RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

TYPE SVS AUTOVALVE LIGHTNING ARRESTERS WITH TYPE PR PRESSURE RELIEF DEVICE

STATION TYPE FOR INDOOR OR OUTDOOR SERVICE

For use at 0 to 6,000 feet altitude

TYPE SVS AUTOVALVE LIGHTNING ARRESTERS described in this leaflet are station-type arresters for the protection of power apparatus such as oil insulated transformers and circuit breakers.

The distinguishing feature of the type SVS arrester is its short compact design. The highest required rating can be erected as a single, unbraced structure of minimum height. Considerable savings can be realized because of reduced space requirements, lack of supporting structures and ease of installation.

The type SVS arrester incorporates the pressure relief device, a combination of pressure relief diaphragms and specially designed exhaust ports. If for any reason an arrester should be damaged and thereby lose its ability to limit or interrupt power follow current after sparkover full system fault current will eventually pass through the arrester. The amount of gas developed by this concentration of fault current inside a porcelain housing is a function of the available fault current and the length of time it is permitted to exist. In cases of high fault current, a relief diaphragm alone is not sufficient to prevent shattering of the porcelain; it is also necessary to remove the arc to the outside of the porcelain within a half cycle or less of fault current. This is accomplished by the specially designed exhaust ports which cause the ionized gas streams from each end of the arrester to meet outside the arrester. This causes the fault current arc to transfer to the outside of the porcelain. The arresters described in this leaflet are of the unit type. To obtain arresters of higher ratings the units are connected in series.

RECEIVING

Each single pole arrester consists of one or more porcelain clad arrester units, and various attachments as required. At the time of installation, these parts must be assembled to form the complete arrester pole. The parts as packaged consist of the following:

1. **The Arrester Units.** These are the porcelain housings, containing the operating parts, having a metal casting cemented to each end. Each unit has a nameplate attached to the vent port of the bottom end casting, giving the identification and rating of the unit only. Each unit is an arrester in itself. See Figure 1.

2. **Line Terminal and Top Cover Assembly.** This is used with an arrester that requires no grading ring or an arrester having a one-piece grading ring. When multiple-piece rings are supplied, the terminal and top cover are incorporated as part of the ring. See Figure 1.

3. **Two Angular Mounting Brackets.** These are used at the bottom of the arrester. One bracket includes the ground terminal. The other has attached to it the master arrester nameplate, giving the complete arrester identification and rating, as well as the unit ratings used and their position in the complete arrester. See Figure 1.

4. **A Grading Ring Assembly.** Used with arresters above 121 kv. Depending on the rating, the ring may be of one-piece or multiple piece construction. See Figure 1.

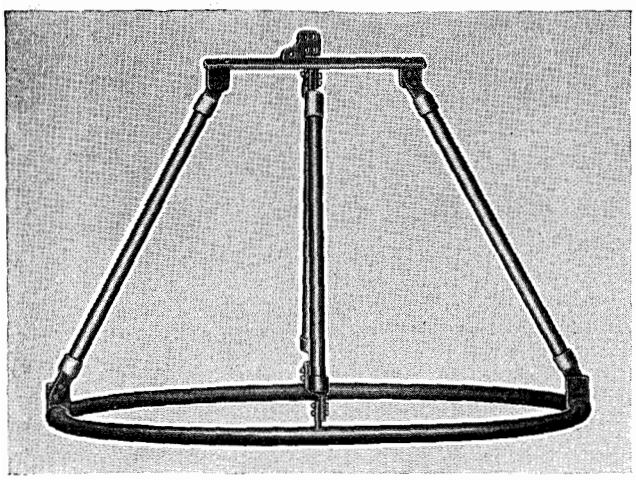
Unpacking. Before unpacking, examine the containers for any visible signs of damage. Unpack the parts carefully and examine for breakage or other damage, especially with respect to the porcelain. If damage exists, save the container and packing, and notify the carrier.

Shortages should be checked with the carrier; or if not the fault of the carrier, with the nearest Westinghouse Sales Office. If parts do not agree with the packing list, contact the nearest Westinghouse representative giving the order reading and other identification.

