Amptector Tester Instruction Leaflet

I.L. 33-791

1. **PRELIMINARY TESTS:** Banana plug assembly (11 circuit) not connected to Amptector, timer switch off, short delay switch in operative position, Hi-Low switch in Lo. Plug tester into 115 volt 60 Hertz source. Turn power switch on, power pilot lamp should light (red) and reset pilot lamp should light (amber). If reset pilot lamp is not lit, push "Reset" button, long delay timer should reset and reset pilot lamp (amber) should light. Turn timer switch on, timer should not run. Push "Test" button, test pilot lamp (red) should light, timer should operate counting seconds, and reset pilot lamp should go out. Operate "Stop" toggle switch (momentary), timer should stop, and test pilot lamp should go out. Push "Reset" button, timer should reset to zero, and reset pilot lamp (amber) should light. If any of the above checks do not work, operate "Stop" switch, and "Reset" switch and repeat check.

Banana plug assembly connected to an Amptector, timer switch off, short delay toggle switch in "Read Amps" position, Hi-Low switch in Lo, circuit selector set at "A". Amptector settings; Set long delay pickup at 1.0 (5 amps ±10%), long delay seconds at 36 (time at 6X (30 amperes)), short delay pickup at 10 and seconds at .50 if available. Instantaneous pickup at 12 and ground at .50 seconds.

Turn power ON, hold "Calib." (Momentary) toggle switch in operated position and turn "Current Adjust" knob slowly from zero to maximum. Ammeter should read from zero to approximately 8 amperes. Turn "Current Adjust" knob to zero and put Hi-Low switch in Hi position, hold "Calib." switch in operated position and turn "Current Adjust" knob from zero to maximum, ammeter should read from 0 to 75 amperes ±5 amperes. CAUTION: Amptector tester has a continuous rating of 30 amperes and currents above 30 amperes should be applied for short intervals.

Long delay pickup, set "Circuit Selector" to "A", Hi-Lo switch to Lo, push "Reset" button, push "Test" button, turn "Current Adjust" knob slowly until long delay pickup pilot lamp (clear) is lit. This lamp should light at 5 amperes ±10% (long delay pickup of Amptector at 1.0). Lamp will go out when current is lowered below pickup.

Long delay time, set "Circuit Selector" to "A", Hi-Lo switch to Hi, hold "Calib." switch in operated position and turn "Current Adjust" knob until ammeter reads 30. Release "Calib." switch, press "Reset" button, Amptector long delay set for 36 seconds, turn timer on, push "Test" button, check current to see that it stays at 30 amperes. Amptector should turn off timer and current ("Test" pilot lamp should go out) between 24 to 36 seconds. Push "Reset" button, timer should reset to zero and "Reset" pilot lamp should go on.

2. **DETAIL TESTS:** Time values on Amptector dials are TOP of the band -- hence expect shorter times when testing.

(A) Pick-up values are mid-band which has ±10% tolerance:

Long Delay	Pick-up Limits	Short Delay & Instantaneous	Pick-up Limits
.5 = 2.5 amp	2.25 to 2.75	4X = 20 amp.	18 to 22
.6 = 3.0	2.7 to 3.0	5X = 25	22.5 to 27.5
.7 = 3.5	3.15 to 3.85	6X = 30	27 to 33
.8 = 4.0	3.6 to 4.4	7X = 35	31.5 to 38.5
.9 = 4.5	4.05 to 4.95	8X = 40	36 to 44
1.0 = 5	4.5 to 5.5	10X = 50	45 to 55
1.25 = 6.25	5.6 to 6.9	12X = 60	54 to 66

(B) To Check Long Delay Pick-up (Switch to Lo, Turn Timer OFF)

1. Push "RESET" and then "TEST".
2. Slowly increase current until Long Delay neon lamp (clear) glows steadily indicating Amptector pick-up.
3. Use "STOP" switch to cut off current.

TESTING

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 In [Test kit p.u. current = (In/sensor rating) times 5 amperes]).
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 ±10% tolerance.
4. Connect banana plug assembly to the trip assembly.
5. Plug the auxiliary control power module 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.
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. Remove AC supply from auxiliary control power module.
2. Set test kit as follows:
   a. Timer switch to "OFF".
   b. HI-LO switch to "LO".
   c. Current Adjust to "ZERO".
3. Push "RESET" button and then the "TEST" button.
4. Slowly increase current via "CURRENT ADJUST" knob until green "Unit Status" LED located on bottom right hand corner of Trip Unit starts to flash. This must occur at 1.25 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".
   c. Circuit selector switch to "A".
   d. Current Adjust to "Zero".
2. Set long delay setting on Trip Unit to desired setting.
3. Push "RESET" button and then the "TEST" button.
4. Slowly increase current via "CURRENT ADJUST" 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 Ins (±10%). [Ins = (In/sensor rating) times 5 amperes]. 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 No. 7)

