



Westinghouse Electric Corporation
Switchgear Division
East Pittsburgh, Pa. 15112

36-553A D WE A
Descriptive Bulletin

Page 1

September, 1975
New Information
E,D,C/1968/DB

Side Operated
2.4 Kv through 13.8 Kv

Type AWP Load Interrupter Switch

Description

The AWP load interrupter switch, frame mounted side operated switch is a full rated quick make-quick break spring stored energy operated switch which provides safe, fast and reliable protection for high voltage circuits 2.4 Kv through 13.8 Kv.

Application

This type of AWP frame mounted switch was specifically designed for use in very low profile mine rectifiers or in skid mounted houses for the mining industry. These units can be applied separately or in conjunction with fuses. Although the design was made for mine application where the use of insulated cable is prevalent, it can provide safe non-automatic switching for sectionalizing primary feeders, and isolation for transformer banks, capacitors voltage regulators and similar applications.

Ratings

This type of AWP switch is available in 600 amperes continuous current rating for all voltage classes 2.4 Kv through 13.8 Kv with one interrupting rating of 600 amperes. The switches have a momentary rating of 40,000 amperes with a fault closing rating of 20,000 and 40,000 amperes.

Design Features

This AWP load break switch for mine application has all the design features as shown in DB 36-553 with these exceptions:

- Electrical/manual stored energy mechanism
- 1200 ampere continuous current capability
- 1200 ampere load break capability
- 61,000 ampere fault close capability

To reduce the overall dimensions the terminal pads are designed for use with insulated cable, this shorter terminal pad reduces the height of the barriers.

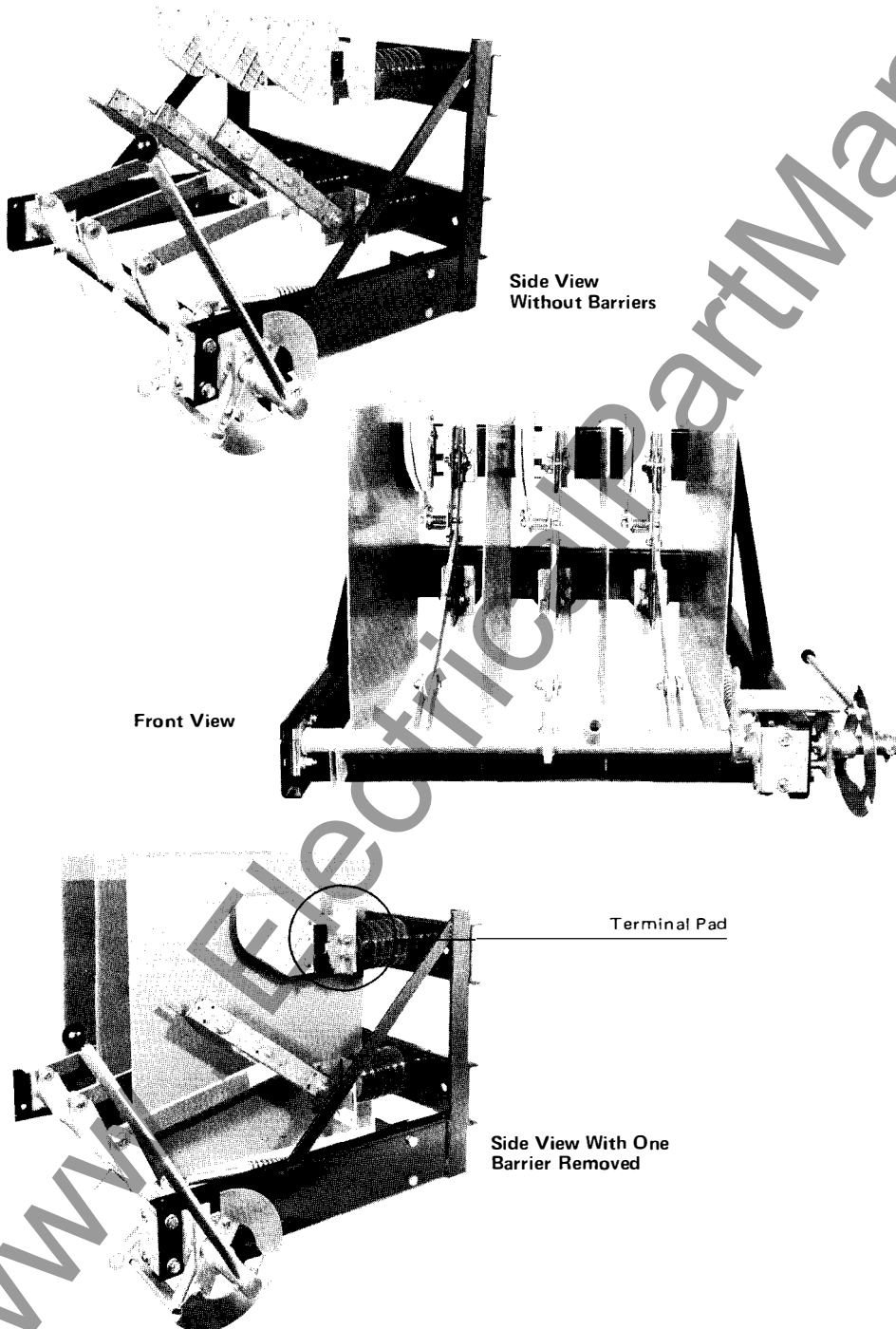
Safety Features

Padlock hasps are provided so that the switch may be locked in either the open or close positions, along with provisions for a Kirk Type "B" interlock.

