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MEMORANDUM

DATE: 2-18-69
A-830-BB01-CPT-15

TO: R. M. Wood, A-830

FROM: C. P. Thomas, A-833

SUBJECT: A NEW COMMUNICATION MODE

COPIES TO: J. M. Brown, D. B. Harmon, W. P. Wilson, Jr., A-830

REFERENCE:

Attached to this memorandum is a loose discourse on the feasibility of a new communications mode which could be a parent or a product of a new propulsion mode.



C. P. Thomas, A-833
Advanced Concepts

CPT:msb
Attachment - Noted

Copy No. 5

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A NEW COMMUNICATION MODE

With the advent of longer-range supersonic flight vehicles, and the approach of possible interplanetary travel, communications and navigation needs play an ever-increasing role in the system performance of any vehicle-ground system complex. This paper examines the possibility of a new communications-navigation concept utilizing a mode of information transfer adapted from natural phenomena other than electromagnetic.

I. Requirements

The requirements for an ideal system would be:

1. Point-to-point communications
2. Point-to-area communications
3. Non-interference by natural phenomena
4. Range minimum and maximum practically unlimited
5. No blank regions
6. Universally utilizable
7. Low power required
8. Real-time identification
9. Real-time authentication
10. Non-interference with existing FCC allocations
11. Non-injurious
12. Compatible with natural phenomena
13. Near-infinite information transfer rate capability
14. Adaptable to existing information source and readout facilities without system degradation
15. Utilizable in traffic handling
16. Practically limitless traffic-handling capacity
17. Utility in all classes of communications; for instance: air-air, air-ground, air-submarine, submarine-submarine
18. Antenna compatibility with all types of requirements
19. Construction feasibility within existing hardware techniques
20. Communications - Navigation - Identification modes operable without switching off any mode, preferably as an integrated mode
21. No degradation or interaction by use in any variation of environment, manufactured or natural
22. Real-time readout, and real-time transmission in any language, based on real-time translation from any language to any language on both readin and readout circuits
23. Minimum possible jammability
24. Minimum possible error rates
25. Maximum possible error correction capability
26. Real-time maximum coding and decoding capability
27. If possible, the CNI system to operate in the same mode as a propulsion mode
28. Maximum possible reliability
29. Maximum achievable simplicity compatible with performance requirements.

II. Possibilities

These requirements eliminate systems utilizing the following modes:

1. Electricity
2. Magnetism
3. Light (Optics)
4. Heat
5. Hydraulics
6. Electromagnetics
7. Nuclear Energy
8. Solar Energy
9. Combustion
10. Sound
11. Mechanics

It leaves little with which to work. The two modes which possibly could satisfy most if not all of the requirements are:

1. Gravity
2. Magnetohydrodynamics

Actually, mhd is disqualified in strict interpretation of the rules of the game; however, a combination of gravity and mhd could satisfy the requirements.

It could be that the eliminated modes cannot be utilized per se as modes of communication, but some may be utilized as means of creation, control, or modulation of a mode which satisfies the most requirements possible.

III. Discussion

It is interesting to note that the two modes most likely to satisfy the requirements are the least understood of all forms of energy as they occur in nature. No one yet knows why gravity "pulls". No one yet knows why the acceleration caused by the "pull" of gravity is uniform for all densities of bodies. (What are the tolerances?) No one knows whether the "pull" of gravity is a field which is set up (or transmitted) at c or greater than c . No one has yet defined the term "mass" on a self-sustaining basis - only by its effects. No one has caused a true gravitational field to exist.

For purposes of discussing a gravitational mode of communications, we will set up some definitions, parameters, and hypotheses.

1. Any matter with "mass" has a gravitational field of its own.
2. If we concur with the concept of the Universe being a sum of particles, then a gravitational field in a given piece of matter is set up by an excess of collisionless particles emanating from the matter over collisionless particles entering the matter and an excess of collision particles flowing toward the matter over collision particles flowing away from the matter. The sum of the flows of collisionless and collision particles in opposite directions is equal.

3. The "instantaneous phenomena" exists.

There is only an indefinite newspaper reference to phenomena measured at a speed greater than c ; however, it may be significant. The New York Times, shortly after the first Soviet nuclear shots at Novaya Zemlya, reported the Soviets as reporting earth-current records taken in Antarctica of the leading-edge pulse of the shots with no measurable time delay from the time of the detonation. At c the time delay would have been in the order of 0.05 second, which is discernible in terms of world-wide atomic clock accuracy, which the Soviet earth-current scientists claim to have had at that time. In any case, the Times article quoted the Soviet scientists as stating that there was an "instantaneous effect" phenomenon with no discernible time delay between Novaya Zemlya and Antarctica, measured in earth-current flow effects alone.

