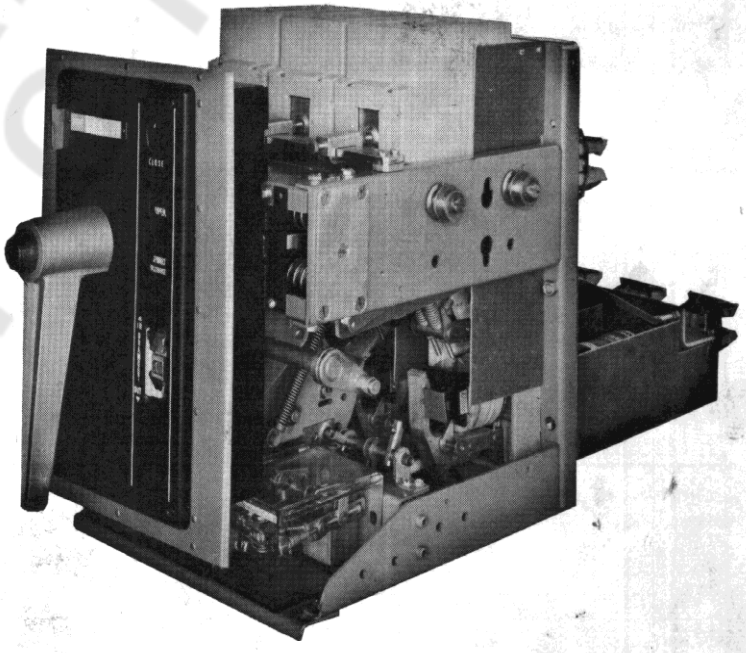
IN-810.9

INSTRUCTION MANUAL
for
TYPE FP LOW VOLTAGE POWER: CIRCUIT BREAKERS
and
FM FUSEMATIC® BREAKERS

FP25-600 FM25-600
FP50-1600 FM50-1600

JUNE, 1971

FP-25-600
CIRCUIT BREAKER



FM-25400
FUSEMATIC®

FEDERAL PACIFIC ELECTRIC COMPANY
POWER EQUIPMENT SYSTEMS DIVISION
1604 AVENUE L, NEWARK, NEW JERSEY 07101

INSTRUCTION MANUAL

for

TYPE FP LOW VOLTAGE POWER CIRCUIT BREAKERS

and

FM FUSEMATIC® BREAKERS

Manually and Electrically Operated

BREAKER	FUSEMATIC"
Type FP-25-600	FM-25-600
Type FP-50-1600	FM-50-1600

INDEX PAGE

FEDERAL PACIFIC ELECTRIC COMPANY
POWER EQUIPMENT SYSTEMS DIVISION
150AVENUE L, NEWARK, NEWJERSEY 07101

PART 1
GENERAL DESCRIPTION

This Instruction Manual covers the FP25-600, FP50-1600, FM25-600 and FM50-1600 Fusematic breakers only. For instructions on the FP '75 series breakers refer in Instruction Booklet #IN810.10.

The FP line of Low Voltage Power Circuit Breakers and Fusematic Breakers, which ranges from 15A through 1600A continuous current at 600 Volt ratings, are designed for simplicity of operation, reliability and easy maintenance. The FP Breaker and FM Fusematic are equipped with a stored energy mechanism mechanically trip free in any position of the closing cycle, three unit pole assemblies, fully field adjustable timing devices, multi-range series trip coils, and telescoping roll-out rails. The three position drawout mechanism is operable with the door closed.

STANDARD ACCESSORIES

Maintenance closing handle 1151-9252
Cell racking in handle 1101-9251

PART 2
SHIPMENT, RECEIVING, HANDLING AND STORAGE

Each FP Breaker and FM Fusematic is thoroughly inspected and tested before leaving the factory. Breakers are shipped in individual crates or in the cell compartment. If breakers are crated, no hooks should be used in handling. Examine all equipment carefully for indication of damage sustained in transit. If damage in transit is indicated, call for an immediate inspection by the delivering carrier. Upon assessment of the damage a claim should he filed with the carrier or, depending on the nature of the damage, an intent to file for concealed damage should be registered. For assistance in filing the claim, advise the area sales office of Federal Pacific Electric Company, giving a full description of the damage, serial number of the breaker, delivering carrier's name, and, if shipped by rail, the car number, waybill reference, and any other information that might he of help to the Company in aiding in the filing of the damage claim.

When unpacking, make sure that all items are removed from the box including packing list, instruction book, maintenance parts and hardware. Report any shortage immediately. See that identification tags are left on the breaker. Lifting eyelets are furnished for handling. Do not lift or handle breaker by the front box or the operating handle.

Clean breaker thoroughly. To remove dust an industrial vacuum cleaner is recommended. If the breaker can be installed in its permanent location, it is advisable to do so, even if it is not expected to be energized for some time. When breakers must he stored in buildings under construction, be sure they are kept in a space free of dust, moisture, dirt and in an upright position. It is recommended that the breaker not be operated prior to final inspection.

PART 3
INSPECTION AND INSTALLATION

SECTION I Inspection - Manually Operated Breakers

The FP and FM breakers consist of a coordinated set of assemblies mounted on a steel frame, all carefully adjusted and locked in place for long and trouble-free operation.

To assist in properly checking and inspecting breakers prior to placing into service, the following steps should be followed in the order listed:

1. Remove arc chutes and interphase barriers.
2. Charge stored energy mechanism by rotating operating handle to a positive stop. Return handle to normal vertical position by counter-clockwise rotation.

