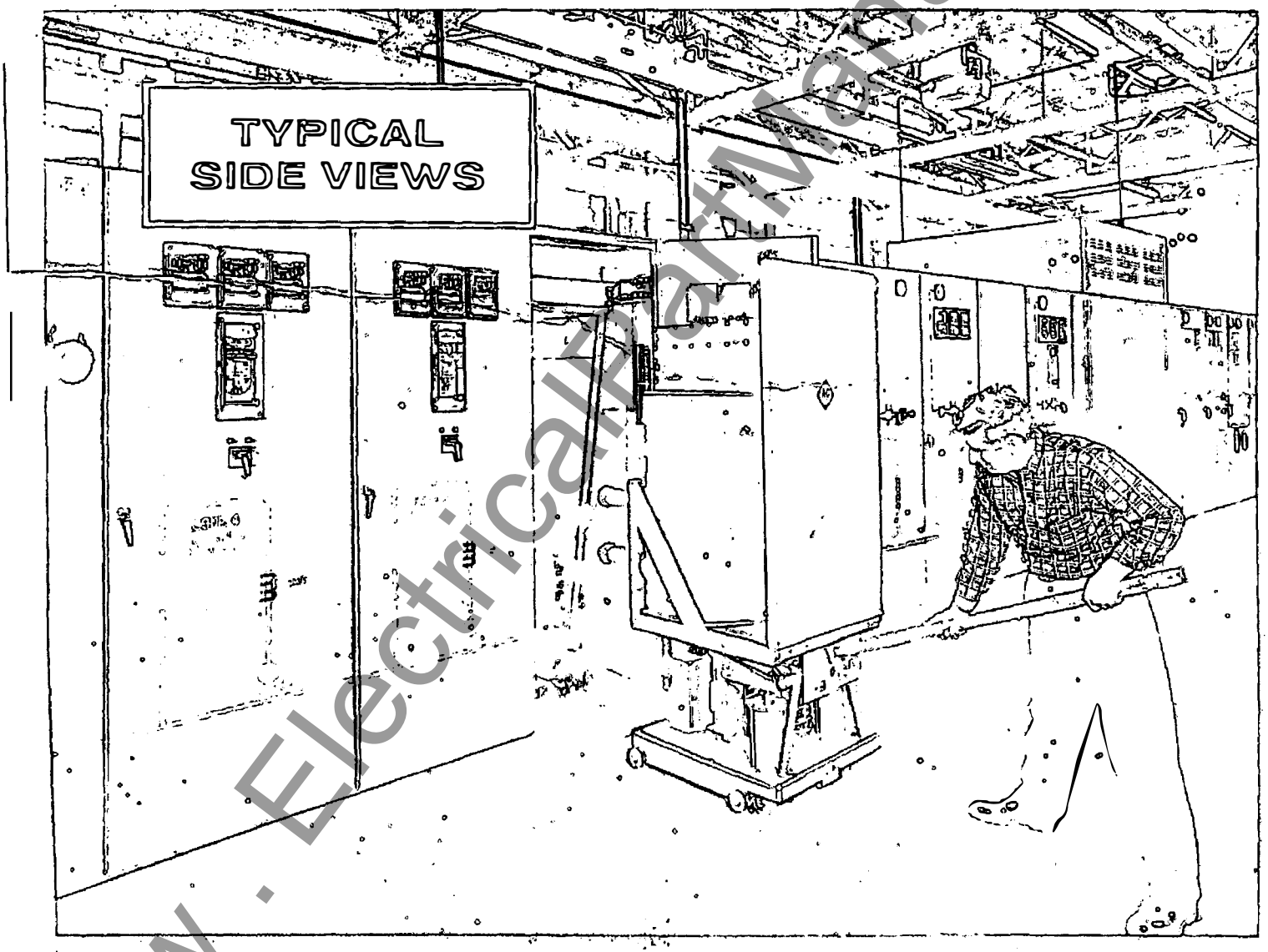
HORIZONTAL DRAWOUT METAL-CLAD SWITCHGEAR

WITH **RUPTAIR** CIRCUIT BREAKER

Rated 13.8 KV
Maximum Design 15 KV

These typical side views show the location of major components of Allis-Chalmers Horizontal Drawout, Metal-Clad Switchgear.

In every case, material and connections will be in accordance with the contract.



189510

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

WIDTH ..... 34 Inches
HEIGHT (including 6 inch sill channel) .....112 Inches

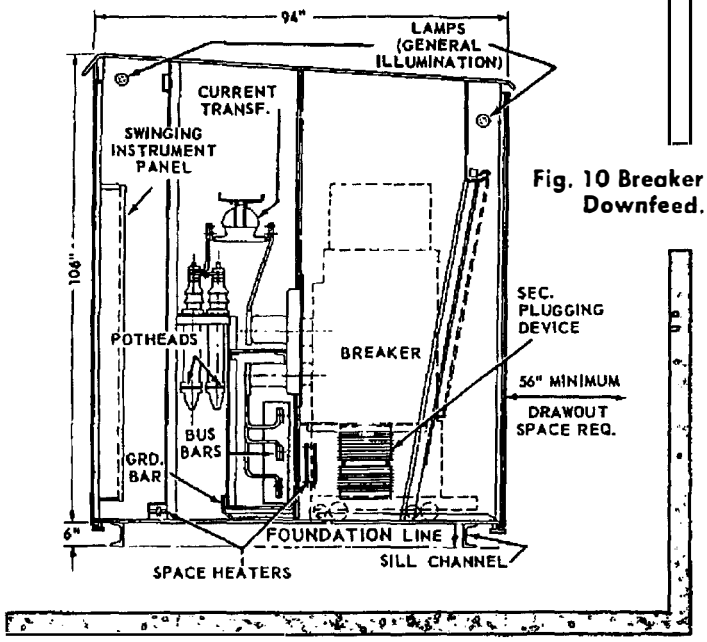


Fig. 10 Breaker Unit Downfeed.

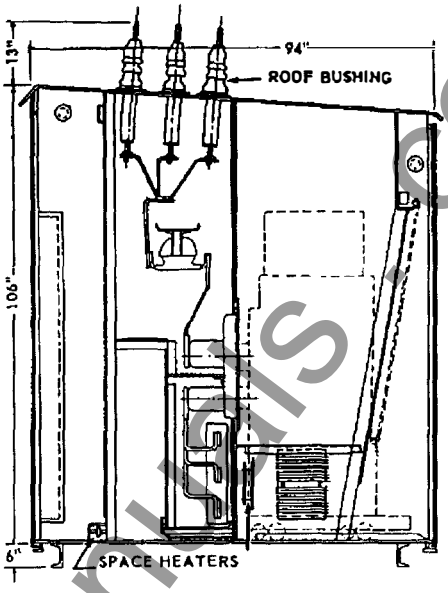


Fig. 11 Breaker Unit — Upfeed.

HORIZONTAL DRAWOUT METAL-CLAD SWITCHGEAR

OUTDOOR

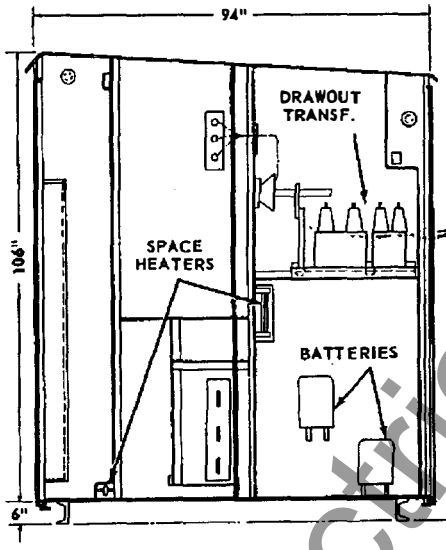


Fig. 12 Outdoor Auxiliary Unit.

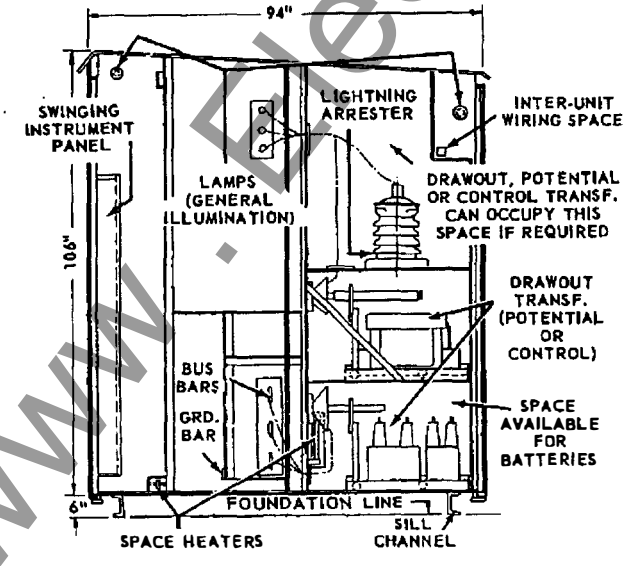


Fig. 13 Outdoor Auxiliary Unit.

