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Clare Safetest Manufacturing

Electrical Safety Tester

Operating Manual

Instructions 313A551

July 2011
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Issue 3

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Safety

Note - Please read the following Safety Instructions before use!




Safety Precautions

The manual contains specific warning and caution statements where they apply.

A Warning will identify the conditions and actions that pose hazard(s) to the user.

A caution will identify the conditions and actions that may damage the Tester.

Symbols used within this manual and on the Tester are shown below:

	Risk of electric shock
	Warning of potential hazard
	Conformité Européenne

Use of the instrument in a manner not specified may impair safety. Read the following safety information carefully before attempting to operate the instrument.

Warning

Due to the potential hazards associated with any electrical circuit it is important that the user is familiar with the instructions covering the capabilities and operation of this instrument. The user should ensure that all reasonable safety precautions are followed and if any doubt exists should seek advice before proceeding.

This product is designed for use by suitably trained competent personnel and should be operated strictly in accordance with the instructions supplied.

Failure to comply with these instructions may expose the user to electrical hazard

This Tester performs a number of electrical tests, which involve high voltages and high currents. Never touch the appliance being tested, or the test leads, whilst a test is in progress.

Always check all test leads for signs of damage prior to use. Never use damaged or defective leads.

Always ensure the mains supply to the Tester provides an adequate Earth.

This manual contains information and warnings, which must be heeded to ensure user safety during operation. It is essential that this manual is read fully before proceeding with any tests.

Should the Tester behave abnormally do not continue with the testing. Disconnect immediately. Contact Instruments 4 Engineers on tel: +44 (0) 161 871 7450 for assistance.

Please refer to chapter 5 Maintaining the tester.

Chapter 1 Introducing the Tester

Introduction

The Clare Safetest Manufacturing Electrical Safety Tester is a powerful tool to assist in the analysis of the safety of portable electrical and electronic equipment. A range of tests are provided, with innovative features to aid the various test situations.

The Tester is designed to be easy to use and includes the following innovative features:-

- Stores up to 2400 results including appliances, location, site, date and time in non-volatile flash memory.
- Accurate Earth Bond and leakage measurement even when multiple Earth paths exist.
- Qwerty keyboard with fast keys.
- Full graphics display, Real-time clock.
- Connects to PC, Barcode reader and printer.
- Compatible with Seaward PAT GUARD and other leading software packages. Contact your distributor for pricing
- Software adjusts the user interface to differing levels of expertise.
- Fast Start-up.
- Simple user interface and generic settings enable immediate testing without the need to enter the setup procedures.
- Should the user need alternative test settings, they are fully user definable via the setup menu.
- Super-fast download up to 10 times faster than existing testers.

Your Electrical Safety Tester

The Display

The Safetest Manufacturing is equipped with a 320 x 240 1/4 VGA Graphical Liquid Crystal Display (LCD). The LCD graphic interface has been designed to give clear feedback on the status of the tester and facilitate a simple intuitive menu system that guides the user through each stage in the testing process.

The Keyboard

The keyboard consists of an alpha-numeric keyboard, together with specific function keys. To the bottom of the keyboard are five function keys, which allow the user fast access to options displayed on the Display.

The Safetest Manufacturing keyboard also has the following features: -

Cursor keys

The cursor keys are used to navigate around the various screens and to help edit text input screens.

YES/START key

The YES/START key is used to confirm that everything is correct and / or that the user wishes to continue. The user is normally required to press this key at the beginning of each individual test. This feature allows the user time to abort testing safely should anything go wrong in the test environment.

NO/ABORT key

The NO/ABORT key is used to signal that the user no longer wished to continue with the test or that the response to a screen prompt is negative. It can also be used to backtrack through the various previous menus.

'Fast' keys

There are five fast keys, each situated below the LCD screen. The function of these keys will change dynamically as each screen changes. A text key will be displayed directly above each key to indicate what effect pressing each key will have.

The functions will reflect the most likely actions to be taken from the point of each screen.

The Safetest Manufacturing also has the ability to use non-standard characters, which can be displayed by pressing the 'Symbols' key during text entry. Simply use the cursor keys to highlight the required character and press the Green button. You can also use numeric keys 1-9 to move you to extreme points of the symbol matrix.

The Shift key, combined with other keys, can also be used when editing text. Below is a list of the various effects that can be produced: -

- Shift & left key Go to start of line
- Shift & right key Go to end of line
- Shift & up key Go to Start of text
- Shift & down key Go to end of text

Chapter 2 Using the Tester

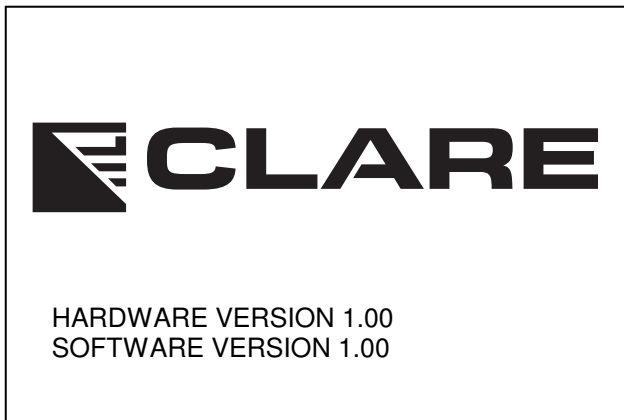
Switching on the tester

The Tester is supplied with a moulded 3 pin plug to ensure that it is safely wired and ready to go from receipt.

The Tester must be powered by a 230V or 110V supply, which includes a protective Earth connection, via a correctly wired 3 pin plug & socket.

