Low Voltage Metal-Enclosed Switchgear

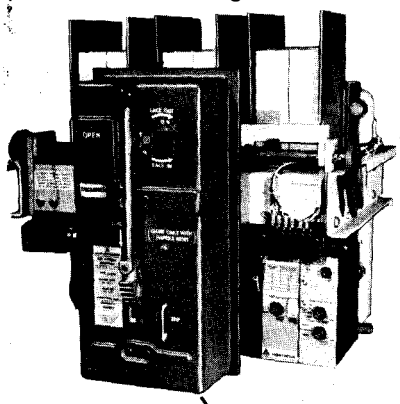
600 Volts Maximum, 4000 Amperes
Continuous Maximum, 150,000 Amperes
Interrupting Capacity Maximum

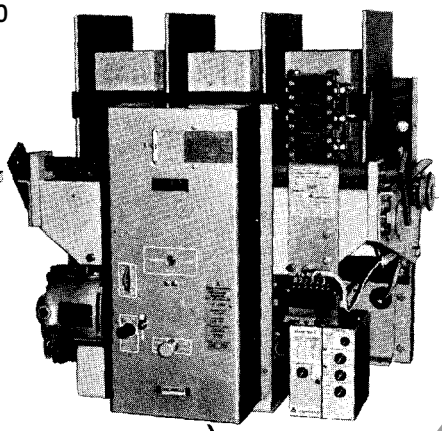
ALLIS-CHALMERS

DESCRIPTION **SG 1.1a**

June 1972

Supersedes August, 1965





Compact, Operator-Tailored— Closed door drawout of electrical or manual stored energy operated power circuit breakers and optional integrally mounted breaker lifting device.

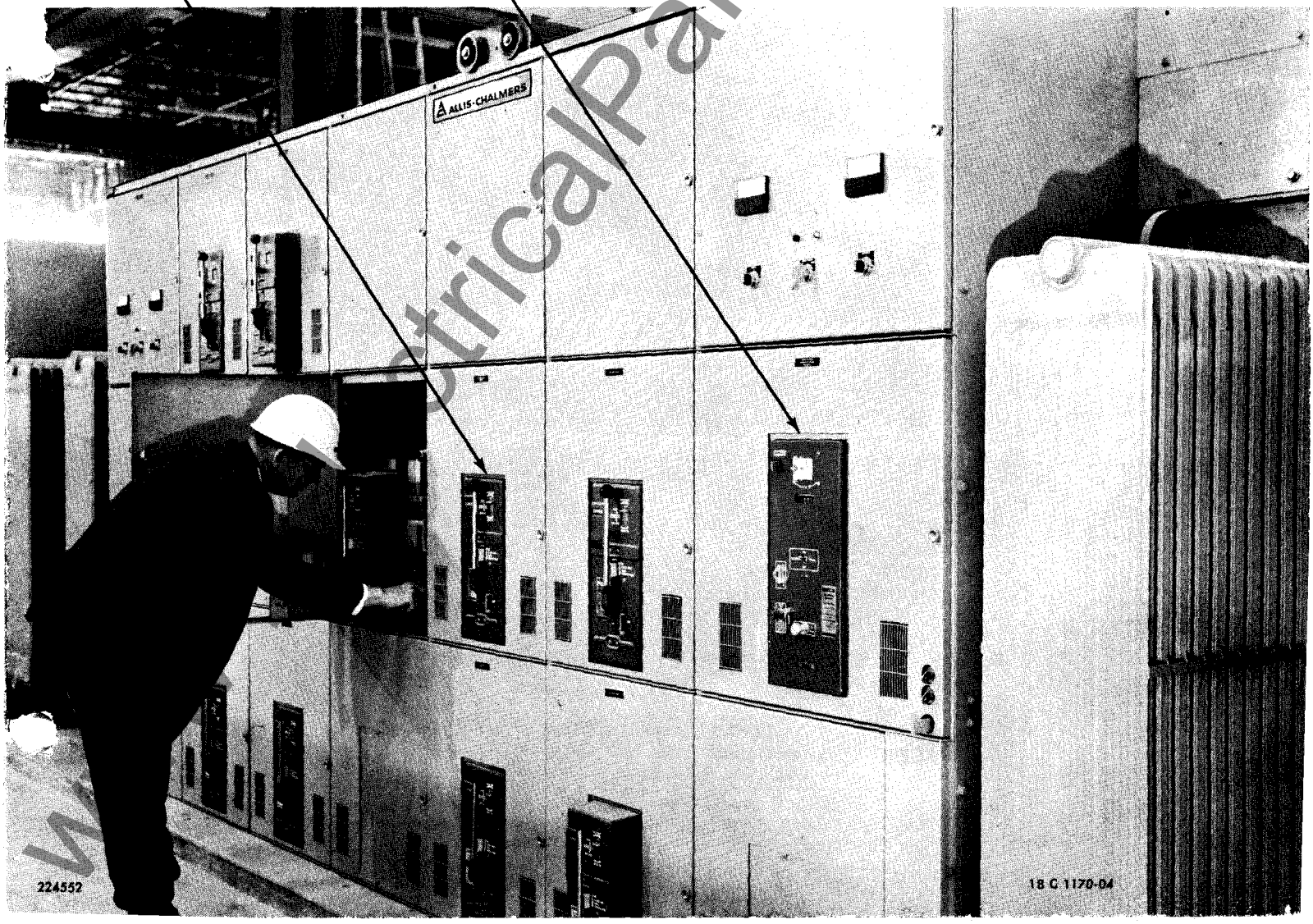
Front Access Current Transformers — Mounted on the stationary disconnects in the breaker compartment. They are easily replaced when a change in breaker rating is required.

"Pyro-Shield" Coordinated Insulation System — High strength, track-resistant, flame retardant, Fiberglas-reinforced polyester insulation, bus supports and moldings provide high momentary short circuit strength. Edge-to-edge bus bar arrangements which incorporate high creepage allowances provide great ability to withstand fault current shocks and magnetic stresses.

Static Overcurrent Trip Devices introduce accuracies and field adjustment benefits heretofore unavailable with series overcurrent trip devices. Combinations of long time, short time, instantaneous, and ground fault tripping provide optimum distribution system protection. Any device fits all LA-series breakers.

Simple Breaker Rating Change — Changes in continuous current or pickup setting can be made over a two and one half to one maximum to minimum range by changing knob settings on trip unit.

Simplified Field Checking of Static Trip Devices — Function tests may be conducted with a variable voltage transformer and a portable ammeter. A portable test set for complete checking of static trip devices is available, requiring only 115-volt ac power.



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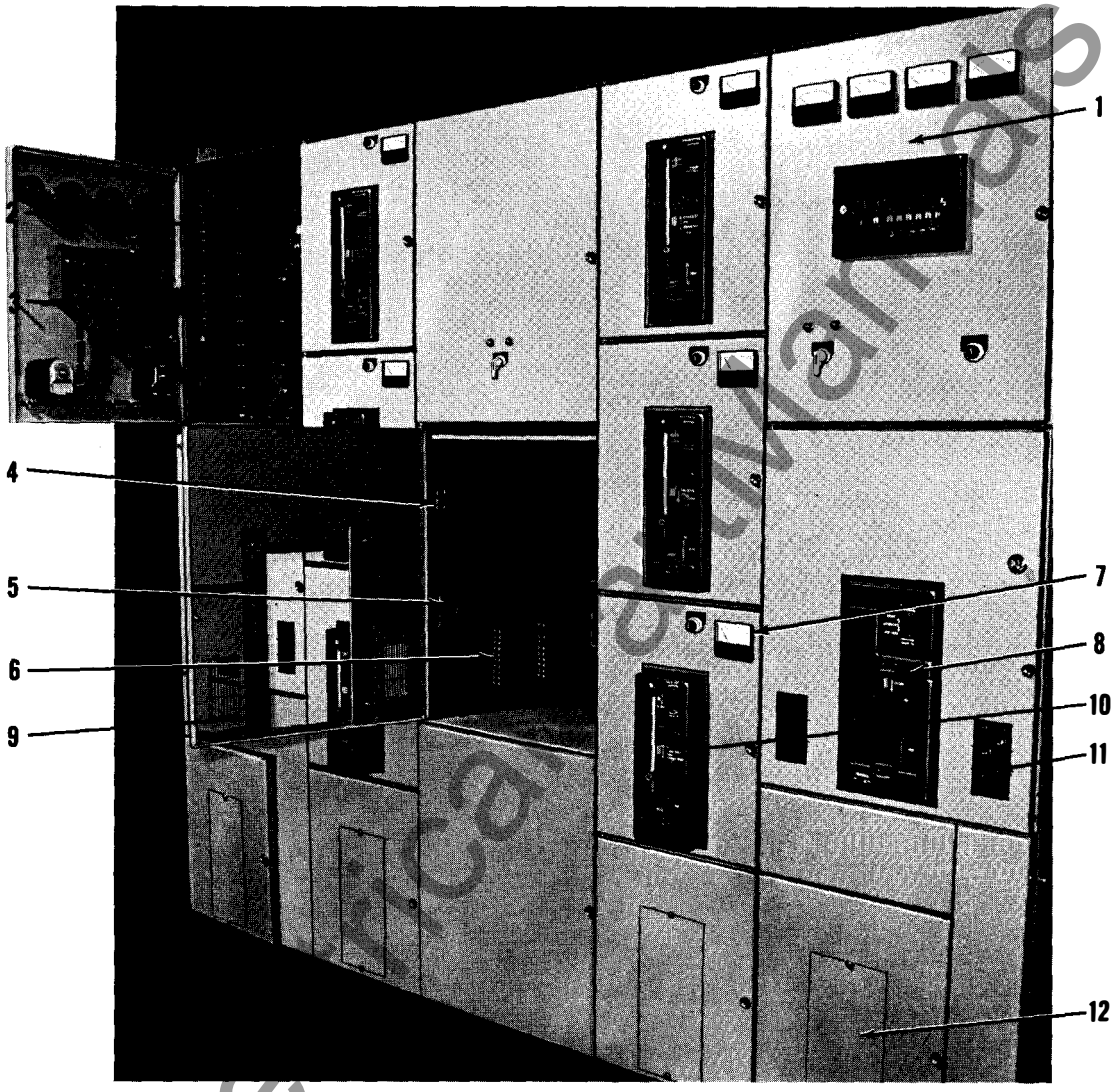
Type ME Low Voltage Switchgear Assembly includes a welded steel framework, sheet steel enclosure, individually welded steel breaker compartments, hinged breaker and auxiliary compartment panels, drawout breaker guide rails, position switches, three-phase buswork and supports, stationary primary and secondary disconnecting devices, ground bus, power and control cable terminal connectors, instruments and relays, control wiring, terminal blocks and instrument transformers.



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Legend	Description
1	Meter Compartment (Page 7)
2	Meter Compartment — Inside View (Page 8)
3	Control Wiring (Page 8)
4	Control Circuit Fuses
5	Teflon Coated Guide Rails (Page 4)
6	Stationary Secondary Disconnects (Page 5)
7	Ammeter and 3-Phase Switch (Page 7)
8	LA-1600 Electrically Operated Breaker in "Connected" Position (Page 3, 8, 9)
9	Breaker Escutcheon Opening
10	LA-600 Manually Operated Breaker in "Test" Position (Page 3, 8, 9)
11	Screened Ventilation Openings
12	Compartment for Future Breaker

The information contained herein is general in nature and is not intended for specific construction, installation, or application purposes. Allis-Chalmers reserves the right to make changes in specifications shown herein or add improvements at any time without notice or obligation.

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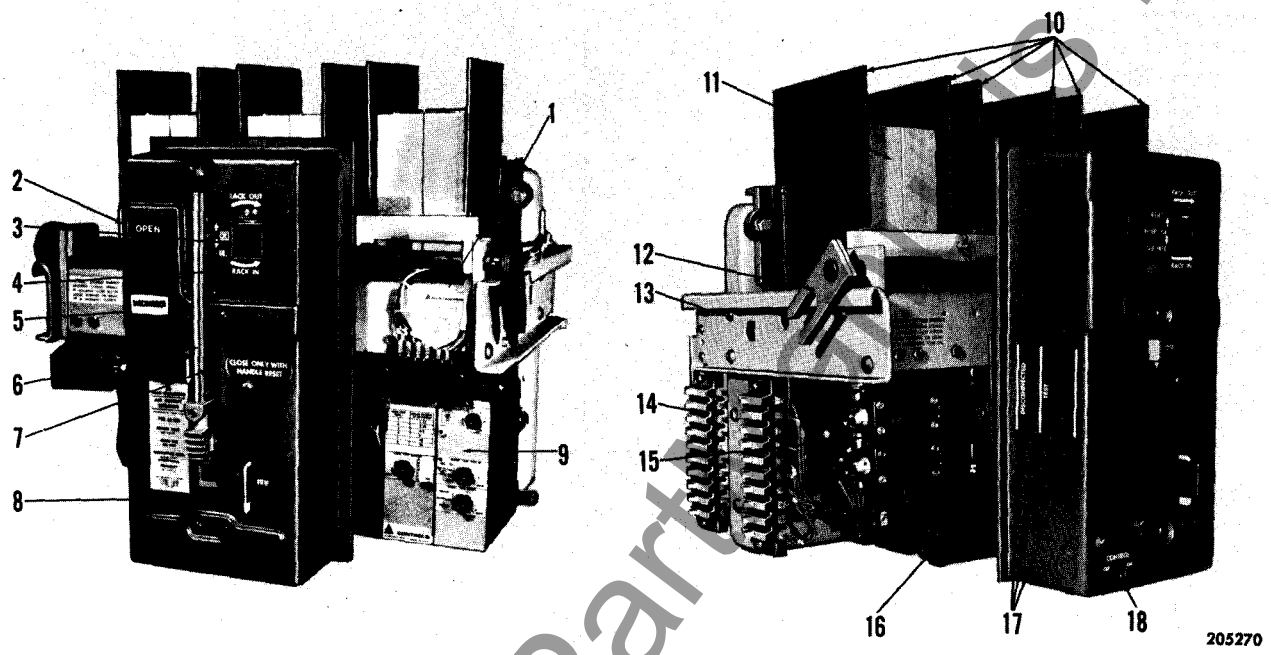
LA-Series Low Voltage Power Circuit Breaker includes a stored energy operating mechanism (either manually or electrically operated), arc quenchers, main and arcing contact structure, inductive tripping transformers, static overcurrent trip device, control wiring, auxiliary switches, interlocks and position indicators.



Legend	Description
1	Rating nameplate
2	Contact position indicator
3	Racking mechanism shutter (with padlocking provisions)
4	Handle stop
5	Stored energy mechanism indicator
6	Handle for manually charging stored energy springs
7	Contact closing lever
8	Tripping lever (with padlocking provisions)
9	Static Trip II overcurrent device

Legend	Description
10	Inter-phase barriers
11	Arc chutes
12	Clevis attached to racking drive screw
13	Drawout guide rails
14	Secondary disconnects (movable)
15	Auxiliary switch
16	Spring charging motor (electrically operated breaker only)
17	Breaker position indicators
18	Power switch for spring charging motor

LA Series Low Voltage Breakers

The LA Series low voltage power circuit breakers are designed for 600-volt and below service with current carrying capacities up to 4000 amp and interrupting capacities up to 150,000 amperes. These compact, flexible, fast operating, dead-front circuit breakers incorporate stored energy for fast, positive closing.