If we accept the "instantaneous effect" phenomena as reported by the Soviets, then an analysis or a hypothesis as to the cause is in order. Incidentally, the Soviet report as stated in the Times also stated that all Soviet earth-current recording stations the world over recorded the same "instantaneous effect" electrical phenomena.

It is interesting to note the comparative status of earth-current facilities between the Soviet and U.S.A. at that time: there were 30 known earth-current recording stations in Russia proper alone, not counting those known to be in Siberia, Antarctica, and in seagoing ships. There were only 3 stations in the entire North American continent.

Before exploring a hypothesis for the cause of an "instantaneous effect", however, let us repeat hypothesis #3: There is an instantaneous phenomenon in the organization of natural energy.

There is a remarkable similarity of organizations of matter of different magnitudes having their own gravitational fields, if we look at known organizations from the atom through the supergalaxy. Included in this family are the atom, planet with radiation belts, blue-white star, galaxy, and supergalaxy. Each has an inner core and outer core, with the inner core representing a region of low energy level, and the outer core representing a surrounding region of high energy level. In these various organizations of matter it is evident that the outer cores represent a concentration of at least a magnetic field; possibly also a concentration of free electrons; and certainly a concentration of photons. In organized matter of the particle class, including proton and electron, the inner and outer core structure cannot be justified except as a continuum of the hierarchy of structures having their own gravitational field.

Taking into consideration those organizations of matter which indicate a departure from this hypothesis (i.e., Mercury, Moon, Mars), it is curious to note that their surface gravities represent a negative departure from the expected gravitational field by virtue of the surface gravity of most of the other planets. Another curious coincidence is the fact that none of these bodies has radiation belts, nor an organized magnetic field.

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One explanation could be that each body of these organizations of matter has a gravitational field which is the sum of hierarchical "sub-matter" comprising the organization, the "sub-matter" having its own inner-outer core structures and attendant gravitational fields. In this case, "sub-matter" refers to that matter of inner and outer core hierarchical structure which can add up to a body as large as a moon or planet with or without radiation belts. The "sub-matter" follows hierarchical patterns of organized magnetic field structure, inner and outer core structure, and gravitational field effects.

In the cases of Mercury, Moon, and Mars, it is plain that with the lack of an organized magnetic field, and the assemblage of "sub-matter" with the organized fields of the "sub-matter" in random orientation, only the gravitational fields of the "sub-matter" are organized.

It appears that there may be emanation of an excess of collisionless particles from the outer core of the hierarchy of inner and outer core structures. (Mercury, Moon, and Mars would have no such emanation on the planetary level.) These particles may be so small as to approach the infinitesimal in size, and may travel so fast as to approach limitless velocity. Let us call such particles "i's" ("imaginaries" or "infinitesimals" traveling near "infinite" velocity).

Since the emanation of an excess of i's would occur only in matter where organized magnetic fields and inner and outer cores exist, it appears that some interrelationship between these factors could hold true. The only plausible one - although the relationship may in reality be wholly "implausible" - would seem to be that the outer core represents a specific location of "overcrowded" energy. The release of energy from this overcrowded state probably would vary from the optical spectrum to ultraviolet, infrared, x-ray, and possibly other photons, with different emanations from different magnitudes of cores; however, the one emanation common to all magnitudes within the hierarchy would be the same as that for brutinos.

A characteristic probably worth consideration is that in the hierarchy, the smaller the outer and inner core structure, the higher the magnetic field density.

A characteristic common to all magnitudes within the hierarchy is that inner and outer cores appear to be consistently spherical. Further, it appears that gravitational field effects are the same with respect to any cores of equal size, and essentially the same in any one body of matter in all radial directions from its concentric cores.

Another characteristic worth mentioning is that two entities of matter demonstrate a gravitational effect only if both have inner and outer core structures, either as primary to the magnitude involved within the hierarchy, or as "sub-matter" structure.

The problem of how the proton and electron fit into the hierarchical structure is not simple. One fact, however, stands out above any conjecture: both particles have organized, high-density internal magnetic fields.

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Since no simple concentration of any magnetic field at the highest experienced density has ever produced a gravitational field, we may assume that the gravitational field of a proton or electron is produced by a formation common to larger magnitudes in the gravitational hierarchy: the inner-outer core structure.

