

OHIO BRASS MANAGEMENT REPORT

Why not get help from the men who wrote the book?

BY ROGER A. BLACK
CHAIRMAN OF THE BOARD
THE OHIO BRASS COMPANY



When we have a legal problem, most of us go to lawyers who have experience in the problem area . . . and, more important, with a record of success in winning their cases.

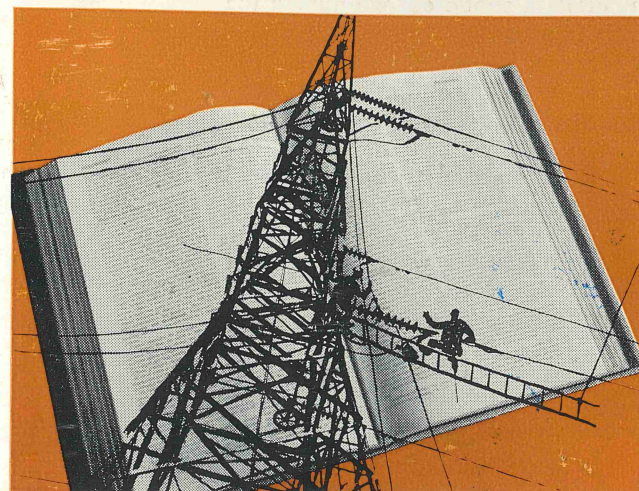
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IF YOU ARE LOOKING for assistance in developing an insulator-hardware-tower arrangement for EHV, or UHV, please consider the experience and facilities which Ohio Brass can offer in this area, now even further enhanced by the opening of our Frank B. Black Research Center.

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incidentally, of which there is only one. Even more valuable than the written experience is the knowledge that has accumulated in the minds of engineers and technicians. So we have not only the best data in our field, but also the men who have developed it and know how to apply it to your problem.

BEFORE WE BRAG any more, we should point out why all this is significant to the utility with a pioneer EHV project. First, you eliminate the need for many days and weeks of tedious preliminary testing. With



the information available to us, we can recognize routine work and handle it with ordinary calculations.

LEST WE MAKE it sound oversimple, let me assure you that your new EHV project would not be designed with a computer. But we can cut short the hackwork and quickly get on to the creative phase of the design and test procedure.

SO WE OFFER experience on the biggest EHV projects of North America and a wealth of test data ready to be applied by the men who compiled it and who will now work in the industry's newest research center. Working with your staff, we're ready to move toward any goal in EHV or UHV that you want to reach.

THE OHIO BRASS COMPANY • MANSFIELD, OHIO • 44902
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HI-TENSION NEWS

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RB5
DR4 } *P. 11*
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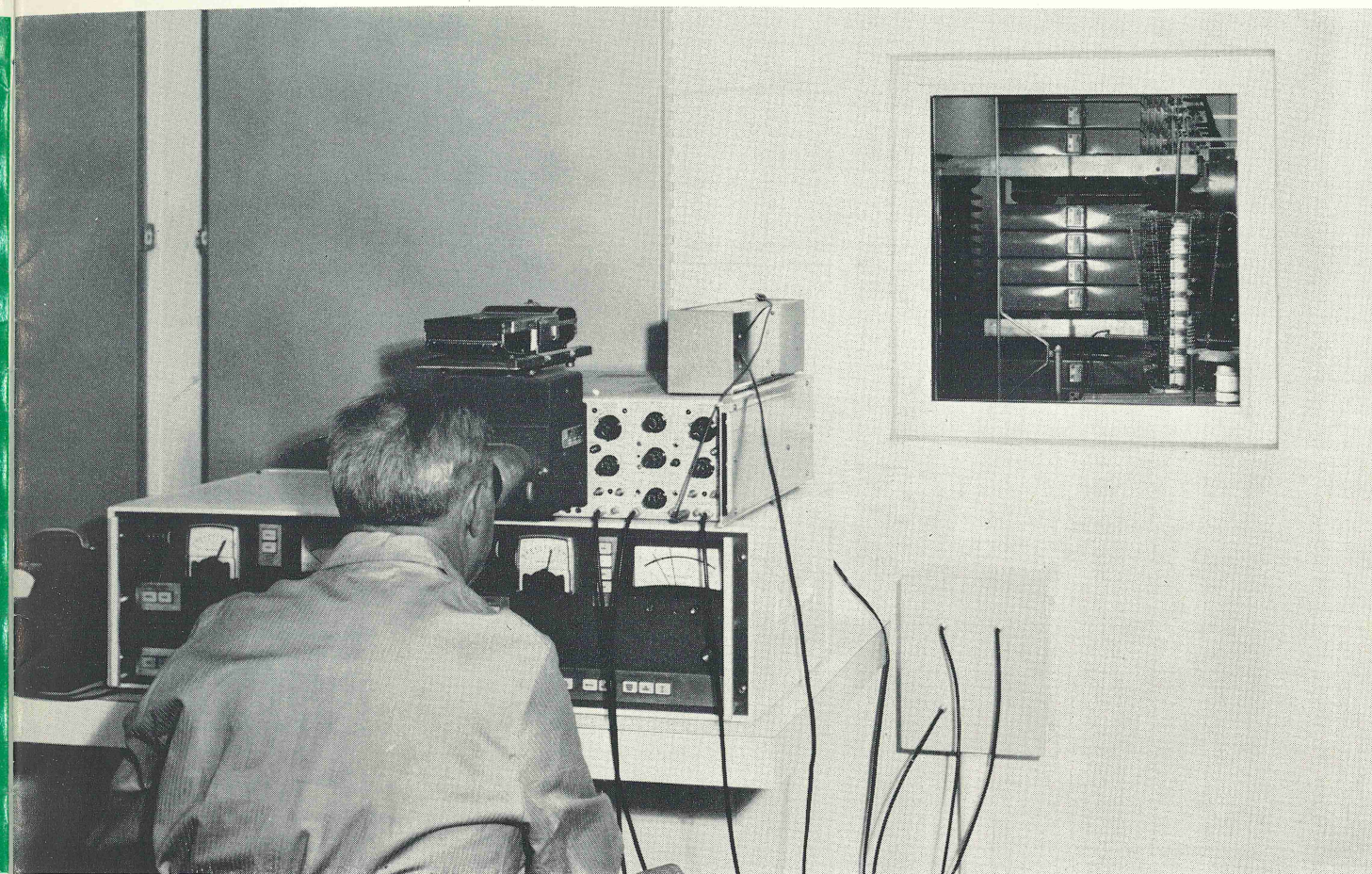
DECEMBER 1968

O-B's NEW SURGE CURRENT LABORATORY

All equipment in the Surge Current Laboratory is monitored by similar instruments. The control panel is behind the operator who is concentrating his attention on the oscilloscope. Observation of the test is through an impact-resistant window.



