

TESTING OF AMPTECTOR, DIGITRIP RMS OR OPTIM TRIP UNITS USING TESTER STYLES 140D481G02R, 140D481G02RR, 140D481G03 OR 140D481G04 FOR DS, DSII, DSL AND DSLII CIRCUIT BREAKERS

CHECKING TEST KIT

(When First Received or for Maintenance Check. A more rigorous check-out would be to perform ALL trip assembly tests on a standard trip assembly.)

- A. Connect the polarized plug assembly to the trip assembly.
- B. Set test kit as follows:
 1. TIMER switch to "OFF".
 2. HI-LO switch to "LO AMPS".
 3. CURRENT ADJUSTMENT to "ZERO".
- C. Plug tester into 120 volts, 60 hertz source (Tester can be used on 50 Hz but timer readings must be multiplied by 6/5).
- D. Turn POWER switch "ON".
 1. POWER pilot lamp (red) should light.
 2. RESET pilot lamp (amber) should light. If RESET pilot lamp is not lit, push RESET button. RESET pilot lamp should then light.
- E. Turn TIMER switch to "ON". Timer should not run.
- F. Push TEST button.
 1. TEST pilot lamp (red) should light.
 2. RESET pilot lamp (amber) should go out.
 3. TIMER should operate, counting seconds.
- G. Operate STOP toggle switch (momentary) to "STOP".
 1. TIMER should stop.
 2. RESET pilot lamp (amber) should light.
 3. TEST pilot lamp (red) should go out.
- H. Push manual RESET button on timer. TIMER should reset to zero.
- I. Hold CALIB toggle switch (momentary) in "CALIB" position and turn CURRENT ADJUSTMENT knob from zero to maximum. Ammeter should read from zero to approximately 8 Amperes.

NOTE: IF CURRENT READING REMAINS AT ZERO, CHECK TO SEE THAT THE SHORTING BAR IS ACROSS "EXT. AM." TERMINALS AND THAT THE TERMINALS ARE TIGHT. IF THE SHORTING BAR IS MISSING A SUBSTITUTE CAN BE MADE USING #10 WIRE AND SPADE TERMINALS.
- J. Return CURRENT ADJUSTMENT knob to "ZERO".
- K. Put HI-LO switch in "HI AMPS" position and repeat Step I. Ammeter should read from zero to approximately 50 amperes.

NOTE: IF BREAKER IS CLOSED, IT WILL TRIP. THEREFORE, THIS STEP SHOULD BE PERFORMED WITH THE BREAKER OPEN.

If any of the above checks do not work, operate "STOP" switch and "RESET" button and repeat check.



CAUTION

CAUTIONS FOR DIGITRIP RMS OR OPTIM TESTING:

NOTE: DO NOT USE TESTER STYLE 140D481G01 OR 140D481G02 TO TEST A DIGITRIP RMS OR OPTIM TRIP UNIT AS DAMAGE TO THE TRIP UNIT WILL OCCUR.

1. **DO NOT TEST DIGITRIP RMS TRIP ASSEMBLY WHILE BREAKER IS IN THE "CONNECTED" POSITION.**
2. **IF POSSIBLE, TESTING SHOULD BE PERFORMED WITH THE TRIP ASSEMBLY UNDER TEST CONNECTED TO A DIRECT TRIP ACTUATOR AS IT IS ON A BREAKER. IF A DIRECT TRIP ACTUATOR IS NOT AVAILABLE, CONNECT A NOMINAL 700 OHM RESISTOR ACROSS TERMINALS "OP" AND "ON". IF THE TRIP ASSEMBLY IS NOT LOADED IN THIS MANNER, SOME FUNCTIONS AND INDICATORS MAY NOT PERFORM PROPERLY.**
3. **TO MINIMIZE THERMAL STRESS ON THE TEST KIT AND TRIP ASSEMBLY, HOLD "CALIBRATE" (MOMENTARY) TOGGLE SWITCH FOR NO MORE THAN 15 TO 20 SECONDS AT A TIME.**
4. **IF CURRENT PERSISTS AFTER THE TEST IS COMPLETE, USE "STOP" SWITCH TO CUT OFF CURRENT.**
5. **WHEN CHECKING SETTINGS ON THE DIGITRIP RMS OR OPTIM TRIP UNIT, THE GENERAL PROCEDURE IS TO START WITH THE HIGH CURRENT SETTINGS AND WORK DOWN TO THE LOWEST CURRENT SETTING. THIS AVOIDS UNNECESSARY DIAL CHANGES AFTER CALIBRATION.**

