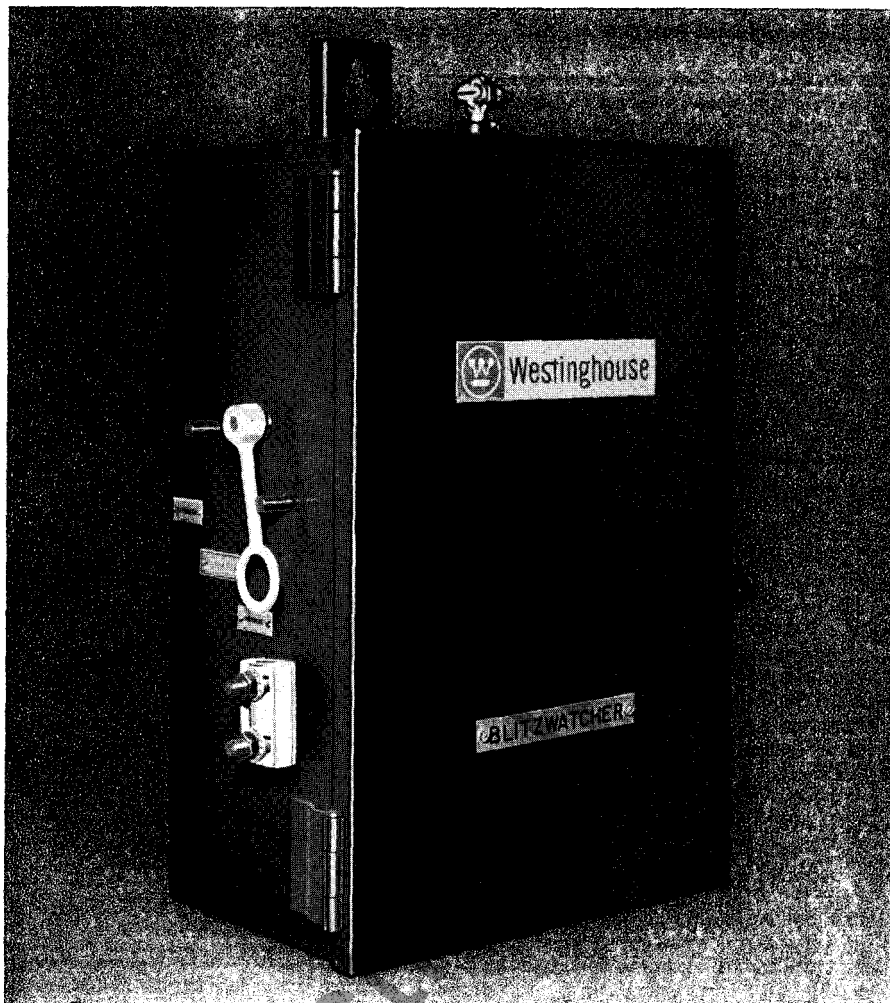


Westinghouse

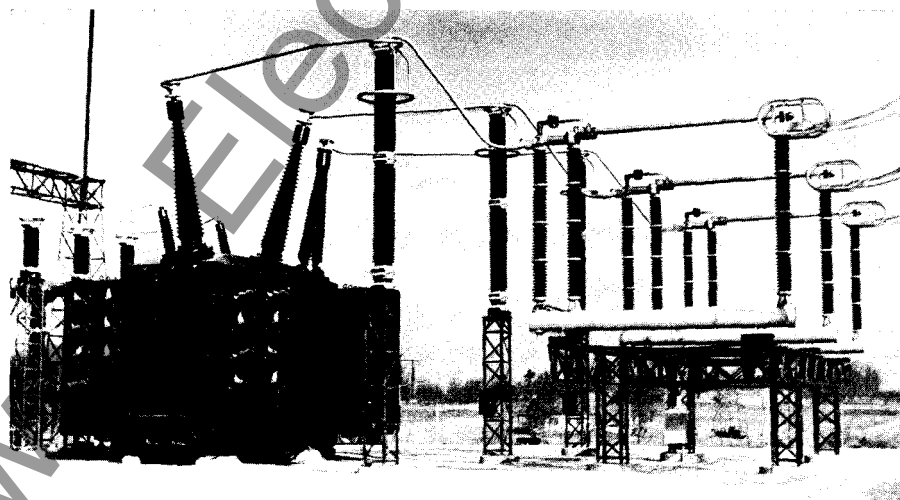
**Blitzwatcher™**

Lightning Discharge Monitoring Device

**Application**

The development of extra high voltage transmission systems has made equipment protection an increasingly important factor due, in part, to the manufacturing time and increased cost associated with EHV equipment. This need for added protection prompted Westinghouse to develop the new SVT station class arrester. Simultaneously, the Blitzwatcher was designed as a discharge monitoring device which would give accurate, reliable information on the duty performed and internal condition of the arrester. This could not be accomplished with a discharge counter alone.

