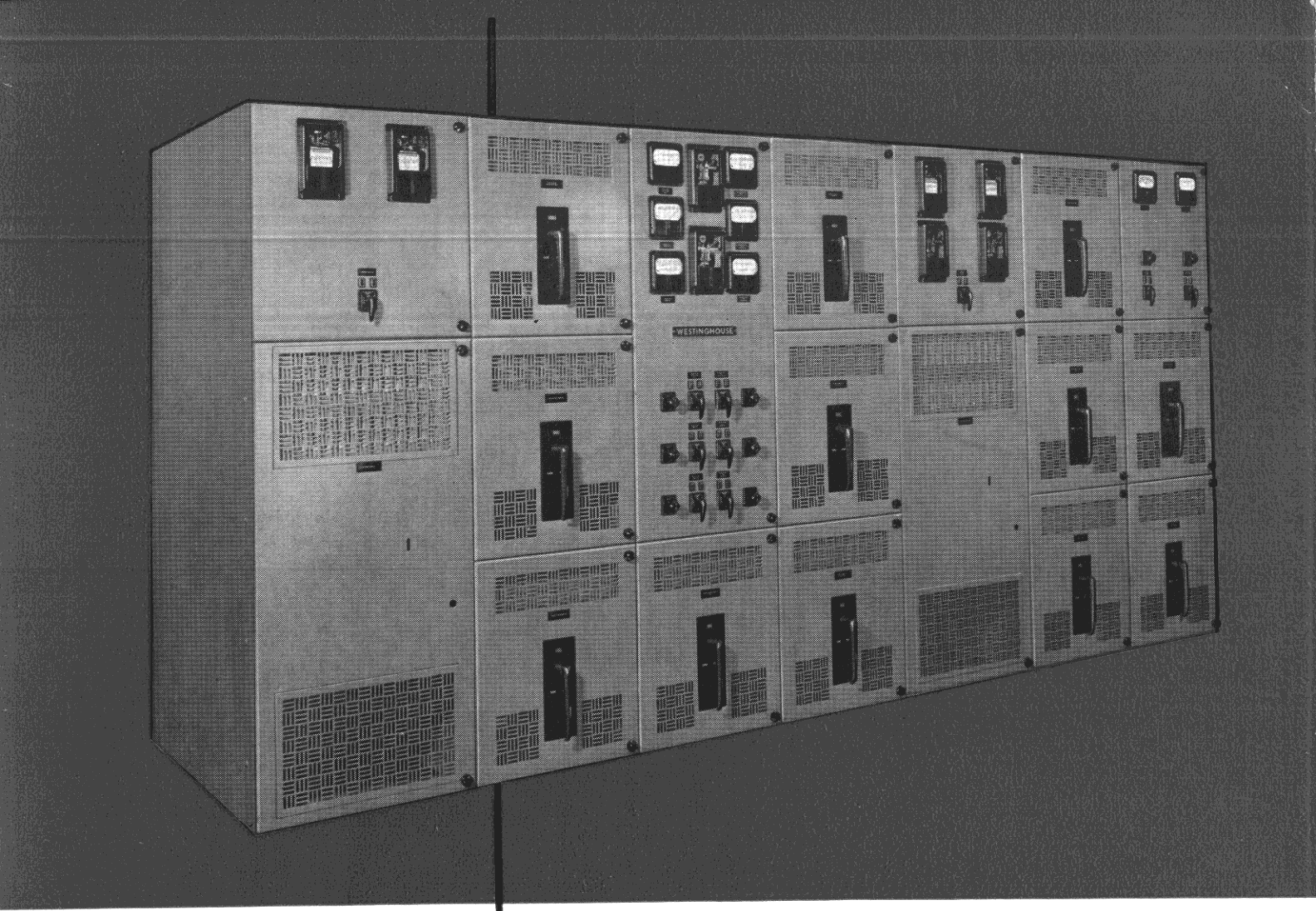


Westinghouse

"UNITIZED" LOW-VOLTAGE METAL-ENCLOSED SWITCHGEAR

WITH TYPES DB AND DA
DRAWOUT "DE-ION®" AIR CIRCUIT BREAKERS

INDOOR AND OUTDOOR SERVICE

600 VOLTS MAXIMUM
15 TO 6000 AMPERES
15,000 TO 100,000 AMPERE INTERRUPTING RATING

"UNITIZED" LOW-VOLTAGE METAL-ENCLOSED SWITCHGEAR

Completely Metal-Enclosed, Self-Supporting

"Unitized" Low-Voltage Metal-Enclosed Switchgear consists of a completely enclosed, self-supporting metal structure containing one or more removable circuit breakers and their associated equipment, such as instrument transformers, busses and connections.

Quickly Placed in Service

Factory-assembled, factory-wired and factory-tested, Low-Voltage Metal-Enclosed Switchgear is shipped as a single unit (if handling facilities at destination permit) ready for placement on a foundation prepared in advance. It can be placed in service as soon as the main cable and control connections have been made.

"Unitized" for Lower Installed Cost

Westinghouse "Unitized" design eliminates special design and engineering costs. Yet it is "custom-built" in that it meets specific application requirements with respect to number and rating of the circuit breakers and the selection of attachments, instruments and relays.

10 Basic Units Meet All 600-Volt Requirements

"Basic Units" and a selection of standard instrument panels are available as completely engineered, completely tooled designs. From these, switchgear can usually be assembled to meet any requirements of 600-volt main and feeder switching and protective equipment. Future additions are easily made at either end of the structure at any time.

Drawout Breakers Assure Quick Servicing

All circuit breakers are of the removable, drawout type. They can be moved physically (through horizontal travel) from the "Connected" to "Test" and "Disconnected" positions, or can be removed completely for inspection, maintenance or replacement. Main power and control connections are established between the removable circuit breaker and the housing by means of self-coupling primary and secondary disconnecting devices.

Modern Appearance

"Unitized" Low-Voltage Metal-Enclosed Switchgear is modern in appearance. The standard finish is light gray for all exterior and interior surfaces. Structures are completely Bonderized after fabrication. This provides a better base for the final finish, inhibits rust, improves appearance and assures a long-lasting finish.

Modern Construction Throughout

The construction of "Unitized" Low-Voltage Metal-Enclosed Switchgear is modern throughout. The welded structure is built of stretcher-leveled sheet metal and is reinforced where necessary to provide adequate strength. All hinges are concealed; instruments, relays and watthour meters are semi-flush mounted. Flexitest cases are provided for relays and watthour meters, eliminating separate test switches.

Safety Assured—in Operation and Maintenance

"Unitized" Low-Voltage Metal-Enclosed Switchgear is inherently dead-front. All breakers may be closed or tripped without opening doors or otherwise exposing live parts. Each breaker is enclosed in an individual metal compartment. Interlocks are provided so that the compartment door cannot be opened while the circuit breaker is closed. Bare busses, cable connections and instrument transformers are placed in full-height rear compartments and separated from breaker compartments. Interlocks and positioning devices assure safe removal or replacement of breakers.

APPLICATIONS

for "Unitized" Low-Voltage Metal-Enclosed Switchgear

CENTRAL STATIONS

Auxiliary power circuits for
- Fans
- Blowers
- Pumps
- Compressors

Lighting circuits

INDUSTRIAL PLANTS

- Power and lighting networks
- Power feeders
- Lighting feeders
- Power generation and auxiliaries
- Power drives for machine tools and material-handling equipment

COMMERCIAL BUILDINGS

- Power feeders for fans, pumps, blowers
- Lighting feeders
- Elevator service
- Air-conditioning systems

TESTED - SHIPPED - INSTALLED - - - as a Unit

Factory Assembled and Tested

Every switchgear unit is completely assembled and wired at the factory. It is then given sequence and overpotential tests—breakers and control devices are checked for operation—instruments, meters and relays are tested for accuracy.

Shipped as a Unit

Where handling facilities at the purchaser's plant permit, the complete switchgear is shipped as a unit. In any case, shipment is made in completely assembled groups of Basic Units, depending in size upon handling facilities in transportation and at destination.

Easily Installed

Installation consists merely of properly anchoring the complete unit to its foundation and connecting the main cables and control connections. The switchgear is self-supporting. It can be lifted by crane or moved on skids to location.

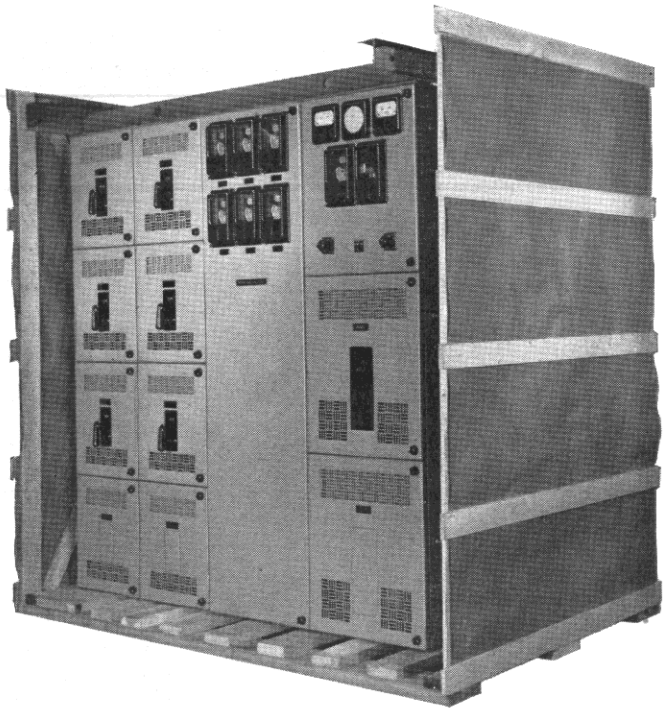


Fig. 1—Complete switchgear unit, partially crated for shipment. Can be lifted by crane or moved on skids to location. Note that the DB-50 breaker is shipped separately, while the smaller DB-25 breakers are shipped in their compartments.

CONTENTS

"UNITIZED" LOW-VOLTAGE

INDOOR APPLICATION

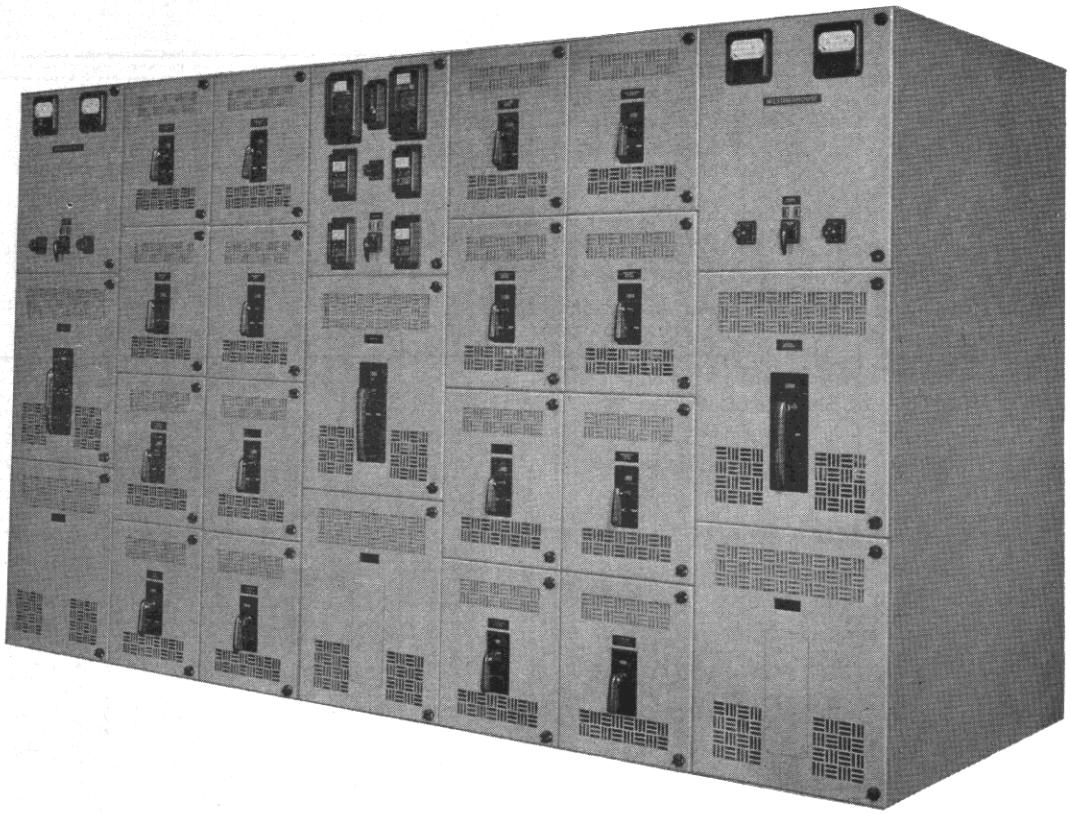


Fig. 2—Typical installation of indoor switchgear with two transformer secondary breakers and one bus tie breaker, providing protection for sixteen feeder circuits. Space for future additions is provided in the three blank breaker compartments below.

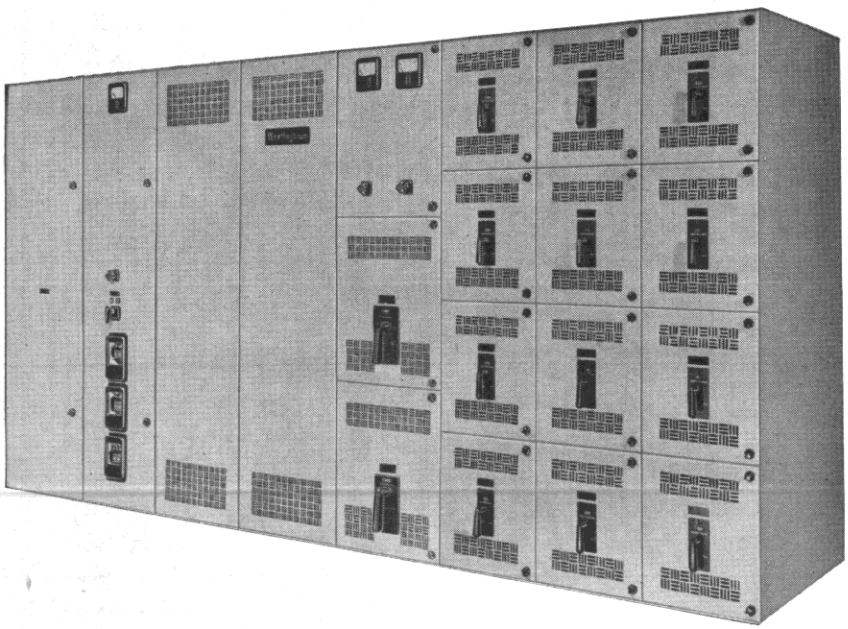


Fig. 3—Westinghouse Low-Voltage Switchgear blends perfectly with air-cooled transformers and High-Voltage Metal-Clad Switchgear to form attractive power centers.

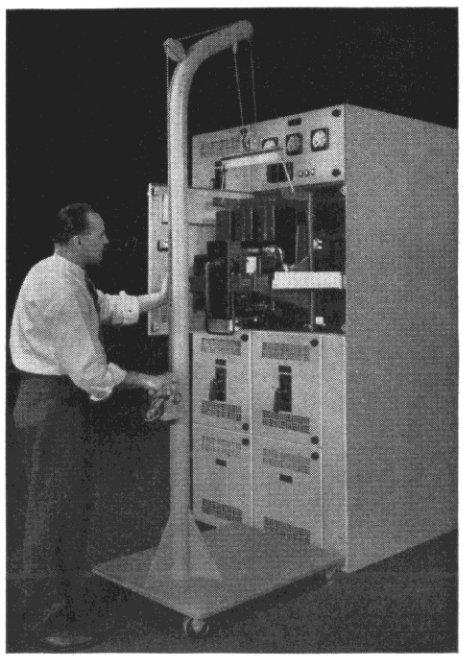


Fig. 4—A monorail or overhead crane is recommended for DB-50 breakers in the second or third tier. However, this carriage—furnished as an additional item—can be used for handling these breakers.

METAL-ENCLOSED SWITCHGEAR

OUTDOOR APPLICATION

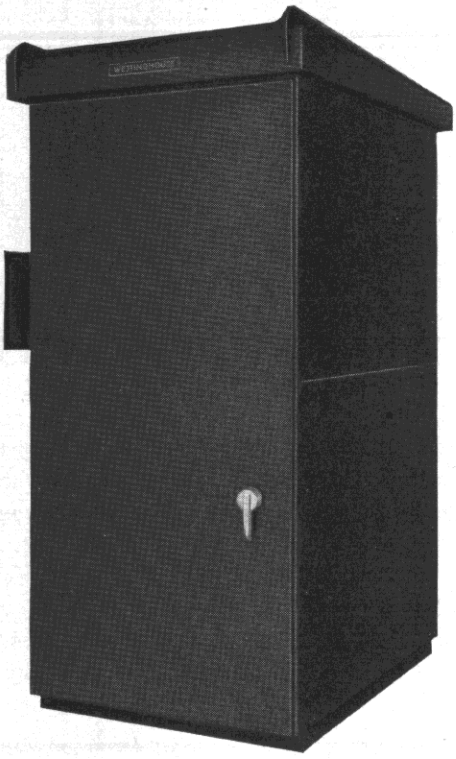


Fig. 5—Westinghouse Outdoor Low-Voltage Switchgear is enclosed in weatherproof housings with adequate ventilation and heating to eliminate condensation.