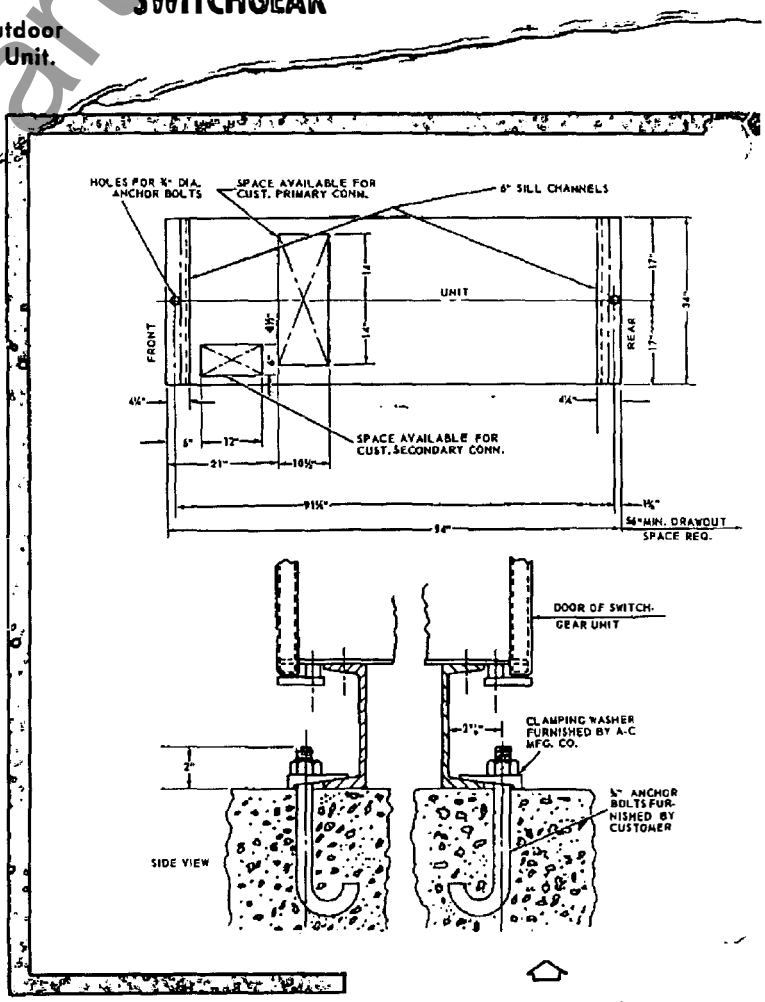


Fig. 14 Outdoor Installation.

Litho in U.S.A. d-m 58

Type LBS-SE Load Break Switch
Stationary Mounted

For 5 and 15-Kv, 600 and 1200-Amp Service

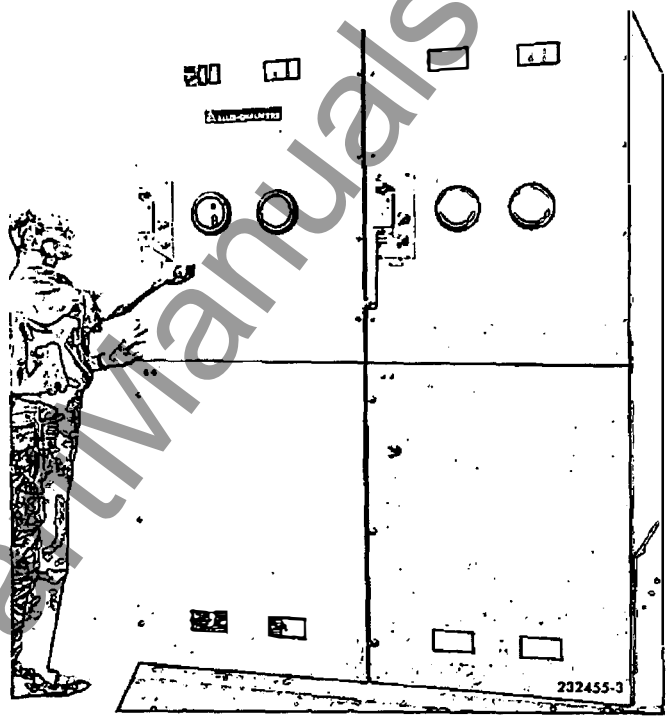
ALLIS-CHALMERS

DESCRIPTION

November, 1968

Supersedes 9/67 issue

- Stored energy for safe and positive operation of switch.
- Sturdy metal enclosure.
- Clean, uncluttered exterior.
- Low initial cost.
- Easy accessibility to components.
- Lightweight and compact for easy installation.



Typical applications include switching and protection for the following circuits —

1. Transformer primaries in secondary unit substations.
2. Service entrances.
3. Throw-over from preferred to emergency circuits.
4. Loop circuit sectionalizing.
5. Isolation of plant feeders.

The type LBS-SE load break switch with stored energy operator is a manually-operated, single throw, gang operated switch that is used as a disconnect and circuit interrupter. A quick-break, quick-make blade, combi ed with an arc chute, provides positive, three-phase interruption of transformer magnetizing and load currents.

Available in either fused or unfused arrangements, the type LBS-SE switch is rated to interrupt load current at distribution voltages from 2.4 through 13.8 kv. An interrupter switch differs from a circuit breaker in that it will interrupt *full load current, but not overload or fault currents.*

Equipped with a true stored energy mechanism, the switch will withstand a 60,000 ampere momentary and will close and latch on an asymmetrical ampere fault as listed in table below.

Closing and opening energy is *pre-stored* in the springs by rotating the charging handle. When the energy is needed, it is simply released by pressing down on the latch release. The resulting high-speed closing and opening assures safe operation and long life.

The handle for the operator is mounted on the front of the unit at eye-level. Adjacent to the handle are inspection windows through which position of the switch may be visually checked.

The metal-enclosed interrupter switch is suited for light duty switching and, when fused, fault current protection on modern industrial power distribution systems when the advantages of circuit breakers are not required.

SWITCH RATINGS

KV		AMPERES				BIL KV
Nominal	Maximum	Cont.	Int.	Momentary	Fault Closing	
4.8	5.5	600	600	60,000	61,000	60
4.8	5.5	1200	1200	60,000	61,000	60
13.8	14.5	600	600	60,000	61,000	95
13.8	14.5	1200	600	60,000	61,000	95

A standard 36-inch cubicle (QA-36) can be used individually with an open dry-type transformer, or adjacent to any auxiliary high voltage unit in which proper bus entry and alignment can be made. A 14-inch wide transition unit is added when the 36-inch wide cubicle is used with liquid-filled or sealed dry-type transformers.

When used with other switchgear, the type QA switch can be located at any point in the group line-up. Unit height is 90 inches for indoor units and 104 inches (including a six-inch base sill) for outdoor units. Depth is 55 inches.

OPERATION

As the switch is closed, the main stationary contacts are engaged slightly prior to the quick-acting arcing contacts inside the arc chute. This reduces the possibility of damage or welding of the interrupter blades if the switch is closed on a fault current. As the switch is fully closed, the quick-acting blade passes between, and is restrained, by the stationary arcing contacts within the arc chute. The closing operation is completed and current is shunted through the main contacts, with very little passing through the quick-acting blade.

Switch life is increased since the arc is drawn from a secondary set of arcing contacts, preventing arc damage to the main contacts. As the arc moves into the arc chutes, it is elongated, cooled and reduced in cross section, causing rapid extinction.

COMPONENT CONSTRUCTION FEATURES

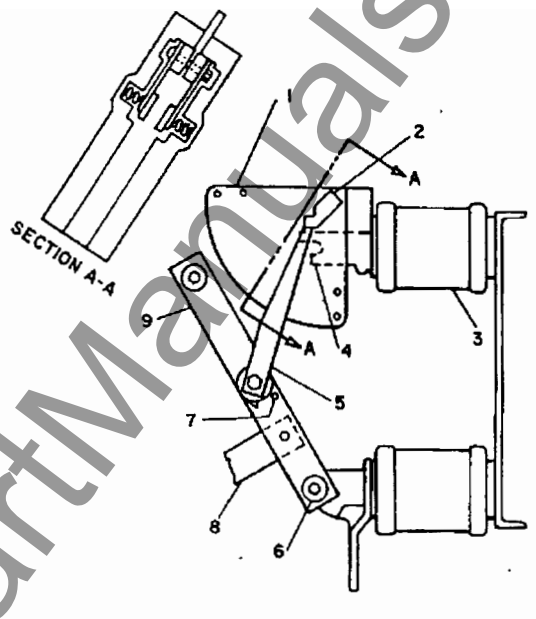
Insulators—The 5-kv switch is mounted on a *Pyro-Shield* stand-off insulator with the necessary clearance from the frame-mounted channels. *Pyro-Shield* is a glass polyester material that is flame-retardent, track resistant and maintains a high impact strength. Insulators are securely bolted to the mounting channels and terminals to prevent live parts from rotating on the insulators.

The 15-kv switch is mounted on NEMA standard class A-20 cast epoxy insulators that meet IEEE-NEMA requirements for basic impulse levels, mechanical strength and dimensions.

Main Stationary Contacts—are high-pressure, silver-to-copper line contacts with a mass backup. A heavy build-up of copper immediately adjacent to the contacts serves to conduct heat generated by momentary overcurrent away from the contact surfaces, preventing melting and welding of contact surfaces.

Main Closing Contacts—*an extended tip,* ab ve the main stationary contact at the break end of the switch, is used as the main closing contact. The blade engages with this tip in closing ahead of the contacts inside the interrupter, enabling the switch to close against fault currents. Any arc that occurs on closing is drawn between the extension of the main blades and the ball-shaped tip, protecting the interrupter from high fault currents. The main contact surfaces, below the extended tip and below the extension of the switch blade, are unharmed—the switch will then still carry its full rated current and will still interrupt its full rating.

Switch Components



1. Arc chute
2. Stationary arcing contacts
3. Insulator
4. Jaw contact
5. Quick-acting blade
6. Hinge contact
7. Stop pin
8. Operating bar
9. Main switch blade

Main Moving Contact—is of high conductivity (98% or better I.A.C.S.), hard drawn, electrolytic tough pitch copper bars with rounded edges.

Quick-Break Quick-Make Blade—is of phosphor bronze with a liberal amount of silver tungsten on the interrupter tip and restraining contacts. Silver is used for its high conductivity and tungsten because of its high melting point. The quick-break, quick-make blades are pivot-mounted o one side of the main blades with a stainless steel spring mounted parallel to the main blades.

