ULTRA-TECH
Enterprises, Inc.

INSTRUCTION and OPERATIONS MANUAL

For

MU LOCOMOTIVE CABLE TESTER

MODEL NUMBER 16814-00

CAUTION

All operators are expected to read and become thoroughly familiar with the entire contents of this manual before attempting to operate the MU Cable Tester.

DOCUMENT NO. 16814-99 Rev. C

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1 GENERAL DESCRIPTION

The function of the MU Locomotive Cable Tester (MU Tester) is to perform shorts, continuity and ground-leakage testing for each of the 27 pin Multi-Unit cables and locomotive consists. The MU Tester is able to perform these test on a locomotive consist of up to eight(8) locomotives while they are powered and stationary. The MU tester is also able to test the 27 pin jumper cables, individually, that are used to interconnect the locomotives.

1.1 System Components

Every MU Tester System contains two of the following:

MU Cable Tester Unit (16814-00)

The MU Tester System is comprised of two identical tester units. Each unit is installed in a heavy duty, water resistant, rugged Pelican case. Each unit contains an MU cable receptacle that mates with a 27 pin MU jumper cable. A snap-on vinyl pouch on the outside cover of each unit provides storage for the battery charger/power adapter and the chassis test lead.

The enclosure cover hinges separate from the test unit as the cover is opened; this removes the cover completely to allow free access to the MU cable receptacle and the control panel. The emergency stop button is centrally located within the enclosure to allow quick access from any location around the test unit.

AC Power Adapter (16944-01)

The AC Power adapter is used to charge the battery from any standard 120 VAC power receptacle.

Chassis Test Lead (17034-01)

This is a lead used to connect the MU Tester to the locomotive for testing of ground-leakage.

1.2 System Tests

1.2.1 Self Test

The self test is used to make sure there are no issues with the test equipment itself. If there are any errors during this test the unit will need to be returned for repair.

1.2.2 Shorts Test

The shorts test is used to test if there are two or more conductors that are shorted together. If any conductors are meant to be shorted together one or more of them must be omitted from the test in order for the test to pass. If there are any faults the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest. When reviewing the errors for the shorts test it will say “Fault 24-27” this means there is a short between conductors 24 and 27. In order to proceed to the next test the error must either be fixed or the test must be modified, see section 4.3.1 for modifying test.

1.2.3 Leakage Test

The leakage test is used to test for shorts between the conductors and the chassis of the locomotive. If there are any faults the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest. When reviewing the faults for the leakage test, “Fault 27”, this means that conductor 27 is shorted to the chassis of the locomotive. In order to proceed to the next test the error must either be fixed or the test must be modified, see section 4.3.2 for modifying test. The leakage test will only be run for Locomotive tests on the Master unit.

1.2.4 Continuity Test

The continuity test is used to test that there are no breaks, if there are faults in the test unit will indicate that the test failed and give the options to modify the test, review the faults, or retest. When reviewing the faults for the continuity test, “Fault 27”, this means that conductor 27 is shorted to the chassis of the locomotive. In order to proceed to the next test the error must either be fixed or the test must be modified, see section 4.3.3 for modifying test.

Although the communications is not an actual test being run but a part of the Continuity Test the faults the can occur during establishing communications are different then the faults that occur during the actual continuity test. If the master is unable to establish communication with the slave unit it will indicate it with an error, this indicates that too many of the selected communication lines do not have continuity.

2 EQUIPMENT DESCRIPTION

The MU Tester System is a stand-alone tester for MU control lines found within locomotives and MU Jumper cables. Typical equipment configuration for the MU Tester System is one designated Slave unit connected to one designated Master unit by way of one MU jumper cable. Up to eight locomotives can be added between the slave and master units with nine jumper cables connecting the entire locomotive consist. All MU locomotive lines and MU jumper cables connected between the slave unit and master unit will be tested as a group.

A failsafe mechanism (Emergency Shut Off) is designed into the test system to immediately disconnect the test units in the event that an unexpected movement of the locomotive occurs during testing. The emergency shut off switch immediately removes testing signals from the MU control lines without removing power from the test unit itself; the emergency shut off function can be accessed from either the slave or master unit and disconnects both slave and master when activated.

