

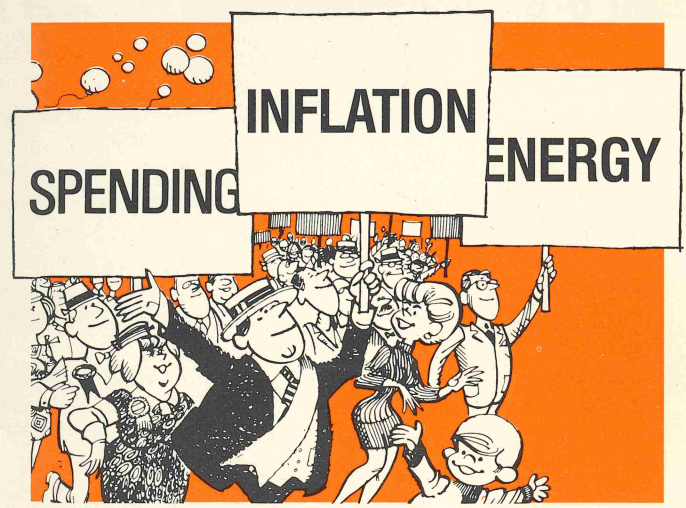


**OHIO BRASS
MANAGEMENT
REPORT**

Voters offer strong clues on which promises to keep



BY **ROGER A. BLACK**, *Chairman of the Board*
THE OHIO BRASS COMPANY



Promises. Promises. Repeated many times during the recent campaign: Federal bureaucracy would be streamlined. Government spending would come down. Inflation would abate. The tax system would be reformed. At last a real energy policy would develop.

Now we wait to see which promises will be kept and which ones will be forgotten. Rather than review their campaign speeches we suggest that our leaders look to the results of the election to determine what promises the people really want them to keep.

Many candidates were elected by the thinnest of margins, indicating no real mandate for their personal programs. But on money issues and energy issues, the feeling of the voters came through clearly.

Tax levies and bond issues were turned down by the hundreds. One state even had a proposal to limit spending to a percentage of personal income. The people flatly said "no" when given a voice in whether they wanted more government spending. It's understandable. Outlays for all types of government in 1975 took 44 per cent of the national income. Between 1970 and 1975, the rise in

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Inflation is still a real danger, and any increase in government spending will certainly increase the danger. That's why campaign promises on zero budgeting, tax reform and streamlining of government bureaus should be kept. The promises for extravagant new programs that would add to government cost should be forgotten as "campaign rhetoric."

The voters also expressed themselves strongly on energy-related issues. They said "go ahead with nuclear power." They agreed in most states that "lifeline" rates would hurt industry and cost jobs. They opposed adding more layers of bureaucracy to monitor utility rate increases. All this should tell our new leaders that energy supply is a paramount concern of the people and we need a policy that will encourage use and development of coal, natural gas, uranium and domestic oil.

On these major issues, the people told the new government leaders which promises they wanted kept. Let's make sure they listen.

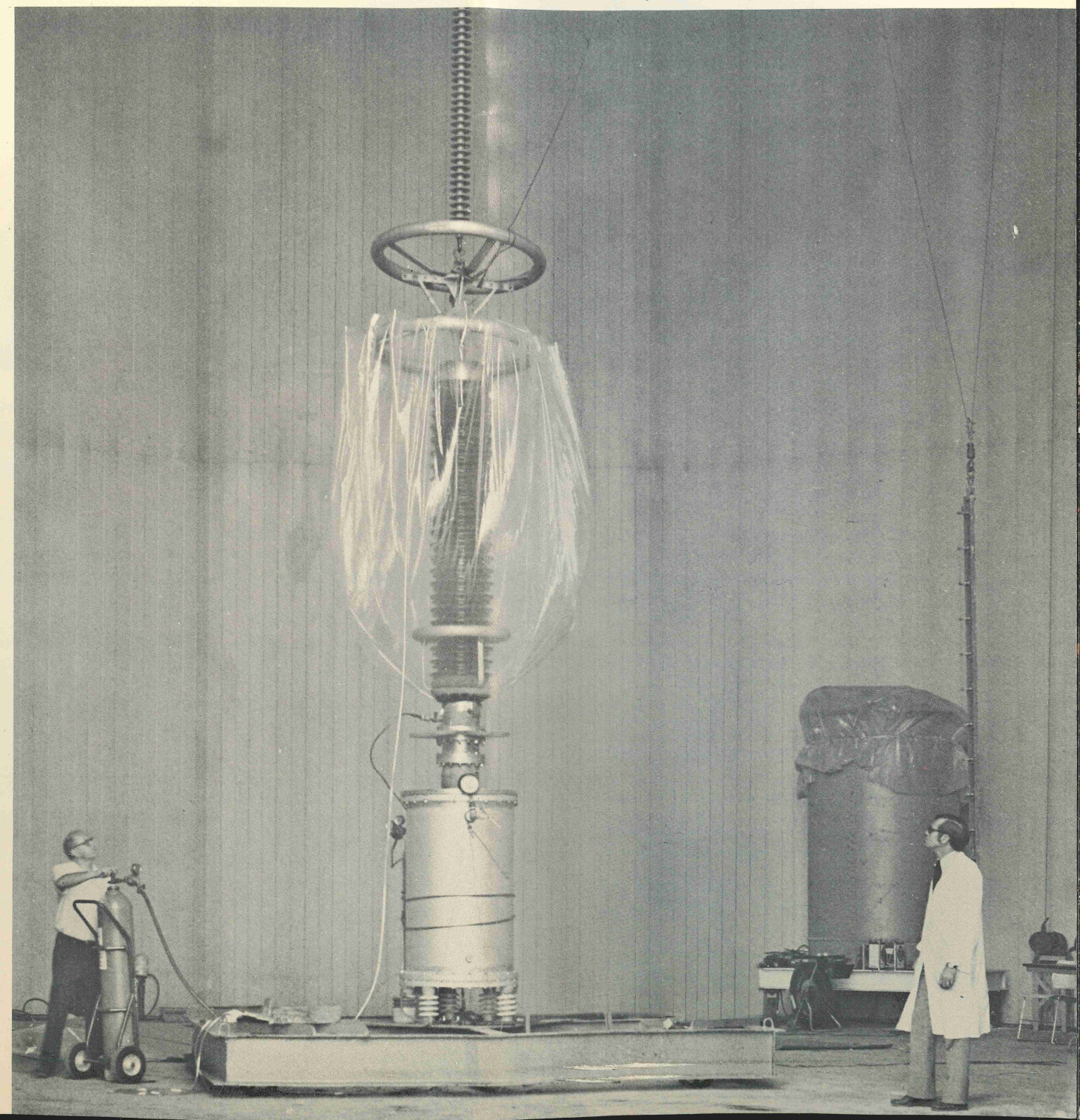
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PUBLISHED BY THE OHIO BRASS COMPANY

