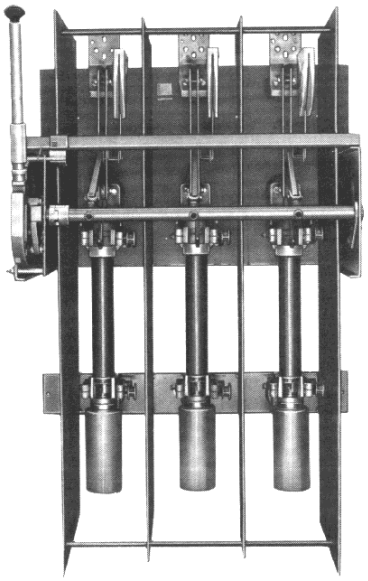
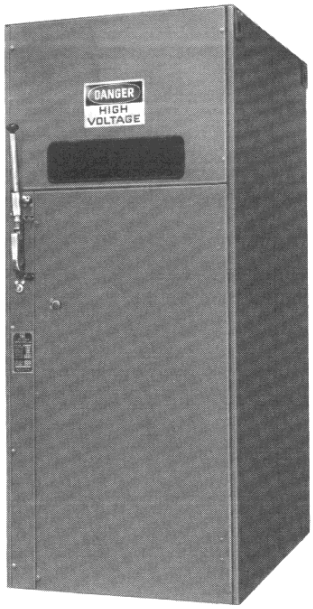
Class 6040
Supersedes May 1988 Edition
MARCH 1992





METAL-ENCLOSED Load Interrupter Switchgear

With HVL Switches Voltage Ratings 2.4kV to 38kV

CONTENTS

SQUARE D

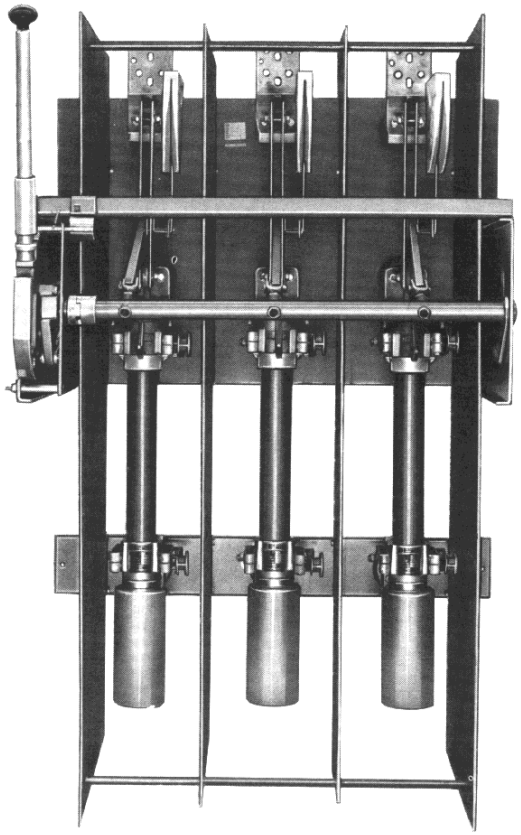
FILE: Distribution Products Catalog

CLASS
6040

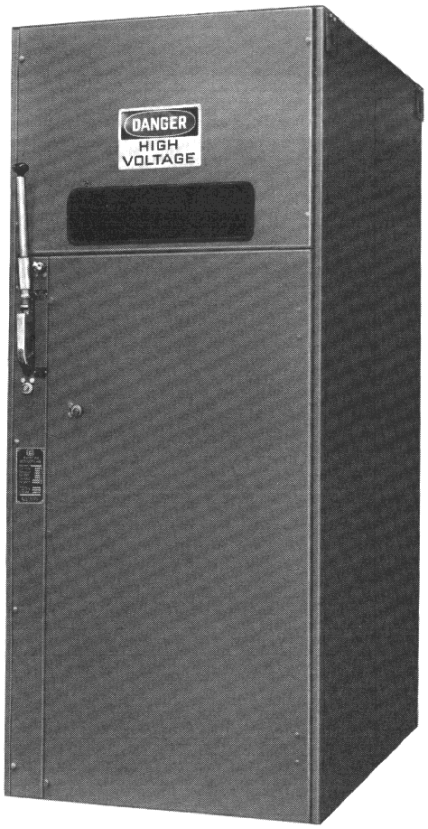
METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

MARCH, 1992

APPLICATION DATA



Square D Type HVL Interrupter Switch
With Boric Acid Type Fuses



5 and 15 kV Single Bay Switchgear Unit

- 2.4 to 38 kV
- 600 and 1200 amperes

- Fused and Not-fusible
- Indoor and Weatherproof
- Single Switch Bay
- Multiple Bay Line-up
- Primary Metering Bay

GENERAL

Better system performance and reliability, lower electrical power cost, easier system expansion, and reduced equipment expense are advantages commanding serious attention to 2400 volt to 38,000 volt power distribution in electrical system planning.

Square D Metal-Enclosed Load Interrupter Switchgear functions as a prime component of these systems providing necessary switching and overcurrent protection for the high-voltage feeders. It is often used in conjunction with Square D unit substations. The switchgear is most frequently applied as service entrance equipment, although it performs equally well in controlling substation transformers and in sectionalizing high-voltage feeder systems.

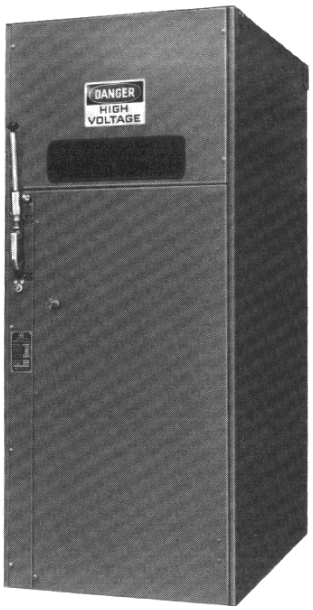
METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

CLASS 6040

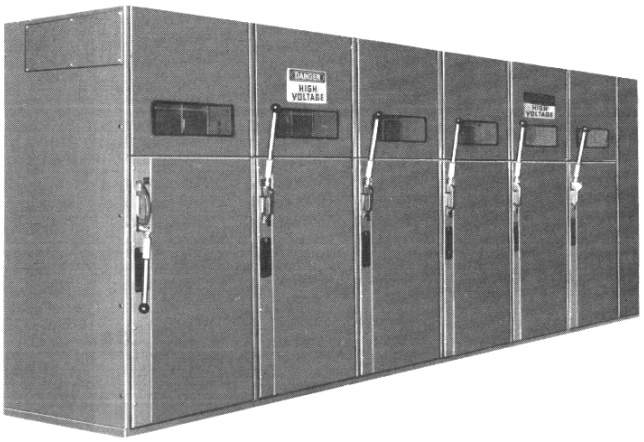
APPLICATION DATA
TYPE OF EQUIPMENT AVAILABLE
INDOOR AND WEATHERPROOF

Single Bay Switchgear equipment contains a single switch or fused switch in a free standing enclosure. It is ideally suited for locating close to a load to control a single high-voltage circuit.

Special emphasis is placed on conduit area, cable entrance and terminations. Normally, no main bus is furnished. A ground bus bonded to the steel frame is furnished with a cable lug termination. Where future expansion is anticipated, the unit can be furnished with main bus provisions to permit additional bays to be connected when needed.



Single Bay Switchgear Unit



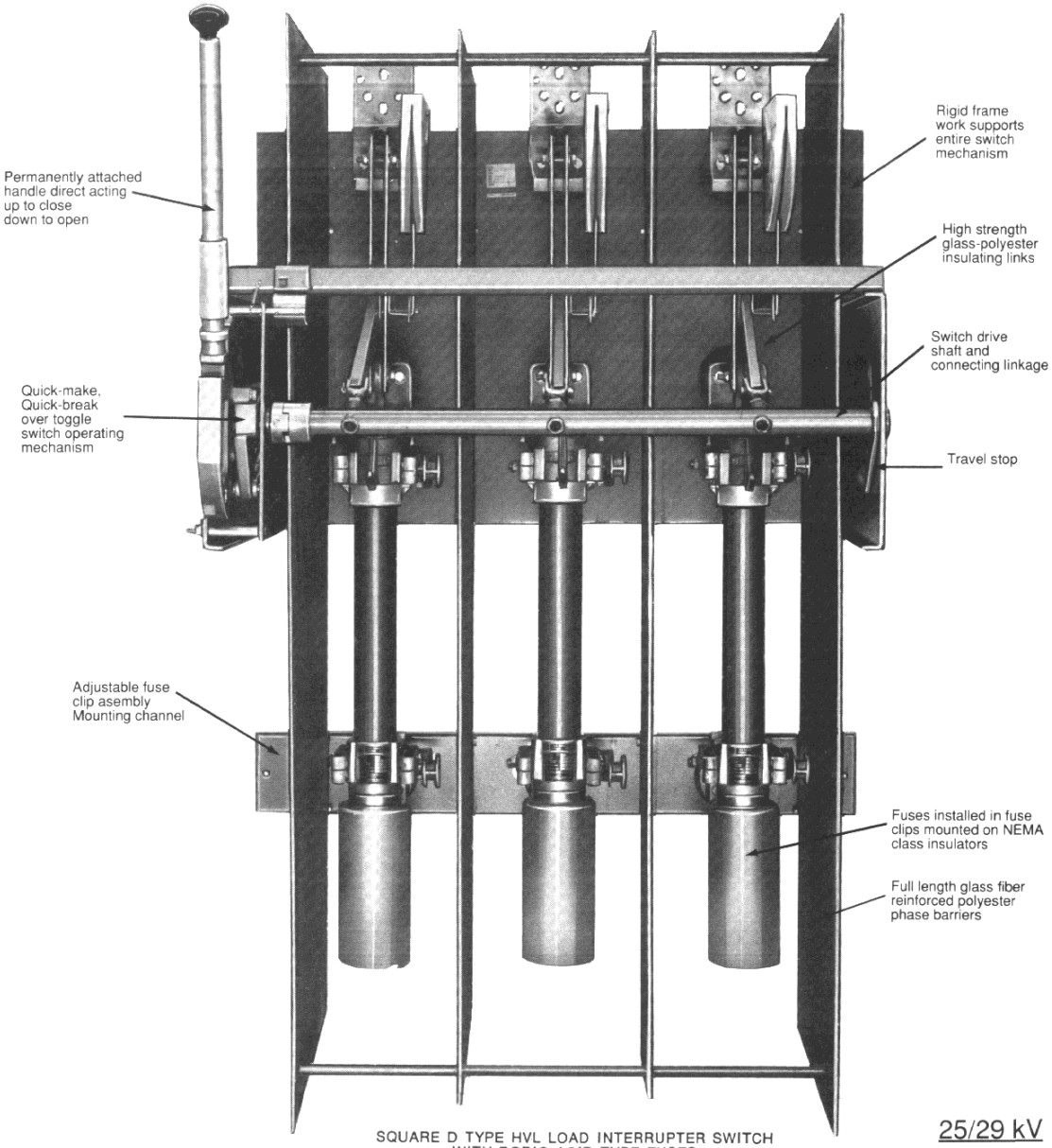
Multiple Bay Indoor Load Interrupter Switchgear

Multiple Bay Switchgear generally consists of a lineup of individual feeder switch bays connected by a common main bus. A main switch, fused or not fused, can be included in the lineup with a utility or user metering cubicle depending upon job requirements. A continuous ground bus is bonded to the frame of each bay for the complete length of the lineup. The end cubicle can be furnished with provisions for the addition of future feeder switch bays.

Outdoor single switch or multiple bay switchgear consists of high-voltage components in a completely weatherproof enclosure. Access is through a gasketed front bulkhead type door. The enclosure is designed so that the sheared edges of the steel are not exposed. The equipment is furnished with a welded formed steel channel base and special weatherproof paint finish.

