point to a reasonably justified explanation of the cause of this phenomena. (R)
3. For convenient cross-reference throughout this Executive Summary, the Contents Lists of Volumes 1, 2 & 3 are at Annex A. (R)

AIM

4. The aim of the investigation has been **to determine the potential value, if any, of UAP sighting reports to Defence Intelligence.** Consistent with MoD policy the available data has therefore been studied principally to ascertain whether there is any evidence of a threat to the UK, and secondly, should the opportunity arise, to identify any potential military technologies of interest. (R)

STUDY METHOD

5. UAP sightings are reported to MoD in a prescribed format and some 30 years of reports are held. A relational database has been designed to study the pattern and nature of UAP. From April 1997 it was decided that the DIS should receive only reports from 'credible' witnesses. This has significantly reduced the number of reports received and as a consequence made up to date records incomplete. For this study a statistically representative sample of the reports received between 1987 and 1997 have been examined in detail, using the database, and hundreds of other reports have been examined manually. The purpose of the **statistical analysis** was to:

- Provide graphical and tabular analysis of the number of reported UAP events by date, type, time and location.
- Allow clusters of events to be examined in greater detail, to determine whether any information of defence interest can be discovered, for example, relating to particular strategic locations, 'inspection' of our aircraft, etc.
- Identify, wherever possible, the atmospheric and terrestrial conditions for the occurrence or formation of a UAP. Although tenuous, in the absence of better quality data, this approach enabled probable causes of the UAP phenomena to be identified and thus eliminate some of the more extreme theses.(R)

6. **Flight Safety Aspects** Within the limitations of the UAP material available, an examination of all unexplained RAF aircraft fatal accidents was made, to assess the possibility, or otherwise, that past accidents may have been caused due to a startling (i.e. UAP) appearance, immediately ahead of military aircraft flying fast and low. An examination was also made for any possible UAP connection with near-miss aerial scenarios where the second air-object was never identified at the subsequent Civil Aviation Authority (CAA) enquiries.(R)

7. **Parallel Activities** The nature of all relevant types of atmospheric phenomena and human interaction have been studied, so that any items of defence intelligence interest could be identified. Factors which cause man-made objects to be misreported as UAP have also been studied. The study also necessarily involved a brief examination of the performance of the current UKADR surface and airborne sensors and whether the airspace could have been penetrated by potentially hostile air-objects in the form of UAP. (R)

8. **Science-Based Approach** A conscious effort has been made to distance the investigation from any external influences [e.g., such as may be found in the media] on the

topic of 'UFOs' and mention is made of these aspects only where absolutely necessary as part of the wider understanding of the enigma. (R)

SUMMARY OF FINDINGS

9. Based on all the available evidence remaining in the Department (reported over the last 30 years), the information studied, either separately or corporately contained in UAP reports, leads to the conclusion that it does not have any significant Defence Intelligence value. However, the Study has uncovered a number of technological issues that may be of potential defence interest. (R)

10. **Causes of UAP Reports** In the absence of any evidence to the contrary, the key UAP report findings are:

- Mis-reporting of man-made vehicles, often observed by perfectly credible witnesses, but with unfamiliar or abnormal features; or in unusual circumstances.
- Reports of natural but not unusual phenomena, which are genuinely misunderstood at the time by the observer.
- The incidence of natural, but relatively rare phenomena. These may be increasing due to natural changes and possibly accelerated by man-aided factors, such as smoke and dust.

Further:

- No evidence exists to associate the phenomena with any particular nation.
- No evidence exists to suggest that the phenomena seen are hostile or under any type of control, other than that of natural physical forces.
- Evidence suggests that meteors and their well-known effects and, possibly some other less-known effects, are responsible for some UAP. (R)

KEY SUPPORTING FINDINGS

11. Aerial phenomena of the type consistent with those reported as UAP, and with exceptional characteristics, certainly exist - but the available evidence suggests that apart from those which can be more easily and satisfactorily explained, they are comprised of several types of rarely encountered **natural** events within the atmosphere and ionosphere.

