CROSS ARMS MAGAZINE

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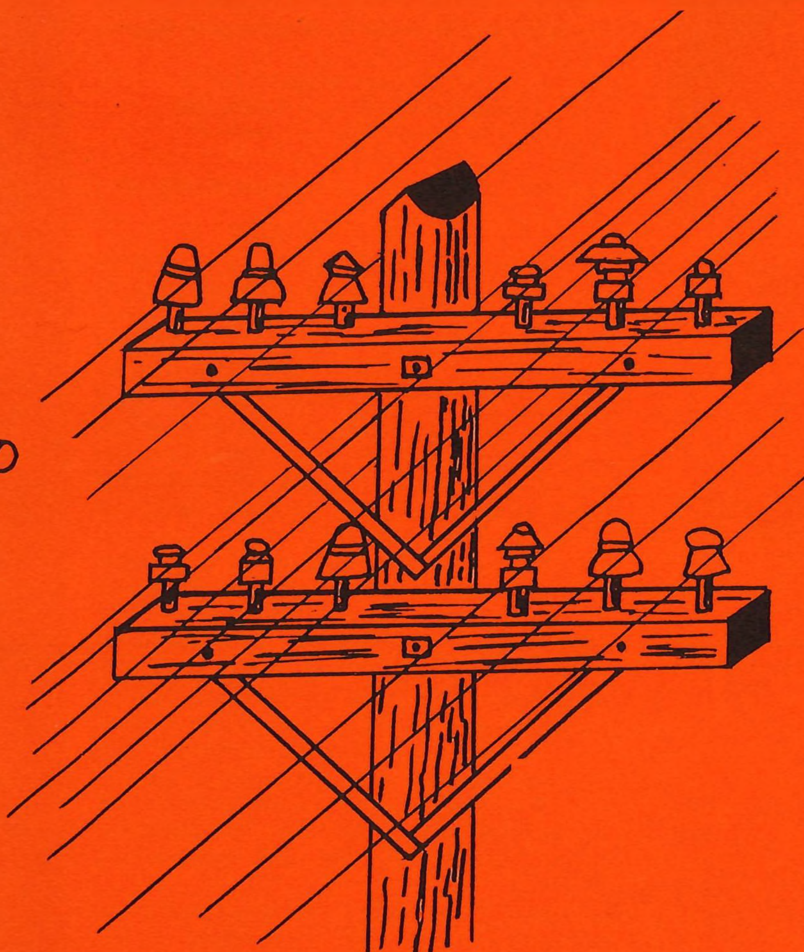

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an insulator collectors' magazine

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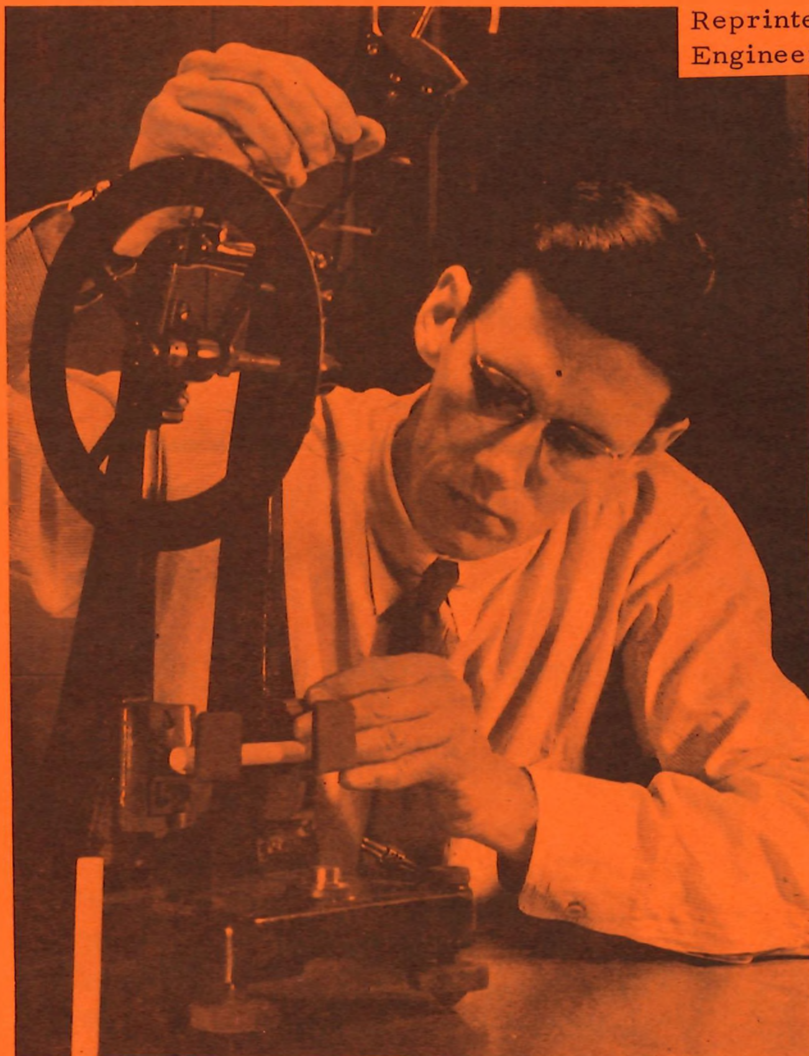


Reprinted from May, 1946 of Westinghouse Engineer

Zircon Porcelain

To our list of war-born materials of permanent value must be added Zircon porcelain, originally developed during the war as a high-frequency insulation. Its unusual properties —high mechanical strength and thermal shock resistance, low electrical loss, high-temperature electrical resistivity, and great moisture resistance—make it almost the ideal ceramic and promise it an extensive future.

Dr. Ralston Russell, Jr.
Section Engineer, Research Laboratories, Westinghouse Electric Corporation

Dr. Russell tests the impact strength of standard and Zircon porcelains. Foreground pieces have equal strengths although Zircon specimen is much smaller.

Zircon porcelain is a widely useful and promising addition to the class of high-quality ceramic materials known under the generic name of porcelain. Although these special Zircon porcelains are essentially new, high-fired Zircon porcelains have been used to some extent for a decade or more in the spark-plug field. Not until the war, however, were the qualities of this porcelain fully appreciated. During this period occurred the original development of Zircon porcelain as a substitute for the Steatite type of porcelain universally used for high-frequency electrical insulation.

The new porcelain has proved invaluable in radio and radar components where mechanical strength and electrical characteristics are vital. Its applications in coaxial-cable terminals and bushings for transformer and capacitor cases are typical. Furthermore, it has proved exceedingly useful for electrical applications at elevated temperatures. Zircon porcelain has such a uniquely excellent combination of electrical, mechanical and thermal properties, coupled with diverse manufacturing possibilities, that its application is foreseeable in many engineering fields. One of its primary uses, for example, is in low-frequency, high-voltage insulation, supplementing its already established high-frequency role. Having low electrical losses, unusually high mechanical strength and thermal shock resistance, and equally effective at both normal and elevated temperatures, Zircon porcelain constitutes a significant and versatile member of the porcelain family.

Types of Porcelain

The term "porcelain" describes a class of ceramic materials composed of various mixtures of inorganic minerals which are molded or shaped in different ways before glazing and finally firing at a high temperature, usually 1200–1450 degrees C, for a sufficient time to effect the thermochemical changes which transform the mineral mass into a vitreous (i.e., absolutely non-porous) material with a glassy surface. Such a material—a white-ware ceramic of highest technical quality—is known as true porcelain.

The term also designates a class of ceramics, and there are numerous types of porcelain as well as untold varieties possible for an· selected type. The common porcelains are ' , Clay-Quartz-Feldspar porcelains, (2) high mullite or alumina porcelains, (3) Steatite and related types, and (4) Zircon porcelains. The distinguishing features of the common porcelains are summarized in table I. The theoretical compositions of the raw materials listed are seldom attained in actual practice. For example, as many as six different clays, all having somewhat different chemical and physical characteristics, may be blended along with other minerals in a single porcelain.

It should be noted that beyond the field of porcelain exists the sintered oxide or refractory oxide field of vitreous ceramics. These ceramics are made from the processed pure oxides of aluminum, magnesium, beryllium, thorium, and zirconium, singly or in a mixture, limited amounts of other inorganic constituents sometimes being used. The sintered oxide ceramics are usually fired at extremely high temperatures of 1600–1950 degrees C, and are comparatively costly and difficult to fabricate, but in general possess the most outstanding properties known in the field of vitrified ceramics. Their existence does not seriously detract from nor do they compete with porcelain for most applications. Such competition could only occur if the lower fired porcelain materials could be improved considerably more than current knowledge permits. Zircon porcelain represents the farthest step yet made in this direction, but it is not claimed to be the equal of the better sintered oxide ceramics in overall properties.

Before considering Zircon porcelain in detail, a recognition

—A Modern Ceramic

of the general properties which an ideal vitrified ceramic might possess, is important. It must be remembered that specific applications require special properties in many cases and that the properties of greatest importance vary with the application. In considering technical and industrial applications, it is necessary to evaluate the thermal, mechanical, electrical, chemical, and general physical character in varying degrees of importance. Overall cost of finished product, ease and flexibility of manufacture with existing methods and equipment, and continuity and uniformity of product are, of course, important factors. Assuming that all such factors are acceptably good, if not the optimum, the ideal ceramic might possess properties somewhat as follows (noting that there is no such thing as a universal ideal):

Thermally, the ceramic should have high thermal conductivity and low coefficient of thermal expansion in order to avoid overheating, to insure stability of size, and to promote thermal shock resistance.

Mechanically, the ceramic should have maximum tensile, compressive and impact strength, and elasticity over a wide temperature range.

Electrically, the ceramic should at normal and elevated temperatures have maximum dielectric strength, high surface resistance under all humidity conditions, low dielectric constant, and low power factor at all frequencies.

Chemically, the ceramic should be resistant to deterioration or change by chemical action over a range of temperature.

Physically, the ceramic should be absolutely dense—i.e., free from open and sealed pores, be light in weight, and be extremely hard if not soft enough to permit machining.

In the light of these ideal properties, which are of most general interest and are sought after in porcelains, some of the characteristics of present Zircon porcelain as a ceramic material may best be considered.

The Nature of Zircon Porcelain

Zircon porcelain consists predominantly of the mineral "Zircon" ($ZrO_2 \cdot SiO_2$), but it also contains lesser amounts of clay substance and fluxes which are generally of the alkaline earth type (CaO, MgO, BaO, SrO). Special fluxes and auxiliary materials are used advantageously in some cases. The mineral Zircon is a constituent of many igneous rocks and is found throughout the world. However, the usable sources are largely confined to beach sands, which interestingly enough often gradually replenish themselves. Some of the more important beach sand deposits are found in Australia, Brazil, India and Florida, and the pure Zircon is fairly easily separated from its accessory minerals, Ilmenite ($FeO \cdot TiO_2$) being a common one. The processing of mineral Zircon to prepare a usable porcelain raw material is largely one of purification and grinding as required. Zircon thus lends itself to much closer control than many ceramic raw materials, including

Zircon porcelain insulators are turned on a lathe during spraying for uniform application of a special glaze.

