perceived and reported as flying much lower than they actually are.

THE ILLUSION OF OBJECT MOTION

18. It is important to note that (other types of actual flying objects excepted), with those visual phenomena which are due to certain atmospheric effects, **little of substantial physical substance actually moves.** It is the **light** seen by the observer that moves from place to place and it becomes visible in those places because the atmospheric conditions (electrical, particle etc.), allow it to become visible. Hence, the observed variation in colours seen, the duration for which an object is seen, and the time for which a sightline rate is discernible. The visualisation (wavelength) of a UAP, from an electrical charge source, also depends upon air pressure.

VELOCITY ILLUSION

19. The illusion of velocity in receding objects is particularly important in UAP reports, where, as they are often in the dark, leave the observer with no surface references with which to relate speed. This is especially the case when the sky background does not offer a simultaneous view of any aircraft, with which to compare sightline motion. Similarly, in bright sunlight the velocity of a small receding spherical object is particularly difficult to assess. This is dependent on whether the object being viewed is just a spherical (i.e. 'round') light, (which may be bright or dim) or whether it is being viewed as a silhouette. The surface area of a receding sphere is seen purely as the area of a circle (Πr^2) and the enclosed angle resulting (i.e.subtended) from its diameter, as range increases, will reduce linearly as the ratio of its diameter to range. However, its area appears to the observer to have shrunk according to the square law. The important feature here is that a sphere comprising plasma, which might not be accelerating away (or even be moving away at linear speed) but is in fact shrinking in size (as its, often brief, lifetime comes to an end as the electrical forces holding it stable collapse), can appear, from the observer's viewpoint, to be receding; whereas, it is actually an illusion and the object may hardly have moved in range.

It is easily seen, therefore, that a reported 'receding light', may in fact be a light which is reducing in intensity but remaining in exactly the same spot. Similarly a 'rotating' light may be a fluctuating light, which is the same light giving the impression of rotation.

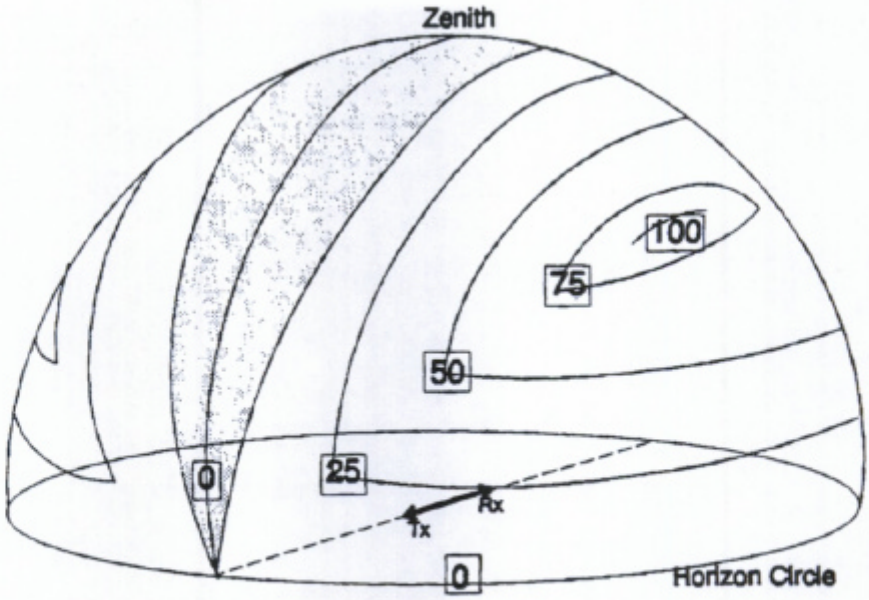

FIGURE 1: METEORITE TRAIL DISTRIBUTION (U)