Further Information:

Prices 36-523A P WE A

Dimensions—Technical Certification Section
36-573 Page 1

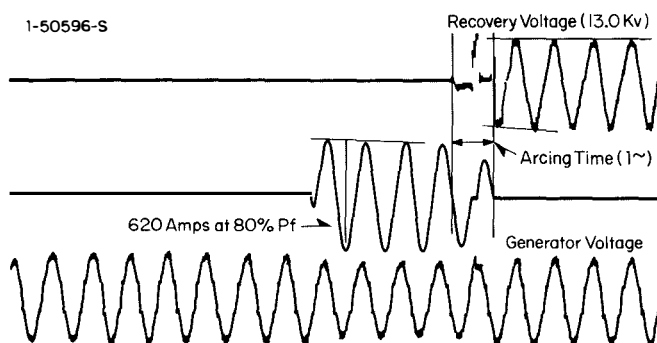


Type AWP Load Interrupter Switch

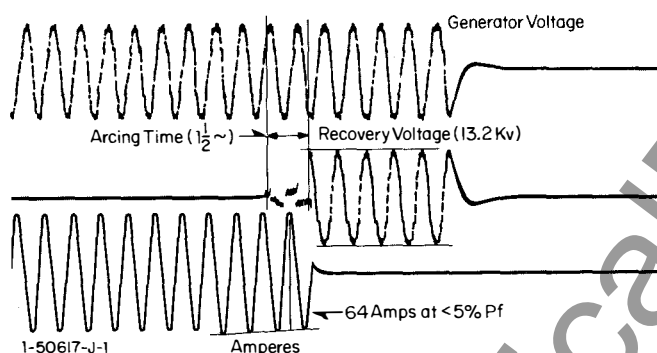
Indoor, 2.4 Kv Through 13.8 Kv

Test Data, Cont'd.

Interrupting Test on 3 Pole AWP Switch 15 Kv 600 Amps



Interrupting Test on 3 Pole AWP Switch 15 Kv 600 Amps 40,000 Amp Rating



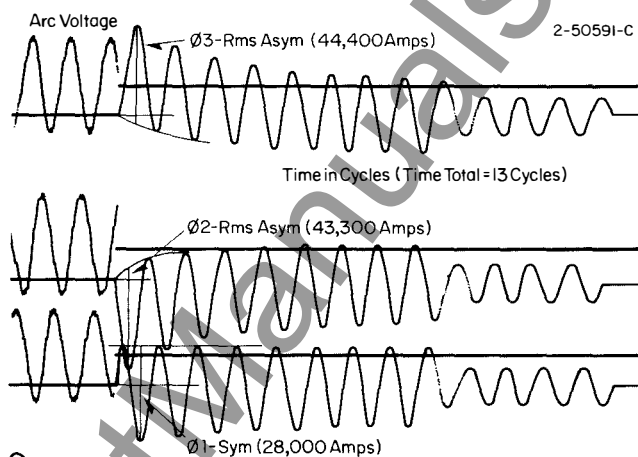
Interruption Tests

Kv	Duty Cycle	Amps	P.F.	Recovery Voltage Kv	Arising Time Cycles
5.0	Open-Close	610	79%	4.35	.5
5.0	Open-Close	80	<10%	4.35	.5
15.0	Open-Close	620	80%	13.0	1.0
15.0	Open-Close	64	<5%	13.2	1.5

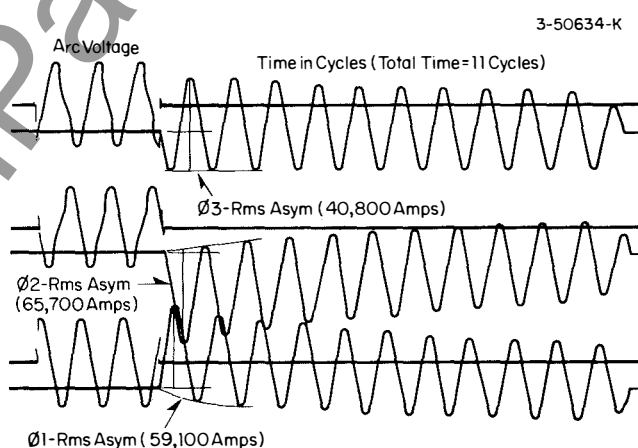
Further Information

Price List 36-523

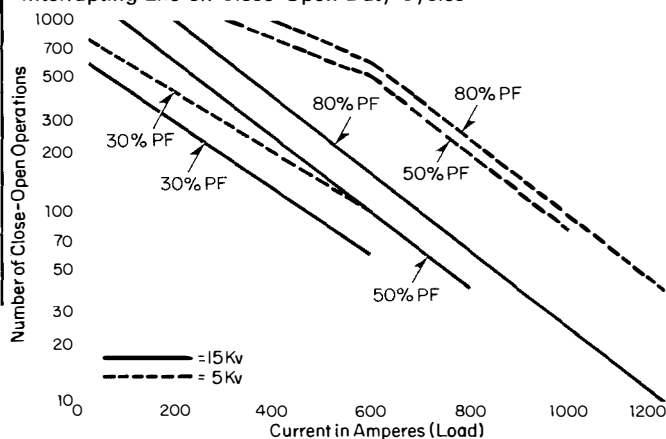
Fault Closing Test on 3 Pole AWP Switch 15 Kv 600 Amps 40,000 Rating



Fault Closing Test on 3 Pole AWP Switch 15 Kv 1200 Amps 61,000 Amp Rating



Interrupting Life on Close-Open Duty Cycles



Type AWP Load Interrupter Switch

Indoor, 2.4 Kv Through 13.8 Kv

Test Data

Tests were performed on 5.0, 7.2 and 15 kv, 600 and 1200 ampere switches in accordance with NEMA Standards SG-6, ANSI Standards 37.32 and Canadian Standards 105-1960 for indoor switches.

The tests were made to determine the required BIL, short time and momentary current ratings, fault closing capability, as well as interrupting capabilities at various current levels and power factors. The AWP Switch was capable of meeting all the requirements as listed in the standards. Shown below are actual oscillograms taken during the tests.