NOTE: Charging Operation:

FP & FM25-600 — Rotate handle 90° counterclockwise to engage mechanism and then 1 80° clockwise to positive stop. (Figure 1)

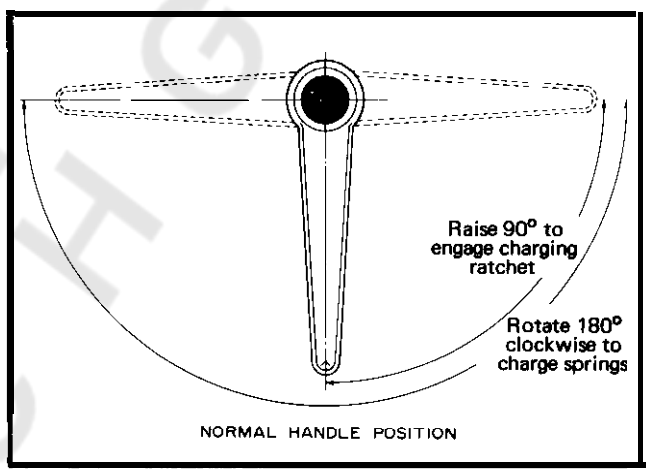


Figure 1

FP & FM50-1600 — Unfold collapsible handle from vertical down position to vertical up position. Rotate 180° clockwise to positive stop. Release handle slowly. (Figure 2).

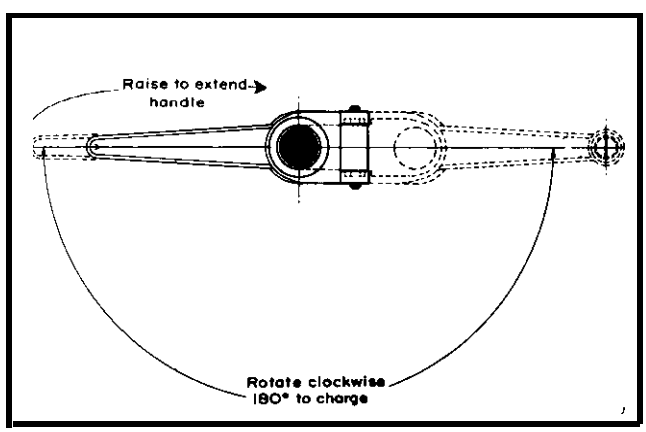


Figure 2

3. Block the undervoltage trip device, when supplied, to prevent tripping.

4. Remove' right and left hand accelerating springs (Figure 4).

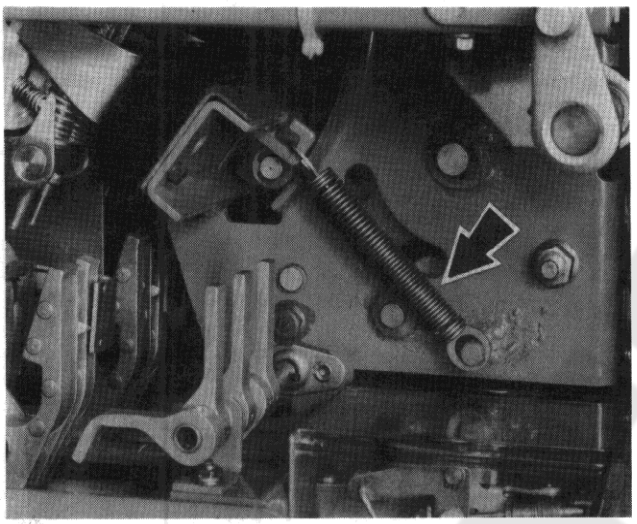


Figure 4

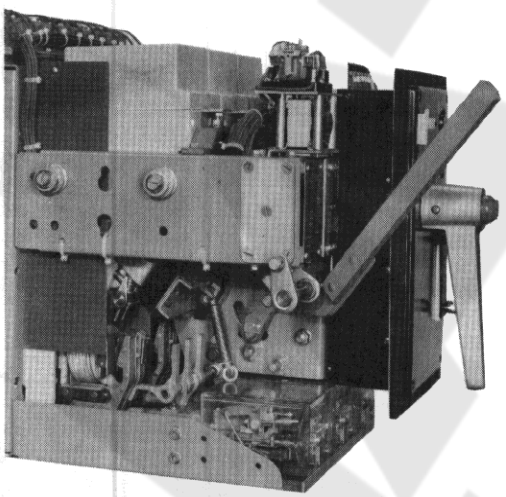


Figure 5

5. Insert maintenance closing handle #1151-9252 as in Figure 5 and slowly operate until arcing contacts touch. All arcing contacts should make simultaneously with a permissible variation of 1/32 max. Movable arcing contact fingers should align with stationary arcing contacts.

   Refer to Part 4 for adjusting instructions if misalignment or misadjustments are observed. Moveable arcing contacts are designed with side clearances for better guidance inside the arc chutes. A side to side movement of 1/8 is allowable. Close breaker and check overtravel on main contacts: 1/8" ± 1/32".

6. With maintenance closing handle in position and trip bar in tripped position, proceed to close breaker. Operating mechanism will now be trip free and contacts should not make.

7. Remove maintenance closing handle and trip breaker by moving trip bar.

8. Replace one pull-off spring right side only.

9. Inspect each arc chute to be sure no plates are damaged. Replace chutes and interphase barriers on breakers. Move contacts in by hand to insure contacts move in and out freely.

10. To avoid possible injury *NEVER* handle or touch any moveable part of the breaker when the stored energy mechanism is charged. Press close button on front cover. Breaker will close. Depress red trip button (located in charging handle). Breaker will open.

11. Recharge stored energy mechanism and close breaker. Slowly move series trip coil magnet (armature) to fully closed position. Breaker should trip before armature touches pole face assembly. Repeat this procedure on all poles.

12. On a draw-out breaker, charge stored energy mechanism, close breaker and move draw-out interlock plate to the left. Breaker will trip. D/O interlock plate must be fully reset to the right before operating breaker to prevent trip-free operations. (Figure 6).

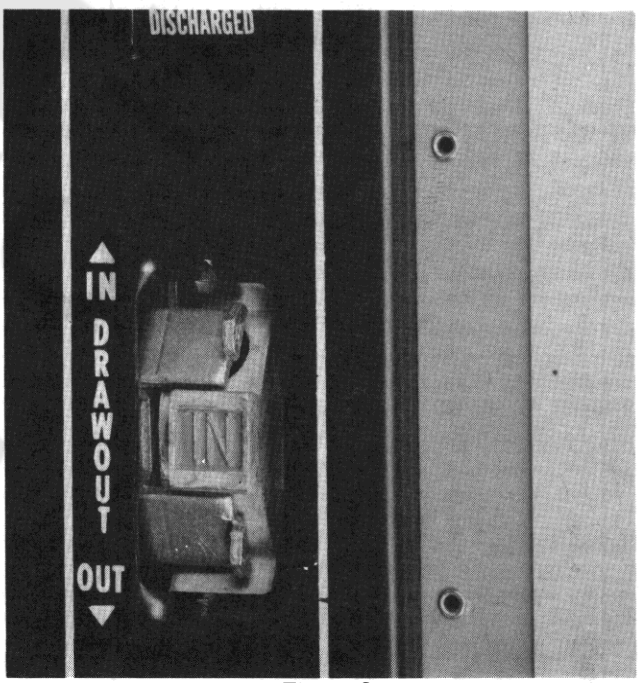


Figure 6

13. Charge stored energy mechanism and close breaker. Pull padlock lever out. Breaker should trip before padlock slot is fully exposed.