Electrically operated stored energy breakers are closed smoothly and positively by the action of springs that have been precharged by an electric motor. The springs remain charged indefinitely until the breaker is to be closed. When energy is released to close the breaker, the motor automatically recharges the springs for another closing operation.

Manual operated stored energy breakers are charged by one downward stroke of the handle; when handle is released it returns to the normal position. A closing lever, located on the front of the breaker, releases the stored energy to close the breaker.

Stored energy provides a quick make switching mechanism that assures high speed closing of breaker primary contacts, independent of operator. Positive, controlled closing prevents unnecessary arcing between the movable and stationary breaker contacts as would be the case with slow or hesitant manual closing. This prevents the potentially dangerous results of improper closing, thereby lengthening contact and breaker life.

Located on the front of the breaker are the tripping lever, targets which indicate primary contact position and condition of stored energy springs, racking screw shutter, breaker close lever, and — for manual stored energy breakers — the charging handle.

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Front Access Current Transformers

Most arrangements have instrument transformers mounted on the stationary primary disconnect studs where they are readily accessible when a feeder circuit change requires replacement of CT's for those of a different rating. No need to enter bus or cable compartment and disturb primary buswork or disconnect cables when replacing CT's.

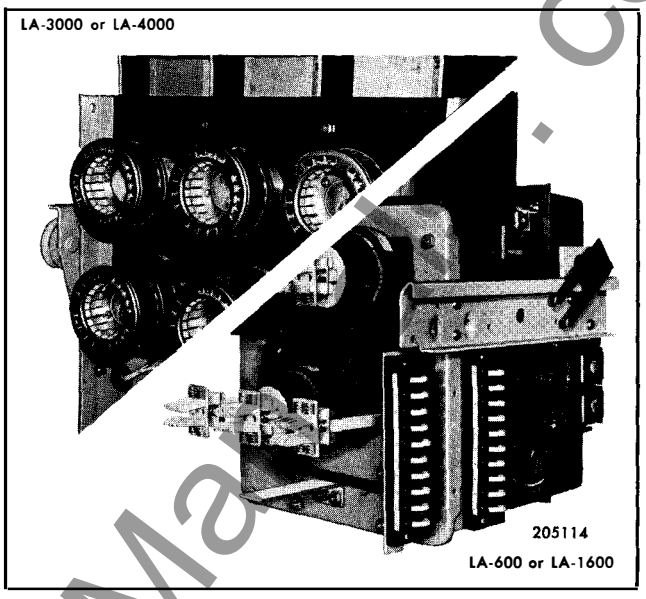
Teflon Lubricated Breaker Guide Rails

A Teflon coating results in low friction guide rails for ease in removal and insertion of the low voltage power circuit breaker.

Primary Disconnects

Primary circuit connections between the removable circuit breaker and the switchgear assembly are made by sets of silver-plated contacts on the circuit breaker with silver-plated stationary contacts in breaker compartment. The finger contacts are mounted on the studs of the circuit breaker, facilitating inspection and maintenance. The stationary contacts are mounted on a solid *Pyro-Shield* insulation molding which is bolted to the rear wall of the breaker cubicle.

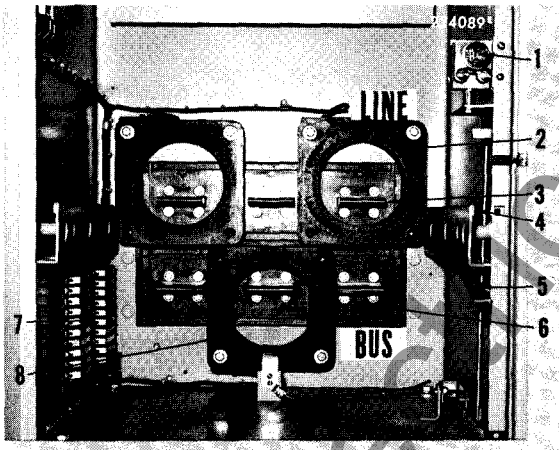
Primary disconnecting devices are arranged so that contact is made only when the removable circuit breaker is in the operating or "connected" position. In the "test" position the primary contacts are separated by a safe distance.



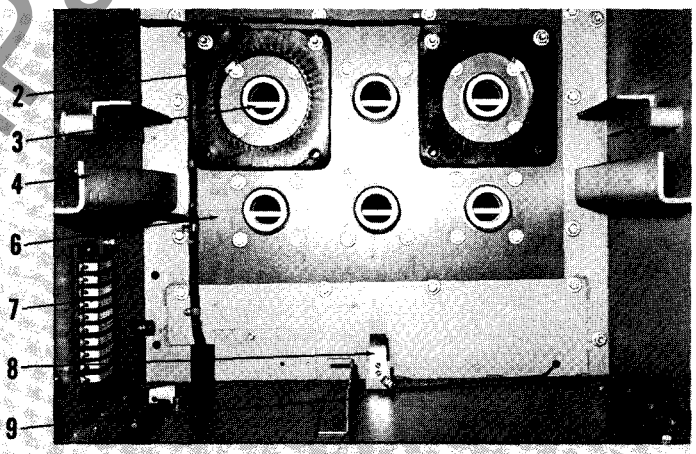
Design of movable primary disconnects.

Firm contact pressure is maintained by means of spring-steel back-up springs. As the circuit breaker is moved into the operating position, the wiping action of the self-aligning contacts assures low contact resistance.

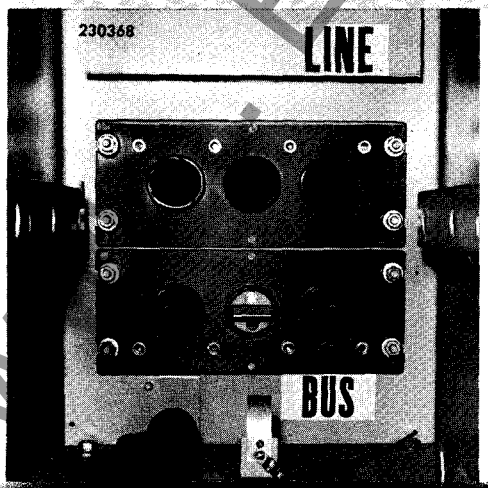
LA-600 or LA-1600



LA-3000 or LA-4000

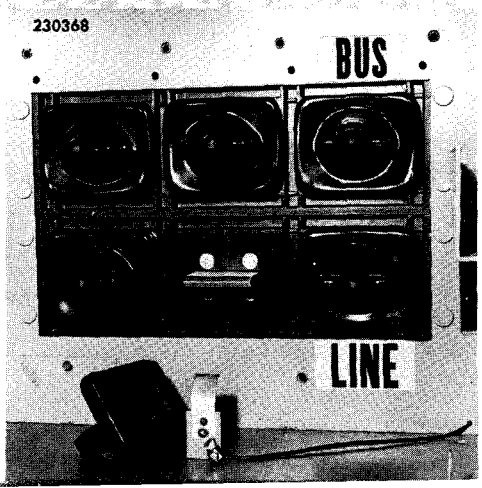


1. Key Interlock
2. Front Access Current Transformers
3. Stationary Primary Connections
4. Teflon Lubricated Guide Rails
5. Breaker Drawout Stop
6. *Pyro-Shield* Primary Disconnect Support Molding
7. Stationary Secondary Disconnects
8. Breaker Ground Contact
9. Safety Interlock



LA-600

To prevent accidental contact with live parts, molded PVC boots are used to cover the primary contacts of cubicles arranged for future addition of breakers.



LA-1600

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Secondary Disconnects

Control of secondary circuit connections between the circuit breaker and stationary switchgear structure are made by means of automatic, self-aligning, multi-contact, silver plated, slip-type connectors.

The contact surfaces in the stationary element are heavily silver plated copper strips and mounted on a sturdy molded base of *Pyro-Shield* insulation. These contact surfaces are recessed to properly guide the movable fingers and to prevent accidental short-circuiting of the control circuits.

The movable secondary disconnect elements are located on the lower left side of the low voltage power circuit breaker, well below the arc quenching area to avoid contamination from rapidly rising arc product gases. With the panel door open, the engagement of the secondary disconnecting elements is clearly visible to the operator.

The secondary connections make contact when the breaker is in both the "test" and "connected" positions.

Current Transformers
Metering and Relaying Accuracy Classes

LA-600 BREAKER COMPARTMENT (ME-3)

Ratio Amperes	Burden					Relaying
	B-0.1	B-0.2	B-0.5	B-1.0	B-2.0	10C
100:5	0.6	2.4	—	—	—	10
150:5	0.6	2.4	—	—	—	10
200:5	0.6	1.2	—	—	—	15
250:5	0.6	1.2	—	—	—	15
300:5	0.3	0.6	0.6	—	—	20
400:5	0.3	0.3	0.6	0.6	—	25
500:5	0.3	0.3	0.6	0.6	—	30
600:5	0.3	0.3	0.6	0.6	—	40
800:5	0.3	0.3	0.3	0.6	0.6	50

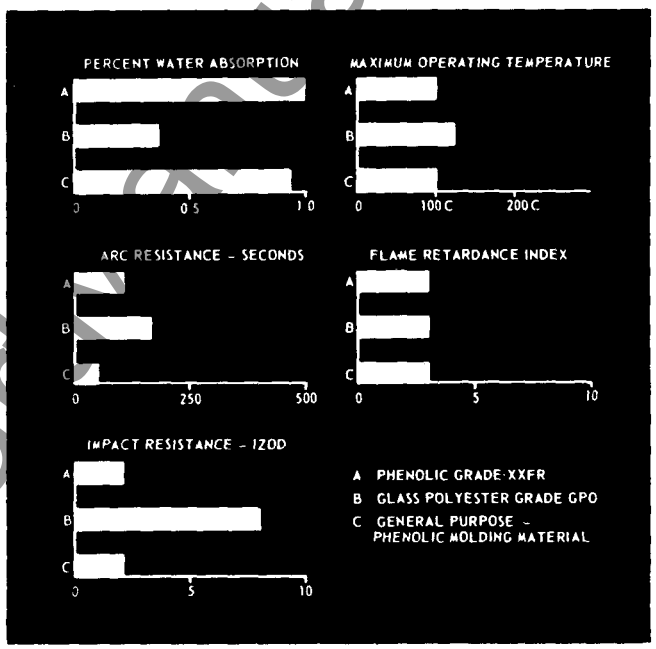
LA-1600, LA-3000, LA-4000 BREAKER COMPARTMENTS (ME-4, ME-5, ME-6)

Ratio Amperes	Burden					Relaying
	B-0.1	B-0.2	B-0.5	B-1.0	B-2.0	10C
400:5	0.3	0.3	0.6	1.2	1.2	40
500:5	0.3	0.3	0.3	0.6	1.2	50
600:5	0.3	0.3	0.3	0.6	1.2	60
800:5	0.3	0.3	0.3	0.6	0.6	75
1000:5	0.3	0.3	0.3	0.3	0.3	100
1200:5	0.3	0.3	0.3	0.3	0.3	115
1500:5	0.3	0.3	0.3	0.3	0.3	130
2000:5	0.3	0.3	0.3	0.3	0.3	150
2500:5	0.3	0.3	0.3	0.3	0.3	170
3000:5	0.3	0.3	0.3	0.3	0.3	185
4000:5	0.3	0.3	0.3	0.3	0.3	200

Potential Transformers 1 ∅ 480/120 V, 288/120 V	
Voltampere Rating	100
Thermal VA Rating	500
Accuracy	
W	0.6
X	0.6
Y	1.2

Insulation Integrity

Track-resistant *Pyro-Shield* insulation is used throughout in the coordinated insulation system and designed to provide liberal creepage allowances. *Pyro-Shield* insulation, a Fiberglas-reinforced polyester material, has high impact strength which eliminates risk of damage due to short circuit stress and assures low moisture absorption. Other advantages are high flame retardance, long life — even at high temperatures — plus high resistance to chemical fumes.



Characteristics of phenolic "X" F.R. and glass polyester "GPO" are compared to general purpose phenolic materials.

Polyester-Glass and Phenolic Property Comparisons

Property	Polyester-Glass	Phenolics
Relative Insulating Property Comparisons (Percent)		
Arc Resistance	2000-2500	100
Impact Strength	500-600	100
Dielectric Strength	150	100
Dielectric Strength (after heat application)	200	100
Dielectric Strength (after immersion in water for 24 hours)	600	100
Additional Comparisons		
Water Absorption (percent in 24 hours)	4	1.6
Water Absorption After Heat (conditioned for 200 hrs at 150 degrees)	7	4.0
Power Factor (at one megaHertz)	1.5	7.0
Power Factor (at 60 Hertz)	2.0	40.0
Acid Resistance	Good	Fair
Alkali Resistance	Good	Fair

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Main and Ground Bus

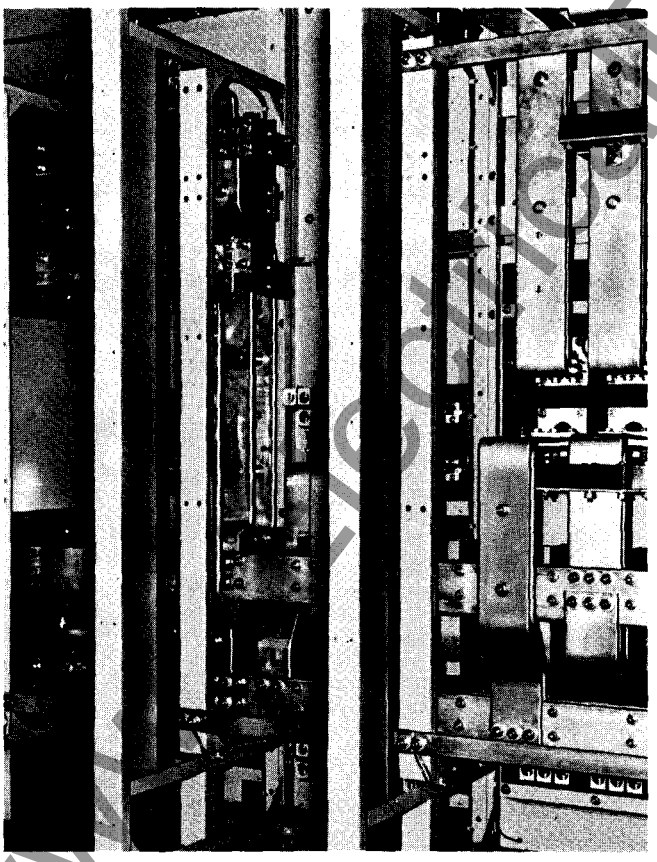
The main bus extends through all units in the metal-enclosed switchgear assembly. It is fabricated from aluminum conductor alloy 6101-T63, an aluminum-magnesium-silicide type. Comparisons of the properties of this material with hard drawn copper are shown in the table below.

