scully

MTT 1000
MOBILE TRUCK TESTER

Automated Sensor, Ground Circuit, and T.I.M.® ID Detection Tool

Model MTT1000
User Manual

Mobile Truck Tester® - Model MTT1000 User Manual

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Introduction

The Scully Mobile Truck Tester (MTT) is a new self-contained complete solution to verify the proper operation of your fuel delivery fleet. It includes functions to verify the operation of overfill sensors, ground connections, and truck identification modules (TIMs). As a validation tool, it can be used to confirm that all Scully safety systems are operating properly before entering the loading lane. This avoids delays while troubleshooting critical functions when trying to load. As a diagnostic tool, the MTT can be used to test and diagnose any part of the vehicle overfill prevention system either on the vehicle or in a maintenance shop. It is especially useful in debugging faulty wiring in the field and confirming proper installation of all Scully components during vehicle commissioning.

The tester is compatible with all major brands of overfill sensors, truck-installed controllers, and all installations compliant with EN-13922 and API RP 1004.

While the tester itself is capable of all the necessary functions for proper safety system verification, the Advanced Mode package includes a Scully software application (app) that offers added features. The app can be downloaded to your Android or Apple device. Among the extended features offered, the app allows remote operation of the tester via a Bluetooth connection to a tablet or phone.

Overall, this guide provides directions on how to
- set up the tester quickly and easily to get started,
- perform basic operations, and
- maximize the device's utility.

Getting Started

### 2.0 Getting Started

2.1 Safety Warnings

The Mobile Truck Tester should be used by qualified personnel familiar with operating a tank truck installation. The tester can be used outdoors but should be stored indoors in its hard, durable case to reduce the likelihood of damage. The General Location version of the Mobile Truck Tester is not approved for use in Hazardous Location (HazLoc) areas.

2.2 Setting Up Your Tester

The Mobile Truck Tester is sold in two packages. One includes an accessory kit and the second does not. The different configurations available are listed in section 5. The first step is to remove the conical truck tester device from the hardened case to install the batteries.
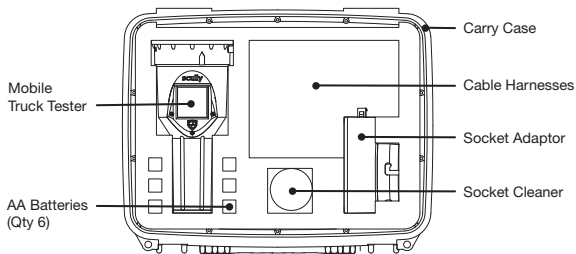
MTT 1000 **A-GL-UL**
P/N 092005114
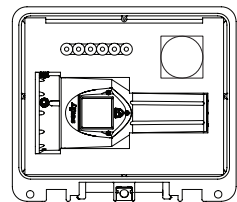
MTT 1000 **A-GL-HC**
P/N 092005115

Figure 2.1-1. Mobile tester and components.

Before use, please inspect the tester for any damage such as cracks in the plastic housing or broken parts visible from the outside. **If the tester appears damaged, do not attempt to use it.** Contact Scully technical support for further assistance (1-800-272-8559).

Battery Installation or Replacement
Caution: Only one brand and type of battery is approved for use in the Mobile Truck Tester. To comply with regulatory requirements, **only use Duracell MN1500 AA (IEC R6) cells**. Use of batteries other than the Duracell MN1500 will void the regulatory approvals of the product.

Getting Started

Scully highly recommends using the Duracell batteries specified in all MTT 1000 units to get the expected battery life. Using these batteries, on average the tester should have 4-8 months of battery life before the batteries need to be replaced.

Ensure the truck tester is in a non-hazardous area for battery replacement. Do not attempt to open the battery compartment in a hazardous area.

Install the batteries before first use. Six AA batteries are supplied with every new tester.

To install the batteries for the first time or to replace the batteries, follow this procedure.

a. Place the Mobile Truck Tester on a safe, solid work surface where the rear of the tester is available with the small end of the tester facing up.
b. Using a small Phillips screwdriver, loosen the three screws from the battery compartment cap on the rear of the tester until the cap can be removed. Note: The three screws are retained by the cap so they will not get lost.
c. Install the batteries in the order shown and observe each battery's polarity. There are three columns of two batteries each.
    The batteries' negative (–) terminals always point toward the springs.
d. Replace the battery cap and reinstall the three battery cap screws while holding the battery cap down. Tighten until the cap is snug over the opening, but do not overtighten the three screws.
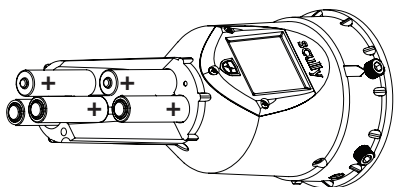

**Figure 2.1-2.
Installing the tester's batteries:
only use Duracell MN1500 AA
(IEC R6) cells.**

If the unit will not be used for an extended period of time, it is recommended that you remove the batteries from the tester to avoid potential damage due to battery leakage.

General Operation

3.0 General Operation

The tester automatically powers on when it is connected to a truck via the API RP-1004 /EN-13922 socket. It also can be powered on manually by momentarily depressing pin 11 inside the coupling end. Once it is powered on, it automatically follows a predetermined sequence of testing actions. After it completes its testing sequence, it will display the final test status and then automatically shut down to preserve battery life. No user interaction is necessary to power off the tester. If the tester is removed from a vehicle socket, soon it begins the shutdown sequence. If it is left attached to a vehicle socket, it continues to perform its automatic testing sequence for a predetermined amount of time (5 – 10 minutes) and then automatically shuts down.
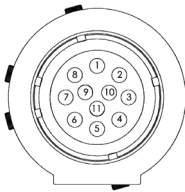
**Figure 3-1.
To manually power on the tester,
depress pin 11 in the coupling end.**

The tester is compatible with all industry standard overfill prevention (OFP) 2-wire and 5-wire sensors as well as both diode and standard resistive vehicle ground validation schemes. The device also is compatible with most industry-standard on-board truck controllers such as the Scully Intellicheck®3. The tester does not support Thermistor sensors.

The tester will detect the type of equipment installed on the vehicle automatically and no user interaction is needed to configure the tester before testing.

3.1 On-Vehicle Testing

Begin the on-vehicle testing procedure by configuring the thumbscrews (installing up to 3 thumbscrew J-slot pins into the threaded holes) in the side of the tester housing (figure 3.1-1). Then connect the tester to the vehicle socket. The truck tester is configurable for multiple socket or interface types—including the API "W" or "S" J-slot and EN-13922.

General Operation

ALL J-SLOT PINS INSTALLED
ONLY FOR REFERENCE, NOT TO BE USED THIS WAY

4 J-SLOT
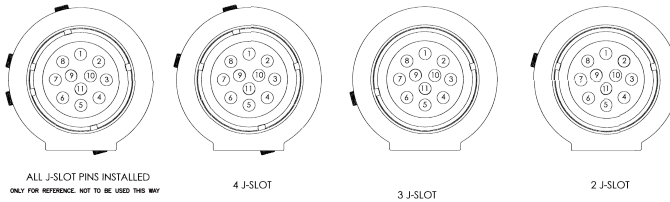
3 J-SLOT

2 J-SLOT

Figure 3.1-1. Socket configurations using J-slot pins: J4, J3, and J2.

When the tester is connected to a Scully vehicle socket, it powers on automatically. Then the tester performs the following functions:

a.   Initialize and perform self-tests to verify proper operation.

b.   Confirm that a vehicle socket connection has been made.

c.   Detect a valid ground connection (either resistive or diode, if present).

d.   Detect a valid TIM ID, if present.

e.   Determine the type of OFP sensor system (2- or 5-wire) installed on the vehicle.

f.   Perform an initial operation test on the OFP sensors.

g.   Display these results on the LCD screen.

h.   After a short delay, the tester will enter a live sensor-scanning mode called "wet-test" to sequentially test each OFP sensor on the vehicle. Results will be shown on the LCD screen as they are updated. Only OFP sensors are continuously monitored during the wet-test cycle.

i.   After a preprogrammed period (5–10 minutes), the tester will conclude the wet-test, display the final test results, and shut down.

j.   Alternatively, if the tester is removed from the Scully socket at any time before the wet-test concludes, soon the tester will shut down to conserve the battery.
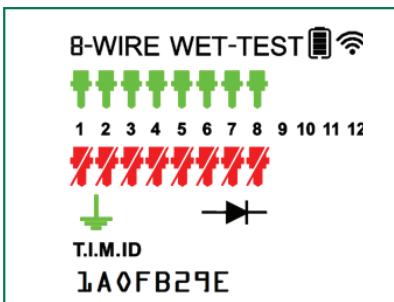
**Figure 3.1-2
Example Tester LCD Screen.**

General Operation

As figure 3.1-2 shows, the test results will be shown on the LCD screen. The featured elements of the LCD screen are identified in figure 3.1-3. Up to twelve (12) 5-wire or eight (8) 2-wire OFP sensors can be detected. The status of each sensor will be shown as green (good and dry) or red (faulty, shorted, or wet). The type of sensor scheme shows on the top line of the display as either "2-wire" or "5-wire."
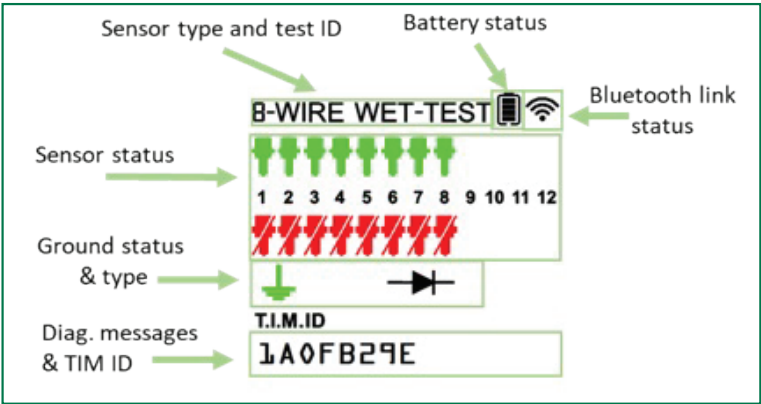
Figure 3.1-3 Elements of the LCD Display

The tester will turn itself off automatically after a preprogrammed period. This time depends on whether the tester is still connected to a truck socket. When connected to a socket and running the wet-test sequence, the tester will operate for about 5-10 minutes and then conclude testing and power off. When manually removed from a socket, the tester will recall the last test results and then begin powering off about 30 seconds later. These times are programmable when using the Scully app.