It may be that high-density magnetic fields do emanate i's, but not in an organized fashion, and that the outer-inner core structure is the only one which emanates i's predominantly as if from a point source, thereby creating a gravitational field. If true, this is further argument for the existence of the outer-inner core structure in a proton and electron.

In any inner-outer core structure within the hierarchy from atom to supergalaxy, the presence of radiation belts can be argued as a part of the total structure contributing to the existence of outer and inner cores. However, radiation belts cannot be part of the structure leading to outer and inner cores of the proton and electron as they evidently are in structures only from atomic upward. We must look for some other natural phenomenon which is beyond the scope of this paper.

However, if we are to tie together the instantaneous effect, Soviet earth-current recordings, and i's, it would appear that a nuclear detonation with its mass-energy interchange relationships would produce a leading edge pulse reflecting a change in i-production balance in the hierarchical balance.

Since the transfer is from mass to energy, it involves a loss of gravitational fields (or, a loss of i-production) in the amount of time necessary for the transfer to take place. The very first loss would be concurrent with the first atom's interchange from mass to energy. The loss would have an effect on every member of the inner-outer core i-producing hierarchy. It might be said that the entire balance of the universe is affected, especially if i's do exist and do travel at near-infinite velocities.

The effect on electrons would be noted in earth-current activity as an "instantaneous" earth-current effect.

If we proceed on the basis of inner-outer core structure from the atom upward, then an orderly picture can be drawn. Each magnitude within the hierarchy represents a trapped magnetic field, and trapped belts of protons and electrons, in balanced trapping action. If i's are emanated from outer cores, then the organized trapped magnetic field could be the supplier of particles from which i's are shed; and the radiation belts serve as trapping agents to trap more magnetic field particles from the background field to replace that part of the trapped field lost in being shed as i's. It appears that, normally, a steady-state balance is maintained; for instance, in a planet, the trapped magnetic field, the trapped radiation belts, the inner-outer core structure, the i-emanation, and planetary rotation would be interdependent. That these states are not constant is attested to by the repeated sudden increases and decreases in the earth's rotational velocity. The most direct cause of rotational velocity change could be a change in

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background magnetic field density, which would lead to a change in trapped field density. Commensurate with any such change would be a change in i-emission from the outer core, or a change in g.

In smaller formations in the hierarchy - such as atoms and molecules - a change in the background magnetic field, or a change in orbital speed of electrons, or a change in density of inflowing i's, could change the electron flow structure of any associated assemblage of electrons.

IV. A Possible Example: ESP (Equilibrium System Perception)

If a communication mode already exists in nature utilizing a gravity system, we possibly could find it in that portion of mammalian physiology which is dependent upon gravity for its continuous and successful operation.

In the human being, there is only one sense which does not use a transducer: the equilibrium system. The eye transforms optical wave lengths to energy suitable for conduction along the optic nerves; the ear system translates audio range waves to the same kind of energy for conduction along the auditory nerve; likewise smell, touch, and taste.

The equilibrium system, however, operates directly on external energy affecting directly the energy conduction in the equilibrium nerve from the semicircular canals to the brain. The semicircular canals are in reality loop antennas, oriented in planes almost exactly at 90° to each other; when a person is standing, there are two loops in the vertical plane, sensing energy flowing through them horizontally, and one in a horizontal plane, sensing energy flowing through it vertically.

It is a curious fact that the equilibrium system utilizes double the antenna in a vertical plane that it does in a horizontal plane. It suggests that available energy signals are far more plentiful vertically than horizontally; the energy source would logically appear to be gravitational. It appears even more logical when considering that equilibrium system operation most probably depends on a reference with the stability unique to gravitation.

In birds and primates it has been demonstrated that the equilibrium nerve which is connected to the semicircular canals goes to the brain, thence to every muscle in the body. The main branch of the nerve after exit from the brain extends through the spinal cord, with every branch extending from every vertebra traceable to every associated muscle in the body. It affords physiological proof of the coordination of the body depending upon a stable reference - and no reference other than gravity fits the requirement, since a constant, stable reference with respect to the vertical is required. In humans, however, the equilibrium nervous system is not so well defined. The entire system through the spinal cord is traceable; however, each branch leaving each vertebra is so small and delicate that it defies tracing to the associated muscle.

This difference between species explains why an anthropoid can habitually perform outstanding feats of acrobatics as normal actions in trees,

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and why birds have an excellent navigation system; their equilibrium systems are far better developed and more sensitive than that of the human being.

