

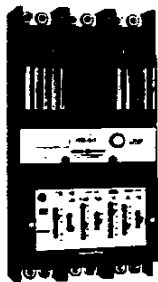


INSTRUCTIONS

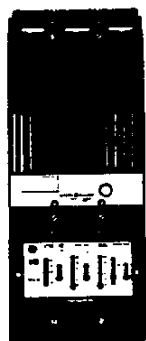
Solid State **VersaTrip™** CIRCUIT BREAKERS

150-4000 Amperes 240, 480 and 600 Volts A-c

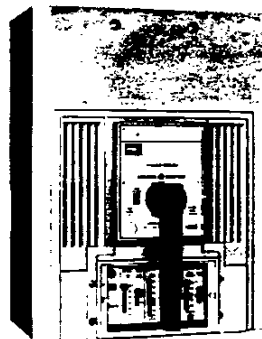
GEH-3481
Rev. D



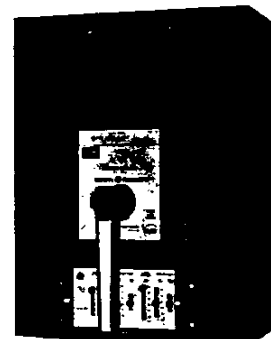
TJ5



TK5



TP55



TH55

TRIPPING FUNCTIONS

General Description

1. Ampere Setting — Standard
2. Long-Time Trip Delay — Standard
3. Short-Time Trip Setting — Optional (Cat. No. Suffix "S").
4. Short-Time Trip Time Delay — Optional (Cat. No. Suffix "S").
5. Instantaneous Trip Setting — Standard
6. Ground Fault Current Trip Setting — Optional (Cat. No. Suffix "G").
7. Ground Fault Trip Time Delay — Optional (Cat. No. Suffix "G").
8. Fixed Instantaneous Override Trip, with Short-Time Trip Delay and Short-Time Trip Setting — Optional (Cat. No. Suffix "D").

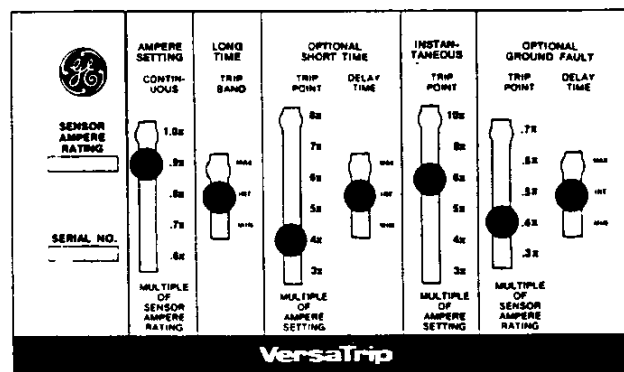
The quantity of the above functions in any given breaker is determined by the complete catalog number.

Detailed Description

1. Ampere Setting

The ampere setting is the value of current the breaker will carry indefinitely without tripping. This value of current is related to the nominal nameplate sensor ampere rating of the breaker in terms of percent.

The range of values is: 60-70-80-90-100%



2. Long-Time Trip Band

Long-time trip bands provide the function of withstanding momentary overloads such as motor starting, welding or other overcurrent conditions without interrupting service.

The purpose of the time delay bands is to provide further degrees of coordination and selectivity within a system. The delay band maintains the same value of trip current, but adds delay (time) to the trip setting. The bands are marked as follows:

Continuous Current Ratings	Typical Time Delay at 600% of Device Setting
150-4000 Ampere	
Maximum Band	20 Seconds
Intermediate Band	10 Seconds
Minimum Band	5 Seconds

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 General Electric Company.

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GENERAL  ELECTRIC

3. Short-Time Trip Setting

The primary function of the short-time trip is to allow the breaker to carry high level overload currents for a short period of time. This feature again is to provide further degrees of selectivity within a system.

Short-time trip settings are the following multiples of the trip setting:

150-1600A — 3x, 4x, 5x, 6x, 7x, 8x
2000-3000A — 2x, 3x, 4x, 5x, 6x, 7x
4000A — 1.5x, 2.0x, 2.5x, 3.0x, 4.0x, 5.0x

4. Short-Time Delay Time

The short-time delay time provides a further refinement of coordination between upstream and downstream circuit breakers which have the same short-time trip settings.