Figure 3.1-4 shows an example tester display when connected to a 6-compartment vehicle without a truck monitor with one wet sensor. The indicators for 1 and 2 show red because the socket in this example is wired for North America with sensors from pins 3 to 8 and the sensor connected to pin 8 is wet. Also shown is the truck identification module (TIM) ID detected from the socket and confirmation of a good diode ground connection from pins 9 to 10.

General Operation
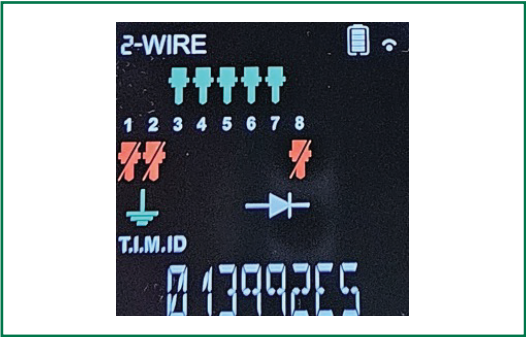
Figure 3.1-4. Example initial test display of a North American 6-compartment vehicle with a diode ground and one wet sensor.

After a suitable delay time, the tester automatically will enter a wet-test sequence (figure 3.1-5). Only the overfill sensors will be shown and their state is updated to reflect any changes to the sensors during testing.
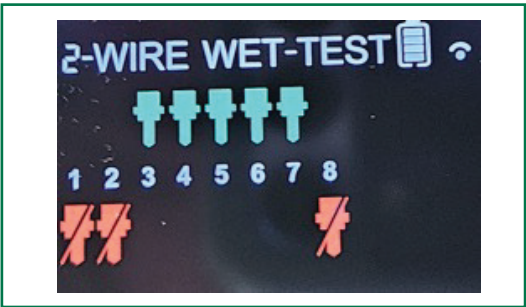
Figure 3.1-5. Tester display during wet-test.

3.2 Elements of the LCD Display Screen

The LCD screen (figure 3.2-1) includes the following elements:
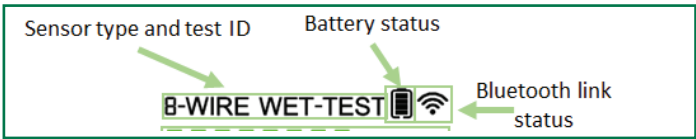
Figure 3.2-1. Elements of the LCD screen.

General Operation

Sensor Type and Test ID: This line of the display identifies whether the detected sensor system is 2- or 5-wire, and when the "wet-test" cycle is running.

Battery Status: This symbol shows the batteries' charge condition when the tester is powered on. Four (4) bars indicate a strong battery. As the number of bars declines, it indicates a weaker battery condition. An empty battery symbol indicates a battery that will need replacement soon.

Bluetooth Link Status: This symbol shows 2 curved stripes when the Bluetooth interface is enabled and ready for a connection. When 3 curved lines are showing, a Bluetooth connection has been established. The MTT app is the only option for communicating wirelessly to the MTT 1000. Only testers with the Advanced Mode features (the default offering) support Bluetooth communication

Sensor Status: This graphic area shows the status of up to eight (8) 2-wire sensors and up to twelve (12) 5-wire sensors. The number of sensors illuminated will depend on the individual vehicle configuration and the number of actual OFP sensors detected during the socket connection. A red indicator displays when a sensor is wet or not operating properly. A green indicator displays when a sensor is dry and ready for vehicle compartment loading. See the sensor type-specific testing and indications in sections 3.4 and 3.5.
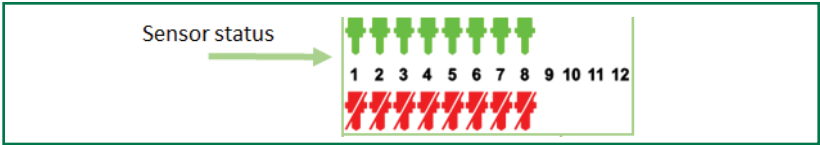
Figure 3.2-2. Green sensors indicate a sensor is dry and ready for loading. Red indicates there is an issue.

Ground Status & Type: The graphics in this region will indicate whether a diode- or resistive-type ground validation connection has been detected. When no ground circuit is detected or when the resistive-type ground circuit is higher than the default testing threshold, a red ground symbol displays.

General Operation
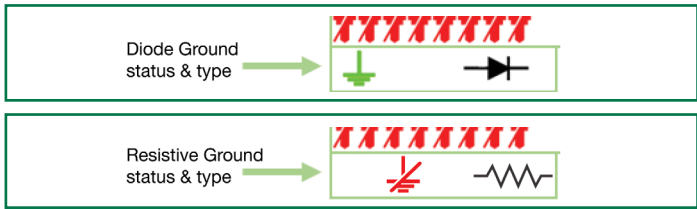
Figure 3.2-3. Ground detection region of the display by status or type (green and a ground type icon indicate a valid connection

Diagnostic Messages & TIM ID: The LCD's lower part is reserved for text message strings that can include many diagnostic messages and the trailer ID (if available) for the vehicle to which the tester currently is connected. See section 3.7 for more information on diagnostic messages.
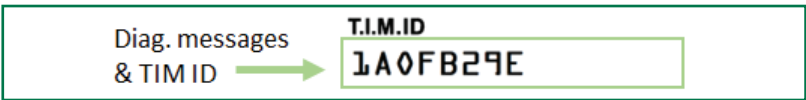
Figure 3.2-4. Lower part of the display showing diagnostic messages for the vehicle/tester connection. The TIM ID is the truck identification module.

3.3 Ground Connection Testing
The tester automatically detects either a resistive or diode ground bond connection installed on the vehicle through the socket. A resistive ground is measured between pins 9 and 10 and the default value for acceptance is 100 ohms or less. Ground status is indicated on the screen as a green or red ground symbol and a resistor or diode icon. The value of the ground resistance test limit can be programmed with the MTT app when using Advanced Mode.

3.4 2-Wire Sensor Testing
Connect the tester to a truck socket with an array of 2-wire sensors available. The tester will detect the status of up to 8 sensor connections and identify each one by a red or green icon. A green icon indicates a 2-wire sensor with a dry condition. A red icon indicates any sensor potentially having a wet, open, or shorted condition.

General Operation

Along with a red icon, the tester will play an alert tone if any detected sensor is in a wet or shorted state. If any connected sensor transitions from dry to any other state, the tester will also play an alert tone.

Sensors that are in an open circuit state on initial detection may not trigger a tone because the tester is not able to determine if an actual sensor should be present on that compartment channel. Some vehicle configurations do not have sensor connections on pins 1 and 2. In this case, those channels will show as red but no alert tones will play.

During the wet-test cycle, the tester will continuously poll all 2-wire sensor compartment locations. This is a round-robin style of testing that energizes one sensor at a time. The reaction time between a change in sensor state and a change of the indication on the display may vary. The tester is a battery-powered device and does not react as quickly as a line-powered rack controller such as a Scully Intellitrol.

3.5 5-Wire Sensor Testing
Connect the tester to a truck socket with an array of 5-wire sensors available. The tester will detect and indicate the number of active and dry sensors. If there are any wet sensors in the circuit, the tester will indicate that by playing an alert tone and showing at least one additional red sensor icon. During the wet-test cycle, the tester will continue to check for both a dry sensor loop and the number of individual sensors on the circuit. If the number of sensors detected decreases, even if the loop indicates dry, the alert tone will sound. If the loop indicates wet, the alert tone will sound. If the number of sensors increases because of trouble-shooting activity, the sensor count will be increased, and any subsequent reduction will be indicated on the screen and an alert tone will sound.

3.6 Testing with Onboard Truck & Trailer Controllers
Connect the tester to a truck socket with any configuration of onboard truck and trailer controller installed. The tester will indicate whether the controller is deemed to be in permit condition (and therefore safely operable). On a 5-wire controller interface, the status will show as a single red or green sensor symbol and the title of "5-wire" just above.

General Operation

On a 2-wire controller interface, the status will display the title of "2-wire," along with up to 8 red or green sensor symbols. In some cases, only a single green sensor may appear when connecting to a truck controller with a 2-wire interface. Because of the nature of onboard truck and trailer controller operations, the tester cannot provide further status regarding sensor count or individual sensors. However, if there is a problem with the overfill sensors, the controller will not issue a permit, and the tester will indicate this problem with a visual icon and an alert tone. If this happens, refer to the display

The tester also will analyze and display the condition of the ground connection of the truck as described in section 4.3.

3.7 Diagnostic Messages on LCD Screen
The display screen on the tester includes a text line at the bottom that provides status and diagnostic information. Below is a list of messages for most of the situations seen on the text line of the LCD screen.

POWERING UP: Displays during the initial power-up event. Bootloader version (12 chars)

Firmware version   (12 chars)
Library version (12 chars)
Truck tester serial number (8 chars)

SYSTEM READY: Message that displays after powering up.

NO TIM: Displays when no TIM is detected.

<TIM value>: Displays when a TIM has been detected.

GND DIODE: Displays when a good diode (or Scully ground bolt) has been detected.

< XX > OHMS: Displays when a resistive ground has been detected.

General Operation

GND UNKNOWN: Displays when no suitable ground circuit has been detected between pins 9 and 10.

CONTROLLER: Displays when a 2- or 5-wire onboard truck controller is detected.

NO DIAG/CTRL: Displays when a 5-wire onboard truck controller is detected and there is a valid permit from the controller.

WT/NDIAG/CTL: Displays when a 5-wire onboard truck controller is detected and there is no valid permit from the controller.

DUMMY = >: Displays when one or more of the connected 2-wire sensors are detected to be type Dummy.

TESTING or TEST DONE: These are testing status messages.

POWERING OFF: Displays when the tester has stopped testing and is ready to shut down automatically.

NO SOCKET: Displays if no truck socket connection is detected.

LOW BATTERY: Displays if the battery level is near or too low to continue testing.

Other messages may appear that are not listed here if a fault condition occurs. Contact Scully Technical Support at 1-800-272-8559 if this happens.

4.0 Advanced Mode Features
The truck tester's Advanced Mode provides additional features to the user through a wireless connection between the tester and a handheld computing device. Advanced Mode is only available in testers that have this feature enabled at the factory when the tester is ordered. Advanced Mode testers can connect to the Scully mobile app through a Bluetooth Low Energy (BLE) radio link.

Figure 4.0-1. Icon of the correct Scully MTT app for download.