MATERIAL PROPERTIES

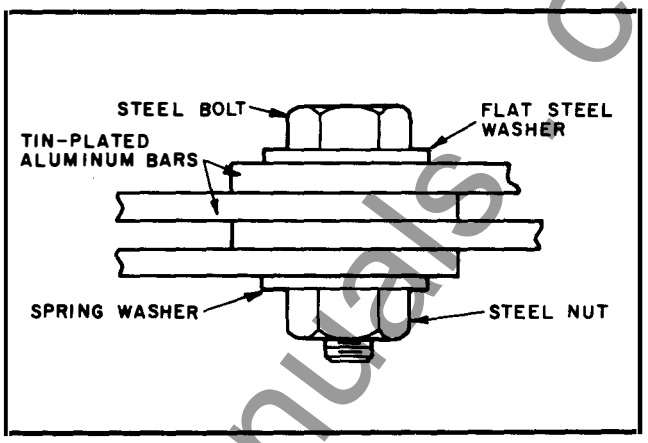
Property	Aluminum 6101-T63	Copper Hard Drawn
Weight — lbs/cu. in.	0.098	0.321
Electrical conductivity, % IACS @ 20 C	56	98
Tensile strength — lbs/sq. in.	27,000	35,000 - 55,000
Yield strength — lbs/sq. in.	22,000	25,000 - 50,000
Resistivity @ 20 C — microhm in.	1.2121	0.67879
Coefficient of expansion — per deg. C	0.000023	0.000016

All bars are tin plated. The bus is supported and braced to adequately withstand the shocks and magnetic stresses caused by fault currents of a magnitude corresponding to the interrupting rating of the associated low voltage power circuit breakers.

The assembly is equipped with a ¼" x 3" completely tin-plated ground bus extending through the entire assembly and securely bolted to the structure.

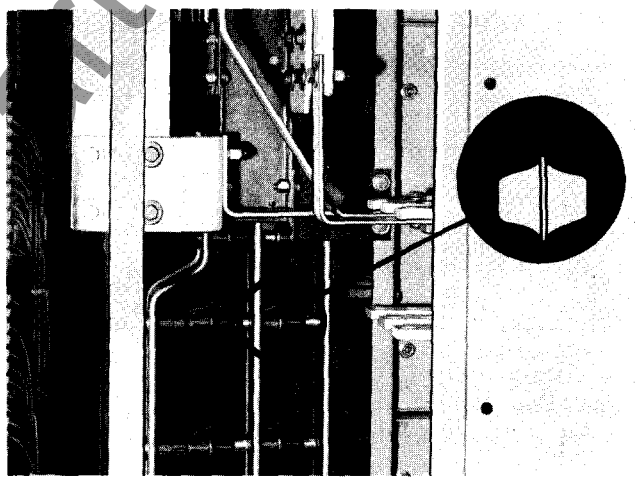


The main bus extends through all units and is connected to each circuit breaker with vertical risers and horizontal members.



Aluminum bus joint connection. Low contact resistance and low unit stress on the aluminum are assured by using a large flat steel washer, a spring (conical) washer, and a properly torqued high strength steel bolt.

The high momentary strength provided by the edge to edge bus bar arrangement is coupled with high creepage distance *Pyro-Shield* insulation to provide the ultimate in bus bar bracing. Post type *Pyro-Shield* insulators between vertical risers and structural shapes fitted on edge between main horizontal bars result in effective creepage prevention. Vertical surfaces inherent with the high strength post insulators and edge-wise situated structural shapes oppose dust buildup between conductors and extend the creepage distance.



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Bus bar arrangement coupled with high creepage distance insulation design provides the ultimate in bus bar bracing.

Framework and Compartmentation

The framework of Type ME low voltage switchgear is constructed of preformed steel channels and angles bolted together and reinforced to form a rigid, self-supporting, compact assembly. Compartments housing each low voltage power circuit breaker are welded steel sub-assemblies mounted within the framework to form the complete switchgear assembly. The top, side, and rear sections are fitted with removable steel sheets securely bolted to the framework forming a rigid assembly. Where two vertical breaker sections are to be

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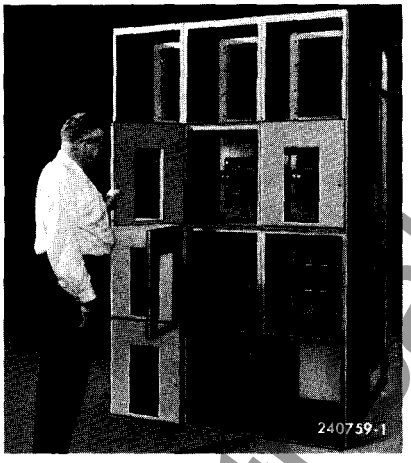
mounted together side by side, there are two steel barriers between adjacent circuit breaker compartments. Transfer of arc product gases directly from one breaker compartment to another is not possible.

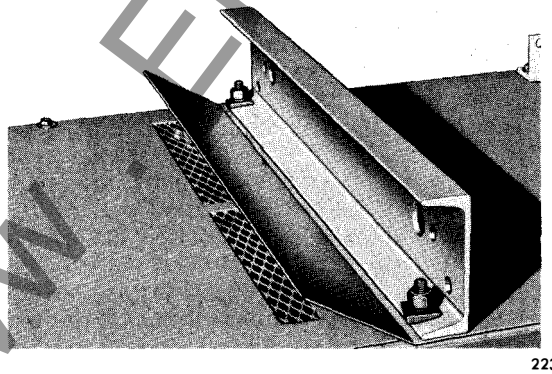
Ample space provided for incoming cables.



Type ME, 600-volt metal enclosed switchgear cubicles.

Exhaust Port

Exhaust of Arc Product Gases is through a baffled top rear wall port in each breaker compartment to a chimney area for eventual venting through the roof of the switchgear *and not into* adjacent breaker compartments.



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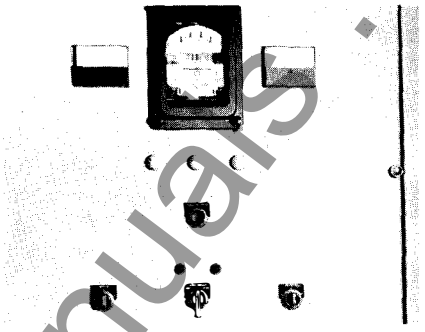
Top view of Type ME low voltage switchgear showing baffled exhaust port for exhausting arc product gases.

Instrumentation

Meters and switches for main bus metering are normally grouped on a panel above the main breaker.



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Typical instrument panel for main bus metering with ammeter and switch, watthour meter, voltmeter and switch, ground detection lights with test switch, and circuit breaker control switch with red and green lights.

Ammeters and switches for feeder circuits can be mounted on each breaker compartment door. This location prevents mistakes in associating the circuit being metered with the breaker. A three-way selector switch allows easy reading of each phase.

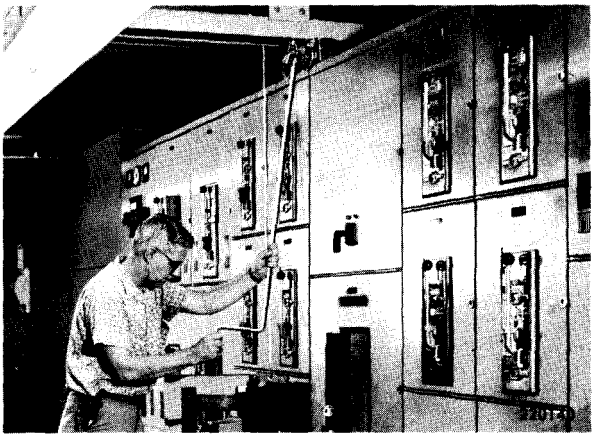
Standard indicating instruments are rectangular, with 2 percent accuracy, semi-flush mounted. Standard meter transfer and breaker control switches are miniature rotary type.

In addition to the ammeter and switch, a circuit breaker control switch with red and green lights and current test blocks may also be mounted on the feeder breaker compartment door.

Traveling Crane — Optional

A crane for ease of breaker handling, which is mounted on top of each switchgear group, travels along rails to locate above any unit. To remove a breaker it must first be drawn completely out and the lifting yoke attached forming a two point lift. Then the hook from the crane is connected to the yoke and by turning a crank which reels up the cable attached to the hook, the breaker is raised or lowered.

The lifting channels used to position the switchgear group are relocated to provide the crane rails.



Handling LA-600 power circuit breaker with optional top-mounted traveling crane.

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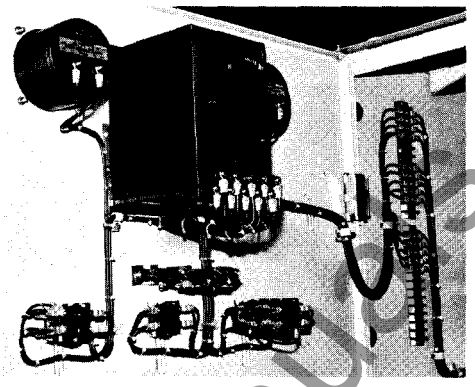
Ground Connection

A ground contact on the removable low voltage power circuit breaker engages with the ground circuit through a contact in the breaker compartment in both the "test" and "connected" positions.

Control Wiring

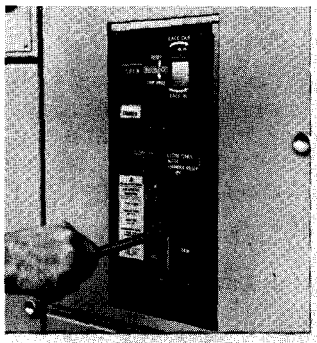
All secondary and control wiring is No. 14 standard copper conductor insulated with thermo-plastic poly-vinyl chloride insulation, with a flame-retardant finish.

The control wiring from each breaker, including connections from the extra contacts on the auxiliary switches, is brought to terminal blocks equipped with marker strips.



Control wiring in meter compartment held neatly and firmly with nylon Ty-raps.

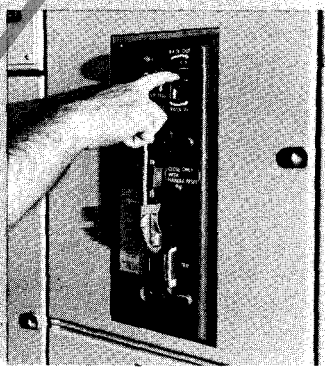
Manual Breaker Operation



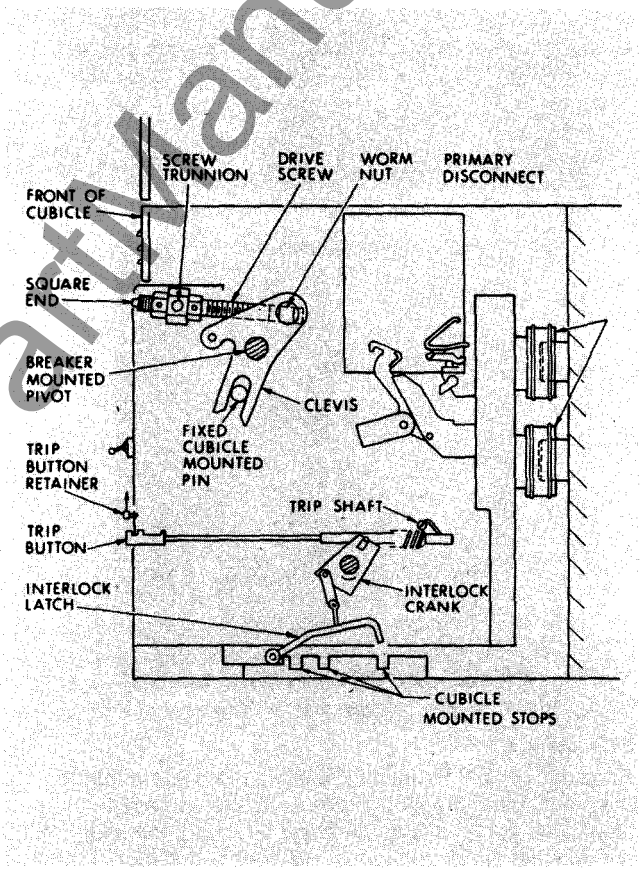
A. A single, complete downward movement of the handle manually charges the circuit breaker closing springs.

B. With the manual handle returned to vertical position, the closing lever is depressed releasing the spring energy and closing the breaker contacts.

C. Depressing the manual trip lever opens the circuit breaker contacts.



D. Depressing the interlock shutter exposes the racking screw. With the shutter depressed, the breaker is in the "trip-free" position and cannot be closed. The breaker can now be racked into or out of the compartment.



Drawout Interlocks LA-3000 and LA-4000

For withdrawal, the *trip button* retainer is raised to allow full travel of the *trip button;* the *retainer* is lowered to maintain the *trip button* in the depressed position. The *trip shaft* is thereby rotated to open the breaker contacts and the *interlock crank* raises the *interlock latch* from the cubicle mounted racking stops. When the *operating crank* is inserted over the square end of the *drive screw* and then rotated, the *drive screw* will move the *clevis* against the fixed pin, mounted on the cubicle side wall. This action draws the breaker away from the *primary disconnect studs.* The *retainer* is then released, and the *breaker* racked out until the *interlock* drops into the *stop* associated with the test position.

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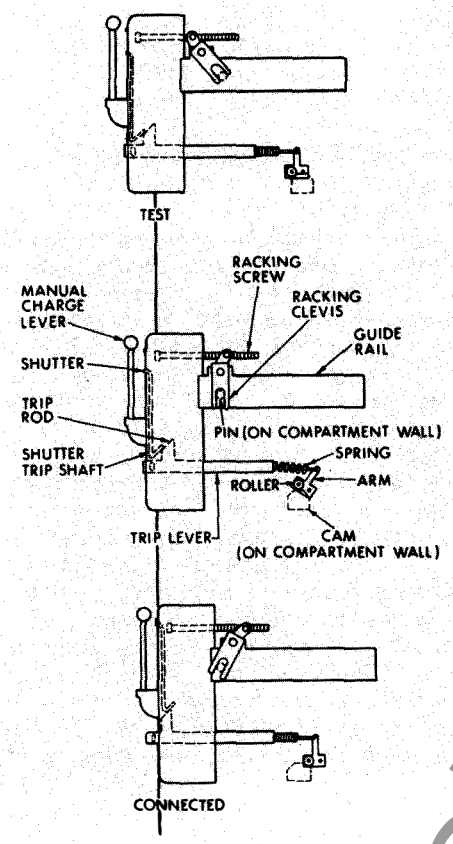
Drawout Interlocks LA-600 and LA-1600



In order to rack the breaker out of its compartment, a shutter must be opened to gain access to the racking screw. As the shutter door is opened, a shaft connected to it moves downward and slides down the trip rod on the trip lever, forcing it to trip the breaker. As long as the shutter is open, the breaker is "trip-free," and cannot be closed.

This interlock arrangement prevents:

Racking the breaker in or out while it is closed.

As the breaker is racked in or out between the "test" and "connected" positions, a roller rides up the cam which is mounted on the compartment wall. The roller raises an arm which is connected to a spring on the trip lever that trips the breaker. The breaker can be closed only if the roller is in the lower (test or connected) position. When the roller is in the upper (between test and connected) position, the breaker is trip-free — it cannot be closed or held in the closed position electrically or mechanically.

This interlock arrangement prevents:

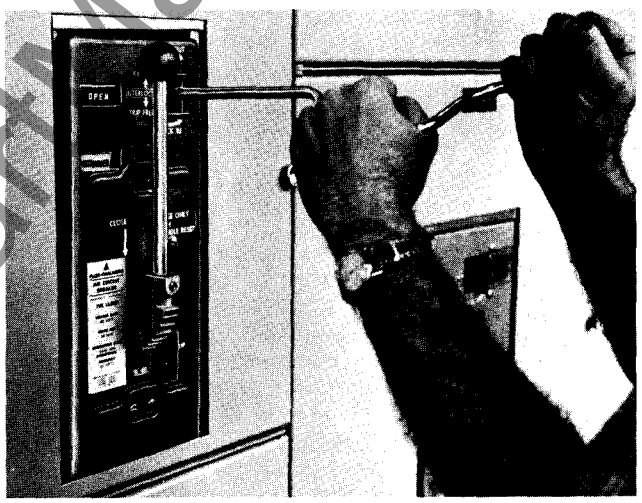
Movement of the circuit breaker to or from the "connected" position when it is in the closed position.