2.1 The Designated Slave Unit

The MU Tester designated as the slave unit performs a self test when powered ON. After a preliminary shorts test between conductors, the designated slave unit waits for a communication link from the master unit. The slave unit monitors a preselected set of possible communication conductors. The slave unit responds to commands from the master unit after the two-way communication link has been established.

2.2 The Designated Master Unit

The MU Tester unit designated as the master unit controls the operation of the entire test system. The master unit performs a self test, a test for short circuits between conductors, and can perform a test for leakage to chassis. The master unit attempts to establish a two-way communication link with the slave unit. Once communications are established the

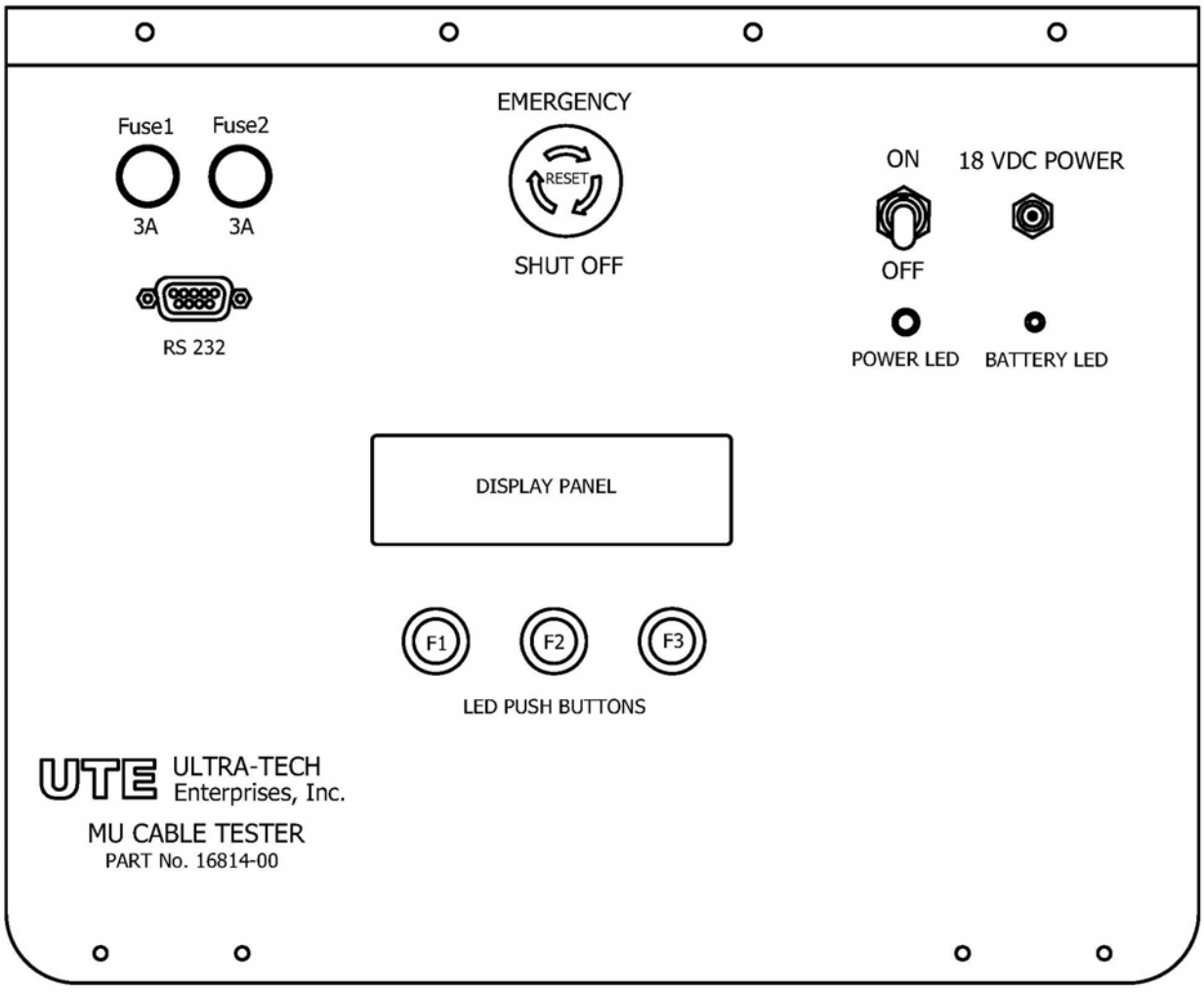
master unit controls the operation of the slave through this link. The conductor continuity test is performed by the master commanding the slave unit to connect a capacitive coupled path between select conductor pairs.

