# Instructions for Testing Magnum DS Digitrips with the MTK2000 Test Kit

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Instructions for Testing Magnum DS Digitrips with the MTK2000 Test Kit
WARNING
DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. DEATH OR SEVERE PERSONAL INJURY CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING WITH THE TASK AND ALWAYS FOLLOW GENERALLY ACCEPTED SAFETY PROCEDURES. EATON IS NOT LIABLE FOR THE MIS-APPLICATION OR MIS-INSTALLATION OF ITS PRODUCTS.

IMPORTANT
THE USER IS CAUTIONED TO OBSERVE ALL OF THE RECOMMENDATIONS, WARNINGS AND CAUTIONS RELATING TO THE SAFETY OF PERSONNEL AND EQUIPMENT, AS WELL AS ALL GENERAL AND LOCAL HEALTH AND SAFETY LAWS, CODES AND PROCEDURES. THE RECOMMENDATIONS AND INFORMATION CONTAINED HEREIN ARE BASED ON EATON'S EXPERIENCE AND JUDGEMENT, BUT SHOULD NOT BE CONSIDERED TO BE ALL-INCLUSIVE OR COVERING EVERY APPLICATION OR CIRCUMSTANCE WHICH MAY ARISE. IF ANY QUESTIONS ARISE, CONTACT EATON FOR FURTHER INFORMATION OR INSTRUCTIONS.

WARNING
DO NOT TEST THE TRIP UNIT WHILE THE BREAKER IS IN THE “CONNECTED” POSITION. BREAKER MUST BE RACKED TO THE “TEST” POSITION, OR REMOVED FROM THE SWITCHGEAR CELL.

Section 1: Introduction
1.1 General Information
The MTK2000 Trip Unit Test is used to test and verify the pickup levels and time delay settings of a breaker’s trip unit. Scheduled testing of the circuit breaker’s trip unit will help to ensure proper operation of the breaker and will lead to safer and more efficient performance.

520 Digitrip Units: The MTK2000 Trip Unit Test it supports the 520 curves accept the short delay I2T and ground I2T.

1150 Digitrip Units: The MTK 2000 Trip Unit Test Kit does not support the Long Delay I4T Short Delay Flat curve, or any of the IEC curves or the IEEE curves.

Section 2: MTK2000 / Breaker Information
2.1 MTK2000 Controls
The following are the identifications and functions of the MTK2000 controls. Any time these are referred to in the following portions of this publication they will be in bold type as shown in the following definitions.

**Power** — Turns power on and off to the MTK2000.

**Phase Select** — Permits checking of all phase input circuits on the Magnum breaker. **Phase Select** can be pressed at any time prior to performing a test. Since all feed into a common pickup and timing circuit, it is only necessary to use one phase to test all the solid-state circuitry functions. Current is applied through the selected phase and returns to MTK2000 via the neutral element. It is only necessary to use one circuit function (e.g., Long Delay) to verify that each phase (A, B and C) performs similarly. The **Phase Select** button is also used as an accelerator when scrolling through numerical entry fields and can be used to delete characters when entering the breaker name.

**Test Select** — Cycles the MTK2000 through the steps of testing, including date input and the various tests. (See Flowchart at back of document)

**Start** — **Test Select** and **Start** both change menus, but when **Start** is pushed it will cause action.

**Cancel** — When pressed, takes the MTK2000 back to the beginning of the test sequence, it is also used to move to previous field when entering text data. (See Flowchart at back of document). Pressing **Cancel** twice will take the MTK2000 back to the main screen.

**Up Arrow** — Increments value.

**Down Arrow** — Decrements value.

Figure 1. MTK2000 Test Kit
2.2 Digitrip Long Time Function

Testing of the Trip Unit must be performed with the Trip Unit properly installed in the breaker. The Long Time function has a memory circuit with a reset time of 36 times the Long Delay Time. The thermal memory jumper may need to be relocated to disable the thermal memory. This jumper is shipped from the factory in the “active” position. (Reference Section 2.3, MTK2000 Breaker Cables) If a trip function LED on the Trip Unit is lit prior to a test, press the Trip Reset pushbutton on the Trip Unit. When bench testing a breaker wired for zone interlock applications, MDS shorting plug 8779C02G06 should be installed. (Reference Section 2.3, MTK2000 Breaker Cables)

2.3 MTK2000 Breaker Cables

The MTK2000 MDS Breaker Cable is used to connect the MTK2000 to the breaker’s trip unit. Before the MDS 14 pin MTK2000 plug is inserted into the Digitrip verify the Long Time Memory (LTM) jumper is in the inactive position, or it is removed. If it is in the active position, it must be removed or returned to the inactive position before the adapter connector can be inserted. It is important to note that all tests must be performed with the LTM jumper in the “inactive” position.

Note: A physical jumper is used with 520 – 520MC Digitrips.