Three steps of selectivity are provided:

Maximum	.3 Seconds
Intermediate	.2 Seconds
Minimum	.1 Seconds

5. Instantaneous Setting

The instantaneous setting provides immediate (no intentional time delay) interruption of severe overloads, thereby minimizing damage to system equipment. The trip point is adjustable and expressed in multiples of the ampere setting:

150-1600A — 3x, 4x, 5x, 6x, 8x, 10x
2000-3000A — 3x, 4x, 5x, 6x, 7x, 8x
4000A — 2.0x, 2.5x, 3.0x, 4.0x, 5.0x, 6.0x

6. Ground-Fault Current Trip Setting

Settings are adjustable with no setting exceeding 1200 amperes to comply with National Electrical Code, Section 230-95.

These settings are the following multiples of sensor ampere rating:

150-1600A — .3x, .4x, .5x, .6x, .7x
2000 and 2500A — .25x, .30x, .35x, .40x, .45x
3000A — 600A, 700A, 800A, 900A, 1100A
4000A — 700A, 800A, 900A, 1000A, 1100A

7. Ground-Fault Trip Time Delay

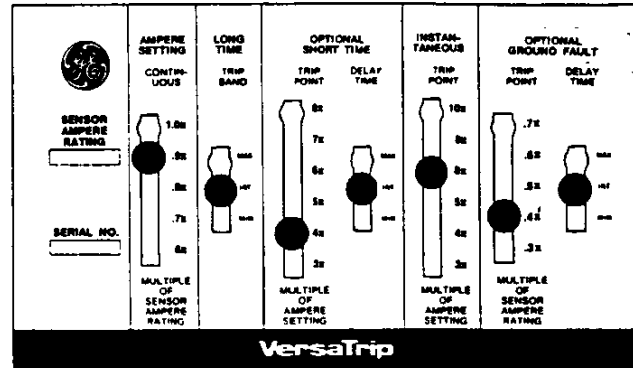
The time delay setting for ground fault interruption provides tripping selectivity for main and feeder breakers. Three steps of selectivity are provided:

Maximum	.4 Seconds
Intermediate	.3 Seconds
Minimum	.2 Seconds

8. Fixed Instantaneous Override Trips

A fixed instantaneous trip is provided on circuit breakers ordered with short-time delay and no adjustable instantaneous trip. These settings are the following multiples of Sensor Ampere Rating:

150-2500A — 15x
3000A — 13x
4000A — 9x



MOUNTING NEUTRAL CURRENT TRANSFORMER

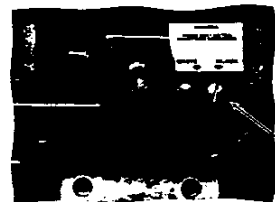
(Supplied with circuit breaker containing ground fault detection circuitry.)

If load circuit does not include a neutral (For example: 3 phase, 3 wire) the neutral CT terminals on the circuit breaker should be left open and neutral CT not used. (do NOT "short" terminals)

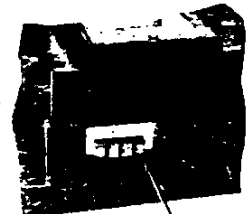
When a neutral is included in the load circuit, neutral CT markings of line and load must be respected when making bus or cable connections.

Polarity of connecting wires from secondary of neutral CT to circuit breaker must also be respected: white to white, black to black.

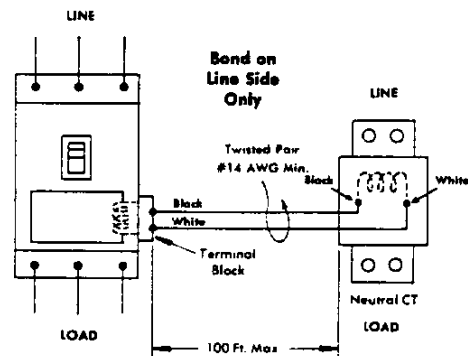
Neutral CT can only be used with static breaker of same ampere rating.



Neut. term's located on load end, back side of center pole on TP55 and TH55 Circuit Breakers.



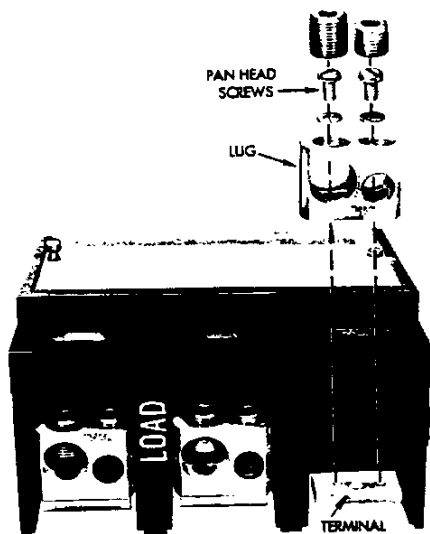
Neut. CT term's located on right side, load end, of TKS and TJS Circuit Breakers.