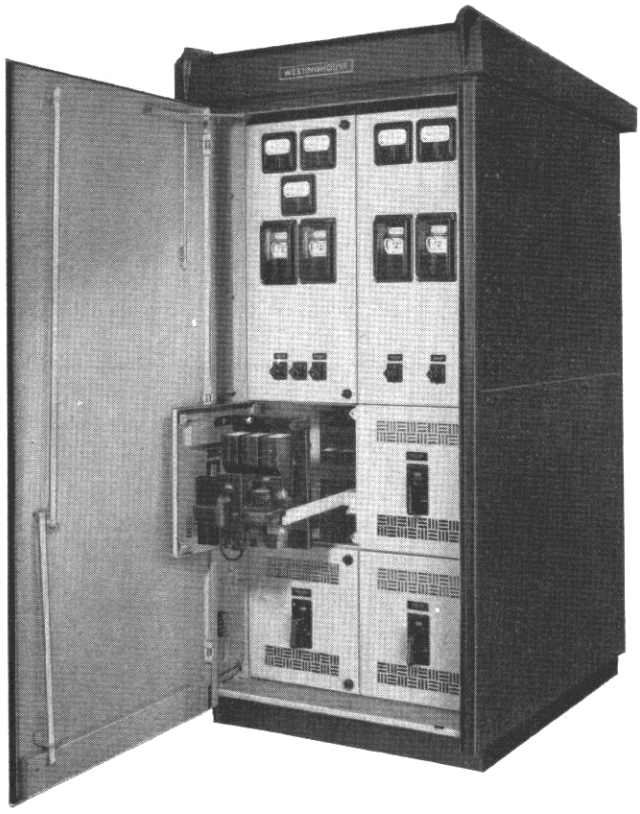


Fig. 6—Opening the door of the weatherproof housing provides the same ease of operation, inspection and maintenance offered by indoor units. Note compactness of installation.

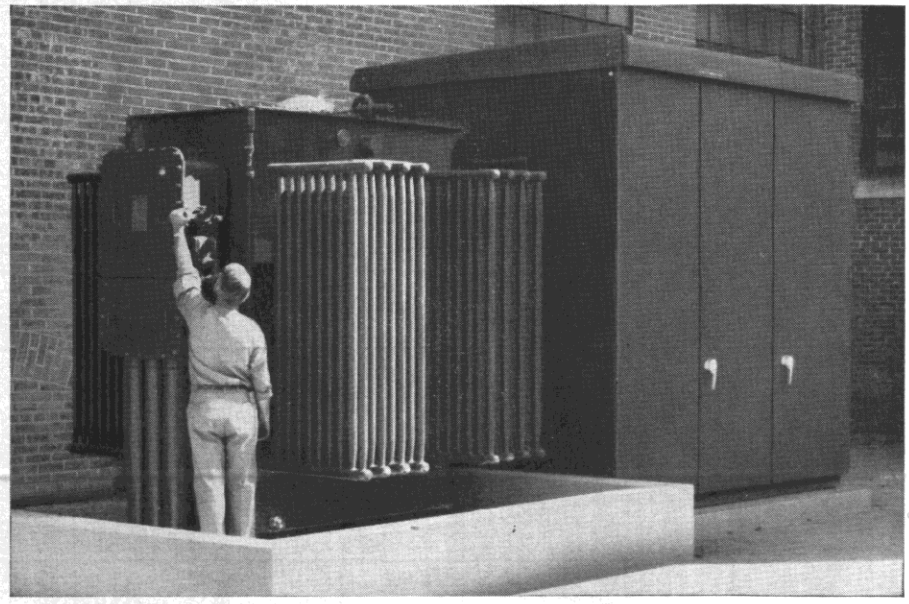


Fig. 7—Typical outdoor power center with transformer throat-connected to Low-Voltage Metal-Enclosed Switchgear in weatherproof switchhouse.

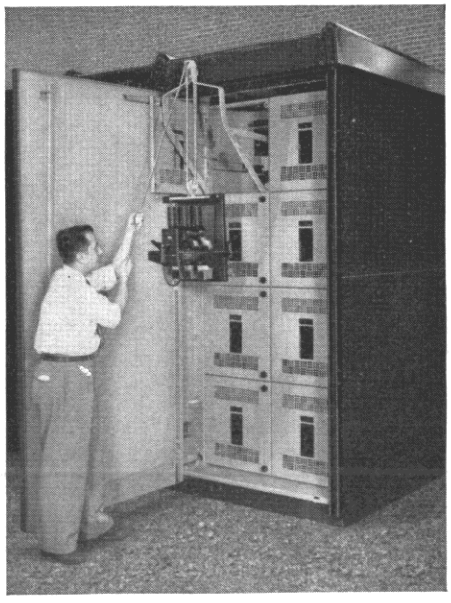


Fig. 8—Breakers in outdoor units are easily handled with this lifting frame furnished as a standard accessory.

CURRENT RATINGS

15 to 6000 Amperes

STANDARD CURRENT RATINGS (Amperes)				
DB-15	DB-25	DB-50	DA-75	DA-100
15				
20				
25				
35	35			
50	50			
70	70			
90	90			
100	100	100		
125	125	125		
150	150	150		
175	175	175		
200	200	200		
225	225	225		
	250	250		
	300	300		
	350	350		
	400	400		
	500	500		
	600	600		
		800		
		1000		
		1200		
		1600		
			2000	
			2500	
			3000	4000
				5000
				6000
				* 8000
				*10000

* D-C rating only.

Standard current ratings of low-voltage breakers.

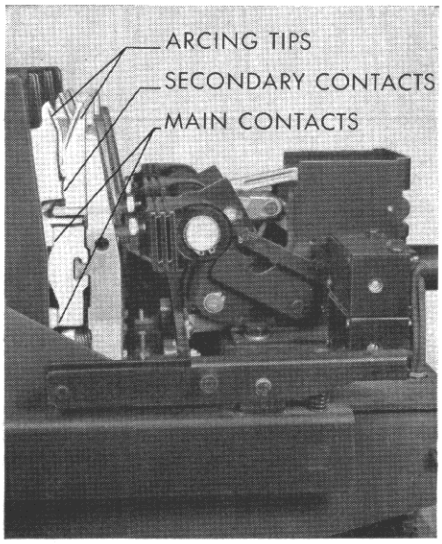


Fig. 9—One-two-three action keeps arcing away from main contacts. When breaker opens, main contacts part first, then secondary contacts and finally arcing tips. When arcing tips break, arc flashes at this point and is blown into "De-ion" arc chute.

All "De-ion" air circuit breakers have solid block, silver-inlaid main contacts. Their construction insures lasting current-carrying ability, which is not seriously impaired even after repeated fault interruptions or repeated momentary overloads. In choosing the circuit-breaker current rating for a given application, it is no longer necessary to provide a substantial margin of safety above the actual circuit load current to prevent contact deterioration.

The "DE-ION" Principle

There are three basic means of extinguishing an arc: lengthening the arc path; cooling, by gas blast or contraction; de-ionizing, or physically removing the conduction particles from the arc path. It was the discovery, by Westinghouse, of this last method which made possible the first large power air circuit breakers.

The "De-ion" principle is incorporated in all these circuit breakers. The arc is forced upward into the arc quencher by strong magnetic fields; rising gas blasts carry the ionized air particles out of the arc path. "De-ion" action makes possible faster arc extinction for given contact travel; assures positive interruption and minimum contact burning.

MANUALLY OPERATED

Circuit Breakers

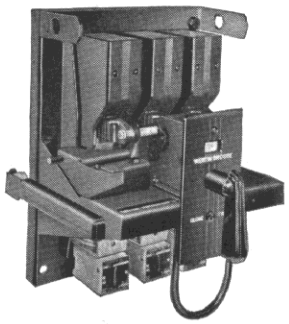


Fig. 10—Type DB-15

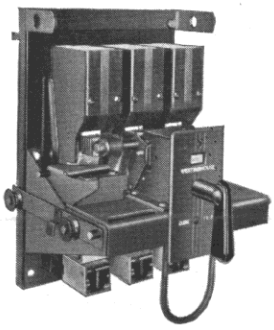


Fig. 11—Type DB-25

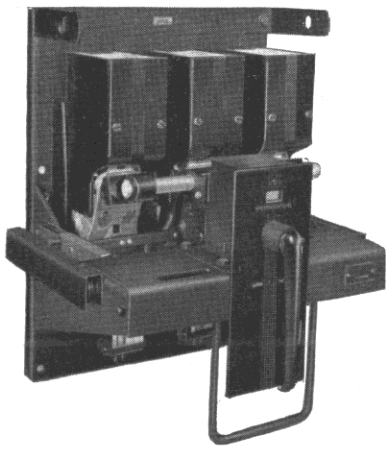


Fig. 12—Type DB-50

INTERRUPTING RATINGS

15,000 to 100,000 Amperes

Low-voltage (600 volts or less) air circuit breakers are generally instantaneous in operation at high-fault currents, and part their contacts during the first half cycle. This fact must be taken into account when selecting the interrupting rating of air circuit breakers.

Low-voltage air circuit breaker interrupting ratings are based on total current. For three-phase circuits, the total current is taken as the average of all three phases. N.E.M.A. has adopted the following to obtain the average current at the first half cycle after the short circuit occurs and which the breaker may open due to action of the instantaneous trip device:

To determine the average value of short circuit current at the end of the first half cycle, multiply the calculated instantaneous symmetrical short circuit value by 1.25.

To determine the instantaneous symmetrical short circuit current, use the sub-transient reactance of the rotating apparatus (both synchronous and induction machines) and the impedance values of all intervening portions of the circuit to the point of fault. Note that for these low-voltage systems the impedance of short runs of conductors, bus runs, current transformer and intervening circuit breakers themselves, may become important elements in limiting the total short circuit as they usually represent a relatively high percentage of the total system impedance.

	TYPE	AMPERES
INTERRUPTING RATINGS	DB-15	15,000
	DB-25	25,000
	DB-50	50,000
	DA-75	75,000
	DA-100	100,000

ELECTRICALLY OPERATED

Circuit Breakers

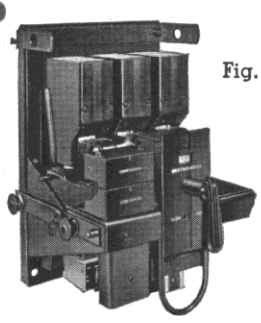


Fig. 13—Type DB-25

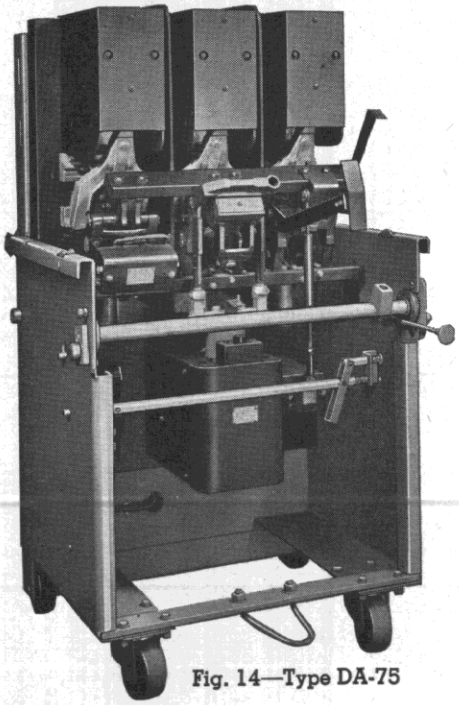


Fig. 14—Type DA-75

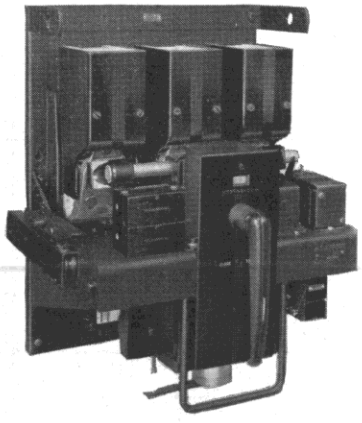


Fig. 15—Type DB-50

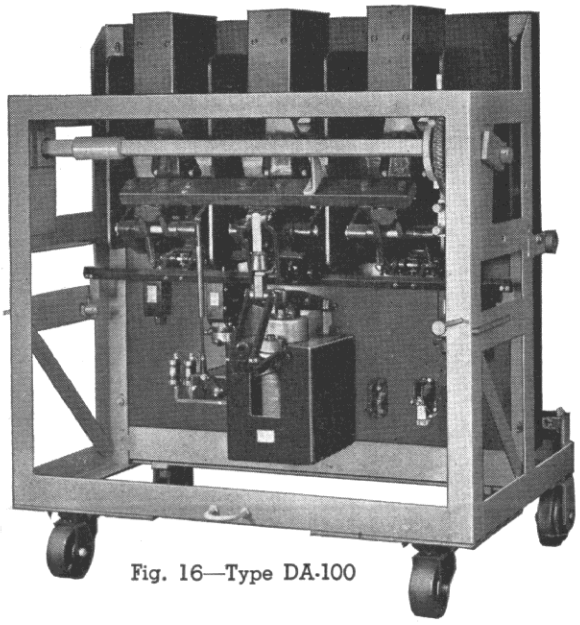
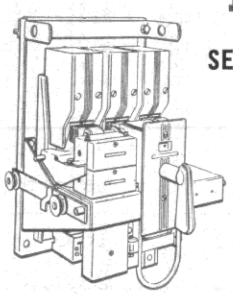


Fig. 16—Type DA-100

THREE-MINUTE REPLACEMENT . . .

with Interchangeable Breakers and Drawout Construction



1 SPARE BREAKER

SERVICE INSURANCE FOR 20 FEEDERS

Twenty power feeders are protected by these twenty identical DB-25 drawout breakers. When inspection, maintenance or repairs become necessary on any breaker, the single spare breaker prevents prolonged service interruption.

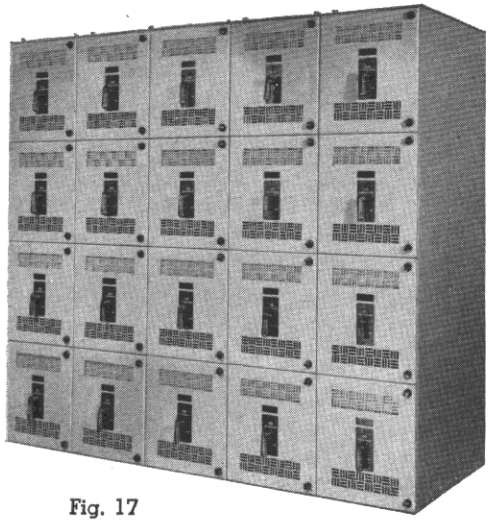
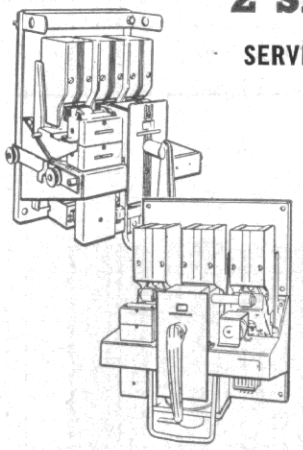


Fig. 17



2 SPARE BREAKERS

SERVICE INSURANCE FOR 16 FEEDERS

Sixteen power feeders are protected by these sixteen identical DB-25 drawout breakers. One DB-50 breaker protects each transformer and one DB-50 is used for the tie circuit. Only two spare breakers, one of each type, are necessary to prevent any prolonged service interruption.

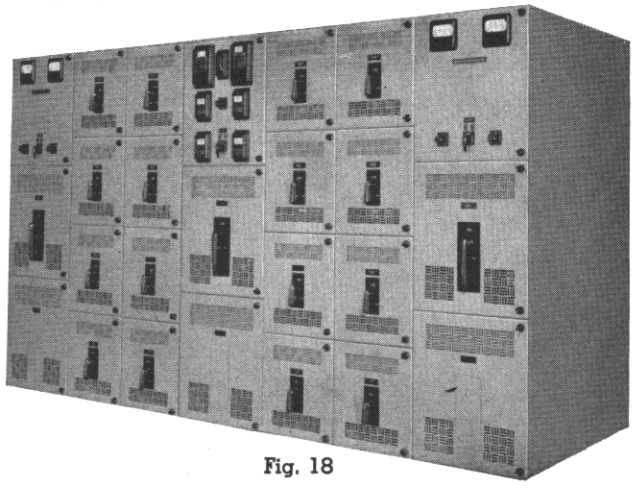
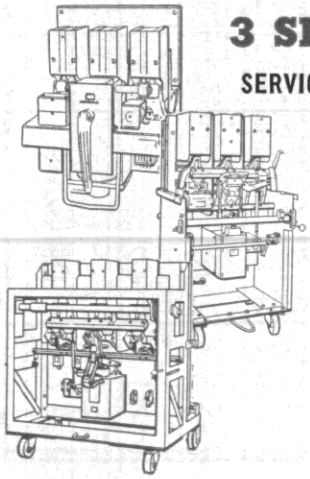


Fig. 18



3 SPARE BREAKERS

SERVICE INSURANCE FOR 24 FEEDERS

Twenty-four power feeders are protected by these 24 identical DB-50 drawout breakers. Two DA-100 breakers protect the transformers; a DA-75 breaker serves as the bus tie. Only three spare breakers, one of each type, are required for this large installation.