6. THE OUTPUT CURRENT IS A FUNCTION OF THE LINE VOLTAGE, WHICH MUST BE REASONABLY SINUSOIDAL AND HAVE GOOD REGULATION.
7. THE LONG TIME FUNCTION HAS A MEMORY CIRCUIT WITH A RESET TIME OF 36 TIMES THE LONG DELAY TIME SETTING; I.E., FOR A LDT SETTING OF 4 SECONDS THE RESET TIME IS 144 SECONDS (36X4). THEREFORE, FOR LONG DELAY TIME TESTS, THERE MUST BE A TIME DELAY GREATER THAN THE CALCULATED RESET TIME OR THE AC CONTROL POWER TO THE TRIP UNIT MUST BE INTERRUPTED BETWEEN TESTS. WHEN USING THE AUXILIARY POWER MODULE, REMOVE THE AC SUPPLY TO THE MODULE RATHER THAN DISCONNECTING THE MODULE PLUG FROM THE TRIP UNIT. FOR 510, 610, 810 AND 910 SERIES DIGITRIPS, THE THERMAL MEMORY JUMPER MAY NEED TO BE REPOSITIONED TO THE "INACTIVE" POSITION TO DISABLE THE THERMAL MEMORY. THIS JUMPER IS SHIPPED FROM THE FACTORY IN THE "ACTIVE" POSITION.
8. IF A TRIP FUNCTION LED ON THE TRIP UNIT IS LIT PRIOR TO A TEST, THE TRIP RESET PUSH-BUTTON ON THE TRIP UNIT MUST BE DEPRESSED TO EXTINGUISH IT OR THE TEST WILL NOT PROCEED.
9. IF THE TEST KIT "RESET" LAMP WILL NOT LIGHT, CHECK TO MAKE SURE THAT NO TRIP LED'S ARE LIT ON THE TRIP UNIT. (SEE NO. 8)
10. BREAKERS WIRED FOR ZONE INTERLOCK APPLICATIONS REQUIRE THE FOLLOWING JUMPERS TO ZONE INTERLOCK CONNECTOR TERMINAL POINTS: (SEE FIG. NO. 1 THROUGH 3)
C TO E (SHORT TIME)
B TO D (GROUND FAULT)
OR STYLE 3A73124G01 SHORTING PLUG
11. FOR TESTING THE TRIP UNIT, AN OPTIONAL AUXILIARY POWER MODULE (APM) IS RECOMMENDED. WHEN USING AN EXTERNAL SINGLE PHASE CURRENT SOURCE TO TEST LOW LEVEL GROUND FAULT CURRENT SETTINGS, IT IS ADVISABLE TO USE THE APM, ESPECIALLY WHEN THE SINGLE PHASE UNIT IS LOW. WITHOUT THE APM IT MAY APPEAR AS IF THE TRIP UNIT DOES NOT RESPOND UNTIL THE CURRENT IS WELL ABOVE THE SET VALUE, LEADING THE TESTER TO BELIEVE THERE IS AN ERROR IN THE TRIP UNIT WHEN THERE IS NONE. THE REASON THIS OCCURS IS THAT THE SINGLE PHASE TEST CURRENT IS NOT A GOOD SIMULATION OF THE NORMAL THREE PHASE CIRCUIT. IF THREE PHASE CURRENT HAD BEEN FLOWING, THE TRIP UNIT WOULD ACTUALLY HAVE PERFORMED CORRECTLY. USE THE APM FOR

CORRECT TRIP UNIT PERFORMANCE WHENEVER SINGLE PHASE TESTS ARE MADE. FOR OPTIM TRIP UNITS USE AN OPTIMIZER. AN APM CAN BE PLUGGED INTO THE OPTIMIZER AS THE POWER SOURCE IN LIEU OF THE SELF CONTAINED BATTERY.