2.3 Battery Charger/Power Adapter

The battery charger/power adapter power cable plugs into any standard 120 VAC power receptacle; the output from the charger plugs into a power input connector in the control panel of each MU Cable Tester unit. The charger provides operational power to the MU Cable Tester and is used to recharge the sealed lead-acid battery housed within the unit. The battery charger/power adapter is stored in the external storage pouch for transport.

2.4 Control Panel

MU Cable Tester operation is performed from the control panel oriented from the short side of the enclosure case. Controls and indications are as follows:



Power On / Off Switch – Controls the main power to the MU Tester Unit. Power is supplied from the AC to DC power adapter or from the internal battery.

Power LED indication – Illuminated when power switch is in the ON position and power is supplied.

18 VDC Power Jack – Used to connect AC to DC power adapter to the MU Tester Unit. Power adapter is also used to charge the internal battery via the power jack.

Battery LED indication – Is illuminated Green when unit is ON and battery is charged above 11.9 VDC. LED turns Red when power is ON and battery charge is 11.9 VDC or less.

Emergency Shut Off Switch – Quickly removes control signals generated from the MU Tester Unit as applied to the MU jumper cable or rail car lines. This switch will not shut off power on the MU Cable Tester Unit.

LED Push Buttons – Used to select available options shown on the Display Panel. Each of the three buttons will be illuminated any time an option is available for that button.

3 OPERATION

Operation of the MU Tester System requires two tester units, one to first be designated as Slave and the other designated as Master. These units must be operated from a stable surface capable of physically supporting the unit while connecting and disconnecting an MU jumper cable to the test units as well as to a locomotive MU Cable receptacle.

3.1 Operations Overview

The basic test procedure is to start by connecting and setting up the first unit as slave and let it run its test, then set the second unit up as master and either let it automatically run though its test or choose which test are to be run.

3.2 Errors and Faults

3.2.1 Self Test Errors

These are errors within the system itself, such as memory check sums and driver shorts. Any self test errors require the unit to be returned for service.

3.2.2 Shorts Test Faults

Shorts test faults indicate that two or more conductors are shorted together; review shows fault(s) as “Fault 24-27” this means there is a short between conductors 24 and 27.

3.2.3 Leakage Test Faults

Leakage test faults indicate that one or more conductors are shorted to the chassis; review shows fault(s) as “Fault 24” this means there is a short between conductor 24 and chassis.

3.2.4 Communications Errors

Communications errors occur when the master cannot establish communications with the slave unit; this can be an indication that the slave unit is not setup correctly or that too many of the designated communication lines are damaged. The communication conductors are 2, 5, 10, 11, 18, 23, 25 and 27.

3.2.5 Continuity Test Faults

Continuity test faults indicate that one or more conductors are open; review shows fault(s) as “Fault 24” this means that conductor 24 is open.

3.3 Setup Slave Unit Locomotive Test (Default Test)

The default test is a Trainline (consist) test - this tests shorts and continuity.

1) Open and remove the cover of either test unit.
2) Secure the MU Tester Before beginning test
3) Connect MU Cable
4) Set the On/Off Power switch to the On position.
5) Confirm the Emergency Shut Off switch to the home (reset) position

   Twist the red button clockwise to release it to the home position.
6) Press the third LED button SLAVE
7) Press the first LED button START

   The unit will run though a self test if it fails during the self test the unit must be returned.
8) Once the self test has finished, there are three options; modify the test, select a different test to be run or start the test.
   a. To modify the shorts test see section 4.3.1
   b. To select a different test see section 4.2
   c. To run the test press the third LED button START
9) The first test run is the Shorts Test, there are three options for the shorts test; step though the conductors, automatically run though the test or skip the test.
   a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.

b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
c. To skip the test without running it press the third LED button SKIP

10) Once the shorts test has finished, if any of the conductors are shorted together the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.1
    b. To review the faults on shorts test press the second LED button REVIEW. If there are any faults it will say “Fault 24-27” this means there is a short between conductors 24 and 27. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.
11) Once the shorts test has passed, the user must press the third LED button CONT and the slave unit will go in a mode where it is waiting for communication from the master unit.