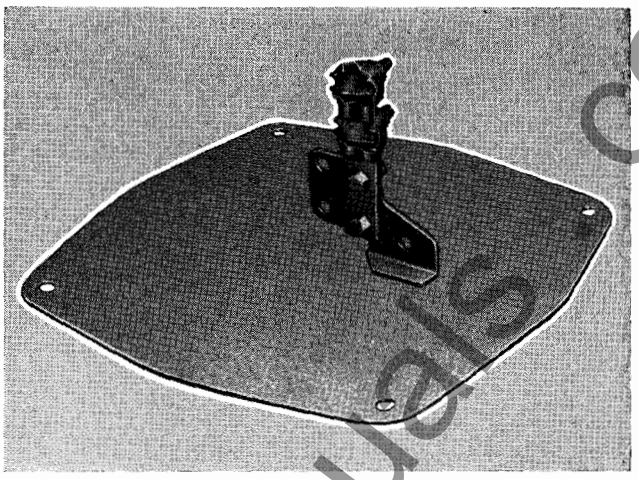
Table I indicates the number of parts to look for when unpacking any one arrester of a given rating.

INSTALLATION

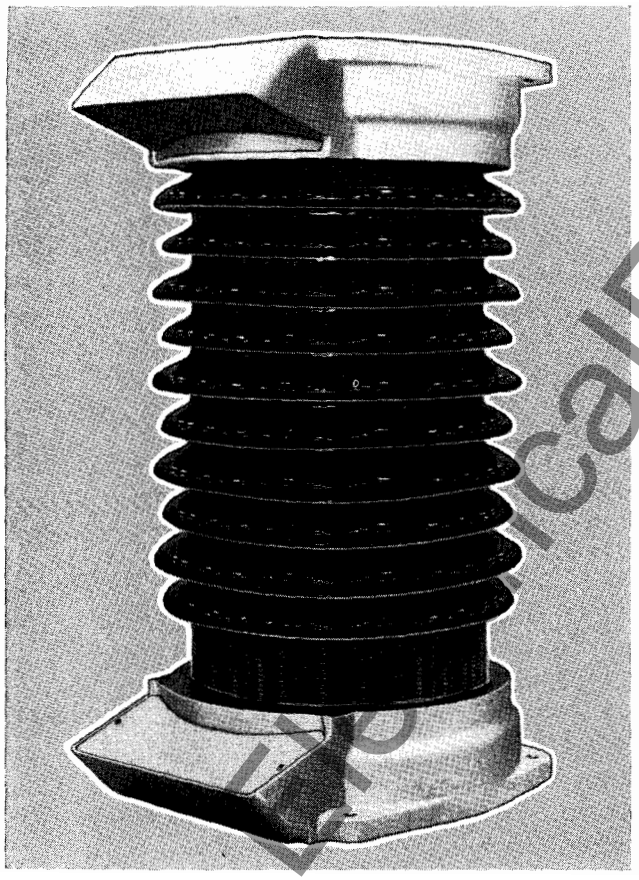
To afford the highest degree of protection, the arrester should be located as close as possible to the apparatus to be protected. All leads should be as short as possible; and the ground connection should



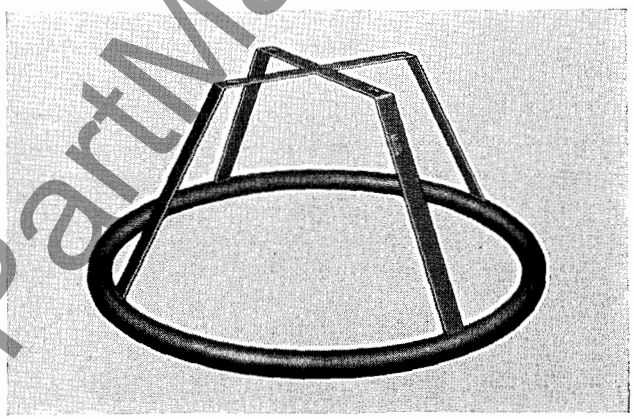
MULTIPLE PIECE GRADING RING
242-336 KV. ARRESTERS



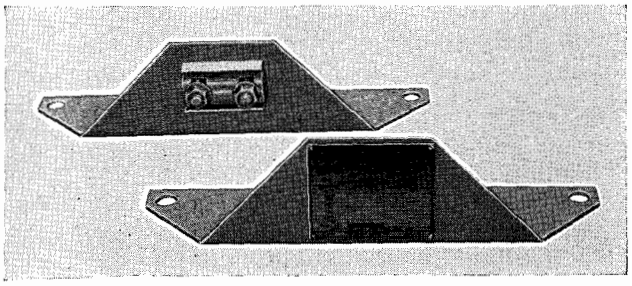
LINE TERMINAL AND TOP
COVER ASSEMBLY



AUTOVALVE LIGHTNING
ARRESTER UNIT



SINGLE PIECE GRADING RING
133-195 KV. ARRESTERS



GROUND TERMINAL AND MASTER
NAMEPLATE MOUNTING BRACKETS

FIG. 1. Type SVS Autovalve Lightning Arrester Component Parts

be made to a low resistance ground, preferably interconnected with the tank or frame of the apparatus.

