2016 PDF edition

Old Familiar Strains

a newsletter for collectors of radio strain insulators and related items

Volume 8 No. 1 February, 2001

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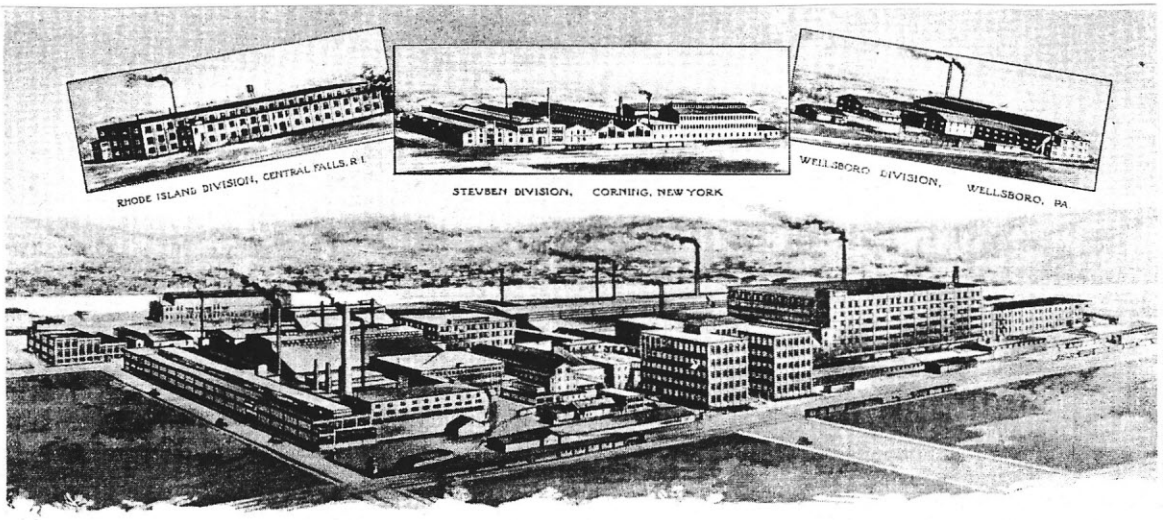
Key Dates in Corning's History

March, 1851	Union Glass Company founded in Somerville, MA
1864	Union Glass moves to Brooklyn, NY
1868	Union Glass moves to Corning, NY
1875	Corning Glass Works incorporated
May 27, 1919	Patent 1,304,623 issued for Pyrex glass
June 16, 1923	First claimed use of Pyrex trademark for electrical insulators
June, 1924	First known advertisement for Pyrex strain insulators
February 20, 1925	PYREX trademark registered for electrical insulators
Summer, 1925	Pyrex insulators go to the Arctic with MacMillan
January 22, 1929	Patent 1,700,066 issued for use of Pyrex for radio insulation
1937	Purchased MacBeth-Evans Glass Company
1943	Multiform glass insulators introduced
1950's	production of Pyrex radio insulators ceases
June 23, 1972	Corning Museum of Glass flooded



CORNING GLASS WORKS, CORNING NEW YORK
THE WORLD'S LARGEST MANUFACTURER OF TECHNICAL GLASSWARE

Corning Glass Works

This history is from "Insulators A History & Guide to North American Glass Pintype Insulators Vol. 1" by John & Carol McDougald © 1990. It is reprinted by permission. Illustrations have been added, and the format of the article was modified to fit the *OFS* publication style.

The Corning Glass Works traces it origins to a glass company in Cambridge, Massachusetts, in which Mr. Amory Houghton purchased an interest. By 1854 he had founded the Union Glass Company in Somerville, Massachusetts, and in 1864 bought the Brooklyn Flint Glass Company in Brooklyn, New York. The operation was moved to Corning, New York, in 1868 for the fuel and transportation resources. The company manufactured fine tableware and decorative glasses. The Corning Glass Works was incorporated in 1875 and their product line was expanded to include tableware blanks, thermometer tubing, and pharmaceutical glassware.

NONEX

The glassworks was always researching the concepts and properties of glass while trying to improve the quality of their product lines. By 1877 they were working on developing better railroad signal lenses by putting the focusing ridges on the inside. The American Railroads also needed a standard color system and through field research on color perception, the ideal colors were found to be red, yellow, and green. In 1908 the

Railway Signal Association adopted Corning's colors as standard, and lenses were mass-produced. Also in 1908, the Corning Research Laboratory was established which was one of the first in American Industry. Their research was directed at producing a glass that could withstand sudden temperature changes. By 1909, Corning was manufacturing lantern globes and battery jars of their non-expansion glass under the trade name of "NONEX."

PYREX

Through the time period of 1910 to 1920, the researchers at Corning were working on expanding the concepts of the NONEX line of glass products. Fred M. Locke, who was well known in the insulator-manufacturing field at this time, was also working on the development of various compositions of borosilicate glass. After much research, in 1909 he successfully produced a new insulator material he called "transparent porcelain." It had the capability of withstanding severe temperature changes. Locke developed boroporcelain by 1915, and a composition material called "borosilicon" soon after that. In all, he was granted eight patents for borosilicate glasses for the manufacture of insulators. Locke sold the rights to many of these different glasses to Corning Glass Works.

Various borosilicate glasses were produced at Corning with the desired properties of chemical stability, heat resistance, and shock resistance. One line of borosilicate glasses developed between 1910 and 1915 contained silica, alumina, boric oxide, and sodium oxide. It was filed with the U.S Patent Office on June 24, 1915, and had the trade name of "Pyrex." This PYREX line was immediately used in glass piping for chemical and food processing firms. Corning also developed their PYREX ovenware and was offering it for sale by late 1915. Laboratory glassware was introduced soon after this and became an industry standard.

The Corning PYREX glass formula was registered July 10, 1915, issued July 13, 1917, and was patented May 27, 1919, Patent No. 1,304,623. The *Official Patent Gazette* published the proposed PYREX trademark on February 10, 1925. It was granted to Corning Glass Works on May 5, 1925, Patent No. 198,173. The trademark "PYREX" designates a product of Corning Glass Works and, as such, carries the guarantee against defects of workmanship and material.

The same ideology of high quality control certainly was carried through to the Corning PYREX line of communication, power, and radio insulators. Initial consideration to use glass as an insulator material by the glass works is dated 1913. The borosilicate PYREX line mentioned above had the permanent characteristics of high thermal stability, while meeting the insulation requirements for high voltage transmission and distribution lines.

Corning was very interested in capturing the porcelain insulator

market by 1920, and they were using the following benefits of their PYREX glass line as selling points:

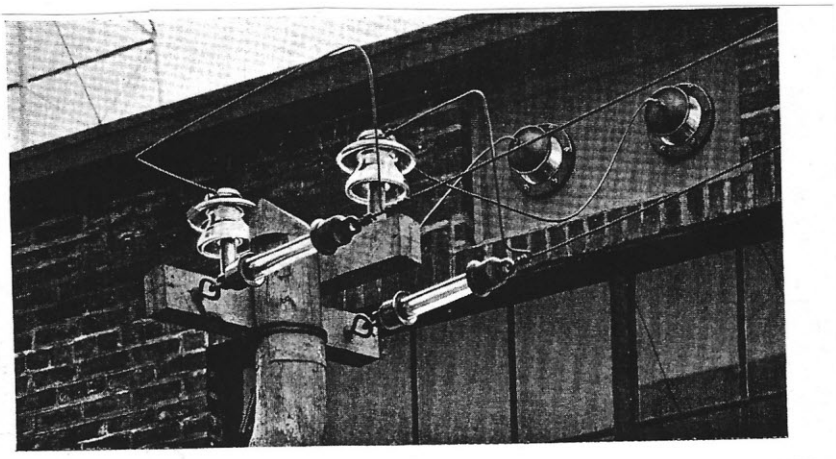
- PYREX insulators were homogeneous and nonporous, requiring no glaze to provide a strengthening cover
- The glass is transparent to solar heat, thus even in brilliant sunshine the insulator's temperature is raised only a few degrees
- The insulators are easily inspected for any internal defects from factory production, during installation, and while in service.

Suspension Insulators

By 1922, Corning was experimenting with suspension insulators on electrical lines in northern New York State. The researchers believed a PYREX suspension insulator could take the place of two porcelain units with the same factor of electrical safety. In 1924, the PRYEX suspension insulators were being offered for sale to American power companies. These units were eventually available in 6", 9", and 10" diameters and were manufactured through 1945.

Pintype Power Insulators

The Corning Glass Works laboratories were not interested in the development of pintype insulators at first, but by 1923 the three-piece PYREX stacker insulator was in use by the Montana Power Company. It is assumed that this unit was an early test insulator. The



A group of PYREX Power Line, PYREX Antenna and PYREX Navy Type Entering Insulators at Broadcasting Station WLW, Cincinnati.

The line shown transmits the radio frequency energy from the transmitter proper inside the building to the antenna coupling system, located in the house under the antenna.

stacker was soon replaced by suspension-type assemblies of three or more connected units. By using the same voltage characteristics, another likely replacement for the stacker is the one-piece PYREX 441 insulator that was designed in 1926. Other catalog models designed throughout 1926 include the 161, 661, 662, 271, and 401. After samples were sent to various power companies across the country, they were all mass-produced. In 1927, Corning Glass Works made available catalog models 131 and 233. The growing need for electrical service in the country at this time saw a ready market for related equipment, and by 1927, Corning Pyrex insulators were in service in thirty-seven states.

The thirty-eight-pound one-piece PYREX insulator model 701 was released for sale by Corning in January of 1930. This addition to their product line made PYREX insulators available for operating voltages from 6,600 to 70,000 volts. The pintypes made by Coring also include the model numbers 353, 453, 553, and 663, which were authorized throughout 1931. The actual production of these four insulators took place by 1932.

Radio Coating

An insulator's value when in use is determined by its electrical resistance. Corning experimented with the electrical resistance of glass made iridescent by a thin coating of tin oxide. This same process was used on PYREX suspension and pintype insulators starting in 1928. A build-up of electricity on insulators would reach a peak and discharge causing extensive radio static,

making reception impossible. The tin oxide treatment allowed the electricity to leak off the insulator without causing any static. All of Corning's PYREX insulators were offered in clear glass, while the majority were also available with tin oxide under the trade name "PRYEX-NOSTATIC." The nostatic surface is an inherent part of the insulator and will not peel, scale, or craze. The term "carnival glass" insulator results from the association of insulators being treated by the same process as glassware given out at carnivals in the 1920's and the 1930's.

Mold Markings

The mold markings on PYREX insulators were used to identify the electrical characteristics of the unit and to assure that the correct-sized insulator was used on any given power line. "Corning PYREX" and "PYREX" as mold markings apparently indicated the origin of the insulator's manufacture within the Corning Glass Works. The glassworks no longer knows the specific code for the letters and series of dots found on many of their insulators, but it is felt that these also somehow indicated some type of product-control method.
Many of the larger insulators such as the 553, 663, and 701 have their markings on the underside of the glass, reading through it. In this way, rainfall was supposed to help keep the unit clean. The marking "REG. U.S. PAT. OFF." that appears on virtually all of Corning Pyrex insulators refers to the PYREX glass patent of May 27, 1919.

Production Dates

Corning Glass Works produced power line insulators from 1924 to 1945, communication line insulators from 1926 to 1941, and radio insulators from 1924 to 1951. These production dates are for United States manufacture only.

Corning Celebrates One-Hundredth Anniversary

This brief, but insightful, history appeared in the 3/51 *Radio TV News* pg. 24-26.

Corning Glass Works is commemorating its hundredth anniversary this year with appropriate ceremony.

Founded in Somerville, Massachusetts in 1851 as the Union Glass Company, the firm moved to Brooklyn in 1864. Four years later the entire operation was transferred to Corning, New York by canal boat.

Today the company employs over 8,000 persons in the Corning area and over 4,000 in other cities where it maintains plants.

The newest of these branch operations is the recently opened television glass bulb plant in Albion, Michigan. Nearly 100 representatives of leading television tube manufacturers were guests of the company at the luncheon and specially conducted tour of the plant which were features of the dedication.

The Name Pyrex

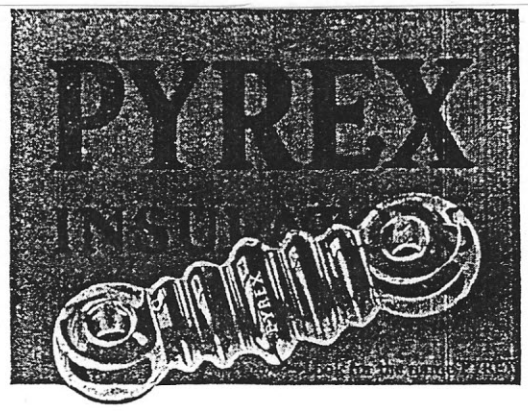
This article appears courtesy of the Rakow Library. Its source is not known.

There is a great deal of misinformation in regard to the formation and meaning of the word PYREX. A recent investigation disclosed the fact that only a very few people in the plant new the true facts.

Mr. V.M. Dorsey, the Company's Patent Counsel in Washington writes as follows on the subject:

"At a very early date and before any name was adopted, there was a suggestion made to advertise for a trademark. I think $5,000 was to be the prize, but while this was under consideration a number of names were being considered. I laid down one definite rule, that under no consideration must the trademark be descriptive of the goods. This was adhered to and PYREX has no meaning, although I think some fanciful derivation s have been put forth based on the Greek pyro and the Latin rex, which of course violates all rules of word formation. On the contrary PYREX was selected purely on its appeal to the eye and appeal to the ear. I remember Churchill pointing out that a word composed of letters that are written both above and below the line is more striking than a work the letters of which are written on the line. He instanced "Kodak" as a case of this, and also as to the value of a word of two syllables only. My recollection is that all kinds of combinations of consonants and vowels were tried until finally the PYREX combination was made and it was thought to satisfy all requirements."

Dr. Sullivan has added to this information that the name Fire Glass was seriously considered for a time. Then the Greek stem of Pyr- was tried with many suffixes. Pyrite became a candidate for favor, but finally the eye and ear appeal of PYREX won out, and although the word has, as Mr. Dorsey points out no meaning, it nevertheless has a reference to its heat resisting properties in the PYR prefix.



Make Your Set Weather-Proof!

Pyrex Insulators are used by the United States Government for the most exacting service. They must not be confused with ordinary glass insulators.