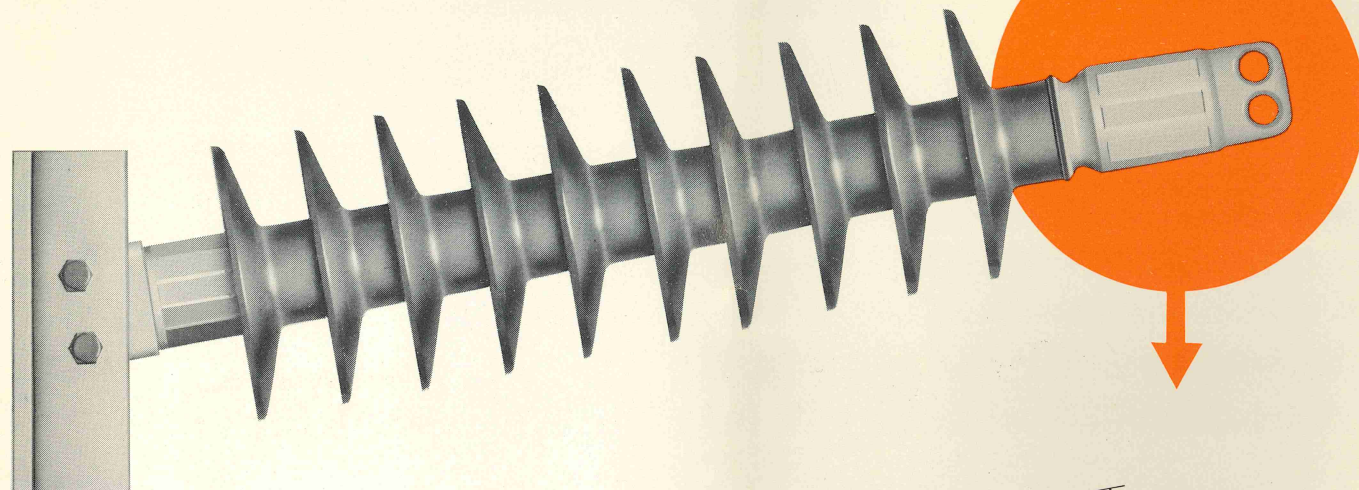
OB Hi-Tension News

MANSFIELD, OHIO 44902 — VOL. 46, NO. 2 FEB., 1977

Withstand testing of SF₆ termination in tank facilitated by supplementary SF₆ insulation in envelope.



Hi-Lite® horizontal line posts adapt to popular conductor attachments

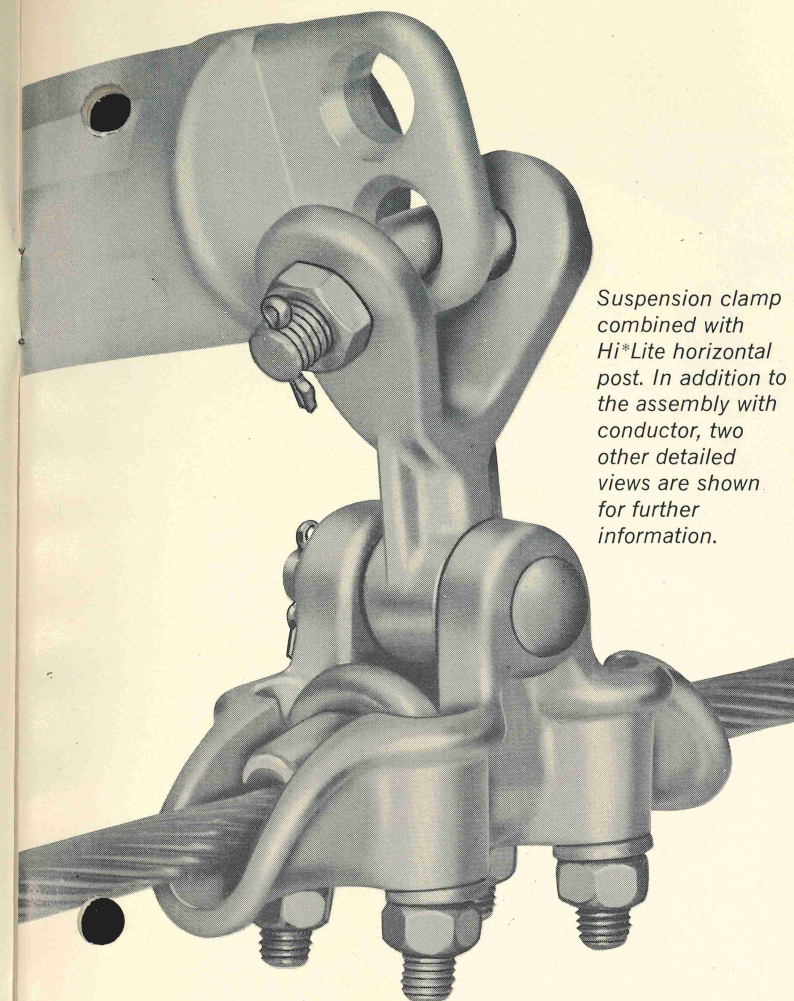
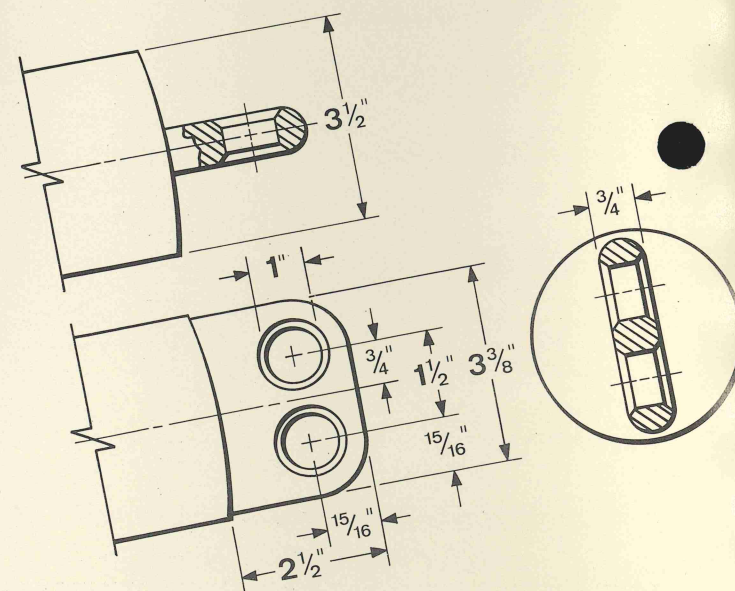


"What are the more common conductor attachments used with Hi-Lite horizontal line posts?" is a question asked by various utilities investigating the use of this insulator.

As with many other types of insulators, there are conventional, and occasionally, unconventional approaches to this question. The engineer with an unusual problem, or an unusual idea, is offered a pair of mounting holes that will accommodate a variety of different fittings, and may suggest some ingenious applications. But, for regular construction, two arrangements are attracting the most attention from designers. A third conductor support for jumpers and special applications is gaining in popularity. These three are described in detail.

The accompanying drawing illustrates the principal dimensions of the Hi-Lite terminal. One or both holes are utilized in attaching the conductor supports shown on the following three pages.

In addition to the devices shown, design is complete for a vertical post mounting and suitable clamp, applicable to pole-top installation, for triangular conductor configuration.



Suspension clamp combined with Hi-Lite horizontal post. In addition to the assembly with conductor, two other detailed views are shown for further information.

Suspension Clamp

Any of the O-B aluminum Cooline suspension clamps listed on page 4 of Hardware Catalog 61 may be attached to the Hi-Lite horizontal post. These comprise a range of conductor diameters from 0.30 to 2.63 inches in 12 clamp sizes.

Use the "Y" clevis fitting, number 90035, between the clamp and the insulator. This fitting is shown on page 23 of Catalog 61.

The clevis fitting is listed under one catalog number but with four suffix numbers to cover a range of suspension clamp sizes. The difference is dimension B, Figure 1. The suspension clamp has variations in dimension E, Figure 2, dictated by conductor size. Detailed information on these dimensions will be found in the catalog listings. When you order separately, please check for compatible dimensions. This detail can be avoided by ordering the clamp, fitting, and insulator as an assembly. In this case, the only information needed is size of the conductor.

Many users favor the suspension clamp arrangement because of the almost unrestricted range of conductor movement afforded.

