

**SIEMENS**

## **Information and Instruction Guide**

**E Frame  
Type CLE-A**

# **ITE<sup>®</sup> Molded Case Circuit Breakers**



### **I-T-E E Frame Type CLE-A Model ETCL 2 and 3 Poles 15-125 Amperes**

#### **WARNING**

Dangerous voltages are present inside the enclosures, or panels in which this circuit breaker is installed. Serious injury, electrocution, and/or equipment damage is possible unless extreme caution is used when examining this circuit breaker while it is still in service.

De-energize all incoming power if conditions exist which are contrary to those described in this instruction book or which are otherwise unusual.

Only qualified personnel should work on or around this equipment.

---

## TABLE OF CONTENTS

---

Important Notices .....	2,4
General Instructions .....	5
Dimensional Reference Drawings .....	6,7
Pressure Wire Connectors .....	8

### Accessories:

Shunt Trip Installation .....	9,10
Undervoltage Trip Installation .....	9,10
Auxiliary Switch Installation .....	9,10,11
Bellalarm Installation .....	9,10
Auxiliary Switch Kits .....	11
Accessory Combinations Recommended .....	11
Electrical Data, Shunt Trip .....	12
Electrical Data, Undervoltage Trip .....	12
Ground Fault Sensor .....	13,14
Rear Connecting Studs For Circuit Breaker .....	15
Plug-In Adapters For Circuit Breaker .....	16,17
Handle Blocking Device .....	18
Padlocking Device .....	18
Rotary Handle Operator, E2RHV9 .....	19,20,21
Rotary Handle Operator, D11CEU1 & D11CEU2 .....	22,23
Rotary Handle Operator, RHOESD & RHOEVD .....	24,25
Rotary Handle Operator, E2RH1 .....	26,27
Flange Mount Handle Operator .....	28,29,30,31,32
Door Latch Mechanism, DKR2, DKR3, DKL2, DKL3 .....	33,34,35
Side Handle Operators, D11EW & D11ERU .....	36,37
Connecting Straps .....	38
Enclosures .....	39,40

### Operating Characteristics:

Time Current Curve .....	41,42,43
Ordering Information .....	44,45,46

### Miscellaneous:

UL Listings and File Number .....	47
-----------------------------------	----

### IMPORTANT

The information contained herein is general in nature and is not intended for specific application purposes nor is it intended as a training manual for unqualified personnel. Refer to Note for definition of a **qualified person**\*. It does not relieve the user of responsibility to use sound practices in application, installation, operation and maintenance of the equipment purchased or in personnel safety precautions. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence. I-T-E Circuit Protection Division of Siemens Energy & Automation, Inc. reserves the right to make changes in specifications shown herein or add improvements at any time without notice or obligation.

### NOTE

**\* Authorized and qualified personnel-**

For the purpose of this manual a qualified person is one who is familiar with the installation, construction or operation of the equipment and the hazards involved. In addition, he has the following qualifications:

- ( a ) **is trained and authorized** to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.
- ( b ) **is trained** in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- ( c ) **is trained** in rendering first aid.

### NOTE

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local I-T-E sales office of Siemens Energy & Automation.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens Energy & Automation, Inc. The warranty contained in the contract between the parties is the sole warranty of Siemens Energy & Automation, Inc. Any statements contained herein do not create new warranties or modify the existing warranty.

### NEMA PROCEDURES NOTE



Dangerous voltages are present in the equipment which can cause severe personal injury and product failure. Always de-energize and ground the equipment before maintenance. Maintenance should be performed only by qualified personnel. The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel will result in dangerous conditions which can cause severe personal injury or equipment damage. Follow all safety instructions contained herein.

# GENERAL INFORMATION FOR I-TE E FRAME, TYPE CLE-A CIRCUIT BREAKER 2 AND 3 POLES, 15-125 AMPERES

## General

CLE-A – Current Limiting Sentron circuit breakers are calibrated for operation in an ambient of 40°C and are for use in panelboards, switchboards and individual enclosures. They are available with non-interchangeable trip units and molded case switches.

Sentron circuit breakers combine thermal magnetic construction for overload protection and a patented “blow-apart” contact arrangement for current limiting protection under high fault interruption conditions. This combination of old and new principles creates a device that easily meets the requirements for current limiting circuit breakers, as outlined in the National Electrical Code (240-11) ① and UL 489, paragraph 2.4A ② of the Underwriters Laboratory. To this end, Sentron circuit breakers have no fuses to replace when they have been required to function due to short circuit conditions. The common trip feature of the circuit breaker is completely retained so that all poles of the circuit breaker open when an overload or short circuit occurs.

Pressure wire connectors, suitable for use with aluminum or copper wire are available for all CLE-A circuit breakers. Rear connection studs or plug-in connector assemblies are also available (2 and 3 pole). The latter type of arrangement permits the removal of the circuit breaker from its leads without physically coming in contact with either the line or load terminals. Special features such as shunt trip, auxiliary and alarm switches and undervoltage trip devices are available for field adaptation. These devices are mounted externally and UL listed, page 47. Information concerning these special devices can be found on page 45.

## Thermal Magnetic

CLE-A circuit breakers provide complete overload and short circuit protection by use of a time delay thermal trip element and an instantaneous magnetic trip device. Fixed instantaneous trip values are shown in the table below:

Breaker Amp Rating	FIXED INSTANTANEOUS BAND
15- 25	400 – 700
30-125	600 – 900

Circuit breakers are calibrated at the factory, under controlled temperature conditions of a 40°C (104°F) ambient, to meet requirements as outlined in UL-489 standard for molded case circuit breakers. Catalog information is found on page 44.

## Molded Case Switch

A molded case switch is available in the CLE-A type circuit breaker. It uses the same operating mechanism as the thermal magnetic and magnetic only units. A preset instantaneous function is factory installed to allow the switch to trip and protect itself at a high fault condition. No overload or low fault current protection is provided. This protection must be supplied by separate overcurrent devices. Catalog information is located on page 44.

## Interrupting Ratings

The interrupting ratings of the CLE-A Sentron circuit breakers are based on procedures and standards established by the Underwriters Laboratory.

Volts AC	Amperes RMS Symmetrical
240	200,000
480	150,000
600	100,000

## Circuit Breaker Operation

With the mechanism latched and the contacts open, the operating handle will be in the “OFF” position. Moving the handle to the “ON” position closes the contacts and establishes a circuit through the circuit breaker. Under overload or short circuit conditions sufficient to trip or open the circuit breaker automatically, the operating handle moves to a position between “ON” and “OFF” as previously described. To relatch the circuit breaker after automatic operation, move the operating handle to the extreme “OFF” position. Automatic tripping can also be simulated for service maintenance purposes by pressing the red trip button located in the molded case beneath the operating handle.

## Warning for Circuit Breaker Removal

For removal, the circuit breaker should always be in the “TRIPPED” or “OFF” position. If practical, the switchboard, panelboard or enclosure should be de-energized before inspecting, changing, installing or removing the circuit breaker. Never attempt to add an external features pod (module) with the circuit breaker already mounted. If the bus or cable cannot be de-energized, use insulated hand tools, rubber gloves and a rubber floor mat.

### ① National Electric Code

(240-11) “A current limiting overcurrent protective device which, when interrupting currents in its current limiting range, will reduce the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit, if the device were replaced with a solid conductor having comparable impedance.”

### ② Underwriters Laboratory

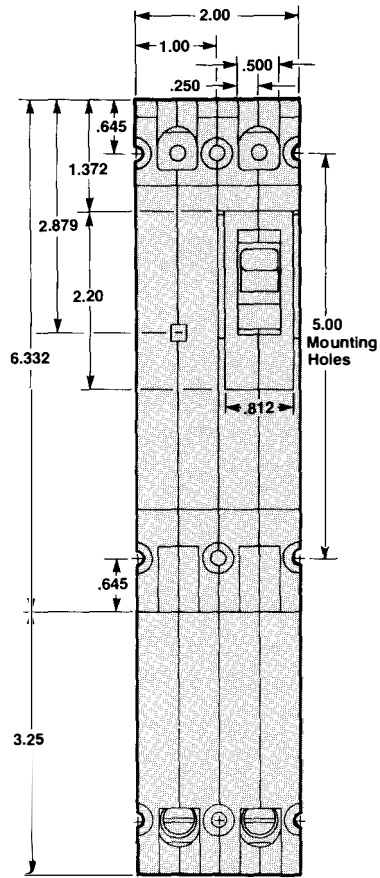
(UL 489, Par. 2.4A) “A circuit breaker that does not employ a fusible element and that when operating within its current limiting range, limits the let-through  $I^2t$  of a  $\frac{1}{2}$  cycle wave of the symmetrical prospective current.”

## Maintenance

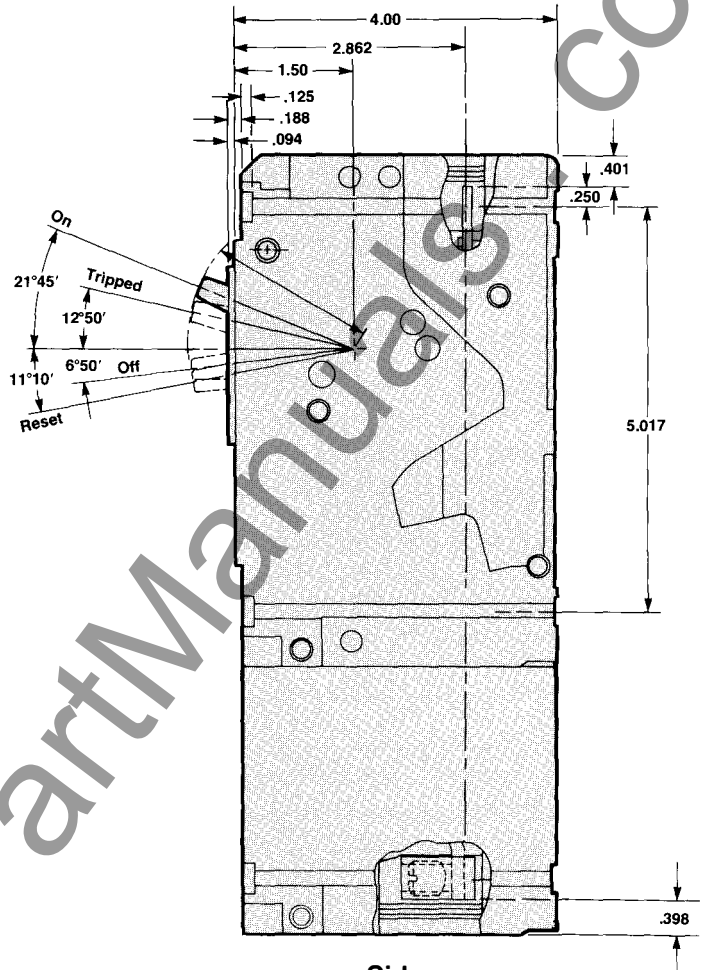
Specific maintenance schedules are recommended in order to assure proper functioning of the circuit breaker. This schedule should include the following items:

- 1) Breaker should trip when “Push To Trip” button is pushed
- 2) All terminal connector screws are at recommended torque values.
- 3) Visual inspection for broken or cracked case. (damage caused by external sources)
- 4) For additional testing information consult NEMA-PROCEDURES FOR VERIFYING PERFORMANCE OF MOLDED CASE CIRCUIT BREAKERS.

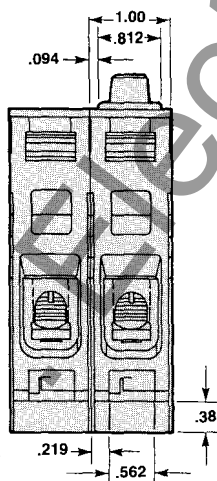
# I-TE E FRAME OUTLINE DRAWINGS – 2 POLE



Front View



Side View



End View

Handle Operating Forces (lbs.)			
Type	On	Off	Reset
2 Pole	8-10	8-10	14

### I-T-E E FRAME OUTLINE DRAWINGS – 3 POLE

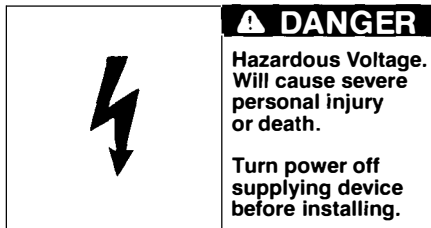
The technical drawings show the following dimensions:

- Front View:** Overall width 3.00 (1.00 + .500 + 1.00), overall height 6.332 (2.879 + 2.20 + .645 + .645). Mounting holes are 5.00 apart. Internal features include a .812 wide central slot and .250 wide side slots.
- Side View:** Overall width 4.00 (2.862 + 1.50 + .125 + .188 + .094). Overall height 5.017 (.401 + .250 + 4.366). The handle is shown in On, Off, and Reset positions with angles of 21°45', 12°50', and 11°10' respectively. A 2.070 wide handle base is indicated.
- End View:** Overall width 1.00 (.812 + .094). Overall height .38 (.219 + .161). Internal features include a .562 wide base and .219 wide side slots.

Type	On	Off	Reset
3 Pole	8-10	8-10	14

Page 7

# INSTRUCTIONS FOR INSTALLING I-TE PRESSURE WIRE CONNECTORS



## ⚠ SAFETY INSTRUCTIONS

1. Place terminal connector body (1) onto breaker tab (2) in terminal cavity (3). See Fig. 1.
2. Insert cable into connector body between breaker tab and cable set screw, except: SA1E025 – place cable between breaker tab and connector body.

3. Hold in place while tightening set screw (4) with a screwdriver or hex wrench on TA1E6125. See Table for proper wire size selection and screw tightening torque.

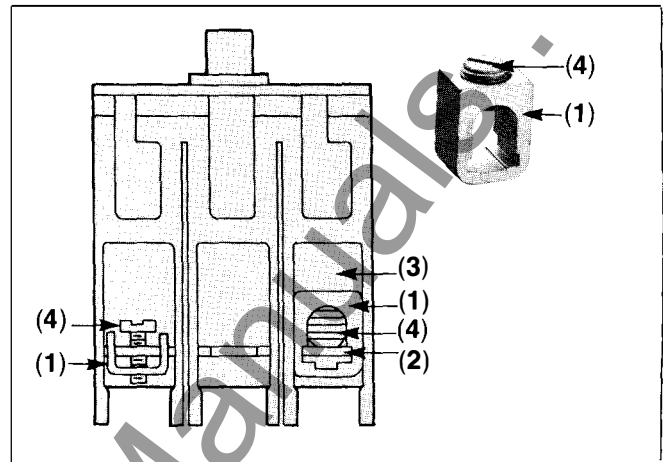
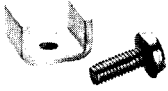




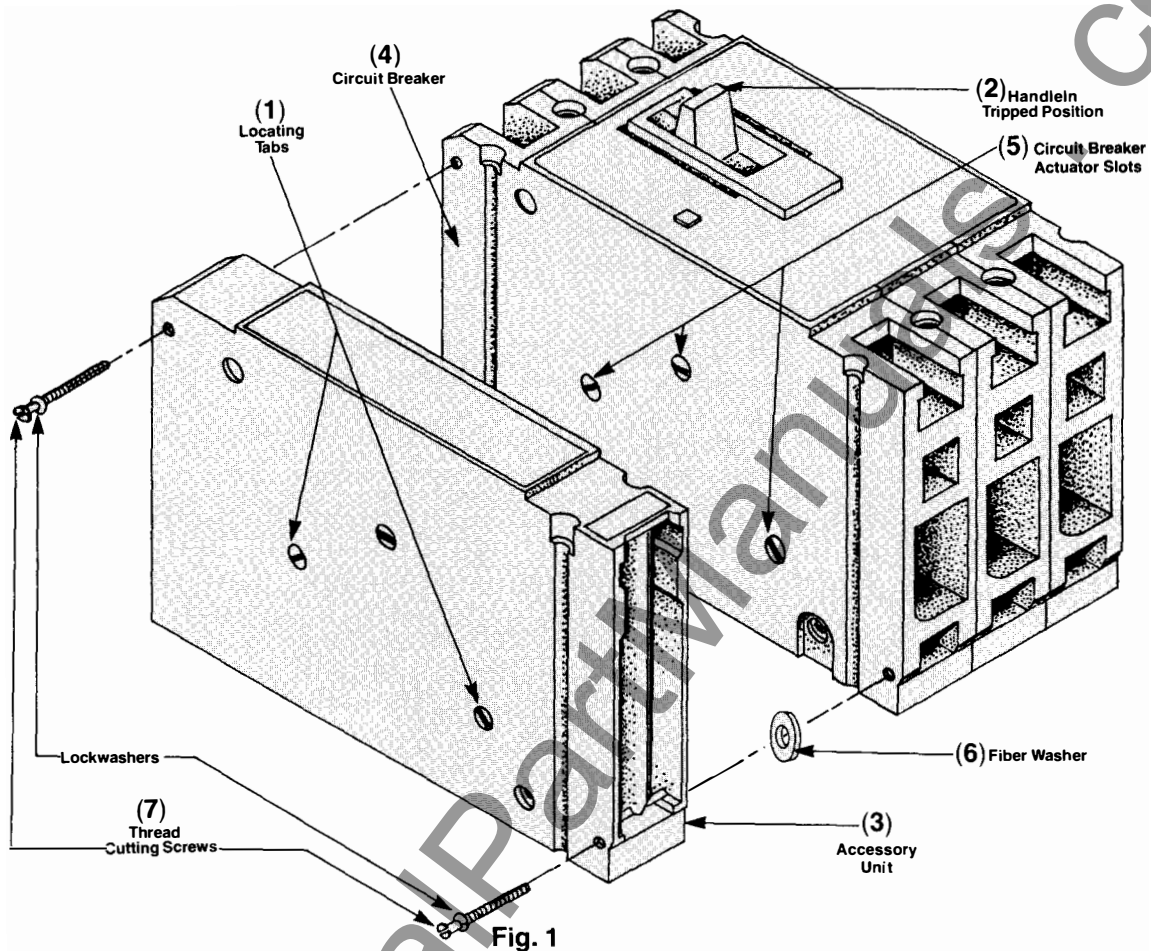


Fig. 1

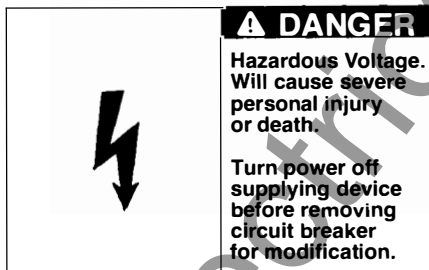
Connector Catalog Number Cu/Al Wire	UL Connector Wire Range	Cable Wire Size	Cable Set Screw Tightening Torque In./Lbs.	Breaker Type E2-A, E4-A, E6-A, HE4-A, HE6-A, E6-A ETI, CLE-A	Breaker Type E2, E4, E6, HE4, HE6, CLE-A
 SA1E025	(1 piece) #14-#10 AWG (Cu) #12-#10 AWG (Al)	#14-#10 AWG	32	15-25 Amps. Line/Load	15-25 Amps. Line/Load
 LN1E100	(1 piece) #10-#1/0 AWG (Cu/Al)	#10 AWG #8 AWG #6-#4 AWG #3 AWG #2-1/0 AWG	20 36 45 50 60	30-100 Amps. 2-3 Pole Line & Load Side 1 Pole Line Side Only	30-100 Amps. Line Side Only
 LD1E060	(1 piece) #10 Cu #8 Cu/Al #6-4 Cu/Al	#10 AWG #8 AWG #6-4 AWG	20 36 45	30-60 Amps. 1 Pole Load Side Only	30-60 Amps. Load Side Only 1-2-3 Poles
 LD1E100	(1 piece) #4 Cu #3 Cu/Al #2-1/0 Cu/Al	#4 AWG #3-#1/0 AWG #2-1/0 AWG	45 50 60	70-100 Amps. 1 Pole Load Side Only	70-100 Amps. Load Side Only 1-2-3 Poles
 TA1E6125	(1 piece) #3-#3/0 Cu #1-#2/0 Al	#3-#3/0 AWG	80	110-125 Amps. Line/Load	—



# **INSTALLATION INSTRUCTIONS FOR I-TE SHUNT TRIP, UNDERVOLTAGE TRIP, AUXILIARY SWITCH AND BELLALARM ACCESSORIES**



**Fig. 1**



## **SAFETY INSTRUCTIONS**

### **Circuit Breaker Preparation**

- A. Before assembling accessory unit to the breaker, make certain that all exposed accessory actuator slots are in line with the locating tabs (1) and the

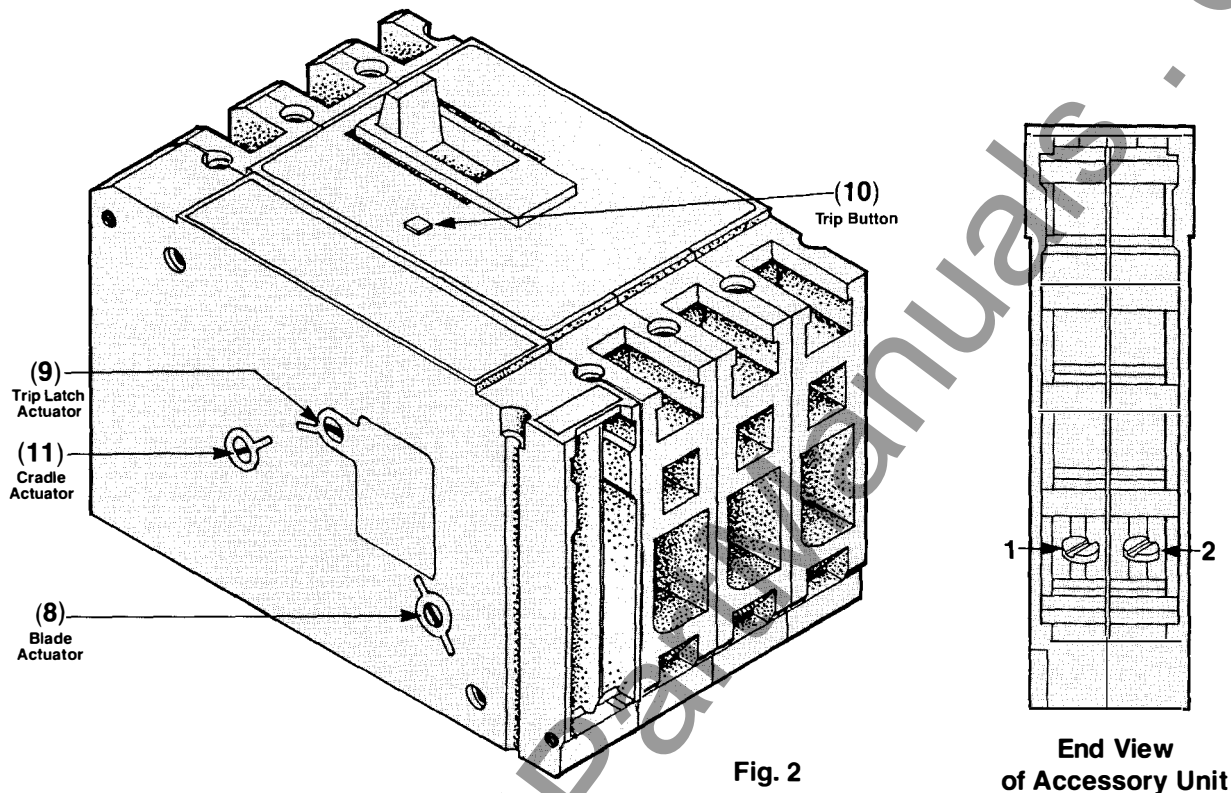
circuit breaker handle (2) is in the tripped position. See Fig. 1.