As underdeveloped and insensitive as it may be, the human being's equilibrium system succeeds in performing its task: to sense vertical and horizontal references provided by nature, and provide a means of coordination of motor nerves and muscles to act and react properly, based on the vertical and horizontal references sensed.

The operation of the equilibrium system depends, then, on the stable reference - presumably gravity - providing a constant signal which is sensed by the equilibrium loops (semicircular canals). Any movement of any portion of the body is accomplished by coordination of intent and muscle action with the stable equilibrium signal providing the reference upon which the movement is based and accomplished.

There seems to be no physiological nor neurological reference which shows or explains which part of the brain or medulla oblongata which is responsible for the equilibrium function. From the meager information available, it must be tentatively concluded that there is no function in the brain and medulla which is without parallel or integrated structure and function with the equilibrium nervous system.

Suppose that the reference signal (which we are postulating to be gravitational) is not solely a stable signal - that it is modulated with information which may be incoherent, coherent, or both. The means of modulation may be disregarded for the moment; we are concerned primarily with the possibility of existing modulation.

If there is coherent information, it could be received and ignored inasmuch as body control would depend on the stable reference only. On the other hand, if there is coherent information, it could be received, detected, and used. Reception and detection would conceivably be so subtle to the person involved that the received intelligence would appear to be his own thoughts. If there is reception of coherent information, this could be the reason that the fact of reception is not recognized nor

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The Tacoma Zoo authorities have stated that the animals react in this manner to every earthquake, but that the Alaskan quake evidently provided them with cause for the most severe vocal demonstration in the Zoo's history. The manifestation of disturbance was not entirely vocal, as the animals also ran about frantically, and the birds flew about as if trying to escape from an unseen assailant.

If indeed this mode of reception exists, and includes coherent information, there should be a method for bringing it out in the open for observation and testing. This has been done.

V. Development and Experimentation With the Human Link

If the coherent information includes information in the English language (including numerical information), then our instrument can be constructed to utilize those factors.

If the equilibrium system honors a stable reference, then possibly it could be made to honor coherent information content in the reference. Since all muscular coordination and action is based on the reference provided through the equilibrium system, then perhaps muscle action can be made to act on the coherent information. For instance, if it is sensed that an "a" is received, then the finger could be instructed by the coordinated motor system to point to an "a" on a chart.

To make the finger, hand, and arm obey 3-dimensional instructions to point to any letter is unnecessary, since we can put all letters and digits on a chart in one plane. The chart can be slippery; and a sliding instrument placed on the chart, with a finger on the sliding instrument, so that the hand and fingers need move in two dimensions only.

It was found that the best sliding instrument is a small "jigger" glass, inverted, which has an indentation in the base in which a fingertip will rest. The angle of the sides of the glass provides a structure which will resist tipping over from the horizontal force supplied through the fingertip.

The chart should be made so that the maximum movement efficiency can be utilized. It was decided at first that an alphabetical circle was best; later, it was modified to an ellipse.

It was further hypothesized that if coherent information exists as a modulated portion of the stable (gravitational) reference, then it would be identical for any number of persons in immediate proximity to each other; therefore, if two or three persons were to operate as concurrent receivers, each with a finger on the inverted glass, the strength of the received signal could be multiplied by the number of persons contributing.

On the very first trial, it was found that there is literally a plethora of intelligent information available through this method, that there are uncountable constant sources of information. Since authentication of both source and information was impossible, the experiment was continued based on observation alone, without judgment as to the source or content. The time of these experiments was in April, 1965.

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Unauthenticated information was received from locations indicating ranges up to hundreds of millions of light-years away. If the source location were correct, the instantaneous link indicated a mode of communication approaching infinite velocity, - many magnitudes greater than c , in any case. When the link was utilized as a two-way link, the indication of this phenomena was even stronger, as conversation ran back and forth with no apparent lag where, by the concept of c , such a link would be impossible.

It was decided that inasmuch as a reception was made, a transmission had been made, and that a controlled test should be performed. First, however, requirements should be established for being a good receiver, and for a good transmitter.

From the small experience up to April 1965, we had learned that the best description of a good receiver is a person who has found his inner peace. One who has learned that concern and worry are not the same; who has found minute-to-minute, hour-by-hour, day-by-day, month-by-month, year-by-year ways of meeting everything, ranging from happiness and joy to boring normalcy to extraordinary adversity with calm acceptance, gaining victory when necessary; accepting failure when unavoidable, and turning it to success whenever possible. It takes a relaxed mind and body to be a good receiver.

