

Naval Research Laboratory

The equipment at the Naval Research Laboratory is very impressive. No expense seems to have been spared to obtain the finest performance not only in sensitivity and control of the antenna patterns, but also in the processing of the data. NRL is the only one of the agencies visited in which data processing can keep pace with data production. The installation cost - 5.5 million dollars. RCA produced most of the equipment under contract. There is the impression that at first RCA did not put their most competent people on this job and that as a consequence it cost more than it should, that perhaps the job might have been done for 3.5 million dollars.

The transmitter has an instantaneous power output of 4.6 megawatts, the pulse length is 320 microseconds, and the PRF is 180 cycles per second. Each of the four output tubes is capable of delivering 1 megawatt C.W. In pulse operation the instantaneous power is limited by high voltage breakdown of the transmission lines. Breakdown occurs at about 20 kilovolts. A single output transmitting tube costs \$20,000. The initial tubes are still in the equipment and have lasted 1200 hours.

There are three antenna systems each fed by 9 inch diameter coaxial transmission line. Two of these, the array of twenty dipoles and the rotatable antenna atop a 200 foot tower are complete. The third, a set of logaperiodic antennas for vertical sounding, is under construction. The mast for the vertical-looking antenna is in place and the logaperiodic elements were being uncrated during the visit. The mast for the vertical-sounding antenna is also 200 feet high.

The array consists of two horizontal rows of ten horizontal dipoles, the one row above the other and the whole provided with a reflector. Each of these dipoles is fed with the same length of coaxial transmission line, to achieve the proper phase and amplitude at each over the frequency range of the system, 13 to 27 Mc. By means of trombone elements, the phase of the R.F. waves to the dipoles may be altered to swing the beam through ± 30 degrees of azimuth centred on the Azores. The antenna has a gain of 18 db., an azimuthal resolution of about 7 degrees and an elevation resolution of about 15 degrees. The elevation resolution is accomplished largely by being able to feed the two rows of dipoles either in phase or antiphase at the flick of a switch.

The rotatable antenna runs on three railway wheels each powered by a motor. The rotating assembly was put on top of the tower in one piece by a very large crane assembled on the site for the purpose. The antenna consists of two horizontal dipoles in a horizontal line with reflector. Since the tower is itself at the edge of a rather high escarpment, quite low elevation angles are obtained for the main lobe. At 27 Mc, the main lobe maximum is 1 degree above the horizon. The dipoles are fitted with extensible stainless steel cylinders so that they may be tuned. A motor for extending them is provided. However, they are at least six inches in diameter and so broadband that such tuning is not used. This rotatable antenna is used for surveillance tests of AMR, PMR, and Wallops Island.

The TR switch in use is tuned and gives a rejection of about 60 db. Apart from the size it is conventional in design, with both TR and anti-TR tubes. The gas discharge tubes are cylinders about 8 inches long and 4 inches in diameter. An attempt is being made to obtain a TR switch that will not need tuning over a 2:1 frequency range. A silicon power rectifier, when put in an HF circuit instead of a 60 cycle circuit, will provide two-way conduction. It is planned to use 12 of these rectifiers instead of the discharge tube and impedance transformation waveguide. Each of these rectifiers would then conduct 680 amperes of current, and the impedance of the duplexing element would be 1 ohm.

The data processing equipment is designed around a magnetic drum (MADRE) which rotates at 180 cycles per second (the PRF). The PRF introduces range ambiguities. It takes 20 seconds to fill the drum. In filling the drum corresponding echoes from successive pulses are displaced slightly on the drum so that their edges overlap somewhat. The drum is not a digital device. The contents of the drum are read out at each revolution, but only when the drum is full is information destroyed as newer information is added. The doppler spectrum of the returned echoes is displayed in .05 cycle per second steps over a range of -9 to +9 cycles per second. Both negative and positive changes in the frequency are retained to distinguish receding from approaching objects. The resolution of .05 cycles per second corresponds to a velocity of 1 knot. The receiver crystal is offset in frequency from the transmitter crystal by about 500 kc. A crystal filter is provided at this frequency with a square slot 20 cycles wide and with a rejection of 120 db.

Mr. Zettle said that auroral echoes are obtained at high signal-to-noise ratios and that doppler shifts have been recorded indicating velocities of ionization patches of 1800 kilometers per hour in a relatively stationary area of disturbance. They have noted different classes of these echoes, the differences arising in the distribution of the doppler spectrum. They have no time to study such phenomena themselves and would be happy to have others use the facility for research purposes.

The sensitivity of the radar is such that the first 450 miles of range is so cluttered as to be almost useless. Meteors and local aircraft are chiefly responsible for the clutter. The equipment can detect a target of 10 square meters at 1500 miles. One milliwatt of transmitter power gives detectable backscatter signal. This latter number provided the engineering specification for stabilization of the transmitter power.

This installation is still in the testing phase. Arrangements were being made for more aircraft flights on the day of the visit. Aircraft have been tracked far beyond the horizon to distances of about 2000 miles. No figures on percentages of tracks observed at AMR are available. The staff at NRL express great confidence in their equipment for 1 hop operation using the skin return.

ACF Industries

The engineering approach at ACF Industries is dramatically different from that at NRL. At ACF the attempt has been made to produce economical and transportable equipment. No item is so large or heavy that it cannot be readily shipped in a standard aircraft. Consequently, they must content themselves with observing enhanced trails rather than skin returns, which latter have a considerably smaller cross section.

The experience of IIR is that the cross section of an enhanced trail is 10^7 square meters regardless of the angle of look. It had been predicted by Booker that the cross section would be much less for a head-on look-angle. IIR have been able to look head on (after an ionospheric reflection) at several missiles and have found much the same cross-section as for other angles. The enhancement of the trail is believed due to turbulence generated in the ionosphere by the natural exhaust gases which by local changes in the dielectric constant of the ionosphere provides a large cross section. The commencement of the enhancement in the E region and its abrupt termination at burnout suggest this model.

The data processing is similar to that of the MDRS technique. One can watch on an oscilloscope the integration of the signals from a number of pulses to produce range and doppler information. For some months ACF have been monitoring continuously both IIR (1 ionospheric reflection) and FMR (2 ionospheric reflections). Since their data processing technique is very much slower than MDRS, a large backlog of data has accumulated. They are constructing additional facilities for analyzing this data.

The ICF transmitters have a peak instantaneous power of 200 kilowatts and they can radiate pulses as long as 1 millisecond. Like the NRL transmitters they have protection devices to switch off the high voltage within a few microseconds if an arc-over occurs in the output tubes. Practically all of the electronic equipment and antennas were designed and built by ACF Industries.

Double rhombics are used to monitor IIR; phased arrays, with facility for swinging the beam in azimuth, are used for FMR. They have found that a line of vertical whips connected by coaxial cable is very useful for installing behind an antenna array to improve the lobe pattern. The whips are on small stands and can be moved by hand to fill in nulls or reduce secondary lobes. In addition, they have rotatable horizontally mounted spiral antennas with reflector screens for missile tracking. These antennas are quite large; the spiral is at least 30 feet in diameter. The moving frame of these antennas is made of conventional 3-sided light aluminum mast elements.

ACF Industries have produced six sets of equipment and are now delivering them to the U.S. Navy. The training of operators for these equipments is now in progress. The electronic equipment is installed in large trailers.

Whelan considers that the important problems are:

- 1) to make the system difficult to jam,
- 2) to reduce the interference background,
- 3) to put the transmitted energy where it can produce a clear signature.

