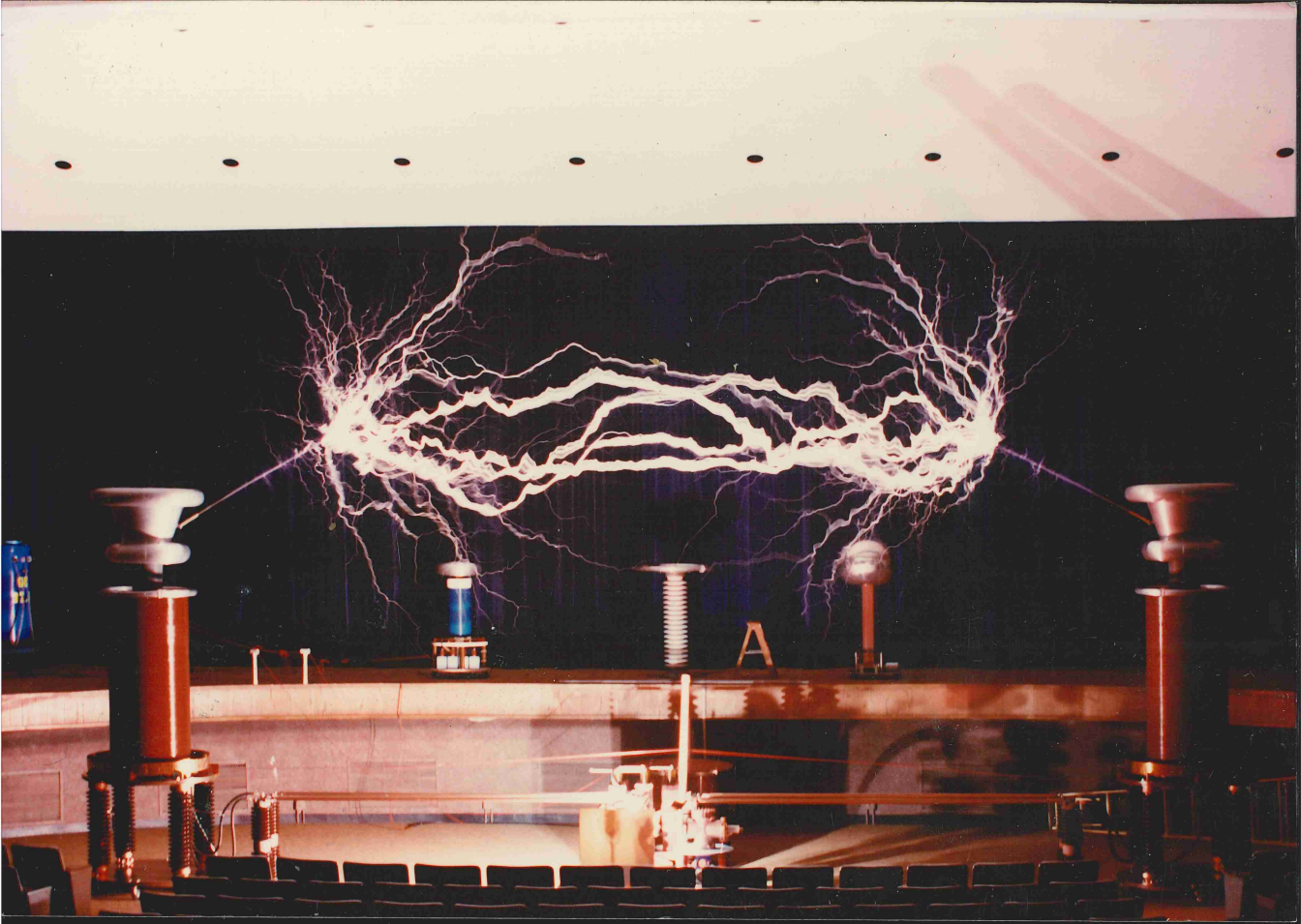
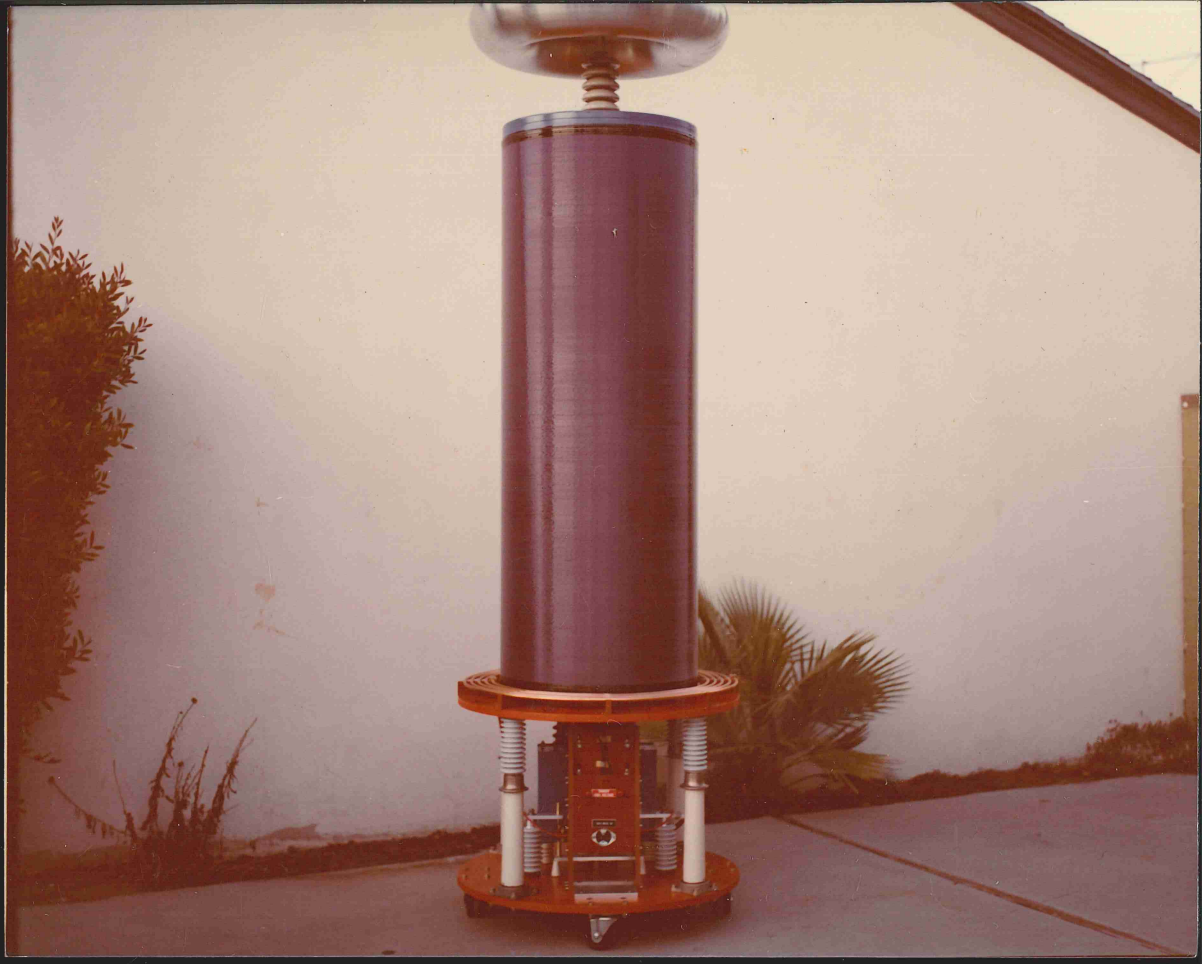

A

MODEL 12
TESLA COIL SYSTEM
6.5 MILLION VOLTS

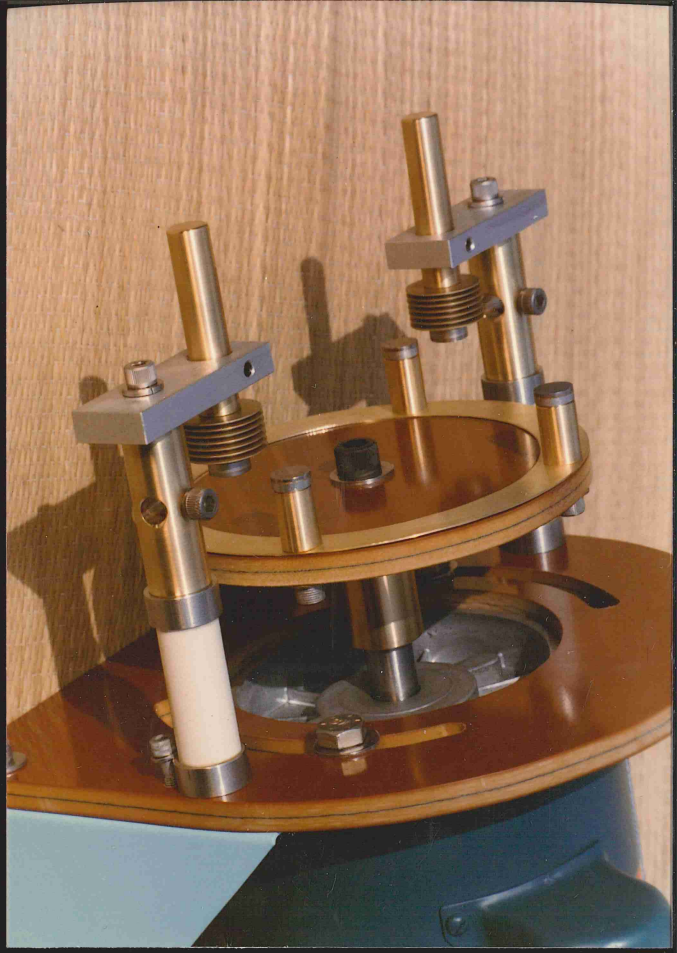
©1993

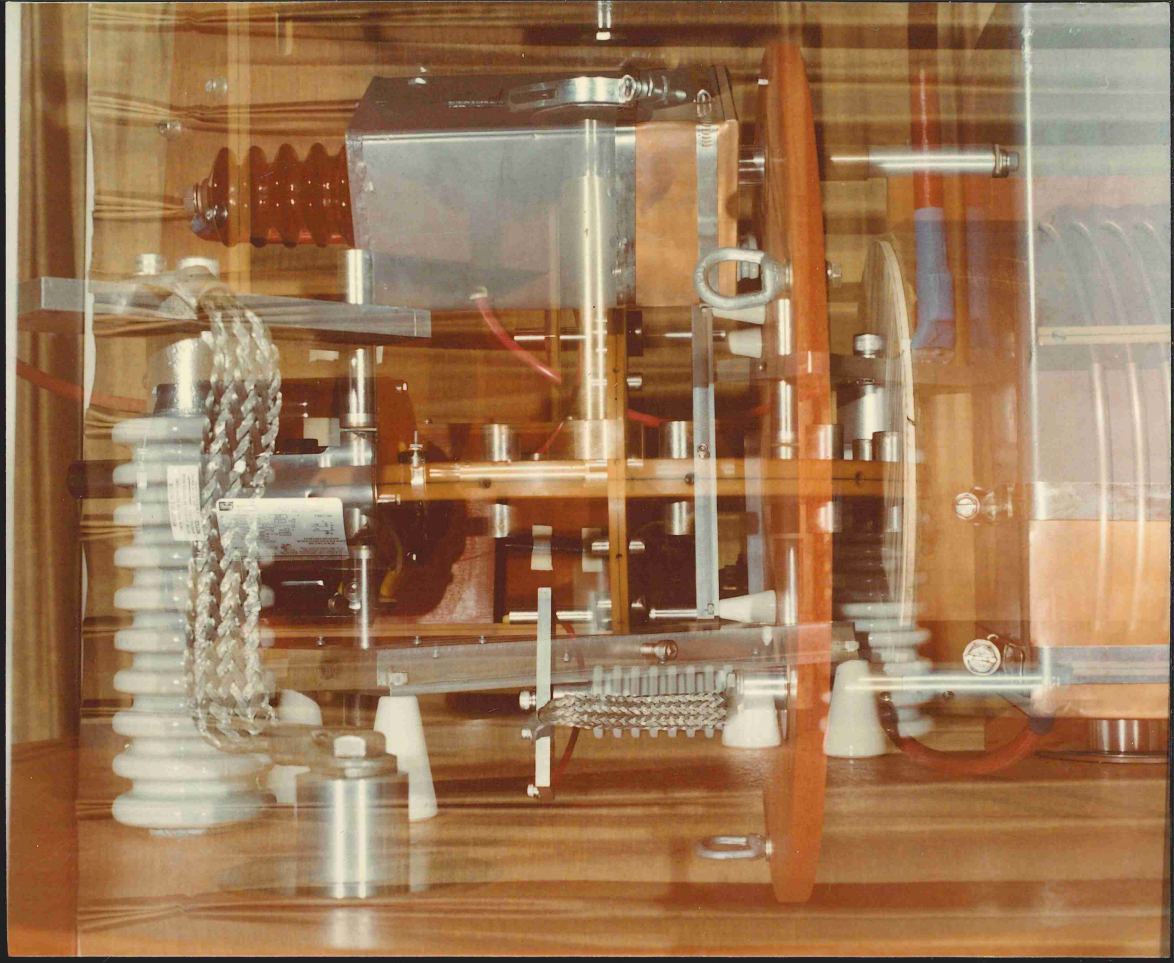


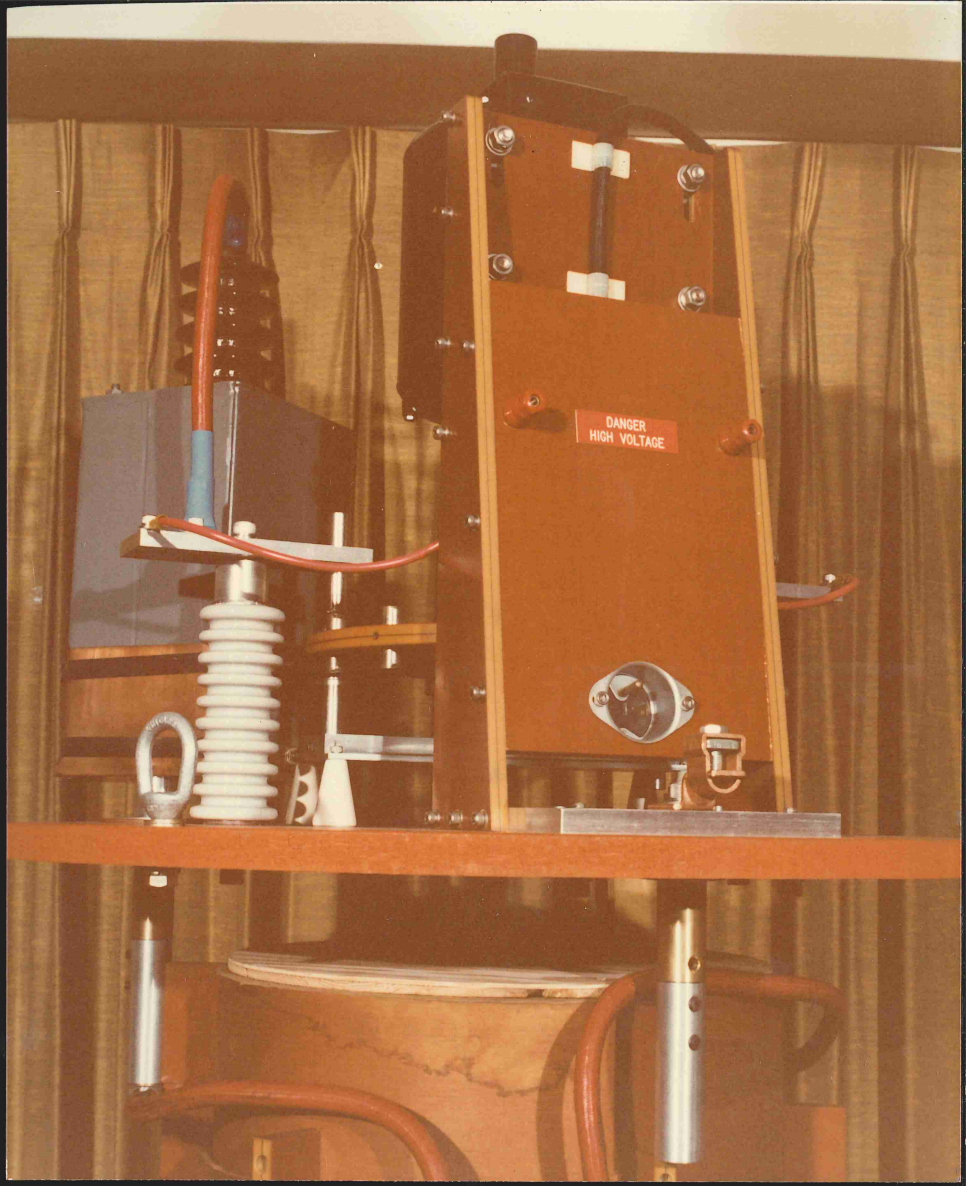

Kodalux
Processing Services
Apr 1993 LB

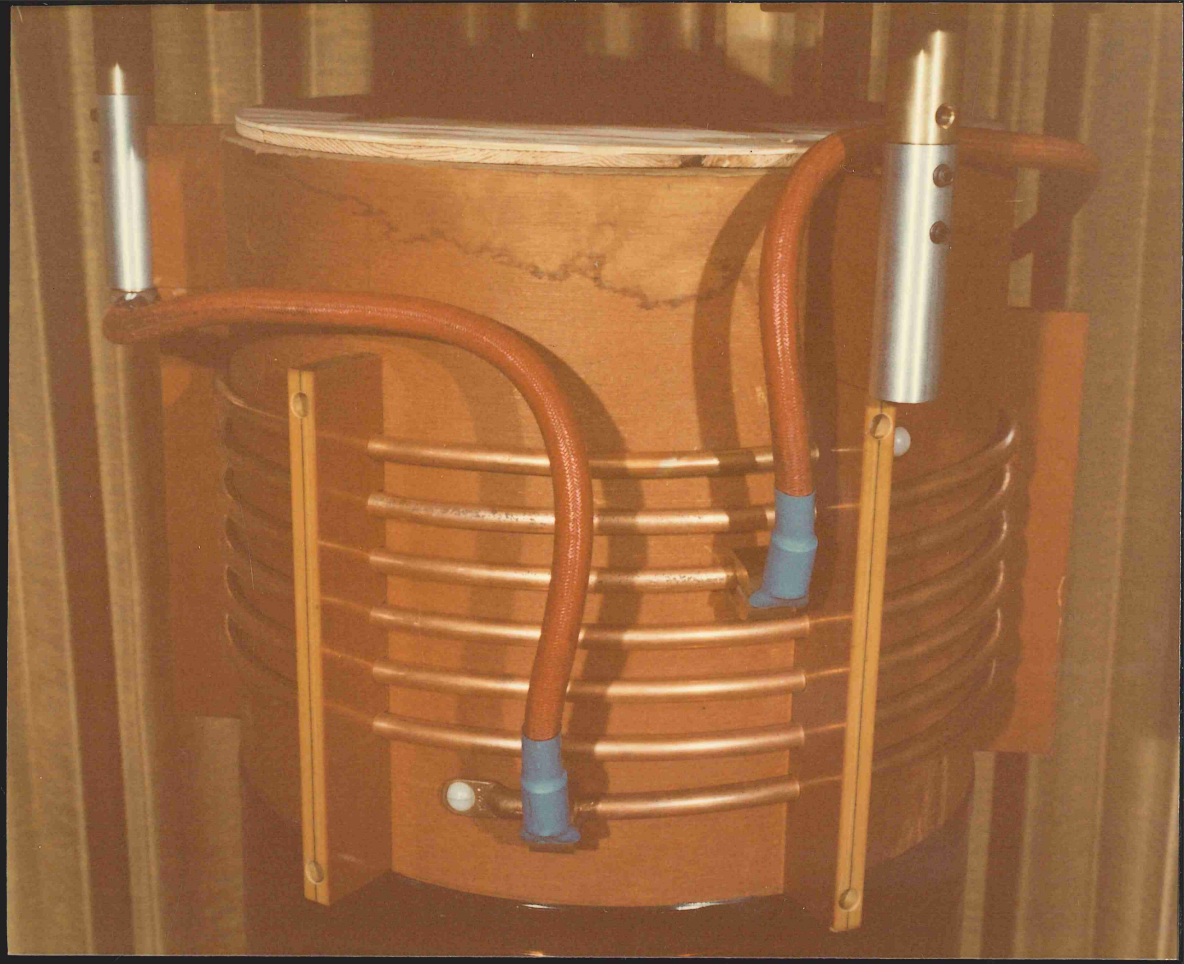


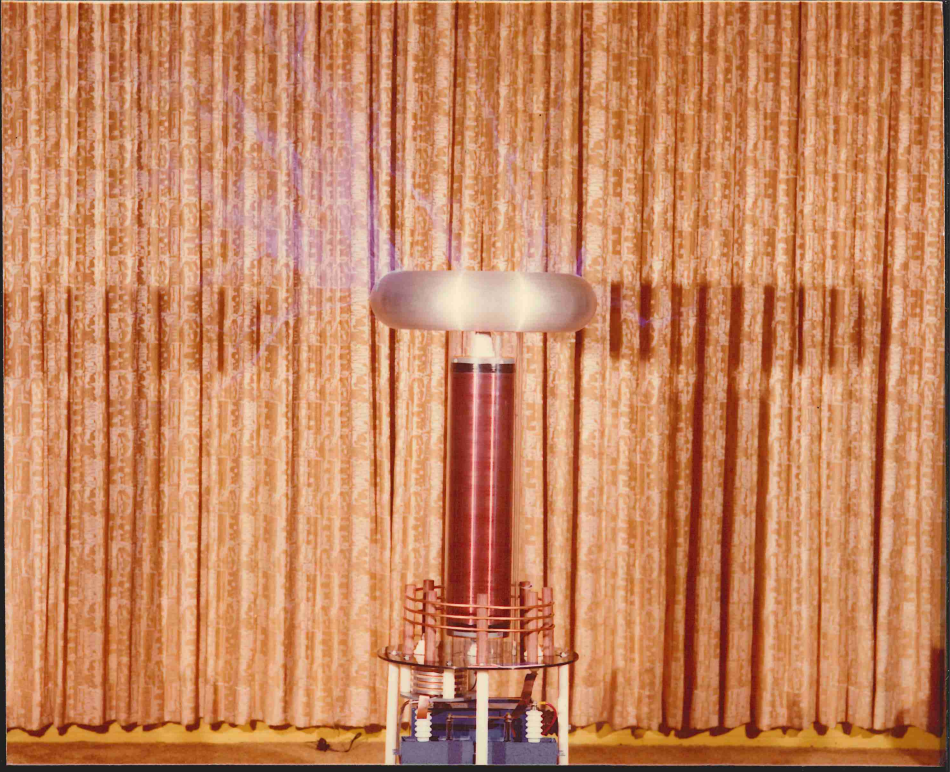


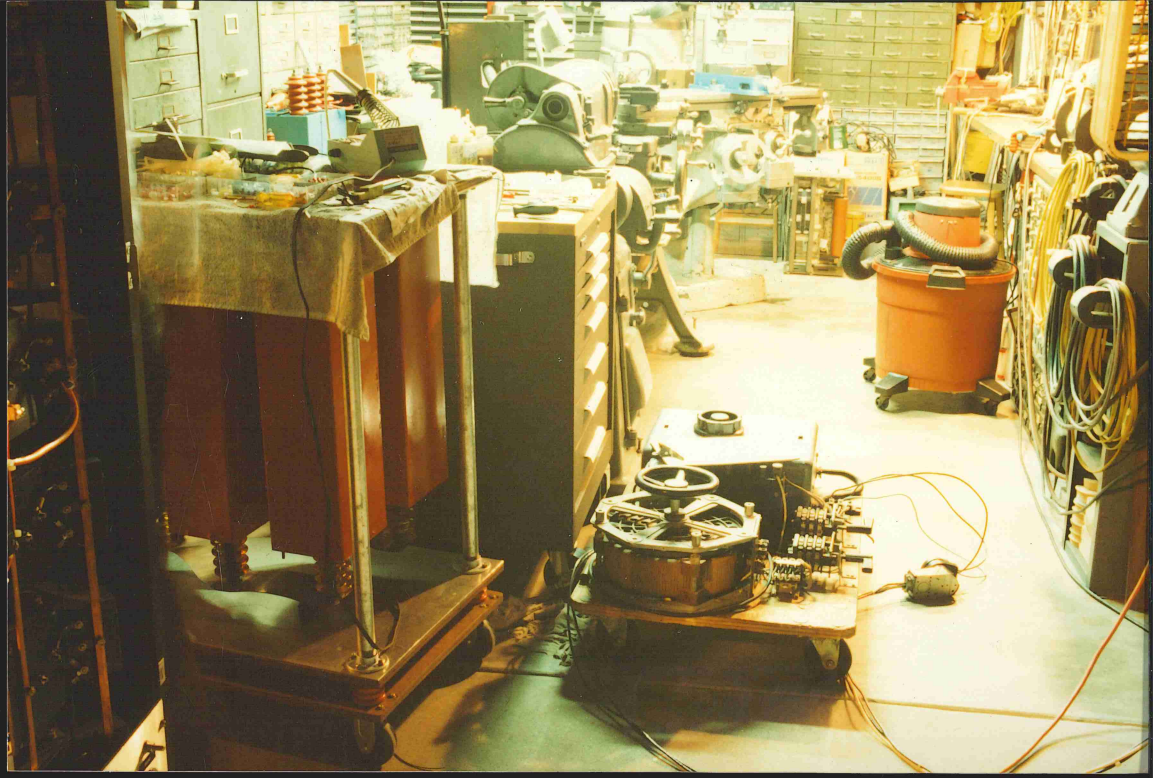


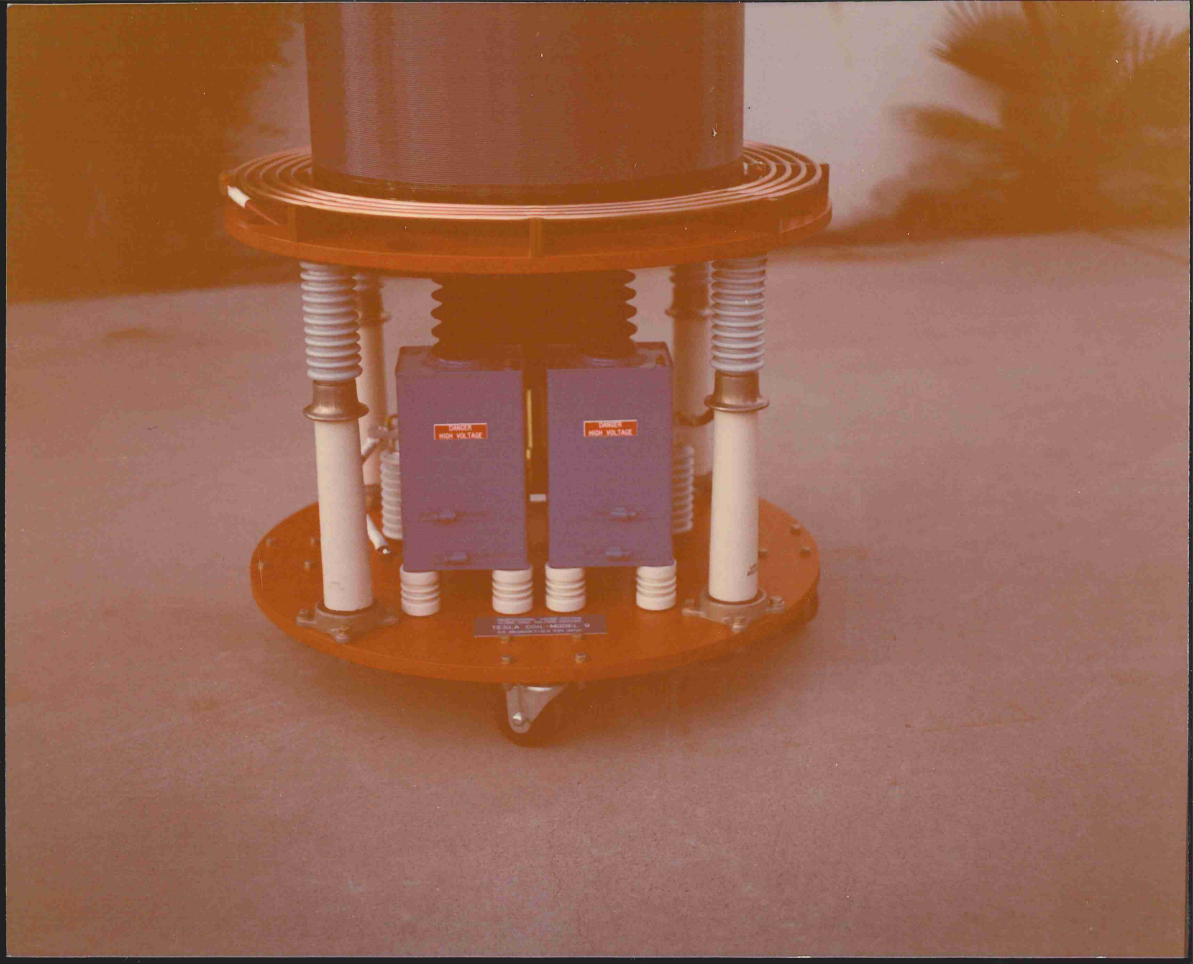


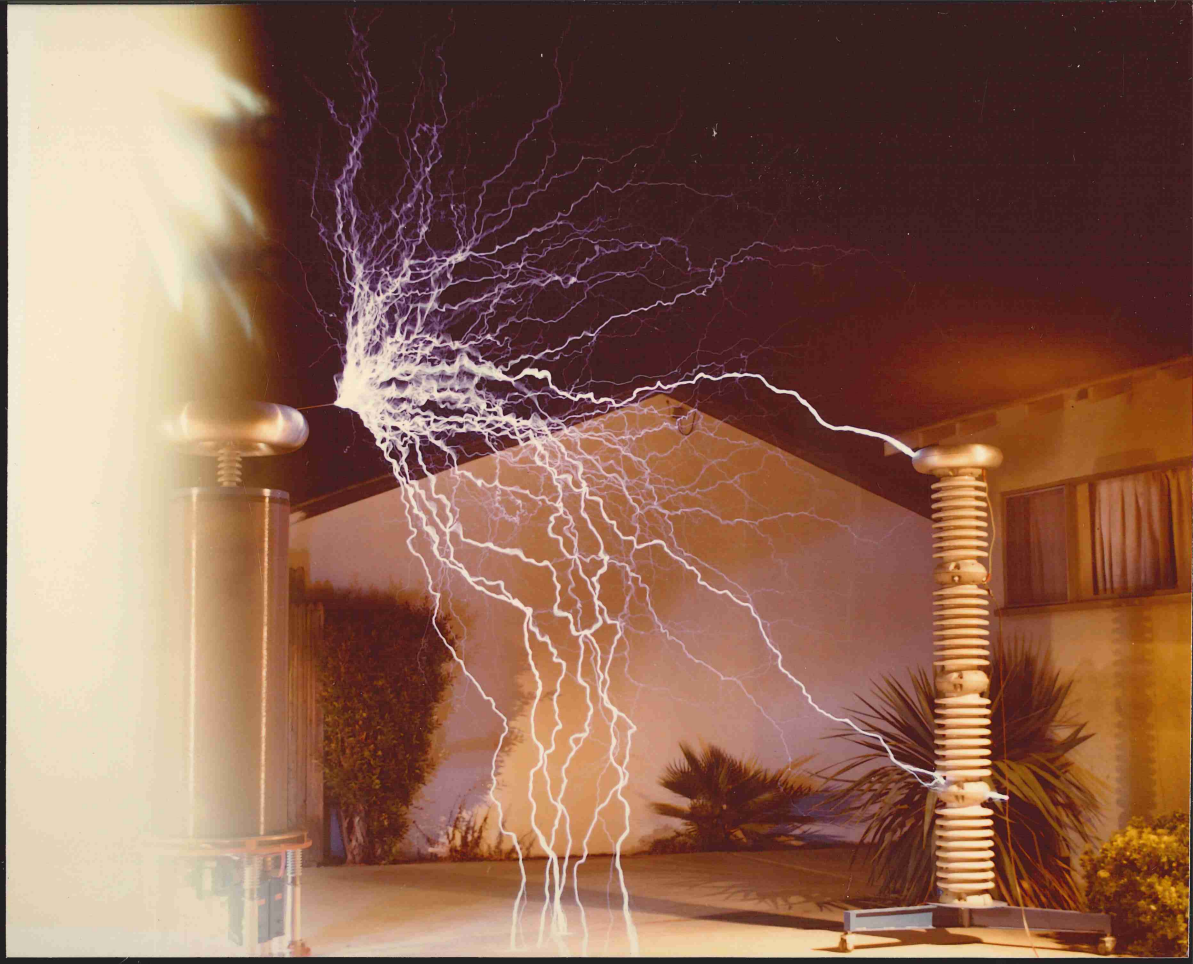

DANGER
HIGH VOLTAGE

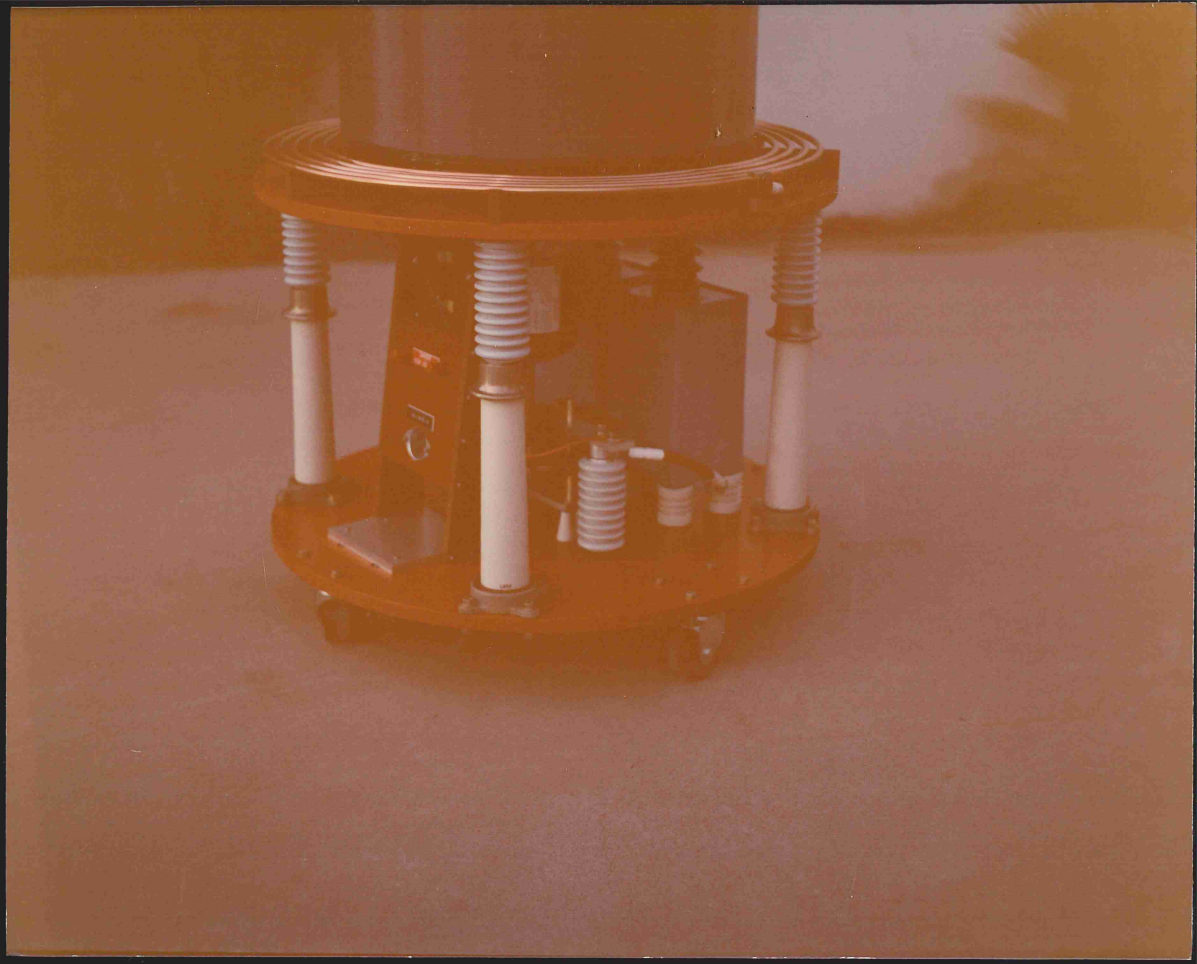


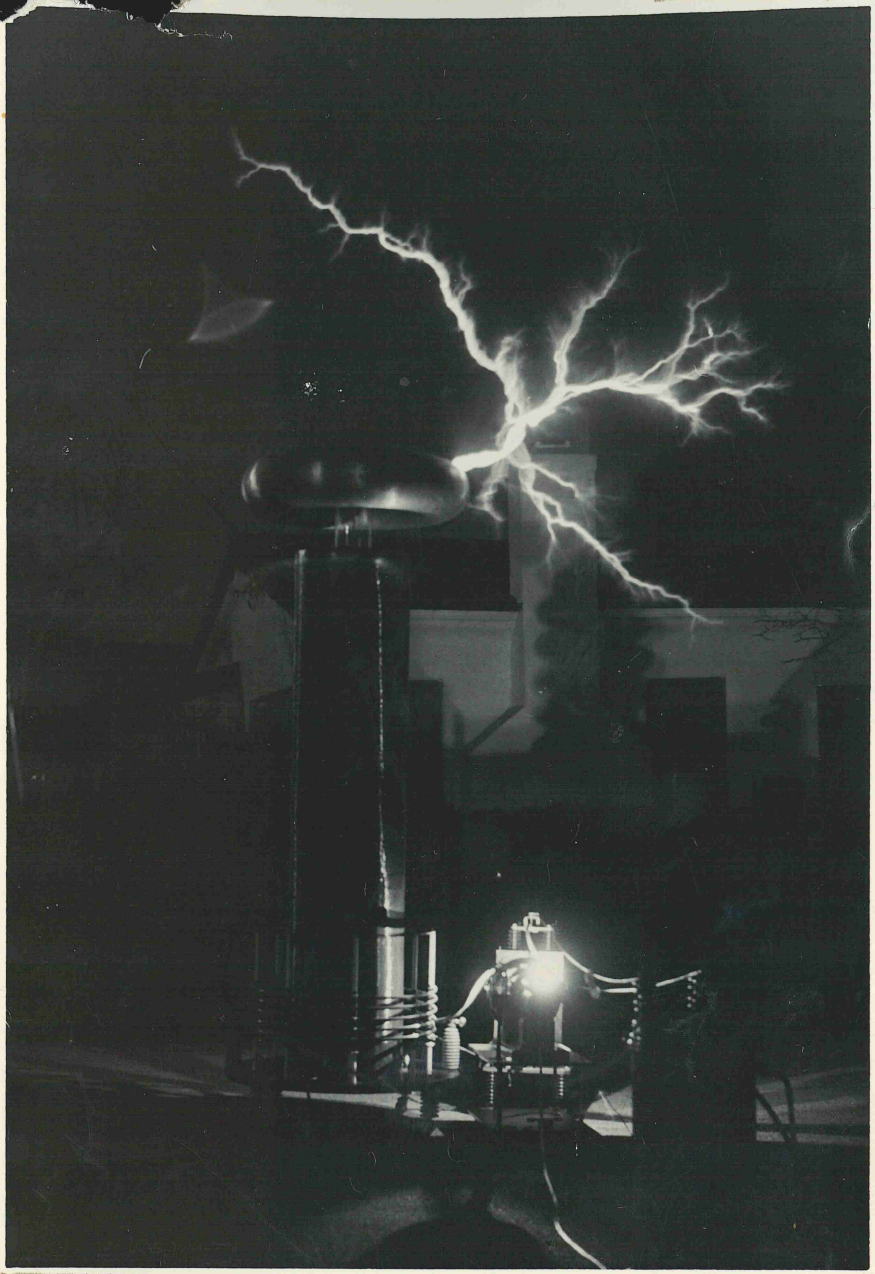




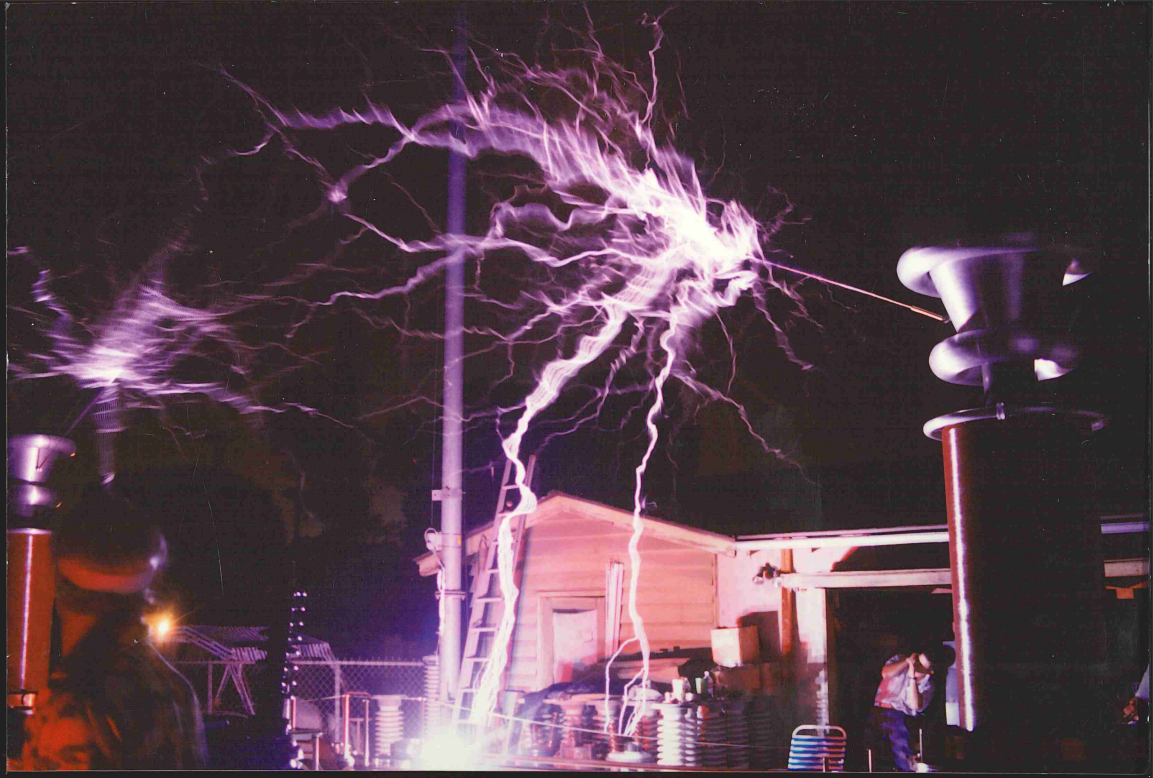

DANGER
HIGH VOLTAGE
DANGER
HIGH VOLTAGE

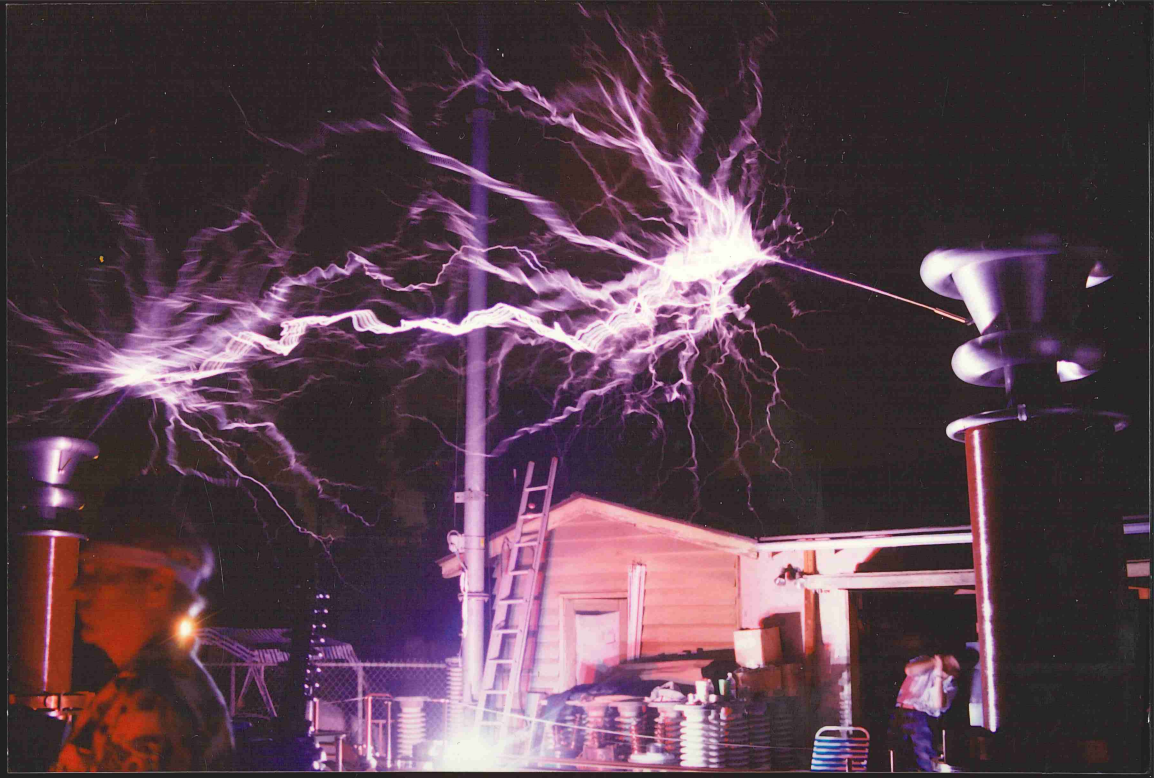






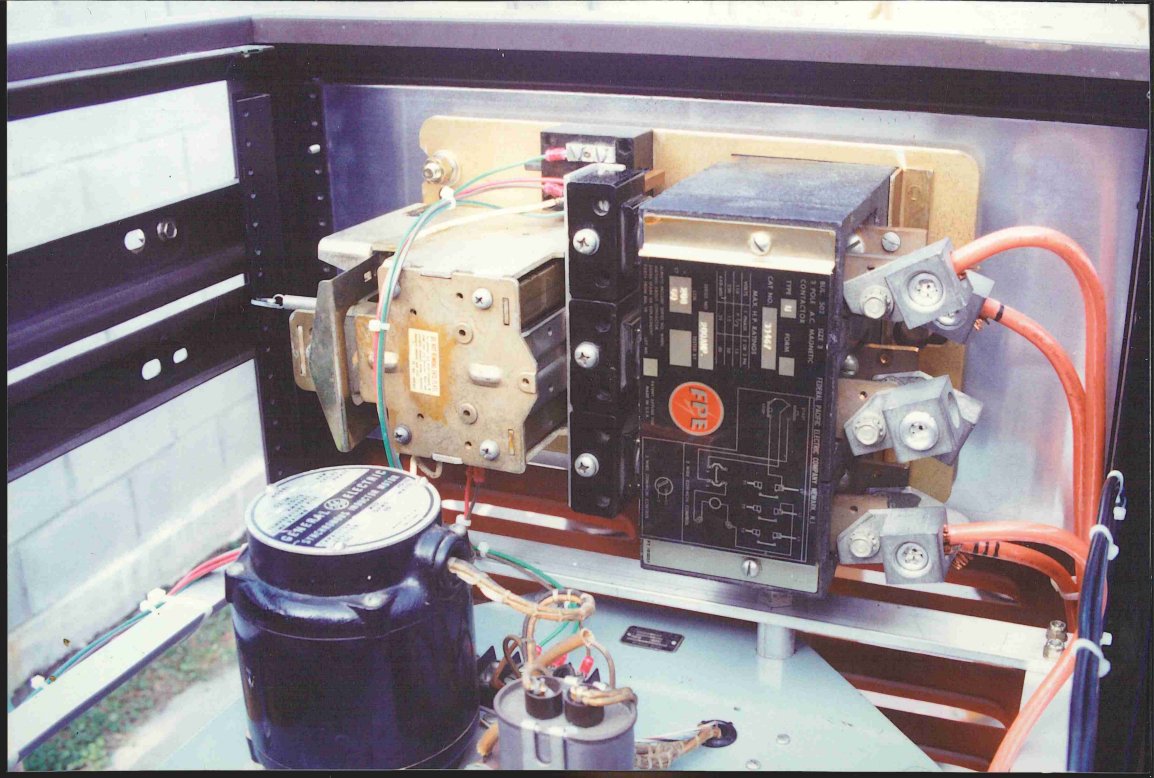






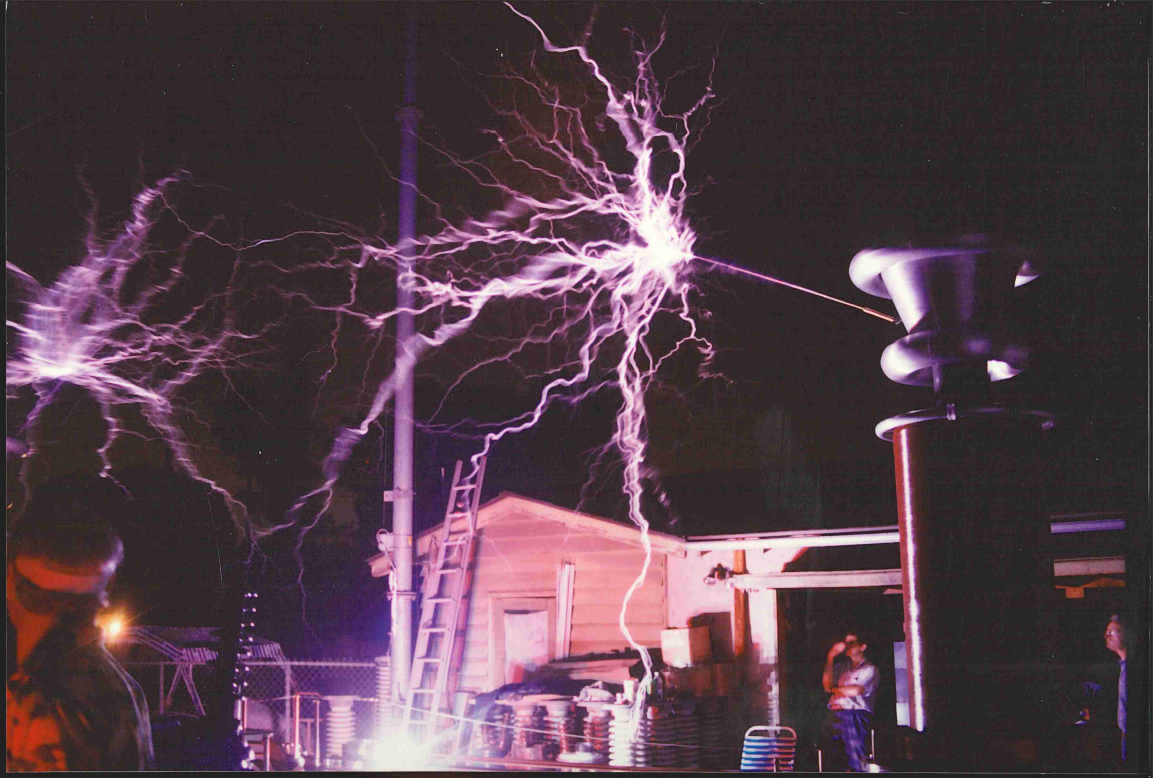


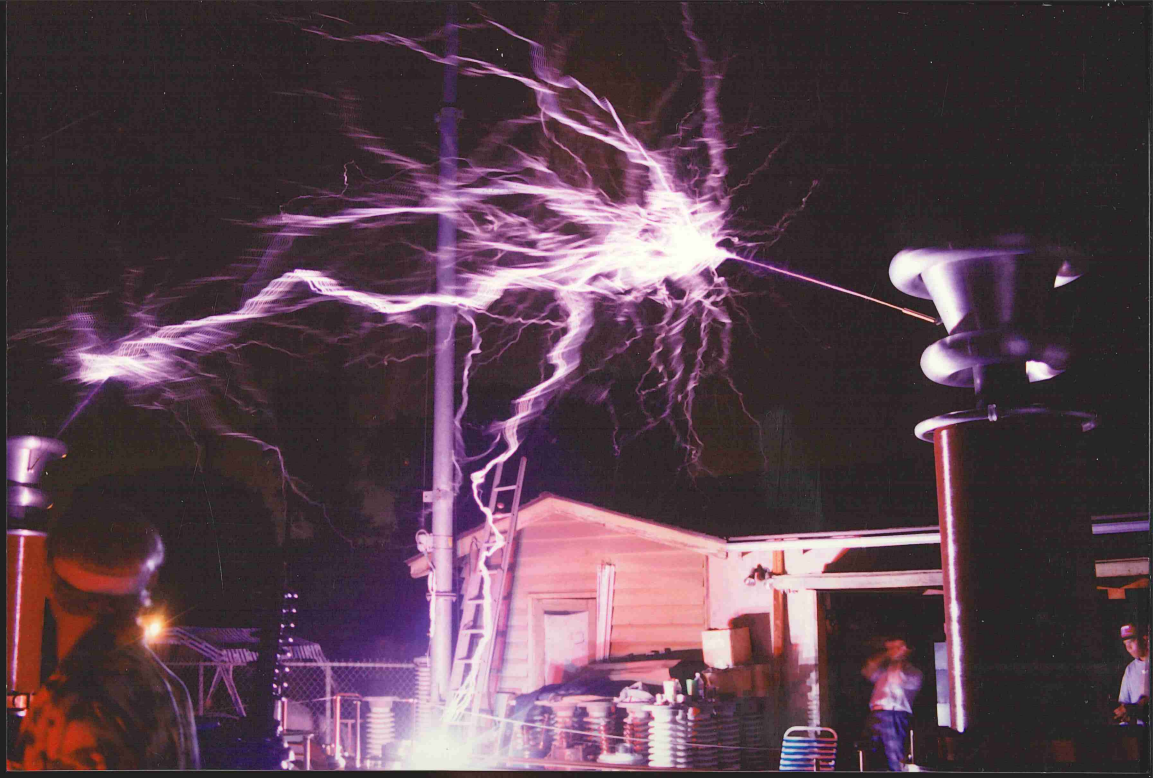


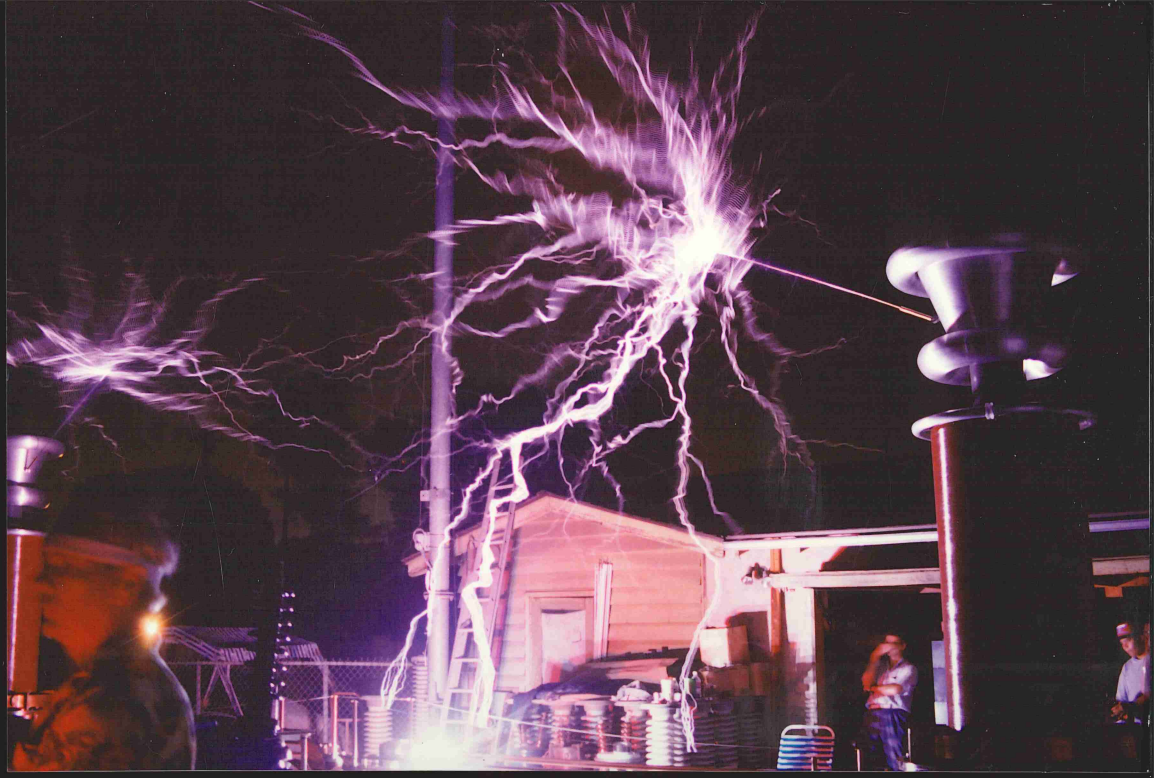

TYPE A.C. MAGNETIC
TYPE
FORM
MAX. H.P. RATINGS
EPE

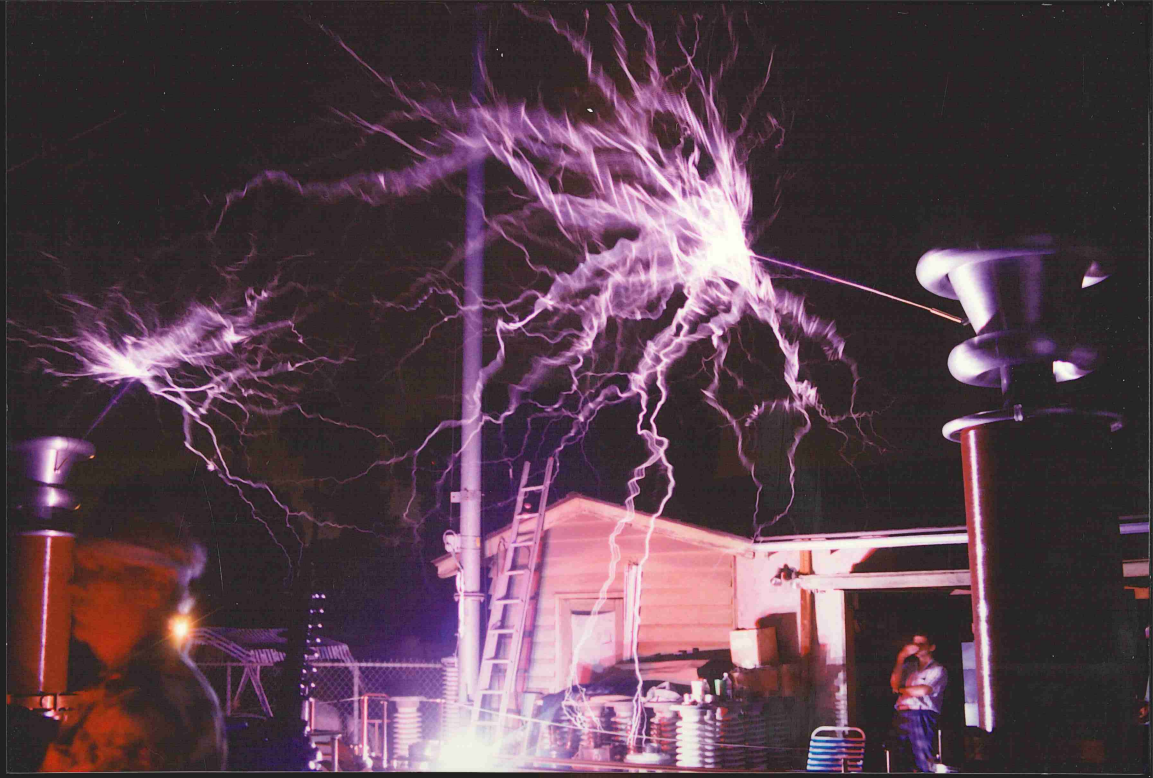


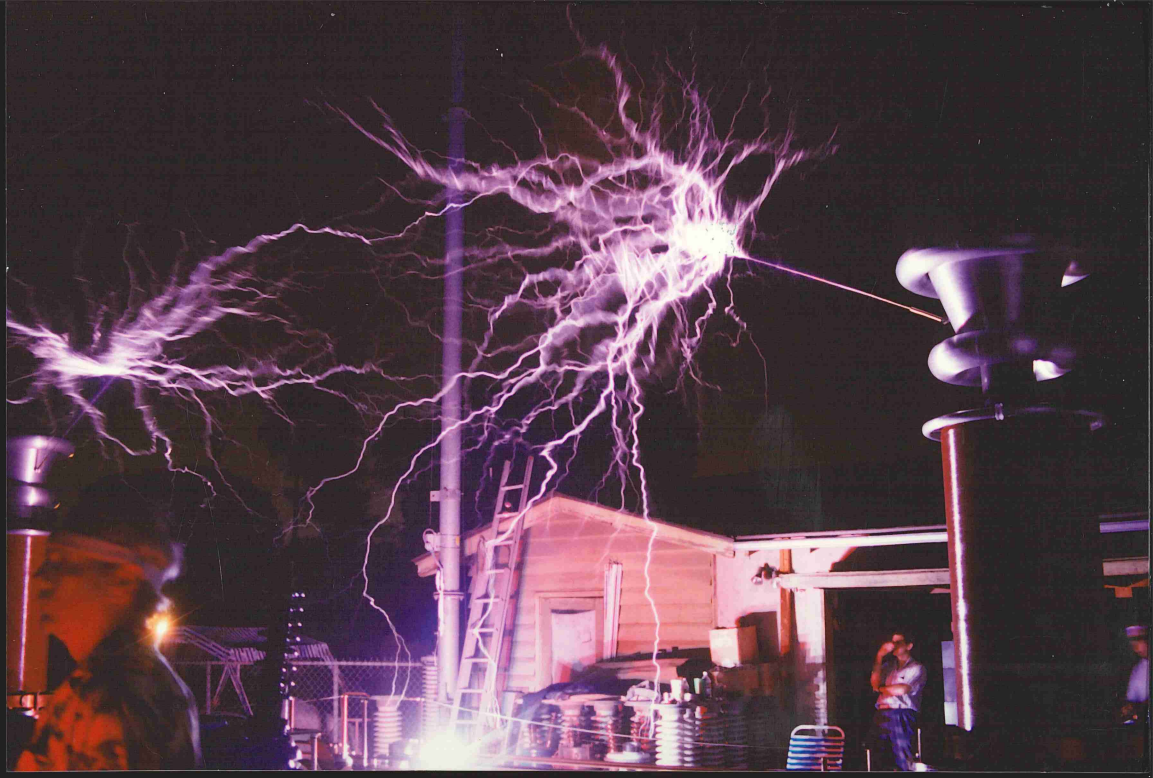


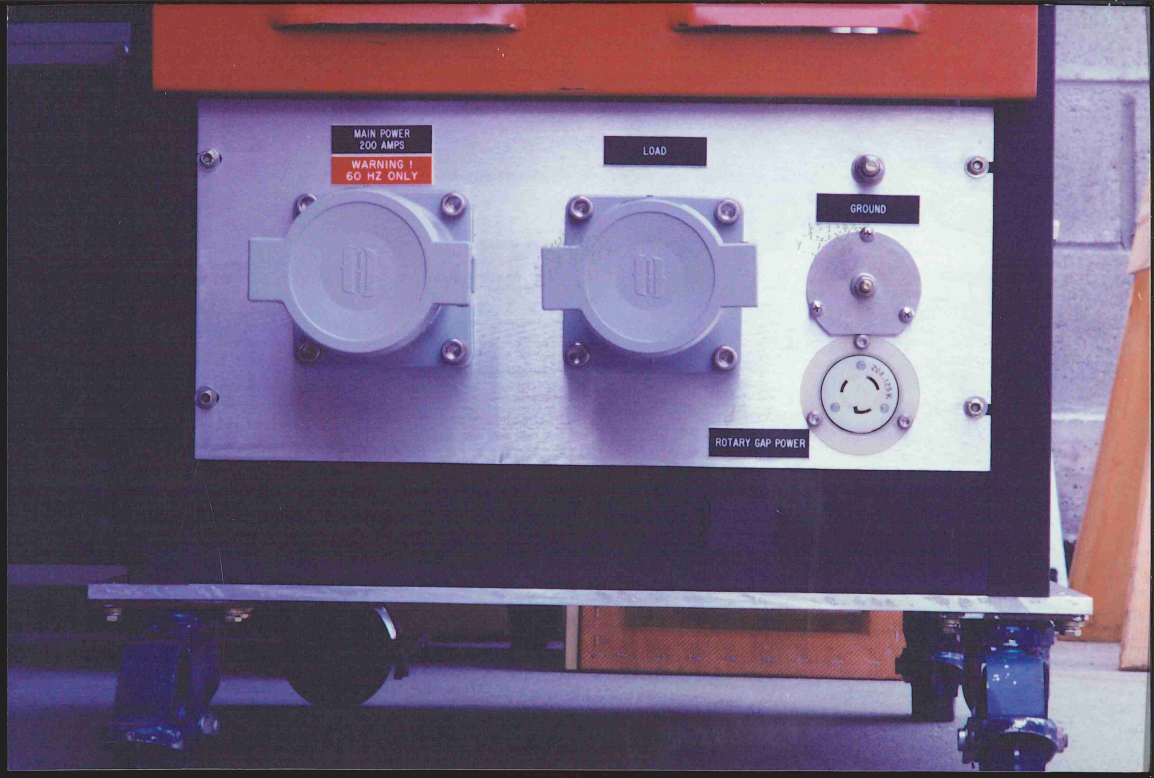


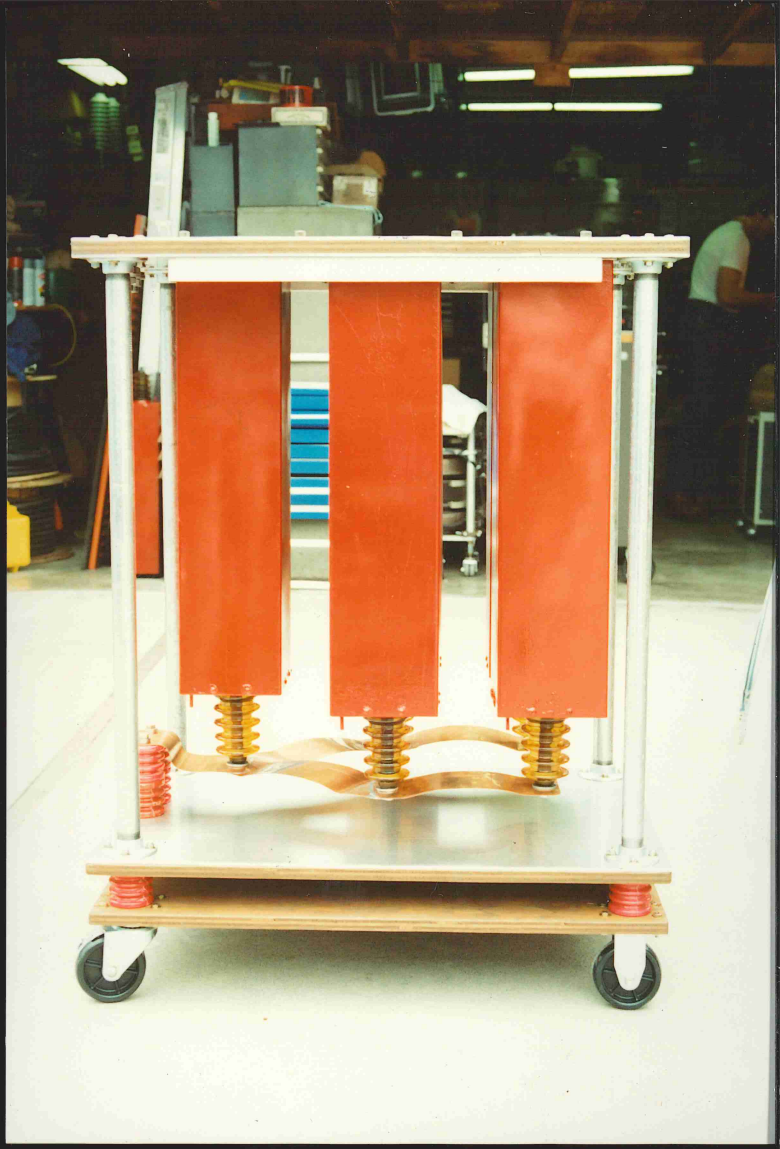




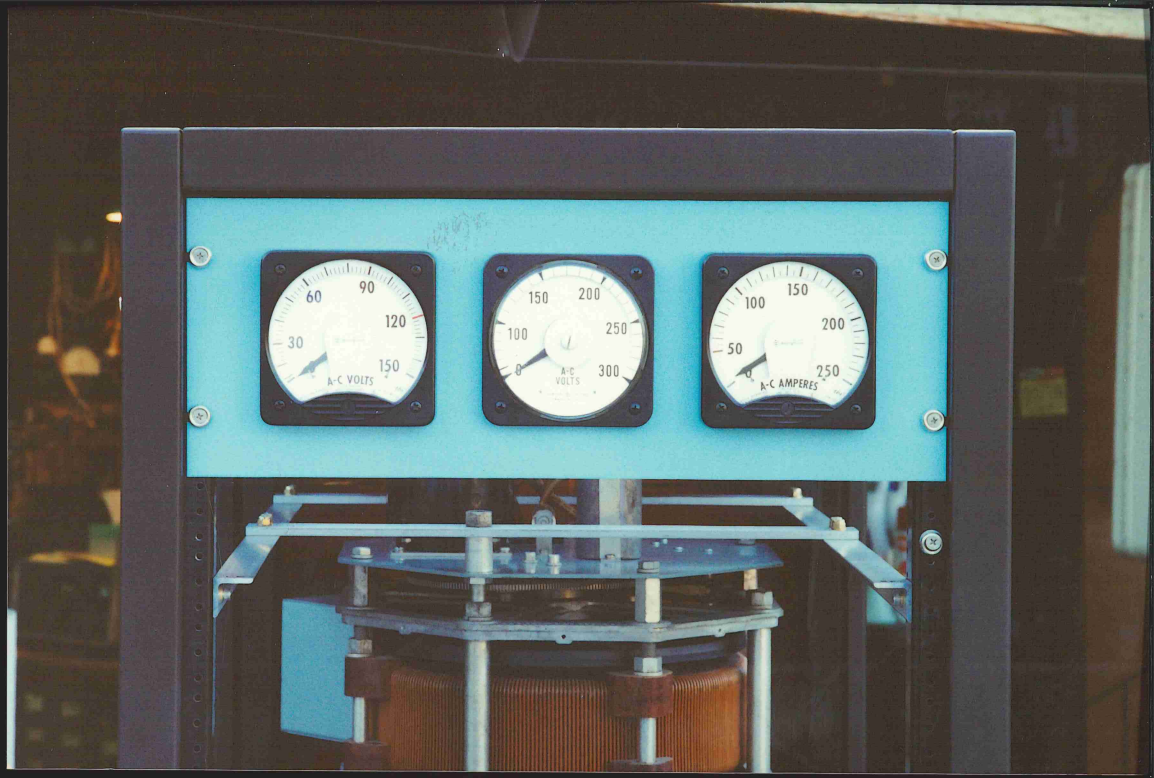


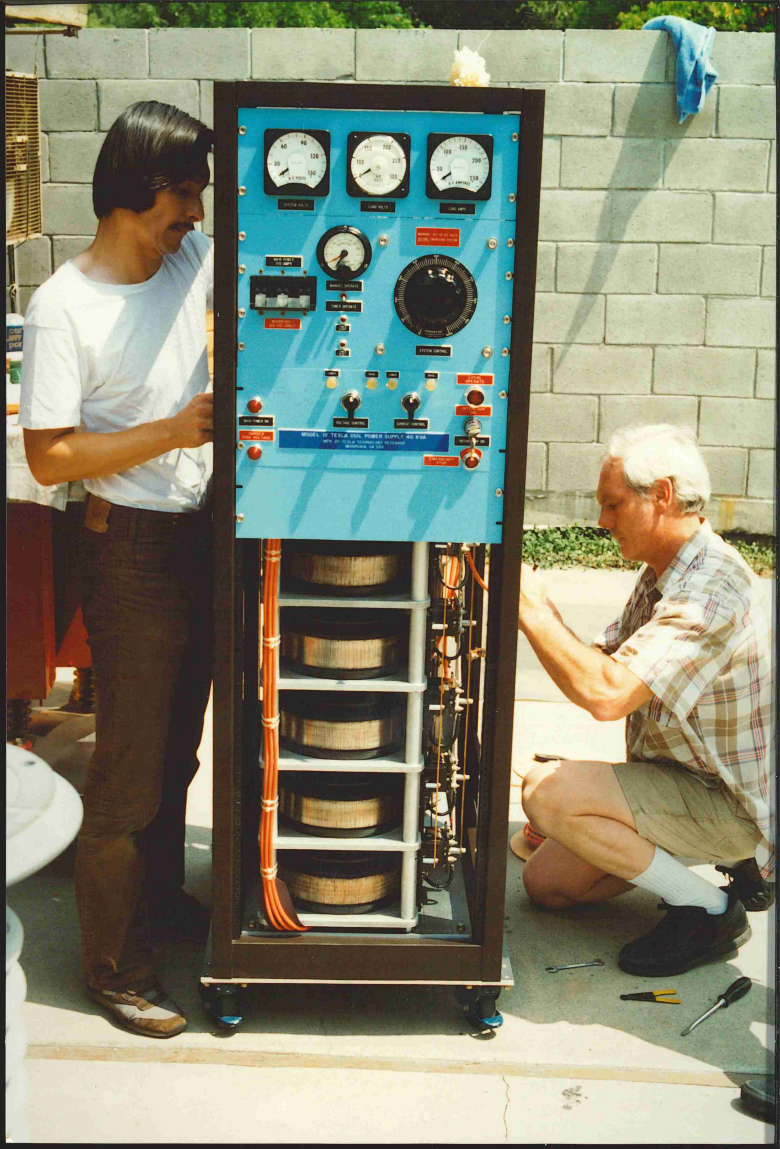



MAIN POWER
200 AMPS
WARNING !
60 HZ ONLY
LOAD
GROUND
ROTARY GAP POWER

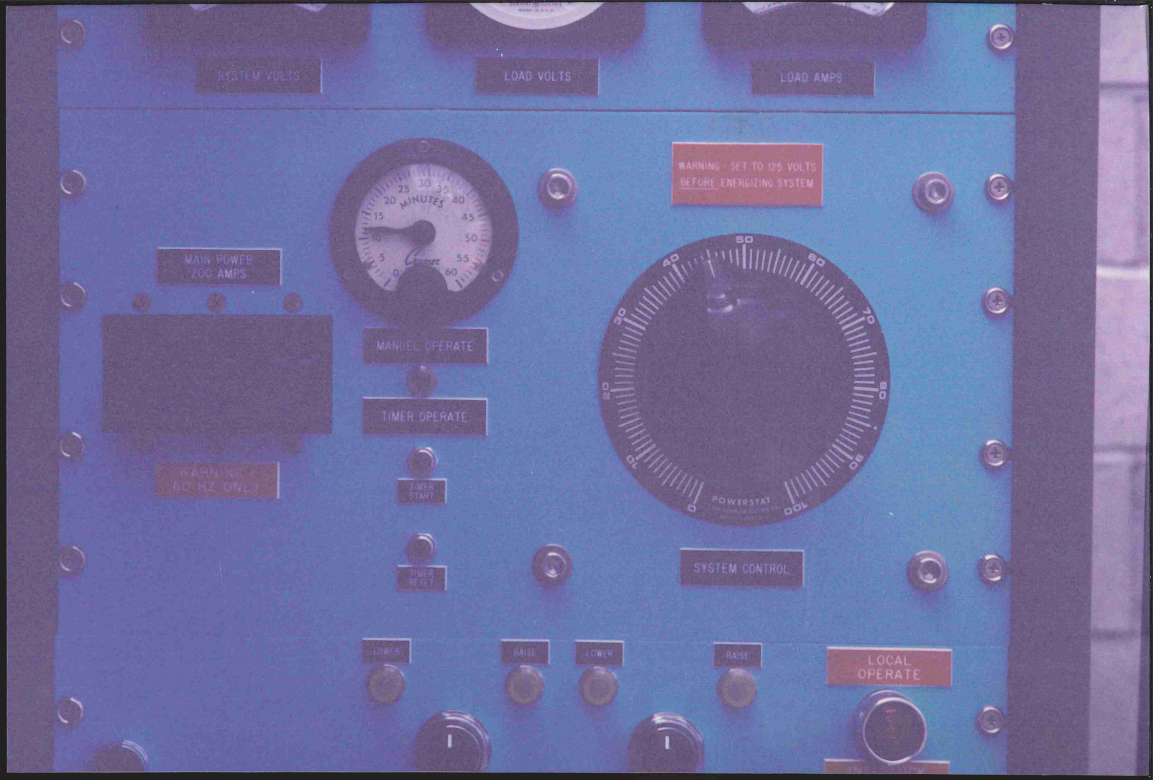



UP

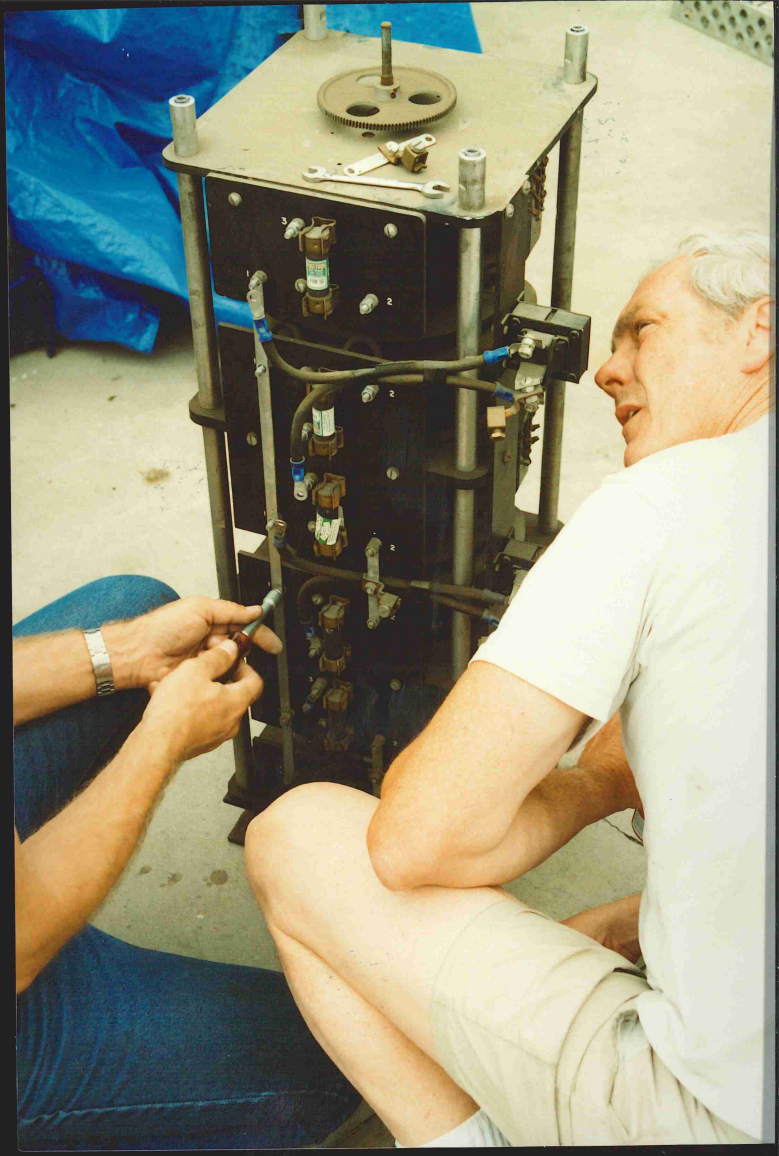

60
90
120
30
150
A-C VOLTS
150
200
100
250
0
A-C VOLTS
300
100
150
200
50
0
250
A-C AMPERES

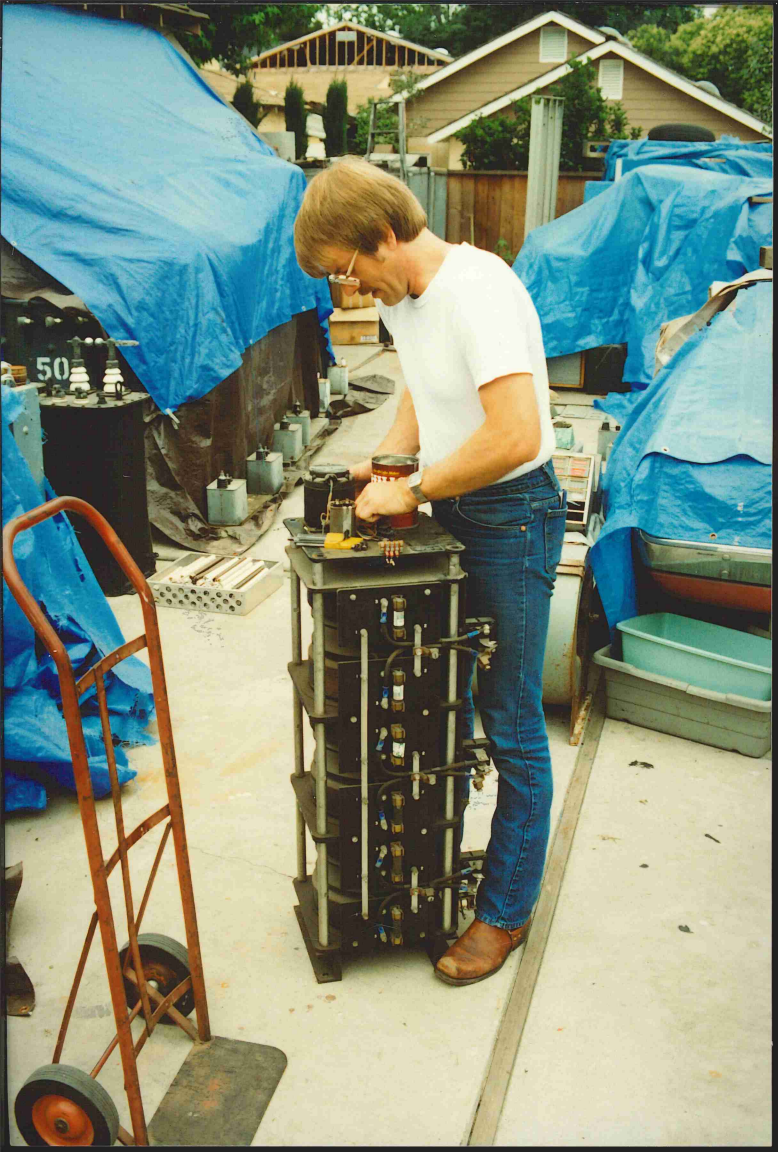





SYSTEM VOLTS
LOAD VOLTS
LOAD AMPS
WARNING - SET TO 175 VOLTS
BEFORE ENERGIZING SYSTEM
MINUTES
MAIN POWER
200 AMPS
MANUEL OPERATE
TIMER OPERATE
TIMER START
TIMER RESET
POWERSTAT
SYSTEM CONTROL
LOWER
RAISE
LOWER
RAISE
LOCAL
OPERATE