Outdoor Multiple Bay Load Interrupter Switchgear

METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR



SQUARE D TYPE HVL LOAD INTERRUPTER SWITCH WITH BORIC ACID TYPE FUSES

- 5 kV-60 kV BIL
- 15 kV-95 kV BIL
- 25.8 kV-125 kV BIL
- 38 kV-150 kV BIL

5 & 15 kV

- 600 Amperes
- 40,000 Amperes Momentary
- 25,000 Amperes Short-Time

- 1200 Amperes
- 61,000 Amperes Momentary
- 25,000 Amperes Short-Time
- 80,000 Amperes Momentary
- 38,000 Amperes Short-Time

25/29 kV

- 600 Amperes
- 40,000 Amperes Momentary
- 25,000 Amperes Short-Time

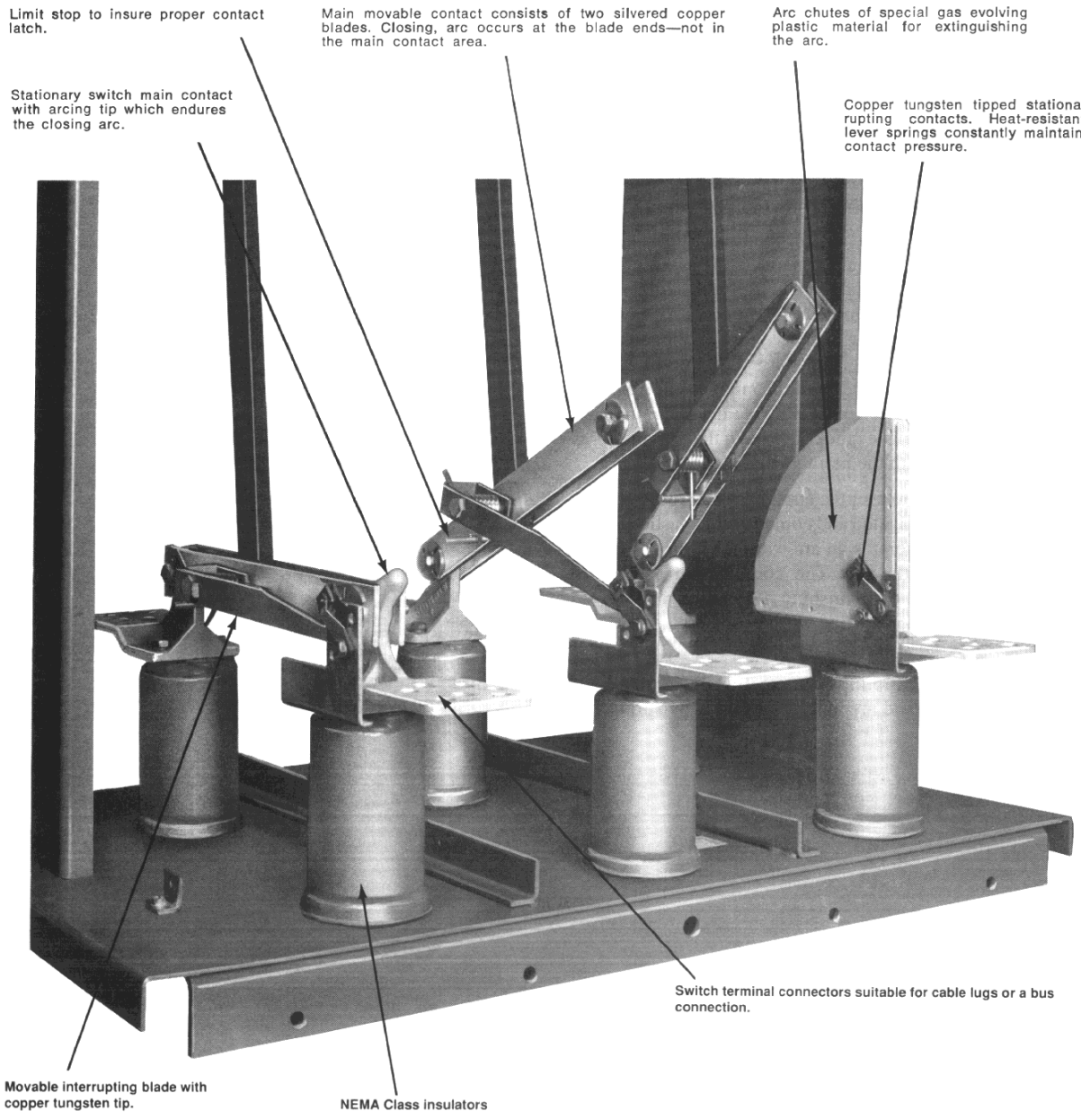
- 1200 Amperes
- 61,000 Amperes Momentary
- 25,000 Amperes Short-Time

38 kV

- 600 Amperes (400 A Int.)
- 28,000 Amperes Momentary
- 20,000 Amperes Short-Time

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA



HVL SWITCH AS VIEWED LESS INTER-PHASE BARRIERS & COMPLETED ARC CHUTE ASSEMBLIES

METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA

SEQUENCE OF OPERATION—OPENING THE SWITCH

In the closed position (Fig. 1), the main switch blades and the interrupting blade are engaged on the stationary contacts. The circuit current flows through the main blades.

As the switch operating handle is moved towards the open position, the stored energy springs are charged. After the springs become fully charged they toggle over the dead center position discharging force to the switch operating mechanism.

The action of the switch operating mechanism forces the movable main blade off the stationary main contacts, without arcing, while the interrupting contacts are held closed, momentarily carrying all the current. Once the main contacts have separated well beyond arc striking distance (Fig. 2), the interrupting blade contact, held captive, has charged the interrupter blade spring. The interrupting blade end then moves out from under the stationary interrupter contacts inside the arc chute. The spring then forces the blade quickly through the arc chute and to the open position with the main switch blades.

The resulting arc, drawn between the stationary and movable interrupting contacts, is elongated and cooled as the plastic arc chute absorbs heat and generates an arc extinguishing gas to break up and extinguish the arc. The combination of arc stretching, arc cooling and extinguishing gas causes a quick interruption with only minor erosion of the contacts and arc chutes.

The movable main and interrupting contacts (Fig. 3), continue to the fully open position and are maintained there by spring pressure.

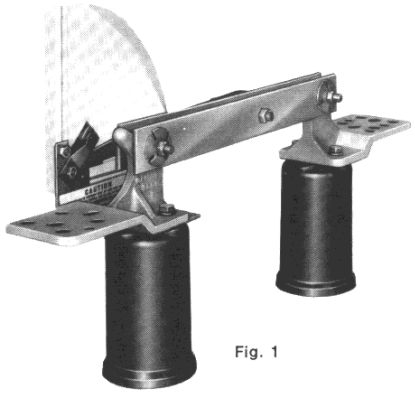


Fig. 1

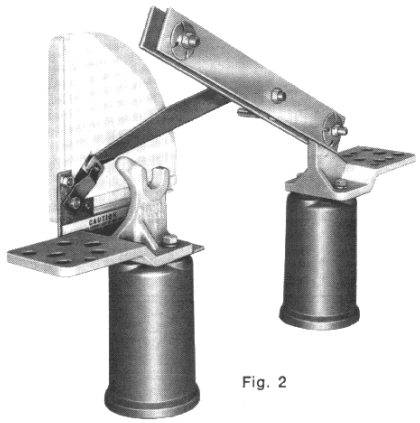


Fig. 2

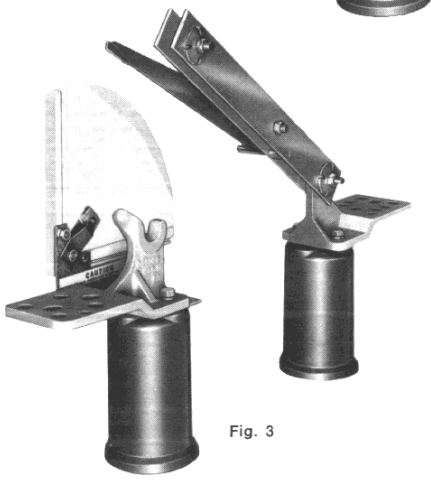


Fig. 3

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA

Fig. 4

SEQUENCE OF OPERATION—CLOSING THE SWITCH

When the switch operating handle is moved towards the closed position, the stored energy springs are being charged. When the springs become fully charged and toggle over the dead center position, the switch blades begin to move toward the closed position (Figure 4).

When the main and movable blades approach the main stationary contacts, a high-voltage arc is established across the diminishing air gap attempting to complete the circuit. The arc occurs between the tip of the stationary main contacts and a remote corner of the movable main blades. This arc is short and brief since the fast closing blades minimize the arcing time.

Spring pressure and the momentum of the fast moving main blades completely close the contacts (Fig. 5). The force is great enough to cause the contacts to close even against repelling short circuit magnetic forces if a fault exists. At the same time, the interrupter blade tip is driven through the twin stationary interrupting contacts definitely latching and preparing them for an interrupting operation when the switch is opened.

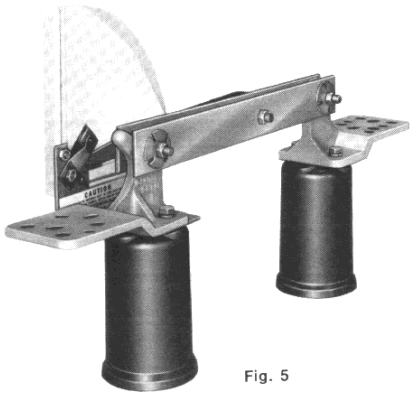
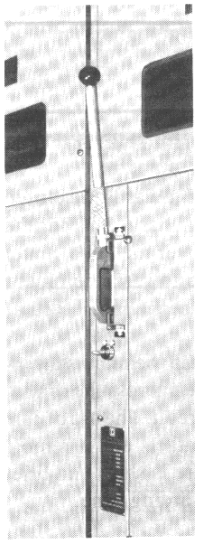
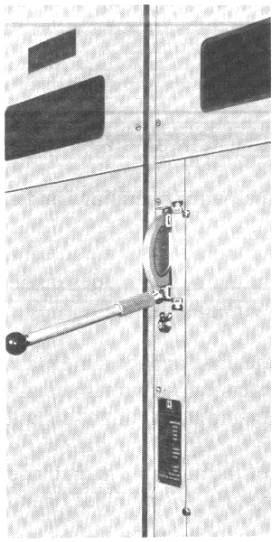


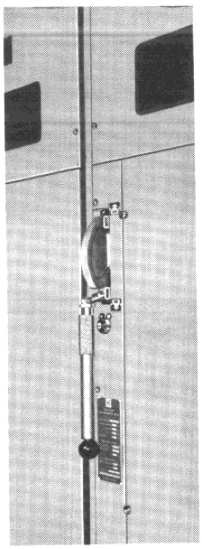
Fig. 5

METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

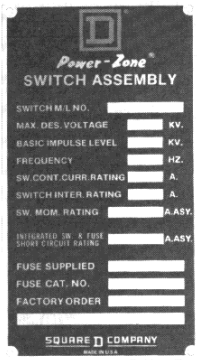
APPLICATION DATA



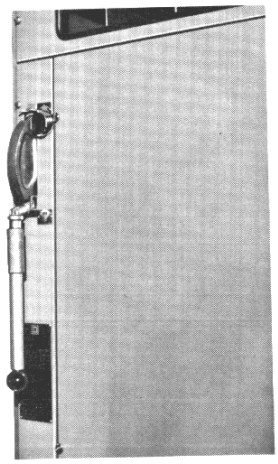


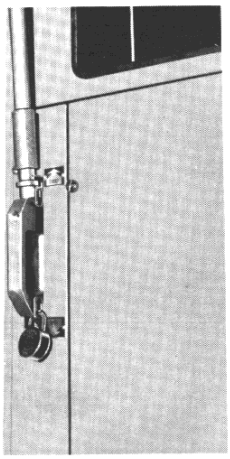


- Permanently mounted switch handle ready for immediate use. Handle gives positive indication of the switch position (up - closed; down - open). The spring-loaded sleeve permits the handle to fold down when the switch is in the open position. A handle stop prevents movement of the handle sleeve and folding the handle when the switch is in the closed position.

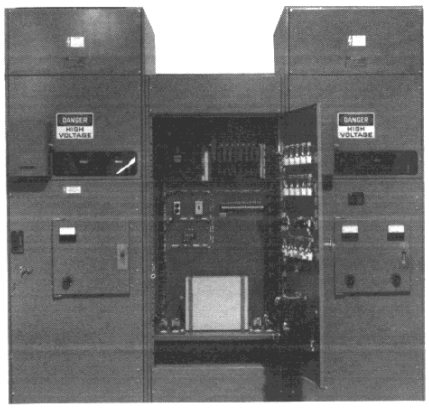


- Switch nameplate prominently lists performance ratings, fuse supplied and equipment identification.





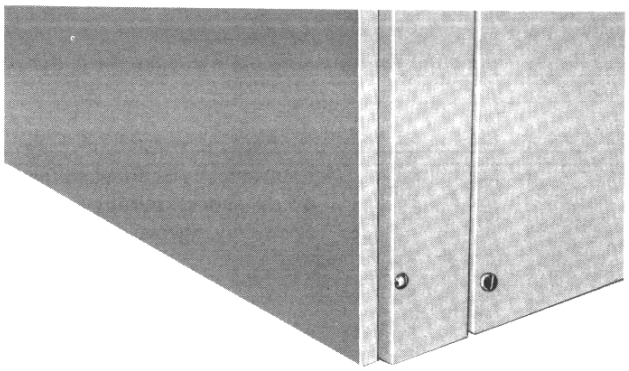
- Provisions for padlocking in the open and closed position.