To achieve improvement along these lines he has incorporated into the present equipment the capability to:

- a) vary the radio frequency randomly within limits. Two choices of limits are available: 0.5 Mc either side of the central frequency or 2.5 Mc either side of the central frequency.
- b) listen before transmitting to assure a reasonably clear channel.
- c) alternate short and long pulses to decrease the limitations on the doppler and range measurements.

ACF Industries are also investigating further means to the same ends:

- 1) they are developing noise modulation equipment,
- 2) they are investigating the differences in the polarization of the waves returned from the incoherent enhanced trail and the polarization of waves from coherent reflectors such as aircraft, meteor trails, and aurora. Whelan claims that the behaviour of the polarization helps distinguish the incoherent enhanced trail from other phenomena. However, doppler measurements still provide the chief means of distinguishing meteors from missiles.

Occasionally signals from enhanced trails are observed that are from 10 to 30 db greater than usual. Dr. Van Handel has done some focussing calculations for ACF and concluded that skip distance focussing is responsible. There are still problems in computing readily the focussing effects of the ionosphere in the illumination of a trail.

The idea of general surveillance from a given point using round-the-world echoes and antipodal focussing has been considered by both ACF Industries and by AFCL. At ACF a routine program of monitoring round-the-world echoes has been underway for months. These echoes are received three to four hours per day mostly in the north-south direction such that the ray follows twilight conditions.

MIT Lincoln Laboratories

The role of Lincoln Laboratory in beyond-the-horizon radar is to develop a theoretical model of the ionospheric perturbation. They have available the data generated by the other agencies and are also conducting experiments of their own. The MIT experiments are:

- 1) to check Booker's model for the ionospheric perturbation. This model indicates that the number density of electrons is greatly decreased along the path of the missile through the ionosphere. MIT is therefore checking this by Faraday rotation type measurements to determine the electron density along the missile trail. Transmissions on two frequencies (98 and 260 Mc) will be made from a missile fired at AMR. These frequencies will be monitored at a mobile station in west Florida (Yankeetown) located in such a position that the ray paths lie along the trail as it enters the F region. Simultaneously, vertical incidence ionosonde measurements will be taken and a real height computation made. The MIT group (in particular Baker) feel that the change in density will be detected. The equipment is in position now. The initial firing date was September 26th. The missile being instrumented is the Atlas. A single pole antenna is used to transmit from the Atlas (which does not spin). A 28 foot dish is used on the ground. Secondary experiments include Langmuir probes both on the Atlas and in packages ejected laterally when the Atlas is between the E and F regions. The Atlas burnout occurs at 200 kilometers.
- 2) to investigate the expansion of neutral gas into a rarefield plasma under controlled laboratory conditions. A spherical cavity about 1 foot in radius will be evacuated to a pressure of about 0.1 micron.

A plasma will then be formed by breakdown of the gas by microwaves. A glass bubble containing air at about 1 atmosphere will then be broken at the centre of the cavity. As the air sweeps the electrons to the surface of the cavity, the changing electron density will be measured at three locations by specially constructed Langmuir probes. Schlieren photographs will also be made. The natural decay time for a plasma in such a cavity is about 1 millisecond. The shock wave phenomena will be over in a few microseconds. Balser is organizing help from MIT aerodynamicists to make appropriate calculations.

- 3) using the Bowles' experiment to study the ionospheric perturbation. The 440 Mc Millstone radar was pointed southward to intersect the path of a missile in the F region. The number density of electrons along a fairly narrow beam directed obliquely through the F region was obtained as a function of range. At the time of passage of the missile, a decrease in the number density of electrons at the appropriate range (1100 miles) was observed. The integration was done in 10 minute intervals and with a range resolution of 10 kilometers. After the fact, the range intervals seem much too short and the time intervals much too long. At the end of the first integration period the change in density had achieved its maximum value, after which it gradually decayed. It disappeared by 40 minutes after the onset of the ionospheric perturbation. There was only one such measurement made. Further tests are not anticipated. MIT authorities do not feel that they can make sufficient time available for this experiment, since countdowns are so time-consuming and other commitments for the radar must be respected.

Astrosurveillance Laboratory, AFCL

AFCL have been monitoring C.W. transmissions for which the ray paths are in the vicinity of Cape Canaveral. In particular, they have been listening in the New England area to transmissions from Quito (a commercial station) and to a Navy C.W. transmitter located at Bilboa in the Canal Zone. They also monitor a short east-west path from Grand Bahama Island to Florida.

The amplitude and fading rate of the carrier is obtained by recording the fast AGC voltage of a Collins receiver, for which the response time is less than 0.1 seconds. A spectral analysis is made of these magnetic tape records, when good (i.e. greater than 10 db signal-noise ratio) perturbation signals are ordinarily obtained.

Characteristic signals are observed for 80 to 90 per cent of missiles for which burnout is above the E region, and for only 10 per cent of missiles for which burnout is in the E region or below.

An interesting fact is that the perturbation is seen only if it occurs on the great circle route between the transmitter and receiver. This fact was deduced from the delay times between the onset of perturbation signals on circuits separated by 200 kilometers and more at Cape Canaveral latitudes. The velocity of travel of the perturbation is approximately 1 kilometer per second. Confirmation that the signatures are produced only by great circle modes has been provided by Whelan using a highly directional antenna.

At AFCRL also the data processing is not keeping pace with data acquisition and they are working on a real time display. In addition they are trying to make marginal signals more obvious with the aid of a variable gain amplifier. If the signals get larger, the gain of the amplifier increases. This is an arrangement that soon runs a good signal into saturation.

Some blank runs are being made to see how many spurious perturbations will arise. Present indications are that there will only be a few per day, and practically all of them in a doubtful class on first inspection.

AFCRL have tried to use VLF waves. Without exception their attempts have been disappointing. These attempts were:

- a) to detect nuclear gyromagnetic radiation at 2.4 kc. The concept was that the population density of the higher energy state would be raised by the temperature of the rocket exhaust and would decay on cooling. This radiation was not observed even in the immediate vicinity of a rocket motor undergoing static test. The decay time for the higher energy state was apparently not taken into account. Since theoretical calculations of optimum parameters were not made, the failure does not seem to have any general significance. This neglect of theory in setting up experimental apparatus is shown also in a different project: to generate magnetohydrodynamic waves in a plasma contained in a cylinder approximately 6 feet in length and about 2 feet in diameter. A coil of wire on one end is to be pulsed with electric current and a pick-up coil on the other end of the cylinder is to pick up the effect of the magnetohydrodynamic wave propagated in the plasam. On questioning it turned out that no calculation of efficiency of transfer of energy from the magnetic field into magnetohydrodynamic waves and back again has been made. This apparatus was nearing completion and tests were to begin by the end of September 1961:
 - b) to receive reflections at VLF from Cape Canaveral firings using the Jim Creek transmitter. Unsuccessful.
 - c) to obtain reflections at 100 kc using a transmitter and receiver near the launch site. The sensitivity of the equipment was calculated to be adequate to detect a target area of 10^6 m². Unsuccessful. Later tests with 10 times the sensitivity gave doubtful results.
 - d) phase measurements at VLF were tried. Again, unsuccessfully.
- Surveillance tests at VLF have therefore been abandoned at AFCRL.

Raytheon

Raytheon has developed oblique incidence pulse sounders for forward propagation surveillance. They are isolating the effects on the R.F. phase produced by the ionospheric perturbation.