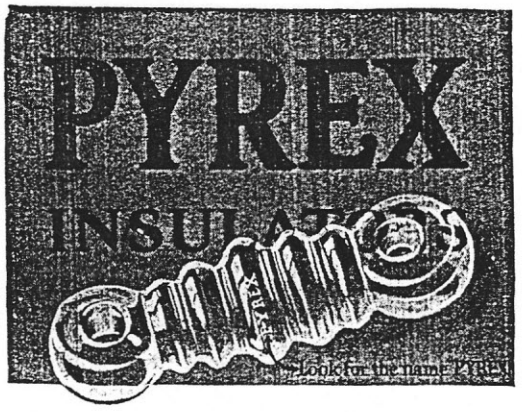
BECAUSE Pyrex Insulators are diamond hard and crystal smooth, they are not affected by rain or snow. Little drops of moisture cannot gather on them. They remain leakproof in spite of the weather. They continue to conserve every available bit of energy. Put in Pyrex Antenna Insulators and get more pleasure out of stormy nights. That's when you most want to use your set. They cost only 45c each at good dealers.

★

Industrial and Equipment Division

CORNING GLASS WORKS, CORNING, NEW YORK

World's Largest Makers of Technical Glassware



They thought he had bought a better set

Pyrex Insulators are used by the United States Government for the most exacting service. They must not be confused with ordinary glass insulators.

HE invited his friends to hear his radio. It sounded so much clearer; it brought in the distant stations so much louder that they thought he had bought a better set.

"No," he said, "It's the old set—but I've put in Pyrex Antenna Insulators. Now I get every bit of energy that's on the air. These insulators really insulate—they don't let energy leak away. And they cost only 45c each."

★

Industrial and Equipment Division

CORNING GLASS WORKS CORNING, NEW YORK

World's Largest Makers of Technical Glassware

Fred M. Locke and Corning

The following excerpts are from Elton Gish's fine book *Fred M. Locke a Biography* and are use by permission of the author.

In his book, *Fred M. Locke a Biography*, Elton Gish discusses Fred Locke's experimentation with glass formulations that were quite similar to those used in Corning's Pyrex glass. Although the whole story is too long to reprint here, Elton's research has provided several key insights into the relationship between Locke and Corning:

- Locke did not invent Pyrex
- Corning purchased exclusive license agreements to manufacture insulators using Locke's patented glass formulas.
- Corning likely manufactured glass insulators for Locke
- Corning's famous Pyrex Flameware stove-top cookware was based upon one of Fred's patents.

Here it is in Elton's words:

Pyrex vs. Locke Boro-Silicate Glass

When research for this book was begun, a relationship between Fred [Locke] and the Corning Glass Works was uncovered, however no hard evidence could be found. Several newspaper accounts reported that Fred invented Corning's Pyrex glass, but newspaper articles are notoriously poor sources of facts....

First, one thing needs to be set straight. Fred Locke did not invent Corning's Pyrex glass. On June 24, 1915, Eugene Sullivan and William Tyler, who were researchers for Corning, filed a patent application for several formulas of boro-silicate glass for their use in baking dishes....

The major differences of Corning's glass from Fred's various boro-silicate glass formulas was that it had about 2% more silica (common sand), slightly less boron, and about four times as much alumina (1.8% vs. 0.4%). The coefficient of expansion was actually lower for some of Fred's glasses than the Pyrex glass formula.

The licensing agreements

On the first page of the Locke/Fry [Glass Company] agreement [10/18/19] was a reference to two license agreements that were dated July 1, 1919. Those two agreements licensed Fred's boro-silicate glass patents to Corning. This implies that Corning licensed the same Locke glass patents and patent applications that were being licensed to Fry, with the exception that Fry's non-exclusive license did not allow them to make insulators.....

Locke's Glass Insulators

The interesting part of all this is that Fred granted Corning an exclusive license to use his boro-silicate glass patents in making insulators. The exclusive license means that *only*

Corning could use his patents for that purpose and no one else. Apparently Fred had given up on the idea of making insulators. This is credible evidence that Corning had been making Fred's insulators....If they did make insulators for Fred, then Corning already knew that there were problems, particularly with cementing the metal caps and pins on suspension disk insulators. Corning started experimenting in earnest to find improved production techniques to manufacture insulators and to solve the cementing problem after receiving the license from Fred on July 1, 1919. It was not until 1922 when their first experimental suspension insulators were put on electrical lines in northern New York. Two years later, in 1924, they had finally perfected the Pyrex glass suspension insulator and began to offer it for sale to American power companies. However, the Pyrex trademark has been used on electrical insulators since June 16, 1923, on glassware and bakeware since, May 20, 1915, and on lab ware since December 8. 1915. The development of Pyrex cookware followed a similar extensive experimentation stage in order to perfect the manufacturing process.

Pyrex Flameware

After Coring purchased the exclusive rights to the Locke patent [No. 1,529,259 granted 3/10/25 for alumino-silicate glass], they began an extensive testing and experimentation program in the late 1920's to convert this glass to products for top-of-stove use....The result of their work was the development of Pyrex Flameware dishes that could be used for stove-top service. The final glass composition was slightly different from any shown on Fred's 1925 patent, but the fact remains that it was derived from the Locke glass which contained a high percentage of alumina and incorporated significant amounts of boric acid, calcia, and magnesia as claimed in the patent. Starting in 1936, Corning used this glass to make millions of Pyrex Flameware coffee percolators, double-boilers, saucepans, and the like for a period of more than 40 years. This alumino-silicate glass survives today. It was used for viewports and windows in all of the space vehicles the U.S. has ever sent up in space.

All quoted passages are from pages 241 – 245 of *Fred M. Locke a Biography* by Elton Gish. The book was published in 1994 by Infinity Press, Buna, TX. The work is copyrighted and is used by permission of the author.

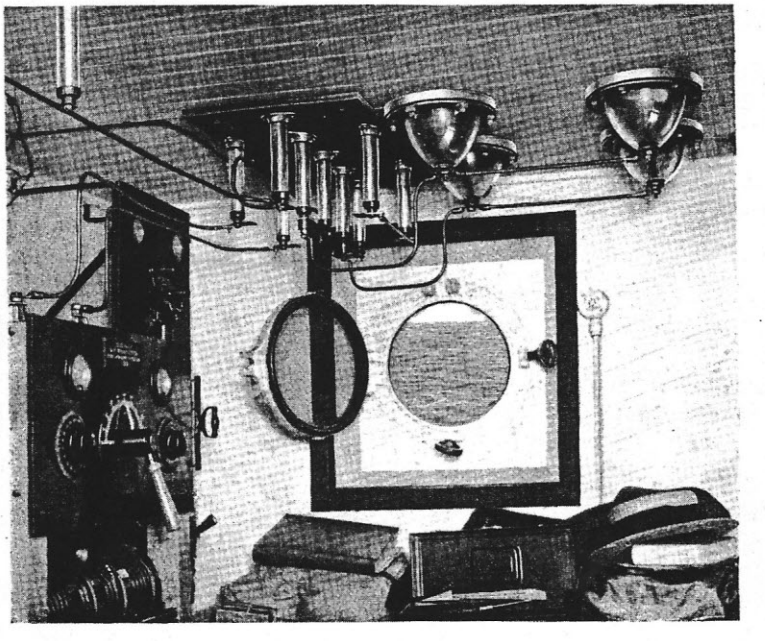
T. M. REG. U. S. PAT. OFF.

PYREX

A MARK OF CORNING GLASS WORKS

RADIO INSULATORS

Where they are used
and
what leading authorities say about their performance



CORNING GLASS WORKS
CORNING, NEW YORK, U.S.A.

Corning Glass Insulators at Work

Stories in this section explain just a few of the many interesting ways that Corning Pyrex radio insulators have been used.

Pyrex Amateur Transmitting Insulator

By John Lewis

(This story originally appeared on page 3 of the December, 1995 issue of *Crown Jewels of the Wire* and is reprinted by permission).

Recently, I placed an ad in an amateur radio magazine for glass radio insulators. After receiving several calls and purchasing 30 or so insulators, I received a very interesting call from a ham radio operator, David Collins, KB2FB, which I would like to share with you.

Mr. Collins, a mechanical engineer with G.E. Corp., told me of a farmhouse he moved into near Scotia, NY, where he found a box of 7" clear Pyrex insulators in the original boxes stored in the attic. This aroused his curiosity so he decided to investigate.

He found out that, in 1920, General Electric bought the farm so they could construct an experimental radio-transmitting site. Dr. Alexanderson, who worked there, conducted radio and TV experiments, and part of this work involved the construction of a 20-meter transmission station.

In 1930, using probably miles of longwire antennas strung over the hillside behind the farmhouse, G.E. was successful in transmitting the first around the world radio communication. They used forty, twenty, and fifteen-meter relay stations to send a signal to California, to Hawaii, on to the Philippines, from there to Europe, and finally to the G.E. receiving station just outside of Albany, NY, in the Helderberg Mountains.

Later the receiving site became the transmitting site for G.E.'s pioneer radio station WGY/WGFM and early TV station WRGB. The RGB stood for Dr. **R**. **G**eorge **B**aker, a pioneer inventor, who worked for G.E.

Eventually, the farmhouse was sold but the receiving site is still in use as the location for the three commercial stations named above.

The true value of the insulators that I purchased is not just their condition, but the part they played in making radio communication history.

Radio Central

By Dan Howard

This story originally appeared in the April, 1997 issue of *OFS.*

From 1921 to 1951, RCA's Radio Central station was operated at Rocky Point, Long Island New York. In 1928, the station was referred to as "the largest and probably the most interesting radio station in the world." Giant antennas suspended on steel towers 410 feet high stretched across some 6,000 acres.

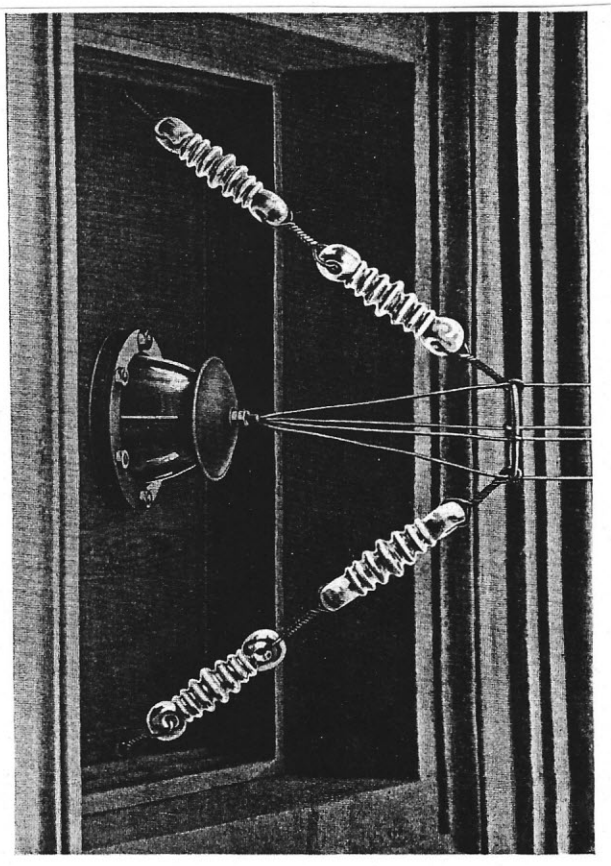
In his book, Wireless Communication in the United States, Thorn Mayes says that 10 200KW alternator transmitters feeding 12 VLF antennas were originally planned but only two were built. These two worked so well, and technology was changing so fast, that they never built the rest.

In 1922, vacuum tube transmitters were tried for the first time and a series of smaller 200' antenna towers were built. In the mid 1920's, the station participated in trans-Atlantic exchange of radio facsimile transmissions!

The alternators were finally removed and the station was closed in 1951.

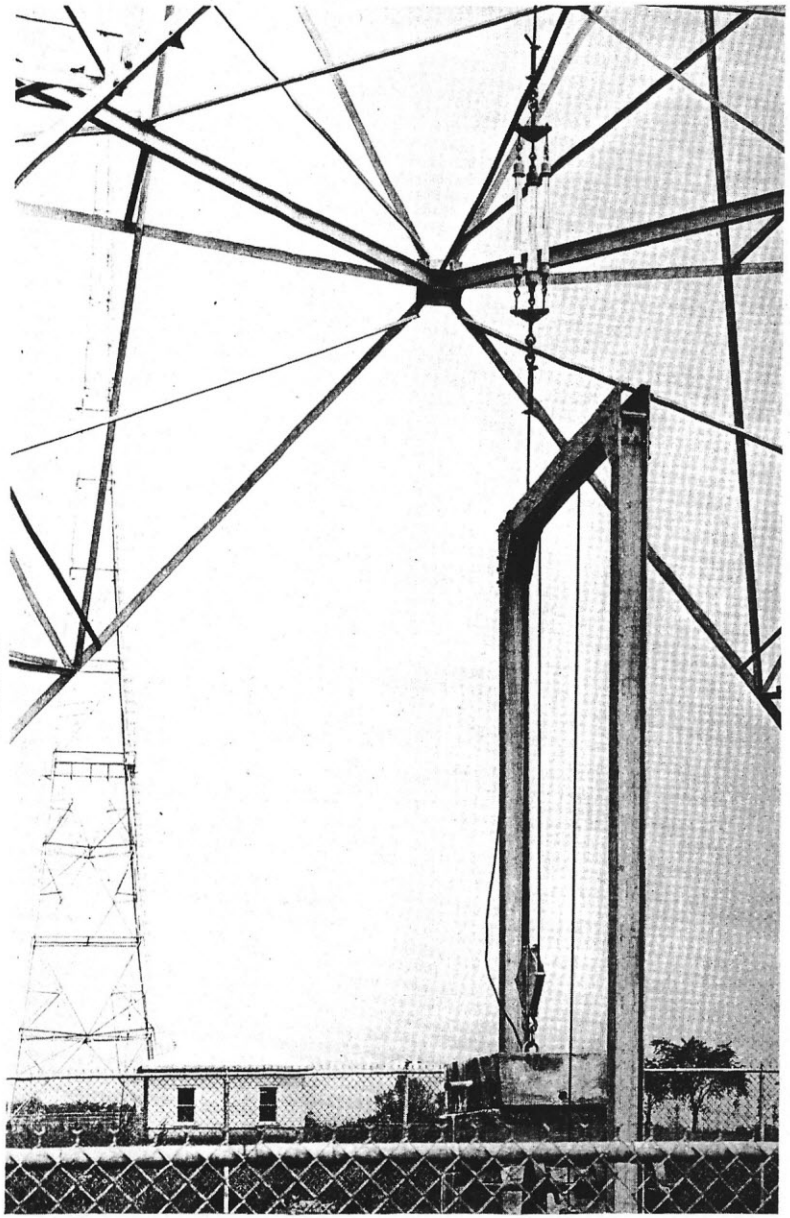
So, what does this have to do with collecting strain insulators? Recently an *OFS* patron donated some Corning Pyrex 7-1/2" glass strains that he had acquired from Marshall Etter – W2ER, the chief engineer at Radio Central. According to our benefactor, the early round-ended strains were used on the station's wire receiving antenna system.

These ads show Pyrex insulators at work at other high-powered stations.