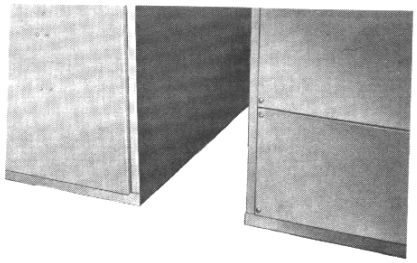
- Motor operated HVL switches are available for applications requiring remote operation. Used in conjunction with Symax Programmable Controllers, or electromechanical relays, motor operated switches may be used in automatic load transfer applications.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

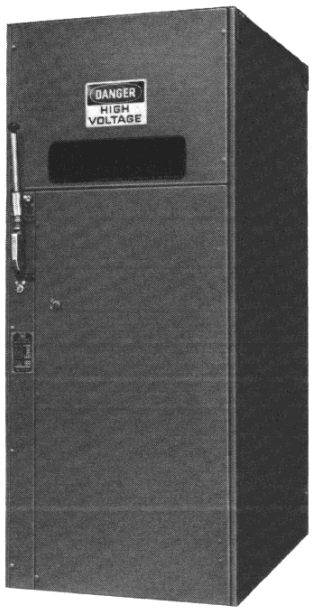
APPLICATION DATA
CONSTRUCTION FEATURES OF INDOOR EQUIPMENT



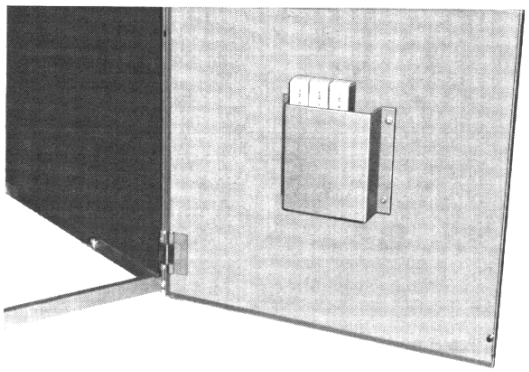
- Strong 11 guage steel enclosure completely grounded.
- Paint finish is a TGIC polyester powder applied electrostatically to yield a rugged, durable surface coating.



- Sectionalized shipment when required.



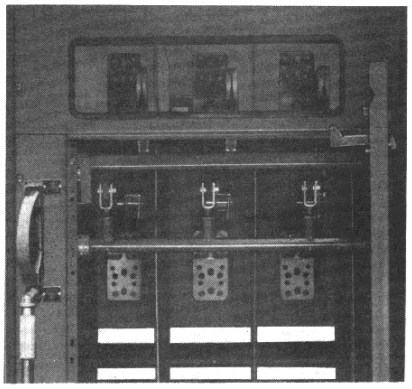
- Prominently displayed DANGER sign.
- Shatter resistant safety glass inspection window for visual assurance of switch blade position.

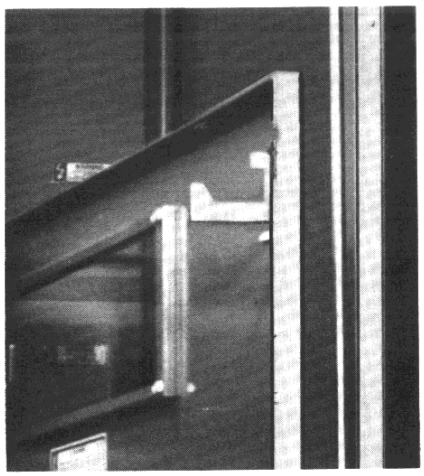


- Spare fuse holder available when required.
- Bolted removable front and rear panels.

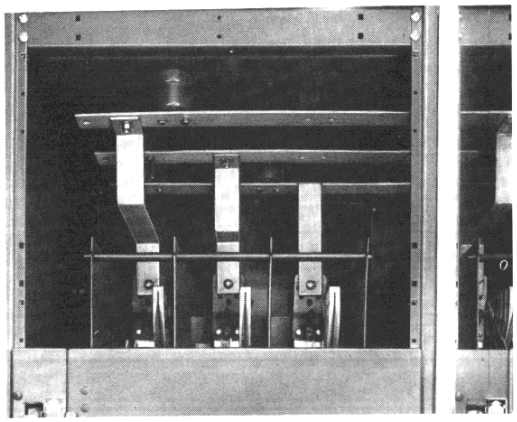
METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA
CONSTRUCTION FEATURES OF INDOOR EQUIPMENT

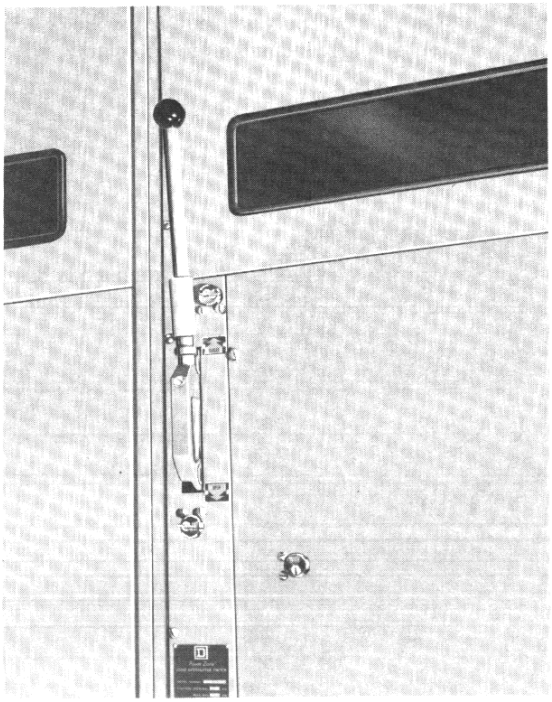




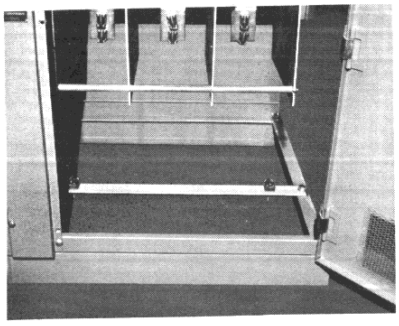
- Mechanically interlocked fuse access door permitting entry to fuses only when switch is open.



- Plated main cross-over bus supported on NEMA class insulators.



- Key interlocking when required.



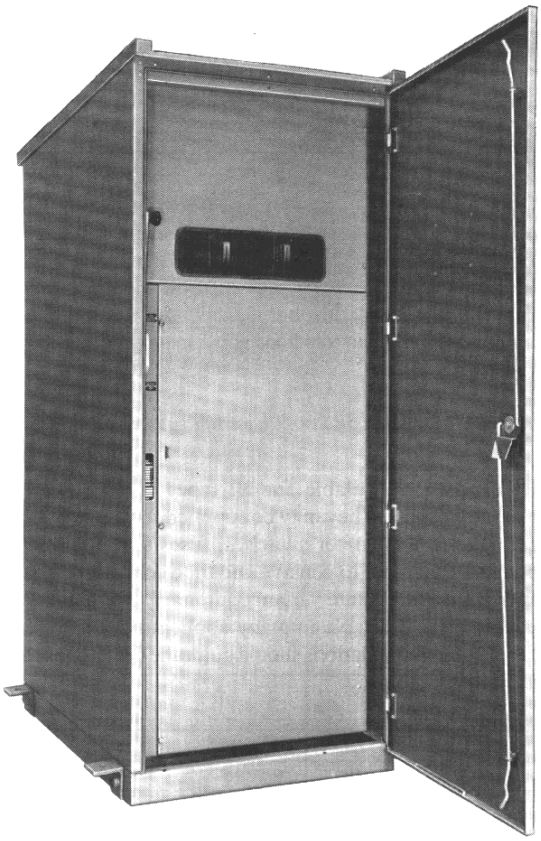
- Plated ground bus bonded to equipment frame.

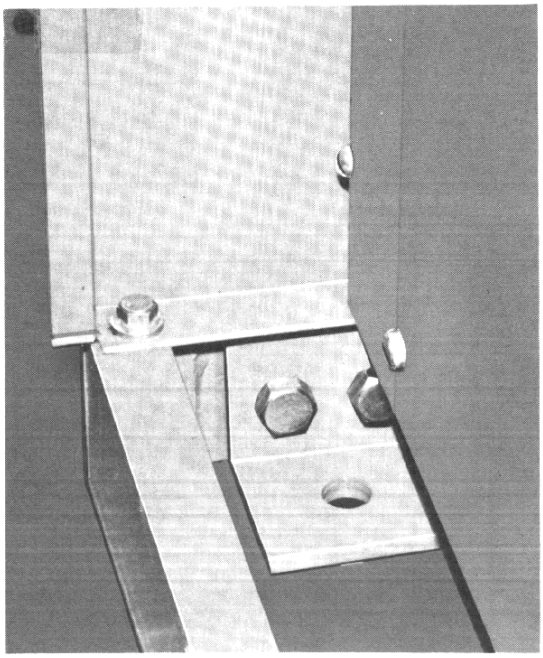
METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA
CONSTRUCTION FEATURES OF OUTDOOR EQUIPMENT

In addition to the construction features of the indoor equipment, the following outdoor features are furnished:

- Roof sloped to rear for precipitation run-off.
- Enclosed operating handle prohibits tampering, and vandalism.
- Front bulkhead door with 3-point latch and vault-type handle with provisions for padlocking.
- Easily removable flanged full height rear panel.

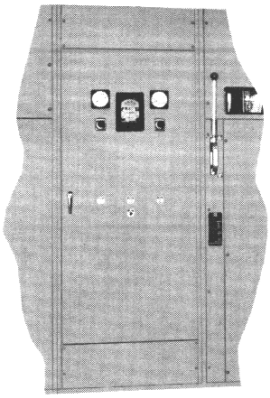




- Combination Lifting and Anchoring Bracket
- Formed Steel Welded Base
- Wind Latch Door Bracket
- Space Heaters

METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

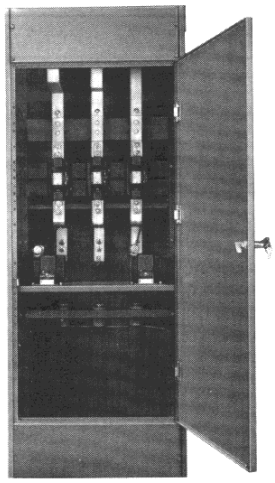
APPLICATION DATA
ADDITIONAL COMPONENTS



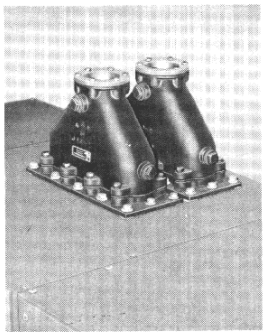
User Metering

Metering bays for user or power company equipment are available. They may be supplied fully equipped with necessary current transformers, potential transformers, meters, and associated devices or with provisions for installing power company components at the job site.

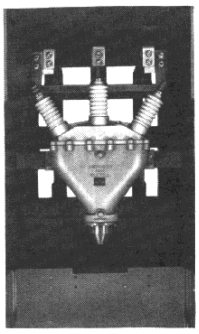
Standardized metering bays match the adjacent switchgear and incorporate all the special requirements of the power company.



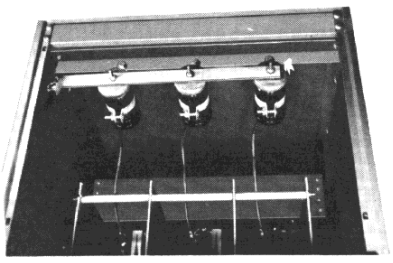
Potheads are available for all types of single or multiple conductor cable. They may be supplied for top or bottom cable entrance to interrupter switches, fuses and main bus. While potheads are more expensive and time consuming termination and often necessitate larger equipment enclosures they are nevertheless desirable in many applications. Cable manufacturers' recommendations should guide the decision as to whether they should be used.