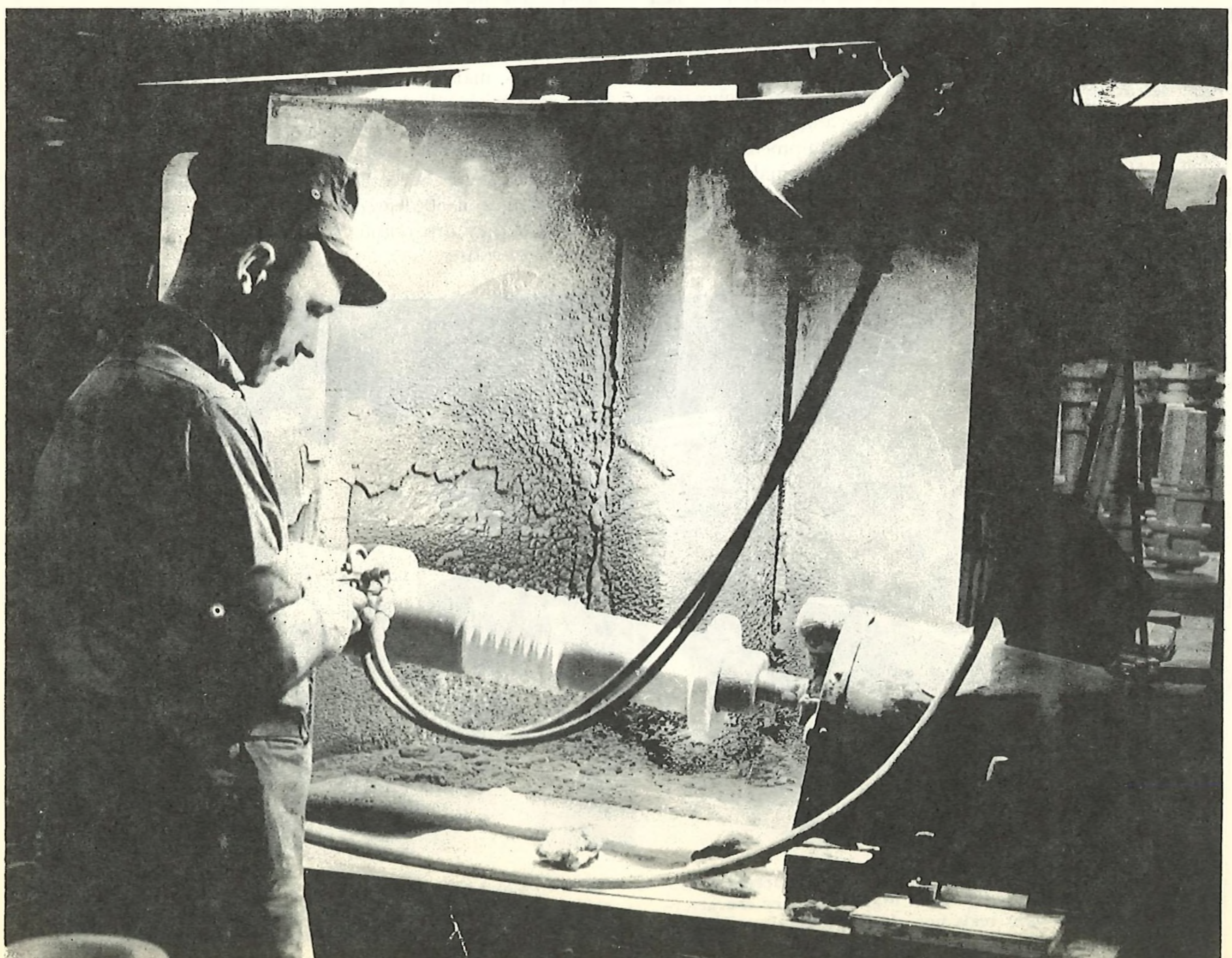


TABLE I — COMPOSITION AND USES

Type of Electrical Insulation	Non-Plastic Constituent	Plastic Constituent	Fluxing Constituent	Primary Electrical Uses
Zircon Porcelain	Zircon ($ZrO_2 \cdot SiO_2$)	Clay ($Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$)	Compounds of CaO, MgO, BaO, SrO	Radio, radar and miscellaneous high-frequency equipment requiring a material of low electrical losses. Also for low-frequency, high-voltage insulation where highest mechanical strength or thermal shock resistance is required. Effective at normal and elevated temperatures.
Steatite and Cordierite	Talc ($3MgO \cdot 4SiO_2 \cdot H_2O$)	Clay	Compounds of Na_2O, K_2O, BaO, CaO, MgO, ZnO, BeO, Li_2O	Radio, radar and miscellaneous high-frequency equipment requiring a material of low or moderate electrical losses. Cordierite is used where thermal shock resistance or dimensional stability is involved. Effective at normal and elevated temperatures.
Mullite Porcelain	Cyanite ($Al_2O_3 \cdot SiO_2$) Mullite($3Al_2O_3 \cdot 2SiO_2$)	Clay	Compounds of K_2O, Na_2O, CaO, MgO	Automotive spark plug insulation, and high-voltage, low-frequency insulation involving elevated temperatures or thermal shock conditions.
High Voltage Porcelain	Quartz (SiO_2)	Clay	Feldspar ($KNaO \cdot Al_2O_3 \cdot 6SiO_2$)	All high-voltage, low-frequency applications where excessive temperatures are not involved; primarily for power transmission and distribution.
Sintered Alumina	Alumina (Al_2O_3)	Clay, if any	BeO, ZrO_2, MgO, CaO	Aircraft and automotive spark plug insulation, electronic and power applications involving extremely high temperatures.
Fused Quartz	Quartz Sand or Quartz Crystals(SiO_2)	Molded by special methods	None	High-frequency applications requiring material of lowest electrical losses, extreme dimensional stability, or highest thermal shock resistance.
Mica-glass Products	Mica	Molded under pressure and heat	Lead Borate Glass	High- or low-frequency applications where some machinability of product may be required or where service temperatures are not high.
Glass	Quartz Sand	Glass is shaped in molten condition	Compounds of Na_2O, B_2O_3, Al_2O_3, CaO, MgO, K_2O	Miscellaneous high- and low-frequency applications where lowest electrical losses are not involved but where high dielectric strength may be required. Useful at only moderately elevated temperatures, but has good thermal shock resistance.

talc or soapstone, the principal ingredient of all the Steatite type of ceramics.

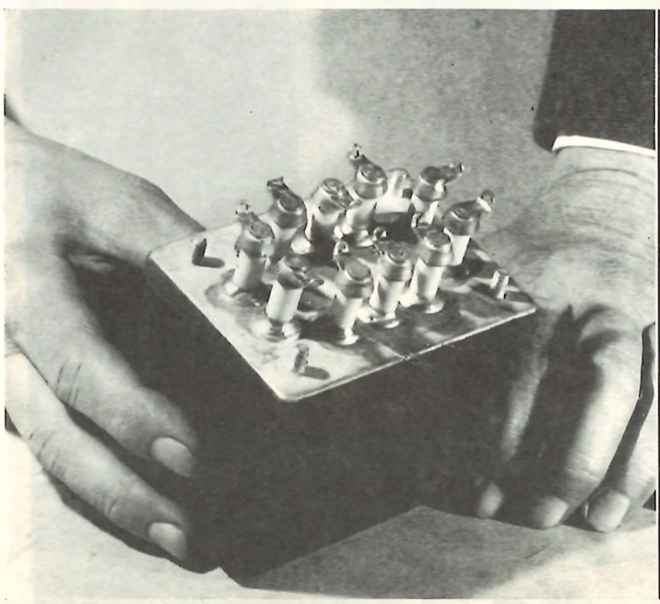
Zircon porcelain is an extremely hard, dense, white mass which is somewhat heavier than the conventional types of porcelain due to the high specific gravity of mineral Zircon. The ware may be glazed to develop an exceptionally smooth, glassy surface during firing. The hardness of the porcelain precludes appreciable shaping, drilling or tapping after firing, although some grinding may be done with difficulty. Zircon porcelain lends itself admirably to the development of vacuum or hermetic metal-to-porcelain seals of all types. Stability of mechanical properties and shape at temperatures up to 1000 degrees C or higher merits careful consideration for special applications.

The porcelain is exceptionally strong mechanically, has good electrical characteristics at normal and elevated temperatures, low electrical losses at high frequencies, and very good thermal shock resistance. This excellent combination of properties affords Zircon porcelain a wide field of application in the low-frequency power field, high- and ultra-high-frequency communications and signaling equipment, and in special installations where resistance to thermal shock or insulation of electrical circuits at elevated temperatures are prerequisites. No other known porcelain has such a diverse field of usefulness.

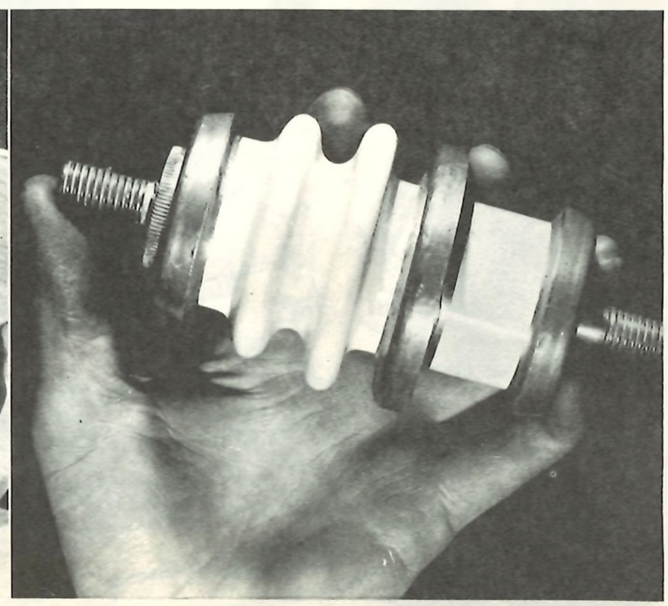
The Manufacturing Process

Zircon porcelain may be manufactured by any of the conventional ceramic molding processes including extrusion, turning, dry or semi-wet pressing, and casting. The body mixing may be accomplished by either the dry-mixing or wet process. The manufacture is considerably more flexible than that of Steatite, which is best adapted to dry-press forming because of the natural softness and lubricity of mineral talc. Special methods involving the use of auxiliary binders and plasticizers are required for the successful extrusion of Steatite and it is cast only with comparative difficulty. Steatite usually must be bisque-fired at a low temperature before turning, whereas Zircon porcelain is turned in the dry state.

A true porcelain is fired to the vitreous state—i.e., it is absolutely impervious and of essentially maximum density. A limited amount of minute sealed pores are usually present, but these are not deleterious to the quality of the ware. An important manufacturing advantage of Zircon porcelain is the ease with which it may be fired to complete vitrification, as is also true of high-voltage porcelain. This is due to a comparatively wide firing range for the development of vitrification. For example, Zircon porcelains often have firing ranges of 30 degrees to 50 degrees C between the point at which they are porous due to underfiring and distorted due to overfiring.



Zircon porcelain bushings, solder-sealed to radar network case-covers, combine not only excellent high-frequency characteristics and vacuum-tight seals but also high shock resistance.



The two metal caps and the flange are hermetically sealed on this glazed Zircon porcelain bushing for radar transformers, providing an assembly unusually high in mechanical strength.

