

INSTALLATION AND USE

TEST SET, FIELD CABLE
AN/GTM-3B

7Z 6625-01-599-3857

Trimble Sustainment Engineering Inc
2910 N. Powers Blvd #335
Colorado Springs, CO 80922

**REPRODUCTION AND DISTRIBUTION OF THIS TECHNICAL MANUAL IS
AUTHORIZED FOR U.S. GOVERNMENT PURPOSES**

MANUAL REVISION: A
P/N: TSE-P01-03-016

26 March 2013

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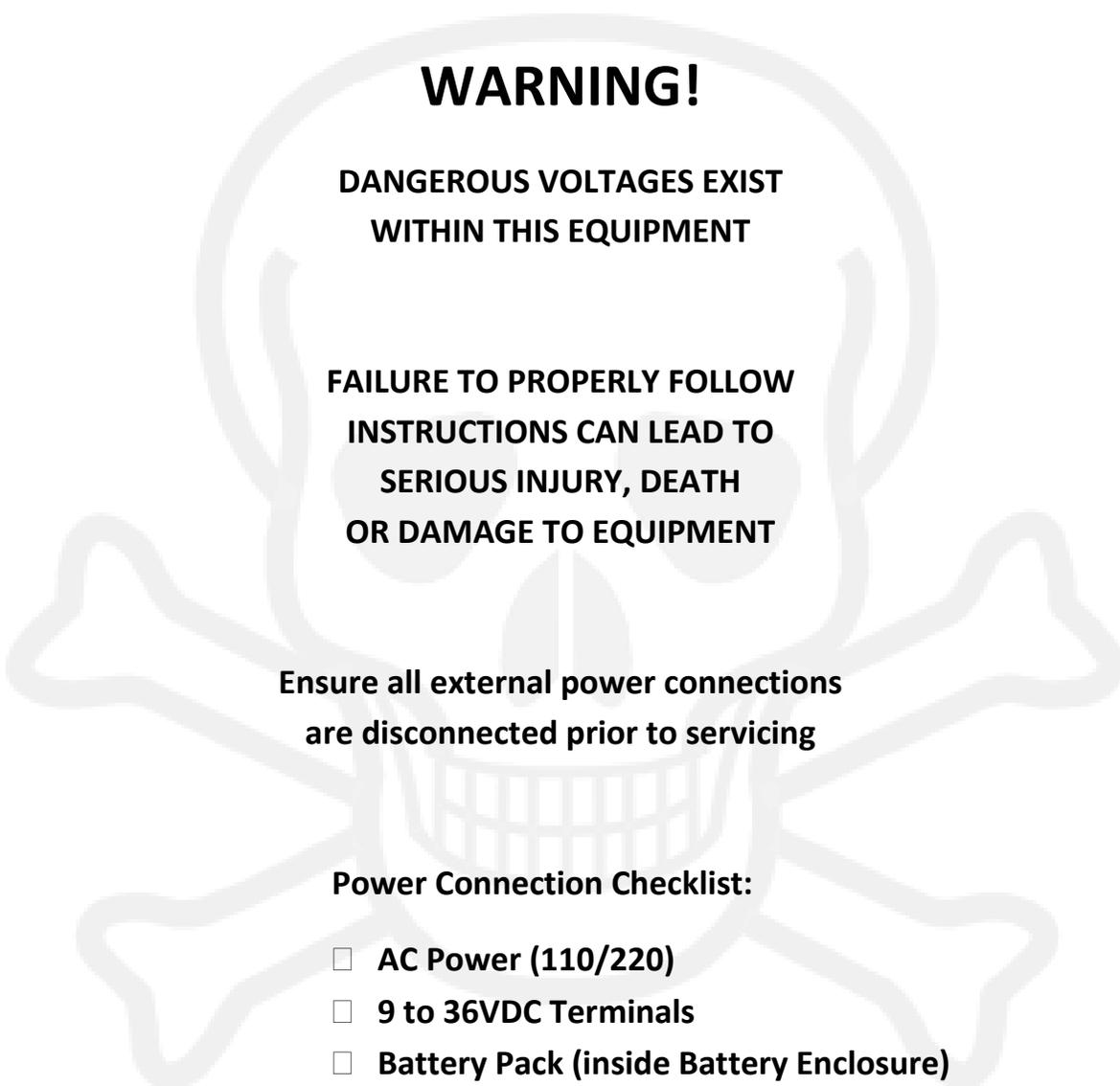
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WARNING!

**DANGEROUS VOLTAGES EXIST
WITHIN THIS EQUIPMENT**

**FAILURE TO PROPERLY FOLLOW
INSTRUCTIONS CAN LEAD TO
SERIOUS INJURY, DEATH
OR DAMAGE TO EQUIPMENT**

**Ensure all external power connections
are disconnected prior to servicing**

Power Connection Checklist:

- AC Power (110/220)**
- 9 to 36VDC Terminals**
- Battery Pack (inside Battery Enclosure)**

**THE AN/GTM-3B CONTAINS NO
OPERATOR SERVICEABLE COMPONENTS**



**IF OPENING THE TEST UNIT IS REQUIRED,
ENSURE ALL ESD PRECAUTIONS ARE
OBSERVED**

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CHAPTER 1

INTRODUCTION

1.1. SCOPE

This manual contains operating instructions and organizational level maintenance procedures for the Test Set, Field Cable, AN/GTM-3B, hereinafter referred to as the Cable Test Set.

NOTE

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1.2. PURPOSE AND USE

The Cable Test Set is a portable testing unit for checking the continuity and insulation resistance of field-installed 26-pair cable assemblies, (type CX-4566/G or equiv.) and patching panels.

A number of improvements have been made to the original AN/GTM-3 design concept. It is important that a new user familiarize themselves with the updated controls and indications as listed in Chapter 3.

1.3. EQUIPMENT DESCRIPTION

Refer to Figure 1. The Cable Test Set comprises the equipment listed in Table 1.