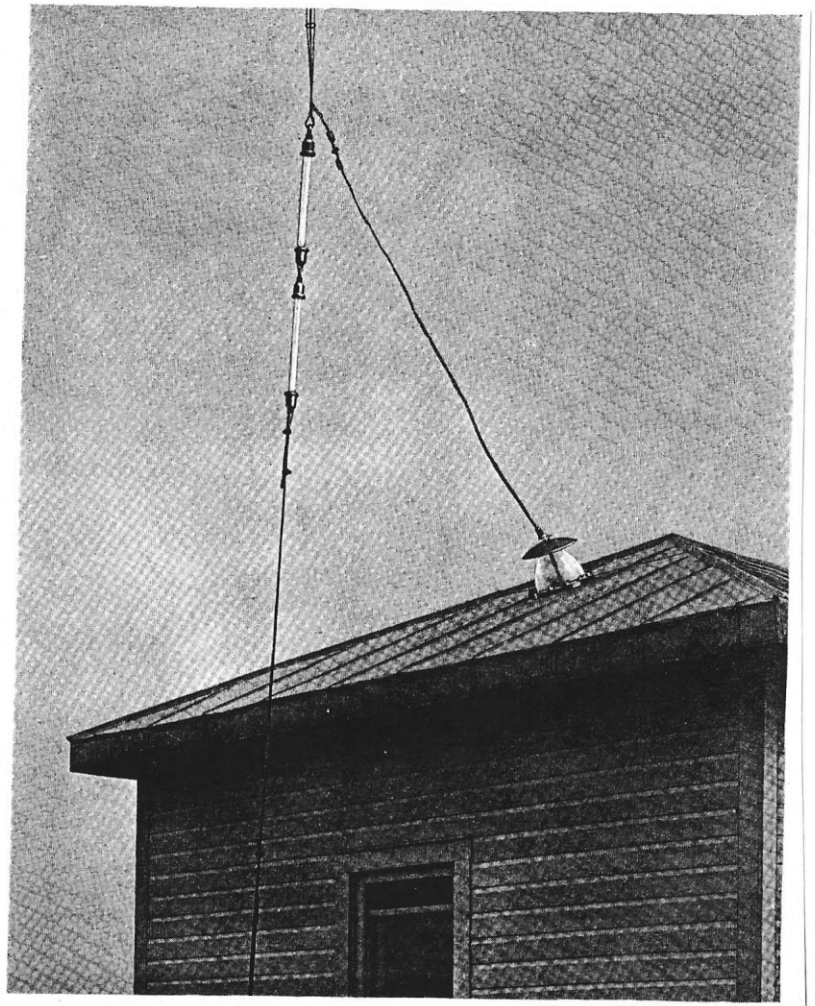


Lead-in through PYREX Entering Insulator at Broadcasting Station WQAM, Miami, Fla.

"We use PYREX Insulators of six different types, find them better than other insulation we have used, durable, and a real help in protecting quality of transmission, especially in damp atmosphere, and in maintaining long transmission range."



Take-up mechanism for keeping the antenna taut between the two 300-ft. towers at Broadcasting Station WLW. The antenna is only 126 ft. long, but to keep the ends far from the towers, the latter are 600 ft. apart. The antenna suspension is fixed at one tower and the tension is controlled by a winch connecting with the other end which extends down from the other tower. A freely suspended weight of 2700 lb. holds the antenna taut and provides "give" under wind action. The three PYREX Navy Type Strain Insulators on the tension line are set between triangular plates to distribute the pull equally among them.



The second view shows the lead-in to the antenna coupling house through a PYREX Navy Deck Type Entering Insulator. The line is insulated by the two 30-in. PYREX Navy Type Strain Insulators connected in series.

Pyrex at the Pole

This article is from the September, 1925 issue of the *C.G.W. Bulletin* published by the Corning Glass Works, Corning, New York. It appears courtesy of The Rakow Library.

Arctic exploration, prior to the present development of radio communication, meant severing of all ties, and a silence – lifted only by the return of explorers, or by word from a relief expedition when it first touched port on the homebound trip.

In those days a journey into the Arctic meant, for the friends of the explorers, months of anxiety and fear, and for the world at large ceaseless speculation – and sometimes unknown tragedy with only imagination to fill in the details.

Radio has altered all of this, and today the MacMillan expedition fighting its way through the ice fields, is in constant touch with friends and the world. Wireless reports from the explorers are featured in the daily press, and the news of yesterday's happenings in the frozen North are read at the breakfast table. The explorers themselves listen to concerts and news items sent out from our broadcasting stations – and have the world for companions instead of the white silence of the snow and ice.

Nothing marks the progress of radio quite so vividly as a comparison of the MacMillan 1923-1924 Expedition and this present voyage. The 1923-1924 expedition carried a wireless that represented the best equipment then available – but there were breaks of weeks without a message, although amateurs throughout the country sat waiting through the nights to catch the faint whisper of Don Mix's code. Disasters were envisioned, then a garbled message would come through and anxiety was relieved only to be followed by another silence.

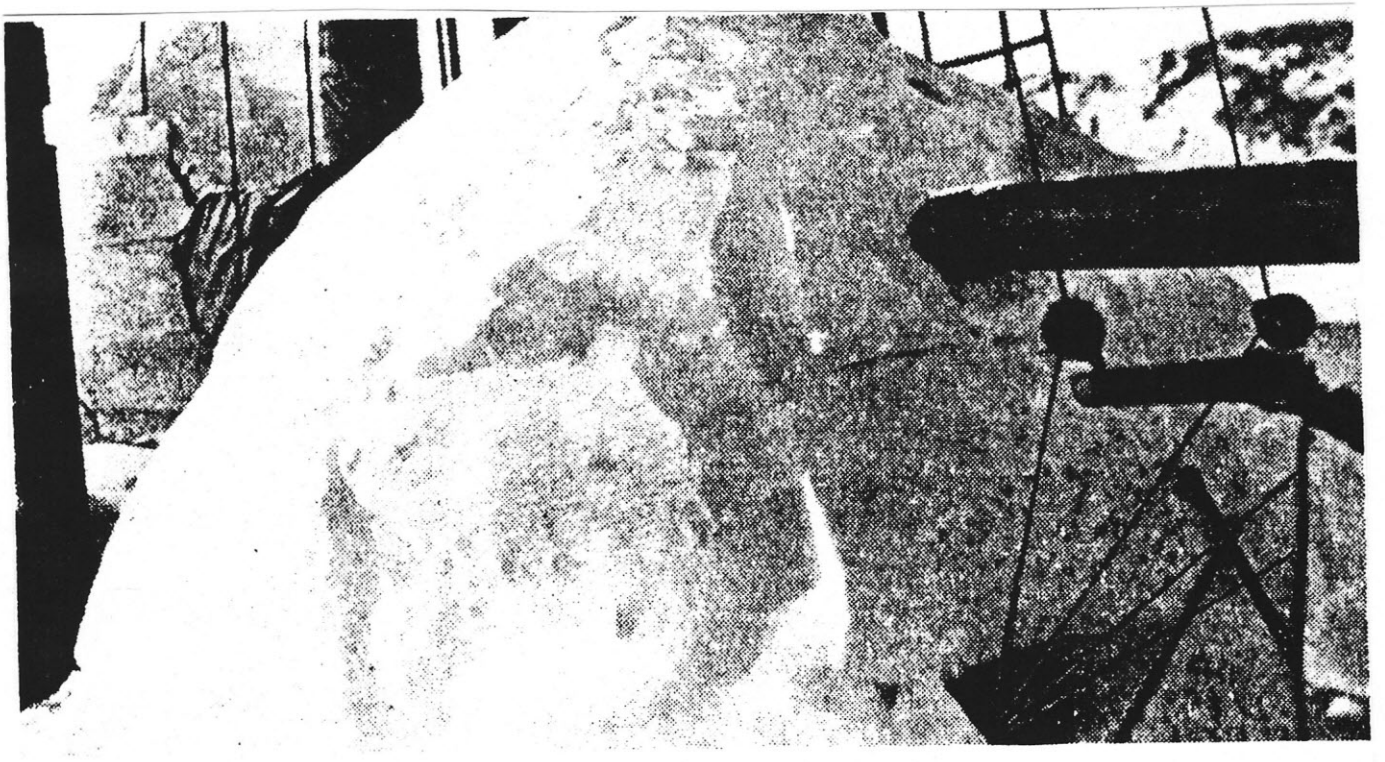
The results of the use of wireless on the "*Bowdoin*" in 1923-1924, unsatisfactory as they were, nevertheless indicated the place wireless could occupy in another expedition, so when the present voyage was projected the wireless equipment received as much consideration as the ships themselves. The aim was constant communication, not only with the world, but between the units of the exploring, party, now enlarged to two ships ("*Bowdoin*" and "*Peary*") and three U.S. Navy seaplanes.

Various types of transmitters were tried out: the final decision being to use a standard Navy set and a special low wave apparatus designed by John Reinartz on each ship, and a small transmitter operated by batteries on each plane.

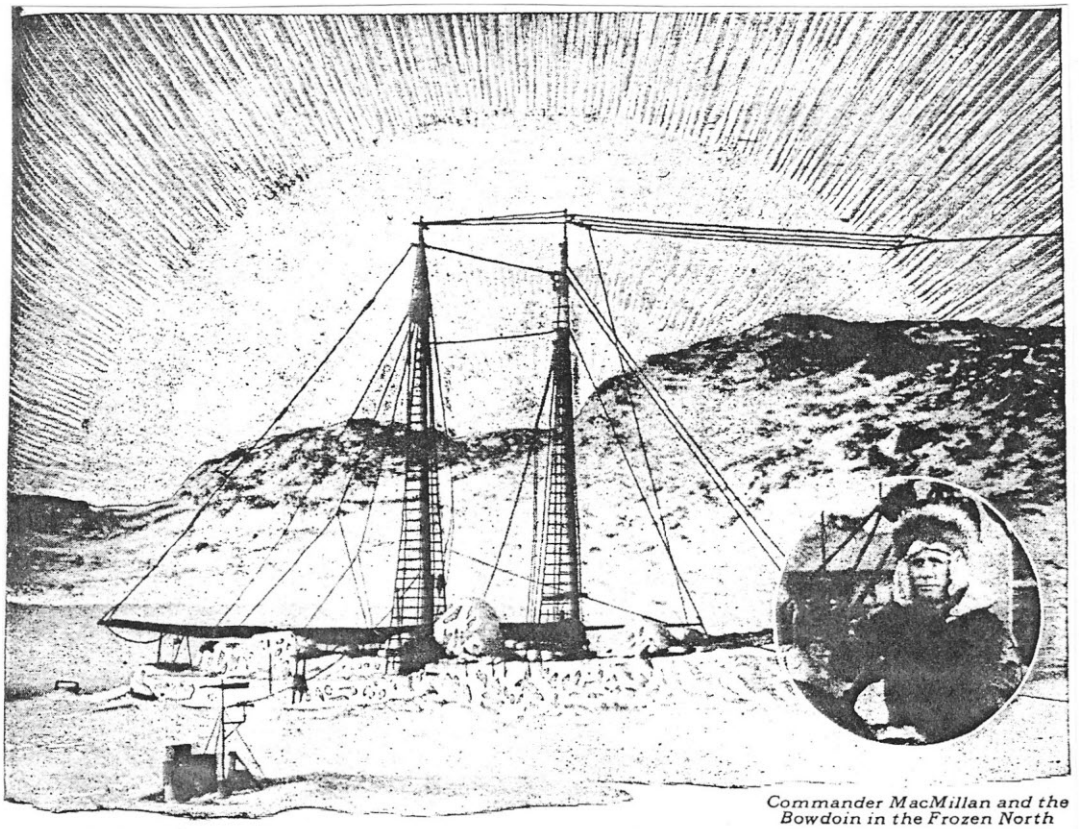
Ships and planes were equipped with antennae of the best designs, and the question of insulators which could be depended on under extreme conditions of service was settled by selecting PYREX. In the case of the planes, standard broadcast reception insulators were used to support the antennae, while on the "*Bowdoin*" and the "*Peary*" regular transmission insulators and lead-ins were employed.

The selection of PYREX as the antennae insulators for the MacMillan expedition is a high compliment to the efficiency of PYREX; and the results now being obtained – the other day a "*Bowdoin*" message was copied in New Zealand – are evidence of the wisdom of the choice.

It is interesting that Reinartz who designed the low wave transmitters and receivers for the expedition, and who is on board the "*Bowdoin*" as wireless operator, was the first amateur to install and test out PYREX transmitting insulators. Reinarts carries a temporary rank during the "*Bowdoin*" voyage as a Lieutenant in the U.S. Navy, and in private life is the electrical engineer of Cheney Bros., of South Manchester, Conn.

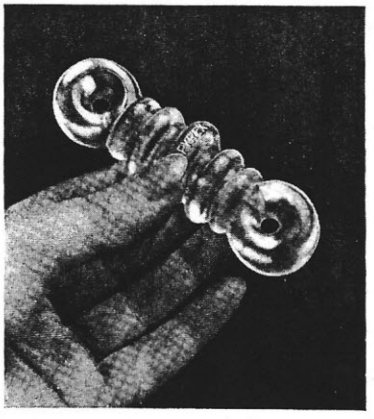


THE WINTERTIME LEAD-IN arrangement on WNP. An igloo was erected over the forecastle hatch, and in this a port was cut for the wires to enter. The four wires of the antenna dropped vertically from the foretopmast to a short spreader mounted on the winch, and thence to the lead-in insulator within the igloo. (Photo by Mix.)

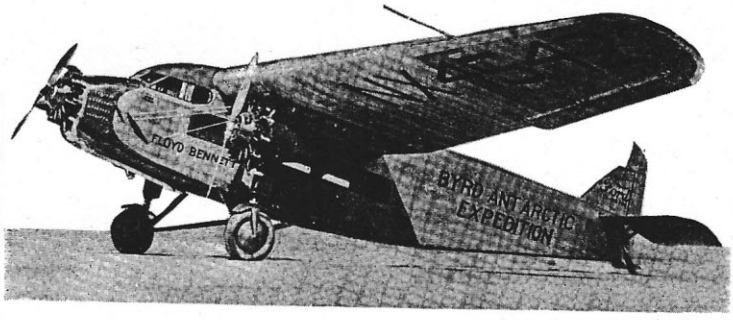


Commander MacMillan and the Bowdoin in the Frozen North

With MACMILLAN *in the* ARCTIC



One of the four **PYREX** Insulators used by Commander Byrd on the antenna of the plane in which the flight across the North Pole was made.

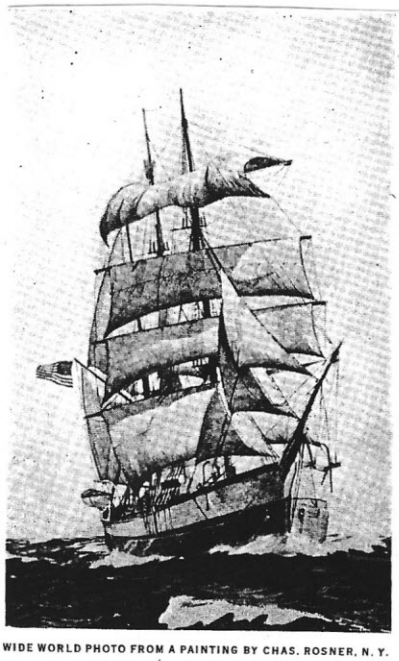


Chief flight plane of the Byrd Antarctic Expedition. Radio set equipped with PYREX Insulators.