TABLE II—MECHANICAL, THERMAL & PHYSICAL PROPERTIES

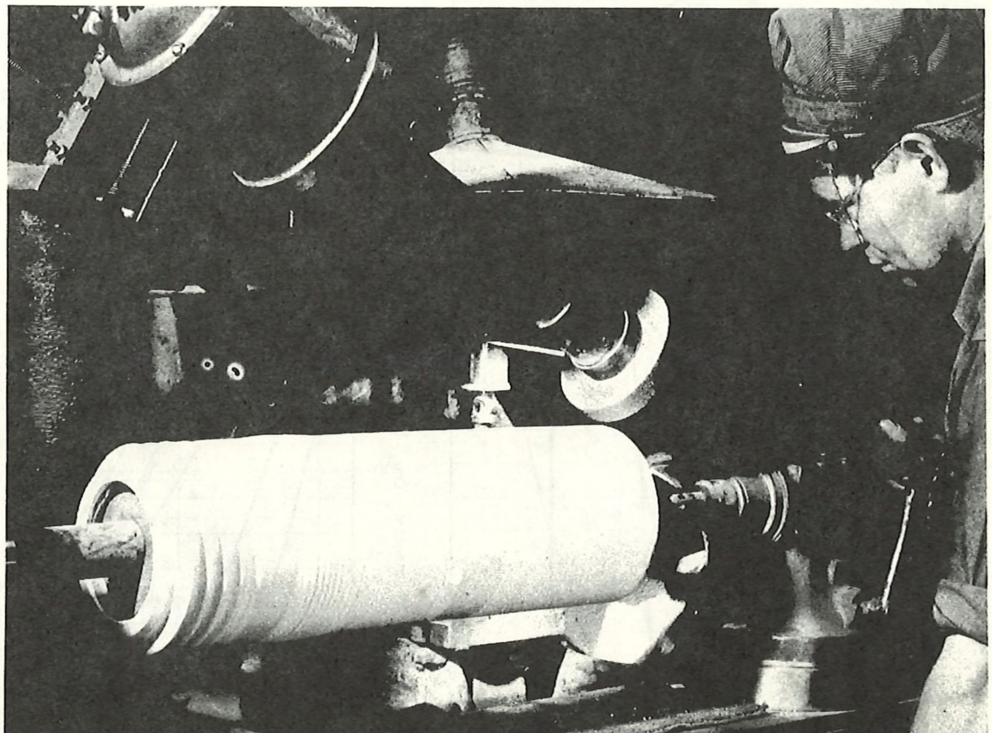
	Westinghouse Standard Zircon Porcelain	Miscellaneous Zircon Porcelains	Steatite Porcelains	Cordierite	Mullite Porcelains	High-Voltage Porcelains	Fused Silica	High-Frequency Glass	Mica-Glass Products	Polystyrene	Sintered (75–100%) Alumina Bodies
Specific Gravity gm/cc	3.68	3.0–3.8	2.5–2.8	2.1–2.2	2.4–3.1	2.3–2.5	2.2	2.1–2.3	3.0–3.5	1.05–1.07	3.1–3.9
Absorption %	0.0	0.0	0.0–0.2	0.0–12.0	0.0	0.0	0.0	0.0–0.01	0.0–0.1	0.0–0.1	0.0
Mohs' Hardness	8.0	7.5–8.5	7.0–7.5	6.0–7.5	7.5	7.0	5.0–7.0	5.0–6.0	3.0–4.0		8.5–9.0
Coefficient Linear Thermal Expansion 20–700°C x 10^{-6}	4.9	3.5–5.5	7.8—10.4	2.0–2.8	4.3–5.0	5.0–6.8	0.55	0–300°C 2.8–3.2	20–400°C 9.2	0–60°C 60–80	5.5–8.1
Safe Operation Temperature °C	1050	1000–1300	1000–1100	1200	1250	1000	1000	425–500	300	50–60	1350–1600
Thermal Conductivity cal/cm²/cm/sec/°C	0.0117	0.010–0.015	0.0053–0.0061	0.0025–0.0061	0.0037–0.0073	0.0025–0.0039	0.0033–0.0036	0.0027	0.0010	0.00019	0.0073–0.0560
Tensile Strength #/in²	12 700	10 000–15 000	6200–13 000	1500–5000	5000–10 000	3400–8000	2500–7000		5000–12 000	5000–9000	8000–36 000
Compressive Strength #/in²	90 000	80000–150000	65000–130000	30 000–70 000	50000–120000	40 000–80 000	20000–30000		20000–38000	11 000–15 000	80000–410000
Transverse Strength #/in²	25 000	20 000–35 000	14 000–24 000	4000–12 000	13 000–21 000	9000–15 000	10000–11000	7000–18 000	14000–20000	8000–19 000	18 000–55 000
Modulus of Elasticity #/in²	24 000 000	20 000 000–30 000 000	13 000 000–15 000 000	7 000 000–13 000 000		7 000 000–14 000 000	10 000 000			170 000–470 000	15 000 000–52 000 000
Thermal Shock Resistance	Good	Good	Poor	Excellent	Good	Fair	Excellent	Good	Fair	Fair	Excellent

Steatite, on the other hand, is comparatively difficult to fire properly due to its short vitrification range of about 10–20 degrees C and its extreme tendency to distort if even slightly overfired. The production of uniformly high-quality Zircon porcelain is thus much easier than is the case with most Steatite ceramics. Zircon porcelain does, however, warp more easily during firing than high-voltage porcelain unless the firing temperature is closely controlled at the lower limit of vitrification. However, warping is serious only when large parts or parts of thin section are not fully supported during firing.

Commercial Zircon porcelain is currently made by the one-fire process, in which the glaze is applied before firing and matured to a glassy surface in a single high-temperature fire. Such glazes are intimately bonded to the porcelain body and can be designed to beneficiate the mechanical strength. Most Steatite, on the other hand, is glazed after the body has been fired to maturity, and the glaze is gloss-fired at a lower temperature. This is largely a commercial expedient due to the necessity of fully supporting Steatite parts to prevent warpage during high-temperature firing, since the design of a one-fire Steatite glaze offers no problem. Low-temperature glazes are less resistant to abrasion and chemical attack. They are also less amenable to mechanical strength improvement than high-fired glazes which can be designed for the best stress relationships between porcelain and glass.

The Properties of Zircon Porcelain

The flexibility of Zircon-porcelain manufacture with respect to body preparation, fabrication, glazing and firing means that it may be produced with uniformly high quality in a wide variety of shapes and sizes to accommodate its many current and probable applications. The cost of Zircon porcelain should compare favorably with all competitive ceramic materials. Mineral Zircon is somewhat more expensive than conventional porcelain constituents such as clay, quartz, feldspar, talc, and cyanite. Zircon also causes greater wear of dies,



Here a Zircon porcelain bushing for high-temperature use is being finished to close tolerances.

TABLE III—ELECTRICAL PROPERTIES

	Westinghouse Standard Zircon Porcelain	Miscellaneous Zircon Porcelains	Steatite Porcelains	Cordierite	Mullite Porcelains	High-Voltage Porcelains	Fused Silica	High-Frequency Glass	Mica-Glass Products	Polystyrene	Sintered (75–100%) Alumina Bodies
Power* Factor at 1 Megacycle	0.0010–0.0014	0.0002–0.0020	0.0002–0.0035	0.003–0.007	0.004–0.005	0.006–0.010	0.0002–0.0023	0.0006–0.0042	0.0012–0.0035	0.0001–0.0008	0.0010–0.0020
Dielectric Constant	9.2	8.0–10.0	5.5–7.5	4.1–5.4	6.2–6.8	6.0–7.5	3.2–4.2	4.0–4.7	6.4–8.5	2.5–2.6	7.3–11.0
Loss Factor	0.009–0.013	0.0016–0.020	0.0011–0.026	0.012–0.038	0.025–0.034	0.036–0.075	0.0006–0.0097	0.0024–0.0197	0.0077–0.0298	0.00025–0.00208	0.007–0.022
Dielectric Strength Volts/mil	290	250–350	200–350	100–250	250–400	250–400	100–400	>500	50–325	400–600	400–1100
Resistivity Ohm-cm	10^{18}	10^{12}–10^{15}	10^{13}–10^{15}	10^{12}–10^{14}		10^{12}–10^{14}	10^{15}	10^{11}–10^{17}	10^{12}–10^{16}	10^{17}–10^{19}	10^{14}–10^{15}
Te Value °C	>700	>700	450– >700	600–700	500–650	300–500	700–900				>700

*Power factor and Dissipation factor are synonymous for values in the range cited in this report augers and other metal equipment parts than do the softer minerals, particularly talc. However, the ease and flexibility with which Zircon porcelain may be processed, and the uniformity and high quality of product certainly more than offset these disadvantages. The hardness of the fired product precludes most shaping or drilling at this stage but insures durability once the final size and shape have been attained. The ease with which Zircon porcelain lends itself to the rigors of hermetic sealing is important where ceramic-to-metal seals are required. Zircon porcelains are 30–50 percent heavier than other conventional porcelains, but this factor is not considered a major one, even in aircraft communications equipment, due to the small weight of ceramic insulation involved. Furthermore, the superior strength of Zircon porcelain permits a reduction in thickness of section in many cases so that the total weight of insulation is not increased.

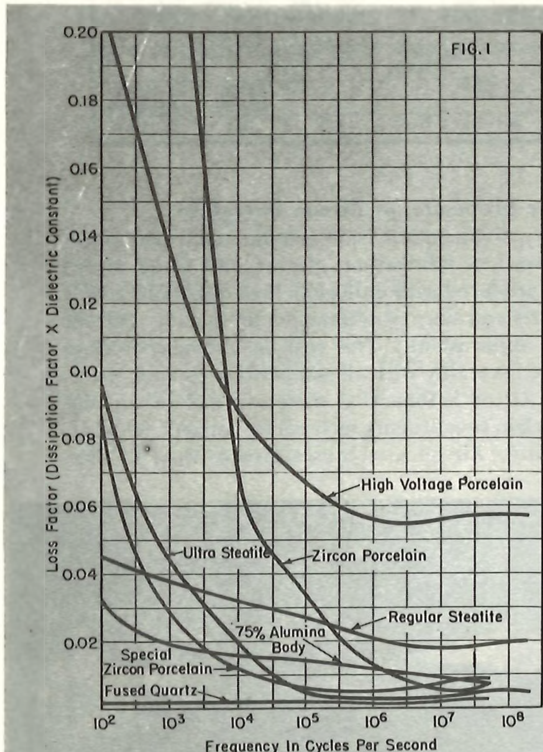
The detailed properties indicate clearly the high quality of Zircon porcelain. Table II includes important physical, mechanical, and thermal properties of Zircon porcelain and various other electrical insulating materials. The electrical properties are included in table III.

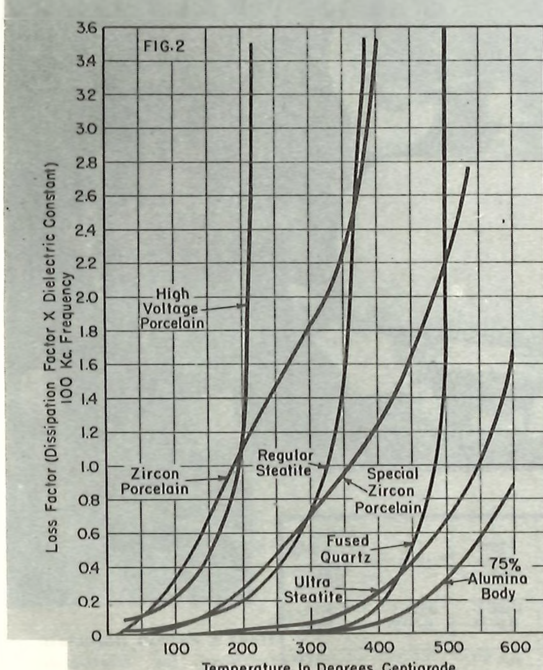
The general superiority of commercial Zircon porcelain to all except the expensive, non-competitive sintered alumina is readily apparent. It is 50 to 200 percent stronger than Mullite and high-voltage porcelains, and 10 to 50 percent stronger than Steatite, heretofore the strongest of the porcelain-type materials. Thermally, Zircon porcelain is equal or superior to any of the other porcelains. It has the highest thermal conductivity and approaches the low thermal expansion of Mullite porcelain. It has been observed to have very good thermal shock resistance, as is also true of Mullite porcelain. High-voltage porcelain is mediocre in this respect, while Steatite porcelain is decidedly the poorest.