### **Accessory Mounting Instructions**

- A. Position accessory unit (3) against the side of the circuit breaker (4) carefully to determine that all accessory actuator blades are engaged into the actuator slots of the circuit breaker (5). NOTE: Fiber washer (6) must be placed between the circuit breaker and the accessory unit as shown in Fig. 1.
- B. Secure accessory unit to the circuit breaker using two #6-20 x 1.38 inch long thread cutting screws and split lockwashers (7).

**Note:** 1. Never attempt to mount accessory module while circuit breaker is installed.  
2. Never attempt to add more than one accessory module to the circuit breaker. Combinations must be ordered within a single module.

# MECHANICAL TESTING FOR I-T-E SHUNT TRIP, UNDERVOLTAGE TRIP, AUXILIARY SWITCH AND BELLALARM ACCESSORIES



## MECHANICAL TESTING

### Shunt Trip and/or Undervoltage Trip

- Reset the circuit breaker and turn handle to "ON" position.
- While observing the slotted actuators in the accessory unit, turn the breaker "OFF" and "ON" several times. The blade actuator slot (8) should nearly align with the locating tab when the breaker is "OFF." When the breaker is moved to the "ON" position, the slot should travel clockwise approximately 40°. See Fig. 2.
- Place breaker in "ON" position and observe the trip latch actuator (9). The actuator slot should rotate a few degrees counterclockwise as the trip button (10) is depressed. After the breaker has tripped, the blade actuator slot and the cradle pin actuator slot (11) should nearly align with their respective locating tabs. See Fig. 2.

### Bellalarm

- For units with bellalarm contacts and either undervoltage or shunt trip, follow above directions for shunt trip.

- For bellalarm only. Reset breaker then turn to "ON" position. Trip the breaker, then observe the cradle pin actuator (11). The slot should nearly align with its locating tab. See Fig. 2.

### Auxiliary Switch

- For units with auxiliary contacts and either undervoltage or shunt trip, follow directions above for shunt trip.
- For auxiliary contacts only. Reset the breaker, then turn it to the "ON" position. While observing the blade, turn the breaker "OFF" and "ON" several times. The slot in the blade actuator should nearly align with its locating tab when the breaker is in the "OFF" position. When the breaker is in the "ON" position, the slot should travel clockwise approximately 40°. See Fig. 2.

**Note: 1. Never attempt to mount accessory module while circuit breaker is installed.  
2. Never attempt to add more than one accessory module to the circuit breaker. Combinations must be ordered with a single module.**

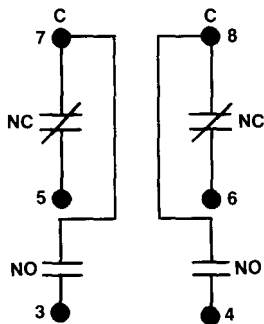
## I-T-E AUXILIARY SWITCH INFORMATION

### AUXILIARY SWITCH KITS

Cat. No.	Number Of Switches	Ampere Rating of Switch				
		AC Voltage			DC Voltage	
		120	240	480	125	250
A01E62	1	5	15	—	.5	.25
A02E62	2	5	15	—	.5	.25
A01E64	1	15	15	15	.5	.25

All switch modules have 3 terminals (if single switch unit) or 6 terminals (if double switch unit).

Wiring diagram illustrates internal function:



Terminal(s)

7-8

C = Common

5-7

NC = Normally closed when circuit breaker is closed.  
"A" Contact

6-8

3-7

NO = Normally open when circuit breaker is closed.

4-8

"B" Contact

### MECHANICAL/ELECTRICAL CHECK

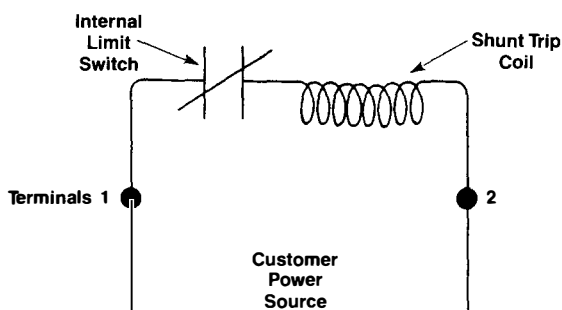
1. Use a buzzer or light attached to switch leads 7 and 5, or (8 and 6 if double auxiliary switch module). With breaker in "ON" position, a light or buzzing noise should be observed.
2. Move handle to "OFF" position. Indicator light or buzzer should turn off.
3. Attach test to leads 7 and 3 or (8 and 4 if double auxiliary switch module). Light or buzzer should turn on.
4. Move handle to "ON" position. Indicator light or buzzer should turn off.

SHOULD THE INDICATOR NOT FUNCTION PROPERLY DURING CHECK PROCEDURE, CHECK FOR INCORRECT INSTALLATION OR WIRING.

# ELECTRICAL CHECK FOR I-TE SHUNT TRIP, UNDERVOLTAGE TRIP, AUXILIARY SWITCH AND BELLALARM ACCESSORIES

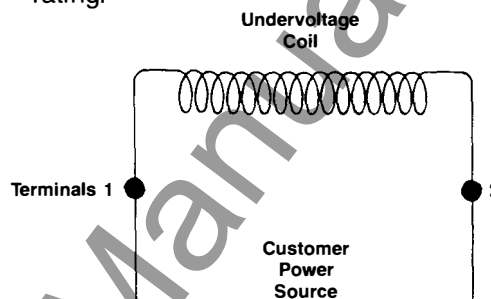
## Shunt Trip Accessories

- A. Reset and turn the circuit breaker handle to "ON" position.
- B. Connect test circuit to accessory terminals 1 and 2 (See Fig. 2, page 15).
- C. Preset test circuit voltage to 55% of the shunt trip voltage rating.
- D. Apply the 55% voltage rating value to the shunt trip device. **It must trip.**
- E. Remove test leads from terminals 1 and 2. Apply a continuity tester or ohm meter to the 1 and 2 terminals. Assure that coil limit contacts are open.



## Undervoltage Trip Accessories

- A. With the circuit breaker in the "OFF" position, apply variable voltage supply leads to the accessory terminals marked 1 and 2 (see Fig. 2, page 15).
- B. Apply 100% of the accessory voltage rating to the undervoltage module.
- C. Turn the circuit breaker to the "ON" position. Breaker must remain closed.
- D. Reduce test voltage. Breaker must trip with voltage level between 70% and 35% of marked accessory rating.



## Bellalarm Accessories

- A. Check continuity of "B" and "B1" contacts per accessory label. See auxiliary and bellalarm information below for definition of normal position.

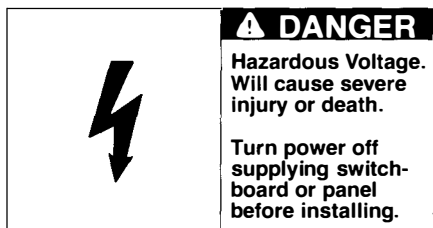
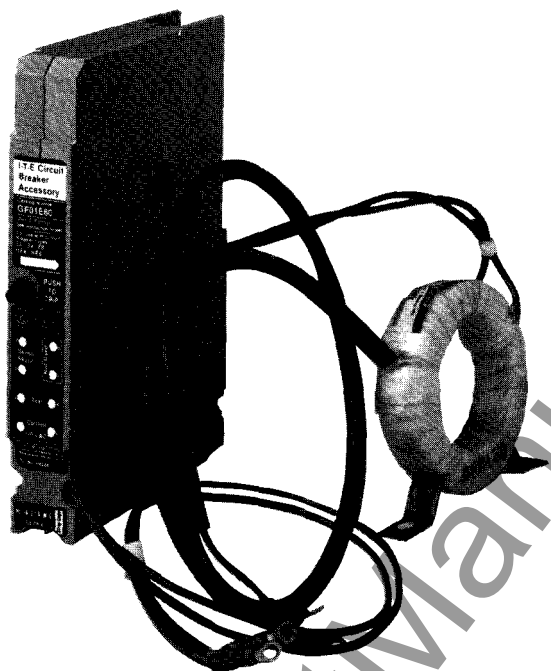
**ELECTRICAL DATA FOR SHUNT TRIP**

Coil Voltage	Inrush Current At Rated Voltage (Amperes)	Cat. No.
60 CYCLES AC		
24	1.200	S17E60
48	0.800	S18E60
120	0.395	S01E60
208	0.265	S02E60
240	0.165	S03E60
277	0.190	S15E60
480	0.145	S04E60
600	0.080	S06E60
DC		
24	2.20	S07E60
48	1.20	S09E60
125	0.50	S11E60
250	0.35	S13E60

**ELECTRICAL DATA FOR UNDERVOLTAGE (UV) TRIP**

Coil Voltage	Sealed-In Current At Rated Voltage (Amperes)	Cat. No.
60 CYCLES AC		
120	.030	U01E60
208	.018	U02E60
240	.016	U03E60
277	.013	U16E60
480	.008	U06E60
*600	.008	U08E60
DC		
24	.110	U13E60
48	.060	U14E60
125	.027	U10E60
250	.020	U12E60

## INSTRUCTIONS FOR I-T-E GROUND FAULT SENSOR



### **SAFETY INSTRUCTIONS**

#### **General Information**

The ground fault circuit sensor/relay module kit functions to de-energize a circuit or portion of a circuit within an established period of time when the current to ground exceeds a predetermined value less than that required to operate the circuit breaker. It performs this operation by detecting up to a 30mA ( $\pm 6$ mA) current difference between two or more load conductors passing through the sensor and actuating the relay to trip the circuit breaker. This current difference normally occurs from a low level ground fault in the load circuit, when load is supplied from a grounded power system.

The relay electronics operates from a 120 VAC, 60 Hz control power source not necessarily related to the load circuit monitored by the sensor. The relay module trip mechanism includes an auxiliary switch contact to de-energize the electronics when the relay module trips the attached circuit breaker.

#### **Installation/Test Procedure**

A. Refer to "E Frame circuit breaker preparation" for breaker preparation, module mounting, mechanical testing and electrical testing of bellalarm contacts (if required). See pages 14-17 in this manual.

- B. The ground fault relay module can be used only with ITE Sensor #64232. Mounting hardware for sensor is supplied by vendor (#10-32  $\times$  .375 screws and lockwashers). Mount circuit breaker/relay assembly and sensor as required.
- C. Sensor comes pre-assembled with leads, terminals and mounting feet. Sensor will accommodate (4) #1 AWG or smaller type TW conductors, or equivalent. Connect control source, sensing leads, "Push To Test" leads, and bellalarm contacts (if required) to terminals on bottom of relay. See Fig. 1 for the proper terminal connections.
- D. Connect load circuit wiring. See Fig. 2.
- E. **Control power for relay must be 120 VAC, (66V-132V), 60Hz. Continuous: .010A at 120V. Inrush (trip): .8A pk max. at 120V.**

#### **Response Time:**

Threshold Level – approximately 2 sec.

115% of pickup – .70 sec. max.

150% of pickup – .30 sec. max.

250% of pickup – .20 sec. max.

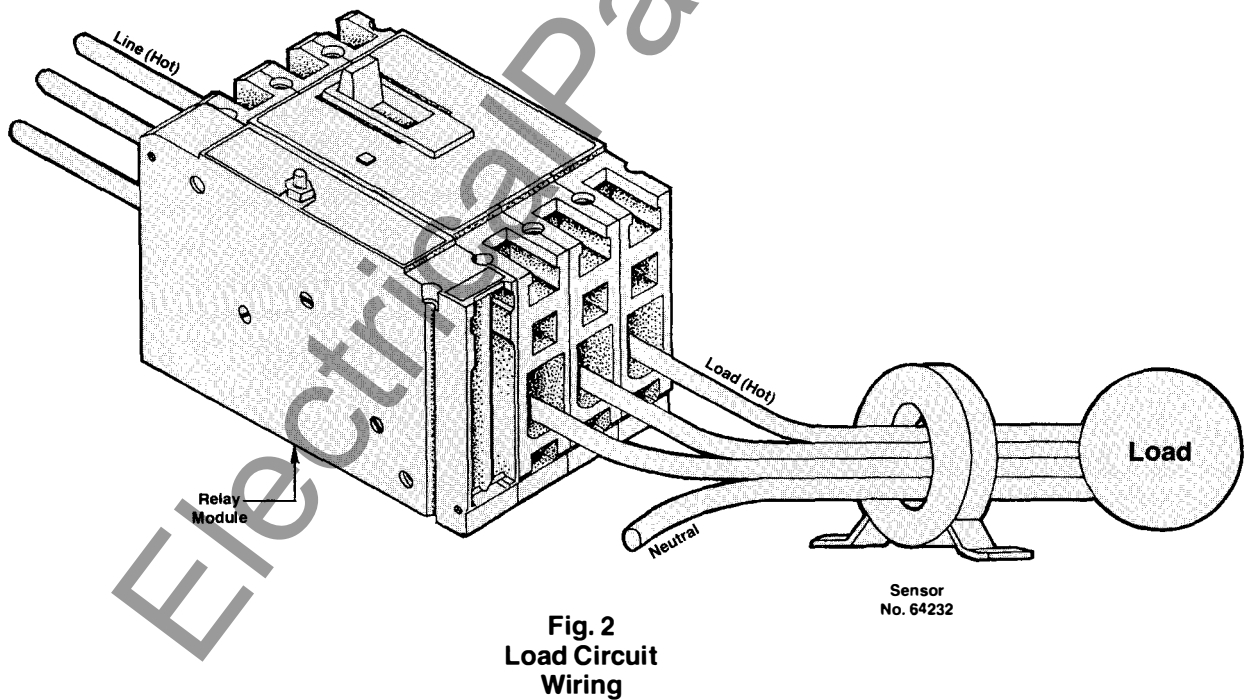
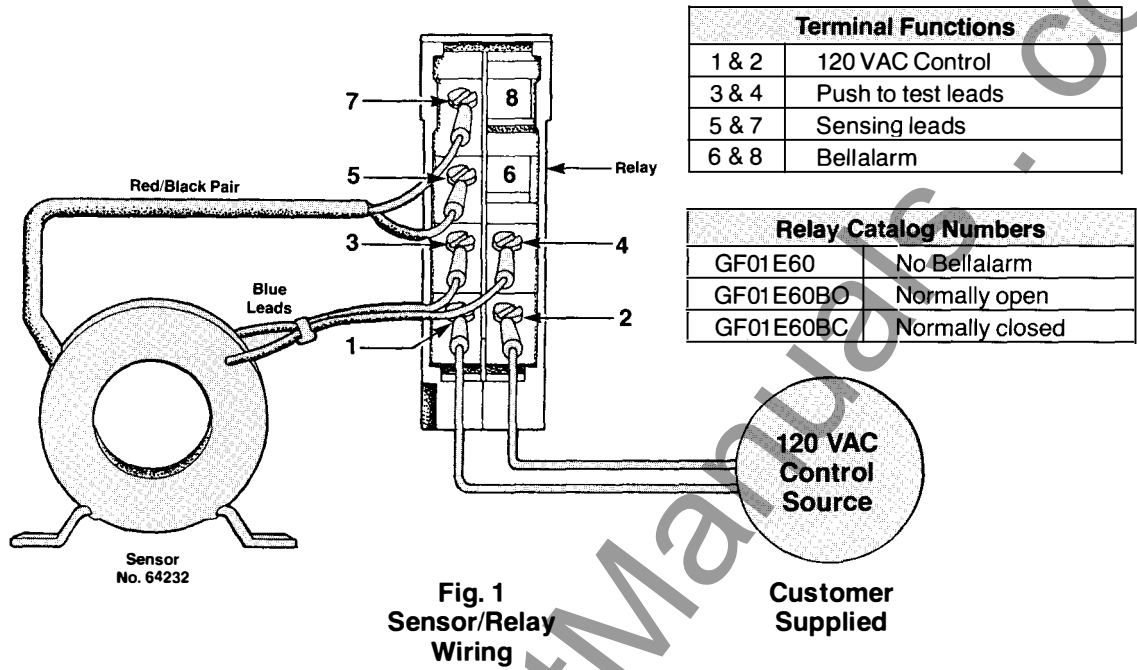
With the control source energized, push test button on face of relay module. The breaker should trip immediately. Reset by moving breaker handle to the fully "OFF" position, then to the "ON" position. Repeat the trip and reset procedure. The assembly is now fully operational. Periodic retesting is recommended to verify continued protection.

#### **Test Circuit:**

Momentary "Push To Trip" switch on face of relay initiates 60mA simulated fault current through blue sensor leads (when energized at 120V).

**Note:** Circuit leakage from the load may add to or subtract from the test current, depending on circuit phase relationships. In the event of test difficulty, check control voltage and load circuit leakage. Some installation may require reversing the blue sensor lead connections for proper test circuit operation.

# **DIAGRAMS FOR I-T-E GROUND FAULT SENSOR**



**Note:** Ground fault relay module can also be used on 1 or 2 pole circuit breakers.

# INSTRUCTIONS FOR INSTALLATION OF I-FE REAR CONNECTING STUDS



## **⚠ DANGER**

**Hazardous Voltage.**  
Will cause severe  
injury or death.

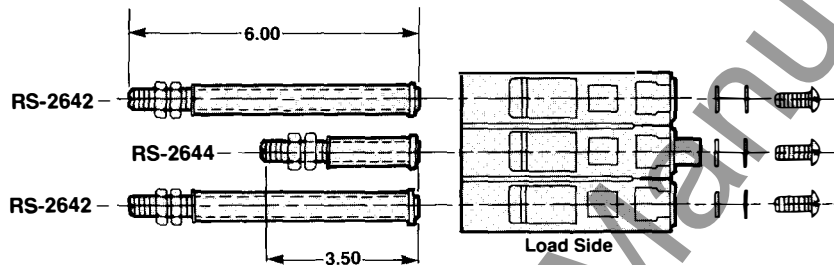
**Turn power off**  
supplying switch-  
board or panel  
before installing.



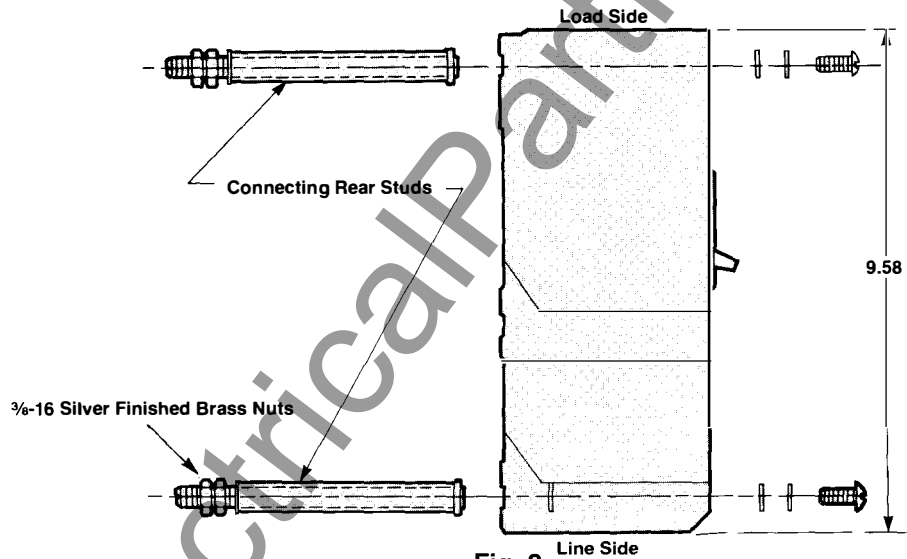
## **SAFETY INSTRUCTIONS**

### **Mounting Preparation and Assembly**

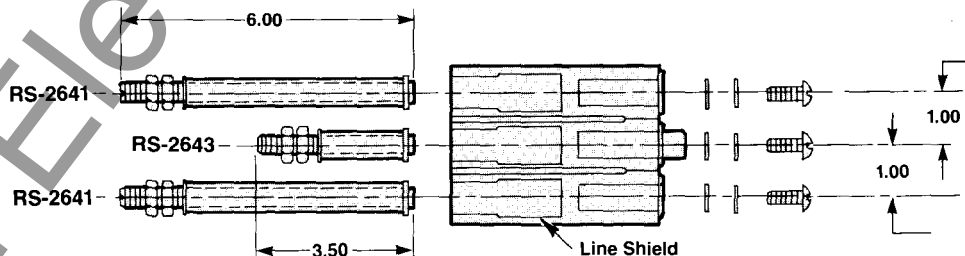
- Remove wire terminals from breaker.
- Select proper rear connecting stud assembly as required for line terminals, Fig. 3 and load terminals, Fig. 1.
- Align rear connecting studs with breaker terminals and secure to breaker terminals with #12-24 screws, lockwashers and flat washers.
- Install line shields on line side of breaker, Fig. 3.
- Install (2)  $\frac{3}{8}$ -16 silver finished brass nuts on the threaded end of each rear connecting stud.