Before switching on make sure the guard switch or guard switch link plug is fitted to the guard switch socket in the back panel. (see Chapter 7 Accessories for details of the guard switch.

When switched on, the Tester will carry out a short self-test procedure (approximately 2 seconds). During this test, the following screen will appear:-



The hardware and software versions are displayed during the self-test. This is useful information to quote should any telephone advice or servicing become necessary.

If there are any problems with the supply, the Tester will give a warning indicating the nature of the problem. There are two possible warnings:

1 - Phase / Neutral reversed

As the message suggests, this means that the Tester has detected that the Line & Neutral are reversed in the power socket.

2 - Possible disconnected or isolated or floating Earth connection. Proceed only if safe.

The message can mean one of the following:

- (a) Earth conductor is faulty and/or disconnected.
- (b) Supply is via an isolating transformer so that Line & Neutral are not referenced to Earth.

Note - Although these messages are intended to help flag up a potential hazard due to a faulty mains supply, the absence of a message must not be used as a guarantee that the supply is perfectly serviceable. All mains supplies should be maintained independently, in accordance with the relevant guidelines in the appropriate Standards where they exist.

Once the self-test is complete, the Login Menu will be displayed.

The Login Screen

The login Menu allows the user to identify themselves so that the test records can show who has done the testing.

Site and location can also be set. These can be very useful in a system that uses a central database recording results and information from many distributed outlets.

It is not compulsory to enter data into these fields, but it need only be done once if the information is always the same. The Tester remembers the settings even when switched off and will offer the last entry as default the next time it is powered up, or the next time the user chooses to go back to the Login screen.

The Cursor keys can be used as described above to navigate through the Login Menu.

In addition to the Login Menu, the screen has two fast key functions - SYMBOLS and OK.

The SYMBOLS command allows the user access to additional characters such as mathematical symbols and letters with accents. Pressing the associated fast key will bring up the range of these symbols complete with a flashing cursor.

The Cursor keys can be used to move the cursor to the desired symbol and pressing the ENTER or YES key will add the character to the current position in the data entry field.

The OK command is an alternative to pressing the YES key to accept all the entries. Pressing this will cause the tester to progress to the next screen.

The Main Menu

Once the Login screen is complete, the Main Menu screen will appear. The Screen will look like this:

-----MAIN MENU-----			
NEW TEST MEMORY OPTIONS SETUP			
USER:		SOMEONE	
SITE:		BRANCH	
LOCATION:		ROOM	
NEW TEST	MEMORY OPTIONS	LOGIN	SETUP

As can be seen, there are three main options, plus a fast key command to return to the Login screen.

At this stage, we are only interested in the new test option since the memory options and set-up selections will be described separately in the later chapters of this manual. If you wish to read about these two options now, turn to Chapter 3.

To start a new test make sure the NEW TEST option is highlighted in the menu and press either the YES button or the ENTER key. If the NEW TEST option is not highlighted, move the highlight bar using the cursor keys. Alternatively you can simply press the appropriate fast key.

A narrow Dialogue box will now appear, prompting for a product ID number.

The ID or serial number of the product to be tested should now be entered using either the keyboard or a barcode reader - see page 37 in Chapter 5 for instructions on using a barcode reader.

As with the Login screen, the SYMBOLS option will be available as a fast key command.

Press YES or ENTER when the correct data has been entered.

Selecting The Test Settings

Once the Product ID has been entered, the SELECT TEST SETTINGS menu will appear. The SELECT TEST SETTINGS menu will offer four choices, each of which are preset with factory default settings as described below:

A: METAL CASE / CLASS 1

This test selection is for domestic and hand tool products that have a metal case and that require a full range of tests including Flash. The standard test settings for this selection are:

Earth Bond Test

Current = 25A

Duration = 2 seconds

Pass level = below 0.5Ω

Line Short to Case

Voltage = 40Vac
Duration = 2 seconds
Pass level = below 1mA

Flash Test

Voltage = 1500Vac
Duration = 2 seconds
Pass level = below 3mA

Power/Leakage Test

Voltage = Supply voltage
Duration = 5 seconds
Power Pass level = Nominal $\geq 4\Omega$
Leakage Pass level = below 1mA

B: DOUBLE INSULATED / CLASS 2

This test selection is for domestic and hand tool products that have a plastic or insulated case and that require a full range of tests including Flash. The standard test settings for this selection are:

Line Short to Case

Voltage = 40Vac
Duration = 2 seconds
Pass level = below 1mA

Flash Test

Voltage = 3000Vac
Duration = 2 seconds
Pass level = below 2mA

Power/Leakage Test

Voltage = Supply voltage
Duration = 5 seconds

Power Pass level = Nominal $\geq 4\Omega$
Leakage Pass level = below 1mA

C: POWER CORD TEST

This test selection is for the testing of detachable power cords such that used by computers & kettles etc. The standard test settings for this selection are:

Earth Bond Test

Current = 100mA
Duration = 2 seconds
Pass level = below 0.5Ω

Line Short to Case

Voltage = 40Vac
Duration = 2 seconds
Pass level = below 1mA

Flash Test

Voltage = 1500Vac
Duration = 2 seconds
Pass level = below 3mA

Polarity Test

Voltage = 40Vac
Duration = 2 seconds
Power Pass level = correct wiring

All of these settings are factory preset for convenience, but can user defined as described in Chapter 3.

As with all menus, to select a setting highlight it using the cursor keys and press YES or Enter.