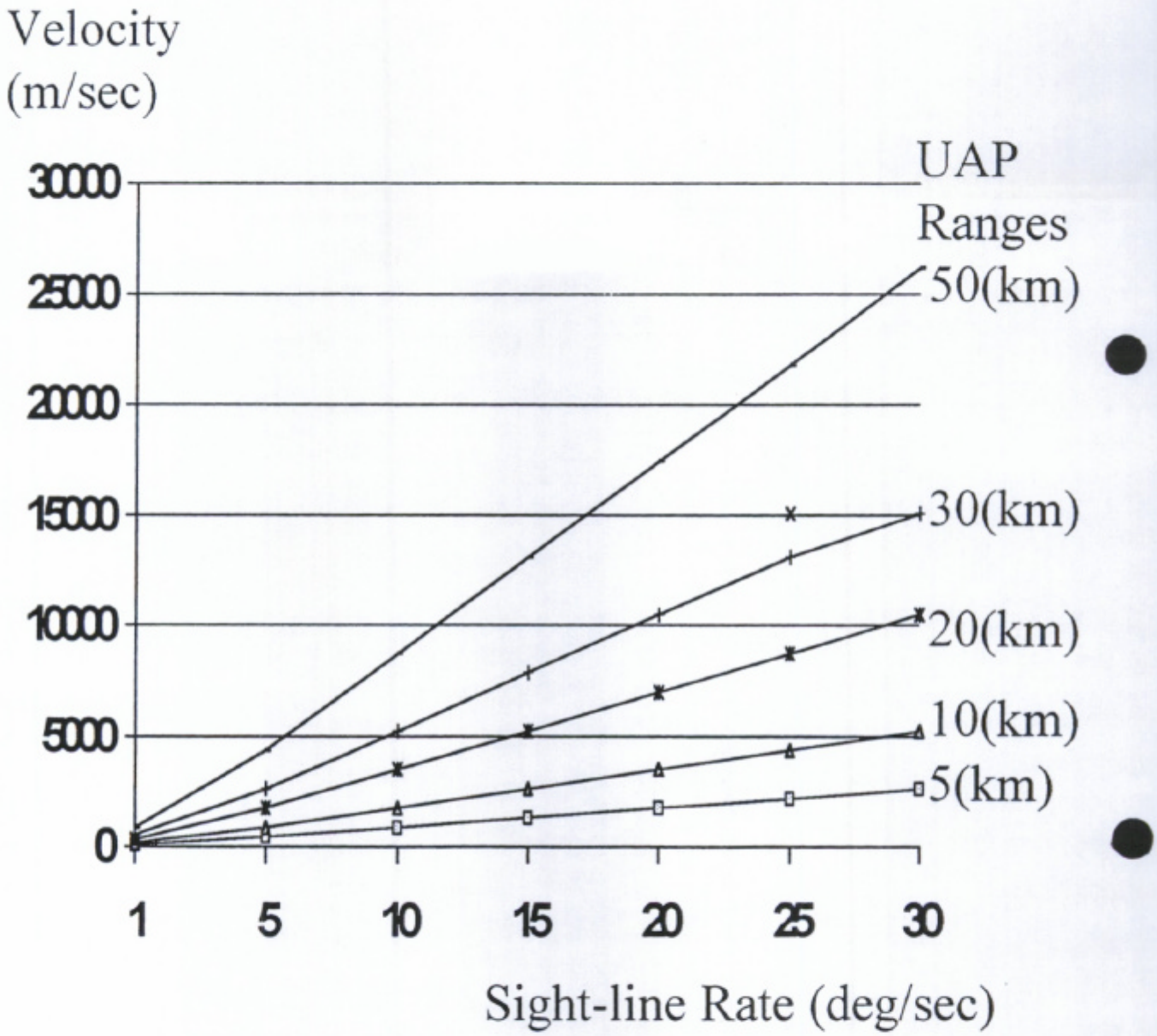

FIGURE 2 SIGHT-LINE RATES(U)

