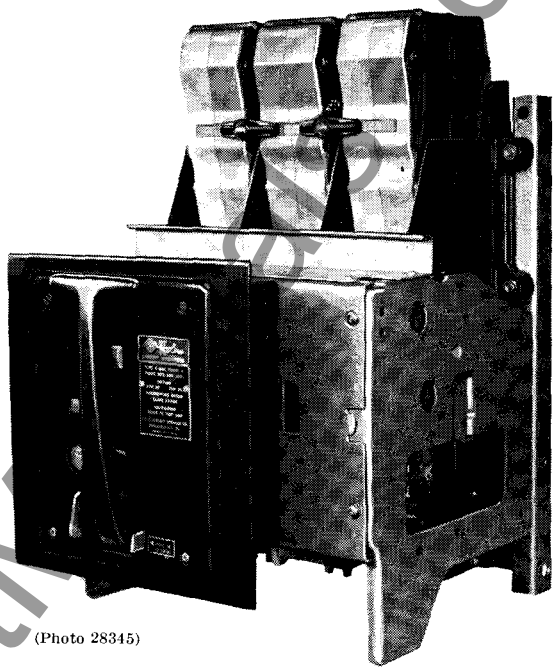
K LINE

600 Volts AC or 250 Volts DC

K-225
15-225 Amperes
Class 15000 I.C.

K-600
30-600 Amperes
Class 25000 I.C.

K-1600
150-1600 Amperes
Class 50000 I.C.



(Photo 28345)

Type K-600 manually charged, stored energy "quick-make" circuit breaker.

General

K Line Circuit Breakers have been developed for the protection of feeder circuits and for use as main circuit breakers where the interrupting requirements are within the ratings shown in Table I. This modern line of low voltage power circuit breakers offer a selection of either manual or motor charged spring closing mechanisms, which provide positive "quick make" operation. K Line Circuit Breakers also offer "expanded range" overcurrent trip devices, reduced dimensions, and many other features which are particularly adaptable to general switchgear applications.

The following table shows the various interrupting ratings and the associated minimum trip coil ratings assigned to K Line Circuit Breakers in standard applications at standard service voltages.

TABLE I

K Line Circuit Breaker Ratings As a Function of Application and Voltage	K-225 Class 15000 I.C.			K-600 Class 25000 I.C.			K-1600 Class 50000 I.C.		
Maximum Voltage (At Which Following Ratings are Applicable)	600 V A-C	480 V A-C	240 V A-C	600 V A-C	480 V A-C	240 V A-C	600 V A-C	480 V A-C	240 V A-C
A. Fully Rated Breakers									
1. Maximum Available Fault Current									
Average 3∅ Rms Asymmetrical.....	15000	25000	30000	25000	35000	50000	50000	60000	75000
(Average 3∅ Rms Symmetrical).....	(14000)	(22000)	(25000)	(22000)	(30000)	(42000)	(42000)	(50000)	(65000)
2. Minimum Applicable Trip Coil Rating	15	15	30	30	90	150	150	250	500
B. Breakers in 2nd Step Cascade									
1. Maximum Available Fault Current									
Average 3∅ Rms Asymmetrical.....	30000	50000	60000	50000	70000	100000	100000	100000	120000
(Average 3∅ Rms Symmetrical).....	(25000)	(42000)	(50000)	(42000)	(60000)	(85000)	(85000)	(85000)	(100000)
2. Minimum Applicable Trip Coil Rating	15	15	30	30	90	150	150	250	500
C. Selective Breakers									
1. Maximum Available Fault Current									
Average 3∅ Rms Asymmetrical.....	15000	15000	15000	25000	25000	25000	50000	50000	50000
(Average 3∅ Rms Symmetrical).....	(14000)	(14000)	(14000)	(22000)	(22000)	(22000)	(42000)	(42000)	(42000)
2. Minimum Applicable Trip Coil Ratings									
a. Maximum Short Time Delay Band.	100	100	100	175	175	175	350	350	350
b. Intermediate Short Time Delay Band	125	125	125	200	200	200	400	400	400
c. Minimum Short Time Delay Band..	150	150	150	250	250	250	500	500	500

Note: The ratings listed in Section A under 600 V. A-C are applicable for D-C voltages up to 250 volts.