14. Check retaining rings and hardware for tightness.

15. Basket and finger assembly should be secured with Nylok retaining screws. Contact fingers must be free of dirt and foreign particles. The secondary contacts should operate freely.

SECTION II Inspection - Electrically Operated Breakers

The ratchet-driven stored energy mechanism is charged by a fractional horsepower AC/DC universal motor. Identification, voltage ranges and current requirements are specified below. The stored energy mechanism charges in approximately one second.

CHARGING MOTORS FOR FP BREAKERS STORED ENERGY MECHANISM

Voltage Rating	FPE Part #	Motor	FLA.	LRA.	Fuse'
48V A.C./48V D.C.	162.007	15056	20	50	12.0
115V A.C./125V D.C.	162-004	14976	6.5	25	5.0
230V A.C./250V D.C.	162-006	14978	6.1	12	3.5

Maximum 240V, use control power transformer for higher voltage
Class 1330 Econ Dual element fuses

From wiring diagram supplied with equipment, or standard diagram Part 7 of this book, locate motor terminals on secondary contacts and connect required power source.

Motor will charge when power is applied and shutoff automatically when charging cycle is completed.

Breaker cannot be closed with the maintenance closing handle unless stored energy mechanism is charged. 0" all electrically operated FP breakers the stored energy mechanism will recharge immediately following a closing operation ready for instant reclosure if needed.

Follow inspection procedure as outlined in "Inspection — Manually Operated Breakers."

In addition the following steps are recommended:

16. From wiring diagram locate terminals on secondary contacts and connect proper control power supply and controls for shunt close and shunt trip attachments. Close and open breaker five times electrically and check for proper operation.
17. Disconnect control power supply. Close and trip trip-breaker manually. Do not leave breaker in the charged and/or closed position while in storage.
18. Move shunt close solenoid armature manually to release closing springs without control power.

SECTION III - Installation

Before installing breaker in cell, check following points inside cell:

1. Secondary contact support when supplied — make sure all connections are tight and adjusted to proper dimensions.
2. Ground connections should he tight.
3. Extension rails should be free to move in and out; check rail stops for tightness.
4. Rail rollers should be free and well lubricated.
5. Main contact stabs should be tight and free of dust and dirt. Lubricate with contact grease.
6. Check condition of insulating transite plate in roof of case. Screws should be tight.
7. Remove control power fuses.
8. Place breaker on fully extended moveable rails. Make sure all four rollers engage on inside grooves (Outside grooves fit into stationary rails inside cell). (Figure 7).

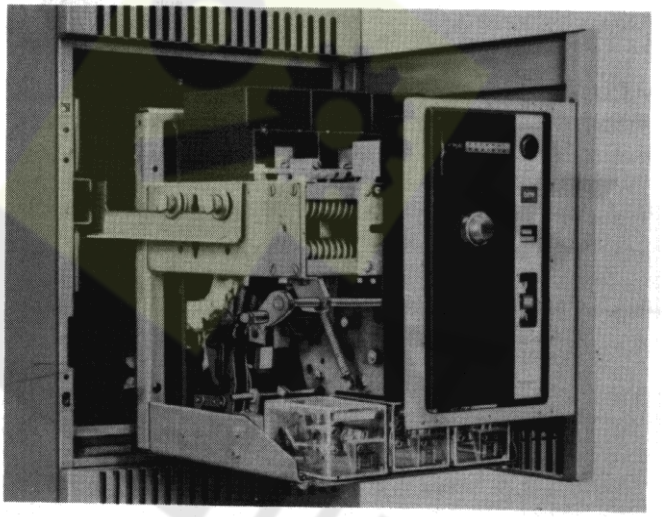


Figure 7

9. Draw-out mechanism on breaker should be in OUT position.
10. Push breaker inside the cell until racking-i" cranks engage a positive stop. This is the OUT position.
11. Close and fasten the door. The metal mask provided on outside of front box will move freely back as it comes in contact with the door. The door should close all the way with the breaker in the OUT position.
12. Push drawout interlock to left, insert drawout lever 1101-9251, (Figure 8) into the bottom hole of the drawout mechanism and, with an up-stroke, rack breaker into the **TEST position.** Remove drawout lever, drawout interlock plate should snap into position completely covering the holes.
13. Install control power fuses, energizing the circuit. The motor will charge the stored energy mechanism. The closing and tripping control circuits become energized in the TEST position.
14. Open door and make sure that grounding contact in cell is in contact with the breaker. Close door and check breaker electrically for proper closing and opening operation.

If breaker operates properly, rack breaker back to OUT position and leave there until ready to be put into service.

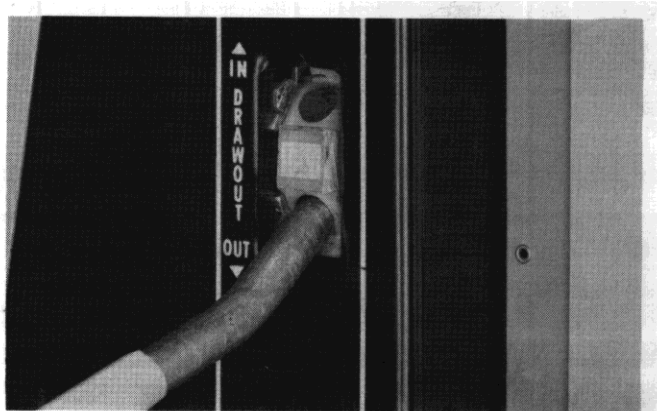


Figure 8

15. To put circuit breaker into service push drawout interlock to left, insert drawout lever in the bottom bole of the drawout mechanism (Figure 8) and with an upward stroke rack breaker into operating position. Remove drawout lever, interlock plate should snap in position and red IN appears. (Figure 9 and 9A).