3.4 Setup Master Unit Locomotive Test (Default)

The default test is a Trainline (consist) test - this tests shorts, leakage and continuity.

1) Open and remove the cover of the other test unit.
2) Secure the MU Tester Before beginning test
3) Connect MU Cable
4) Set the On/Off Power switch to the On position.
5) Confirm the Emergency Shut Off switch to the home (reset) position
   Twist the red button clockwise to release it to the home position.
6) Press the first LED button Master
7) Press the first LED button START
   The unit will run though a self test if it fails during the self test the unit must be returned.
8) Once the self test has finished, there are three options; modify the test, select a different test to be run or start the test.
    a. To modify the shorts test see section 4.3.1
    b. To select a different test see section 4.2
    c. To run the test press the third LED button START
9) The first test run is the Shorts Test, there are three options for the shorts test; step though the conductors, automatically run though the test or skip the test.
    a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.

b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
c. To skip the test without running it press the third LED button SKIP

10) Once the shorts test has finished, if any of the conductors are shorted together the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.1
    b. To review the faults on shorts test press the second LED button REVIEW. If there are any faults it will say “Fault 24-27” this means there is a short between conductors 24 and 27. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.
11) Once the shorts test has passed, the user must press the third LED button CONT and the Master unit will go to the leakage test.
12) The next test run is the Leakage Test, there are three options for the leakage test; step though the conductors, automatically run though the test or skip the test.
    a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.
    b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
    c. To skip the test without running it press the third LED button SKIP
13) Once the leakage test has finished, if any of the conductors are shorted to the chassis the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.2
    b. To review the faults on leakage test press the second LED button REVIEW. If there are any faults it will say “Fault 24” this means there is a short between conductor 24 and chassis. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.
14) Once the leakage test has passed, the user must press the third LED button CONT and the Master unit will go to the continuity test.
15) The master unit will attempt to establish communications with the slave unit. If communications are not established the user will be given the option to retry or fail.
    a. To retry establishing communication press the first LED button RETRY

b. To stop retrying press the third LED button FAIL, this will return the use to the main master screen.

16) Once communications are established, there are three options for the continuity test; step though the conductors, automatically run though the test or skip the test.
    a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.
    b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
    c. To skip the test without running it press the third LED button SKIP
17) Once the continuity test has finished, if any of the conductors are not continuous the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.3
    b. To review the faults on continuity test press the second LED button REVIEW. If there are any faults it will say “Fault 24” this means that conductor 24 is not continuous. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.
18) Once the continuity test has passes the unit will save the test results and review the tests whether they have been passed or not run.

3.5 Setup Slave Unit Cable Test

1) Open and remove the cover of either test unit.
2) Connect MU Cable
3) Set the On/Off Power switch to the On position.
4) Confirm the Emergency Shut Off switch to the home (reset) position
   Twist the red button clockwise to release it to the home position.
5) Press the third LED button SLAVE
6) Press the first LED button START
   The unit will run though a self test if it fails during the self test the unit must be returned.
7) Once the self test has finished, press the second LED button SELECT to select another test type.
8) Use the first and third LED buttons to navigate though the list of test to find Cable, press the second LED button to select the test.
9) Press the second LED button SELECT, to run all the test.

10) The first test run is the Shorts Test, there are three options for the shorts test; step though the conductors, automatically run though the test or skip the test.
    a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.
    b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
    c. To skip the test without running it press the third LED button SKIP
11) Once the shorts test has finished, if any of the conductors are shorted together the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.1
    b. To review the faults on shorts test press the second LED button REVIEW. If there are any faults it will say “Fault 24-27” this means there is a short between conductors 24 and 27. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.
12) Once the shorts test has passed, the user must press the third LED button CONT and the slave unit will go in a mode where it is waiting for communication from the master unit.