K Line General Description 1604

Type K-600 motor charged, stored energy "quick-make" circuit breaker. All controls and indicators are on the escutcheon such as close and

General Construction

K Line Circuit Breakers utilize only carefully selected materials and are manufactured and tested within rigid tolerances to insure long life and trouble free performance. Each breaker consists of a support frame and four basic elements.

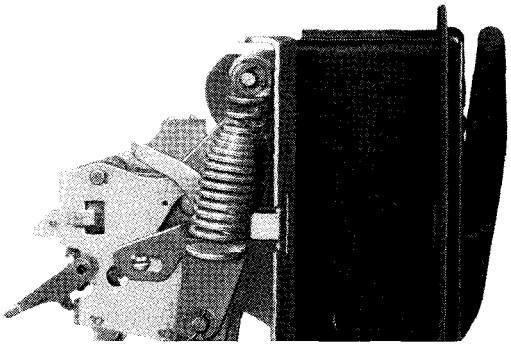
1. Operating Mechanism
2. Contact Structure
3. Arc Quencher
4. Overcurrent Trip Device

A choice of either two pole or three pole construction is available in this new line of circuit breakers. Two pole construction is attained by omission of the center pole.

The space requirements of the new K Line Circuit Breakers have been greatly reduced. Current ratings up to 600 amperes are now suitable for "four-high" mounting in standard 90 inch high switchboards. Various mounting arrangements available are illustrated in the outline dimensional drawings shown at the conclusion of this section.

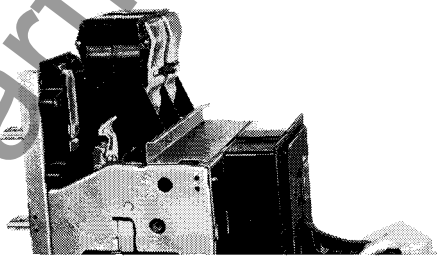
Operating Mechanism—Manual

The manually charged stored energy (quick-make) closing mechanism offers several advantages to the users of manual circuit breakers. Of primary importance is the added safety for operating personnel. This "quick-make" mechanism also provides longer contact and breaker life and increases the scope of application for manual circuit breakers.



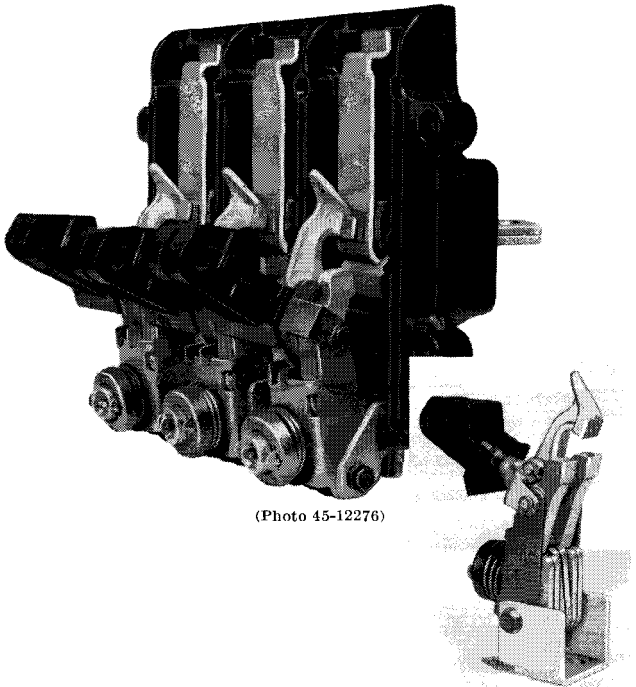
which are equipped with instantaneous trip elements may be safely applied up to their full interrupting rating.

A manual "trip" button is located on the breaker escutcheon where it is easily accessible. The button is flush mounted to minimize the possibility of accidental tripping. Provision is made to lock breaker in open position with as many as 3 padlocks. The mechanism is also equipped with an Automatic Trip Indicator (Hand Reset) which provides a visual indication of automatic trip operations.

