Spare Parts days

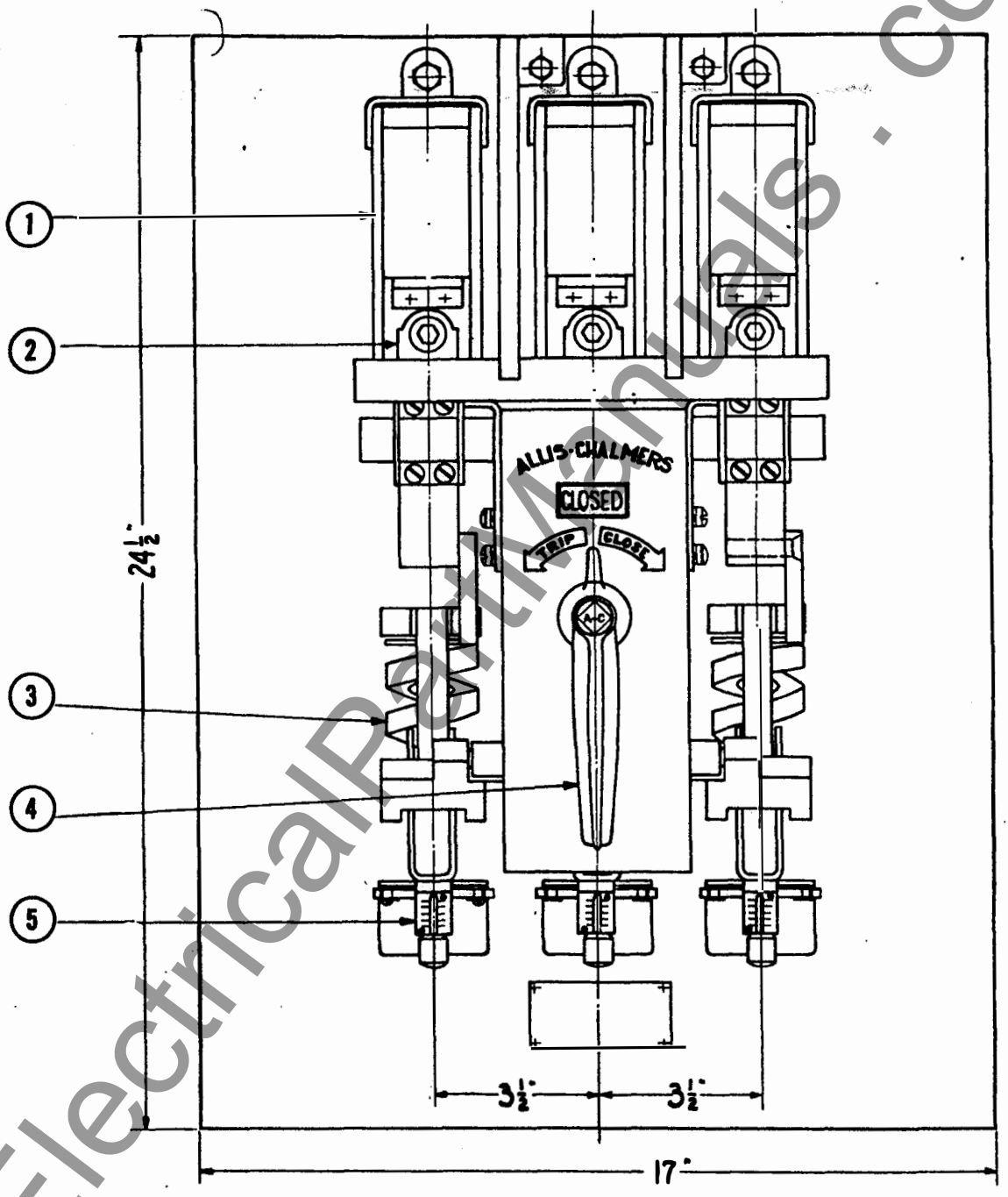
H. OBERLANDER

Air Circuit Breakers

Type G-25

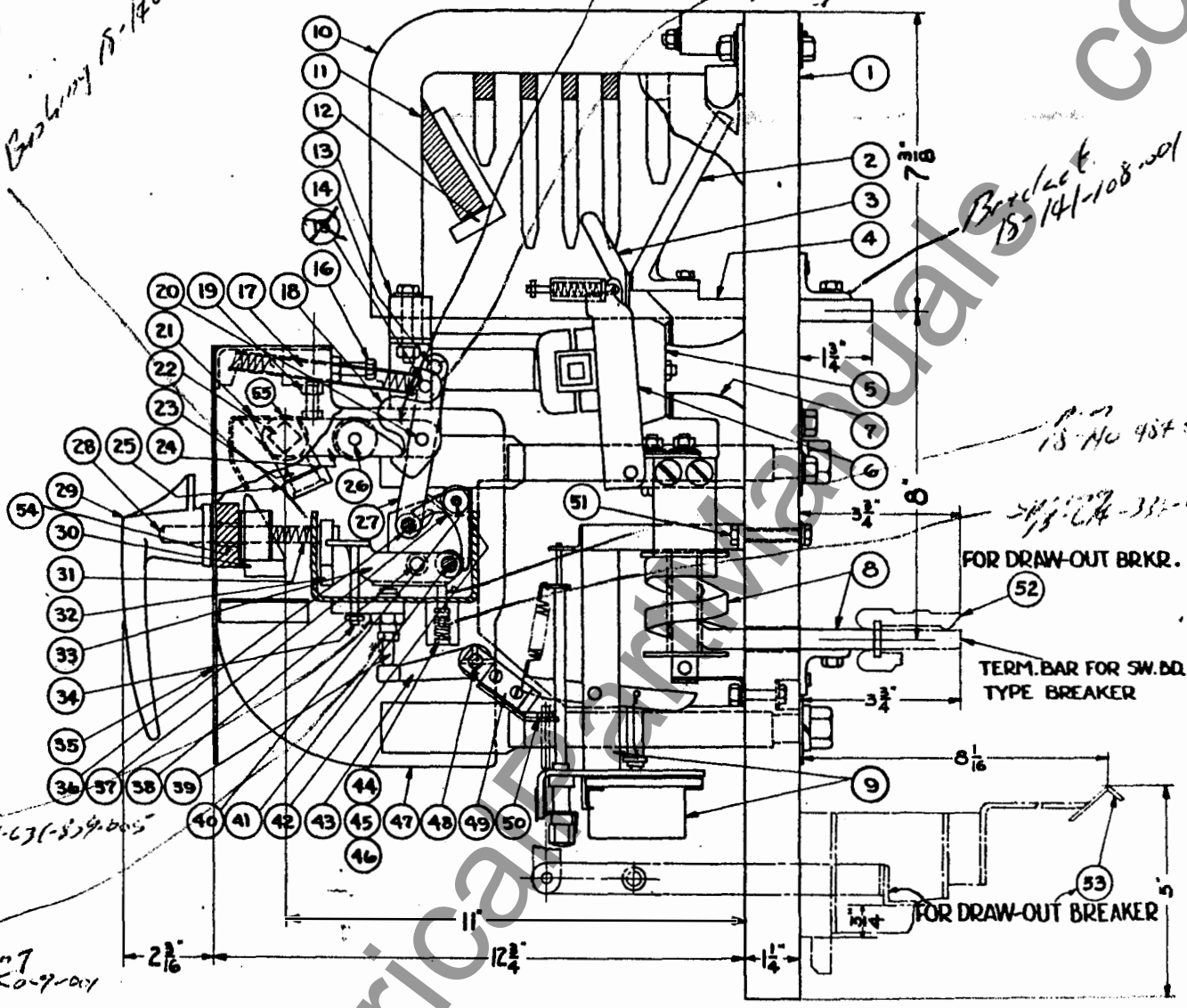
INSTRUCTION BOOK and PARTS LIST

ALLIS-CHALMERS



1 Arc Chute
2 Contact Arm
3 Series Trip Coil
4 Operating Handle
5 Calibrating Label

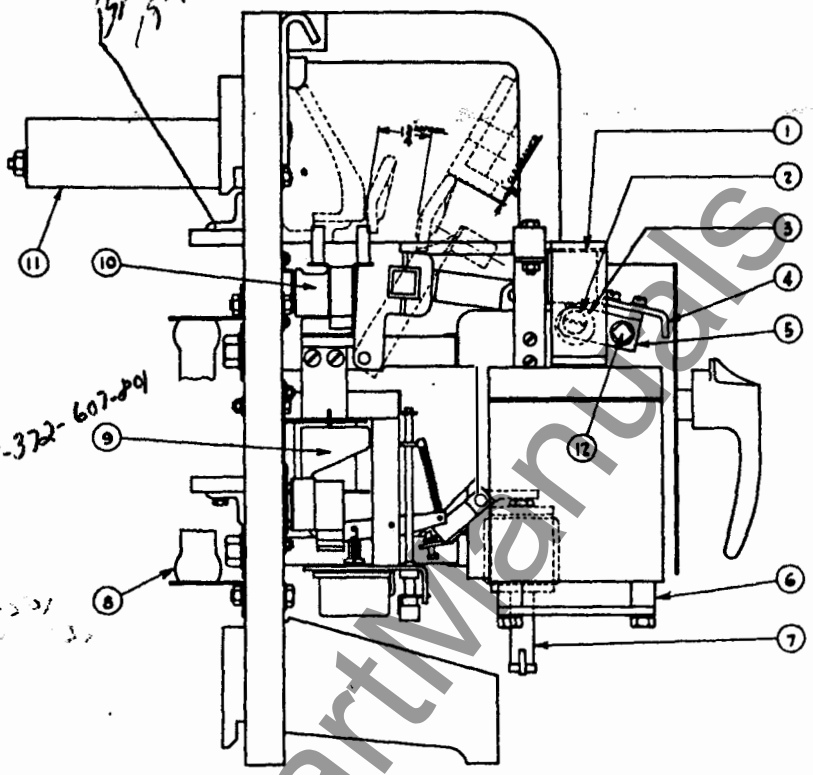
Fig. 1
Manually Operated
(Front View)



1 Panel Assembly
2 Arcing Contact Assem. (stationary)
3 Arcing Contact Assem. (movable)
4 Main Contact and Terminal—Upper
5 Main Contact Block
6 Main Contact Arm Assem.
7 Main Contact—Lower
8 Overcurrent Coil and Lower Terminal
9 Trip Magnet Assem.
10 Barrier
11 Arc Chute Assem.
12 Arc Runner
13 Support
14 Pin
15 Pin
16 Stop
17 Spring
18 Latch Lever Assem.
19 Stop
20 Pin
21 Indicator
22 Shaft Assem.
23 Pin
24 Toggle Latch Assem.
25 Roller
26 Pin
27 Operating Arm
28 Operating Shaft
29 Operating Handle
30 Operating Cam
31 Torsion Spring
32 Trip Lever
33 Trip Arm Assem.
34 Set Screw
35 Front Cover Plate
36 Pin
37 Torsion Spring
38 Pin
39 Pin
40 Pin
41 Pin
42 Trip Latch
43 Trip Hammer
44 Screw
45 Pin
46 Spring
47 Oper. Mech. Frame
48 Pin
49 Trip Bar Assem.
50 Nut
51 1/4" x 1 3/4" Lg. Hex. Cap Screw
52 Contact Finger Assem.
53 Sec. Contact Assem.
54 Bushing
55 Bushing

Fig. 2 Manually Operated (Side View)

Fig. 3 Electrically Operated (Side View)



1 "aa" Switch
2 Eccentric Pin
3 Roller
4 Interlock Latch
5 Closing Lever
6 Closing Solenoid
7 Shunt Trip
8 Rectifier Resistor
9 "X" Relay
10 "Y" Relay
11 Rectifier for ac Control Voltage
12 Main Shaft