The Blitzwatcher provides reliable information on several factors from which it is possible to determine the duty experienced by an arrester. This includes the number of surges, approximate magnitude of surge current, a means of differentiating between switching surges and lightning surges, approximate wave shape and whether or not power follow current was present. It is also possible to determine leakage current and the internal condition of the arrester gaps. The Blitzwatcher was designed to aid utilities to monitor lightning arrester duty and anticipate well in advance any possible system outages due to arrester failure. The Blitzwatcher achieves this through a coordination of three component parts: discharge counter, series ammeter and series gap assembly.



Westinghouse



Design Features

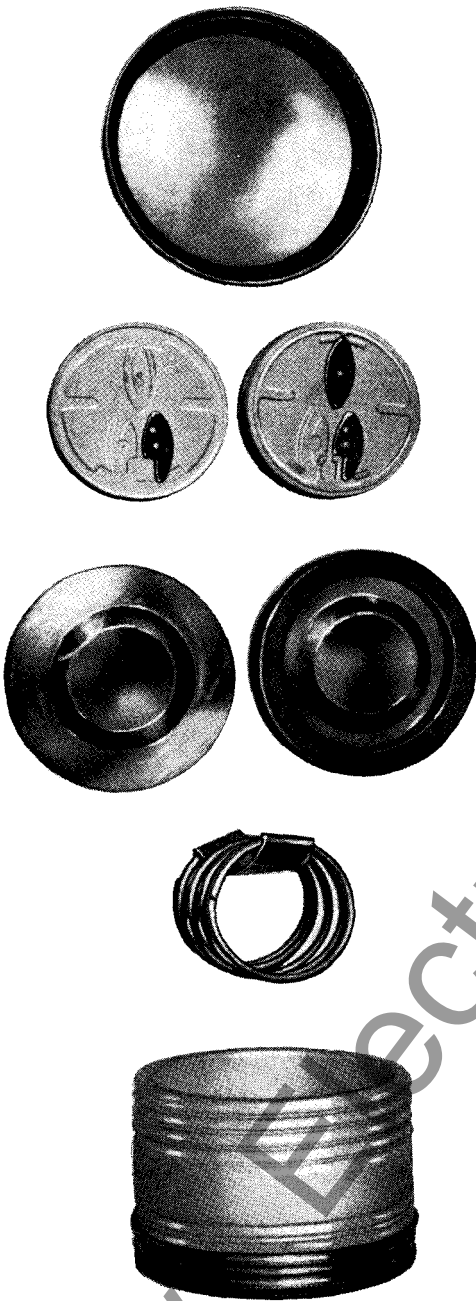


Figure 1. Gap Assembly

Series Gap Assembly

Contained in a fiber cylinder are two sets of gaps, a compression spring and a small bag of moisture-absorbing desiccant material (Figure 1). Screw-on metal end caps allow easy removal of the gaps for inspection. The mirror gap consists of two heavy, highly polished copper electrodes separated by a grading resistor. When a surge causes an arrester discharge, this gap will spark over leaving a discolored trace on both polished surfaces. The size of this "splash" or burned area is proportional to the magnitude of the surge current. The color and shape of this "splash" will reveal whether a switching surge or a lightning surge caused arrester sparkover since the approximate wave shape can be determined by the arc terminal characteristics. The presence of a small "tail" on the tracer will indicate power follow current. The difference in color of the traces on the bottom and top electrodes will indicate the polarity of the surge.

Figure 2 shows the results of ten operations of a Blitzwatcher connected to an arrester on a system rated 500 kv. These are actual operations on an actual system. Examination of the gap plates reveals ten operations due to switching surges. The surges are in the range of 150 amperes with a duration of about 1,000 microseconds. They appear to be equally divided between positive and negative polarities. A complete and detailed photographic table of actual surges is included with each Blitzwatcher unit for purposes of interpretation.