Arc Chute—is formed from Urea Formaldehyde Alpha-cellulose, especially selected for its gas-evolving, arc extinguishing properties. The chute contains a pair of silver tungsten tipped restraining contacts that engage the quick-acting blade when in the closed position. The necessary spring pressure is supplied by a pair of small phosphor bronze compression springs inside the arc chute.

Terminal—is heavy cast metal in pads having silver plated terminal surfaces on both ends of the switch.

OPERATING MECHANISM

Rapid, decisive closing and opening of switch blades is provided by a stored energy operator. The operator, a true stored energy mechanism, consists of a set of belleville springs that store the energy provided by either a manual hand crank or an optional motor.

Opening or Closing Operation—The springs are compressed from either end, depending on which direction the spring shaft is to move to open or close the switch. This way, the same springs are used for opening and closing operations. By reversing direction of screw rotation and returning the charging bar to discharged position, the springs can be deenergized at any time. The springs must be fully charged for each closing or opening operation.

The springs are released by depressing a lever on the operator panel that unlatches the mechanism holding the switch blades either closed or open. This feature allows the powerful springs to close (or open) at the high speed necessary to achieve the close and latch rating. It also assures that the switch will remain closed when subjected to 60,000 amperes momentary. The high speed opening reduces contact wear when interrupting load current.

Position Indicators—Eye-level position indicators, mounted on the operating mechanism panel, show when the springs are charged or discharged, and when the switch is closed or open.

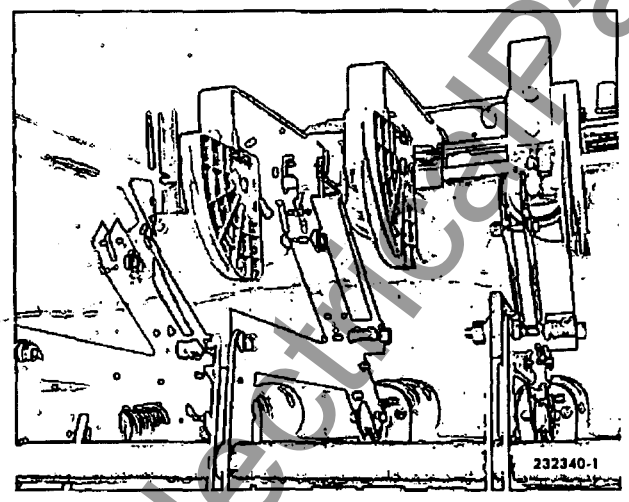
Key Interlock—The operating mechanism has provisions for key interlocking with remote devices such as transformer secondary breakers and other switches.

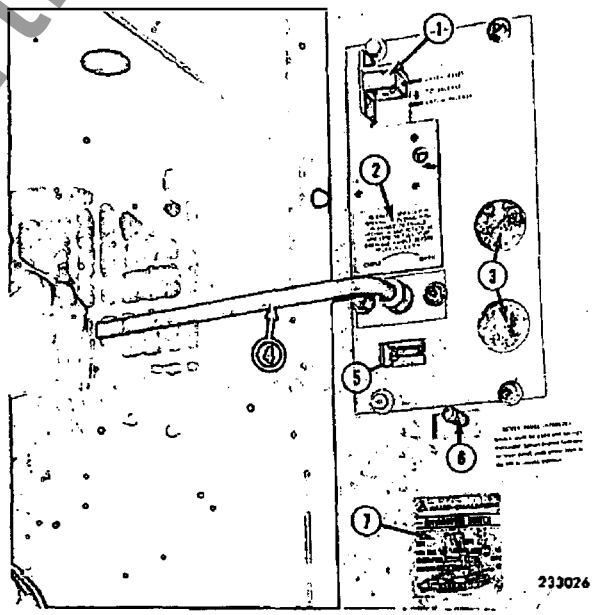
Door Interlock—The lower hinged panel—fuse access door—is mechanically interlocked with the operating mechanism to prevent opening when the switch is closed or charged.

Operator Panel Components

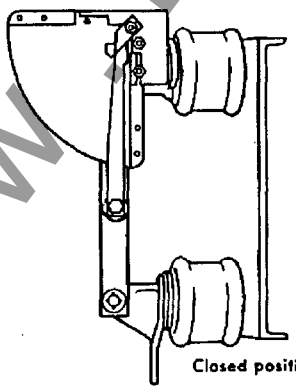
1. Latch release
2. Charging instructions
3. Provision for key interlock
4. Charging handle
5. Switch position indicator
6. Lower panel interlock
7. Rating plate

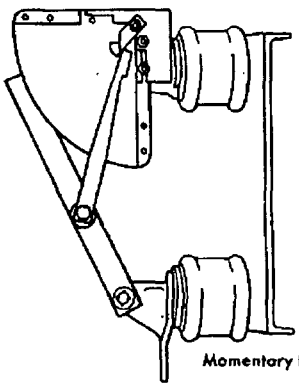
Load break switch blades in open position—front view.

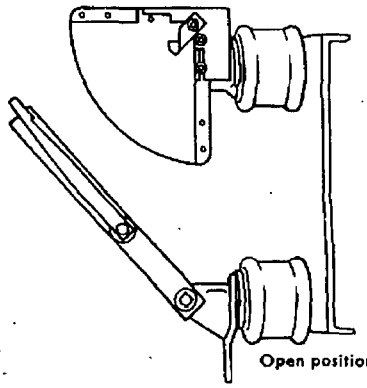




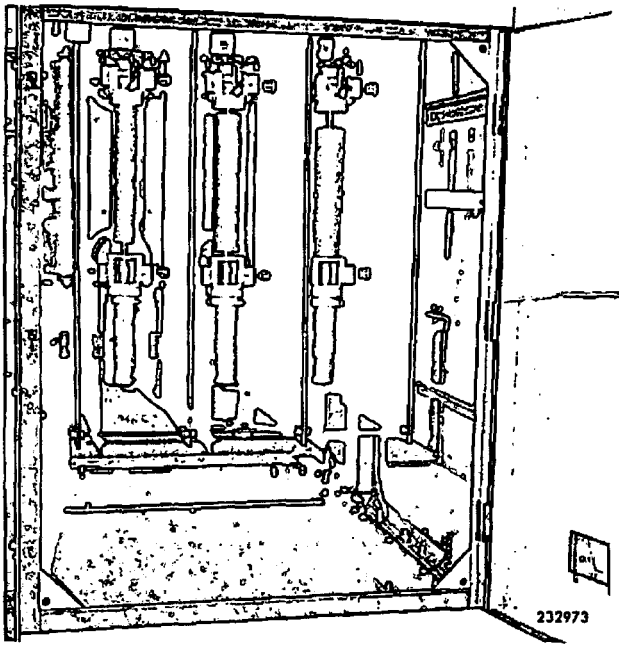
Switch opening sequence.


Closed position


Momentary transfer


Open position

TYPE LBS-SE LOAD BREAK SWITCH—STATIONARY MOUNTED



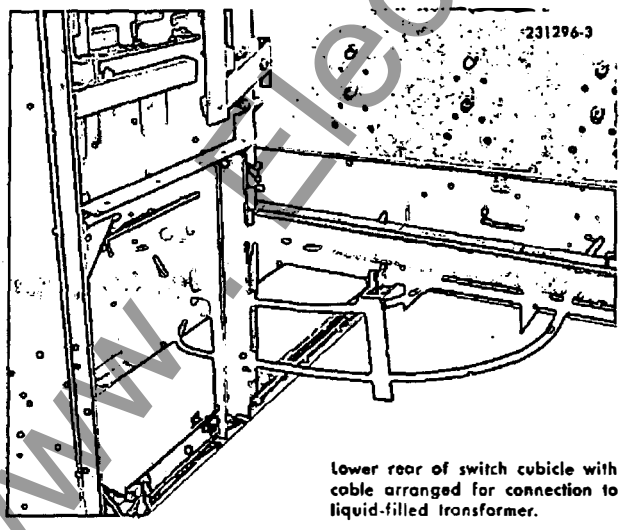
Opened hinged panel on this outdoor unit shows mounting of expulsion type fuses. Interlocking between fuse access panel and operating mechanism prevents entry to fuse compartment when switch is closed or charged.

FUSED SWITCHES

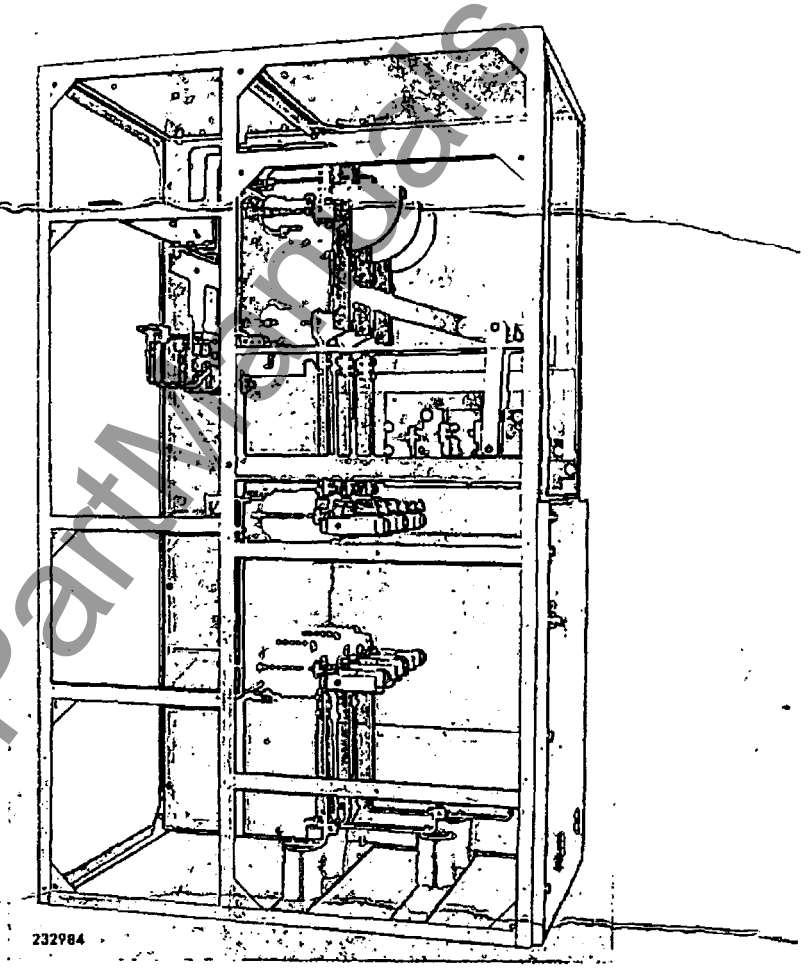
A load break interrupter switch mounted in series with fuses affords a combination that provides both load switching and short circuit protection in areas where the higher initial cost of circuit breakers cannot be justified.