The 1150 is set differently than the 520 Digitrips; there is no LTM jumper, the “Long Memory” function must be set to off.

2.4 Zone Interlock Shorting Plug

The Zone Interlock Shorting Plug for the Magnum breaker (8779C02G06) is required when the breaker is removed from the switchgear cell for testing. The Shorting Plug must be installed on the breaker secondary contacts to defeat zone-interlock wiring.
Review the picture below for the installation of the Magnum Shorting plug.

**Figure 4. Magnum Shorting Plug**

*Note: If the ZSI shorting plug is not in the circuit the ground fault time test will go instantaneously. The short delay time test will go instantaneously.*

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### 2.5 Circuit Breaker Information

#### 2.5.1 MTK2000 Tolerance Bands

The Long Delay Pickup point is normally set in the Digitrip at 110% of the Long Delay Setting. The tolerance is ±5% of 110%. Long Delay Times of the Trip Unit are top of band. The tolerance is +0% /-30% of the Long Delay Time Setting. Short Delay Pickup, Instantaneous, and Ground Fault Pickup values are mid-band, which have ±10% tolerance. Short Delay Time and Ground Time require curve for band tolerance.

#### 2.5.2 Digitrip Test Guidelines

Testing of the Trip Unit must be performed with the Trip Unit properly installed in the breaker. The Long Time function has a memory circuit with a reset time of 36 times the Long Delay Time. The thermal memory jumper may need to be relocated to disable the thermal memory. This jumper is shipped from the factory in the “active” position. (Reference Section 2.3, MTK2000 Breaker Cables) If a trip function LED on the Trip Unit is lit prior to a test, press the Trip Reset pushbutton on the Trip Unit. When bench testing a breaker wired for zone interlock applications, MDS shorting plug 8779C02G06 should be installed (Reference Section 2.3, MTK2000 Breaker Cables).
Section 3: MTK2000 Setup

3.1 General Information

Place the MTK2000 on a stable surface prior to testing. The handle can be rotated for ease of viewing and operation by pressing the buttons on the sides of the handle and rotating the handle to the desired angle (see Flowchart at back of document). When powering on, the MTK2000 will run a self diagnosis before displaying the Home Screen (see Flowchart at back of document).

3.2 Hardware Connections

Insert the power supply into a standard 120V outlet and plug the opposite end into the MTK2000. Plug the breaker cable into the MTK2000 and insert the grooved end into the breaker trip unit. Check the long time memory jumper position before plugging connector into test port.

3.3 Storing Test Results

The MTK2000 is capable of storing data obtained from multiple tests on the included SD Card. These results can be downloaded to a computer via the communication cable included in the kit or by importing the data directly from the SD Card. This data is saved automatically to the MTK2000 as each test is performed. Once the memory is full, the MTK2000 automatically begins to write over the first test in memory. Because calibration data is also stored on the card, it is crucial to the operation of the MTK2000 that the information on the SD Card is never removed.

It is important to press the Cancel button twice after performing all tests on one trip unit before proceeding to the next trip unit so that a new breaker name can be entered.

3.4 Powering Up the MTK2000

Press Power on the MTK2000. Once the kit powers on, the self-diagnosis has been completed and the kit is ready to test the trip unit. Upon power up and following self-diagnosis, the MTK2000 will display the Home Screen. Press Test Select.

3.5 Setting the Date & Time

Reference Flow Chart for this section in order to understand how to modify the System Setting for the MTK2000, press the Down Arrow immediately after the MTK2000 displays the Home Screen. The Home Screen will read “System Settings -> Date & Time”. Press Start to modify the date. Use the Up Arrow and Down Arrow to modify values in each selection and press Test Select to proceed. Once completed press Cancel to return to the Systems Configuration menu. Pressing Cancel once more will return the MTK2000 to the Home Screen.

3.6 Communication Settings

Reference Flow Chart for this section in order to understand how to modify the System Setting for the MTK2000; press the Down Arrow immediately after the MTK2000 displays the Home Screen. Once “System Settings -> Date & Time” is displayed, press the Down Arrow to verify “Communications” is displayed.

Press Start to modify these settings. Use the Up Arrow and Down Arrow to modify values in each selection and press Test Select to proceed. Once completed press Cancel to return to the Systems Configuration menu. Pressing Cancel once more will return the MTK2000 to the Home Screen.