Typical combined test being conducted at the location of the .004-farad generator, with the control panel for another machine moved into position for monitoring both pieces of equipment from a single station. Each station also has complete connections for recording instruments. The test can be observed visually through the safety window.



... a place where you can do almost anything

With installation of all equipment nearing completion, and major pieces now in regular operation, the Surge Current Laboratory in O-B's new Frank B. Black Research Center is attracting unusual interest on the part of visiting engineers. It is the only facility of its kind in the industry. While it has been briefly mentioned in previous descriptions of the new center, so far it has not been explored in detail.

Product development and research have progressed beyond the application of a single type of elec-

trical discharge in laboratory investigations. Many pieces of equipment are exposed to severe transient disturbances while performing their normal function. Separate tests for each condition do not reflect the same data as the simultaneous application of two or more perhaps widely differing types of test energy.

In its previous High Voltage Laboratory, O-B had most of the necessary test equipment for such investigations, some of which was unique in its discharge capability. But, like most laboratories, this

equipment was built during periods of expansion and its location was dictated by convenience and available space, since the concept of combined testing had not become fully established; therefore, coordinated use was restricted. The need for combined testing, however, became more and more recognized, and construction of a new Research Center at last made it feasible to build a special laboratory for advanced studies under a combination of fully coordinated power sources.

Some of the equipment is not safe

to operate while exposed. Specimens tested to failure may shatter with explosive violence. Furthermore, noise of certain discharges is intolerable. For these reasons, five large test cells are employed — each isolated by heavy masonry walls. Doors leading to a long connecting hallway must be closed to complete the control circuit. Observation is made through windows containing impact-resistant glass.

An elaborate system of bus work permits tying any combination of equipment together to obtain the desired test hookup. Naturally, this centers attention on a specimen that will be located in one of the test cells, although some of the operating

equipment may be some distance away. It is desirable to concentrate all control and read-out instruments at a single point that may be in any one of five locations.

Each piece of apparatus is monitored by a miniaturized portable control panel. At the five stations along the hallway there are multiple receptacles that permit plugging in any or all monitor panels at a particular point; therefore, universal control from any location is possible. Other outlets at each point accommodate connections for recording instruments. In this way any combination of equipment in the Surge Current Laboratory can be interconnected, then controlled and ob-

served from any of the five stations in the hallway.

In addition to basic sources of adequate a-c and d-c power, each in its own enclosure, there are three highly sophisticated generators. One utilizes a complex circuit, based on capacitance and inductances, to simulate any given length of energized high-voltage power line in order to investigate the phenomena of trapped charges. A second surge generator is capable of producing impulse discharges as high as 150,000 amperes, useful in many investigations including certain special lightning studies. Third is what is at present the most powerful piece of equipment in the entire Research Center.

This surge generator has an energy storage capacity of 220,000 watt-seconds at 10,500 volts and .004 farad.

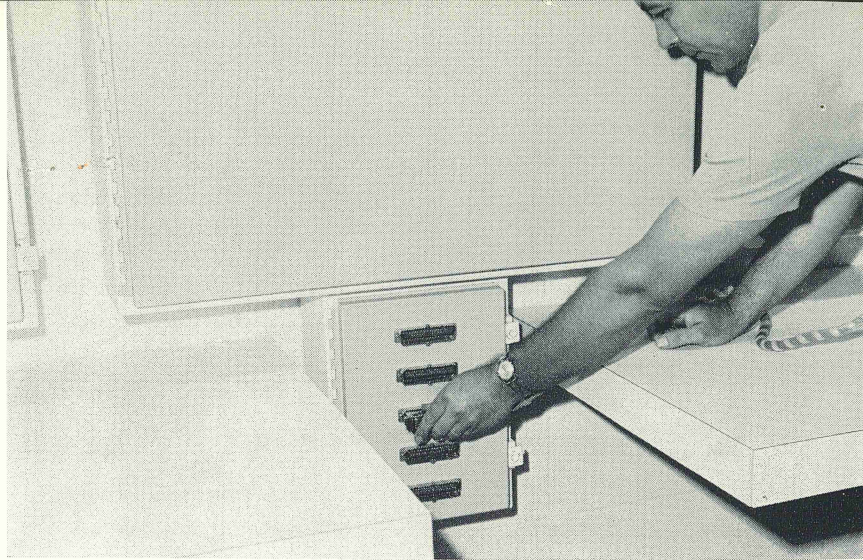
While the all-weather surge generator in the outdoor laboratory will soon have a 234,000 - watt - second storage, following an addition to be built, this wattage will be attained at 5-million volts, instead of the modest 10,500 volts of the machine just described.

In examining the new Surge Current Laboratory, it is easy to see how it gained the nickname "power laboratory." O-B engineers have not only adequate facilities for the study of today's conditions, but also for conditions in the foreseeable future. As a bonus, they enjoy a degree of flexibility in the use of such equipment heretofore unattainable.

