315 "Summary of Methods to Detect Variations"

Chapel Hill, N.C. Feb. 10, 1980

In the foregoing sections of these notes, various methods have been described, more or less in detail, for the detection of the petrovoltaic effect. These methods have, in general, related to the effect as it is observed in dielectric materials, and it usually concerns the spontaneous generation of an emf.

A slightly different aspect of the same phenomenon appears as a change in resistance of conductors carrying a current. Hence, there are two basic manifestations — 1) a spontaneous emf and 2) a change in resistance.

It is believed that the two manifestations have a common origin and explanation; i.e. the accretion of dipole charge as a result of the absorption and conversion of an external radiant energy. Ref. Sec. 300.

Therefore, two basic methods appear to exist for the detection of "variations" —

1) the direct measurement of emf.
2) " measurement of conductivity.

In 1), a sensitive millivolt meter is used, with or without a resistive load on the specimen. In 2) a constant -

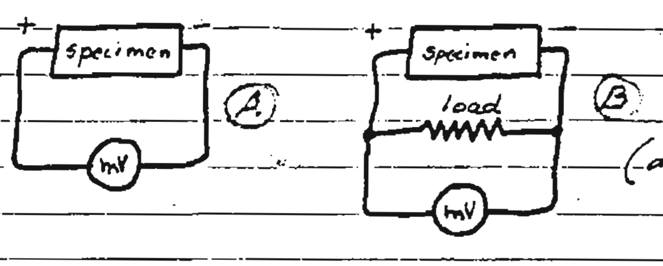
voltage source (battery) is used in connection with a sensitive nano-ammeter for measuring current.

In the latter case, the petrovoltaic effect appears as a counter-emf, thereby influencing the normal current flow from the battery. Hence, it would appear that conductivity varies inversely and resistivity varies directly with the petrovoltaic potential (PVP).

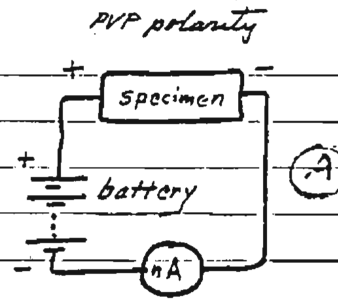
If so, there may be times when PVP is so great that the (above) current is reversed - causing a situation in the conductor where the resistance is said to be "negative". Ref. Sec 313.

There have been a number of instances in the recorded observations where this current (during glitches) has actually reversed from the normal (battery) current. In such instances, there appears to be no doubt that the PVP, during the peak of the glitch, actually exceeds the battery voltage.

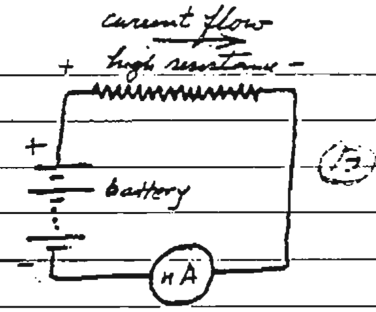
The two basic methods are as follows:



№ 1
(direct measurement of PVP)

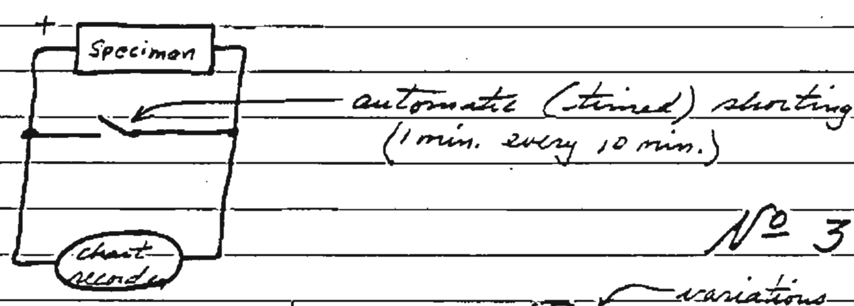


№ 2
(resistance



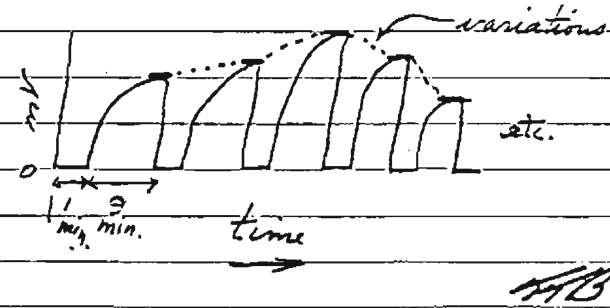
Then there is a third method, related to №1, which is the "accumulation" of charge by dielectric materials. It may also be referred to as "anomalous variations in dielectric absorption".

The method applies mainly to capacitors, although certain rocks having high PVP "recovery" may also be used. This method concerns the rate of "build-up" of self-potential following shorting. Variations in peak emf after a fixed interval following shorting is believed to be an accurate measure of energy intake. No battery need be used.



№ 3

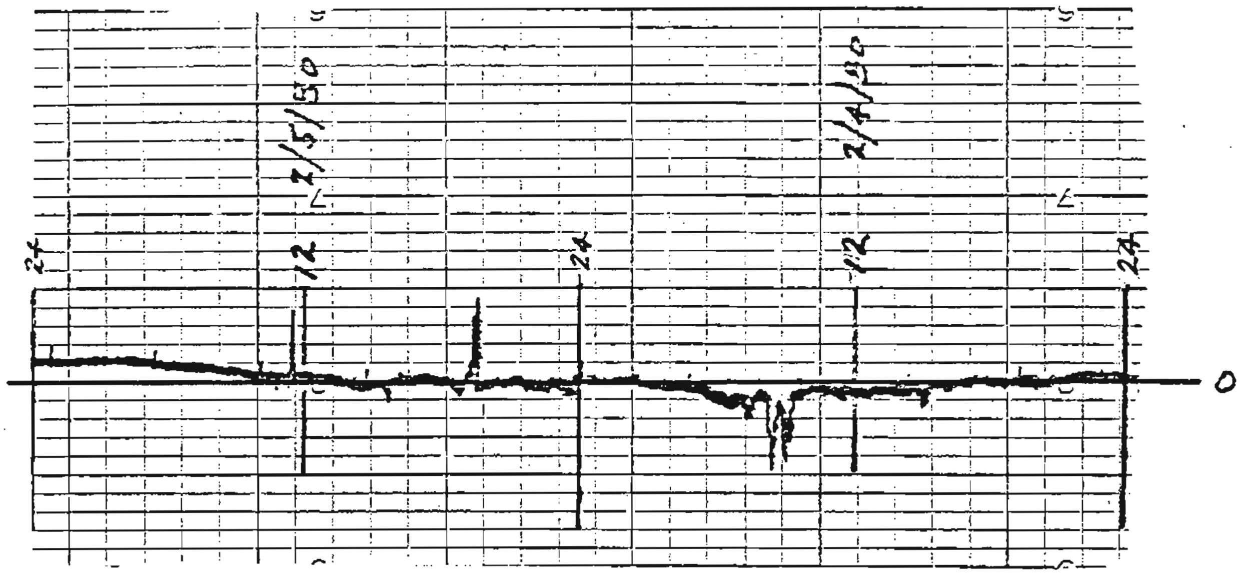
"PVP Recovery"