The AWP, 15 kv, 1200 ampere, 3 pole, gang operated switch was also subjected to 500 or more mechanical operating cycles under no load conditions and showed no failure to moving parts or current carrying parts.

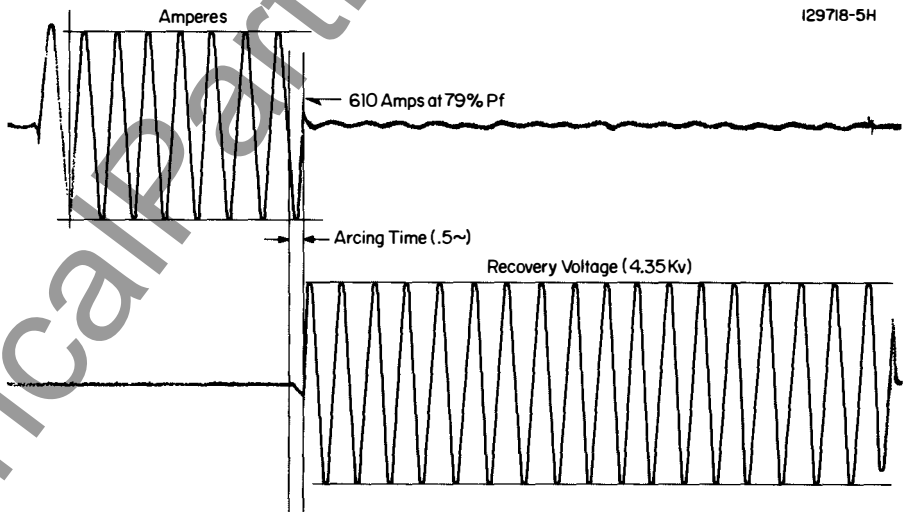
All fault closing tests done at maximum voltage rating and without any protective fusing.

Certified test reports are available on request.

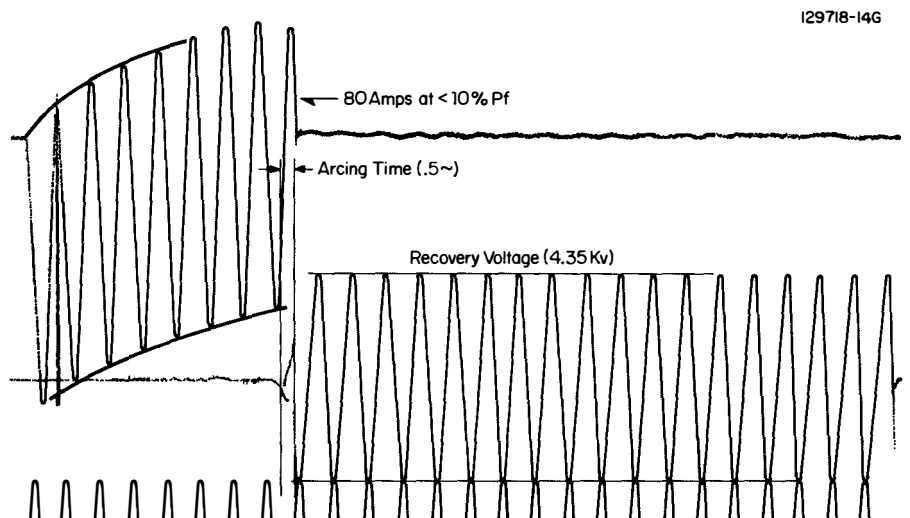
Switch Data

Maximum Voltage	Nominal Voltage	BIL Kv	Continuous Amperes	I.C.	Momentary		Fault Close Ka
					10 Cycles Asymmetrical Ka	4 Seconds Symmetrical Ka	
5.0	4.8	60	600	600	40	25	20
5.0	4.8	60	600	600	40	25	40
5.0	4.8	60	1200	600	61	38	61
5.0	4.8	60	1200	1200	61	38	61
8.25	7.2	75	600	600	40	25	20
8.25	7.2	75	600	600	40	25	40
8.25	7.2	75	1200	600	61	38	61
8.25	7.2	75	1200	1200	61	38	61
15.0	13.2	95	600	600	40	25	20
15.0	13.2	95	600	600	40	25	40
15.0	13.2	95	1200	600	40	25	40
15.0	13.2	95	1200	600	61	38	61
15.0	13.2	95	1200	1200	61	38	61

Interrupting Test on 3 Pole AWP Switch 5 Kv 600 Amps



Interrupting Test on 3 Pole AWP Switch 5 Kv 600 Amps



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Operation of Electrical/Manual Stored Energy Mechanism

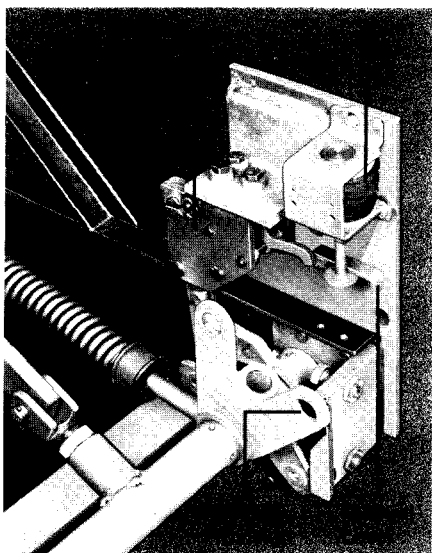


Figure 16

The electrical/manual stored energy mechanism portion of the AWP Switch is located on the right side of the switch just above the operating shaft and handle casting assembly, Figure 16.

The unit is a mechanical linkage consisting of a teeter bar, double toggle assembly and a shunt trip coil. Closing of this switch is accomplished by inserting the handle into the handle casting. An upward motion of the handle starts the rotation of the casting assembly; through a mechanical linkage, this operates a spring lever which compresses the spring. When the spring lever reaches the over toggle position, the spring tends to release its energy and tries to move the operating shaft. The movement is restrained by a linkage which transfers the energy into the double toggle assembly.