4.1 Getting Started in Advanced Mode
Follow these steps to get started with Advanced Mode and unlock all the available features in your tester.

a. Identify the portable computing device to be used. Suitable devices include Android smartphones/tablets, and Apple products such as iPhones/iPads. Note: Do not use uncertified computing devices in the hazardous area.
b. Download and install the Scully MTT app for free from the Google or Apple application stores.
c. Launch the MTT app and connect your tester to a truck socket or socket adapter (in the accessory kit).
d. Locate a tester as an "available device" and connect to it from the MTT app.
e. Follow the instructions below to use the MTT app.
f. When finished, unplug the tester from the socket and close the MTT app (or disconnect from the tester through the wireless interface). To preserve battery life, the tester will eventually time out and shut down, even if the connection from the MTT app is not closed.

Advanced Mode Features

There are two modes of operation for the tester when it is connected to the MTT app—"autonomous" and "user." Autonomous mode operates the same as when the tester is used without a connection to the MTT app. It follows the testing sequence described in 3.1. Progress can be seen from the MTT app's home screen. User test mode is entered when the MTT app is used to command specific tests or manually control tester functions. Once a tester enters user mode, all control functions are transferred to the MTT app until the tester is disconnected from a socket or reset through a power cycle.

4.2 Tester Identification
The tester comes from the Scully factory with a serial number assigned that is printed on the product label on your tester. This number also is preprogrammed into the tester firmware. When identifying your tester for connection from the MTT app, refer to this serial number. The list of available testers will show each one's serial numbers that can be located for connection. Matching this serial number will ensure the connection is linked to the desired device. Note that in advance mode testers can be renamed, and therefore be identified by their new name.

4.3 Tester Bluetooth Connections
Connections between the MTT app and the tester itself are made using the Bluetooth interface on your portable device. Be sure to enable Bluetooth connectivity before attempting to pair the app with the tester. A "connection" consists of pairing one tester with one portable computing device running the MTT app. Once a connection has been established, the app will maintain that connection so long as the tester is powered on. When a tester powers off, or moves out of range, the app will continue to monitor the connection until the tester awakens for a period of 30 seconds. This period of time can be adjusted in the app. During this time, the home screen will become grayed and a circling indicator will show next to the tester's name. A pop-up message also may appear. If another tester is powered on for pairing, it can be accessed by using the Select Available Testers menu function.

Advanced Mode Features

In some cases, the Bluetooth connection's stability can be compromised and either the original tester or a second tester will not pair properly. If this happens, close the app, let the tester power off, and restart them both to attempt a connection or reconnection.

4.4 Instructions for MTT App Screens

There are many functions and settings accessible through the MTT app's user interface screens. Below is a list of the most useful ones and a graph of the navigation.
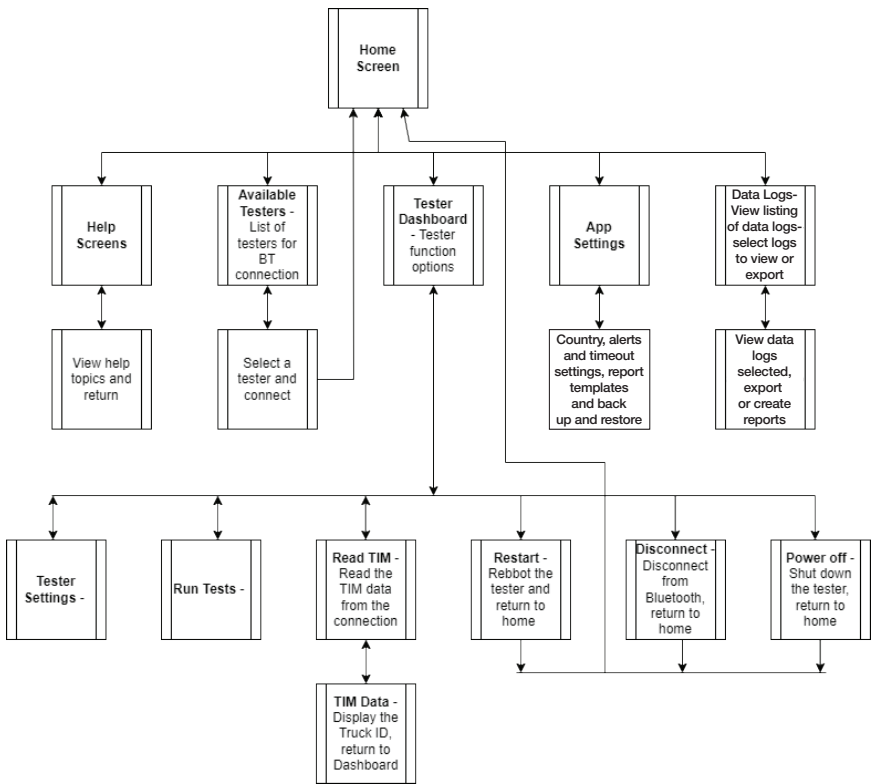
Advanced Mode Features
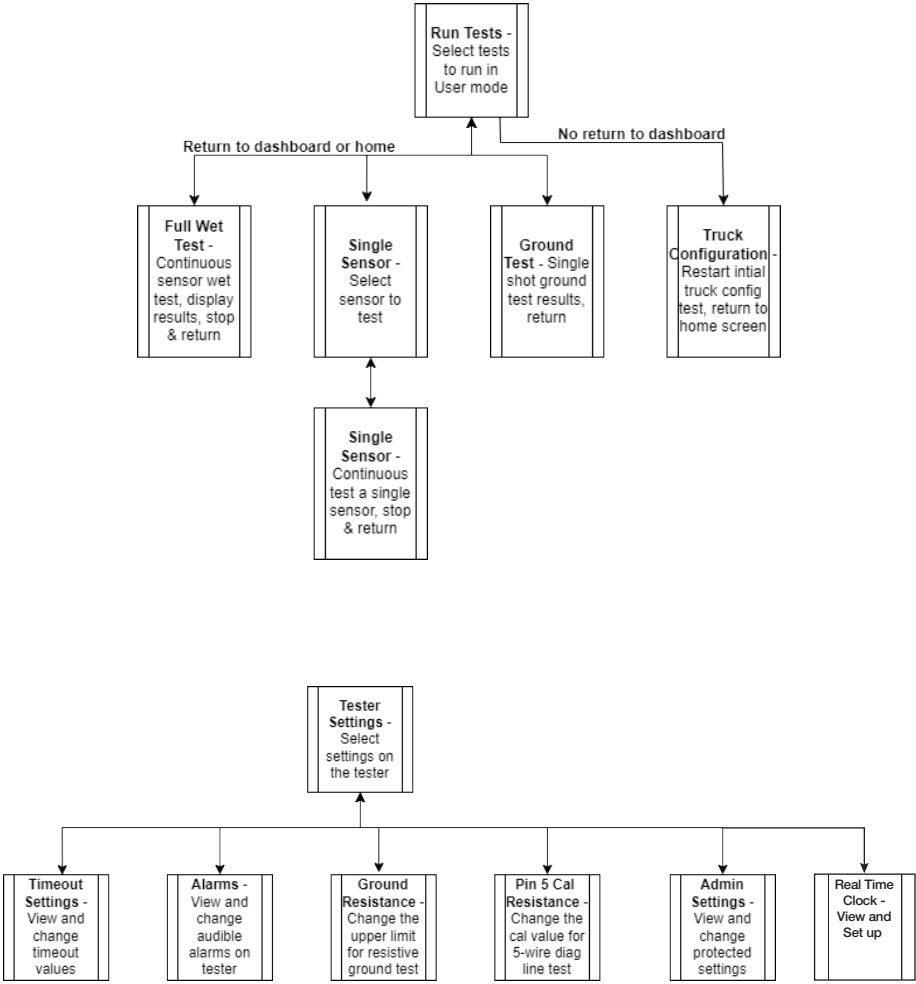
Figure 4.4-1. Navigating sample functions and settings through the MTT app's user interface screens.

Advanced Mode Features

4.4.1 Home Screen

At the bottom of the screen are the system icons that are static when navigating through different menus. Selecting Home enables you to navigate back to the home screen in one click. The Settings icon is for the app (not the tester). The Data icon provides access to previous downloaded test results, and there is a useful Help menu.
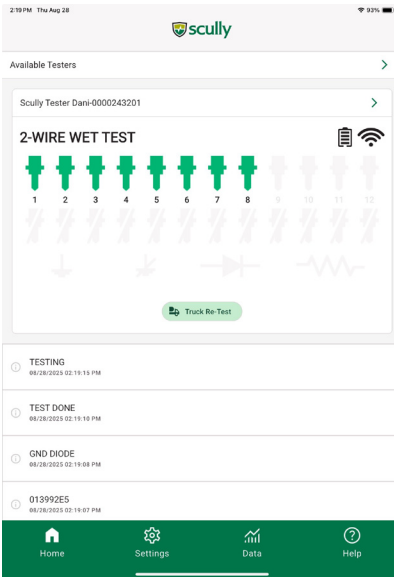
Figure 4.4.1-1. Screenshot of the MTT "Home" screen.

To connect to a tester, use the option near the top of the screen labeled Available Testers on the home screen (click on the green arrow). This function will locate an active truck tester to connect with. Touch the name of the tester to complete the connection, which will then return to the home screen. The first time the MTT is linking to the app in a device, a password is requested. The default password is "123456."

Note: Only one tester can be connected to the app at a time. To change your connection to a different tester, you can go back to the home screen and use the Available Testers option to pick a different device.

Advanced Mode Features

Once connected to a tester, from the home screen, a virtual display of the tester shows its current state and any testing activity. Any messages from the tester appear below the virtual display with the most recent message at the top of the list.

Select the tester name just above the virtual display, to see more available operations for the currently connected tester. Or review the list of downloaded test results from the test data icon button. Use the gear icon button to adjust the app's settings.

4.4.2 Tester Dashboard Screen
This screen is accessed from the home screen by selecting the connected tester's name/ID. From this screen, multiple categories of functions directly controlling the connected truck tester can be accessed:
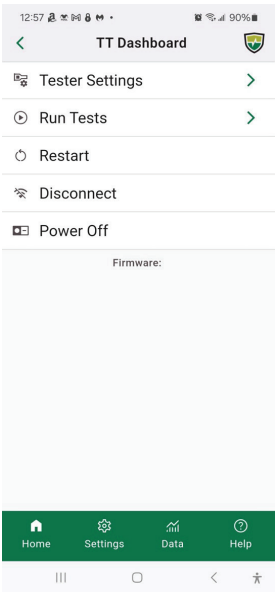
Figure 4.4.2-1. Screenshot of the MTT "Dashboard" Interface.

Tester Settings:
This option provides access to many user-selectable operating parameters in the tester.

Advanced Mode Features

Run Tests:

This option provides access to multiple testing functions for the tester, which are controllable from this app.

Restart:

This function will restart the tester and reacquire the configuration of the trailer or adapter socket to which the tester is connected. Note: This will cause the Bluetooth connection to drop and a message to reconnect will appear on the MTT app.