TESTING OF DIGITRIP RMS. THE FOLLOWING LEG-END IS FOR REFERENCE:

I_n = rating plug value

I_s = sensor rating

I_g = ground fault current pickup (Table 1)

I_t = test kit trip current

$I_{n/s} = I_n / I_s$

$I_{pu} = 5 (I_{n/s})$

AND FOR DIGITRIP RMS 510, 610, 810 AND 910 TRIP UNITS AND OPTIM 750 AND 1050 TRIP UNITS:

$I_r = I_n \times \text{Long Delay Pickup}$

A. GENERAL

1. Three Phase – The CIRCUIT SELECTOR switch permits checking to determine if all trip assembly phase inputs are operative. Since all feed into a common pickup and timing circuit, it is only necessary to use one phase to check out all the solid state circuitry functions. It is only necessary to use one circuit function (e.g., long delay pickup) to verify that each phase (A, B, and C) performs similarly (e.g., each phase picks up at about 1.0 p.u. current with long delay pickup set at 1.0 I_{pu}).
2. Long Delay Times marked on Digitrip RMS dials are top of band – hence expect shorter times when testing.
3. Pickup values for Short Time, Instantaneous, and Ground Fault are mid-band, which has $\pm 10\%$ tolerance.
4. Connect polarized plug from the tester to the trip assembly.
5. For Digitrip Rms trip units, plug the auxiliary power module (APM), Cat. # PRTAAPM, into a 120 volts, 50/60 Hz source and plug its keyed plug into the keyed receptacle located in the upper right hand corner of the Digitrip RMS trip unit. The green "Unit Status" LED should flash indicating that the Trip Unit is operational. For Optim trip units, plug the hand held programmable Optimizer into the programming port (lower right corner) of the Optim trip unit. The green "Unit Status" LED should flash indicating that the trip unit is operational. If not, replace the Optimizer battery and try again. An APM can be plugged into the Optimizer as the power source in lieu of the battery.

6. Plug tester into 120 volts, 60 Hz source. (Tester can be used on 50 Hz but timer readings must be multiplied by 6/5.)
7. Turn POWER "ON".
8. It is recommended that a check of the Trip Unit per step B below be performed prior to performing any of the other tests.

B. TO CHECK TRIP UNIT

1. For Digitrip RMS trip units remove AC supply from auxiliary power module. For OPTIM trip units disconnect the Optimizer
2. Set test kit as follows:
 - a. TIMER switch to "OFF".
 - b. HI-LO switch to "LO AMPS".
 - c. CURRENT ADJUSTMENT to "ZERO".
3. Push RESET button and then the TEST button.
4. Slowly increase current via CURENT ADJUSTMENT knob until green "Unit Status" LED located on bottom right hand corner of Trip Unit starts to flash. This must occur at 1.8 amperes or less to indicate that the Trip Unit is functional. Note that the current changes abruptly at the point where the Trip Unit becomes functional.

C. TO CHECK LONG DELAY PICKUP (L.D.P.U.)

1. Set test kit as follows:
 - a. TIMER switch to "OFF".
 - b. HI-LO switch to "LO AMPS".
 - c. CIRCUIT SELECTOR switch to "A".
 - d. CURRENT ADJUSTMENT to "ZERO".
2. For Digitrip units set long delay setting on Trip Unit to desired setting. For OPTIM units turn on the Optimizer, push the view function, scroll to setpoints, push select and edit long delay settings.
3. Push RESET button and then the TEST button.
4. Slowly increase current via CURRENT ADJUSTMENT knob until long delay setting LED on Trip Unit starts to flash. This LED should start to flash at the pickup setting, which will be the long delay setting of the Trip Unit times $I_{pu} (\pm 10\%)$. [Remember that $I_{pu} = 5 (I_n / I_s)$]. The LED will go out when the current is lowered below the pickup setting.
NOTE THAT THE LONG DELAY PICKUP LAMP ON THE TESTER WILL NOT LIGHT.
5. Use STOP switch to cut off current.
6. Repeat 3 and 4 with the CIRCUIT SELECTOR switch on "B" and then again with it on "C". (See Caution No. 7)