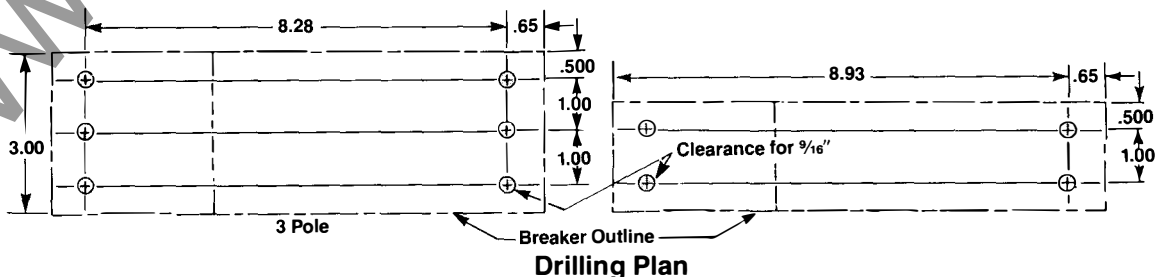
**Fig. 1**



**Fig. 2**



**Fig. 3**



## INSTRUCTIONS FOR INSTALLATION OF I-T-E CIRCUIT BREAKER PLUG-IN ADAPTERS

A complete plug-in installation requires one line end adapter assembly (consisting of a plug-in adapter, stud connectors and associated hardware), one load end adapter assembly. An optional switchboard mounting plate is available or customer can supply a mounting means to suit his requirements.

Application Information	No. Poles	Line End Adapter Cat. No.	Load End Adapter Cat. No.	Switch-board Mtg. Plate Cat. No.
	2	PC2637	PC2638	PL2616
	3	PC2657	PC2658	PL2616

### Mounting Preparation (Figs. 1 & 2)

- If the switchboard mounting plate (1) is to be used, provide drilling as shown in Fig. 1.
- If other mounting means are to be used, provide the cutouts and drilling required to mount the adapter blocks as shown in Fig. 2.

### Switchboard Mounting Plate, if used, (Fig. 3)

- Place switchboard mounting plate (1) in position at location previously prepared in step A above. Secure in place with 1/4" hardware (hardware furnished by customer).

### Plug-In Adapter (Fig. 3)

- Align plug-in adapter (2) with cutouts in switchboard mounting plate (or customer's mounting means as previously prepared in Step 2 above) and secure in place with 1/4" screws (3), washers (4) & (5) and hexnuts (6).

**Breaker Preparation** (Fig. 4) Remove pressure wire connectors from breaker if present.

- Select line side breaker stud and insulator (11) & (12) and assemble to terminals, from back of breaker, and secure to breaker terminals with #12-24 screws and washers (7), (8), (9) as shown in Fig. 4. Recommended tightening torque for these screws is 2 1/2-3 ft. lbs. to assure good electrical connection. Repeat this procedure for the remaining line & load connections, breaker studs & insulations.

- Insert line end shields (10) into slots provided at line end breaker.

- Add accessory warning labels (13), (14) to top of breaker as indicated in Fig. 5.

### Final Assembly (Fig. 6)

- Make bus and/or cable connection to rear of mounting block studs using hex nuts (15) furnished to secure this connection.

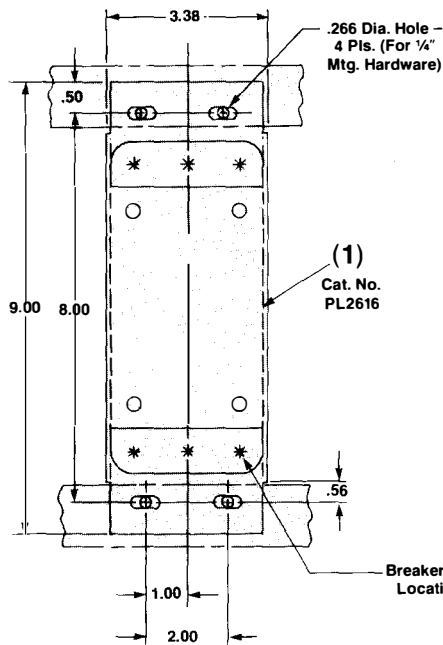
**CAUTION:** Make certain that breaker operating handle is in the "OFF" position before proceeding with the next step.

- Align breaker with plug-in adapter and force male studs (11) over female tulip clips in plug-in adapter until breaker base bottoms against plug-in adapter. Secure breaker in place with #8-32 x 4.06 long mounting screws (16).

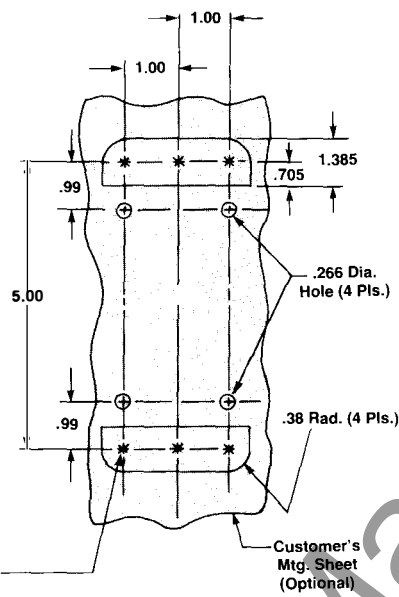
- If installation requires use of front panel trim, provide cutout for breaker escutcheon as shown in Fig. 7.



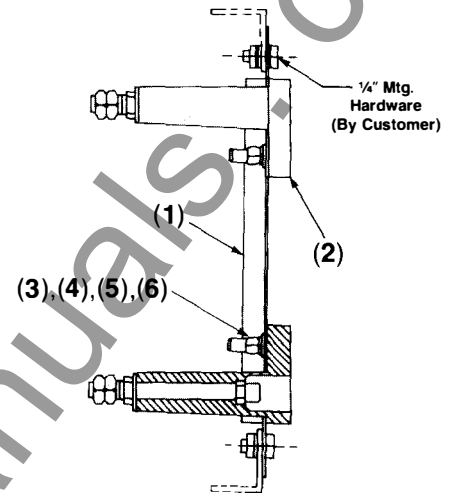
# **DIAGRAMS FOR INSTALLATION OF I-T-E CIRCUIT BREAKER PLUG-IN ADAPTERS**



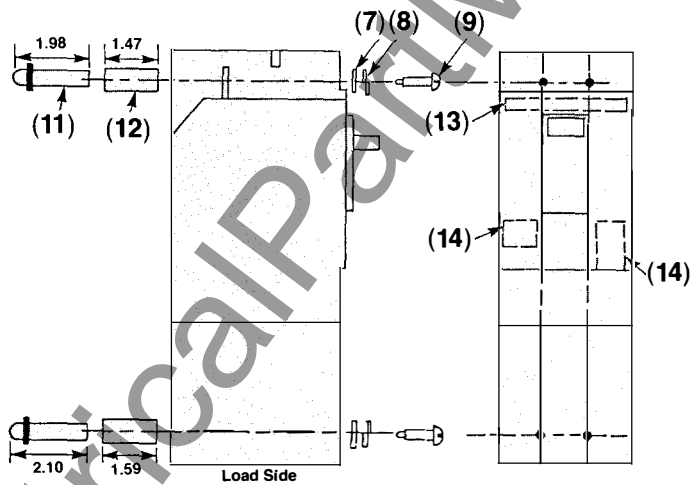
**Fig. 1**



**Fig. 2**

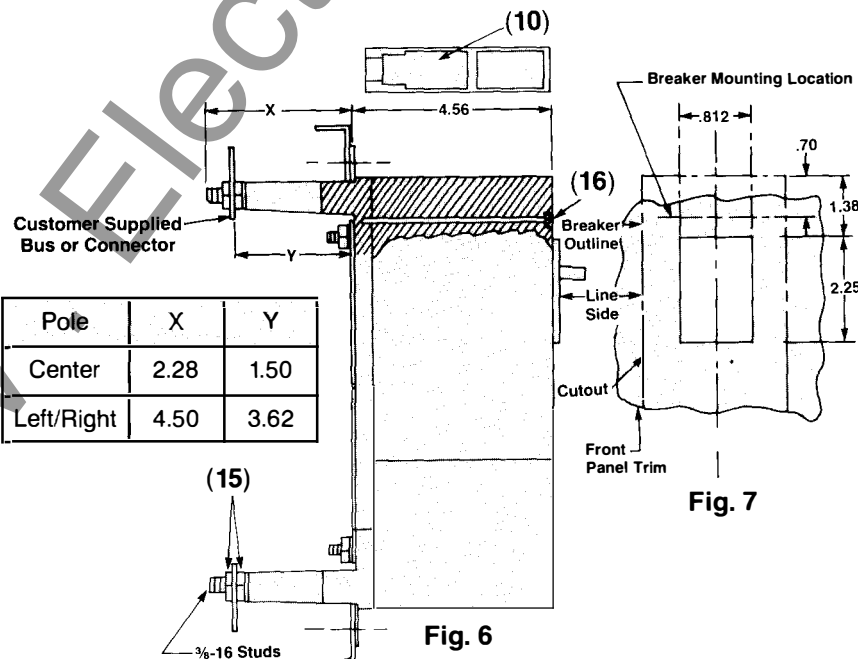


**Fig. 3**



**Fig. 4**

**Fig. 5**



**Fig. 6**

**Fig. 7**

## INSTALLATION INSTRUCTIONS

### ATTACHING I-FE HANDLE BLOCKING CLIPS CAT. NO. E2HBL

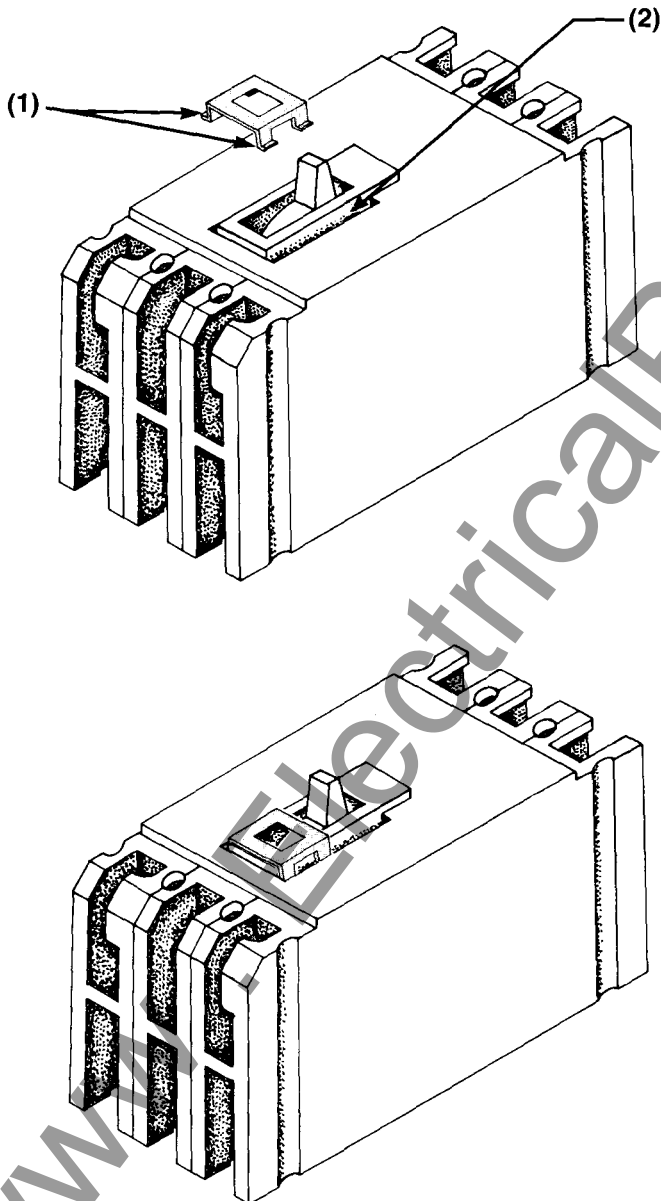
#### To Block Handle "ON"

Turn breaker "ON". Assemble blocking device to breaker by positioning it below handle. Insert tabs (1) into slots (2) on either side of pad.

#### To Block Handle "OFF"

Turn breaker "OFF". Assemble blocking device to breaker by positioning it above handle. Insert tabs (1) into slots (2) on either side of pad.

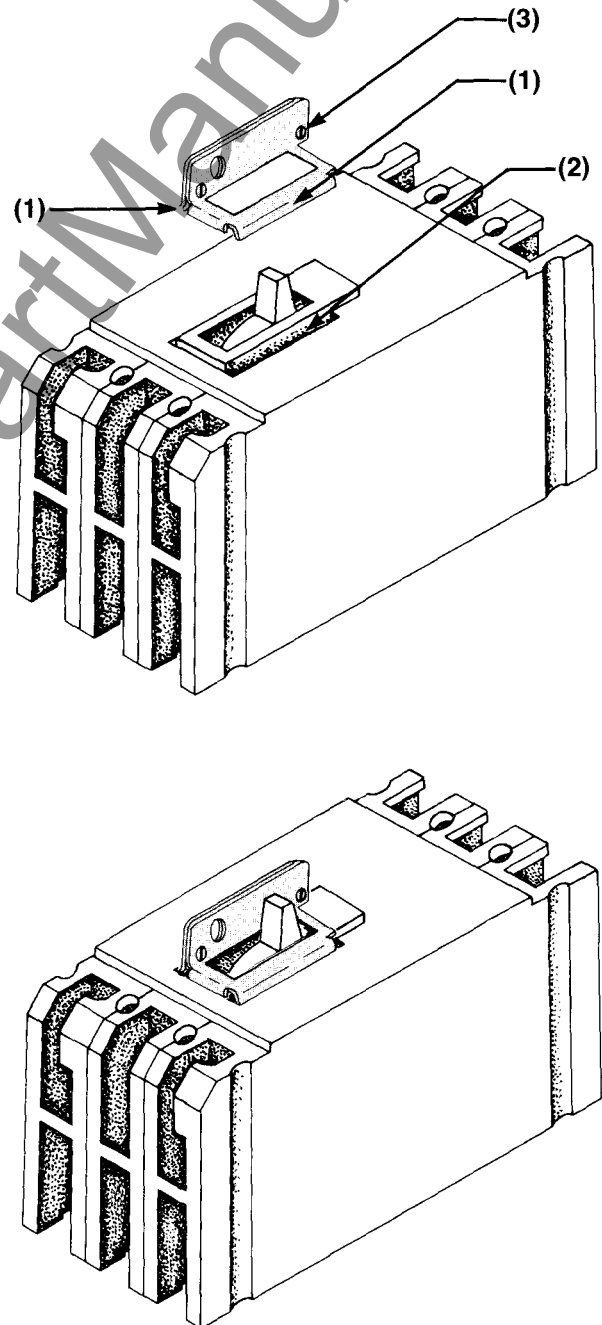
Note: Handle blocking clip is compatible with CLE-A breaker types.



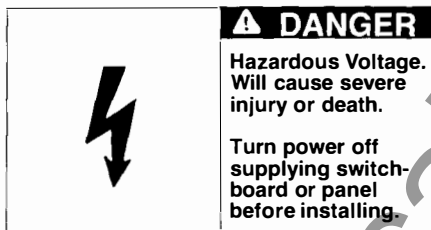
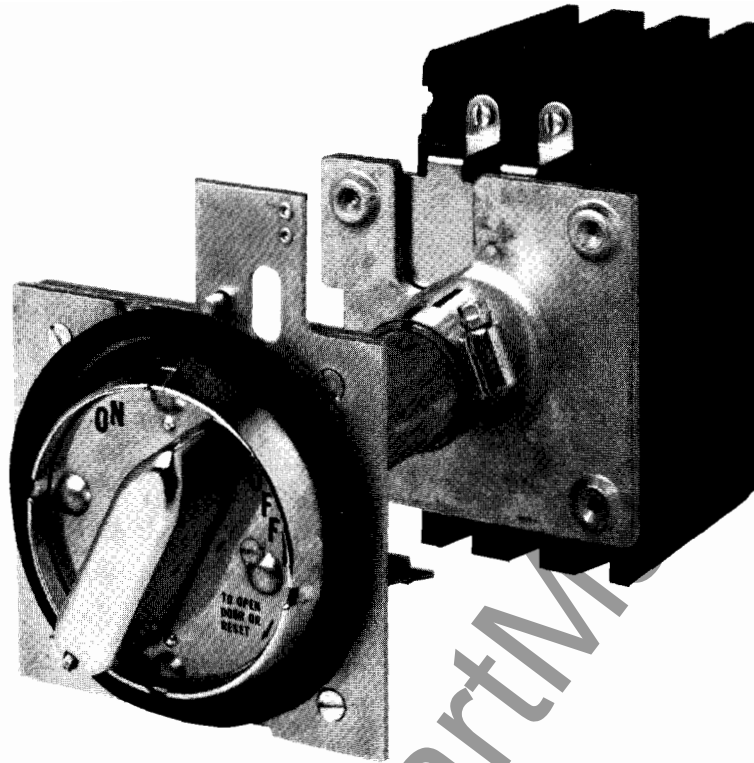
### ATTACHING I-FE PADLOCKING DEVICE CAT. NO. E2HPL

Assemble padlocking device to breaker by placing it over breaker handle as shown in photo below. Position tabs (1) into slots (2) on either side of pad; tighten screws (3) to secure padlocking device.

Note: Padlocking device is compatible with CLE-A breaker types.



**INSTRUCTIONS FOR  
I-TE VARIABLE-DEPTH ROTARY HANDLE  
ENCLOSURE MECHANISM – E2RHV (3), (5), (7) OR (9) ① TYPES 1 OR 12**



**⚠ SAFETY INSTRUCTIONS**

**Drilling of Enclosure**

- A. Drill four breaker mounting holes (H) in the enclosure per drilling plan on outline drawing. See Fig. 1.
- B. Place template on breaker mounting surface so that the four centers in the template line up with the breaker mounting holes. Make sure "ON-OFF" indications on template are in same direction as "ON-OFF" indications on the breaker. To hold template in place, punch two holes in template with breaker mounting screws and tighten into breaker mounting holes.
- C. Measure distances "M" and "N" from walls of enclosure. See Fig. 2.
- D. Relocate template on enclosure cover by adding enclosure thickness and cover overhang "P" to dimensions "M" and "N". See Fig. 3.
- E. Remove backing from template and secure template on door.

- F. Drill holes "J" (.375 diam.) and "K" (4.12 diam.) on template. See Fig. 3.

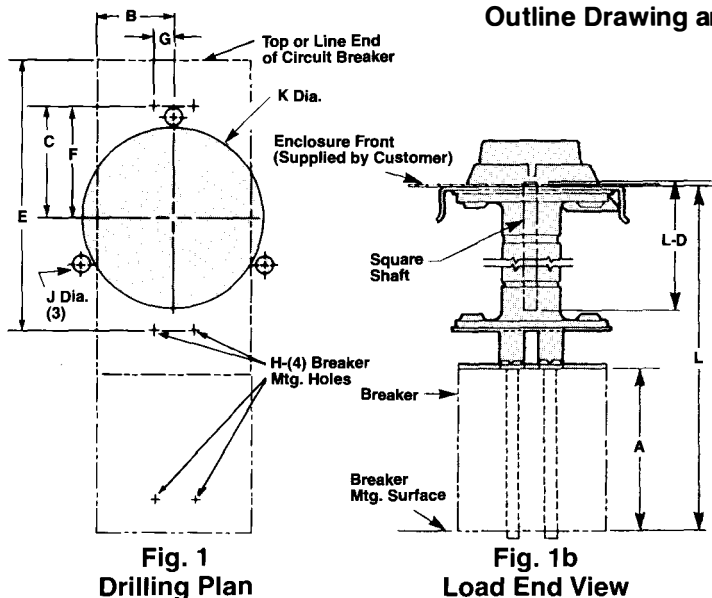
**Circuit Breaker/Rotary Handle Mechanism Mounting**

- A. Mount breaker with handle up by sliding it under the tabs in mounting plate.
- B. With breaker in "OFF" position and rotary handle mechanism in "OFF" position, mount mechanism on breaker using four #8-32 x 4 1/4" screws. Make sure opening in mechanism lever engages breaker handle. Tighten screws.
- C. Loosely secure the door rings with three #6-32 x 1/4" screws as provided. Position the interior ring (1) (has the latch tabs and threaded holes) as shown in Fig. 5. The exterior ring mounts on the outside of the door with the small flange to the inside. See Fig. 6.
- D. Close the enclosure door and adjust external ring on door so it is concentric with handle ring. Tighten the three screws (3).
- E. Check the door operation. Latch on mechanism should engage latch tab (2) interior ring when breaker is "ON" and disengage latch tab when handle is rotated to "Open Door" position.
- F. Enclosure door may be opened when breaker is "ON" by turning defeater screw on rotary handle face plate, in a clockwise direction.

- Use (3), (5), (7) or (9) as a suffix number. This indicates pipe lengths as related to enclosure depth.