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Some of these are still barely understood. It is clear that they have been reported as exceptional occurrences throughout recorded history, using the language of the times. In this respect the reader is especially referred to Annex A (page A4) for topics covered in Volume 2 Papers 2, 10, 13, 19, 21, 23 & 24 and to Volume 1 Annex C. (R)

12. Considerable evidence exists to support the thesis that the events are almost certainly attributable to physical, electrical and magnetic phenomena in the atmosphere, mesosphere and ionosphere. They appear to originate due to more than one set of weather and electrically-charged conditions and are observed so infrequently as to make them unique to the majority of observers. There seems to be a strong possibility that at least some of the events may be triggered by meteor re-entry, the meteors neither burning up completely nor impacting as meteorites, but forming buoyant plasmas. The conditions and method of formation of the electrically-charged plasmas and the scientific rationale for sustaining them for significant periods is incomplete or not fully understood.(R)

13. The key supporting findings are:

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XXX
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XXX
- Dependent on an object's colour temperature and aerosol density, it may be seen visually; either by its self-generated plasma colour, by reflected light or in silhouette by light blockage and background contrast. As an electrically-charged, but not ionised, gaseous mass, this may be either visible to the eye but not to radar sensors; or fully ionised and visible to both.
- Occasionally and perhaps exceptionally, it seems that a field with, as yet, undetermined characteristics, can exist between certain charged buoyant objects in loose formation, such that, depending on the viewing aspect, the intervening space between them forms an area (viewed as a shape, often triangular), from which the reflection of light does not occur. This is a key finding in the attribution of what have frequently been reported as black 'craft', often triangular and even up to hundreds of feet in length. (Volume 2, Paper 18)
- The close proximity of plasma related fields can adversely affect a vehicle or person. For this to occur the UAP must be encountered at very close ranges. A probable modulated magnetic, electric or electromagnetic (or even unknown

field), appears to emanate from some of the buoyant charged masses. Local fields of this type (probably either an electromagnetic near-field, or a direct magnetic field) have been medically proven to cause responses in the temporal lobes of the human brain. These result in the observer sustaining (and later describing and retaining) his or her own vivid, but mainly incorrect, description of what is experienced. Some observers are likely to be more susceptible to these fields than are others, and may suffer extended memory retention and repeat experiences. **This is suggested to be a key factor in influencing the more extreme reports found in the media and are clearly believed by the 'victims'** (Volume 2 Papers 1, 2 and (with experimental results) Paper 25)

- Those closest to the event but located in vehicles or behind obstacles, appear to be partially or fully screened from the radiated field and any radiant heat. Radiated effects are reported in some very rare instances to be sufficient to cause scorching of human skin and damage to nearby terrestrial objects. (Volume 2, Papers 1, 2 & 25)
- Within the influence of the field, and effectively in its probable near-field discharge path, coupling to vehicle electronic and electrical systems can occur and affect equipment operation. Although this effect has been limited to the temporary malfunction of internal combustion engines and radios within the UK, it is of importance that aircraft equipment could exceptionally be affected for a limited period, according to authoritative open scientific reports from the USA.
- **Although it cannot be completely ruled out, there is no firm evidence that aircraft or crews are exposed to a direct threat (e.g. collision risk) from a UAP, unless violent manoeuvres are undertaken to avoid or chase them. As a virtually inertia-less charged gaseous mass, the UAP will always be able to manoeuvre (much more rapidly than any aircraft) into a position demanded by the influence of the balance of electrical charges pertaining at the time.** (Volume 3)
- There is some evidence that the form and visual appearance of a buoyant entity, can be changed by the addition of external energy. It is possible that a natural body at a charge threshold level might change state if extra energy arrives. (This has led 'Ufologists' to imagine that an 'alien response' is being given to their signals!) (Volume 2, Paper 10)
- The increases in atmospherically-carried dust and other types of industrial gaseous emission, are likely to provide additional opportunities for electrically-charged aerosol formation (dusty plasmas). Dusty plasmas caused by this process are

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probably not limited to occurring and remaining principally in those regions of the earth where volcanoes and earthquakes are natural events. (Volume 2, Paper 19)

- A Russian aerodynamics report shows that an otherwise 'indistinct, blurred or raggedly-shaped' charged aerosol formation (often a feature of UAP reports) can be naturally reshaped by the airflow in which it travels to look remarkably like a typically-reported 'classic UFO' shape. (Volume 2, Paper 19) (R)

14. At present the information is not available to accurately predict the condition for the formation of plasmas, which are believed to be responsible for many UAP reports. If the conditions for UAP formation can be predicted or even measured, it might be possible to enable formation probability forecasts to be made; **this may become an important factor in the future if the incidence (and hence the nuisance aspects) of UAP increases.** (R)