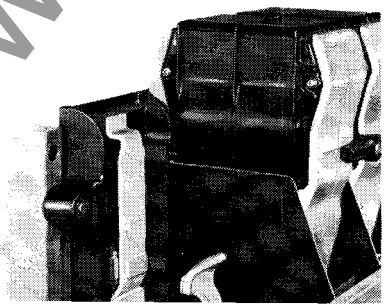


Contact Structure

The contact structure is mounted on a one piece impact resistant upper base molding which serves as an insulated barrier between the current carrying parts and the grounded frame. A completely new contact structure has been developed for each of the new K Line Circuit Breakers. The forged contact carrying arms are much stronger than those employed on conventional breakers of this type. The contacts are made of a new high temperature alloy which combines high conductivity with improved durability and arc resistant properties. A unique pressure hinge arrangement has eliminated the need for flexible conductors. This feature provides a completely "braidless" contact structure which is not limited by the life of a conventional flexible conductor.



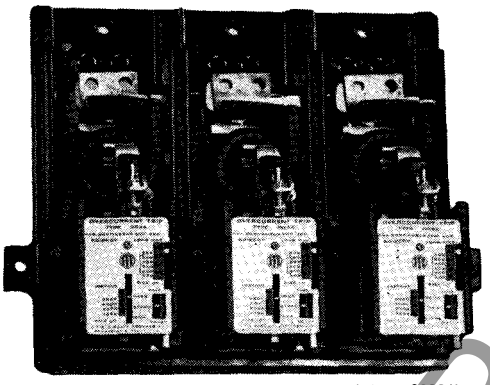
(Photo 45-12276)



Overcurrent Trip Devices

The K Line Overcurrent Trip Device offers extremely flexible protection. It is available with a complete selection of time-current characteristics, including long time delay, short time delay, and instantaneous tripping. These adjustable characteristics are available in any required combination and with a wide range of calibration.

The OD-3 General Purpose Device provides the standard combination of long time delay and instantaneous trip characteristics with the additional advantages of improved adjustment and "expanded range" calibration. The OD-4 Selective Trip Device provides long time delay and short time delay trip characteristics. Applications which require instantaneous tripping only or other special tripping characteristics should be referred to the factory for additional information.



(Photo 28224)

Type K-600 Lower Base Molding Assembly. Three OD-3 General Purpose Overcurrent Trip Devices are mounted on one impact resistant molding. Three single pole moldings are employed on the Type K-1600. Pick-up and time delay adjustment screws may be seen at the bottom of each device.

OD-3 General Purpose Overcurrent Trip Device

The OD-3 is a fully adjustable dual magnetic trip device. It employs a single armature connected to an oil displacement dashpot by a collapsible instantaneous calibration linkage to provide both long time delay and instantaneous trip characteristics. This device offers independent adjustment of the long time delay pick up, the instantaneous pick up, and the amount of time delay.

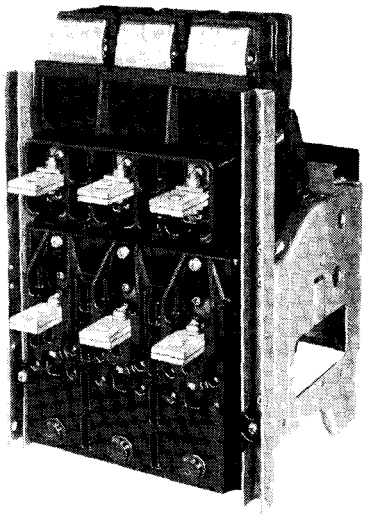
Expanded range calibration has been incorporated to provide a greater number of usable calibrated long time trip settings. Conventional trip devices provide only two calibrated pick up settings (80% and 100%) which may be used continuously without excessive overheating. Table II shows the increased number of OD-3 calibrated long time trip settings within the continuous current rating of each trip coil. This feature permits a user to select an OD-3 with a trip coil rating which provides adequate protection for present power requirements and also permits an increase in capacity by means of a simple adjustment.

A wide range of adjustment makes the OD-3 ideal for protection of motors and equipment which require close protection.