Closing of the circuit breaker until the primary disconnecting devices are either in full contact or are separated by a safe distance.

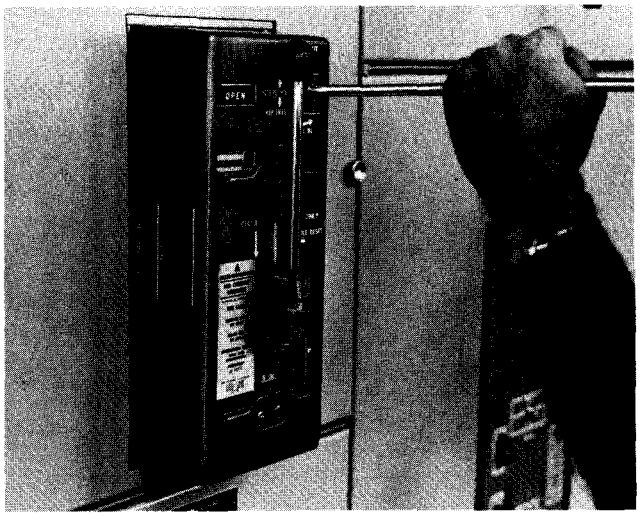
Racking

Racking the breaker in or out is accomplished by operating a racking screw with a crank as shown in the illustrations. The screw operates a clevis on each side of the breaker that fits into a pin mounted on the compartment wall. The motion of the clevis around the stationary pin moves the breaker in or out of the compartment.

When the breaker is completely racked in it is said to be in the "connected" position. This is the normal operating position. As it is drawn out it passes into a "test" position where the primary disconnects do not make contact, but the secondary circuits are connected. In this position the breaker may be opened and closed for testing without energizing the load. Beyond the test location the breaker is in the "disconnected" position where no contact is made. Racking of the breaker can be done while the compartment door is open or closed.



The breaker racking crank is inserted and connected onto the racking screw.



The circuit breaker is now racked horizontally along the guide rails from the "connected" to the "disconnected" position with the compartment door closed.

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STATIC OVERCURRENT TRIPPING SYSTEM

Static overcurrent tripping has been standard on the LA line of circuit breakers since 1962. The tripping system was re-designed in 1971 to make use of the latest integrated circuit components and is called Static Trip II.

The Static Trip II system provides the following features:

Ease and accuracy in making field adjustments.

Excellent repeatability.

Negligible change in characteristics with normal temperature variations.

Continuous pick-up adjustment over a wide range — no taps to change.

Ground current tripping available without an external relay.

Simple field testing without need of a primary current source — portable test set available as an option.

Minimum maintenance — only one moving part.

Simple breaker rating change.

Flexibility — many combinations available including long time delay, short time delay, instantaneous and ground fault elements in the same device.

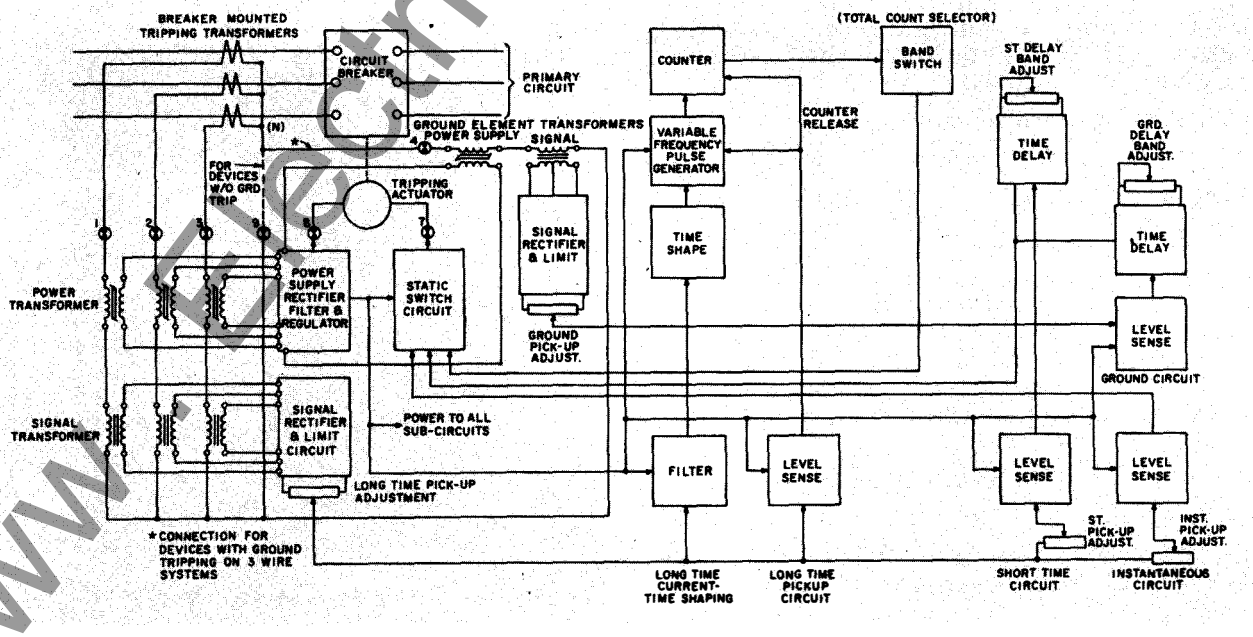
The tripping system is completely contained on the circuit breaker. The power for tripping the breaker and for operating the solid state circuitry in the static trip device is drawn from the primary current through tripping current transformers mounted on the breaker. Four-wire ground applications include a fourth current transformer mounted in the cable compartment. A signal, proportional to primary current, is taken from these same tripping transformers. This signal is applied to the static trip device and causes it to operate the tripping actuator to trip the breaker in accordance with a pre-set time delay versus current magnitude relationship.

A block diagram of the static trip system is shown below. The power supply and signal transformers step the secondary current of the tripping transformers down to a level suitable for the solid state circuits. The power supply transformers, unlike the signal transformers, do not need to maintain a constant ratio and are therefore designed to saturate so as to limit maximum power input to the static trip device.

The desired time-current relationship of the long time delay circuit is accomplished as follows: a pulse generator and time shaping circuit in combination produce a train of pulses whose frequency is proportional to approximately the square of the primary current. Both the pulse generator and counter are blocked when the signal is below the pickup level. If the signal reaches the pickup level, both the pulse generator and counter are released, and counting of pulses begins. The counter is a 7-stage binary counter which produces an output from the first stage after one count, from the second stage after two counts, from the third stage after four counts, and so on up to 64 counts for the last stage. The time band switch selects the counter stage which is connected to operate the tripping actuator through the static switch circuit. This scheme results in each time band having a delay precisely twice that of the next lower band.

The tripping transformer neutral (N) is wired to terminal 9 for systems without ground tripping and to terminal 4 for 3 wire systems with ground fault tripping. Ground fault protection is available for 4-wire circuits also with only the addition of an external tripping transformer.

Adjustment knobs are available on the front of the static trip unit for all the applicable adjustments shown in the block diagram.



The static overcurrent tripping system consists of tripping current transformers, static trip device, and tripping actuator.
Type TSIG *Static Trip* II is shown connected for a 3-wire application.

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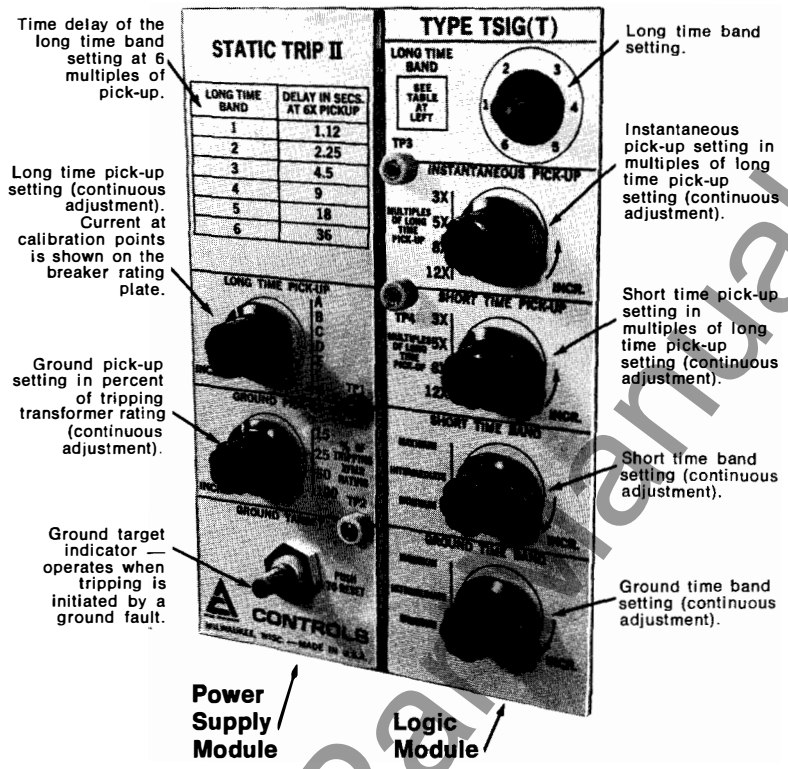
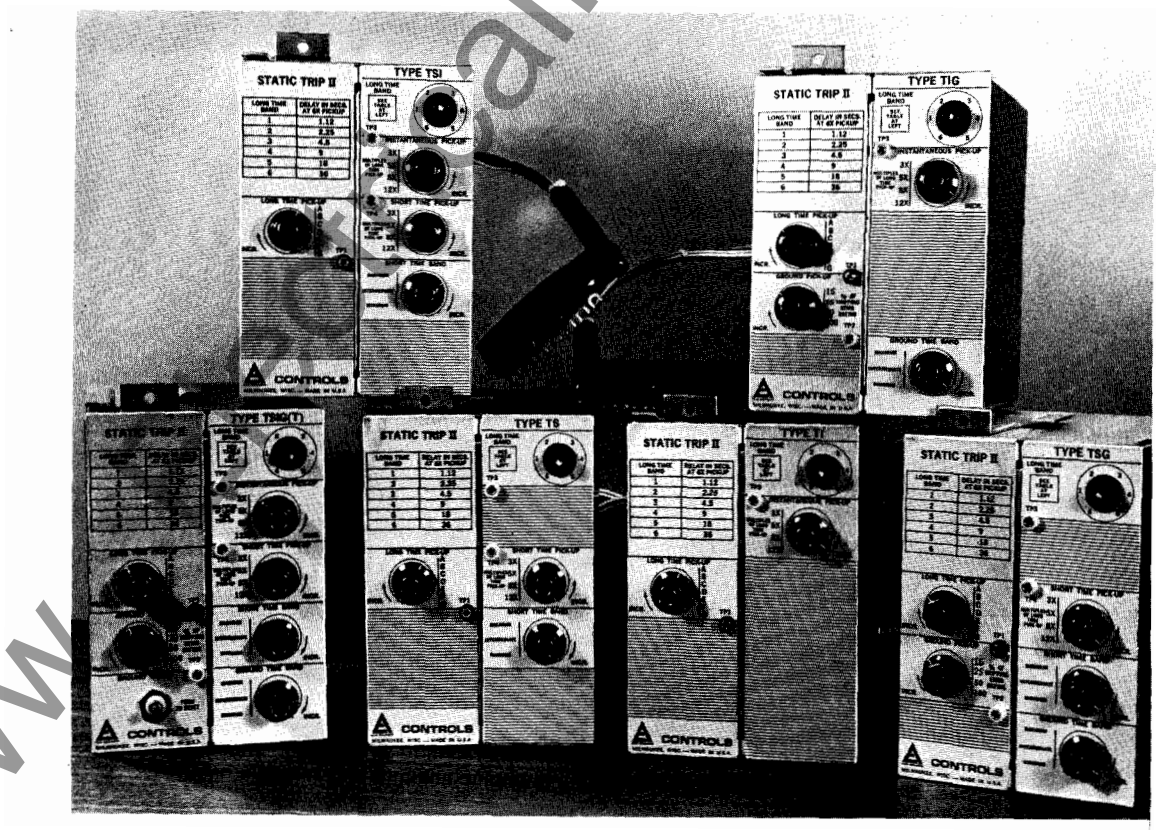


Static Trip II face showing pickup and band adjustments and ground target indicator.



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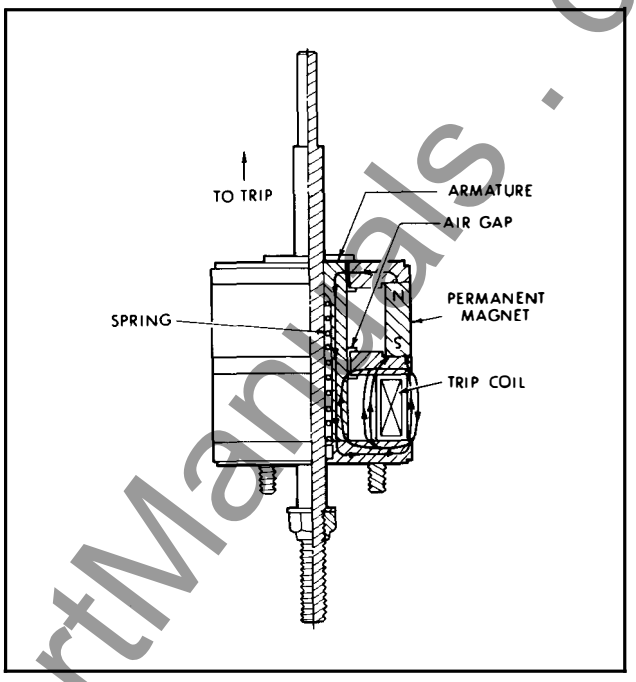
Tripping Actuator

Fast action tripping of the breaker is achieved with a low energy flux-shifting tripping actuator. When the breaker is in the closed position, the spring is reset mechanically and held in that position by a permanent magnet. Most of the flux from the magnet flows through the armature rather than through the higher reluctance path of the air gap inside the coil. The magnetic force holds the armature and spring firmly in position. When the flux-shifting coil is energized by the static trip device, the flux of the coil and air gap cancels the flux of the permanent magnet, releasing the armature which allows the spring to act to trip the breaker.