Section 4: Testing the MDS 520 Digitrip Models

4.1 Legend for MTK2000 testing with 520 Digitrip Models

- g: entered ground value setting
- GF: Ground Setting
- i(A): the entered instantaneous value setting
- I(A): the output instantaneous value for the MTK2000

I_{m}^{(A)} = I_{m} \times g

I_{i}^{(A)} = I_{i} \times i

I_{n}^{(A)} = I_{n} \times m

I_{mult}^{(A)} = I_{mult} \times mult

I_{r}^{(A)} = rated plug value (must match sensor rating, I_{p})

I_{r} = (\frac{I_{m}}{I_{p}}) \times m

 INST = Instantaneous

LDS = Long Delay Setting

LDT = Long Delay Time@6xlr

mm = limit for Maintenance mode reduction levels

mult = multiplying factor

MMODE = Maintenance Mode

n = Rating Plug Value

r = entered Long Delay Setting

R = the actual time the Digitrip tripped during the test

s = entered “Short Delay Setting” value setting

SDS = Short Delay Setting

SD = Short Delay Setting

SDT = Short Delay Time

T = entered time value for the MTK2000

T_{s} = entered time value for the “Ground Time”

T_{r} = entered time value for the “Long Delay Time @6xlr”

T_{s} = entered time value for the “Short Delay Time”

4.2 Entering Breaker Name

The MTK2000 is capable of storing test results as each test is performed. For this reason, it is important to label the breakers subject to test in the MTK2000 memory. When prompted for breaker name on the display screen press Start then use the Up Arrow and Down Arrow to change the character and Start button to advance to the next character. The Cancel button can be pressed to move to the previous field. The Phase Select button, when pressed, performs the delete function. Once the entry is complete, press the Test Select button to proceed.
It is important to press the Cancel button twice to return to the Home Screen after performing all tests on one breaker before proceeding to the next breaker so that a new breaker name can be entered.

4.3 Setting the Rating Plug
Press Start to set the rating plug value on the MTK2000 by using the scroll up and down button. Press Test Select button when complete.

4.4 Setting the Frequency
Press Start to set the frequency value on the MTK2000 by using the scroll Up and Down Arrow. Press Test Select button when complete.

4.5 ZSI Shorting Plug
The MTK2000 will ask if the ZSI Shorting Plug is installed, please validate if it is installed (Reference Section 2.4 Zone Interlock Shorting Plug), if the correct answer is not shown, press Start then scroll the up and down arrows to find the correct answer. Once the correct answer is shown press Test Select.

Note: If the shorting plug is present the short delay time and ground fault time can be calculated by the MTK 2000.

If the shorting plug is not present and the answer to this query is “Yes”, both the Short Delay Time and Ground Time test will “Fail” on the MTK2000.

If the shorting plug is not present and the answer to this query is “No”, both the Short Delay Time and Ground Time test will be a “Pass” on the MTK2000.

4.6 Self Calibrate
This should be done for every MAGNUM breaker
Press Start
Once the calibration is complete the MTK2000 will say “Calibration Complete” press Test Select to Return.

4.7 Long Delay Setting
4.7.1 MDS 520 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
• Set the desired test value for the “Long Delay Setting” dial.
• Set values for the “Short Delay Setting” dial to the maximum value.
• Set values for the “Ground Setting” Dial to the maximum value.
• Set for the “Instantaneous” dial to “OFF”.

While performing MTK2000 testing, please validate the LTM jumper is in the “inactive” position. Reference Section 2.3 MTK2000 Breaker Cables.

4.7.2 MTK2000
“LONG DELAY TEST” should be shown on the screen if not press Test Select until “LONG DELAY TEST” is on screen. Press Start.

The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.

Set “r” value on the MTK2000 display to match the Digitrip’s “Long Delay Setting” dial by scrolling the up and down arrows.

Once value is set press Start on MTK2000, the test kit begins to generate current. Begin to press the Up Arrow until the “Unit Status” LED on the Digitrip begins to flash quickly. This should occur at the Long Delay pickup current level. Once the pickup current value is found press the Start button. A message of “TEST TERMINATED ->PASSED” or “TEST TERMINATED ->FAILED” will appear on the MTK2000 display. The current level is the Long Delay Pickup Value, this is the value where the trip unit will Start timing for Long Delay (overload protection).

Note: If the Start button is not pressed, the test times out after 40 seconds.

Note: The rate of the Status LED flashing will slow to normal when the current is lowered below the pickup setting.

4.8 Long Delay Time
4.8.1 MDS 520 Digitrip Models
If any of the red LED’s are blinking press “Reset” on Digitrip.
Do not change the “Long Delay Setting” dial.

Set the desired test value for the “Long Delay Time @6xItr” dial.

4.8.2 MTK2000
After the “LONG DELAY TEST” pick up current is found press Test Select on the MTK2000.

Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Long Delay pick up current test.

The next value that needs to be set on the MTK2000 display is “mult” the multiplier setting for the “Long Delay Time @6xItr”. (The standard multiplier is 6 hence the statement “@6xItr”. If the multiplier is changed lower than 6 the LD Time value goes up, if you raise the multiplier higher the LD Time value goes down. When you leave the multiplier as 6, the TR value and the LDT value stay the same.)

Press Test Select on MTK2000.