A good transmitter is a person who can think one thought, excluding all other thoughts, even from his subconscious, without thinking himself into doing so. Top-flight lecturers and show people have this quality - persons like Danny Kaye and Johnny Carson are good transmitters. They hold their audiences because their conscious and subconscious (through the equilibrium system) transmit identical messages concurrently. The conscious message, of course, is vocal.

A person who is both a good transmitter and receiver has the capability of switching functions and attitudes instantaneously as necessary.

Our first step was to train two receivers. Two teenagers were chosen; a boy 15, and a girl 14. The training involved using a third person (male, age 45) as transmitter. This person would transmit to any person anywhere (who would identify himself) and the person would transmit back, with the teenagers receiving the message. It was noted day by day that they would move the inverted glass over the communication alphabet faster and faster, until finally they could not move the glass as fast as they could detect what they received. At that point they discarded the glass and merely voiced the received message concurrently with reception of the message.

Through all of this training it was decided that authentication of the link was to be avoided. It was found that any attempt to authenticate usually resulted in jamming the link, and entered sufficient doubt in the mind of the receiver such as to seriously hamper his ability to receive. We discovered that complete faith in the success of the method is a requirement for successful training - both on the part of the receiver and transmitter.

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VI. Testing

At the end of a two-week training and practice period it was decided that a closed-room, controlled factual link test was in order. It was decided that the simplest information was to be utilized: card suits.

From a deck of cards, the four aces were removed. The Ace of Spades was discarded, as the spade in the center was large and ornamented. The deuce of spades was removed. The four cards then were placed face up, side by side, in 2-spade, A-heart, A-diamond, A-club order. The remainder of the deck (47 cards) was shuffled and placed face down. A 5" x 7" white card with a 1/2" diameter hole cut in the center was used by the transmitter to sight through at the upturned card face suit symbol to be transmitted.

The transmitter sat in the living room on a couch, with a card table in front of himself, with the cards arranged as described above. He faced the dining room, with the receiver sitting at the dining room table, about 12 feet away from the transmitter, with the back of the receiver facing directly toward the transmitter.

The transmitter would draw a card, mentally note the suit, and set the card down, face down. He then would sight through the holed 5" x 7" card at the suit symbol of the corresponding suit of the four face-up cards. His vision included only the whiteness of the 5" x 7" card, the hole in the card, the suit symbol, and the surrounding white area of the face-up card made visible by the hole-card. As soon as the transmitter established within himself that he was transmitting properly (excluding all other thoughts but the image of the card suit being observed), he said "now". The time interval between drawing the card and "now" was usually 3 to 5 seconds. As soon as the transmitter said "now", the receiver stated one word: the name of the suit being received.

By this method, 42 out of the 47 cards were transmitted and received correctly, the correct suit being stated correctly by the receiver on the first try. The 5 missed ones were analyzed by the transmitter to be errors on his part: he had allowed extraneous thoughts to clutter his transmission. Each time an error was made, without knowledge of the receiver, the suit was retransmitted, making it appear as if a new card had been turned. On each of the 5 first-try errors, the second try was correct.

The interesting fact about the second tries was that the receiver knew they were second tries in spite of the efforts to mask the fact. It was realized afterward that the receiver should have known in spite of whatever masking attempts were made.

A simplification of the odds for 42 out of 47 successes would be that the odds in favor of the successes would be 1 out of 4⁴².

So, it would appear that there is a communication link which is capable of transmission and reception of at least simple factual information. In this case, there were 5 errors out of 47 bits (10.6%), which is well within known error correction techniques.

The degree of authentication by this technique lends some credence to the reception of messages from sources on an instantaneous basis which should have involved from minutes to megayears delay, for it was the daily practice with links at light-minutes to light-years range which developed the capability of the receiver to receive factual information and read it out consciously.

In all of man's experience in physics, engineering, and psychology, the propagation velocity of a gravitational field has never been determined; nor has it been determined as to what generates the field. It could be (although it may not be) instantaneous. In all of man's experience in physics, engineering, and psychology, never has he encountered any proven instantaneous phenomena.

VII. Discussion of Manufactured Link

If indeed the instantaneous phenomena does exist, then the only reasonable postulation as to the means for its existence would be through modulation of instantaneous gravity fields. If this is so, then the task is: first, generate a gravitational field; and second, modulate the field.

If an experiment were set up in order to attempt modulation of a gravitational field, it would have to include apparatus generating a gravitational field and apparatus with which to modulate the field. The first try would use humans as receivers; if successful, a receiver would be constructed to supplant the humans as receiver.