To prevent any of the fuse discharge gasses from contaminating the switch and arc chute area, fuses are mounted below the switch. A fused switch should not be used on circuits sensitive to single phasing.

Either power or current-limiting fuses are available for protection of all standard secondary unit substation transformers from 112.5 through 2000 kva, 2.4 through 13.8 kv with interrupting ratings adequate for most power systems, as listed on page 9.



Lower rear of switch cubicle with cable arranged for connection to liquid-filled transformer.



Side view of partially assembled switch cubicle showing fuse, switch and cable compartments.

CUBICLES

Switch and fuse equipment is mounted within a sturdy metal enclosure for indoor installation. For outdoor installation, the equipment is mounted in a weatherproof metal enclosure.

The frame of the cubicles is constructed of steel channels and angles welded together and reinforced to form a rigid, self-supporting structure.

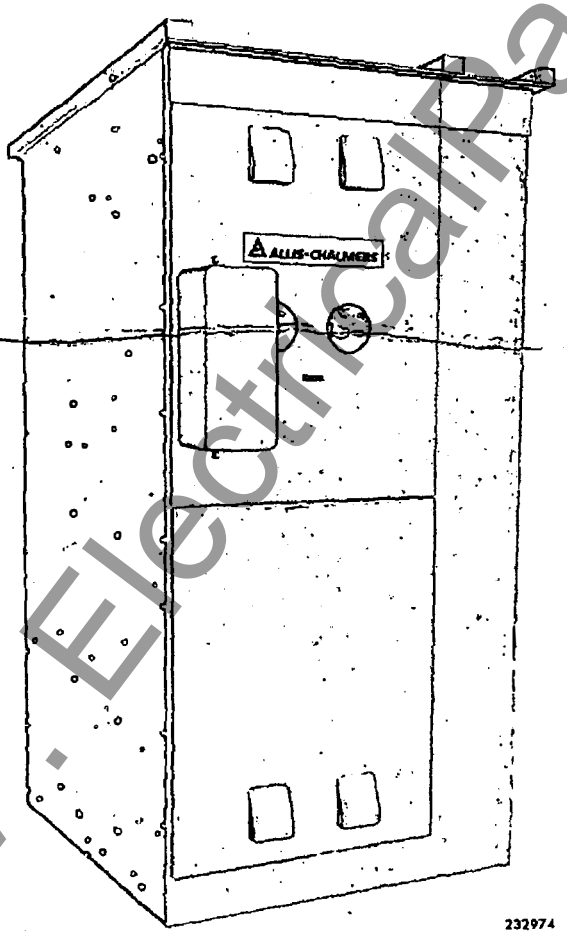
Switch units are separated by tightly fitted steel barriers. The tops, rear and ends of the switch units are fitted with removable plates of sheet steel securely bolted to the frame. Rear plates, bolted to the frame, can be removed during installation and for routine inspection and maintenance. Side plates are solid except for openings through which the bus and the interconnecting heater wiring can pass for outdoor units. The enclosure is completed by addition of formed front panels. Windows, next to the operator handle, are conveniently located for visual inspection of switch position.

Provision for top or bottom cable entrance is made in accordance with the plan view. Clamp type cable lugs are standard; however, potheads may be mounted in the rear or on top of the cubicle.

A space heater in each outdoor unit eliminates excessive condensation. The roof of the outdoor unit slopes to the rear to drain off water. All panels on outdoor units are gasketed to weather- and dustproof the units. The underside of the steel flooring is coated with a corrosion-resistant compound. Optional equipment for each unit includes fuses, potheads, lightning arresters, current transformers and potential transformers.

Ample space is available in a standard switch cubicle for mounting of optional equipment, such as lightning arresters.

Outdoor switch cubicle has filtered louvers on front and rear upper and lower compartment panels for proper air circulation. Gasketed, metal cover over operator handle is held on by knurled bolts and is easily removed (lower right) for switch operation.



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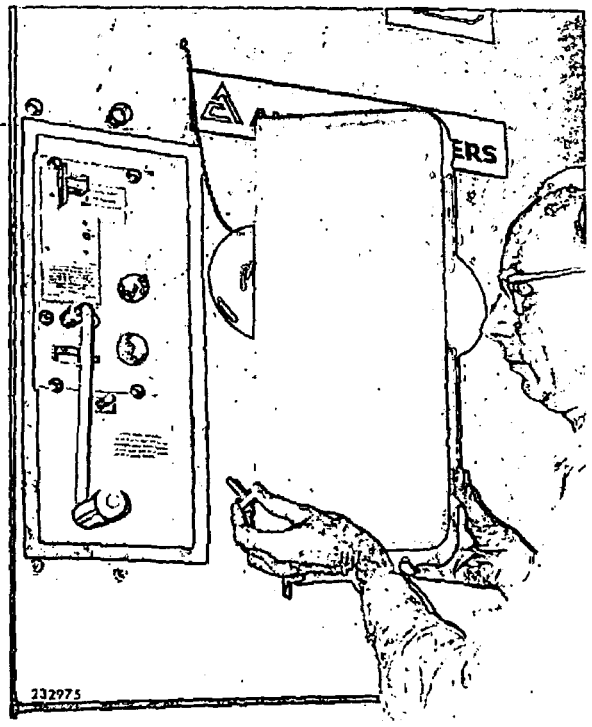

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TYPE LBS-SE LOAD BREAK SWITCH—STATIONARY MOUNTED

INCOMING LINE SECTIONS

Single Switch (3-pole, 2-position) — Primary Radial or Loop Systems — A standard switch unit is commonly used on the primary of transformers to permit disconnecting and de-energizing the transformers. The units can switch the full load current of the transformers up to 600 amperes when necessary. In addition, key interlocking with the transformer secondary breaker is recommended to eliminate the possibility of opening the switch during overload or short circuit conditions. Fuses may be desired to provide short circuit protection for the transformer and cables.

Duplex Switch for Primary Selectivity (two 3-pole, 2-position) — Incoming line circuits can be brought into two separate switch units to provide a primary selective system, while eliminating the possible hazard caused by the failure of one incoming circuit affecting the other circuit. One primary incoming line circuit can be de-energized and isolated by a clearly visible air gap for maintenance with the alternate circuit energized and supplying the load. Fusing of the outgoing feeders practically eliminates the possibility of closing onto a faulted transformer, bus or outgoing cable. Key interlocking may be provided between the switches to prevent paralleling the two incoming lines if desired.

Selector Switch (3-pole, 2-position) — A 3-pole, 2-position 600-amp selector may be applied when a primary selective arrangement with a single, space-saving cubicle is desired. Like the duplex switch arrangement, one primary incoming line circuit can be deenergized and isolated by a clearly visible air gap with the alternate circuit energized and supplying the load.

The selector switch — with three visually identified positions of "line 1," "open" and "line 2" — consists of a type LBS-SE — 2-position (open/close) 600-amp interrupter switch in series with a 2-position (line 1/line 2) disconnect. The selector switch is mechanically interlocked to prevent it being operated when the interrupter is closed. The LBS-SE interrupter is identical to single feeder units and interrupts any load current. The selector switch is mounted in the cable compartment and is operated from the front of the unit.

SERVICE ENTRANCE

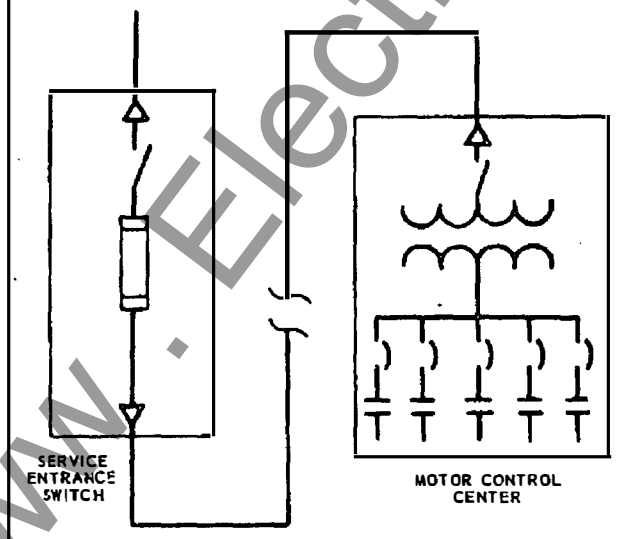
The service entrance arrangement is a special incoming line section, serving only one outgoing feeder and is not close-coupled to a transformer. It is the incoming service terminations of an industrial power user. The outgoing cable, protected by power fuses, can be switched under full load. The service entrance unit may be arranged for either a single supply source or a selective system involving two sources.

