

THE BREAKER
THAT LETS YOU
CHANGE ITS MIND


## II. Operation

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## INSTALLATION - OPERATING - MAINTENANCE INSTRUCTIONS

## SSPB EREAKERS <br> 800-1600-2000 AMP FRAMES

The complete SSPB line encompasses frame sizes from 800 to 4000 amperes, up to 600 volts A.C. Basic sub-assernblies include the operating mechanism, contact structures, arc chutes, and static trip device.

The operating mechanism offers a choice of eith manual for local control, or electrical for remc operation. A stored energy principle of operati is utilized for either type.

## 1. Recaiving

Each shipping section of switchgear has been palletized to facilitate moving. The shipping section is covered with a transparent plastic eloth to inhibit entrance of foreign particles and permit carrier awareness of shipping contents.

Immediately upon receipt of equipment, examine components making note of any damages incurred in transit. If necessary, immediately file a claim with the delivering carrier and notify us.

## 2. Installation of Separately Shipped Breakers

Insert racking handle into cell being installed with breaker and tum counterclockwise until cradie is in withdrawn position. White lines surrounding collar of withdrawing device indicate cradle position. Three white lines visible ahead of cell frame or front of closed door indicates cradle is in isolated position. In this position, the two telescopic rails should be fully withdrawn to accept the breaker element.
Remove breaker element from shipping carton in the manner outtined under "Handling". After a visual inspection for damage, mount element on rails locating holes in the breaker support over the four mounting metric bolts $18 \mathrm{~mm} \cdot 0.7 \mathrm{~mm}$ thread). Secure element to rails with lock washers and 8 mm metric nuts using a 13 mm metric wrench or $1 / 2$ inch open end wrench.

## 3. Storage

Breakers and equipment not installed for imme-

## CAUTION:

The drawout breaker elements ar secured to their cradles installed in the switchgea assembly. In order to withdraw the element, it i first necessary to remove the two bottom shippin boits holding the orange shipping plates to th stationary cradle. With these bolts removed, th breaker may be cranked (counterclockwise) to it open position and then tully withdrawn, in th withdrawn position, the remaining four shippin bolts and orange plates should be removed ani discarded.
diate use must be stored in a ventilated room an protected from dust and water by means of nor absorbent covering.

## 4. Handling

Although the SSPB circuit breakers include higi precision components, they will only remai reliable if handled with care.

Never rest the element on the contact jaws. Th breaker element must always be laid on a clean flat surface either upright or on its side. Th breaker can be easily and safely transported on lift truck. For transporting in this manner, a palle must be used.

Toward the top of the side plates of the breake element, lugs (two on each side) are provided fo lifting. Never lift element by its contact jaws 0 its static trip sensor box.
11. OPERATION

## 1. Manually Operated Breakers

With the manually operated SSPB breaker, a simple rotary motion of the operating handle in the counterclockwise direction for approximately 90 degrees charges the springs for a close-open operation. Rotation clockwise back to its normal vertical position initiates the spring release for closing. The closing speed is completely independent of the operator. A position indicator located on the front escutcheon indicates the position of the main contacts: red for "on""or."closed", green for "off" or "open.

The breaker may be tripped manually by depressing the manual trip button. Through linkages, this action causes the mechanism trip latch to be displaced collapsing the operating springs and thereby opening the breaker contacts.

If breaker is equipped with a lock-out device or undervoltage release, refer to paragraph 4 operating instructions.

## 2. Electrically Operated Breakers

For electrical operation, a fractional horsepower, high-torque gearmotor provides energy for charging the springs. Charging requires approximately 5 seconds. Recharging takes place automatically after the breaker is closed. A limit switch removes the gearmotor supply voltage at the end of travel. The supply voltage at the motor terminals may be between 90 to $110 \%$ of the rated voltage.