To monitor the Atlantic missile range they have stations in the Canal Zone, Grand Bahama Island, Florida, Georgia, South Dartmouth and Rome, N.Y. For the Pacific missile range the stations are Hawaii, Canal Zone, Grand Bahama Island, and South Dartmouth. Two way pulse transmissions are used in synchronized but not responder type operation (as for the Canadian oblique sounders). The sounders are not the sweep frequency type, but they may be readily tuned to any frequency in the HF band. A variety of rhombics, log aperiodics and Yagi antennas are used as seems appropriate. The transmitters deliver a 200 microsecond pulse with a peak power of 100 kilowatts.

The received pulses, on a suitable I.F. are recorded on magnetic tape with a reference frequency for analysis. The pulses are sampled for phase in 10 microsecond intervals. Corresponding fractions of successive pulses are gated out, stretched and integrated. The result is $d\phi/dt$, the change in R.F. phase of the pulse. During the passage of a perturbation through a region traversed by the received pulse, large changes in phase occur (see diagram).

At Raytheon it is believed that the phase changes observed are due to a pressure wave which increases the local electron density and causes the ray path to move downward in height with the high pressure and upward as the low pressure part of the pressure wave passes the ionospheric reflection point of the radio wave. Consequently, the integral of $d\phi/dt$ should give the shape of the pressure wave. The pressure wave so computed is plausible - an increase of density of electrons of 0.5 per cent followed by a decrease of 2.0 per cent damped to zero after one cycle. This form of the wave has been checked by vertical incidence phase path measurements at Grand Bahama Island. These phase change fluctuations last about 3 minutes on a given record. The propagation velocity for the perturbations as deduced by delay time for onset on different circuits is 1 kilometer per second, the value found by AFRL.

SID's generate similar changes in the phase of received pulses. Since there are differences in the shape of the $d\phi/dt$ curve and since absorption effects immediately follow SID's, it is believed that identification of SID effects will be readily accomplished.

K. Davies of CRPL has been collecting SID information by means of oblique sounders with a view to helping resolve this problem.

The phase perturbations are seen clearly on a 3-hop mode from Hawaii to the New England area. A good 10 db of S/N is obtained. These circuits have recently come into operation. The four attempts made to observe the perturbation have all been successful. The perturbations are observed on circuits as far as 900 kilometers from the intersection of the missile path with the F layer, and they are observed at good signal strength on circuits as far as 250 kilometers from this intersection.

A proposal has been generated by Stanford Research Institute to create a grid of oblique incidence sounders to monitor Russian missile ranges.

How DRTE might aid the U.S. program:

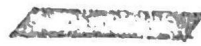
1. We might monitor South American stations having great circle paths near Cape Canaveral for the purpose of getting some experience of our own that might prove helpful. Raytheon results indicate that phase coherent type records give considerably better signal noise ratios than the amplitude (fading rate) type. The extra gain to be had over the records obtained by Raytheon (in view of the greater average radiated power of the Quito station) suggests that quite good records might be had.
2. We might contribute in calculations of focussing of the time delay type. The problem is sufficiently complex that a confirmation of results would in any case be useful. A device based on the reflectrix concept could probably be constructed simply to provide the frequency for best illumination of a given region of interest. It would use vertical incidence data obtained at the radar station.
3. The test of the CRPL-AIL topside sounder in a rocket showed an interesting phenomenon in the multiple reflection of waves between the ionosphere and the height of the rocket. The target area of the rocket was enhanced on exit since similar multiple echoes were not observed on entry. Whatever the cause of this enhanced target area, it makes surveillance by topside sounder type equipment a definite possibility. The G.E.-AFCL topside sounder has been cancelled. It is therefore more important than ever to co-operate in determining the efficiency of a topside sounder for surveillance. Mr. Van Every of ARPA has suggested that special firings or timing of firings be arranged if it seems appropriate in order that the kind of information desired be generated. As a result of prior correspondence between Dr. Chapman and Mr. Crysdale, DRTE has been asked by the U.S. to be on the alert for the effects on topside sounding data of missiles and high altitude nuclear explosions.
4. We should show discretion in public discussion of relevant matters. ARPA has not been satisfied that sufficient care has been exercised by U.S. agencies in the past. In the present the boundary of discretion is being approached very closely. Every paper in the H.F. radio propagation section of Commission 3 of the Fall URSI-IRE Meeting 1961 deals with problems of beyond-the-horizon radar. These papers are all produced by organizations involved directly as contractors in the development of beyond-the-horizon radar.

E. Warren.

Dist:

→ D PhysR : Mr. Dehuc (2)
DRM(w) : Mr. Crysdale (1)
DCS/DRTE (1)
S/CL/DRTE (1)
Author (1)
File (1)

RECEIVED
Scientific Intelligence
31/7/1952
23 JUN 1952

 Newcastle, Ont.
June 14 1952.

Intelligence Branch
Royal Canadian Air Force,
Ottawa.

Referred to <i>D11/1</i>
JUN 17 1952
File No. <i>and TC</i>
Chgd to <i>CR</i>

Sir,

Enclosed please find several metallic strips.
We have found these strips scattered over the
entire area of the farm (135 ac.) and again a
land east a half mile and (another farm some
three miles distant).

Due to the scattered area, it would seem
the strips are, or were, airborne.

Would you be kind enough to give me any
information you might have on their source.

Thanking you in anticipation, I am,

Yours truly,



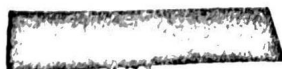
 Newcastle

5635

8.21-1-9

ROYAL CANADIAN AIR FORCE

Ont.,
25th August, 1952


Newcastle, Ont.

Dear Sir:

The origin of the metallic strips enclosed
with your letter of 14th June, 1952 is known to the
RCAF and the strips themselves are harmless.

Your interest in forwarding the objects to
Air Force Headquarters is greatly appreciated.

Yours truly,



D.A.I. - Attention
To: D.S.I. - Attention

To:

Flying Saucers (File 9-21-1-9)

(1) Enclosed, is the translation of a letter written by [redacted] dated.

(2) Evaluation of the Source

[redacted] appears to be an emotionally unbalanced individual, with no scientific knowledge on the subject which he tries to make us believe he knows something about. He appears to suffer from some sort of "mania grandiosa" and holds a distinct grudge against his American Interrogators who dealt with him in Western Germany.

(3) It appears from his letter that he has been already thoroughly interrogated by the Americans in Western Germany.

(4) In the circumstances, it is considered advisable to drop the matter altogether.

CEN/7606/fc.

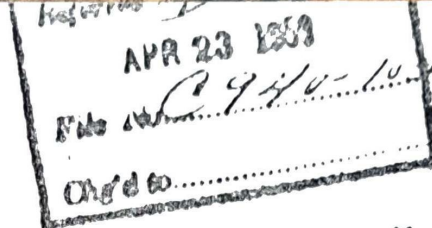
C.A.F.A. 207

SM Para of 100-7-51 (4907)

H.Q. 4554-A-207



524
Translation
MR 23-4-59



Weedon, April 20, 1959

Honorable Minister

Since the snow has melted, we are finding little strips, which appear to be made of lead, all over the fields and in the bush. To what do you attribute their presence?

I am sending you the ones I picked up in the sugar bush and in the fields. (Not sent to B for Trans)



Weedon(Wolfe), P.Q.

5/9/59
Minister returned
in DEW
11/11/59
F 123 2
6660

No real
Distant Warning
Early.

5220-5
(BTRs)

AIRMAIL

Century Building,
Ottawa, Ontario.

August 28, 1968.

Section 19(1)

THE FINNISH AIR TELEGRAPH DEPARTMENT,
Lennätinosasto, Vst. Sokos,
Helsinki 10, Finland.