Set “Tr” value on the MTK2000 display to match the Digitrip’s “Long Delay Time @6xItr” dial by scrolling the up and down arrows.

Once value is set press Start on MTK2000.

A message of “LONG DELAY PASSED” or “LONG DELAY FAILED” will appear on the MTK2000 display.

4.9 Short Delay Settings
4.9.1 MDS 520 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
• Do not change the “Long Delay Setting” dial.
• Set value on the “Long Delay Time @6xItr” dial to the maximum value.
• Set the desired test value for the “Short Delay Setting” dial.
• Set value on the “Short Delay Time” dial to “.1” sec.
• Set value on the “Instantaneous” dial to “OFF”.

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4.9.2 MTK2000
Press Test Select until “SHORT DELAY TEST” name comes up. Press Start.
The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.
Set the “s” value on the MTK2000 display to match the Digitrip’s “Short Delay Setting” dial by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “TRIP CURRENT FOUND –> PASSED” or “TRIP CURRENT FOUND –> FAILED” will appear on the MTK2000 display.

4.10 Short Delay Time Settings
4.10.1 MDS 520 Digitrip Models
If red light is blinking press “Reset” on Digitrip.
Set the desired test value for the “Short Delay Time” dial.
Note: Since this MTK2000 does not support the I2t curves the maximum no values were set in the Digitrip Instructions. Press Start on MTK2000.
Press Test Select until “SHORT DELAY (at 1.5xs)” comes up on the MTK2000 display.
Note: If Test Select is hit more than once the MTK will skip the next test sequence. The only way to return to the time test is to redo the Is Short Delay pick-up current test.
Set the “Ts” value on the MTK2000 display to match the Digitrip’s “Short Delay Time” dial by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “SHORT DELAY PASSED” or “SHORT DELAY FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables

4.11 Ground Settings
4.11.1 MDS 520 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
• Set values for the “Ground Delay” dial to the maximum value.
• Set the desired test value for the “Ground Setting” dial.

4.11.2 MTK2000
Press Test Select until “GROUND FAULT TEST” comes up on the MTK2000. Press Start.
Set the “g” value on the MTK2000 display to match the Digitrip’s “Ground Setting” dial by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
Note: The “g” value must not go above 1200Amps, please keep this in mind when rating plugs are above 1200Amps.
A message of “TRIP CURRENT FOUND –> PASSED” or “TRIP CURRENT FOUND –> FAILED” will appear on the MTK2000 display.

4.12 Ground Time Settings
4.12.1 MDS 520 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
Set the desired test value for the “Ground Time” dial.

4.12.2 MTK2000
After the “GROUND FAULT TEST” current is found press Test Select until “GF Delay” comes up on the MTK2000 display.
Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Ig Ground current Pick-up test.
Set the “Tg” value on the MTK2000 display to match the Digitrip’s “Ground Time” dial by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “GROUND FAULT PASSED” or “GROUND FAULT FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables

4.13 Instantaneous Settings (If Applicable)
4.13.1 MDS 520 Digitrip Models
If red light is blinking press “Reset” on Digitrip.
• Set value on the Long Delay dial to maximum.
• Set value on the Long Delay Time dial to maximum.
• Set value on the Short Delay Setting dial to M1.
• Set value on the Short Delay Time dial to maximum.
• Set the desired test value for the Instantaneous dial.

4.13.2 MTK2000
Press Test Select until “INSTANTANEOUS TEST” comes up on the MTK2000. Press Start.
The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.
Set the “i” value on the MTK2000 display to match the Digitrip’s “Instantaneous” settings by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “TRIP CURRENT FOUND –> PASSED” or “TRIP CURRENT FOUND –> FAILED” will appear on the MTK2000 display.

4.14 Instantaneous Time Settings
4.14.1 MDS 520 Digitrip Models
If any of the red LEDs are blinking on Digitrip press Reset.

4.14.2 MTK2000
After the “INSTANTANEOUS TEST” current is found press Test Select until “INSTANT MAX TIME” comes up on the MTK2000 display.
Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the li current test.
Press Start and the MTK2000 will return the Instantaneous trip time.
A message of “INSTANTANEOUS PASSED” or “INSTANTANEOUS FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables.
4.15 Maintenance Mode Setting

4.15.1 MDS520 Digitrip Models

If any of the red LEDs are blinking press “Reset” on Digitrip.

- Set Maintenance Mode dial “On”
- Set R value on the dial below the Maintenance Mode “On” Dial.
- Set value on the Long Delay dial to maximum.
- Set value on the Short Delay Setting dial to maximum.

4.15.2 MTK2000

Press Test Select until “MAINTENANCE MODE TEST” comes up on the MTK2000. Press Start.

The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.

Set the “R” value on the MTK2000 display to match the Digitrip’s Maintenance Mode R values by scrolling the up and down arrows.