After the springs are charged, the closing springs are held by an electromagnetically operated latch. When the breaker is closed by depressing the manual close button located on the front escutcheon the closing latch is displaced, thereby collapsing the springs and closing the main contacts. This action is initiated with remote closing by er:ergizing the electromagnet.

The breaker may be manually tripped locally or electrically tripped from remote locations.

In the event of power loss, it is possitie t: manually charge the springs of an electricaily operated breaker for close-open operation. The emergency operating handle is identical in appearance to the handle used on manually operated breakers. The method of spring charging differs from the manually operated breaker in that the handle is rotated hark and fnrth thrnuah annrnximatolv 25 donrooc
until there is no apparent spring resistance operator. To fully charge the springs ma requires approximately 15 reversals or oscii of the handle.

The control panel or front escutheon differ: the manually operated breaker in that twe

buttons are furnished, one for initiating clos main contacts (red) and one for opening (s In addition, a spring indicator is included (y for charged, and (black) for discharged coni


## 3. Safety Tripping

If the breaker is inserted or withdrawn $w$ main contacts in the closed position, a mect linkage automatically trips the breaker separation of the main contacts during with or before closing of the main contacts insertion. The same device prevents the clo: the breaker between positions'test'and'servic

## 4. Anti-Pumping and Control Characteristics

Anti-pumping its assured in both the loc remote control operations. If the local close I is held depressed or a remote closing signal tained, it will be necessary to interrupt this : after tripping breaker, to effect a subsi closing.

If tripping is a result of overload or short current and the breaker is equipped with reset lockout device, it is necessary to com| depress the trip button in order to effect sequent closing.

By padlocking the local trip button in a def position, it is impossible to close the $t$ Ineallv ne remntelv sinep the latrh haldi
charged closing springs cannot be released.
Maintaining a remote tripping signal nullifies any remote or local closing action. It is possible to depress the local close button causing the closing spring to release; however, the main contacts will not close until the remote tripping signal is removed. Should it be desired to prevent accidental closing when the local trip button is released, an undervoltage release device with lockout must be used for remote tripping.

Where electricatly operated breakers equipped with an undervoltage release are closed by a constant signal, there are two possible methods of operating, depending upon whether the closing electromagnet and undervaltage release are energized by the same source or separate sources.

> Common Source: Voltage drops - breaker trips Voltage restores - breaker automatically closes

Separate Source: Voitage drops - breaker trips Voltage restores - breaker remains open

The closing signal must be momentarily removed in order to reclose the breaker. If a closing signal is maintained even when the closing spring is discharged, the breaker will automatically close at the completion of spring charging. This would occur where voltage is applied simultaneously to the charging motor and closing electromagnet. The latch keeping the closing spring charged cannot be released if the breaker is in the closed position.

## 5. Auxiliary Circuits (Cradle/Element)

The SSPB breaker can be equipped with a maximum of 24 secondary isolating contacts. Each contact is designed to accept two $1 /{ }^{\prime \prime}$ quick disconnect lugs per terminal.

The secondary isolating blocks may contain up to twenty-four (24) terminals, twelve (12) on each side, which may be used for breaker operation and alarm circuits. Internal wiring of breakers is numbered in conformity with standard wiring diagrams. The terminals of the secondary or stationary isolating contacts on the cradle are arranged and connected in a manner to permit interchangeability of similar elements.

Six terminals of the secondary isolating block are
required to operate electrically operated brea Two of these terminals are made contin through the test-service position in order to vide power for the spring charging motor. remaining four are for closing and tripping.

In some applications, it may be necessar electrically connect the breaker in the $c$ service position differently from that in the position. This can be accomplished by reme the test or service terminal. After the fixed sec ary isolating contact block has been remove is only necessary to remove the terminal by screwing the fixing screw and breaking the bl between the test and service contacts at the provided for this purpose.

To protect the auxiliary wires from physin coming in contact with moving parts when breaker is being inserted or withdrawn, an ench passage, located at the point of exit from stationary isolating terminal blocx, is provided.