With Commander Byrd at the North and South Poles

From the Pyrex 1929 catalog pp. 5-6

Commander Byrd and his technical advisers so clearly recognized the importance of [good insulators] that the radio equipment taken on the Byrd Arctic expedition was equipped with PYREX Radio Insulators.
Similarly, the airplane, *America*, in which Commander Byrd flew across the Atlantic Ocean, was equipped with PYREX insulators.
After these two grueling tests it was indeed a striking tribute to their worth that Commander Byrd equipped his Antarctic expedition with PYREX Insulators exclusively.
It was on this expedition that Commander Byrd established the extraordinary record of two-way communication between his plane, *Stars and Stripes*, and the New York Times Radio Station in New York city, 10,000 miles away.
Commander Byrd and Lieutenant Hanson, Radio Engineer of the expedition, both feel that their confidence in PYREX Radio Insulators has been amply justified.



WIDE WORLD PHOTO FROM A PAINTING BY CHAS. ROSNER, N. Y.

The "City of New York" of the Byrd Antarctic Expedition.

Questions of General Interest

This material originally appeared in the February and April, 1998 issues of *OFS*.

When did Corning make Pyrex radio strain insulators?

According to one source, the company made radio strain insulators from 1924 to 1951 (1:131).

Additional correspondence with Mr. N.R. Woodward leads to a different answer. Mr. Woodward produced the enclosed "1955" price list, in a 1996 letter to *Crown Jewels of the Wire* magazine. He confirms that, according Corning's Electronic Sales Division, production of pin insulators had ceased by 1955, but they were still making a limited line of wall and antenna-type insulators. He also pointed out that durable goods such as strains are easily warehoused for sales long after production has ceased. Who knows when the "last" Pyrex strain was sold.

Note also that at the time of the price sheet, 1955, strains were apparently being produced at the Corning New York Glass Works, while the wall tubes were apparently being produced in Parkersburg, West Virginia.

PRICE LIST
INSULATORS

GLASS 7740 PYREX

TITLE	PRICE PER PIECE 10 to 99	100 up	
Tube, wall insulator, 9/16 in. O.D. x 6 in. long	$ .50	$ .25	Std. Tubing Ctn.
Tube, wall insulator, 9/16 in. O.D. x 12 in. long	.70	.35	Std. Tubing Ctn.
Tube, wall insular, 9/16 in. O.D. x 15 in. long	.80	.40	Std. Tubing Ctn
Insulator, antenna, 7-1/2 in. long	1.75	1.75	1 Pc/ Pkg., 12 Pkgs/Ctn.
Insulator, antenna, strain, 12-1/4 in. long	3.50	3.50	1 Pc/Pkg., 12 Pkgs/Ctn.

Glass components of other types of insulators will be quoted upon request.

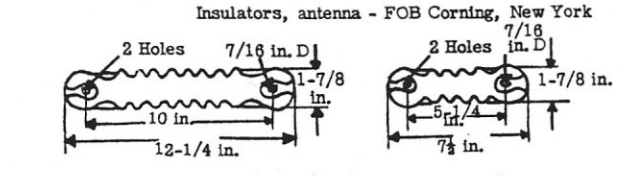
Packages are included in prices listed above.

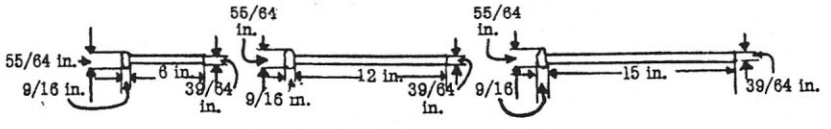
Minimum order: $5.00

Terms: Net 30 days

Shipping Point: Tube, wall insulators - FOB Parkersburg, W. Va.

Insulators, antenna - FOB Corning, New York





ELECTRONIC SALES DEPARTMENT
CORNING GLASS WORKS
CORNING - NEW YORK

How many styles were made?

Corning catalogued three sizes of all-glass strain insulators:

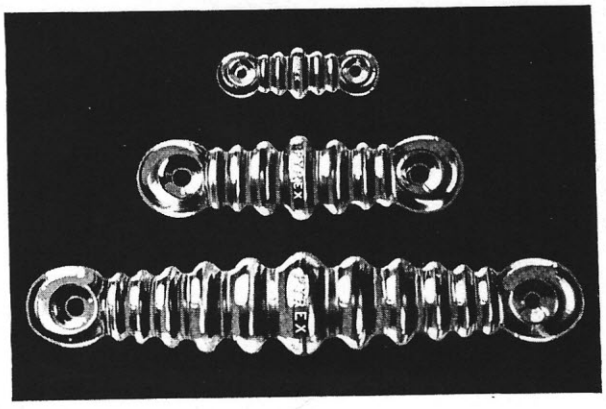
- 3-1/2" "Broadcast Reception"
- 7-1/4" "Amateur Transmitting"
- 12-1/4" "Strain Insulator"

Each size was assigned a catalog part number that did not change. However, two larger sizes went through very significant restyling. When first produced, the insulators had round ends and ribs that tapered from the middle to the ends. In the 1930's, saddleways were added and the number of ribs decreased. Later the company stopped using tapered ribs and reinforced the ends. Again, the number of ribs was decreased.

Jim Singleton estimates that the 7-1/4" and 12-1/4" strains with the simple, round ends were made from 1924 until 1934. The strains with saddleways were made between 1935 and 1945, and the strains with the reinforced ends were made from 1945 until the end of production (2:1). (These are "educated estimates." To date, we have not been able document them.)

Corning made other types of insulators for radio work as well. Standoff, lead-in, and feed-thru insulators were made. Large tubular-glass strain insulators with metal ends called "Navy type" were made in several lengths. Pyrex glass wall tubes are shown on page 46. A Pyrex glass johnny ball insulator appears on page 39.

Standard PYREX Radio Insulators
PYREX ANTENNA INSULATORS



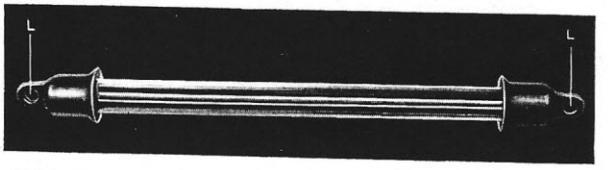
What are Navy Type insulators?

The importance of the U.S. Navy in the development of radio really can't be over-emphasized (see *OFS* 10/98). The Navy was quick to appreciate radio's ability to provide over-the-horizon communication with ships. So, from the first, the Navy worked with civilian contractors to develop reliable long-range radio communications equipment.

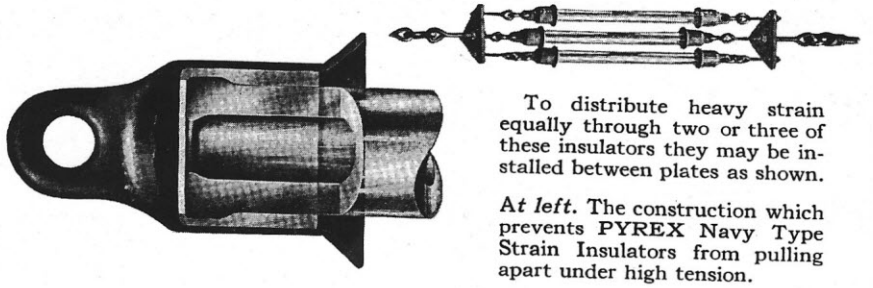
As shown on the following page, Corning developed several sizes of large Navy Type insulators. Ranging in length from 12" to 32", these big brutes were intended for high-powered broadcast stations and large ship antennas. According to advertisements, each Navy Type insulator was tested to a strain of 3,500 pounds during the factory inspection process. Despite this incredible strength, special brackets

PYREX STRAIN INSULATORS—NAVY TYPE SE-2193

Every Type SE-2193 PYREX Radio Insulator is actually tested to 3,200 pounds pull strain.



No.	Average Length (L.toL.)	Outside Diameter of PYREX Part	Weight	Developed Leakage Path	Average Flash-over Value (Kv.) Wet	Dry	Price Each
67045	12 in.	1⅞ in.	8 lb. 10 oz.	3⅞ in.			$18.50
67044	16 in.	(same for	9 lb. 6 oz.	7⅞ in.			18.50
67043	18 in.	all Type	9 lb. 12 oz.	9⅞ in.			18.75
67052	20 in.	SE-2193	10 lb. 2 oz.	11⅞ in.			19.00
67053	22 in.	Insulators)	10 lb. 8 oz.	13⅞ in.			19.50
67046	24 in.		10 lb. 14 oz.	15⅞ in.			20.25
67054	26 in.		11 lb. 4 oz.	17⅞ in.			21.00
67055	28 in.		11 lb. 10 oz.	19⅞ in.			21.75
67008	30 in.		12 lb.	21⅞ in.	129.5	219	22.50
67048	32 in.		12 lb. 6 oz.	23⅞ in.			22.50



To distribute heavy strain equally through two or three of these insulators they may be installed between plates as shown.

At left. The construction which prevents PYREX Navy Type Strain Insulators from pulling apart under high tension.

were made so that several insulators could be used in parallel, making them able to carry even more weight!

Unlike the smaller sizes, Navy Type strains are made from hollow glass rods. The cast metal ends have three small mounting holes on the flared skirt. I believe that these are for mounting corona shields. They could also be used for attaching a strap for "bonding" the metal end to the conductor.

Although I've not examined more than a handful of Navy strains, all have been marked one of two ways. The stylized marking probably dates from the 1920's and may be a variation of the CGW logo. This mark is pressed into the metal.

Later markings mirror those used on the all-glass types. The words "Pyrex", "Made in USA", and "PAT 1700066" are shown in raised letters. Both types of markings are illustrated on page 40.

Were they made in colors?

Yes. We believe that they were made with a carnival finish, in "milk glass," and in an opaque finish.

Tin oxide was applied to many Pyrex pintype and suspension insulators to minimize radio static (1:131). This

created a "carnival glass" finish.

To date, only one Pyrex strain with a carnival finish has been reported. Graham Barnes displayed the 7-1/4" insulator in the combined strain display at the NIA National Convention in Chicago (1997).

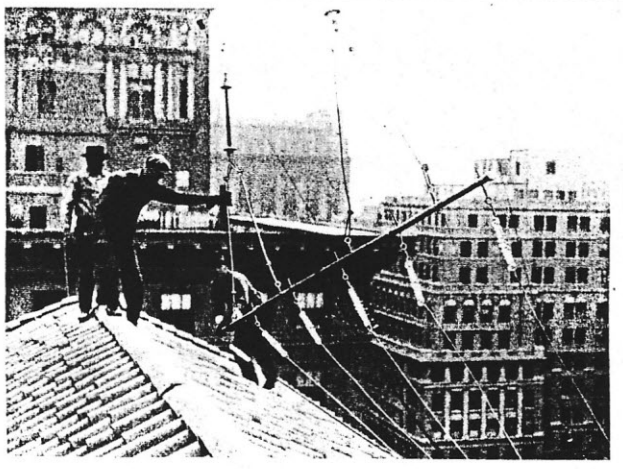
I would be keenly interested to hear from any reader who can document any other colored Pyrex strains.

Corning made johnny balls in its "Multiform" glass in the 1940's (see page 42). Multiform glass has a white appearance that is similar to milk glass. None of these insulators has been reported by readers.

In the 1934 Pyrex catalog and the 1945 *Radio's Master* listing, Corning offered several sizes of lead-in bowls in "opaque" glass. I do not know how the glass was made opaque or what the resulting color was. I have a photo of a blue lead-in bowl that may be an example of the "opaque" insulators described in the catalogs.

What do the 2-letter codes on the strains mean?

Like some other glass insulators, many Pyrex strains are embossed with mold numbers. Look for a 2-letter or letter-number code on the back of the insulator. We believe that this is the number of the mold in which the unit was formed (1:131). The reported mold numbers for each style are included in the photo section.



INSTALLING PYREX INSULATORS AT STATION WRNY
HOTEL ROOSEVELT, NEW YORK CITY

Who used Pyrex insulators?

Nearly everybody!

Pyrex glass is known for its superior qualities including a low coefficient of expansion. This makes it very rugged. After their introduction in the mid-1920's, Pyrex strain insulators earned a reputation for durability even under adverse conditions.

Pyrex insulators were used *exclusively* on several early explorations of the polar regions (3:14). The U.S. Army, the Navy, the Coast Guard, the airmail service, and the other Government departments used Pyrex insulators. Corning's Navy supplier code was CBI (4:71).

In 1943, the American Standards Association published a set of standard specifications for Glass Radio Insulators for military use. The standards for glass strain insulators appear to have been created directly from specifications for the three families of Pyrex

strains! For more information on military strains, see page 46.

Judging from the numbers surviving today, it would not be an exaggeration to say that many thousands of each style were sold.

For some "real life" stories on how Pyrex antenna insulators were used, please turn to page 15.

Why were they phased out?

Changes in the 1950's prompted manufacturers to stop making many types of strain insulators, including Pyrex.

I believe that there were three key factors:

- More homes began sporting TV antennas than outdoor radio antennas during this period.
- Many commercial broadcasters had converted from large wire antenna arrays to loaded towers.
- Less expensive and more durable insulating materials such as plastics and fiberglass were becoming available.

The ad below, from 1945, shows some of the company's post-war production, with the 12" strain sporting the reinforced ends.

T.M. REG. PYREX U.S. PAT. OFF.

RADIO INSULATORS

for

BETTER RECEPTION · BETTER PROTECTION · BETTER TRANSMISSION

The isolation of radio frequency currents and their confinement within definite circuits demand the use of non-conducting materials possessing an unusual combination of electrical and physical characteristics. Radio frequency currents tend to leak over to adjacent conductors, and materials which may offer a fairly effective barrier to the passage of currents of low frequency sometimes prove to be conductors, or at least inefficient insulators, at radio frequencies.

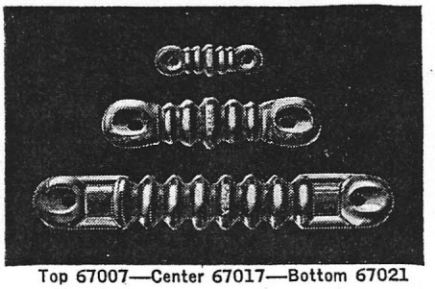
Essential properties for satisfactory radio insulation are low power loss, low surface conductivity, high electrical resistance, a hard smooth surface, stability against corrosive influences, and a high strength-to-weight ratio. These properties must remain permanent and unchanged by age, exposure to the elements, and the continued impact of radio energy.