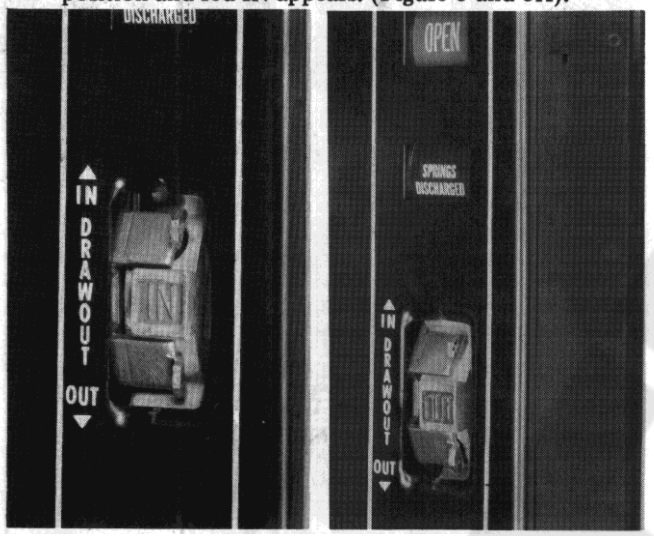


Figure 9 & Figure 9A

PART 4 MAINTENANCE

The breakers with all component parts have been extensively tested for performance as per NEMA Standards SG 3 and ANSI C37-13 and proved to be satisfactory with a wide margin of safety.

A periodic maintenance schedule should be established. An annual inspection should be made for clean, low-use applications. More frequent inspections should be made for dirty, corrosive or high-use applications.

The following instructions and adjustments should be followed carefully:

CONTACT ADJUSTMENT — Figure 10 and 11

MAIN AND ARCING CONTACTS ADJUSTMENT FOR FP600A AND FP1600A BREAKERS

"A" - Main Contact Pressure

600A —	42-50 lbs., measured at point of contact
1600A —	25-35 lbs., measured at point of contact
"B" - Over Travel Mains	& ±1/32 (Fig. 10)
"C" - Arcing Contact Press	2-25 lbs., measured at a point 1¼ below tip of contact
"D" - Gap (distance) between mains when arcing contacts touch	8 ±1/32 (Fig. 11)

CHECK POINTS -Figure 10, 11 and 12

1. Stationary arcing contacts — make sure that retaining screws and contacts are tight.
2. Main contacts should be clean and free
3. Make sure all retaining rings are in place.
4. Surfaces marked "F" should be lubricated by a thin film of "Conducto-Lube #240-200" before assembly. (Figure 12).

Contacts must be inspected after every known short circuit interruption and should also he inspected at regular inspect& periods. If contacts are found to be worn or excessively pitted they should be dressed or replaced.

CAUTION: When reinstalling the arc chutes, adjust the retaining screws on the arc chute retaining bar so that the contact insulating block clears the arc chute base when the breaker is closed.

CONTACT ASSEMBLY

To repair or replace moveable arcing contacts, proceed as follows (Figure 11) :

1. Charge stored energy mechanism.
2. Remove arc chutes and interphase barrier.
3. Remove insulating block and push fork assembly.
4. Tighten moveable arcing contact's adjusting screw until springs are solid and remove retaining pins.
6. **Remove arcing** contact pivot pin and replace moveable arcing contacts. Both contacts should be replaced at one time.
6. Make sure nylon bushings on arcing contact pivot pin are in place and in a good condition, when replacing moveable arcing contact.

Reassemble following the reverse sequence of operations and adjust per Figs. 10 and 11. In most cases it is not necessary to replace contacts, but occasional redressing and readjustments are recommended.

To replace stationary arcing contacts (Figure 10), remove unit pole assembly, replace main stud and arcing contact assembly, part 1151-9939, for 600A breaker and 1151-9937 for 1600A breaker.

Adjust contacts as per Figures 10, 11 & 12.

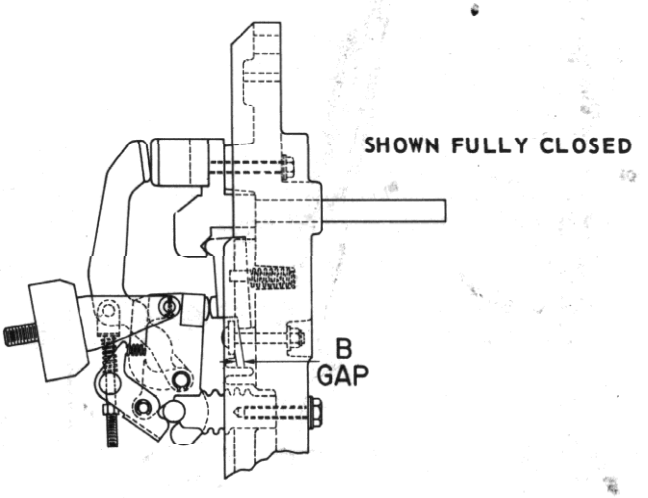
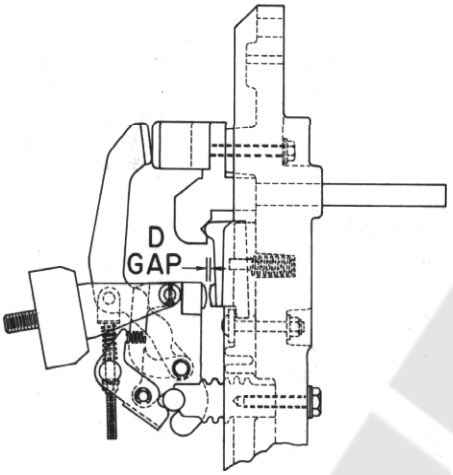
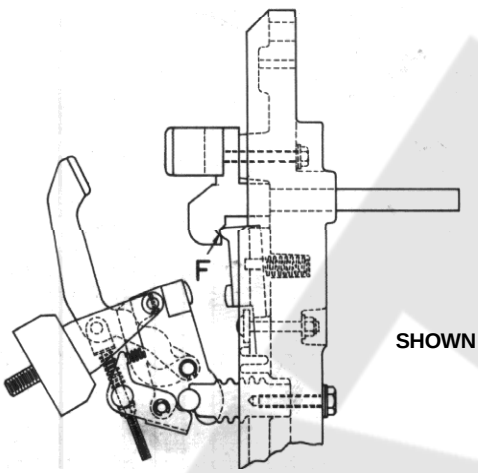