## 6. Auxiliary Circuits (Devices)

Auxiliary contacts may be added as an acces either on electrically or manuaily oper breakers. A built-in time differential of 15 n seconds is available between contact group ; tions 1-8 and $9-16$ for sequence logic. Cor positions 9.16 act simultaneously with $r$ contacts.

## 7. Arrangement of Cubicle Door

The cubicle door for drawout air circuit bre: elements is provided with an opening permit entry of the control board or front escutct plate. A retracting collar surrounding the escu eon plate permits the operator to rack the bre: element from the service position to the tes fully open position without opening the cut door. it is, therefore, possible to store brea without fear of unauthorized personnel ha' access to them.

## 8. Static Sensors

Static sensors consists of separate printed circ for long time, short time, instantaneous, ground fault tripping. Components are pre-z and factory calibrated to insure utmost tript accuracy. No field calibration is required. Si cards have been designed for plug-in field inst: tion, it is possible to change systems by sir
ordering cards from your nearest Syivania office. When ordering ground fault, it is necessary to indicate whether the system is three or four wire. On a four wire system, a neutral CT will be fumished with the logic card. This CT must be installed in the neutral bus and wired to the

breaker in accordance with included instructions. The ground fault logic card includes a retractable target that indicates tripping under ground fault conditions.

## 9. Setting of Static Trip Sensors

In order to prevent damage to static sensor pins, the following procedure should be followed when selecting or changing sensor settings.

1. Loosen two bottom screws holding transparent plastic shield.
2. Raise shield to clear bolt heads and lift out.
3. Select values of sensors desired.
4. Place thumb and forefinger on shorting bar and pull bar forward until shorting pins are cleared.
5. Raise or lower shorting bar to pre-selected sensor value.
6. Return shorting bar to pins until fully reseated.
7. Replace protective shield and tighten screws.


Multi-ratio window type current transft mounted at the rear of the circuit breaker el provide signal source for the static trip st Since these sensors for initiating breaker trip all necessary energy from the current monitor external energy source is required. (Any accessory for breaker tripping must be prt with a separate power source.)

To change tripping range of breaker, transpo wire on each of three current transformers. nals are marked to indicate primary current st When making this change on a four wire s with ground fault indication, it is necess: change the current transformer located i neutral bus (rear of switchboard) accordingly

## 11. Padlocking

All SSPB breakers are provided with mear using a maximum of three padlocks ( $1 / 4^{\prime \prime}$ to shackels) to lock the breaker in the open tripped position. To apply padlocks, it is nec to place the breaker in the tripped positic depressing the local trip buton. While holdir trip button depressed, withdraw horizonta located adjacent to trip button and apply pad With this bar withdrawn, the trip button is $h$ the depressed position, thereby preventing cic

## 12. Key Interlocks

If the cradle is provided with a key interloci following procedure should be followed for lo the breaker out:

Withdraw breaker eiement to fully disco position by turning crank counterclockw stop. (This operation may be performed cell door ovened or closed.) Turn $k$
cylinder to remove. If key will not rotate in cylinder, turn cradle crank approximately 15 degrees to permit alignment. When stops are aligned, key will rotate for removal.

With this interlocking system, it is possible to remove the element from the cradle for either maintenance or replacement without permitting element insertion until the key has been returned to the key cylinder block.
13. Optional Devicas

Shunt Trip (S.T.) This device will trip the
when energized by a voltage source of 65: $130 \%$ of rated voltage. An auxiliary conta series with the coil opens and removes st voltage when breaker is open.

Undervoltage Trip (U.V.) When the voitage drops below $30 \%$ of rated voltage, the bre: tripped. In the region of $30 \%$ to $60 \%$ of voltage, tripping may or may not occur. N ping action will occur when the supply volt $60 \%$ to $100 \%$ of rated voltage.


