

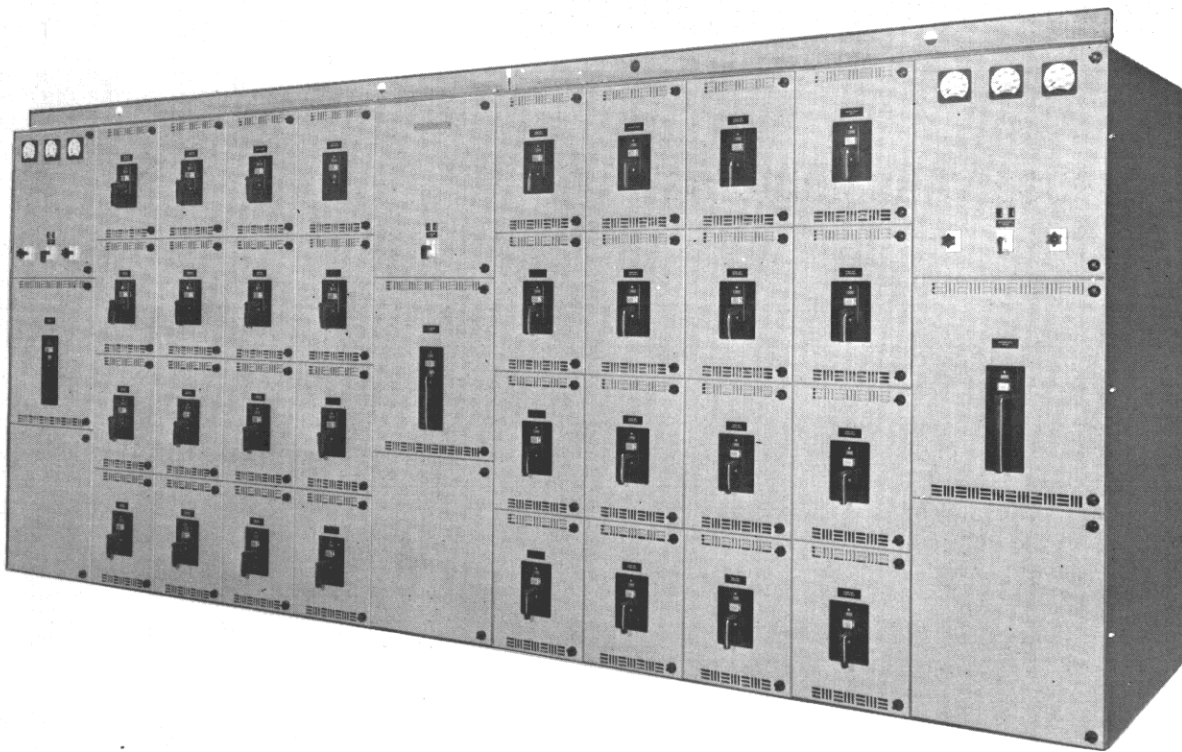
Westinghouse



**Type DB
Circuit Breakers & Accessories
for
Switchboard Assemblers**

Westinghouse Electric Corporation
Switchgear Division, East Pittsburgh, Pa.
November, 1965

MB 2802



TYPE DB CIRCUIT BREAKERS AND ACCESSORIES FOR SWITCHBOARD ASSEMBLERS

INTRODUCTION

The type DB air circuit breaker is used on low voltage systems of 600 volts or less. It includes an operating mechanism, contacts, arc chutes, and built-in direct acting over-current trip attachments. The distinguishing features of the type DB breakers are their sturdy construction, ample electrical clearances, high current carrying capacities, high interrupting capacity and momentary ratings. The direct acting trip attachments are available in a great variety of time-current characteristics and the pickup settings and operating times are adjustable over a wide range.

This circuit breaker finds its chief application in low voltage metal enclosed drawout switchgear assemblies whenever power must be distributed at a low voltage. The type DB breaker is particularly applicable where a heavy duty, high quality protective device is required for branch circuit protection.

The DB air circuit breaker is designed to give continuous and reliable service as the protective link between the power source and associated productive equipment. This breaker is built to operate with a minimum of maintenance, while at the same time its simplified construction permits maximum accessibility for inspection and adjustment when required. The ease with which attachments may be added or removed is an outstanding feature of the DB design.

Westinghouse type DB circuit breakers are available for use on 600 volt a-c and 250 volt d-c systems for circuit protection or other applications requiring interrupting capacities of from 14,000 symmetrical amperes at 600 volts a-c thru 130,000 symmetrical amperes at 240 volts a-c.

Each of the individual frame size breakers, namely, the types DB-15, DB-25, DB-50, DB-75, and DB-100 can be equipped for various types of operation and protection by addition of factory calibrated attachments to the basic breaker. When the different current ratings of trip coils applicable to the DB breakers are considered as well as the various combinations of tripping characteristics available for these series trip coils, and the fact that some breakers can be manually or electrically operated and equipped with a variety of attachments such as shunt trips, bell alarm switches, undervoltage, lockout coils, etc., it can be seen that there are almost limitless possible combinations that could be specified for this complete line of breakers.

To meet this application scope of the breaker, it is vital that the basic breaker and components be designed so that tool-made factory components can be applied and interchanged readily.

The compact arrangement of the breaker components on a welded steel base makes the unit completely self-contained. Extensive machine tooling is utilized in the manufacturing processes to insure interchangeability of identical parts.

GENERAL:

Type DB low voltage breakers, one-high stack-up units and substructures are specifically designed for use by switchboard builders for incorporation into low voltage metal enclosed switchgear assemblies, power centers and motor control centers. The substructures and stack-up units provide maximum flexibility in design and minimize the amount of labor and material which must be contributed by the assembler.

ADVANTAGES:

Type DB stack-up units and substructures offer the following advantages to the customer:

- a. Standardized units permit shorter shipments and facilitate stocking of units.
- b. Stack-up units provide mounting of basic DB breaker and components in a metal housing to form a single compact unit. The plan features factory assembled, tested and stocked components for improved service.
- c. Substructure design reduces to a minimum the amount of labor required by the switchboard builder to assemble the metal enclosed units.
- d. Substructure designs are available that permit breakers to be stacked one, two, three or four high to form standard 90.38" high assemblies.

EQUIPMENT INCLUDED:

Each one high drawout stack-up unit includes the following components:

- a. 1 - Type DB air circuit breaker of the drawout type, manually or electrically operated as required.
- b. 1 - Metal enclosed compartment to include:
 - 6 - Stationary primary disconnecting contacts.
 - 1 - Set of stationary secondary control contacts, if required.
 - 1 - Ground contact.
 - 1 - Set of rails for drawout mechanism.
 - 1 - Grilled hinged front door.
 - 1 - Set of interlocks to prevent racking the breaker in or out of the connected position when the breaker is in the closed position.

Each substructure unit includes the following components:

- a. 1 - Type DB air circuit breaker of the drawout type, manually or electrically operated as required.
- b. 1 - Set of cell parts to include the following:
 - 6 - Stationary primary disconnecting contacts, plate mounted.
 - 1 - Set of stationary secondary control contacts, if required.
 - 1 - Ground contact.
 - 2 - Rails for the drawout mechanism.
 - 1 - Set of interlocks to prevent racking the breaker in or out of the connected position when the breaker is in the closed position.

AVAILABLE RATINGS:

Type DB air circuit breakers are available in the following ratings:

Breaker Type	Rated Volts	Frame Size Amps	Interrupting Rating Symmetrical Amperes		
			240 V	480 V	600 V
DB-15	600	225	25,000	22,000	14,000
DB-25	600	600	42,000	30,000	22,000
DB-50	600	1600	65,000	50,000	42,000
DB-75	600	3000	85,000	65,000	65,000
DB-100	600	4000	130,000	85,000	85,000

MODIFICATIONS:

The following equipment is available for use with type DB assemblies at an addition in price.

- a. Current transformers.
- b. Control and instrument switches.
- c. Terminal blocks.
- d. Capacitor trip devices.
- e. Switchgear accessories.
- f. Indicating lights.
- g. Ground detectors.
- h. Bus supports.
- i. Bus braces.

FIELD SERVICE:

No field service of any kind is included in the quoted prices.

WARRANTY:

Westinghouse in connection with apparatus sold herein agrees to correct any defect or defects in workmanship or material which may develop under proper or normal use during one year from the date of shipment, by repair or by replacement f.o.b. factory of the defective part or parts, and such correction shall constitute a fulfillment of all Westinghouse liabilities in respect to said apparatus. In no event shall Westinghouse be liable for consequential damages.

TERMS OF SALE:

The terms and conditions of sale will be as shown in the latest issue of Selling Policy 33-700.

BREAKER CONSTRUCTION:

To illustrate simplicity of construction, the basic breaker is illustrated in Figure 1 which shows the subassembly details that go to form a complete breaker.

Starting at the upper left hand corner, the steel panel and platform that mounts all of the breaker components is shown and is common for each frame size breaker and is stocked as such. Then, in counterclockwise direction is shown, the auxiliary switch assembly, the electrically operated control relay, the manual operating mechanism assembly, the solenoid operating assembly (for electrically operated breakers), the shunt trip attachments, the overload trip attachments, the basic pole unit itself, and the arc chute. All these subassembly components are carried in stock by style number and assembled in the proper combination to meet any application. All of these subassemblies are factory tested and are interchangeable with like parts of breakers already in the field.

Figure 2 shows a completely assembled type DB-15 breaker, electrically operated, for mounting in drawout switchgear. Since the breaker base is made of formed sheet steel, the pole unit parts must be assembled into an insulation molding to provide the necessary phase-to-ground and phase-to-phase insulation. The cross bar that closes all three poles simultaneously is connected to the moving contacts with an insulation molding so that the operating mechanism of the breaker is completely insulated from live parts.

Figure 3 shows a type DB-25 breaker which is similar to the type DB-15 breaker. Notice that this electrically operated breaker has been equipped with two 4-pole auxiliary switches on the left hand side of the platform.

DB BREAKER

SUB-ASSEMBLY PLAN

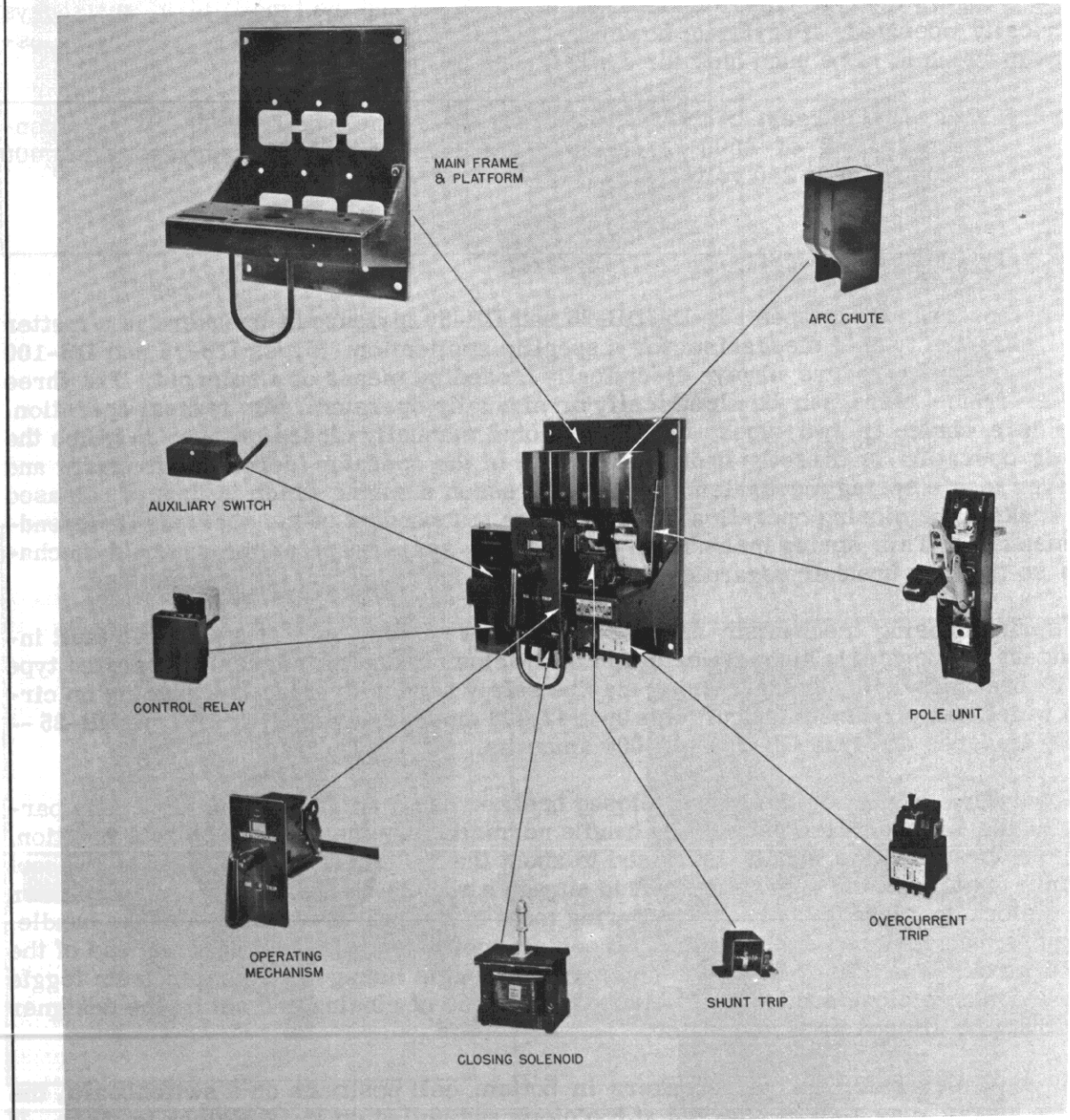


Figure 1

Figure 4 shows the type DB-50 breaker, manually operated; and, in this case, the breaker does not have the side rails and details for drawout mounting. This is the basic breaker that is readily adaptable to drawout mounting or for mounting in separate enclosures.

Figure 5 shows the type DB-75 breaker. This breaker and the type DB-100 are always electrically operated. Provision, however, is made for the insertion of a manual closing lever which is to be used only for maintenance purposes.

Figure 6 shows the largest of the DB line of breakers, the type DB-100, having a continuous current rating of 4000 amperes a-c and an interrupting capacity of 150,000 symmetrical amperes at 240 volts a-c.

OPERATING MECHANISMS:

The method of closing types DB-15, DB-25 and DB-50 air circuit breakers is a matter of selecting the type of mechanism for a specific application. Types DB-75 and DB-100 air circuit breakers are always electrically closed by means of a solenoid. The three smaller frame sizes can be electrically or manually operated. For manual operation, there is a choice of two types; the conventional manually closed breaker in which the closing operation is directly under the control of the operator (dependent manual); and the over toggle spring mechanism which compresses a spring which in turn is released thus making the closing operation of the breaker independent of the operator (independent manual). This spring mechanism occupies the same space as the solenoid mechanism so that any breaker regardless of the type of operation fits in the same cell.

The spring closing mechanism assures rapid safe-closing against a possible fault independent of operator's strength or effort on the closing handle. Manually operated type DB-50 breakers with spring closing may be safely used with selective tripping on circuits which can produce fault currents up to 42,000 amperes symmetrical, type DB-25 -- 22,000 amperes and type DB-15 -- 14,000 amperes.

The operating handle of the spring-closed breaker has a rotary motion in a plane parallel to the breaker face plate. The handle normally assumes the six o'clock position. To close breaker, the handle is raised to about the 2 o'clock position, pushed in about 1/2 inch axially on the operating shaft to engage a simple ratchet, and then pulled down to 6 o'clock to close the breaker. During most of the pull-down motion of the handle, energy is being stored in a spring. No contact motion occurs until near the end of the handle stroke when an over-center compression toggle linkage is released from toggle and the contacts close suddenly. The speed and force of closing are set by the designer and cannot be altered by the operator.

As a convenience for circuit breakers in bottom cell positions on a switchboard, the closing handle may also be engaged at 8 o'clock and pulled up to 12 o'clock to close. If desired, the handle may readily be removed from the operating shaft by freeing a smaller latch on its lower side.

Qualified breaker maintenance personnel may slowly operate the contacts of a breaker with spring closing mechanism without any special tools. The closing handle is engaged

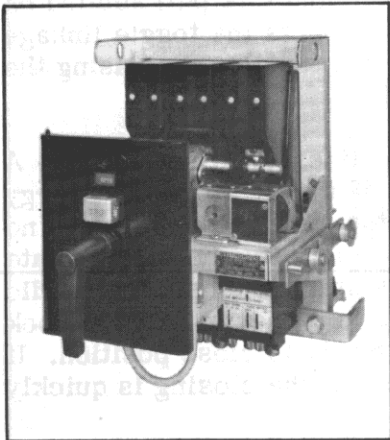


Figure 2

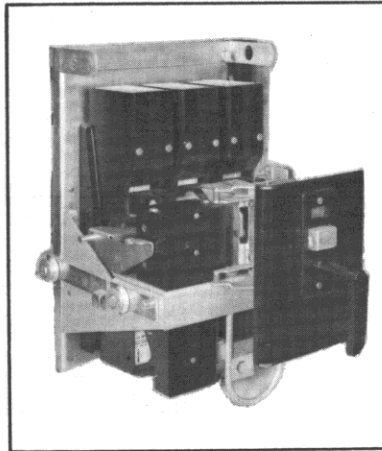


Figure 3

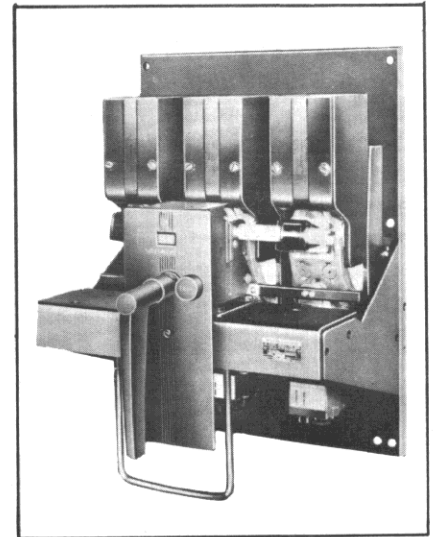


Figure 4

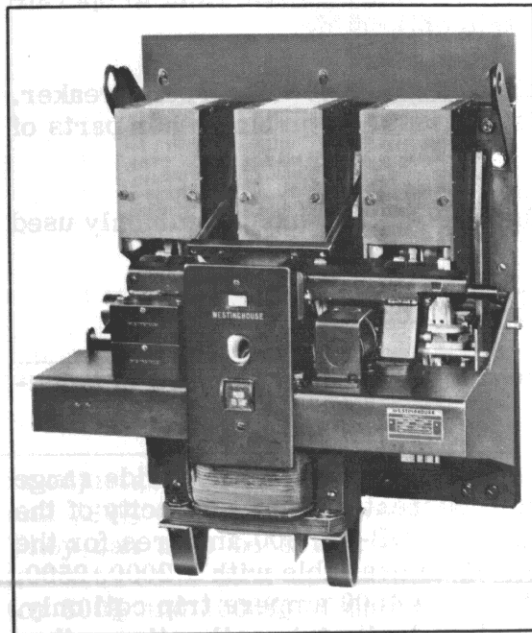


Figure 5

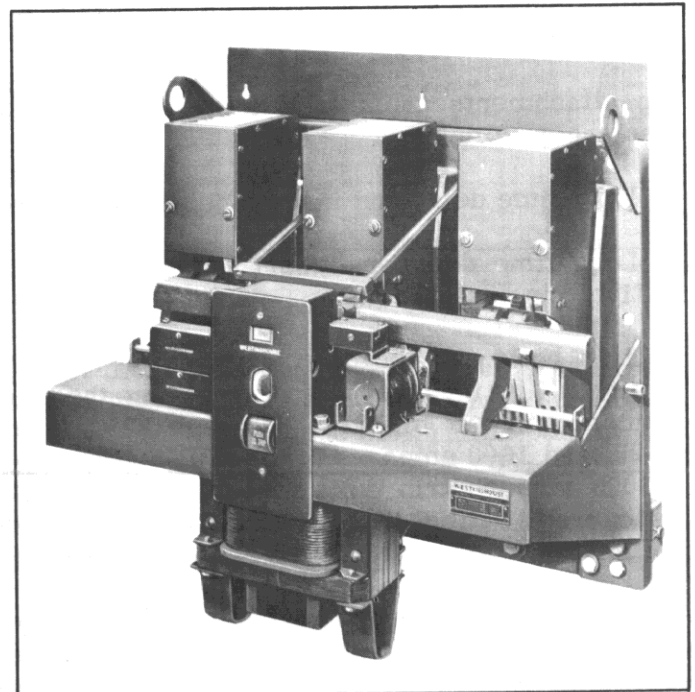


Figure 6

in the usual way and a slight downward pull applied. While keeping this pull applied on the handle, the cross bar is pushed in a short distance. This upsets the toggle linkage and permits slow motion of the contacts controlled by the closing handle. Releasing the handle returns the mechanism to normal ready-to-close condition.