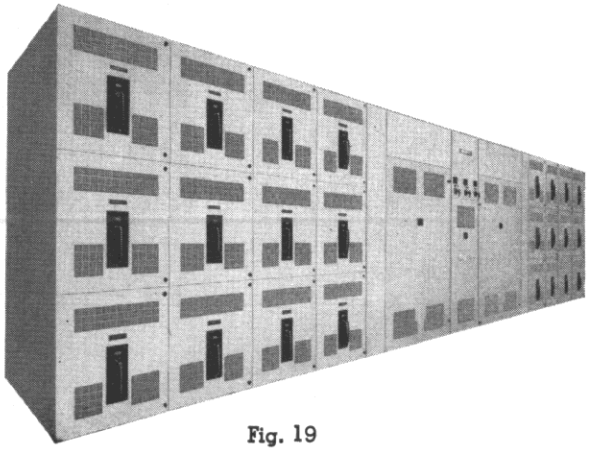


Fig. 19

Assures Maximum Continuity of Service

Drawout construction of this metal-enclosed switchgear offers three distinct advantages all of which are important for continuity of service:

INSPECTION—easier and more thorough.

DISCONNECTION—when drawn out ot operating position, breaker serves as disconnect.

REPLACEMENT—any breaker can be replaced with a reserve breaker of same type and rating or with breaker from less important circuit.

"De-ion" air circuit breakers incorporate the most modern and advanced principles of arc interruption and are capable of performing repeated interrupting cycles without material change of their operating characteristics.

To insure that the circuit breakers will be in good repair at all times, periodic inspections are necessary. Careful consideration has been given to this problem in the design of all drawout units to reduce inspection time to the minimum.

All floor-wheeled drawout units can be quickly rolled out of their housings. All other units roll onto rail extensions which are easily attached on the enclosing structure. In the withdrawn position, complete accessibility of all parts requiring inspection is attained.

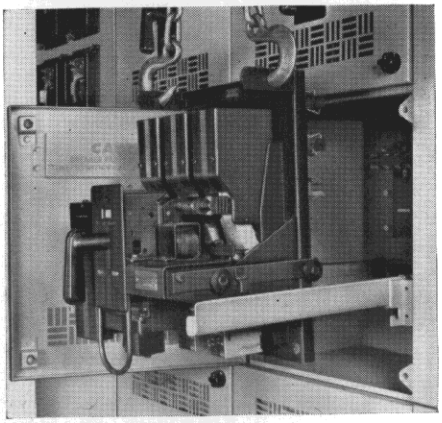


Fig. 20—Extension rails, furnished with all switchgear orders, make removal easy for maintenance or repairs.

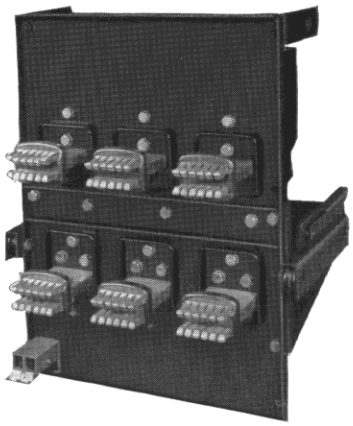


Fig. 21 — Reserve breaker, ready for service. (Note that the female primary contacts are on the breaker unit, not in the compartment—an important advantage in maintenance.)

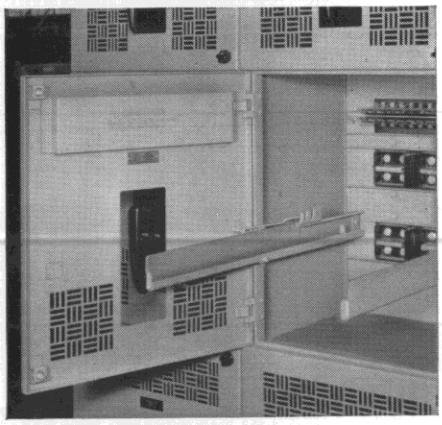


Fig. 22—Compartment, ready to receive the breaker. Accurate assembly, use of jigs for fabrication, and careful testing assure that all breaker compartments are identical, breakers interchangeable.

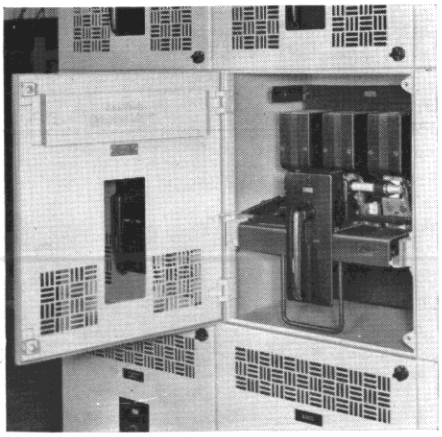
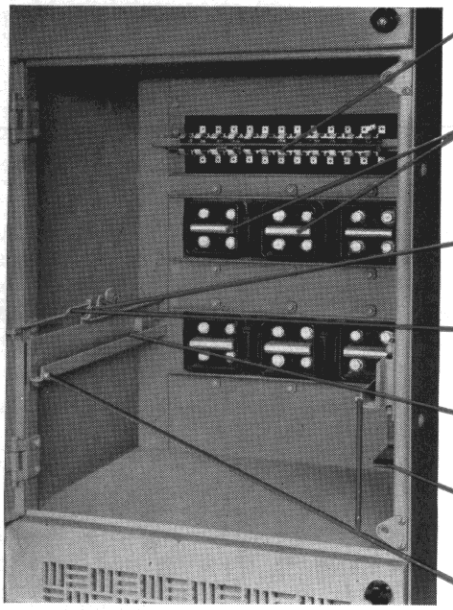


Fig. 23 — Breaker in operating position. Under normal circumstances, and with the reserve breaker at hand, the complete replacement can be made by one man in one to three minutes.

SAFETY . . . EASE OF MAINTENANCE . . .

Assured



Secondary contacts establish control circuits in "Test" and "Connected" positions.

Stationary primary contacts are in compartment; finger-type female contacts are on removable element for ease of inspection and maintenance.

Self-engaging, definite-positioning stops for "Disconnected" "Test" and "Connected" positions.

Interlock engages floating lever, trips breaker if breaker is closed when door is opened.

Wheels running in jig-welded rails insure accurate contact alignment.

Ground shoe engages floating contact on removable-unit frame in "Connected" and "Test" positions.

Levering device operating between the pins on the stationary structure and the removable element moves unit into or out of contact engagement.

Fig. 24

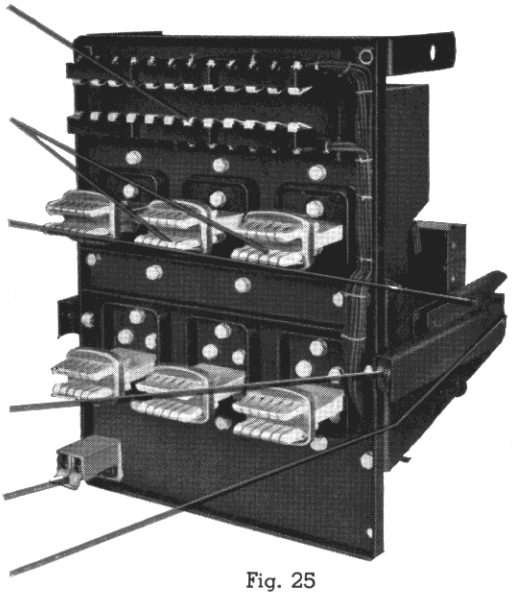
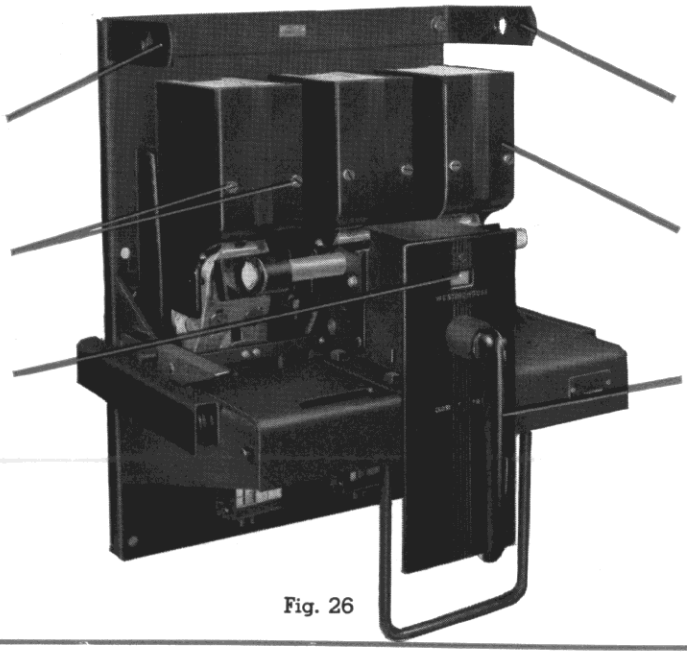


Fig. 25



Lifting bracket

Arc chute easily removed from front by loosening two screws.

Indicator (red—closed; green — open) shows breaker positions with door closed.

Lifting bracket

"De-ion" arc chutes eliminate need for arc-resisting cell lining for circuits up to 600 volts a-c and 300 volts d-c.

Operating handle to close or trip breaker.

Fig. 26

by These Features

Access to busses, cable connections, instrument transformers and secondary terminal blocks is provided by removing the rear covers of the switchgear. For ease of handling, two separate removable back covers are used for each basic unit. (Photograph shows two Basic Units 2 with three manually operated Type DB-25 breakers per unit, and one Basic Unit 5 with two Type DB-50 breakers.)

All main bus joints and all tap connections are silver-plated and tightly clamped with through-bolts to insure maximum conductivity.

Full-height steel barrier separates breaker enclosures from bus and connection compartments.

Clamp-type terminals are supplied on all feeder circuits. Number per phase is determined by circuit requirements.

Cable cleats mounted on standard tie members are provided for cable support.

Wiring trough for cross-panel connections is provided as required. Cover is removable.

Terminal blocks located across rear—can be located at top of structure if desired.

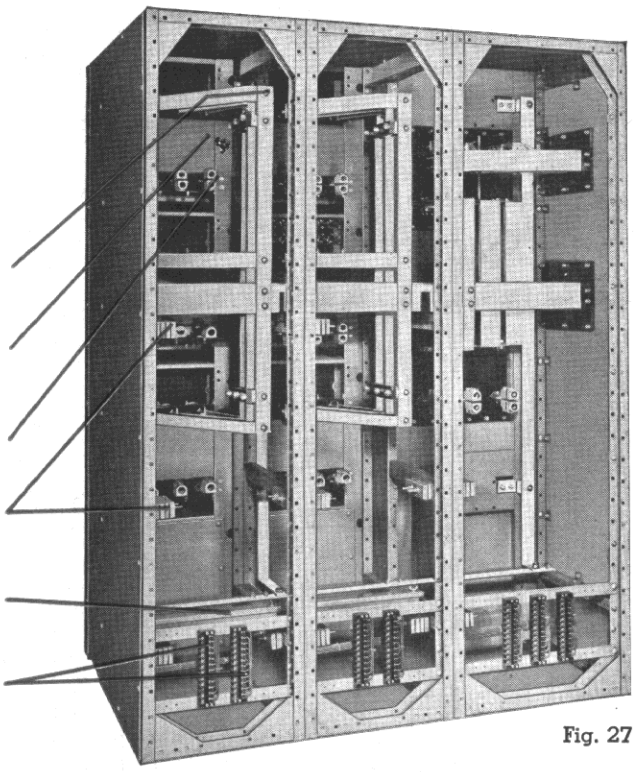


Fig. 27

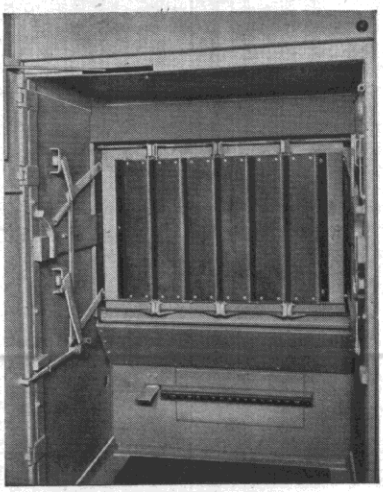


Fig. 28—A DA-100 cell equipped with shutters* which cover the stationary contacts. These shutters close automatically when the breaker is removed, open automatically when the breaker is moved back into operating position.

*Note: Automatic shutters are available for any unit when specified.

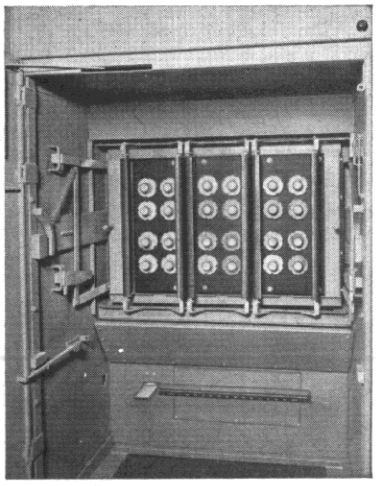


Fig. 29—View of stationary contacts for 4000-ampere Type DA-100 circuit breaker with shutters blocked in open position.

STANDARD SWITCHGEAR ASSEMBLIES

INDOOR HOUSINGS

TYPICAL ASSEMBLIES

Parts for Low-Voltage Metal-Enclosed Switchgear assemblies shown on these two pages are carried in stock to insure quick delivery on all orders. These assemblies will suffice for almost any combination of breaker ratings desired by a purchaser. Recommended unit depths are as indicated. However, these depths can be increased or decreased in 6-inch steps to line up with adjacent units or to meet special requirements such as rating of main busses, number and size of conduits and cables entering each unit, or complications due to bus risers or bus run connections. Instrument compartments or bus transition sections can be added to the switchgear assembly to meet complication of instrument and relay requirements or involved bus connections that may arise on high-current installations.

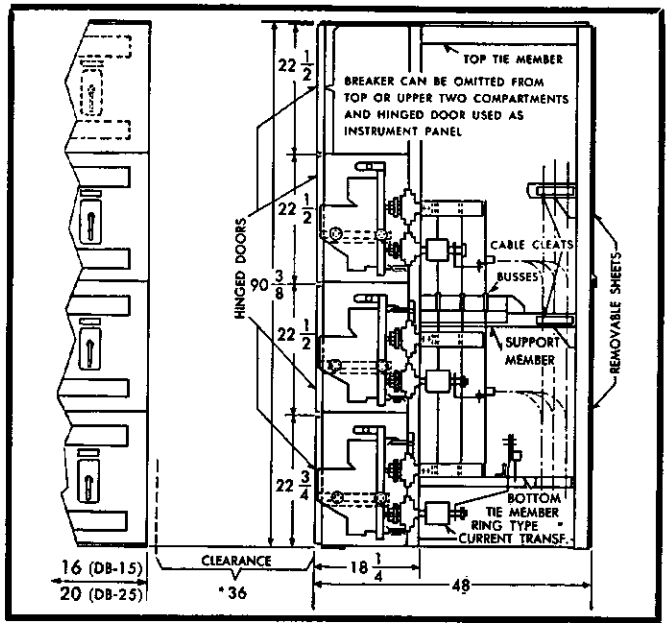


Fig. 30
Basic Units 2, 3 and 4
DB-15 or DB-25 manually or electrically operated breakers.

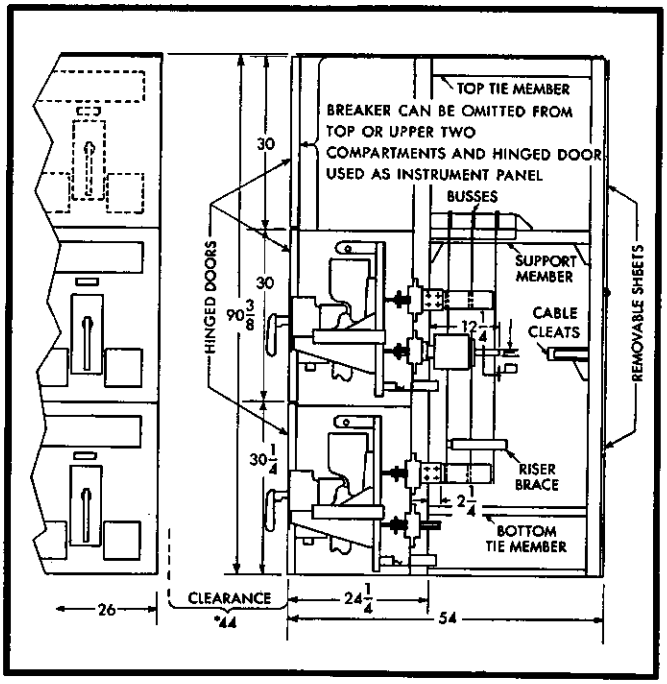


Fig. 31
Basic Units 5, 6 and 7
DB-50 manually or electrically operated breakers.