Installation is begun by laying out a suitable foundation accordance with the outline drawing of the arrester. See Figure 2 for clearances and arrester dimensions.

Once the foundation is prepared, install the bottom arrester unit by bolting it directly to the foundation. At the same time insert the ground terminal and nameplate brackets between the foundation and the bottom end casting of the arrester unit. Once the bottom unit is firmly anchored, install the remaining units as indicated on the master nameplate and in the outline drawing. For multiple-unit arrester assemblies having more than two units it will be easier to bolt two units together on the ground and installing them in multiples of two.

When all units are bolted in place, add the line terminal and cover assembly to the top unit, for those arresters using no grading ring. For those arresters using the one-piece ring, add the ring first and then the terminal and cover assembly. For those arresters using the multiple-piece ring, no separate terminal and cover assembly is used, the terminal assembly is part of the grading ring. The multiple-piece ring should be assembled prior to placing it in position on the top arrester unit.

Typical arrester assemblies are shown in Figure 3.

CAUTION: Do not lift by means of the line terminal.

Terminals. The standard terminals furnished with the arrester will handle the following:

Line terminal—cabel size #2 to 350 MCM;
Diameter size—.255 to .681".
Ground terminal—cable size #5 to 200 MCM;
Diameter size—.204 to .530".

If special terminals are ordered, they may be received packed separately and standard terminals found in place on the cover assembly and ground terminal bracket. If so, remove the standard terminals and discard them.

Insulating Base. An insulating base is available when it is desired to insulate the arrester from ground in order to record or measure discharges through the arrester. The unit consists of a small porcelain housing with metal castings on each end. See Figure 4.

The insulating unit is not included as a part of an arrester and is therefore not covered by the arrester style number. The unit may be used with all arrester ratings, and is ordered as S#366C421G01.

CAUTION: If the insulating unit is installed and recording or measuring equipment not used, the unit must be by-passed. A cable shunt is supplied with each unit for this purpose.

RATINGS

The voltage rating given on the nameplate is a maximum rating. It designates the maximum sixty-cycle rms voltage applied between the arrester line and ground terminals, against which the arrester is able to return itself to an insulator after having discharged a surge. If the system voltage applied to the arrester terminals under either normal, or abnormal conditions (such as faults) exceeds this rating, the arrester is likely to remain conducting after discharging a surge, and will be damaged.

To Change Rating. The arrester rating may be altered in the field by adding, subtracting, or changing arrester units. If this is done, it will also be necessary to change the grading ring size to the one required for the particular rating of arrester.

The arrester units described in this leaflet are not interchangeable with any other type of arrester unit now in use.

In all cases, the nearest Westinghouse District Office should be consulted before making changes in arrester ratings.

TESTING

All arrester units are tested at the factory. Each valve element is surge tested, and the complete arrester unit is tested for sixty-cycle sparkover and leakage current at rated voltage. In addition, each unit is pressure tested to insure that it is tightly sealed against entrance of moisture. Units should not be opened in the field, as to do so would break the seal; leading to the possibility of moisture entrance and consequent deterioration of the arrester.

There are no simple field tests that will check the complete characteristics of an arrester unit. This requires considerable laboratory equipment.

If an arrester is suspected to having been damaged in service, the only field tests that should be attempted are sixty-cycle sparkover, "Megger" or "Doble" tests. It must be understood, however, that such tests will not determine the condition of the valve elements; and therefore, there is no way in the field to determine an arrester's condition with complete certainty.

If sixty-cycle tests are made, sufficient series resistance must be used to limit the current flow after sparkover to 100 milliamperes or less; and the duration of current flow should be limited to not more than 5 seconds. The voltage should be run up to sparkover quickly, so as not to overheat the gap shunting resistors.

