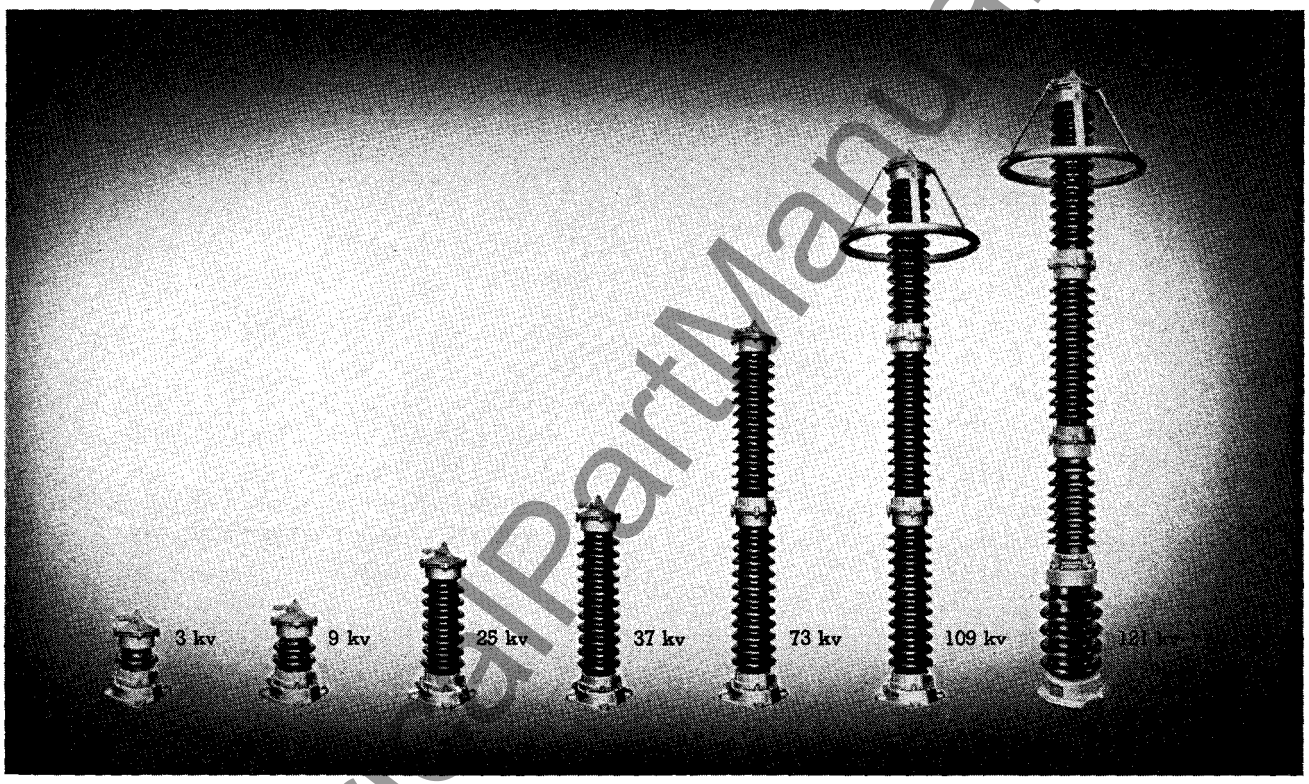
ERECTION • TESTING • MAINTENANCE

INSTRUCTIONS

TYPE SV AUTOVALVE LIGHTNING ARRESTERS

Station Type for Indoor or Outdoor Service
3000 through 121,000 Volts, A-C



AUTOVALVE LIGHTNING ARRESTERS, Type SV described in this leaflet are station-type arresters for the protection of power apparatus such as oil insulated transformers and circuit breakers. (For surge protection at the terminals of rotating machinery or of dry type air insulated transformers, arresters designed especially for the purpose should be used. They are described in separate listings.)

Each arrester is a single pole unit. For three phase installations three arresters must be used.

RECEIVING

Each single pole station type arrester consists essentially of one or more porcelain clad arrester units, depending on the rating. In addition, there are included various attachments as required. These are described in more detail later. When the arrester is erected, the parts of which the complete arrester pole consists must be assembled. The parts as packaged, consist of the following:

(a) The arrester unit or units; these are the porcelain weather casings with metal end castings, Figs. 1, 2, 3. They contain all of the operating elements. Each unit has a small nameplate mounted on the bottom end casting giving the identification and rating of the unit only. The necessary hardware is in a sack tied to one end casting of each unit.

(b) Cap with line terminal attached, Figs. 1, 2, 3.

(c) Base with ground terminal and nameplate giving the identification and rating of the complete arrester pole, Fig. 1. This separate base is not furnished with the 121 kv arresters, Fig. 2.

(d) In the case of arresters with ratings of 97 kv and higher a grading ring, as shown at the right of Fig. 2, to be attached to the top of the column of units, between the top unit casting and the cap.

Unpacking. Before unpacking, examine the containers for any visible signs of damage or abuse. Any damage should be noted carefully. If after unpacking, the arrester parts are found to be damaged, the container should be saved for evidence.

Unpack the parts carefully and examine for breakage or other damage. Inspect particularly the porcelains for any breakage. If damage exists, save the containers and packing material and notify the Carrier.

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

The following table indicates the number of parts to look for when unpacking any one arrester of a given rating.

CHECK-LIST OF COMPONENT PARTS

Standard Type SV Arresters

RATINGS	PARTS REQUIRED
3 to 37 kv inclusive	One arrester unit plus base and cap. (See Fig. 1).
40 to 73 kv inclusive	Two arrester units plus base and cap.
97 to 109 kv inclusive	Three arrester units plus base, cap, and grading ring.
121 kv	Four arrester units plus cap and grading ring.
Higher than 121 kv	Require mechanical bracing, and are discussed in a supplemental leaflet.

The 121 kv arresters include a large substantial unit to be used as the bottom unit as illustrated in Fig. 2. These arresters do not have separate bases, but the bottom arrester unit is bolted directly to the foundation. Standard units are bolted to this unit to make the complete arrester pole. 121 kv arresters include a grading ring and a cap.