HILLS
BROS
AMX 10




50





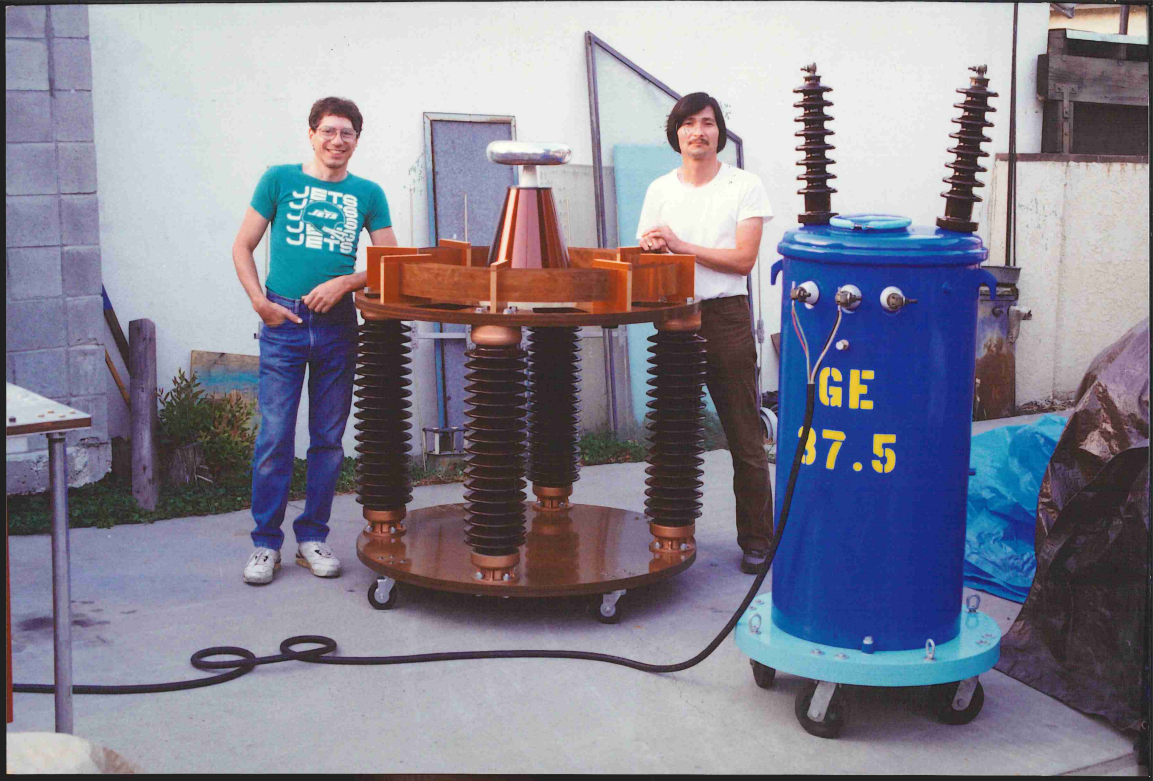

VARIAC
VARIAC
VARIAC





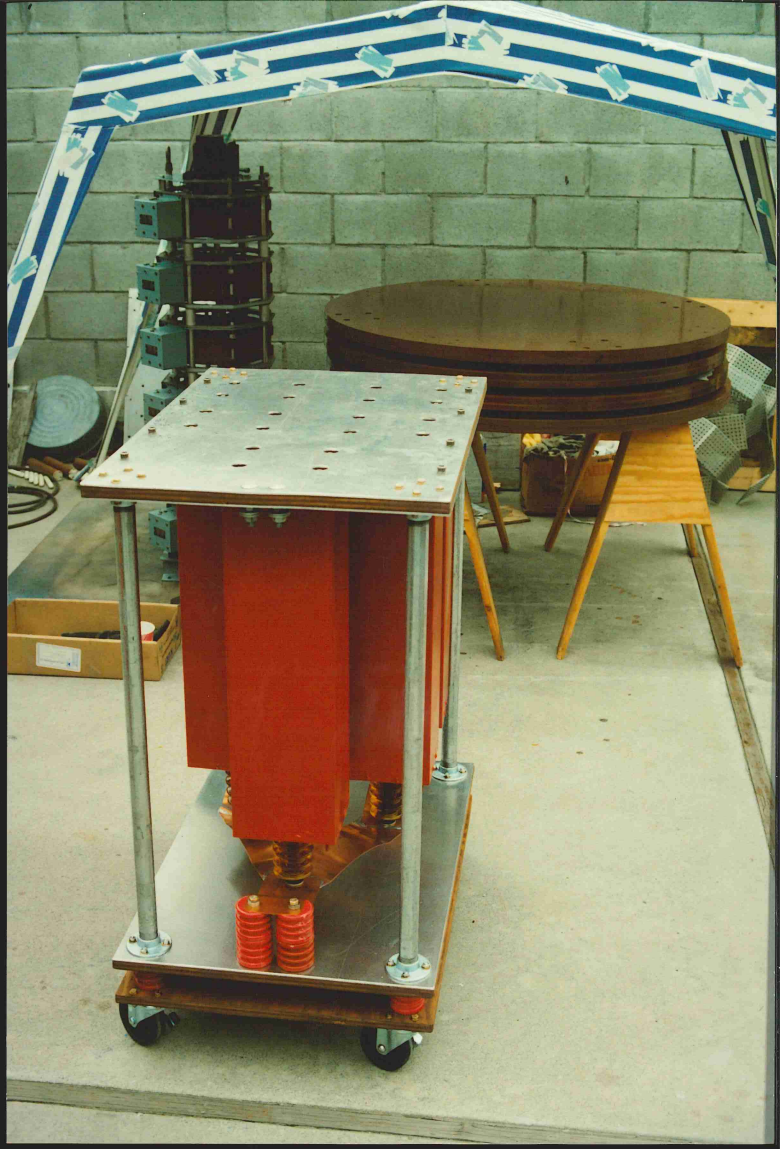


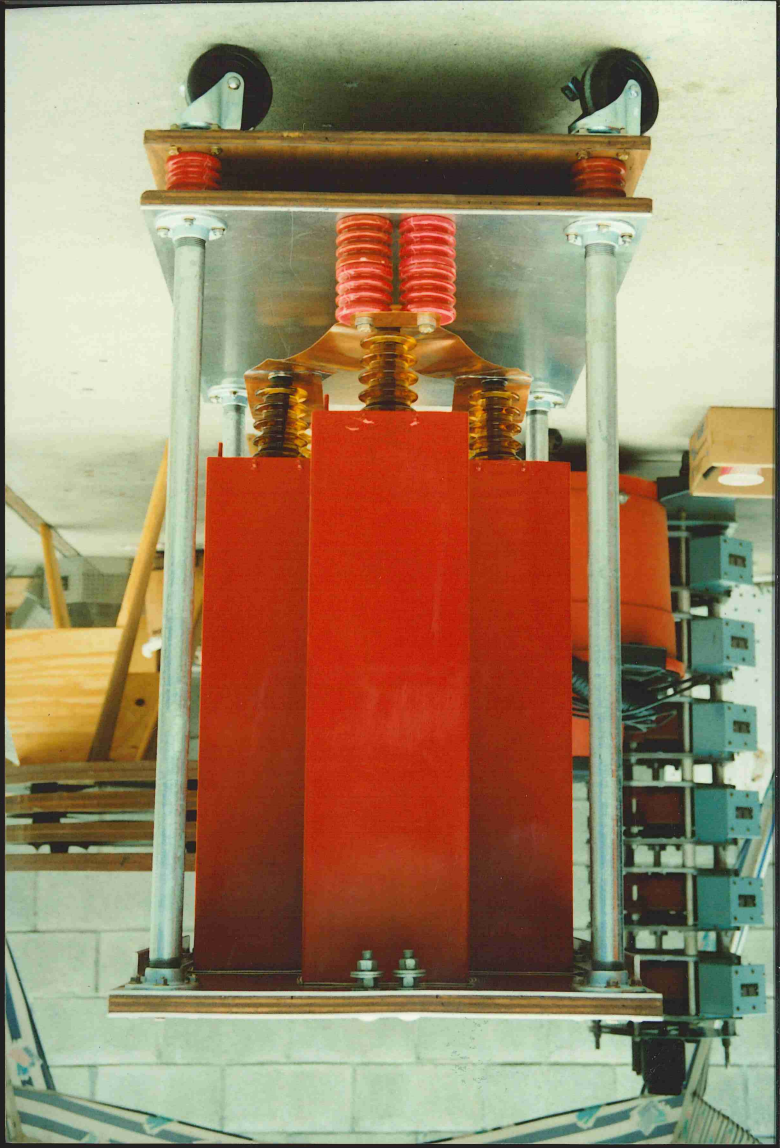



GE
37.5



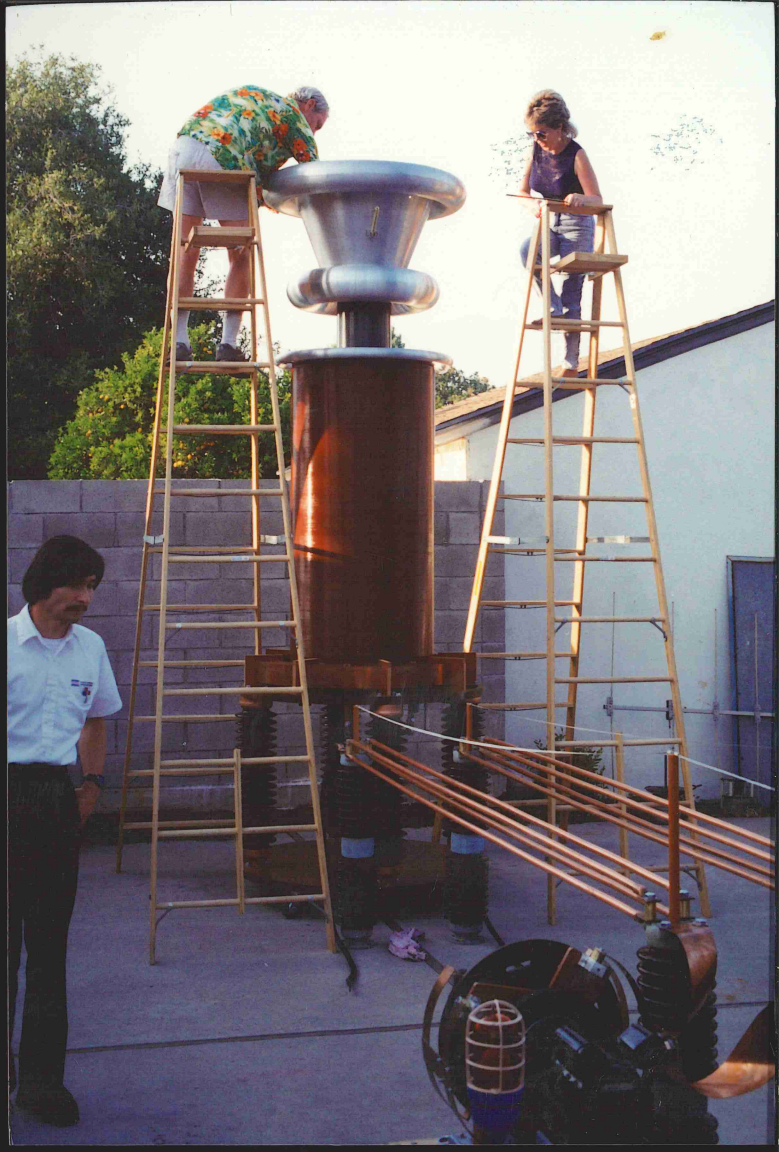








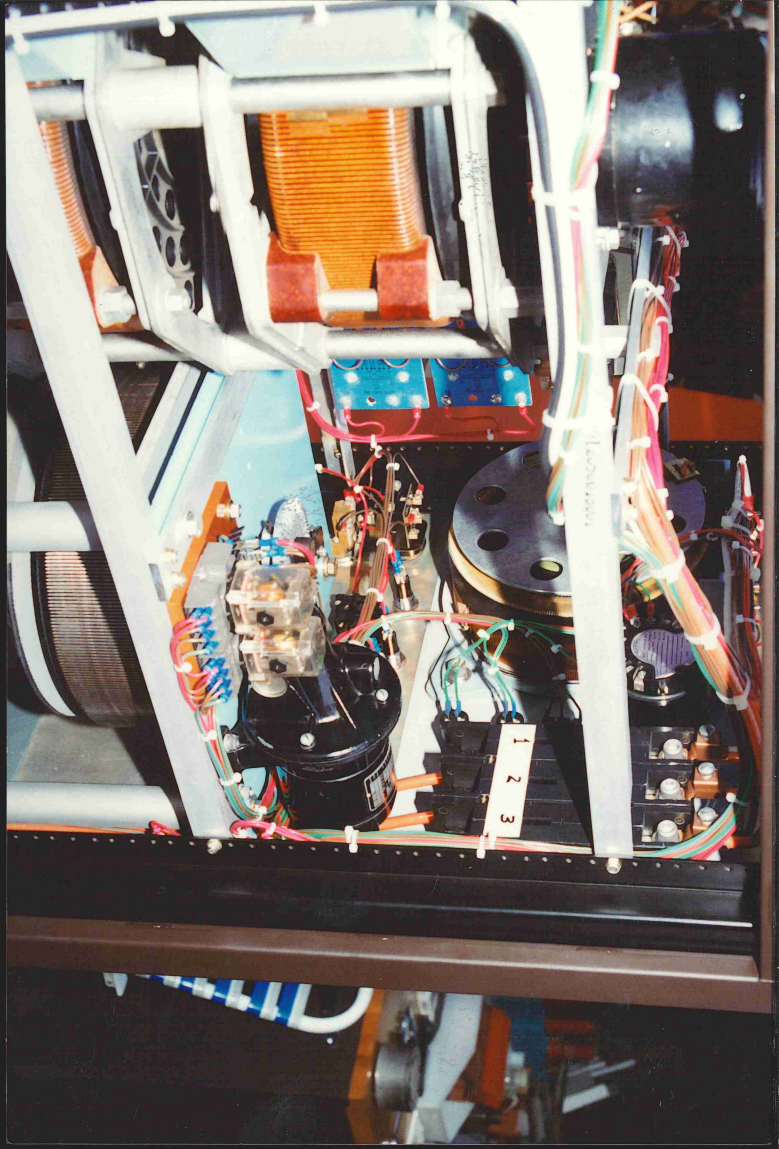

It's
Showtime



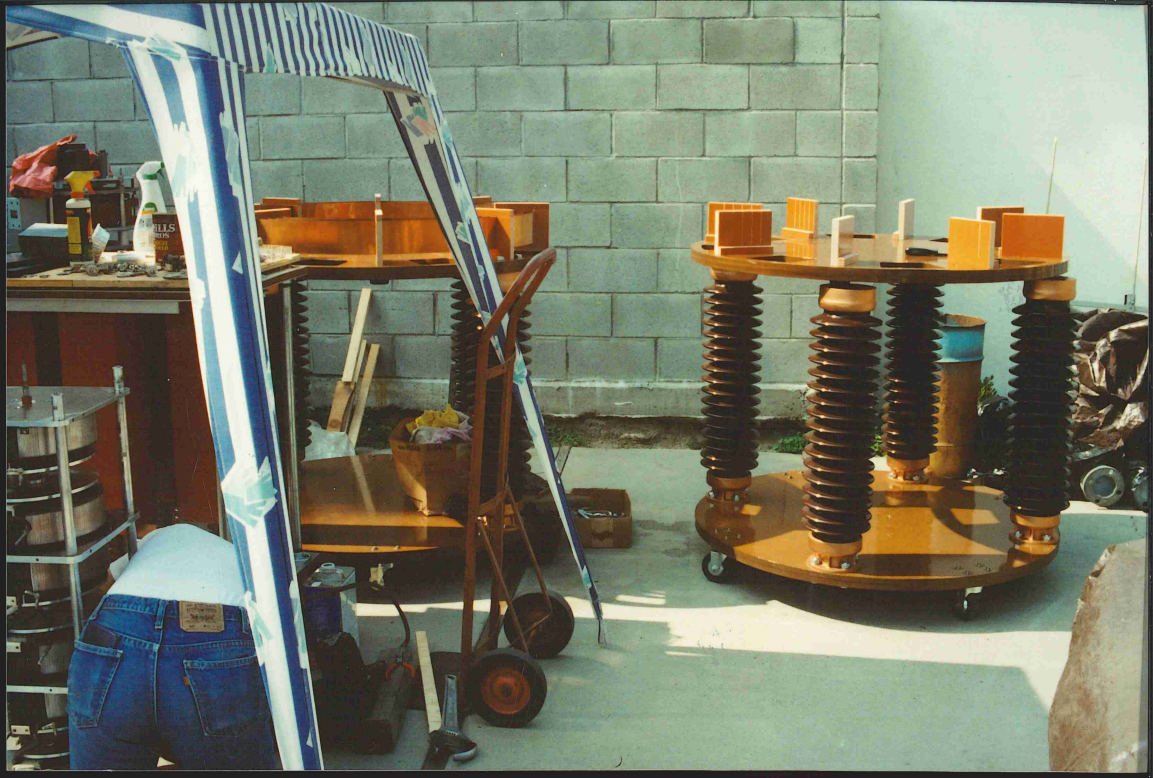

GE
37.5



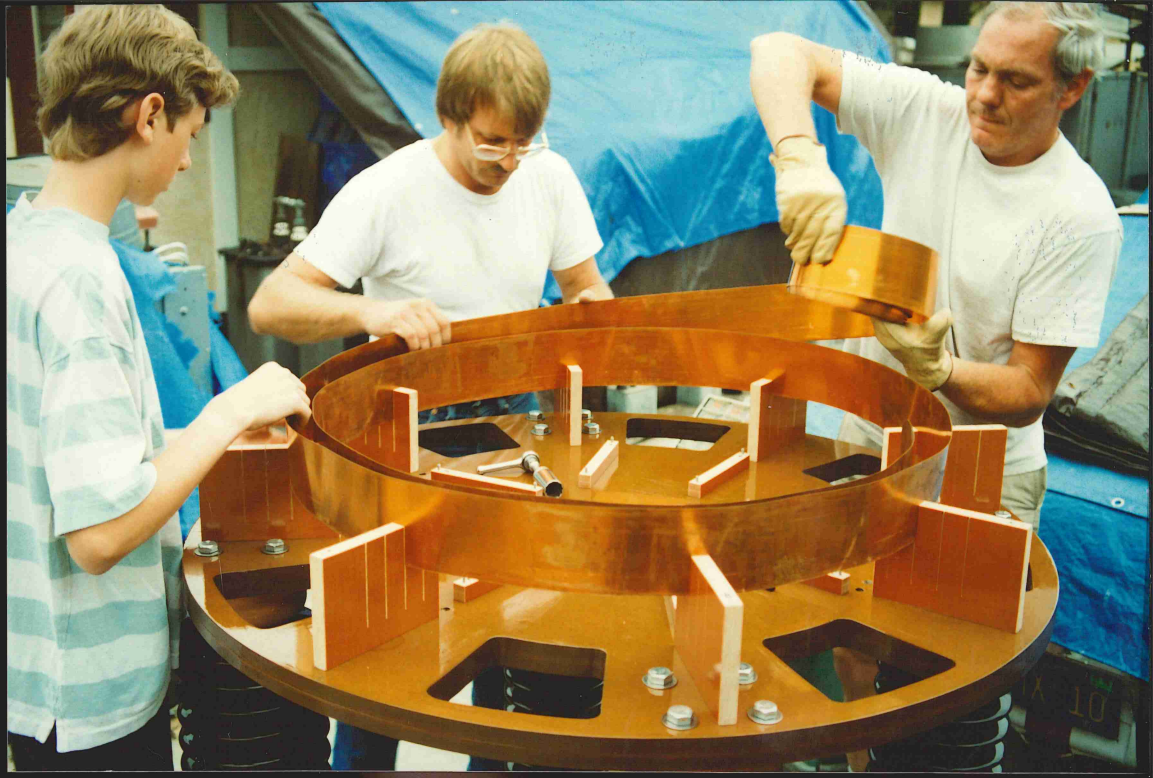



1 2 3

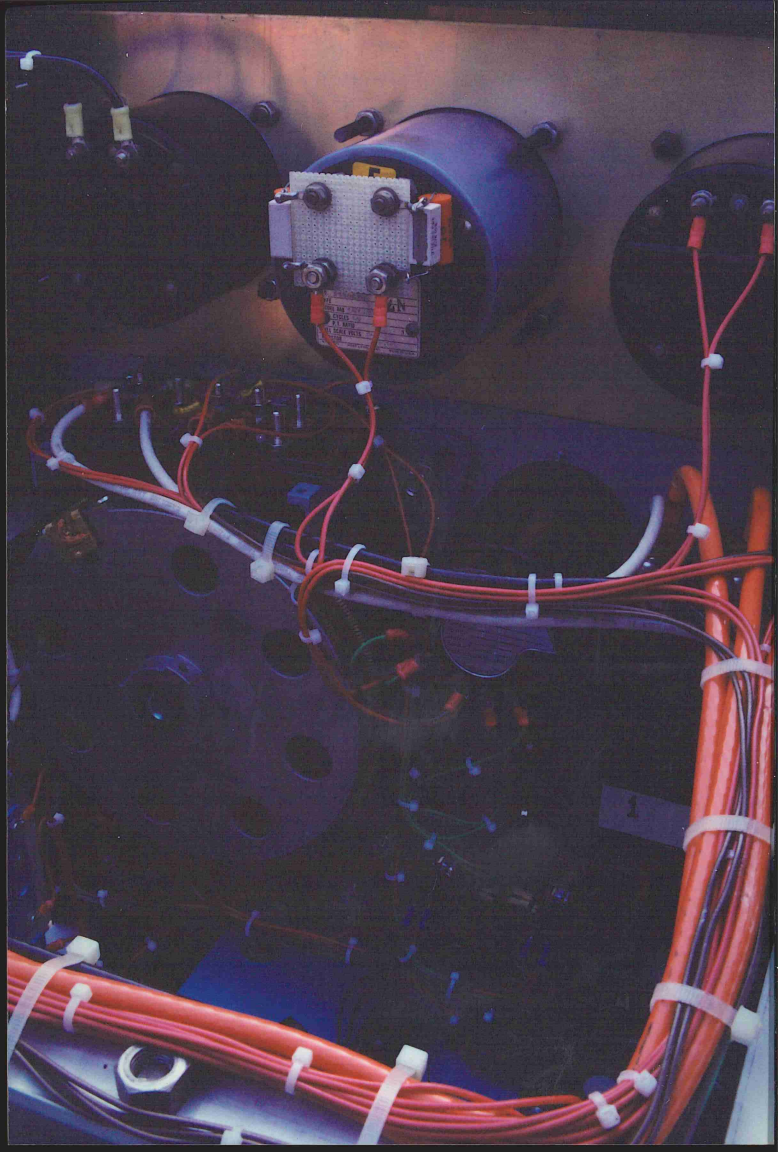

10
ignition

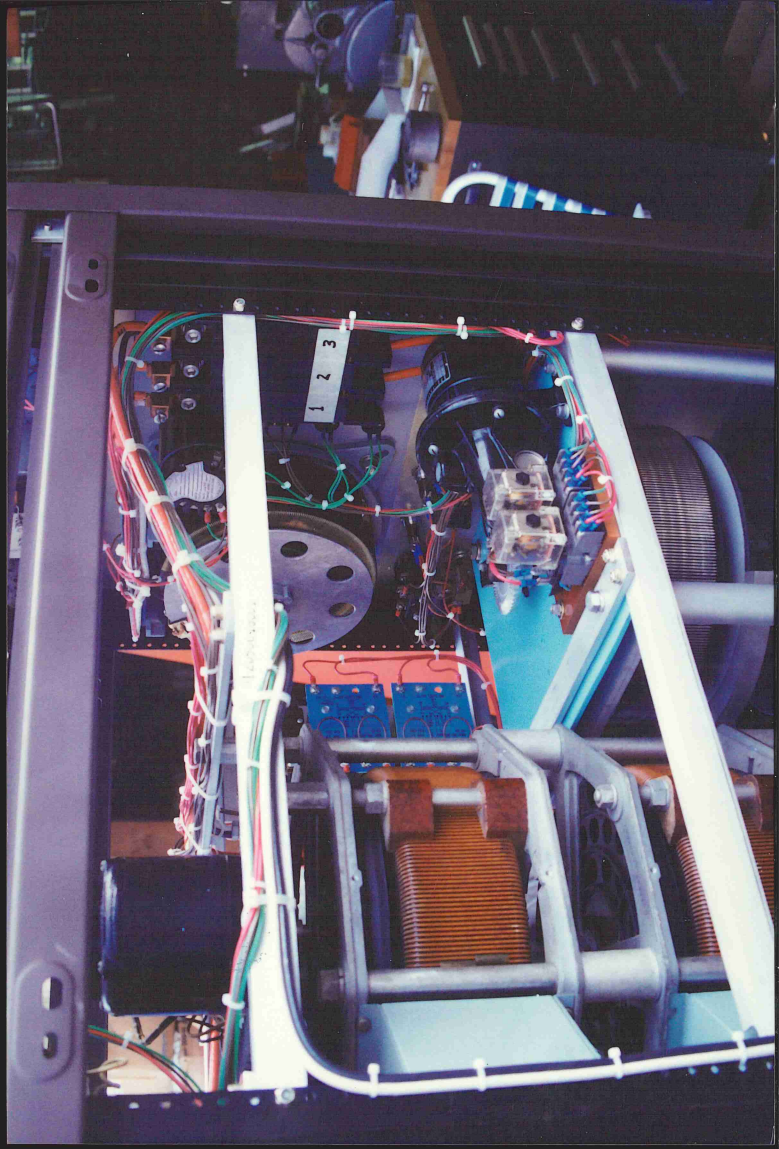


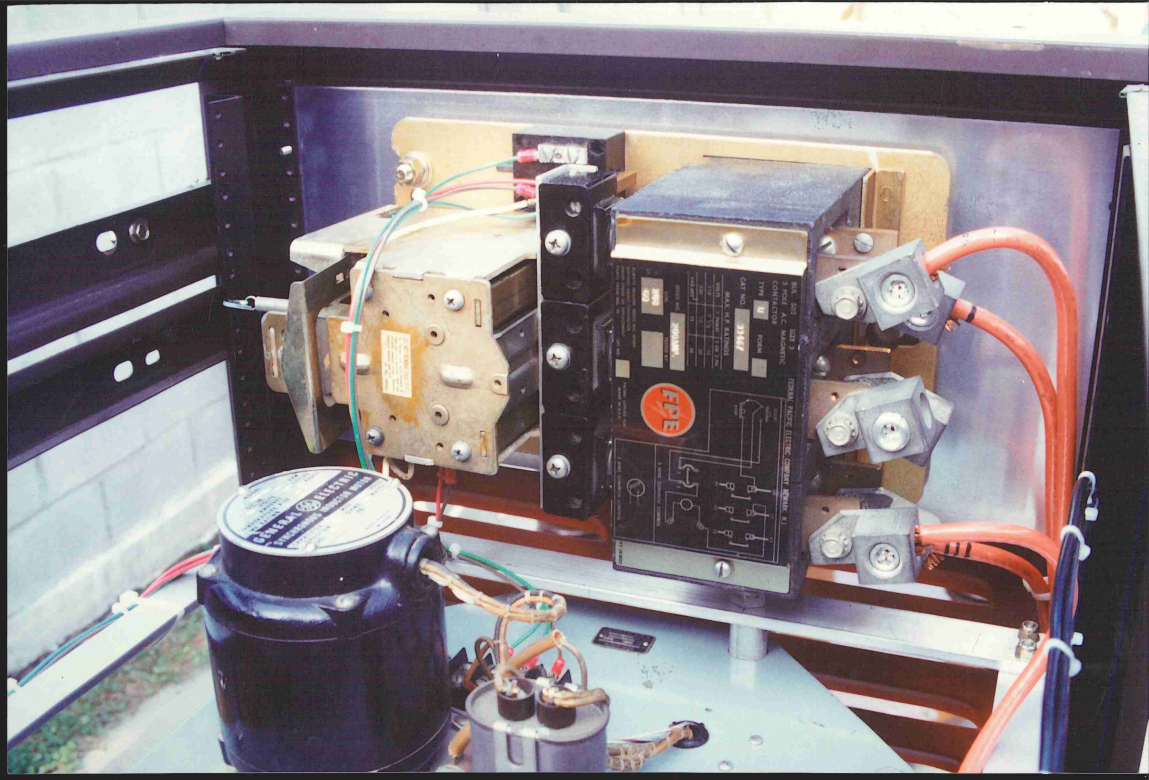


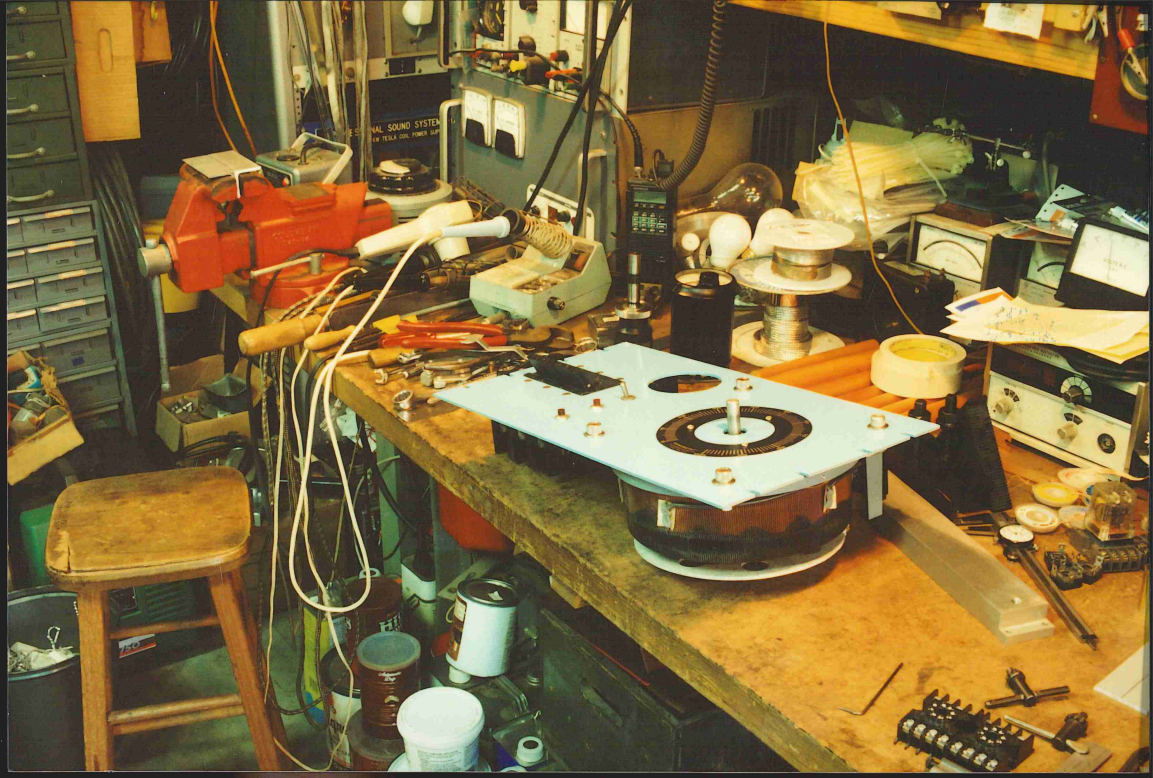


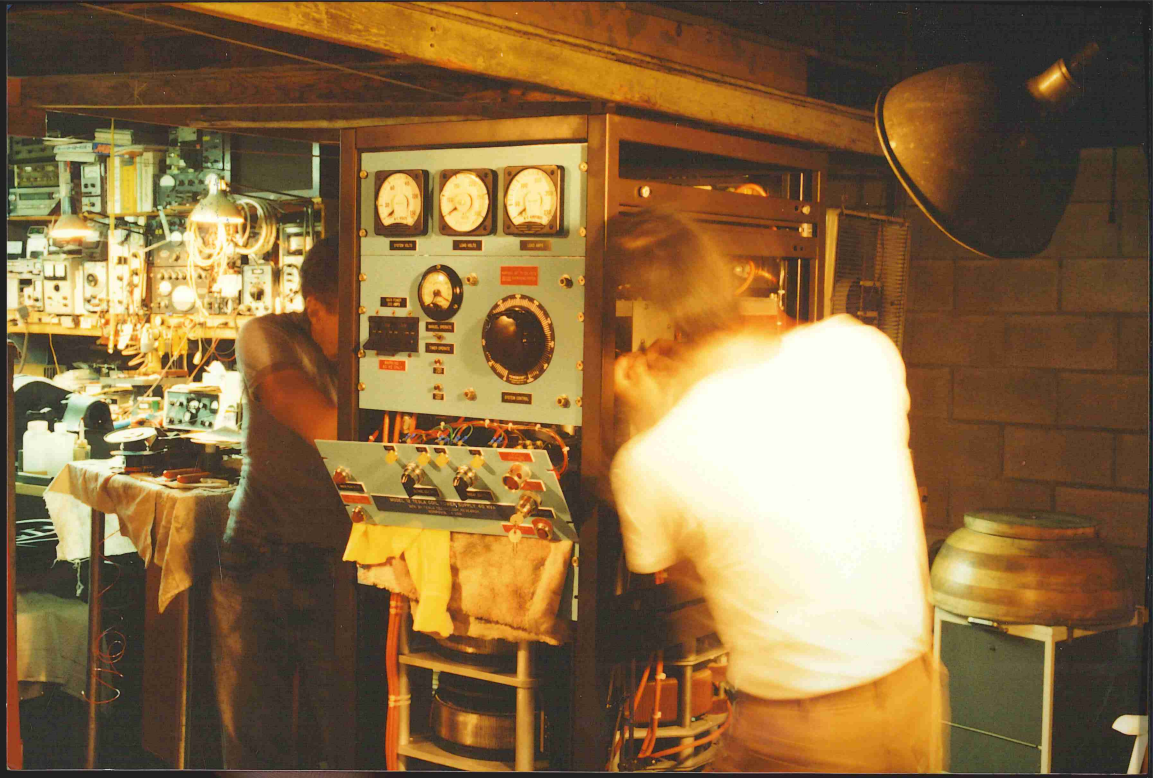


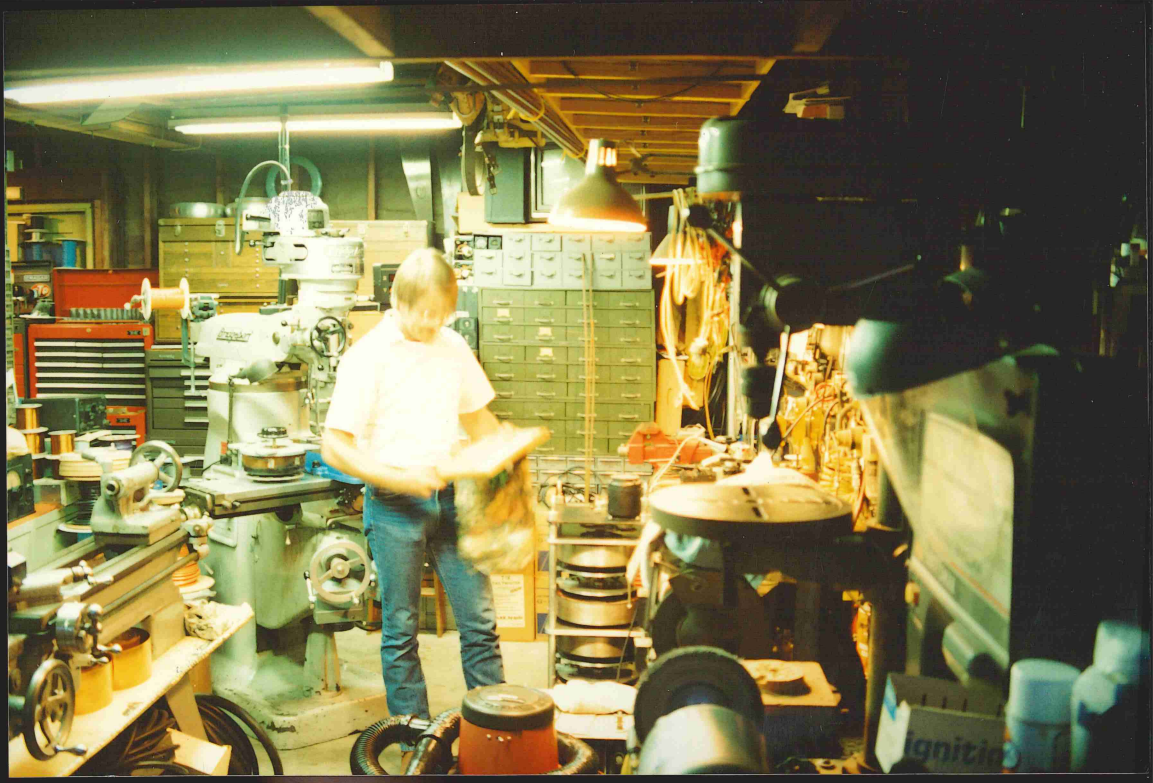


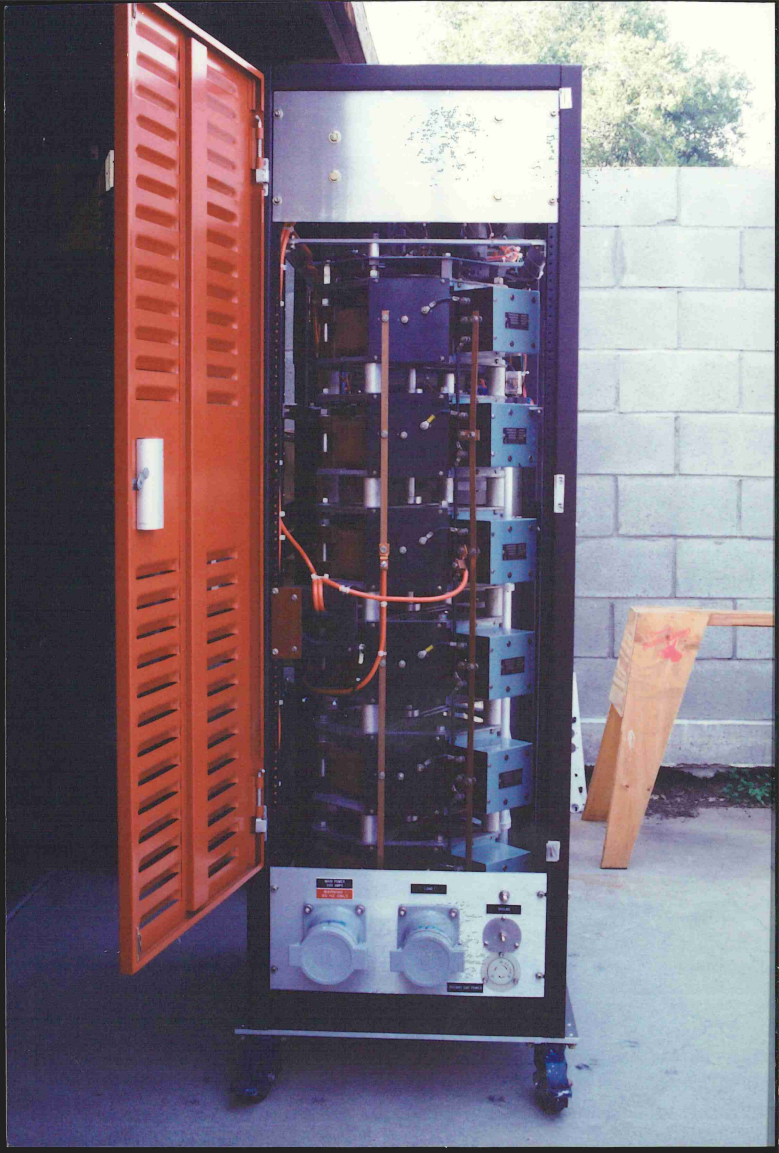

1 2 3


FPE

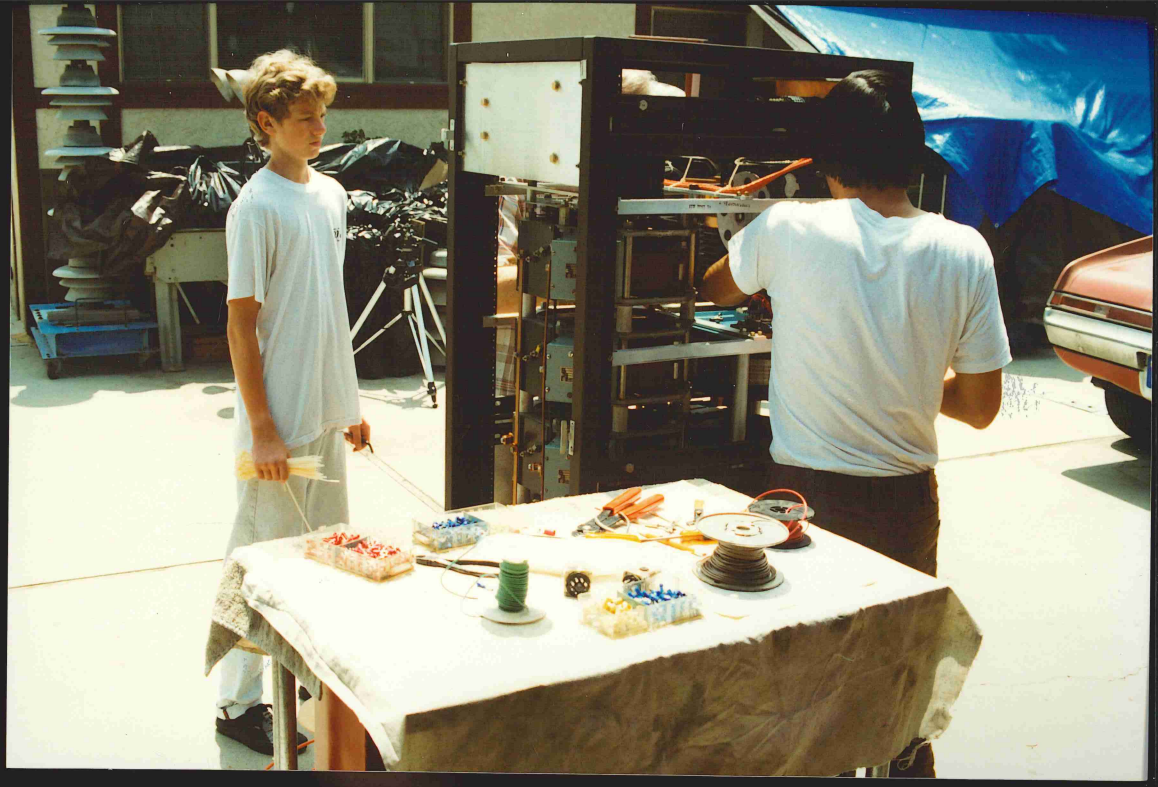


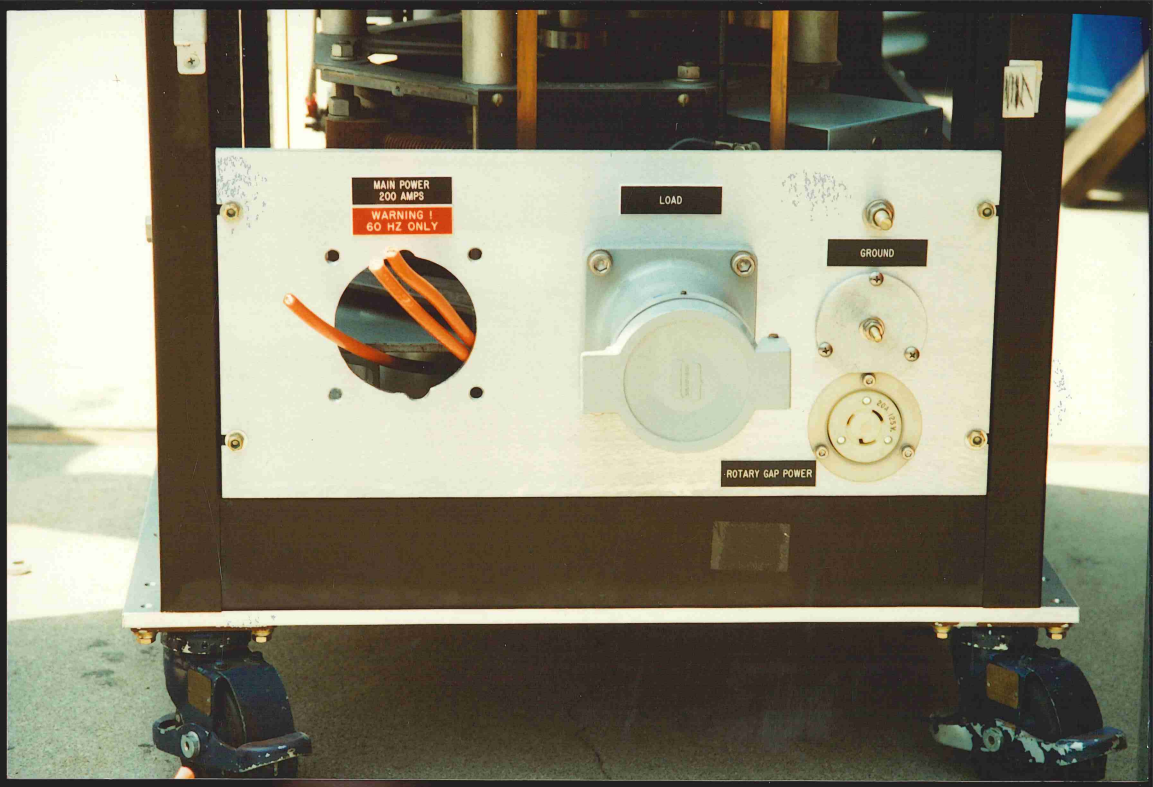


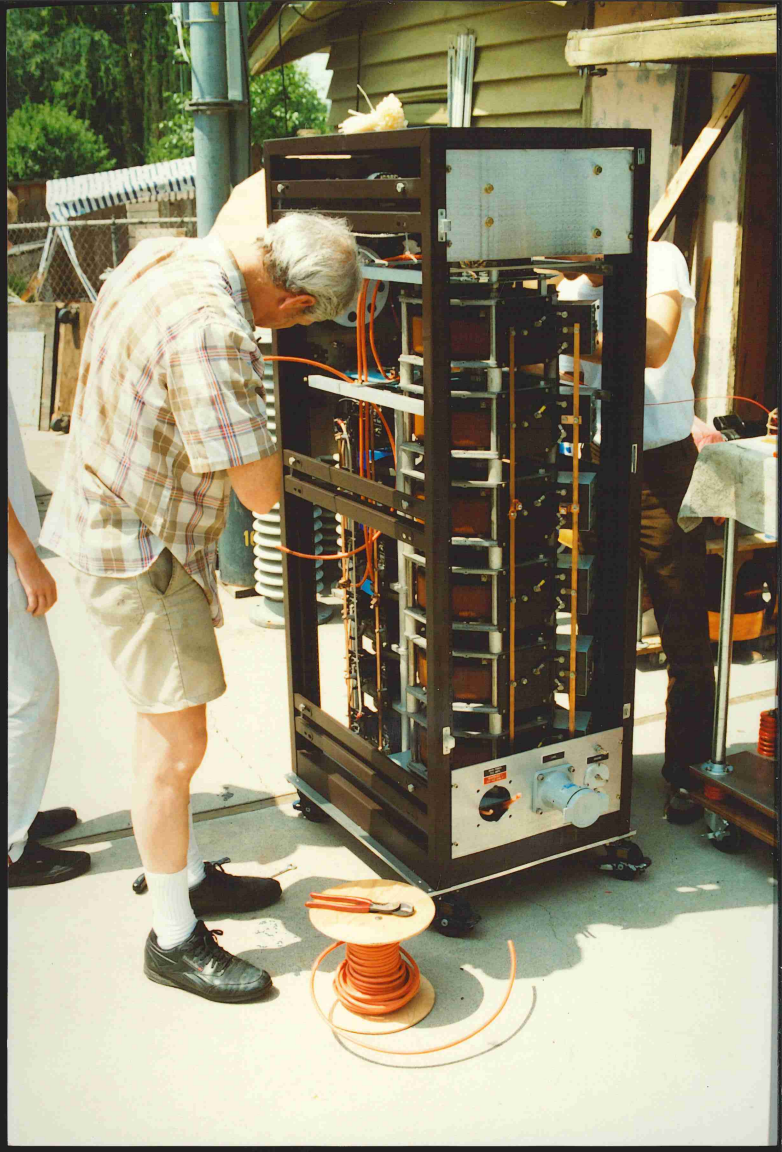


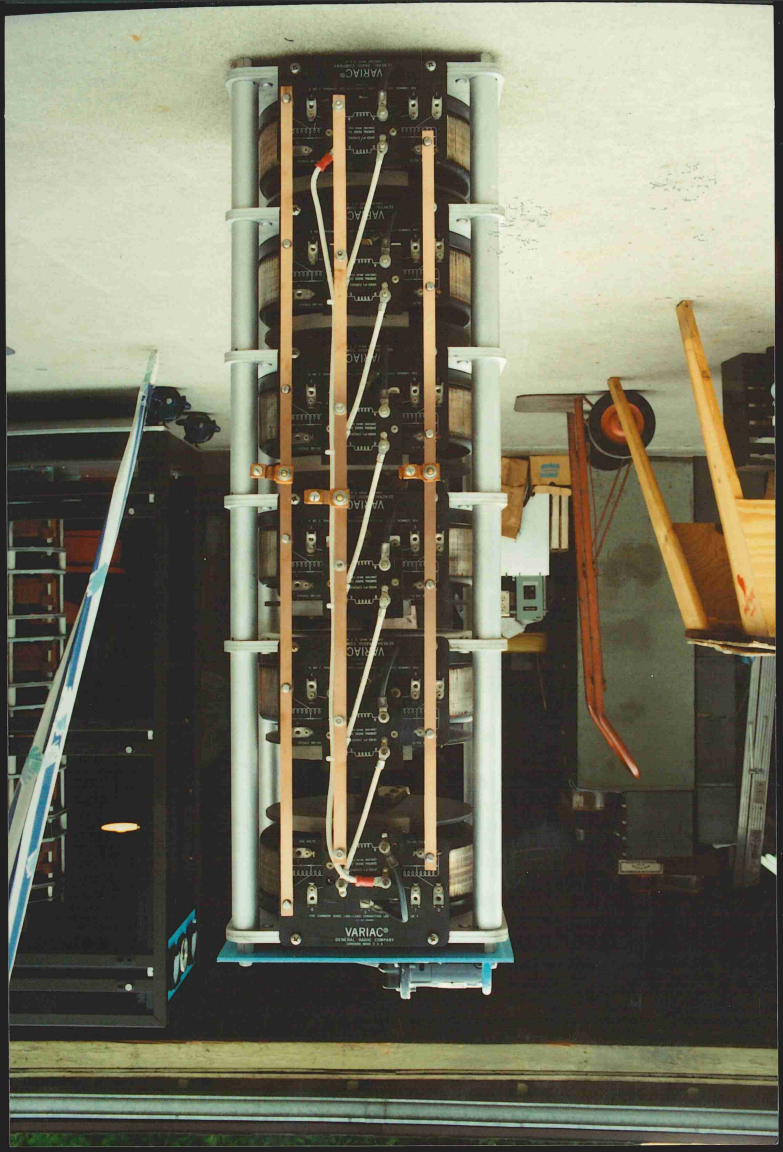




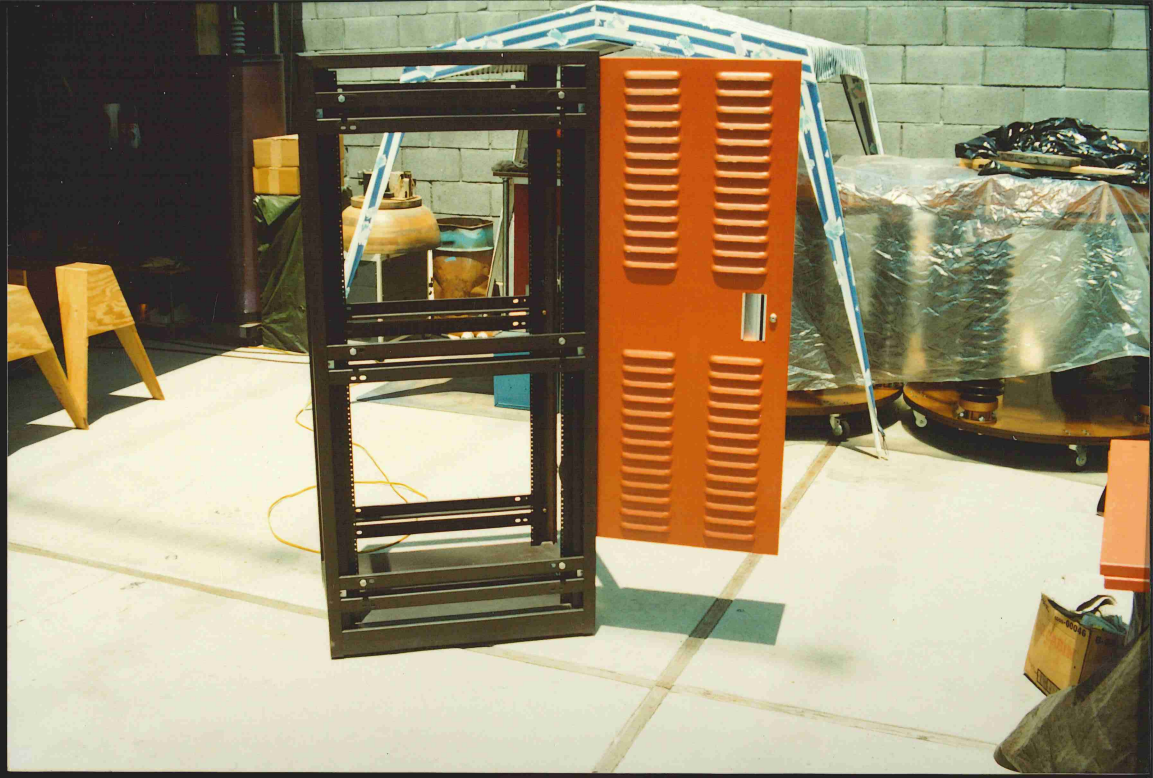


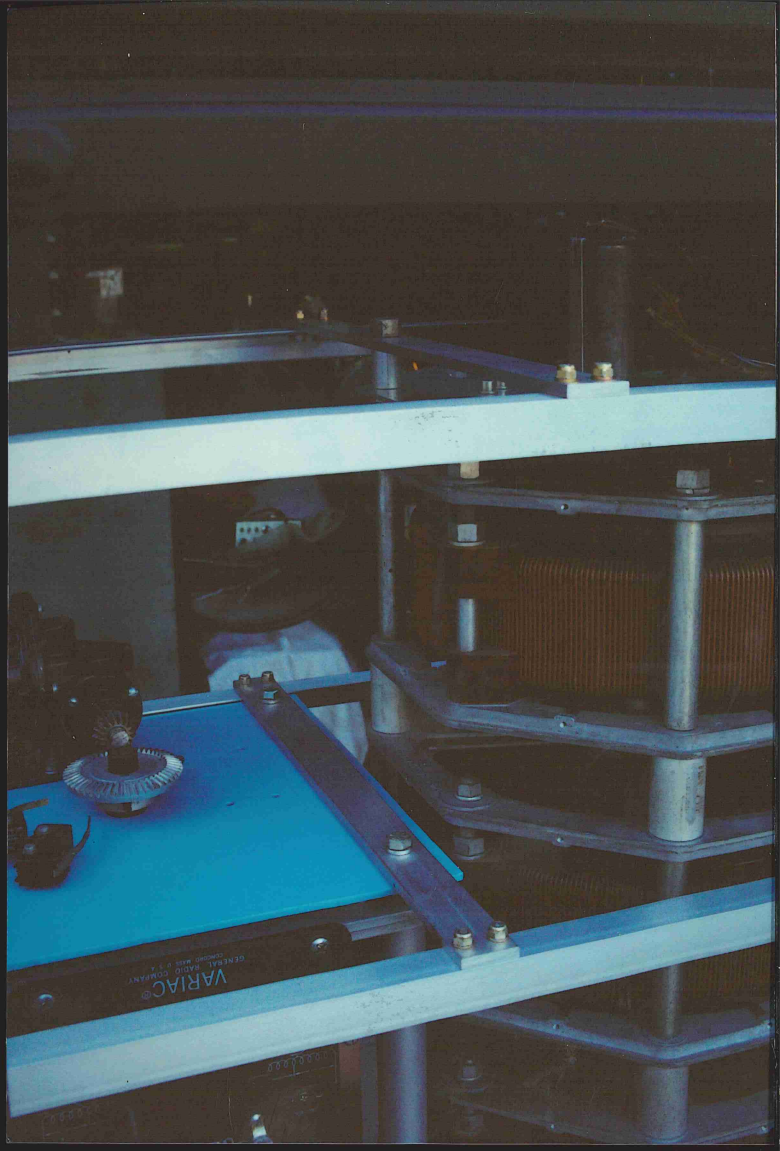

MAIN POWER
200 AMPS
WARNING !
60 HZ ONLY
LOAD
GROUND
ROTARY GAP POWER




VARIAC®
GENERAL RADIO COMPANY





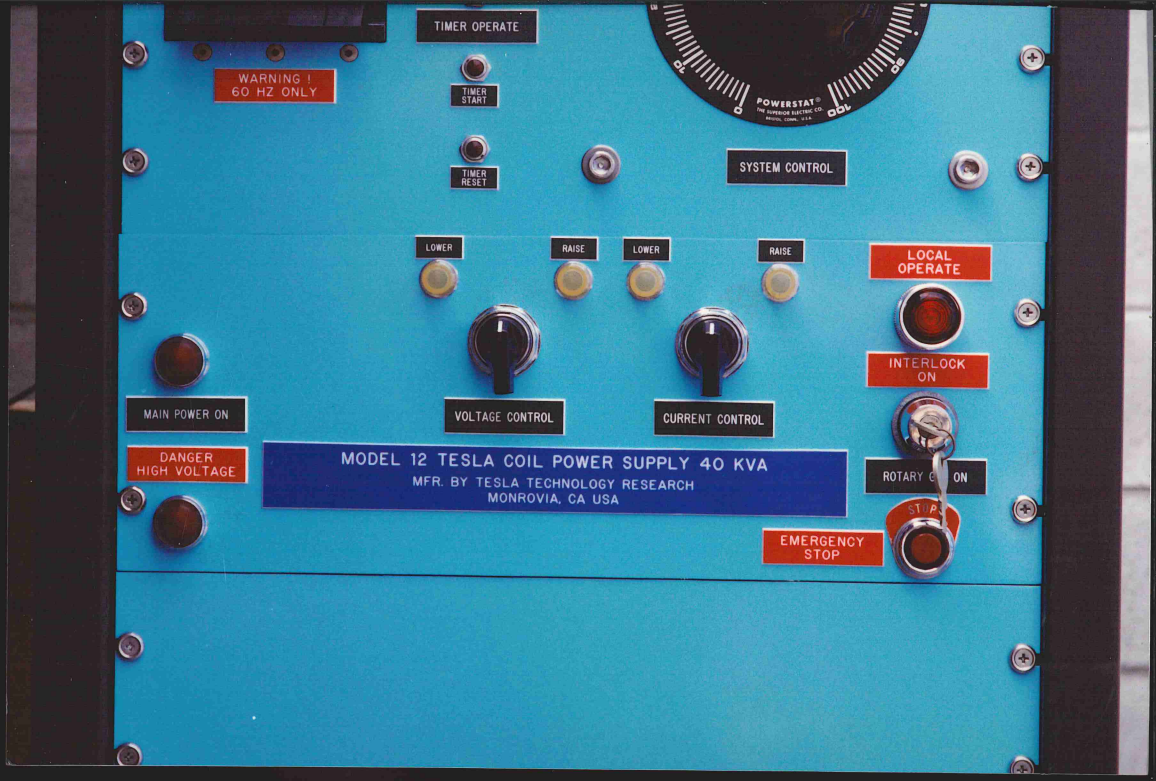

VARIAC®
GENERAL RADIO COMPANY

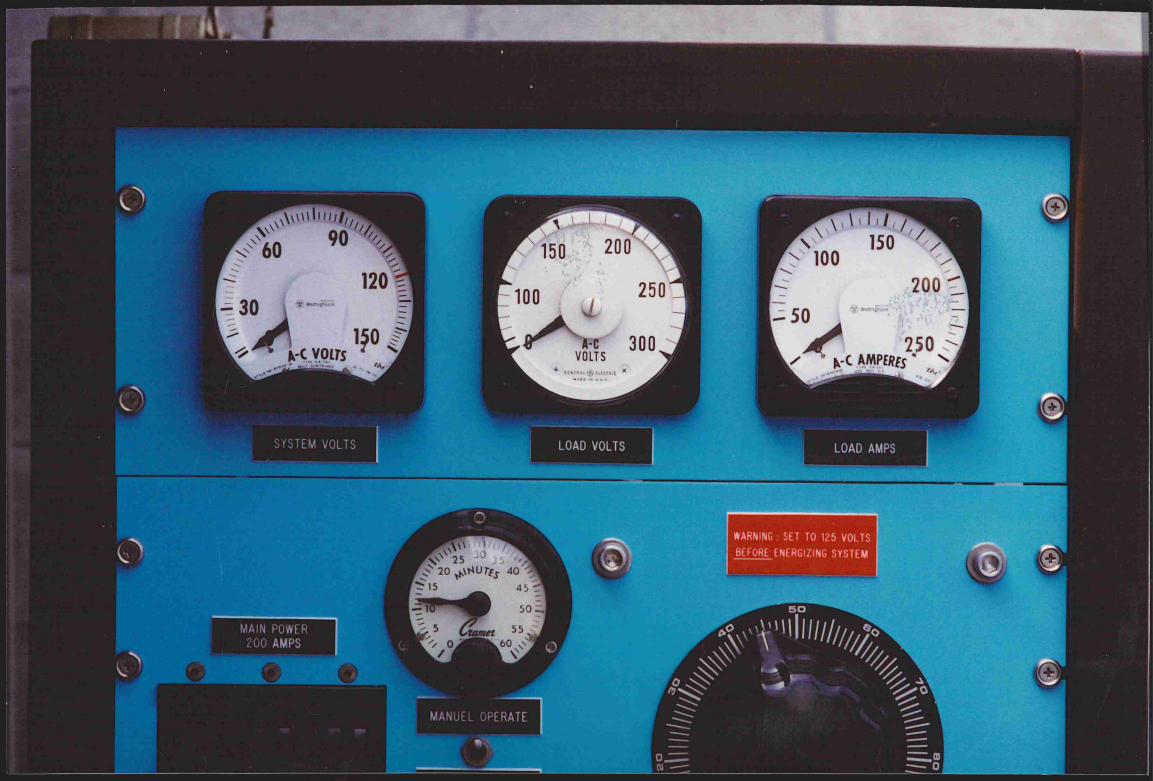


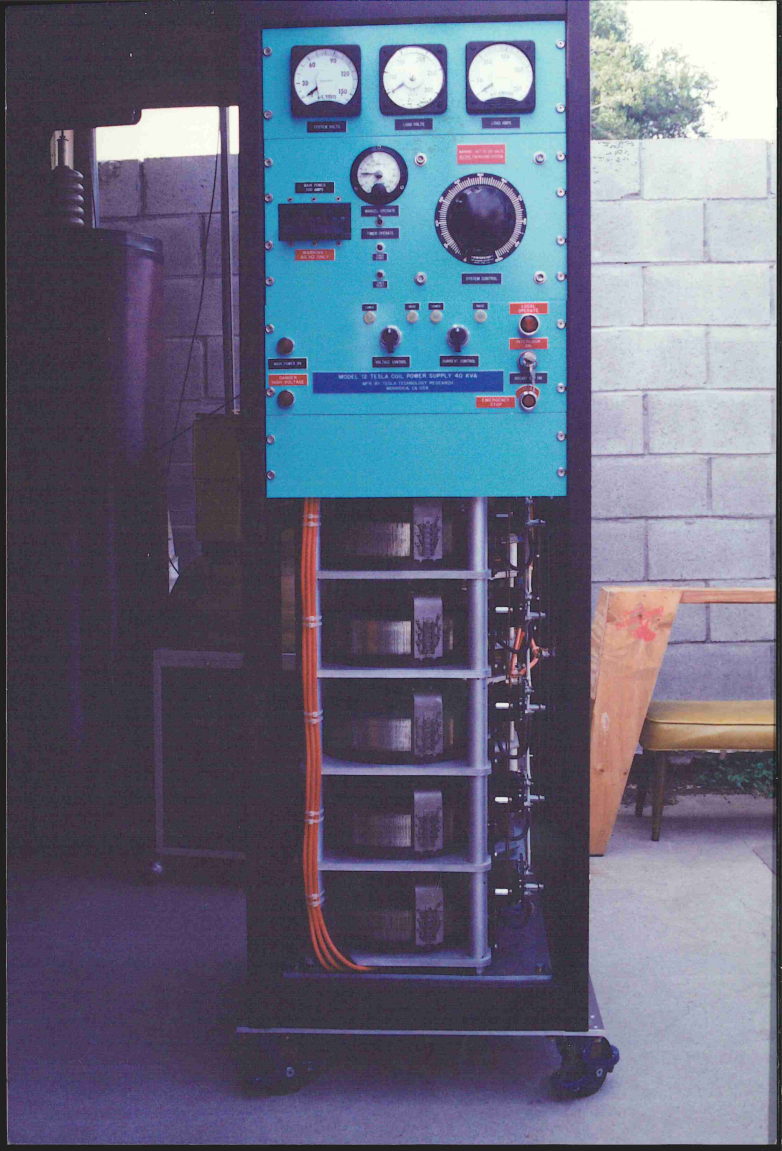


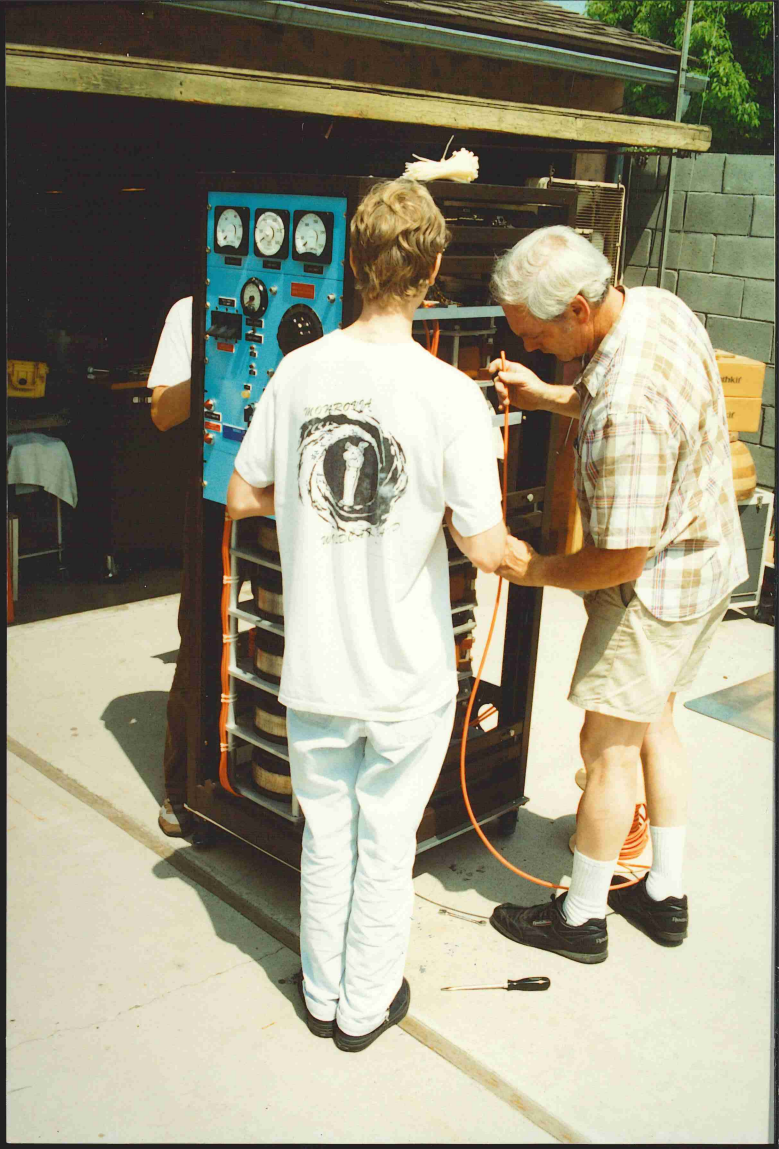


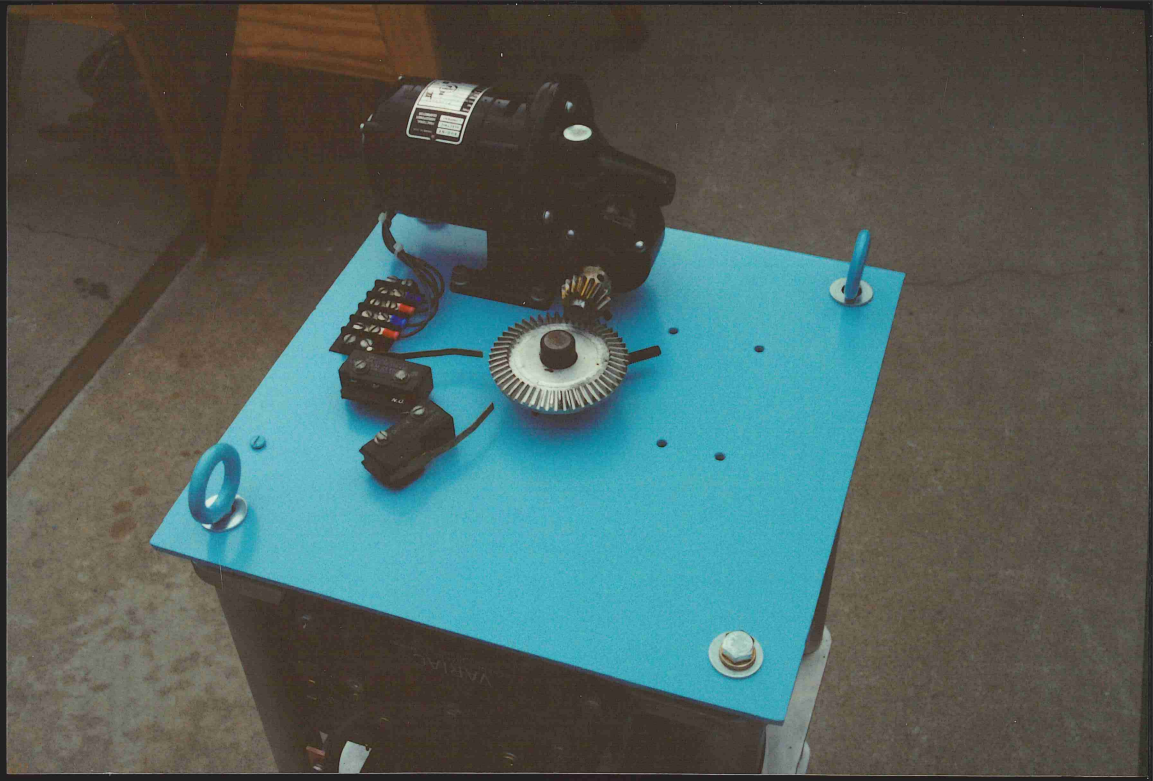

MODEL 12 TESLA COIL POWER SUPPLY 40 KVA

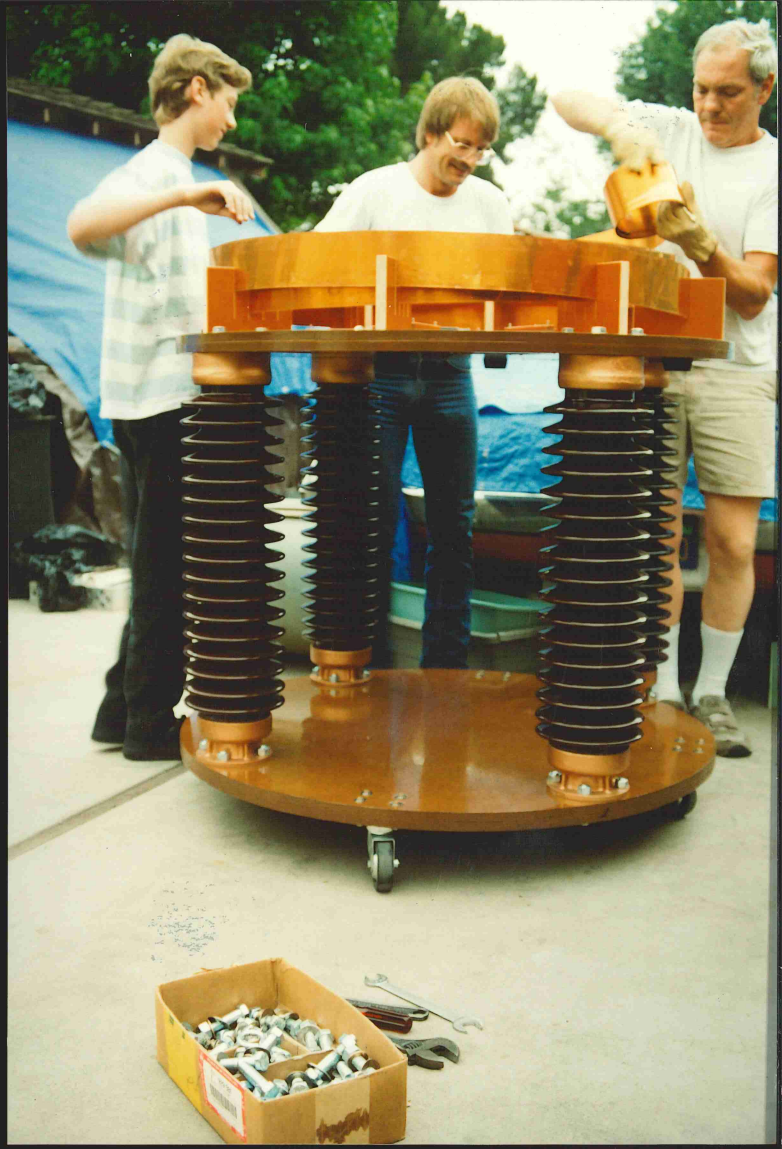

TIMER OPERATE
WARNING !
60 HZ ONLY
TIMER START
TIMER RESET
POWERSTAT
SYSTEM CONTROL
LOWER
RAISE
LOWER
RAISE
LOCAL OPERATE
INTERLOCK ON
MAIN POWER ON
VOLTAGE CONTROL
CURRENT CONTROL
DANGER HIGH VOLTAGE
MODEL 12 TESLA COIL POWER SUPPLY 40 KVA
MFR. BY TESLA TECHNOLOGY RESEARCH
MONROVIA, CA USA
EMERGENCY STOP

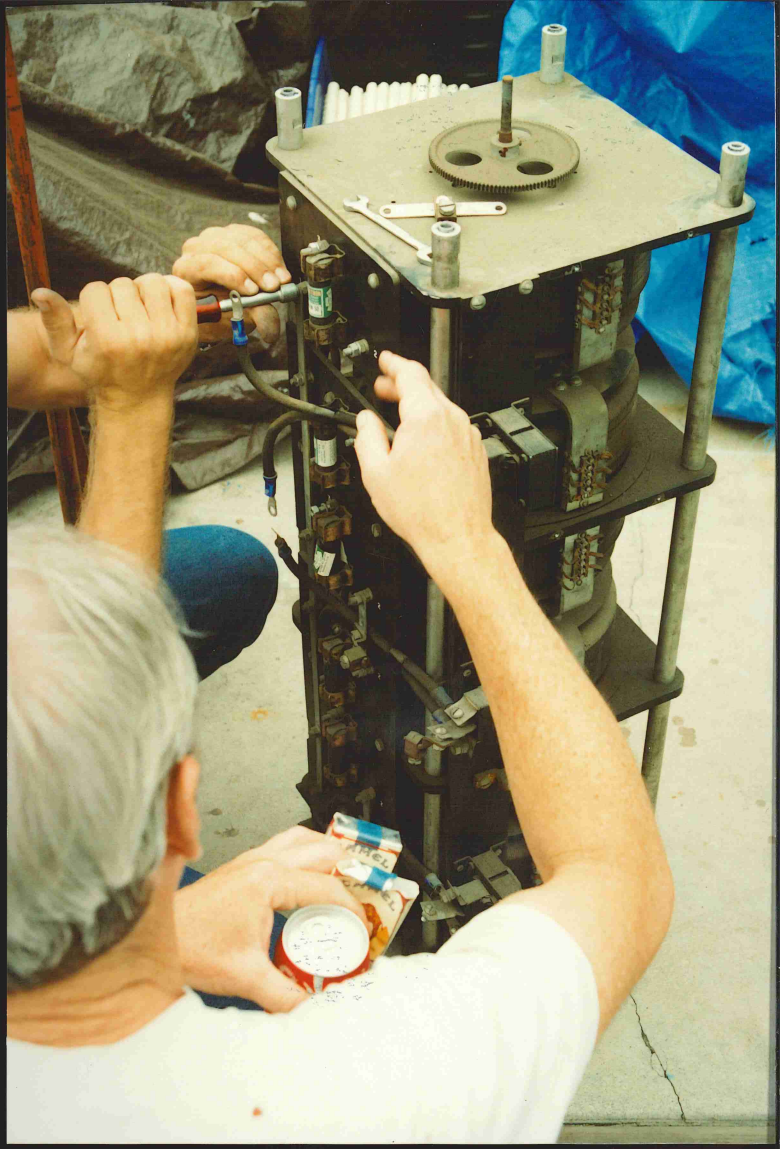

A-C VOLTS
SYSTEM VOLTS
A-C VOLTS
LOAD VOLTS
A-C AMPERES
LOAD AMPS
MAIN POWER
200 AMPS
MINUTES
Cramer
MANUEL OPERATE
WARNING : SET TO 125 VOLTS
BEFORE ENERGIZING SYSTEM