WORKING PAPER NO. 8

RARITY OF UAP SOUND REPORTS

February 1, 2000

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RARITY OF UAP SOUND REPORTS

INTRODUCTION

1. An initial overview on UAP sound is at Working Paper No. 1. This paper further sound in the context that there appears to be a contradiction between the occasional report of sounds, the frequent lack of sound when high UAP velocities are reported when, unusually there are no corresponding reports of 'sonic booms' nearby. Normally, sound is either generated and then emitted by a stationary body due to some inherent mechanical or electrical vibrating, oscillating or rotating device mounted internally or on its surface. A moving body produces sound due to bulk or frictional displacement of air. Sound may also be caused by electrical discharge or chemical action.

2. **Anomalies** When an object is in the air and, however erroneously is considered to be a 'vehicle', a witness normally expects to hear some sort of noise. The faster a UAP is perceived as travelling, then the greater is the expectation of sound. The lack of sound at the witness location may be due to:

- An over-estimate of the object's actual velocity.
- The presence of some atmospheric conditions (e.g. wind absorbing cloud) that suppressed the sound to an inaudible level.
- The probability that, while reported as being in the atmosphere, the object is in fact in space.
- The object - though travelling sometimes at high speed, has not actually disturbed the atmosphere through which it has clearly seemed to pass.
- The fact that the 'object' seen may have no mass, or negligible mass, compared with its surrounding atmosphere (i.e. it is a 'visible mass' only, caused by reflections from its ionised gases or an internally-generated colour temperature).

3. **Discussion** The first effect above is not unexpected as most UAP witnesses are untrained. The second can occur when the sonic shock wave is distorted and the conical pattern of the shock front does not reach the ground. It is also noted that the classic bow and tail shocks may not both be heard as they are at different intensities. Hence, as the public are aware (and may recognise a double shock as a supersonic aircraft), a single shock 'bump' may not be recognised as coming from a genuine aircraft. Further, the lateral extent of a supersonic shock wave causes a variation in intensity. This effect coupled with windspeed can either reinforce or weaken the sound heard.

4. **Geometry** Unless the observer is along the track of the target, ± a few kilometres, the double (or even single) 'boom' may not be heard. Airframe aerodynamic design can reduce shock wave effects, though not eliminate them.

5. **Future Systems** It is of interest, here in the UAP context, that the first experiments to modify airflow using electromagnetic fields (and plasmas) took place in the 1960s, and is a topic of current interest with its 'read-across' to target signature control (i.e. RCS reduction). It is not clear, at present, how much the reduction of drag will affect the overall audio noise generated. Intuitively the majority of noise heard on the ground is generated by the engine thrust, relatively little being generated by the airflow over a smooth vehicle body.

6. **Mis-reported Sounds** Finally, one must consider that sounds may be mis-reported (e.g. mistaken description of the noise itself) or are a figment of the imagination engendered and embellished with the rest of the alleged phenomena. For example, it is as easy to imagine a charged mass to have a dome and portholes as it is to attribute a whine when it 'takes off'! Sound reports, as with other attributes, suffer from not having a first-hand debrief immediately after the event and before reports become forgotten or the information of interest is lost.

SUMMARY

7. It seems most likely that the reasons for few reports of sound (for those sightings in which nearby aircraft can be eliminated) are that many objects are beyond the range at which sound would be heard, are mis-reported in range, they are satellites; or are 'charged' air masses of various sorts which emit little or no sound.(e.g. Charged aerosols or plasmas, etc.)

WORKING PAPER NO.9

'BLACK' AND OTHER AIRCRAFT

AS UAP EVENTS

S.27

SPECIAL NOTE:

This working paper contains NATO RESTRICTED information on the UK low Flying Zone, for use in UAP report filtering and analysis, which must not be divulged to the public.