Tripping actuator

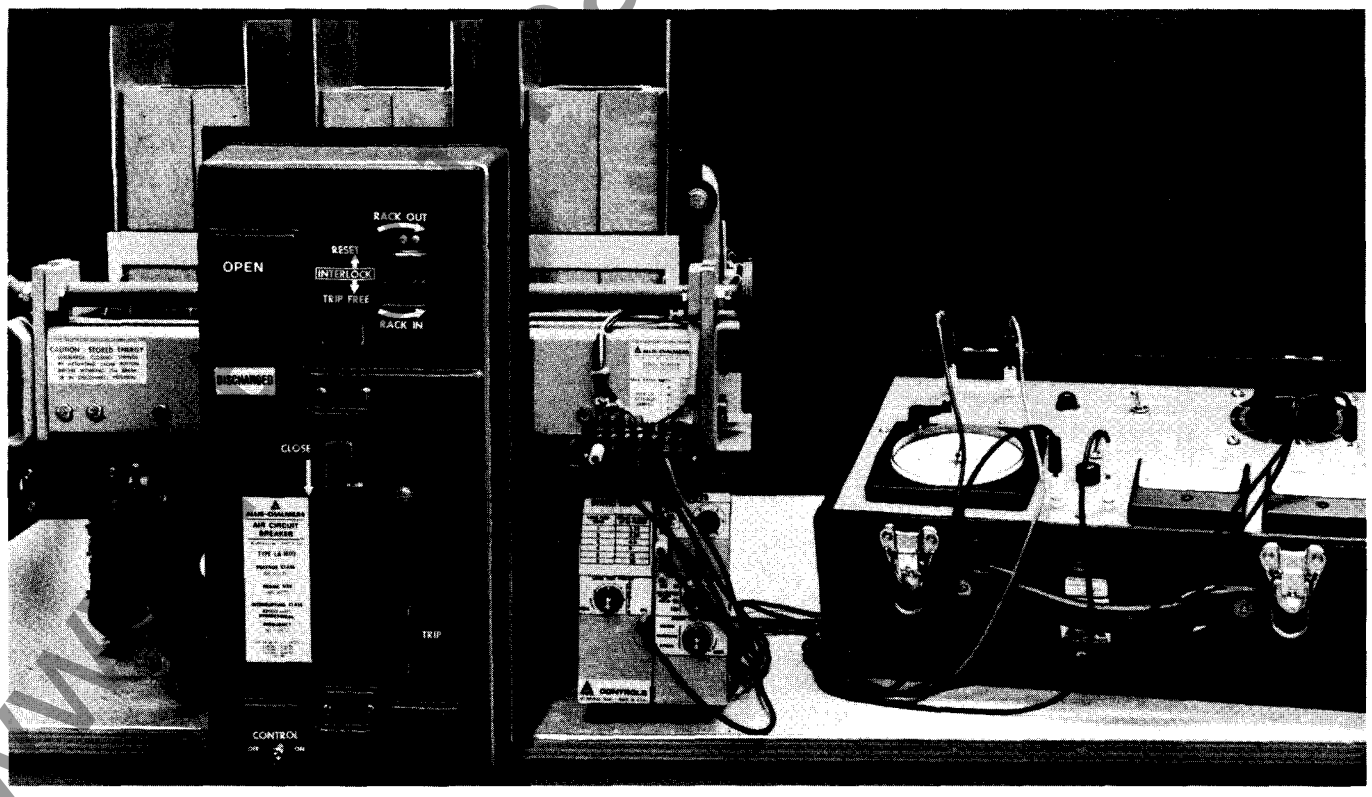
Temperature Range of Operation

Operation of the static tripping system is extremely stable over a wide range of temperature. From −40 C to 55 C (−40 F to 131 F) the variation from performance at room temperature is less than 10 percent in pick-up value and timing. If they must be operated in environments beyond these limits, heating or ventilation is recommended.

Field Testing

Static tripping enables simple and economical field testing of the static trip devices. An inexpensive portable test set using 115-volt power is available to make function and timing tests to indicate if the device is working properly. Operation of a circuit breaker may also be checked by whether or not it trips when supplied an appropriate signal.

Portable test set is shown being used on a breaker removed from its cubicle. The test set may also be used with the breaker in "test" or "disconnected" positions in its cubicle.



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CIRCUIT BREAKER DATA

Control Data

	LA-600				LA-1600			
	115 V ac	230 V ac	125 V dc	250 V dc	115 V ac	230 V ac	125 V dc	250 V dc
Closing Voltage Range (at Motor Terminals)	95-125	190-250	90-130	180-260	95-125	190-250	90-130	180-260
Current of Spring Charge Motor:								
Cutoff Value — Amperes	0.43	0.28	0.39	0.25	0.6	0.41	0.56	0.35
Inrush Value — Amperes	1.05	1.47	1.90	0.98	1.2	1.10	1.96	1.00
Shunt Trip Voltage Range (at Coil)	95-125	190-250	70-140	140-280	95-125	190-250	70-140	140-280
Tripping Current (Seal-in — Amperes)	2.4 *	1.3	2.8	1.55	2.1	1.0	2.86	1.8
Spring Release Coil (Cutoff Value — Amperes)	1.5	0.77	3.0	1.44	2.15	1.0	3.13	1.74
Y-Relay Current (Cutoff Value — Amperes)	0.1	0.05	0.093	0.046	0.1	0.05	0.093	0.046

Control Data (continued)

	LA-3000				LA-4000			
	115 V ac	230 V ac	125 V dc	250 V dc	115 V ac	230 V ac	125 V dc	250 V dc
Closing Voltage Range (at Motor Terminals)	95-125	190-250	90-130	180-260	95-125	190-250	90-130	180-260
Current of Spring Charge Motor:								
Cutoff Value — Amperes	10.40	4.95	7.85	3.42	10.40	4.95	7.85	3.42
Inrush Value — Amperes	16.20	10.00	27.00	10.40	16.20	10.00	27.00	10.40
Shunt Trip Voltage Range (at Coil)	95-125	190-250	70-140	140-280	95-125	190-250	70-140	140-280
Tripping Current (Seal-in — Amperes)	0.34	0.17	3.56	1.78	0.34	0.17	3.56	1.78
Spring Release Coil (Cutoff Value — Amperes)	2.00	1.00	5.06	2.75	2.00	1.00	5.06	2.75
Y-Relay Current (Cutoff Value — Amperes)	0.1	0.05	0.093	0.046	0.1	0.05	0.093	0.046

Operating Time (60 Hertz basis)

	LA-600	LA-1600	LA-3000	LA-4000
Time from Energizing Shunt Trip Coil Until (Cycles):				
Contacts Part	1.5-3.0	1.5-2.5	2.0-3.0	2.0-3.0
Contacts Fully Open	2.2-3.7	2.2-3.5	3.0-4.0	3.0-4.0
Time from Energizing Closing Control Relay Until (Cycles):				
Contacts Touch	3.0-5.0	3.0-5.0	2.0-4.0	2.0-4.0
Contacts Fully Close	3.3-5.3	3.3-5.3	2.5-4.5	2.5-4.5
Average Spring Charging Time (Seconds):				
Minimum Voltage	20	23	1.3	1.3
Nominal Voltage	15	16	1.2	1.2
Maximum Voltage	9	6	1.1	1.1

Physical Design

	LA-600	LA-1600	LA-3000	LA-4000
Net Weight:				
Manual	100	185	—	—
Electric	125	195	475	525
Length of Break (Inches):				
Minimum Between Mains	1¼	1¼	1 3/16	1 3/16
Between Arcing Contacts	1⅝	1⅝	1 15/16	1 15/16

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STATIC TRIP II
Rating Table — Amperes

Breaker Type and Frame Size	Tripping XFMR Rating (Primary)	Long Time Element Calibrated Pick-Up Settings							Max Cont Rating	Ground Element Calibrated Pick-Up Settings			
		A	B	C	D	E	F	G		15%	25%	50%	100%
LA-600 600 Amperes	80	40	50	60	70	80	90	100	100	—	—	40	80
	200	100	125	150	175	200	225	250	250	30	50	100	200
	400	200	250	300	350	400	450	500	500	60	100	200	400
	600	300	375	450	525	600	675	750	600	90	150	300	600
LA-1600 1600 Amperes	200	100	125	150	175	200	225	250	250	—	50	100	200
	400	200	250	300	350	400	450	500	500	60	100	200	400
	800	400	500	600	700	800	900	1000	1000	120	200	400	800
	1600	800	1000	1200	1400	1600	1800	2000	1600	240	400	800	1600
LA-3000 3000 Amperes	2000	1000	1250	1500	1750	2000	2250	2500	2500	300	500	1000	2000
	3200	1600	2000	2400	2800	3200	3600	4000	3000	480	800	1600	3200
LA-4000 4000 Amperes	4000	2000	2500	3000	3500	4000	4500	5000	4000	600	1000	2000	4000

General Notes

1. The "Tripping XFMR Rating" values represent the primary value of the current transformer ratio in amperes. The secondary value is one ampere.
2. The pick-up settings of the long time element are continuously adjustable, and are calibrated at points "A" thru "G" as shown in the rating table.
3. The pick-up settings of the instantaneous and short time delay elements are continuously adjustable, and are calibrated at 3, 5, 8 and 12 multiples of the long time pick-up setting.
4. The pick-up settings of the ground elements are continuously adjustable, and are calibrated in percent of the tripping transformer rating as shown in the rating table.
5. The long time element has 6 bands which are field selectable. The time delay at 6 multiples of pickup is as follows:

   Band 1 — 1.12 seconds Band 4 — 9 seconds
   Band 2 — 2.25 seconds Band 5 — 18 seconds
   Band 3 — 4.5 seconds Band 6 — 36 seconds
6. The short time element and ground element have 3 bands which are calibrated at minimum, intermediate and maximum, but are continuously adjustable.
7. The maximum interrupting time is the maximum length of time that fault current flows, including arcing time.
8. The lower limit of ground fault recognition is 25 amperes for an LA-600 breaker and 40 amperes for an LA-1600 breaker.

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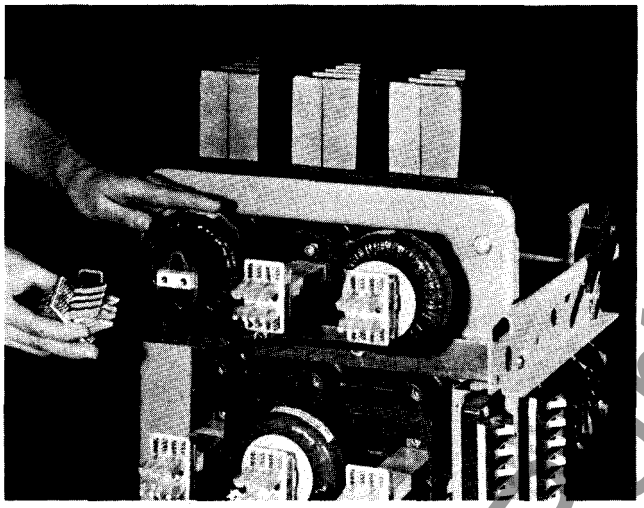
Simplified Breaker Rating Change

The continuous rating of the circuit breaker may be readily changed in the field by replacing the tripping current transformers mounted on the circuit breaker studs. The CT rating, listed in primary amperes, will be found on the rating plate of each circuit breaker. Whenever a breaker rating is changed, a new rating plate is furnished.



Current transformers send secondary low voltage signal to trip device proportional to primary current.

Typical Breaker Rating Plate

SERIAL NO. _____

TRIPPING XFMR RATING _____/1A

LONG TIME PICK-UP IN AMPERES

A_____ B_____ C_____

D_____ E_____ F_____

G_____ MAX. CONT. CURRENT _____

WIRED PER - _____

MILWAUKEE, WIS.
MADE IN U.S.A.

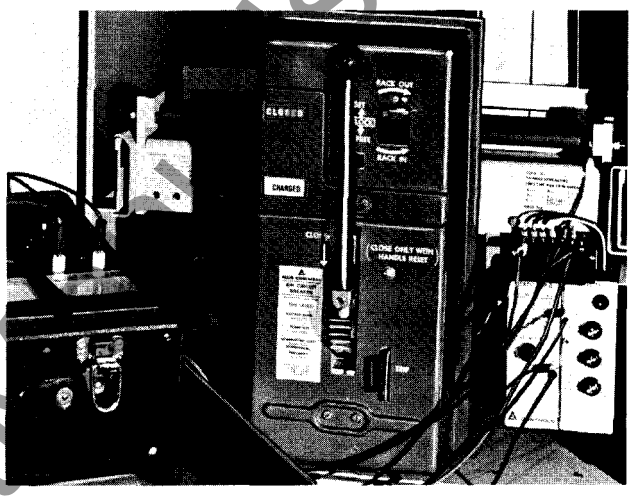
CONTROLS

Ground Target Indicator (Optional)

Trip devices which are provided for sensitive ground fault protection can be furnished with a ground target indicator. This unique device gives a visual indication of a trip initiated by a ground fault. A red button pops out of the face of the trip device when a ground fault causes a breaker to trip. It is reset by simply depressing the red button.

Trip Device Accessibility

Located in the lower right side of the breaker compartment, the trip device is easily accessible to the operator for simple adjustment of all settings.



Plug-in test points on front of trip device allow testing in the breaker "test" position.

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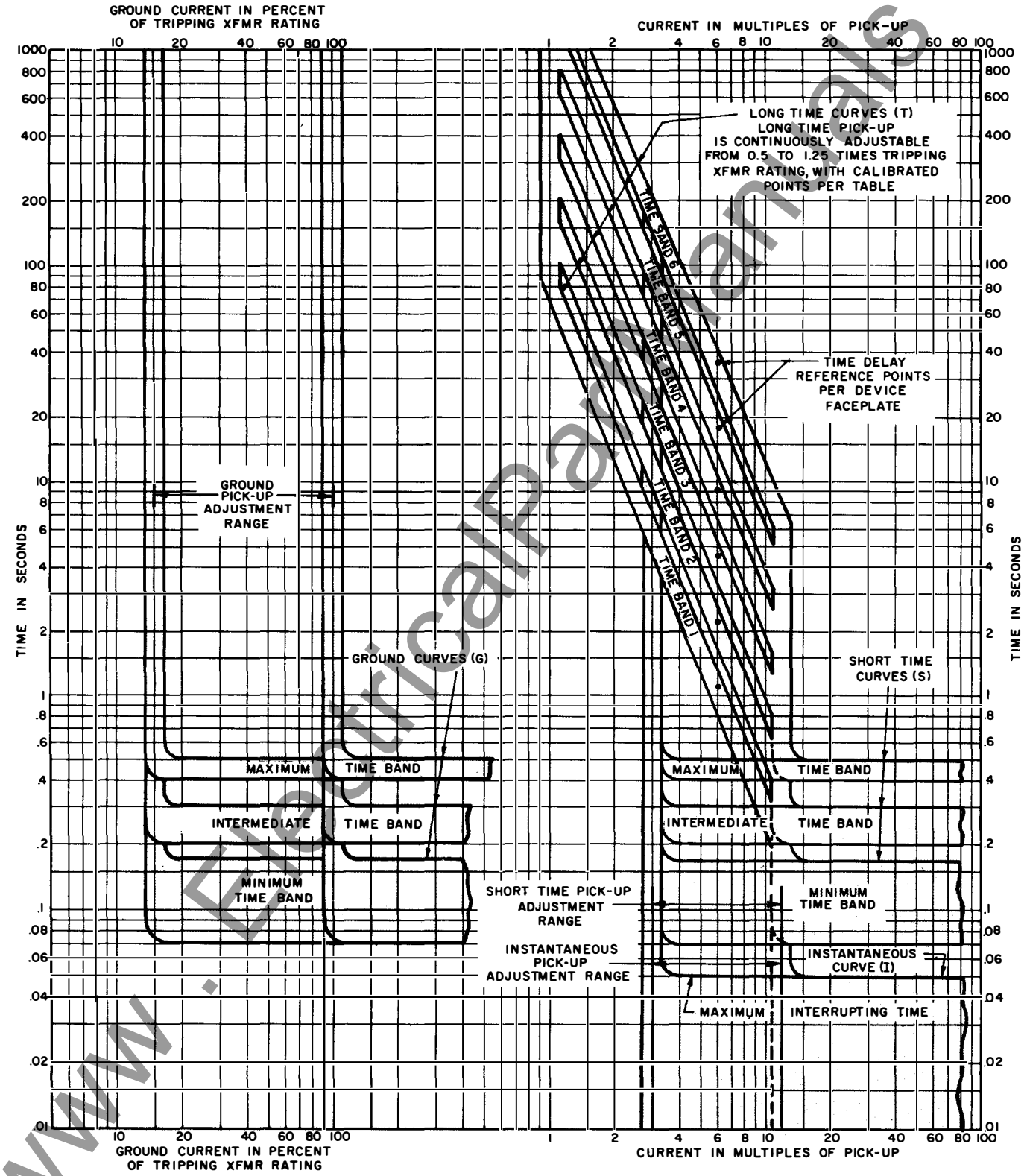
STATIC TRIP II
Time Current Characteristics



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TYPES OF *STATIC TRIP II* DEVICES AVAILABLE

Type TI — A dual trip device normally used for phase overcurrent protection. The long time pick-up range is selected from the trip rating table and is continuously adjustable from "A" thru "G" in the field. The instantaneous element is continuously field adjustable from 3 to 12 multiples of the long time pick-up setting selected. The long time delay is field adjustable with a choice of six bands.