Distinctive features of this mechanism include simplicity, sturdiness, and reliability. A conservatively stressed compression spring is used to momentarily store the energy required to close the breaker. The spring closing portion of the mechanism involves no latches or triggers. It is impossible to stall or stick the mechanism in any intermediate condition. If pull on the handle is relaxed before the contacts start to close, the handle returns to the 2 o'clock position, disengages, and rotates freely back to the 6 o'clock position. The mechanism returns to the normal discharged ready to close position. If the pull on the handle is exerted far enough to begin contact motion, the closing is quickly completed regardless of further action at the handle.

Figure 7 shows a DB-50 breaker with spring closing mechanism.

DIRECT-ACTING TRIP ATTACHMENTS:

The type DB air circuit breakers are normally equipped with direct-acting trip attachments mounted on the circuit breaker with which they are associated. They trip the breaker by direct mechanical action in response to current magnitude in the circuit. These time delay, direct-acting trip attachments are adjustable in the field to operate at any value of current between 80% and 160% of the trip coil rating.

One overcurrent trip attachment is supplied for each pole of the type DB circuit breaker. These tripping devices are interchangeable in the field without disturbing other parts of the breaker.

Trip attachments are available in a variety of combinations. The most commonly used types are as follows:

1. Long time delay and instantaneous overcurrent trip attachment.
2. Long time delay and short time delay overcurrent trip attachment. Used in selective trip applications.

The trip coils used in these overcurrent trip attachments are available in a wide range of current ratings up to and including the maximum current carrying capacity of the particular circuit breaker. This is 225 amperes for the DB-15, 600 amperes for the DB-25, and 1600 amperes for the DB-50. The type DB-75 is available with a 2000, 2500, or 3000 ampere trip coils while the DB-100 is limited to a 4000 ampere trip coil only. The current rating of a DB circuit breaker is determined by its trip coil rating rather than its continuous current carrying capacity or frame size.

The tripping device encountered most frequently is the long time delay and instantaneous overcurrent trip attachment which is designed for service in motor or general purpose feeder circuits. It provides automatic tripping of the circuit breaker with delayed tripping on overcurrent and instantaneous tripping on high current faults. The current setting

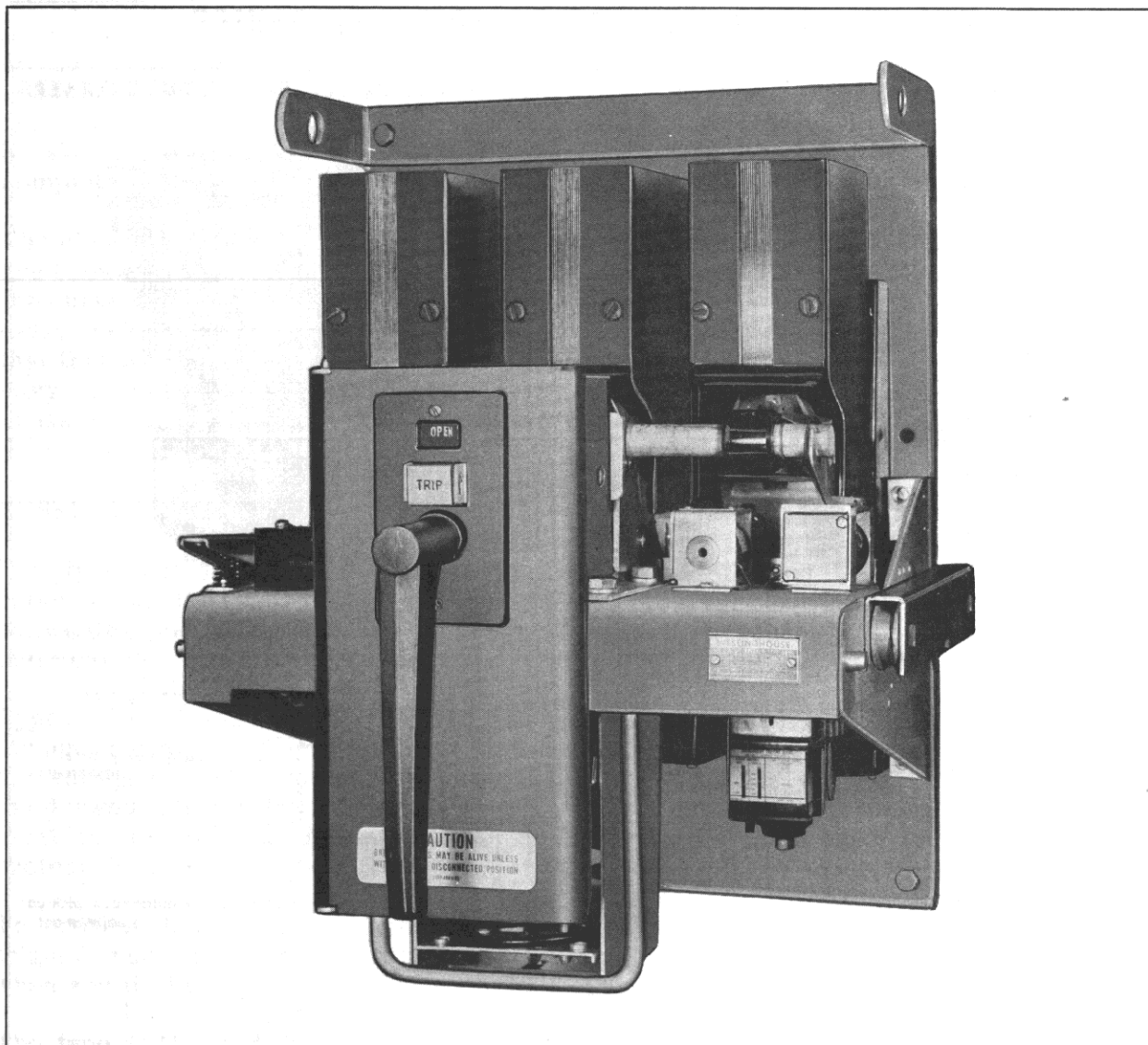


Figure 7

is adjustable in the field. The longtime delay pick-up setting is adjustable between 80% and 160% of the coil rating with calibration marks at 80, 100, 120, 140 and 160 percent. They can also be set at any intermediate value between these calibration points. The instantaneous pick-up setting is adjustable with calibration marks at 800% and 1200% (or 500% and 1000%) of the trip coil rating.

Figures 8 and 9 illustrate the dual overcurrent series tripping devices used on the DB-50, DB-75 and DB-100 breakers.

Figure 10 shows the selective tripping device which, in addition to the 80 and 160% long delay pick-up settings and the 20 and 30 second long delay settings, has short time delay pick-up and time delay settings in a variety of combinations. For example, a typical

DUAL OVERCURRENT SERIES TRIPPING DEVICE

DB-50 AIR CIRCUIT BREAKERS

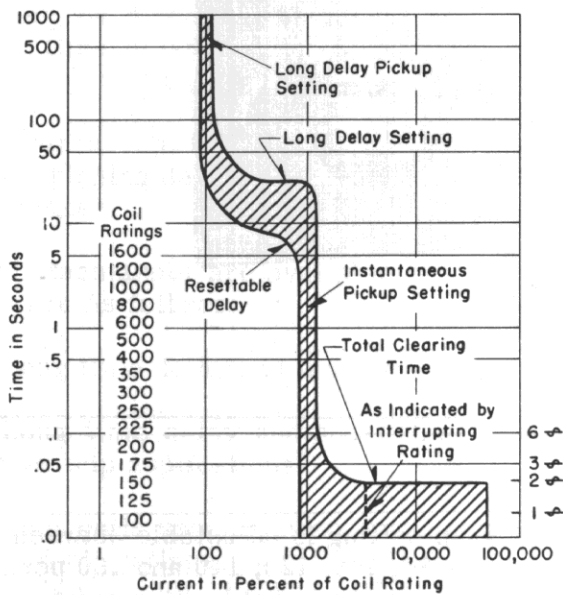
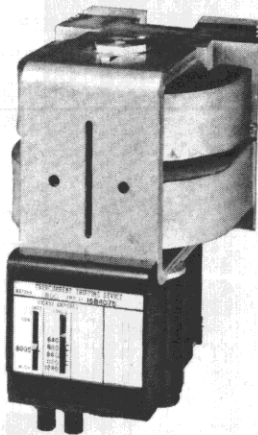


Figure 3

Characteristic Time-Current Curve, Long Delay and Instantaneous Trip
TOTAL CLEARING TIME is the duration of fault current flow, including arcing time.

RESETTABLE DELAY is the duration of fault current flow after which breaker may trip even though fault current may subside to a value less than 80 percent breaker rating. However, if fault current subsides in less than resettable delay, the breaker will not trip and the delaying device will reset.

Figure 8

DB-75 AND DB-100 AIR CIRCUIT BREAKERS

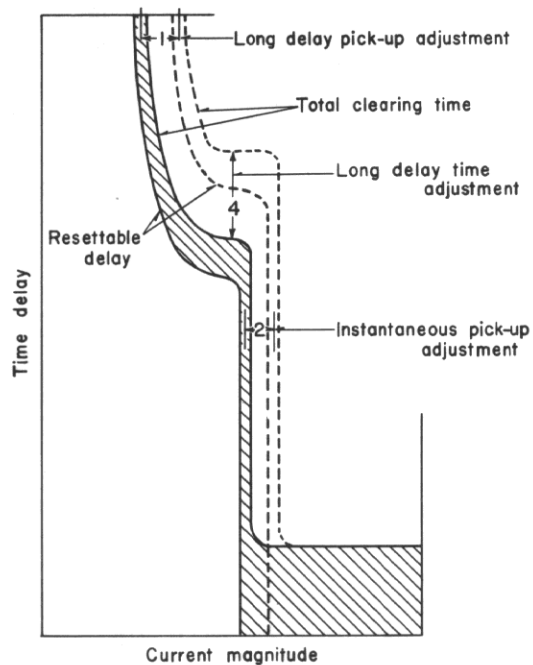
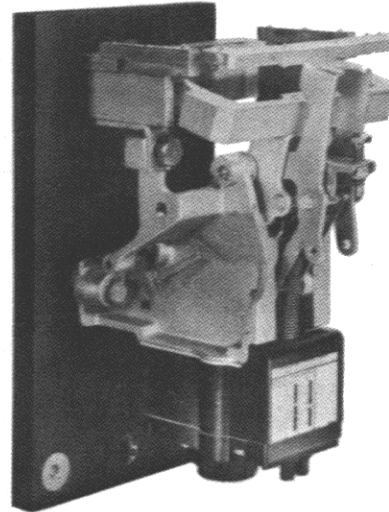


Figure 3

Characteristic Time-Current Curve, Long Delay and Instantaneous Trip.

TOTAL CLEARING TIME is the duration of fault current flow, including arcing time.

RESETTABLE DELAY is the duration of fault current flow after which breaker may trip even though fault current may subside to a value less than 80 percent of the long delay pick-up setting. However, if fault current subsides in less than resettable delay, the breaker will not trip and the delaying device will reset.

Figure 9

selective trip device for a type DB-50 breaker will have long delay pick-up settings of 80, 100, 120, 140, and 160% of the coil rating; long time delay settings of 20 and 30 seconds; short delay pick-up settings of 500, 750 and 1000% of the coil rating and short time delay settings of 6, 15, and 30 cycles. The available series overload devices on type DB breakers really provide "relay-like" characteristics inherent with the breaker so that complete co-ordination with fuses and overcurrent relays can be obtained.

The characteristics provided by the selective trip unit and its factory calibrated settings are shown in Figure 10. Note the 80 to 160% long delay pick-up calibration at the top of the curve, the long delay setting adjustment at the knee of the curve, as well as the short delay pick-up and short time delay setting calibrations at the right of the curve. Note that this type of trip unit provides no instantaneous trip calibration because it is necessary to co-ordinate this selective curve with the standard tripping curve of the load breakers which always have instantaneous calibration.

FUSED CIRCUIT BREAKERS:

The type DB breaker continues to be the most widely used breaker on industrial and commercial distribution systems and low voltage power stations. However, there are some distribution systems which can produce fault currents approaching 200,000 symmetrical amperes which are above the interrupting capacity of type DB breakers.

Types DBL-25 and DBL-50 circuit breakers equipped with current limiters are available for application to systems having a fault capacity of up to 200,000 amperes symmetrical for voltages of 600 volts and below. The current limiters are mounted integrally with the drawout circuit breaker element. They are mounted on the rear of the breaker element in series with the upper main contacts and the main bus bars so that they also protect the circuit breaker for internal faults.

To prevent damage to 3 phase motors on the system upon blowing of one limiter only, trigger fuses are incorporated in the limiters which operate to trip the breaker open when any limiter operates. Thus, single phase operation is prevented.

The type DBL breaker is limited to the DB-25 and DB-50 sizes. The current limiters will afford protection to the associated DB breaker where the available fault current is not in excess of 200,000 amperes symmetrical.

It should be noted that the DBL breakers are not interchangeable with the standard DB breakers, i.e., they will not fit in housings designed to take standard DB breakers or vice-versa. The structures which house the DBL breakers are 6 inches deeper than that which houses the standard DB breakers.

The type DBL-25 and DBL-50 breakers are particularly useful for protecting small loads (600 amperes and below in the case of the DBL-25 and 600-1600 amperes in the case of the DBL-50) when such small loads or feeders must be supplied from high short circuit capacity systems.

Figure 11 shows the rear view of a type DBL-50 drawout breaker.

DUAL SELECTIVE OVERCURRENT SERIES TRIPPING DEVICE FOR TYPE DB-50 AIR CIRCUIT BREAKERS

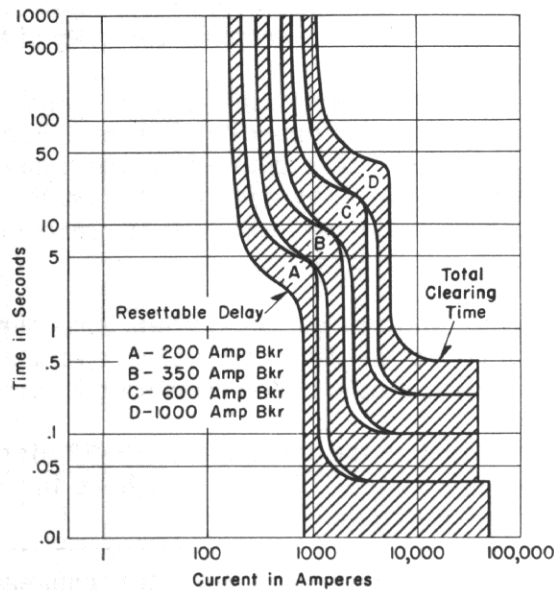
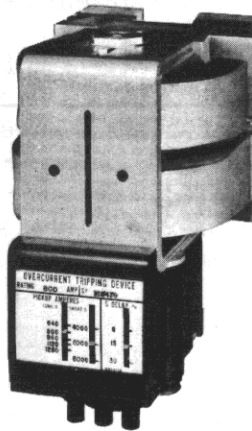


Figure 3

Time-Current Characteristic for a Typical Coordinated Selective Trip Application.

TOTAL CLEARING TIME is the duration of fault current flow, including arcing time.

RESETTABLE DELAY is the duration of fault current flow after which breaker may trip even though fault current may subside to a value less than 80 percent breaker rating. However, if fault current subsides in less than resettable delay, the breaker will not trip and the delaying device will reset.

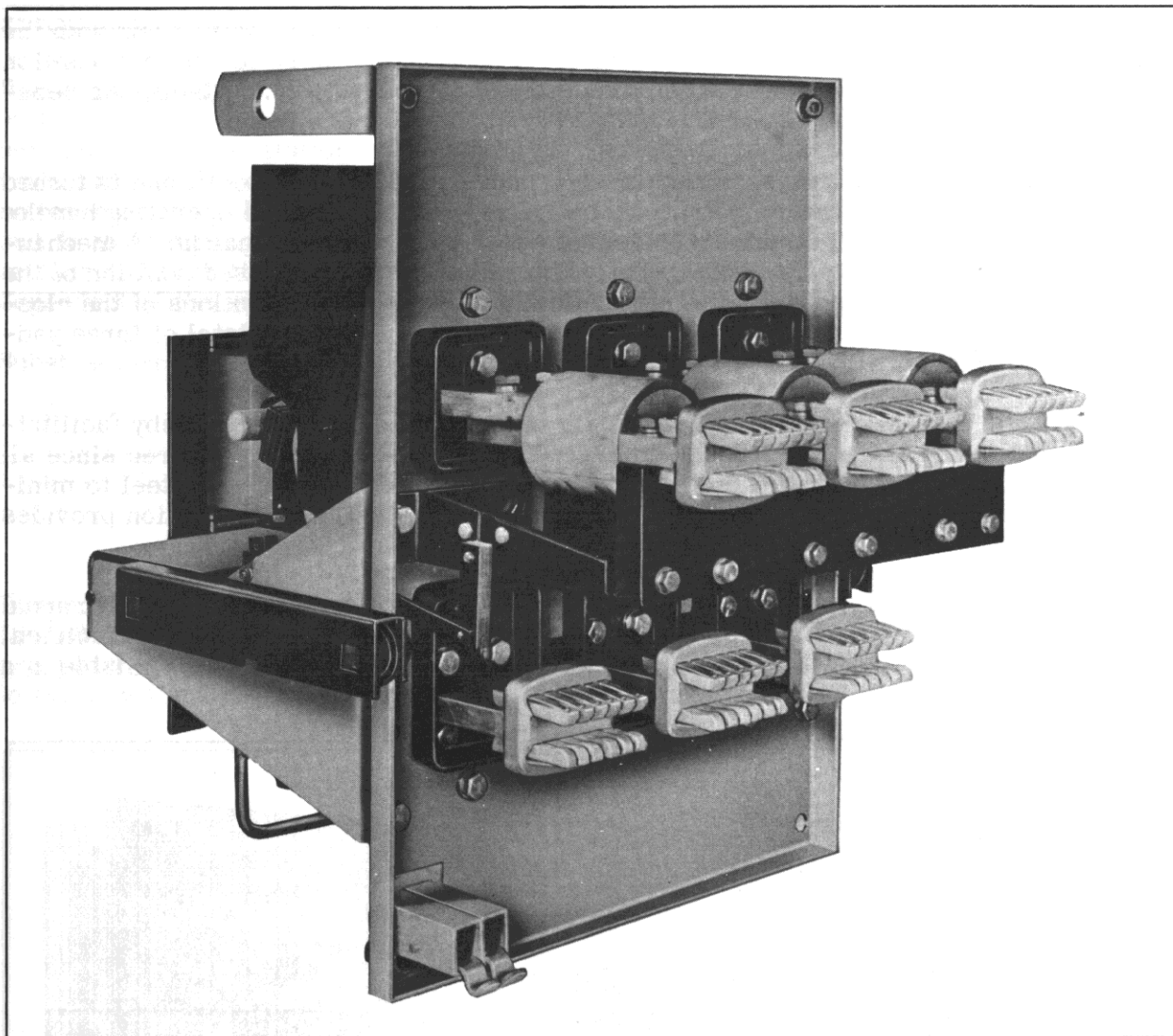


Figure 11

THREE-POSITION TYPE DB AIR CIRCUIT BREAKERS:

The type DB air circuit breakers used in drawout type of construction are furnished in a three-position drawout arrangement. This allows the breaker to be in the connected, test, or disconnected position with the breaker door closed. A portion of the mechanism projects through the door when the breaker is in either the test or disconnected positions with a white line on the breaker face plate indicating the breaker position in the cell.