Figure 10



SHOWN AS ARC CONTACTS MAKE

Figure 11



SHOWN FULLY OPEN

Figure 12

STORED ENERGY MECHANISM

Check latch engagement and adjust if necessary to provide a min. of .062" latch surface contact. Make sure springs are in place and in good condition. On electrically operated breakers, remove motor to make sure roller is free and well lubricated. Reinstall motor. Make sure that all retaining rings are in place. Check mechanism to insure that all moving parts ate free and well lubricated.

OPERATING MECHANISM

Make sure that all retaining rings and springs are in place and that the mechanism is free. Replace nylon bumper rollers if excessive wear is evident. Make sure that the operating mechanism resets when stored energy mechanism is charged slowly and that the trip shaft is free. It should take no more than 22 ounce inches of torque to trip the breaker.

GENERAL

Make sure that all current carrying parts are secured and associated hardware is tight. Basket and finger assembly should be secured but free enough to compensate for misalignment in cell. The free up and down movement should be approximately 3/16.

PART 5

ACCESSORIES

SHUNT TRIP

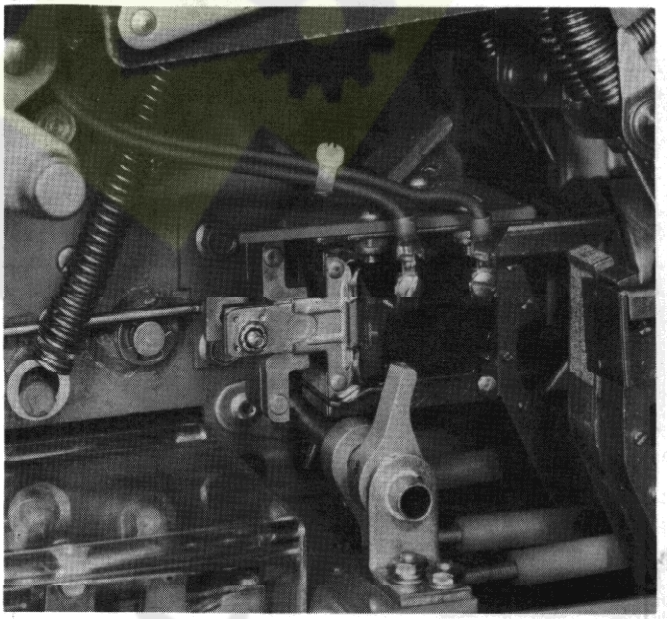
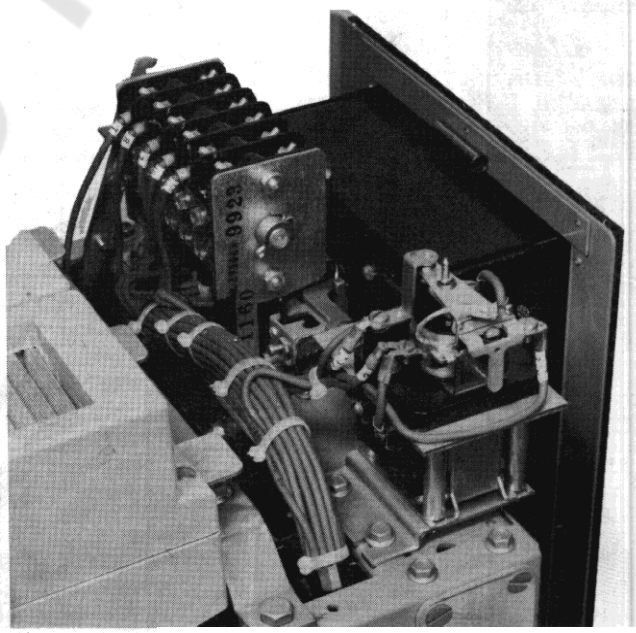


Figure 13

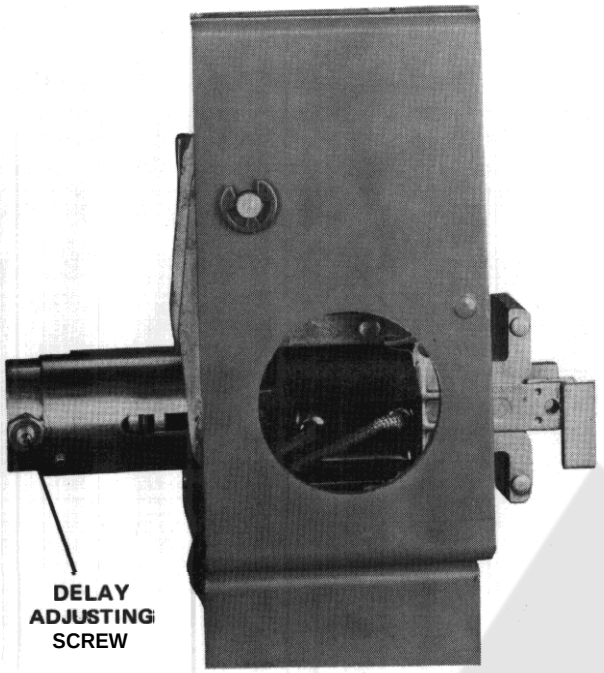
The shunt trip attachment is mounted directly above the trip shaft. It is a non-adjustable electro-magnet intended for intermittent duty only, and its circuit should be interrupted only by an auxiliary contact.

SHUNT CLOSE



The shunt close attachment is mounted on top of the stored energy mechanism and is used to electrically discharge the stored energy mechanism and thus to close the breaker. It is a non-adjustable intermittent duty device and its circuit should be interrupted by an auxiliary contact.