Type TIG (optional) — A dual trip device which provides phase overcurrent protection same as Type TI plus sensitive ground fault protection for 3-wire and 4-wire circuits on systems with either phase-to-phase or phase-to-neutral loading. Ground current pick-up settings are independent of the phase pick-up settings, and continuously adjustable in the field from 15% through 100% of the tripping transformer rating. When used on 4-wire circuits, a fourth tripping transformer is required. It is mounted in the cubicle, and wired to the breaker through secondary disconnects.

Type TIG(T) (optional) — Same as Type TIG, except a ground target is provided to give a visual indication of a trip initiated by a ground fault.

Type TS (optional) — A selective trip device used for phase overcurrent protection which provides time delay tripping only. It allows complete field adjustment of the long time band and pick-up plus the short time band and pick-up. The short time pick-up can be adjusted from 3 to 12 multiples of the long time pick-up setting. Any one of the three short time bands can be chosen to be used with any of the six long time bands.

Type TSG (optional) — A selective trip device which provides phase overcurrent protection same as Type TS plus sensitive ground fault protection for 3-wire and 4-wire circuits for systems with either phase-to-phase or phase-to-neutral loading. Ground current pick-up settings are independent of the phase pick-up settings, and continuously adjustable in the field from 15% through 100% of the tripping transformer rating. When used on 4-wire circuits, a fourth tripping transformer is required. It is mounted in the cubicle, and wired to the breaker through secondary disconnects.

Type TSG(T) (optional) — Same as Type TSG, except a ground target is provided to give a visual indication of a trip initiated by a ground fault.

Type TSI (optional) — A triple selective trip device used for phase overcurrent protection which provides long time delay, short time delay, and instantaneous elements. It allows complete field adjustment of the long time band and pick-up, the short time band and pick-up and the instantaneous pick-up. Both the short time and instantaneous elements can be adjusted to pick up at 3 to 12 multiples of the long time pick-up setting. Any one of the three short time bands can be chosen to be used with any of the six long time bands.

Type TSIG (optional) — A triple selective trip device which provides phase overcurrent protection same as Type TSI plus sensitive ground fault protection for 3-wire and 4-wire circuits on systems with either phase-to-phase or phase-to-neutral loading. Ground current pick-up settings are independent of the phase pick-up settings, and continuously adjustable in the field from 15% through 100% of the tripping transformer rating. When used on 4-wire circuits, a fourth tripping transformer is required. It is mounted in the cubicle, and wired to the breaker through secondary disconnects.

Type TSIG(T) (optional) — Same as Type TSIG, except a ground target is provided to give a visual indication of a trip initiated by a ground fault.

TRIP RATINGS
GENERAL NOTES
TIME CURRENT CHARACTERISTICS

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Table 1 — Ratings at 60 Hertz*

Voltage Ratings						
Rated Voltage, Volts	Rated Maximum Voltage, Volts	Frame Size Amperes	Insulation Level Dielectric Withstand, Volts	Short Circuit Rating (1) Symmetrical Amps	Short Time Rating (2) Symmetrical Amps	Continuous Current Rating, Amperes
600	630	600	2200	22,000	22,000	40-600
600	630	1600	2200	42,000	42,000	100-1600
600	630	3000	2200	65,000	65,000	1000-3000
600	630	4000	2200	85,000	85,000	2000-4000
480	500	600	2200	30,000	22,000	40-600
480	500	1600	2200	50,000	42,000	100-1600
480	500	3000	2200	65,000	65,000	1000-3000
480	500	4000	2200	85,000	85,000	2000-4000
240	250	600	2200	42,000	22,000	40-600
240	250	1600	2200	65,000	42,000	100-1600
240	250	3000	2200	85,000	65,000	1000-3000
240	250	4000	2200	130,000	85,000	2000-4000

*For frequencies less than 50 Hertz, the interrupting ratings at 600 volts apply.
(1) Use when breaker is equipped **with** instantaneous overcurrent trip device.
(2) Use when breaker is equipped **without** instantaneous overcurrent trip device.

Table 2 — 208 Volts

Transformer Rating 3 Ø KVA & % IZ	Max. Short Circuit KVA Available Primary System	Normal Load Continuous Amp.	Short Circuit Current Symmetrical Amperes			Recommended AC Breaker Type LA (See Table 1 for trip coil ratings)		
			Transformer Alone	50% Motor Load	Combined	M	F	S
300 5%	50,000	834	14900	1700	16600	1600	600	600
	100,000		15700		17400	1600	600	600
	150,000		16000		17700	1600	600	600
	250,000		16300		18000	1600	600	600
	500,000		16500		18200	1600	600	600
	Unlimited		16700		18400	1600	600	600
500 5%	50,000	1388	23100	2800	25900	1600	600	1600
	100,000		25200		28000	1600	600	1600
	150,000		26000		28800	1600	600	1600
	250,000		26700		29500	1600	600	1600
	500,000		27200		30000	1600	600	1600
	Unlimited		27800		30600	1600	600	1600
750 5.75%	50,000	2080	28700	4200	32900	3000	600	1600
	100,000		32000		36200	3000	600	1600
	150,000		33300		37500	3000	600	1600
	250,000		34400		38600	3000	600	1600
	500,000		35200		39400	3000	600	1600
	Unlimited		36200		40400	3000	600	1600
1000 5.75%	50,000	2780	35900	5600	41500	3000	600	1600
	100,000		41200		46800	3000	1600	3000
	150,000		43300		48900	3000	1600	3000
	250,000		45200		50800	3000	1600	3000
	500,000		46700		52300	3000	1600	3000
	Unlimited		48300		53900	3000	1600	3000

Table 3 — 240 Volts

Transformer Rating 3 Ø KVA & % IZ	Max. Short Circuit KVA Available Primary System	Normal Load Continuous Amp.	Short Circuit Current Symmetrical Amperes			Recommended Type LA Breaker (See Table 1 for trip coil ratings)		
			Transformer Alone	100% Motor Load	Combined	M	F	S
300 5%	50,000	722	12900	2900	15800	1600	600	600
	100,000		13600		16500	1600	600	600
	150,000		13900		16800	1600	600	600
	250,000		14100		17000	1600	600	600
	500,000		14300		17200	1600	600	600
	Unlimited		14400		17300	1600	600	600
500 5%	50,000	1203	20000	4800	24800	1600	600	1600
	100,000		21900		26700	1600	600	1600
	150,000		22500		27300	1600	600	1600
	250,000		23100		27900	1600	600	1600
	500,000		23600		28400	1600	600	1600
	Unlimited		24100		28900	1600	600	1600
750 5.75%	50,000	1804	24900	7200	32100	3000	600	1600
	100,000		27800		35000	3000	600	1600
	150,000		28900		36100	3000	600	1600
	250,000		29800		37000	3000	600	1600
	500,000		30600		37800	3000	600	1600
	Unlimited		31400		38600	3000	600	1600
1000 5.75%	50,000	2406	31000	9600	40600	3000	600	1600
	100,000		35600		45200	3000	1600	3000
	150,000		37500		47100	3000	1600	3000
	250,000		39100		48700	3000	1600	3000
	500,000		40400		50000	3000	1600	3000
	Unlimited		41800		51400	3000	1600	3000
1500 5.75%	50,000	3609	41200	14400	55600	4000	1600	3000
	100,000		49800		63200	4000	1600①	3000①
	150,000		53500		67900	4000	3000	4000
	250,000		56800		71200	4000	3000	4000
	500,000		59600		74000	4000	3000	4000
	Unlimited		62800		77200	4000	3000	4000

FOR TABLES 2 THROUGH 5

① Breakers are adequate for use with standard liquid-filled transformers only. For dry-type transformers, use next larger breaker.

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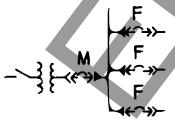
Table 4 — 480 Volts

Transformer Rating 3 Ø KVA & % IZ	Max. Short Circuit KVA Available Primary System	Normal Load Continuous Amp.	Short Circuit Current Symmetrical Amperes			Recommended AC Breaker Type LA (See Table 1 for trip coil ratings)		
			Transformer Alone	100% Motor Load	Combined	M	F	S
300 5%	50,000	361	6400	1400	7800	600	600	600
	100,000		6800		8200	600	600	600
	150,000		6900		8300	600	600	600
	250,000		7000		8400	600	600	600
	500,000		7100		8500	600	600	600
	Unlimited		7200		8600	600	600	600
500 5%	50,000	601	10000	2400	12400	1600	600	600
	100,000		10900		13300	1600	600	600
	150,000		11300		13700	1600	600	600
	250,000		11600		14000	1600	600	600
	500,000		11800		14200	1600	600	600
	Unlimited		12000		14400	1600	600	600
750 5.75%	50,000	902	12400	3600	16000	1600	600	600
	100,000		13900		17500	1600	600	600
	150,000		14400		18000	1600	600	600
	250,000		14900		18500	1600	600	600
	500,000		15300		18900	1600	600	600
	Unlimited		15700		19300	1600	600	600
1000 5.75%	50,000	1203	15500	4800	20300	1600	600	600
	100,000		17800		22600	1600	600	1600
	150,000		18700		23500	1600	600	1600
	250,000		19600		24400	1600	600	1600
	500,000		20200		25000	1600	600	1600
	Unlimited		20900		25700	1600	600	1600
1500 5.75%	50,000	1804	20600	7200	27800	3000	600	1600
	100,000		24900		32100	3000	1600	1600
	150,000		26700		33900	3000	1600	1600
	250,000		28400		35600	3000	1600	1600
	500,000		29800		37000	3000	1600	1600
	Unlimited		31400		38600	3000	1600	1600
2000 5.75%	50,000	2405	24700	9600	34300	3000	1600	1600
	100,000		31000		40600	3000	1600	1600①
	150,000		34000		43600	3000	1600	3000
	250,000		36700		46300	3000	1600	3000
	500,000		39100		48700	3000	1600①	3000
	Unlimited		41800		51400	3000	3000	3000
2500 5.75%	50,000	3008	28000	12000	40000	4000	1600	1600①
	100,000		36500		48500	4000	1600①	3000
	150,000		40500		52500	4000	3000	3000
	250,000		44600		56600	4000	3000	3000
	500,000		48100		60100	4000	3000	3000
	Unlimited		52300		64300	4000	3000	3000

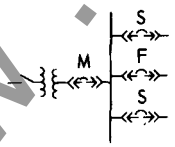
Table 5 — 600 Volts

Transformer Rating 3 Ø KVA & % IZ	Max. Short Circuit KVA Available Primary System	Normal Load Continuous Amp.	Short Circuit Current Symmetrical Amperes			Recommended Type LA Breaker (See Table 1 for trip coil ratings)		
			Transformer Alone	100% Motor Load	Combined	M	F	S
300 5%	50,000	289	5200	1200	6300	600	600	600
	100,000		5500		6700	600	600	600
	150,000		5600		6800	600	600	600
	250,000		5600		6800	600	600	600
	500,000		5700		6900	600	600	600
	Unlimited		5800		7000	600	600	600
500 5%	50,000	481	8000	1900	9900	600	600	600
	100,000		8700		10600	600	600	600
	150,000		9000		10900	600	600	600
	250,000		9300		11200	600	600	600
	500,000		9400		11300	600	600	600
	Unlimited		9600		11500	600	600	600
750 5.75%	50,000	722	10000	2900	12900	1600	600	600
	100,000		11100		14000	1600	600	600
	150,000		11600		14500	1600	600	600
	250,000		11900		14800	1600	600	600
	500,000		12200		15100	1600	600	600
	Unlimited		12600		15500	1600	600	600
1000 5.75%	50,000	962	12400	3900	16300	1600	600	600
	100,000		14300		18200	1600	600	600
	150,000		15000		18900	1600	600	600
	250,000		15600		19500	1600	600	600
	500,000		16200		20100	1600	600	600
	Unlimited		16700		20600	1600	1600	600
1500 5.75%	50,000	1444	16500	5800	22300	1600	1600	1600
	100,000		20000		25800	1600	1600	1600
	150,000		21400		27200	1600	1600	1600
	250,000		22700		28500	1600	1600	1600
	500,000		23900		29700	1600	1600	1600
	Unlimited		25100		30900	1600	1600	1600
2000 5.75%	50,000	1924	19700	7800	27500	3000	1600	1600
	100,000		24800		32600	3000	1600	1600
	150,000		27200		35000	3000	1600	1600
	250,000		29400		37200	3000	1600	1600
	500,000		31300		39100	3000	1600	1600
	Unlimited		33500		41300	3000	1600①	1600①
2500 5.75%	50,000	2404	22400	9600	32000	3000	1600	1600
	100,000		29200		38800	3000	1600	1600
	150,000		32400		42000	3000	1600①	1600①
	250,000		35600		45200	3000	3000	3000
	500,000		38500		48100	3000	3000	3000
	Unlimited		41800		51400	3000	3000	3000



FULLY RATED SYSTEM —

M — Main breaker (optional) with or without instantaneous trip element.
F — Feeder breaker with instantaneous trip element.



SELECTIVE SYSTEM

M — Main breaker (optional) without instantaneous trip element to give selective tripping with feeder breakers F and S.
F — Feeder breaker with instantaneous trip element not required to coordinate with additional protective devices nearer the load.
S — Feeder breaker without instantaneous trip element which must coordinate with additional protective devices nearer the load.

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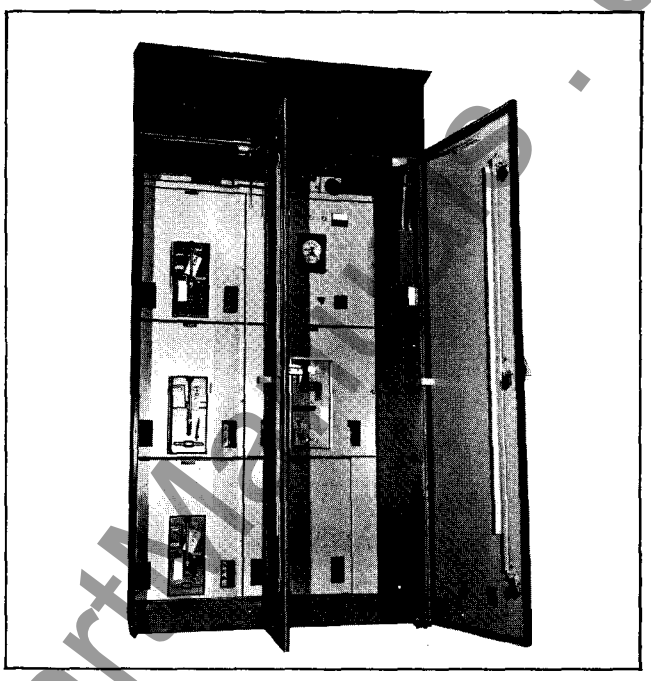
OUTDOOR SWITCHGEAR

Outdoor construction consists of a sturdy weatherproof steel housing, which protects the complete switchgear group, plus all indoor features. A service aisle approximately 38 inches wide allows inspection and maintenance while protecting personnel and equipment from the weather.