Dear Sir:

In reply to your letter concerning the late Wilbur B. Smith,
I am pleased to forward the following information.

The late Mr. W.B. Smith who was employed by this Department during the period stated in your letter, was quite active in the field of Unidentified Flying Objects, and he termed some of these spare time activities "Project Magnet". However, these activities were purely a personal hobby of his and we have no Departmental information on the subject.

Regarding "The Canadian Engineering Award", to the best of our knowledge there is no such award in existence in Canada.

Yours very truly,

W. A. Caton
fa (W. A. Caton),
Chief, Radio Regulations,
Telecommunications Bureau.

KG
W. A. Caton

1094

MEMORANDUM

V 2000-4 Vol 2 (D Ops)

22 September, 1967.

The Minister

UNIDENTIFIED FLYING OBJECTS (UFOs) - INVESTIGATIONS

References: A. Paper prepared by the Director of Operations on UFOs.

B. Suggested memorandum addressed to National Research Council (NRC) for DND signature.

1. Reference A deals with a paper on UFOs prepared by the Director of Operations which recommends that the National Research Council (NRC) be approached with the view of accepting the responsibility for investigating UFO reports.

2. The investigations conducted by CFHQ into UFO reports disclose no evidence to suggest that UFOs pose a threat to national security. However, a number of investigations indicate that UFOs may exhibit some unique scientific or advanced technology which could possibly contribute to scientific or technical research. From information available on UFO activity it would appear that the primary interest lies in the field of scientific and technical research and to a lesser degree to one which poses a threat to national security.

4. The number of UFO reports being referred to this Headquarters for investigation has continued to increase. Although every attempt has been made to arrive at a satisfactory conclusion it is evident that NRC with their scientific facilities and trained personnel would be the most logical governmental agency to undertake these investigations.

5. It is appreciated that DND would be required to provide assistance to NRC in such areas as carrying out field investigation in support of these investigations. As DND would be vitally concerned if scientific investigations should produce evidence to suggest UFOs pose a threat to national security, it would be necessary to co-operate with NRC in a spirit of mutual understanding to ensure our respective interests.

6. Reference B is a suggested memorandum addressed to The Honourable C.M. Drury for your signature.

RECEIVED
CHARR
J.V. Allard

General
Chief of the Defence Staff

Scientific Intelligence
Division
8/10/77

5 OCT 1953



7017 Britton Avenue
Cincinnati 27, Ohio
September 30, 1953

Project "MAGNET"
Defense Research Board
Ottawa
Dominion of Canada

14/3
19/3

Dear Sirs:

(1)

In common cause and in the spirit of International cooperation, this writer earnestly believes the world can no longer be restricted from certain overt truths regarding one of the greatest riddles of our time--UFO phenomena!

I am aware that your Government has viewed this subject seriously and is presently working, under wraps of secrecy, toward its resolution.

From personal investigation and research plus having witnessed the phenomena on four occasions over Cincinnati area during 1952 (on A. T. I. C. files), I am convinced "saucers" are controlled devices from some extra-terrestrial Intelligence.

Unfortunately, at the present time, our Air Force, through a policy of contradiction, is embarrassed before the public. However, anyone who has weighed the massive evidence can find only one logical answer--the Interplanetary answer!

At this point it is hoped that your project, handling UFO analyses, will clarify or verify the following statements:

1. Objects (except for rare instances) involving simultaneous tracking by radar and visual observation are not due to temperature inversion or electrostatic phenomena.
2. Objects, in the main, and those particularly reported by reputable observers, are material devices.
3. A discernable pattern exists for the object's flight behavior.

Your time and consideration are kindly appreciated in advance.

(2) DSI
Pencel, please.
B. Stringfield
5/10/53
LHS/mdm

Yours respectfully,

Leonard H. Stringfield

Leonard H. Stringfield

(2) Noted
W. D. Smith
7 Oct 53

MEMORANDUM

V 1540-1050 TD 7165 (DOps)

10 July, 1967.

TO: SEC DS (through Brig Gen)

MINISTERIAL INQUIRY

CANADIAN AERIAL PHENOMENA INVESTIGATIONS COMMITTEE

1. On 9 Jun 67, Mr A.K. Vezina, Chairman of the m/n committee, wrote to the Associate Minister of National Defence requesting financial assistance for the committee. An interim reply was given on 19 Jun 67.
2. This matter has been discussed with Brig Doucet, EA to the AMND, who feels that no further reply is required at this time. It is felt also that DND should NOT be put in the position of appearing to be responsible for this subject, thus linking these phenomena, in the public mind, with some sort of threat to the national security. Brig Doucet suggested that a paper be prepared for submission to Defence Council recommending a transfer of responsibility from DND to the National Research Council.
3. A paper is attached for your consideration.

H.M.A. Parker
H.M.A. Parker

Colonel

Director Operations

② Records

The subject will be placed before the Defence Council. A final reply to the Minister's inquiry will be required when a decision has been reached by the Defence Council para. above.

SEC DS (MI)
2-5223

JUL 20 1967

V 2000-4 Vol 2 (D Ops)

Ottawa 4, Ontario
September, 1967

The Honourable C.M. Drury
Chairman
Advisory Committee on
Scientific and Industrial Research
MacDonald Building
123 Slater Street
Ottawa, Ontario.

My dear Colleague:

UNIDENTIFIED FLYING OBJECTS (UFOs) - INVESTIGATIONS

A study conducted by this Headquarters has recommended that consideration be given to transferring the responsibility for investigating UFOs to the National Research Council where scientific research facilities and trained personnel are available for carrying out an objective investigation.

UFO reports which are referred to this Headquarters for investigation are studied by the Operations Staff who endeavour to classify the information into one of two categories, namely:

Category one - Information which would suggest the type of phenomena associated with fireballs and meteorites, or

Category two - Information which does not conform to the physical patterns usually associated with fireballs or meteorite activity.

Reports which are classified under category one are forwarded to the National Research Council Meteorite Centre for scientific study.

Reports which are classified under category two are either placed on file and annotated that no further action is required, or action is initiated to conduct a formal investigation of the report by a military officer. The investigations conducted to date have failed to disclose any evidence which would suggest that UFOs pose a threat to national security. However, a number of investigations suggest the possibility of UFOs exhibiting some unique scientific information or advanced technology which could possibly contribute to scientific or technical research. From information available on UFO activity it would appear that the primary interest lies in the field of scientific and technical research and to a lesser degree to one that poses a threat to national security.

It may be of interest to note that in the early 1950s scientific committees were set up in both Canada and the United States, under the defence auspices, to investigate UFO reports. Following several years of study, both committees were able to explain all but a very small percentage of the many thousands of sighting reports made. The American committee concluded its investigation by stating, "that the evidence presented on UFOs shows no indication that these phenomena constitute a direct physical threat to national security". Although not formally stated, the Canadian committee arrived at the same conclusions.

The increasing number of UFO reports being referred to official agencies is a clear indication that the general public is becoming more interested in unusual aerial objects which can be neither identified nor explained and are turning to governmental agencies for information. Recently, and probably due to the increasing concern of the general public, the United States Air Force has selected the University of Colorado, under the direction of Dr. E.O. Condon, physics professor, to conduct an independent investigation into UFOs. Many private citizens, many of whom are exceptionally well qualified, are either carrying out personal and independent research studies on UFOs, or have joined organizations established for this purpose. It would, therefore, seem advisable that a governmental scientific agency outside of DND be requested to undertake the investigation of UFOs.

Providing National Research Council would be prepared to accept the responsibility for investigating UFOs, this Headquarters would provide such assistance as may be mutually agreed with the understanding that DND would be kept advised on matters of significant importance which would suggest a threat to national security.