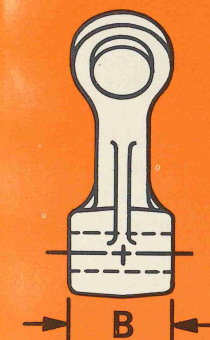
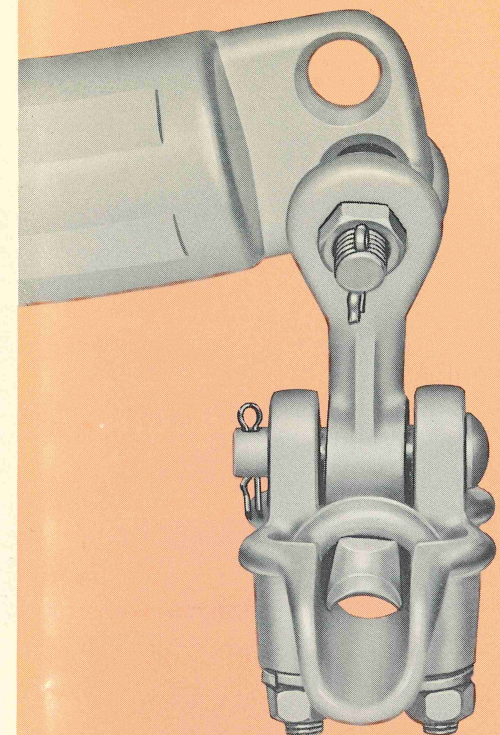


FIGURE 1

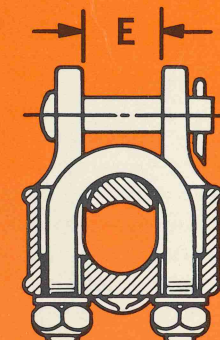
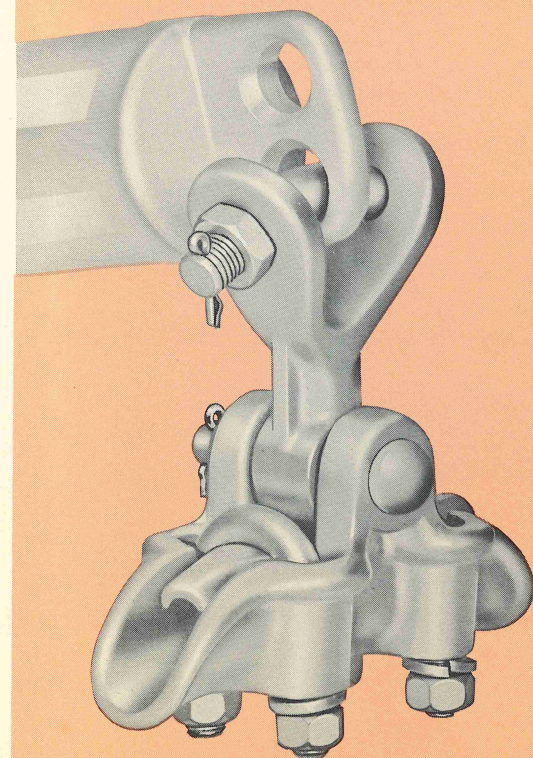
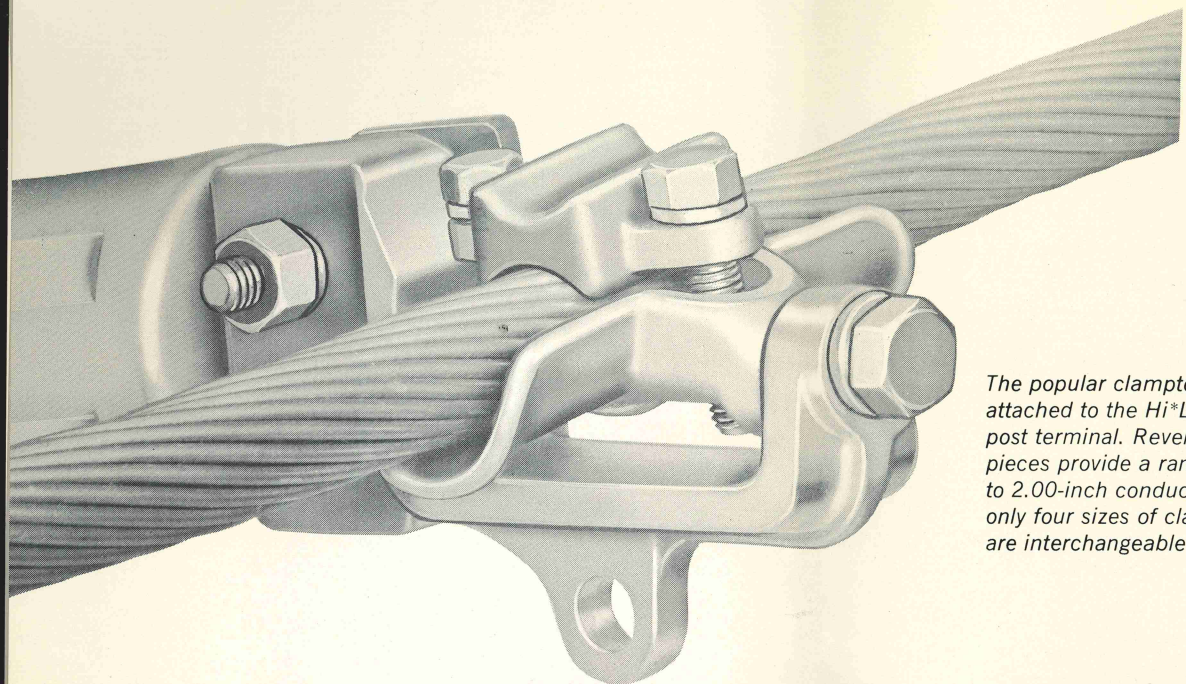


FIGURE 2





*The popular clamptop is easily attached to the Hi*Lite horizontal line post terminal. Reversible keeperpieces provide a range of 0.25 to 2.00-inch conductor diameter with only four sizes of clamp bodies that are interchangeable in the support.*

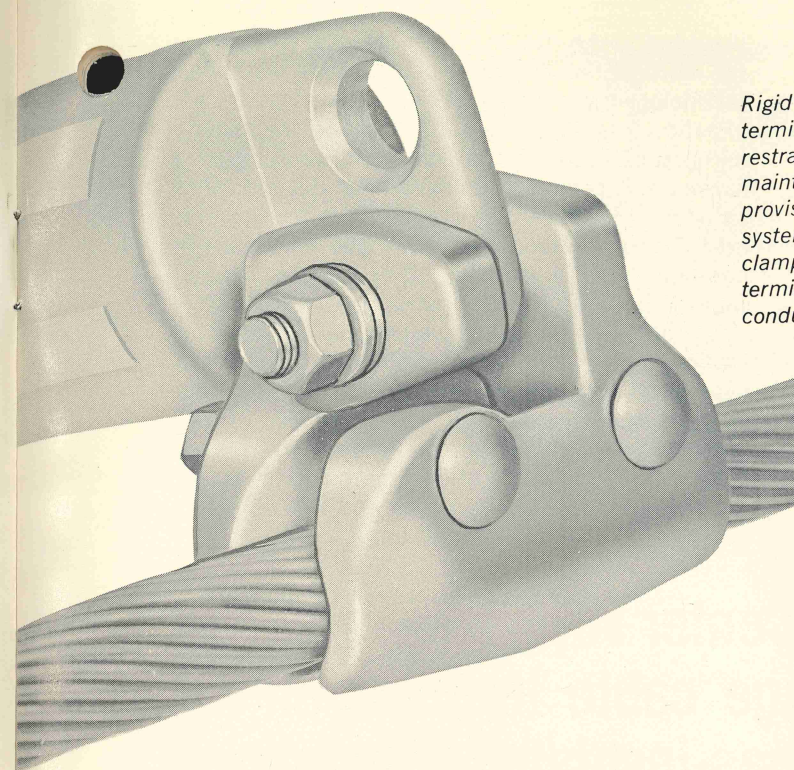
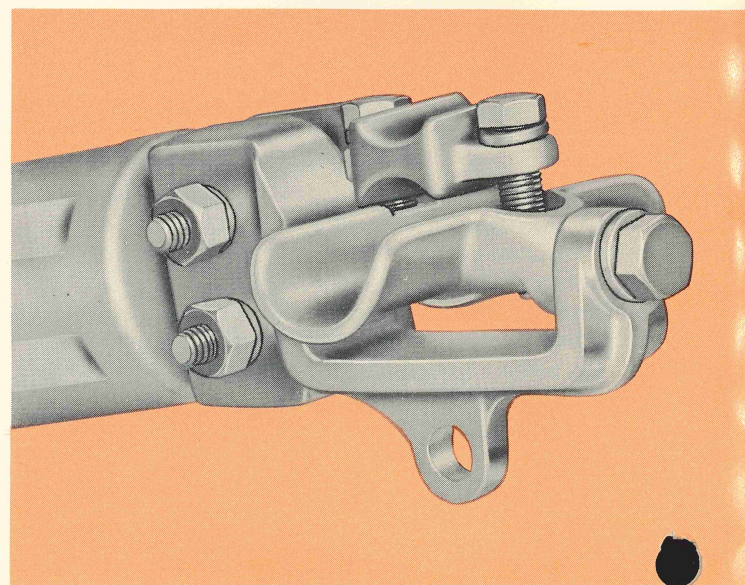
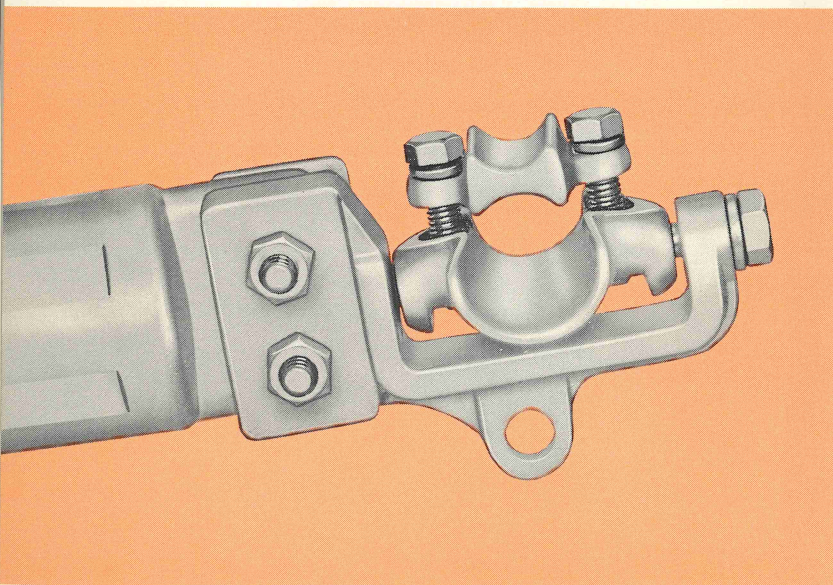
Clamptop