Table I

CHECK LIST OF COMPONENT PARTS

COMPLETE ARRESTER ASSEMBLY (SINGLE POLE)		STYLE NO.		38-108-4	506D108G02	506D107G01	506D107G02	506D107G03	506D107G04	162A842G01	162A842G02	161A021G02	366C415G02	366C415G03	366C416G02	366C416G03	366C416G04	366C416G05
Style Number	Kv	PART		INSTRUCTION LEAFLET	18 KV UNIT	36 KV UNIT	42 KV UNIT	48 KV UNIT	60 KV UNIT	GROUND TERMINAL	N. P. BKT. @	TERMINAL ASSEMBLY	GRADING RING*	GRADING RING*	GRADING RING+	GRADING RING+	GRADING RING+	GRADING RING+
506D200G17	60	..	..	1	.	.	.	.	1	1	1	1	.	.	.	.	.	.
506D200G18	73	..	..	1	.	2	.	.	.	1	1	1	.	.	.	.	.	.
506D200G19	90	..	..	1	.	.	1	1	.	1	1	1	.	.	.	.	.	.
506D200G01	97	..	..	1	.	.	.	2	.	1	1	1	.	.	.	.	.	.
506D200G02	109	..	..	1	.	.	.	1	1	1	1	1	.	.	.	.	.	.
506D200G03	121	..	..	1	.	.	.	.	2	1	1	1	.	.	.	.	.	.
506D200G04	133	..	..	1	.	1	.	2	.	1	1	1	1	.	.	.	.	.
506D200G05	145	..	..	1	.	.	.	3	.	1	1	1	1	.	.	.	.	.
506D200G06	169	..	..	1	.	.	.	1	2	1	1	1	1	.	.	.	.	.
506D200G07	182	..	..	1	.	.	.	.	3	1	1	1	1	.	.	.	.	.
506D200G08	195	..	..	1	.	.	.	4	.	1	1	1	.	1	.	.	.	.
506D200G09	242	..	..	1	.	.	.	.	4	1	1	.	.	.	1	.	.	.
506D200G10	258	..	..	1	1	.	.	.	4	1	1	.	.	.	.	1	.	.
506D200G11	264	..	..	1	.	1	.	1	3	1	1	.	.	.	.	1	.	.
506D200G12	276	..	..	1	.	1	.	.	4	1	1	.	.	.	.	.	1	.
506D200G13	288	..	..	1	.	.	.	1	4	1	1	.	.	.	.	.	1	.
506D200G14	320	..	..	1	1	.	.	.	5	1	1	.	.	.	.	.	.	1
506D200G15	336	..	..	1	.	1	.	.	5	1	1	.	.	.	.	.	.	1

* One piece grading ring
\+ Multiple piece grading ring
@ Master nameplate attached

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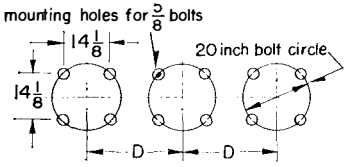


minimum distance between arrester phase-legs.