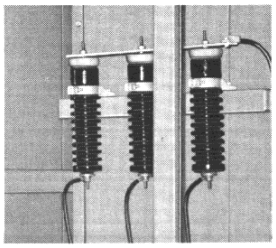
Flange Mounted



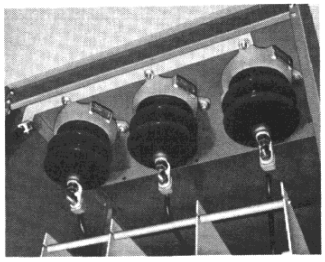
Internally Mounted



Distribution Class

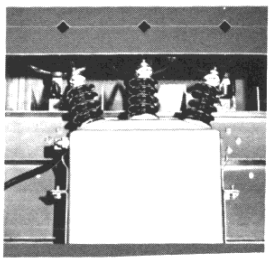


Intermediate Class



Station Class

Metal oxide surge arresters are available to protect the equipment and cable from high-voltage lightning and switching surges. Distribution type arresters are usually adequate, but larger more expensive, intermediate and station type arresters can be provided if desired. **Surge capacitors** also may be supplied with the lightning arresters to offer additional protection. Due to the peculiar nature of voltage surges, one set of lightning arresters often will not protect the entire system. It is usually desirable to place a set of lightning arresters near the terminals of all major equipment on the high-voltage system.



Surge Capacitor

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION AND RATINGS SELECTION

INTEGRATED EQUIPMENT RATINGS

High-voltage metal-enclosed load interrupter switchgear is an integrated assembly of many components, properly selected and coordinated to provide safe and reliable operation of the over-all equipment. Each component has its own ratings defined by its own industry standards (usually ANSI). In the past, these individual component ratings have been emphasized since they often appear to be quite impressive though often irrelevant to the component's application. The result has often been confusion and a shifting of the burden for analysis, selection and coordination of specific components from the equipment manufacturer to the purchaser who would rather evaluate over-all equipment performance. Integrated ratings of the complete equipment are the natural solution and Square D switchgear is rated in this manner. These integral equipment ratings are readily comparable with the anticipated voltage, short-circuit and continuous current values obtained when designing a distribution system. The major ratings of complete Square D switchgear are arranged in Table A: Integrated Equipment Ratings Without Fusing. This table covers all rating of the switchgear and the HVL load interrupter switches when applied without fuses. The integrated Short Circuit Ratings may change with various types and brands of fuses; Consult Table B: Integrated Ratings, for 600 and 1200 Ampere switches with Current-Limiting Fuses, Table C: Intergrade Ratings for 600 Ampere switches with Boric Acid Expulsion Fuses, or Table D: Integrated Ratings for 1200 Ampere switches with boric acid expulsion fuses.

An integrated equipment short circuit rating at a given voltage defines the maximum short circuit to which the entire equipment may be subjected without damage to the equipment or endangering the safety of operating personnel. Because all current ANSI standards for metal-enclosed switchgear and the components are rated individually in rms symmetrical amperes, the integrated rating is also expressed this way (the Asymmetric rating is obtained by multiplying the symmetrical value by 1.6). For convenience when comparing to older equipment, the integrated rating is also expressed in "MVA". The MVA ratings are calculated at the nominal system voltage and with the rms symmetrical amperes, e.g.: MVA = Nominal System Voltage x Amperes, rms, sym. x $\sqrt{3}$. The integrated equipment rating combines the following ratings:

1. Switchgear — momentary and short time (bus bracing)
2. Load Interrupter switch — momentary, fault closing and short time.
3. Fuses — interrupting and energy let-through characteristics (current-limiting fuses limit the energy during a short circuit thereby allowing higher integrated ratings than the switches and switchgear would have if unfused or with boric-acid fuses).
4. Other components such as bar type current transformers that may have limited capabilities.

TABLE A: INTEGRATED EQUIPMENT RATINGS without fusing

A.	Nominal Voltage (kV)	4.16			13.8			16.5	23		25		34.5
	Maximum Voltage (kV)	5.5			15.0			17.0	25.8		29.0		38.0
	Impulse Withstand Voltage (B.I.L.) (kV)	60			95			95	125		125		150
	Power Frequency Withstand Voltage (kV)	19			36			36	60		60		80
	Frequency (Hertz)	50/60			50/60			50/60	50/60		50/60		50/60
B.	Continuous Current (Amperes)	600	1200	1200	600	1200	1200	600	600	1200	600	1200	600
C.	HVL Switch Interrupting Current (Amperes)	600	1200	1200	600	1200	1200	600	600	1200	400	400	400
D.	Load Current Switching Endurance (No. of Operations)	50	20	20	30	10	10	30	10	10	10	10	10
E.	Momentary Current (Amperes, Asym.)	61,000	61,000	80,000	61,000	61,000	80,000	61,000	40,000	61,000	40,000	61,000	40,000
	2-Second Short-Time Current (Amperes, Asym.)	25,000	38,000	48,000	25,000	38,000	48,000	25,000	25,000	25,000	25,000	25,000	25,000
	Fault Closing Current (Amperes, Asym.)	40,000	61,000	61,000	40,000	61,000	61,000	40,000	28,000	28,000	28,000	28,000	20,000
	Integrated Short Circuit Rating (Amperes, Sym.)	25,000	38,000	48,000	25,000	38,000	48,000	25,000	17,500	17,500	17,500	17,500	12,500
	MVA, 3-phase, Sym.	180	270	345	600	910	1150	600	700	700	755	755	750
F.	Mechnical Endurance (No. of Operations)	500	250	150	500	250	150	500	350	150	350	150	350

EXPLANATION OF RATINGS

A. Voltage Ratings:

The voltage for a given system is normally expressed in nominal volts and are in reality operated in a range that fluctuates based on a number of operating factors. ANSI standards generally recognize a tolerance of plus or minus 5%. For switchgear, the Maximum design voltage should not be exceeded. When operated below this maximum the equipment will withstand the 50 or 60 Hz voltage continuously, the low frequency withstand for one minute, and impulse voltages applied in accordance with ANSI design test procedures.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA

B. Continuous Current Rating:
The over-all continuous current is determined by the component with the smallest capacity - bussing, load interrupter switch, fuses, fuse mountings, connections, etc. Unfused equipment is normally rated by the main bus which is available in ratings of 600, 1200, or 2000 Amperes continuous. The continuous current rating of fused equipment is generally determined by the fuses since the other components have greater current carrying capacities than the fuses. When the fuse ratings exceed 600 Amperes, 1200 Ampere bus and switches are required.

C. HVL Switch Interrupting Current Rating:
The HVL switch is designed and tested in accordance with ANSI standards and as such is a "load interrupter," switch, capable of interrupting load currents up to its continuous current rating. Load Interrupter switches are not tested for interrupting currents above their continuous currents and are not meant to be used for the interruption of phase or ground faults. Note that the interrupting ratings at 29.0 and 38.0 kV are limited to 400 Amperes.

D. Load Current Switching Endurance:
The interrupting ratings are established through tests on "a circuit having a 0.8 or greater power factor lagging," and "requiring no maintenance for the number of operations stated". Therefore, these numbers are taken from ANSI C37.20.4 and are not a "rating". These are the minimum number of operations that are required. In many cases these requirements have been exceeded.

E. Short Circuit Ratings:
An integrated short circuit rating is normally established based on the Momentary, 2-second short time, and fault close capabilities of the equipment as explained in the section above on "Integrated Equipment Ratings". The most important number is the Integrated Short Circuit Rating which establishes over-all rating for the equipment. This number is normally based on either unfused switches or using boric acid fuses. Current-limiting fuses can be used to increase the integrated rating. Use Tables B, C, or D to select the proper fuse and associated integrated short circuit rating.

G. Mechanical Endurance:
These numbers represent actual test values that the given switch rating has been subjected to. ANSI Standard C37.20.4 does not require a "rating", only that a switch is tested to a specified minimum number of operations without repair, component replacement, or maintenance. In all cases the switch rating shown has been tested to many more than the minimum number of operations shown here.

HIGH VOLTAGE FUSE SELECTION

Fuses are usually used in conjunction with the high-voltage switch to provide overcurrent protection They are normally mounted vertically below the switch to prevent the possibility of their falling into the mechanism during replacement; and when an inverted arrangement with fuses above is required, barriers provide the same safety. Unless user job requirements demand otherwise, fuses are always connected to the load-side of the switch and are de-energized when the switch is open. When mounted in the switchgear, the fuses are visible through an inspection window and readily accessible through an interlocked door for easy removal. Fuses also may be supplied without an associated switch when the application requires, and special construction can be employed when unusual switch and fuse arrangements are necessary.

Current limiting fuses or boric acid type fuses can be provided in Square D Metal-Enclosed Switchgear. These provide short-circuit interrupting protection equal to or greater than the short-circuit rating of the equipment in accordance with their nominal current ratings and characteristic curves.

Current limiting type fuses offer the maximum short-circuit rating and are most economical in the majority "E" ratings in which they are available in addition to the previously listed features.

Fuses supplied provide the following conditions when properly selected:

1. Fuse interrupting capacity will be in accordance with the integrated equipment short-circuit current rating.
2. Fuse continuous current "E" rating will be as required up to the maximum continuous current rating of the fuse.
3. Most applications seem to favor fast acting current limiting fuses. These fuses limit the let through current and minimize the short circuit damage to a system. The fuses, completely factory assembled and sealed, exclude any dust or foreign material, and operated without any noise, pressure or expulsion of gas, flame and extinguishing material, even at maximum capacity.
   Boric acid fuses employ the use of refill units for replacement in the holder. These fuses can expel gas and can develop pressure within the enclosure during an interruption.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA

FUSE RATINGS

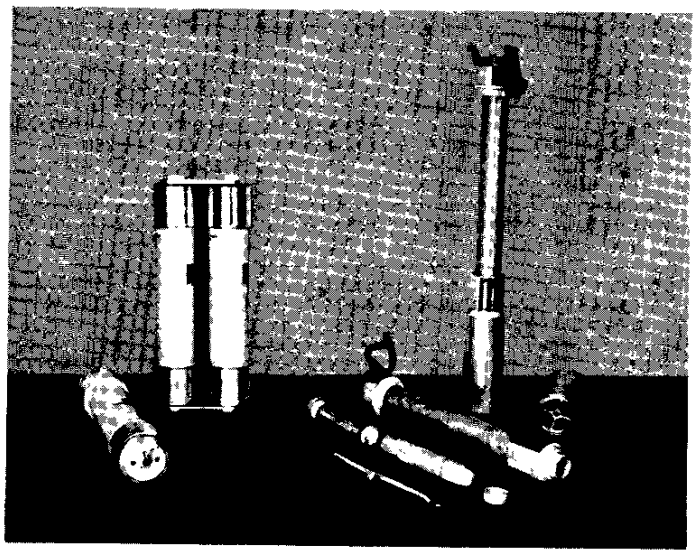
"E" rated fuses function as follows:

100E or less – must melt in 300 seconds (5 minutes) on 200-240% of E (ampere) rating.

Over 100E – must melt in 600 seconds (10 minutes) on 220-264% of E (ampere) rating.

"X" ratings define fuses where:

1. The minimum melting current is from two to three times the full load current.
2. The temperature rise on the plated, copper fuse ferrules may exceed recommended ANSI and IEC standards under full load conditions.



CURRENT LIMITING FUSES:

- Fast acting to limit available fault current stresses on the system
- Silent operation
- Completely factory assembled and sealed for consistent characteristics
- High-interrupting capacity
- Positive indication of blown fuse
- No refills to replace or parts to clean

BORIC ACID FUSES:

- Low cost refill units
- Available for high continuous current ratings
- Silencer and snuffler type
- Discharge filter type

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA
RATINGS & SELECTION

TABLE B: INTEGRATED RATINGS FOR 600 AND 1200 AMPERE SWITCHES WITH CURRENT LIMITING FUSES[1]

Note: Current–Limiting fuses increase the integrated short circuit rating because of their energy limiting capabilities. To increase the short circuit rating of the entire line–up of switchgear, current–limiting fuses must be used in the entrance bays.