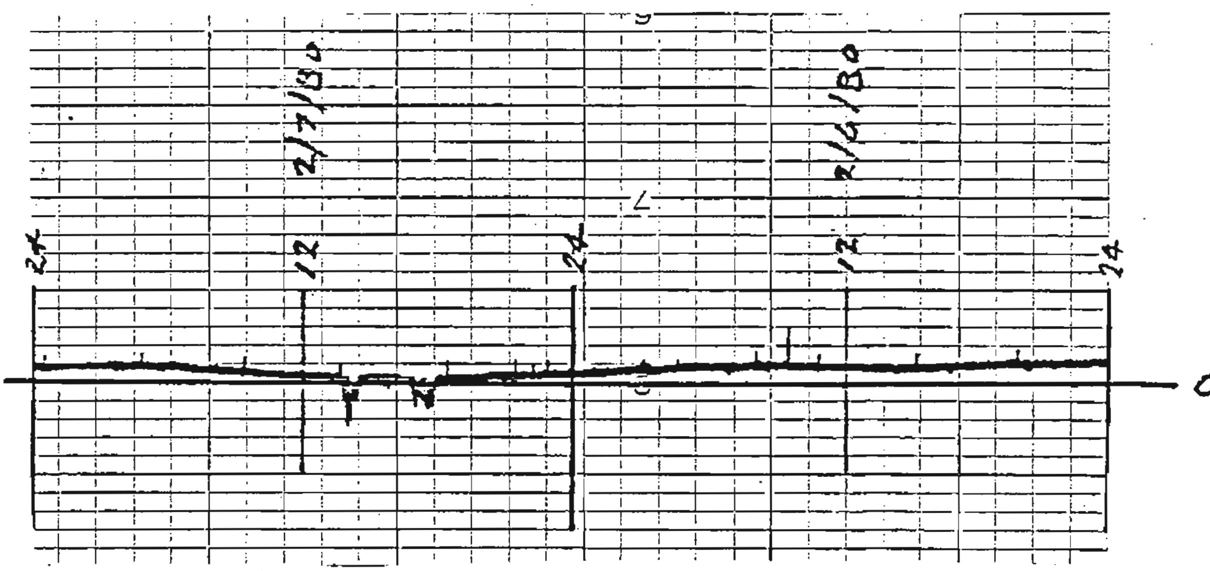


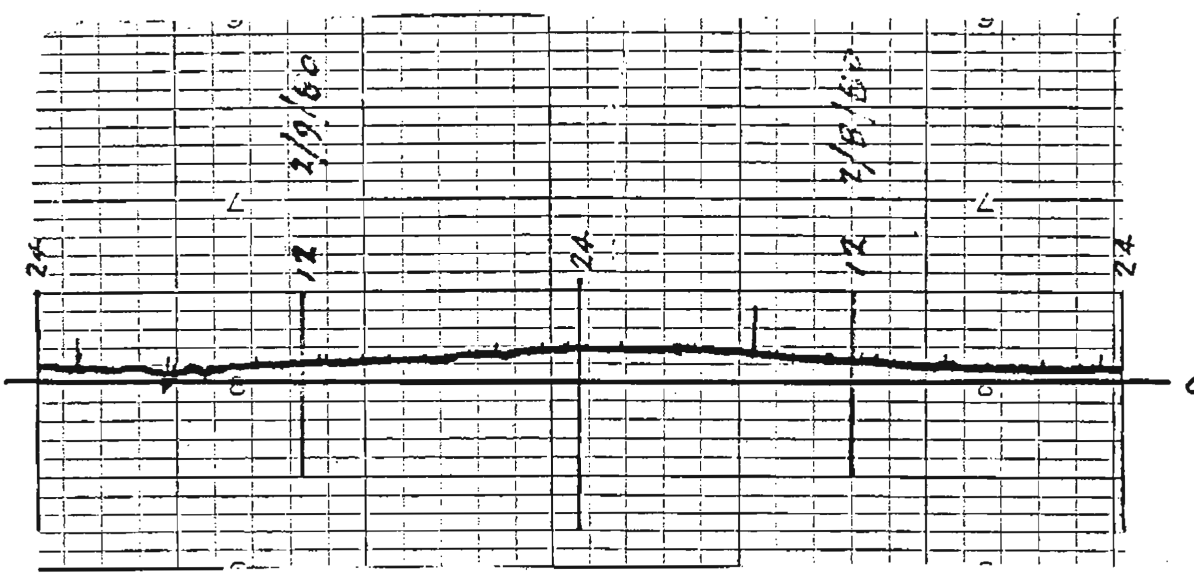
See P. 8 and 9.