Note: If you are not sure which R value is needed the next menu will allow the multiplier value to be set.

Press Test Select for “MMODE TRIP SET” menu, the “mm” value can be adjusted up or down to give you the R value desired for testing.

Once value is set press Start on MTK2000.

A message of “TRIP CURRENT FOUND –> PASSED” or “TRIP CURRENT FOUND –> FAILED” will appear on the MTK2000 display.

4.16 Maintenance Mode Time Settings

4.16.1 MDS 520 Digitrip Models

If any of the red LEDs are blinking on Digitrip press Reset.

4.16.2 MTK2000

After the “MAINTENANCE MODE” current is found press Test Select until “MMODE MAX TIME” comes up on the MTK2000 display.

Note: If Test Select is hit more than twice, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Im current test.

Press Start and the MTK2000 will return the Maintenance Mode trip time.

A message of “MAINTENANCE PASSED” or “MAINTENANCE FAILED” will appear on the MTK2000 display.

If test is failing please reference Section 2.3 MTK2000 Breaker Cables.

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Section 5: Testing the 1150 Digitrip Models

5.1 Legend for MTK2000 testing with 1150 Digitrips

- \( g \) = entered ground value setting
- GF = GND PU
- \( i(A) \) = the entered instantaneous value setting
- \( l(A) \) = the output current value for the MTK2000 tested
- \( l_m(A) = l_x \times g \)
- \( l_{mm}(A) = n \times i \)
- \( l_{max}(A) = l_x \times m \)
- \( l_{mult}(A) = l_x \times mult \)
- \( l_n(A) = \text{rated plug value (must match sensor rating, } l_r) \)
- \( l_i(A) = l_i \times r \)
- \( l_m(A) = l_m \times s \)
- INST = INST PU
- LDS = LONG PU
- LDT = LongTIME
- \( mm \) = limit for Maintenance mode reduction levels
- \( mult \) = multiplying factor
- MMODE = Maintenance Mode
- \( n \) = Rating Plug Value
- \( r \) = Long PU
- \( R \) = the actual time the Digitrip tripped during the test
- \( s \) = SHORT PU
- SDS or SD = SHORT PU
- SDT = SHORT TIME
- \( T_g \) = entered time value for the “GROUND TIME”
- \( T_r \) = entered time value for the “LongTIME”
- \( T_s \) = entered time value for the “SHORT TIME”

5.2 Entering Breaker Name

The MTK2000 is capable of storing test results as each test is performed. For this reason, it is important to label the breakers subject to test in the MTK2000 memory. When prompted for breaker name on the display screen press Start then use the Up Arrow and Down Arrow to change the character and Start button to advance to the next character. The Cancel button can be pressed to move to the previous field. The Phase Select button, when pressed, performs the delete function. Once the entry is complete, press the Test Select button to proceed.

It is important to press the Cancel button twice to return to the Home Screen after performing all tests on one breaker before proceeding to the next breaker so that a new breaker name can be entered.
5.3 Setting the Rating Plug
Press Start to set the rating plug value on the MTK2000 by using the scroll up and down button. Press Test Select button when complete.

5.4 Setting the Frequency
Press Start to set the frequency value on the MTK2000 by using the scroll Up and Down Arrow. Press Test Select button when complete.

5.5 ZSI Shorting Plug
The MTK2000 will ask if the ZSI Shorting Plug is installed, please validate if it is installed (Reference Section 2.4 Zone Interlock Shorting Plug), if the correct answer is not shown, press Start then scroll the up and down arrows to find the correct answer. Once the correct answer is shown press Test Select.

Note: If the shorting plug is present the short delay time and ground fault time can be calculated by the MTK 2000.

If the shorting plug is not present and the answer to this query is “Yes”; both the Short Delay Time and Ground Time test will run “Fail” on the MTK2000.

If the shorting plug is not present and the answer to this query is “No”; both the Short Delay Time and Ground Time test will be a “Pass” on the MTK2000.

5.6 Self Calibrate
This should be done for every MAGNUM breaker
Press Start
Once the calibration is complete the MTK2000 will say “Calibration Complete” press Test Select to Return.

5.7 Long Delay Setting
5.7.1 MDS Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
Set value for the “LONG Slope” function to “I/T”.

Note: The MTK2000 is not programmed to test the Long Delay I/T or IEC or IEC slopes.

Set the desired test value for the “LONG PU” function.
For test purposes set the “Long Memory” function is set to “OFF; Reference Section 2.3 MTK2000 Breaker Cables.
Set value for the “SHORT SLOPE” to “FLAT”.

Note: The MTK2000 is not programmed to test Short Delay with I/T slope.

The MTK2000 is not programmed to test GROUND Delay with I/T slope.

Once all selections have been made, press “Save” under the “Edit Value” Menus buttons.