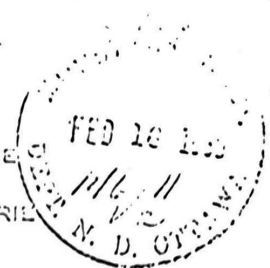
May the proposal contained herein receive your consideration and this Headquarters be advised accordingly.

Yours sincerely,

MINISTER
OF
INDUSTRY



MINISTRE
DE
L'INDUSTRIE



Ottawa 4, Ontario
February 16, 1968

The Honourable L. Cadieux
Minister of National Defence
125 Elgin Street
Ottawa 4, Ontario

My dear Colleague:

Subject to your concurrence, I can now confirm that the National Research Council has agreed to act as the repository of reports of unidentified flying objects.

Therefore, if you agree, your existing file of such reports, as well as any which may be received in the future by your Department, may be forwarded to the Radio and Electrical Engineering Division of NRC. Your Department should retain any reports which it is felt should be classified for reasons of military security.

*Dr. McRae
Peter McRae
Hos. Upper
at. Upper
Branch*

Investigations by NRC, if any, of these reports will depend on the degree of scientific interest in each case. Officials of your Department and of NRC have collaborated in similar examinations in the past, and their continued cooperation would be most appreciated.

Yours sincerely,

C. M. Drury

1
FEB 19 1968

*Return to JAF/UCS
c.c. for EMDC(S)*

Minutes of the Sixth Meeting held at the Defence
Research Board, 22 Feb 54, 0900 hrs.

Chairman: Dr. P.M. Millman
Dominion Observatory.

Members: Capt. Baker
D.M.I.

S/L Coupland
D.A.I.

Lt. Cdr. Stone
D.N.I.

S/L W. Birch
Defence Research Board.

Mr. W.B. Smith,
Dept. of Transport.

In his opening remarks the Chairman stated that one of the prime objects of keeping the Committee in being was to keep abreast of developments in connection with unidentified flying objects. In this connection, particularly at this meeting, it was intended to review the work being carried out at the Department of Transport as well as to follow up the various items outlined for action at the last meeting. The minutes of the last meeting were moved for adoption by Mr. Smith, and seconded by S/L Birch.

Concerning items arising out of past meetings the request that Capt. Rupplet of the USAF be brought to Canada for discussions with this Committee. The Chairman pointed out that this item of unfinished business had now been on the agenda since 9 March 1953 and no action had yet been initiated by the R.C.A.F. The R.C.A.F. representative was again asked to look into this matter to find out definitely whether there was any possibility of contact with the US group dealing with unidentified flying objects.

Prior to asking Mr. Smith to outline the activities of D.O.T., the Chairman made reference to the "fire ball" sighting on 13 January 1954. This fire ball was seen 0702 hours in the region generally from Eastern Quebec to Western Ontario and Northern Michigan. The Dominion Observatory is conducting a complete investigation and over one hundred reports have already been received. However, due to sparsity of population in the region where the "fire ball" was observed it is doubtful whether it can be determined if any small meteorites landed.

The Chairman made reference also to the latest book on the newstands entitled "Flying Saucers have Landed", by Leslie and Adamski. This book appears to be of doubtful authenticity and must not be taken too seriously. The Chairman will check with the Palomar Observatory on their knowledge of Adamski.

37490

M E M O R A N D U M'8 October, 1958. *HNL*

Mr. Stannard:

Classification cancelled / Changed to: *DSI*By authority of: *DSI*Date: *28/5/81*Signature: *[Signature]*Unit / Rank / Appointment: *NDS*Investigations of Unidentified Flying Objects

1. Reference your minute re letter from the National Investigations Committee on Aerial Phenomena dated 14 August, 1958. I have drawn up a draft letter which PRO might forward to NICAP. It should be noted that Mr. Smith is a member of this organization and surely the Director of NICAP must be aware of this. It was also thought that the procedure for investigations of UFO reports should be reviewed to establish what was now being done by Canadian agencies in this regard.

2. Past History

U.S. "Project Saucer" was completed about 1950 and it was found desirable to solicit Canadian reports. At the 220th meeting of the JIC on the 12, Apr. 1950, UFO's were discussed and the following decisions were reached:

- (a) DSI and DAI were to collaborate in preparing a questionnaire to be distributed to field intelligence officers of the three services and the RCMP.
- (b) DAI is to co-ordinate the investigation arrangements in the field.
- (c) All field reports were to be passed to DSI for official examination on behalf of DND.

In late 1950 a questionnaire or sighting report form was drawn up and approved; copies and instructions were passed to field units. (Ref: letter S21-1-9 (DAI) 19 October, 1950 to TCHQ)

3. In 1952 the "Project Second Story" Committee was formed and the sighting report form was revised. The Committee met about six times, the most recent meeting apparently being 25 Feb. 54. The Committee concluded its activities which were summarized in a memo by Dr. Millman, Chairman. It was concluded that the sightings did not lend themselves to a scientific method of investigation. In 1954 the Secretary of the Committee informed DAI of Dr. Millman's summary and stated that reports were still being collected, but that no analysis was being carried out.

4. Action by DRB/DSI

A tabular record of reports of sightings dating back to 1954 was initiated by F/L Birch of DSI. This is kept in this office and is classified SECRET. The last entry is a sighting of 8th June 1956. A file is also kept here which contains a multitude of press articles, sightings, etc. DRB file 3800-10-1-1 (3 vols.) contains a large number of sighting reports dating back to 1947.

5. Recent Action by DAI

This morning I examined a number of files held in DAI and talked to S/L Lovelace. In January, 1957 DAI initiated liaison duties with Mr. W. Smith of the Department of Transport. A sighting report form was devised which proved to be identical to that devised by Project Second Story Committee. A copy of this form is attached.

6. In December, 1957 a letter was prepared by DAI in reply to a request from a magazine regarding Canadian policy in investigating UFO's. An extract is as follows: "The DND makes no provision for the investigation into these phenomena. However, it has come to our attention that Mr. W.B.

~~CONFIDENTIAL~~

Smith, Chief of Radio Division DCT Room 2210, No. 8 Temporary Building, has made and is making extensive studies on the subject of UFO's. Mr. Smith is ex-officio Canadian Chairman of NICAP located in Washington, D.C." The letter was signed by the Deputy Minister for National Defence.

7. Also in December, 1957 a letter was written to ACAS by DAI: "The RCAF has no official policy concerning the subject. There is no office within NDHQ commissioned to deal with the reports of these phenomena, although DAI seems to be a gathering place for them. There has been a recorded instance of October, 1950 where A/C Briens, then AMAP, ordered that reports would be filed, but that investigations would be played down. There has never been an investigation of any report on file at AFHQ". (Ref: C940-105 (DAI) 10th December, 1957)

8. At present, S/L Lovelace in DAI deals with the matter of flying saucers and is maintaining liaison with Mr. Smith. If a report is received the observer is asked by DAI to complete a sighting report form which is then forwarded to Mr. Smith. The last report in the DAI files was dated July, 1958. DAI did not appear to be aware of earlier policy as explained in paragraphs 2 and 3 above.

9. It would appear that DSI is not now involved to any large extent in the investigation of UFO reports. However the decision mentioned in paragraph 2(c) above may still be valid. Possibly the matter should be considered further.