The switch can now be closed by tripping the double toggle assembly by a manual release located in front of the switch or remotely by the shunt trip coil.

Once the switch is closed, the opening cycle is made ready by a downward motion of the handle; the double toggle assembly resets after each open or close cycle allows the mechanical sequence to repeat. Again the switch can now be opened manually or electrically. Shunt trip coil voltages can be 48 volts dc, 125 volts dc, 250 volts dc, 115 volts ac and 230 volts ac

Safety Features

Indicators located at the operating end are provided to show if the spring is charged or if the switch is opened or closed, Figure 18.

A shaft lock assembly is provided on the left side of the switch to prevent the switch from operating when the door is opened and the switch charged for operation, Figure 17.

On this type of operating mechanism, Kirk Key Interlocks cannot be provided; however, there is provision for padlocks on the handle casting, Figure 16.

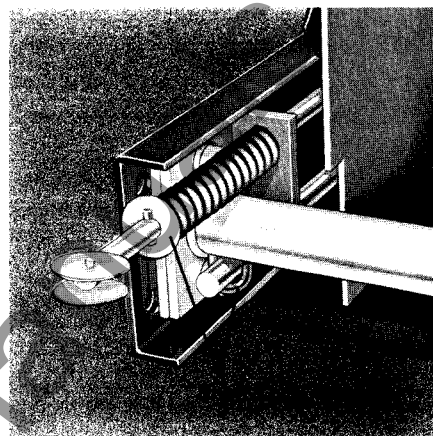


Figure 17

Access Door

Access door to switch operating mechanism can be provided for mounting on cabinet door. This door assembly can be used for either indoor or outdoor application. See drawing pertaining to cutout requirements for mounting.

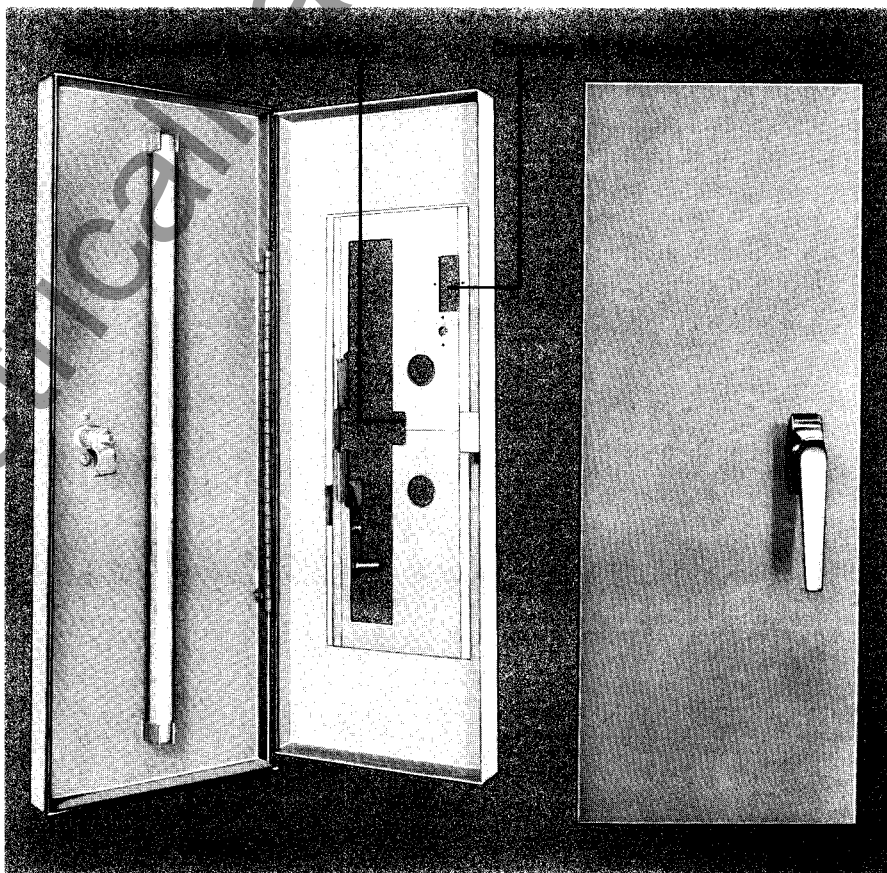


Figure 18

Type AWP Load Interrupter Switch

Indoor, 2.4 Kv Through 13.8 Kv

Safety Features

Since the speed and force of closing the main contacts are independent of the lever closing operation, the AWP has an inherent built-in anti-tease mechanism. To further assure safety, each switch has two mechanical interlocks. The door interlock is a hook lug arrangement on the shaft which engages a ring mounted on the enclosure door, Figure 12. This prevents the door from being opened while the switch is in the closed position. The other interlock prevents the switch from being closed while the door is opened. The latch, Figure 13, must be pushed forward by a latch lug mounted on the enclosure door to close switch.

To prevent accidental contact with live parts through the mechanism operating plate, a barrier surrounds the operating mechanism, isolating it from the main current carrying parts of the switch, Figure 14.

In addition to the built-in interlocks, there are provisions for two kirk key interlocks, Figure 15, which will allow the switch to be locked in various open or closed positions, plus provisions for one padlock, Figure 13. An adapter is available to accommodate additional padlocks if required.