Generation of the gravitational field would be accomplished as much as possible in a manner similar to nature: with an inner and outer core. A hollow sphere of soft iron could serve as the outer core; two coils of wire, one above the north pole, one below the south pole, both carrying D-C to establish a trapped field common to both and the iron outer core; for an inner proton belt. A glass "doughnut" filled with H_2 , and capacitor plates on the inside and outside radii, the inside charged positively and the outside charged negatively; and for the electron belt, an evacuated tube containing a heater coil, obtaining free electrons through thermionic emission.

On the D-C magnetizing current passing through the north and south coils, voice modulation can be impressed, which will modulate the trapped magnetic field, which in turn should modulate both charged belts, and hopefully the gravitational field generated in the outer core.

The dimensions of the setup could be such that the entire assemblage could fit on a table top; the financial dimensions, however, might not fit within existing limitations.

By so doing it would be possible to duplicate (with much stronger signal strengths) communication as it exists in mammals on the direct mind-to-mind level; voice-direct-to-mind communications, using a manufactured transmitter with the voice; and controlled communications at unlimited ranges with other civilizations. (It can be shown, with the assumption that the universe is bounded, that the existence probability of civilizations other than ours approaches 100%.)

It should be stressed that in mind-to-mind communications, most links attempting to deal with factual information fail. It appears that if one end of the link is regarded as the interrogator and the other the responder, the responder often responds to interrogations with a wishfully true answer rather than a factual one. It has been found that the mind-to-mind link is loaded with wishful thoughts and jamming influences such as pretenders, impostors, interrupters, kidders, and just plain liars. If this type of communication is to be utilized, it will need much refinement over the present mode of utilization (mind-to-mind). It can be expected that with controlled transmissions and receptions, the transmitter (and interrogator) will be authenticatable as much as they are in presently used electromagnetic systems; and reception will afford much higher selectivity, and will be less subject to broad spectrum jamming.

VIII. Some Communication Samples

In communicating with many sources at many different ranges, a variety of topics was covered which could fill pages on subjects from sociology, government, economics, warfare, crime, and medicine to engineering and science.

A very few of the communications dealt with space ships, their operation, and their construction. Most of those contacted were reluctant to talk about these subjects.

The few times we were able to enter communications with anyone willing to discuss any mathematics involved in space-propulsion, the link was unmercifully jammed by unknowns, indicating that there are those who deem it our task to find our own solutions.

Some of the more interesting communications are summed here:

- I. One source who stated that he was from another universe discoursed quite freely about their space ships and space travel.

It was made quite clear that he did not mean another galaxy or super-galaxy. He stated that he knew of our planet and had been by several times, never having landed. He stated that it took about 5 of our days to travel here from his universe, using normal cruise speeds; that with top speed it could be accomplished in 3 days.

He stated that the rotor (propeller) in the ship is about 3 feet in diameter, with 4 arms, and flattened tear-drop shaped magnets at the end of each arm. (It could have been that he meant high permeability material rather than permanent magnets.) He further stated that advanced ships accomplish the same thrust with 2-foot diameter rotors. The rotor arms are hollow, with rods going to the magnets, and a pitch control mechanism rotating the magnets. The magnets change pitch with rotation of the control mechanism in the rods. Acceleration and speed of the ship were controlled solely by pitch control of the magnets.

He also stated that the power relationships in the operation of their ships were contrary to our concepts of power. His power equation was:

$$P_t = P_p + P_r + P_i + P_e + P_f$$

where: P_t = Total power into the ship
 P_p = Power required to propel the ship
 P_r = Power required to rotate the rotor
 P_i = Power for instrumentation
 P_e = Power for all other equipment
 P_f = Power for overcoming friction

He stated that if we regard the total power input as the volume going through a cylinder, with the rotating magnets drawing the power through the cylinder only in the volume covered by rotation of the magnets, and that power being drawn through doing the work of drawing the remainder of the power through inside the radius of rotation of the magnets, we would understand. The power being drawn through by the power drawn through by the magnets then could be tapped for propulsion, rotor drive, friction losses, and other power requirements.

He stated that "tapoffs" of power passing through the cylinder in that part of the radius between the center shaft and magnets was accomplished by conductor rods angling down and out of the cylinder, drawing the power out the rods. The best reconstruction possible of his description indicates that these rods are placed with their top ends at 30° to the rotor shaft.

He also stated that the 3 balls under most scout ships were where propulsion power is fed out which is summed vectorially, and it is common to ships built by civilizations in primary stages of space ship building.