For many years O-B has supplied a clamptop conductor fitting with horizontal porcelain line posts. This device has proved very popular with users, and is also available with Hi*Lite horizontal posts. All the original features of clamptop design are included. To read about details of the clamptop, please refer to pages 32 and 33 of O-B Insulator Catalog 60.

Very briefly, the clamptop substitutes a full clamp for the conventional tie wire. It is easy to work, both

hot and cold. Since the keeperpiece is firmly bolted, tight attachment to the conductor is assured and RIV is greatly reduced. Only four clamp sizes fit a range of conductor diameters from 0.25 to 2.00-inch. Clamp bodies are normally supplied in aluminum, but are available in malleable iron.

Clamptops are attached to Hi*Lite insulators by two through-bolts. The bolts are equipped with bushings to obtain a snug fit in the one-inch holes of the insulator terminal.



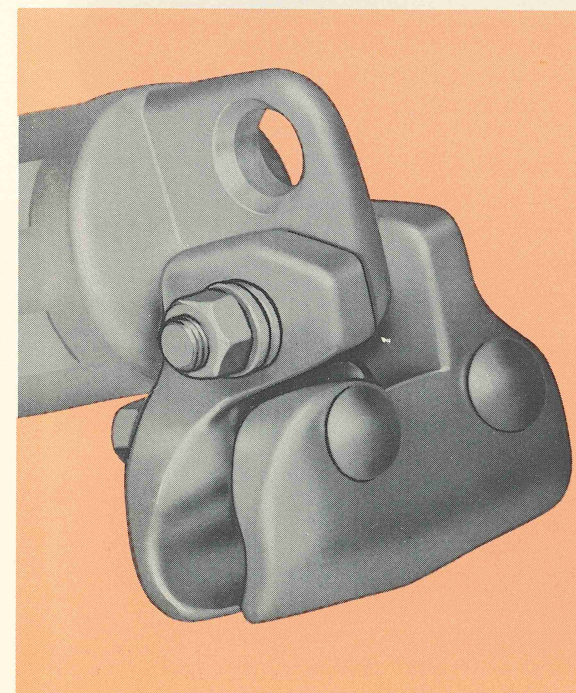
*Rigid attachment of a jumper clamp to the terminal of a Hi*Lite horizontal line post provides restrained support for jumper loops, and permits maintaining minimum clearance to ground without provision for wind sway. For bundle conductor systems, a yoke equipped with the jumper clamps shown can be attached to the insulator terminal. Capacity of clamps, 1.0 to 1.5-inch conductor diameter.*

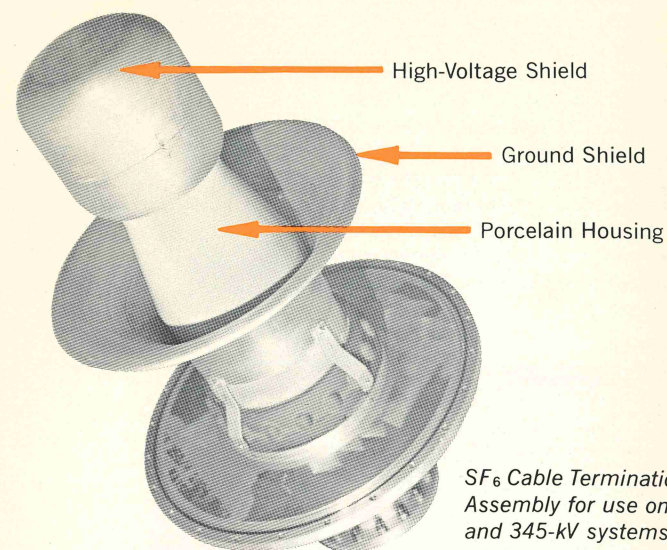
Jumper Clamp

Hi*Lite horizontal line posts are finding a new and valuable application as a stand-off insulator, mainly for jumper loops. In this use, a fixed support is provided for the slack conductor to restrain lateral wind movement and establish a minimum clearance to ground.

The post is mounted on the tower or pole, and the conductor is held in the clamping jaws which are rigidly attached to the insulator terminal. Mechanical characteristics of the insulator are ideally suited to this application, and its length establishes the desired spacing and voltage rating. It has two advantages over a string of suspension insulators: first, a definite saving in material and labor; and, second, restraint of the jumper loop so that swing of this member in the wind need not be taken into account in clearances. In special examples of corner construction, where the jumper is brought partly around the structure, substantial savings in crossarms may be effected.

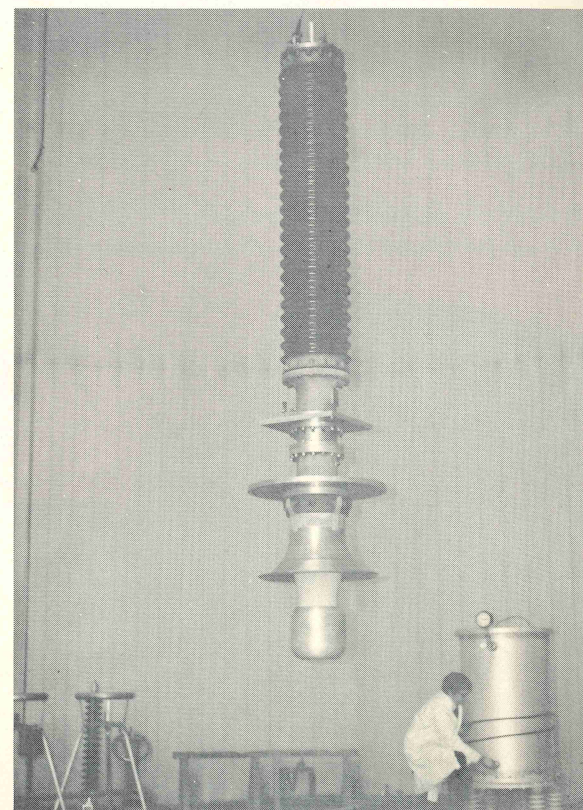
Users of the Hi*Lite post in this way have commented that they know other good places for it, now that they have a horizontal post of exceptional strength and dependability.