## 111. MAINTENANCE

## 1. Frequency

The frequency of maintenance depends essentially on the conditions of service of the breaker, frequency of operation, fault tripping, relative humidity, or presence of dust.

The mechanical endurance of the breaker is 20,000 operations with the main contacts being guaranteed for the life of the breaker. Arc chutes and the arcing contacts are guaranteed a minimum of 1500 make-break operations at the nominal current and voltage ( 0.2 to unity power factor), 10 makebreak operations at 10 times raced current, or 3 make-break operations at rated short circuit.

To insure performance, it is recommended that breakers be inspected every six months if exposed to dust, every 3000 operations or every six months if left idle. In general, breakers should be inspected at least once a year.

## 2. Arc chutes (Fig. 5)

Remove arc chute by depressing or raising back part of retaining lever 61 and rotating clockwise 90 degrees. Lift are chute upwards clearing arcing horns.

(ㅁ)
Fig. 5

Wipe the insulating surfaces clean with a dry piece of cloth. The two insulating barriers covering the inside of the arc chute walls may be blackened. In that case, they can be wiped clean of carbon deposits to restore them to their original quality. At the end of 3000 make-break operations at rated current, or 10 times at rated current, or 3 times at rated short circuit, it is recommended that the arc chutes be dismantled and the insulating barriers tumed around so as to have fresh surfaces facing
the arc. This operation enables doubling it of the are chutes. After two cycles, it is nec, to replace the arc chutes.

## 3. Poles <br> (Fig. 6)

Insulating barriers are located on each side , arcing area for each pole. With a piece of clea cloth, wipe barriers to remove any deposits.


Fig. 6

Close breaker and check gap setting of horns. If gap exceeds 1.5 mm ( 0.059 inches). contacts by ioosening boit * VI dFig. 6) settir to $0.9 \mathrm{~mm} \pm 0.1 \mathrm{~mm} 10.035 \pm 0.004$ inches tightening boit by torquing to $0.8 \mathrm{~mm}-\mathrm{kg}$. ( $\{$ ft.). Remove both fixed and movabie horns along with insulating barriers when this of arcing pads erodes to approximately 0 ( 0.020 inches).

Main contacts may have spots on them $w$ affecting the breaker. These contacts c : cleaned with a very fine emory cloth and tho ly wiped to remove any particles. Do not $r$ main contacts as they are guaranteed for the the breaker.

With drawout breakers, clean the main isc contacts of the breaker and the correspe cradle contacts with a piece of clean cloth s in trichlorethylene. Apply a light coat of Sy SSPB-01 grease to the cleaned surfaces.

## 4. Breaker Element Pole Assembly (Fig. 7)

The pole assemblies are maintained undi $\mathrm{m}-\mathrm{Kg}$. (2.9 $\mathrm{lb} . \mathrm{ft}$.) pressure by each of six (three per side) located on the outside surf the breaker element. They may be identif being painted red. Torque each bolt for $c$ tightness.


## 5. Auxiliary Contacts (Fig. 8)

The auxiliary contacts located on the front right hand side of the eiement should not be cleaned or adjusted. A faulty relay should be replaced by placing the breaker contacts in the closed position and removing hold-down screws V3. Auxiliary contacts are only found on electrically operated breakers as a standard itern since one of the contacts are required for isolating the shunt trip coil when the breaker is open.

## 6. Devices

Under voltage, shunt trip, and solid-state trip devices do not require maintenance. In case of failure, replace the complete device.


A breaker normally lubricated and operating dust-free and non-corrosive atmosphere. regt over a period of two years can undergo its nc cycle mechanical endurance without any I cating. As such ideal service conditions are $h$ i encountered, it is advisable to check periodi the lubricating, particularly when unusual ce. or friction is observed during inspection.

All rubbing surfaces (metal to metal) are ti lubricated with a thin film of high-tempera high-pressure lubricant equal to Syivania SSPE Hardened grease and dirt stould be remover use of trichlorethylene solvent. The main si trip rod, intermediate manual control shaft, return charging spring and gear train for elect operation do not require lubrication since the, provided with sealed bearings. Do not lubricate releases or grounding terminal.