Nameplates. Each arrester unit has a small nameplate attached to the bottom unit casting. This gives the rating and style number of the unit itself, not of the complete arrester.

The nameplate for the entire arrester is a large nameplate usually attached to the base casting, or in the case of the 121 kv arrester to the bottom casting of the large bottom unit. Should the main arrester nameplate be shipped separately, it should be attached by the installer so that the arrester can be identified in the future.

A typical main nameplate is shown in Fig. 2. It gives the voltage rating and style number of the complete arrester. In addition to this, the lower part of the nameplate shows the voltage ratings and style numbers of the arrester units of which the arrester consists, listed in the proper order of assembly, starting from the bottom. In any inquiries about the lightning arrester, refer to the type, voltage rating, and style number given at the top of the large nameplate covering the complete arrester.

ERECTION

For the best protection, the arresters should be located as close as possible to the apparatus to be protected. All leads should be as short as possible.

Start with the base. For all arresters of 3 kv to 109 kv inclusive, the same base is used. This base (shown in Fig. 1) has no flexible steel spring ring, such as is supplied with the high voltage, braced arresters (Fig. 3). Make sure that the proper base is received. Should a base with a spring ring as shown in Fig. 3, be shipped by mistake, remove the spring ring and discard it.

These arresters should be anchored firmly since their only point of support is at the base.

Bolt the base to the foundation. Then add the arrester units as specified on the main nameplate and as indicated on the outline drawings at the end of this leaflet.

On 97, 109, and 121 kv arresters add the grading ring and the cap as in Fig. 2. The arrester is now complete except for the connection of the line and ground leads.

Use of Crane. If a crane or other type of lifting equipment is used during the erection of the arrester, it may be found easier to assemble the arrester from the top down than to start from the bottom up. To do this, set the top unit on the ground, attach the grading ring, etc., then lift the entire assembly high enough to set it on the second unit from the top. Bolt the two units together then raise this assembly and attach the third unit from the top and so on until the stack is assembled.

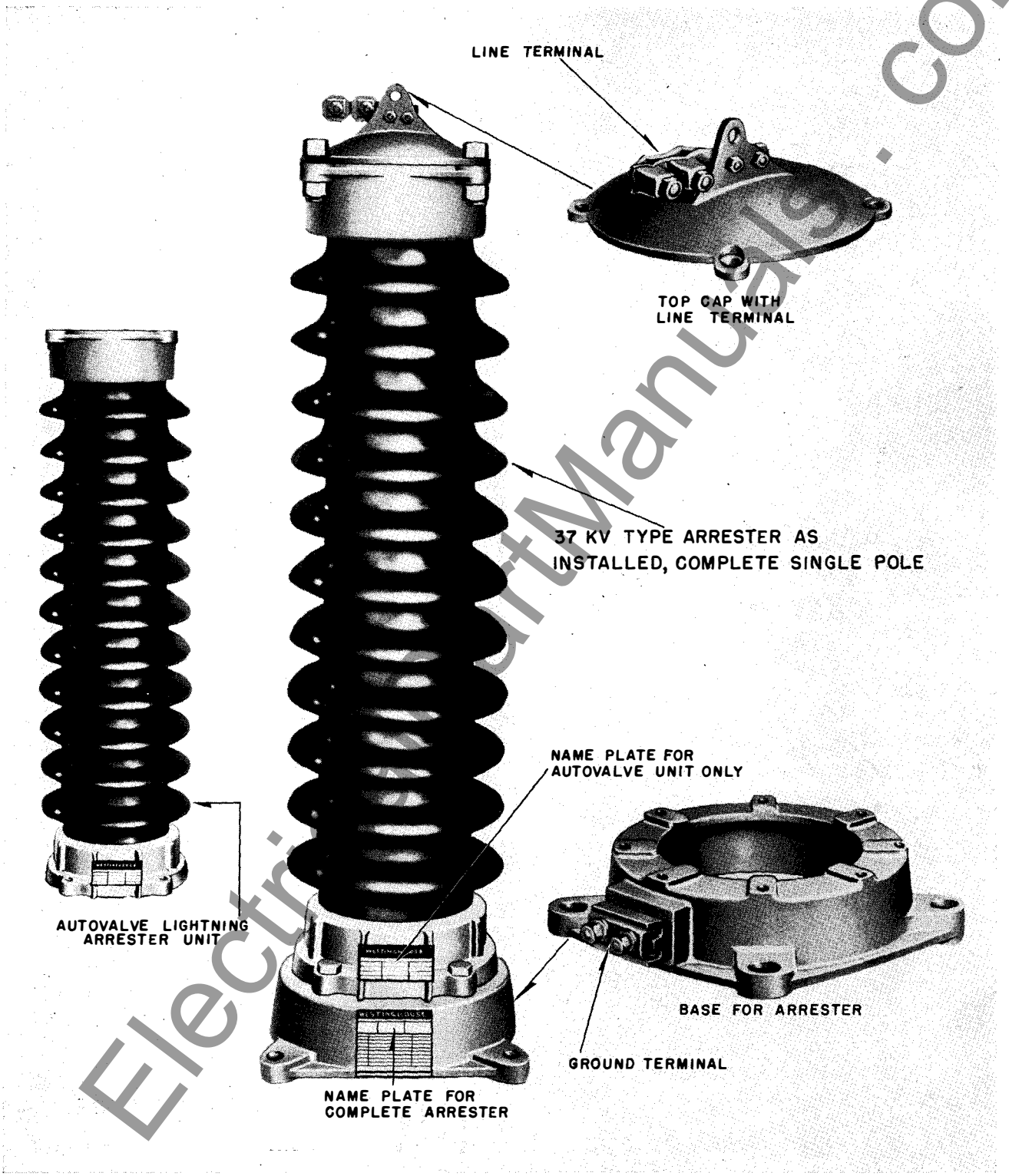
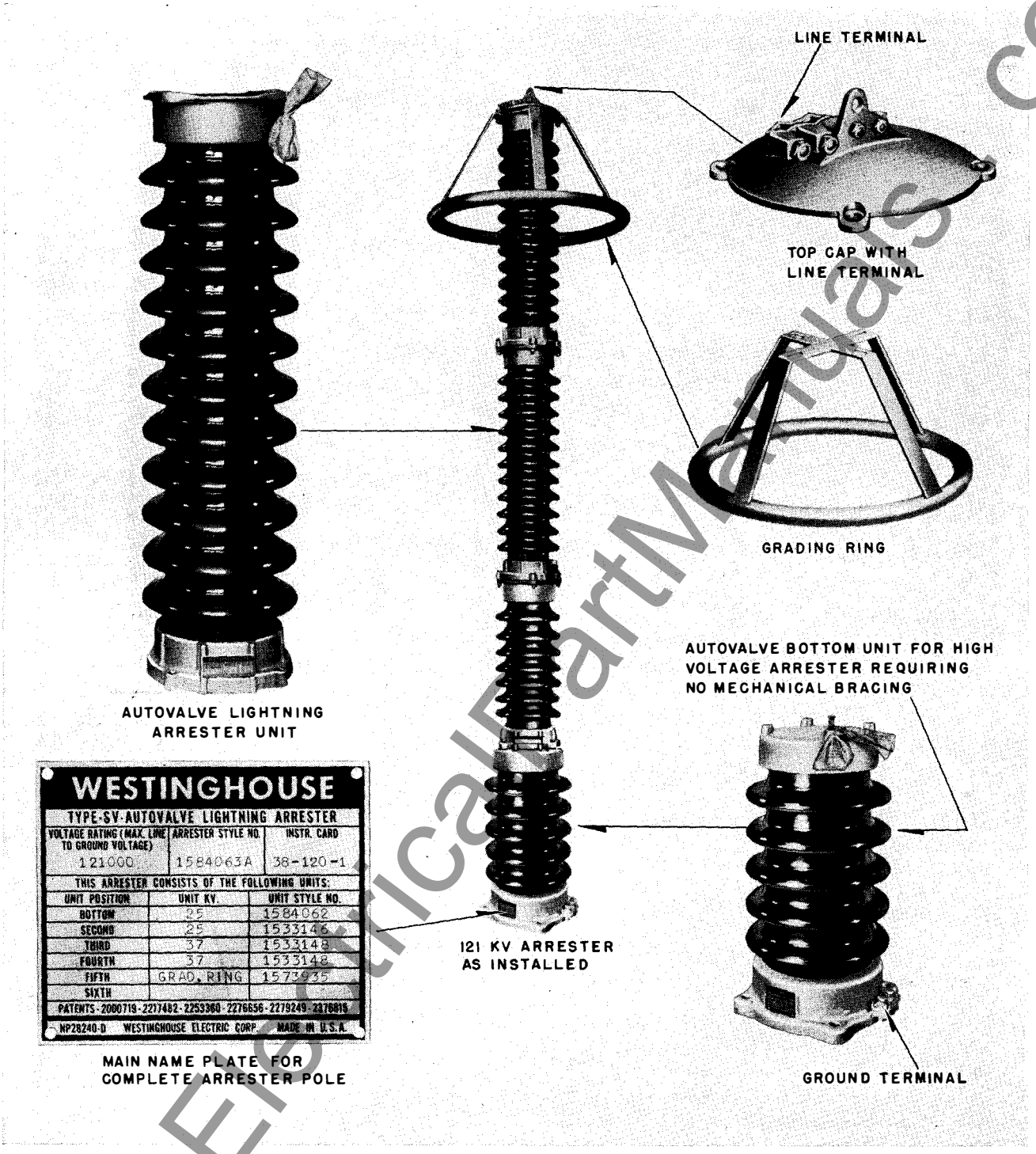