SF₆ Cable Termination Assembly for use on 230- and 345-kV systems.

Frank B. Black Research Center reports successful development of high-voltage cable termination for gas-insulated substations



The SF₆ cable termination is on the lower end of this test assembly, providing the opportunity to compare its much shorter length and functional configuration with that of a conventional cable-to-air termination.

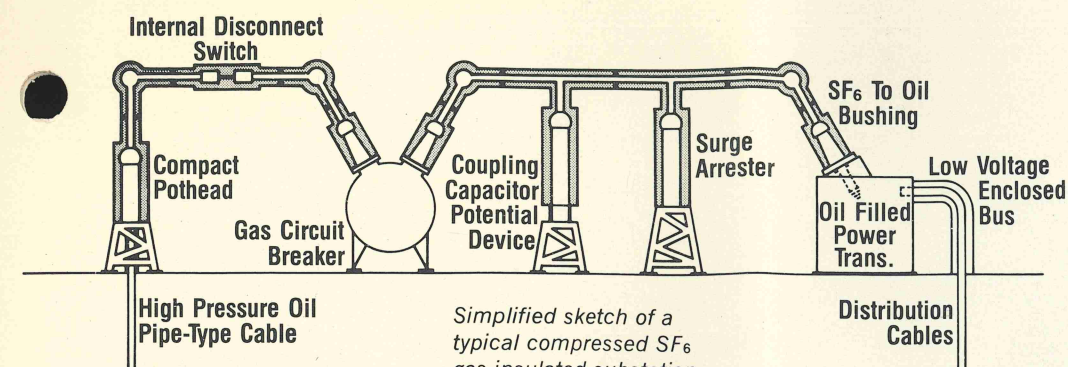
Everyone in the electric utility industry agrees that the introduction of sulfur-hexafluoride insulation technology has come at an opportune time. Its application has provided an immediate solution to many substation installations with seemingly insurmountable space problems. An SF₆-insulated substation requires only about one-tenth the land area of a conventional one, is virtually impervious to contamination, and offers other inherent advantages in apparatus and construction.

Use of SF₆ gas as the insulating medium for substations has a very recent history, beginning ten years ago in Europe and introduced in this country only about five years ago. The principles of CGI (compressed gas insulation) have been known much longer, but their application to substation design did not start until costs, needs and availability of equipment could be rationalized.

O-B's Frank B. Black Research Center has been specifically involved in the development of surge arresters and cable terminations for high-voltage SF₆ substations (230 kV and above). Development work for these two components has proceeded in opposite directions: in surge arresters the objective has been to design a protective device which can be installed intact within the SF₆ enclosure without being rendered inoperative by the high dielectric SF₆ gas; in cable terminations the dielectric characteristics of the SF₆ gas are functionally integrated into the design.

Research Center design objectives in developing a cable termination for use in SF₆-filled enclosures included arranging and shaping the components in a configuration which would not cause high electrical stress at any location. The cable termination electrical field studies were initially made with the aid of digital computer models. The computer is programmed to calculate the voltage gradients in each dielectric material.

The SF₆ termination bears little resemblance to the conventional outdoor termination for oil-filled cables. The petticoated porcelain housing is not required since the assembly is completely enclosed within the pressurized gas chamber. The terminated length of cable can be greatly reduced since the dielectric characteristics of the SF₆ gas greatly simplify the grading system. Electrical stress control is obtained by properly proportioning and locating the stress cone and external shields.



Simplified sketch of a typical compressed SF₆ gas insulated substation. The entire bus and all energized parts of major components are enclosed within gas-tight metal housings filled with the high dielectric SF₆ insulating gas.

A number of design variations were tried by the engineers before a selection was made for further development. Prototype assemblies were tested in the laboratory and progressive changes made until a satisfactory termination was produced.

The Research Center then proceeded with design tests on the prototype cable termination. The arrangement used for full-scale laboratory testing required a suitable length of pipe-type cable. One end of the cable was terminated by a conventional outdoor termination. The other end was terminated in the SF₆ termination in a back-to-back arrangement. Both terminations were evacuated and filled with oil under pressure. The SF₆ termination was sealed in a tank containing the pressurized dielectric gas.

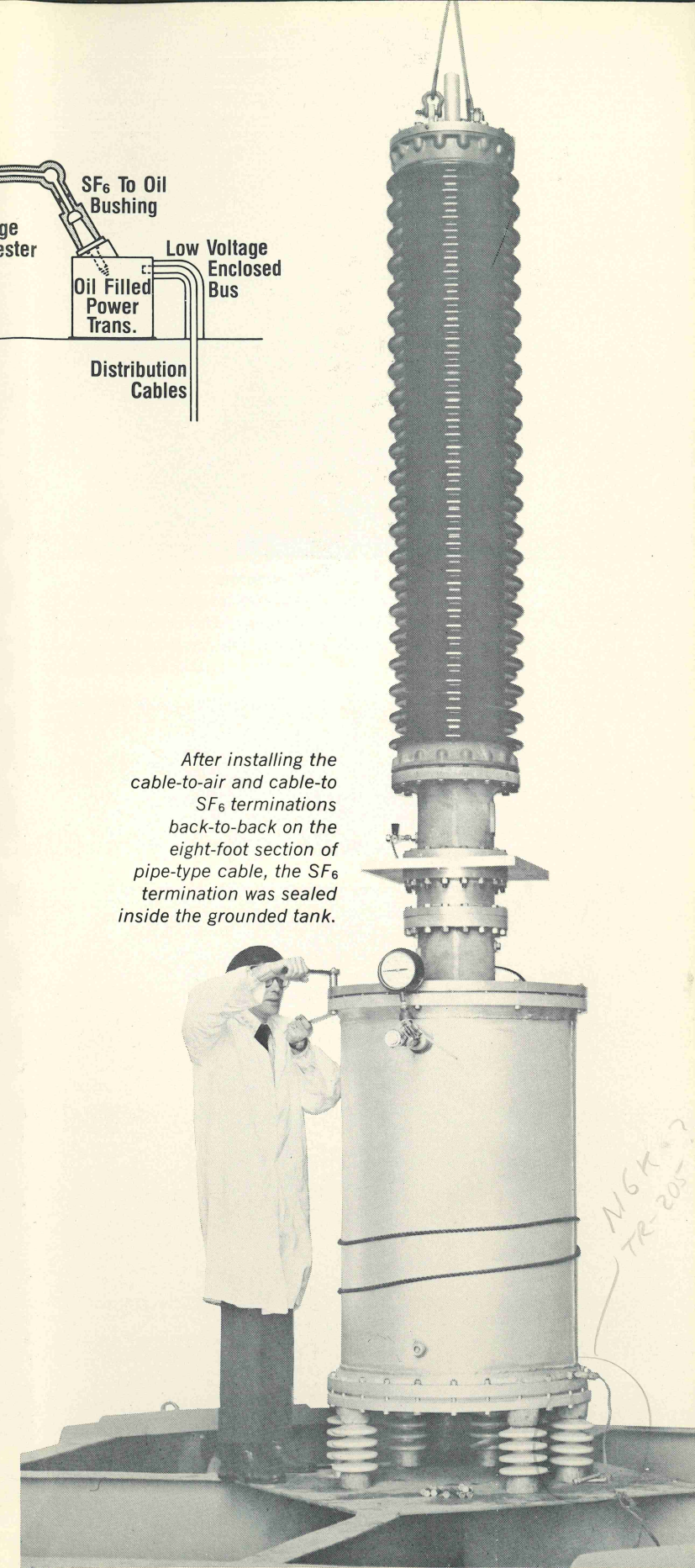
The design tests resulted in a number of further modifications in the full-scale model, each modification constituting a step toward the development of the final SF₆ cable termination, which successfully passed the designated test requirements. These electrical withstand requirements are tabulated in the following table:

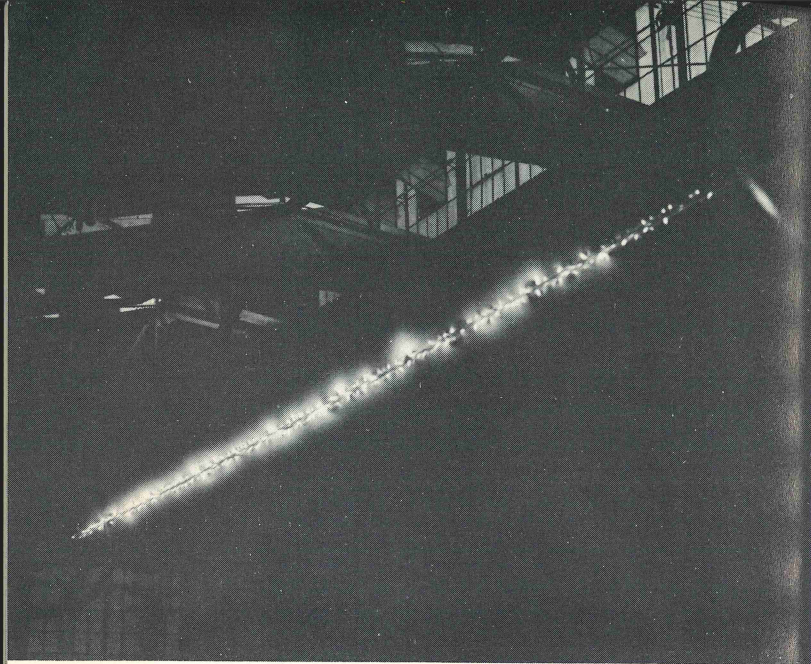
System voltage	230 kV	345 kV
Impulse BIL	900 kV	1050 kV
Switching surge	—	825 kV
One-minute 60 Hz rms	390 kV	460 kV
Six-hour 60 Hz rms	280 kV	310 kV
15-minute d c	450 kV	510 kV

The final test of the series was a one-minute withstand test at maximum rated voltage with 0-psig SF₆ gas pressure in the tank.

O-B's SF₆ cable termination design also met a physical specification that it can be used with conductors as large as 4000 kcmil with reduced insulation wall thickness.

After installing the cable-to-air and cable-to-SF₆ terminations back-to-back on the eight-foot section of pipe-type cable, the SF₆ termination was sealed inside the grounded tank.





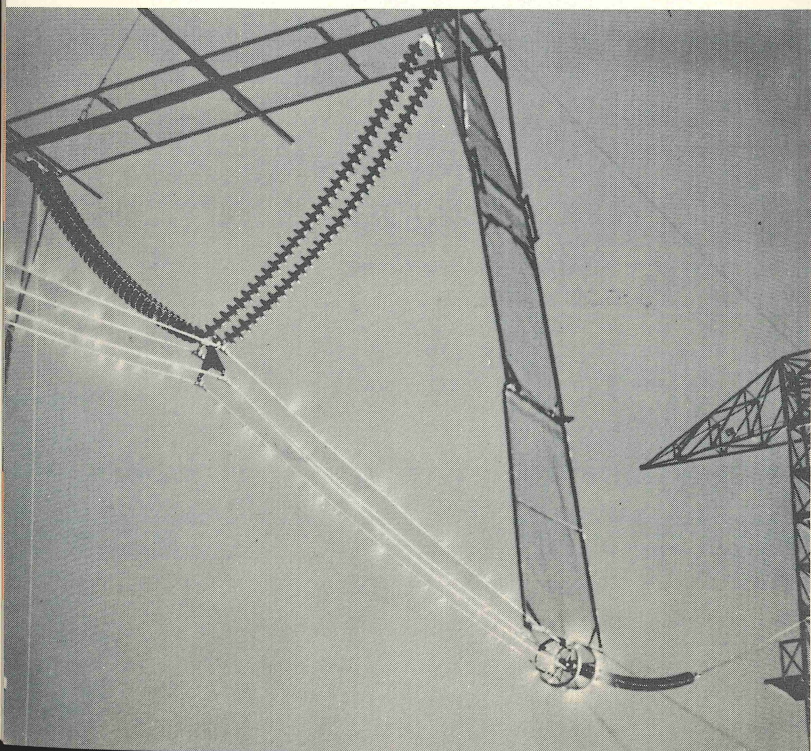
The HVDC test generator at the Frank B. Black Research Center provides an important new facility for the study of corona. This photo was made of corona on a 1.1-inch diameter conductor energized at 460 kV d c (negative).

O-B's Frank B. Black Research Center is known throughout the electrical industry for its studies of corona, its causes and its prevention. This investigative work has increased significance as contemplated transmission voltages soar into the million-volt levels.

The basic analysis of corona as an occurrence associated with the initial phases of electrical failure of insulation has been comprehensively detailed in a report published several years ago by O-B's engineers. The validity of this analysis is confirmed time and again as the O-B research center conducts corona tests at higher and higher voltages.

O-B Publication "What is Corona?" has become classic reference in field of specialized research

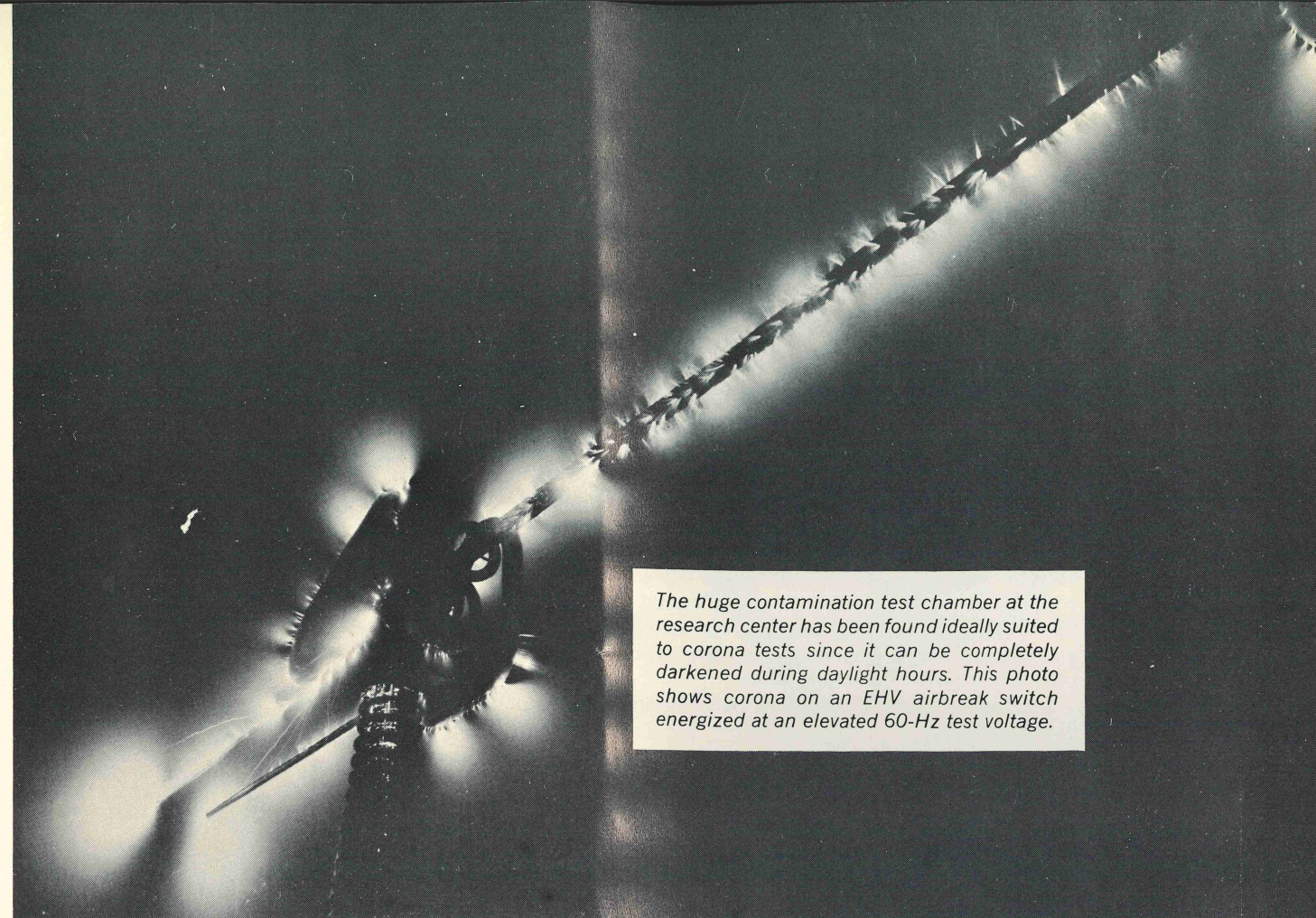
Corona test of suspension yoke plate for EHV four-conductor bundle. Voltage is raised on the specimen to the level at which corona is visible on the conductor but not on the yoke plate.