Figure 12 shows the three positions of the breaker. The left view shows the breaker in the connected position with both secondary and main contacts engaged. In the middle view, the breaker has been withdrawn so that the primary contacts are separated but the secondary contacts are still engaged and the breaker can be operated for testing. In the

right view, the breaker has been withdrawn to the full disconnected position and both the secondary and main contacts are disengaged. The breaker can be left in this position with the door closed and with no danger to personnel or to the breaker itself. No separate storage facilities are required.

The manual operating handle extends through the front door of the cell, and is turned clockwise to close the breaker. A trip pushbutton is located above the operating handle. This trip button is protected against accidental operation by two side guards. A mechanical indicator located on the coverplate shows the opened or closed position of the breaker contacts. The mechanism is mechanically trip-free in all positions of the closing stroke. The trip pushbutton has provisions for padlocking with a total of three padlocks in the open position of the circuit breaker.

The breaker is free-standing when completely removed from its cell, thereby facilitating inspection, adjustment, or disassembly. Long operating life is assured since all pins, important levers and links in the mechanism are made of hardened steel to minimize wear and prevent corrosion. The "de-ion" principle of arc interruption provides for quick arc extinction assuring longer contact life.

The type DB-15, DB-25, and the DB-50 circuit breakers are available for either manual or electrical operation. The type DB-75 and DB-100 are available only for electrical operation. In addition to this, the DB-15, 25, and 50 breakers are also available in a spring closed, manually operated version.

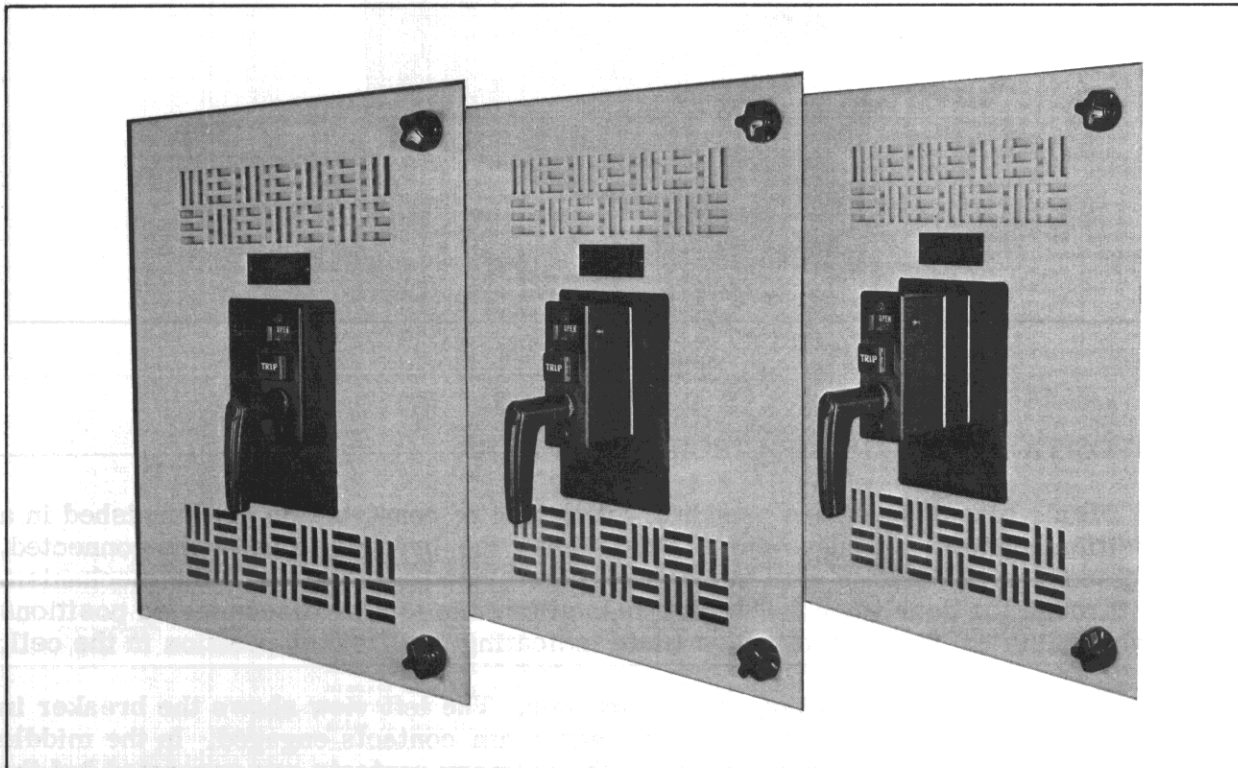


Figure 12

SUBSTRUCTURES:

Westinghouse type DB substructure units are designed for direct incorporation into metal enclosed assemblies supplied by the switchboard assembler. Each substructure unit consists of 6 stationary primary disconnecting contacts, ground contact, drawout rails and, in the case of electrically operated breakers, necessary stationary control power contacts. Rear studs are readily accessible for connection to the main bus bars and to the outgoing cable circuits. The units are bolted into the compartment by means of four bolts at the bottom of the assembly. Alignment of the contacts and rails is independent of the switchboard frame.

Substructure units are available for the following type DB circuit breakers:

DB-15	--	225 ampere frame
DB-25	--	600 ampere frame
DB-50	--	1600 ampere frame
DBL-25	--	600 ampere frame
DBL-50	--	1600 ampere frame

Where desired, for incorporation in 98 inch high assemblies, there can be supplied 89-1/2 inch upright channels, rails and backplates as shown in Figure 15. The uprights are punched to permit one to four stackings of DB-15 and DB-25 components, also one to three of the DB-50 components.

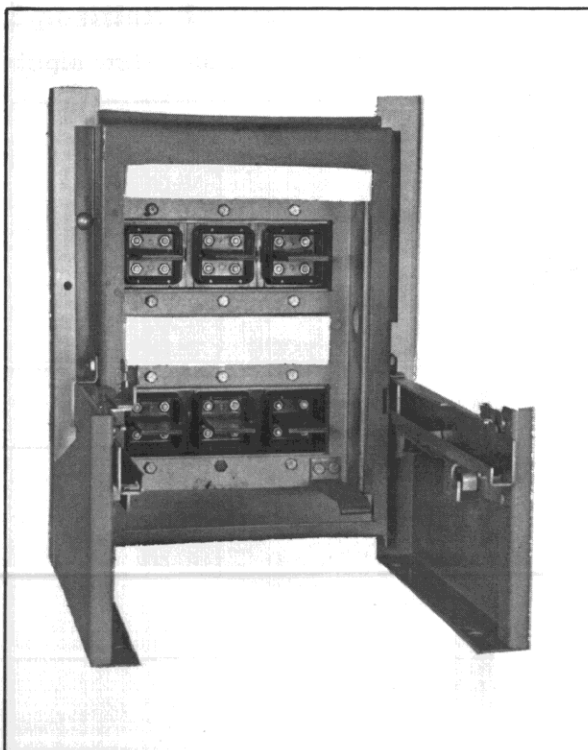


Figure 13. DB-15 Substructure

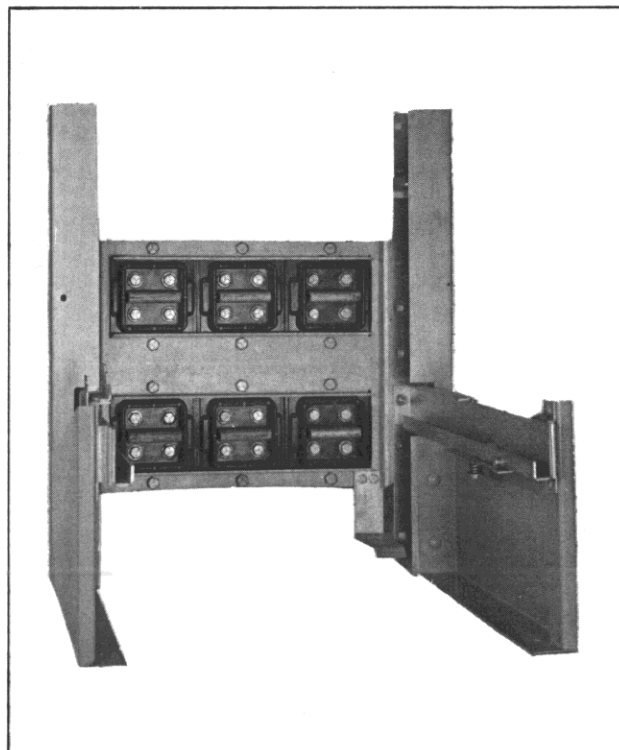


Figure 14. DB-50 Substructure

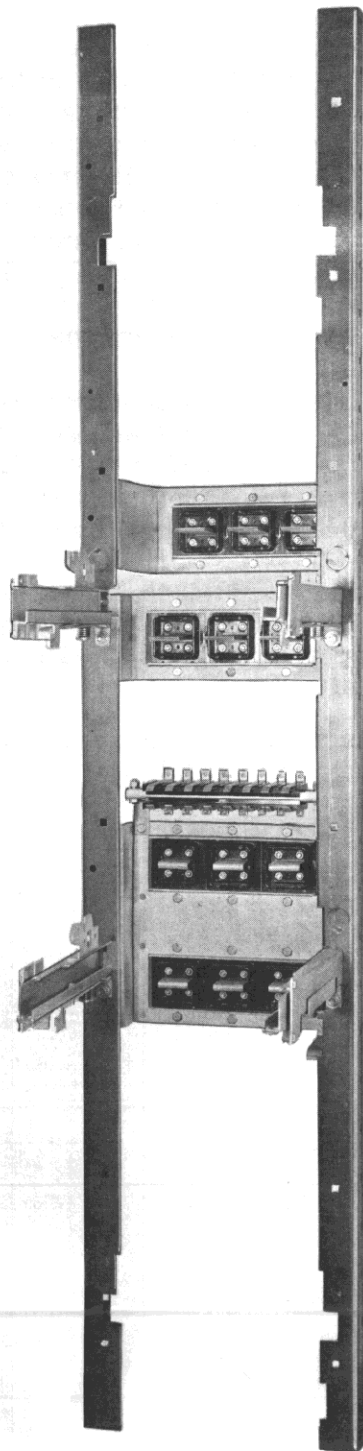


Figure 15

ONE HIGH DRAWOUT UNITS:

Factory assembled metal enclosures are available for all types of DB and DBL air circuit breakers. These standardized design units are complete with rails, stationary contacts both primary and secondary, ground contacts and a hinged front door. They are suitable for stacking by the switchboard assembler to form standard 90" high low voltage switchgear sections. The switchboard assembler, of course, must add the rear bus compartment and outgoing cable compartment.

The single units each incorporate the Westinghouse standard 3-position drawout arrangement which permits the door of the breaker compartment to be closed with the breaker in any of its three positions - "connected", "test", "disconnected". The 3-position feature offers a new convenience and safety to operating and maintenance personnel and greater protection for the circuit breakers.

For the switchboard assembler, the single unit type of assembly has many advantages including rapid assembly of metal enclosed units and the elimination of expensive and time consuming jiggling and testing.

Figures 16 and 17 show the front and rear views of electrically operated one-high draw-out units. Figure 18 illustrates a type DB-50 manually operated three position breaker.

3-position drawout breakers

single unit—one high

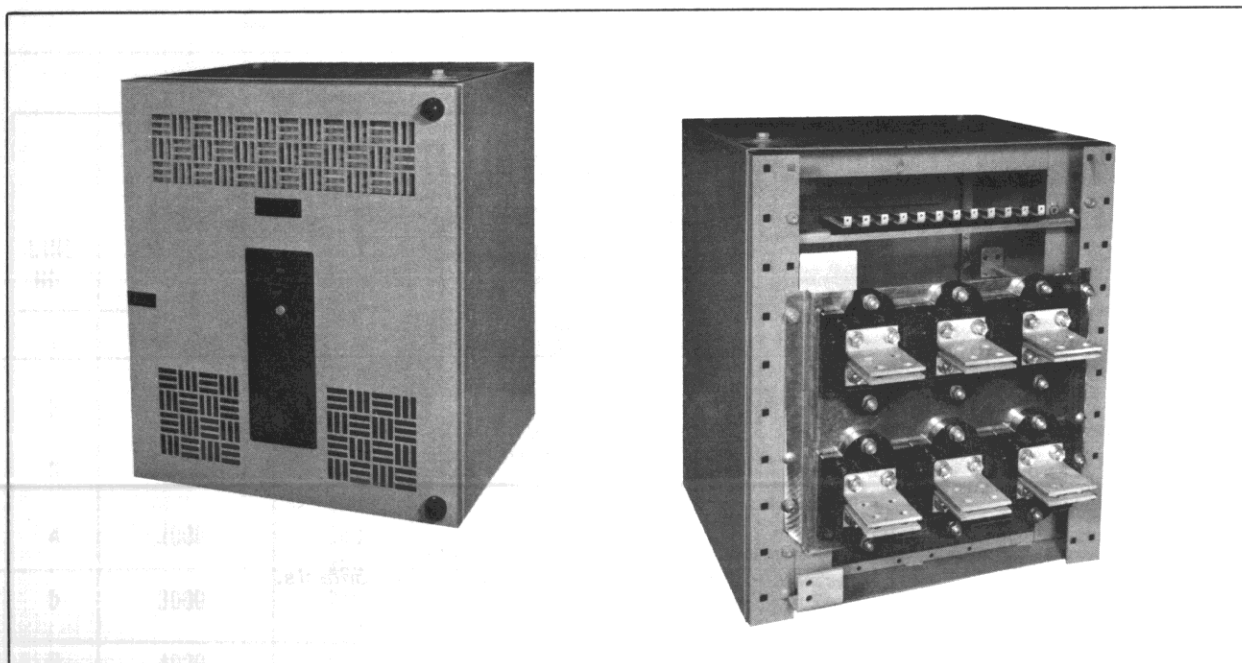


Figure 16. Type DB-50

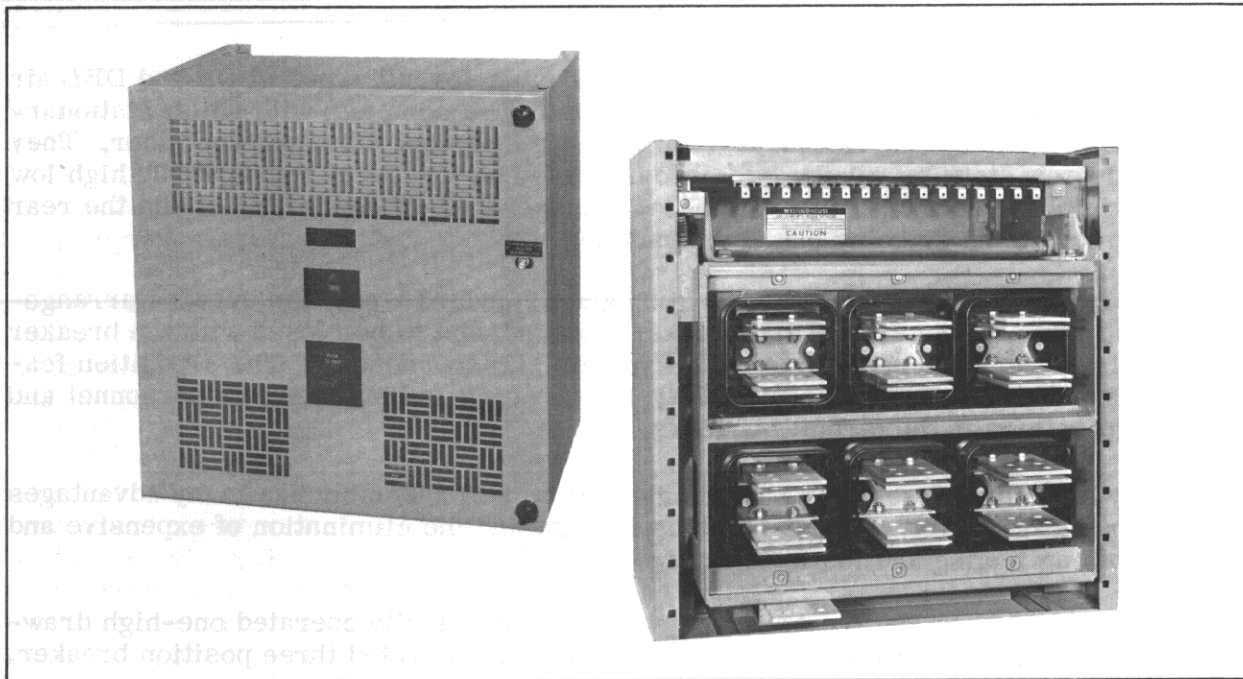


Figure 17. Type DB-75

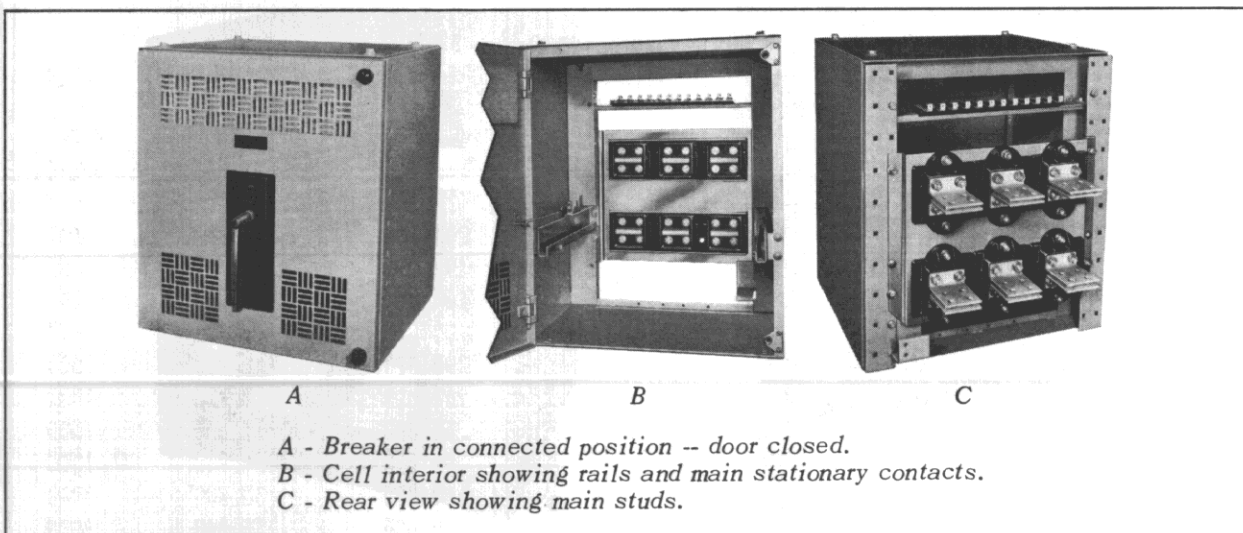


Figure 18. 3-Position Drawout Breakers
 Single Unit -- One High

TYPE DBE SERVICE ENTRANCE PROTECTOR

The DBE service entrance protector is designed to give continuous and reliable service as the protective link between a source of high capacity fault current and other switch-gear equipment. The unit consists of a three-pole interrupting device with a current limiting fuse connected in series with each pole unit.