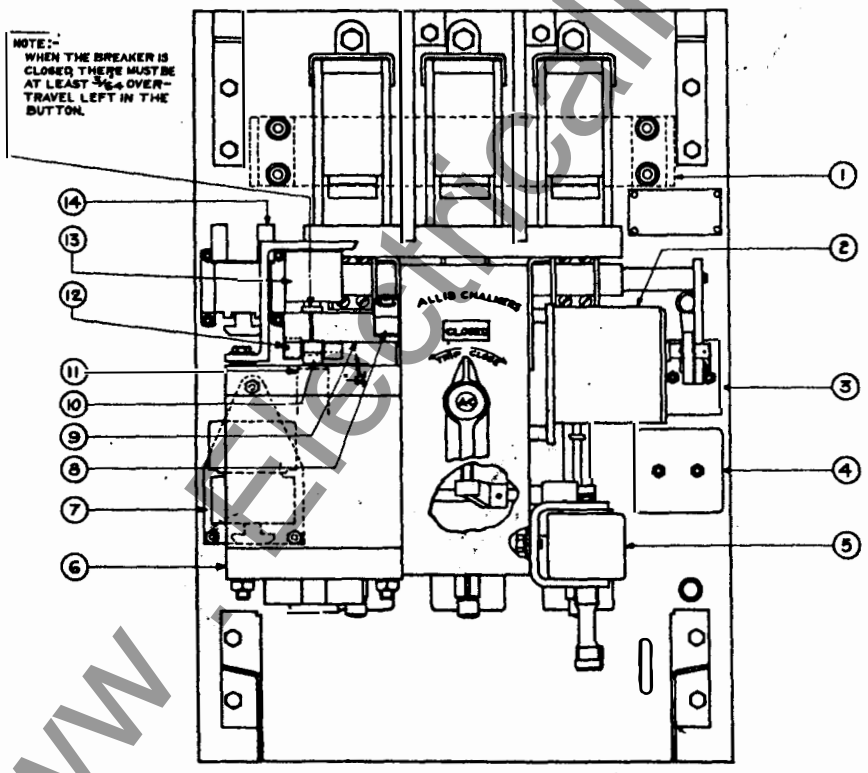
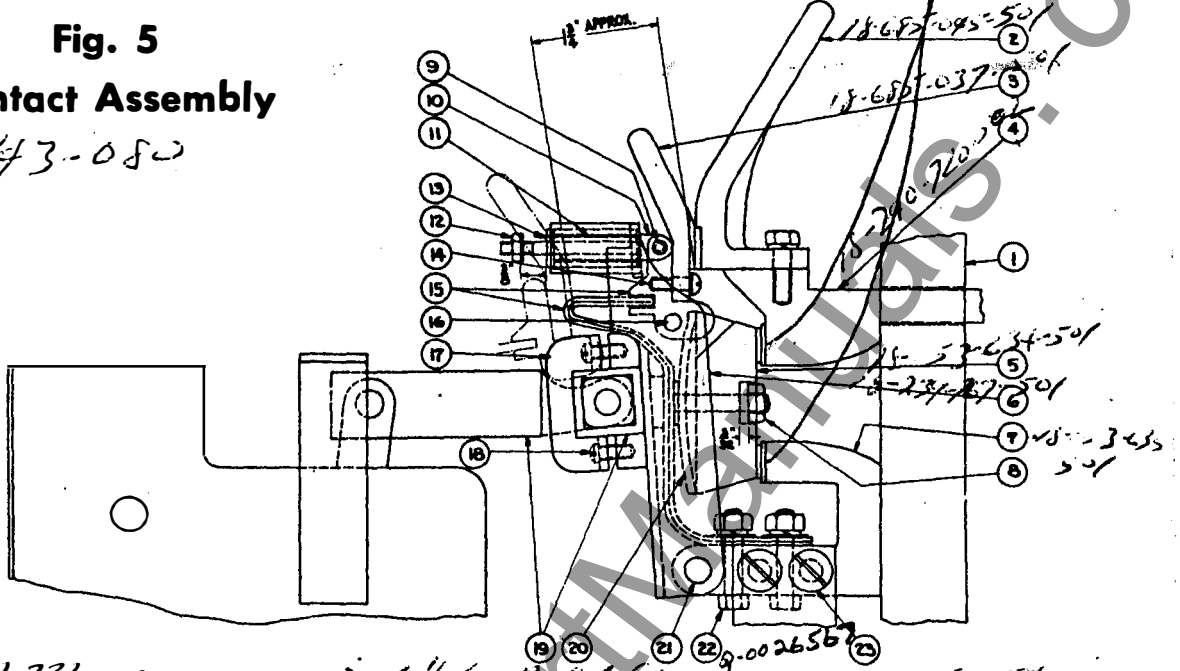


Fig. 4 Electrically Operated (Front View)

1 Rectifier for ac Control Voltage
2 Auxiliary Switch
3 Knife Switch
4 Double Pole Fuse Cutout
5 Shunt Trip
6 Closing Solenoid
7 "X" Relay
8 Interlock Latch
9 Closing Lever
10 Roller
11 Plunger
12 Eccentric Pin
13 "aa" Switch
14 "Y" Relay

Fig. 5
Contact Assembly

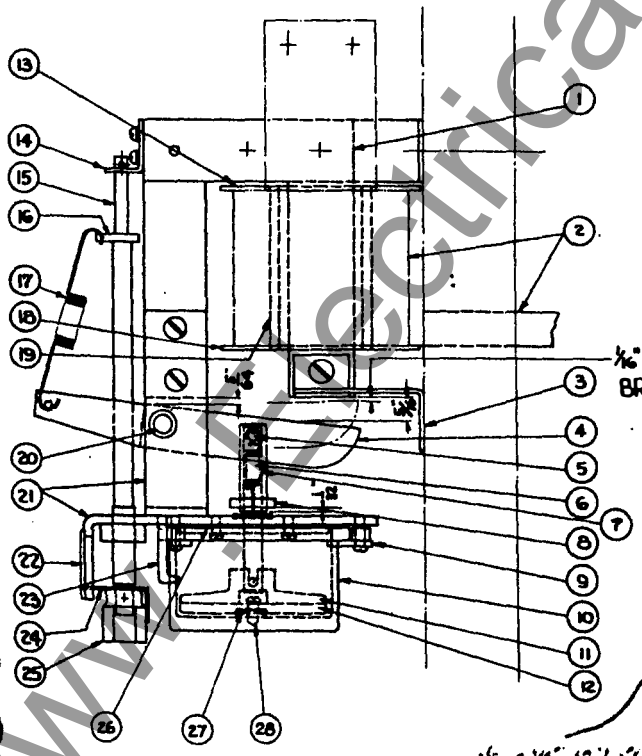
See 18-443-050



1 Panel 18-342 772 001
2 Arcing Contact Assem. (stationary)
3 Arcing Contact Assem. (movable)
4 Main Contact and Terminal—Upper
5 Main Contact Block
6 Main Contact Arm Assem.
7 Main Contact—Lower
8 ¼"—28 Elastic Stop Nut 9000527?
9 Pin
10 Guide Pin 18-685-090-001
11 Spring 18-614-334-00?
12 No. 10—32 Elastic Stop Nut 9000518
13 Washer
14 No. 10—24x½" Rd. Hd. Mach. Sc.
15 Flexible Connector Assem. 18-685-133-00?
16 Pin 18-685-019-010
17 Bracket 18-685-054
18 ¼"—20x⅜" Lg. Fil. Hd. Sc.
19 Cross Bar Assem. 18-283-685-00?
20 Main Contact Spring 18-685-006-00?
21 Pin 18-685-019-003
22 ¼"—20 Sf. Hex. Nut and ¼"—20x1¼ Hex. Hd. Cap Sc.
23 5/16"—18x2" Lg. Flat Hd. Cap Sc.