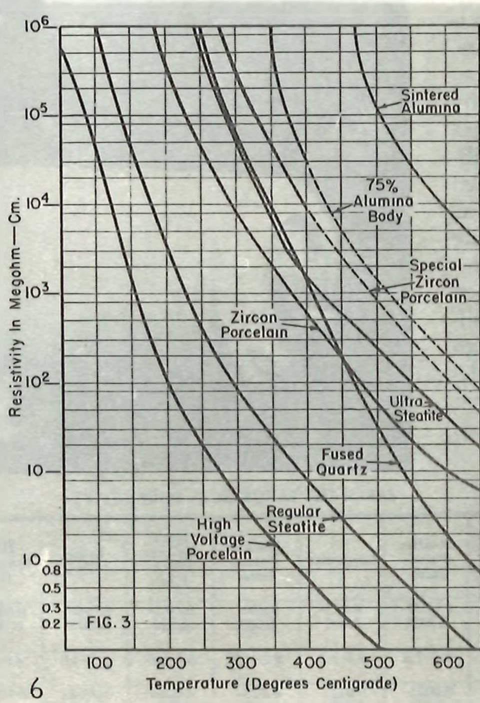
All of the porcelains have good resistance to all alkalies and acids except hydrofluoric. Sintered alumina is, however, known to resist corrosive vapors and reducing conditions at high temperatures more effectively than any porcelain and to resist hydrofluoric acid.

The electrical properties of Zircon porcelain further substantiate its high quality and wide usefulness. The electrical losses (dissipation factor × dielectric constant) are a primary criterion in selecting insulation for high-frequency applications. Zircon porcelains generally fall within the three best classes of ceramic high-frequency insulators; namely, classes[1] L-4, L-5, and L-6 having loss factors at 1 megacycle of 0.016, 0.008, and 0.004, respectively. This is also true of most Steatite ceramics which have been universally exploited for high-

[1]American Standards Association, American War Standard C-75.1-1943, Ceramic Radio Insulating Materials, Class L.





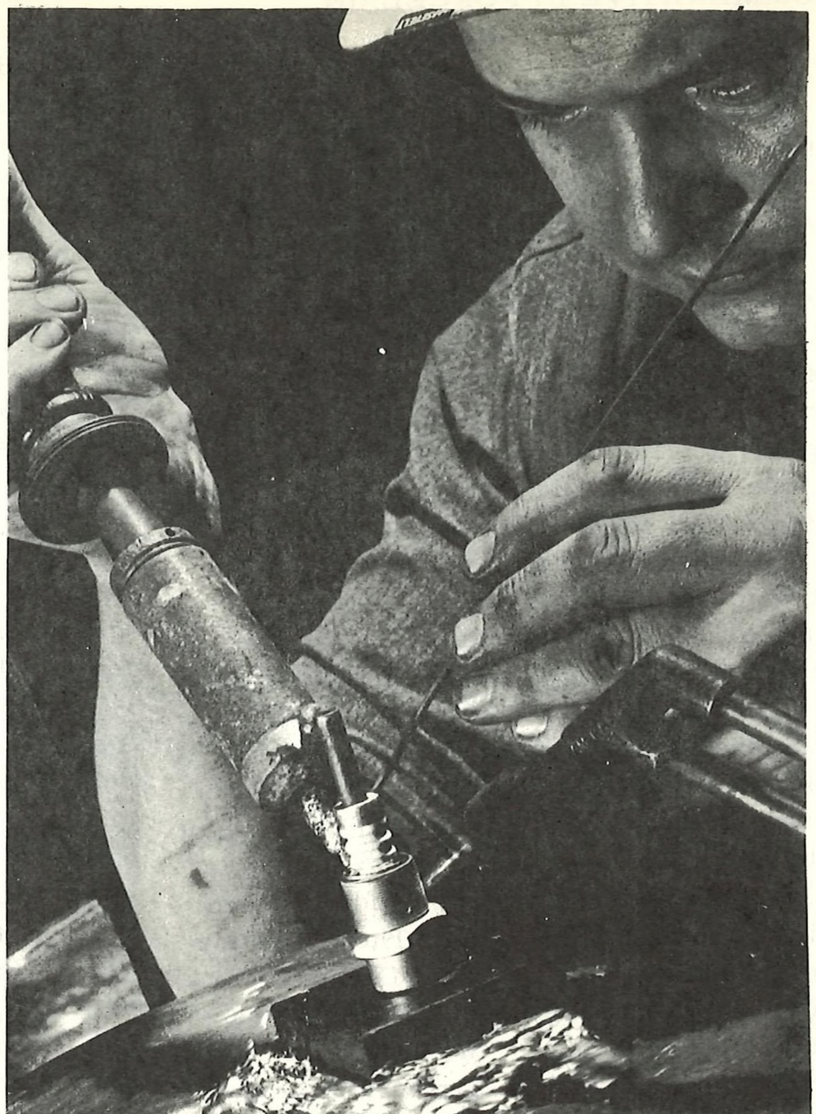


The curves at the left present electrical properties of several typical ceramic materials. Fig. 1 plots loss factor versus frequency. Figure 2 shows the effect of temperature upon loss factor, while the dependence of resistivity on temperature is indicated in Fig. 3.

frequency equipment. The electrical loss characteristics of some typical materials at different frequencies are shown in Fig. 1. The high loss factor of one of the Zircon porcelains at low frequencies is of no particular importance, since electrical losses assume a major role only at high frequencies. The somewhat higher dielectric constant of Zircon porcelain is offset by its low power factor at high frequencies, the product of the two being sufficiently low to insure satisfactory classification. It is noteworthy that some Zircon porcelains fall within the superior L-6 class although the current commercial varieties are in classes L-4 or L-5, the classes which are usually specified in the selection of high-frequency insulation.

The effects of temperature upon loss factor and electrical resistivity are shown in Figs. 2 and 3. Zircon porcelains are seen to compare favorably with all other porcelains currently available, being superior to high-voltage porcelains and the average grade of Steatite. A special grade of Steatite was found to be next to sintered alumina in high-temperature electrical loss properties, but it is believed that special Zircon porcelains will be found to at least equal this high-quality Steatite. There is some doubt at present, however, that the properties of pure sintered alumina can be attained in any porcelain type of material.

The characteristics of Zircon porcelain are largely covered in the tables and curves, and the advantages and disadvantages can be summarized briefly. It is worth noting that the raw materials are readily available and that the product can be formed by a number of conventional methods. Zircon porcelain is amenable to production in uniformly high quality. It can be fired with ease to complete vitrification, for it has a long firing range, and it can be made by a one-fire process. It has a high resistance to abrasion and to chemical attacks, and it is not only strong mechanically but quite resistant to thermal shock. Zircon porcelain falls within the best classes of high-frequency ceramic insulators as classified by the American Standards Association, possessing low electrical losses over a range of frequencies and temperatures in addition to high electrical resistivity and good dielectric strength at both normal and elevated temperatures. Finally, Zircon porcelain responds satisfactorily to metal sealing.



Vacuum-tight seals are necessary for terminal assemblies in high-frequency applications. Here a Zircon porcelain coaxial-cable bushing undergoes a solder-seal operation.

On the other hand, there are several apparent disadvantages to Zircon porcelain. First of all, the raw materials are moderately expensive. Raw Zircon, moreover, is a very hard substance and causes considerable tool and die wear. During the firing process, Zircon porcelain has a slight tendency to warp in thin sections. The fired ware itself is difficult either to cut or grind because of the extreme hardness of the material. Finally, glazing of Zircon porcelain requires special care and attention. In spite of these short-comings, all of which relate only to the manufacturing process, the predominantly advantageous characteristics of Zircon porcelain make it an exceptional porcelain material.

The Future of Zircon Porcelain

It is obvious that Zircon porcelain ranks closest of all porcelains to the "Ideal Ceramic" previously outlined. This promises increased usage of Zircon porcelain, not only in replacing other ceramics for many applications, but also in new electrical equipment where Zircon porcelain may solve some of the more vexing insulation problems. Among the current electrical uses for Zircon porcelain are radio, radar, and high-frequency applications (e.g., sockets, tube bases, coil forms, terminal and switch plates, antenna insulators, etc.), coaxial cable terminals, capacitor dielectrics, spark-plug insulators, and tubes for wire-wound resistors of all types. Still other applications include strain insulators, bus supports, bushings for transformer and capacitor cases, and bushings and supports for use at elevated temperatures or over a wide range of frequencies. In addition to their electrical applications, Zircon porcelains will find technical and mechanical applications where the properties of a superior ceramic are required.

Improved Zircon porcelains and new applications will be developed, and exploitation will continue until Zircon porcelains have a position of lasting importance commensurate with their high quality, uniformity, and diverse usefulness. It is almost certain, for example, that the next new vitrified, porcelain-type ceramic will be evaluated in comparison to Zircon porcelain, just as Zircon is currently evaluated in respect to Steatite, Mullite, and high-voltage porcelains. This tendency to establish Zircon porcelain as the comparative standard is an indication of its position as an outstanding modern ceramic, and its successful application during the wartime emergency leaves little doubt as to the future importance of Zircon porcelain in the field of vitrified ceramics.

A COMMERATIVE IN PORCELAIN

by Addie

At the April 2nd meeting of the Insulator Collectors Club-San Diego County, Dick Alumbaugh of Anaheim was the guest speaker who unfolded this following story.

The idea of a porcelain commerative came to Dick while in the hospital in May, 1974. The Cutter was his first choice so he called Max Cutter in June and received approval for mold use. Now came the hardest part- a manufacturer. Al Gladding of San Jose referred Dick to Lloyd Sissell in El Monte who aggreed to give it a try.

At the Western Regional in August, Dick requested permission of the N. I. A. After a lot of talk and debate, Ernie gave approval. You'd think it was all set but in late September, Max Cutter backed out. Dick inquired about the cost of making a dry hot press of his own. Estimates were over $8,000. Dick was very disgusted with everyone by now.

In December, Maury and Addie Tasem inquired about the progress. The porcelain commerative was still a great IDEA as porcelain collectors as well as all collectors could have a keepsake of the Nationals. So after the holidays, Dick started all over again. Over 9 companies turned him down. Then a company who makes Dreslin fine china seemed interested. The first mold just didn't turn out and was broken. A new mold was made and two samples were made. After comments from several collectors, all felt it should be glazed final product. Well, the company refused to glaze Dreslin. So ended U393A except for the 2 samples that are embossed.

So again the looking. About a mile from Sissell, Dick found H. P. C. Co. who agreed to give it a try. A mold maker in Glendale and Dick picked U390. Since Dick didn't have this insulator, Dee Willett of Bakersfield, loaned him the insulator so a mold could be made from it. Then to Pasadena, where a 72 year old engraver was found. After several trips to see all those people, the first insulator was made but it came out disfigured. But setting that aside, it didn't look bad so another was made in white. This one looked great except embossing was washed out. A beige one was made and again not right but they were getting someplace. So a Harvest gold one was made and approved by those who were asked.