FIG. 1. Typical 37 kv Type SV Autovalve Lightning Arrester Complete Single Pole and Component Parts

Arresters rated 3 to 37 kv have one arrester unit; 40 to 73 kv have two units; 97 and 109 kv have three units



WESTINGHOUSE

TYPE-SV-AUTOVALVE LIGHTNING ARRESTER

VOLTAGE RATING (MAX. LINE TO GROUND VOLTAGE)	ARRESTER STYLE NO.	INSTR. CARD
121000	1584063A	38-120-1

THIS ARRESTER CONSISTS OF THE FOLLOWING UNITS:

UNIT POSITION	UNIT KV.	UNIT STYLE NO.
BOTTOM	25	1584062
SECOND	25	1533146
THIRD	37	1533148
FOURTH	37	1533148
FIFTH	GRAD. RING	1573935
SIXTH		

PATENTS-2090719-2217482-2253360-2276656-2279249-2376815

NP28240-D WESTINGHOUSE ELECTRIC CORP. MADE IN U.S.A.

MAIN NAME PLATE FOR COMPLETE ARRESTER POLE

FIG. 2. 121 kv Type SV Autovalve Lightning Arrester Complete Single Pole and Component Parts

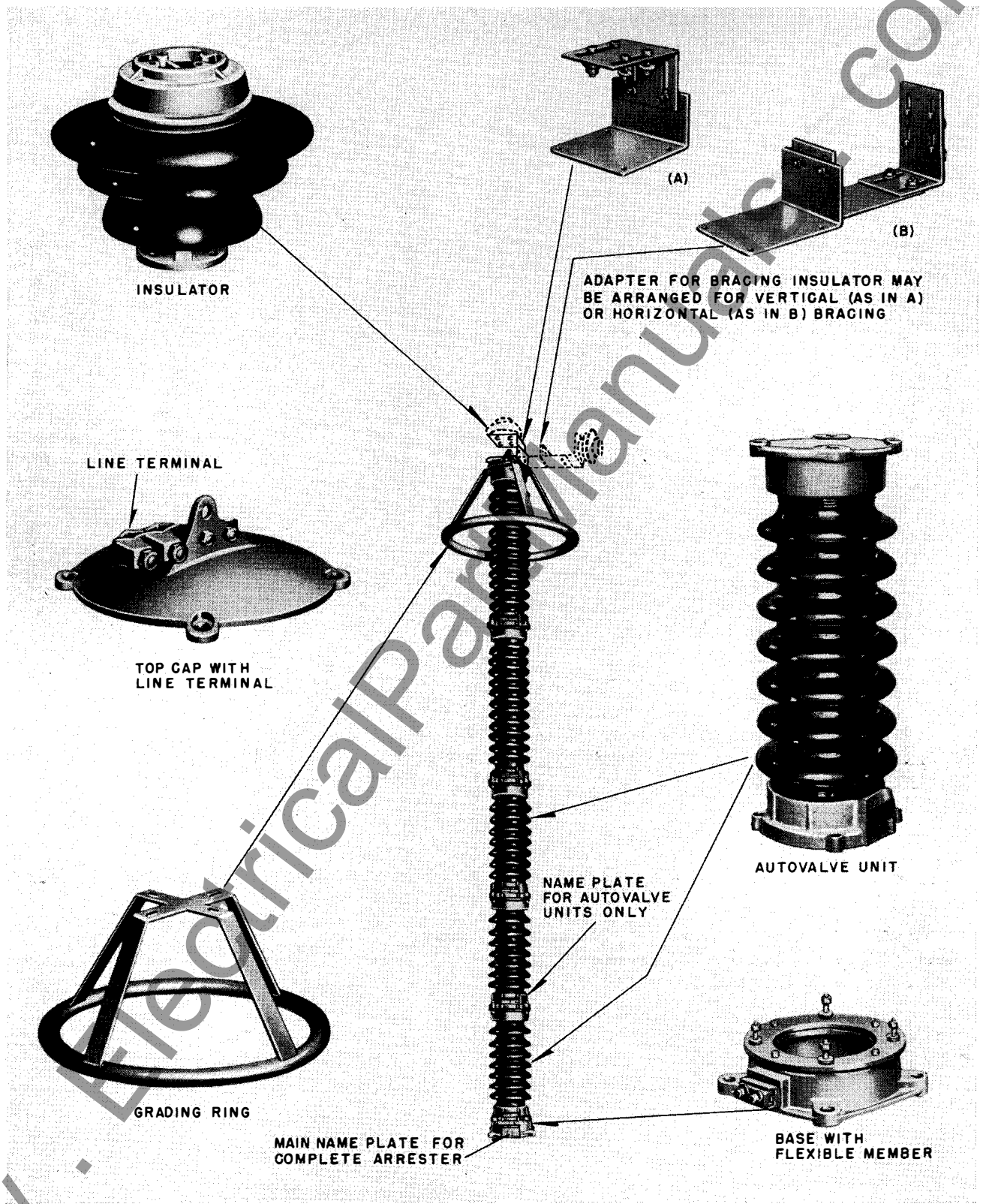


FIG. 3. 145 kv Type SV Autovalve Lightning Arrester

Typical of high voltage arresters 145 to 242 kv requiring mechanical bracing

NOTE: Arresters rated 195 to 242 kv use V-bracing not shown.

Then swing the whole stack into place on the base already attached to the foundation.

In the case of 121 kv arresters it is not recommended that the crane procedure described above be followed entirely. Place the heavy bottom unit in position on the foundation first. The remaining units may then be assembled as described in the preceding paragraph.

Terminals. The standard terminals furnished with the standard arresters will handle the following cable sizes:

Line terminal: solid #0 to 6/0, or cable #2 to 350 MCM.
Ground terminal: solid #4 to 5/0, or cable #5 to 200 MCM.

If special terminals are ordered, they may be received packed separately and the standard terminals may be found attached to the base and cap. If so, remove the standard terminals, discard them and attach the special terminals in their place.

Grounding. Each arrester should be effectively grounded. It is recommended that the arrester ground terminal be interconnected with the tanks or frames of the protected equipment and that the resulting connection to earth be low in resistance.

Insulating Base. The insulating base (Figs. 4 and 5) is a porcelain unit with metal end castings. It is used to insulate the arrester proper from ground if it is desired to record or measure discharges through the arrester. The insulating unit is not included as a part of standard arresters and is not covered in the style numbers of arresters listed in this leaflet. When the unit is to be installed as part of an arrester, it should be placed between the foundation base, and the bottom unit of the arrester, as if it were an additional arrester unit.

On the 121 kv arresters (Fig. 2) the unit is placed between the foundation and the bottom arrester unit.

The insulating base for all arresters except the 121 kv is S#1573926. The unit for use with the 121 kv SV is S#1318340. S#1573926 is 9 inches high, and S#1318340 is 12 inches high. When these units are used, the overall heights of the arresters shown in the outline drawings will be increased correspondingly.

If arresters are erected with insulating units and recording or measuring equipment is not used, the insulating unit must be short-circuited. A cable shunt is furnished for this purpose as part of the insulating base.

FIG. 4. Insulating Base as Shipped

RATINGS

The voltage rating given on the nameplate is a maximum rating. It designates the maximum voltage applied across the arrester line and ground terminals, against which the arrester is able to return itself to an insulator after having been discharged by a surge. If the system voltage applied to the arrester terminals under normal or abnormal operating conditions such as faults, exceeds the arrester rating then the arrester is likely to remain conducting after it has been discharged by a surge, and it will be damaged.

To Change Rating. The voltage ratings of arresters may be altered in the field by adding or subtracting or changing arrester units. The units which have been described in this leaflet are not interchangeable with units of certain obsolete designs (before 1940).

Units of the following style number series are electrically the same, have the same bolt hole dimensions, but have slightly different outside shapes and in some cases, lengths. They may be interchanged: Styles 1124288, etc.; 1418181, etc.; 1533140, etc. Consult the nearest district office for recommendations before making changes in ratings.