GROUP LINEUPS

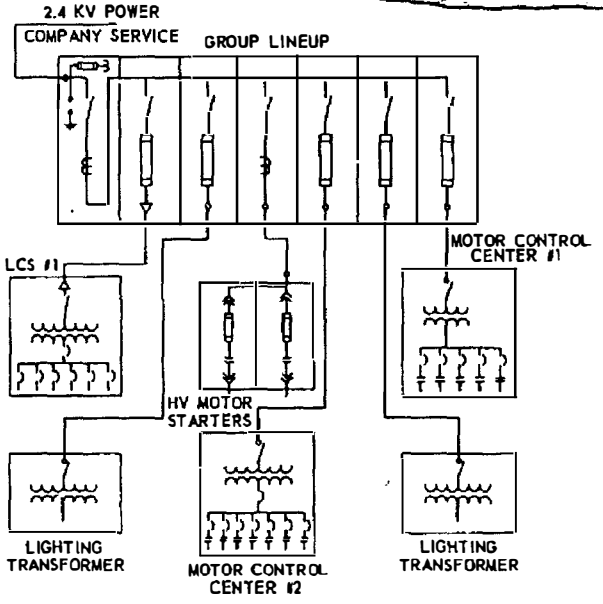
Group lineups of stationary load break switches often form the originating point of a power distribution system which establishes feeder cables for remote substations. This radial arrangement provides full load switching with fault closing capability and short circuit protection on small power systems.

Standard 36-inch wide units (QA-36) are assembled in groups and joined with 1200 or 2000 amp bus, located in the top of the units. Optional metering equipment, suitable for the application, can be included in the incoming line units. Radial systems are commonly used for educational buildings, hospitals, shopping centers and light industrials such as textile mills, light manufacturing, etc.

Single line diagram showing application of load break switch as a service entrance switch.

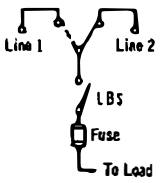


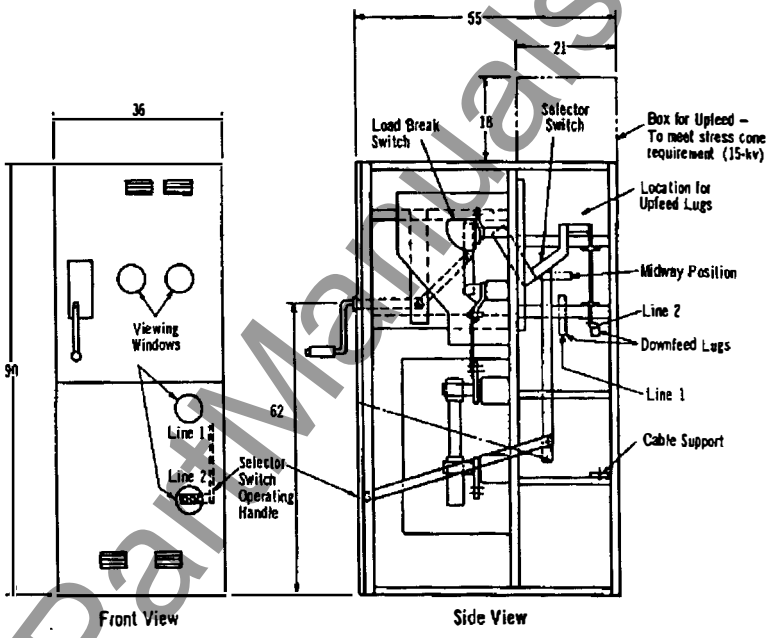
Single line diagram of group lineup, radial arrangement.



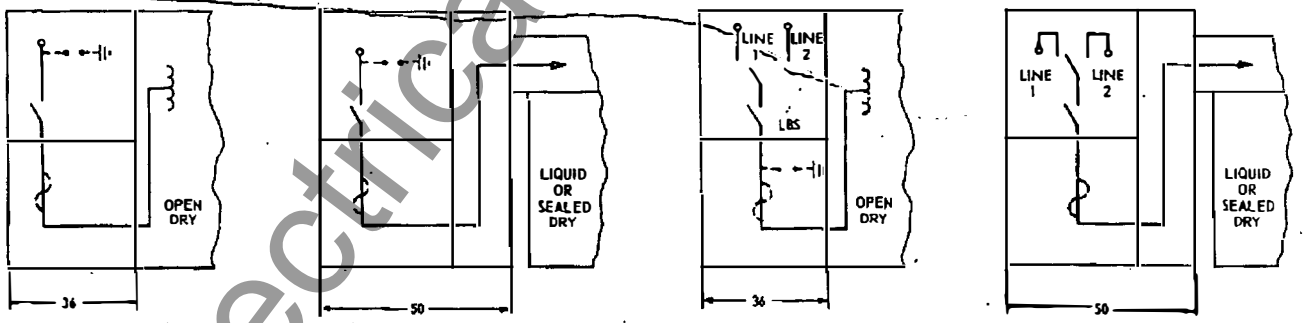
TYPE LBS-SE LOAD BREAK SWITCH—STATIONARY MOUNTED

The selector switch arrangement, a type LBS-SE interrupter switch and a 2-position selector switch mounted in a single cubicle, is ideal for primary selective 600-amp application when installation space is limited.



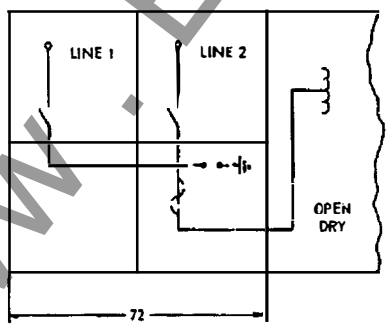


Arrangements (Front Elevations)

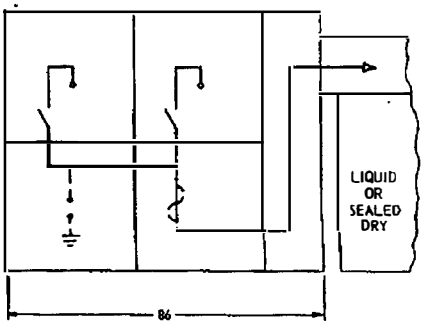


Single switch arrangement for connection to open dry (left) and liquid or sealed dry (right) type transformers.

Selector switch arrangement for connection to open dry (left) and liquid or sealed dry (right) type transformers.

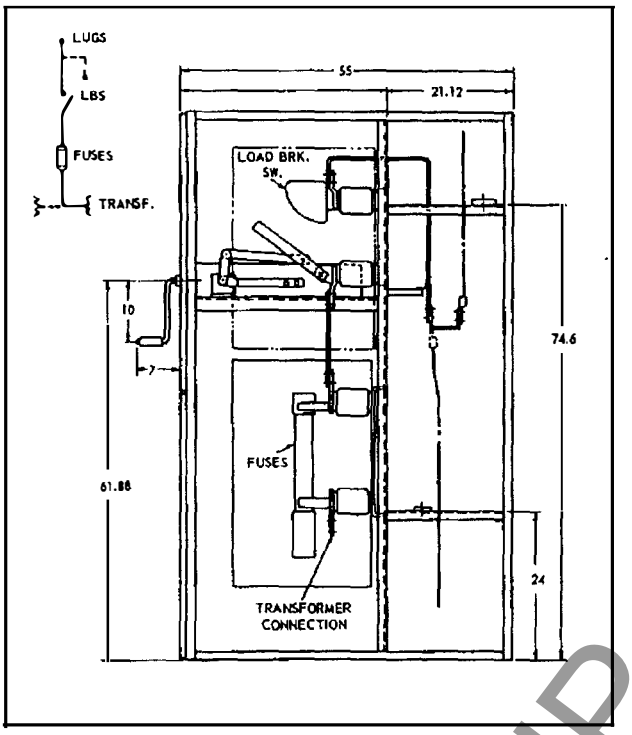


Duplex switch arrangement for primary selectivity of two incoming lines connected to open dry (left) and liquid or sealed dry (right) type transformers.

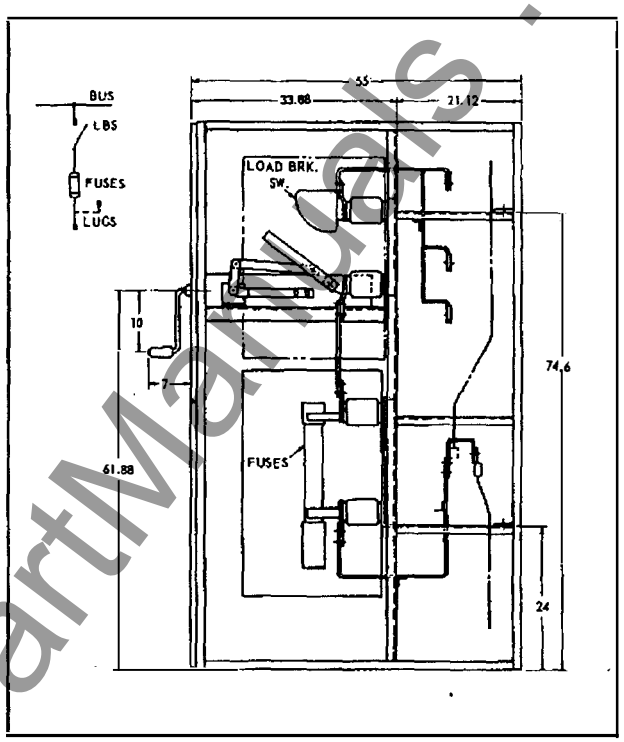


TYPE LBS-SE LOAD BREAK SWITCH—STATIONARY MOUNTED

TYPICAL SIDE VIEWS

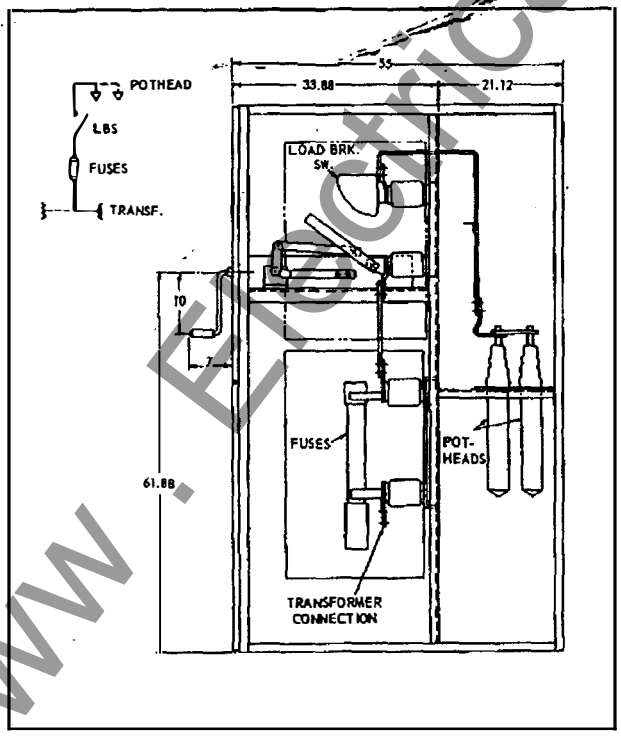


Upfeed or downfeed connection.