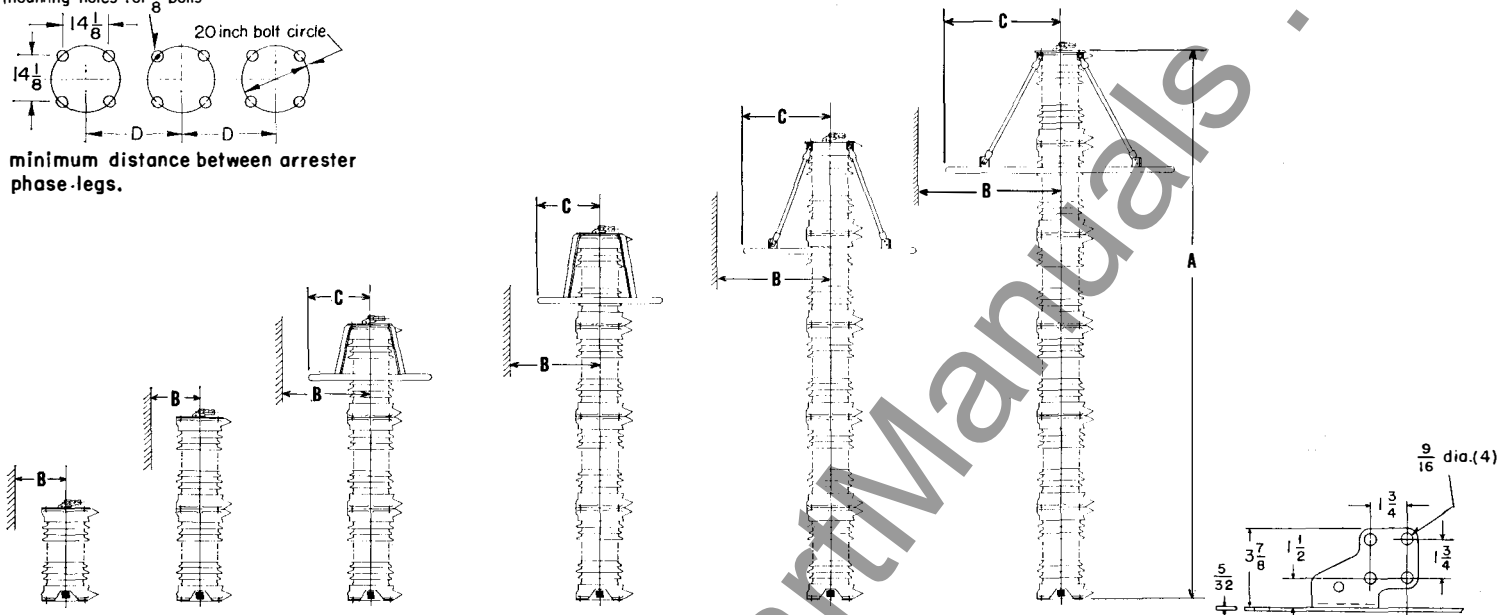
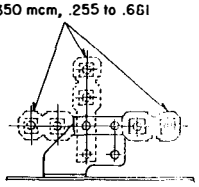


Fig. 1 60 Kv | Fig. 2 73-121 Kv | Fig. 3 133-182 Kv | Fig. 4 195-242 Kv | Fig. 5 258-288 Kv | Fig. 6 320-336 Kv

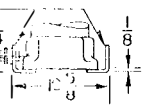
terminal pad dimensions

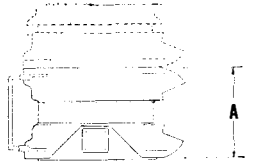
Arrester Rating Kv rms	Style Number	Figure Reference	Dimensions in Inches (Approximate) A Overall Height	B Minimum Dimension to Grounded Object	C Grading Ring Radius	D Minimum Distance Between Arrester Phase Legs
48	506D200G16	1	41-3/8	26	..	38
60	506D200G17	1	45-3/8	30	..	42
73	506D200G18	2	73-3/4	35	..	47
90	506D200G19	2	79-1/4	43	..	54
97	506D200G01	2	79-1/4	43	..	54
109	506D200G02	2	83-1/4	47	..	59
121	506D200G03	2	87-1/4	52	..	63
133	506D200G04	3	114-5/8	69	25	96
145	506D200G05	3	117-3/8	73	25	100
169	506D200G06	3	125-3/8	81	25	109
182	506D200G07	3	129-3/8	86	25	113
195	506D200G08	4	153-1/2	95	25	120
242	506D200G09	4	169-1/2	112	30	146
258	506D200G10	5	191-7/8	124	36	164
264	506D200G11	5	200-5/8	126	36	166
276	506D200G12	5	204-5/8	131	36	171
288	506D200G13	5	207-3/8	135	36	175
320	506D200G14	6	233-3/4	159	48	212
336	506D200G15	6	246-1/2	164	48	212

alternate positions of line terminal cable size no. 2 to 350 mcm, .255 to .661



alternate positions of ground terminal (with nameplate opposite) cable size no. 5 to 200 mcm, .204 to .530





insulating base unit S# 366C421G01-when used increase dimension "A" by 14 inches.