TABLE 1. EQUIPMENT SUPPLIED

Part Number: TSE-P01-01-001-PL		Rev-				
Assembly: Cable Tester Kit						
ID	Description	Part Number	Manufacturer	CAGE	Board Qty	Reference Designator
1	Transit Case	1560-008-110	Pelican	6JUB6	1	
2	Test Unit	TSE-P01-01-002	TSE	6AUC2	1	TSE-P01-01-002
3	Branch Cable	TSE-P01-01-003	TSE	6AUC2	1	TSE-P01-01-003
4	Test Plug	MX-10898/GTM-3	TSE	6AUC2	1	TSE-P01-01-004
5	AC Power Cord, 6'	ANY STANDARD 3-PRONG			1	
6	Operation & Maintenance Manual		TSE	6AUC2	1	
7	Use & Installation Manual		TSE	6AUC2	1	
8	CD ROM		TSE	6AUC2	1	
9	Close Cell Foam		TSE	6AUC2	1	TSE-P01-03-009

A brief description of the major components that make up the Cable Test Set is given in the following paragraphs.

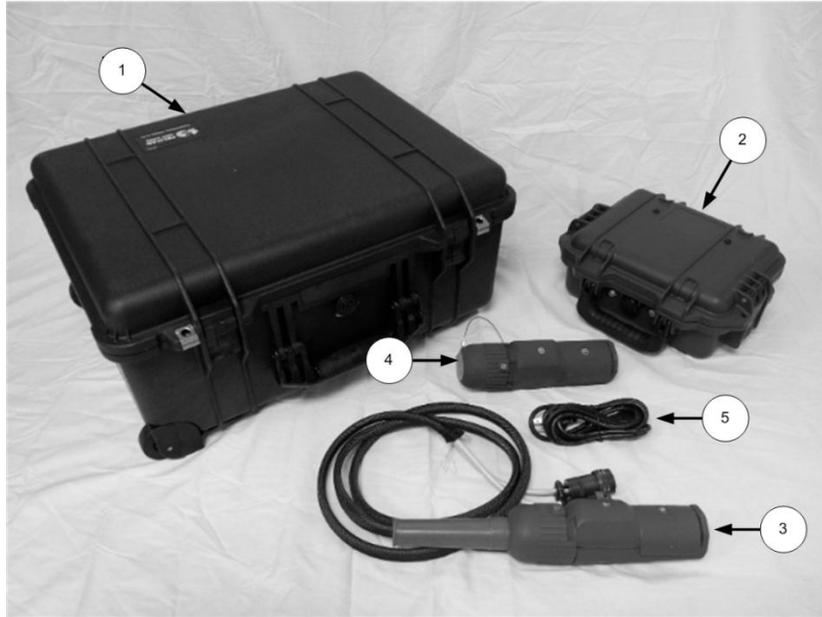


Figure 1. TEST SET COMPONENTS

1.3.1. Transit Case

The transit case (Figure 1 - 1) comprises a water-tight, ruggedized enclosure with a hinged cover; it houses all components of the Cable Test Set.

1.3.2. Test Unit

The Test Unit (Figure 1 - 2) is designed to check the continuity and insulation resistance of up to six, 26-pair cable assemblies (each 250-ft long) connected in series. The Test Unit can be operated from an AC or DC power source, or internal battery assembly.

1.3.3. Branched Cable

The branched cable (Figure 1 - 3) provides the interface between one end of the cable under test and the Test Unit. The branched cable is approximately five feet long and is equipped with two, 26-pin circular connectors at one end and a 26-pair hermaphroditic connector at the other end.

1.3.4. Test Plug

The test plug (Figure 1 - 4) is a modified hermaphroditic connector which, when placed at the end of the cable under test, loops the paired wires to the Test Unit via the branched cable. The test plug is used during continuity testing.

1.3.5. Power Cord

The power cord (Figure 1 - 5) supplied with the Test Set is a North American standard 3-prong.

NOTE

The AC power cord furnished with the Test Unit can only be plugged into standard North American 110VAC outlets. When using the Test Unit with a 220VAC power source, it is necessary to either replace the power cord or use an appropriate adapter so that the plug may be used with the 220VAC outlet.

For DC operation, the Test Unit can either be powered with the internally-mounted Ni-MH battery pack, or from an external 9-36VDC power source. While the 9-36VDC input jacks are color coded, the input is diode protected to eliminate potential damage caused by an accidental reversal of the polarity. While good to observe the polarity in practice, it is therefore not necessary to connect positive to red and negative to black.

For AC operation, the Test Unit may be operated with a 110/60Hz or 220 VAC/50Hz power source. No configuration changes are required to alter the AC input.

1.4. Battery Installation Instructions

NOTE

The Test Unit is designed to detect the presence of the Battery Pack and charge if necessary. The Test unit **does not** require that the Battery Pack be installed to operate.

- 1.4.1. Remove the Test Unit from the Transit Case and place onto a flat surface. Open the Test Unit lid and locate the Battery Box (Figure 2).



FIGURE 2. BATTERY BOX

- 1.4.2. Using a hex wrench, remove the two Battery Box Lid screws and slide the cover forward (Figures 3 and 4). Note how the lid is removed to make replacement easier.



FIGURE 3. BATTERY COVER PARTIALLY REMOVED



FIGURE 4. BATTERY BOX COVER REMOVED

1.4.3. When placing the Battery Pack into the Battery Box, note the notch on the right-hand side (Figure 4) for the wiring harness assembly to rest in. Place the Battery Pack as shown in Figure 5, with the harness on the right and the pull tabs straight up. The Battery Box is designed to hold the Battery Pack snugly.



FIGURE 5. BATTERY PARTIALLY INSTALLED

1.4.4. Attach the Test Unit's battery cable to the Battery Pack wiring harness. Note that the connectors are keyed and cannot be connected incorrectly. Place the connectors on the top of the battery and route the Test Unit cable through the notch at the left of the Battery Box (Figure 6).