(E.A. Bernard) S/L

Classification cancelled / Changed to Unclass
By authority of DSIS
Date 25/5/84
Signature [Handwritten Signature]
Unit / Rank / Appointment NSIS

Chicago American

EVENING AND SUNDAY

326 W. MADISON ST.
CHICAGO 6, ILL.

TELEPHONE
ANDOVER 3-1234

February
2
1955

(1)

om 1/2

Dr. O. M. Solandt
Chairman, Defense Research Board
Ottawa, Canada

Dear Dr. Solandt:

As you will read in the attached clippings, I have for some weeks been trying to chase down facts about flying saucers.

I do not consider myself an authority on the subject of course, but my investigations have convinced me that many people are seeing strange things that have not been satisfactorily explained.

I am writing to you and to others with similar technical knowledge in the hope you can interpret for the public some of these strange phenomena.

What do you think saucers are? Are they fact or fantasy and what makes you think so?

I hope you will cooperate in this effort to explain a great mystery, with the assurance that whatever your views, they will be treated fair and impartially.

Sincerely,

Tom Castham

P.A. →

S. 200-4-160

8th February 1955

Dear Mr. Eastham,

Thank you for your letter of February 2nd and for the attached clippings about flying saucers. I do not feel able to make any useful comment concerning these reports. I naturally follow such reports with great interest but still feel that the best I can do is to reserve judgment concerning the nature of the objects that are reported to have been seen.

Yours sincerely,

Original Signed by
O. M. SCLANDT

Chairman,
Defence Research Board.

Mr. Tom Eastham
Chicago American
326 W. Madison Street
Chicago 6, Illinois

Noted
SCL
9/2/55

With reference to the work being done at DOT, the Chairman asked Mr. Smith to review the project covering the following phases:

- (a) what the organization is now doing with reference to analysis of reports and any conclusions arrived at.
- (b) methods used by the DOT sighting station.
- (c) future plans

At the request of the Secretary Mr. Smith agreed to prepare a written resume. A copy of his report is attached hereto.

PROJECT MAGNET REPORT

During the past five years there has been accumulating in the files of the United States Air Force, Royal Canadian Air Force, Department of Transport, and various other agencies, an impressive number of reports on sightings of unidentified flying objects popularly known as "Flying Saucers". These files contain reports by creditable people on things which they have seen in the sky, tracked by radar, or photographed. They are reports made in good faith by normal, honest people, and there is little if any reason to doubt their veracity. Many sightings undoubtedly are due to unusual views of common objects or phenomenae, and are quite normal, but there are many sightings which cannot be explained so easily.

Project Magnet was authorized in December, 1950, by Commander C.P. Edwards, then Deputy Minister of Transport for Air Services, for the purpose of making as detailed a study of the saucer phenomenae as could be made within the framework of existing establishments. The Broadcast and Measurements Section of the Telecommunications Division were given the directive to go ahead with this work with whatever assistance could be obtained informally from outside sources such as Defence Research Board and National Research Council.

It is perfectly natural in the human thinking mechanism to try and fit observations into an established pattern. It is only when observations stubbornly refuse to be so fitted that we become disturbed. When this happens we may, and usually do, take one of three courses. First, we may deny completely the validity of the observations; or second, we may pass the whole subject off as something of no consequence; or third, we may accept the discrepancies as real and go to work on them. In the matter of Saucer Sightings all three of these reactions have been strikingly apparent. The first two approaches are obviously negative and from which a definite conclusion can never be reached. It is the third approach, acceptance of the data and subsequent research that is dealt with in this report.

The basic data with which we have to work consist largely of sightings reported as they are observed throughout Canada in a purely random manner. Many of the reports are from the extensive field organization of the Department of Transport whose job it is to watch the sky and whose observers are trained in precisely this sort of observation. Also, there are in operation a number of instrumental arrangements such as the ionospheric observatories from which useful data have been obtained. However, we must not expect too much from these field stations because of the very sporadic nature of the sightings. As the analysis progresses and we know more about what

to look for we may be able to obtain and make much better use of field data. Up to the present we have been prevented from using conventional laboratory methods owing to the complete lack of any sort of specimens with which to experiment, and our prospects of obtaining any in the immediate future are not very good. Consequently, a large part of the analysis in these early stages will have to be based on deductive reasoning, at least until we are able to work out a procedure more in line with conventional experimental methods.

The starting point of the investigation is essentially the interview with an observer. A questionnaire form and an instructional guide for the interrogator were worked out by the Project Second Storey Committee, which is a Committee sponsored by the Defence Research Board to collect, catalogue and correlate data on sightings of unidentified flying objects. This questionnaire and guide are included as Appendix I, and are intended to get the maximum useful information from the observer and present it in a manner in which it can be used to advantage. This form has been used so far as possible in connection with the sightings investigated by the Department of Transport.

A weighting factor is assigned to each sighting according to a system intended to minimize the personal equation. This weighting system is described in Appendix II. The weighting factor may be considered as the probability that the report contains the truth, the whole truth and nothing but the truth, so far as the observer and interrogator are aware. It has nothing to do with the nature of the object claimed to be seen. It is in a sense analagous to the order of precision with which a measurement may be made, and for the purpose of this analysis this is precisely the manner in which it is used.

Sightings may be grouped according to certain salient features, and the combined weight of all pertinent observations with respect to these features may be determined by applying Peter's formula, which is a standard mathematical technique for determining probable error.

$$r_0 = \frac{.8453}{n \sqrt{n-1}} (v_1 + v_2 + v_3 + \dots \dots \dots v_n)$$

where r_0 is the probable error of the mean, n is the number of observations and v is the probable error of each observation, that is, unity minus the weighting factor. This method has the advantage of being simple and easy to use and enables a number of mediocre observations to be combined effectively into the equivalent of one good one.

The next step is to sort out the observations according to some pattern. The particular pattern is not so important as the fact that it should take account of all contingencies, however improbable they may appear at first sight. In other words, there must be a compartment somewhere in the scheme of things into which each sighting may be placed, comfortably, and with nothing left over. Furthermore, it must be possible to arrive at each appropriate compartment by a sequence of logical reasoning taking account of all the facts presented. If this can be done, then the probability for the real existence of the contents of any compartment will be the single or combined weighting factor pertinent to that single or group of sightings. The charts shown in Appendix III were evolved as a means for sorting out the various sightings and provide the pattern which was used in the analysis of those sightings reported to and analysed by the Department of Transport.

Most sightings fit readily into one of the classifications shown, which are of two general types; those about which we know something and those about which we know very little. When the sightings can be classified as something we know about, we need not concern ourselves too much with them, but when they fit into classifications which we don't understand we are back to our original position of whether to deny the evidence, dismiss it as of no consequence, or to accept it and go to work on it. The process of sorting out observations according to these charts and fitting them into compartments can hardly be considered an end in itself. Rather, it is a convenience to clarify thinking and direct activity along profitable channels. It shows at once which aspects are of significance and which may be bypassed. Merely placing a sighting under a certain heading does not explain it; it only indicates where we may start looking for an explanation.

Appendix IV contains summaries of the 1952 sightings as investigated by the Department of Transport. Considerably more data exists in the files of other agencies, and more is being collected as the investigations proceed. While it is not intended to make any reference to an analysis of the records of other agencies, it may be said that the Department of Transport sightings are quite representative of the sightings reported throughout the world. The following is a table of the breakdown of the 25 proper sightings reported during 1952.