Fig. 6
Dual Magnetic Device Assembly

16-443-250



1 Core Assem. 18-685-114
2 Overcurrent Coil Assem.
3 Bracket
4 Armature 18-148-179-001
5 Pin 18-685-139-001
6 Spring 18-685-140-001
7 Actuating Rod Assem.
8 Spring Holder 18-685-141-001
9 Cup Holder 18-685-142-001
10 Cup 18-163-1K
11 Moving Disc 18-685-106-002
12 Stationary Disc
13 Washer—Upper 18-685-075-002
14 Bracket 18-685-124-001
15 Rod 18-685-135-001
16 Spring Holder
17 Spring 18-139-205-001
18 Washer—Lower 18-685-075-001
19 Insulating Tube 18-147-747-001
20 Pin 18-685-019-002
21 Support 18-685-097-001
22 Calibration Label
23 Pointer 18-685-098-004
24 Indicator 18-685-138-001
25 Adjusting Knob 18-685-1X-004
26 Gasket 18-632-120-001
27 Washer
28 No. 8—32x¼" Lg. Rd. Hd. Screw 18-152 687 105

In addition to the "a" and "b" auxiliary switches, an "aa" auxiliary switch (Fig. 4, Item 13) is furnished with each electrically operated breaker. This switch follows the operating mechanism; switch is closed when mechanism is in the energized position and open when mechanism is in de-energized or open position. The function of this switch is to make the Y relay (Fig. 4, Item 14) circuit just as the mechanism is about to close and thus initiate the de-energization of the X-relay (Fig. 4, Item 7) and then of the closing coil at the proper time.

M. | SHUNT TRIP ATTACHMENT

The shunt trip attachment (Fig. 4, Item 5) is used to trip breaker electrically from a remote point by closing its circuit either manually, through a control switch, or automatically through relay contacts. Since the shunt trip coil is designed for a momentary duty cycle, an "a" auxiliary switch is used to interrupt its circuit immediately after the breaker is tripped. Fig. 14 shows a control scheme for this shunt trip attachment.

6. Special Accessories

Special conditions of circuit breaker application require attachments of both standard and special types. These attachments are listed in the following pages and are optional, depending on customer's requirements.

A. | UNDERVOLTAGE TRIP ATTACHMENT

The undervoltage trip attachment (Fig. 8) is a device which trips the breaker when the applied voltage drops below a predetermined value. With an undervoltage attachment the breaker has a positive means of tripping in the event of operating voltage failure. The energy for tripping the breaker is supplied by a preloaded spring (Item 18) which receives a slight additional loading as the armature (Item 5) picks up. The device is connected across the line through a step down transformer and a rectifier. In the de-energized position, switch (Item 4) is closed allowing full voltage to be applied to the coil (Item 3) as soon as the line is energized. This causes armature (Item 5) to pick up. As the armature picks up, the switch (Item 4) opens shunting voltage through resistor which reduces the voltage applied to the coil (Item 3). This device is set at the factory to pick up if line voltage is 80% of normal voltage or above and will drop out if line voltage drops below a predetermined value (between 30 to 60% of normal line voltage). As armature (Item 5) drops, pivoting on pin (Item 6), adjusting screw (Item 15) pushes up on trip pin (Item 17), which in turn pushes the trip bar of the breaker up, tripping the breaker. If line voltage is below 80% of normal the armature will not pick up, and the breaker being in the trip free position, cannot be closed.

To adjust the drop out value of this device (between 30 to 60% of line voltage), increase or decrease the tension on spring (Item 18) through set screw (Item 1). Increase tension for a drop out at a lower percentage of line voltage and decrease tension for a drop out at a higher percentage of line voltage. Keep in mind however, that any adjustment on the tension of the spring affects the pick up value of the device. This can be compensated for through adjusting the value of the resistor by moving its slide to increase or decrease the resistance as the case requires. Gap adjusting screw (Item 7) controls the distance of the drop out and may also help in compensating for spring tension adjustment. Be sure lock-nuts (Item 8 and 16) are securely tight after adjustment has been made.

The undervoltage rectifier is subject to aging and may therefore, have more resistance after aging. To compensate for this, the transformer may have the secondary leads reconnected so that the red-yellow (red-yellow stays permanently connected) and the red leads are connected to the undervoltage device.

1. Adjustment for Time Delay

On breakers equipped with undervoltage attachments using time delay (Fig. 8) make certain that the oil cup and discs are perfectly clean. When necessary, wash the cups and discs with clean alcohol or carbon tetrochloride. Inspect the surface of the discs to make certain there are no burrs, ridges, etc., that will prevent the lapped surfaces from coming together perfectly.

The upper disc (Fig. 8, Item 11) is set on the threaded stem so when the armature (Fig. 8, Item 5) is in the picked-up position the disc surfaces just come together. This setting is important; the discs should not come together too soon so as to hold the armature away slightly from the magnet core. Also, the armature should not close the air gap without bringing the discs together.

The correct setting of the upper disc is obtained through a quarter turn adjustment of the upper disc on a threaded stem. This stem has two holes near each end. These holes are perpendicular to one another and in line with the two holes in the opposite end.

If it is desired to lower the upper disc one quarter turn (to have the surfaces come together just as the armature comes solidly against the core), remove the pin (Fig. 8, Item 14) that secures the stem to the armature. Then rotate the stem 90° and replace the pin. The upper disc is then screwed down one quarter turn and the cotter pin replaced to prevent the disc from changing its position.

If half turn adjustment is desired, it is only necessary to turn the disc a half turn as the lapped surfaces will automatically match up.

With one quarter turn adjustment, the surfaces are not matched and it is necessary to rotate the stem as described above.

When the correct position of the upper disc has been determined, push the armature to its closed position and hold for a few seconds. Then release the armature to see whether or not the discs are holding together so as to give a time delay. If no time delay or not enough is obtained, and the discs are coming together properly, it may be necessary to relap the discs to make their surfaces flat.