FIGURE 6. BATTERY PROPERLY INSTALLED

1.4.5. Slide the Battery Box cover back onto the Battery Box while 'tucking in' the connector and related hardware. Replace the two hex head screws removed in Step 1.3. The completed installation is shown in Figure 7.



FIGURE 7. FINISHED BATTERY INSTALLATION

1.4.6. Removal is the reverse of installation with one change: the Battery Pack must be removed by pulling up on both sides of the black strips (Shown standing vertically in Figure 5). The battery may not be removed by pulling the wiring harness.

1.4.7. Once the battery is installed, apply external power to the Test Unit and allow 8 hours of continuous charging prior to use.

1.5. REFERENCE DATA

TABLE 2. PHYSICAL AND ELECTRICAL CHARACTERISTICS

Item	Characteristics
Cable Test Set	
Dimensions	22.06"L x 17.93"W x 10.43"H
Weight	30Lbs (Total weight, including cables, adapters, transit case and manuals)
Volume	1.64 Cubic Feet
Test Unit	
Dimensions	11.8"L x 9.8"W x 4.7"H
Weight (w/ battery)	7.2Lbs / 3.3kg
Volume	0.18 Cubic Feet
Operating Voltage	DC Input: 9-36VDC from an external power supply. Diode-protected input eliminates the need for proper polarity when connecting. AC Input: 110 or 220 VAC, 50 or 60Hz. Input voltage selection is not required.
Battery Charging	Built-in constant current charger for the internal 4-cell, 4.8VDC 4500mAh Ni-MH battery pack.
Current, Battery	Charge: ~ 2A @ 24VDC MAX Draw: ~ 200mA @ 5VDC MAX when testing
Type of Tests	Continuity and insulation resistance.
Continuity Test	Seven selectable ranges: 250-ft: Up to 20Ω 500-ft: Up to 40Ω 750-ft: Up to 60Ω 1000-ft: Up to 80Ω 1250-ft: Up to 100Ω 1500-ft: Up to 120Ω Self-Test: Up to 10Ω
Insulation Resistance	Indicates a fault condition if the insulation resistance between one selected conductor and ground is 10MΩ (nominal) or less.

1.6. ENVIRONMENTAL CHARACTERISTICS

The AN/GTM-3B was designed to meet or exceed MIL-PRF-28800 Class III specifications. Table 3 provides the environmental characteristics of the Cable Test Set.

TABLE 3. ENVIRONMENTAL CHARACTERISTICS

Item	Characteristics
Test Unit	
Operating Temp	0°C to +50°C
Storage Temp	-40°C to +71°C
Operating Altitude	0 to 4600 meters
Humidity	5% to 75% ±5% from +30°C to +40°C 5% to 45% ±5% above +40°C
Vibration, Random	Per MIL-PRF-28800 Table 3 (3.8.4.1)
Vibration, Sinusoidal	Per MIL-PRF-28800 Table 4 (3.8.4.2)
Shock, Functional	30g
Bench Handling	Per MIL-PRF-28800 Table 4 (3.8.5.3)
Watertight Case, Transit	IPC67: 1 meter submersion for 30 minutes
Min Operating Time (Battery)	8 hours
Max Recharge Time (Battery)	10 hours
Calibration Interval	No Calibration Required

1.7. WARRANTY INFORMATION

The AN/GTM-3B comes with a one-year warranty covering defects in both parts and workmanship until the end-date noted on the label inside the lid of the Test Unit. It does not cover damage caused by abuse, neglect or acts of God.

CHAPTER 2

SERVICE UPON RECEIPT

2.1. UNPACKING

The Cable Test Set is shipped in a standard single-wall cardboard box. Unpacking of the Cable Test Set is straightforward and does not require any special tools or unpacking instructions.

2.2. CHECKING UNPACKED EQUIPMENT

Open the Transit case and check the Cable Test Set as follows:

1. Inspect the equipment for possible in-shipment damage. If equipment is received in damaged condition, do not attempt to power-on or operate it until the damage has been corrected.
2. Check the equipment against the packing slip and Table 1 to ensure the shipment received is complete. All documentation and accessories will be located within the Transit Case.

2.3. SHIPPING PRECAUTIONS

NOTE

Prior to shipping the Cable Test Set, remove the Battery Pack from the Test Unit and place it into the proper cut-out in the Transit Case.

The Cable Test Set can be shipped in the Transit Case without an external shipping container, but this is not recommended to ensure the longevity of the Transit Case. It is recommended that the Cable Test Set be shipped in a standard cardboard box. The shipping box supplied with the Cable Test Set is not considered reusable dunnage and is intended to be discarded.

2.4. PREPARATION FOR SHIPMENT

From the Test Unit, referring to Section 1.4, remove the Battery Pack and place into the Battery Pack cut-out in the Transit Case. Place all items into the Transit Case, referring to Table 1 to ensure completeness. Once the case lid is secured, the Cable Test Set is properly prepared for shipment and ready to be placed into a standard cardboard shipping container.

2.5. INSTALLATION OF INTERNAL RECHARGEABLE BATTERY

CAUTION

Only a battery pack, model #TSE-P01-03-004 (or equivalent) should be used in the Test Unit. The charging circuit in the Test Unit provides optimum charging current for the specified battery type (Ni-MH) and capacity (4500mAh) only. Refer to Section 4.5.1 for battery pack information.

The Test Unit is shipped with the rechargeable battery pack external to the Test Unit. Refer to Section 1.4 for installation or replacement.

2.6. OPERATION FROM 9-36VDC POWER SOURCE

NOTE

While the DC input terminals are RED and BLACK to indicate polarity, the Test Unit is diode-bridge protected and the positive (+) lead may be connected to either input (positive or negative) with no possibility of damage, provided the voltage is kept between 9 and 36VDC.

The external 9-36VDC input to the Test Unit is connected via two binding posts located on the right-hand side of the Front Panel Assembly. To power via the 9-36VDC input, perform the following:

1. Set the POWER switch on the Test Unit to OFF.
2. Ensure the 110V/220VAC power input is not connected.
3. Connect the positive lead from the 9-36VDC power source to the red (+) binding post; negative lead to the black (-) binding post. To connect a lead, press and hold the face of the binding post to expose the connection hole, insert the wire into the hole and release the binding post.
4. Configuration complete.