HB
2/10/80

4

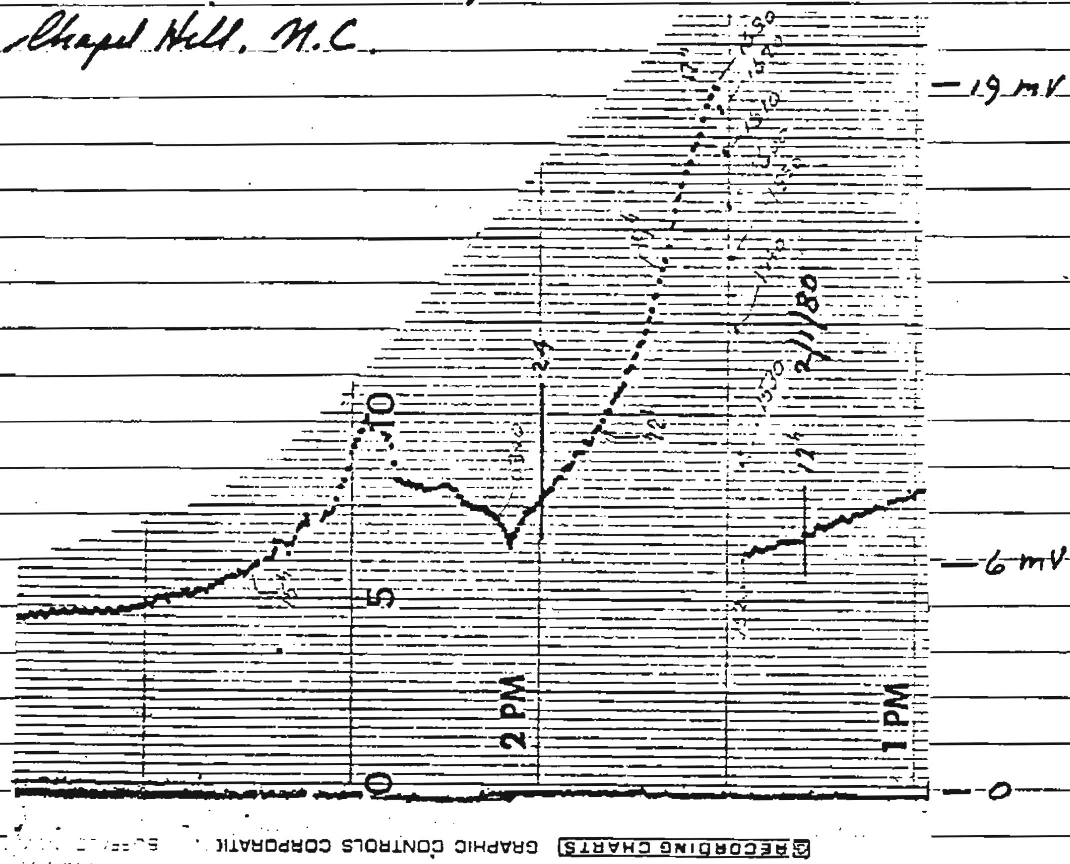

2/5/80
2/4/80
24
12
24
12
24
0


2/7/80
2/6/80
24
12
24
12
24
0

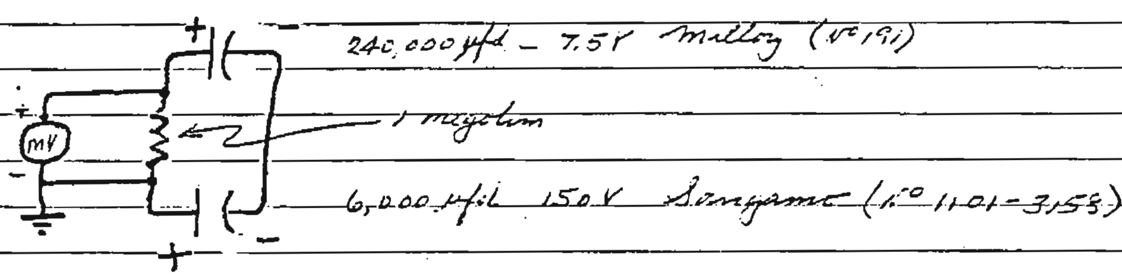

2/9/80
24
12
24
12
24
0

316 Glitch of Feb. 1, 1980

Chapel Hill, N.C.



This glitch was observed on an experimental circuit consisting of two capacitors. It represents a sudden surge in the current between them.



During the glitch – voltage rose from 6 to 19 mV – 315% in appr. 70 min., then decayed in 10 hr. followed by a small second glitch 66% – further decay.

317 The "Shorting & Recovery" Method

Chapel Hill Feb. 15, 1980

In Sec. 297, 298 and 300, the phenomenon of "charge accretion" was considered at some length. It was pointed out that an emf is spontaneously generated by dipoles and that, in some way not as yet understood, the increase in potential results from the conversion of some form of radiant energy from the ambient.

This increase in potential is observable, in the case of rocks or capacitors, immediately following shorting. See Sec. 315 (Page 3 of this notebook). If shorting is repeated at regular intervals and the recovery charted, variations are readily apparent.

The presently-accepted concept of dielectric absorption, where a residual charge is bled away, the recurring build-up should become less with each successive shorting, so that the absorbed charge would eventually decay to zero. That this does not appear to occur would indicate that charge-accretion somehow takes place.

What actually happens is that the build-up at certain times increases, so that the potential at those times is greater than before shorting. This build-ups can continue for hours or days.

When connected to a chart recorder, the pattern is seen to have circadian and (long-term) secular variations similar to the petrovoltaic (steady-state) readings.

In some respects, the "shorting and recovery" method (so-called S&R) has many advantages over the steady-state method.

1) It checks the zero each interval, thereby avoiding electrometer drift.

2) It offers a rebuttal to the belief that dielectric absorption alone is responsible.

3) The sensitivity and freedom of erratic fluctuations is readily apparent.

4) It integrates the potential (gain) over a long period of time.

5) Such totalizing helps in estimating the energy of glitches.

6) It points up the fact that an external source of energy is at work.

The S&R method can be used with rocks, capacitors and discharged batteries (all so-called "capacitive means"). It is not useful with wires or other purely resistive sensors where current variations are observed using a battery.

T. Townsend Brown
2/15/80

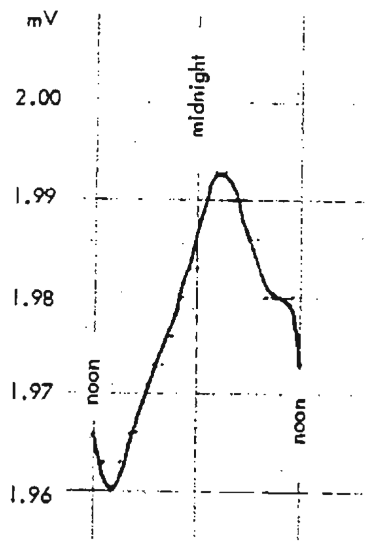
Experiment SR-10

EXPERIMENT SR-10

Hourly readings

hr.	2/13	2/14	2/15	2/16
12	202	193	195	
13	201	193	195	
14	200	193	195	
15	200	194	195	
16	200	194	196	
17	199	194	197	
18	199	195	197	
19	199	195	198	
20	198	195	199	
21	198	196	199	
22	198	197	199	
23	198	197	200	
24	197	197	201	
	1	197	198	202
	2	197	198	203
	3	196	198	204
	4	196	197	204
	5	196	197	204
	6	195	197	204
	7	195	197	204
	8	194	196	204
	9	194	196	204
	10	194	196	204
	11	194	196	204
	12	193	195	204

3-DAY MEANS



RESULTS:

No theoretically-expected decay is observed. Rather, a gradual increase is noted – together with a diurnal cycle with a maximum shortly after midnight and a minimum shortly after noon. No "glitches" observed during this period.

Project XERXES
UNC, Chapel Hill, N.C.
Feb. 26, 1980.

318 "Possibilities of Increasing Energy Output"

Chapel Hill, N.C. Feb. 24, 1980

The petrovoltaic effect, to date, has produced only a minuscule amount of energy. It is probably true that we do not, as yet, know the nature of the energy nor do we know the source.

If, as some believe, it is resident entirely within the dielectric (as - for example dielectric absorption) then a gradual decay would necessarily take place. There has even been a suggestion that the diurnals and glitches are solely internal but are "triggered" somehow by an outside influence. Such explanations appear untenable in the light of all the evidence to the contrary: i.e. that both the energy source and the modulated effects (diurnals and glitches) are external — even extraterrestrial.

The evidence of penetrability (mineshafts) points to the mechanism of an incident radiation. The characteristics of the variations point to a modulation of that radiation before it reaches the "sensor". The "proximity effect" by other masses, and, more particularly, the perithermal effect — where the temperature of ambient masses is sensed — is striking proof. See Sec 199 Notebook No 4.

Such ambient effects appear to indicate that neighboring masses must radiate (possibly re-radiate) the same kind of energy that the sensor (itself) detects.

If (let us say) the incoming energy is in the form of UHF gravitic radiation (perhaps optical frequency or thereabout), all masses intercepting it would convert it, in part, to electricity (petrovoltaic) and the remainder might be re-radiated as UHF gravitic radiation even at a different frequency. Such action might be termed "gravitic albedo" or "gravitic fluorescence". Let us call this re-radiation "gravitic secondary radiation". Or, if we want to be conservative and not say it is "gravitic", then let's call it just "secondary radiation".