D. TO CHECK LONG DELAY TIME (See Caution Note 7)

1. Set test kit as follows:
 - a. TIMER switch to "OFF".
 - b. HI-LO switch to "HI AMPS".
 - c. CIRCUIT SELECTOR switch to "A".
 - d. CURRENT ADJUSTMENT to "ZERO".
2. If equipped, set Short Delay and Inst. Pickups on Trip Unit to maximum (or off for OPTIM) to prevent trip of the breaker by these functions.
3. Set desired Long Delay Pickup and Long Delay Time on Trip Unit.
4. Toggle CALIB switch in "CALIB" position and increase current on tester, using CURRENT ADJUSTMENT, to $6 I_{pu}$. (See Caution No. 3)
5. Push "RESET" button.
6. Turn TIMER "ON". If TIMER does not read zero, push manual RESET button on TIMER.
7. Push TEST button. TIMER will stop when Trip Unit trips the breaker. Timer should read less than the dial setting but not under 2/3 of the setting; e.g., if set at 24, it should be more than 16 seconds but less than 24 seconds.

NOTE: $I^2T = \text{CONSTANT}$, THEREFORE, TRIP TIME AT A CURRENT OTHER THAN $6 I_N$ IS CALCULATED AS FOLLOWS:

$$(6 I_{pu} / \cancel{I_{pu}})^2 \times (\text{Long Delay Time}) = \text{Trip Time at } \cancel{I_{pu}} \text{ current.}$$

example: Long Delay Time = 24 seconds @ $6 I_{pu}$.
Then for $\cancel{I_{pu}} = 3$, the Long Delay Trip Time would be as follows:

$$(6 I_{pu} / 3 I_{pu}) \times (24 \text{ seconds}) = 96 \text{ second Long Delay Time at } 3 I_{pu}.$$

Remember to use I_{pu} per 4 above to set the tester current.

E. TO CHECK INSTANTANEOUS (if applicable)

1. Set Long Delay Setting and Time to maximum and, if equipped, Short Delay Pickup to maximum (or off for OPTIM) so that these functions do not trip the breaker.
2. Set desired Inst. pickup on the Trip Unit.
NOTE: PICKUP SETTING SHOULD NOT EXCEED THE CAPABILITY OF THE TEST KIT (APPROX. 50 AMPERES).
3. Set test kit as follows:
 - a. TIMER switch to "OFF".
 - b. CURRENT ADJUSTMENT to "ZERO".
 - c. Set HI-LO switch to "HI AMPS".
4. Push "RESET" button.
5. Toggle CALIB switch in "CALIB" position and using

the CURRENT ADJUSTMENT knob, set current to about 3/4 of pickup setting. **(See Caution No. 3)**

6. Push TEST button and increase current steadily, using CURRENT ADJUSTMENT knob, until breaker trips and red Test lamp goes out.
7. Prior to returning CURRENT ADJUSTMENT to "ZERO", hold CALIB switch in "CALIB" position momentarily to read the trip current.

F. TO CHECK SHORT DELAY PICKUP (S.D.P.U.) (if applicable)

1. Set trip unit Short Delay Time to minimum (.1 sec.) and Inst. to maximum (or off for OPTIM) if equipped.
2. Set desired Short Delay Pickup on the Trip Unit. Note that for 510, 610, 810 and 910 trip units, the Short Delay Pickup is a function of the Long Delay Setting.
3. Set test kit as follows:
 - a. SHORT DELAY switch in "OPERATIVE" position.
 - b. CURRENT ADJUSTMENT to "ZERO".
 - c. TIMER to "OFF".
 - d. Set HI-LO switch to "LO AMPS" if Short Delay Pickup is less than 8 amperes or to "HI AMPS" if it is greater than 8 amperes.
4. Do steps E.4 thru E.7.

G. TO CHECK SHORT DELAY TIME (if applicable)

1. Dial Short Delay Pickup on trip unit.
NOTE: 2.5 TIMES THE SHORT DELAY PICKUP SETTING SHOULD NOT EXCEED THE CAPABILITY OF THE TEST KIT (APPROX. 50 AMPERES).
I.E. For $I_{pu} = 5$, maximum short delay pickup = 4. Note that for 510, 610, 810 and 910 trip units, the Short Delay Pickup is a function of the Long Delay Setting.
2. Set Long Delay Pick up Setting (not required for "10" series trip units), Long Delay Time to maximum and Inst. to maximum (or off for OPTIM) so that these functions do not trip the breaker.
3. Set test kit as follows:
 - a. TIMER switch to "OFF".
 - b. HI-LO switch to "HI AMPS".
 - c. CURRENT ADJUSTMENT to "ZERO".
4. Toggle CALIB switch in "CALIB" position and adjust current, using CURRENT ADJUSTMENT knob, to 2.5 times pickup setting. Note that if the breaker is closed, it will trip. Do not reclose breaker until current is adjusted to the proper value.
5. Reset trip unit. **(See Caution No. 8)**
6. Close breaker.
7. Turn TIMER "ON". If TIMER does not read zero, push TIMER RESET button.