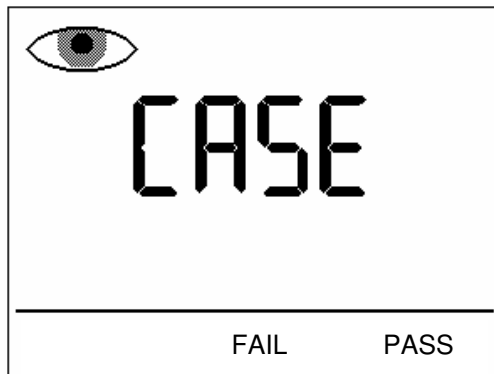
The Test Sequence

Before continuing, make sure that the product to be tested is plugged in to the appropriate socket outlet on the tester and that the Earth Bond clip is connected where Earth bond tests are to be performed. If testing power cord extensions, plug each end into the appropriate receptacle so that both ends are connected to the tester.

Assuming no adjustment has been made to the test sequences, the following sequence will follow the test selection screen:

1: Visual Check

The visual check feature is included to enable the user to record the fact that the unit has been physically inspected for defects. There are three main inspection points - case, lead & fuse. For each of these three inspection categories, the tester will prompt the user for confirmation of a pass or fail result. To record a pass or fail, press the appropriate fast key as indicated on the display. The Visual Check screen will resemble the screen shot below.



Recording a fail result will cause the tester to skip testing and go straight to the end of test options.

2: Earth Bond Test

If the test is a metal case test, the Earth Bond test screen will now appear. The screen will show the current test settings including duration in the top right of the screen, pass level in the main centre display and test current setting in the small secondary readout near the bottom right.

The Earth bond clip must be securely fastened to a **non-moving** Earthed part of the product under test. The area must be non-moving to prevent any hazards during the Leakage test which powers the unit.

Pressing Enter or YES will cause the test to be performed.

3: Insulation Test

If selected in the test settings, the Insulation Test will be performed. The test applies 250V or 500V to Live & Neutral with respect to Earth.

The protective insulation between Live / Neutral and Earth is then measured and displayed in M Ω .

If testing a Double Insulated product, use the Flash probe and apply it to a suitable test point on the product under test.

4: Short to Case

The Short Line to Case test will be performed automatically and will display the fault current that would have resulted from applying the full mains voltage to the product.

This test is designed to avoid the risk of powering up a product that has a severely damaged insulation. A safe voltage level of 40Vrms is applied to both Live and Neutral conductors and the resulting current to Earth is measured.

If this test fails, testing on the product must not continue until the fault has been rectified.

5: Flash Test

**WARNING - The voltage output during this test is potentially lethal.
Do not test if you are in any doubt about the safety of the test facility.
Do not test if the Earth Bond test has not been successfully performed if testing a metal cased product.
NEVER touch the product during any of the tests.**

Depending on test selection, the Flash test is performed at either 1500Vac or 3000Vac. For Metal Cased products, the test is performed at 1500Vac.

The test voltage will be displayed at the top of the screen.

If testing a Double Insulated product, use the Flash probe and apply it to a suitable test point on the product under test.

6: Leakage Test / Power Test

WARNING - The product under test will be powered up during this test. It is essential to ensure that no hazard will result from the product function e.g. spinning drill etc.

During the test, the tester will display the leakage current to Earth in the main readout and the power dissipation in the secondary readout.

Power tests are not normally performed during power cord tests.

7: Polarity Test

The Polarity test is only performed during Power Lead Tests.

The test checks for correct wiring in the power cord extension.

8: Testing is now complete.

At the end of the test sequence the End of Test menu will be displayed. The menu will offer the following options: -

New Test

Selecting New Test will cause the tester to store the test results and return to the Product ID dialogue box.

Print Results

Selecting Print Results will cause the tester to print the results in the current print format.

This setting will default to Roll Printer PASS / FAIL labels.

Performing Manual Tests

Manual mode provides the user with direct access to the tests. In this mode individual tests can be selected and performed. This is particularly useful where a product has unique test requirements such as multiple Earth Bond test points.

Entering Manual Mode

After selecting New Test and entering a Product ID, use the Fast key to select Manual Mode from the Select Test Settings menu.

The following menu will now appear: -

```
-----MANUAL TEST SELECTION-----  
1. VISUAL CHECK  
2. EARTH BOND TEST  
3. SHORT TO CASE  
5. FLASH TEST  
6. LEAKAGE TEST  
8. POLARITY TEST  
C. TEST COMPLETE  
S. SWITCH 110V / 240V
```

Press the appropriate key to select a test or use the cursor keys to scroll to the test and press enter or YES/START.

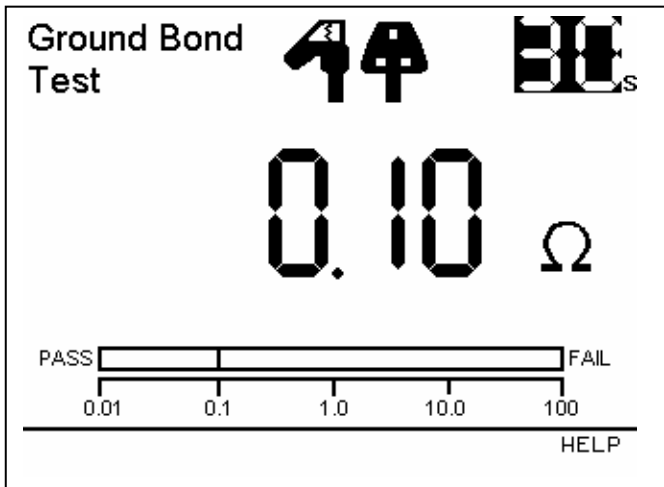
Performing The Test

Visual Check

This test is performed in the same way as when performed during the standard automatic tests. Once the test is complete, the Manual Test Selection menu will reappear.

