

CIRCUIT BREAKER OPERATION & ADJUSTMENT (AHT-1 & T-12)

Preliminary factory adjustment of the breakers is expected to give signal light contact continuity under the following four conditions:

1. When the cocking lever is moved beyond the open position.
2. When the cocking lever is moved beyond the closed position.
3. When the trip bar is moved, but before the breaker contacts are tripped.
4. When the breaker has tripped completely.

To achieve these conditions, the position of the two signal light contacts and the calibrating screw are factory preset. To obtain light indication from the reset position, the cocking lever must be moved toward the light tower when the contacts are open. To obtain light indication from the closed position, the cocking lever must be moved toward the contacts when the contacts are closed. This allows the light switch operation to be checked outside the tank.

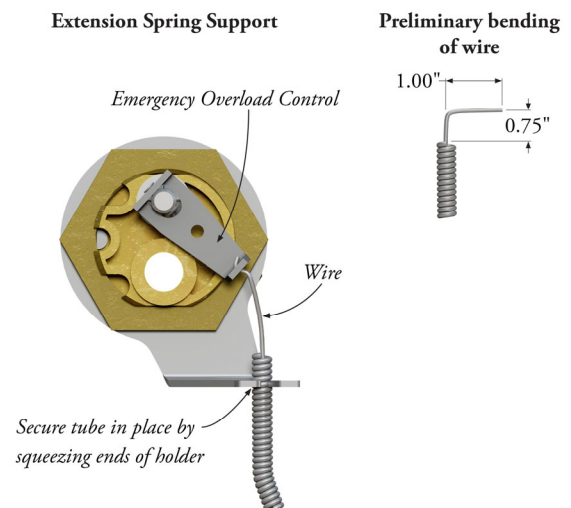
Following this preliminary adjustment, the breakers are calibrated and packaged.

To obtain the same conditions when the breaker is installed in a transformer requires the correct amount of free travel at each end of the operating handle motion.

Obtaining the correct free travel is often a cut-and-try procedure due to variation in the handle location, breaker location and tank dimensions. To facilitate this adjustment the following steps may prove useful.

1. Bolt breaker to support, tighten screws firmly and back off the screw under the trip bar ½ turn.
2. Install the operating handle assembly in the tank and tighten the clamping nut until the gasket stop bottoms out. Further tightening is undesirable.
3. Position the operating handle to align the yellow arrow with the "R" on the bearing, allowing about ¼" clearance between the handle stop and the bearing stop. Position breaker in the cocked position with the contacts open.
4. Screw the connecting rod (link arm) in to the cocking lever until the holes in the rod and operating arm mate. Insert a cotter pin in the holes, hold cotter pin in place and move the operating handle to check for the following operations:
 - a. Close and open the breaker.
 - b. Close breaker, trip light contact manually (avoid tripping main breaker contacts). Reset light by moving operating handles to the "L" position.
 - c. Trip breaker contacts and try resetting the breaker. A properly adjusted breaker will have approximately ¼" of travel left between the handle and bearing stops. If breaker fails to operate properly, adjust connecting rod until the above operating conditions are obtained.

5. Install cotter pin permanently; avoid binding between rod and lever.
6. Install signal light in tank wall; tighten clamping nut only enough to compress the gasket. Avoid over-tightening.
7. Position calibration control mechanism (overload lever) on the breaker at the "normal" position. Insert the preformed end control wire into the breaker overload lever and thread the control cable (sheath) into the support on the breaker and lock the connection by pinching the support around the cable sheath.
8. Position the calibration control mechanism (overload lever) on the breaker in the "normal" position. Hold the control assembly lever on the operating handle bearing in the "normal" position. Thread the control cable through the hole in the cable support and lock the connection by pinching the support around the cable sheath. Twist the control wire into and around the emergency overload control lever as show below.
9. Connect signal light winding to terminal on the breaker.
10. Connect signal light winding to the signal light.
11. For breakers without emergency overload and signal light, the following procedure is recommended to make the breaker assembly adjustment in the transformer tank:
 - a. Place breaker in the cocked position with the contacts open.
 - b. Adjust threaded connecting rod (link arm) so that the yellow arrow on the operating handle is aligned with the "O" on the bearing.
 - c. Check breaker for proper reset and close operations. Adjust connecting rod (link arm) to achieve proper operation, if required.