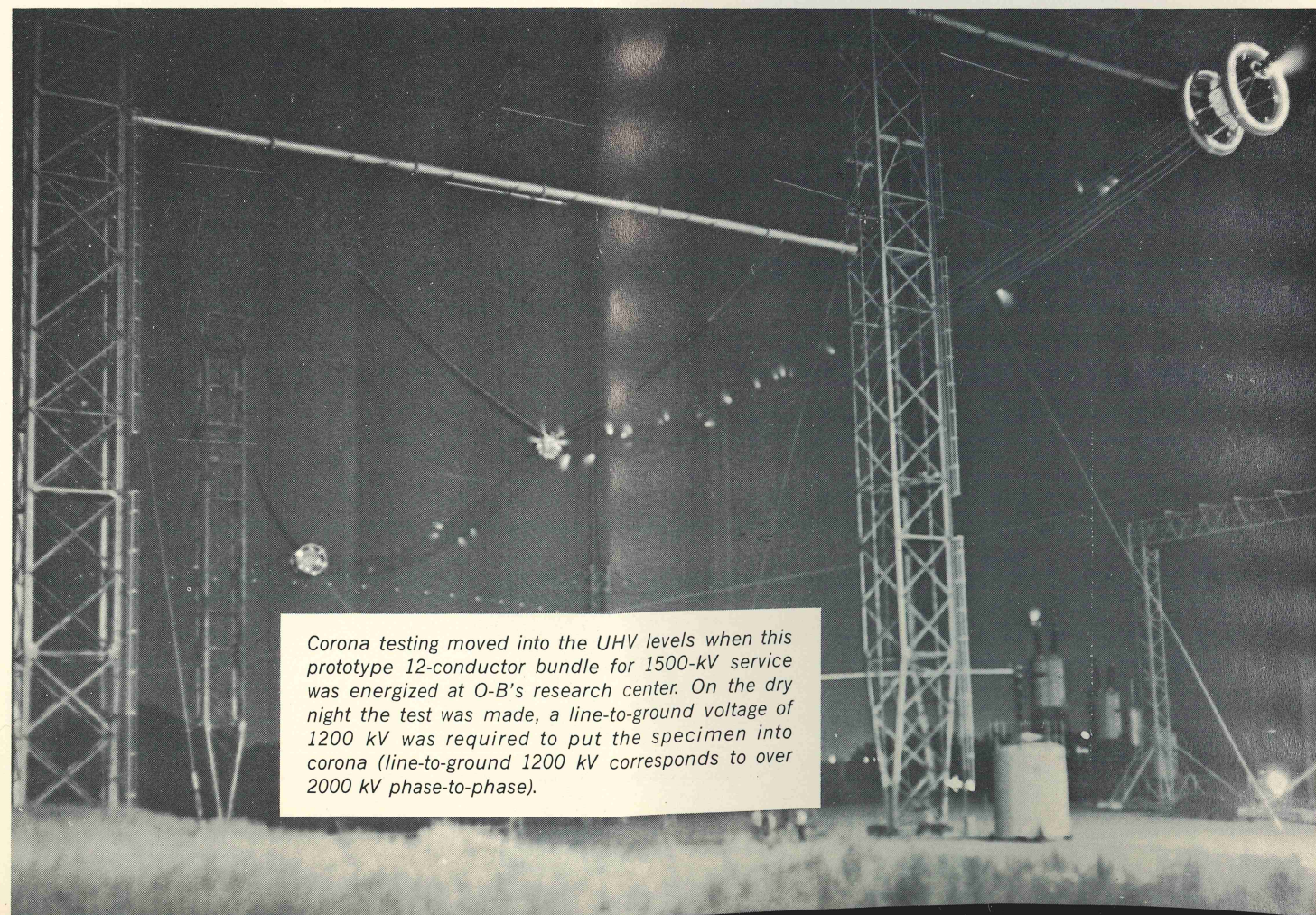
Photography of specific examples of corona is an essential tool in determining and describing the visible characteristics from which the various conclusions are drawn. Many of the photographs in the O-B report involved the use of special equipment to obtain illustrations of negative and positive half cycles of energized conductors during corona conditions. All corona photos required total darkness.

The technical paper concludes with a brief discussion of the RIV associated with corona. A comparison is made of the levels of electrical disturbance which can be attributed to each of the definable forms of corona.

The original publication, "What Is Corona?" has been reprinted and is available on request. Address inquiries to The Ohio Brass Company, Mansfield, Ohio 44902, and specify Publication 1619-H.



The huge contamination test chamber at the research center has been found ideally suited to corona tests since it can be completely darkened during daylight hours. This photo shows corona on an EHV airbreak switch energized at an elevated 60-Hz test voltage.



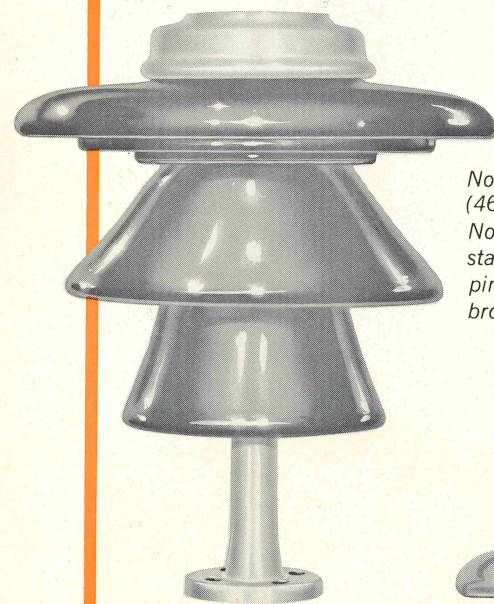
Corona testing moved into the UHV levels when this prototype 12-conductor bundle for 1500-kV service was energized at O-B's research center. On the dry night the test was made, a line-to-ground voltage of 1200 kV was required to put the specimen into corona (line-to-ground 1200 kV corresponds to over 2000 kV phase-to-phase).

Superior features provide proven benefits in many station applications

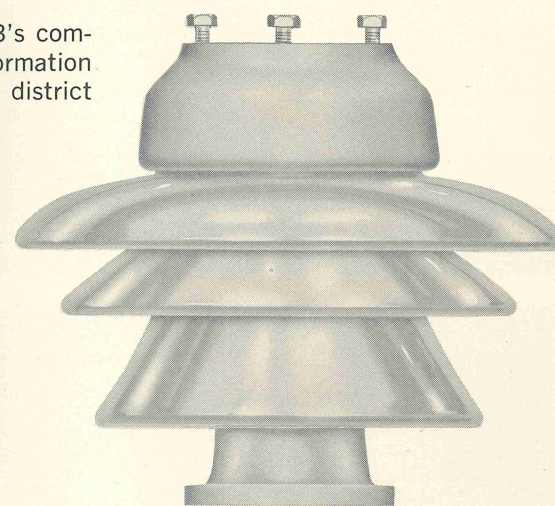
Pincap insulators have inherent advantages that have established longtime preference among many substation designers and utility engineers. No other station insulator provides as much resistance to airborne contamination problems, nor has greater adaptability or ease of assembly.