Earth Bond Test

There are two areas of interest in the test screens. The areas are shown in the following screen shot:



The cursor keys can be used to change the value of each of the parameters. To do this, press the left or right cursor to highlight the parameter to change and the press up or down cursors to toggle through the various settings until the desired setting is selected.

Once the settings on screen are correct, press YES/START to perform the test. Once the test is complete, the tester will return to this screen to allow another test to be performed if required. If no more Earth bond tests are required for that product then press NO/ABORT at this stage and the tester will return to the Manual Test Selection menu.

Short to Case

As with Earth Bond Test, the cursor keys can be used to change the value of each of the parameters. To do this, press the left or right cursor key to highlight the parameter to change and the press up or down cursors to toggle through the various settings until the desired setting is selected.

Once the settings on screen are correct, press YES/START to perform the test. Once the test is complete, the tester will return to this screen to allow another test to be performed if required. If no more tests are required for that product then press NO/ABORT at this stage and the tester will return to the Manual Test Selection menu.

Flash Test

As with the above tests, the cursor keys can be used to change the test parameters, but here we can also change the test type from Metal Case to Double Insulated. This is done by highlighting the voltage setting and pressing the up or down cursor keys to toggle the setting. If performing double insulated tests, the Flash Probe must be used and applied to an appropriate point on the product under test.

Once the settings on screen are correct, press YES/START to perform the test. Once the test is complete, the tester will return to this screen to allow another test to be performed if required. If no more tests are required for that product then press NO/ABORT at this stage and the tester will return to the Manual Test Selection menu.

Leakage Test

This test should only be performed after ensuring that no hazard will result from the product function e.g. spinning drill etc.

Once the settings on screen are correct, press YES/START to perform the test. Once the test is complete, the tester will return to this screen to allow another test to be performed if required. If no more tests are required for that product then press NO/ABORT at this stage and the tester will return to the Manual Test Selection menu.

When all testing is complete, press C or select complete and press YES/START. The normal end of test options will now appear and the procedure described in section 7 of the normal test process can be followed.

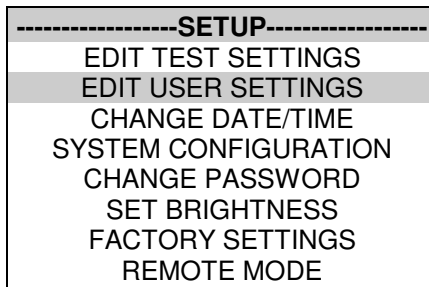
Chapter 3 – Changing the Setup

Configuring The Tester

Although the tester has been designed to be used without the need to make any changes to the settings, it is possible to tailor the settings to suit the individual application. The settings include user preferences, automatic printing of labels and disabling help screens etc. The configuration & settings are accessed via the SETUP option.

How to use Setup

To set up the Tester, use the cursor keys to highlight the Setup option on the Main Menu and press Enter to display the following menu: -



From this menu you can change the way the Tester will operate and also change User levels. Use the cursor keys to highlight a function and press Enter to select the desired option.

Edit Test Settings

This allows the user to add, modify, remove or confirm test settings that can then be selected during automatic testing.

SELECT TEST SETTING
A. 240V CLASS 1
B. 240V CLASS 2
C. 240V POWER CORD
D. 110V CLASS 1
E. 110V CLASS 2

Use the cursor keys to highlight a Test Setting and press Enter to invoke the TEST SETTING EDITOR.

The TEST SETTINGS EDITOR will appear as shown below and will allow changes to be made to the test sequence if required.

-----TEST SETTINGS EDITOR-----				
	OUTPUT	LIMIT	DUR	NUM
SOCKET	230V			
VISUAL		YES		1
EARTH BOND	25A~	0.10Ω	5s	1
SHORT LINE		SKIP		
FLASH		SKIP		
LEAKAGE	110V~	0.75mA	5s	1
POLARITY		SKIP		
NAME: DOUBLE INSULATED				
OK				

Use the cursor keys to highlight a field to be changed and press Enter to select the desired option.

Name

Each test sequence is given a name. This is to help the user when selecting test sequences during automatic testing. When Name is highlighted press the Enter button, then use the keyboard to enter a new name for the Test Sequence (of up to 15 characters) and press Enter to confirm.

Test Parameter Fields

By selecting one of the test parameter fields from the TEST SETTINGS EDITOR, a list of options for that field will be displayed as shown in the example below: -

-----LEAKAGE-----			
O/P	LIMIT	DUR	
110V	SKIP	2s	2
230V	0.25mA	5s	4
	0.50mA	10s	5
	0.75mA	30s	10
	1.00mA	60s	15
	1.50mA	120s	20
	2.00mA	180s	25
			UL
			UL

When you first enter this menu all of the previous values and one of the Test Parameter columns are highlighted. Use the cursor left and right keys to highlight the Test Parameter to be changed and then use the cursor up and down keys to highlight the required setting. Use this process for each Test Parameter.

Use the Enter button or OK Fast key to save the settings and return to the TEST SETTINGS EDITOR. Press the Red button to abort changes made to the settings and return to the TEST SETTINGS EDITOR.

Store Settings

Use the cursor keys to highlight the OK and press Enter or select the OK Fast key to save the settings and return to the previous menu. Pressing the Red Button will abort all of the changes made and return to the previous menu.