Performance, which alone has won for PYREX Radio Insulators their present day supremacy, is the direct result of the inherent properties of the glass composition from which they are made. PYREX Radio Insulators are made of a material whose dielectric constant is 4.7 at 740,000 cycles, and whose power factor is 0.42% at 740,000 cycles. The surface conductivity is so low as to be practically negligible. The specific gravity is 2.23, so that in PYREX Radio Insulators the dual advantages of light weight and high electrical strength are combined.

The stability of PYREX Radio Insulators against corrosive influences renders them immune to the attack of acid fumes, smoke, fog and salt sprays. For this last reason, PYREX Insulators are widely used for marine communication systems.

PYREX Radio Insulators, because of their coefficient of expansion of 0.0000032 between 19 deg. C. and 350 deg. C., are indifferent to heat shock and abrupt temperature changes. Tropical sunshine does not create strains within them. The sudden chill of a summer hailstorm does not affect them.

PYREX Insulators have played their part in many spectacular examples of extreme service. They have been with Commander Byrd at the North and South Poles. They were an important part of the radio equipment of the Louise A. Boyd and the MacGregor Arctic expeditions. The Atlantic Ice Patrol sends warnings of icebergs over antennae equipped with PYREX Radio Insulators. They are used by the United States Army Signal Corps, the Coast Guard, the Navy, and the Lighthouse Service. On your own equipment they will perform the same duties and provide the same unfailing service.



Top 67007—Center 67017—Bottom 67021

PYREX ANTENNA INSULATORS

For Superior Sending and Reception. For Longer Life and Trouble-Free Service.

No.	Description	Length Over-all	Developed Leakage Path	Average Flashover Value (KV) Wet	Dry	Minimum Ultimate Strength	Price Each, List
67007	Broadcast Reception Insulator	3 5/8"	2 9/16"	28	42	300 lbs.	$ .25
67017	Amateur Transmitting Insulator	7 1/2"	6 1/16"	54	70	800 lbs.	1.00
67021	Strain Insulator	12 1/4"	11 3/16"	87	121	1000 lbs.	3.00
67003	Galvanized Shackles for installing 67017 or 67021; one pair per insulator; price per pair						1.00

Technical Questions on Pyrex Glass

What is "dielectric constant?"

In several ads, Corning uses physical properties, such as "dielectric constant" to differentiate the quality of its Pyrex glass from ordinary glass. One such advertisement says that, "At a frequency of 500 Kilocycles, Pyrex has a dielectric constant of 4.9 and ordinary glass has a dielectric constant of 6.8 to 8.0."(6:66) So what is a dielectric constant?

Douglas Miner defines dielectric constant as "the ratio of the capacitance of a condenser containing a given dielectric to the capacitance of the same condenser with a vacuum for dielectric. (7:8)

Now, *in English*.

Insulators and other materials are commonly evaluated in terms of their electrical capacitance and their "resistivity" (ohms per cubic cm). Insulators should have a high resistivity and a low capacitance. **The dielectric constant compares the capacity of an insulating material to that of vacuum (the perfect insulator).**

This table compares figures from Miner's book that show the dielectric constant and resistivity of three classes of materials: conductors, semiconductors, and good insulators. As you can see, Pyrex glass rates *very* well in both categories.

Material	Dielectric Constant	Resistivity
Conductors	30 to 100	0 to 10^6
Semiconductors	6 to 30	10^6 to 10^{12}
Good Insulators	< 6	> 10^{12}
Pyrex Glass	4.9	10^{15} ohms (at 22°C)

What is phase angle difference?

The ASTM defines phase angle as "the angular difference between the sinusoidal alternating potential applied to a dielectric and the component of the resulting alternating current having the same period as the potential difference" (9:24).

The power factor (PF) of a dielectric can be expressed as the cosine of the phase angle (9:24).

So, **the phase angle is an indication of the efficiency of the dielectric** (insulating material).

The phase angle difference of Pyrex glass has been variously described as .16° (10:58), .25° (11:60), and .3° (12:71). In contrast, Corning says that ordinary glass has a phase angle difference of .4° to .6° (10.58).

Pyrex Strain Insulator Boxes

Three styles of boxes have been found so far, and there must be more.

Orange Boxes

The earliest boxes that we have found probably date from the 1920's. They feature an orange background with black lettering (an example is shown in color in *OFS* 4/99). The early boxes are marked with Corning's 5/27/19 glass patent (#1304623). Thus, I have to assume that they predate the 1929 glass formula patent (#1700066) that is shown on later insulators.

Gray Boxes

A second type of box is predominately gray in color. Although they are very similar, I believe that the gray box predates the red box, the third style, because of the simplicity of its design.

Red Boxes

The red box adds the word "brand" after Pyrex, reflecting increasing sophistication. It is shown in color in the 4/98 issue.

All three styles of boxes are shown together on page 5 of the 10/99 issue.

Other Boxes

In addition to these, I believe that there is probably a "plain brown" box of some type that would have been used for Corning's military production. Materials packaged for the Signal Corps and the Navy generally came packed as such with the military stock number and other data printed on.

I can't wait to see what the box (or more likely the *crate*) looks like that the Navy Type insulators came packed in.

Supposedly a Portland-area collector has a *case* of the Amateur Transmitting insulators. If they ever come out of his attic, I'll be sure to get a picture into *Old Familiar Strains.*

Corning Trademarks and Patents

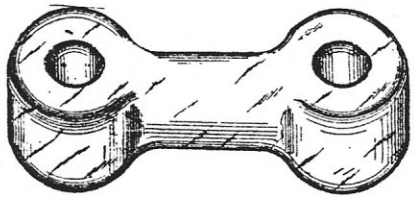
Trademark styles often change over the years and can be one means of dating a company's production. I have reproduced several styles of Corning logos here. The CGW logo is the earliest, dating from the 1920's. Except for the earliest styles most Pyrex strains carry patent number 1700066. As shown below, the patent covered the glass formula rather than any particular insulator design.

Ser. No. 197,868. (CLASS 21. ELECTRICAL APPARATUS, MACHINES, AND SUPPLIES.) CORNING GLASS WORKS, Corning, N. Y. Filed May 31, 1924.

PYREX

Particular description of goods.—Electrical Insulators and Electrical Insulating Compound.
Claims use since June 16, 1923.

1,700,066. INSULATOR FOR RADIO FREQUENCY CURRENTS. ALBERT EDWARD MARSHALL, Baltimore, Md., assignor to Corning Glass Works, Corning, N. Y., a Corporation of New York. Filed July 17, 1924. Serial No. 726,507. 2 Claims. (Cl. 173—28.)



1. In a system carrying radio frequency currents, the combination with a part charged with such currents, of an insulator therefor composed of a glass having a high silica content, a low alkali content and containing boric oxide.

CORNING GLASS WORKS

CORNING, N. Y.

Glasses of special chemical composition, with unusual properties, for special purposes

PYREX BRAND

Laboratory Ware
Pharmaceutical Ware
Tubing
Cylinders
Battery Jars
Lantern Globes
Gauge Glasses
Fuse Plugs
Piping
Thermos Bottle Blanks
Insulators
Lenses
Industrial Glassware
Filter Glasses
Ovenware
Flameware
Teapots and Teakettles
Nursing Bottles
Coffee Making Ware
Percolators

VYCOR BRAND

Industrial Glassware
Laboratory and Pharmaceutical Ware
Filter Glasses

STEUBEN BRAND

Artistic Glassware
Architectural Glassware
Lighting Glassware

CORNING BRAND

Electric Lamp Bulbs & Tubing
Radio Tubes
Thermometer Tubing
Neon Sign Tubing
Railroad, Marine and Aviation Lenses and Glassware
Light Filters
X-Ray Ware
Dental Glassware
Theater Equipment Glassware
Tableware
Tumblers
Optical Ware
Christmas Ornaments

MACBETH BRAND

Commercial, Residential Lighting Glassware
Street Lighting Globes
Gasoline & Oil Pump Cylinders
Safety Lamp Glasses
Lamp Shades and Parts
Opal Advertising Globes
Lamp Chimneys
Lantern Globes
Gauge Glasses

T. M. REG. U. S. PAT. OFF.
PYREX
A MARK OF CORNING GLASS WORKS

3-1/2" Broadcast Reception Insulator
Pyrex Part #: 67007
Length: 3-5/8" long

The Broadcast Reception insulator was made from the 1920's until the 1950's and, except for changes in embossing, it remained unchanged throughout the production run.

Artist renderings showing a unit with saddleways are believed to be conceptions only, as such a unit has never been found.

Broadcast reception insulators were used on airplanes and may have been produced for the military. None has been found with military markings.

Style 1: without saddleways
# of ribs: 5

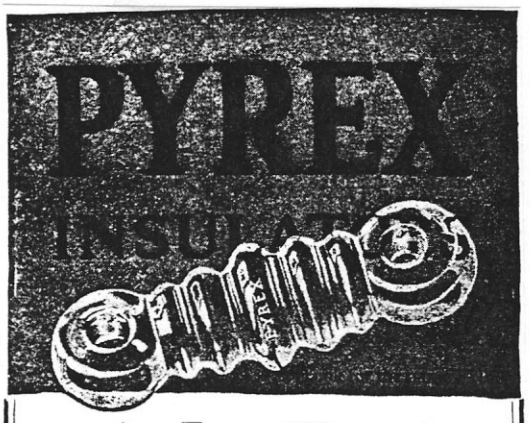
embossing variants:

version	embossing	loc.[1]
A	PYREX	3f
B	PYREX	3f
	MADE IN U.S.A.	4f
	PAT. 1700066	4b
C	MADE IN U.S.A.	2f
	PYREX	3f
	PAT. 1700066	3b

mold markings:

version	embossing	loc.
C	C A	2b

[1] Holding the insulator upright, locations are indicated by counting the ribs down from the top. Front is indicated by "f", back by "b."



7-1/4" Amateur Transmitting Insulator
Pyrex Part #: 67017
Length: 7-1/4" long

At least 5 distinct versions of this insulator have been found, more than any other size. It is found with a carnival glass finish and also with military markings.

The insulator was very popular with hams because of its great strength and small size. Thousands were used at commercial installations including the Radio Central station in Riverhead, NY. This is the most commonly found size today.

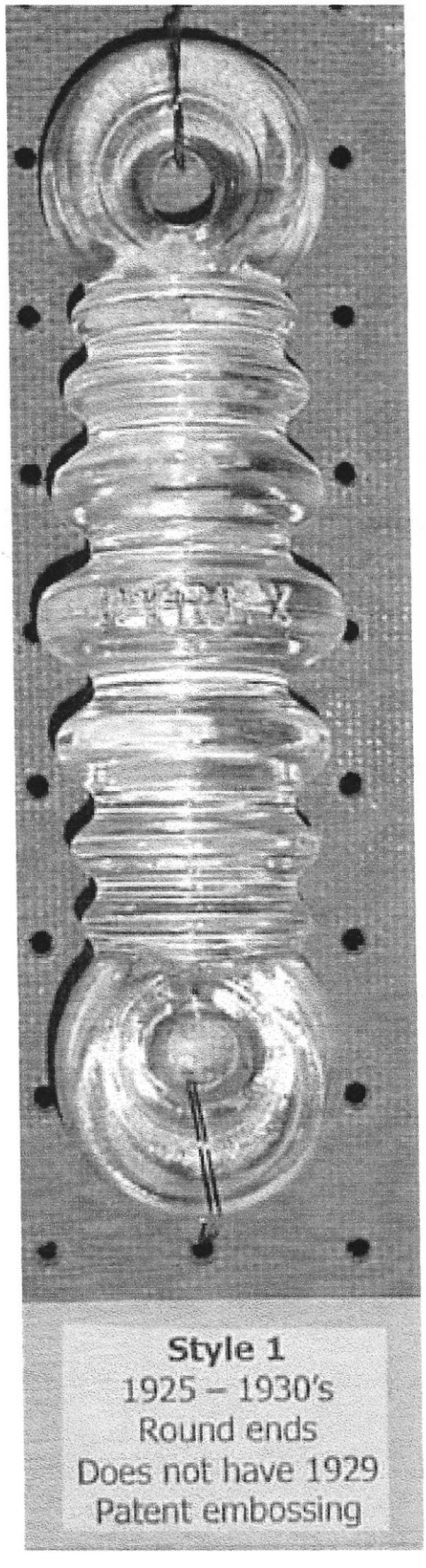
A similar insulator with Japanese markings is profiled on page 41.

Style 1: without saddleways
# of ribs: 7
Estimated production: 1920's – 1930's

embossing variants:

version	embossing	loc.
A	PYREX	4f
B	PYREX	4f
	MADE IN U.S.A.	5f
	PAT. 1700066	4b
C	Japanese	ends

mold markings:
none reported



7-1/4" Amateur Transmitting Insulator

Style 2: with saddleways ("skinny")
# of ribs: 5
Max. dia. of end: 1-3/4"
Estimated production: 1930's – 1940's

Styles 2 and 3 are very similar. Style 3 simply has a thicker appearance over all. Enough examples of each size have appeared that I consider them to be distinctly different. And they do not share the same mold markings.

I do not know if one preceded the other or if they were in concurrent production. If I had to guess, I might say that the thicker design was an attempt to further strengthen the insulator. It may represent a half step toward the reinforced style 4 version.

embossing variants:

version	embossing	loc.
A	PYREX	3f
	MADE IN U.S.A.	4f
	PAT. 1700066	3b

mold markings:

version	embossing	loc.
A	E1	2b
A	E3	2b

7-1/4" Amateur Transmitting Insulator

Style 3: with saddleways ("thick")
# of ribs: 5
Max. dia. of end: 1-15/16"
Estimated production: 1930's – 1940's

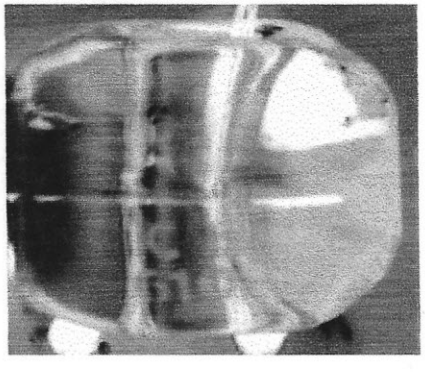
The carnival-finish insulator that Graham Barnes has appears to be Style 3. Jeff Barnes describes its "yellow-tinged" coating as "sick carnival." It has the version A embossing and carries no mold mark.
Two military versions of this insulator have been reported. One has embossing version A with no mold mark. It has "CBI 61014" etched on one end ring. The other is marked "CBI 61014A." These date from World War II. (See *OFS* 10/98).