With properly lapped discs and a properly adjusted undervoltage device a time delay as high as seven seconds has been obtained in our shops.

If desired, the discs may be tested for holding by removing the cup with its lower disc and the upper disc with its stem from the undervoltage assembly. Then with clean

oil in the cup, and with a steady pull of 2.4 lbs on the stem, it should take a minimum time of ten seconds for the discs to separate after the full area of the discs is allowed to be in contact for 30 seconds.

If less than ten seconds time is obtained on above test, is an indication that the contact surfaces of one disc, or of both, are out of flat and need relapping. If no accurate lapping facilities are available, new discs should be obtained.

B. | THERMAL-MAGNETIC TRIPPING DEVICE ASSEMBLY

When G-25 breakers are used for ac motor starting and protection, a thermal trip magnet assembly (Fig. 7) in each phase is used instead of the inverse time series trip (Fig. 6).

The thermal trip magnet assembly is mounted in the same location and acts to trip the breaker in the same way as the inverse time series trip.

The thermal element of this trip magnet assembly is of the spiral wound bimetallic type and is surrounded by a heater coil (Fig. 7, Item 17). The heater coil receives current from the secondary coil (Fig. 7, Item 21) by transformer action from the overcurrent coil assembly (Fig. 7, Item 2). The heat generated in the heater coil (Fig. 7, Item 17) causes the free end of the bimetallic element to rotate and carries cam (Fig. 7, Item 15) with it. The cam in turn acts against latch (Fig. 7, Item 11) and on overloads is sufficient to cause the latch to release the time delay armature (Fig. 7, Item 18). Upon being released, the time delay armature rotates about its pivot point so as to close the air gap through which it is electromagnetically attracted to the core assembly (Fig. 7, Item 1). As the time delay armature (Fig. 7, Item 18) rotates, it also acts to trip the breaker in the same manner as previously described under the operating mechanism. When the breaker has tripped, the core assembly is no longer magnetized and the time delay armature drops to its latched position. A short reset time may be required as the bimetallic element cools.

Fig. 13 shows the characteristic time delay for this device. Before the breaker leaves the factory each thermal magnetic trip device is tested and calibrated to make certain that the tripping time is as shown in Fig. 13. Therefore it is not necessary for the operator to make any changes in this device except to select the desired calibration setting as shown in Fig. 13. This is done by turning the adjusting knob (Fig. 7, Item 14) to the desired calibration shown on the front plate (Fig. 7, Item 13). Any intermediate calibration setting may be obtained by setting the knob at the proper point. Front plate (Fig. 7, Item 13) is engraved with the same curves shown in Fig. 13, to enable the operator to easily obtain the correct setting.

Because of the inherent long time delay of this device it is equipped with an instantaneous trip armature (Fig. 7, Item 7) which provides short circuit protection. This instantaneous trip armature is factory set so as to trip the breaker whenever 8 to 12 times normal coil current flows. The thermal-magnetic trip device may be removed from the panel in the same manner as described under replacement of Series Trip Attachments. It is desirable not to change the initial setting of the air gaps when this device is reassembled to the panel.

C. | BELL ALARM AND ELECTRIC LOCKOUT SWITCH

The bell alarm and electrical lockout switch (See Fig. 11) is connected so that is closes a circuit to a bell (or other audible signaling device) upon automatic opening of the circuit breaker. It may also open the circuit controlling the closing solenoid on an automatic opening of the breaker so that the closing circuit cannot be energized until his switch is reset.

The function of the device is as follows: When used for alarm duty the switch is wired normally open. Whenever the trip bar is actuated to trip the breaker, it also acts against the button of the bell alarm switch causing the switch to close its contacts and sound a bell. The bell will continue to sound until the reset button is pushed so as to open the contacts of the bell alarm switch. A compression spring which acts against the trip bar, prevents the bell alarm from being set off unintentionally.

D. | DOOR INTERLOCK

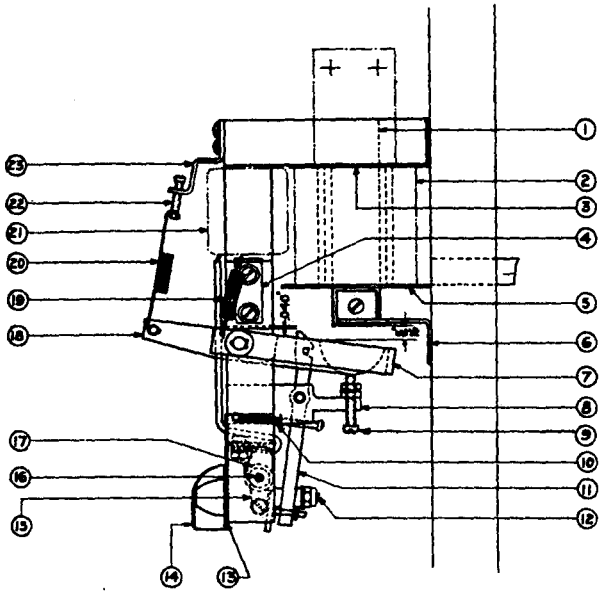
When specified, a door interlock is available as protection against opening the enclosure door of an energized breaker. This device consists of an interlock latch (Fig. 3, Item 4) attached to the tie bar of the breaker and a door interlock fastened to the inner side of the enclosure door. As the breaker closes, the latch moves to engage the door interlock, thus automatically locking the door. When the breaker is opened, the latch and the door interlock automatically disengages, allowing enclosure door to be opened.

7. Recommended Service Parts

When ordering spare parts give serial number of the breaker or breakers to insure delivery of proper parts.