Disconnect:

This option will disconnect the wireless Bluetooth link from the currently connected truck tester and return the MTT app to the home screen.

4.4.3 Run Tests Screen

From this screen, it is possible to control all the individual testing functions available in the tester and see more detailed test results. (When in this screen, the tester will enter USER mode and stop any autonomous testing functions in-process).
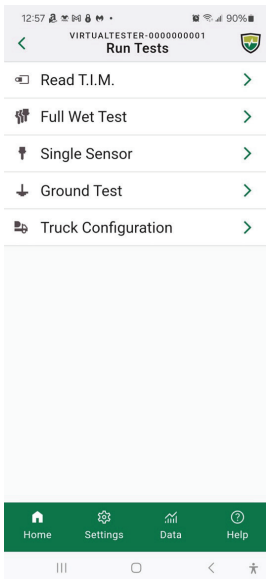
Figure 4.4.3-1. Screenshot of the MTT "Run Tests" Interface.

Advanced Mode Features

Read TIM:
This function reads the TIM trailer ID from the trailer/truck to which the tester is connected. (A TIM module must be installed on the vehicle or connected to the adapter socket to get a reading.)

Full Wet-Test:
Select this option to begin the full wet-test sequence. For 2-wire sensors, this will begin a round-robin sequence of testing up to 8 associated sensors continuously until halted. Results for each sensor will be shown on the Full Wet-Test screen and indicate by color, text, and icon, the states of Open, Wet, Shorted, Dry, or Invalid. Sensors not originally detected during the initial scan of the truck/trailer will be shown in gray if they continue to appear as an open circuit. If those sensors become active, their states will be shown by color, text, and icon.

For 5-wire sensors, this test continuously will monitor the sensor string as well as the diagnostic line (which indicates the number of dry sensors). A maximum of 12 sensors can be monitored and the display will indicate by color, text, and icon the states of Open, Wet, Shorted, and Dry for each sensor. Note that in a 5-wire system, the actual state of any sensors higher in number than the first wet sensor cannot be determined. Sensors not originally detected during the initial scan of the truck/trailer will be shown in gray if they continue to appear as an open circuit. If those sensors become active, their states will be shown by color, text, and icon.

The wet-test cycle can be concluded by selecting the Stop button at the bottom of the screen. It then can be restarted with the Restart button.

Single Sensor:
This test continuously will monitor the state of a single 2-wire sensor on any of the 8 available sensor channels. Select the sensor (channel) number on the next screen and the display will indicate by color, text, and icon the states of Open, Wet, Shorted, Dry, or Invalid. This test is only available for 2-wire sensors. To monitor the states of 5-wire sensors, select the Full Wet-Test option.

Advanced Mode Features

The single sensor test cycle can be concluded by selecting the stop button at the bottom of the screen. It then can be restarted with the Restart button.

Ground Test:
Use this test to check the state of the ground connection. Ground connections can be verified based on their resistance and the presence of the Scully ground-proving diode. A resistive ground test can determine the resistance of the ground loop and compare that value with the configurable Ground Resistance value. If the measured value is less than the set value, then a good ground is indicated by a green ground and resistor symbols. If a good diode ground is detected, then it is indicated by a green ground and diode symbols. If the ground connection cannot be verified, then a red ground symbol is displayed. This test will run continuously until you select the stop button at the bottom of the screen. The Ground Resistance value can be set from a submenu in the Tester Settings screen.

Truck Configuration:
Use this option to repeat the initial truck configuration testing. Do this if the configuration of the truck/trailer has changed. If sensors are added or removed, or any other aspects of the truck connection are changed, you should repeat the initial truck configuration testing. Use this option to redetect the trailer/truck state and perform an initial test scan of the sensors. Results will be displayed on the app's home screen. Selecting this option also returns the app to the home screen and returns the tester to Autonomous mode.

Advanced Mode Features

4.4.4 Tester Settings Overview Screen
Use this screen to access user selectable settings for the tester
(not the MTT app).
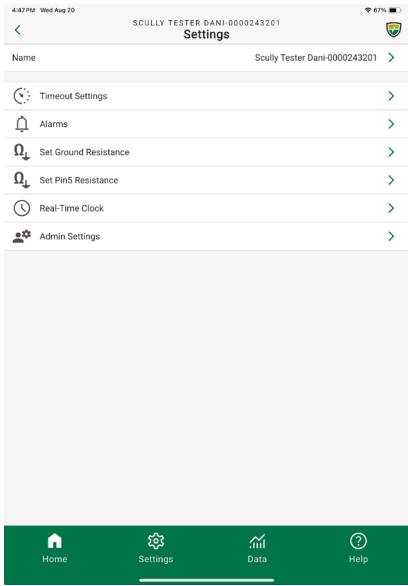
**Figure 4.4.4-1.
Using the App to Select
Settings for the Tester.**

Timeout Settings:
This option allows access to change multiple
operational timing parameters in the tester.

Alarms:
This option allows access to change the operation of the alarm events
and sounds in the truck tester. These changes apply to the tester
hardware, not the MTT app.

Set Ground Resistance:
This function allows access to change the maximum resistance value to
be allowed for resistive ground connection validation. For example,
if this value is set to 20 ohms, then the ground test will provide a "pass"
indication only when the measured resistance is <= 20 ohms.

Advanced Mode Features

Set Pin5 Resistance:

This function allows access to a calibration value that can be used to fine-tune 5-wire OFP sensor counting on the diagnostic line (socket pin 5). The resistance value refers to the series reference resistance used to measure load current in the pin 5 circuit. The default value is 360 ohms. For vehicles with 8 compartments or less, no change to this value should be needed. In cases where a 5-wire OFP system is used on 9–12 vehicle compartments, the sensor count can be affected by small changes in socket and wiring resistance. This setting gives the user the option to calibrate the tester for certain vehicle configurations.

To adjust this setting, start with a known good vehicle with a clean socket connection, connect the tester to the vehicle, wait for the set test sequence to begin, and observe the number of 5-wire sensors shown. If the number is correct, then no changes are needed. If the indicated sensor count is higher than the known number of sensors/compartments, then increase the value of this setting one step at a time. If the indicated sensor count is lower than the known number of sensors/compartments, then decrease the value of this setting one step at a time. The setting is correct when the number of sensors indicated on the tester screen agrees with the known number of sensors on the vehicle.

Real Time Clock:

The tester maintains an internal real-time clock (RTC) that allows for the time and date tagging of all testing activities without the need for a wireless connection. But there are scenarios where time zones need to be adjusted, or the tester needs to be updated for accuracy. More details are available in section 4.4.7.

Admin Settings:

This option allows access to additional settings that can be changed if you have the correct administrator password. The password to get into this section is admin1. The three features within this section are listed below:

Advanced Mode Features

Bluetooth Passcode:
The default passcode for wireless Bluetooth connections is "123456."
Use this option to change the passcode to another 6-digit number you
prefer. Only numbers are allowed, and six digits are required.

Admin Password:
Use this option to change the default administrator password for
protected tester settings.

Import reports:
This option allows you to import previously exported raw tester logs.
Assuming you are currently connected to the same tester. Be cautious
when using this option, as it may result in duplicate records, incorrectly
associate the logs, or cause other side effects. It is highly recommended
to create a backup before attempting to create an import.

4.4.5 Truck Tester Timeout Settings Screen
Use this screen to adjust the timeouts programmed into the tester.
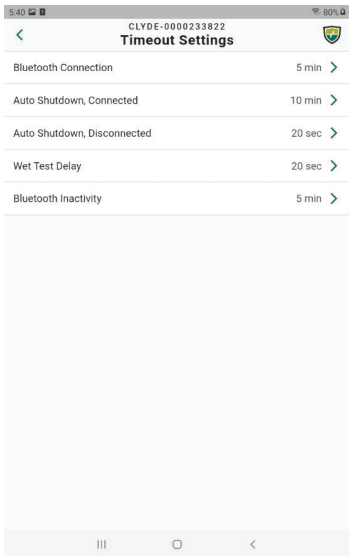
**Figure 4.4.5-1.
Choosing the Timeout
Settings for the Tester.**

Advanced Mode Features

Bluetooth Connection:

When powered on, an Advanced Mode tester will automatically enable the Bluetooth interface and will begin seeking a connection. This setting controls the time (in minutes) for the tester to wait for a connection before shutting down the Bluetooth interface. Reducing this value improves the battery life while decreasing the time allotted to establish a connection. The choices are 2, 5, 10, or 99 minutes. The default is 5. If 99 is selected, the Bluetooth interface stays on the entire time the truck tester is powered on.

Auto Shutdown, Connected:

When the tester is connected to a truck/trailer socket and operating, it will automatically shut down after a period of time to preserve battery life. This setting controls the time (in minutes) that it will stay on from the start of the socket connection until automatic shutdown. The choices are 2, 5, 10, or 20 minutes. The default is 10. If the tester is connected to the Scully MTT app through Bluetooth, this timeout is not used.

Auto Shutdown, Disconnected:

When the tester is disconnected from a truck/trailer socket, it will display the last test results on the screen and then automatically power down. This setting controls the time (in seconds) that it will stay on after being disconnected. The choices are 10, 20, 30, or 60 seconds. The default is 20. If the tester is connected to the Scully MTT app through Bluetooth, this timeout is not used.

Wet-Test Delay:

This setting adjusts the time for the tester to pause between its initial configuration test and the start of the continuous wet-test. This setting is useful to see the results of the initial configuration testing before the wet-test begins. Choices are 5, 10, 20, or 30 seconds. The default is 20 seconds.

Advanced Mode Features

Bluetooth Inactivity:
This setting adjusts the time the tester will remain on when connected to the mobile app but not connected to a socket, while there is no communication activity. This is useful to protect battery life by limiting the amount of time the tester spends in the idle state waiting for wireless connection activity. The choices are 5, 10, 15, or 20 minutes. The default is 10.

4.4.6 Tester Alarms Setting Screen
These settings control the audible alarms and notifications on the truck tester itself (not the audible alerts in the app).

Enable Alarms: Use this setting to turn all tester alarms on or off.

Startup: Enable or disable the notification of tester startup.

Full Wet-Test: Enable or disable the notification of the wet-test's start.

Shut Down: Enable or disable the notification of tester shutdown.

Sensor Error: Enable or disable the notification of a sensor error during wet-testing.

System Fail: Enable or disable the notification.

Initial Scan End: Enable or disable the notification of the completion of the initial truck detection scan.