5.7.2 MTK2000
“LONG DELAY TEST” should be shown on the screen if not press Test Select until “LONG DELAY TEST” is on screen. Press Start.
The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.
Set “r” value on the MTK2000 display to match the Digitrip’s “Long PU” settings by scrolling the up and down arrows.

Once value is set press Start on MTK2000, the test kit begins to generate current. Begin to press the Up Arrow until the “Unit Status” LED on the Digitrip begins to flash quickly. This should occur at the pickup current. Once the pickup current value is found press the Start button. A message of “TEST TERMINATED ->PASSED” or “TEST TERMINATED ->FAILED” will appear on the MTK2000 display. The current level is the Long Delay Pickup Value, this is the value where the trip unit will Start timing for Long Delay (overload protection).

Note: If the Start button is not pressed, the test times out after 40 seconds.
Note: The rate of the Status LED flashing will slow to normal when the current is lowered below the pickup setting.

5.8 Long Delay Time
5.8.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
Do not change the “LONG PU” function.
In the Program Settings menu set the desired test value for the “LongTIME” function.
Once all selections have been made, press “Save” under the “Edit Value” Menus buttons.

5.8.2 MTK2000
After the “LONG DELAY TEST” pick up current is found press Test Select on the MTK2000.

Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Long Delay pick up current test.

The next value that needs to be set on the MTK2000 display is “mult” the multiplier setting for the “Long Delay Time @6×ir” (The standard multiplier is 6 hence the statement “@6×ir”). If the multiplier is changed lower than 6 the actual LDT value goes up, if you raise the multiplier higher the actual LDT value goes down. When you leave the multiplier as 6, the TR value and the LDT value stay the same.

Press Test Select on MTK2000.
Set “Tr” value on the MTK2000 display to match the Digitrip’s “LongTIME” value by scrolling the up and down arrows.
Once value is set press Start on MTK2000.

A message of “LONG DELAY PASSED” or “LONG DELAY FAILED” will appear on the MTK2000 display.

5.9 Short Delay Settings
5.9.1 MDS 520 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip..

• Do not change the “LONG PU” function.
• Set value for the “LongTIME” function to maximum.
• Set the desired test value for the “SHORT PU” function.
• Set value for the “SHORT TIME” function to >.1 sec.
• Set value for the “INST PU” function to “OFF”.

Once all selections have been made, press “Save” under the “Edit Value” Menus buttons.
5.9.2 MTK2000
Press Test Select until “SHORT DELAY TEST” name comes up. Press Start.
The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.
Set the “s” value on the MTK2000 display to match the Digitrip’s “SHORT PU” value by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “TRIP CURRENT FOUND -> PASSED” or “TRIP CURRENT FOUND -> FAILED” will appear on the MTK2000 display.

5.10 Short Delay Time Settings
5.10.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
Set the desired test value for the “SHORT TIME” function.
Once selection has been made, press “Save” under the “Edit Value” Menus buttons.
5.10.2 MTK2000
After the “SHORT DELAY TEST” current is found press Test Select until “SHORT DELAY (at 1.5xs)” comes up on the MTK2000 display.
Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Is Short Delay Pick-up current test.
Set the “Ts” value on the MTK2000 display to match the Digitrip’s “SHORT TIME” values by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “SHORT DELAY PASSED” or “SHORT DELAY FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables.

5.11 Ground Settings
5.11.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
• Set the “SHORT PU” function to maximum.
• Set the desired test value for the “GND PU” function.
Once selection has been made, press “Save” under the “Edit Value” Menus buttons.
5.11.2 MTK2000
Press Test Select until “GROUND FAULT TEST” comes up on the MTK2000. Press Start.
Set the “g” value on the MTK2000 display to match the Digitrip’s “GROUND PU” values by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
Note: The “g” value must not go above 1200Amps, please keep this in mind when rating plugs are above 1200Amps.
A message of “TRIP CURRENT FOUND -> PASSED” or “TRIP CURRENT FOUND -> FAILED” will appear on the MTK2000 display.

5.12 Ground Time Settings
5.12.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
Set the desired test value for the “GROUND TIME” function.
Once selection has been made, press “Save” under the “Edit Value” Menus buttons.

5.12.2 MTK2000
After the “GROUND FAULT TEST” current is found press Test Select until “GF Delay” comes up on the MTK2000 display.
Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Ig Ground current Pick-up test.
Set the “Tg” value on the MTK2000 display to match the Digitrip’s “GROUND TIME” values by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “GROUND FAULT PASSED” or “GROUND FAULT FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables.