Fig. No.	Item No.	Part	Drwg. No.	Quan. for 1 Brkr.	Quan. for 6 Brkrs.	Quan. for 10 or more Brkrs.
2	4	Main Contact and Terminal Bar, Upper	18-240-720-502	—	1	3
2	7	Main Contact—Lower	18-153-635-501	—	—	3
2	5	Main Contact—Block	18-153-634-501	—	2	4
2	6	Main Contact—Arm Assembly	18-239-767-501	—	1	2
2	3	Arcing Contact Assem.—Movable	18-685-037-501	3	9	12
2	2	Arcing Contact Assem.—Stationary	18-685-045-501	2	6	10
2	11	Arc Chute Assembly	18-385-085-501	1	2	4
5	19	Cross Bar Assem. without Aux. Sw. Mtg.	18-285-028-501	—	1	2
5	19	Cross Bar Assem. with Aux. Sw. Mtg.	18-245-914-501	—	1	2
2	49	Trip Bar Assembly	18-240-742-501	—	—	1
2	33	Trip Arm Assembly	18-143-600-501	—	1	2
2	42	Trip Latch	18-685-020-001	1	2	4
5	10	Guide Pin	18-685-090-001	1	2	4
5	15	Flexible Connector Assembly	18-685-115-501	—	2	4
6	9	Cup Holder	18-685-112-001	3	6	10
2	54	Bushing (for Electrically Operated)	18-150-282-001	—	1	2
2	54	Bushing (for Manually Operated)	18-140-238-005	—	1	2
2	55	Bushing (for Manually Operated)	18-140-238-002	—	1	2
—	—	Dashpot Oil	18-682-504	1 pt.	1 pt.	2 pt.
2	29	Operating Handle	18-240-046-001	—	1	2
5	11	Spring	18-614-334-010	1	2	4
2	46	Spring	18-614-334-011	—	2	4
6	6	Spring	18-685-140-001	—	2	4
2	31	Torsion Spring	18-685-031-002	—	1	2
2	37	Torsion Spring	18-140-488-001	1	2	4
6	17	Expansion Spring	18-139-708-001	2	6	10
2	8	Overcurrent Coil and Lower Terminal (for Drawout Breaker)	18-385-044	1	2	4
2	8	Overcurrent Coil and Lower Terminal (for Swbd. Mtd. Breaker)	18-385-042	1	2	4
6	—	Trip Magnet Assembly	18-347-100	—	1	2
2	17	Spring	18-685-033-001	—	2	4
9	—	Shunt Trip Coil	18-341-280	—	1	2
2	52	Contact Finger Assembly (for Drawout Breaker Only)	18-337-177-501	1	2	3
2	53	Movable Sec. Contact Assembly (for Drawout Breaker Only)	18-242-261	—	1	2
—	—	Torsion Spring (for Interlock Trip Lever)	18-638-626-001	—	1	3
4	6	Closing Coil	18-245-909-501	—	1	1
3	1	"aa" Switch	01-414-796-501	—	—	1
3	9	"X" Relay (125 volts dc)	18-151-408-001	—	—	1
		(250 volts dc)	18-151-408-002	—	—	1
		(220 volts ac)	18-151-453-001	—	—	1
3	10	"Y" Relay (125 volts dc)	18-107-031-001	—	—	1
		(250 volts dc)	18-107-035-001	—	—	1
		(220 volts ac)	18-107-065-001	—	—	1
3	11	Rectifier (For ac Control Voltage)	18-245-910-502	—	—	1
3	8	Resistor (For ac Control Rectifier)	18-241-568-502	—	—	1

Fig. 7
Thermal Magnetic Tripping Device Assembly

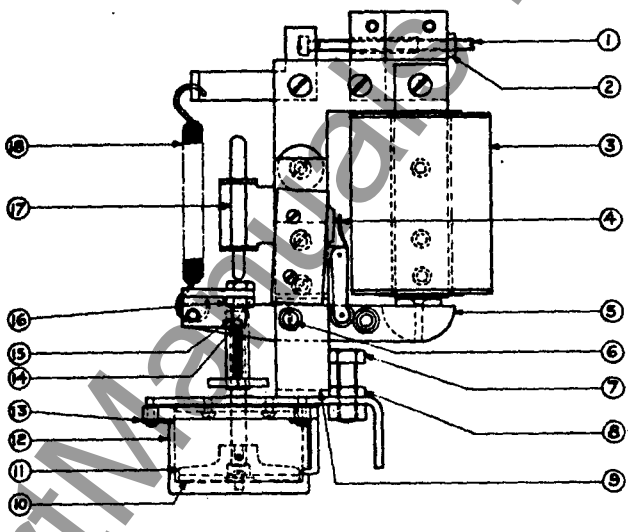


1 Core Assembly 18-665-[illegible]
2 Overcurrent Coil Assembly
3 Washer—Upper
4 Spring Holder
5 Washer—Lower
6 Bracket 18-685-125
7 Armature (instantaneous trip)
8 Support Bracket 18-253-760
9 Gap Adjusting Screw
10 Spring 18-155-932-001
11 Latch Assem. 18-H8-235
12 Shaft
13 Front Plate
14 Adjusting Knob 18-149-586-001
15 Cam 18-H8-241-501
16 Main Shaft 18-H8-237-004
17 Heater H-208-304-001
18 Armature Assembly (time delay)
19 Spring 18-[illegible]-565-001
20 Spring 18-179-708-001
21 Coil Assembly 18-H8-[illegible]
22 Adjusting Screw
23 Guide

Item 17 heater ass'y 18-H8-243-54

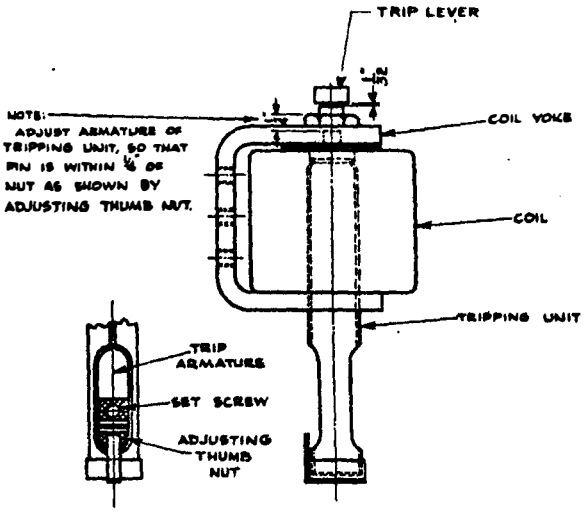
Fig. 8
Undervoltage Trip Attachment

18-492-485



1 Adjusting Screw (spring tension)
2 Lock Nut
3 Coil
4 Switch
5 Armature
6 Pin
7 Gap Adjusting Screw
8 Lock Nut
9 Bracket
10 Stationary Disc
11 Moving Disc
12 Cup
13 Cup Holder
14 Pin
15 Trip Adjusting Screw
16 Lock Nut
17 Trip Pin
18 Spring 18-140-154-002