NATURE OF SIGHTINGS	NUMBER	WEIGHT
Probably meteor	4	91 2/3
Probably aircraft	1	69 2/3
Probably balloons	1	74 1/3
Probably marker light	1	64 1/3
Bright speck at night, not star or planet	3	75 1/3
Bright speck daylight, not star or planet	1	68 1/3
Luminous ring	1	68 1/3
Shiny cone	1	53 1/3
Circular or elliptical body, shiny day	5	88 1/3
Circular or elliptical body luminous night	5	90 1/3
Unidentified lights of various kinds	2	77 1/3
TOTAL NUMBER OF PROPER SIGHTINGS	25	96 1/3

With reference to the above table, of the four cases identified as probably meteors, their weight works out at 91%, which is the probability that the observers actually did see meteors which appeared as they described them. Considering the circular or elliptical bodies together, their weight works out at 91% for the ten sightings, from which we may conclude that SOMETHING answering this description was actually observed.

Similarly we may consider each of the other groups of sightings, taking account of the probability that the observations are reliable.

It is not intended to describe here in detail the intricate and tedious processes by which the sightings are evaluated, beyond the fact that the pattern set forth in the charts of Appendix III is followed. The cardinal rule is that a sighting must fit completely under one or more of the chart headings, with nothing left over and without postulating any additions, deletions, or changes in the facts as reported.

Should there be no suitable heading, then obviously the charts must be expanded to provide one, in fact this was the evolution of these charts. Where a sighting may be fitted under more than one heading an arbitrary division of the probability of finding it under each applicable heading is assigned. The sum of such probability figures must of course be unity, and the probability for the real existence under any particular heading is the product of this probability figure and the reliability or weighting factor for the sighting concerned.

It is apparent that the judgment of the people doing the evaluating is bound to enter the picture and may produce substantial numerical differences with reference to sightings listed under certain headings. However, since many headings are automatically eliminated by the nature of the facts available, the discrepancies are confined to the probability figures for the distribution under the remaining headings which are considered eligible, and we end up with definite classifications for the sightings with SOME probability figure for the reality of each group. This has the effect of forcing those who are doing the evaluating to face the reported facts squarely, pay meticulous attention to them, and place each sighting honestly under the only headings where it will fit.

In working through the analysis of the proper sightings listed, we find that the majority of them appear to be of some material body. Of these, seven are classed as probably normal objects, and eleven are classed as strange objects. Of the remainder, four have a substantial probability of being material. strange, objects, with three having a substantial probability of being immaterial, electrical, phenomenae. Of the eleven strange objects the probability definitely favours the alien vehicle class, with the secret missile included with a much lower probability.

The next step is to follow this line of reasoning as far as possible so as to deduce what we can from the observed data. Vehicles or missiles can be of only two general kinds, terrestrial and extra-terrestrial, and in either case the analysis enquires into the source and technology. If the vehicles originate outside the iron curtain we may assume that the matter is in good hands, but if they originate inside the iron curtain it could be a matter of grave concern to us.

In the matter of technology, the points of interest are: - the energy source; means of support, propulsion and manipulation; structure; and biology. So far as energy is concerned we know about mechanical energy and chemical energy, and a little about energy of fission, and we can appreciate the possibility of direct conversion of mass to energy. Beyond this we have no knowledge, and unless we are prepared to postulate a completely unknown source of energy of which we do not know even the rudiments, we must conclude that the vehicles use one of the four listed energy sources. Unless something we do not understand can be done with gravitation, mechanical energy has little use beyond driving model aircraft. We use chemical energy to quite an extent, but we realize its limitations, so if the energy demands of the vehicles exceed what we consider to be the reasonable capabilities of chemical fuels, we are forced to the conclusion that such vehicles must get their energy from either fission or mass conversion.

With reference to the means for support, propulsion and manipulation, unless we are prepared to postulate something else quite beyond our knowledge, there are only the two groups of possibilities, namely the known means and the speculative means. Of the known means there is only physical support through the use of buoyancy or airfoils, the reaction of rockets and jets, and centrifugal force, which is what holds the moon in position. Of the speculative means we know only of the possibility of gravity waves, field interaction and radiation pressure. If the observed behaviour of the vehicles is such as to be beyond the limitations which we know apply to the known means of support, then we are forced to the conclusion that one of the speculative means must have been developed to do the job.

From a study of the sighting reports (Appendix IV), it can be deduced that the vehicles have the following significant characteristics. They are a hundred feet or more in diameter; they can travel at speeds of several thousand miles per hour; they can reach altitudes well above those which would support conventional aircraft or balloons; and ample power and force seem to be available for all required manoeuvres. Taking these factors into account, it is difficult to reconcile this performance with the capabilities of our technology, and unless the technology of some terrestrial nation is much more advanced than is generally known, we are forced to the conclusion that the vehicles are probably extra-terrestrial, in spite of our prejudices to the contrary.

It has been suggested that the sightings might be due to some sort of optical phenomenon which gives the appearance of the objects reported, and this aspect was thoroughly investigated. Charts are shown in Appendix III showing the various optical considerations. Enticing as this theory is, there are some serious objections to its actual application, in the form of some rather definite and quite immutable optical laws. These are the geometrical laws dealing with optics generally and which we have never yet found cause to doubt, plus the wide discrepancies in the order of magnitude of the light values which must be involved in any sightings so far studied. Furthermore, introducing an optical system might explain an image in terms of an object, but the object still requires explaining. A particular effort was made to find an optical explanation for the sightings listed in this report, but in no case could one be worked out. It was not possible to find so much as a partial optical explanation for even one sighting. Consequently, it was felt that optical theories generally should not be taken too seriously until such time as at least one sighting can be satisfactorily explained in such a manner.

It appears then, that we are faced with a substantial probability of the real existence of extra-terrestrial vehicles, regardless of whether or not they fit into our scheme of things. Such vehicles of necessity must use a technology considerably in advance of what we have. It is therefore submitted that the next step in this investigation should be a substantial effort towards the acquisition of as much as possible of this technology, which would without doubt be of great value to us.