TABLE II

OD-3 General Purpose Dual Magnetic Overcurrent Trip Calibration

Breaker Frame Size	Maximum Continuous Coil Rating	Conventional Maximum Continuous Coil Rating	Adjustable Long Time Delay Pick Up Points	Adjustable Instantaneous Pick Up Points
K-225	20	15 20	12 15 18 20 25	75 125 200 300
K-225 and K-600	40	30 40	20 25 30 40 50	150 250 400 600
K-225 and K-600	70	50 70	40 50 60 70 90	250 500 750 1100
K-225 and K-600	125	90 100 125	70 90 100 125 160	450 800 1200 1900
K-225 K-600 and K-1600	225	150 175 200 225	120 150 175 200 225 285	750 1500 2400 3400
K-600 and K-1600	400	250 300 350 400	200 250 300 350 400 500	1250 2000 4000 6000
K-600	600	500 600	400 500 600 750	2500 4000 6000 9000
K-1600	800	500 600 800	400 500 600 800 1000	2500 5000 7500 10000
K-1600	1600	1000 1200 1600	800 1000 1200 1600 2000	5000 10000 15000 20000



(Photo 28233)

Type K-600. Rear view shows the rear terminals projecting from the upper and lower base moldings. The vertical mounting channels provide rigid support for the base moldings.

K-LINE CIRCUIT BREAKER ACCESSORIES

Protective and Tripping Devices

Instantaneous Undervoltage Trip
Time Delay Undervoltage Trip
Transformer Trip (5 ampere coils on overcurrent device requiring bus mounted C.T.s)
Reverse Current Relay (bus mounted)
Shunt Trip

Auxiliary Contacts, Switches and Indicators

Overcurrent Alarm Contacts (Hand Reset)
Auxiliary Switch (4, 8, or 12 Contacts)
Control Switch and Indicating Lights (Remote Mounting)

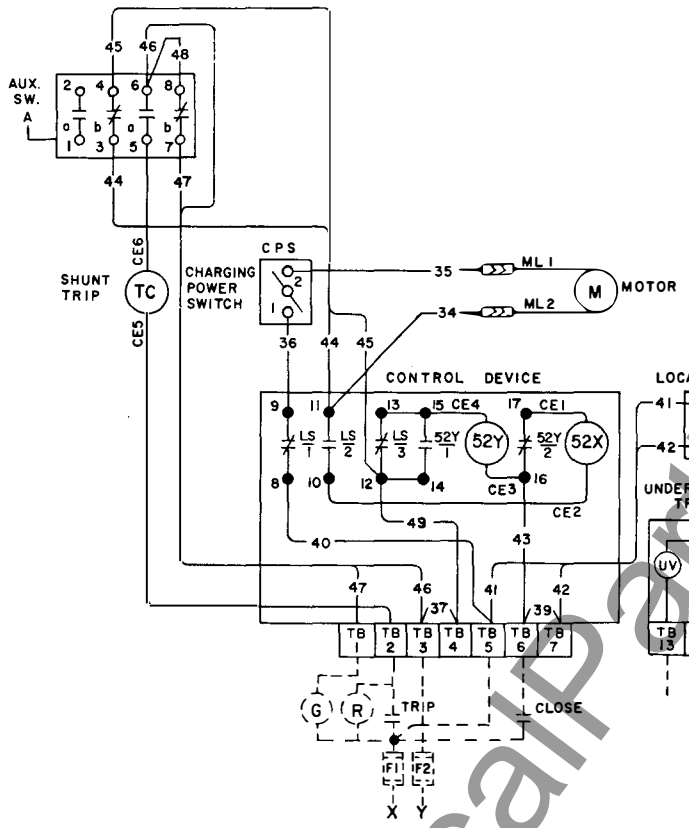
Lock-Outs and Interlocks

Electrical Lockout
Mechanical Interlock
Key Interlock
Key Lock
Provision for 3 Padlocks
Overcurrent Lockout (Hand Reset before closing)