8. Push RESET button.
9. Push TEST button. TIMER will give an approximate reading of the delay. **(See Caution No. 10)**
NOTE: THIS IS NOT ACCURATE ENOUGH FOR CLOSE TIMING OF SHORT DELAY BUT IT WILL SHOW THE DIFFERENCE BETWEEN THE BAND CALIBRATIONS.

H. TO CHECK GROUND PICKUP

1. Set desired Ground Fault Pickup on Trip Unit.
2. Set test kit as follows:
 - a. HI-LO switch to "LO AMPS".
 - b. CURRENT ADJUSTMENT to "ZERO".
 - c. TIMER to "OFF".
3. Push RESET button.
4. Hold GROUND TEST momentary switch in down position during steps 5 and 6.
5. Push TEST button.
6. Turn CURRENT ADJUSTMENT slowly until breaker trips.
7. Prior to returning CURRENT ADJUSTMENT to "ZERO", hold GROUND TEST switch in the down position and CALIB switch in "CALIB" position to read the trip current. (See Note 2 Table 1)
8. For pickup values see Table 1 below.

NOTE THAT THE PICKUP VALUES CANNOT BE READ DIRECTLY. USE THE FOLLOWING FORMULAE TO CONVERT TEST KIT READING TO PICKUP VALUE:

$$a) I_g = I_t \times I_s / 5$$

$$b) I_t = I_g \times 5 / I_s$$

where:

I_g = Ground fault current pickup (Table 1)

I_t = Test kit trip current

I_s = Sensor rating

I_n = Rating plug rating

Examples:

- a) Assume $I_t = 1.2$ amps, $I_s = 200$, $I_n = 200$, pickup setting = A, then: $I_g = 1.2 \times 200 / 5 = 48$ amps

Table 1 shows expected value of 50 amps. 48 amps is within the $\pm 10\%$ tolerance.

- b) Assume $I_n = 100$, $I_s = 200$, pickup setting = K, then: $I_t = 100$ (from Table 1) $\times 5 / 200 = 2.5$ amps

9. If sensors are connected to the Digitrip RMS during the test, expect increased pickup currents due to the required sensor exciting current.

I. TO CHECK GROUND TIME

1. Set desired Ground Fault Time setting on Trip Unit.
2. Set test kit as follows:
 - a. TIMER to "OFF".
 - b. CURRENT ADJUSTMENT to "ZERO".
 - c. HI-LO switch to "LO AMPS".
3. While holding "GROUND TEST" momentary switch and "Calib" switch in the down positions, turn CURRENT ADJUSTMENT knob to get a current above pickup value (see Table 1 and Step H8 above). Note that if breaker is closed, it will trip. Do not reclose breaker until current is adjusted to the desired value. (See Caution No. 3)

Table 1 – Ground Fault Current Pickup Settings

Installed Rating Plug Amperes (I _n)	Pickup (Dial) Setting Amperes ①							
	A ②	B ②	C ②	D ②	E ②	F	H	K
100	25	30	35	40	50	60	75	100
200	50	60	70	80	100	120	150	200
250	63	75	88	100	125	150	188	250
300	75	90	105	120	150	180	225	300
400	100	120	140	160	200	240	300	400
600	150	180	210	240	300	360	450	600
800	200	240	280	320	400	480	600	800
1000	250	300	350	400	500	600	750	1000
1200	300	360	420	480	600	720	900	1200
1600	400	480	560	640	800	960	1200	1200
2000	500	600	700	800	1000	1200	1200	1200
2400	600	720	840	960	1200	1200	1200	1200
3200	800	960	1120	1200	1200	1200	1200	1200
4000	1000	1200	1200	1200	1200	1200	1200	1200

① Except as noted, tolerances on pickup levels are ± 10% of values shown in chart.