W.B. Smith
Engineer-in-Charge,
Project Magnet

Chart I

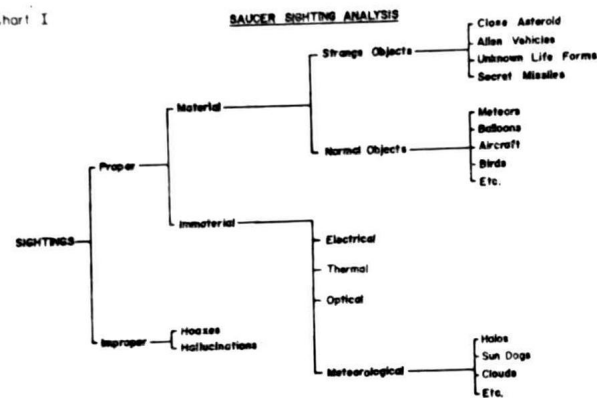


Chart II

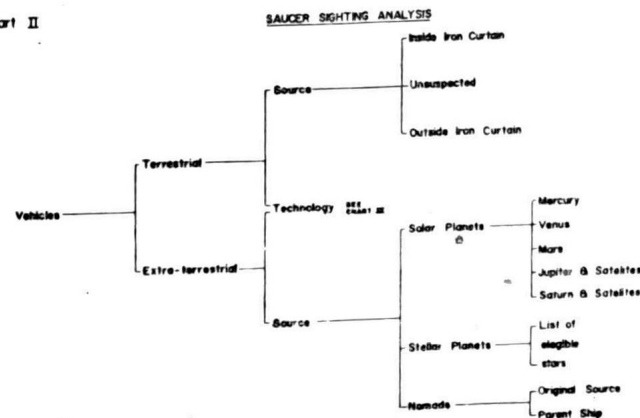


Chart III

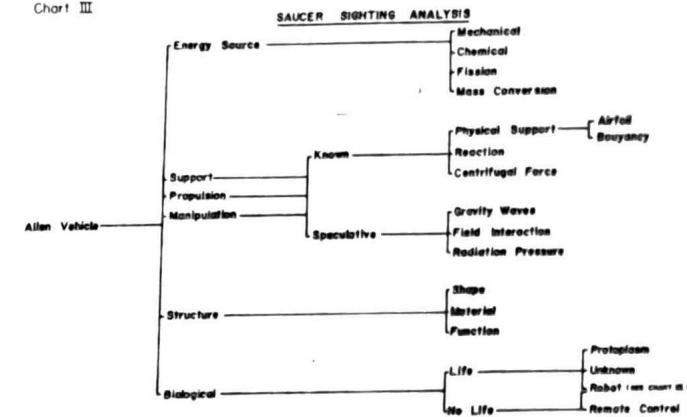


Chart IV

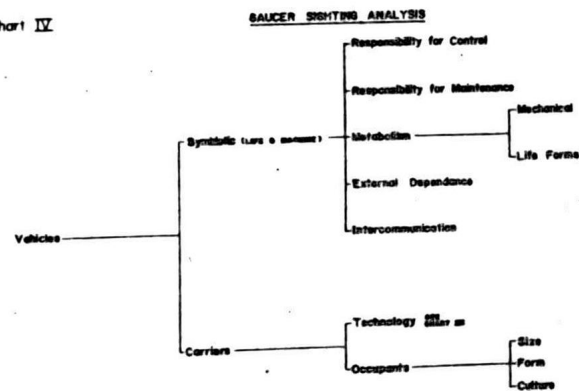


Chart V

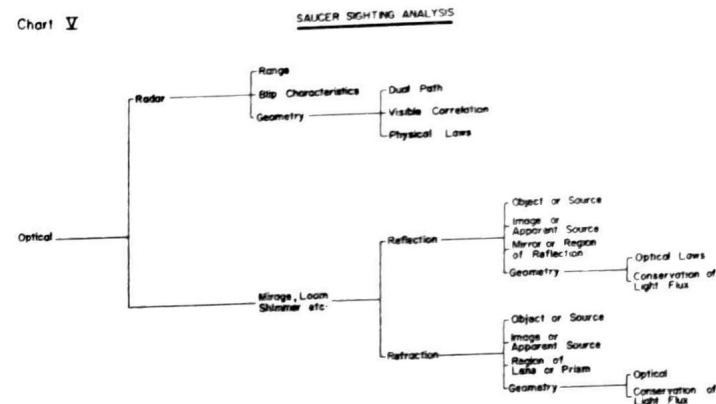


Chart VI

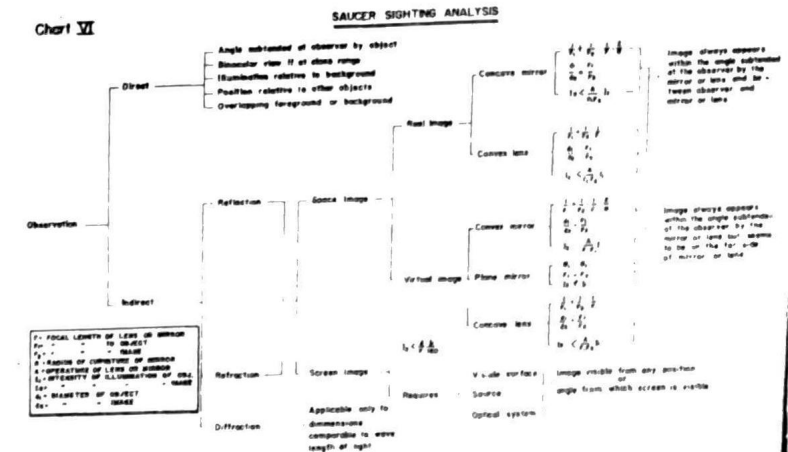


Chart VII

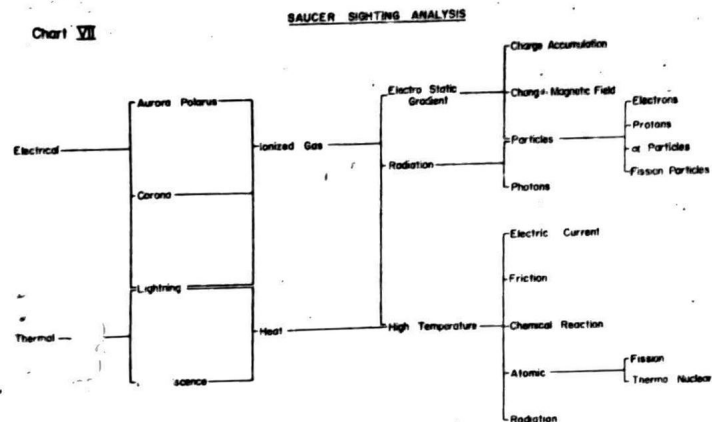


Chart VIII

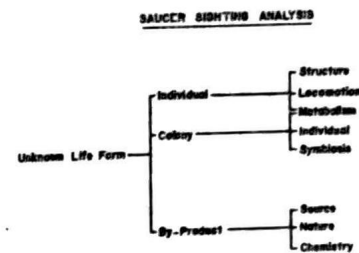
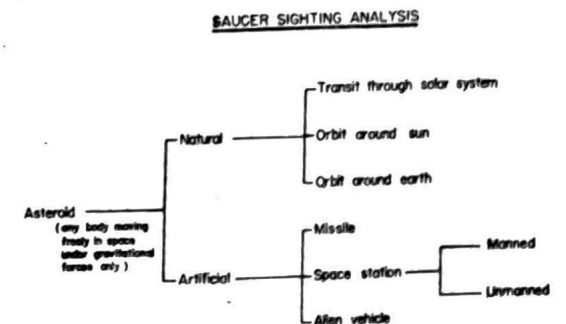


Chart IX



Based on the conclusions of the 1952 report, it was felt that certain of the phenomenae would probably be accompanied by physical effects which could be measured, and since measurements are always more satisfactory than qualitative observations, it was decided to try and get some measured data.

Whether the phenomenae be due to natural electromagnetic causes, or alien vehicles, there would probably be associated with a sighting some magnetic or radio noise disturbance. Also, there is a possibility of gamma radiation being associated with such phenomenae.

It has been suggested by some mathematicians that gravity waves may exist in reality, as well as a convenience to make an equation balance. While we know practically nothing of such waves in nature, nevertheless, if the possibility exists, flying saucer phenomenae, being largely an unknown field, might be a good place to look for such gravity waves.

Therefore, a group of instruments was set up in a hut at Shirley Bay for the purpose of trying to get measurements which could be tied to one or more actual sightings. The instruments are; a compass type magnetometer, a gamma ray counter, a radio set and gravimeter. The outputs of these four instruments are arranged to draw proportional traces on a 4 pen recorder.

These instruments went into operation last October and apart from the usual bugs, seems to be operating satisfactorily. We have as yet obtained no saucer data from them.

Our future plans include study of any data which we may get from our Shirley Bay set-up, should we be so fortunate, as well as the continued analysis of sighting reports which come in to us. We propose also to make rigid analysis of unknown phenomenae to see how much can be explained on this basis. Most of the previous work along these lines has been largely qualitative and open to serious objection from the point of view of quantitative analysis.

We intend to promote a study of gravity waves, whether within this Department or outside to find out if:

- a) They exist in nature
- b) How we can detect them if they do
- c) How to generate them, and
- d) What they may be used for.