## IV. ADJUSTMENTS AND INSPECTIONS

The following adjustrnents and inspections were performed at the factory following installation of various accessories. These procedures may be followed for field adjustment and inspections, realizing that/rolerances are based upon the life of nomal mechanical endurance for breakers. For normal service, the limits of admissibie wear has beeniincluded. When these limits are reached, it is necessary to either readjust the components to the dimensions shown, or to replace cornponents if these dimensions cannot be met.

## A. CRADLE ACCESSORY

 (16004 and 20004 frames only) a. Service position (Fig. 9).Adjust screw (10) to insure operation of the limit switch $3 \mathrm{~mm} \pm 0.5$ (0.118 $\pm 0.020$ inches) before the service $\pm 0.020$ inches) before the service
position stop. (Eliminate play by pulling on telescopic rails while making adjustments.

Fig. 9
b. Test position

Adjust the support (11) and the two screws (12) to insure the operation of the limit switch 3 mm ( 0.118 inches) before the test position in the direction of withdrawai. (Eliminate play by pushing on rail while making adjustment).
c. Isolated position

Adjust the support (11) and the two screws (12) to insure operation of the limit switch 2 mm ( 0.079 inches) before the stop of the isolated position. (Eliminate play by pushing on rail A

## 1. Limit switch for position indication


B. CIRCUIT BREAKER

1. Breaker Assembly (Fig. 10)
a. Tightening of pole assembly Tighten six screws (1) painter torquing to $0.4 \mathrm{~m}-\mathrm{kg}(2.9 \mathrm{lb} .-\mathrm{ft}$ ).





$\qquad$ -
2. Overload and short circuit release
a. Tripping (Fig. ${ }^{12 \text { ) }}$
1) Adjustment. With breaker in closed position and release reset, back off red nut until neariy all threads are exposed. Tighten same nut until distance between tripping striker (111) and lug (12) of the latch (13) shown in the normal position is


Fige 12
2) Inspection. Place breaker in closed position and check to see that there is a minimum clearance of 0.5 mm ( 0.020 inches) between the tripping striker (11) and lug (12) of the latch (13) shown in the normal position. LIMIT OF WEAR: 0.1 mm 10.004 inches).
To test tripping of breaker by the release crank, place a wire hook as shown in Fig. 13 and hold while applying a momentary signal of 12-18 volts D.C. to the tripping actuator EX. When release unlarches, slowly allow release crank to withdraw until breaker trips open.


Fig. 13
NOTE: Restraining release crank (14) while performing this test results in the blocking of reserting which occurs when breaker opens
or trips. Therefore, using restore release crank to its re: latched position.
b. Resetting

1) Breaker equipped with sign dication with memory for ovi and short circuit release (wi without indication.) (Fig. 14).
a) Adjustment. When breake equipped with this accesse is necessary to place breal open position and adjust (16) to effect latching $t$ lease. A very distinct indicates latching. To ins margin of safety, unscrew a turn.
b) Place breaker in open po and check to see that 1.5 ( 0.059 inch) clearance is able.
LIMIT OF WEAR: Non-I ing.