In addition to the mirror gap the fiber cylinder contains a replica gap consisting of one main gap, electrodes, and drive coil, with its protective gap. This replica gap is identical to the gaps inside the arrester porcelain and, because they are in series with the main arrester gaps, will see approximately the same surge duty. Thus, the condition of the replica gaps will also be representative of the condition of the internal arrester gaps. If the arrester has been damaged in any way by physical shock, sustained over-voltage, or excessively high lightning surge, the unit may start to fail by partial shorting. This will result in excessive power follow current which will be reflected by visible burning and pitting of the replica gap electrodes.

Leakage Current Indicator

This component consists of a millimeter connected in series with the gap assembly to measure the total leakage current through the arrester. This includes both the internal grading current and any external leakage current due to porcelain surface contamina-



Figure 2. Mirror Gap

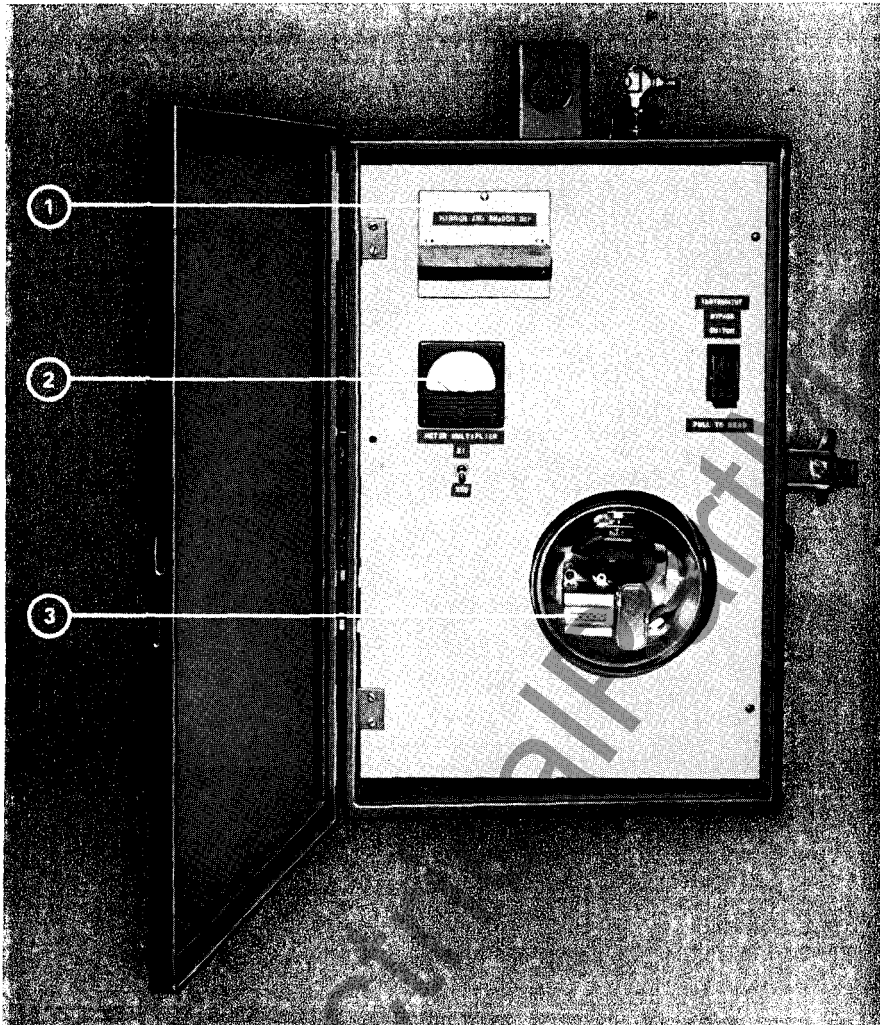
tion. The millimeter reading should be recorded when the arrester is first energized while in a clean, dry state. Any subsequent readings greatly differing from this value could be cause for concern, providing the reading is taken while the arrester is dry. It is possible that a conducting contaminant is allowing excessive external leakage current to flow or the internal arrester components are damaged. Washing the arrester and re-reading the millimeter can then determine the source of the leakage current.