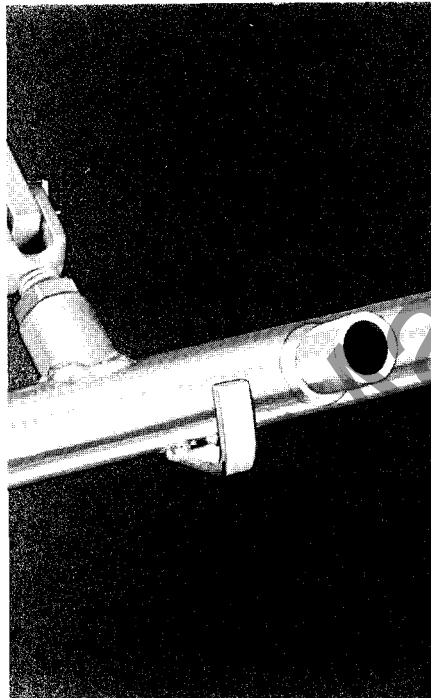


Figure 12

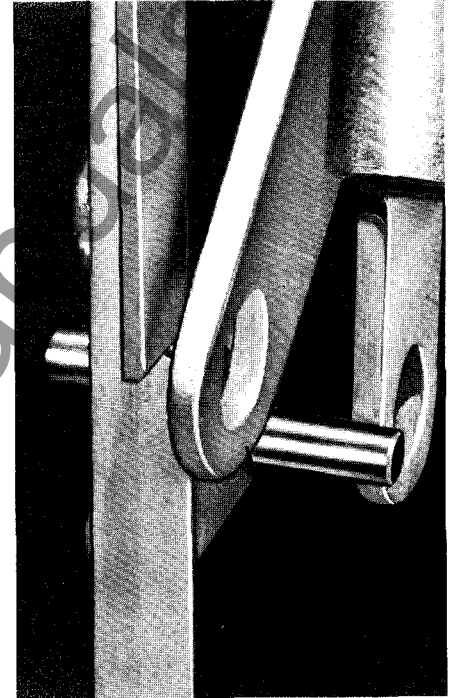


Figure 13



Figure 14

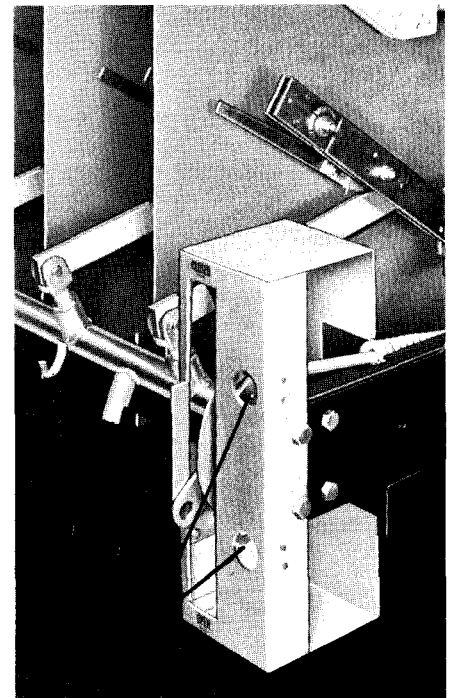


Figure 15

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**Design Features, (Continued)****Flicker Blade**

The flicker blade is connected to the side and parallel to the main blade. It is constructed of hard drawn copper with an arc resisting silver tungsten alloy tip, Figure 9. In the opening sequence as the main blade separates from the main break contact, the current is transferred to the flicker blade which is being restrained by the high pressure contacts within the arc chute. Once the maximum angular movement between the flicker blade and main blade has been reached, the flicker blade starts to move out of the arc chute contacts. The additional pull of the torsional spring on the flicker blade assembly snaps the blade into an open position at high speed.

The heat of the arc, releases a blast of de-ionizing gas from the arc chamber. This combination of the quick break and De-ion action quickly extinguishes the arc safely de-energizing the circuit.

For maintenance purposes or replacement, only the flicker blade portion need be removed.

Terminals

The terminal pads for both the 600 and 1200 ampere switches are high conductivity hard drawn copper bar with standard NEMA drilling, Figures 5, 6 and 9.

Blade Alignment

Blade and contact alignment for maintenance purposes can be checked with ease and safety. The AWP Switch is supplied with slow close feature. Inserting the operating lever into the hub located on the shaft and using an upward motion, Figure 10, the switch blades can be readily moved for alignment check with main contacts. For safety purposes the switch can never be fully closed with this slow close feature and once the lever is released the switch will always revert to the open position.

Barriers and Drive Rods

The barriers and drive rods are made of flame retardant glass polyester, the drive rods are also track resistant, Figure 11.

Standardization

The AWP was designed to be as flexible and simple as possible. Parts may be readily added or removed for changing applications. Non-load break switches can be converted to load break by simply adding arc chutes and flicker blade assemblies.