2) Breaker equipped with sigr dication on overload and shc cuit tripping with local re: (Fig's 15 and 16).
a) Adjustment. Insert wire he shown in Fig. 13 and he lease crank (14) while ap momentary signal of $9-1 \varepsilon$ DC to the tripping actuatc When release unlatches, s allow release crank to witt to tripped position shov Fig. 15. With the release
tripped position and the crank (10) resting against stop (20), adjust link (21) to allow $1=$ $0.5 \mathrm{~mm}(0.039 \pm 0.020 \mathrm{inch})$ clearance. Press the local tripping pushbutton (23) while adjusting screw (24) to effect resetting of the release. A distinct click will be heard when the release crank latches. Unscrew one tum to insure a margin of safety in resetting.
b) Inspection. With the breaker in the open position, press the trip button (23) Fig. 16 and check travel of release bar. Distance between maximum position of reset and latch should be $0.5 \mathrm{~mm}(0.020$ inch). Check play between lever (24) and adjustment screw (24) for a minimum of 0.2 mm ( 0.008 inch). Press the pushbutton fully to check for a minimum clearance of 0.2 mm ( 0.008 inch) between lug (12) of the latch (13) and the bottom of the slot.
4. Voltage Tripping Devices (Accessory)
A. Tripping (Fig. 17 and 18)
1) Adjustment. Place breaker in open position and unscrew adjusting reset screw (30). With release bar in latched on position resulting from breaker being in open position, adjust linkage (26) to provide $1=$ 0.5 mm ( $0.039 \pm 0.020$ inch) between lever (28) and lug (12) of the latch (13).
2) Inspection. Place breaker in closed position and inspect :I that a minimum of 0.5 mm /C inch) exists between lever ( $2 \varepsilon$ lug (12) of the lever (13) shov the normal position.
LIMIT OF WEAR: $0.1 \mathrm{~mm} /(\mathrm{C}$ inch).
Holding the striking pin ( 2 S illustrated in Fig. 23, apply voltage to the hoiding coil, pl release bar in unlatched posi Remove voltage and allow re bar to slowly withdraw obse


Fig.
breaker tripping.

- NOTE: in order to prevent block. ing of the release bar from being reset when breaker opens, it is necessary to return release bar to its latched position by means of the hook illustrated in Fig. 23.
B. Resetting

1) Adjustment. With the breaker in the open position and the release bar latched as illustrated in Fig. 14, adjust screw (30) lengthening linkage until stirrup is against stop (29), then back off $1 / 2$ tum.
2) Inspection. Place breaker in latched position as illustrated in Fig. 18. Check for minimum clearance of 2 mm ( 0.079 inch). LIMIT OF WEAR: Non-Latching


Fig. 18
5. Auxiliary Contact Block Support Adjustment (Fig. 19).


With contact blocks removed, adjust (32) until distance shown in Fig. 1 $44.5 \pm 0.5 \mathrm{~mm}(1.753 \pm 0.020 \mathrm{inch})$.
LIMIT OF WEAR: Overall travel of a iary contact should not exceed 0.1 (0.004 inch).
6. Limit switch on Trip Rod (Accesse Limit switch for signal indication of ing on overload and short circuit.
A. Adjustment (Fig. 20). Place breakı closed position with overcurrent short circuit release bar latched. form strip 136 to obtain clear between strip (36) and spring pin (

8. Inspection. Check operation of mi switch by tripping breaker.
7. Limit switch on voltage release (Accessc The undervoltage crelease device can equipped with two separate limit switc One will indicate when the undervol release bar is latched and the other indicate undervoltage coil being energiz
A. Limit switch for Latch Indication. $P$ bar in latched position as showr Fig. 17 and 18. In this position, limit switch contacts will be cle Deform strip (38) Fig. 21 to provi maximum gap setting of 1 mm ( 0 . inch) between strip (38) and lug ( NOTE: This adjustment must be formed without applying voltage to undervoltage holding coil. Follov adjustment, operate voltage re! device permitting release bar to latch. Inspect limit switch to see contacts open.


Fig. :
B. Limitswitch for Voltage Indication. This limitswitch has no adjustments. Check position of contacts by applying and removing "voltage to holding coil of solenoid.
8. Closing Adjustment Electrically Operated Breakers
A. Adjustment (Fig. 22). Place breaker in tripped position with closing springs fully charged. Adjust screw (44) to obtain $4 \pm 0.5 \mathrm{~mm}(0.158 \pm 0.020$ inch) clearance between lever (45) and end of screw (44). Adjust screw (46) on trip button for $4 \pm 0.5 \mathrm{~mm}(0.158 \pm$ 0.020 inctl clearance between strip (47) and screw end (46).