② Ground fault pickup levels shown are nominal values when tested with auxiliary power module, Cat.# PRTAAPM. Without the auxiliary power module ground pickup levels may exceed these values and be as high as the value shown for the "E" setting of that particular rating plug.

4. Release CALIB and GROUND TEST switches.
5. Reset trip unit. **(See Cautions Nos. 7 and 8)**
6. Close breaker.
7. Turn TIMER "ON". If TIMER does not read zero, push manual RESET button on timer.
8. Push RESET button.
9. While holding GROUND TEST momentary switch in the down position, push the TEST button. Timer will give an approximate reading of the delay. **(See Caution No. 10)**



CAUTION

CAUTIONS FOR AMPTECTOR TESTING:

1. **DO NOT TEST AMPTECTOR WHILE BREAKER IS CARRYING CURRENT.**
2. **IF POSSIBLE, TESTING SHOULD BE PERFORMED WITH AMPTECTOR UNDER TEST CONNECTED TO A DIRECT TRIP ACTUATOR AS IT IS ON A BREAKER. IF A DIRECT TRIP ACTUATOR IS NOT AVAILABLE, CONNECT A 15 TO 30 OHM RESISTOR (1/8 WATT MINIMUM) ACROSS TERMINALS "OP" AND "ON". IF AMPTECTOR IS NOT LOADED IN THIS MANNER, SOME FUNCTIONS AND INDICATORS MAY NOT PERFORM PROPERLY.**
3. **TO MINIMIZE THERMAL STRESS ON TEST KIT AND AMPTECTOR, HOLD "CALIB" (MOMENTARY) TOGGLE SWITCH FOR NO MORE THAN 15 TO 20 SECONDS AT A TIME.**
4. **IF CURRENT PERSISTS AFTER THE TEST IS COMPLETE, USE "STOP" SWITCH TO CUT OFF CURRENT.**
5. **WHEN CHECKING OUT SETTINGS ON A AMPTECTOR, THE GENERAL PROCEDURE IS TO START WITH THE HIGH CURRENT SETTINGS AND WORK DOWN TO THE LOWEST CURRENT SETTING. THIS AVOIDS UNNECESSARY DIAL CHANGES AFTER CALIBRATION.**
6. **THE OUTPUT CURRENT IS A FUNCTION OF THE LINE VOLTAGE WHICH MUST BE REASONABLY SINUSOIDAL AND HAVE GOOD REGULATION.**
7. **TESTER MAY BE USED ON 50 Hz SOURCE BUT TIMER READINGS MUST BE MULTIPLIED BY 6/5.**

TESTING AMPTECTOR

Times marked on Amptector dials are TOP of the band – hence, expect shorter times when testing.

A. GENERAL

1. 3 Phase – The CIRCUIT SELECTOR switch permits checking to all if all Amptector phase inputs are operative. Since all feed into a common pickup and timing circuit, it is only to use one phase to check out all the solid state circuitry functions. It is only necessary to use one circuit function (say, long delay pickup) to verify that each phase (A, B, and C) performs similarly (say, each phase picks up at about 5 amps with long delay pickup set at 1X).
2. Pickup values are mid-band which has ± 10% tolerance: (See table 2 on page 7)

B. TO CHECK LONG DELAY PICKUP (Set HI-LO Switch to "LO AMPS", Turn TIMER "OFF").

1. Push RESET and then TEST.
2. Slowly increase CURRENT ADJUSTMENT until LONG DELAY lamp (white) glows steadily indicating Amptector pickup.
3. Use STOP switch to cut off current.

C. TO CHECK LONG DELAY TIME (Set HI-LO Switch to "HI AMPS", Short Delay and Inst. Pickups set above 6X, Set 30 amp. [6X] with CALIB switch) (See Caution No. 3).

1. Push RESET and turn TIMER "ON".
2. Push TEST – Test Kit will stop when Amptector trips the output. Timer should read less than dial setting but not under 2/3 of the setting, i.e., if set at 36 it should be more than 24 seconds.
3. Any other multiple of sensor may be checked, if desired – see performance curves for approximate trip time to be expected.