Since the functional application of pincap insulators is an important factor in their selection, Ohio Brass offers broad options in their specification. Single non-stacking pincaps are available for all voltage classes up to and including 46 kV. Stacking pincaps can be obtained for voltage classes 69 kV and above. All pincap insulators are produced in either brown or skytone glaze porcelain.

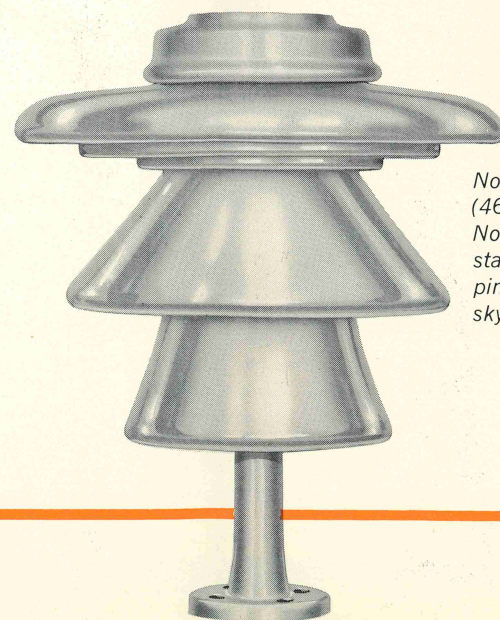
Catalog 67 gives a complete description of O-B's comprehensive line of pincap insulators, including information on uniform and mixed-strength stacks. Ask your district manager for a copy today.



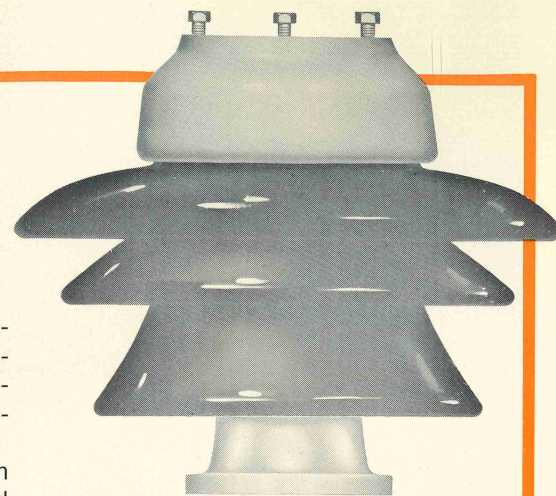
No. 37746
(46-kV voltage class)
Non-stacking
standard-strength
pincap insulator with
brown porcelain.



No. 31152 stacking
high-strength pincap insulator
with skytone porcelain.



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No. 31152 stacking
high-strength pincap insulator
with brown porcelain.

O-B PRODUCT SHOWCASE FOR 1977

You can get the options you need— in O-B's solid-porcelain vertical line posts

Whether your preference is for tietop or clamptop vertical line posts, you can be assured that O-B offers the sizes, the ratings, and the variety of options and accessories needed for line construction.

The O-B solid line post is inherently free from lightning puncture because of the large mass of dielectric in the column of porcelain between the conductor and base. The exposed surfaces promote rain washing, offsetting any accumulation of soluble, conductive contamination. The basic post design has been found to be remarkably free from radio interference, particularly in the clamptop versions.

Vertical posts are less prone to mechanical damage than pincaps; their heavy porcelain sections, sturdy petticoats and columnar shape resist breakage from gunshot, rocks and handling. Feeder lines installed on vertical posts have a neat, clean appearance which is both functional and easy to maintain.

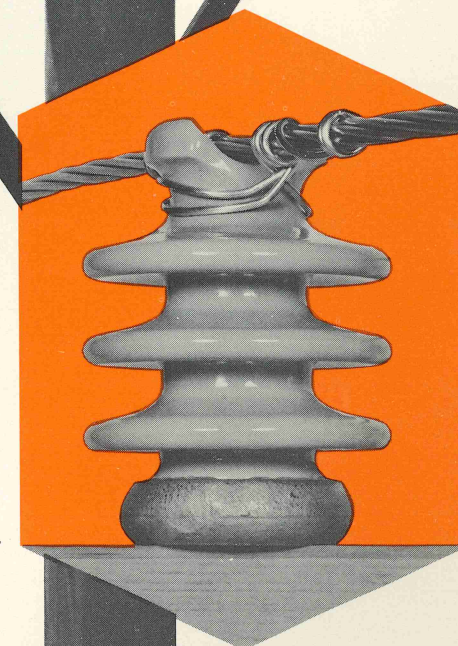
O-B catalogs 11 different vertical tietop line posts with voltage ratings from 13.2 through 69 kV. The same voltage ratings are available for clamptop posts, although fewer sizes are shown. All O-B clamptop and most tietop line posts are rated 2800 pounds cantilever; a few lower-voltage tietops are rated 1500 pounds maximum. Working load is 40 per cent of these ratings, or 1120 and 600 pounds respectively.

Malleable iron bases of vertical line posts through the 27-kV rating are drilled and tapped for 5/8-inch studs. Posts of higher ratings accommodate 3/4-inch studs, except those offered for severe 69-kV applications which are drilled and tapped for 7/8-inch studs. Posts can be ordered without studs, with short studs or with long studs.

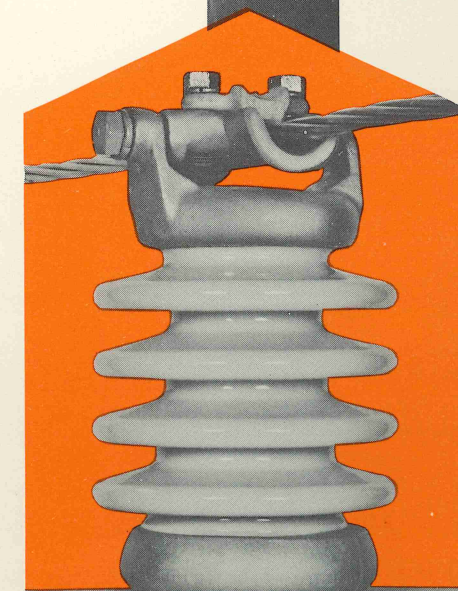
Tietop posts are offered with Types C, F and N necks in the voltage rating ranges normally applicable. Clamptop clamps can be specified either aluminum or malleable iron in any of four conductor size ranges.

A full description of vertical line posts is given in O-B's Catalog 60—Transmission and Distribution Insulators.

Vertical
tietop
line post
(13.2 kV).



Vertical
clamptop
line post
(23 kV).



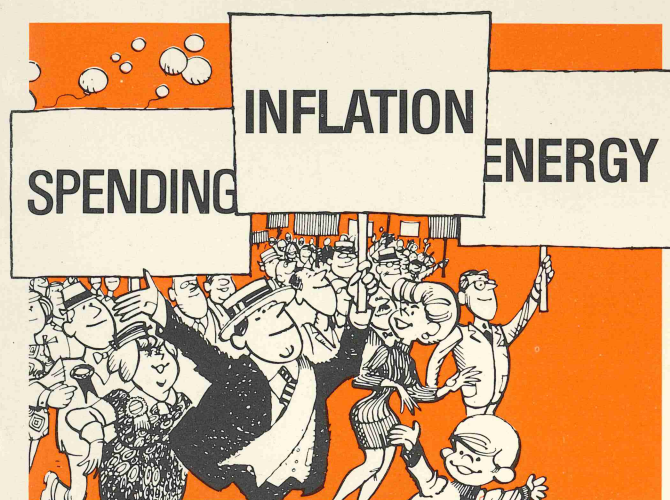


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