5.13 Instantaneous Settings (If Applicable)
5.13.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
• Set value for the “LONG PU” function to maximum.
• Set value for the “LongTIME” function to maximum.
• Set value for the “SHORT PU” function to maximum.
• Set value for the “INST PU” function to “ON”.
• Set the desired test value for the “INST PU” function.
Once selection has been made, press “Save” under the “Edit Value” Menus buttons.
5.13.2 MTK2000
Press Test Select until “INSTANTANEOUS TEST” comes up on the MTK2000. Press Start.
The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.
Set the “i” value on the MTK2000 display to match the Digitrip’s “INST PU” settings by scrolling the up and down arrows.
Once value is set press Start on MTK2000.
A message of “TRIP CURRENT FOUND -> PASSED” or “TRIP CURRENT FOUND -> FAILED” will appear on the MTK2000 display.

5.14 Instantaneous Time Settings
5.14.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
5.14.2 MTK2000
After the “INSTANTANEOUS TEST” current is found press Test Select until “INSTANT MAXTIME” comes up on the MTK2000 display.
Note: If Test Select is hit more than once, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Li current test.
Press Start and the MTK2000 will return the Instantaneous trip time.
A message of “INSTANTANEOUS PASSED” or “INSTANTANEOUS FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables.
5.15 Maintenance Mode Setting
5.15.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
• Set the desired test value for the “Maint PU” function.
• Set the “MaintenanceMode” menu to “Enable”.
Once selection has been made, press “Save” under the “Edit Value” Menus buttons.
• Set value for the “LONG PU” function to maximum.
• Set value for the “LongTIME” function to maximum.
• Set value for the “SHORT PU” function to maximum.
Once selection has been made, press “Save” under the “Edit Value” Menus buttons.
5.15.2 MTK2000
Press Test Select until “MAINTENANCE MODE TEST” comes up on the MTK2000. Press Start.
The MTK2000 display is specifying that values need to be set, these values were set in the Digitrip Instructions. Press Start.
Set the “R” value on the MTK2000 display to match the Digitrip’s “MAINT PU” values by scrolling the up and down arrows.
Note: If you are not sure which R value is needed the next menu will allow the multiplier value to be set.
Press Test Select for “MMODE TRIP SET” menu, the “mm” value can be adjusted up or down to give you the R value desired for testing.
Once value is set press Start on MTK2000.
A message of “TRIP CURRENT FOUND -> PASSED” or “TRIP CURRENT FOUND -> FAILED” will appear on the MTK2000 display.

5.16 Maintenance Mode Time Settings
5.16.1 MDS 1150 Digitrip Models
If any of the red LEDs are blinking press “Reset” on Digitrip.
5.16.2 MTK2000
After the “MAINTENANCE MODE” current is found press Test Select until “MMODE MAXTIME” comes up on the MTK2000 display.
Note: If Test Select is hit more than twice, the MTK will skip the next test sequence. The only way to return to the time test is to redo the Im current test.
Press Start and the MTK2000 will return the Maintenance Mode trip time.
A message of “MAINTENANCE PASSED” or “MAINTENANCE FAILED” will appear on the MTK2000 display.
Note: If test is failing please reference Section 2.3 MTK2000 Breaker Cables.

Section 6: Troubleshooting
Listed below are resolutions to common problems experienced with MTK2000. Please review this section prior to contacting Eaton with questions.

Trip Unit keeps indicating the wrong type of trip (i.e. Long Delay Trip when testing Short Delay Pickup).
Verify that the trip unit is set correctly as indicated on the MTK2000 prior to Starting the test and that the trip unit is reset prior to Starting a test. Verify that the Zone Interlock plug is installed when the breaker is removed past the Test Position or is removed from the cell.

Measured values for a particular Digitrip are not consistent with settings on the Digitrip.
Press Cancel twice to reach the Home Screen. Proceed as normal and ensure that the MTK2000 performs the self calibration procedure with the new Digitrip. Verify that the thermal memory jumper is in the correct position or setting (see paragraph 2.2.2). Ensure that the SD Card provided from the factory is installed in the MTK2000 and still has the original calibration data stored.

Digitrip seems not to respond to input from the MTK2000.
Verify that the Digitrip Cable is plugged correctly into the Digitrip as well as the rear of the MTK2000.

Long Delay Times seem to decrease during testing.
Verify that the thermal memory jumper is in the correct position (see paragraph 2.2.2)

The values on the MTK2000 Test Kit and the values on my metering Digitrip do not match.
It is important to understand that the Digitrip has a tolerance band within which it is expected to perform. Some difference is acceptable, although this value should be minimal.
Section 7: Customer Updates
Periodically Eaton will issue updates that can be obtained at the following web address.
http://www.eaton.com/EatonCom/Markets/Electrical/Products/Switchgear/LowVoltageSwitchgear/index.html
These updates are meant to resolve issues as well as improve functionality and usability of the MTK2000 Test Kit. These updates are to be performed by the MTK2000 Test Kit user using the included data communication cable.
Please visit the web site prior to testing to ensure the latest firmware revision has been installed on the PACB Trip Unit Test Kit. Detailed instructions will be provided in the downloadable file guiding the user through the update procedure.