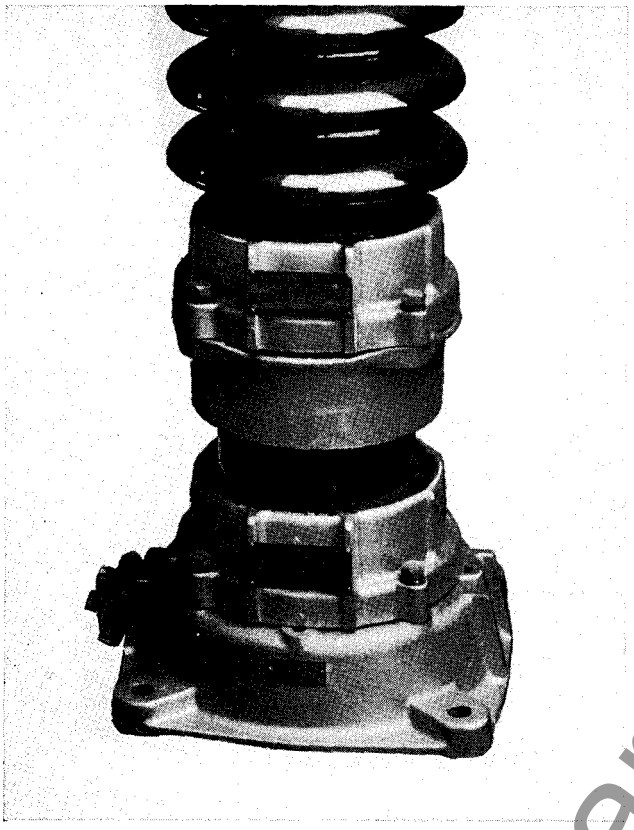


FIG. 5. Insulating Unit Installed Between Arrester Unit and Foundation Base

TESTING

All Autovalve lightning arresters are tested in the factory. Each valve element is surge tested, and complete arrester units are tested for 60 cycle sparkover. Each unit is also tested with air pressure to assure that it is tightly sealed so that it will not accumulate moisture internally in service. It is recommended that the unit not be opened in the field as this may break the seals and admit moisture, leading to radio interference and eventual damage to the arrester.

There are no simple field tests that will tell the complete characteristics of the lightning arrester. This requires considerable laboratory equipment. If 60 cycle voltage tests for sparkover are made, it should be noted that lightning arresters do not have unlimited capacity for dynamic current flow. In such tests sufficient series resistance should be used to limit the 60 cycle current that flows after sparkover to 100 milliamperes or less and the duration of the current flow to not more than 5 seconds. The voltage should be run up to sparkover quickly so that the gap shunting resistors will not be overloaded.

The series gaps of Westinghouse SV arresters are shunted by high resistance. With 60 cycle voltage equal to the arrester rating applied to the arrester line and ground terminals, the leakage current is approximately 0.45 milliamperes. Hence, tests made with a megger will not show infinite resistance. Tests made to measure the leakage current or watts loss will show readings that are high compared to the leakage or watts loss for insulators, for example.

If Doble tests are made on lightning arrester units to determine the degree of insulation and to determine whether there is any deterioration of the insulation, it may be found that different units of the same rating will give different readings. It is recommended that if such tests are made they be made periodically and the trends of the readings observed.

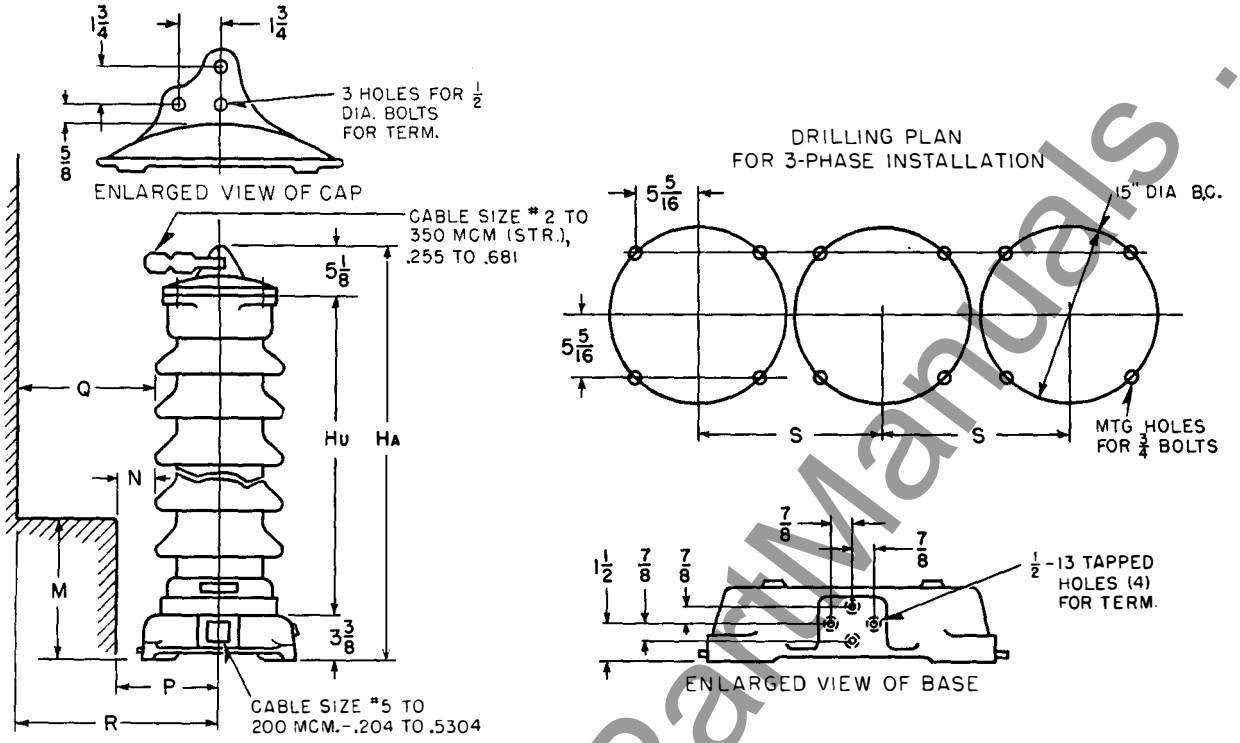
If the readings remain consistent or decrease slightly, then the units are in good insulating condition. If the watts loss or leakage current increase markedly then an investigation should be made. If a number of units of the same rating are tested and one shows a considerable deviation from the rest, its condition may be open to question. If any such tests are made, care should be taken that the outside of the porcelain housing is clean and dry, otherwise leakage current over the surface may produce misleading results.

MAINTENANCE

The Autovalve arrester requires no regular maintenance other than an occasional inspection. In locations where dirt and soot collect, it is recommended that the arresters be cleaned periodically.

Caution: Do not wash lightning arresters by hosing while they are energized.