NOTE: Breakers fitted with a D.C. electromagnetic for closing have a series resistance (economizer) which is placed in series with the coil, after pickup. thereby reducing current consumption to a minimum. To adjust, hold 1 mm ( 0.039 inch) gap setting of the electromagnet and deform limitswitch strip until contacts close.


Fig 22
B. Anti-Pumping Inspection. Mechanically operated breaker. Depress trip button and hold while charging and unlatch closing springs. Breaker contacts must remain open.
Electricaily operated breaker. Close breaker by depressing local close button and allow gear motor to charge stored energy springs. While holding close button depressed, depress trip button. Breaker must trip and remain tripped until close button is released for next cycle of operation.
C. Undervoltage lockout (Fig. 23). When the undervoltage release is provided with lockout to prevent breaker re-

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E. Undervoltage and Shunt Trip Release (Fig. 28). To remove trip device (8), place breaker in open position and remove coil wires from terminal block (81) located on rear of breaker. By removing pin (86) and mounting nuts (82), the device may be removed. When replacing trip device, iubricate and adjust as deseribed in Chapter IV under Voltage Tripping Devices.
F. Secondary Isolating Contact Block (Fig. 29). Removal of contact block is accomplished by removing wiring and mounting screws illustrated in Fig. 29.

G. Motor (Fig. 30). To gain access to motor, remove protective cover (5) held by two boits (3). After removing wires from terminal block (4) and mounting nuts (6), lift motor from gear train. When replacing motor, check to see that clearance exists between pinion and gear. No further adjustment is required after motor is properly aligned.

H. Closing Solenoid (Fig. 31, 32). Slide coil housing from plunger (Fig. 31) after remo coil wires from terminal block (4) and mounting bolts (11). (Fig. 32) If breaks equipped with closing preventer which we be mounted adjacent to the closing solen the coil and housing cannot slide sideways. I

therefore, necessary to remove horseshoe retaining washer (8) and linkage pin from plunger so complete assembly may be lifted out. Coil may be removed from hoúsing as illustrated in Fig. 31. When replacing, make adjustments as described in Chapter IV, Voltage Tripping Devices.
shown.
When replacing limitswitch, follow adjustm instructions outlined in Chapter IV, Lin switch On Trip Rod.

I. Closing Preventer (Fig. 32). The closing preventer (19) located directly behind the closing solenoid, may be removed by removing coil wires and two holddown boits from base (5). When replacing closing preventer, make adjustments as described in Chapter IV, Undervoltage Lockout.
J. Fixed Secondary Isolating Contact Blocks (Fig. 33). Removal of blocks may be simplified by removing three screws ( 1 ) in wire guard and removing holddown screws (2) as illustrated.

K. Limitswitch for Fault Indication (Fig. 34). The limitswitch for fault indication located on the underside of the element may be removed by



Fig. 34
L. Undervoltage and Shunt Trip Limitswitch (Fig. 35).

1. Limitswitch for trip indication. To remo the limitswitch (28) for indicating trippi by undervoltage or shunt tripping, bre: connections and remove screws (178 When replacing limitswitch, follow adju: ment instructions outlined in Chapter I' Limitswitch On Voltage Release.

2. Limitswitch Operating on Undervoltage. Limitswitch (29) used to indicate voltage being applied to holding coil of solenoid may be removed by breaking connections and removing screws (43).

When replacing limitswitch, move armature of solenoid to see that limitswitch does not prevent solenoid from closing. Adjustment may be made by bending limitswitch lever.