2.7. OPERATION FROM AC POWER SOURCE

The external AC input to the Test Set is connected via the AC power cord to the AC Inlet connector located on the right-hand side of the Front Panel Assembly. To power via the AC input, perform the following:

1. Set the POWER switch on the Test Unit to OFF.
2. Ensure the 9-36VDC input is not connected.

3. From the front panel of the Test Unit, connect the 110VAC Power Cord from the AC Inlet to the wall outlet.
4. Configuration complete.

Note that there is no voltage selector switch required when alternating between the 110VAC and 220VAC inputs.

NOTE

The AC power cord furnished with the Test Unit can only be plugged into standard North American-type 110VAC outlets. When using the Test Set with a 220VAC power source, it is necessary to either replace the power cord plug, or use an adapter.

CHAPTER 3

CONTROLS AND INDICATORS

3.1. GENERAL

This section provides a description of the Test Unit's controls and indicators. There are no operating controls or indicators on any other items included with the Cable Test Set.

3.2. CONTROL AND INDICATORS

Figure 8 shows the controls and indicators for the Test Unit. Table 4 details the function and use of each control and indicator.

TABLE 4. CONTROLS AND INDICATORS

Fig / Index No.	Control / Indicator	Function
1	9-36VDC binding posts	Provides for connection of external 9-36VDC input. It is diode protected, allowing for connection without regard to polarity (e.g., Positive to RED binding post and Negative to BLACK binding post) and eliminating potential damage.
2	AC Inlet	Provides for connection of external AC Power to the Test Unit, either 110VAC/60Hz or 220VAC/50Hz.
3	POWER switch	ON Position: Test Unit is switched on. OFF Position: Test Unit is switched off. There is no special shut-down procedure required. NOTE When external power (AC or DC) is connected and the Test Unit is powered off, the Test Unit will charge the internal Battery Pack but there will be no indicator.
4	CABLE PAIRS indicators	Serves to identify the Cable Pair(s) or conductor(s) as either passing or failing, as well as indicating the pair or conductor under test. If the Test Unit is operated with the internal battery, the indicators associated with the pair under test illuminate green to show test progress, extinguishing as it moves to the next pair. When the test discovers a faulty Cable Pair

		<p>or conductor, the indicator associated with the faulty pair will illuminate “RED” and remain illuminated until the Test Unit switches off or the test is exited.</p> <p>If the Test Unit is operated with external power (9-36VDC or AC), the indicators corresponding to the Cable Pair under test will light continuously, “GREEN” for pass and “RED” for fail.</p>
5	GO indicator	<p>Illuminates “GREEN” when test results are normal (GO) and “RED” when a defective Cable Pair is discovered (NO-GO). This indicator is used for both the CCHK and IR tests.</p>
6	END indicator	<p>Illuminates “GREEN” after the completion of the current test.</p>
7	LCD display	<p>The LCD display provides operator information based upon the position of the TEST switch (10) as follows:</p> <p style="text-align: center;">NOTE</p> <p>Whether running from the internal Battery Pack or on External Power, the LCD backlight will remain illuminated. Backlight illumination is not user selectable.</p> <p><u>CCHK</u></p> <p>250-ft – Used for testing one 26-pair, 250-ft cable with a nominal resistance not exceeding 20Ω.</p> <p>500-ft – Used for testing two 26-pair, 250-ft cables (500-ft total) with a nominal resistance not exceeding 40Ω.</p> <p>750-ft – Used for testing three 26-pair, 250-ft cables (750-ft total) with a nominal resistance not exceeding 60Ω.</p> <p>1000-ft – Used for testing four 26-pair, 250-ft cables (1000-ft total) with a nominal resistance not exceeding 80Ω.</p> <p>1250-ft – Used for testing five 26-pair, 250-ft cables (1250-ft total) with a nominal resistance not exceeding 100Ω.</p> <p>1500-ft – Used for testing six 26-pair, 250-ft cables</p>

		<p>(1500-ft total) with a nominal resistance not exceeding 120Ω.</p> <p>Self-Test – Runs the Continuity Self-Test with a nominal resistance not exceeding 10 Ω.</p> <p><u>IR</u> IR – Runs the Insulation Resistance Test.</p> <p>Self-Test – Runs the Insulation Resistance Self-Test.</p> <p>Test Speed Slow / Fast – Changes the speed of the IR test execution. Default is Slow. Use the “START” button to change the selection.</p> <p>Stop on Fail: YES / NO – Changes the nature of the IR test execution to either continue running when a fault is found (NO) or to stop (YES). Default is NO. Use the “START” button to change the selection.</p> <p><u>MENU</u> Lamp Test – Runs the Display Self-Test, turning on all green LEDs, red LEDs and the Graphical LCD’s pixels.</p> <p>Button Test – Runs the Button Self-Test, verifying that all Front Panel buttons are operational.</p> <p>Test Tone – Applies a constant tone to the Cable Pair under test.</p> <p>Tester Info – Provides Firmware Build Date and Time.</p> <p>Auto-Off Enabled / Disabled – Affect CCHK and IR tests when running off of the battery pack only. When ENABLED, the Test Unit will turn off once a successful test is completed. When DISABLED, the Test Unit will continue running after a successful test completion. Default is ENABLED. Use the “START” button to change the selection.</p> <p style="text-align: center;">NOTE</p> <p>When running off of the internal Battery Pack with Auto-Off ENABLED, the Test Unit will turn off only upon a successful test completion (“GO”). If the test fails, the</p>
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		<p>Test Unit will remain on.</p> <p>System Zero Cal – Allows the operator to connect any cable / plug combination to the Test Unit and ‘calibrate out’ the system resistance to ensure that measured continuity values are as accurate as possible.</p>
8	ONE STEP pushbutton	<p>When the AUTO/MAN switch is in the MAN position, pressing the ONE STEP pushbutton once advances the test to the next Cable Pair.</p> <p>When the AUTO/MAN switch is in the AUTO position and the test has halted due to a locating a faulty Cable Pair, pressing the ONE STEP pushbutton advances the test to the next Cable Pair.</p>
9	START pushbutton	<p>The START pushbutton performs a multifunction role, starting tests, changing selections (e.g., Test Speed Slow to Fast), and exiting tests.</p> <p>During AUTO mode, pressing the START pushbutton initiates the testing at Cable Pair 1. Holding the START pushbutton down during a test execution resets the test to Cable Pair 1.</p> <p>During MAN mode, pressing the START pushbutton resets the test to Cable Pair 1.</p> <p style="text-align: center;">NOTE</p> <p>When running MAN mode it may be necessary to press the ONE STEP button while pressing the START button.</p>
10	TEST switch	<p>A three-position switch for selecting the required test mode:</p> <p>CCHK – Selects the “continuity” test mode. IR – Selects the “insulation resistance” test mode. MENU – Selects the Test Unit Self-Test Functions.</p> <p style="text-align: center;">NOTE</p> <p>When running a test in either AUTO or MANUAL mode, changing the TEST switch position (e.g., IR from CCHK) will cause the test that is running to halt and the display</p>