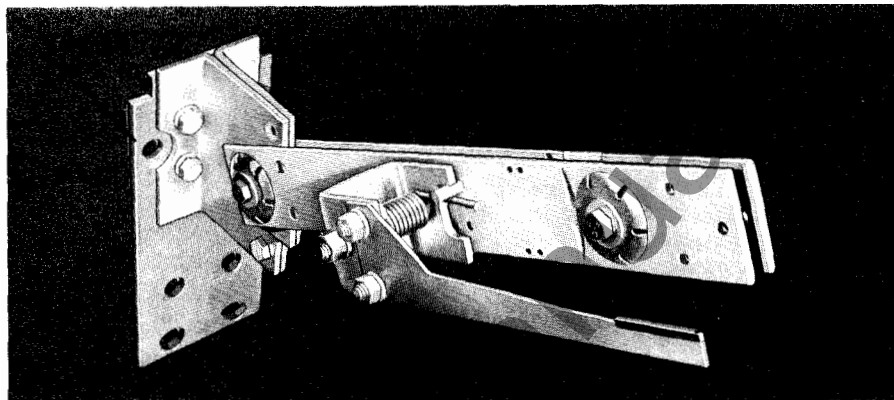


Figure 9

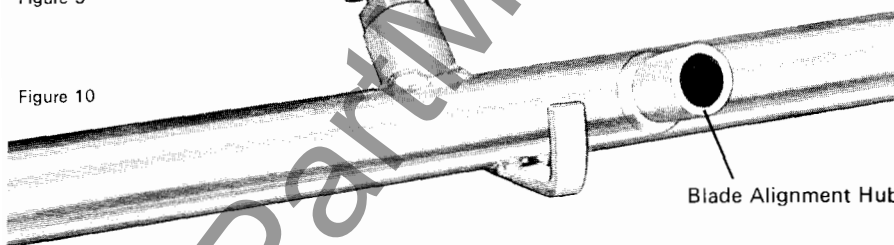
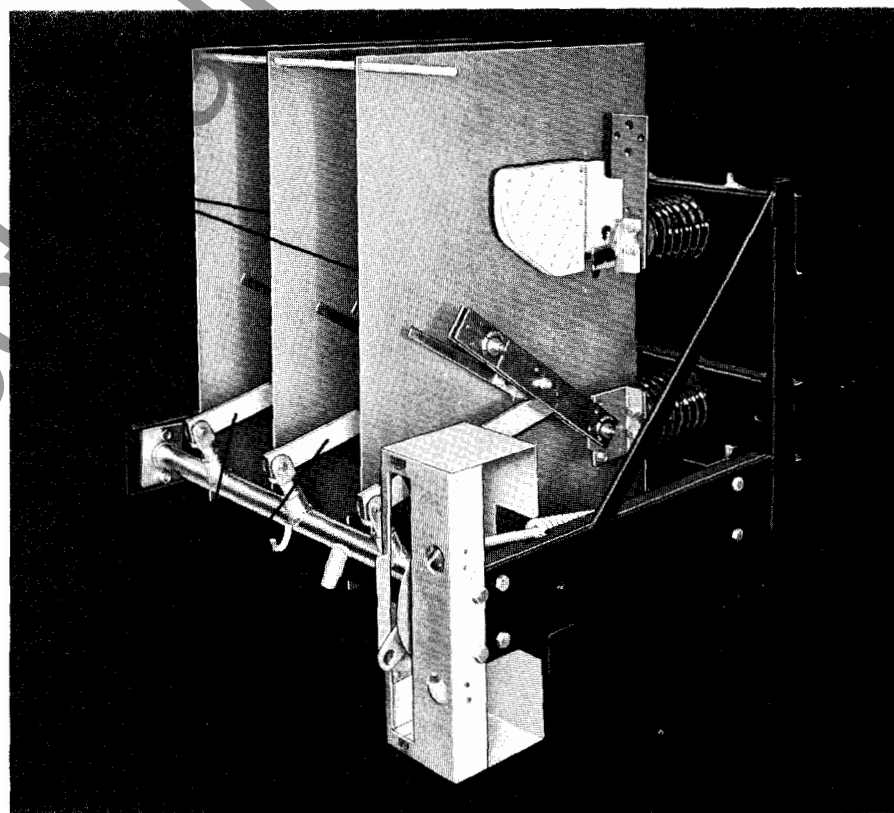


Figure 10

Blade Alignment Hub



Type AWP Load Interrupter Switch

Indoor, 2.4 Kv Through 13.8 Kv

Design Features, (Continued) Main Contact

The main contacts, break and hinge end, are made of high conductivity hard drawn copper. For 40,000 and 61,000 ampere fault closing, the break end is provided with a copper tungsten alloy arcing tip, Figure 5.

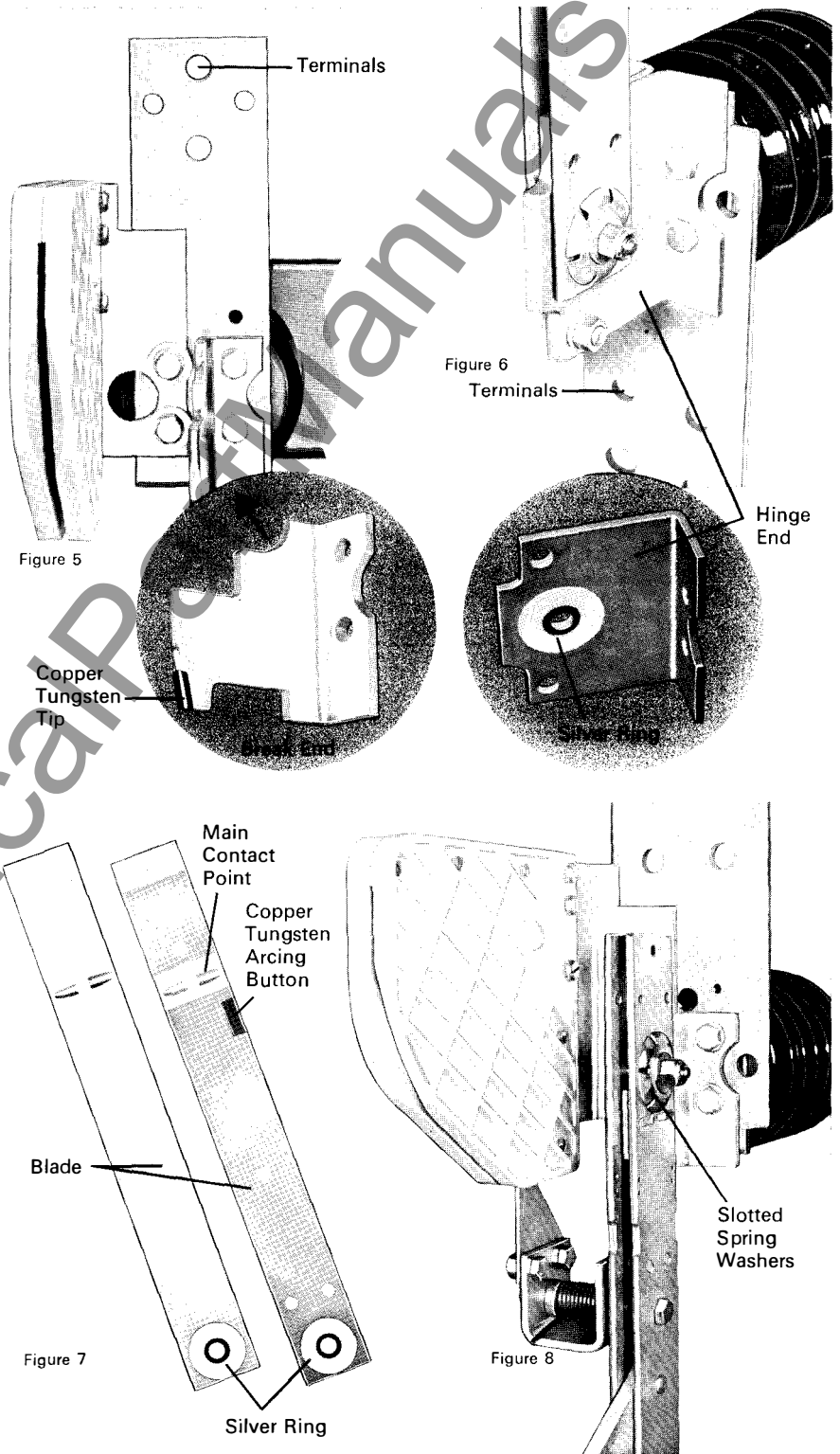
The hinge end consists of two pieces of copper fastened together and proper electrical contact maintained when the blade is attached to the hinge contact with a bolt and spring washer. To further assure good electrical contact at 1200 amperes, the hinge end is also provided with silver rings at the moving point, Figure 6.