3.6 Setup Master Unit Cable Test

1) Open and remove the cover of the other test unit.
2) Connect MU Cable
3) Set the On/Off Power switch to the On position.
4) Confirm the Emergency Shut Off switch to the home (reset) position
   Twist the red button clockwise to release it to the home position.
5) Press the first LED button Master
6) Press the first LED button START
   The unit will run though a self test if it fails during the self test the unit must be returned.
7) Once the self test has finished, press the second LED button SELECT to select another test type.
8) Use the first and third LED buttons to navigate though the list of test to find Cable, press the second LED button to select the test.
9) Press the second LED button SELECT, to run all the test.
10) The first test run is the Shorts Test, there are three options for the shorts test; step though the conductors, automatically run though the test or skip the test.

a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.
b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
c. To skip the test without running it press the third LED button SKIP

11) Once the shorts test has finished, if any of the conductors are shorted together the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.1
    b. To review the faults on shorts test press the second LED button REVIEW. If there are any faults it will say “Fault 24-27” this means there is a short between conductors 24 and 27. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.
12) Once the shorts test has passed, the user must press the third LED button CONT and the Master unit will go to the Continuity test.
13) The master unit will attempt to establish communications with the slave unit. If communications are not established the user will be given the option to retry or fail.
    a. To retry establishing communication press the first LED button RETRY
    b. To stop retrying press the third LED button FAIL, this will return the use to the main master screen.
14) Once communications are established, there are three options for the continuity test; step though the conductors, automatically run though the test or skip the test.
    a. To step though the conductors press the first LED button STEP, this allows the user to push a button and walk though all the conductors.
    b. To automatically run though the test press the second LED button AUTO or wait 5 seconds, this will run though the test without any input from the user.
    c. To skip the test without running it press the third LED button SKIP
15) Once the continuity test has finished, if any of the conductors are not continuous the unit will indicate that the test failed and give the options to modify the test, review the faults, or retest.
    a. To modify the test see section 4.3.3
    b. To review the faults on continuity test press the second LED button REVIEW. If there are any faults it will say “Fault 24” this means that conductor 24 is not continuous. Either the faults have to be resolved or conductors have to be removed from the test and the test must pass before the unit will move on to the next part of the test.
    c. To retest press the third LED button.

16) Once the continuity test has passes the unit will save the test results and review the tests whether they have been passed or not run.

4 Test Modification

4.1 Select a different test file

The MU Tester allows the user to have multiple test configurations stored on the MU Tester. These variations can be used to omit tests or omit conductors. These test need to be uploaded from a computer using MU Tester Host Software. This will only set the test file until the MU is rebooted. To select a different test:

1) Open and remove the cover of the other test unit.
2) Set the On/Off Power switch to the On position.
3) Confirm the Emergency Shut Off switch to the home (reset) position
   Twist the red button clockwise to release it to the home position.
4) Select either Master or Slave.
5) Press the first LED button START
   The unit will run though a self test if it fails during the self test the unit must be returned.
6) Press the second LED, SELECT
7) Use the first and third LED buttons to navigate though the list of test, use the second LED button to select the desired test.
8) Press the second LED, SELECT to return to the main test menu

4.2 Selecting to Test Only or Omit Test

If test is selected the user then has the ability to select whether they want to run the test or select to omit single test or run only one test. In order to run test only the test must be in the test file.

1) Open and remove the cover of the other test unit.
2) Set the On/Off Power switch to the On position.
3) Confirm the Emergency Shut Off switch to the home (reset) position
   Twist the red button clockwise to release it to the home position.
4) Select either Master or Slave.
5) Press the first LED button START
   The unit will run though a self test if it fails during the self test the unit must be returned.

6) Press the second LED, SELECT
7) Use the first and third LED buttons to navigate though the list of test, use the second LED button to select the desired test.
8) Use the first and third LED buttons to navigate though the list of test options, use the second LED button to select the desired test option.
    a. Omit Shorts Test; this will skip the shorts test but run all others.
    b. Shorts Test Only; this will only run the shorts test.
    c. Omit Leakage Test; this will skip the leakage test but run all others.
    d. Leakage Test Only; this will only run the leakage test.
    e. Omit Continuity Test; this will skip the continuity test but run all others.
    f. Continuity Test Only; this will only run the continuity test.

4.3 Modifying a test

Any test can be modified to add or remove conductors.