Advanced Mode Features
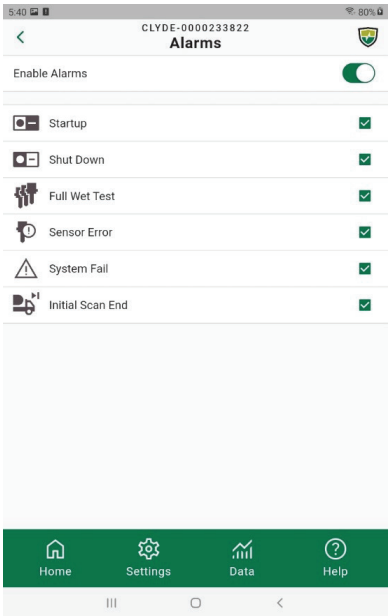
**Figure 4.4.6-1.
Alarm Settings for the Tester.**

4.4.7 Tester Real-Time Clock

The tester maintains an internal real-time clock (RTC) that allows for the time and date tagging of all testing activities without the need for a wireless connection. This RTC needs to know which time zone the tester is operating in and periodically needs to be updated for accuracy. By default, the app updates the testers RTC whenever the wireless Bluetooth connection to the app is established. However, you can disable this setting and manually set the time, date, and time zone stored in the tester. Select real-time clock and use the controls on the next screen to make your selections.

Regardless of which way the RTC is configured, you can see the current time and date in your tester, along with the time zone and country, at the top of the screen.

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Advanced Mode Features

Set RTC Automatically:
This option instructs the application to adjust the RTC to the time currently set on your mobile device every time you connect to that tester. The date and time will follow your country and time zone settings from your mobile device. In the unlikely event that your time zone is not detected correctly, you can adjust the country in App Settings to improve detection. If you have a custom country set in App Settings, it will be used instead of the country sent from the device.

Set RTC Manually:
This option allows you to set the date and time manually. Be careful — incorrectly setting the RTC can result in improperly dated test results, so always double-check the time you are setting. Automatic RTC adjustment is highly recommended instead.

When you select this option, you will be presented with a screen where you can adjust the date, time, and time zone. By default, the date and time will be updated to match your tester device's current settings, respecting the time zone and country set on the tester. Unless you change the values, they will automatically update while you are on the screen. Changing either the date or time by more than one minute from the mobile device's time will stop updating the values, and you will see a warning. You can tap "Reset" to bring the time back into sync.

Your selection will be applied to the tester, switching it to manual RTC adjustment once you tap the 'Update Tester RTC' button. If you click 'Cancel' or use the back button, you will navigate back to the RTC screen, and no changes will be applied.

4.4.8 Application Data Logs and Reports Screen
This screen provides access to the test data downloaded from all the tester(s) to which the app has connected. Test results are listed in time/date order with the most recent at the top. Test results are down-loaded upon initiation of a wireless link to the tester (figure 4.4.7-1).

Advanced Mode Features
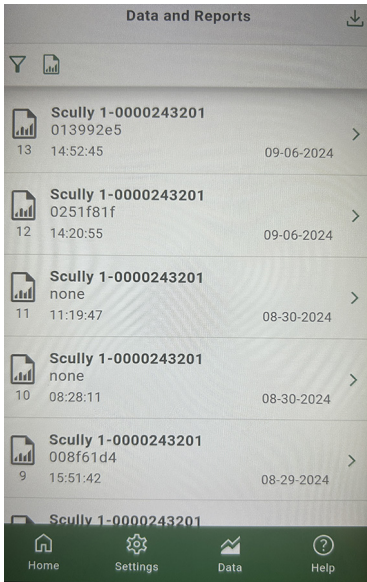
Figure 4.4.7-1.
Screenshot of the MTT App's
"Data and Reports" Interface.

Log Filter:
Users can now filter logs by MTT device, trailer ID, or date range. Click on the top left filter icon to view "Filter" options. After selecting a preference, click apply and the log data files that meet the filtering criteria will appear on the "Data and Reports" screen. Users can also refine their filtered results by selecting individual logs.

Select Individual Records to filter: You can work with all filtered results or a selection to refine your results. To select individual logs, either tap and hold (long press) on a log or use the kebab menu (three-dot menu) and choose "Select Individual Records."

To complete your selection, simply tap the checkmark icon and only the records chosen will appear in the list. To modify a selection, switch back to selecting individual records.

Uses: The filter makes it easy to find a specific test report within a large data report set. It can also quickly identify all completed tests for a particular truck or trailer.

Advanced Mode Features

Export Log Options:
Users can now export MTT device logs in multiple formats, including plain text, CSV, and raw content.
• Application records are presented in plain text format
• CSV provides a comma-separated view of records.
• Raw format retains the records' original format (as received from the tester)—useful for troubleshooting but not ideal for everyday operations.

All export options are available on the kebab menu. When exported, all visible records will appear in the selected format and included as an attachment file to be emailed.

Uses: Easily transfer log test data to Microsoft® Excel or other reporting programs.

Reading the Text Logs:
Test results can be viewed by clicking directly on the tile representing each entry one at a time. When a test is selected, the next page will show all the information in that record (figure 4.4.7-2).

All data log lines are time stamped and sequenced as the tester is running through its testing sequence:
• Tester information
• Truck configuration
• Truck configuration status
• Wet test status

Additional fields may be included depending on if manual tests have been triggered by the user, BTE connection changes, or changes to the RTC.

Advanced Mode Features
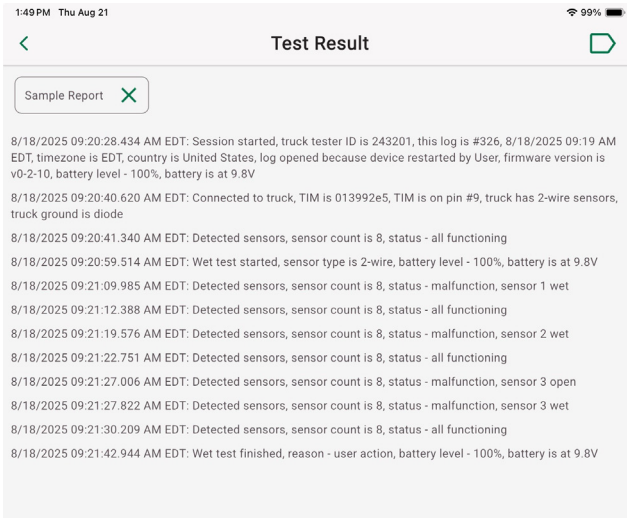
Figure 4.4.7-2. Screenshot of an Individual Test Report Record.

Create Reports from Templates:

Users can now create a report using the Report Template based on the MTT device log selection. The report templates enable users to display test data in a user-friendly, intuitive format. Two types of reports can be created—a single log test report presenting data of one test result and an aggregate log test report presenting data of multiple test results.

Single log test reports:

To run this report, choose "Create Report..." from the kebab menu or the Share button in IOS, and select the desired template. The Scully MTT Test Report will open in a new window and display the following information:

Advanced Mode Features

Scully MTT Test Report

Date/Time of Test:	8/18/2025 09:20:28.434 AM EDT
Log Information	Log Number =326 Log Label = Sample Report
Tester Name & ID:	Scully Tester Dani-0000243201; truck tester ID is 243201
Vehicle ID (decimal):	20550373 on Pin 9
Vehicle ID (HEX):	013992e5 on Pin 9
Sensor Type:	2-wire
Initial Sensor State:	Count = 8, Dry => S1 D, S2 D, S3 D, S4 D, S5 D, S6 D, S7 D, S8 D
Initial Ground State	diode
Sensor Wet Test:	Count = 8, Wet => S1 W, S2 D, S3 D, S4 D, S5 D, S6 D, S7 D, S8 D Count = 8, Dry => S1 D, S2 D, S3 D, S4 D, S5 D, S6 D, S7 D, S8 D Count = 8, Wet => S1 D, S2 W, S3 D, S4 D, S5 D, S6 D, S7 D, S8 D Count = 8, Dry => S1 D, S2 D, S3 D, S4 D, S5 D, S6 D, S7 D, S8 D Count = 8, Wet => S1 D, S2 D, S3 O, S4 D, S5 D, S6 D, S7 D, S8 D Count = 8, Wet => S1 D, S2 D, S3 W, S4 D, S5 D, S6 D, S7 D, S8 D Count = 8, Dry => S1 D, S2 D, S3 D, S4 D, S5 D, S6 D, S7 D, S8 D
Ground Type & Status:	Diode => Good
Tester Status:	Battery Level High

Log information: In the test report we included a field named Log Information. This allows a user to reference the test log the report was created from. The log information includes the log number of the data file and the customer-specified file name is applied.

Uses: Add details to the Log Information field to create a reference between the test log data and the report.

Wet Test and Ground Test results: The sensor wet test data displays any change in test results in a new row. In this example the first sensor changed from a wet to dry state. Then in row 3, sensor two was wet and in row 4 it changed back to dry. Note that sensors can be W-Wet, D-Dry, O-Open, or S-Short. This logic is the same on the Ground Test where the report displays the change status between "good" and "none found" ground.

Advanced Mode Features

Aggregate log test reports:

To run this report, first choose which log files to include in the aggregated report using the "Select Individual Records" in the kebab or three dot drop menu. Select the tests to be reported by checking the boxes on the left of the log file and accept by clicking the check mark on the top right in IOS and in Android. The filtered reports will be listed in the Data and Reports window. Choose 'Create a Report' from the kebab menu or the Share button in IOs and select the desired template. The Scully MTT Test Report will open in a new window displaying the following information:

Scully MTT Aggregated Test Report

Period of Testing:	8/18/2025 09:19:35.000 AM EDT - 7/18/2025 02:56:21.000 PM EDT
Ground Verification:	20550373 => Ground Diode = Good None => Ground Diode = Good 20550373 => Ground Diode = Good 20550373 => Ground Diode = Good
Sensor Verification:	20550373 => 2-wire, Count = 8, Dry None => 5-wire, Count = 4, Dry 20550373 => 2-wire, Count = 8, Dry 20550373 => 2-wire, Count = 8, Dry
Test Times & Dates:	20550373 => 7/18/2025 02:56:21.000 PM EDT None => 7/22/2025 03:58:41.000 PM EDT 20550373 => 8/14/2025 07:46:56.000 AM EDT 20550373 => 8/18/2025 09:19:35.000 AM EDT
Report Notations:	
Tester Name(s), ID(s) & Status:	Scully Tester Dani-0000243201, Battery Level High Scully Tester Dani-0000243201, Battery Level Good Scully Tester Dani-0000243201, Battery Level Good Scully Tester Dani-0000243201, Battery Level Good

Each test log presents the ground status, sensor last wet test result, and the time and date of the test. The data is presented based on the Truck ID and result. If no Truck ID is present, then it would state "none." If a test resulted in a faulty condition, a Report notification will mention "Trailer XYZ needs service" based on the trailer ID, and faulty test result listed in the sections above.