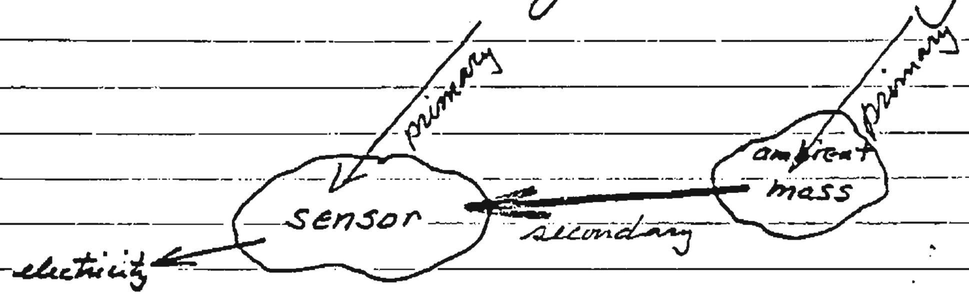


Fig. 1.

This hypothesis was discussed in Sec. 183 (1975) of Notebook N° 4. and in other sections later.

EFFECTS OF TEMPERATURE:

Temperature effects have long been noted. So important are they that continuous runs for observing diurnals and glitches must always be done at rigorously constant temperature.

The way in which temperature affects a sensor is complex and certainly not understood at this time.

Somehow, it appears to "valve" the incident radiation — perhaps, as in nucleonics — the cross-section changes. In any event, the self-potential output of any sensor is a function of its temperature. Higher the temperature — the higher the output — but this sometimes is transient and a decay occurs.

However, when a large ambient mass is involved — an increase in temperature is believed to produce an increase in the secondary radiation, thus producing the perithermal effect. But again, the increase is transient and may decay.

Sudden changes in ambient temperature (rate-of-change) may affect petrovoltaic output. This may be rapid enough to cause a "glitch". Hence, these strange sudden bursts may not, in every case, be extraterrestrial or of cosmological origin. They could be atmospheric and "perithermal". The same may be said of certain diurnal variations — caused by rapid heating or cooling of the upper air. The fact that the diurnals are (in the main) related to the solar day, this would seem to be a logical explanation.

Now, to summarize. The perithermal action depends (as the name implies) upon the temperature or temperature changes in the ambient medium (usually air). Solar diurnal variations may, in fact, be manifestations of the perithermal effect. It could occur entirely in the upper air. The same may cause "glitches" if the change of temperature is extremely rapid.

As to the effect of temperature upon the sensor itself, very little is known at the present time. In general, it has been observed that the self-potential rises with the temperature, but then, in certain instances drops back.

Let us assume, now, a type of dielectric (if such can be found) where the electric output varies directly with temperature. Is there, in such a case, a Curie Point beyond which the electric output drops to zero? If not, how much farther (and higher) will it go?

In other words, can a dielectric be found which will produce a substantial (commercially useful) amount of wattage when operated red hot? Could such a dielectric be a porcelain or a fused leaded glass or any number of ceramics, ~~barium titanate~~ or highly refractory materials. At high temperatures, many materials of this type are conductors of electricity and if, at the same time, they produce a high self-potential, then obviously, they could be electric power sources.

If so, there would be a certain analogy to nuclear energy — particularly fusion — where the temperature has to be high enough to maintain action.

There is an analogy even with wood, coal or oil where the temperature must be raised to "ignition" before energy is released and action sustained.

Research in this direction is needed. All that research (so far) in petrovoltaics has accomplished is to provide evidence that a self-potential is present. All these tests have been conducted (approx.) at room temperature. All have been limited to observing millivolts and microamperes — nothing of substantial commercial value.

Nevertheless, even such a small showing must be acknowledged as a new source of energy and should qualify for funding under that category. But the main slant of the research, from this point on, must be toward investigating the possibilities of power production.

All of this still does not explain where petrovoltaic energy comes from, what it is and if the source (wherever it is) is powerful enough to supply the energy we hope to obtain. MB
2/24/80

321 "Capacitor Depolarization"

Chapel Hill, N.C. Mar. 4, 1980

The accepted definition of a capacitor is "a device for storing electrical charge". It is not recognized that a capacitor may be a source of electrical charge, generally speaking.

There are some notable exceptions to the above generalization — and that is where the dielectric material is:

1) electrochemical — where energy is derived from chemical action.

2) piezoelectric — where energy is derived (momentarily) from kinetic action.

3) pyroelectric — where energy is converted from thermal action.

4) photoelectric — where light reaches the dielectric. Not possible where the capacitor (dielectric) is in a can.

5) radiation — electromagnetic

(a) where electromagnetic radiation (any frequency) reaches the dielectric. Where the capacitor dielectric is in a can, attenuation takes place.

(b) penetrating radiation — x-rays, gamma, etc. where incoming energy can penetrate the can.

6) corpuscular — high-energy particles, cosmic radiation, nuclear emissions, which readily penetrate the can.

7) gravitational radiation — possible gravito-electric effects on the dielectric, which readily penetrate the can and other shields.

To the best of my knowledge, these are the only known ways in which energy can reach the dielectric material so as to increase the charge of a capacitor.

With all of these possibilities, it would appear virtually impossible to completely discharge (depolarize) any capacitor. As has been noted in many cases, capacitors which have been shorted (sometimes for many years) always stage a come-back when the short is removed. This is usually referred to as vestigial or residual charge stored in the dielectric from some former charge — so-called dielectric absorption.

Just how valid this interpretation is remains to be seen. Certainly, it does not take into account the possibilities of incoming energy as in 5, 6 & 7 (above).

If certain capacitors are effective receptors and energy-converters of incident radiation, they are no longer (strictly) storage devices, and the definition of capacitor (ordinarily accepted) no longer holds.

This appears to open up a whole new field of utility for capacitors, not as storage devices but as sensors of some (possibly many) outside factors. It is entirely possible that these outside factors may not be limited to the immediate environment but may even be extra-terrestrial or cosmological in origin.

So it follows that capacitors may act as receptors and sensors of a wide variety of external factors — many of which may not be observable by any other physical means.

For example,

1) External temperature variations (so-called "penthermal" effect)

2) Penetrating radiation — perhaps certain nuclear eminations not detectable by ionization, but, more certainly, the possible UHF gravitational radiation — (even optical frequency).

All forms of capacitors are included. Some are more effective than others. Even rocks are included — for rocks are shown to be effective capacitors. The petrovoltaic effect is essentially a (capacitor) self-potential function. Certain electrochemical cells (batteries) are likewise included — apparently generating a self-potential quite apart from their chemical action.

With all of these possibilities, it becomes important to chose the type of capacitor, useful as a sensor, and as free as possible from the chemical, thermal and mechanical (distortive) interference. In general, this would appear to exclude the following types:

1) Electrolytic — chemical (contact-potential)
2) Ceramic — piezo and pyro electric.
3) All capacitors not enclosed in a light-tight can which can be grounded.

This leaves the polycarbonate types, most oil-filled (chemically-inert) paper types and (of course) vacuum capacitors.

Where it can be definitely determined that no chemical action is inherent in the oil-filled (Pyranol) types, and the can (as is usually the case) is hermetically sealed, not subject to external pressure, the Pyranol capacitor (or equivalent) is acceptable.