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



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

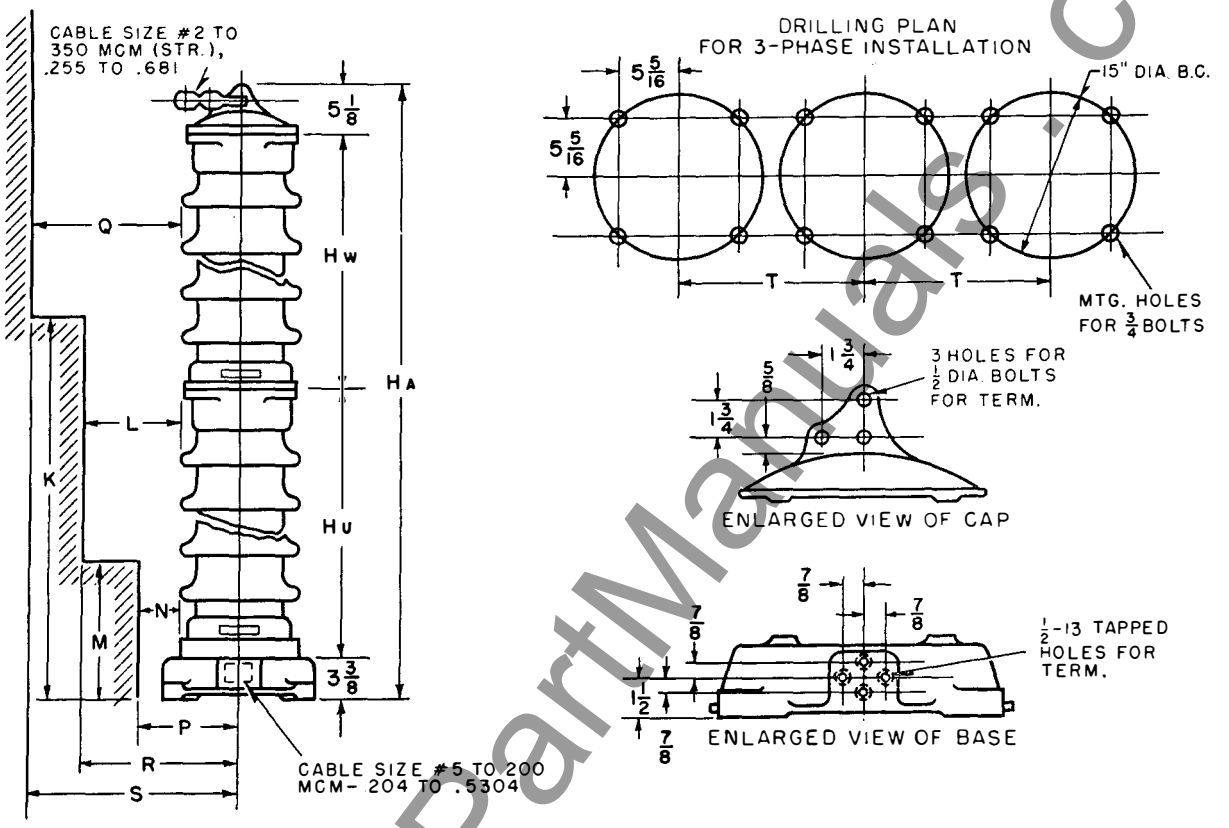
VOLTAGE RATING KV RMS	STYLE NUMBER*	NO. SHEDS	DIMENSIONS IN INCHES							
			HA	Hu	M△	N	Q	P	R	S∅
3	1533 113	1	20½	12	7	2	3	7⅜	8⅜	14¾
6	1533 114	1	20½	12	7	2	4	7⅜	9⅜	16¼
9	1533 115	2	24½	16	7	3	5	8⅜	10⅜	17¾
12	1533 116	2	24½	16	8	3	6	8⅜	11⅜	19¼
15	1533 117	4	28½	20	9¼	4	7½	9⅜	12⅞	20¾
20	1533 118	7	38½	30	11½	5	9½	10⅜	14⅞	23¼
25	1533 119	7	38½	30	13½	5	11	10⅜	16⅜	25¾
30	1533 120	9	44½	36	15	5	13	10⅜	18⅜	28¾
37	1533 121	11	50½	42	19	5	15	10⅜	20⅜	31¼

* Style number covers one complete single pole arrester. For three phase installation, three poles are required.

△ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N & P may be used as shown in the figure.

∅ Minimum distance center line to center line between arrester phase legs.

FIG. 6. Outline Dimensions for 3 to 37 kv Type SV Arresters



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES											
		M △	N	P	K ◉	L	R	Q □	S	Hu	HA	T ∅	Hw
40	1533 122	11½	5	10⅜	44	9½	14⅜	16	21⅜	30	68½	32¾	30
50	1533 123	13½	5	10⅜	46	11	16⅜	20	25⅜	30	68½	37¾	30
60	1533 124	15	5	10⅜	54	13	18⅜	24	29⅜	36	80½	43¾	36
73	1533 125	19	5	10⅜	64	15	20⅜	29	34⅜	42	92½	50¾	42

* Style number covers one complete single pole arrester. For three phase installation, three poles are required.