UNDERVOLTAGE ATTACHMENT (Figure 15)



The undervoltage attachment is a continuous duty device, which can be provided with or without a time delay, and which mechanically trips the breaker if the voltage drops to 30% to 60% of normal voltage. It is mechanically reset and has no auxiliary contact in its circuit. The undervoltage time delay mechanism is of the pneumatic delay type. The time delay is controlled by the 10-32 adjusting screw.

To inspect the undervoltage attachment, hold the moveable armature by hand, close breaker and slowly release armature. Before the armature is fully opened, the spring loaded plunger will be released, strike the trip lever and trip the breaker. Check for missing retaining rings and loose or missing screws and bolts. Check condition of coil. If undervoltage attachment is noisy while being energized, clean faces of armature and core.

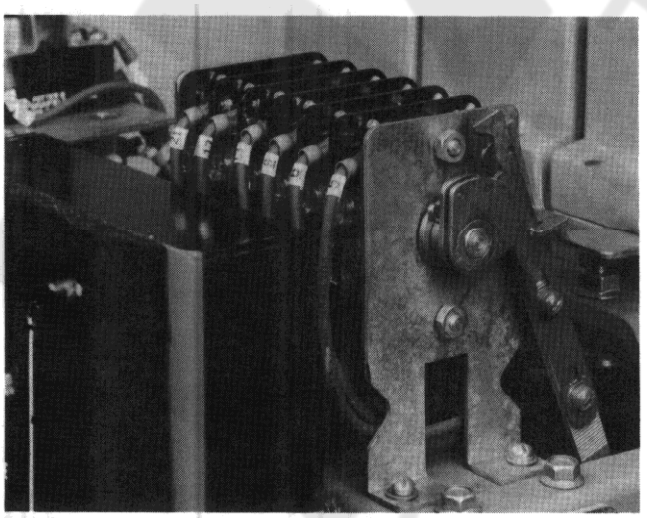


Figure 16

AUXILIARY SWITCH (Figure 16)

A max. 6 stage, 12 contact switch is available. It is mounted on top of the stored energy mechanism on the right hand side of the breaker and is operated by the main moveable contacts. All contacts are operated by phenolic cams and are factory adjusted to provide "a" (normally open) and "b" (normally closed) contacts.

The position and the condition of all contacts can be see" and inspected through the transparent dust covers. The contacts may be changed from a to b or b to a by removing the cover and inverting the contact bridge.

INTERRUPTING CAPACITY

TYPE R-4 AUXILIARY SWITCH INTERRUPTING RATING IN AMPS

Volts	D.C. Non-Inductive	D.C. Inductive	A.C. Non-Inductive	A.C. Inductive
	SINGLE CONTACT			
24	20	15	—	—
48	10	7.5	—	—
115	—	—	50	30
125	2.5	2.0	—	—
230	—	—	25	15
250	0.5	.45	—	—
	DOUBLE CONTACT			
24	50	40	—	
48	25	20	—	—
115	—	—	80	60
125	12	7	—	—
230	—	—	50	30
250	2.25	2	—	

BELL ALARM SWITCH (Figure 17)

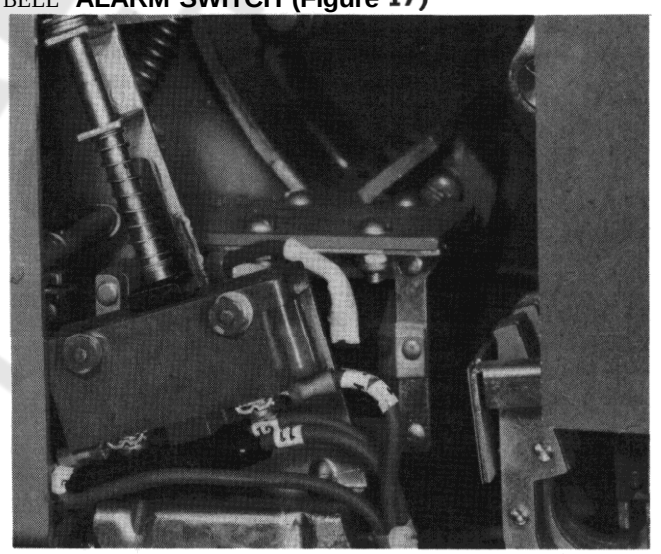


Figure 17

A bell alarm switch attachment is mounted on the right hand side of the breaker and will function only when breaker is tripped by the overcurrent trip units. It can be manually and/or electrically reset. Closing of breaker also resets the alarm switch.

To check the alarm switch attachment, hip breaker with trip button, the" with shunt trip. In both cases the switch should not be actuated. Trip breaker by moving the series trip coil magnet and the switch should operate.

PART 6
OVERCURRENT TRIP DEVICES

GENERAL DESCRIPTION

The direct acting series coils and magnet assemblies provide the energy to operate the over-current time delay device and to trip the circuit breaker, interrupting sustained overcurrents and faults. There are seven (7) different coils covering the range from 15 to 1600 amperes.

Each magnet is set and calibrated in the factory at the desired continuous current rating. Any one of the seven series coils may be used in any of the FP circuit breakers and FM Fusematic circuit breakers provided the current rating dues not exceed the maximum continuous current rating of the circuit breaker frame. [IE., 600A, 1600A.]

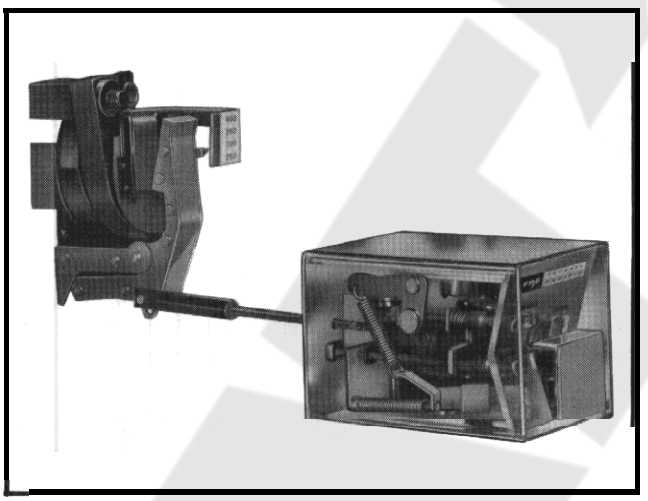


Figure 18

Dual Magnetic Overcurrent Trip Device (TD-1) (Figure 18)

The dual magnetic overcurrent trip device, in combination with the series coil and magnet, provides inverse long delayed tripping for all overcurrents below the instantaneous pickup setting, and adjustable instantaneous tripping. All devices are factory calibrated and can be field adjusted.

