

## **Research and Preliminary Engineering Space Vehicle Program**

**SUBJECT:** Research and Preliminary Engineering for Space Vehicle Program

Part I - Propulsion

Part II - Navigational and Flight Control Instruments

Part III - Communication and Remote Control Systems

Part IV - Materials of Construction

### **SYNOPSIS:**

This proposal recommends a long-range coordinated program for the research and preliminary engineering leading to the construction of prototype space vehicles.

The proposal stresses the importance of research on gravitation and on the relationships between electrodynamics and gravitation. It calls attention to certain possibilities inherent in such a program of development.

The program would be divided and conducted in steps, as follows:

- (a) Preliminary investigations of physical methods,
- (b) Engineering development,
- (c) Advance design,
- (d) Construction of operating prototypes.

### **SCOPE OF INTEREST:**

(a) Propulsion

The program anticipates the use of electric methods of propulsion and control, and specifically excludes the consideration of jet or rocket propulsion devices, per se, except as a means for generating the required high electrical potential. Emphasis is placed on studies of the physical relationships between electrodynamics and gravitation leading to the development of methods of electrogravitic propulsion and steering control.

## (b) Navigational and Flight Control Instruments

Problems of space navigation are to be examined, particularly with the view of applying electrogravitic principles in the design of flight instruments to indicate:

1. Gravitational Vector (insensitive to acceleration),
2. Acceleration (insensitive to gravity),
3. Gravitational Gradient (insensitive to acceleration),
4. Gravitational Potential of Space,
5. Electrical Potential of Space,
6. Space Speed (absolute ether drift).

## (c) Communication and Remote Control Systems

Applications of electrogravitic induction to communications and remote control are to be developed. Use of gravitational radiation is the objective.

Basic tests with electrically-shielded capacitors and massive high-K dielectrics are proposed. Methods are to be extended into full-scale communication systems. Such systems, while similar to electromagnetic (radio) systems may be found to offer many advantages - such as higher penetrability, elimination of "shaded" areas, higher velocity of wave propagation and a wholly new spectrum of channels.

## (d) Materials of Construction

Continuation of the research of the late Charles Francis Brush on the "non-equivalence of mass and weight" is recommended (see appendix). Further confirmation of the Brush findings may be provided by the existence of gravitational isotopes, as distinguished from mass isotopes. Procedures for isolating gravitational isotopes in common aircraft metals, with the object of creating super-light alloys.

Methods of beneficiation are suggested for enriching the content of lighter gravitational isotopes in common aircraft metals, with the object of creating super-light alloys.

The spontaneous evolution of heat, observed by Brush and Harrington, appears to be one of the characteristics of lighter gravitational isotopes, and may serve as a tracer in the steps of beneficiation. Studies are proposed to determine the source of the energy and to investigate possible uses of said heat.

This program is to include a study of the rare earth metals and their alloys, and also the metal tantalum, regarded as potential aircraft materials. In nature, most of the rare earth metals (and tantalum) indicate mean values of specific gravity having large negative anomalies, and this property makes them interesting as probable rich sources of gravitational isotopes required in the manufacture of super-light materials of construction.

## PROGRAM OF RESEARCH AND DEVELOPMENT:

### Group A - ELECTRODYNAMIC-GRAVITATIONAL FIELD RELATIONSHIPS

Purpose: Generation of quasi-gravitation by electrical means, quantitative measurements and derivation of equations.

Abstract:

One of the basic relationships between the electrodynamic field and the gravitational field appears to be revealed "during the process of charging or discharging electric capacitors".

Proposal:

Confirming experiments are proposed in which two or more large high-voltage capacitors are associated spatially with a short-period geophysical gravimeter. Careful observations are to be made of the momentary gravitational anomalies induced in the region which accompany the change in electrical state. Studies are proposed of the effects of varying total capacitance, rate-of-change of electric charge, mass of dielectric materials, specific inductive capacity of said materials and whether the effects are vector or scalar. These investigations shall be directed toward the derivation of a satisfactory mathematical expression including all of the above factors.

### Group B - PROPAGATION OF GRAVITATIONAL WAVES

Purpose: Transmission and reception of electro-gravitational waves for purposes of communication and remote control.

Abstracts:

Preliminary experiments have indicated the existence of an inductive inter-action between two independent shielded capacitors. In these experiments, a discharging capacitor induces a voltage in an adjacent capacitor, and the effect appears to penetrate electromagnetic shielding. Theoretically, this effect of one capacitor upon another appears to be electrogravitic in nature and constitutes evidence of a new type of wave propagation. It is believed that this form of inductive transmission may eventually be utilized in a completely new method of wireless communication.