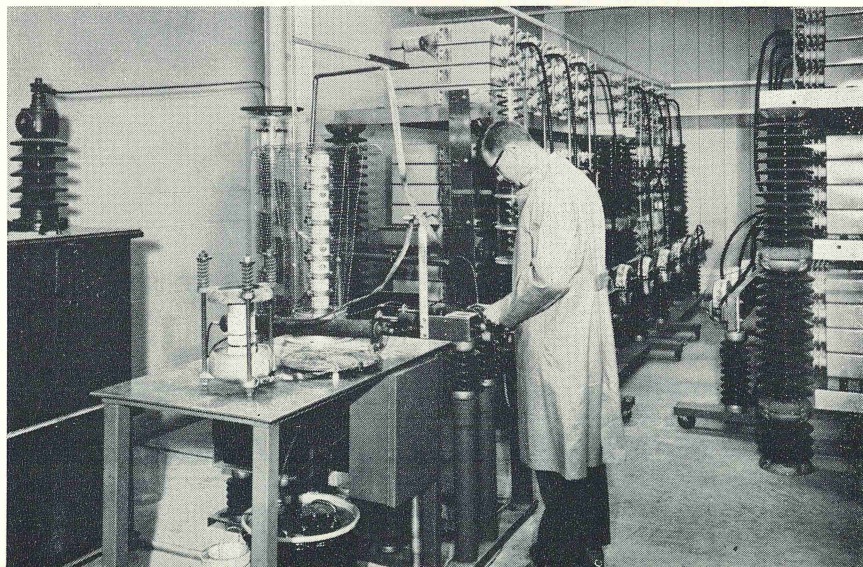
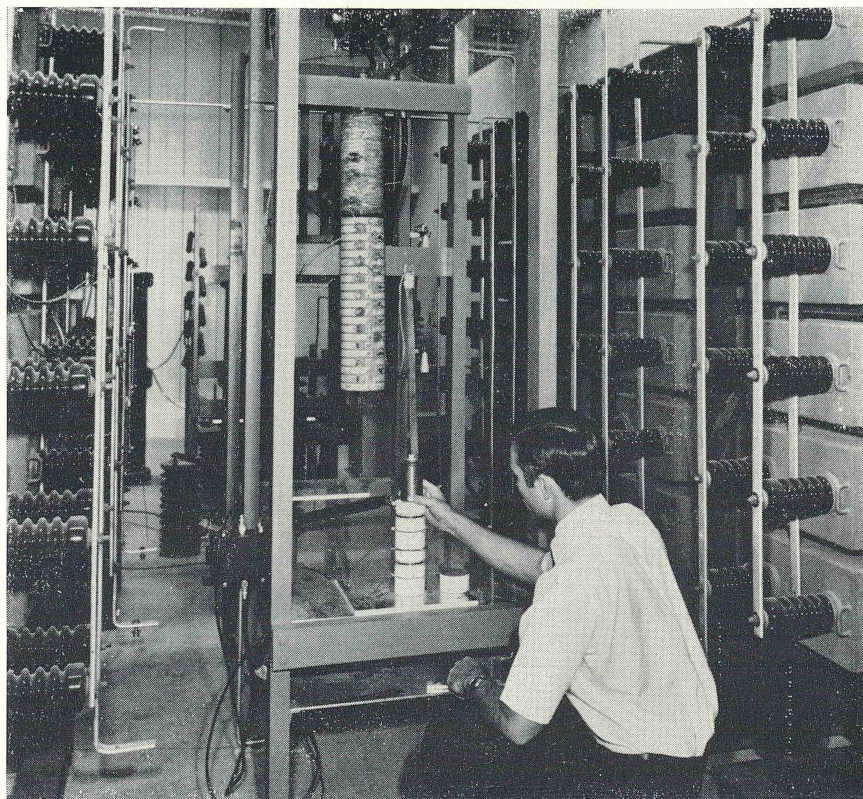
Such advanced testing apparatus would be wasted on any but the most competent personnel. O-B's greatest asset is men with the training, imagination, and experience to exploit such a fine set of tools. In the final analysis, the new Research Center is a vast workshop for capable people. It is these people who collaborate and consult with utility engineers in planning new high-voltage projects. While they think in terms of power transmission, it is always with a practiced eye on economics, guided by extensive background. This is why O-B rates high in its particular field of technical achievement.

Laboratory technician arranging a test specimen on the 150,000-ampere surge generator. The device is invaluable in both lightning arrester development and other studies involving high-current discharges.

Capability of this surge generator is 220,000 watt-seconds at 10,500 volts and .004 farad. Its massive discharges are available for many advanced studies.

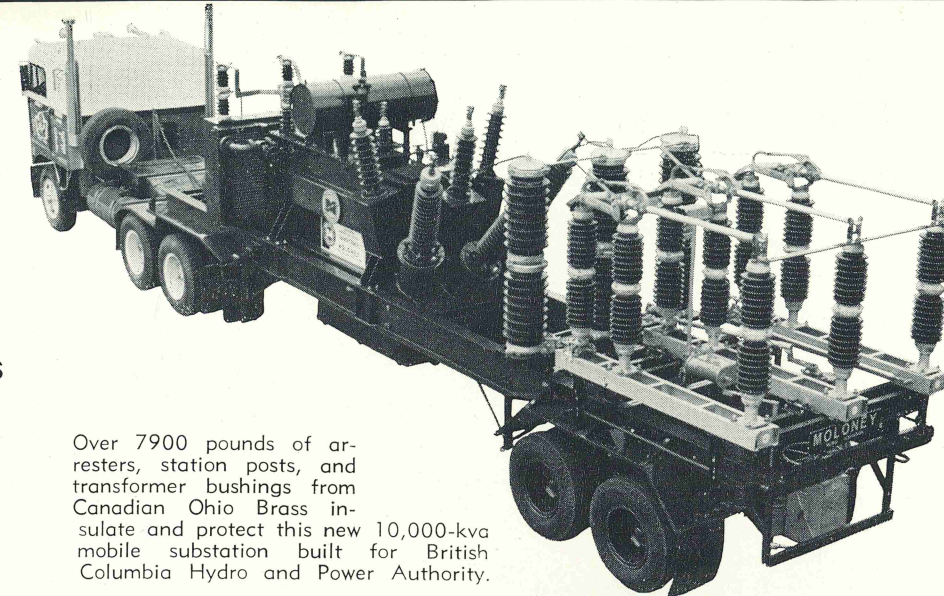


Five sources of high power are in adjacent protected cells. At each location a junction box permits plugging in any combination of control panels so that a complicated hookup of equipment can be monitored from a single location.



New 10,000 KVA MOBILE SUBSTATION

uses nearly four tons
of insulation -
posts, arresters
and bushings



Over 7900 pounds of arresters, station posts, and transformer bushings from Canadian Ohio Brass insulate and protect this new 10,000-kva mobile substation built for British Columbia Hydro and Power Authority.

Canadian Ohio Brass supplied all stacking post insulators, transformer bushings, and lightning arresters for a new 10,000-kva mobile substation — a total of more than 7900 pounds of insulation. The compact new high-capacity mobile unit was built for British Columbia Hydro and Power Authority to supply emergency power to customers during an outage and stand-by power during construction or maintenance work in substations. Purchase of a mobile unit provides the power authority with stand-by power conversion that can be moved to a trouble spot, quickly eliminating the need for five or six stand-by transformers in stationary installations.

Because of the varying requirements of the different areas where the mobile unit might be employed, several voltage selections are avail-

able. The primary side of the unit offers either 138-kv or 69-kv connections with one auto-transformer tap. The secondary or low-voltage side of the mobile substation provides for 12 voltage-level selections from 4 kv to 25 kv. The new unit may be connected into a system in series, parallel, wye, or delta circuits. The unit also includes a built-in power supply for the transformer coolers.