4.3.1 Modifying Shorts Test

To modify the shorts test:

1) On any screen with MENU, press the first LED button MENU
2) On the menu screen, press the second LED button MODIFY
3) On the shorts test screen, press the second LED button MODIFY
4) To add all the conductors press the first LED button, this enable all conductors to be tested. To remove all conductors used omit continuity test from section 4.2
5) To remove conductors, press the second LED button
    a. Use the third LED button to navigate though the list
    b. Use the second LED button to remove the desired conductor
    c. When finished removing conductors, press the first LED button RETURN
    d. On the save as default screen, press the second LED button YES
    e. The choose either MENU to do further modifications or RETURN to return to the main test screen
6) To add conductors, press the third LED button
    a. Use the third LED button to navigate though the list
    b. Use the second LED button to add the desired conductor
    c. When finished adding conductors, press the first LED button RETURN
    d. On the save as default screen, press the second LED button YES
    e. The choose either MENU to do further modifications or RETURN to return to the main test screen

7) To exit with out making changes press the second LED button REMOVE
    a. On the remove screen, press the first LED button RETURN
    b. On the save as default screen, press the third LED button NO
    c. The choose either MENU to do further modifications or RETURN to return to the main test screen

4.3.2 Modifying Leakage Test

To modify the leakage test:

1) On any screen with MENU, press the first LED button MENU
2) On the menu screen, press the second LED button MODIFY
3) On the shorts test screen, press the third LED button NEXT
4) On the leakage test screen, press the second LED button MODIFY
5) To add all the conductors press the first LED button, this enable all conductors to be tested. To remove all conductors used omit leakage test from section 4.2
6) To remove conductors, press the second LED button
    a. Use the third LED button to navigate though the list
    b. Use the second LED button to remove the desired conductor
    c. When finished removing conductors, press the first LED button RETURN
    d. On the save as default screen, press the second LED button YES
    e. The choose either MENU to do further modifications or RETURN to return to the main test screen
7) To add conductors, press the third LED button
    a. Use the third LED button to navigate though the list
    b. Use the second LED button to add the desired conductor
    c. When finished adding conductors, press the first LED button RETURN
    d. On the save as default screen, press the second LED button YES
    e. The choose either MENU to do further modifications or RETURN to return to the main test screen
8) To exit with out making changes press the second LED button REMOVE
    a. On the remove screen, press the first LED button RETURN
    b. On the save as default screen, press the third LED button NO
    c. The choose either MENU to do further modifications or RETURN to return to the main test screen

4.3.3 Modifying Continuity Test

To modify the Continuity test:

1) On any screen with MENU, press the first LED button MENU
2) On the menu screen, press the second LED button MODIFY
3) On the shorts test screen, press the third LED button NEXT
4) On the leakage test screen, press the third LED button NEXT
5) On the continuity test screen, press the second LED button MODIFY
6) To add all the conductors press the first LED button, this enable all conductors to be tested. To remove all conductors used omit leakage test from section 4.2
7) To remove conductors, press the second LED button
    a. Use the third LED button to navigate though the list
    b. Use the second LED button to remove the desired conductor
    c. When finished removing conductors, press the first LED button RETURN
    d. On the save as default screen, press the second LED button YES
    e. The choose either MENU to do further modifications or RETURN to return to the main test screen
8) To add conductors, press the third LED button
    a. Use the third LED button to navigate though the list
    b. Use the second LED button to add the desired conductor
    c. When finished adding conductors, press the first LED button RETURN
    d. On the save as default screen, press the second LED button YES
    e. The choose either MENU to do further modifications or RETURN to return to the main test screen
9) To exit with out making changes press the second LED button REMOVE
    a. On the remove screen, press the first LED button RETURN
    b. On the save as default screen, press the third LED button NO
    c. The choose either MENU to do further modifications or RETURN to return to the main test screen

4.3.4 Reviewing Shorts Test

To review the shorts test:

1) On any screen with MENU, press the first LED button MENU
2) On the menu screen, press the first LED button REVIEW

3) On the shorts test screen, press the second LED button REVIEW
4) Use the second LED button to navigate though the list. The screen will say “Conductor 1:ON 2:OFF” this means that when the test is run conductor 1 will be tested but 2 will not be test.
5) Once finished reviewing press the third LED button to test to be reviewed screen
6) Press the third LED button three more times to return to the main test screen.