The blade consists of two high conductivity hard drawn copper bars in parallel, Figure 7. Since the electrical contact point for 600 amperes is silver to copper, the blades are provided with a silver ring at the hinge end and a copper embossed silver plated main contact point. On 40,000 and 61,000 ampere fault close ratings, copper tungsten alloy arcing buttons are provided to prevent damage to main break contact.

The two bars are fastened together to form the single blade at the hinge and break end. To assure permanent high contact pressure, self-adjusting slotted spring washers of phosphorus bronze are drawn tight over machined spacers to provide flexibility in meeting stresses from distortion due to load or from uneven mounting, Figures 6 and 8.

Arc Chute

The arc chutes consist of two pieces of UREA formaldehyde fastened together to produce gas under high current conditions to extinguish the arc. Contacts within the arc chute restrain the flicker blade assembly until the spring is charged prior to opening, Figures 5 and 8.



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Design Features

Stored energy mechanism:

The AWP quick make-quick break stored energy mechanism provides constant high speed opening and closing of switch and is capable of closing and holding on its rated fault current. The speed and force of opening and closing the contacts are both independent of the handle operation stroke.

The energy for the operation of the switch is provided by a spring that is compressed and released through a mechanical linkage.

Operation

Closing of the switch is accomplished by inserting the handle into the handle casting, Figure 1. An upward motion of the handle starts the rotation of the casting assembly; through a mechanical linkage this operates a spring lever, Figures 2, 3 and 4, which compresses the spring. When the spring lever reaches the over toggle position, the spring releases its energy and closes the main contacts. The opening cycle is initiated by a downward motion of the handle and the mechanical sequence being repeated.