Fig. 9
Shunt Tripping Device Assembly



* Super-

Fig. 13
Average Time Current Curve — Thermal Trip

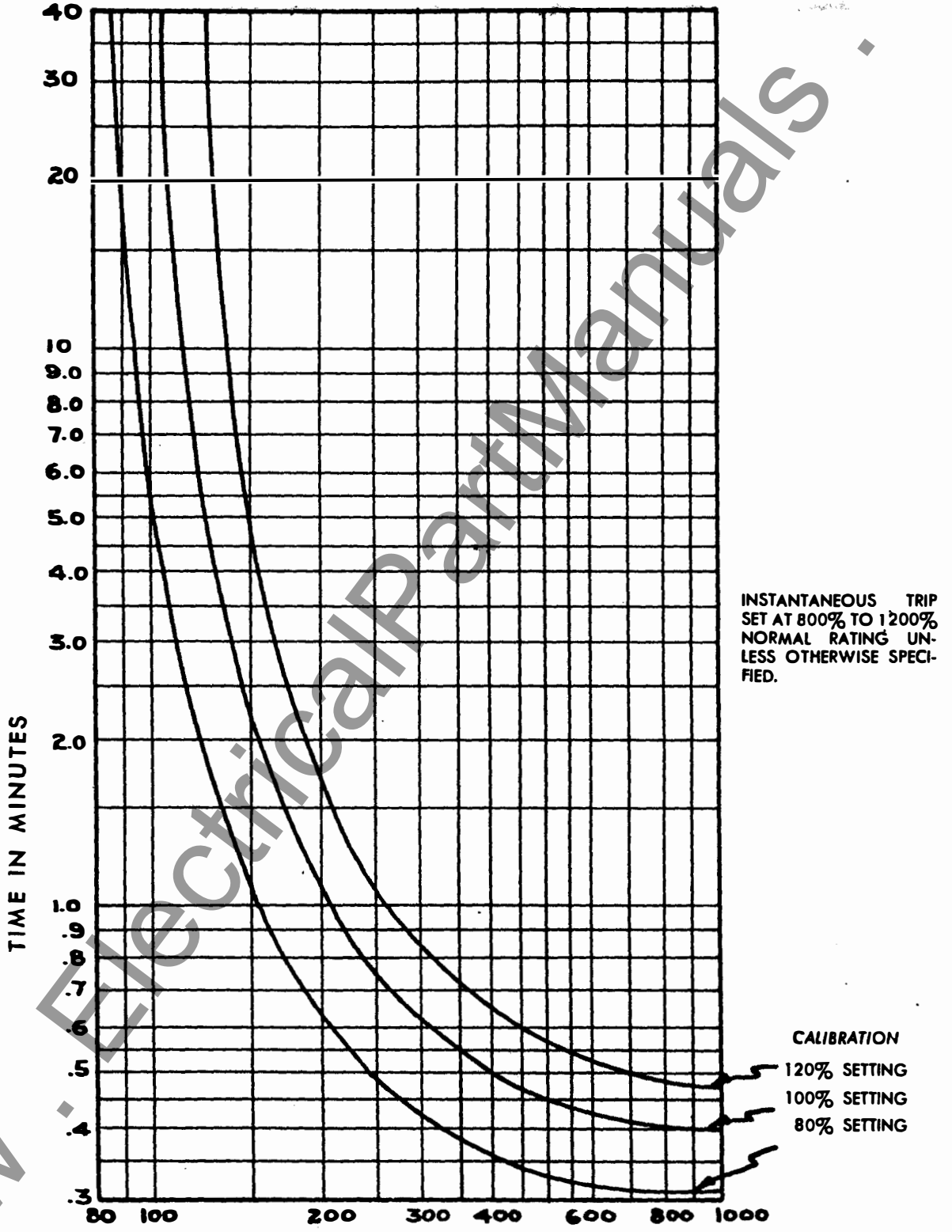


Fig. 10
Auxiliary Switch Mounting

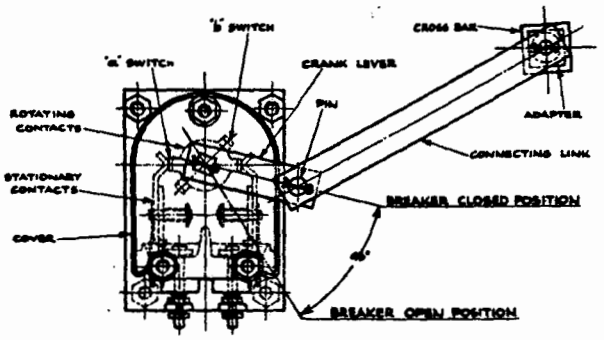
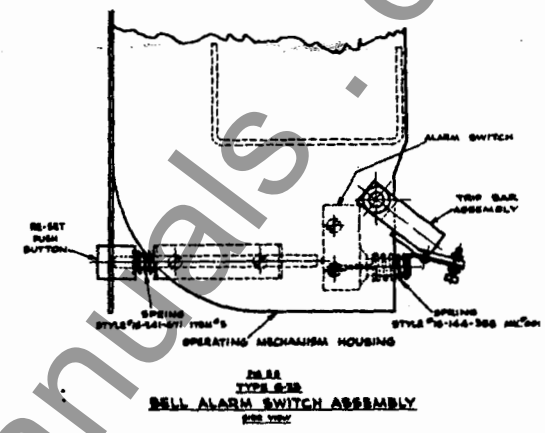
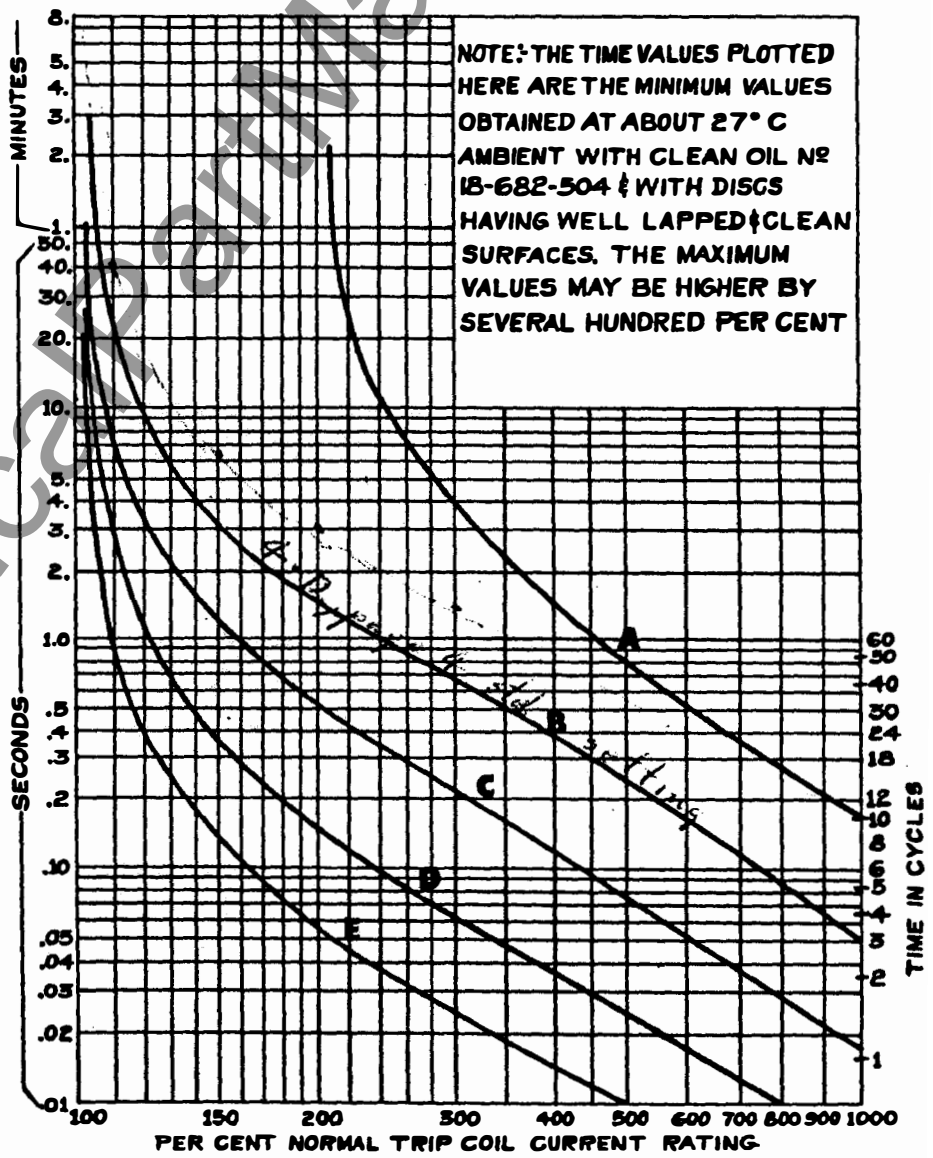