Manfacturer →		GOULD SHAWMUT	GE	WESTINGHOUSE				
Fuse Type →		CS-3	EJO-1	CLE	CLE-1	CLE-2	CLE-3	CLE-750
Nominal System Voltage (kV) ↓	Max Design Voltage (kV) ↓	Integrated Short Circuit Rating in rms Symmetrical Amperes Integrated Short Circuit Rating in MVA Maximum Continuous Fuse Current						
2.4	5.5	63 000 A 259 MVA 900E[2]	50,000 A 207 MVA 450E	50,000 A 207 MVA 25E	50,000 A 207 MVA 225E	40,000 A 166 MVA 450X	Not Available	40,000 A 166 MVA 1100E[2]
4.16	5.5	63,000 A 450 MVA 900E[2]	50,000 A 360 MVA 450E	50,000 A 360 MVA 25E	50,000 A 360 MVA 225E	40,000 A 288 MVA 450X	Not Available	40,000 A 288 MVA 1100E[2]
4.8	5.5	63,000 A 519 MVA 900E[2]	50,000 A 415 MVA 450E	50,000 A 415 MVA 25E	50,000 A 415 MVA 225E	40,000 A 332 MVA 450X	Not Available	40,000 332 MVA 1100E[2]
7.2	8.25	50,000 A 623 MVA 200E	50,000 A 623 MVA 250E	50,000 A 623 MVA 25E	50,000 A 623 MVA 125E	50,000 A 623 MVA 200E	Not Available	Not Available
12.0	15.0	40,000 A 844 MVA 200E	50,000 A 1039 MVA 300E	31,500 A 655 MVA 25E	85,000 A 1753 MVA 65E	85,000 A 1753 MVA 125X	50,000 A 1039 MVA 200X	Not Available
12.47	15.0	40,000 A 877 MVA 200E	50,000 A 1079 MVA 300E	31,500 A 680 MVA 25E	85,000 A 1822 MVA 65E	85,000 A 1822 MVA 125X	50,000 A 1079 MVA 200X	Not Available
13.2	15.0	40,000 A 928 MVA 200E	50,000 A 1143 MVA 300E	31 500 A 720 MVA 65E	85,000 A 1929 MVA 65E	85,000 A 1929 MVA 125X	50,000 A 1143 MVA 200X	Not Available
13.8	15.0	40,000 A 971 MVA 200E	50,000 A 1195 MVA 300E	31,500 A 753 MVA 65E	85,000 A 2016 MVA 65E	85,000 A 2016 MVA 125X	50 000 A 1195 MVA 200X	Not Available
16.5	17.0	Not Available	25,000 A[3] 736 MVA 100E	Not Available	Not Available	Not Available	Not Available	Not Available
22.9	25.8	Not Available	25,000 A 992 MVA 100E	Not Available	Not Available	Not Available	Not Available	Not Available
24.9	25.8	Not Available	25,000 A 1078 MVA 100E	Not Available	Not Available	Not Available	Not Available	Not Available
26.4	29.0	Not Available	12,500 A 572 MVA 80E	Not Available	No: Available	Not Available	Not Available	Not Available
34.5	38.0	Not Available	12,500 A 747 MVA 80E	Not Available	No: Available	Not Available	Not Available	Not Available

1 Ratings shown in these tables are based on combining with either 600 or 1200 Ampere switches. Fuses with continuous current over 600 Amperes will only be supplied with 1200 Ampere switches.

2 If a 600 Ampere switch is selected the largest fuse size that will be provided is 600 Amperes.

3 Ratings are based only on use with 600 Ampere switches which are rated for application at 17.0 kV maximum and fuses which are rated for application for 25.8 kV maximum.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA
RATINGS & SELECTION

TABLE C: INTEGRATED RATINGS FOR 600 AMPERE SWITCHES WITH BORIC ACID EXPULSION FUSES[1]

Manufacturer →		WESTINGHOUSE			S & C		
Fuse Type →		RBA—200 with Discharge Filter	RBA—400 with Discharge Filter	RBA—600 with Discharge Filter	SM—4Z	SM—5S	SM—5SS
Nominal System Voltage (kV) ↓	Max Design Voltage (kV) ↓	Integrated Short Circuit Rating in rms Symmetrical Amperes Integrated Short Circuit Rating in MVA Maximum Continuous Fuse Current					
2.4	5.5	19,000 A 80 MVA 200E	25 000 A[2] 103 MVA 400E	25 000 A[2] 103 MVA 600E	17,200 A 71 MVA 200E	25,000 A[2] 103 MVA 400E	Not Available
4.16	5.5	19,000 A 137 MVA 200E	25 000 A[2] 180 MVA 400E	25,000 A[2] 180 MVA 600E	17,200 A 123 MVA 200E	25,000 A[2] 180 MVA 400E	Not Available
4.8	5.5	19 000 A 158 MVA 200E	25,000 A[2] 208 MVA 400E	25,000 A[2] 208 MVA 600E	17,200 A 142 MVA 200E	25,000 A[2] 208 MVA 400E	Not Available
7.2	8.25	16,600 A 205 MVA 200E	25,000 A[2] 312 MVA 400E	25,000 A[2] 312 MVA 60CE	15,600 A 194 MVA 200E	25,000 A 312 MVA 400E	SEE TABLE D
12.0	15.0	14,400 A 299 MVA 200E	25,000 A[2] 519 MVA 400E	25,000 A[2] 519 MVA 600E	12,500 A 259 MVA 200E	25,000 A 519 MVA 400E	SEE TABLE D
12.47	15.0	14,400 A 311 MVA 200E	25,000 A[2] 540 MVA 400E	25,000 A[2] 540 MVA 600E	12,500 A 270 MVA 200E	25,000 A 540 MVA 400E	SEE TABLE D
13.2	15.0	14 400 A 329 MVA 200E	25,000 A[2] 571 MVA 400E	25,000 A[2] 571 MVA 600E	12,500 A 285 MVA 200E	25,000 A 571 MVA 400E	SEE TABLE D
13.8	15.0	14,400 A 345 MVA 200E	25,000 A[2] 597 MVA 400E	25,000 A[2] 597 MVA 600E	12,500 A 298 MVA 200E	25,000 A 597 MVA 400E	SEE TABLE D
16.5	17.0	10,500 A[3] 300 MVA 200E	21,000 A[3] 600 MVA 300E	21,000 A[3] 600 MVA 540E	12,500 A[3] 355 MVA 200E	25,000 A[3] 714 MVA 400E	Not Avilable
22.9	25.8	10,500 A 416 MVA 200E	17,500 A[2] 694 MVA 300E	17,500 A[2] 694 MVA 540E	9,400 A 375 MVA 200E	17,500 A[2] 694 MVA 300E	Not Available
24.9	25.8	10,500 A 453 MVA 200E	17,500 A[2] 754 MVA 300E	17,500 A[2] 754 MVA 540E	9,400 A 405 MVA 200E	17,500 A[2] 754 MVA 300E	Not Available
26.4	29.0	6,900 A 316 MVA 200E	16,800 A 768 MVA 300E	16,800 A 768 MVA 540E	7,800 A 356 MVA 200E	17,500 A 800 MVA 300E	Not Available
34.5	38.0	6,900 A 412 MVA 200 E	12,500 A[2] 746 MVA 300E	12,500 A 746 MVA 540E	6,250 A 373 MVA 200E	12,500 A 746 MVA 300E	Not Available

1 Ratings shown in this table are based on combining boric acid fuses with 600 Ampere switches that have a fault close rating of 40 kA Asymmetrical up to 17.0 kV, 28 kA Asymmetrical at 24.9 and 29.0 kV, and 20 kA Asymmetrical at 38.0 kV.

2 The integrated rating shown is limited by the switch to less than the full interrupting capability of the fuse. Higher ratings can be achieved in some cases by combining with 1200 Ampere switches — see Table D.

3 Ratings are based only on use with 600 Ampere switches rated for application at 17.0 kV maximum. Westinghouse boric acid fuses used for this voltage class are rated 25.8 kV maximum while the S & C fuses are rated 17.0 kV maximum.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

APPLICATION DATA
RATINGS & SELECTION

TABLE D: INTEGRATED RATINGS FOR 1200 AMPERE SWITCHES WITH BORIC ACID EXPULSION FUSES[1]

Manfacturer →		WESTINGHOUSE			S & C		
Fuse Type →		RBA—200 with Discharge Filter	RBA—400 with Discharge Filter	RBA—800 with Discharge Filter	SM—4Z	SM—5S	SM—5SS
Nominal System Voltage (kV) ↓	Max Design Voltage (kV) ↓	Integrated Short Circuit Rating in rms Symmetrical Amperes Integrated Short Circuit Rating in MVA Maximum Continuous Fuse Current					
2.4	5.5	19,000 A 80 MVA 200E	37,500 A 155 MVA 400E	37,500 A 155 MVA 720E	17,200 A 71 MVA 200E	37,500 A 155 MVA 400E	Not Available
4.16	5.5	19,000 A 137 MVA 200E	37,500 A 270 MVA 400E	37,500 A 270 MVA 720E	17,200 A 123 MVA 200E	37,500 A 270 MVA 400E	Not Available
4.8	5.5	19,000 A 158 MVA 200E	37,500 A 312 MVA 400E	37,500 A 312 MVA 720E	17,200 A 142 MVA 200E	27,000 A 224 MVA 400E	Not Available
7.2	8.25	16,600 A 205 MVA 200E	29,400 A[2] 367 MVA 400E	29,400 A[2] 367 MVA 720E	15,600 A 194 MVA 200E	25,000 A 312 MVA 400E	34,600 A 431 MVA 400E
12.0	15.0	14,400 A 299 MVA 200E	29,400 A[2] 611 MVA 400E	29,400 A[2] 611 MVA 720E	12,500 A 259 MVA 200E	25,000 A 520 MVA 400E	34,600 A 719 MVA 400E
12.47	15.0	14,400 A 311 MVA 200E	29,400 A[2] 635 MVA 400E	29,400 A[2] 635 MVA 720E	12,500 A 270 MVA 200E	25,000 A 540 MVA 400E	34,600 A 747 MVA 400E
13.2	15.0	14,400 A 329 MVA 200E	29,400 A[2] 672 MVA 400E	29,400 A[2] 672 MVA 720E	12,500 A 285 MVA 200E	25,000 A 571 MVA 400E	34,000 A 777 MVA 400E
13.8	15.0	14,400 A 345 MVA 200E	29,400 A[2] 703 MVA 400E	29,400 A[2] 703 MVA 720E	12,500 A 298 MVA 200E	25,000 A 597 MVA 400E	34,000 A 812 MVA 400E
16.5	17.0	[3]	[3]	[3]	[3]	[3]	Not Avilable
22.9	25.8	10,500 A 416 MVA 200E	17,500 A[4] 694 MVA 300E	17,500 A[4] 694 MVA 540E	9,400 A 375 MVA 200E	17,500 A[4] 694 MVA 300E	Not Available
24.9	25.8	10,500 A 453 MVA 200E	17,500 A[4] 754 MVA 300E	17,500 A[4] 754 MVA 540E	9,400 A 405 MVA 200E	17,500 A[4] 754 MVA 300E	Not Available
26.4	29.0	6,900 A 316 MVA 200E	16,800 A 768 MVA 300E	16,800 A 768 MVA 540E	7,800 A 356 MVA 200E	17,500 A 800 MVA 300E	Not Available

1 Ratings shown in this tables are based on combining boric acid fuses with 1200 Ampere switches that have a minimum fault close rating of 61 kA Asymmetrical up to 17.0 kV and 28,000 kA Asymmetrical at 25.8 and 29.0 kV.

2 The interrupting rating can be increased to 37,800 symmetrical amperes at voltage ratings below 14.5 kV with an available "High Capacity Discharge Filter". (MVA can be calculated from the formula: nominal system (kV) x $\sqrt{3}$ x 37.8 kA)

3 Switches rated for application at 17.0 kV maximum are available only at 600 Amperes (See Table C).

4 The integrated rating shown is limited by the switch to less than the full interrupting capability of the fuse.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

STANDARD SYMBOLS


Upright HVL Switch (Manual Operated)


Inverted HVL Switch (Manual Operated)