Schematic Wiring Diagram for Connection of Neutral Current Transformer for VersaTrip Ground Fault.

Refer to Label on CT for Wiring Instruction.

TJS Breaker Front Connected Lugs

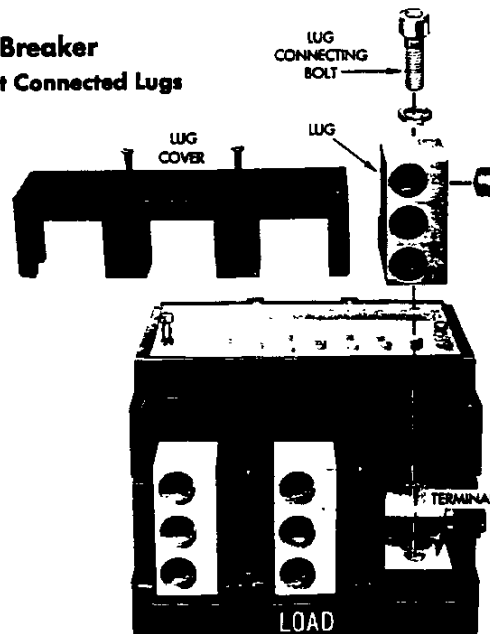


1. Insert two pan head screws and lock washers (furnished) in lug.
2. Place lug and inserted screws in breaker frame with stamped lug information visible on outside of breaker.
3. Secure each pan head screw to 60 inch pound minimum.
4. Feed in copper or aluminum cable.
5. Secure cable connection to lug with hex socket screws (furnished).

NOTE: For 400 amp rating and below, use lugs Cat. No. TCAL 43 or TCAL 47.

For 500 and 600 amp rating, use lugs Cat. No. TCAL63.

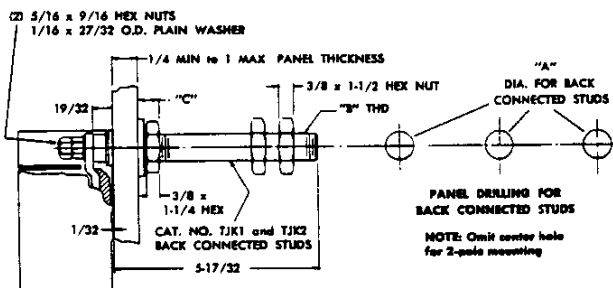
TKS Breaker Front Connected Lugs



1. Remove lug covers at line and load ends of breaker.
2. Insert correct lug in place and secure to terminal at line and/or load end with socket head screws and washers provided with 200 in. lbs. min. torque. Cable screws may be tightened with 1 1/4" leg of 3/8" socket wrench.
3. Replace lug covers. (High lug covers are supplied with trip units 700 amperes and above. Remove center pole plastic knockout for cable access in 3-pole application.

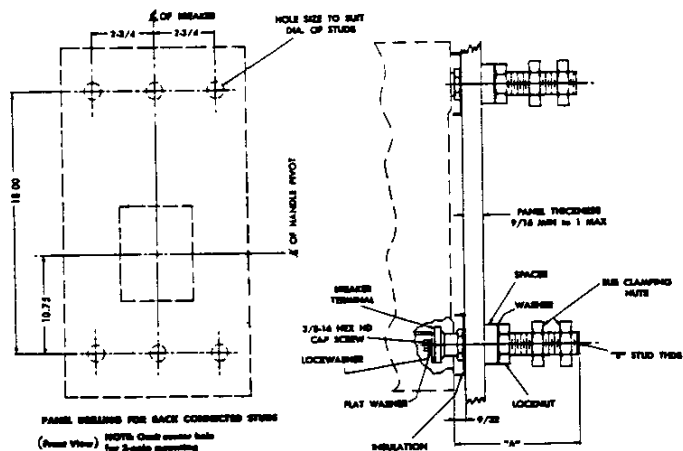
NOTE: For 2-pole application, do not connect to center terminals.