STANDARD OPERATING INSTRUCTION GUIDE FOR LOW-VOLTAGE BREAKER & SIGNAL LIGHT

WARNING : ON SINGLE PHASE & THREE PHASE TRANSFORMERS WITH THE SECONDARY CIRCUIT BREAKER OPEN, THERE MAY BE SUFFICIENT COUPLING TO THE WINDING SO THAT PERCEPTIBLE SHOCK MIGHT BE OBTAINED FROM THE SECONDARY TERMINALS.

A circuit breaker when provided is mounted inside the tank, under the liquid level. The function of this breaker is to open the low-voltage circuit and protect the transformer from faults or severe overloads. A red signal light, when provided, gives the warning that the load has reached a value near the tripping point of the breaker. The signal light remains lighted until reset (turned off) by means of the breaker-operating handle. Transformers should not be operated under load conditions that will cause the red light to appear frequently, since it indicates an overload on the transformers. When such a condition exists, it is recommended that a larger transformer be substituted to avoid impairing the life of the smaller unit.

The circuit breaker operating handle and position indicator are shown in Figure 1. Transformers are shipped with the circuit breakers closed. To open the low voltage circuit manually, move the handle so that the pointer moves from "C" (closed) to "O" (open), at which point the circuit is open. Verify that the circuit breaker is latched in the "open" position.

To insure that the discharge of the static charge, which is sometimes present in the low voltage winding due to capacitance, it is recommended that the low voltage be grounded after opening the circuit breaker until the high voltage is disconnected.

To close the breaker after manual opening move the handle so the arrow points towards "C". If the breaker has been tripped it is necessary to move the arrow towards "R" to reset the breaker before closing the breaker by moving the arrow towards "C".

If a fault exists or an excessive load exists at the time the breaker is closed, the breaker will reopen even though the operating handle is held in the "C" (closed) position.

To reset the signal light, rotate the handle to the "L" (light), and then return to "C" (close). If the light fails to go out, the transformer is still over heated.

Provision is made for checking the signal light bulb when the transformers are in service, to do this, rotate the handle to "L" (light)

and the light should come on. If it does not, the bulb should be replaced. The bulb is a standard six-volt, GE bulb No. 44, and is replaceable from outside the transformer and by removing the signal light lens. After checking return the operation handle to "C". Faulty bulbs should be replaced, since operating the transformer with the faulty bulb or without a bulb may result in radio noise.

Some circuit breakers are equipped with emergency overload devices, which can be used to restore service following a circuit breaker operation due to overload. With the emergency lever in the normal position the breaker will trip at its normal settings as calibrated at the factory. Moving the lever in clockwise direction (see Figure 1) increases the setting so that a higher temperature is required to trip the breaker. This emergency setting provides extra load capacity and still permits manual breaker operation, and also retains short circuit protection of the transformer. It is important that the emergency setting be used only when and as long as absolutely necessary, because its use will result in a reduction of transformer life.

A meter seal is provided on the emergency lever to prevent tampering. It is recommended that a new seal be applied when it is returned to the normal position after emergency operation.

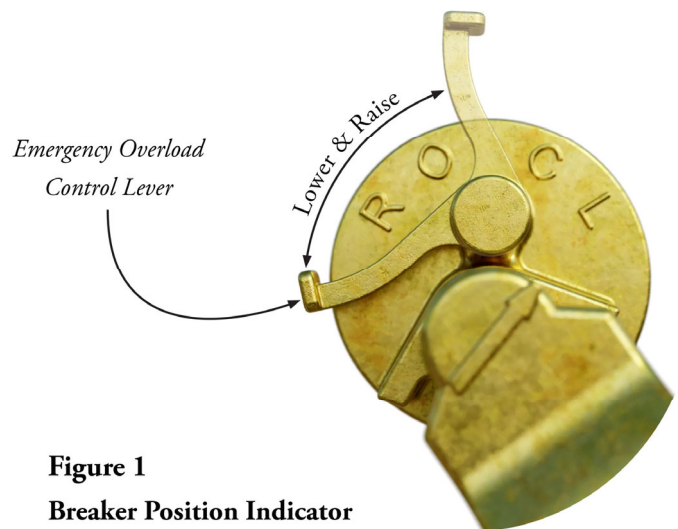


Figure 1
Breaker Position Indicator



CIRCUIT BREAKER APPLICATION

ECI
7-7D
A1-12
02/05



TITLE *A 2550K180*
CONT ON SH 2 SH 1
CIRCUIT BREAKER (APPLICATION)