Even better, it would seem, are the chemically-inert film types such as polyester, polypropylene and polycarbonate. These are usually rated as having very low dielectric absorption and DC resistive loss. Vacuum capacitors would, of course, be ideal but their capacitance, in usual commercially-available sizes, is so low as to make their use as sensors almost too dependent upon noise-free amplifiers. Nevertheless, their use should be further investigated.

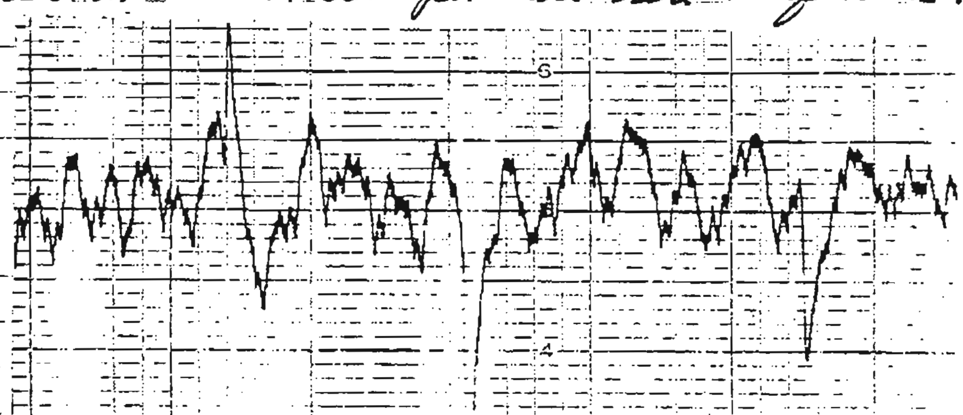
In summary, therefore, polycarbonate capacitors would seem to make the best (available) sensors. Their stability with temperature, freedom from vibration (and pressure) effects, chemical activity and other disturbing external influence would seem to make them ideal.

Polycarbonate capacitors are housed in metal cans which can be grounded. They can be readily connected in series or in parallel.

It is proposed to run some tests using the "short & recovery" (S & R) method P. 3, 8 & 9, at constant temperature, also some continuous runs with applied resistive load.

March 11, 1980

Tests with a 10 μfd 100V polystyrene capacitor have been disappointing. Even at constant temperature (±.1°C), noise (Johnson or Nyquist) is so great that stable measurements seem impossible at room temperature (see chart below). Tests at lower temperature are required.



323 "Possible New Source of Energy"

Anomalous Behavior in Dielectric Absorption with Possible Identification of a New Source of Energy

T. Townsend Brown

ABSTRACT

Critical examination of dielectric absorption in both solid and liquid dielectrics has revealed certain phenomena not (as yet) adequately explained. Effects are noted which appear to indicate energy in excess of that originally applied.

Experiments are described * in which the self-potential of various dielectric materials, including granitic and basaltic rocks, are examined over extended periods of time. In many instances, it is noted that the anticipated decay (according to accepted theory) does not occur, but, instead, long-term increases take place indicating an accretion of charge.

The action appears to be similar to the charge accretion in dielectrics resulting from charged-particle bombardment or by gamma irradiation via secondary Compton electrons. It is phenomenal in that, in many cases, diurnal variations are observed with occasional "bursts" up to 300% of normal. Such variations may be of solar origin or (possibly) even of cosmological origin - modulated by the Earth's rotation.

Where no charged-particle bombardment and no (observable) gamma radiation is present, the source of energy remains an enigma. Since the tests are performed at constant temperature and, in most cases, within heavily shielded (grounded) containers, the observed variations (and bursts) cannot be attributed to thermal, electrical or kinetic factors or similar environmental effects. Especial care has been taken to eliminate possible feedback effects from the amplifier/recorder system. It has been satisfactorily determined that instrumental artifacts do not contribute.

Tests performed in the mineshaft (UC Berkeley) and in the 90-ton radiation shield (NASA Sunnyvale, Ca.) appear to indicate that the radiation (whatever it is) is extremely penetrating.

In view of the evidence obtained so far, there is a distinct possibility that a new form of penetrating radiation is at work. It is suggested that the energy of this radiation may be converted via charge-separation into the observed (sustained) self-potential. The action may be markedly analogous to the photoelectric effect.

* Project XERXES
UNC, Chapel Hill, N.C.
March 14, 1980

324 Negative Resistance (continued)

Chapel Hill, N.C. Apr. 4, 1980

In the measurement of sensor conductivity, where a constant battery emf is supplied, an interesting result is obtained.

Immediately following a shorted condition, when the circuit contains a battery, current flows from the battery into the sensor charging the sensor. This current quickly decays as the sensor gains a charge, and reaches zero when the sensor emf equals that of the battery.

In other words, the resistance of the sensor, when a charging voltage is applied, is minimum at the start and then increases to infinity as the battery emf is reached. Immediately thereafter, the current reverses with the sensor emf exceeding the battery emf, and (it may be said) that the sensor counter-emf is productive of a negative resistance.

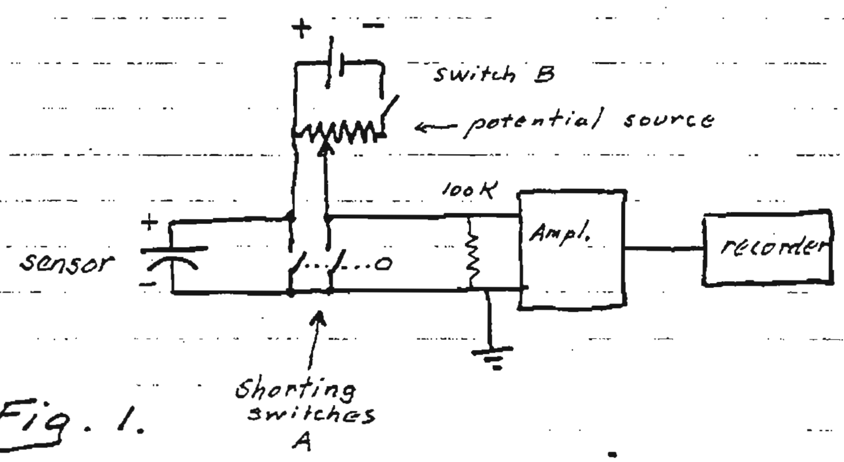


Fig. 1.

Steps of operation:

Switch B energizes the battery voltage (thru divider) so that the charging potential is (always) less than the open-circuit emf of the sensor.

With the shorting switches (A) closed, both the sensor and the recorder system are shorted. Voltage divider is also shorted.

Upon opening A, maximum current flows from the battery (divider) to the sensor. This produces a peak in the recorded current. But then, the sensor becomes charged and the current drops rapidly to zero.

At this point, the sensor emf begins to dominate over the battery, and the current reverses. In time, the increase in current slows as the sensor emf reaches its metastable level.

The above may be cycled by an accurate timer on A. (9 min. open, 1 min. closed). Or, if not cycled, the current will reach higher (variable) levels (from the sensor).

The experiment is of value in that it shows the effect of periodic charging of the sensor — thereby minimizing the effects of dielectric absorption (vestigial charges).

The following curves are of interest.