Nondisconnect Type Fuse Assembly


Disconnect Type Fuse Assembly


Mechanical Interlock


Key Interlock


1-Double Clamping Lug/Phase

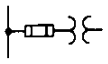

1-Compression Lug/Phase


Provisions Only (1-NEMA 2 Hole Drilling) For 1-Double Clamping Lug/Phase

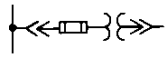

Provisions Only (1-NEMA 2 Hole Drilling) For 1-Compression Lug/Phase


Upright HVL Switch Motor Operated


Inverted HVL Switch Motor Operated


Fixed Mounted Potential Transformer With Primary Fuse

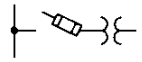

Provisions For Fixed Mounted Potential Transformer


Drawout Mounted Potential Transformer With Primary Fuse

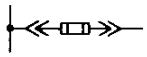

Provisions For Current Transformer


Bar-Type Current Transformer


Donut-Type Current Transformer


Control Power Transformer With Primary Fuses


Bus Shipping Split


Drawout Mounted Primary Fuse


1-3 Conductor Pothead

3-1 Conductor Pothead


Roof Bushing


Surge Capacitor


Surge (Lightning) Arrestor

Ammeter

Voltmeter

Ammeter Selector Switch

Voltmeter Selector Switch

Watthour Meter

Watthour Meter With Demand Attachment

Power Factor Meter

Varmeter

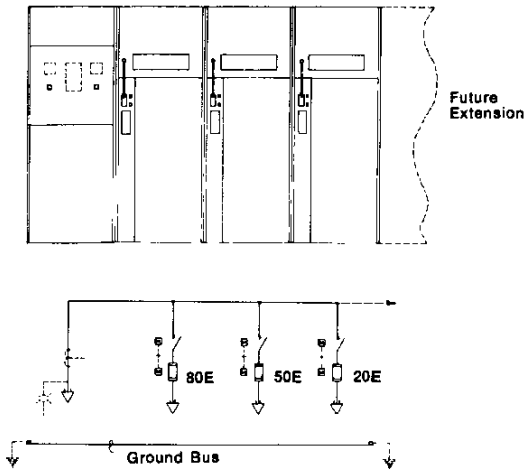
Test Block

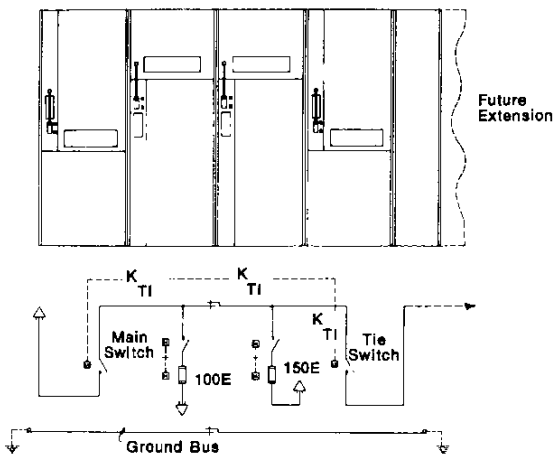
PowerLogic Circuit Monitor

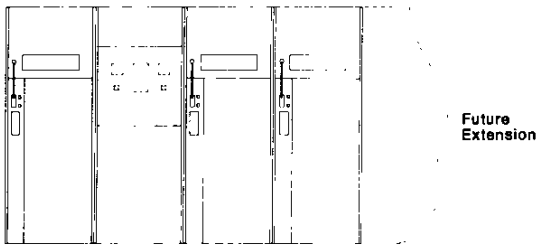
PowerLogic System Display

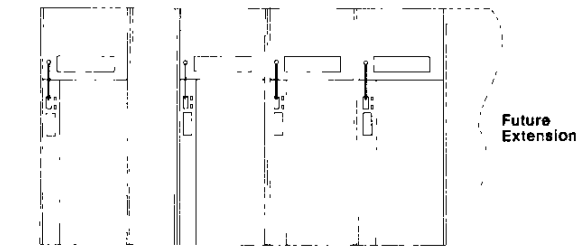
METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

TYPICAL MULTIPLE BAY SWITCHGEAR ARRANGEMENTS







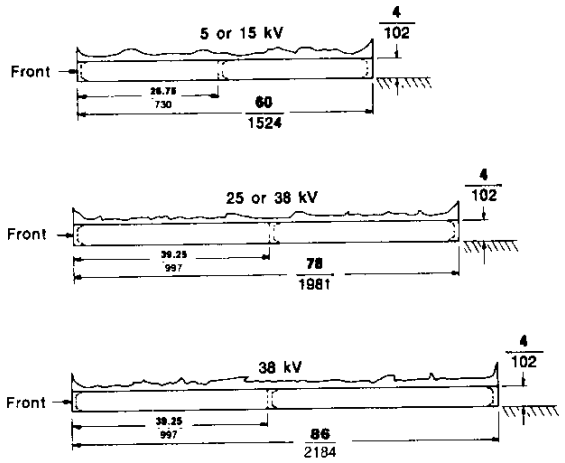


METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

TYPICAL ARRANGEMENT OF BASE CHANNELS

(SIDE VIEW)

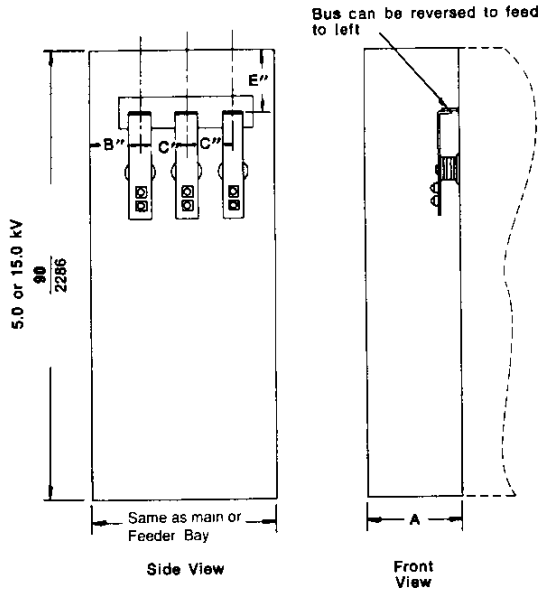
OUTDOOR
All Channels
2" x 4"



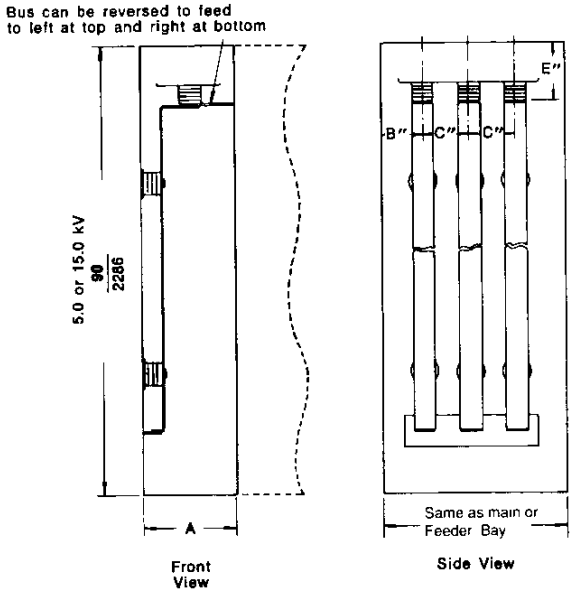
INCOMING LINE AND BUS BAR TRANSITION BAY DIMENSIONS

Equipment Nominal kV	A	B	C	E
5.0 and 15.0	22 / 559	8.38 / 213	9.25 / 235	8.38 / 213

INCOMING LINE BAY



BUS BAR TRANSITION BAY



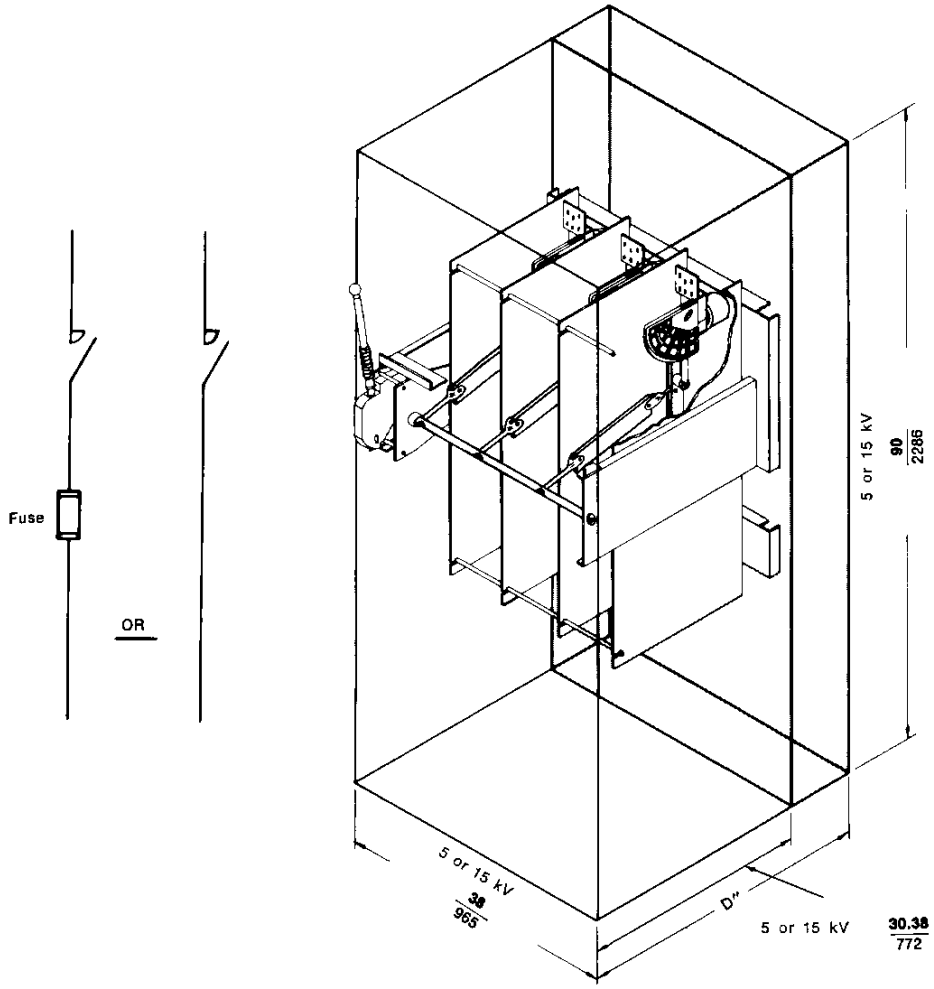
Approximate Shipping Weight Per Bay Indoor — 550 Lbs.
Outdoor — 600 Lbs.

INCHES / Millimeters Dual Dimensions

METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

MAIN SWITCH

5 OR 15 kV



OUTDOOR CONSTRUCTION: ADD $\frac{6.5}{165}$ TO THE TOTAL HEIGHT AND INCREASE THE BASE TO THE DEPTH DIMENSION OF $\frac{60}{1524}$

Approximate Shipping Weight Per Bay: Indoor — 1350 Lbs.
Outdoor — 1850 Lbs.

Dual Dimensions $\frac{\text{INCHES}}{\text{Millimeters}}$

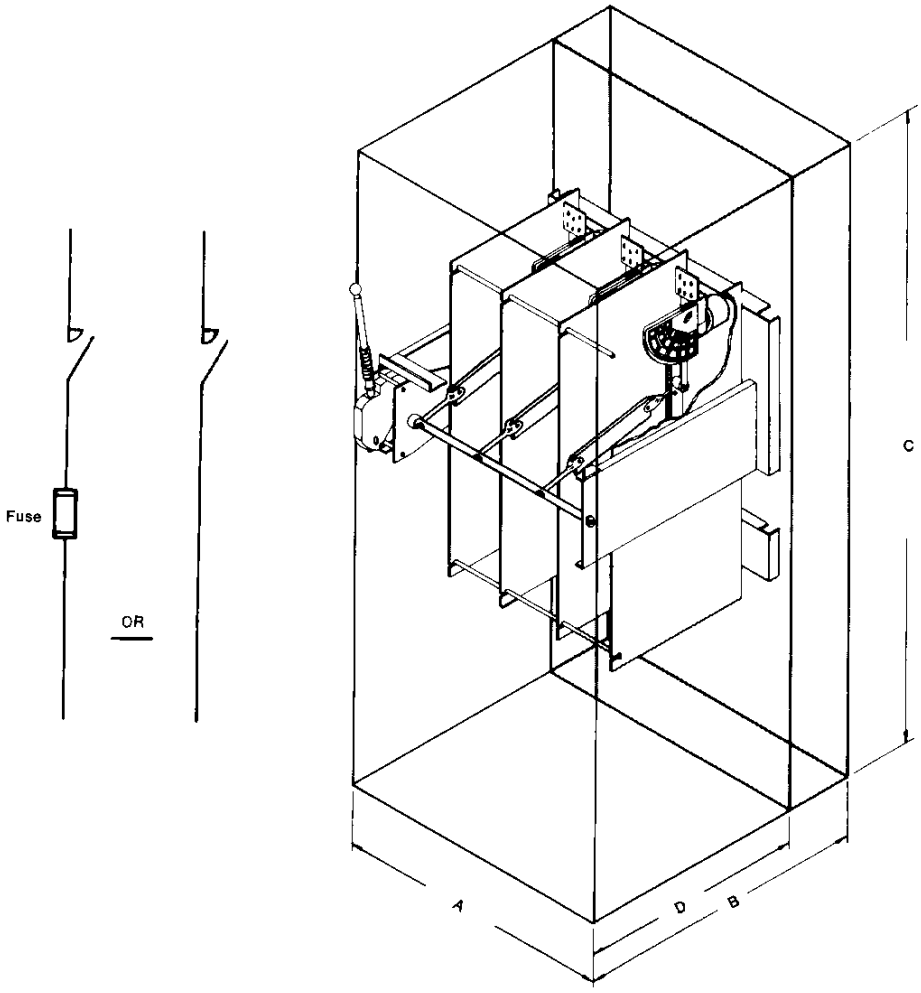
DEPTH DIMENSION OF MAIN SWITCH BAY (INDOOR)

Type	Equipment Nominal kV	Cable Lugs Top or Bottom Entrance				Roof Bushings or Pothead Top Entrance				Pothead Bottom Entrance			
		Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.	Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.	Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.
		D	D	D	D	D	D	D	D	D	D	D	D
Fused or Unfused	5	54 / 1372	54 / 1372	54 / 1372	54 / 1372	54 / 1372	54 / 1372	54 / 1372	N.A.	54 / 1372	54 / 1372	N.A.	N.A.
	15	54 / 1372	54 / 1372	54 / 1372	54 / 1372	54 / 1372	54 / 1372	54 / 1372	N.A.	54 / 1372	54 / 1372	N.A.	N.A.