Edit User Settings

This menu will appear as below: -

----- EDIT USER SETTINGS -----
NAME: JOHN
USER LEVEL: ADVANCED
BEEP ON KEYPRESS: YES
BEEP ON TESTS: YES
BEEP ON BARCODES: YES
BEEP ON WARNING: YES
OK

To change the user name highlight NAME and press the Enter button.

Note

If you change the name of the user during testing all of the previous tests will still be referenced to the old user name, this gives unlimited amounts of users within the test results memory.

Use the cursor keys to highlight options that can be selected for each User and press Enter to select the desired option.

User Level

Use the cursor keys to highlight a USER LEVEL and press Enter to select the desired option.

Novice User

Selects the User level as a NOVICE user. This will cause Help screens to be displayed prior to every test.

Advanced User

Selects the user level as an ADVANCED user. No Help will be displayed before each test automatically. Help is still available from the Help fast key

Beep on Key Press

Use the cursor keys to highlight the option and press Enter to select the desired option.

This option will cause a beep every time a key is pressed.

Beep on Tests

Use the cursor keys to highlight the option and press Enter to select the desired option.

This option will cause a beep whenever the High Voltage Test in Progress icon is displayed or a test has failed.

Beep on Barcodes

Use the cursor keys to highlight the option and press Enter to select the desired option.

This option will cause a beep whenever a barcode has been received.

Beep on Warning

Use the cursor keys to highlight the option and press Enter to select the desired option.

This option will cause a beep whenever a warning message is displayed or a test fails.

Saving User Settings

In the EDIT USER SETTINGS, highlight OK and press the Enter button or select the OK Fast key. The user settings will then be saved.

Change Date / Time

-----SET DATE AND TIME-----
01/08/2002 15:30

This option allows the user to change the Date and Time. Use the left and right cursor keys to highlight the digit to be changed. Use the up and down cursor keys to change the value or enter the digits directly using the keypad. Select the OK Fast key to store the settings or press the Red button to cancel any changes.

System Configuration

-----SYSTEM CONFIGURATION-----	
POWER POLARITY:	INPUT & REVERSED
ON TEST FAILURE:	END APPLIANCE
AFTER TEST:	OPTIONS
ROLL PRINTER:	SEAWARD (283A954)
DATE AND TIME:	UNPROTECTED
USER LIST:	UNPROTECTED
EDIT PASS/FAIL LABEL TITLE	
OK	

The SYSTEM CONFIGURATION settings cover the range of system settings available to the User.

POWER POLARITY

This option will allow the tester to perform the power tests in one of three ways.

INPUT POLARITY - perform the power tests with the same mains polarity as the Safetest Manufacturing is powered.

AUTO CORRECTED - perform the power tests with the mains correct polarity even if the Safetest Manufacturing is powered from a socket, which has the mains polarity, reversed.

INPUT & REVERSED - this option will perform two power tests for every one selected, one with the correct mains polarity and one with the reverse mains polarity.
Default is INPUT POLARITY.

ON TEST FAILURE

This gives the User the option of having a menu for a failure within an automatic sequence. This menu will give you the option of retrying a failed test or appliance.
Default is FAIL MENU.

AFTER TEST

The options set here determine the next action after all the test results are saved to memory. Options are: -

OPTIONS – Displays the OPTIONS menu giving the User further choices.

NEW TEST – Will display the ENTER APPLIANCE DETAILS screen to immediately commence the next test.

DOWNLOAD, NEW TEST – Will Download the test results with out further prompting and display the ENTER APPLIANCE DETAILS screen to immediately commence the next test. When this option is chosen a further option is required to CONFIGURE the Download.
Default is OPTIONS.

ROLL PRINTER

This allows the user to define the roll printer to be used with the Safetest Manufacturing. For barcode printing with the Seaward Thermal Printer (283A954) set to SEAWARD (283A954).

Change Password

It is possible to Password protect the TEST SEQUENCE EDITOR and the SYSTEM CONFIGURATION

If you currently do not have password protection you will be asked to enter a new password twice, once for confirmation.

If you currently do have password protection then you will be asked for the old password before entering a new one, again you will be asked for the new password twice.

To clear the password protection, simply press Enter when asked for the new password. Or set the field to 'blank' (i.e. all spaces) if a password was previously set.

Set Brightness

You can set the Brightness of the display. Use the cursor keys to change the Brightness, once the Brightness is set press the Green button to accept the changes. Press the Red button to abort any changes made.

Factory Settings

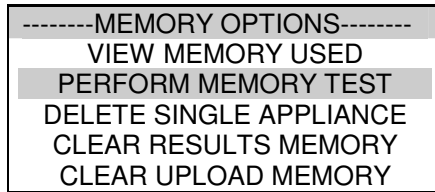
It is possible to reset the Safetest Manufacturing to the settings which were configured from new. This option will first ask you if you are sure, select Yes to reset or No to abort.

Caution

This will restore all TEST SETTINGS to the default levels

How to use the Memory

To use the memory tests and functions, use the cursor keys to highlight the MEMORY OPTIONS on the Main Menu and press Enter to display the following menu: -

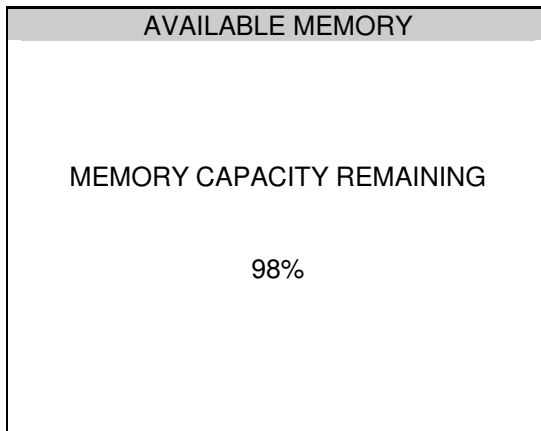


Use the cursor keys to highlight a test or function and press Enter to select the desired option.