MODEL 12 TESLA COIL POWER SUPPLY 40 KVA

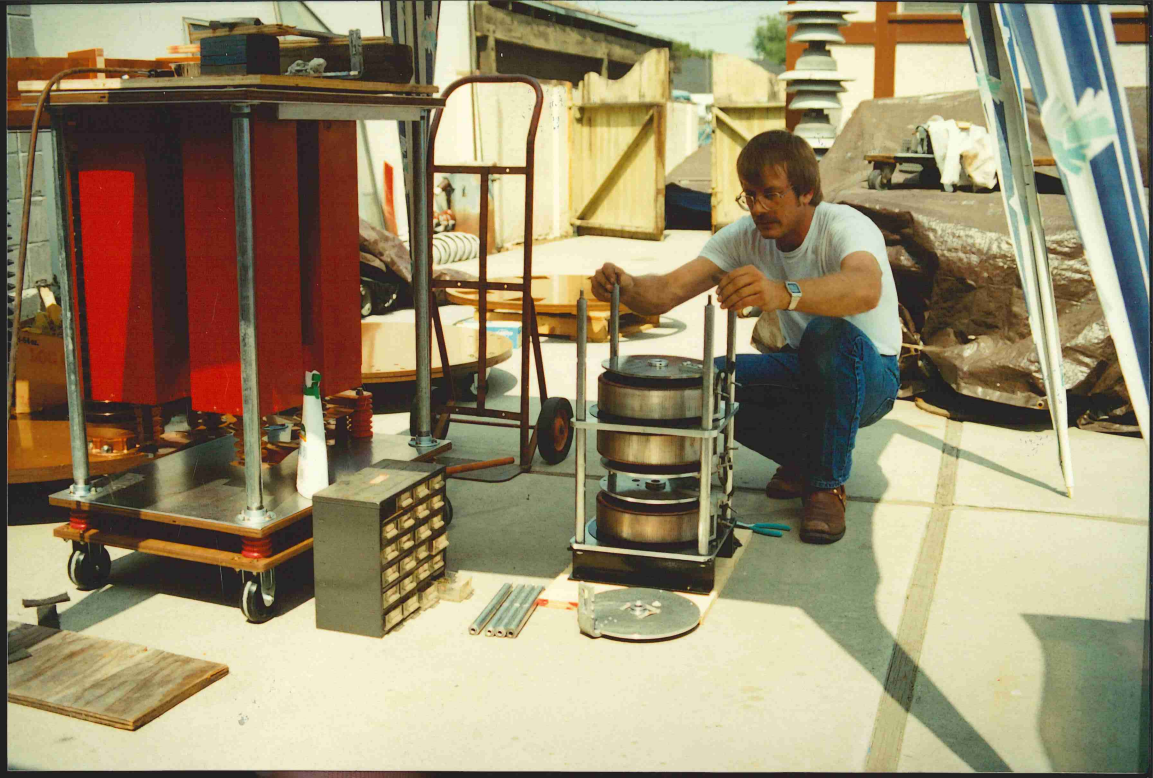


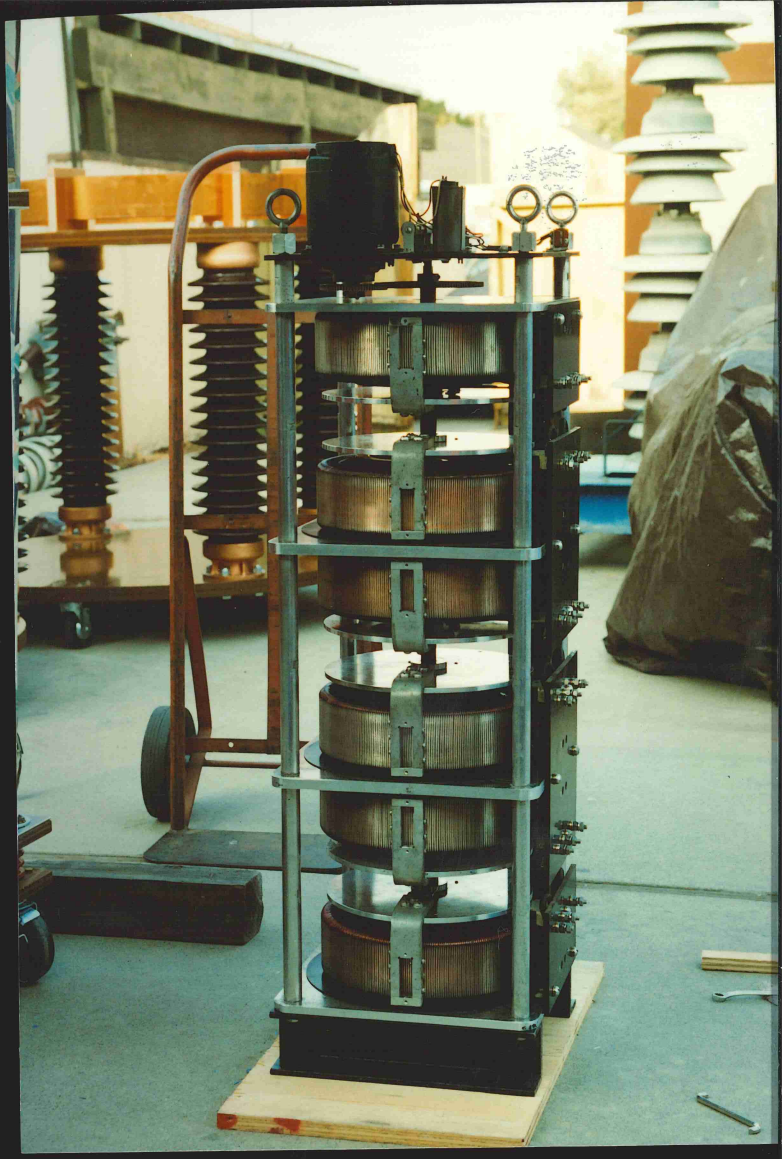


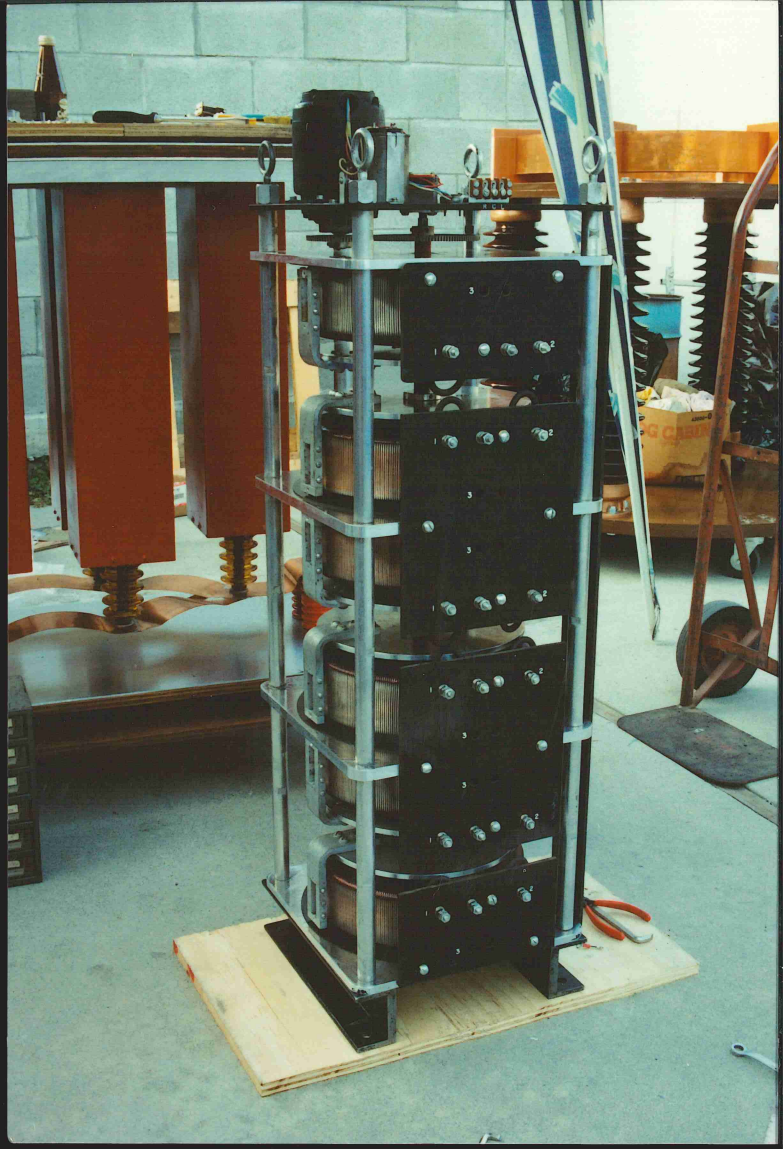


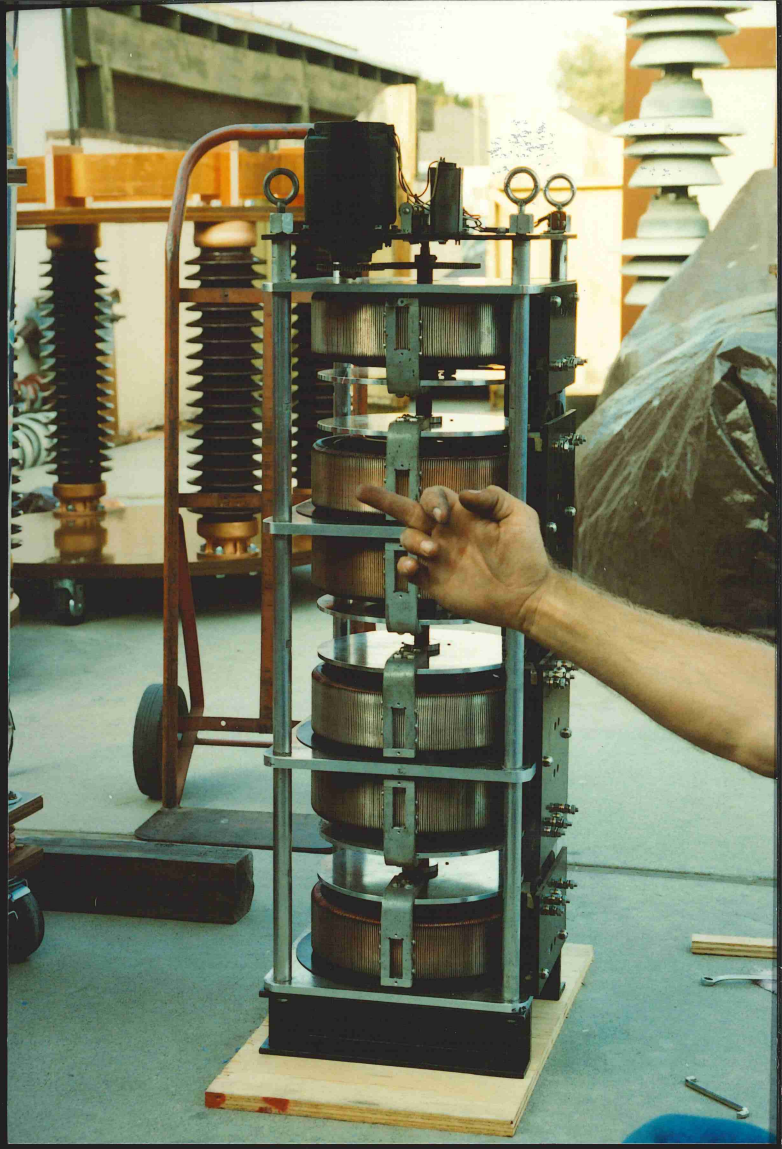




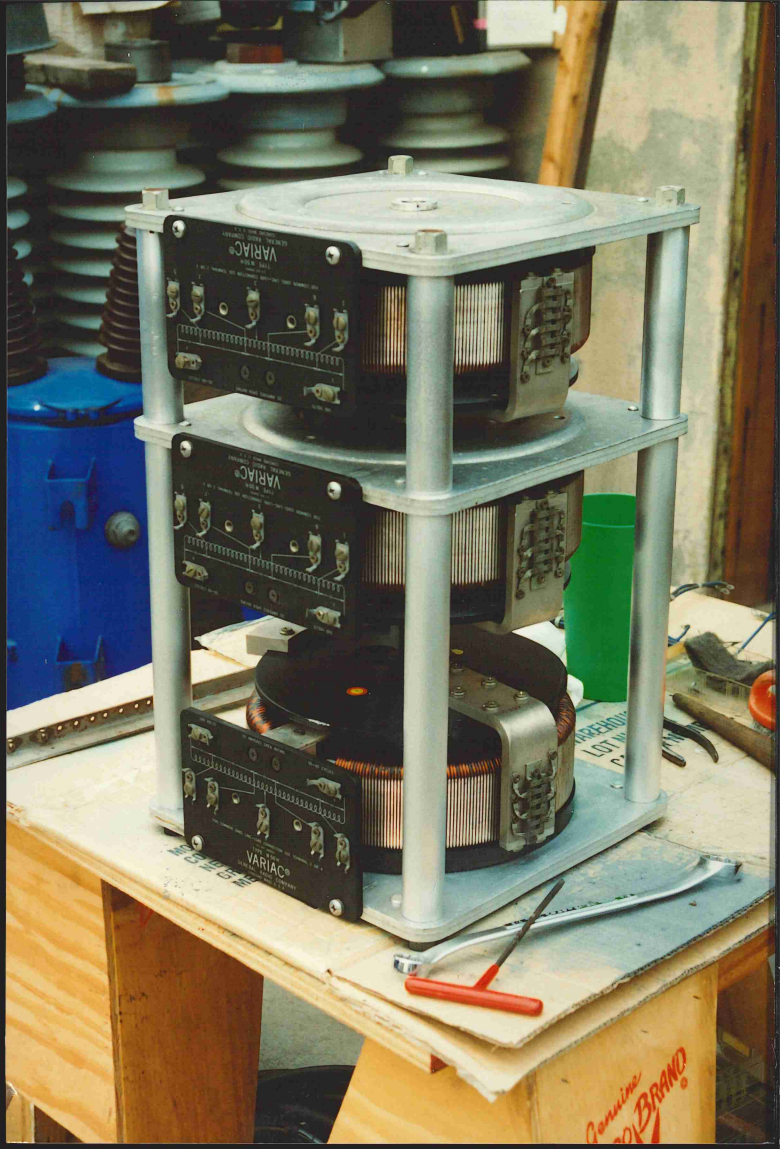






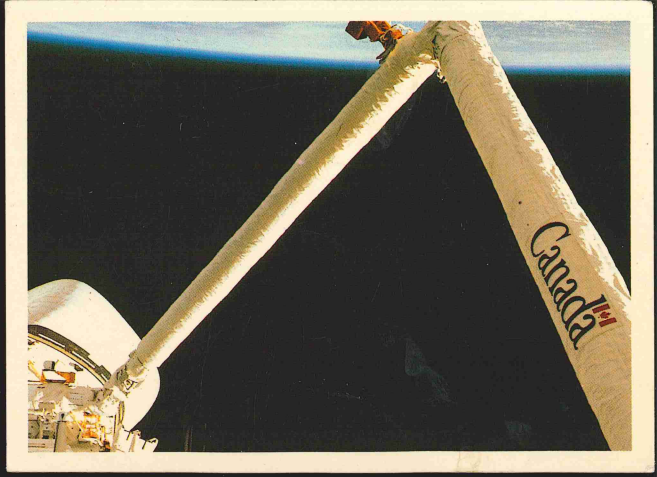




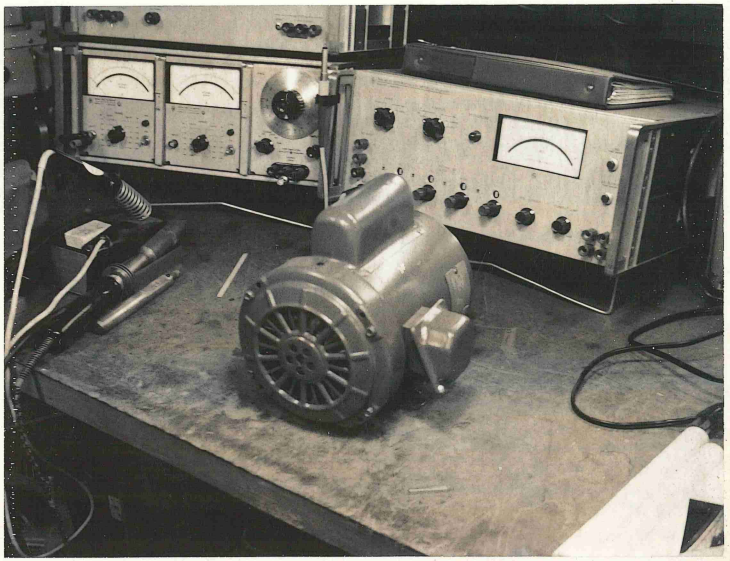

VARIAC®
VARIAC®
VARIAC®

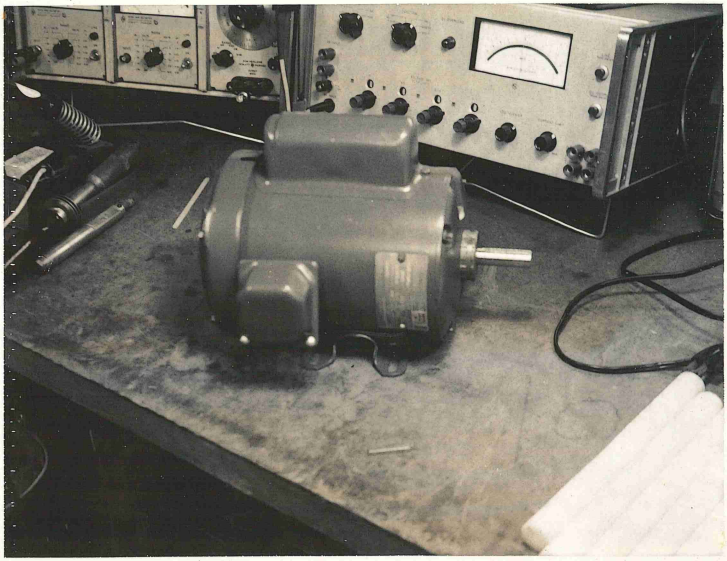


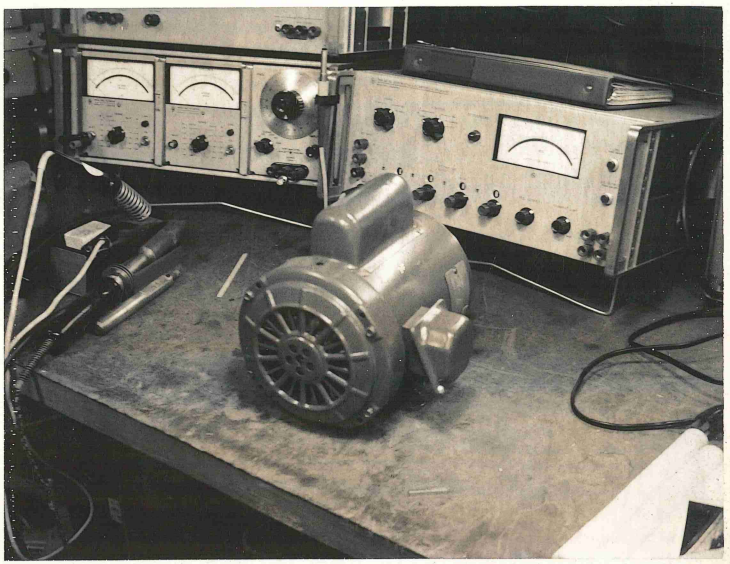


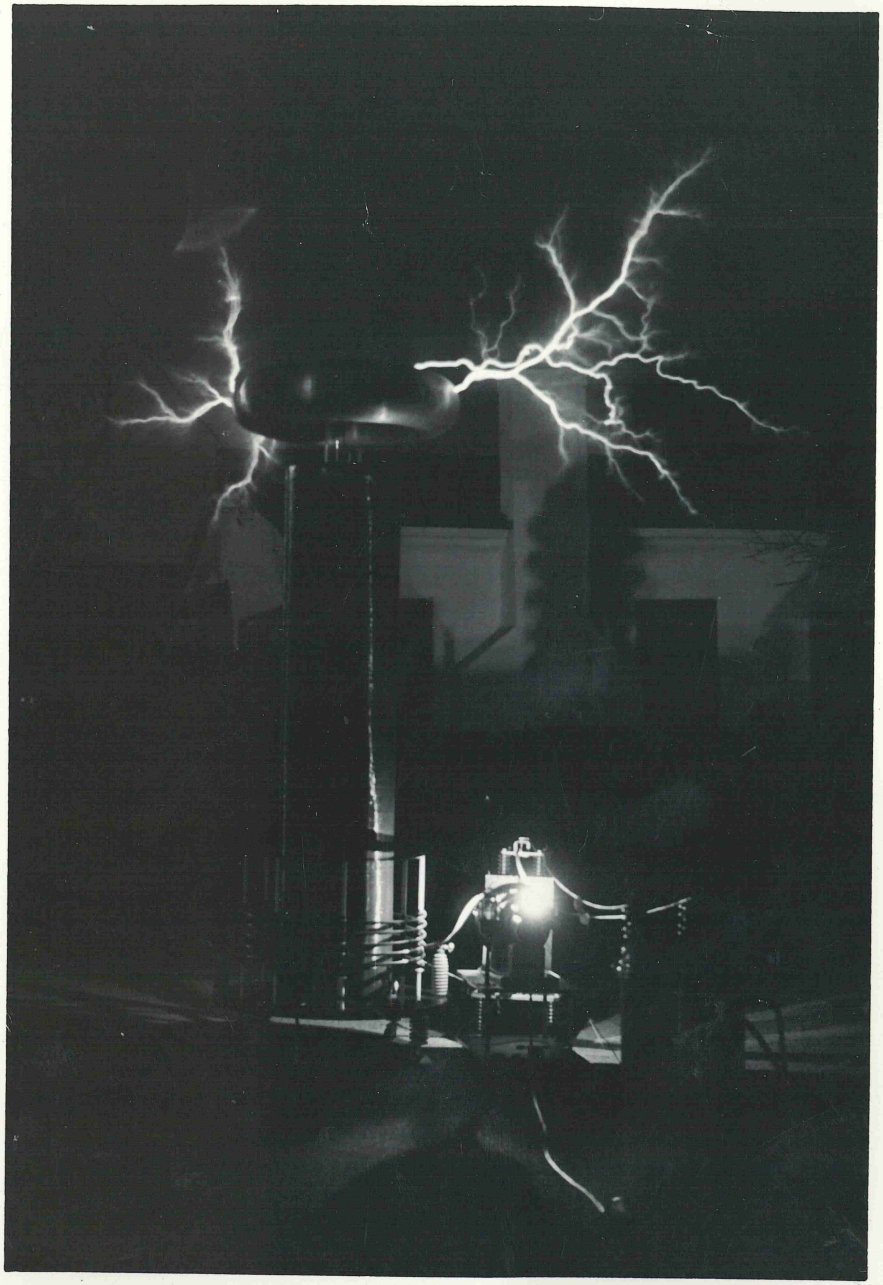

Canada

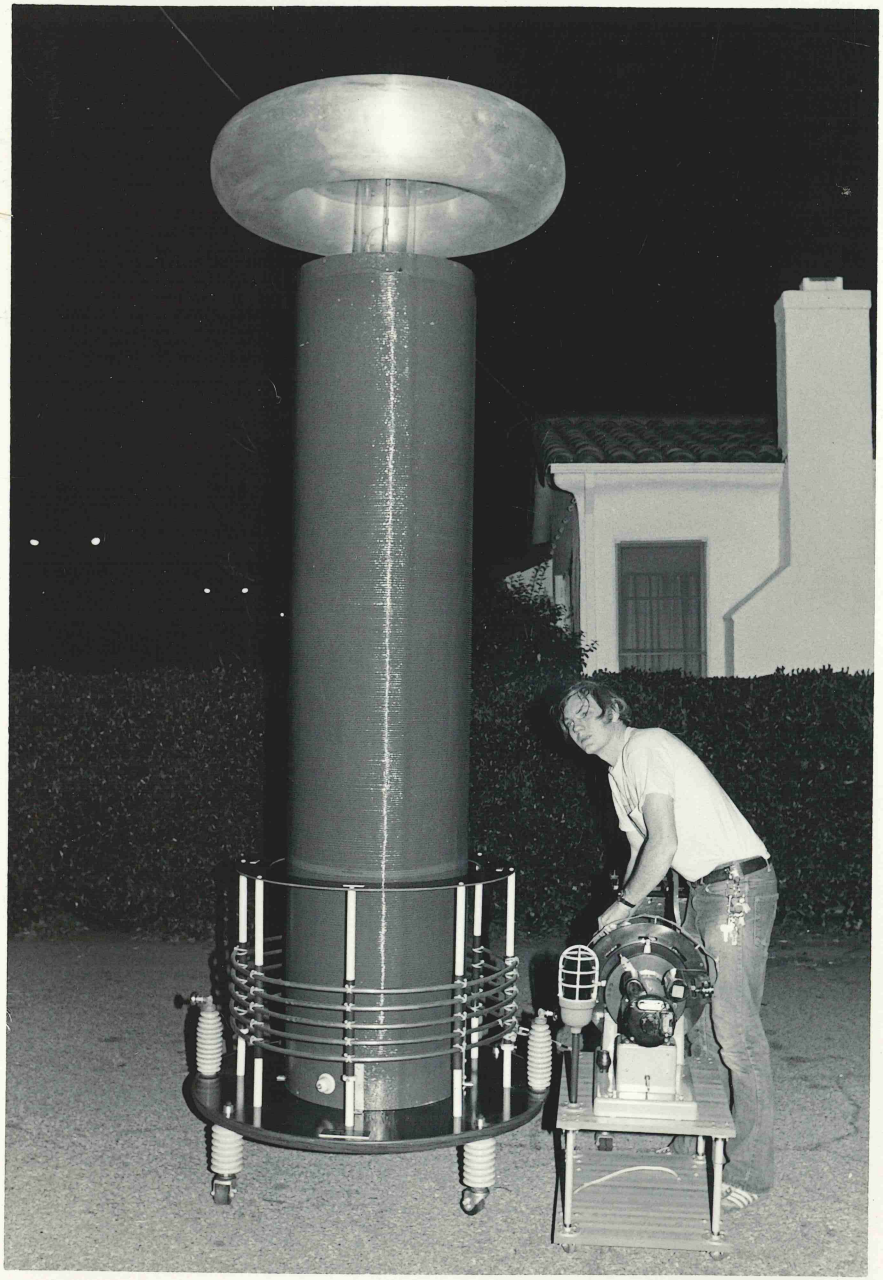
STS–2 ONBOARD PHOTO – THIS VIEW OF THE REMOTE MANIPULATOR SYSTEM (RMS) ARM WAS TAKEN BY THE STS–2 CREW OF ASTRONAUTS JOE H. ENGLE AND RICHARD H. TRULY FROM INSIDE THE COLUMBIA'S FLIGHT DECK. THE FRAME IS FROM A 70MM HAND–HELD CAMERA AND REPRESENTS THE FIRST IMAGE OF STILL PHOTOGRAPHY RELEASED WHICH SHOWS THE TEATING OF THE ARM, WHICH IS MAKING ITS FIRST FLIGHT IN SPACE. NOTE THE END EFFECTOR (NEAR BACK OF BAY) WHICH FUNCTIONS AS A HUMAN HAND. NEAR THE ELBOW CAN BE SEEN A REMOTELY OPERATED TELEVISION CAMERA. THE STILL CAMERA WHICH EXPOSED THIS FRAME WAS AIMED THROUGH ONE OF TWO AFT WINDOWS OF THE COLUMBIA'S CABIN.
**PHOTO CREDIT—NASA.**

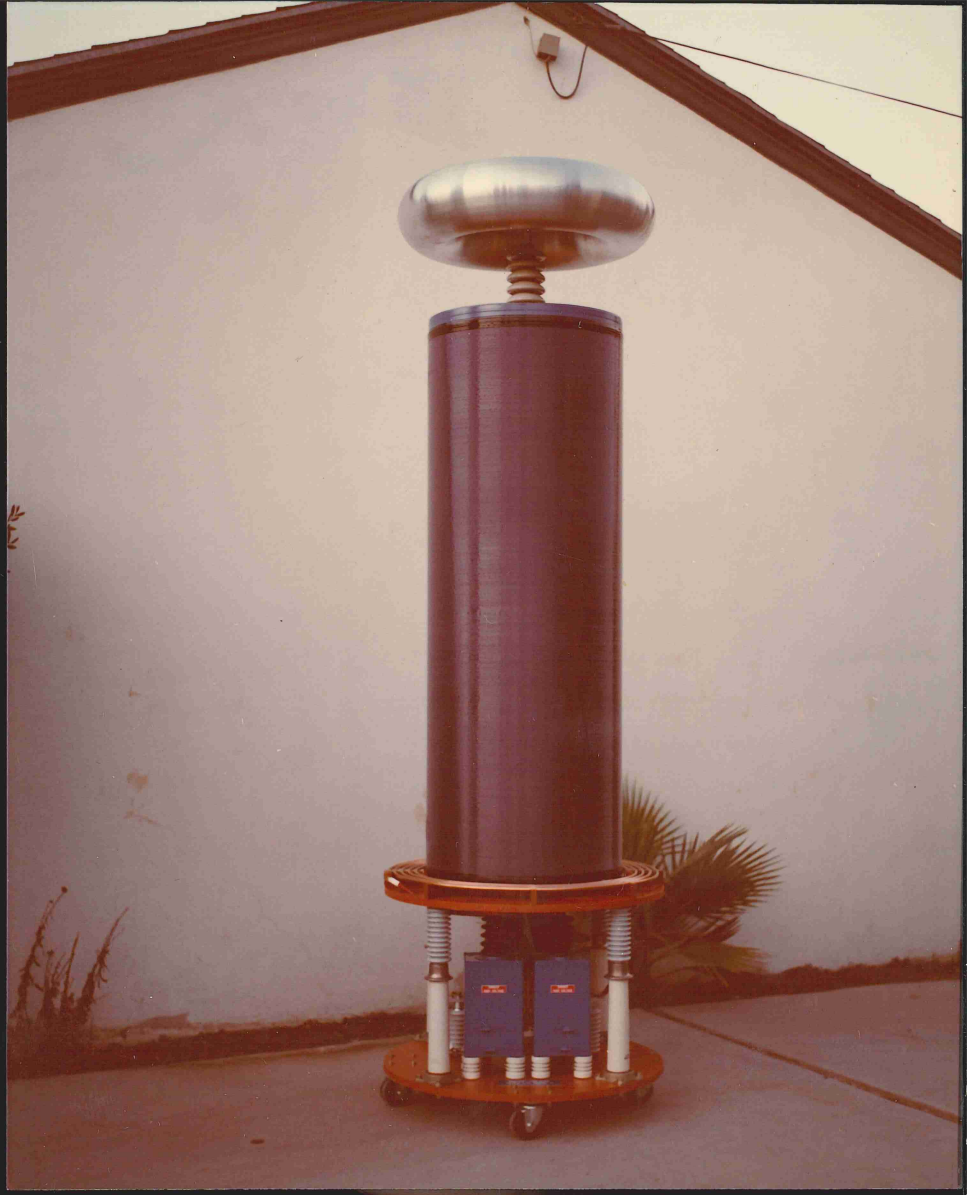


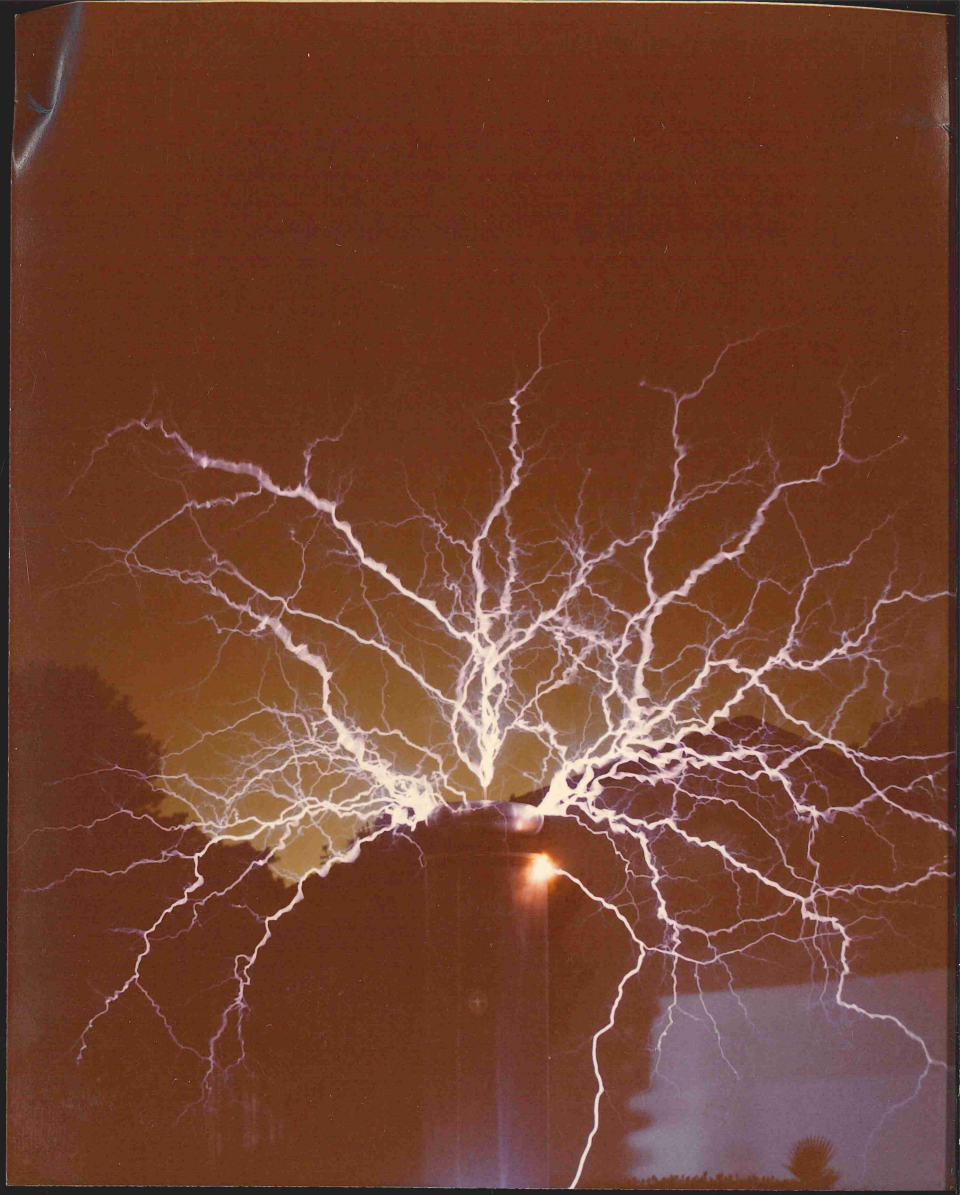




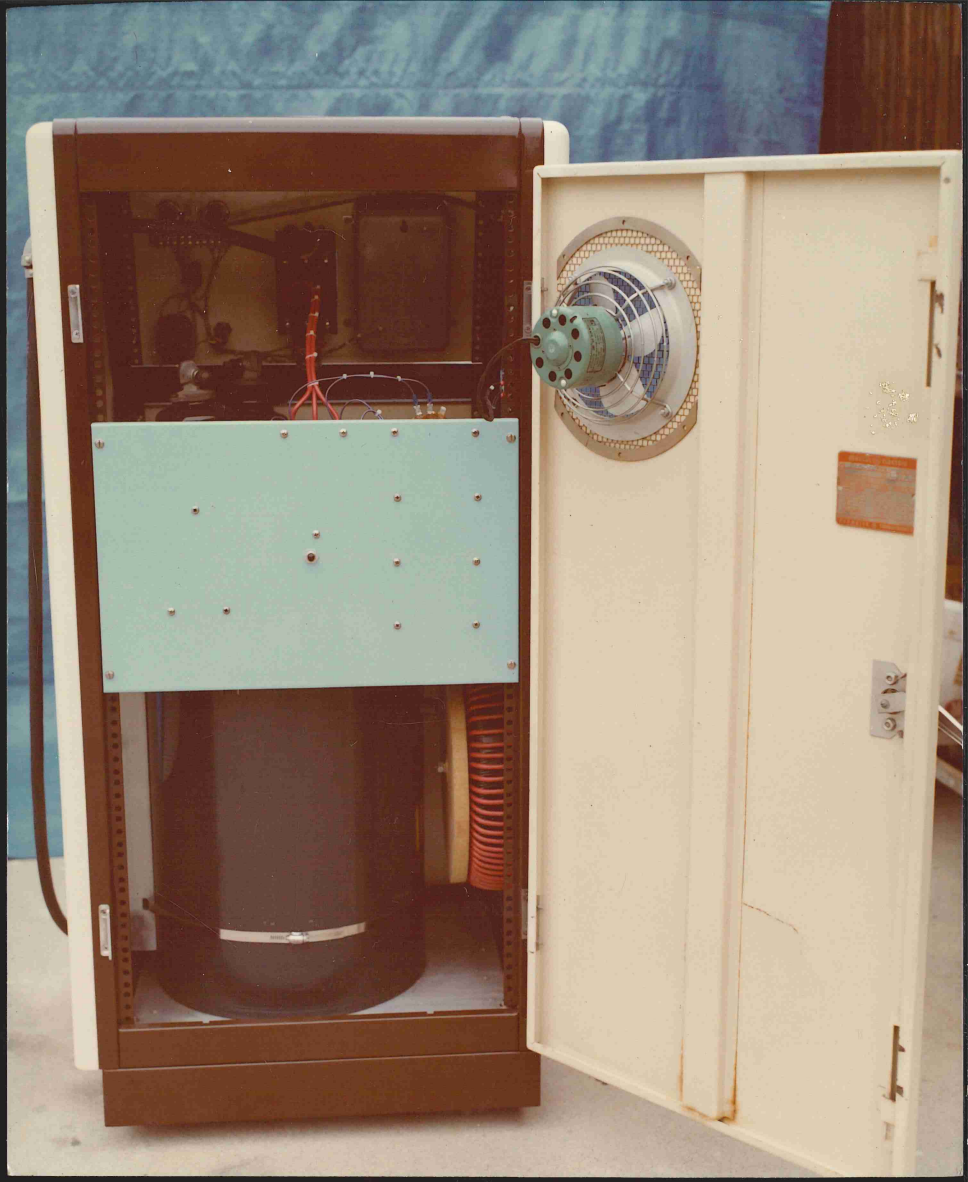


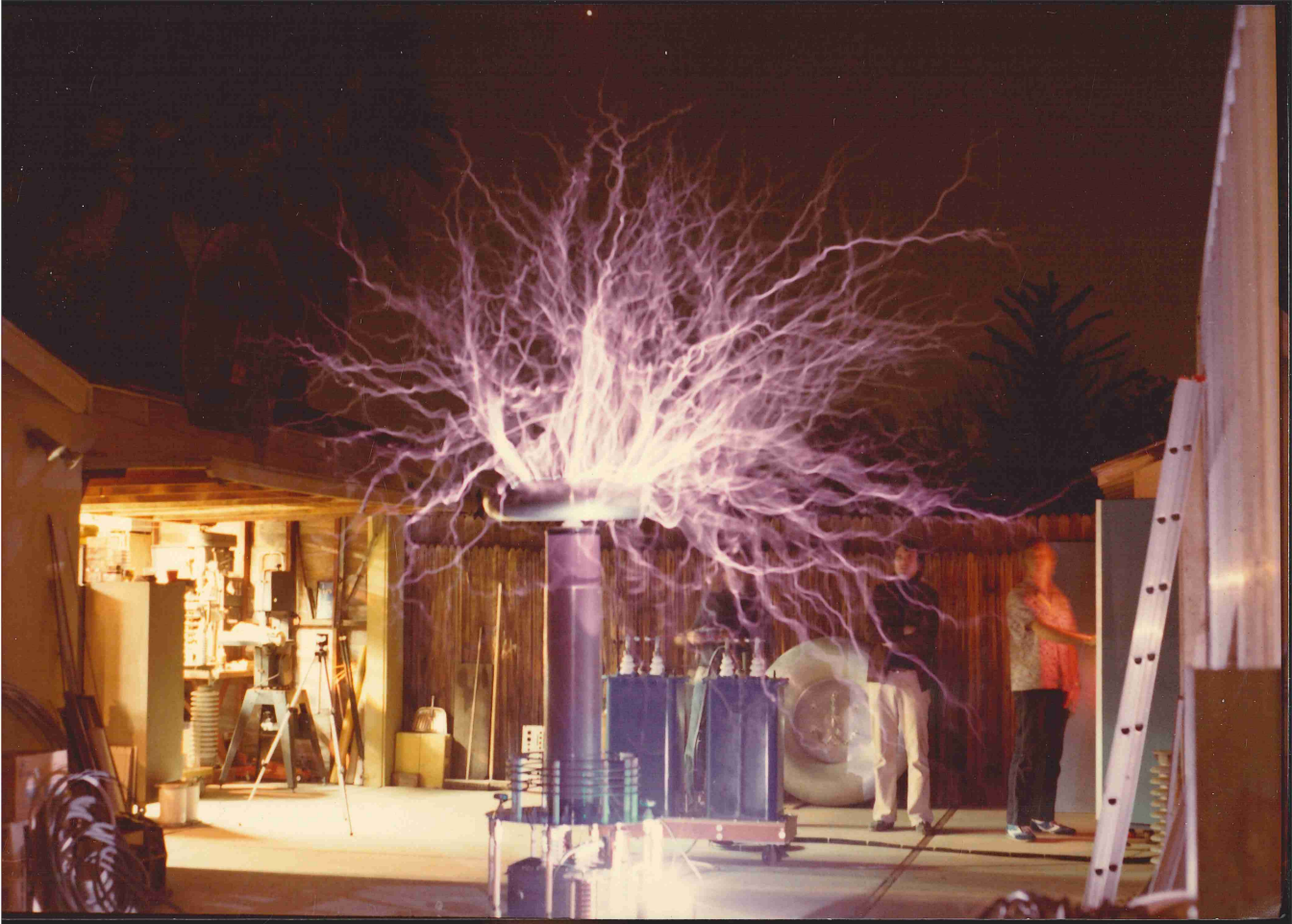


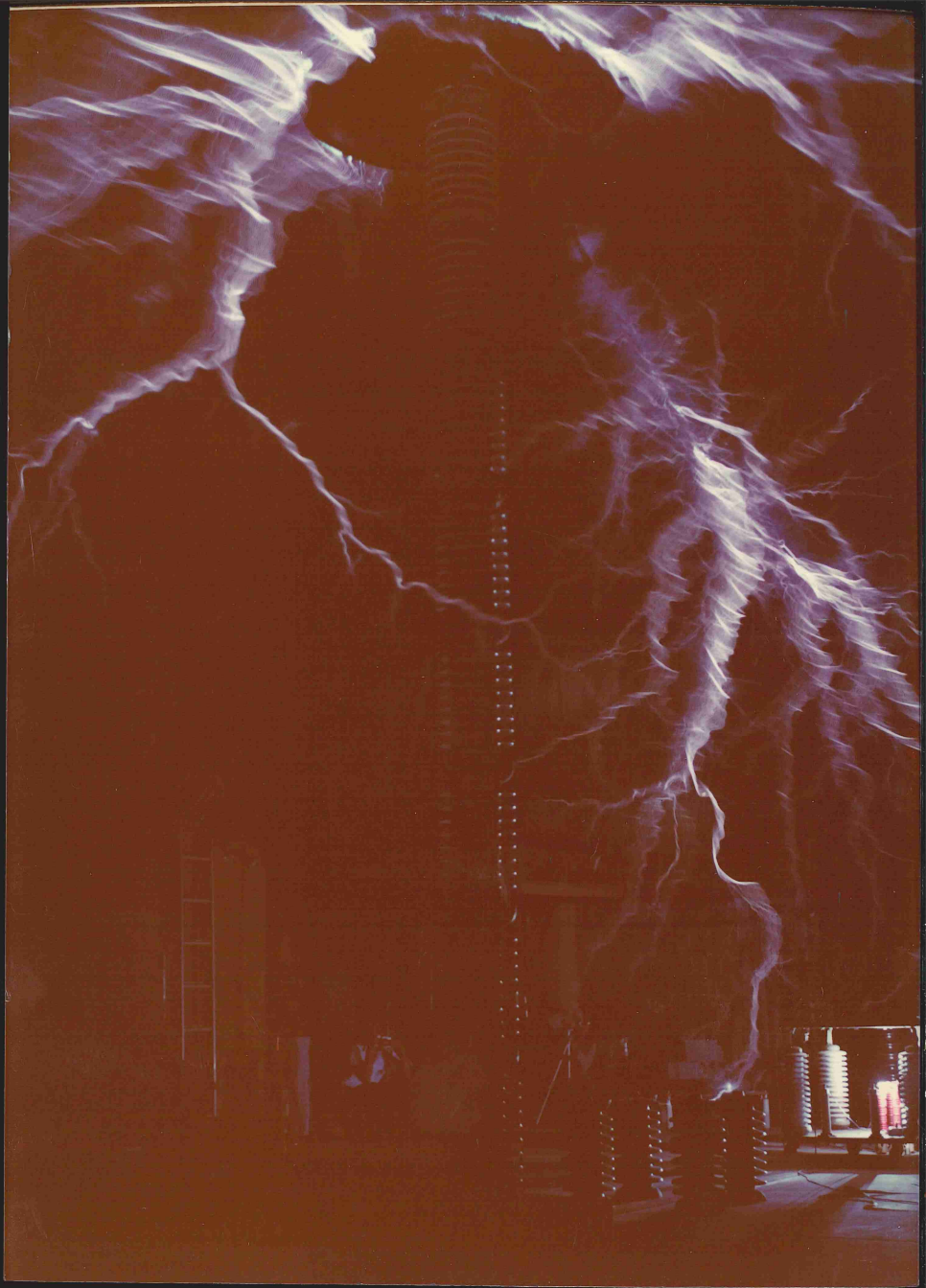


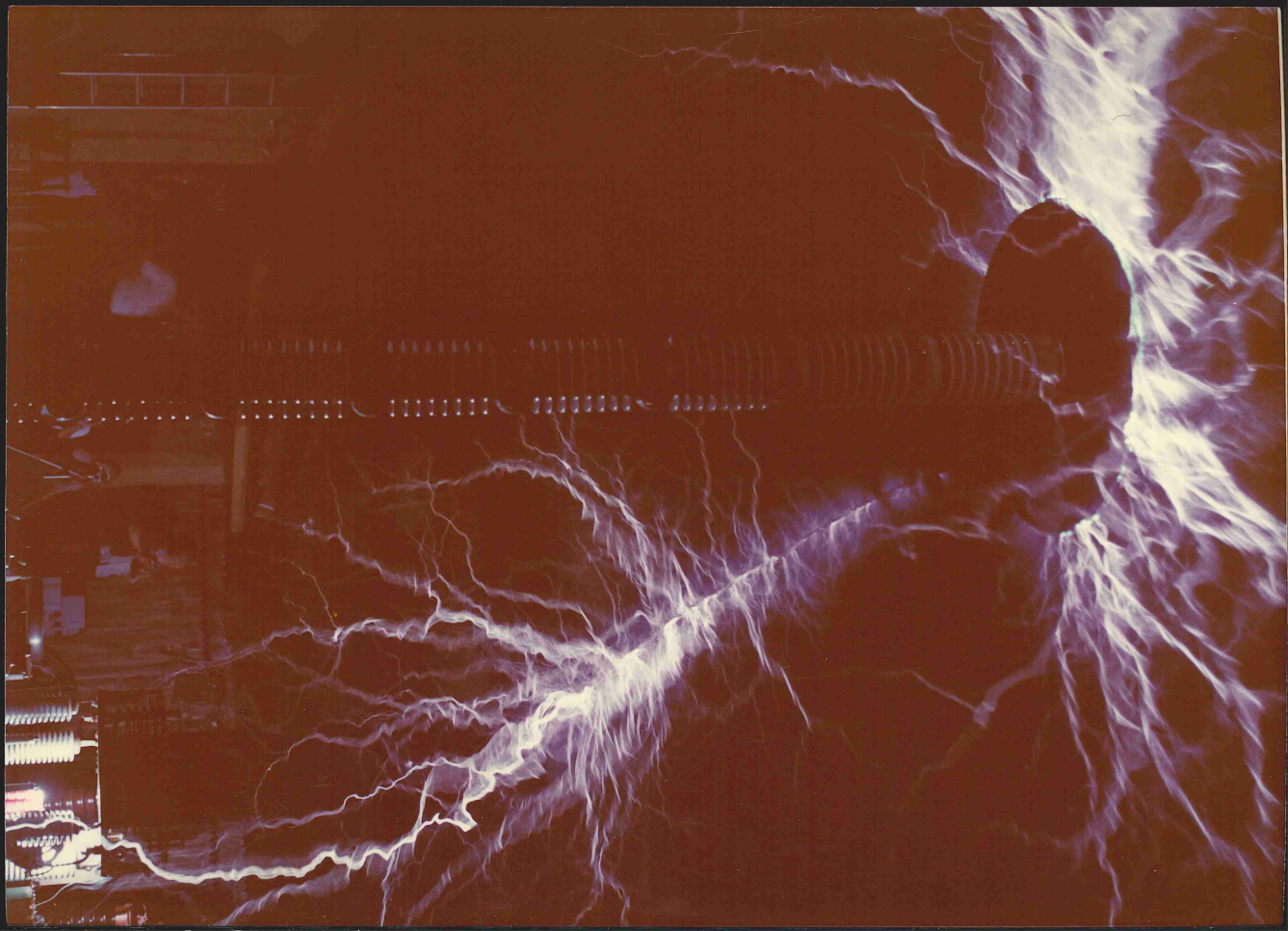




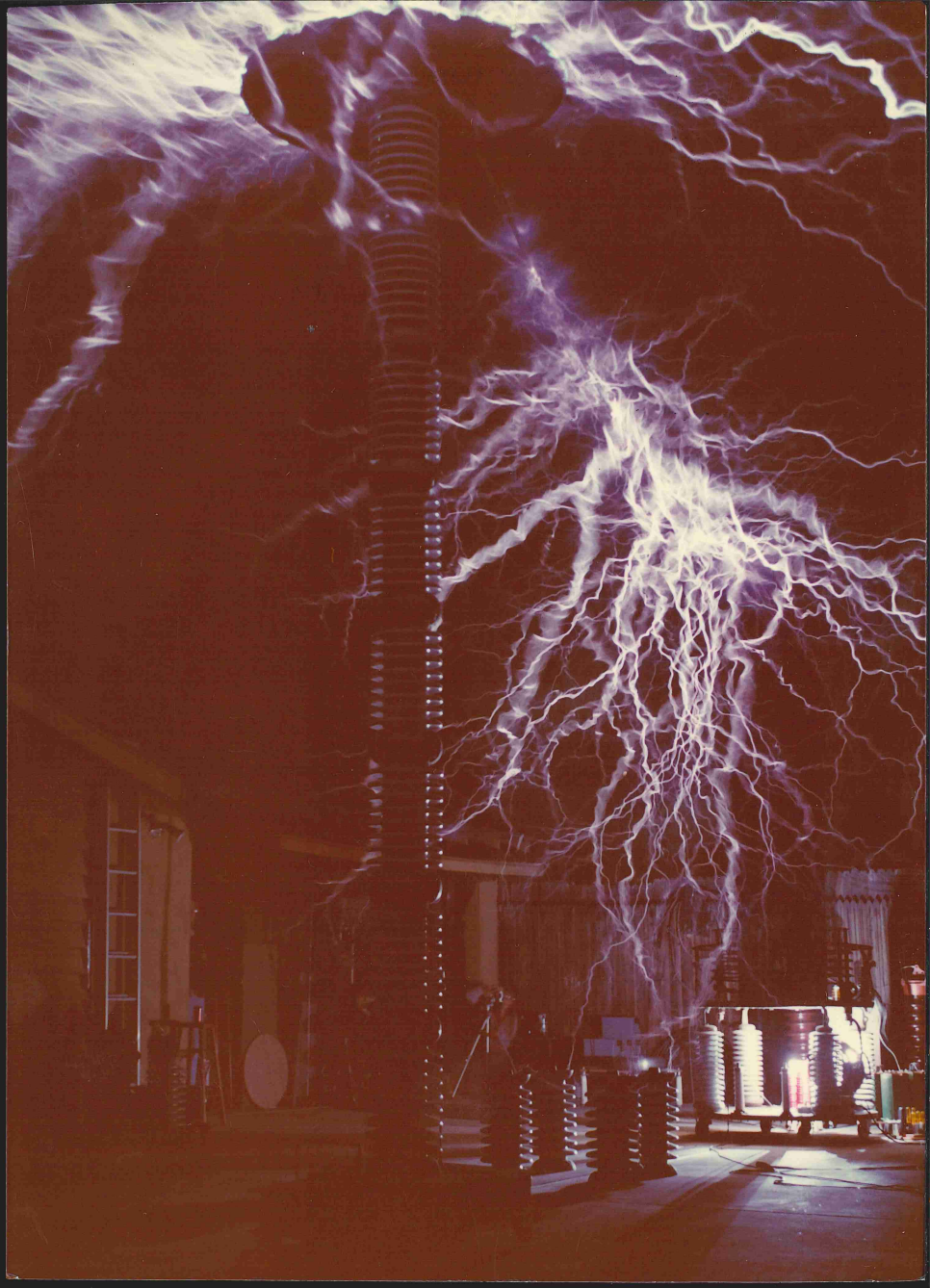









Lacquer
Thinner



PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

2527 TREELANE AVE,
MONROVIA, CA 91016
(213) 359-1373

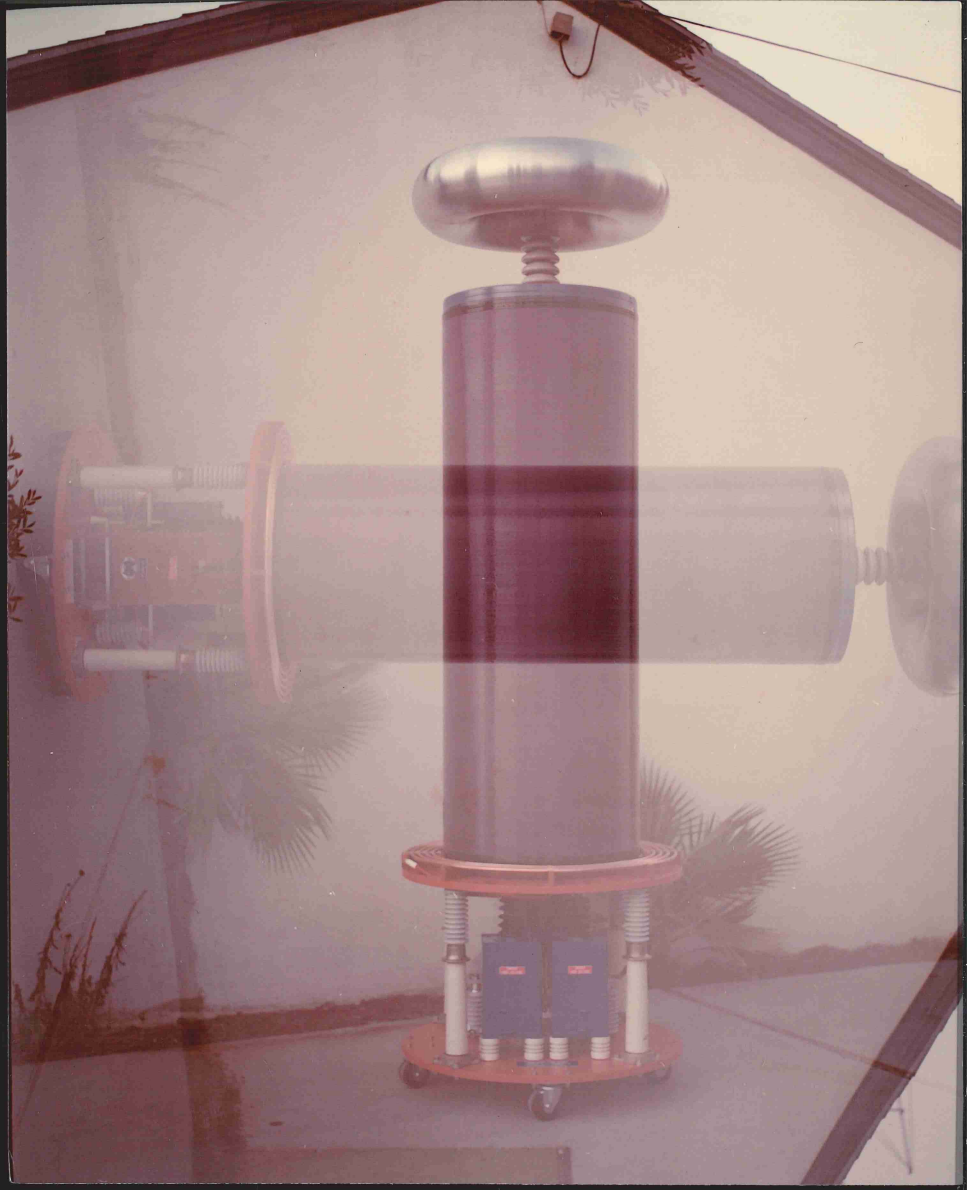
ULTRA HIGH VOLTAGE DIVISION

WILLIAM C. WYSOCK

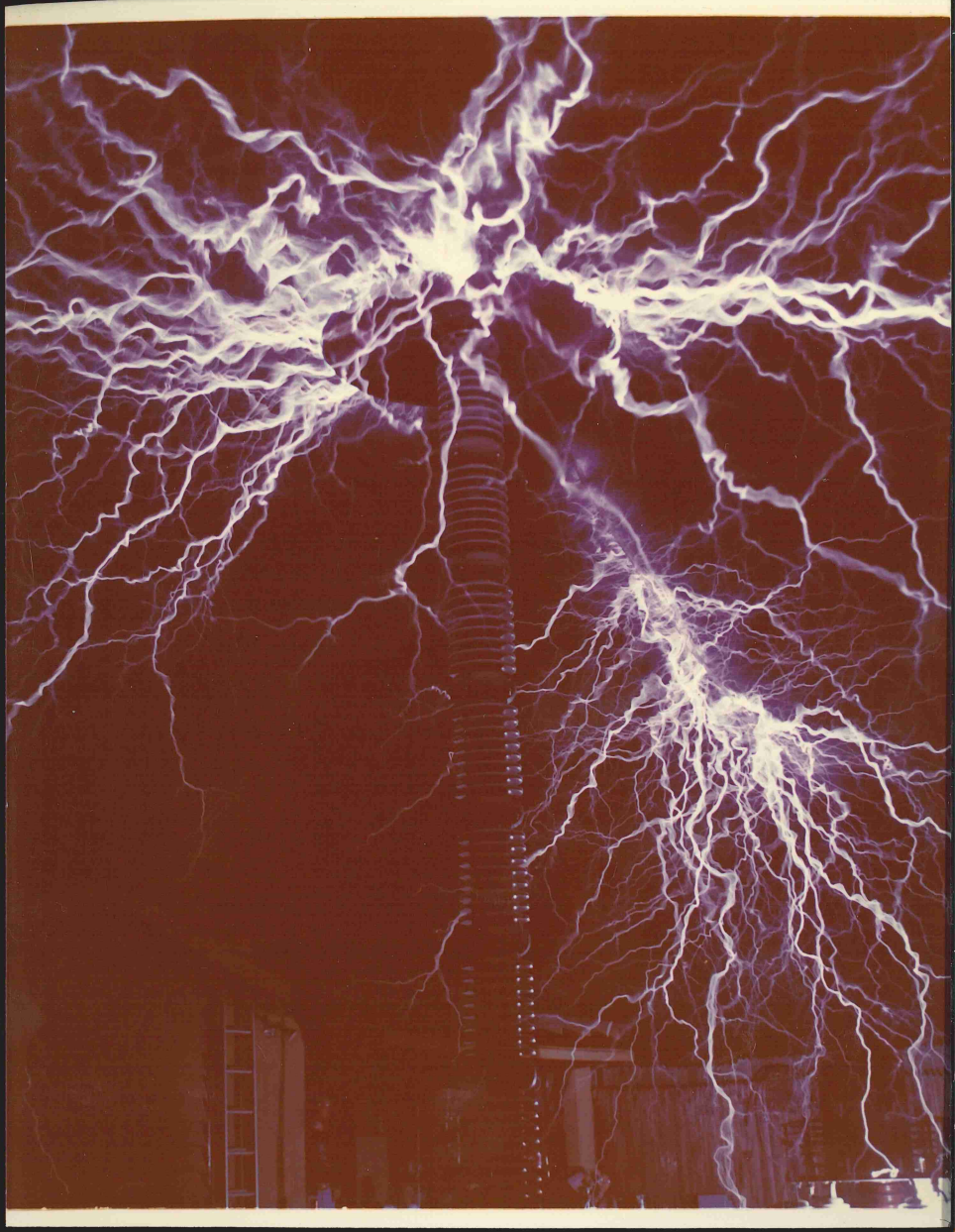
Big @ MODEL #10

5 mins 30 ft — Electricity.

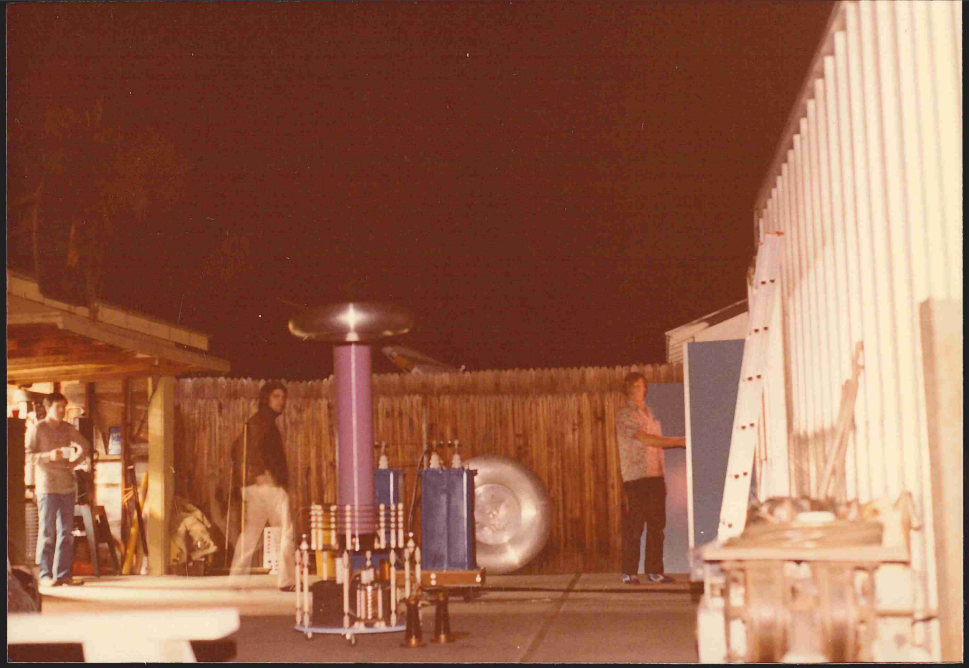
MODEL 10 COIL
> 25 FOOT LONG
DISCHARGES
@ 25 KVA INPUT

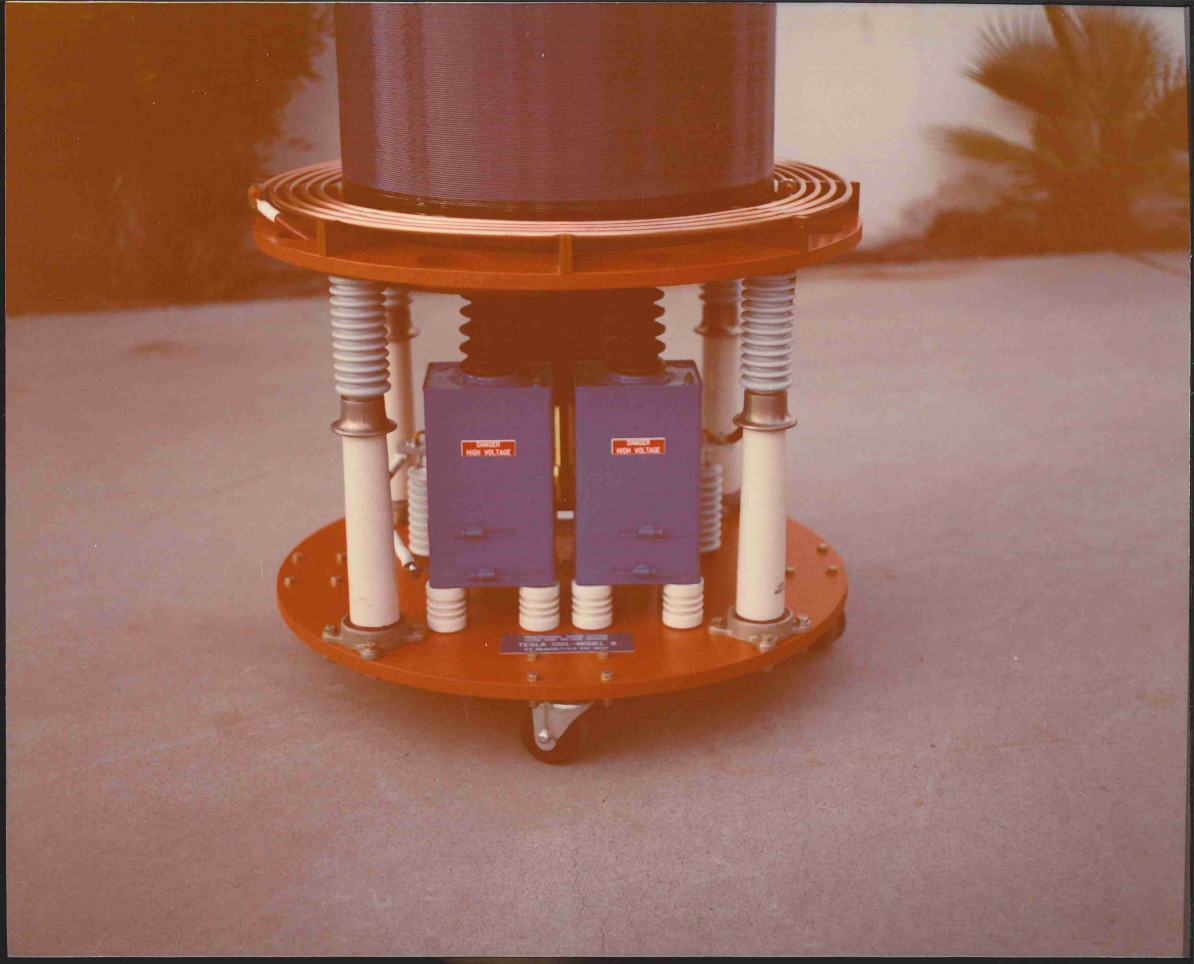



PROFESSIONAL SOUND SYSTEM
ULTRA HIGH VOLTAGE DIVISION
TESLA COIL-MODEL 9
3.5 MEGAVOLT/12.5 KVA INPUT
DANGER
HIGH VOLTAGE
MAIN POWER
30 AMP
GROUND
READY
OPERATE
INTERLOCK/
ROTARY GAP
REMOTE