1. Set test kit as follows:
   a. Timer switch to "OFF".
   b. HI-LO switch to "HI".
   c. Circuit selector switch to "A".
   d. Current Adjust to "ZERO".
2. Set Short Delay and Inst. Pickups on Trip Unit to S2 and M2, respectively, to prevent trip of the breaker by these functions.
3. Set desired Long Delay Pickup and Long Delay Time on Trip Unit.
4. Hold Calibrate switch in "CALIB" position and increase current on tester, using Current Adjust knob, to 6 Ins [Ins = (In/sensor rating) times 5 amperes]. Release Calibrate switch. (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 = Constant, therefore, trip time at a current other than 6 In is calculated as follows:

   (6 In/x In)^2 Times Long Delay Time setting
   e.g. Trip time at 3 In and L.D.T. setting of 24 sec =
   (6/3)^2 Times 24 = 96 seconds

   Remember to use Ins per 4 above to set the tester current.

E. To Check Instantaneous

1. Set Long Delay Setting and Time to maximum and Short Delay Pickup to S2 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). [Remember that Ins = (In/sensor rating) times 5 amperes.]

3. Set test kit as follows:
   a. Timer to "OFF".
   b. Current Adjust to "ZERO".
   c. Set HI-LO switch to "LO" if pickup Ins is less than 8 amperes or to "HI" if it is greater than 8 amperes.
4. Push "RESET" button.
5. Hold Calibrate switch in "CALIB" position and using the Current Adjust knob, set current to about 3/4 of pickup setting. Release calibrate switch. (See Caution No. 3.)
6. Push "TEST" button and increase current steadily, using Current Adjust knob, until breaker trips and red Test lamp goes out.
7. Prior to returning Current Adjust to "ZERO", hold Calibrate switch in "CALIB" position to read the trip current.

F. To check Short Delay Pickup (S.D.P.U.)

1. Set trip unit Short Delay Time to minimum (.1 sec.) and Inst. to maximum (M2).
2. Set desired Short Delay Pickup on the Trip Unit.
3. Set test kit as follows:
   a. Short Delay switch in "OPERATIVE" position.
   b. Current Adjust to "ZERO".
   c. Timer to "OFF".
   d. Set HI-LO switch to "LO" if pickup Ins is less than 8 amperes or to "HI" if it is greater than 8 amperes.
4. Do Steps E.4 thru E.7.

G. To Check Short Delay Time

1. Set Desired 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). [Remember that Ins = (In/sensor rating) times 5 amperes].

2. Set Long Delay Setting and Time to maximum and Inst. to M2 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".
   c. Current Adjust to "ZERO".
4. While holding Calibrate switch in "CALIB" position, adjust current, using current adjust knob, to 2.5 times pickup setting. [Remember that Ins = (In/sensor rating) times 5 amperes]. Note that if 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 manual reset button on timer.
8. Push "RESET" button.
9. Push "TEST" button. 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 band calibrations.

H. To Check Ground Pickup

1. Set desired Gnd Fault Pickup on Trip Unit.
2. Set test kit as follows:
   a. HI-LO switch in "LO".
   b. "CURRENT ADJUST" 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 ADJUST" slowly until breaker trips.
7. Prior to returning Current Adjust to "ZERO", hold Ground Test switch in the down position and Calibrate switch in "CALIB" position to read the trip current.

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) $Ig = It \times Is/5$
   b) $It = Ig \times 5/Is$

   where:
   Ig = Ground fault current pickup (Table 1)
   It = Test kit trip current
   Is = Sensor rating
   In = Rating plug rating

   Examples:

   a) Assume It = 1.2 amps, Is = 200, In = 200, pickup setting = A then:
   $Ig = 1.2 \times 200/5 = 48$ amps

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

   b) Assume In = 100, Is = 200, pickup setting = K, then:
   It = 100 (from Table 1) x 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 Adjust to "ZERO".
   c. HI-LO switch to "LO".
3. While holding Ground Test momentary switch and Calibrate switch in the down positions, turn Current Adjust 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.)
4. Release Calibrate 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.

Table 1 – Ground Fault Current Pickup Settings

Installed Rating Plug Amperes (I_n)	Pickup (Dial) Setting Amperes①							
	A②	B②	C②	D②	E②	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 the auxiliary control power module. Without the auxiliary control 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.

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Banana plug assembly connected to an Amptector, timer switch off, short delay toggle switch in "Read Amps" position, Hi-Low switch in Lo, circuit selector set at "A". Amptector settings; Set long delay pickup at 1.0 (5 amps ±10%), long delay seconds at 36 (time at 6X (30 amperes)), short delay pickup at 10 and seconds at .50 if available. Instantaneous pickup at 12 and ground at .50 seconds.

Turn power ON, hold "Calib." (Momentary) toggle switch in operated position and turn "Current Adjust" knob slowly from zero to maximum. Ammeter should read from zero to approximately 8 amperes. Turn "Current Adjust" knob to zero and put Hi-Low switch in Hi position, hold "Calib." switch in operated position and turn "Current Adjust" knob from zero to maximum, ammeter should read from 0 to 75 amperes ±5 amperes. CAUTION: Amptector tester has a continuous rating of 30 amperes and currents above 30 amperes should be applied for short intervals.