The porcelain commerative insulator is gold in color and about 12% smaller than the original. There are no internal threads as it is just a pour hole. It is embossed with raised letters on front- 6th NIA CONVENTION, SAN DIEGO, CA JULY 11-13, 1975 and the back-SERIAL NUMBER of 500. Yes, each insulator will be serialized, be registered to each getting one, and a certificate with it. Only one insulator will be made with that number.

Serialize seems like a simple idea. Two insulators 1 of 500 and 500 of 500 will be kept by Dick. The next series to 21 were given as special gifts to special people. Three of these numbers will change yearly as they are post positions. After hours of talking, the letters of the alphabet will be used with the numbers for those three numbers (3A, 3B, etc.). At the ICCSDC meeting, we had the list of names who were to get the free ones and we had a drawing to be fair to those individuals. An ICCSDC meeting and NIA member, Dennis Kotan, was blindfolded and drew the numbers for each individual who will be given an insulator. Dennis was given a blue signal porcelain insulator for his assistance.

Dick announced that the porcelain commerorative was now being made. None will be sold until July 11th. Numbers will be given in order and no special number request will be honored. The price is $8.00. For mail requests will be accepted after the Convention with $1.50 extra for mailing and handling.

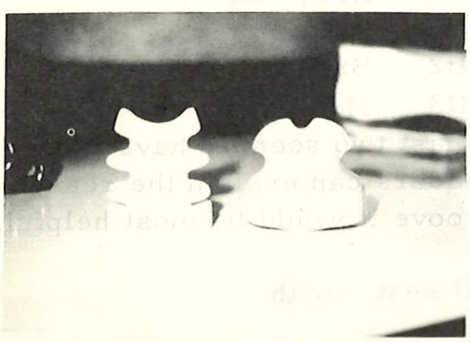
Your serial number is yours for as long as you want it. Each year you will be notified when you can purchase the new commerative. Your serial number collection will grow in value. If ever sold, the new owner should notify Dick showing a copy of the bill of sale so his records (kept at Wells Fargo Bank) will be changed to the new owner.

An idea from a hospital bed took 11 months of disappointments, problems, hard work and money to produce an insulator that is an asset to any collection. The first porcelain commerative came into being at the right time.

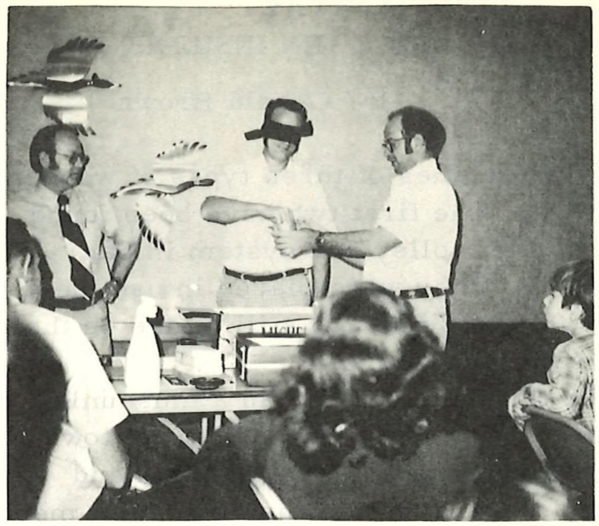
re; R. E. Alumbaugh, 611 Jambolaya, Anaheim, CA 92806.

Serial no.	Person
001	Dick Alumbaugh
002	NIA President
003	Convention Show hosts
004	Marion & Evelyn Milholland
005	Cross Arms Magazine
006	Crown Jewels Magazine
007	Gary Cranfill
008	Reserved
009	Brent Mills
010	Reserved
011	Old Bottle Magazine
012	J. Tibbets
013	Frank & Frances Peters
014	N. R. Woodward
015	Jack Tod
016	Gerald Brown
017	Frances Terrill
018	Greg Kareofelas
019	Donated for NIA drawing
020	retained for donation to any NIA Museum.

Serial numbers 021 of 500 through 499 of 500 will be offered to public.



Insulator left-only two made of Dreslin china; right-is commerative.



Drawing the numbers Dick Alumbaugh left, Dennis Kotan center, Maury Tasem right.

Mr. & Mrs. Robert Adams.

SHOW WINNER

Our big winner for the CROSS ARMS ribbon was Mr. & Mrs. Robert Adams, Miami, also 2nd place in insulators.

Tom Watson, Birmingham, Alabama Show on May 3-4, 1975.

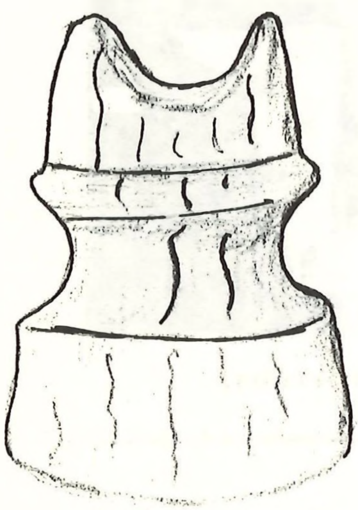
LIGNUM VITAE
(Tree of Life) WOODEN INSULATORS

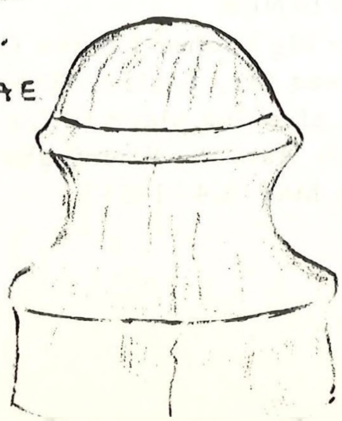
BY Gerald Brown

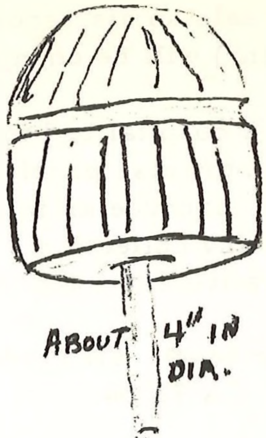
Here sketches of three types of wooden insulators. The first two have been found in use on the trolley car system in San Francisco. They were placed in use there about 1900 and some are still in use on the street car lines there.

The third insulator is in a museum at Corrinne, Utah which is the nearest town to Promitory Point, where the east and west rails of the first transcontinental met. It is made of laminated wood.

I have more fully described and explained these in my new book "UNIQUE COLLECTIBLE INSULATORS". Much of the material was furnished me for use in the book and cannot be reprinted.







INSULATOR OF THE MONTH
by E. C. Storey

Much of the credit for this month's insulator goes to Bob Brandt of Marion, Iowa. He sent me extensive information on CD 151's. He has found as well as a fine sepcimen for his collection. People like Bob make this column possible. If I receive as much information on insulators for the months to come, all should go well.

Bob found his insulators along the Rock Island; a midwestern railroad in financial trouble. Since railroads are a major source of insulators, I would like to mention a book that might make searching along them easier and more rewarding. The book is Right of Way by Waldo Neilsen. This lists abandoned railroad lines state by state and provides a good starting point for insulator hunting trips.

In future months we are planning the following:

Whitall Tatum #1
CD 145 H. G. Co.
CD 162. 5 P. L. W.
CD 112 Brookfield
CD 113 Hemingray #12

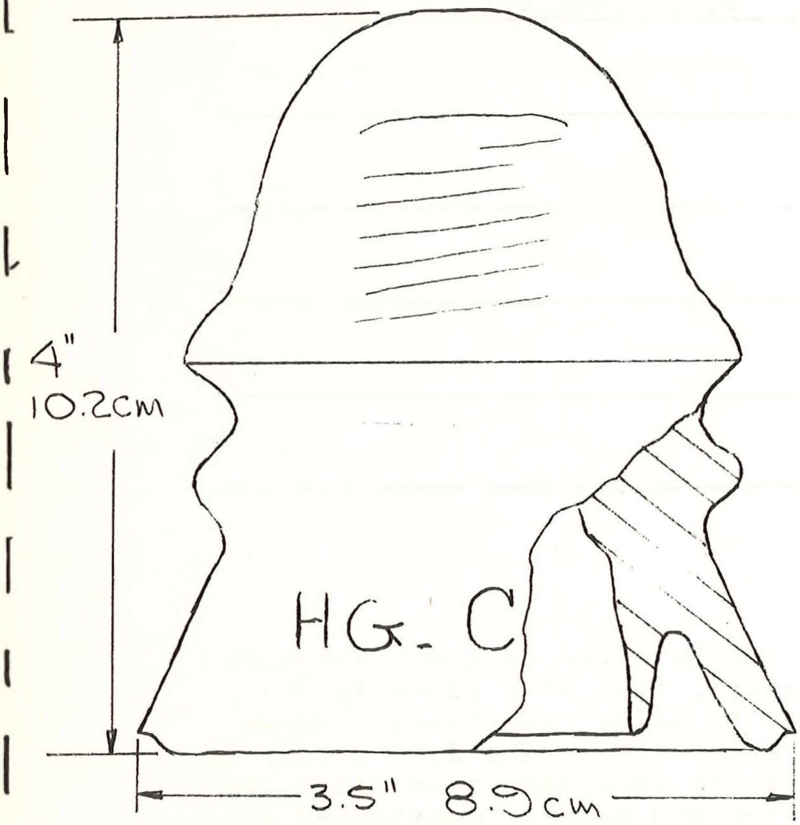
The last two seem to have two grooves. If any readers can explain the reason for the lower groove it would be most helpful.

Until next month,

Ed Storey
98 Apollo Dr.
Rochester, NY 14626

H.G. Co.

cd. 151



AQUA
LIGHT GREEN
LIGHT BLUE
BLUE
SATIN

DOUBLE PETTICOAT

SHARP DRIP POINTS

MARKINGS ON SKIRT

HG. CO. - FRONT
PETTICOAT - REAR

These insulators were probably made by the Hemingray Glass Company before they began embossing Hemingray on them. I have not seen any that say Hemingray on them but they have many Hemingray characteristics. Many are well made and mention Hemingray patent dates. Perhaps writing out Hemingray was too much work. Many have rather large letters and some of them seem as though the embossing was hand scratched into the mold.

There are several varieties to be found. Some have the Hemingray drippoint patent date under the H.G. Co. At least one has been found with this patent date blocked out and no drip points; indicating some users had ordered these without drips. H.G. Co. 151's have been found on the Chicago, Rock Island and Pacific in Iowa.

Record of Insulator

Where seen/found	Price/condition	Comments

History

Cd. 151 H G Co. insulators can be dated by their features. As they all have an inner skirt, they were probably made after the Oakman patent date in 1883. Similiarly, those with drip points were made after 1893. The drip points on the inner skirt as well probably were made soon after the patent was issued. Their need was quickly questioned and they were deleted shortly thereafter. Hemingray started using their whole name about the turn of the century. The fact that the mold lines do not extend over the dome further supports the 1890 - 1900 time period.

Cross Arms May 1975 by E. C. Storey

Hemingray Nº 9

by Charles N. Angevine

When I began collecting several years ago, I had no idea how many sizes, shapes and colors of insulators there were. This was before I had my first insulator book or knew that there was such a thing as a club of insulator collectors. After joining the Pole Cats, buying some books and attending some shows one thing became clear to me. I would never be able to have every different insulator I saw.

In January 1974, I was talking with Dennis McHenry, NIA Treasurer about my problem. Dennis is a long time collector and has nearly the entire Hemingray line. Within his collection he has a specialty group of Hemingray 9, CD 106. At that time he had 38 of them, all different and suggested that they would make a fine inexpensive specialty for me. The thought of so many different insulators by one manufacturer as well as the usually low price appealed to me. In February 1974, I began my specialty with a single insulator. Now, 14 months later the collection has grown to 72 peices, all different in one way or another.