4.3.5 Reviewing Leakage Test

To review the Leakage test:

1) On any screen with MENU, press the first LED button MENU
2) On the menu screen, press the first LED button REVIEW
3) On the shorts test screen, press the third LED button NEXT
4) On the leakage test screen, press the second LED button REVIEW
5) Use the second LED button to navigate though the list. The screen will say “Conductor 1:ON 2:OFF” this means that when the test is run conductor 1 will be tested but 2 will not be test.
6) Once finished reviewing press the third LED button to test to be reviewed screen
7) Press the third LED button two more times to return to the main test screen.

4.3.6 Reviewing Continuity Test

To review the Continuity test:

1) On any screen with MENU, press the first LED button MENU
2) On the menu screen, press the first LED button REVIEW
3) On the shorts test screen, press the third LED button NEXT
4) On the leakage test screen, press the third LED button REVIEW
5) On the continuity test screen, press the second LED button REVIEW
6) Use the second LED button to navigate though the list. The screen will say “Conductor 1:ON 2:OFF” this means that when the test is run conductor 1 will be tested but 2 will not be test.
7) Once finished reviewing press the third LED button to test to be reviewed screen
8) Press the third LED button once more to return to the main test screen.

5 Charging

To charge the internal battery for use open the unit and connect the included power adaptor to the 18 VDC Power jack, this can take up to 8 hours if the battery is severely discharged.

6 Specifications

6.1 Physical

6.1.1 Size

The MU Cable Tester System in comprised of two tester units each housed in a durable plastic case that measure as follows:

Width: 20”
Depth: 16”
Height: 7.5”

The snap-on vinyl pouch attaches to the top of the case. The additional height of the storage pouch is less than one inch when empty, and about 1.5 inches with the battery charger/power adapter and chassis test lead are stored inside.

6.1.2 Weight

The weight of each MU cable tester unit with battery installed and accessory pouch with battery charger/power adapter and chassis test lead is:

27.5 lbs.

6.2 Electrical

The following electrical parameters must not be exceeded. Operation in excess of these limits may cause damage to the MU Cable Tester.

6.2.1 Input Power

Battery Charger/Power Adapter Input Voltage	120 VAC 60Hz
Input Current	0.8 Amp

6.2.2 Battery Operating Time

5 hours, with fully charged battery

6.3 Environmental

The MU Cable Tester meets the following environmental specifications.

6.3.1 Storage Temperature

Storage Temperature Range: -20°C to 40°C

6.3.2 Operating Temperature

Operating Temperature Range: 0°C to 40°C

Warranty

Ultra-Tech Enterprises, Inc. (the "Company"), will repair or replace, at the Company's option, its products free of charge if such products are found to be defective in material or workmanship, for the period of one year from the date of purchase, except as follows:

Transportation charges to the Company's designated repair station for defective and replacement parts or service are the responsibility of the purchaser. This warranty does not apply, if: (I) the product has been damaged by improper connection or disconnection with any electrical device; (ii) the product has been damaged in shipping; (iv) the product has been damaged due to an act of God, accident, misuse, abuse, negligence or any other use than the product's intended use as set forth in the specifications; or (v) the device has suffered damage from an external blow or trauma. This warranty does not cover cosmetic damage and may not be transferred to any person or entity. The Company will provide warranty service as provided herein as soon, as is commercially reasonable.

THE SOLE REMEDY UNDER THIS WARRANTY IS THE REPAIR OR REPLACEMENT OF THE PRODUCT AS PROVIDED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. IN ANY EVENT, IF DAMAGES ARE AWARDED, THEY WILL BE LIMITED TO THE COST OF THIS PRODUCT.
EXCEPT TO THE EXTENT PROHIBITED BY ANY APPLICABLE STATE OF FEDERAL LAW, ALL IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.

Some states do not allow the exclusion or limitation of incidental, indirect, or consequential damages, or allow limitations to the length of an implied warranty, in which case the foregoing warranty shall be extended to conform to the minimum requirement of such applicable law.

To obtain service under this warranty, it is necessary to obtain a Return Merchandise Authorization (RMA) from the Company prior to returning equipment for service. RMA numbers must be clearly marked on the outside of the shipping package in which the merchandise is returned. Failure to follow the Company's RMA procedure may result in delays in obtaining requested service and or refusal of the Company to accept packages not marked clearly with the appropriate RMA number.

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