# **DIAGRAMS FOR I-TE VARIABLE-DEPTH ROTARY HANDLE ENCLOSURE MECHANISM – E2RHV (3), (5), (7) OR (9)**

## **Outline Drawing and Drilling Plan**



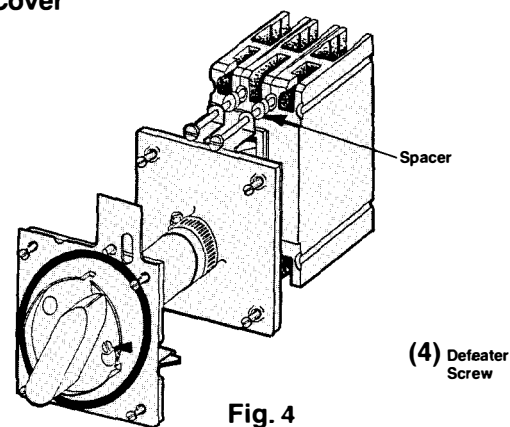
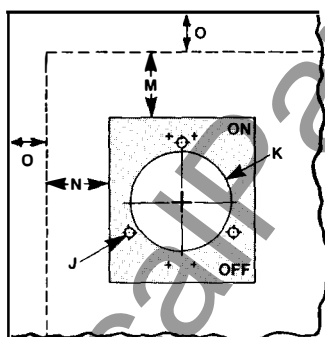
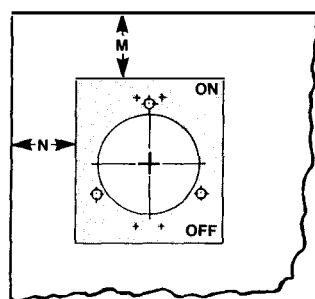
Dimensions – Inches	
A	4.0
B*	.50
B**	1.50
C	3.188
D	5.312
E	5.0
F	2.563
G	.50
H	8-32
J	.375
K	4.125

Enclosure Depth Dimensions – Inches		
3 in. Pipe	Min.	9.0
	Max.	11.0
5 in. Pipe	Min.	11.0
	Max.	13.0
7 in. Pipe	Min.	13.0
	Max.	15.0
9 in. Pipe	Min.	15.0
	Max.	17.0

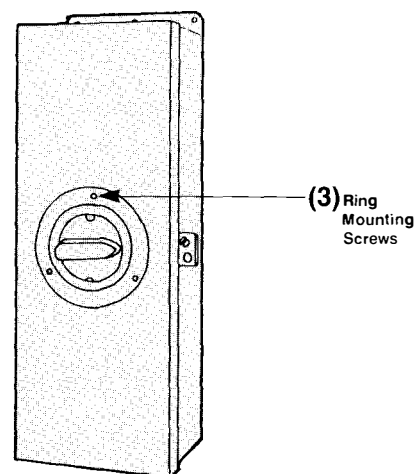
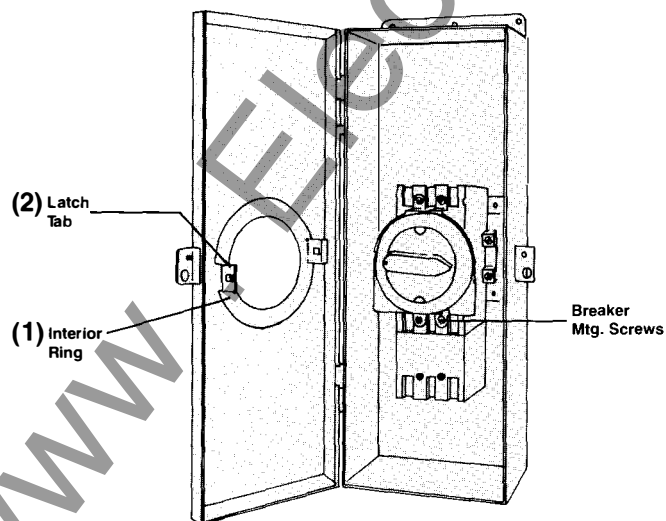
\* 1 or 2 pole. Dimension shown is for 3 pole unit without accessory section. For breaker with accessory section add 1" to C dimension.

\*\* 3 pole. Dimension shown is for 3 pole unit without accessory section. For breaker with accessory section add 1" to C dimension.

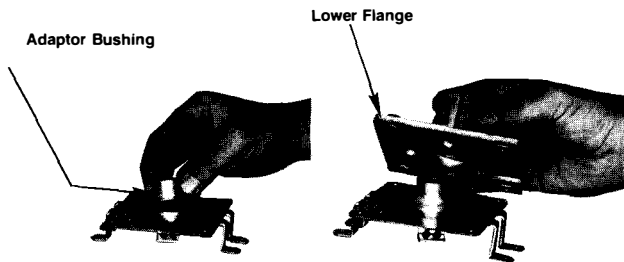
## **Drilling of Enclosure and Enclosure Cover**



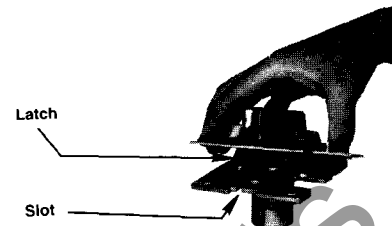
## **Final Assembly**



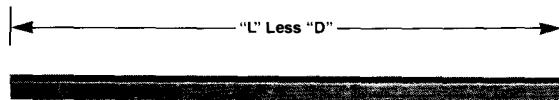
# MECHANICAL ASSEMBLY FOR I-E VARIABLE-DEPTH ROTARY HANDLE ENCLOSURE MECHANISM – E2RHV (3), (5), (7) OR (9)



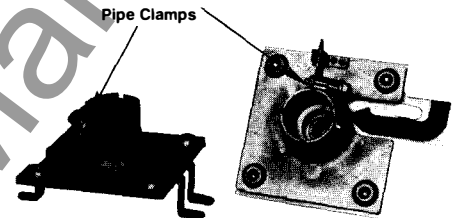
1. With adapter bushing in place on bearing of lower mechanism, place lower flange (flange with the 4 tapped holes) on to the lower mechanism. Secure with four flat head screws.



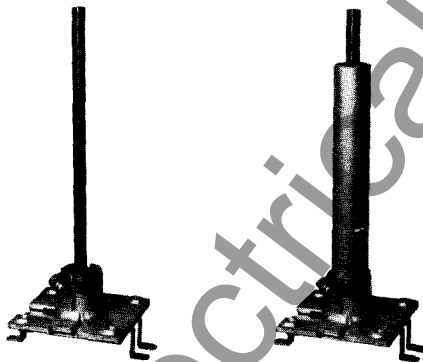
2. Place upper mechanism on upper flange (flange with 4 tapped holes) and secure with four flat head screws. Be sure latch on mechanism fits into elongated slot in flange.



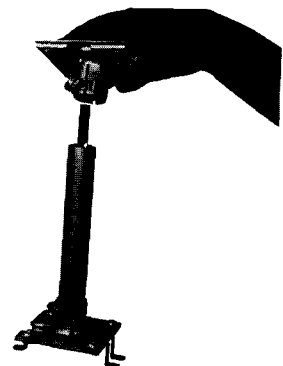
3. Cut square shaft to desired dimension. To do this subtract dimension "D" (see dimension chart on page 27) from "L" dimension which is the distance from the back of the breaker to inside of enclosure door.



4. Place pipe clamp on the collar of each flange. Do not tighten.

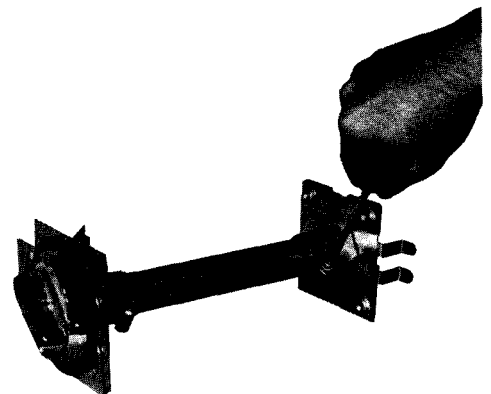


5. Place square shaft into bushing on lower mechanism and then place support pipe over this shaft and into collar of flange.

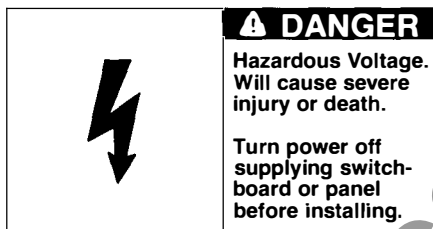
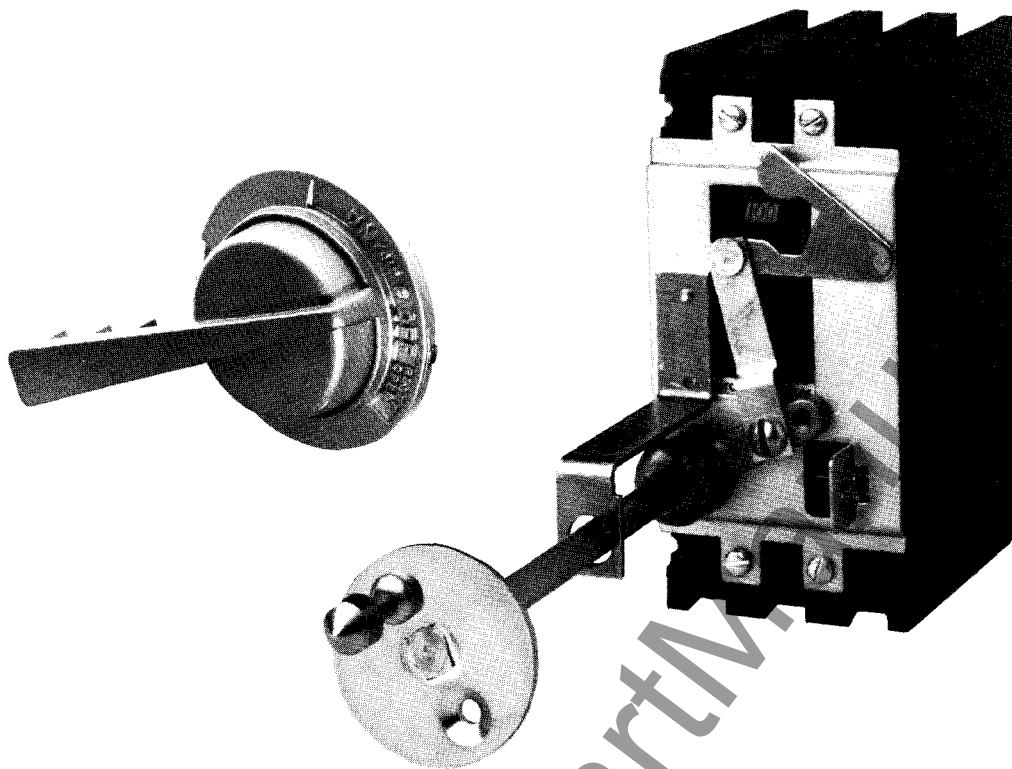


6. With both lower and upper mechanisms in "OFF" position (lower mechanism is "OFF" when square shaft is turned fully to the right) place upper mechanism on to support pipe. Make sure square shaft engages upper mechanism.

7. Lay assembly on flat surface (this will square assembly). If "L" dimension is the minimum, as shown on dimensional chart, tighten pipe clamps with support pipe seated fully into both flange collars. If "L" dimension is other than minimum, adjust support pipe so that approximately same amount of pipe is in each of the upper and lower flange collars. (A minimum of 1/2 inch of pipe must be in each flange collar). Tighten pipe clamps.



**INSTRUCTIONS FOR  
I-TE STANDARD-DEPTH (D11CEU1) AND VARIABLE-DEPTH (D11CEU2)  
ROTARY HANDLE ENCLOSURE MECHANISM TYPES 1 OR 12**



## SAFETY INSTRUCTIONS

### General

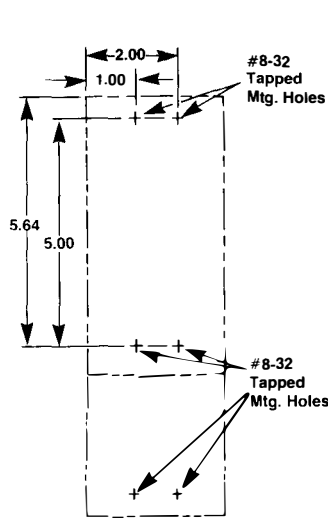
Handle will permit locking the disconnect device in the "OFF" position using up to three locks having shackles up to  $\frac{3}{8}$  inches in diameter. Provision for locking in "ON" position is provided, but the handle plate must have the material covering the locking notch removed. This can be done with a hacksaw or file. The handle has a voidable interlock. Voiding the interlock requires inserting a small screwdriver into the rectangular opening in the handle plate, which will release the handle.

### Mounting Instructions

- A. Drill and tap breaker mounting holes as shown in Fig. 1.
- B. Measure distances "A" and "B" from mounting holes to walls of the enclosure. See Fig. 2.

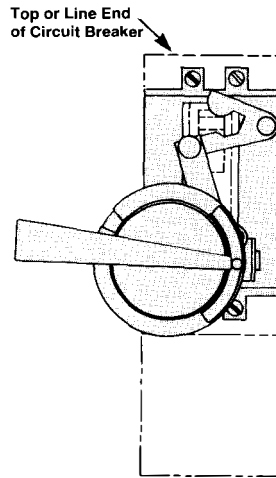
- C. Find handle center dimensions "D" and "E" by adding enclosure thickness and cover overhang "C" to "A" -  $\frac{1}{2}$  and "B" =  $3\frac{63}{64}$ . Drill hole "X" ( $2\frac{1}{4}$  dia.) and drill either holes "Y" or "Z" ( $\frac{5}{16}$  dia.) depending on handle orientation required. See Fig. 2a.
- D. If installing variable depth kit, measure distance "F" from breaker mounting surface to outside of cover. See Fig. 3. If distance "F" is less than 8 inches then remove shaft guide bracket.
- E. Find length "G" by subtracting "F" from  $16\frac{5}{8}$  inches. Mark length "G" from end of operating shaft and cut shaft squarely at mark. See Fig. 3a.
- F. Breaker must be "tripped" during installation. Push red button marked "Push To Trip".
- G. Using screws supplied with kit, attach mechanism plate to breaker and mount in enclosure in position shown.
- H. Insert end of operating shaft into square socket in cast operating arm so that top of shaft has proper relationship to handle. Tighten set screw in operating arm (recommended torque: 75 in. lb.)
- I. Place handle and cork gasket on outside of cover and place handle mounting bracket on inside of cover; fasten together loosely through cover with the two short screws provided.
- J. Adjust handle so that cover will not open when handle is in "OFF" position but will open when handle is between "OFF" and "RESET/OPEN" positions. Tighten screws and operate handle "ON" and "OFF" to see that circuit breaker operates satisfactorily.

# **DIAGRAMS FOR I-FE STANDARD-DEPTH (D11CEU1) AND VARIABLE-DEPTH (D11CEU2) ROTARY HANDLE ENCLOSURE MECHANISM**

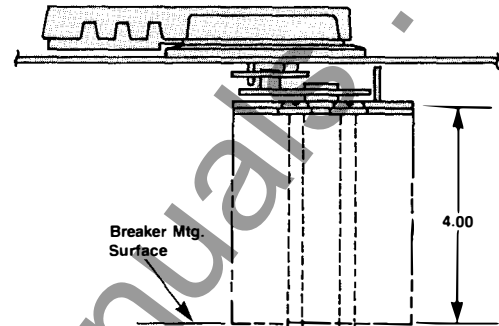


**Fig. 1  
Drilling Plan**

## **Outline Drawing and Drilling Plan**

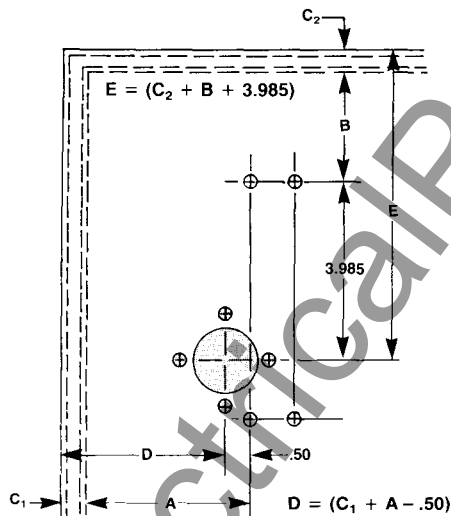


**Fig. 1b  
Front View**

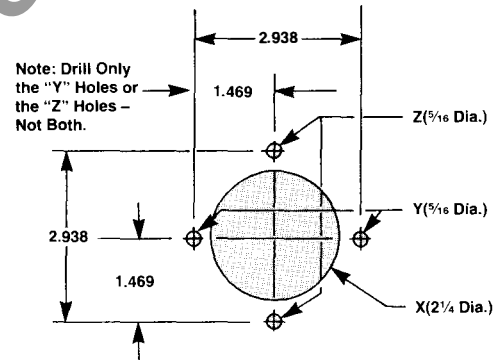


**Fig. 1c  
Standard-Depth  
Load End View**

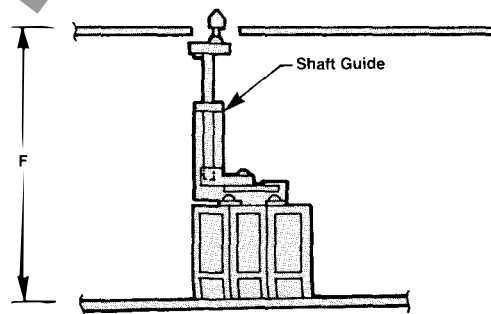
## **Drilling of Enclosure and Enclosure Cover**



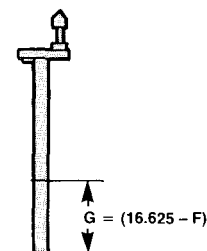
**Fig. 2  
Enclosure Cover**



**Fig. 2a**

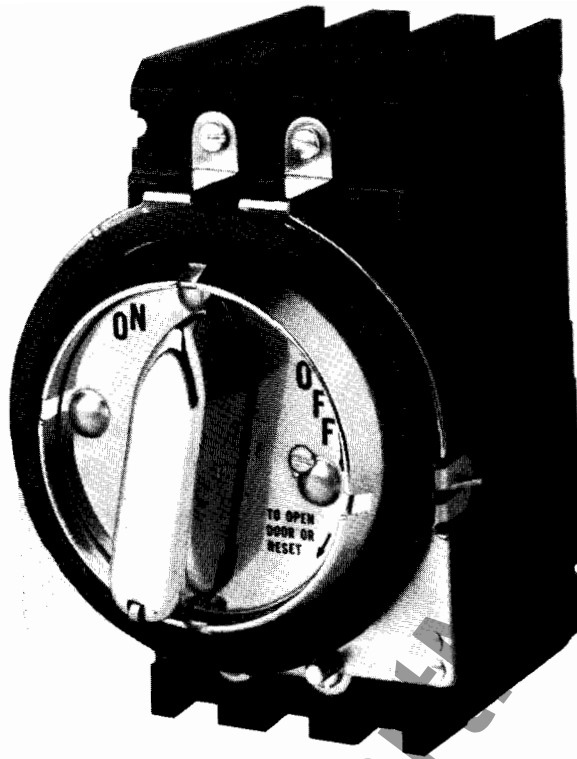


**Fig. 3  
Variable-Depth**



**Fig. 3a**

**INSTRUCTIONS FOR  
I-TE STANDARD-DEPTH ROTARY HANDLE  
ENCLOSURE MECHANISM (E2RH1) TYPES 1 OR 12**



	<b>⚠ DANGER</b>
	<b>Hazardous Voltage.</b> Will cause severe injury or death.
	Turn power off supplying switch-board or panel before installing.



## SAFETY INSTRUCTIONS

### Drilling of Enclosure

- A. Drill four breaker mounting holes (H) in the enclosure per drilling plan on outline drawing. See Fig. 1.
- B. Place template on breaker mounting surface so that the four centers in the template line up with the breaker mounting holes. Make sure "ON-OFF" indications on template are in same direction as "ON-OFF" indications on the breaker. To hold template in place, punch two holes in template with breaker mounting screws and tighten into breaker mounting holes.
- C. Measure distances "J" and "K" from walls of enclosure. See Fig. 2.
- D. Relocate template on enclosure cover by adding enclosure thickness and cover overhang "L" to dimensions "J" and "K". See Fig. 3.
- E. Remove backing from template and secure template on door.
- F. Drill holes "M" ( $\frac{3}{8}$  inch diam.) and "I" ( $4\frac{1}{8}$  inch diam.) on template. See Fig. 3.

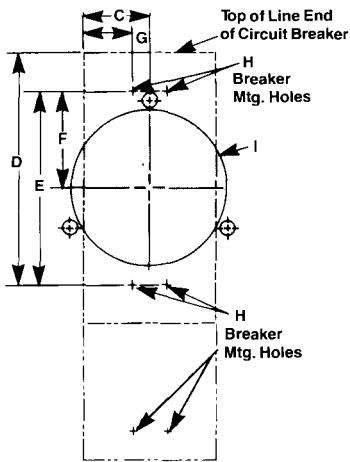
### Circuit Breaker/Rotary Handle Mechanism Mounting

- A. Mount breaker with handle up by sliding it under the tabs in the mounting plate.
- B. With breaker in "OFF" position and rotary handle mechanism in "OFF" position, mount mechanism on breaker using four #8-32  $\times$   $4\frac{1}{4}$ " screws.  
**NOTE:** When mounting type CLE-A with any handle operator, four spacers must be used as shown in Fig. 4. Make sure opening in mechanism lever engages breaker handle. Tighten screws.
- C. Loosely secure the door rings with the three #6-32  $\times$   $\frac{1}{4}$ " screws as provided. Position the interior ring (1) (has the latch tabs and threaded holes) as shown in Fig. 5. The exterior ring mounts on the outside of the door with the small flange to the inside. See Fig. 6.
- D. Close the enclosure door and adjust external ring on door so it is concentric with handle ring. Tighten the three screws (3).
- E. Check the door operation. Latch on mechanism should engage latch tab (2) interior ring when breaker is "ON" and disengage latch tab when handle is rotated to "Open Door" position. Repeat step C if a slight adjustment is necessary.
- F. Enclosure door may be opened when breaker is "ON" by turning defeater screw (4), Fig. 4 on rotary handle face plate, in a clockwise direction.