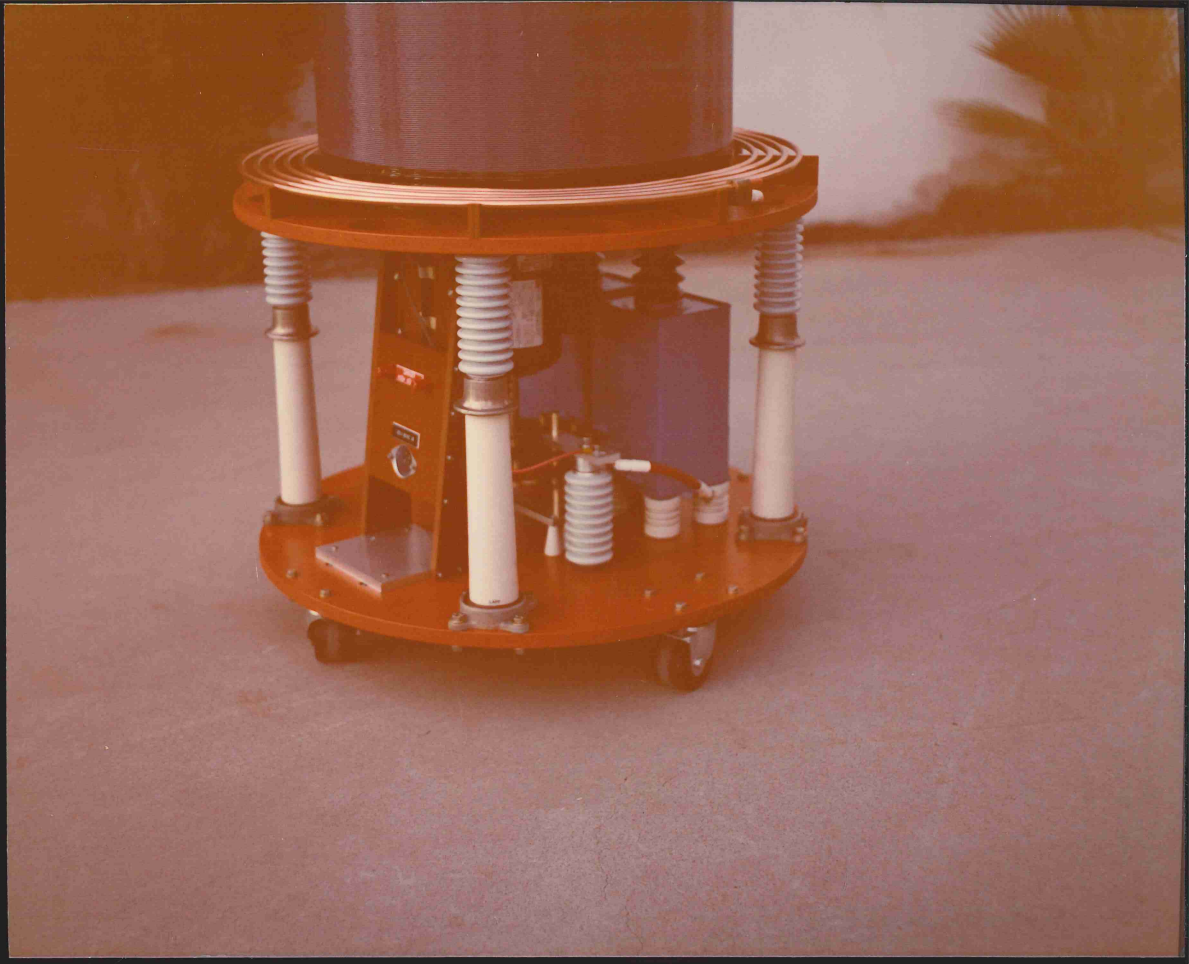




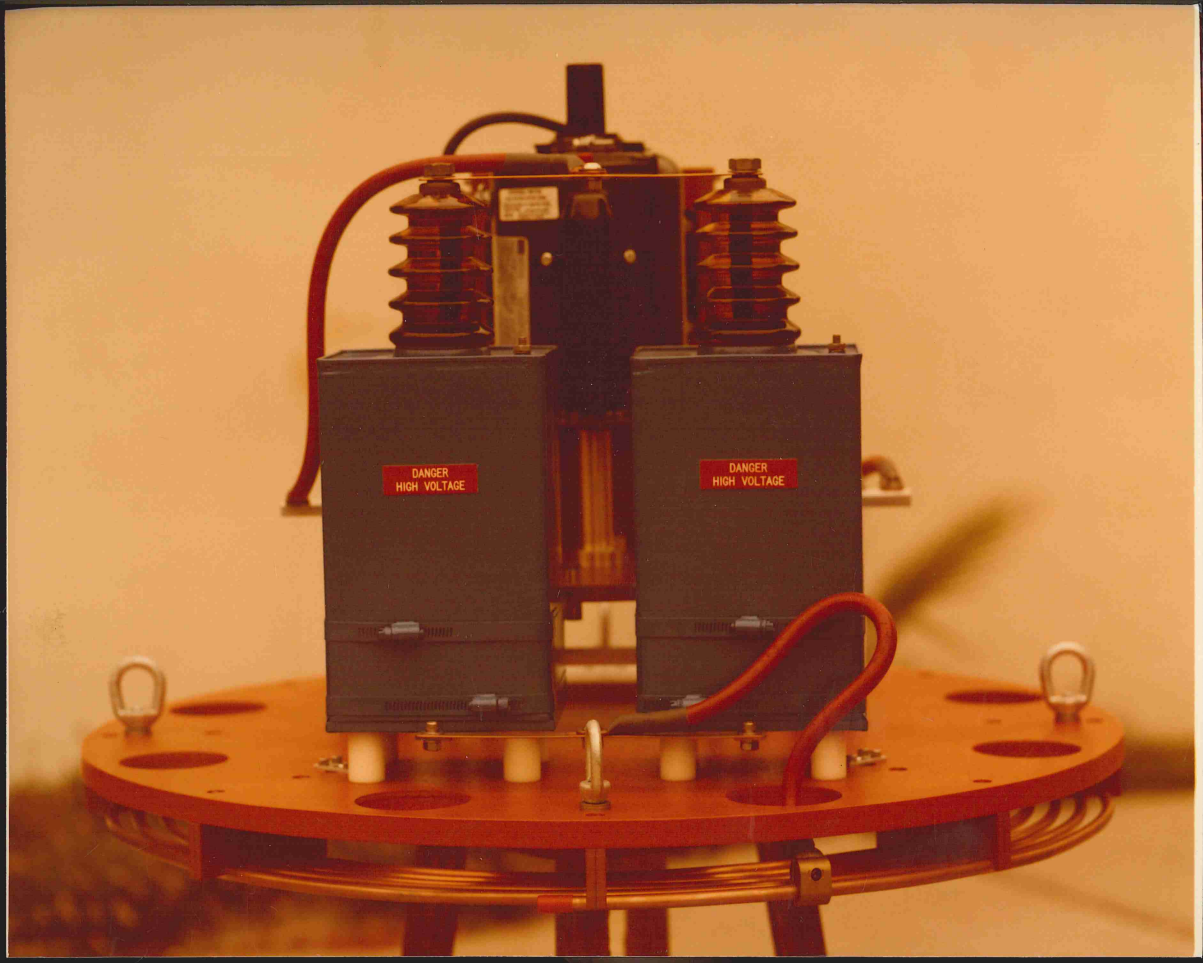


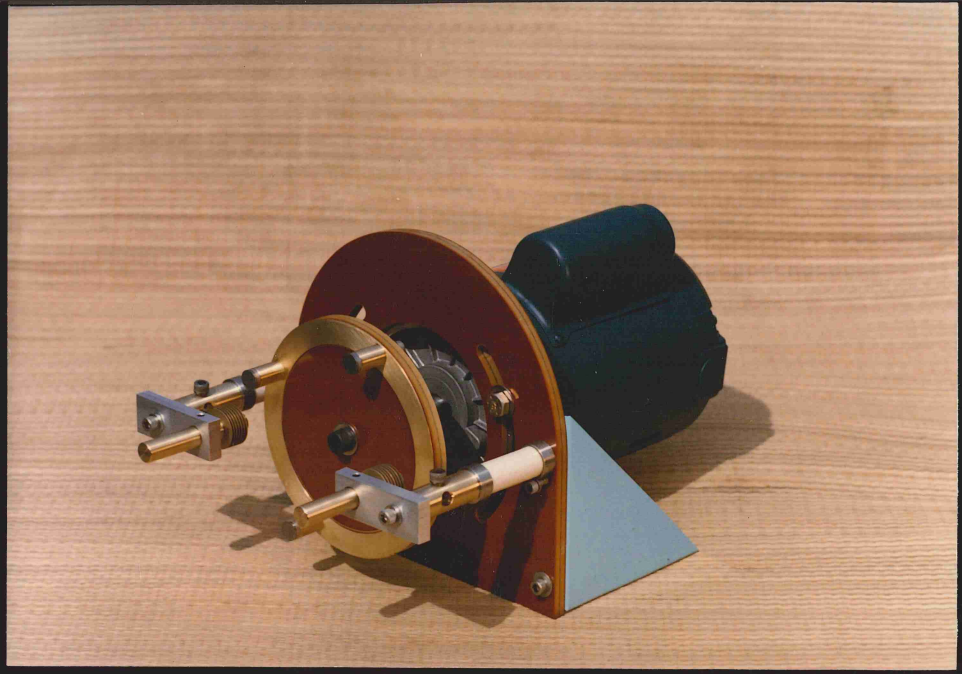

DANGER
HIGH VOLTAGE
DANGER
HIGH VOLTAGE

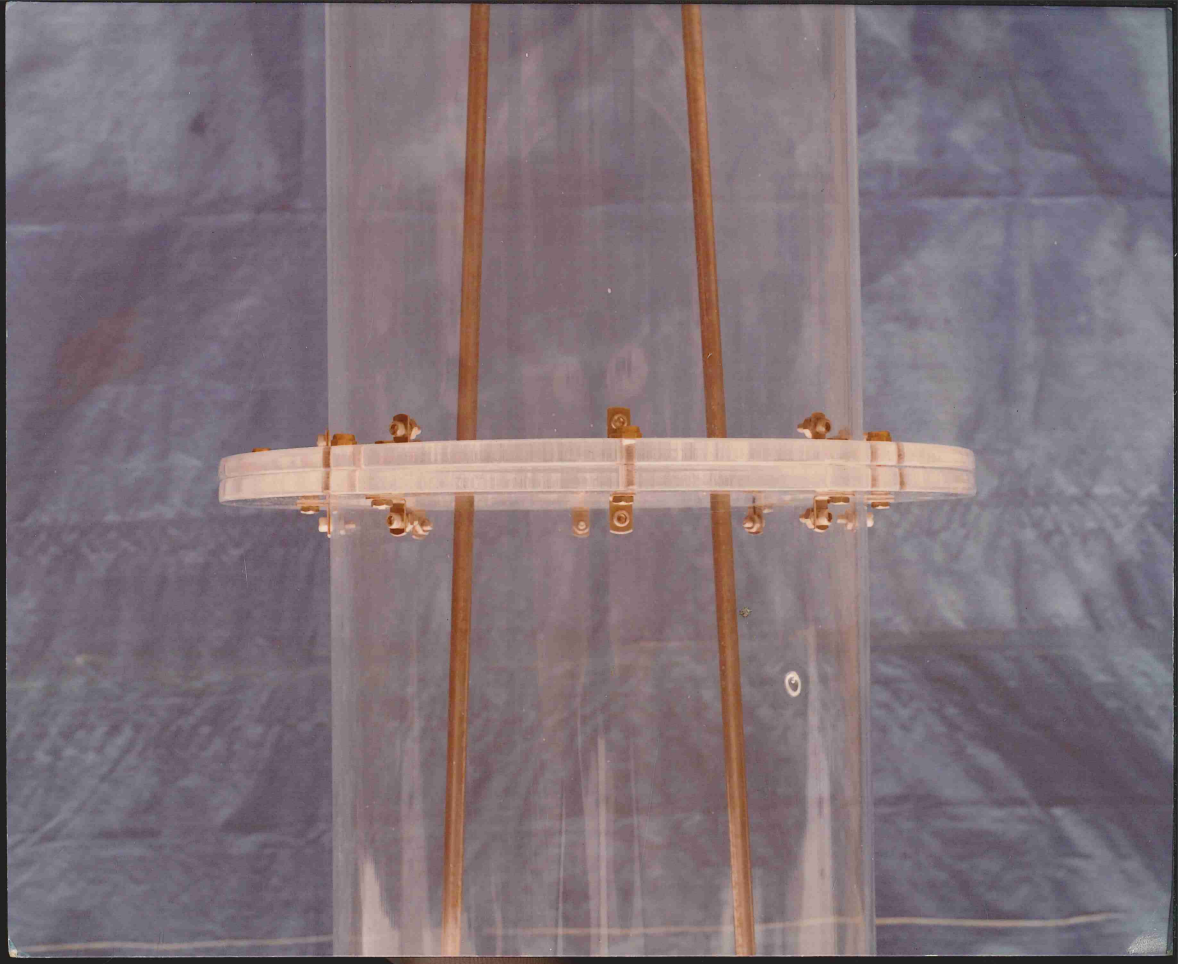

PROFESSIONAL SOUND SYSTEM
ULTRA HIGH VOLTAGE DIVISION
TESLA COIL-MODEL 9
3.5 MEGAVOLT/12.5 KVA INPUT

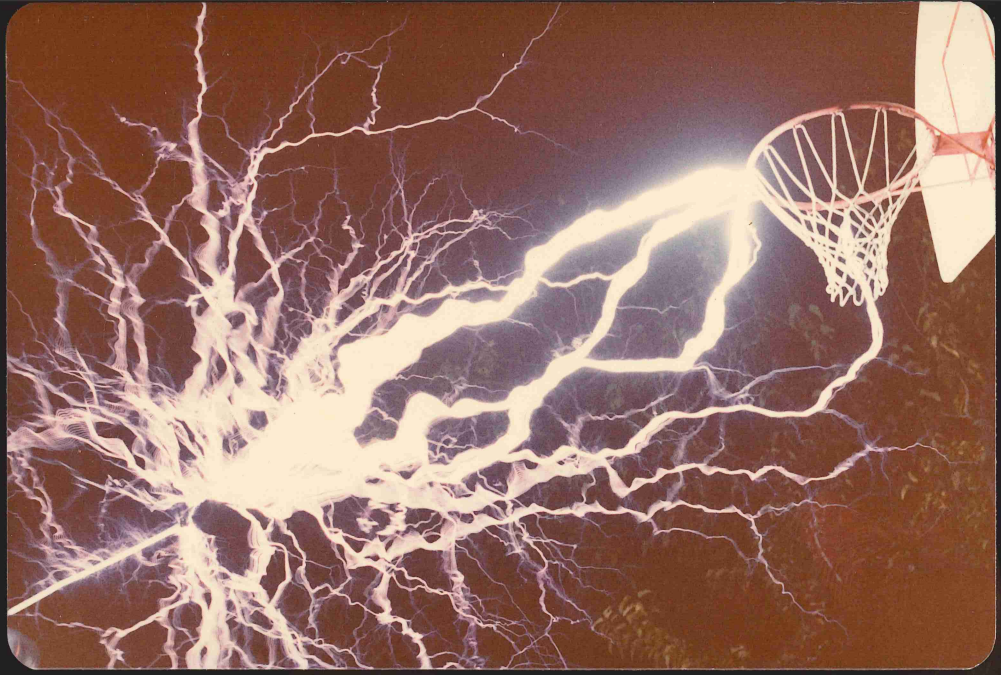





DANGER
HIGH VOLTAGE
DANGER
HIGH VOLTAGE








DANGER
HIGH VOLTAGE

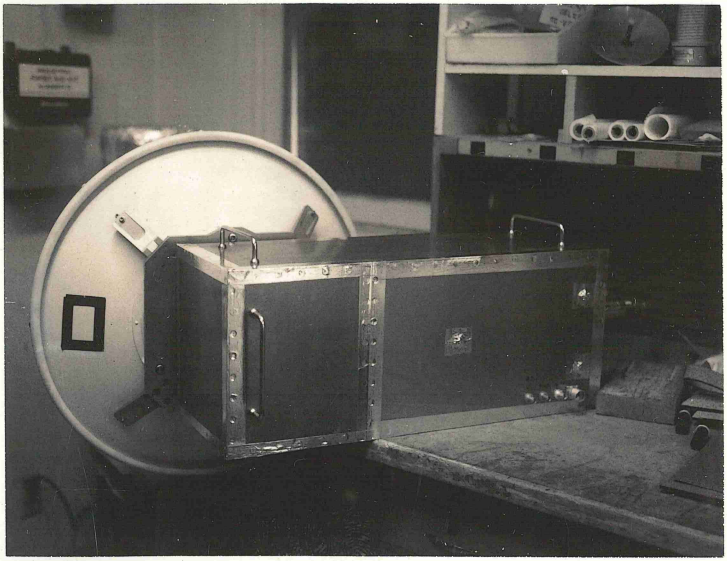


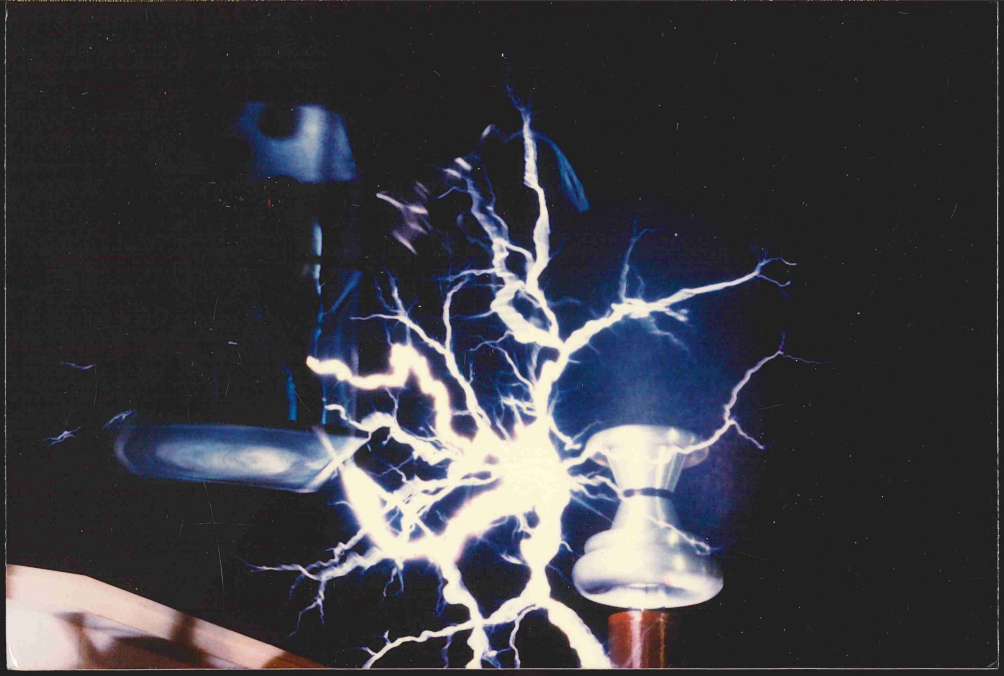



THIS IS AN
EMERGENCY
EXIT
ONLY
dbx
dbx 900

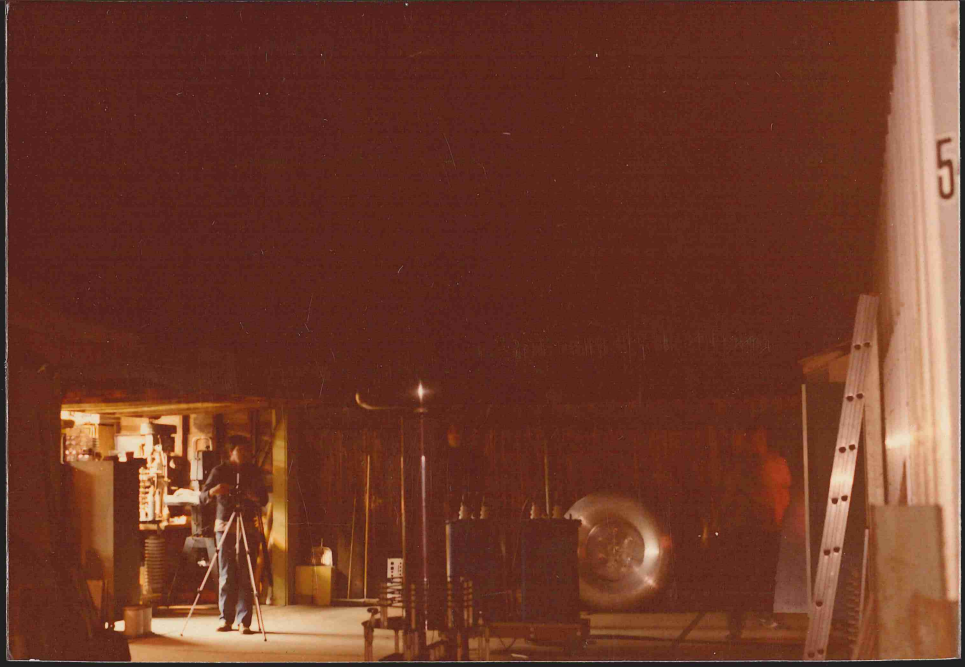




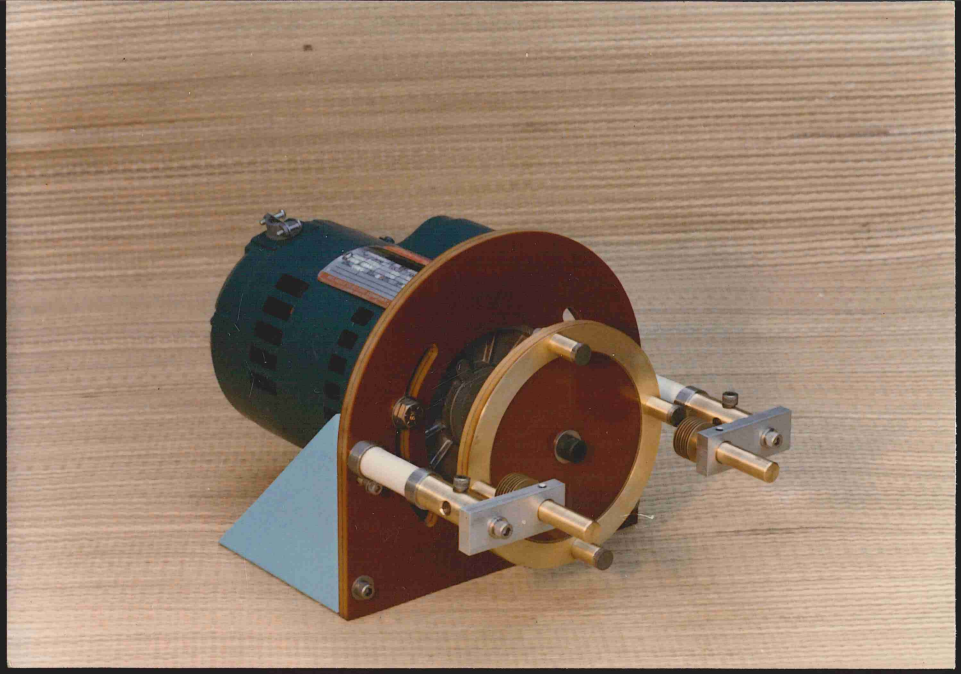


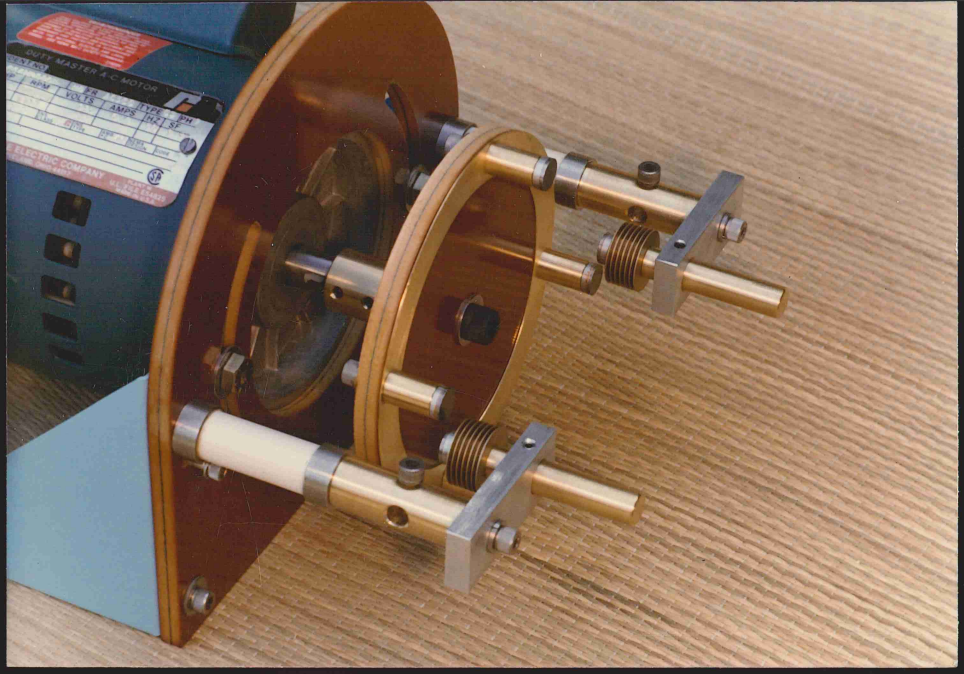



TOYOTA

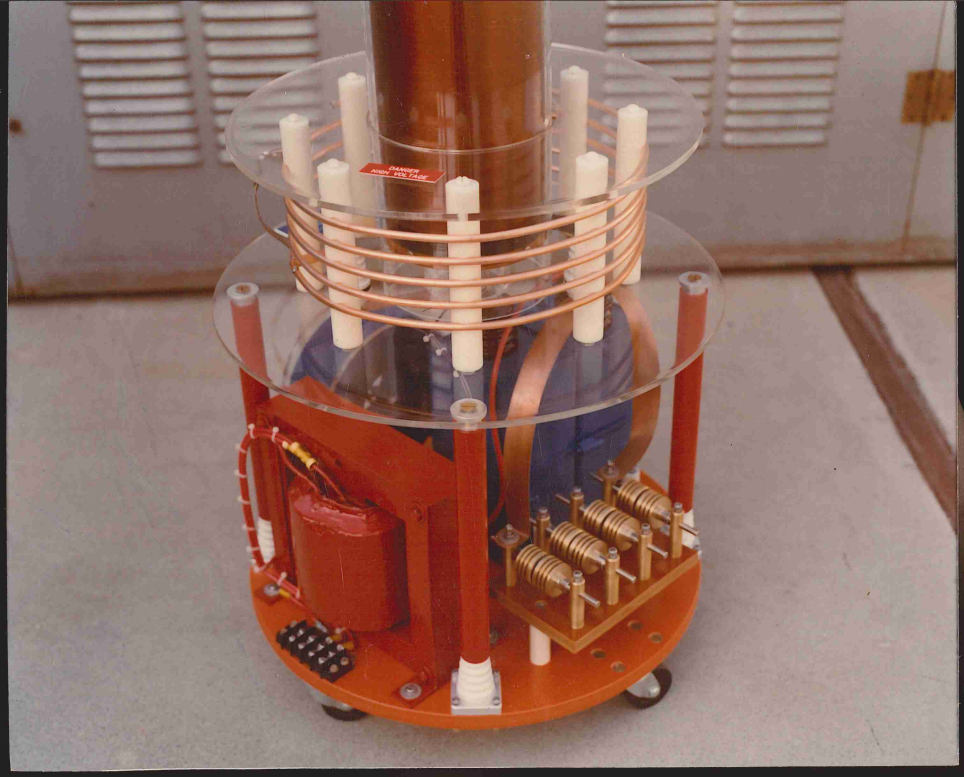







MASTER A-C MOTOR
VOLTS
AMPS
ELECTRIC COMPANY




DANGER
HIGH VOLTAGE

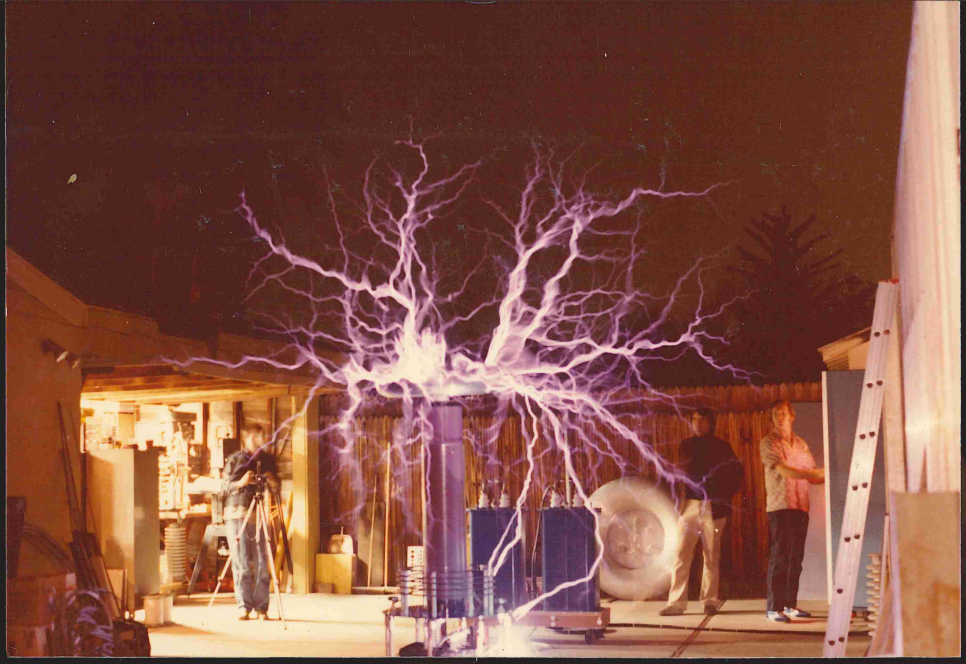

BRONCOS
DENVER
NFL

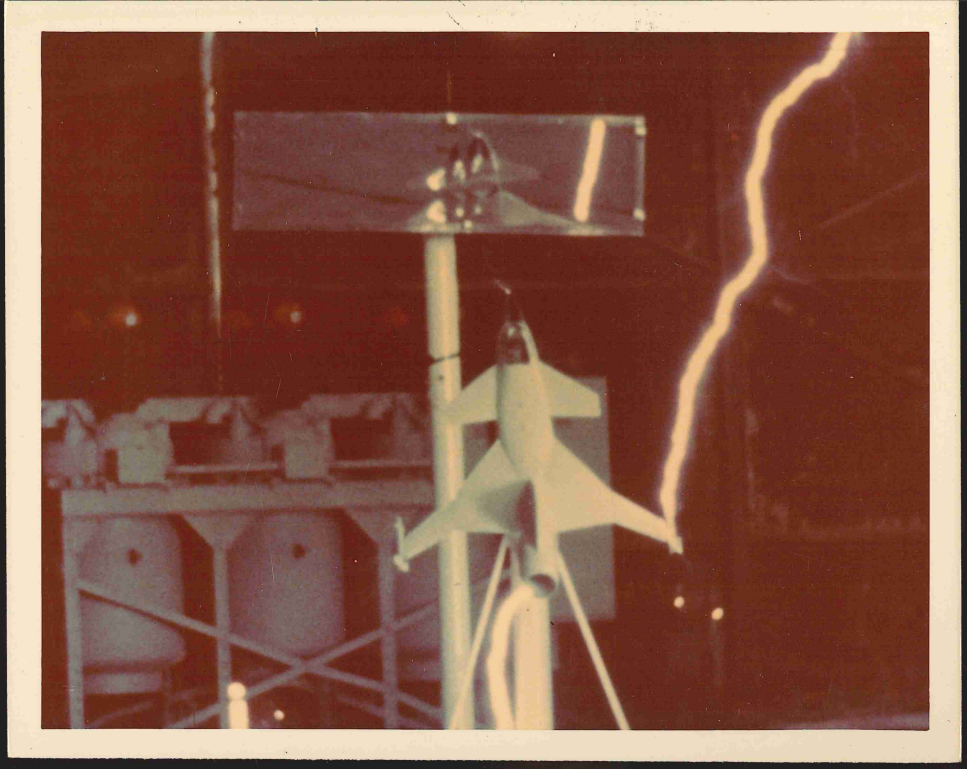

KAF 621

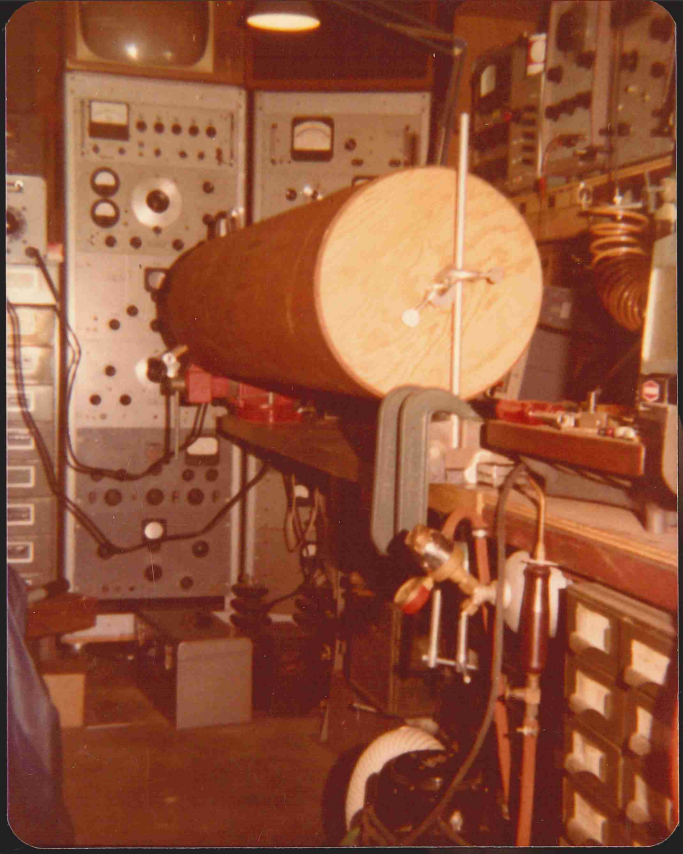




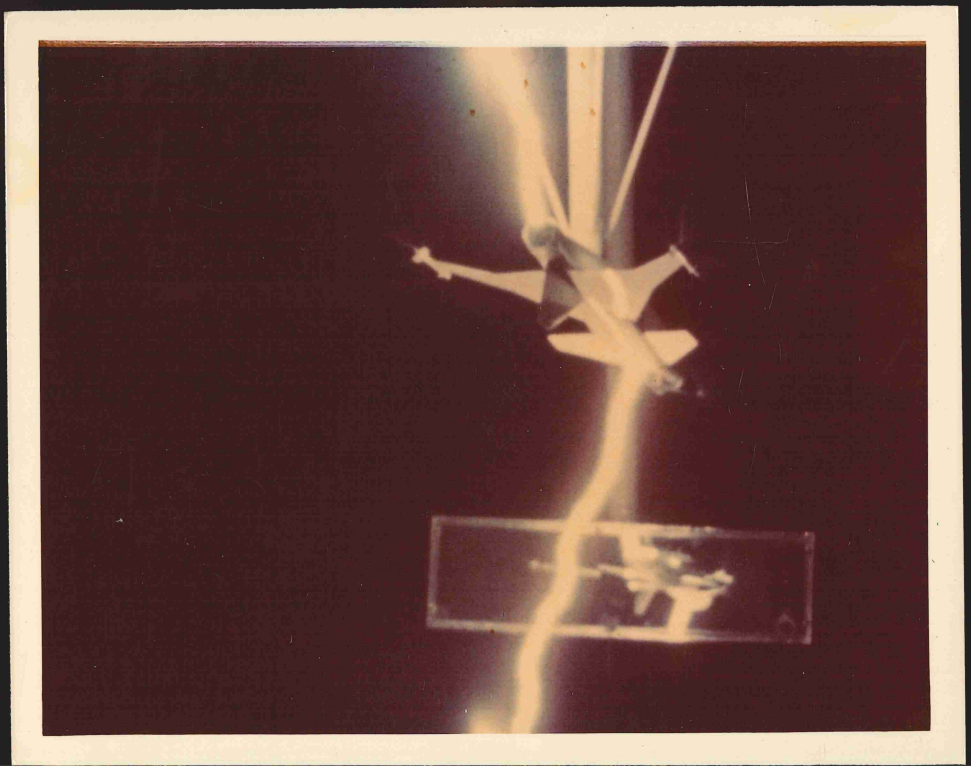









FRAGILE
FRAGILE






Sandwiches and Coffee at the

Crystal Lake Store

Operated by Mr. and Mrs. Bill Conner

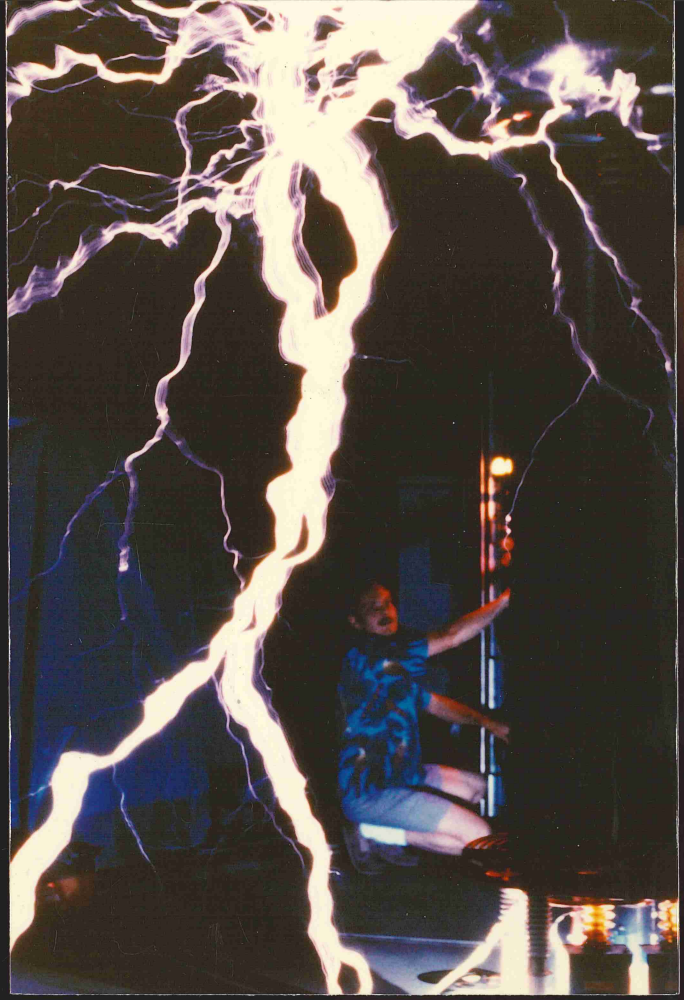
**Crystal Lake Recreational Area**

Angeles National Forest

25 miles north of Azusa in the San Gabriel Mountains

Elevation 5800 ft.

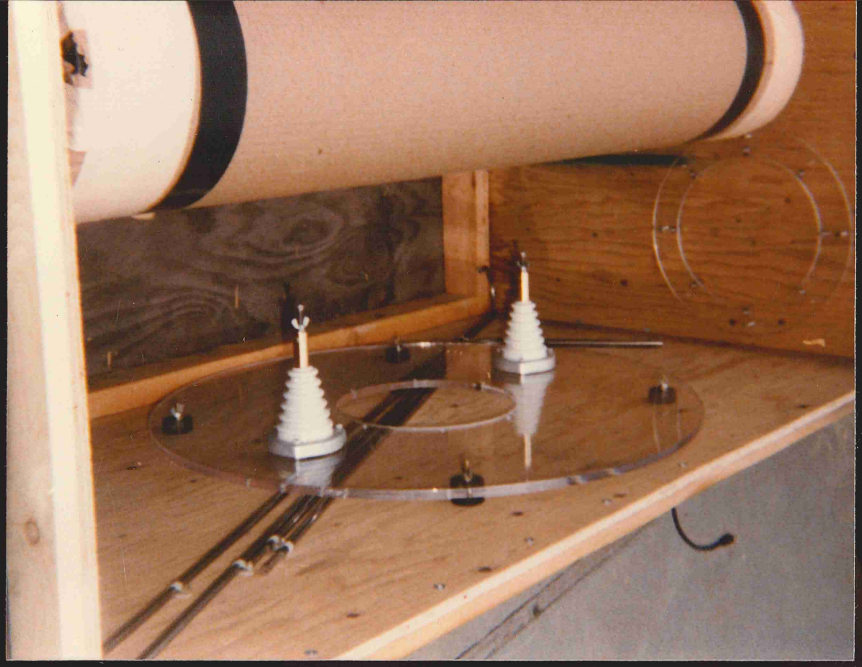
F-8188









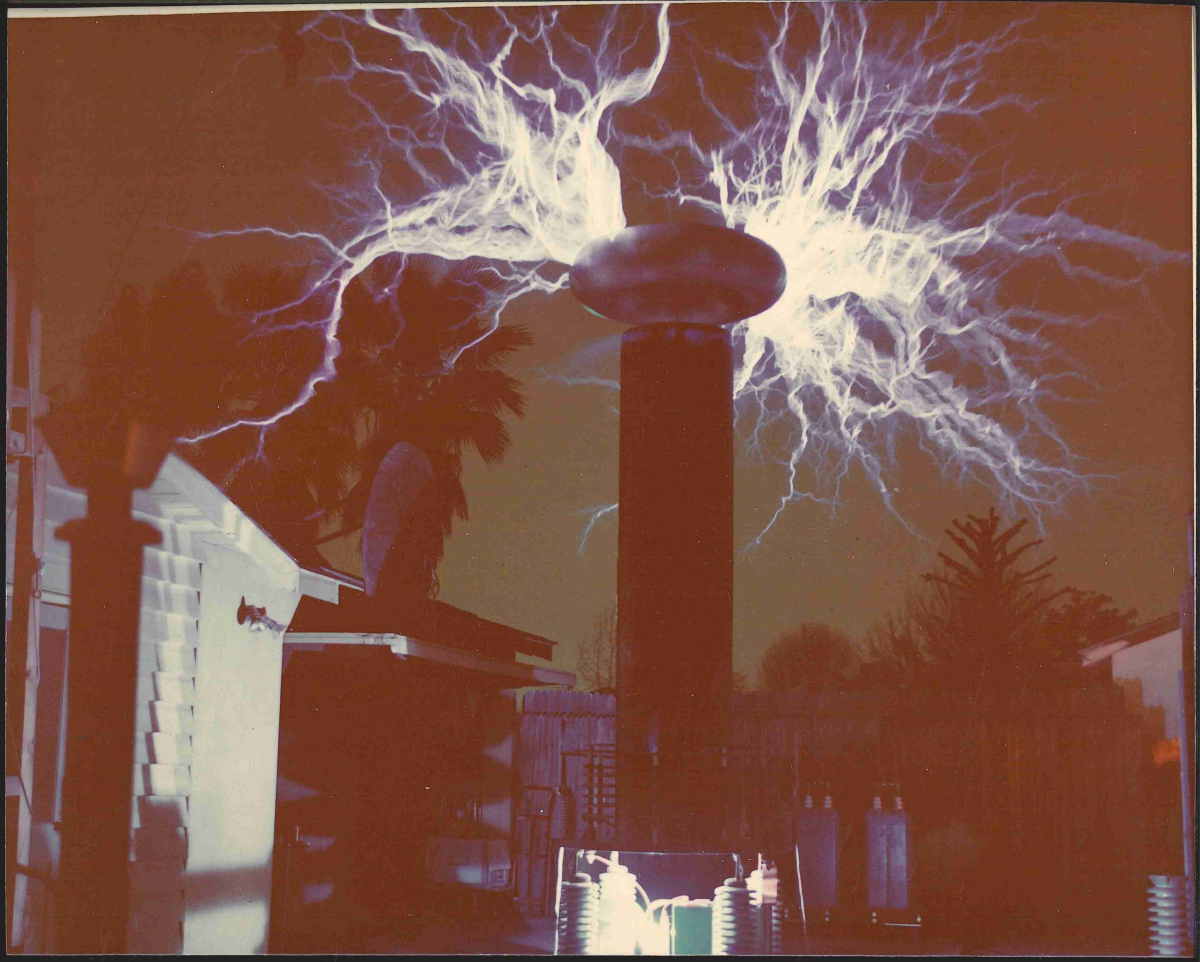


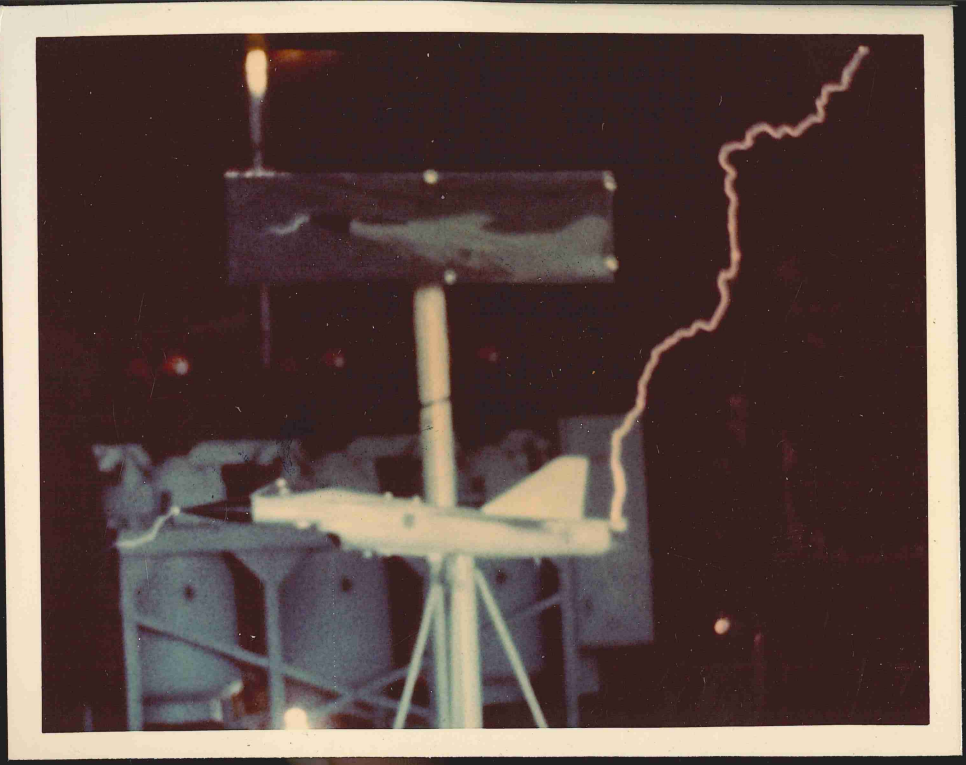


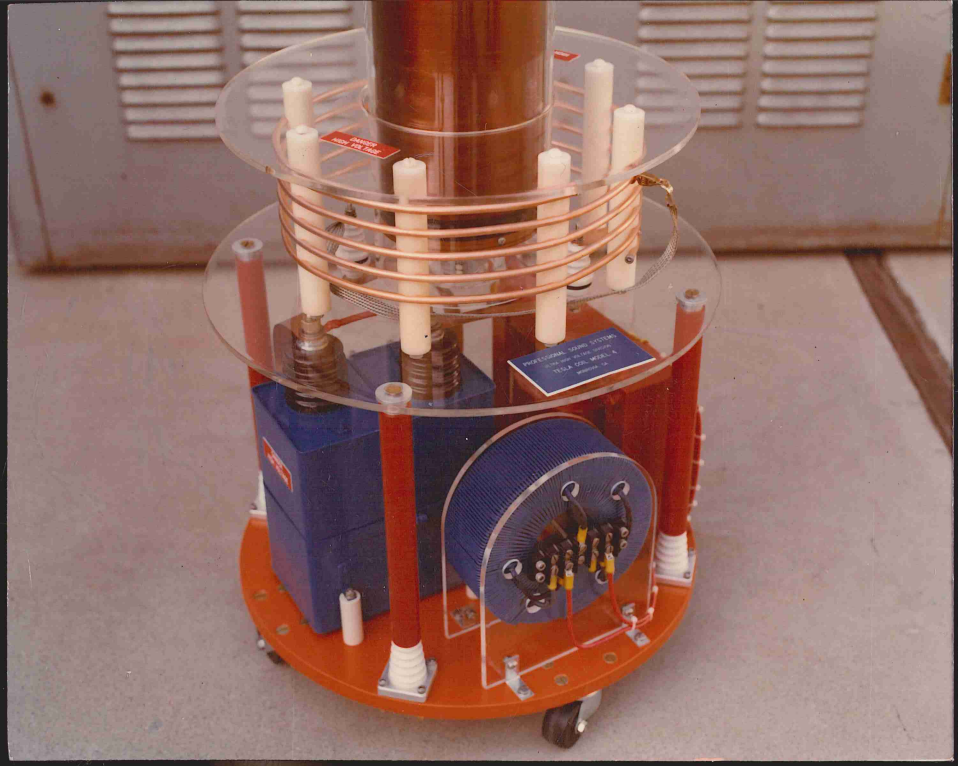


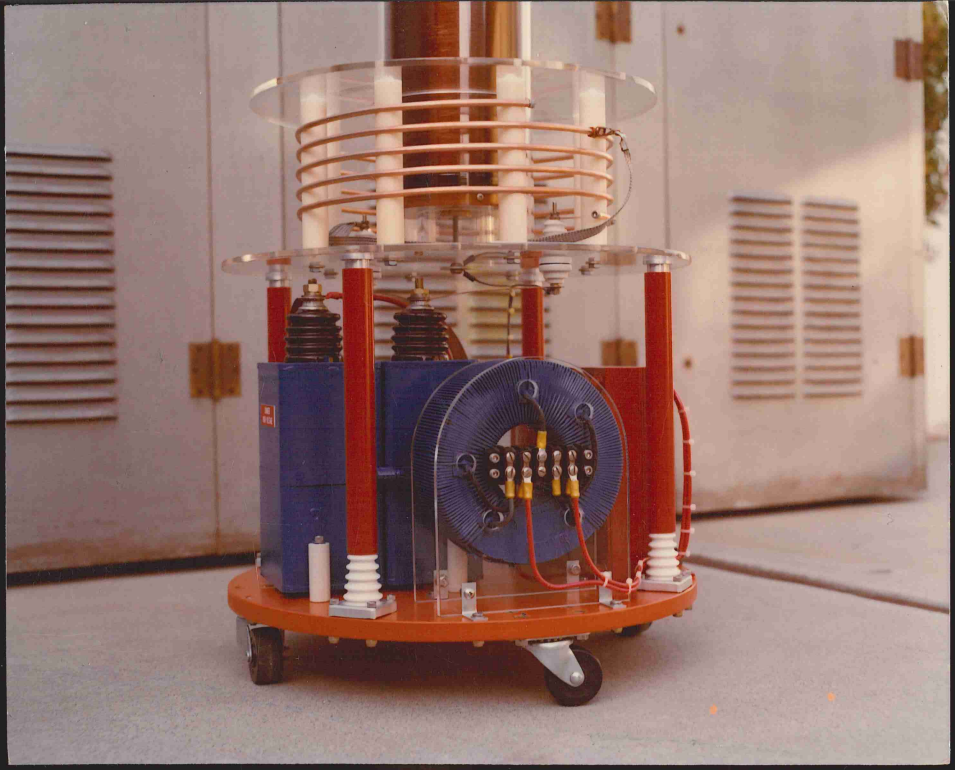

FRAGILE

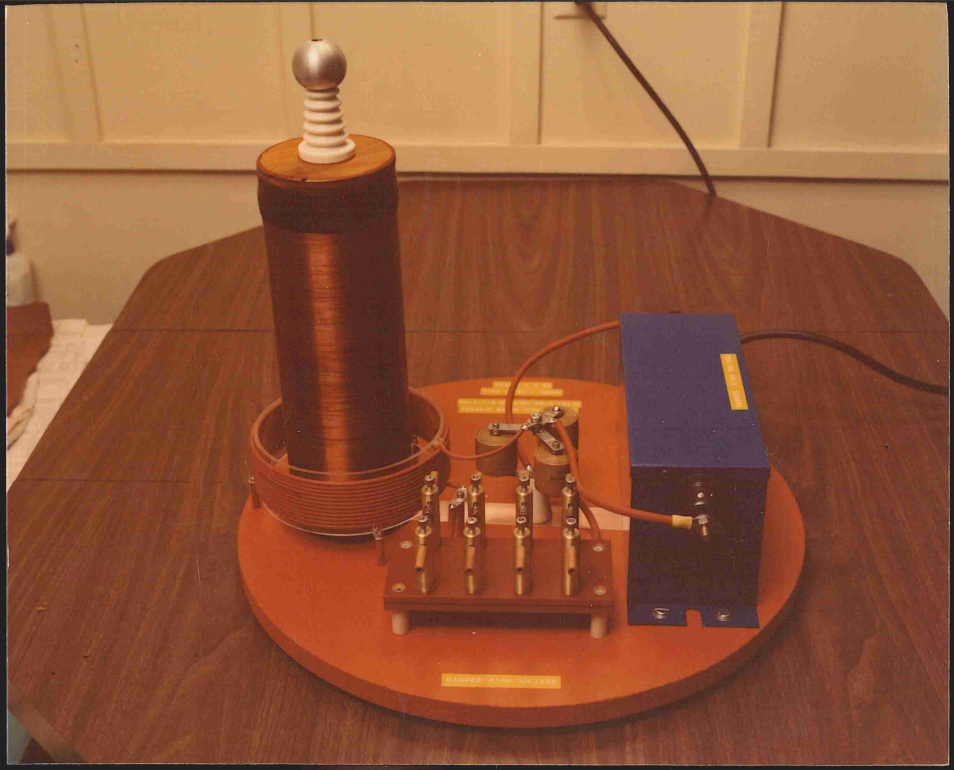

EXIT

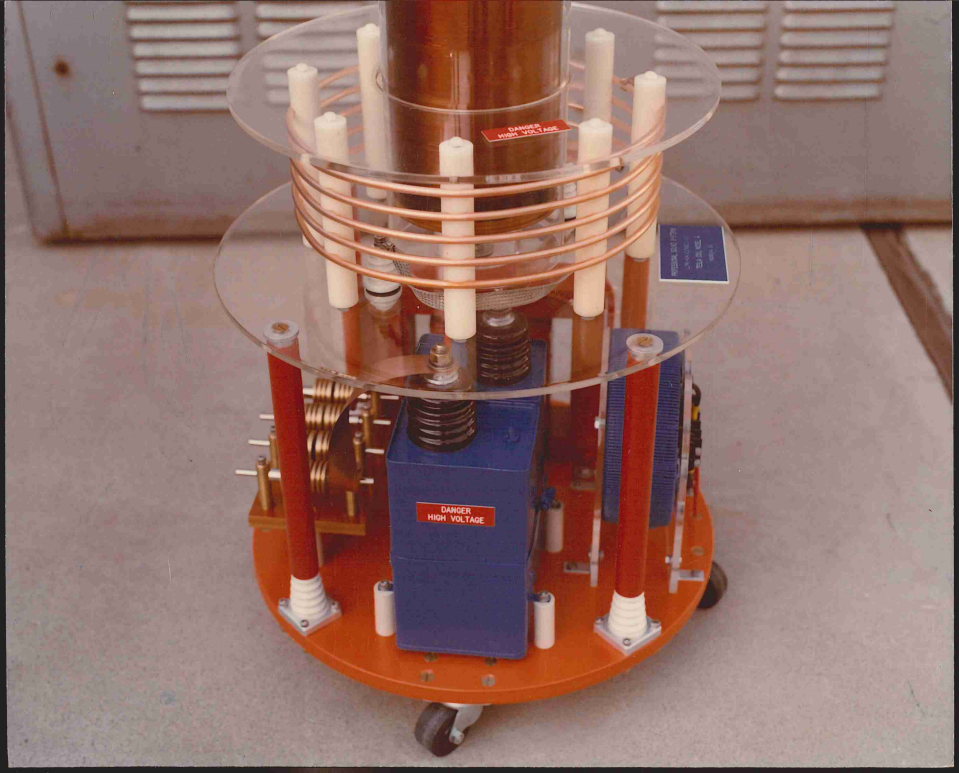


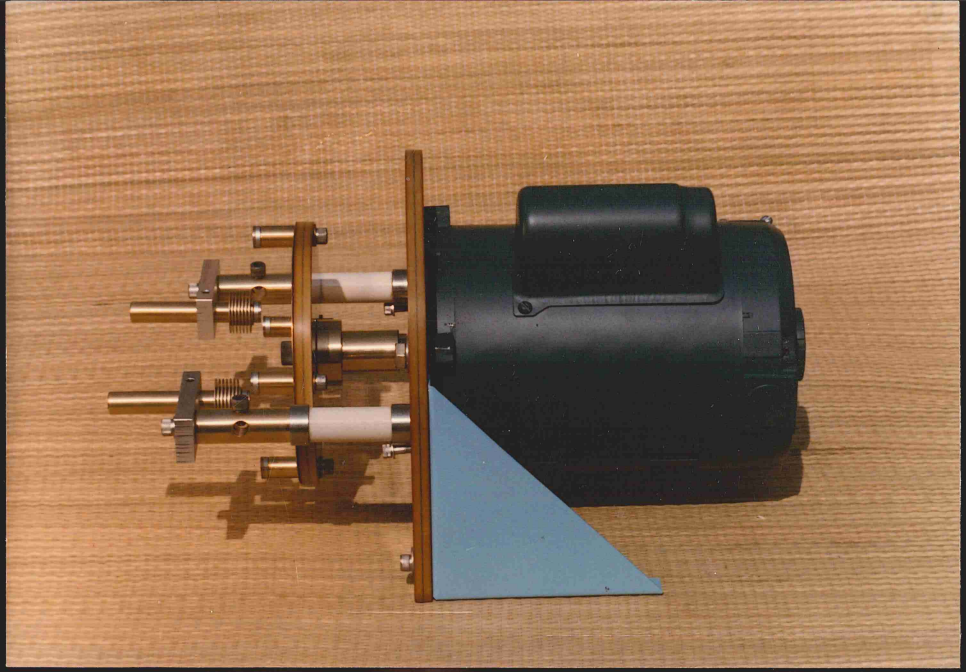


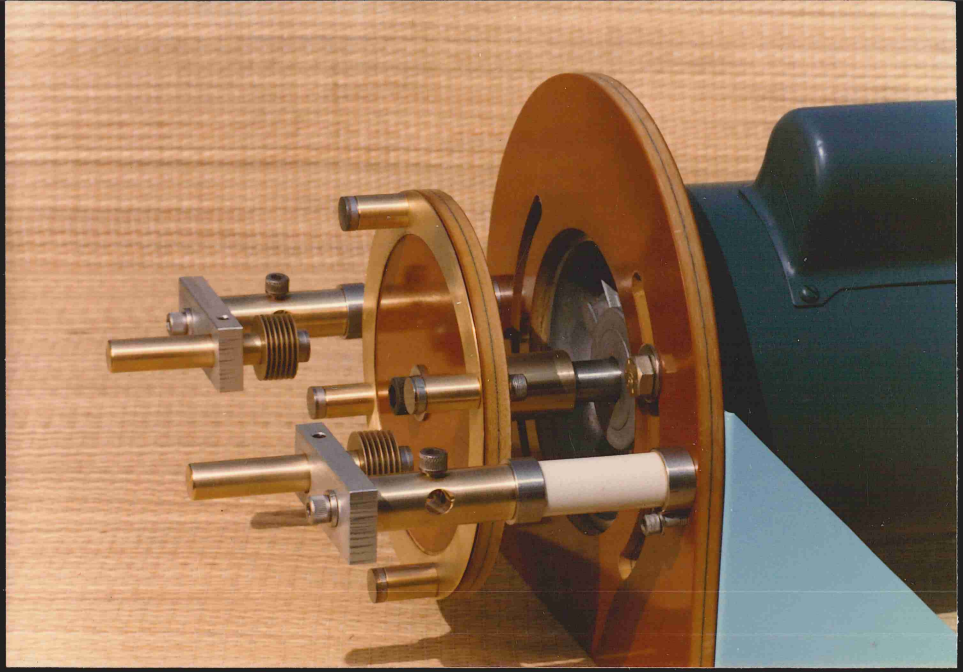

DANGER
HIGH VOLTAGE

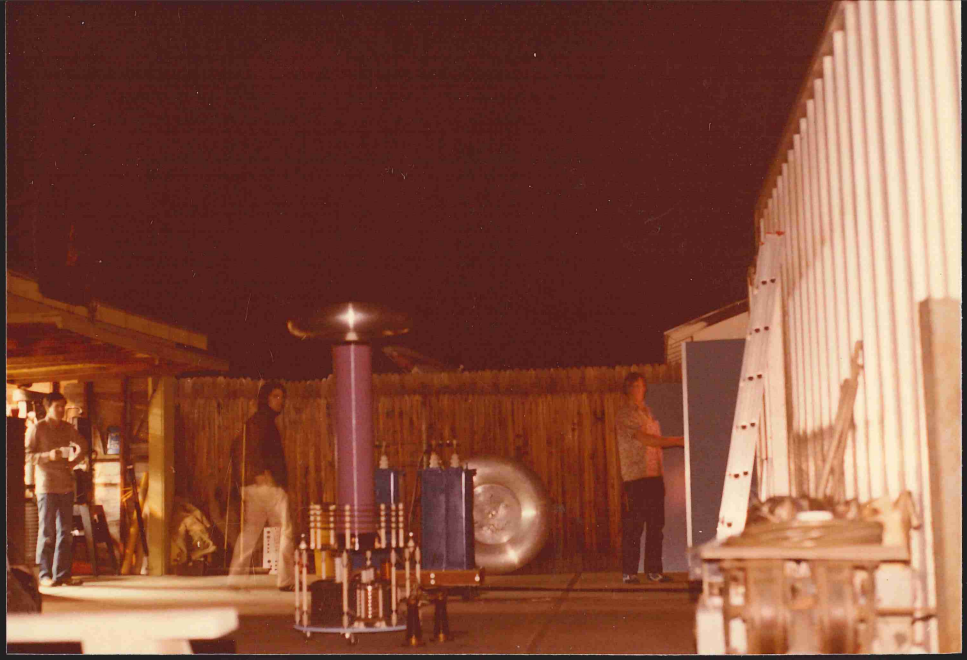


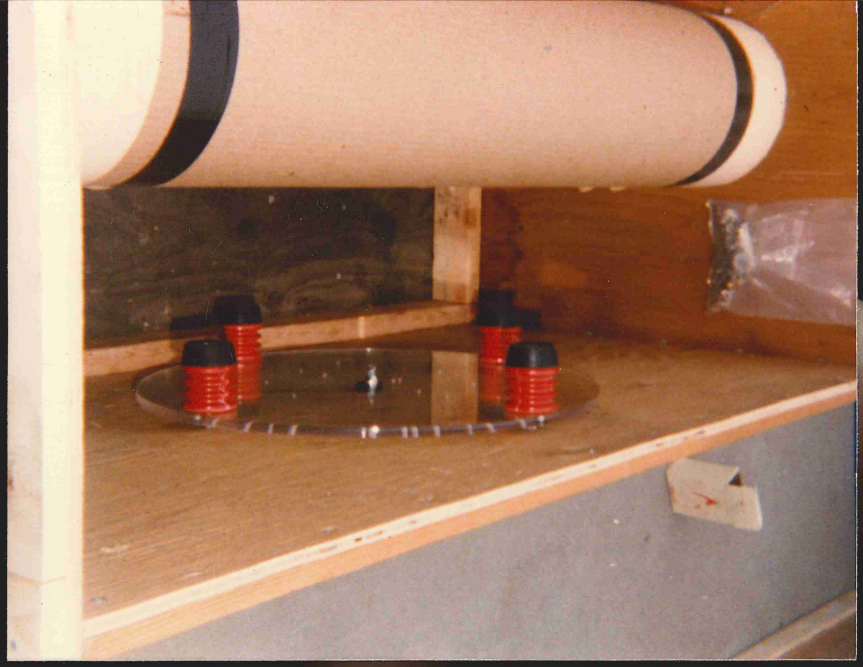


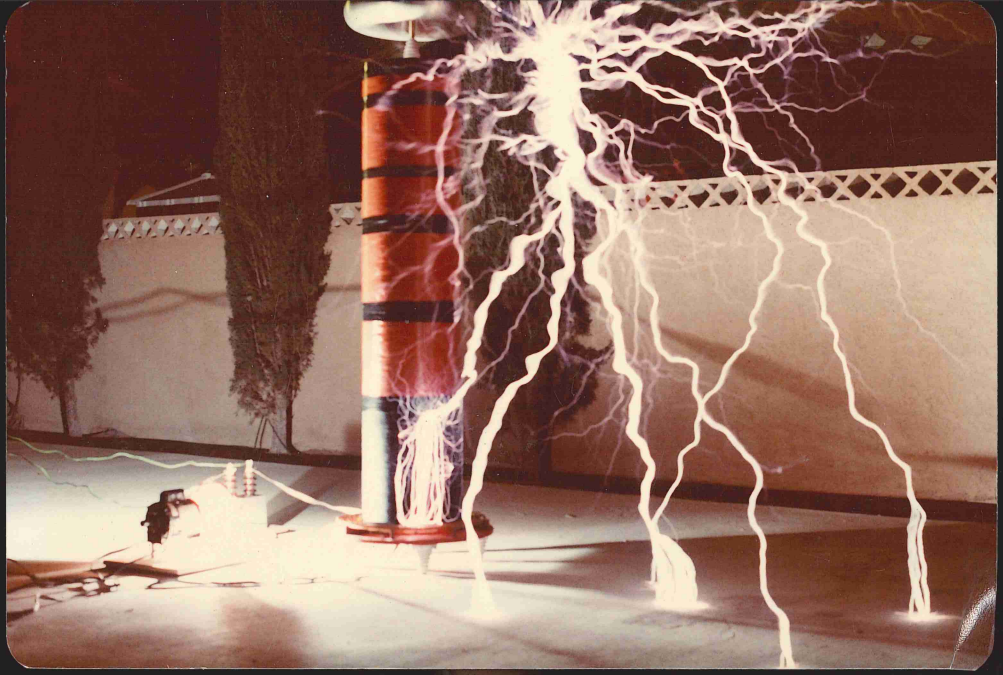

DANGER
HIGH VOLTAGE

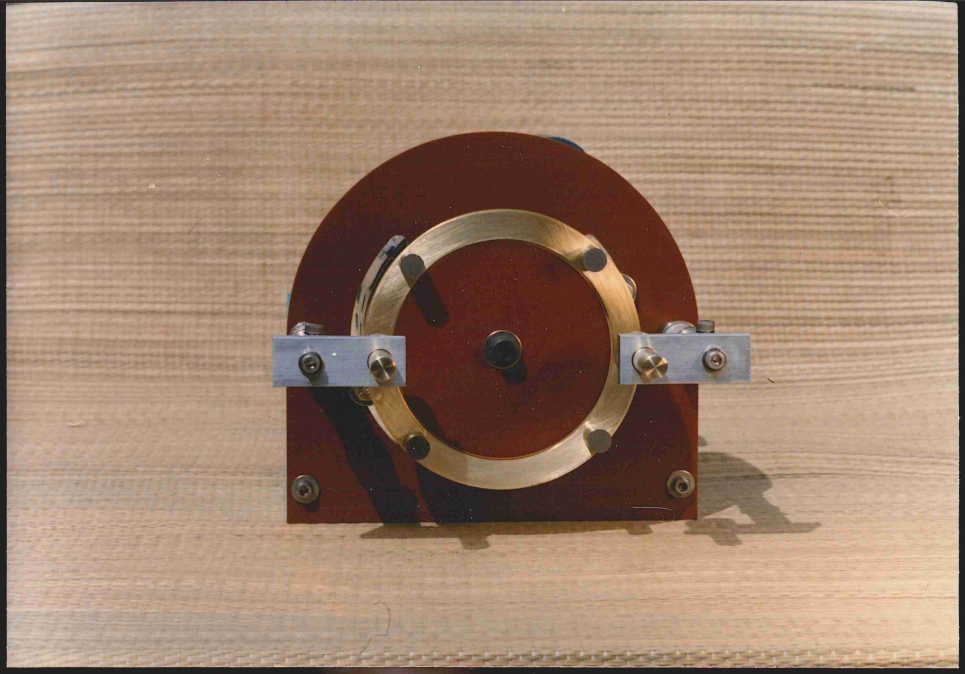


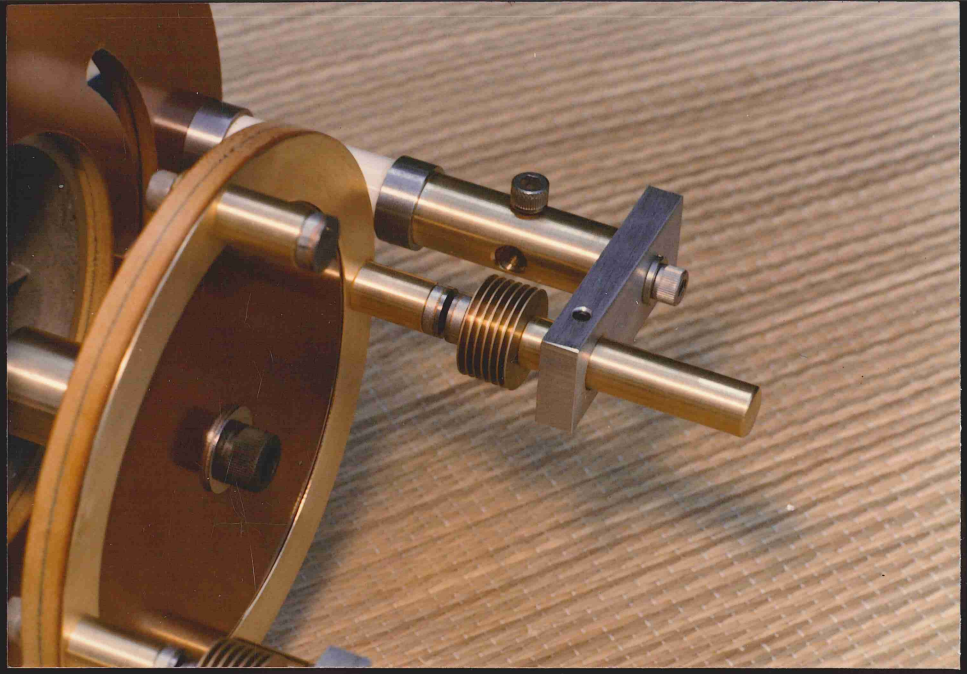


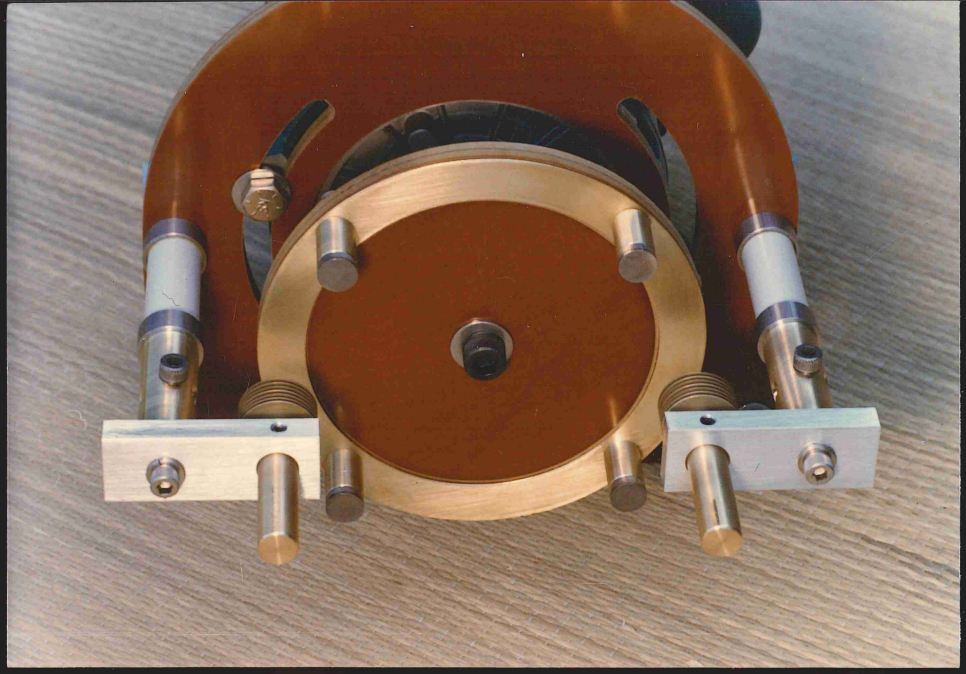


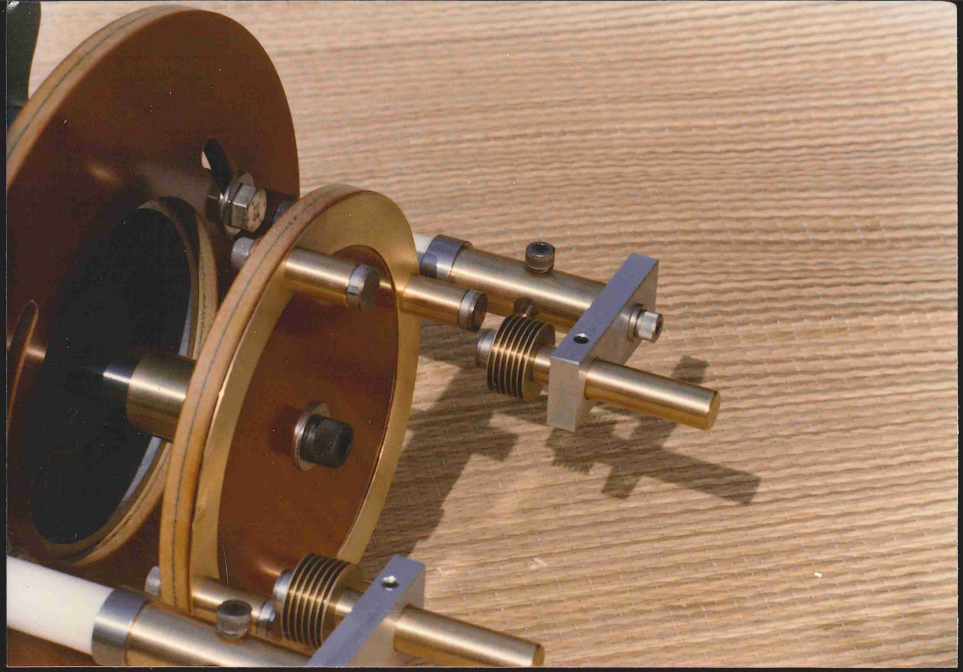




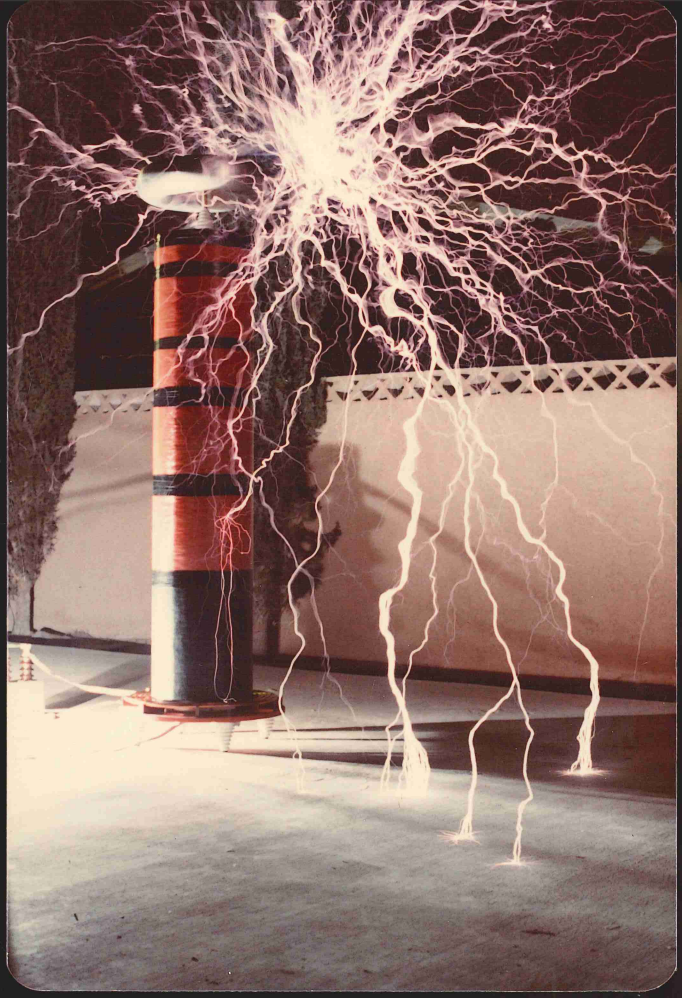


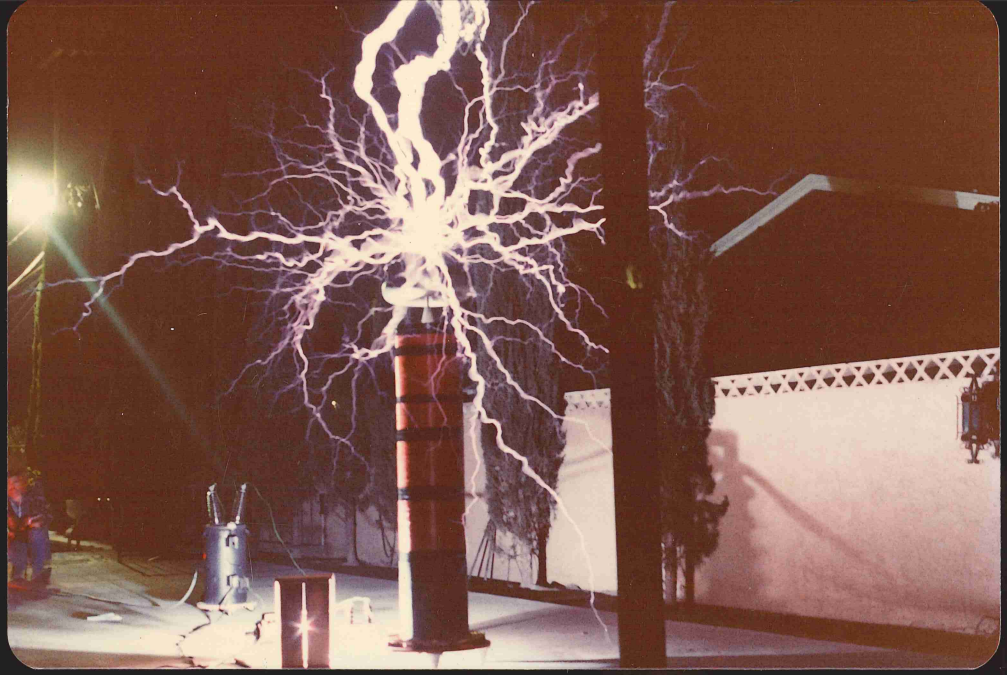


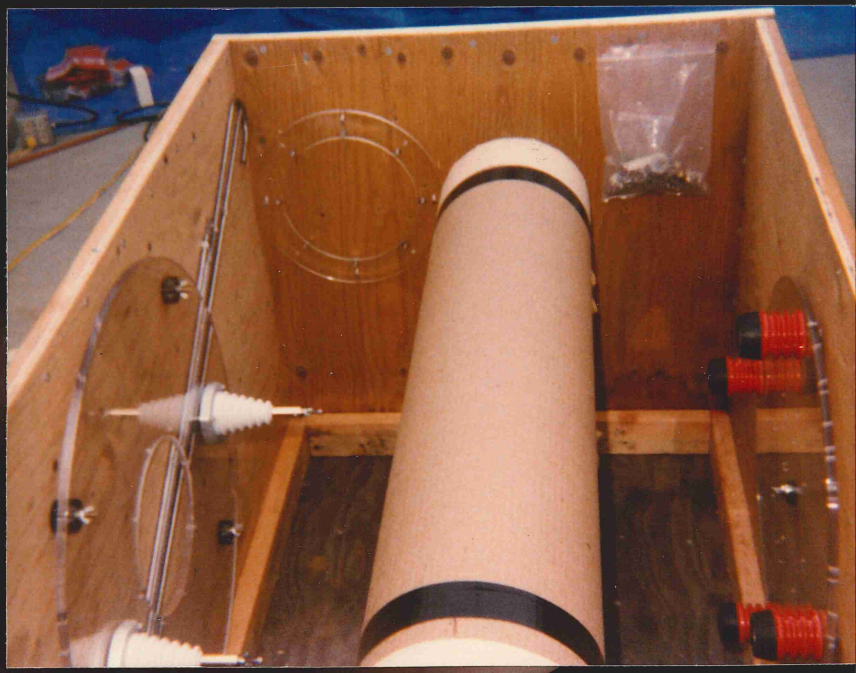






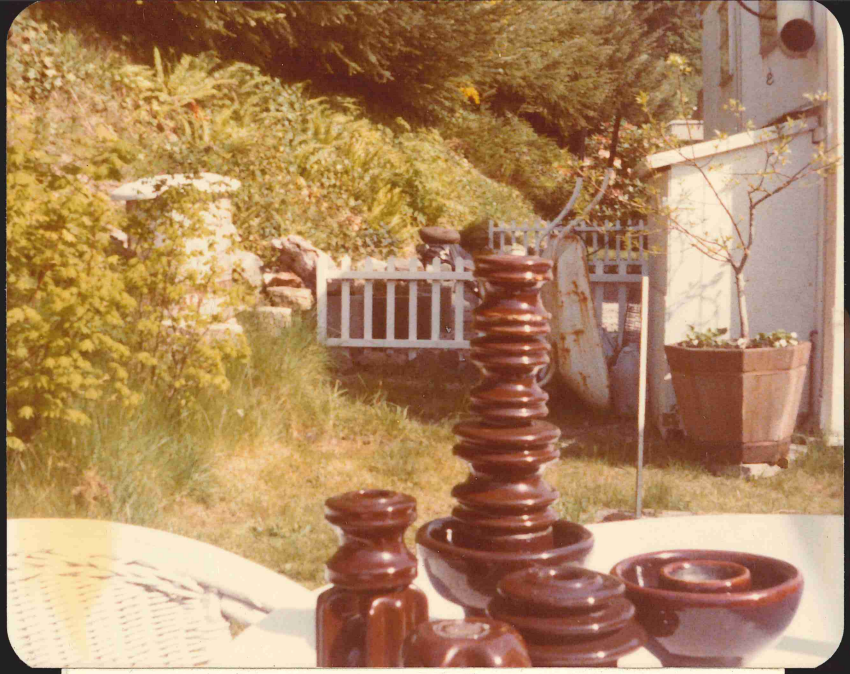












#1
#4

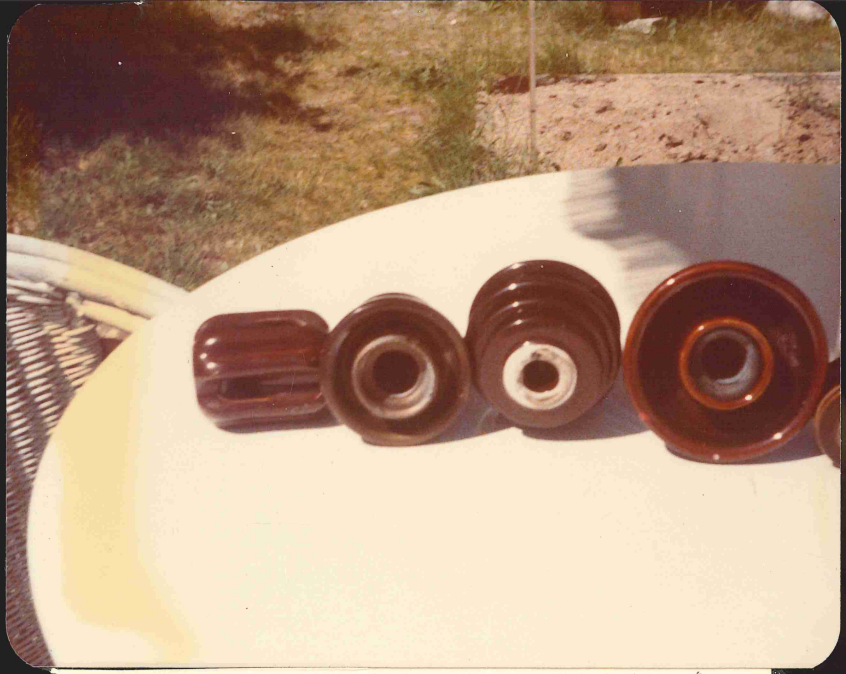
#1
#1
#6
#2

#3.

#5.