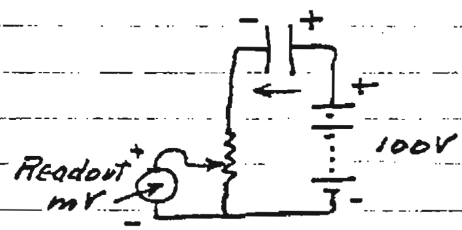
T. Townsend Brown
4/4/80

325 "Negative Resistivity in Sensor RC-5"

Avalon, Ca. June 5, 1980

Probably the most significant development in this entire research effort is indicated in the behavior of Sensor RC5.

This sensor is a portable type — using a "Pyranol" (oil-filled) capacitor and a 100V battery — measuring current thru the oil.



The normal resistance of the capacitor (oil) establishes a current as shown by the red arrow. This gives a positive (millivolt) reading across the (adjustable) resistor.

Setting the resistor to read 100 mV at 75°F, all readings thereafter were made at this setting.

It was found that temperature affected the sensor linearly in the region between 60° & 80° F. (See curve on next page). All readings (normally) are positive, indicating the expected current flow thru the oil.

However, another unexplained effect makes the situation more complicated.

On May 26, 1980, Mr. Robert Dadd and I made a trip (in his car) from San Francisco to Livermore, Ca and return. We took sensor RC5 and made numerous observations enroute. The sensor was kept wrapped in a heavy wool blanket to prevent sudden temperature fluctuations

Upon leaving the San Francisco area, the reading was a (normal) +50 mV. This increased slightly as we went thru Oakland. But upon crossing the hills toward Livermore the reading (rather suddenly) became negative, and reached -210 mV thruout the entire side east of the hills. Upon returning to Oakland, the negative reading diminished and again reached positive in S.F.

This observation poses a real problem. "Did the current actually reverse, or did the negative (-) indication appear thru some instrumental defect?"

Assuming that the reading was valid, there appears to be no other explanation than that the voltage (output) of the capacitor exceeded that of the battery (100V), and that the capacitor was providing a counter emf to the circuit, - hence negative resistance.

It was obvious that this was not temp. induced. Increase in temp. always has caused an increase in (+) reading, never a decrease to zero or to (-). And it was noted that temperature increased slightly during the trip.

Hence, it seems clear that something else caused the increase in the capacitor emf. Could this have been related to the terrain (or other environmental factor) near Livermore. It is known that various nuclear studies are in progress at the Lawrence-Livermore Laboratories and that some reactors are in operation. It is not understood, however, how such activities could affect sensor RC5.

This observation, however, does point up the need to continue field tests and surveys of this type.

When sensors of this type are equipped with constant-temperature shields, field tests will be more meaningful.

It is proposed that careful field surveys be made, and contour charts prepared, where areas of maximum "negativity" can be delineated. Would such information be valuable in geophysics?

Several possibilities come to mind:

(a) Subsurface hot spots - geothermal reservoirs. (perithermal effects).

(b) Sources of certain radiations.

(c) Detection of oil-pools.

(d) Mineral prospecting.

T.T.B. 6/5/80

327 "Pulse-driven Energy Accumulator"

Coronado, Ca. Aug. 20, 1980

If it turns out that the foregoing type of sensor is operative (and the induced polarization causes a counter-emf), it would appear to follow that the counter-emf may derive its energy from the ambient flux (incident radiation or whatever).

Hence, it would appear that, once polarized, the resultant emf would continue for a period of time — decaying eventually to zero due to resistive loss within the conductor. In other words, once current is established within a conductor and gradient polarization takes place, a potential difference appears between the ends of the conductor after the battery has been disconnected. It is as if the long wire were acting as a capacitor.

If, for example, a short "polarizing" pulse is applied to a long wire, the wire will charge-up like a capacitor, and that charge will then decay due to resistive loss. If, during this period, polarization "accretion" takes place, more energy will be dissipated than received from the initial charging pulse.

If such charging and discharging were repeated (multiple pulsing) the question is "would the energy accumulate?"

If so, one might anticipate a situation in which rapid microsecond pulsing (from a HV DC source, would cause a continuous DC output from the ends of the long conductor, the energy of which may exceed the total pulse energy.

Such a possibility was foreseen (See Sec 212, Notebook No 4) in 1975 in regard to rocks. It would apply equally to capacitors.

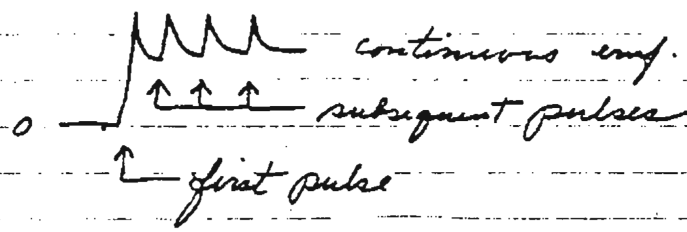


Fig. 1

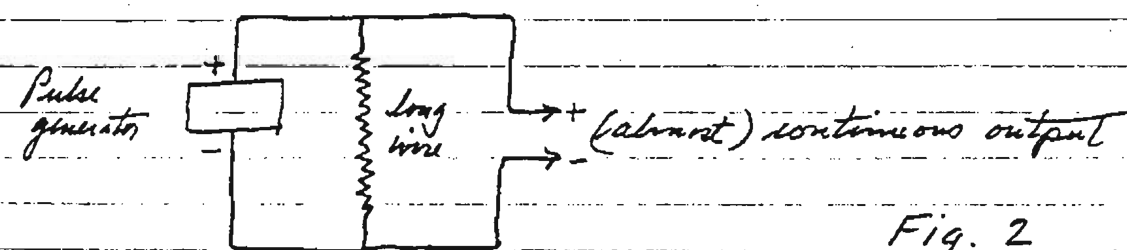


Fig. 2

In this test, the long wire would act as a capacitor — and perhaps more than that — act to accumulate energy in excess of that supplied by the pulse generator!

Further tests are needed.

T.T. Brown
8/20/80

328 "An Apparent Departure from Ohm's Law"

Coronado, Ca. Aug 22, 1980

If the concept developed in the previous sections is correct, and critical experiments confirm such a concept, we are in trouble with Ohm's law. At least, an exception under certain conditions, may have to be considered.

In measuring the resistance of a long wire (for example), an emf is supplied (usually from a battery). Current is measured and this current is (by Ohm's law) always directly proportional to the applied voltage.

If the resistance is constant $(R = \frac{V}{I})$.

One would expect then, in performing a critical test with a long wire, that if the applied voltage is increased, the observed current would increase proportionately. That this may not be the case, is the essence of the concept of "induced polarization." A departure from proportionality would, in effect, appear to confirm such a concept.

It is proposed that resistance measurements of various metals (wires) be performed using voltages (starting at zero) to the highest values which do not produce observable heating.

T. T. Brown
8/22/80

330 "Effects of Temperature upon Resistive Sensors"

Coronado, Ca. Aug. 31, 1980

In the foregoing section, the effects of temperature upon the sensor output was discussed. It was indicated that wire-resistivity was the factor involved and that the material of the wire (having minimum temp. coefficient) would provide compensation.

This may not be strictly true if the counter emf is (in some way) temperature related. In other words, if the temperature of the wire affects the energy transfer / absorption from the incident radiation, the counter emf developed may be directly related to temperature. The action may involve the absorption cross-section.