Proposal:

It is proposed that progressively larger-scale and longer-range transmissions be conducted. Beginning with untuned systems, laboratory tests are proposed to explore the basic electrogravitic relationships between simple systems of capacitors. Then, progressing to tuned systems, and

pulsed (radar) applications, large-scale out-of-door demonstrations are suggested. Such demonstrations shall be conducted between suitably protected transmitting and receiving vaults (preferably underground) which are thoroughly shielded against electromagnetic radiation. Appropriate studies of wave attenuation due to transmission through large masses of earth may then be undertaken. Similar studies of wave attenuation in sea water are also prosed. These studies are to be supported by fundamental research on the nature of electrogravitic induction (See appendix for outline).

### Group C - PONDEROMOTIVE FORCES IN SOLID DIELECTRICS

Purpose: Isolation and measurement of electrogravitic forces in solid dielectrics.

Abstract:

Investigations conducted by Biefeld and Brown point to the existence of a hitherto unrecognized ponderomotive force in all ferroelectrics under changing electric stress. This force appears to be a function of the specific inductive capacitance and the mass of the dielectric material, as well as high voltage and current factors. Recent availability of the massive barium titanate (high-K) dielectrics and other dielectrics of this class give promise of developing these forces to the point where they may become of practical importance in specific propulsion applications.

Proposal:

A survey of dielectric materials revealing this effect is proposed. Beginning with a critical analysis, using the Townsend Brown Differential Electrometer (an instrument developed at the Naval Research Laboratory and at the University of Pennsylvania), studies are proposed of the forces developed in mica, glass, marble, phenolics and dielectrics in general and then, in particular, the newer ceramic dielectrics. This work is to be augmented by basic determinations of the Biefeld-Brown effect in vacuum. (See appendix).

It is proposed that, after suitably active materials are selected, scale models of other rotary and linear "motors" be constructed and tested. With the necessary engineering data then at hand, a motor to weigh approximately 500 lbs. may be constructed to propel a model ship. This is proposed as a practical demonstration of one of the forms of electrogravitic drive.

Ether drift and space-couple observations, including specifically a repetition of the classic Trouton-Noble experiment (but using massive dielectrics) are suggested as being of interest not only for their contribution to basic knowledge of the nature of space but as bearing upon the principle of operation of space speed indicators (See appendix).

Low temperature experiments in physics of the solid state (using the liquid-helium cryostat) are highly recommended but are expensive. These experiments, however, may be so designed as to provide answers to many questions relative to the fundamental nature of gravitation. They are to embrace such subjects as the "Anomalous Mass of the Electron in Metals" and the "Behavior of Super-Cooled Dielectrics".

The availability of the liquid-helium cryostat would enable the project to engage continuously in low-temperature work which could contribute enormously to our knowledge of solid state physics.

#### Group D - REACTIVE FORCES IN FLUID DIELECTRICS

Purpose: Development of high speed electrokinetic propulsive systems for spacecraft.

Abstract:

Studies of boundary forces (where electrodes are in contact with fluid dielectrics) reveal the existence of a "complex" of inter-acting forces, some of which are purely electrostatic, some electromagnetic and some which could be electrogravitic. The tentative theory requires these electrogravitic forces to be present whenever a mass of dielectric material is charged and moving, and to increase in proportion to the volume of the fluid which is charged and moved. Hence, it is, in a sense, the juxtaposition of the elements of the static form of the capacitor described in Group C experiments, and provides what may be described as an electrokinetic propulsive system, with direct applications to high speed aircraft and spacecraft.

Proposal:

It is proposed that electrically-charged circular airfoils be mathematically analyzed and improved. Starting with 2 ft. discs at 50 KV, the steps of the development should include 4 ft. discs at 150 KV and a 10 ft. disc at 500 KV. Careful measurements are to be made of both static and dynamic thrust. Studies are also proposed wherein the discs are adapted for vertical lift (levitation) as well as for horizontal thrust and this feature may be incorporated in the design of the 10 ft. experimental model.

It is proposed that studies likewise be made of various methods for obtaining the required high voltages, and these studies should include the development and evaluation of the capacitor voltage multiplier and the "flame-jet" electrostatic generator to provide up to 15 million volts (See appendix).

This work is to be augmented by the engineering studies on the relative efficiency of propulsion of electrified discs in air at reduced pressure or in vacuum and at various voltages.

#### Group E - "THE SPONTANEOUS GENERATION OF HEAT IN CERTAIN COMPLEX SILICATES, LAVAS AND CLAYS.

Purpose: To establish the existence of the positive effects observed by Brush and Harrington, determine the origin of the energy represented and extend the observations into the rare earth /and other/ elements.