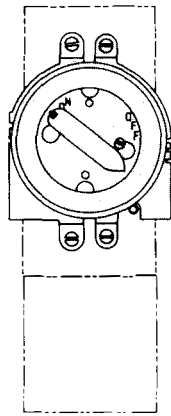


# DIAGRAMS FOR I-FE STANDARD-DEPTH ROTARY HANDLE ENCLOSURE MECHANISM (E2RH1)

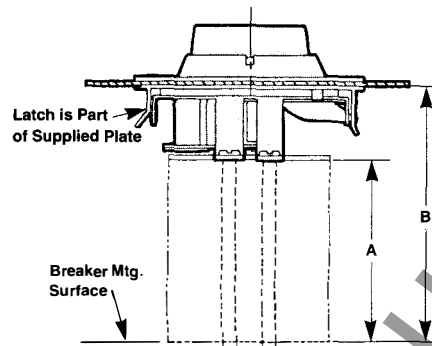
## Outline Drawing and Drilling Plan



**Fig. 1**  
**Drilling Plan**



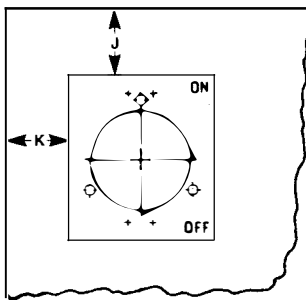
**Fig. 1b**  
**Front View**



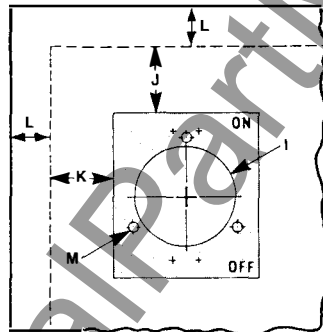
**Fig. 1c**  
**Load End View**

Dimensions – Inches	
A	4.0
B	5.25
C	1.50
D	5.64
E	5.0
F	2.56
G	.50
H	8-32
I	4.125

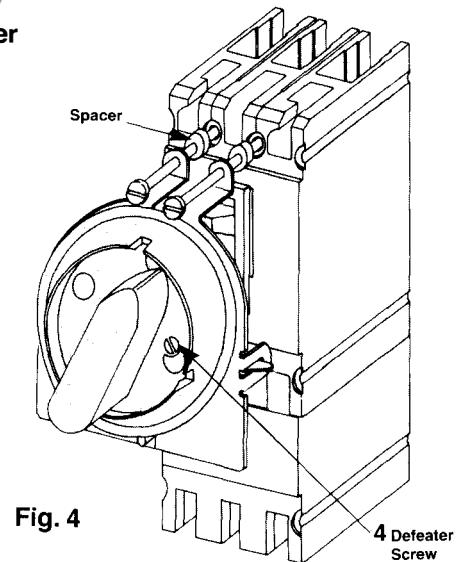
## Drilling of Enclosure and Enclosure Cover



**Fig. 2**  
**Breaker Mounting Surface**

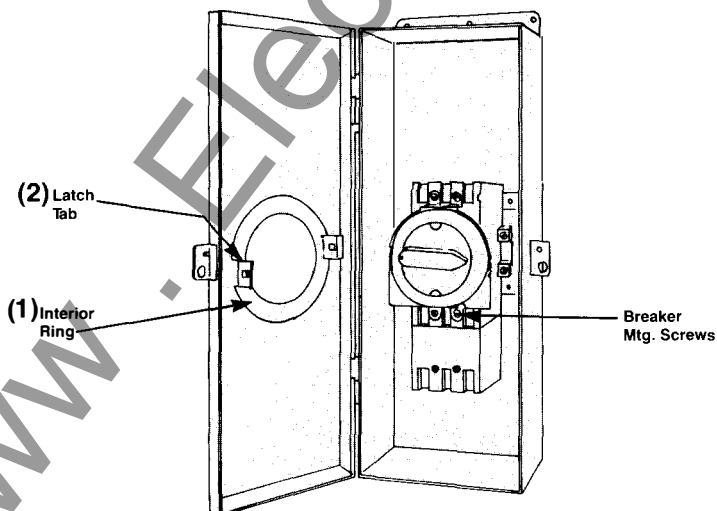


**Fig. 3**  
**Enclosure Cover**

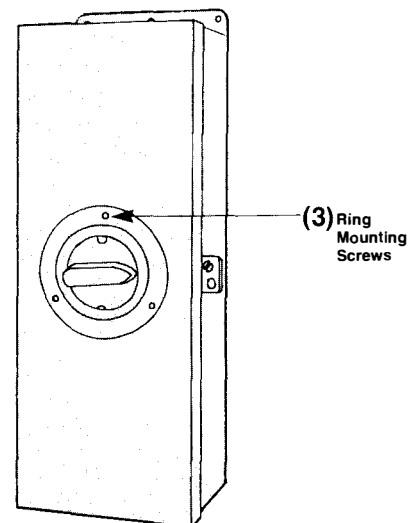


**Fig. 4**

## Final Assembly

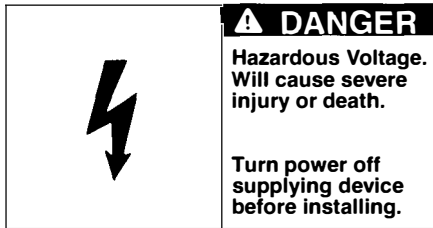


**Fig. 5**



**Fig. 6**

**GENERAL INFORMATION FOR  
I-T-E FLANGE-MOUNT HANDLE OPERATOR (FHOEBO)  
TYPES 1, 3, 3R, 12**



## SAFETY INSTRUCTIONS

### Description

The I-T-E Max-Flex Flange Mount Handle Operator is a flexible cable control device used for the remote switching of a circuit breaker within an enclosure. The flexible cable is connected directly to the breaker switch handle at one end and a factory installed switch handle operator at the other end. The remote operator handle, located on the enclosure flange, is used to perform mechanical open/close switching operations. This is accomplished through the cable's sliding center race enclosed within the cable.

### Function

The advanced design concept of the Max-Flex Flange Mount Handle Operator provides for greater flexibility when locating a circuit breaker within an enclosure. The circuit breaker can be mounted almost anywhere, at any angle and on almost any convenient

surface. The same flexibility applies when locating the switch handle operator on the flange section of the enclosure.

### Application

The Max-Flex Operator is designed to work with I-T-E circuit breakers having current ratings through 600 amperes. The Max-Flex unit meets all the industrial criteria such as UL and Automotive Industry Standards.

### Design

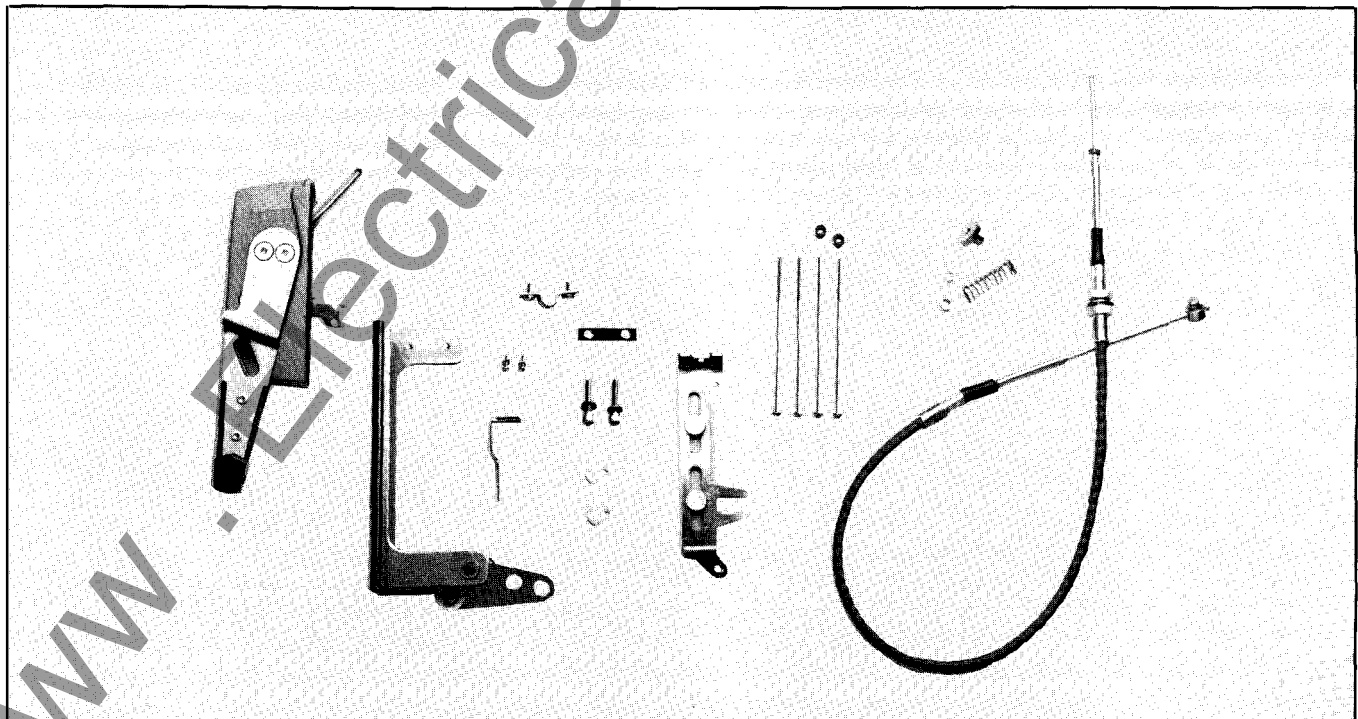
The new Max-Flex Handle Operator provides maximum flexibility in design and assembly of electrical equipment. Since there are no linkages to assemble, the Max-Flex system can save time during installation.

The cable design is flexible and rugged. It is similar to those cables used in aircraft control systems. The flexible cable comes in standard 3 or 4 foot lengths. However, specific lengths can be special ordered up to 20 feet.

### Operation

When properly installed, the Max-Flex Handle Operator is used to perform remote switching operations from outside of the enclosure. Switching is accomplished, by pushing the Max-Flex Handle Operator up for "ON" and down for "OFF". The mechanical advantage gained with this device simplifies switching operations when compared with local switching at the breaker.

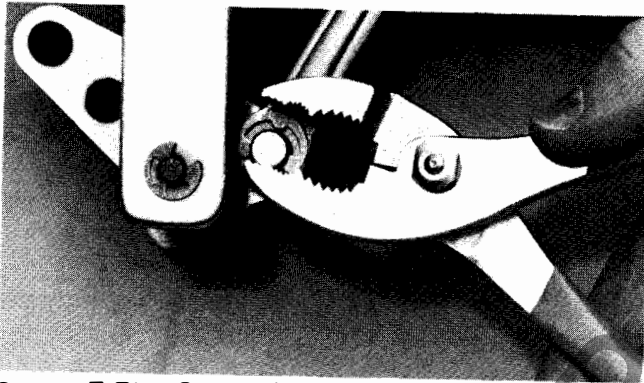
This unique design offers breaker trip indication as a standard feature. Interlocking provisions are included and described below. All switching functions are standard according to accepted practices.



# INSTRUCTIONS FOR I-TE FLANGE-MOUNT HANDLE OPERATOR (FHOEBO)

## Step 1: Mounting the Max-Flex™ Handle Operator To The Enclosure Frame Assembly

- Drill the mounting holes in the enclosure flange and file all burrs. See Fig. 1 & 2. Note the maximum and minimum drill hole distances in Fig. 2.
- Push the rubber gasket (1) down into the groove of the handle assembly (2). See Fig. 3.
- The handle (7) and the interlock mechanism (3) are supplied pre-assembled from the factory. NOTE: For ease of assembly, move the operating handle to the "ON" position ("up" toward the top of the enclosure). Mount the frame (4) and handle assembly (2) to the enclosure flange (5) with two 1/4-20 x 1" socket head cap screws and lockwashers. Tighten cap screws from within the enclosure. See Fig. 3.



Secure E-Ring Connection

- Rotate the bellcrank (6) clockwise to engage the return spring (7). Hold the bellcrank in position and place the plastic washer and connecting link onto the bellcrank pin (8). Using pliers, secure the connection with an E-ring (9). See Figure 3.
- Mount the interlock lever extension (10) to the interlock lever (3) using two #6-32 x 3/8" machine screws lockwashers. Screws mount through the threaded lever extension into the lever. See Figure 3.

**Operating Note:** With the enclosure door open, the operating handle cannot be moved from the "OFF" to "ON" position without deliberately defeating the interlock mechanism. In the "OFF" position, the interlock can be defeated by pushing the interlock lever extension (10) downward while moving the handle to the "ON" position (see Fig. 2). With the enclosure door open and the handle in the "ON" position, the interlock can be defeated by turning the defeater screw (11) on the operating handle counter-clockwise. When the enclosure door is closed, the door latch mechanism now automatically defeats the interlock.

- Weld the door catch bracket (12) to the enclosure frame. See Figures 2 & 4. NOTE: Holes may be drilled in the door catch bracket using the projection. User must provide the mounting holes in the enclosure frame.

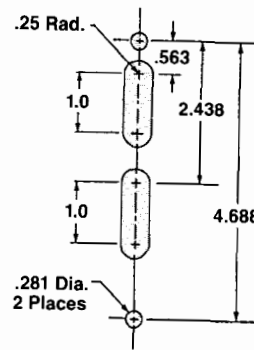


Fig. 1

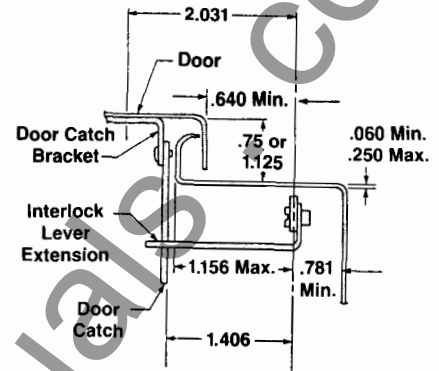


Fig. 2

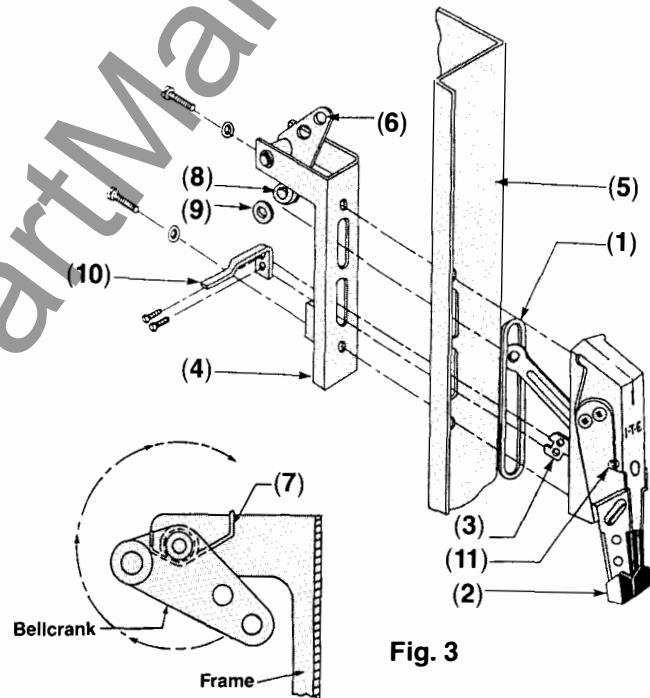


Fig. 3

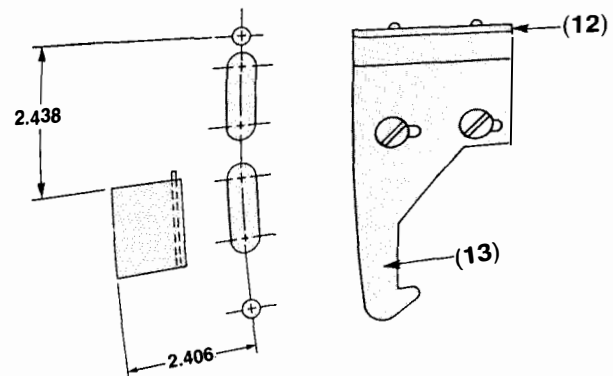


Fig. 4

## I-T-E ORDERING INFORMATION CIRCUIT BREAKER ACCESSORIES

### ADDITIONAL ACCESSORIES

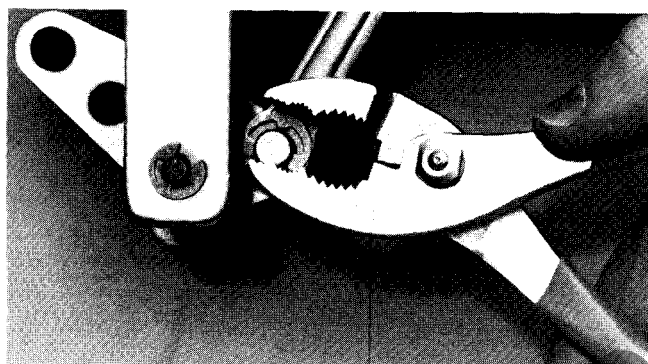
Item	Catalog No.	Item	Catalog No.
Pressure Wire Connectors (15-25 Amperes)	SA1E025	Rotary Handle Operators	D11CEU1 D11CEU2
Multi-Pole (30-100 Amperes)	LN1E100	Rotary Handle Operators	RHOESD <sup>①</sup> RHOEVD <sup>①</sup>
Single-Pole (30-60 Amperes) Load Side Only	LD1E060	Rotary Handle Operators	E2RH1
Single-Pole (70-100 Amperes) Load Side Only	LD1E100	Rotary Handle Operators	E2RHV9
Single-Pole (30-100 Amperes) Line Side Only	LN1E100	Linear Drive Operator	OHES1
(110-125 Amperes)	TA1E6125	Side Handle Operators	D11ELU D11ERU
Handle Blocking Device	E2HBL	Flange Mount Handle Operator	FHOH <sup>②</sup> FHOEBO FHOECO
Padlocking Device	E2HPL	Handle Breaker Operator Cable Operator	
Rear Connecting Studs		Enclosures	
Line Side (Long)	RS2641	Type 1 (Surface Mounting)	E2N1S
Load Side (Long)	RS2642	Type 1 (Flush Mounting)	E2N1F
Line Side (Short)	RS2643	Type 3R	E2N3R
Load Side (Short)	RS2644	Type 7,9 15-60 Amperes	EA
Plug-In Adaptors		70-100 Amperes	EB
Line Side (2 Pole)	PC2637	Type 12	E2N12
Load Side (2 Pole)	PC2638	Single Pole Mounting Bracket	E2BMB
Line Side (3 Pole)	PC2657		
Load Side (3 Pole)	PC2658		
Ground Fault Sensing Relay Kit			
Basic Kit	GF01E60		
Basic Kit with Normally Open Bellalarm	GF01E60B0		
Basic Kit with Normally Closed Bellalarm	GF01E60BC		

- ① For 4.4x application, order RHOH4 instead of RHOH.  
② For 4.4x application, order FHOH4 instead of FHOH.

# INSTRUCTIONS FOR I-TE FLANGE-MOUNT HANDLE OPERATOR (FHOEBO)

## Step 1: Mounting the Max-Flex™ Handle Operator To The Enclosure Frame Assembly

- Drill the mounting holes in the enclosure flange and file all burrs. See Fig. 1 & 2. Note the maximum and minimum drill hole distances in Fig. 2.
- Push the rubber gasket (1) down into the groove of the handle assembly (2). See Fig. 3.
- The handle (7) and the interlock mechanism (3) are supplied pre-assembled from the factory. NOTE: For ease of assembly, move the operating handle to the "ON" position ("up" toward the top of the enclosure). Mount the frame (4) and handle assembly (2) to the enclosure flange (5) with two 1/4-20 x 1" socket head cap screws and lockwashers. Tighten cap screws from within the enclosure. See Fig. 3.



Secure E-Ring Connection

- Rotate the bellcrank (6) clockwise to engage the return spring (7). Hold the bellcrank in position and place the plastic washer and connecting link onto the bellcrank pin (8). Using pliers, secure the connection with an E-ring (9). See Figure 3.
- Mount the interlock lever extension (10) to the interlock lever (3) using two #6-32 x 3/8" machine screws lockwashers. Screws mount through the threaded lever extension into the lever. See Figure 3.

**Operating Note:** With the enclosure door open, the operating handle cannot be moved from the "OFF" to "ON" position without deliberately defeating the interlock mechanism. In the "OFF" position, the interlock can be defeated by pushing the interlock lever extension (10) downward while moving the handle to the "ON" position (see Fig. 2). With the enclosure door open and the handle in the "ON" position, the interlock can be defeated by turning the defeater screw (11) on the operating handle counter-clockwise. When the enclosure door is closed, the door latch mechanism now automatically defeats the interlock.

- Weld the door catch bracket (12) to the enclosure door. See Figures 2 & 4. NOTE: Holes may be drilled in the door catch bracket using the projections as centers. User must provide the mounting hardware.
- Fasten the door catch (13) to the door catch bracket with two #8-32 x 5/16" pan head screws and external tooth lockwashers. See Figure 2.

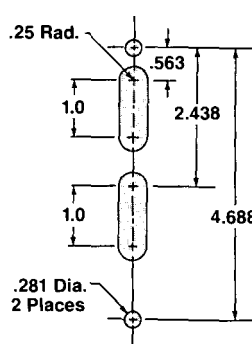


Fig. 1

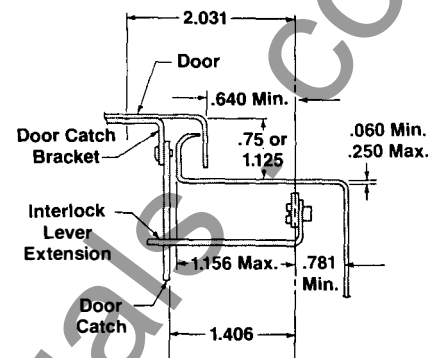


Fig. 2

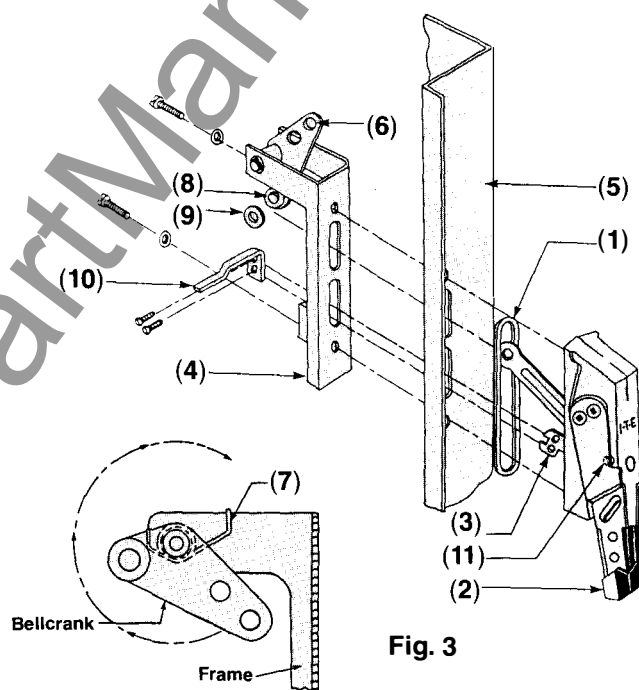


Fig. 3

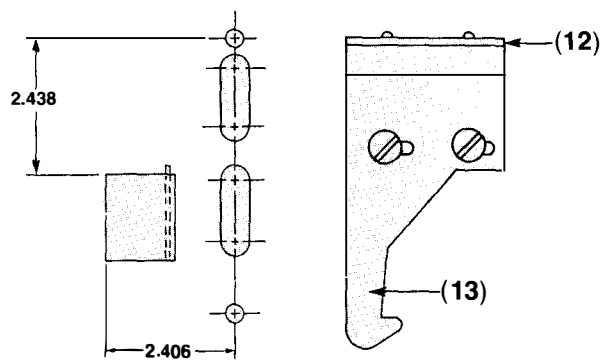


Fig. 4

# INSTRUCTIONS FOR I-TE FLANGE-MOUNT HANDLE OPERATOR (FHOEBO)

## Step 2: Adjusting the Door Catch Mechanism

- Close the enclosure door and move the handle into the "ON" position. Adjust the door catch downward if the handle cannot be moved from the "ON" position.
- With the handle in the "ON" position, try to open the enclosure door without turning the defeater screw in the handle. If the door opens, readjust the door catch and repeat A & B.