15. As part of the investigation other relevant factors have been taken into account:

- It is acknowledged that certain unfamiliar, friendly aircraft may be authorised, for covert entry into UK controlled airspace and this gives rise to some UAP reports. There is no evidence of the penetration of the UKADR by unauthorised air platforms. (Volume 2, Papers 6 & 9)
- No artefacts of unknown or unexplained origin have been reported or handed to the UK authorities, despite thousands of UAP reports. There are no SIGINT, ELINT or radiation measurements and little useful video or still IMINT, from the often short-lived UAP events. (Volume 2, Paper 22)
- A brief investigation into known or postulated 'exotic technologies' which might account for the phenomena has not revealed any likely exploitation of these by any known source. For any such capabilities to be viable, the technologies, reliabilities, manoeuvre capabilities, accelerations and velocities would apparently require an 'inertia-less vehicle'. For this to be the case a completely new understanding of materials, forces and fields would have to be in operation. The fact that the objects reportedly have the manoeuvre and acceleration attributes of an inertia-less vehicle re-inforces the hypothesis that they are buoyant charged bodies which move under the forces of both natural and man-made fields until they disperse naturally. (Volume 2, Paper 6)
- There is evidence, from openly-published scientific papers, that scientists in the former Soviet Union have taken a particular interest in 'UFO Phenomena'. They have identified the close connection with plasma technologies and are pursuing

related techniques for potential military purposes. For example, very high power energy generation, RF Weapons, Impulse Radars, air vehicle drag and radar signature reduction or control, and possibly for radar reflecting decoys. (Volumes 1 & 3) (R)

16. **Decoys** Charged masses can appear as visual, infra-red and radar targets. The potential use of these is noted, for example, as decoy targets. However, the means of generation and control of these in the atmosphere at the right time and place appears to be a significant challenge and it would have to be shown that there would be a clear advantage of plasma-type decoys over existing electronic warfare methods. There are clear analogies with the radar detection of UAP and specially constructed air vehicles which may use plasma to achieve signature modification. [Sensitive comparisons which might be made are discussed at Volume 3] (R)

KEY FINDINGS OF DEFENCE INTEREST

17. The overall analysis, which has included an examination of reports received during the Cold War, indicates that:

- **There is no evidence that any UAP, seen in the UKADR, are incursions by air-objects of any intelligent (extra-terrestrial or foreign) origin, or that they represent any hostile intent.**
- **There is no evidence that 'solid' objects exist which could cause a collision hazard.**
- **A small possibility may exist, suggested by the low density of such past reports, of a head-on encounter with a UAP. If the increased density of UAP reports (as seen, for example during 1996/97) is an indicator of an increase in genuine sightings, this may indicate that the probability of head-on encounters could increase. This could be a startling event for very low flying aircraft and could, conceivably, result in a sudden control input from which recovery is impossible before ground impact. Although the risk, based on all available evidence, is judged to be very low, it cannot be totally ruled-out.. (Volume 3)**
- **Attempts by other nations to intercept the unexplained objects, which can clearly change position faster than an aircraft, have reportedly already caused fatalities. However, there is no indication that deliberate 'UAP chasing' has caused this in the UKADR.(Volume 3)**

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- The conditions for the initial formation and sustaining of what are apparently buoyant charged masses, which can form, separate, merge, hover, climb, dive and accelerate are not completely understood. Nevertheless, the underlying physics may have some military application in the future in the form of active visual, radar and IR decoys and passive electromagnetic spectrum energy-absorbers. XXXXXXXX

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(R)

STUDY RECOMMENDATIONS

18. Key Recommendation Although the study cannot offer **certainty** of explanation of all UAP phenomena, the existing evidence is sufficiently persuasive to make **one** key and 4 subsidiary recommendations:

- It should no longer be a requirement for DI55 to monitor UAP reports as they do not demonstrably provide information useful to Defence Intelligence. Therefore, Hd Sec (AS) should be advised.

Subsidiary Recommendations

- Selection of a ten year UAP reporting period for detailed statistical studies, allowed material from both the Cold War and post-Cold War periods to be studied. No significant differences were discovered in the results from these two time periods. For this and other reasons it is not expected that further inputs to the database will significantly change the findings stated in this Executive Summary. Consequently, and in keeping with the key recommendation, it is recommended that there be no further requirement for maintaining the database.
- The flight safety aspects of the findings should be made available to the appropriate RAF Air Defence and other military and civil authorities which operate aircraft, particularly those operating fast and at low altitude.