The base interrupting device is nonautomatic; that is, manual closing and tripping. It will be capable of interrupting fault currents up to fifteen times its continuous current rating. Fuses are of the current limiting type and are per NEMA Standards FU-1, class L. A manual spring close mechanism is used on all units. For independent closing, an electrically operated mechanism is available utilizing a closing solenoid. A manual trip button at the front of the operating mechanism, and a closing handle are standard equipment. All units are provided with facilities for padlocking in the open position.

An Anti-Single Phase device is provided on all service entrance protectors. It consists of trigger fuses and micro-switches which are connected in the shunt trip circuit. When any of the trigger fuses opens the micro-switch contact closes and energizes the shunt trip device which then trips the protector. The protector remains trip free until the blown trigger fuses are replaced.

Flat bar terminals are available on all units. All external connections should be made so fuses will be on the load side of the interruptor.

- Modifications:
- | | |
|-------------------------|----------------------|
| 1. Electrical operation | 4. Neutral connector |
| 2. Undervoltage trip | 5. Cable terminals |
| 3. Enclosure | |

LINE NO.	RATED CONTINUOUS CURRENT AND FRAME SIZE, AMPERES	RATED VOLTAGE, VOLTS	RATED MAXIMUM VOLTAGE, VOLTS	INSULATION LEVEL DIELECTRIC WITHSTAND, VOLTS	RATED SHORT-CIRCUIT CURRENT, SYMMETRICAL AMPERES	RATED SWITCHING CURRENT, SYMMETRICAL AMPERES	RATED FUSE SIZE, AMPERES
1	800	240	250	2200	200,000	9,600	800
		480	500	2200	200,000	9,600	800
2	1200	240	250	2200	200,000	14,400	1200
		480	500	2200	200,000	14,400	1200
3	1600	240	250	2200	200,000	19,200	1600
		480	500	2200	200,000	19,200	1600
4	2000	240	250	2200	200,000	24,000	2000
		480	500	2200	200,000	24,000	2000
5	3000	240	250	2200	200,000	36,000	3000
		480	500	2200	200,000	36,000	3000
6	4000	240	250	2200	200,000	48,000	4000
		480	500	2200	200,000	48,000	4000

Figure 19 shows an electrically operated, frame mounted, 4000A, DBE. Also, illustrated is the Anti-Single Phase device mounted under the main platform. Shown are the trigger fuse and micro-switch. This protector utilizes the solenoid operated closing mechanism.

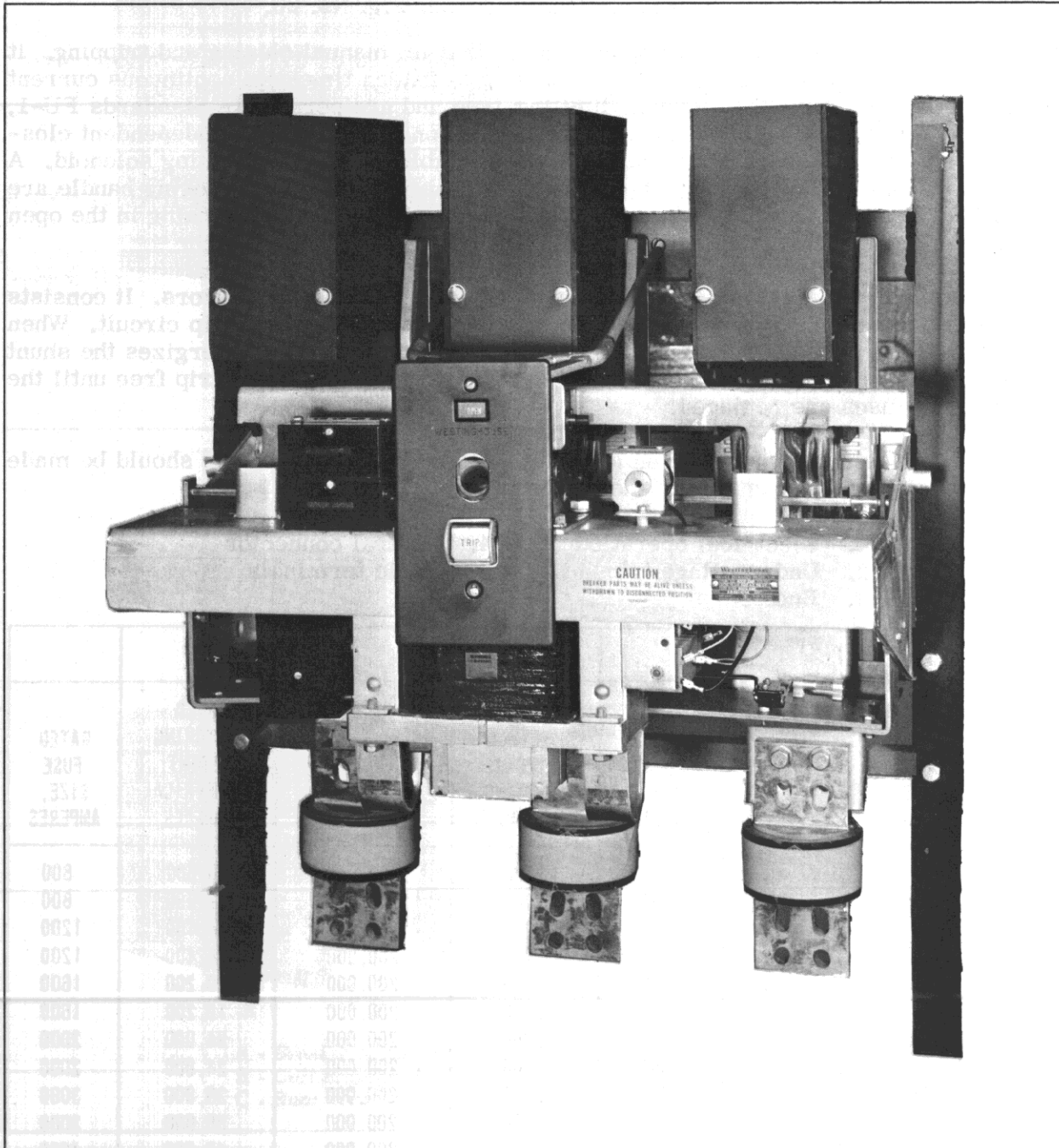


Figure 19

ACCESSORIES:

The following accessories are available for use with type DB circuit breakers:

- a. Extension rails for types DB-15, DB-25 and DB-50 circuit breakers to permit the breakers to be fully withdrawn from the cell. Re. Fig. No. 20.
- b. Levering-in yoke for types DB-15, DB-25 and DB-50 circuit breakers for moving the breakers into or out of the fully connected position. Re. Fig. No. 21.
- c. Levering-in crank for types DB-75 and DB-100 circuit breakers.
- d. Extension platform for types DB-75 breakers required where the DB-75 breakers are mounted two-high. Re. Fig. No. 22.
- e. Top-of-gear mounted circuit breaker lifting device mounted on rails to permit movement to each end of the assembly. Re. Fig. No. 22.
- f. Breaker lifting device and transport truck. Re. Fig. No. 23.

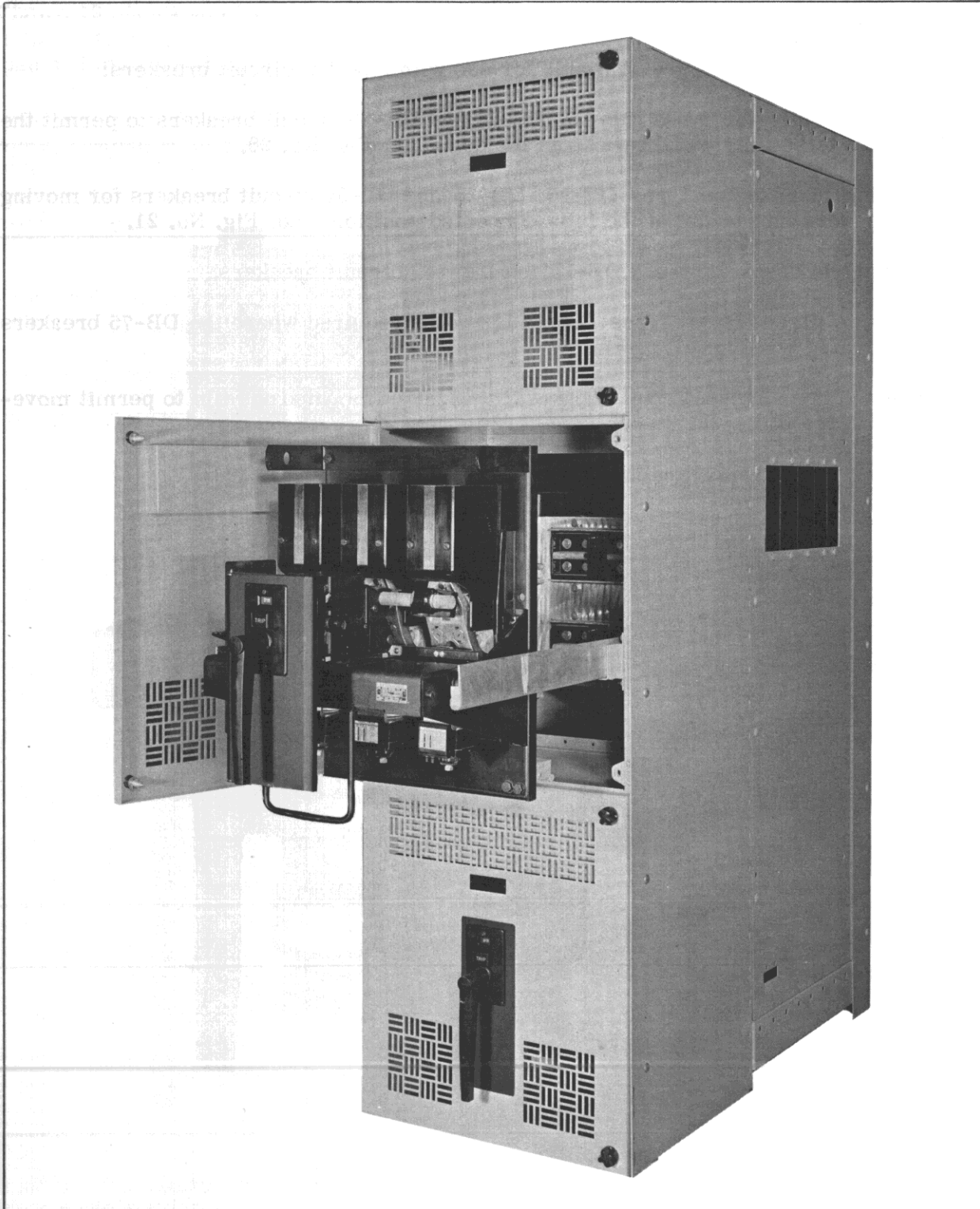


Figure 20

Levering Device

Type DB drawout air circuit breakers are easily moved in and out of the cells. Types DB-15, DB-25 and DB-50 air circuit breakers utilize a simple levering-in mechanism operating between the pins on the stationary structure and the removable breaker element to move the element into or out of contact engagement. It is only during contact engagement or disengagement that any levering effort is required. All removable breaker elements are equipped with sheels that run on jig located rails to assume accurate contact alignment and ease of movement into or out of the cell. Figure 21 shows a DB-50 levering device in position.

Air circuit breakers types DB-75 and DB-100 are equipped with floor wheels which permit rolling these units in and out of their respective cells. Contact engagement or disengagement is accomplished by means of a crank mechanism.

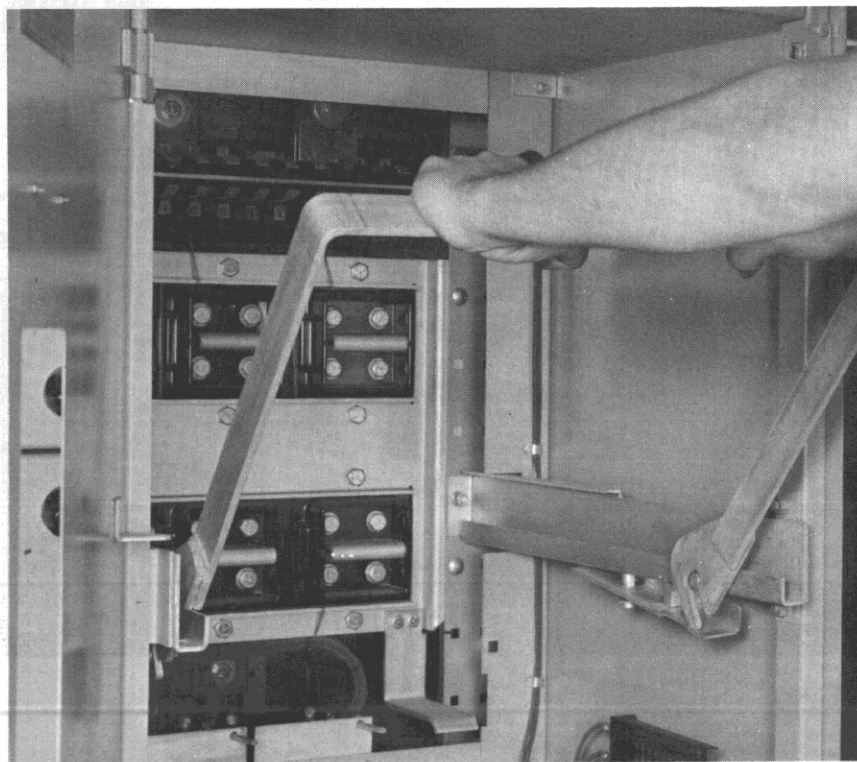


Figure 21

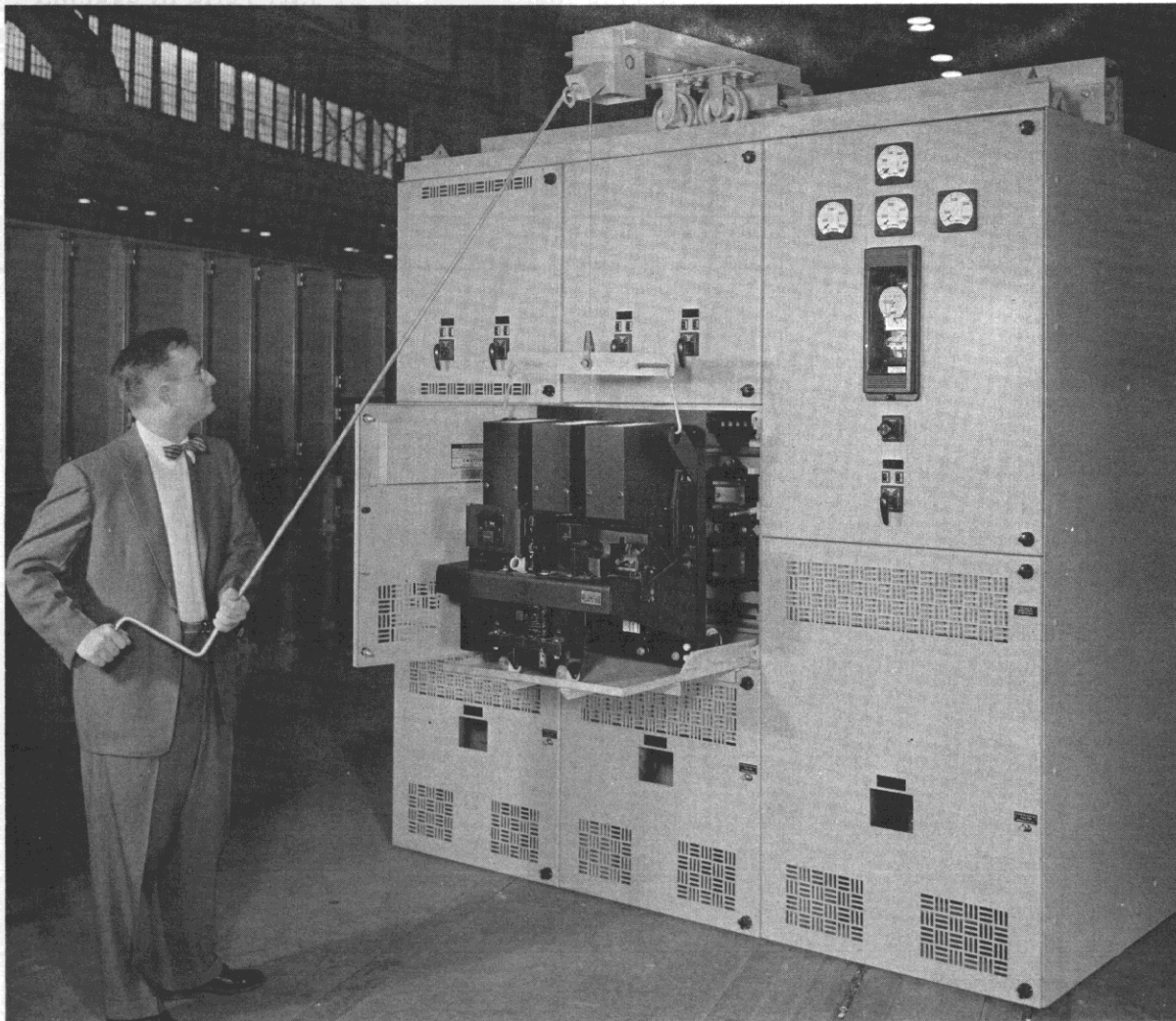


Figure 22

Breaker Lifting Devices

Since type DB breakers weigh from approximately 115 pounds for the type DB-15 up to 800 pounds for the type DB-100 size, some means must be provided for lifting the breakers up to the intermediate and upper compartments.

For indoor switchgear assemblies a breaker lifting device is available at modest cost. This device is commonly called a "traveling lifter" and is mounted on top of the switchgear assembly. One such device is required for each indoor assembly, if no overhead crane is available for lifting the breakers into position.

In addition, a "breaker lifting and transfer truck" is available at a price addition. Only one such device need be purchased for any one particular location.

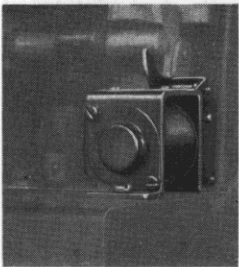


Figure 23

OPTIONAL ATTACHMENTS:

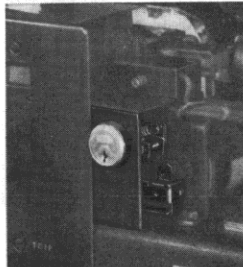
The following equipment is available at a price addition for modifying the standard circuit breaker units:

- a. Shunt trip coil for manually operated breakers.
- b. Undervoltage trip attachments.
- c. Reverse current trip attachment for d-c breakers.
- d. Overcurrent alarm contacts.
- e. Electrical lockout coils.
- f. Mechanical interlocks.
- g. Key interlocks.
- h. Extra auxiliary switch contacts.
- i. Circuit breaker control switch and indicating lights for electrically operated breakers.
- j. Close and trip pushbuttons with lights for electrically operated breakers.



undervoltage trip

Trips breaker on loss of voltage and is automatically reset by breaker action. Attachment is available for instantaneous or time delay tripping.



key interlock

Several designs available for interlocking two or more breakers.