Selective Overcurrent Trip Device (TD-2) (Fig. 18)

The selective overcurrent trip device, in combination with the series coil and dual armature magnet, provides inverse long delayed tripping for all overcurrents below the short delay pickup setting, and short delayed tripping for all overcurrents and faults above the short delay pickup setting. All devices are factory calibrated and can be field adjusted.

Single Phasing Protection (Fig. 19) (Fusematic)

When fuses are used to protect circuits feeding three phase motors or similar reactive apparatus there is always the possibility, upon the blowing of one fuse only, that the apparatus, single phased, will bum out. To eliminate this danger, Fusematic Air Circuit Breakers incorporate three single phase trip coils, one in parallel with each of the three main fuses.

The voltage drop across a blown fuse energizes the single phase trip coil in parallel with it.

The trip coils will operate from 630 volts down to 24 volts. Each coil, when energized, releases a spring loaded plunger which trips and locks the circuit breaker in the "TRIP FREE," (Open) position. The plunger(s) which has been released indicates which fuse(s) have blown. They are reset manually, after replacing the blown fuses, by pulling the plunger(s) out as far as they will go and releasing them. The reset plunger will remain latched in the "OUT" position. The circuit breaker should be thoroughly inspected after every "Blown Fuse" operation and returned to service only after the conditions in part 3 Section 1 & II "Inspection and Installation" have been satisfied.

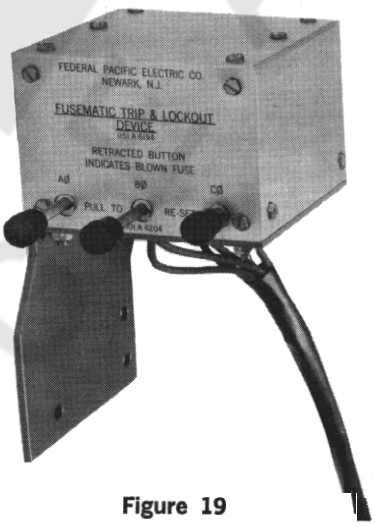


Figure 19

METHOD OF OPERATION

A. Series Coil and Magnet

The current through the series coil provides the magneto-motive force to energize the magnet assembly. The clapper type armature exerts a force on the push rod which operates the trip unit and trips the circuit breaker. The current rating of the coil and magnet may he changed by moving the pole face assembly up or down. The trip system must be recalibrated after adjusting the magnet pole face.

B. Dual Magnetic Overcurrent Trip Device (TD-1) (Long Time Delay and Instantaneous Trip)

The long delay overcurrent trip device consists of a dash pot which operates by the positive displacement of a liquid through a fixed orifice and an adjustable tension coupling spring which permits the push md to move rapidly when the force from the magnet exceeds a predetermined value. The lever ratio between the push rod and the dash pot is adjustable permitting the time delay to be varied. There are three adjustment bands, identified as minimum, inter. mediate and maximum. In addition to the long delay band adjustment there is a" adjustable tension spring which prevents motion of the push rod for currents below the maximum desired continuous current. This is the long delay pickup. It is adjustable from 80 percent to 160 percent with calibrated points at 80%, 100%, 120%, 140% and 160%.

The tension in the coupling spring determines the current at which the dash pot will be mechanically by-passed. This is the instantaneous pickup adjustment. The high range instantaneous element has calibrated settings at 7.5, 10 and 15 times the coil and magnet setting.

C. Selective Service Trip Device (TD-2) (Long Delay and Short Delay)

The selective service trip device is similar to the dual magnetic trip device except that it has a rigid coupling link in place of an instantaneous pickup coupling spring and it has a mechanical escapement timing device which provides a short delay for hiih values of overcurrents and for faults. The long delay dash pot is identical to that used on the dual magnetic trip device. The short delay device is operated by a separate armature in the series coil and magnet assembly. It has a pickup adjustment range of 5 to 10 times the coil and magnet setting. In addition, the short delay has an adjustable band with minimum, intermediate and maximum settings.

MAINTENANCE & ADJUSTMENTS

Remove breaker completely from cells before servicing.

A. Series Coil and Magnet Assembly

The series coil and magnet requires no maintenance other than cleaning periodically to remove dust and dirt which may accumulate on bearings and pivots of the magnet armatures. All pivots and bearings are made of nylon and no lubrication is required.

The entire series coil and magnet assembly may be removed and replaced in the field by removing the ⅜" coil retaining screws and the ½" magnet retaining screws at the rear of the pole insulator. When replacing coils, always tighten the coil retaining screws securely. This is important to prevent overheating and possible failure. Care should be taken not to damage the coil insulation

B. Dual Magnetic Overcurrent Trip Device (TD-1) (Long Delay and Instantaneous Trip)

The circuit breakers are shipped with the trip devices installed and properly adjusted. It is only necessary to keep the devices reasonably clean. They are lubricated for the life of the circuit breaker and *must not* be lubricated again.

It is possible to remove and replace a trip device in the field.

To Remove a Trip Device

The trip units which are contained in transparent plastic cases should be removed as units. Remove the two screws which hold the trip unit to the breaker frame. These screws are located in the back of the trip unit and can be removed by reaching in from behind. The connecting rod which connects to the magnet assembly must be Slipped off the pin connection at the magnet. The plastic connector and trip finger are then removed fmm the push-rod.

To Install a Trip Device

Insert the push rod in the proper hole in the front channel and screw the trip unit to the channel using the two 5/16" hex. nuts provided. Run a special "Dyna-lock" 10-32 nut down the push rod. Follow it with a trip finger on top of the push rod with a spacer between the wings and another 10.32 nut. (Do not tighten it yet.) Install the nylon turn-buckle and adjust its length so that it is 1/32" longer than is just necessary to permit the trip device to reset the magnetic armature against its stop. Install the turn buckle on the armature pin and retain it with E-ring provided. Adjust the position of the trip finger so that the breaker does not trip when the magnet is closed with a 1/32" thick shim in the air gap, and does trip with a 1/64" thick shim in the air gap. Tighten the finger and check thii adjustment again. The trip unit must reset the magnet armature all the way until the armature is against the stop.