D. TO CHECK INSTANTANEOUS (Turn Timer OFF)

1. Set Long Delay Time to maximum so Long Delay will not trip too fast.
2. Set SHORT DELAY switch to "READ AMPS" to disable the Short Delay function.
3. Push RESET then TEST and increase CURRENT ADJUSTMENT steadily but rather rapidly until red and white lamps go out in Test Kit. (If current is preset to about 3/4 of setting, using CALIB switch, the final setting can be approached slower for better accuracy). (See Caution No. 3)
4. Reset – Hold INST switch in "READ AMPS" position – push TEST button and read current. (See Caution No. 4)

E. TO CHECK SHORT DELAY PICKUP (Set instantaneous to Max.)

1. Place SHORT DELAY switch in "OPERATIVE" position, time to min. and proceed similar to Instantaneous above.
2. Set SHORT DELAY switch to "READ AMPS" to read ammeter as in D.4. above. (See Caution No. 4)

F. TO CHECK SHORT DELAY TIME

NOTE: IT IS POSSIBLE, UNDER CERTAIN CONDITIONS, THAT THE FIXED DISCRIMINATOR OR INSTANTANEOUS FUNCTION MAY TRIP INSTANTANEOUSLY DURING SHORT DELAY TIME TESTING. TO AVOID THIS, MERELY HOLD THE INSTANTANEOUS OPERATIVE/READ AMPS TOGGLE SWITCH IN THE "READ AMPS" POSITION WHILE PERFORMING THE TEST IN STEP F.4.

1. Set Short Delay Pickup dial at 4X (20 amperes).
2. Set "CURRENT ADJUSTMENT" at 10X (50 amperes) with "CALIB" switch. (See Caution No. 3)
3. Turn TIMER "ON" and SHORT DELAY switch to "OPERATIVE".
4. Push RESET and TIMER RESET button, then TEST and TIMER will give an approximate reading of the delay.

NOTE: THIS IS NOT ACCURATE ENOUGH FOR CLOSE TIMING OF SHORT DELAY BUT IT WILL SHOW THE DIFFERENCE BETWEEN THE THREE BAND CALIBRATIONS.

G. TO CHECK GROUND PICKUP

1. Hold GROUND TEST momentary switch in down position during steps 2, 3, and 4.
2. Place CURRENT ADJUSTMENT knob to "ZERO", switch HI-LO switch to "LO AMPS".
3. Push RESET then TEST.
4. Turn CURRENT ADJUSTMENT until unit trips (from 0.9 to 1.2 amps).
5. See Table 3 or chart on top of Amptector for pickup settings.
6. If sensors are connected to the Amptector during the test, expect increased pickup currents due to the required sensor exciting current. Again, see the chart mentioned in G.5. for typical values.

H. TO CHECK GROUND TIME

1. Holding both GROUND TEST momentary switch and CALIB switch in down position, turn CURRENT ADJUSTMENT to get 2.5 amperes. Release CALIB switch.
2. Turn TIMER to "ON". (If timer is not at zero, push TIMER RESET button.)
3. Holding GROUND TEST switch down, push RESET, TIMER RESET button and then TEST. Timer will give and approximate reading of the delay.

I. LONG DELAY RESET TEST (with any long delay pickup and time setting).

1. Set current at 30 amps and find long delay trip time as in Section C. (Remember HI-LO switch, Short Delay and Inst. Pickup settings.)
2. Start test again, but when time is about 80% of the above trip time, quickly reduce current to about 80% of long delay pickup setting. (Pickup light should go out.)
3. Quickly raise current back to 30 amps and allow Amptector to trip.

4. The total time on counter should be between 150 and 200% of trip time in (1) above.

(If time setting in (1) is very low, run test at 15 amps instead of 30 amps.)