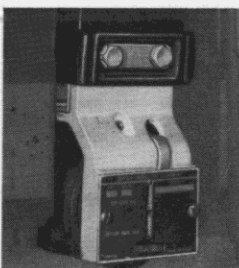
alarm switch

Closes to initiate alarm when breaker is tripped by an automatic tripping device (does not operate when breaker is tripped manually or by shunt trip).



electrical lockout

Holds breaker linkage in trip-free position to prevent closing until lockout is energized. After breaker is closed, de-energizing coil will not trip breaker.



reverse current trip

Opens breaker upon a reversal of current in the circuit. This direct-current device is adjustable and may be set to trip at 5 to 25% reverse current, based on normal current rating.

BREAKER KEY INTERLOCK SCHEME:

The scheme for interlocking DB-15, DB-25 and DB-50 drawout breakers is shown by Figure 24. A mechanical interference prevents inserting the breaker into the connected position unless the key is available to the operator. Operation is by simple twist of a shaft. No springs or close adjustments are required.

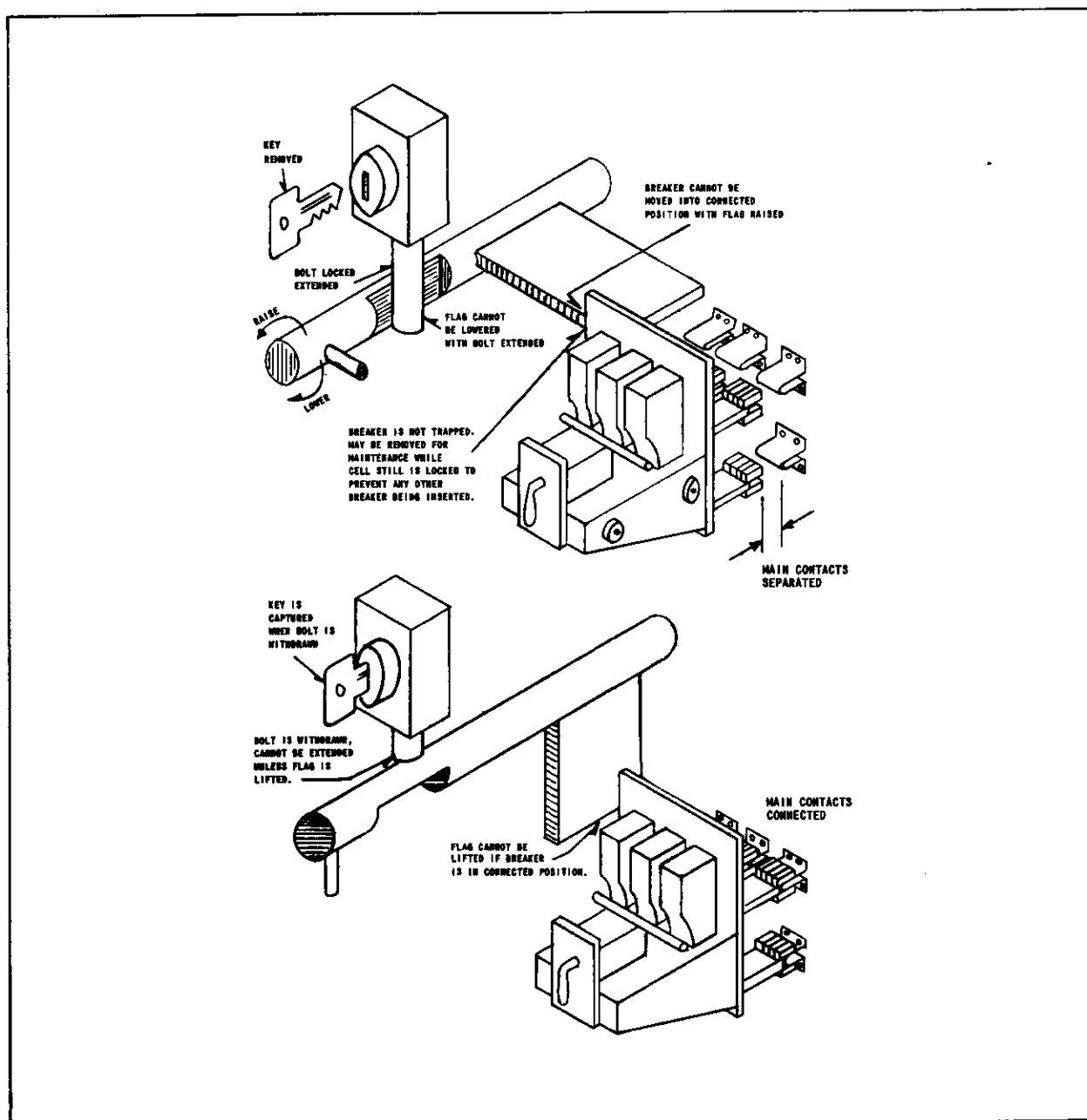


Figure 24

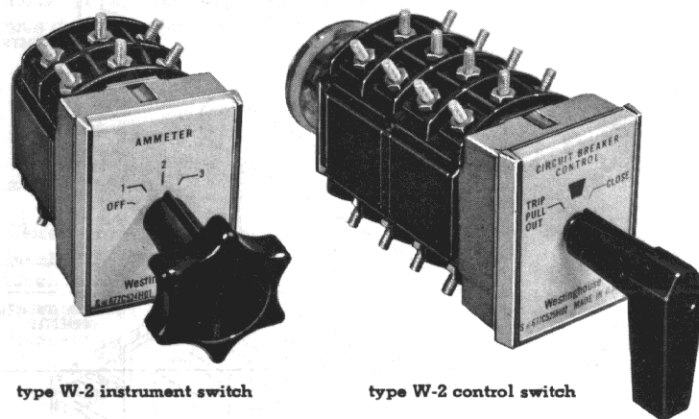
INSTRUMENT AND CONTROL SWITCHES:

The type W-2 switch is designed for use as an instrument, control or general purpose switch, to be applied within the ratings specified. It is compact, yet of sufficient size to adequately carry applied current for a long, trouble-free life.

Design flexibility of internal parts and contacting allows the purchaser to buy a basic switch and wire it externally to suit his application. Only a minimum number of basic switches is required to cover numerous applications. The flexibility of the design is provided in basic switch styles.

The switch is furnished in these basic styles requiring the addition of a handle, one of three standard shapes, and a face plate, to make a complete unit. Additional features of wire connectors and stud protective covers are available.

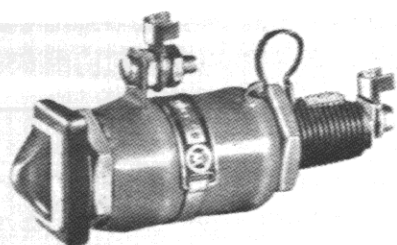
Type W-2 switches may also be ordered complete for specific applications. Refer to Descriptive Bulletin 37-150.



Silver-plated contacts on type W-2 instrument and control switches resist corrosion and give smooth, rotary operation for long life. Rolling action keeps contacts clean.

INDICATING LAMPS

rectangular Minalite



Rectangular Minalite is a medium sized low-drain indicating lamp designed for extreme angular visibility and to provide the utmost in sturdiness, compactness and appearance. Its design matches modern rectangular switchboard devices, such as instruments, relays and control switches. It is intended for general indicating or signal purposes on switchboards, control desks, etc.

Rectangular Minalite includes a rugged one-piece receptacle, made of Moldarta, a high-strength molded material, and is suitable for mounting on panels $\frac{1}{32}$ to 2 inches thick. The molded receptacle is shaped to key into a square hole in the panel to provide accurate positioning. Where positioning is not mandatory, the same receptacle can be mounted by drilling a $\frac{25}{32}$ -inch round hole. Pressure-type leaf spring contacts establish connections with the slide base telephone lamp having a rating of .032-.038 amperes, at 24 or 48 volts.

The rectangular lens assembly is held in place by means of phosphor bronze spring clips engaging in retaining grooves of the receptacle. A chromium metal holder encases the lens and spring clips. Rigid terminals for standard 10-32 hardware are provided. Resistors are available for bright-dim operation.

The lens provides visibility in all directions. The assembly using the 0.75-watt, 24-volt bulb is standard. A similar assembly using a 1.5-watt, 48-volt bulb is available for use in locations having a high level of illumination.

Matches switchboard design in modern appearance and compactness.

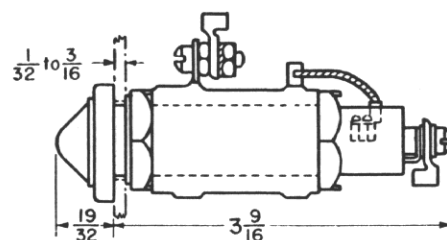
lamp characteristics

voltage rating	watts											
	rectangular minalite			large round indicating lamp			round minalite					
	.032-.038 ampere, 24 volts, 750 ohms			.032-.038 ampere, 48 volts, 1500 ohms			.11 ampere, 18 volts, 165 ohms			.090-.11 ampere, 24 volts, 267 ohms .045-.060 ampere, 55 volts, 1200 ohms		
	bulb	resistor	total	bulb	resistor	total	bulb	resistor	total	bulb	resistor	total
25	0.83	...	0.83	1.67	...	1.67	1.47	0.89	2.36	2.34	...	2.34
50	0.78	.83	1.61	1.52	...	1.52	1.29	3.13	4.42	2.27	2.34	4.61
70	0.80	1.48	2.28	1.52	0.71	2.23	1.38	5.02	6.40	2.45	0.71	3.16
115	0.74	2.88	3.62	1.53	2.14	3.67	1.36	9.09	10.45	2.54	2.75	5.29
125	0.75	3.21	3.96	1.47	2.44	3.91	1.38	10.06	11.44	2.31	3.17	5.48
208	0.76	5.85	6.61	1.54	5.12	6.66	1.33	17.35	18.68	2.45	6.95	9.40
230	0.76	6.54	7.30	1.53	5.82	7.35	1.33	19.30	20.63	2.49	7.99	10.48
250	0.76	7.20	7.96	1.54	6.47	8.01	1.35	21.25	22.60	2.39	8.77	11.16

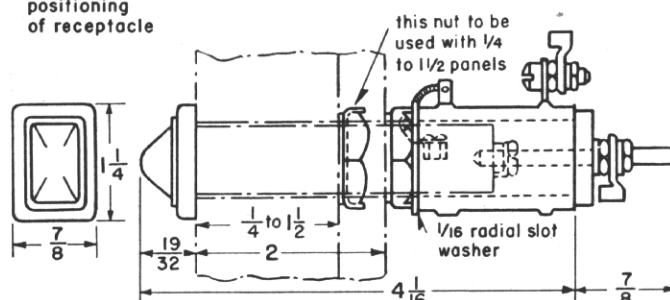
dimensions in inches

drilling plans

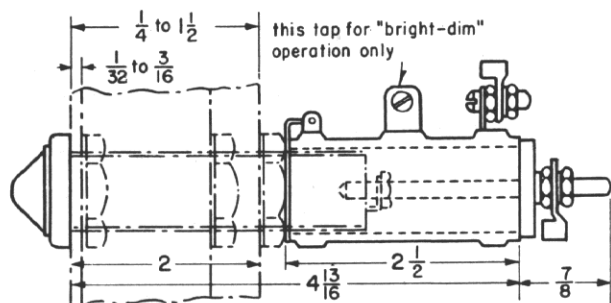
$\frac{3}{4}$
square
No. 1—provides
positioning of
receptacle
 $\frac{25}{32}$
drill
No. 2—does not
provide
positioning
of receptacle



for panels $\frac{1}{32}$ to $\frac{3}{16}$ -inch thick, and for voltages up to and including 250.

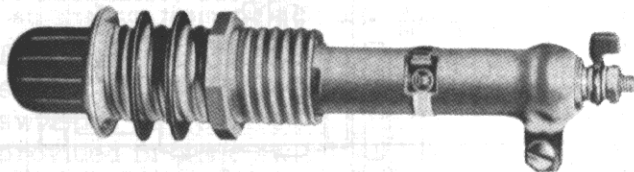


for panels $\frac{1}{4}$ to 2-inches thick, and for voltages up to and including 250.



380 and 480-volt receptacles, and all receptacles for "bright-dim" operation. $\frac{1}{32}$ to 2-inch thick panel mounting.

large round indicating lamps



Large round indicating lamp is a large high-drain lamp providing maximum illumination and universal mounting. It is more expensive and is primarily recommended for match-up purposes and for applications requiring good visibility of signals at great distances.

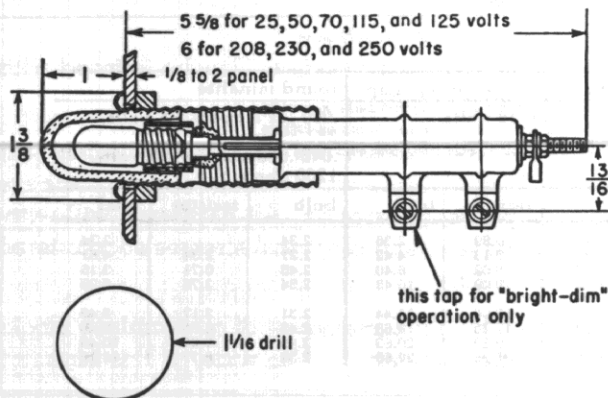
maximum illumination: Large high-drain lamp provides high levels of illumination efficiency.

long distance visibility: Designed for applications requiring good visibility at great distances. Matches up with switchboard design.

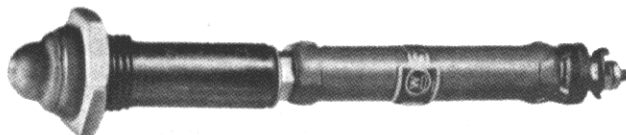
heavy duty construction: For heavy-duty applications and enclosed in a universal housing.

Large round indicating lamp is a type desirable for heavy-duty application. It uses an 18-volt, 11 ampere, candelabra screw base type bulb. The design lends itself for use on panels from $\frac{1}{8}$ to 2 inches thickness. The resistor and receptacle form one complete unit. Resistor units are available for bright and dim operation.

dimensions in inches



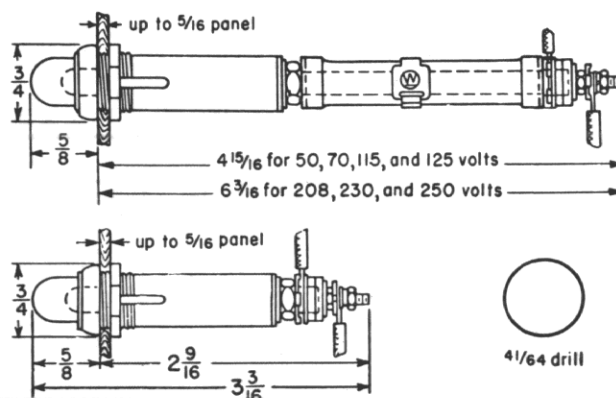
round Minalite



Round Minalite is a compact, medium-drain indicating lamp developed especially for miniature steel switchboards, providing the maximum illumination in the smallest possible space. Since some rigidity was sacrificed to obtain the long, slender construction, which permits close center spacing between adjacent lamps, it is intended only for such applications where the wire size is not larger than no. 18.

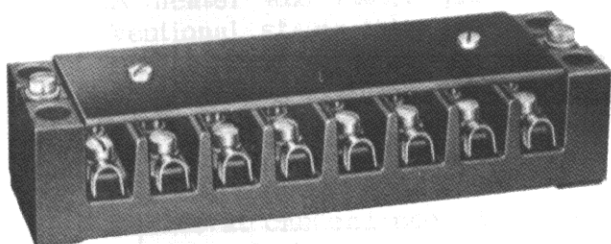
Round Minalite is designed for panels up to $\frac{5}{16}$ inch in thickness. It is available for standard control circuits of 50 to 250 volts, with a series resistor, or 25 volts without a resistor. The assembly uses a slide-basebulb.

dimensions in inches

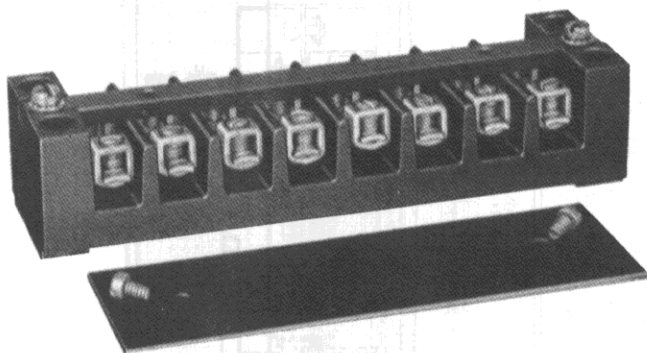


TERMINAL BLOCKS

8-circuit standard terminal block with cover



8-circuit terminal block with high-pressure connectors, cover removed



Application

Terminal blocks are designed to meet modern demands of space economy, safety in operation, and flexibility in arrangement of control wiring and conduits. Black Moldarta blocks are compact, sturdy, and serviceable; they can be mounted by bolts in any two of the four bolt holes provided. Maximum short-circuit protection is provided between wires and to ground. Terminal blocks are rated 30 to 50 amperes. Test voltages greatly in excess of AIEE requirements for 750-volt service can be successfully applied.

Standard terminals are suitable for wire sizes no. 18 to no. 10 maximum. High-pressure terminals are available for wire sizes no. 16 to no. 6 maximum.

Advantages

standard Moldarta blocks: Formed of a plastic material of fibrous cellulose filler and synthetic resin binder. They have exceptionally high resistance to heat, moisture and shock. This material is resistant to common solvents and has a smooth even finish which tends to retard the accumulation of dust.

removable covers: When used, can be removed without disturbing mounting, connections, or marking strips.

ease of mounting: Blocks can be mounted flat on housing or panel, or on brackets, by any two of four bolt holes.