## Step 3: Mounting the Breaker Operator

The circuit breaker can be mounted remotely from the handle within a range that is limited by the length of the operating cable (14) and the depth of the enclosure. Tables 2, 3 and Fig. 5 show the vertical range (E) of the circuit breaker in 8-16 inch enclosures, when mounted at the horizontal distance "F" from the handle.

Table 1

Cat. No.	Frame	A"	B"	C"	D"	F"Min.	Tap Size
FH0E036 FH0E048	CLE-A	1.0	5.0	.64	8.93	4.5	#1/4-20

Table 2

Cat. No.	Frame	E" Dimensions					
		8"		10"		12-16"	
		Min.	Max.	Min.	Max.	Min.	Max.
FH0E036	CLE-A	-2.25	24.0	-7.5	23.75	-2.0	19.0

Table 3

Cat. No.	Frame	E" Dimensions					
		16"		18"		24"	
		Min.	Max.	Min.	Max.	Min.	Max.
FH0E048	CLE-A	13.75	29.25	11.75	25.25	-8.75	26.25

**Caution:** When installed, the cable bend radius should not be less than 3 inches. This minimum wire bending requirement must be met to insure operating safety. The mounting procedure is as follows:

- Determine the desired circuit breaker mounting location using Tables 1, 2 and Fig. 5.
- Drill and tap four mounting holes (15) in the enclosure back panel using dimensions "A" and "B" from Table 1.
- Mount the circuit breaker inside the back panel. Align the holes in the panel with the mounting holes of the breaker.
- Insert the three plastic spacers (16) into the circuit breaker mounting holes for support, as shown in Fig. 6.
- Install the operating mechanism (17) on the spacers (16) and secure with the three 1/4-20 x 5" pan head screws and lockwashers. Insert the 1/4-20 x 4 1/4" pan head screw through the hole without a spacer (18). Mount the circuit breaker and operating mechanism to the enclosure panel with the screws supplied.

## Step 4: Securing the Operating Cable To The Frame Assembly

- To attach the operating cable (14) to the frame assembly (4), move the operating handle (2) to the "ON" position and attach the cable swivel (19) to the outer hole of the bellcrank (6). Secure the connection with an E Ring. See Fig. 7.

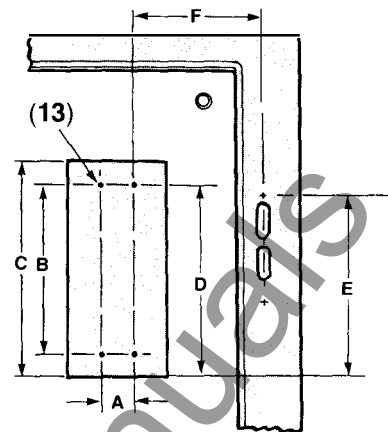


Fig. 5

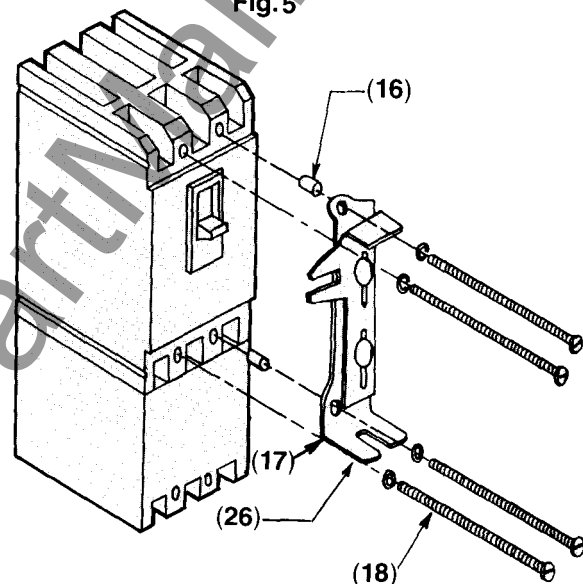


Fig. 6

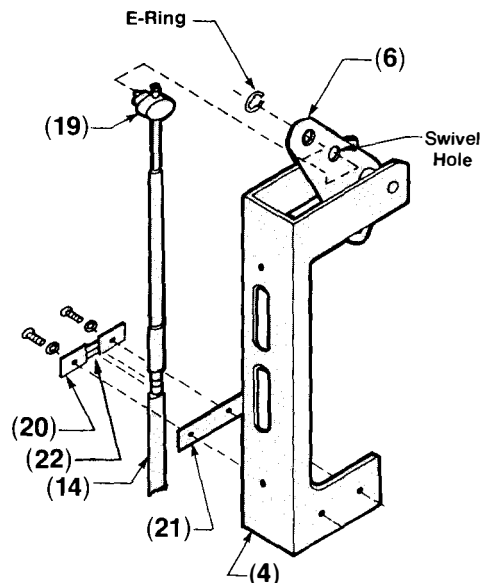
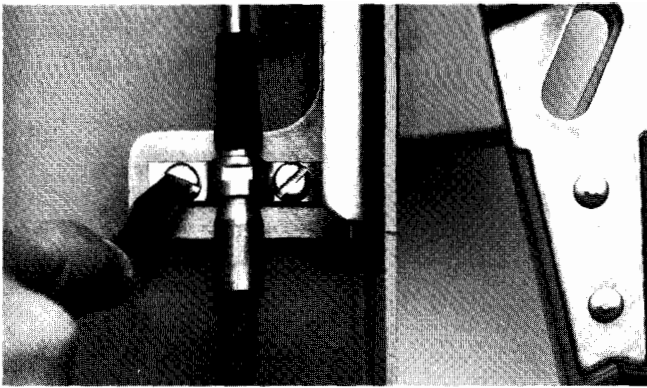


Fig. 7

## INSTRUCTIONS FOR I-E FLANGE-MOUNT HANDLE OPERATOR (FHOEBO)



Tighten Detent Screws

- B. Secure the cable (14) to the frame assembly (4) by placing it between the cable retainer clip (20) and the shim (21), secure with two #10-32 x 3/8" screws and lockwashers. NOTE: Detent (22) in cable retainer must align with the groove (23) in the cable's metal fitting. See Fig. 7.

### Step 5: Securing The Operating Cable To The Circuit Breaker

**WARNING:** Before attaching the cable to the circuit breaker, installers must confirm that the power from the supply source has been de-energized.

- A. Move the circuit breaker handle to the "ON" position.
- B. Remove the soft plastic cap from the end of the threaded cable rod (24) and slide the rod through the hole in the sliding plate tab (25) of the circuit breaker operating mechanism (17). See Fig. 8.
- C. Move the flange mount operating handle (2) to its maximum "ON" position and hold it in place.
- D. Place the cable mounting threads (24) into the slot on the fixed plate tab (26) so that the two mounting nuts (27) are on both sides of the tab. Adjust the two mounting nuts so that the #10-32 nut on the cable rod just touches the sliding plate tab (25). Tighten the mounting nuts (27) to secure the cable. See Fig. 8.
- E. Continue holding the operating handle in the "ON" position and place the spring (28) over the end of the rod. Screw on the spring adjuster (29) and tighten until it begins to compress the spring. DO NOT OVERTIGHTEN.

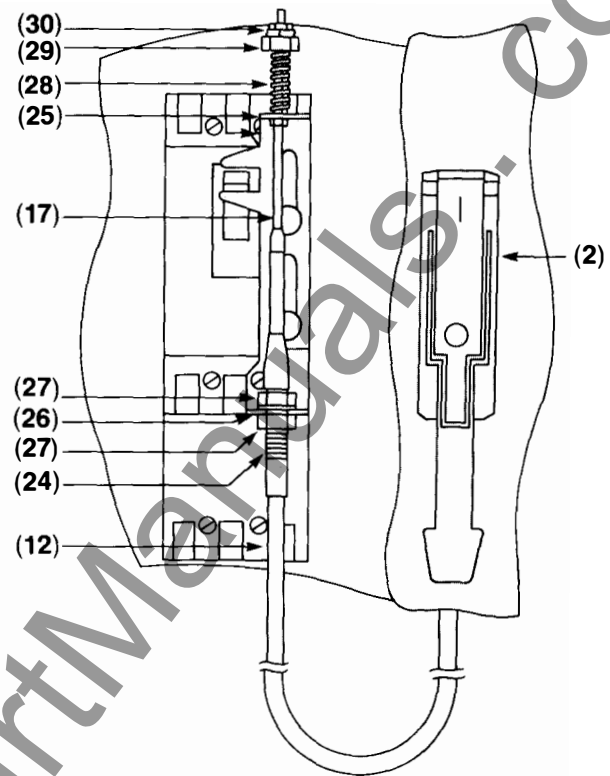
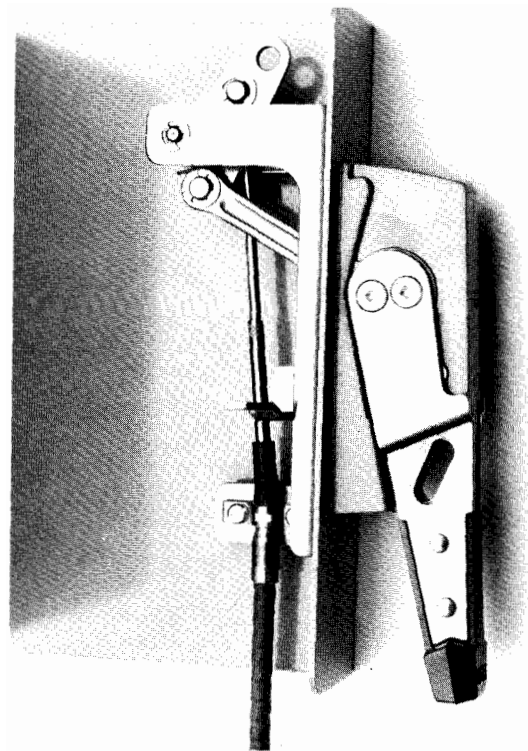
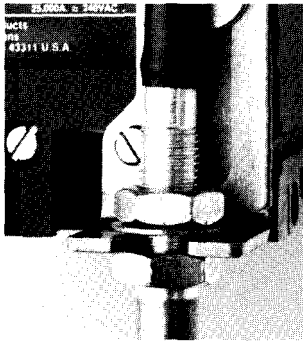


Fig. 8

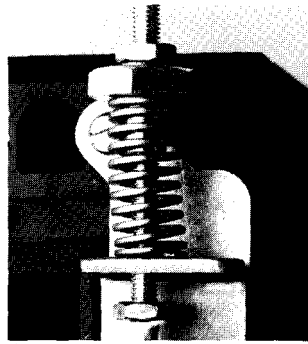


Side View of Max-Flex Handle Operator

## INSTRUCTIONS FOR I-TE FLANGE-MOUNT HANDLE OPERATOR (FHOEBO)



Fixed Plate Adjustment



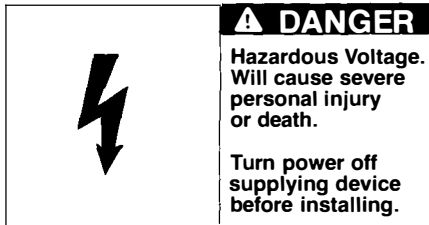
Spring Adjustment

### Step 6: Making Cable Adjustments

- A. Check that circuit breaker turns "OFF" and "ON" by moving the operating handle (2) up for "ON" and down for "OFF". If the breaker does not switch "ON", loosen the cable mounting nuts (27) at the fixed plate tab (26), hold the operating handle in the maximum "ON" position, and move the cable (12) toward the top of the breaker. Retighten the mounting nuts (27) to secure.
- B. Trip the circuit breaker by pressing the "Push To Trip" button on the front of the circuit breaker.
- C. Check that circuit breaker resets by moving the operating handle (2) from "ON" to "OFF" and back to "ON". If the breaker resets, tighten the spring adjuster (29) one additional turn. Attach the lockwasher and #10-32 locknut to the end of the cable rod (24), and tighten the locknut.
- D. If the circuit breaker does not reset after Step 2, tighten the spring adjuster (29) one turn and repeat Step 2. Continue this procedure until the breaker does reset, then tighten the adjuster spring one additional turn. Secure with the lockwasher and locknut (30).



# INSTRUCTIONS FOR I-E DOOR LATCH MECHANISM (DKR2, DKR3, DKL2, DKL3)



## SAFETY INSTRUCTIONS

### General Information

These door latch mechanisms are for use in standard or custom built enclosures. The door latch post assemblies and the door catch are supplied with the kits. **Users must supply their own 1/4" x 1/2" steel latch bar.**

Enclosures with an overall height less than 40 inches require the two-point door latch mechanism. When the overall height is greater than 40 inches, the three-point latch mechanism is used.

**The door latch mechanism can be used with or without the type FHOH Flange Mount Handle Operator.** These instructions apply when the door latch mechanism is mounted adjacent to and interlocks with the FHOH Operator. The door handle can be padlocked to prevent unauthorized entry into the enclosure.

Drawings in these installation instructions are oriented for right-hand flange installation. Left-hand flange installation drawings are "mirror" images of the right-hand versions. For left-hand flange installation, substitute "clockwise" for "counterclockwise" and vice versa, whenever those words appear.

All dimensions are given in inches.

### Installation of the Door Latch Mechanism

- A. Drill mounting holes in the enclosure door observing the minimum dimensions shown in Fig. 2. See FHOH Handle Operator instructions for flange drilling pattern.

**NOTE:** "D" and "E" dimensions are determined by the height of the enclosure.

Refer to Fig. 1 for the following steps:

- B. Place gasket (1) on handle plate (2) and attach handle plate to enclosure door with two thinwall hex nuts (3). Tighten the nuts.
- C. Insert lockout screw (4) and handle (5) through holes in the handle plate.
- D. Install latch bar post assembly (6) (screw, sealing washer, flat washer, and special hex nut (7), if used.)
- E. Attach top (8), bottom (9) and latch plate rollers (10) to latch bar with retaining pins and E-rings.

**NOTE:** Two-point latch does not have bottom roller.

- F. Fasten the top and bottom rollers to the enclosure door with locking type flange nuts. Tighten the nuts, then loosen them 1/8 turn to allow movement of the roller assemblies.

- G. Place bottom spring (11) (larger wire diameter) over the bottom thinwall hex nut inside the enclosure door.

- H. Turn the handle 1/4 turn clockwise (looking from inside the enclosure door) and attach the latch plate roller to the handle shaft, while inserting the bent leg of the spring into the hole in the latch plate. Fasten with a locking-type flange nut. Tighten the nut, then loosen 1/8 turn to allow movement of the roller assemblies. See Fig. 1.

**NOTE:** Straight leg of spring must rest against pin (12) on handle plate. See inset on Fig. 1.

- I. Attach the interlock defeater lever (15) to the latch bar (16) with two #10 lockwashers and #10-24 screws.

**NOTE:** The position of lever depends on enclosure depth. See Fig. 3.

- J. Weld or rivet the door catch (17) to the enclosure door. **User must supply the mounting hardware.**

- K. Attach the door latch label next to the door handle on the enclosure door.

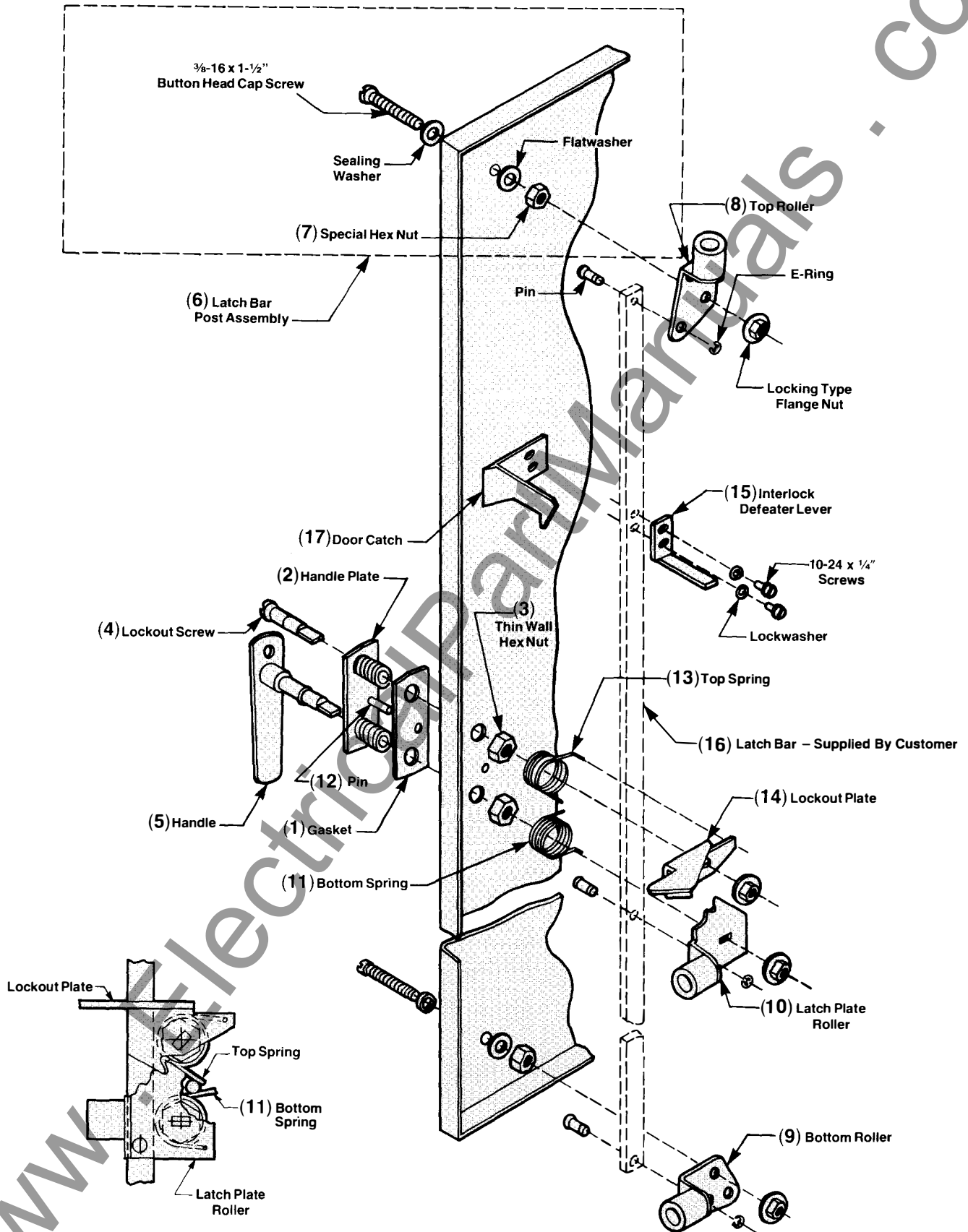
### Adjusting the Mechanism

If using in conjunction with the FHOH Flange Mount Handle Operator, perform the following steps:

- A. With the door in the open (unlatched) position, close the door, but do not turn the door handle. The lockout plate should latch the door partially closed.
- B. Turn the handle "clockwise" to stop. This will engage the rollers against the enclosure flange, securing the door fully closed.
- C. Check that the circuit breaker can be turned "ON". If the breaker will not turn "ON", adjust the interlock defeater lever downward to engage the lever on the handle operator.
- D. To open the door, insert a screwdriver into the handle screw and turn the screw and handle "counterclockwise". The door will only open partially if the operating handle is in the "ON" position. If the door fully opens with the handle in the "ON" position, adjust the interlock defeater lever upward and repeat steps C. and D.

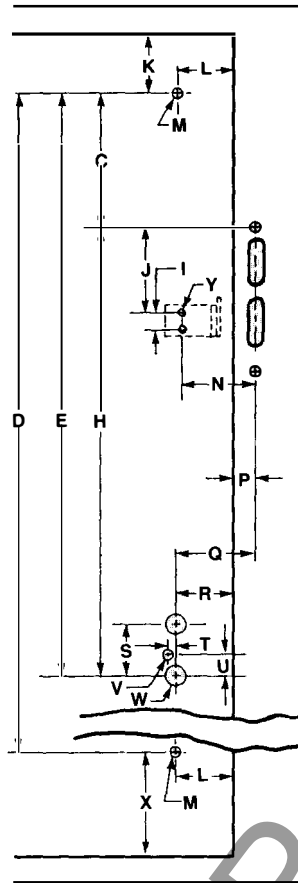
**NOTE:** To open the door when the handle is in the "ON" position, turn the latch defeater screw located on the side of the operating handle.

# **DIAGRAMS FOR I-E DOOR LATCH MECHANISM (DKR2, DKR3, DKL2, DKL3)**



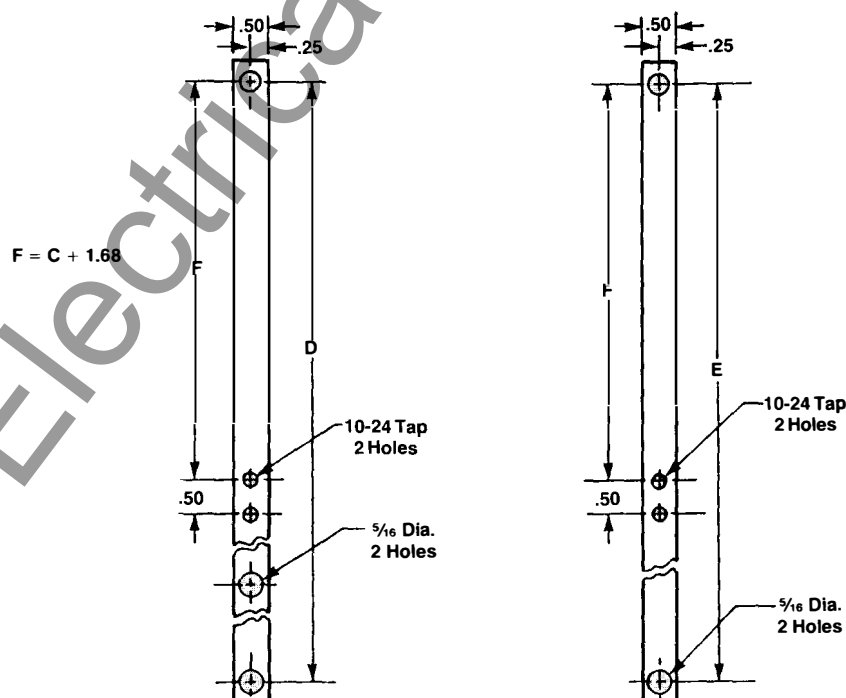
**Fig. 1**

# **DIAGRAMS FOR INSTALLING I-TE DOOR LATCH MECHANISM (DKR2, DKR3, DKL2, DKL3)**



Minimum Dimensions (Inches)	
C	1.922
H	9.375
I	.50
J	2.688
K	1.859
L	1.797
M	.391 Dia.
N	2.297
P	.719
Q	2.594
R	1.875
S	1.625
T	.250
U	.688
V	.281 Dia.
W	.703 Dia.
X	2.484
Y	.219 Dia.