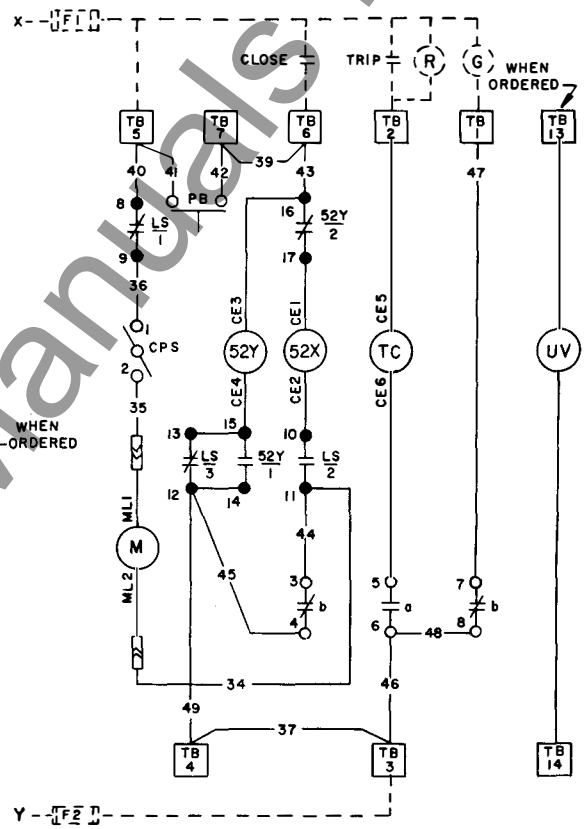
ELECTRICAL DIAGRAM

For K Line Circuit Breakers
Electrically Operated With Shunt Trip and 4 Contact Auxiliary Switch

FRONT OF BOARD CONNECTION DIAGRAM



SCHEMATIC DIAGRAM



Drawing No. 703399

NOTES:

1. Dotted lines indicate customers equipment and wiring.
2. Breaker wired with No. 16.7 stranded wire.
3. To defeat local close omit wire No. 39 on control device.
4. For sequence of operation see other side of page.

LIST OF ABBREVIATIONS:

a Contact closed when breaker is closed.
b Contact open when breaker is closed.
CE Coil Ends.
ML Motor Leads--with plug connections.
TB Terminal Block points.

CLOSING AND TRIPPING CURRENTS, VOLTAGES AND RANGES

Nominal Control Voltage	Maximum Closing Motor Current Amperes	Shunt Trip Current Amperes	Closing Relay Current Amperes		Under-Voltage Trip Current Amperes	Closing Circuit Voltage Range	Shunt Trip Circuit Voltage Range	Under-Voltage Trip Voltage Range	Recommended Control Fuse Rating (F 1 and F 2)
			Anti-Pump	Release					
115 V. A-C 60 Cycle	10.	7.	.15	3.	.3	95–125	95–125	35–70	10 Amp.
230 V. A-C 60 Cycle	5.	3.5	.075	1.5	.15	190–250	190–250	70–140	10 Amp.
125 V. D-C	10.	4.	.06	1.	.08	90–130	70–140	37–74	10 Amp.
250 V. D-C	5.	2.	.03	.5	.04	180–260	140–280	74–148	10 Amp.

SEQUENCE OF OPERATION

Legend

LS/1, LS/3	Limit switch contacts closed when springs are discharged, open when springs are charged.
LS/2	Limit switch contacts open when springs are discharged, closed when springs are charged.
52X	Latch release coil.
52Y	Control coil.
52Y/1	Lockout relay contact, normally open.
52Y/2	Lockout relay contact, normally closed.
CPS	Charging power switch.

Charging

The closing springs must be fully charged before an electrical closing operation can be performed. The springs are automatically charged when the following conditions exist:

1. CPS closed and control power available.
2. Charging springs discharged.
3. Main breaker contacts open.

LS/1 and a "b" contact energize the motor which charges the springs until they reach the fully charged position when LS/1 de-energizes the motor and the closing latch arrests the closing springs.

Closing

The breaker is electrically closed by the operation of 52X which releases the closing latch and allows the fully charged springs to close the breaker. 52X is energized by remote or local close switch, 52Y/2, LS/2 and a "b" contact.