C. Selective Service Trip Device (TD-2) (Long Delay and Short Delay)

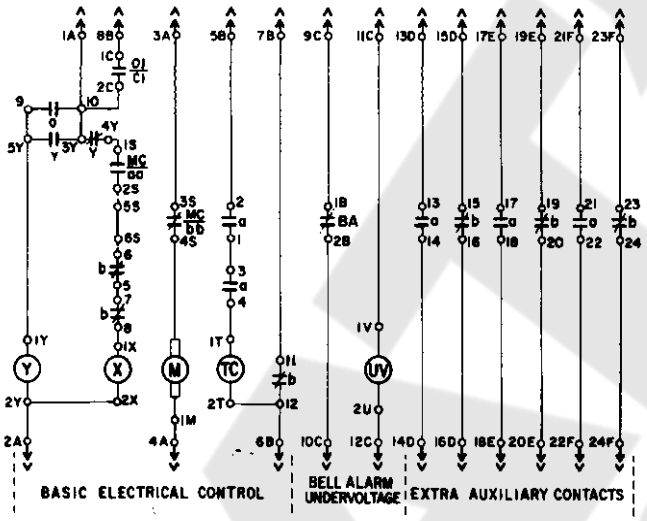
The maintenance and adjustment of the selective service trip device is the same as the dual magnetic trip device, except that the trip finger on the short delay push rod is installed under the push rod. Care should be taken to ensure that the long delay trip finger on top of its push rod does not interfere with the short delay trip linger which is installed under its push rod.

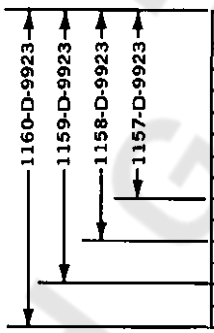
PART 7

WIRING DIAGRAMS

DEFINITION OF SYMBOLS

TC	—	Trip coil
TC1	—	A phase fuse trip coil
TC2	—	B phase fuse trip coil
TC3	—	C phase fuse trip coil
X	—	Closing release coil
Y	—	Anti pump relay
M	—	Spring charging motor
MC/aa	—	NO } Motor cut off switch (Shown with
MC/bb	—	NC } closing mechanism spring discharged)
a	—	Auxiliary switch contact (open when breaker is open)
b	—	Auxiliary switch contact (closed when breaker is open)
01	—	Control switch 01 local, C1 close
BA	—	Bell alarm switch
PF	—	Power fuse
uv	—	Undervoltage device
A	—	Main power circuit - A phase
B	—	Main power circuit - B phase
c	—	Main power circuit - C phase





AUXILIARY SWITCH	
CONTACTS	FUNCTIONS
1 — 2	a CONTACT
3 — 4	a CONTACT
5 — 6	b CONTACT
7 — 8	b CONTACT
9 — 10	a CONTACT
11 — 12	b CONTACT
13 — 14	a CONTACT
15 — 16	b CONTACT
17 — 18	a CONTACT
19 — 20	b CONTACT
21 — 22	a CONTACT
23 — 24	b CONTACT

TYPE FP & FM ELECTRICALLY OPERATED A.C.B. SCHEMATIC DIAGRAM

FP25 FP50
FM25 FM50

FP BREAKER OPERATING SEQUENCE

1. Control switch 01-C closed (local close) or remote close via Terminal 1A.
2. "X" coil is energized thru "b" contact of the "Y" relay, "b" contact of the breaker auxiliary switch, and "aa" contact of the motor cut-off switch.
3. Stored energy closing spring released via "X" coil, closing breaker.
4. Closing breaker operates auxiliary switch opening "b" contacts and closing "a" contact thus energizing anti pump "Y" relay and de-energizing "X" coil.
5. "Y" relay remains energized via seal-in contact thus providing anti-pumping lockout of "X" coil if $\frac{01}{CI}$ is held closed
6. "Y" relay is de-energized when #contact is opened.
7. Closing breaker, closes auxiliary switch "a" contacts permitting the breaker to be tripped electrically when control power is switched to auxiliary stabs 5B and 6B.
8. Motor cut-off switch contact "bb" closes when spring discharges and re-opens when spring is fully charged.
9. Auxiliary switch "b" contact closes when the breaker is tripped.
10. Motor cut-off switch contact "aa" closes when the closing mechanism spring is fully charged.
11. The breaker will close when control switch $\frac{01}{C1}$ is closed.

PART 8

RECOMMENDED SPARE PARTS

No. Reg.	FP.25.600	No. Reg.	FP-50-1600	Description
6		6	1151.9986	Moving arcing contacts
3	1151.9939 1151-9986	3	1151.9937	Upper stud assembly
		12	1151.9354	Main Stationary contact assembly
6	1151-9088	3	1152.9354	Leading contacts
6		6	1151-0632	Cluster assembly
3	1151-9566	3	1151-9566	Arc Chutes

SHUNT CLOSE

Voltage	Assembly No.	Mounting Ref. Drawing
48V AC 48V DC	1151-6038	
115V AC 125V DC	1152-6038	1100~6034
230V AC 230V DC	1153-6038	

SHUNT TRIP

Voltage	Assembly No	Mounting Ref. Drawing
48V AC 48V DC	1151.6039	
115V AC 125V DC	1152.6039	1100.6035
230V AC. 250V DC	1153-6039	

MOTORS TO CHARGE STORED ENERGY MECHANISM

Voltage	Assembly No.	Mounting Ref. Drawing
48V AC 48V DC	1102-6013	
115V AC 125V DC	1103-6013	1100-6014
230V AC 250V OC	1104-6013	

UNOER VOLTAGE TRIP DEVICE

Voltage	Assembly No.	Mounting Ref. Drawing
115V AC	1151C6138	
230V AC	1152C6138	1100C6032
480V AC	1153C6138	

Printed in U.S.A.