Mr. N. R. Woodward in his book of insulator history states that the Hemingray 9 was introduced about 1900 and continued in production virtually unchanged until 1955 when it was re-designed. I believe that this run of 55 years is the longest production run of any insulator. I also believe that the 1955 re-design was quite major, and in later years when CD numbers were assigned the old 9 was given CD 106 and the new 9 was given CD 107. I have no proof of these assumptions.

Perhaps the long production run accounts for the variety found in the 9. Perhaps some of it can be attributed to the mold wearing over the years. Or perhaps different mold makers used some artistic license to create a slightly different looking insulator. Some-

a slightly different looking insulator. Some-

day perhaps I'll be able to answer some of these things. One person who may be able to supply some of the answers is Mr. Ern Parkinson of Muncie, Indiana. Mr. Parkinson, who worked for Hemingray for 41 years, has already been very helpful. Someday I hope to meet him in person and gather more information on this fascinating subject.

That's enough background information. Now I'll get on to explaining what makes the insulators different. The things I use to judge by are as follows; embossing, color, dome size, skirt length, drip points, manufacturing defects and embossing errors.

I have recorded 8 different embossing arrangements. This is without counting mold and lot numbers. If they were counted there would be no end to the arrangements. The list of arrangements would be more interesting if they were in chronological order. As it is they are in random order.

1. HEMINGRAY -9//MADE IN U. S. A.
2. HEMINGRAY/ Nº 9//PATENT/ MAY 2 1893 The 2 in this one is a script 2, like the old written Q.
3. HEMINGRAY/ Nº 9//PATENTED/MAY 2 1893
4. HEMINGRAY/Nº9//PATENT/MAY 2 1893
5. HEMINGRAY/ Nº 9//PATENTED
6. HEMINGRAY-9/0//MADE IN U. S. A. The O on the front is an alpha O and indicates the insulator was made by Owens-Illinois who bought out Hemingray in 1933.
7. HEMINGRAY //Nº 9
8. HEMINGRAY/MADE IN U. S. A. //Nº 9

Still on the subject of embossing, it should be noted that there are many different sizes of characters used. Sometimes there is more than one size on a single insulator. In most cases the embossing is very strong, regardless of the size.

I know that colors are seen differently by each person, but I feel I have recorded 14 different colors.

1. Clear
2. Near Clear
3. Straw
4. Pale Aqua
5. Aqua
6. Ice Blue
7. Normal Hem. Blue
8. A Darker Blue
9. Lime Green
10. Seven Up Green
11. Green Aqua
12. Emerald Green
13. Jade Milk Glass
14. Amethyst (various shades)

After the embossing and colors the next most apparent thing in looking at a group of 9's is the dome size. This is the diameter of the upper ridge of the wire groove. I have recorded 11 different sizes, ranging from 2 3/32" to 2 7/16".

The next most apparent difference is the skirt length. This is the distance from the end of the threads to the base. I have recorded 19 different lengths, ranging from 1/4" to 1 1/2".

The next difference is not nearly as apparent as the others, mainly because the insulator sits on them. Of course I mean the drip points. I finally gave up trying to record different drip shapes and settled on just 2; sharp and round. However, I have recorded 17 different numbers of drip points, ranging from 26 to 42. I also understand, some 9s were made without drips, but I have not seen any.

Manufacturing defects are usually easy to spot. I count in this category mixed colors and any other abnoralities. I have recorded 9 of these defects.

1. Amber swirls in Aqua
2. Amber Swirl in Ice Blue.
3. Jade swirl in Aqua.
4. Hemingray Blue full of tiny bubbles.
5. Ghosting of letters on crown, as if insulator fell back into the mold.
6. Varied size of drips on same insulator, as if too little glass was used.
7. Black streaks in Pale aqua.
8. Skirt not the same length all around, as if it settled to one side during cooling.

9. Jade and Amber swirl in aqua.

The last difference is the embossing errors. These are usually easy to spot, but sometimes they do take considerable looking. I have recorded 6 embossing errors.

1. 'N' in Hemingray was overstruck with a 'G'.
2. 'D' in Patented was omitted.
3. 'M' in Hemingray was double struck.
4. 'ED' in Patented was omitted.
5. 'HEMINGRAY/ Nº9' embossed over an attempt to blot out PATENT/ MAY 2 1893.
6. 'M' in Hemingray was overstruck with an 'I'.

Sorry to have been so long winded, but I guess my 72 insulators have quite a story to tell. Thanks for inviting me to tell as much of the story as I know or can guess. Perhaps someday I'll be able to add to it.

In the meantime, I woudl be glad to hear from anyone who has any information relating to the Hemingray 9. I am also interested in buying or trading for any 9s that are different.

NIA ANNOUNCEMENT

The Second Great Lakes Insulator Show to be held August 9-10, and sponsored by the Ohio Valley Insulator Club, is being NIA sanctioned.

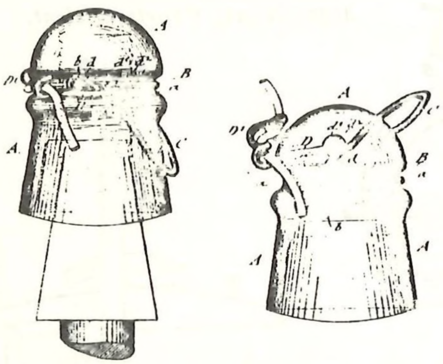
There is free admission to this show; open to insulators and lightning rod balls. Six foot sales tables are $6 per day or $11 for both days. Eight foot sales tables are $8 per day or $14 for two days.

45 tables are available. Exhibits are planned. Free on-site parking of self-contained campers is available for overnighting.

The show chairman is John McDougald, 4592 Andorra Drive, North Olmsted, Ohio 44070.

INSULATOR RESEARCH.......

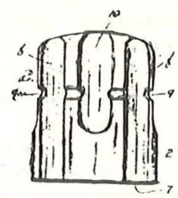
465,961. INSULATOR Giuseppe S. Albanese, Orange, N.J. Serial No. 387,517 (Patented December 29, 1891.



Claim.--The combination, with an insulator having an annular groove or neck, of a fastening device composed of a neck-band, a locking-lever pivoted to said neck-band, and a bail connected pivotally to the locking-lever and provided with a bent-up or hook-shaped portion for engaging the line-wire and applying it to the neck of the insulator when the lever is moved into locked position on the same, substantially as set forth.

2. The combination, with an insulator having an annular neck, of a neck-band provided with outwardly-bent ends a U-shaped looking-lever pivoted to the ends of the neck-band and provided with eyes forming fulera at some distance from the same, and a ball pivoted to the eyes of the lever and provided with a bent-up or hook-shaped portion for engaging the line-wire and attaching the same firmly to the neck of the insulator when the lever is moved into locked position on the same substantially as set forth.

1,140,040. INSULATOR. Robert A. Manwaring and James T. Hessel, New Haven, Conn. Serial No. 834,011. (Patented May 18,1914.



1. A single piece insulator having substantially straight sides, a central pin recess entering the lower end, and formed in its outer surface with a conductor groove extending throughout its length in a plane substantially parallel with the axis of the central recess.

2. A single piece insulator having substantially, a central pin recess entering the lower end, and formed in its outer surface with a plurality of conductor grooves extending throughout its length in a plane substantially parallel with the axis of the central recess.

3. A single piece insulator having substantially straight sides, a central pin recess entering the lower end and formed in its outer surface with a plurality of vertically arranged conductor grooves extending throughout the length in a plane substantially parallel with the axis of the central recess and with an annular groove arranged at right angles to the conductor grooves and intersecting the same.

201,615. INSULATORS FOR TELEGRAPH-WIRES. W. C. Johnson and Saml. E. Phillips, Charlton, England. Filed Aug. 22, 1877.

To all whom it may concern:

Be it known that we, WALTER CLAUDE JOHNSON and SAMUEL EDMUND PHILLIPS, of Charlton, Kent, England, have invented Improvements in Insulators for Telegraph-Wires, of which the following is a specification:

The object of this invention is constructing telegraph-wire insulators that they may contain a quantity of insulating hydrocarbon fluid, such as paraffine-oil, which will not support a film of moisture or dust on the surface, whereby we produce a better and more uniform insulation, especially during foggy and rainy weather.

We are aware that insulators have hitherto been made with inside cups or receptacles, containing paraffine-wax or other similar solid matter, and we make no claim thereto, our invention being limited to employment of the oil, or equivalent insulating fluid. By the use of the fluid instead of a solid, we secure a more perfect and permanent insulation, and avoid the danger of the insulation being destroyed, which is liable to occur in the event of the solid cracking or shrinking, or of dust setting on its surface and forming an absorbent for the moisture of the atmosphere.

The insulators, of porcelain, glass, or other suitable material, may have the fluid-receivers within themselves, the insulator acting as a cover, to shield the liquid from dust and dirt; or a separate receiver may be arranged under or within the insulator; or a metallic or other cover may be arranged above the fluid-receiver, which cover may be stationary or be caused to rotate by the action of the wind, whereby any web or filament may become broken.

The invention is clearly represented in the annexed drawings.

Figure 1—A is an insulator, of porcelain, of ordinary form exteriorly, the wire being fastened around or to the groove B, as is usual. This insulator is hollow, and has an internal lip, C, turned up, by which a receiver or reservoir is formed for containing hydrocarbon or other insulating fluid D. E is the stem or bolt by which the insulator is secured to the post, building, or other structure.

Fig. 2 shows a half-sectional view of an insulator, A, as a cover to a separate fluid-receiver, F, which is thus protected from dust and dirt. The insulator has a ring, G, dipping in the fluid for the perfect insulation of same.

Fig. 3 represents a half-sectional view of an insulator, by which a wire can be suspended in the usual manner. This insulator has its upper part recessed, to form a receiver or reservoir for the insulating-fluid D, and a cover, H, is fitted above, upon which, in some cases, we affix vanes or fan-blades I, as in Figs. 3 and 4, so that the wind may revolve it from time to time, and thus break any web or filament which might otherwise connect the insulator to the cover, and so to earth.

We claim as our invention—

1. In an insulator for telegraph-wires, a non-conducting fluid contained in a suitable cup or receptacle, and cutting off the surface connection between the wire and the exterior of the insulator, substantially as shown.

2. A telegraph-insulator having paraffine-oil or similar non-conducting fluid mounted therein, substantially as and for the purpose described.

3. A telegraph-insulator having a rotating cap, provided with a vane, substantially as shown, for the purpose of causing the wind to move the cap and break the continuity of any surface film of moisture which may form upon the insulator.

WALTER CLAUDE JOHNSON.
SAMUEL EDMUND PHILLIPS.

Witnesses:

JOHN SMITH, *Charlton.*
JOHN NEAL, *Charlton, Kent.*

W. C. JOHNSON & S. E. PHILLIPS.
Insulator for Telegraph Wires.

No. 201,615. Patented March 26, 1878.