		to change to the new setting.
11	AUTO/MANUAL switch	<p>Permits AUTO (automatic) or MAN (manual) operating mode of the Test Unit.</p> <p>AUTO – Testing of the Cable Pairs is performed automatically, beginning with Cable Pair 1 and ending with Pair 26.</p> <p>MAN – Testing of the cables pairs is performed manually by depressing the ONE STEP pushbutton for each Cable Pair. The manual test begins with Cable Pair 1 and steps through to Cable Pair 26. The MAN position is normally used when troubleshooting or repairing a cable assembly.</p>
12	PAIRS 14-26 connector	Provides for connection of the 26-pin female connector on the branched cable.
13	PAIRS 1-13 connector	Provides for connection of the 26-pin male connector on the branched cable.
14	UP/DN switch	A momentary rocker switch that allows the operator to interact with the LCD display (7) selections prior to test execution, and also allows for stepping through test results once completed.
15	LCD Contrast Adjust	<p>This panel-mounted potentiometer is used to adjust the contract of the LCD Display.</p> <p style="text-align: center;">NOTE</p> <p>The contrast may need to be adjusted during use in temperature extremes, when charging or when the Battery Pack charge is low, which is normal for all LCD Displays.</p>
16	Battery Pack Cable Inlet	This inlet allows for the Battery Pack to be connected to the Test Unit Internal Assembly.

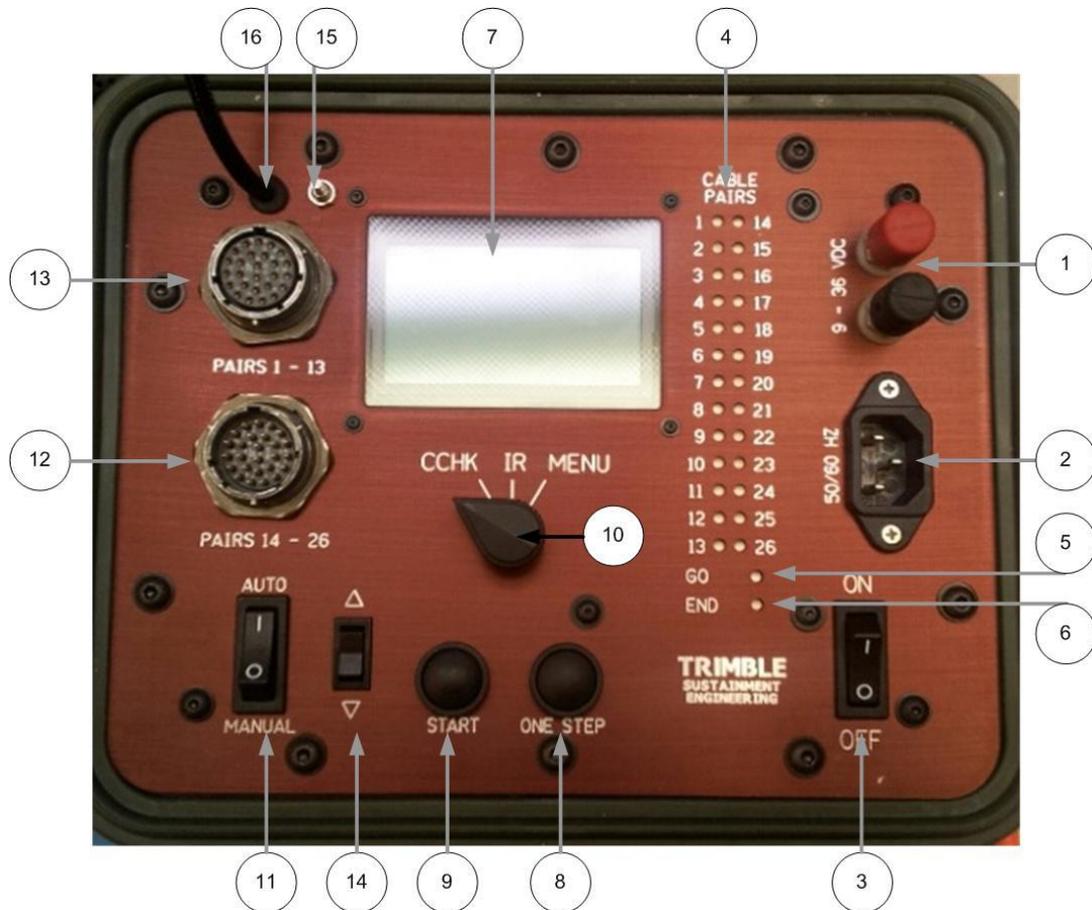


FIGURE 8. CONTROLS AND INDICATORS

3.3. OPERATING INSTRUCTIONS

When the Test Unit is being powered via internal battery, only the pairs under test will illuminate while all others will remain extinguished to conserve battery power. Once the test is completed and the START button is depressed, the Test Unit will automatically power down to conserve power.