Hence, it would appear desirable, in every case, to operate the sensor at constant temperature. A constant-temp. blanket should be provided to every portable geophysical sensor, at least until this matter can be more intensively studied.

Another factor to be studied concerns the area (dimensions) of the wire. It is possible that a larger (higher wattage) resistor, encompassing a larger area could increase the capture cross-section, hence converting more of the incident radiation.

- T. T. Brown 8/31/80

331 "Counter emf (subtractive) versus additive"

Coronado, Ca — Sept. 6, 1980

In the foregoing sections, it speaks of an emf generated by a dipole, the polarization of which has been increased due to the accretion of (radiant) energy from an external source.

It has appeared that this increase always results from an <u>increase</u> in the <u>existing</u> polarization. And it has been assumed that current in a conductor always polarizes the constituent molecules in the direction of the current. Hence, such an increase, it would seem, would always produce a counter emf which would oppose the current flow and increase the apparent resistivity.

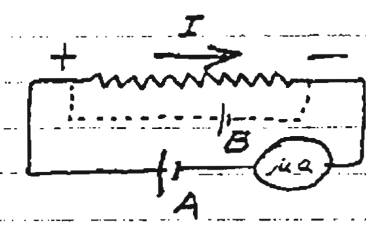


Fig. 1.

In other words, without B, the (normal) resistance would be determined by the emf of A. As B is increased, current in the circuit (as measured) would decrease. This current would reach zero (null) when B = A, and, at this point, the resistor would appear to have infinite resistance. B would be said to supply a counter-emf.

However, there is a paradox here. In certain oil-filled (capacitor) sensors as RC-5, this does not seem to be true, and the opposite takes place.

Assuming that the output of a simple sensor, such as the 2200 μfd electrolytic (Mallory), is directly indicative of the incoming radiation, it is observed that the current in RC-5 is virtually proportional. Hence, if the two types of sensors are responding to a common parameter (causative factor), the effects are opposite.

The reversal seems to be resident in the RC-5. Assuming the polarization in the oil (dielectric) is established by the current from the 100 V battery, any counter emf would tend to reduce the current. But this does not seem to be borne out. The observed current is in phase with the output of the Mallory. (See charts of July-Sept. 1980).

This apparent paradox may be resolved (possibly) by the fact that the battery voltage in RC-5 is so high (approx. 100 V). If that voltage were 1V or below, the results may be different. The basic reasons for this anomaly are difficult to understand and must be more thoroughly studied.

T T Brown
9/6/80

332 "Possible Explanations for Additive Emf"

Coronado, Ca Sept. 6, 1980

In an effort to explain the foregoing difficulties, the following thoughts are hereby recorded:

1) That there are two phenomena at work here.

a) In one case, we are observing the direct conversion of incident (radiant) energy into electrical potential. This, in turn, produces an apparent counter-emf and an increase in apparent resistance.

b) In the other case, where there is substantial current flow from a 100 V battery, the incident (radiant) energy (somehow) produces a proportionate increase in conductivity, with attendant decrease in resistance.

2) In developing (b), one is reminded that many penetrating radiations, cosmic rays, etc., increase conductivity, usually through ionizing interactions.

Altho it is believed the incident radiation (in this case) is non-ionizing, there may be other reasons that it may increase conductivity.

3) The possible existence of the two distinct actions (as set forth above) could give rise to another method for detecting this radiation.

a) The measurement of current when high voltages (possibly also currents) are used. The results could be in direct conflict with Ohm's Law.

b) Such a sensor would provide direct correlation with the intensity of the incoming radiation.

c) This indicates that there would exist a voltage (probably about 1V) where there might exist a balance, that is, neither an increase or decrease of current with a varying incoming radiation.

See Notebook № 2

4) In the investigations of Fernando Sanford (Phy Rev. Vol. 1 & 2 - 1893) the precision measurements of the resistance of a copper wire, Sanford reported temporal variations which he could not explain.

In his reports, it was not recorded what battery potential he was using in his measurements of resistance. It is presumed that it was in excess of 1V and, therefore, the variations he observed were probably directly proportional (or at least directly related) to the incident radiation of which he was not aware. A repeat of the Sanford tests is of great importance at this time. Such tests should cover both high voltages and high currents — although it is believed that voltage, rather than current, is the significant factor.

If it is found that, in the measurement of resistance, that higher voltages (applied) produce departures from Ohm's law, the finding should be of great significance. This possibility was recognized and discussed in a proposed article for "Letters to the Editor" Physical Review by TTB as early as 1930. This submission, however, was rejected. (See next two pages).

Reasons for the departure from Ohm's law when higher voltages are used in the measurement of resistance are certainly not clear. The correlation with a possible penetrating and unrecognized (cosmic) radiation may provide a clue. This, in brief, is the purpose of Project XERXES, altho other manifestations are of equal interest and importance.

Of the three basic factors in electrical technology — resistance, capacitance and inductance — resistance is probably the most basic. It is surprising that a phenomenon such as that set forth in Project XERXES has not been recognized long ago.

T T Brown
9/6/80

335 "Possible Effect of Ambient Matter"

Coronado, Ca. Sept. 21, 1980

In Sec. 318, 183 (notebook No 4) and in several other sections, reference has been made to the possible effects of ambient material on the readings of all types of sensors.

Such ambient material would be other dielectric materials of high K or mass (density), rocks, air or water. It seems possible that the temperature of the ambient material may also have a effect, i.e. the perithermal effect. (See prev. sections).

In any effect of this nature, it is necessary to run tests with adequate controls, that is, similar sensors with and without surrounding material.

It would appear that Sensor 2200 might be useful in some preliminary studies of this nature, by encasing the sensor in large blocks of various materials.

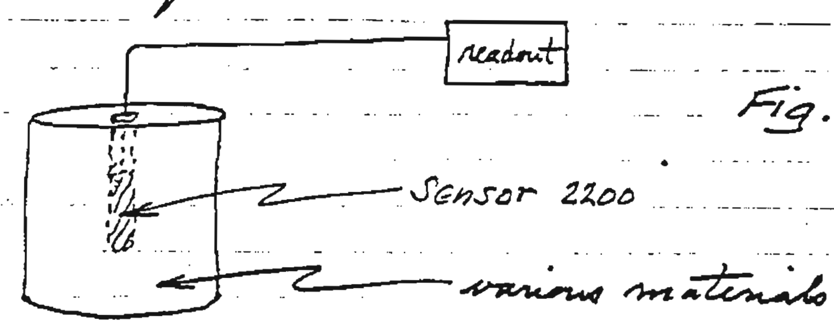


Fig. 1.

A hole would be drilled in the material and tests made with the sensor inside & outside the hole. Uniform temperature must be maintained

Various materials could be tested in this way, - including

1. Granitic and basaltic rocks.
2. Various other natural rock-like substances.
3. High K materials such as $BaTiO_3$
4. Various metals, including alloys.
5. " liquids - both elements & compounds.
6. " gases - various pressures.

Effects of temperature should also be noted.

In most cases, increase in temperature results in an increase in emf output, but sometimes this is only temporary and an inverse effect may be noted.

In a more advanced experiment where the temperature of the sensor itself can be held constant, observations should be made of the effect of changing the temperature of the ambient medium. Here we may get to the root of the "peri-thermal" effect which has long been noted.