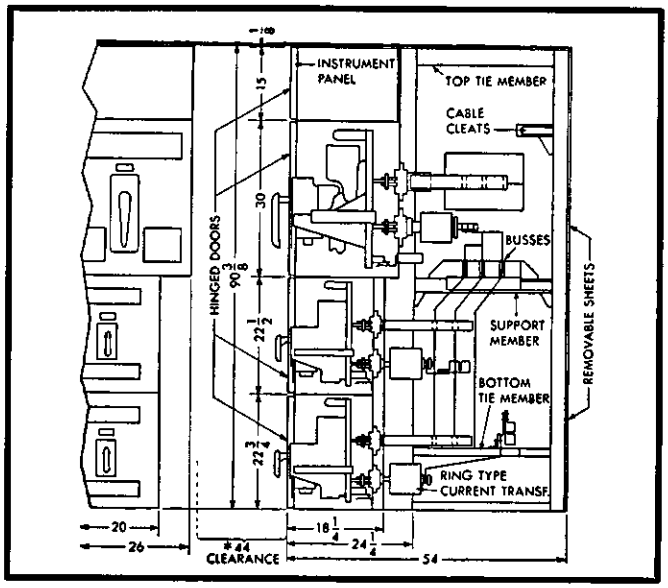


Fig. 32
Basic Unit 8
One DB-50 and two DB-15 or DB-25 manually or electrically operated breakers.

NOTES APPLYING TO DIMENSION DRAWINGS

Terminal blocks can be mounted at top or bottom across rear of unit.

External primary connections may be brought in at top or bottom.

Current transformers are shown for convenience of layout but are included only when specified on order.

Potential transformers are generally located on rear barrier of instrument section and are included only when specified on order.

Gang-operated disconnect switches are available for instrument sections which are at least 30 inches high.

*This clearance must be 60 inches when handling carriage is furnished.

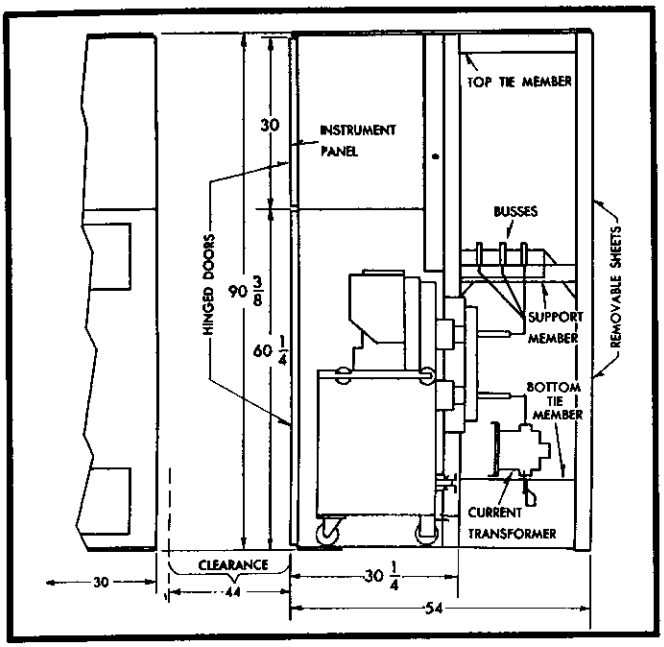


Fig. 33
Basic Unit 9
DA-75 electrically operated breakers (2000–2500–3000 amperes).

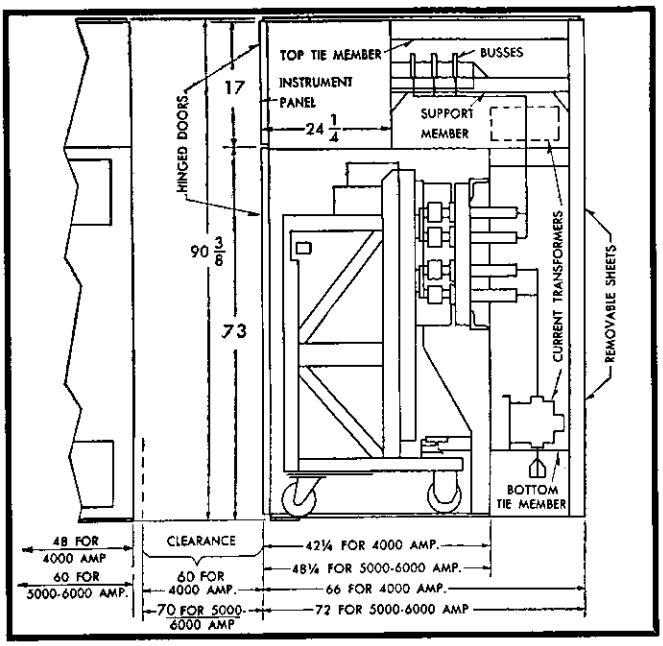


Fig. 34
Basic Unit 10
DA-100 electrically operated breakers.

OUTDOOR HOUSINGS

The outdoor housing for low-voltage switchgear is strong . . . weatherproof . . . functional. Weatherproof features include a weatherproof floor mounted above the foundation, weatherproof doors front and rear, weatherproof end trims and weatherproof roof. The housing contains facilities for adequate ventilation and heaters to prevent condensation. Accessibility is provided by front and rear doors.

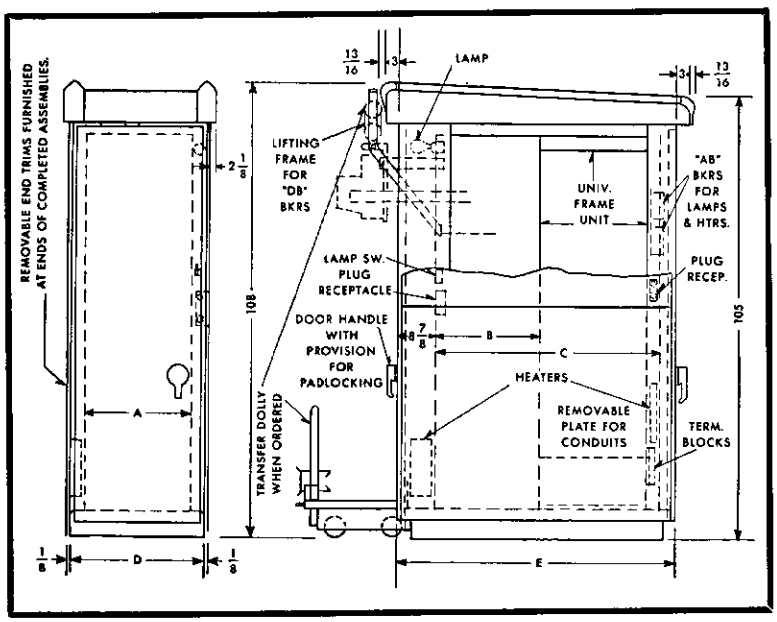


Fig. 35
Low-voltage switchgear outdoor housing.

UNIVERSAL FRAME UNIT				SWITCHHOUSE	
TYPE	SIZE			SIZE	
	A	B	C	D	E
DB-15; DB-25 & 20 W. Trans...	20	18¼	See Note 1	26	See Note 2
DB-50	26	24¼		32	
2-DB-15	32	18¼		38	
2-DB-25	40	18¼		46	
1-DA-75	30	30¼		36	

Note 1: "C" Dimension can vary from 42 to 60 inches in 6-inch steps.

Note 2: "E" Dimension can vary from 54 to 72 inches in 6-inch steps, depending on depth of low-voltage unit to be used—with 66-inch depth to be considered as standard.

Note that width of switch house is 6 inches larger than width of indoor unit, and that depth of the switch house is 12 inches larger than depth of the indoor unit.

UNIVERSAL FRAMES Provide Flexibility . . . Speed Assembly

Low-Voltage Metal-Enclosed Switchgear structures are made of formed and welded sheet steel enclosures for the air circuit breakers and bolted frames with sheet steel covers to provide support and a housing for the bus, copper cables, instrument transformers and other details. A variety of breaker enclosures, as required for the ten listed standard units, is carried in stock, as well as associated parts necessary to complete the structures.

Standard switchgear housings for all sizes of low-voltage air breakers must be suitable for line assembly in any desired combination. It must be possible to locate busses and arrange cables as the circuits and breaker positions require. This has been accomplished by building up each breaker unit from the eight following parts; (1) the breaker cell structure, (2) a rear frame, (3) bottom members, (4) top members, (5) bus support member, (6) top cover, (7) upper half rear cover, and (8) lower half rear cover. The first five parts are marked and illustrated in Figure 36. An assembly of two units, each suitable for four 15,000 or 25,000-ampere interrupting-capacity circuit breakers, is shown in Figure 37. A completed and equipped structure appears in Figure 27 on page 11.

Terminal blocks are usually located at the bottom, across the rear frame. When control circuits enter from above, however, they can be located at the top of the structure. Bus support members can be located vertically in 1½-inch steps as the bus location requires. These tie members are stocked in several lengths, so that over-all structure depths can be selected in 6-inch steps. This gives greater flexibility in lining up units for different sizes of breakers and permits varying the size of the bus compartment as the equipment requires.

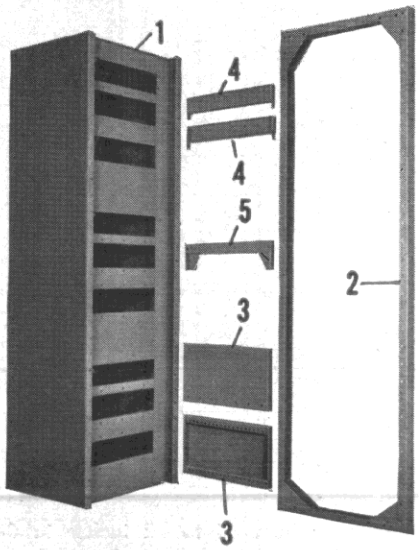


Fig. 36—Standard housing parts for a Type DB-50 breaker unit. Parts are: (1) breaker cell structure, (2) rear frame, (3) bottom members, (4) top members, and (5) bus support member.

The frames and tie members are punched with rows of square holes, and carriage bolts are used to assemble these parts. Holes are located so that by using standard members, terminal blocks, cable clamps, wiring troughs, bus supports, fuse mountings, etc., can be located as desired. Additions and changes can be made in the field without cutting, welding or drilling.

Since the over-all structures are made of front breaker enclosures with bolted frames in the rear, they can be stripped easily, rearranged and equipped in a new location if changes in factory layout make this desirable. Any new parts required can be supplied from stock.

Universal frame structures are well adapted to unusual conditions such as interference from building columns. Since the parts are bolted together, they can be assembled around such obstructions if necessary. Special housings to enclose reactors or similar equipment can be made up largely of standard parts. The same flexibility of construction and general appearance results where these special units are set into a "Unitized" group.

Universal frame structures for low-voltage air breakers provide much greater flexibility and adaptability for present and future use than equivalent all-welded construction.

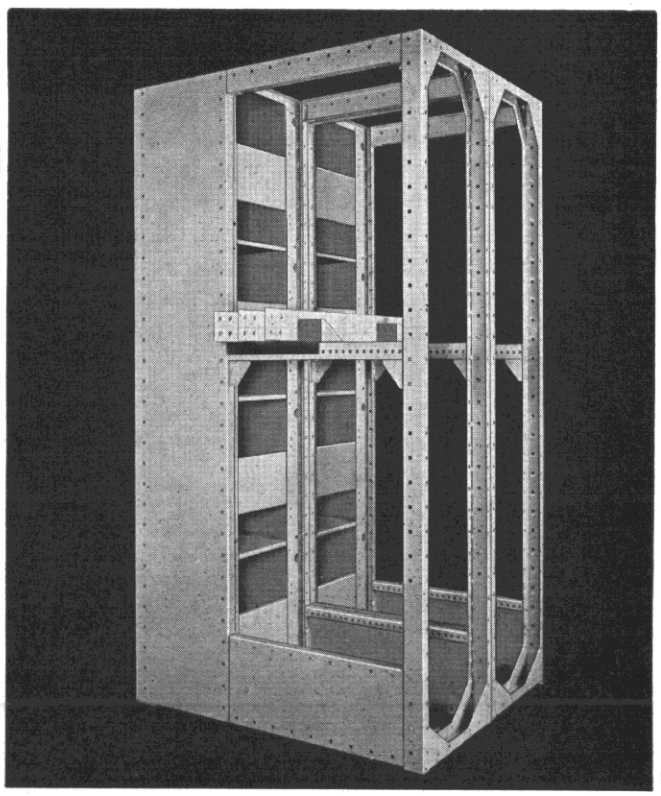


Fig. 37—Assembly of standard parts for two units, each suitable for four 15,000 or 25,000-ampere interrupting capacity circuit breakers.

BUS SUPPORTS Meet All Current-Carrying Requirements

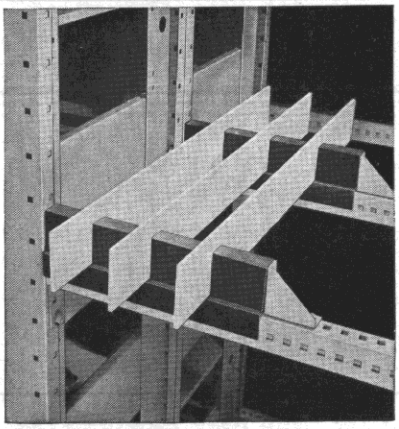


Fig. 38—Micarta bus supports arranged for one bus bar per phase.

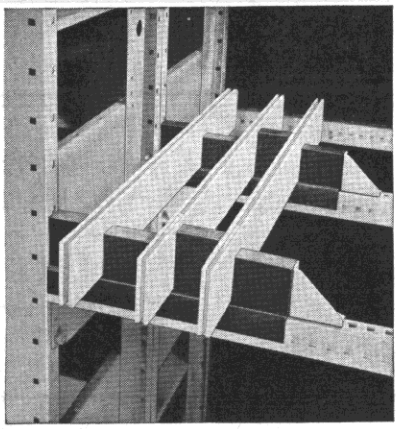


Fig. 39—Bus supports arranged for two bars per phase.

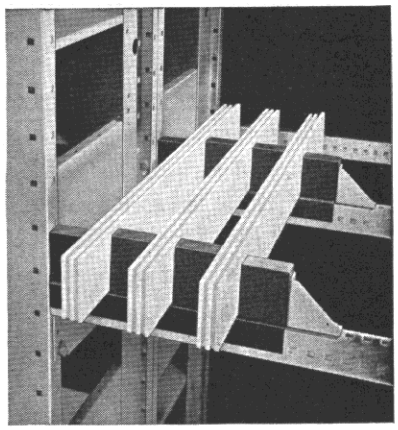


Fig. 40—Micarta block arrangement for three bus bars per phase.

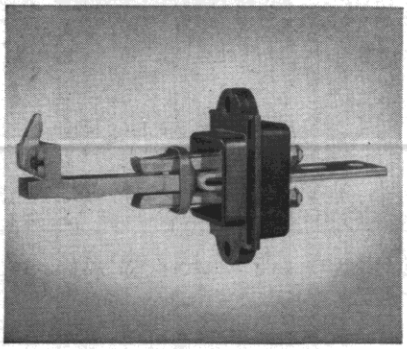
The standard bus supports for universal frame structures are arranged for 3-phase busses having current-carrying capacities up to 3800 amperes. The use of slightly different parts provides for a neutral conductor or two bus bars when single-phase or direct-current circuits are involved. The mechanical strength is adequate for short-circuit currents up to 50,000 amperes, average 3-phase rms current. By the addition of standard clamping units, this figure can be raised to 75,000 amperes.

Standard bus supports permit mounting 3-phase busses with one, two, or three bars per phase, in widths up to 6 inches, thus giving a maximum current-carrying capacity of 3800 amperes. When it is desirable to increase the bus capacity, it is only necessary to rearrange the bus supports, and they then can accommodate the additional bus bars.

The bus support parts are made up of Micarta® and are arranged for mounting on the steel bus support member, one of the standard universal frame parts. As shown in Figure 38, the bus support can be located against the back of the breaker cubicle with the outer end against an angle bracket. An angle bracket can be used at each end of the support assembly if the bus is located back from the breaker units. The insulating members are made up of five parts, one being a quarter-inch thick Micarta channel which straddles the steel support member, and the other four are Micarta blocks. These are deeply tapped on two edges for 3/8-inch bolts which enter from the bottom through the steel and Micarta channel.

Figure 38 shows the support arranged for one bar per phase. Figure 39 shows the block nearest the breaker unit and the second block from it turned upright. The horizontal dimension of the block is shorter with this mounting, and permits the addition of one more bar per phase. The original three bars were on 4-inch centers and their position remains unchanged, so that with a bus having two bars per phase, the actual centers of the conductors are no longer equally spaced. Figure 40 shows all of the blocks turned upright, with three bus bars used in each phase conductor. In this case the center bar of each group is in the same position as when a single bar was used and the busses are again on 4-inch centers.