FIG. 2. Outline Dimensions for 48-336 Kv. Type SVS Autovalve Lightning Arresters

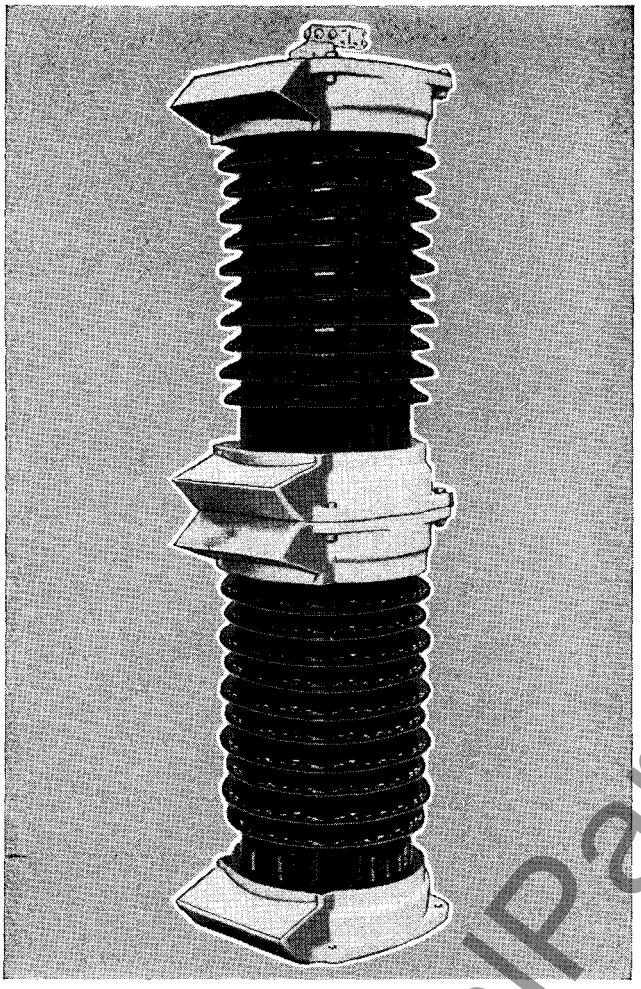


FIG. 3. 97 Kv. Type SVS Autovalve Lightning Arresters

Since the series gaps are shunted by high resistance, an arrester will have approximately 0.5 to 1.0 milliamperes leakage current when energized at rated voltage. A "Megger" test will not show infinite resistance. Tests made to measure leakage current or watts-loss will therefore give readings that are high compared to insulators for example.

If "Doble" tests are made on arrester units, it may be found that different units of the same rating will give different readings. However, if one unit shows a considerable deviation from the rest, its condition may be open to question. It is more significant to make periodic readings and note the trends of the readings. Normally, readings should remain reasonably consistent or decrease slightly; if the watts-loss or leakage current shows a marked increase, then an investigation should be made. Of the tests, the "Megger" test is least desirable due to the low voltage at which the test is made.

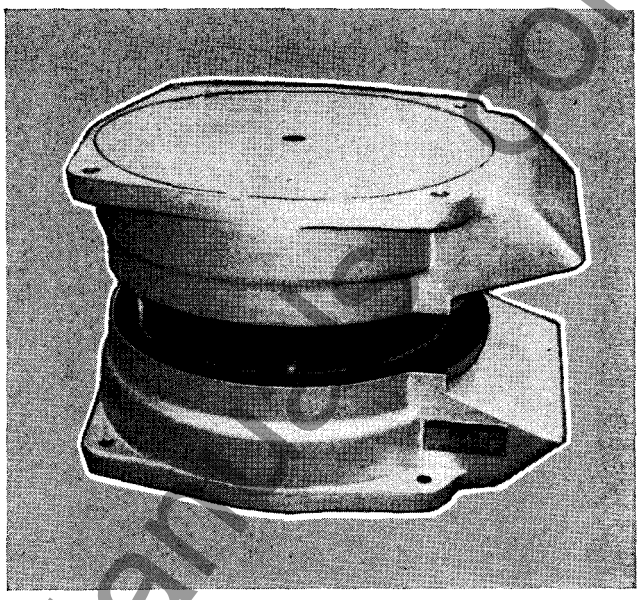


FIG. 4. Insulating Unit

In any tests, care should be taken to see that the outside of the porcelain is clean and dry; otherwise external leakage may produce misleading results.

MAINTENANCE

Arresters require no regular maintenance other than an occasional inspection. In locations where the porcelain becomes contaminated by dirt, soot, salt, etc., it is recommended that the arresters be cleaned periodically.

CAUTION: It is not recommended that arresters consisting of more than two units be washed while they are energized.

Correspondence. Direct any inquiries pertaining to the lightning arrester to the nearest Westinghouse Sales Office giving the arrester type, voltage rating, and complete arrester style number as stated on the main arrester nameplate.