Back Connected Studs Assemble as shown



CAT. NO.	A	B	C
TJK1	13/16	3/4-16 THD	5/8
TJK2	1	15/16-16 THD	7/8

Back Connected Studs Assemble as shown



CAT. NO.	AMP MAX	"A"	"B" STUD THDS
TKM9	400	5-1/2	3/4-16
TKM10	600	5-1/2	15/16-16
TKM11	800	5-1/2	1-1/8-16
TKM12	to 1200	8	1-1/8-16

Ground Return "GR" Suffix VersaTrip Circuit Breakers

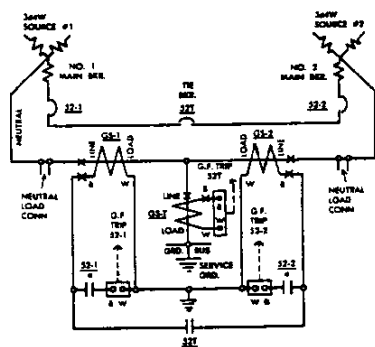


FIG. 1 - Double-Ended Switchboard with VersaTrip Ground Fault Protection - Mains and Tie Tripped for GFP

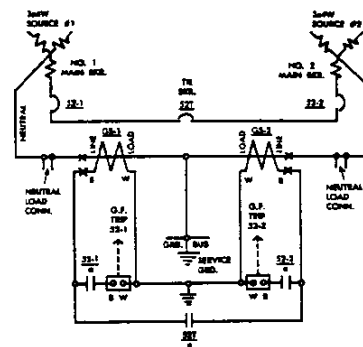


FIG. 2 - Double-Ended Switchboard with VersaTrip Ground Fault Protection - Mains Only Tripped for GFP

WIRING

Connect wiring from sensor to breaker black to black and white to white using twisted pair #14 AWG minimum. Belden 8640, 61 or 8470, 71, or equal.

GROUND FAULT PROTECTION GFP SCHEMES

There are two GFP schemes that can be used with 3-phase 4-wire double-ended equipment. In the first method, shown in Fig. 1, the two main breakers and the tie breaker are provided with VersaTrip-GR ground fault protection. In the second method, shown in Fig. 2, the main breakers only are provided with VersaTrip-GR ground fault protection, and the tie breaker is not tripped for GFP.

The most selective tripping is provided when all three breakers are equipped with GFP (Fig. 1). See comparison of the two schemes in the table below.

The two VersaTrip GFP schemes described here are applicable to 3-phase 4-wire double-ended equipment where the system will not be operated with all three breakers closed.

VersaTrip GFP utilizes internal tripping power derived from the flow of phase current through the phase sensors. To develop this tripping power, a minimum of 10% of rated sensor current must be carried by the breaker. Under balanced load conditions in a double-ended arrangement with mains and tie closed, a tie breaker might not carry enough current to develop tripping power for ground fault tripping of the tie.

When double-ended equipment is subject to operating with all three breakers closed, reliable GFP can be obtained by using a Ground-Break relay to trip the tie, in combination with Versa-Trip-GR mains. The tie can be either a standard breaker or a VersaTrip with a shunt trip accessory.

Condition	Mains & Tie Tripped by VersaTrip GFP	Mains Only Tripped by VersaTrip GFP
Mains closed, tie open	Main that supplies the faulted bus will open, other main stays closed	Main that supplies the faulted bus will open, other main stays closed
One main and tie closed, other main open	If ground fault is on load side of tie, the tie will open and main stays closed. If ground fault is on line side of tie, both main and tie will open.	Main that supplies the faulted bus both buses will open for a ground fault on either bus.

NEUTRAL LOAD CURRENT

In a double-ended switchboard, when one main is open and the tie is closed, neutral load current can flow through the two neutral sensors. The sensor circuitry shown in Fig. 1 & Fig. 2 is arranged to prevent the neutral load current from actuating the ground fault trip units.

GFP SETTINGS

When mains and tie have VersaTrip-GR ground fault protection, set tie breaker delay time at MINIMUM (0.2 sec.). Set main breaker delay time at INTERMEDIATE (0.3 sec.), in order to obtain selectivity between the mains and tie.

When mains only have VersaTrip-GR ground fault protection, set delay time at MINIMUM (0.2 sec.), unless longer time is needed in order to coordinate with other ground fault relays in downstream devices.

Current pickup settings (trip point) should be determined by a system study, but in the absence of other information, set trip point at 0.4X on each breaker (1100A for 3000A and 4000A frame sizes).