Fig. 11
Bell Alarm and Electrical Lookout



TYPE B-28
BELL ALARM SWITCH ASSEMBLY

Fig. 12
Inverse Time Series Overcurrent Trip Calibration Curves



A— 200% CALIBRATION
100% ITL

B— 100% CALIBRATION
100% ITL

C— 100% CALIBRATION
50% ITL

D— 100% CALIBRATION
25% ITL

E— 100% CALIBRATION
0% ITL

Fig. 14
Manually Operated Air Circuit Breaker-Connection Diagram

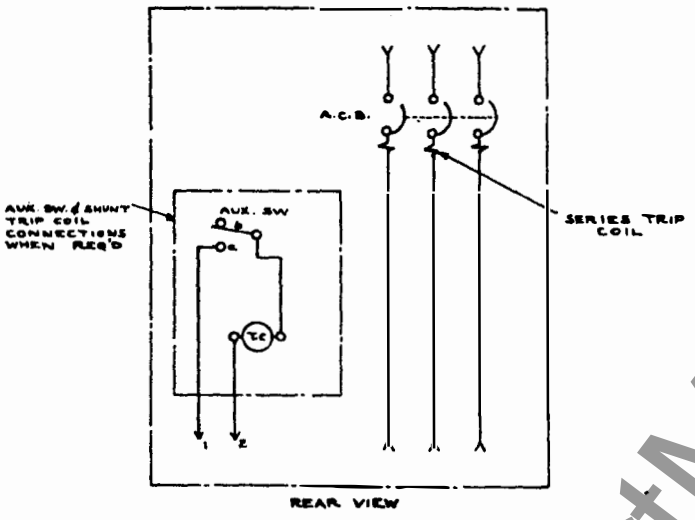
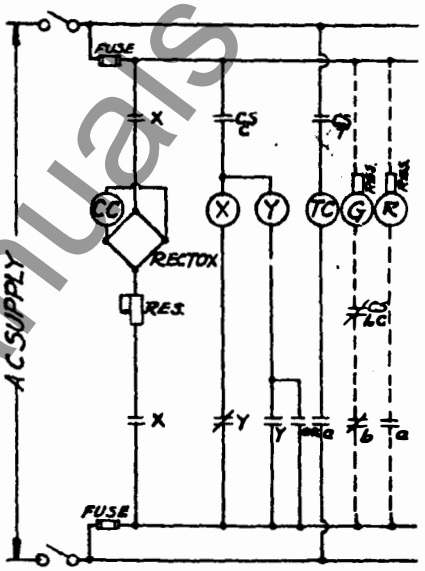
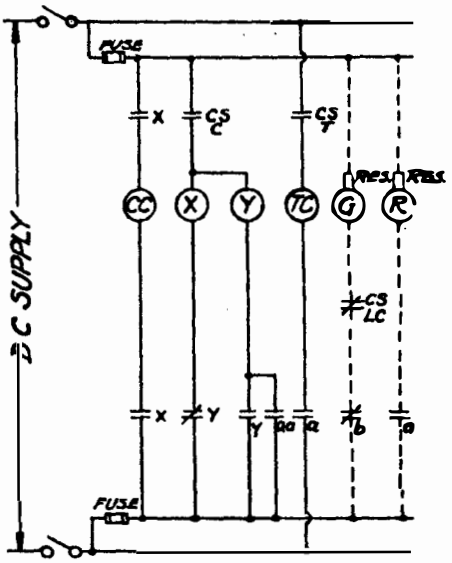


Fig. 15
Control Schemes





SYMBOLS

CC	— Closing Coil
TC	— Trip Coil
XY	— Control Relays
a	— Auxiliory Switch
aa	— Auxiliary Cut-Off Switch
b	— Auxiliary Switch
R	— Red Indicating Lamp
G	— Green Indicating Lamp
CSC	— Control Switch Close
CST	— Control Switch Trip
CSLC	— Control Switch Lamp Cut-out

Fig. 16
Under Voltage Attachment Schematic Diagram