'BLACK' AND OTHER AIRCRAFT AS UAP EVENTS

WESTERN PROGRAMMES

1. It is acknowledged that some UAP reports can be attributed to covert aircraft programmes – in which unusual air vehicles may be seen, either at the experimental stage or in service. UAP reports often describe the shapes that are shown at Figures 1 to 9. It is noted that certain viewing aspects of these vehicles may be described as 'saucer like' – hence they are not ignored by observers – as more conventional and familiar aircraft shapes would be, but are frequently reported as UAPs.

2 **SR-71 Programme** Figure 1 shows an SR-71. Flights have been conducted since the 1960s. It is known that this was a US supersonic (M3+) reconnaissance aircraft that operated over the UK. This aircraft was also known as 'SENIOR CROWN'.

3. 

4. Figures 7 and 9 show head-on silhouettes of the F117 and B2 'Stealth' aircraft and of other aircraft, the body/fuselage shape of which can be reported respectively as 'saucer or arc/boomerang shaped' under certain silhouette and lighting conditions. These aircraft types are unfamiliar as they are rarely spotted in UK airspace.

5. It is important to note that since these aircraft cannot hover then accelerate, they cannot be the cause of reports where these phenomena occur.

6. 

RUSSIA

7. In 1992 Russia announced a new flying machine, called a thermoplane, constructed by designers of the Moscow Aviation Institute, according to Moskovskaya Pravda newspaper. This unusual airship, outwardly resembling a **flying saucer**, is intended to be used for ecologically sound highly effective technologies in the field of superblock construction; control and remote exploration of the environment; and large scale life-saving operations.

8. According to experts the fuel and economic efficiency of the thermoplane will exceed that of an aeroplane by five to seven times, two to three 2-3 times for an automobile and can be compared with seagoing vessels up to 20 thousand tonnes displacement. Tests on the thermoplane are being conducted in Ulyanovski Aviation Industrial Complex (Volga region). The diameter is ~40m and depth 16m.

UAVs

9. There is a significant UAV programme in the USA and Israel and to a lesser extent in the European NATO Nations. It is possible that experimental versions may be flown principally over coastal or sparsely inhabited regions of the UKADR in the future. Some of these may be reported as UAP.

GLIDERS

10. Gliding objects are of particular interest in the UAP context, as they make very little sound. Further para-wings and hang-gliders often appear to an observer to hover, move, climb and descend. On occasions, depending on livery, a glider has briefly reflected light and has been reported as a UAP, insufficient of the rest of the machine being seen to permit the observer to recognise the sighting as a glider. Both freeflight and powered gliders fall in this category.

PARA-WINGS, HANG-GLIDERS & MICROLIGHTS

11. There is an increase in the use of sport para-wings and hang-gliders, both unpowered and powered. The small size (and often similar span to length ratio), make these more likely to be misreported as a UAP than ignored, as would be the case for a more conventional aircraft. Hang-glider avoidance areas are specified, therefore the possibility of an erroneous UAP report can be minimised by referring to Figure 10 and Figures 15 to 33. These types do not normally fly after dark.

MIXED AIR ASSETS

12. Except for towing aircraft for gliders, other fixed wing aircraft, especially fast low jet aircraft, are prohibited from glider and hang-glider sites. Hence, within those areas, a useful filter is that UAP events cannot be misinterpreted as other military or civil operations. UAP reports from within these areas are therefore due to either gliders or hang-gliders, or other natural or man-made objects, which may enter the airspace, (e.g. birds, balloons); or 'genuine' UAP events. Note should be taken of the fact that these sport aircraft, though in use at all times during daylight, when weather conditions allow are more likely to appear at weekends and holidays.

HELICOPTERS

13. Although helicopters can be seen anywhere and under certain conditions (rotor disc illuminated from above or below) are reported as a disc-type UAP event, this is more likely to occur within the UK helicopter routes shown in Figures 11 to 14.