UNLESS OTHERWISE SPECIFIED, TOLERANCES ARE

SURFACES	2 PL DEC	3 PL DEC	ANGLES
✓	±	±	± DEG

FIRST MADE FOR

REVISIONS

A. AS TANK DIAMETER INCREASES CIRCUIT BREAKER IS MOVED TO LEFT TO KEEP OPERATING ARM LENGTH UNDER 7.50 FOR B DIM.

B. MAXIMUM OF 7.12 (SEE SEC. A4) FOR OPERATING SHAFT. PREFERABLE TO USE ONE OF THE OTHER LENGTHS SHOWN IN CATALOG.

C. A 5° MAXIMUM TILT OF ARM FROM VERTICAL FOR OPERATION. THE WOBBLE IN THE LINK IS ONLY 5° EITHER SIDE OF VERTICAL CENTER LINE.

D. INDICATES OPERATING HANDLE SHOULD BE ABOVE OIL LEVEL TO INSURE THAT GASKET LEAK WOULD NOT LOWER THE OIL LEVEL.

E. TO KEEP OPERATING ARM SHORT AND SATISFY THE 5° REQUIREMENTS IT IS PERMISSIBLE TO PUT AN OFFSET IN THE ARM. A PROTOTYPE SHOULD BE CHECKED OUT TO SEE THAT THE OFFSET LEVERAGE DOES NOT OVERCOME THE STIFFNESS OF THE ARM AND TAKE A PERMANENT SET OF SPRING INTO A NEW SHAPE DURING ACTUAL OPERATION.

F. ARM SHOULD NOT EXTEND THROUGH THE LINK SO FAR THAT IT CAN HIT THE TANK WALL DURING BREAKER OPERATION.,

G. AN AUXILIARY SUPPORT OF SOME TYPE SHOULD BE ADDED WHEN THE SUPPORT EXCEEDS 6.00 INCHES TALL, OTHERWISE THE INHERENT WOBBLE OF THE SUPPORT MIGHT KEEP THE BREAKER FROM RESETTING DURING COCKING OPERATION.

H. WHEN HANDLE IS IN THE UP POSITION THERE SHOULD BE SUFFICIENT HAND CLEARANCE TO A TANK RIM.

J. DUE TO THE LOCATION OF THE ACTIVE ARC OF ROTATION OF THE OPERATION LEVER ON THE BREAKER, GREAT CAUTION MUST BE TAKEN TO INSURE THE MOTION WILL APPROXIMATE A TANGENTIAL PULL TO COCK THE BREAKER MECHANISM. FIG.#3 AND #4 POINT OUT THE MAXIMUM AND MINIMUM REQUIREMENTS OF BREAKER LOCATION IN RELATION TO OPERATING ARM ON HANDLE ASSEMBLY.

K. THIS ARM PREVIOUSLY CAME IN (2) SIZES

1. FOR AHT-1 IT WAS A STEEL ROD OF .193 DIA WITH A ROLLED THREAD OF #12-28 TO SCREW INTO LINK ON CIRCUIT BREAKER OPERATING LEVER.
2. FOR THE T-12 A STEEL ROD OF .219 DIA WITH A ROLLED THREAD OF .250-20 TO SCREW INTO LINK ON CIRCUIT BREAKER OPERATING LEVER. AS OF JANUARY 1976, THE ROD HAS BEEN STANDARDIZED TO USE THE .219 DIA WITH A .250-20 ROLLED THREAD ON BOTH AHT-1 AND T-12 BREAKERS.