View Memory Used

The Tester allows the user to see how much of the results memory is being used. The following bar graph of the memory remaining is displayed:-

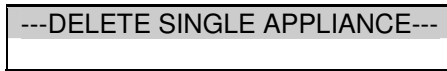
Perform Memory Test



Once the PERFORM MEMORY TEST option is highlighted press the enter button.

The memory test checks all of the appliance results against their checksums. If the test passes then no action is taken. If the test fails then the Memory checksum requires updating. Use the cursor keys and press Enter to choose an action if corrupted tests are found.

Delete Single Appliance



Enter the Appliance number to delete a single appliance and press Enter.

A warning 'Are You Sure?' prompt will appear. Press the No Fast key to return to the previous menu or press the Yes Fast key to perform the delete operation and return to the previous menu.

Clear Results Memory

This option will delete the entire test results currently stored in memory and should be used carefully!

A warning 'Are You Sure?' prompt will appear. Press the No fast key to return to the previous menu or press the Yes fast key to perform the clear operation and return to the previous menu.

Chapter 4 Tips & Troubleshooting

How to use Help

The Tester is provided with an on-line help function, which can be called up when the test screens are displayed, by pressing the HELP fast key.

Each test will have three or four help pages depending on information content.

Help Provided to the User

The Help function provides the following information:-

Description of Test

The first help page shown contains information on the particular test, including its icon and a description of the purpose of the test.

How to Perform Tests

The second page of information describes how the Tester performs the test. A diagram showing how to connect the Tester to the EUT is included. A description of how to connect the test leads and perform the test is provided in a step-by-step format.

Why tests fail

The final page of information provides guidance on why a test may fail e.g. connection problems. This includes a step-by-step checklist to ensure all of the connections are correct and secure.

Power-On Self tests:

When the tester is powered on, a number of messages can possibly appear as the Tester performs safety tests on itself and the mains power supply.

If a voltage greater than 30V is detected on the neutral input line or the Earth is missing then the following message will be displayed.

-----WARNING-----
LIVE AND NEUTRAL REVERSED
PRESS ANY KEY TO CONTINUE

Check for incorrect wiring on supply.

The next test will check for a Earth connection. If there is no Earth connection, the following message will appear.

-----WARNING-----
POSSIBLE DISCONNECTED, FLOATING OR
ISOLATED EARTH
CHECK INPUT EARTH BEFORE CONTINUING

Check for incorrect wiring on supply.

The Tester will fail the Earth check if it is being supplied with a balanced supply (e.g. isolating transformer) since it will detect phase voltage on both L and N supply connections. Only continue if certain that the supply is balanced and the Earth on the Tester connection is secure.

If all the above is checked OK, then the Safetest Manufacturing may be faulty. Contact Instruments 4 Engineers for repairs.

The unit then completes an internal check. If any faults are found then the following message will be displayed: -

-----WARNING-----
INTERNAL RELAY FAULT.CANNOT PROCEED.

If this message is displayed then the Safetest Manufacturing is faulty and should be returned to your Clare agent for repair.

Safety Tests during operation

The Tester performs self-tests during normal operation. An internal Earth Bond test and a low voltage test are performed prior to applying mains power to any EUT (including Leakage tests). If the internal Earth Bond test fails, the following message will be displayed: -

-----WARNING-----
INTERNAL RELAY FAULT.CANNOT PROCEED.

If this message is displayed then the Safetest Manufacturing is faulty and should be returned to your Clare agent for repair.

If the low voltage test fails, then either of the following warnings will be displayed:-

-----WARNING-----
APPLIANCE MAY BE SHORT CIRCUIT
PRESS THE ENTER BUTTON IF SAFE
PRESS THE RED BUTTON TO ABORT

-----WARNING-----
FUSE MAY BE OPEN CIRCUIT
PRESS THE ENTER BUTTON IF SAFE
PRESS THE RED BUTTON TO ABORT

These messages mean that the EUT is switched off or the fuse may be open circuit, or it may be possible that the EUT will draw more

than 20A and could damage the Tester. User discretion is required, but if in doubt about the test and seek advice.

Temperature monitoring

The tester is provided with internal temperature monitors to ensure sensitive components are not overheated. High rates of testing may lead to this situation, especially with long duration Earth Bond tests. Setting Earth Bond test duration to 2 secs will increase operating time. If the following message appears, leave the tester to cool down before pressing Enter to continue testing.

WARNING
THE TEST HAS BEEN ABORTED BECAUSE THE
APPLIANCE TESTER BECAME TOO HOT. ALLOW
THE UNIT TO COOL BEFORE STARTING PRESS
ENTER BUTTON TO CONTINUE

Multiple Earth Connections:

In general, multiple Earth connections to a EUT (e.g. water pipe connections to a water heater) can cause difficulties in measurement. This has previously needed the additional Earth connections to be isolated.

The Safetest Manufacturing tester is capable of testing Earth connections in the presence of additional Earth paths. This is done automatically by performing a point-to-point measurement of the Earth connection, and measurement of the differential leakage current, rather than the Earth lead current. Measurements are thus assured without special precautions.