Advanced Mode Features

4.4.9 Application Settings

Countries list: The application now automatically detects the country based on the phone's language (Android) or region (iOS). Users can manually override the country's setting.

Uses: Properly configure the Real-Time Clock (RTC) on your tester and manually apply any necessary correction if the country is not automatically detected. If your country is not listed, we recommend picking one of the valid options that are also in the time zone you want to use.

Alerts:

The alert settings provide the option to duplicate audible event alerts from the tester on your phone or tablet. For example, the sensor alert can be selected and a sound assigned to it from your tablet or phone. Selecting the alert screen will show a list of available alert sounds. Each one can be controlled individually or they can all be enabled or disabled. A volume control is provided to adjust the default volume for these alerts.

Timeouts:

Not to be confused with the tester's Bluetooth timeout settings, this new category on the app's screen allows access to a setting called "Auto Disconnect Timeout." The setting defines how long the app attempts to connect via Bluetooth before it times out. The default time is 30 seconds, but the other available options are 15 seconds, 24 seconds, 1 minute, or 2 minutes.

Report template management:

The app now supports configurable report templates for creating stand-alone or aggregated reports from one or more MTT device logs. Scully is supplying a default report template for standalone or aggregated reports available during initial installation or update. If a customer wants to create a customized report, Scully can support this effort for a fee.

Automated Sensor, Ground Circuit, and T.I.M.® ID Detection Tool

Each report template has a version number. You can keep multiple versions of the same report and switch which one you use by default at any time. Different versions may support different test result formats, contain updates, and include improvements.

You can see a list of all templates you currently have. Each row shows the template title, author's name, and template version. Tapping on a template will expand the row to provide additional information.
New report templates can be added, restored, deleted, and selected as default. Details on how to implement are listed below.

Adding New Template:
At any time, you can add a new template to the ones you already have. To do this, simply tap on menu icon at the top of the screen, select "+ Add" menu item and you will be prompted to select a file. You can choose either a single template, typically ending with .j2 or .j2.txt, or a zip file to add multiple templates at once.

Restore Defaults:
At any time, you can restore the templates to their original state. To do this, simply tap on the menu icon at the top of the screen, select the "Restore Defaults" menu item, and confirm the action when prompted. This will replace your current templates with the pre-installed default versions. Those changes do not affect custom added templates. Please ensure you create a fresh backup before proceeding.

Deleting Templates:
You can delete templates that you no longer need. To do this, tap on the kebab menu for the template and choose 'Delete,' then confirm your choice. After deletion, all versions of the template will be permanently removed. Be careful — there is no way to undo the deletion. The only way to bring a deleted template back is to add it again.

Advanced Mode Features

Deleting Template Version:
If you still use a template but need to delete older versions that you no longer require, you can delete specific versions while keeping the others intact. To do this, tap on the kebab menu for the template and select 'Versions' from the submenu. Once you locate the version you no longer need, tap on it and choose 'Delete.' Confirm your choice, and the version will be permanently removed. Similar to deleting templates, this operation cannot be undone, and you will have to add the version again to bring it back.

Changing Default Template Version:
When selecting a report template to create a report, you can only use a particular template version.
By default, the latest available template version is set as the default. However, you might want to use a different version as your go-to choice.

To change which template version is used by default, tap on the kebab menu for the template and select 'Versions' from the submenu, then tap on the desired version and choose 'Make Default.'

If you change the default version to something other than the latest, it will not be automatically updated to the latest when you import a new version.

*Uses –advanced users may have multiple versions of reports for different customers therefore will need to navigate using different templates as they create report*s.

Backup and Restore:
Users can now create and restore backups of their data using two modes: replacing everything or loading only missing data. Backups capture the complete application state, enabling quick restoration to a previously backed up state.
For your data safety, the backup and restore options are only available when you are not connected to any tester.

Advanced Mode Features

Backup Data:
The data backup allows you to create a reserve copy of your application data. It includes everything necessary to restore your application to its state at the time of the backup, such as teste information, logs, report templates, application settings, and more. Have peace of mind with a secure backup copy of your data. To create a backup file just click the 'Backup Data' feature and the system will archive the .ZIP file and save it either on the device or the cloud.

Restore Data:
Restore option allows you to bring your application back to the state it was at the time you created a backup copy. Before a backup copy is restored, you can choose to replace everything or add missing items.

If you choose to replace everything, all current data will be deleted and replaced with the data from the backup archive you select. If you choose to add missing, your existing data will be preserved and only the data from the backup that you don't currently have will be added. Your existing data will remain unchanged.

Uses – backing up your data periodically is a good practice if something gets corrupted and you need to reinstall the application your data will be saved to the last back up.

In a case where a device needs to be replaced / upgraded, having the ability to restore the Scully App to the same configuration as the last backed up version is now feasible.

Report an Issue:
When a user comes across an unexpected technical problem with the App that they deem important to share with Scully technical team, an easy means of communication is via the 'Report an Issue' function. This feature provides technical information on the status of the App and would be sent as an Attachment via email. and allows users to share it with the Support Team when they encounter issues. This file should be emailed to Scully application team to **email address techservice@scully.com.**

Accessory Kit

5.0 Accessory Kit

The accessory kit provides a complete testing solution to the vehicle technician. The kit includes a Mobile Truck Tester for all on-vehicle system testing, an adapter socket to facilitate cable-based component testing, and a family of test cables suitable for the geographic region of interest. This kit is packaged in a rugged carrying case suitable for the most rigorous field or maintenance garage environments.

■ **(OS) STANDARD OPTICAL SENSOR KIT.**
Includes Two (2) Harnesses for 2 and 5-Wire Sensors (NA & EU).

Cable Assembly, 2-Wire, Ground/TIM
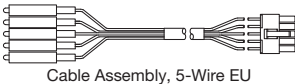
Cable Assembly, 5-Wire EU

OR
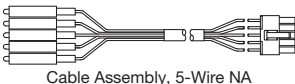
Cable Assembly, 5-Wire NA

■ **(SC) SCULLY CONNECT KIT.**
Includes Four (4) Harnesses for 2 and 5-Wire CONNECT® Cap, and Direct Sensor.
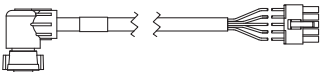
Cable Assembly to CONNECT, 5-Wire
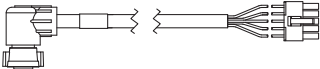
Cable Assembly to CONNECT, 2-Wire
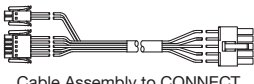
Cable Assembly to CONNECT
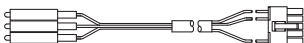
Cable Assembly, 2-Wire, Ground/TIM

■ **(CP) SCULLY CONNECT PLUS KIT.**
Includes Three (3) Harnesses for 2 and 5-Wire CONNECT® PLUS Cap, and Direct Sensor.
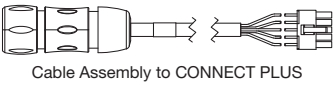
Cable Assembly to CONNECT PLUS
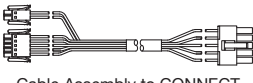
Cable Assembly to CONNECT
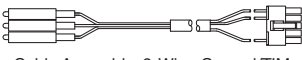
Cable Assembly, 2-Wire, Ground/TIM

■ **(UL) UNIVERSAL KIT.**
Includes all Three (3) Cable Kits.

Figure 5.0-1. The MTT accessory kit includes test cables, a sensor/socket adapterto facilitate single sensor component testing, and the MTT device.

Accessory Kit

5.1 Testing a Single Sensor or Sensor Holder
Items needed are the cone tester, sensor adapter, and the appropriate adapter cable harness. It's easier to run the test utilizing the app.
a. Choose the appropriate adapter cable for the type of sensor or sensor holder to be tested and connect it to the tester socket adapter.
b. When testing a sensor with exposed wires, connect the same color wires to the equivalent alligator clip wire. If it's a CONNECT® cap or sensor, make the connection accordingly.
c. Connect the MTT to the socket connection on the sensor adapter.
d. The MTT will identify the sensor and show its status.
e. On the app, you can run the single sensor wet-test manually and get a more detailed result on the sensor's status. Dipping the sensor into a water cup will help validate the test results.

5.2 Testing a Single T.I.M. Device
Items needed are the cone tester, sensor adapter and the three wire harness with color code white, purple and black and a T.I.M device.
It's easier to run the test utilizing the app.
a. Connect the wire harness to the sensor adapter.
b. Connect the purple wires to each other and the white wires to each other using the alligator clip.
c. Place the cone tester on the sensor adapter and notice it boots up.
d. The T.I.M. ID will be shown on the LED screen.

You can also read the T.I.M. via the app.
e. Establish the Bluetooth link between the app and the tester on the app. (section 4.4.1)
f. After clicking on the linked tester, on the tester dashboard, run tests 'Red T.I.M'. The T.I.M. ID will be shown on the screen. (section 4.4.3.1)

Accessory Kit

5.3 Testing a Ground Bolt or Ball Single Device

Items needed are the cone tester, sensor adapter and the three wire harness with color code white, purple and black and a ground ball/ bolt. It's easier to run the test utilizing the app but with two pair of hands it can run as well without it.

a. Connect the wire harness to the sensor adapter.
b. Connect the white wire with the alligator clip to the green wire connected to the ground ball or bolt. Hold the purple alligator clip and touch the top of the ground ball or bolt.
c. Place the cone tester on the sensor adapter and notice it boots up.
d. The diode and ground symbol will be shown on the LED screen during the configuration stage.

You can also read the TIM via the app (one person set up)

e. Establish the Bluetooth link between the app and the tester on the app. (section 4.4.1)
f. After clicking on the linked tester, on the tester dashboard, run tests 'Ground Test". It is a continuous test.
g. Connect the white wire with the alligator clip to the green wire connected to the ground ball or bolt. Hold the purple alligator clip and touch the top of the ground ball or bolt.
h. The ground symbol and diode symbol will turn Green if the device is working correctly. (section 4.4.3.1)

6.0 Troubleshooting Tips and Guidelines

The tester is designed to emulate a typical overfill and grounding verification rack controller and indicate the operating conditions of the onboard vehicle overfill sensors, TIM, and ground connections.
The tester is designed to recognize most of the known fuel transportation truck and trailer configurations used around the world.

The tester can be connected to a variety of truck sockets with up to 11 pins and several J-slot options. This is inclusive of the 10-pin socket defined in EN-13922 (figure A.2) and API RP-1004 socket.