#### Abstract:

The discovery by Charles Francis Brush of an unexplained heating effect in certain materials is strikingly reminiscent of the discovery of radioactivity by Henri Becquerel which led to the isolation of radium by the Curies. Recent studies have indicated a certain parallelism between the radioactive elements and the rare earth elements, revealing the possibility of a spontaneous release of energy (in this instance in the form of heat alone) by the rare earth elements.

Thus, the newly discovered "thermoactivity" may bear the same relationship with the rare earth elements as "radioactivity" bears with the radioactive elements. In all probability the source of the energy represented in thermoactivity will be found in the complex unstable electronic shells of the rare earth atoms, and not in the nuclei as in radioactivity.

The anomalous gravitational properties of the rare earth elements and their wide-spread but tenuous occurrence in nature point to other parallels with the radioactive elements such as decay of activity and critical limits of mass.

#### Proposal:

1. Conduct an organized examination of materials (complex silicates, lavas, and clays) known to exhibit spontaneous heating.
2. Conduct a field search for additional materials.
3. Attempt to isolate and purify materials showing spontaneous heating.
4. Extend the examinations into the rare earth metals and tantalum.
5. Conduct mathematical and theoretical studies of gravitational isotopes as distinguished from mass isotopes.
6. Study the mechanism of spontaneous heat generation and the decay of the effect.
7. Study the effects of ionization, electric and magnetic fields upon the effect.
8. Study methods of beneficiation of materials for intensification of the heating effect.

#### Group F - NAVIGATIONAL AND FLIGHT CONTROL INSTRUMENTS

1. Gravitational Vector (stable vertical)
2. Accelerometer (inertial gradient)
3. Gravitational Gradient (gravity)

Purpose: Engineering development and design, adaptation for operation in conjunction with servo mechanisms for actuating flight control devices.

#### Abstract:

The physical principles underlying the operation of these instruments have evolved from the findings of C. F. Brush (see appendix - references). Quite recently, careful studies of the records of the Brush experiments have been made. The conclusions, while still highly controversial, leave

no doubt that the Brush concept, if supported, can provide answers to many difficult and, as yet unsolved, problems in navigational and flight control instrumentation.

The Brush findings may be expressed simply:

"the ratio of mass to weight is not the same for all kinds of matter, as has been supposed, and the mass-weight ratio is not constant even in the same kind of matter".

Based on the hypothesis of the non-equivalence of mass and weight, the principles of three instruments have evolved as follows:

#### 1. Gravitational vector (stable vertical)

Two equal (inertial) masses of unequal weight are utilized in a balanced pivoted device. Such a device may be said to be inertially symmetrical and gravitationally asymmetrical. The pivoted system will orient itself to the vector of gravity and yet remain insensitive to the inertial effects of acceleration and centrifugal force.

#### 2. Accelerometer (inertial gradient)

Two unequal (inertial) masses of equal weight disposed in a pivoted device as above, but with spiral spring (or the like) tending to restore the movable system to zero position. The pivoted element responds quantitatively to inertial effects of acceleration and centrifugal force but is insensitive to gravity.

#### 3. Gravitational Gradient (gravity)

Such an instrument is the reverse of the accelerometer above and structurally resembles the gravitational vector indicator except that it includes a spring which is adjusted to restore the indication to zero in the absence of a gravitational field. The movable element responds quantitatively to gravity (g) only and is completely insensitive to all inertial effects such as acceleration or centrifugal force.

Proposal:

It is proposed that operating models of the three types of instruments be constructed and tested on a centrifugal carriage. Materials for the dipoles of the pivoted systems are to be selected from benificiated gravitational isotopes (both light and heavy) developed under Group E. These prototype instruments are to be adaptable for operation in conjunction with telemetric circuits or servo mechanisms for actuating flight control devices.

IMPLEMENTATION:

(a) Laboratory facilities

To be supplied directly by the parent company or its subsidiaries.

(b) Personnel

Members of the regular research and engineering staff of the parent company and its subsidiaries, with services of such technical or operational consultants as may be necessary.

(c) Sub-contracts

To be awarded only when it is impractical or uneconomical to perform the work with company facilities.



CONDENSED SCHEDULE AND ESTIMATED COST:

1955 - October through December (3 months only)

Organizational work and planning (\$ 3,000.00)

Establishment of technical reference library on gravitation and allied subjects (\$ 5,000.00)

Preliminary beneficiation of gravitational isotopes (\$ 12,500.00)

Engineering design of flight control instruments (\$ 12,500.00)

Quantitative tests of Biefeld\_Brown effects in solid dielectrics (\$ 9,500.00)

Basic tests on propagation of gravitational waves for communication purposes (\$15,000.00)

Total (\$ 57,500.00)

1956 - 1958 (3 years)

Detailed schedule and expenditures to be determined during the preliminary organizational and planning stage.

Respectfully submitted.

T. Townsend Brown  
Consultant

Washington D. C.  
December 1, 1955