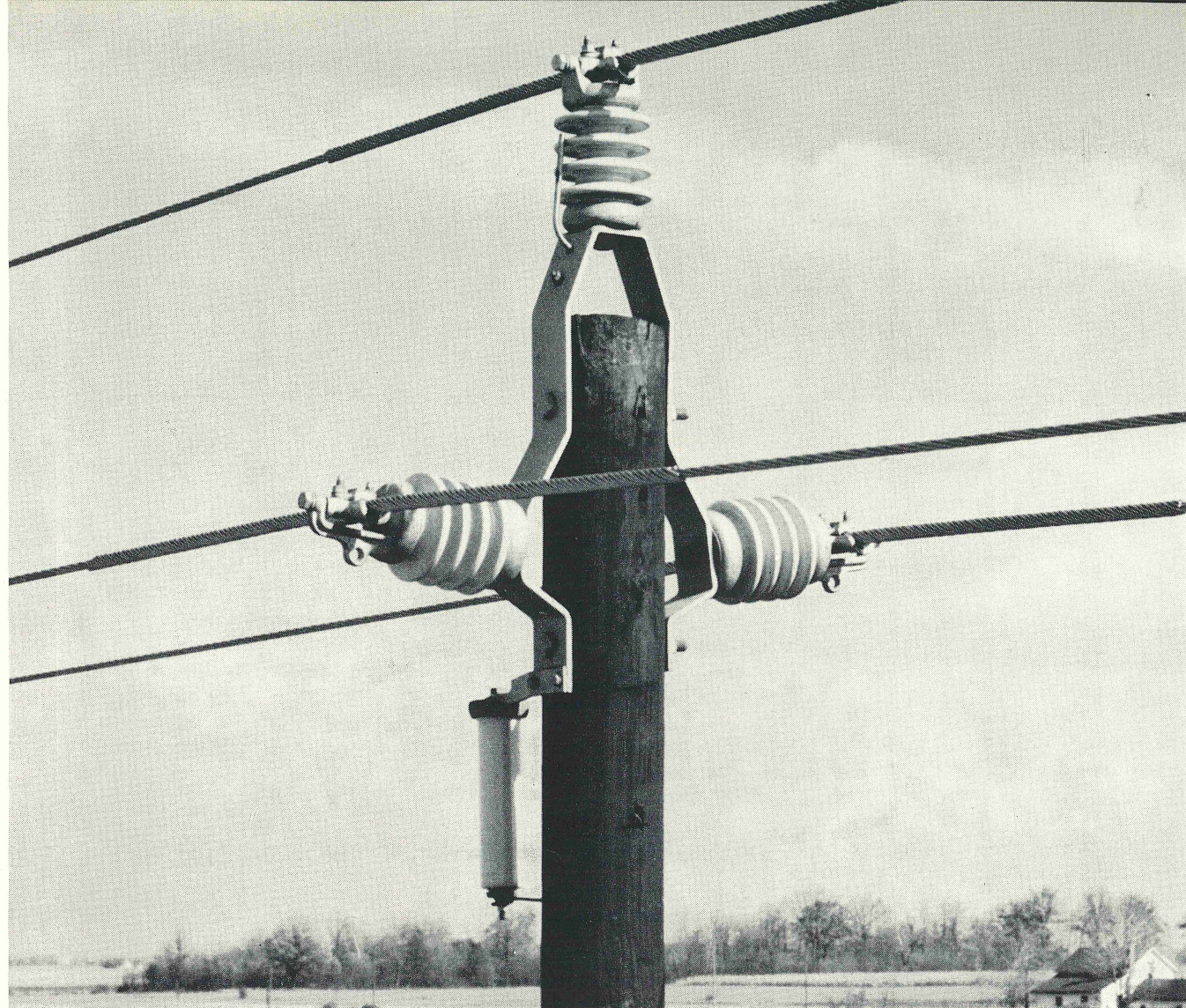
From back to front on the trailer (or from primary to secondary), the new substation includes three circuit switches mounted on nine O-B Number 47801 stacking post insulators. Three special MPR-120 Dynagap[®] tapped arresters furnish entrance protection to the high voltage (69 kv and 138 kv) side of the transformer which is terminated with three GK-40 bushings. The

transformer also includes three GK-30 bushings and five R-10 bushings on the secondary side of the transformer. The low-voltage side is protected by three special GP-18 Dynagap[®] arresters which are tapped for the numerous voltage levels at which the secondary section of the unit may be operated.

Ohio Brass supplies a complete range of transmission, distribution, and station insulation to the electric utility industry. The new 10,000-kva mobile substation's insulation equipment is just one example of how O-B products can be adapted to the special equipment needs of a utility or an equipment manufacturer. Ask your O-B representative to help you solve insulation problems that crop up during your construction or modernization programs. He'll be glad to help — and take your order.

Mobility of this new 10,000-kva substation permits a utility to eliminate five or six stand-by transformers in stationary installation because the mobile substation may be moved quickly to a trouble spot.