The tester also supports pin 11 as a TIM exclusive communication channel. The tester auto-detects the truck configuration based on what it finds during the initial test scan after connecting to the socket. If the onboard overfill and ground systems are working properly, the tester will normally auto-detect the configuration correctly and report the status of all functions. Typical truck configurations can include the following:

a. 2-Wire Optic OFP Sensors (up to 8) with or without diode ground.
b. 5-Wire Optic OFP Sensors (up to 12) with or without diode ground.
c. 2 or 5-Wire Optic OFP Sensors with an on-board truck controller such as the Intellicheck™3.
d. Single compartment fuel trucks with Optic 2-Wire Dual-Level Sensors.
e. Truck information modules (TIMs) made by Scully.

It is important to know what truck or trailer configuration is expected when using the tester. If the onboard sensors are not operating properly, or the wiring harness has been damaged, the tester could mis-detect the truck configuration. Knowing the expected configuration of your truck is helpful when interpreting the results reported by the tester. For example, number of compartments (hence number of sensors), sensor types (2-Wire or 5-Wire), presence of an on-board truck controller, location and types of interlocks and other safety devices, type of grounding scheme (resistive or ground bolt) and whether your truck is equipped with an on-board TIM.

Troubleshooting flow charts for 2 & 5 Wire overfill sensors see Appendix

Troubleshooting Tips and Guidelines

Table 6.0 – 1 Mobile Truck Tester Troubleshooting.

ISSUE	POSSIBLE RESOLUTION
Tester does not turn on when connected to a socket.	Check or replace the batteries. See section 3.2.
Tester displays "No Socket".	Connect the tester to a socket. Once it is connected, make sure at least two J-slot pins are installed, and the tester is being held against the contact pins.
Tester shows 1 red sensor and 5-Wire type.	Either a non-permitting 5-wire truck controller or no sensors are connected to pins 1–8 of the socket.
Tester shows no sensor icon and 5-Wire type.	This is caused by an unsupported truck controller interface.
The truck has 6, 2-Wire compartments but the tester shows less than 6 green sensor icons.	One or more of the 2-wire sensors are either wet, open circuit, or shorted. Refer to the sensor number and wiring diagram of the truck for diagnostics. In 2-wire schemes, each sensor is on a unique circuit between its assigned socket pin (1–8) and ground (10).
The truck has six (6) 5-wire compartments, but the tester shows less than 6 green sensor icons and no red icons.	One or more of the 5-wire sensors are not properly \actuating the diagnostic line, but the pulse lines are working correctly. In 5-wire schemes, there can be a fault in the diagnostic line without indicating wetness. Refer to the sensor number and truck's wiring diagram for diagnostics.

Troubleshooting Tips and Guidelines

ISSUE	POSSIBLE RESOLUTION
The truck has six (6) 5-wire compartments, but the tester shows less than 6 green sensor icons, and one or more red icons.	One or more of the 5-wire sensors are either wet, open circuit, or shorted. In 5-wire schemes there can be an open (or short) in the diagnostic line or pulse lines. Refer to the sensor number and the truck's wiring diagram for diagnostics.
Tester shows all sensors red in any scheme and a red ground icon.	Check for a dirty socket or broken ground connection. A variety of dirty or intermittent socket pin combinations can cause this result.
Tester shows a green resistive ground icon, but the truck has a ground bolt installed.	The ground proving diode in the ground bolt may be faulty.
Tester shows a red ground icon, but all sensors are working fine.	The ground is validated between socket pins 9 and 10. Check for a dirty or faulty connection on pin 9. This can cause the ground detection to fail.
Tester shows a fluctuating number of green sensors in a 5-wire system during the wet-test.	Check for a dirty or intermittent connection on pin 5 of the socket. Or check the integrity of the diagnostic line wiring on the truck.
Tester shows only one green or red sensor icon on a 5-wire system (with multiple compartments) when no controller is present.	Check for a dirty or open connection on the pin 5 diagnostic line circuit to the sensors. An open connection on pin 5 will cause this display.

Troubleshooting Tips and Guidelines

ISSUE	POSSIBLE RESOLUTION
Tester shows all red sensor icons on a 5-wire system when no controller is present.	Check for a dirty or open connection on the pin 4 circuit to the sensors. An open connection on pin 4 from the socket to the sensors will cause this display.
Truck has N 5-wire compartments, but the tester shows N+1 sensor icons and the last one is red. (For example, there are 4 compartments but 5 sensors, with the fifth being red.)	This is caused by all sensors asserting the diagnostic line while the return pulse is not detected. This is either a wet state or a connection/wiring issue. Check for a dirty or open connection on the pin 6 circuit from the sensors. An open on pin 6 from the socket to the sensors will cause this display.
The truck has 6 (or less) 2-wire compartments, but the first 2 or more sensor icons are red.	In North America, truck compartments are wired to pins 3 and higher on the socket. Pins 1 and 2 will appear as open sensors to the tester.
The truck has N, 2-wire compartments, but the tester shows > N green sensor icons and a text message that says "DUMMY."	The tester is showing the dummy sensor channels working as well. In North America, a minimum of 6 sensor channels (pins 3 – 8) are needed. The unpopulated channels are simulated with a device called a "dummy." This is an expected outcome.

Automated Sensor, Ground Circuit, and T.I.M.® ID Detection Tool

Troubleshooting Tips and Guidelines

ISSUE	POSSIBLE RESOLUTION
The Truck has N < 6, 2-wire compartments, and the tester shows the same number of green sensor icons.	If green icons on sensors 3–8 do not appear, check the wiring of the dummy sensor in the socket housing. In North America, there is a need for a minimum of 6 sensor channels (pins 3–8). The unpopulated channels are simulated with a device called a "dummy." If the dummy fails, only green will appear on the actual sensors.
The truck has N 2-wire compartments, but the tester shows < N green sensor icons.	Each sensor has its own circuit. Any individual sensor channel can be open, shorted, or wet Refer to the truck's sensor number and wiring diagram for diagnostics. In North America, 2-wire sensors generally count upward from 3–8. In Europe, 2-wire sensors generally count upward from 1–8.

Mobile Truck Tester® - Model MTT1000 User Manual

Troubleshooting Tips and Guidelines

Table 6.2 – 2 Scully MTT Application Troubleshooting.

ISSUE	POSSIBLE RESOLUTION
App will not pair with a tester on Bluetooth.	Verify that the tester is enabled for Bluetooth access. When powered on, does the wireless connection symbol appear in the display's upper right corner? If not, the tester does not have wireless connection capability. If it does, try closing and restarting the app and try connecting again.
App will not reconnect with a tester on Bluetooth it previously paired with successfully.	Occasionally, if a tester powers off while connected to the app, the app will not be able to recover the connection when the tester powers on again. Remedy this by closing the app and restarting it. Also wait for the tester to power off and then restart.

If these options do not resolve the issue, please contact Scully Technical Support for assistance (1-800-272-8559).

Technical Specifications and Approvals

7.0 Technical Specifications and Approvals

7.1 General Specifications
The following information provides guidance on the tester's technical specifications.

Table 7.1-1. Scully MTT1000 Technical Specifications.

Operating temperature range:	-20ºC to +50ºC (-4ºF - +132ºF)
Storage temperature range:	-40ºC to +60ºC (-40ºF - +140ºF)
Input power (6 AA batteries)*	6.7 – 9.9 volts DC
Dimensions:	4" diameter x 8.25" long (10.2cm x 21cm)
Weight with batteries installed:	1 lb 4 oz (567g)
Display:	LCD, 2" (50cm)
Operating time on new batteries	~48 hours continuously running. 6 – 12 months on average use.

*Only use six (6) Duracell MN1500 AA (IEC R6) cells.

Mobile Truck Tester® - Model MTT1000 User Manual

Technical Specifications and Approvals

7.2 Radio Approvals
FCC Regulatory Information:
Contains FCC ID: XPYNINAB4

FCC Interference Statement (Part 15.105(b))
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

FCC Compliance Statement (Part 15.19(a))
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Warning Statement (Part 15, Clause 15.21)
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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Technical Specifications and Approvals

Industry Canada (IC) Regulatory Information
Contains transmitter module IC: 8595A-NINAB4
Contient un module émetteur IC: 8595A-NINAB4

ISED RSS-Gen Notice
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

European Union Radio Equipment Directive (RED)
This product complies with requirements to be placed on the EU market per Radio Equipment Directive (RED) 2014/53/EU.

Brazil (INMETRO)

ANATEL
11049-21-05903

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

Warranty

8.0 Warranty

Scully warrants the Scully Mobile Truck Tester Kit manufactured by Scully Signal Company ("Scully") to be free from defects in materials and workmanship under normal use and service. The electrical components will be covered for a period of three (3) years while the mechanical components will be covered for a period of one (1) year from the date of sale from Scully. Peripheral equipment such as all cables or the sensor adapter manufactured by Scully are warranted for a period of ninety (90) days from date of installation. All equipment returned to Scully that has a manufacturing date code that exceeds the warranty period must be accompanied by an invoice or work order that states the date purchased and date of installation. Under these warranties, Scully shall be responsible only for actual loss or damage suffered, and then only to the extent of Scully's invoiced price of the product. Scully shall not be liable in any case for the removal and/or reinstallation of defective Scully equipment. These warranties shall not apply to any defects or other damages to any Scully equipment caused by improper installation procedures, misuse, negligence or excessive force or wear, and this warranty shall not apply to any Scully equipment that has been altered or tampered with by anyone other than Scully factory representatives.

In all cases, Scully will warrant only Scully products which are being used for applications acceptable to Scully and within the technical specifications of the particular product. In addition, Scully will warrant only those electronic products which have been installed and maintained according to Scully factory specifications.

Limitation on Warranties

These warranties are the only warranties, expressed or implied, upon which products are sold by Scully, and Scully makes no warranty of merchantability or fitness for any particular purpose in respect to the products sold. Scully products or parts thereof assumed to be defective by the purchaser within the stipulated warranty period should be returned to the seller, local distributor, or directly to Scully for evaluation and service. Whenever direct factory evaluation, service or replacement is necessary, the customer must first—by either letter, fax, email or phone—obtain a Returned Material Authorization (RMA) from Scully Company directly. No material may be returned without a RMA number assigned to it or without proper factory authorization.

Any returns must be returned freight prepaid to:
Scully Signal Company, 70 Industrial Way, Wilmington, MA 01887-3479 U.S.A. Indicate the RMA number on the outside of the shipping container. Returned warranted items will be repaired or replaced at the discretion of the Scully Service Department according to Scully Product Warranty Policy and the Scully Returned Materials Procedure.

Important: Signing up via the QR code link will enable us to notify you in the event of a product recall or to supply you with product safety information and customer loyalty rewards.