Long delay pickup, set "Circuit Selector" to "A", Hi-Lo switch to Lo, push "Reset" button, push "Test" button, turn "Current Adjust" knob slowly until long delay pickup pilot lamp (clear) is lit. This lamp should light at 5 amperes ±10% (long delay pickup of Amptector at 1.0). Lamp will go out when current is lowered below pickup.

Long delay time, set "Circuit Selector" to "A", Hi-Lo switch to Hi, hold "Calib." switch in operated position and turn "Current Adjust" knob until ammeter reads 30. Release "Calib." switch, press "Reset" button, Amptector long delay set for 36 seconds, turn timer on, push "Test" button, check current to see that it stays at 30 amperes. Amptector should turn off timer and current ("Test" pilot lamp should go out) between 24 to 36 seconds. Push "Reset" button, timer should reset to zero and "Reset" pilot lamp should go on.

2. **DETAIL TESTS**: Time values on Amptector dials are TOP of the band -- hence expect shorter times when testing.

(A) Pick-up values are mid-band which has ±10% tolerance:

Long Delay	Pick-up Limits	Short Delay & Instantaneous	Pick-up Limits
.5 = 2.5 amp	2.25 to 2.75	4X = 20 amp.	18 to 22
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.7 = 3.5	3.15 to 3.85	6X = 30	27 to 33
.8 = 4.0	3.6 to 4.4	7X = 35	31.5 to 38.5
.9 = 4.5	4.05 to 4.95	8X = 40	36 to 44
1.0 = 5	4.5 to 5.5	10X = 50	45 to 55
1.25 = 6.25	5.6 to 6.9	12X = 60	54 to 66

(B) To Check Long Delay Pick-up (Switch to Lo, Turn Timer OFF)

1. Push "RESET" and then "TEST".
2. Slowly increase current until Long Delay neon lamp (clear) glows steadily indicating Amptector pick-up.
3. Use "STOP" switch to cut off current.

(C) To Check Long Delay Time (Set 30 amp. (6X) with "Calibrate" switch)
1. Push "RESET" and turn Timer ON.
2. Push "TEST" - Test Kit will stop when Amptector fires the output. Timer should read less than dial setting but not under 2/3 of the setting; i.e. if set at 24 it should be more than 16 seconds.
3. Any other multiple of sensor may be checked if desired -- see curve for time values to be expected.

(D) To Check Instantaneous (Turn Timer OFF)
1. (Set Long Delay to max.-in order to not have long delay take you out too fast.)
2. (If Short Delay is in Amptector set short Delay switch to "Read Amps".)
3. Push "Reset" then "Test" and increase current steadily but rather rapidly until relay "clicks" off in Test Kit. (If current is preset to about 3/4 of setting, using calibrate switch, the final setting can be approached slower for better accuracy.)
4. Reset -- Hold INST switch in "Read" position -- push "TEST" button and read current.-- CAUTION - if relay does not cut off current when INST is released; use stop switch to remove current.

(E) To Check Short Delay Pick-up (Set Instant. to Max. 12X)
1. Place Short Delay switch in OPERATIVE position and proceed similar to Instantaneous above.
2. Switch to "Read Amps," to read ammeter -- CAUTION - use STOP switch to cut off current.

(F) To Check Short Delay Time
1. Set Short Delay Pick-up dial @ 4X(20 amperes).
2. Set "Current Adjust" at 10X(50 amperes) with "Calibrate" switch.
3. Turn timer on and Short Delay switch to "Operative".
4. Push "Reset" then "Test" and timer will give an approximate reading of the delay. NOTE: This timer is not accurate enough for close timing of short delay but it will show the difference between the three band calibrations.

(G) 3 Phases: The selector switch permits checking to see if all Amptector phase inputs are operative. Since all feed into a common pick-up and timing circuit it is only necessary to determine on one of the above tests that all inputs will cause Amptector operation.

(H) To Check Ground Pick-up
1. Hold Ground Test momentary switch in down position during steps 2, 3 and 4.
2. Place "Current Adjust" knob @ zero.
3. Push "Reset" then "Test".
4. Turn "Current Adjust" till unit trips (from 1.0 to 1.2 amps).

(I) To Check Ground Time
1. With Ground Test momentary switch and calibrate switch in down position, turn Current Adjust to read 2.5X(2.5 amperes).
2. Turn "Timer" on.
3. Release "Calibrate" switch, continue to hold Ground Test switch down.
4. Same as F4.

(J) When checking out settings on an Amptector for use, the general procedure is to start with the high current settings and work down to the lowest current setting.

(K) CAUTION: DO NOT TEST AMPTECTOR WHILE BREAKER IS CARRYING CURRENT.