Chapter 5 - Interfacing

The Tester provides two interfacing ports: -

Serial Port

The serial port uses a standard 9-way D-type connector

Pin	Description
1.	N.C.
2.	RX
3.	TX
4.	DTR
5.	0V
6.	N.C.
7.	0V
8.	N.C.
9.	+5V

Baud Rate:	9600, 19200, 28800 (selectable)
Start Bits:	1
Data Bits	8
Stop Bits:	2
Parity:	None
Inter-character Delay:	20ms

The Serial Port is for connection to a PC, Printer, Barcode Reader, Modem, or Brain Cell Reader.

Parallel Port – for printing to generic printers

To avoid any problems during download, ensure that leads are undamaged and correct for the application.

Downloading to Computer Software

For the PatGuard Programs always select SSS as the Download Format on the Download Options screen prior to downloading

Barcodes

Barcode Scanner Specification

The Safetest Manufacturing Tester can be used with barcodes and barcode scanners, readers or wands compatible with other Seaward PAT testers. These connect to the serial (RS232) connector. The required barcode reader / scanner configuration is as follows: -

Baud Rate:	9600
Start Bits:	2
Data Bits	8
Stop Bits:	2
Parity:	None
Inter-character Delay:	20ms

When to use a Barcode Scanner

Barcodes are used to identify the product number. These are usually in the form of a sticker secured to the in the ENTER APPLIANCE DETAILS screen.

Desk Test n Tag Printer

The Safetest Manufacturing Tester has been designed to work alongside the Desk Test n Tag System. The system enables connection to the printer via the parallel port whilst using a barcode reader or tag/brain cell reader in the serial port.

Guard Switch

The guard switch socket is provided for use as a safety interlock to enable the user to comply with BS EN50191. The guard switch can be opened at any time and testing will be interrupted to ensure the safety of the user.

Beacon

As with the guard switch socket, the beacon socket is provided to enable the user to comply with BS EN50191.

Chapter 6 Maintaining the Tester

Cleaning the Tester

The Tester case can be cleaned with a damp cloth, with if necessary, a small amount of mild detergent. Prevent excessive moisture around the socket panel or in the lead storage area. Do not allow liquid inside the Tester, or near the sockets panel. Do not use abrasives, solvents, or alcohol.

If any liquid is spilt into the Tester case, the Tester should be returned for repair, stating the cause of the defect.

User Maintenance

The Tester is a rugged quality instrument. However, care should always be taken when using, transporting and storing this type of equipment. Failure to treat the product with care will reduce both the life of the instrument and its reliability.

If the Tester is subject to condensation, allow the Tester to completely dry before use.

- Always check the Tester and all test leads for signs of damage and wear before use.
- Do not open the Tester under any circumstances.
- Keep the instrument clean and dry.
- Avoid testing in conditions of high electrostatic or electromagnetic fields.
- Maintenance should only be performed by authorised personnel.
- There are no user replaceable parts in the Tester.
- The unit should be regularly calibrated (at least annually).
- For Repair or Calibration please return the unit to your authorized distributor. Contact details below.

Contact address:-

Instruments 4 Engineers Ltd

Stockport Business & Innovation Centre

Broadstone Mill, Broadstone Road

Stockport, SK5 7DL , United Kingdom

Tel: +44 (0) 161 871 7450

info@instruments4engineers.com

Contact: Joy Torres

Chapter 7 Accessories

A series of standard and optional accessories are available for the Clare Safetest Manufacturing Tester. The standard accessories are supplied with the Tester.

Standard Accessories

<i>Accessory</i>	<i>Part Number</i>
Earth Bond Test Lead	249A908
Flash Probe	43B679
Instruction Manual	313A551
Computer Download Lead	44B113

Optional Accessories

<i>Accessory</i>	<i>Part Number</i>
Barcode Scanner	194A922
Serial Printer Lead	283A955
Serial-PC Lead (9-9 way)	194A919
Serial-PC Lead (9-25way)	194A920
Read/Write Brain Cell Reader	288A910
Brain Cells (Self Adhesive) (50)	288A953
Brain Cells (Cable Tie) (50)	288A954
PATGuard Plus Software	296A910
Desk Test n Tag Printer	312A950
Desk Test n Tag Printer Labels	312A954
Desk Test n Tag Printer Ribbon	312A952
Guard Switch	DCS317
Beacon	H-5027
Beacon connector lead	H-5028

Chapter 8 Specifications

Specification

Earth Bond Test

Test Voltage	6V nominal (no load)
Test Current	4A, 10A, 25A (into s/c load)
Range	40m Ω - 19.99 Ω
Resolution	1m Ω
Accuracy	+/- 5% +/- 2 digits
Pass Levels	user selectable

Earth Screen Test (IT Earth Bond Test)

Test Voltage	100mV nominal (no load)
Test Current	100mA (into s/c load)
Range	40mW - 19.99W
Resolution	1m Ω
Accuracy	+/- 5% +/- 2 digits
Pass Levels	user selectable

Insulation Test

Test Voltage	500V
Display Range	0.1 - 99.99M Ω
Accuracy	+/- 5% +/- 2 digits (up to 19.99M Ω)

Short to Case Test

Test Voltage	40V a.c. o/c
Display Range	0.1 - 20.0 mA a.c.
Resolution	0.01mA
Accuracy	+/- 10% +/- 2 digits (1.00 - 20mA)
Pass Levels	selectable up to 15mA

Flash Test (CLASS 1)

Test Voltage	1.5kV a.c
Display Range	0.1 - 10 mA a.c.
Resolution	0.01mA
Accuracy	+/- 5% +/- 2 digits
Pass Levels	selectable up to 10mA