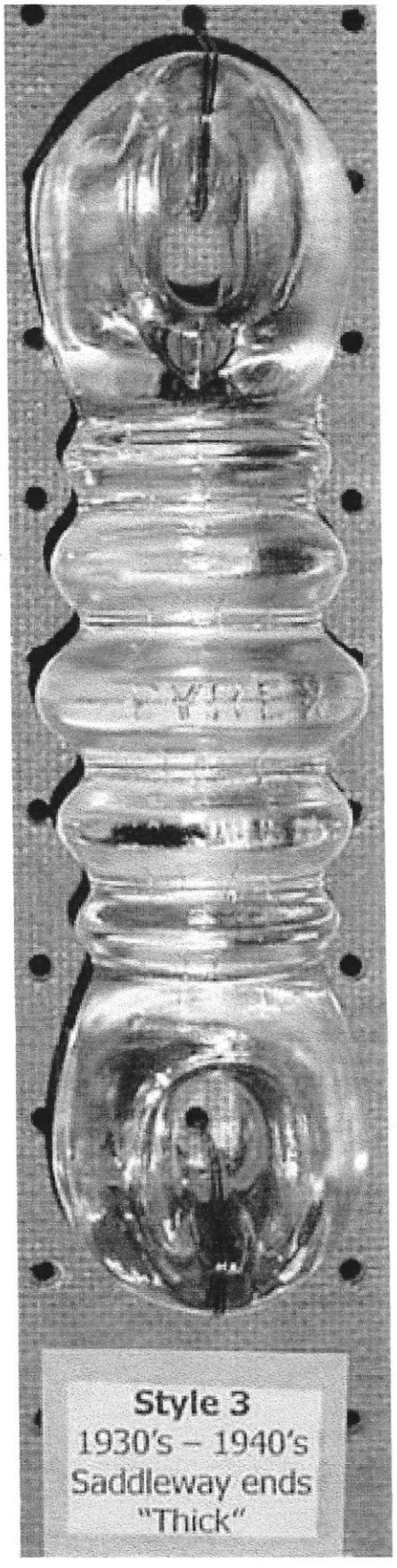
embossing variants:

version	embossing	loc.
A	PYREX	3f
	MADE IN U.S.A.	4f
	PAT. 1700066	3b

mold markings:

version	embossing	loc.
A	AB	2b
A	B	2b
A	B A	2b
A	CA	2b





7-1/4" Amateur Transmitting Insulator

Style 4: reinforced ends
# of ribs: 4
All ribs are the same size
Estimated production: 1940's – 1950's

Unlike styles 2 & 3, style 4 was poured from the sides. The ends are nicely finished. However, obvious casting marks are present on the right side of the glass reinforcements.

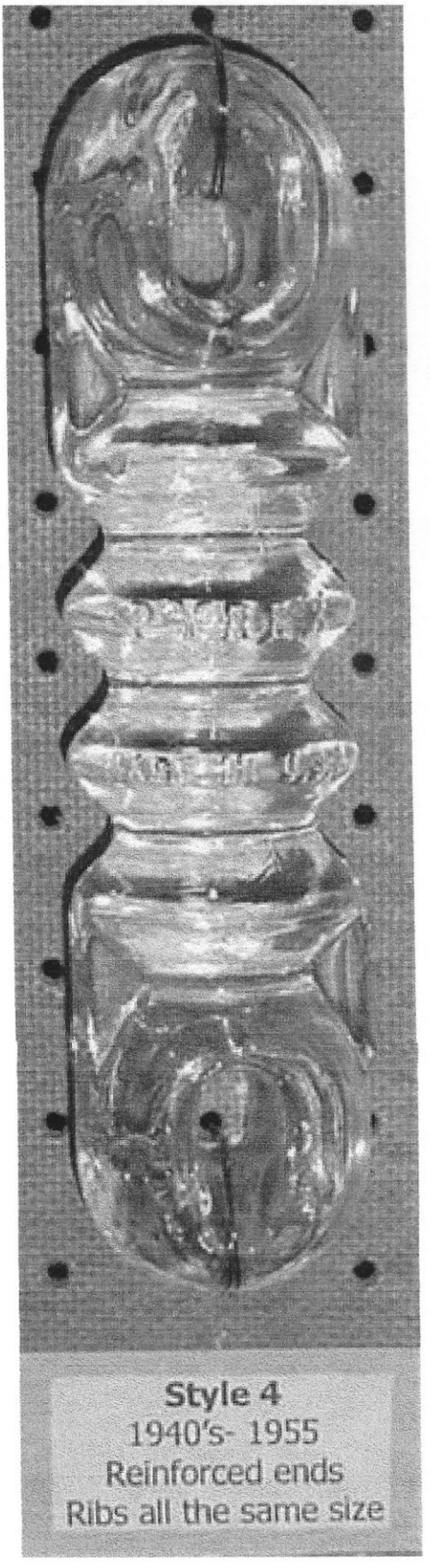
Note that the rib count has declined from 7 (style 1) to only 4.

embossing variants:

version	embossing	loc.
A	PYREX	2f
	MADE IN U.S.A.	3f
	PAT. 1700066	2b

mold markings:

version	embossing	loc.
A	F1	4b
A	F2	4b
A	F4	4b
A	F5	4b
A	F7	4b
A	F8	4b



7-1/4" Amateur Transmitting Insulator

Style 5: reinforced ends
# of ribs: 5
Ribs taper from center to ends
Estimated production: 1940's?

As you can see from the picture, this is an unusual insulator. Like styles 2 and 3, it has five tapering ribs. Similar to style 4, the ends are reinforced.

When viewed from the side, styles 2-4 have relatively round ends. Like style 1, the ends of this insulator are rather flat.

Styles 1-3 were poured from the ends and they have large ground-off areas on the end rings. Like style 4, this insulator was poured from the side. Rough areas remain on the left side of the glass reinforcements and on the left side of the center rib. The examples that I've examined all appear to have been hand-finished.

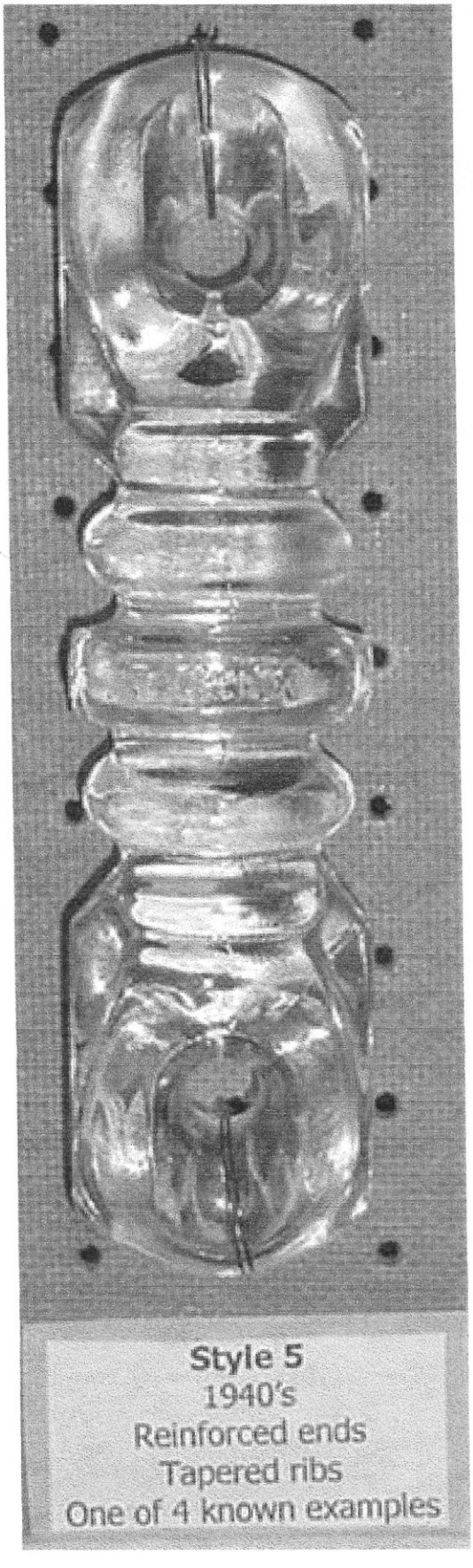
I would like to place this in the production continuum between styles 3 and 4. However, those styles all had the Made in USA and patent notices, which style 5 does not.

Four of these insulators are known today. Additional information would be appreciated.

embossing variants:

version	embossing	loc.
A	PYREX	3f

mold markings:
none found



12-1/4" Strain Insulator

Pyrex Part #: 67021
Length: 12-1/4" long

Three versions of the Pyrex Strain Insulator have been found. With its large size, it was mainly marketed to higher-powered amateur and small commercial stations.

The Strain Insulator was produced from the 1920's until the 1950's, with at least one military-marked version produced.

Style 1: without saddleways

of ribs: 11
Estimated production: 1920's – 1930's

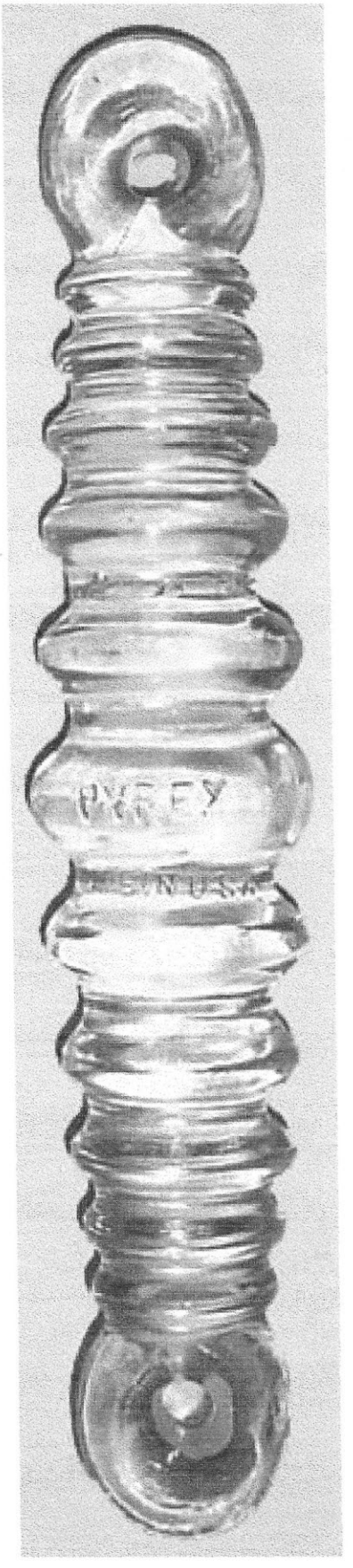
This version uses an embossing on the groove between the 6th and 7th ribs. The Pyrex 12" is the only insulator in the series to be marked in the grooves.

The military version of this insulator is etched with "SE-2188" on both ends.

embossing variants:

version	embossing	loc.
A	PYREX	6f
B	PYREX	6f
	MADE IN U.S.A.	6-7f
	PAT. 1700066	6b

mold markings:
none reported



12-1/4" Strain Insulator

Style 2: with saddleways
# of ribs: 9
Estimated production: 1930's – 1940's

Like style 1, this version has the Made in U.S.A. marking in the groove between the 5th and 6th ribs.

I suspect that there might be a World War II version of this style with a "CGI 6xxxx" marking. However, none has been reported to date.

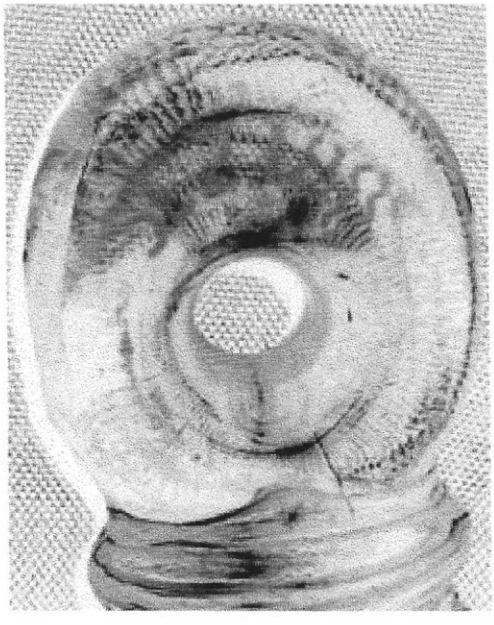
embossing variants:

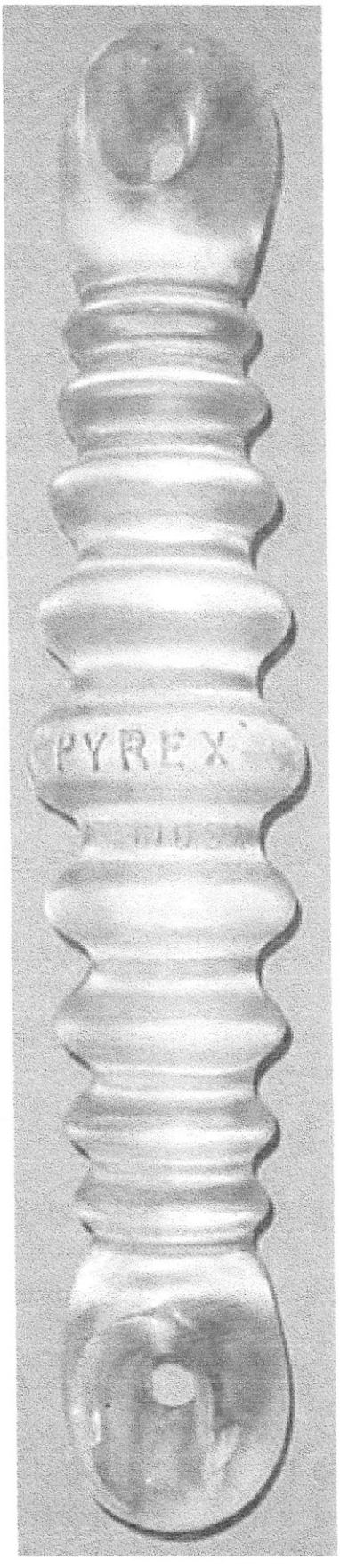
version	embossing	loc.
A	PYREX	5f
	MADE IN U.S.A.	5-6f
	PAT. 1700066	5b

mold markings:

version	embossing	loc.
none reported		

Close up of Style 1 insulator with military marking "SE-2188"