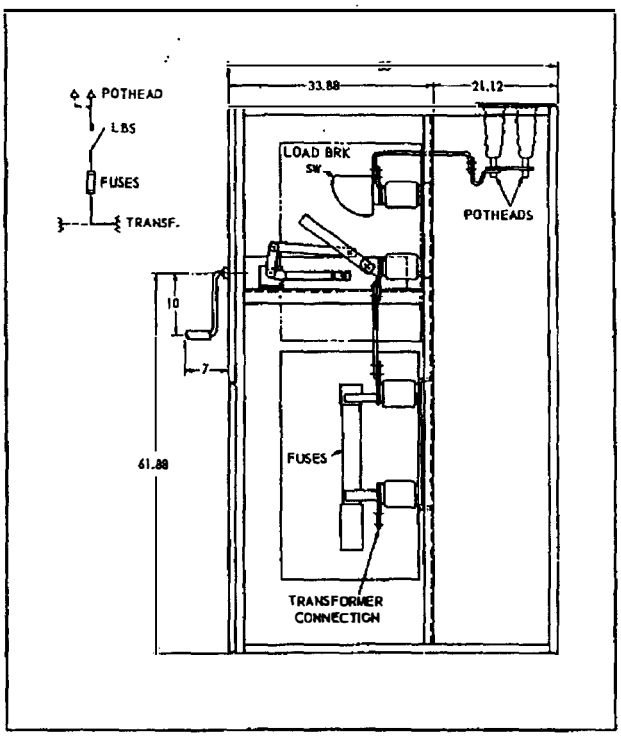


Upfeed or downfeed connection to bus.

Downfeed pothead connection.



Upfeed pothead connection.



(Dimensions in inches)

FUSE SELECTION GUIDE FOR TRANSFORMER PROTECTION

System Voltage	Fuse Type (1)	Interrupting Ratings		Normal Fuse Size for Various Substation Sizes, Continuous Current Rating in Amperes (4) (6)					
		Total RMS Amp (Asym) (2)	Max. 3-Phase Mva (Sym) (3)	500 Kva	750 Kva	1000 Kva	1500 Kva	2000 Kva	2500 Kva
2400	CL	57,500	150	200E	250E	300E	—	—	—
	EJO-1	60,000	155	200E	—	—	—	—	—
	EJ-1	80,000	210	—	250E	325A	450A	—	—
	SM-4	27,500	72	175E	—	—	—	—	—
	SM-5	60,000	150	175E	250E	400E	540E(5)	720E(5)	—
4160	CL	48,000	216	100E	150E	200E	300E	362A	—
	EJO-1	60,000	270	125E	150E	200E	—	—	—
	EJ-1	80,000	360	—	—	—	300E	375A	400A
	SM-4	27,500	125	100E	150E	200E	—	—	—
	SM-5	60,000	270	100E	150E	200E	300E	400E	540(5)
4800	CL	48,000	250	80E	125E	200E	270A	362A	362A
	EJO-1	60,000	310	100E	125E	200E	—	—	—
	SM-4	27,500	144	100E	125E	175E	—	—	—
	SM-5	60,000	310	100E	125E	175E	250E	400E	400E
7200	CL	44,000	350	65E	—	—	—	—	—
	EJO-1	80,000	620	100E	125E	150E	200E	—	—
	SM-4	25,000	195	65E	100E	125E	175E	—	—
	SM-5	41,500	325	65E	100E	125E	175E	250E	300E
12,000	CL	40,000	520	40E	50E	65E	100E	156A	170A
	EJO-1	50,000	650	80E	100E	—	—	—	—
	SM-4	20,000	260	40E	50E	65E	100E	125E	175E
	SM-5	40,000	500	40E	50E	65E	100E	125E	175E
13,200	CL	40,000	573	30E	50E	65E	100E	125E	156A
	EJO-1	50,000	715	65E	80E	100E	—	—	—
	SM-4	20,000	285	30E	50E	65E	100E	125E	150E
	SM-5	40,000	500	30E	50E	65E	100E	125E	150E
13,800	CL	40,000	600	30E	50E	65E	100E	125E	156A
	EJO-1	50,000	750	65E	80E	100E	—	—	—
	SM-4	20,000	300	30E	50E	65E	100E	125E	150E
	SM-5	40,000	500	30E	50E	65E	100E	125E	150E

(1) Type CL is ITE current limiting type. Types EJ-1 and EJO-1 are General Electric current limiting type. Types SM-4 and SM-5 are S & C expulsion type.

(2) These values for fuses correspond to momentary ratings for breakers.

(3) The 3-phase mva = $1.73 \left(\frac{kv}{1000}\right) \left(\frac{\text{fuse interrupting amp.}}{1.6}\right)$

(4) The fuses are sized to pass transformer magnetizing inrush. Other sizes may be applied to coordinate with other system components. The use of forced cooled transformers may require larger fuses.

(5) These applications require two fuses in parallel to obtain the high ampere ratings shown.

(6) "E" rated fuses meet all NEMA standards.

TYPICAL LOAD BREAK SWITCH SPECIFICATIONS

Information set off in blue is to be supplied by purchaser and denotes alternates, options and specific information.

The incoming line section(s), switch lineup will consist of an indoor, outdoor metal-enclosed cubicle(s), including the following:

_____ SINGLE AIR INTERRUPTER SWITCH, type LBS-SE, 3-pole, 2-position (open-closed). The interrupter switch will be stored energy closed and stored energy opened, manually, electrically operated, with the operator located on the front of the unit. Each operator will have indicating targets to show position of switch blades (open — closed) and condition of charging springs (charged — discharged). Two windows will be located on the upper front panel for visual inspection of switch blades. Latch release will have padlock provision.

_____ DUPLEX SELECTOR SWITCH, consisting of two type LBS-SE, 3-pole, 2-position air interrupter switches. The two switches will provide three positions (line 1 — open — line 2). The switches will be key interlocked to prevent both being closed at the same time.
Each interrupter switch will be stored energy closed and stored energy opened, manually, electrically operated, with the operator located on the front of the unit. Each operator will have indicating targets to show position of switch blades (open — closed) and condition of charging springs (charged — discharged). Two windows will be located on the upper front panel for visual inspection of switch blades. Latch release will have padlock provision.

_____ SELECTOR SWITCH, consisting of one type LBS-SE, 3-pole, 2-position (open-closed) 600 ampere air interrupter switch and one 3-pole, 2-position (line 1 — line 2) disconnect switch, both mounted in a single cubicle.
The interrupter switch will be stored energy closed and stored energy opened, manually, electrically operated, with the operator located on the front of the unit. Each operator will have indicating targets to show position of switch blades (open — closed) and condition of charging springs (charged — discharged). Latch release will have padlock provision.
The interrupter switch is to be located in the front of the unit and connected in series with the rear mounted disconnect switch. The disconnect switch operating handle is to be located behind the lower front panel. The lower panel will be mechanically interlocked with the interrupter switch so that the disconnect switch cannot be operated unless the interrupter switch is open.
The disconnect switch operating handle will have indicating targets (line 1 — line 2) to show position of switch blades.
Four windows — two each on the upper front and rear panels — will be provided for visual inspection of switch blades.

The Each interrupter switch will be rated:

_____ System Voltage_____ KV

_____ Voltage Class 4.8, 13.8 KV

_____ Impulse Level (BIL) 60, 95 KV

_____ Continuous Current 600, 1200 Amperes (selector switch available rated 600 amperes only)

_____ Interrupting Rating 600, 1200 Amperes (selector switch available rated 600 amperes only)

_____ Momentary Rating 60,000 Amperes (selector switch rated 40,000 amperes only)

_____ Fault Closing _____ Amperes

Typical Load Break Switch Specifications

The following will also be included:

_____ Set(s) of three expulsion, current limiting fuses, type _____, with an interrupting rating of _____ rms amperes, _____ equivalent KVA at _____ volts.

The fuses will be mounted in the lower compartment of the unit, between the switch and outgoing connections. The fuse access panel will be hinged and mechanically interlocked with the operating mechanism to prevent opening when the switch is closed or the operator springs charged, and to prevent operating the switch when the panel is open.

_____ Incoming, loop-feed line(s) will enter through the top, bottom, of the unit and will terminate at suitable clamp type cable lugs, potheads, roof bushings.