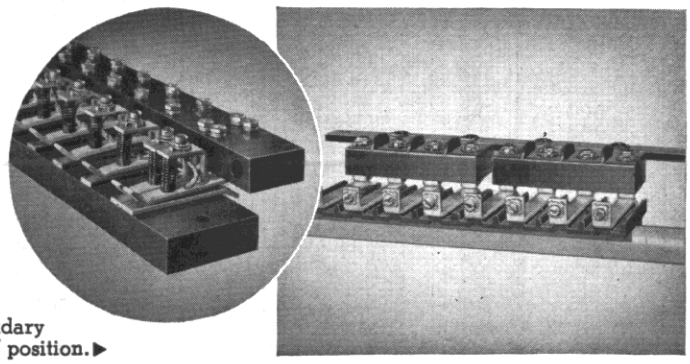
The universal frame construction makes it possible to locate the bus supports in any desired position, and rearrangements of busses can be made easily in the field if changes in loads make this necessary.



◀ Fig. 41—Primary contact assembly for 600-ampere, Type DB-25 breakers.

Fig. 42—Partial view ▶ of secondary contacts of DA breakers in operating position. Upper finger assembly is mounted on removable element—lower stationary portion in cell.

Fig. 43—Partial view of DB breaker secondary contacts shown in "Test" position. ▶



BUSHING-TYPE CURRENT TRANSFORMERS

Occupy Minimum Space

The space economy and high mechanical short time current ratings inherent in the design of bushing-type current transformers are particular advantages in metal-enclosed switchgear. They are used where their performance characteristics meet application requirements. Two types, BT-5 and BT-12.5 are available for use on drawout breaker installations.

Type BT-5 current transformers are primarily intended for use with instruments and meters only. The transformer is approximately 4 inches long and 4 inches in diameter and can be applied to all ratings of Type DB breakers rated 800 amperes or less. The maximum secondary burden which may be connected to these transformers is small, the nominal burden being the ASA standard B-0.2 burden (5 VA-90% P.F. based on 5 amperes, 60 cycles). Applications should be checked with the tabulation shown below, listing the available ASA standard primary current ratings and corresponding accuracy classifications.

Type BT-12.5 current transformers are intended for use with instruments and meters or relays. The transformer is approximately 6 inches long and 6 inches in diameter and can be applied to all ratings of Type DB breakers. The nominal burden of this transformer is the ASA standard B-0.5 burden (12.5 VA-90% P.F. based on 5 amperes, 60 cycles). Applications should be checked with the tabulation shown below listing the available ASA standard primary current ratings and corresponding accuracy classifications.

TYPE BT-5 BUSHING-TYPE CURRENT TRANSFORMERS

PRIMARY CURRENT RATINGS AMPERES	ASA STANDARD ACCURACY CLASSIFICATIONS					
	Metering Accuracy at Indicated Burdens					RELAYING ACCURACY
	B-0.1	B-0.2	B-0.5	B-1	B-2	
100	1.2	2.4	...	...	...	.....
150	0.6	1.2	2.4	...	...	.....
200	0.6	1.2	1.2	2.4	...	10L10
300	0.3	0.3	0.6	1.2	2.4	10L10
400	0.3	0.3	0.6	0.6	1.2	10L20
600	0.3	0.3	0.6	0.6	1.2	10L20
800	0.3	0.3	0.3	0.6	0.6	10L20

TYPE BT-12.5 BUSHING-TYPE CURRENT TRANSFORMERS

PRIMARY CURRENT RATINGS AMPERES	ASA STANDARD ACCURACY CLASSIFICATIONS					
	Metering Accuracy at Indicated Burdens					RELAYING ACCURACY
	B-0.1	B-0.2	B-0.5	B-1	B-2	
100	0.6	1.2	2.4	...	...	10L20
150	0.6	0.6	1.2	2.4	2.4	10L20
200	0.6	0.6	0.6	1.2	1.2	10L50
300	0.3	0.3	0.3	0.6	1.2	10L50
400	0.3	0.3	0.3	0.6	0.6	10L100
600	0.3	0.3	0.3	0.6	1.2	10L100
800	0.3	0.3	0.3	0.3	0.6	10L100
1200	0.3	0.3	0.3	0.3	0.3	10L100
1500	0.3	0.3	0.3	0.3	0.3	10L100
2000	0.3	0.3	0.3	0.3	0.3	10L100

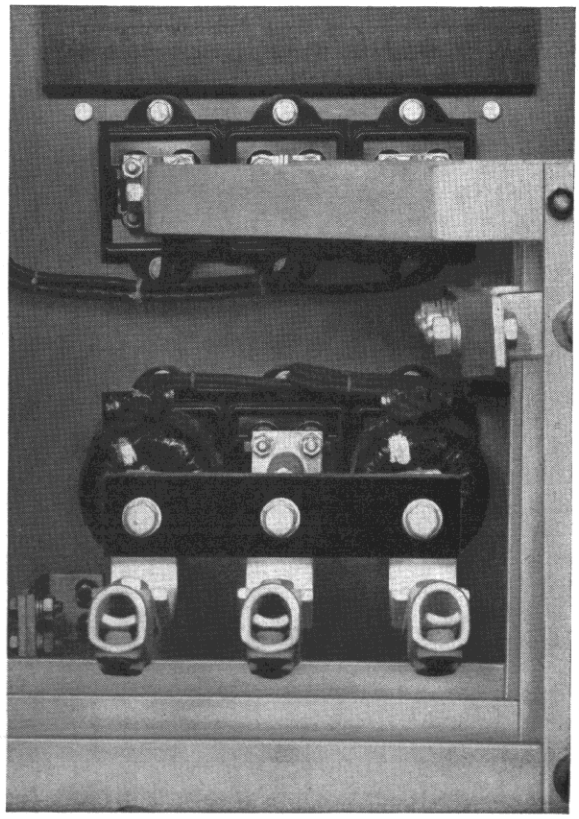


Fig. 44—Current transformers mounted on stationary primary studs.

BREAKER ATTACHMENTS—AUXILIARY SWITCHES—

SECONDARY CONTACTS for "Unitized" Low-Voltage Switchgear

AVAILABLE ATTACHMENTS FOR AIR CIRCUIT BREAKERS

	DB-15	DB-25	DB-50	DA-75	DA-100
Non-Adjustable Instantaneous Series Overload Trip	—	—	—	●	●
Adjustable Instantaneous Series Overload Trip	●	●	●	●	*
Long Time Delay Series Overload Trip	●	●	●	●	*
Long Time Delay and Instantaneous Series Overload Trip	●	●	●	—	—
Long Time Delay and Short Time Delay Series Overload Trip	●	●	●	—	—
Adjustable Transformer Trip, Time Delay or Instantaneous	—	—	—	—	●
Shunt Trip	●	●	●	●	●
Undervoltage Trip, Time Delay or Instantaneous	●	●	●	—	●
Reverse Current Trip	●	●	●	●	—
Alarm Switch	●	●	●	●	●
Field Discharge Contact	●	●	●	●	—
Capacitor Trip	●	●	●	—	—
Electric Lockout Coil	●	●	●	—	—
Key Interlock	●	●	●	●	●
Padlocking Provisions	●	●	●	—	—

● Available
* Available on D-C Breakers Only
— Not Available

AVAILABLE AUXILIARY SWITCH CONTACTS FOR AIR CIRCUIT BREAKERS

TYPE	NUMBER OF CONTACTS
DB-15	4 or 8
DB-25	4 or 8
DB-50	4, 8 or 12
DA-75	3, 5, 7 or 9
DA-100	3, 5, 7, 9 or 11

AVAILABLE SECONDARY CONTACTS FOR AIR CIRCUIT BREAKERS

TYPE	NUMBER OF CONTACTS
DB-15	8 or 16
DB-25	8 or 16
DB-50	12 or 24
DA-75	13 or 26
DA-100 (4000-A)	16 or 32
DA-100 (5000 & 6000-A)	22

METHOD OF ANCHORING LOW-VOLTAGE METAL-ENCLOSED SWITCHGEAR

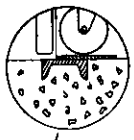


Fig. 45

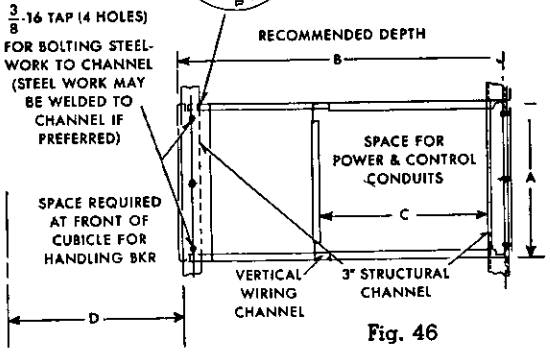


Fig. 46

BKR. TYPE	BREAKER RATING		DIMENSIONS —INCHES			
	A-C AMP.	D-C AMP.	A	B	C	D
DB-15	15 to 225	15 to 225	16	48	30	36*
DB-25	35 to 600	35 to 600	20	48	27⅞	36*
DB-50	100 to 1600	200 to 1600	26	54	28 13/16	44*
DA-75	2000, 2500 3000	2000, 2500 3000	30	54	20⅜	44
DA-100	4000	4000, 5000 6000	48	66	21⅝	60
DA-100	5000, 6000	8000, 10,000	60	72	18⅜	70

*Must be 60 inches when handling carriage is furnished.

CASCADING OF BREAKERS

Lowers Cost . . . on Some Applications

Low-voltage air circuit breakers are normally applied on the basis of adequate interrupting and current-carrying ratings, both for normal loads and fault currents for short time intervals. Under these conditions, standard interrupting-duty cycles apply.

Breakers may also be applied on the cascade principle. Under these conditions, certain breakers may be subjected to currents above their published interrupting ratings, and a restricted interrupting-duty cycle results.

It is evident that if two or more breakers operate in series to clear a fault, the stresses on them are less than if they opened individually. This condition is recognized, and breakers farthest from the source of power in cascade arrangements may be applied with interrupting ratings less than the fault currents to which they will be subjected. Each breaker in these cascade circuits must be free to trip instantaneously when the breaker next lower in the cascade is subjected to currents above its published interrupting rating. This means that selective isolation of faults is not possible on currents exceeding the published interrupting rating of the smallest breakers.

Breakers which interrupt currents above their rating, as evidenced by the opening of the breaker next higher in the cascade, must not be closed even once without inspection. They may be damaged so that normal load current cannot be safely carried, or their interrupting ability may be impaired. N.E.M.A. Standards specify that all circuit breakers subjected to fault currents in excess of their interrupting rating shall be electrically operated.

Cascading is limited to three steps of interrupting rating. The breaker nearest the source of power must have adequate interrupting rating for the circuits in which they are applied. The breakers next lower in the cascade may have one half of the interrupting rating required by the maximum fault currents, and those farthest from the source may have one third this rating. For the system shown in Fig. 48 Page 20, breaker "A" must have full interrupting rating; breaker "B" may have one half interrupting rating; breaker "C" may be applied on the basis of one third interrupting rating.

The reduced selectivity, restricted interrupting-duty cycle, and some additional maintenance which can be expected with cascaded breakers is often compensated for, however, by large savings in the initial cost of the switchgear. Under these conditions, cascaded arrangements may be preferred.

SELECTIVE TRIPPING

Assures Maximum Continuity of Service

For essential circuits, such as those supplying power station auxiliaries, it is highly desirable to have selective tripping, which is the term used to describe time discrimination between the overload tripping of circuit breakers connected in series so that the section where a fault occurs is isolated, and service to other essential circuits is maintained.

For the system shown in Fig. 48, page 20, breaker "C" would be a motor feeder breaker and would be equipped with series tripping elements having long time delay and instantaneous characteristics. The long time delay portion is designed for motor starting duty and overload protection, and the instantaneous portion is designed to function on short circuits. Breakers "B" and "A" would be equipped with tripping elements having long time delay and short time delay characteristics, with a longer time delay for breaker "A", than for breaker "B". The short time delay feature functions to provide a time delay on currents of short-circuit magnitude to permit the breaker farther from the power source to trip first if the fault is beyond that breaker. This arrangement would permit breaker "A" to trip only for a fault between breakers "A" and "B" and breaker "B" to trip only for a fault between breakers "B" and "C".

The Type DB breaker trip units have been designed so that a total of four breakers in series may be made to trip selectively.

In applying circuit breakers to a selective tripping system, it is necessary that each breaker have an interrupting rating equal to, or greater than, the available short-circuit current at the point of application. It is also necessary that all breakers except those having instantaneous tripping elements, such as the ones farthest removed from the power source, have a short time (30-cycle) rating equal to, or greater than, the fault current at the point of application. The Type DB line of air circuit breakers has been designed to withstand short circuits, without derating, for a period of time necessary to secure selective tripping.

In order that the current-time characteristics will not overlap for adjacent breakers in a selective scheme, the current ratings of the breakers must be properly selected. A current rating ratio of at least two-to-one is necessary to prevent false tripping.

APPLICATION TABLE
FOR CASCADING OF AIR CIRCUIT BREAKERS

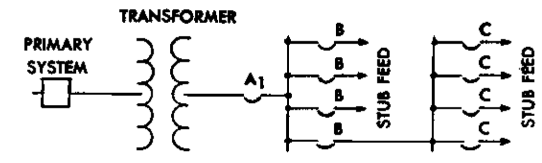


Fig. 47

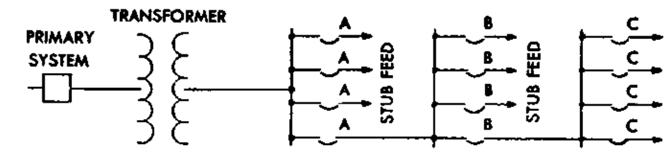


Fig. 48

208 VOLTS*

TRANSFORMER RATING 3-PH. KVA AND IMPEDANCE PERCENT	MAX. SHORT-CIRCUIT KVA AVAILABLE FROM PRIMARY SYSTEM	NORMAL LOAD CONTINUOUS CURRENT AMP.	SHORT-CIRCUIT CURRENT TOTAL RMS AMPERES (AVERAGE 3-PHASE AMP.) TRANSFORMER ALONE	50% MOTOR LOAD†	COMBINED	INTERRUPTING RATING OF WESTINGHOUSE AIR CIRCUIT BREAKER RECOMMENDED FIG. 47 A_1 ‡	FIG. 48 A ‡	B §	C §
300 5%	15000	834	14900	2100	17000	50000	25000	15000	15000
	25000		16700		18800	50000	25000	15000	15000
	50000		18600		20700	50000	25000	15000	15000
	100000		19600		21700	50000	25000	15000	15000
	150000		20000		22100	50000	25000	15000	15000
	250000		20300		22400	50000	25000	15000	15000
	500000		20500		22600	50000	25000	15000	15000
	Unlimited		20800		22900	50000	25000	15000	15000
450 5%	25000	1250	22900	3100	26000	50000	50000	15000	15000
	50000		26500		29600	50000	50000	15000	15000
	100000		28600		31700	50000	50000	25000	15000
	150000		29400		32500	50000	50000	25000	15000
	250000		30100		33200	50000	50000	25000	15000
	500000		30600		33700	50000	50000	25000	15000
	Unlimited		31400		34500	50000	50000	25000	15000
500 5%	25000	1388	24800	3500	28300	50000	50000	15000	15000
	50000		28900		32400	50000	50000	25000	15000
	100000		31500		35000	50000	50000	25000	15000
	150000		32500		36000	50000	50000	25000	15000
	250000		33300		36800	50000	50000	25000	15000
	500000		34000		37500	50000	50000	25000	15000
	Unlimited		34600		38100	50000	50000	25000	15000
600 5%	25000	1668	28200	4200	32400	75000	50000	25000	15000
	50000		33500		37700	75000	50000	25000	15000
	100000		37100		41300	75000	50000	25000	15000
	150000		38500		42700	75000	50000	25000	15000
	250000		39700		43900	75000	50000	25000	15000
	500000		40600		44800	75000	50000	25000	15000
	Unlimited		41700		45900	75000	50000	25000	25000
750 5½%	25000	2080	30600	5200	35800	75000	50000	25000	15000
	50000		37100		42300	75000	50000	25000	15000
	100000		41600		46800	75000	50000	25000	25000
	150000		43300		48500	75000	50000	25000	25000
	250000		44800		50000	75000	50000	25000	25000
	500000		46100		51300	75000	75000	50000	25000
	Unlimited		47300		52500	75000	75000	50000	25000
1000 5½%	25000	2780	36500	7000	43500	75000	50000	25000	15000
	50000		46300		53300	75000	75000	50000	25000
	100000		53400		60400	75000	75000	50000	25000
	150000		56300		63300	75000	75000	50000	25000
	250000		58900		65900	75000	75000	50000	25000
	500000		60900		67900	75000	75000	50000	25000
	Unlimited		63200		70200	75000	75000	50000	25000
1500 5½%	25000								
	50000								
	100000								
	150000								
	250000								
	500000								
	Unlimited								
2000 5½%	25000								
	50000								
	100000								
	150000								
	250000								
	500000								
	Unlimited								