If the Test Unit is being powered via an external source, the Cable Pairs will illuminate continuously to indicate test results. The END indicator will light and remain ON until a new test is initiated (i.e., there is no auto power shutdown).

3.4. INTERNAL BATTERY CHECK

The Test Unit continuously monitors the battery level and will top off the battery charge as necessary. When the battery pack discharges sufficiently below the fully charged value, the Test Unit LCD display will notify the operator by displaying “BAT LO” in the upper right corner.

When externally powered, the LCD upper right corner will indicate either “*CHG*” (blinking), “BAT OK” (fully charged), or nothing (battery is not installed).

When powered by the internal Battery Pack, the LCD upper right corner will indicate either “BAT OK” (battery charge is within tolerance) or “BAT LO” (battery requires charging soon).

3.5. SELF-TEST - IR and CCHK

3.5.1. Insulation Resistance Test

To self-test the Test Unit, proceed as follows:

1. Connect the two connectors on the branched cable to the two connectors (PAIRS 1-13 and PAIRS 14-26) on the Test Unit Front Panel Assembly. Ensure the test plug is not connected to the branched cable.
2. Set the Test Unit as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST SWITCH	IR
AUTO/MANUAL	AUTO

3. Using the “UP/DN” switch and from the Test Unit LCD, select SELF-TEST and press the START pushbutton. The CABLE PAIRS indicators will cycle through from 1 to 26, testing each wire for a resistance of greater than 10MΩ. The LCD will indicate the measured value of each conductor within the 26-pairs as well as PASS/FAIL. Failures will be noted on the LED Display.
4. Upon completion, the GO indicator will illuminate either GREEN (GO or PASS, the cable is ready for use) or RED (NO-GO or FAIL, the cable or Test Unit require repair).
5. If a failure is noted, use the “UP/DN” toggle switch to step through the measured values of each Cable Pair until the failed wire is located. Note the wire number and A or B designator along with the measured range prior to continuing to the next step.
6. If the IR (3.5.1) self-test fails, isolate the failed component by first performing the following:
 1. Remove and replace the branched cable with an alternate.
 2. Perform the Insulation Resistance Test (3.5.1). If the test passes, mark the previous cable as potentially bad and remove from service. If the test fails, mark the Test Unit as requiring maintenance and remove from service.

3.5.2. Continuity Test

To self-test the Test Unit, proceed as follows:

1. Connect the two connectors on the branched cable to the two connectors (PAIRS 1-13 and PAIRS 14-26) on the Test Unit Front Panel Assembly. Ensure the test plug is connected to the branched cable.
2. Set the Test Unit as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON

TEST SWITCH	CCHK
AUTO/MANUAL	AUTO

3. Using the “UP/DN” switch and from the Test Unit LCD, select SELF-TEST and press the START pushbutton. The CABLE PAIRS indicators will cycle through from 1 to 26, testing each pair for a resistance of <10, 20, 40, 60, 80, 100 and 120Ω. Measured resistance values will be noted on the LCD Display and failures will be noted with the Red/Green LED Display.
4. Once completed, the GO indicator will illuminate either GREEN (GO) or RED (NO-GO). Once completed successfully, the cable under test is verified ready for use.
5. If the CCHK (3.5.2) self-test fails, isolate the failed component by first performing the following:
 1. Remove and replace the branched cable with an alternate. Perform the Continuity Test (3.5.2). If the test passes, mark the initial branched cable as potentially bad and remove from service. If the test fails, continue to the next step.
 2. Remove and replace the test plug with an alternate. Perform the Continuity Test (3.5.2). If the test passes, mark the initial test plug as potentially bad and remove from service. If the test fails, continue to the next step.
 3. Mark the Test Unit as requiring maintenance and remove from service.

3.6. SELF-TEST / MENU SELECTION

3.6.1.Lamp Test

To check the serviceability of the front panel indicators, proceed as follows:

1. Set the Test Unit switches as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST SWITCH	MENU

2. Using the “UP/DN” switch, and from the LCD Display, highlight the LAMP TEST selection and press START and ensure the following occurs:
 - a. All LED’s illuminate RED then GREEN.
 - b. The LCD display turns on all pixels, appearing like a large black box with a white border.
3. After approximately 4 seconds the display will return to its previous state.

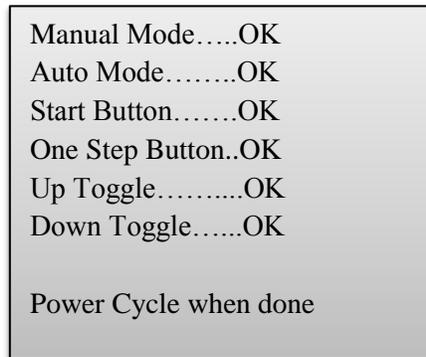
3.6.2.Front Panel Button Test

To check the serviceability of the front panel buttons, proceed as follows:

1. Set the Test Unit switches as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST SWITCH	MENU

2. From the LCD Display, highlight the BUTTON TEST selection and press START and ensure that each button press is reflected on the front panel LCD display. Note that the LCD will display “Power Cycle when done” across the bottom, instructing the operator to power cycle the Test Unit when completed.
3. Once all the buttons are tested, the display should look like the following:



NOTE

This test will continue to run until the operator cycles the Test Unit power switch.

3.6.3. Test Tone

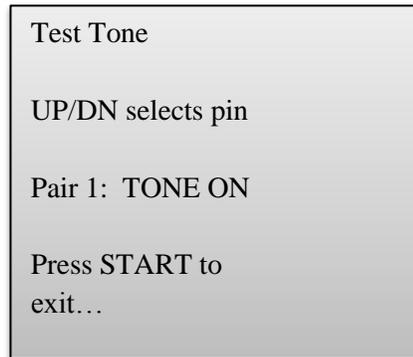
This selection allows the operator to verify that cable under test is capable of passing an audible signal. The Test Unit does not automatically step through the pairs, relying instead on the operator to manually select the pair that requires testing.