He indicated that a ring output method of power is more advanced. The pilot has a control stick which can be vertical, or tipped in any direction toward a circular limit. The output of the ship is from a ring in the bottom of the ship which is segmented and integral with the ship's shell, the output being in the direction of tip of the control stick and in a magnitude commensurate with the degree of tip of the control stick.

This method of propulsion power output was stated to be more efficient as it gave a direct directional output, whereas the 3-ball output method involved vector summing of outputs from each ball; the latter was said to involve losses through the vector summing process.

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2. Many different sources talked about their metallurgy. In the main, it was within our knowledge. There was one source, however, which talked about a totally different concept of metallurgy. He stated that they made their own atoms, constructing them concentrically. It had to be accomplished on planets or moons without radiation belts, with great "guns" firing the atoms at an accumulator. Through making concentric atoms they can construct extremely light metals with an excellent balance of strength, malleability, and brittleness by virtue of being able to construct the central atom with far fewer neutrons than normally required for the total number of protons in both the outer and inner atoms.

Through this method, it was stated, they are able to make absolutely pure light metals with higher tensile strength and less brittle than we ever could through any alloy making methods we have.

He also stated that their mother ships while in space manufacture oxygen and nitrogen atoms from particles gathered in space; are totally self-sufficient and never need to land.

3. One source told us of mother-ship building facilities on Saturn. He stated that there are virtually no trees on that planet, that civilization there is almost completely based on metallurgy. They can, for instance, make a tuba in a fraction of the time we require, with far superior workmanship. He stated that they have outdoor factories, over 50 miles long, to build mother ships 50 miles long. The factory is a deep open trench dug in the ground, surveyed accurately so that the curvature of Saturn is eliminated. He stated that the power plant for a mother ship was a number of power plants used in the scouts operating in parallel.

He stated that the most difficult part of laying out a factory was to establish one straight line over the 50-mile length, since it was a 3-dimensional problem fraught with optical aberrations. He also stated that they only had three such factories on the entire planet.

An interesting sidelight to this description of factories on Saturn is that there are many reports of a single sighting of a UFO of a "cigar shape" type off the coast at Los Angeles which calculations showed to be a minimum of 20 and a maximum of 50 miles long.

4. One communication was with a source who stated that he was in a galaxy 5.4 million light years from us. He stated that c was merely another boundary through which it is possible to pass.
5. One communication was with a source who stated that he was in "another galaxy which you call Andromeda". He stated that "c is Earth's coffin" inasmuch as when it becomes necessary to leave our planet we will not know how since we will not have conquered c. He emphasized the point that in communicating as we were we were proving that c could be conquered. (By our standards, not proof.)

He stated that the smallest particle in the universe is an infinitesimal which travels at near infinite speed.

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6. Many descriptions of many ships were given. One type, an umbrella-shaped affair with an indented center on top and a plane-surfaced bottom, was said to be 8, 12, and 16 ft diameter shapes.

Other ships were described as 35, 45, and 75 feet in diameter. The 75-foot ship was the smallest described which was said to be capable of interstellar travel. Ships not circular horizontally ranged from a few hundred yards long to 50 miles long.

There was only one ship encountered in all communications which was privately owned, and described as one mile long, and owned by a man who owns a space ship factory in a planetary system other than the solar system. The ship was his "private yacht".

7. Many varied and thorough descriptions of other civilizations, economics, governments, religions, educations, and social structures were received, even to various structures of organization in crime. These subjects alone could fill a book.

IX. Some Second Order Unexplained Communications

In many samples of communicating with unauthenticatable sources, it was apparent that it is possible to communicate with persons who have deceased. The length of time elapsed since death seems to have no bearing on the ability to communicate.

It appears possible for that portion of a person which survives after death to travel in time, for such as the case in many communications. Some vivid descriptions of past events were given through this means:

Perhaps the most significant cause for pursuing this aspect of communications was the strong indication of an entirely new concept in particle physics, if indeed we live in a particle-based universe. The closest approach this writer has seen toward a rational analysis is in Terletskii: "Paradoxes in the Theory of Relativity".

There are several approaches which could apply to a solution:

1. Infinitesimals (i's) traveling at near-infinite velocity;
2. Imaginary mass particles;
3. Negative mass particles.

The imaginary mass particle would seem to be the particle best suited to time travel.