240 VOLTS*

TRANSFORMER RATING 3-PH. KVA AND IMPEDANCE PERCENT	MAX. SHORT-CIRCUIT KVA AVAILABLE FROM PRIMARY SYSTEM	NORMAL LOAD CONTINUOUS CURRENT AMP.	SHORT-CIRCUIT CURRENT TOTAL RMS AMPERES (AVERAGE 3-PHASE AMP.) TRANSFORMER ALONE	100% MOTOR LOAD†	COMBINED	INTERRUPTING RATING OF WESTINGHOUSE AIR CIRCUIT BREAKER RECOMMENDED FIG. 47 A_1 ‡	FIG. 48 A ‡	B §	C §
300 5%	15000	722	12900	3600	16500	50000	25000	15000	15000
	25000		14600		18200	50000	25000	15000	15000
	50000		16100		19700	50000	25000	15000	15000
	100000		17000		20600	50000	25000	15000	15000
	150000		17400		21000	50000	25000	15000	15000
	250000		17600		21200	50000	25000	15000	15000
	500000		17900		21500	50000	25000	15000	15000
	Unlimited		18100		21700	50000	25000	15000	15000
450 5%	25000	1083	19900	5400	25300	50000	50000	15000	15000
	50000		22900		28300	50000	50000	¶15000	15000
	100000		24800		30200	50000	50000	25000	15000
	150000		25400		30800	50000	50000	25000	15000
	250000		26000		31400	50000	50000	25000	15000
	500000		26500		31900	50000	50000	25000	15000
	Unlimited		27000		32400	50000	50000	25000	15000
500 5%	25000	1203	21500	6000	27500	50000	50000	15000	15000
	50000		25100		31100	50000	50000	25000	15000
	100000		27300		33300	50000	50000	25000	15000
	150000		28200		34200	50000	50000	25000	15000
	250000		28900		34900	50000	50000	25000	15000
	500000		29500		35500	50000	50000	25000	15000
	Unlimited		30100		36100	50000	50000	25000	15000
600 5%	25000	1443	24400	7200	31600	50000	50000	25000	15000
	50000		29000		36200	50000	50000	25000	15000
	100000		32100		39300	50000	50000	25000	15000
	150000		33300		40500	50000	50000	25000	15000
	250000		34400		41600	50000	50000	25000	¶15000
	500000		35100		42300	50000	50000	25000	¶15000
	Unlimited		36000		43200	50000	50000	25000	¶15000
750 5½%	25000	1804	26600	9000	35600	75000	50000	25000	15000
	50000		32300		41300	75000	50000	25000	¶15000
	100000		36100		41500	75000	50000	25000	25000
	150000		37600		46600	75000	¶ 50000	¶25000	25000
	250000		39000		48000	75000	¶ 50000	¶25000	25000
	500000		40000		49000	75000	¶ 50000	¶25000	25000
	Unlimited		41100		50100	75000	75000	50000	25000
1000 5½%	25000	2406	31700	12000	43700	75000	50000	25000	¶15000
	50000		40200		52200	75000	75000	50000	25000
	100000		46300		58300	75000	75000	50000	25000
	150000		48800		60800	75000	75000	50000	25000
	250000		51000		63000	75000	75000	50000	25000
	500000		52800		64800	75000	75000	50000	25000
	Unlimited		54700		66700	75000	75000	50000	25000
1500 5½%	25000	3609	39300	18000	57300	100000	75000	50000	25000
	50000		53200		71200	100000	¶ 75000	50000	¶25000
	100000		64500		82500	100000	100000	50000	50000
	150000		69500		87500	100000	100000	50000	50000
	250000		74000		92000	100000	¶100000	¶50000	50000
	500000		77900		95900	100000	¶100000	¶50000	50000
	Unlimited		82000		100000	100000	¶100000	¶50000	50000
2000 5½%	25000								
	50000								
	100000								
	150000								
	250000								
	500000								
	Unlimited								

480 VOLTS*

TRANSFORMER RATING 3-PH. KVA AND IMPEDANCE PERCENT	MAX. SHORT-CIRCUIT KVA AVAILABLE FROM PRIMARY SYSTEM	NORMAL LOAD CONTINUOUS CURRENT AMP.	SHORT-CIRCUIT CURRENT TOTAL RMS AMPERES (AVERAGE 3-PHASE AMP.) TRANSFORMER ALONE	100% MOTOR LOAD†	COMBINED	INTERRUPTING RATING OF WESTINGHOUSE AIR CIRCUIT BREAKER RECOMMENDED FIG. 47 A_1 ‡	FIG. 48 A ‡	B §	C §
300 5%	15000								
	25000	361	7300	1800	9100	25000	15000	15000	15000
	50000		8100		9900	25000	15000	15000	15000
	100000		8500		10300	25000	15000	15000	15000
	150000		8700		10500	25000	15000	15000	15000
	250000		8800		10600	25000	15000	15000	15000
	500000		8900		10700	25000	15000	15000	15000
	Unlimited		9000		10800	25000	15000	15000	15000
450 5%	25000	542	9900	2700	12600	25000	15000	15000	15000
	50000		11500		14200	25000	¶15000	15000	15000
	100000		12400		15100	25000	25000	15000	15000
	150000		12700		15400	25000	25000	15000	15000
	250000		13000		15700	25000	25000	15000	15000
	500000		13300		16000	25000	25000	15000	15000
	Unlimited		13500		16200	25000	25000	15000	15000
500 5%	25000	601	10800	3000	13800	50000	¶15000	15000	15000
	50000		12500		15500	50000	25000	15000	15000
	100000		13700		16700	50000	25000	15000	15000
	150000		14100		17100	50000	25000	15000	15000
	250000		14500		17500	50000	25000	15000	15000
	500000		14800		17800	50000	25000	15000	15000
	Unlimited		15100		18100	50000	25000	15000	15000
600 5%	25000	722	12200	3600	15800	50000	25000	15000	15000
	50000		14600		18200	50000	25000	15000	15000
	100000		16100		19700	50000	25000	15000	15000
	150000		16700		20300	50000	25000	15000	15000
	250000		17200		20800	50000	25000	15000	15000
	500000		17600		21200	50000	25000	15000	15000
	Unlimited		18100		21700	50000	25000	15000	15000
750 5½%	25000	902	13300	4500	17800	50000	25000	15000	15000
	50000		16100		20600	50000	25000	15000	15000
	100000		18000		22500	50000	25000	15000	15000
	150000		18800		23300	50000	¶25000	15000	15000
	250000		19500		24000	50000	¶25000	15000	15000
	500000		20000		24500	50000	¶25000	15000	15000
	Unlimited		20500		25000	50000	¶25000	15000	15000
1000 5½%	25000	1203	15800	6000	21800	50000	25000	15000	15000
	50000		20100		26100	50000	50000	15000	15000
	100000		23200		29200	50000	50000	¶15000	15000
	150000		24400		30400	50000	50000	25000	15000
	250000		25500		31500	50000	50000	25000	15000
	500000		26400		32400	50000	50000	25000	15000
	Unlimited		27400		33400	50000	50000	25000	15000
1500 5½%	25000	1804	19600	9000	28600	75000	50000	¶15000	15000
	50000		26600		35600	75000	50000	25000	15000
	100000		32300		41300	75000	50000	25000	15000
	150000		34800		43800	75000	50000	25000	¶15000
	250000		37000		46000	75000	¶50000	¶25000	25000
	500000		38900		47900	75000	¶50000	¶25000	25000
	Unlimited		41100		50100	75000	75000	50000	25000
2000 5½%	25000	2406	22100	12000	34100	75000	50000	25000	15000
	50000		31700		43700	75000	50000	25000	¶15000
	100000		39400		51400	75000	75000	50000	25000
	150000		44100		56100	75000	75000	50000	25000
	250000		46800		58800	75000	75000	50000	25000
	500000		50700		62700	75000	75000	50000	25000
	Unlimited		54700		66700	75000	75000	50000	25000

600 VOLTS*

TRANSFORMER RATING 3-PH. KVA AND IMPEDANCE PERCENT	MAX. SHORT-CIRCUIT KVA AVAILABLE FROM PRIMARY SYSTEM	NORMAL LOAD CONTINUOUS CURRENT AMP.	SHORT-CIRCUIT CURRENT TOTAL RMS AMPERES (AVERAGE 3-PHASE AMP.) TRANSFORMER ALONE	100% MOTOR LOAD†	COMBINED	INTERRUPTING RATING OF WESTINGHOUSE AIR CIRCUIT BREAK[ER RECOMMENDED] FIG. 47 A_1 ‡	FIG. 48 A ‡	B §	C §
300 5%	15000								
	25000	289	5850	1450	7300	25000	15000	15000	150
	50000		6450		7900	25000	15000	15000	150
	100000		6850		8300	25000	15000	15000	150
	150000		6950		8400	25000	15000	15000	150
	250000		7050		8500	25000	15000	15000	150
	500000		7150		8600	25000	15000	15000	150
	Unlimited		7250		8700	25000	15000	15000	150
450 5%	25000	433	7900	2200	10100	25000	15000	15000	150
	50000		9000		11200	25000	15000	15000	150
	100000		9900		12100	25000	15000	15000	150
	150000		10200		12400	24000	15000	15000	150
	250000		10400		12600	25000	15000	15000	150
	500000		10600		12800	25000	15000	15000	150
	Unlimited		10800		13000	25000	15000	15000	150
500 5%	25000	481	8600	2400	11000	25000	15000	15000	150
	50000		10000		12400	25000	15000	15000	150
	100000		11000		13400	25000	15000	15000	150
	150000		11300		13700	25000	15000	15000	150
	250000		11600		14000	25000	¶15000	15000	150
	500000		11800		14200	25000	¶15000	15000	150
	Unlimited		12000		14400	25000	¶15000	15000	150
600 5%	25000	578	9700	2900	12600	¶25000	15000	15000	150
	50000		11600		14500	¶25000	¶15000	15000	150
	100000		12900		15800	¶25000	25000	15000	150
	150000		13300		16200	¶25000	25000	15000	150
	250000		13800		16700	¶25000	25000	15000	150
	500000		14100		17000	¶25000	25000	15000	150
	Unlimited		14500		17400	¶25000	25000	15000	150
750 5½%	25000	722	10600	3600	14200	50000	¶15000	15000	150
	50000		12900		16500	50000	25000	15000	150
	100000		14500		18100	50000	25000	15000	150
	150000		15100		18700	50000	25000	15000	150
	250000		15600		19200	50000	25000	15000	150
	500000		16000		19600	50000	25000	15000	150
	Unlimited		16400		20000	50000	25000	15000	150
1000 5½%	25000	962	12700	4800	17500	50000	25000	15000	150
	50000		16100		20900	50000	25000	15000	150
	100000		18500		23300	50000	¶25000	15000	150
	150000		19500		24300	50000	¶25000	15000	150
	250000		20500		25300	50000	50000	15000	150
	500000		21100		25900	50000	50000	15000	150
	Unlimited		21900		26700	50000	50000	15000	150
1500 5½%	25000	1444	15700	7200	22900	50000	25000	15000	150
	50000		21300		28500	50000	50000	¶15000	150
	100000		25900		33100	50000	50000	25000	150
	150000		27900		35100	50000	50000	25000	150
	250000		29700		36900	50000	50000	25000	150
	500000		31200		38400	50000	50000	25000	150
	Unlimited		32900		40100	50000	50000	25000	150
2000 5½%	25000	1924	17700	9600	27300	75000	50000	25000	150
	50000		25300		34900	75000	50000	25000	150
	100000		31600		41200	75000	50000	25000	150
	150000		25300		44900	75000	50000	25000	¶150
	250000		37500		47100	75000	¶50000	¶25000	250
	500000		40500		50100	75000	75000	50000	250
	Unlimited		43800		53400	75000	75000	50000	250

* All selections in table are based on voltages, transformer impedances, and motor loads, as indicated. For conditions differing from those given in the table, the selections therein do not apply. Under different conditions, the short-circuit currents should be calculated and selections made accordingly

† The motor's short-circuit contributions are computed on the basis of motor characteristics that will give five times normal current. For the 208-volt table, 50 percent motor load is assumed. For the 240-, 480-, and 600-volt tables, 100 percent loads are assumed. For other percentages of load the motor short-circuit current will be in direct proportion.

‡ Breaker A_1 selections are in all cases governed by the necessary continuous-current ratings of the transformer, and this accounts for the fact that in some cases the interrupting ratings are higher than the ratings given for the corresponding A breaker. Ratings of A are all based only on the interrupting requirements, as determined by the total combined short-circuit current. For breakers A_1 and A which back up breakers B and C instantaneous, high-set trips only are recommended.

§ Breakers B and C selections are based on the use of main transformer or main feeder breakers (A or A_1) as listed in the tables.

¶ Except those that are marked with this symbol (¶), the breaker selections recommended are suitable for ranges of 220-240, 440-480, and 550-600 volts, respectively. Where marked by this symbol, the current values given in the tables should be multiplied by the ratio:

$\frac{240}{\text{new voltage}}$, $\frac{480}{\text{new voltage}}$ or $\frac{600}{\text{new voltage}}$, as the case may be, and selections should be made accordingly.

KEY

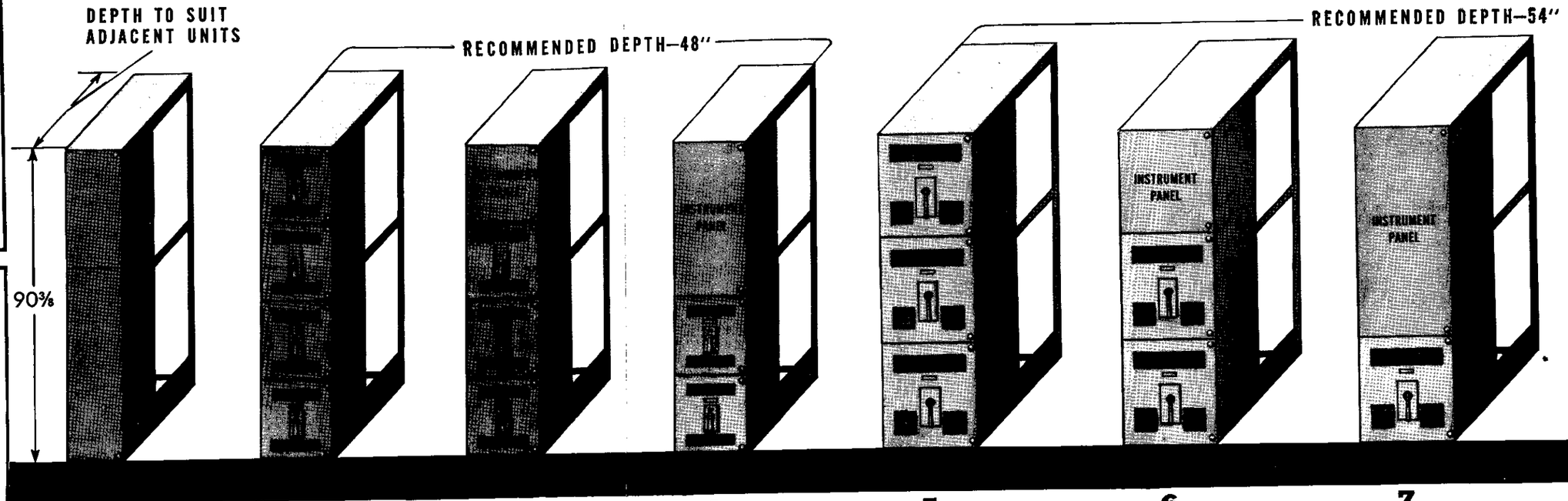
To Instrument-Panel Abbreviations

A —Ammeter
AS —Ammeter Switch
CA —Ratio-differential Relay
CO —Overcurrent Induction Relay
CS —Circuit-breaker Control Switch
NP —Name Plate
V —Voltmeter
VS —Voltmeter Switch
WH—Watthour Meter

Recommended Unit Depths are as indicated, but depths can be increased or decreased in 6-inch steps to suit combination of units and bus-space requirements.

Any decrease in unit depths from recommended dimension should be carefully investigated to assure adequate bus space.

Maximum unit depth for all units is 72 inches.



BASIC UNITS

1 Bus transition or Instrument compartment

2

3 15,000 or 25,000-ampere interrupting capacity Type DB-15 or DB-25 air circuit breakers, manually or electrically operated.

4

5

6 50,000-ampere interrupting capacity Type DB-50, manually or electrically operated air circuit breakers.

7

*Standard width of DB-15 unit is 16 inches. DB-15 breaker may be mounted in DB-25 cell by the addition of conjunction parts.

TYPICAL POWER CONNECTIONS

CONNECTION BETWEEN TRANSFORMER AND SWITCHGEAR

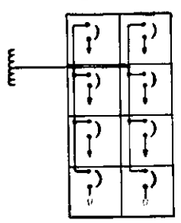


Fig. 49—Transformer feeding Basic Units 2.

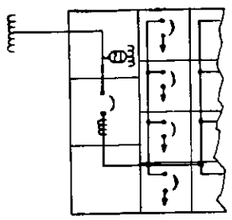


Fig. 51—Transformer feeding Basic Units 2 through a removable breaker mounted in Basic Unit 6.