L. THIS IS THE OPERATING LEVER LINK. THE OPERATING LINK WILL USE A .25-20 THREAD WITH THE 5° WOBBLE FROM SIDE TO SIDE AND FREE ROTATION IN THE OTHER PLANE.

M. THE OFFSET DIM OF THE OPERATION SHAFT (CRANK) INCREASES WHEN THE LONG LEG OF THE SHAFT INCREASES. THIS IS DUE TO CLEARANCES IN BEARING AND SPRING ACTION OF SHAFT. SEE SEC. A4 FOR M DIM. AND SHAFT LENGTH

N. FOR EMERGENCY OVERLOAD HOOKUP TO OPERATING HANDLE PLUS HOLE SIZE AND SHAPE IN TANK FOR OPERATION HANDLE BEARING SEE SE. A4, 3101C2620K017. SIGNAL LIGHT DATA ALSO INCLUDED.

P. THE FLAT OR TILTED SUPPORT SHOULD BE AT LEAST .188 THICK AND 1.00 WIDE AND FLAT TO INSURE WHEN THE MOUNTING SCREWS ARE USED, THE PLASTIC BASE OF THE BREAKER IS NOT SUBJECTED TO A CONSTANT BENDING FORCE.

UPDATE TEMPLATE

Removed lines in (L)

R. GILLAND
8-NOV-01

N. Adams
2/11/05

3

4

RETRCD ACAD

UPDATED TEMPLATE

A.DOWNS
06FEB95

STULPIN
28-JAN-99

1

2

ERMCO-V

PRINTS
TO

MADE BY: AARON DOWNS 06-FEB-95

APPROVALS

ECI

A2550K180

ISSUED BY: N. Adams 2/11/05

CONT ON SH 2

SH 1



CIRCUIT BREAKER APPLICATION

ECI
7-7D
A1-13
01/99

UNLESS OTHERWISE SPECIFIED			ERMCO COMPONENTS, INC.		A 2550K180		
SURFACES		TOLERANCES		TITLE		CONT ON SH 3 SH 2	
✓		2 PL DEC ±	3 PL DEC ±	ANGLES ± DEG		CIRCUIT BREAKER (APPLICATION)	
FIRST MADE FOR							
<p>FIG. #1</p>						REVISIONS	
<p>FIG. #2 OPTION TO OVERRIDE "C" LIMITS</p>						RETRCD ACAD	
						UPDATED TEMPLATE	
A.DOWNS 06FEB95						STULPIN 28-JAN-99	
1						2	
ERMCO-V							
PRINTS TO							
MADE BY: AARON DOWNS 06-FEB-95						A 2550K180	
ISSUED BY: S. STULPIN 28-JAN-99						CONT ON SH 3 SH 2	
APPROVALS						HICKORY ERMCO	



CIRCUIT BREAKER APPLICATION

ECI
7-7D
A1-14
11/01

ERMCO COMPONENTS, INC.