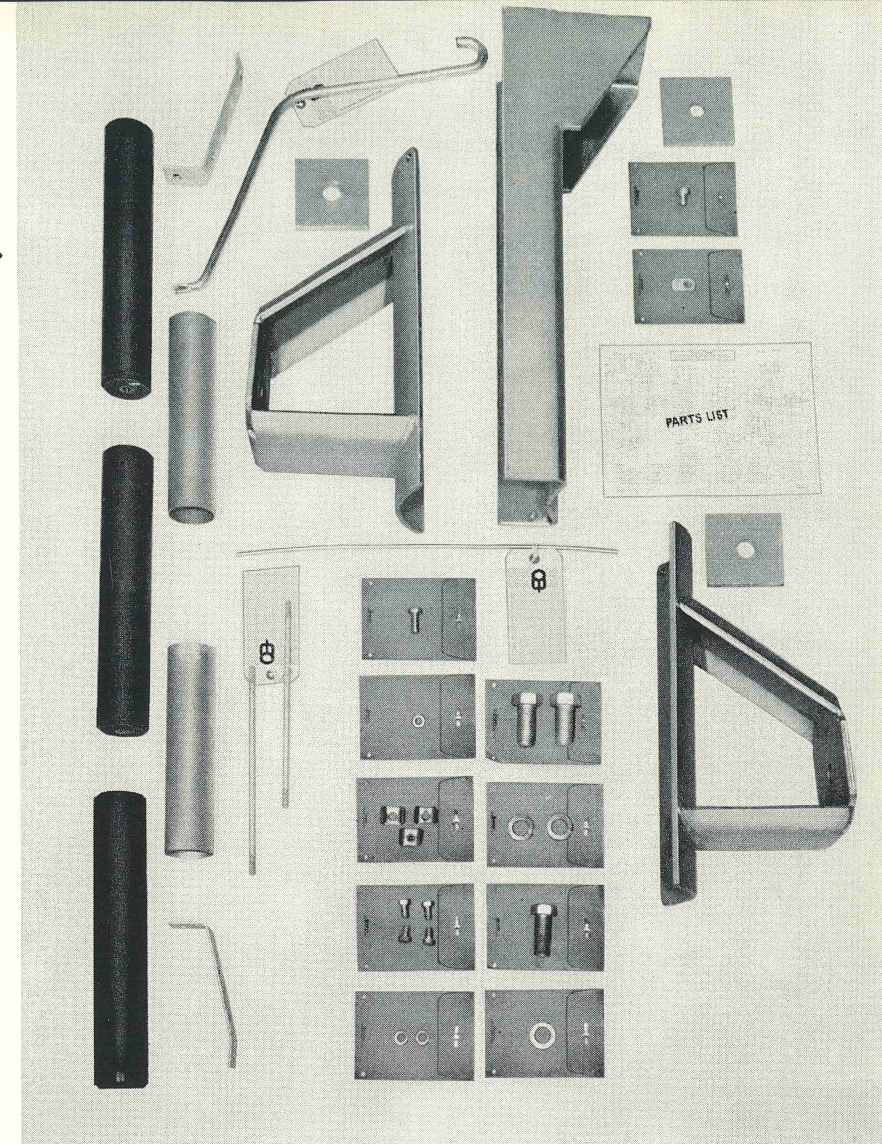




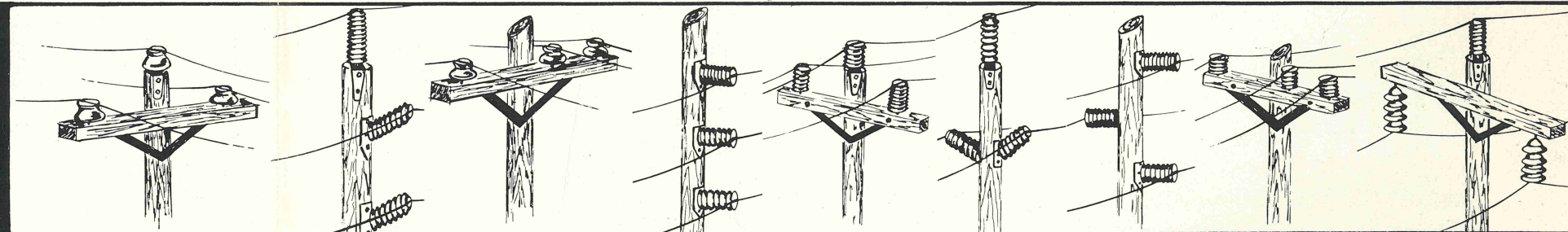
This illustration of the individual components (except post insulators) of the 69-kv Thortec poletop assembly indicates the range of selection of parts available for specific changeovers of existing construction.

soundness of the basic Thortec design principles and can now serve to provide the performance standards from which acceptable deviations to accommodate existing construction can be determined.

Some progress toward this objective can now be announced. Certain recommendations have already been furnished in critical situations where unshielded feeder lines had reached the point of requiring an immediate decision. Details of these conversions are being reviewed and consolidated for publication in the form of application data sheets. A technical task force has been assigned to examine many other com-



THORTEC CHANGEOVERS...



add effective protection to existing line construction

What are the possibilities and probable benefits of applying Thortec to an existing distribution line?

It has become increasingly obvious during the first year's introductory period that the broadest benefits to the utility from Thortec

can be attained by exploring the changeover possibilities of existing line construction, particularly those which are now unshielded or unprotected. Many inquiries have been received requesting specific details in respect to the adaptation of Thor-

tec protective components to existing poletop configurations.

Experience with distribution and subtransmission lines which are not fully converted to Thortec design is limited. All initial field trials, some of which have now been in operation for more than three years, incorporated Thortec poletops with all components specifically selected to meet design specifications. These field trials have substantiated the

mon poletop configurations and to analyze suggestions received from utility engineers, with the purpose of enlarging the range of published application data.

Investigation of Thortec changeovers has been integrated into research and development projects undertaken at the new Frank B. Black Research Center. Proposals for incorporating Thortec components into existing construction will

be first evaluated and approved by development engineering.

As an essential first step in the encouragement of field changeovers, the individual components of the Thortec poletop assembly for each voltage class have now been listed as separate items and are available for immediate delivery in whatever combination or quantity they are required.

In a brief summary of the poten-

tial benefits of the typical Thortec changeover, it can be generally stated that the addition of Thortec to an unshielded line will provide as good lightning protection as the addition of an overhead ground wire, and at lower cost. Thortec, in addition, will provide greater flashover resistance to insulator contamination and animal contacts, and a significant improvement in poletop appearance.

Transformer - handling device permits full utilization of aerial elbow capacity

JAMES L. EUCHER*

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To permit full utilization of the capability built into the manufacturer's aerial elbows, a new hydraulically operated transformer-handling device has just been introduced by Holan Division of The Ohio Brass Co., Cleveland, Ohio.

The 2882-11 device's built-in flexibility adds significantly to the capability of a material-handling elbow and eliminates substantial amounts of maneuvering between the job and the ground. Most material-handling aerial el-

bows offer maximum lift capabilities with the upper arm at 75 degrees. For example, at 75 degrees the extra-heavy-duty Holan Bronco 85 will lift a bareshaft load (less buckets, swivels, and options) of 2650 pounds. Lower that upper arm to 0 degrees, however, and the bareshaft lift capability becomes 1050 pounds.

Also, most lifting gin poles for use on the upper arm require a crew to pass through the 0-degree position to connect the material and lift it into position.

The increasing use of 50- and 100-kva transformers for replacement programs meant a payload of up to 1100 pounds or more. Rather than develop a single device capable of lifting just the 100-kva unit, the decision was made to design a tool compatible with the ratings of the aerial device, and with the built-in flexibility to work efficiently in all work situations.

The answer to these material-handling problems, the new 2882-11 transformer-handling device, consists of a fiberglass boom and winch mechanism that attaches to the bucket shaft on the side of the elbow opposite the man-carrying bucket. The fiberglass boom pivots on the shaft in 10 positions to permit attainment of the most convenient and safest work attitude relative to the upper arm and the work situation. Coupled with the 270-degree upper-arm-actuation capability, the new 2882-11 device permits full arm lift capability from 0 to 75 degrees, even when the arm is over center. It gives line personnel the capability to set 100-kva transformers or larger with pinpoint accuracy and a minimum of physical labor.

To provide the lifting muscle, the new device uses a hydraulic winch, to provide smooth continuous lifting with the finite control inherent in hydraulically actuated systems. All hoses employed for the winch operation consist of the same type

used for the elbow controls, to insure insulation integrity of the aerial elbow.