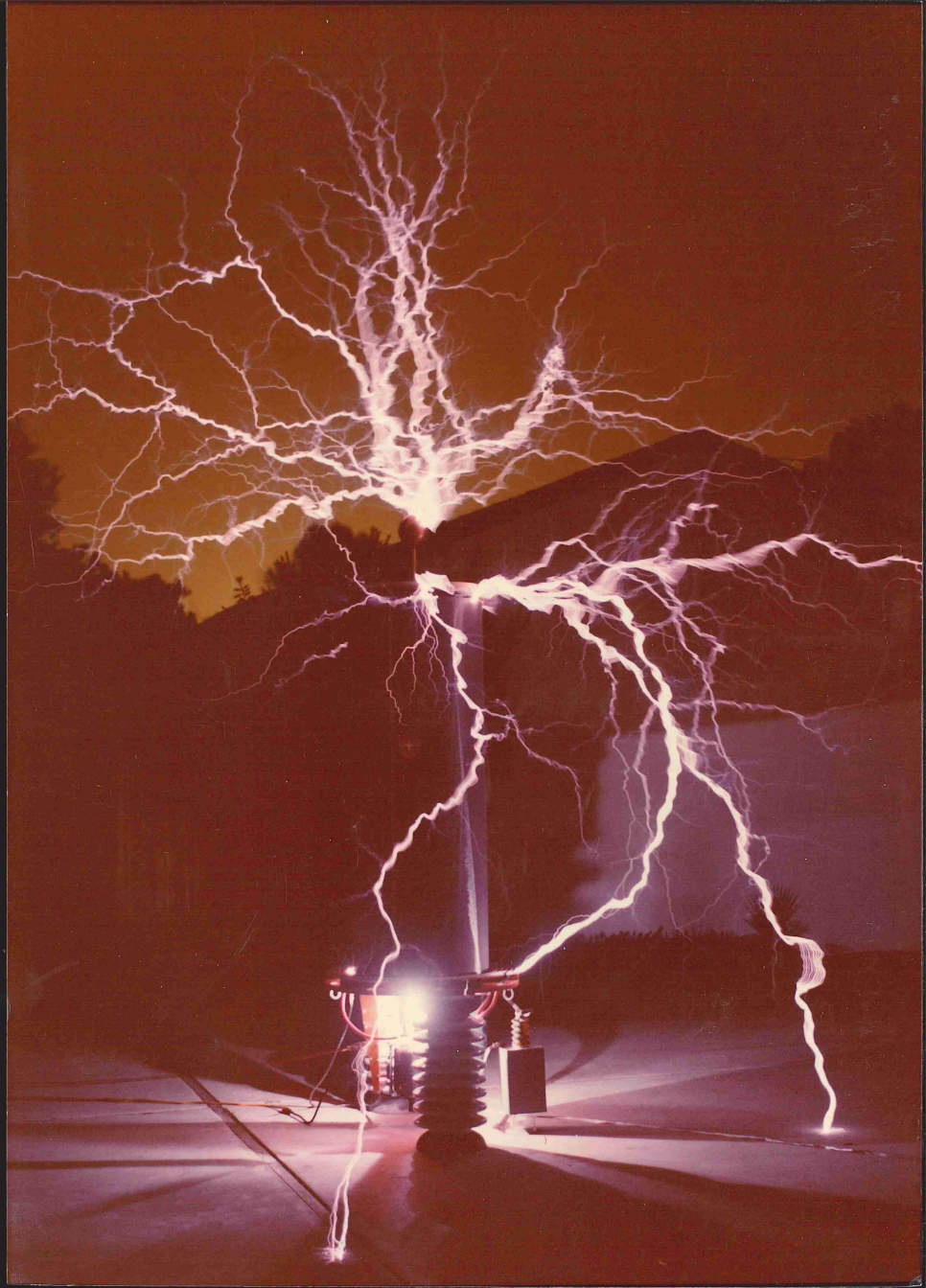


#1. #4. #1. #2. #1
#3. #1
#6
#2



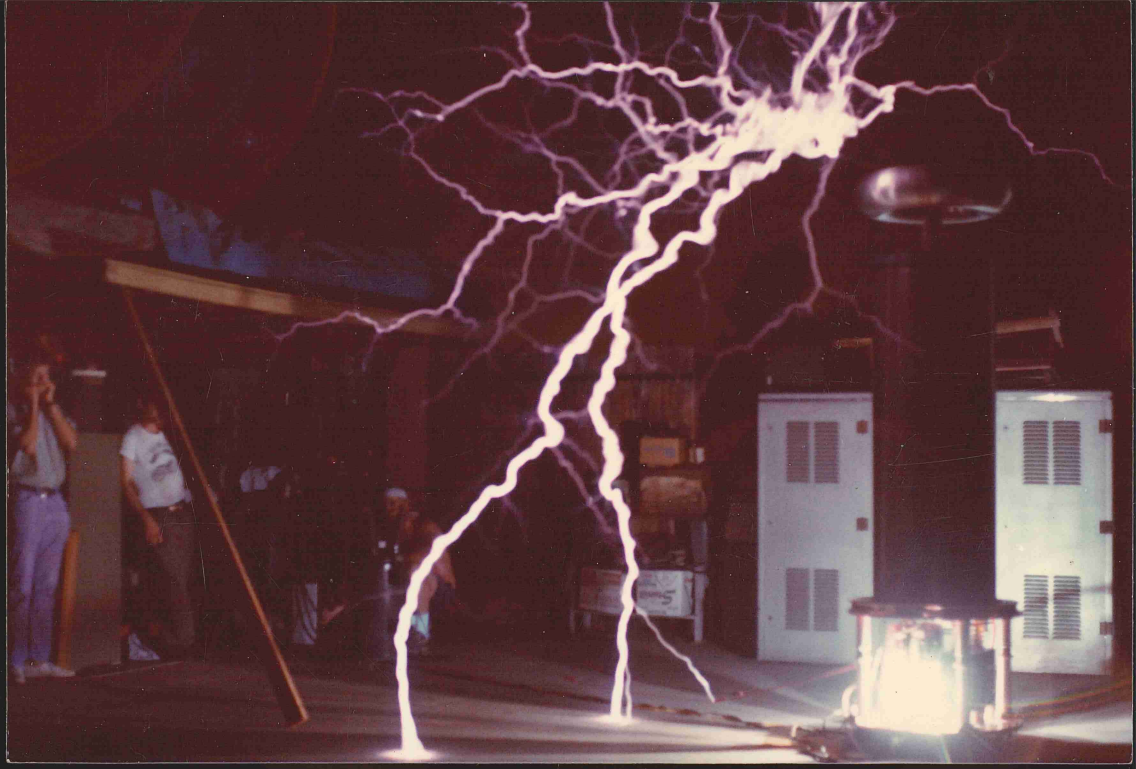
#4. #6. #3. #2.

side view of openings

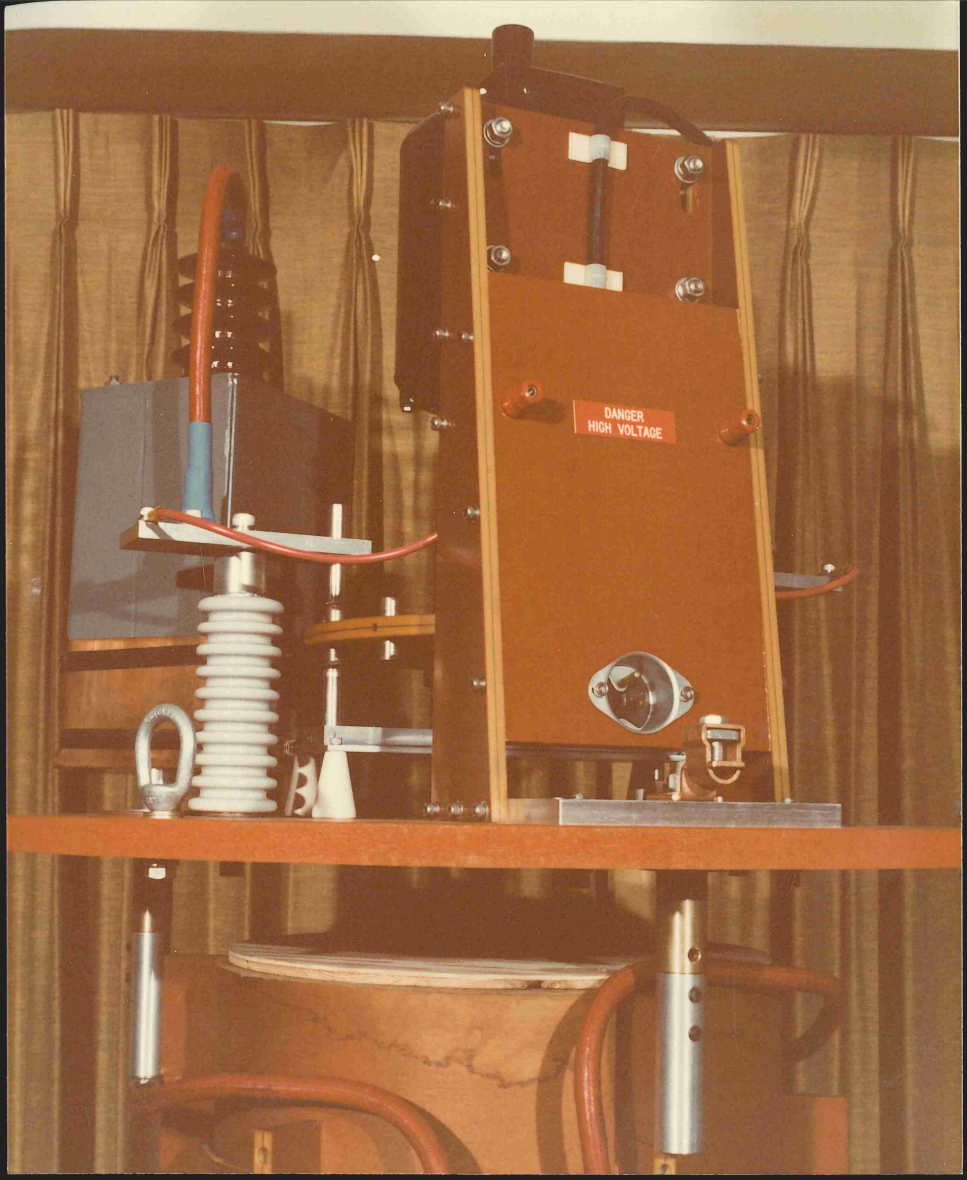


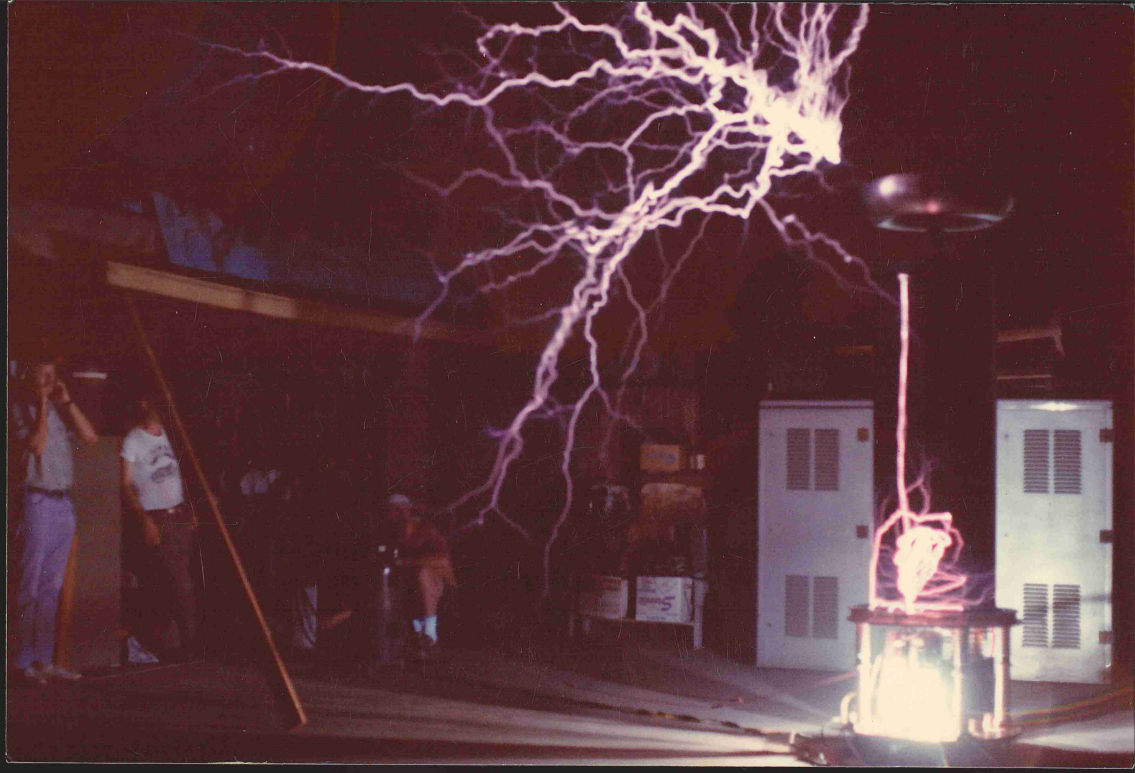


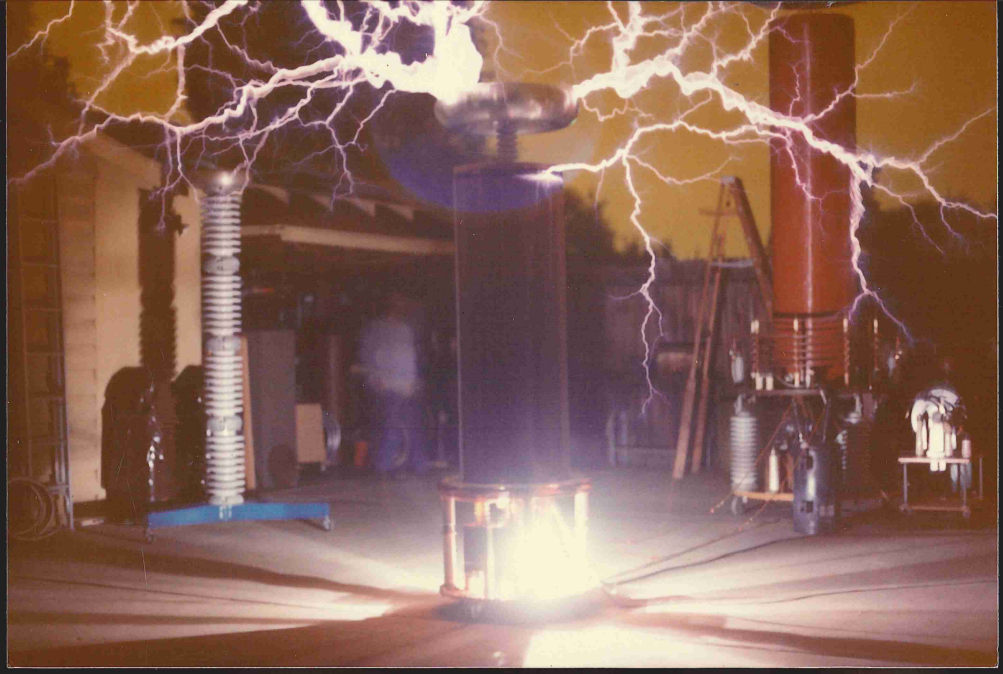


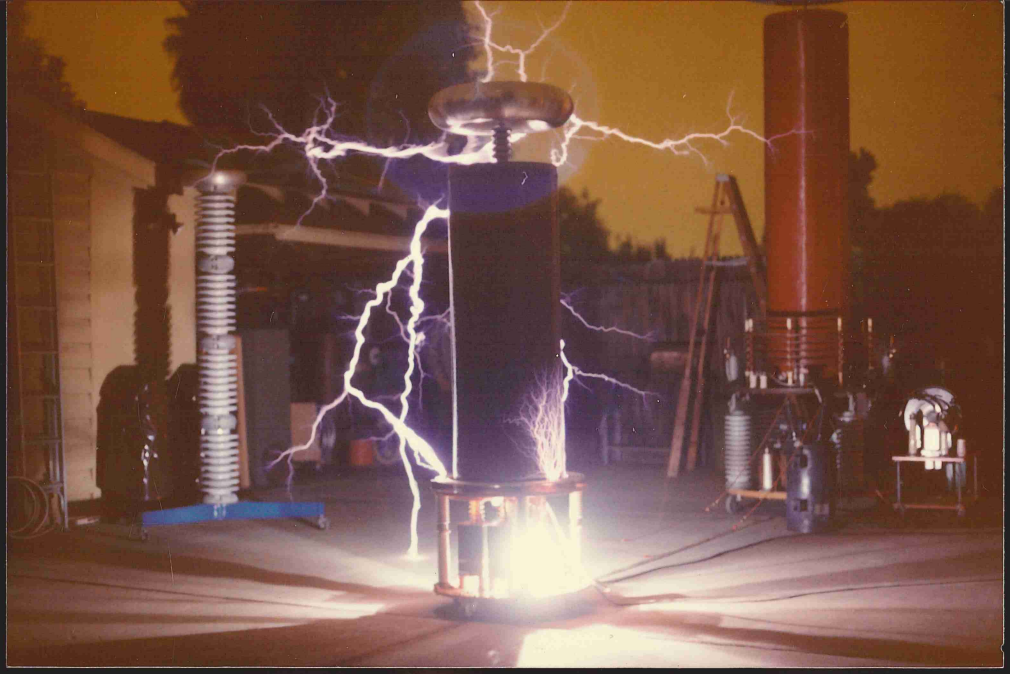


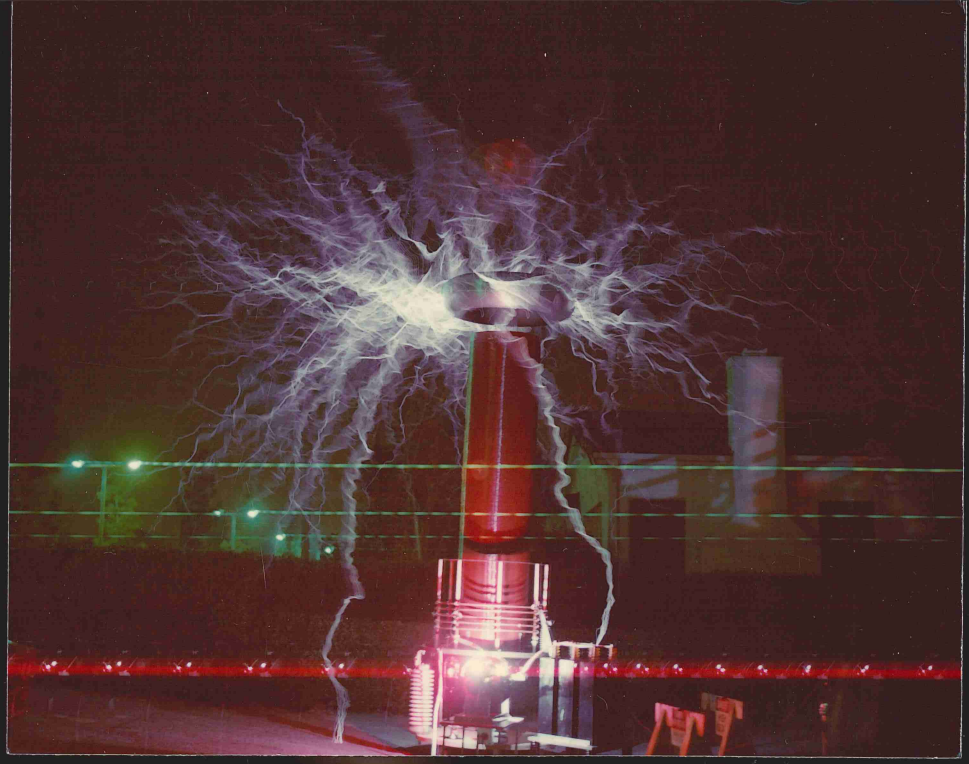



DANGER
HIGH VOLTAGE

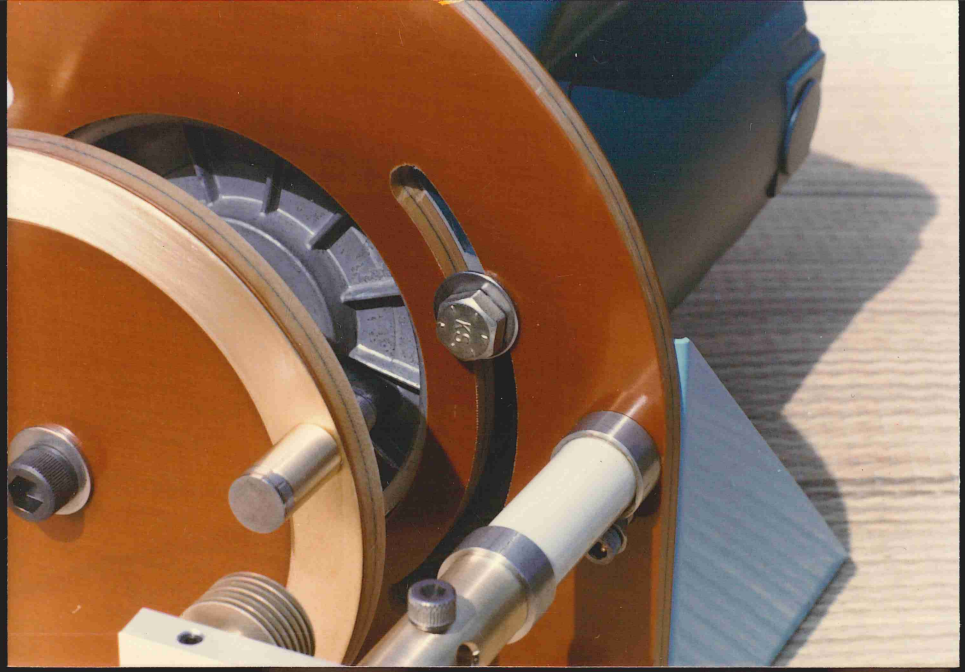


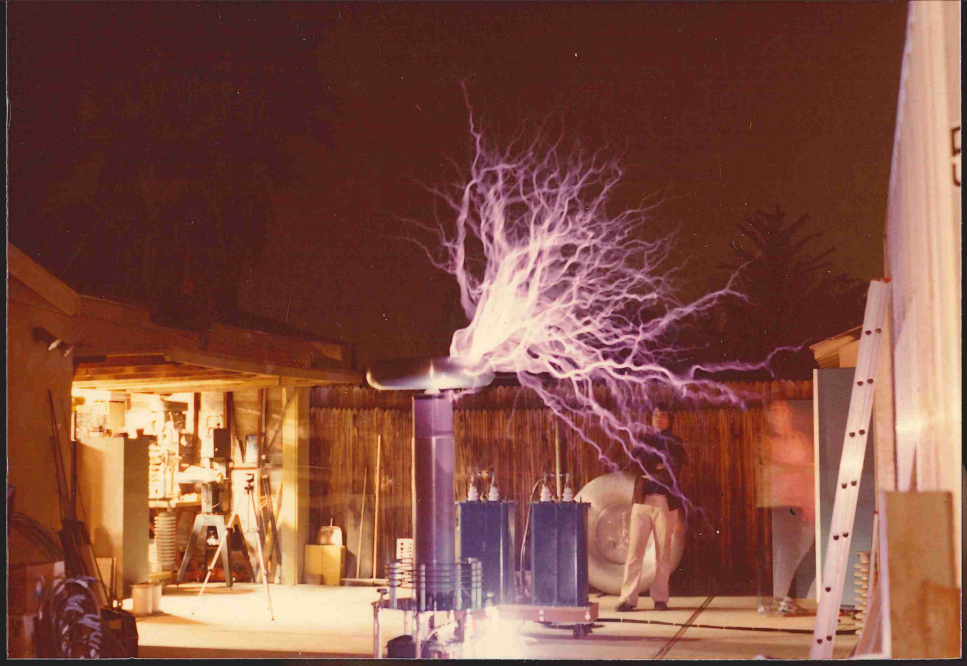




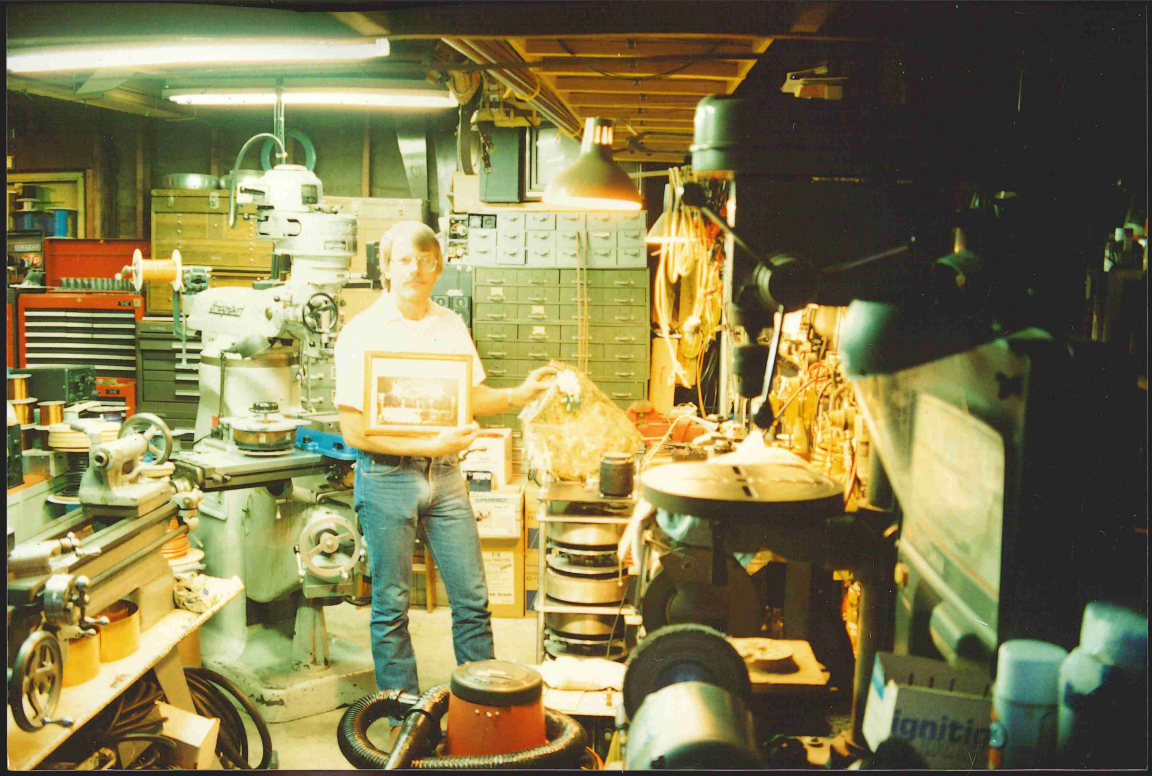


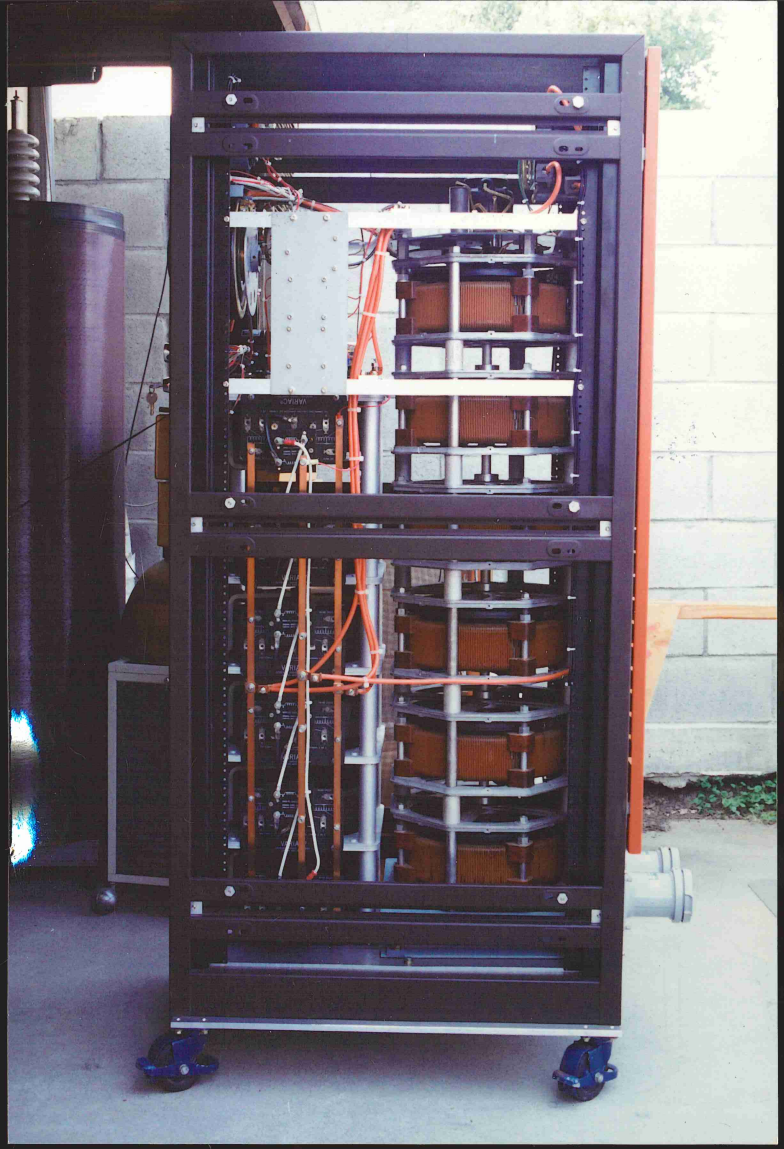










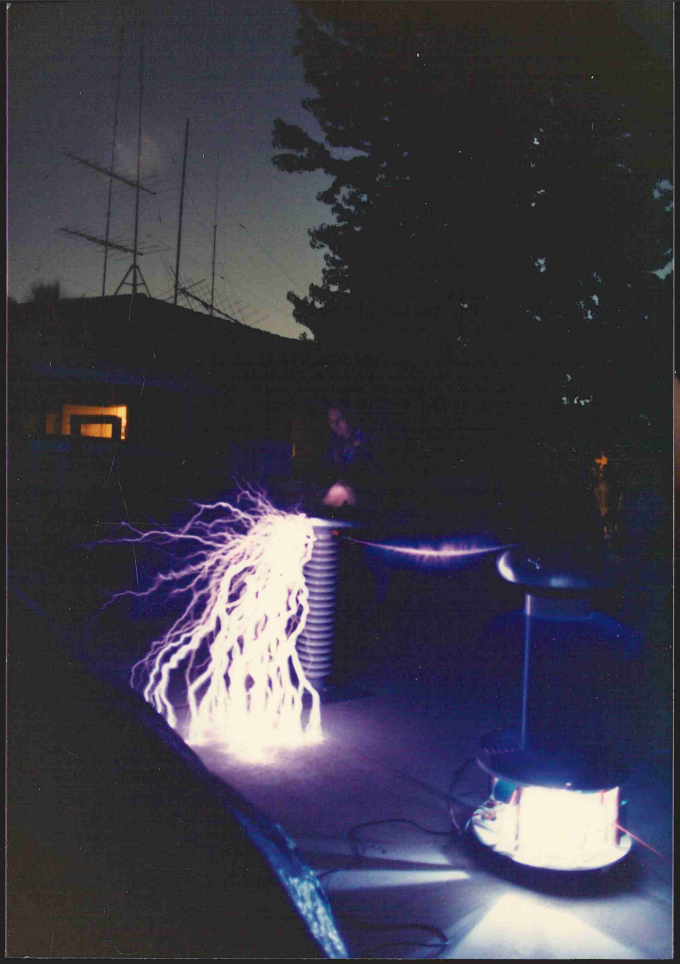


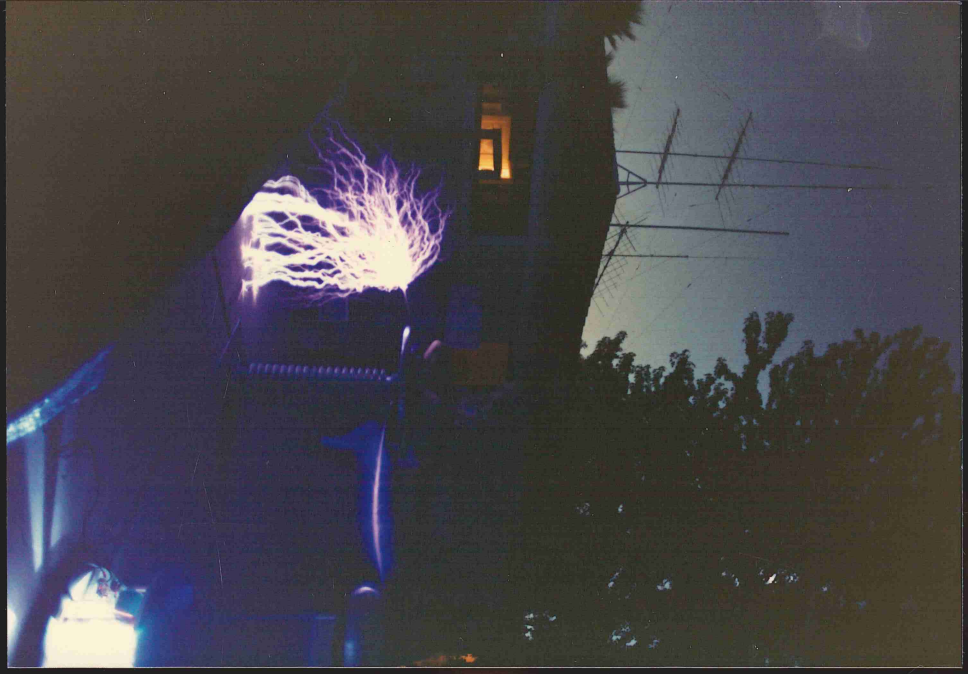


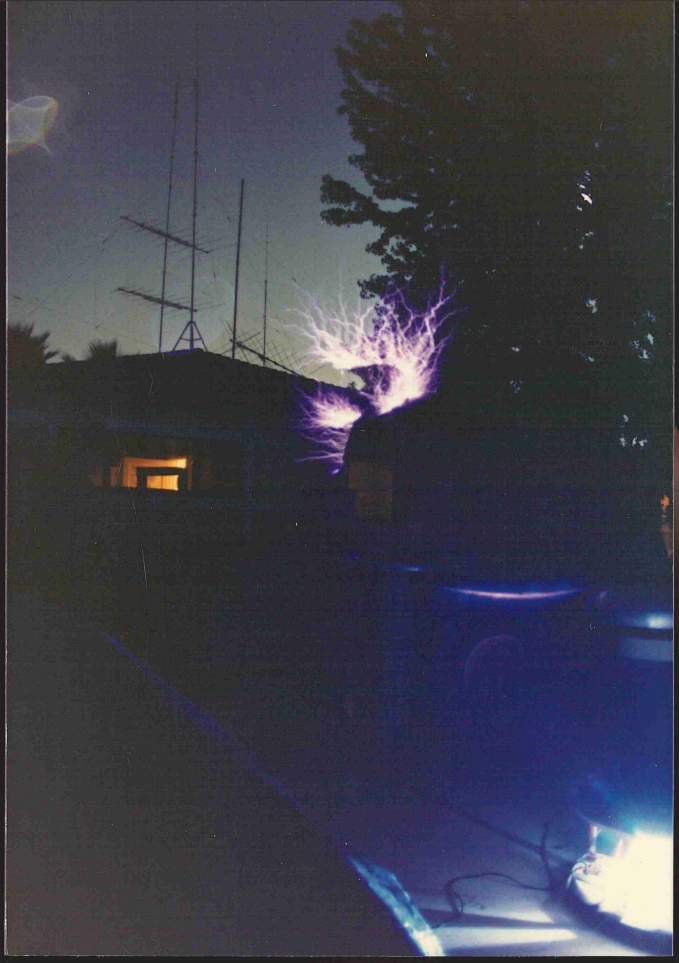


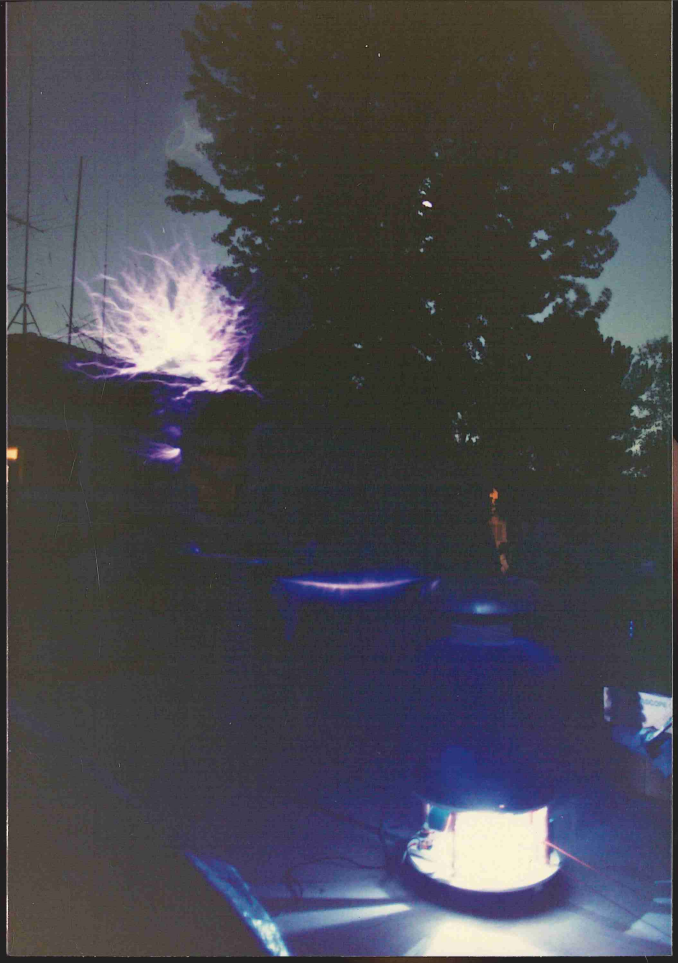


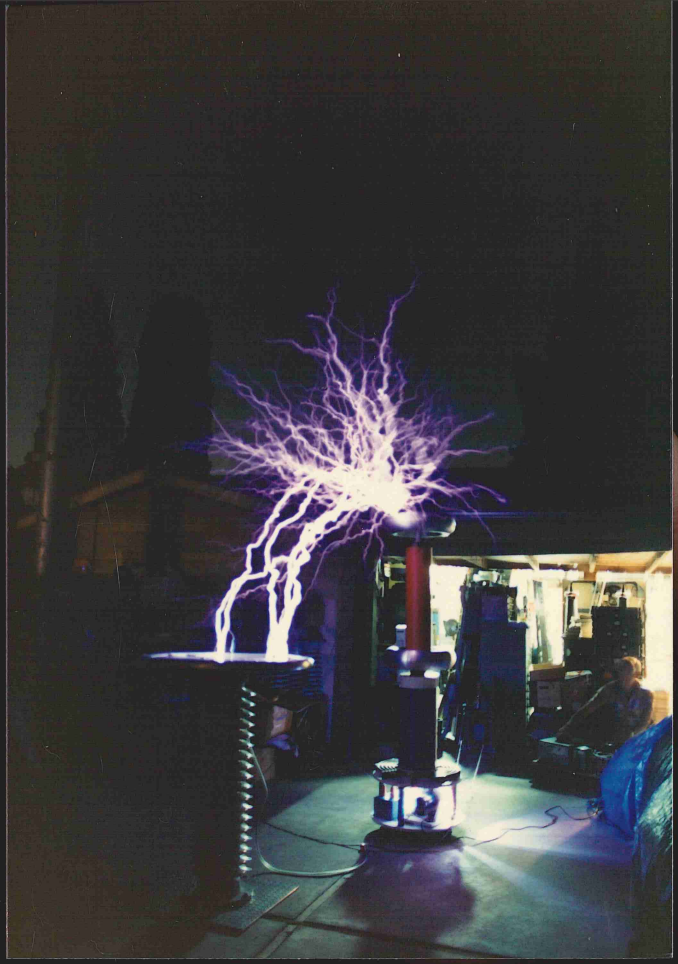


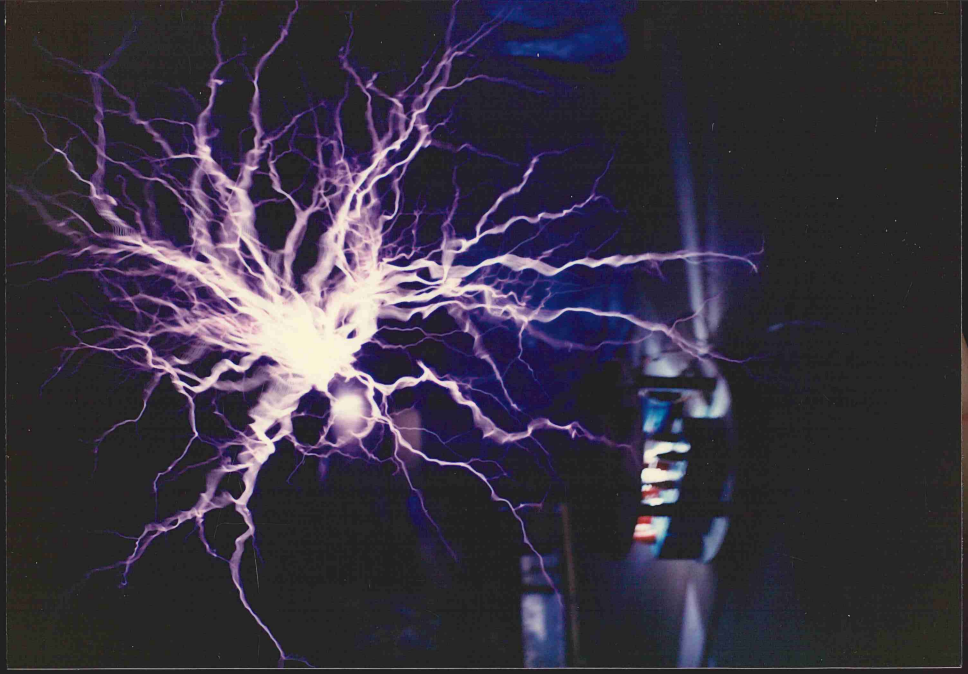




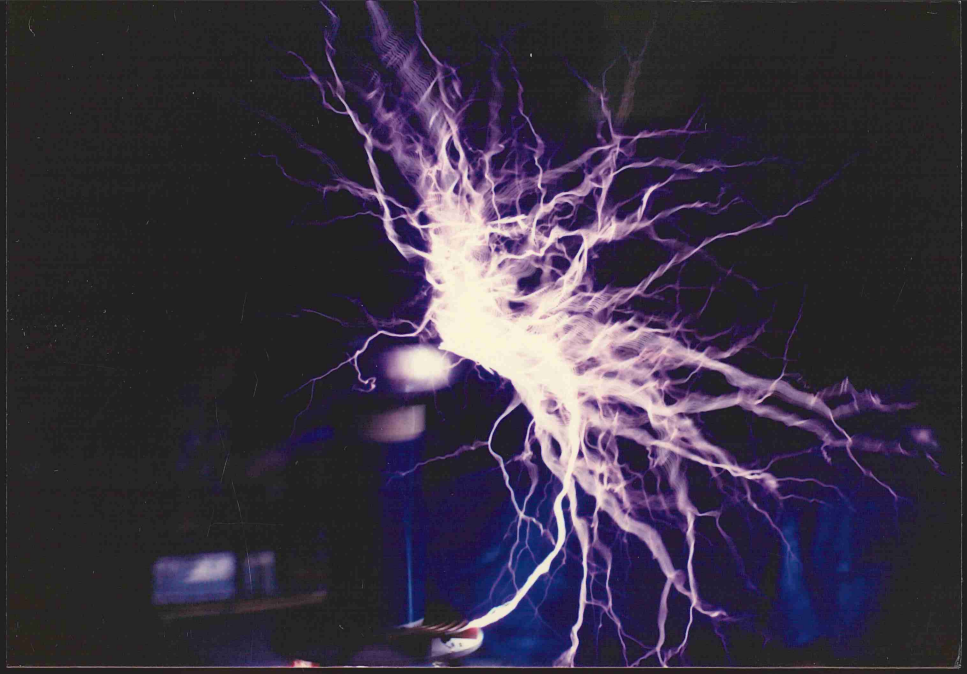








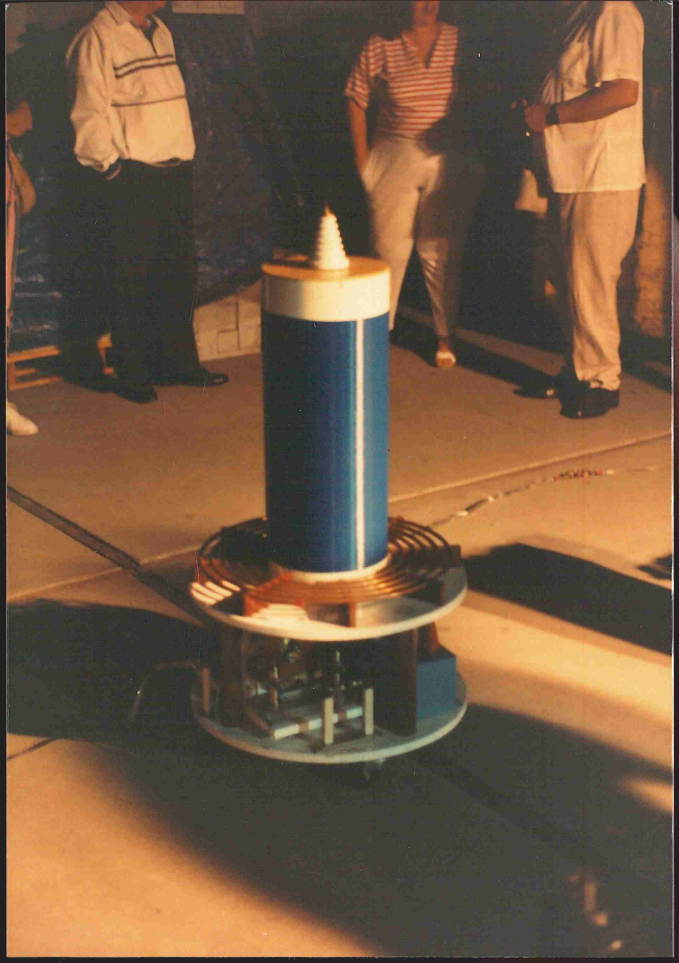


























©1981
Richard G. Arendt 1

# The Griffith Observatory's Tesla Coil

The Tesla Coil exhibited in the Hall of Science at the Griffith Observatory, was constructed in the 1920's by Earl Ovington. It is reported that Mr. Ovington built the coil for presentations on the vaudeville stage, a common use for Tesla Coils during that period. The coil as it appears in the Hall of Science is really only half of the original Ovington outfit. That is, the complete unit was two coils butted together at their bases with their axis in a horizontal plane rather than vertically oriented in which case the spark jumped from one end to the other, a spark in excess of eight feet. A double ended coil, WITH A MIDPOINT GROUND, is a half wave coil whereas the single ended resonator is a quarter wave.

Mr. Ovington was an associate of Dr. Fredric K. F. Strong, and together they collaborated on the construction and application of high frequency high potential medical equipment. The coil was given to Dr. Strong by Mr. Ovington who then, in 1937, donated the facility to the Griffith Observatory.

In its halfwave double ended configuration it was to large to be set up in the available space. Thus it was necessary to separate the coil into two quarter wave resonators and set one of them up as a single ended vertical unit; this arrangement sometimes refered to as an Ovdin (Founder A. Ovdin, M.S.E.E.) coil or resonator.

The preparation of the coil as it is seen was done under the direction of Mr. Leon Hall, technical director of the observatory at its inception. Mr. Hall with the assistance of Mr. Kenneth Strichfaden, an authority on all types of high frequency high potential equipment, set the Tesla coils in particular coil up in the observatory basement as two independent quarter wave units looking at one another, again producing a spark over eight feet long. In the arrangement just described, each coil ~~(quarter wave section)~~ had its own primary winding. The primaries were so connected as to require only one capacitor bank, spark gap and 60 hertz high voltage transformer. Unfortunately, as previously stated, the available display location was only large enough for one of the quarter wave cones and its associated primary. Thus the other secondary and its primary were stored away for spares to be used when the demonstration unit was in need of service. This turned out to be a wise decision as at some point between 1937 and 1951 the lower fourteen feet of the demonstration coil's secondary burned out and was replaced with the spare unit. The coil now on display had a similar failure at the top, but was able to be salvaged by the removal of a few top turns.

Again in 1951, the secondary with the damage lower section was borrowed by the Moody Institute of Science. The damaged lower secondary

turns were removed, reducing the secondary length from 49" to 45", in the remaining 4" space a single turn primary of rubber covered power line (industrial 1) cable having a diameter of one half inch was wound; the winding of the primary and secondary on the same form is a standard configuration in high frequency coil design. The coil was then connected with a 0.2 mfd capacitor, a synchronous rotary spark gap, three of the five primary turns and a 17,200 volt 10.4 KVA transformer. When the coil was first tried it drew over 100 amps at 117 volts but the spark from the coil was well over nine feet in length. While this may seem impossible, a spark over nine double the coils length, a well designed coil can easily break down twice its length if enough power is made available to it. That is, if a coil is correctly tuned, the high potential gradient exists only from end to end, a uniform voltage distribution does not occur from turn to turn but instead follows a sine curve along the total quarter wave length of the secondary wire. It is for this reason that high frequency inductances of the single layer type often have their last 20% stretched out in the case of cylindrical coils or the coils shaped as a cone thus providing more turns per unit length of wire at the ungrounded end.

Tesla, in his early work (1890's) realized the non-linearity of the voltage gradient along the secondary coil and compensated for it by winding the primary and 80% of the secondary on a large cylindrical form and the last 20% on a smaller elevated cylinder.

Mr. Ovington elected to employ the conical (tapered) coil form and constructed them (two) like a wooden barrel, that is, of several wooden disks per cone. Starting at the bottom with one of 36" in diameter and ending at the top with one 18" one. These disks are placed along a wooden dowel 48" long. The disks were then covered with wooden strips 49" (hypotenuse) long by 1/8" thick, tapering from 4" at one end to 2" at the other. The top and bottom of the cones was then provided with a turn of 1/2 round wooden moulding for winding termination and cosmetic appearance.

The winding itself consists of 400 turns of 18 gauge rubber covered stranded wire. Since the outside diameter of the insulation is approximately 1/8 of an inch, the winding is not space wound as is typically done when enameled wire is used. The winding, for physically protective reasons, was then covered with a layer of 3/16" twine, much like a small rope. This surface was then given a coat of red glyptol, a finish frequently used for electrical equipment where high voltage insulation is important. Before leaving the secondary winding it would be well to point out that the frequency of the coil will be in wavelength, four times the actual secondary wire (not cone or coil) length in meters — that is to say, the secondary winding is a 1/4 wave antenna coiled up.

The actual wavelength is slightly longer than the wirelength as a result of the capacity introduced in the secondary by its being wound into a coil but using the wire length as a 1/4 wave measure, very close estimates can be derived regarding the primary inductance and capacitance.

The balance of the circuit consists of a primary coil, a primary capacitor, spark gap, transformer, and line filter.

The primary coil consists of 10 turns of 3/16 x 3/4" copper ribbon spirally wound radiating out from the base of the secondary coil; roughly three turns of this winding are used to obtain resonance with the secondary. Ten turns were wound as it was not absolutly certain the value of the original capacitor and too many turns was safer than too few.

The capacitors provided with the coil were large leyden jars, approximatly 8" in diameter by 18" tall. Eight of these jars gave a capacity of around .125 mfd which was a fairly good match for the power available. These jars were supported in a wooden frame similar to a "GIANT" test tube rack. The coil came with 4 extra jars as apparently Mr. Ouington knew what was to come when he designed the outfit. As suggested, over the years, the leyden jars broke down (punctured) and were one by one, consumed.

Hence the capacitor is now a glass plate stack of 60 copper plates, 14" by 15", separated by 3/16 window glass. As to the electrical quality of the window glass as compared with what may have been "quartz" in the leyden jars, a standard dielectric used in commercial leyden jars used for spark radio transmitting equipment and other high frequency high voltage applications at the start of the century, there is some uncertainty. The capacity of the glass stack is approximately .117 mf and since 3/16" glass plates (.187") are employed at 200-250 volts per mil the dielectric should stand ~~approximately~~ 37.4 → 46.8 KV's, an adequit safty margin since it is charged with only 10,000 volts rms.

The spark gap used with the Griffith coil is a non syncronous (does not rotate in step with the 60 hertz supply line frequency), Marconi type, that is, a rotating disk with axially oriented electrodes placed around its periphery rotates between two stationary electrodes, thus as the disk revolves each electrode on the disk comes in between the two stationary electrodes providing two small spark gaps which then can be broken down by the transformer voltage. Their are 14 electrodes equally spaced on a 12" bakelite disk. The rotary as well as the stationary electrodes are 3/8" in diameter and

Tungsten tiped. When a moving electrode is in line with the stationary electrodes a total of 1/8" spacing exists.

It is frequently though that in some way the rotary gap is involved with the frequency (wavelength) at which the coil operates, this is not exactly true. The frequency of oscillation is dictated by the L/C (Inductance/Capacitance) ratio as needed to resonate with the secondary winding of the rotary, or for that mater, whatever type of spark is used does, indeed, influence the wave shape produced by the oscillator, winding. The wave shape has a significant effect on the appearance and sound of the spark. If the primary circuit is charged with a D.C. rather than an A.C. (60 hertz) source, the rate at which the rotary gap interrupts the primary current will be the only audible frequency in the spark.

The rotary gaps greatest advantage over other types is its self cleaning and cooling qualities, desirable charistics where high power and frequent operation is called for.

The transformer is a 10,000 volt 2 KVA (KVA - kilovoltamp - is a term used in AC circuits where inductances are involved as at: KW - kilowatt is used for AC + DC circuits having only resistance) unit manufactured by the Reinhardt Transformer Co, it is of the high reactance type, for spark oscillator service.

It was originally manufactured as a 20,000 volt unit with a midpoint ground but had been internally reconnected for 10,000 volts at twice the current (200 milamps) with one end grounded.

Because the transformer being used to excite a spark gap oscillator is subjected to short circuit conditions each time the spark gap breaks down or when the capacitor is completely discharged it must either be a high reactance (self limiting) type or have its input or output limited by chokes or resistances, the chokes being preferable.

The capacity of the primary transformer in 2KVA as a good "rule of thumb" in Tesla Coil design is to use 500 VA (.5KVA) for every foot of spark needed. The location in the Hall of Science provides for a four foot spark, thus 2KVA is adequit. (approximately one million volts)

The .5KVA/foot ratio is based on how bright the spark (current) against how long the spark (potential) and the ratio indicated produces a "good looking" spark for what ever length is chosen. This number only applies to well designed coils where good electrical considerations as well as good construction materials are employed.

The bottom line is electrical 'Q' (quality factor); all phases of the circuit, especially the high frequency circuitary must have the highest 'Q' possible.

Resistance is the negative aspect where 'Q' is concerned in inductors — as little as possible is the way to high 'Q' since 'Q' is the ratio of inductive reactance to resistance. A 'Q' of 10 or more is said to be good. The same holds true for the interconnecting cables, although in their case you want as little as possible of both resistance and reactance so a minimum of power will be dissipated in the interconnections. Since high frequencies flow on the surfaces of conductors, where high currents are involved, as in the primary circuit, large surface areas are desirable to permit the skin effect to handle the power with little resistance. It is for this reason that high power commercial facilities have their circuitary, ~~where it is opposed to atmosphere~~ silver plated as silver was one of the lowest oxide resistances, and in the case of the capacitors, they are best oil immersed or in some way sealed from the air least they not be equipted with silver plated plates; ~~In the case of the capacitor,~~ the air also deposits a film on the exposed insulating surfaces which brings resistance in the form of surface leakage into the circuit.

The KVA rating of the transformer is again a product of its voltage times its current it is well to point out that you only need enough voltage

to breakdown the spark gap and drive as much current as possible through the primary inductance. Since a capacitors volumn goes up by the square of the increase in voltage it is desirable to hold the transformer between 7-10KV and increase the current to increase the KVA for greater spark length.

The line filter ~~for the~~ is placed in the primary of the 60 hertz transformer and is composed of series inductances and shunt capacitances to ground. The function of this filter is to prevent any transients from finding their way back into the building wiring in so doing breaking down insulation and causing serious damage in general.

A frequently asked question concerning the lightning <u>like</u> (appearance only) spark coming from a Tesla Coil is ones ability to allow the spark to jump to him or stand on the coil (bare foot) and have the spark jump from his finger tips. These effects and many more were classic stage showperformances starting back at the turn of the century. It must be remembered, that the "skin effect" of high frequency currents is what makes this possible and as the coil gets bigger the wavelength gets longer and so the depth of penatration becomes greater — this permits the current to effect

more nerve endings and since the power level in big coils is greater to effect these nerve endings in a more unpleasant fassion. When doing stunts of this sort with big coils the demonstrator should not be grounded or especially when standing on a coil allow the spark to jump to ground as in either of these two cases the circuit is complete and logically greater currents will flow frequently causing the muscles to react in a violent manner. When experimenting with a coil even as small as a few hundred volt amps lethal conditions may be encountered since although the power available may not electrocute a person it doesn't take much to stop the heart from electric shock. ~~Also where high power outfits (over 1KVA) are.~~ It should also be remembered that if there is a fair amount of current in the spark it is not recommended to receive the spark on the bare skin as this typically results in "Radio Frequency" burns; again the nerve endings are effected and R.F. burns take a long time to heal. Thimbles on the finger tips ~~or~~ or ~~rods~~ some metal object held in the hand is the way to perform effects of this sort. Also, it is sometimes thought, that ones hair will stand on end, but since you are being charged with alternating current, your body takes on no net charge of ~~any~~ a magnitude sufficient

to cause this effect. To make ones hair stand on end the person must be charged with high voltage direct current obtained from an electro static generator (Van de Graaff) or d.c. power supply. The Griffith coil is frequently mistaken for a Van de Graaff as it also has a ball on top but for different reasons. The Van de Graaff generators ball is the capacitance ~~which~~ where the high potential is gradually accumulated where the Tesla Coils ball is a series capacitance which improves the 'Q' of the secondary winding.

Stunts of the type discussed could not be safely done at the observatory due to the physical layout of the coils location, that is to say, ~~that~~ the walls are too close. If the power to the coil was cut down to a level where the spark could not reach the wall it would be feasable to produce these effects safely but much of the spectacle would be lost.

At this point I would like to close by thanking those persons, who without their help this article would not have been possible, In alphabetical order

The Staff of the Griffith Observatory

Past

Dr. C. Cleminshaw (Director)

Mr. Leon Hall

Present

Robb Hanson
Kim Johnson
Dr. E.C. Krupp (Director)
John Lofdahl
Wayne Nelson
Bret Paul
John Sepikas

personal associates

Ed Angell and Janice Newmark (Lexington Set Shop)
Lydia Hammond
Dr. Victor Hugowitz
James T. Shaffer
Kenneth Strickfaden

publications

Electricity at High Frequencies and High Potentials
H.L. Transtrom

High Voltage Laboratory Technique
Craigs and Meek

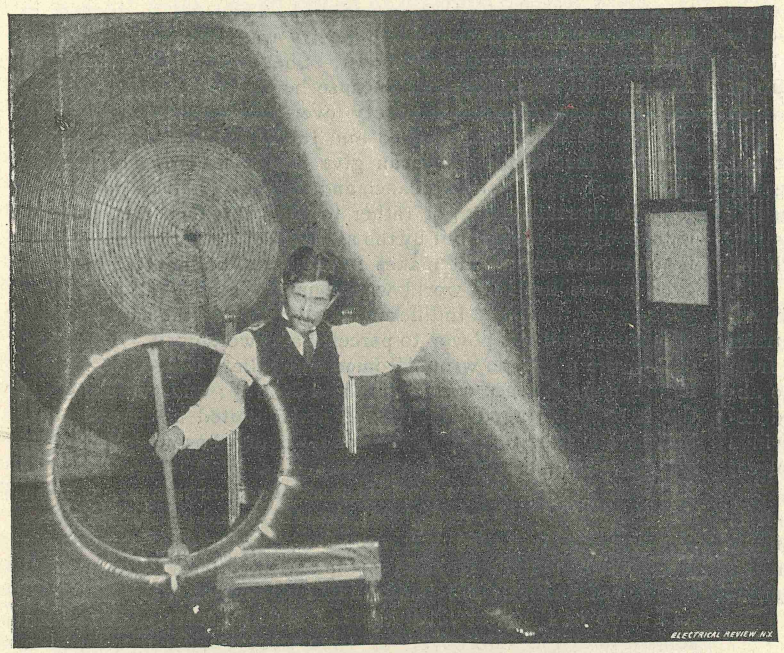
Standard Polyphase Apparatus and Systems
Maurice A. Oudin, M.S.

© 1981
Richard C. Hamm

## SCIENCE AND INVENTION.

### RECENT EXPERIMENTS BY TESLA.

NIKOLA TESLA contributes to *The Electrical Review* (March 29) an illustrated account of some of his latest experiments in the building of improved induction-coils for the development of great electrical pressure. Mr. Tesla says that it is easier for him to invent than it is to perfect and to record his inventions. He puts it thus:



SOME EXPERIMENTS IN TESLA'S LABORATORY WITH CURRENTS OF HIGH POTENTIAL AND HIGH FREQUENCY.

The operator's body, in this experiment, is charged to a high potential by means of a coil responsive to the waves transmitted to it from a distant oscillator, and a long glass tube waved in the hand is lighted to great brilliancy by the electrical charges conveyed to it through the body.

Courtesy of *The Electrical Review*.

"Ideas come through a happy inspiration, apparently without much exertion; but it is the working out of the many harassing details and putting into a presentable form which consumes time and energy. It was impossible to abandon research in new directions, in which I have felt myself irresistibly drawn, and it was equally impossible to do full justice to the work partially completed, and I can only hope gradually to retrieve my losses by the only expedient available, which is to redouble the zeal."

The author pays his respects to the sensation-loving public, which at intervals attributes to his genius some new miracle, to the disgust of sober and slow-going, native-born scientists. "Some people," he says,

"have found a singular satisfaction in dwelling extensively in their columns on my proposed glass-house on Long Island, which was to cover acres of ground, and which was to be built for the purpose of catching the sun's rays; on my claims of the discoveries of Roentgen; on my invention enabling me to move and explode torpedo-boats by will power, and on my efforts to annihilate the entire British navy. It is to be hoped that the limits of patience of the readers have been finally reached."

The inventor next describes the process of thought that led him to devote special attention to the improvement of induction-coils. He says:

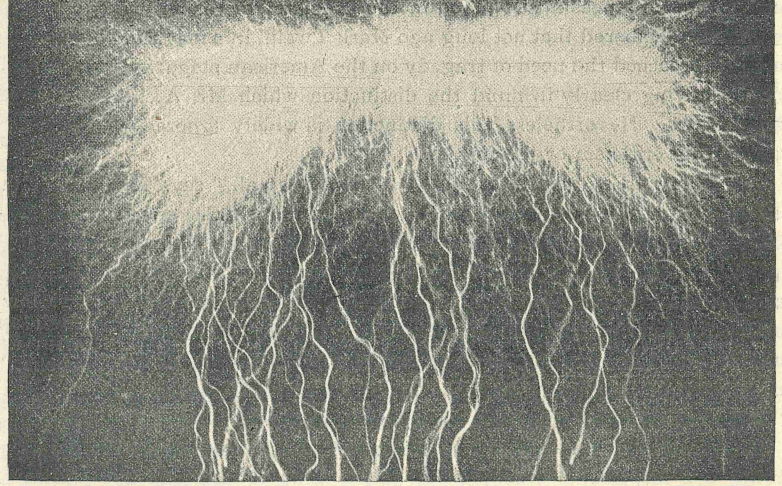
"The importance of the task of providing proper implements for research in these various fields once recognized, it became the question in what line the efforts to this end would be likely to be most profitable. A little thought showed that it was in investigating high electrical pressures, for these were needed in most instances. . . . . .

"Soon it was recognized that . . . generators of steady pressure were entirely impractical, quite apart from their incidental limitations. It was exactly as if one attempted to drive piles into the ground by the application of continuous pressure. This would require cumbersome and powerful machinery, and would be very inconvenient. An incomparably better way of developing high pressure is by delivering violent blows as with a hammer. In such a case the motion of the hammer being suddenly arrested pressure is developed on the point of impact, which is all the greater the smaller the displacement caused; and if there were material absolutely rigid, incompressible, and inelastic, an infinite pressure might thus be developed by a small blow. Hence one is forcibly driven to the use of a transformer or induction-coil as a means for producing great electrical pressures."

We can not follow the inventor in his detailed description of his work. The first difficulty he encountered was that of insulation, but by clever devices and by various alterations of position and arrangement in his primary and secondary coils, he finally attained remarkable results. His final and most radical improvement is thus described:

"During these efforts I fortunately discovered the important part which air played in the breaking down of the insulation, and by adopting proper methods for the exclusion of gaseous matter, I was able to increase the electromotive force to more than ten times the value without breaking down the secondary. I have described this method since, which I am using in the manufacture of coils and condensers, and without which it would be entirely impossible to reach any such results as I have obtained. The industrial world has profited by the recognition of the action of the air, for it has helped to extend power transmission to greater distances than heretofore practicable. . . . . .

"Further experimentation . . . finally led step by step to the adoption of a coil of large dimensions. . . . With such a coil I found that there was practically no limit to the tension obtain-



PHOTOGRAPH OF AN ACTIVE TERMINAL OF AN IMPROVED OSCILLATOR, USED IN TESLA'S EXPERIMENTS FOR TRANSMITTING ELECTRICAL ENERGY TO GREAT DISTANCES WITHOUT WIRES.

Width of illuminated space is 18 feet—the pressure on the terminal is about eight million volts.

Courtesy of *The Electrical Review*.

liefs and dreams and joys and glories in the spirited adventures of other days. And it is thus that she gets very close to the heart of her people and race.

"There are plenty of warm descriptions—descriptions of the long lake, the rich plain, the steep hills, and the blue mountains of the province of Wermland. 'The Knights of Ekeby,' the book might almost have been named, but Gösta Berling, the dismissed priest, is the central figure and natural leader of the twelve of this new Round Table. Their mad adventures during a year of power fill the book. The volume is a series of pictures of the past arranged in panorama, and the gray old days are portrayed when men were both more brutal and more childish, and women were hardier and more beautiful—and all were controlled by elemental instincts and passions. Every act is exaggerated in a region of legendary lore, where there hovers an atmosphere of ancient sagas and where rule elemental nature forces to which man is bound subject.

"The author's style agrees with the matter. It is almost that of the ancient Norse poems again. There is a story, a legend, a saga to be told, and this begins in the simplest way. It begins and it is—there is no stopping to tell why it is, nor does it matter, it simply is. The simplicity of method is at once the strength and the charm of the book.

"The close kinship with the spirit of the saga goes further. The characters look and are dressed in keeping with their traits and names. Comparisons and figures of speech are taken from observance of nature, direct, strong, concrete, and nowhere abstractions. Everything is alive. Passions and wishes and desires are no longer qualities, they are hoarse ravens with wings of fire and claws of steel. And wolves are more than wolves, and magpies more than magpies.

"The book is not only a distinctly literary production—it is also a spiritual one. It may be symbolic, and if it has an inner meaning this can well be that in the struggle of forces in man's nature the moral must win over merely the esthetic and the sensuous."—*Translation made for* THE LITERARY DIGEST.

---

## PESSIMISTIC AND TRAGIC ART: A DISTINCTION.

MR. WILLIAM ARCHER, one of England's foremost literary and dramatic critics, contends, in a recent review, "that tragedy is not necessarily an expression of personal gloom, any more than comedy is necessarily an ebullition of personal gaiety; and that a work of imagination makes for optimism or pessimism in the reader, not in virtue of the gaiety or gloom of its story, but rather in virtue of its inherent vitality or lack of vitality, the bracing or 'lowering' quality of the spirit which animates it." Thus, according to Mr. Archer, tragedy does not necessarily beget a pessimistic mood in the spectator or reader. It will be remembered that not long ago Mark Twain, in a magazine article, preached the need of tragedy on the American stage, evidently having clearly in mind the distinction which Mr. Archer here draws. Nevertheless, this distinction is widely ignored in the current criticism of the day.

"Ask any artist who is capable of tragedy at all," says Mr. Archer, "and it is ten to one he will tell you that his finest effects have been achieved in the happiest moments of his happiest years." Thus Shakespeare's four great tragedies are not in themselves any evidence of a prolonged mood of despondency and pessimism on the part of the author; nor does Mr. Archer admit them to be pessimistic in themselves. Pessimism, as distinguished from tragedy, he finds in "Troilus and Cressida," in "Timon of Athens," and, to a large extent, in the "Sonnets."

The following passages (*The Fortnightly Review*, March) bring out Mr. Archer's contention that a work of art may be tragic to a degree and yet inspire emotions the very reverse to a fear or a hatred of life. He is speaking, in the beginning, of "Romeo and Juliet":

"There is no ethical or psychological necessity for the tragic issue of the fable. By no strain of sophistry can it be made to 'justify the ways of God to man.' The lovers are 'star-crossed,' that is the last word of their saga. They fell victims partly to man's inhumanity, mainly to brute chance. If it were in the nature of man to quail before the terrors of his lot, who could endure to live in a world where youth and beauty, passion and innocence, may thus be hurled to annihilation by the miscarriage of a letter? But age-old experience assures us that if the artist can make man's lot seem moving, interesting, above all, beautiful, his audience will not shrink from its terrors. Nay, rather, they will be heartened to play their parts bravely and with a will upon so fascinating a stage. It would have been easy to give 'Romeo and Juliet' a 'happy ending.' They did so, indeed, in the Restoration Theater, when poetry was out of fashion, and prosaic sensualism ruled the roost. Shakespeare kept the myth, as he found it—tragic—not because he was a pessimist, but because he was an artist, a beauty-lover, and shrank from the inconceivable bathos of 'Romeo and Juliet Married and Settled.' He knew that death alone can give beauty its crown of immortality, and exalt it above chance and change. If it be pessimism to make this admission, or rather to state this fact, then tragedy is indeed pessimistic; but by the same act of definition, pessimism becomes the creed that makes for resolute, undaunted, healthy, even joyous life in a world where nature, among all her other gifts—good, bad, and indifferent—has given us the supreme gift of beauty, and the power to perceive and worship it. Pessimist or not, the man who wrote 'Romeo and Juliet' impresses us as a happy man, at peace with nature and destiny; and, infinitely sad tho it be, the tragedy has dashed and daunted no human soul, but, through the three centuries of its being, has made for courage, passion, and the will to live. . . . . .

"Shakespeare, to sum up this part of my argument, was an artist to whom gaiety and gloom, optimism and pessimism, were simply qualities of the material he worked in, of the colors on his palette, all equally adaptable to the one end of his endeavor, the creation of beauty. No doubt he had his moods, like other men, and some of them, at all periods of his life, seem to have been somber enough. Moreover, as time went on, he developed a keener eye for the profound spiritual beauties of tragedy, and cared less for the arabesques of comedy, the pageant-frescoes of history. But there is nothing to show that Hamlet, Macbeth, Othello, and Lear, either expressed a personal disgust for life or were intended to beget, or did beget, any such disgust in others. We may rather assert that the mind which gave birth to these plays must have been in its full flush of healthy activity. When bitterness *did* get the upper hand, as in 'Troilus and Cressida,' it ousted the creative energy; and Shakespeare, while still a profound intelligence, ceased for the nonce to be a master artist."

Modern criticism, "not consciously, perhaps, but none the less insistently," says Mr. Archer, "demands the banishment of tragedy from the domain of modern art." His distinction between pessimistic and tragic fiction is stated concisely in the following:

"The only rational definition of a pessimistic novel or play is one which tends to discourage the reader, to put him out of conceit of life, to damp his ardor, to lower his vitality. But this is not necessarily the effect of tragedy, whether ancient or modern. Whatever the precise operation which Aristotle understood by his *katharsis* of the emotions, he evidently conceived it as a beneficial, an invigorating process; and invigoration may be gained from the tragedy of to-day no less than from that of twenty-five centuries ago. The old physiological conception of 'spirits' as a sort of vital essence permeating the frame may conveniently be transferred to imaginative literature. There are books in which the 'spirits' are high and intense, others in which the 'spirits' are low and flagging; and the line of cleavage between books of high 'spirits' and books of low 'spirits' is very far from coinciding with the line of cleavage between 'sad' books and 'happy' books."

Turning to the most recent literature for further illustrations of this distinction, Mr. Archer selects "Gösta Berling's Saga," by Selma Lagerlöf, and "The Open Question," by C. E. Raimond (Miss Elizabeth Robins). Of these two much-discussed books, the one gloomy throughout, the other painful in its conclusion, he says that they are both, to his thinking, "placed far above the reproach of pessimism by the inherent vitality, the love of life, even in its darkest aspects, which animates every page." Yet "The Open Question" has been hailed on every side as an embodiment of modern pessimism.

able, and it is by its means that I discovered the most important of all facts arrived at in the course of my investigation in these fields. One of these was that the atmospheric air, tho ordinarily a perfect insulator, conducted freely the currents of immense electromotive force producible by such coils and suitable accessories. So great is the conductivity of the air that the discharge issuing from a single terminal behaves as if the atmosphere were rarefied. Another fact is that this conductivity increases very rapidly with the rarefaction of the atmosphere and augmentation of the electrical pressure, to such an extent that at barometric pressures which permit of no transit of ordinary currents, those generated by such a coil pass with great freedom through the air as through a copper wire. Following up these promising revelations I demonstrated conclusively by experiments that great amounts of electrical energy can be transmitted to any distance through upper-air strata which are easily accessible, and since this truth has been recognized every fiber has been strained to realize such a transmission on a large scale. These two observations explain clearly the silent discharges noted frequently in dense-air strata, but three or four miles above the earth's surface. One more equally important fact I may mention, which was simultaneously observed. The discharges of such a coil, when of an electromotive force of a few millions of volts, excite powerful affinities in the atmospheric nitrogen, causing it to combine readily with the oxygen and other elements, particularly in the presence of aqueous vapor. So energetic are these actions and so strangely do such powerful discharges behave, that I have often experienced a fear that the atmosphere might be ignited, a terrible possibility, which Sir William Crookes, with his piercing intellect, has already considered. Who knows but such a calamity is possible? And who can tell with certitude that periodical cessations of organic life on the globe might not be caused by ignition of the air and destruction of its life-sustaining qualities, accidentally or as a consequence of some accumulative change? A lump of coal will lie for centuries unaffected in contact with oxygen, but the combustion once started, the process continues as long as there are elements to combine."

## THE LIFE OF DISEASE GERMS OUTSIDE THE BODY.

WHAT becomes of a disease after it is cured? This is not an Irish bull. Diseases exist often in the soil, the air, or the water. It is well known that certain disease germs grow and thrive outside the human body. If these germs are to be fought successfully we should certainly know all about the conditions of such growth, with a view to making them as unfavorable as possible. When organisms of this kind grow thus in dead, as opposed to living, organic matter, they are called "saprophytes," and the saprophytic state of the microbes of disease certainly merits our close investigation. In the Milroy Lectures, just delivered at the Royal College of Physicians in London by Dr. G. V. Poore, these forms are studied. To quote an abstract of the lectures given in *The Hospital:*

"Dr. Poore describes the action of the earth in relation to the preservation and destruction of contagia, pointing out that the chemical composition of earth is constantly changing, and that its fitness for supporting the life of the various microorganisms that are found in it varies accordingly. Each of these microbes presumably grows best in what one may call its optimum conditions, and the smallest alteration in these conditions may turn the scale and decide which among the competing organisms shall obtain the mastery. In illustration of the curious exactitude of the conditions without which certain fungi will not grow, and of their extraordinary development whenever these conditions are fulfilled, Dr. Poore refers to the growth of mushrooms. 'Some of the larger saprophytes,' he says, 'such, for instance, as the common mushroom, require no little skill for their artificial production, involving far more attention to exact details than is necessary with the ordinary green-leaved garden plants. We know that for a few weeks in the autumn they may appear in great numbers in dry pastures where horses have been fed, provided that the conditions of the air as to temperature, light, and moisture be favorable, and we also know that directly the necessary conditions fail the mushroom harvest is at an end.' And it is clear that 'the optimum conditions for the growth and development of these short-lived and delicate organisms must be marvelously subtle, probably quite beyond the ken of the chemist.' Referring then to certain diseases, such, for example, as anthrax and tetanus, the germs of which are known to grow freely in certain soils, attention is drawn to the rarity with which men are attacked by them even when working on land which has almost certainly been infected. We are thus brought face to face with the importance of the extra-corporeal phases of microbic life in the maintenance of continuity of infection. Unfortunately, we seem to know but little in regard to the exact conditions under which the several pathogenic organisms are best able to maintain their existence in saprophytic form. Something we know about the bacillus of tuberculosis, and something we are beginning to know about that of enteric fever, but much more knowledge in this direction is badly wanted."

In this case the lecturer remarks, "the proper study of mankind" is not man, but what goes on in nature outside his body, for here is where we must look to get to the bottom of the problem of infectious disease, especially when it takes an epidemic form. To quote again:

"No longer must he [the pathologist] be content to study the action of the microbe within man's frame or the methods by which it brews toxins and sets up disease, but he must trace its life history outside, and find out what these infectious particles are doing and how they are living through the long interval that sometimes elapses between the termination of one 'case' and the development of another. One fine morning we look out upon our paddock and find it full of mushrooms; and another, altho we know that the spore is present just the same, there is not a mushroom to be seen. It was the conditions, not the seed alone, that made them grow. And this is a parable."

## A GREAT SCIENTIST DEAD.

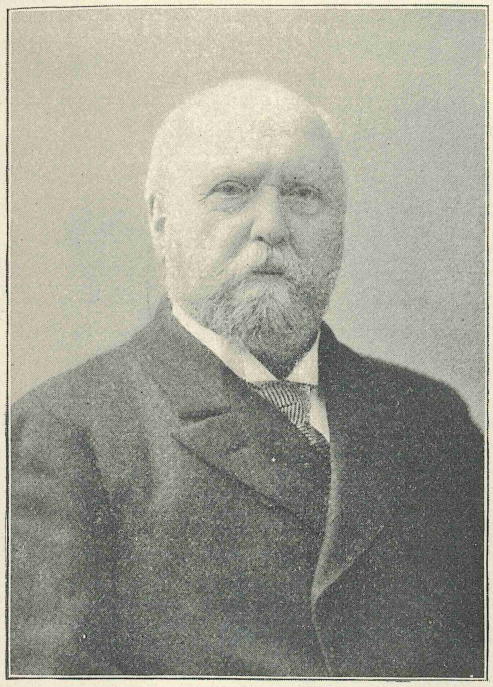
PROF. OTHNIEL CHARLES MARSH, of Yale University, who has just died, occupied a unique position among American scientific men, in that he was not only a skilled scientific worker, but a most generous giver to the cause in which he worked. The man who gives and the man who works are usually distinct, but Professor Marsh gave freely of his wealth to advance the cause for which he himself constantly toiled. We quote the following brief notice of his life from *The Engineering and Mining Journal* (March 25):

"Othniel Charles Marsh, who died at New Haven, Conn., March 18, was one of the best-known geologists in the world, his fame having long been fully established by his original researches. In his especial branch he was for years the highest authority, and his name is honored by geologists everywhere.

"He was born at Lockport, N. Y., October 29, 1831. In 1860 he was graduated at Yale University, and passed two years at the Yale Scientific School, fitting himself for higher studies in natural history. At first he became most interested in the study of mineralogy, but soon devoted himself to the problems of paleontology. He was fortunate in the discovery of a fossil reptile in the coal formation of Nova Scotia, the 'Eosaurus Acadianus,' which he reconstructed and fully described. This gave him at once positive rank and recognition among scientists.

"From 1862 to 1865 he studied zoology, mineralogy, and geology in Germany under Professor Ehrenberg and other eminent authorities in the universities of Berlin, Heidelberg, and Breslau. During his vacations he devoted himself to original investigations in the Alps and in the less known parts of Germany. By the time he had completed his studies abroad his fame had become firmly established in this country, as well as in Europe. A chair of paleontology was created especially for him at Yale; he accepted it in 1866 and held it until his death. During these thirty-three years he strove earnestly and in the most highly scientific method to increase the stock of facts about the fossil history of this continent, as well as to multiply the means for the careful study and classification of the specimens collected. In the latter field his greatest benefaction is the establishment of the Peabody

Museum at Yale. He was the nephew of George Peabody, and induced his uncle to give to Yale a fund that should be used for the erection and founding of a great museum of natural history. Much work had been done on the building and in the collection of specimens, but Professor Marsh died before the whole work was completed, as the fund had not accumulated sufficiently to warrant the building of the central structure and one of the wings. This will not be possible for several years yet, altho the fund is



PROF. OTHNIEL CHARLES MARSH.

growing rapidly and the success of the museum is assured. Until it shall be completed it will not be possible to exhibit and use for study the great mass of specimens which he had collected.

"Professor Marsh selected as his special field of study the remains of extinct vertebrate animals, particularly those found in the region of the Rocky Mountains. His first expeditions led him to places so remote from the army posts, then the vanguard of civilization, that they had never been visited before by white men. In some of his excursions he had very narrow escapes from death at the hands of savages or from the exposure to the weather. He used to delight his classes at Yale, as well as scientific students and others who were fortunate enough to listen to his lectures or to his addresses, by narrating many of his adventures among the Indians.

"It was on these expeditions that Professor Marsh learned much about the outrages inflicted upon the Indians. He made representations to the Government that finally, after a long controversy with Secretary Delano, led to the retirement of the Secretary and the redress of some grievances of the red men. This was in 1875.

"Professor Marsh's studies and investigations have brought to light more than one thousand new species of extinct vertebrates that were not before known to have existed in this country. He published descriptions of more than three hundred of these, principally in papers in *The American Journal of Science*. Among them are a new sub-class of birds with teeth, odontornithes, and the first known American pterodactyles; two new orders of large mammals from the eocene-tertiary of the Rocky Mountains, the tillodontia, which seems to be related to the carnivores, ungulates, the rodents of elephantine bulk, bearing on their heads two or more horn-cores; also from the same formation, the epihippus, or the early ancestor of the modern horse, and the first monkeys, bats, and marsupials ever found in this country. He also discovered several new families of the dinosaurs, probably the largest land animals yet discovered. . . . . .

"Professor Marsh was elected president of the American Association for the Advancement of Science in 1878, and in 1883 president of the National Academy of Sciences. He received many honors and degrees from scientific societies and universities. In addition to the degrees conferred upon him by Yale, he received the degree of Ph.D. from the University of Heidelberg in 1886, and in the same year Harvard conferred upon him the degree of LL.D. He was a member of the geological societies of London and Germany; of the Royal Irish Academy, the Royal Bavarian Academy of Science, and the royal academies of Denmark and Belgium. In 1898 he was awarded the prize of the French Académie des Sciences."

## EXPLOSIONS FROM COMMON SUBSTANCES.

MANY serious explosions have been caused by common substances not generally known to be explosive or by substances that are explosive only under special or rarely occurring conditions. Cases of this kind are described in a recent address by Prof. Charles E. Munroe, printed in *Science*, March 10. We quote portions of this address below. Professor Munroe first speaks of the explosive power of finely powdered substances, of which he says:

"It is well understood that the speed of the combustion is greatly accelerated by comminuting the combustible and mixing it intimately with the supporter of combustion, and it is also well recognized that many explosions are due solely to very rapid combustion; yet it is only within comparatively recent times, and since manufacturing operations have come to be carried on upon a very considerable scale, that we have had it strongly demonstrated that ordinarily combustible solids might, when finely divided and mixed with air, give rise, on ignition, to most violent and disastrous explosions; and it seems especially notable that the first well-demonstrated cases of this kind should have arisen from the apparently harmless operations attending the grinding of grain, and the more particularly as flour is not looked upon as a very readily combustible substance when compared with other commonly used solids."

Professor Munroe describes some of the classical flour-mill explosions, including those at Glasgow, Scotland, in 1872 and that at Minneapolis in 1878. In the latter two millstones "striking fire" produced an explosion that destroyed large buildings, blowing fragments to a distance of two miles, and projected a column of flame to a height of six hundred feet. Of course to produce such an effect the flour must be very fine, must be thickly mingled with air, and must be confined in a closed space such as the "exhaust-box" of the mill. To quote further:

"Knowing the chemical composition of flour, we may calculate approximately the mechanical work which a given mass of flour can perform, and find that the contents of an ordinary sack, when mixed with 4,000 cubic feet of air, will generate force enough to throw 2,500 tons mass to a height of 100 feet. If we now consider the many tons of flour there must have been in a mill such as the Washburn 'A,' where as much as 1,000 pounds of dust per day was collected from a single pipe, we can readily comprehend how such great destruction could be wrought."

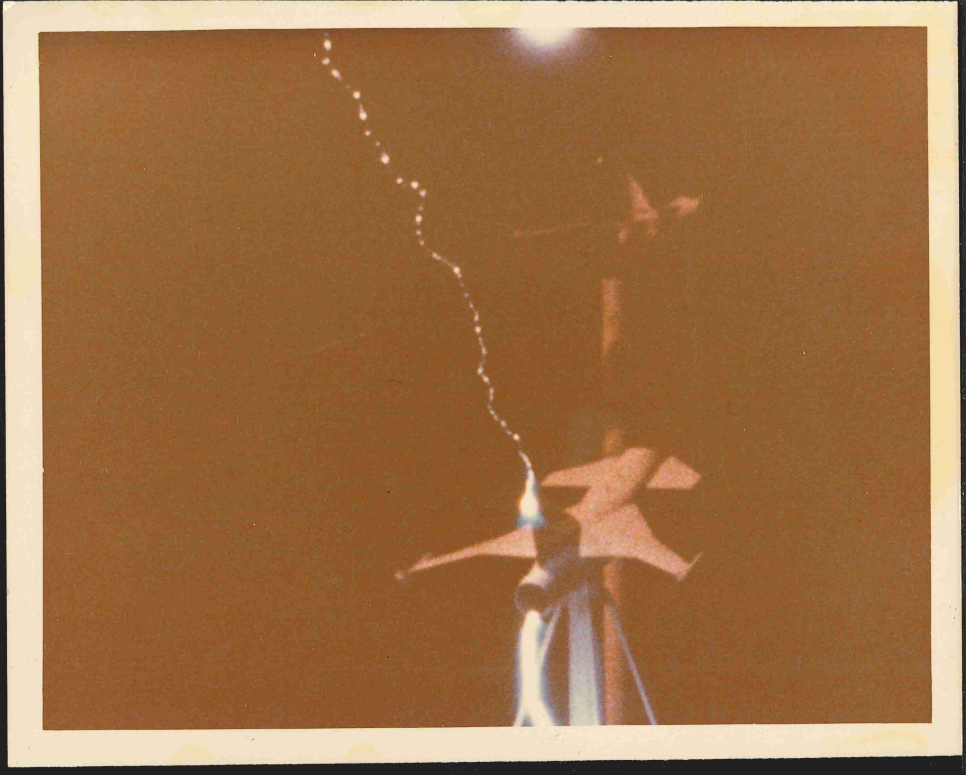
Of course flour is not the only powdered substance that will explode thus, and the author chronicles similar explosions of dust from oatmeal, candy, rice, malt, spice, sawdust, and even soap and metallic zinc. A curious kind of explosion is that which results from the unwitting production of an explosive in the compounding of drugs or in laboratory work. The volatile hydrocarbons are especially dangerous, and many disastrous explosions of benzene or other petroleum products have taken place both on land and by sea. Some of these are historical. Says Professor Munroe:

"Even where great precautions are taken to prevent accidents they not infrequently occur from inflammable substances being met with in unexpected places, or being introduced surreptitiously in admixture with harmless bodies. Nowhere, perhaps, is more care taken in this respect than on passenger steamships and in the naval service, yet eighteen years ago a series of accidents occurred on board English ships, the cause of which was for a time veiled in mystery and which, in the then existing state of

Golka Associates
ELECTRONIC CONSULTANTS
38 PARK STREET BROCKTON, MASSACHUSETTS 02401




Mr. Bill Wysock
4914 Baldwin Ave.
Temple City, Cal.
91780



1978

Ball Lightning

Formed while Testing

1/2 scale Model of F-16 Pilot-

Computer Control fighter Plane

for U S A F. Wendover AFB,

Utah 84083

(Composite Skin Aircraft) Robert K. Golka

## *Up & Coming*

# Computer Used To 'Move' Dirt At Nav Stations

SCOTT AFB, Ill. — The amount of grade-and-fill needed to help create the best signals from navigational aid stations is being determined by a computer plan here.

Tests being conducted by AF Communications Service's (AFCS) 1842d Electronics Engineering Group could save U.S. taxpayers money in earth-moving costs, AFCS said.

Project managers are using a computer system to determine the amount of earth that must be moved or added for the most efficient operation of instrument landing systems. Earth layout affects the strength of a station's generated navigational signal.

To insure the maximum accuracy of landing systems, it is necessary at times to grade and fill the surrounding area. "This method, particularly when the movement of several 100,000 cubic yards of dirt is necessary, is not only time-consuming, but extremely expensive," Jim Baggett said. Baggett is the project officer for the computer program.

The cost of moving dirt has climbed from 90 cents to more than $5 a cubic yard in recent years, Baggett said.

With the use of the computer plan, a site can be "modeled" — mathematically built before the first yard of dirt is moved. Information on surface features, antenna heights, radio signals, flying runs and other data are fed, in different sets, to the computer. The impact these items have on radio bounce are computed.

The program in the computer then gradually shaves the hills and/or fills the hollows until the best signals are produced with the least projected amount of earth movement.

used in the systems, the company said.

Here's what the colors will depict: red, navigation aids; orange, weather; yellow and green, aircraft data blocks. Yellow and green will provide controllers with the identity, altitude and other information on flights being handled.

### *Building Its Own*

WASHINGTON — A former Pentagon official has told the House Armed Services Committee that NATO countries are serious about reducing their purchase of U.S. weapons systems.

Dr. Roger Shields, an economist and former Pentagon official, cited a decision by NATO countries to co-produce the advanced F-16 aircraft in Europe rather than buy it outright from the U.S.

According to Shields, the cost of European production is significantly more than the price of the aircraft off U.S. production lines. But, he told the committee, NATO members claimed it was worth it because of the technology transfer involved.

Shields said that NATO members look at the manufacturing of weapons in their countries as a means of promoting jobs and improving their economic health.

### *New Bomber Eyed*

WASHINGTON — The FY 1980 defense budget is expected to contain funds to study the needs of a new manned penetrating bomber, an AF spokesman said.

The studies could lead to a successor to the B-1 bomber that was canceled by President Carter. Defense Department officials have said that a new bomber is needed — one different in design from the B-1 — by the 1990s.

A program to evaluate potential contractors to support the AF bomber efforts reportedly is under way.

### *V/STOL Takes Off*

ST. LOUIS, Mo. — Full-scale development of the Marine Corps AV-8B vertical/short takeoff and landing(V/STOL) aircraft is scheduled to start in January, the Defense Department said.

Marine Corps plans to purchase 350 AV-8Bs after flight tests are completed at the Naval Air Station at Patuxent River, Md.

The AV-8B flew for the first time at McDonnell Douglas Corp. facilities here recently. DoD officials said the AV-8B will more than double the payload or radius Marine pilots now experience with the craft's predecessor, the British Aerospace AV-8A Harrier.

### *Contracts*

Hughes Aircraft Co., Calif., $3.5 million for F-106A/B navigation system upgrade.

General Electric Co., Mass., $3.1 million increase for J85-GE-21A engines.