Surge Counter

Although it will give no indication of magnitude, a discharge counter is included in the Blitzwatcher package to keep a running count of the number of arrester operations. While the mirror gaps do indicate the number of surges, it is expected that they will be replaced from time to time as the polished surfaces become marred.

Blitzwatcher

Lightning Discharge Monitoring Device



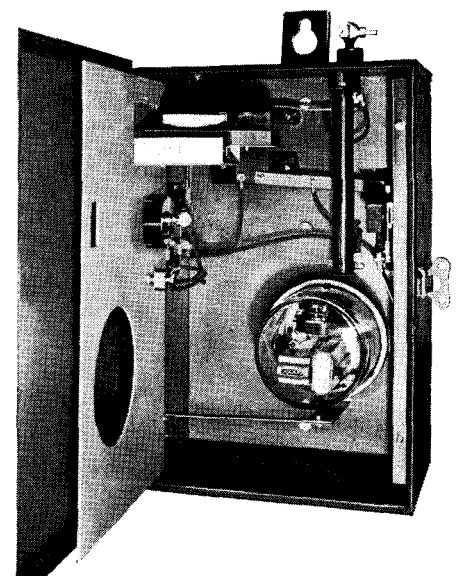
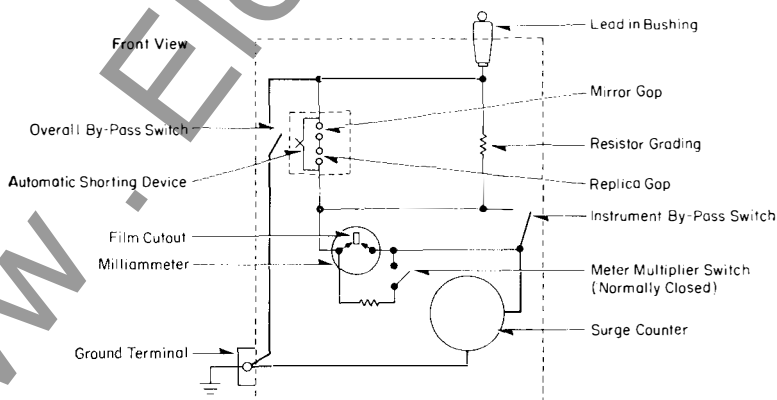
Safety Features

The Blitzwatcher has been designed for complete safety to operating personnel. It is not necessary to open the panel of the Blitzwatcher to take any readings. However, if for any reason, such as removing the milliammeter, it is desirable to open the panel, complete safety is still maintained by an interlocking device between the hinged panel and the main by-pass switch on the side of the cabinet. The panel door cannot be opened unless the main by-pass switch is in the grounded position; in which case, all components are shunted by a copper bus running directly from the lead-in bushing to the ground terminal. This grounding switch cannot be operated unless the hinged panel is closed.

The gap assembly is interlocked so that the main by-pass switch must be in a grounded position before the assembly can be removed from the panel. This assures that a closed ground lead circuit is maintained. Also, as added protection against an open ground circuit, the cabinet is equipped with an automatic shorting device that closes when the gap assembly is removed. The instrument by-pass switch must be activated to read the meter. If the operator forgets to push the trigger back in after taking the reading, it will be automatically accomplished when the cabinet door is closed.

It is recommended that the Blitzwatcher be connected to the arrester with an insulated cable.

Typical Schematic Diagram



Interlocked panel permits access to components in complete safety.

Blitzwatcher

Lightning Discharge Monitoring Device

How to Inspect the Blitzwatcher

When data from the Blitzwatcher is desired, it is only necessary to open the cabinet door and work with the instruments on the panel. Normally it should not be necessary to remove the panel screws and swing out the panel.

To remove the gap assembly: 1. Move the main by-pass switch (Figure 3) to the grounded position. 2. Take out the two set screws holding the gap assembly in place and pull it with the cabinets using the handles provided. 3. The copper straps on either side of the fiber cylinder are then removed and the mirror gaps and replica gaps taken out by removing the metal end caps. The used mirror gaps should be replaced by the spare set provided in the cabinet when the mirror gaps have been sufficiently used to no longer provide reliable information. All interpretation of the mirror gaps should be done in conjunction with the photographic table provided in the instruction leaflet. To read the milliammeter, move the main by-pass switch to the normal position; then, pull ammeter by-pass switch to the operating position. Note that there is a selector switch on the milliammeter which is spring loaded in the "X50" position in normal operation. If the current is too small to register then move the selector switch to the "X2" position and read the arrester leakage current. The discharge counter can be read by noting the numbers on the register. This should be recorded in the instruction leaflet, with all other data and observations, and kept permanently inside the cabinet.