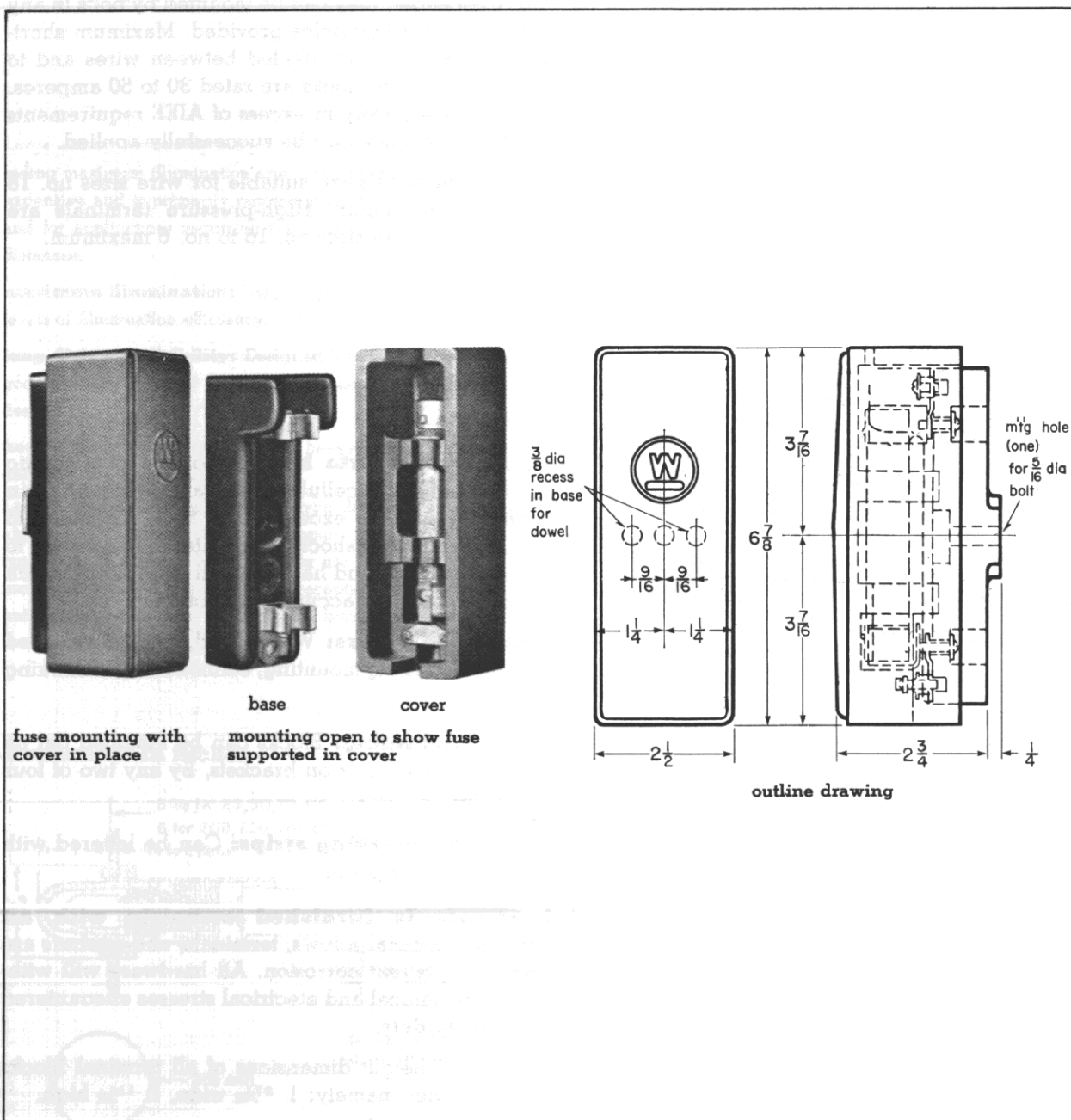
reversible marking strips: Can be lettered with white or yellow paint.

hardware is furnished complete with all blocks: Terminal screws, terminals, and washers are tinned to prevent corrosion. All hardware will withstand mechanical and electrical stresses encountered in ordinary duty.

Width and height dimensions of all terminal blocks are the same—namely: 1 $\frac{27}{32}$ wide, 1 $\frac{11}{32}$ high.

CLV FUSES:

Type CLV current limiting fuses and fuse mountings are available for protection of potential transformer and control power transformer primary circuits. The CLV current limiting fuse is designed to clear a faulty transformer from the line within 1/2 cycle. It does not blow on magnetizing inrush currents. The fuses are available in ratings of 2, 5, 7 and 10 amperes.

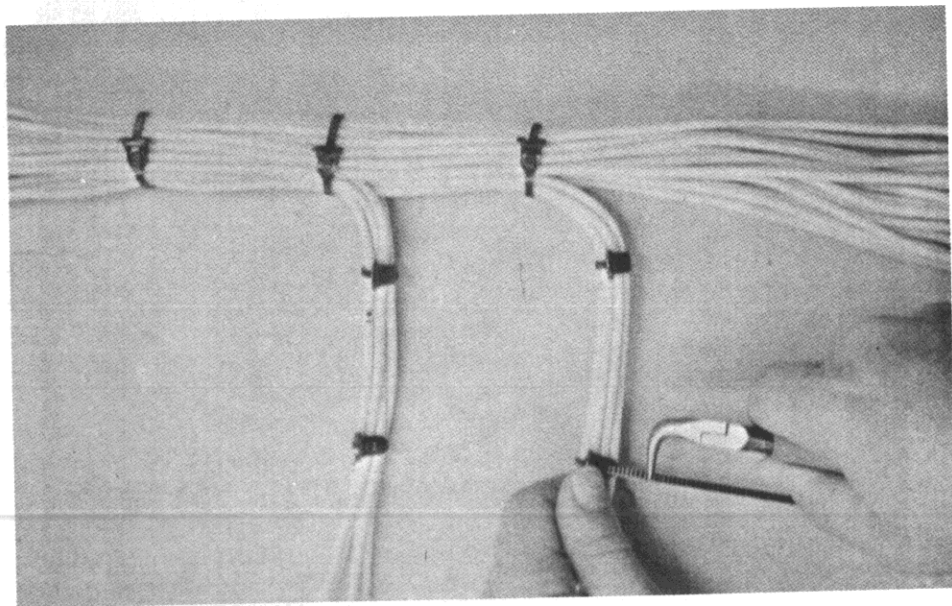


NYLON WIRE TIES:

Westinghouse Nylon wire ties are self-adjusting molded straps used primarily in securing bundles of wires in harnesses for switchboards, panelboards, switchgear assemblies and motor control centers. Other applications are found wherever wires are connected to or used with other electrical apparatus.

A neater and faster job can be accomplished with wire ties as compared with conventional string-tying methods. Time studies indicate substantial savings in installation time. Pre-wired harnesses and assemblies can be easily moved and handled without concern for loosening or shifting bundles. In addition, the Nylon material offers strength and insulation to the wire bundle.

The flexible Nylon tie is $1/8$ " wide and $5-1/4$ " long, having a patented ratchet-like buckle at one end and a tapered lead point at the other end. The outside surface of the strap is formed as a continuous series of ratchet teeth, while the inside smooth surface has a length-wise raised rib that prevents side slippage when the tie is pulled up snug around a wire bundle. The unique ratchet design allows the tie to be immediately adjusted to diameters of $3/16$ " minimum to $1-1/4$ " maximum.

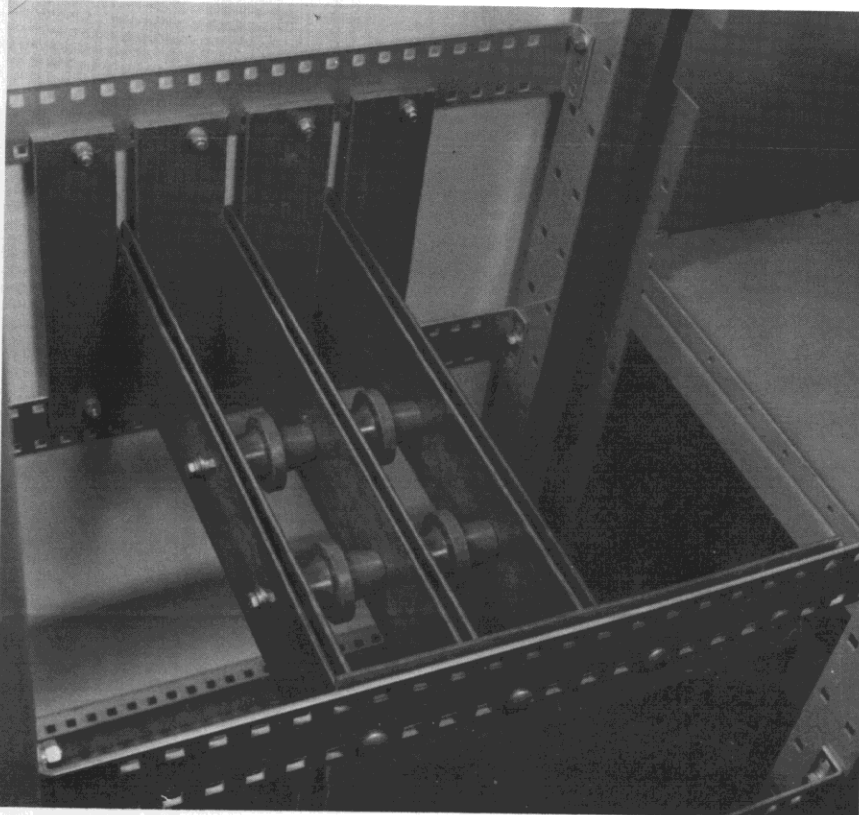


BUS SUPPORTS:

Glass polyester insulating material is used for bus supports and for bus bracing. Flat plate-type bus supports are available for 1, 2 or 3 bar assemblies with spool-type polyester bus braces available in three lengths to match the supports. Some of the many qualities of this new insulation material that make it superior to any material previously used for low voltage insulation are:

- a. Highly resistant to moisture absorption.
- b. Highly resistant to tracking.
- c. Glass polyester is flame retardant.

Another feature which has been provided in the support design is improved creepage surfaces. A vertical surface will collect less dust and other contaminants than a horizontal surface. For example, contrast the appearance of the top with the front of a cubicle when it has not been dusted for sometime. Dust will build up on switchgear insulation in the same manner. Much of the dust which collects on the insulation may contain salts and in the presence of moisture, can provide a conducting path to ground. In order to reduce this effect, deep slots have been cut in the bus supports to increase the vertical creepage distance so that even with poor maintenance, the creepage path to ground will remain clean.



GLASS POLYESTER BUS INSULATORS:

New Westinghouse insulation of improved glass polyester material is used for short circuit bracing of low voltage switchgear bus bars. In addition to being highly track resistant, this new insulation is also flame retardant. These bus braces are designed to be essentially self-cleaning and they are shaped to provide increased creepage distances.

The insulators have the following physical and electrical properties:

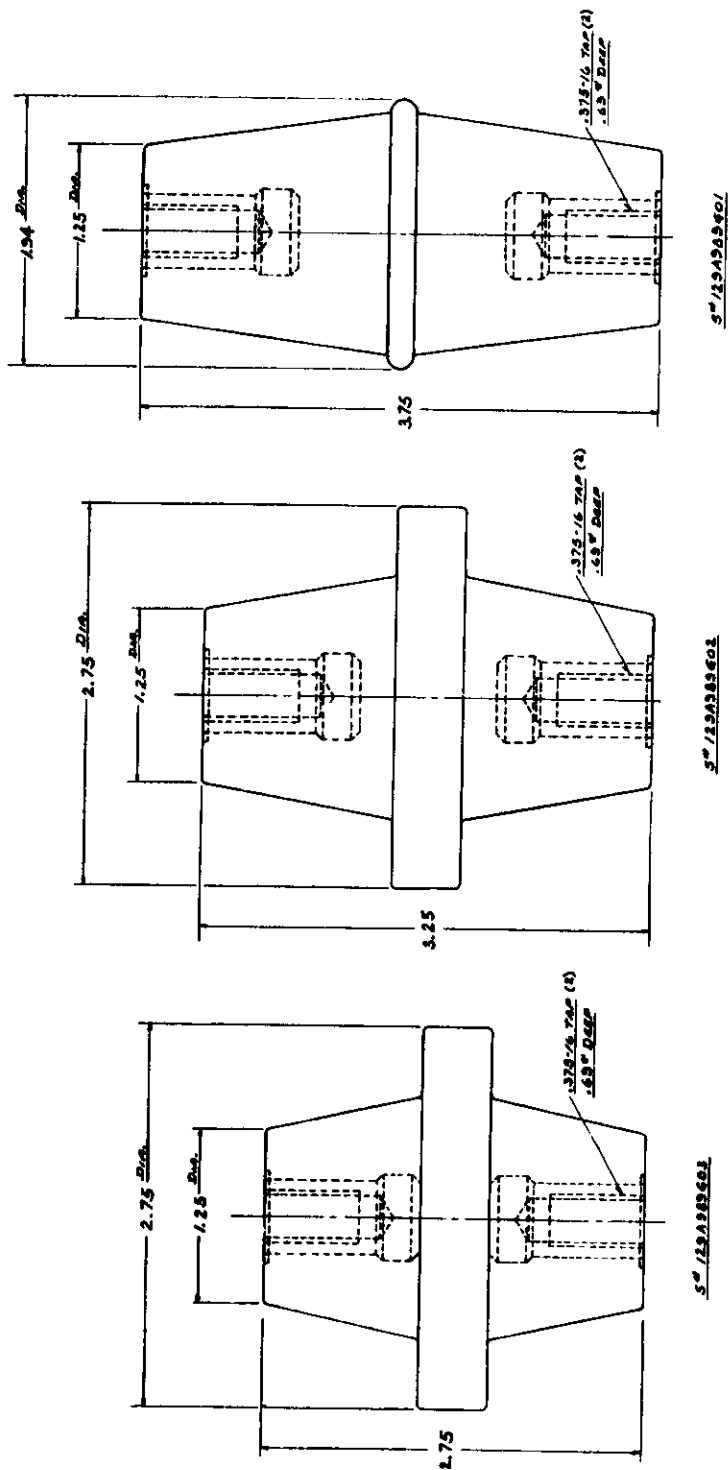
Impact strength (ft. - lbs.)	6-8
Flexural strength (psi)	18,000
Tensile strength (psi)	4,100
Compression strength (psi).	14,500
Water absorption (% in 24 hrs.)048%
Heat distortion	230°C
Dielectric strength (short time)	230 volts per mil
Dielectric strength (step by step)	259 volts per mil
Arc resistance (seconds).	105
Specific gravity.	2.07
Flame retardance (ignition)	123 seconds
Flame retardance (burning)	52 seconds
Thread inserts (plated steel).	3/8" X 16", 11/16" deep

Height:

Style 129A989G01 (one bar per phase).	3.75"
129A989G02 (two bars per phase)	3.25"
129A989G03 (three bars per phase)	2.75"

Creep Distance:

Style 129A989G01	3.88"
129A989G02	4.25"
129A989G03	4.00"



Glass Polyester Bus Insulators

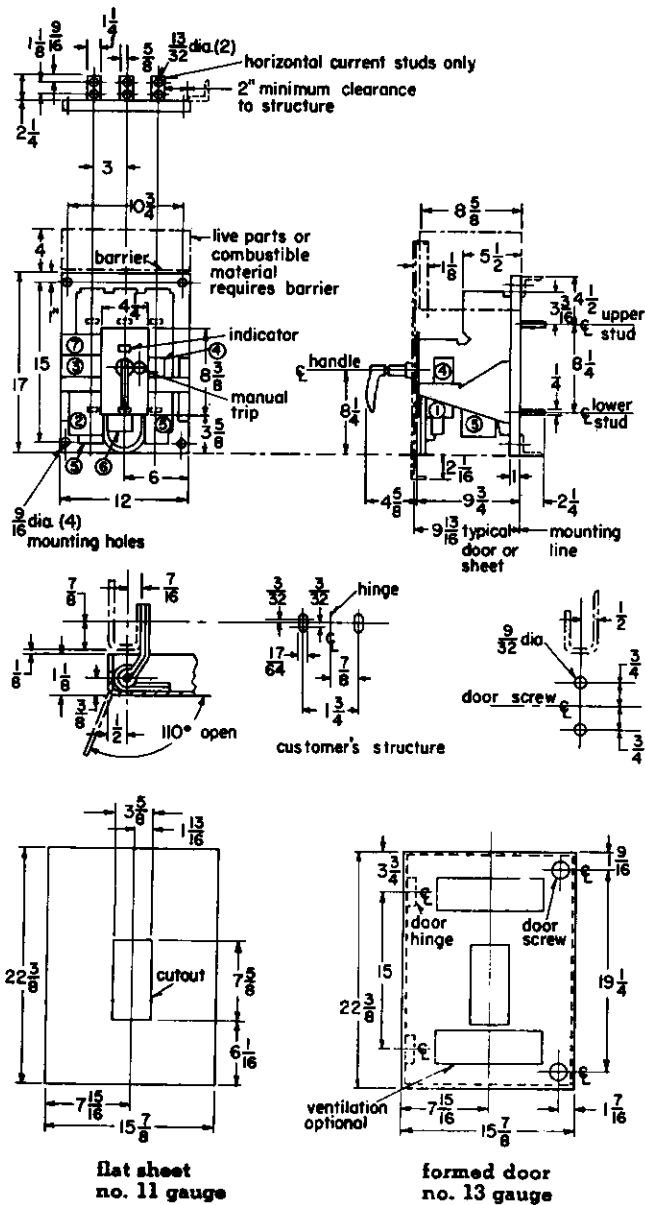
dimensions

DB De-ion[®] circuit breakers

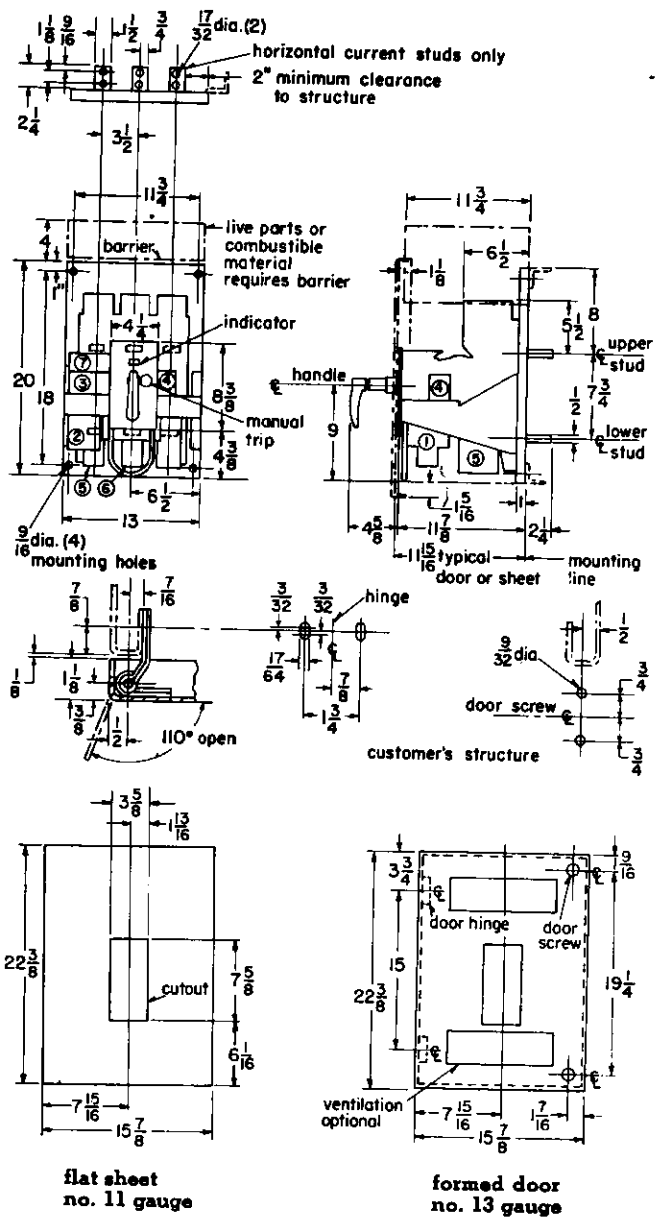
manually or electrically operated • 2 or 3 pole

dimensions in inches

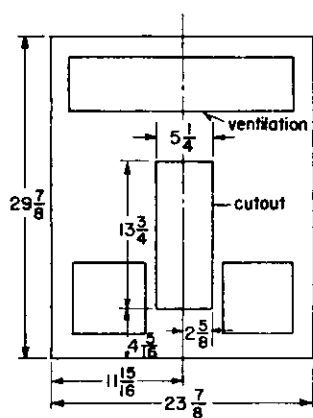
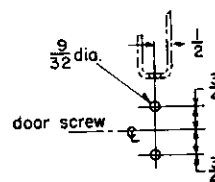
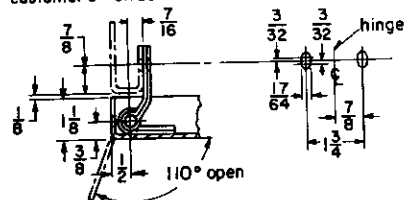
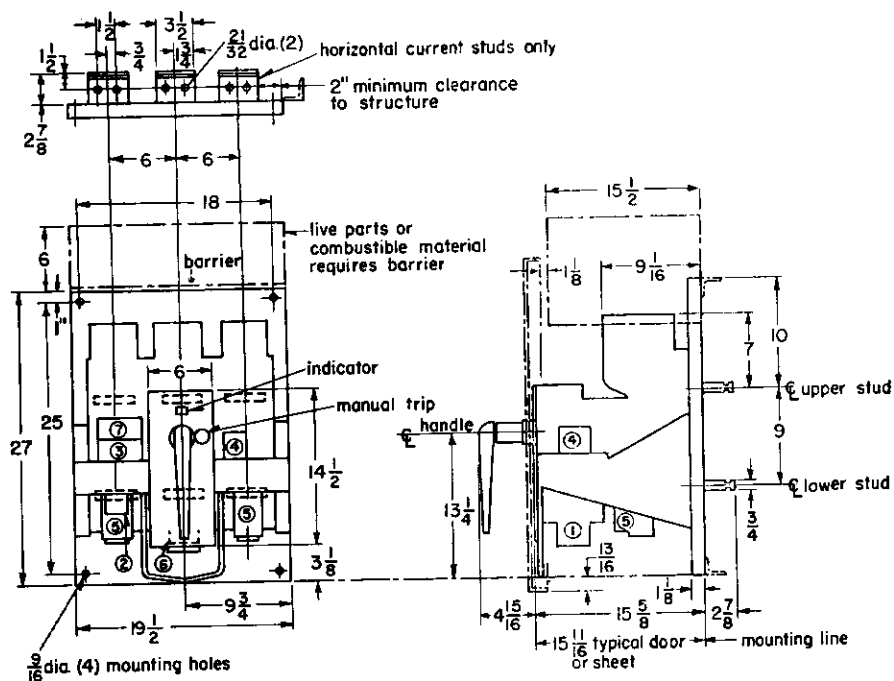
type DB-15