Airborne Instruments Laboratory, N.Y., $1.2 million for EF-111A aircraft ALQ-99 subassemblies.

TRW, Calif., $3.6 million increase for Minuteman III retargeting capability updating.

TRW, Calif., $1.7 million for Space and Missile Systems Organization operational flight test support.

TRW, Calif., $1 million increase for Defense Satellite Communication System II antenna modifications and other work.

Ford Aerospace and Communications Corp., Calif., $8.2 million for logistics support of AF Satellite Control Facility at Palo Alto, Calif., and other locations.

Rolls Royce Ltd., England, $1.7 million for A-7 aircraft engine modification kits.

McDonnell Douglas Corp., Mo., $1.9 million for F-15 radar data processor spare parts.

Geodynamics Corp., Calif., $2 million for MX program technical assistance.

United Technologies Corp., Calif., $6 million increase for Titan missile work.

Tektronix Inc., Ore., $1.4 million for 100 megahertz oscilloscopes.

### *Colorful Radar*

WASHINGTON — Say it in living color!

Such an idea is to be tested by the Federal Aviation Administration under a $186,000 contract with the Raytheon Co.

The FAA intends to add more color to its radar displays to help air traffic controllers get a better reading on different information presented on their screens.

Four view displays will have color capabilities added for tests to be conducted at the FAA's air route traffic control center in Leesburg, Va., Raytheon said. Two multicolor displays will be delivered to the FAA's National Aviation Facilities Experimental Center in New Jersey.

The display systems will provide information in four colors — red, orange, yellow and green — rather than the single green now

# Lightning Strikes Tested

By a Times Staff Writer

WASHINGTON — A "machine" used in the late 1890s has been duplicated near Hill AFB, Utah, in order to generate lightning strikes against aircraft.

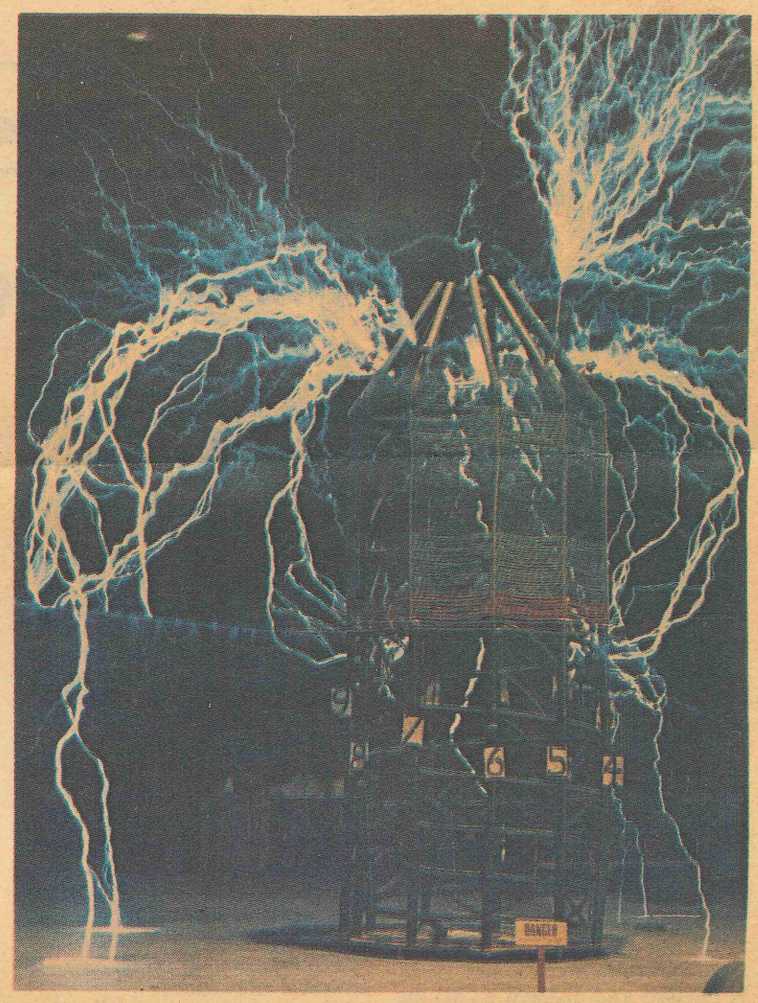
Robert K. Golka, director for Project Tesla, told *Air Force Times* that the Tesla generator simulates the ball lightning that aircraft can encounter in flight.

The idea, he added, is to determine ways to reinforce aircraft and their systems so that they can survive repeated lightning strikes. AF wants to determine aircraft "hardness," Golka said.

Golka, who has been working on the project for 10 years, traveled to Belgrade, Yugoslavia, in 1968 to learn more about the U.S.-conducted research of Nikola Tesla who invented various electric devices.

Ironically, Tesla's work was conducted in Colorado Springs, Colo., but his diary of 1899 was discovered by Golka in the Nikola Tesla Museum in Yugoslavia.

Golka said tests at the Wendover Auxiliary Airfield have been conducted mostly with aircraft models, but actual aircraft can and have been used. AF is interested in developing lightning protection for aicraft made with lightweight composite materials which can be penetrated by nature's electrical charges.



Lightning can cause composites to explode, Golka said.

The Tesla generator takes about 100,000 watts to produce lightning bolts. It has been modified several times to make it as "original" as possible, Golka said.

# CG: Divorce No Cause for BAQ Hikes

By a Times Staff Writer

WASHINGTON — Service members' basic allowance for quarters should not be increased simply because they are divorced or separated from other service members and are paying child support, the U.S. Comptroller General has ruled.

The services apparently have been paying too much BAQ to some such members, the comptroller indicated in a recent decision (B-191617) designed to clarify some rules under which BAQ is paid.

BAQ is not payable to a member who lives in single-type government quarters and pays child support to a separated or divorced spouse who also is a service member, if that spouse has custody of their child and is assigned to adequate family quarters.

BAQ at the "without-dependent" rate is payable to a member who does not have adequate single quarters when the estranged spouse has child custody and has adequate family government quarters, the comptroller said.

Under the services' pay and allowances system, all members must receive either adequate quarters or quarters allowances for themselves and their dependents.

When members married to members are separated or divorced, both retain their legal rights either to adequate quarters or to a quarters allowance, the comptroller said.

If the estranged spouse with child custody is furnished adequate family quarters, the other spouse is entitled either to single quarters or to a BAQ at the without-dependents rate, the comptroller said.

Some apparently have received BAQ at the with-dependent rate, the comptroller indicated.

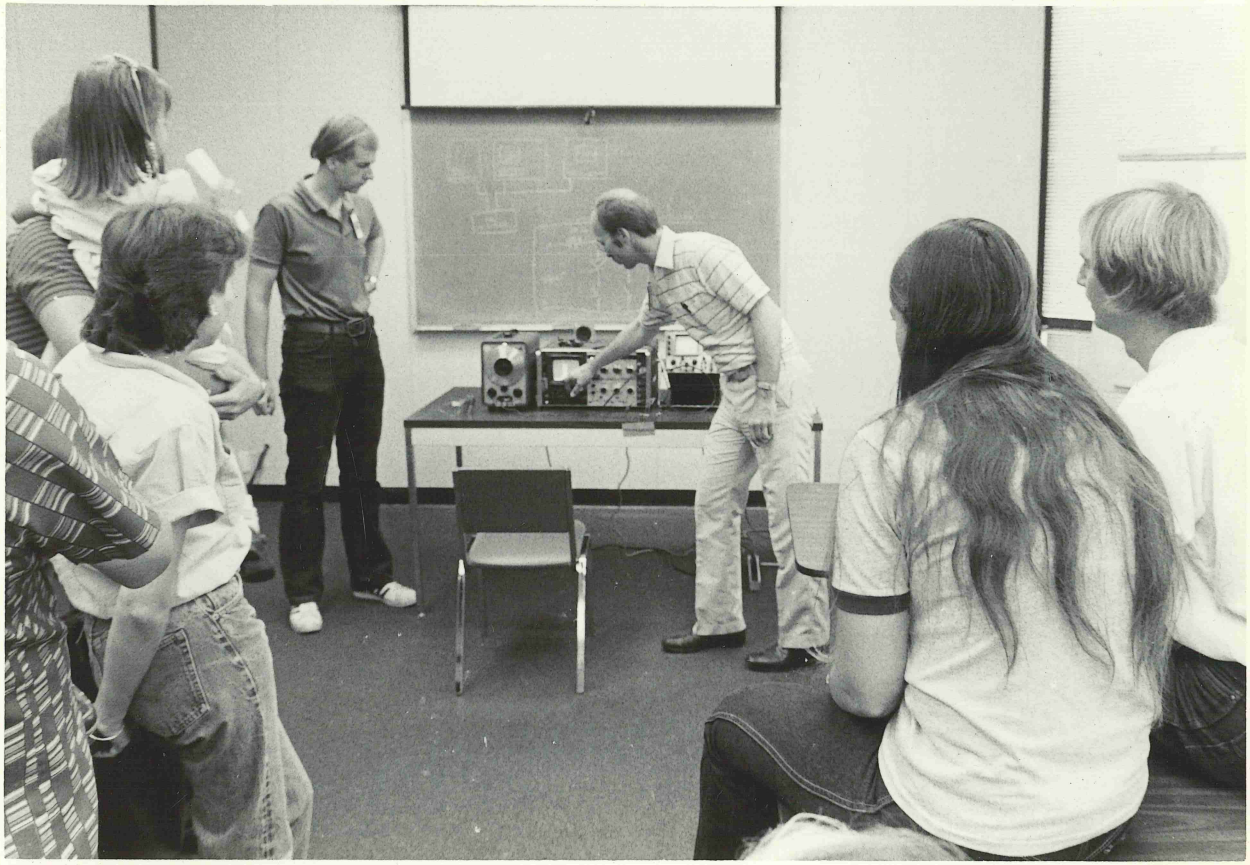
The without-dependent rate is lower for all ranks. For example, an E-7 receives $150.30 monthly at the without-dependent rate and $231.90 at the with-dependent rate. An O-3 receives $231.90 at the without-dependent rate and $286.20 at the with-dependent rate.

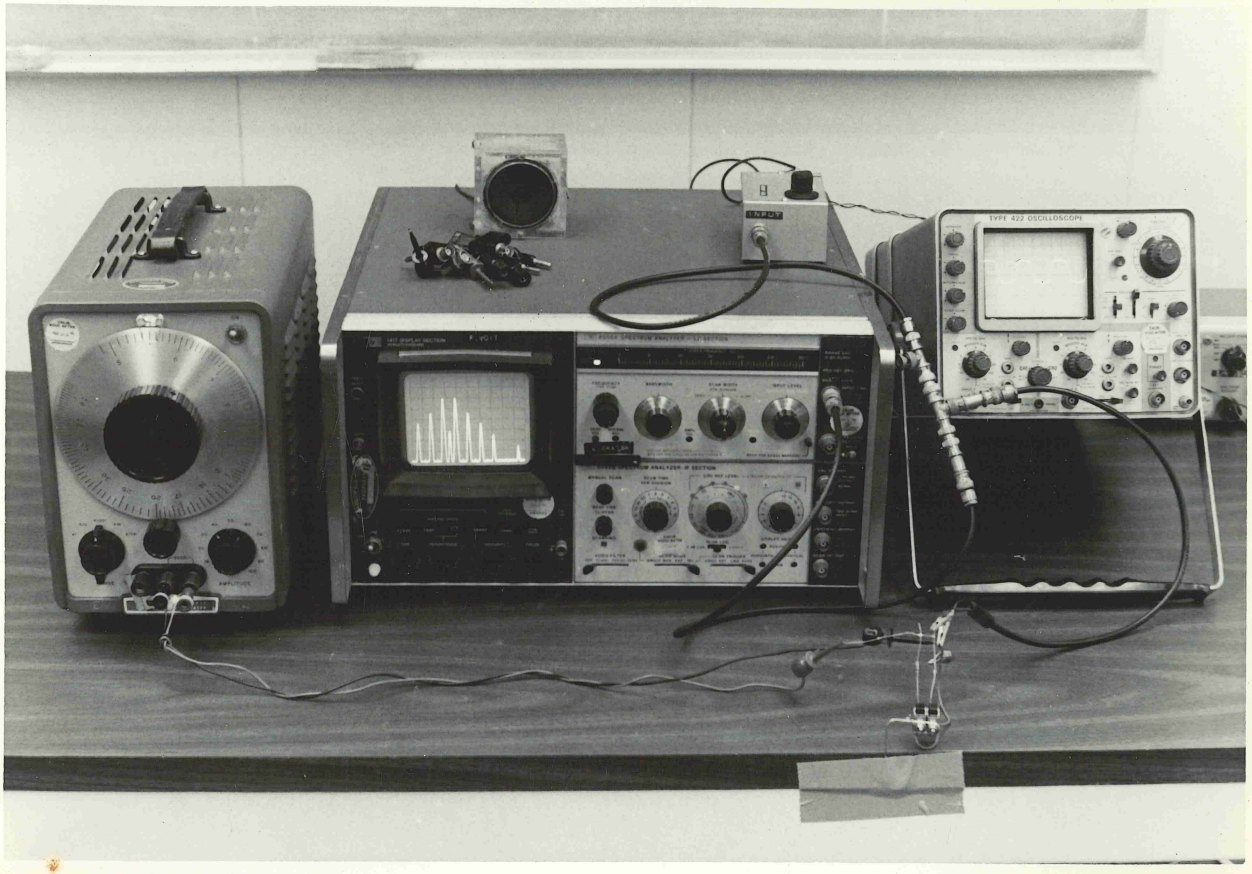
BAQ entitlements are not related to the amount of alimony and child support paid by one member to his separated or divorced spouse who also is a member, the comptroller said.

In many cases, such payments are not reduced when the spouse with child custody is assigned base housing.

That means the estranged spouse with child custody may receive both full support payments — which presumably help pay housing expenses, among other things — plus "free" housing from the government.

It is the responsibility of members liable for such payments to have their support agreements adjusted when a spouse and child are furnished government quarters at no cost to either spouse, the comptroller said.



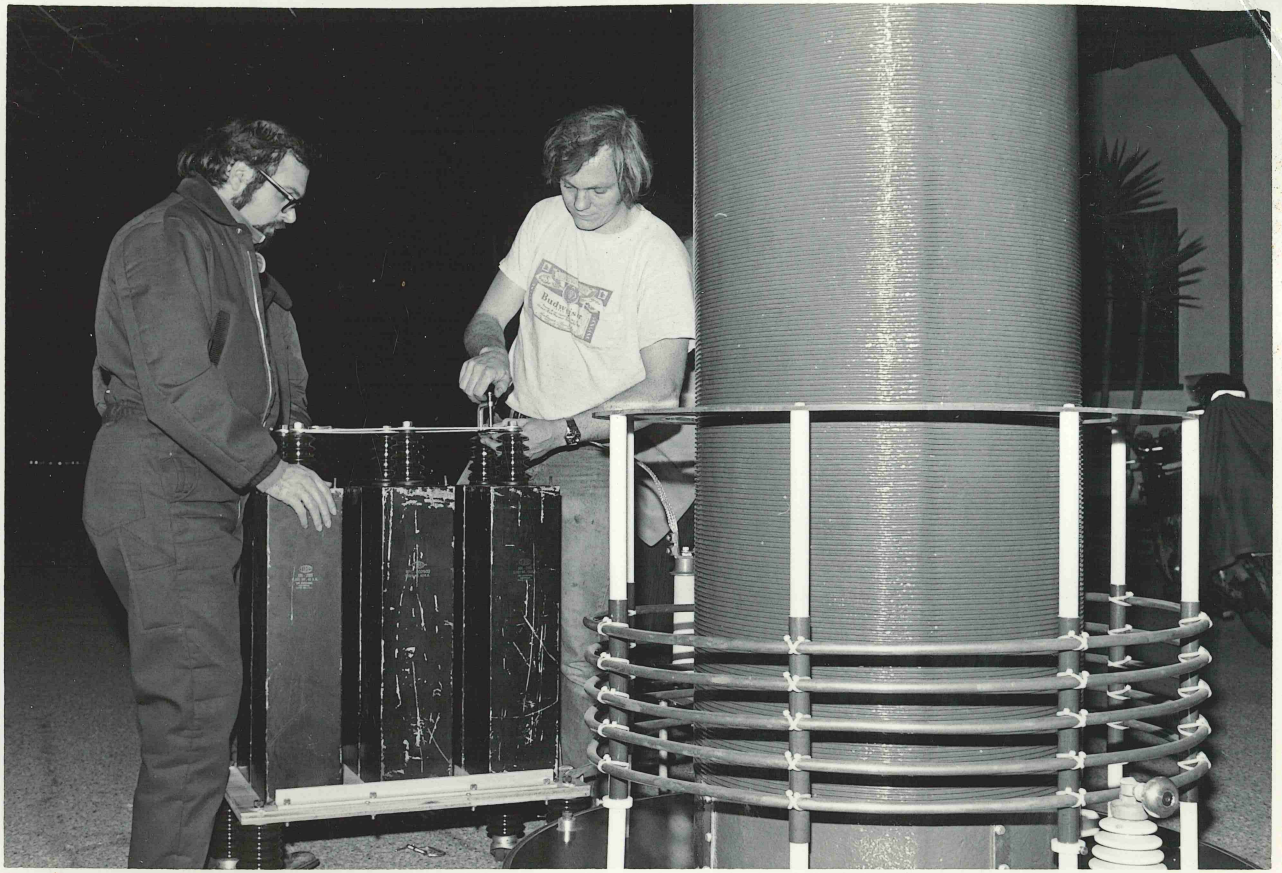

INPUT
TYPE 422 OSCILLOSCOPE





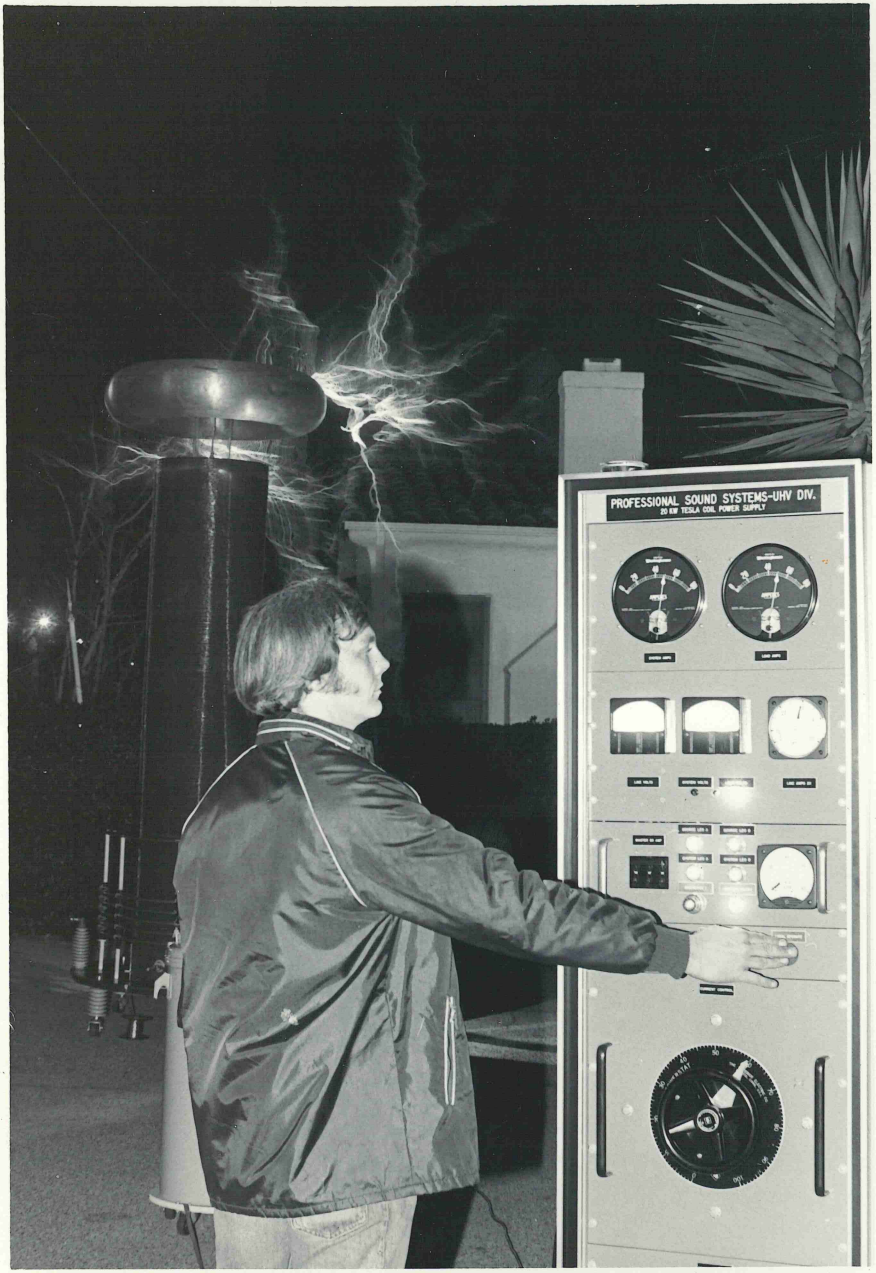

KENWOOD


KENWOOD

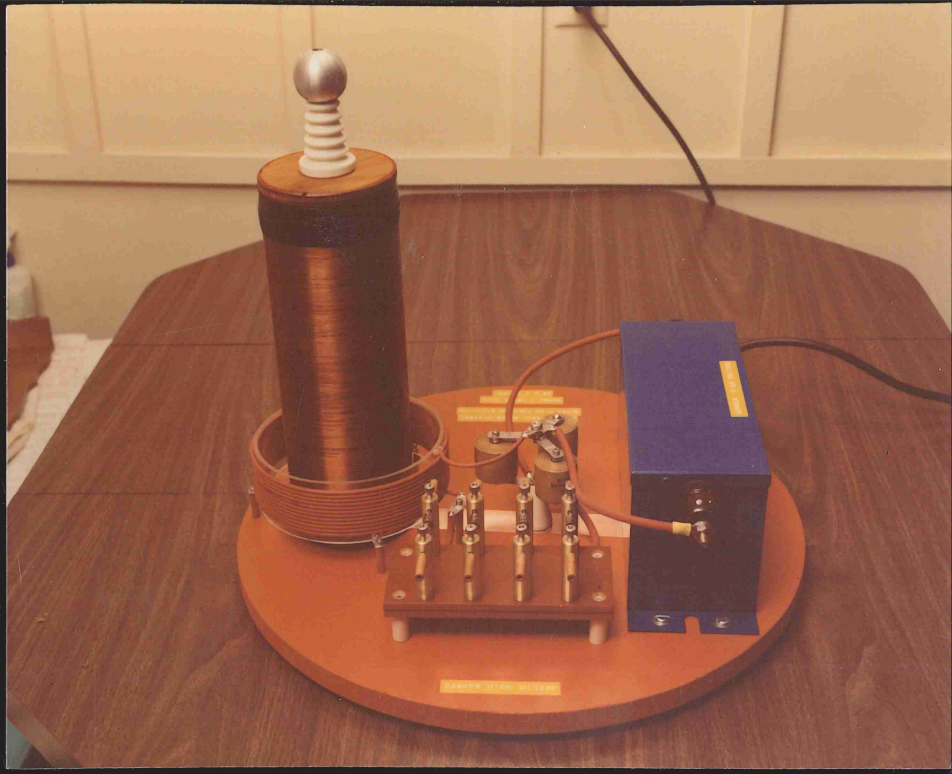






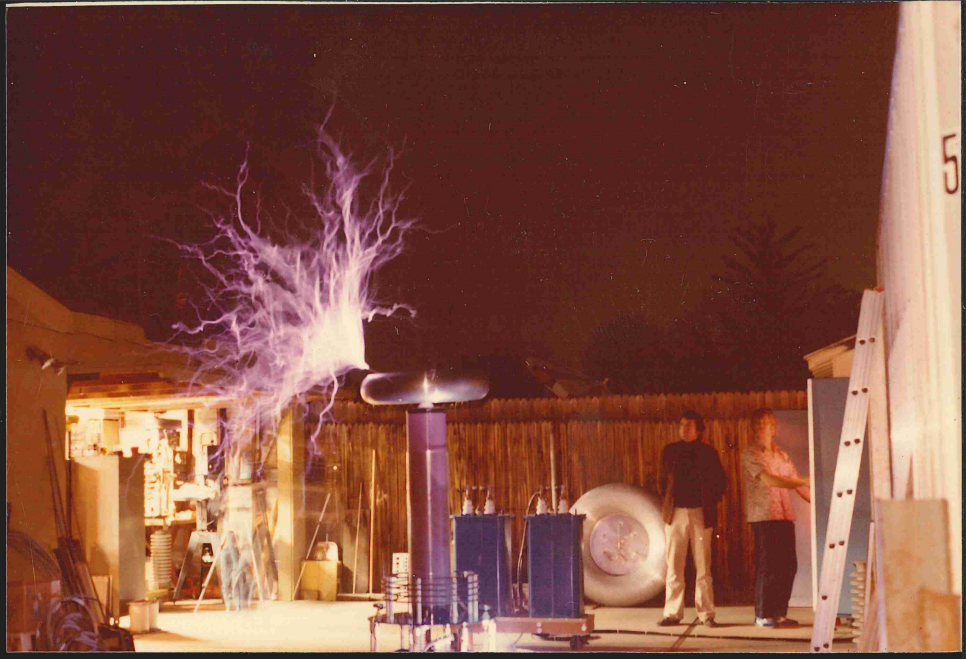

PROFESSIONAL SOUND SYSTEMS-UHV DIV.
20 KW TESLA COIL POWER SUPPLY



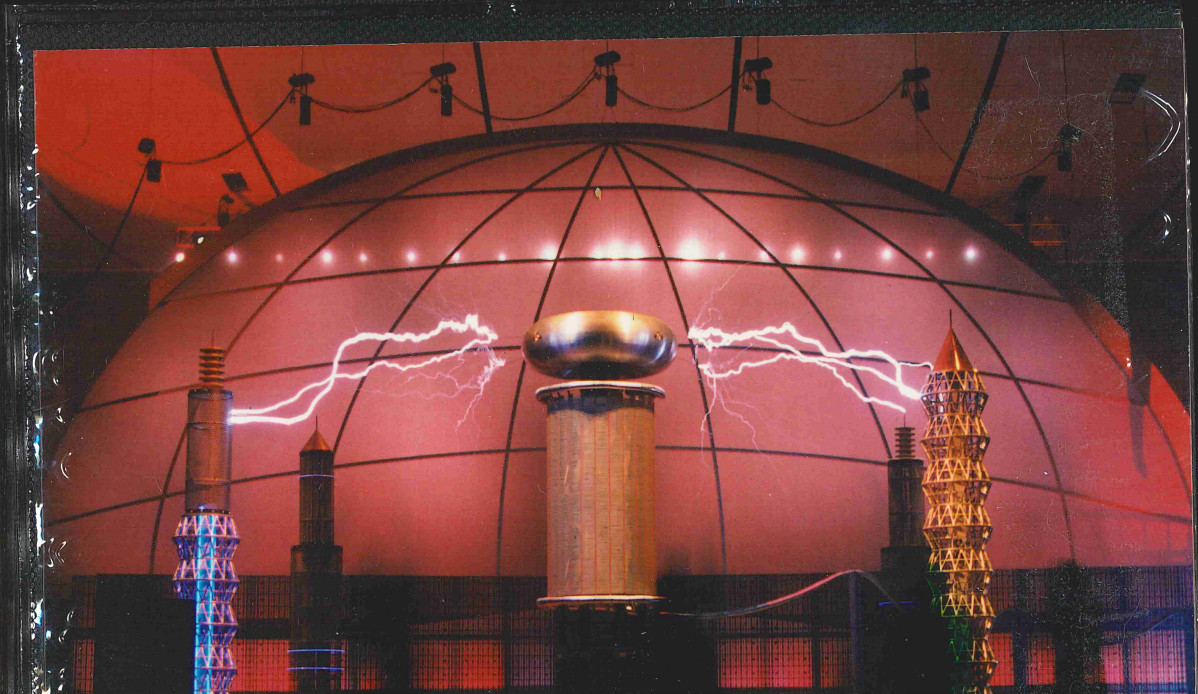


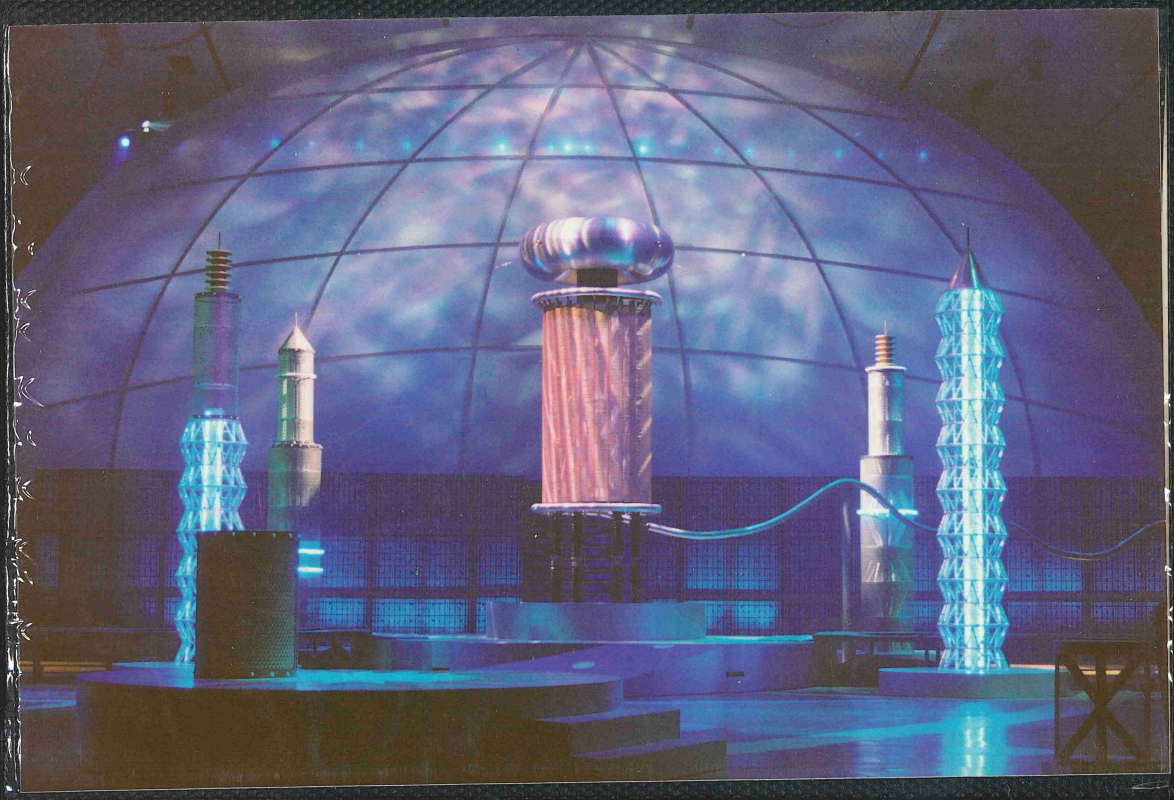


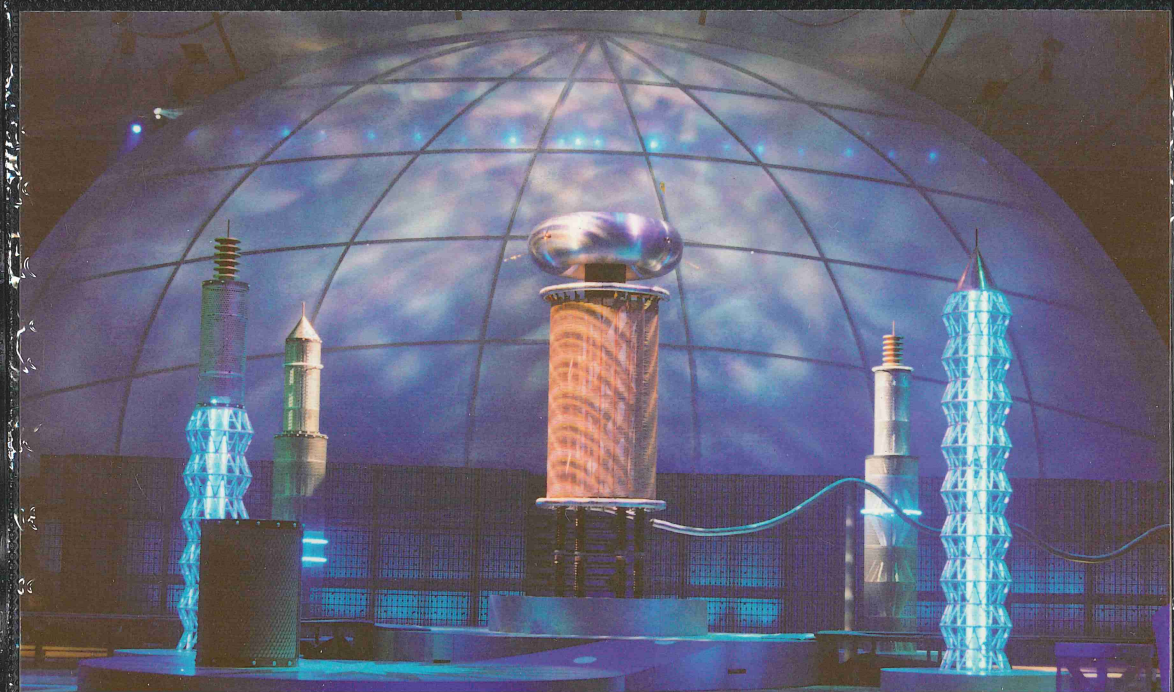




©1998 Robin Perine Photography
Seeing Red Studio
800-803-1743



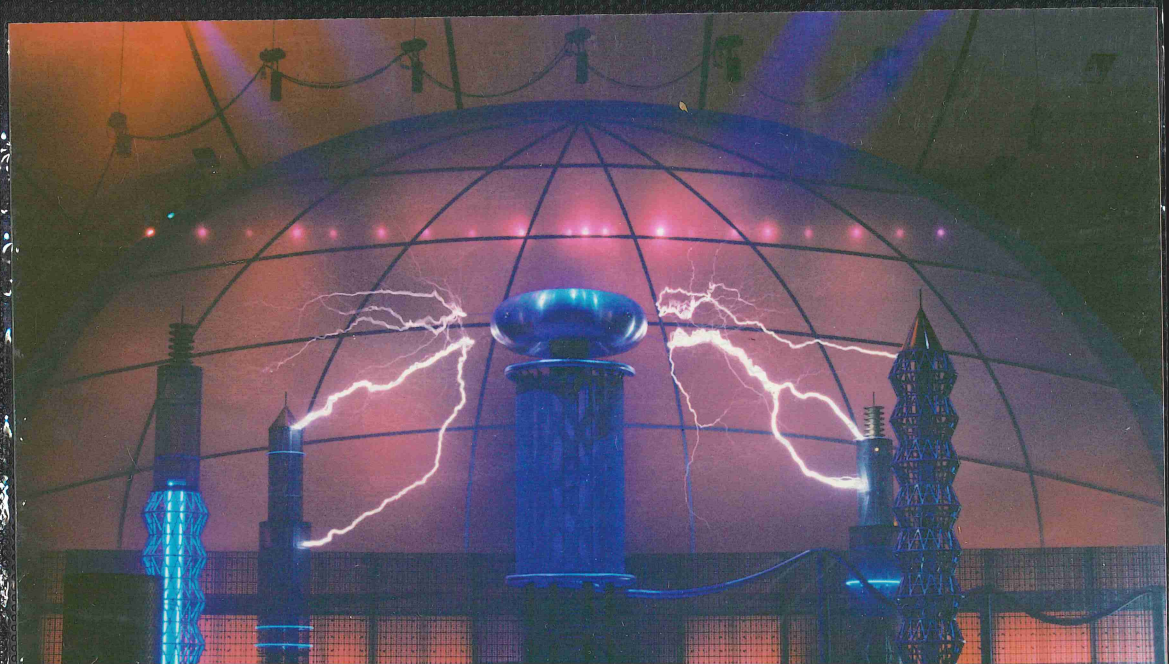


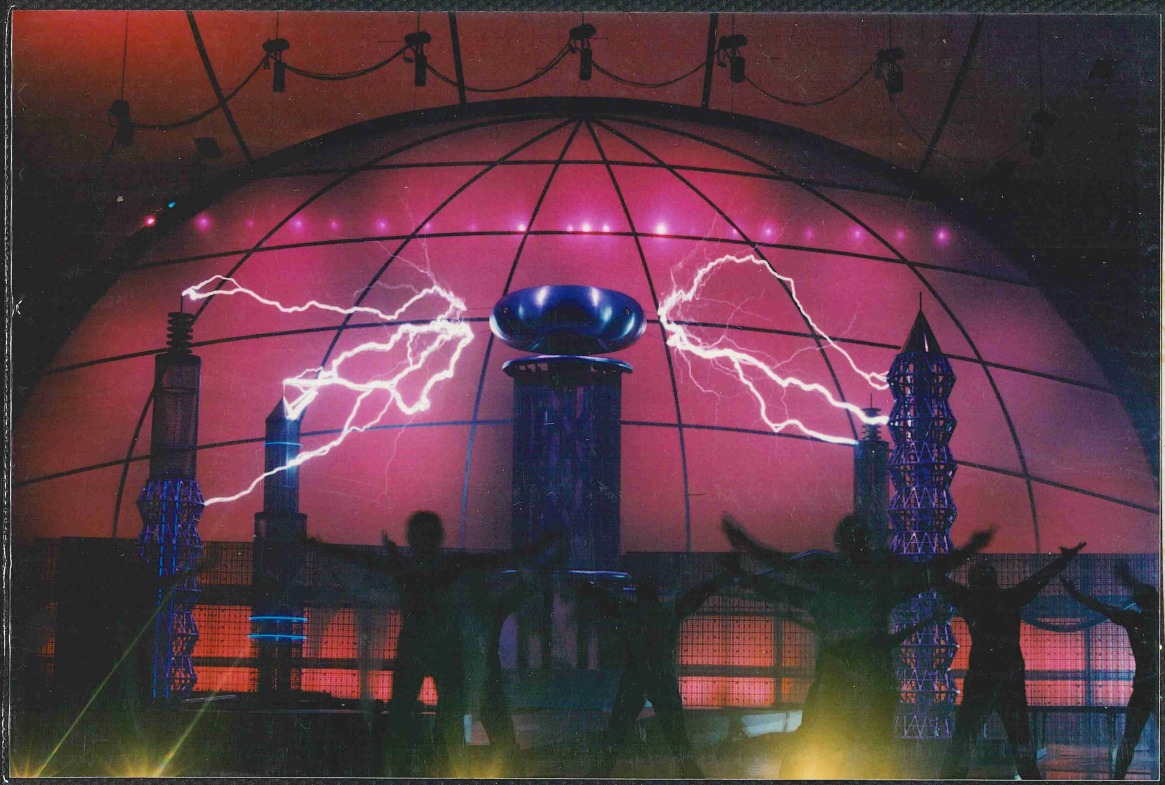


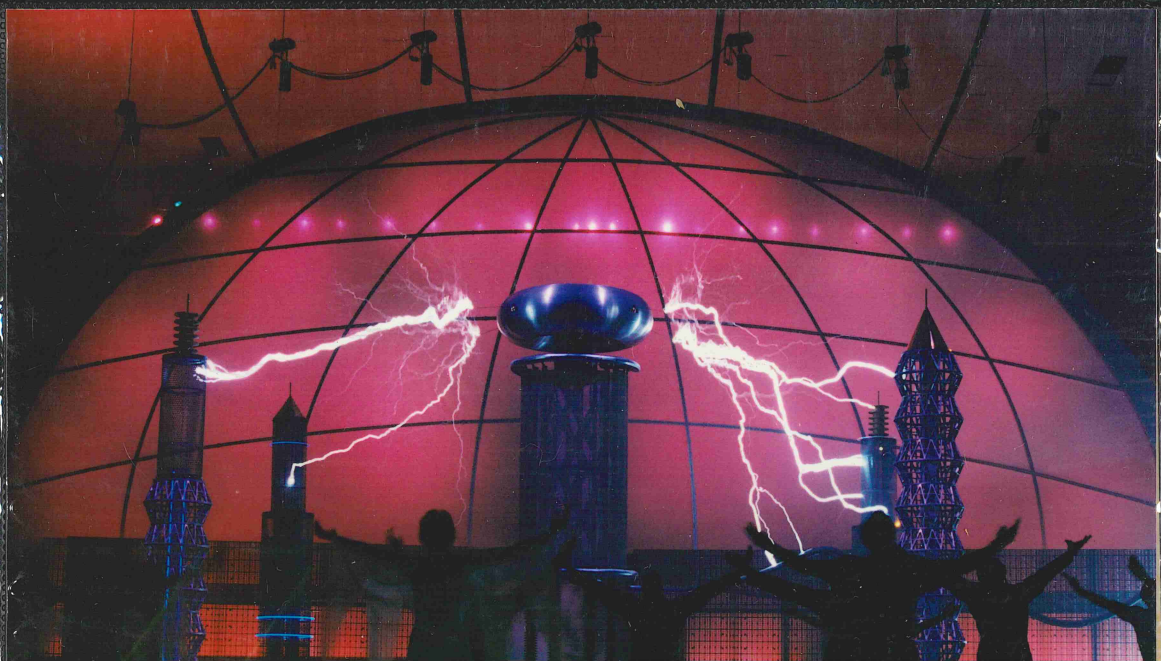




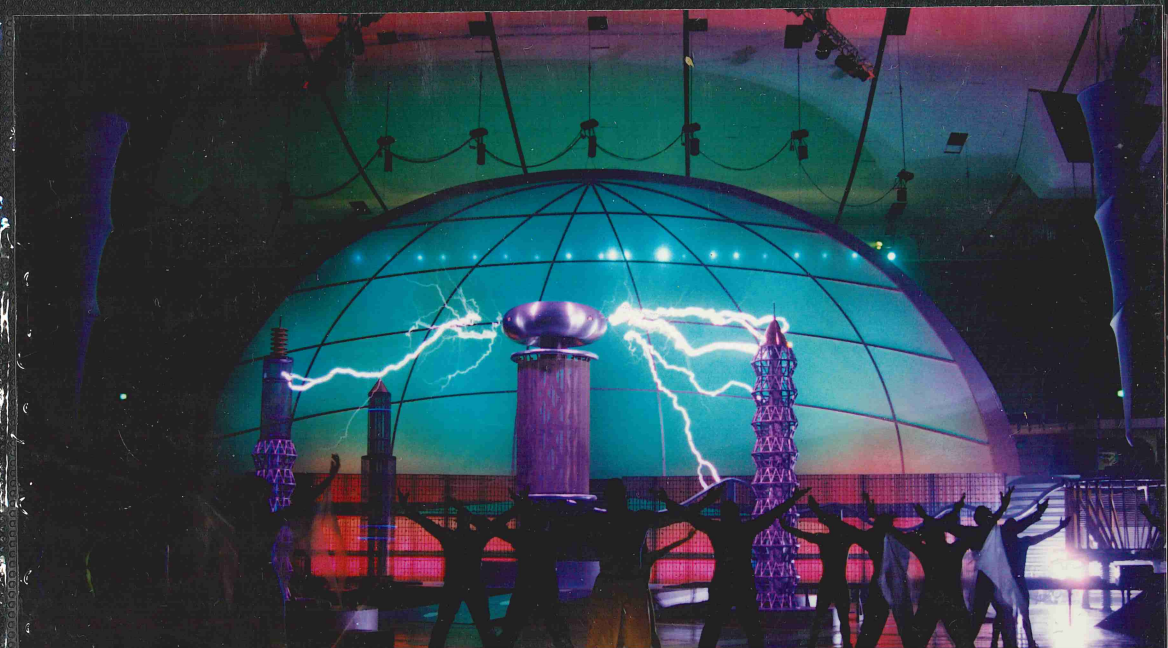














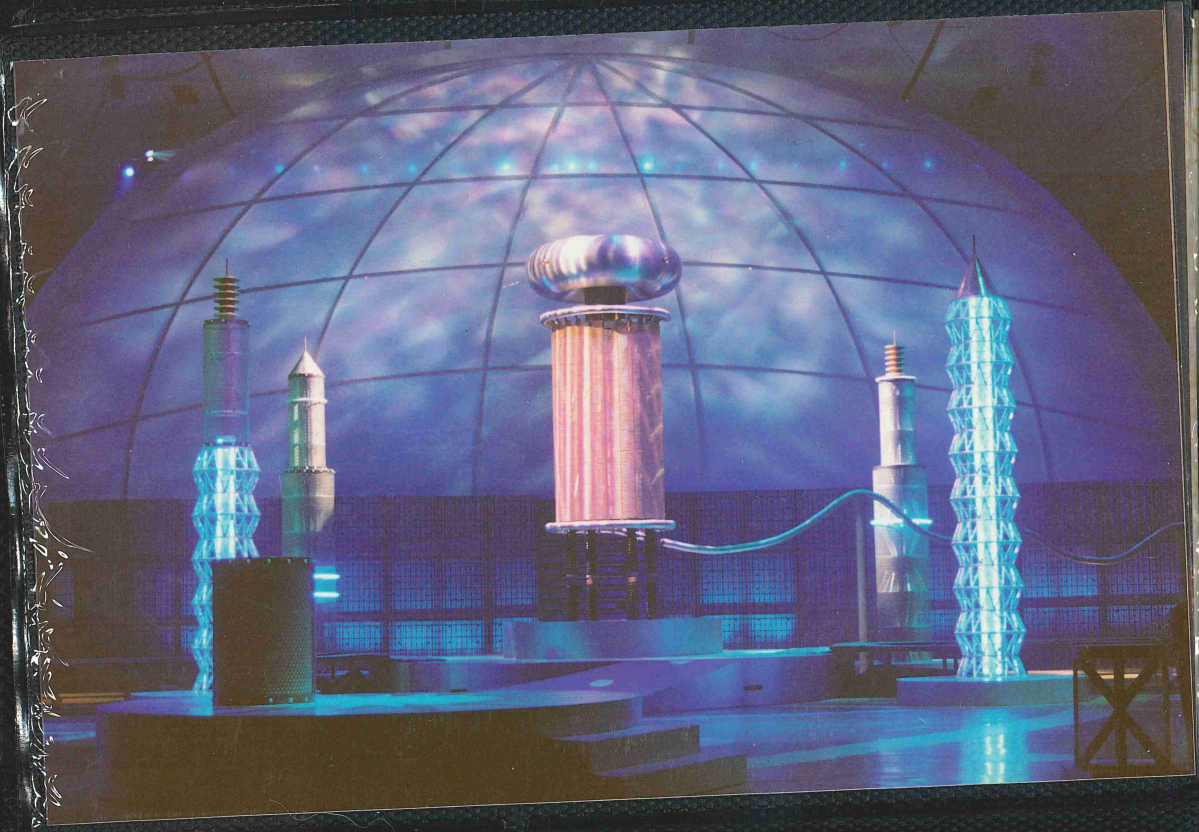




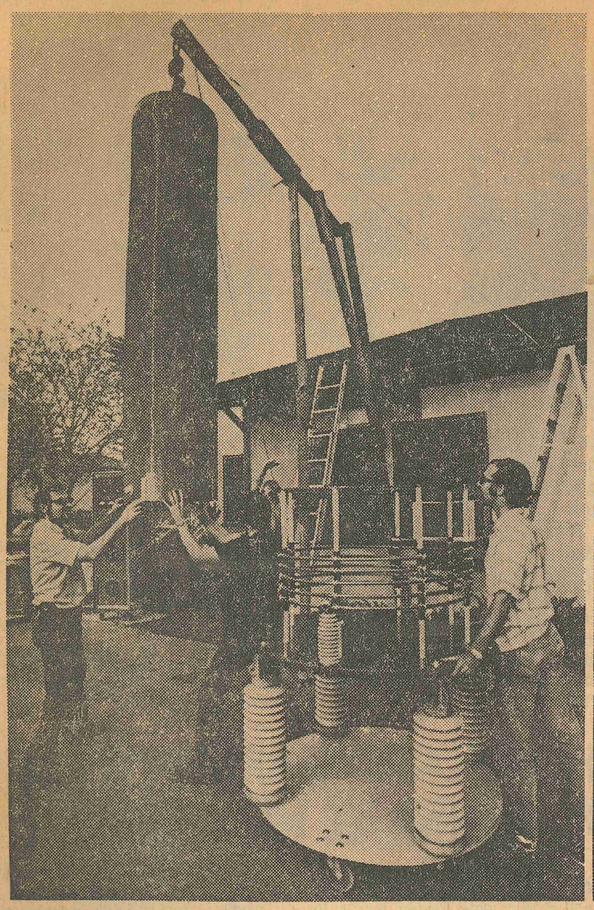


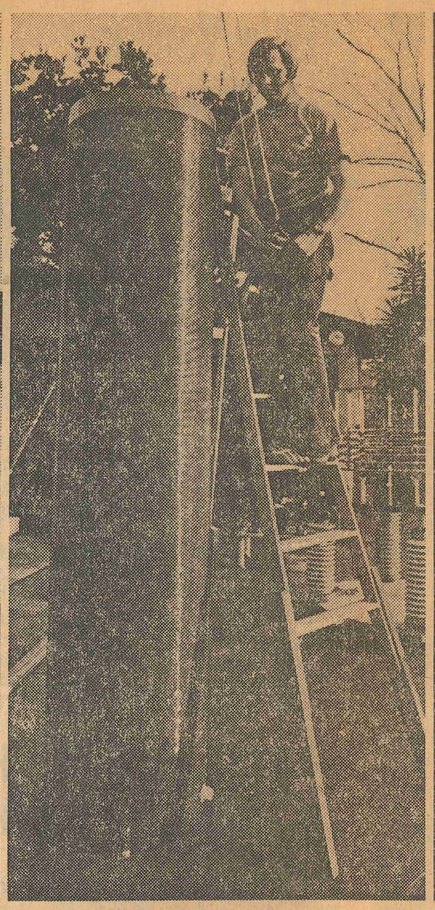


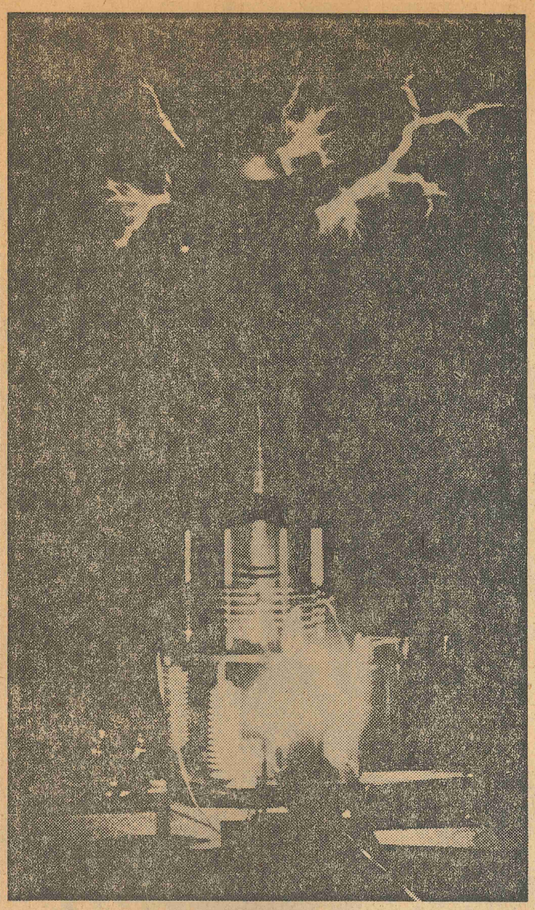





Robin Perine
Photography
RGPerine@aol.com
800-803-1743
http://members.aol.com/RGPerine/SeeingRed.html







**WATT-AGE**—Bill Wysock of Temple City is determined to light up his life—and everybody else's—with the man-made lightning he creates on Tesla coil in his driveway. As Wysock adjusts the wire, left, his friends, from left, Ron Rockwell, Dave Jennings and Jim Shaffer help him set up the contraption. It takes several hours to assemble the coil and at one point, Wysock climbs a ladder, center, to get closer to his subject. The 14-foot coil is the 10th and largest that Wysock has built. It has produced 17-foot-long sparks, some of which look like those coming from the coil at right.

**Times photos by Joel P. Lugavere**

# Lightning Experimenter Seeks Bigger, Better Bolts

## Enthusiast Follows in Steps of Inventor, Hunts New Energy

**BY MAYERENE BARKER**
**Times Staff Writer**

As a young boy, Bill Wysock was so fascinated by lightning that he would run out into the rain just to catch a glimpse of it.

"The bigger the bolt the better," recalled Wysock.

Today, at 29, Wysock not only still chases lightning bolts but makes his own in the driveway of his Temple City home.

He creates man-made lightning with a Tesla coil, a high frequency transformer of electric current. The 14-foot-tall coil in his driveway is the 10th and largest that Wysock has built.

A year in the making, the coil has produced lightning "sparks" 17 feet long during Wysock's driveway experiments.

"I'm still searching for the spark that satisfies," Wysock said. "I'm always trying to make a longer one."

However, he has conducted the experiment with his latest and largest Tesla coil only five times since it was completed a year ago.

One reason is that it takes 1½ hours and at least three assistants to get the coil and its generator set up and ready to make lightning.

Friends Dick Aurandt, Glendale; Jim Shaffer, South Gate; Ron Rockwell, Orange and Dave Jennings, Arcadia, assisted Wysock at his latest test.

"A Tesla devotee will travel any distance to see an experiment," Aurandt said. "And on a Saturday night, too."

When the experiment started, neighbors gathered and passing motorists stopped and watched. Soon, a small crowd of spectators surrounded the driveway.

"The non-technically minded are awed at the spectacle," Wysock said. "It is so extraordinary."

The electrical discharges turned out by the coil are "almost an art form," he added. "I can't describe their beauty."

Although the experiment began about 6 p.m., Wysock and his friends were still at it at 10 this particular night.

Los Angeles Times
San Gabriel Valley
S PART VII
THURSDAY, MAY 3, 1979

"He's an electronics genius," said one boy to his friend as they watched. "He made that whole thing, you know."

Wysock, a graduate of Arcadia High School and Pasadena City College, did telecommunications work during a hitch in the Army. But that is the extent of his formal education.

"I'm self-taught," he said. "To do that you have to have incentive and curiosity. I don't know about the genius part."

During his experiments, Wysock is friendly to curiosity-seekers but takes every possible safety precaution.

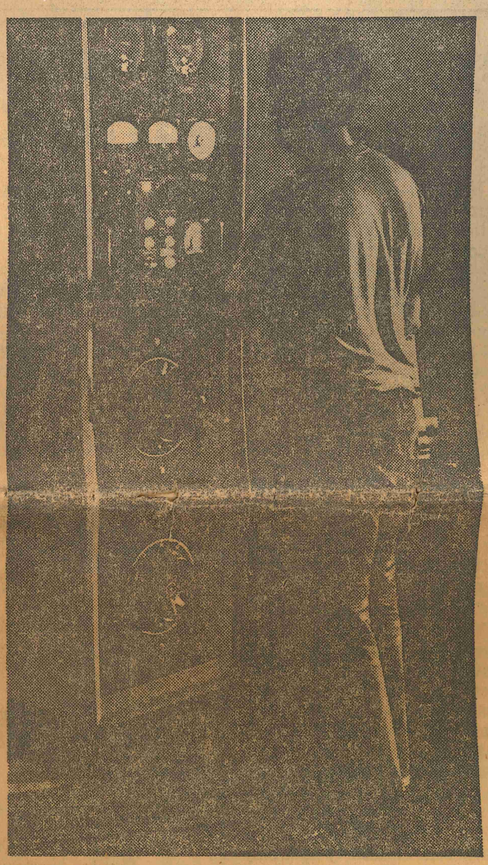
The sparks are "absolutely lethal," Wysock emphasized.

But he always tells the curious about Nikola Tesla, the coil's inventor. One of his goals is to make Tesla better known.

Tesla, an electrician and inventor who emigrated to the United States from Croatia in 1884, worked briefly for Thomas A. Edison, then went off on his own to invent, in addition to the coil named for him, an induction motor, such as the one that operates a washing machine; alternating current (AC) transmission of electricity; a wireless communications system and a system of wireless electric power transmission.

To Wysock, who built his first Tesla coil at age 9, Tesla is an unsung hero whose name should be as widely known

**Please Turn to Page 6**



**COUNTDOWN**—Wysock adjusts controls of Tesla coil in preparation for home-made light show.

# Pasadena Police Win Fight for Workout Room

**BY BERT MANN**
**Times Staff Writer**

PASADENA—The Police Officers Assn. has been given the right to use an exercise room in the police headquarters building.

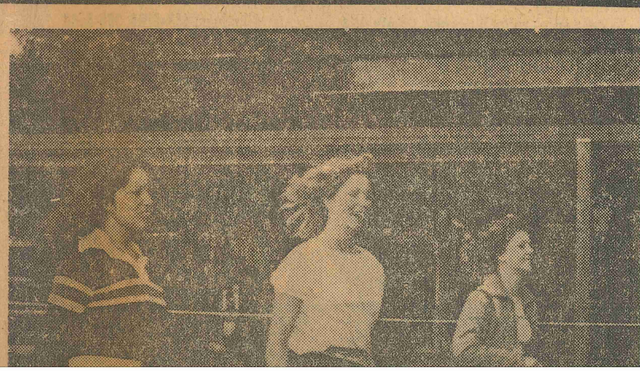
## ARSON SUSPECTED

# School Records Survive $350,000 School Fire

**BY MIKE WARD**
**Times Staff Writer**

WEST COVINA—If vandals set fire to the administration building at West Covina High School to destroy school records, they failed.

But they succeeded in wrecking of mation leading to the conviction of those responsible is being offered through We-TIP, an organization that funnels information from anony-mous sources to investigators.





**WATT-AGE**—Bill Wysock of Temple City is determined to light up his life—and everybody else's—with the man-made lightning he creates on Tesla coil in his driveway. As Wysock adjusts the wire, left, his friends, from left, Ron Rockwell, Dave Jennings and Jim Shaffer help him set up the contraption. It takes several hours to assemble the coil and at one point, Wysock climbs a ladder, center, to get closer to his subject. The 14-foot coil is the 10th and largest that Wysock has built. It has produced 17-foot-long sparks, some of which look like those coming from the coil at right.

Times photos by Joel P. Lugavere

# Lightning Experimenter Seeks Bigger, Better Bolts

## Enthusiast Follows in Steps of Inventor, Hunts New Energy

BY MAYERENE BARKER
Times Staff Writer

As a young boy, Bill Wysock was so fascinated by lightning that he would run out into the rain just to catch a glimpse of it.

"The bigger the bolt the better," recalled Wysock.

Today, at 29, Wysock not only still chases lightning bolts but makes his own in the driveway of his Temple City home.

He creates man-made lightning with a Tesla coil, a high frequency transformer of electric current. The 14-foot-tall coil in his driveway is the 10th and largest that Wysock has built.

A year in the making, the coil has produced lightning "sparks" 17 feet long during Wysock's driveway experiments.

*"I'm still searching for the spark that satisfies,"* Wysock said. "I'm always trying to make a longer one."

However, he has conducted the experiment with his latest and largest Tesla coil only five times since it was completed a year ago.

One reason is that it takes 1½ hours and at least three assistants to get the coil and its generator set up and ready to make lightning.

Friends Dick Aurandt, Glendale; Jim Shaffer, South Gate; Ron Rockwell, Orange and Dave Jennings, Arcadia, assisted Wysock at his latest test.

"A Tesla devotee will travel any distance to see an experiment," Aurandt said. "And on a Saturday night, too."

When the experiment started, neighbors gathered and passing motorists stopped and watched. Soon, a small crowd of spectators surrounded the driveway.

"The non-technically minded are awed at the spectacle," Wysock said. "It is so extraordinary."

The electrical discharges turned out by the coil are "almost an art form," he added. "I can't describe their beauty."

Although the experiment began about 6 p.m., Wysock and his friends were still at it at 10 this particular night.

Los Angeles Times
San Gabriel Valley
S PART VII
THURSDAY, MAY 3, 1979

"He's an electronics genius," said one boy to his friend as they watched. "He made that whole thing, you know."

Wysock, a graduate of Arcadia High School and Pasadena City College, did telecommunications work during a hitch in the Army. But that is the extent of his formal education.

"I'm self-taught," he said. "To do that you have to have incentive and curiosity. I don't know about the genius part."

During his experiments, Wysock is friendly to curiosity-seekers but takes every possible safety precaution.

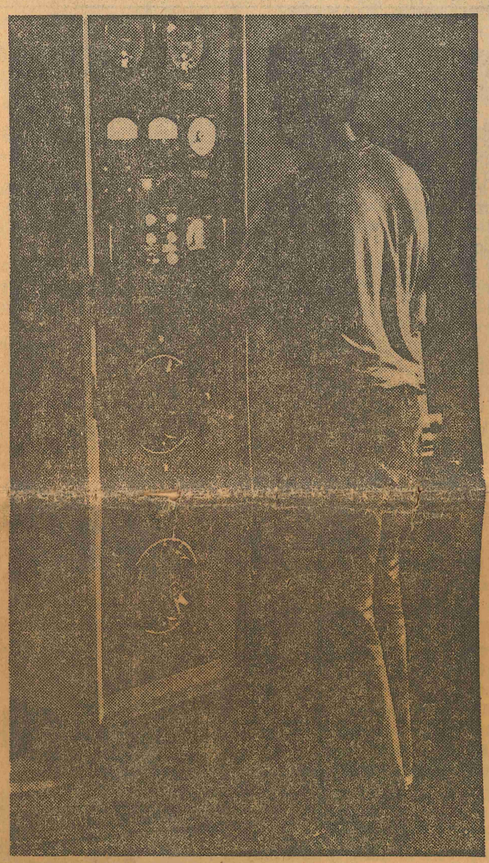
The sparks are "absolutely lethal," Wysock emphasized.

But he always tells the curious about Nikola Tesla, the coil's inventor. One of his goals is to make Tesla better known.

Tesla, an electrician and inventor who emigrated to the United States from Croatia in 1884, worked briefly for Thomas A. Edison, then went off on his own to invent, in addition to the coil named for him, an induction motor, such as the one that operates a washing machine; alternating current (AC) transmission of electricity; a wireless communications system and a system of wireless electric power transmission.

To Wysock, who built his first Tesla coil at age 9, Tesla is an unsung hero whose name should be as widely known

Please Turn to Page 6



**COUNTDOWN**—Wysock adjusts controls of Tesla coil in preparation for home-made light show.

# Pasadena Police Win Fight for Workout Room

BY BERT MANN
Times Staff Writer

PASADENA—The Police Officers Assn. has been given the right to use an exercise room in the police headquarters building.

The Board of City Directors by a 4 to 3 vote authorized the use of the room where several months ago the 160-member association had installed, at its own expense, a $6,000 Universal exercise machine. The machine includes a pulley system of weights with slant boards and other devices designed to improve muscle condition.

But after the machine was installed, the city attorney's office ruled that it could not be used on city property on the grounds that the city could be liable for injuries suffered during its use

But Director William Bogaard won majority support for a proposal that the association be allowed to use the room for a one-year trial period.

At the same time, Bogaard's proposal stipulated that only off-duty sworn officers who are under the supervision of a gymnasium instructor should be allowed to use the equipment.

Conditions also imposed are that no loose weights or barbell equipment will be allowed in the exercise room and that the police association provide liability insurance.

Director Donald F. Yokaitis, who was among those opposed to Bogaard's proposal, said he thought it was "irresponsible on the part of the

Please Turn to Page 4

ARSON SUSPECTED

# School Records Survive $350,000 School Fire

BY MIKE WARD
Times Staff Writer

WEST COVINA—If vandals set fire to the administration building at West Covina High School to destroy school records, they failed.

But they succeeded in wrecking offices, ruining school trophies, knocking out the bell system that summons students to class and creating damage tentatively estimated at $350,000.

West Covina police Det. Dan Leonard said the cause of Monday's fire has not been determined, but arson is suspected. A $500 reward for information leading to the conviction of those responsible is being offered through We-TIP, an organization that funnels information from anonymous sources to investigators.

The arson theory was reinforced police said, by the discovery that vandals had broken into a woodshop classroom and a trailer housing a career opportunities program. Papers were scattered on the floor. Tools taken from the shop were found on the campus grounds.

Leonard said investigators believe the break-ins and fire may be connected but have no evidence yet to support their theory.

Much of the administration building was burned before firemen arrived. Police called firemen after officers responded to a burglar alarm at the school at 12:31 a.m. when flames were seen shooting from the building.

The fire was confined to the administration building, destroying the offices of the principal and other administrators and the nursing and attendance offices.

Leonard said the school records were in a fireproof wall vault protected by concrete and steel.

He said the loss that can't be replaced is the many trophies earned by students and the school. "West Covina is one of the outstanding high schools in Southern California in athletics," Leonard said, "and many of its major achievement awards were de-

Please Turn to Page 6

## LAYOFFS OF 30 BASSETT TEACHERS LOOM

BASSETT—Layoff of 30 faculty members at the end of this school year will be recommended to the Bassett school board by Supt. Terry Krauss at a special meeting at 7:30 tonight.

Krauss said he will recommend the board accept the judgment of a hearing officer who has ruled that the district is justified in terminating 30 certificated employes.

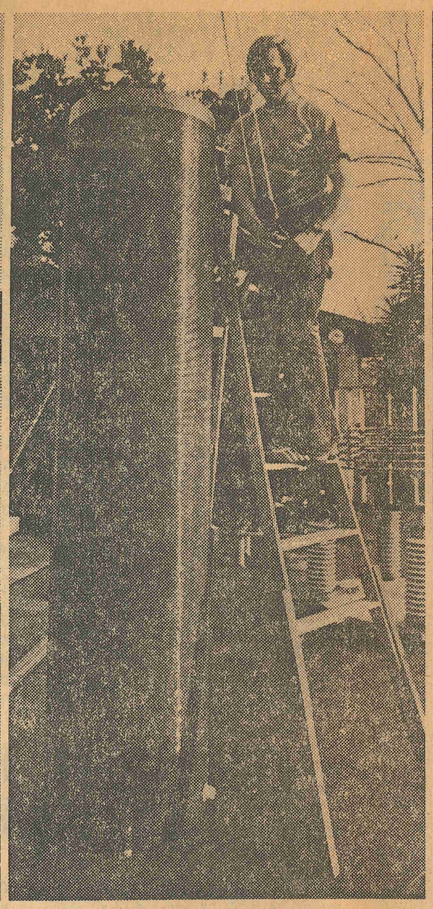
Krauss said the district is overstaffed because of declining enrollment. The number of students has fallen from 8,500 in 1972-73 to 5,500 this year and is expected to decline to 5,100 next year.

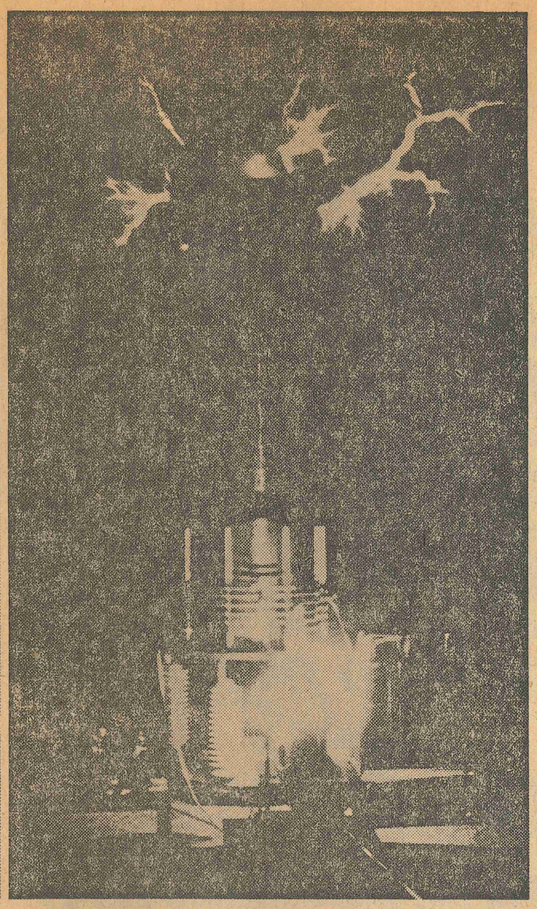
Please Turn to Page 6



**HURRY, HURRY**—Students at West Covina High School scurry back to classes at the ring of Victory Bell by Larry Thorne, dean of students. Bell replaces a c school's ad by fire. Da







mple City is deter
verybody else's—
creates on Tesla
adjusts the wire, left, his friends, from left, Ron Rockwell, Dave Jennings and Jim Shaffer help him set up the contraption. It takes several hours to assemble the coil and at one point, Wysock climbs a ladder, center, to get closer to his subject. The 14-foot coil is the 10th and largest that Wysock has built. It has produced 17-foot-long sparks, some of which look like those coming from the coil at right.

Times photos by Joel P. Lugavere

# Experimenter Seeks Bigger, Better Bolts

## in Steps of w Energy

RKER

was so fascinated by the rain just to catch a

called Wysock. still chases lightning veway of his Temple

ith a Tesla coil, a high rent. The 14-foot-tall largest that Wysock

as produced lightning k's driveway exper-

at satisfies," Wysock er one."

experiment with his e times since it was

rs and at least three rator set up and ready

Jim Shaffer, South ve Jennings, Arcadia,

distance to see an exaturday night, too."

ighbors gathered and tched. Soon, a small riveway.

awed at the spectaary."

ut by the coil are "al t describe their beau-

bout 6 p.m., Wysock is particular night.

Los Angeles Times
San Gabriel Valley
S PART VII
THURSDAY, MAY 3, 1979

"He's an electronics genius," said one boy to his friend as they watched. "He made that whole thing, you know."

Wysock, a graduate of Arcadia High School and Pasadena City College, did telecommunications work during a hitch in the Army. But that is the extent of his formal education.

"I'm self-taught," he said. "To do that you have to have incentive and curiosity. I don't know about the genius part."

During his experiments, Wysock is friendly to curiosity-seekers but takes every possible safety precaution.

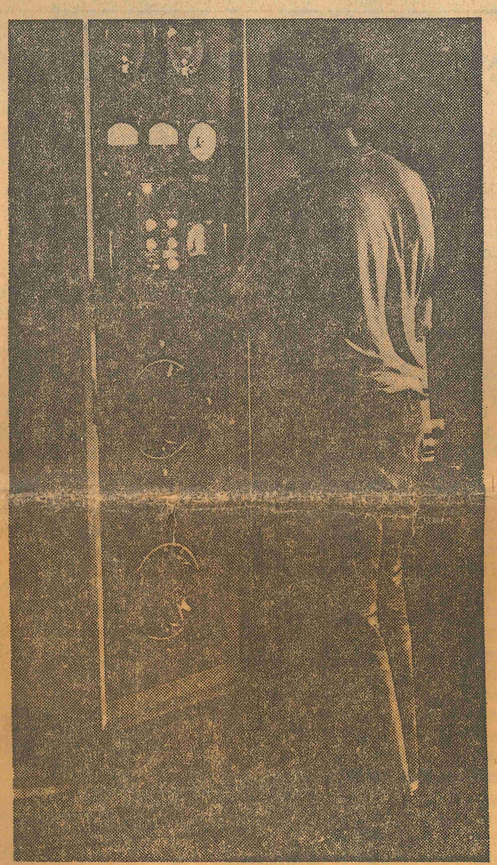
The sparks are "absolutely lethal," Wysock emphasized.

But he always tells the curious about Nikola Tesla, the coil's inventor. One of his goals is to make Tesla better known.

Tesla, an electrician and inventor who emigrated to the United States from Croatia in 1884, worked briefly for Thomas A. Edison, then went off on his own to invent, in addition to the coil named for him, an induction motor, such as the one that operates a washing machine; alternating current (AC) transmission of electricity; a wireless communications system and a system of wireless electric power transmission.

To Wysock, who built his first Tesla coil at age 9, Tesla is an unsung hero whose name should be as widely known

Please Turn to Page 6



COUNTDOWN—Wysock adjusts controls of Tesla coil in preparation for home-made light show.

# Seven School Reorganizing Plans Ready

## Numerous Closings Among Proposals of Pasadena Committee

BY LEE AUSTIN
Times Staff Writer

PASADENA—Seven plans, calling for school closures and reorganization of district facilities, will be presented next week by the District Staff-Community Planning Committee to the Board of Education.

The district is faced with reorganizing because of declining enrollment and economy. However, as in any proposal affecting Pasadena students, integration is a factor.

Some of the plans advocate selling or leasing several of the schools proposed for closure. One plan proposes selling the north section of the Education Center, the district's administration building, along with the adjacent McKinley Junior High School.

Every school except Roosevelt School of the Handicapped would be affected by the plans, either by realignment of their grades, switching to a special or regular school or closure.

This is expected to stir widespread reaction among parents and school personnel, especially those whose schools are proposed for closure. Even before the committee's plans were made final, 23 members of Audubon School's staff registered their protest against closure to the school board. Five of the plans call for Audubon to be closed.

Other schools proposed for closure in the various plans are Field, Jackson, Linda Vista, McKinley Elementary, Noyes, Sierra Mesa, McKinley Junior High, Washington Junior High and Wilson Junior High.

The plans also tag Don Benito, Hale and Loma Alta schools for possible closure.

Appointed by the Board of Education, the 32-member committee, headed by Peter Hagen, district research director, completed the plans last week after nine study sessions which started Feb. 26.

The committee consisted of school and district staff personnel, parents and others.

The plan will be discussed at a community meeting conducted by the PTA Council on May 12, from 9 a.m. to 1 p.m. in the Holliston Avenue Methodist Church.

The contemplated reorganization of the district's schools stems from the need to economize because of Proposition 13 revenue loss and the continuing enrollment decline. The district's 24,195 enrollment is projected to decrease by 750 to 800 students next year.

Mrs. Reynolds told committee members to recommend alternatives which would "maximize the use of district facilities and staff . . . in times of declining enrollments and fiscal restraints."

Developed by subcommittees and individual members of the committee, the plans are divided into four short-range ones for the new school year in September and three long-range proposals with a September, 1980 target.

They offer a variety of choices for the board.

Supt. Verdelle Reynolds said she would make her recommendations at the regular Tuesday board meeting

Please Turn to Page 6

RSON SUSPECTED

# School Records Survive $350,000 School Fire

BY MIKE WARD
Times Staff Writer

WEST COVINA—If vandals set to the administration building at st Covina High School to destroy ool records, they failed.

mation leading to the conviction of those responsible is being offered through We-TIP, an organization that funnels information from anony-





ole City is deter
erybody else's—
creates on Tesla
adjusts the wire, left, his friends, from left, Ron Rockwell, Dave Jennings and Jim Shaffer help him set up the contraption. It takes several hours to assemble the coil and at one point, Wysock climbs a ladder, center, to get closer to his subject. The 14-foot coil is the 10th and largest that Wysock has built. It has produced 17-foot-long sparks, some of which look like those coming from the coil at right.

Times photos by Joel P. Lugavere

# Experimenter Seeks Bigger, Better Bolts

## Steps of Energy

ER

so fascinated by
rain just to catch a

lled Wysock.
ll chases lightning
way of his Temple

a Tesla coil, a high
nt. The 14-foot-tall
rgest that Wysock

produced lightning
's driveway exper-

satisfies," Wysock
one."
periment with his
times since it was

s and at least three
tor set up and ready

Jim Shaffer, South
e Jennings, Arcadia,

istance to see an ex-
turday night, too."
ghbors gathered and
hed. Soon, a small
iveway.
awed at the specta-
ry."
by the coil are "al
describe their beau-

out 6 p.m., Wysock
particular night.

Los Angeles Times
San Gabriel Valley
S PART VII
THURSDAY, MAY 3, 1979

"He's an electronics genius," said one boy to his friend as they watched. "He made that whole thing, you know."

Wysock, a graduate of Arcadia High School and Pasadena City College, did telecommunications work during a hitch in the Army. But that is the extent of his formal education.

"I'm self-taught," he said. "To do that you have to have incentive and curiosity. I don't know about the genius part."

During his experiments, Wysock is friendly to curiosity-seekers but takes every possible safety precaution.

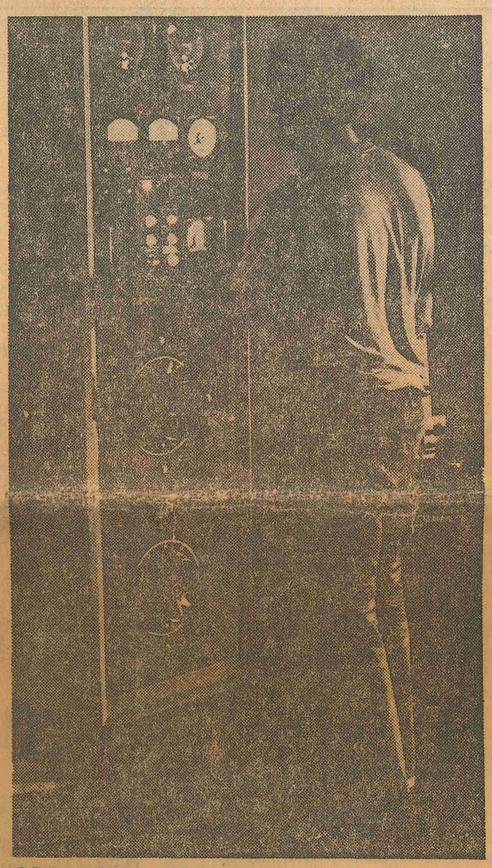
The sparks are "absolutely lethal," Wysock emphasized.

But he always tells the curious about Nikola Tesla, the coil's inventor. One of his goals is to make Tesla better known.

Tesla, an electrician and inventor who emigrated to the United States from Croatia in 1884, worked briefly for Thomas A. Edison, then went off on his own to invent, in addition to the coil named for him, an induction motor, such as the one that operates a washing machine; alternating current (AC) transmission of electricity; a wireless communications system and a system of wireless electric power transmission.

To Wysock, who built his first Tesla coil at age 9, Tesla is an unsung hero whose name should be as widely known

Please Turn to Page 6



**COUNTDOWN**—Wysock adjusts controls of Tesla coil in preparation for home-made light show.

School of the Handicapped would be affected by the plans, either by realignment of their grades, switching to a special or regular school or closure.

This is expected to stir widespread reaction among parents and school personnel, especially those whose schools are proposed for closure. Even before the committee's plans were made final, 23 members of Audubon School's staff registered their protest against closure to the school board. Five of the plans call for Audubon to be closed.

Other schools proposed for closure in the various plans are Field, Jackson, Linda Vista, McKinley Elementary, Noyes, Sierra Mesa, McKinley Junior High, Washington Junior High and Wilson Junior High.

The plans also tag Don Benito, Hale and Loma Alta schools for possible closure.

Appointed by the Board of Education, the 32-member committee, headed by Peter Hagen, district research director, completed the plans last week after nine study sessions which started Feb. 26.

The committee consisted of school and district staff personnel, parents and others.

The plan will be discussed at a community meeting conducted by the PTA Council on May 12, from 9 a.m. to 1 p.m. in the Holliston Avenue Methodist Church.

The contemplated reorganization of the district's schools stems from the need to economize because of Proposition 13 revenue loss and the continuing enrollment decline. The district's 24,195 enrollment is projected to decrease by 750 to 800 students next year.

Mrs. Reynolds told committee members to recommend alternatives which would "maximize the use of district facilities and staff . . . in times of declining enrollments and fiscal restraints."

Developed by subcommittees and individual members of the committee, the plans are divided into four short-range ones for the new school year in September and three long-range proposals with a September, 1980 target.

They offer a variety of choices for the board.

Supt. Verdelle Reynolds said she would make her recommendations at the regular Tuesday board meeting

Please Turn to Page 6

## RSON SUSPECTED

# School Records Survive $350,000 School Fire

BY MIKE WARD
Times Staff Writer

EST COVINA—If vandals set
o the administration building at
Covina High School to destroy
ol records, they failed.
t they succeeded in wrecking of-
ruining school trophies, knock-
ut the bell system that summons
nts to class and creating damage
tively estimated at $350,000.
est Covina police Det. Dan Leon-
said the cause of Monday's fire
ot been determined, but arson is
cted. A $500 reward for infor-
mation leading to the conviction of those responsible is being offered through We-TIP, an organization that funnels information from anonymous sources to investigators.

The arson theory was reinforced police said, by the discovery that vandals had broken into a woodshop classroom and a trailer housing a career opportunities program. Papers were scattered on the floor. Tools taken from the shop were found on the campus grounds.

Leonard said investigators believe the break-ins and fire may be connected but have no evidence yet to support their theory.

Much of the administration building was burned before firemen arrived. Police called firemen after officers responded to a burglar alarm at the school at 12:31 a.m. when flames were seen shooting from the building.

The fire was confined to the administration building, destroying the offices of the principal and other administrators and the nursing and attendance offices.

Leonard said the school records were in a fireproof wall vault protected by concrete and steel.