DUAL TRANSFORMER FEED AND BUS-TIE CONNECTION

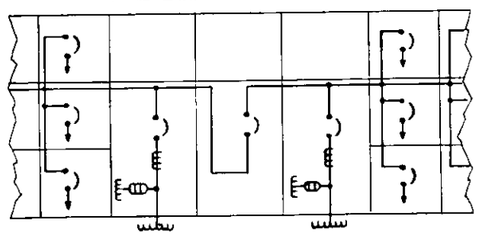


Fig. 52—Three single breakers in Basic Units 7, 9 or 10. Size of breakers depends on the ratings required.

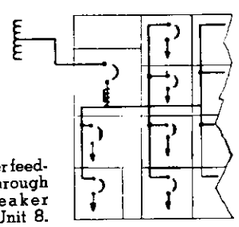
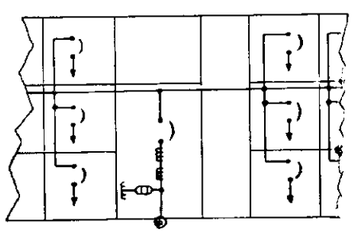


Fig. 50—Transformer feeding Basic Units 2 through a removable breaker mounted in Basic Unit 8.

GENERATOR FEED FOR NON-PARALLEL OPERATION

Fig. 53—Complete generator control equipment. One single breaker unit and one instrument compartment Basic Units 7 and 1, 9 and 1, or 10 and 1 are used depending on the required circuit breaker rating.



Note: See page 28 for arrangement of instrument panels.

TYPICAL INSTRUMENT PANELS FOR MAIN BREAKERS FOR BASIC UNITS NOS. 7 AND 9

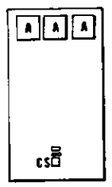


Fig. 54—Option A with ammeters. Option G with VM.

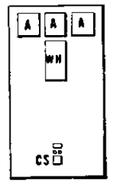


Fig. 55—Option B with ammeters and watthour meter.

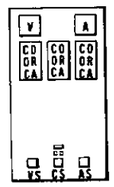


Fig. 56—Option C with CA relays. Option F with CO relays.

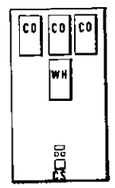


Fig. 57—Option D. Option E is similar except watthour meter omitted.

Note; See pages 26 and 27 for explanation of options.

STANDARD FEEDER BUS ARRANGEMENTS WHERE INTERRUPTING CAPACITY IS 15,000 OR 25,000 AMPERES (TYPE DB-15 OR DB-25 CIRCUIT BREAKERS)

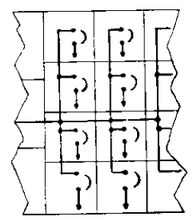


Fig. 58—Using Basic Units 2.

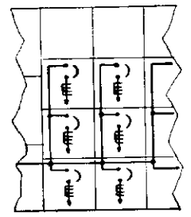


Fig. 59—Using Basic Units 3.

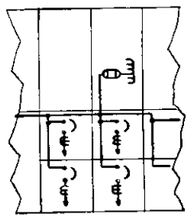


Fig. 60—Using Basic Units 4.

WHERE INTERRUPTING CAPACITY IS 50,000 AMPERES (TYPE DB-50 CIRCUIT BREAKERS)

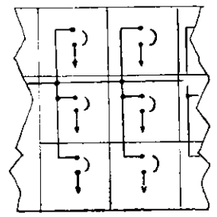


Fig. 61—Using Basic Units 5.

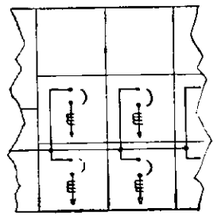


Fig. 62—Using Basic Units 6.

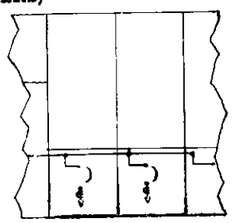


Fig. 63—Using Basic Units 7.

KEY

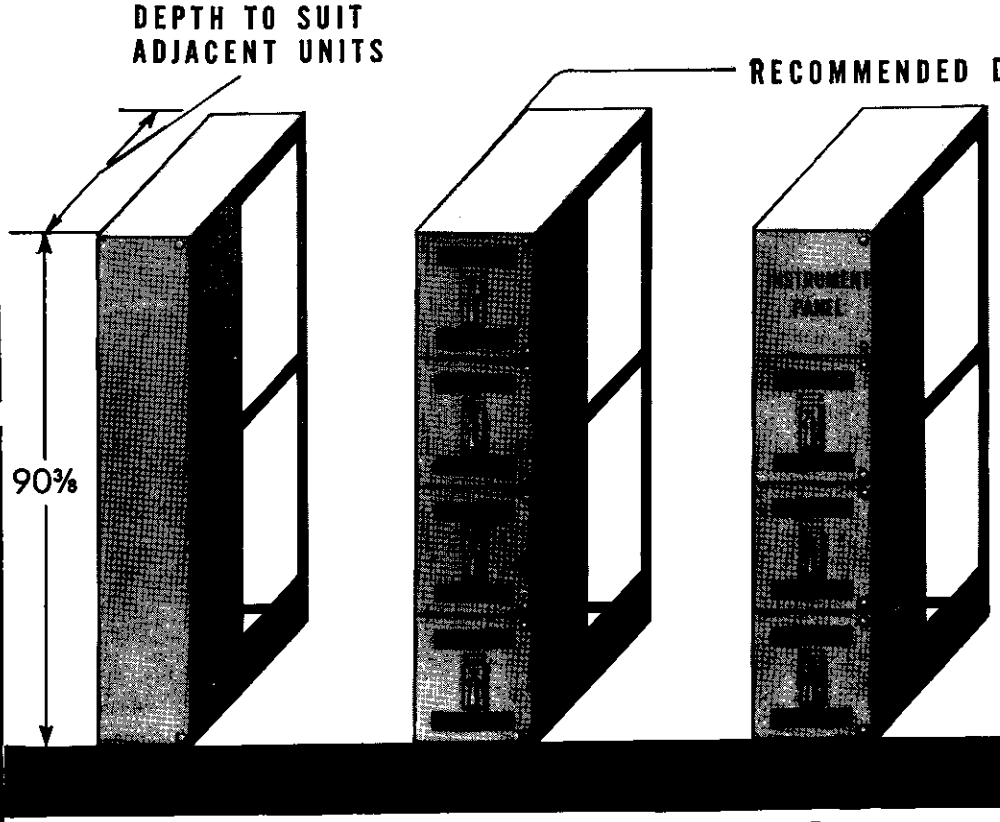
To Instrument-Panel Abbreviations

A —Ammeter
AS —Ammeter Switch
CA —Ratio-differential Relay
CO —Overcurrent Induction Relay
CS —Circuit-breaker Control Switch
NP —Name Plate
V —Voltmeter
VS —Voltmeter Switch
WH—Watthour Meter

Recommended Unit Depths are as indicated, but depths can be increased or decreased in 6-inch steps to suit combination of units and bus-space requirements.

Any decrease in unit depths from recommended dimension should be carefully investigated to assure adequate bus space.

Maximum unit depth for all units is 72 inches.



BASIC UNITS **1** Bus transition or Instrument compartment

2

3 15,000 or 25,000-ampere interruptin capacity Type DB-15 or DB-25 air circu breakers, manually or electrically operated

*Standard width of DB-15 unit is 16 inches. DB-15 breaker may be mounted in DB-25 cell by the addition of conjunction parts.

TYPICAL POWER CONNECTIONS

CONNECTION BETWEEN TRANSFORMER AND SWITCHGEAR

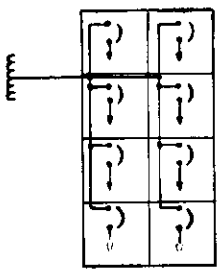


Fig. 49—Transformer feeding Basic Units 2.

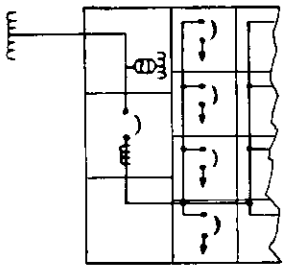


Fig. 51—Transformer feeding Basic Units 2 through a removable breaker mounted in Basic Unit 6.

DUAL TRANSFORMER FEED AND BUS-TIE CONNECTION

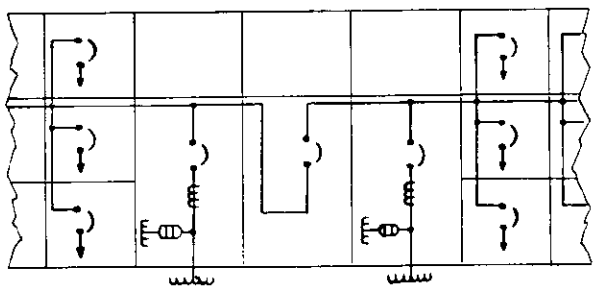


Fig. 52—Three single breakers in Basic Units 7, 9 or 10. Size of breakers depends on the ratings required.

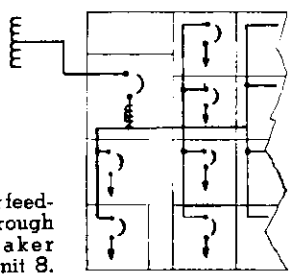
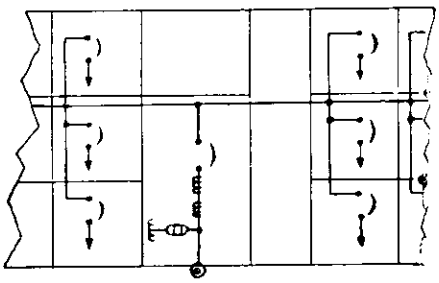


Fig. 50—Transformer feeding Basic Units 2 through a removable breaker mounted in Basic Unit 8.

GENERATOR FEED FOR NON-PARALLEL OPERATION

Fig. 53—Complete generator control equipment. One single breaker unit and one instrument compartment Basic Units 7 and 1, 9 and 1, or 10 and 1 are used depending on the required circuit breaker rating.



Note: See page 28 for arrangement of instrument panels.

HOW TO

"Unitized" Low-Voltage Metal-Enclosed

INFORMATION TO BE FURNISHED WITH ORDERS

1. Single-line diagram showing main connections and sketch showing desired order of assembly of Basic Units.

2. Interrupting capacity and current and voltage rating of each air circuit breaker.

3. Type of operating mechanism; whether manual or electric. For the latter specify the a-c or d-c voltage of control source.

4. Type and number of trip or other desired attachments for each air circuit breaker.

5. Name of manufacturer, ratings and wiring diagrams of all equipment to be controlled by the switchgear. Generator information should include: machine name-plate reading, outline of field-discharge resistor, type of governor motor, exciter rating and outline of exciter-field rheostat. Motor information should include: locked-rotor, starting and full-load currents.

6. Complete information on equipment furnished by others, but mounted on the switchgear panels or structure.

7. Number and size of power cables and conduits for each circuit and where they are to enter (top or bottom).

8. Where control cables are to enter (top or bottom).

9. Instrument transformer ratios.

10. Instrument scales, unless manufacturer is to select them.

11. Maximum length of shipping section which can be handled and installed at destination.

12. Complete name plate wording for each circuit-identification name plate.

SPECIFICATIONS

The following specifications are based on 600-volt maximum, 3-phase, 3-wire service, with ungrounded neutral. The specifications can be readily adapted to cover switchgear for lower voltage, for 3-phase, 4-wire, or single-phase, 3-wire a-c or for 2 or 3-wire d-c.

GENERAL: Low-voltage metal-enclosed switchgear will consist of a stationary structure assembly and one or more removable "De-ion" air circuit-breaker units fitted with disconnecting devices and other necessary equipment. The switchgear will be suitable for 600 volts maximum service and will receive a dielectric test for that voltage class in accordance with NEMA standards. It will be designed, manufactured and tested in accordance with the latest standards of the AIEE and NEMA.

STATIONARY STRUCTURE: Each cubicle forming part of the stationary structure will be fabricated from stretcher-leveled steel and will be a self-contained housing having one or more individual units and a full-height rear compartment for the bare busses, instrument transformers and outgoing cable connections.

The individual circuit-breaker compartments will be equipped with primary and secondary contacts, rails, stationary disconnecting mechanism parts, and the cell interlock which prevents moving the removable unit into or out of the "connected" position while the circuit breaker is closed. A formed steel door made from stretcher-leveled steel, equipped with ornamental grilles and supported by concealed hinges, will be provided for each circuit breaker compartment. The door of the Type DA unit is automatically locked when the circuit breaker is closed in the "connected" position. Opening the door of the Type DB unit automatically trips the breaker. This interlock can be modified to allow opening of the door when the breaker is closed to permit inspection of the breaker.

The top of the structure will be enclosed with removable sheets made of stretcher-leveled steel.

The structure will be so designed that future additions may readily be made at either end, at any time. The steel structure will be thoroughly cleaned and Bonderized prior to the application of the priming and finishing coats of paint.

A black, engraved circuit-designation plate, 1¼ inches high and 3½ inches wide will be provided on each circuit breaker door.

ORDER

Switchgear with Drawout Circuit Breakers

BUSSES AND CONNECTIONS: Each circuit will include the necessary 3-phase bus and the connections between the bus and the circuit-breaker studs. Risers for the outgoing connections need not be supplied*. The busses will consist of high-conductivity bare copper bars mounted in heavy Micarta supports. The main bus joints and all tap connections will be silver-plated and tightly clamped with through-bolts to insure maximum conductivity.

The cables will be supported by cleats mounted on bus support members.

Moldarta† terminal blocks with integral-type barriers will be provided for the secondary circuits. The terminal blocks will be mounted at the rear of the units, and will be accessible through a removable cover. They will be mounted at top or bottom as required by purchaser.

DISCONNECTING DEVICES: The stationary part of the primary disconnecting devices for each circuit breaker will consist of a set of contacts mounted on an insulating base. Busses and outgoing cable connections will be directly connected to them. The corresponding moving contacts will consist of a set of contact fingers suitably spaced on the circuit breaker studs. In the operating position, these contact fingers will engage the stationary contacts, forming a current-carrying bridge. The assembly will provide a multitude of silver-to-silver high-pressure point contacts. High uniform pressure on each finger will be maintained by individual short leaf springs. The entire assembly will be full floating and will provide ample flexibility between the stationary and moving elements. Contact engagement will be maintained only in the "connected" position.

The secondary disconnecting devices will consist of floating fingers mounted on the removable unit and engaging flat contact segments located at the rear of the compartment. The secondary disconnecting devices will be silver-plated to insure permanence of contact. Contact pressure will be provided by helical springs. Contact engagement will be maintained in the "connected" and "test" positions.

*Risers can be supplied at additional price when specified.

A heavy-duty, finger-type ground contact will be provided and mounted on the frame of the removable unit and a stationary ground contact of ample capacity will be bolted to the ground bus. Contact engagement will be maintained in the "connected" and "test" positions.

REMOVABLE ELEMENT: The removable element will consist of a Type DB or DA "De-ion" air circuit breaker mounted in a formed and welded steel frame. Removable elements requiring a cell height of 60 inches or more will be floor-wheeled.

AIR CIRCUIT BREAKERS: The air circuit breakers will be the Westinghouse Type DB or DA, operating on the Westinghouse principle of "De-ion" arc interruption. These breakers will incorporate specially designed circuit-interrupting devices which provide improved interrupting efficiency and minimize the formation of arc flame and gases. The air circuit breakers have solid silver-inlay, butt-type contacts which operate under high pressure. The auxiliary and main arcing contacts will be of arc-resisting tungsten alloy. The breaker will be equipped with "De-ion" arc chutes which effectively enclose the arcing contacts and confine the arc to reduce the disturbance caused by short-circuit interruption.

Each breaker will be equipped with a visible position indicator, mechanically connected to the circuit breaker mechanism and located so that the position of the circuit breaker is indicated on the front door of the cell.

FACTORY ASSEMBLY AND TESTS: The switchgear will be completely assembled, wired, adjusted and tested at the factory. After assembly, the complete switchgear will be tested for operation under simulated service conditions to assure the accuracy of the wiring and the functioning of the equipment.

The main circuits will be given a dielectric test of 2200 volts for one minute between live parts and ground and between opposite polarities. The wiring and control circuits will be given a dielectric test of 1500 volts for one minute between live parts and ground.

†Trade Mark

SPECIFICATIONS

BUS TRANSITION

BASIC UNIT 1 Metal-enclosed switchgear unit for bus transition. Equipment will include:

1—Set of 3-phase bare bus risers, ... amperes.

CONTROL EQUIPMENT FOR TRANSFORMER, BUS TIE OR FEEDERS

BASIC UNIT 2 Metal-enclosed switchgear unit for the control of four 3-phase, 60-cycle feeders. Dimensions and bus arrangements will be in accord with Fig. 30, page 12, and Fig. 58, page 22. Equipment will include:

4—Type (DB-15) (DB-25) "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare copper busses and connections.
4—Sets of terminals for outgoing cables.
4—Circuit name plates.