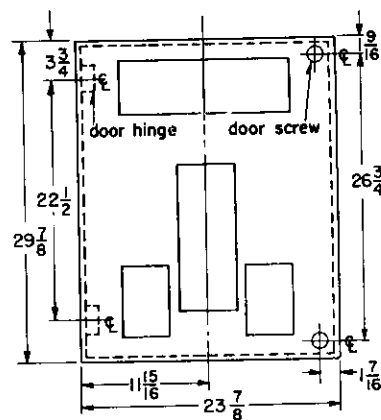
type DB-25



type DB-50



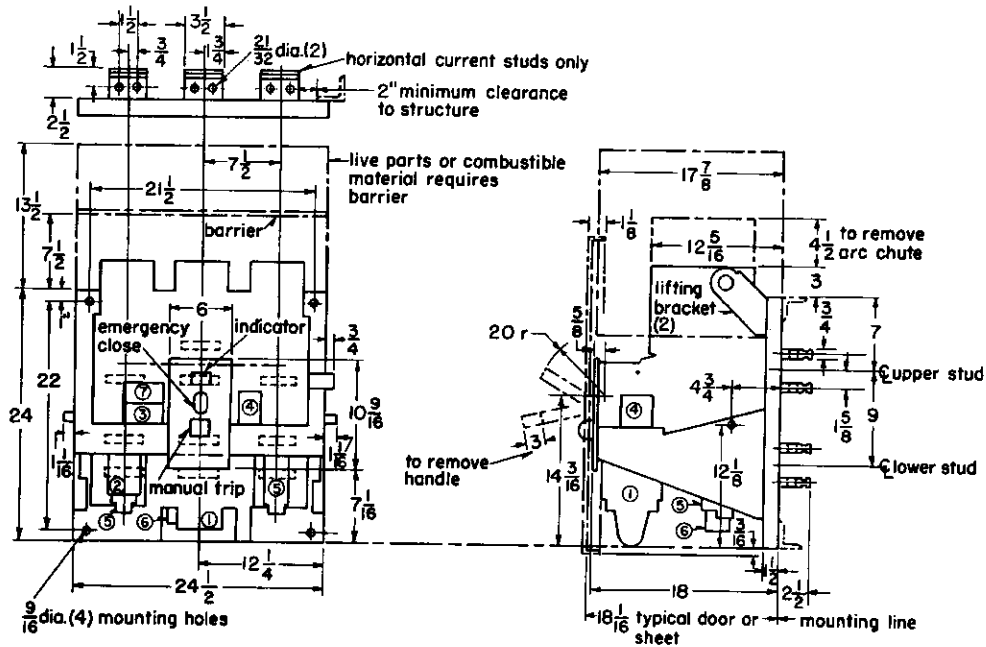
flat sheet no. 11 gauge



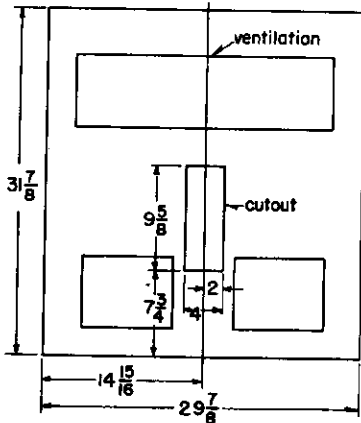
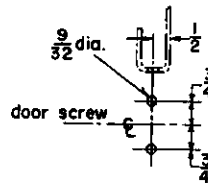
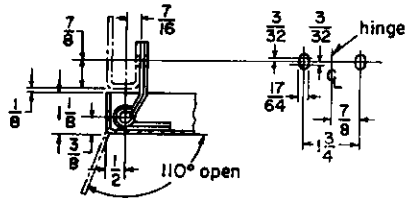
formed door no. 13 gauge

DB De-ion circuit breakers electrically operated • 2 or 3 pole

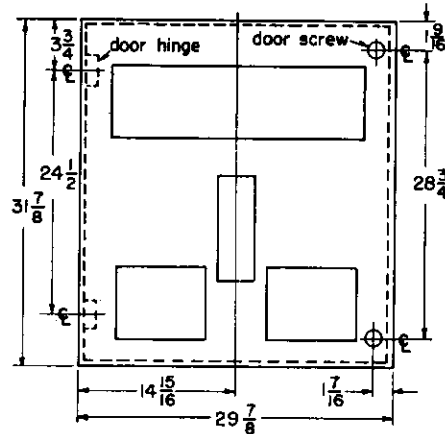
type DB-75



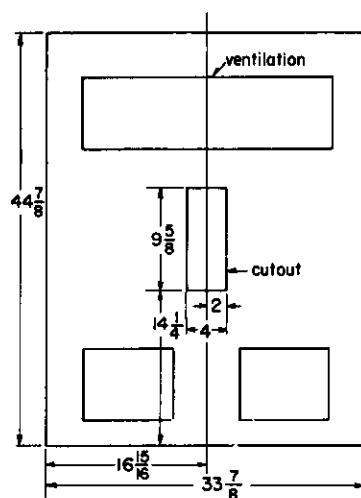
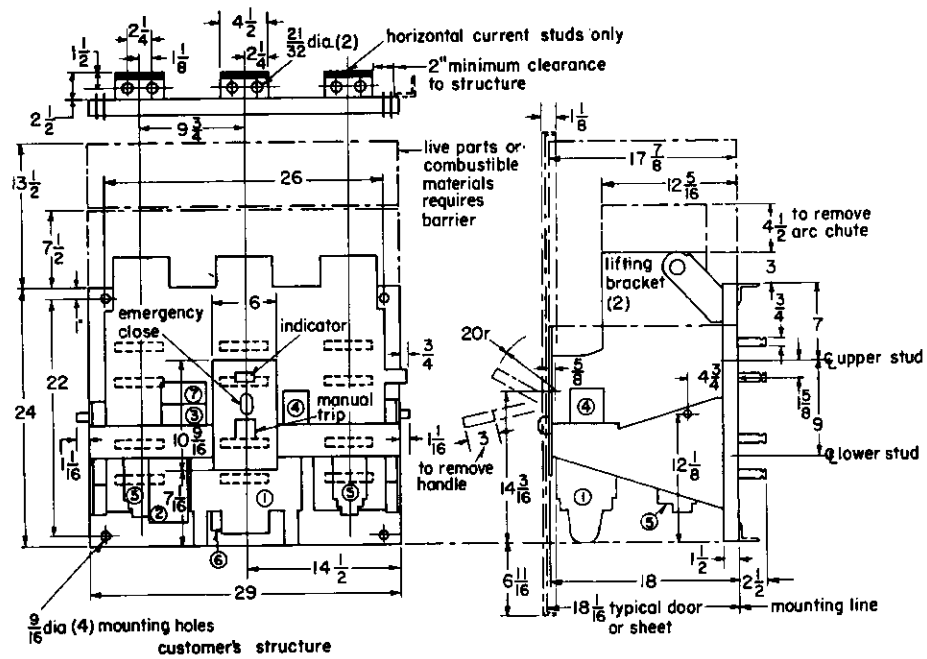
customer's structure



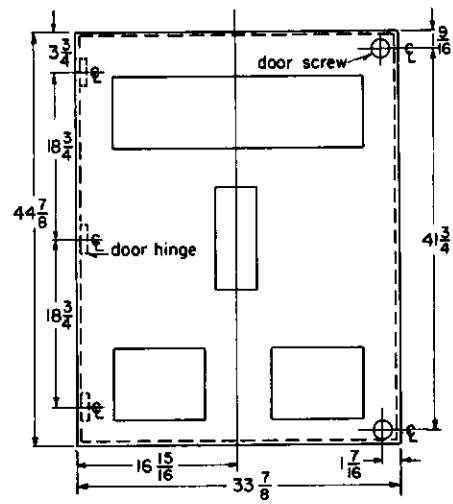
flat sheet no. 11 gauge



formed door no. 13 gauge

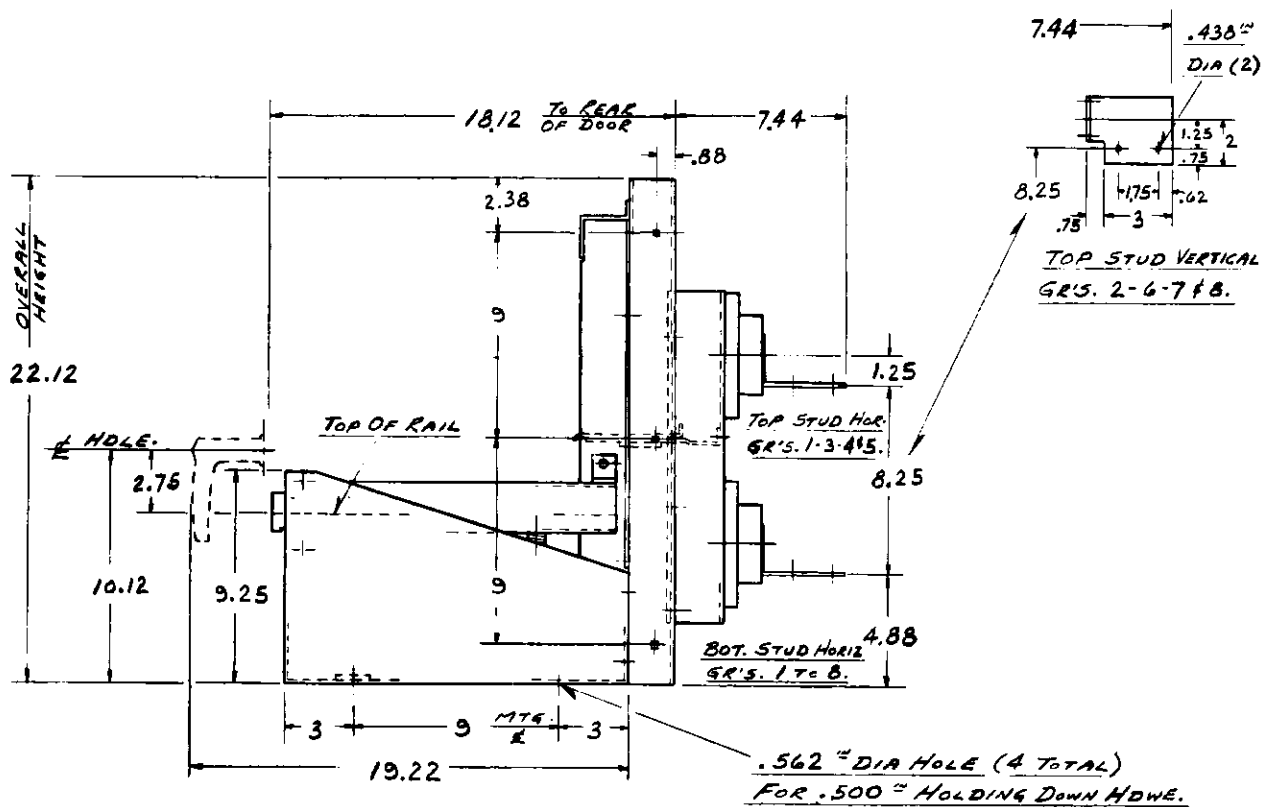
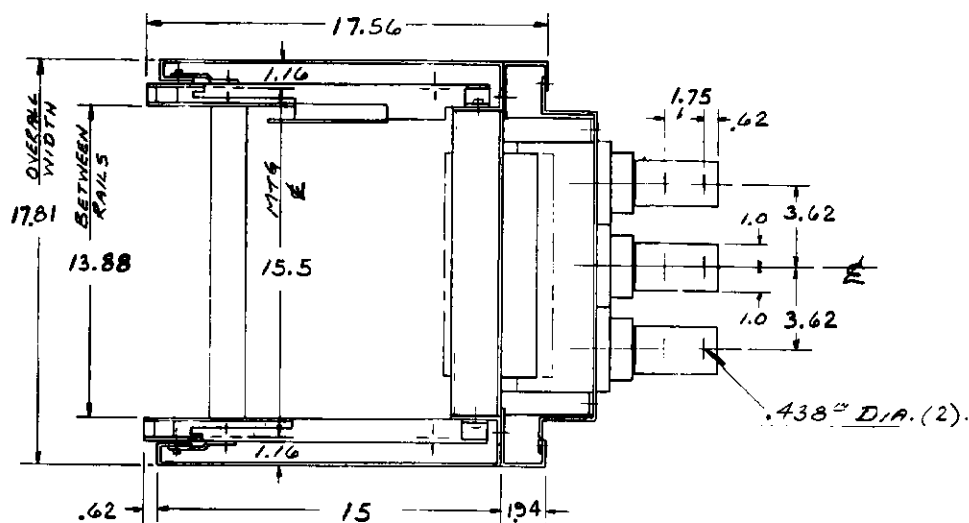
type DB-100