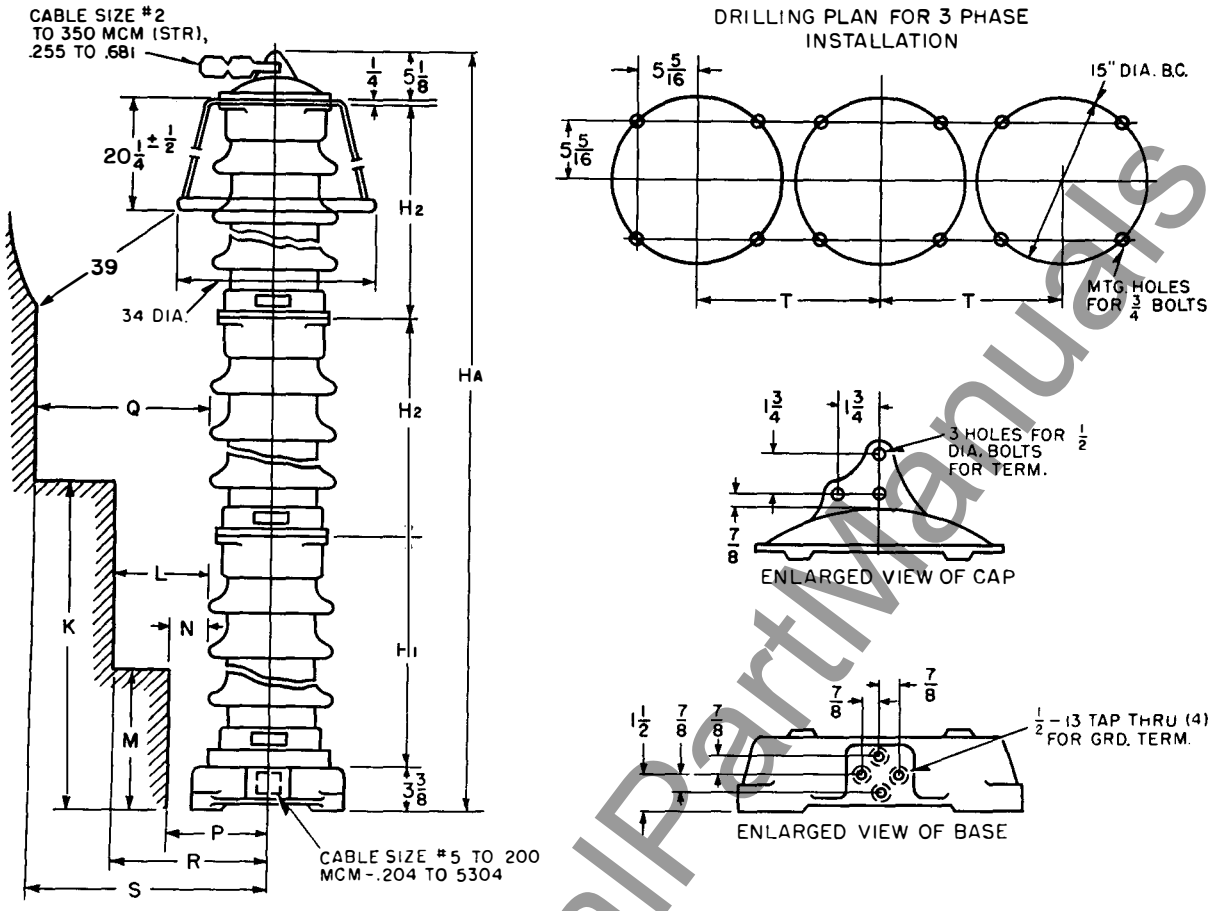
△ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N & P may be used as shown in the fig.

◉ If a near-by grounded object does not exceed "K" in height, then the minimum clearance dimensions L & R may be used as shown in the fig.

□ If a near-by grounded object exceeds "K" in height then minimum clearance dimensions Q & S must be used.

∅ Minimum distance center line to center line between arrester phase legs.

FIG. 7. Outline Dimensions for 40 to 73 kv Type SV Lightning Arresters



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES											
		M△	N	P	K◉	L	R	Q□	S	H1	H2	HA	T∅
97	1533 126	12	8	13⅜	36	24	29⅜	44	49⅜	30	42	122¾	89

* Style number covers one complete single pole arrester. For three phase installation three poles are required.

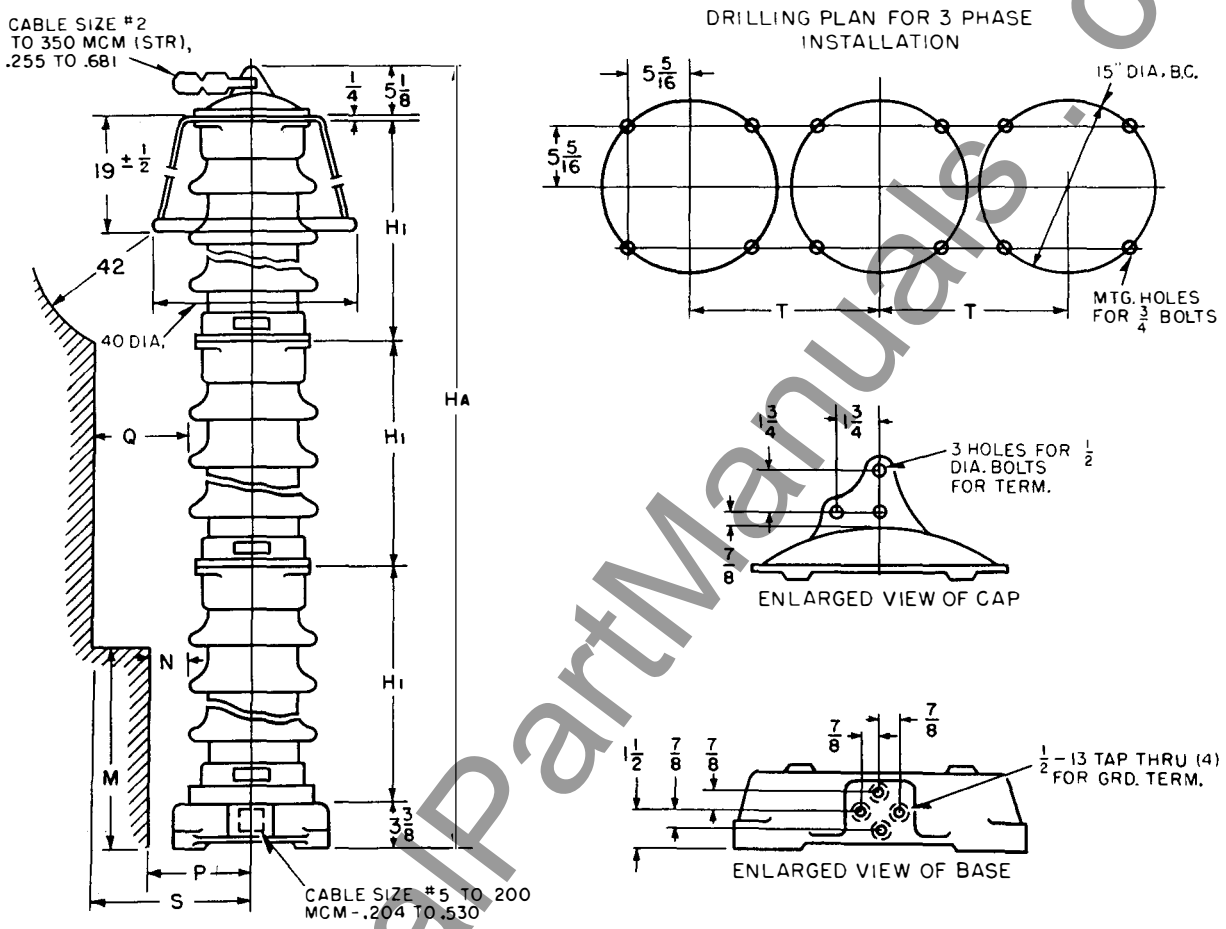
△ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N & P may be used as shown in the fig.