*This arrangement consists of a full metering section mounted behind a standard switch. Instruments and instrument transformers to be selected by factory.
Note—If switch is unfused, current transformers can be mounted directly above the switch and be front accessible.

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

MAIN SWITCH OR FEEDER BAY
25 AND 38 kV



Approximate Shipping Weight Per Bay: Indoor — 2200 Lbs.
Outdoor — 2600 Lbs.

Dual Dimensions **INCHES** / Millimeters

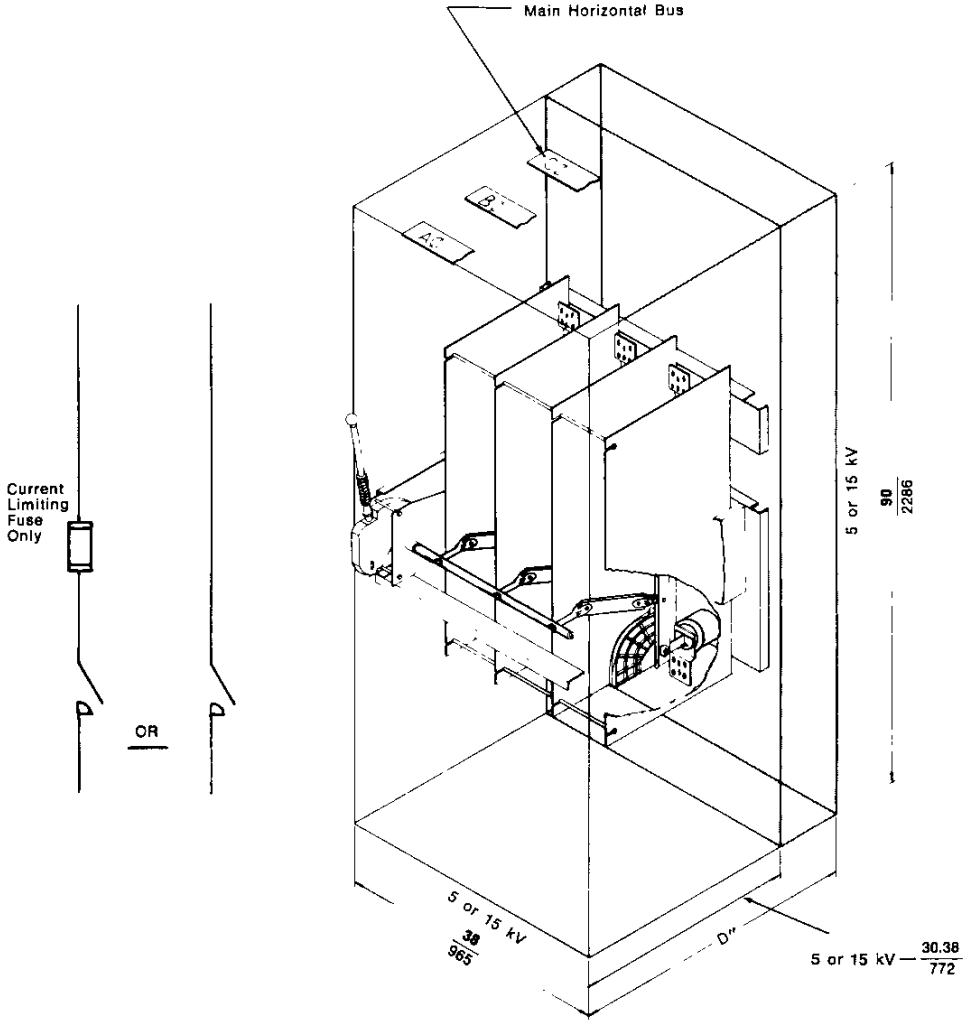
DIMENSIONS OF MAIN OR FEEDER SWITCH BAY (INDOOR)

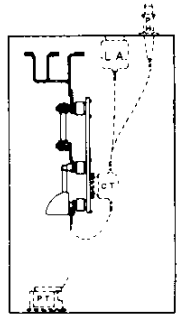
Type	Equipment Nominal kV	Single Switch				Line-up			
		A	B	C	D	A	B	C	D
Fused or Unfused	25	**48** / 1219	**60** / 1524	**105** / 2667	**37.14** / 943	**48** / 1219	**72** / 1829	**114** / 2896	**37.14** / 943
	38	**60** / 1524	**72** / 1829	**105** / 2667	**40.14** / 1020	**60** / 1524	**80** / 2032	**120** / 3048	**40.14** / 1020

METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

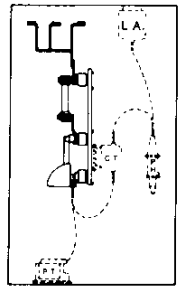
INVERTED MAIN SWITCH BAY

5 OR 15 kV





Top Feed Entrance



Bottom Feed Entrance

OUTDOOR CONSTRUCTION: ADD $\frac{6.5}{165}$ TO THE TOTAL HEIGHT AND INCREASE THE BASE TO THE DEPTH DIMENSION OF $\frac{60}{1524}$

Approximate Shipping Weight Per Bay: Indoor — 1350 Lbs.
Outdoor — 1850 Lbs.

Dual Dimensions **INCHES** / Millimeters

DEPTH DIMENSION OF MAIN SWITCH BAY (INDOOR)

Type	Equipment Nominal kV	Cable Lugs Top or Bottom Entrance				Roof Bushings or Pothead Top Entrance				Pothead Bottom Entrance			
		Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.	Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.	Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.
		D	D	D	D	D	D	D	D	D	D	D	D
Fused or Unfused	5	**54** 1372	**54** / 1372	**54** / 1372	**54** / 1372	**54** 1372	**54** / 1372	**54** / 1372	N.A.	**54** / 1372	**54** / 1372	N.A.	N.A.
	15	**54** 1372	**54** / 1372	**54** / 1372	**54** / 1372	**54** / 1372	**54** / 1372	**54** / 1372	N.A.	**54** / 1372	**54** / 1372	N.A.	N.A.

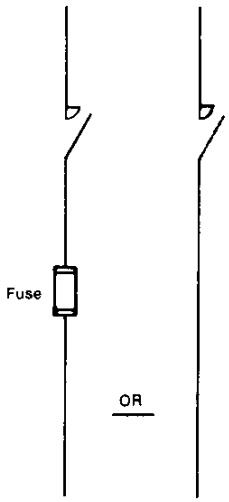
*This arrangement consists of a full metering section mounted behind a standard switch. Instruments and instrument transformers to be selected by factory.
Note—If switch is unfused, current transformers can be mounted directly above the switch and be front accessible.

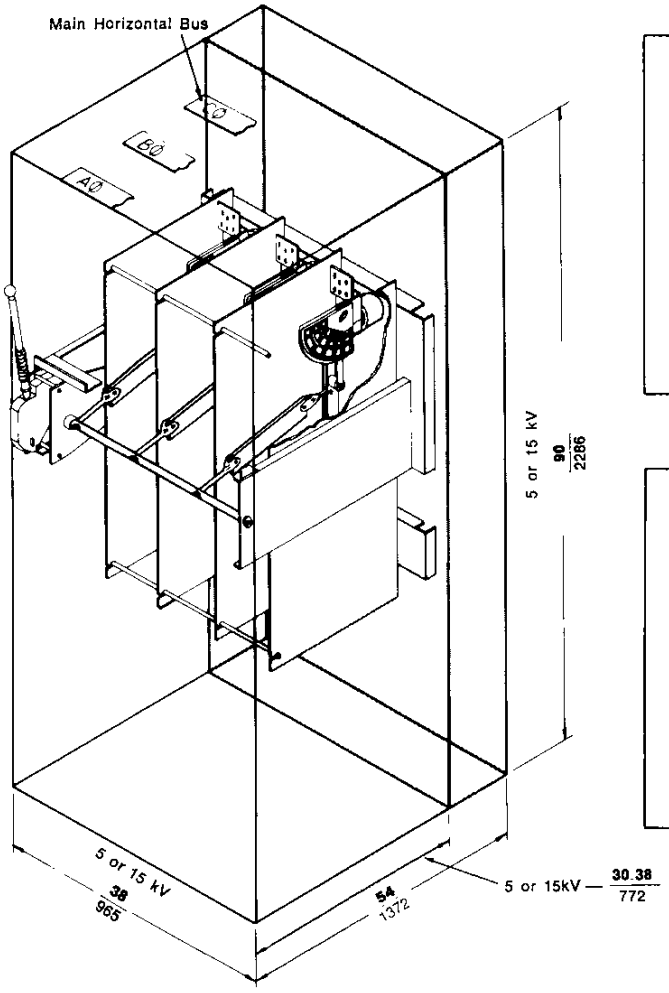
METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

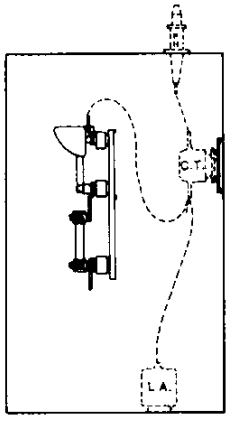
CLASS 6040

FEEDER SWITCH BAY AND SINGLE BAY

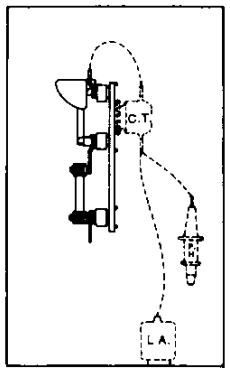
5 OR 15 kV







Top Feed Entrance



Bottom Feed Entrance

OUTDOOR CONSTRUCTION: ADD $\frac{7.5}{19.1}$ TO THE TOTAL HEIGHT AND INCREASE THE BASE TO THE DEPTH DIMENSION OF $\frac{60}{1524}$

Approximate Shipping Weight Per Bay: Indoor — 1350 Lbs.
Outdoor — 1850 Lbs.

Dual Dimensions $\frac{\text{INCHES}}{\text{Millimeters}}$

DEPTH DIMENSION OF FEEDER SWITCH BAY (INDOOR)