flat sheet no. 11 gauge

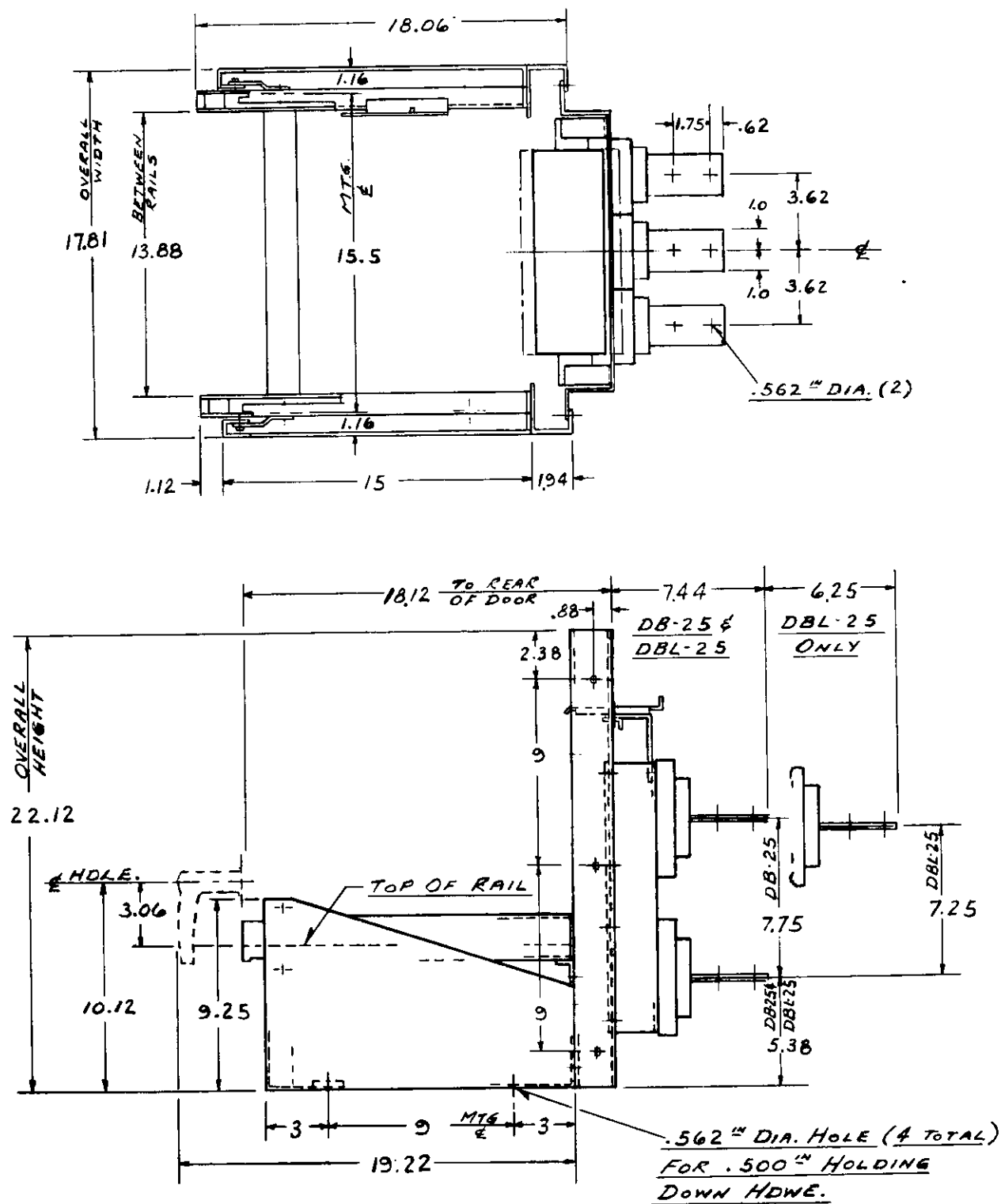


formed door no. 13 gauge

type DB-15



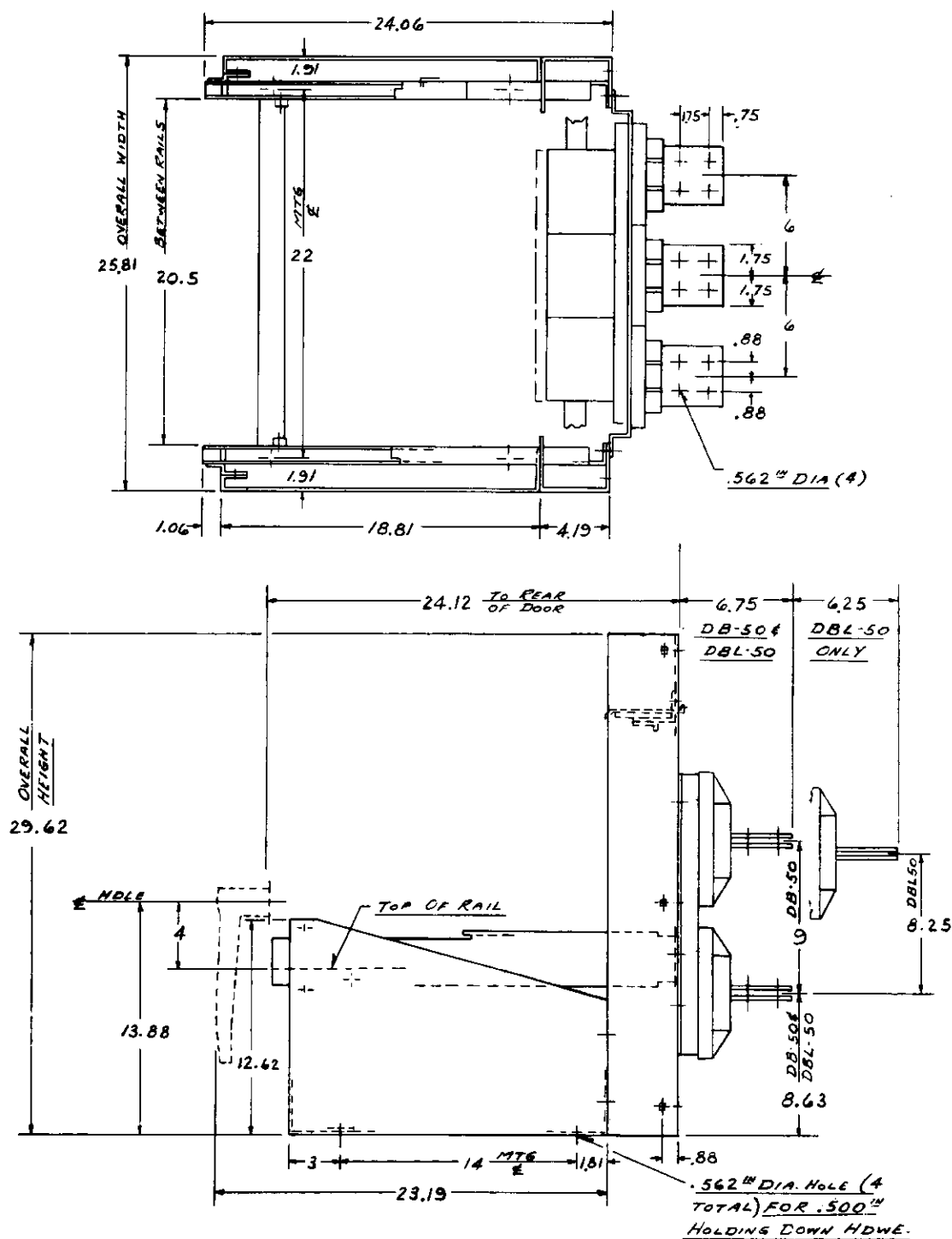
type DB-25



DB De-ion® circuit breakers
drawout breaker substructure

drawout breaker substructure

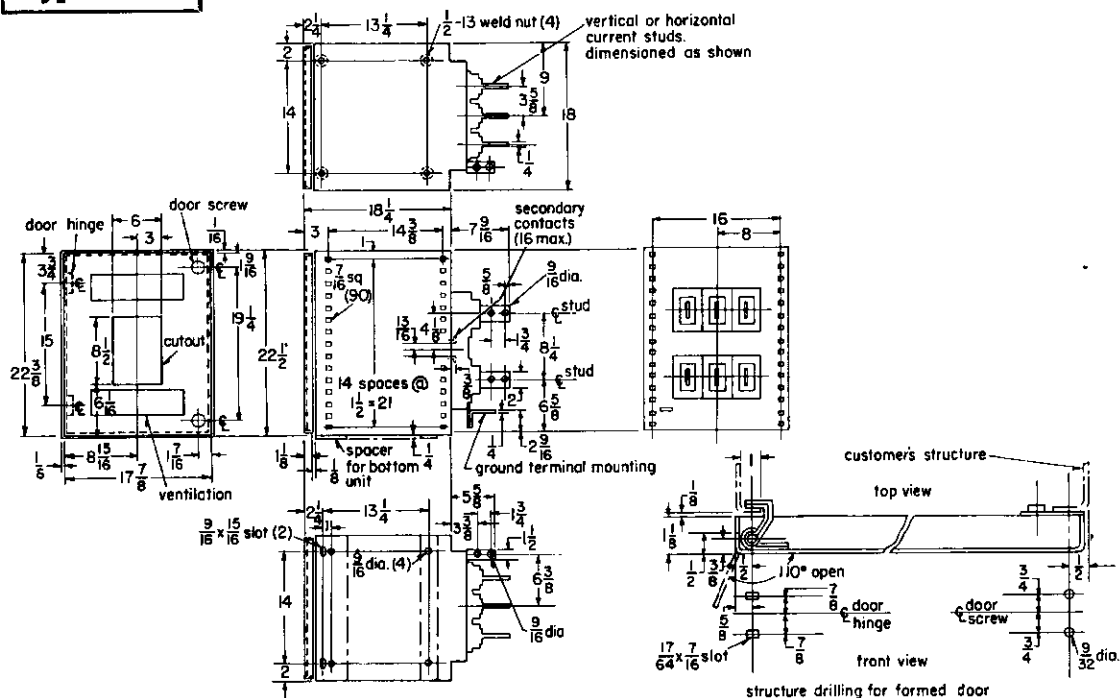
type DB-50



DB De-ion circuit breakers

standard individual, or stack-up unit for 3 position, drawout breakers

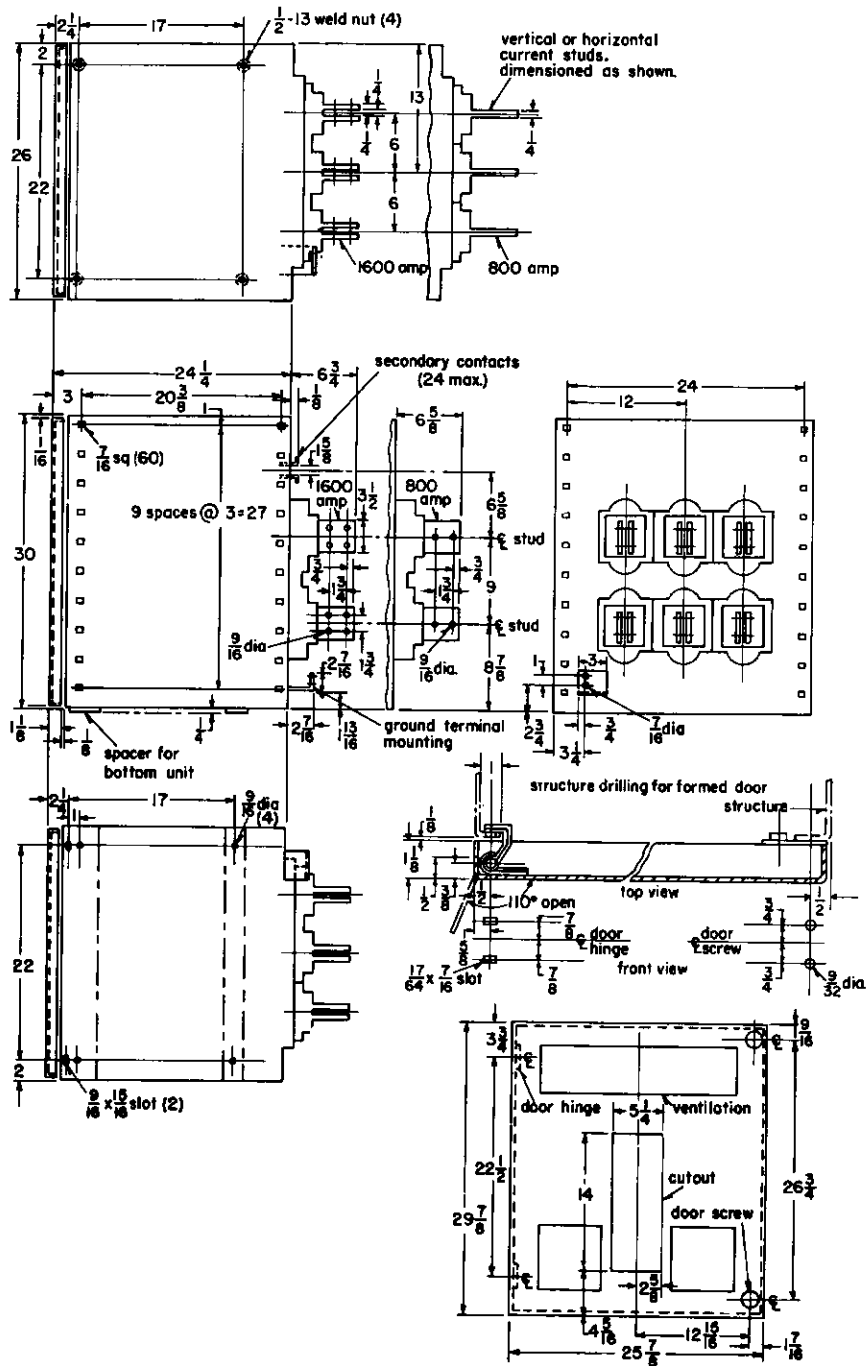
type DB-15



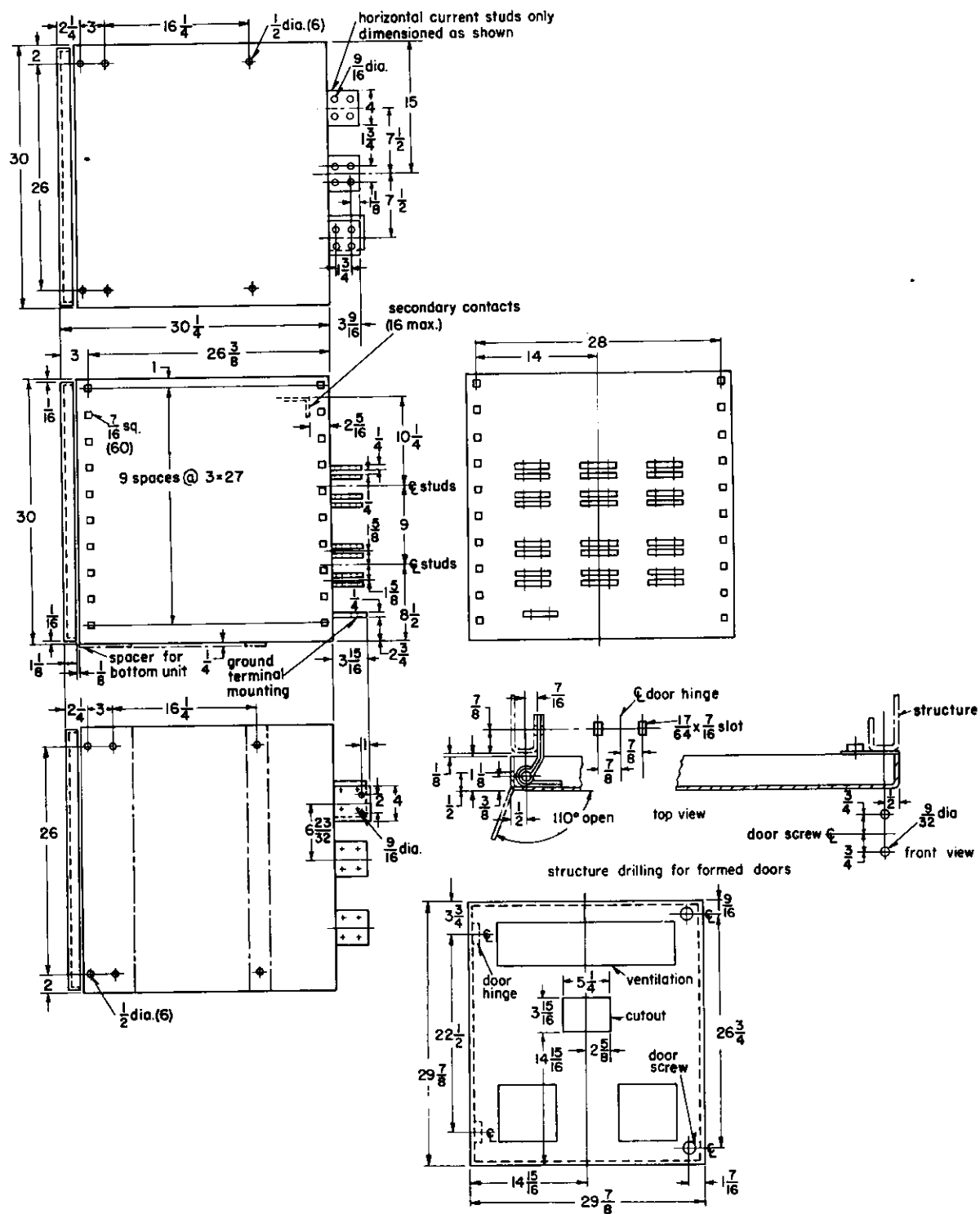
DB De-ion® circuit breakers

standard individual, or stack-up unit for 3 position, drawout breakers

type DB-50



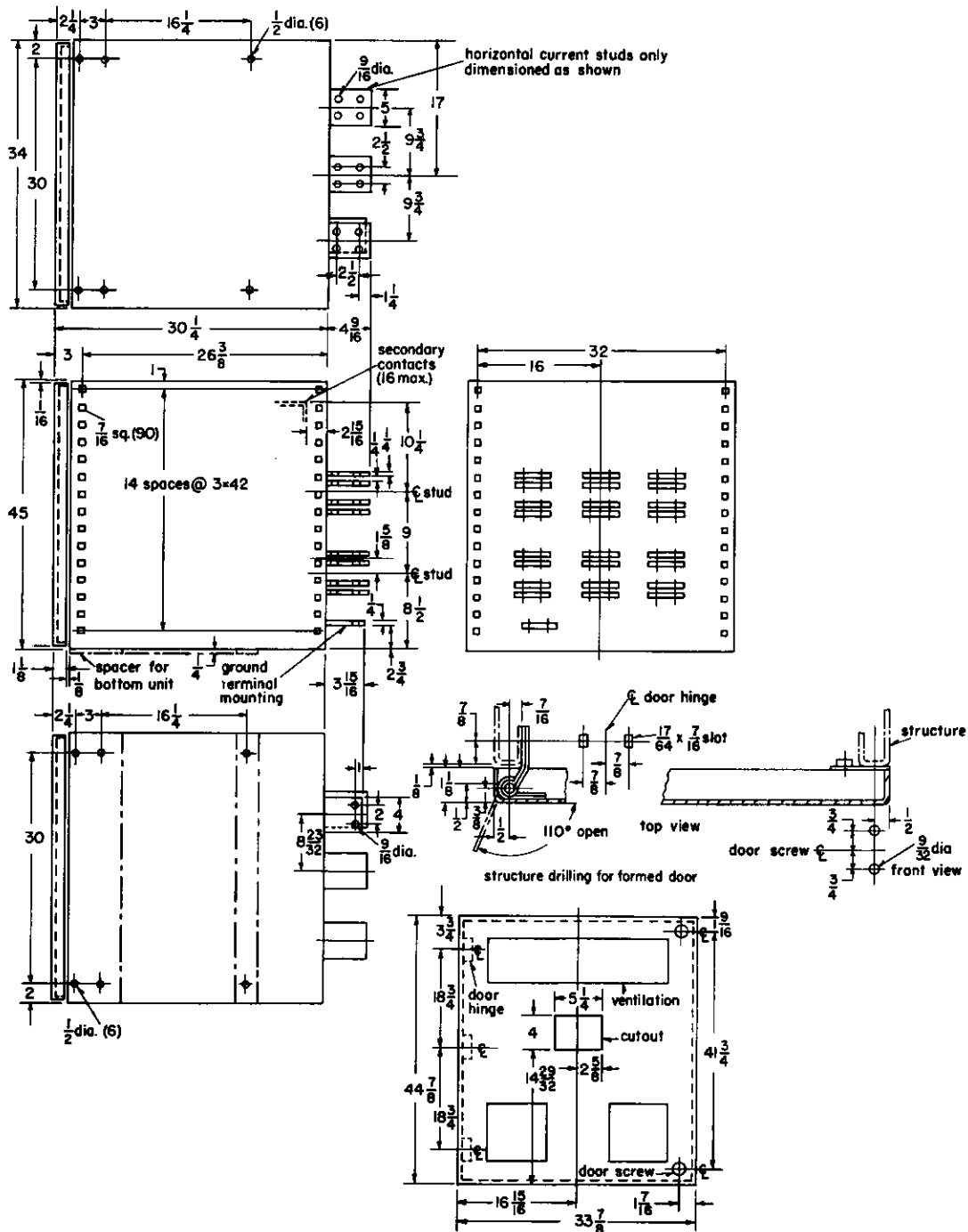
type DB-75



DB De-ion[®] circuit breakers

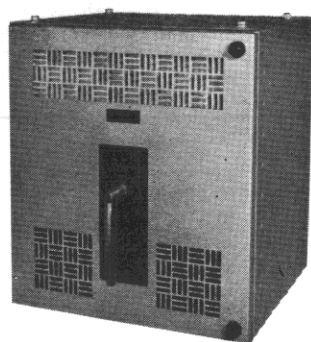
standard individual, or stack-up unit for 3 position, drawout breakers

type DB-100

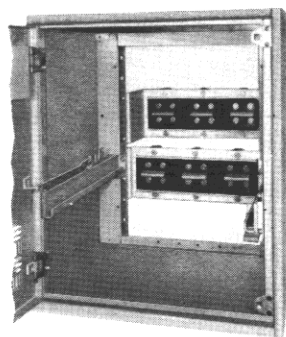


DB De-ion[®] circuit breakers single unit, one-high drawout

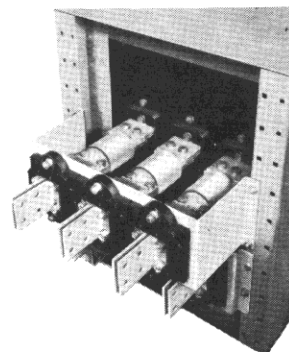
DBL-25 and DBL-50 breakers



DBL breaker in compartment.



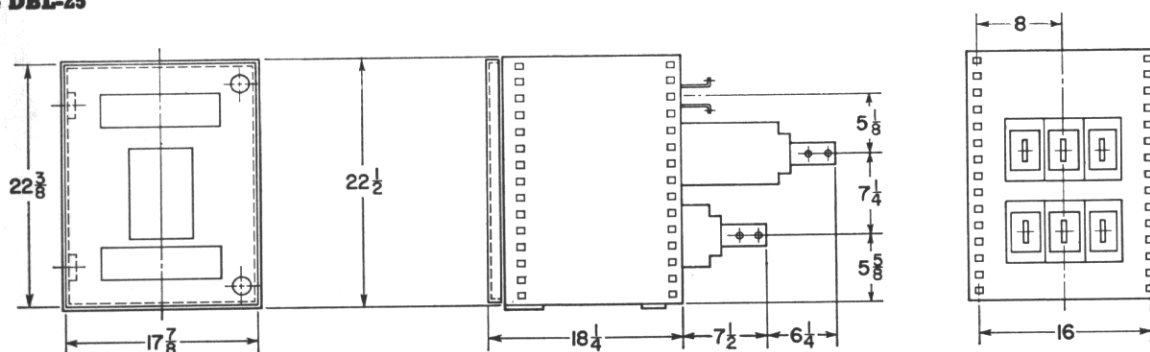
Low-voltage housing view
with DBL breaker removed.



Rear view of DBL-50 breaker
shows current limiter mounted
on breaker.

dimensions in inches approximate • not for construction purposes ▲

type DBL-25



type DBL-50