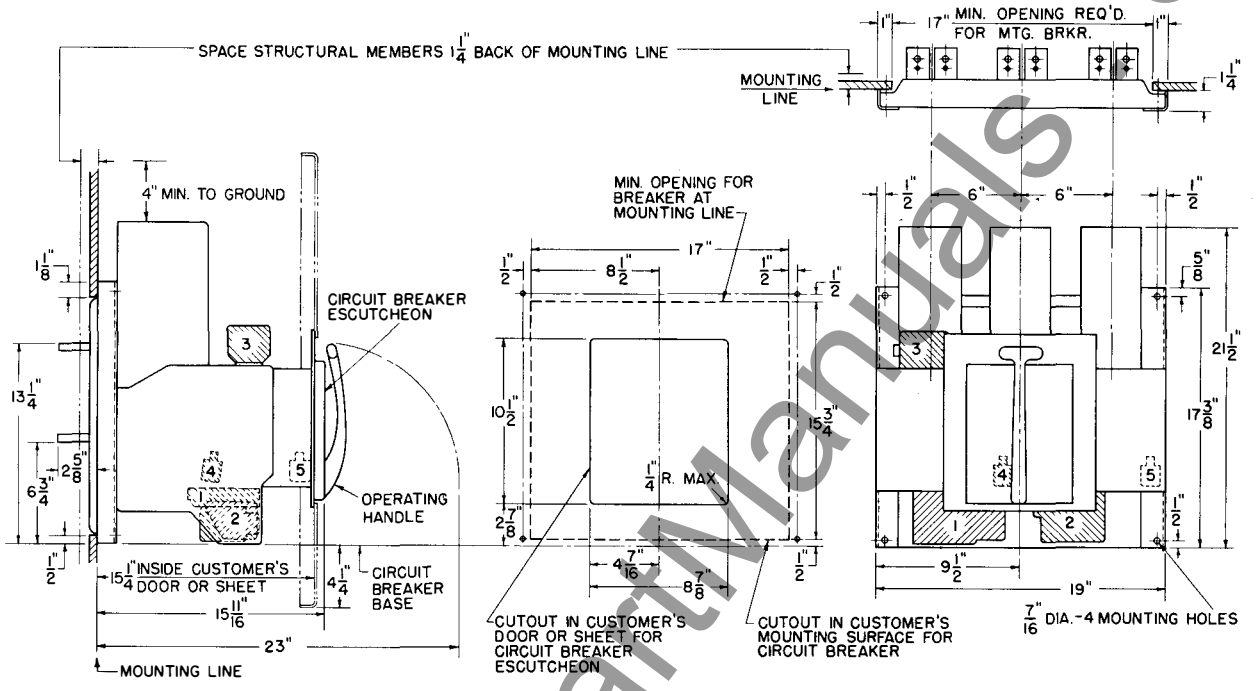
52Y limits 52X to a single operation each time remote or local close switches are operated on both momentary and maintained control schemes.

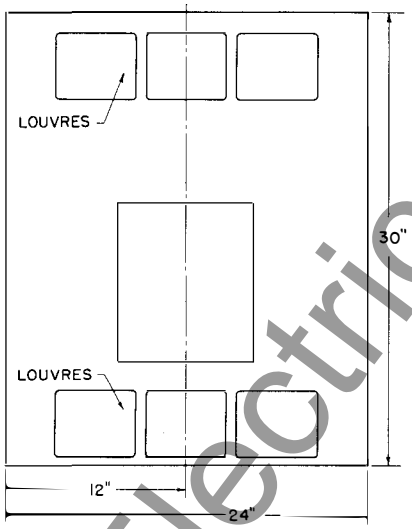
Tripping

The breaker may be electrically tripped by either the TC or UV. Shunt tripping occurs when the TC is energized by the remote trip switch and an "a" contact. Undervoltage tripping occurs when the voltage applied to the UV is reduced to 60% or less of normal voltage.