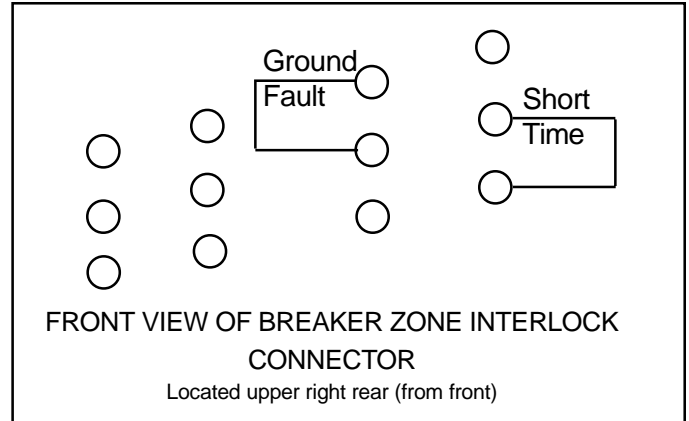
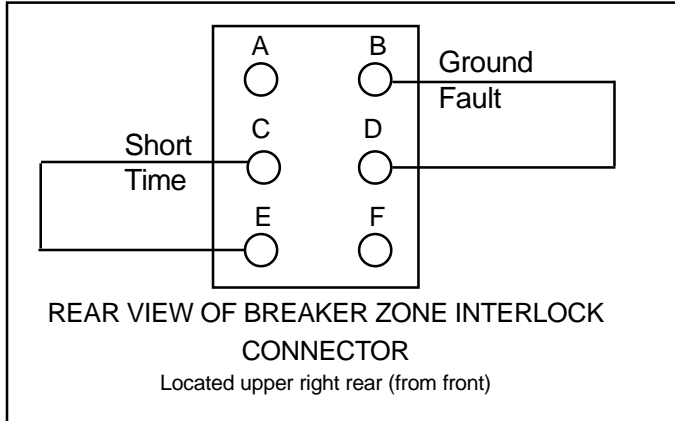


Fig. 1 – Jumpers for Testing DS Breakers (Manufactured prior to March 1994) Wired for Zone Interlock Applications.

Fig. 3 – Jumpers for Testing DSII Breakers Wired for Zone Interlock Applications.

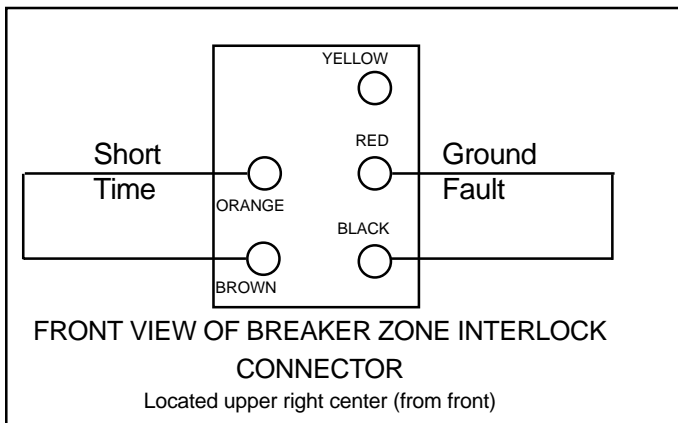


Fig. 2 – Jumpers for Testing DS Breakers (Manufactured beginning March 1994) Wired for Zone Interlock Applications.

Table 2 - Table of Limits for Step A.2

Long Delay	Pickup Limits (Amps)	Short Delay and Instantaneous	Pickup Limits (Amps)
.5X = 2.5 Amp	2.25 to 2.75	4X = 20 Amp	18 to 22
.6X = 3.0	2.7 to 3.3	5X = 25	22.5 to 27.5
.7X = 3.5	3.15 to 3.85	6X = 30	27 to 33
.8X = 4.0	3.6 to 4.4	7X = 35	31.5 to 38.5
.9X = 4.5	4.05 to 4.95	8X = 40	36 to 44
1.0X = 5.0	4.5 to 5.5	10X = 50	45 to 55
1.25X = 6.25	5.6 to 6.9		

Table 3 – Amptector I-A

Dial Setting	Ground Pickup Value – Amperes														Secondary Current ①
	50	100	150	200	300	400	600	800	1200	1600	2000	2400	3200	4000	
A	13	57	60	65	80	110	145	180	260	330	400	530	640	800	1.0
B	18	67	75	85	110	150	205	260	385	505	600	770	1000	1200	1.5
C	22	75	85	100	130	185	250	325	480	625	760	960	1200	N.A.	1.9
D	33	100	120	145	200	270	385	500	730	970	1200	N.A.	N.A.	N.A.	3.0

All pickup values may vary $\pm 10\%$

① Current of this value from the secondary of an external ground transformer will cause the ground element to function. Ground element pickup can also be tested using this value. All sensors must be disconnected during test.

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