TITLE

CONT ON SH

SH 3

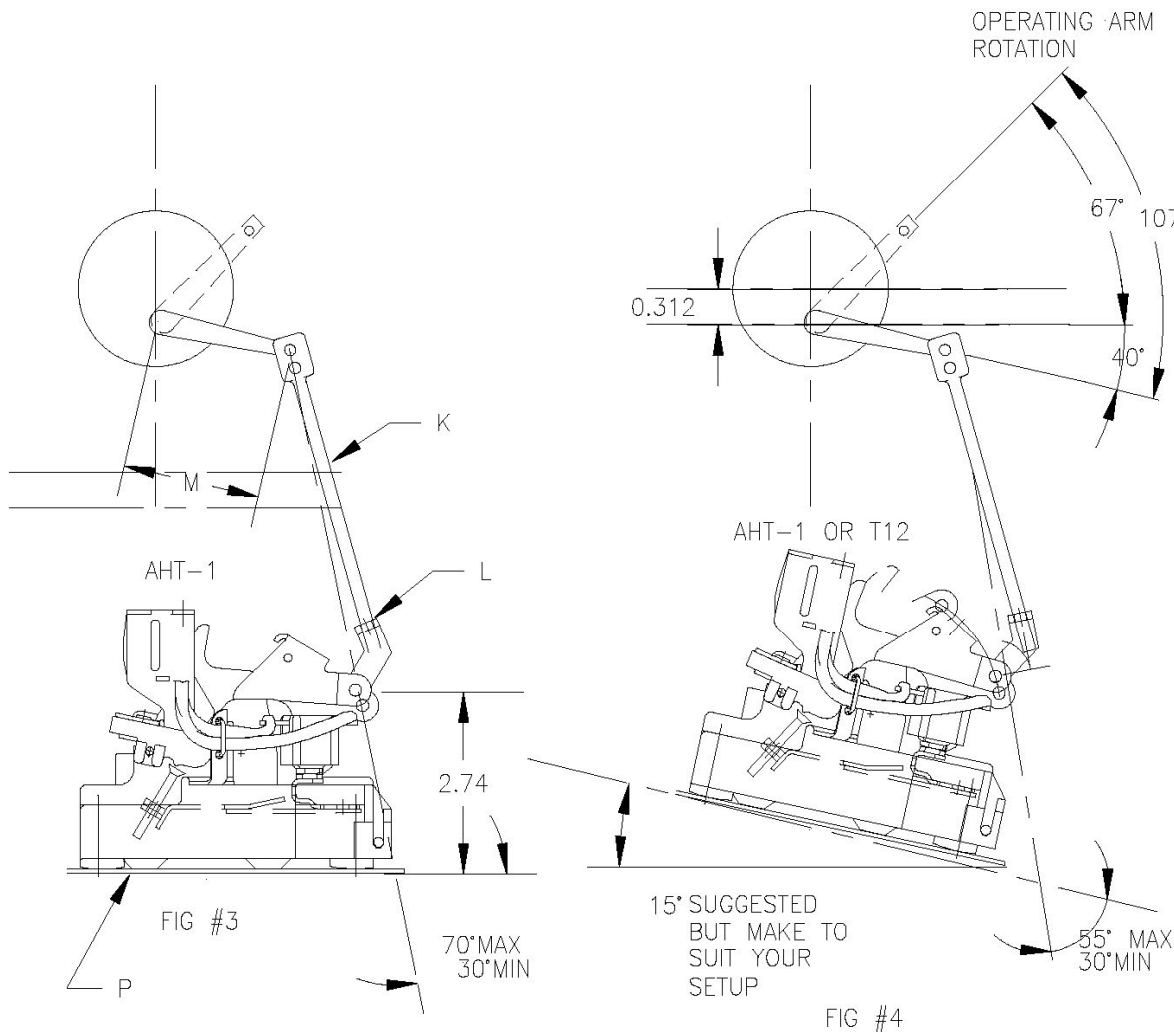
A 2550K180
CIRCUIT BREAKER (APPLICATION)

UNLESS OTHERWISE SPECIFIED, TOLERANCES ARE

SURFACES	2 PL DEC	3 PL DEC	ANGLES
✓	±	±	± DEG

FIRST MADE FOR

REVISIONS



SEE CIRCUIT BREAKER OUTLINE
FOR OTHER DIMENSIONS
REQUIRED

ALSO SEE 3101C2620K017
FOR OPERATING HANDLE,
SIGNAL LIGHT, AND EMERGENCY
CONTROL ASSEMBLY

107° MOTION OF HANDLE FROM STOP TO STOP
ALLOW FOR 4° LOSS OF MOTION AT EACH STOP
IN ANY NEW DESIGN CONSIDERATIONS. NOTE THE
ANGLES 67° AND 40° ARE SET UP THIS WAY TO
AID IN THE OPERATION OF THIS TYPE OF BREAKER

UPDATED TEMPLATE

GILLAND
8-NOV-01

3

RETRCD ACAD
UPDATED TEMPLATE

A.DOWNS
06FEB95

1

2

ERMCO-V

PRINTS
TO

MADE BY: AARON DOWNS 06-FEB-95

APPROVALS

HICKORY
ERMCO

A2550K180

CONT ON SH

SH 3

ISSUED BY: R. GILLAND 8-NOV-01