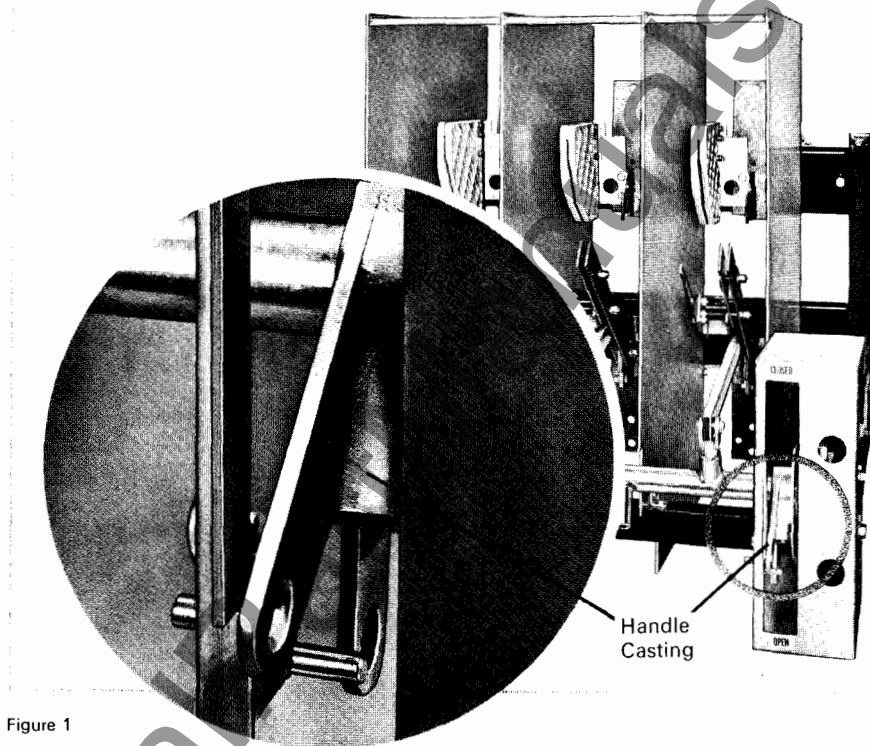


Figure 1

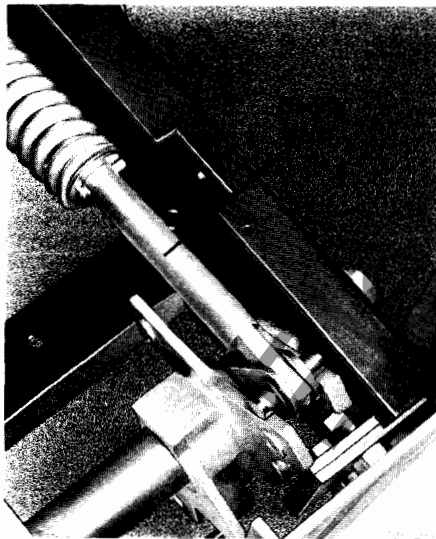


Figure 2

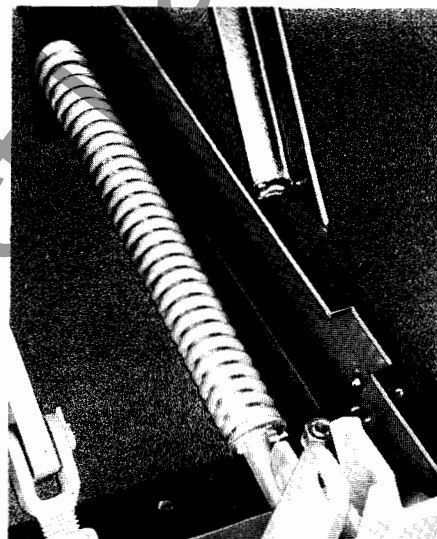


Figure 3

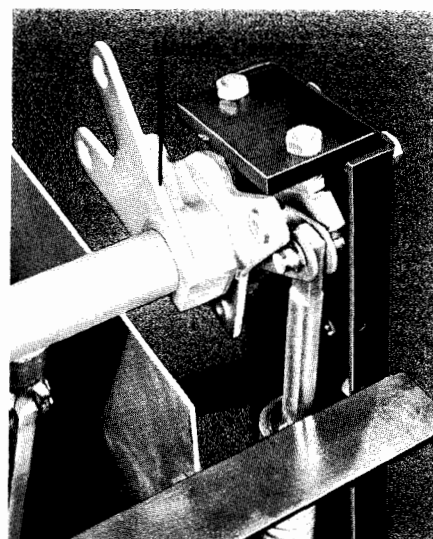


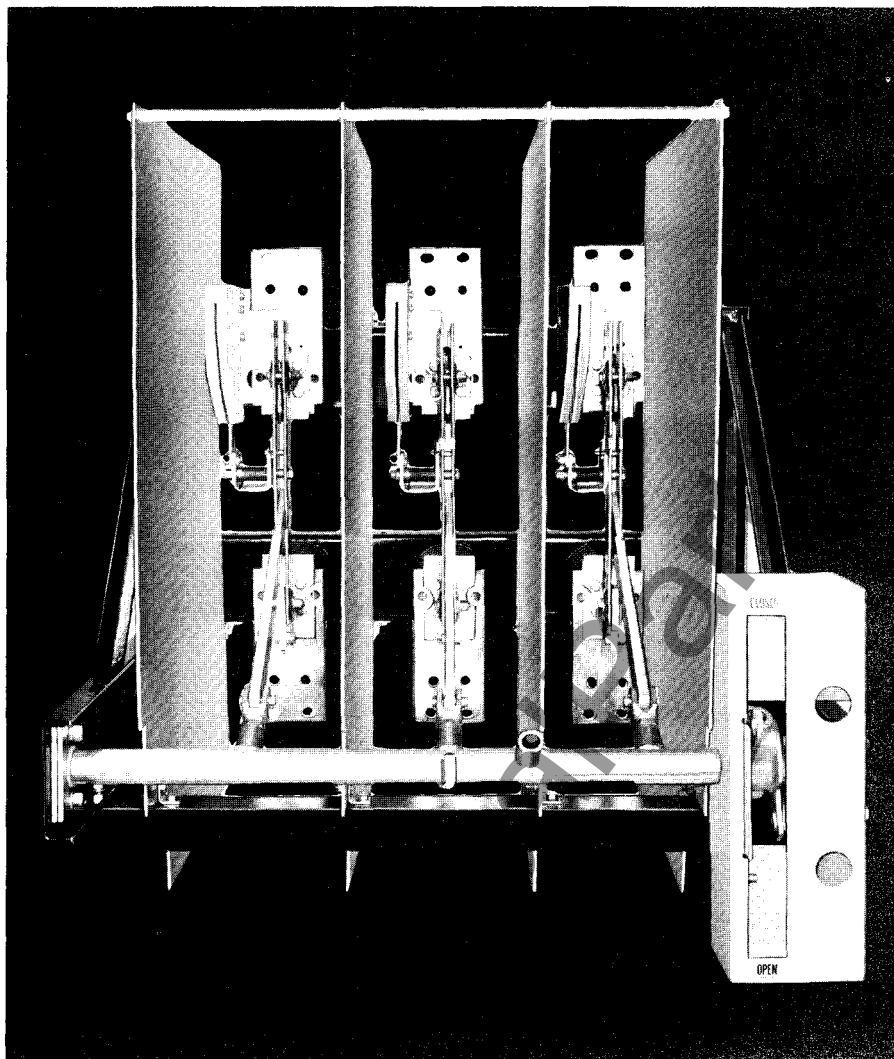
Figure 4

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Type AWP Load Interrupter Switch

Indoor, 2.4 Kv Through 13.8 Kv



General

The AWP load interrupter switch is a full rated quick make-quick break spring stored energy operated switch which provides safe, fast and reliable protection for high voltage circuits 2.4 kv through 13.8 kv.

Application

The AWP interrupter switches are available in unitized three pole, frame mounted construction for mounting in enclosures or assemblies. These units can be applied separately or in conjunction with fuses. They provide safe non-automatic switching for sectionalizing primary feeders, and isolation for transformer banks, capacitors, voltage regulators and similar application. When used in series with expulsion or current limiting fuses, they provide excellent fault protection.

Ratings

The AWP switch is available in both 600 and 1200 ampere continuous current ratings for all voltage classes 2.4 kv through 13.8 kv with an interrupting rating of 600 and 1200 amperes. The switches have momentary ratings of 40,000, 61,000 and 80,000 amperes with fault closing ratings of 20,000, 40,000 and 61,000 amperes.