Dimensions in Inches (Approximate)

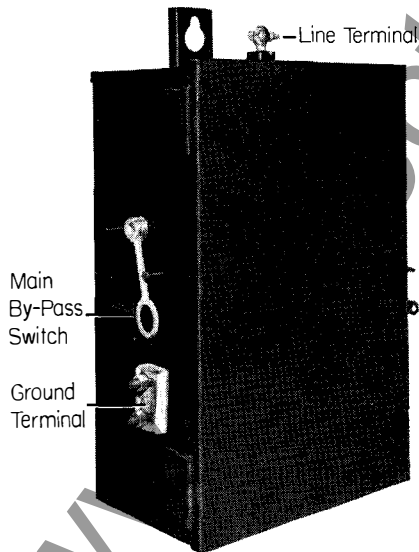
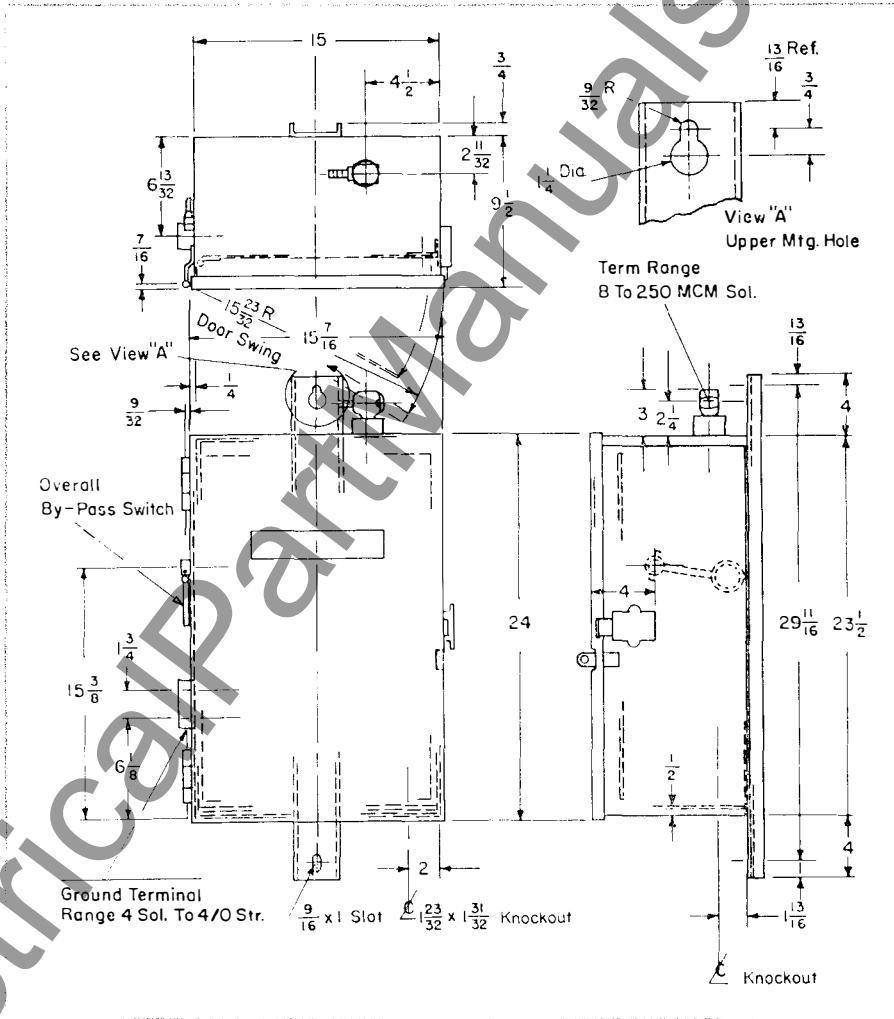


Figure 3

Further Information

Prices: Price List 38-160
 SVT Arrester: Technical Publication 65-1,
 File 38-120
 Blitzwatcher Instruction Bulletin