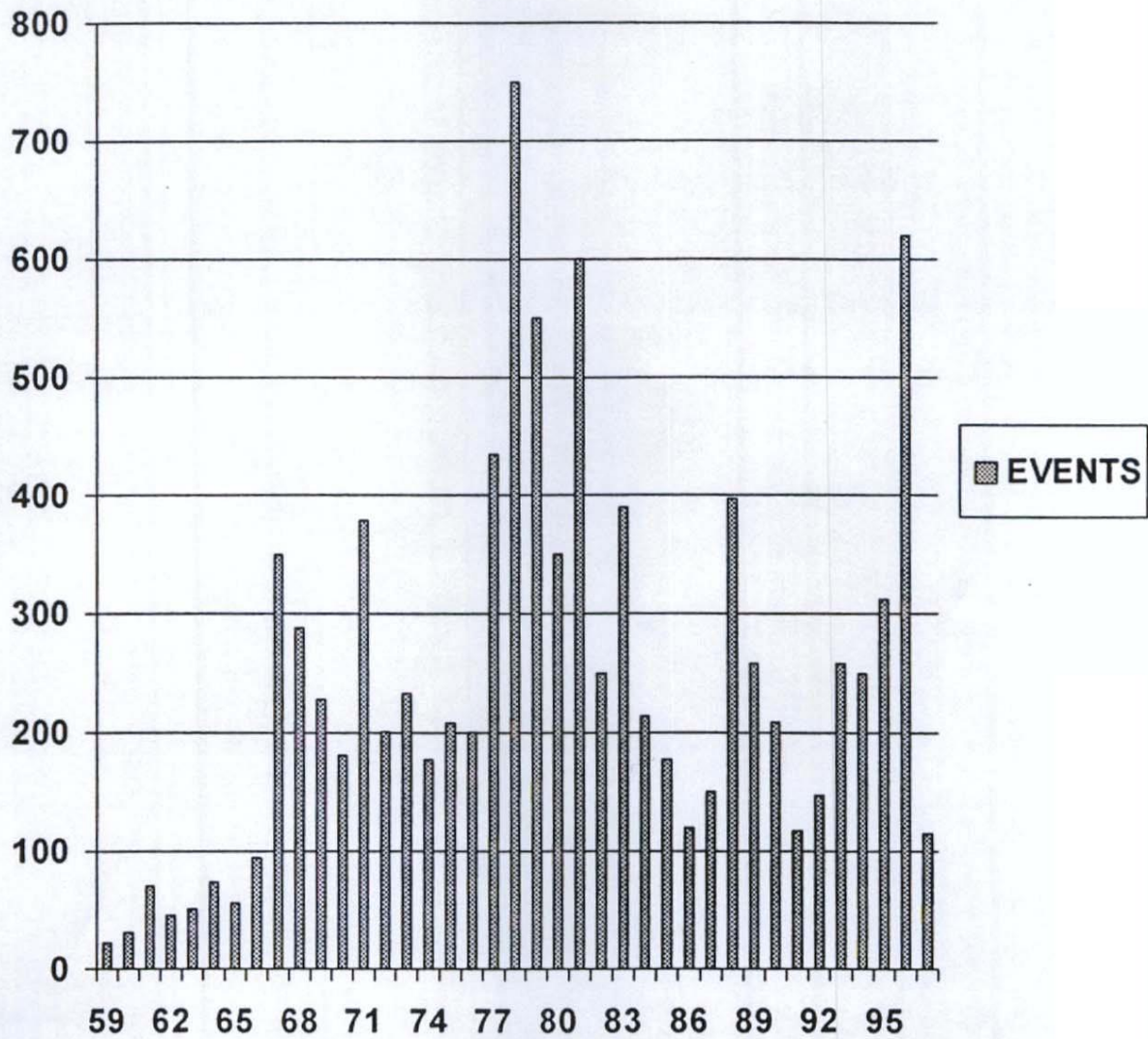
In so advising:

- It should be stressed that, despite the recent increase in UAP events, the probability of encountering a UAP remains very low.
- No attempt should be made to out-manoeuvre a UAP during interception.

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- At higher altitudes, although UAP appear to be benign to civil air-traffic, pilots should be advised not to manoeuvre, other than to place the object astern, if possible.
- The reasons affecting the variability in radar detections of UAP by UKADR (and civil air traffic) sensors, should be passed to the appropriate operating authorities.
- The relevance of plasma and magnetic fields to UAP were an unexpected feature of the study. It is recommended that further investigation should be into the applicability of various characteristics of plasmas in novel military applications. With respect to the possibility of the use of plasmas for military applications, such as target radar signature control and antennas, it is noted that the implications have already been briefed to the relevant MoD technology managers.

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Note: 1997 value is for first quarter only

FIGURE 1 - NUMBER OF UAP ANNUAL REPORTS 1959-1996

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ANNEX A

to Unidentified Aerial Phenomena in The UK Air Defence Region: Executive Summary

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CHINA
SPAIN
USA & CANADA

ANNEX A . "RUSSIAN GENERATION OF PLASMA FORMATIONS BY PULSED
DISCHARGES"

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