2 Wire Sensor – Wiring and Signals

▶ Key elements
  ▶ Signals
  ▶ Wire colors

Signal	EU - ADR	NA
Sensor Pulsed Signal	Black	Black
Sensor ground	White	White
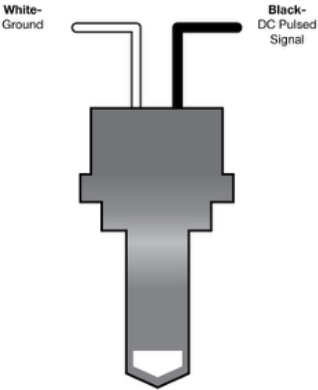
▶ Key elements
  ▶ Ground to sensors in parallel
  ▶ Signal to sensors individually
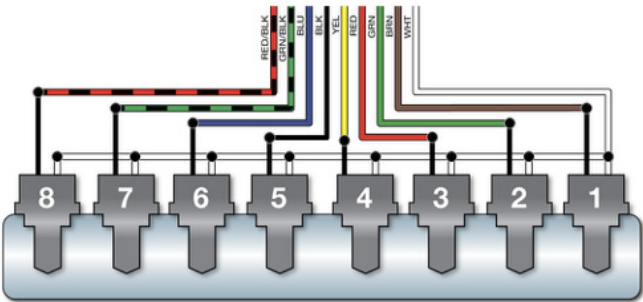
MTT 1000 testing a 2-wire installation

✓ Testing sequence on 2-wire vehicle
  ✓ Initialize and perform self-tests to verify proper operation.
  ✓ Confirm that a Scully socket connection has been made.
  ✓ Determine the type of ground connection and look for TIM
  ✓ Display ground and TIM data
  ✓ Then determine the type of OFP sensor (2 or 5 wire)
  ✓ Perform an initial operation test on the sensors, display those results on the LCD screen.
  ✓ After a short delay, it will enter a live sensor scanning mode called "wet-test" to sequentially test each OFP sensor on the vehicle.
  ✓ Results will be shown on the LCD screen as they are updated.
  ✓ After a pre-programmed period of time, the tester will conclude the
  ✓ wet-test, display the final test results, and begin a shut-down sequence.

✓ Demonstrate good set up 8-compartment sensor setup

Trouble shooting logic – with monitor

▸ Installations with truck monitors only give permit / non-permit indication
  ▸ w/ monitors:
    ▸ Either all 6 or 8 sensors will be indicated either 'dry' (green) or 'wet' (red)
    ▸ Status of which sensor is 'wet' is indicated on the truck monitor
    ▸ On a dual level the independent sensor will show on channel 5

Trouble shooting logic – with Truck Monitor

▸ Using the accessory kit adaptor use one of two techniques
  ▸ Disconnect the sensor inputs on the IC3 and connect the 2-wire harness alligator clip to test the wire harness and sensor
    Use the manual 'wet test' in the app to get the fault indication
  ▸ Test from the sensor back to the controller
▸ Follow the indication in the app to identify fault location
  ▸ 'Open' or 'Short' is probably the wire harness
  ▸ 'Wet' is probably the sensor.
▸ If a Scully Connect set up, you can connect with the accessory kit to the Cap directly

Trouble shooting logic – no monitor

▸ Simple logic where each 2–wire sensor status is displayed per compartment
  ▸ In NA sockets pins one and two are empty therefore the first sensor is displayed as compartment 3 on the LCD. Compartment 1 & 2 will show a red sensor.
  ▸ In EU sockets the wiring begins in pin 1 therefore the first sensor is displayed as compartment 1 on the LCD
  ▸ On the app run the manual 'wet test', and verify the indicated fault
    ▸ If 'wet' – replace sensor
    ▸ If 'short' or 'open' inspect the wire harness

5 Wire Sensor – Wiring and Signals

▶ Key elements
  ▶ Signals
  ▶ Wire colors

Signal	EU - ADR	NA
Diagnostic	Green	Green
Pulse Output	Blue	Orange
Pulse Input	Yellow	Yellow
Sensor power	Gray	Red
Sensor ground	White	Black

Yellow-
Pulsed Input
Signal

Orange-
Pulsed Output
Signal

Red-
DC Supply

Green-
Diagnostic

Black-
DC Common
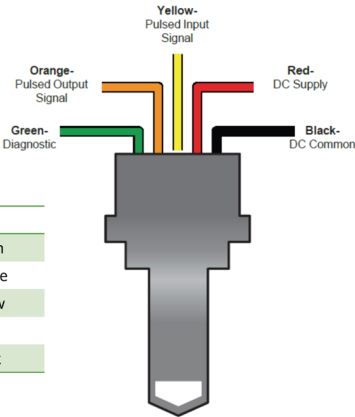
5 Wire Sensor – Wiring and Signals

▶ Key elements
  ▶ Power to sensors in parallel
  ▶ Signal to sensors in series
  ▶ Diagnostic line in parallel
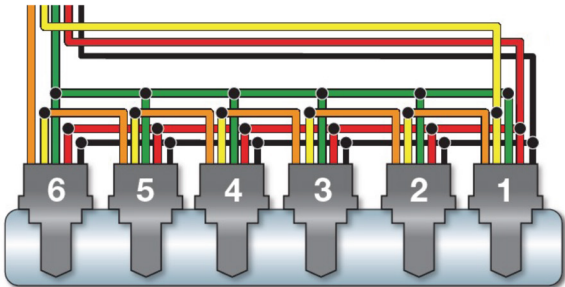
MTT 1000 testing a 5-wire installation

✓ Testing sequence on 5-wire vehicle
  ✓ Initialize and perform self-tests to verify proper operation.
  ✓ Confirm that a Scully socket connection has been made.
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  ✓ Display ground and TIM data
  ✓ Then determine the type of OFP sensor (2 or 5 wire)
  ✓ Perform an initial operation test on the sensors, display those results on the LCD screen.
  ✓ After a short delay, it will enter a live sensor scanning mode called "wet-test" to sequentially test each OFP sensor on the vehicle.
  ✓ Results will be shown on the LCD screen as they are updated.
  ✓ After a pre-programmed period of time, the tester will conclude the
  ✓ wet-test, display the final test results, and begin a shut-down sequence.

✓ Demonstrate good set up 6-compartment sensor setup

Appendix B- How to Trouble Shoot a 5-Wire Truck or Trailer

Trouble shooting flow chart

▶ We will take it step by step

Trouble shooting flow chart

▶ Choose the correct path
  ▶ On-board controller or no controller

Appendix B- How to Trouble Shoot a 5-Wire Truck or Trailer

Trouble shooting flow chart – set up with Controller

Path for On-board Controller diagnostics

5-WIRE WET TEST

▸ Most of the errors are due to unclean sockets

Connect MTT to socket: Expect a single green sensor and the message "NO DIAG/CTRL" to display

Display shows single green sensor? —Yes→ Sensor / Controller interface debug good, Proceed to ground checking…

No

Remove the MTT from the socket, use the socket cleaner to remove any debris film off the socket. Reconnect the MTT and check again

Go to ground testing ←Yes— Display shows single green sensor?

Trouble shooting flow chart – set up with Controller

5-WIRE WET TEST

▸ Step 2

Display shows single red sensor? —No→ Verify the controller is powered. Inspect the controller/socket interface wiring

Controller is in non-permit state: Examine the controller display for possible sensor fault, inspect wiring from controller to sensors

Use MTT and adapter box to bypass the controller: Remove from the controller (Intellicheck3 TB4) the five wires (Pulse In, Diag, Pwr, Gnd, Pulse Out) and attach to the clips of the 5-wire sensor harness of the accessory kit. Connect the tester to the adapter socket and start testing the system without the controller

Use the MTT and adapter box to manually test suspected sensors in position or remove sensors for bench testing

Go to no-controller side of the flow chart first decision diamond "displays shows correct number of sensors and all green" and continue the trouble shooting there.

Go to sensor testing with Accy Kit

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Appendix B- How to Trouble Shoot a 5-Wire Truck or Trailer

Trouble shooting flow chart – set up no Controller

Path for direct seonsors diagnostics

On-board controller present? i.e Intellicheck 3 —No→ Connect MTT to socket

OFP Sensor interface debug good, Proceed to ground checking... ←Yes— Display shows correct number of sensors and all green? —No→ Remove the MTT from the socket, use the socket cleaner to remove any debris film off the socket. Reconned the MTT and check again

▸ Most of the errors are due to unclean sockets

Go to ground testing ←Yes— Display shows correct number of sensors and all green?

Here we can have a red sensor, the wrong number of sensors, or both

Trouble shooting flow chart – set up no Controller

▸ Step 2

No← Is the number of sensors shown correct? →Yes

Number of sensors is right, one or more is red

One or more wet sensors: One or more sensors in the chain are not returning the pulse to pin 6. Use the MTT with the APP in wet-test to debug the wiring or remove the suspect sensors and bench test with the adapter kit. The first red sensor number indicates the first bad compartment number.

Incorrect sensor count can go both ways: Over by one or under by any number...

Is the sensor count too low or too high? →High→ Are all the sensors green? —No→

Sensor count too high and green means pin 5 scaling is off in MTT

LOW

Go to Pin 5 recalibration ←Yes

Wiring fault after last sensor: The last sensor in the chain is not returning the pulse to pin 6 but it is acting dry. Use the MTT with the APP in wet-test to debug the wiring or remove the suspect sensor and bench test with the adapter kit

Return pulse is invalid, bad sensor in chain

Are all the sensors green?

Trouble shooting flow chart
– set up no Controller

▶ Step 3

Is the sensor count too low or too high?

LOW

Are all the sensors green?

No

Yes

Return pulse is valid, diagnostic voltage is wrong

Diagnostic line (sensor) fault:
One or more sensors are not properly activating the diagnostic circuit - Use the MTT with the APP in wet-test to debug the wiring or remove the suspect sensors and bench test with the adapter kit. This could be a bad connection between the green wire on the sensor and the truck harness.

Return pulse (sensor) fault:
One of the sensors in the chain is in a wet or fault state, or the pulse wiring circuit is faulty. The MTT displays the number of dry sensors plus one red to indicate the missing return pulse. Use the MTT with the APP in wet-test to debug the wiring or remove the suspect sensors and bench test with the adapter kit.
The first red sensor number indicates the first bad compartment number.

Setting Standards in Safety and Dependability since 1936.

For over seventy-five years Scully has been engineering and building products to the highest safety and reliability standards. We design and manufacture all of our systems under one roof to ensure complete quality control over our manufacturing and testing operations.

Scully is ISO certified and all of our products are made in the U.S.A. In addition, we back up our products with the best service in th industry. We have direct sales and service personnel in the U.S.A., The United Kingdom, and Europe and are represented in over 50 countries.

For more information and 24 hour technical assistance, call **Scully Signal Company at 1-800-2SCULLY (1-800-272-8559)**

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