For any particle, according to Terletskii (p.82)

$$P = \frac{E}{c^2} u$$

$$c^2 M^2 = \frac{E^2}{c^2} - p^2 = \frac{E^2}{c^2} - \frac{E^2 u^2}{c^4}$$

$$M^2 = \frac{E^2}{c^4} - \frac{E^2 u^2}{c^6}$$

where P = momentum

E = energy

M = proper mass, a 4-dimensional invariant representing a natural generalization of Newtonian mass

u = velocity

if $u > c$,

then $M^2 < 0$, meaning that proper mass is an imaginary quantity.

According to Terletsii (p.82), "we have come to the conclusion that it is physically admissible for particles to exist with an imaginary proper mass and move with velocities higher than the velocity of light."

Further, Terletsii says (p.106-7): "IS IT POSSIBLE TO DETECT PARTICLES WITH IMAGINARY MASSES?"

"We have already seen that particles of imaginary mass do not carry negentropy and therefore cannot be used as signals. Thus, it appears that they cannot be detected at all and that they are in this sense unobservable objects.

However, in talking about particles of negative mass, we have already seen that objects exist which cannot be detected by ordinary instruments, but which can be found with the help of measuring devices of a fundamentally new type. We should therefore examine the possibility of the existence of special instruments capable of detecting particles of imaginary mass.

Since the systematic detection of absorption or emission of particles of imaginary mass would lead to the violation of the second law of thermodynamics, we must reject the possibility of the construction of a device capable of detecting a particle of imaginary mass at a given point. This does not mean, of course, that we completely deny the possibility of detecting any effect due to a particle of imaginary mass at a given point, since there is no prohibition on the occurrence of fluctuations in which such particles can collect at one point, the second law of thermodynamics being violated locally, thus leading to the operation of an instrument of the usual type.

Although instruments detecting a particle of imaginary mass at a given point are forbidden, instruments detecting the emission of such a

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particle at one point and its absorption at another point as a single event are not. Thus, for example, if a particle of imaginary mass carries an electric charge, then the process of its emission by particle A and its absorption by particle B can be detected in nuclear emulsions from the track left by particle A before it emits the particle of imaginary mass and the track of particle B formed after the absorption of the particle of imaginary mass. In other words, it appears possible that we can register the process of charge exchange between charged and neutral particles involving a particle of imaginary mass (i.e., the process which is commonly considered as a process in which a virtual particle is exchanged).

Consequently, particles of imaginary mass can be experimentally detected in principle, although only with the help of special instruments or special experiments in which the processes of emission and absorption of such particles are detected simultaneously."

The point which became most significant to us who were training the teenage subjects was that their unique factual proficiency resulted from unquestioning practice in communicating with sources claiming to be multi-millions of light years away, with no discernible time delay involved.

X. Language

Communication with distant unauthenticatable sources, although always accomplished in English, almost without exception provided an interesting facet in language. All sources, of any distance and age, preferred and attempted to communicate using the Greek alphabet symbols, both capital and small letters. The symbols represent phrases which are "rephrasable" as applied within different contexts, and apparently represent a universal language, which is best termed as prehistoric Mayan. The vestiges of this language are apparent in Polynesian tongues, American Indian, Eskimo, Yakut (spoken by the Oriental Uighur tribe of Turkey), Greek, and in northern India tribal tongues.

CONCLUSIONS

1. The development of mind-to-mind communications as a means of study of the gravitational phenomena is practicable within social and business limitations only to a certain point; that point has been reached. Further development is possible, i.e., to a point of vocal real-time readout and near-100% factual reliability; however, it would require a real isolation from society and business associations, and a basic research philosophy; the persons involved also would require training of their families in order to maintain the gains realized during company training.
2. Were probability theory employed, it is this writer's estimation that it would show gravity fields to be 1) the most likely basis for mind-to-mind communications, and 2) the most likely means for satisfying the requirements of the ideal CNI System.

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3. Were a gravity-CNI System developed, it would automatically offer a gravitational field propulsion system as a byproduct.
4. This dissertation is at best a qualitative and conceptual speculation concerning the possibility of technologically leapfrogging into the optimum CNI System, rather than slowly evolving into it through years of modification engineering.

Actuality can be reached only through sound, quantitative research and development. The highest probability approach for successful transition from concept to sound engineering would be through applied mathematics with a concurrent experimental program.

5. This writer is of the opinion that a gravity-modulated CNI System is feasible in hardware, be it through infinitesimals or imaginary mass particles.



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Advanced Concepts

Terletskii, Yakov P., Paradoxes In The Theory Of Relativity, Plenum Press, New York, N.Y. 10011, Library of Congress Catalog Card Number 68-19185, 1968

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