**Fig. 2**



**Fig. 3**



# INSTRUCTIONS FOR MOUNTING I-FE SIDE HANDLE OPERATOR (D11ERU) TYPES 1 OR 12

Add openings to enclosure flange as shown in Fig. 1. Weld interlock latch to inside of cover. Note: If vault handle kit is used, the interlock latch is not required and may be discarded. Refer to vault handle kit instruction sheet.

The handle mechanism and interlock mechanism are supplied preassembled. Before disassembling, note in Fig. 2 the position of the levers (Items A & B) of the interlock mechanism with respect to (Item C) of the handle mechanism. Lever (A) must be placed in back of handle mechanism (Item C) and lever (B) in front. Care must be taken to insure this relationship is maintained when the device is reassembled.

Assemble handle mechanism from the outside of the enclosure. (Operating handle must be moved to the approximate middle of its stroke for ease of assembly.) Assemble mounting frame and interlock mechanism from inside of enclosure. When properly assembled the operating handle cannot be moved from the "OFF" position to the "ON" position while the cover is open.

Assemble circuit breaker mounting plate to mounting frame with four 1/4-20 screws supplied and provide end support as shown in Fig. 4 below. Mount circuit breaker operating mechanism and circuit breaker on mounting plate with four 8-32 x 4-1/4 long screws as shown in Fig. 3.

NOTE: Slot of rocker arm must engage roller of handle mechanism.

Nominal position (8-32 screw) covers elongated slot of mechanism bracket, adjust if necessary.

## Operation:

The handle cannot be moved from the "OFF" position to the "ON" position while the door is open, unless the interlock mechanism is deliberately voided. This involves turning the screw in the handle housing clockwise before moving the operating handle.

To open door while the handle is in the "ON" position the same screw is turned counterclockwise.

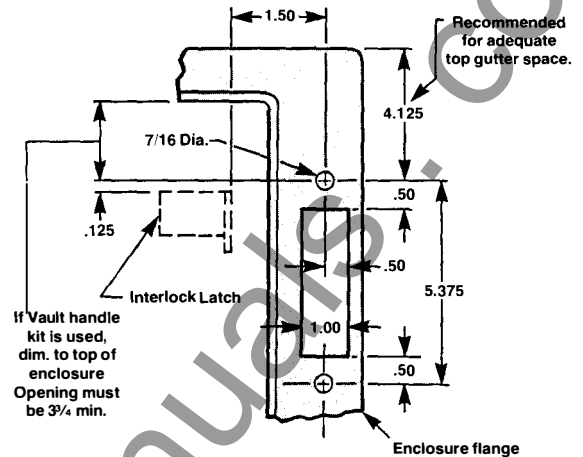


Fig. 1

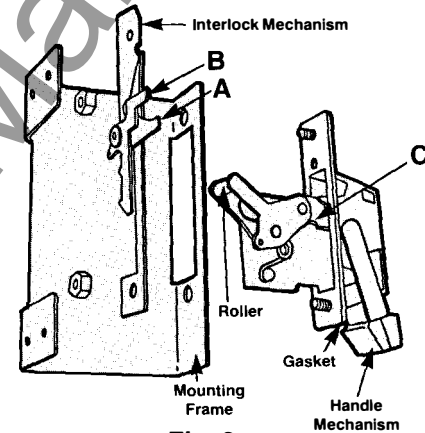


Fig. 2

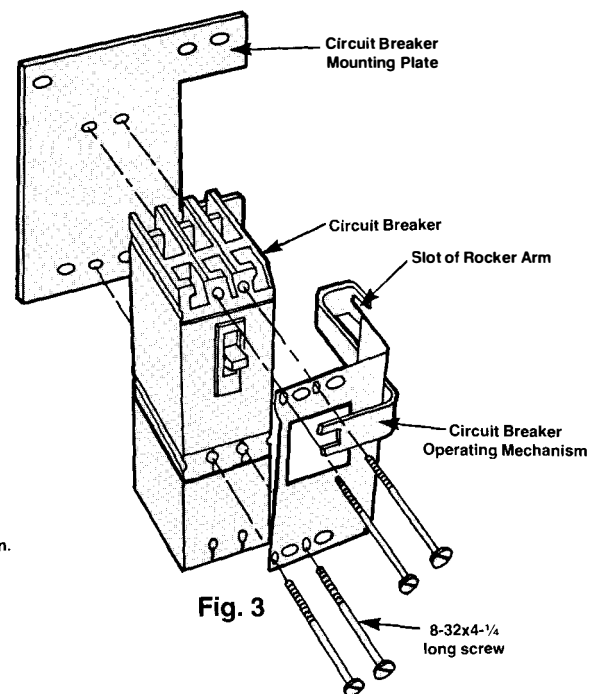


Fig. 3

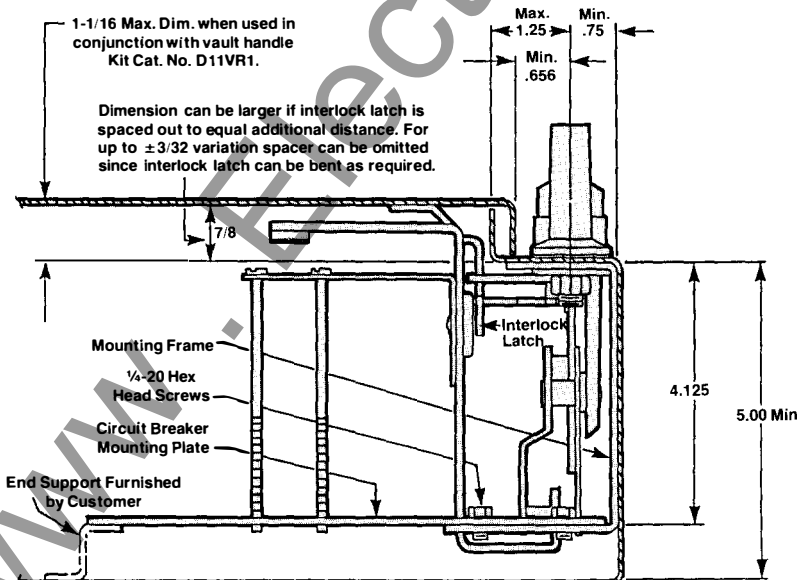
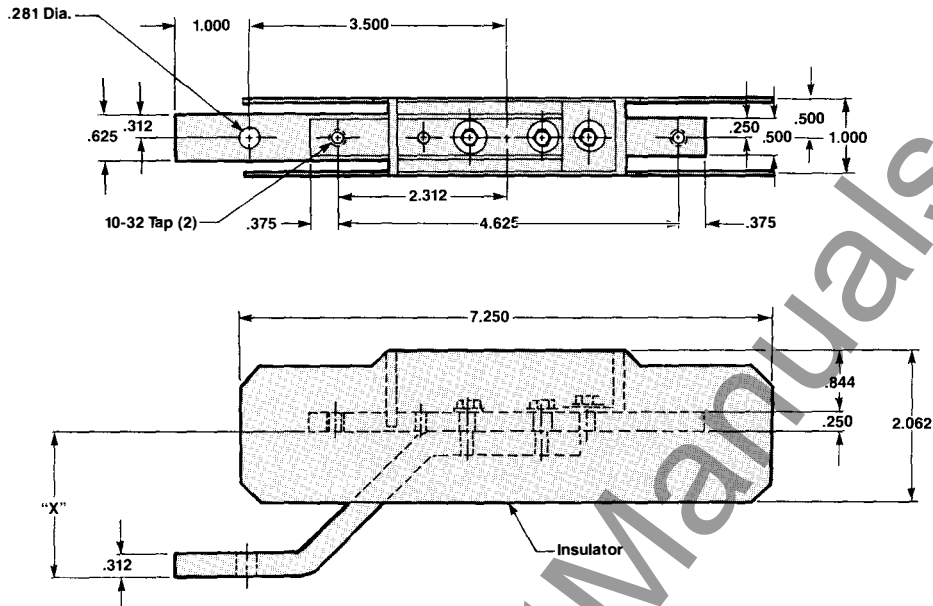


Fig. 4

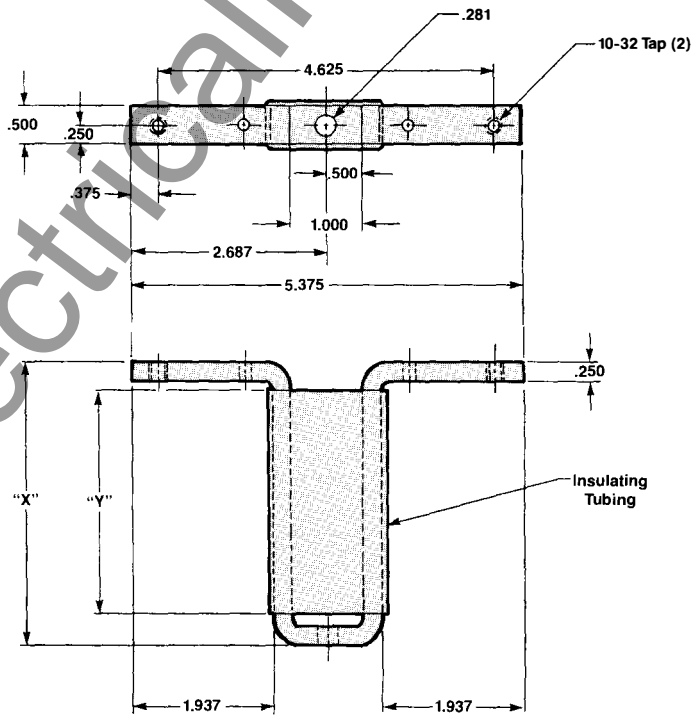
## I-T-E PANELBOARD CONNECTOR STRAPS

### OUTSIDE CONNECTOR STRAP



Cat. No.	"X"
CS3600R	1.984
CS3602R	3.546

### INSIDE CONNECTOR STRAP



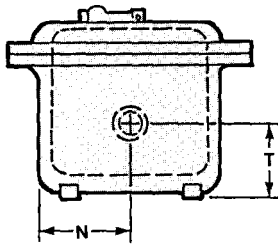
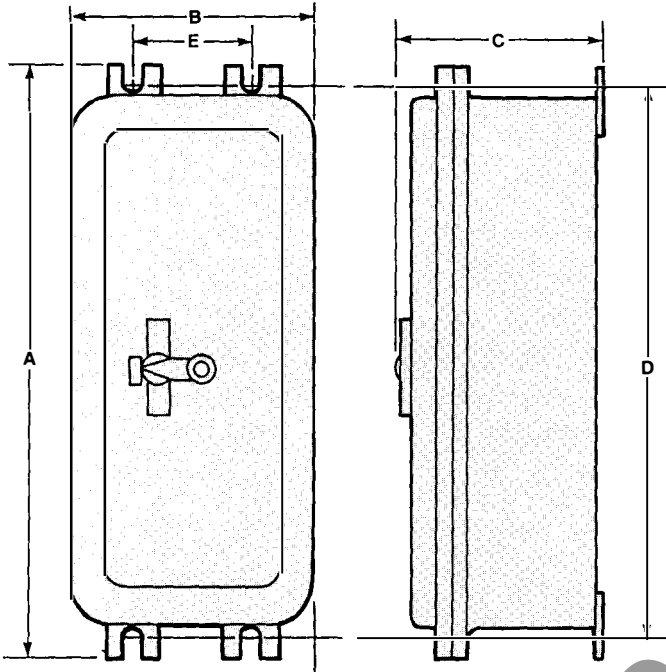
Cat. No.	"X"	"Y"
CS3601R	2.234	1.500
CS3603R	3.796	3.000

Note: These straps are not used by I-T-E in series 6 or 7 panelboards.

## I-T-E ENCLOSURES

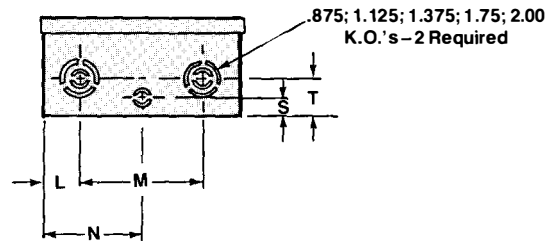
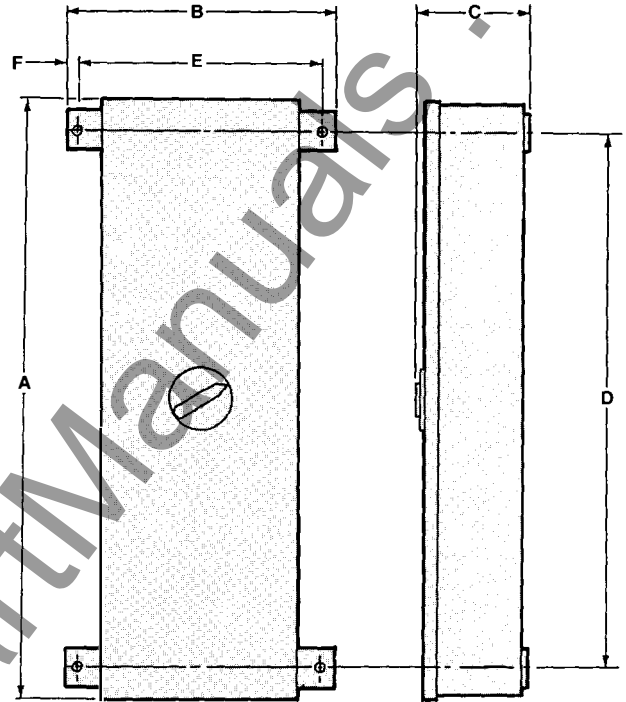
### TYPE 7, 9 – EA (60A), EB (100A)

Cast aluminum enclosure, classified as explosion and fire hazard only enclosure for use in hazardous locations; Class I – Group D, Class II – Groups E, F and G, Class III.



### TYPE 12, 12K – E2N12K

A special-industry, sheet-steel enclosure for indoor use in atmosphere containing particles of lint, dust, dirt, sawdust and other foreign matter.



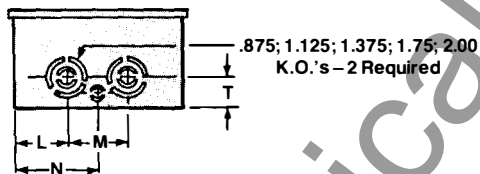
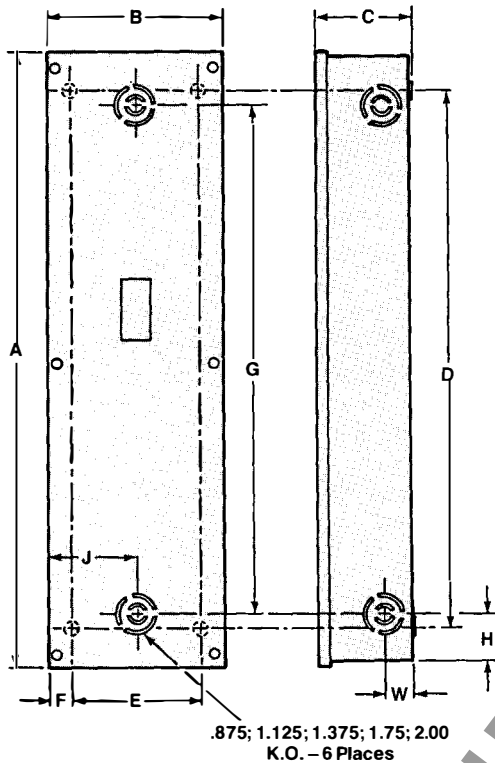
Cat. No.	Dimension Reference									
	A	B	C	D	E	F	G	H	J	K
EA(60A)	14.3	9.4	6.6	13.1	5.5	2.0	—	—	—	—
EB(100A)	19.4	9.9	6.7	18.0	6.0	1.9	—	—	—	—
E2N12K	18.6	8.3	7.1	18.0	6.06	.50	—	—	—	—

Cat. No.	Dimension Reference									
	L	M	N	P	R	S	T	W	X	Y
EA	—	—	—	—	—	—	1.6	—	—	—
EB	—	—	—	—	—	—	2.0	—	—	—
E2N12K	2.1	3.1	—	—	—	—	2.4	1.5	—	—

## I-T-E ENCLOSURES

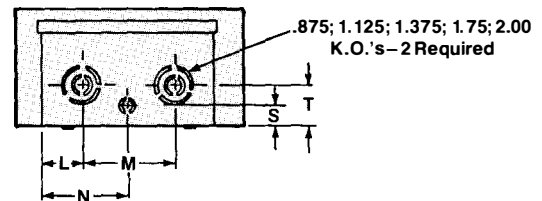
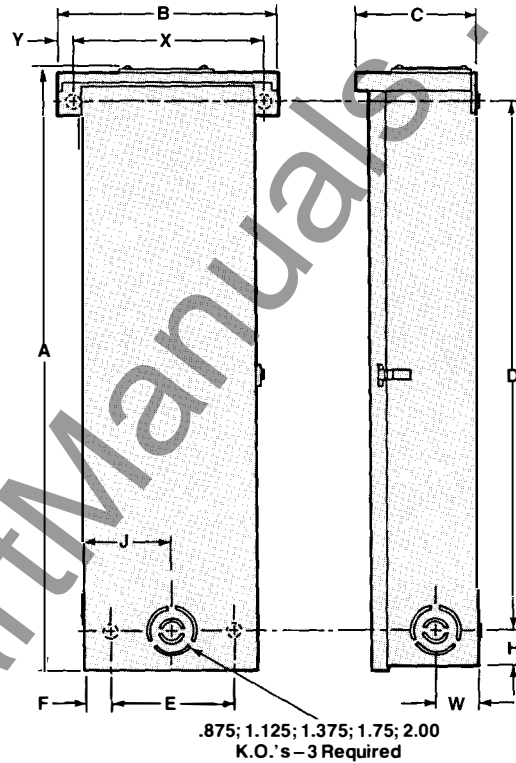
### TYPE 1 – E2N1S

General purpose indoor, sheet-steel enclosure for use in normal atmosphere, listed as service-entrance equipment.



### TYPE 3R – E2N3R

An outdoor sheet-steel enclosure providing protection against driving rain, sleet or snow. Listed as service-entrance equipment.

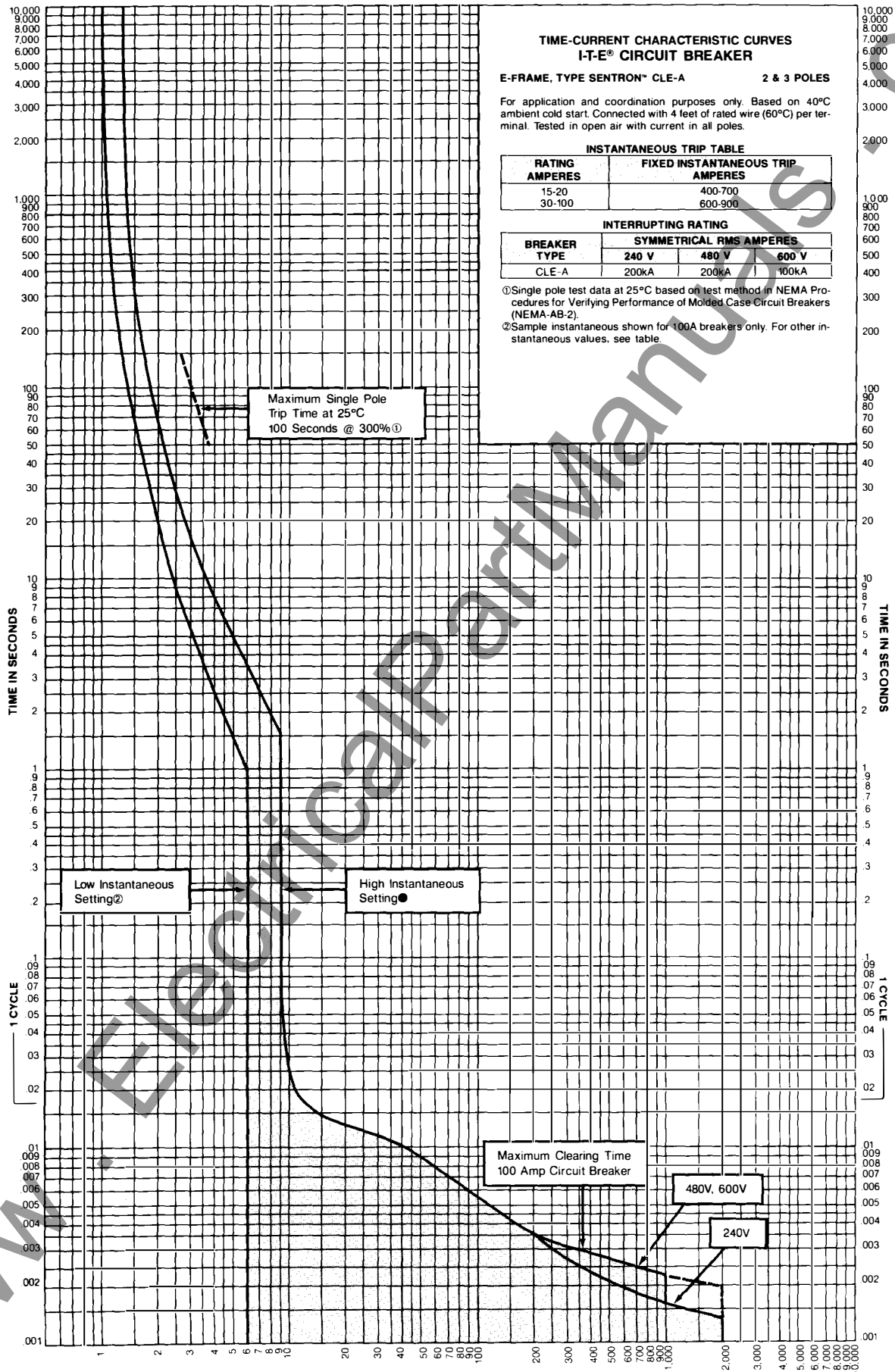


Cat. No.	Dimension Reference									
	A	B	C	D	E	F	G	H	J	K
E2N1F	17.5	8.5	4.6	13.7	5.25	1.00	13.2	1.6	3.6	—
E2N1S	16.7	7.6	4.6	13.7	5.25	1.00	13.2	1.6	3.6	—
E2N3R	17.2	7.7	5.2	12.6	5.38	1.00	—	1.8	3.8	—