To perform the Test Tone test, proceed as follows:

1. Set the Test Unit switches as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST SWITCH	MENU

2. Using the “UP/DN” switch, and from the LCD Display, highlight the TEST TONE selection and press START and ensure the following occurs:
 - a. Cable Pair ‘1’ LED illuminates GREEN.
 - b. The LCD should display the following:



3. Using the “UP/DN” toggle switch, select the cable that requires verification.
4. When the test is complete, press the START button to return to the MENU.

3.6.4. Tester Info

This selection allows maintenance personnel to quickly verify that the Test Unit firmware is up to date. If the firmware is found to be out of date the Test unit must be returned for maintenance.

3.6.5. Auto-Off Enabled/Disabled

This selection allows operator to over-ride the default automatic shut-off that occurs at the end of testing when running on the internal Battery Pack. “ENABLED” means that the Test Unit shall turn off once a successful IR / CCHK test is completed and the START button is pressed to continue. “DISABLED” means that the Test Unit shall not turn off once an IR / CCHK test is completed and START is pressed to continue.

NOTE

The Auto-Off feature was included to extend the life of the Battery Pack. Disabling the Auto-Off feature will reduce the amount of time the Test Unit will be able to run on battery power.

To change the Auto-Off value, proceed as follows:

1. Set the Test Unit switches as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST SWITCH	MENU

- Using the “UP/DN” switch, and from the LCD Display, highlight the AUTO-OFF ENABLED selection and press START. Ensure that the display changes from AUTO-OFF ENABLED to AUTO-OFF DISABLED.
- Pressing START again while AUTO-OFF is selected will alternate the value from ENABLED to DISABLED and back again.

NOTE

Powering cycling the Test Unit returns all values to their default values. If power is lost, settings will need to be changed again.

3.6.6. System Zero Cal

NOTE

Prior to running the System Zero Cal, verify that the Branched Cable and Test Plug to be used will pass the IR and CCHK tests.

The Test Unit was designed to allow for any Branched Cable and Test Plug to be used when testing, even older pre-existing cable assemblies. One issue that may occur with these older cables is a higher line resistance due to age, contact corrosion, etc, and so to counter this the System Zero Cal was included. This function allows the operator to connect any cable / plug combination to the Test Unit and ‘calibrate out’ the system resistance to ensure that measured continuity values are as accurate as possible.

NOTE

Running the System Zero Cal with no cable attached will result in the Test Unit storing bad calibration data. If this occurs, connect a cable / plug and re-run the test prior to resuming testing.

To perform the System Zero Cal, proceed as follows:

1. Set the Test Unit switches as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST SWITCH	MENU

2. Using the “UP/DN” switch, and from the LCD Display, highlight the SYSTEM ZERO CAL selection and press START. The Test Unit will prompt the user to attach the Branched Cable and Shorting Plug. Press START to continue.
3. The LCD will display EEPROM ##: **, where ## is a non-volatile location in memory and ** is a small value, typically 00 to 02, representing the value in ohms. The test will run to completion automatically and, once finished, return the LCD display to the MENU. If the operator notices a very large value (> 60) then a line is faulty and the test will need to be re-run after the cable and plug are verified. It is not necessary to run the SYSTEM ZERO CAL more than once unless the cable and test plug assemblies are changed. All values are stored in non-volatile memory and are loaded when the Test Unit is started.

3.7. INSULATION RESISTANCE TEST

This test serves to check the integrity of the insulation between Cable Pairs and ground, executing the test on the “A” side first, followed by the “B” side. If a faulty wire is detected, the test indicates the defective wire within the faulty pair (e.g. 1A or 1B) and notifies the operator via the front panel LED display.

1. Set the Test Unit as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST	IR
AUTO/MAN	AUTO

CAUTION

The cable assembly to be tested must be completely disconnected (both ends) from the equipment to which it is normally connected.

2. Refer to Figure 9. Connect the cable under test to the Test Unit using the hermaphroditic connector on the branched cable

3. Press and release the START pushbutton and observe that the Cable Pairs indicators illuminate GREEN in sequence, indicating the conductor under test. Note that the test passes through the “A-side” of the connector first, followed by the “B-side”, displaying the results in ‘real-time’ as the test progresses, including the pin under test, the resistance range (e.g. >10M, etc.) and whether the resistance either passes or fails.
4. If step 3 is completed successfully, the insulation resistance of the cable assembly under test is satisfactory and the Test Unit will display either PASS or FAIL at the top of the LCD. The operator can then either use the “UP/DN” rocker switch to cycle through all of the Cable Pairs to review measured values, or press the START button to exit the test. If running on battery power, and if Auto-Off is ENABLED, the Test Unit will then power off to conserve battery power.
5. If any conductor fails the test, the LCD display will indicate a FAIL condition, the GO LED will illuminate RED and the LCD Display will show the failure location (e.g., 1A, 4B, etc).

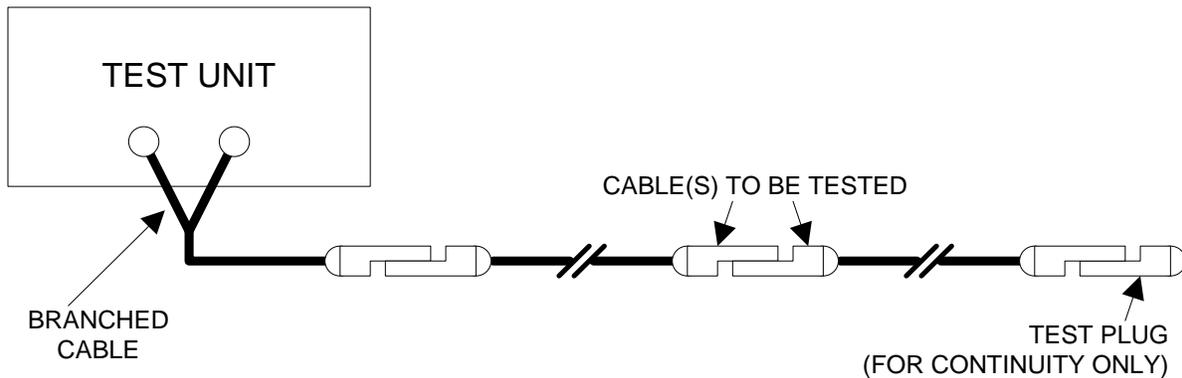


FIGURE 9. TEST UNIT, OPERATIONAL SET-UP

3.8. CONTINUITY TEST

This test checks for and identifies “open circuit” or high resistance Cable Pairs, if any. Note, however, that although the test identifies the faulty pair, the defective wire within the faulty pair (e.g., 1A or 1B) is not isolated by this test. Proceed as follows:

1. Set the Test Unit as follows:

<u>Switch</u>	<u>Setting</u>
POWER	ON
TEST	CCHK
LCD UP/DN	FEET OF CABLE HIGHLIGHTED
AUTO/MAN	AUTO

2. Refer to Figure 9. Install the test plug on the other end of the cable under test.

3. Press and release the START pushbutton and observe that the Cable Pairs indicators illuminate GREEN in sequence, indicating the pair under test and a “PASS” condition.
4. If step 3 is completed successfully there will be no RED LED Cable Pair indicators illuminated and the cable under test is acceptable for use. If failures are noted, refer to paragraph 3.9 for corrective action.
5. Once the test is complete, the Test Unit will display either PASS or FAIL at the top of the LCD. The operator can then either use the “UP/DN” rocker switch to cycle through all of the Cable Pairs to review measured values, or press the START button to exit the test. If running on battery power, and if Auto-Off is ENABLED, the Test Unit will then power off to conserve battery power.

3.9. FAULT INDICATION

If the continuity test (Para. 3.8) or the insulation resistance test (Para. 3.7) is not completed successfully, the GO indicator will illuminate RED continuously, indicating a fault, or NO-GO, condition. In addition to the GO indicator, one (or more) CABLE PAIR indicators will be illuminated RED. The Cable Pair(s) identified by the RED indication is/are faulty and require maintenance. For example, if CABLE PAIR indicator 22 is RED, then Cable Pair 22 is faulty.

NOTE

It should be noted that a Cable Pair identified as being faulty during continuity test merely means that the Cable Pair does not meet the parameters set by the Test Unit; it does not necessarily mean that the cable is defective. Refer to paragraph 3.10 to determine if the cable is still serviceable.

3.10. CABLE USEABILITY TEST

Use the following procedure to determine if a cable found to be faulty as a result of the continuity test (Para. 3.8) is still serviceable.

NOTE

If a continuity fault is detected on a certain cable-length setting, selecting a longer length will assist with determining the usability of the cable assembly under test.

1. Set the Test Unit switches as follows:

Switch	Setting
POWER	ON
TEST	MENU

LCD UP/DN	TEST TONE
AUTO/MAN	AUTO or MANUAL

NOTE

The Test Tone test runs in a manual mode only regardless of the AUTO/MAN selection, with the Cable Pair under test selected using the “UP/DN” rocker.

2. Disconnect the test plug from the cable under test, if installed.
3. Connect a field-type telephone to the far end of the cable under test.
4. Upon Test Tone test execution, use the “UP/DN” rocker switch to select the Cable Pair under test. The “UP/DN” rocker allows for moving both forward and backwards through the Cable Pairs.
5. Listen for the test tone on the selected pair as indicated by the Test Unit. For example, if Cable Pair 1 is selected, connect the field telephone to Cable Pair 1 and listen for the test tone. If the test tone quality is acceptable, Cable Pair 1 is still serviceable. Repeat this check on all Cable Pairs selected by the Test Unit as required.

3.11. REPAIR VERIFICATION

After completing repairs on a faulty cable, perform the insulation resistance test (Para. 3.7) and continuity test (Para. 3.8) before returning the cable assembly to service.

3.12. TEST OF PATCHED PANELS

The Cable Test Set can be used to test the SB-3659/A Panel, Patching Communication (NSN 5859-01-102-2099) and SB-4097/U Panel, Patching Communication (NSN 5895-01-102-2100), or any other patching panels and shelters employing 26-pair connectors, type U-186/U or U-187/U.

Testing of the patching panels is performed in the same manner as described in the preceding paragraphs. Summary follows:

1. For insulation resistance testing, connect the patching panel IN connector to the Test Unit using the branched cable assembly. Make sure that the OUT connector on the patching panel is open circuit, i.e., it must not be connected to any equipment or the shorting plug. Perform the insulation resistance testing per paragraph 3.6.
2. For continuity testing, connect the patching panel IN connector to the Test Unit using the branched cable assembly. Connect the patching panel OUT connector to the shorting plug. Perform continuity testing per paragraph 3.8.

NOTE

The IN and OUT jacks on the patching panel normally provide a straight-thru connection. When

a patch cord is plugged into an IN or OUT jack, the thru connection is broken (becomes open circuit). This feature can be used to check the serviceability of the jacks while performing the continuity testing.

3.13. POWER TURN-OFF (AUTO-OFF ENABLED)

When the Test Unit is operated with the internal battery in AUTO or MANUAL mode and Auto-Off is ENABLED, the unit switches off automatically as follows:

1. When a test cycle (CCHK or IR) is successfully completed and all Cable Pairs pass, the GO and END indicators will illuminate GREEN and the LCD will display the measured values for the first pair. The Test Unit will remain on until the START button is pressed, at which time it will automatically shut off.
2. If a fault is located the Test Unit will not automatically shut off regardless of AUTO-OFF setting.

It is recommended that regardless of the mode (AUTO or MANUAL), the POWER switch be set to OFF when the Test Unit is not in use.

When operating from an external power source (9-36VDC or 110/220VAC), use the POWER switch on the Test Unit to turn the unit off.