AIRCRAFT LOW FLYING ROUTES

14. Although, in principle, the whole of the UKADR is available for low flying (down to an altitude of 250ft), in practice, and excluding the prohibited and restricted areas, such as danger areas, major conurbations and other specified areas, low flying is limited to the designated low flying areas. In three areas aircraft can fly down to 100ft. Although they are theoretically available for 24hrs per day, low flying is prohibited **over land areas**, between 2300 and 0700hrs, with few exceptions for non-jet aircraft. This is rare enough to warrant special permission and then only for Monday to Friday. Weekend and Public Holiday flying is only permitted for small-scale, pre-arranged exercises, and only from 0800 to 1900, with the exception of some aircraft used for parachute training. An obvious exception is that of Search and Rescue operations and helicopter training over sea at weekends and on Public Holidays. Use of the UK Low Flying System is exclusively for UK aircraft, UK aircraft based in Germany and NATO aircraft on approved

flights. Special approval is required for other (non-NATO) nations, who must not fly below 2000ft AGL. Exceptionally UK light fixed wing aircraft may fly down to 50ft.

VISIBILITY FOR LOW FLYING

15. Strict rules apply to visibility for low flying. This is of interest in the UAP context, as clearly this filters out all manned aircraft if certain conditions exist:

- For low flying aircraft (in excess of 140kts), there must be a forward visibility of at least 5km and 150ft horizontal and 500ft vertical separation from cloud.
- Light aircraft must have a forward visibility of at least 2km, be clear of cloud and sight of the surface
- Helicopters, (flying at 140kts, or less) must either be clear of cloud and in sight of the surface, or apply the same rules as for low flying aircraft above.

AIRCRAFT LOW FLYING AT NIGHT

16. The UK Night Low Flying System (UKNLFS) is a source of potential UAP erroneous reports. Restrictions apply as shown at Table 1, with timing that can be taken into account for UAP event analysis. Normally, low flying night flights will show navigation lights.

AIRCRAFT IN FORMATIONS

17. In the UK Low Flying System a formation is not normally to exceed four aircraft, but North of 54 degrees North formations of up to 8 aircraft may be flown permitted for various operational activities. Special permission is required to exceed these rules and the incidence of larger formations is very rare.

SPEED WHEN LOW-FLYING

18. The maximum speed (all aircraft types) is 520kts.

USE OF RE-HEAT OR AFTERBURNER

19.A characteristic of some UAP reports is that of glowing objects in the sky. Except for emergencies, it is unlikely that after-burners will be used overland at low altitude at less than 1000ft for most aircraft. The Jaguar is an exception (500ft)

FREE-FALL PARACHUTING

20.A brief glimpse of a parachute can be sufficient to produce a UAP report. Manned aircraft are prohibited from the designated parachuting areas. Normally, parachuting only takes place in daylight.

OBSTRUCTIONS & POWER LINES

21. During analysis it should be noted that while a UAP (e.g. Ball Lightning) may be observed near to tall structures, aircraft, the crews of which will be aware of these, can be eliminated, as they will not fly close by. UK towers below a height of 500ft are not lit. Slow inspection aircraft can be expected in the vicinity of electrical power lines.

PROHIBITED & AVOIDANCE AREAS

22. For the purpose of evaluation of UAP reports it is possible to filter out fixed wing aircraft (not withstanding any infringement), where sufficient UAP evidence exists to determine that its altitude was observed below the avoidance area minimum altitude (2000ft AGL)