On the tip of the fiberglass boom is a multiple sheave head. It permits threading of the winch line for standard use with the upper arm actuated between storage and 75 degrees relative to the chassis, or for over-center use. This built-in flexibility combines with the 1200-pound lift capability to furnish a very useful working tool with which

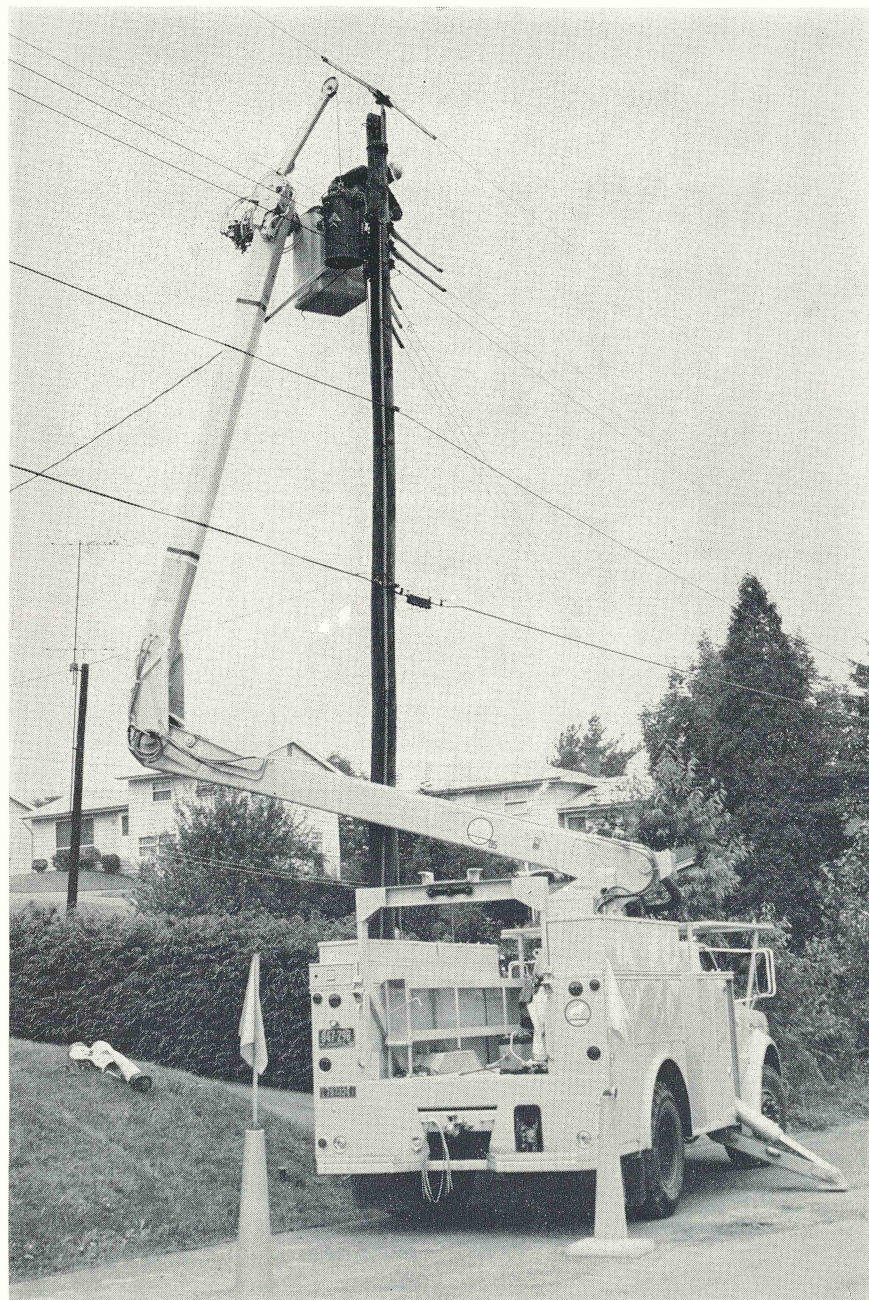
jumpers the old transformer or takes the served customers off line. He then threads his sheave head, which is within easy reach, attaches his lifting sling to the transformer, tensions the line with the hydraulic winch, loosens the retaining bolts, and then lifts the unit off the pole. With the transformer free of the pole, the lineman maneuvers the rig into position to lower the old transformer into the truck bed.

With the old transformer stored,

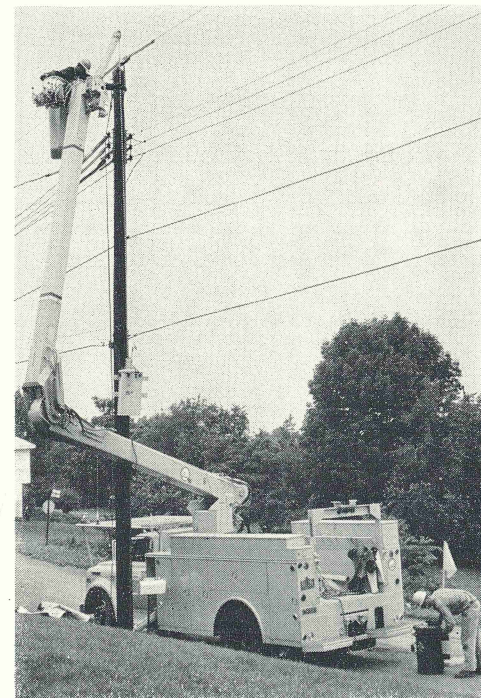
up materials, and stores his elbow ready for the next job.

Sample times for such a transformer change-out include some as low as 15 minutes. A new installation is just as simple — especially since the hydraulic power for remote-tool operation is available at the bucket if desired.

Designed primarily as a transformer-handling tool, the new device, available for the Bronco 85 and 88 aerial elbows, finds numer-

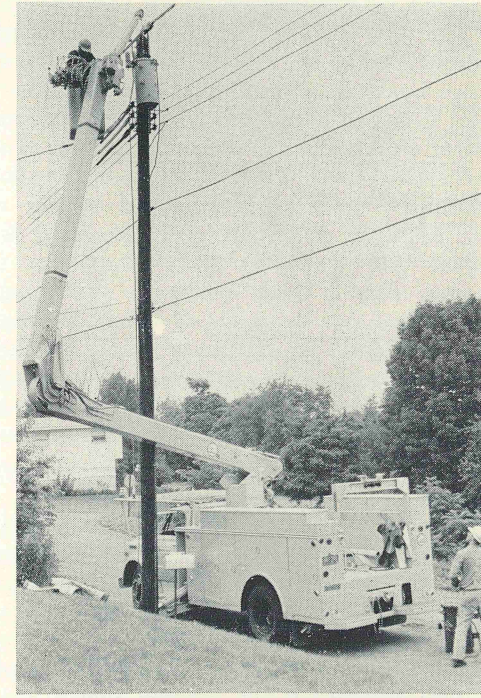


With the winch line of the transformer-handling device taut, lineman swivels bucket around the pole to loosen the retaining bolts on the old transformer.



As a groundman prepares the old transformer for storage, the lineman uses the hydraulic winch to raise the new 50-kva transformer into position on the pole.