BASIC UNIT 3 Metal-enclosed switchgear unit for the control of three 3-phase, 60-cycle feeders. Dimensions and bus arrangements will be in accord with Fig. 30, page 12, and Fig. 59, page 22. Equipment will include:

3—Type (DB-15) (DB-25) "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare busses and connections.
3—Sets of terminals for outgoing cables.
6—Type BT-5 current transformers, ... ratio.
3—Circuit name plates.

Arrangements for 22½-inch high Instrument Panel

OPTION A (Fig. 64, page 23)

3—Type KA-25 ammeters, suitable scale, 5-ampere coil.
3—Type W ammeter switches.
3—Circuit name plates.

OPTION B (Fig. 65, page 23)

3—Type CB-2F polyphase watthour meters, two-element, 5-ampere, 115-volt, Flexitest cases.
2—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
3—Circuit name plates.

BASIC UNIT 4 Metal-enclosed switchgear unit for the control of two 3-phase, 60-cycle feeders. Dimensions and bus arrangements will be in accord with Fig. 30, page 12, and Fig. 60, page 22. Equipment will include:

2—Type (DB-15) (DB-25) "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare copper busses and connections.
2—Sets of terminals for outgoing cables.
4—Type BT-5 current transformers, ... ratio.
2—Circuit name plates.

Arrangements for 45-inch high Instrument Panel

OPTION A (Fig. 66, page 23)

2—Type KA-25 ammeters, suitable scale, 5-ampere coil.
2—Type W ammeter switches.
2—Type CB-2F polyphase watthour meters, two-element, 5-ampere, 115-volt, with Flexitest cases.
2—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
2—Circuit name plates.

BASIC UNIT 5 Metal-enclosed switchgear unit for the control of three 3-phase, 60-cycle feeders. Dimensions and bus arrangements will be in accord with Fig. 31, page 12, and Fig. 61, page 22. Equipment will include:

3—Type DB-50 "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare busses and connections.
3—Sets of terminals for outgoing cables.
3—Circuit name plates.

BASIC UNIT 6 Metal-enclosed switchgear unit for the control of two 3-phase, 60-cycle feeders. Dimensions and bus arrangements will be in accord with Fig. 31, page 12, and Fig. 62, page 22. Equipment will include:

2—Type DB-50 "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare busses and connections.
2—Sets of terminals for outgoing cables.
4 or 6—Type BT-5 or BT-12.5 current transformers, ... ratio.
2—Circuit name plates.

Arrangements for 30-inch high Instrument Panel

OPTION A (Fig. 67, page 23)

2—Type KA-25 ammeters, suitable scale, 5-ampere coil.
2—Type W ammeter switches.
2—Circuit name plates.

OPTION B (Fig. 68, page 23)

2—Type KA-25 ammeters, suitable scale, 5-ampere coil.
2—Type W ammeter switches.
2—Type CB-2F polyphase watthour meters, two-element, 5-ampere, 115-volt, with Flexitest cases.
2—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
2—Circuit name plates.

OPTION C (Fig. 69, page 23)

2—Type KA-25 ammeters, suitable scale, 5-ampere coil.
2—Type W ammeter switches.
2—Type CB-3F polyphase watthour meters, three-element, 5-ampere, 115-volt, with Flexitest cases.
3—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
2—Circuit name plates.

BASIC UNIT 7 Metal-enclosed switchgear unit for the control of one 3-phase, 60-cycle, transformer or bus-tie circuit. Dimensions and bus arrangements will be in accord with Fig. 31, page 12 and Fig. 63, page 22. Equipment will include:

1—Type DB-50 "De-ion" air circuit breaker, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare busses and connections.
1—Set of terminals for outgoing cables.
1—Circuit name plate.

FOR BASIC UNITS

Arrangements for 60-inch high Instrument Panel

OPTION A (Fig. 54, page 22)

3—Type KA-25 ammeters, suitable scale, 5-ampere coil.
3—Type BT-5 or BT-12.5 current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps (with electrically operated breaker).

OPTION B (Fig. 55, page 22)

3—Type KA-25 ammeters, suitable scale, 5-ampere coil.
1—Type CB-2F polyphase watthour meter, two-element, 5-ampere, 115-volt, with Flexitest case.
2—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
3—Type BT-5 or BT-12.5 current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps (with electrically operated breaker).

OPTION C (Fig. 56, page 22)

1—Type KA-25 ammeter, suitable scale, 5-ampere coil.
1—Type W ammeter switch.
1—Type KA-25 voltmeter, suitable scale, 115-volt coil.
1—Type W voltmeter switch.
2—Potential transformers, with fuses.
3—Type CA ratio-differential relays for transformer protection, with Flexitest cases.
3—Type BT-5 or BT-12.5 current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps (with electrically operated breaker).

BASIC UNIT 8

Metal-enclosed switchgear unit for the control of one 3-phase, 60-cycle transformer and two 3-phase, 60-cycle feeders. Dimensions and bus arrangements will be in accord with Fig. 32, page 12, and Fig. 50, page 21. Equipment will include:

1—Type DB-50 "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
2—Type (DB-15) (DB-25) "De-ion" air circuit breakers, ... amperes, 3-pole, single-throw, (manually) (electrically) operated.
1—Set of bare busses and connections.
2—Sets of terminals for outgoing cables.
2—Circuit name plates.

BASIC UNIT 9

Metal-enclosed switchgear unit for the control of one 3-phase, 60-cycle transformer or bus-tie circuit. Dimensions and bus arrangements will be in accord with Fig. 33, page 13, and Fig. 52, page 21. Equipment will include:

1—Type DA-75 "De-ion" air circuit breaker, ... amperes, 3-pole, single-throw, electrically operated.
1—Set of bare busses and connections.
1—Set of terminals for outgoing cables.
1—Circuit name plate.

Arrangements for 30-inch high Instrument Panel

OPTION A (Fig. 54, page 22)

3—Type KA-25 ammeters, suitable scale, 5-ampere coil.
3—Wound-type current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION B (Fig. 55, page 22)

3—Type KA-25 ammeters, suitable scale, 5-ampere coil.
1—Type CB-2F polyphase watthour meter, two-element, 5-ampere, 115-volt, with Flexitest case.
2—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
3—Wound-type current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION C (Fig. 56, page 22)

1—Type KA-25 ammeter, suitable scale, 5-ampere coil.
1—Type W ammeter switch.
1—Type KA-25 voltmeter, suitable scale, 115-volt coil.
1—Type W voltmeter switch.
2—Potential transformers, with fuses.
3—Type CA ratio-differential relays for transformer protection with Flexitest cases.
2—Wound-type double-secondary current transformers, ... ratio.
1—Wound-type single-secondary current transformer, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION D (Fig. 57, page 22)

1—Type CB-2F polyphase wattheur meter, two-element, 5-ampere, 115 volts, with Flexitest case.
2—Potential transformers, with fuses.
NOTE: Only one set of potential transformers is required per bus section.
3—Type CO standard-energy overcurrent induction relays, 4-15 ampere range, with Flexitest cases.
3—Wound-type current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION E (Fig. 57, page 22)

3—Type CO standard-energy overcurrent induction relays, 4-15 ampere range, with Flexitest cases.
3—Wound-type current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION F (Fig. 56, page 22)

1—Type KA-25 ammeter, suitable scale, 5-ampere coil.
1—Type W ammeter switch.
1—Type KA-25 voltmeter, suitable scale, 115-volt coil.
1—Type W voltmeter switch.
2—Potential transformers, with fuses.
3—Type CO standard-energy overcurrent induction relays, 4-15 ampere range, with Flexitest cases.
3—Wound-type current transformers, ... ratio.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION G (Fig. 54, page 22)

3—Type KA-25 voltmeters, suitable scale, 115-volt coils, for ground detectors.
3—Potential transformers, with fuses.
1—Type W circuit breaker control switch with red and green indicating lamps.

OPTION H

1—Type W circuit breaker control switch with red and green indicating lamps.

BASIC UNIT 10

Metal-enclosed switchgear unit for the control of one 3-phase, 60-cycle transformer or bus-tie circuit. Dimensions and bus arrangements will be in accord with Fig. 34, page 13, and Fig. 52, page 21. Equipment will include:

1—Type DA-100 air circuit breaker, ... amperes, 3-pole single-throw, electrically operated.
1—Set of bare busses and connections.
1—Set of terminals for outgoing cables.
1—Circuit name plate.

CONTROL EQUIPMENT FOR ONE GENERATOR (NONPARALLEL OPERATION)

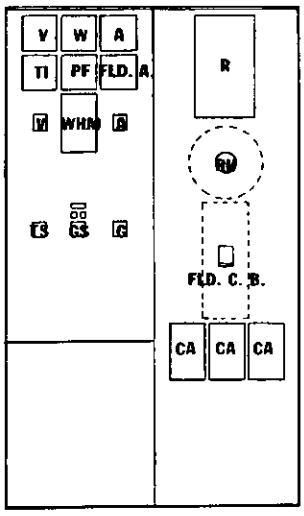
BASIC UNITS 1 & 7 Basic Unit No. 1—Metal-enclosed switchgear unit, 26 inches wide, for instrument compartment. Equipment will include:

1—Type SRA Silverstat® regulator, complete with accessories.
1—Drilling for exciter-field rheostat.
1—Type AB field circuit breaker, manually operated, complete with field-discharge clip and shunt trip coil.
3—Type CA ratio-differential relays for generator protection, with Flexitest cases.

Basic Unit No. 7—Metal-enclosed switchgear unit for the control of one 3-phase, 60-cycle generator. Dimensions and bus arrangements will be in accord with Fig. 31, page 12, and Fig. 53, page 21. Equipment will include:

1—Type DB-50 "De-ion" air circuit breaker, ... amperes, 3-pole, single-throw, electrically operated.
1—Set of bare busses and connections.
1—Set of terminals for outgoing cables.
3—Potential transformers, with fuses.
2—Current transformers, ... ratio, double secondary.
4—Current transformers, ... ratio, single secondary.
NOTE: Three current transformers will be shipped unmounted for connection into the generator neutral leads.
1—Circuit name plate.

Fig. 70



Mounted on the Hinged Instrument Panel

1—Type KA-25 ammeter, suitable scale, 5-ampere coil.
1—Type W ammeter switch.
1—Type KA-25 voltmeter, suitable scale, 115-volt coil.
1—Type W voltmeter switch.
1—Type KY-25 polyphase wattmeter, suitable scale, 5-ampere, 115-volt.
1—Type KY-25 power-factor meter, suitable scale.
1—Type KX-25 ammeter, suitable scale, complete with shunt.
1—Type KX-25 temperature indicator.
1—Type W temperature-indicator switch.
1—Type CB-2 polyphase watthour meter, two-element, 5-ampere, 115-volt, with Flexitest case.
1—Type W governor-control switch.
1—Type W circuit breaker control switch with red and green indicating lamps.

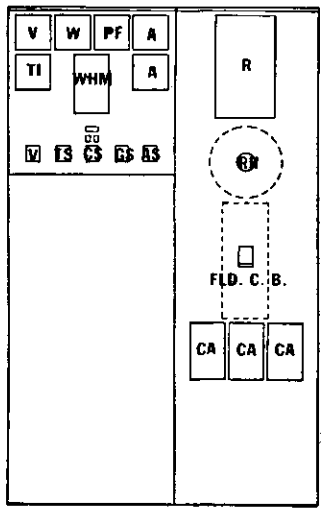
BASIC UNITS 1 & 9 Basic Unit No. 1—Metal-enclosed switchgear unit, 26 inches wide, for instrument compartment. Equipment will include:

1—Type SRA Silverstat® regulator, complete with accessories.
1—Drilling for exciter-field rheostat.
1—Type AB field circuit breaker, manually operated, complete with field-discharge clip and shunt trip coil.
3—Type CA ratio-differential relays for generator protection, with Flexitest cases.

Basic Unit No. 9—Metal-enclosed switchgear unit for the control of one 3-phase, 60-cycle generator. Dimensions and bus arrangements will be in accord with Fig. 33, page 13, and Fig. 53, page 21. Equipment will include:

1—Type DA-75 "De-ion" air circuit breaker, ... amperes, 3-pole, single-throw, electrically operated.
1—Set of bare busses and connections.
1—Set of terminals for outgoing cables.
3—Potential transformers, with fuses.
2—Current transformers, ... ratio, double secondary
4—Current transformers, ... ratio, single secondary.
NOTE: Three current transformers will be shipped unmounted for connection into the generator neutral leads.
1—Circuit name plate.

Fig. 71



Mounted on the Hinged Instrument Panel

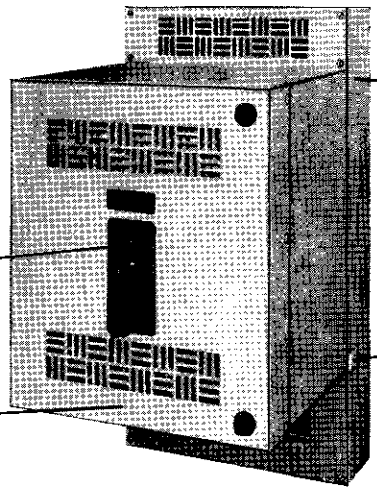
1—Type KA-25 ammeter, suitable scale, 5-ampere coil.
1—Type W ammeter switch.
1—Type KA-25 voltmeter, suitable scale, 115-volt coil.
1—Type W voltmeter switch.
1—Type KY-25 polyphase wattmeter, suitable scale, 5-ampere, 115-volt.
1—Type KY-25 power-factor meter, suitable scale.
1—Type KX-25 ammeter, suitable scale, complete with shunt.
1—Type KX-25 temperature indicator.
1—Type W temperature-indicator switch.
1—Type CB-2 polyphase watthour meter, two-element, 5-ampere, 115-volt, with Flexitest case.
1—Type W governor-control switch.
1—Type W circuit breaker control switch with red and green indicating lamps.

LOW-VOLTAGE UNITS with special features

TYPE	WIDTH	HEIGHT	DEPTH
DB-15	20	36	28
DB-25	20	36	28
DB-50	26	45	36

Large industrial plants having widely separated load locations often require isolated breaker units instead of a central distribution switchboard. Wall-mounted, low-voltage, drawout air circuit breaker units are designed to meet these requirements.

These individual units are available with air circuit breakers having interrupting capacities of 15,000, 25,000 and 50,000 amperes, manually or electrically operated. The housings are designed for cable entrances at either top or bottom. The units include all the safety and interlock features of standard, low-voltage drawout units.



Main housing for wall mounting with knockouts at top and bottom for conduits. Housing can be mounted in place and all cable connections made before breaker compartment is bolted on.

Manually or electrically operated Type DB-15 or DB-25 breaker on standard drawout element.

External ground connection for solidly grounding housing and drawout welded frame.

Breaker compartment includes door interlock, breaker position stops and all safety features of standard units.

Fig. 72—Individual unit Type DB breaker for wall mounting.

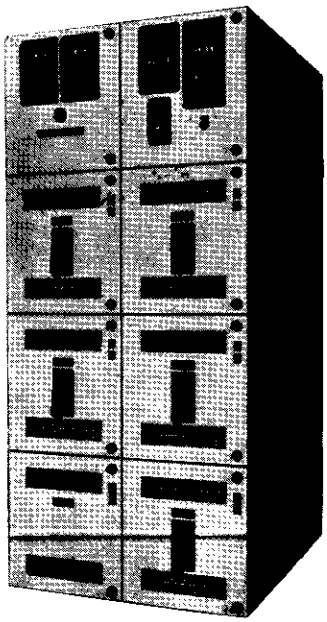


Fig. 73—Type DB-25 electrically operated breaker with indicating lamps. Pushbuttons for circuit breaker operation are also available.

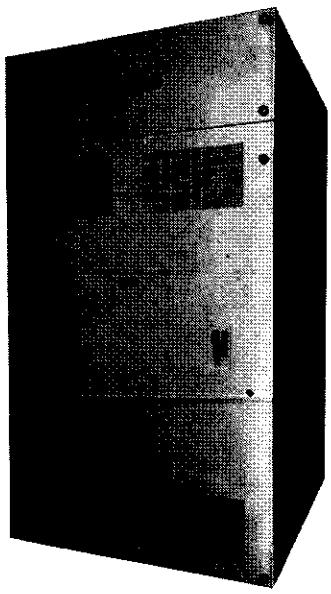


Fig. 74—Type DA-100 breaker with control switch and indicating lamps mounted on the removable unit, and operable from the front of the board.

Electrically operated breakers for standard low-voltage switchgear are also available with indicating lamps and pushbuttons as shown in chart below. On DA-100 units, a control switch and indicating lamps may be mounted directly on the removable truck as shown in Fig. 74. Thus they form complete operating units.

Fig. 75—Chart showing breakers available with indicating lamps and pushbuttons.

TYPE	IND. LAMPS	PUSH-BUTTONS
DB-15, MAN.	YES	NO
DB-15, ELEC.	YES	YES
DB-25, MAN.	YES	NO
DB-25, ELEC.	YES	YES
DB-50, MAN.	YES	NO
DB-50, ELEC.	YES	YES

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Switchgear Division

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