Cat. No.	Dimension Reference									
	L	M	N	P	R	S	T	W	X	Y
E2N1F	2.1	3.1	—	—	—	—	2.2	1.6	—	—
E2N1S	2.1	3.1	—	—	—	—	2.2	1.6	—	—
E2N3R	1.5	4.2	—	—	—	—	1.6	1.6	—	3.8

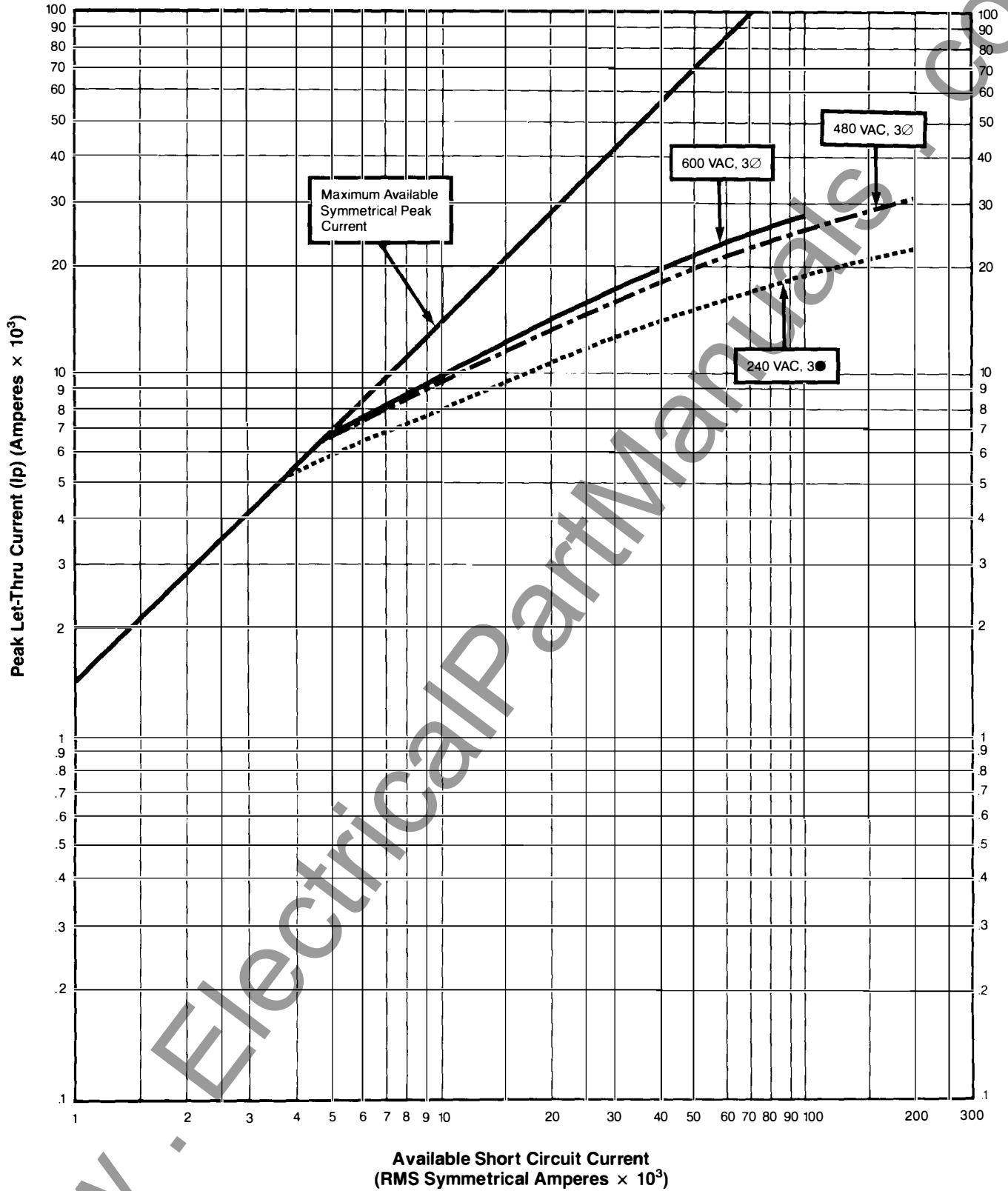


# I-T-E TIME/CURRENT CURVES E FRAME 600 VOLTS, 60 HZ, 15-100 AMPERES



Multiples of Circuit Breaker Continuous Current Rating

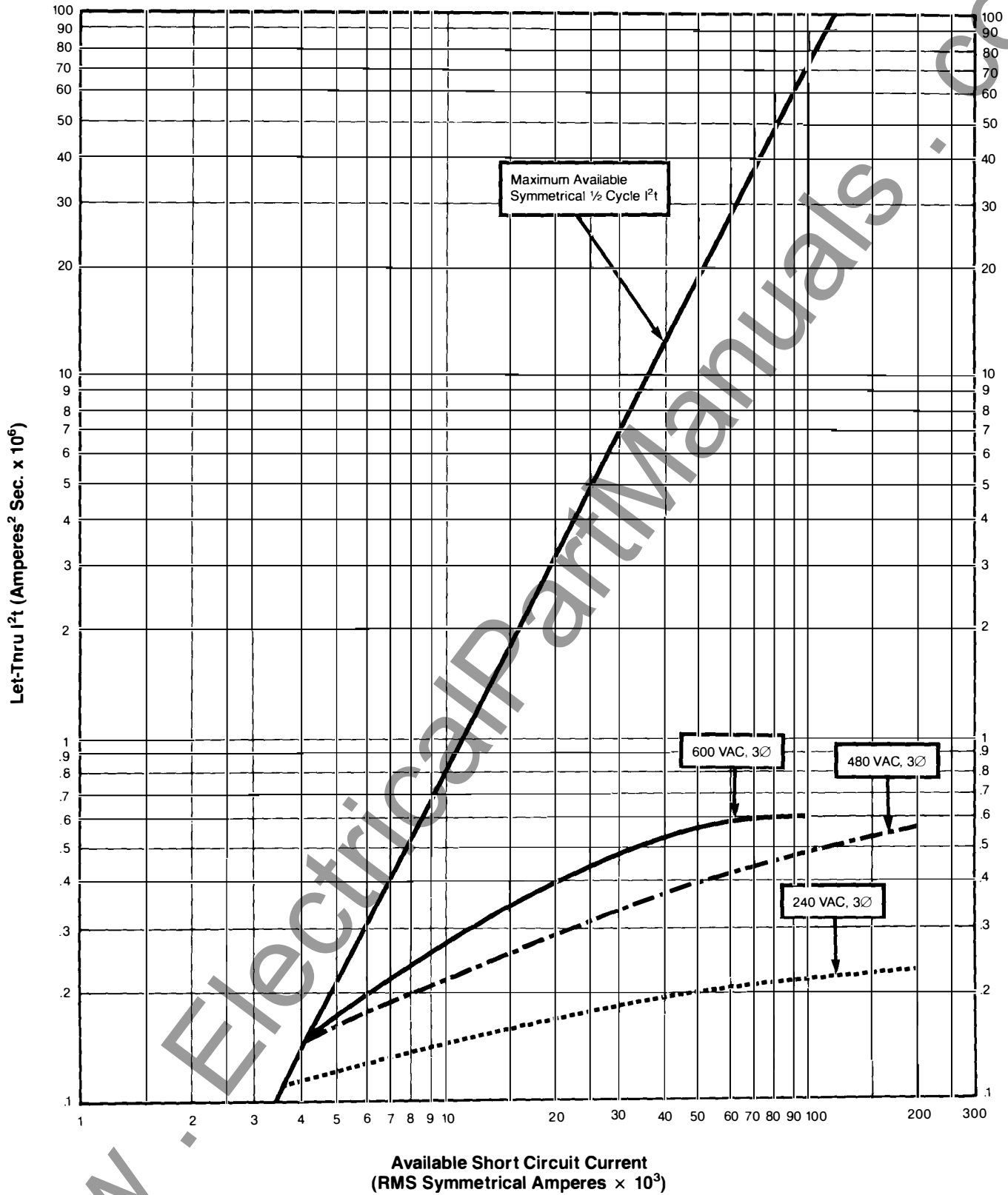
# I-T-E PEAK CURRENT ( $I_p$ ) CURVES E FRAME 600 VOLTS, 60 HZ, 15-100 AMPERES



TD-6001-A SHEET 1 OF 1  
OCTOBER, 1987

Siemens Energy & Automation, Inc.  
I-T-E Electrical Products  
Alpharetta, Georgia 30201

# I-T-E PEAK $I^2t$ CURVES E FRAME 600 VOLTS, 60 HZ, 15-100 AMPERES



TD-6001-B SHEET 1 OF 1  
OCTOBER, 1987

Siemens Energy & Automation, Inc.  
I-T-E Electrical Products  
Alpharetta, Georgia 30201

# I-T-E ORDERING INFORMATION CIRCUIT BREAKER CATALOG NUMBERS

Breaker Type	Ampere Rating	Complete Breaker Unenclosed		UL Interrupting Ratings (kA) (RMS Symmetrical Amperes)						
		Catalog Number		Volts AC					Volts DC	
				120	240	277	480	600	125	250
CLE-A <sup>①</sup> 2-Pole 600V AC	15	CLE62B015	Non-Interchangeable Trip		200		200	100		
	20	CLE62B020			200		200	100		
	30	CLE62B030			200		200	100		
	40	CLE62B040			200		200	100		
	50	CLE62B050			200		200	100		
	60	CLE62B060			200		200	100		
	70	CLE62B070			200		200	100		
	80	CLE62B080			200		200	100		
	90	CLE62B090			200		200	100		
	100	CLE62B100			200		200	100		
	100 Molded Case Switch <sup>②</sup>	CLE62S100A								
SHIPPING: 5 per carton. (Wt. 20 lbs.)										
CLE-A <sup>①</sup> 3-Pole 600V AC	15	CLE63B015	Non-Interchangeable Trip		200		200	100		
	20	CLE63B020			200		200	100		
	30	CLE63B030			200		200	100		
	40	CLE63B040			200		200	100		
	50	CLE63B050			200		200	100		
	60	CLE63B060			200		200	100		
	70	CLE63B070			200		200	100		
	80	CLE63B080			200		200	100		
	90	CLE63B090			200		200	100		
	100	CLE63B100			200		200	100		
	100 Molded Case Switch <sup>②</sup>	CLE63S100A								
SHIPPING: 5 per carton. (Wt. 30 lbs.)										

① The CLE-A circuit breaker is directly interchangeable with the CLE type, both electrically and mechanically.

② Includes self-protecting instantaneous element.

## I-TE ORDERING INFORMATION CIRCUIT BREAKER ACCESSORIES

### AUXILIARY SWITCH

Control Voltage		1 Auxiliary Switch	1 Alarm Switch and 1 Auxiliary Switch	1 Alarm Switch and 2 Auxiliary Switches	2 Auxiliary Switches
AC	DC	Catalog Number	Catalog Number	Catalog Number	Catalog Number
120		A01E62	A01E62B	A02E62	A02E62B
208		A01E62	A01E62B	A02E62	A02E62B
240		A01E62	A01E62B	A02E62	A02E62B
277		A01E64	A01E64B	-	-
480		A01E64	A01E64B	-	-
600		-	-	-	-
	24	A01E62	A01E62B	A02E62	A02E62B
	48	A01E62	A01E62B	A02E62	A02E62B
	125	A01E62	A01E62B	A02E62	A02E62B
	250	A01E62	A01E62B	A02E62	A02E62B

### SHUNT TRIP

Control Voltage		1 Shunt Trip	1 Shunt Trip and 1 Auxiliary Switch	1 Shunt Trip 1 Auxiliary Switch and 1 Alarm Switch	1 Shunt Trip and 1 Alarm Switch	1 Shunt Trip and 2 Auxiliary Switches
AC	DC	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
24		S17E60	-	-	-	-
48		S18E60	-	-	-	-
120		S01E60	S01E62A	S01E62AB	S01E62B	S01E62AA
208		S02E60	S02E62A	S02E62AB	S02E62B	S02E62AA
240		S03E60	S03E62A	S03E62AB	S03E62B	S03E62AA
277		S15E60	S15E64A	S15E64AB	S15E64B	-
480		S04E60	S04E64A	S04E64AB	S04E64B	-
600		S06E60	-	-	-	-
	24	S07E60	S07E62A	S07E62AB	S07E62B	S07E62AA
	48	S09E60	S09E62A	S09E62AB	S09E62B	S09E62AA
	125	S11E60	S11E62A	S11E62AB	S11E62B	S11E62AA
	250	S13E60	S13E62A	S13E62AB	S13E62B	S13E62AA

### UNDERVOLTAGE TRIP

Control Voltage		1 Undervoltage Trip	1 Undervoltage Trip and 1 Auxiliary Switch	1 Undervoltage Trip and 1 Auxiliary Switch and 1 Alarm Switch	1 Undervoltage Trip and 1 Alarm Switch	1 Undervoltage Trip and 2 Auxiliary Switches
AC	DC	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
120		U01E60	U01E62A	U01E62AB	U01E62B	U01E62AA
208		U02E60	U02E62A	U02E62AB	U02E62B	U02E62AA
240		U03E60	U03E62A	U03E62AB	U03E62B	U03E62AA
277		U16E60	U16E64A	U16E64AB	U16E64B	-
480		U06E60	U06E64A	U06E64AB	U06E64B	-
600		U08E60	-	-	-	-
	24	U13E60	U13E62A	U13E62AB	U13E62B	U13E62AA
	48	U14E60	U14E62A	U14E62AB	U14E62B	U14E62AA
	125	U10E60	U10E62A	U10E62AB	U10E62B	U10E62AA
	250	U12E60	U12E62A	-	-	U12E62AA

### BELLALARM

Control Voltage		1 Alarm Switch
AC	DC	Catalog Number
120		-
208		-
240		B00E62
277		-
480		B00E64
600		-
	24	-
	48	-
	125	-
	250	B00E62

Note: Each catalog number represents an add-on module. **Only one module can be added to a circuit breaker.**

# I-T-E ORDERING INFORMATION CIRCUIT BREAKER ACCESSORIES

## ADDITIONAL ACCESSORIES

Item	Catalog No.	Item	Catalog No.
Pressure Wire Connectors (15-25 Amperes)	SA1E025	Rotary Handle Operators	D11CEU1 D11CEU2
Multi-Pole (30-100 Amperes)	LN1E100	Rotary Handle Operators	RHOESD <sup>①</sup> RHOEVD <sup>①</sup>
Single-Pole (30-60 Amperes) Load Side Only	LD1E060	Rotary Handle Operators	E2RH1
Single-Pole (70-100 Amperes) Load Side Only	LD1E100	Rotary Handle Operators	E2RHV9
Single-Pole (30-100 Amperes) Line Side Only	LN1E100	Linear Drive Operator	OHES1
Single-Pole (110-125 Amperes) Line Side Only	TA1E6125	Side Handle Operators	D11ELU D11ERU
Handle Blocking Device	E2HBL	Flange Mount Handle Operator	FHOH <sup>②</sup> FHOEBO FHOECO
Padlocking Device	E2HPL	Handle Breaker Operator Cable Operator	
Rear Connecting Studs		Enclosures	
Line Side (Long)	RS2641	Type 1 (Surface Mounting)	E2N1S
Load Side (Long)	RS2642	Type 1 (Flush Mounting)	E2N1F
Line Side (Short)	RS2643	Type 3R	E2N3R
Load Side (Short)	RS2644	Type 7,9 15-60 Amperes	EA
Plug-In Adaptors		70-100 Amperes	EB
Line Side (2 Pole)	PC2637	Type 12	E2N12
Load Side (2 Pole)	PC2638	Single Pole Mounting Bracket	E2BMB
Line Side (3 Pole)	PC2657		
Load Side (3 Pole)	PC2658		
Ground Fault Sensing Relay Kit			
Basic Kit	GF01E60		
Basic Kit with Normally Open Bellalarm	GF01E60B0		
Basic Kit with Normally Closed Bellalarm	GF01E60BC		

- ① For 4.4x application, order RHOH4 instead of RHOH.  
② For 4.4x application, order FHOH4 instead of FHOH.

## MISCELLANEOUS INFORMATION

<u>I-T-E Item</u>	<u>UL File Number</u>	<u>CSA Report Number</u>
Breakers	E10848	LR13077
Terminal Connectors	E23615 (SP)	
Plug-in Connectors	E23615	
Rear Studs	E23615	
Add-On External Accessories	E69455	LR13077
Shunt trips		
Undervoltage		
Aux. Switch		
Bellalarm		
Molded Case Switch	E68312	LR42022
Enclosures	E10848	
ETI Breakers	E10848	LR42022
Circuit Breaker Mounting Screws #8 – 32 x 4.06		

PROCEDURES FOR VERIFYING PERFORMANCE OF MOLDED CASE CIRCUIT BREAKERS — AB2

**National Electrical Manufacturers Association**  
**2101 L Street N.W. Suite 300**  
**Washington, DC 20037**

## Sales Offices

For more information, contact your I-T-E Electrical Products distributor or your local I-T-E sales office listed below

<b>Alabama</b> Birmingham (205) 879-7030 Mobile (205) 928-0822  <b>Alaska</b> Anchorage (907) 346-2489  <b>Arizona</b> Phoenix (602) 944-7900  <b>Arkansas</b> Little Rock (501) 224-9595  <b>California</b> Fresno (209) 264-5018 Los Angeles (714) 979-6600 Sacramento (916) 447-0273 San Diego (619) 569-8015 San Francisco (415) 786-9240 Stockton (209) 478-9596  <b>Colorado</b> Denver (303) 694-3770 Colorado Springs (303) 597-6500 Ft. Collins (303) 223-2712  <b>Connecticut</b> Wallingford (203) 265-5003	<b>Florida</b> Ft. Lauderdale (305) 484-3888 Fort Myers (813) 656-3605 Jacksonville (904) 396-3214 Miami (305) 592-4106 Orlando (305) 894-7771 Tallahassee (904) 386-8926 Tampa (813) 886-2551 West Palm Beach (305) 683-5185  <b>Georgia</b> Atlanta (404) 458-4353 Macon (912) 743-8994 Savannah (912) 897-5049  <b>Hawaii</b> Honolulu (808) 533-7135  <b>Idaho</b> Boise (208) 342-6852  <b>Illinois</b> Chicago (312) 519-4320 Peoria (309) 688-8729  <b>Indiana</b> Evansville (812) 422-9176 Fort Wayne (219) 744-0440 Indianapolis (317) 788-5500 Roseland (219) 277-7040	<b>Iowa</b> Davenport (319) 359-1357 Des Moines (515) 280-1614  <b>Kansas</b> Kansas City (913) 491-3114 Wichita (316) 942-1409  <b>Kentucky</b> Louisville (502) 426-4647  <b>Louisiana</b> Baton Rouge (504) 293-6874 New Orleans (504) 885-3622 Shreveport (318) 424-0720  <b>Maine</b> Portland (207) 772-0021  <b>Massachusetts</b> Boston (617) 470-3660 Braintree (617) 848-5770 Worcester (617) 792-4566  <b>Michigan</b> Detroit (313) 358-2470 Grand Rapids (616) 247-7611  <b>Minnesota</b> Minneapolis (612) 835-1560	<b>Mississippi</b> Jackson (601) 982-2274  <b>Missouri</b> Kansas City (913) 491-3114 St. Louis (314) 567-3900  <b>Montana</b> Big Fork (406) 837-5092  <b>Nebraska</b> Omaha (402) 397-1940  <b>New Hampshire</b> Manchester (603) 623-6264  <b>New Jersey</b> Totowa (201) 890-1260  <b>New Mexico</b> Albuquerque (505) 881-1611  <b>New York</b> Buffalo (716) 834-3815 Long Island (516) 484-3490 New York (201) 890-1260 Syracuse (315) 446-8660  <b>North Carolina</b> Charlotte (704) 372-9540 Greensboro (919) 373-1849 Raleigh (919) 782-3365	<b>North Dakota</b> Bismarck (701) 258-9555 Fargo (701) 293-7709  <b>Ohio</b> Cincinnati (513) 793-3880 Cleveland (216) 642-0701 Columbus (614) 766-2204 Dayton (513) 298-2289 Toledo (419) 865-8823  <b>Oklahoma</b> Oklahoma City (405) 943-9156 Tulsa (918) 665-1806  <b>Oregon</b> Eugene (503) 683-2111 Portland (503) 684-3750  <b>Pennsylvania</b> Philadelphia (215) 825-5300 Pittsburgh (412) 257-0090  <b>Rhode Island</b> Providence (401) 272-2888  <b>South Carolina</b> Columbia (803) 254-7095 Greenville (803) 288-3490	<b>Tennessee</b> Chattanooga (615) 267-7412 Johnson City (615) 282-2718 Knoxville (615) 690-5172 Memphis (901) 761-2123 Nashville (615) 367-9403  <b>Texas</b> Austin (512) 443-7822 Beaumont (409) 835-7634 Dallas (214) 247-0606 Fort Worth (817) 735-1947 Houston (713) 681-4900 Lubbock (806) 793-2377 McAllen (512) 687-2072 San Antonio (512) 824-7421  <b>Utah</b> Salt Lake City (801) 272-2090  <b>Virginia</b> Richmond (804) 288-8311 Roanoke (703) 982-2776 Virginia Beach (804) 481-2440  <b>Washington</b> Seattle (206) 828-6600 Spokane (509) 325-2582  <b>Washington, DC</b> (301) 459-2044  <b>Wisconsin</b> Milwaukee (414) 258-8535
--	---	---	---	---	--

Your Distributor is:

International—TLX: 822024SEA/BU UF  
Fax: (404) 751-2496