_____ The incoming cable will be _____-conductor _____ MCM _____ KV. _____ inches outer diameter.

_____ Provision for direct connection to the adjacent _____ KVA transformer section. (14-inch wide transition unit included on all but open dry type transformer connections.)

_____ Space heater, 230-volt, 500-watt, thermostatically controlled. (Standard with each outdoor unit, optional in indoor units.) The space heater will be energized by a 230-volt ac, single-phase supply furnished by the purchaser, by the supplier.

_____ Lightning arresters, rated _____ KV, single-pole, station, intermediate, distribution class, mounted within the unit.

_____ Key interlock so that operation is possible only when the associated transformer secondary breaker is open, all the feeder breakers are open.

_____ An auxiliary unit will be provided with a hinged front panel, on which will be mounted the following:

_____ Voltmeter, single-phase, indicating, semi-flush mounted, _____ scale.

_____ Voltmeter transfer switch, three-phase.

_____ Ammeter, single-phase, indicating, semi-flush mounted, _____ scale.

_____ Ammeter transfer switch, three-phase.

_____ Watthourmeter, _____-element, drawout type, semi-flush mounted, with demand attachment.

Mounted within the unit will be the following optional equipment:

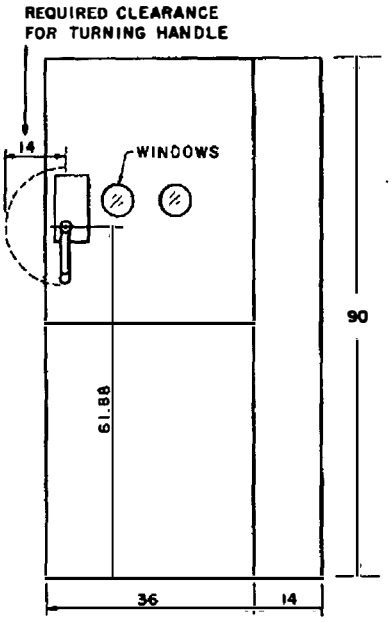
_____ Current transformer, _____ secondary, _____ /5 amperes ratio, stationary mounted, for primary metering.

_____ Potential transformer, fused, _____ cycles, _____ volt ratio, stationary mounted for primary metering.

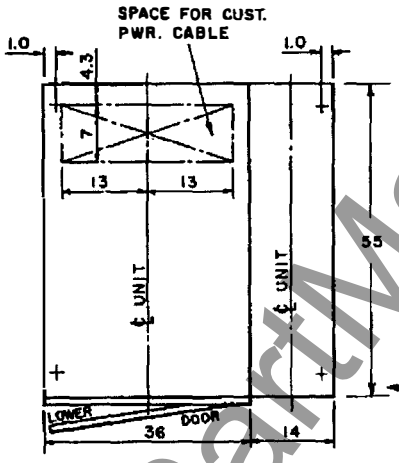
TYPE LBS-SE LOAD BREAK SWITCH—STATIONARY MOUNTED

OUTLINES AND DIMENSIONS

INDOOR

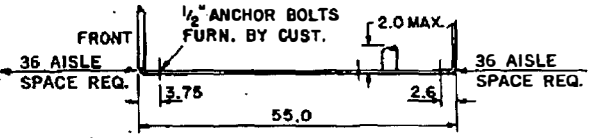


Front view.



Floor plan.

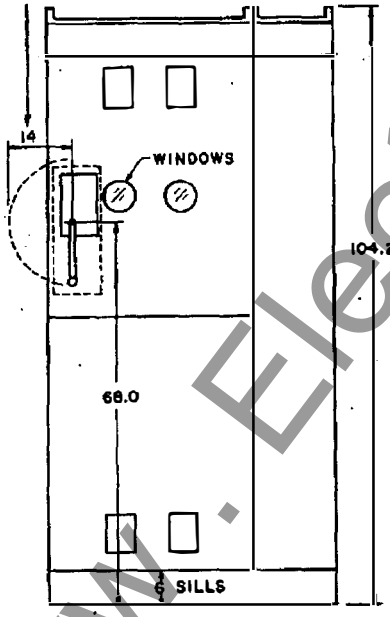
Refer to pages 7 and 8 for typical arrangements.



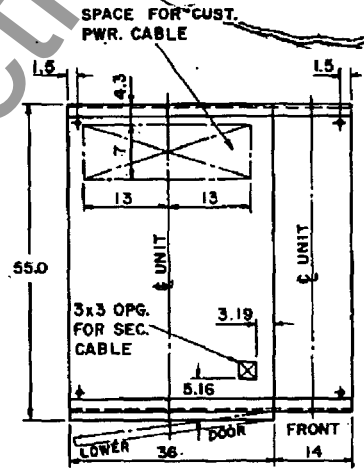
Bolting Arrangement.

OUTDOOR

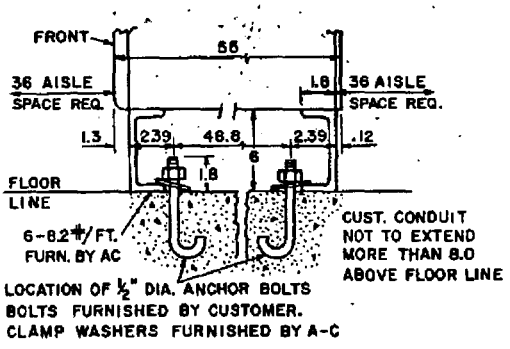
(Dimensions in inches)



Front view.



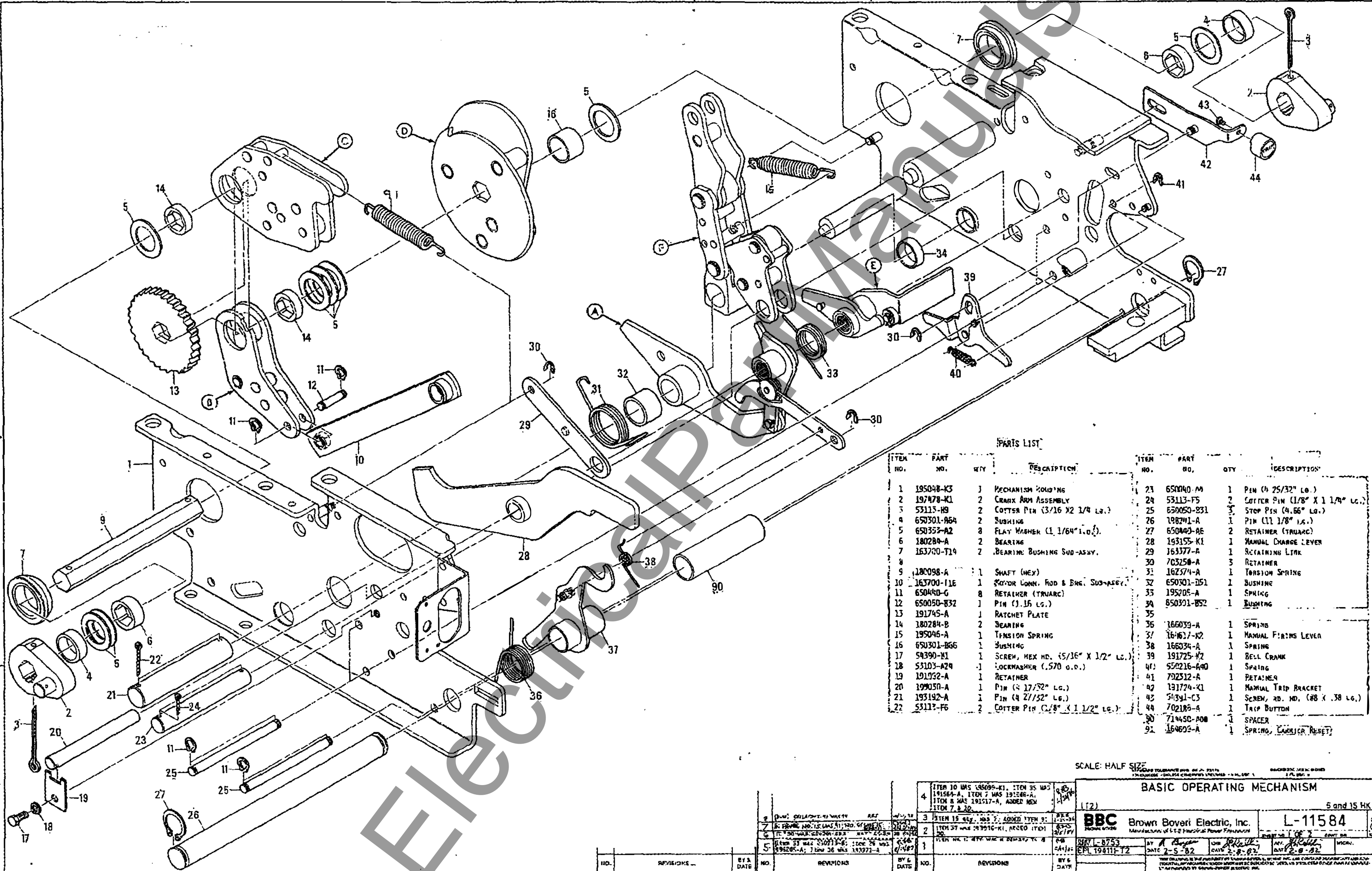
Floor plan.



Bolting Arrangement.