Fig. 1

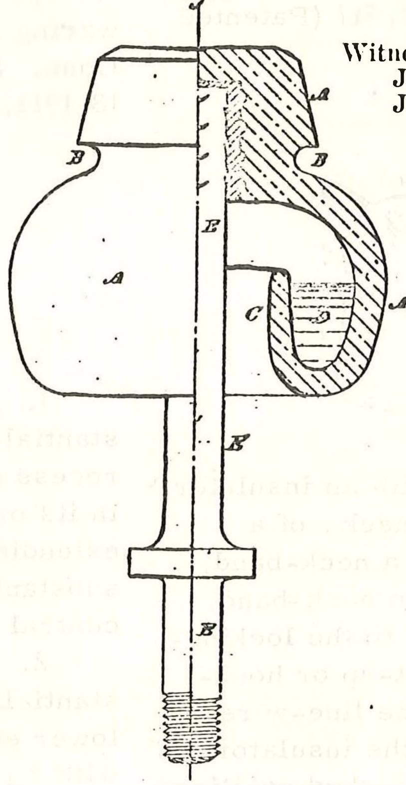


Fig. 3

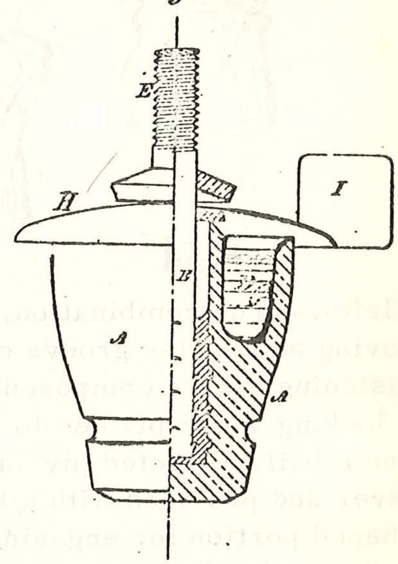


Fig. 2

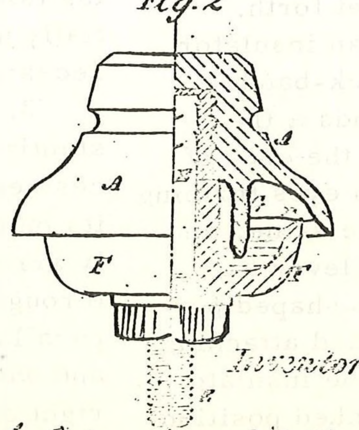
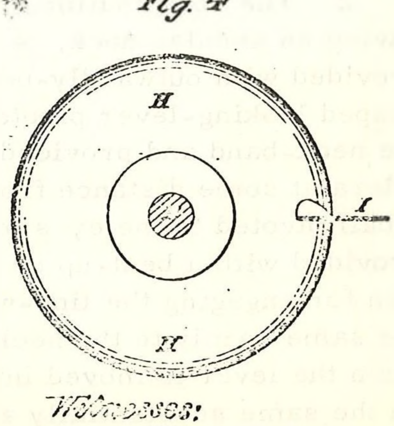


Fig. 4



Inventor:

Witnesses:

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GARY CRANFILL
5536 Keoncrest #2, Sacramento, California 95841
(SEND FOR A SAMPLE PAGE)

WANTED: Cobalt blue & SCA, for sale or swap CD 162 Lynchburg #36 aqua $5 - 3 different for $12; CD 164 Gayner 38-20 aqua $5 - 2 for $8. $1 postage, 1st- $.50 each extra. Bill Thompson, PO 1532, Bristol, Conn. 06010. 203-584-2888. 8

PORCELAIN INSULATORS Guide Book for Collectors, the standard reference for pintypes. Hardbound book plus all supplements, $14.90 postpaid. From author, Jack H. Tod (CA), 3427 N. 47th Place, Phoenix, Ariz. 85018. 5

FOR SALE. Manhattan, v.v.n.m., green, $25.00; #2 Columbia, mint, green, $80.00. Postage extra. Richard Case, 3227 Seward Ave., Apt #4, Rockford, IL 61108. (815) 398-1522. '

Will trade my lightning rod balls or insulators for your weathervanes. Good selection. McManis, 16006 W. Holdridge, Wayzata, MN 55391. 612-475-1595. 7

Wanted to Buy - CD 234 & 235 carnivals, purple, and SCA in quantity and CD 162, Percy Hill, 2254 Seracedar, Baton Rouge, LA 70816. 7

Common to scarce, color, too. Send SASE for latest list. Tommy Middleton, P.O. Box 45, Hawthorne, F Fla. 32640. 904-481-2318. '

RARE CABLE SALE = NEGM Straight Sides (heavy impressive cable style) aqua NM, $190.00; also have two mint aqua and two mint dark green NEGM straight side-write. CD 140 Oakman rim embossed Jumbo, lite aqua VVVNM, $190.00; CD 140 uneared Jumbo (no embossing (rare), aqua VNM, $200.00; CD 140 uneared Jumbo, lite green, rare color, VNM $250.00; CD 267 NEGM No. 4 (dated) bluish color, VNM, $175.00; CD 269 Jumbo with ears, Oakman, rim embossed, aqua VVNM, $225.00; CD 266, No. 5 Cable, aqua, top trade - write. All above open to part cash, part trade. What have you ? L. Veneziano 27 W. 115 Vale, West Chicago, IL 60185. 6

Will trade Californias, McLaughlins and Maydwells for CD 190-191 or parts. Chuck Irwin, 1707 S.E. 113th, Portland, Oregon 97216. '

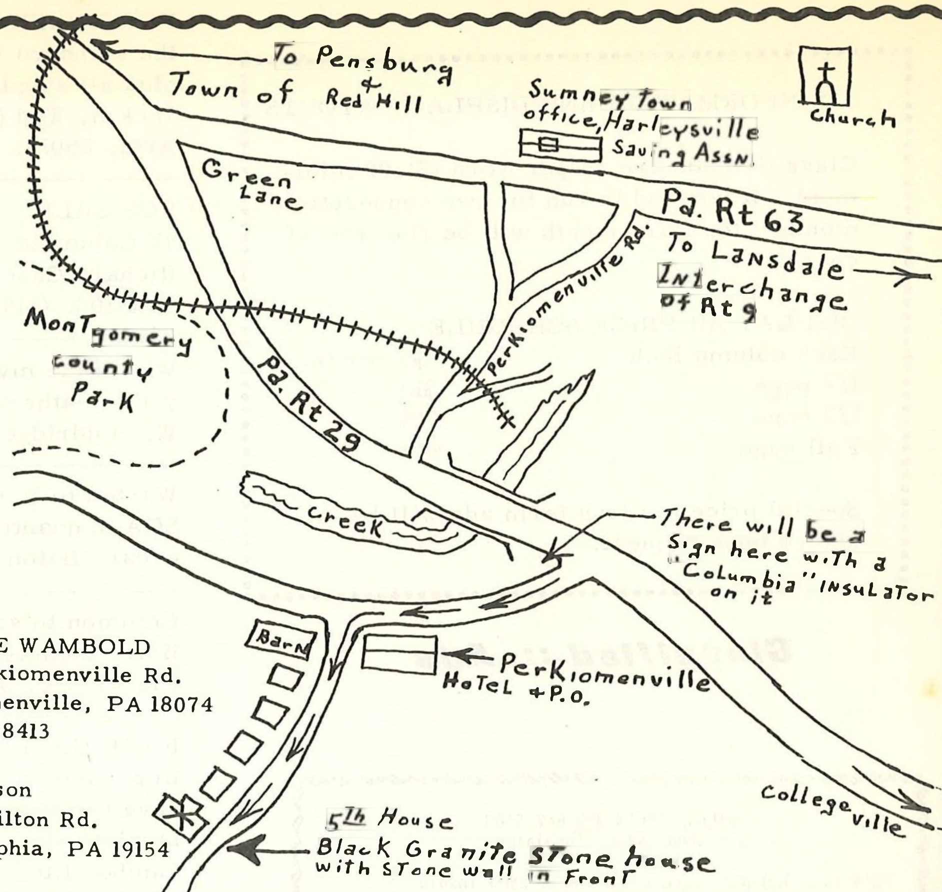
Specializing in cables and transposition. Want CD 270, CD 191 bottom K. Eme Eisenga, P.O. Box 8747, Stockton, CA 95208. Phone (209) 464-5198. '

U503 sim., UE, cobalt $8.00; U39 F. Locke, tan $8; U68 UE brown, $3.00; U90 Thomas, white, $20.00; U152 Cook, white, $3.00; U174 Pinco Pat. Applied For, brown $8.00; U249 Cook, brown, $8.00. Add postage, SASE, list. Lew Hohn, 96 Birchbrook Dr., Rochester, NY 14623. 716-334-2968.

WANTED: Old telephones (magneto, common battery) Also, old books or pamphlets pertaining to old telephones (before 1915-Western Electric, Stromberg Carlson, etc) L. N. Theysohn, 253 Union St., Hudson, NY 12534. '

INSULATOR LIST. Milkglass, carnival, etc. Common-rare. Stamped envelope, please! Phil Balkan, 5860 Tobias Ave., Van Nuys, Cal. 91411. '

On Saturday, June 28, 1975, the Delaware Valley Insulator Collectors will be having their 2nd annual "Free Bee". Rules are the same as last year. No charge for tables, bring your own. Trading only from 10:00 AM til noon selling from noon til 2:00 PM. Bring your own tables, chairs, food and of course insulators. This is a great chance for the little collector to have some great fun and improve their collection at little or no expense. Awards for displays this year, so come on out and set up. Bring your traders and help your collection.



INFORMATION:

CLAUDE WAMBOLD
522 Perkiomenville Rd.
Perkiomenville, PA 18074
215-234-8413

or

Bob Wilson
12612 Chilton Rd.
Philadelphia, PA 19154

SAN DIEGO INFORMATION

Temperature: Days 76' Nights 60'

Coming In By-

PLANE-Arrive Lindberg Field. Hotel guests call Hotel for pick up service. Cabs, bus, limonses service, and car rental available. 5 minutes or 2 miles from the Hotel

BUS OR TRAIN-depots are a few blocks from the Hotel.

AUTO-from I-5 take I-805 to 163 to Ash St. San Diego and turn right. 2 blocks away. ---from I-8 to south 163 to Ash St. San Diego and turn right. 2 blocks away.

Admission - FREE

6TH NATIONAL INSULATOR ASSOCIATION CONVENTION
July 11, 12, 13, 1975
El Cortez Convention Center, San Diego, California
Admission - FREE

TABLES - $36.00 for 3 days 8' x 30"
$28.50 for 3 days 6' x 30"

SECURITY- From Friday 6 A.M. to Sunday 8 P.M.

DISPLAYS - Free - If interested in displaying, please send a full description of display. Displayers will be notified of acceptance. Awards will be given.

SCHEDULE -

Fri. 11th -	6 A.M.-6 P.M. -	Dealers and Displayers Setup
	9 A.M.-6 P.M. -	Admission to N.I.A. Members Only
	7 P.M. -	N.I.A. Meeting - Open to All Collectors
Sat. 12th -	6 A.M.-9 A.M. -	Set ups
	9 A.M.-6 P.M. -	Open to General Public
	7 P.M. -	Banquet Dinner
Sun. 13th -	6 A.M.-9 A.M. -	Set ups
	9 A.M.-6 P.M. -	Open to General Public
	6 P.M.	Take Down of Displays and Sales Tables

SPECIAL NOTICES -
Convention Center totally air conditioned, carpeted and well lighted. Parking facilities adjacent to center 35¢ per day for non-hotel guests in parkade. No overnight parking on streets.