12-1/4" Strain Insulator

Style 3: reinforced ends
# of ribs: 8
Estimated production: 1940's-1950's

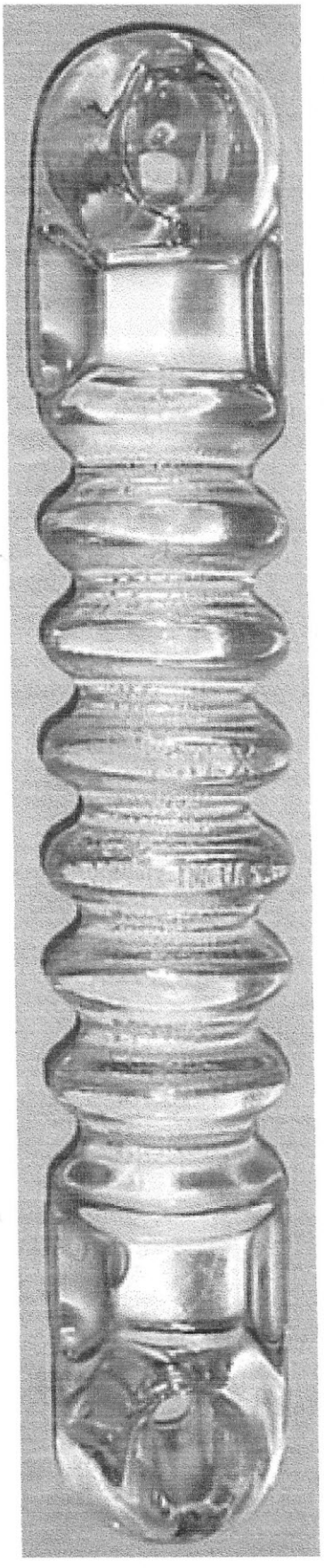
Like the Style 5 7-1/4" insulator, this insulator also has an embossing version with only the word "PYREX" on it. This is surprising considering the insulator's late production dates.

embossing variants:

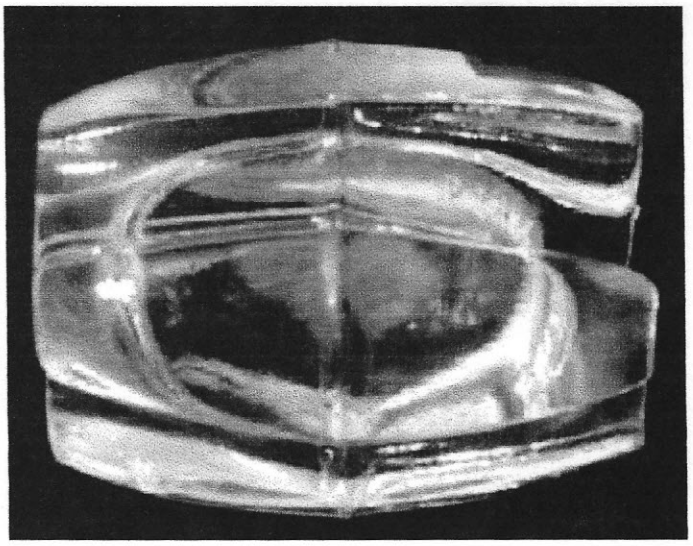
version	embossing	loc.
A	PYREX	4f
B	PYREX	4f
	MADE IN U.S.A.	5f
	PAT. 1700066	4b

mold markings:

version	embossing	loc.
B	C 1	3b
B	C 2	3b
B	C 4	3b
B	C 5	3b
B	7	5b



Pyrex Johnny Ball



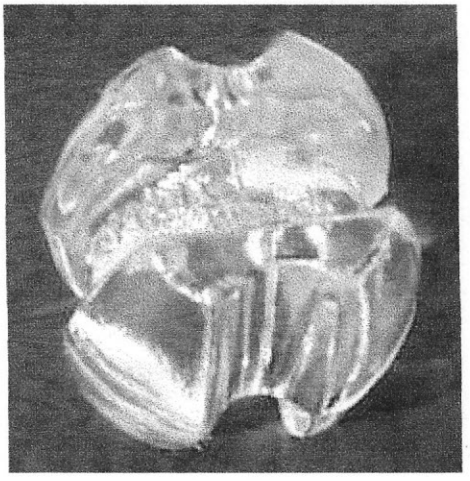
Pyrex Part #: 66000
Length: 2-1/8"

Greg Hafer graciously shared these views of his Pyrex johnny ball insulator with us.

The insulator measures 2-1/8"high and 1-1/2" wide and 1-1/2"deep.

The embossing is all in the wire grooves.

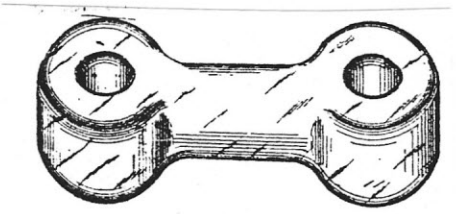
On one end it is embossed "Pyrex" and below that to the right it is embossed "Brand". The opposite is embossed "66000."



Assigning a production timeframe to the insulator is challenging because we haven't found any ads for it.

In the April, 1995 *OFS*, we talked about several styles of johnny ball designs. In this solid-glass version, the conductors simply wrap over the surface of the insulator without passing through holes.

Pyrex Dog Bone



At least one example of a Pyrex Dog Bone insulator is known. The ARRL museum in Hartford, CT has one. The unit appears to be about 6" long and closely resembles the patent drawing for patent 1700066, which I've reproduced here.

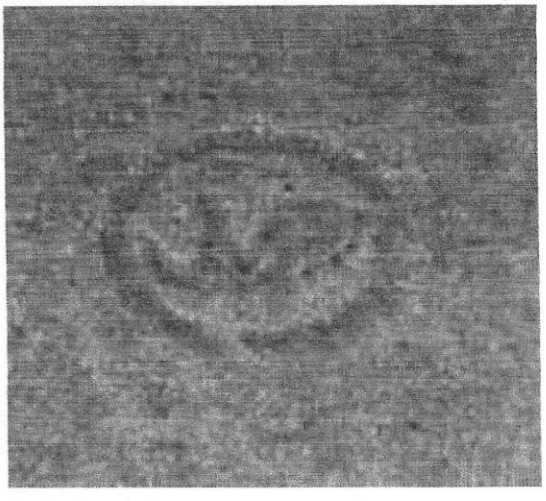
Pyrex Navy Type Strains

The Navy Type strains are the largest strains that Pyrex cataloged. As shown on page 24, they came in sizes ranging from a "modest" 12" all they way up to 32" long.

To date, two types of markings have been found, the standard embossed "Pyrex" "Made in USA" "Pat 1700066" marking, and a stylized marking which I believe is the CGW logo in a highly-stylized form.

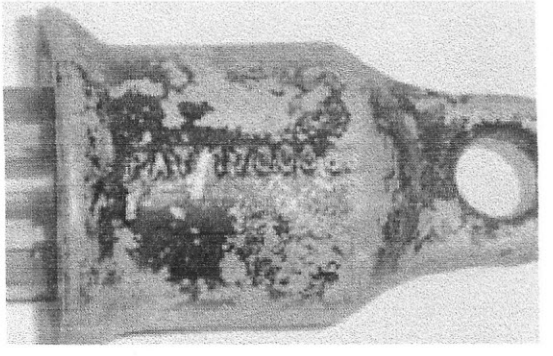
I believe that the stylized logo, shown below, is the earlier of the two styles. Insulators with this marked probably date from the 1920's.

Since, patent 1,700,066 was not issued until 1929, insulators with that mark would have to have been made after that time.



"CGW" (?) logo from the 1920's

PYREX
MADE IN USA



PAT 1700066

Corning Insulators with Foreign Markings

The Japanese 7-1/4" Strain

Thanks to **Robin Harrison**, we now know a little more about this Pyrex look-alike.

The insulator is an exact copy of the Pyrex Style 1 Amateur Transmitting insulator. It is marked on both end rings. One has the word TEN surrounded by lightning bolts and a circle. The other has Japanese characters. The embossing is much smaller and finer in detail than Pyrex markings.

After looking it over, Robin researched the Katakana writing and reports, "Your insulator is marked 'Durex' or 'Jurex' (probably Durex) but definitely not Pyrex." Robin also reports that another look-alike insulator has been found. It is marked "Telex" on one side and "Matsuda" on the other.

Maybe someday we'll know whether these were subcontracted Pyrex products or just copies.

The French Strains

Rick Soller reports that there is a 12" strain with French markings in the hands of a U.S. collector. According to Rick, the item is marked "Brevet Depose." Rick is hoping to see the insulator soon so that we can better document it.

While at the Rakow Library, I was thrilled to find this advertisement for Pyrex antenna insulators in a French Pyrex catalog. The catalog, entitled "ARTICLES EN PYREX POUR LE MENAGE," dates from 1931. It was issued by Verreries du Pays de Liege et de la Campine, Division Pyrex, Bruxelles.

The insulator in the ad appears to be a 3-1/2" broadcast reception insulator, similar in design to domestic production.

I can't tell from this listing whether other sizes were also sold in France, but I suspect that they were.

Isolateurs d'Antennes de T. S. F.

Tubes et glaces pour niveau de chaudières.

Verres pour lampes de mines.

Glaces et verres à vitres pour regards de fours, etc.

Globes pour Machines Héliographiques.

Verres filtrant les couleurs.

etc...

- Catalogues franco sur demande -

Milk Glass Insulators

This information originally appeared in the April, 2000 issue.

In 1943, Pyrex used these ads in *Radio News* to publicize its new Multiform glass.

The chart below, from the March, 1943 issue shows how Multiform glass stacks up against steatite and porcelain.

The full page ad, from the June, 1943 issue shows the many uses to which the glass could be put.

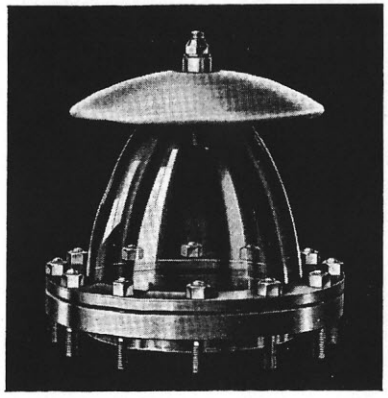
Take a close look at the picture – it sure looks like they were making johnny balls out of this white-colored material. It would sure be nice to ad one of the milk-glass appearing insulators to the collection....

ENGINEERING PROPERTIES OF PYREX MULTIFORM GLASS VS. OTHER INSULATING MATERIALS

GLASS CODE		790	7761	707	774	Steatites*	Electrical Porcelains*
GLASS TYPE		Multiform Glass	Multiform Glass	Multiform Glass	Conventional Glass		
ENGINEERING PROPERTIES	UNIT						
DENSITY	—	2.15	—	2.10	2.23	2.5—2.8	2.3—2.5
SOFTENING TEMPERATURE	°C	—	—	—	820	1250—1400	1500—1600
MAX. OPERATING TEMPERATURE	°C	800	500	425	500		
LINEAR EXPANSION (0-300°C)	per °C X 10^{-7}	8.5	—	32	32	60—90	30—50
WATER ABSORPTION—24 HRS.	%	<.01	<.01	<.01	NONE	0—0.1	0—2.0
MODULUS OF RUPTURE —ANNEALED GLASS	LBS./IN.^{2} X 10^3	5	7	7	10	—	6—12
MODULUS OF RUPTURE —SPECIAL PROCESS	LBS./IN.^{2} X 10^3	—	—	12	18	17—24	
VOLUME RESISTIVITY							
LOG R AT 20°C		—	—	—	14.7	14	12—14
LOG R AT 250°C	OHMS PER	9.3	—	—	8.1	9—14	7–10
LOG R AT 350°C	CM. CUBE	7.8	—	—	6.7	8—13	6—8
S. I. C.—20°C—1 MEG.	—	4.0	4.0	4.0	4.65	5.5—7.5	5.0—7.5
P. F. —20°C—1 MEG.	%	0.18	0.11	0.10	0.42	0.03—0.20	0.70—1.2
L. F. —20°C—1 MEG.	%	0.72	0.44	0.40	1.95	0.15—1.24	3.5—9.0
DIELECTRIC STRENGTH	VOLTS/MIL	>500	>500	>500	HIGH	200—300	200—280

**Data from Rigterink, M .D., Review of Scientific Instruments, vol. 12, no. 11, 527-534 (1941).*

PYREX ENTERING INSULATOR—NAVY DECK TYPE



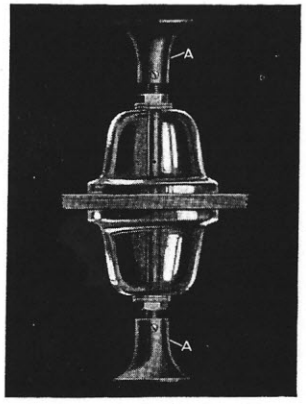
No. 67042 is the bowl only.

The mounting has 15⅞-in. diam. flanges with twelve equidistantly spaced ⅝-in. studs on 14⅝-in. bolt circle. Height from top of center pin to bottom of lower flange 15 in., to bottom of bowl 16 in.

No.	*Navy Type*	*Weight*	*Height Overall*	*Outside Diameter at Base*	*Average Flashover Value Wet*	*Dry*	*Price Each*
67042	SE-2459	16 lb.	13 in.	13 in.	48.5	113	$ 30.00
67077	SE-2459 Complete with brass fittings and aluminum shield as shown						157.50
67087	SE-2459 Complete with brass fittings and aluminum shield and 12 additional locknuts						161.25

PYREX ENTERING INSULATORS—AIRPLANE TYPES

57080

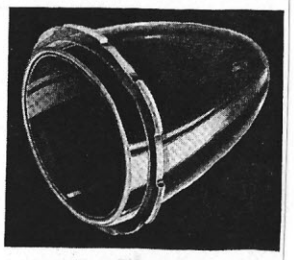


67079

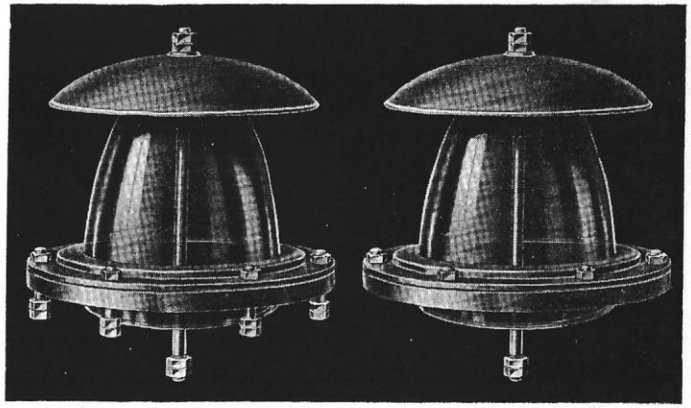
	67056	67080	67079	67075
Number	67056	67080	67079	67075
Navy Type	SE-2555	SE-2556	SE-2558	SE-2557
Description	(PYREX shell only)	(67056 shell with brass fittings)	(Two 67056 shells with brass fittings)	(Same as 67079 but without guides A)
Outside diameter	2½ in.	3¼ in.	2½ in.	2½ in.
Overall length	1⅝ in.	4 in	6⅝ in.	5¼ in.
Weight	3 oz.	12 oz.	9 oz.	14 oz.
Price, each	$0.90	$5.00	$5.00	$2.80

Hollow center rod on No. 67079; solid rod with jamb nuts on No. 67075.