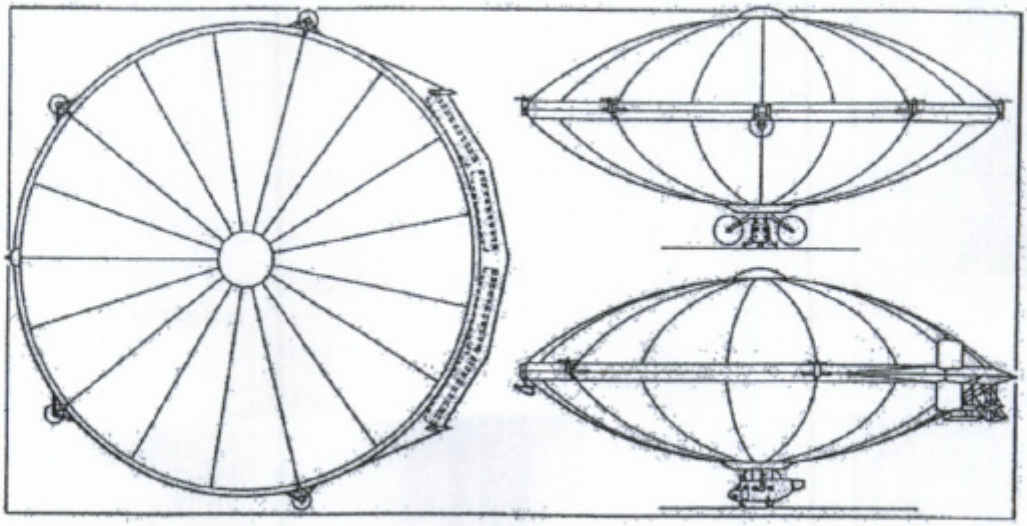
MONTH	START	END
JAN	1630	0800
FEB	1730	0700
MAR	1830	0600
APR	1930	0430
MAY	2000	0330
JUN	2100	0300
JUL	2030	0330
AUG	1930	0430
SEP	1830	0530
OCT	1730	0600
NOV	1630	0700
DEC	1600	0800
	NOTE: All times Zulu	

TABLE 1 LOW FLYING NIGHT-TIME PERIODS

FIGURE 1: SR-71 IN FLIGHT (NASA PHOTO)

S.27

FIGURE 2:



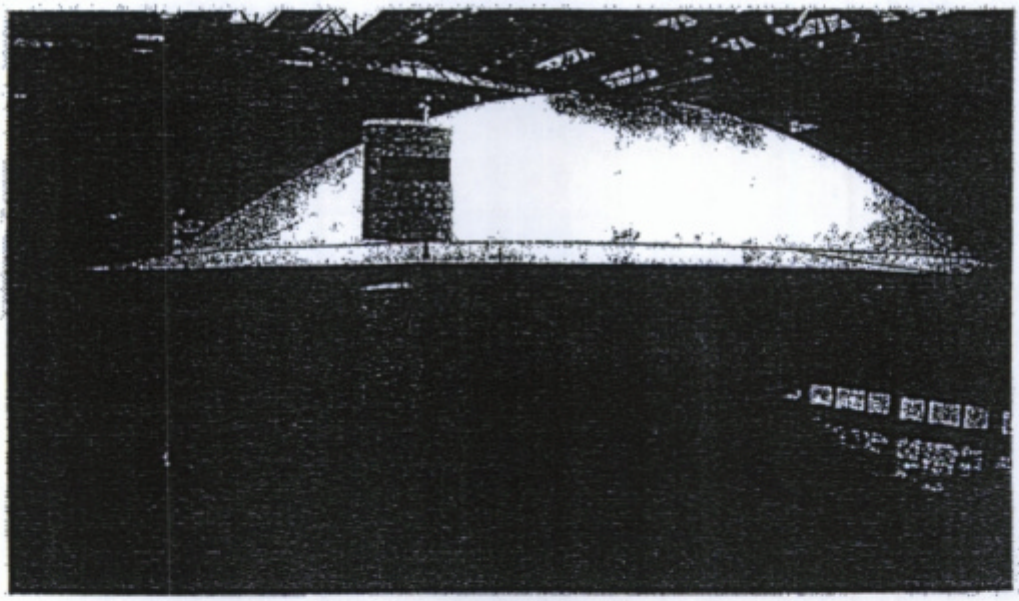
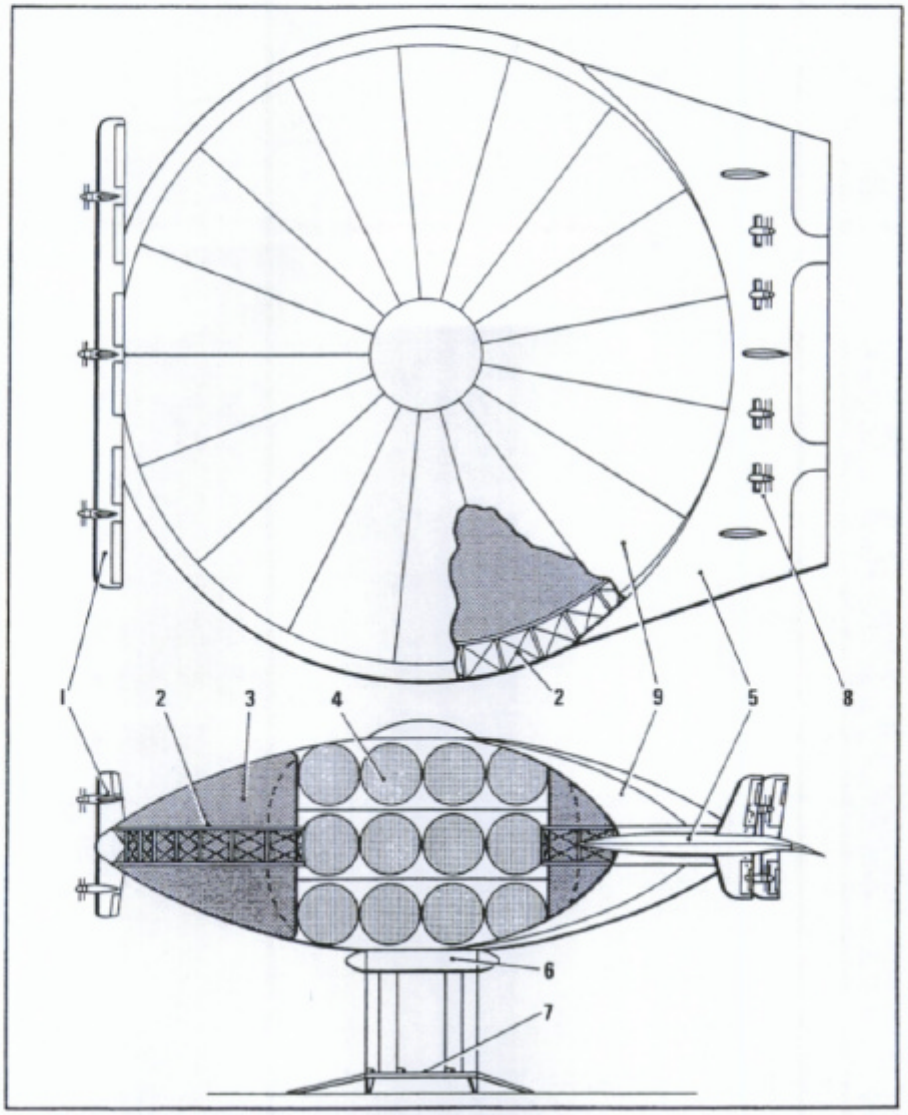


FIGURE 3: THE ALA-40 PROOF OF CONCEPTMTHERMOPLANE UNDER TEST AT ULYANKOVSK IN MID-1992 (P. DUFF)



Structural details of the Thermoplane ALA-600:
1. Front vertical and horizontal stabilisers
2. Internal hull construction
3. Hot air/natural gas volume
4. Hydrogen or helium spheres
5. Rear stabiliser
6. Fuselage module
7. Cargo platform
8. Engines
9. Hull skin

FIGURE 4: ALA-600 THERMOPLANE (RUSSIA)