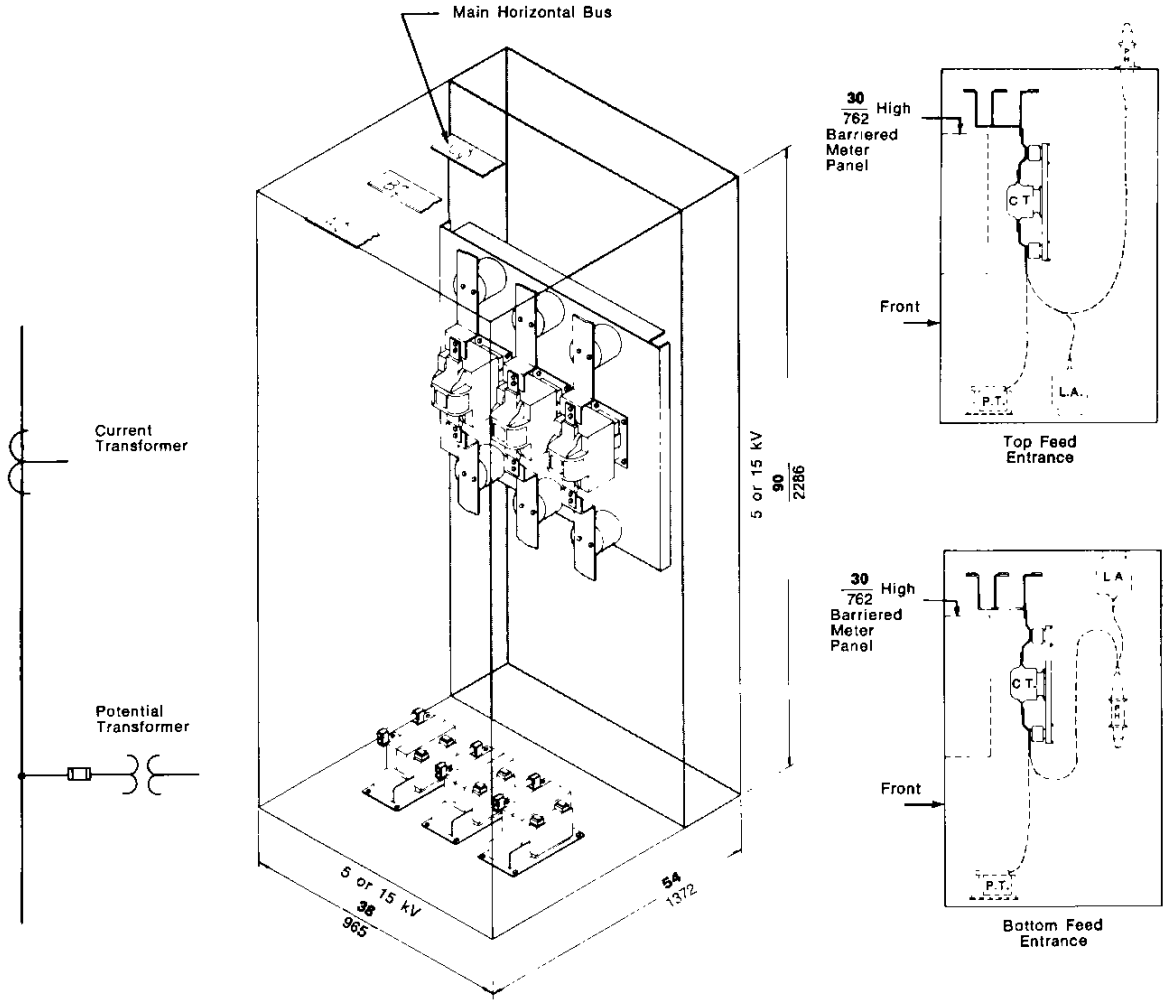
Type	Equipment Nominal kV	Cable Lugs Top or Bottom Entrance		Roof Bushings or Pothead Top Entrance		Pothead Bottom Entrance	
		Without CT's	With CT's	Without CT's	With CT's	Without CT's	With CT's
		D	D	D	D	D	D
Fused	5 or 15 kV	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$
Unfused	5 or 15 kV	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$

Note—If switch is unfused, current transformers will be mounted directly below the switch and will be front accessible.
One ammeter and 3Ø selector switch and/or one voltmeter and 3Ø selector switch may be located on the front of the switch bay — instruments and instrument transformers to be selected by factory.

METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

USER METERING BAY

5 OR 15 kV



OUTDOOR CONSTRUCTION: ADD $\frac{7.5}{19.1}$ TO THE TOTAL HEIGHT AND INCREASE THE BASE TO THE DEPTH DIMENSION OF $\frac{60}{1524}$

Approximate Shipping Weight Per Bay: Indoor — 1500 Lbs.
Outdoor — 2050 Lbs.

Dual Dimensions $\frac{\text{INCHES}}{\text{Millimeters}}$

DEPTH DIMENSION OF METERING BAY (INDOOR)

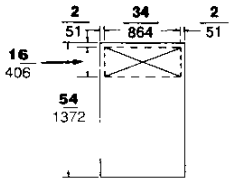
Equipment Nominal KV	Cable Lugs Only Top or Bottom Entrance		Roof Bushings or Pothead Top Entrance		Pothead Bottom Entrance	
	With CT's & PT's	With CT's, PT's & L.A.	With CT's & PT's	With CT's, PT's & L.A.	With CT's & PT's	With CT's, PT's & L.A.
	D	D	D	D	D	D
5 or 15 kV	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$

Dimensions based on factory choice of instrument transformers.

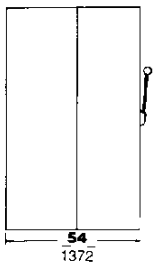
METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

STANDARD DIMENSIONS
(APPROXIMATE DIMENSIONS — NOT FOR CONSTRUCTION)
5 OR 15 kV

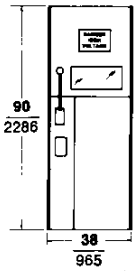
INDOOR EQUIPMENT



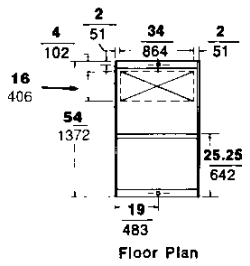
Top View



Left End Elevation

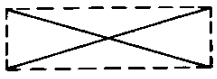


Front Elevation



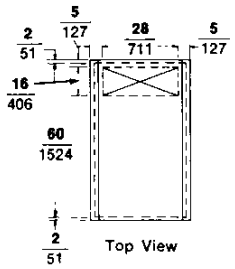
Floor Plan

Dimensions subject to change without notice.

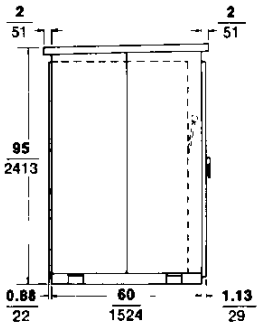


Represents Suggested Conduit Entrance Area

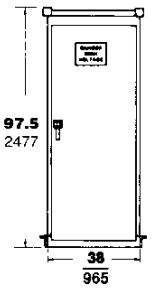
OUTDOOR EQUIPMENT



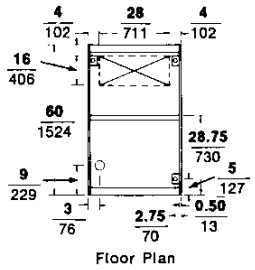
Top View



Left End Elevation



Front Elevation



Floor Plan

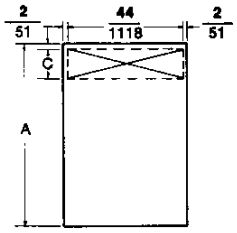
Approximate Weights:
Indoor — 1350 Lbs.
Outdoor — 1850 Lbs.

Dual Dimensions $\frac{\text{INCHES}}{\text{Millimeters}}$

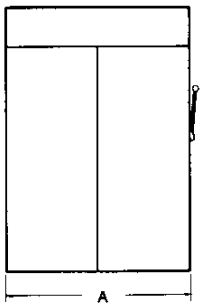
METAL-ENCLOSED
LOAD INTERRUPTER SWITCHGEAR

STANDARD DIMENSIONS
(APPROXIMATE DIMENSIONS — NOT FOR CONSTRUCTION)
25 kV

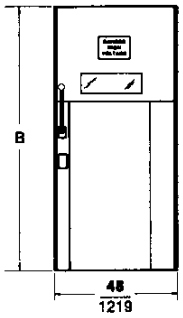
INDOOR EQUIPMENT



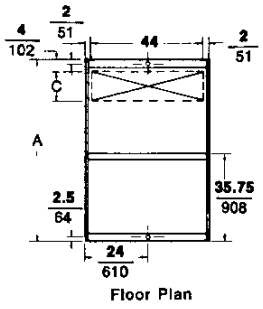
Top View



Left End Elevation

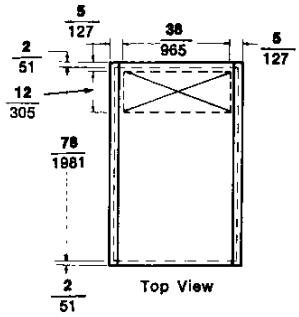


Front Elevation

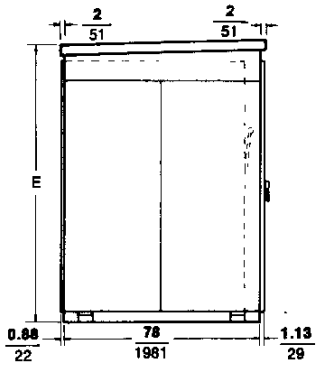


Floor Plan

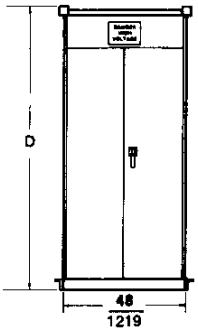
OUTDOOR EQUIPMENT



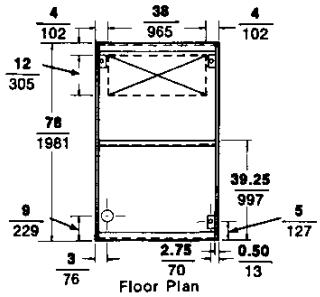
Top View



Left End Elevation



Front Elevation



Floor Plan

Dimensions subject to change without notice.

Represents Suggested Conduit Entrance Area

Dual Dimensions INCHES / Millimeters

Approximate Weight:
Indoor — 2000 Lbs.
Outdoor — 2500 Lbs.

Cubicle	DIMENSIONS FOR 25 kV ENCLOSURES				
	INDOOR			OUTDOOR	
	A	B	C	D	E
Single	60 / 1524	105 / 2667	16 / 406	113 / 2845	111 / 2794
Line-up	72 / 1829	114 / 2896	16 / 406	122 / 3073	120 / 3023

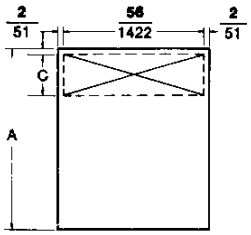
METAL-ENCLOSED LOAD INTERRUPTER SWITCHGEAR

STANDARD DIMENSIONS

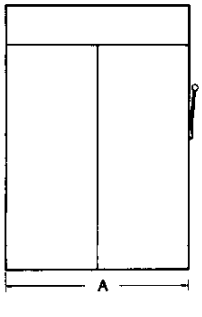
(APPROXIMATE DIMENSIONS – NOT FOR CONSTRUCTION)

38 kV

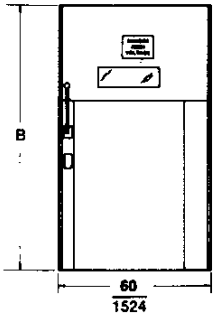
INDOOR EQUIPMENT



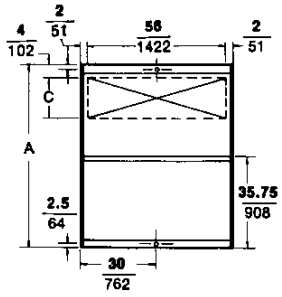
Top View



Left End Elevation

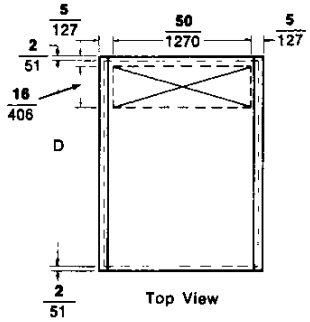


Front Elevation

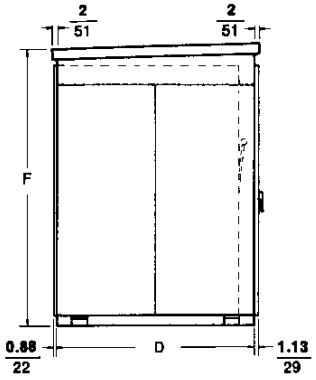


Floor Plan

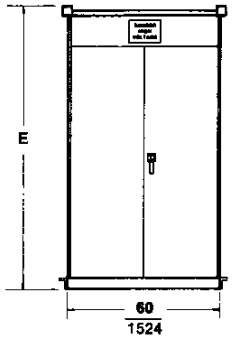
OUTDOOR EQUIPMENT



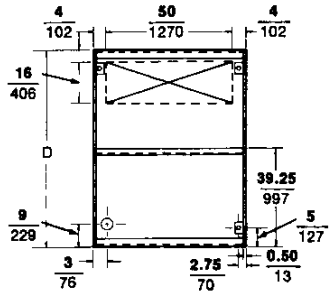
Top View



Left End Elevation

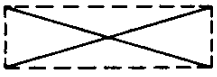


Front Elevation



Floor Plan

Dimensions subject to change without notice.



Represents Suggested Conduit Entrance Area

Dual Dimensions INCHES / Millimeters

Approximate Weight:
Indoor — 2200 Lbs.
Outdoor — 2700 Lbs.

DIMENSIONS FOR 38 kV SWITCHES

Cubicle	INDOOR			OUTDOOR		
	A	B	C	D	E	F
Single	72/1829	105/2667	16/406	78/1981	113/2870	111/2819
Line-up	80/2032	120/3048	16/406	86/2184	128/3251	126/3200

Order No. 6040CT9201 Printed in U.S.A.
(Formerly Catalog Class 6040) 22M CPS 3/92

SQUARE D