◉ If a near-by grounded object does not exceed "K" in height, then the minimum clearance dimensions L & R may be used as shown in the fig.

□ If a near-by grounded object exceeds "K" in height, then the minimum clearance dimensions Q & S must be used.

∅ Minimum distance center line to center line between arrester phase legs.

FIG. 8. Outline Dimensions for 97 kv Type SV Lightning Arrester



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES							
		M△	N	P	Q□	S	H1	HA	T∅
109	1573 939	27	15	20 3/8	24	29 3/8	42	134 3/4	98

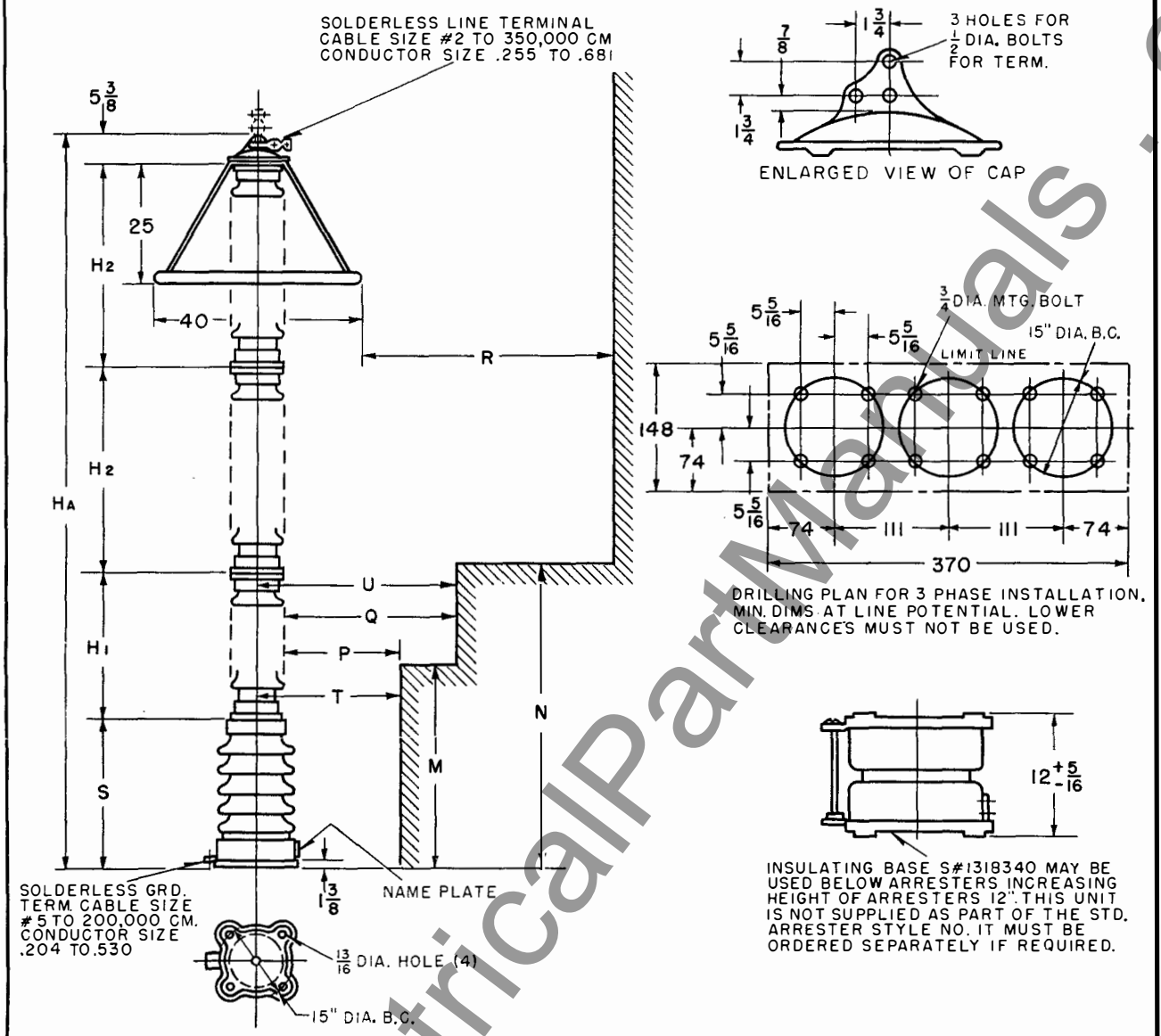
* Style number covers one complete single pole arrester. For three phase installation three poles are required.

△ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N and P may be used as shown in the fig.

□ If a near-by grounded object exceeds "M" in height then the minimum clearance dimensions Q and S must be used.

∅ Minimum distance center line to center line between phase legs

FIG. 9. Outline Dimensions for 109 kv Type SV Lightning Arrester



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES										
		H1	H2	HA	M△	N	P	Q	R	S	T	U
121	1584 063	30	42	150 ± 1¼	41	62	24	36	54	30⅝	29⅜	41⅜

* Style number covers one complete single pole arrester. Three are required for 3 phase installation.

△ If a nearby grounded object does not exceed "M" in height, then the minimum clearance dims. "P" & "T" may be used as shown in fig., otherwise the minimum clearance dims. "Q" & "U" must be used.

FIG. 10. Outline Dimensions for 121 kv Type SV Autovalve Lightning Arrester

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