Variable positioning, built-in hydraulic winch, and multiple-sheave head on the new device permit full utilization of the aerial-lift's capability even with the upper arm in the over-center position.



to place pole transformers.

Typical installation procedures employed by utilities presently using the new 2882-11 unit illustrate the work and labor-saving features available with this device. With the carrying truck positioned at the job site, a lineman maneuvers the bucket up to the existing transformer. After completing all cover-up operations, the lineman either

the groundman attaches the new replacement transformer to the winch line. The lineman then actuates the winch and raises the transformer to bucket level. Maneuvering up to the pole, he sets the transformer on the retaining bolts. While maintaining winch line tension, he swivels his bucket around to tighten the retaining bolts. He then ties in the new transformer, removes his cover-

ous other applications on a utility system. For example, the new device may be used for lifting in replacement of capacitor banks, switch gear, crossarms, and other equipment. Or, it may be employed for setting ornamental poles.

*James L. Eucker, manager of engineering, Holan Division of The Ohio Brass Co., Cleveland, Ohio

GK-50 JOINS O-B BREAKER-TRAN FAMILY

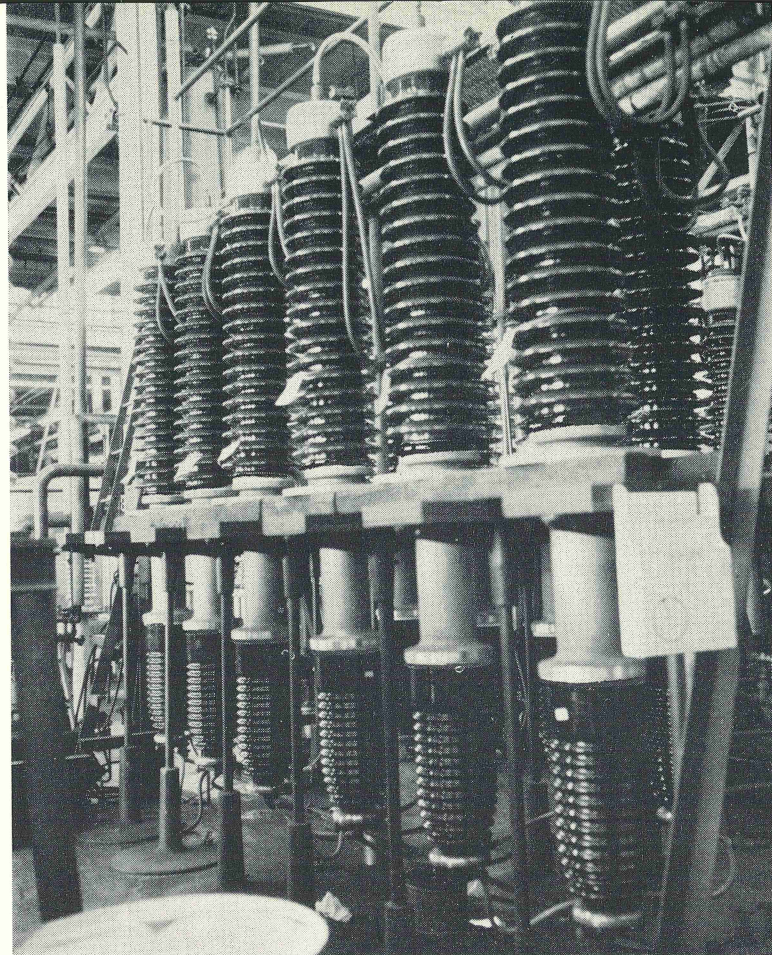
Lighter, stronger design featured

Improved circuit-breaker performance and lighter weight — just two of the advantages inherent in O-B's newest Breaker-Tran bushing, the GK-50. The 161-kv insulation-class bushing, Number 49420, is a 1600-ampere fixed conductor or 800-ampere draw-lead transformer bushing and is suitable for 2000 amperes in circuit-breaker service. BIL is 750 kv. Weighing in at approximately 250 pounds less than the previous GK-50 design, the bushing meets present USA standards in all respects.

The new GK-50 shares the same design innovations as the GK-40 and -45 Breaker-Tran bushings, which were introduced earlier. It has an aluminum conductor tube and lower terminal plate. The upper copper alloy terminal threads directly to the copper alloy conductor extension instead of bolting to the reservoir cover nut, as in previous designs. The transition from aluminum to copper alloy is made inside the sealed part of the bushings by means of a threaded connection which is constantly under the full spring loading. As in the lower-voltage bushing line, and similar to the GK-40 and GK-45, the new GK-50 uses a one-piece aluminum casting for the flange and ground sleeve.

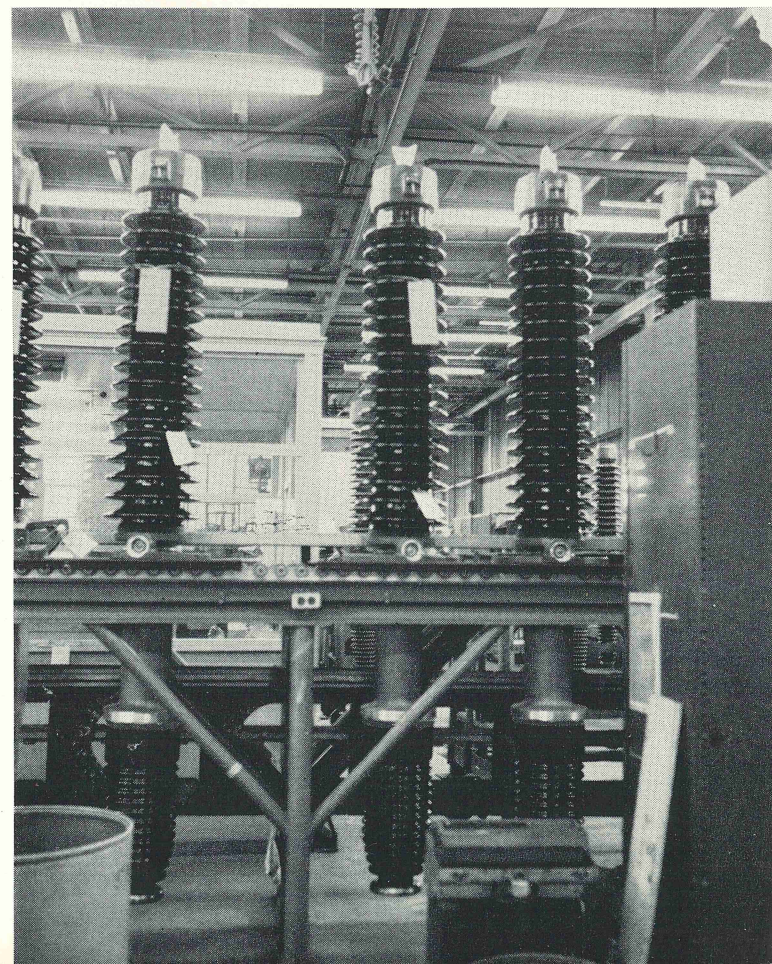
Bushing Number 49420 is approximately seven inches shorter than its predecessor, with a simple screw-in upper terminal helping to reduce upper-end length, without reducing insulation length. It has a cast-bronze reservoir with a magnetic oil-level indicator. Where the flange and ground sleeve meet the upper and lower insulating shells, the porcelain is recessed into the metal and sealed with a "live" oil-resistant rubber gasket, to form completely leakproof joints.