2 KW. PYREX ENTERING INSULATOR



Bowl only ..... No. 67091
Weight ..... 9 lb.
Height over all ..... 9⅜-in.
Outside diam. of bowl at base ..... 8 in.
Diam. of flange ..... 9 in.
Thickness of flange ..... 9/16-in.
Price each $4.50



Type A
No. 67092
$67.50

Type B
No. 67093
$67.50

Type A mounting is known also as U. S. Coast Guard Type CGR-37, Drawing R-1030.

All types have 11 in. shield and 14-in. x ½-in. brass pin with four nuts, 13 U.S.S. threads per in. Top of pin to bottom of bowl, 11 in.

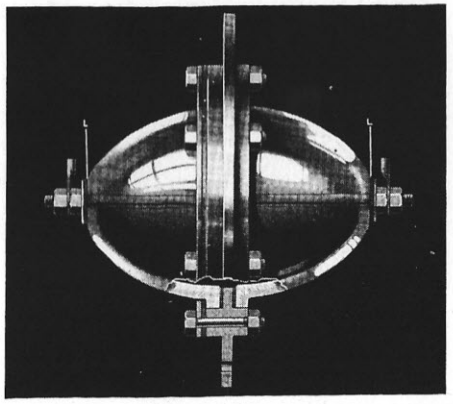
Types A and B have 12⅜-in. flanges with six equidistantly spaced holes on 11¼-in. circle.

Type B has also six equidistantly spaced 17/32-in. countersunk fastening holes on 11¼-in. circle in bottom flange.

Type C has 12½-in. flange with six equidistantly spaced 9/16-in. counterbored holes on 11¼-in. circle in flange. Diam. of shoulder at bottom of flange, 9⅞-in.

Type C No. 67094
$45.00

PYREX ENTERING INSULATOR—DOUBLE LEAD-IN

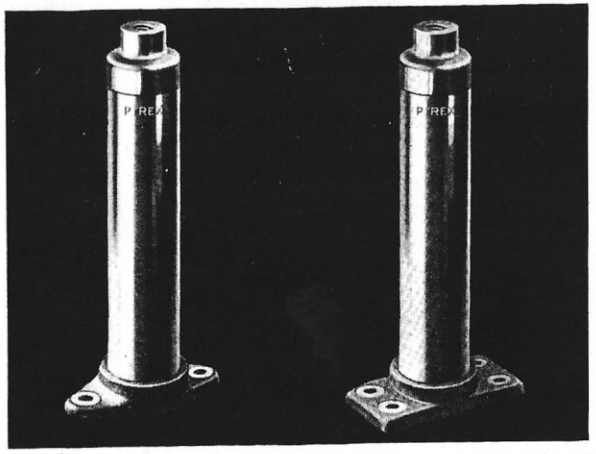


This insulator is made up of two Type SE-2202 (No. 67037) Insulators (see Page 13) and brass fittings as shown.

†6 holes 7/16-inch on 10¾-inch bolt circle.

No.	Weight	Length L. to L.	Length Overall	Outside Diameter Flange†	Outside Diameter PYREX Bowl	Price
67085	20 lb.	9 5/16-in.	11¾-in.	12 in.	6 15/16-in.	$40.50

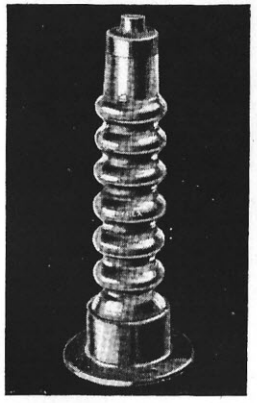
PYREX STAND-OFF INSULATORS—TYPE SE-2190



Oval base—two 9/32-in. holes 2 5/16-in. centers; Rectangular base—four 9/32-in. holes 1-inch and 2¼-inch centers.

Number	67018	67019	67068	67069
Height overall	3 in.	7 in.	3 in.	7 in.
Oval base, brass overall	3 1/16-in. x 1 5/8-in.	3 1/16-in. x 1 5/8-in.		
Rectangular base, brass, overall			2 7/8-in. x 1 5/8-in.	2 7/8-in. x 1 5/8-in.
Tapped hole in brass cap	3/8-in.—16 th.	3/8-in.—16 th.	3/8-in.—16 th.	3/8-in.—16 th.
Diameter (PYREX Part)	1¼-in.	1¼-in.	1¼-in.	1¼-in.
Weight	10 oz.	17 oz.	14 oz.	20 oz.
Average flashover value (Kv.), wet	7	32.5	7	32.5
Average flashover value (Kv.), dry	21.5	56	21.5	56
Packing	12 in case	12 in case	12 in case	12 in case
Price, each	$2.75	$3.00	$2.75	$3.00

PYREX STAND-OFF INSULATOR—CORRUGATED



No.	Outside Diameter of PYREX Part Base*	Tapped Hole in Cap	Height Overall	Wgt.	Average Flashover Value (Kv.) Wet	Dry	Developed Leakg. Path	Price Each
67027	4¾ in.	1 5/8 in. to 2 1/8 in.	3/8 in.—16th	12¼ in.	5½ lb.	57	97.5	10½ in.	$8.00

*Four holes 9/32-inch on 3 7/8-inch bolt circle. Base and cap are brass.

PYREX BUS BAR INSULATOR—NAVY TYPE SE-2196

No.	Weight	Height Overall	Outside Diameter of Base	Outside Diameter of PYREX Part	Average Flashover Value (Kv.) Wet	Dry	Tapped Hole in Cap	Price Each
67024	3 lb. 12 oz.	4½ in.	4 in.	2½ in. to 2 61/64 in.	29.5	46.5	3/8 in.—16th	$6.00

Base and cap are brass.

Military-Specification Products

As might be expected, this ad from the 1942 Radio Amateur's Handbook shows products that Corning produced to military specification during World War II. All of these items (and a few more) are listed in the "American War Standard for Glass Radio Insulators" which was issued by the American Standards Association in November, 1943. The glass wall tube insulators might be of special interest to the readers as they are rarely seen.

Note also the "artists conception" drawings of the strain insulators that show the 3-1/2" Broadcast Reception insulator with saddleways (probably never produced) and only generally approximate the appearance of the larger sizes. Note also that the standard drawing for these insulators (Type 53) (see *OFS* 10/98) shows an insulator without saddleways, a design that Corning had long-since replaced!

DOES YOUR RADIO INSULATION MEASURE UP TO THESE "PYREX" STANDARDS?

Low power loss . . . low surface conductivity . . . high electrical resistance . . . smooth, hard surface . . . resistance to corrosion . . . high strength-to-weight ratio!

THESE properties are essential to satisfactory radio insulation. But that's not all — they must be permanent and unchanged by age, elements, or energy impact.

Use PYREX brand Radio Insulators and you get all these properties . . . at their best. For example:

- LOW LOSS FACTOR: Less than 2.0 at 740,000 cycles.
- LOW SURFACE CONDUCTIVITY: Almost negligible . . . 10^{14} ohms resistivity per sq. in. at 34% humidity; 10^{10} ohms at 84% humidity.
- HIGH ELECTRICAL RESISTANCE: Volume resistivity 5 x 10^{14} ohms per cubic in. at 22° C., uniform throughout.
- SPECIFIC GRAVITY: Only 2.23; hence, light in weight.
- NON-POROUS, NON-CORROSIVE: No pores to pit; no added glaze to check or craze; surface and body are homogeneous.
- SHOCK-RESISTANT: Low expansion coefficient (.0000032 between 19° C. and 350° C.) makes "Pyrex" Insulators indifferent to heat shock and sudden temperature changes.

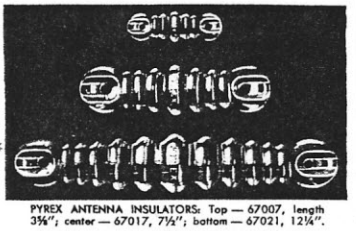
T.M. REG. PYREX U.S. PAT. OFF.

Send for free folder or United catalog pages describing complete line of PYREX Radio Insulators. And at your local supply house, ask for PYREX Insulators by name.

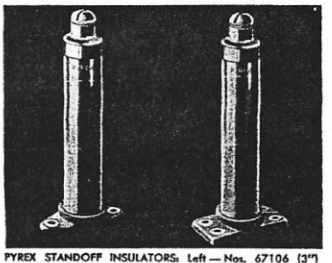
"Pyrex" is a registered trade-mark and indicates manufacture by

Corning Glass Works

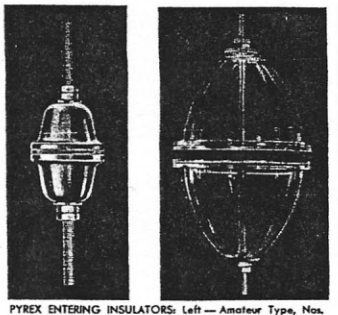
INSULATION DIVISION • CORNING, N. Y.



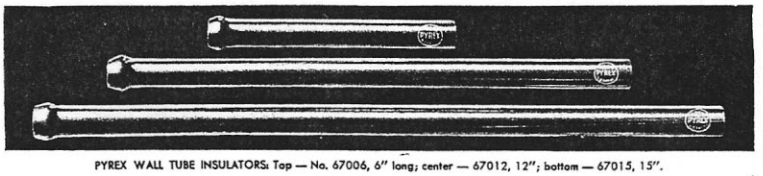
PYREX ANTENNA INSULATORS: Top — 67007, length 3⅛"; center — 67017, 7½"; bottom — 67021, 12¼".



PYREX STANDOFF INSULATORS: Left — Nos. 67106 (3") and 67107 (7"), oval base. Right — Nos. 67108 (3") and 67109 (7"), rectangular base.



PYREX ENTERING INSULATORS: Left — Amateur Type, Nos. 67104 (15"), 67105 (20"). Right — Amateur Type, Nos. 67115 (6-1/16" x 15"), 67116 (6-1/16" x 20").



PYREX WALL TUBE INSULATORS: Top — No. 67006, 6" long; center — 67012, 12"; bottom — 67015, 15".

Summary of Corning Pyrex Radio Insulators by Part Number

Part #	Description	Military #
#66000	2-1/8" johnny ball	
67006	6" long wall tube	
67012	12" long wall tube	
67015	15" long wall tube	
67007	3-7/8" bcast. recep.	
67017	7-1/4" Am. xmitting	61014/A
67021	12-1/4" strain	SE-2188
67045	12" Navy Type	SE-2193
67044	16" Navy Type	SE-2193
67043	18" Navy Type	SE-2193
67052	20" Navy Type	SE-2193
67053	22" Navy Type	SE-2193
67046	24" Navy Type	SE-2193
67054	26" Navy Type	SE-2193
67055	28" Navy Type	SE-2193
67008	30" Navy Type	SE-2193
67048	32" Navy Type	SE-2193
67056	2-1/2" dia. entering insulator (glass shell only)	SE-2555
67080	67056 with brass fittings	SE-2556
67079	two 67056 with hollow rod and guides	SE-2558
67075	two 67056 with 5-1/4" solid brass rod	SE-2557
67104	two 67056 with 15" solid brass rod	
67105	two 67056 with 20" solid brass rod	
67009	6-1/4" dia. entering insulator (glass shell only)	SE-1846
67115	two 67009 with 15" solid brass rod	
67116	two 67009 with 20" solid brass rod	
67037	6-15/16" dia. entering insulator (glass shell only)	SE-2202
67085	two 67037 w/ brass fittings	
67070	67037 with fittings and corona shield	SE-2202
67071	67037 with fittings and corona shield	SE-2202
67076	67070 with additional hardware	SE-2202

Part #	Description	Military #
67091	8" dia. 2 KW entering insulator	
67092	67091 with mounting hardware	
67093	67091 with mounting hardware	
67094	67091 with mounting hardware	
67042	13" dia. Navy deck type entering insulator	SE-2459
67077	67042 with brass fittings and aluminum shield	SE-2459
67087	67077 with additional hardware	SE-2459
67110	13-1/6" dia. opaque entering insulator	SE-2954C
67086	13-1/6" dia. opaque entering insulator	CBI-2954B
67111	15-7/8" dia. entering insulator (clear or opaque)	SE-1694
67112	67111 with additional hardware	SE-1694
67113	15-7/8" dia. entering insulator (clear or opaque)	SE-1694B
67114	67113 with additional hardware	SE-1694B
67018	3" standoff insulator (oval base) AKA 67106	SE-2190
67019	7" standoff insulator (oval base) AKA 67107	SE-2190
67068	3" standoff insulator (rectangular base) AKA 67108	SE-2190
67069	7" standoff insulator (rectangular base) AKA 67109	SE-2190
67027	12-1/4" corrugated standoff (round base)	
67059	2" pillar	SE-2550
67060	3" pillar	SE-2549
67061	4" pillar	SE-2546
67065	6" pillar	SE-2545
67062	7" pillar	SE-2545
67024	4-1/2" corrugated bus bar insulator	SE-2196

Collecting Pyrex Strain Insulators

Corning's Pyrex insulators were popular in all sizes and sales most assuredly ran into the 10's of thousands (probably the 100's of thousands). So, realistically, most should not be considered rare. It is equally unlikely that any item is truly "one-of-a-kind" even though some may be much harder to come by than others. That said, I would like to offer a few observations based on my own experience and from the mail that I've gotten.

"Unique Pieces"

- The Pyrex Dog Bone (pg.39). The ARRL museum has one. Anyone else?
- No one has reported a Multiform johnny ball (see page 42).
- The Pyrex johnny ball that lives with Greg Hafer (see page 39) is the only one known
- The Amateur Transmitting insulator with the carnival glass finish (see page 33) is also unique.
- The Style 5 Amateur Transmitting insulator (see page 35) is only known in limited numbers. I know of 4 of these currently in the hands of collectors. By the standards generally used by the hobby, that would certainly qualify this insulator as rare.

Naturally, any of these "rare" insulators could be knocked off its pedestal when someone walks into a show with a case of them...

All-Glass Insulators

Of the all-glass insulators, I would say that the Broadcast Reception is the least common.

The hams and commercial purchasers of the larger Pyrex strains were very particular about quality and durability. Pyrex's superior performance assured brisk sales. Although they were also used commercially, the little Broadcast Reception insulator was best suited for the home-user. In this market, price often outweighed quality in the buying decision. Consequently, Corning was competing head-to-head against cheap glass and low-end porcelain strains. While the little Pyrex seems cheap enough by today's standards (less than 50 cents each), other insulators were selling for 10 cents or less. The fact that the Broadcast Reception insulator was never sold as part of an antenna kit may also contribute to its relative scarcity today.

While the small strain is in no way rare, of the three all-glass sizes, I probably see the least of these.

Navy-Type Insulators

Although these appeared to be very hard to come by, lately I've seen a few of these around. None of the sizes is easy to come by, and good luck to the collector that aspires to have one of each size. (And then there would be the challenge of having each style of embossing in each size....)

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