The full-length front doors are hinged and may be padlocked. Rear doors are hinged and bolted. They extend below the floor line to assure complete enclosure.

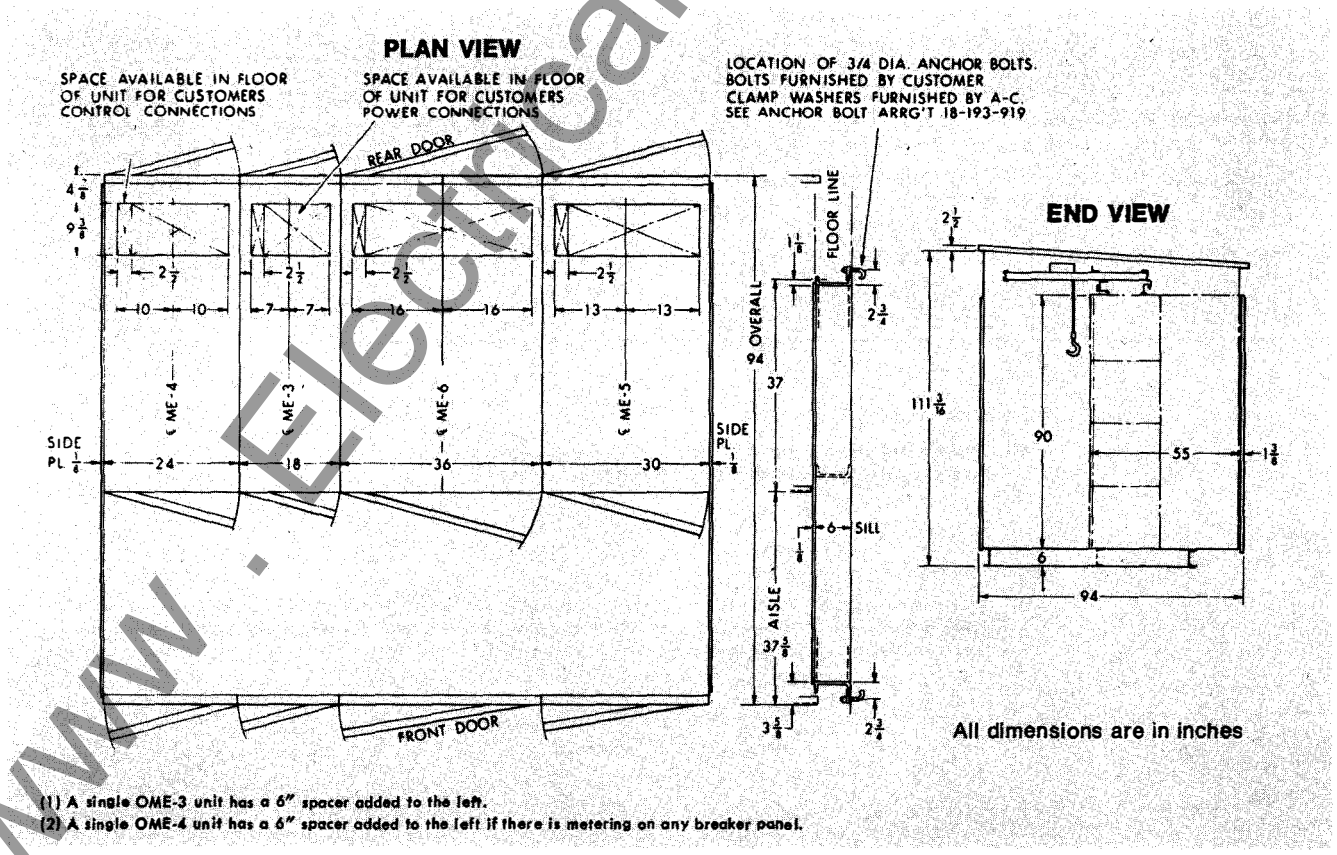
A sheet steel floor reinforced by structural ties forms a rigid base support for the switchgear units and provides a tight bottom seal. For protection from snow, rain and dust, each group is mounted on six-inch foundation channels. Synthetic rubber gasketing around front and rear doors insures thorough sealing of the unit. Hurricane boxes are appropriately located to permit proper air circulation, but to exclude dust, dirt, and insects. A bituminous undercoating is applied to all undersurfaces as protection against moisture and corrosion.

Space heaters in the breaker, bus and auxiliary compartments eliminate excessive condensation. One thermostat in the bus compartment of each unit controls operation of the space heaters.



Hinged front doors provide easy access to wide, unobstructed service aisle.

Standard accessories for outdoor units include all those provided for indoor switchgear. In addition, a light is mounted inside and above the front door of each unit and is controlled by a switch on the wall. Each group of units contains a convenience outlet and switches.



(1) A single OME-3 unit has a 6" spacer added to the left.
(2) A single OME-4 unit has a 6" spacer added to the left if there is metering on any breaker panel.

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SPECIFICATION GUIDE

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

The equipment outlined in this specification will consist of 600 volt metal-enclosed switchgear with necessary compartment, bus work, drawout air circuit breakers and miscellaneous equipment for the application.

The switchgear equipment will comply with all applicable standards of ANSI, IEEE, and NEMA.

SERVICE

The switchgear sections will be Allis-Chalmers indoor type ME, outdoor type OME rated 600 volts. This equipment will operate on a service voltage of volts, Hertz, phase, wire grounded ungrounded, wye, delta

METAL-ENCLOSED ASSEMBLY

The assembly will consist of welded steel breaker compartments with hinged front doors, welded steel framework, and sheet steel enclosure. The enclosure and welded components will be chemically cleaned, hot phosphate treated, and rinsed, and given one primer coat of ASA No. 61 indoor light grey paint. After complete assembly, all exterior surfaces are given an additional coat of paint ASA No. 61 light grey indoor or ASA No 24 dark grey outdoor.

Guide rails will allow the breaker to be racked to the "connected," "test," and "disconnected" position with the door closed. An interlock will prevent racking the breaker when it is closed. Current transformers when required, will be mounted in the breaker compartment, accessible from the front. A coordinated *Pyro-Shield* Glass polyester insulation system will be supplied.

CIRCUIT BREAKERS

Circuit breakers will be the low voltage power circuit breaker type, 600-volt class, three pole, single throw, drawout mounted, electrically and mechanically trip free with stored energy operator. Each will have arc quenchers, main and arcing contact structure, a static overcurrent trip device, a contact position indicator (open-closed), stored energy mechanical indicator (charged-discharged), primary disconnecting devices, and a mechanical interlock to prevent making or breaking contact on the primary disconnects. Electrically operated breakers will also have a shunt trip device, a universal motor to store the energy, a spring release coil, secondary disconnecting devices, and a four-stage auxiliary switch.

BUS

The main bus will be suitably rated for the application. A ground bus will extend the length of the line-up. (A one-half full capacity neutral bus will be carried with the phase busses in addition to a ground bus.) All bus will be tin-plated aluminum with bolted joints.

WEATHERPROOF HOUSING (Option)

Outdoor weatherproof construction will be used. Front and rear doors will be gasketed and hinged, front doors will have provision for padlocking, rear doors will be bolted. An aisle, approximately 38 inches wide and accessible from any one of the front doors, will be provided at the front of the switchgear line-up to facilitate inspection and testing of the circuit breakers and associated equipment while protected from the weather. One hand-operated crane, mounted above the switchgear aisle-way, will be provided to facilitate removal and handling of the circuit breaker elements.

The following equipment will be furnished within the outdoor weatherproof switchgear: Light sockets for interior illumination of the aisle, convenience receptacles as a source of 120-volt ac power for electric tools, necessary space heaters to prevent condensation of moisture, a switch for all the space heaters, and a switch for the lamps.

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DETAILED SPECIFICATIONS

The group of switchgear will include the following:

1 Set of _____ ampere, 3-phase, 3-wire, main bus.
1 Ground bus.
_____ Neutral bus _____ amperes.
_____ Type LA-_____ main, feeder air circuit breakers, _____ amperes symmetrical interrupting capacity at _____ volts, manually, electrically operated with type _____ static trip device, with ground fault trip for use on a ___-wire circuit rated _____ amperes. (Add breaker modifications as desired.)*
_____ Key interlocks for main breakers, for interlocking with primary interrupter switches.
_____ Main, Feeder circuit breaker control switches, each complete with one red and one green indicating light.
_____ Type LA-_____ tie, feeder air circuit breakers, _____ amperes symmetrical interrupting capacity at _____ volts, _____ manually, electrically operated with type _____ static trip device, with ground fault trip for use on a ___-wire circuit rated _____ amperes. (Add breaker modifications as desired.)*
_____ Tie, Feeder circuit breaker control switches, each complete with one red and one green indicating light.
_____ Type LA-_____ feeder air circuit breaker, _____ amperes symmetrical interrupting capacity at _____ volts, manually, electrically operated, with type _____ static trip device, with ground fault trip for use on a ___-wire circuit rated _____ amperes. (Add breaker modifications as desired.)*
_____ Provision for the future addition of a type LA-_____ tie, feeder air circuit breaker element, _____ amperes symmetrical interrupting capacity at _____ volts, manually, electrically operated. Stationary primary contacts covered with PVC boots. (Add breaker modifications as desired.)*
_____ Provision for the future addition of a type LA-_____ feeder air circuit breaker element, _____ amperes symmetrical interrupting capacity at _____ volts, manually, electrically operated. Stationary primary contacts covered with PVC boots. (Add breaker modifications as desired.)*
_____ Feeder circuit breaker control switches, each complete with one red and one green indicating light.
_____ Sets of necessary suitable clamp type terminals (one set per feeder) for purchasers outgoing feeder cables.
_____ Sets of space heaters. (Standard on Outdoor.)
_____ Control power transformers, dry type, suitable KVA capacity, single phase, _____ -120/240- volt ratio, complete with primary current limiting fuses, to supply auxiliary power from the low voltage bus for space heaters, lights, convenience outlets, transformer fans, and electrically operated breakers.
_____ Current transformers, _____ ampere ratio, for main bus metering.
_____ Potential transformers, dry type _____ -120-volt ratio, complete with primary current limiting fuses
_____ Potential transformers, dry type, _____ -120-volt ratio, complete with primary current limiting fuses for ground detector lights, voltmeters, _____.
_____ Current transformers, _____ ampere ratio, for feeder metering.
_____ Current transformers, _____ ampere ratio, for feeder metering.
_____ Voltmeters, single-phase, indicating, _____ volt scale.
_____ Voltmeter transfer switches, 3-phase.
_____ Ammeter, single-phase, indicating, for main bus, feeder metering, _____ ampere scale.
_____ Ammeter transfer switches, 3-phase.
_____ Wattmeters, 3-phase, indicating, for main bus, feeder metering, _____ MW scale.
_____ Power factor meters, indicating, for main bus, feeder metering.
_____ Varmeter, 3-phase, indicating, for main bus, feeder metering _____ MVAR scale.
_____ Watthour meters, _____-element, with _____ minute demand attachment, for main bus, feeder metering.
_____ Sets of three (3) ground detector lights, with pushbutton test switches.
_____ Sets of three (3) ground detector voltmeters, indicating.
_____ Potential test blocks.
_____ Current test blocks.
_____ Sets of nameplates, as required.

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*BREAKER MODIFICATIONS **(Add the following to each breaker item as required)**

Overcurrent bell alarm device — manual reset, electrical reset

Electrical lockout device, overcurrent.

Shunt trip device (standard on electrically operated breakers).

Instantaneous undervoltage device.

Time delay undervoltage device.

Auxiliary switch with _____ contacts (four contacts are standard on electrically operated breakers).

ACCESSORIES

A set of standard low voltage switchgear accessories will be furnished, including:

_____ Crank for manual operation of the breaker drawout mechanism.
_____ Lifting yoke for each type of breaker element.
_____ Maintenance closing device for electrically operated breakers.
_____ Traveling crane for handling breaker elements, mounted on top of indoor switchgear (optional), mounted above the aisle space in outdoor switchgear (standard).
_____ Test plug, less cable, for drawout watthour meters.

A-C VALUE ORIENTATION

Responsibility for assuring a top-value product rests with product engineering, tool engineering, manufacturing, inspection, field service and sales groups.

Principal means for assuring a quality-built product include: product design standards, tool and facility design, manufacturing procedures, product inspection and testing, tool inspection and field inspection. High-grade materials, proper tools and techniques, and continuous inspection programs are joined to produce quality equipment. All contribute to the total picture of Allis-Chalmers quality, its control and assurance.

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The assembled switchgear is tested for proper operation and for operation of all interlocks. Primary and secondary connections are given standard dielectric tests to insure that the insulation and spacing of current carrying parts are ample for the rated voltage. All wiring is carefully checked to assure proper operation of relays and meters.