The GK-50 Breaker-Tran bushing is designed for the progressively higher interrupting ratings required by today's circuit breakers, and fills the demand for bushings paralleling these requirements. It is a part of Ohio Brass' continuing program of development on capacitance-graded bushings, emphasizing lighter equipment and improved circuit-breaker performance.



GK-50 bushings are evacuated prior to filling with oil.

New GK-50's await completion on final assembly rack.



Since many men in the utility business appreciate being kept informed on the subject of insulator contamination, we wish to present an interesting and little-known aspect of the problem; even if it has no pat answer.

The Silicates, as a class, may be even more complex than the Carbons in their chemical behavior. Glass and the glaze on an insulator, which are similar compounds, undergo a subtle change during the first year or two of natural exposure. As a demonstration, two chemically clean insulator surfaces, with different periods of exposure, show a clear difference in their wetting action. A drop of water on a seasoned glazed surface tends to flatten and spread, as in Figure 1, whereas the same drop on a new surface remains spherical and tries to roll off. Obviously, some surface change takes

these foreign particles on an insulator surface however, can trap other contaminants of a much more troublesome nature, and they tend to make the insulator more prone to the accumulation of undesirable surface deposits, as shown in Figure 4.

Once an insulator has become coated with these tightly bonded particles, their removal is impractical. Shop cleaning is the only answer, and this involves use of solutions that are not safe in the hands of ordinary workmen. Furthermore, most insulators would not justify the trouble and cost of salvage.

By now it appears that we have painted a rather bleak picture of insulator contamination by a combination of fresh surfaces and dusts. First, it must be understood that this is a condition existing mainly with new glass surfaces, and sub-

Seasoning of glaze surface presents interesting aspect of insulator contamination

place as glass ages on exposure. See Figures 1 and 2.

When an insulator is first put in service and exposed to certain wind-blown dusts, particles of near microscopic size may become bonded to the surface. These dusts are often in the general category of Silicates, embracing many of the field dusts, including gypsum. See Figure 3.

This bonding action, for all practical purposes, is permanent. Even hand cleaning with steel wool will not remove it. If atmospheric pollution includes any acids, the bonding property of Silicate dusts is considerably accelerated.

Mineral compounds that behave in this fashion, fortunately, are not highly conductive, and small particle size and dispersion does not normally create a severe electrical leakage condition. The presence of

sides within a year or two. Second, there is a practical preventative where the presence of Silicate dusts is suspected.

When the insulator is installed, a thin coating of Silicone grease can be applied to all surfaces. This coating acts as a parting agent and prevents the adhesion of pollutants by providing a physical separation between the dust particles and the glaze surface. See Figure 5. If, in the course of time, the Silicone becomes saturated with contaminants, it can be wiped off and reapplied. As time progresses, the need for Silicone treatment in this specific application decreases.

Not all problems of insulator contamination are simple, and we feel that the well-informed utility engineer may welcome information that will expand his knowledge of the subject, even if no simple remedy is forthcoming.

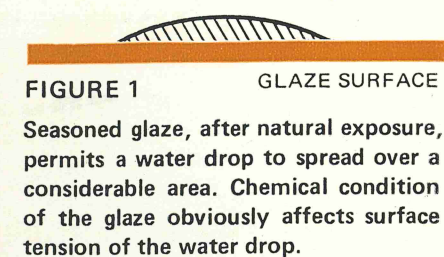


FIGURE 1 GLAZE SURFACE
Seasoned glaze, after natural exposure, permits a water drop to spread over a considerable area. Chemical condition of the glaze obviously affects surface tension of the water drop.

FIGURE 2 GLAZE SURFACE
Demonstrating that a fresh glaze surface has different properties than a seasoned surface, the same drop of water as in Figure 1 remains spherical and tends to roll off.



FIGURE 3 GLAZE SURFACE
Dust or soil particles, that frequently fall into the category of Silicon compounds, can bond themselves to new glaze with a high degree of adhesion. This is aided by the presence of any acid that may be carried in polluted air.



FIGURE 4 GLAZE SURFACE
Small size, dispersion, and low conductivity of adhered particles may not constitute a severe electrical leakage hazard, but the contaminants they tend to trap may become troublesome.



FIGURE 5 GLAZE SURFACE
By applying a Silicone grease coating to a new insulator it acts as a parting agent in keeping dust particles out of contact with the fresh glazed surface.

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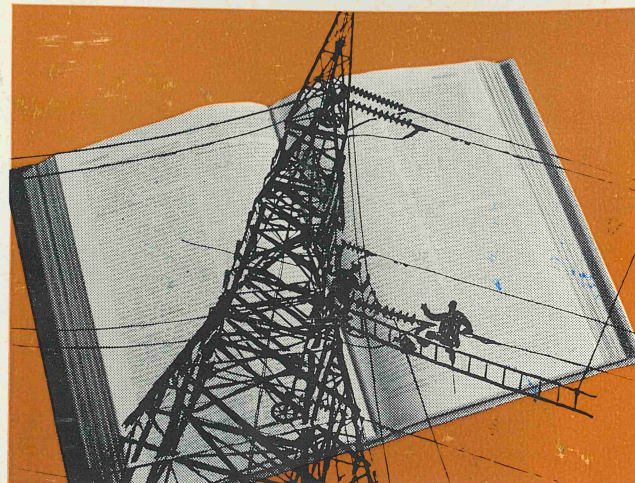
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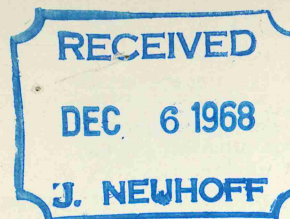
LEST WE MAKE it sound oversimple, let me assure you that your new EHV project would not be designed with a computer. But we can cut short the hackwork and quickly get on to the creative phase of the design and test procedure.

SO WE OFFER experience on the biggest EHV projects of North America and a wealth of test data ready to be applied by the men who compiled it and who will now work in the industry's newest research center. Working with your staff, we're ready to move toward any goal in EHV or UHV that you want to reach.

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HI-TENSION NEWS

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DECEMBER 1968