DIMENSIONS

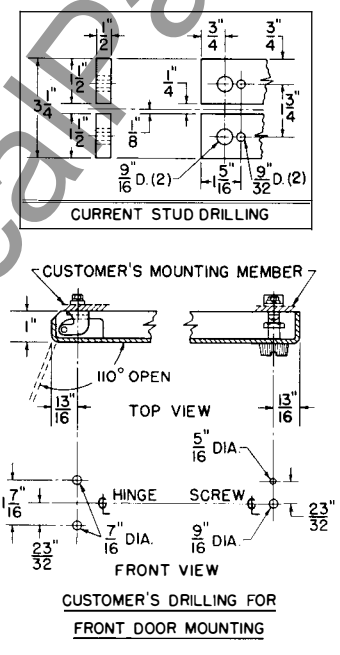
Type K-1600 Circuit Breakers
Switchboard Type



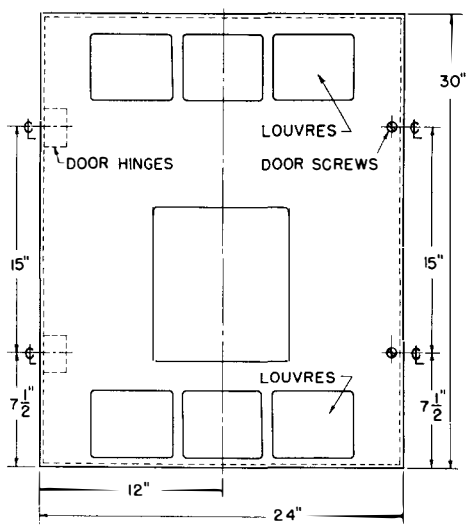


FLAT SHEET

U.S. STD. NO.12 GAUGE (.1046) STEEL.
FINISH - BONDERIZED, PLUS ONE PRIMARY COAT OF GRAY PAINT.
MOUNTING HOLES DRILLED BY CUSTOMER.



CUSTOMER'S DRILLING FOR FRONT DOOR MOUNTING



FORMED DOOR

U.S. STD. NO. 14 GAUGE (.0747) STEEL.
FINISH - BONDERIZED, PLUS ONE PRIMARY COAT OF GRAY PAINT.