## ZII REPLACEMENT PARTS



## VI. REPLACEMENT PARTS - CONTINUED

| Devoription | Replacemment Pare Na | $\begin{aligned} & \text { Pare } \\ & \text { No. } \end{aligned}$ |
| :---: | :---: | :---: |
| Key Interlock for Draw-out ACB | 536-0000-0500 | Not S |
| Printed Clrcuit Board - long time | 538-0000-0002 | 3 |
| Printed Clreuit Board-short dime | 538-0000-0003 | 3 |
| Printad Circuit 8oard-instantaneous | 536-0000-0004 | 3 |
| Printed Circuit Board - ground fault | 536-0000-0005 | 3 |
| Solid State Relay without Cards | 538-0000-0001 | 4 |
| Safety Shutter - 800 A | 536-0803-0020 | - |
| Safuty Shutter - 1600 A | 536-1603-0020 | - |
| Safaty Shutter - 2000 A | 536-2003-0020 | - |
| Fiexible Crank | 538-2000-0091 | Not S |
| Standard Crank | 536-2000-0090 | Not S |
| Shumt Trip Device - 110 VAC | 536-0000-0100 | 8 |
| Shunt Trip Device - 220 VAC | 538-0000-0101 | 8 |
| Shunt Trip Dovice - 460 VAC | 536-0000-0102 | 8 |
| Shumt Trip Device - 48 VOC | 538-0000-0103 | 8 |
| Shunt Trip Device - 125 VDC | 536-0000-0104 | 8 |
| Shurt Trip Device - 240 VDC | 536-0000-0105 | 8 |
| Undervaltage Trip Device - 110 VAC | 538-0000-0110 | 8 |
| Undervoltage Trip Device - 220 VAC | 536-0000-0111 | 8 |
| Undervoitage Trip Device - 460 VAC | 538-0000-0112 | 8 |
| Undervoltage Trip Device - 48 VDC | 536-0000-0113 | 8 |
| Undervoltage Trip Device - 125 VDC | 536-0000-0114 | 8 |
| Undervoltage Trip Devica - 240 VDC | 536-0000-0115 | 8 |
| Undervoltage Time Delay Device - 110 VAC | 536-0000-0120 | 8 |
| Undervoltage Time Delay Device - 220 VAC | 536-0000-0121 | 8 |
| Undervoltage Time Delay Device - 460 VAC | 536-0000-0122 | 8 |
| Undervoltage Time Defay Devics - 48 VDC | 536-0000-0123 | 8 |
| Undervoltage Time Delay Device - 125 VDC | 536-0000-0124 | 8 |
| Undervoitage Time Delay Device - 240 VDC | 536-0000-0125 | 8 |



 InTry


Cradis Limitswitch Contact Rating


Man. Currort

## Short Ciresit Indication Limitwwitch C-2

| Loed |  | Mase Votare |  | Max Curremt |
| :---: | :---: | :---: | :---: | :---: |
| sisti | - | 125 V A.C. | 0 | 5. |
|  |  | 250V A.C. |  | 2.5 |

Overload and Short Circuit Indication Limitswitch C-1

Leed
Resistive

Mane Voleap

$$
\begin{array}{ll}
\text { Manz. Voltog } & \text { Max. Curromt } \\
115-230 \text { A.C. } & 8 A \\
110 \text { V D.C. } & 0.5 \\
220 \text { D.C. } & 0.2 \\
115-230 \text { A.C. } & 5 \\
115-230 V & 3
\end{array}
$$

-Undervoltage, Time Delay, Undervoltage, and Shunt Trip
Indication Limitswitch (C-3) (C.5)

| Loed | Mase. Vortage | Max. Currome |
| :---: | :---: | :---: |
| Resistive | 115-250V A.C. | 8A |
|  | 110 V D.C. | 0.5A |
|  | 220 V D.C. | 0.2A |
| Reactive | 115-250V D.C. | 5A |
| Lighting | 115-250V A.C. | 3A |

Energized Undervoltage Relay Indication Limitswitch (C-4)

Loed
Resistive

Mare Voltape
115-250V A.C.
125V D.C.
クEMM ค

Max. Currert