He said the loss that can't be replaced is the many trophies earned by students and the school. "West Covina is one of the outstanding high schools in Southern California in athletics," Leonard said, "and many of its major achievement awards were de-

Please Turn to Page 6

## YOFFS OF BASSETT ACHERS LOOM

SSETT—Layoff of 30 faculty
bers at the end of this school
will be recommended to the
tt school board by Supt. Terry
ss at a special meeting at 7:30 to-

auss said he will recommend the
l accept the judgment of a hear-
fficer who has ruled that the dis-
is justified in terminating 30 cer-
ted employes.
auss said the district is over-
d because of declining enroll-
. The number of students has
n from 8,500 in 1972-73 to 5,500
ear and is expected to decline to
next year.

Please Turn to Page 6



**HURRY, HURRY**—Students at West Covina High School scurry back to classes at the ring of Victory Bell by Larry Thorne, dean of students. Bell replaces a class bell system destroyed when the school's administration building was damaged by fire. Damage was estimated at $350,000.

Times photo by Al Markado



DREN'S PLAY—The vain emperor, Ed Mark d, is admired by his tailors, Darlene Walters Christopher Barrios, in a scene from the Rio Hondo College production of "The Emperor's New Clothes." The production will be presented both Saturday and Sunday, May 5 and 6.

# ASADENA SCHOOL DISTRICT PLANS

ued from First Page

the other plans will be pre-

e short-range plans propose ng to the 1977-78 school con- ion of kindergarten to third fourth to sixth grades, seventh ghth grades and nine to 12th

plans would restore the junior ade level and reopen Wilson which along with Eliot School house the seventh and eighth

present board majority elimin- e junior high grade level this putting the seventh grade in nentary schools and grouping th graders at Eliot School. nerated an issue in the recent f Education election, which in the defeat of two trustees ur-member board majority.

new board majority of Mrs. Wyatt and trustees-elect Mrs. ack and Elbie Hickambottom, ke office in July, advocate a school concept centering on enth and eighth grades. of the long-range plans also r a middle school concept by a h to ninth grade alignment at Marshall and Washington s.

ther plan proposes a kindergar- fifth grade, sixth and seventh s and eighth and ninth grades 10th to 12th grade at the three chools.

er one plan the present kinder- to fourth grade, fifth to sev- rade, eighth grade and ninth to rade configuration is to be kept. he plans provide for maintain- tegrated schools. And they call taining compulsory assignment dents to school.

However, one long-range plan, adds a freedom of choice option if students desire to attend a school other than the one to which they are assigned.

Two of the plans provide for a skills center or a vocational type school for children in secondary grades.

However, the committee voted unanimously at its last meeting to recommend establishing a skills center at McKinley Junior High School next September in cooperation with the city and Pasadena City College.

The fundamental schools and the alternative school would be continued although their locations would be changed in several of the plans.

One plan calls for changing Blair High School to a fundamental seventh through 12th grade school. Another would offer alternative secondary school students academic classes at Blair along with its regular ninth through 12th grades. And Marshall fundamental school classes would be able to use Pasadena High School's facilities in a third plan.

Another plan calls for utilization of closed schools for multi-purpose use by the community instead of selling or leasing them. It would convert the schools or parts of them to child care centers and community meeting places.

Two plans would relocate the district's administrative offices, now at the Education Center, to Hale School or to other schools.

Four plans were developed by subcommittees headed by William Bibbiani, district research department evaluator; Scott Marshall, continuation high school staff member; Jimmie Charles, Eliot Junior High School vice principal, and Charles Parcell, Blair High School principal. The other three plans were designed by three committee members, Mrs. Martha Guth, PTCA Council president; Mrs. Kyle Crist, fundamental school reading teacher, and Frank Hardinge, who has been active in school matters.

Pending are recommendations for changes by two other committees.

One is a 20-member committee appointed by U.S. Dist. Judge Manuel Real, who ordered the school district to integrate in 1970. It is a key committee because Real holds legal jurisdiction over the district.

Committee Chairman Warren Ettinger, a former municipal judge, plans to have the committee's recommendations ready by May 11.

The other committee was furthered by Hickambottom shortly after his election. Committee chairman, the Rev. Kent D. Lawrence of the Westminster Presbyterian Church, expects the community-based group will have recommendations for the school board by mid-June.

# ENERGY HUNTER

Continued from First Page

for his inventions as Edison, Alexander Graham Bell or Samuel Morse.

"Tesla helped lay the foundation for modern technology" he said. "The (television) picture tube, for example, is a direct descendant of Tesla's high voltage, high energy coil.

"Engineering schools here have little in their curriculum about Tesla. In Europe, he is required study. I hope someday he will be in this country."

Wysock said Tesla became a rival of Edison after he left the latter's employ.

"Edison was a proponent of direct current (DC) for electrical transmission," he said. "Tesla won out over Edison in a court case known as the 'War of the Currents.' The court ruled that AC was more economical than DC. It was a little-known victory."

Shortly after his court victory, Tesla sold the patents of his inventions to George Westinghouse, a Tesla backer and another Edison rival. Tesla also had been backed financially by John Jacob Astor and J.P. Morgan.

Wysock said Tesla died virtually unknown and penniless in 1943 at the age of 87.

Wysock, an electronics researcher for a large government-owned company, the Aerospace Corp., is attempting, in his spare time, to carry on Tesla's work as well as increase public appreciation of his inventions.

Wysock said when Tesla invented his coil, he created a new source of energy which has remained unperfected.

"The coil generates energy so that when you hold up a light bulb while it is operating, the bulb will light up," Wysock said. "It is a form of wireless energy of which Tesla was trying to produce in large quantities.

"The theory is that without wire, energy is radiated from a large coil. Then, you would tune in any amount of power you wanted. You could even transmit power to needy areas overseas. It is a nonpollutant type of energy discovered prior to 1900."

What Wysock eventually would like to do is to produce a long enough spark of man-made lightning, intense enough to produce ball lightning—large circular flames

Please Turn to Page 8

# RECORDS SURVIVE

Continued from First Page

stroyed."

John Sweat, dean of students, said classes have continued as usual because no classrooms were damaged. But, he said, there are inconveniences.

The fire destroyed the bell system that summons students to class, so the school's victory bell is used to announce the beginning and end of class periods. Teachers have supplemented the victory bell by ringing hand bells.

Supt. Donald Todd said the architect who designed the administration building has estimated the structural loss at $250,000. The loss in furnishings and equipment is still undetermined, he said. Leonard said police and fire investigators based their total damage figure of $350,000 on rough estimates by insurance investigators.

Sweat said this is the first major damage from fire of vandalism since the school was opened 22 years ago. However, the district's other high school, Edgewood, suffered $500,000 damage in 1972 when fire destroyed its media center.

Another West Covina school, Orangewood, also was damaged Monday night by vandals who broke 90 windows. Todd estimated the replacement cost at $1,800.

The investigation into the high school fire is being carried out jointly by the police and fire departments, with assistance of arson investigators from other Valley cities.

# EACHERS

nued from First Page

auss said the district went gh termination hearings last and won the right to drop 13 ers, but then rehired all of them, an additional 13. The hirings based on enrollment expecta- that were not met.

the board accepts his recommen- on, Krauss said none of the teach- who lose their jobs this time will ehired unless there is an extraor- ry rate of attrition—retirements, gnations and deaths among the aining staff.

he district has 304 certificated loyes.

# FESTIVITIES

Continued from 4th Page

$15 a person. A happy hour will begin at 6 p.m., dinner will be served from 7 to 9 p.m., and there will be dancing and folklorico entertainment until 1 a.m.

Sunday, May 6, a touring mariachi group from Mexico City, La Tribu de la Paz, will perform in a 1 p.m. concert on the grounds of Pacific Oaks College at 5 Westmoreland Place in Pasadena. Refreshments will be served and admission will be $2 a family.

## arden Club Spring Show

L MONTE—The annual spring show of the El Monte se and Garden Club will be held Saturday and Sunday, y 5 and 6, in the Community Center at 3130 N. Tyler e.


THE FACE CLINIC

FOR A GOOD LOOK

There's no secret to a perfectly clean skin and blemish-free complexion. It's simply a matter of combining regular professional care with a little extra effort on your own. That's The Face Clinic way, and it works.

soap and water is just a start

Of course it's important to clean the surface of your skin with soap and water, but this time-honored cleansing method cannot penetrate pores and un-clog them. Dead tissue and blemishes remain. In addition, cosmetics accumulate in facial pores, along with impurities in the air. Soap and water can't always get to them. So obviously, more thorough cleansing is necessary, The Face Clinic's DermaCulture treatments fill that need.

The DermaCulture treatment is a proven, scientific method of alleviating lines, dryness, oily and troubled facial skin, it is effective on men and women of all ages. As the treatment begins, your pores are opened by means of a heat mask that creates a gentle moisturizing vapor, which loosens blackheads, whiteheads, dead tissue, stimulates circulation and forces waste material to the surface. Next, feather-touch but thorough vacuuming removes blemish-causing material and further stimulates circulation.

The final phase of the treatment is the toning and firming of the skin with specially designed equipment. A freshener is applied to the skin for a final cleansing. At the conclusion of the treatment, you'll notice how exceptionally clean your skin looks and feels. That is one step to a cleaner healthier skin—but only one. Much remains to be done. For example, first time visitors are treated with an exclusive granular cleansing, which removes dead tissue. We suggest that this procedure be used regularly at home.

we're not miracle workers

A single treatment at The Face Clinic cannot correct what the years may have done to your skin. Regular treatments may, provided you also follow a skin care program at home between visits to The Face Clinic. Trained, experienced DermaCulture specialists will help you determine which procedures are best suited to your requirements.

So welcome to The Face Clinic, where common sense and caring will result in a complexion you will always be proud of.

ADDITIONAL INFORMATION AND APPOINTMENTS MAY BE MADE BY TELEPHONING THE FACE CLINIC, 909 E. GREEN STREET, PASADENA, TELEPHONE (213) 449-3678. TREATMENT $15.00/OPEN 10 A.M., EVENINGS BY APPOINTMENT UNTIL 10.



Compuclean™ Drapery Cleaning



You may have won 2 tickets to

AUTO EXPO INTERNATIONAL

AUTO SHOW



Conserve NO

SHOP ATLAN SUPPLY!

AMERIC ENERGY SA WATER

30 GAL...

40 GAL...

50 GAL.

5 YEAR GUAR.—

CLOSE-COUPLE CLOSET

WESTE 12

$4

SE

SINGLE BALL DELTA F

Gleaming Heavy C Model 100 8-in

$4

GAR DISP

INSIN

MO

$3

½ H.P.

100 AMP & BREA

GAFFERS & S

ENERGY S

WALL OVEN MO

$2

B D

$4

## 10-Year High School Reunion

A 10-year class reunion of San Gabriel High School's class of 1969 will be held Saturday, May 5, at the Quiet Cannon Country Club in Montebello. The cost of $20 a person will include a buffet dinner and dancing. Reservations may be made at the school.

## Meeting for Senior Citizens

PASADENA—Assemblyman William H. Ivers (R-La Canada) will host a town hall meeting for senior citizens Friday, May 4, at 2 p.m. at the Senior Center, 85 E. Holly St.

## Church Women Slate Sale

WEST COVINA—A rummage sale is planned by United Methodist Women of United Methodist Church, Azusa and Cameron Aves., on Friday, May 4, from 9 a.m. to 2 p.m. and Saturday, May 5, from 9 a.m. to noon.

## Film Explains Relativity

ARCADIA—"Time and Eternity," a film exploring the principles of relativity, will be screened at 6 p.m. Sunday, May 6, in the Arcadia Friends Church, 5705 N. Lenore Ave.

## Postcard, Collectibles Sale

ALHAMBRA—An exhibit and sale of antique postcards and paper collectibles will be held from 10 a.m. to 5 p.m. Sunday, May 6, in Alhambra Masonic Temple, 9 W. Woodward Ave. Wheelchair access will be provided. Admission is $1, or 75 cents for senior citizens.

## Methodists Plan Fashion Show

PASADENA—A fashion show, luncheon and boutique is planned by United Methodist Women of St. James United Methodist Church at 11:30 a.m. Saturday, May 5, at the church, 2033 E. Washington Blvd.

## Sisterhood Sets 'Dine-Around'

ARCADIA—The Sisterhood of Temple Shaarei Tikvah will present it annual fund-raising "Dine-Around" beginning at 7 p.m. Saturday, May 5. The progressive dinner will end with dessert and dancing at the home of new Arcadia school board member Paul Friedman. Reservations, at $15 a person, are at the temple.

## Singles Stress Workshop

SAN MARINO—The Roundtable group for singles will sponsor a stress management workshop Sunday, May 6, from 1 to 4:30 p.m. at 1941 San Gabriel Blvd.

# BIGGER LIGHTNING

**Continued from 6th Page**

that appear only in intense electrical storms.

"Tesla accidentally produced ball lightning," Wysock said. "Because of its intensity, it is possible to produce the vast quantities of wireless energy necessary for an alternate energy source."

Wysock's love affair with the Tesla coil began when he first saw one at the age of 9 at Griffith Park Observatory. His interest was further sparked by an article about Tesla coils in Popular Electronics magazine.

It was then that he built his first coil which produced 1½-inch sparks. His later coils displayed around the living room of his home, which he shares with his wife, Lynn, and infant son. A poster of Tesla adorns the wall.

Wysock's coils are various sizes and are numbered according to the minimum size spark they produce.

"I would build one, then another," Wysock said. "Then, I would want to build one still bigger.

"Model 5 is the most popular. It is often used in educational demonstrations and at museums. With some modification, it is used in industry for generating fertilizing plants. It really is an economical means of generating extremely high voltage."

Wysock has sold several of his coils to museums and educational institutions. He hopes to sell others for research.

"For example, the Tesla coil is being used in a research project to find out why lightning strikes airplanes," Wysock said. "No one has ever tried to manufacture and sell a line of Tesla coils before. But I'm giving it a try."

Other modern-day uses for the Tesla coil are for special effects in the movies such as in the Frankenstein monster films. It was last used in "The Young Frankenstein."

## Humane Society Open House

PASADENA—Open house will be held from 2 to 5 p.m. Sunday, May 6, at the Pasadena Humane Society, 361 S. Raymond Ave. The society will be presented a $1,000 check from the Kennel Club of Pasadena to be used for its spaying and neutering programs.

## Pastor Will Be Installed

HACIENDA HEIGHTS—Dr. Antony M. Gamley will be installed pastor of Shepherd of the Valley United Presbyterian Church in a service at the church at 3 p.m. Sunday, May 6. Dr. J. Albert Smith, founding pastor of the church and senior pastor of First Presbyterian Church of Alhambra, will give the sermon.

## Growth Center Classes Set

ARCADIA—A new series of classes in personal development will begin Saturday, May 5, at the Personal Growth Center of Santa Anita Church, 226 W. Colorado. Subjects range from Divine Science principles to disco dancing. Reservations are suggested.

## Friends to Stage Concert

ALTADENA—Friends of the Public Library will present a concert by the Steed Woodwind Quintet on Friday, May 4, at 7:30 p.m. at the library, 600 E. Mariposa St. The event is free to the public.

## Nursery School Carnival

SIERRA MADRE—The annual carnival of the Community Nursery School will be Saturday, May 5, from 10 a.m. to 4 p.m. at Sierra Vista Park. The event, free to the public, will include games, pony rides, boutiques and refreshments.

## Fine Arts Series at Church

PASADENA—Singer Gwendolyn Lytle will perform as part of the Fine Arts Series of First Congregational Church, 464 E. Walnut St., Sunday, May 6, at 3 p.m. General admission is $3.

## Symphony Orchestra at Civic

PASADENA—A free performance by the Pasadena Youth Symphony Orchestra will be Sunday, May 6, at 3:30 p.m. at the Civic Auditorium.

## Photo Day at Citrus College

Citrus College will hold a photo day Saturday, May 5, from 10 a.m. to 3 p.m. for amateur and professional photographers to take pictures on campus. Models from a local agency, antique and new cars, trucks and motorcycles will be available for photographers' use.

## Law Day Lucheon Slated

MONTEREY PARK—The annual law day luncheon of the San Gabriel Valley Bar Assn. will be held at noon Friday, May 4, at Luminarias restaurant, 3500 Ramona Blvd.

Friday, May 4. Children's birth certificates and immunization records are required.

## Be Kind to Animals Week Slated

PASADENA—The Pasadena Humane Society, 361 S. Raymond Ave., will observe the beginning of "Be Kind to Animals Week" with its annual open house from 2 to 5 p.m. Sunday, May 6, at the Baldwin Park Community Hospital, 14148 Francisquito Ave. Demonstrations on first aid and paramedic rescue work will be interspersed with clowns, magic tricks, games and free refreshments.

## Church Fellowship Day

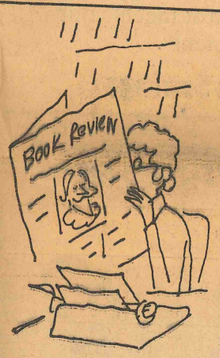
PASADENA—Church Women United will celebrate May Fellowship Day on Friday, May 4, at 9:30 a.m. at St. Rita Catholic Church, Baldwin and Grandview Aves., Sierra Madre.

## Learning Center Open House

COVINA—The Assistance League of East San Gabriel Valley will hold an open house at its Learning Center, 626 E. San Bernardino Road, on Saturday, May 5, from 11 a.m. to noon. The center's purpose is to assist children who have learning disabilities.

## Creative Arts Open House

TEMPLE CITY—Members of Creative Arts will hold an open house for the public Sunday, May 6, from 11 a.m. to 4 p.m. and Monday, May 7, from 10 a.m. to 2 p.m. at Live Oak Park.


Looking for a good book to read?

Check the Book Review section with Sunday's Times.



FREE!

19th ANNU

Mother's Day

ROSE SHOW

AT THE

PAGEANT OF ROSES GARDEN

LOCATED AT

ROSE HILLS MEMORIAL PA

3900 Workman Mill Road • Whittier, Calif

Telephone: (213) 699-0921 (714) 739-

AMPLE FREE PARKING • NO ADMISSION



MERCURY SAVINGS

and loan association

NOW OPEN

SATURDAY 10 A.M.-4 P.M.

MON.-FRI. 9 A.M.-6 P.M.

FSLIC

Executive Offices: 7812 Edinger Ave., Huntington Beach, CA 92647

Southern California Regional Offices

8955 Valley View St., Buena Park, CA 90620

20715 S. Avalon Blvd., Carson, CA 90746

22821 Lake Forest Dr., (Lake Forest), El Toro, CA 92630

1001 E. Imperial Hwy, La Habra, CA 90631

4140 Long Beach Blvd., Long Beach, CA 90807

1095 Irvine Blvd., Tustin, CA 92680

235 N. Citrus Ave., West Covina, CA 91793

EQUAL HOUSING LENDER



CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY CONTEMPORARY

CROSSROADS

"the meeting place of good design"

1979 parking lot & warehouse SALE

2 days only! may 5 & 6

saturday 10-6 sunday 10-6

we're cleaning house. tremendous savings await you for the finest in contemporary home furnishings. everything is priced to move, so bring your truck or van. mastercharge and visa accepted

where? main showroom 15250 e. whittier blvd. whittier (213) 945-2325

1979© de fazio ltd.



Village

FINE FURNISHINGS

Our Spring Sale

Select from an array of beautifully styled sofas and chairs by Morris James. Fine tailoring, exquisite fabrics and superior craftsmanship. All at an incredible savings.

Ready for Delivery

Additional savings on floor samples.

Chairs Reg. $369 to

Sofas Reg. $925 to

Village

8109 GREENLEAF AVE. AT WHITTIER BLVD., WHI

SHOP FRIDAY 'TIL 9 BANK CREDIT CARDS



FRONT COVER
PHOTO 1A
(OUTSIDE FLAP)
FEB. 82
SHOOT FULL SIZE

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

OFC 110% Page 1



BACK COVER

~~PHOTO~~ 1J

(OUTSIDE FLAP)

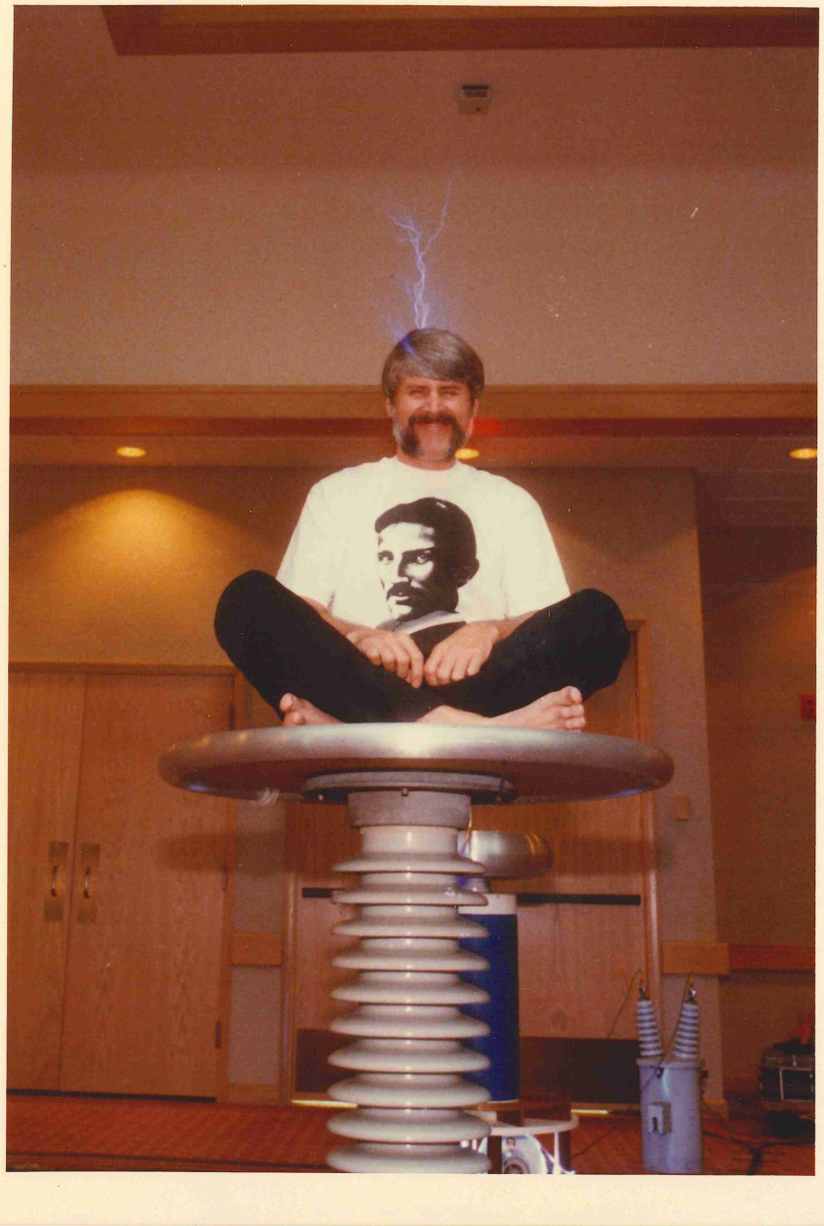
SHOOT FULL SIZE

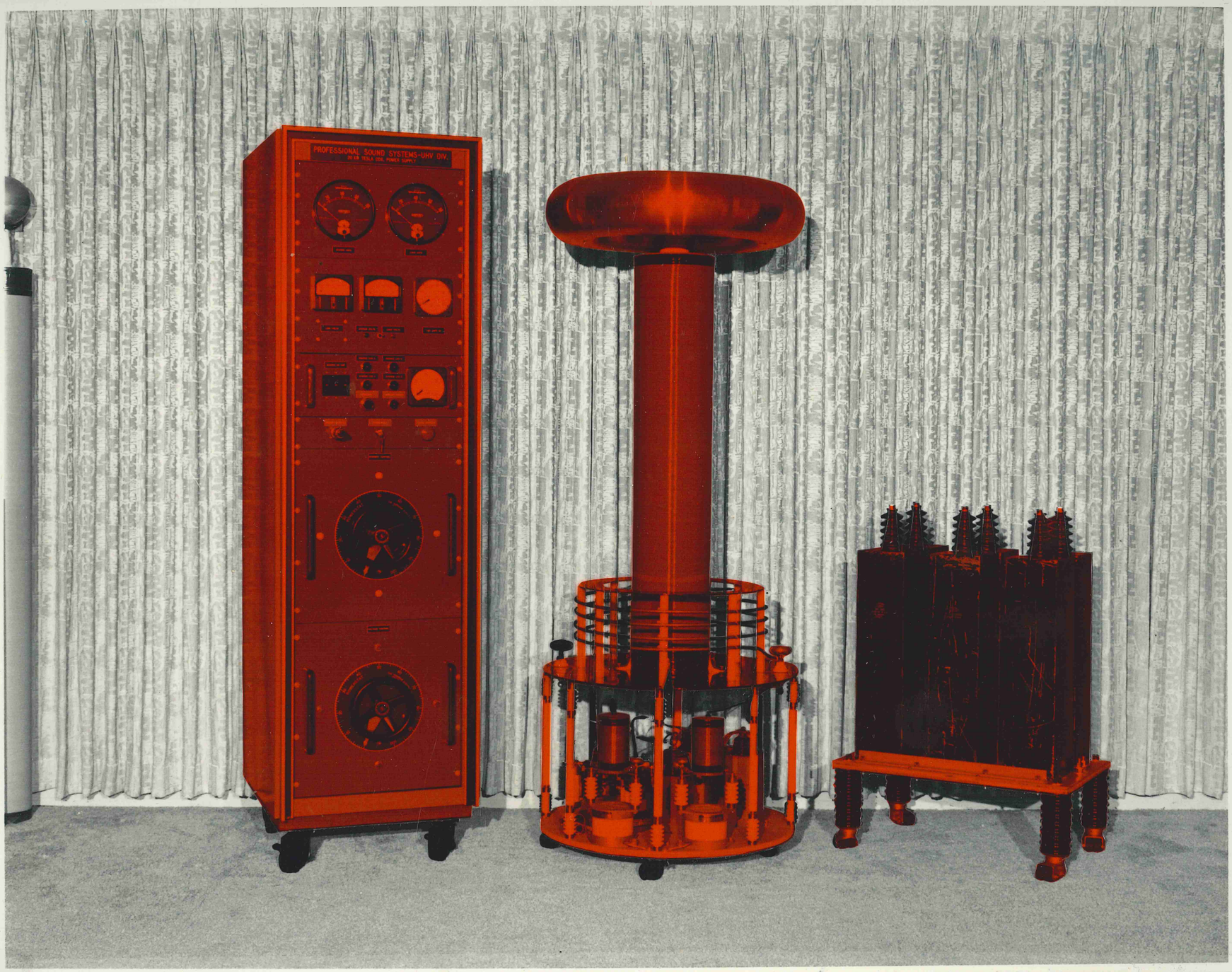
FEB '82

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

125% OBC Pg12






PROFESSIONAL SOUND SYSTEMS-UHV DIV.

PAGE 1

PHOTO IC

(REDUCE 50%)

FEB 82

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

Pg 3 [redacted] 82% Burn out background



PAGE 2

PHOTO ID

(FULL SIZE)

MODEL 8.5 COIL

FEB '82

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

P94 117 burnout background

THIS SIDE UP

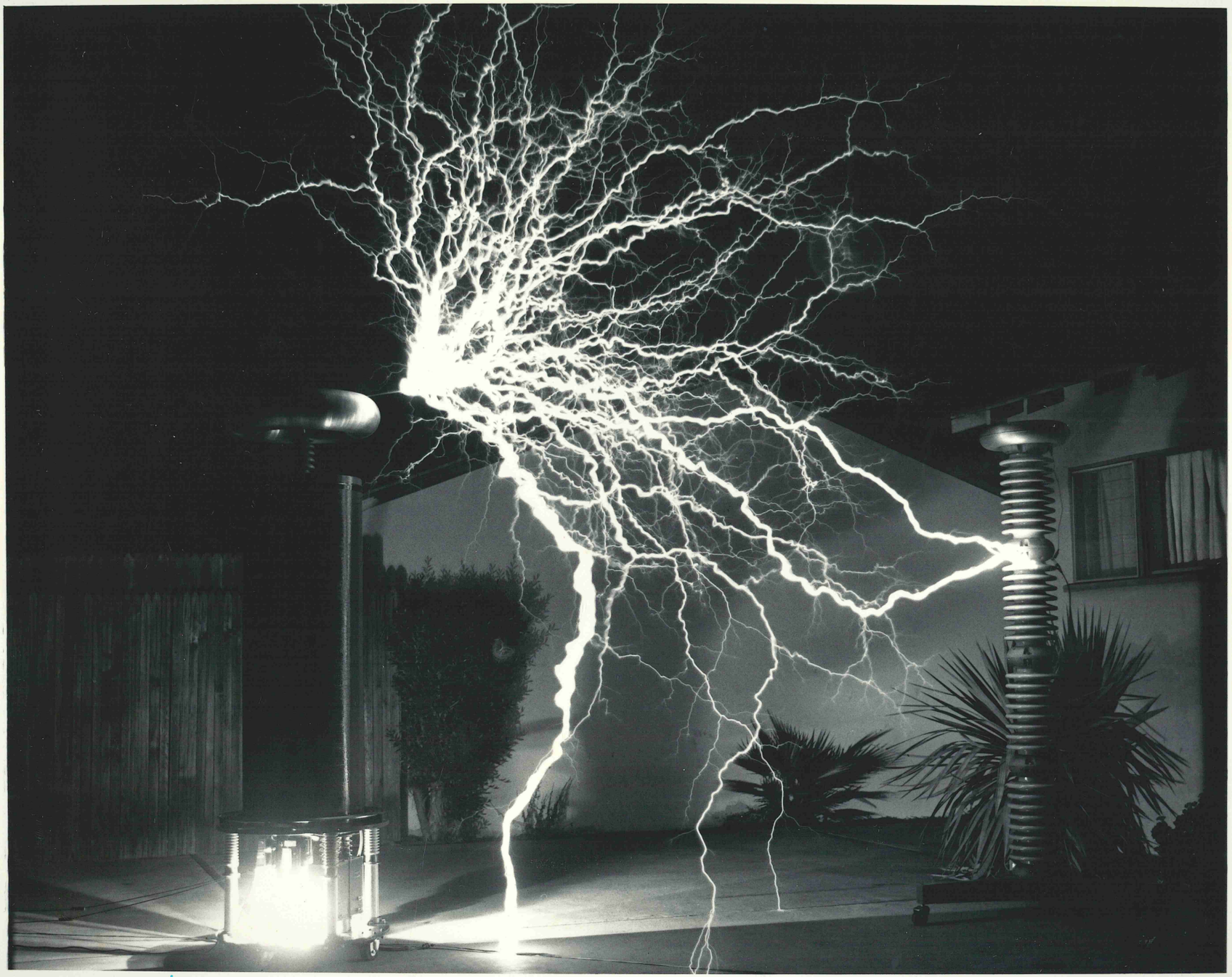


PROFESSIONAL SOUND SYSTEMS PHOTO E

97%
H/T ~~100~~ 4's
neg only

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

Page 6 96½%



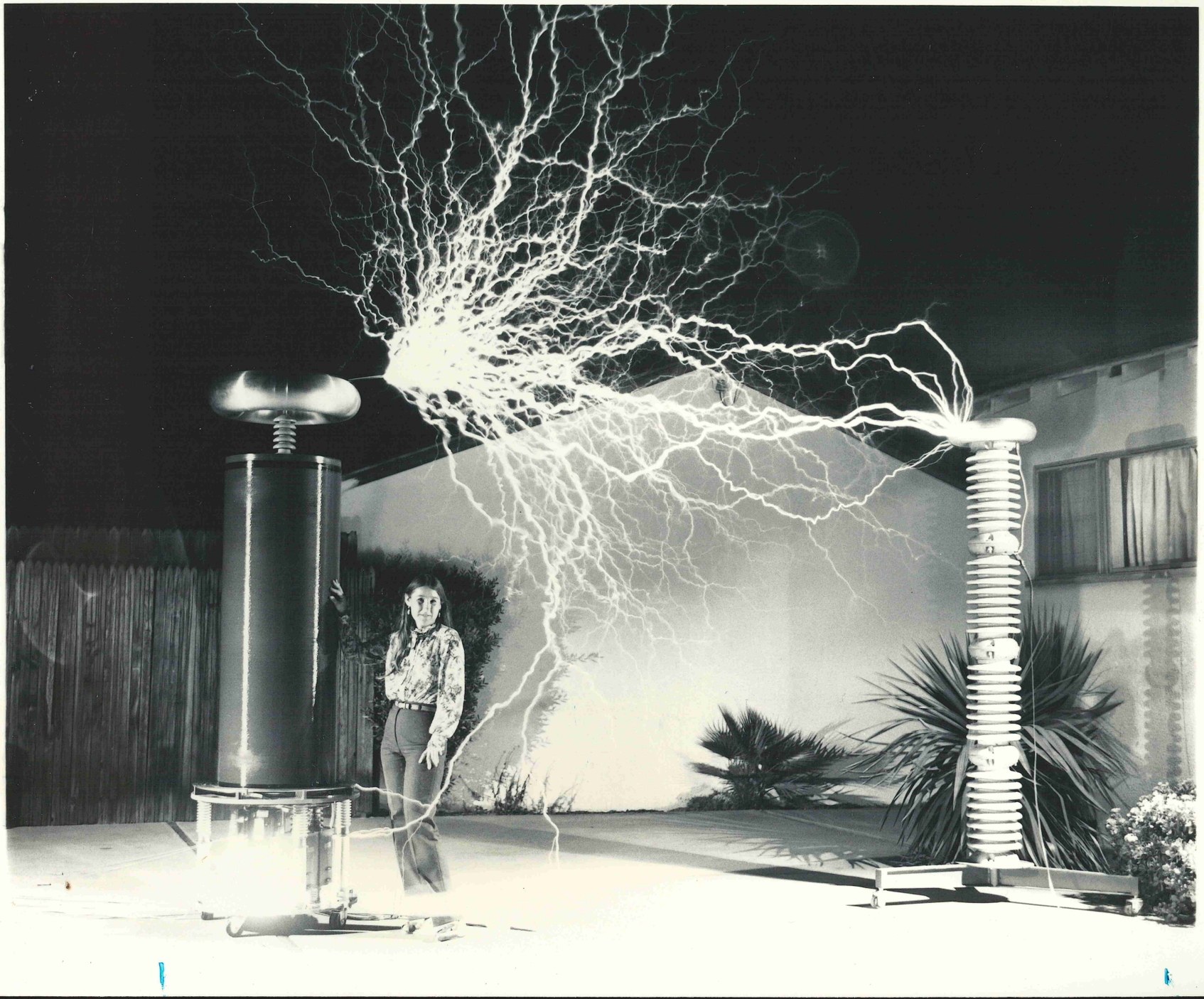
SUPER MODEL 9 TESLA COIL
FEB '82

PHOTO ~~1A~~ 1F

SHOOT DOWN 50%

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

71½% (A) pg 8



~~DELUX~~

SUPER MODEL 9 COIL

SHOOT DOWN 50%

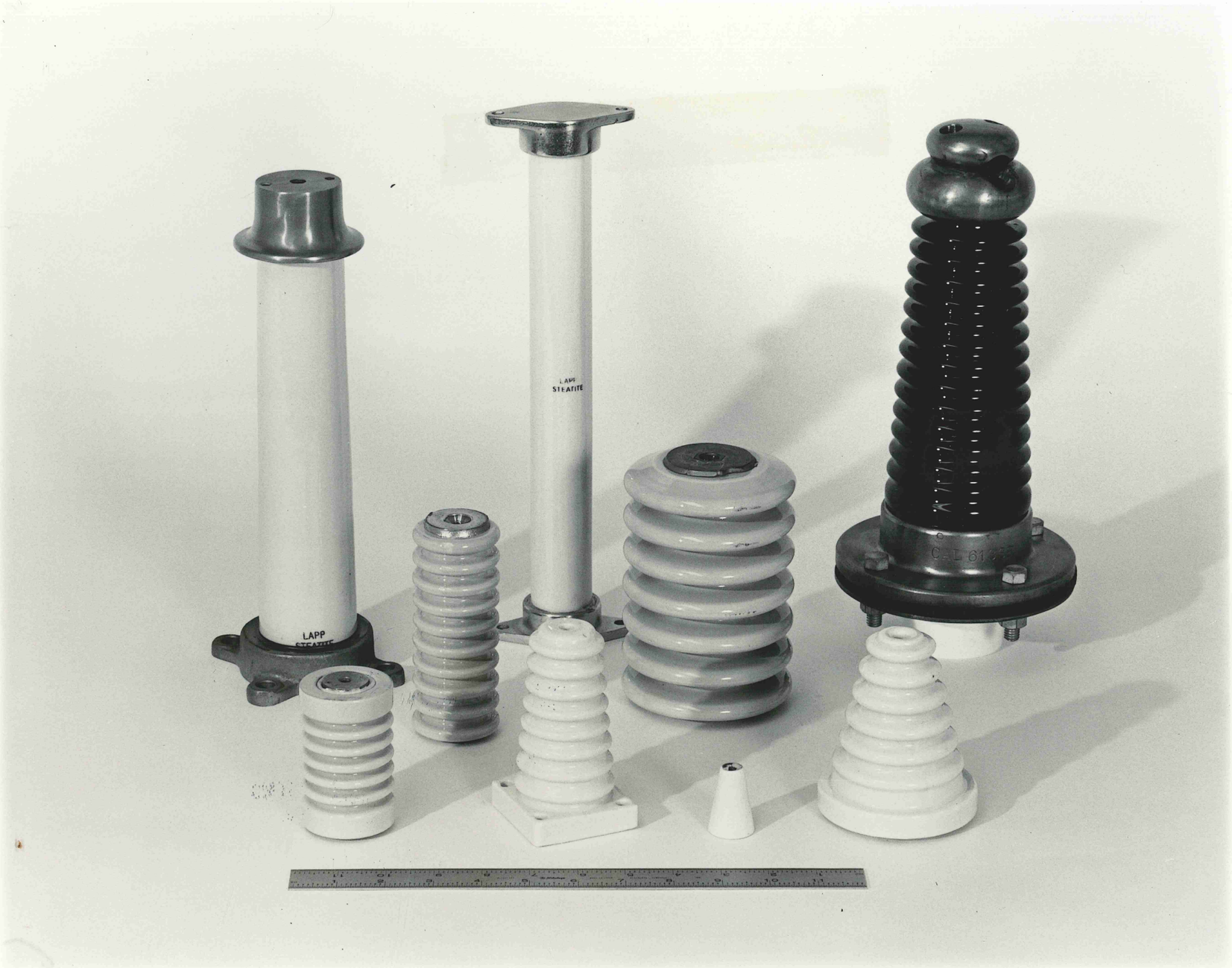
FEB '82

PHOTO 1G

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

71½% (B) pg 8

THIS SIDE UP




PROFESSIONAL SOUND SYSTEMS PHOTO G

66%

IRT 1024/5

neg only

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

66% pg 7 (6)

THIS SIDE UP

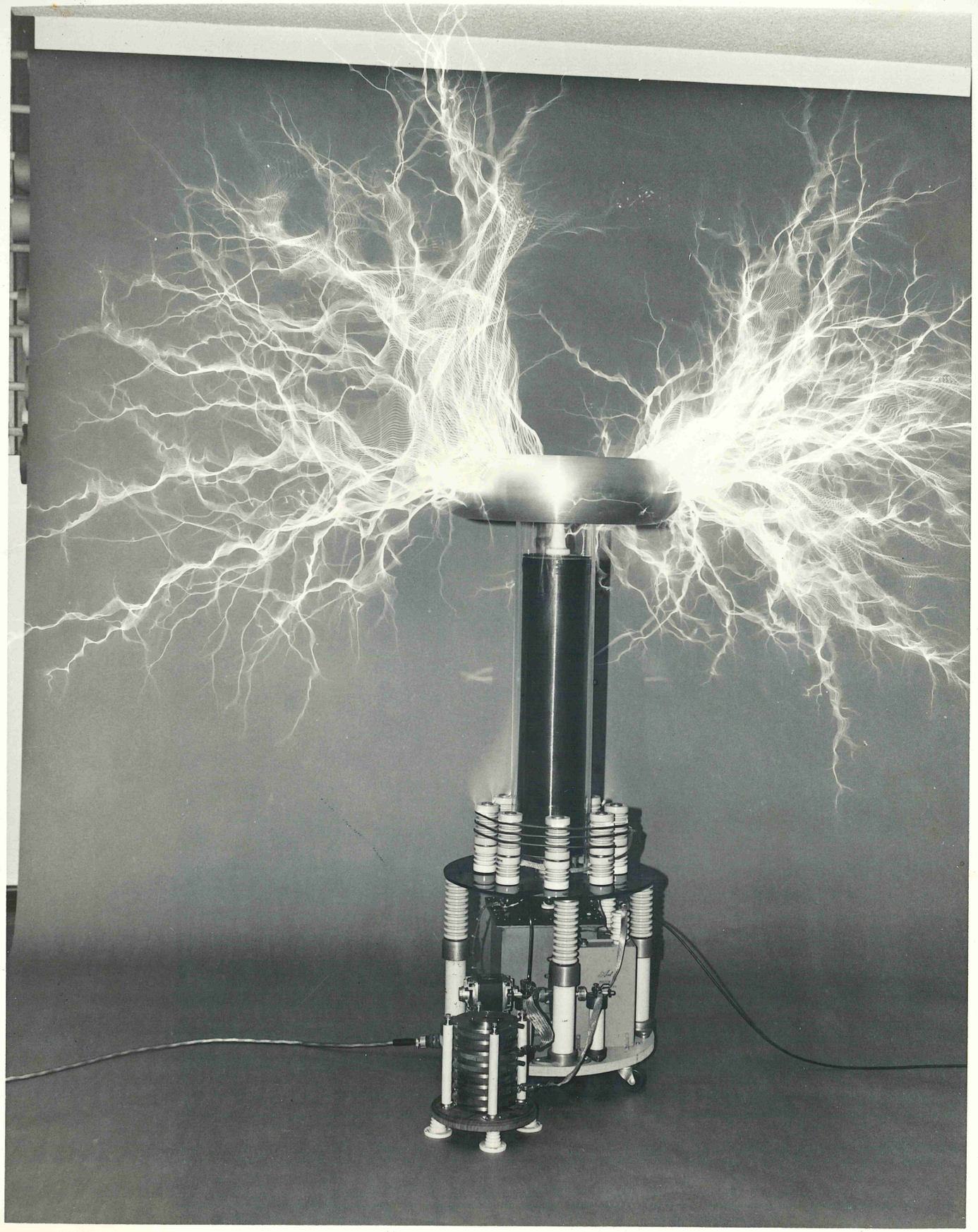



PROFESSIONAL SOUND SYSTEMS PHOTO F

~~H/T 100%~~ 60%
H/T 100%
neg only

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

(F) 60% pg 7




FRONT COVER
PHOTO TO
(INSIDE FLAP
FEB. 82
SHOOT FULL
SIZE
PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016
FC - Page 2 @135% no overlay

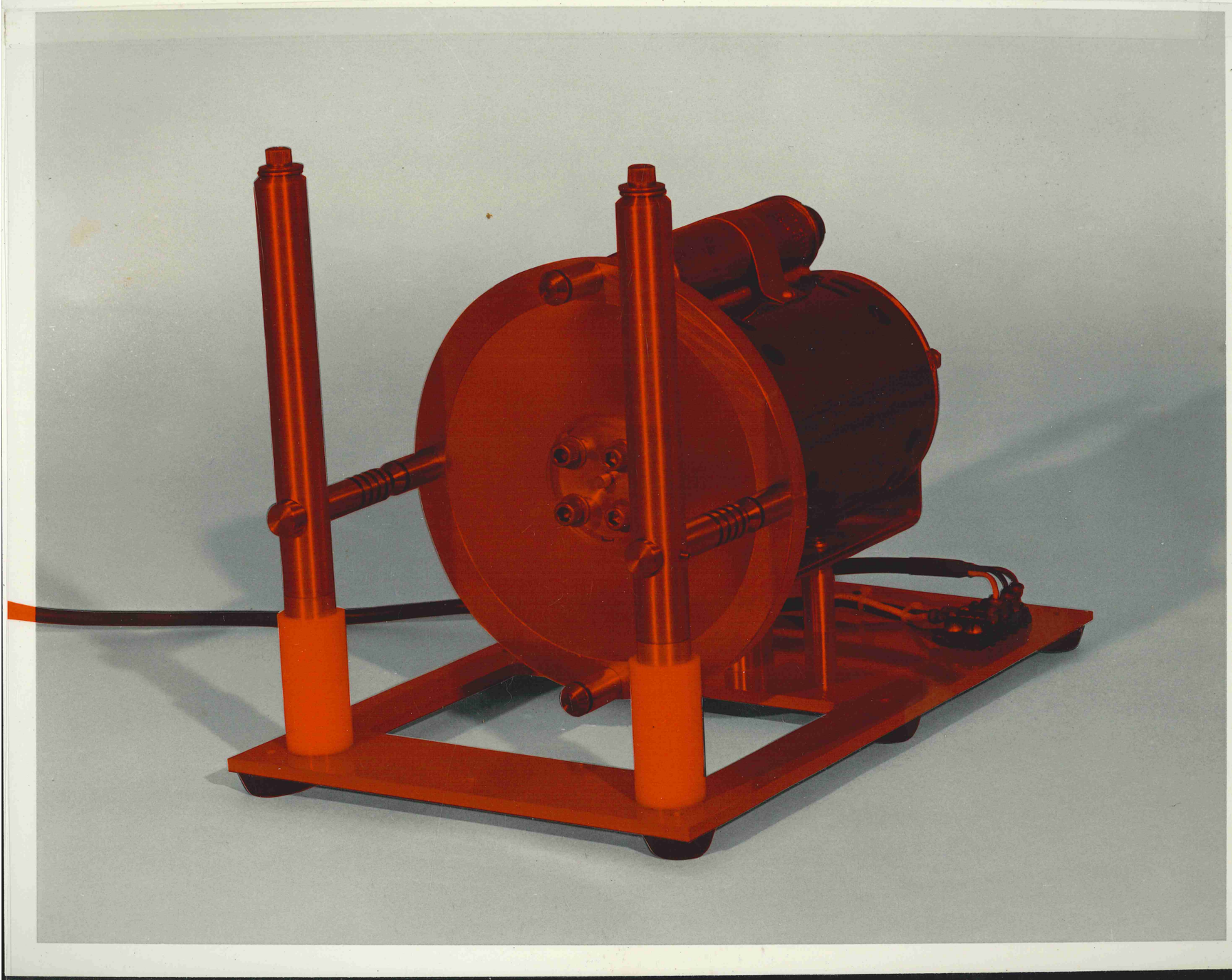

PROFESSIONAL SOUND SYSTEM
ULTRA HIGH VOLTAGE DIVISION
TESLA COIL-MODEL 9
3.3 MEGAVOLT/3.3 KVA INPUT
DANGER
HIGH VOLTAGE
MAIN POWER
ARMING
READY
EMERGENCY
REMOTE
DANGER
HIGH VOLTAGE
DANGER
HIGH VOLTAGE

① 118%

+

① 100%

pg 11



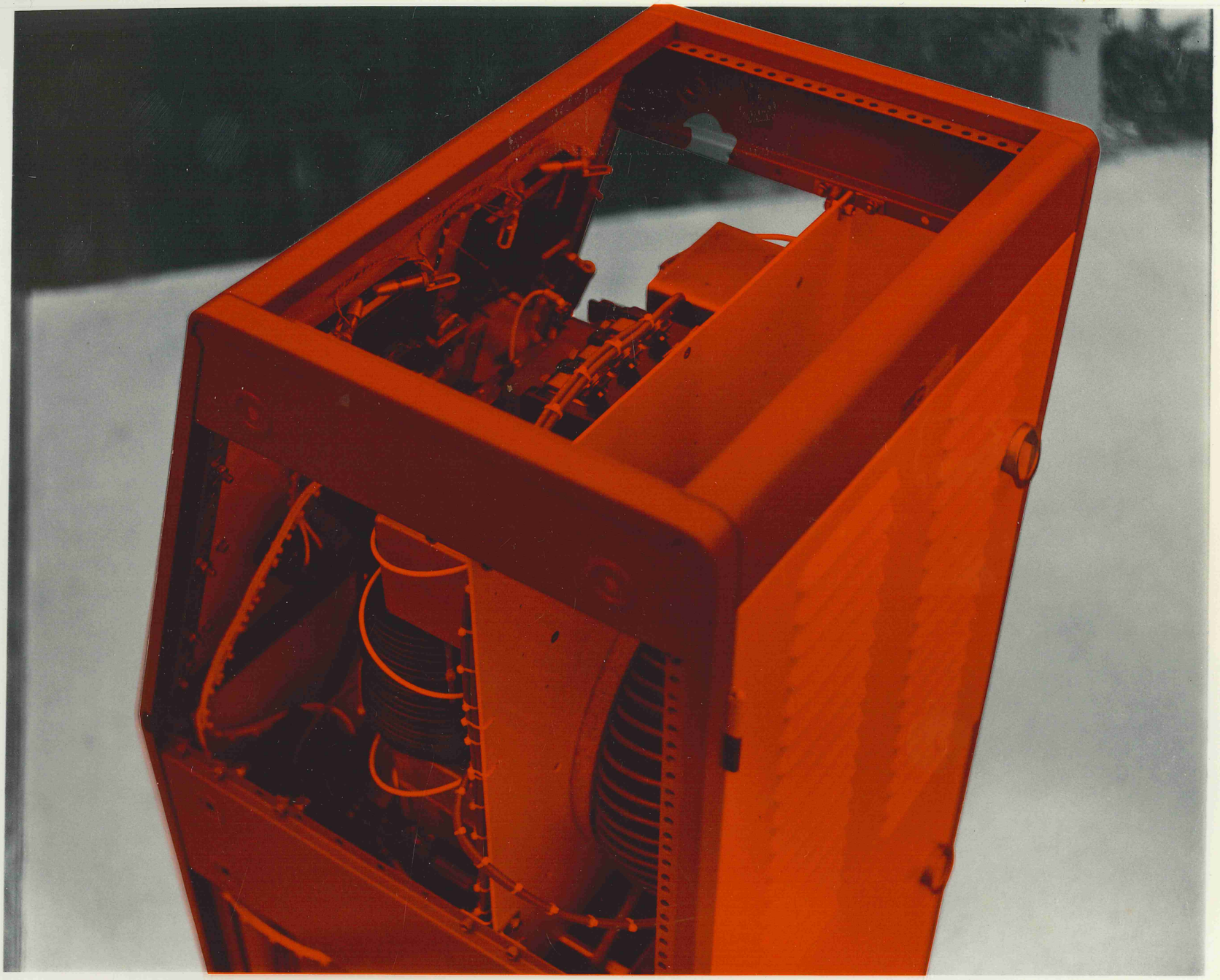
SYNCRONOUS ROTARY GAP SHOOT, DOWN 50%

FEB 82

PHOTO 1 I

PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

P99 (B) 85% Burn out Background



FEB '82

SUPER MODEL 9

TESLA COIL POWER SUPPLY

SHOOT DOWN 50%

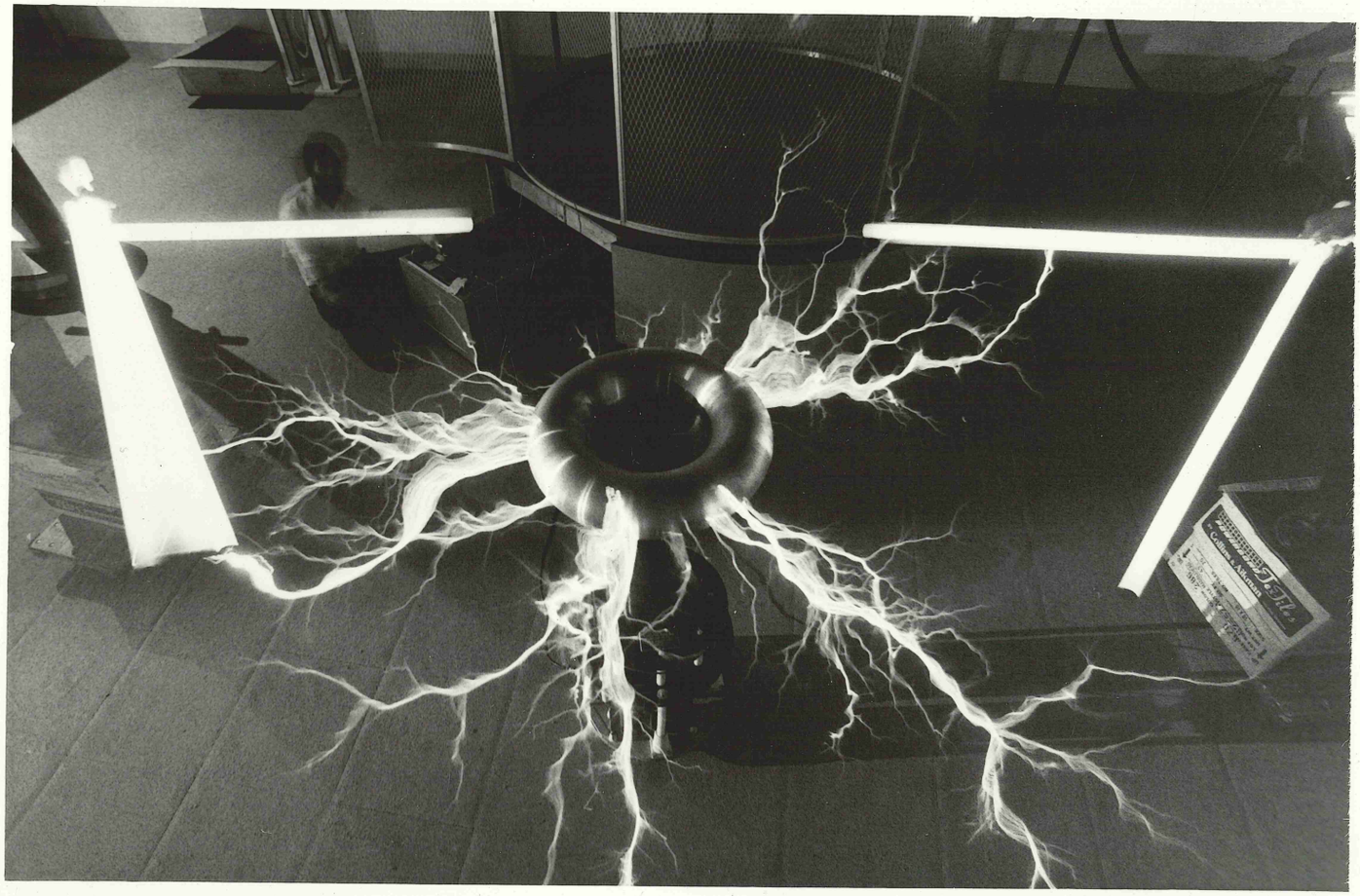
PHOTO 1

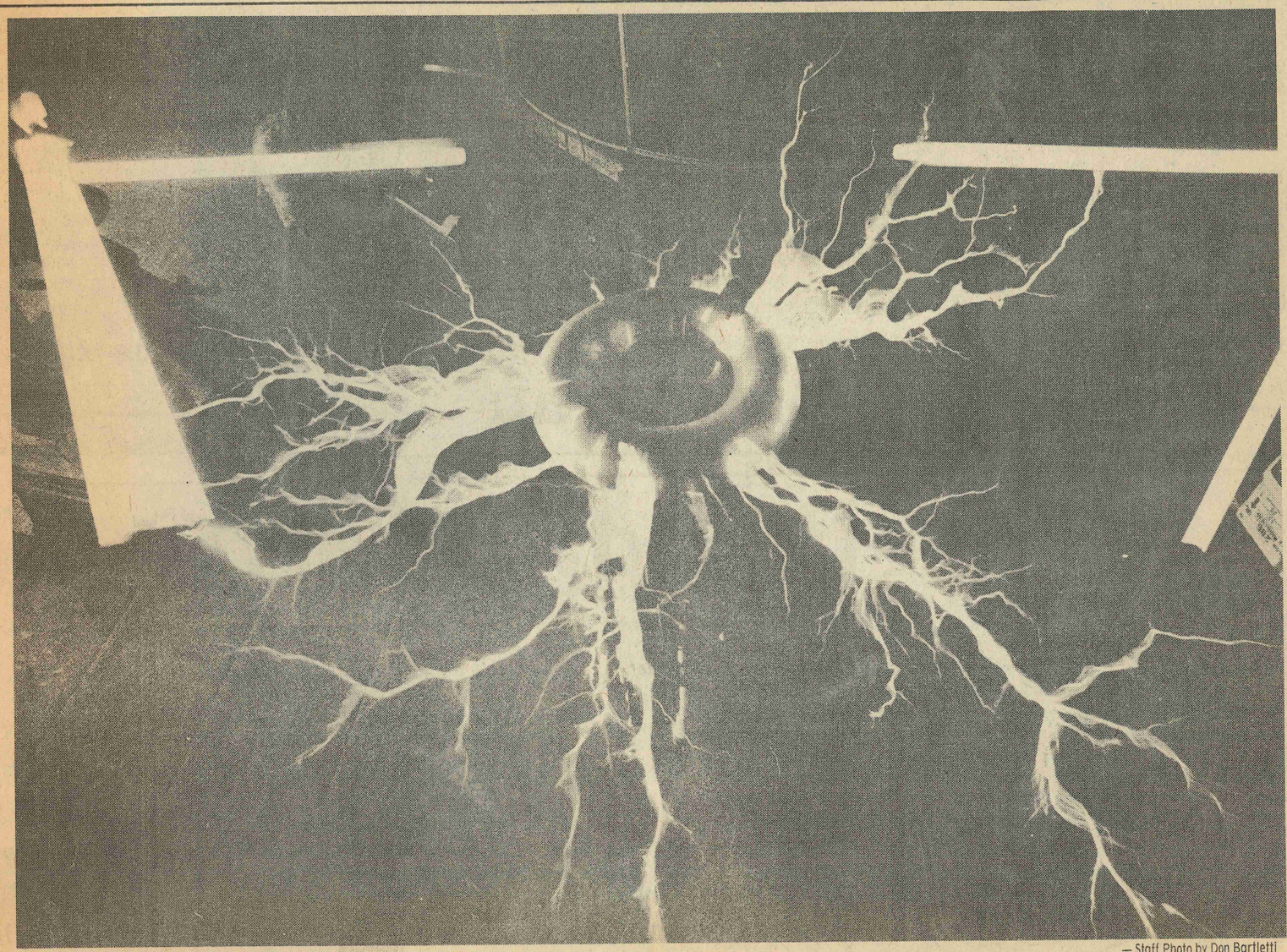
PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIV.
2527 Treelane Ave.
Monrovia, Ca 91016

pg 9 @ 70½% burn out background







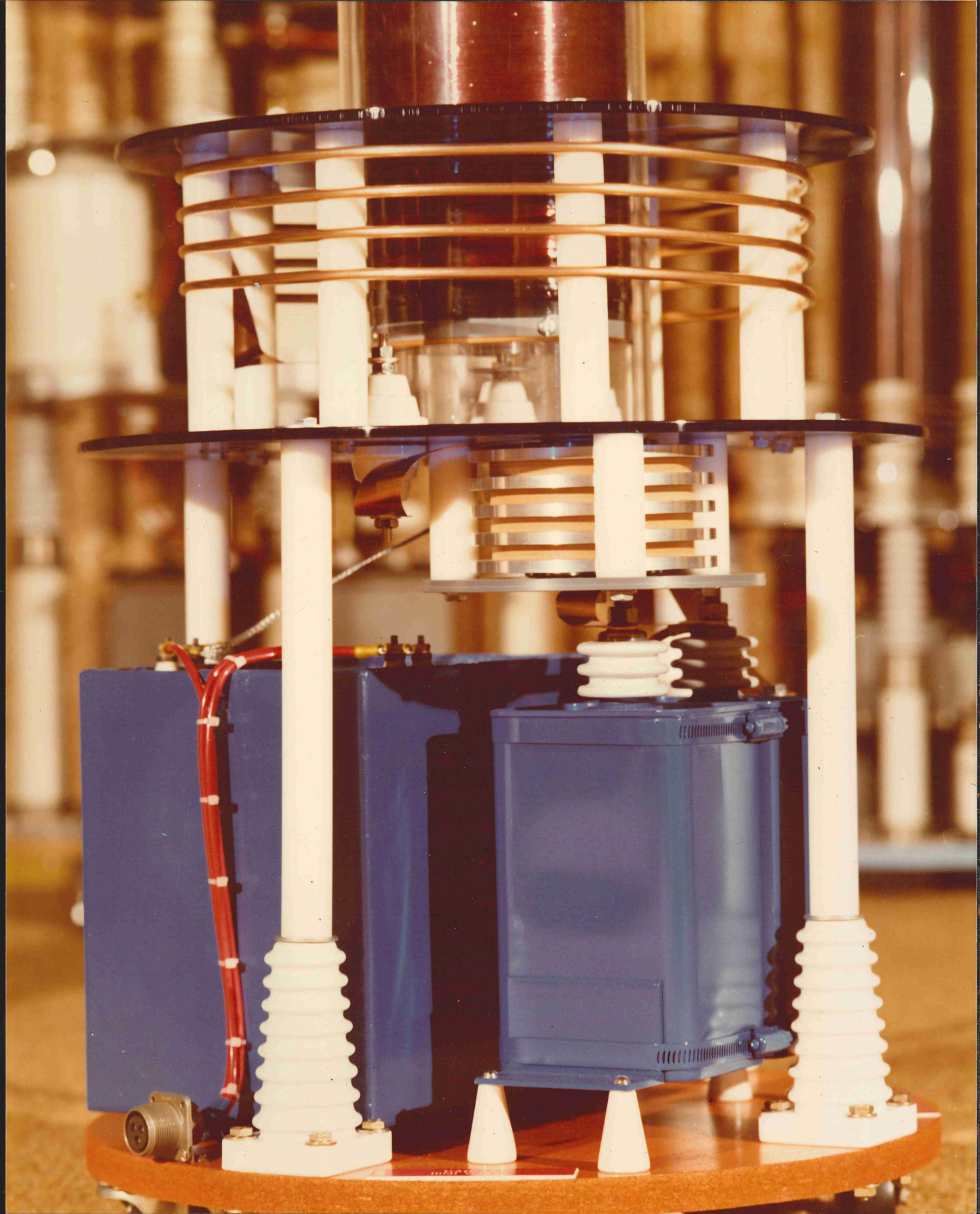


— Staff Photo by Don Bartletti

## MAN-MADE LIGHTNING BLAZES

Lightning-like sparks radiate three feet outward from a doughnut-shaped Tesla coil at the Fleet Space Theater in Balboa Park. The straight bars of light in this quadruple exposure were made by a 40-watt fluorescent tube. Arcs generated by the 750,000-volt coil are relatively safe because they contain low amperage, or current, but are powerful enough to illuminate the fluorescent tube.

## 'DON'T KNOW HOW I DID IT'






J-B-T INSTRUMENTS, INC. J-B-T NEW HAVEN, CONN. U.S.A.
ELAPSED TIME METER
60 CYCLES 110-125 VOLTS
model 31-EGW-5
ELAPSED TIME
99999
HOURS | TENTHS
A.C. AMPERES
NEUMANN
A.C. AMPERES
MASTER
A.C. VOLTS
AC LINE
AC MAIN
24 V DC
OFF
OFF
DM DISC-MASTERS
NEUMANN DEFEAT
NEUMANN OPERATE
SYSTEM DEFEAT
SYSTEM OPERATE



# THE HAVENSTOCK RIVERBAND

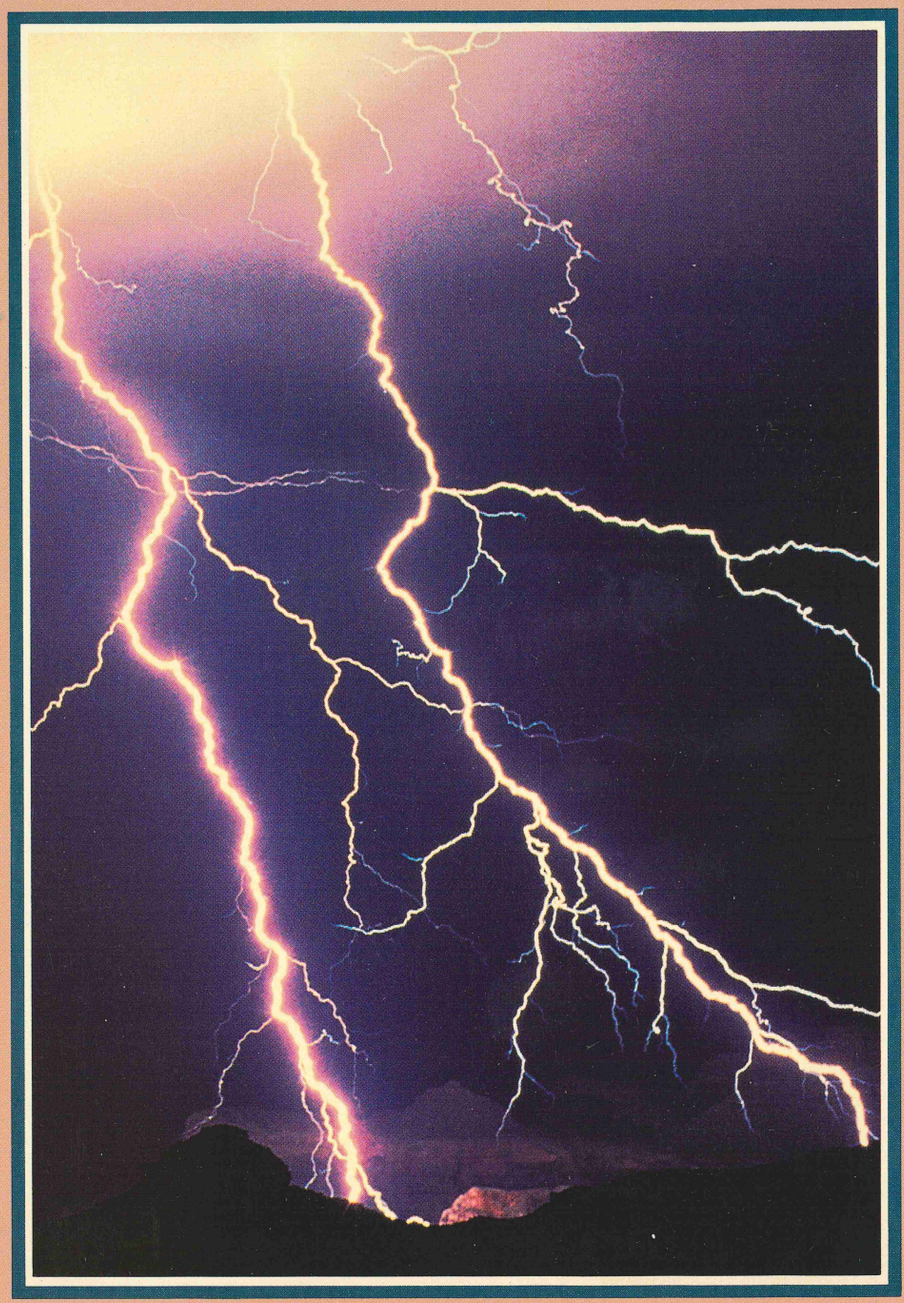
Im'press Records
7925 Santa Monica
Hollywood, Calif.
(213) 654-4522