Also, the variations (anomalies) picked up in moving the sensors from one geological location to another obviously are dependent on the effect of ambient (even sub-surface) materials or features, such as appear to be detected by the petrovoltaic geophysical prospecting instruments as discussed in Sec. 329.

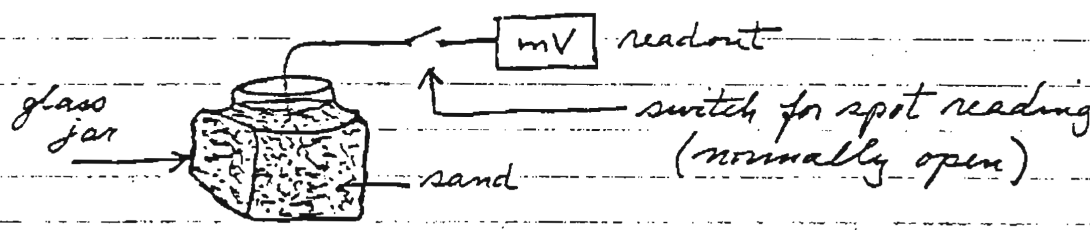
T. T. Brown
Sept. 21, 1980.

336. "Sand as Ambient Matter"

Coronado, Ca. Sept. 25, 1980

Pursuant to the suggestions set forth on P57, sensor 2200 was immersed in sand obtained from the beach at Coronado.

The sand was allowed to remain at room temperature for several hours to stabilize at the same temperature as the sensor. It was then poured into a glass jar containing the sensor (in the center).



Soon thereafter, it was noted that the sensor increased its output from 227 to 234 mV, an increase of 7 mV. to what appeared to be a new metastable level. (Sept 18-19). It was also noted that the diurnal variation shifted phase, reaching a later peak and with a long period of no change between midnight and noon.

Since temperature change was ruled out, it appeared obvious that the mere presence of the sand around the sensor was causing the effect. This kind of test must be repeated not only with sand but with other powdered or granulated materials.

T. T. Brown
9/25/80

337 "Water as Ambient Matter"

Avalon, Ca. Oct. 13, 1980

Several tests have been conducted with Sensor 2200 immersed in water. The results have been consistently spectacular. In every case, an increase in voltage output has been noted. The test conducted Oct 12 showed an increase of 22 mV (from 232 to 254) within 12 hrs following immersion.

It is noted that the increase is not immediate, but takes time ranging to several hours. The rate is rapid at the start and then slows to a (metastable) level. It is as if the input (energy) flux increases immediately upon immersion but the elec. capacitance of the sensor "slows" the voltage rise, introducing a kind of inertia.

This is truly a very interesting and perhaps significant discovery. The phenomenon is far from being understood. Just what is involved is certainly not readily explained. The ambient medium has no known physical effect upon the dielectric material within the sensor. Excluding, of course, the effects of temperature, it appears to me that a penetrating flux of some kind is at work. If so, the presence of the ambient medium serves to modulate that flux.

It seems reasonable to believe that the modulation can be achieved in one of two ways — 1) reradiation (fluorescence) from a primary or 2) a shift in flux level of the region.

In (1), the reradiation would presumably take the form of a frequency-dependent radiation such as electromagnetic or ultra high-frequency gravitic, rather than particulate, altho shower-type secondaries are a possibility.

In (2), a field-type phenomenon may be involved, where the mere presence of additional matter affects the entire field. Here, a modification of an "ether" concept may be involved.

To choose between the two would be difficult at this time. Much would depend upon the results obtained with ambient matter of different kinds. Tests should be conducted with material of different mass (density) or dielectric constant.

One highly-speculative aspect of these findings is that of an "ether flux". This possibility was discussed in Sec. 189 and 191, Notebook No 4. If ether flux is involved, some of the diurnal characteristics may be explained as being caused by the motion (and rotation) of the Earth.

Immersion of the sensors in water would appear to be an important investigative step. Not only is complete immersion of interest but proximity to large bodies of water (ocean) is important. Tests in deep water wells are suggested — as a function of depth. One is reminded that water has a (listed) K of 81, much higher than that of most terrestrial materials, rocks, sand, etc.

T. T. Brown
10/13/80

338 "The Ambience Effect"

Avalon, Ca. Oct. 14, 1980

Probably the most puzzling facet of the entire petrovoltaic phenomenon is the effect of ambient matter, the so-called "Ambient Effect".

It was first observed at the Haleakala Observatory in 1974-75. A sensor was attached to a steel column and voltage variations (diurnals) virtually disappeared. Removed from the column, diurnals reappeared. The effect of the adjacent (steel) mass seemed obvious.

This effect was again observed in the 90-ton radiation shield at NASA, where (actually) the intensity increased but the diurnals became indistinct. In steel and concrete buildings (as Phillips Hall at UNC), the same levelling occurred, and was only relieved when the recorders were moved to the wood-frame building on Linden Road. Also, in the mineshaft at Berkeley, surrounded by rock, the same effect seemed to be present.

The "mechanism" of the effect is not readily apparent. Some connective link must exist. Other than temperature, no common parameter is, as yet, identified.

When one realizes that both rocks and capacitors show the "ambience effect", and it seems quite possible the resistance sensors (Sec. 326) will also be found to show the effect, it is reasonable to assume that it is basic and probably very important.

Of all the phenomena included in Project Xorpeo, the Ambience Effect is probably the most significant — one which has the greatest practical value. It is the operative element in geophysical sensors. See Sec. 329.

In reviewing existing theory, no adequate explanation is at hand. Capacitors are supposed to have no perikinetic connection with their environment. The capacitance of free space is believed to be constant. No other factor in the immediate environment of a capacitor is believed to affect its capacitance.

Perhaps the nearest approach lies in the thinking of Prof. Sanford in his attempts to link the resistance of a copper wire with the medium (dielectric) in which the wire is immersed. (Phys. Rev. Vol. 1&2, 1893).

My feeling is that Sanford was on the same track and would have found a pronounced positive effect if he had continued and refined his experiments. In short, if Sanford had used longer and finer wires, and had used a lower (battery) voltage, he would have observed a pronounced effect in resistivity when the wire was immersed (or surrounded by) various dielectrics — preferably high-density or high-K materials.

One can only guess as to what was Sanford's intent when he devised his experiment. Was it that he anticipated an "ether" effect. The experiment was conducted at a time when the "luminiferous aether" concept was popular. Could it be that this concept, or a modification of it, should be revived?

As a matter of fact, the concept of an ether is, even today, not dead. Various attempts are in vogue to revive it, but evidence is lacking. Could it be that the evidence here would be helpful?

If the presence of a mass distorts the ether or, if there is a flux of ether, changes its direction or intensity, then its scalar value may change. This could be felt by the conductor (conducting current) or by the capacitor in the immediate vicinity.

The enigma arises when one tries to explain the accretion of charge. Can a flux of ether supply energy? Is the rate of accretion (evidenced by an increase in self-potential) somehow dependent upon the rate of motion thru an ether? And are there directional effects which can be observed by rotating the capacitor with respect to the (hypothetical) ether flow. (Reference — The Trouton-Noble Experiment).

T. T. Brown
10/14/80