CONTROLS
DIVISION
P.O. Box 2505, West Allis, Wisconsin 53214

Litho in U.S.A. — DLC



PARTS LIST

ITEM NO.	PART NO.	QTY	DESCRIPTION
1	195048-K3	1	Mechanism Housing
2	197478-K1	2	Crank Arm Assembly
3	53113-H9	2	Cotter Pin (3/16 X2 1/4 lg.)
4	650301-A64	2	Bushing
5	650353-A2	8	Flat Washer (1 1/64" I.D.).
6	180284-A	2	Bearing
7	163700-T14	2	Bearing Bushing Sub-assy.
8			
9	180098-A	1	Shaft (hex)
10	163700-T1E	1	Motor Conn. Rod & Brg. Sub-assy.
11	650440-G	8	Retainer (truarc)
12	650050-B32	1	Pin (1.16 lg.)
13	191745-A	1	Ratchet Plate
14	180284-B	2	Bearing
15	195046-A	1	Tension Spring
16	650301-B66	1	Bushing
17	54390-M1	1	Screw, hex hd. (5/16" X 1/2" lg.)
18	53103-A29	1	Lockwasher (.570 o.d.)
19	191932-A	1	Retainer
20	199050-A	1	Pin (4 17/32" lg.)
21	193192-A	1	Pin (4 27/32" lg.)
22	53113-F6	2	Cotter Pin (1/8" X 1 1/2" lg.)
23	650040-M	1	Pin (4 25/32" lg.)
24	53113-F5	2	Cotter Pin (1/8" X 1 1/4" lg.)
25	650050-B31	3	Stop Pin (4.66" lg.)
26	198201-A	1	Pin (11 1/8" lg.)
27	650440-AE	2	Retainer (truarc)
28	193155-K1	1	Manual Charge Lever
29	163377-A	1	Retaining Link
30	703250-A	3	Retainer
31	162574-A	1	Torsion Spring
32	650301-D51	1	Bushing
33	195205-A	1	Spring
34	650301-B52	1	Bushing
35			
36	166039-A	1	Spring
37	164617-K2	1	Manual Firing Lever
38	166034-A	1	Spring
39	191725-K2	1	Bell Crank
40	550216-A40	1	Spring
41	702512-A	1	Retainer
42	191724-K1	1	Manual Trip Bracket
43	54391-C3	1	Screw, rd. hd. (#8 X .38 lg.)
44	702186-A	1	Trip Button
90	714450-A08	1	Spacer
91	164609-A	1	Spring, Carrier Reset

SCALE: HALF SIZE

NO.	REVISIONS	BY & DATE
8	[illegible]	[illegible]
7	[illegible]	[illegible]
6	[illegible]	[illegible]
5	Item 33 was 650213-B; Item 26 was 195205-A; Item 36 was 193373-A	[illegible]
4	ITEM 10 WAS 195099-K1, ITEM 35 WAS 191564-A, ITEM 7 WAS 191566-A, ITEM 8 WAS 191517-A, ADDED NEW ITEM 7 & 20.	[illegible]
3	ITEM 15 QTY. WAS 7; ADDED ITEM 91	[illegible]
2	ITEM 37 WAS 193916-K1, ADDED ITEM 90.	[illegible]
1	ITEM NO. 1 QTY. WAS [illegible]	[illegible]

BASIC OPERATING MECHANISM

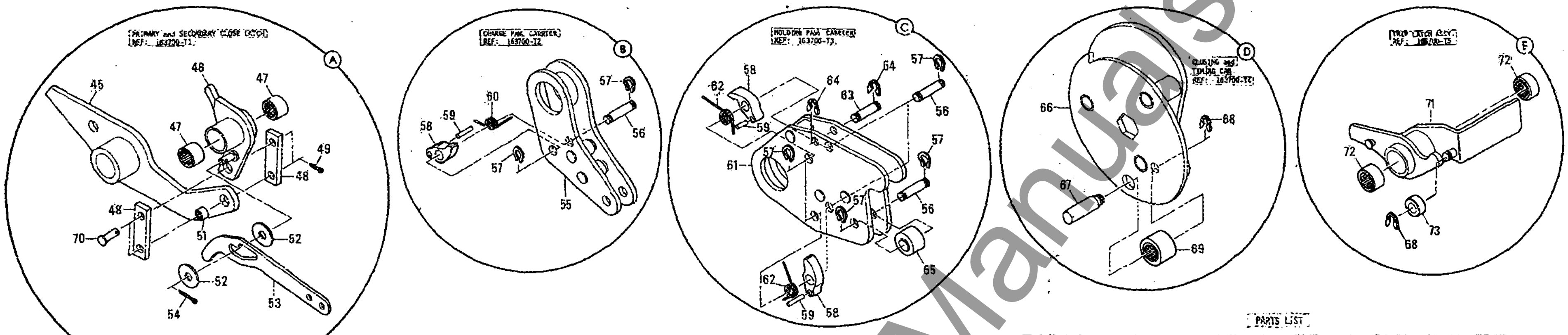
(T2) 5 and 15 HK

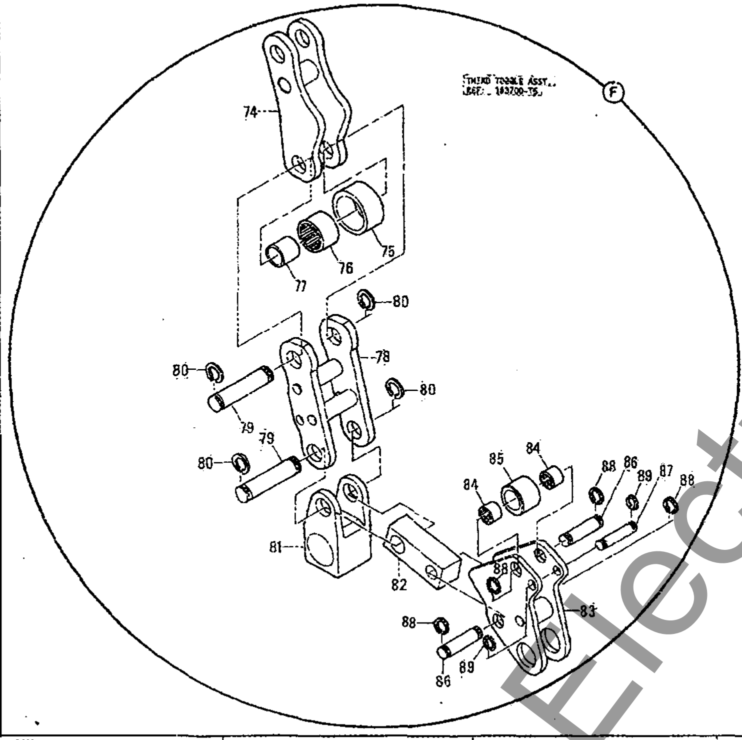
BBC Brown Boveri Electric, Inc.

L-11584 — Rev. 8 — Sheet 1 of 2

SKT L-8753
EPL 194111-T2

By A. [illegible] Date 2-5-82 — Chk [illegible] Date 2-8-82 — App. [illegible] Date 2-8-82





PARTS LIST

ITEM NO.	PART NO.	QTY	DESCRIPTION
45	194906-K1	1	PRIMARY CLOSE LATCH
46	194909-K2	1	SECONDARY CLOSE LATCH ASSY.
47	75547-D	2	NEEDLE BEARING
48	196457-A	2	FLAT LINK
49	53117-B	2	COTTER PIN
50			
51	75547-A10	2	NEEDLE BEARING
52	650351-A91	2	WASHER
53	193191-D	1	MANUAL CLOSE
54	53113-B2	1	COTTER PIN DISCONNECTOR
55	191647-K2	1	CHARGE PAWL CARRIER
56	650050-B32	4	PIN
57	650440-G	8	RETAINER (TRUARC)
58	192307-A	3	PAWL
59	650044-C	3	SPIRAL PIN
60	650213-F	1	SPRING
61	191649-K2	1	HOLDING PAWL CARRIER
62	650213-E	2	SPRING
63	650050-B33	1	PIN
64	703250-A	2	RETAINER
65	191343-A	1	ROLLER
66	194642-K1	1	CLOSING & TIMING CAM
67	192298-B	1	PIVOT PIN
68	702312-A	2	RETAINER
69	163700-T15	1	BEARING ROLLER SUB-ASSY.
70	148115-A	2	PIN, CLOSE LATCH
71	195089-K2	1	TRIP LATCH ASSY.
72	75547-D	2	NEEDLE BEARING
73	704131-A	1	ROLLER
74	190770-K2	1	THIRD TOGGLE ASSY.
75	650301-C71	1	OUTER RACE
76	75547-A11	1	NEEDLE BEARING
77	650301-C70	1	INNER RACE
78	180089-K4	1	SECOND TOGGLE ASSY.
79	50131-B93	2	PIN
80	650433-A	4	RING, RETAINING
81	161786-B	1	FIRST TOGGLE
82	180092-A	1	LINK
83	180096-K2	1	TRIP ROLLER CARRIER
84	193566-B	2	BEARING
85	180097-A	1	TRIP ROLLER
86	50131-B92	2	PIN
87	650050-B19	1	PIN
88	53100-D	4	RING, RETAINING
89	53100-B	2	RING, RETAINING

Scale: HALF SIZE

NO.	REVISIONS	BY & DATE
6	ITEM 50 ... [illegible]	[illegible]
5	ADDED NEW ITEM #70: ITEM 50 WAS QTY. 2: ITEM 55 WAS QTY. 4	[illegible]
4	ITEM 69 WAS 193566-C, ITEM 70 WAS 195206-A, ADDED NEW ITEM 69.	[illegible]
3	ITEM 53 was -A.	[illegible]
2	ITEM 72 WAS 180089-K3	[illegible]
1	REARRANGED ITEMS 57, 59, 60	[illegible]
7	SEE SHEET 1	

BASIC OPERATING MECHANISM

(T2) 5 and 15 HK

BBC Brown Boveri Electric, Inc.
Manufacturer of I-T-E Electrical Power Equipment

L-11584 | REV. 8

SHEET NO. 2 OF 2

L-8753

EPL 194111-T2

BY R. Boyer DATE 2-8-82 | CHK. DATE 2-8-82 | APP. DATE 2-8-82