Flash Test (CLASS2)

Test Voltage	3.0kV a.c
Display Range	0.1 - 10 mA a.c.
Resolution	0.01mA
Accuracy	+/- 5% +/- 2 digits
Pass Levels	selectable up to 10mA

Leakage

Test Voltage	Mains Supply
Display Range	0.1 - 20.0 mA a.c.
Resolution	0.01mA
Accuracy	+/- 10% +/- 2 digits (1.00 - 20mA)
Pass Levels	selectable up to 10mA

Power Tests

Resolution	0.01kVA
Measured Load	0 - 4kVA
Accuracy	+/- 10 of reading, +/- 2 digits

IEC Lead Test

Test Voltage	40Vac
Detects	Good, Open, Short, Reversed

Mechanical

Size	450mm x 410mm x 155mm
Weight	3.5kg

Environmental

Operating	0°C to 40°C (non condensing)
Storage	10°C to 50°C (non condensing)
Maximum RH	90%
Supply Rating	110V - 230V +/- 6% 50/60Hz
Max Output Current	20A

Appendix A Purpose of Tests

Earth Bond Test

This test is to ensure that the connection between the Earth pin in the mains plug of the appliance and the metal casing of the appliance is satisfactory and of sufficiently low resistance.

A selectable test current is applied between the Earth pin of the mains supply plug and the Earth Bond test lead clip.

A high current is normally used to stress the connection under fault conditions. The length of the test should be limited to prevent damage due to overheating.

Earth Screen Test

This test is to check the Earth screen connection using a current which will prevent damage that may be caused by testing using high currents. This is often required by sensitive electronics such as computers and other Information Technology (IT) equipment.

A low voltage of approximately 100mV AC RMS is applied between the Earth pin of the mains supply plug and the Earth Bond test lead clip. A current of 100mA is allowed to flow for the duration of the test.

Insulation Test



Warning

500 V / 250V d.c. test voltage

This test is used to verify that adequate insulation exists between the mains supply pins and earth.

During the insulation test, a 500V DC voltage is applied between the earth pin and both the live and neutral pins of the appliance mains supply plug. The Tester displays the resistance measured and allows the user to confirm sufficient insulation exists.

For Class 2 appliances, the Earth Bond Test clip can be used for an earth return lead.

For appliances which incorporate over-voltage protection, a 250V DC test voltage is provided to allow a reading to be taken without the protection devices generating a false failure.

Short to Case Test

The Short to Case test applies a nominal voltage of 40V AC RMS to the appliance and is applied between the Earth pin and both the live and neutral pins of the supply plug. For Double Insulated appliances, connect the Earth Bond test clip to the appliance as a substitute for the Earth.

The Tester measures the current that flows and scales the result to display a guide to the current that would flow if the test voltage had been the nominal mains supply voltage, scaled for the applicable socket.

Please note that values for Short to Case may differ substantially from that of conventional Earth Leakage tests because of the way that the test is performed (e.g. it will be affected by the presence of Neutral-to-Earth suppression capacitors).

This test can prove useful in situations where neither conventional Insulation nor Flash Tests are acceptable methods of testing the insulation of the appliance.

Flash Test



Warning

1500V/3000V a.c. test voltage

For Metal Cased appliances, a nominal test voltage of 1.5kV AC RMS is applied between the Earth pin, and both the live and neutral pins of the appliance mains supply plug

For Double Insulated appliances, a nominal voltage of 3.0kV AC RMS is applied between the flash probe tip and the live and neutral pins of the appliance mains supply plug.

IEC Lead Test

This test confirms the electrical safety of 230V IEC leads.

The IEC test performs a continuity and polarity check on the Live and Neutral conductors and confirming that there are no breaks or cross wiring in these conductors.

Powered Tests

Warning

During these tests full mains voltage is applied to appliance. Operators must make sure that no hazard will arise from the equipment under test being energized. For instance, it is important that the user verifies that an appliance with moving parts (e.g. an electric drill) is safely mounted to allow movement without causing damage to equipment or personnel.

The following powered tests differ from the previous tests in that they apply mains supply voltage to the appliance to perform their functions: -

- Leakage Test
- Power Test

The Tester performs an initial low voltage test to establish that the appliance can be safely powered.

If the potential load current is too high, a warning message appears, allowing the user to continue. If a Live to Neutral short exists, this message will appear, and if tests are continued the fuses will blow. If the potential load current is low, a warning message appears to allow the user to check that the appliance is switched on, and all fuses are intact. The Tester also performs a safety test to verify that internal relays are properly set before applying full mains supply to the appliance.

Power to the appliance will remain until the Red Button is pressed. This allows the user to switch between the three powered tests without removing power from the appliance.

Leakage Test

The Leakage Test shows the current being lost through Leakage as the difference in the currents flowing in the Live and the Neutral conductors. This difference is the total leakage away from the appliance, and is generally equivalent to the current flow through the Earth lead of the appliance, and displays the result in milliamps (mA).

This differential method of determining leakage will show the full leakage of an appliance in-situ, so if the appliance has an extra Earth point, i.e. water pipe, then the Tester will show the full and true appliance leakage. This is also known as Enclosure or Differential Leakage.

Power Test

The Power test supplies the equipment under test, connected to the power outlet test socket, with the rated voltage of that socket.

The Tester measures the power used by the appliance and displays the reading in kVA. There is no test duration limit on the Power tests. Once supplied with power, the appliance will be supplied until the operation is cancelled. This will allow appliances with slow start-up speeds the time to ramp up to their working state.