Section 8: Additional Publications
In addition to this Instruction Book, the following Instruction Books and drawings are commonly included with any Magnum DS® Circuit Breaker and/or provided with any Eaton Low-Voltage Assembly shipment. Please inspect the documentation provided before contacting an Eaton service representative for replacements.

IB 2C12060H08 Instructions for Installation, Operation and Maintenance of Magnum DS, DSX and DSL Low Voltage Power Circuit Breakers
IB 2C12063H02 Instructions for Installation, Operation and Maintenance of Magnum SB Insulated Case Low Voltage Power Circuit Breakers
IL 70C1036H05 Instructions for Digitrip Models 1150, 1150i and 1150+, 1150+i Trip Units for use only in Cutler-Hammer Magnum and Magnum DS Circuit Breakers
IL 70C1037H05 Digitrip models 520, 520i; and 520M, 520Mi, 520MC, 520MCI trip units for use only in Magnum and Magnum DS circuit breakers
70C1082 Characteristic Curves for Magnum DS Circuit Breakers using Digitrip 220, 220Pm 520, 520M Tripunits and Magnum Circuit Breakers using Digitrip 520i, 520Mi, 520MCI Tripunits
70C1030 Characteristic Curves for Magnum DS and Magnum SB Circuit Breakers using Digitrip 1150 and Magnum Circuit Breakers using 1150i Tripunits
Instructions for Testing Magnum DS Digitrips with the MTK2000 Test Kit

MTK2000 Flowchart

2 Second Timeout
Cancel

MTK2000 – Press Test <Date> <Time>

Up Arrow
Test Select (Start or Down Arrow)

Start

BREAKER TEST KIT
FIRMWARE: S6900020.26X

Up Arrow

BREAKER TYPE XXXXXX

Start

Up Arrow
Test Select (Start or Down Arrow)

BREAKER TYPE XXXXXX

Up Arrow

BREAKER TYPE XXXXXX

Start

Up Arrow
Test Select (Start or Down Arrow)

BREAKER NAME XXXXXXXXXXX

Start

Up Arrow
Test Select (Start or Down Arrow)

ZSISHORTINGPLUG INSTALLED? <XXX>

Start

Up Arrow
Test Select (Start or Down Arrow)

ZSISHORTINGPLUG INSTALLED? <XXX>

Start

Up Arrow
Test Select (Start or Down Arrow)

FREQUENCY XX Hz

Start

Up Arrow
Test Select (Start or Down Arrow)

FREQUENCY XX Hz

Start

Up Arrow
Test Select (Start or Down Arrow)

PLUG RATING XXXX A

Start

Up Arrow
Test Select (Start or Down Arrow)

PLUG RATING XXXX A

Start

Up Arrow
Test Select (Start or Down Arrow)

NRX?
Yes
No
Increment Phase to next Channel

Phase Button?
Yes
No

MAGNUM

Up Arrow (Change Value)

Down Arrow (Change Value)

X

Up Arrow (Increment Character Value)

Down Arrow (Increment Character Value)

XXXXXX

Up Arrow (Change Value)

Down Arrow (Change Value)

6300 A | 6000 A | 5000 A | 4000 A … 250 A | 200 A | 100 A

Up Arrow (Change Value)

Down Arrow (Change Value)

60 Hz | 50 Hz

Up Arrow (Change Value)

Down Arrow (Change Value)

YES | NO

Up Arrow (Change Value)

Cancel

A

B

C
Instructions for Testing Magnum DS Digitrips with the MTK2000 Test Kit

1. SET SDT TO '0.1'
2. SETINST=OFFLDT=MAX

Test-initializing:
I=XXX

Test active:
XX seconds
I=XXX

Test running:
Test passed

Test cancelled:

Trip current found:
XX.XX %Err=**PASSED**

Trip current not found:
XX.XX %Err=**FAILED**

Test failed

Test passed

15 second timeout

NOTE: Values will wrap at range limits when incrementing & decrementing with Arrow buttons.
Instructions for Testing Magnum DS Digitrips with the MTK2000 Test Kit

1. SET LDS & LDT MAX
2. SET SDS to M1
   (Informational)

SELECT TEST:
> INSTANTANEOUS TEST

NOTE: Values will wrap at range limits when incrementing & decrementing with Arrow buttons.

INSTANT TRIP SET
>=X.XX n=X.XX li=XXXX

INSTANT MAX TIME
>=X.XX n=XXXX li=XXXX

1. SET LDS & LDT MAX
2. SET SDS to M1
   (Informational)
Instructions for Testing Magnum DS Digitrips with the MTK2000 Test Kit

1. SET LDS & LDT MAX SDS M1
2. SET MMODE ON (Informational)

NOTE: Values will wrap at range limits when incrementing & decrementing with Arrow buttons.
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