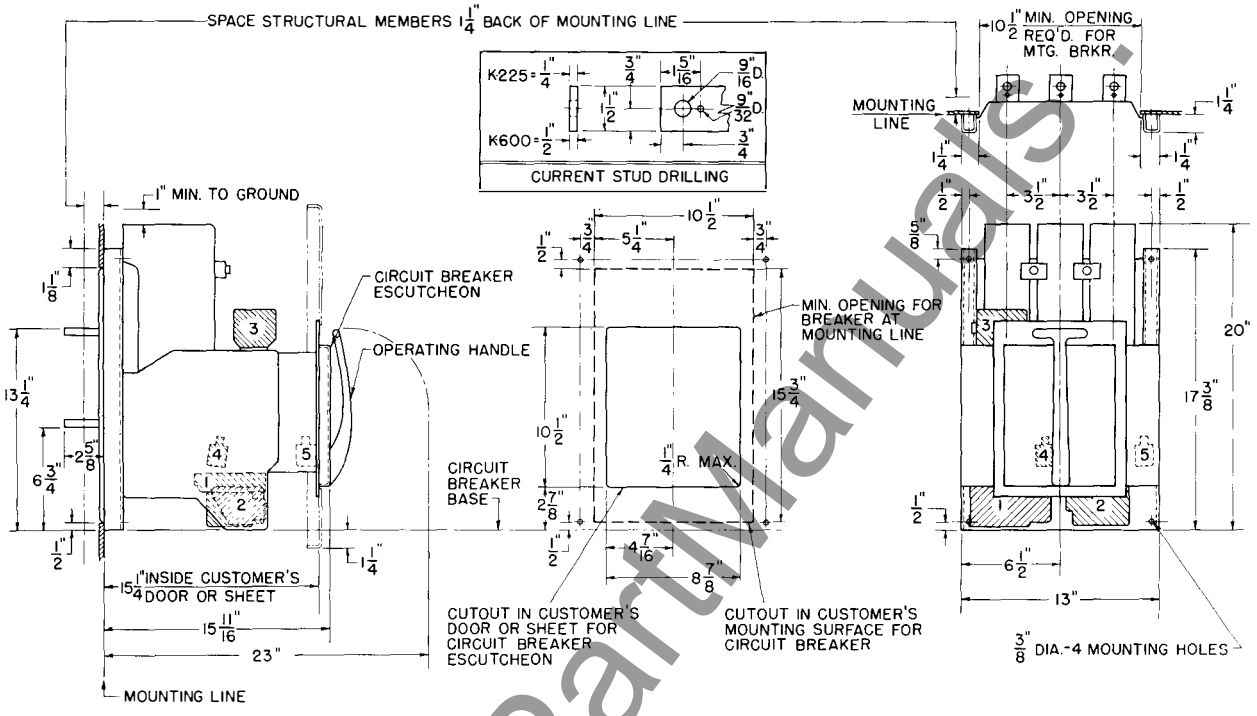
GENERAL INFORMATION

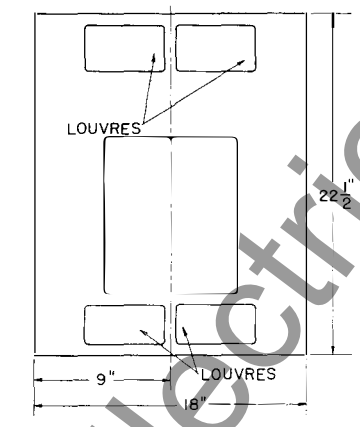
STANDARD ELECTRICALLY OPERATED CIRCUIT BREAKER WITH AUXILIARY DEVICES SHOWN CROSS HATCHED.
PART NO. ① CONTROL DEVICE
② MOTOR
③ AUXILIARY SWITCH
④ SHUNT TRIP
⑤ UNDERVOLTAGE (WHEN ORDERED)
STANDARD MANUALLY OPERATED CIRCUIT BREAKER AS SHOWN EXCEPT AUXILIARY DEVICES OMITTED.
ARRANGEMENT OF CIRCUIT BREAKER POLES: THREE POLE AS SHOWN, TWO POLE - CENTER POLE OMITTED.

Drawing No. S-14650

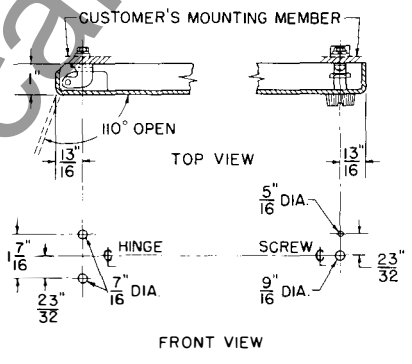
DIMENSIONS

Types K-225 or K-600 Circuit Breakers
Switchboard Types

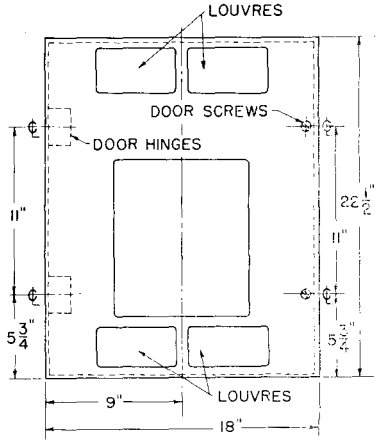




FLAT SHEET
U.S. STD. NO 12 GAUGE (.1046) STEEL
MOUNTING HOLES DRILLED BY CUSTOMER.
FINISH-BONDERIZED, PLUS ONE PRIMARY COAT OF GRAY PAINT.



CUSTOMER'S DRILLING FOR FRONT DOOR MOUNTING



FORMED DOOR
U.S. STD. NO. 14 GAUGE (.0747) STEEL.
FINISH-BONDERIZED, PLUS ONE PRIMARY COAT OF GRAY PAINT.

GENERAL INFORMATION

STANDARD ELECTRICALLY OPERATED CIRCUIT BREAKER WITH AUXILIARY DEVICES SHOWN CROSS HATCHED.

PART NO. ① CONTROL DEVICE
② MOTOR
③ AUXILIARY SWITCH
④ SHUNT TRIP
⑤ UNDERVOLTAGE (WHEN ORDERED)

(Drawing No. S-14649)

STANDARD MANUALLY OPERATED CIRCUIT BREAKER AS SHOWN EXCEPT AUXILIARY DEVICES OMITTED.

ARRANGEMENT OF CIRCUIT BREAKER POLES: THREE POLE AS SHOWN, TWO POLE-CENTER POLE OMITTED.

NEW