# Brownie & Sonny on IMPRESS records


AC OUT 1
AC OUT 2
AC MAIN IN
SYSTEM GROUND
AC GROUND
FUSE
AC
FUSE
DC
24 VDC
MFR. PROFESSIONAL SOUND SYSTEMS
S/N 100874



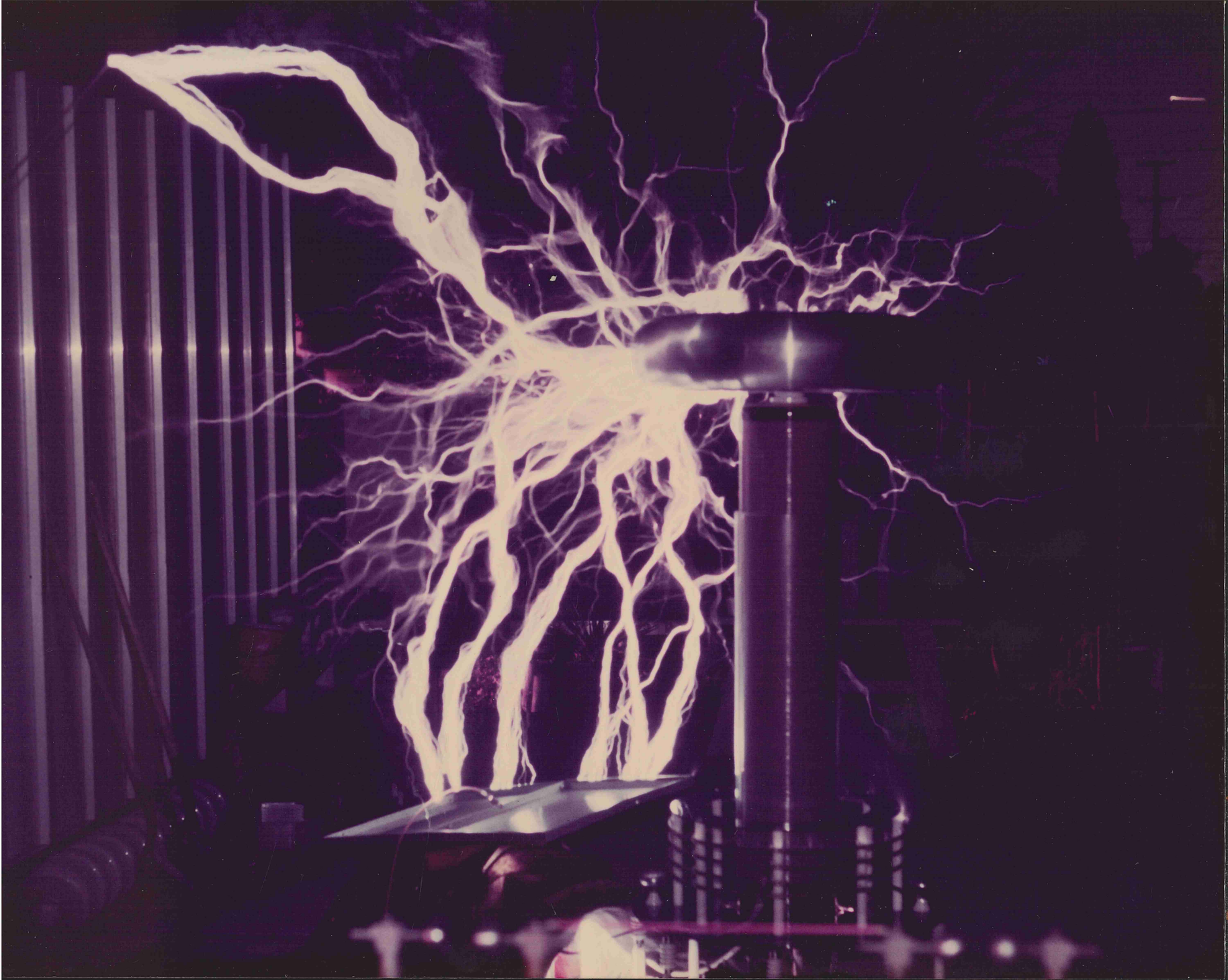


KODAK SAFETY FILM 6049
→2
KODAK SAFETY FILM 6049
→3
KODAK SAFETY FILM 6049
→4
KODAK SAFETY FILM 6049
→5

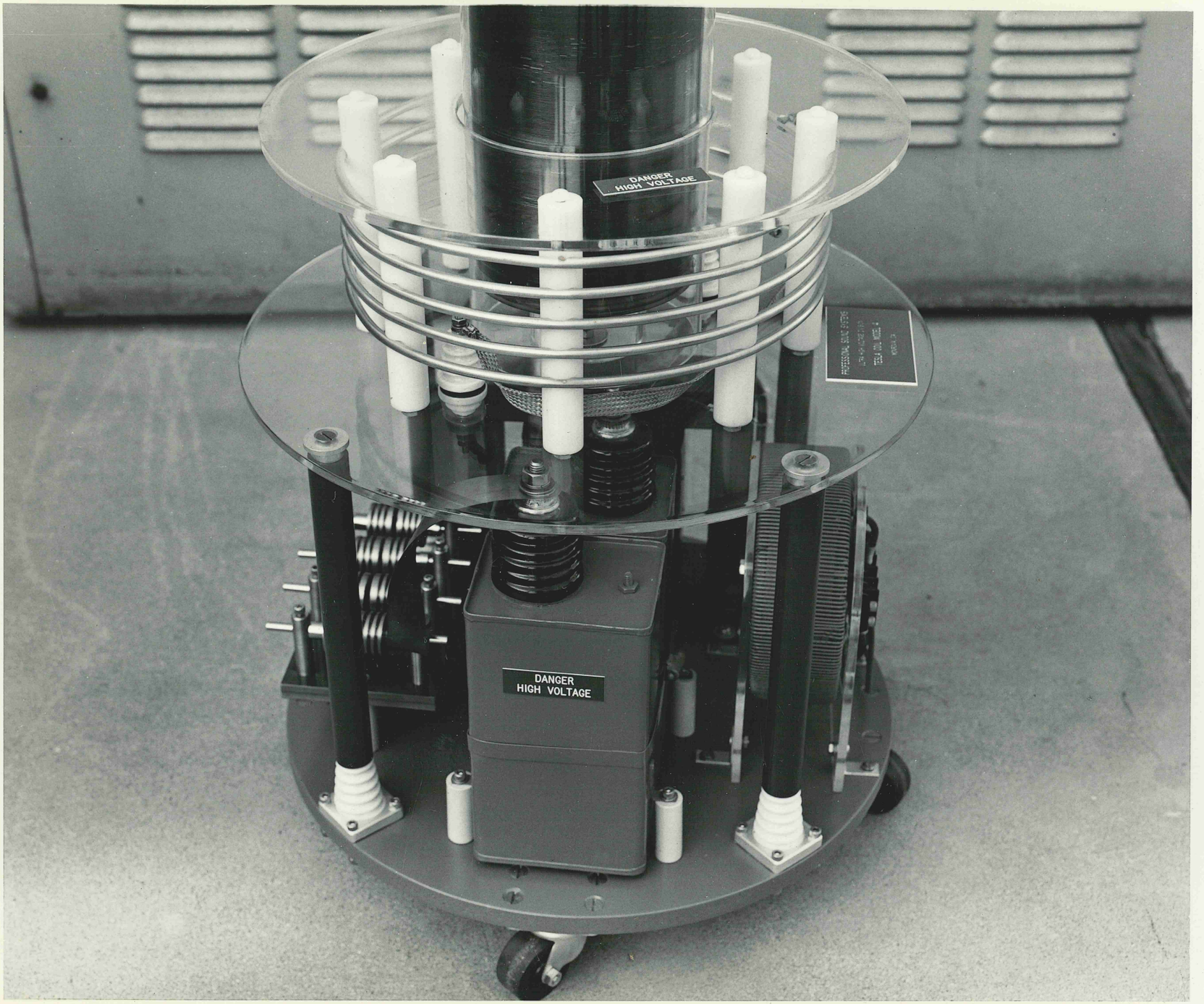

KODAK SAFETY FILM 6049
→6
KODAK SAFETY FILM 6049
→7

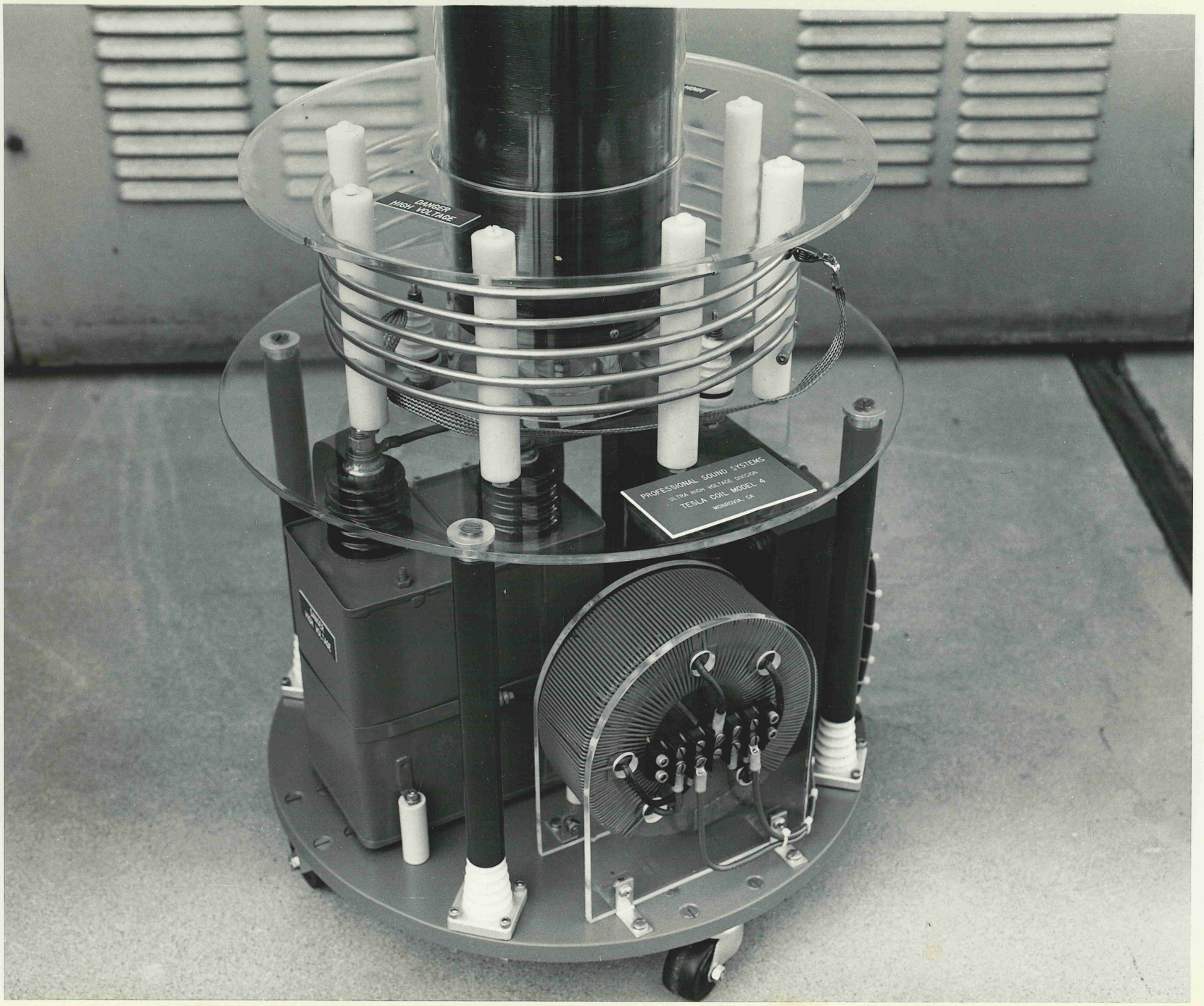

→9
KODAK SAFETY FILM 6049
→10
KODAK SAFETY FILM 6049
→11
KODAK SAFETY FILM 6049
→12

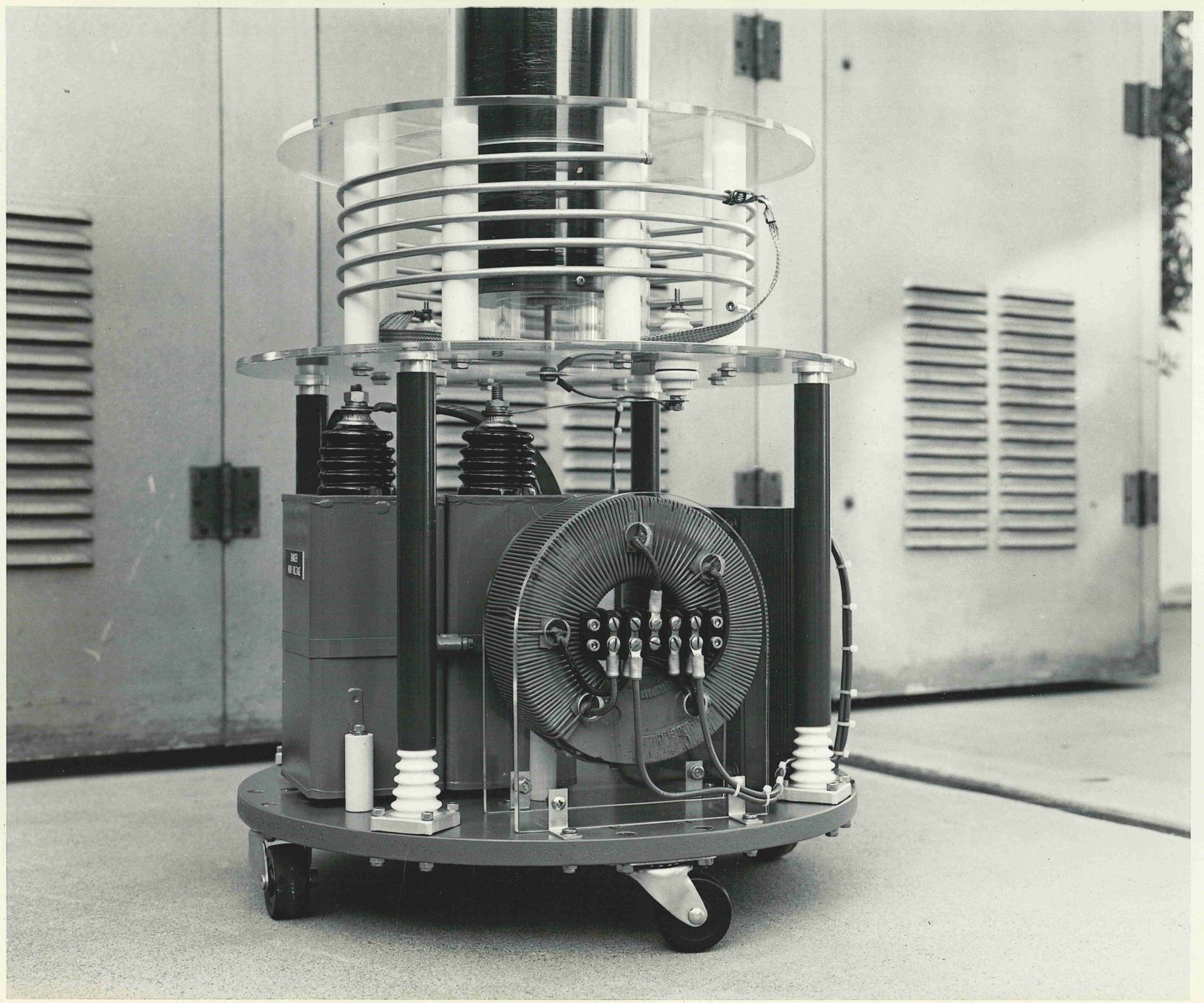


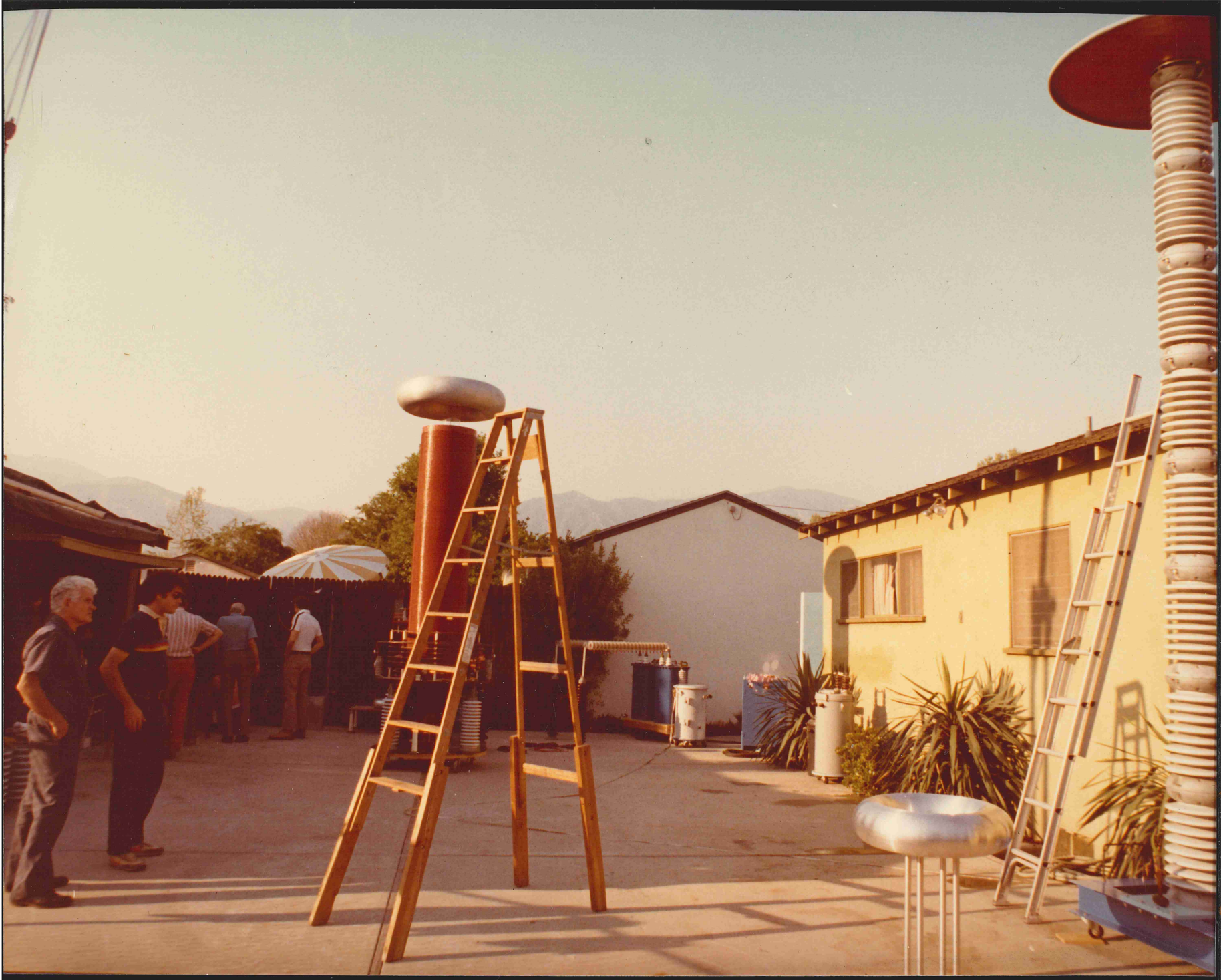


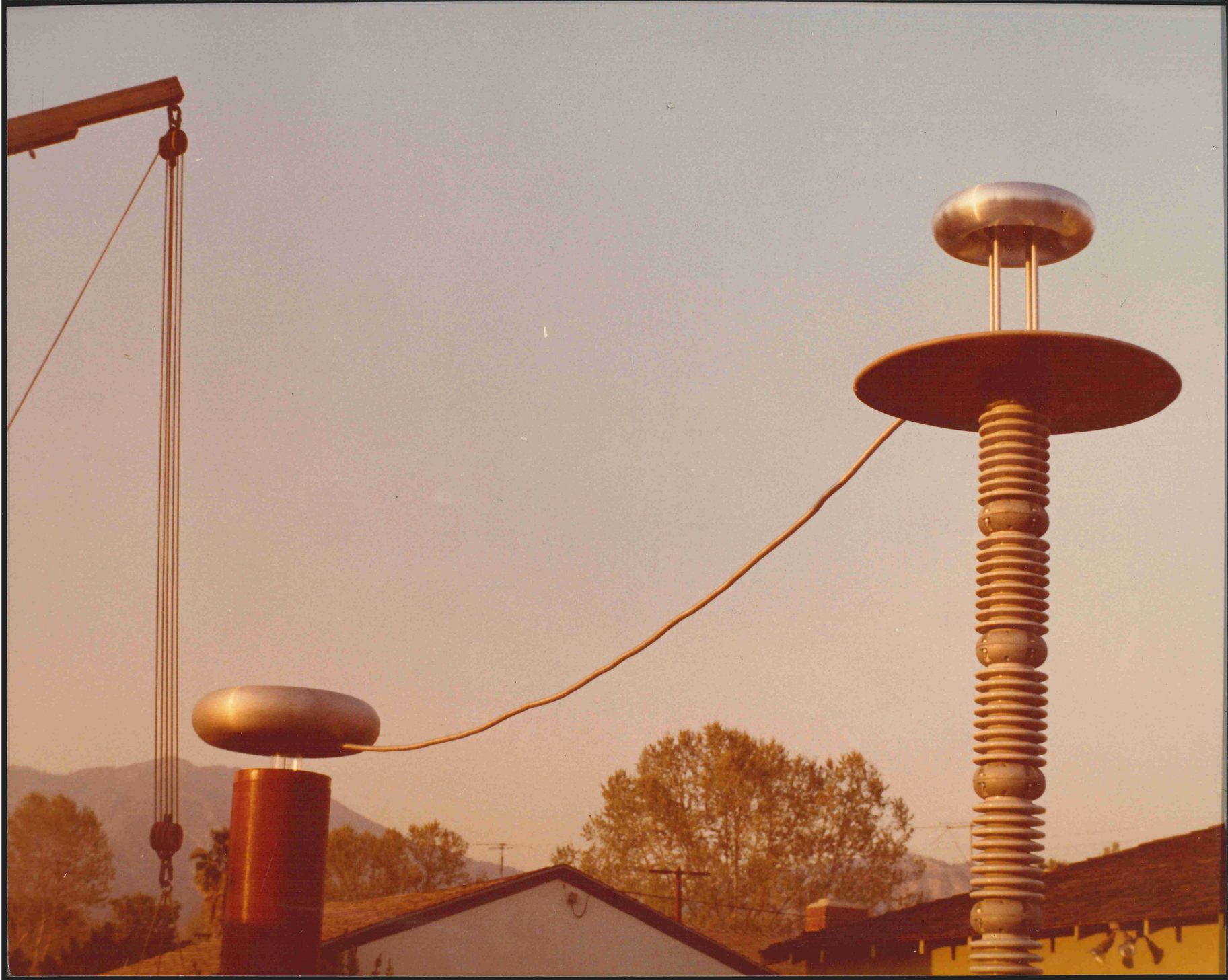

UNIVERSAL AUDIO
UNIVERSAL AUDIO

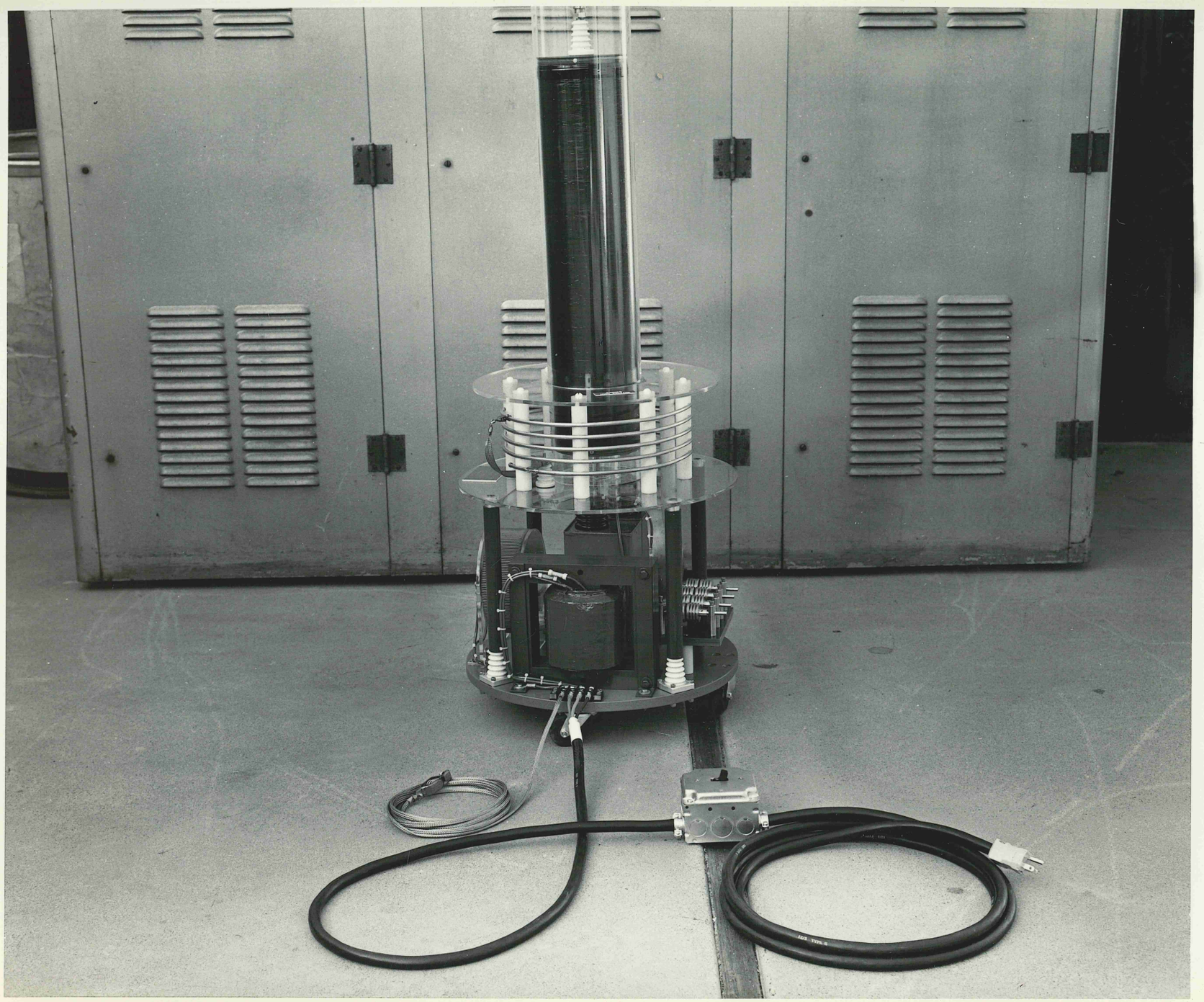

DANGER
HIGH VOLTAGE
DANGER
HIGH VOLTAGE

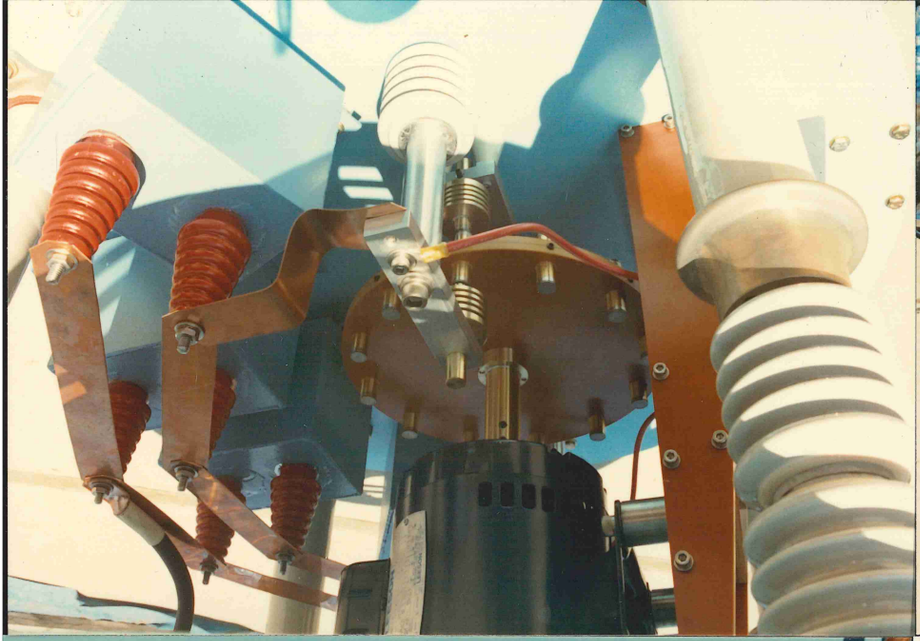

DANGER
HIGH VOLTAGE
PROFESSIONAL SOUND SYSTEMS
ULTRA HIGH VOLTAGE DIVISION
TESLA COIL MODEL 4
MONROVIA, CA

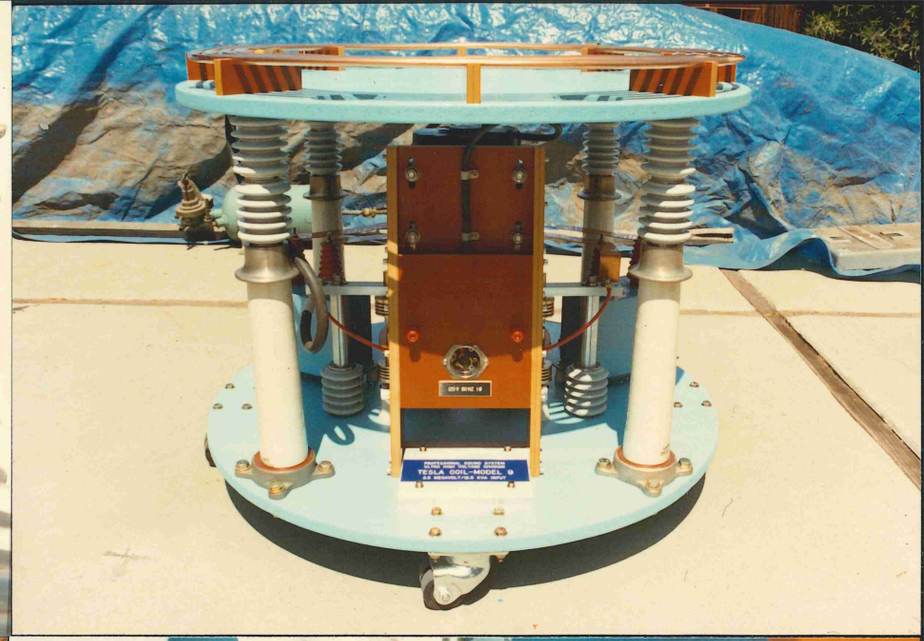


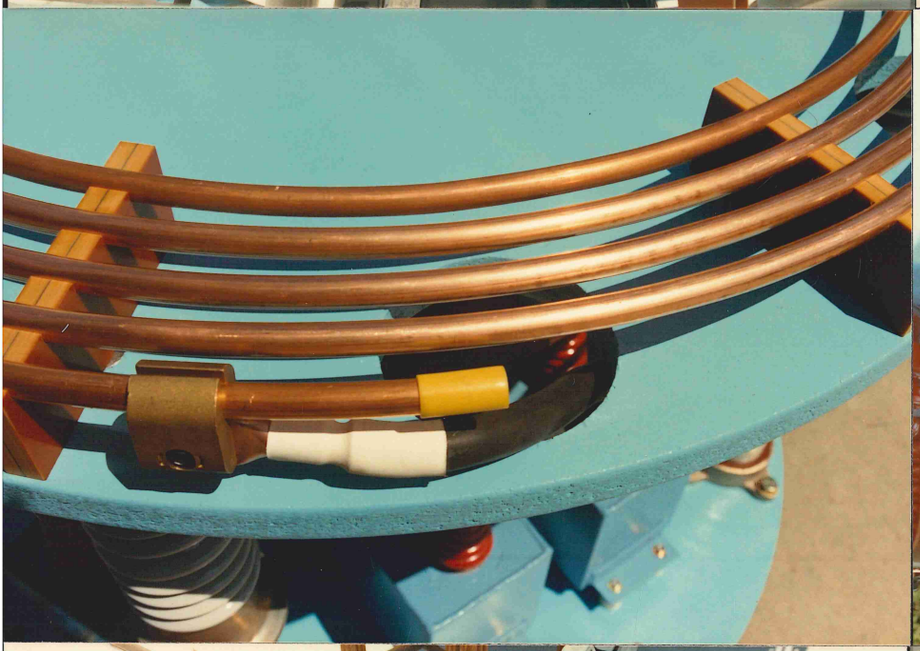


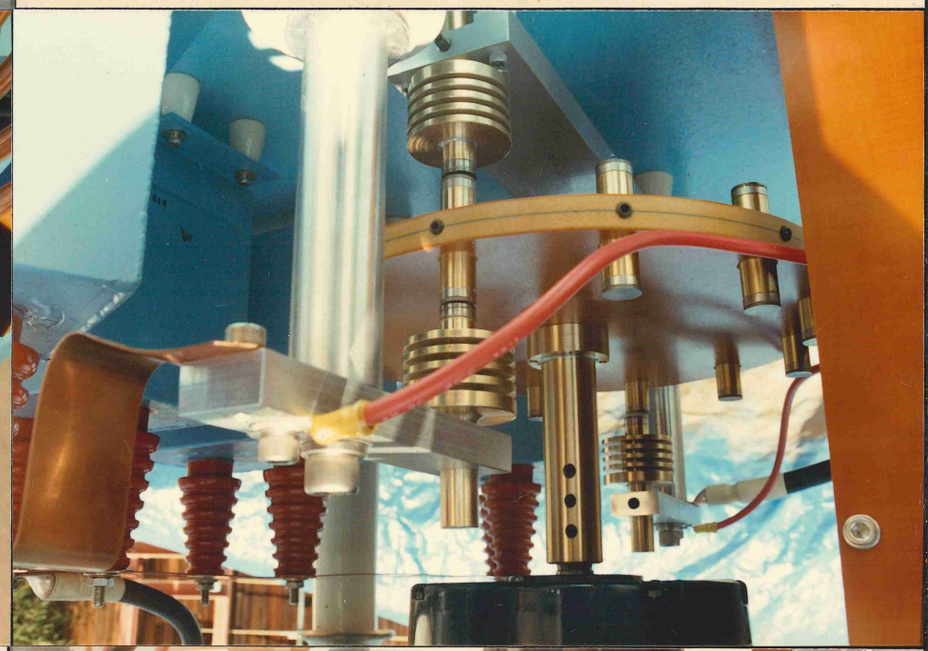


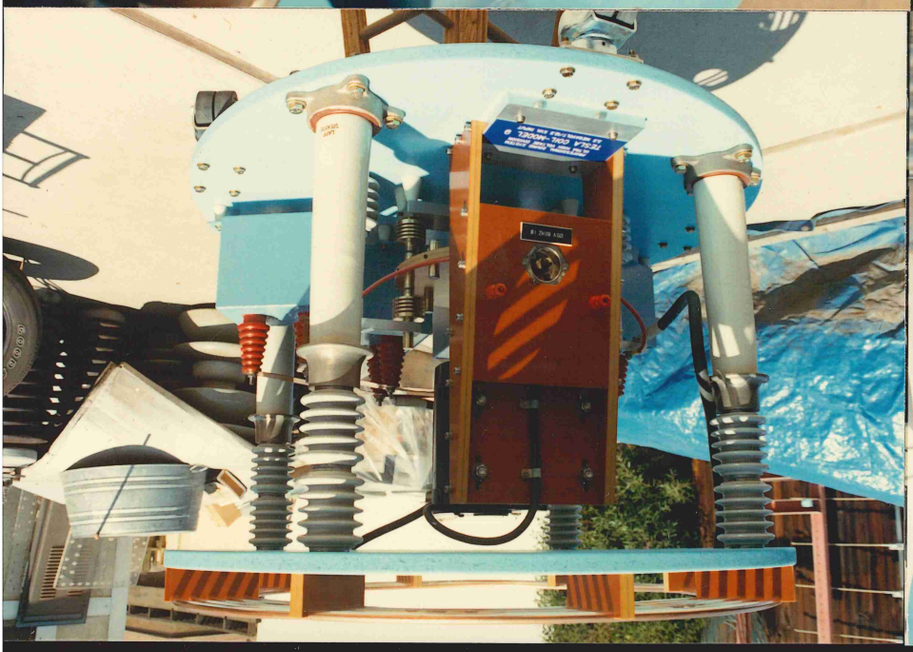


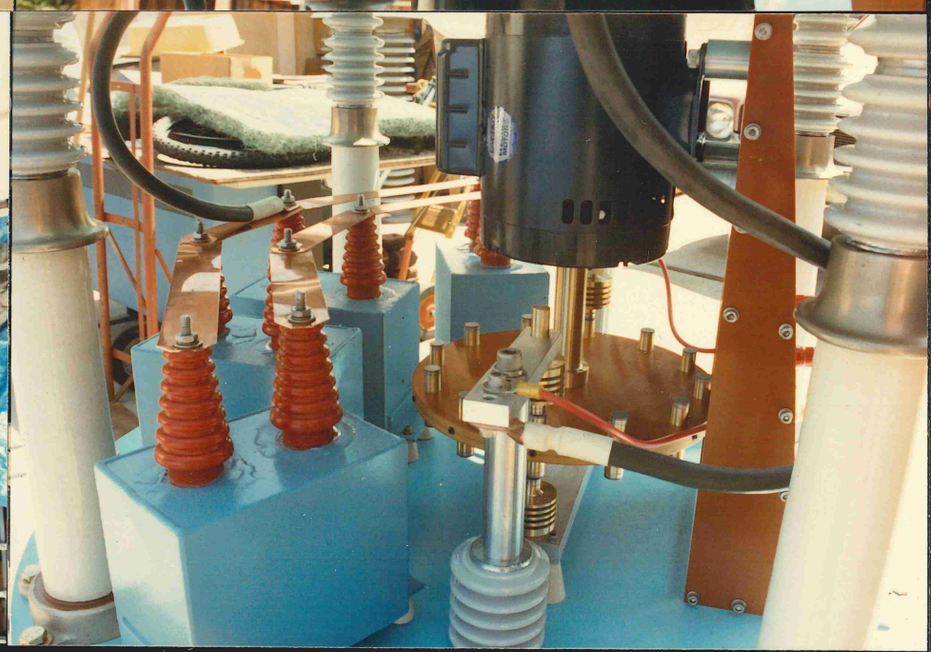


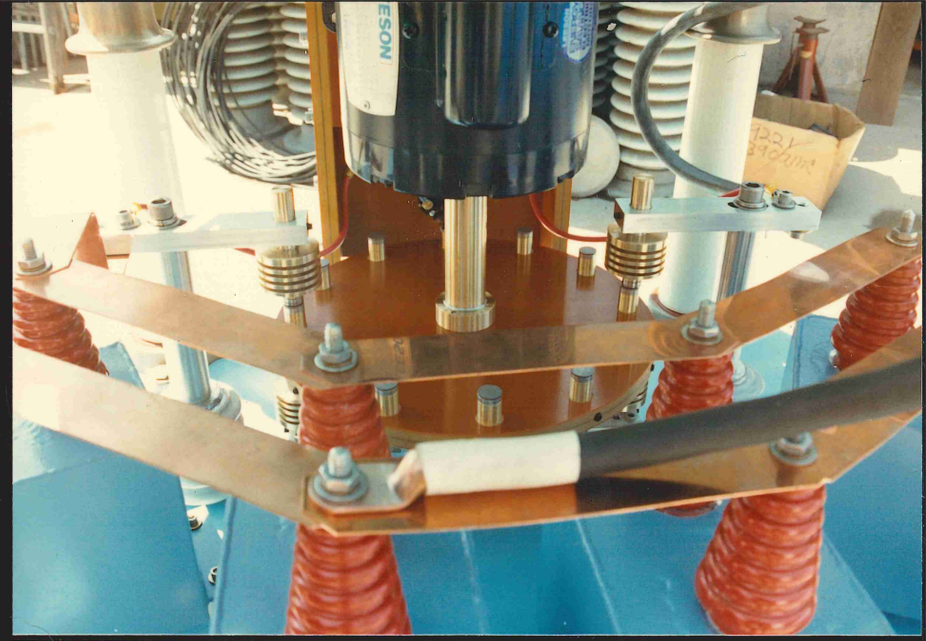


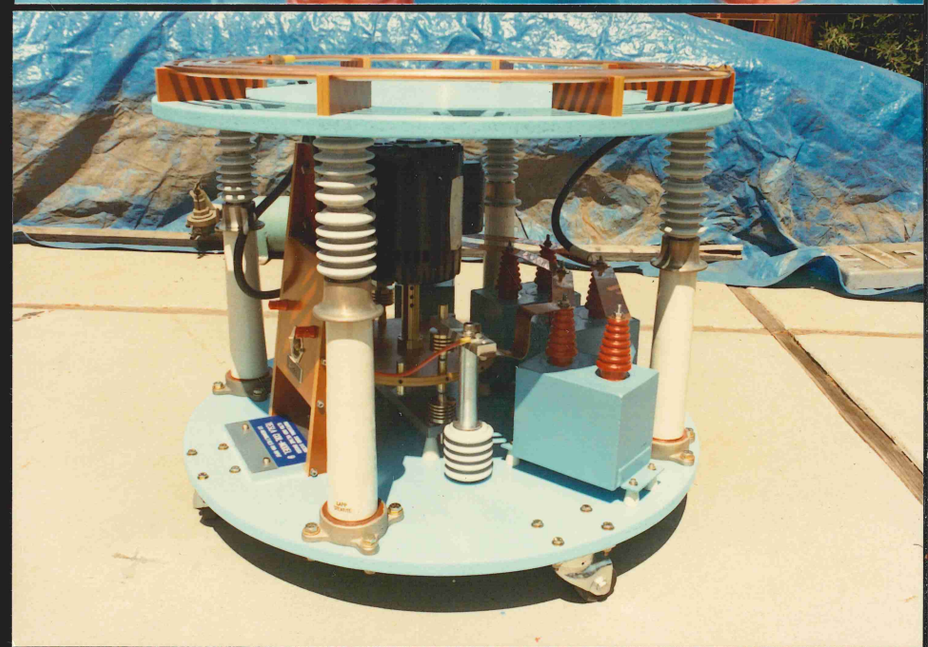


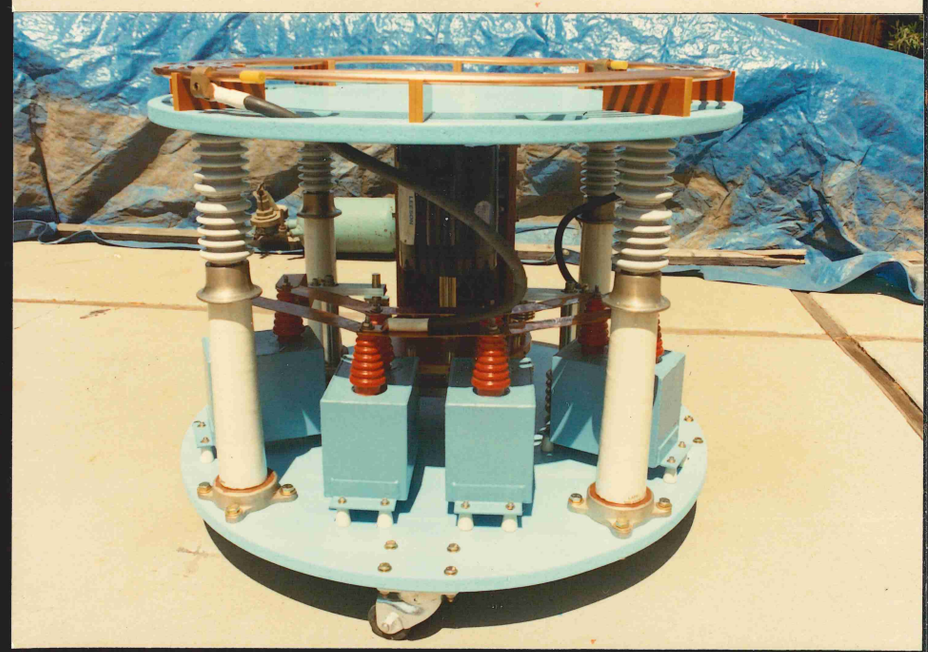


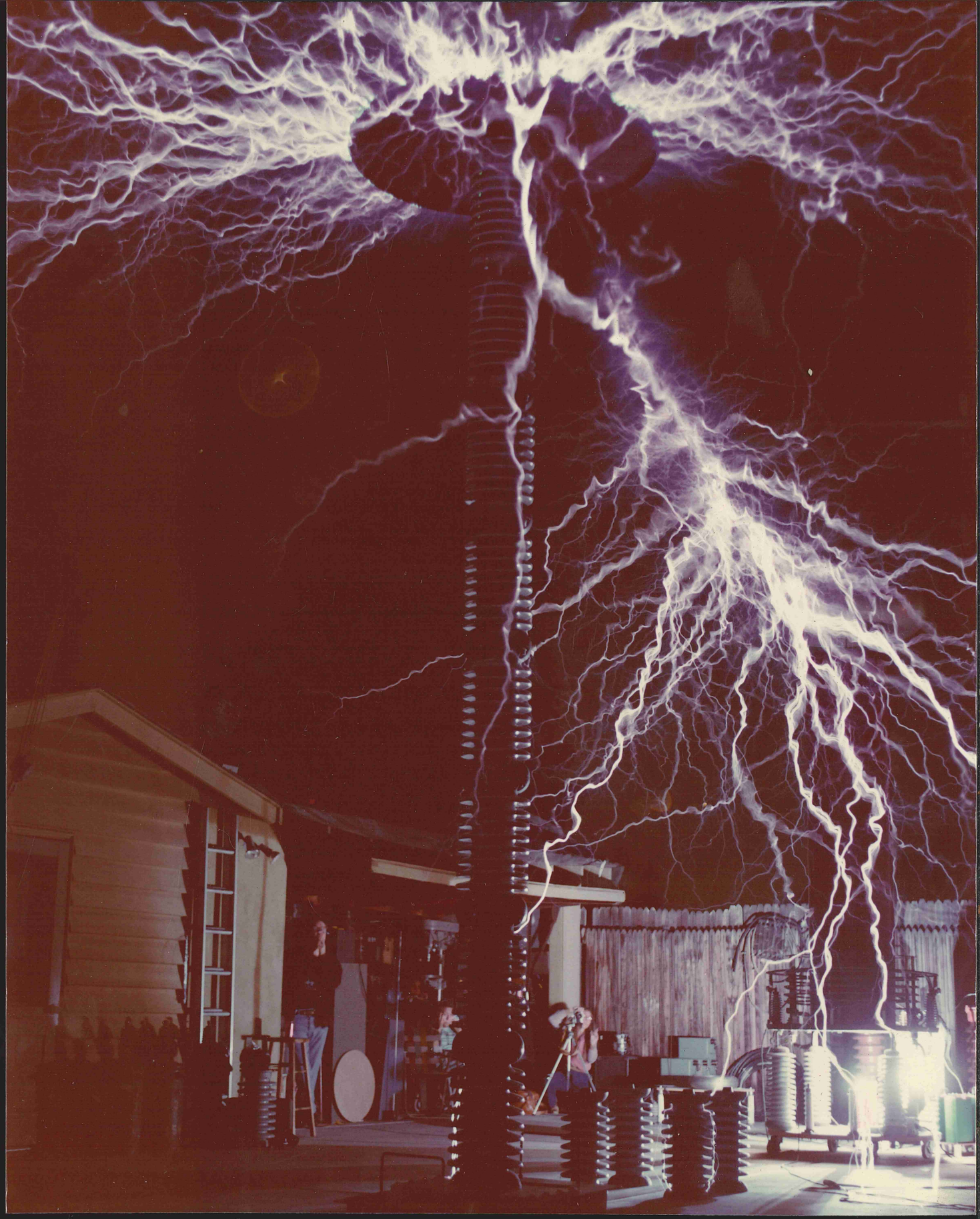




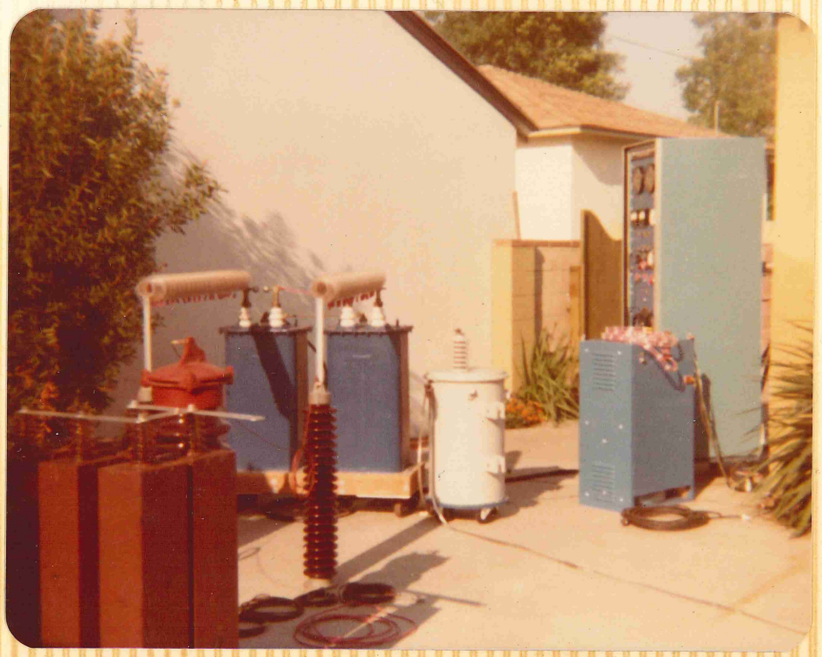






















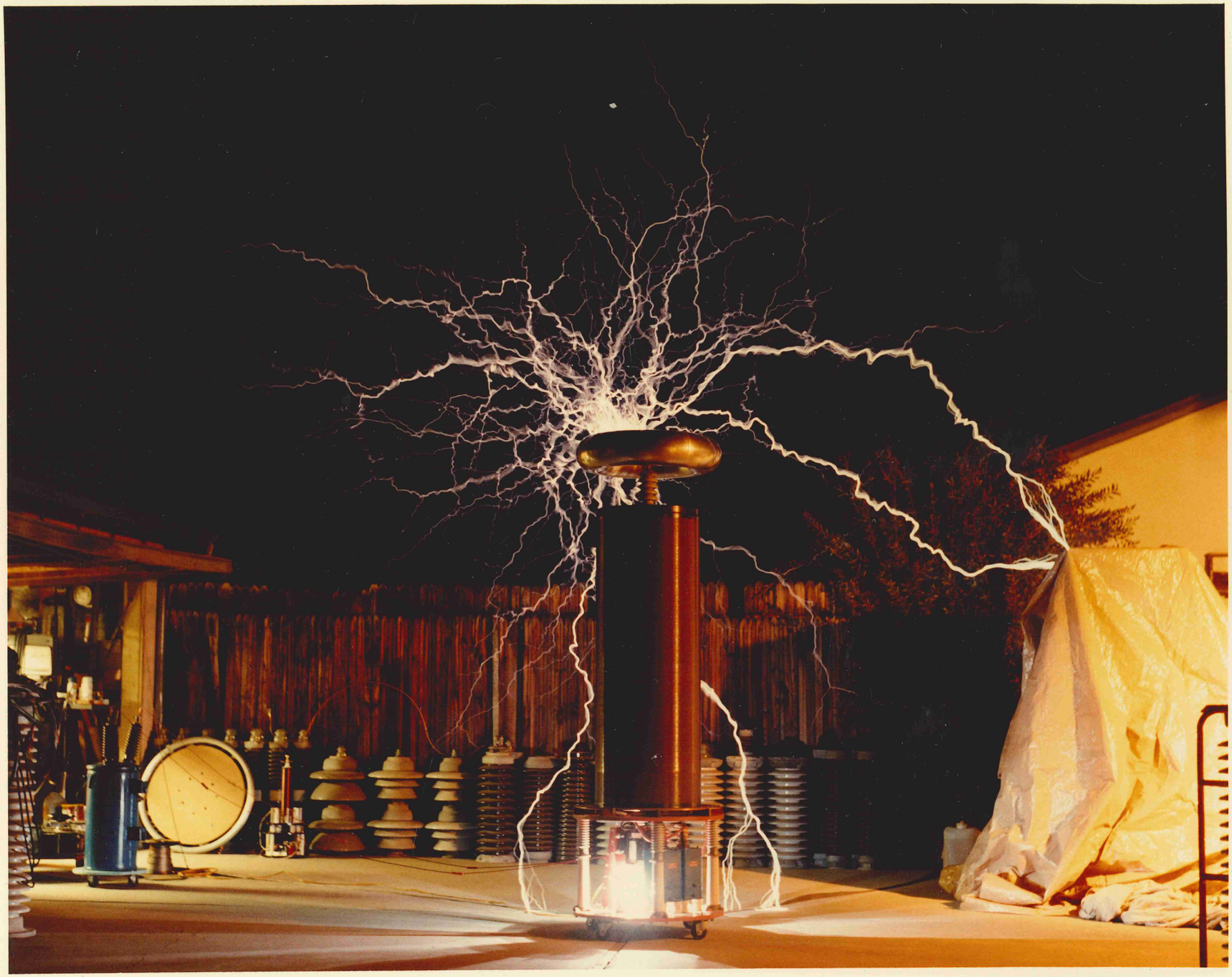


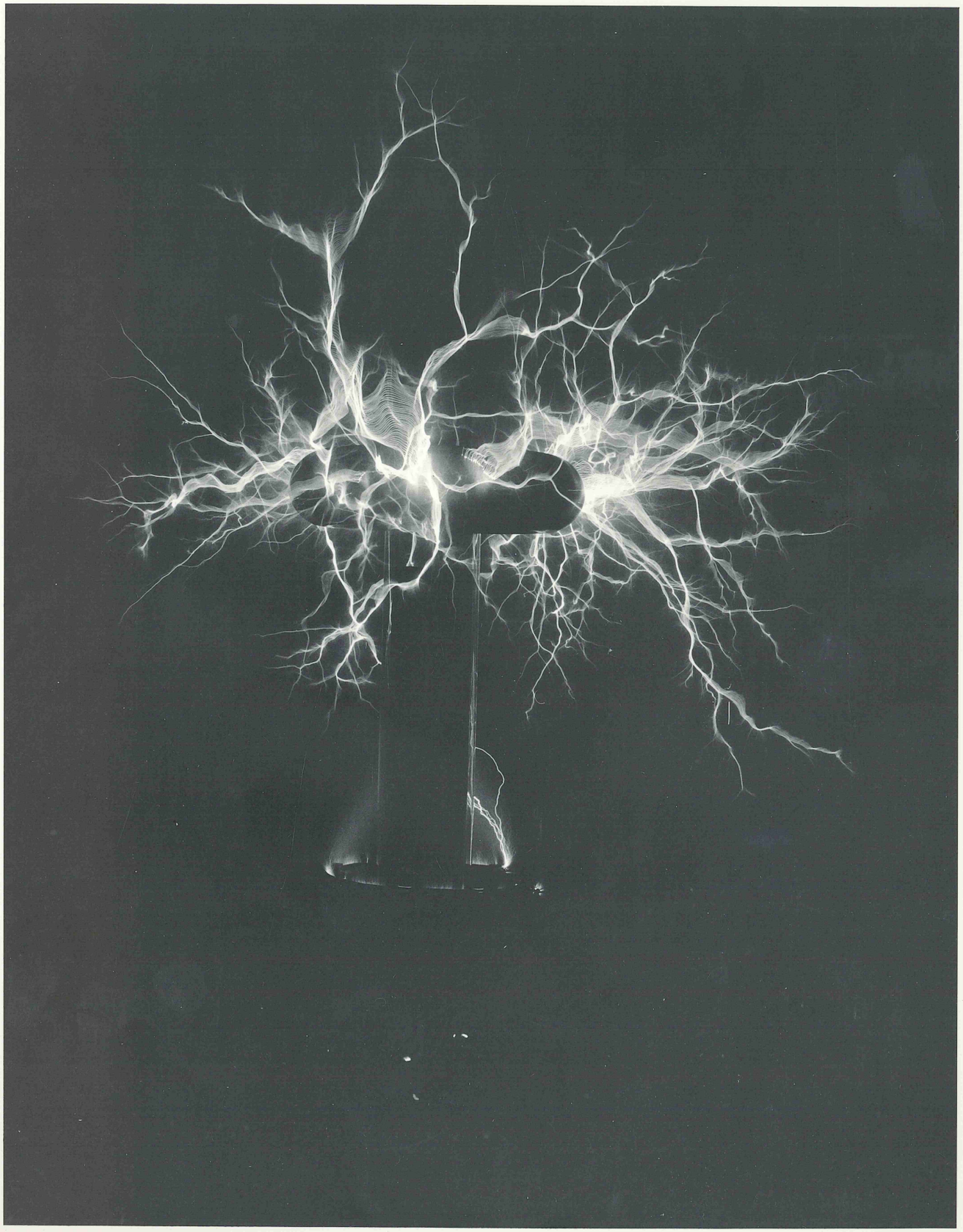


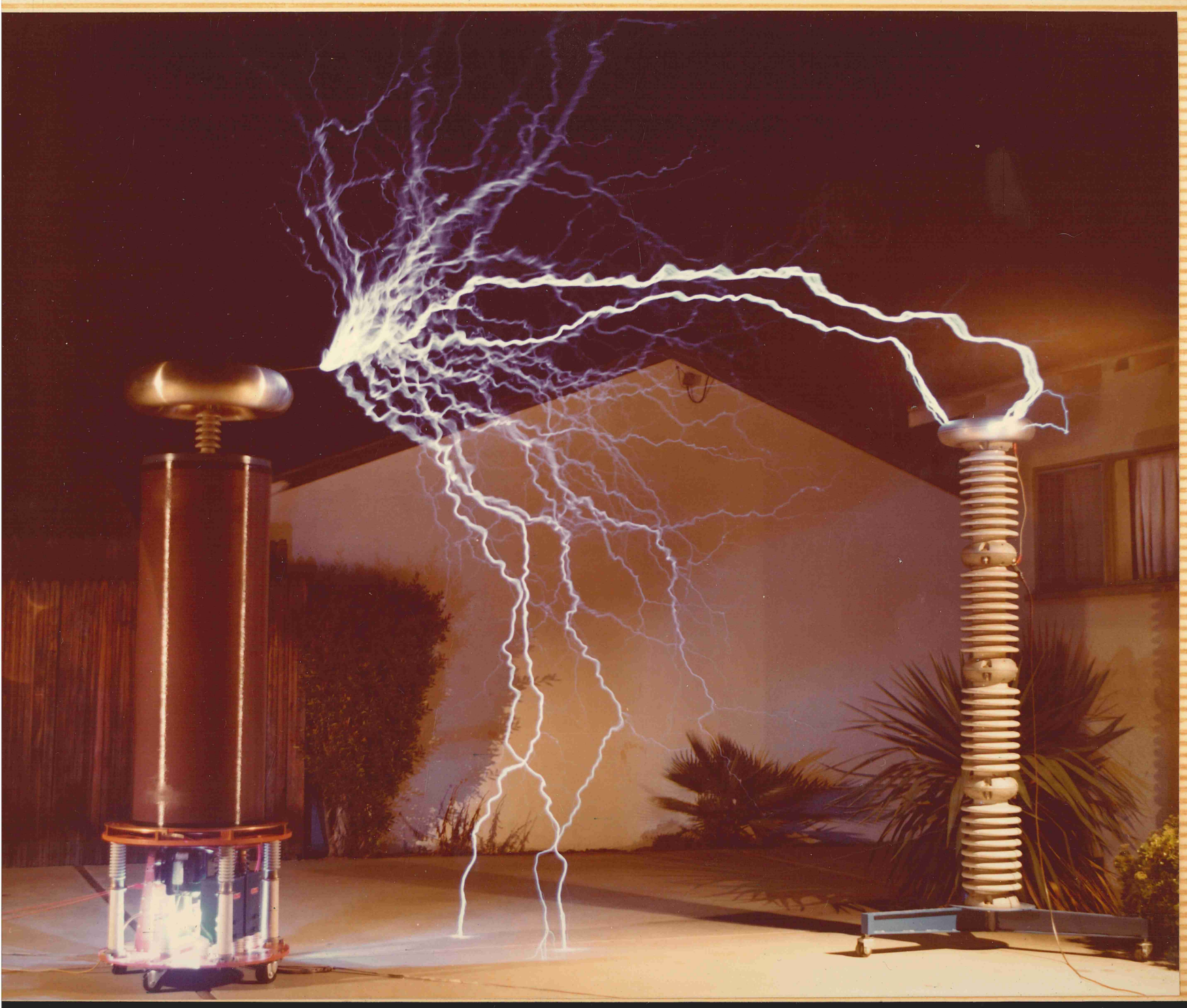




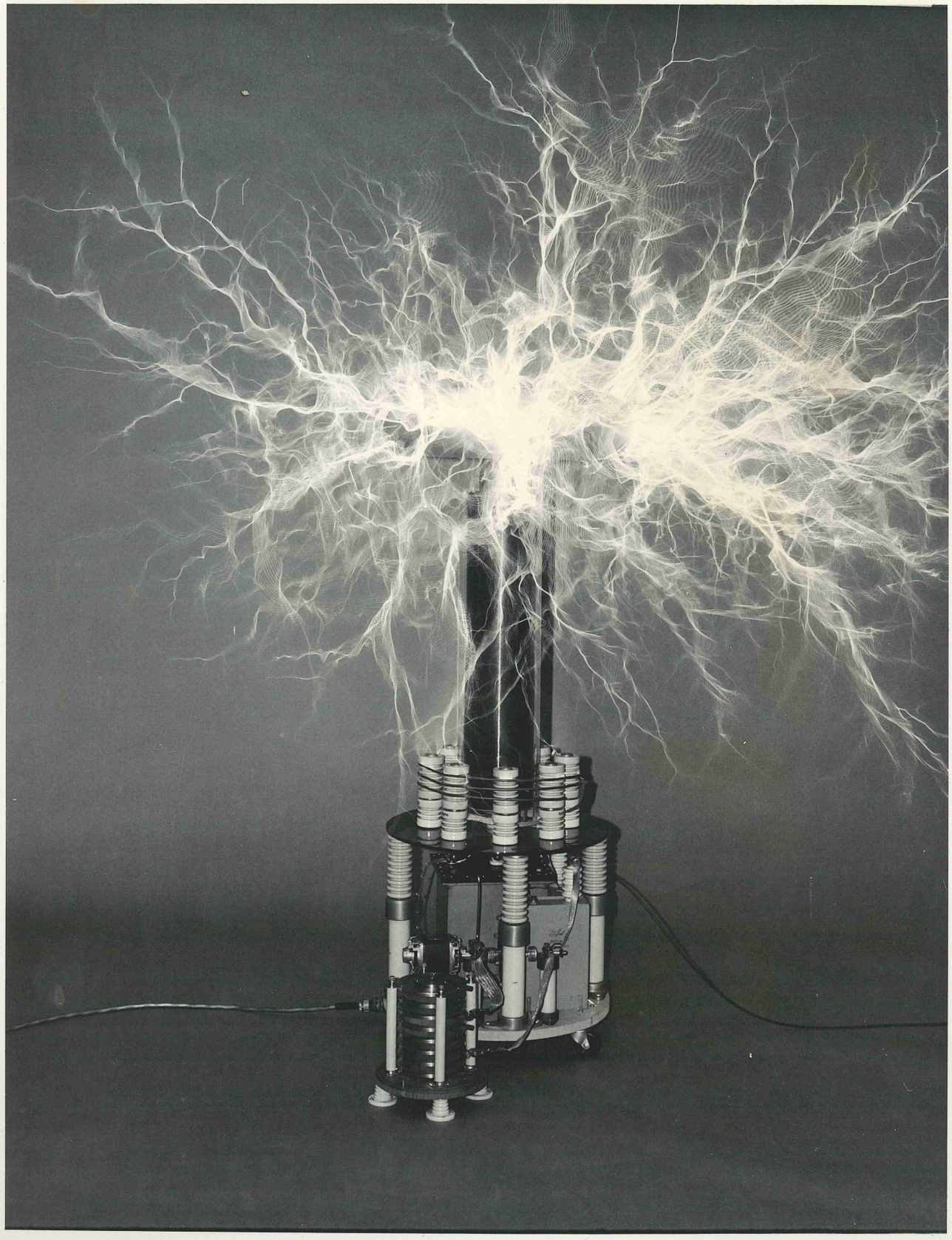

PHOTO 3

112% 85 4/5









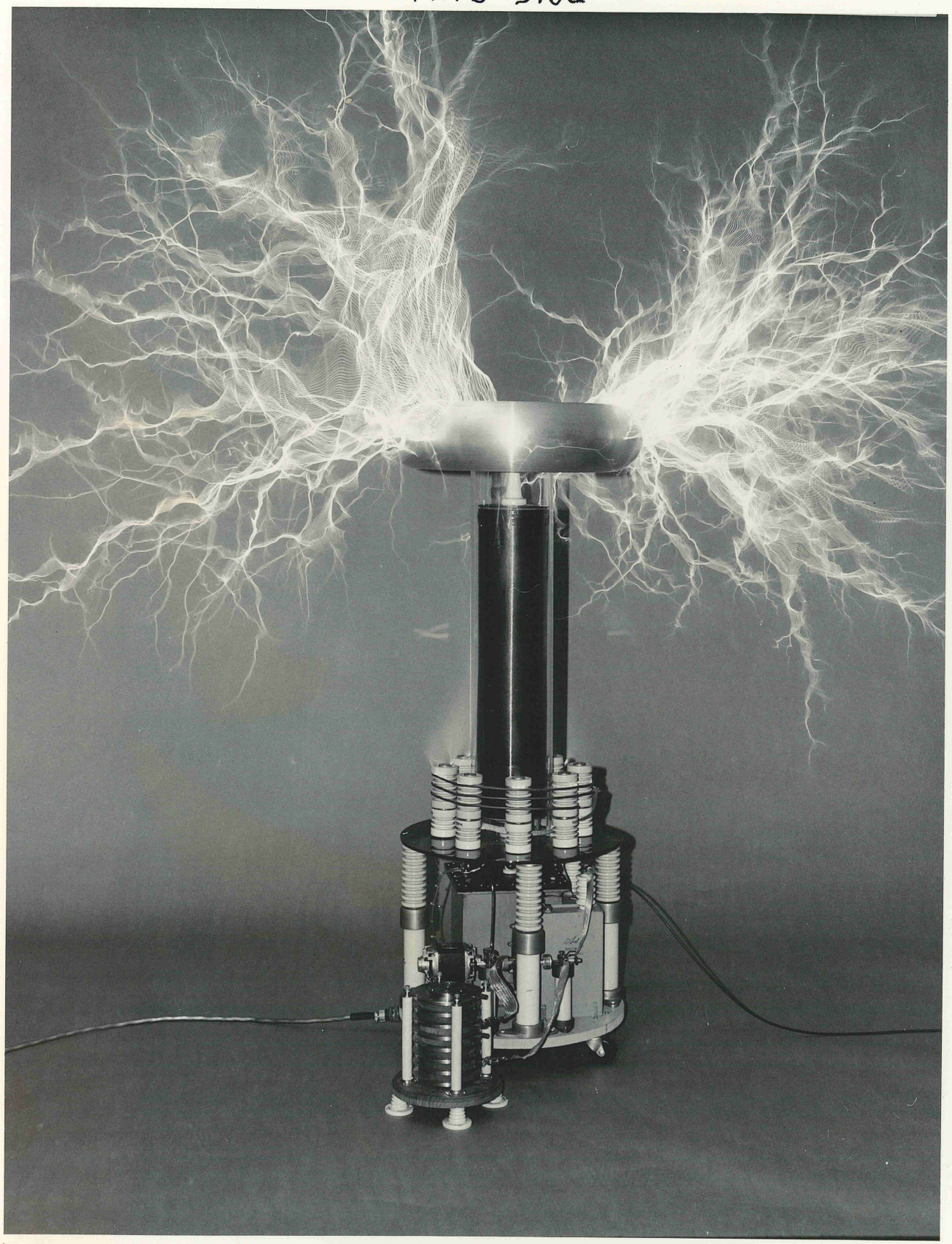
THIS SIDE UP



PROFESSIONAL SOUND SYSTEMS

FRONT COVER PHOTO A

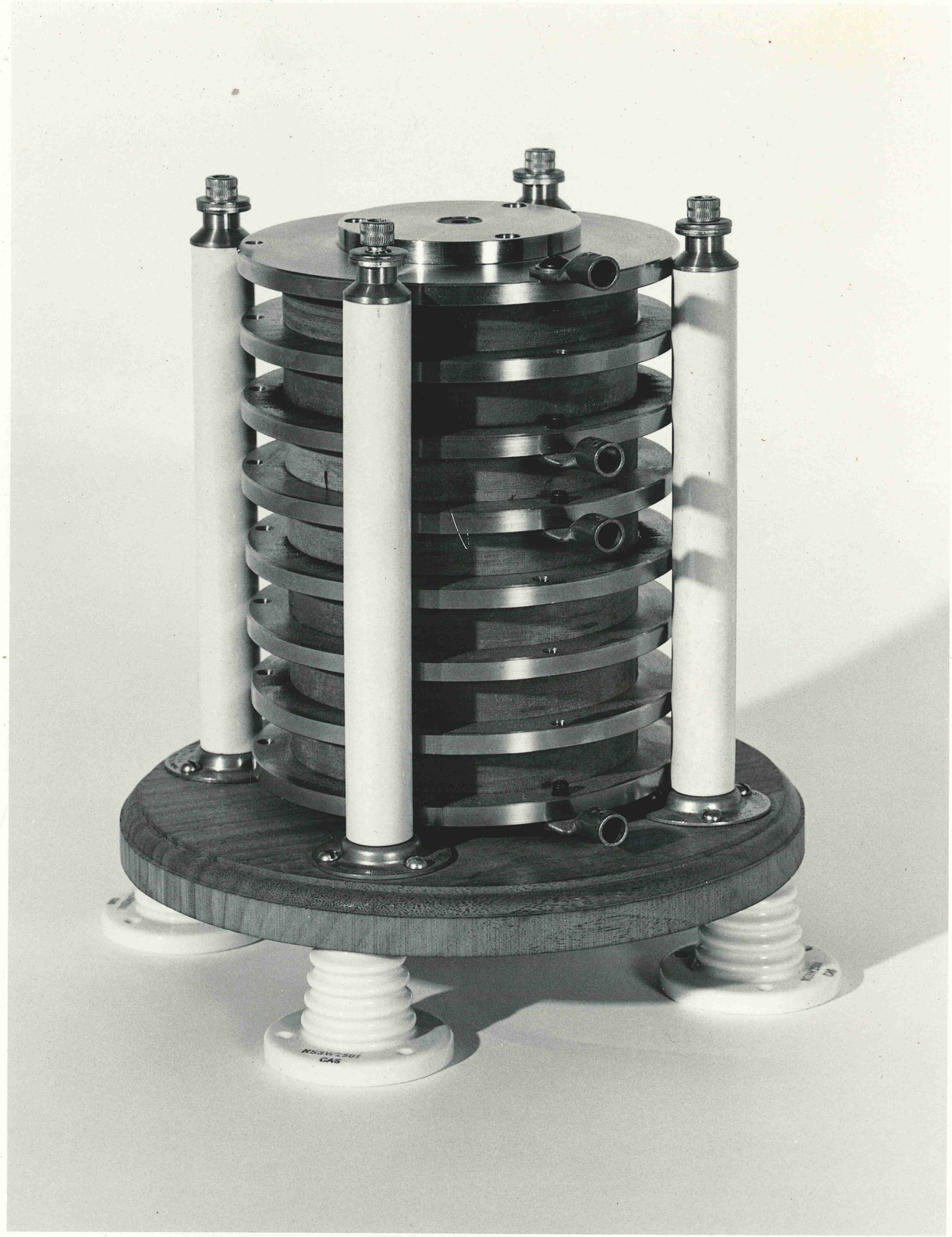
THIS SIDE UP



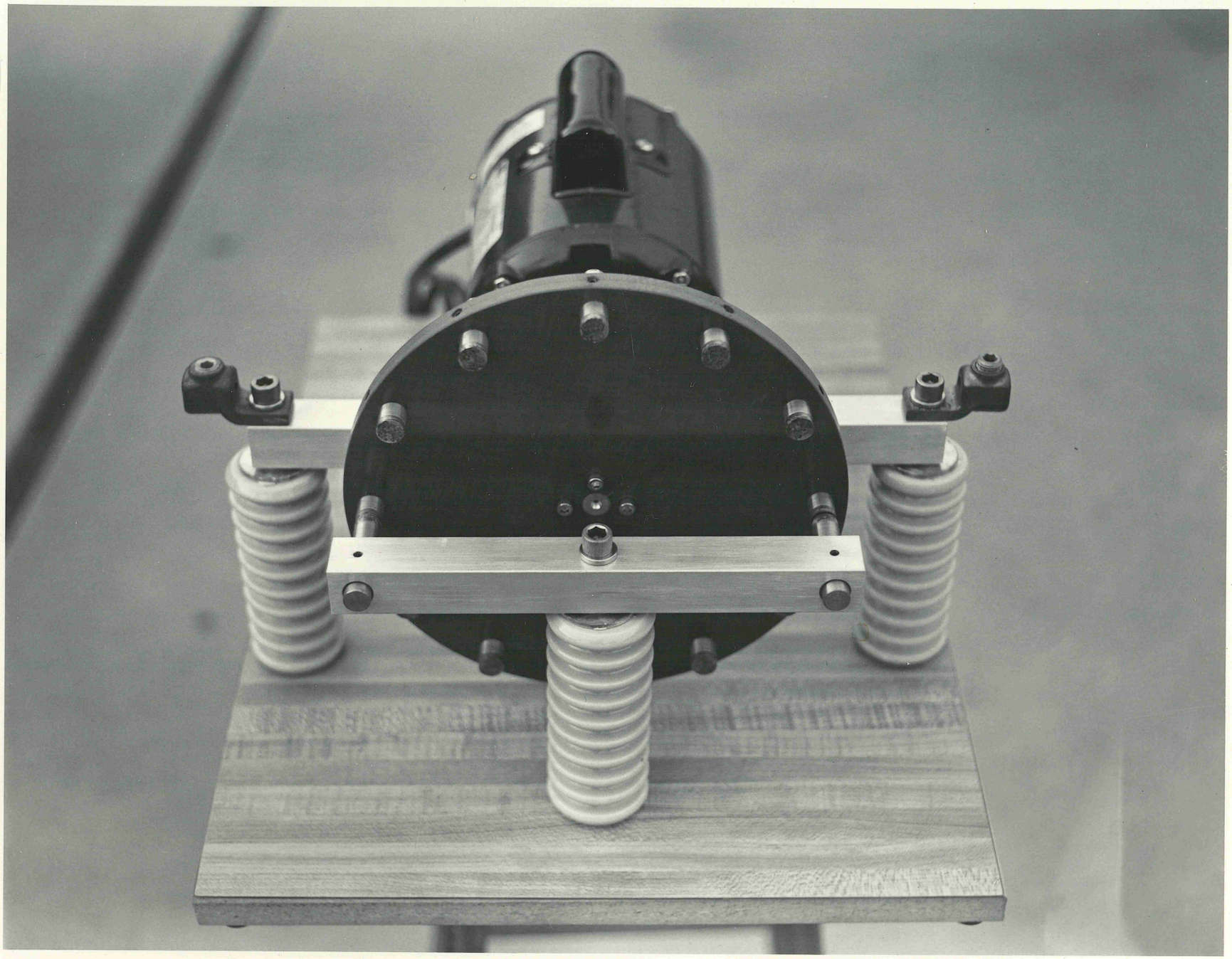
FRONT COVER PHOTO A

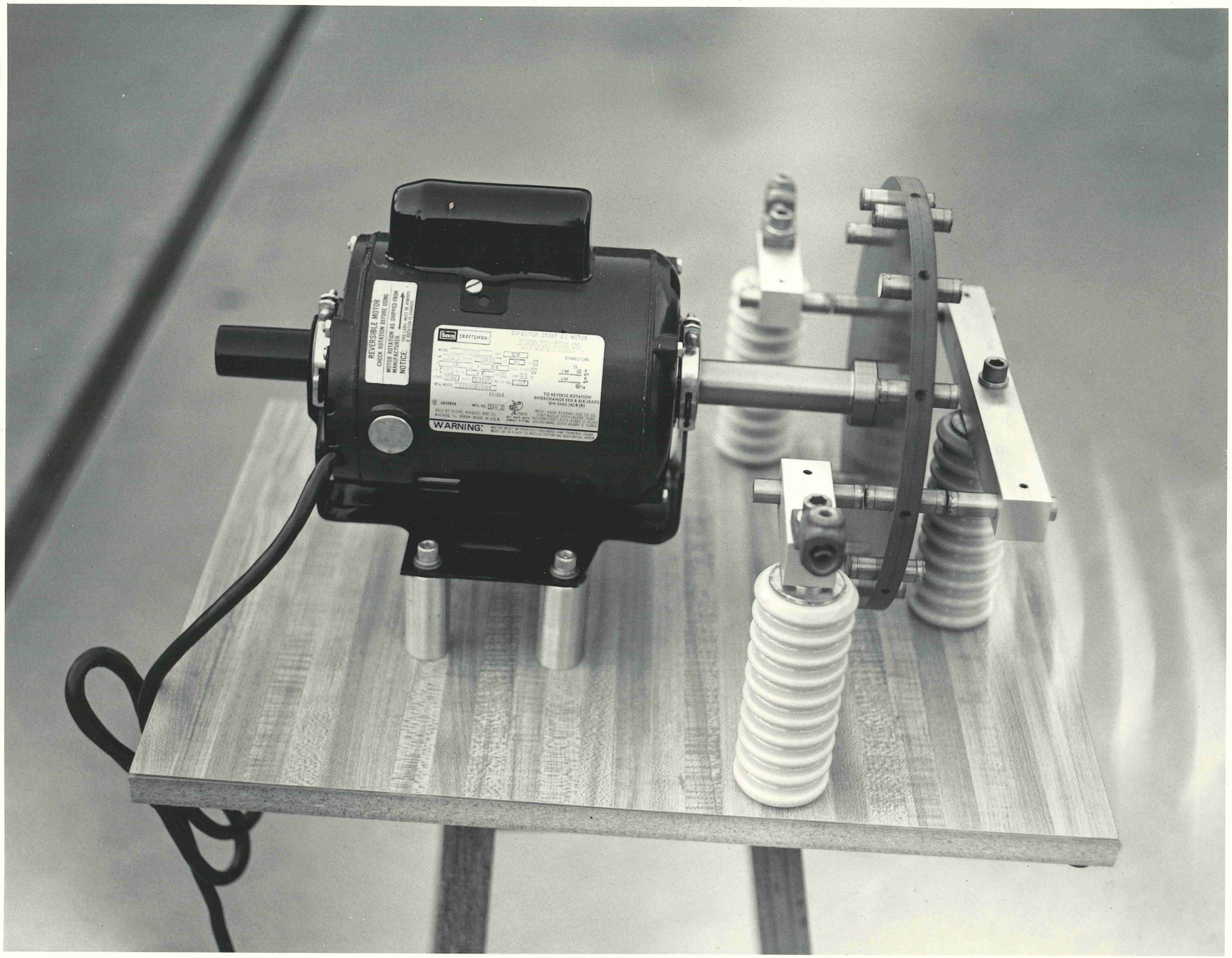
PROFESSIONAL SOUND SYSTEMS

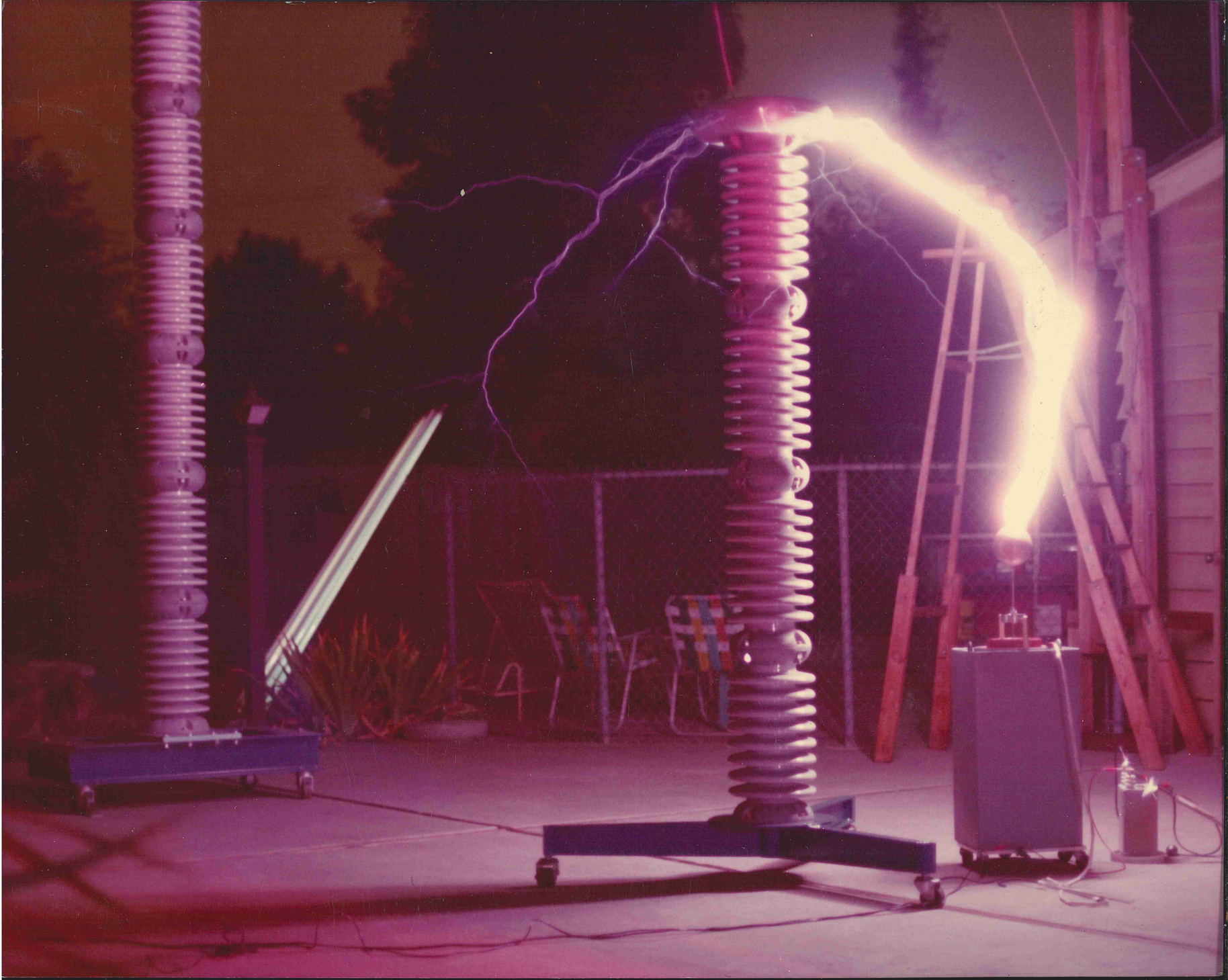
THIS SIDE UP

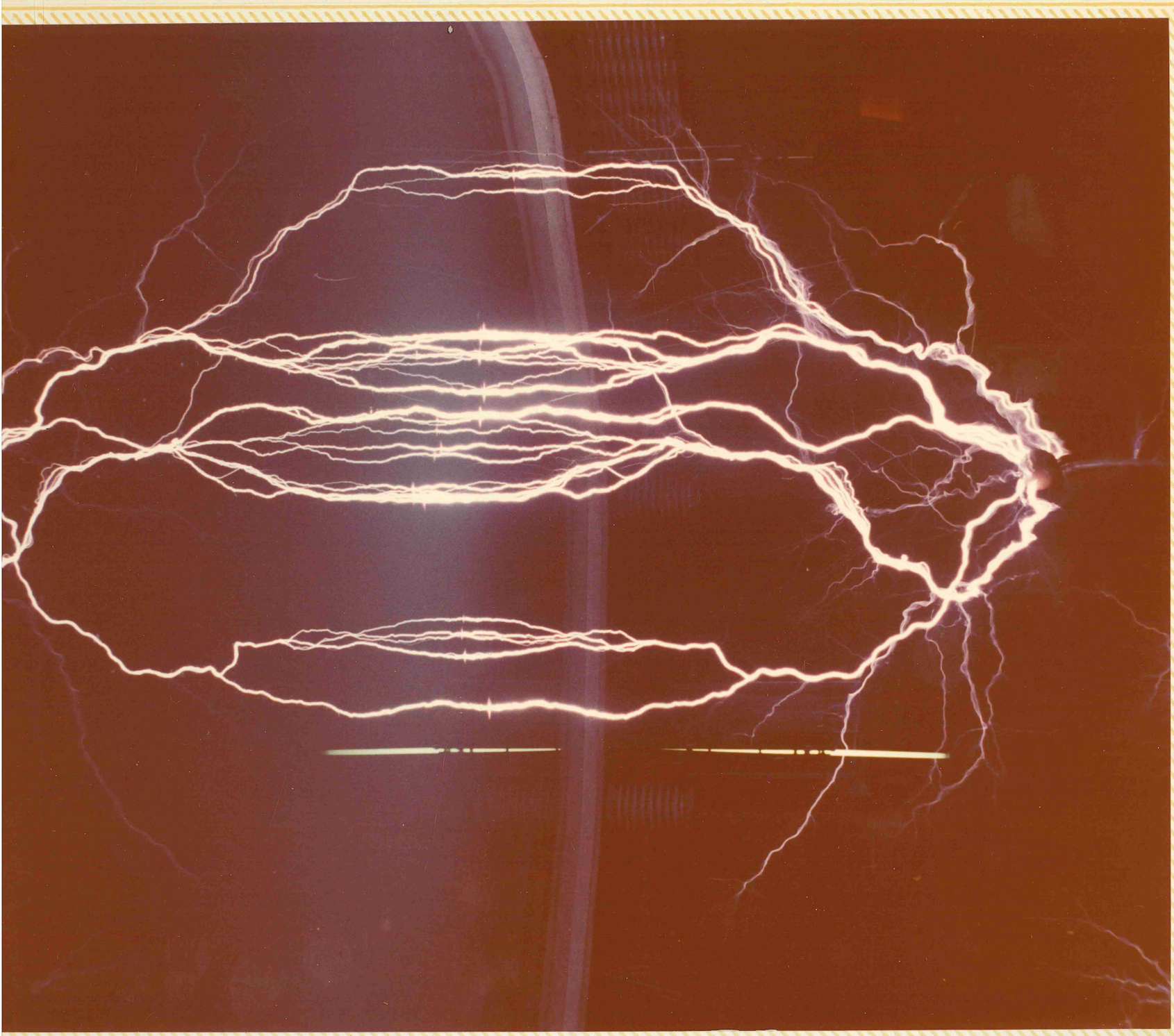


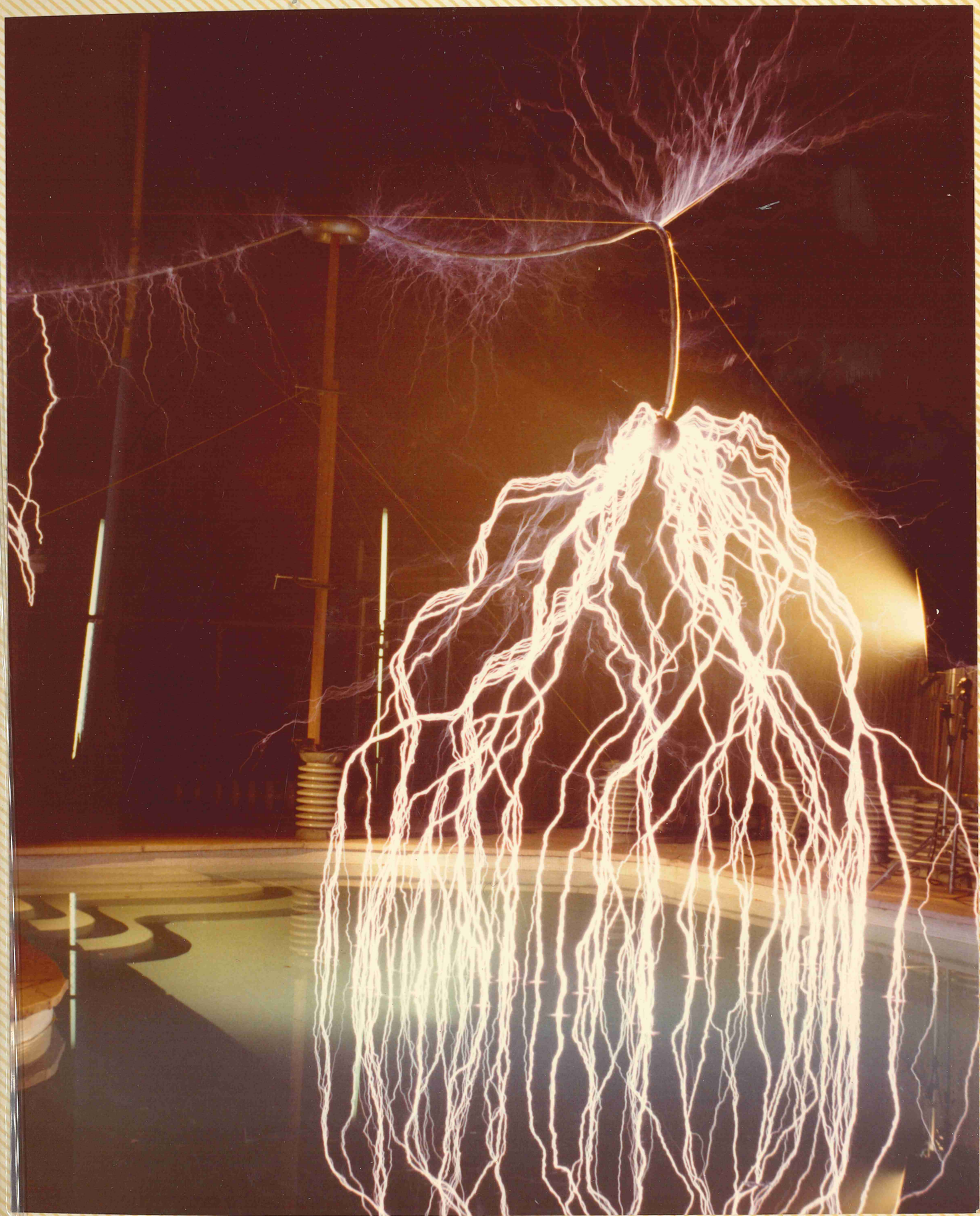
PROFESSIONAL SOUND SYSTEMS PHOTO D



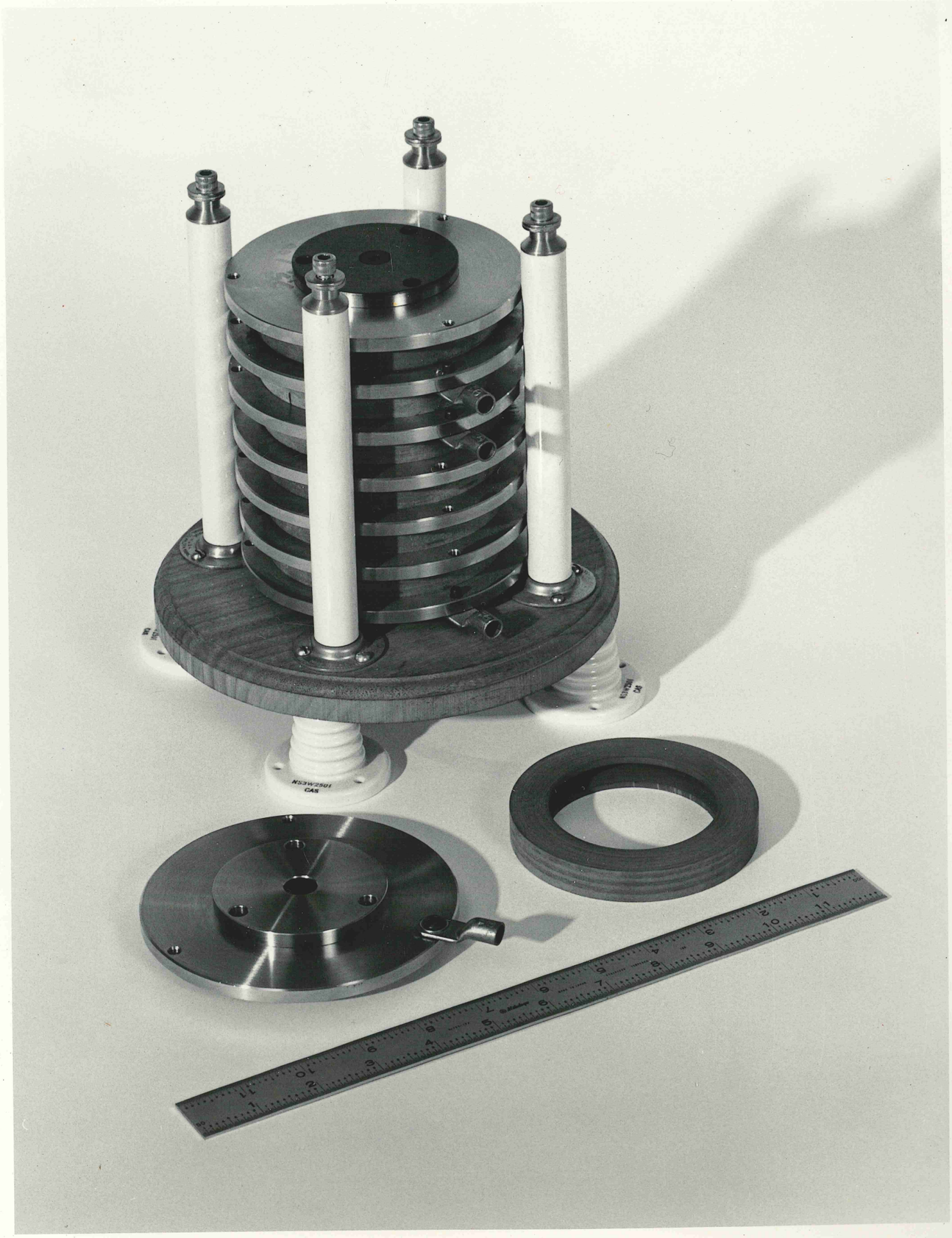

REVERSIBLE MOTOR
CHECK ROTATION BEFORE USING
MOTOR OPERATES AS SHIPPED FROM
MANUFACTURER
NOTICE:
CRAFTSMAN
WARNING:







THIS SIDE UP



PROFESSIONAL SOUND SYSTEMS PHOTO C