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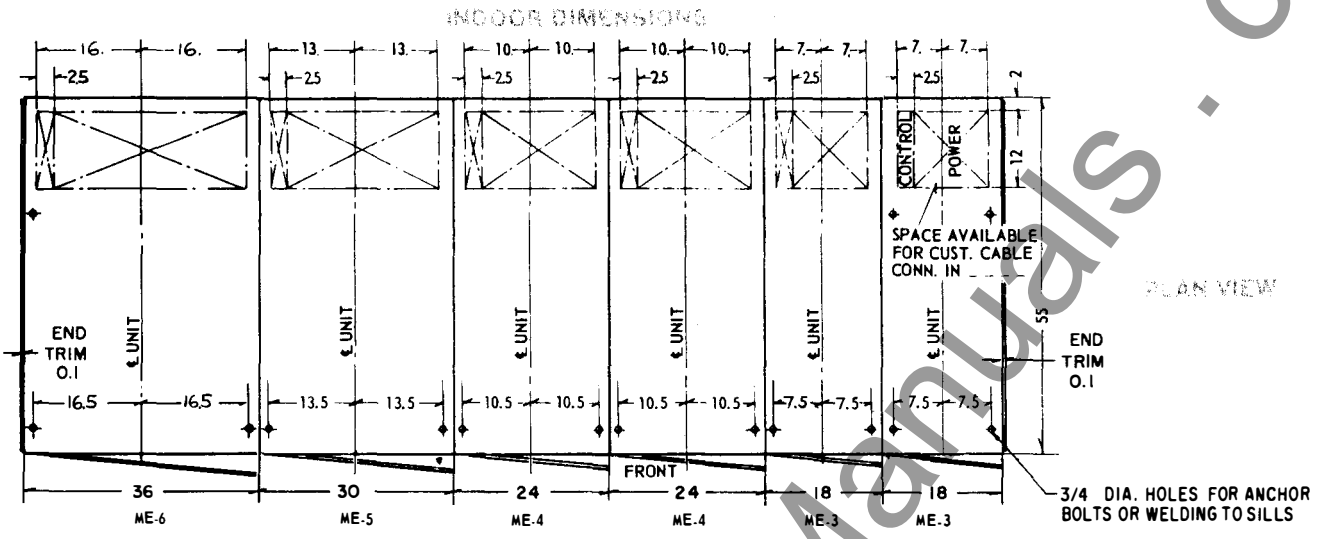
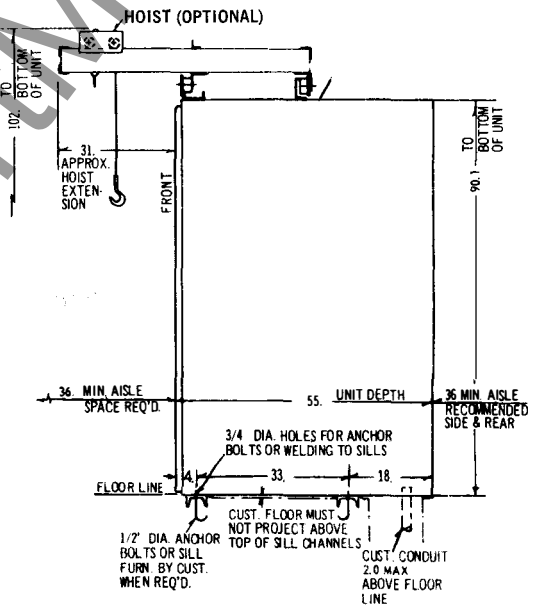
ALLIS-CHALMERS

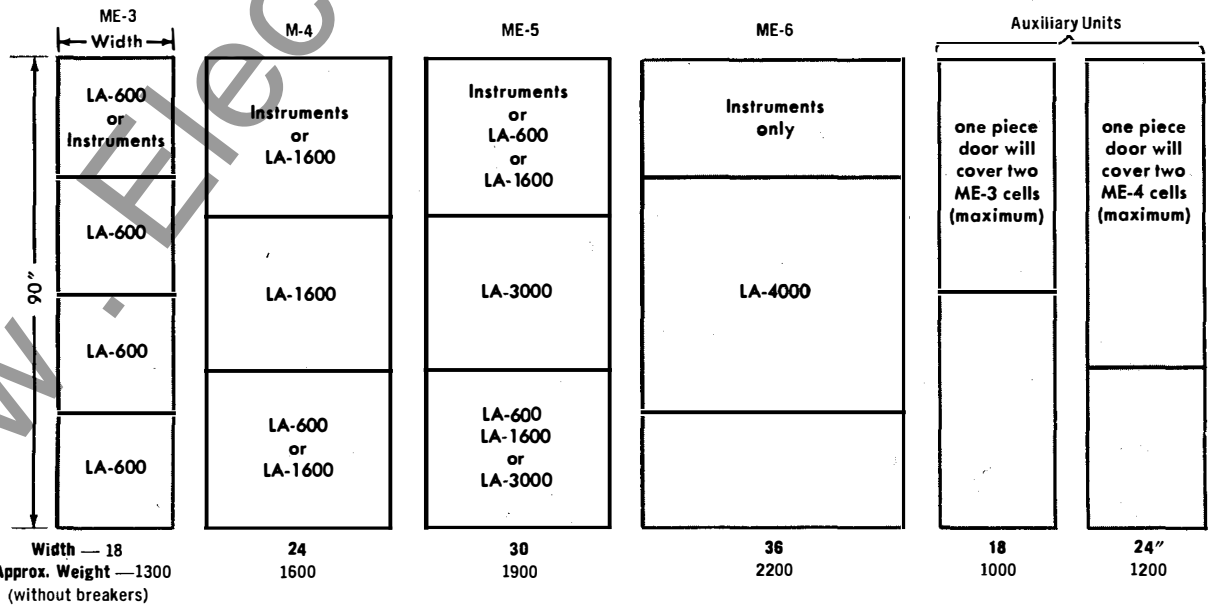
LOW VOLTAGE METAL-ENCLOSED SWITCHGEAR





All units are accurately aligned on true and level bedplates at the factory. This care insures ease of operation and proper fit of mating parts.

Anchor bolts or tack welding is required only on the end units and at shipping splits.



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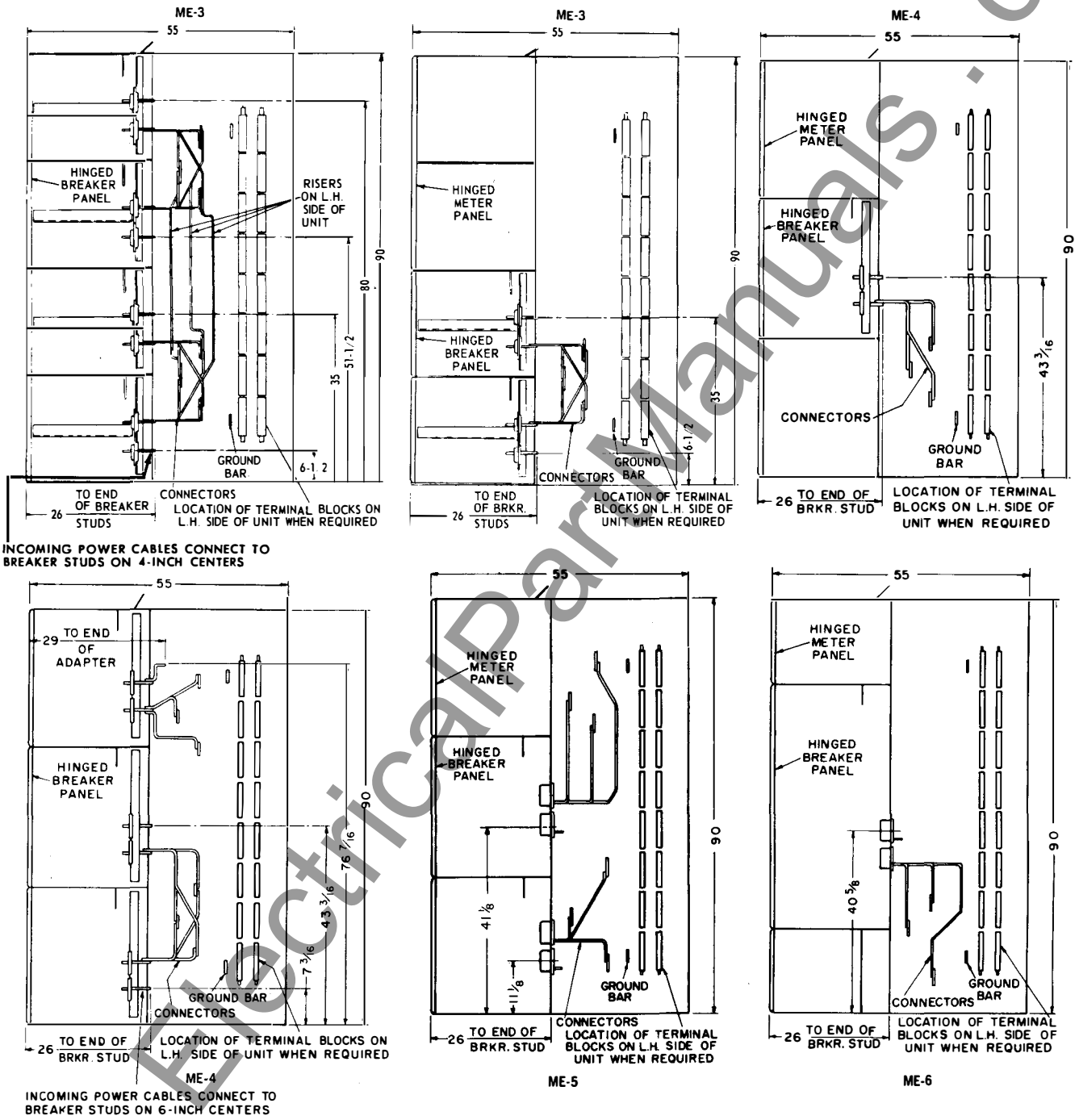
TYPICAL SIDE VIEWS



Breaker Type	Interrupting Capacity at 600 volts (RMS Amperes)	Frame Size (Maximum Current Rating, Amperes)	Method of Operation	Unit Type	Indoor Width	Indoor Depth	Outdoor Width	Outdoor Depth①
LA-600	25,000	600	Manual or Electrical	ME-3	18	55	18	94
LA-1600	50,000	1,600	Manual or Electrical	ME-4	24	55	24	94
LA-3000	75,000	3,000	Electrical	ME-5	30	55	30	94
LA-4000	100,000	4,000	Electrical	ME-6	36	55	36	94
Standard Auxiliary Unit				ME-3 or ME-4	18 or 24	55	18 or 24	94

① Including 38" walk-in aisle.

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ALLIS-CHALMERS

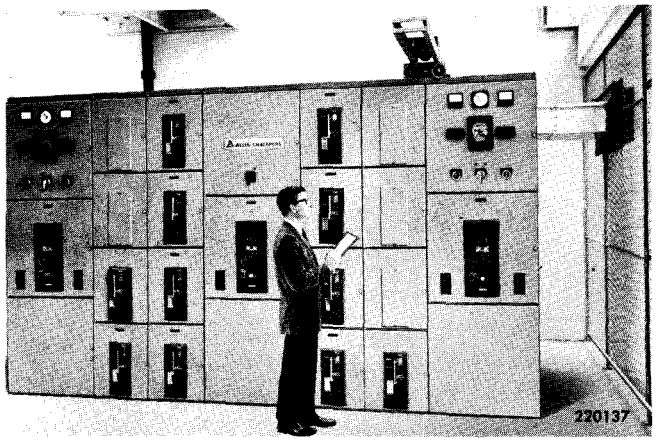
LOW VOLTAGE METAL-ENCLOSED SWITCHGEAR
600 Volts Maximum, 4000 Amperes Continuous Maximum
150,000 Amperes Interrupting Capacity Maximum

TYPICAL INSTALLATIONS

CENTRAL STATIONS — Protect and distribute power to station auxiliaries — blowers, compressors, fans, pumps, motors.

COMMERCIAL AND RESIDENTIAL BUILDINGS — For protection and distribution of power for lighting, elevators, air conditioning, plus blowers, fans, motors, and pumps.

INDUSTRIAL PLANTS — For power and lighting networks, power and lighting feeders, plus power generation and auxiliaries. Also to provide power for machine tools and material handling equipment drives.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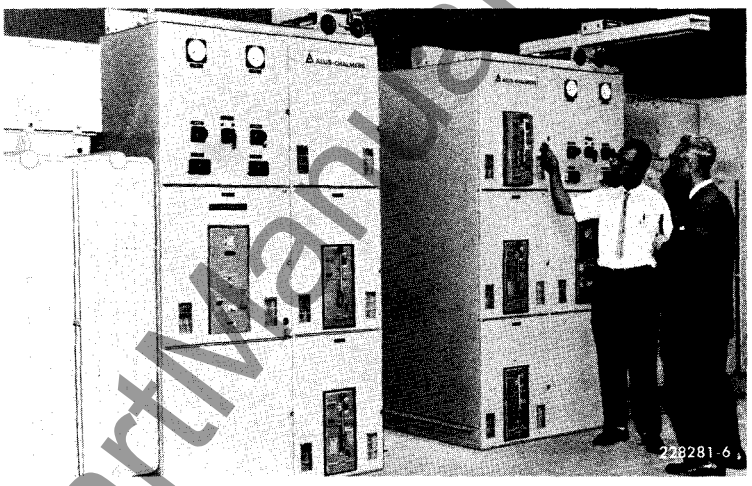
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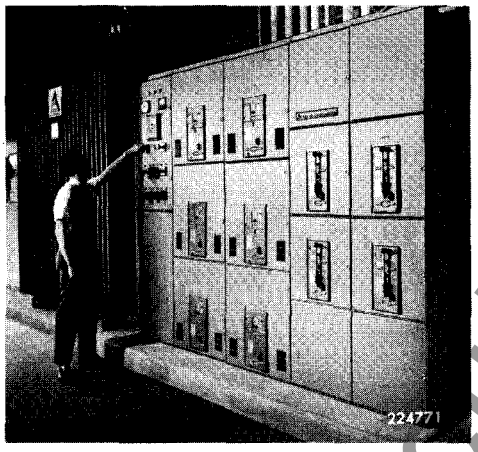
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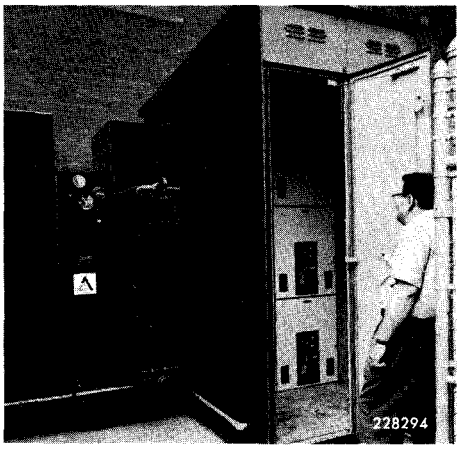
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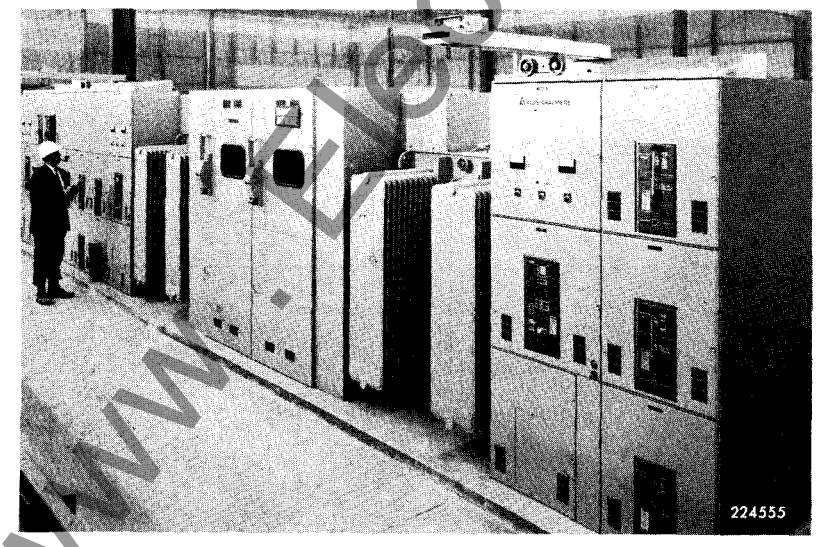
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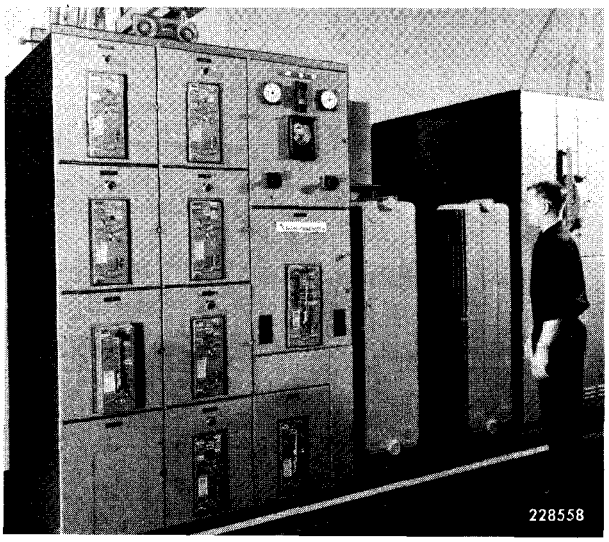
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