POSTAGE & INSURANCE, $1 first, 50¢ ea. additional

116	Pat. 1893, 1871, 1892, Pat App, med. aq, MINT	$27
110	BROOKFIELD, deep aqua, MINT	70
120	H. BROOKES, minor chipping, about NM, blue	22
123	E. C. &M. rare short style, deep blue aqua small base chip NM+	40
131.4	LGT, 2 pat. NM+	40
133	small diamond on dome top, AM. INS. CO. threads, black glass red amber (Boston area) VNM	90
133	same, aqua, wire groove chip	15
133	ELEC. SUP., Chicago, aqua VNM	18
133	AM. INS. CO (backward N) crude, misshapen, ice green, MINT	20
135	CHICAGO INS CO (base embossed-flake chip in one diamond, blue	30
136	BRO, BRFD, 45 Cliff-nice greenish aq. MLOD MINT	10
143	Great Northwestern Tel, aqua, NM+	18
144	PAT DEC 23 1890 on dome, crude, bubbly, flat rim chip, nice glass	35
144	No embossing, monor damage, med aqua	18
145	AM INS. CO., 3 pat, rich blue VVNM	10
145	EDR, VVNM	18
145	HBR, VVNM	20
162	H. G. CO., deep peacock, VVNM	27
162	H. G. CO., med amber, VVNM	15
162	same, deep amber, VNM	15
162	T-H. E. Co.-Pat 1883, MLOD-2 sm. rim flakes	9
162	Star w/drips, deep aq, VNM	9
166.2	E. L. CO. (Edison Light Co) small i. s. c., minor nicks	40
190/191	Diamond, royal purple, VVVNM	33
194/195	Hem. 54 A& B, purple, MINT	33
202	K, 2 inner skirt chips, aqua	12
208	CALIFORNIA, nice wine, dome sm. finger nail chip	20
240	PYREX-131, near clear, MINT	8
245	T-H 9200, blue aqua, amber swirl, VVNM	95
252	Knowles Cable Ins. (tall size), aqua, NM+	16
252	GAYNER-620, base chips	14
260	CALIFORNIA, rich sage, sm. inner sk. chip	27
261	Pointed-ear CABLE, deep gr. aq., VVNM	20
262	No. 2 Columbia, deep aqua, MINT	60
263	Columbia-no pat. date-scarce variety, beautiful light aqua, MINT	65
267	No. 4 CABLE, 2 large flat rim chips, top mint	25
267	same, but VVNM	85
288	MERSHON, aqua, VNM	25
288	LOCKE, 4 pat, aqua VNM	37
297	LOCKE, 4 pat. other pat pend, lt. aqua NM-VNM	12
316.5	No Name, no slash top variety, deep blue, aqua fingernail chip	27
320	PYREX-171, good carnival, MINT	24
	Baby bat ears, PRISM, 4 ribs, blue aqua, NM-VNM	125
	"mini-bird feeder" battery ins., dark cobalt, MINT	9
	same, small bruise	7
	same, smerald green, chip	4
	SPRATT PATENT 1890 (on "trigger") dk. green, MINT	10
	same, near mint	8

PETE SCHRIBER
19 MAPLE AVE.
HADLEY, MASS 01035
413-584-3808

Threadless egg for sale. 4" tall, in crude, cloudy, aqua glass. Some damage, worn condition. Also, a crudely-made white Elliot high hat with some damage, $125. Branham, 410 Hale St., Pennington, NJ 08534. (609) 737-2338.

NEW SPECIAL LIST. with emphasis on COLOR and foreign glass. Includes Mexican lime green 162.7's, RYT 155, Derflinger 1545 and a maverick-no CD (cross between 134 and 162.4). Also Australian bottles 160.7 & a 110.5 & 249. Send S. A. S. E. for list. Bronson Hoffman, 5110 San Aquario Dr., San Diego, CA 92109.

INSULATOR SNATCHER - Attached to a bamboo pole it will unscrew unused insulators from crossarms. Includes everything except the bamboo pole. Light weight, simple to use, and guaranteed. $3. Kelly Bridges, 3674 Conrad Dr., Baton Rouge, LA 70805

FOR SALE: Have some MINT CD 302, 7-inch Muncie aqua-$15.00 each. POSTPAID & INSURED. F-MUNCIE; B- HEMINGRAY/PATENT MAY 2nd 1893. Paul H. Houpt, 211 S. Chauncey St., Columbia City, IN 46725.

WANTED CD 152's. Lynchburg, H. G. CO., Mc - Laughlin, odd colored Hemingrays, what have you? Will buy or trade, Kelly Bridges, 3674 Conrad Dr., Baton Rouge, LA 70805.

CD 165.1 F-Whitall Tatum Co. Nº 5; B-Made in USA ice blue, $5.00; CD 164 F-Dominion 614; B-straw or lt. green, $5.00; CD 162.4 F-1678, lt aqua, $8.00; CD 162.4 F-1673, lt. aqua, $10.00; 734 McMicking, mint $275.00. Wilfred L. Secord, 21680-122 Ave., Maple Ridge, B. C., Canada VZX 3W9

Paying cash for threadless and rarer types of insulators or quantities. What have you?? SASE for new list. L. Veneziano, 27 W. Vale, West Chicago, IL 60185.

BOOKS--Complete your insulator library with "UNIQUE COLLECTIBLE INSULATORS." All about non-glass and non-porcelain insulators-$4.00 pp.-- "COLLECTIBLE PORCELAIN INSULATORS-SECOND EDITION"-$6.00 pp. "COLLECTIBLE PORCELAIN INSULATORS"-SUPPLEMENT"-$2.50pp. Order from author, Gerald Brown, Two Buttes, CO 81084.

I have a insulator I will take mail bids on, with money-back guarantee. CALIFORNIA # Helmet, C. D. 260 in beautiful bubbly red SCA. 1 3/8" saddle groove with amber swirls in the glass. Will ship to high bidder by July 1, 1975. Bids accepted in cash or trade. Value insulators for my collection Mint, glass colored-"Via Milholland's '75 Price list. --Also CD 131.4 NO NAME, very crude old bubbly lt. aqua with milk glass feather and swirls in it. PATENT/DEC. 19, 1871 side of crown, smooth base M. L. up to button-Back No-on side of dome. Same deal as above. Hank Durnil, 1822 Rockefeller, Everett, WA 98201.

NEW BOOK

'UNIQUE COLLECTIBLE INSULATORS'

ITS ALL ABOUT- Non Glass and Non-Porcelain Wood-Metal-Composition-hooks-Rubber-Plastic $4.00 postpaid

Also-"COLLECTIBLE PORCELAIN INSULATORS"- "Second Edition"--$6.00 P.P.
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CD 145 H.G. Co. with Petticoats

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I pay your price on those I keep. I pay all postage & insurance. All correspondence answered!

SHOW Calender

JUNE 13-14-15 — Shoshoni, Wyoming
Wyoming's largest annual barbed wire show and all other collectibles. Shoshoni, High School Gym. Info: Betty Metcalf, Box 51, Shoshoni, WY 82649. 876-2566.

JUNE 14-15 — El Paso, Texas
4th Annual Insulator, Bottle, and Collectibles Show and Sale, National Guard Armory, 9100 Gateway N & Hondo Pass. Info: Jerry Stevens, P.O. Box 6534, El Paso, TX 79912.

JUNE 21-22 — Anaheim, California
Orange County Collectors Show & Sale, Sheraton-Anaheim Motor Hotel. It will follow the National Association of Avon Clubs 4th Annual Convention. Info: Mike Reeder, Orange County Avon Club, P.O. Box 505, Garden Grove, CA 92642.

JUNE 21-22 — Greeley, California
CBWCA 7th Annual Western Collectable Show, Greeley Hill Hall. Info: Lee Dunlap, 10055 Ernest Road, Coulterville, CA 95311.

JUNE 22 — Washington County, Pennsylvania
Washington County Bottle and Insulator Club Show & Sale, Holiday Inn. Interstate 70, exit 4. Info: Bill Cole, RD#1 Box 342, Carmichaels, PA 15320 (412) 966-7996.

JUNE 28 — Perkiomenville, Pennsylvania
2nd Annual "Free Bee", 522 Perkiomenville Rd., Perkiomenville, PA. Info: Claude Wambold, 522 Perkiomenville Rd., Perkiomenville, PA 18074 or Bob Wilson, 12612 Chilton Rd., Phila, PA 19154.

JUNE 28-29 — West Monroe, Louisiana
Northeast Louisiana's Bottle & Insulator Club's 4th Annual Show & Sale, Moose Lodge, 1710 Glenwood Dr., Show Chairman Charles Smith, 1618 Evergreen St., West Monroe, LA 71291.

JULY 11-12-13 — San Diego, California
6th N.I.A. National Convention at the El Cortez Convention Center, 7th and Ash. Info: Maury & Addie Tasem, 519 Verdin St., El Cajon, CA 92021.

AUGUST 2-3 — Atlantic, Iowa
Southwest Iowa Insulator & Bottle Show & Sale, Best Western Country Squire Motel US 6 & Southbound 71. Info: Cecil Boos, RR1, Cumberland, Iowa 50843 (712) 774-5382

Richard Sharer, 2400 S.W. Watrous, Des Moines, Iowa 50321 (515) 285-0304.

AUGUST 9-10 — Fairview Park, Ohio
2nd Great Lakes Insulator Show, American Legion Hall, 22001 Brook Park Rd., exit 9 on Ohio Turnpike. Info: John & Carol McDougald, 4592 Andorra Dr., North Olmsted, Ohio 44070. (216) 779-8232.

AUGUST 23 — Redmond, Washington
Insulator Swap Meet, Happy Valley Grange Hall, 196 & NE 50 Info: Andy Brown, 7049-243 NE, Redmond, WA (206) 885-4826 or Dick Vaughn (206) 788-1381.

SEPTEMBER 27-28 — St. Louis, Missouri
1975 Central Regional Show & Sale, sponsored by the St. Louis Insulator Collectors Club at the Ramada Inn-South. Info: SLICC, P.O. Box 492, Baldwin, MO 63011 or call (314) 527-4853.

SEPTEMBER 27-28 — Grand Junction, Colorado
Western Slope Bottle Club will put on its 3rd annual bottle & insulator show & sale. Info: Bill Ellicott, 3289 E. 1/2 Rd., Clifton, CO 81520.

OCTOBER 12 — S. Burlington, Vermont
The First Vermont Insulator Show & Sale, Rice Mem. High School Gym, Proctor Ave., Info: Frank R. Anderson, NIA # 474, Lake Road, Charlotte, Vermont 05445.

OCTOBER 18-19-20 — St. Charles, Illinois
The 3rd Chicago Mid-West Jumbo Show, Kane County Fairgrounds, Randall Rd., Info: L. Veneziano, 324 Hawthorne Dr., Bensenville, IL 60106.

OCTOBER 26 — Cedar Rapids, Iowa
Insulator-Bottle Show at I.B.E.W. Hall, 1211 Wiley Blvd SW. Info: Dale L. Vincent, 283-22nd Ave., SW, Cedar Rapids, Iowa 52404 Ph. (319) 365-2480 or Noel. J. Motter, 2865-2nd Ave., Marion Iowa 52302.

NOVEMBER 1-2 — Columbia City, Indiana
The 3rd Hoosier Insulator Show, Swap & Auction, sponsored by the Ohio Valley Insulator Club. Whitley County 4-H Building. Info: Paul H. Houpt, 211 S. Chauncey St., Columbia City, Ind. 46725. Ph. (219) 244-5840

NOVEMBER 2 — Clifton Park, New York
Capital District Insulator Club of NY, 4th Annual Show & Sale, Clifton Park High School. Info: Co Chairman Grant Barnes, 24 Harlau Dr., Scotia, NY 12302, or Tom Louden, 126 Sixth Ave., Troy, NY 12180.

NOVEMBER 15-16 — Winter Haven, Florida
2nd Annual Central Florida Insulator Show & Sale. Info: Bob Alexander, 205 Whitman Rd., Winter Haven, FL 33880.